LATTICE SEMICONDUCTOR CORP
Form 10-K
February 26, 2019
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UNITED STATES
SECURITIES AND
EXCHANGE COMMISSION
Washington, D.C. 20549
FORM 10-K
(Mark One)

þ	ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934 FOR THE FISCAL YEAR ENDED DECEMBER 29, 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: 000-18032

LATTICE SEMICONDUCTOR CORPORATION
(Exact name of registrant as specified in its charter)

Delaware	93-0835214
(State of Incorporation)	(I.R.S. Employer Identification Number)

5555 NE Moore Court, Hillsboro, Oregon 97124-6421
(Address of principal executive offices) (Zip Code)
Registrant's telephone number, including area code: (503) 268-8000

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

(Title of Class)	(Name of each exchange on which registered)
Common Stock, $.01 par value	NASDAQ Global Select Market

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 þ

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 þ

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 þ 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 þ No ¨

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405 of this chapter) is not contained herein, and will not be contained, to the best of the 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. þ

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. (Check one):

Large accelerated filer ¨	Accelerated filer þ	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 þ

Aggregate market value of voting stock held by non-affiliates of the registrant as of June 29, 2018	$575,075,952
Number of shares of common stock outstanding as of February 21, 2019	131,598,332

DOCUMENTS INCORPORATED BY REFERENCE

The information required by Part III of this Report, to the extent not set forth herein, is incorporated herein by reference from the registrant's definitive proxy statement relating to the 2019 Annual Meeting of Stockholders, which definitive proxy statement shall be filed with the Securities and Exchange Commission within 120 days after the end of the fiscal year to which this Report relates.

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Forward-Looking Statements

This Annual Report on Form 10-K 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. These involve estimates, assumptions, risks and uncertainties. Any statements about our expectations, beliefs, plans, objectives, assumptions or future events or performance are not historical facts and may be forward-looking. We use words or phrases such as “anticipates,” “believes,” “could,” “estimates,” “expects,” “intends,” “plans,” “predicts,” “projects,” “ “should,” “continue,” “ongoing,” “future,” “potential” and similar words or phrases to identify forward-looking statements.

Examples of forward-looking statements include, but are not limited to, statements about: our transitions to newly adopted accounting standards; the effect of new accounting standards on our consolidated financial statements and financial results; the effects of sales mix on our gross margin in the future; our judgments involved in revenue recognition; our strategies and beliefs regarding the markets in which we compete or may compete; our expectations regarding emerging trends and market opportunities, our expectations regarding market infrastructure and growth areas, our future investments in research and development and our product leadership; our expectations regarding cash provided by or used in operating activities; our expectations regarding royalties under collaborative agreements; our expectations regarding our ability to service our debt obligations; our expectations regarding restructuring charges under and timing of restructuring plans; our expectation regarding payment of foreign and U.S. federal income taxes; the sufficiency of our financial resources to meet our operating and working capital needs through at least the next 12 months; our intention to continually introduce new products and enhancements and reduce manufacturing costs; our expectation of production volumes and the associated revenue streams for certain mobile handset providers; our continued participation in or sources of revenue from standard setting initiatives or consortia that develop and promote the High-Definition Multimedia Interface ("HDMI") specification including our expectations regarding sharing of HDMI royalty revenues; our plans to continue to monetize our patent portfolio through sales of non-core patents; our beliefs regarding our disclosure controls and procedures; the adequacy of assembly and test capacity commitments; our expectations regarding taxes and tax adjustments, particularly with respect to the 2017 Tax Act; our expectations regarding the outcome of tax and other audits; our valuation allowance and uncertain tax positions; our beliefs regarding the adequacy of our liquidity, capital resources and facilities; our intention to sublease vacated leased space in San Jose, California and Portland, Oregon; our expectations regarding our implementation of a company-wide enterprise resource planning system; our beliefs regarding legal proceedings, and our expectations regarding the impact of sanctions imposed by the United States Department of Commerce.

Forward-looking statements involve estimates, assumptions, risks, and uncertainties that could cause actual results to differ materially from those expressed in the forward-looking statements. The key factors, among others, that could cause our actual results to differ materially from the forward-looking statements included global economic conditions and uncertainty, including as a result of trade related restrictions or tariffs, the concentration of our sales in certain end markets, particularly as it relates to the concentration of our sales in the Asia Pacific region, market acceptance and demand for our existing and new products, market and technology trends, our ability to license or sell our intellectual property, any disruption of our distribution channels, the impact of competitive products and pricing, unexpected charges, delays or results relating to our restructuring plans, unexpected complications with our implementation of a company-wide enterprise resource planning system, the effect of any downturn in the economy on capital markets and credit markets, unanticipated taxation requirements or positions of the U.S. Internal Revenue Service or other taxing authority, unanticipated effects of tax reform, or unexpected impacts of accounting guidance. In addition, actual results are subject to other risks and uncertainties that relate more broadly to our overall business, including those more fully described herein and that are otherwise described from time to time in our filings with the Securities and Exchange Commission, including but not limited to the items discussed in “Risk Factors” in Item 1A of Part I of this Annual Report on Form 10-K.

You should not unduly rely on forward-looking statements because our actual results could differ materially from those expressed in any forward-looking statements made by us. In addition, any forward-looking statement applies only as of the date on which it is made. We do not plan to, and undertake no obligation to, update any forward-looking statements to reflect events or circumstances that occur after the date on which such statements are made or to reflect the occurrence of unanticipated events.

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PART I

Item 1. Business

Overview

Lattice Semiconductor Corporation and its subsidiaries ("Lattice," the "Company," "we," "us," or "our") develop semiconduct technologies that we monetize through products, solutions, design services, and licenses. We engage in smart connectivity, control, and compute solutions, providing intellectual property ("IP") and low-power, small form-factor programmable logic devices that enable global customers to quickly and easily develop innovative, smart, and connected products. We help their products become more aware, interact more intelligently, and make better and faster connections. In an increasingly intense global technology market, we help our customers get their products to market faster than their competitors. Our broad end-market exposure extends from mobile devices and consumer electronics to industrial and automotive equipment, communications and computing infrastructure, and licensing and services.

Our historic focus was on programmable logic devices ("PLDs"). In 2011, we made the strategic decision to competitively differentiate from other established programmable logic companies with ultra-low power and ultra-small sized field programmable gate array ("FPGA") solutions, a type of PLD. As a result, we acquired a leader in this technology, SiliconBlue Technologies, Inc. in 2011, and FPGA solutions and PLDs comprised our core business. In 2015, we broadened our product offerings by acquiring Silicon Image, Inc. ("Silicon Image"), a connectivity standards developer and semiconductor company. Over the past year we have re-focused more significantly on our core business of FPGA solutions and have divested various non-core assets and product lines acquired in our 2015 acquisition of Silicon Image.

Our FPGA devices provide us with a strong, growing base of control, connect, and compute technologies. We believe there are multiple growth areas that will allow us to increase our addressable market. In particular, we believe there are several emerging trends in servers, infrastructure, and smart devices that are opportunities for Lattice:

- With the growth of data centers, our "processor agnostic" solutions are ideal for control and connect functions in enterprise and data center server applications.
- With the expected continued communications infrastructure build-out from 5G deployment, Lattice solutions are being adopted to control and connect a variety of functions in critical systems.
- With the increase in electrification and the proliferation of sensors in smart factories and automobiles, our low power, small form factor solutions are ideal for everything from battery powered systems and sensor applications to video formats.
- With the increase in artificial intelligence and machine learning and a multitude of applications at the network edge, Lattice has the capabilities to provide solutions. These applications often act independently and need to make instantaneous decisions. As such, they need their own computing and learning capabilities to perform functions like face detection, image recognition, and video analytics – capabilities that we have today as a result of technology obtained with the acquisition of Silicon Image.

To serve these emerging needs, devices require high levels of processing power, speed, and memory, the need to operate with low power consumption, and the ability to integrate complex functionality into a highly compact footprint. These requirements align to the capabilities of our FPGA devices. Our flexible, low power, small form factor FPGAs put us in a unique position to meet these growing market needs.

Our Markets and Customers

We sell our products globally in three primary end markets groups: Mobile and Consumer, Communications and Computing, and Industrial and Automotive. We also provide Intellectual Property licensing and services to these end markets.

In the Mobile and Consumer Market, you can find our solutions making both consumer and prosumer products smarter and thinner, including: smart-phones, wearables, accessories such as chargers and docks, smart home devices, Virtual Reality ("VR") headsets, digital SLR cameras, drones, and other connected devices.

Our Mobile and Consumer customers are driven by the need to deliver richer and more responsive experiences. They typically require:

- More intelligence and computing power. Products need to be always-on and always-aware.
- Longer battery lives for handheld devices and reduced energy consumption for plugged-in devices.
- Real-time transmission of higher resolution video content on larger screen sizes.
- Fast design cycles. Products must be quickly and easily differentiated.
- Smaller form factors. Products need to lay flatter on the wall or fit more easily in people’s pockets.
- Various levels of video processing and analytics.

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Lattice solutions help solve these challenges with the following products and services:

- FPGAs bring multiple benefits to our customers. An FPGA's parallel architecture enables faster processing than competing devices, such as processors, allowing for a user experience with shorter pauses and fewer delays. Our FPGAs have among the lowest power consumption in the industry, enabling the application processor and other high power components to remain dormant longer, resulting in longer battery life. Finally, with some of the industry's smallest packages, we enable thinner end products.
- A full suite of standards-based HDMI Video Connectivity Application Specific Standard Products ("ASSPs") enable the immersive audio-visual experience that consumers demand.
- Intellectual Property Licensing and Services enable customers who wish to develop a proprietary solution to use our proven technology.

Our proprietary solutions help our customers get their products to market faster than typical development cycles. With re-programmability and flexibility, our FPGAs inherently allow our customers to have quicker product development. Our deep engagement with industry standards bodies gives us an intimate knowledge of various video technologies and enables our customers to accelerate their innovation. All of Lattice's solution time-to-market advantages are critical given shorter product life cycles and higher competition in our customers' end markets.

In the Communications and Computing Market, our solutions play key roles in computing systems such as servers and clients, heterogeneous network ("HetNet") small cell base stations, network backhaul, wired access aggregation, and other related applications.

Our Communications and Computing customers need to "connect anything to everything," at ever-increasing data rates.

- As data center servers become smaller and power costs become more dominant, there is a growing requirement for smaller form factors with lower installed and operational costs. Lattice's low cost per look-up table, and high Input-Output ("I/O") count enable customers to use fewer devices in much smaller spaces.
- Additionally, they need simplified control logic, enhanced security, and rigorous power and thermal management.
- Networks typically require progressively higher bandwidth and increased reliability as more data is demanded by consumer and other connected devices. Bandwidth demands are also driven by the rapid transition to a cloud-based infrastructure.
- As wireless cells become more compact without fans, there is a growing requirement for smaller form factors optimized for low power consumption.

We help customers solve these problems with the following products:

- FPGAs optimized for I/O expansion, low cost look-up tables, hardware acceleration, hardware management, and affordability. Our FPGAs consume power at very low rates, which reduces operating costs. Their small form factor enables higher functional density in less space. Finally, our FPGAs are I/O rich, which allows for more connections with system application specific integrated circuits ("ASICs") and ASSPs. Our programmable mixed signal devices make power and thermal management easy and reliable.

Examples of our products enabling intelligent automation in the Industrial and Automotive Market include machine vision, robotics, factory automation, industrial handhelds, surveillance cameras and DVRs, digital signage, driver assistance, automotive infotainment, servers, and data center networks.

Our Industrial and Automotive customers face numerous challenges:

- As smart factories develop, sensors are proliferating and machine vision is becoming higher definition, in turn requiring increasing amounts of data to be gathered, connected, and processed.
- Cars, trucks, and trains are also becoming smarter and more connected. Drivers and passengers are demanding better in-cabin experiences including entertainment, diagnostics, and enhanced safety — often involving multiple displays, cameras, and sensors.

