ANNUAL REPORT

SMART GLOBAL HOLDINGS

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D. C. 20549

FORM 10-K

(Mark One)

☒ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the fiscal year ended August 30, 2019

or

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the transition period from to

Commission File Number 001-38102

SMART GLOBAL HOLDINGS, INC.

(Exact name of registrant as specified in its charter)

Cayman Islands **(State or other jurisdiction of** **incorporation or organization)**	**98-1013909** **(I.R.S. Employer** **Identification No.)**
c/o Maples Corporate Services Limited **P.O. Box 309** **Ugland House** **Grand Cayman, Cayman Islands** **(Address of principal executive offices)**	**KY1-1104** **(Zip Code)**

Registrant's telephone number, including area code: (510) 623-1231

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Ordinary shares, $0.03 par value per share	SGH	The NASDAQ Stock Market LLC (NASDAQ Global Select Market)

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☐ No ☒

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes ☐ No ☒

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer", "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer	☐	Accelerated filer	☒
Non-accelerated filer	☐	Smaller reporting company	☐
Emerging growth company	☐		

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes ☐ No ☒

The aggregate market value of the voting and non-voting common equity held by non-affiliates of the Registrant, based on the closing price of the shares of common stock on The NASDAQ Stock Market on March 1, 2019 (the last business day of the registrant's most recently completed second fiscal quarter), was $378.5 million. Shares of common stock held by each executive officer, director, and their affiliated holders have been excluded in that such persons may be deemed to be affiliates. This determination of affiliate status is not necessarily a conclusive determination for other purposes.

As of October 18, 2019, the registrant had 23,746,664 ordinary shares outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's Proxy Statement for the 2019 General Meeting are incorporated herein by reference in Part III of this Annual Report on Form 10-K to the extent stated herein. Such proxy statement will be filed with the Securities and Exchange Commission within 120 days of the registrant's fiscal year ended August 30, 2019.

SMART GLOBAL HOLDINGS, INC.

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CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K (“Annual Report”) contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended, which statements involve substantial risks and uncertainties. Forward-looking statements generally relate to future events or our future financial or operating performance. In some cases, you can identify forward-looking statements by the use of forward-looking words such as “anticipate,” “believe,” “could,” “expect,” “should,” “plan,” “intend,” “estimate” and “potential,” among others.

Forward-looking statements appear in a number of places in this Annual Report and include, but are not limited to, statements regarding our intent, belief or current expectations. Forward-looking statements are based on our management’s beliefs and assumptions and on information currently available to our management. Such statements are subject to risks and uncertainties, and actual results may differ materially from those expressed or implied in the forward-looking statements due to various factors, including, but not limited to, those identified under the section entitled “Item 1A. Risk Factors” in this Annual Report. These risks and uncertainties include factors relating to:

- the losses we have experienced in the past and may experience in the future;
- the unpredictable fluctuation of our operating results from quarter to quarter;
- the highly cyclical markets in which we compete have experienced severe downturns;
- declines in memory component prices and average selling prices that may cause declines in our net sales and gross profit;
- worldwide economic and political conditions in Brazil or other countries, as well as other factors may adversely affect our operations and cause fluctuations in the demand for our products;
- our dependence on growth in the memory market in Brazil, which could cease or contract;
- the dependence of our sales and profit margins in Brazil on the continuing existence of local content requirements for electronics products;
- the dependence of a significant portion of our net sales on the continuing existence of, and demand from, a limited number of key customers;
- the amount of corporate income and excise and import taxes we pay that may increase significantly if tax incentives or tax holiday arrangements in Brazil or Malaysia are discontinued or if our interpretations and assumptions with respect to such tax incentives or tax holiday arrangements are incorrect;
- other factors that may affect our financial condition, liquidity and results of operations; and
- other risk factors discussed under “Item 1A. Risk Factors.”

Forward-looking statements speak only as of the date they are made, and we do not undertake any obligation to update them in light of new information or future developments or to release publicly any revisions to these statements in order to reflect later events or circumstances or to reflect the occurrence of unanticipated events, except as otherwise required by the rules and regulations of the Securities and Exchange Commission.

ABOUT THIS ANNUAL REPORT

Unless otherwise indicated or the context otherwise requires, all references in this Annual Report on Form 10-K to “SMART Global Holdings” or the “Company,” “Registrant,” “we,” “our,” “ours,” “us” or similar terms refer to SMART Global Holdings, Inc., or SMART Global Holdings, together with its subsidiaries, and, where the context requires, our predecessor entities. We use a 52- to 53-week fiscal year ending on the last Friday in August. Unless the context indicates otherwise, whenever we refer in this Annual Report to a particular year, with respect to ourselves, we mean the fiscal year ending in that particular calendar year. Financial information for two of our subsidiaries, SMART Modular Technologies Indústria de Componentes Eletrônicos Ltda., or SMART Brazil, and SMART Modular Technologies do Brasil Indústria e Comércio de Componentes Ltda., or SMART do Brazil, is included in our consolidated financial statements on a one-month lag because their fiscal years begin August 1 and end July 31.

All references herein to the “real,” “reais” or “R$” are to the Brazilian real. All references herein to “U.S. dollars,” “dollars” or “$” are to U.S. dollars. Solely for the convenience of the reader, we have translated certain amounts in this Annual Report from reais into U.S. dollars using the exchange rate as reported by the Banco Central do Brasil as of July 31, 2019 of R$3.7649 to $1.00. These translations should not be considered representations that any such amounts have been, could have been or could be converted into U.S. dollars at that or at any other exchange rate as of that or any other date. In addition, translations should not be construed as representations that the real amounts represent or have been or could be converted into U.S. dollars as of that or any other date.

Part I.

Item 1. Business

Overview

We are a leading designer and manufacturer of electronic products focused in memory and computing technology areas. We specialize in application specific product development and support for customers in enterprise, government and original equipment manufacturer, or OEM, markets. We support our customers with our worldwide manufacturing and supply chain management capabilities. We operate in three primary product areas:

1. Specialty Memory Products
2. Brazil Products
3. Specialty Compute and Storage Solutions

In specialty memory products, we are a global leader serving the electronics industry for over 30 years. We have a leading market position worldwide as measured by revenue. We work closely with OEM customers to develop solutions which incorporate customer-specific requirements. Our products are designed-in by OEMs in the industrial, defense, networking and communications, enterprise storage and computing, and other vertical markets. We also offer customized, integrated supply chain services to enable our customers to better manage supply chain planning and execution, reduce costs and increase productivity. Our supply chain services are based on our proprietary software platform that we developed and integrated with our customers' respective procurement management systems as well as our suppliers' distribution management systems.

In Brazil we have established a leading market position, as measured by market share, where we are the largest in-country manufacturer of memory and our products are designed-in by OEM customers for desktops, notebooks and servers, as well as mobile memory for smartphones. In this market, we process imported wafers and die and we cut, package and test them to create dynamic random access memory, or DRAM, modules and other DRAM and Flash-based products. We have a strategic, long-term relationship with a global memory wafer supplier that has provided us with a stable source of competitively priced wafers for the Brazil market. The relationship also provides our supplier with access to that market through our in-country infrastructure and capabilities. We have continued to build upon our business in Brazil by adding our battery assembly capability to address the local smartphone market.

In order to diversify and grow our business, we acquired Penguin Computing, Inc., or Penguin Computing, in June 2018, and created our Specialty Compute and Storage Solutions, or SCSS, product group. As a result, we have expanded our serviceable markets into areas requiring specialized computing platforms in artificial intelligence, or AI, machine learning, or ML, advanced modeling and high performance computing, or HPC. Penguin Computing provides solutions to Tier 1 and a broad base of secondary customers in the financial services, energy, government, social media and education markets.

Additionally, in July 2019, we expanded our SCSS product line to include embedded computing products through the acquisitions of Artesyn Embedded Computing, Inc., or AEC, and Inforce Computing, Inc., or Inforce. AEC is a global leader in the design and manufacture of standard and custom products providing highly reliable embedded computing solutions for a broad range of defense, industrial, telecommunications infrastructure and network edge computing, and transportation customers for over 35 years. Inforce is a leading system-on-module, or SOM, and single board computer, or SBC, supplier targeting a wide range of IoT endpoint applications across the industrial, digital health, smart city, and smart office markets. After completion of these acquisitions, we changed the name of AEC to SMART Embedded Computing, Inc., or SMART EC, and changed the name of Inforce to SMART Wireless Computing, Inc., or SMART Wireless.

Our Products and Services

Specialty Memory Products

In our specialty memory products business, we focus on the design and manufacture of application-specific products, technical support and value-added testing services that differ from the core focus of standard memory module providers. We collaborate closely with our global OEM customers throughout their design process and across multiple projects to create solutions for demanding applications with differentiated requirements, such as specific form factors, higher density, lower power, specific firmware or greater durability and reliability compared to standard solutions. We target opportunities where we believe we can be a primary supplier of longer-lifecycle solutions to OEM customers for diverse and growing end markets within the industrial, defense, networking and communications, and enterprise storage and computing markets as well as other vertical markets. In this business, we offer an extensive portfolio of over 2,000 products available in standard and rugged formats.

We offer an extensive lineup of DRAM modules utilizing a wide range of DRAM technologies from legacy Synchronous DRAM to double data-rate, or DDR, DDR2, DDR3 and leading edge, high-performance DDR4 DRAM devices. These technologies are incorporated into enterprise memory and hybrid memory solutions in standard and rugged formats. These modules encompass a broad range of form factors and functions, including dual in-line memory modules, or DIMMs, nonvolatile DIMMs, load reducing DIMMs, registered DIMMs, unbuffered DIMMs, small outline dual in-line memory modules, and mini-DIMMs and XR-DIMMs for industrial and defense, networking and communications, enterprise storage and computing, and other vertical markets. These memory modules come in configurations of up to 288 pins and densities of up to 128 gigabytes. We support leading-edge and emerging interconnect standards such as Gen-Z and OpenCAPI with our Gen-Z Memory module (ZMM) and Differential DIMM (DDIMM). We utilize advanced printed circuit board and device packaging/stacking technologies to achieve cost-effective, high-density solutions. We also develop specialized memory module designs based on specific OEM requirements. Our products are designed to meet the quality requirements of enterprise class systems pursuant to stringent specifications required by various high-speed applications.

We also design and manufacture embedded and removable Flash memory products in a variety of form factors and capacities incorporated into storage and hybrid memory solutions in standard and rugged formats. Our wide range of Flash memory products includes Serial Advanced Technology Attachment, or SATA, and PCIe NVMe products in 2.5” enclosures, M.2 and other module form factors. We also offer Flash component products such as embedded multimedia controllers, or eMMC, and embedded and removal products in USB, CompactFlash and SD/microSD Card configurations. Our Flash capabilities include application-specific and customized firmware development.

We also offer supply chain services, including procurement, logistics, inventory management, temporary warehousing, programming, kitting and packaging services. We tailor our supply chain service offerings to meet the specific needs of our customers to enable our customers to manage supply chain planning and execution, which reduces costs and increases productivity. Our supply chain services are based on our proprietary software platform that we develop, which is then integrated with our customers’ respective procurement management systems as well as our suppliers’ distribution management systems. Our global footprint allows us to provide these services to our customers and their manufacturing partners in many regions of the world. Our global inventory management capabilities allow us to manage a vast array of customer and supplier part numbers across our worldwide manufacturing and logistics hubs, helping our customers minimize inventory levels while maintaining reliable delivery and availability of supply.

Brazil Products

In Brazil we manufacture DRAM modules for desktops, notebooks and servers, where local manufacturing requirements provide substantial financial incentives to our customers to procure locally manufactured memory modules. We have leveraged our experience and infrastructure in Brazil and now process, dice, package and test imported wafer products to create DRAM and Flash components. These capabilities have enabled us to significantly expand our product offering to add mobile memory products, primarily for smartphones. The expanded product offering includes mobile or low power DRAM, eMMC products, and embedded multi-chip package, or eMCP products for smartphones. We also have continued to build upon our success in Brazil by adding our battery assembly capabilities and we are now expanding our manufacturing to include products for the IoT market.

Specialty Compute and Storage Solutions

Through Penguin Computing we offer specialty compute and storage system solutions to customers in a broad set of verticals including financial services, energy, government, social media and education end markets. We provide a broad portfolio of hardware and software products including solutions based on the Open Compute Project, or OCP. Our products include servers, software, integrated turn-key clusters, enterprise-grade storage, and bare metal HPC, all available in hardware or cloud-based solutions via Penguin Computing® On-Demand™ (POD™). Our product offering includes our Open Compute Tundra Extreme Scale products to solve technical challenges. We also provide turn-key storage solutions that provide power and flexibility with hardware optimized for software-defined storage based upon our Frostbyte™ storage platform. Our rackmount servers and GPU accelerated computing platforms give customers powerful tools to implement their AI and ML advanced modeling and high performance computing applications. Complementing our compute, storage and networking hardware solutions is our Scyld Software line of cloud and cluster management software. These products provide advanced capabilities for management of HPC clusters from department-level systems to supercomputers. In addition, they enable customers to provide their own HPC cloud with remote access via our proprietary Cloud Workstation browser-based solution.

Our SMART EC products, which are now part of SCSS, provide advanced computing solutions and low profile embedded computing solutions. Building on its long heritage, SMART EC is a well-recognized, leading provider of advanced computing solutions and professional services. Our high-end advanced computing system solutions include application-ready platforms, SBCs, enclosures, blades, enabling software, edge servers and network accelerator cards. SMART EC's advanced computing board and system solutions include ATCA, VME, PCIe, rackmount server and failsafe products. The target markets for these products are defense, telecommunications infrastructure, industrial, network edge computing, and transportation applications.

SMART Wireless products, which are also part of SCSS, include low profile wireless computing modules such as SOMs and SBCs for wireless computing endpoint applications. We offer standard and custom solutions, along with development boards and services for all forms of connected devices targeting IoT endpoint applications such as smart city, digital health, and smart office.

Manufacturing and Test

Manufacturing

We have manufacturing facilities in Atibaia, Brazil, Newark, California and Penang, Malaysia. These manufacturing facilities have been ISO 9001:2015, ISO 14001:2015 and ISO 4500:2018 certified. We also have manufacturing and integration facilities in Fremont, California where assembly and test of our Penguin Computing products is done. Additionally, we are a member of the Responsible Business Alliance, or RBA, and our manufacturing facilities are compliant with the RBA Code of Conduct which is increasingly a business requirement of our customers.

We believe that our manufacturing operations for specialty memory products for OEM customers have benefited from our many years of design experience and our existing library of proven designs which stress high manufacturability and quality. Over 30 years of manufacturing experience enables us to quickly move from manufacturing initiation to full production volumes of new products, which is paramount in helping our customers achieve rapid time-to-market for their new product introductions. As a result of our design efficiencies, high level of automation and expertise in utilizing advanced manufacturing processes, we achieve high manufacturing yields and reduced direct labor costs and offer our customers quick turnaround of both small and large production orders, which is a key factor in enabling our build-to-order model.

While we do not own or operate wafer fabs, we have capabilities for subsequent stages of the product manufacturing cycle. Our manufacturing capabilities in Brazil consist of receiving unmounted integrated circuits, or ICs, in wafer form from third-party wafer fabs, preparing and packaging the ICs into semiconductor components, testing the components, and in some cases placing these components on substrates or printed circuit boards to make modules or multi-chip packages. Our advanced manufacturing capabilities have enabled us to become the largest local manufacturer, as measured by market share, of DRAM components and DRAM modules for the desktop, notebook and server markets in Brazil, as well as various Flash-based products, including eMCP and eMMC products for the mobile phone market. Through our investments and experience in Brazil, we have developed expertise in semiconductor technology and advanced manufacturing and test that allows us to manufacture products with shrinking geometries and increasing complexity. We have made significant capital investments to expand our manufacturing and test capabilities and operate at a high level of efficiency.

In our SCSS products, we have utilized two primary methods of fulfilling demand for products: building products to order and configuring products to order in each case using components and subassemblies that we acquire from a wide range of vendors. At Penguin Computing, we have developed capabilities for design and development of large scale systems and dense HPC clusters that have significant power requirements with manufacturing and test for our HPC products being done in Fremont, California.

Product testing is an important aspect of our manufacturing operations and we believe that we have established substantial technical expertise in the testing of products for high-end applications. Our extensive testing capabilities not only help to ensure a low defect rate, but they also enable us, in certain situations, to sell specialized testing as an additional service. We design customer specific testing processes that differ from the core focus of standard providers. We have achieved stringent quality targets across a broad spectrum of system applications and customer-specific designs. Our staff includes experienced test engineers who have developed proprietary testing routines and parameters which, combined with our advanced test equipment, enable us to diagnose problems in components as well as in system design, and enable us to characterize the performance of new products and to provide high quality products in volume.

We employ extensive software-based electrical and thermal simulations and test our designs on high-end functional testers utilizing a broad set of test suites. These tests are designed to meet the quality requirements of enterprise class systems pursuant to stringent specifications required by various high speed and high compute applications. We also conduct design verification testing of hardware and firmware as well as system integration and reliability testing. We work to continually improve our test routines and associated software and for our specialty memory products, we have developed a high-volume, fully automated reliability testing and screening capability substantially beyond standard industry practices that enables us to reduce the occurrence of early life failures and weak module fallout which can save our customers from the often significant expenses associated with replacing products that fail after their field deployment.

Customers

We believe our customers rely on us as a strategic supplier due to our application-specific products, quality and technical support, our global footprint and, in Brazil, our ability to provide locally manufactured products. We also provide customized, integrated supply chain services to certain OEM customers to assist them in the management and execution of their procurement processes. We believe our close collaboration with customers, customer-specific designs, long-lifecycle solutions and proprietary supply chain services create significant customer attachment.

We sell our products and solutions directly to a diversified base of local and global OEM, enterprise and government customers. Our specialty memory products are sold primarily to OEM customers in industrial, defense, networking and communications, enterprise storage and computing, as well as other vertical markets. In SCSS, we sell Penguin Computing products to enterprise and government customers in financial services, energy, defense, social media and education end markets and we sell SMART EC products to OEM customers in defense, telecommunications infrastructure, industrial, network edge computing and transportation markets., In SMART Wireless, we sell products to OEMs in IoT endpoint applications such as smart city, digital health, and smart office markets. In Brazil, we sell to OEM customers in computing and mobile products.

Overall, we served more than 750 end customers in fiscal 2019. In fiscal 2019, 2018 and 2017, sales to our ten largest end customers (including sales to contract manufacturers or ODMs at the direction of such end customers) accounted for 73%, 84% and 84% of net sales, respectively. Of our end customers, Samsung Electronics Co., Ltd., or Samsung, (for whom all sales are direct sales) accounted for 18%, 34% and 19% of net sales in fiscal 2019, 2018 and 2017, respectively; Cisco Systems, Inc., or Cisco, accounted for 11%, 12% and 15% of net sales in fiscal 2019, 2018 and 2017, respectively; Lenovo Group Limited, or Lenovo, accounted for 13%, 11% and 11% of net sales in fiscal 2019, 2018 and 2017, respectively; and Dell Technologies Inc., or Dell, accounted for 10% of net sales in fiscal 2018. Direct sales to Flex accounted for 17%, 13% and 14% of net sales in fiscal 2019, 2018 and 2017, respectively; and direct sales to Hon Hai accounted for 13% of net sales in fiscal 2017. During these periods, no other customers accounted for more than 10% of our net sales.

Our products are manufactured on a build-to-order basis. Our sales are made primarily pursuant to customer purchase orders and are not based on long-term supply agreements. Accordingly, we have limited backlog and we do not believe our backlog is material or indicative of anticipated net sales.

Suppliers

To address the needs of our customers, we have developed and maintained relationships with leading semiconductor suppliers located in Asia, Europe and the Americas. Our semiconductor suppliers include many of the world’s largest memory manufacturers including Samsung Semiconductor, Inc., or Samsung, Micron Technology, Inc., or Micron, SK Hynix, Inc., or SK Hynix, and Toshiba Corporation, or Toshiba. They also include some of the world’s largest providers of computing, communications and graphics processers including Intel Corporation, or Intel,, Advanced Micro Devices, Inc., or AMD, Nvidia Corporation, or Nvidia and Qualcomm Incorporated, or Qualcomm; as well as providers of subsystems including Intel and Giga-Byte Technology Co., Ltd., or Giga-Byte; networking products including Artista Networks, Inc., or Artista, and Mellanox Technologies, Ltd., or Mellanox; and suppliers of software products including Red Hat, Inc., or Red Hat. We frequently work jointly with our suppliers in bidding for customers’ design-in opportunities. We also work closely with our suppliers to better ensure that materials are available and delivered on time. Our established global network of materials sourcing helps to ensure that our pricing remains competitive and that we are able to provide a stable source of supply for our customers.

We believe that our longstanding relationships with leading suppliers put us in a favorable position to procure sufficient quantities of materials, including during periods of industry shortages. Our flexible and responsive global manufacturing capabilities, inventory management systems and global IT system allow us to cost-effectively move materials from one site to another and often deploy what might otherwise be excess inventory among other products and customers. We purchase almost all of our materials, including wafers used in our memory products in Brazil, from our suppliers on a purchase order basis and generally do not have long-term commitments from suppliers.

Sales, Support and Marketing

We primarily sell our products directly to global OEMs, enterprise, government and other end customers located across North America, Latin America, Asia and Europe. Our sales and marketing efforts are conducted through an integrated process incorporating our direct sales force, customer service representatives and our on-site field application engineers, or FAEs, with a network of independent sales representatives, distributors, integrators and resellers. Our sales and marketing efforts also include a high level of involvement from our senior executives. Larger customers are also often supported by dedicated sales and support teams. As of August 30, 2019, we had 134 sales and marketing personnel worldwide.

Our on-site FAEs work closely with our sales team to provide product design support to our customers. Our FAEs collaborate closely with our customers, providing us with insight into their business models and product roadmaps and allowing us to identify opportunities at an early stage to help grow our business. The combination of our integrated sales network with our FAEs enables us to be more responsive and successful in navigating through each customer's unique and oftentimes complex design qualification or bid proposal processes.

Our marketing activities include advertising in technical journals, publishing articles in leading industry periodicals, social media, periodic webinars, publishing white papers and utilizing direct email solicitation. In addition to these marketing activities, we also participate in many industry trade shows worldwide. We have active memberships in industry organizations such as the Joint Electron Device Engineering Council, or JEDEC, the USB Implementers Forum, the SD Card Association, the Storage Networking Industry Association, the CompactFlash Association, Gen-Z Consortium, OpenCAPI Consortium, CXL Consortium, Trusted Computing Group, or TCG, the OCP, Sensor Open Systems Architecture, or SOSA, and Peripheral Component Interconnect Special Interest Group, or PCI-SIG.

Research and Development

The timely development of new products is essential to maintaining our competitive position. Our research and development activities are conducted primarily at our research and development centers in Newark, Fremont and Irvine, California; Bangalore and Kochin, India; Atibaia, Brazil; Penang, Malaysia; Tempe and Gilbert, Arizona; Seongnam-City, South Korea; New Taipei City, Taiwan; and Tewksbury, Massachusetts. Our research and development activities are focused on driving innovation in our products as well as continuous process improvement for our procurement, test and manufacturing. Our product development in specialty memory and Brazil includes innovations for next generation DRAM products, mobile DRAM, hybrid memories such as hybrid volatile and non-volatile DRAM or NVDIMM, enterprise memory, many Flash-based products, such as eMMC and eMCP, and new battery assembly technologies. Our research and product development for Penguin Computing includes server selection and design, designs to enable integration of racks and clusters, storage system design and evaluation, high performance network design, component testing for switches, cables and interface devices, and development of software defined storage systems. Our product development for SMART EC and SMART Wireless includes embedded computer boards and systems. We plan to continue to devote research and development efforts to the innovation and design of these and other new products which address the requirements of our customers, with a focus on the faster growing markets.

We continue to develop a broad offering of Flash-based products targeting the industrial, defense, communications, and enterprise storage and compute markets. In order to enhance our efforts to develop innovative Flash products, we continue to increase our engineering resources significantly, including in our research and development center in New Taipei City, where our engineering team is dedicated to firmware development, systems engineering and integration, system and platform validation and applications, and product and reliability engineering for new Flash memory products. In addition, in order to take advantage of local regulations and government incentive programs for the growing mobile memory market in Brazil, we have invested substantial financial and management resources to expand our Brazilian research and development capabilities to enable us to develop a broad offering of Flash-based products for the local market. We are also working on expanding our offering for IoT and IIoT products and, through our acquisition of SMART Wireless, we now have over 40 design engineers combined in our two locations in India.

Our advanced engineering and design capabilities allow us to address our customers' increasingly complex needs. We design our products to be compatible with existing industry standards and, where appropriate, develop and promote new standards or provide custom solutions to meet customers' requirements. An important aspect of our research and development effort is understanding the challenges presented by our customers' requirements and addressing them by utilizing our industry knowledge, proprietary technologies and technical expertise. By working closely with our customers and suppliers, we are able to deliver technically advanced products designed to meet customer-specific needs with competitive solutions to satisfy our customers' memory, storage and compute requirements, shorten their time-to-market and enhance the performance of our customers' end products and applications.

We spent $47.9 million, $39.8 million and $38.2 million on research and development in fiscal 2019, 2018 and 2017, respectively. As of August 30, 2019, we had 282 research and development personnel worldwide.

Competition

In our specialty memory products and our Brazil products, we primarily compete against global and local memory module providers, and to a lesser extent, large semiconductor memory IC manufacturers that utilize a portion of their capacity to manufacture memory modules. In our Penguin Computing products we primarily compete with global manufacturers of HPC products and services. In SMART EC products, we primarily compete with makers of ruggedized computer boards and systems as well as makers of edge computing devices. In SMART Wireless products, we primarily compete with providers of SOMs and SBCs. The principal competitive factors in our markets include the ability to meet customer-specific requirements and provide high product quality, strong technical support, technologically advanced products and services, advanced testing capabilities, flexible and global delivery options, reliable supply and reasonable pricing. Our principal competitors include:

- Providers of specialty memory products, including Viking Technology (a division of Sanmina Corporation), or Viking Technology, ATP Electronics, Inc., or ATP, Unigen Corporation, or Unigen, Apacer Technology, Inc., or Apacer, Swissbit AG, or Swissbit, Innodisk Corporation, or Innodisk, Virtium LLC, or Virtium, and Transcend Information, Inc., or Transcend;
- In Brazil, local manufacturers of DRAM modules and Flash products and local manufacturers of memory ICs, including HT Micron Semicondutores Ltda., or HT Micron, Adata Integration S/A, or Adata, Multilaser Indústria de Equipamentos de Informática Eletrônicos e Ópticos Ltda., or Multilaser, Cal-Comp Indústria de Semicondutores S/A, or Cal-Comp;
- Semiconductor memory IC manufacturers that also manufacture DRAM modules and Flash products, including Samsung, Micron, Western Digital Corporation, or Western Digital, SK Hynix, and Toshiba;
- In our supply chain services business, a broad set of companies, including distributors and third party logistics providers as well as our customers' in-house solutions;
- Providers of compute and storage systems, including HPE, Dell, Cray Computer Corporation, or Cray (recently announced to be acquired by HPE);
- Providers of embedded computing platforms and systems including ADLink, Advantech, Kontron, Curtis Wright, and Mercury Systems; and
- Providers of system-on-modules and single board computers including Intrynsic, Thundercomm, and Toradex.

Some of our global competitors are large international companies that have substantially greater financial, technical, marketing, distribution and other resources, as well as greater name recognition and longer-standing relationships with customers and suppliers than we do. In contrast with our focus on specialty or niche products with high levels of service and support, these competitors are generally focused on higher-volume memory, storage or compute products that are manufactured to industry standard specifications, and they have limited customization and service capabilities. We believe that our close collaboration with customers, customer-specific designs, long-lifecycle solutions and proprietary supply chain services create significant customer attachment that may provide an advantage when competing with the large international companies.

In addition, some of our competitors are also our suppliers or customers. See "Item A. Risk Factors—Risks Relating to Our Business—Sales to a limited number of customers represents a significant portion of our net sales, and the loss of any key customer or key program, or the demands of our key customers, could materially harm our business, results of operations and financial condition" and "—Our dependence on a small number of sole or limited source suppliers subjects us to certain risks, including the risk that we may be unable to obtain adequate supplies at a reasonable price and in a timely manner."

In Brazil, other than the large, global semiconductor manufacturers, our competitors are generally much smaller in scale than we are in terms of revenue and capabilities for manufacturing and for research and development. To a lesser degree, we compete with companies that import DRAM and Flash components and products as well as battery products.

Intellectual Property

We rely on a combination of trade secrets, know-how, trademarks, copyright and, to a lesser extent, patents to protect our intellectual property rights. As of October 18, 2019, we have 155 issued patents, including 115 patents issued in the United States, 36 patents issued in China, one patent issued in Brazil and 3 patents issued in South Korea, expiring between 2019 and 2037, excluding any additional patent term for patent term adjustments. In addition, we have 40 patent applications pending, including 19 patent applications in the United States, 7 patent applications in China, 7 patent applications in Brazil, 6 patent applications in Malaysia, and 1 patent application in Argentina.

We also own a number of trademark registrations, including registrations in the United States for the word marks MHUB, SMART MODULAR TECHNOLOGIES and PENGUIN COMPUTING, and trademarks for our stylized "S" logo in combination with the word SMART and in combination with the words SMART MODULAR TECHNOLOGIES; a trademark in the US and Canada for the graphic logo containing the words PENGUIN COMPUTING; in Brazil, registrations for our stylized "S" logo in combination with the words SMART Modular Technologies; and in Canada, a registration for the word mark PENGUIN COMPUTING. With the acquisition of AEC, we acquired the following registered trademarks: CENTELLIS in the U.S., China, Canada, Mexico, Brazil, India, Germany, Norway, Russia, EU, Hong Kong, Japan, Korea, Taiwan, Australia; MAXCORE in Mexico, Germany, EU, India, Japan, Taiwan, Australia (and pending in U.S., Canada, Brazil, Norway, Russia, China, Hong Kong, Korea); CONTROLSAFE (and logo) in Japan, Norway, Korea, U.S. (and pending in Canada and China); FORCE in Norway, UK, WIPO, Austria, Benelux, Switzerland, Germany, EU, Spain, France, Italy, Montenegro, Serbia, Yugoslavia; SRSSTACKWARE in U.S., China; RAPIDEX in Germany; COMSTRUCT in UK; SPIDERWARE in China.

While many of our products contain proprietary aspects, the majority of our products are built to meet industry standards, such as those set by JEDEC, the standards-setting organization for the semiconductor industry. The absence of patent protection for most of our products means that we cannot prevent our competitors from reverse-engineering and duplicating those products. Much of our intellectual property is know-how and trade secrets, and often we rely on the technological skills and innovation of our personnel rather than on patent protection. We believe that our continued success depends largely on our customer relationships, manufacturing and support capabilities and the technical expertise we have developed in manufacturing and designing products, and we rely on trade secret laws and non-disclosure agreements to protect this aspect of our business.

Employees

As of August 30, 2019, we had 1,712 full-time employees.

Our employee relations in Brazil are subject to Brazilian labor laws and regulations as well as collective bargaining arrangements that are negotiated every year. Five of these collective bargaining agreements are specific to our company while there are other collective bargaining agreements that are generally applicable to certain segments of the electronics industry. The applicable labor laws and regulations, as well as the collective bargaining agreements, principally relate to matters such as general working conditions, working time compensation, paid vacation and sick days and other mandatory benefits, length of the workday and payments for overtime, profit sharing and severance. Although a very small number of our employees in Brazil are members of a labor union, all employees in Brazil are represented by the unions for labor and employment matters.

We have never experienced a work stoppage in any of our locations worldwide, and we consider our employee relations to be good.

Brazil Local Manufacturing Requirements

The Brazilian government has a long history of utilizing local manufacturing requirements to promote job creation, sustain economic growth and increase the competitiveness of various domestic industries. These regulations have also helped enable the expansion of the Brazilian middle class. These requirements have been important in the development of numerous industries in Brazil, including automotive, oil and gas, aerospace and healthcare. Beginning in 1991, local manufacturing regulation was introduced to vitalize Brazil's IT industry as government programs began to be implemented to incentivize manufacturers to establish and expand their operations in Brazil and to incentivize OEMs to apply and utilize locally manufactured components for their products.

We have participated in three government investment incentive programs.

- *Lei da Informática—Processo Produtivo Básico, 1991, extended through 2029,* or PPB/IT Program: Provides for significant relief from various tax provisions for companies that develop or produce computing and automation goods and invest in IT-related research and development in Brazil. The PPB/IT Program requirements for local manufacturing are published publicly on a periodic basis. OEMs that are PPB/IT Program-compliant and who fulfill the regulatory requirements receive substantial benefits including a reduction in excise taxes on their purchases from qualified suppliers as well as a reduction in the taxes that they are required to charge on sales to their end customers. These tax benefits are a strong incentive for OEMs to purchase products from local manufacturers such as our Brazilian subsidiaries. The PPB/IT Program requirements for locally sourced memory components from calendar years 2008 through June 30, 2019 were enacted through several ordinances portions of which are set forth below.
- *Lei do Bem, 2005*: Fosters technology innovation in Brazil by providing a reduction in corporate income tax through the allowance of deductions for expenses related to research and development activities.
- *PADIS, 2007*: Awards incentives and significant tax relief, including reductions in the Brazilian aggregate statutory income tax rates, to semiconductor and display companies that invest in research and development and that promote the development, design, test and packaging processes in Brazil. Furthermore, combining PADIS with PPB/IT Program-compliance can provide additional financial incentives to OEMs that apply or utilize memory components that are locally processed from wafers.

PPB/IT Program Requirements for PC and Server Memory[(1)]	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Notebook DRAM IC Packaging	0%	30%	30%	40%	50%	60%	80%	80%	80%	70%	80%	80%
Desktop DRAM IC Packaging	10%	10%	10%	10%	10%	30%	50%	60%	80%	80%	80%	80%
Server DRAM IC Packaging	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%

PPB/IT Program Requirements for Mobile Memory[(1)]	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Notebook SSD IC Package	0%	0%	0%	35%	40%	30%	40%	40%	35%	50%	50%	50%
SSD Module Flash IC Package	0%	0%	0%	0%	0%	40%	60%	80%	30%	40%	60%	60%
Mobile/Smartphones microSD Cards	0%	0%	0%	0%	5%	5%	10%	20%	40%	50%	50%	50%
All Other Memory Types[(2)]	0%	0%	0%	0%	0%	0%	5%	20%	30%	30%	50%	60%

PPB/IT Program Requirements for TV	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
TV IC Package	0%	0%	0%	0%	0%	0%	0%	0%	30%	40%	40%	40%

(1) Revoked effective July 2019.
(2) Includes mobile DRAM, eMMC and eMCP.

Source Brazilian Ministry of Science, Technology and Innovation, Interministerial Ordinances 287/2014, 85/2014, 239/2016, 179/2016, 141/2015, 263/2014, 14/2016, 21/2017, 52/2017, 20/2018 and 44/2018.

As the leading local manufacturer, as measured by market share, of desktop, notebook and server DRAM modules and DRAM components as well as DRAM and Flash mobile memory products in Brazil, we have benefited from these requirements and incentives.

In 2013, the European Union, or EU, later joined by Japan, requested the establishment of a panel within the World Trade Organization, or WTO, to determine whether the structure of certain programs enacted by the Brazilian government concerning incentives and local content requirements for the automotive and several other industries (including the IT industry and including portions of Lei do Bem that do not relate to our business, as well as PADIS and the PPB/IT Program), were inconsistent with WTO rules. On August 30, 2017 the WTO panel released a report and on December 13, 2018, after hearing appeals, the appellate body of the WTO released its decision in which it upheld some of the panel's findings that certain of the incentives available to us in Brazil are contrary to certain of the principles of the WTO agreements while also rejecting some of the complaints by the EU and Japan. The WTO's decision does not impact the benefits that we receive under Lei do Bem. The appellate body also noted that it would not contravene the principles of the WTO agreements for Brazil to establish local manufacturing processes as a condition to benefit from incentives granted by the government provided that certain conditions are met.

In response to the WTO report, government authorities in Brazil revoked several ordinances that established local content requirements under the PPB/IT Program, many of which were related to our local business. The revocation became effective June 30, 2019. Government officials in Brazil have continued to express their intent to restructure the incentives to be consistent with the WTO principles while still continuing to support local industry.

In June 2019, the authorities in Brazil published the first of a series of new ordinances, effective as of July 1, 2019, that provide a structure for revised support for local manufacturing utilizing a score-based point system for eligibility for incentives. In this system, each manufacturing process within an electronic device is assigned a different number of points. Our manufacturing processes related to memory products are a valuable part of the electronics manufacturing chain and, as such, are expected to provide our customers the opportunity to accomplish a significant number of the overall points required if they purchase products manufactured by us in Brazil.

While we believe that this score-based system will continue to incentivize our Brazilian customers to purchase products from us in Brazil, there can be no assurance that the replacement programs will ultimately be structured and implemented in a way that will provide the same or a similar level of support and benefit for our customers and our business as was previously in place. There can also be no assurance that the WTO, the EU and Japan will agree that this new program structure is compliant with the WTO agreements. Any adverse change in legislation or in the impact and effectiveness of the local incentives programs, or our failure to meet the requirements of any of the regulations, could significantly reduce the demand for, the profit margins on, and the competitiveness of our products in Brazil, and would have a material adverse effect on our business, results of operations and financial condition. See "Item A. Risk Factors—Risks Relating to Our Business—Risks Related to our International Operations— Our success in Brazil depends in part on Brazilian laws establishing incentives for local manufacturing of electronics products. The elimination of or a reduction in the incentives for local manufacturing, or our inability to secure the benefits of these regulations, could significantly reduce the demand for, and the profit margins on, our products in Brazil."

Environmental Regulations

Our operations and properties are subject to a variety of environmental laws and regulations of the United States and other jurisdictions governing, among other things, air emissions, wastewater discharges, management and disposal of hazardous and non-hazardous materials and wastes, reverse logistics (take-back policy) and remediation of releases of hazardous materials. The presence of lead in quantities not believed to be significant have been found in the ground under one of the multi-tenant buildings we lease in Brazil. While we did not cause the contamination, we may be held responsible if remediation is required, although we may be entitled to seek indemnification from responsible parties under Brazilian law and from our lessor under our lease. We cannot be certain that identification of presently unidentified environmental conditions, more vigorous enforcement by regulatory agencies, enactment of more stringent laws and regulations or other unanticipated events will not arise in the future and cause additional material liabilities which could have a material adverse effect on our business, financial condition and results of operations.

Corporate Information

Our address in the Cayman Islands is c/o Maples Corporate Services Limited, P.O. Box 309, Ugland House, Grand Cayman, KY1-1104, Cayman Islands. Our U.S. principal executive offices are located at 39870 Eureka Drive, Newark, California 94560. Our telephone number at this address is (510) 623-1231. Our principal website is http://www.smartm.com. The information contained on, or that can be accessed through, our website is not a part of this Annual Report.

SMART Global Holdings, SMART Modular Technologies, SMART, the SMART logo, Penguin Computing, the Penguin Computing logo, and our other trademarks or service marks appearing in this Annual Report are our property. Trade names, trademarks and service marks of other companies appearing in this Annual Report are the property of the respective holders.

Available Information

We make available, free of charge through our website, our annual reports on Form 10-K, quarterly reports on Form 10-Q and current reports on Form 8-K, and amendments to those reports, filed or furnished pursuant to Sections 13(a) or Section 15(d) of the Securities Exchange Act of 1934, as amended, as soon as reasonably practicable after they have been electronically filed with, or furnished to, the Securities Exchange Commission, or SEC.

The public may read and copy any materials we file with the SEC at the SEC's Public Reference Room at 100 F. Street, NE, Washington, DC 20549. The public may obtain information on the operation of the Public Reference Room by calling the SEC at 1-800-SEC-0330. The SEC maintains an internet site (http://www.sec.gov) that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC.

Item 1A. Risk Factors

You should carefully consider the risks and uncertainties described below and the other information in this Annual Report on Form 10-K, including "Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations" and our financial statements and related notes. Our business, financial condition or results of operations could be materially and adversely affected if any of these risks occurs and, as a result, the market price of our ordinary shares could decline and you could lose all or part of your investment.

This Annual Report also contains forward-looking statements that involve risks and uncertainties. See "Cautionary Note Regarding Forward-Looking Statements" for additional information. Our actual results could differ materially and adversely from those anticipated in these forward-looking statements as a result of certain factors, including the risks facing our company described below and elsewhere in this Annual Report.

Risks Relating to Our Business

Our operating results have fluctuated in the past and may fluctuate from quarter to quarter in the future, which makes them difficult to predict.

Our quarterly operating results have fluctuated in the past and may fluctuate in the future. As a result, our past quarterly operating results are not necessarily indicative of future performance. Furthermore, we may not be able to maintain the margins we have achieved in recent periods. Our operating results in any given quarter can be influenced by numerous factors, many of which we are unable to predict or are outside of our control, including:

- the cyclical nature of the markets in which we compete;
- changes in memory component prices or the average selling prices of our products, including fluctuations in the market price of DRAM and Flash memory components;
- lack of growth or contraction or increased competition in the memory market in Brazil or other markets;
- adverse changes to the local content regulations in Brazil;
- corruption or adverse political situations in Brazil or other markets;
- increased trade restrictions or trade wars;
- the loss of, significant reduction in sales to, or demand from, one or more key customers;
- industry consolidation, which may further reduce the number of our potential customers and/or suppliers;
- fluctuations in the markets served by our OEM, enterprise and government customers;
- difficulty matching our purchasing and production to customer demand, which is difficult to forecast accurately;
- cancellations, modifications or delays in customer orders, product returns and inventory value or obsolescence risk;
- competitive developments, including the introduction of new competitive products;
- our failure to develop new or enhanced products and introduce them in a timely manner;
- reductions in government spending; and
- the other factors described in this "Item 1A. Risk Factors" section and elsewhere in this report.

Due to the various factors mentioned above and other factors, the results of any prior quarterly or annual period should not be relied upon as an indication of our future operating performance. In one or more future periods, our results of operations may fall below the expectations of securities analysts and investors. In that event, the market price of our ordinary shares would likely decline. In addition, the market price of our ordinary shares may fluctuate or decline regardless of our operating performance.

We have experienced losses in the past and may experience losses in the future.

Our business has experienced quarterly and annual operating losses during the periods presented in the financial statements included in this Annual Report. For example, in fiscal 2017, we had a net loss of $7.8 million. Our ability to maintain profitability depends in part on revenue growth from, among other things, increased demand for our memory solutions, products and related service offerings in our current markets including Brazil, growth in our SCSS business unit including the newly acquired companies SMART EC and SMART Wireless, as well as our ability to expand into new markets. We may not be successful in achieving the revenue and revenue growth necessary to maintain profitability. Moreover, as we continue to expend substantial funds for research and development projects, enhancements to sales and marketing efforts, integration of acquisitions and to otherwise operate our business, we cannot assure you that we will maintain profitability on an annual or quarterly basis even if our revenue does grow.

The markets in which we compete historically have been highly cyclical and have experienced severe downturns that have materially adversely affected, and may in the future materially adversely affect, our business, results of operations and financial condition.

Historically, the markets in which we compete have been highly cyclical and have experienced significant downturns often connected with, or in anticipation of, maturing product cycles of both component suppliers and electronic equipment manufacturers, and/or declines in general economic conditions. These downturns have been characterized by diminished product demand, production overcapacity, high inventory levels and accelerated erosion of selling prices and inventory values. Our industry depends on the continued growth of the electronics industry and on end-user demand for our customers' products. Economic downturns often have had an adverse effect upon manufacturers and end-users of electronics products. The timing of new product developments, the lifecycle of existing electronics products and the level of acceptance and growth of new products can also affect demand for our products. Downturns in the markets we serve could have a significant negative impact on the demand for our products. Additionally, due to changing conditions, our customers have experienced and may in the future experience periods of excess inventory that could have a significant adverse impact on our sales. During an industry downturn, there is also a higher risk that some of our trade receivables become delinquent or even uncollectible and that our inventory would decrease in value. We cannot predict the timing or the severity of the cycles within our industry. In particular, it is difficult to predict how long and to what levels any industry upturn or downturn, or general economic strength or weakness, will last or develop.

Our OEM customers primarily serve end users in the industrial, networking and communications, storage and computing, mobile products, defense, financial services, energy, social media, education, network edge computing, transportation, and IoT endpoint applications markets. Sales of our products are dependent upon demand in these markets. From time to time, each of these markets has experienced cyclical downturns, often in connection with, or in anticipation of, declines in general economic conditions, and we may experience substantial period-to-period fluctuations in our operating results due to factors affecting these markets. Changes in end-user demand for our customers' products and services could have a material adverse effect on demand for our products and services, particularly if the customer has accumulated excess inventories of products purchased from us or from competitors selling similar products. Reduced demand for our products could have a material adverse effect on our business, results of operations and financial condition.

Declines in memory component prices and our average selling prices may result in declines in our net sales and gross profit and could have a material adverse effect on our business, results of operations and financial condition.

The markets for our specialty memory and Brazil products have historically been characterized by declines in average selling prices. Our average selling prices may decline due to several factors, including general declines in demand for our products and excess supply of DRAM and Flash memory components as a result of overcapacity. In the past, transitions to smaller design geometries and other factors causing overcapacity in memory markets have led to significant increases in the worldwide supply of memory components. If not accompanied by increases in demand, supply increases usually result in significant declines in component prices and, in turn, declines in the average selling prices and profit margins of our products. During periods of overcapacity, our net sales may decline if we fail to increase sales volume of existing products or to introduce and sell new products in quantities sufficient to offset declines in selling prices. Our efforts to increase sales or to introduce new products to offset the impact of declines in average selling prices may not be successful. Furthermore, our competitors and customers also impose significant pricing pressures on us. These declines in average selling prices have in the past had, and may again in the future have, a material adverse effect on our business, results of operations and financial condition. Declines in prices also could affect the valuation of our inventory, which could result in inventory write-downs. Declines in average selling prices also might enable OEMs to pre-install higher density memory modules into new systems at existing price points, thereby reducing the demand for future memory upgrades. In addition, our net sales and gross profit may be negatively affected by shifts in our product mix during periods of declining average selling prices.

Worldwide economic and political conditions as well as other factors may adversely affect our operations and cause fluctuations in demand for our products.

Uncertainty in global economic and political conditions poses a risk to the overall economy, as consumers and businesses have made it difficult for customers, suppliers and us to accurately forecast and plan future business activities. Declines in the worldwide semiconductor market, economic conditions or consumer confidence would likely decrease the overall demand for our products. Other factors that could cause demand for our products to fluctuate include:

- a downturn in the computing, networking, communications, storage, aerospace, defense, mobile or industrial markets;
- changes in consumer confidence caused by changes in market conditions, including changes in the credit markets, expectations for employment and inflation and energy prices;
- corruption or adverse political situations in Brazil or other markets;
- increased trade restrictions or trade wars;
- changes in the level of customers’ components inventory;
- competitive pressures, including pricing pressures, from companies that have competing products, architectures, manufacturing technologies and marketing programs;
- changes in technology or customer product needs;
- strategic actions taken by our competitors; and
- market acceptance of our products.

If demand for our products decreases, our manufacturing or assembly and test capacity could be underutilized, and we may be required to record an impairment on our long-lived assets, including facilities and equipment, as well as intangible assets, which would increase our expenses. In addition, if product demand decreases or we fail to forecast demand accurately, we could be required to write-off inventory or record underutilization charges, which would have a negative impact on our profitability. If product demand increases more or faster than anticipated, we may not be able to add manufacturing or assembly and test capacity fast enough to meet market demand. These changes in demand for our products, and changes in our customers’ product needs, could have a variety of negative effects on our competitive position and our financial results, and, in certain cases, may reduce our net sales, increase our costs, lower our profit margins or require us to recognize impairments of our assets. The occurrence of any of the foregoing could have a material adverse effect on our business, results of operations and financial condition.

Changes in U.S. trade policies, including the imposition of tariffs and a potential resulting trade war, could have a material adverse impact on our business.

