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MoSys, Inc.

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

FORM 10-K

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

For the Fiscal Year December 31, 2019 or

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

Commission file number: 000-32929

MOSYS, INC.
(Exact name of registrant as specified in its charter)

Delaware	**77-0291941**
(State or other jurisdiction of incorporation or organization)	(IRS Employer Identification Number)

2309 Bering Drive
San Jose, California 95131
(Address of principal executive offices)

(408) 418-7500
(Registrant's telephone number, including area code)

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

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, par value $0.001 per share	MOSY	The NASDAQ Stock Market, LLC

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

Title of each class	Name of each exchange on which registered
Series AA Preferred Stock, par value $0.01 per share	None

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

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

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

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

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

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

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

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

The aggregate market value of the voting and non-voting common equity held by non-affiliates of the Registrant, based on the closing price of the shares of common stock on The NASDAQ Stock Market on June 30, 2019 was $7,534,001.

The number of shares of Registrant's Common Stock outstanding, par value $0.001 per share, as of March 1, 2020, was 2,314,512

ANNUAL REPORT ON FORM 10-K
FOR THE YEAR ENDED DECEMBER 31, 2019

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This Annual Report on Form 10-K and the documents incorporated herein by reference contain forward-looking statements within the meaning of Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934, which include, without limitation, statements about the market for our products, technology, our strategy, competition, expected financial performance and other aspects of our business identified in this Annual Report, as well as other reports that we file from time to time with the Securities and Exchange Commission. Any statements about our business, financial results, financial condition and operations contained in this Annual Report that are not statements of historical fact may be deemed to be forward- looking statements. Without limiting the foregoing, the words "believes," "anticipates," "expects," "intends," "plans," "projects," or similar expressions are intended to identify forward-looking statements. Our actual results could differ materially from those expressed or implied by these forward-looking statements as a result of various factors, including the risk factors described in Part I., Item 1A, "Risk Factors," and elsewhere in this report. We undertake no obligation to update publicly any forward-looking statements for any reason, except as required by law, even as new information becomes available or other events occur in the future.

MoSys®,1T-SRAM® and Bandwidth Engine® are registered trademarks of MoSys, Inc. LineSpeed™ and GigaChip™ are trademarks of MoSys, Inc.

Item 1. Business

Overview

MoSys, Inc., together with its subsidiaries (" *MoSys*," the "*Company*," "*we*," "*our*" or "us"), is a fabless semiconductor company focused on the development and sale of integrated circuits, or ICs, for the high-speed cloud networking, communications, security appliance, video, monitor and test, data center and computing markets. Our solutions deliver time-to-market, performance, power, area and economic benefits for system original equipment manufacturers, or OEMs. Our primary product line is marketed under the Accelerator Engine name and comprises our Bandwidth Engine and Programmable HyperSpeed Engine IC products, which integrate our proprietary, 1T-SRAM high-density embedded memory and a highly-efficient serial interface protocol resulting in a monolithic memory IC solution optimized for memory bandwidth and transaction access performance. Further performance benefits can be achieved to offload statistical, search or other custom functions using our optional integrated logic and processor elements.

As data rates and the amount of high-speed processing increase, critical memory access bottlenecks occur. Our Accelerator Engine ICs dramatically increase memory accesses per second, removing these bottlenecks. In addition, the serial interface and high-memory capacity reduce the board footprint, number of pins and complexity, while using less power. To complement our Accelerator Engine ICs and utilize our technology we have recently introduced a new Software Accelerator product line that leverages our proprietary graphical memory engine technology to provide data classification capabilities. These new software and IP products are hardware agnostic and operate with or without one of our Accelerator Engine IC products. We expect to begin licensing these products in the first half of 2020.

Our LineSpeed IC product line comprises non-memory, high-speed serialization-deserialization interface, or SerDes I/O, physical layer, or PHY, devices that ensure signal integrity between interfaces which is commonly referred to as clock data recovery, or CDR, or retimer functionality, which perform multiplexing to transition from one speed to another, commonly referred to as Gearbox functionality. These PHY devices reside within optical modules and on networking equipment line cards designed for next-generation Ethernet and optical transport network applications.

