GSI TECHNOLOGY INC
Form 10-K
June 01, 2018
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UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

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

For the fiscal year ended March 31, 2018

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 001-33387

GSI Technology, Inc.

(Exact name of registrant as specified in its charter)

Delaware	77-0398779
(State or other jurisdiction of	(IRS Employer

incorporation or organization) Identification No.)

1213 Elko Drive

Sunnyvale, California 94089

(Address of principal executive offices, zip code)

(408) 331-8800

(Registrant's telephone number, including area code)

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

Title of Each Class	Name of Each Exchange on which Registered
Common Stock, $0.001 par value	The Nasdaq Stock Market LLC

Securities registered pursuant to Section 12(g) of the Act: None

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 and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

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

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 Exchange Act). Yes No

The aggregate market value of the registrant's voting stock held by non-affiliates of the registrant, based upon the closing sale price of the common stock on September 30, 2017, as reported on the Nasdaq Global Market, was approximately $119.1 million. Shares of the registrant's common stock held by each officer and director and each person who owns 10% or more of the outstanding common stock of the registrant 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 May 29, 2018, there were 21,686,364 shares of the registrant's common stock issued and outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's definitive proxy statement for its 2018 annual meeting of stockholders are incorporated by reference into Part III hereof.

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GSI TECHNOLOGY, INC.

2018 FORM 10-K ANNUAL REPORT

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Forward-looking Statements

In addition to historical information, this Annual Report on Form 10-K includes 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 (the "Exchange Act"). These forward-looking statements involve risks and uncertainties. Forward-looking statements are identified by words such as "anticipates," "believes," "expects," "intends," "may," "will," and other similar expressions. In addition, any statements which refer to expectations, projections, or other characterizations of future events or circumstances are forward-looking statements. Actual results could differ materially from those projected in the forward-looking statements as a result of a number of factors, including those set forth in this report under "Management's Discussion and Analysis of Financial Condition and Results of Operations" and "Risk Factors," those described elsewhere in this report, and those described in our other reports filed with the Securities and Exchange Commission ("SEC"). We caution you not to place undue reliance on these forward-looking statements, which speak only as of the date of this report, and we undertake no obligation to update these forward-looking statements after the filing of this report. You are urged to review carefully and consider our various disclosures in this report and in our other reports publicly disclosed or filed with the SEC that attempt to advise you of the risks and factors that may affect our business.

PART I

Item 1. Business

Overview

For many years we have developed and marketed high performance memory products, including "Very Fast" static random access memory, or SRAM, and low latency dynamic random access memory, or LLDRAM, that are incorporated primarily in high-performance networking and telecommunications equipment, such as routers, switches, wide area network infrastructure equipment, wireless base stations and network access equipment. We sell these products to leading original equipment manufacturer, or OEM, customers including Nokia and Cisco Systems. In addition, we serve the ongoing needs of the military, industrial, test and measurement equipment, automotive and medical markets for high-performance SRAMs. Based on the performance characteristics of our products and the breadth of our product portfolio, we consider ourselves to be a leading provider of Very Fast SRAMs. We utilize a fabless business model, which allows us both to focus our resources on research and development, product design and marketing, and to gain access to advanced process technologies with only modest capital investment and fixed costs.

On November 23, 2015, we acquired all of the outstanding capital stock of privately held MikaMonu Group Ltd. ("MikaMonu"), an Israel-based company that was engaged in the development of in-place associative computing technology. MikaMonu, located in Tel Aviv, held 12 United States patents and a number of pending patent applications. Subsequent to our acquisition of MikaMonu, our principal strategic objective has been the development of in-place associative computing solutions for applications in evolving new markets such as "big data" (including machine learning and deep convolutional neural networks ("CNNs")), natural language processing, computer vision, and cyber security.

We were incorporated in California in 1995 under the name Giga Semiconductor, Inc. We changed our name to GSI Technology in December 2003 and reincorporated in Delaware in June 2004 under the name GSI Technology, Inc. Our principal executive offices are located at 1213 Elko Drive, Sunnyvale, California, 94089, and our telephone number is (408) 331-8800.