We source materials from and sell products in foreign countries, including China, making the price and availability of our merchandise susceptible to international trade risks and other international conditions. In addition, many of our customers rely heavily on international trade. The imposition of tariffs, duties, border adjustment taxes or other trade restrictions by the United States could also result in the adoption of new or increased tariffs or other trade restrictions by other countries. The tariffs may in the future increase our cost of materials and may cause us to increase prices to our customers which we believe may reduce demand for our products. Our price increases may not be sufficient to fully offset the impact of the tariffs and result in lowering our margin on products sold. In addition, the current U.S. administration has indicated that it may withdraw the U.S. from the North American Free Trade

Agreement ("NAFTA") in order to encourage the U.S. Congress to vote on the ratification of the United States-Mexico-Canada Agreement ("USMCA") which was signed in 2018 and which is intended to be the successor to NAFTA. If the U.S. government increases or implements additional tariffs, withdraws from NAFTA, the ratification and implementation of the USMCA is not completed promptly and effectively, or if additional tariffs or trade restrictions are implemented by the U.S. or other countries, the resulting trade barriers could have a significant adverse impact on our suppliers, our customers and on our business. We are not able to predict future trade policy of the U.S. or of any foreign countries in which we operate or purchase goods, or the terms of any renegotiated trade agreements, or their impact on our business. The adoption and expansion of trade restrictions and tariffs, quotas and embargoes, the occurrence of a "trade war," or other governmental action related to tariffs or trade agreements or policies, has the potential to adversely impact demand for our products, our costs, our customers, our suppliers and the world and U.S. economies, which in turn could have a material adverse effect on our business, operational results, financial position and cash flows.

Sales to a limited number of customers represent a significant portion of our net sales, and the loss of any key customer or key program, or the demands of our key customers, could materially harm our business, results of operations and financial condition.

Our principal end customers include global OEMs that compete in the computing, networking, communications, storage, aerospace, defense, mobile and industrial markets. In fiscal 2019, 2018 and 2017, sales to our ten largest end customers (including sales to contract manufacturers or ODMs at the direction of such end customers) accounted for 73%, 84% and 84% of net sales, respectively. Of our end customers, Samsung (for whom all sales are direct sales) accounted for 18%, 34% and 19% of net sales in fiscal 2019, 2018 and 2017, respectively; Cisco accounted for 11%, 12% and 15% of net sales in fiscal 2019, 2018 and 2017, respectively; Lenovo accounted for 13%, 11% and 11% of net sales in fiscal 2019, 2018 and 2017, respectively; and Dell accounted for 10% of net sales in fiscal 2018. Direct sales to Flex accounted for 17%, 13% and 14% of net sales in fiscal 2019, 2018 and 2017, respectively; and direct sales to Hon Hai accounted for 13% of net sales in fiscal 2017. While Samsung is a significant customer of ours, purchasing eMCPs from us in their smartphone division and DRAM modules from us in their PC division, Samsung's semiconductor division is also a major supplier and a competitor. See "Risk Factors—Risks Relating to Our Business—Our dependence on a small number of sole or limited source suppliers subjects us to certain risks, including the risk that we may be unable to obtain adequate supplies at a reasonable price and in a timely manner" and "—The memory market is intensely competitive, and we may not be able to maintain or improve our competitive position."

We expect that sales to relatively few customers will continue to account for a significant percentage of our net sales for the foreseeable future. However, we can provide no assurance that any of these customers or any of our other customers will continue to utilize our products or our services at current levels, or at all. Although we have master agreements with one or more key customers, these agreements govern the terms and conditions of the relationship and do not contain requirements for them to purchase minimum volumes.

Our customer concentration may also subject us to perceived or actual bargaining leverage that our key customers may have, given their relative size and importance to us. Since a large percentage of our sales is to a small number of customers that are primarily large OEMs, these customers are able to exert, have exerted and we expect will continue to exert, pressure on us to make concessions on price and on terms and conditions which can adversely affect our business, results of operations and financial condition. If our key customers seek to negotiate their agreements on terms less favorable to us and we accept such unfavorable terms, such unfavorable terms may have a material adverse effect on our business, results of operations and financial condition. Accordingly, unless and until we diversify and expand our customer base, our future success will significantly depend upon the timing and volume of business from our largest customers and the financial and operational success of these customers. If we were to lose one of our key customers or have a key customer cancel a key program or otherwise significantly reduce its volume of business with us, our sales and profitability would be materially reduced and our business and financial condition would be seriously harmed.

The markets that we serve are intensely competitive, and we may not be able to maintain or improve our competitive position.

The markets that we serve are characterized by intense competition. Our competitors include many large domestic and international companies that have substantially greater financial, technical, marketing, distribution and other resources, greater name recognition, broader product lines, lower cost structures and longer-standing relationships with customers and suppliers than we do. As a result, our competitors may be able to respond better to new or emerging technologies or standards and to changes in customer requirements. Further, some of our competitors are in a better financial and marketing position from which to influence industry acceptance of a particular product standard or competing technology than we are. Our competitors may also be able to devote greater resources to the development, promotion and sale of products, and may be able to deliver competitive products at a lower price than we can.

Our primary competitors in the specialty memory market include Viking Technology, ATP, Unigen, Apacer, Swissbit, Innodisk, Virtium and Transcend. In Brazil, we compete against local manufacturers of DRAM modules and local manufacturers of memory ICs, including HT Micron, Adata, Cal Comp and Multilaser.

We compete globally against semiconductor memory IC manufacturers that also manufacture DRAM ICs and modules and Flash products, including Samsung, Micron, Western Digital, SK Hynix and Toshiba. While these companies generally focus on higher volume commodity products, they sometimes compete with some of our specialty memory products. In addition to competing with certain portions of our product offering, Samsung is also a major supplier and a significant customer. See "Risk Factors—Risks Relating to Our Business—Sales to a limited number of customers represents a significant portion of our net sales, and the loss of any key customer or key program, or the demands of our key customers, could materially harm our business, results of operations and financial condition" and "—Our dependence on a small number of sole or limited source suppliers subjects us to certain risks, including the risk that we may be unable to obtain adequate supplies at a reasonable price and in a timely manner."

In our supply chain services business, we compete in a fragmented market with a broad set of companies, including distributors and third party logistics providers as well as our customers' in-house solutions.

Through imports of DRAM components and modules and Flash products, we face some of the same competitors in Brazil as we do elsewhere. We also face competition from local manufacturers of DRAM modules and Flash products, and expect to face more competition in the future from local semiconductor packaging companies, such as Adata Integration Brazil S/A, which began production of its new packaging plant in Brazil in the first half of calendar year 2017. We believe that import duties and local content requirements in Brazil give us an advantage over companies that import DRAM modules or Flash products or import memory components; however, that competitive advantage may become less significant in the event that competitors build manufacturing facilities in Brazil or local content regulations change or are eliminated. As the local market grows, competition may increase in Brazil.

In our Penguin Computing business, we compete with HPE, Dell, Cray (recently announced to be acquired by HPE), and other smaller companies manufacturing computing components and products. We also compete with the direct to customer efforts from several of our large partners including Intel Corporation, or Intel, Quanta Services, Inc., or Quanta, Synnex Corporation, or Synnex, and Super Micro Computer, Inc., or Super Micro.

In our SMART EC products we compete with providers of embedded computing platforms and systems including ADLink, Advantech, Kontron, Curtis Wright, and Mercury Systems. In our SMART Wireless products we compete with providers of SOMs and SBCs including Intrynsic, Thundercomm, and Toradex.

We face competition from existing competitors and expect to face new companies that may enter our existing or future markets with similar or alternative products, which may be less costly or provide additional features. We also face competition from current and prospective customers that evaluate our capabilities against the merits of manufacturing products internally. Competition may also arise due to the development of cooperative relationships among our current and potential competitors and/or suppliers or third parties to increase the ability of their products to address the needs of our prospective customers. Accordingly, it is possible that new competitors or alliances among competitors and/or suppliers may emerge and acquire significant market share.

We expect that our competitors will continue to improve the performance of their current products, reduce their prices and introduce new products that may offer greater performance and improved pricing, any of which could cause a decline in sales or market acceptance of our products. In addition, our competitors may develop enhancements to, or future generations of, competitive products that may render our technology or products obsolete or uncompetitive. To remain competitive, we must continue to provide technologically advanced products and manufacturing services, maintain high quality, offer flexible delivery schedules, deliver finished products on a reliable basis, reduce manufacturing and testing costs, and compete favorably on the basis of price. Competitive pressure has led in the past and may continue to lead to intensified price competition resulting in lower net sales and profit margins which could negatively impact our financial performance. Our efforts to maintain and improve our competitive position, or our failure to do so, could have a material adverse effect on our business, results of operations and financial condition.

Industry consolidation and company failures may reduce the number of our potential customers, increase our reliance on our existing key customers and negatively impact the competitiveness of our supplier base.

Many of our customer and supplier markets are characterized by a limited number of large companies. Some participants in the industries in which we serve have merged and/or been acquired, and this trend may continue. In addition, there have been company failures among both our customer and supplier base. Industry consolidation and company failures could decrease the number of potential significant customers for our products and services. Consolidation and company failures in some of our customers' industries may also result in the loss of customers. The decrease in the number of potential significant customers will increase our reliance on key customers and, due to the increased size of these companies, may negatively impact our bargaining position and thus our profit margins. Furthermore, the loss of, or a relatively reduced relationship with, key customers due to industry consolidation and company failures could negatively impact our business, results of operations and financial condition. Additionally, consolidation and company failures in our supplier base could reduce our purchasing alternatives and reduce the competition for our business resulting in higher cost of goods and less availability of components which would have a negative impact on our business, results of operations and financial condition.

Customer demand is difficult to forecast accurately and, as a result, we may be unable to optimally match purchasing and production to customer demand, which may have a material adverse effect on our business, results of operations and financial condition.

In most cases we do not obtain long-term purchase orders or commitments from our customers but instead we work with our customers to develop non-binding estimates or forecasts of future requirements. Utilizing these non-binding estimates or forecasts, we make significant decisions based on our estimates of customer requirements including determining the levels of business that we will seek and accept, production scheduling, component purchasing and procurement commitments, inventory levels, personnel and production facility needs and other resource requirements. A variety of conditions, both specific to each individual customer and generally affecting each customer's industry, may cause customers to cancel, reduce or delay orders that were either previously made or anticipated, and often with little or no notice to us. Generally, customers may cancel, reduce or delay purchase orders and commitments without penalty. The short-term and flexible nature of commitments by many of our customers, and the possibility of unexpected changes in demand for their products, reduces our ability to accurately estimate future customer requirements. On occasion, customers may require rapid increases in production, which can challenge our resources and can reduce profit margins. We may not have sufficient capacity at any given time to meet our customers' demands. Downturns in the markets in which our customers compete can, and have, caused our customers to significantly reduce the amount of products ordered from us or to cancel or delay existing orders leading to lower utilization of our facilities. This in turn can cause us to have more inventory than we need and can result in inventory write-downs or write-offs. Additionally, as many of our costs and operating expenses are relatively fixed, reduction in customer demand would have an adverse effect on our operating income, results of operations and financial condition.

We may experience inventory write-downs or write-offs.

To the extent we manufacture products or make purchases in anticipation of future demand that does not materialize, or in the event a customer cancels or reduces outstanding orders, we could experience an unanticipated increase in our inventory. We have had in the past and expect we could again have in the future, inventory write-downs and/or write-offs due to obsolescence, excess quantities and declines in market value below our costs. In particular, if product obsolescence causes product demand to decrease or we fail to forecast demand accurately, we could be required to write-off inventory or record under-utilization charges, which would have a negative impact on our profit margins and our profitability. Any one or more of these occurrences could have a negative impact on our results of operations and financial condition. Our inventory write-downs were $9.0 million, $5.2 million and $2.8 million for fiscal 2019, 2018 and 2017, respectively.

In connection with delivering our supply chain services, we make significant inventory purchases based on customer forecasts and/or customer purchase orders. In most instances, forecasts are non-binding and purchase orders can be rescheduled at the customer's option, often times without penalty. When actual consumption does not meet the customer's forecast or the customer's purchase orders, it will result in unanticipated and sometimes significant increases in our inventory. Additionally, some of our logistics transactions contemplate extended periods of inventory management. These programs generally obligate customers to eventually purchase certain aged logistics inventory with minimal right to price reductions, and typically provide for periodic carrying charges. We can provide no assurance, however, that the customers will comply with these obligations. If a customer of our supply chain services has significant delays in delivery of inventory, this could have a negative impact on our profitability. If a customer of our supply chain services fails to consume the inventory that we purchase for it, this could result in significant inventory write-downs or write-offs. Any one or more of these occurrences could have a significant negative impact on our cash flows, business, results of operations and financial condition. At the end of each of the last four fiscal quarters, logistics inventory (including inventory specifically requested by customers) ranged between 22% and 27% of our total inventory.

New product development requires significant investment. Our failure to develop new or enhanced products and introduce them in a timely manner would undermine our competitiveness.

The markets that we serve are subject to rapid technological change, product obsolescence, frequent new product introductions and feature enhancements, changes in end-user requirements and evolving industry standards. Our ability to successfully compete and to continue to grow our business depends in significant part upon our ability to develop, introduce and sell new and enhanced products on a timely and cost-effective basis, and to anticipate and respond to changing customer requirements. We have experienced, and may experience in the future, delays and unanticipated expenses in the development and introduction of new products. A failure to develop products with required feature sets or performance standards, or a delay as short as a number of weeks in bringing a new product to market could significantly reduce our return on investment as well as our net sales, all of which would have a material adverse effect on our business, results of operations and financial condition.

Delays in the development, introduction and qualification of new products could provide a competitor a first-to-market advantage and allow a competitor to achieve greater market share. These delays could also result in customers having the right to cancel orders without penalty. Defects or errors found in our products after sampling or commencement of commercial shipments could result in delays in market acceptance of our products. Lack of market acceptance for our new products for any reason would jeopardize our ability to recoup substantial research and development expenditures, hurt our reputation and have a material adverse effect on our business, results of operations and financial condition. Accordingly, we can provide no assurance that our future product development efforts will be successful or result in products that gain market acceptance.

We have invested in the past and expect in the future to invest in new technologies and emerging markets. If these new technologies and emerging markets fail to gain acceptance or to grow, it would have a material adverse effect on our business, results of operations and financial condition. We have made and expect to continue to make significant investments in various products. There is significant competition in the markets for these markets and we can provide no assurance that we will develop and introduce products in a timely manner or that our new products will gain market acceptance, be price competitive or result in any significant increase in our net sales. If these investments fail to provide the expected returns, then such failure would have a material adverse effect on our business, results of operations and financial condition.

Our OEM customers require that our products undergo a lengthy and expensive process of evaluation and qualification without any assurance of net sales.

Our products are often incorporated into our OEM customers' systems at the design stage. As a result, we rely on OEMs to select our product designs, which we refer to as design wins, and then to qualify our products for production buys. We often incur significant expenditures in the development of a new product without any assurance that any OEM will select our product for design into its system. Additionally, in some instances, we are dependent on third parties to obtain or provide information that we need to achieve a design win. These third parties may not supply this information to us on a timely basis, if at all. Furthermore, even if an OEM designs one of our products into its system, we cannot be assured that they will qualify or use our product in production, that the OEM's product will be commercially successful or that we will receive significant orders as a result of that design win or qualification. Generally, our OEM customers are not obligated to purchase our products even if we get a design win. If we are unable to achieve design wins or if our OEM customers' systems incorporating our products are not commercially successful, it could have a material adverse effect on our business, results of operations and financial condition.

In addition, because the qualification process is both product-specific and platform-specific, our existing customers sometimes require us to requalify our products, or to qualify our new products, for use in new platforms or applications. For example, as our OEM customers transition from third generation double date-rate, or DDR3, DRAM architectures, or fourth generation DDR, or DDR4, DRAM architectures, we must design and qualify new products for use by those customers. In the past, the process of design and qualification has taken several months to complete, during which time our net sales to those customers declined significantly. After our products are qualified, it can take several months before the customer begins production and we begin to generate net sales from such customer.

Likewise, when our suppliers discontinue production of components, it may be necessary for us to design and qualify new products for our customers. Such customers may require of us or we may decide to purchase an estimated quantity of discontinued memory components necessary to ensure a steady supply of existing products until products with new components can be qualified. Purchases of this nature may affect our liquidity. Additionally, our estimation of quantities required during the transition may be incorrect, which could adversely impact our results of operations through lost revenue opportunities or charges related to excess and obsolete inventory.

We must devote substantial resources, including design, engineering, sales, marketing and management efforts, to qualify our products with prospective customers in anticipation of sales. Significant delays in the qualification process could result in an inability to keep up with rapid technological change or new, competitive technologies. If we delay or do not succeed in qualifying a product with an existing or prospective customer, we will not be able to sell that product to that customer, which may result in us losing potential revenue and holding excess or obsolete inventory, any of which may have a material adverse effect on our business, results of operations and financial condition.

If our OEM customers decide to utilize a standardized memory solution instead of our specialty memory products, our net sales and market share may decline.

Many of our specialty memory products are specifically designed for our OEM customers' systems. In an effort to reduce costs and assure supply of their memory module requirements, a number of our OEM customers design commodity JEDEC-standard DRAM modules into their products. Although we also manufacture JEDEC-standard modules, an increase in such efforts by our customers could reduce the demand for our higher priced specialized or customized memory solutions, which in turn would have a negative impact on our business, results of operations and financial condition. In addition, when customers utilizing custom memory solutions choose to adopt a JEDEC-standard instead of a custom module, new competitors producing standardized memory modules may take a portion of our customers' business previously purchased from us.

Our dependence on a small number of sole or limited source suppliers subjects us to certain risks, including the risk that we may be unable to obtain adequate supplies at reasonable prices and in a timely manner.

We are dependent upon a small number of sole or limited source suppliers for certain materials, including certain critical components, we use in manufacturing our products. We purchase almost all of our materials from our suppliers on a purchase order basis and generally do not have long-term commitments from suppliers. Our suppliers are not required to supply us with any minimum quantities and there is no assurance that our suppliers will supply the quantities of components we may need to meet our production goals. In our specialty memory products, our major suppliers include Samsung, Micron and SK Hynix. These suppliers also compete with us in the memory market. For example, while Samsung, Micron and SK Hynix all sell DRAM modules to us, and Samsung and Micron supply us with DRAM ICs, Flash ICs and finished products, they also compete with us by selling DRAM ICs and modules and Flash ICs and finished products to many of our customers, usually focusing on higher volume commodity products. Samsung is also a significant customer, as Samsung's smartphone division purchases eMCPs from us, and its PC division purchases DRAM modules from us.

In Brazil, we purchase the wafers used in our memory products exclusively from a single global memory wafer supplier. The target volume and pricing of wafers are established annually, and our purchases are generally made monthly on a purchase order basis and are not cancelable. In the event that our wafer supply relationship or our purchase orders are terminated, or if our supplier's production of silicon wafers is reduced or disrupted, we may be unable to obtain sufficient quantities of high-quality wafers at reasonable prices, and in a timely manner, to fulfill our Brazilian customers' requirements. In addition, there can be no assurance that we will reach agreement with our wafer supplier on the pricing and quantities of wafers that they will supply and we will purchase.

The markets in which we operate have experienced, and may experience in the future, shortages in components, including DRAM and Flash ICs, which are essential components of our memory products. These shortages cause some suppliers to place their customers, including us, on component allocation. As a result, we may not be able to obtain the components that we need to fill customer orders. If any of our suppliers experience quality control or intellectual property infringement problems, we may not be able to fill customer orders. Furthermore, our products that utilize that supplier's components may be disqualified by one or more of our customers and we may not be able to fill their orders.

The inability to fill customer orders due to shortages or long lead-times from suppliers could cause delays, customer cancellations, disruptions or reductions in product shipments or require costly product redesigns and/or re-qualifications which could, in turn, damage relationships with current or prospective customers, increase costs and have a material adverse effect on our business, results of operations and financial condition.

A disruption in or termination of our supply relationship with any of our significant suppliers or our inability to develop relationships with new suppliers, if required, would cause delays, disruptions or reductions in product manufacturing and shipments or require product redesigns which could damage relationships with our customers, increase our costs or the prices we need to charge for our products and could materially and adversely affect our business, results of operations and financial condition.

Unless we maintain manufacturing efficiency, we may not remain profitable and our future profitability could be materially adversely affected.

The memory industry is characterized by constant and rapid technological changes and product obsolescence. For example, new manufacturing process technologies using smaller feature sizes and offering better performance characteristics are generally introduced every one to two years. The introduction of new manufacturing process technologies allows us to increase the functionality of our products while at the same time optimizing performance parameters, decreasing power consumption and/or increasing storage capacity. In order to remain competitive, it is essential that we secure the capabilities to develop and qualify new manufacturing process technologies. If we are delayed in transitioning to new technologies, our business, results of operations and financial condition could be materially adversely affected.

If the lifecycle of a product is shortened as a result of the introduction of a new technology, we may be forced to transition our manufacturing capabilities to a new configuration more quickly than originally planned. This can result in increased capital and other expenditures. This can also cause decreases in demand for the older technology products and our manufacturing or assembly and test capacity to be under-utilized. As a result, we may be required to record an impairment on our long-lived assets, including facilities and equipment, as well as intangible assets, which would increase our expenses. When new technologies are introduced, the capacity to manufacture the new products often cannot meet the demand and product shortages can arise. If our suppliers cannot support such demand, we may not be able to fill customer orders or participate in new markets as they emerge.

Our manufacturing efficiency can significantly affect our results of operations, and we cannot be sure that we will be able to maintain or increase our manufacturing efficiency to the same extent as our competitors. We continuously modify our manufacturing processes in an effort to improve yields and product performance and decrease costs. During periods when we are implementing new process technologies, manufacturing facilities may not be fully productive and may experience higher than acceptable defect rates. We may fail to achieve acceptable yields or may experience product delivery delays as a result of, among other things, capacity constraints, delays in the development of new process technologies, increased defect rates, changes in our process technologies, upgrades or expansion of existing facilities, impurities or other difficulties in the manufacturing process. Any of these occurrences could adversely impact our relationships with customers, cause harm to our reputation in the marketplace, cause customers to move future business to our competitors or cause us to make financial concessions to our customers. Improving our manufacturing efficiency in future periods is dependent on our ability to:

- develop advanced process technologies and advanced products that utilize those technologies;
- successfully transition to more advanced process technologies;
- continue to reduce test times;
- ramp product and process technology improvements rapidly and effectively to commercial volumes across our facilities;
- achieve acceptable levels of manufacturing output and yields, which may decrease as we implement more advanced technologies; and
- maintain our quality controls and rely upon the quality and process controls of our suppliers.

Disruption of our operations at our manufacturing facilities would substantially harm our business.

A disruption at one of our manufacturing facilities could adversely impact our manufacturing operations and consequently our customer relations and our business. Such a disruption could result from, among other things, sustained process abnormalities, government intervention, waste disposal issues, power failures or other circumstances, or from ramp-up related challenges, such as obtaining sufficient raw materials, hiring of qualified factory personnel, installation and efficient operation of new equipment and management and coordination of our logistics networks within our global operations. We maintain insurance to protect against certain claims associated with business interruption, however, our insurance may not cover all or any part of a particular loss. Since a large percentage of our production is done in a small number of facilities, a disruption to operations, or a loss that is in excess of, or excluded from, our insurance coverage could adversely impact our business, results of operations and financial condition.

We are subject to a number of procurement laws and regulations. Our business and our reputation could be adversely affected if we fail to comply with these laws.

With respect to a portion of our business, we must comply with and are affected by laws and regulations relating to the award, administration and performance of government contracts in the U.S. and other countries. Government contract laws and regulations affect how we do business with our customers and impose certain risks and costs on our business. A violation of specific laws and regulations, by us, our employees, others working on our behalf, a supplier or a venture partner, could harm our reputation and result in the imposition of fines and penalties, the termination of our contracts, suspension or debarment from bidding on or being awarded contracts, loss of our ability to export products or services and civil or criminal investigations or proceedings. In some instances a government agency may terminate any of our government contracts and subcontracts either at its convenience or for default based on our performance. A termination arising out of our default may expose us to liability including for excess costs incurred by the customer in procuring undelivered services and solutions from another source and such termination may have a material adverse effect on our ability to compete for future contracts and orders. In addition, on those contracts for which we are teamed with others and are not the prime contractor, the government could terminate a prime contract under which we are a subcontractor, notwithstanding the quality of our services as a subcontractor. In the case of termination for default, the government could make claims to reduce the contract value or recover its procurement costs and could assess other special penalties. Government agencies routinely audit and investigate government contractors. These agencies review a contractor’s performance under its contracts, its cost structure, its business systems and compliance with applicable laws, regulations and standards. Certain government agencies have the ability to decrease or withhold certain payments when it deems systems subject to its review to be inadequate. Additionally, any costs found to be misclassified may be subject to repayment. If an audit or investigation uncovers improper or illegal activities, we may be subject to civil or criminal penalties and administrative sanctions, including reductions of the value of contracts, contract modifications or terminations, forfeiture of profits, suspension of payments, penalties, fines and suspension, or prohibition from doing business with the government. In addition, we could suffer serious reputational harm if allegations of impropriety were made against us. Similar government oversight exists in most other countries where we conduct business.

The U.S. government may terminate, cancel, modify or curtail our contracts at any time and, if we do not replace them, we may be unable to achieve or sustain revenue growth and may suffer a decline in revenues and profitability.

Certain of the U.S. government programs in which we participate as a contractor or subcontractor may extend for several years and include one or more base years and one or more option years. Under some contracts, the government generally has the right not to exercise options to extend or expand our contracts and may otherwise terminate, cancel, modify or curtail our contracts at its convenience. Any decision by a government agency not to exercise contract options or to terminate, cancel, modify or curtail any major programs or contracts would adversely affect our revenues, revenue growth and profitability. We may experience and continue to experience periodic performance issues under certain of our contracts. Depending on the nature and value of the contract, a performance issue or termination for default could cause our actual results to differ from those anticipated and could harm our reputation and our operating results and financial condition.

If our products are defective or are used in defective systems, we may be subject to warranty, product recalls or product liability claims.

If our products are defectively manufactured, contain defective components or are used in defective or malfunctioning systems, we could be subject to warranty and product liability claims and product recalls, safety alerts or advisory notices. While we have product liability insurance coverage, it may not be adequate to satisfy claims made against us. We also may be unable to obtain insurance in the future at satisfactory rates or in adequate amounts. Warranty and product liability claims or product recalls, regardless of their ultimate outcome, could have an adverse effect on our business, financial condition and reputation, and on our ability to attract and retain customers. In addition, we may determine that it is in our best interest to accept product returns in circumstances where we are not contractually obligated to do so to maintain good relations with our customers. Accepting product returns may adversely impact our results of operations and financial condition.

Cyber attacks or other data security incidents that disrupt our operations or result in the breach or other compromise of proprietary or confidential information about our company, our workforce, our customers, or other third parties could disrupt our business, harm our reputation, cause us to lose customers, and expose us to costly regulatory enforcement and litigation.

We may manage, store, transmit and otherwise process various proprietary information and sensitive personal or confidential data. In addition, our cloud computing businesses routinely process, store and transmit data, including sensitive and personally identifiable information, for our customers. We may experience breaches or other compromises of the information technology systems we use for these purposes, as criminal or other actors may be able to penetrate our network security and misappropriate or compromise our information or that of third parties, create system disruptions or cause shutdowns. There are numerous and evolving risks to cybersecurity and privacy, including criminal hackers, hacktivists, state-sponsored intrusions, industrial espionage, employee malfeasance, and human or technological error. Computer hackers and others routinely attempt to breach the security of technology products, services and systems, and to fraudulently induce employees, customers, and other third parties to disclose information or unwittingly provide access to systems or data. The risk of such attacks includes attempted breaches not only of our own products, services and systems, but also those of customers, contractors, business partners, vendors and other third parties. Our products, services and systems may be used in critical company, customer, government or other third-party operations, or involve the storage, processing and transmission of sensitive data, including valuable intellectual property, classified information, other proprietary or confidential data, regulated data, and personal information of employees, customers and others. Successful breaches, employee malfeasance, or human or technological error could result in, for example, unauthorized access to, disclosure, modification, misuse, loss, or destruction of company, customer, government or other third party data or systems; theft of sensitive, regulated, classified or confidential data including personal information and intellectual property; the loss of access to critical data or systems through ransomware, destructive attacks or other means; and business delays, service or system disruptions or denials of service. Further, hardware and operating system software and applications that we produce or procure from third parties may contain defects in design or manufacture, including "bugs" and other problems that could unexpectedly interfere with the operation of such systems.

The costs to address product defects or any of the foregoing security problems and security vulnerabilities before or after a cyber incident could be significant. Remediation efforts may not be successful and could result in interruptions, delays, or cessation of service, and loss of existing or potential customers that may impede our sales, manufacturing, distribution, or other critical functions. We could lose existing or potential customers for outsourcing services or other information technology solutions in connection with any actual or perceived security vulnerabilities in our products. In addition, breaches of our security measures and the unapproved dissemination of proprietary information or sensitive or confidential data about us or our customers or other third parties could expose us, our customers, or other third parties affected to a risk of loss or misuse of this information, result in regulatory enforcement, litigation and potential liability, damage our brand and reputation, or otherwise harm our business. Further, we rely in certain limited capacities on third-party data management providers and other vendors whose possible security problems and security vulnerabilities may have similar detrimental effects on us.

We are subject to laws, rules, and regulations in the United States and other countries relating to the collection, use, transmission, processing and security of user and other data. Our ability to execute transactions and to possess, process, transmit and use personal information and data in conducting our business subjects us to legislative and regulatory burdens that, among other things, may require us to notify regulators and customers, employees, or other individuals of a data security breach, including in the EU and the European Economic Area where the General Data Protection Regulation, or GDPR, took effect in May 2018. We have incurred, and will continue to incur, significant expenses to comply with mandatory privacy and security standards and protocols imposed by law, regulation, industry standards, or contractual obligations, but despite such expenditures may face regulatory and other legal actions in the event of a data breach or perceived or actual non-compliance with such requirements. The GDPR imposes significant obligations and compliance with these obligations depends in part on how particular regulators apply and interpret them. If we fail to comply with the GDPR, or if regulators assert we have failed to comply with the GDPR, it may lead to regulatory enforcement actions, which can result in monetary penalties of up to 4% of worldwide revenue, private lawsuits, or reputational damage.

Open source development and licensing practices may limit the value of our SCSS software assets. If open source programmers do not continue to develop and enhance open source technologies, we may be unable to develop new technologies, adequately enhance our existing technologies or meet customer requirements for innovation, quality and price.

Many of our SCSS offerings, including Linux-based products, are built primarily from software components licensed under various open source licenses. While some components are developed by our employees, we obtain many components from software developed and released by contributors to independent open source software development projects. Open source licenses grant licensees broad permissions to use, copy, modify and redistribute the software. Certain open source licenses, such as the GNU General Public License, impose significant limits on our ability to license derivative works under more restrictive terms and generally require us to disclose the source code of such works. The inclusion of software components governed by such licenses in our offerings may limit our ability to use traditional proprietary software licensing models for those offerings. As a result, while we may have substantial copyright interests in our software technologies, open source development and licensing practices may have the effect of limiting the value of our software copyright assets. If open source programmers fail to adequately further develop and enhance open source technologies, we would have to rely on other parties to develop and enhance our offerings or we would need to develop and enhance our offerings with our own resources. We cannot predict whether further developments and enhancements to these technologies would be available from reliable alternative sources. Moreover, if third-party software programmers fail to adequately further develop and enhance open source technologies, the development and adoption of these technologies could be stifled and our offerings could become less competitive. Delays in developing, completing or delivering new or enhanced offerings could result in delayed or reduced revenue for those offerings and could also adversely affect customer acceptance of those offerings.

Because of the characteristics of open source software, there are few technology barriers to entry into the open source market by new competitors and it may be relatively easy for competitors, some of which may have greater resources than we have, to enter our markets and compete with us.

One of the characteristics of open source software is that anyone may modify and redistribute the existing open source software and use it to compete with us. Such competition can develop without the degree of overhead and lead time required by traditional proprietary software companies. It is possible for competitors with greater resources than ours to develop their own open source solutions or acquire a smaller business that has developed open source offerings that compete with our offerings, potentially reducing the demand for, and putting price pressure on, our offerings. In addition, some competitors make their open source software available for free download and use on an ad hoc basis or may position their open source software as a loss leader. We cannot guarantee that we will be able to compete successfully against current and future competitors or that competitive pressure and/or the availability of open source software will not result in price reductions, reduced operating margins and loss of market share. Additionally, any failure by us to provide high-quality technical support, or the perception that we do not provide high-quality technical support, could harm our reputation and negatively impact our ability to sell subscriptions for our open source offerings to existing and prospective customers. If we are unable to differentiate our open source offerings from those of our competitors or compete effectively with other open source offerings, our business, financial condition, operation results and cash flows could be adversely affected.

In our SCSS business, we regularly contribute software source code under open source licenses and have made other technology we developed available under other open licenses, and we include open source software in our products. For example, we have contributed certain technology related to our products to the Open Compute Project Foundation, a non-profit entity that shares and develops such information with the technology community, under the Open Web Foundation License. As a result of our open source contributions and the use of open source in our products, we may license or be required to license or disclose code and/or innovations that turn out to be material to our business and may also be exposed to increased litigation risk. As a result of making certain of our technology available to third parties, the value of our brands and other intangible assets may be diminished and competitors may be able to more effectively mimic our products, services, and methods of operations which could have an adverse effect on our business and financial results. Likewise, if the protection of our proprietary rights is inadequate to prevent unauthorized use or appropriation by third parties, the value of our brands and other intangible assets may be diminished and competitors may be able to more effectively mimic our products, services, and methods of operations. Any of these events could have an adverse effect on our business and financial results.

We could be prevented from selling or developing our software if the GNU General Public License and similar licenses under which our technologies are developed and licensed are not enforceable or are modified so as to become incompatible with other open source licenses.

A number of our SCSS offerings have been developed and licensed under the GNU General Public License and similar open source licenses. These licenses state that any program licensed under them may be liberally copied, modified and distributed. It is possible that a court would hold these licenses to be unenforceable or that someone could assert a claim for proprietary rights in a program developed and distributed under them. Additionally, if any of the open source components of our offerings may not be liberally copied, modified or distributed, then our ability to distribute or develop all or a portion of our offerings could be adversely impacted. In addition, licensors of open source software employed in our offerings may, from time to time, modify the terms of their license agreements in such a manner that those license terms may become incompatible with other open source licenses in our offerings or our end user license agreement, and thus could, among other consequences, prevent us from distributing the software code subject to the modified license.

Our indemnification obligations to our customers and suppliers for product defects, intellectual property infringement and other matters could require us to pay substantial damages.

A number of our product sales and product purchase agreements provide that we will defend, indemnify and hold harmless our customers and suppliers from damages and costs which may arise from various matters including, without limitation, product warranty claims or claims for injury or damage resulting from defects in, or usage of, our products or the products of our suppliers. In addition, we currently have in effect a number of agreements in which we agree to defend, indemnify and hold harmless our customers and suppliers from damages and costs which may arise from the infringement or alleged infringement by our products of third-party patents, trademarks or other intellectual property rights. We periodically have to respond to claims and may have to litigate indemnification obligations in the future.

Indemnification obligations could require us to expend significant amounts of money to defend claims and/or to pay damages or settlement amounts. We maintain insurance to protect against certain claims associated with the use of our products; however, our insurance may not cover all or any part of a claim asserted against us. Our insurance does not cover intellectual property infringement in most instances. A claim brought against us that is in excess of, or excluded from, our insurance coverage could adversely impact our business, results of operations and financial condition.

Certain of our products are used in transportation safety devices and a product failure could result in significant losses.

Certain of our products are used in transportation safety devices in the rail industry. These products are certified by independent auditors to safety integrity level, or SIL, 4 standards and are subsequently integrated into larger systems designed by our OEM customers and then go through rigorous testing and additional certification processes. In the event that our products fail to perform as expected, accidents and significant losses could occur. While our contracts for the sale of these products typically contain disclaimers, there can be no assurance that we would be insulated from liability in the event of an accident. Additionally, in the event of an accident, even if our product is ultimately determined not to be at fault, the costs of an investigation could be substantial.

We may need to raise additional funds, which may not be available on acceptable terms or at all.

We may need to raise additional funds, which we may seek to obtain through, among other things, public or private equity offerings and debt financings. Our future capital requirements will depend on many factors, including, without limitation, our levels of net sales, our levels of inventory, the timing and extent of expenditures to support research and development activities, the expansion of manufacturing and test capacity and the continued market acceptance of our products. Additional funds may not be available on terms acceptable to us, or at all. If we issue equity or convertible debt securities to raise additional funds, our existing shareholders may experience dilution and the new equity or debt securities may have rights, preferences, and privileges senior to those of our then existing shareholders. If we incur additional debt, it may increase our leverage relative to our earnings or to our equity capitalization, as well as impose financial and operating covenants that could restrict the operations of our business. In addition, our existing indebtedness may limit our ability to obtain additional financing in the future, as discussed in greater detail below under "—Risks Relating to our Debt—Our indebtedness could impair our financial condition and harm our ability to operate our business."

In fiscal 2019, 2018 and 2017, we spent $33.4 million, $25.7 million and $18.7 million, respectively, on capital expenditures, which we used, among other things, to expand manufacturing and test capacity as well as research and development. We plan to continue to make capital expenditures in the future. If our expected returns on these investments are not achieved, it could adversely impact our business, results of operations and financial condition.

In fiscal 2019, we spent $76.1 million to acquire SMART EC, SMART Wireless and Premiere Logistics and in fiscal 2018, we spent $45.1 million to acquire Penguin Computing. We plan to continue exploring additional acquisition opportunities in the future. If our expected returns on these transactions are not achieved, it could adversely impact our business, results of operations and financial condition.

If adequate capital is not available when needed, we may be required to modify our business model and operations to reduce spending. This could cause us to be unable to execute our business plan, take advantage of future opportunities or respond to competitive pressures or customer requirements. It may also cause us to delay, scale back or eliminate some or all of our research and development programs, or to reduce or cease operations, which could adversely impact our business, results of operations and financial condition.

We have in the past and may in the future make acquisitions of companies and/or technologies which involve numerous risks. If we are not successful in integrating the technologies, operations and personnel of acquired businesses or fail to realize the anticipated benefits of an acquisition, our business, results of operations and financial condition may be adversely affected.

As part of our business and growth strategy, we have in the past and may in the future acquire or make significant investments in businesses, products or technologies, such as our acquisitions of Penguin Computing, SMART EC and SMART Wireless, in an effort to complement our existing product offering, expand our market coverage, increase our engineering workforce or enhance our technological capabilities. Any acquisitions or investments would expose us to the risks commonly encountered in acquisitions of businesses or technologies. Such risks include, among others:

- problems integrating the purchased operations, technologies, products or personnel;
- unanticipated costs or expenses associated with an acquisition or investment, including write-offs of tangible assets as well as goodwill or other intangible assets;
- negative effects on profitability resulting from an acquisition or investment;
- adverse effects on existing business relationships with suppliers and customers;
- risks associated with entering markets in which we have little or no prior experience and markets with complex government regulations;
- loss of key employees of the acquired business; and
- litigation arising from an acquired company's operations.

Problems encountered in connection with an acquisition could divert the attention of management, utilize scarce corporate resources and otherwise harm our business. If we make any future acquisitions, we could issue ordinary shares that would dilute our existing shareholders' percentage ownership, incur substantial additional debt, expend cash and reduce our cash reserves or assume additional liabilities. Furthermore, acquisitions may require material charges and could result in adverse tax consequences, substantial depreciation, deferred compensation charges, liabilities under earn-out provisions, the amortization of amounts related to deferred compensation and identifiable purchased intangible assets or impairment of goodwill or other intangibles, any of which could negatively impact our business, results of operations and financial condition. We are unable to predict whether or when any prospective acquisition candidate will become available or the likelihood that any acquisition will be completed. We may expend significant resources and management time pursuing an acquisition that we are unable to consummate. Even if we do find suitable acquisition opportunities, we may not be able to consummate the acquisitions on commercially acceptable terms or at all, or may not realize the anticipated benefits of any acquisitions we do undertake. Our investments in private companies are subject to risk of loss of investment capital. These investments are inherently risky because the markets for the technologies or products they may have under development are typically in the early stages and may never materialize. We could lose our entire investment in these companies.

In connection with the sale of our storage business, we agreed to indemnify SanDisk against specified losses.

In August 2013, we completed the sale of substantially all of the business unit which was focused on solid state drives, which we referred to as the Storage Business, to SanDisk (now a part of Western Digital) for approximately $304 million in cash, subject to certain escrows and holdbacks. The sale agreement for the Storage Business, or the Sale Agreement, contained certain indemnification obligations that are typical for transactions of this nature, including, among others, for losses arising from breaches of our representations and warranties relating to the sale, as well as for taxes arising with respect to pre-closing tax periods. These indemnification obligations are subject to a number of limitations, including certain deductibles and caps and limited time periods for making indemnification claims. On August 21, 2014, SanDisk made a claim against us under the indemnification provisions of the Sale Agreement in connection with a lawsuit filed by Netlist, Inc., or Netlist, against SanDisk alleging that certain products of the Storage Business that we sold to SanDisk, infringe various Netlist patents, which SanDisk in turn alleges would, if true, constitute a breach of representations and warranties under the Sale Agreement. Under the Sale Agreement, our indemnification obligation in respect of intellectual property matters, including those claimed by SanDisk, is subject to a deductible of approximately $1.8 million and a cap of $60.9 million. The SanDisk claim included what purported to be an estimate of SanDisk's alleged indemnifiable losses that is greater than the cap in the Sale Agreement for intellectual property matters.

We believe that the allegations giving rise to the indemnification claim are without merit and we intend to dispute SanDisk's claim for indemnification. In addition, there may be other grounds for us to dispute the indemnification claim and/or the amounts of any indemnifiable losses of SanDisk. While we believe that the infringement claims are without merit, we can provide no assurance that SanDisk will be successful in defending the infringement claims or that we will otherwise be successful in disputing the indemnification claim and/or the amount of indemnifiable losses. In addition to the infringement claim described above, we continue to have an obligation to indemnify SanDisk for certain specified matters, including tax obligations for pre-closing tax periods, some of which indemnification obligations are capped at certain amounts and survive for periods of time set forth in the Sale Agreement. An indemnity claim brought against us by SanDisk, including the claim described above, could have a material adverse effect on our business, results of operations and financial condition.

Our future success is dependent on our ability to retain key personnel, including our executive officers, and to attract qualified personnel. If we lose the services of these individuals or are unable to attract new talent, our business may be adversely affected.

Our future operating results depend in significant part upon the continued contributions of our key senior management and technical personnel, many of whom would be difficult to replace. We are particularly dependent on the continued service of Ajay Shah, our Chairman, President and Chief Executive Officer, and Jack Pacheco, our Executive Vice President, Chief Operating Officer and Chief Financial Officer. Our future operating results also depend in significant part upon our ability to attract, train and retain qualified management, including for manufacturing and quality assurance, engineering, design, finance, marketing, sales and support personnel. We are continually recruiting such personnel in various parts of the world. However, competition for such personnel can be strong and we can provide no assurance that we will be successful in attracting or retaining such personnel now or in the future. In addition, particularly in the high-technology industry, the value of stock options, restricted stock units (RSUs), grants or other share-based compensation is an important element in the retention of employees. Declines in the value of our ordinary shares could adversely affect our ability to retain employees and we may have to take additional steps to make the equity component of our compensation packages more attractive to attract and retain employees. These steps could result in dilution to shareholders.

In Brazil in particular, there is limited availability of labor with the technical skills required for our operations. As a result, we rely heavily on our ability to train personnel or relocate individuals from outside of the country. Relocation from a foreign country is expensive. To keep pace with our anticipated growth in Brazil, we anticipate the need to increase the number of our technical personnel. Additionally, to meet the obligations associated with certain tax incentives, we are required to invest in research and development activities which could require an increase in engineering and other technical personnel. To the extent that competitors enter or expand in the local market, our labor force could be targeted, which could result in the loss of personnel and/or the increase in wages to retain personnel.

The loss of any key employee, the failure of any key employee to adequately perform in his or her current position, our inability to attract, train and retain skilled employees as needed or the inability of our key employees to expand, train and manage our employee base as needed, could have a material adverse effect on our business, results of operations and financial condition.

We rely, in part, on third-party sales representatives to assist in selling our products, and the failure of these representatives to perform as expected could reduce our future sales.

Sales of our products to some of our OEM customers are accomplished, in part, through the efforts of third-party sales representatives. We are unable to predict the extent to which these third-party sales representatives will be successful in marketing and selling our products. Moreover, many of these third-party sales representatives also market and sell competing products and may more aggressively pursue sales of our competitors' products. Our third-party sales representatives may terminate their relationships with us at any time on short or no notice. Our future performance may also depend, in part, on our ability to attract and retain additional third-party sales representatives that will be able to market and support our products effectively, especially in markets in which we have not previously sold our products. If we cannot retain our current third-party sales representatives or recruit additional or replacement third-party sales representatives or if these sales representatives are not effective, it could have a material adverse effect on our business, results of operations and financial condition.

If we are unable to protect our intellectual property, our operating results may be adversely affected.

Our success is dependent, in part, upon protecting our intellectual property rights. We rely on a combination of trade secrets, know-how, trademarks, copyright and, to a lesser extent, patents. We do not own or apply for patents in respect of the majority of our products. The absence of patent protection for most of our products means that we cannot prevent our competitors from reverse-engineering and duplicating our products.

We believe that our continued success depends largely on the technical expertise we have developed in manufacturing and designing products, and we rely on confidential proprietary information, including trade secrets and know-how to develop and maintain our competitive position. Any disclosure to or misappropriation by third parties of our confidential proprietary information could enable competitors to quickly duplicate or surpass our technological achievements, thus eroding our competitive position in our market. We seek to protect our confidential proprietary information, in part, by confidentiality and non-disclosure agreements and invention assignment agreements with our employees, consultants, advisors, contractors and collaborators. These agreements are designed to protect our proprietary information, however, we cannot be certain that such agreements have been entered into with all relevant parties, and we cannot be certain that our trade secrets and other confidential proprietary information will not be disclosed or that competitors will not otherwise gain access to our trade secrets or independently develop substantially equivalent information and techniques. For example, any of these parties may breach the agreements and disclose our proprietary information, including our trade secrets, and we may not be able to obtain adequate remedies for such breaches. We also seek to preserve the integrity and confidentiality of our confidential proprietary information by maintaining physical security of our premises and physical and electronic security of our information technology systems, but it is possible that these security measures could be breached. If any of our confidential proprietary information were to be lawfully obtained or independently developed by a competitor, we would have no right to prevent such competitor from using that technology or information to compete with us, which could harm our competitive position.

It is possible that our efforts to protect our intellectual property rights may not:

- prevent our competitors from independently developing similar products, duplicating our products or from designing around the patents owned by us;
- prevent third-party patents from having an adverse effect on our ability to do business;
- prevent disputes with third parties regarding ownership of our intellectual property rights;
- prevent the challenge, invalidation or circumvention of our existing patents;
- result in issued patents or registered trademarks from any of our pending applications; or
- result in patents that lead to commercially viable products or provide competitive advantages for our products.

If any of our issued patents are found to be invalid or if any of our patent applications are rejected, our ability to exclude competitors from making, using or selling the same or similar products as us could be compromised. In addition, because we conduct a substantial portion of our operations and sell a large percentage of our products outside the United States, we have exposure to intellectual property risks from operating in foreign countries, many of which have laws that may not adequately protect our intellectual property rights.

Activities in the area of intellectual property rights, including litigation and various patent processes can cause us to incur substantial expenses. We are currently involved in contested proceedings, which may result in decisions against us.

The markets in which we compete are characterized by frequent claims alleging misappropriation of trade secrets or infringement of patents, trademarks, copyrights or other intellectual property rights of others. From time to time, third parties may assert against us or our customers alleged infringement of such intellectual property rights on technologies that are important to our business. We can provide no assurance that third parties will not in the future pursue claims against us or our customers with respect to the alleged infringement of intellectual property rights. In addition, litigation or other legal and technical processes may be necessary to protect our intellectual property rights, to determine the validity and scope of the proprietary rights of others or to defend against third party claims of infringement and/or invalidity. Litigation and other legal and administrative processes, whether as plaintiff, defendant, or otherwise, could result in substantial costs and diversion of resources and management attention and could have a material adverse effect on our business, results of operations and financial condition, whether or not such litigation or other processes are ultimately determined in our favor. In the event of an adverse result in, or a settlement of, a litigation matter, we could be required to pay substantial damages or settlement amounts; cease the manufacture, use, import and sale of certain products or components; expend significant resources to develop or acquire rights to use non-infringing technology; and/or discontinue the use of certain processes or obtain licenses and pay one-time fees and/or on-going royalties to use the infringing or allegedly infringing technology. The occurrence of any of the foregoing could result in unexpected expenses or require us to recognize an impairment of our assets, which would reduce the value of our assets and increase our expenses. Alternate technology development or license negotiations would likely result in significant expenses and divert the efforts of our technical and management personnel. We cannot assure that we would be successful in such development or negotiations. Moreover, there could be public announcements of the results of interim proceedings or developments. If securities analysts or investors perceive these announcements or results to be negative, it could have a substantial adverse effect on the price of our ordinary shares.