- As factories and automotive manufacturers continue their evolution of computerization, power reduction, faster time to design in and market, lower costs are becoming increasingly normal.

Our product portfolio helps solve these challenges. Our small-sized, low-power FPGAs not only provide the I/O expansion, bridging, connectivity, and processing inherent in FPGAs to the full Industrial Market, but they also form the backbone of several integrated solutions, including complete HD camera and DVR solutions on a single FPGA device and Human-Machine Interfaces (HMI) on a chip.

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Our Products, Services, and Competition

We deliver two types of semiconductor devices to help solve our customers' problems: FPGAs and Video Connectivity ASSPs. We also serve our customers with IP licensing and various other services.

Field Programmable Gate Arrays (“FPGAs”)

FPGAs are regular arrays of logic that can be custom-configured by the user through software. This programmability allows our customers flexibility and reduced time to market while allowing us to offer the chips to many different customers in many different markets. Five product family lines anchor our FPGA offerings:

- The ECP families are our “Connectivity & Acceleration FPGAs.” They offer customers the lowest cost per gate, Digital Signal Processing ("DSP") capability, and Serialize-Deserialize ("SerDes") connectivity. ECP devices are optimized for the Communications and Computing market but also find significant use in the Industrial and Automotive market.
- The MachXO families are known as “Bridging and Expansion FPGAs.” They are control oriented and offer the lowest cost per I/O, along with the lowest cost per look-up table. MachXO families are widely used across our three primary target markets: Communications and Computing, Industrial and Automotive, and Mobile and Consumer.
- iCE40 families are known as the “World’s Smallest FPGAs.” Their small size and ultra-low power make them the optimal products for customizing Consumer mobile and Industrial handheld products. The iCE40 UltraLite was named “Digital Semiconductor Product of the Year” by the 2015 Elektra European Electronics Industry Awards. In 2016, we released the latest member of the family, iCE40 UltraPlus, focused on smart-phone and Internet of things ("IoT") edge devices.
- CrossLink was introduced in 2016 as the world’s first video “pASSP” (programmable Application Specific Standard Part). CrossLink combines the power and speed benefits of hardened video camera and display bridging cores with the flexibility of FPGA fabric. CrossLink was the 2016 recipient of the “Editor’s Choice Award” by EEPW magazine.
- Programmable Mixed Signal devices, such as our Platform Manager 2 and L-ASC10 combine programmable digital logic with analog functionality to help customers manage power, thermal, and control planes in real time.

To enable our customers to get to market faster we support the FPGAs with intellectual property cores, reference designs, development kits, and design software.

Competition for our FPGAs is fragmented:

- While ASICs, ASSPs, and microcontrollers have historically dominated high-volume market segments through low cost and reduced power consumption, our FPGAs have become small enough with sufficiently low power consumption that we are now considered by customers in use cases where they need the architectural benefits of FPGAs, namely programmability with its accelerated time-to-market and the speed that comes from parallelism. Not only can customers use FPGAs to add new features and support new standards, but if a customer’s design is not working as intended, the customer can quickly change it using the programmability of our FPGAs through software. In contrast, ASICs and ASSPs require time consuming and expensive redesign and fabrication. Against microcontrollers, we differentiate our products with smaller sized packages and higher performance.
- Our main FPGA competitors are Xilinx and Intel. Both make FPGAs that are generally focused on the high-density end of the market, making devices that are up to a full order of magnitude larger than ours with the associated increases in power and size. We differentiate from them with ultra-low power and very small sized packages.

Video Connectivity Application Specific Standard Products ("ASSPs")

In the Mobile and Consumer market, consumers need to connect many different types of audio-video devices and expect them to work seamlessly together. We refer to these connections as “Video Connectivity.” Industry standards, such as HDMI, and USB Type-C, ensure that consumers are able to successfully make those connections. These industry standards support resolutions up to 8K, High Dynamic Range, Deep Color, and HDCP 2.2 content protection.

Our Video Connectivity ASSPs implement these standards along with value-added features and allow consumer original equipment manufacturers ("OEMs") to quickly get feature rich and interoperable products to market.

Our Video Connectivity ASSPs perform many functions, including ensuring interoperability, enhancing picture quality, converting between resolutions, and transmitting / receiving content without the need for additional components. Specific device types include port processors, port controllers, video processors, transmitters, receivers, bridges, and converters. These devices are used in products such as mobile phones, UHD TVs, home theater systems, HDMI cable extenders, automotive infotainment, PCs, video accessories, projectors, and monitors.

In general, our Video Connectivity competition includes:

- HDMI functionality offered in either discrete devices or integrated into system-on-a-chip products. These are offered by a small number of companies.
- In-house semiconductor solutions designed by large consumer electronics OEMs.
- Alternative HD connectivity technologies such as DisplayPort and MiraCast, which are offered by select companies.

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We believe that we have a competitive advantage because of our deep engagement with industry standards bodies. This involvement has enabled us to bring our “standards plus” products and IP to market more quickly and gives our customers confidence that we have the expertise needed to successfully execute.

Intellectual Property (IP) Licensing and Services

Lattice has a broad set of technological capabilities and many U.S. and international patents. We generate revenue from our technology portfolio via upfront fees and on-going royalty payments through the following activities:

- Standard IP Licensing - these activities include our participation in two consortia for the licensing of HDMI and MHL technologies to customers who adopt the technology into their products and voluntarily report their usage and royalties. The royalties are split between consortium members, including us.
- IP Core Licensing - some customers need Lattice’s technology for specific functions or features, but for various reasons are not able to use our silicon solutions. In those cases, we may license them IP cores, which they can integrate into their own ASICs. In contrast to the use of consortia, these licensing activities are generally performed internally.
- Patent Monetization - we sell certain patents from our portfolio generally for technology that we are no longer actively developing. The revenue from these sales generally consists of upfront payments and potential future royalties.
- IP Services - projects and design services for customers who wish to develop specific solutions that harness our proven technology and expertise.

Research and Development

We place a substantial emphasis on new product development, where return on investment is the key driver, and believe that continued investment in research and development is required to maintain and improve our competitive position. Our product development activities emphasize new proprietary products, advanced packaging, enhancement of existing products and process technologies, improvement of software development tools, development of innovative technology standards, and enhanced services. Research and development activities occur primarily in Hillsboro, Oregon; San Jose, California; Shanghai, China; and Muntinlupa City, Philippines.

We believe that a continued commitment to research and development is essential to maintaining product leadership and providing innovative new product offerings and, therefore, we expect to continue to make significant future investments in research and development.

Operations

We do not manufacture our own silicon products. We maintain strategic relationships with large, established semiconductor foundries to source our finished silicon wafers. This strategy allows us to focus our internal resources on product and market development, and eliminates the fixed cost of owning and operating semiconductor manufacturing facilities. We are able to take advantage of the ongoing advanced process technology development efforts of semiconductor foundries, and to choose to apply those technologies when they become most economically beneficial to us and to our customers.

Lattice and Fujitsu Limited ("Fujitsu") have entered into agreements pursuant to which Fujitsu manufactures our next generation products on its 130nm, 90nm and 65nm CMOS process technologies, as well as embedded flash memory in these technical nodes. United Microelectronics Corporation ("UMC") manufactures certain of our next generation 40nm products. Taiwan Semiconductor Manufacturing Company Ltd. (“TSMC”) manufactures our acquired SiliconBlue and Silicon Image products. Seiko Epson ("Epson") manufactures our 500nm, 350nm, 250nm and 180nm products.

All of our assembly and volume test operations are performed by outside suppliers. We perform certain test operations as well as reliability and quality assurance processes internally. We have achieved and maintained ISO9001:2015 Quality Management Systems Certification and released a line of products qualified to the AEC-Q100 Reliability Standard.

We rely on third party vendors to provide cost-effective and efficient supply chain services. Among other activities, these outsourced services relate to direct sales logistics, including order fulfillment, inventory management and warehousing, and shipment of inventory to third party distributors.

Wafer Fabrication

We source silicon wafers from our foundry partners, Fujitsu and Epson in Japan, and TSMC and UMC in Taiwan, pursuant to agreements with each company and their respective affiliates. We negotiate wafer volumes, prices and other terms with our foundry partners and their respective affiliates on a periodic basis.

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Assembly

After wafer fabrication and initial testing, we ship wafers to independent subcontractors for assembly. During assembly, wafers are separated into individual die and encapsulated in plastic packages. We have qualified two major assembly partners, Advanced Semiconductor Engineering ("ASE") and Amkor Technology ("Amkor') and are second sourced where volume and customer requirements are necessary. All ASE and Amkor manufacturing of our products is in Asia. We negotiate assembly prices, volumes and other terms with our assembly partners and their respective affiliates on a periodic basis.

We currently offer an extensive list of standard products in lead (Pb) free packaging. Our lead-free products meet the European Parliament Directive entitled "Restrictions on the use of Hazardous Substances" ("RoHS"). A select and growing subset of our ROHS compliant products are also offered with a "Halogen Free" material set.

Testing (Sort and Final Test)

We electrically sort test the die on most wafers prior to shipment for assembly. Wafer sort testing is primarily performed by Amkor in Japan and our second source King Yuan Electronics Co. (“KYEC”) in Taiwan. Some legacy products are tested at Unisem Group in Indonesia.

Following assembly, but prior to customer shipment, each product undergoes final testing and quality assurance procedures. Final testing is performed by ASE and Amkor, our assembly partners in Asia.

Sales and Revenue

We generate revenue by monetizing our technology and patents using two go-to-market strategies:

- Product and Technology Sales: Involves direct and channel sales of silicon-based products with their associated software solutions and services.
- Intellectual Property Licensing and Services: Involves the licensing or sale of intellectual property that we have developed, some of which we use in our products, and certain design services that we may provide.

Seasonality

While we periodically may experience some seasonal trends in the sale of our products, general economic conditions and the cyclical nature of the end markets we serve generally have a greater impact on our business and financial results than seasonal trends.

Backlog

Our backlog consists of orders from distributors and certain OEMs that require delivery within the next year. Historically, our backlog has not been a predictor of future sales or customer demand for the following reasons:

- Purchase orders, consistent with common industry practices, can generally be revised or canceled up to 30 days before the scheduled delivery date without significant penalty.
- Our backlog for distributors is valued at list price, which in most cases is substantially higher than the prices ultimately recognized as revenue.
- A sizable portion of our revenue comes from our "turns business," where the product is ordered and delivered within the same quarter.

A portion of our revenue arises from vendor-managed inventory arrangements where the timing and volume of customer utilization is difficult to predict.

Sales and Customers

We primarily sell our products to end customers from Lattice Semiconductor Corporation or our wholly-owned subsidiary, Lattice SG Pte. Ltd. We sell both directly and through a network of independent manufacturers' representatives. Additionally, we sell indirectly through independent distributors. We also employ a direct sales management and field applications engineering organization to support our end customers and indirect sales resources. Our end customers are primarily original equipment manufacturers ("OEMs") in the Communications and Computing, Mobile and Consumer, and Industrial and Automotive end markets.

We have agreements with 20 manufacturers' representatives in North America. We have established sales channels in over 44 foreign countries and maintain a network of 10 international sales representatives. A substantial portion of our sales are made through distributors.

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We provide global technical support to our end customers with engineering staff based at our headquarters, product development centers and selected field sales offices. We maintain numerous domestic and international field sales offices in major metropolitan areas.

Resale of product by distributors accounted for approximately 83% of our net revenue in fiscal 2018, approximately 77% of our net revenue in fiscal 2017, and approximately 73% of our net revenue in fiscal 2016. We expect our distributors to generate a significant portion of our revenue in the future. We depend on our distributors to sell our products to end customers, complete order fulfillment, and maintain sufficient inventory of our products. Our distributors also provide technical support and other value-added services to our end customers. We have two global distributors. We also have regional distribution in Asia, Japan, Israel, and North America, and we sell through three major on-line distributors.