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Industry Background

SRAM, LLDRAM and Bandwidth Engine Market Overview

Virtually all types of high-performance electronic systems incorporate some form of volatile memory. An SRAM is a memory device that retains data as long as power is supplied, without requiring any further user intervention. In contrast, dynamic random access memory, or DRAM, is a memory device that requires user intervention in the form of refresh operations to retain data while power is supplied, due to the capacitive nature of its memory cell. However, a DRAM memory cell is much smaller than an SRAM memory cell, so several times more DRAM bits than SRAM bits can be implemented in any given unit area of silicon. The fundamentally different characteristics of SRAM and DRAM memory cells have resulted in the emergence of markedly different architectures for SRAM-based and DRAM-based memory products, and the two types of memory serve different applications. Classically, SRAM-based products have served high performance requirements while DRAM-based products have been used in cost-optimized applications. Today, SRAM- and DRAM-based products serve both performance and cost-based applications. As the volatile memory market fragments into a variety of specialized products, more meaningful distinctions between volatile memory products can be made.

There is an increasingly broad variety of volatile memory products on the market, characterized by a number of attributes, such as speed, memory capacity, or density, I/O interface and power consumption. There are several different industry measures of speed:

latency, which is the delay between the request for data and the delivery of such data for use and is measured in nanoseconds, or ns, or when used to describe performance of synchronous memory products may be described in terms of numbers of clock cycles required between the load of an address and the delivery of valid data;

random access time, which is the minimum amount of time required between accesses to random locations within the memory array, typically measured in nanoseconds, or ns;

bandwidth, which is the rate at which data can be streamed to or from a device and is often measured in megabits or gigabits per second (Mb/s or Gb/s);

clock frequency, which is the cycle rate of a clock within a synchronous device and is often measured in megahertz or gigahertz (MHz or GHz); and

transaction rate, which is the rate at which new commands can be executed by the memory device, and is often measured in millions or billions of transactions per second (MT/s or BT/s).

Historically, SRAMs have been utilized wherever other lower price-per-bit memory technologies have been inadequate. SRAMs demonstrate lower latency and faster random access times relative to DRAMs and other types of memory technologies, but at a higher price-per-bit. Historically, the volatile memory market has had three price-performance points, DRAM at the low end, Fast SRAM at the high end, and slow SRAM in the middle. Gartner Dataquest divides the SRAM market into segments based on speed. The highest performance segment is comprised of SRAMs that operate at speeds of less than 10 nanoseconds, which we refer to as “Very Fast SRAMs.” Very Fast SRAMs are predominantly utilized in high-performance networking and telecommunications equipment. Over the past two decades, alternative memory technologies have been introduced to address certain applications that formerly used slow SRAMs. For example, new types of DRAM have displaced slow SRAM in applications such as cell phones. However, in the networking memory market a technology vacuum formed between Fast SRAMs on one end

and commodity DRAMs at the other, with no high bandwidth, high transaction rate, moderate capacity, moderate latency, and moderate cost volatile memory product to fill the void. In the past decade, low latency DRAMs, or LLDRAMs, have been developed to fill that void. Like the slow SRAMs that came before them, LLDRAMs have a much higher price-per-bit than commodity DRAMs (in order to deliver higher transaction rates) but demonstrate slower random access times and longer latencies than Fast SRAMs.

The need for increasingly greater capacity, data bandwidth and transaction rates from the various memory technologies continues unabated as the networking market begins to make preparations for Terabit networking in the

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latter half of the current decade. We believe that Fast SRAM and LLDRAM, optimized for networking applications, will continue to play an essential role in enabling continued improvements in network performance.

We believe the key success factors for a networking memory vendor are the ability to offer a broad catalog of high-performance, high-quality and high-reliability networking memory products, to maintain timely availability of prior generations of products for several years after their introductions, and to provide effective logistic and technical support throughout their OEM customers' product development and manufacturing life cycles.