As we increase our sales, develop more technology and expand our product offerings, the possibility of being involved in more intellectual property contests grows. Increased intellectual property contests could have a material adverse effect on our business, results of operations and financial condition.

We may not have rights to manufacture and sell particular products that we currently offer, or we may be required to pay a royalty to sell certain products.

The memory, storage and compute markets are constantly undergoing rapid technological change and evolving industry standards. From time to time, third parties may claim that we are infringing upon technology to which they have proprietary rights and that we require a license to manufacture and/or sell certain of our products. If we are unable to supply certain products at competitive prices due to royalty payments we are required to make or at all because we were unable to secure a required license, our customers might cancel orders or seek other suppliers to replace us, which could have a material adverse effect on our business, results of operations and financial condition.

Changes in, or interpretations of, tax regulations or rates, or changes in the geographic dispersion of our net sales, or changes in other tax benefits, may adversely affect our income, value-added and other taxes, which may in turn have a material adverse effect on our business, results of operations, and financial condition.

Our future effective tax rates could be unfavorably affected by the resolution of issues arising from tax audits with various tax authorities in the United States and abroad; adjustments to income taxes upon finalization of various tax returns; increases in expenses not deductible for tax purposes, including write-offs of acquired in-process research and development and impairments of goodwill in connection with acquisitions; changes in available tax credits; changes in tax laws or regulations or tax rates; changes in the interpretation or application of tax laws; changes in tax regulations or rates; increases or decreases in the amount of net sales or earnings in countries with particularly high or low statutory tax rates; changes in exemptions from taxes in certain jurisdictions or in connection with certain transactions; or by changes in the valuation of our deferred tax assets and liabilities. In addition, taxable income in any jurisdiction is dependent upon acceptance of our operational practices and intercompany transfer pricing by local tax authorities as being on an arm’s length basis. Due to inconsistencies in application of the arm’s length standard among taxing authorities, as well as lack of adequate treaty-based protection, transfer pricing challenges by tax authorities could, if successful, substantially increase our income tax expense. While we enjoy and expect to continue to enjoy beneficial tax treatment in certain foreign jurisdictions, most notably Brazil and Malaysia, we are subject to meeting specific conditions in order to receive the beneficial treatment. Additionally, many of the beneficial treatments must be renewed periodically, and our enjoyment thereof is conditioned upon compliance with several legal requirements and is subject to change. See “—Risks Relating to our International Operations—If the tax incentive or tax holiday arrangements from which we benefit in Brazil or Malaysia change or cease to be in effect or applicable in part or in whole, for any reason, or if our assumptions and interpretations regarding tax laws and incentive or holiday arrangements prove to be incorrect, the amount of corporate income, excise, import and contribution taxes we have to pay could increase significantly.”

We are subject to tax examination in the United States and in foreign jurisdictions, including in Brazil where we have had several audits and are currently being audited with respect to certain taxes. We regularly assess the likelihood of outcomes resulting from these examinations to determine the adequacy of our provision for taxes and have reserved for potential adjustments that may result from current examinations. We believe such estimates to be reasonable; however, there can be no assurance that the final determination of any examinations will be in the amounts of our estimates.

Any significant variance in the results of an examination as compared to our estimates, any failure to continue to receive any beneficial tax treatment in any of our foreign locations or any increase in our future effective tax rates due to any of the factors set forth above or otherwise could reduce net income and have a material adverse effect on our business, results of operations and financial condition.

Our ability to use our net operating loss carryforwards are limited.

As of August 30, 2019, we had U.S. federal and state net operating loss carryforwards of approximately $114.8 million and $44.4 million, respectively. The federal net operating loss carryforwards will expire, if not utilized, in fiscal 2023 through fiscal 2038, and the state net operating loss carryforwards will expire in fiscal 2020 through fiscal 2038, both in varying amounts, if not utilized. In addition, under Section 382 of the Internal Revenue Code of 1986, as amended, or the Code, if a corporation undergoes an "ownership change," the corporation's ability to use its pre-change net operating loss carryforwards to offset its post-change taxable income may be limited. In general, an "ownership change" will occur if there is a cumulative change in our ownership by certain "5-percent shareholders" that exceeds 50 percentage points over a rolling three-year period. Similar rules may apply under state tax laws. Our net operating loss carryforwards are subject to limitations per Section 382 of the Code. We have experienced ownership changes in the past, and we may experience ownership changes in the future as a result of future transactions in our ordinary shares, some changes of which may be outside our control. As a result, our ability to use our pre-change net operating loss carryforwards to offset post-change U.S. federal and state taxable income may be subject to additional limitations.

If our goodwill or intangible assets become impaired, we may be required to record a significant charge to earnings.

Under U.S. GAAP, we review our long-lived intangible and tangible assets for impairment when events or changes in circumstances indicate the carrying value may not be recoverable. Goodwill is required to be tested for impairment at least annually. Factors that may be considered a change in circumstances indicating that the carrying value of our goodwill or other intangible assets may not be recoverable include declines in our share price and market capitalization or future cash flow projections. We may be required to record a significant charge to earnings in our financial statements during the period in which any impairment of our goodwill or other intangible assets is determined. Impairment charges could have a material adverse effect on our business, results of operations and financial condition.

We are subject to a variety of federal, state, foreign and international laws and regulatory regimes. Failure to comply with governmental laws and regulations could subject us to, among other things, mandatory product recalls, penalties and investigation and legal expenses which could have an adverse effect on our business, results of operations and financial condition.

Our business is subject to regulation by various U.S. federal and state governmental agencies. Such regulation includes, without limitation, the radio frequency emission regulatory activities of the Federal Communications Commission, the antitrust regulatory activities of the Federal Trade Commission, or FTC, and the Department of Justice, the consumer protection laws of the FTC, the import/export regulatory activities of the Department of Commerce, the product safety regulatory activities of the Consumer Products Safety Commission, the regulatory activities of the Occupational Safety and Health Administration, the environmental regulatory activities of the Environmental Protection Agency, the labor regulatory activities of the Equal Employment Opportunity Commission, the export control regulatory activities of the Department of State, and tax and other regulations by a variety of regulatory authorities in each of the areas in which we conduct business. We are also subject to similar, and in some cases additional, regulation in other countries where we conduct business, including import and export laws and foreign currency control. In certain jurisdictions, such regulatory requirements may be more stringent and complex than in the United States. We are also subject to a variety of U.S. federal and state employment and labor laws and regulations, including, without limitation, the Americans with Disabilities Act, the Federal Fair Labor Standards Act, the Worker Adjustment and Restructuring Notification Act, which requires employers to give affected employees at least 60 days' notice of a plant closing or a mass layoff, and other regulations related to working conditions, wage-hour pay, overtime pay, employee benefits, antidiscrimination and termination of employment.

Like other companies operating or selling internationally, we are subject to the Foreign Corrupt Practices Act, or FCPA, and other laws which generally prohibit improper payments or offers of payments to foreign governments and their officials and political parties by U.S. companies and their intermediaries for the purpose of obtaining or retaining business or otherwise obtaining favorable treatment. We are also subject to similar or even more restrictive anticorruption laws imposed by the governments of other countries where we do business, including the UK Bribery Act, the Malaysian Anticorruption Act and the Brazil Clean Company Act. We make sales and operate in countries known to experience corruption that are rated as high-risk nations. Our business activities in such countries create the risk of unauthorized conduct by one or more of our employees, consultants, customs brokers, freight forwarders, sales agents or distributors that could be in violation of various laws including the FCPA or similar local regulations. In addition, we may be held liable for actions taken by such parties even though such parties are not subject to the FCPA or similar laws. Any determination that we have violated the FCPA or similar laws may result in severe criminal or civil sanctions, and we may be subject to other liabilities that could have a material adverse effect on our business, results of operations and financial condition.

Our Brazilian operations are subject to periodic and regular investigations by labor officials and governmental bodies, including the Brazilian Ministry of Labor and the Brazilian Labor Public Prosecutor's Office, with respect to our compliance with labor rules and regulations. Although we believe that we comply with all of the laws and regulations applicable to our business and activities performed in Brazil, these investigations could result in fines and proceedings that may materially and adversely affect our business, results of operations and financial condition.

Noncompliance with applicable regulations or requirements could subject us to investigations, sanctions, mandatory product recalls, enforcement actions, disgorgement of profits, disbarment from government projects, fines, damages and civil and criminal penalties or injunctions that could harm our business, results of operations and financial condition. In addition, from time to time we have received, and may receive in the future, correspondence from former employees and parties with whom we have done business with, threatening to bring claims against us alleging that we have violated one or more regulations related to customs, labor and employment, foreign currency control or other laws or regulations. An adverse outcome in any litigation or proceeding related to such matters could require us to pay damages, attorneys' fees and/or other costs.

If any governmental sanctions were to be imposed, or if we were not to prevail in any civil action or criminal proceeding, our business, results of operations and financial condition could be materially adversely affected. In addition, responding to any litigation or action would likely result in a significant diversion of management's attention and resources and a significant increase in professional fees.

We could incur substantial costs or liabilities as a result of violations of environmental laws.

Our operations and properties are subject to a variety of U.S., foreign government and international environmental laws and regulations governing, among other things, environmental licensing and registries, protection of flora and fauna, air emissions, use of water resources, wastewater discharges, management and disposal of hazardous and non-hazardous materials and wastes, reverse logistics (take-back policy) and remediation of releases of hazardous materials. Our failure to comply with present and future requirements, or the management of known or identification of new or unknown contamination, could cause us to incur substantial costs, including cleanup costs, indemnifications, compensations, fines, suspension of activities and other penalties, investments to upgrade our facilities or change our processes or curtailment of operations. For example, the presence of lead in quantities not believed to be significant have been found in the ground under one of the multi-tenant buildings we lease in Brazil. While we did not cause the contamination, we may be held responsible if remediation is required, although we may be entitled to seek indemnification from responsible parties under Brazilian law and from our lessor under our lease. The identification of presently unidentified environmental conditions, more vigorous enforcement by regulatory agencies, enactment of more stringent laws and regulations or other unanticipated events may arise in the future and give rise to material environmental liabilities and related costs. The occurrence of any of the foregoing could have a material adverse effect on our business, results of operations and financial condition.

Worldwide political conditions and threats of terrorist attacks may adversely affect our operations and demand for our products.

Armed conflicts around the world could have an impact on our sales, our supply chain and our ability to deliver products to our customers. Political and economic instability in some regions of the world could also have a negative impact on our business. More generally, various events could cause consumer confidence and spending to decrease, or could result in increased economic or financial volatility, any of which could result in a decrease in demand for our products.

Additionally, the occurrence or threat of terrorist attacks may in the future adversely affect demand for our products. In addition, such attacks may negatively affect our operations directly or indirectly and such attacks or other armed conflicts may directly impact our physical facilities or those of our suppliers or customers. Such attacks may make travel and the transportation of our products more difficult and more expensive, ultimately having a negative effect on our business.

Any such occurrences could have a material adverse effect on our business, results of operations and financial condition.

Our operations in different parts of the world could be subject to natural disasters, health epidemics and other business disruptions, which could have a material adverse effect on our business, results of operation and financial condition.

Our operations in different parts of the world could be subject to natural disasters, including earthquakes, monsoons, cyclones and floods. For example, our United States headquarters in Newark, California and our Penguin Computing operations in Fremont, California are located near major earthquake fault lines. Our manufacturing facility in Penang, Malaysia is also prone to natural disasters, such as cyclones, monsoons and floods. In the event of a major earthquake, cyclone, monsoon or other natural or manmade disaster, we could experience business interruptions, destruction of facilities and/or loss of life, any of which could materially adversely affect our business.

In addition, our business could be adversely affected by the outbreak of diseases and pandemics. Any occurrence of these pandemic diseases or other adverse public health developments in Malaysia or elsewhere could severely disrupt our business or the business of our customers and suppliers, which could materially adversely affect our business.

Since a large percentage of our production is done in a small number of facilities, a disruption to operations could have a material adverse effect on our business, results of operations and financial condition.

Risks Relating to our International Operations

We depend on the desktop, notebook, server and smartphone markets in Brazil, and lack of growth, or the occurrence of contraction, in these markets have in the past, and could again in the future, have a material adverse impact on our business, results of operations and financial condition.

A significant portion of our sales and operations are focused on Brazil. Sales to customers in Brazil accounted for 44%, 62% and 52% of our net sales in fiscal 2019, 2018 and 2017, respectively. We have invested substantial financial and management resources to develop a research and development center and a semiconductor packaging and test facility in Brazil in order to target the growing market for memory in Brazil and to take advantage of certain Brazilian laws and government incentives, as described below in "—Risks Relating to our International Operations." Our future financial performance will depend in large part on growth in the Brazilian market, which may not grow again at historical rates, or at all.

Demand for our products in Brazil is dependent upon, among other things, demand in the markets served by our customers, including the Brazilian computing and mobile markets. From time to time, the markets served by our Brazilian customers have experienced significant downturns, often in connection with political unrest or in connection with, or in anticipation of, declines in general economic conditions. A decline or significant shortfall in demand in any of the markets that we serve could have a significant negative impact on the demand for our products. In addition, a prolonged economic downturn in Brazil, even absent a worldwide economic downturn, may lead to higher interest rates or significant changes in the rate of inflation in Brazil, or an inability of our Brazilian customers and suppliers to access capital on acceptable terms. Our customers and suppliers in Brazil could experience cash flow problems, credit defaults or other financial hardships.

In addition, as discussed in greater detail below, our sales and our profit margins in Brazil have been favorably impacted by laws establishing local content requirements for electronics products which laws are undergoing changes as a result rulings by the WTO. See "—Our success in Brazil depends in part on Brazilian laws establishing local content requirements for electronics products. The elimination of or a reduction in the local content requirements, or our inability to secure the benefits of these regulations, could significantly reduce the demand for, and the profit margins on, our products in Brazil."

Any of these circumstances could have a material adverse effect on our business, results of operations and financial condition.

Our success in Brazil depends in part on Brazilian laws establishing incentives for local manufacturing of electronics products. The elimination of or a reduction in the incentives for local manufacturing, or our inability to secure the benefits of these regulations, could significantly reduce the demand for, and the profit margins on, our products in Brazil.

Successive Brazilian governmental administrations have adopted economic policies intended to foster innovation and investment in local production, stimulate job growth, provide stimulus to exports and defend local manufacturers in various industries. In recent decades, the Brazilian government identified the design and manufacture of ICs as a priority and established tax incentives and local content requirements intended to promote the development of the local IT industry. These incentives include the PPB/IT Program, PADIS and Lei do Bem. The law that provides the PPB/IT Program benefits is currently legislated to remain in force through the end of 2029. The PPB/IT Program is intended to promote local manufacturing by allowing qualified companies to receive incentives when they sell specified IT products, including desktops, notebooks, servers, SmartTVs and mobile products that contain components that are manufactured in Brazil. The PPB/IT Program, through the enactment of several ordinances, provided for reduced Brazilian federal excise tax rate, or the IPI, for qualified parties as compared to the rate that is required to be collected by non-qualified parties. The PPB/IT Program provided an incentive for certain customers to purchase products from us because they were not required to pay the regular level of IPI on their purchases. Under the PPB/IT Program, the percentage of local content required in specified IT products has increased significantly from 2006 to 2019. For example, under the PPB/IT Program, from 2006 to 2019, the total requirement of DRAM modules made with locally packaged DRAM ICs for notebook computers has increased from 0% to 80%. In order to receive the intended treatment as a PPB/IT Program supplier, our subsidiary, SMART do Brazil, was required to invest in research and development activities in an amount equal to 4% of its gross annual sales revenues reduced by the following: the cost of raw materials qualified as products eligible for the PPB/IT Program, including the ICs that are purchased from our other Brazilian subsidiary, SMART Brazil, and that are used to make memory modules; applicable sales taxes; the value of products exported out of Brazil; and the value of products shipped to the Manaus Free Trade Zone.

Brazil’s local content requirements for the IT industry have been subject to criticism by other governments and international organizations.

In 2013, the EU, later joined by Japan, requested the establishment of a panel within the WTO to determine whether the structure of certain programs enacted by the Brazilian government concerning incentives and local content requirements for the automotive and several other industries (including the IT industry and including portions of Lei do Bem that do not relate to our business, PADIS and the PPB/IT Program), are inconsistent with WTO rules. On August 30, 2017, the WTO panel released a report and on December 13, 2018, after hearing appeals, the appellate body of the WTO released its decision in which it upheld some of the panel’s findings that, among other things, the tax exemptions, reductions and suspensions granted for the automotive, IT and other industries amount to subsidies that are inconsistent with the principles of the various WTO agreements, while also rejecting some of the complaints by the EU and Japan. The WTO’s decision included a recommendation that Brazil withdraw certain of the subsidies, however, it does not impact the benefits that we receive under Lei do Bem. The appellate body also noted that it would not contravene the principles of the WTO agreements for Brazil to establish local manufacturing processes as a condition to benefit from incentives granted by the government provided that certain conditions are met.

In response to the WTO report, government authorities in Brazil revoked several ordinances that established local content requirements under the PPB/IT Program, many of which were related to our local business. The revocation became effective June 30, 2019. Government officials in Brazil have continued to express their intent to restructure the incentives to be consistent with the WTO principles while still continuing to support local industry. In June 2019, the authorities in Brazil published the first of a series of new ordinances, effective as of July 1, 2019, that provide a structure for revised support for local manufacturing utilizing a score-based point system for eligibility for incentives. In this system, each manufacturing process within an electronic device is assigned a different number of points. Our manufacturing processes related to memory products are a valuable part of the electronics manufacturing chain and, as such, are expected to provide our customers the opportunity to accomplish a significant number of the overall points required if they purchase products manufactured by us in Brazil.

While we believe that this score-based system will continue to incentivize our Brazilian customers to purchase products from us in Brazil, there can be no assurance that the replacement programs will ultimately be structured and implemented in a way that will provide the same or a similar level of support and benefit for our customers and our business as was previously in place. There can also be no assurance that the WTO, the EU and Japan will agree that this new program structure is compliant with the WTO agreements. Any adverse change in legislation or in the impact and effectiveness of the local incentives programs, or our failure to meet the requirements of any of the regulations, could significantly reduce the demand for, the profit margins on, and the competitiveness of our products in Brazil, and would have a material adverse effect on our business, results of operations and financial condition.

In addition, we benefit from various other tax incentives extended to us in Brazil to promote the development of the local IT industry, and are subject to related risks, as described below.

Significant changes in the political or economic environments in Brazil or Malaysia could adversely affect our business, results of operations and financial condition.

We have extensive operations in Malaysia and significant operations and sales in Brazil. The governments of these countries frequently intervene in their respective economies and occasionally make significant changes in policies and regulations. The Brazilian government's actions to control inflation and other policies and regulations have often involved, among other measures, increases in interest rates, changes in tax policies, price controls, currency devaluations, capital controls and limits on imports. Our business, results of operations and financial condition, as well as the market price of our securities, may be adversely affected by changes in these and in other countries, to policies or regulations involving or affecting general economic factors, such as:

- interest rates;
- exchange rates and currency controls and restrictions on the movement of capital out of country;
- currency fluctuations;
- import and export controls;
- inflation;
- liquidity of the domestic capital and lending markets;
- reduction or cancellation of tax incentives to which we are currently entitled;
- other changes to tax and regulatory policies; and
- other political, social and economic developments.

The political environment in Brazil has influenced and continues to influence the performance of the country's economy. Recurring economic and political instability as well as corruption scandals in Brazil contribute to a reduction in market confidence in the Brazilian economy. Moreover, we cannot predict the outcome or future effects of new political administrations in Brazil and cannot predict which policies will be adopted or modified or the effect thereof on Brazilian economy and on our business. Any new policies or changes in current policies may have a material adverse effect on our business and financial condition.

If the tax incentive or tax holiday arrangements from which we benefit in Brazil or Malaysia change or cease to be in effect or applicable in part or in whole, for any reason, or if our assumptions and interpretations regarding tax laws and incentive or holiday arrangements prove to be incorrect, the amount of corporate income, excise, import and contribution taxes we have to pay could increase significantly.

We have structured our operations in a manner designed to maximize our benefit from various tax incentives and/or tax holidays extended to manufacturers in Brazil and Malaysia to encourage investment and employment. In Brazil, we participate in the following government investment incentive programs, among others:

- *Support Program for the Technological Development of the Semiconductor and Display Industries (PADIS), 2007.* PADIS is designed to promote the development of the local semiconductor industry. In December 2010 and January 2011, the required agencies of the Brazilian government approved our application for beneficial tax treatment under the PADIS program for DRAM ICs and we began operations under the PADIS rules in February 2011. Subsequently, we received approvals for PADIS benefits for microSD cards and USB Flash drives in June 2012, mobile, or low power DRAM in March 2013, eMMC and Flash Fine-pitch Ball Grid Array, or Flash FBGA, in February 2014, eMCP in June 2014, DDR4 DRAM in July 2016, and for any other mounted components in May 2015. The PADIS benefits include: (i) relief from Brazil's corporate income tax, resulting in a reduction in the Brazilian statutory income tax rate from 34% to 9% on taxable income from the semiconductor IC portion of our operations, (ii) relief from the PIS and COFINS Contributions, the IPI, and Brazil's import tax, on both the import and domestic acquisition of fixed assets, inputs, software and sale of final products eligible for PADIS, and (iii) relief from Brazil's tax on outbound royalties, or CIDE. To realize these benefits, our subsidiary, SMART Brazil, is required to invest a percentage of its gross annual semiconductor sales revenues (reduced by the following: the cost of raw materials covered within the scope of PADIS, applicable sales taxes, the value of products exported out of Brazil and the value of products shipped to the Manaus Free Trade Zone) in research and development activities conducted in Brazil each calendar year. The applicable percentage was 3% for 2015, increasing to 4% for 2016 through 2018, and increasing to 5% for 2019 and beyond. Furthermore, SMART Brazil is not permitted to distribute to shareholders (through dividends, capital reductions or otherwise) the amount of corporate income taxes not paid as a result of the PADIS benefits. Failure to comply with our obligations under the PADIS would result in our being charged the amount of the relieved taxes, plus interest equal to the Central Bank of Brazil's overnight rate, or the SELIC rate, plus a 75% penalty and could also result in the suspension of our participation in PADIS and ultimate termination of PADIS should SMART Brazil fail to repair the infraction within 90 days or should SMART Brazil have PADIS suspended twice in the period of two years. If SMART Brazil's participation in PADIS were terminated, it would be permitted to reapply for the program only after a two-year period.

- *Lei da Informática—Processo Produtivo Básico (PPB/IT Program), 1991, extended through 2029.* Brazil's PPB/IT Program, in which we also began to participate in February 2011, is intended to promote local manufacturing by allowing qualified PPB/IT Program companies to sell certain IT products with a reduced rate of IPI as compared to the rate that is required to be collected by non-qualified suppliers. The PPB/IT Program provides an incentive for certain customers to purchase from us because our sales will not be subject to the regular level of IPI. In order to receive the intended treatment as a PPB/IT Program supplier, our subsidiary SMART do Brazil is required to invest in research and development activities conducted in Brazil in an amount equal to 4% of its gross annual sales revenues reduced by the following: the cost of raw materials qualified as products eligible for the PPB/IT Program, including the ICs that are purchased from our other Brazilian subsidiary, SMART Brazil, and that are used to make memory modules; applicable sales taxes; the value of products exported out of Brazil; and the value of products shipped to the Manaus Free Trade Zone. Failure to comply with our obligations under the PPB/IT Program would result in our being charged the amount of the relieved taxes, plus interest equal to the SELIC rate, plus a 75% penalty and could also result in the suspension of our participation in the PPB/IT Program and ultimate termination should SMART do Brazil fail to cure the infraction within 180 days.

Compliance with these programs is measured annually, on a calendar year basis. We believe that we have fulfilled these research and development investment requirements through calendar 2018, however, for certain years the authorities in Brazil have not yet completed the relevant review. For calendar years 2011 to 2016, the authorities have requested additional information in order to review whether certain of our reported research and development investments as required for SMART do Brazil qualify for the PPB/IT Program. We believe that all of our research and development investments do qualify and we have provided the additional information. While we believe that all of our reported investments qualify for the research and development requirements, we cannot provide assurance that the Brazilian authorities will agree with our classification in which case we may be required to make incremental payments to the authorities or to make incremental research and development investments in the future. If we fail to make the additional payments or additional investments if required, we may lose the anticipated benefits of these programs and could be penalized for failing to make the research and development investments when required, or for failing to pay required statutory income taxes or to collect the required PIS/COFINS and IPI upon our sales. In addition, there is a risk that modifications to laws may prohibit, interrupt, limit, terminate early or change the use of these existing tax incentives. Additionally, we cannot provide assurance that we will be able to make the required investments in the future.

In 2013, the EU, later joined by Japan, requested the establishment of a panel within the World Trade Organization, or WTO, to determine whether the structure of certain programs enacted by the Brazilian government concerning incentives and local content requirements for the automotive and several other industries (including the IT industry and including portions of Lei do Bem that do not relate to our business, as well as PADIS and the PPB/IT Program), were inconsistent with WTO rules. See "Risks Related to our International Operations—Our success in Brazil depends in part on Brazilian laws establishing incentives for local manufacturing of electronics products. The elimination of or a reduction in the incentives for local manufacturing, or our inability to secure the benefits of these regulations, could significantly reduce the demand for, and the profit margins on, our products in Brazil."

In addition, we have obtained tax incentives from Malaysia, which provide that certain classes of income we earn in Malaysia are subject to tax holidays. Each tax incentive is separate and distinct from the others and may be granted, withheld, extended, modified, truncated, complied with or terminated independently without any effect on the other incentives. To retain these tax benefits in Malaysia, we must continue to meet certain operating conditions specific to each incentive relating to, among other things, investments in fixed assets, research and development expenditures, minimum operating expenditures, required ratio of staff with degrees in science and technology, local purchasing programs, minimum numbers of patents with local involvement and registration and segregated accounting for the covered products or businesses. If we cannot or elect not to comply with the operating conditions included in any particular tax incentive, we will lose the related tax benefits. In such event, we could be required to refund material tax benefits previously realized by us with respect to that incentive and, depending on the incentive at issue, could likely be required to modify our operational structure and tax strategy. Any such modified structure or strategy may not be as beneficial to us from an income tax expense or operational perspective as the benefits provided under the present tax incentive arrangements. We have received approvals for these tax incentives for up to ten years beginning September 2019, subject to certain operating conditions. The impact of these tax incentives will be recorded in the period in which they are realized.

Our interpretations and conclusions regarding the tax incentives are not binding on any taxing authority. If our assumptions about tax and other laws are incorrect, if these tax incentives are substantially modified or rescinded or if we fail to meet the conditions of any of the tax incentives, we could suffer material adverse tax and other financial consequences including owing significant amounts of taxes and penalties that would increase our expenses, reduce our profitability and adversely affect our cash flows, results of operations and financial condition.

If Brazilian administrative tax courts find that we have used an incorrect product code on our imports, then the amount of administrative penalties and interest that we have to pay on past transactions could have a material adverse effect on our business, results of operations and financial condition.

On February 23, 2012, Brazilian federal tax authorities served our Brazilian operating subsidiary, SMART Brazil, with a tax assessment for approximately R$117.0 million (or $31.1 million) (the First Assessment), alleging that SMART Brazil had incorrectly used an import product classification code for its imports of unmounted ICs for the five calendar years of 2007 through and including 2011. Brazilian federal tax authorities subsequently served a second assessment for an administrative penalty of approximately R$6.0 million (or $1.6 million) (the Second Assessment) for the alleged use of an improper import code. Each assessment is subject to increases for interest and other charges.

In March 2012, SMART Brazil filed defenses to the tax assessments. On May 2, 2013, the first level administrative tax court ruled in favor of the tax authorities and against SMART Brazil for the First Assessment, but did not rule on the Second Assessment for the administrative penalty. SMART Brazil filed an appeal on May 31, 2013 at the second level tax court known as CARF. SMART Brazil’s appeal resulted in a unanimous favorable decision rejecting the position of the tax authorities. Subsequently, the tax authorities filed a request for clarification of certain points in the decision published by CARF, and on September 17, 2014, we received a unanimous ruling rejecting the tax authorities request for clarification. On November 7, 2014, the tax authorities notified CARF that they would not be appealing the CARF decision, and the First Assessment has been extinguished.

On February 6, 2018, the first level administrative court unanimously ruled in favor of SMART Brazil with respect to the Second Assessment. Due to the size of the Second Assessment, Brazil law required that the tax authorities appeal the decision to CARF. The appeal on the Second Assessment was heard on December 11, 2018 and we received a unanimous favorable ruling rejecting the position of the tax authorities. The tax authorities did not file any request for clarification or appeal and, as a result, the Second Assessment was extinguished in May 2019.

Due to the issuance of these tax assessments, Brazilian federal tax authorities conducted an enrollment of assets of SMART Brazil. Brazilian legislation states that whenever the sum of the debts owed to the Brazilian Revenue Service exceeds 30% of the known equity of a company and R$2.0 million (or $0.5 million), the Brazilian Revenue Service may conduct an enrollment of assets of SMART Brazil, which is a means of monitoring the company’s equity. During this period, the taxpayer must notify the Brazilian Revenue Service of any disposal, encumbrance or transfer of the assets or rights enrolled within five days from the occurrence of the act; if the company does not provide such notice, then the Brazilian Revenue Service may file a tax injunction. The enrollment does not constitute a lien or encumbrance on the assets. The assets covered by the enrollment are typically assets classified as fixed assets or non-current assets and include assets that are subject to any form of registration before a public deed service or equivalent, such as real estate and vehicles. Other assets may be subject to enrollment in the event that the assets described above are not sufficient to satisfy the amount of the tax liability. The enrollment does not create any limitation or prohibition against remitting dividends or making cash payments of interest on equity. After the First Assessment has been extinguished, we petitioned to have the enrollment cancelled and the tax authorities substantially reduced the amount of the enrollment to R$13.9 million (or $3.7 million) as of January 31, 2017. After the Second Assessment was extinguished, we petitioned the tax authorities again to cancel the enrollment. There can be no assurance that the enrollment will be cancelled unless all of the assessments are extinguished.

On December 12, 2013, SMART Brazil received another notice of assessment in the amount of R$3.6 million (or $1.0 million) with respect to the same import-related tax issues and penalties as discussed above for 2012 and 2013 (the Third Assessment). This new assessment does not seek import duties and related taxes on DRAM products and only seeks import duties and related taxes on Flash unmounted components with respect to the months of January 2012 to June 2012. This is because SMART Brazil's imports of DRAM unmounted components were subject to 0%, and after June 2012, SMART Brazil's imports of Flash unmounted components became subject to 0%, import duties and related taxes as a result of PADIS. Even with this 0%, if SMART Brazil is found to have used the incorrect product classification code, SMART Brazil will be subject to an administrative penalty equal to 1% of the value of the imports. SMART Brazil has filed defenses to this assessment. We believe that SMART Brazil used the correct product code on its imports and that the Third Assessment is incorrect.

As a result of the CARF decision in favor of SMART Brazil on the First Assessment and the Second Assessment, we believe that the probability of any material charges as a result of the Third Assessment is remote. We can provide no assurance that SMART Brazil ultimately will prevail on the remaining tax assessments or the administrative penalties, and no amounts have been accrued in the financial statements for any such assessments or penalties. In addition, in the event that SMART Brazil does not prevail, the amount of the assessments and the penalties and interest could have a material adverse effect on our business, results of operations and financial condition.

Our business is subject to the risks generally associated with international business operations.

Sales outside of the United States accounted for 68%, 84% and 82% of our net sales in fiscal 2019, 2018 and 2017, respectively. In addition, a significant portion of our product design and manufacturing is performed at our facilities in Brazil and Malaysia. In addition, a significant amount of our product design activities are performed in Taiwan and India. As a result, our business is and will continue to be subject to the risks generally associated with international business operations in Brazil, Malaysia and other foreign countries, including:

- changes in tax and other laws and regulations, including recent tariffs;
- changes in social, political and economic conditions;
- transportation delays;
- power and other utility shutdowns or shortages;
- limitations on foreign investment;
- restrictions on currency convertibility and volatility of foreign exchange markets;
- import-export quotas;
- increased trade regulations or trade wars;
- corruption or adverse political situations in Brazil or other markets;
- changes in local labor conditions;
- difficulties resulting from different employment regulations;
- difficulties in obtaining governmental approvals;
- expropriation and nationalization of our assets in a particular jurisdiction; and
- restrictions on repatriation of cash, dividends or profits.

Some of the foreign countries in which we do business or have operations have been subject to social and political instability in the past, and interruptions in operations could occur in the future. Our net sales, results of operations and financial condition could be adversely affected by any of the foregoing factors.

Our global operations expose us to numerous and sometimes conflicting legal and regulatory requirements, and violation of these regulations could harm our business.

We are subject to numerous, and sometimes conflicting, legal regimes on matters as diverse as anticorruption, import/export controls, content requirements, trade restrictions, tariffs, taxation, sanctions, immigration, internal and disclosure control obligations, securities regulation, anti-competition, data privacy and labor relations. This includes in emerging markets where legal systems may be less developed or familiar to us. Compliance with diverse legal requirements is costly, time consuming and requires significant resources. Violations of one or more of these regulations in the conduct of our business could result in significant fines, criminal sanctions against us or our officers, prohibitions on doing business and damage to our reputation. Violations of these regulations in connection with the performance of our obligations to our customers or suppliers also could result in liability for significant monetary damages, fines and/or criminal prosecution, unfavorable publicity and other reputational damage, restrictions on our ability to process information and allegations by our customers or suppliers that we have not performed our contractual obligations. Due to the varying degrees of development of the legal systems of the countries in which we operate or sell, local laws might be insufficient to protect our rights.

Our operations in foreign countries are more difficult to manage, which may expose us to additional risks that may not exist in the United States, which in turn could have a negative impact on our business, results of operations and financial condition.

A significant portion of our operations is outside of the United States. Additionally, international sales account for a significant portion of our overall sales. In some of the countries in which we operate or sell our products, it is difficult to recruit, employ and retain qualified personnel to manage and oversee our local operations, sales and other activities. The effects of instabilities in the labor market, including strikes, work stoppages, protests and changes in employment regulations, increases in wages and the conditions of collective bargaining agreements could directly affect the development of our activities and those of our customers, which could have a material adverse effect on our results. Further, given our executive officers' lack of physical proximity to our foreign country activities and the inherent limitations of cross-border information flow, our executive officers may at times face extra challenges in their ability to effectively oversee the day-to-day management of our international operations. The challenges facing management to effectively recruit, employ and retain qualified personnel and to otherwise effectively manage our international operations could result in compliance, control or other issues that could have a material negative impact on our business, results of operations and financial condition.

If we were to lose the tax-related benefits of being a Cayman Islands company, our business could be adversely affected.

We are a Cayman Islands company and operate through subsidiaries in a number of countries throughout the world. As a result, income generated in certain non-U.S. subsidiaries is not subject to taxation in the United States. We are subject to changes in tax laws, treaties and regulations or the interpretation or enforcement thereof in the United States, the Cayman Islands and jurisdictions in which we or any of our subsidiaries operate or are resident. In the past, legislative proposals have been introduced in the United States that, if enacted into law, could result in us being considered a U.S. company for tax purposes. This could have the effect of subjecting a larger portion of our worldwide income to U.S. taxation. While no such laws have been enacted to date, there can be no assurance that they will not be enacted in the future.

Unfavorable currency exchange rate fluctuations could cause currency exchange losses, result in our products becoming relatively more expensive to our overseas customers and increase our manufacturing costs, each of which could adversely affect our business and our profitability.

Our international sales and our operations in foreign countries expose us to certain risks associated with fluctuating currency values and exchange rates. Because some of our sales are denominated in U.S. dollars, increases in the value of the U.S. dollar could increase the price of our products so that they become relatively more expensive to customers in a particular country, possibly leading to a reduction in sales and profitability in that country. Some of the sales of our products, including sales in Brazil, are denominated in foreign currencies. Gains and losses on the conversion to U.S. dollars of such revenues and of other associated monetary assets and liabilities, as well as profits and losses incurred in certain countries, may contribute to fluctuations in the value of our assets and our results of operations. We also have costs and expenses that are denominated in foreign currencies, and decreases in the value of the U.S. dollar could result in increases in such costs that could have a significant negative impact on our results of operations. In addition, fluctuating values between the U.S. dollar and other currencies can result in currency gains which are used in the computation of foreign taxes and can increase foreign taxable income.

In fiscal 2019, we began using foreign exchange forward contracts in Brazil to mitigate foreign currency exchange rate risk associated with foreign-currency-denominated assets and liabilities, primarily third party payables. We do not use foreign currency contracts for speculative or trading purposes. Foreign exchange forward contracts outstanding at August 30, 2019 are not designated as hedging instruments for hedge accounting purposes.

We are a holding company. If enacted, exchange controls may limit our ability to receive dividends and other distributions from our foreign subsidiaries.

We conduct all of our operations through subsidiaries and are dependent on dividends or other intercompany transfers of funds from our subsidiaries to meet our obligations and pay intercompany dividends. If enacted, restrictions on intercompany dividends or other distributions in certain jurisdictions could have a material adverse effect on our ability to transfer funds from certain subsidiaries. Additionally, Brazilian law permits the Brazilian government to impose temporary restrictions on conversions of Brazilian currency into foreign currencies and on remittances to foreign investors of proceeds from their investments in Brazil whenever there is a serious imbalance in Brazil's balance of payments or there are reasons to expect a pending serious imbalance. The Brazilian government may take similar measures in the future. Any imposition of restrictions on conversions and remittances could hinder or prevent us from converting Brazilian reais into U.S. dollars or other foreign currencies and remitting abroad dividends, distributions or the proceeds from operations in Brazil.

Inflation and certain measures by the Brazilian government to curb inflation have historically adversely affected the Brazilian economy and Brazilian securities market, and high levels of inflation in the future would adversely affect our business, results of operations and financial condition.

In the past, Brazil has experienced extremely high rates of inflation. Inflation and some of the measures taken by the Brazilian government in an attempt to curb inflation have had significant negative effects on the Brazilian economy generally. Inflation, policies adopted to curb inflationary pressures and uncertainties regarding possible future governmental intervention have contributed to economic uncertainty and heightened volatility in the Brazilian securities market.

Since the introduction of the real in 1994, Brazil's inflation rate has been substantially lower than in previous periods. According to the Extended National Consumer Price Index (Índice Nacional de Preços ao Consumidor Amplo), Brazilian inflation rates were 3.7%, 2.9%, 6.3%, 10.7%, 6.4%, 5.9%, 5.8% and 6.5% in 2018, 2017, 2016, 2015, 2014, 2013, 2012 and 2011, respectively. However, the Brazilian government's measures to control inflation have often included maintaining a tight monetary policy with high interest rates, thereby restricting the availability of credit and reducing economic growth. The Central Bank of Brazil has frequently adjusted the interest rate in situations of economic uncertainty and to achieve objectives under the economic policy of the Brazilian government. Inflation, along with government measures to curb inflation and public speculation about possible future government measures, have had significant negative effects on the Brazilian economy and contributed to economic uncertainty in Brazil and heightened volatility in the Brazilian securities market, which may have an adverse effect on us.

If Brazil experiences substantial inflation or deflation in the future, we and our ability to comply with our obligations may be adversely affected. In addition, we may not be able to adjust the prices we charge our customers to offset the impact of inflation on our expenses, leading to an increase in our expenses and a reduction in our net operating margin. This could have a material negative impact on our business, results of operations and financial condition.

Developments and the perception of risk in other countries, such as the 2008-2009 developments in the global financial markets, and particularly in emerging market countries, may adversely affect the perceived value of companies with substantial operations in Brazil, causing the market price of our ordinary shares to decline.

The market value of securities of companies with substantial operations in Brazil is affected to varying degrees by political, economic and market conditions in other countries, including other Latin American and emerging market countries. Developments or economic conditions in other emerging market countries have at times significantly affected the availability of credit to the Brazilian economy and resulted in considerable outflows of funds from Brazil and decreases in the amount of foreign investments in Brazil. Although economic conditions in these countries may differ significantly from economic conditions in Brazil, investors' reactions to developments in these other countries, such as the 2008-2009 developments in the global financial markets, may have an adverse effect on the market value of Brazilian companies or companies with significant operations in Brazil. Since a significant portion of our total assets is located in Brazil, a decrease of the perceived value of companies with substantial operations in Brazil could adversely impact the market price of our ordinary shares.

Risks Relating to our Debt

Our indebtedness could impair our financial condition and harm our ability to operate our business.

Certain of our subsidiaries have incurred indebtedness under a senior secured term loan and revolving credit facility, which we refer to, together with all related loan documents, as amended and restated in August 2017 and as amended thereafter, as the Amended Credit Agreement. The obligations under the Amended Credit Agreement are jointly and severally guaranteed on a senior basis by certain of our subsidiaries and secured by a pledge of the capital stock of, or equity interests in, most of our subsidiaries and by substantially all of our assets and those of our subsidiaries.

Our Brazilian operating subsidiary, SMART Brazil, has incurred additional indebtedness under a credit facility with the Brazilian Development Bank, or BNDES, which we refer to, together with all related loan documents and as amended from time to time, as the BNDES 2013 Credit Agreement. Under the BNDES 2013 Credit Agreement, credit in the amount of R$50.6 million (or $13.4 million) was made available to SMART Brazil for investments in infrastructure, research and development in Brazil and acquisitions of equipment not otherwise available in the Brazilian domestic market.

In December 2014, SMART Brazil entered into a second credit facility with BNDES, which we refer to, together with all related loan documents and as amended from time to time, as the BNDES 2014 Credit Agreement. The BNDES 2013 Credit Agreement and the BNDES 2014 Credit Agreement are collectively referred to as the BNDES Agreements. Under the BNDES 2014 Credit Agreement, a total of R$52.8 million (or $14.0 million) was made available to SMART Brazil for research and development conducted in Brazil related to IC packaging and for acquisitions of equipment not otherwise available in the Brazilian domestic market.

SMART Brazil's obligations under the BNDES Agreements are guaranteed by Banco Votorantim S/A, or Banco Votorantim. SMART Brazil has entered into an agreement with Banco Votorantim to assure payment to Banco Votorantim in the event that BNDES collects on either of the guarantees.

As of August 30, 2019, the outstanding principal balance under the Amended Credit Agreement and the BNDES 2014 Credit Agreement, respectively, was $208.5 million and R$13.2 million (or $3.5 million). We have a right to draw an additional $50.0 million under the revolving loan provisions of the Amended Credit Agreement.

Our indebtedness may have important consequences, including, but not limited to, the following:

- increasing our vulnerability to general economic downturns and adverse industry conditions;
- requiring us to dedicate a significant portion of our cash flows from operations to the payment of interest and principal on our debt, which would reduce the funds available to us for our working capital, capital expenditures or other general corporate requirements;

- limiting our flexibility in planning for, or reacting to, changes in our business and industry;
- placing us at a competitive disadvantage compared to our competitors with less indebtedness or more liquidity; and
- limiting our ability to obtain additional financing in the future for working capital, capital expenditures, acquisitions, general corporate purposes or other purposes.

All of our debt under the Amended Credit Agreement bears interest at variable rates. If the rates were to increase significantly, our ability to borrow additional funds may be reduced and the risks related to our indebtedness would be exacerbated.

Our Amended Credit Agreement contains restrictions that limit our flexibility in operating our business.

Our Amended Credit Agreement contains restrictive covenants that limit our ability to engage in specified transactions and prohibit us from voluntarily prepaying certain of our other indebtedness. These covenants limit our ability to, among other things:

- incur additional indebtedness;
- pay dividends on, or repurchase or make distributions in respect of, our capital stock or make other restricted payments;
- make certain investments, including limitations on capital expenditures and acquisitions;
- sell or transfer assets;
- enter into or effect sale leaseback transactions;
- enter into swap agreements;
- prepay, repurchase, redeem, otherwise defease or amend the terms of any subordinated indebtedness;
- change fiscal periods;
- create liens;
- acquire companies;
- enter into contractual obligations that restrict our ability to grant liens on assets or capital stock;
- change the character of our business;
- consolidate, merge, sell or otherwise dispose of all or substantially all of our assets; and
- enter into certain transactions with affiliates.

Under the Amended Credit Agreement, in certain circumstances we also are required to satisfy and maintain specified financial ratios. Our ability to meet those financial ratios could be affected by events beyond our control, and there can be no assurance that we will meet those ratios.

The failure to comply with any of these covenants would cause a default under the Amended Credit Agreement. A default, if not waived, could result in acceleration of the outstanding indebtedness under the Amended Credit Agreement, in which case such indebtedness would become immediately due and payable. If any default occurs, we may not be able to pay our debt or borrow sufficient funds to refinance it. Even if new financing is available, it may not be available on terms that are acceptable to us. Complying with these covenants may cause us to take actions that we otherwise would not take or not take actions that we otherwise would take.

Our ability to generate cash to service or to pay off our debt depends on many factors beyond our control.

Our ability to make scheduled payments on, to refinance, or to pay off our debt obligations depends on the financial condition and operating performance of our business. This, to a certain extent, is subject to prevailing economic and competitive conditions and to certain financial, business, regulatory and other factors beyond our control. Our business may not generate sufficient cash flows from operations, and future borrowings may not be available to us under the Amended Credit Agreement or the BNDES 2014 Credit Agreement in an amount sufficient to enable us to service our debt or to fund our other liquidity needs. If we are unable to meet our debt obligations or fund our other liquidity needs, we may need to restructure or refinance all or a portion of our debt or sell certain of our assets on or before the maturity of our debt. We may not be able to restructure or refinance any of our debt on commercially reasonable terms, if at all, which could cause us to default on our debt obligations and impair our liquidity. Any refinancing of our indebtedness could be at higher interest rates and may require us to comply with more onerous covenants that could further restrict our business operations. The outstanding principal balance of all term loans under the Amended Credit Agreement is due in full on August 9, 2022. As of August 30, 2019, the outstanding principal balance of these term loans was $208.5 million. If we are not able to refinance or restructure our debt obligations before they become due, this could cause us to default on our debt obligations and impair our liquidity.

In addition, if our cash flows and capital resources are insufficient to fund our debt service obligations, we may be forced to reduce or delay investments and capital expenditures, or to sell assets or seek additional capital. These alternative measures may not be available to us, may not be successful and may not permit us to meet our scheduled debt service obligations, which could result in substantial liquidity problems. Our Amended Credit Agreement restricts our ability to dispose of our assets and use the proceeds from the disposition. We may not be able to consummate those dispositions or to obtain the proceeds which we could realize from them, and these proceeds may not be adequate to meet any debt service obligations then due. Any of these circumstances could have a material adverse effect on our business, results of operations and financial condition.

Disruption in the financial markets may adversely impact the availability and cost of credit and cause other disruptions and additional costs at a time when we may need capital to refinance our debt or to fund growth.

Refinancing our existing debt or securing new debt or equity financing may be difficult, expensive, dilutive or impossible. As in the past, future instability in the financial markets may have an adverse effect on the U.S. and/or world economy which could adversely impact our business. If we are not able to obtain the capital required to refinance our existing debt or to fund future growth or if we are required to incur significant expenses and/or dilution to do so, this could have a material adverse effect on our business, results of operations and financial condition and may require us to undertake alternative plans, such as selling assets, reducing or delaying capital investments or downsizing our business.

Risks Relating to Investments in Cayman Islands Companies

We are a Cayman Islands company and, because the rights of shareholders under Cayman Islands law differ from those under U.S. law, shareholders may have difficulty protecting their shareholder rights.

Our corporate affairs are governed by our amended and restated memorandum and articles of association, the Cayman Islands Companies Law (2018 Revision), or the Companies Law, and the common law of the Cayman Islands. The rights of shareholders to take action against the directors, actions by minority shareholders and the fiduciary responsibilities of our directors to us under Cayman Islands law are to a large extent governed by the common law of the Cayman Islands. The common law of the Cayman Islands is derived in part from comparatively limited judicial precedent in the Cayman Islands as well as from English common law, which has persuasive, but not binding, authority on a court in the Cayman Islands. The rights of our shareholders and the fiduciary responsibilities of our directors under Cayman Islands law are not as clearly established as they would be under statutes or judicial precedent in some jurisdictions in the United States. In particular, the Cayman Islands has a less exhaustive body of securities laws as compared to the United States, and some states, such as Delaware, have more fulsome and judicially interpreted bodies of corporate law.