In fiscal years 2018, 2017, and 2016, our revenue was broadly distributed across end markets and end customers, with no individual end customer accounting for more than 10% of the total revenue.

Revenue from foreign sales as a percentage of total revenue was 90%, 87%, and 88%, for fiscal 2018, 2017, and 2016, respectively. We assign revenue to geographies based on ship-to location of the end customer, where available, and based upon the location of the distributor to which the product was shipped otherwise (see "Geographic Information" in Note 21 - Segment and Geographic Information to our Consolidated Financial Statements in Part II, Item 8). Both foreign and domestic sales are denominated in U.S. dollars.

Intellectual Property, Patents, and Licensing

Intellectual Property

We seek to protect our products and technologies primarily through patents, trade secrecy measures, copyrights, mask work protection, trademark registrations, licensing restrictions, confidentiality agreements and other approaches designed to protect proprietary information. There can be no assurance that others may not independently develop competitive technology not covered by our intellectual property rights or that measures we take to protect our technology will be effective.

Patents

We hold numerous United States and international patents and have patent applications pending in the United States and internationally. Our current patents will expire at various times between 2019 and 2037, subject to our payment of periodic maintenance fees. There can be no assurance that pending or future patent applications will result in issued patents, or that any issued patents will survive challenges to their validity. Although we believe that our patents have value, there can be no assurance that our patents, or any additional patents that may be issued in the future, will provide meaningful protection from competition. We believe that our success will depend primarily upon the technical expertise, experience, and creativity, and the sales and marketing abilities of our personnel.

Patent and other proprietary rights infringement claims are common in our industry. There can be no assurance that, with respect to any claim made against us, we would be able to successfully defend against the claim or that we could obtain a license that would allow us to use the proprietary rights on terms or under conditions that would not harm our business.

Licenses

We have acquired various licenses from third parties to certain technologies that are implemented in IP cores or embedded in our products. Those licenses support our continuing ability to make and sell these products to our customers. While our various licenses are important to our success, we believe our business as a whole is not materially dependent on any particular license, or group of licenses.

Our Team

As of December 29, 2018, we had 754 full-time employees worldwide. We believe that our future success will depend, in part, on our ability to continue to attract and retain highly skilled technical, sales, and management personnel. None of our employees are represented by a collective bargaining agreement. We have never experienced any work stoppages and consider our employee relations to be good.

Corporate Background

Lattice was incorporated in Oregon in 1983 and reincorporated in Delaware in 1985. In the first quarter of 2019, we relocated our corporate headquarters to our facility at 5555 NE Moore Court, Hillsboro, Oregon 97124. Our website is www.latticesemi.com. Information contained or referenced on our website is not incorporated by reference into, and does not form a part of, this Annual Report on Form 10-K. Our common stock trades on the NASDAQ Global Select Market under the symbol LSCC.

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Reporting Calendar

We report based on a 52 or 53-week fiscal year ending on the Saturday closest to December 31. Our fiscal 2018, 2017, and 2016 were 52-week years that ended December 29, 2018, December 30, 2017, and December 31, 2016, respectively. Our fiscal 2019 will be a 52-week year and will end on December 28, 2019. All references to quarterly or yearly financial results are references to the results for the relevant fiscal period.

Available Information

We make available, free of charge through the Investor Relations section of our website at www.latticesemi.com, our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, proxy statements and amendments to those reports and statements as soon as reasonably practicable after such materials are electronically filed with, or furnished to, the SEC. You may also obtain free copies of these materials by contacting our Investor Relations Department at 5555 NE Moore Court, Hillsboro, Oregon 97124, telephone (503) 268-8000. Our SEC filings are also available at the SEC's website at www.sec.gov. The content on any website referred to in this filing is not incorporated by reference into this filing unless expressly noted otherwise.

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ITEM 1A. Risk Factors

The following risk factors and other information included in this Annual Report should be carefully considered before making an investment decision relating to our common stock. If any of the risks described below occur, our business, financial condition, operating results and cash flows could be materially adversely affected. The risks and uncertainties described below are not the only ones we face. Additional risks and uncertainties not presently known to us or that we currently deem immaterial also may impair our business operations and financial results.

We rely on a concentrated number of subcontractors to supply and fabricate silicon wafers for our semiconductor products. If they are unable to do so on a timely and cost-effective basis in sufficient quantities and using competitive technologies, we may incur significant costs or delays.

We rely on a concentrated number of independent foundries in Asia to supply and fabricate silicon wafers for our semiconductor products, including Fujitsu, United Microelectronics Corporation, Taiwan Semiconductor Manufacturing, and Seiko Epson. Our success is dependent upon our ability to successfully partner with our foundry partners and their ability to produce wafers with competitive performance attributes and prices. Establishing, maintaining and managing multiple foundry relationships requires the investment of management resources as well as costs. If we fail to maintain our foundry relationships, if our foundry partners do not provide facilities and support for our development efforts, or if we elect or are required to change foundries, we may incur significant costs and delays. If our foundry partners are unable to, or do not, manufacture sufficient quantities of our products at acceptable yields, we may be required to allocate the affected products among our customers, prematurely limit or discontinue the sales of certain products, or incur significant costs to transfer products to other foundries, which could adversely affect our customer relationships and operating results.

Any adverse change in our relationship with our distributors or our distributors' performance could harm our sales.

We depend on a concentrated group of distributors to sell our products to end customers, complete order fulfillment, and maintain sufficient inventory of our products. Our distributors also provide technical support and other value-added services to our end customers. In fiscal 2018, revenue attributable to distributors accounted for 83% of our total revenue, with two distributors accounting for 54% of total revenue. In fiscal 2017, distributors accounted for 77% of our total revenue with two distributors accounting for 51% of total revenue. We have significant outstanding receivables with our top distributors, and expect our distributors to generate a significant portion of our revenue in the future. Any adverse change to our relationships with our distributors or a failure by one or more of our distributors to perform its obligations to us could have a material impact on our business. A significant reduction of effort by a distributor to sell our products, a material change in our relationship with one or more distributors, or a reduction in the financial health of our distributors may result in the inability of distributors to effectively perform services on our behalf or pay receivables, reduce our access to certain end customers, or adversely affect our ability to sell our products.

Our success and future revenue depends on our ability to develop and introduce new products that achieve customer and market acceptance.

We compete in a dynamic environment characterized by rapid technology and product evolution, generally followed by a relatively longer process of ramping up to volume production on advanced technologies. Our markets are also characterized by evolving industry standards, frequent new product introduction, short product life cycles, and increased demand for higher levels of integration and smaller process geometry. Our competitive position and success depends on our ability to innovate, develop, and introduce new products that compete effectively on the basis of price, density, functionality, power consumption, form factor, and performance, and our addressing the evolving needs of the markets we serve. These new products typically are more technologically complex than their predecessors. In addition, we expect revenue related to mature products to decline over time in a normal product life cycle. As a result, we may be increasingly dependent on revenue derived from our newer products.

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Our future growth and the success of new product introductions depend upon numerous factors, including:

- timely completion and introduction of new product designs;
- ability to generate new design opportunities and design wins, including those which result in sales of significant volume;
- achievement of necessary volume of production to achieve acceptable cost;
- availability of specialized field application engineering resources supporting demand creation and customer adoption of new products;
- ability to utilize advanced manufacturing process technologies;
- achieving acceptable yields and obtaining adequate production capacity from our wafer foundries and assembly and test subcontractors;
- ability to obtain advanced packaging;
- availability of supporting software design tools;
- utilization of predefined IP logic;
- market acceptance of our HDMI-enabled and mobile products;
- customer acceptance of advanced features in our new products;
- availability of competing alternative technologies; and
- market acceptance of our customers' products.

The failure of any of these factors, among others, could adversely affect our product innovation, development and introduction efforts and our financial condition and results of operations.

Our global business operations expose us to various economic, legal, regulatory, political, and business risks.

We have significant international operations, including foreign sales offices to support our international customers and distributors, which account for the majority of our revenue, and operational and research and development sites in China, the Philippines, and other Asian locations. In addition, we purchase our wafers from foreign foundries; have our commercial products assembled, packaged, and tested by subcontractors located outside of the United States; and rely on an international service provider for inventory management, order fulfillment, and direct sales logistics.

These and other integral business activities outside of the United States are subject to the operational challenges, risks and uncertainties associated with conducting business in foreign economic and regulatory environments including trade barriers; political instability, acts of war or terrorism, natural disasters, economic sanctions; weak economic conditions, environmental regulations; labor regulations; import and export regulations; tax or freight rates, duties; trade restrictions; interruptions in transportation or infrastructure, changes in trade policies; anti-corruption laws; domestic and foreign governmental regulations; potential vulnerability of and reduced protection for intellectual property; disruptions or delays in production or shipments; and instability or fluctuations in currency exchange rates, any of which could have a material adverse effect on the operations of one of our international customers, distributors or service providers and could adversely affect our business, financial condition, and operating results.

If we fail to comply with the many laws and regulations to which we are subject, we may be subject to significant fines, penalties or liabilities for noncompliance, which could harm our business and financial results. For example, effective May 2018, the European Union adopted the General Data Protection Regulation (“GDPR”), which established new requirements regarding the handling of personal data and non-compliance monetary penalties of up to the higher of 20 million Euros or 4% of worldwide revenue. Any inability or perceived inability to adequately comply with applicable laws or regulations, including GDPR, could result in additional cost and liability to our business and could adversely affect our financial condition and results of operations.

Moreover, our financial condition and results of operations could be affected in the event of political instability, including as a result of terrorist activity, U.S. or other military actions, actions against our customers, the United Kingdom referendum in June 2016 (commonly referred to as "Brexit"), or economic crises in countries where our main wafer suppliers, end customers, contract manufacturers, and logistics providers are located.

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The semiconductor industry routinely experiences cyclical market patterns and a significant industry downturn could adversely affect our operating results.

Our revenue and gross margin can fluctuate significantly due to downturns in the highly cyclical semiconductor industry. These downturns can be severe and prolonged and can result in price erosion and weak demand for our products. Weak demand for our products resulting from general economic conditions affecting the end markets we serve or the semiconductor industry specifically and reduced spending by our customers can result, and in the past has resulted, in diminished product demand, high inventory levels, erosion of average prices, excess and obsolete inventories and corresponding inventory write-downs. Our expense levels are based, in part, on our expectations of future sales. Many of our expenses, particularly those relating to facilities, capital equipment, and other overhead, are relatively fixed. We might be unable to reduce spending quickly enough to compensate for reductions in sales. Accordingly, shortfalls in sales could adversely affect our operating results. Furthermore, any significant upturn in the semiconductor industry could result in increased competition for access to raw materials and third-party service providers. The dynamics of the markets in which we operate make prediction of and timely reaction to such events difficult. Due to these and other factors, our past results are not reliable predictors of our future results and cyclical changes in the semiconductor industry could adversely affect our operating results.

General economic conditions and deterioration in the global business environment could have a material adverse effect on our business, operating results, and financial condition.

Adverse economic conditions or our customers’ perceptions of the economic environment may negatively affect customer demand for our products and services and result in delayed or decreased spending. Several factors contribute to these weak economic conditions, including volatility in the financial markets, lower levels of consumer liquidity, higher interest rates, price increases for materials and components, and political uncertainty. Weak global economic conditions in the past have resulted in weak demand for our products in certain geographies and had an adverse impact on our results of operations. If global economic conditions weaken, our business could be harmed due to customers or potential customers reducing or delaying orders. In addition, the inability of customers to obtain credit, the insolvency of one or more customers, tariffs applicable to our customers’ products, or the insolvency of key suppliers could result in sales or production delays. Any of these effects could impact our ability to effectively manage inventory levels and collect receivables, require additional restructuring actions, and decrease our revenue and profitability. Uncertainty about future economic conditions makes it difficult for us to forecast operating results and to make decisions about future investments. Any or all of these factors could adversely affect our financial condition and results of operations in the future.