Industry Background

The amount of data and the number of data consumers and devices is growing exponentially, driven primarily by commercial and consumer cloud applications, video services, high speed mobile networks, Internet of Things, or IoT, and many other cloud applications. In order to meet these demands, the new cloud infrastructure, including the backbone, edge, access network and data centers, must scale in both speed and intelligence to handle real-time security, bandwidth allocation, and service-level expectations. In addition, workloads or applications delivered at a massive scale from the cloud require flexible and efficient data transmission to optimize resources to enable these applications and lower the overall cost, size and power of the data center. These increased demands strain communication between onboard IC devices, limiting the data throughput in network switches and routers and the network backbone.

To meet these demands, carrier and enterprise networks are merging with the cloud and are undergoing significant changes and, most significantly, are migrating to packet-based Ethernet networks that enable higher throughput, lower cost and uniform technology across access, core and metro network infrastructure. These networks have been designed to deliver voice and video applications over high-speed Internet services on one converged, efficient and flexible network. These trends require networking systems, especially the high-speed switches, security appliances and routers that primarily comprise these networks, to comply with evolving market requirements and be capable of providing new services and better quality of service while supporting new protocols and standards. Traditional OEM network and telecommunications equipment manufacturers, such as Nokia Corporation, and its subsidiary, Alcatel-Lucent, Cisco Systems, Inc., Tel. LM Ericsson, Fujitsu Ltd., Hitachi Ltd., Huawei Technologies, and Juniper Networks, Inc., as well as new vendors and cloud-service providers, who are delivering a new set of white-box solutions, must offer higher levels of packet forwarding rates, bandwidth density and be optimized to enable higher-density, lower-power data path connectivity in the next generations of their networking systems.

Networking communications, security, video and computing systems throughout the cloud network must operate at higher speed and performance levels, and so require new generations of packet processors and improved memory subsystems to enable system performance. These systems and their component line cards generally need to support aggregate rates of 100 gigabits per second, or Gbps, and above to meet the continued growth in network traffic. Data centers and access equipment that were previously aggregating slower traffic at rates of up to 40Gbps now are being designed to aggregate traffic at 100Gbps, or more. The transition to high-bandwidth networks and the move to 100Gbps and higher rates at the edge (i.e., closer to the networks and users generating data and voice traffic) is underway, and the increase in data rates for these networks is expected to continue to grow rapidly over the coming years.

The systems that our customers build come in various sizes and utilize cards that contain several types of semiconductors. Line cards are found in chassis-based systems that have slots and can contain up to 20 line cards. Our networking and communication system and certain other system customers typically use chassis-based systems. The alternative is systems that contain a single card; these systems are generally referred to as appliances or “pizza boxes.” Cards that typically plug into a server or compute system are generally referred to as accelerator cards. We believe the wider use of these accelerator cards in systems throughout the network, especially at the edge, will expand the market opportunity for our products, as a number of these cards utilize field programmable gate array ICs, or FPGAs, as the packet processor. Our Accelerator Engines are ideally suited to support FPGAs performing these functions. Each line card, or accelerator card, includes one or more processors and multiple memory chips. These processors are complex ICs or IC chipsets that perform high-speed data or packet processing for functions, such as traffic routing, shaping, metering, billing, statistics, detection, steering, security, video processing, monitoring and workload acceleration. The line cards use various types of memory ICs to facilitate temporary packet storage and assist in the analysis and tracking of information embedded within the data flowing through the processors. After a packet enters the line card, a packet or data processor helps separate the packet into smaller pieces for rapid analysis. In a typical packet-based network for example, the data is broken up into the packet header, which contains vital information on packet destination and type, such as the Internet protocol address, and the payload, which contains the data being sent. Generally, the line card operations must occur at full data rates and typically require frequent access to the memory ICs.