It may be difficult to enforce a judgment of U.S. courts for civil liabilities under U.S. federal securities laws against us in the Cayman Islands.

We are a company incorporated under the laws of the Cayman Islands. The Cayman Islands courts are unlikely:

- to recognize or enforce against us judgments of courts of the United States based on certain civil liability provisions of U.S. securities laws; or
- to impose liabilities against us, in original actions brought in the Cayman Islands, based on certain civil liability provisions of U.S. securities laws that are penal in nature.

Although there is no statutory enforcement in the Cayman Islands of judgments obtained in the United States, the courts of the Cayman Islands will recognize and enforce a foreign money judgment of a foreign court of competent jurisdiction without retrial on the merits based on the principle that a judgment of a competent foreign court imposes upon the judgment debtor an obligation to pay the sum for which judgment has been given provided certain conditions are met. For a foreign judgment to be enforced in the Cayman Islands, such judgment must be final and conclusive and for a liquidated sum, and must not be in respect of taxes or a fine or penalty, inconsistent with a Cayman Islands judgment in respect of the same matter, impeachable on the grounds of fraud or obtained in a manner, and/or be of a kind the enforcement of which is, contrary to natural justice or the public policy of the Cayman Islands (awards of punitive or multiple damages may well be held to be contrary to public policy). A Cayman Islands Court may stay enforcement proceedings if concurrent proceedings are being brought elsewhere.

As a result of all of the above, public shareholders may have more difficulty protecting their interests in the face of actions taken by management, members of the board of directors or controlling shareholders than they would as public shareholders of a U.S. company.

Risks Relating to Our Ordinary Shares

Influence by our principal shareholders could adversely affect our other shareholders.

As of October 18, 2019, 48% of our ordinary shares outstanding immediately after our initial public offering, or IPO, in May 2017 were owned by Silver Lake Partners III Cayman (AIV III), L.P., Silver Lake Sumeru Fund Cayman, L.P. (investment funds affiliated with Silver Lake Partners and Silver Lake Sumeru, collectively Silver Lake) and their affiliates, including certain of our directors and our Chief Executive Officer. Pursuant to the terms of the Amended and Restated Sponsors Shareholder Agreement dated as of May 30, 2017, or the Sponsor Shareholder Agreement, entered into in connection with the IPO, Silver Lake has the right to nominate members of our board of directors as follows: so long as Silver Lake and their affiliates own, in the aggregate, (i) less than 50% but at least 35% of our ordinary shares outstanding immediately after the IPO, Silver Lake will be entitled to nominate four directors, (ii) less than 35% but at least 20% of our ordinary shares outstanding immediately after the IPO, Silver Lake will be entitled to nominate three directors, (iii) less than 20% but at least 10% of our ordinary shares outstanding immediately after the IPO, Silver Lake will be entitled to nominate two directors, (iv) less than 10% but at least 5% of our ordinary shares outstanding immediately after the IPO, Silver Lake will be entitled to nominate one director, and (v) less than 5% of our ordinary shares outstanding immediately after the IPO, Silver Lake will not be entitled to nominate any directors. The Sponsor Shareholder Agreement further provides that, for so long as Silver Lake collectively owns ordinary shares in an amount equal to or greater than 25% of our ordinary shares outstanding immediately following the IPO, in addition to the approval of our board of directors, the approval of Silver Lake will be required for certain corporate actions such as change in control transactions, acquisitions with a value in excess of $5 million and any material change in the nature of the business conducted by us or our subsidiaries. As a result, based on Silver Lake's ownership of our ordinary shares and the rights in the Sponsor Shareholder Agreement, Silver Lake has significant ability to nominate members of our board of directors, and thereby influence our management and affairs. Silver Lake will continue to have significant influence over our affairs for the foreseeable future. This concentrated control will limit the ability of other shareholders to influence corporate matters and, as a result, we may take actions that our other shareholders do not view as beneficial. For example, this concentration of control could have the effect of delaying or preventing a change in control or otherwise discouraging a potential acquirer from attempting to obtain control of us, which in turn could cause the market price of our ordinary shares to decline or prevent our shareholders from realizing a premium over the market price for their ordinary shares. Furthermore, Silver Lake may have interests that are different from, or opposed to, the interests of the public shareholders.

The price of our ordinary shares may be volatile and subject to wide fluctuations.

The market price of the securities of technology companies can be especially volatile. Broad market and industry factors may adversely affect the market price of our ordinary shares regardless of our actual operating performance. The market price of our ordinary shares could be subject to wide fluctuations in response to the risk factors listed in this section and others beyond our control, including, among other things:

- actual or anticipated variations in our operating results;
- overall conditions in our industry;
- events affecting Brazil or the market for our products there;
- addition or loss of a major customer or of significant business at a major customer;
- changes in laws or regulations applicable to our products or our operations;
- actual or anticipated changes in our growth rate relative to our competitors;
- announcements of technological innovations by us or other companies operating in our industry;
- announcements by us or our competitors of significant acquisitions, strategic partnerships, divestitures, restructuring initiatives or other events that affect us or companies in our industry;
- additions or departures of key personnel;
- competition from existing products or new products that may emerge;
- the failure of financial analysts to cover our company;
- negative or inaccurate coverage by financial analysts;
- changes in financial estimates by financial analysts, any failure by us to meet or exceed any of these estimates or changes in the recommendations of any financial analysts that elect to follow our company or our competitors;
- changes in the market valuations of other companies operating in our industry;
- developments in existing litigation or disputes or the filing of new litigation or claims against us;
- disputes or other developments related to proprietary rights, including patents, litigation matters and our ability to obtain intellectual property protection for our technologies;
- announcement of, or expectation of, additional financing efforts;
- future sales of our ordinary shares;
- share price and volume fluctuations attributable to inconsistent trading volume levels of our ordinary shares;
- the expiration of contractual lock-up agreements with us and our executive officers, directors and shareholders; and
- general economic and market conditions.

In addition, the stock market in general has experienced substantial price and volume fluctuations that have often been unrelated or disproportionate to the operating performance of particular companies affected. These broad market and industry factors may materially harm the market price of our ordinary shares, regardless of our operating performance. In the past, following periods of volatility in the market price of certain companies' securities, securities class action litigation has been instituted against these companies. This litigation, if instituted against us, could adversely affect our financial condition or results of operations.

An active trading market for our ordinary shares may not be maintained.

Our ordinary shares are listed on the NASDAQ. However, we can provide no assurance that we will be able to maintain an active trading market for our ordinary shares on NASDAQ or any other exchange in the future. If there is no active market for our ordinary shares, the market price and liquidity of our ordinary shares may be materially and adversely affected. The lack of an active market may reduce the fair market value of our ordinary shares or impair your ability to sell the ordinary shares at the time you may wish to sell them or at a price that you consider reasonable. Investors in our ordinary shares may experience a significant decrease in the value of their shares regardless of our operating performance or prospects.

If financial analysts do not publish research or reports about our business, or publish negative reports about our business, our share price and trading volume could decline.

The trading market for our ordinary shares depends in part on the research and reports that financial analysts publish about us or our business. We do not have any control over these analysts. If one or more of the analysts who cover us downgrade our shares, change their opinion of our shares, or provide a negative opinion about our company, our share price would likely decline. If one or more of these analysts cease coverage of our company or fail to regularly publish reports on us, we could lose visibility in the financial markets, which could cause our share price or trading volume to decline.

If our estimates or judgments relating to our critical accounting policies are based on assumptions that change or prove to be incorrect, our results of operations could fall below expectations of securities analysts and investors, resulting in a decline in the market price of our ordinary shares.

The preparation of financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the amounts reported in the consolidated financial statements and accompanying notes. We base our estimates on historical experience and on various other assumptions that we believe to be reasonable under the circumstances, as described in “Item 7. Management’s Discussion and Analysis of Financial Condition and Results of Operations,” the results of which form the basis for making judgments about the carrying values of assets, liabilities, equity, revenue and expenses that are not readily apparent from other sources. Significant assumptions and estimates used in preparing our consolidated financial statements include those related to revenue recognition, accounts receivable, inventory valuation, income taxes, impairment of long-lived assets and long-lived assets to be disposed, share-based compensation and fair value of ordinary shares. If our assumptions change or if actual circumstances differ from those in our assumptions, our results of operations may be adversely affected and may fall below the expectations of securities analysts and investors, resulting in a decline in the market price of our ordinary shares.

Future sales of our ordinary shares in the public market, or the perception that these sales may occur, could cause our share price to fall.

Sales of substantial amounts of our ordinary shares in the public market, including sales of our ordinary shares by us or our affiliates pursuant to the Shelf Registration Statement, defined below, or otherwise, or the perception that these sales may occur, could cause the market price of our ordinary shares to decline. This could also impair our ability to raise additional capital through the sale of our equity securities. Under our amended and restated memorandum and articles of association, we are authorized to issue up to 200,000,000 ordinary shares, of which 23,616,874 ordinary shares were outstanding as of August 30, 2019. Out of our ordinary shares outstanding as of August 30, 2019, 9,959,293 shares are held by our affiliates and our current directors, executive officers and their respective affiliates, which are eligible for resale in the public markets, subject to Rule 144 under the Securities Act of 1933, as amended, the Securities Act. In addition, on September 20, 2018, we filed a shelf registration statement on Form S-3 with the SEC that was declared effective by the SEC on October 9, 2018 (the Shelf Registration Statement), which permits us to offer up to $150 million of ordinary shares, preferred shares, debt securities, warrants and purchase contracts in one or more offerings and in any combination, including in units from time to time, and which permits Silver Lake to sell up to 9,256,755 of our ordinary shares from time to time. We have also filed registration statements on Form S-8 to register the total number of shares of our common stock that may be issued under the SMART Global Holdings, Inc. 2017 Share Incentive Plan (the SGH Plan), including the equity awards issued to our executive officers and directors, and shares purchased under the SMART Global Holdings, Inc. 2018 Employee Share Purchase Plan (ESPP). As of August 30, 2019, there are 2,297,758 options outstanding to purchase our ordinary shares, and 1,078,218 RSUs outstanding under the SGH Plan, and there are 1,427,339 additional shares available for issuance under the SGH Plan and 540,090 shares available for purchase under the ESPP. These ordinary shares can be freely sold in the public market upon issuance under the SGH Plan or purchase under the ESPP subject to any restrictions on such shares pursuant to the respective plan documents.

In addition, certain of our existing shareholders and holders of options and RSUs, in the event they become exercisable, have the right to demand that we file a registration statement covering the offer and sale of their ordinary shares and shares issuable under such options and RSUs under the Securities Act and to require us to include their securities on a registration statement filed by us. While these holders, other than Silver Lake, waived their right to include their shares in the Shelf Registration Statement, if we file a registration statement in the future for the purpose of selling additional ordinary shares to raise capital and are required to include ordinary shares held by these shareholders pursuant to the exercise of their registration rights, our ability to raise capital may be impaired. In addition, if we conduct an offering under our Shelf Registration Statement, our ability to raise capital in such offering may be impaired.

We cannot predict the size of future sales or issuances of our ordinary shares or the effect, if any, that such future sales and issuances would have on the market price of our ordinary shares.

The requirements of being a public company have and will continue to increase our costs and may disrupt the regular operations of our business.

As a public company, our legal, accounting, reporting and other administrative costs have and will continue to increase.

We also anticipate that we will continue to incur costs associated with corporate governance requirements, including requirements under the Sarbanes-Oxley Act, as well as rules implemented by the SEC and NASDAQ. We expect these rules and regulations to increase our legal and financial compliance costs and make some management and corporate governance activities more time consuming and costly, particularly now that we are no longer an "emerging growth company." These rules and regulations may make it more difficult and more expensive for us to obtain director and officer liability insurance, and we may be required to accept reduced policy limits and coverage or incur substantially higher costs to obtain the same or similar coverage. This could have an adverse impact on our ability to recruit and bring on qualified directors.

The additional demands associated with being a public company may disrupt regular operations of our business by diverting the attention of some of our senior management team away from revenue producing activities to management and administrative oversight, adversely affecting our ability to attract and complete business opportunities and increasing the difficulty in both retaining professionals and managing and growing our businesses. Any of these effects could harm our business, financial condition and results of operations.

While we were an "emerging growth company" under the JOBS Act, our independent registered public accounting firm was not required to attest to the effectiveness of our internal control over financial reporting pursuant to Section 404 of the Sarbanes-Oxley Act. We are no longer an emerging growth company as of the beginning of our fiscal 2018, and our independent registered public accounting firm is required to attest to the effectiveness of our internal control over financial reporting pursuant to Section 404 of the Sarbanes-Oxley Act as of August 31, 2018. In addition, in connection with the implementation of the necessary procedures and practices related to internal control over financial reporting, we may identify deficiencies that we may not be able to remediate in time to meet the deadline imposed by the Sarbanes-Oxley Act for compliance with the requirements of Section 404. Failure to comply with Section 404 could subject us to regulatory scrutiny and sanctions, impair our ability to raise revenue, cause investors to lose confidence in the accuracy and completeness of our financial reports and negatively affect the price of our ordinary shares.

We no longer qualify as an "emerging growth company" and will be required to comply with certain provisions of the Sarbanes-Oxley Act and can no longer take advantage of reduced disclosure requirements.

For as long as we remained an emerging growth company, we could take advantage of certain exemptions from various reporting requirements that are applicable to other public companies that are not emerging growth companies including, but not limited to, not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act, reduced disclosure obligations regarding executive compensation in its periodic reports and proxy statements, and exemptions from the requirements of holding a non-binding advisory vote on executive compensation. We no longer qualify for such status, and as we are no longer an emerging growth company, we expect to incur additional expenses and devote substantial management effort toward ensuring compliance with those requirements applicable to companies that are not emerging growth companies.

Anti-takeover provisions in our organizational documents may discourage our acquisition by a third party, which could limit shareholders' opportunity to sell their ordinary shares at a premium.

Our amended and restated memorandum and articles of association include provisions that could limit the ability of others to acquire control of us, modify our structure or cause us to engage in change of control transactions. These provisions include, among other things:

- a classified board of directors with staggered three-year terms;
- restrictions on the ability of our shareholders to call meetings or make shareholder proposals;
- our amended and restated memorandum and articles of association may only be amended by a vote of shareholders representing at least 75% of the outstanding ordinary shares or by a unanimous written consent;
- so long as Silver Lake collectively owns at least 40% of the number of our outstanding ordinary shares, directors may be removed with or without cause, the size our board may be increased and vacancies on the board may be filled upon the affirmative vote of a majority of our outstanding ordinary shares; however, at any time when Silver Lake owns less than 40% of our outstanding ordinary shares, shareholders will not be permitted to increase the size of our board, fill vacancies on our board or remove directors without cause; and
- the ability of our board of directors, without action by our shareholders, to issue 30,000,000 preferred shares and to issue additional ordinary shares that could have the effect of impeding the success of an attempt to acquire us or otherwise effect a change in control.

These provisions could deter, delay or prevent a third party from acquiring control of us in a tender offer or similar transactions, even if such transaction would benefit our shareholders. Even in the absence of a takeover attempt, the existence of these provisions may adversely affect the prevailing market price of our ordinary shares if they are viewed as discouraging future takeover attempts.

As of October 18, 2019, 40% of our outstanding ordinary shares were owned by Silver Lake and their affiliates, including certain of our directors and our Chief Executive Officer.

We do not anticipate paying any cash dividends in the foreseeable future.

We currently intend to retain our future earnings, if any, for the foreseeable future, to repay indebtedness and to fund the development and growth of our business. We do not intend to pay any dividends to holders of our ordinary shares. In addition, our Amended Credit Agreement contains restrictions on our ability to pay dividends. As a result, capital appreciation in the price of our ordinary shares, if any, will be your only source of gain on an investment in our ordinary shares.

Item 1B. Unresolved Staff Comments.

None.

Item 2. Properties

We have facilities in Newark, Fremont and Irvine California; Atibaia, Brazil; Penang, Malaysia; Gilbert and Tempe, Arizona; New Taipei City, Taiwan; Seongnam-City, South Korea; Tewksbury, Massachusetts; Bangalore and Cochin, India; East Kilbride, Scotland; and Houston, Texas.

Location	Facility size (Sq. Feet)	Leased or Owned	Lease Expiration	Capabilities
Newark, CA	79,480	Leased	April 2021	U.S. Headquarters Procurement R&D Manufacturing Sales Supply Chain Services
	30,000	Leased	February 2020	Supply Chain Services
Fremont, CA	44,256	Leased	July 2030	Manufacturing Procurement Sales
	42,050	Leased	December 2030	Manufacturing R&D Sales
Atibaia, Brazil	87,088	Leased	June 3032	Procurement
	65,926	Leased	October 2027	R&D Manufacturing Sales
Penang, Malaysia*	86,730	Owned	N/A	Procurement R&D Manufacturing Sales Supply Chain Services
	25,750	Leased	July 2022	Procurement Supply Chain Services
Tempe, AZ	87,709	Leased	September 2021	R&D Sales
New Taipei City, Taiwan	14,788	Leased	November 2021	Procurement R&D Sales
Seongnam-City, South Korea	12,622	Leased	July 2021	R&D
Gilbert, AZ	9,750	Leased	December 2021	Procurement R&D Sales
Tewksbury, MA	7,666	Leased	September 2023	R&D
Bangalore, India	5,000	Leased	March 2021	R&D
Cochin, India	2,495	Leased	August 2021	R&D
Irvine, CA	4,394	Leased	August 2022	Procurement R&D Sales
East Kilbride, Scotland	3,300	Leased	July 2024	Supply Chain Services
Houston, TX	2,415	Leased	June 2024	Sales

* Our Penang facility is situated on leased land with a term expiring in 2070.

We also lease a number of smaller design, planning and sales facilities worldwide.

Item 3. Legal Proceedings

We are currently involved in, and may in the future be involved in, legal proceedings, claims and government investigations in the ordinary course of business. We are involved in litigation, and may in the future be involved in litigation, with third parties asserting, among other things, infringement of their intellectual property rights. We are currently involved in several proceedings, including the following:

Indemnification Claims by SanDisk

In August 2013, we completed the sale (the Sale) of substantially all of the business unit which was focused on solid state drives, to SanDisk Corporation (now a part of Western Digital). In connection with the Sale the sale agreement (Sale Agreement) contained certain indemnification obligations, including, among others, for losses arising from breaches of representations and warranties relating to the Sale. These indemnification obligations are subject to a number of limitations, including certain deductibles and caps and limited time periods for making indemnification claims. On August 21, 2014, SanDisk made a claim against us under the indemnification provisions of the Sale Agreement in connection with a lawsuit filed by Netlist, Inc. (Netlist) against SanDisk alleging that certain products sold in the Sale infringe various Netlist patents, which SanDisk in turn alleges would, if true, constitute a breach of representations and warranties under the Sale Agreement. Under the Sale Agreement, our indemnification obligation in respect of intellectual property matters, such as those claimed by SanDisk, is subject to a deductible of approximately $1.8 million and a cap of $60.9 million. As required in the Sale Agreement, the SanDisk claim purported to include a preliminary good faith estimate of SanDisk's alleged indemnifiable losses, which estimate was greater than the Sale Agreement cap for intellectual property matters. We believe that the allegations giving rise to the indemnification claim are without merit and we intend to dispute SanDisk's claim for indemnification. In addition, there may be other grounds for us to dispute the indemnification claim and/or the amounts of any indemnifiable losses of SanDisk.

Netlist

On September 10, 2012, SMART Modular filed a complaint in the Eastern District of California (the EDCA) against Netlist alleging infringement of certain claims of SMART Modular's U.S. Patent No. 8,250,295 (the '295 patent) and seeking, among other things, a preliminary injunction. Netlist filed certain counterclaims alleging, among other things, attempted monopolization, collusion, unfair competition, fraud on the U.S. Patent and Trademark Office (the USPTO) and sham litigation, and asserting that the '295 patent is invalid.

In July 2013, Netlist filed a lawsuit in the Central District of California against SMART Modular alleging claims very similar to Netlist's counterclaims set forth in the EDCA case. Netlist later amended its complaint to add additional parties, including SMART Worldwide. Netlist has sought compensatory damages for the harm it claims to have suffered, as well as an award of treble damages and attorneys' fees. The claims against SMART Modular and SMART Worldwide were transferred to the EDCA.

In January 2019 the parties entered into stipulated settlements to dismiss with prejudice, all claims and counterclaims in both actions with no amounts for damages being paid by either party and with each party to bear their own costs.

Import Duty Tax assessment in Brazil

On February 23, 2012, SMART Brazil was served with a notice of a tax assessment for approximately R$117.0 million (or $31.1 million) (the First Assessment). The First Assessment was from the federal tax authorities of Brazil and related to four taxes in connection with the importation processes. The tax authorities claimed that SMART Brazil categorized its imports of unmounted integrated circuits in the format of wafers under an incorrect product classification code, which carries an import duty of 0%. The authorities alleged that a different classification code should have been used that would require an 8% import duty and the authorities were seeking to recover these duties, as well as other related taxes, for the five calendar years of 2007 through and including 2011. Subsequent to the initial assessment, SMART Brazil received a second notice of an additional administrative penalty of approximately R$6.0 million (or $1.6 million) directly related to the same issue and which has been imposed exclusively for the alleged usage of an inappropriate import tax code (the Second Assessment).

In March 2012, SMART Brazil filed defenses to the First Assessment and the Second Assessment. On May 2, 2013, the first level administrative tax court issued a ruling in favor of the tax assessor and against SMART Brazil on the First Assessment. On May 31, 2013, SMART Brazil filed an appeal to the second level tax court known as CARF. The appeal was heard on November 26, 2013 and SMART Brazil received a unanimous favorable ruling rejecting the position of the tax authorities. Subsequently, the tax authorities filed a request for clarification and on September 17, 2014, SMART Brazil received a unanimous ruling rejecting the request from the tax authorities for clarification. On November 7, 2014, the tax authorities notified CARF that they would not be appealing the CARF decision, and the First Assessment has been extinguished. On February 6, 2018, the first level administrative court unanimously ruled in favor of SMART Brazil with respect to the Second Assessment. Due to the size of the Second Assessment, Brazil law required that the tax authorities appeal the decision to CARF. The appeal on the Second Assessment was heard on December 11, 2018 and SMART Brazil received a unanimous favorable ruling rejecting the position of the tax authorities. The tax authorities did not file any request for clarification or appeal and, as a result, the Second Assessment was extinguished in May 2019.

On December 12, 2013, SMART Brazil received another notice of assessment in the amount of R$3.6 million (or $1.0 million) with respect to the same import-related tax issues and penalties discussed above for 2012 and 2013 (the Third Assessment). The Third Assessment does not seek import duties and related taxes on Dynamic Random Access Memory (DRAM) products and only seeks import duties and related taxes on Flash unmounted components with respect to the months of January 2012 to June 2012. This is because SMART Brazil's imports of DRAM unmounted components were subject to 0%, and, after June 2012, SMART Brazil's imports of Flash unmounted components became subject to 0%, import duties and related taxes, both as a result of PADIS. Even with this 0%, if SMART Brazil is found to have used the incorrect product classification code, SMART Brazil will be subject to an administrative penalty equal to 1% of the value of the imports. SMART Brazil has filed defenses to the Third Assessment. The Company believes that SMART Brazil used the correct product code on its imports and that the Third Assessment is incorrect. SMART Brazil intends to vigorously fight this matter. Although SMART Brazil did not receive the Third Assessment until December 12, 2013, the Third Assessment was issued before the CARF decision in favor of SMART Brazil on the First Assessment as discussed above was published.

The amounts claimed by the tax authorities on the Third Assessment are subject to increases for interest and other charges, which resulted in a combined assessment balance of approximately R$5.6 million (or $1.5 million) as of August 30, 2019.

As a result of the CARF decisions in favor of SMART Brazil on the First Assessment and the Second Assessment, we believe that the probability of any material charges as a result of the Third Assessment is remote and we do not expect the resolution of this disputed assessment to have a material impact on its consolidated financial position, results of operations or cash flows. While we believe that the Third Assessment is incorrect, there can be no assurance that SMART Brazil will prevail in the disputes.

Item 4. Mine Safety Disclosures.

Not applicable.

Part II.

Item 5. Market For Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities

Market Information for Ordinary Shares

On May 24, 2017, our ordinary shares began trading on the NASDAQ Global Select Market under the symbol "SGH". Prior to that date, there was no public trading market for our common stock. Shares sold in our initial public offering, or IPO, were priced at $11.00 per share on May 23, 2017.

Holders

As of October 18, 2019 there were 83 registered holders of record of our ordinary shares (not including beneficial holders of our ordinary shares in street names).

Dividends

We have not paid any cash dividends on our ordinary shares, and we do not currently intend to pay any cash dividends on our ordinary shares in the foreseeable future. We currently intend to retain all available funds and any future earnings to support operations and to finance the growth and development of our business. Any future determination to pay dividends will be made at the discretion of our board of directors subject to applicable laws and will depend upon, among other factors, our results of operations, financial condition, contractual restrictions and capital requirements. Our future ability to pay cash dividends on our capital stock may also be limited by the terms of any future debt or preferred securities or future credit facility.

Unregistered Sales of Equity Securities

SMART EC Acquisition

In connection with the SMART EC acquisition as described in Item 15, Consolidated Financial Statements, Note 2, the seller is entitled to earn-out payments of up to $10 million based on achievement of specific gross revenue levels through December 31, 2019 plus additional earn-out payments of $0.10 for each dollar of gross revenue through December 31, 2019 over an agreed upon achievement level. The earn-out is payable, at our option, in either cash or in the ordinary shares of SMART Global Holdings, Inc., par value $0.03 per share, the Shares, with each of the Shares to be valued at the volume weighted average daily price of the Shares as traded on the Nasdaq Global Select Market and reported on Bloomberg, measured over the ten trading-day period of such Shares immediately preceding and ended December 30, 2019. In the event that any earn-out is achieved and we elect to pay the earn-out consideration in Shares, then, pursuant to the Artesyn SPA, we will use our reasonable best efforts to (i) cause a registration statement on Form S-3 to be filed with the U.S. Securities and Exchange Commission on or before the forty-fifth day following the earn-out determination date with respect to the resale of such Shares by the seller and (ii) cause such registration statement to become effective and to remain effective until the first to occur of (A) such time that all such Shares have been sold by seller and (B) the first anniversary of the date of such effectiveness.

In the event that any earn-out is achieved and we elect to pay the earn-out consideration in Shares, then such Shares will be issued in reliance upon the exemption from registration available under Section 4(a)(2) of the Securities Act, including Regulation D promulgated thereunder. We did not engage in any form of general solicitation or general advertising in connection with the transaction to acquire AEC. Seller also represented that it was an "accredited investor" as defined in the Securities Act, and that it would be acquiring the Shares for its own account and not for distribution. All Shares issued in this transaction will have a legend stating that these Shares have not been registered under the Securities Act and cannot be transferred until properly registered under the Securities Act or an exemption applies. This exemption is based on certain representations, warranties, agreements, and covenants contained in the Artesyn SPA.

SMART Wireless Acquisition

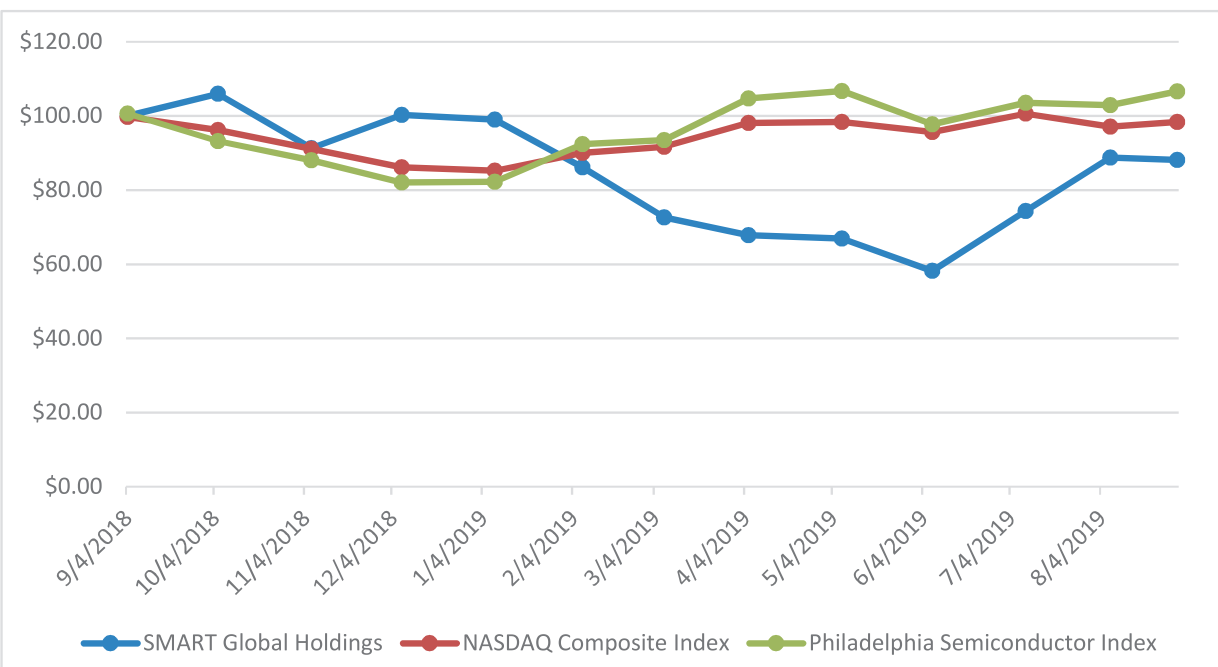
In connection with the acquisition of SMART Wireless, as described in Item 15, Consolidated Financial Statements, Note 2, SMART Global Holdings, Inc., issued 382,788 Shares as part of the merger consideration and retained as security for the sellers' indemnification obligations as well as any post-closing adjustments to the purchase price (the Holdback), $0.7 million in cash and 67,550 in Shares. The Shares issued and to be issued in connection with this transaction are also subject to a lock-up period, pursuant to which the Shares may not be sold by for one year following the closing date of July 9, 2019.

All of the Shares issued in the SMART Wireless transaction were issued in reliance upon the exemption from registration available under Section 4(a)(2) of the Securities Act, including Regulation D promulgated thereunder. SMART Global Holdings, Inc. did not engage in any form of general solicitation or general advertising in connection with the Inforce transaction. Each of the Inforce shareholders receiving Shares also represented that it was an "accredited investor" as defined in the Securities Act and that it was acquiring such securities for its own account and not for distribution. All Shares issued in this transaction have a legend stating that these Shares have not been registered under the Securities Act and cannot be transferred until properly registered under the Securities Act or an exemption applies. This exemption is based on certain representations, warranties, agreements, and covenants contained in the merger agreement entered into in connection with this transaction.

Stock Performance Graph

This performance graph shall not be deemed "soliciting material" or to be "filed" with the Securities and Exchange Commission, or the SEC, for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, or the Exchange Act, or otherwise subject to the liabilities under that Section, and shall not be deemed to be incorporated by reference into any of our filings under the Securities Act of 1933, as amended, or the Securities Act, except as shall be expressly set forth by specific reference in such filing.

The following performance graph shows the cumulative total stockholders return of an investment of $100 in cash on August 31, 2018 through August 30, 2019, in our common stock, the NASDAQ Composite Index and Philadelphia Semiconductor Index and assuming that all dividends were reinvested. The stock price performance on the following graph is not necessarily indicative of future price performance of our stock.



Item 6. Selected Financial Data

The following tables present our historical selected consolidated financial data. The selected consolidated statement of operations data for the years ended August 30, 2019, August 31, 2018 and August 25, 2017, and the selected consolidated balance sheet data as of August 30, 2019 and August 31, 2018 are derived from our audited consolidated financial statements that are included elsewhere in this report. The selected statement of operations data for the year ended August 26, 2016 and August 28, 2015, and the selected consolidated balance sheet data as of August 25, 2017, August 26, 2016 and August 28, 2015 are derived from our audited consolidated balance sheet as of such dates and is not included in this report. Our historical results are not necessarily indicative of the results that may be expected in the future.

We maintain our books and records in U.S. dollars and prepare our consolidated financial statements in accordance with U.S. GAAP.

This financial information should be read in conjunction with "Management's Discussion and Analysis of Financial Condition and Results of Operations" and our consolidated financial statements, including the notes thereto, included elsewhere in this report.

	Fiscal Year Ended				
	August 30, 2019	August 31, 2018	August 25, 2017	August 26, 2016	August 28, 2015
	(in thousands, other than per share data)				
Consolidated Statement of Operations Data:					
Net sales	$1,211,999	$1,288,821	$ 761,291	$ 534,423	$ 643,469
Cost of sales[1][2]	974,472	997,235	599,041	427,491	512,032
Gross profit	237,527	291,586	162,250	106,932	131,437
Operating expenses:					
Research and development[1][2]	47,920	39,824	38,160	38,116	43,741
Selling, general, and administrative[1][2]	103,226	84,541	66,759	57,495	89,233
Change in estimated fair value of acquisition-related contingent consideration	(2,700)	(3,000)	—	—	—
Management advisory fees	—	—	3,000	4,001	4,030
Restructuring charge	—	—	457	1,135	1,143
Total operating expenses	148,446	121,365	108,376	100,747	138,147
Income (loss) from operations	89,081	170,221	53,874	6,185	(6,710)
Interest expense, net	(20,716)	(19,144)	(29,204)	(25,575)	(27,560)
Other income (expense), net	(2,161)	(13,299)	(22,551)	1,874	(5,532)
Total other expense	(22,877)	(32,443)	(51,755)	(23,701)	(33,092)
Income (loss) before income taxes	66,204	137,778	2,119	(17,516)	(39,802)
Provision for income taxes	14,872	18,315	9,914	2,444	6,649
Net income (loss)	$ 51,332	$ 119,463	$ (7,795)	$ (19,960)	$ (46,451)
Earnings per share:					
Basic	$ 2.24	$ 5.42	$ (0.49)	$ (1.44)	$ (3.36)
Diluted	$ 2.19	$ 5.17	$ (0.49)	$ (1.44)	$ (3.36)
Shares used in computing earnings per share:					
Basic	22,959	22,051	15,785	13,841	13,833
Diluted	23,468	23,119	15,785	13,841	13,833

(1) Includes share-based compensation expense as follows:

Cost of sales	$ 2,485	$ 1,335	$ 636	$ 461	$ 771
Research and development	2,654	1,460	655	725	844
Selling, general and administrative	13,060	7,763	4,073	2,686	4,517

(2) Includes amortization of intangible assets expense as follows:

Cost of sales	$ 566	$ 7	$ —	$ —	$ —
Research and development	—	987	4,897	4,897	6,160
Selling, general and administrative	5,048	5,136	7,042	8,471	24,669

	Fiscal Year Ended				
	August 30, 2019	**August 31, 2018**	**August 25, 2017**	**August 26, 2016**	**August 28, 2015**
	(dollars in thousands)				
Other Financial Data:					
Adjusted EBITDA[(1)]	$ 134,673	$ 195,540	$ 99,387	$ 51,760	$ 55,762
Gross billings to customers[(2)]	$2,158,302	$2,302,214	$1,625,547	$1,925,047	$2,147,437
Days sales outstanding (DSO)[(3)]	37	38	41	27	31
Inventory turns[(4)]	16	9	12	18	15
Days payable outstanding (DPO)[(5)]	31	40	47	40	51

(1) We define Adjusted EBITDA as our net income (loss) plus net interest expense, income tax expense, depreciation and amortization expense, share-based compensation, acquisition-related expenses, restructuring charges, amortization of non-cash debt discount related to warrants, non-cash charges in connection with refinancing, and other infrequent or unusual items. We have provided a reconciliation below of Adjusted EBITDA to net income (loss), the most directly comparable U.S. GAAP financial measure.

We have included Adjusted EBITDA in this report because it is a key measure used by our management and board of directors to understand and evaluate our core operating performance and trends, to prepare and approve our annual budget and to develop short-term and long-term operational and compensation plans. In particular, the exclusion of certain non-cash, non-recurring or infrequent expenses in calculating Adjusted EBITDA can provide useful measures for period-to-period comparisons of our core business. Accordingly, we believe that Adjusted EBITDA provides useful information to investors and others in understanding and evaluating our operating results in the same manner as our management and board of directors.

Adjusted EBITDA has limitations as an analytical tool, and you should not consider this measure in isolation or as a substitute for analysis of our results as reported under U.S. GAAP. Some of these limitations are:

- Adjusted EBITDA does not consider the cost of equity-based compensation, which is an ongoing expense for us;
- Adjusted EBITDA does not reflect past cash capital expenditures and future requirements for replacements or for new capital expenditures;
- Adjusted EBITDA does not reflect tax payments that may represent a reduction in cash available to us; and
- other companies, including companies in our industry, may calculate Adjusted EBITDA differently, which reduces its usefulness as a comparative measure.

Because of these limitations, you should consider Adjusted EBITDA along with other financial performance measures, including various cash flow metrics, net income (loss) and our other U.S. GAAP results. A reconciliation of Adjusted EBITDA to net income (loss) is provided below:

	Fiscal Year Ended				
	August 30, 2019	August 31, 2018	August 25, 2017	August 26, 2016	August 28, 2015
			(in thousands)		
Net income (loss)	$ 51,332	$ 119,463	$ (7,795)	$ (19,960)	$ (46,451)
Share-based compensation expense	18,199	10,558	5,364	3,872	6,132
Amortization of intangible assets	5,614	6,130	11,939	13,368	30,829
Interest expense, net	20,716	19,144	29,204	25,575	27,560
Provision for income tax	14,872	18,315	9,914	2,444	6,649
Depreciation	23,592	20,052	21,300	18,111	19,315
Acquisition-related expenses*	2,922	3,435	25	1,611	123
Contingent consideration fair value adjustment*	(2,700)	(3,000)	—	—	—
Purchase accounting adjustment*	—	631	—	—	—
Legal fees - term loan (payment holiday)	126	—	—	—	—
S-1 related costs	—	812	—	—	—
Loss on extinguishment of debt**	—	—	16,579	—	—
Loss on early repayment of debt***	—	—	6,743	—	—
Debt extension costs****	—	—	1,745	—	—
Management advisory fees	—	—	3,000	4,001	4,030
Investment advisory fees	—	—	540	—	—
Restructuring	—	—	457	1,135	1,143
Obsolete inventory related to restructuring	—	—	372	—	—
Valuation adjustment related to prepaid state value-added taxes	—	—	—	908	—
Misappropriated product shipment	—	—	—	695	—
Write-off of public offering expenses	—	—	—	—	4,388
In-process research and development charge	—	—	—	—	1,582
Storage sale-related legal costs	—	—	—	—	987
Insurance settlement related to a fiscal 2013 claim	—	—	—	—	(525)
Adjusted EBITDA	$ 134,673	$ 195,540	$ 99,387	$ 51,760	$ 55,762

* Amounts in fiscal 2019 and 2018 related to acquisitions of SMART EC and SMART Wireless (July 2019) and Penguin Computing (June 2018).

** Consists of $15.2 million loss on extinguishment of long-term debt for principal payment of $151.0 million in August 2017 and a $1.4 million loss on a February 2017 extinguishment.

*** Loss on early payment of term loan for principal amount of $61.1 million in June 2017 related to the IPO.

**** Debt extension costs associated with the amendment of our senior secured term loan and revolving credit facility in November 2016.

(2) Gross billings to customers consists of product net sales and our gross billings for services. We provide procurement, logistics, inventory management, kitting or packaging services for certain customers. We account for sales from these services on an agency basis (that is, we recognize the fees associated with serving as an agent with no associated cost of sales). We recognize revenue for these arrangements as service revenue, which is determined as a fee for services based on material procurement costs. See Note 1(d) to our consolidated financial statements.

(3) We calculate days sales outstanding as (i) accounts receivable outstanding as of the period end divided by (ii) gross billings to customers for the period (iii) divided by the number of days in the period.

(4) We calculate inventory turns as (i) cost of sales plus cost of purchased materials—service for the period, on an annualized basis (i.e., multiplied by four and then divided by the number of quarters in the period) divided by (ii) inventory as of the period end.

(5) We calculate days payables outstanding as (i) accounts payable outstanding as of the period end divided by (ii) (x) cost of sales plus cost of purchased materials—service for the period divided by (y) the number of days in the period.

	As of				
	August 30, 2019	August 31, 2018	August 25, 2017	August 26, 2016	August 28, 2015
			(in thousands)		
Consolidated Balance Sheet Data:					
Cash and cash equivalents	$ 98,139	$ 31,375	$ 22,436	$ 58,634	$ 68,094
Working capital	234,360	226,264	107,115	90,095	98,074
Total assets	704,137	672,762	480,028	458,655	564,707
Long-term debt	182,450	184,190	154,450	225,587	234,617
Total shareholders' equity (deficit)	273,460	187,128	82,396	(1,237)	8,639

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations

The following discussion and analysis of our financial condition and results of operations should be read in conjunction with the condensed consolidated financial statements and the notes to those statements included elsewhere in this Annual Report on Form 10-K. This discussion contains forward looking statements that involve risks and uncertainties. Our actual results could differ materially from those contained in these forward-looking statements due to a number of factors, including those discussed below and elsewhere in this report. See also "Cautionary Note Regarding Forward-Looking Statements" at the beginning of this report.

We use a 52- to 53-week fiscal year ending on the last Friday in August. Unless the context indicates otherwise, whenever we refer in this report to a particular year, with respect to ourselves, we mean the fiscal year ending in that particular calendar year. Financial information for two of our subsidiaries SMART Brazil and SMART do Brazil is included in our consolidated financial statements on a one-month lag because their fiscal years begin August 1 and end July 31.

For an overview of our business, see "Part I – Item 1. Business Overview."

Components of Operating Results

Net Sales

We generate product revenues predominantly from sales of our solutions, which include memory components and modules and specialty compute and storage products, to OEMs, as well as end users that compete in the computing, networking, communications, storage, aerospace, defense, mobile and industrial markets. Sales of our products are made primarily pursuant to purchase orders and are not based on long-term supply agreements. We generate service revenue by providing procurement, logistics, inventory management, temporary warehousing, kitting and packaging services. Our net sales are substantially dependent upon demand in the end markets for our customers' products and fluctuations in end-user demand can have a rapid and material effect on our net sales. Furthermore, sales to relatively few customers have accounted for, and we expect for the foreseeable future will continue to account for, a significant percentage of our net sales.

Cost of Sales

The most significant components of cost of sales are materials, fixed manufacturing costs, labor, depreciation, freight and customs charges. Increases in capital expenditures may increase our future cost of sales due to higher levels of depreciation expense. Cost of sales also includes any inventory write-downs. We have in the past, and may in the future, write down inventory for a variety of reasons, including obsolescence, excess quantities and declines in market value below our cost. A significant percentage of our cost of sales consists of the cost of DRAM and Flash components and wafers. While we have historically received competitive pricing and have had consistent sources of supply for these supplies, we do not have agreements that provide us with fixed pricing or guarantees of supply. Increases in DRAM pricing typically improve our margins, at least in the short term and particularly in our operations in Brazil, as we consume previously purchased inventory. However, declines in DRAM pricing often require us to reduce our prices even as we consume higher priced DRAM inventory, thereby reducing our margins.

Gross Profit

Gross profit and gross margin has been and will continue to be affected by a variety of factors, including the average sales prices of our products, manufacturing and overhead costs, the mix of products sold and our ability to leverage our existing infrastructure as we continue to grow. We expect our gross margins to fluctuate over time depending on the factors described above.

Operating Expenses

Our operating expenses consist of research and development expense, selling, general and administrative expense and management advisory fees. Personnel costs are the most significant component of operating expenses.

Research and development expense. Research and development expense consists primarily of personnel costs, consulting costs, allocated overhead and other costs to support our development activities. To date, we have expensed all research and development costs as incurred. We expect research and development expense to increase in absolute dollars as we continue to invest in our research and product development efforts to enhance our product capabilities and access new customer markets, although such expense may fluctuate as a percentage of total net sales. In order to qualify for certain tax incentives under PADIS and PPB/IT Program in Brazil, we are required to expend a minimum amount on research and development in Brazil.

Selling, general and administrative expense. Sales and marketing expense consists primarily of personnel costs, sales commission costs and allocated overhead. We expense sales commission costs as incurred. Sales and marketing expense also includes costs for recruiting and training channel partners, market development programs, promotional and other marketing activities, travel, office equipment and outside consulting costs. We expect sales and marketing expense to increase in absolute dollars as we expand our sales and marketing headcount in all markets and expand our international operations, although such expense may fluctuate as a percentage of net sales.

General and administrative expense consists primarily of personnel costs, facilities and non-manufacturing equipment costs, allowances for bad debt and other support costs, including utilities, insurance and professional fees. We have experienced and will continue to experience increased general and administrative expenses as a result of being a publicly-traded company, including significant increased legal and accounting costs related to compliance with rules and regulations implemented by the SEC and NASDAQ, as well as additional insurance, investor relations and other costs associated with being a public company.

Interest Expense, Net

Interest expense, net consists primarily of interest expense on our debt obligations.

Other Expense, Net

Other expense, net includes gains and losses from foreign currency transactions and other non-operating items.

Provision for Income Taxes

We record income taxes using the asset and liability method, which requires the recognition of deferred tax assets and liabilities for the expected future tax consequences of events that have been recognized in our financial statements or tax returns. In estimating future tax consequences, we generally consider all expected future events other than enactments or changes in the tax law or rates. We provide valuation allowances when necessary to reduce deferred tax assets to the amount expected to be realized.

We recognize a tax benefit from an uncertain tax position only if it is more likely than not that the tax position will be sustained on examination by the taxing authorities, based on the technical merits of the position. We then measure the tax benefits recognized in the financial statements from such positions based on the largest benefit that has a greater than 50% likelihood of being realized upon settlement. In the event that we recognize any unrecognized tax benefits, the effective tax rate will be affected. If recognized, approximately $1.6 million of unrecognized tax benefit would impact the effective tax rate at August 30, 2019. Although we believe our estimates are reasonable, we cannot assure that the final tax outcome of these matters will be the same as these estimates. We update these estimates quarterly based on factors such as changes in facts or circumstances, changes in tax law, new audit activity and effectively settled issues.

We follow specific and detailed guidelines in each tax jurisdiction regarding the recoverability of any tax assets recorded on the balance sheet and provide necessary valuation allowances as required. Future realization of deferred tax assets ultimately depends on the existence of sufficient taxable income of the appropriate character (for example, ordinary income or capital gain) within the carryback or carryforward periods available under the tax law. We regularly review our deferred tax assets for recoverability based on historical taxable income, projected future taxable income, the expected timing of the reversals of existing temporary differences and tax planning strategies. Our judgments regarding future profitability may change due to many factors, including future market conditions and our ability to successfully execute our business plans and/or tax planning strategies. Should there be a change in our ability to recover our deferred tax assets, our tax provision would increase or decrease in the period in which the assessment is changed.

Results of Operations

The following is a summary of our results of operations for the periods presented. The period-to-period comparison of results is not necessarily indicative of results for future periods.

	Fiscal Year Ended					
	August 30, 2019	% of sales*	August 31, 2018	% of sales*	August 25, 2017	% of sales*
Consolidated Statement of Operations Data:						
Net sales	$1,211,999	100%	$1,288,821	100%	$761,291	100%
Cost of sales (1)(2)	974,472	80%	997,235	77%	599,041	79%
Gross profit	237,527	20%	291,586	23%	162,250	21%
Operating expenses:						
Research and development (1) (2)	47,920	4%	39,824	3%	38,160	5%
Selling, general and administrative (1) (2)	103,226	9%	84,541	7%	66,759	9%
Change in estimated fair value of acquisition-related contingent consideration	(2,700)	0%	(3,000)	0%	—	0%
Management advisory fees	—	0%	—	0%	3,000	0%
Restructuring	—	0%	—	0%	457	0%
Total operating expenses	148,446	12%	121,365	9%	108,376	14%
Income from operations	89,081	7%	170,221	13%	53,874	7%
Other income (expense):						
Interest expense, net	(20,716)	(2%)	(19,144)	(1%)	(29,204)	(4%)
Other expense, net	(2,161)	0%	(13,299)	(1%)	(22,551)	(3%)
Total other expense	(22,877)	(2%)	(32,443)	(3%)	(51,755)	(7%)
Income before income taxes	66,204	5%	137,778	11%	2,119	0%
Provision for income taxes	14,872	1%	18,315	1%	9,914	1%
Net income (loss)	$ 51,332	4%	$ 119,463	9%	$ (7,795)	(1%)
Earnings per share:						
Basic	$ 2.24		$ 5.42		$ (0.49)	
Diluted	$ 2.19		$ 5.17		$ (0.49)	
Shares used in computing earnings per share:						
Basic	22,959		22,051		15,785	
Diluted	23,468		23,119		15,785	

* Summations may not compute precisely due to rounding.