Our business depends on the proper functioning of internal processes and information technology systems, and failure of these processes and systems may cause business disruptions.

We rely on various information technology ("IT") networks and systems to manage our operations, including financial reporting, and we regularly make changes to improve them as necessary by periodically implementing new, or upgrading or enhancing existing, operational and IT systems, procedures, and controls. These systems are supported by subcontractors, and they may also be subject to power and telecommunication outages or other general system failures. The legal, regulatory and contractual environment surrounding information security and data privacy is complex and evolving. We have recently undergone a significant integration and systems implementation that included implementation of a new enterprise resource planning ("ERP") system to standardize our processes worldwide and adopt best-in-class capabilities. We committed significant resources to this new ERP system, which replaced multiple legacy systems. We are focused on realizing the full analytical functionality of this conversion, which is extremely complex, in part, because of the wide range of processes that must be integrated.

During our use of the new ERP system and our other information technology systems, we may experience delays or disruptions in the integration of our new or enhanced systems, procedures, or controls. The policies and security measures established with our new ERP system and other information technology systems may be vulnerable to data breaches, cyber-attacks or fraud. We may also encounter errors in data, an inability to accurately process or record transactions, and security or technical reliability issues. All of these could harm our ability to conduct core operating functions such as processing invoices, shipping and receiving, recording and reporting financial and management information on a timely and accurate basis, and could impact our internal control compliance efforts. If the technical solution or end user training are inadequate, it could limit our ability to manufacture and ship products as planned. We have various systems that remain that may be nearing the end of their useful life or vendor support, which will ultimately need to be replaced. Failure of our IT systems or difficulties or delays in maintaining, managing, and integrating them could adversely affect the Company’s controls and procedures and could impact the Company's ability to perform necessary operations, which could materially adversely affect our business.

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Data breaches and cyber-attacks and cyber-fraud could compromise our intellectual property or other sensitive information or result in losses.

We maintain sensitive data on our networks and the networks of our business partners and third-party providers, including proprietary and confidential information relating to our intellectual property, personnel, and business, and that of our customers and third-party providers. We believe that companies have been increasingly subject to a wide variety of security incidents, cyber-attacks, hacking, phishing, and other attempts to gain unauthorized access or engage in fraudulent behavior. Cyber-attacks have become more prevalent, sophisticated and much harder to detect and defend against and it is often difficult to anticipate or detect such incidents and to assess the damage caused by them. Our policies and security measures cannot guarantee security, and our information technology infrastructure, including our networks and systems, may be vulnerable to data breaches, cyber-attacks or fraud. In the past, third parties have attempted to penetrate and/or infect our network and systems with malicious software and phishing attacks in an effort to gain access to our network and systems. In addition, we are subject to the risk of third parties falsifying invoices and similar fraud, frequently by obtaining unauthorized access to our vendors' and business partners' networks.

In some circumstances, we may partner with third-party providers and provide them with certain sensitive data. If these third parties fail to adopt or adhere to adequate data security practices, or in the event of a breach of their networks, this sensitive data may be improperly accessed, used or disclosed. These data breaches and any unauthorized access or disclosure of sensitive data could compromise our intellectual property, expose sensitive business information and subject us to third party claims.

The increase in cyber-attacks has resulted in an increased focus on cybersecurity by certain government agencies. Cyber-attacks or any investigation or enforcement action related to cybersecurity could cause us to incur significant remediation costs, result in product development delays, disrupt key business operations, and divert attention of management and key information technology resources. In addition, we may incur loss as a result of cyber-fraud, such as those experienced by other companies by making unauthorized payments irrespective of robust internal controls.

Our reputation, brand, and business could be significantly harmed, and we could be subject to third-party claims or governmental penalties in the event of such a security breach.

Our outstanding indebtedness could reduce our strategic flexibility and liquidity and may have other adverse effects on our results of operations.

As of December 29, 2018, we had approximately $263.0 million outstanding under a Credit Agreement, dated March 10, 2015 (the "Credit Agreement"). Our obligations under the Credit Agreement are guaranteed by our U.S. subsidiaries, and include a requirement to pay quarterly installments of approximately $0.9 million and up to 75% of our annual excess cash flow toward repayment of the facility, with the remaining balance due upon maturity in March 2021. Our ability to meet our debt service obligations depends upon our operating and financial performance, which is subject to general economic and competitive conditions and to financial, business and other factors affecting our operations, many of which are beyond our control. If we are unable to service our debt, we may need to sell material assets, restructure or refinance our debt, or seek additional equity capital. Prevailing economic conditions and global credit markets could adversely impact our ability to sell material assets, restructure or refinance our debt on terms acceptable to us, or at all, or we may not be able to restructure or refinance our debt without incurring significant additional fees and expenses.

The Credit Agreement also contains restrictive covenants, including limitations on liens, mergers and consolidations, sales of assets, payment of dividends, and additional indebtedness. The amount and terms of our indebtedness, as well as our credit rating, could have important consequences, including the following:

- we may be more vulnerable to economic downturns, less able to withstand competitive pressures, and less flexible in responding to changing business and economic conditions;
- our cash flow from operations may be allocated to the payment of outstanding indebtedness, and not to research and development, operations or business growth;
- we might not generate sufficient cash flow from operations or other sources to enable us to meet our payment obligations under the facility and to fund other liquidity needs;
- our ability to make distributions to our stockholders in a sale or liquidation may be limited until any balance on the facility is repaid in full; and
- our ability to incur additional debt, including for working capital, acquisitions, or other needs, is more limited.

If we breach a loan covenant, the lenders could accelerate the repayment of the facility. We might not have sufficient assets to repay our indebtedness upon acceleration. If we are unable to repay or refinance the indebtedness upon acceleration or at maturity, the lenders could initiate a bankruptcy proceeding against us or collection proceedings with respect to our assets and subsidiaries securing the facility, which could materially decrease the value of our common stock.

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We depend on a concentrated group of end customers for a significant portion of our revenues. If any of these end customers reduce their use of our products, our revenue could decrease significantly.

A significant portion of our revenue depends on sales to a concentrated number of customers. In fiscal 2018, even though no individual end customer accounted for more than 10% of our total revenue, our top five end customers accounted for approximately 18% of our total revenue. If our relationships with any material customers were to diminish, if these customers were to develop their own solutions or adopt alternative solutions or competitors' solutions, if any one or more of our concentrated groups of customers were to experience significantly adverse financial conditions, or if as a result of trade disputes or sanctions these customers were restricted from purchasing our products, our results could be adversely affected.

In addition, our customer's continued use of our products is frequently reevaluated, as certain of our customers' product life cycles are relatively short and they continually develop new products. The selection process for our products to be included in our customers' new products is highly competitive. There are no guarantees that our products will be included in the next generation of products introduced by these customers.

We may be unable to successfully develop and produce products on smaller geometries.

To remain competitive, we expect to continue to transition our semiconductor products to increasingly smaller nanometer geometries. Continual transition requires new and changes to existing manufacturing process technologies, which could have significantly higher mask and prototyping costs, as well as additional expenditures for engineering design tools. We may determine that we cannot transition on a cost-effective basis; and therefore not offer a competitive product.

In addition to costs, we depend on our relationships with our foundry partners to transition to smaller geometry processes successfully. Our foundry partners are limited by their existing obligations and technological capabilities. We make no assurance that our foundry partners would be able to effectively manage a transition of our products to smaller nanometer geometries in a timely manner, or at all. If we or any of our foundry partners experience significant delays in or fail to efficiently implement a transition to smaller process geometries, we could experience reduced manufacturing yields, delays in product deliveries, and increased expenses, all of which could adversely affect our relationships with our customers and our financial condition and operating results.

Our business could suffer as a result of tariffs and trade sanctions or similar actions.

The imposition by the United States of tariffs, sanctions or other restrictions on goods imported from outside of the United States or countermeasures imposed in response to such government actions could adversely affect our operations or our ability to sell our products globally, which could adversely affect our operating results and financial condition. In 2018, the President of the United States signed an order to impose a tariff on imports from certain countries, including China. The materials subject to these tariffs may impact the cost of raw materials used by our suppliers or in our customers’ products. The imposition of further tariffs by the United States on a broader range of imports, or further retaliatory trade measures taken in response to additional tariffs, could increase costs in our supply chain or reduce demand of our customers’ products, either of which could adversely affect our results of operations.

Our customers or suppliers could also become subject to U.S. regulatory scrutiny or export restrictions. For example, the United States Department of Commerce imposed sanctions on one of our customers in China in 2018, which prevented us from doing business with them until the sanctions were lifted. The U.S. Justice Department filed criminal charges against another of our customers in China and has otherwise taken a negative tone to perceived business practices by this customer and others in China. Revenue from distributors and end customers in China represented approximately 51% of our total revenue in 2018. Future sanctions similar to those imposed in the past could adversely affect our ability to earn revenue from these and similar customers. We cannot predict what impact these and future actions, sanctions or criminal charges could have on our customers or suppliers, and therefore our business. If any of our other customers or suppliers become subject to sanctions or other regulatory scrutiny, or if our customers are affected by tariffs or other government trade restrictions, our business and financial condition could be adversely affected.

We compete against companies that have significantly greater resources than us and numerous other product solutions.

The semiconductor industry is highly competitive and many of our direct and indirect competitors have substantially greater financial, technological, manufacturing, marketing, and sales resources. Consolidation in our industry may increasingly mean that our competitors have greater consolidated resources, or other synergies, that could put us at a competitive disadvantage. We currently compete directly with companies that have licensed our technology or have developed similar products, as well as numerous semiconductor companies that offer products based on alternative solutions, such as applications processor, application specific standard product, microcontroller, analog, and digital signal processing technologies. Competition from these semiconductor companies may intensify as we offer more products in any of our end markets. These competitors include established, multinational semiconductor companies, as well as emerging companies.

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The intellectual property licensing component of our business strategy increases our business risk and fluctuation of our revenue and margins.

Our business strategy includes licensing our intellectual property to companies that incorporate it into their technologies that address multiple markets, including markets where we participate and compete. Our Licensing and services revenue may be impacted by the introduction of new technologies by customers in place of the technologies we license, changes in the law that may weaken our ability to prevent the use of our patented technology by others, the expiration of our patents, and changes of demand or selling prices for products using licensed patents. We cannot assure that our licensing customers will continue to license our technology on commercially favorable terms or at all, or that these customers will introduce and sell products incorporating our technology, accurately report royalties owed to us, pay agreed upon royalties, honor agreed upon market restrictions, or maintain the confidentiality of our proprietary information, or will not infringe upon or misappropriate our intellectual property. Our intellectual property licensing agreements are complex and may depend upon many factors that require significant judgments, including completion of milestones, allocation of values to delivered items and customer acceptance.

Our sale of patents and intermittent significant licensing transactions can cause material fluctuations in our revenue and gross margins.

We have generated revenue from the sale of certain patents from our portfolio, generally for non-core technology that we are no longer actively developing. While we plan to continue to monetize our patent portfolio through sales of non-core patents, we may not be able to realize adequate interest or prices for those patents. Accordingly, we cannot provide assurance that we will continue to generate revenue from these sales. In addition, although we seek to be strategic in our decisions to sell patents, we might incur reputational harm if a purchaser of our patents sues one of our customers for infringement of the purchased patent, and we might later decide to enter a space that requires the use of one or more of the patents we sold. In addition, as we sell groups of patents, we no longer have the opportunity to further sell or to license those patents and receive a continuing royalty stream.