Simultaneously, the packet’s payload, which may be substantially larger than the packet header, is also stored in memory ICs until processing is complete and the packet can be re-combined and sent to its next system destination. Within the line card, communication between the packet processor and memory ICs occurs through an interface consisting of combinations of physical pins on each type of chip. These pins are grouped together in a parallel or a serial architecture to form a pathway, called a bus, through which information is transferred from one IC to the next.

Today, the majority of physical buses that connect networking equipment and components use a parallel architecture to communicate between processors and memory ICs, which means information can travel only in one direction and in one instance at a time. As processing speeds increase, the number of pins required and the speed of the bus in a parallel architecture become a limitation on system performance and capability. In contrast, the number of connections is reduced substantially across fewer, higher-rate pins in a serial architecture, and data is transferred simultaneously in both directions. Data transfer rates are limited by the data access rates of the various ICs included on the line card, thus leading to bottlenecks when these ICs perform inadequately. In order to remove these bottlenecks and meet next-generation bandwidth requirements, the line card ICs need to support higher access rates enabled by internal memory or high-speed serial bus architectures and these more advanced interface protocols.

Most networking and communication systems sold and in operation today include line cards that process data at speeds ranging from 10Gbps to 400Gbps, and support many aggregated slower ports. To accommodate the substantial and growing increase in demand for networking communications and applications, networking systems manufacturers are developing and bringing to market next-generation systems that run at aggregate speeds of 400 Gbps or more with newer products scaling to tens of thousands of Gbps, or tens of terabits, per second. Applications, such as security appliances, broadcast video and compute accelerators that were previously running at aggregate rates of 10Gbps or 40Gbps, are moving to higher aggregate rates in the 100s of Gbps. Although processor performance in applications, such as computing and networking has traditionally doubled nearly every 18 months, or even sooner, the performance of external high-density memory technology has generally been able to double only once every 10 years. Existing memory IC solutions built for high capacity and based on parallel interface architecture struggle to meet the access rates required to meet speeds of 100Gbps and beyond due to system-level limitations for pin counts, power and performance. To compensate for slow external memory access, developers must either integrate larger amounts of on-chip memory and/or utilize complex system alternatives to try to work around the access-rate limitations of these memories. The additional memory and circuitry adds to IC power, size and cost and may not be feasible depending on the economics and technology used to implement the data processor. These networking and communications systems generally comprise a chassis populated by 4 to 16 line cards. Often, these systems are shipped to customers with only a portion of the line card slots populated, and the customer will add additional line cards to increase system performance, capacity and features.

Each line card requires a significant amount of memory to support its processing capabilities. Traditional external memory IC solutions currently used on line cards include both dynamic random access memory, or DRAM, and static random access memory, or SRAM. Line cards in networking systems use both specialized, high-performance DRAM ICs, such as reduced-latency DRAM, or RLDRAM, low-latency DRAM, or LLDRAM, and commodity DRAM, such as double data rate, or DDR ICs. The latest DDR memory is high-bandwidth memory, or HBM, which provides high bandwidth, but has fundamentally slow access time. For very high access, networking systems use higher-performance SRAM, which may be integrated into the data processing IC itself depending on size, power and economics or use traditional external SRAM IC, such as quad data rate, or QDR SRAM. These memories are very fast, but are much smaller, cost more and burn more power than traditional DRAM. Substantially all of these traditional memory IC solutions use parallel interfaces, which are slower than serial interfaces. For data processing solutions, which are unable to integrate large amounts of SRAM, such as field-programmable gate arrays (FPGA), we believe the traditional external SRAMs or RLDRAMs will be increasingly challenged to meet the performance, pin count, area and power requirements as networking systems and other new security, video, and compute systems expand beyond 100Gbps. The result is a gap between processor and memory performance. To meet the higher performance requirements being demanded by the industry, while using current components and architectural approaches, system designers must add more discrete memory ICs to the line cards and/or add more embedded memory on the packet processor. New processor and custom data processing engine ICs are being developed that integrate more SRAM to help offset the bottlenecks, but the cost to develop these custom ICs is high and there is a trade-off in cost, power and size. FPGAs offer flexibility, lower development cost and time to market but are limited in the amount of internal circuitry and the amount of integrated SRAM memory. We believe our Accelerator Engine family of products is well suited to address memory access bottleneck challenges and provide significant performance, size, pin count and power advantages compared to traditional external memory solutions, primarily for FPGA-based systems.