(1) Includes share-based compensation expense as follows:			
Cost of sales	$ 2,485	$ 1,335	$ 636
Research and development	2,654	1,460	655
Selling, general and administrative	13,060	7,763	4,073
(2) Includes amortization of intangible assets expense as follows:			
Cost of sales	$ 566	$ 7	$ —
Research and development	—	987	4,897
Selling, general and administrative	5,048	5,136	7,042

Comparison of the Years Ended August 30, 2019 and August 31, 2018

	Fiscal Year Ended		Change	
	August 30, 2019	August 31, 2018	Amount	%
	(in thousands, except percentages)			
Net sales	$1,211,999	$1,288,821	$ (76,822)	(6%)
Cost of sales [(1)]	974,472	997,235	(22,763)	(2%)
Gross profit	$ 237,527	$ 291,586	$ (54,059)	(19%)
Gross margin	19.6%	22.6%		

(1) Includes share-based compensation expense and intangible amortization of $2.5 million, $0.6 million, $1.3 million and $0 in fiscal 2019 and 2018, respectively.

Net Sales, Cost of Sales and Gross Margin

Net sales decreased by $76.8 million, or 6.0%, during fiscal 2019 compared to the prior fiscal year. Net sales were negatively impacted by lower mobile memory and DRAM sales in Brazil in fiscal 2019 of $266.0 million, or a decline of 33.3%. These decreases were mainly due to lower customer demand for mobile memory and DRAM products of 25% and 26%, respectively, as well as 22% lower average selling prices for mobile memory. The decreases in Brazil were partially offset by additional sales from Penguin Computing for the full year in fiscal 2019. Penguin, which was acquired in June 2018, contributed additional revenue of $150.4 million in fiscal 2019 as compared to the prior year as Penguin's results were only consolidated into the Company's results for one quarter in fiscal 2018. The sales decrease was also offset in part by 7% higher Specialty DRAM sales in fiscal 2019, which was driven by 8% higher average selling prices due to product mix, as well as sales of new products and increased customer penetration.

Cost of sales decreased by $22.8 million, or 2.3%, during fiscal 2019 compared to the prior fiscal year, primarily due to a decrease of 4.6% in the cost of materials for the lower level of sales, offset by higher production costs related to the increased revenue and additional costs for the new SCSS business. Included in the cost of sales decreases was a favorable foreign exchange impact of $6.8 million due to locally sourced cost of sales in Brazil.

Gross margin decreased to 19.6% during fiscal 2019, compared to 22.6% for fiscal 2018, primarily due to higher cost of sales for SCSS, as well as fixed manufacturing costs for Brazil.

Operating Expenses

	Fiscal Year Ended		Change	
	August 30, 2019	August 31, 2018	Amount	%
	(in thousands, except percentages)			
Operating expenses:				
Research and development (1) (2)	$ 47,920	$ 39,824	$ 8,096	20.3%
Selling, general and administrative (1) (2)	103,226	84,541	18,685	22.1%
Change in estimated fair value of acquisition-related contingent consideration	(2,700)	(3,000)	300	(10.0%)
Total operating expenses	$ 148,446	$ 121,365	$ 27,081	22.3%

(1) Includes share-based compensation expense as follows:

Research and development	$ 2,654	$ 1,460	$ 1,194	81.8%
Selling, general and administrative	13,060	7,763	5,297	68.2%
Total	$ 15,714	$ 9,223	$ 6,491	70.4%

(2) Includes amortization of intangible assets expense as follows:

Research and development	$ —	$ 987	$ (987)	(100.0%)
Selling, general and administrative	5,048	5,136	(88)	(1.7%)
Total	$ 5,048	$ 6,123	$ (1,075)	(17.6%)

Research and Development Expense

Research and development, or R&D, expense increased by $8.1 million, or 20.3% in fiscal 2019 compared to the prior fiscal year mainly due to $7.8 million higher costs from our new SCSS businesses, as well as higher depreciation and share-based compensation, partially offset by lower intangible amortization expense as some intangible assets became fully amortized. Included in the R&D expense increase was a favorable foreign exchange impact of $2.3 million.

Selling, General and Administrative Expense

Selling, general and administrative, or SG&A, expense increased by $18.7 million, or 22.1%, during fiscal 2019 compared to the prior fiscal year. The increase was primarily due to $22.8 million higher costs from our new SCSS business, as well as higher share based compensation, partially offset by lower professional services and personnel-related expenses. Included in the SG&A expense increase was a favorable foreign exchange impact of $1.4 million.

Other Income (Expense)

	Fiscal Year Ended		Change	
	August 30, 2019	August 31, 2018	Amount	%
	(in thousands, except percentages)			
Other income (expense):				
Interest expense, net	$ (20,716)	$ (19,144)	$ (1,572)	8.2%
Other expense, net	(2,161)	(13,299)	11,138	(83.8%)
Total other expense	$ (22,877)	$ (32,443)	$ 9,566	(29.5%)

Interest expense, net increased $1.6 million, or 8.2%, during fiscal 2019 compared to the prior fiscal year primarily due to higher interest expense from an incremental loan in connection with the Penguin acquisition. Other expense, net decreased by $11.1 million, or 83.8%, primarily due to $10.1 million foreign currency gains/losses.

Provision for Income Taxes

	Fiscal Year Ended		Change	
	August 30, 2019	August 31, 2018	Amount	%
	(in thousands, except percentages)			
Provision for income taxes	$ 14,872	$ 18,315	$ (3,443)	(18.8%)

Provision for income taxes decreased by $3.4 million, or 18.8% during fiscal 2019 compared to the prior fiscal year primarily due to lower income in non-U.S. jurisdictions subject to tax.

Our Malaysian subsidiary was approved for income tax holidays for the operations of its Pioneer business and Global Supply Chain (GSC) business. We have received approvals for a continuation of these tax incentives for up to ten years, subject to certain operating conditions. The impact of these tax incentives will be recorded in the period in which they become effective. In general, these future tax holidays will have tax rates greater than our prior approved tax holidays, thus our effective income tax rate in the future may be higher depending on a combination of our overall and jurisdictional profitability.

Comparison of the Years Ended August 31, 2018 and August 25, 2017

	Fiscal Year Ended		Change	
	August 31, 2018	August 25, 2017	Amount	%
	(in thousands, except percentages)			
Net sales	$1,288,821	$ 761,291	$ 527,530	69.3%
Cost of sales (1)	997,235	599,041	398,194	66.5%
Gross profit	$ 291,586	$ 162,250	$ 129,336	79.7%
Gross margin	22.6%	21.3%		

(1) Includes share-based compensation expense of $1.3 million and $0.6 million in fiscal 2018 and 2017, respectively.

Net Sales, Cost of Sales and Gross Margin

Net sales increased by $527.5 million, or 69.3%, during fiscal 2018 compared to the prior fiscal year. The increase was primarily due to a 104% increase in sales of mobile memory products in Brazil in fiscal 2018 which was driven in part by new product introductions of higher density eMCP products, a 43% increase in the average selling prices of mobile memory products resulting from increasing mobile density, and an increase in local content requirements from 30% to 50% for mobile memory products for smartphones effective January 1, 2018. Strategic investments to increase production capacity in prior periods helped enable us to meet the increased demand in the Brazil mobile memory market. Our Brazil PC DRAM sales also increased as consumer IC and server demand grew, leading to 94% higher sales, and product mix also positively impacted our average selling prices of modules as they increased 61%. Our Specialty DRAM and Flash sales also increased due to strength in the server, networking and communication markets, leading to 17% and 33% higher sales, respectively, and increases of 60% and 49% in the average selling prices, respectively. The new SCSS business also added $52.5 million of revenue in fiscal 2018.

Cost of sales increased by $398.2 million, or 66.5%, during fiscal 2018 compared to the prior fiscal year, primarily due to an increase of 74% in the cost of materials for the higher level of sales, as well as higher production costs related to the increased revenue and additional costs for the new SCSS business. Included in the cost of sales increase was a favorable foreign exchange impact of $2.0 million due to locally sourced cost of sales in Brazil.

Gross margin increased to 22.6% during fiscal 2018, compared to 21.3% for fiscal 2017, primarily due to higher Brazil mobile memory and specialty DRAM revenue while cost of sales associated with higher density memory modules increased at a lower rate.

Operating Expenses

	Fiscal Year Ended		Change	
	August 31, 2018	August 25, 2017	Amount	%
	(in thousands, except percentages)			
Operating expenses:				
Research and development [1] [2]	$ 39,824	$ 38,160	$ 1,664	4.4%
Selling, general and administrative [1] [2]	84,541	66,759	17,782	26.6%
Change in estimated fair value of acquisition-related contingent consideration	(3,000)	—	(3,000)	(100.0%)
Management advisory fees	—	3,000	(3,000)	(100.0%)
Restructuring	—	457	(457)	(100.0%)
Total operating expenses	$ 121,365	$ 108,376	$ 12,989	12.0%
(1) Includes share-based compensation expense as follows:				
Research and development	$ 1,460	$ 655	$ 805	122.9%
Selling, general and administrative	7,763	4,073	3,690	90.6%
Total	$ 9,223	$ 4,728	$ 4,495	95.1%
(2) Includes amortization of intangible assets expense as follows:				
Research and development	$ 987	$ 4,897	$ (3,910)	(79.8%)
Selling, general and administrative	5,136	7,042	(1,906)	(27.1%)
Total	$ 6,123	$ 11,939	$ (5,816)	(48.7%)

Research and Development Expense

Research and development, or R&D, expense increased by $1.7 million in fiscal 2018 compared to the prior fiscal year mainly due to higher costs from our new SCSS business, as well as higher outside services and personnel-related expenses, partially offset by lower intangible amortization expense as some intangible assets became fully amortized. Included in the R&D expense increase was a favorable foreign exchange impact of $0.7 million.

Selling, General and Administrative Expense

Selling, general and administrative, or SG&A, expense increased by $17.8 million, or 26.6%, during fiscal 2018, which was our first full year as a public company, compared to the prior fiscal year. The increase was primarily due to higher expenses from our new SCSS business (including $3.4 million acquisition-related expenses), as well as personnel-related, professional and shareholder services expenses, aggregating $19.7 million, partially offset by a $1.9 million net decrease in intangible amortization expense as some intangible assets became fully amortized. Included in the SG&A expense increase was a favorable foreign exchange impact of $0.7 million.

Other Income (Expense)

	Fiscal Year Ended		Change	
	August 31, 2018	August 25, 2017	Amount	%
	(in thousands, except percentages)			
Other income (expense):				
Interest expense, net	$ (19,144)	$ (29,204)	$ 10,060	(34.4%)
Other expense, net	(13,299)	(22,551)	9,252	(41.0%)
Total other expense	$ (32,443)	$ (51,755)	$ 19,312	(37.3%)

Interest expense, net decreased $10.1 million, or 34.4%, during fiscal 2018 compared to the prior fiscal year primarily due to $4.7 million lower interest expense resulting from lower principal balances after our 2017 refinancing, as well as $5.1 million lower warrant amortization (i.e., fiscal 2017 expense). Other income (expense), net decreased by $9.3 million primarily due to the non-recurrence of a $23.3 million debt extinguishment loss in fiscal 2017, partially offset by a $13.5 million currency loss mainly in Brazil.

Provision for Income Taxes

	Fiscal Year Ended		Change	
	August 31, 2018	August 25, 2017	Amount	%
	(in thousands, except percentages)			
Provision for income taxes	$ 18,315	$ 9,914	$ 8,401	84.7%

Provision for income taxes increased by $8.4 million, or 84.7% during fiscal 2018 compared to the prior fiscal year primarily due to higher income in non-U.S. jurisdictions subject to tax.

Our Malaysian subsidiary was approved for income tax holidays for the operations of its Pioneer business and Global Supply Chain (GSC) business. We have received approvals for a continuation of these tax incentives beyond calendar 2018, subject to certain operating conditions. The impact of these tax incentives will be recorded in the period in which they become effective. In general, these future tax holidays will have tax rates greater than our prior approved tax holidays, thus our effective income tax rate in the future may be higher depending on a combination of our overall and jurisdictional profitability.

Liquidity and Capital Resources

	Fiscal Year Ended		
	August 30, 2019	August 31, 2018	August 25, 2017
	(in thousands)		
Cash provided by (used in) operating activities	$ 169,657	$ 67,907	$ (933)
Cash used in investing activities	(109,440)	(67,749)	(18,027)
Cash used in financing activities	100	7,944	(16,975)
Effect of exchange rate changes on cash and cash equivalents	588	(331)	(28)
Net decrease in cash and cash equivalents	$ 60,905	$ 7,771	$ (35,963)

At August 30, 2019, we had cash and cash equivalents of $98.1 million, of which approximately $76.9 million was held outside of the United States.

In July 2019, we acquired SMART EC and SMART Wireless for purchase prices of approximately $77 million and $14 million, respectively. We financed these acquisitions using cash from operations, as well as approximately $11 million in SGH ordinary shares attributable to the SMART Wireless acquisition.

In June 2018, we acquired Penguin for a purchase price of approximately $44 million and assumed approximately $32.3 million of Penguin's outstanding indebtedness. We financed this acquisition with net proceeds from the $60 million Incremental Amendment as defined below.

On May 23, 2017, we completed our IPO and raised proceeds, net of underwriting commissions and discounts and other offering costs, of approximately $60.8 million. On June 2, 2017, we used the net proceeds to make a mandatory prepayment of $61.1 million aggregate principal amount of our outstanding term loans under the Amended Credit Agreement.

We expect that our existing cash and cash equivalents, line of credit and cash generated by operating activities will be sufficient to fund our operations for at least the next twelve months. Our principal uses of cash and capital resources are acquisitions, debt service requirements as described below, capital expenditures, R&D expenditures and working capital requirements. We expect that future capital expenditures will focus on expanding capacity of our operations, expanding our R&D activities, manufacturing equipment upgrades and/or acquisitions and IT infrastructure and software upgrades. Cash and cash equivalents consist of funds held in demand deposit accounts and money market funds. We do not enter into investments for trading or speculative purposes.

Operating Activities

During fiscal 2019, cash provided by operating activities was $169.7 million. The primary factors affecting our cash flows during this period were a $51.3 million net income, $71.6 million in change in our net operating assets and liabilities and $46.8 million of non-cash related expenses. The $71.6 million change in net operating assets and liabilities consisted of decreases of $35.2 million in accounts receivable and $102.1 million in inventory and an increase of $0.4 million in accrued expenses and other liabilities, offset by increases of $1.6 million in prepaid expenses and other assets and a decrease of $64.6 million in accounts payable. The decrease in accounts receivable was primarily due to lower gross sales. The decreases in inventory and accounts payable were primarily due to the reduction of inventory along all business areas as product lead times and average selling prices reduced.

During fiscal 2018, cash provided by operating activities was $67.9 million. The primary factors affecting our cash flows during this period were a $119.5 million net income and $34.7 million of non-cash related expenses, partially offset by an $86.3 million change in our net operating assets and liabilities. The $86.3 million change in net operating assets and liabilities consisted of increases of $55.3 million in accounts receivable, $42.4 million in inventory, and $8.7 million in prepaid expenses and other assets, offset by increases of $17.5 million in accounts payable and $2.6 million in accrued expenses and other liabilities. The increase in accounts receivable was due to lower purchases under our Receivables Purchasing Agreement (terminated at the end of fiscal 2017), while the increase in inventory was due to both higher sales forecast and higher cost of materials resulting from increased DRAM prices.

Investing Activities

Net cash used in investing activities during fiscal 2019 was $109.4 million consisting primarily of $76.1 million for the new SCSS acquisitions, net of cash acquired, and $33.4 million used for purchases of property and equipment. Net cash used in investing activities during fiscal 2018 was $67.7 million consisting primarily of $42.3 million for the Penguin acquisition, net of cash acquired, and $25.7 million used for purchases of property and equipment.

Financing Activities

Net cash provided by financing activities during fiscal 2019 was $0.1 million, consisting primarily of $7.4 million of proceeds from issuance of ordinary shares from share option exercises and purchases under our employee share purchase plan, offset by $6.8 million of long-term debt payments for the BNDES Credit Agreements and $0.5 million for withholding tax on the vesting of restricted share units. Net cash provided by financing activities during fiscal 2018 was $7.9 million, consisting primarily of $59.4 million of net proceeds from issuance of long-term debt (due to the Incremental Amendment) and $7.5 million of proceeds from option exercises, offset by $24.3 million of long-term debt payments, $32.3 million to pay off Penguin's line of credit assumed from the acquisition, $1.6 million payment of IPO costs and $0.8 million in fees paid for revolving line of credit financing.

Contractual Obligations

Our contractual obligations as of August 30, 2019 are set forth below:

	Payments due by Period				
	1 year	2-3 years	4-5 years	After 5 years	Total
			(in millions)		
Amended Credit Agreement Debt	$ 22.5	$ 186.0	—	$ —	$ 208.5
Interest expense in connection with the Amended Credit Agreement	17.5	29.5	—	—	47.0
BNDES 2014 Credit Agreement	3.5	—	—	—	3.5
Interest expense in connection with the BNDES 2014 Credit Agreement	0.1	—	—	—	0.1
Operating leases	6.3	9.7	6.8	19.3	42.1
Non-cancellable product purchase commitments	30.1	—	—	—	30.1
Total contractual obligations	$ 80.0	$ 225.2	$ 6.8	$ 19.3	$ 331.3

As of August 30, 2019, we had gross unrecognized tax benefits of $15.0 million which includes penalties and interest. Approximately $1.6 million has been recorded as a noncurrent liability. At this time, we are unable to make a reasonably reliable estimate of the timing of payments in individual years in connection with these tax liabilities and therefore such amounts are not included in the above contractual obligation table.

Senior Secured Credit Agreement

On August 9, 2017, SMART Worldwide, SMART Modular Technologies (Global), Inc. (Global), and SMART Modular Technologies, Inc. (SMART Modular) entered into a Second Amended and Restated Credit Agreement (together with all related loan documents, as amended from time to time including as amended by the Incremental Amendment as defined below, the Amended Credit Agreement) with certain lenders which amended and restated that certain Amended and Restated Credit Agreement dated as of November 5, 2016 (the ARCA), which had amended and restated that certain Credit Agreement dated as of August 26, 2011 (the Original Credit Agreement). The Company’s subsidiaries named as borrowers in the Amended Credit Agreement and certain other subsidiaries that entered into a guarantee with respect to the Amended Credit Agreement including Penguin, SMART EC and SMART Wireless, are collectively referred to as the Loan Parties and together with SMART Modular Technologies Sdn. Bhd. (SMART Malaysia), the Credit Group. The Amended Credit Agreement provides for $165 million of initial term loans (the Initial Term Loans) with a maturity date of August 9, 2022, and $50 million of revolving loans with a maturity date of February 9, 2021 (the Initial Revolver Maturity Date) which revolving loan maturity date automatically extends to February 9, 2022 if the total leverage ratio of the Credit Group is less than 3.0:1.0 on the Initial Revolver Maturity Date. SMART Global Holding is not a party to the Amended Credit Agreement.

On June 8, 2018, SMART Worldwide, Global and SMART Modular entered into an Incremental Facility Agreement (the Incremental Amendment) which provided for incremental term loans under the Amended Credit Agreement in the aggregate amount of $60 million (the Incremental Term Loans) which Incremental Term Loans are on substantially identical terms as the Initial Term Loans. Pursuant to the Incremental Amendment, the borrowers agreed to pay the structuring advisor a $0.6 million fee pursuant to a separate agreement.

On October 2, 2018, SMART Worldwide, Global and SMART Modular entered into the Second Amendment to the Amended Credit Agreement (the Second Amendment) which did not become effective until October 25, 2018. As a result of the Second Amendment, the borrowers were granted a holiday from the obligation to make quarterly repayments of principal under the Initial Term Loans and the Incremental Term Loans at any time with respect to fiscal 2019. In addition, the borrowers were granted a holiday from the obligation to repay any loans as a result of excess cash flow that would otherwise be due with respect to any period of fiscal 2019.

The Amended Credit Agreement is jointly and severally guaranteed on a senior basis by certain subsidiaries of Global (including Penguin, SMART EC and SMART Wireless, and excluding, among other subsidiaries, SMART Malaysia). In addition, the Amended Credit Agreement is secured by a pledge of the capital stock of, or equity interests in, most of the subsidiaries of SMART Worldwide (including, without limitation, SMART Malaysia, Penguin, SMART EC and SMART Wireless) and by substantially all of the assets of the subsidiaries of SMART Worldwide, excluding the assets of SMART Malaysia and certain other subsidiaries.

Covenants. The Amended Credit Agreement contains various representations and warranties and affirmative and negative covenants that are usual and customary for loans of this nature including, among other things, limitations on the Credit Group's ability to engage in certain transactions, incur debt, pay dividends, and make investments. The Amended Credit Agreement also requires that the Credit Group maintain a Secured Leverage Ratio not in excess of 3.5:1.0 as of the end of each fiscal quarter (commencing with the fiscal quarter ending November 24, 2017) and puts restrictions on the Credit Group's ability to retain cash proceeds from the sale of certain assets with net proceeds in excess of $2 million, subject to customary six-month reinvestment rights. The Incremental Amendment required the Credit Group to repay the Penguin Credit Facility, as defined below, and to pledge as collateral, all of the capital stock of and substantially all of the assets of Penguin within 60 days after the closing of the Penguin acquisition.

Interest and Interest Rates. Loans under the Amended Credit Agreement accrue interest at a rate per annum equal to an applicable margin plus, at the borrowers' option, either a LIBOR rate, or a base rate. The applicable margin for term loans with respect to LIBOR borrowings is 6.25% and with respect to base rate borrowings is 5.25%. The interest rate on the Initial Term Loans was 8.43%, 8.6% and 7.57% as of August 30, 2019, August 31, 2018 and August 25, 2017, respectively. The interest rate on the Incremental Term Loans was 8.71% and 8.58% as of August 30, 2019 and August 31, 2018, respectively.

The applicable margin for revolving loans adjusts every quarter based on the Secured Leverage Ratio for the most recent fiscal quarter with the applicable margin for revolving loans with respect to LIBOR borrowings ranging from 3.75% to 4.00% and the applicable margin for revolving loans with respect to base rate borrowings ranging from 2.75% to 3.00%.

Interest on base rate loans is payable on the last day of each calendar quarter. Interest on LIBOR-based loans is payable every one, two, three, six, nine or twelve months after the date of each borrowing, dependent on the particular interest rate period selected with respect to such borrowing.

Principal Payments. The Amended Credit Agreement requires quarterly repayments of principal under the Initial Term Loans equal to 2.5% of $165 million, or $4.1 million per fiscal quarter and, commencing on November 30, 2018, quarterly repayments of principal under the Incremental Term Loans equal to 2.5% of $60 million, or $1.5 million per fiscal quarter. As a result of the Second Amendment, the borrowers were granted a holiday in fiscal 2019 from the obligation to make quarterly repayments of principal under the Initial Term Loans and the Incremental Term Loans. During fiscal 2019 and 2018, the borrowers made scheduled principal payments of $0 million and $16.5 million, respectively.

Prepayments. The borrowers have the right at any time to make optional prepayments of the principal amounts outstanding under the Amended Credit Agreement provided that prepayments of principal which are voluntary or are made in connection with certain transactions will be subject to prepayment premiums of 3%, 2% and 1% during the first, second and third years, respectively, after the effective date of the Amended Credit Agreement.

The Amended Credit Agreement also requires certain mandatory prepayments of principal whereby the borrowers must prepay outstanding loans, subject to certain exceptions, which include, among other things:

- (i) 75% of excess cash flow on a semi-annual basis if the total leverage ratio is greater than 1.5:1.0, (ii) 50% of excess cash flow on a semi-annual basis if the total leverage ratio is greater than 1.0:1.0 but less than or equal to 1.5:1.0 and (iii) 25% of excess cash flow on an annual basis if the secured leverage ratio is less than or equal to 1.0:1.0., which amounts will be reduced by any voluntary prepayments of principal made in the applicable period;
- 100% of the net proceeds of certain asset sales or other dispositions of property of Global or any of its restricted subsidiaries, subject to customary rights to reinvest the proceeds within six months; and
- 100% of the net cash proceeds of incurrence of certain debt by Global or any of its restricted subsidiaries, other than proceeds from debt permitted to be incurred under the Amended Credit Agreement.

As a result of the Second Amendment, the borrowers were granted a holiday from the obligation to repay any loans as a result of excess cash flow that would otherwise be due with respect to any period of fiscal 2019. No mandatory prepayments were required for fiscal 2019 or 2018.

On June 2, 2017, SMART Global Holdings contributed to Global $61.0 million from the proceeds of the IPO closed in May 2017. Global in turn used the proceeds to pay down the original term loans under the Original Credit Agreement, as required under the ARCA, which resulted in a $6.7 million loss on early repayment of long-term debt. As of August 9, 2017, prior to the one year anniversary of the ARCA, the Credit Group entered into the Amended Credit Agreement with new term loans in the aggregate principal amount of $165 million with different lenders. The proceeds from the Amended Credit Agreement were used to fully repay and refinance the term loans under the ARCA in the principal amount of $151.0 million, which resulted in a write off of $15.2 million of original issue discount and debt issuance costs as an extinguishment loss.

Term loans under the Amended Credit Agreement were issued at a discount of 2.0% of the then outstanding principal amount of $165 million, for a discount of $3.3 million. The Company incurred $8.7 million debt issuance costs upon entering into the Amended Credit Agreement, of which $5.3 million was attributable to the term loans and recorded as a direct reduction to the face amount of the term loans, and $3.4 million was allocated to the revolving line of credit and recorded as a separate asset on the balance sheet. Debt issuance costs and debt discount related to term loans are being amortized to interest expense based on the effective interest rate method over the life of the term loans. Those fees allocated to the revolving line of credit are being amortized to interest expense ratably over the life of the revolving line of credit.

As of August 30, 2019 and August 31, 2018, the outstanding principal balance of all term loans under the Amended Credit Agreement was $208.5 million and there were no outstanding revolving loans. The fair value of the term loans as of August 30, 2019 and August 31, 2018 was estimated to be approximately $210.6 million and $207.5 million, respectively.

Penguin Credit Agreement

On June 8, 2018 in connection with the Penguin acquisition, the Company assumed the outstanding balances due under that certain credit agreement dated January 8, 2018 between Penguin and Wells Fargo Capital Finance, LLC (the Penguin Credit Facility) which had an outstanding balance of $32.3 million as of June 8, 2018. In addition, on June 8, 2018, SMART Global Holdings entered into a guarantee with Wells Fargo Capital Finance, LLC (WFCF) whereby SMART Global Holdings guaranteed the repayment and full performance of Penguin under the Penguin Credit Facility. As required under the Incremental Amendment, the Company paid off the outstanding balance under the Penguin Credit Facility in August 2018.

BNDES Credit Agreements

In December 2013, SMART Brazil, entered into a credit facility with the Brazilian Development Bank, or BNDES (such loan the BNDES 2013 Credit Agreement). Under the BNDES 2013 Credit Agreement, a total of R$50.6 million (or $13.4 million) was made available to SMART Brazil for investments in infrastructure, research and development conducted in Brazil and acquisitions of equipment not otherwise available in the Brazilian domestic market. SMART Brazil's obligations under the BNDES 2013 Credit Agreement were guaranteed by Banco Itaú BBA S.A., or Itaú Bank, which guarantee was in turn secured by a guarantee from SMART Brazil and SMART do Brazil and a commitment by SMART Brazil to maintain minimum cash balances with Itaú Bank equal to 11.85% of the maximum aggregate balance of principal, interest and fees outstanding under the BNDES 2013 Credit Agreement. The committed amount was R$6.0 million (or $1.6 million), which is shown on the Company's consolidated balance sheets as restricted cash in other noncurrent assets as of August 31, 2018.

Approximately half of the available debt under the BNDES 2013 Credit Agreement accrues interest at a fixed rate while the other half accrues interest at a floating rate. The facility under the BNDES 2013 Credit Agreement is a term loan fully amortizing in 48 equal monthly installments beginning on August 15, 2015 with the final principal payment paid on July 15, 2019.

As of August 30, 2019, SMART Brazil had no outstanding debt under the BNDES 2013 Credit Agreement. As of August 31, 2018, SMART Brazil's outstanding debt under the BNDES 2013 Credit Agreement was R$12.9 million (or $3.4 million), of which R$6.3 million (or $1.7 million) accrues interest at the fixed rate of 3.5% and R$6.6 million (or $1.7 million) of the debt accrues interest at the floating rate of 0.5% above the TJLP rate published by the Central Bank of Brazil, or BZTJLP (5.0%), combined corresponding to an overall effective interest rate of 5.5% per annum.

In December 2014, SMART Brazil, entered into a second credit facility with BNDES, referred to as the BNDES 2014 Credit Agreement. The BNDES 2013 Credit Agreement and the BNDES 2014 Credit Agreement are collectively referred to as the BNDES Agreements. Under the BNDES 2014 Credit Agreement, a total of R$52.8 million (or $14.0 million) was made available to SMART Brazil for research and development conducted in Brazil related to integrated circuit (IC) packaging and for acquisitions of equipment not otherwise available in the Brazilian domestic market.

Prior to July 2018, SMART Brazil's obligations under the BNDES 2014 Credit Agreement were also guaranteed by Itaú Bank, which guarantee was in turn secured by a guarantee from SMART Brazil and SMART do Brazil in favor of Itaú Bank and a commitment by SMART Brazil to maintain minimum cash balances with Itaú Bank equal to 30.31% of the maximum aggregate balance of principal, interest and fees outstanding under the BNDES 2014 Credit Agreement, or approximately R$16.0 million (or $4.3 million) of required cash balances, which is shown on the Company's consolidated balance sheets as restricted cash in other noncurrent assets as of August 31, 2018.

In July 2018, SMART Brazil entered into guarantee arrangements with Banco Votorantim S.A. which bank in turn replaced the guarantees of the BNDES Credit Agreements previously issued by Itaú Bank. As a result, the guarantees with Itaú Bank were cancelled and Itaú Bank returned R$22.0 million (or $5.9 million) of committed balances to SMART Brazil in the first quarter of fiscal 2019. As such, the Company no longer has any restricted cash on its consolidated balance sheets as of August 30, 2019.

The available debt under the BNDES 2014 Credit Agreement accrues interest at a fixed rate of 4% per annum. The BNDES 2014 Credit Agreement is a term loan fully amortizing in 48 equal monthly installments beginning on August 15, 2016 with the final principal payment being due on July 15, 2020.

As of August 30, 2019 and August 31, 2018, SMART Brazil's outstanding debt under the BNDES 2014 Credit Agreement was R$13.2 million (or $3.5 million) and R$26.4 million (or $7.0 million), respectively.

While the BNDES Agreements do not include any financial covenants, they contain affirmative and negative covenants customary for loans of this nature, including, among other things, an obligation to comply with all laws and regulations; a right for BNDES to terminate the loan in the event of a change of effective control; and a prohibition against the disposition or encumbrance, without BNDES consent, of intellectual property developed with the funds from the loans. The BNDES 2013 Credit Agreement includes an obligation to draw down the entire loan within specified periods of time or pay unused commitment fees of 0.1%. The BNDES 2014 Credit Agreement required a loan fee of 0.3% of the total face amount of the loan facility.

The future minimum principal payments under the Amended Credit Agreement and the BNDES 2014 Agreement as of August 30, 2019 are (in thousands):

	Amended Credit Agreement	BNDES	Total
Fiscal year ending August:			
2020	$ 22,500	$ 3,506	$ 26,006
2021	22,500	—	22,500
2022	163,500	—	163,500
	$ 208,500	$ 3,506	$ 212,006

Management Agreement

In connection with the Amended and Restated Transaction and Management Fee Agreement (the Management Agreement), management advisory fees consisting of quarterly fees plus out-of-pocket expenses, were payable by us to Silver Lake Management Company III, L.L.C. and Silver Lake Management Company Sumeru, L.L.C., affiliates of Silver Lake, or the Managers. Under the Management Agreement, we recorded quarterly fees of $1.0 million plus out-of-pocket expenses. The Management Agreement was terminated upon the completion of our IPO on May 23, 2017. As of August 30, 2019, there are no amounts due and payable under the Management Agreement.

Off-Balance Sheet Arrangements

As of August 30, 2019 and August 31, 2018, we did not have any off-balance sheet arrangements or relationships with unconsolidated entities or financial partnerships, such as entities often referred to as structured finance or special purpose entities, which are typically established for the purpose of facilitating off-balance sheet arrangements or other contractually narrow or limited purposes.

Critical Accounting Policies

We believe the following critical accounting policies are the most significant to the presentation of our financial statements and they at times require the most difficult, subjective and complex estimates.

Revenue Recognition

The Company's revenues include products and services. The Company's product revenues are predominantly derived from the sale of memory modules, flash memory cards, compute products and storage products, which the Company designs and manufactures. The Company's service revenues are derived from procurement, logistics, inventory management, temporary warehousing, kitting and packaging services. Also, a small portion of the Company's product sales include extended warranty and on-site services, subscriptions to the Company's high performance computing environment, professional services, software and related support.

The Company determines revenue recognition through the following steps: (1) identification of the contract with a customer; (2) identification of the performance obligations in the contract; (3) determination of the transaction price; (4) allocation of the transaction price to the performance obligations in the contract; and (5) recognition of revenue when, or as, a performance obligation is satisfied.

The Company's contracts are executed through a combination of written agreements along with purchase orders with all customers including certain general terms and conditions. Generally, purchase orders entail products, quantities and prices, which define the performance obligations of each party and are approved and accepted by the Company. The Company's contracts with customers do not include extended payment terms. Payment terms vary by contract type and type of customer and generally range from 30 to 45 days from invoice. Additionally, taxes assessed by a governmental authority that are both imposed on and concurrent with a specific revenue-producing transaction, that are collected by the Company from a customer and deposited with the relevant government authority, are excluded from revenue.

The transaction price is determined based on the consideration to which the Company will be entitled in exchange for transferring goods or services to the customer adjusted for estimated variable consideration. Variable consideration may include discounts, rights of return, refunds, and other similar obligations. The Company allocates the transaction price to each distinct product and service based on its relative standalone selling price. The standalone selling price for products primarily involves the cost to produce the deliverable plus the anticipated margin and for services is estimated based on the Company's approved list price.

In the normal course of business, the Company does not accept product returns unless the items are defective as manufactured. The Company establishes provisions for estimated returns and warranties. In addition, the Company does not typically provide customers with the right to a refund and does not transact for noncash consideration.

Standard Products

The Company's main performance obligations are to deliver the requested goods to customers according to the agreed-upon shipping terms. The Company recognizes revenue when control transfers to the customer (i.e., when the Company's performance obligation is satisfied). The Company invoices the customer and recognizes revenues for such delivery when control transfers based on shipping terms.

Customized Products

For customized product sales with terms that require the customer to purchase 100% of all parts built to fulfill the customers forecast, the Company recognizes revenue when control of the underlying assets passes to the customer, as the customer is able to both direct the use of, and obtain substantially all of the remaining benefit from the assets; the customer has the significant risks and rewards associated with ownership of the assets; and the Company has a present right to payment. For these sales, control passes when the Company has made these products available to the customer and under the terms of the agreement cannot repurpose them without the customer's express consent. Accordingly, the Company will recognize revenue at the point in time when products made to the customer's order or forecast are completed and made available to the customer.

Non-cancellable nonrefundable, or NCNR, customized product sales are recognized over time on a cost incurred basis. The customer obtains control and benefits from the services as they are performed over the period based on the cost input measure in the production process for the NCNR customized product. The terms within the NCNR sales orders provide the Company with a legally enforceable right to receive payment including a reasonable profit margin upon customer cancellation for performance completed to date. Accordingly, the Company recognizes revenue over time as customized products listed within the NCNR orders are completed.

Computing Products and Services

A small portion of the Company's product sales includes extended warranty and on-site services, subscriptions to the Company's high performance computing environment, professional consulting services including installation and other services, and hardware and software related support. Each contract may contain multiple performance obligations, which requires the transaction price to be allocated to each performance obligation. The Company allocates the consideration to each performance obligation based on the relative selling price. The Company uses best-estimated selling price, determined as the best estimate of the price at which the Company would transact if it sold the deliverable regularly on a stand-alone basis.

For services provided to the customers over a period of time, such revenues are recognized over time in line with when the customer receives and consumes the benefit of the services. Extended warranty and on-site services, hardware support, software support, and subscription revenue for access to the Company's high performance computing environment is deferred and recognized ratably over the contractual period as the Company transfers control as it satisfies its performance obligations over time as the services are rendered. These services contracts are typically one to three years in length. Subscription revenue for certain customers is recognized based on the contractual fee to use the high-performance-computing environment. Professional consulting services revenue is recognized as the service is performed and the customer obtains control and benefits from the services as they are performed over the period. The methods of recognizing revenue for each of these products and services were selected because they reflect a faithful depiction of the transfer of control.

Agency Services

The Company has service performance obligations for agency related services such as procurement, logistics, inventory management, temporary warehousing, kitting and packaging services for certain agency basis customers. The agency services are also known as supply chain services and the performance obligations for these services consist of customized, integrated supply chain services management to assist customers in the planning, execution and overall management of the procurement processes.

For these customers that are accounted for on an agency basis, the Company recognizes as revenue the amount billed less the material procurement costs of products serviced as an agent with the cost of providing these services embedded with the cost of sales. The Company has separate agent performance obligations as follows: (a) procurement, logistics, and inventory management, (b) temporary warehousing, and (c) kitting and packaging services for these customers. Revenue from these arrangements is recognized as service revenue and is determined by a fee for services based on material procurement costs (i.e. fee as a percentage of the associated material being procured, warehoused, kitted or packaged). The Company recognizes revenue for procurement, logistics and inventory management upon the completion of the services or performance obligation, typically upon shipment of the product, as the criteria for over time recognition is not met. For temporary warehousing, kitting and packaging services, revenue is recognized over time, but the period of performance is typically very short in duration. There are no obligations subsequent to shipment of the product under the agency arrangements.

Contract Costs

As a practical expedient, the Company recognizes the incremental costs of obtaining a contract, specifically commission expenses that have an amortization period of less than twelve months, as an expense when incurred. Additionally, the Company has adopted an accounting policy to recognize shipping and handling costs that occur after control transfers, if any, to the customer as a fulfillment activity. The Company records shipping and handling costs related to revenue transactions within cost of sales as a period cost.

Gross Billings and Net Sales

The following is a summary of our gross billings to customers and net sales for services and products (in thousands):

	Fiscal Year Ended		
	August 30, 2019	August 31, 2018[(2)]	August 25, 2017[(2)]
Service revenue, net	$ 42,527	$ 42,978	$ 36,843
Cost of purchased materials - service [(1)]	946,303	1,013,393	864,256
Gross billings for services	988,830	1,056,371	901,099
Product net sales	1,169,472	1,245,843	724,448
Gross billings to customers	$2,158,302	$2,302,214	$1,625,547
Product net sales	$1,169,472	$1,245,843	$ 724,448
Service revenue, net	42,527	42,978	36,843
Net sales	$1,211,999	$1,288,821	$ 761,291

(1) Represents material procurement costs of products provided as an agent reported on a net basis.

(2) Amounts for fiscal 2018 and 2017 are accounted for under ASC 605 (refer to Note 1(u)).

Inventory Valuation

At each balance sheet date, we evaluate our ending inventories for excess quantities and obsolescence. This evaluation includes analysis of sales levels by product family. Among other factors, we consider historical demand and forecasted demand in relation to the inventory on hand, competitiveness of product offerings, market conditions and product life cycles when determining obsolescence and net realizable value. We adjust the carrying values to approximate the lower of our manufacturing cost or net realizable value. Inventory cost is determined on a specific identification basis and includes material, labor and manufacturing overhead. From time to time, our customers may request that we purchase and maintain significant inventory of raw materials for specific programs. Such inventory purchases are evaluated for excess quantities and potential obsolescence and could result in a provision at the time of purchase or subsequent to purchase. Inventory levels may fluctuate based on inventory held under service arrangements. Our provisions for excess and obsolete inventory are also impacted by our arrangements with our customers and/or suppliers, including our ability or inability to re-sell such inventory to them. If actual market conditions or our customers' product demands are less favorable than those projected or if our customers or suppliers are unwilling or unable to comply with any arrangements related to their purchase or sale of inventory, additional provisions may be required and would have a negative impact on our gross margins in that period. We have had material inventory write-downs in the past for reasons such as obsolescence, excess quantities and declines in market value below our costs, and we may be required to do so from time to time in the future. Our inventory write-downs were $9.0 million, $5.2 million and $2.8 million for fiscal 2019, 2018 and 2017, respectively.

Income Taxes

We use the asset and liability method of accounting for income taxes. Deferred tax assets and liabilities are recognized for the future consequences attributable to differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax basis and net operating loss and credit carryforwards. When necessary, a valuation allowance is recorded or reduced to value tax assets to amounts expected to be realized. The effect of changes in tax rates is recognized in the period in which the rate change occurs.

The calculation of our tax liabilities involves accounting for uncertainties in the application of complex tax rules, regulations and practices. We recognize benefits for uncertain tax positions based on a two-step process. The first step is to evaluate the tax position for recognition of a benefit (or the absence of a liability) by determining if the weight of available evidence indicates that it is more likely than not that the position taken will be sustained upon audit, including resolution of related appeals or litigation processes, if any. If it is not, in our judgment, more likely than not that the position will be sustained, then we do not recognize any benefit for the position. If it is more likely than not that the position will be sustained, a second step in the process is required to estimate how much of the benefit we will ultimately receive. This second step requires that we estimate and measure the tax benefit as the largest amount that is more than 50% likely of being realized upon ultimate settlement. It is inherently difficult and subjective to estimate such amounts. We reevaluate these uncertain tax positions on a quarterly basis. The total amount of unrecognized tax benefits that would affect the effective tax rate, if recognized, is $1.6 million as of August 30, 2019. This evaluation is based on a number of factors including, but not limited to, changes in facts or circumstances, changes in tax law, new facts, correspondence with tax authorities during the course of an audit, effective settlement of audit issues and commencement of new audit activity. Such a change in recognition or measurement could result in the recognition of a tax benefit or an additional charge to the tax provision in the period.

Impairment of Long-Lived Assets and Long-Lived Assets to be Disposed

We review our long-lived assets for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. Recoverability of assets to be held and used is measured by a comparison of the carrying amount of an asset to the future undiscounted cash flows expected to be generated by the asset. If such assets are considered to be impaired, the impairment is measured by the amount by which the carrying amount of the assets exceeds the fair value of the assets.

Share-Based Compensation

We recognize compensation costs related to share-based awards granted to employees based on the estimated fair value of the awards on the date of grant. We estimate the grant date fair value of options, and the resulting share-based compensation expense, using the Black-Scholes option-pricing model. The grant date fair value of the share-based awards is generally recognized on a straight-line basis over the requisite service period, which is generally the vesting period of the respective awards.

The Black-Scholes model requires the use of subjective and highly complex assumptions which determine the fair value of share-based option awards. The fair value of each option grant is estimated on the date of grant using the Black-Scholes option pricing model that uses the assumptions noted in the following table. The expected volatility is based on the historical volatilities of the common stock of comparable publicly traded companies. The expected term of options granted represents the weighted average period of time that options granted are expected to be outstanding giving consideration to vesting schedules and the historical exercise patterns. The risk-free interest rate for the expected term of the option is based on the average U.S. Treasury yield curve at the end of the quarter in which the option was granted.

We used the following assumptions to value options granted under the SGH Plan during fiscal 2019, 2018 and 2017:

	Fiscal Year Ended		
	August 30, 2019	**August 31, 2018**	**August 25, 2017**
Stock options:			
Expected term (years)	6.25	6.25	6.25
Expected volatility	41.68% - 48.15%	39.00% - 46.27%	45.88% - 55.75%
Risk-free interest rate	1.42% - 2.88%	2.15% - 2.82%	1.89% - 2.03%
Expected dividends	—	—	—

The following table sets forth our total share-based compensation expense during fiscal 2019, 2018 and 2017 (in thousands):

	Fiscal Year Ended		
	August 30, 2019	August 31, 2018	August 25, 2017
Share-based compensation expense by category (in thousands):			
Cost of sales	$ 2,485	$ 1,335	$ 636
Research and development	2,654	1,460	655
Selling, general and administrative	13,060	7,763	4,073
Total	$ 18,199	$ 10,558	$ 5,364

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

Our exposure to market rate risk includes risk of foreign currency exchange rate fluctuations, changes in interest rates and translation risk.

Foreign Exchange Risks

We are subject to inherent risks attributed to operating in a global economy. Our international sales and our operations in foreign countries subject us to risks associated with fluctuating currency values and exchange rates. Because a portion of our sales are denominated in United States dollars, increases in the value of the United States dollar could increase the price of our products so that they become relatively more expensive to customers in a particular country, possibly leading to a reduction in sales and profitability in that country. A significant portion of the sales of our products are denominated in reais. In addition, we have certain costs that are denominated in foreign currencies, and decreases in the value of the U.S. dollar could result in increases in such costs that could have a material adverse effect on our results of operations. We do not currently purchase financial instruments to hedge foreign exchange risk, but may do so in the future.

As a result of our international operations, we generate a portion of our net sales and incur a portion of our expenses in currencies other than the U.S. dollar, particularly the reais. Approximately 44%, 62% and 52% of our net sales during fiscal 2019, 2018 and 2017, respectively, originated in reais. We present our combined financial statements in U.S. dollars, and we must translate the assets, liabilities, net sales and expenses of a substantial portion of our foreign operations into U.S. dollars at applicable exchange rates. Consequently, increases or decreases in the value of the U.S. dollar may affect the value of these items with respect to our non-U.S. dollar businesses in our combined financial statements, even if their value has not changed in their local currency. Our customer pricing and material cost of sales are based on U.S. dollars, as is the global market for memory products. Accordingly, the impact of currency fluctuations to our consolidated statement of operations is primarily to our other costs of sales (i.e., non-material components) and our operating expenses as those items are typically denominated in local currency. Our consolidated statement of operations is also impacted by foreign currency gains and losses recorded in Other Income (Expense) arising from transactions denominated in a currency other than the functional currency of the respective subsidiary. These translations could significantly affect the comparability of our results between financial periods or result in significant changes to the carrying value of our assets, liabilities and equity. As a result, changes in foreign currency exchange rates impact our reported results.

During fiscal 2019, 2018 and 2017, we recorded ($3.1) million, ($13.2) million, and $0.3 million, respectively, of foreign exchange gains (losses).

Interest Rate Risk

We are subject to interest rate risk in connection with our long-term and short-term debt, including the $208.5 million aggregate balance under the term loan under the Amended Credit Agreement as of August 30, 2019. Although we did not have any revolving balances outstanding as of August 30, 2019, the revolving facility under the Amended Credit Agreement provides for borrowings of up to $50 million that would also bear interest at variable rates. Assuming that we will satisfy the financial covenants required to borrow and that the Amended Credit Agreement is fully drawn and other variables are held constant, each 1.0% increase in interest rates on our variable rate borrowings would result in an increase in annual interest expense and a decrease in our cash flow and income before taxes of $2.6 million per year.

Item 8. Financial Statements and Supplementary Data

The financial statements and supplemental financial information required by this item are presented beginning on page F-1 in Part IV, Item 15 of this annual report on Form 10-K and are incorporated herein by reference, and the supplementary data required by this item is included in Note 15, Selected Quarterly Information, in our notes to consolidated financial statements.

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

None.

Item 9A. Controls and Procedures

Evaluation of Disclosure Controls and Procedures

An evaluation was performed under the supervision and with the participation of our Company's management, including the Chief Executive Officer, or CEO, and Chief Financial Officer, or CFO, of the effectiveness of the design and operation of the Company's disclosure controls and procedures (as such term is defined in Rules 13a-15(e) and 15d-15(e)) under the Securities Exchange Act of 1934 as amended. Based on that evaluation, the Company's management, including the CEO and CFO, concluded that as of August 30, 2019, the Company's disclosure controls and procedures were effective to ensure the information required to be disclosed by an issuer in the reports that it files or submits under the Securities Exchange Act of 1934 is accumulated and communicated to our management, including our principal executive and principal financial officers, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure. There are inherent limitations to the effectiveness of any system of disclosure controls and procedures, including the possibility of human error and the circumvention or overriding of the controls and procedures. Accordingly, even effective disclosure controls and procedures can only provide reasonable assurance of achieving their control objectives.