Our Licensing and services revenue fluctuates, sometimes significantly, from period to period because it is heavily dependent on a few key transactions being completed in a given period, the timing of which is difficult to predict and may not match our expectations. Because of its high margin, the Licensing and services revenue portion of our overall revenue can have a disproportionate impact on gross profit and profitability. In addition, generating revenue from patent sales and intellectual property licenses is a lengthy and complex process that may last beyond the period in which our efforts begin, and the accounting rules governing the recognition of revenue from patent sales and intellectual property licensing transactions are increasingly complex and subject to interpretation. As a result, the amount of license revenue recognized in any period may differ significantly from our expectations.

Our products are used across different end markets, and a downturn in any of these end markets could cause a meaningful reduction in demand for our products.

Our products are used across different end markets, and demand for our products is difficult to predict and may vary within or among our Industrial and Automotive, Communications and Computing, and Mobile and Consumer end markets. Our target markets may not grow or develop as we currently expect, and demand may increase or change in one or more of our end markets, and changes in demand may reduce our revenue, lower our gross margin and effect our operating results. We have experienced concentrations of revenue at certain customers and within certain end markets, and we regularly compete for design opportunities at these customers and within these markets. Any deterioration in these end markets, reductions in the magnitude of revenue streams, our inability to meet design and pricing requirements, or volatility in demand for our products could lead to a reduction in our revenue and adversely affect our operating results. Our success in our end markets depends on many factors, including the strength or financial performance of the companies in our end markets, our ability to timely meet rapidly changing product requirements, market needs, and our ability to maintain design wins across different markets and customers to dampen the effects of market volatility. Our inability to accomplish any of the foregoing, or to offset the volatility of the end markets through diversification into other markets, could materially and adversely affect our business, financial condition, and results of operations.

Our margins are dependent on our achieving continued yield improvement.

We rely on obtaining yield improvements and corresponding cost reductions in the manufacture of existing products and on introducing new products that incorporate advanced features and other price/performance factors that enable us to increase revenues while maintaining acceptable margins. To the extent such cost reductions and new product introductions do not occur in a timely manner, or that our products do not achieve market acceptance or market acceptance at acceptable pricing, our forecasts of future revenue, financial condition, and operating results could be materially adversely affected.

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Shortages in, or increased costs of, wafers and materials could adversely impact our gross margins and lead to reduced revenues.

Worldwide manufacturing capacity for silicon wafers is relatively inelastic. If the demand for silicon wafers or assembly material exceeds market supply, our supply of silicon wafers or assembly material could quickly become limited or prohibitively expensive. We typically have short-term wafer supply agreements that do not ensure long-term supply or allocation commitments. A shortage in manufacturing capacity could hinder our ability to meet product demand and therefore reduce our revenue. In addition, silicon wafers constitute a material portion of our product cost. If we are unable to purchase wafers at favorable prices, our financial condition and results of operations will be adversely affected.

The nature of our business and length of our sales cycle makes our revenue, gross margin and net income subject to fluctuation and difficult to accurately predict.

A number of factors, including how products are manufactured to support end markets, yield, wafer pricing, cost of packaging raw materials, product mix, market acceptance of our new products, competitive pricing dynamics, product quality, geographic and/or end market mix, and pricing strategies, can cause our revenue, gross margins and net income to fluctuate significantly either positively or negatively from period to period.

We have limited visibility into the demand for our products, particularly new products, because demand for our products depends upon our products being designed into our end customers' products and those products achieving market acceptance. During our sales cycle, our customers typically test and evaluate our products prior to deciding to include our products into the design of their own products, and then require additional time to begin volume production of their products. This lengthy sales cycle may cause us to incur significant expenses, experience significant production delays and to incur additional inventory costs before we receive a customer order that may be delayed or never get placed. A key strategic customer may demand certain design or production resources to meet their requirements or work on a specific solution, which could cause delays in our normal development schedule and result in significant investment of our resources or missed opportunities with other potential customers. We may incur these expenses without generating revenue from our products to offset the expenses.

While our sales cycles are typically long, our average product life cycles tend to be short as a result of the rapidly changing technology environment in which we operate. Our inventory levels may be higher than historical norms, from time to time, due to inventory build decisions aimed at meeting expected demand from a single large customer, reducing direct material cost or enabling responsiveness to expected demand. In the event the expected demand does not materialize, or if our short sales cycle does not generate sufficient revenue, we may be subject to incremental excess and obsolescence costs.

These factors make it difficult for us to accurately forecast future sales and project quarterly revenues. The difficulty in forecasting future sales weakens our ability to project our inventory requirements, which could result, and in the past has resulted, in inventory write-downs or failure to meet customer product demands in a timely manner. While we may give guidance, the difficulty in forecasting revenues as well as the relative customer and product mix of those revenues limits our ability to provide accurate forward-looking revenue and gross margin guidance.

We may experience a disruption of our business activities due to changes in our executive leadership team and the resulting management transitions.

We have recently experienced significant changes to our executive leadership team. In August 2018, the Company's Board of Directors announced the appointment of Jim Anderson as the Company's President and Chief Executive Officer, whose employment commenced September 4, 2018. From September 2018 to January 2019, the Company also announced new appointments to executive leadership roles in finance, research and development, marketing, sales and operations. This executive leadership transition may result in loss of personnel with deep institutional knowledge and has the potential to disrupt our operations and relationships with employees, customers and suppliers. We must successfully integrate our new management team members within our organization in order to achieve our operating objectives, and these management transitions may temporarily affect our financial performance and results of operations as our new executive leadership team becomes familiar with our business. In addition, our competitors may seek to use this transition and the related potential disruptions to gain a competitive advantage over us. Our future operating results depend substantially upon the continued service of our key personnel and in significant part upon our ability to attract and retain qualified management personnel. If we are unable to mitigate these or other similar risks, our business activity could be disrupted, and our financial condition and results of operations could be materially adversely affected.

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Acquisitions, divestitures, strategic investments and strategic partnerships could disrupt our business and adversely affect our financial condition and operating results.

We may pursue growth opportunities by acquiring complementary businesses, solutions or technologies through strategic transactions, investments or partnerships. The identification of suitable acquisition, strategic investment or strategic partnership candidates can be costly and time consuming and can distract our management team from our current operations. If such strategic transactions require us to seek additional debt or equity financing, we may not be able to obtain such financing on terms favorable to us or at all, and such transaction may adversely affect our liquidity and capital structure. We may also choose to divest certain non-core assets, which divestitures could lead to charges against earnings and may expose us to additional liabilities and risks. Any strategic transaction might not strengthen our competitive position, may increase some of our risks, and may be viewed negatively by our customers, partners or investors. Even if we successfully complete a strategic transaction, we may not be able to effectively integrate the acquired business, technology, systems, control environment, solutions, personnel or operations into our business or global tax structure. We may experience unexpected changes in how we are required to account for strategic transactions pursuant to U.S. GAAP and may not achieve the anticipated benefits of any strategic transaction. We may incur unexpected costs, claims or liabilities that we incur during the strategic transaction or that we assume from the acquired company, or we may discover adverse conditions post acquisition for which we have limited or no recourse.

We regularly test for goodwill and other impairments as required under U.S. GAAP, and we may incur future impairments.

We are required under U.S. GAAP to test goodwill for possible impairment on an annual basis and to test goodwill and long-lived assets, including amortizable intangible assets, for impairment at any other time that circumstances arise indicating the carrying value may not be recoverable. For purposes of testing goodwill for impairment, the Company currently operates as one reporting unit: the core Lattice ("Core") business, which includes intellectual property and semiconductor devices. Impairment charges related to amortizable intangible assets from the Silicon Image acquisition totaled approximately $12.5 million, $32.4 million, and $7.9 million in fiscal years 2018, 2017, and 2016, respectively. There is no assurance that future impairment tests will indicate that goodwill or amortizable intangible assets will be deemed recoverable. As we continue to review our business operations and test for impairment or in connection with possible sales of assets, we may have impairment charges in the future, which may be material.

We depend on independent contractors to provide key functions in our product development and operations, and any disruption of their services, or an increased in cost of these services, could negatively impact our financial condition and results of operations.

We depend on subcontractors to provide cost effective and efficient services in our product development and supply chain functions, including test and assembly services, software and hardware development, support of intellectual property cores, inventory management, order fulfillment and direct sales logistics.

Our operations and operating results may be adversely affected if we experience problems with our subcontractors that impact the delivery of product to our customers. These problems may include: delays in software or hardware development timelines, prolonged inability to obtain wafers or packaging materials with competitive performance and cost attributes; inability to achieve adequate yields or timely delivery; inability to meet customer timelines or demands, disruption or defects in assembly, test, or shipping services; or delays in stabilizing manufacturing processes or ramping up volume for new products. If our third-party supply chain providers were to reduce or discontinue services for us or their operations are disrupted as a result of a fire, earthquake, act of terrorism, political unrest, governmental uncertainty, war, disease, or other natural disaster or catastrophic event, weak economic conditions, or any other reason, our financial condition and results of operations could be adversely affected.

Litigation and unfavorable results of legal proceedings could adversely affect our financial condition and operating results.

From time to time we are subject to various legal proceedings and claims that arise out of the ordinary conduct of our business. Certain claims may not yet be resolved, including but not limited to any that are discussed under Item 3. Legal Proceedings and "Note 19 - Contingencies" contained in the Notes to Consolidated Financial Statements, and additional claims may arise in the future. Results of legal proceedings cannot be predicted with certainty. Regardless of merit or outcome, claims or litigation may be both time-consuming and disruptive to our operations and cause significant expense and diversion of management attention and we may enter into material settlements to avoid these risks. Should we fail to prevail in certain matters or enter into a material settlement, we may be faced with significant monetary damages or injunctive relief against us that could materially and adversely affect our financial condition and operating results and certain portions of our business.

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Changes to financial accounting standards may affect our results of operations and could cause us to change our business practices.

We prepare our consolidated financial statements to conform to generally accepted accounting principles in the United States, or U.S. GAAP. These accounting principles are subject to interpretation by the American Institute of Certified Public Accountants, the SEC and various bodies formed to interpret and create accounting rules and regulations. Changes in these rules, such as the adoption of ASC 606 - Revenue from Contracts with Customers in fiscal 2018 or ASC 842 - Leases in fiscal 2019, or in the guidance relating to interpretation and adoption of the rules could have a significant effect on our financial results and could affect portions of our business differently.

Accounting requirements related to sales through our distribution channel could result in our reporting revenue in excess of demand.

New revenue standards require recognition of revenue based on estimates and may require us to book revenue from distributors that is in excess of actual end customer demand. Since we have limited ability to forecast inventory levels of our end customers, we depend on the timeliness and accuracy of resale reports from our distributors. Late or inaccurate resale reports could mask significant build-up of inventories in our distribution channel, have a detrimental effect on our ability to properly recognize revenue, and impact our ability to forecast future sales. An inventory build-up in our distribution channel could result in a slowdown in orders, requests for returns from customers, or requests to move out planned shipments. If our distributors do not ultimately sell the inventory and our estimates change, we could be required to materially correct our recognized revenue in a future period, depending on actual results. Any failure to manage these challenges could disrupt or reduce sales of our products and unfavorably impact our financial results.

Our participation in the HDMI standard is evolving. We no longer act as agent for the HDMI standard and accordingly, our share of adopter fees for the HDMI standard is declining and may further decline.

We acted as agent of the HDMI consortium until December 31, 2016 and were responsible for promoting and administering the specification. We received all of the adopter fees paid by adopters of the HDMI specification in connection with our role as agent. In September 2016, the Founders of the HDMI consortium, of which we are a member, amended the Founders Agreement resulting in changes to our role as agent for the HDMI consortium and to the model for sharing adopter fee revenues. Under the terms of the agreement, our role as the agent was terminated effective January 1, 2017 and a new independent entity was appointed to act as the new HDMI licensing agent with responsibility for licensing and the distribution of royalties among Founders. As a result of the amended model for sharing adopter fee revenue, we will be entitled to a reduced share of adopter fees paid by parties adopting the HDMI standard.