Memory Requirements for "Big Data" Applications

With the vast amount of data currently being generated and the demand for faster processing of that data, processor speeds are continuing to increase. However, existing systems that move data back and forth between the processor and memory are inadequate to address the fast response times required by "big data" applications (including machine learning, CNNs and natural language processing). Faster response times are also needed to meet the demands of developers in such markets as cyber security and computer vision. For example, in the automotive market, advanced driver assistance systems ("ADAS") require a tremendous amount of image processing to be accomplished in real time

The GSI Solution

Continue Leadership in the High Performance Memory Market

We endeavor to address the overall needs of our OEM customers, not only satisfying their immediate requirements for our latest generation, highest performance networking memory, but also providing them with the ongoing long-term support necessary during the entire lives of the systems in which our products are utilized. Accordingly, the key elements of our solution include:

Product Performance Leadership. Through the use of advanced architectures and design methodologies, we have developed high-performance SRAM and LLDRAM products offering superior high speed performance capabilities and low power consumption, while our advanced silicon process technologies allow us to optimize yields, lower manufacturing costs and improve quality.

Product Innovation. We believe that we have established a position as a technology leader in the design and development of Very Fast SRAMs. We are believed to have the industry's highest density RadHard SRAM, the SigmaQuad II+, which is an example of our industry-leading product innovation.

Broad and Readily Available Product Portfolio. We have what we believe is the broadest catalog of Very Fast SRAM products.

Master Die Methodology. Our master die methodology enables multiple product families, and variations thereof, to be manufactured from a single mask set so that we are able to maintain a common pool of wafers that incorporate all available master die, allowing rapid fulfillment of customer orders and reducing costs.

Customer Responsiveness. We work closely with leading networking and telecommunications OEMs, as well as their chip-set suppliers, to anticipate their requirements and to rapidly develop and implement solutions that allow them to meet their specific product performance objectives.

Development of In-Place Associative Computing Products

The in-place associative computing technology that we obtained in the MikaMonu acquisition addresses the bottleneck caused by the inability of memory bus speeds to keep up with increasing processor speeds by changing the concept of computing from serial data processing – where data is moved back and forth from the processor to the memory – to parallel processing computation and search functions being conducted directly in the main processing

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array. This new computing model has the potential to greatly expedite computation and response times in "big data" applications. We believe that our state-of-the-art circuit design expertise will enable the development of high quality associative processors incorporating MikaMonu's patented, in-place associative computing technology and algorithms to create a new category of computing products with substantial target markets and a large new customer base in those markets. We anticipate the release of our initial product based on the MikaMonu IP to be released late in calendar 2018. Our associative computing products will improve system performance, reducing query response times from hours to seconds and at the same time significantly reducing power consumption and reducing system cost.

The GSI Strategy

Our objective is to profitably increase our market share in the markets that we serve, while developing transformative new products utilizing our cutting-edge in-place associative computing technology. Our strategy includes the following key elements:

Continue to Focus on the Networking and Telecommunications Markets. We intend to continue to focus on designing and developing high transaction rate, low latency, high bandwidth and feature-rich memory products targeted primarily at the networking and telecommunications markets.

Complete the Development of Our Initial In-place Associative Computing Product. Our principal strategic objective is the completion of our initial in-place associative computing product. Realization of this goal will require additional development and marketing efforts during the remainder of calendar 2018, with initial product introduction and customer evaluation expected in late fiscal 2019.

Exploit Opportunities to Expand the Market for Our Memory Products. While we develop our high-performance memory products principally for the networking and telecommunications markets, they are often applicable across a wide range of industries and applications. We have experienced growth in product sales for military, industrial, test and measurement, and medical markets and intend to continue penetrating these and other new markets with similar needs for high-performance memory technologies.

Strengthen and Expand Customer Relationships. We are focused on maintaining close relationships with industry leaders to facilitate rapid adoption of our products and to enhance our position as a leading provider of high-performance memory. We work with both our customers and with their non-memory IC suppliers that require high-performance memory support in order to anticipate their future high-performance memory needs and to identify and respond to their immediate requests for currently available products and variants on currently available products.

Continue to Invest in Research and Development to Extend Our Technology Leadership. We believe we have established a position as a technology leader in the design and development of Very Fast SRAMs. Our Very Fast SRAM products most often provide the highest speed available at a given density for a given device configuration. We intend to maintain and advance our technology leadership through continual enhancement of our existing Very Fast SRAM products, particularly our SigmaQuad/SigmaDDR family of low latency, high-bandwidth synchronous SRAMs, while we continue to broaden our product line with the introduction of other new high performance memory

technologies targeted to address the evolving needs of the high performance memory market.