Management's Report on Internal Control Over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Exchange Act Rules 13a-15(f). Under the supervision and with the participation of our management, including our CEO and CFO, we conducted an evaluation of the effectiveness of our internal control over financial reporting based on the framework in Internal Control— Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 Framework). Based on our evaluation under the 2013 Framework, management concluded that our internal control over financial reporting was effective as of August 30, 2019.

In July 2019, we completed the acquisitions of SMART Embedded Computing and SMART Wireless Computing. For further discussion of these acquisitions, refer to Item 8: "Financial Statements, Note 2: Business Combinations." The Securities and Exchange Commission permits companies to exclude acquisitions from their assessment of internal control over financial reporting during the first year of an acquisition, and our management has elected to exclude these companies from our assessment as of August 30, 2019. These acquisitions constituted, in aggregate, 4% and 1% of our consolidated total assets and net sales as of and for the year ended August 30, 2019, respectively.

The effectiveness of our internal control over financial reporting as of August 30, 2019 has been audited by Deloitte & Touche LLP, an independent registered public accounting firm, as stated in their report that is included in this Annual Report on Form 10-K.

Changes in Internal Control Over Financial Reporting

There has been no change in our internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act) during the fourth quarter of fiscal 2019 that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Shareholders and the Board of Directors of SMART Global Holdings, Inc.

Opinion on Internal Control over Financial Reporting

We have audited the internal control over financial reporting of SMART Global Holdings, Inc. and subsidiaries (the "Company") as of August 30, 2019, based on criteria established in *Internal Control — Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of August 30, 2019, based on criteria established in *Internal Control — Integrated Framework (2013)* issued by COSO.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated financial statements as of and for the year ended August 30, 2019 of the Company and our report dated November 6, 2019, expressed an unqualified opinion on those financial statements and included an explanatory paragraph relating to the Company's adoption of Accounting Standards Update No. 2014-09 Revenue from Contracts with Customers, as amended (Topic 606).

As described in Management's Report on Internal Control Over Financial Reporting, management excluded from its assessment the internal control over financial reporting of three acquisitions that were completed during the year ended August 30, 2019, which constitute, in aggregate, 4% of assets and 1% of net sales of the consolidated financial statement amounts as of and for the year ended August 30, 2019. Accordingly, our audit did not include the internal control over financial reporting of three acquisitions.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management's Report on Internal Control Over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ DELOITTE & TOUCHE LLP
San Jose, California
November 6, 2019

Item 9B. Other Information

None.

Item 10. Directors, Executive Officers and Corporate Governance

The information required by this item is incorporated by reference to our Proxy Statement for our next Annual General Meeting to be filed with the SEC within 120 days after the close of the year ended August 30, 2019.

Code of Conduct

The Company has adopted a code of business ethics and conduct (the "Code of Conduct") that applies to all employees, officers and directors, including the principal executive officer, principal financial officer and principal accounting officer. The Code of Conduct is available on the Company's website at www.smartm.com on the Investor Relations page. The Company intends to post on its website all disclosures that are required by law or NASDAQ listing rules regarding any amendment to, or a waiver of, any provision of the Code of Conduct for the principal executive officer, principal financial officer, principal accounting officer or controller, or persons performing similar functions.

Item 11. Executive Compensation

The information required by this item is incorporated by reference to our Proxy Statement for our next Annual General Meeting to be filed with the SEC within 120 days after the close of the year ended August 30, 2019.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Shareholder Matters

The information required by this item is incorporated by reference to our Proxy Statement for our next Annual General Meeting to be filed with the SEC within 120 days after the close of the year ended August 30, 2019.

Item 13. Certain Relationships and Related Transactions, and Director Independence

The information required by this item is incorporated by reference to our Proxy Statement for our next Annual General Meeting to be filed with the SEC within 120 days after the close of the year ended August 30, 2019.

Item 14. Principal Accounting Fees and Services

The information required by this item is incorporated by reference to our Proxy Statement for our next Annual General Meeting to be filed with the SEC within 120 days after the close of the year ended August 30, 2019.

PART IV.

Item 15. Exhibits and Financial Statement Schedules

(a) The following documents are filed as a part of this report:

(1) Financial Statements.

The following Consolidated Financial Statements are filed as part of this report under Item 8 "Financial Statements and Supplementary Data."

(2) Exhibits. Exhibits are listed on the Exhibit Index at the end of this report.

Item 16. Form 10-K Summary

Not applicable.

INDEX TO FINANCIAL STATEMENTS

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Shareholders and the Board of Directors of SMART Global Holdings, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of SMART Global Holdings, Inc. and subsidiaries (the "Company") as of August 30, 2019 and August 31, 2018, the related consolidated statements of operations, comprehensive income (loss), shareholders' equity (deficit), and cash flows for each of the three years in the period ended August 30, 2019, and the related notes, (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of August 30, 2019 and August 31, 2018, and the results of its operations and its cash flows for each of the three years in the period ended August 30, 2019, in conformity with accounting principles generally accepted in the United States of America.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of August 30, 2019, based on criteria established in *Internal Control — Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission and our report dated November 6, 2019, expressed an unqualified opinion on the Company's internal control over financial reporting.

Change in Accounting Principle

As discussed in Note 1 to the financial statements, the Company has changed its method of accounting for revenue from contracts with customers in the year ended August 30, 2019 due to the adoption of Accounting Standards Update No. 2014-09 Revenue from Contracts with Customers, as amended (Topic 606) using the modified retrospective approach.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ DELOITTE & TOUCHE LLP

San Jose, California
November 6, 2019

We have served as the Company's auditor since 2014.

SMART Global Holdings, Inc.
and Subsidiaries

Consolidated Balance Sheets

(In thousands, except per share data)

	August 30, 2019	August 31, 2018
Assets		
Current assets:		
Cash and cash equivalents	$ 98,139	$ 31,375
Accounts receivable, net of allowances of $184 and $225 as of August 30, 2019 and August 31, 2018, respectively	217,433	237,212
Inventories	118,738	221,419
Prepaid expenses and other current assets	37,950	32,043
Total current assets	472,260	522,049
Property and equipment, net	68,345	56,615
Other noncurrent assets	12,784	22,449
Intangible assets, net	69,325	26,255
Goodwill	81,423	45,394
Total assets	$ 704,137	$ 672,762
Liabilities and Shareholders' Equity		
Current liabilities:		
Accounts payable	$ 164,866	$ 223,186
Accrued liabilities	48,980	45,190
Current portion of long-term debt	24,054	27,409
Total current liabilities	237,900	295,785
Long-term debt	182,450	184,190
Other long-term liabilities	10,327	5,659
Total liabilities	$ 430,677	$ 485,634
Commitments and contingencies (see Note 10)		
Shareholders' equity:		
Ordinary shares, $0.03 par value. Authorized 200,000 shares; issued and outstanding 23,617 and 22,480 as of August 30, 2019 and August 31, 2018, respectively	712	678
Additional paid-in capital	285,994	250,191
Accumulated other comprehensive loss	(177,866)	(175,995)
Retained earnings	164,620	112,254
Total shareholders' equity	273,460	187,128
Total liabilities and shareholders' equity	$ 704,137	$ 672,762

The accompanying notes are an integral part of these consolidated financial statements.

SMART Global Holdings, Inc.
and Subsidiaries

Consolidated Statements of Operations

(In thousands, except per share data)

	Fiscal Year Ended		
	August 30, 2019	**August 31, 2018**	**August 25, 2017**
Net sales [1]	$ 1,211,999	$ 1,288,821	$ 761,291
Cost of sales	974,472	997,235	599,041
Gross profit	237,527	291,586	162,250
Operating expenses:			
Research and development	47,920	39,824	38,160
Selling, general, and administrative	103,226	84,541	66,759
Change in estimated fair value of acquisition-related contingent consideration	(2,700)	(3,000)	—
Management advisory fees	—	—	3,000
Restructuring charge	—	—	457
Total operating expenses	148,446	121,365	108,376
Income from operations	89,081	170,221	53,874
Interest expense, net	(20,716)	(19,144)	(29,204)
Other expense, net	(2,161)	(13,299)	(22,551)
Total other expense	(22,877)	(32,443)	(51,755)
Income before income taxes	66,204	137,778	2,119
Provision for income taxes	14,872	18,315	9,914
Net income (loss)	$ 51,332	$ 119,463	$ (7,795)
Earnings per share:			
Basic	$ 2.24	$ 5.42	$ (0.49)
Diluted	$ 2.19	$ 5.17	$ (0.49)
Shares used in computing earnings per share:			
Basic	22,959	22,051	15,785
Diluted	23,468	23,119	15,785

(1) Includes sales to affiliates of $117,403, $133,552 and $73,455 in fiscal 2019, 2018 and 2017, respectively (see Note 3).

The accompanying notes are an integral part of these consolidated financial statements.

SMART Global Holdings, Inc.
and Subsidiaries

Consolidated Statements of Comprehensive Income (Loss)

(In thousands)

	Fiscal Year Ended		
	August 30, 2019	August 31, 2018	August 25, 2017
Net income (loss)	$ 51,332	$ 119,463	$ (7,795)
Other comprehensive income (loss):			
Foreign currency translation	(1,871)	(32,785)	4,313
Comprehensive income (loss)	$ 49,461	$ 86,678	$ (3,482)

The accompanying notes are an integral part of these consolidated financial statements.

SMART Global Holdings, Inc.
and Subsidiaries

Consolidated Statements of Shareholders' Equity (Deficit)

(Dollars and shares in thousands)

	Ordinary shares		Additional paid-in capital	Accumulated other comprehensive loss	Retained earnings (accumulated deficit)	Total shareholders' equity (deficit)
	Shares	Amount				
Balances as of August 26, 2016	13,869	416	145,284	(147,523)	586	(1,237)
Share-based compensation expense	—	—	5,364	—	—	5,364
Issuance of ordinary shares from exercises	152	4	402	—	—	406
Issuance of ordinary shares from release of restricted stock units (RSUs)	117	4	(4)	—	—	—
Withholding tax on RSUs	(46)	—	(763)	—	—	(763)
Issuance of ordinary shares from initial public offering (IPO), net of issuance costs	6,095	183	60,584	—	—	60,767
Issuance of ordinary shares from exercise of warrants	1,537	46	(46)	—	—	—
Surrendered shares	(58)	—	—	—	—	—
Warrants issued in connection with debt	—	—	21,341	—	—	21,341
Foreign currency translation	—	—	—	4,313	—	4,313
Net loss	—	—	—	—	(7,795)	(7,795)
Balances as of August 25, 2017	21,666	653	232,162	(143,210)	(7,209)	82,396
Share-based compensation expense	—	—	10,558	—	—	10,558
Issuance of ordinary shares from exercises	702	22	7,474	—	—	7,496
Issuance of ordinary shares from release of RSUs	112	3	(3)	—	—	—
Foreign currency translation	—	—	—	(32,785)	—	(32,785)
Net income	—	—	—	—	119,463	119,463
Balances as of August 31, 2018	22,480	678	250,191	(175,995)	112,254	187,128
Share-based compensation expense	—	—	18,199	—	—	18,199
Issuance of ordinary shares from exercises	413	13	5,057	—	—	5,070
Issuance of ordinary shares in connection with acquisition	383	11	9,156	—	—	9,167
Share consideration holdback in connection with acquisition	—	—	1,618	—	—	1,618
Issuance of ordinary shares from release of RSUs	249	7	(7)	—	—	—
Withholding tax on RSUs	(18)	—	(520)	—	—	(520)
Issuance of ordinary shares from employee share purchase plan (ESPP)	110	3	2,300	—	—	2,303
Effect of adopting ASC 606	—	—	—	—	1,034	1,034
Foreign currency translation	—	—	—	(1,871)	—	(1,871)
Net income	—	—	—	—	51,332	51,332
Balances as of August 30, 2019	23,617	$ 712	$285,994	$ (177,866)	$ 164,620	$ 273,460

The accompanying notes are an integral part of these consolidated financial statements.

SMART Global Holdings, Inc.
and Subsidiaries

Consolidated Statements of Cash Flows

(In thousands)

	Fiscal Year Ended		
	August 30, 2019	August 31, 2018	August 25, 2017
Cash flows from operating activities:			
Net income (loss)	$ 51,332	$ 119,463	$ (7,795)
Adjustments to reconcile net income (loss) to net cash provided by (used in) operating activities:			
Depreciation and amortization	29,206	26,182	33,238
Share-based compensation	18,199	10,558	5,364
Provision for doubtful accounts receivable	(90)	(86)	(51)
Deferred income tax benefit	(719)	(2,820)	(2,389)
Loss on disposal of property and equipment	77	691	352
Loss on extinguishment of debt	—	—	16,580
Loss on early repayment of debt	—	—	6,744
Amortization of debt discounts and issuance costs	2,803	2,972	8,231
Write-off of other assets	—	250	—
Change in fair value of contingent consideration	(2,700)	(3,000)	—
Changes in operating assets and liabilities:			
Accounts receivable	35,240	(55,297)	(40,426)
Inventories	102,083	(42,435)	(21,851)
Prepaid expenses and other assets	(1,606)	(8,736)	(58)
Accounts payable	(64,569)	17,548	(10,608)
Accrued expenses and other liabilities	401	2,617	11,736
Net cash provided by (used in) operating activities	169,657	67,907	(933)
Cash flows from investing activities:			
Capital expenditures and deposits on equipment	(33,433)	(25,738)	(18,678)
Proceeds from sale of property and equipment	81	305	651
Acquisition of business, net of cash acquired	(76,088)	(42,316)	—
Net cash used in investing activities	(109,440)	(67,749)	(18,027)
Cash flows from financing activities:			
Long-term debt payments	(6,753)	(24,269)	(19,698)
Proceeds from borrowings under revolving line of credit	254,500	429,395	457,750
Repayments of borrowings under revolving line of credit	(254,500)	(461,684)	(457,750)
Proceeds from issuance of ordinary shares from share option exercises	5,070	7,496	406
Tax payments due upon issuance of ordinary shares for release of RSUs	(520)	—	(763)
Proceeds from issuance of ordinary shares from ESPP	2,303	—	—
Issuance of ordinary shares from IPO, net of underwriting commissions	—	—	63,507
Payment of costs related to IPO	—	(1,591)	(1,149)
Proceeds from issuance of long-term debt, net of costs paid	—	59,365	156,962
Fees paid for revolving line of credit financing	—	(768)	(3,167)
Payment for extinguishment of long-term debt	—	—	(151,946)
Early debt payment for long-term debt	—	—	(61,127)
Net cash provided by (used in) financing activities	100	7,944	(16,975)
Effect of exchange rate changes on cash, cash equivalents and restricted cash*	588	(331)	(28)
Net increase (decrease) in cash, cash equivalents and restricted cash*	60,905	7,771	(35,963)
Cash, cash equivalents and restricted cash at beginning of period*	37,234	29,463	65,426
Cash, cash equivalents and restricted cash at end of period*	$ 98,139	$ 37,234	$ 29,463
Supplemental disclosures of cash flow information:			
Cash paid during the year:			
Cash paid for interest	$ 20,648	$ 15,291	$ 21,458
Cash paid for income taxes, net of refunds	15,306	21,832	8,095
Noncash activities information:			
Capital expenditures included in accounts payable at period end	1,437	724	153
Fair value of ordinary shares issued and holdback in connection with acquisition	10,785	—	—
Acquisition consideration held back to satisfy potential indemnification claims	1,676	3,479	—
Fair value of contingent consideration for acquisition of business	2,700	3,000	—
Fair value of warrants issued	—	—	21,341
IPO costs included in accounts payable and accrued liabilities at period end	—	—	1,591
Unpaid debt fees related to term loan and revolver	—	178	768

* *Cash balance was adjusted to include restricted cash upon adoption of ASU 2016-18 in fiscal 2019 (see Note 1(u)).*

The accompanying notes are an integral part of these consolidated financial statements.

SMART Global Holdings, Inc.
and Subsidiaries

Notes to Consolidated Financial Statements

August 30, 2019, August 31, 2018 and August 25, 2017

(1) Overview, Basis of Presentation and Significant Accounting Policies

(a) Overview

On August 26, 2011, SMART Global Holdings, Inc., formerly known as Saleen Holdings, Inc., a Cayman Islands exempted company (SMART Global Holdings, and together with its subsidiaries, the Company), consummated a transaction with SMART Worldwide Holdings, Inc., formerly known as SMART Modular Technologies (WWH), Inc. (SMART Worldwide), pursuant to an Agreement and Plan of Merger (the Merger Agreement) whereby, through a series of transactions, SMART Global Holdings acquired substantially all of the equity interests of SMART Worldwide with SMART Worldwide surviving as an indirect wholly owned subsidiary of SMART Global Holdings (the Acquisition). SMART Global Holdings is an entity that was formed by investment funds affiliated with Silver Lake Partners and Silver Lake Sumeru (collectively Silver Lake). As a result of the Acquisition, since there was a change of control resulting in Silver Lake as the controlling shareholder group, the Company applied the acquisition method of accounting and established a new basis of accounting.

The Company, through its subsidiaries, are leading designers and manufacturers of electronic products focused on memory and computing technology areas. The Company specializes in application specific product development and support for customers in enterprise, government and OEM markets. Customers rely on SMART as a strategic supplier with top tier customer service, product quality, and technical support with engineering, sales, manufacturing, supply chain and logistics capabilities worldwide. The Company targets customers in markets such as communications, storage, networking, mobile, industrial automation, industrial internet of things, government, military, edge computing and high performance computing. The Company operates in three primary product areas: Specialty Memory, Brazil and Specialty Compute and Storage Solutions.

SMART Global Holding is domiciled in the Cayman Islands and has U.S. headquarters in Newark, California. The Company has operations in the United States, Brazil, Malaysia, Taiwan, Hong Kong, Scotland, Singapore, India, Netherlands and South Korea.

(b) Basis of Presentation

The accompanying consolidated financial statements comprise SMART Global Holdings and its wholly owned subsidiaries. Intercompany transactions have been eliminated in the consolidated financial statements.

The Company uses a 52- to 53-week fiscal year ending on the last Friday in August. Fiscal 2019, 2018 and 2017 ended on August 30, 2019, August 31, 2018 and August 25, 2017, respectively, and included 52, 53 and 52 weeks, respectively.

All financial information for two of the Company’s subsidiaries, SMART Modular Technologies Indústria de Componentes Eletrônicos Ltda. (SMART Brazil) and SMART Modular Technologies do Brasil Indústria e Comércio de Componentes Ltda. (SMART do Brazil), is included in the Company’s consolidated financial statements on a one-month lag because their fiscal years begin August 1 and end July 31.

(c) Use of Estimates

The preparation of consolidated financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting periods presented. Actual results could differ from the estimates made by management. Significant items subject to such estimates and assumptions include the useful lives of long-lived assets, the valuation of deferred tax assets, inventory and contingent consideration in business acquisitions, share-based compensation, the estimated net realizable value of Brazilian tax credits, income tax uncertainties and other contingencies.

(d) Revenue

The Company's revenues include products and services. The Company's product revenues are predominantly derived from the sale of memory modules, flash memory cards, compute products and storage products, which the Company designs and manufactures. The Company's service revenues are derived from procurement, logistics, inventory management, temporary warehousing, kitting and packaging services. Also, a small portion of the Company's product sales include extended warranty and on-site services, subscriptions to the Company's high performance computing environment, professional services, software and related support.

The Company determines revenue recognition through the following steps: (1) identification of the contract with a customer; (2) identification of the performance obligations in the contract; (3) determination of the transaction price; (4) allocation of the transaction price to the performance obligations in the contract; and (5) recognition of revenue when, or as, a performance obligation is satisfied.

The Company's contracts are executed through a combination of written agreements along with purchase orders with all customers including certain general terms and conditions. Generally, purchase orders entail products, quantities and prices, which define the performance obligations of each party and are approved and accepted by the Company. The Company's contracts with customers do not include extended payment terms. Payment terms vary by contract type and type of customer and generally range from 30 to 45 days from invoice. Additionally, taxes assessed by a governmental authority that are both imposed on and concurrent with a specific revenue-producing transaction, that are collected by the Company from a customer and deposited with the relevant government authority, are excluded from revenue.

The transaction price is determined based on the consideration to which the Company will be entitled in exchange for transferring goods or services to the customer adjusted for estimated variable consideration. Variable consideration may include discounts, rights of return, refunds, and other similar obligations. The Company allocates the transaction price to each distinct product and service based on its relative standalone selling price. The standalone selling price for products primarily involves the cost to produce the deliverable plus the anticipated margin and for services is estimated based on the Company's approved list price.

In the normal course of business, the Company does not accept product returns unless the items are defective as manufactured. The Company establishes provisions for estimated returns and warranties. In addition, the Company does not typically provide customers with the right to a refund and does not transact for noncash consideration.

Standard Products

The Company's main performance obligations are to deliver the requested goods to customers according to the agreed-upon shipping terms. The Company recognizes revenue when control transfers to the customer (i.e., when the Company's performance obligation is satisfied). The Company invoices the customer and recognizes revenues for such delivery when control transfers based on shipping terms.

Customized Products

For customized product sales with terms that require the customer to purchase 100% of all parts built to fulfill the customers forecast, the Company recognizes revenue when control of the underlying assets passes to the customer, as the customer is able to both direct the use of, and obtain substantially all of the remaining benefit from the assets; the customer has the significant risks and rewards associated with ownership of the assets; and the Company has a present right to payment. For these sales, control passes when the Company has made these products available to the customer and under the terms of the agreement cannot repurpose them without the customer's express consent. Accordingly, the Company will recognize revenue at the point in time when products made to the customer's order or forecast are completed and made available to the customer.

Non-cancellable nonrefundable, or NCNR, customized product sales are recognized over time on a cost incurred basis. The customer obtains control and benefits from the services as they are performed over the period based on the cost input measure in the production process for the NCNR customized product. The terms within the NCNR sales orders provide the Company with a legally enforceable right to receive payment including a reasonable profit margin upon customer cancellation for performance completed to date. Accordingly, the Company recognizes revenue over time as customized products listed within the NCNR orders are completed.

Computing Products and Services

A small portion of the Company's product sales includes extended warranty and on-site services, subscriptions to the Company's high performance computing environment, professional consulting services including installation and other services, and hardware and software related support. Each contract may contain multiple performance obligations, which requires the transaction price to be allocated to each performance obligation. The Company allocates the consideration to each performance obligation based on the relative selling price. The Company uses best-estimated selling price, determined as the best estimate of the price at which the Company would transact if it sold the deliverable regularly on a stand-alone basis.

For services provided to the customers over a period of time, such revenues are recognized over time in line with when the customer receives and consumes the benefit of the services. Extended warranty and on-site services, hardware support, software support, and subscription revenue for access to the Company's high performance computing environment is deferred and recognized ratably over the contractual period as the Company transfers control as it satisfies its performance obligations over time as the services are rendered. These services contracts are typically one to three years in length. Subscription revenue for certain customers is recognized based on the contractual fee to use the high-performance-computing environment. Professional consulting services revenue is recognized as the service is performed and the customer obtains control and benefits from the services as they are performed over the period. The methods of recognizing revenue for each of these products and services were selected because they reflect a faithful depiction of the transfer of control.

Agency Services

The Company has service performance obligations for agency related services such as procurement, logistics, inventory management, temporary warehousing, kitting and packaging services for certain agency basis customers. The agency services are also known as supply chain services and the performance obligations for these services consist of customized, integrated supply chain services management to assist customers in the planning, execution and overall management of the procurement processes.

For these customers that are accounted for on an agency basis, the Company recognizes as revenue the amount billed less the material procurement costs of products serviced as an agent with the cost of providing these services embedded with the cost of sales. The Company has separate agent performance obligations as follows: (a) procurement, logistics, and inventory management, (b) temporary warehousing, and (c) kitting and packaging services for these customers. Revenue from these arrangements is recognized as service revenue and is determined by a fee for services based on material procurement costs (i.e. fee as a percentage of the associated material being procured, warehoused, kitted or packaged). The Company recognizes revenue for procurement, logistics and inventory management upon the completion of the services or performance obligation, typically upon shipment of the product, as the criteria for over time recognition is not met. For temporary warehousing, kitting and packaging services, revenue is recognized over time, but the period of performance is typically very short in duration. There are no obligations subsequent to shipment of the product under the agency arrangements.

Contract Costs

As a practical expedient, the Company recognizes the incremental costs of obtaining a contract, specifically commission expenses that have an amortization period of less than twelve months, as an expense when incurred. Additionally, the Company has adopted an accounting policy to recognize shipping and handling costs that occur after control transfers, if any, to the customer as a fulfillment activity. The Company records shipping and handling costs related to revenue transactions within cost of sales as a period cost.

Gross Billings and Net Sales

The following is a summary of the Company's gross billings to customers and net sales for services and products (in thousands):

	Fiscal Year Ended		
	August 30, 2019	August 31, 2018 [2]	August 25, 2017 [2]
Service revenue, net	$ 42,527	$ 42,978	$ 36,843
Cost of purchased materials - service [1]	946,303	1,013,393	864,256
Gross billings for services	988,830	1,056,371	901,099
Product net sales	1,169,472	1,245,843	724,448
Gross billings to customers	$2,158,302	$2,302,214	$1,625,547
Product net sales	$1,169,472	$1,245,843	$ 724,448
Service revenue, net	42,527	42,978	36,843
Net sales	$1,211,999	$1,288,821	$ 761,291

(1) Represents material procurement costs of products provided as an agent reported on a net basis.
(2) Amounts for fiscal 2018 and 2017 are accounted for under ASC 605 (refer to Note 1(u)).

Gross billings to customers in the table above represents total amounts invoiced to customers during the period and is the sum of net sales plus material procurement costs of products the Company provides as an agent. The amount invoiced to customers for agency related services is the total of the related material procurement costs and fees for providing its services. Gross billings to customers are reflected in accounts receivable for unpaid invoices as of the end of the period. Additionally, material procurement costs of products the Company manages as an agent on behalf of its customers on hand as of the end of the period are reflected in inventory. Both the amounts in accounts receivable and inventory impact the determination of net cash provided by (or used in) operations.

Contract Balances

The Company records accounts receivable when it has an unconditional right to consideration. Contract assets represent amounts recognized as revenue for which the Company does not have the unconditional right to consideration. All contract assets represent amounts related to invoices expected to be issued during the next 12-month period and are recorded as prepaid expenses and other current assets. Contract liabilities are recorded when cash payments are received or due in advance of performance. Contract liabilities consist of advance payments and deferred revenue, where the Company has unsatisfied performance obligations. Contract liabilities are classified as deferred revenue and are allocated between accrued liabilities and other long-term liabilities on our consolidated balance sheet based on the timing of when the customer takes control of the asset or receives the benefit of the service. Payment terms vary by customer. The time between invoicing and when payment is due is not significant. Changes in the accounts receivable, contract assets and the deferred revenues balances during the year ended August 30, 2019 are as follows (in thousands):

	August 30, 2019	September 1, 2018	$ Change
Accounts receivable	$ 217,433	$ 240,098	$ (22,665)
Contract assets	$ 4,606	$ 1,136	$ 3,470
Deferred revenue	$ 24,219	$ 11,750	$ 12,469

The increase in contract assets from $1.1 million at September 1, 2018 to $4.6 million as of August 30, 2019 was primarily driven by the recognition of revenue that had not yet been billed. The increase in deferred revenue from $11.8 million to $24.2 million was due to additional funds collected for hosting and support contracts signed during the year in which billing occurred in advance of revenue recognition. During fiscal 2019, $6.8 million of revenue recognized was included in the deferred revenue balance at the beginning of the period, which was offset by additional deferrals during the period.

Disaggregation of Revenue

The Company disaggregates revenue by source of revenue and geography; no other level of disaggregation is required considering the type of products, customer, markets, contracts, duration of contracts, timing of transfer of control and sales channels. The revenue by geography is disclosed in Note 11, and revenue by source is as follows (in thousands):

	Fiscal Year Ended		
	August 30, 2019	August 31, 2018	August 25, 2017
Brazil	$ 536,495	$ 797,849	$ 398,175
Specialty Memory	458,946	438,446	363,116
Specialty Compute and Storage Solutions	216,558	52,526	—
Total net sales	$1,211,999	$1,288,821	$ 761,291

Revenue Allocated to Remaining Performance Obligations

The Company's performance obligations related to product sales have a contractual duration of less than one year. The Company elected to apply the optional exemption practical expedient provided in ASC 606 and, therefore, is not required to disclose the aggregate amount of the transaction price allocated to those performance obligations that are unsatisfied or partially unsatisfied at the end of the reporting period.

Remaining performance obligations represent contracted revenue related to support services that have not yet been recognized. The Company expects to recognize revenue on the remaining performance obligations as follows (in thousands):

	August 30, 2019
Within 1 year	$ 16,680
2-3 years	7,104
Thereafter	435
	$ 24,219

(e) Cash and Cash Equivalents

All highly liquid investments with maturities of 90 days or less from original dates of purchase are carried at cost, which approximates fair value, and are considered to be cash equivalents. Cash and cash equivalents include cash on hand, cash deposited in checking and saving accounts, money market accounts and securities with maturities of less than 90 days at the time of purchase. Due to the adoption of ASU 2016-18 in fiscal 2019, the presentation of the Statement of Cash Flows has been updated with the inclusion of restricted cash – refer to Note 1(u) for details.

(f) Allowance for Doubtful Accounts

The Company evaluates the collectability of accounts receivable based on a combination of factors. In cases where the Company is aware of circumstances that may impair a specific customer's ability to meet its financial obligations, the Company records a specific allowance against amounts due and, thereby, reduces the net recognized receivable to the amount management reasonably believes will be collected. For all other customers, the Company recognizes allowances for doubtful accounts based on a combination of factors including the length of time the receivables are outstanding, industry and geographic concentrations, the current business environment and historical experience.

The changes in the accounts receivable allowances and sales returns during fiscal 2019, 2018 and 2017 are as follows (in thousands):

	Total
Balance as of August 26, 2016	$ 228
Charged to costs and other	652
Deductions	(566)
Balance as of August 25, 2017	314
Charged to costs and other	220
Additions from business acquisition (see Note 2)	82
Deductions	(391)
Balance as of August 31, 2018	225
Changes to costs and other	1,091
Additions from business acquisitions (see Note 2)	50
Deductions	(1,182)
Balance as of August 30, 2019	$ 184

(g) Derivative Financial Instrument

The Company records the assets or liabilities associated with derivative instruments at fair value based on Level 2 inputs in prepaid expenses and other current assets or accrued liabilities, respectively, in the consolidated balance sheets. The accounting for gains and losses resulting from changes in fair value depends on the use of the derivative and whether it is designated and qualifies for hedge accounting. See Note 4 for further details.

(h) Inventories

Inventories are valued at the lower of actual cost or net realizable value. Inventory value is determined on a specific identification basis for material and an allocation of labor and manufacturing overhead. At each balance sheet date, the Company evaluates the ending inventories for excess quantities and obsolescence. This evaluation includes an analysis of sales levels by product family and considers historical demand and forecasted demand in relation to the inventory on hand, competitiveness of product offerings, market conditions and product life cycles. The Company adjusts carrying value to the lower of its cost or net realizable value. Inventory write-downs are not reversed and create a new cost basis.

(i) Prepaid State Value-Added Taxes (ICMS)

Since 2004, the Sao Paulo State tax authorities have granted SMART Brazil a tax benefit to defer and eventually eliminate the payment of ICMS levied on certain imports from independent suppliers. This benefit, known as an ICMS Special Regime, is subject to renewal every two years. When the then current ICMS Special Regime expired on March 31, 2010, SMART Brazil timely applied for a renewal of the benefit, however, the renewal was not granted until August 4, 2010.

On June 22, 2010, the Sao Paulo authorities published a regulation allowing companies that applied for a timely renewal of an ICMS Special Regime to continue utilizing the benefit until a final conclusion on the renewal request was rendered. As a result of this publication, SMART Brazil was temporarily allowed to utilize the benefit while it waited for its renewal. From April 1, 2010, when the ICMS benefit lapsed, through June 22, 2010 when the regulation referred to above was published, SMART Brazil was required to pay the ICMS taxes on imports, which payments result in ICMS credits that may be used to offset ICMS obligations generated from sales by SMART Brazil of its products; however, the vast majority of SMART Brazil's sales in Sao Paulo were either subject to a lower ICMS rate or were made to customers that were entitled to other ICMS benefits that enabled them to eliminate the ICMS levied on their purchases of products from SMART Brazil. As a result, from April 1, 2010 through June 22, 2010, SMART Brazil did not have sufficient ICMS collections against which to apply the credits and the credit balance increased significantly.

Effective February 1, 2011, in connection with its participation in a Brazilian government incentive program known as Support Program for the Technological Development of the Semiconductor and Display Industries Laws, or PADIS, SMART Brazil spun off the module manufacturing operations into SMART do Brazil, a separate subsidiary of the Company. In connection with this spin off, SMART do Brazil applied for a tax benefit from the State of Sao Paulo in order to obtain a deferral of state ICMS. This tax benefit is referred to as State PPB, or CAT 14. The CAT 14 approval was not obtained until July 21, 2011, and from February 1, 2011 until the CAT 14 approval was granted, SMART do Brazil did not have sufficient ICMS collections against which to apply the credits accrued upon payment of the ICMS on SMART do Brazil's imports and inputs locally acquired, and therefore, it generated additional excess ICMS credits.

As of August 30, 2019, the total ICMS tax credits reported on the Company's accompanying consolidated balance sheet are R$32.3 million (or $8.6 million), of which (i) R$7.2 million (or $1.9 million) are fully vested ICMS credits, classified as prepaid and other current assets and R$23.2 million (or $6.2 million) are fully vested ICMS credits, classified as other noncurrent assets, and (ii) R$1.9 million (or $0.5 million) are ICMS credits subject to vesting in 48 equal monthly amounts, classified as prepaid expenses and other current assets (R$0.6 million or $0.2 million), and other noncurrent assets (R$1.3 million or $0.3 million). As of August 31, 2018, the total ICMS tax credits reported on the Company's accompanying consolidated balance sheet are R$45.3 million (or $12.1 million), of which (i) R$16.6 million (or $4.4 million) are fully vested ICMS credits, classified as prepaid and other current assets, and R$25.4 million (or $6.8 million) are fully vested ICMS credits, classified as other noncurrent assets, and (ii) R$ 3.3 million (or $ 0.9 are ICMS credits subject to vesting in 48 equal monthly amounts, classified as prepaid expenses and other current assets (R$0.6 million or $0.2 million), and other noncurrent assets (R$2.7 million or $0.7 million). It is expected that the excess ICMS credits will continue to be recovered in fiscal 2020 through fiscal 2022. The Company updates its forecast of the recoverability of the ICMS credits quarterly, considering the following key variables in Brazil: timing of government approvals of automated credit utilization, the total amount of sales, the product mix and the inter and intra state mix of sales. If these estimates or the mix of products or regions vary, it could take longer or shorter than expected to recover the accumulated ICMS credits, resulting in a reclassification of ICMS credits from current to noncurrent, or vice versa.

In April and June 2016, the Company filed cases with the State of Sao Paulo tax authorities to seek approval to sell these excess ICMS credits. In December 2017, the Company obtained approval to sell R$31.6 million (or $8.4 million) of its ICMS credits. Once approved, sale of ICMS credits usually take several months to complete and typically incur a discount to the face amount of the credits sold, as well as fees for the arrangers of these sales which together aggregate 10% to 15% of the face amount of the credits being sold. Once the sale is complete, the tax authorities usually approve the transfer of credits in monthly installments and the proceeds resulting from the sale of the aforementioned credits shall be received by the Company accordingly. The Company has recorded valuation adjustments for the estimated discount and fees that the Company will need to offer in order to sell ICMS credits to other companies.

In the first quarter of fiscal 2019, the Company sold R$17.7 million (or $4.5 million) of its ICMS credits that had been approved to be sold in December 2017. The payments are to be received in 22 installments starting in the second quarter of fiscal 2019 through fiscal 2020. The Company received a total of R$10.0 million (or $2.7 million) of the monthly installments during fiscal 2019.

(j) Property and Equipment

Property and equipment are recorded at cost. Depreciation and amortization are computed based on the shorter of the estimated useful lives or the related lease terms, using the straight-line method. Estimated useful lives are presented below:

	Period
Asset:	
Manufacturing equipment	2 to 5 years
Office furniture, software, computers and equipment	2 to 5 years
Leasehold improvements*	2 to 60 years

* Includes the land lease for the Penang facility with a term expiring in 2070.

(k) Goodwill

The Company performs a goodwill impairment test annually during the fourth quarter of its fiscal year and more frequently if events or circumstances indicate that impairment may have occurred. Such events or circumstances may, among others, include significant adverse changes in the general business climate. As of August 30, 2019 and August 31, 2018, the carrying value of goodwill on the Company's consolidated balance sheet was $81.4 million and $45.4 million, respectively.

When conducting the annual impairment test for goodwill, the Company compares the estimated fair value of a reporting unit containing goodwill to its carrying value. If the fair value of the reporting unit is determined to be more than its carrying value, no goodwill impairment is recognized. The excess of the fair value of the reporting unit over the fair value of assets less liabilities is the implied value of goodwill and is used to determine the amount of impairment.

All of the $81.4 million carrying value of goodwill on the Company's consolidated balance sheet as of August 30, 2019 is associated with the Company's three reporting units (Specialty Memory, Brazil and Specialty Compute and Storage Solutions). No impairment of goodwill was recognized through August 30, 2019.

The changes in the carrying amount of goodwill during fiscal 2019 and 2018 are as follows (in thousands):

Balance as of August 25, 2017	$ 46,022
Addition from business acquisition (see Note 2)	4,575
Translation adjustments	(5,203)
Balance as of August 31, 2018	45,394
Provisional adjustments from business acquisition (See Note 2)	671
Additions from business acquisitions (see Note 2)	35,428
Translation adjustments	(70)
Balance as of August 30, 2019	$ 81,423

(l) Intangible Assets, Net

The following table summarizes the gross amounts and accumulated amortization of intangible assets by type as of August 30, 2019 and August 31, 2018 (dollars in thousands):

		August 30, 2019			August 31, 2018		
	Weighted avg. life (yrs)	Gross Carrying amount	Accumulated amortization	Net	Gross Carrying amount	Accumulated amortization	Net
Customer relationships	4-7	$52,300	$ (3,755)	$48,545	$ 37,187	$ (22,968)	$ 14,219
Trademarks/tradename	5-7	13,100	(2,172)	10,928	12,200	(400)	11,800
Technology	4	10,350	(498)	9,852	5,150	(4,914)	236
Backlog	< 1	400	(400)	—	400	(400)	—
Total		$76,150	$ (6,825)	$69,325	$ 54,937	$ (28,682)	$ 26,255

Amortization expense related to intangible assets totaled approximately $5.6 million, $6.1 million and $11.9 million in fiscal 2019, 2018 and 2017, respectively. Acquired intangibles are amortized on a straight-line basis over the remaining estimated economic life of the underlying intangible assets.

	Fiscal Year Ended		
	August 30, 2019	August 31, 2018	August 25, 2017
Amortization of intangible assets classification (in thousands):			
Cost of sales	$ 566	$ 7	$ —
Research and development	—	987	4,897
Selling, general and administrative	5,048	5,136	7,042
Total	$ 5,614	$ 6,130	$ 11,939

Estimated amortization expense of these intangible assets for the next five fiscal years and all years thereafter are as follows (in thousands):

	Amount
Fiscal year ending August:	
2020	$ 13,654
2021	13,654
2022	13,639
2023	12,879
2024	9,092
2025 and thereafter	6,407
Total	$ 69,325

(m) Long-Lived Assets

Long-lived assets, excluding goodwill, are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset group may not be recoverable. Recoverability of assets to be held and used is measured by a comparison of the carrying amount of an asset group to the future undiscounted cash flows expected to be generated by the asset group. If such assets are considered to be impaired, the impairment is measured by the amount by which the carrying amount of the assets exceeds the fair value of the assets. Assets to be disposed are reported at the lower of the carrying amount or fair value, less cost to sell. No impairment of long-lived assets was recognized in fiscal 2019, 2018 and 2017.

(n) Research and Development Expense

Research and development expenditures are expensed in the period incurred.

(o) Income Taxes

The Company uses the asset and liability method of accounting for income taxes. Deferred tax assets and liabilities are recognized for the future consequences attributable to differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax basis and net operating loss and credit carryforwards. When necessary, a valuation allowance is recorded to reduce tax assets to amounts expected to be realized. Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. The effect on deferred tax assets and liabilities of a change in tax rates is recognized in income (or loss) in the period that includes the enactment date. The Company recognizes the effect of income tax positions only if those positions are more likely than not of being sustained. Recognized income tax positions are measured at the largest amount that is greater than 50% likely of being realized. Changes in recognition or measurement are reflected in the period in which the change in judgment occurs. The Company records interest and penalties related to unrecognized tax benefits in tax expense.

(p) Foreign Currency Translation

For foreign subsidiaries using the local currency as their functional currency, assets and liabilities are translated at exchange rates in effect at the balance sheet date and income and expenses are translated at average exchange rates during the period. The effect of this translation is reported in other comprehensive income (loss). Exchange gains and losses arising from transactions denominated in a currency other than the functional currency of the respective foreign subsidiaries are included in results of operations.

For foreign subsidiaries using the U.S. dollar as their functional currency, the financial statements of these foreign subsidiaries are remeasured into U.S. dollars using the historical exchange rate for property and equipment and certain other nonmonetary assets and liabilities and related depreciation and amortization on these assets and liabilities. The Company uses the exchange rate at the balance sheet date for the remaining assets and liabilities, including deferred taxes. A weighted average exchange rate is used for each period for revenues and expenses.

All foreign subsidiaries and branch offices, except Brazil and South Korea, use the U.S. dollar as their functional currency. The gains or losses resulting from the remeasurement process are recorded in other income (expense) in the accompanying consolidated statements of operations.

In fiscal 2019, 2018 and 2017, the Company recorded ($3.1) million, ($13.2) million and $0.3 million, respectively, of foreign exchange gains (losses) primarily related to its Brazilian operating subsidiaries.

(q) Share-Based Compensation

The Company accounts for share-based compensation under ASC 718, *Compensation—Stock Compensation*, which requires companies to recognize in their statement of operations all share-based payments, including grants of share options and other types of equity awards, based on the grant-date fair value of such share-based awards.

	Fiscal Year Ended		
	August 30, 2019	**August 31, 2018**	**August 25, 2017**
Share-based compensation expense by category (in thousands):			
Cost of sales	$ 2,485	$ 1,335	$ 636
Research and development	2,654	1,460	655
Selling, general and administrative	13,060	7,763	4,073
Total	$ 18,199	$ 10,558	$ 5,364

(r) Loss Contingencies

The Company is subject to the possibility of various loss contingencies arising in the ordinary course of business. The Company considers the likelihood of a loss and the ability to reasonably estimate the amount of loss in determining the necessity for and amount of any loss contingencies. Estimated loss contingencies are accrued when it is probable that a liability has been incurred or an asset impaired and the amount of loss can be reasonably estimated. The Company regularly evaluates the most current information available to determine whether any such accruals should be recorded or adjusted.

(s) Comprehensive Income (Loss)

Comprehensive income (loss) consists of net income (loss) and other gains and losses affecting shareholders' equity that, under U.S. GAAP are excluded from net income (loss). For the Company, other comprehensive income (loss) generally consists of foreign currency translation adjustments.

(t) Concentration of Credit and Supplier Risk

The Company's concentration of credit risk consists principally of cash and cash equivalents and accounts receivable. The Company's revenues and related accounts receivable reflect a concentration of activity with certain customers (see Note 12). The Company does not require collateral or other security to support accounts receivable. The Company performs periodic credit evaluations of its customers to minimize collection risk on accounts receivable and maintains allowances for potentially uncollectible accounts.

The Company relies on four suppliers for the majority of its raw materials. At August 30, 2019 and August 31, 2018, the Company owed these four suppliers $110.9 million and $141.8 million, respectively, which was recorded as accounts payable and accrued liabilities. The inventory purchases from these suppliers in fiscal 2019, 2018 and 2017 were $1.3 billion, $1.5 billion and $1.0 billion, respectively.

(u) New Accounting Pronouncements

In October 2018, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update ("ASU") No. 2018-16, *Derivatives and Hedging (Topic 815) Inclusion of the Secured Overnight Financing Rate (SOFR) Overnight Index Swap (OIS) Rate as a Benchmark Interest Rate for Hedge Accounting Purposes*. This standard amends ASC 815, *Derivatives and Hedges*, and permits the SOFR OIS rate as an approved rate to be used in valuing derivative instruments. ASU 2018-16 is effective for fiscal years, including interim periods within those fiscal years, beginning after December 15, 2018, on a prospective basis. The Company will not adopt this standard before the fiscal year in which it becomes effective. Based on derivative instruments held as of August 30, 2019, this standard is not expected to have a material impact on the Company's consolidated financial statements.

In August 2018, the Securities and Exchange Commission ("SEC") adopted amendments to certain disclosure requirements in Securities Act Release No. 33-10532, Disclosure Update and Simplification. The amendments became effective on November 5, 2018. The SEC staff subsequently indicated that it would not object if a filer's first presentation of changes in shareholders' equity is included in its Form 10-Q for the quarter that begins after the final rule's effective date. Among the amendments is the requirement to present the changes in shareholders' equity in the interim financial statements (either in a separate statement or footnote) in quarterly reports on Form 10-Q. The analysis should present a reconciliation of the beginning balance to the ending balance of each period for which a consolidated income statement is required to be filed. The Company implemented this requirement as of the second quarter of fiscal 2019.

In February 2018, the FASB issued ASU No. 2018-02, *Income Statement-Reporting Comprehensive Income (Topic 220): Reclassification of Certain Tax Effects from Accumulated Comprehensive Income*. The new guidance allows companies to reclassify standard tax effects resulting from the Tax Act, from accumulated other comprehensive income to retained earnings. The guidance also requires certain new disclosures regardless of the election. The Company is required to adopt the guidance in the first quarter of fiscal 2020. Early adoption is permitted; however, the Company has elected to not early adopt this guidance. The Company is currently evaluating the timing and the impact of these amendments to its consolidated financial statements.

In November 2016, the FASB issued ASU No. 2016-18, *Statement of Cash Flows (Topic 230): Restricted Cash*, which clarifies the inclusion and presentation of changes in restricted cash and restricted cash equivalents in the statement of cash flows. The Company adopted ASU 2016-18 in fiscal 2019 on a retrospective basis.

The following table provides a reconciliation of cash and cash equivalents as previously reported within the Consolidated Statements of Cash Flows to cash, cash equivalents and restricted cash as currently reported in the Consolidated Statements of Cash Flows (in thousands):

	August 31, 2018	August 25, 2017
Cash, cash equivalents as previously reported in the Consolidated Statements of Cash Flows	$ 31,375	$ 22,436
Restricted cash (Other noncurrent assets)	5,859	7,027
Cash, cash equivalents as currently reported in the Consolidated Statements of Cash Flows	$ 37,234	$ 29,463

In August 2016, the FASB issued ASU No. 2016-15, *Cash Flow Statements, Classification of Certain Cash Receipts and Cash Payments*. The new guidance is intended to address the diversity in practice in how certain cash receipts and cash payments are presented and classified in the statement of cash flows under Topic 230, Statement of Cash Flows, and other Topics. The guidance addresses eight specific cash flow classification issues with the objective of reducing diversity in practice. The Company adopted ASU 2016-15 in fiscal 2019 on a retrospective basis. The adoption of this standard did not have a material impact on its consolidated financial statements.

In February 2016, the FASB issued ASU No. 2016-02, *Leases (Topic 842)*, which modified lease accounting for both lessees and lessors to increase transparency and comparability by recognizing lease assets and lease liabilities by lessees for those leases classified as operating leases under previous accounting standards and disclosing key information about leasing arrangements. ASU 2016-02 will be effective for the Company beginning on August 31, 2019 and early adoption is permitted. In transition, lessees and lessors are required to recognize and measure leases at the beginning of the earliest period presented using a modified retrospective approach. In July 2018, the FASB issued ASU 2018-11, *Targeted Improvements to ASC 842, Leases*, which permits an entity to elect an additional transition method to the existing modified retrospective transition requirements. Consequently, an entity's reporting for the comparative periods presented in the financial statements in which it adopts the new leases standard will continue to be in accordance with the previous lease guidance in ASC Topic 840. The Company intends to adopt the new standard using this optional transition method with the recognition of both a right-of-use asset of approximately $20.0 million to $24.0 million and a corresponding lease liability of approximately of $23.0 million to $27.0 million on the balance sheet upon adoption. No impact on the net income is expected.