We share HDMI royalties with the other HDMI Founders based on an allocation formula, which is reviewed every three years. Our portion of the royalty allocation has declined for the last several years. In 2015, we received between 24% and 25% of the royalty allocation, while for 2016 and 2017, we received 20% of the royalty allocation. The royalty allocation for 2018 and future years is not yet known but may decline. If the royalty allocation continues to decline, our financial performance could be adversely affected. In addition, delays in the signing of new royalty sharing agreements impacted our timing of revenue recognition and ability to recognize revenue related to the royalties in fiscal 2017. With our adoption of ASU 2014-09, Revenue from Contracts with Customers (Topic 606), we will recognize revenue related to royalties based on estimates of the amounts we will be entitled to receive, and these estimates could differ materiality from actual royalty sharing amounts.

Changes in effective tax rates, tax laws and our global organizational structure and operations could expose us to unanticipated tax consequences.

We are subject to taxation in the United States, Singapore, and other countries. We have a global tax structure that aligns our corporate structure with our global business operations, and we currently operate legal entities in multiple countries. In some countries, we maintain multiple entities for tax or other purposes. We may choose to consolidate or integrate certain of these entities, and these integration activities, changes in tax laws, rates, regulations, future jurisdictional profitability of the Company, and related regulatory interpretations in the countries in which we operate may impact the taxes we pay or tax provision we record, which could adversely affect our results of operations. In addition, future effective tax rates could be affected by changes in the composition of earnings in countries with differing tax rates, changes in the valuation of deferred tax assets and liabilities.

We make no assurance as to what taxes we pay or the ability to estimate our future effective tax rate because of, among other things, uncertainty regarding the tax policies of the jurisdictions where we operate. In particular, we anticipate that the Tax Cuts and Jobs Act, enacted December 22, 2017, will impact us. While we are able to quantify or estimate the effects of some of the provisions now in the act, we do not know of all of the rules the Internal Revenue Service ("IRS") will enact to fully implement the tax law changes, or the IRS' interpretations of the changes. We also continue to analyze and understand the changes and the impacts on us, including the indirect impacts that result from how our industry or we might modify behaviors in a response to the new tax law structure. We also provide no assurance that estimates we provide to quantify the effect of the changes may be accurate.

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We may be subject to warranty claims and other costs related to our products.

In general, we warrant our products for varying lengths of time against non-conformance to our specifications and certain other defects. Because our products, including hardware, software, and intellectual property cores, are highly complex and increasingly incorporate advanced technology, our quality assurance programs may not detect all defects, whether manufacturing defects in individual products or systematic defects that could affect numerous shipments. Inability to detect a defect could result in a diversion of our engineering resources from product development efforts, increased engineering expenses to remediate the defect, and increased costs due to customer accommodation or inventory impairment charges. On occasion, we have also repaired or replaced certain components, made software fixes, or refunded the purchase price or license fee paid by our customers due to product or software defects. Our insurance may be unavailable or inadequate to protect against these issues. If there are significant product defects, the costs to remediate such defects, net of reimbursed amounts from our vendors, if any, or to resolve warranty claims may adversely affect our financial condition and results of operations and may harm our reputation.

If we are unable to adequately protect our new and existing intellectual property rights, our financial results and our ability to compete effectively may suffer.

Our success depends in part on our proprietary technology and we rely upon patent, copyright, trade secret, mask work, and trademark laws to protect our intellectual property. We intend to continue to protect our proprietary technology, however, we may be unsuccessful in asserting our intellectual property rights or such rights may be invalidated, violated, circumvented, or challenged. From time to time, third parties, including our competitors, have asserted against us patent, copyright, and other intellectual property rights to technologies that are important to us. Third parties may attempt to misappropriate our intellectual property through electronic or other means or assert infringement claims against us in the future. Such assertions by third parties may result in costly litigation, indemnity claims, or other legal actions, and we may not prevail in such matters or be able to license any valid and infringed patents from third parties on commercially reasonable terms. This could result in the loss of our ability to import and sell our products or require us to pay costly royalties to third parties in connection with sales of our products. Any infringement claim, indemnification claim, or impairment or loss of use of our intellectual property could materially adversely affect our financial condition and results of operations.

Weakness in our internal control over financial reporting could adversely affect our business and financial results.

In our Annual Report on Form 10-K for the year ended December 30, 2017, we disclosed a material weakness in our internal control over financial reporting related to our risk assessment involving significant unusual transactions. Our management team has developed remediation steps to address such material weakness. Although this material weakness was eliminated by our remediation steps, we may identify a material weakness in our internal control over financial reporting in the future. Any failure to maintain an effective system of internal controls over financial reporting could limit our ability to report our financial results accurately and timely, which could adversely affect our business, financial results and stock price.

A material change in the agreements governing encryption keys we use could place additional restrictions on us, or our distributors or contract manufacturers, which could restrict product shipment or significantly increase the cost to track products throughout the distribution chain.

Certain components in our products contain encryption keys used in connection with High Definition Content Protection ("HDCP"). The regulation and distribution of these encryption keys are controlled through license agreements with Digital Content Protection ("DCP"), a wholly owned subsidiary of Intel Corporation. These license agreements have been modified by DCP from time to time, and such changes could impact us, our distributors, and our customers. An important element of HDMI is the ability to implement link protection for high definition ("HD"), and more recently, 4K UltraHD, content. We implement various aspects of the HDCP link protection within certain parts we sell. We also, for the benefit of our customers, include the necessary HDCP encryption keys in parts we ship to customers. These encryption keys are provided to us from DCP. We have a specific process for tracking and handling these encryption keys. If DCP changes any of the tracking or handling requirements associated with HDCP encryption keys, we may be required to change our manufacturing and distribution processes, which could adversely affect our manufacturing and distribution costs associated with these products. If we cannot satisfy new requirements for the handling and tracking of encryption keys, we may have to cease shipping or manufacturing certain products.

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We may have failed to adequately insure against certain risks, and, as a result, our financial condition and results may be adversely affected.

We carry insurance customary for companies in our industry, including, but not limited to, liability, property, and casualty; workers' compensation; and business interruption insurance. We also insure our employees for basic medical expenses. In addition, we have insurance contracts that provide director and officer liability coverage for our directors and officers. Other than the specific areas mentioned above, we are self-insured with respect to most other risks and exposures, and the insurance we carry in many cases is subject to a significant policy deductible or other limitation before coverage applies. Based on management's assessment and judgment, we have determined that it is more cost effective to self-insure against certain risks than to incur the insurance premium costs. The risks and exposures for which we self-insure include, but are not limited to, certain natural disasters, certain product defects, certain matters for which we indemnify third parties, political risk, certain theft, patent infringement, and employment practice matters. Should there be a catastrophic loss due to an uninsured event (such as an earthquake) or a loss due to adverse occurrences in any area in which we are self-insured, our financial condition or operating results could be adversely affected.

We compete with others to attract and retain key personnel, and any loss of, or inability to attract, such personnel could adversely affect our ability to compete effectively.

We depend on the efforts and abilities of certain key members of management and other technical personnel. Our future success depends, in part, upon our ability to retain such personnel and attract and retain other highly qualified personnel, particularly product engineers who can respond to market demands and required product innovation. Competition for such personnel is intense and we may not be successful in hiring or retaining new or existing qualified personnel. Additionally, from time to time we have effected restructurings which have eliminated a number of positions. Even if such personnel are not directly affected by the restructuring effort, such terminations can have a negative impact on morale and our ability to attract and hire new qualified personnel in the future. If we lose existing qualified personnel or are unable to hire new qualified personnel, as needed, we could have difficulty competing in our highly-competitive and innovative environment.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

In the first quarter of 2019, we relocated our corporate headquarters from Portland, Oregon to our facility in Hillsboro, Oregon. We lease a 47,800 square foot of space in Hillsboro, Oregon as our corporate headquarters and a research and development facility through November 2022. During 2018, our corporate headquarters and executive office were located in a 23,680 square foot of space leased in Portland, Oregon through March 2025. We plan to fully vacate the space in Portland, Oregon in early 2019 and intend to sublease the vacated space. In San Jose, California, we have 98,874 square feet under lease through September 2016, of which we use 49,579 square feet as a research and development facility, while we vacated 49,295 square feet during the fourth quarter of 2018 and intend to sublease the vacated space.

In Muntinlupa City, Philippines, we lease a total of 48,565 square feet through May 2025 and 1,938 square feet through June 2025 for research and development and operations facilities. In this location, we also leased another 2,856 square feet through April 2018 as storage space that has been consolidated into other facilities.

In Shanghai, China, we lease 68,027 square feet through May 2021 for research and development operations. We also owned an 18,869 square foot research and development facility in Shanghai, China, which we sold in August 2017.

We also lease office facilities in multiple other metropolitan locations for our domestic and international sales staff. We believe that our existing facilities are suitable and adequate for our current and foreseeable future needs.

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Item 3. Legal Proceedings

On or about December 19, 2018, Steven A.W. De Jaray, Perienne De Jaray and Darrell R. Oswald (collectively, the "Plaintiffs") commenced an action against the Company and several unnamed defendants in the Multnomah County Circuit Court of the State of Oregon, in connection with the sale of certain products by the Company to defendants in or around 2008. Plaintiffs allege that the Company violated the Lanham Act, engaged in negligence and fraud by failing to disclose to purchaser the export-controlled status of the subject parts. Plaintiffs seek damages of $138 million, treble damages, and other remedies. In January 2019, the Company removed the action to the United States District Court for the District of Oregon. At this stage of the proceedings, the Company does not have an estimate of the likelihood or the amount of any potential exposure to the Company; however, the Company believes that these claims are without merit and intends to vigorously defend the action. See "Litigation and unfavorable results of legal proceedings could adversely affect our financial condition and operating results" in "Risk Factors" in Item 1A of Part I of this Annual Report on Form 10-K.

From time to time, we are exposed to certain asserted and unasserted potential claims. Periodically, we review the status of each significant matter and assess its potential financial exposure. If the potential loss from any claim or legal proceeding is considered probable and a range of possible losses can be estimated, we then accrue a liability for the estimated loss. Legal proceedings are subject to uncertainties, and the outcomes are difficult to predict. Because of such uncertainties, accruals are based only on the best information available at the time. As additional information becomes available, we reassess the potential liability related to pending claims and litigation and may revise estimates.

Item 4. Mine Safety Disclosures

Not applicable.

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PART II

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

Market Information

Our common stock is traded on the NASDAQ Global Select Market under the symbol "LSCC".

Holders

As of February 21, 2019, we had approximately 227 stockholders of record.

Dividends

The payment of dividends on our common stock is within the discretion of our Board of Directors. We intend to retain earnings to finance our business. We have never paid cash dividends.

Recent Sales of Unregistered Securities

None.

Issuer Purchases of Equity Securities

None.

Comparison of Total Cumulative Stockholder Return

The following graph shows the five-year comparison of cumulative stockholder return on our common stock, the Standard and Poor's (“S&P”) 500 Index and the Philadelphia Semiconductor Index (“PHLX”) from December 2013 through December 2018. Cumulative stockholder return assumes $100 invested at the beginning of the period in our common stock, the S&P and PHLX. Historical stock price performance is not necessarily indicative of future stock price performance.