Collaborate with Wafer Foundries to Leverage Leading-edge Process Technologies. We will continue to rely upon advanced complementary metal oxide semiconductor, or CMOS, technologies, the most commonly used process technologies for manufacturing semiconductor devices, from TSMC for SRAM-based products and from Powerchip for DRAM-based products.

Seek New Market Opportunities. We intend to supplement our internal development activities by seeking additional opportunities to acquire other businesses, product lines or technologies, or enter into strategic partnerships, that would complement our current product lines, expand the breadth of our markets, enhance our technical capabilities, or otherwise provide growth opportunities.

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Products

We design, develop and market a broad range of high-performance memory products primarily for the networking and telecommunications markets. We specialize in high performance memory products featuring very high transaction rates, high density, low latency, high bandwidth, fast clock access times and low power consumption. We commit to offering our products for longer periods of time than our competitors, typically seven years or more following their initial introduction. Accordingly, we continue to offer products in a variety of package types that have been discontinued by other suppliers.

We currently offer more than 30 families of SRAMs and one family of LLDRAMs. These basic product configurations are the basis for over 16,000 individual products that incorporate a variety of performance specifications and optional features. Our products can be found in a wide range of networking and telecommunications equipment, including core routers, multi-service access routers, universal gateways, enterprise edge routers, service provider edge routers, optical edge routers, fast Ethernet switches and wireless base stations. We also sell our products to OEMs that manufacture products for military and aerospace applications such as radar and guidance systems and satellites, for professional audio applications such as sound mixing systems, for test and measurement applications such as high-speed testers, for automotive applications such as smart cruise control, and for medical applications such as ultrasound and CAT scan equipment.

We have spent in excess of two years developing and marketing in-place associative computing solutions since our acquisition of MikaMonu in November 2015, leveraging the patented technology obtained in our acquisition of MikaMonu and our 20-plus years of high-performance SRAM development experience. Our new associative computing solutions will address evolving new markets, such as “big data” (including machine learning and CNNs), natural language processing, computer vision and cyber security.

Synchronous SRAM Products

Synchronous SRAMs are controlled by timing signals, referred to as clocks, which make them easier to use than older style asynchronous SRAMs with similar latency characteristics in applications requiring high bandwidth data transfers. Synchronous SRAMs that employ double data rate interface protocols can transfer data at much higher bandwidth than both single data rate and asynchronous SRAMs. We currently supply synchronous SRAMs that can cycle at operating frequencies as high as 1,333 MHz.

BurstRAM™ and NBT™ SRAMs. We currently offer BurstRAMs and No Bus Turnaround, or NBT, SRAMs that implement a single data rate bus protocol. BurstRAMs were originally developed for microprocessor cache applications and have become the most widely used synchronous SRAMs on the market. They are used in applications where large amounts of data are read or written in single sessions, or bursts. NBT SRAMs are a variation on the BurstRAM theme and were developed to address the needs of moderate performance networking applications. NBT SRAMs feature a single data rate bus protocol designed to minimize or eliminate wasted data transfer time slots on the bus when BurstRAMs switch from read to write operations. Both families of products can perform burst data transfers or single cycle transfers at the discretion of the user.

Our BurstRAMs and NBT SRAMs are offered in both pipeline and flow-through modes. Flow-through SRAMs allow the shortest latency. Pipelined SRAMs break the access into discrete clock-controlled steps, allowing new access commands to be accepted while an access is already in progress. Therefore, while flow-through SRAMs offer lower latency, pipelined SRAMs offer greater data bandwidth. Our BurstRAM and NBT SRAM products incorporate a number of features that reduce our OEM customers’ cost of ownership and increase their design flexibility, including a JTAG test port and our FLXDrive feature, which allows system designers to optimize signal integrity for a given application.

We currently offer BurstRAMs and NBT SRAMs with storage densities of up to 288 megabits with clock frequency of up to 400 MHz and clock access times as fast as 2 nanoseconds that operate at 3.3, 2.5 or 1.8 volts.