In May 2014, the FASB issued a new standard, ASU No. 2014-09, *Revenue from Contracts with Customers, as amended*, which supersedes nearly all existing revenue recognition guidance. The FASB has issued several amendments to the new standard, including clarification on identifying performance obligations. The amendments include ASU No. 2016-08, *Revenue from Contracts with Customers (Topic 606)—Principal versus Agent Considerations*, which was issued in March 2016, and clarifies the implementation guidance for principal versus agent considerations in ASU 2014-09. The new standard permits adoption either by using (i) a full retrospective approach for all periods presented in the period of adoption or (ii) a modified retrospective approach with the cumulative effect of initially applying the new standard recognized at the date of initial application and providing certain additional disclosures. The new standard is effective for annual reporting periods beginning after December 15, 2017. The Company adopted the new standard effective September 1, 2018 using the modified retrospective approach applied to all contracts that are not completed contracts at the date of initial adoption (i.e. September 1, 2018).

The Company has completed its assessment and implemented policies, processes, and controls to support the standard measurement and disclosure requirements. Under ASC 606, the Company recognized a change to the timing of revenue recognition in two areas. The first relates to customized product sales orders deemed NCNR. Under previous accounting standards, the Company recognized revenue and costs related to these sales when products were shipped or delivered to the customers based on the terms of the purchase orders and sales agreements. Under ASC 606, the terms within the NCNR sales orders that provide the Company with a legally enforceable right to receive payment including a reasonable profit margin upon customer cancellation for performance completed to date will affect the timing of revenue recognition. Accordingly, the Company will recognize revenue over time as customized products listed within the NCNR orders are completed.

The second change for the Company under ASC 606 relates to the timing of revenue recognition for customized product sales with terms that require the customer to purchase 100% of all parts built to fulfill the customers forecast. Under previous accounting standards, the Company recognized revenue and costs related to these sales when products are shipped or delivered to the end-customers based on the terms of the purchase orders and sales agreements. Under ASC 606, the Company recognizes revenue when control of the underlying assets passes to the customer, as the customer is able to both direct the use of, and obtain substantially all of the remaining benefit from the assets; the customer has the significant risks and rewards associated with ownership of the assets; and the Company has a present right to payment. For these sales, control passes when the Company has made these products available to the customer and under the terms of the agreement cannot repurpose them without the customer's express consent. Accordingly, the Company will recognize revenue at the point in time when products made to the customer's forecast are completed and made available to the customer.

Results for reporting periods beginning after September 1, 2018 are presented under ASC 606, while prior period amounts are not adjusted and continue to be reported in accordance with the prior accounting under ASC 605. As a result of these changes, the Company recorded a net increase to opening retained earnings of $1.0 million as of September 1, 2018 due to the cumulative impact of adopting ASC 606, with a corresponding increase of $2.9 million in accounts receivables, $1.1 million in contract assets and a decrease of $3.0 million in inventory. Effective September 1, 2018, the Company recognized revenue on NCNR customized product sales over time and customized product sales where control has deemed to pass before shipment at the time that those products are made available to the customer as opposed to at the time of shipment.

The following tables summarize the impacts of ASC 606 adoption on the Company's consolidated financial statements as of and fiscal year end of August 30, 2019 (in thousands).

Selected Consolidated Balance Sheet Line Items:

	As of August 30, 2019		
	As Reported	Adjustment	Balances Without Adoption
Accounts receivable	$ 217,433	$ (8,383)	$ 209,050
Inventories	$ 118,738	$ 6,411	$ 125,149
Prepaid expenses and other current assets	$ 37,950	$ (4,606)	$ 33,344
Accrued liabilities	$ 48,980	$ 123	$ 49,103
Retained earnings	$ 164,620	$ (6,701)	$ 157,919

Selected Consolidated Statement of Operations Line Items:

	Fiscal Year Ended August 30, 2019		
	As Reported	Adjustment	Balances Without Adoption
Net sales	$1,211,999	$ (9,125)	$1,202,874
Cost of sales	$ 974,472	$ (3,423)	$ 971,049
Gross profit	$ 237,527	$ (5,702)	$ 231,825
Provision for income taxes	$ 14,872	$ (35)	$ 14,837
Net income	$ 51,332	$ (5,667)	$ 45,665

Selected Consolidated Statement of Cash Flows Line Items:

	Fiscal Year Ended August 30, 2019		
	As Reported	Adjustment	Balances Without Adoption
Net income	$ 51,332	$ (5,667)	$ 45,665
Adjustment to reconcile net income to net cash provided by operating activities:			
Changes in operating assets and liabilities			
Accounts receivable	$ 35,240	$ 5,497	$ 40,737
Inventories	$ 102,083	$ (3,422)	$ 98,661
Prepaid expenses and other assets	$ (1,606)	$ 3,469	$ 1,863
Accrued expenses and other liabilities	$ 401	$ 123	$ 524
Net cash provided by operating activities	$ 169,657	$ —	$ 169,657

(v) Restructuring Expense

In fiscal 2017 the Company had multiple reductions-in-force in order to streamline operations and achieve operating efficiencies. During fiscal 2017, the Company recorded restructuring costs of $0.5 million for severance, severance-related benefits and building-related charges, of which $0.1 million was remaining to be paid as of August 25, 2017. The reductions-in-force were completed by the end of the period.

(2) Business Acquisitions

Fiscal Year 2019

SMART Embedded Computing, Inc. (SMART EC)

On July 8, 2019, SMART Global Holdings entered into a Stock Purchase Agreement (the Artesyn SPA), by and among SMART Global Holdings, Artesyn Embedded Computing, Inc., a Wisconsin corporation (AEC), Pontus Intermediate Holdings II, LLC, a Delaware limited liability company, and Pontus Holdings LLC, a Delaware limited liability company. Pursuant to the Artesyn SPA, on July 8, 2019, the Company agreed to purchase all of the shares of AEC, a private company based in Tempe, Arizona and Artesyn Netherlands B.V., a company with limited liability organized under the laws of the Netherlands (AEC and Artesyn Netherlands B.V., collectively Artesyn), both entities being subsidiaries of Artesyn Embedded Technologies, Inc. SMART Global Holdings through one or more subsidiaries, paid the Artesyn equityholders a base purchase price of approximately $75 million at closing using cash on hand. Pursuant to the Artesyn SPA, the former equityholders of Artesyn are also entitled to earn-out payments of up to $10 million based on Artesyn's achievement of specific gross revenue levels through December 31, 2019 plus additional earn-out payments of $0.10 for each dollar of gross revenue through December 31, 2019 over an agreed upon achievement level. The earn-out is payable, at the option of the Company, in either cash or ordinary shares of SMART Global Holdings. SMART Global Holdings deposited $0.8 million of the purchase price into escrow as security for sellers' indemnification obligations during the escrow period of one year. The Company changed the name of AEC to SMART Embedded Computing, Inc., or SMART EC.

Under the acquisition method of accounting, the assets acquired and liabilities assumed of SMART EC were recorded as of the acquisition date at their respective fair values. The reported consolidated financial condition after completion of the acquisition reflects these fair values. SMART EC's results of operations are included in the consolidated financial statements from the date of acquisition.

The initial fair value of contingent consideration was estimated at the date of acquisition to be $2.7 million, which was recorded as a current liability. The Company determined the fair value of the obligations to pay contingent consideration using a real options technique which incorporates various estimates, including projected gross revenue for the period, a volatility factor applied to gross revenue based on year-on-year growth in gross revenue of comparable companies, discount rates and the estimated amount of time until final payment is made. This fair value measurement is based on significant inputs not observable in the market, which ASU 820-10-35 refers to as Level 3 inputs. The resulting probability-weighted cash flows were discounted using the Company's estimated cost of debt of 8.50% derived from the Company's interest rates from the existing line of credit (2.75% plus US Prime Rate) and its term loan (6.25% plus 3-month LIBOR).

Subsequent to the acquisition date, the Company adjusted the contingent consideration to its current fair value with such changes recognized in income from operations. Changes in fair values reflect new information about the probability and timing of meeting the conditions of the gross revenue target. As of August 30, 2019, the fair value of the contingent consideration was $0.

A reconciliation of net cash exchanged in accordance with the Artesyn SPA to the total purchase price as of the closing date of the transaction, July 8, 2019, is presented below (in thousands):

Net cash for merger	$	74,358
Cash and cash equivalents acquired		37
Upfront payment in accordance with agreement		74,395
Post-closing adjustments in accordance with agreement		558
Total consideration		74,953
Estimated fair value of contingent consideration		2,700
Total purchase price	$	77,653

The total purchase consideration has been allocated to the tangible and intangible assets acquired and liabilities assumed. The assets acquired and liabilities assumed at the acquisition date are based upon their respective fair values summarized below (in thousands):

Tangible assets acquired	$	16,482
Liabilities assumed		(7,840)
Identifiable intangible assets		41,900
Goodwill		27,111
Total net assets acquired	$	77,653

Asset categories acquired included working capital, fixed assets, and identified intangible assets. The intangible assets are as follows (in thousands):

		Amount	Estimated Useful Life (in years)
Customer relationships	$	31,800	4-6 years
Technology		10,100	4 years
	$	41,900	

The excess of purchase price over the fair value amounts assigned to the assets acquired and liabilities assumed represents the goodwill amount resulting from the acquisition. The Company does not expect any portion of this goodwill to be deductible for tax purposes. The goodwill attributable to the SMART EC acquisition has been recorded as a noncurrent asset and is not amortized but is subject to an annual review for impairment. Factors that contributed to the recognition of goodwill include the broader reach and capabilities of the Company into new technologies, markets and channels that leverage its existing products and services. SMART EC brings an outstanding customer base, solid products and strong supplier relationships to the Company in the defense, industrial IoT (IIoT), edge computing, and communications OEM markets. SMART EC will have substantially improved access to capital to drive additional investment in, and further development and growth of its products and services.

Due to the timing of acquisition, the total purchase consideration has been allocated to the tangible and intangible assets acquired and liabilities assumed based on a preliminary valuation analysis. These preliminary values may change in future reporting periods upon finalization of the valuation and net working capital adjustment, which will occur no later than the fourth quarter of fiscal 2020. During fiscal 2019 the Company incurred certain costs related to the acquisition, which are included in selling, general and administrative expense in the consolidated statement of operations. Acquisition-related costs include the following (in thousands).

	August 30, 2019
Professional fees	$ 1,045

The revenue and net income earned by SMART EC following the acquisition are not material to the Company's consolidated results of operations.

SMART Wireless Computing, Inc. (SMART Wireless)

On July 9, 2019, SMART Global Holdings entered into an Agreement and Plan of Merger (the Inforce Merger Agreement), by and among SMART Global Holdings, Thor Acquisition Sub I, Inc., a California corporation and a wholly-owned indirect subsidiary of the SMART Global Holdings (Merger Sub I), Thor Acquisition Sub II, Inc., a Delaware corporation and a wholly-owned indirect subsidiary of the SMART Global Holdings (Merger Sub II), and Inforce Computing, Inc., a California corporation (Former Inforce). Pursuant to the Inforce Merger Agreement, on July 9, 2019, Merger Sub I was merged with and into Former Inforce, with Former Inforce continuing as the surviving corporation (the First Merger) and, immediately following the effectiveness of the First Merger, the surviving corporation of the First Merger was merged with and into Merger Sub II, with Merger Sub II surviving as a wholly-owned indirect subsidiary of SMART Global Holdings (the Inforce Merger). SMART Global Holdings through one or more subsidiaries, paid the Former Inforce equityholders approximately $14.6 million including amounts paid at closing composed of $3.2 million in cash and 382,788 of ordinary shares of SMART Global Holdings valued at $9.1 million, and amounts retained by the Company as security for the sellers' indemnification obligations as well as any post-closing adjustments to the purchase price (the Holdback) composed of $0.7 million in cash and 67,550 of ordinary shares of SMART Global Holdings valued at $1.6 million. The Company changed the name of Inforce Computing to SMART Wireless Computing, Inc., or SMART Wireless.

Under the acquisition method of accounting, the assets acquired and liabilities assumed of SMART Wireless were recorded as of the acquisition date at their respective fair values. The reported consolidated financial condition after completion of the acquisition reflects these fair values. SMART Wireless' results of operations are included in the consolidated financial statements from the date of acquisition.

A reconciliation of net cash exchanged in accordance with the Inforce Merger Agreement to the total purchase price as of the closing date of the transaction, July 9, 2019, is presented below (in thousands):

Net cash for merger	$ 1,581
Cash and cash equivalents acquired	1,576
Upfront cash payment	3,157
Upfront shares issued	9,167
Upfront consideration in accordance with agreement	12,324
Purchase price holdback - cash due to pre-closing holders	413
Purchase price holdback - shares due to pre-closing holders	1,618
Post-closing adjustments in accordance with agreement (as of August 30, 2019)	285
Total purchase price	$ 14,640

The total purchase consideration has been allocated to the tangible and intangible assets acquired and liabilities assumed. The assets acquired and liabilities assumed at the acquisition date are based upon their respective fair values summarized below (in thousands):

Tangible assets acquired	$	5,266
Liabilities assumed		(5,643)
Identifiable intangible assets		6,700
Goodwill		8,317
Total net assets acquired	$	14,640

Asset categories acquired included working capital, fixed assets, and identified intangible assets. The intangible assets are as follows (in thousands):

	Amount		Estimated Useful Life (in years)
Customer relationships	$	5,800	5 years
Technology		900	5 years
	$	6,700	

The excess of purchase price over the fair value amounts assigned to the assets acquired and liabilities assumed represents the goodwill amount resulting from the acquisition. The Company does not expect any portion of this goodwill to be deductible for tax purposes. The goodwill attributable to the SMART Wireless acquisition has been recorded as a noncurrent asset and is not amortized, but is subject to an annual review for impairment. Factors that contributed to the recognition of goodwill include the broader reach and capabilities of the Company into new technologies, markets and channels that leverage its existing products and services. SMART Wireless is a fast growing developer of high-performance production-ready ARM ISA-based embedded computing platforms for IoT applications enabling the next generation of connected devices. SMART Wireless brings an outstanding customer base, solid products and strong supplier relationships to the Company in the medical imaging, video conferencing, AR/VR computing, IIoT, commercial drones and robotics markets. SMART Wireless will have substantially improved access to capital to drive additional investment in, and further development and growth of its products and services.

Due to the timing of acquisition, the total purchase consideration has been allocated to the tangible and intangible assets acquired and liabilities assumed based on a preliminary valuation analysis. These preliminary values may change in future reporting periods upon finalization of the valuation of net working capital adjustment, which will occur no later than the fourth quarter of fiscal 2020. During fiscal 2019 the Company incurred certain costs related to the acquisition, which are included in selling, general and administrative expense in the consolidated statement of operations. Merger-related costs include the following (in thousands):

	August 30, 2019	
Professional fees	$	462

The revenue and net income earned by SMART Wireless following the acquisition are not material to the Company’s consolidated results of operations.

Premiere Logistics

In February 2019, the Company acquired all of the outstanding shares of Premiere Customs Brokers, Inc. and Premiere Logistics, Inc., both privately-held California corporations (collectively Premiere Logistics). The primary purpose of this acquisition is to provide the Company with cost savings solutions in support of its own freight and logistics requirements. In connection with the acquisition, the Company paid upfront cash consideration of $0.2 million.

The assets acquired and liabilities assumed at the acquisition date are based on their respective fair values summarized below (in thousands):

Tangible assets acquired	$	277
Liabilities assumed		(168)
Identifiable intangible assets		83
Total net assets acquired	$	192

Results of operations of the businesses acquired have been included in the Company's consolidated financial statements subsequent to the date of acquisition. The revenue and net income earned by the businesses acquired following the acquisition are not material to our consolidated results of operations.

No pro forma financial information is presented for any of the acquisitions in fiscal 2019 as the impact is not material, individually or in the aggregate, to the Company's consolidated statements of operations.

Fiscal Year 2018

Penguin Computing

On June 8, 2018, SMART Global Holdings entered into an Agreement and Plan of Merger (the Penguin Merger Agreement), by and among SMART Global Holdings, Glacier Acquisition Sub, Inc., a Delaware corporation and a wholly-owned indirect subsidiary of the SMART Global Holdings (Merger Sub), Penguin Computing, Inc., a California corporation (Penguin) and Fortis Advisors LLC, a Delaware limited liability company, solely in its capacity as the representative of the holders of the securities of Penguin. Pursuant to the Penguin Merger Agreement, on June 8, 2018, Merger Sub was merged with and into Penguin, with Penguin surviving as a wholly-owned indirect subsidiary of SMART Global Holdings (the Penguin Merger). SMART Global Holdings through one or more subsidiaries, paid the Penguin equityholders approximately $45 million at closing and assumed approximately $32.3 million of Penguin's outstanding indebtedness. SMART Global Holdings financed the acquisition with net proceeds of $60.0 million from the Incremental Amendment. Pursuant to the Penguin Merger Agreement, the former equityholders of Penguin are also entitled to potential cash earn-out payments, up to $25.0 million based on Penguin's achievement of specified gross profit levels through December 31, 2018. No earn-out amounts were achieved.

At the closing of the Penguin Merger, SMART Global Holdings deposited $6.0 million of the purchase price into escrow as security for Penguin's indemnification obligations during the escrow period of one year. SMART Global Holdings also deposited $2.0 million of the purchase price into escrow as security for customary post-closing adjustments to the purchase price. SMART Global Holdings notified the sellers of various disputes with respect to the closing balance sheet and other indemnity claims aggregating $4.9 million. While the escrow claims have not been resolved, on July 23, 2019, the parties agreed to release $3.2 million of these funds to the former equityholders and $1.8 million of the escrow funds to SMART Global Holdings. The balance of $3.0 million remains in escrow.

Under the acquisition method of accounting, the assets acquired and liabilities assumed of Penguin were recorded as of the acquisition date at their respective fair values. The reported consolidated financial condition after completion of the acquisition reflects these fair values. Penguin's results of operations are included in the consolidated financial statements from the date of acquisition.

The initial fair value of contingent consideration was estimated at the date of acquisition to be $3.0 million, which was recorded as a current liability. The Company determined the fair value of the obligations to pay contingent consideration using a real options technique which incorporates various estimates, including projected gross profit for the period, a volatility factor applied to gross profit based on year-on-year growth in gross profit of comparable companies, discount rates and the estimated amount of time until final payment would have been made. This fair value measurement was based on significant inputs not observable in the market, which ASU 820-10-35 refers to as Level 3 inputs. The resulting probability-weighted cash flows were discounted using the US Information Technology B Corporate Bond Yields of 4.06%, which is representative of a market participant assumption.

Subsequent to the acquisition date, the Company adjusted the contingent consideration to its current fair value with such changes recognized in income from operations. Changes in fair values reflect new information about the probability and timing of meeting the conditions of the gross profit target. As of December 31, 2018 and August 31, 2018, the fair value of the contingent consideration was $0.

A reconciliation of net cash exchanged in accordance with the purchase agreement to the total purchase price as of the closing date of the merger, June 8, 2018, is presented below (dollars in thousands):

Net cash for merger	$	42,316
Cash and cash equivalents acquired		2,769
Upfront payment in accordance with agreement		45,085
Post-closing adjustments in accordance with agreement		(3,479)
Total consideration		41,606
Estimated fair value of contingent consideration		3,000
Total purchase price	$	44,606

The total purchase consideration has been allocated to the tangible and intangible assets acquired and liabilities assumed. The assets acquired and liabilities assumed at the acquisition date are based upon their respective fair values summarized below (in thousands):

	Previous Reported	Purchase Price Allocation Measurement period adjustment	As Adjusted
Tangible assets acquired	$ 84,707	$ (671)	$ 84,036
Liabilities assumed	(72,226)	—	(72,226)
Identifiable intangible assets	27,550	—	27,550
Goodwill	4,575	671	5,246
Total net assets acquired	$ 44,606	$ —	$ 44,606

The provisional amounts presented in the table above pertained to the preliminary purchase price allocation reported in our Form 10-K for the fiscal year ended August 31, 2018. The measurement period adjustment, as recognized in the third quarter, is related to the reduction of inventory originally represented by the sellers as held by vendors for repairs. Upon further analysis, the Company confirmed with the vendors that the stated inventory or an obligation by the vendors to refund the Company did not exist as of June 8, 2018, the acquisition date.

We do not believe that the measurement period adjustments had a material impact on our consolidated statements of operations, balance sheets or cash flows in any periods previously reported. The final determination of the fair values were completed within the measurement period of up to one year from the acquisition date, and adjustments to provisional amounts that were identified during the measurement period were recorded in the reporting period in which the adjustment was determined.

Asset categories acquired included working capital, fixed assets, and identified intangible assets. The intangible assets are as follows (in thousands):

	Amount	Estimated Useful Life (in years)
Customer relationships	$ 14,700	7 years
Trade name	12,200	7 years
Technology	250	4 years
Existing order backlog	400	< 1 year
	$ 27,550	

The excess of purchase price over the fair value amounts assigned to the assets acquired and liabilities assumed represents the goodwill amount resulting from the acquisition. The Company does not expect any portion of this goodwill to be deductible for tax purposes. The goodwill attributable to the Penguin Merger has been recorded as a noncurrent asset and is not amortized, but is subject to an annual review for impairment. Factors that contributed to the recognition of goodwill include the broader reach and capabilities of the Company into new technologies, markets and channels that leverage its existing products and services. Penguin brings an outstanding customer base, solid products and strong supplier relationships to the Company in the specialty compute, storage and networking markets. Conversely, Penguin will have substantially improved access to capital to drive additional investment in, and further development and growth of its product and services.

As part of the Penguin Merger, the Company recorded a net deferred tax liability of $1.6 million. This amount was primarily comprised of $7.9 million related to non-goodwill intangible assets and other fair market value adjustments, offset by net deferred tax assets including acquired net operating losses and research credit carryovers totaling $6.3 million.

During fiscal 2018, the Company incurred certain costs related to the merger, which are included in selling, general and administrative expense on the statement of operations. Merger-related costs include the following (in thousands):

	August 31, 2018
Professional fees	$ 2,496
Employee retention bonuses	1,181
	$ 3,677

For the period of June 8, 2018 (date of acquisition) to August 31, 2018, total revenues and net loss for Penguin amounted to $52.5 million and $0.7 million, respectively.

Unaudited Pro Forma Information

The results of operations related to the Penguin acquisition have been included in our consolidated income statements from the acquisition date. The following unaudited pro forma financial information presents our combined results of operations as if the acquisition of Penguin and entering into the Incremental Amendment had occurred on August 27, 2016. The unaudited pro forma financial information is not necessarily indicative of what our consolidated results of operations actually would have been had the acquisition been completed on August 27, 2016. In addition, the unaudited pro forma financial information does not attempt to project the future results of operations of the combined company. The actual results may differ significantly from the pro forma results presented here due to many factors.

(In thousands, except per share data)	Fiscal 2018	Fiscal 2017
Total net sales	$ 1,437,963	$ 909,022
Net income (loss)	$ 116,787	$ (14,268)
Earnings per share:		
Basic	$ 5.30	$ (0.90)
Diluted	$ 5.05	$ (0.90)

The unaudited pro forma financial information above reflects the following material adjustments:

- Incremental amortization expense related to the estimated fair value of identifiable intangible assets from the purchase price allocation.
- Incremental interest expense and amortization of debt issuance costs related to our Incremental Amendment.
- The adjustments to income tax expense as a result of the consolidation and pro forma adjustments.

(3) Related Party Transactions

In the normal course of business, the Company had transactions with its affiliates as follows (in thousands):

	Fiscal Year Ended		
	August 30, 2019	August 31, 2018	August 25, 2017
Affiliates:			
Net sales	$ 117,403	$ 133,552	$ 73,455
Expenses:			
Management advisory fees	$ —	$ —	$ 3,000

As of August 30, 2019 and August 31, 2018, amounts due from these affiliates were $8.2 million and $11.7 million, respectively.

Management advisory fees represent fees paid to entities affiliated with Silver Lake pursuant to a management agreement that was terminated upon closing of the Company's initial public offering on May 23, 2017 (the IPO). There was no balance due under this agreement as of August 30, 2019 and August 31, 2018.

On July 9, 2019, SMART Wireless became a wholly-owned subsidiary of the Company (see Note 2). Included in the selling shareholders of this acquisition were the Company's CEO and two members of the Company's Board of Directors, who became entitled to receive in the aggregate 397,407 in SGH common shares valued at $9.5 million (consisting of 337,692 shares issued upon closing and 59,715 shares that are subject to the Holdback).

(4) Foreign Currency Exchange Contracts

The Company transacts business in various foreign currencies and has international sales and expenses denominated in foreign currencies, subjecting the Company to foreign currency risk. The Company utilizes foreign exchange forward contracts to mitigate foreign currency exchange rate risk associated with foreign-currency-denominated assets and liabilities, primarily third party payables. The Company does not use foreign currency contracts for speculative or trading purposes.

Foreign exchange forward contracts outstanding at August 30, 2019 are not designated as hedging instruments for hedge accounting purposes. Accordingly, any gains or losses resulting from changes in the fair value of the non-designated forward contracts are reported in other income, net in the consolidated income statements. The gains and losses on these forward contracts generally offset the gains and losses associated with the underlying foreign-currency-denominated balances, which are also reported in other income, net.

As of August 30, 2019, the Company's non-designated forward contacts resulted in a $36 thousand derivative asset and $0.2 million derivative liability. For fiscal 2019, the Company recognized realized losses in the amount of $2.6 million, and net unrealized losses on the change in the fair value of the non-designated forward contracts in the amount of $0.1 million.

(5) Balance Sheet Details

Inventories

Inventories consisted of the following (in thousands):

	August 30, 2019	August 31, 2018
Raw materials	$ 67,629	$ 105,017
Work in process	10,546	35,977
Finished goods	40,563	80,425
Total inventories*	$ 118,738	$ 221,419

* As of August 30, 2019 and August 31, 2018, 25% and 22%, respectively, of total inventories represented inventory held under the Company's supply chain services.

Prepaid Expenses and Other Current Assets

Prepaid expenses and other current assets consisted of the following (in thousands):

	August 30, 2019	August 31, 2018
Unbilled service receivables	$ 9,665	$ 5,361
Contract assets*	4,606	—
Prepaid R&D expenses	3,949	2,590
Indemnification claims receivable**	3,044	8,000
Prepaid income taxes	2,555	1,697
Prepaid ICMS taxes in Brazil***	2,140	4,593
Prepayment for VAT and other transaction taxes	963	2,557
Other prepaid expenses and other current assets	11,028	7,245
Total prepaid expenses and other current assets	$ 37,950	$ 32,043

* See Note 1(d).
** See Note 2.
*** See Note 1(i).

Property and Equipment, Net

Property and equipment consisted of the following (in thousands):

	August 30, 2019	August 31, 2018
Office furniture, software, computers and equipment	$ 21,476	$ 21,267
Manufacturing equipment	124,706	97,192
Leasehold improvements*	29,255	24,011
	175,437	142,470
Less accumulated depreciation and amortization	107,092	85,855
Net property and equipment	$ 68,345	$ 56,615

* Includes Penang facility, which is situated on leased land.

Depreciation and amortization expense for property and equipment was approximately $23.6 million, $20.0 million and $21.3 million in fiscal 2019, 2018 and 2017, respectively.

Other Noncurrent Assets

Other noncurrent assets consisted of the following (in thousands):

	August 30, 2019	August 31, 2018
Prepaid ICMS taxes in Brazil*	$ 6,513	$ 7,483
Deferred tax assets	1,933	2,430
Prepaid R&D expense	1,584	2,218
Revolver debt fees	431	1,383
Tax receivable	233	1,237
Restricted cash**	—	5,859
Other	2,090	1,839
Total other noncurrent assets	$ 12,784	$ 22,449

* See Note 1(i).
** See Note 7 and 1(u).

Accrued Liabilities

Accrued liabilities consisted of (in thousands):

	August 30, 2019	August 31, 2018
Deferred revenue	$ 16,680	$ 8,292
Accrued employee compensation	15,424	19,501
VAT and other transaction taxes payable	3,009	3,037
Customer deposits	2,683	1,334
Accrued warranty reserve	1,770	856
Indemnification claims liability*	1,369	4,521
Income taxes payable	1,151	2,242
Other accrued liabilities	6,894	5,407
Total accrued liabilities	$ 48,980	$ 45,190

* See Note 2.

(6) Income Taxes

Income before provision for income taxes for all annual periods presented consisted of the following (in thousands):

	Fiscal Year Ended		
	August 30, 2019	August 31, 2018	August 25, 2017
U.S.	$ 4,279	$ (7,918)	$ (8,352)
Non-U.S.	61,925	145,696	10,471
Total	$ 66,204	$ 137,778	$ 2,119

The components of the provision for income taxes are as follows (in thousands):

	Fiscal Year Ended		
	August 30, 2019	August 31, 2018	August 25, 2017
Current:			
Federal	$ (163)	$ —	$ (79)
State	120	19	(461)
Other foreign	15,633	21,688	12,616
	15,590	21,707	12,076
Deferred:			
Federal and state	(1,216)	(1,661)	—
Other foreign	498	(1,731)	(2,162)
	(718)	(3,392)	(2,162)
Total income tax provision	$ 14,872	$ 18,315	$ 9,914

In applying the statutory tax rate in the effective income tax rate reconciliation, the Company used the U.S. statutory tax rate, rather than the Cayman Islands zero percent tax rate. The effective income tax rate, expressed as a percentage of income before income taxes, varied from the U.S. statutory income tax rate applied to loss before provision for income taxes as a result of the following items:

	Fiscal Year Ended		
	August 30, 2019	August 31, 2018	August 25, 2017
Statutory tax benefit rate	21.0%	25.8%	35.0%
Foreign income taxes at different rates	1.3	(16.2)	312.1
State income tax, net of federal tax benefit	3.6	3.5	(23.8)
Tax on uncertain tax positions	0.1	—	21.8
Change in valuation allowance	(3.0)	(9.7)	68.1
Non-deductible expenses	(0.8)	(1.4)	56.0
Change in U.S. federal tax rate	—	11.4	—
Other - net	0.3	(0.1)	(1.5)
Effective income tax rate	22.5%	13.3%	467.7%

The tax effects of temporary differences that gave rise to significant portions of deferred tax assets and liabilities are as follows (in thousands):

	August 30, 2019	August 31, 2018
Deferred tax assets:		
Accruals and allowances	$ 6,861	$ 4,002
Share-based compensation	6,864	5,155
Research and other tax credits carryforwards	6,213	1,625
Property and equipment	89	721
Net operating loss carryforwards	28,296	29,563
Deferred tax assets	48,323	41,066
Valuation allowance	(36,722)	(32,497)
Deferred tax assets after valuation allowance	11,601	8,569
Deferred tax liabilities:		
Purchase accounting intangibles	(9,964)	(6,432)
Net deferred tax liabilities	(9,964)	(6,432)
Net deferred tax assets	$ 1,637	$ 2,137

The Company records its deferred tax assets within other long term assets on the consolidated balance sheets as of August 30, 2019 and August 31, 2018.

On December 22, 2017, the Tax Cuts and Jobs Act (P.L. 115-97) (TCJA) was signed into law. Among other changes is a permanent reduction in the federal corporate income tax rate from 35% to 21% effective January 1, 2018. As a result of the reduction in the corporate income tax rate, the Company revalued its net deferred tax asset during the year ended August 31, 2018. The Company reduced the value of its net deferred tax asset of approximately $15.7 million, which was offset by the change in valuation allowance of $15.7 million. TCJA also repealed the corporate AMT for tax years beginning after December 31, 2017, and provides that existing AMT credit carryovers are refundable in tax years beginning after December 31, 2017. The Company has approximately $0.3 million of AMT credit carryovers that are expected to be fully refunded between 2019 and 2022. This amount is recorded as a long term tax receivable within other long term assets on the consolidated balance sheet as of August 30, 2019.

In connection with the Company's acquisition of SMART Wireless during fiscal 2019, deferred tax liabilities were established on the acquired identifiable intangible assets. These deferred tax liabilities exceeded the acquired deferred tax assets by $1.2 million and created additional sources of income to realize a tax benefit for the Company's deferred tax assets. As such, authoritative guidance requires the impact on the acquiring company's deferred tax assets and liabilities caused by an acquisition be recorded in the acquiring company's financial statements outside of acquisition accounting. Accordingly, the valuation allowance on a portion of the Company's deferred tax assets was released and resulted in an income tax benefit of $1.2 million.

As of August 30, 2019, the Company had U.S. federal and state net operating loss carryforwards of approximately $114.8 million and $44.4 million, respectively. The federal net operating loss carryforwards will expire in fiscal 2023 through fiscal 2038, if not utilized, and the state net operating loss carryforwards will expire in fiscal 2020 through fiscal 2038, both in varying amounts. In addition, the Company has U.S. federal and state tax credit carryforwards of approximately $5.9 million and $0.4 million, respectively. These federal and state carryforwards are subject to an annual limitation, under the provisions of Section 382 of the Internal Revenue Code of 1986. Section 382 provides an annual limitation on net operating loss carryforwards following an ownership change. Any unused annual limitation is carried forward and added to the limitation in the subsequent year. In addition to other potential limitations, approximately $12.8 million and $1.4 million of acquired federal and state loss carryovers and $5.3 million and $0.4 million of acquired federal and state credit carryovers are subject to these limitations. The Company has foreign net operating loss carryforwards of approximately $16.3 million and will expire 2020 through fiscal 2025.

The valuation allowance on deferred tax assets, primarily related to U.S. net operating loss carry forwards and tax credit carryforwards and Netherlands net operating loss carryforwards, was $36.7 million and $32.5 million as of August 30, 2019 and August 31, 2018, respectively. The increase in valuation allowance of $4.2 million is primarily attributable to the valuation allowance on foreign losses acquired from the SMART EC acquisition in fiscal 2019. The Company intends to maintain a valuation allowance until sufficient positive evidence exists to support the realization of such deferred tax assets.

Provisions have been made for deferred income taxes on undistributed earnings of foreign subsidiaries to the extent that dividend payments by such foreign subsidiaries are expected to result in additional tax liability. The undistributed foreign earnings of approximately $137.1 million would not be included in U.S. taxable income because the U.S. subsidiaries are not direct or indirect shareholders of these foreign subsidiaries. The Company, a Cayman Islands entity, is the indirect holding company for which the Cayman Islands do not assess income taxes. The undistributed foreign earnings would incur an insignificant amount of foreign country withholding taxes if it were to be distributed to the Company due to foreign tax laws and rulings.

The Company’s Malaysia subsidiary, SMART Modular Technologies Sdn. Bhd. (SMART Malaysia), has been approved for tax holidays for the operations of its Pioneer business and Global Supply Chain (GSC) business. The Pioneer tax holiday commenced on January 1, 2014 and will expire on December 31, 2019. The GSC tax holiday commenced on September 1, 2013 and expired on August 31, 2019. New Pioneer and GSC tax holidays were effective beginning September 1, 2018 for up to ten years. The Malaysian tax holidays are subject to certain conditions, with which SMART Malaysia has complied for all applicable periods in fiscal 2019, 2018 and 2017. The net impact of these tax holidays in Malaysia, as compared to the Malaysia statutory tax rate, and was to decrease income tax expense by approximately $4.9 million ($0.21 per share), $9.1 million ($0.39 per share) and $6.1 million ($0.39 per share) in fiscal 2019, 2018 and 2017, respectively.

Effective February 1, 2011, SMART Brazil began to participate in PADIS. This program is specifically designed to promote the development of the local semiconductor industry. The Brazilian government has approved multiple applications for different products by SMART Brazil for certain beneficial tax treatment under the PADIS incentive. This beneficial tax treatment includes a reduction in the Brazil statutory income tax rate from 34% to 9% on taxable income for the Brazilian semiconductor operations of SMART Brazil. The net impact of the PADIS beneficial tax treatment, as compared to the Brazilian statutory tax rate, was to decrease income tax expense by approximately $11.4 million ($0.49 per share), $30.5 million ($1.32 per share) and $10.4 million ($0.66 per share) for fiscal 2019, 2018 and 2017, respectively. In order to receive the expected benefits, SMART Brazil is required to invest 5% of its net semiconductor sales in research and development (R&D) activities each calendar year, which is the measurement period. In May 2014, the R&D investment requirement was reduced to 3% for calendar years 2014 and 2015. SMART Brazil fulfilled this R&D investment requirement in calendar years 2017 and 2018 and expects to fulfill this R&D requirement in calendar year 2019.

The total gross amount of unrecognized tax benefits was approximately $15.0 million and $16.5 million as of August 30, 2019 and August 31, 2018, respectively. The Company records interest and penalties on unrecognized tax benefits as income tax expense. The balance of accrued interest and penalties on unrecognized tax benefits was $1.6 million and $1.5 million as of both August 30, 2019 and August 31, 2018. As of August 30, 2019, changes to the Company's uncertain tax positions in the next twelve months that are reasonably possible are not expected to have a significant impact on our financial position or results of operations.

The aggregate changes in the balance of unrecognized tax benefits were as follows (in thousands):

	August 30, 2019	August 31, 2018
Unrecognized tax benefits, beginning of period	$ 16,514	$ 15,715
Tax positions taken in prior periods:		
Gross increases	1,410	329
Gross decreases	(3,802)	—
Tax positions taken in current period:		
Gross increases	915	489
Settlements	—	(19)
Unrecognized tax benefits, end of period	$ 15,037	$ 16,514

The total amount of unrecognized tax benefits that would affect the effective tax rate, if recognized is $1.6 million and $1.6 million for fiscal 2019 and 2018, respectively.

The Company's U.S. subsidiaries file federal and state income/franchise tax returns in the United States. The tax periods ended August 2013 through August 2018 remain open to federal income tax examination. Generally, in the major state jurisdictions, the tax periods ended August 2012 through August 2018 remain open to state income/franchise tax examination. In addition, any prior year that generated a net operating loss or tax credit carryforward available for use in the taxable periods ending after August 2012 and August 2011 for federal and state income/franchise taxes, respectively, remains open to income tax examination to the extent of such net operating loss carryforward.

The Company's non-U.S. subsidiaries file income tax returns in various non-U.S. jurisdictions, including Malaysia, Brazil, Luxembourg, United Kingdom, Hong Kong, South Korea, Taiwan, Singapore and Italy. The years that are open for examination by the tax authorities of these jurisdictions vary by country. The earliest year open for examination is the fiscal year ended 2003 in the U.S. and the fiscal year ended August 2010 for any non-U.S. subsidiary.

(7) Long-Term Debt

Amended Credit Agreement

On August 9, 2017, SMART Worldwide, SMART Modular Technologies (Global), Inc. (Global), and SMART Modular Technologies, Inc. (SMART Modular) entered into a Second Amended and Restated Credit Agreement (together with all related loan documents, as amended from time to time including as amended by the Incremental Amendment as defined below, the Amended Credit Agreement) with certain lenders which amended and restated that certain Amended and Restated Credit Agreement dated as of November 5, 2016 (the ARCA), which had amended and restated that certain Credit Agreement dated as of August 26, 2011 (the Original Credit Agreement). The Company's subsidiaries named as borrowers in the Amended Credit Agreement and certain other subsidiaries that entered into a guarantee with respect to the Amended Credit Agreement including Penguin, SMART EC and SMART Wireless, are collectively referred to as the Loan Parties and together with SMART Modular Technologies Sdn. Bhd. (SMART Malaysia), the Credit Group. The Amended Credit Agreement provides for $165 million of initial term loans (the Initial Term Loans) with a maturity date of August 9, 2022, and $50 million of revolving loans with a maturity date of February 9, 2021 (the Initial Revolver Maturity Date) which revolving loan maturity date automatically extends to February 9, 2022 if the total leverage ratio of the Credit Group is less than 3.0:1.0 on the Initial Revolver Maturity Date. SMART Global Holding is not a party to the Amended Credit Agreement.

On June 8, 2018, SMART Worldwide, Global and SMART Modular entered into an Incremental Facility Agreement (the Incremental Amendment) which provided for incremental term loans under the Amended Credit Agreement in the aggregate amount of $60 million (the Incremental Term Loans) which Incremental Term Loans are on substantially identical terms as the Initial Term Loans. Pursuant to the Incremental Amendment, the borrowers agreed to pay the structuring advisor a $0.6 million fee pursuant to a separate agreement.

On October 2, 2018, SMART Worldwide, Global and SMART Modular entered into the Second Amendment to the Amended Credit Agreement (the Second Amendment) which did not become effective until October 25, 2018. As a result of the Second Amendment, the borrowers were granted a holiday from the obligation to make quarterly repayments of principal under the Initial Term Loans and the Incremental Term Loans at any time with respect to fiscal 2019. In addition, the borrowers were granted a holiday from the obligation to repay any loans as a result of excess cash flow that would otherwise be due with respect to any period of fiscal 2019.

The Amended Credit Agreement is jointly and severally guaranteed on a senior basis by certain subsidiaries of Global (excluding, among other subsidiaries, SMART Malaysia). In addition, the Amended Credit Agreement is secured by a pledge of the capital stock of, or equity interests in, most of the subsidiaries of SMART Worldwide (including, without limitation, SMART Malaysia, Penguin, SMART EC and SMART Wireless) and by substantially all of the assets of the subsidiaries of SMART Worldwide, excluding the assets of SMART Malaysia and certain other subsidiaries.

Covenants. The Amended Credit Agreement contains various representations and warranties and affirmative and negative covenants that are usual and customary for loans of this nature including, among other things, limitations on the Credit Group's ability to engage in certain transactions, incur debt, pay dividends, and make investments. The Amended Credit Agreement also requires that the Credit Group maintain a Secured Leverage Ratio not in excess of 3.5:1.0 as of the end of each fiscal quarter (commencing with the fiscal quarter ending November 24, 2017) and puts restrictions on the Credit Group's ability to retain cash proceeds from the sale of certain assets with net proceeds in excess of $2 million, subject to customary six-month reinvestment rights. The Incremental Amendment required the Credit Group to repay the Penguin Credit Facility, as defined below, and to pledge as collateral, all of the capital stock of and substantially all of the assets of Penguin within 60 days after the closing of the Penguin acquisition.

Interest and Interest Rates. Loans under the Amended Credit Agreement accrue interest at a rate per annum equal to an applicable margin plus, at the borrowers' option, either a LIBOR rate, or a base rate. The applicable margin for term loans with respect to LIBOR borrowings is 6.25% and with respect to base rate borrowings is 5.25%. The interest rate on the Initial Term Loans was 8.43%, 8.6% and 7.57% as of August 30, 2019, August 31, 2018 and August 25, 2017, respectively. The interest rate on the Incremental Term Loans was 8.71% and 8.58% as of August 30, 2019 and August 31, 2018, respectively.

The applicable margin for revolving loans adjusts every quarter based on the Secured Leverage Ratio for the most recent fiscal quarter with the applicable margin for revolving loans with respect to LIBOR borrowings ranging from 3.75% to 4.00% and the applicable margin for revolving loans with respect to base rate borrowings ranging from 2.75% to 3.00%.

Interest on base rate loans is payable on the last day of each calendar quarter. Interest on LIBOR-based loans is payable every one, two, three, six, nine or twelve months after the date of each borrowing, dependent on the particular interest rate period selected with respect to such borrowing.

Principal Payments. The Amended Credit Agreement requires quarterly repayments of principal under the Initial Term Loans equal to 2.5% of $165 million, or $4.1 million per fiscal quarter and, commencing on November 30, 2018, quarterly repayments of principal under the Incremental Term Loans equal to 2.5% of $60 million, or $1.5 million per fiscal quarter. As a result of the Second Amendment, the borrowers were granted a holiday in fiscal 2019 from the obligation to make quarterly repayments of principal under the Initial Term Loans and the Incremental Term Loans. During fiscal 2019 and 2018, the borrowers made scheduled principal payments of $0 million and $16.5 million, respectively.

Prepayments. The borrowers have the right at any time to make optional prepayments of the principal amounts outstanding under the Amended Credit Agreement provided that prepayments of principal which are voluntary or are made in connection with certain transactions will be subject to prepayment premiums of 3%, 2% and 1% during the first, second and third years, respectively, after the effective date of the Amended Credit Agreement.

The Amended Credit Agreement also requires certain mandatory prepayments of principal whereby the borrowers must prepay outstanding loans, subject to certain exceptions, which include, among other things:

- (i) 75% of excess cash flow on a semi-annual basis if the total leverage ratio is greater than 1.5:1.0, (ii) 50% of excess cash flow on a semi-annual basis if the total leverage ratio is greater than 1.0:1.0 but less than or equal to 1.5:1.0 and (iii) 25% of excess cash flow on an annual basis if the secured leverage ratio is less than or equal to 1.0:1.0., which amounts will be reduced by any voluntary prepayments of principal made in the applicable period;
- 100% of the net proceeds of certain asset sales or other dispositions of property of Global or any of its restricted subsidiaries, subject to customary rights to reinvest the proceeds within six months; and
- 100% of the net cash proceeds of incurrence of certain debt by Global or any of its restricted subsidiaries, other than proceeds from debt permitted to be incurred under the Amended Credit Agreement.

As a result of the Second Amendment, the borrowers were granted a holiday from the obligation to repay any loans as a result of excess cash flow that would otherwise be due with respect to any period of fiscal 2019. No mandatory prepayments were required for fiscal 2019 or 2018.

On June 2, 2017, SMART Global Holdings contributed to Global $61.0 million from the proceeds of the IPO closed in May 2017. Global in turn used the proceeds to pay down the original term loans under the Original Credit Agreement, as required under the ARCA, which resulted in a $6.7 million loss on early repayment of long-term debt. As of August 9, 2017, prior to the one year anniversary of the ARCA, the Credit Group entered into the Amended Credit Agreement with new term loans in the aggregate principal amount of $165 million with different lenders. The proceeds from the Amended Credit Agreement were used to fully repay and refinance the term loans under the ARCA in the principal amount of $151.0 million, which resulted in a write off of $15.2 million of original issue discount and debt issuance costs as an extinguishment loss.

Term loans under the Amended Credit Agreement were issued at a discount of 2.0% of the then outstanding principal amount of $165 million, for a discount of $3.3 million. The Company incurred $8.7 million debt issuance costs upon entering into the Amended Credit Agreement, of which $5.3 million was attributable to the term loans and recorded as a direct reduction to the face amount of the term loans, and $3.4 million was allocated to the revolving line of credit and recorded as a separate asset on the balance sheet. Debt issuance costs and debt discount related to term loans are being amortized to interest expense based on the effective interest rate method over the life of the term loans. Those fees allocated to the revolving line of credit are being amortized to interest expense ratably over the life of the revolving line of credit.

As of August 30, 2019 and August 31, 2018, the outstanding principal balance of all term loans under the Amended Credit Agreement was $208.5 million and there were no outstanding revolving loans. The fair value of the term loans as of August 30, 2019 and August 31, 2018 was estimated to be approximately $210.6 million and $207.5 million, respectively. Since the Company used broker quotes from inactive markets and there were no unobservable inputs, this was treated as a Level 2 financial instrument.

Penguin Credit Agreement

On June 8, 2018 in connection with the Penguin acquisition, the Company assumed the outstanding balances due under that certain credit agreement dated January 8, 2018 between Penguin and Wells Fargo Capital Finance, LLC (the Penguin Credit Facility) which had an outstanding balance of $32.3 million as of June 8, 2018. In addition, on June 8, 2018, SMART Global Holdings entered into a guarantee with Wells Fargo Capital Finance, LLC (WFCF) whereby SMART Global Holdings guaranteed the repayment and full performance of Penguin under the Penguin Credit Facility. As required under the Incremental Amendment, the Company paid off the outstanding balance under the Penguin Credit Facility in August 2018.

BNDES Credit Agreements

In December 2013, SMART Brazil, entered into a credit facility with the Brazilian Development Bank, or BNDES (such loan the BNDES 2013 Credit Agreement). Under the BNDES 2013 Credit Agreement, a total of R$50.6 million (or $13.4 million) was made available to SMART Brazil for investments in infrastructure, research and development conducted in Brazil and acquisitions of equipment not otherwise available in the Brazilian domestic market. SMART Brazil's obligations under the BNDES 2013 Credit Agreement were guaranteed by Banco Itaú BBA S.A., or Itaú Bank, which guarantee was in turn secured by a guarantee from SMART Brazil and SMART do Brazil and a commitment by SMART Brazil to maintain minimum cash balances with Itaú Bank equal to 11.85% of the maximum aggregate balance of principal, interest and fees outstanding under the BNDES 2013 Credit Agreement. The committed amount was R$6.0 million (or $1.6 million), which is shown on the Company's consolidated balance sheets as restricted cash in other noncurrent assets as of August 31, 2018.