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Lattice Cumulative Stockholder Return

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Item 6. Selected Financial Data

STATEMENT OF OPERATIONS: (In thousands, except per share data)	Year Ended (1)				
	December 29, 2018	December 30, 2017	December 31, 2016	January 2, 2016 (3)	January 3, 2015 (2)
Revenue:					
Product	$380,468	$356,502	$390,704	$369,200	$366,127
Licensing and services	18,331	29,459	36,350	36,766	—
Total Revenue	398,799	385,961	427,054	405,966	366,127
Costs and expenses:					
Cost of product revenue	179,101	164,657	179,983	184,914	159,940
Cost of licensing and services revenue	259	4,725	637	1,143	—
Research and development	82,449	103,357	117,518	136,868	88,079
Selling, general, and administrative	91,054	90,718	98,602	97,349	73,527
Amortization of acquired intangible assets	17,690	31,340	33,575	29,580	2,948
Restructuring charges	17,349	7,196	9,267	19,239	17
Acquisition related charges	1,531	3,781	6,305	22,450	—
	12,486	32,431	7,866	21,655	—

Impairment of goodwill and acquired intangible assets					
Gain on sale of building	—	(4,624)	—	—	—
Total costs and expenses	401,919	433,581	453,753	513,198	324,511
(Loss) income from operations	(3,120)	(47,620)	(26,699)	(107,232)	41,616
Interest expense	(20,600)	(18,807)	(20,327)	(18,389)	(172)
Other (expense) income, net	(249)	(3,286)	2,844	(1,072)	1,497
(Loss) income before income taxes	(23,969)	(69,713)	(44,182)	(126,693)	42,941
Income tax expense (benefit)	2,353	849	9,917	32,540	(5,639)
Net (loss) income	$(26,322)	$(70,562)	$(54,099)	$(159,233)	$48,580
Net (loss) income per share:					
Basic	$(0.21)	$(0.58)	$(0.45)	$(1.36)	$0.41
Diluted	$(0.21)	$(0.58)	$(0.45)	$(1.36)	$0.40
Shares used in per					

share calculations:					
Basic	126,564	122,677	119,994	117,387	117,708
Diluted	126,564	122,677	119,994	117,387	120,245

BALANCE SHEET: (In thousands)	December 29, 2018	December 30, 2017	December 31, 2016	January 2, 2016	January 3, 2015
Cash, cash equivalents, and short-term marketable securities	$128,675	$111,797	$116,860	$102,574	$254,844
Total assets	$623,687	$635,961	$766,883	$785,920	$510,530
Long term liabilities	$295,812	$334,621	$338,903	$369,223	$8,809
Total liabilities	$365,230	$418,268	$496,453	$480,400	$69,555
Total stockholders' equity	$258,457	$217,693	$270,430	$305,520	$440,975

(1) Results for periods prior to 2018 are presented in accordance with ASC 605, which was in effect during those fiscal years.

(2) The year ended January 3, 2015 was a 53-week year as compared to the other years presented, which were based on our standard 52-week year.

(3) Our results for the year ended January 2, 2016 include the results associated with the acquisition of Silicon Image for the approximately 10-month period from March 11, 2015 through January 2, 2016. Results presented for the period prior to fiscal 2015 are those historically reported for Lattice only.

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ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

Overview

Lattice Semiconductor and its subsidiaries (“Lattice,” the “Company,” “we,” “us,” or “our”) is a Delaware corporation that develops semiconductor technologies that we monetize through products, solutions, design services, and licenses. We engage in smart connectivity, control, and compute solutions, providing intellectual property ("IP") and low-power, small form-factor programmable logic devices that enable global customers to quickly and easily develop innovative, smart, and connected products. We help their products become more aware, interact more intelligently, and make better and faster connections. In an increasingly intense global technology market, we help our customers get their products to market faster than their competitors. Our broad end-market exposure extends from mobile devices and consumer electronics to industrial and automotive equipment, communications and computing infrastructure, and licensing and services. Lattice was founded in 1983 and is headquartered in Hillsboro, Oregon.

Discontinuation of millimeter wave business

In the second quarter of 2018, we made the strategic decision to discontinue our millimeter wave business, which included certain assets related to our Wireless products, and our Board of Directors approved a related internal restructuring plan. This action was designed to improve profitability, reduce our infrastructure costs, and re-focus on our core business activities. Approximately $24.1 million of total expense was recorded in our Consolidated Statements of Operations in fiscal 2018, including $11.9 million charged to Impairment of acquired intangible assets, $8.0 million charged to Cost of product revenue for inventory reserves, and $4.2 million charged to Restructuring charges for severance and other personnel costs, and for other asset restructuring. See Notes 6, 8, 10, and 15 to our consolidated financial statements presented in Part 2, Item 8 of this Report for additional details on the charges and costs related to the discontinuation of our millimeter wave business.

Critical Accounting Policies and Use of Estimates

Critical accounting policies are those that are both most important to the portrayal of a company's financial condition and results, and that require management's most difficult, subjective, and complex judgments, often as a result of the need to make estimates about the effect of matters that are inherently uncertain.

The preparation of financial statements in conformity with U.S. generally accepted accounting principles ("U.S. GAAP") requires management to make estimates and assumptions that affect the reported amounts and classification of assets, such as marketable securities, accounts receivable, contract assets included in prepaid expenses and other current assets, inventory, goodwill (including the assessment of reporting unit), intangible assets, current and deferred income taxes, accrued liabilities (including restructuring charges and bonus arrangements), disclosure of contingent assets and liabilities at the date of the financial statements, amounts used in acquisition valuations and purchase accounting, impairment assessments, the fair value of equity awards, and the reported amounts of product revenue, licensing and services revenue, and expenses during the fiscal periods presented.

We base our estimates and judgments on historical experience, knowledge of current conditions, and our beliefs of what could occur in the future considering available information. While we believe that our estimates, assumptions, and judgments are reasonable, they are based on information available when made, and because of the uncertainty inherent in these matters, actual results may differ from these estimates under different assumptions or conditions. We evaluate our estimates and judgments on an ongoing basis. We believe the following accounting policies and the related estimates are critical in the portrayal of our financial condition and results of operations, and require management's most difficult, subjective, or complex judgments. See "Note 1 - Nature of Operations and Significant

Accounting Policies" under Part II, Item 8 of this report for further information on the significant accounting policies and methods used in the preparation of the consolidated financial statements.

Revenue from Contracts with Customers

We adopted ASC 606, Revenue from Contracts with Customers, effective on December 31, 2017, the first day of our 2018 fiscal year, using the modified retrospective method. Under this standard, we recognize revenue under the core principle of depicting the transfer of control to our customers. We measure revenue based on the amount of consideration we expect to be entitled to in exchange for products or services. For revenue recognized on both sales to distributors and related to HDMI royalties, the amount of consideration we expect to be entitled to receive is based on estimates that require assumptions and judgments relating to trends in recent and historical activity. See "Note 2 - Revenue from Contracts with Customers" under Part II, Item 8 of this report for further information on our recognition of revenue.

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Sales to most distributors are made under terms allowing certain price adjustments and limited rights of return of our products held in their inventory or upon sale to their end customers. Such price adjustments are estimated using the expected value method based on an analysis of historical price adjustments, at the distributor and product level, over a period of time considered adequate to account for current pricing and business trends, typically 6 months. Any differences between the estimated consideration and the actual amount received from the customer is recorded in the period that the actual consideration becomes known. To date, these differences have not been material. Most of our distributors are entitled to limited rights of return, referred to as stock rotation, not to exceed 5% of billings, net of returns and price adjustments. Stock rotation reserves are based on historical return rates and recorded as a reduction to revenue with a corresponding reduction to cost of goods sold for the estimated cost of inventory that we expect to be returned. The revenue recognized based on estimated price adjustments and stock rotation reserves may be materially different from the actual consideration received if the actual distributor price adjustments and stock rotation returns differ significantly from historical trends.

HDMI royalty revenue is determined by a contractual allocation formula agreed to by the founders of the HDMI consortium ("Founders"). The contractual allocation formula is subject to periodic adjustment, generally every three years. An agreement covering the period beginning January 1, 2018 is yet to be signed. While a new royalty sharing agreement is being negotiated with the other Founders of the HDMI consortium, the HDMI agent is unable to distribute the majority of the royalties collected to the Founders. We are recording revenue based on our estimated share of the royalties, which we determine using an analytical model that combines historical and forecasted collection trends with our expected share of those collections. This estimate will be adjusted once the Founders finalize the agreement for the period beginning January 1, 2018. Under a new agreement, our share of HDMI collections may change significantly from our current assumptions, and our estimated revenue could differ martially from actual royalty sharing amounts received.

Inventories and Cost of Product Revenue

Inventories are recorded at the lower of average cost determined on a first-in-first-out basis or market. We establish provisions for inventory if it is obsolete or we hold quantities which are in excess of projected customer demand. The creation of such provisions results in a write-down of inventory to net realizable value and a charge to Cost of product revenue.

Restructuring Charges

Expenses associated with exit or disposal activities are recognized when incurred under ASC 420, “Exit or Disposal Cost Obligations,” for everything but severance expenses, which are recognized under ASC 712, “Compensation - Nonretirement Postemployment Benefits.” When leased facilities are vacated, an amount equal to the total future lease obligations from the date of vacating the premises through the expiration of the lease, net of any future sublease income, is recorded as a part of restructuring charges. Expenses from other exit or disposal activities, including the cancellation of software contracts and engineering tools or the abandonment of long lived assets, is recorded as a part of restructuring charges. Because we have a history of paying severance benefits, the cost of severance benefits associated with a restructuring plan is recorded when such costs are probable and the amount can be reasonably estimated in accordance with ASC 712.

Impairment of Long-Lived Assets

Long-lived assets, including amortizable intangible assets, are carried on our financial statements based on their cost less accumulated depreciation or amortization. We monitor the carrying value of our long-lived assets for potential impairment and test the recoverability of such assets annually during the fourth quarter and whenever events or changes in circumstances indicate that their carrying amounts may not be recoverable. These events or changes in circumstances, including management decisions pertaining to such assets, are referred to as impairment indicators. If an impairment indicator occurs, we perform a test of recoverability by comparing the carrying value of the asset group to its undiscounted expected future cash flows. If the carrying values are in excess of undiscounted expected future cash flows, we measure any impairment by comparing the fair value of the asset group to its carrying value. Fair value is generally determined by considering (i) internally developed discounted projected cash flow analysis of the asset group; (ii) actual third-party valuations; and/or (iii) information available regarding the current market for similar asset groups. If the fair value of the asset group is determined to be less than the carrying amount of the asset group, an impairment in the amount of the difference is recorded in the period that the impairment indicator occurs and is included in our Consolidated Statements of Operations. Estimating future cash flows requires significant judgment and projections may vary from the cash flows eventually realized, which could impact our ability to accurately assess whether an asset has been impaired.

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Accounting for Income Taxes

Our provision for income tax is comprised of our current tax liability and changes in deferred tax assets and liabilities. Deferred tax assets and liabilities are recognized for the expected tax consequences of temporary differences between the tax bases of assets and liabilities and their reported amounts in the financial statements using enacted tax rates and laws that will be in effect when the difference is expected to reverse. Valuation allowances are provided to reduce deferred tax assets to an amount that in management's judgment is more-likely-than-not to be recoverable against future taxable income. The determination of a valuation allowance and when it should be released requires complex judgment. In assessing the ability to realize deferred tax assets, we evaluate both positive and negative evidence that may exist and consider whether it is more-likely-than-not that some portion or all of the deferred tax assets will be realized. The ultimate realization of deferred tax assets is dependent upon the generation of future taxable income during the periods in which those temporary differences become deductible.

As part of our financial review process, we also assess the likelihood that our tax reporting positions will ultimately be sustained. To the extent it is determined it is more likely than not (a likelihood of more than 50 percent) that some portion or all of a tax reporting position will ultimately not be recognized and sustained, a provision for unrecognized tax benefit is provided by either reducing the applicable deferred tax asset or accruing an income tax liability. Our judgment regarding the sustainability of our tax reporting positions may change in the future due to changes in U.S. or international tax laws and other factors. These changes, if any, may require material adjustments to the related deferred tax assets or accrued income tax liabilities and an accompanying reduction or increase in income tax expense which may result in a corresponding increase or decrease in net income in the period when such determinations are made.