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SigmaQuad and SigmaDDR Products. High-performance double data rate and quad data rate synchronous SRAMs have become the de facto standard for the networking and telecommunications industry. We offer a full line of quad data rate separate I/O SRAMs, known as our SigmaQuad family, as well as a companion line of double data rate common I/O SRAMs, known as our SigmaDDR family. SigmaQuad SRAMs feature two uni-directional (one input and one output) double data rate data ports (two data ports times double data rate transfers equals quad data rate), controlled via a single address and control port. SigmaDDR SRAMs feature a single bi-directional double data rate data port. We currently offer our SigmaQuad and SigmaDDR devices in multiple bus protocol versions and data burst lengths, and with various power supply and interface voltages, all under the names SigmaQuad, SigmaQuad-II, SigmaQuad-IIIe and SigmaQuad-IVe, and their SigmaDDR equivalents. An additional variant in this family of SRAMs is the SigmaSIO DDR, which is designed to address some segments of the market currently served by dual-port SRAMs.

We currently offer SigmaQuad/SigmaDDR products in five storage densities, 18 megabits, 36 megabits, 72 megabits, 144 megabits and 288 megabits. These SRAMs are capable of speeds up to 1,333 MHz and operate on main power supply voltages that range from 2.5 volts to 1.2 volts and interface voltages that range from 1.8 volts to 1.2 volts.

RadHard and RadTolerant SRAM Products. We have committed to introduce and market radiation-hardened, or “RadHard”, and radiation-tolerant, or “RadTolerant”, SRAMs for aerospace and military applications such as networking satellites and missiles. Our initial RadHard and RadTolerant products are 288 megabit devices from our SigmaQuad-II family. The RadHard products are housed in a hermetically-sealed ceramic column grid array package, and undergo a special fabrication process that diminishes the adverse effects of high-radiation environments.

Low Latency DRAM Products

Our low latency DRAM family fills an under-served market segment between commodity DRAMs and Fast SRAMs. Offering moderate density, moderate speed and moderate cost, LLDRAM technology gives system designers a middle choice when commodity DRAM performance is insufficient but Fast SRAM performance is unnecessary. LLDRAMs offer one-third the latency of commodity DRAMs and four times the density of Fast SRAMs, giving networking equipment designers another tool for solving difficult data management problems.

Our current LLDRAM portfolio includes both 288 megabit and 576 megabit devices that are capable of speeds of up to 533 MHz, and that operate on a 1.8 volt power supply and support both 1.8 volt and 1.5 volt interfaces. They are available in five distinct configurations including common I/O and separate I/O types and data bus widths of x36, x18 and x9. These devices serve as an alternate source for users of a popular, functionally equivalent device from a competing vendor.

Customers

Historically, our primary sales and marketing strategy has been to achieve design wins with leading OEMs in the networking and telecommunications markets and the other markets we serve. With the development of our new in-place associative computing products, we are focusing sales and marketing efforts in the markets for “big data” (including CNNs), natural language processing, computer vision and cyber security.

The following is a representative list of our OEM customers that directly or indirectly purchased more than $500,000 of our products in the fiscal year ended March 31, 2018:

BAE Systems	Ciena	Cisco Systems
General Dynamics	Honeywell	Lockheed

Nokia Raytheon Rockwell

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Many of our OEM customers use contract manufacturers to assemble their equipment. Accordingly, a significant percentage of our net revenues is derived from sales to these contract manufacturers and to consignment warehouses who purchase products from us for use by contract manufacturers. In addition, we sell our products to OEM customers indirectly through domestic and international distributors.

In the case of sales of our products to distributors and consignment warehouses, the decision to purchase our products is typically made by the OEM customers. In the case of contract manufacturers, OEM customers typically provide a list of approved products to the contract manufacturer, which then has discretion whether or not to purchase our products from that list.

Direct sales to contract manufacturers and consignment warehouses accounted for 34.9%, 39.0% and 37.6% of our net revenues for fiscal 2018, 2017 and 2016, respectively. Sales to foreign and domestic distributors accounted for 62.5%, 57.5% and 50.4% of our net revenues for fiscal 2018, 2017 and 2016, respectively.

The following direct customers accounted for 10% or more of our net revenues in one or more of the following periods:

	Fiscal Year Ended March 31,		
	2018	2017	2016
Contract manufacturers and consignment warehouses:			