Approximately half of the available debt under the BNDES 2013 Credit Agreement accrues interest at a fixed rate while the other half accrues interest at a floating rate. The facility under the BNDES 2013 Credit Agreement is a term loan fully amortizing in 48 equal monthly installments beginning on August 15, 2015 with the final principal payment paid on July 15, 2019.

As of August 30, 2019, SMART Brazil had no outstanding debt under the BNDES 2013 Credit Agreement. As of August 31, 2018, SMART Brazil's outstanding debt under the BNDES 2013 Credit Agreement was R$12.9 million (or $3.4 million), of which R$6.3 million (or $1.7 million) accrues interest at the fixed rate of 3.5% and R$6.6 million (or $1.7 million) of the debt accrues interest at the floating rate of 0.5% above the TJLP rate published by the Central Bank of Brazil, or BZTJLP (5.0%), combined corresponding to an overall effective interest rate of 5.5% per annum.

In December 2014, SMART Brazil, entered into a second credit facility with BNDES, referred to as the BNDES 2014 Credit Agreement. The BNDES 2013 Credit Agreement and the BNDES 2014 Credit Agreement are collectively referred to as the BNDES Agreements. Under the BNDES 2014 Credit Agreement, a total of R$52.8 million (or $14.0 million) was made available to SMART Brazil for research and development conducted in Brazil related to integrated circuit (IC) packaging and for acquisitions of equipment not otherwise available in the Brazilian domestic market.

Prior to July 2018, SMART Brazil's obligations under the BNDES 2014 Credit Agreement were also guaranteed by Itaú Bank, which guarantee was in turn secured by a guarantee from SMART Brazil and SMART do Brazil in favor of Itaú Bank and a commitment by SMART Brazil to maintain minimum cash balances with Itaú Bank equal to 30.31% of the maximum aggregate balance of principal, interest and fees outstanding under the BNDES 2014 Credit Agreement, or approximately R$16.0 million (or $4.3 million) of required cash balances, which is shown on the Company's consolidated balance sheets as restricted cash in other noncurrent assets as of August 31, 2018.

In July 2018, SMART Brazil entered into guarantee arrangements with Banco Votorantim S.A. which bank in turn replaced the guarantees of the BNDES Credit Agreements previously issued by Itaú Bank. As a result, the guarantees with Itaú Bank were cancelled and Itaú Bank returned R$22.0 million (or $5.9 million) of committed balances to SMART Brazil in the first quarter of fiscal 2019. As such, the Company no longer has any restricted cash on its consolidated balance sheets as of August 30, 2019.

The available debt under the BNDES 2014 Credit Agreement accrues interest at a fixed rate of 4% per annum. The BNDES 2014 Credit Agreement is a term loan fully amortizing in 48 equal monthly installments beginning on August 15, 2016 with the final principal payment being due on July 15, 2020.

As of August 30, 2019 and August 31, 2018, SMART Brazil's outstanding debt under the BNDES 2014 Credit Agreement was R$13.2 million (or $3.5 million) and R$26.4 million (or $7.0 million), respectively.

While the BNDES Agreements do not include any financial covenants, they contain affirmative and negative covenants customary for loans of this nature, including, among other things, an obligation to comply with all laws and regulations; a right for BNDES to terminate the loan in the event of a change of effective control; and a prohibition against the disposition or encumbrance, without BNDES consent, of intellectual property developed with the funds from the loans. The BNDES 2013 Credit Agreement includes an obligation to draw down the entire loan within specified periods of time or pay unused commitment fees of 0.1%. The BNDES 2014 Credit Agreement required a loan fee of 0.3% of the total face amount of the loan facility.

The fair value of amounts outstanding under the BNDES Agreements as of August 30, 2019 and August 31, 2018 was estimated to be approximately \$3.3 million and \$9.4 million, respectively. Since the Company used broker quotes from inactive markets and there were no unobservable inputs, this was treated as a Level 2 financial instrument.

The Amended Credit agreement and the BNDES Agreements are classified as follows in the accompanying consolidating balance sheets (in thousands):

	August 30, 2019	August 31, 2018
Term loan	\$ 208,500	\$ 208,500
BNDES 2013 principal balance	—	3,422
BNDES 2014 principal balance	3,506	7,030
Unamortized debt discount	(1,885)	(2,520)
Unamortized debt issuance costs	(3,617)	(4,833)
Net amount	206,504	211,599
Current portion of long-term debt	(24,054)	(27,409)
Long-term debt	\$ 182,450	\$ 184,190

The future minimum principal payments under the Amended Credit Agreement and the BNDES 2014 Agreement as of August 30, 2019 are (in thousands):

	Amended Credit Agreement	BNDES	TOTAL
Fiscal year ending August:			
2020	\$ 22,500	\$ 3,506	\$ 26,006
2021	22,500	—	22,500
2022	163,500	—	163,500
Total	\$ 208,500	\$ 3,506	\$ 212,006

(8) Financial Instruments

Fair Value of Financial Instruments

The fair value of the Company's cash, cash equivalents, accounts receivable and accounts payable approximates the carrying amount due to the relatively short maturity of these items. Cash and cash equivalents consist of funds held in general checking and savings accounts, money market accounts, and securities with maturities of less than 90 days at the time of purchase. The Company does not have investments in variable rate demand notes or auction rate securities.

The FASB guidance establishes a fair value hierarchy that prioritizes the inputs to valuation techniques used to measure fair value. The hierarchy gives the highest priority to unadjusted quoted prices in active markets to identical assets or liabilities (Level 1 measurements) and the lowest priority to unobservable inputs (Level 3 measurements). The three levels of the fair value hierarchy are described below:

- Level 1. Valuations based on quoted prices in active markets for identical assets or liabilities that an entity has the ability to access. The Company's Level 1 assets include funds held in general checking accounts, savings accounts and money market funds that are classified as cash equivalents and restricted cash which is classified under long-term assets.
- Level 2. Valuations based on quoted prices for similar assets or liabilities, quoted prices for identical assets or liabilities in markets that are not active, or other inputs that are observable or can be corroborated by observable data for substantially the full term of the assets and liabilities. The Company's Level 2 liabilities include the term loans under the Amended Credit Agreement and the BNDES Credit Agreements that are classified as long-term debt and derivative financial instruments.

- Level 3. Valuations based on inputs that are supported by little or no market activity and that are significant to the fair value of the assets or liabilities. The Company's Level 3 liabilities include the contingent considerations related to the SMART EC and Penguin acquisitions (see Note 2), which had a fair value of $0 as of August 30, 2019 and August 31, 2018, respectively.

Assets and liabilities measured at fair value on a recurring basis include the following (in millions):

	Quoted Prices in Active Markets for Identical Assets or Liabilities (Level 1)	Observable/ Unobservable Inputs Corroborated by Market Data (Level 2)	Significant Unobservable Inputs (Level 3)	Total
Balances as of August 30, 2019:				
Assets				
Cash and cash equivalents	$ 98.1	$ —	$ —	$ 98.1
Total assets measured at fair value	$ 98.1	$ —	$ —	$ 98.1
Liabilities				
Term loans(1)	$ —	$ 210.6	$ —	$ 210.6
BNDES Credit Agreement(2)	—	3.3	—	3.3
Derivative financial instruments(3)	—	0.2	—	0.2
Acquisition-related contingent consideration	—	—	—	—
Total liabilities measured at fair value	$ —	$ 214.1	$ —	$ 214.1
Balances as of August 31, 2018:				
Assets				
Cash and cash equivalents	$ 31.4	$ —	$ —	$ 31.4
Restricted cash(4)	5.9	—	—	5.9
Total assets measured at fair value	$ 37.3	$ —	$ —	$ 37.3
Liabilities				
Term loans(1)	$ —	$ 207.5	$ —	$ 207.5
BNDES Credit Agreements (1)	—	9.4	—	9.4
Acquisition-related contingent consideration	—	—	—	—
Total liabilities measured at fair value	$ —	$ 216.9	$ —	$ 216.9

(1) Included under long-term debt on the Company's consolidated balance sheets.
(2) Included under current portion of long-term debt on the Company's consolidated balance sheets.
(3) Included in accrued liabilities on the Company's consolidated balance sheets - see Note 4.
(4) Included in other noncurrent assets on the Company's consolidated balance sheets – see Note 5.

(9) Share-Based Compensation and Employee Benefit Plans

(a) Share-Based Compensation

Equity Awards

On August 26, 2011, the board of directors adopted the Saleen Holdings, Inc. 2011 Stock Incentive Plan which was amended and restated as of May 18, 2017 to be known as the SMART Global Holdings, Inc. Amended and Restated 2017 Share Incentive Plan. On January 29, 2019, the shareholders approved an amendment to the SMART Global Holdings, Inc. Amended and Restated 2017 Share Incentive Plan (as amended, the SGH Plan) which amendment increased the reserve under the SGH Plan by 1,500,000 shares effective as of February 1, 2019. The SGH Plan provides for grants of equity awards to employees, directors and consultants of SMART Global Holdings and its subsidiaries. Options granted under the SGH Plan provide the option to purchase SMART Global Holdings' ordinary shares at the fair value of such shares on the grant date. The options and RSUs generally vest over a four-year period beginning on the grant date and generally have a ten year term. Options granted after August 26, 2011 and before September 23, 2014 have an eight year term. As of August 30, 2019, there were 4,803,315 ordinary shares reserved for issuance under the SGH Plan, of which 1,427,339 ordinary shares were available for grant. As of August 31, 2018, there were 3,385,550 ordinary shares reserved for issuance under the SGH Plan, of which 251,965 ordinary shares were available for grant.

Summary of Assumptions and Activity

The fair value of each option grant is estimated on the date of grant using the Black-Scholes option pricing model that uses the assumptions noted in the following table.

The expected volatility is based on the historical volatilities of the common stock of comparable publicly traded companies. The expected term of options granted represents the weighted average period of time that options granted are expected to be outstanding giving consideration to vesting schedules and the historical exercise patterns. The risk-free interest rate for the expected term of the option is based on the average U.S. Treasury yield curve at the end of the quarter in which the option was granted.

The following assumptions were used to value the Company's stock options granted in the below fiscal years:

	Fiscal Year Ended		
	August 30, 2019	August 31, 2018	August 25, 2017
Stock options:			
Expected term (years)	6.25	6.25	6.25
Expected volatility	41.68% - 48.15%	39.00% - 46.27%	45.88% - 55.75%
Risk-free interest rate	1.42% - 2.88%	2.15% - 2.82%	1.89% - 2.03%
Expected dividends	—	—	—

SGH Plan—Options

A summary of option activity for the SGH Plan is presented below (dollars and shares in thousands, except per share data):

	Shares	Weighted average per share exercise price	Weighted average remaining contractual term (years)	Aggregate intrinsic value
Options outstanding at August 26, 2016	1,528	$ 10.80	7.36	$ 2,373
Options granted	506	15.13		
Options exercised	(152)	2.68		
Options forfeited and cancelled	(94)	11.64		
Options outstanding at August 25, 2017	1,788	$ 12.66	7.61	$ 11,174
Options granted	1,354	40.53		
Options exercised	(700)	10.69		
Options forfeited and cancelled	(28)	23.50		
Options outstanding at August 31, 2018	2,414	$ 28.75	7.88	$ 20,459
Options granted	356	22.48		
Options exercised	(413)	12.28		
Options forfeited and cancelled	(59)	32.48		
Options outstanding at August 30, 2019	2,298	$ 30.65	7.39	$ 10,916
Options exercisable at August 30, 2019	688	$ 23.85	6.83	$ 6,193
Options vested and expected to vest at August 30, 2019	2,298	$ 30.65	7.39	$ 10,916

In March 2018, the Company granted two performance-based stock options that contained a stock market index as a benchmark for performance (Market-Based Options). The share-based compensation expense for these options is recognized over the requisite service period by tranche. The exercisability of Market-Based Options will depend upon the 30-trading day rolling average closing price of Company's ordinary shares. If the target price is not achieved by the end of 4th or 7th anniversary of the respective grant date, the options will expire. The fair value of Market-Based Options is determined by using a Monte Carlo valuation model, using the following assumptions:

	Three Months Ended May 25, 2018
Stock options:	
Expected term (years)	1.10 - 4.00
Expected volatility	46.29%
Risk-free interest rate	2.75%
Expected dividends	—

The Black-Scholes weighted average fair value of options granted under the SGH Plan in fiscal 2019, 2018 and 2017 was $10.16, $18.18 and $7.14 per share, respectively. The total intrinsic value of employee stock options exercised in fiscal 2019, 2018 and 2017 was approximately $7.4 million, $19.5 million and $0.9 million, respectively. As of August 30, 2019, there was approximately $17.9 million of unrecognized compensation costs related to stock options under the SGH Plan, which will be recognized over a weighted average period of 2.37 years. As of August 31, 2018, there was approximately $23.5 million of unrecognized compensation costs related to stock options under the SGH Plan, which will be recognized over a weighted average period of 3.00 years.

SGH Plan—Restricted Stock Awards (RSAs), Restricted Stock Units (RSUs) and Performance Stock Units (PSUs)

The fair value of RSUs is determined using the fair value of the Company's common stock on the date of grant. A summary of the changes in RSAs, RSUs and PSUs outstanding under the SGH Plan is presented below (dollars and shares in thousands, except per share data):

	Shares	Weighted average grant date fair value per share	Aggregate intrinsic value
Awards outstanding at August 26, 2016	4	$ 26.97	$ 40
Awards granted	491	$ 7.75	
Awards vested and paid out	(117)	7.99	
Awards outstanding at August 25, 2017	378	$ 7.91	$ 6,956
Awards granted	465	38.39	
Awards vested and paid out	(113)	8.03	
Awards forfeited and cancelled	(10)	12.01	
Awards outstanding at August 31, 2018	720	$ 27.50	$ 23,753
Awards granted	652	24.22	
Awards vested and paid out	(249)	20.21	
Awards forfeited and cancelled	(45)	31.69	
Awards outstanding at August 30, 2019	1,078	$ 27.03	$ 30,632

In May 2019, the Company granted a performance-based restricted share unit award (PSU) which has both service and performance conditions. As of August 30, 2019, the Company has deemed it probable that the service condition will be met, and the attainment of the performance condition for this award is probable. As such, there was $0.8 million of share-based compensation expense recognized for this award in fiscal 2019.

The share-based compensation expense related to RSAs, RSUs and PSUs in fiscal 2019, 2018 and 2017 was approximately $7.9 million, $2.7 million and $1.0 million, respectively. The total fair value of shares vested in fiscal 2019, 2018, and 2017 was approximately $6.8 million, $4.0 million and $2.0 million, respectively. As of August 30, 2019, there was approximately $24.2 million of unrecognized compensation costs related to awards under the SGH Plan, which will be recognized over a weighted average period of 2.35 years.

Employee Stock Purchase Plan

In January 2018, the Company's shareholders approved the SGH 2018 Employee Share Purchase Plan (the Purchase Plan) under which an aggregate of 650,000 of ordinary shares have been approved for issuance to eligible employees. The Purchase Plan generally permits employees to purchase ordinary shares at 85% of the lower of the fair market value of the ordinary shares at the beginning of the offering period or at the end of purchase period, which is generally six months. Rights to purchase ordinary shares are granted during the first and third quarter of each fiscal year. The Purchase Plan terminates in January 2028. As of August 30, 2019, 109,910 ordinary shares have been purchased under the Purchase Plan and 540,090 ordinary shares are reserved for future purchases by eligible employees. As of August 31, 2018, the number of ordinary shares reserved for future purchases by eligible employees was 350,000.

Equity Rights and Restrictions

The holders of ordinary shares of SMART Global Holdings are entitled to such dividends and other distributions as may be declared by the board of directors of SMART Global Holdings from time-to-time, out of the funds of SMART Global Holdings lawfully available therefor.

Substantially all SMART Global Holdings shares owned by employees, by certain former lenders of the Company, and all shares underlying the SMART Global Holdings options, PSUs and RSUs are subject to either the Employee Investors Shareholders Agreement dated August 26, 2011 (the Employee Investors Shareholders Agreement), the Amended and Restated Investors Shareholders Agreement dated as of November 5, 2016 (as amended by Amendment No. 5, Amendment No. 4, Amendment No. 3, Amendment No. 2 and subsequent amendments, the Amended and Restated Investors Shareholders Agreement) and the Amended and Restated Sponsors Shareholders Agreement dated May 30 2017 (as amended, the Sponsor Shareholder Agreement; the Employee Investors Shareholders Agreement, the Amended and Restated Investors Shareholders Agreement and the Sponsor Shareholder Agreement are collectively referred to as the Shareholders Agreements). Under the terms of the Shareholders Agreements, such shares are subject to certain restrictions on sale and could become subject to lock-up restrictions in the event of any future registered public offerings by the Company.

(b) Savings and Retirement Program

The Company offers a 401(k) Plan to U.S. employees, which provides for tax-deferred salary deductions for eligible U.S. employees. Employees may contribute up to 60% of their annual eligible compensation to this plan, limited by an annual maximum amount determined by the U.S. Internal Revenue Service. The Company may also make discretionary matching contributions, which vest immediately, as periodically determined by management. The matching contributions made by the Company in fiscal 2019, 2018 and 2017 were approximately $2.0 million, $1.2 million and $1.1 million, respectively.

(10) Commitments and Contingencies

(a) Commitments

Minimum rent payments under operating leases are recognized on a straight-line basis over the term of the lease including any periods of free rent. Rent expense for operating leases in fiscal 2019, 2018 and 2017 was $5.0 million, $3.3 million and $2.9 million, respectively.

Future minimum lease payments under all leases as of August 30, 2019 are as follows (in thousands):

	Amount
Fiscal year ending August:	
2020	$ 6,327
2021	5,922
2022	3,795
2023	3,454
2024	3,326
Thereafter	19,303
Total	$ 42,127

(b) Product Warranty and Indemnities

Product warranty reserves are established in the same period that revenue from the sale of the related products is recognized, or in the period that a specific issue arises as to the functionality of a Company's product. The amounts of the reserves are based on established terms and the Company's best estimate of the amounts necessary to settle future and existing claims on products sold as of the balance sheet date.

The following table reconciles the changes in the Company's accrued warranty (in thousands):

	Fiscal Year Ended		
	August 30, 2019	August 31, 2018	August 25, 2017
Beginning accrued warranty reserve	$ 856	$ 275	$ 266
Additions from business acquisitions (see Note 2)	533	558	—
Provision for product warranties	1,914	612	412
Warranty claims	(1,533)	(589)	(403)
Ending accrued warranty reserve	$ 1,770	$ 856	$ 275

Product warranty reserves are recorded in accrued liabilities in the accompanying consolidated balance sheets.

In addition to potential liability for warranties related to defective products, the Company currently has in effect a number of agreements in which it has agreed to defend, indemnify and hold harmless its customers and suppliers from damages and costs, which may arise from product defects as well as from any alleged infringement by its products of third-party patents, trademarks or other proprietary rights. The Company believes its internal development processes and other policies and practices limit its exposure related to such indemnities. Maximum potential future payments cannot be estimated because many of these agreements do not have a maximum stated liability. However, to date, the Company has not had to reimburse any of its customers or suppliers for any losses related to these indemnities. The Company has not recorded any liability in its financial statements for such indemnities.

(c) Legal Matters

From time to time, the Company is involved in legal matters that arise in the normal course of business. Litigation in general and intellectual property, employment and shareholder litigation in particular, can be expensive and disruptive to normal business operations. Moreover, the results of complex legal proceedings are difficult to predict. The Company believes that it has defenses to the cases pending, including those set forth below. Except as noted below, the Company is not currently able to estimate, with reasonable certainty, the possible loss, or range of loss, if any, from such legal matters, and accordingly, no provision for any potential loss, which may result from the resolution of these matters, has been recorded in the accompanying consolidated financial statements.

Indemnification Claims by SanDisk

In August 2013, the Company completed the sale (the Sale) of substantially all of the business unit which was focused on solid state drives, to SanDisk Corporation (now a part of Western Digital). In connection with the Sale the sale agreement (Sale Agreement) contained certain indemnification obligations, including, among others, for losses arising from breaches of representations and warranties relating to the Sale. These indemnification obligations are subject to a number of limitations, including certain deductibles and caps and limited time periods for making indemnification claims. On August 21, 2014, SanDisk made a claim against the Company under the indemnification provisions of the Sale Agreement in connection with a lawsuit filed by Netlist, Inc. (Netlist) against SanDisk alleging that certain products sold in the Sale infringe various Netlist patents, which SanDisk in turn alleges would, if true, constitute a breach of representations and warranties under the Sale Agreement. Under the Sale Agreement, the Company's indemnification obligation in respect of intellectual property matters, such as those claimed by SanDisk, is subject to a deductible of approximately $1.8 million and a cap of $60.9 million. As required in the Sale Agreement, the SanDisk claim purported to include a preliminary good faith estimate of SanDisk's alleged indemnifiable losses, which estimate was greater than the Sale Agreement cap for intellectual property matters. The Company believes that the allegations giving rise to the indemnification claim are without merit and the Company is disputing SanDisk's claim for indemnification. In addition, there may be other grounds for the Company to dispute the indemnification claim and/or the amounts of any indemnifiable losses of SanDisk.

Netlist

On September 10, 2012, SMART Modular filed a complaint in the Eastern District of California (the EDCA) against Netlist alleging infringement of certain claims of SMART Modular's U.S. Patent No. 8,250,295 (the '295 patent) and seeking, among other things, a preliminary injunction. Netlist filed certain counterclaims alleging, among other things, attempted monopolization, collusion, unfair competition, fraud on the U.S. Patent and Trademark Office (the USPTO) and sham litigation, and asserting that the '295 patent is invalid.

In July 2013, Netlist filed a lawsuit in the Central District of California against SMART Modular alleging claims very similar to Netlist's counterclaims set forth in the EDCA case. Netlist later amended its complaint to add additional parties, including SMART Worldwide. Netlist has sought compensatory damages for the harm it claims to have suffered, as well as an award of treble damages and attorneys' fees. The claims against SMART Modular and SMART Worldwide were transferred to the EDCA.

In January 2019 the parties entered into stipulated settlements to dismiss with prejudice, all claims and counterclaims in both actions with no amounts for damages being paid by either party and with each party to bear their own costs.

(d) Contingencies

Import Duty Tax assessment in Brazil

On February 23, 2012, SMART Brazil was served with a notice of a tax assessment for approximately R$117.0 million (or $31.1 million) (the First Assessment). The First Assessment was from the federal tax authorities of Brazil and related to four taxes in connection with the importation processes. The tax authorities claimed that SMART Brazil categorized its imports of unmounted integrated circuits in the format of wafers under an incorrect product classification code, which carries an import duty of 0%. The authorities alleged that a different classification code should have been used that would require an 8% import duty and the authorities were seeking to recover these duties, as well as other related taxes, for the five calendar years of 2007 through and including 2011. Subsequent to the initial assessment, SMART Brazil received a second notice of an additional administrative penalty of approximately R$6.0 million (or $1.6 million) directly related to the same issue and which has been imposed exclusively for the alleged usage of an inappropriate import tax code (the Second Assessment).

In March 2012, SMART Brazil filed defenses to the First Assessment and the Second Assessment. On May 2, 2013, the first level administrative tax court issued a ruling in favor of the tax assessor and against SMART Brazil on the First Assessment. On May 31, 2013, SMART Brazil filed an appeal to the second level tax court known as CARF. The appeal was heard on November 26, 2013 and SMART Brazil received a unanimous favorable ruling rejecting the position of the tax authorities. Subsequently, the tax authorities filed a request for clarification and on September 17, 2014, SMART Brazil received a unanimous ruling rejecting the request from the tax authorities for clarification. On November 7, 2014, the tax authorities notified CARF that they would not be appealing the CARF decision, and the First Assessment has been extinguished. On February 6, 2018, the first level administrative court unanimously ruled in favor of SMART Brazil with respect to the Second Assessment. Due to the size of the Second Assessment, Brazil law required that the tax authorities appeal the decision to CARF. The appeal on the Second Assessment was heard on December 11, 2018 and SMART Brazil received a unanimous favorable ruling rejecting the position of the tax authorities. The tax authorities did not file any request for clarification or appeal and, as a result, the Second Assessment was extinguished in May 2019.

On December 12, 2013, SMART Brazil received another notice of assessment in the amount of R$3.6 million (or $1.0 million) with respect to the same import-related tax issues and penalties discussed above for 2012 and 2013 (the Third Assessment). The Third Assessment does not seek import duties and related taxes on Dynamic Random Access Memory (DRAM) products and only seeks import duties and related taxes on Flash unmounted components with respect to the months of January 2012 to June 2012. This is because SMART Brazil's imports of DRAM unmounted components were subject to 0%, and, after June 2012, SMART Brazil's imports of Flash unmounted components became subject to 0%, import duties and related taxes, both as a result of PADIS. Even with this 0%, if SMART Brazil is found to have used the incorrect product classification code, SMART Brazil will be subject to an administrative penalty equal to 1% of the value of the imports. SMART Brazil has filed defenses to the Third Assessment. The Company believes that SMART Brazil used the correct product code on its imports and that the Third Assessment is incorrect. SMART Brazil intends to vigorously fight this matter. Although SMART Brazil did not receive the Third Assessment until December 12, 2013, the Third Assessment was issued before the CARF decision in favor of SMART Brazil on the First Assessment as discussed above was published.

The amounts claimed by the tax authorities on the Third Assessment are subject to increases for interest and other charges, which resulted in a combined assessment balance of approximately R$5.6 million (or $1.5 million) as of August 30, 2019.

As a result of the CARF decisions in favor of SMART Brazil on the First Assessment and the Second Assessment, the Company believes that the probability of any material charges as a result of the Third Assessment is remote and the Company does not expect the resolution of this disputed assessment to have a material impact on its consolidated financial position, results of operations or cash flows. While the Company believes that the Third Assessment is incorrect, there can be no assurance that SMART Brazil will prevail in the disputes.

(11) Segment and Geographic Information

The Company operates in one reportable segment: the design, manufacture and sale of specialty memory solutions and services to the electronics industry. The Company's chief operating decision-maker, the President and CEO, evaluates financial performance on a company-wide basis.

A summary of the Company's net sales by geographic area, based on the ship-to location of the customer, and property and equipment by geographic area is as follows (in thousands):

	Fiscal Year Ended		
	August 30, 2019	August 31, 2018	August 25, 2017
Geographic Net Sales:			
U.S.	$ 383,316	$ 203,410	$ 140,188
Brazil	536,510	798,257	398,385
Asia	214,530	227,216	174,644
Europe	42,497	30,137	26,293
Other Americas	35,146	29,801	21,781
Total	$1,211,999	$1,288,821	$ 761,291

	August 30, 2019	August 31, 2018
Property and Equipment, Net:		
U.S.	$ 8,801	$ 7,805
Brazil	49,221	41,611
Malaysia	8,186	4,749
Other	2,137	2,450
Total	$ 68,345	$ 56,615

(12) Major Customers

A majority of the Company's net sales are attributable to customers operating in the information technology industry. Net sales to significant end user customers, including sales to their manufacturing subcontractors, defined as net sales in excess of 10% of total net sales, are as follows (dollars in thousands):

	Fiscal Year Ended					
	August 30, 2019		August 31, 2018		August 25, 2017	
	Amount	Percentage of net sales	Amount	Percentage of net sales	Amount	Percentage of net sales
Customer A	$ 219,677	18%	$ 434,438	34%	$ 146,478	19%
Customer B	162,273	13%	143,367	11%	82,285	11%
Customer C	139,349	11%	158,172	12%	116,821	15%
Customer D	—	—	128,848	10%	—	—
	$ 521,299	42%	$ 864,825	67%	$ 345,584	45%

As of August 30, 2019, three direct customers that represented less than 10% of net sales, Customers E, F and G, accounted for approximately 15%, 15% and 12% of accounts receivable, respectively. As of August 31, 2018, four direct customers that represented less than 10% of net sales, Customers E, F, G and H, accounted for approximately 15%, 19%, 17% and 11% of accounts receivable, respectively.

(13) Earnings Per Share

Basic earnings per share is calculated by dividing net income (loss) by the weighted average of ordinary shares outstanding during the period. Diluted earnings per share is calculated by dividing the net income (loss) by the weighted average of ordinary shares and dilutive potential ordinary shares outstanding during the period. Dilutive potential ordinary shares consist of dilutive shares issuable upon the exercise of outstanding stock options and vesting of RSUs computed using the treasury stock method. The dilutive weighted shares are excluded from the computation of diluted net loss per share when a net loss is recorded for the period as their effect would be anti-dilutive.

The following table sets forth for all periods presented the computation of basic and diluted earnings per share, including the reconciliation of the numerator and denominator used in the calculation of basic and diluted earnings per share (dollars and shares in thousands, except per share data):

	Fiscal Year Ended		
	August 30, 2019	August 31, 2018	August 25, 2017
Numerator:			
Net income (loss)	$ 51,332	$ 119,463	$ (7,795)
Denominator:			
Weighted average shares outstanding:			
Basic	22,959	22,051	15,785
Diluted	23,468	23,119	15,785
Earnings per share:			
Basic	$ 2.24	$ 5.42	$ (0.49)
Diluted	$ 2.19	$ 5.17	$ (0.49)
Anti-dilutive weighted shares excluded from the computation of diluted earnings per share	1,549	678	1,302

(14) Other Expense, Net

The following table provides the detail of other expense, net as follows (in thousands):

	Fiscal Year Ended		
	August 30, 2019	August 31, 2018	August 25, 2017
Foreign currency gains (losses)	$ (3,148)	$ (13,227)	$ 286
Loss on extinguishment of debt	—	—	(16,580)
Loss on early repayment of debt	—	—	(6,744)
Other	987	(72)	487
Total other expense, net	$ (2,161)	$ (13,299)	$ (22,551)

(15) Selected Quarterly Information (Unaudited)

The following tables set forth certain data from the Company's consolidated statements of operations for each of the quarters in fiscal 2019 and 2018.

The unaudited quarterly consolidated financial statements have been prepared on the same basis as the audited consolidated financial statements contained herein and include all adjustments that the Company considers necessary for a fair presentation of such information when read in conjunction with the Company's annual audited consolidated financial statements and notes thereto appearing elsewhere in this report. The operating results for any quarter are not necessarily indicative of the results for any subsequent period or for the entire fiscal year.

	Three Months Ended							
	Aug 30, 2019	May 31, 2019	Mar 1, 2019	Nov 30, 2018	Aug 31, 2018	May 25, 2018	Feb 23, 2018	Nov 24, 2017
	(unaudited, in thousands except per share amounts)							
Net sales	$278,400	$235,657	$304,063	$393,879	$373,970	$335,477	$313,965	$265,409
Gross profit	$ 52,292	$ 43,035	$ 57,131	$ 82,069	$ 82,679	$ 78,054	$ 73,017	$ 57,836
Income from operations	$ 11,432	$ 7,399	$ 22,451	$ 47,799	$ 44,981	$ 48,694	$ 45,078	$ 31,468
Net income	$ 5,625	$ 1,945	$ 12,786	$ 30,976	$ 29,718	$ 31,946	$ 36,794	$ 21,005
Earnings per share								
Basic	$ 0.24	$ 0.08	$ 0.56	$ 1.37	$ 1.33	$ 1.44	$ 1.68	$ 0.97
Diluted	$ 0.24	$ 0.08	$ 0.55	$ 1.33	$ 1.28	$ 1.37	$ 1.60	$ 0.92
Shares used in per share calculation								
Basic	23,366	23,005	22,872	22,595	22,383	22,206	21,915	21,673
Diluted	23,825	23,330	23,359	23,257	23,270	23,306	23,038	22,715

EXHIBIT INDEX

Exhibit No.	Description	Incorporated by Reference				Filed Herewith
		Form	File No.	Exhibit	Filing Date	
2.1	Agreement and Plan of Merger, dated as of June 8, 2018, by and among SMART Global Holdings, Inc., Glacier Acquisition Sub, Inc., Penguin Computing, Inc. and Fortis Advisors LLC	8-K	001-38102	2.1	6/11/2018	
2.2	Stock Purchase Agreement, dated as of July 8, 2019, by and among Artesyn Embedded Computing, Inc., Pontus Intermediate Holdings II, LLC, Pontus Holdings, LLC and SMART Global Holdings, Inc.	8-K	001-38102	2.1	7/12/2019	
3.1	Amended and Restated Memorandum and Articles of Association of SMART Global Holdings, Inc.	10-Q	001-38102	3.1	6/29/2017	
4.1	Amended and Restated Sponsor Shareholders Agreement, dated as of May 30, 2017, by and among the Issuer, SLP III Cayman, SLTI III Cayman, SLS Cayman, SLTI Sumeru Cayman, Mr. Ajay B. Shah, Krishnan-Shah Family Partners, L.P., Fund No. 1, Krishnan-Shah Family Partners, L.P., Fund No. 3, Krishnan-Shah Family Partners, L.P., Fund No. 4, and The Ajay B. Shah and Lata K. Shah 1996 Trust u/a/d 5/28/1996	10-Q	001-38102	4.1	6/29/2017	
4.2	Amended and Restated Registration Rights Agreement, dated as of November 5, 2016, by and among SMART Global Holdings, Inc., Silver Lake Partners III Cayman (AIV III), L.P., Silver Lake Technology Investors III Cayman, L.P., Silver Lake Sumeru Fund Cayman, L.P., Silver Lake Technology Investors Sumeru Cayman, L.P., Mr. Ajay B. Shah, Krishnan-Shah Family Partners, L.P., Fund No. 1, Krishnan-Shah Family Partners, L.P., Fund No. 3, Krishnan-Shah Family Partners, L.P., Fund No. 4, The Ajay B. Shah and Lata K. Shah 1996 Trust u/a/d 5/28/1996, Mr. Mukesh A. Patel, Patel Family Partners, LP – Fund No. 2, The Patel Revocable Trust u/a/d 6/6/2002, the Management Holders and the Warrant Holders	S-1/A	333-217539	4.2	5/11/2017	
4.3	Saleen Holdings, Inc. Employee Investors Shareholders Agreement, dated as of August 26, 2011, by and among Saleen Holdings, Inc., Silver Lake Partners III Cayman (AIV III), L.P., Silver Lake Technology Investors III Cayman, L.P., Silver Lake Sumeru Fund Cayman, L.P., Silver Lake Technology Investors Sumeru Cayman, L.P. and the Employee Investors	S-1/A	333-217539	4.4	5/11/2017	

4.4	Amended and Restated Investors Shareholders Agreement, dated as of November 5, 2016, by and among SMART Global Holdings, Inc., Silver Lake Partners III Cayman (AIV III), L.P., Silver Lake Technology Investors III Cayman, L.P., Silver Lake Sumeru Fund Cayman, L.P., Silver Lake Technology Investors Sumeru Cayman, L.P., the Management Investors and the Warrant Investors and Form of Amendment No. 2 to Investors Shareholders Agreement, by and among SMART Global Holdings, Inc., Silver Lake Partners III Cayman (AIV III), L.P., Silver Lake Technology Investors III Cayman, L.P., Silver Lake Sumeru Fund Cayman, L.P. and Silver Lake Technology Investors Sumeru Cayman, L.P., the Management Investors and the Warrant Investors	S-1/A	333-217539	4.5	5/22/2017
4.5	Amendment No. 2 to Investors Shareholders Agreement, by and among SMART Global Holdings, Inc., Silver Lake Partners III Cayman (AIV III), L.P., Silver Lake Technology Investors III Cayman, L.P., Silver Lake Sumeru Fund Cayman, L.P. and Silver Lake Technology Investors Sumeru Cayman, L.P., the Management Investors and the Warrant Investors	10-Q	001-38102	4.2	6/29/2017
4.6	Amendment No. 3 to Investors Shareholders Agreement, by and among SMART Global Holdings, Inc., Silver Lake Partners III Cayman (AIV III), L.P., Silver Lake Technology Investors III Cayman, L.P., Silver Lake Sumeru Fund Cayman, L.P., and Silver Lake Technology Investors Sumeru Cayman, L.P., the Management Investors and the Warrant Investors	8-K	001-38102	4.1	10/23/2017
4.7	Amendment No. 4 to Investors Shareholders Agreement, by and among SMART Global Holdings, Inc., Silver Lake Partners III Cayman (AIV III), L.P., Silver Lake Technology Investors III Cayman, L.P., Silver Lake Sumeru Fund Cayman, L.P., and Silver Lake Technology Investors Sumeru Cayman, L.P., the Management Investors and the Warrant Investors	8-K	001-38102	4.1	2/2/2018

4.8	Amendment No. 5 to Investors Shareholders Agreement dated as of June 20, 2018, by and among SMART Global Holdings, Inc., Silver Lake Partners III Cayman (AIV III), L.P., Silver Lake Technology Investors III Cayman, L.P., Silver Lake Sumeru Fund Cayman, L.P., Silver Lake Technology Investors Sumeru Cayman, L.P., the Management Investors (as defined in the A&R Investors Shareholders Agreement) and the Warrant Investors.	10-Q	001-38102	10.1	6/21/2018	
4.9	Description of Securities Registered Under Section 12 of the Exchange Act					X
10.1	Form of Indemnification Agreement entered into with each of the Registrant's officers and directors	S-1/A	333-217539	10.1	5/11/2017	
10.2	SMART Global Holdings, Inc. Amended and Restated 2017 Share Incentive Plan	10-Q	001-38102	10.1	6/29/2017	
10.3	Offer Letter by and between the Registrant and Ajay Shah, dated March 13, 2018	10-Q	001-38102	10.1	3/22/2018	
10.4	Amended and Restated Employment Agreement between SMART Modular Technologies, Inc. and Jack Pacheco	10-Q	001-38102	10.2	3/22/2018	
10.5	Employment Agreement, dated as of October 10, 2011, between SMART Modular Technologies, Inc. and Jack Pacheco	S-1	333-217539	10.4	4/28/2017	
10.6	Severance and Change of Control Agreement, dated as of December 10, 2010, between SMART Modular Technologies (WWH), Inc. and Alan Marten	S-1	333-217539	10.5	4/28/2017	
10.7	Severance and Change of Control Agreement, dated as of December 10, 2010, between SMART Modular Technologies (WWH), Inc. and Bruce Goldberg	S-1	333-217539	10.6	4/28/2017	
10.8	Severance and Change of Control Agreement, dated as of December 10, 2010, between SMART Modular Technologies (WWH), Inc. and KiWan Kim	S-1	333-217539	10.7	4/28/2017	
10.9	Credit Agreement, dated as of August 26, 2011, among SMART Modular Technologies (Global Memory Holdings), Inc., SMART Modular Technologies (Global), Inc., SMART Modular Technologies, Inc., the Lender Parties thereto and JPMorgan Chase Bank, N.A., as Administrative Agent	S-1	333-217539	10.8	4/28/2017	
10.10	Amendment No. 1 to Credit Agreement, dated as of December 13, 2011, among SMART Modular Technologies (Global Memory Holdings), Inc., SMART Modular Technologies (Global), Inc., SMART Modular Technologies, Inc., the lenders party thereto and JPMorgan Chase Bank, N.A., as Administrative Agent	S-1	333-217539	10.9	4/28/2017	

10.11	First Refinancing Amendment to Credit Agreement, dated as of August 20, 2014, among SMART Modular Technologies (Global Holdings), Inc., SMART Modular Technologies (Global), Inc., SMART Modular Technologies, Inc., the new revolving lenders party thereto and JPMorgan Chase Bank, N.A., as Administrative Agent	S-1	333-217539	10.10	4/28/2017
10.12	Master Guarantee Agreement, dated as of August 26, 2011, among SMART Modular Technologies (Global Memory Holdings), Inc., SMART Modular Technologies (Global), Inc., SMART Modular Technologies, Inc., the subsidiary guarantors identified therein and JPMorgan Chase Bank, N.A. as Administrative Agent	S-1	333-217539	10.11	4/28/2017
10.13	Collateral Agreement, dated as of August 26, 2011, among SMART Modular Technologies, Inc., the other grantors party thereto and JPMorgan Chase Bank, N.A. as Administrative Agent	S-1	333-217539	10.12	4/28/2017
10.14	Amendment No. 2 to Credit Agreement, dated as of September 19, 2014, among SMART Modular Technologies (Global Holdings), Inc., SMART Modular Technologies (Global), Inc., SMART Modular Technologies, Inc., the lenders party thereto and Barclays Bank PLC, as Administrative Agent	S-1/A	333-217539	10.13	5/11/2017
10.15	Amendment No. 3 to Credit Agreement, dated as of December 4, 2015, among SMART Worldwide Holdings, Inc., SMART Modular Technologies (Global), Inc., the revolving lenders party thereto and Barclays Bank PLC, as Administrative Agent	S-1/A	333-217539	10.14	5/11/2017
10.16	Amendment No. 4 to Credit Agreement, dated as of November 5, 2016, among SMART Worldwide Holdings, Inc., SMART Modular Technologies (Global), Inc., the lenders party thereto and Barclays Bank PLC, as Administrative Agent	S-1/A	333-217539	10.15	5/11/2017
10.17	Amended and Restated Credit Agreement, dated as of November 5, 2016, among SMART Worldwide Holdings, Inc., SMART Modular Technologies (Global), Inc., SMART Modular Technologies, Inc., the lenders party thereto and Barclays Bank PLC, as Administrative Agent	S-1/A	333-217539	10.16	5/11/2017
10.18	Lease Agreement, dated as of February 18, 2009, between Newark Eureka Industrial Capital LLC and SMART Modular Technologies, Inc.	S-1	333-217539	10.17	4/28/2017

10.19	First Amendment to Lease Agreement, dated as of April 29, 2014, between Newark Eureka Industrial Capital LLC and SMART Modular Technologies, Inc.	S-1	333-217539	10.18	4/28/2017
10.20	Amended and Restated Transaction and Management Fee Agreement, dated as of November 5, 2016, among SMART Worldwide Holdings, Inc., Silver Lake Management Company III, L.L.C. and Silver Lake Management Company Sumeru, L.L.C.	S-1/A	333-217539	10.19	5/11/2017
10.21	Stock Purchase Agreement, dated as of July 2, 2013, among SMART Storage Systems (Global Holdings), Inc., SanDisk Corporation, SanDisk Manufacturing and solely for the purposes of Section 5.7(c), Section 5.8, Article VIII and Article IX, Saleen Holdings, Inc., Saleen Intermediate Holdings, Inc. and SMART Worldwide Holdings, Inc.	S-1/A	333-217539	10.20	5/22/2017
10.22	Receivables Purchase Agreement, dated as of May 16, 2012, among SMART Modular Technologies, Inc., SMART Modular Technologies (Europe) Limited and Wells Fargo Bank, N.A.	S-1	333-217539	10.21	4/28/2017
10.23	First Amendment to Receivables Purchase Agreement, dated as of March 28, 2013, among SMART Modular Technologies, Inc., SMART Modular Technologies (Europe) Limited and Wells Fargo Bank, N.A., and confirmed by SMART Modular Technologies (Global Holdings), Inc., SMART Modular Technologies (Global), Inc.	S-1	333-217539	10.22	4/28/2017
10.24	Second Amended and Restated Credit Agreement, dated as of August 9, 2017, among SMART Worldwide Holdings, Inc., SMART Modular Technologies (Global), Inc., SMART Modular Technologies, Inc., the lenders party thereto and Barclays Bank PLC, as Administrative Agent and as Collateral Agent	8-K	001-38102	10.1	8/11/2017
10.25	Incremental Facility Amendment, dated as of June 8, 2018, to the Second Amended and Restated Credit Agreement, dated as of August 9, 2017 (as amended, supplemented or otherwise modified from time to time) among SMART Worldwide Holdings, Inc., SMART Modular Technologies (Global), Inc., SMART Modular Technologies, Inc., Barclays Bank PLC, as Administrative Agent and the other Lenders party thereto	8-K	001-38102	10.1	6/11/2018

10.26	Second Amendment, dated as of October 12, 2018 and effective October 25, 2018, to the Second Amended and Restated Credit Agreement, dated as of August 9, 2017 (as amended, supplemented or otherwise modified from time to time) among SMART Worldwide Holdings, Inc., and SMART Modular Technologies (Global), Inc., SMART Modular Technologies, Inc., Barclays Bank PLC, as Administrative Agent and other Lenders party thereto	10-K	001-38102	10.26	10/30/2018	
21.1	List of Subsidiaries of Registrant					X
23.1	Consent of Independent Registered Public Accounting Firm					X
24.1	Power of Attorney (contained in the signature page to this Annual Report on Form 10-K)					X
31.1	Certification of Principal Executive Officer Pursuant to Rules 13a-14(a) and 15d-14(a) under the Securities Exchange Act of 1934, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002					X
31.2	Certification of Principal Financial Officer Pursuant to Rules 13a-14(a) and 15d-14(a) under the Securities Exchange Act of 1934, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002					X
32.1	Certification of Principal Executive Officer Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002					X
32.2	Certification of Principal Financial Officer Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002					X
101.INS	XBRL Instance Document					X
101.SCH	XBRL Taxonomy Extension Schema Document					X
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document					X
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document					X
101.LAB	XBRL Taxonomy Extension Label Linkbase Document					X
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document					X

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

Dated: November 6, 2019

SMART Global Holdings, Inc.

By: /s/ Ajay Shah
Name: Ajay Shah
Title: Chairman of the Board, President and Chief Executive Officer

POWER OF ATTORNEY AND SIGNATURES

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below hereby constitutes and appoints Ajay Shah, Jack Pacheco and Bruce Goldberg, and each of them, as his or her true and lawful attorney-in-fact and agent with full power of substitution, for him or her in any and all capacities, to sign any and all amendments to this Annual Report on Form 10-K, and to file the same, with all exhibits thereto and other documents in connection therewith, with the SEC, granting unto said attorney-in-fact and agent full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully for all intents and purposes as he or she might or could do in person, hereby ratifying and confirming all that said attorney-in-fact and agent, or his substitute, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the Registrant in the capacities and on the dates indicated.

/s/ Ajay Shah Ajay Shah	Chairman of the Board, President and Chief Executive Officer (Principal Executive Officer)	November 6, 2019
/s/ Jack Pacheco Jack Pacheco	Executive Vice President and Chief Financial Officer (Principal Financial and Accounting Officer)	November 6, 2019
/s/ Randy Furr Randy Furr	Director	November 6, 2019
/s/ Kenneth Hao Kenneth Hao	Director	November 6, 2019
/s/ Bryan Ingram Bryan Ingram	Director	November 6, 2019
/s/ Paul Mercadante Paul Mercadante	Director	November 6, 2019
/s/ Sandeep Nayyar Sandeep Nayyar	Director	November 6, 2019
/s/ Mukesh Patel Mukesh Patel	Director	November 6, 2019
/s/ Maximiliane Straub Maximiliane Straub	Director	November 6, 2019
/s/ Jason White Jason White	Director	November 6, 2019

DIRECTORS

Ajay Shah
Chairman of the Board, President & Chief Executive Officer

Randy Furr

Kenneth Hao

Bryan Ingram

Paul Mercadante

Sandeep Nayyar

Mukesh Patel

Maximiliane Straub

Jason White

INDEPENDENT AUDITORS

Deloitte & Touche LLP
San Jose, CA

TRANSFER AGENT

Computershare Trust Company, N.A.
250 Royal Street
Canton, MA 02021
800-962-4284
www.computershare.com

INVESTOR INFORMATION

Current and prospective SMART investors may access information at: www.smartgh.com. Requests may also be made to Suzanne Schmidt at +1 (510) 360-8596 or ir@smartm.com.

MARKET INFORMATION

NASDAQ Global Select Market
Stock Symbol: SGH

EXECUTIVE MANAGEMENT

Ajay Shah
Chairman of the Board, President & Chief Executive Officer

Jack Pacheco
Executive Vice President, Chief Operating &
Chief Financial Officer

Bruce Goldberg
Vice President, Chief Legal & Chief Compliance Officer

Alan Marten
Senior Vice President, Specialty Memory

KiWan Kim
Senior Vice President, Emerging Markets &
President, SMART Brazil

Stephen Dow
Senior Vice President, Specialty Compute
& Storage Solutions

Tom Coull
Senior Vice President, Specialty Compute
& Storage Solutions, and CEO of Penguin Computing, Inc.

ANNUAL GENERAL MEETING OF SHAREHOLDERS

February 13, 2020 at 10:00 a.m. (PST)
DoubleTree Hotel
39900 Balentine Drive
Newark, CA 94560

CORPORATE HEADQUARTERS

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