Results of Operations

Key elements of our Consolidated Statements of Operations are presented in the following table:

	Year Ended *					
(In thousands)	December 29, 2018		December 30, 2017		December 31, 2016	
Revenue	$398,799	100.0 %	$385,961	100.0 %	$427,054	100.0 %
Gross margin	219,439	55.0	216,579	56.1	246,434	57.7
Research and development	82,449	20.7	103,357	26.8	117,518	27.5
Selling, general, and administrative	91,054	22.8	90,718	23.5	98,602	23.1
Amortization of acquired intangible assets	17,690	4.4	31,340	8.1	33,575	7.9
Restructuring charges	17,349	4.4	7,196	1.9	9,267	2.2
Acquisition related charges	1,531	0.4	3,781	1.0	6,305	1.5
Impairment of acquired intangible assets	12,486	3.1	32,431	8.4	7,866	1.8
Gain on sale of building	—	—	(4,624)	(1.2)	—	—
Loss from operations	$(3,120)	(0.8)%	$(47,620)	(12.3)%	$(26,699)	(6.3)%

* Results for 2017 and 2016 are presented in accordance with ASC 605, which was in effect during those fiscal years.

We adopted ASC 606, Revenue from Contracts with Customers, on December 31, 2017 using the modified retrospective method. We have not restated any prior financial statements presented. See "Note 2 - Revenue from Contracts with Customers" to our consolidated financial statements and the Revenue discussions, below, for the impact of the adoption of ASC 606.

Revenue

	Year Ended *			% Change in	
(In thousands)	December 29, 2018	December 30, 2017	December 31, 2016	2018	2017
Revenue	$398,799	$ 385,961	$ 427,054	3	(10)

* Results for 2017 and 2016 are presented in accordance with ASC 605, which was in effect during those fiscal years.

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Revenue increased $12.8 million, or 3%, in fiscal 2018 compared to fiscal 2017, primarily driven by (1) increased demand for our products that perform control applications in server reference designs, (2) broad market increases from industrial market customers, particularly in growth from the products supporting industrial video applications and factory automation robotics applications, (3) growth in products used by several handset screen replacement customers, (4) increased demand for products used in home automation devices, and (5) increases in royalties that we recognized as revenue in fiscal 2018 under ASC 606. These were partially offset by a decline in demand for products supporting a major handset manufacturer, by the discontinuation of our millimeter wave business, and by a patent sale that was recognized in fiscal 2017 but which did not recur in fiscal 2018.

For fiscal 2018, adoption of ASC 606 increased our revenues by $15.6 million compared to revenue that would have been recognized under previous guidance. Of this amount, $14.1 million was due to the acceleration of revenue recognition on sales to certain distributors, and an additional $1.5 million was due to increases in Licensing and services revenue from the timing of revenue recognition from HDMI royalties and audit settlements.

Revenue decreased $41.1 million, or 10%, in fiscal 2017 compared to fiscal 2016, primarily driven by lower revenue from consumer mobile handsets and reductions from Digital Television ("DTV") and Home Theater related devices. This was coupled with a decline from the line item reduction caused by the obsoleting of tin leaded assembly material in one of the complex programmable logic devices ("CPLD") in the industrial and communications markets, for which shipments predominately occurred in fiscal 2016 but did not recur in fiscal 2017. These decreases were partially offset by a broad market increase in programmable logic device revenue in the Industrial and Automotive end market, and the production ramp of a server reference design being widely adopted in the computing market. Additionally, in fiscal 2017 we saw growth in our XO2/XO3 and EC5 product families, revenue from a patent sale transaction, and modest growth in the 60GHz wireless silicon products.

Revenue by End Market

The end market data below is derived from data provided to us by our distributors and end customers. With a diverse base of customers who may manufacture end products spanning multiple end markets, the assignment of revenue to a specific end market requires the use of estimates and judgment. Therefore, actual results may differ from those reported.

Under ASC 606, we recognize certain revenue for which end customers and end markets are not yet known. We assign this revenue first to a specific end market using historical and anticipated usage of the specific products, if possible, and allocate proportionally to the end markets if we cannot identify a specific end market.

Our Licensing and services end market includes revenue from the licensing of our IP, the collection of certain royalties, patent sales, the revenue related to our participation in consortia and standard-setting activities, and services. While Licensing products are primarily sold into the Mobile and Consumer market, Licensing and services revenue is reported as a separate end market as it has characteristics that differ from other categories, most notably its higher gross margin.

The following are examples of end market applications for the fiscal years presented:

Communications and Computing	Mobile and Consumer	Industrial and Automotive	Licensing and Services
Wireless	Smart-phones	Security and Surveillance	IP Royalties
Wireline	Cameras	Machine Vision	Adopter Fees
Data Backhaul	Displays	Industrial Automation	IP Licenses
Client Computing	Wearables	Human Computer Interaction	Patent Sales
Data Center Computing	Televisions	Automotive	Testing Services
Data Storage	Home Theater	Drones	Design Services

The composition of our revenue by end market is presented in the following table:

	Year Ended *						% Change in	
(In thousands)	December 29, 2018		December 30, 2017		December 31, 2016		2018	2017
Communications and Computing	$123,195	31 %	$113,019	29 %	$123,021	29 %	9	(8)
Mobile and Consumer	99,294	25	108,844	28	127,405	30	(9)	(15)
Industrial and Automotive	157,979	39	134,639	35	140,278	33	17	(4)
Licensing and Services	18,331	5	29,459	8	36,350	8	(38)	(19)
Total revenue	$398,799	100%	$385,961	100%	$427,054	100%	3	(10)

* Results for 2017 and 2016 are presented in accordance with ASC 605, which was in effect during those fiscal years.

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Our revenue in the Communications and Computing end market is largely dependent on a small number of large telecommunications equipment providers. For fiscal 2018, Communications and Computing end market revenue increased 9% primarily due to continued demand increases for server products, partially offset by the discontinuation of our millimeter wave business. For fiscal 2017, Communications and Computing end market revenue declined 8% primarily in the communications market, which saw a significant decrease in revenue from a major telecommunications customer whose business was affected by Commerce department actions, and by conversion of materials from 200mm to 300mm wafers. This was partially offset by growth in the Communications and Computing end market due to the initial production ramp of the server platform reference design being widely adopted in that sector.

Mobile and Consumer end market revenue decreased 9% in fiscal 2018, after decreasing 15% in fiscal 2017. Mobile and Consumer end market revenue decreased in fiscal 2018 primarily due to a decline in demand for products supporting a major handset manufacturer, partially offset by increased demand for home automation and handset screen replacement products. Consumer end market revenue decreased in fiscal 2017 primarily due to a significant decrease in volume for a major mobile handset provider. The production volume for this mobile handset peaked in the fourth quarter of fiscal 2016, and the associated revenue stream has declined in subsequent quarters as the end product completes its lifecycle. These decreases were coupled with declines in revenue from HDMI devices used in DTV and Home Theater related products and from MHL devices used in mobile handsets.

For fiscal 2018, Industrial and Automotive end market revenue increased 17% when compared to fiscal 2017. This is primarily due to broad market increases in the Industrial end market as well as growth from the products supporting industrial video applications and factory automation robotics applications. For fiscal 2017, Industrial and Automotive end market revenue decreased 4% when compared to fiscal 2016. This is primarily due to a decline from the line item reduction caused by the obsoleting of tin leaded assembly material in one of the CPLD devices for which shipments predominately occurred in fiscal 2016 but did not recur in fiscal 2017. This decrease was substantially offset by broad market growth in this end market, especially from our XO2/XO3 FPGA product families.

Revenue from the Licensing and Services end market decreased by 38% in fiscal 2018 compared to fiscal 2017 predominantly due to revenue from a patent sale in the first half of fiscal 2017 that did not recur in the current year, and by the absence of revenue from Simplay Labs testing activities after the transfer of certain assets related to that business unit at the end of the third quarter of fiscal 2017. These decreases are partially offset by HDMI royalties that we recognized as revenue in fiscal 2018 under ASC 606 but were not able to recognize in fiscal 2017 under the previous guidance.

Licensing and Services revenue decreased by 19% in fiscal 2017 primarily due to lower revenue from HDMI licensing and adopter fees as a new royalty sharing agreement had not been finalized, and by the termination of our role as agent for the HDMI consortium. As a result of the amended model for sharing revenue and the appointment of a new independent agent for the HDMI consortium, we will be entitled to a reduced share of adopter fees paid by parties adopting the HDMI standard in 2017 and future years. The termination of our role as agent for the HDMI consortium resulted in a decrease of approximately $11 million for fiscal 2017 compared to fiscal 2016. While a new royalty sharing agreement is being negotiated, the HDMI agent is collecting royalties but is unable to distribute a majority of the royalties to the Founders. Given that a new royalty sharing agreement was not fully executed under previous revenue guidance, the fixed and determinable revenue recognition criteria was not met, and we were unable to recognize all of the HDMI royalty revenue in fiscal 2017. Revenue attributable to HDMI royalties is down approximately $9 million for fiscal 2017 compared to fiscal 2016 mainly as a result of the royalty sharing formula not being finalized. The decrease related to HDMI was partially offset by a patent sale transaction of $18 million in fiscal 2017.

We share HDMI royalties with the other HDMI Founders based on an allocation formula, which is reviewed every three years. The most recent royalty sharing formula covered the period from January 1, 2014 through December 31, 2016, and an interim agreement covering the period from January 1, 2017 through December 31, 2017 was signed in the second quarter of fiscal 2018. However, a new agreement covering the period beginning January 1, 2018 is yet to be signed. As a result of the signing of the HDMI Founders royalty sharing agreement for 2017, we received $6.4 million in cash during the second quarter of fiscal 2018 for fiscal 2017 HDMI royalties. Collection of this amount had no impact on our reported revenues and was recorded as a reduction to the contract asset recorded in Prepaid expenses and other current assets in our Consolidated Balance Sheets. This contract asset was recorded in the first quarter of fiscal 2018 with an offset to Accumulated deficit as a cumulative effect adjustment for the adoption of ASC 606.

HDMI royalties are considered variable consideration under the new revenue standard and recognized as royalty revenue as usage occurs. While a new royalty sharing agreement is being negotiated with the other Founders of the HDMI consortium for fiscal 2018, we are estimating our share of royalty revenues under an anticipated new agreement. Before the HDMI royalty sharing agreement is signed, we estimate that we will recognize $1 million to $2 million of additional Licensing and Services revenue every quarter under ASC 606 that we would not have recognized under previous guidance. Once the HDMI royalty sharing agreement is signed, ongoing HDMI royalty revenue recognition under both ASC 606 and previous guidance will be consistent during the term of that sharing agreement.

For fiscal 2018, adoption of ASC 606 increased our revenues by $15.6 million compared to revenue that would have been recognized under previous guidance. Of this amount, $14.1 million was due to the acceleration of revenue recognition on sales to certain distributors, with $4.7 million attributed to Communications and Computing, $4.6 million attributed to Mobile and Consumer, and $4.8 million attributed to Industrial and Automotive. An additional $1.5 million was due to increases in Licensing and Services revenue comprised of an increase of $7.9 million, mainly in HDMI royalties and audit settlements for fiscal 2018, partially offset by $6.4 million in 2017 HDMI royalties collected that were not recorded as revenue in either fiscal 2018 under ASC 606 or in fiscal 2017 under previous guidance.

Revenue by Geography

We assign revenue to geographies based on ship-to location of the end customer, where available, and based upon the location of the distributor to which the product was shipped otherwise.

The composition of our revenue by geography is presented in the following table:

	Year Ended *				% Change in	
(In thousands)	December 29, 2018		December 30, 2017	December 31, 2016	2018	2017
Asia	$298,119	75%	$ 277,638			