In order to improve performance and resolve memory bottlenecks, in recent years, the trend has been to have algorithms on the memory device perform computations in order to reduce processing time and power consumption. This trend is sometimes called in-memory compute or processor-in-memory. In order to make a flexible solution, the in-memory compute can be accomplished with arrays of reduced instruction set computer, or RISC, cores on the memory device. Further performance gains can be accomplished with application-specific enhancements to the memory device's instruction set architecture.

We have developed our ICs to synergistically address the need for high-speed data access and throughput currently confronting system designers. We expect our IC products to meet the increasing demands placed on conventional memory technology used on the line cards in high-speed systems. We believe that our products and technology are well positioned as replacements for existing IC solutions in or der to support the needs of a growing number of FPGA-based data processing applications with aggregate rates greater than 100Gbps that require high bandwidth and high access rate to memory.

Our Approach

We have leveraged our proprietary IP to design our IC products and related acceleration IP to help OEMs in our target markets to address the growing bottlenecks in system performance. We have incorporated critical features into our product families to accomplish this objective.

High-Performance Interface

High-speed, efficient interfaces are critical building blocks to meet high data transfer rate requirements for communication between ICs on network line cards. Semiconductor companies are increasingly turning to serial interface architectures to achieve needed system performance. Using serial interfaces, IC developers also are able to reduce the number of pins (the wired electrical pins that connect an IC to the network line card on which it is mounted) on the IC. With reducing geometries, the size of most high-performance ICs is dictated by the number of pins required, rather than the amount of logic and memory embedded in the chip. As a result, using a serial interface facilitates cost reduction and reduced system power consumption, while improving the performance of both the IC itself and the overall system. While serial interfaces provide significantly enhanced performance over parallel interfaces, SerDes interfaces traditionally have had higher power consumption, which is a challenge for IC designers. Our SerDes interfaces, however, are optimized to meet our customers' signal integrity, low-power consumption and latency requirements.

We make our interface technologies compliant with industry standards so that they can interoperate with interfaces on existing ICs. In addition, we make them programmable to support multiple data rates, which allows for greater flexibility for the system designer, while lowering development and validation costs.

GigaChip Interface Protocol

In addition to the physical characteristics of the serial interface, the protocol used to transmit data is also an important element that impacts speed and performance. To address this and complement our Accelerator Engine devices, we have developed the GigaChip Interface, or GCI, which is an open-interface transport protocol optimized for efficient chip-to-chip communications. The GCI electrical interface is compatible with the current industry standards, including 10G and 25G IEEE and OIF interface standards, to simplify electrical interoperability between devices. GCI can enable highly efficient serial chip-to-chip communications, and its transport efficiency averages 90% for the data transfers it handles. GCI is included in our ICs and is offered to customers and prospective partners on terms intended to encourage widespread adoption.

High-Performance and High-Density Memory Architecture

The high density of our proprietary 1T-SRAM technology stems from the use of a single-transistor, or 1T, which is similar to DRAM, with a storage cell for each bit of information. Embedded memory utilizing our 1T-SRAM technologies is typically two to three times denser than the six-transistor storage cells used by traditional SRAM, or 6T-SRAM. Embedded memory utilizing our 1T-SRAM technologies typically provides speeds essentially equal to or greater than the speeds of traditional SRAM and DRAM, particularly for larger memory sizes. Our 1T-SRAM memory designs can sustain random access cycle times of less than three nanoseconds, significantly faster than DRAM technology. Embedded memory utilizing our 1T-SRAM technologies can consume as little as one-half the active power and generate less heat than traditional SRAM when operating at the same speed. The 1T-SRAM allows us to integrate more high-performance memory using less expensive processing technology, reduce system level heat dissipation and enable reliable operation using lower-cost packaging.

Embedded In-Memory Functions

We have combined our high-speed memory architecture with intelligence to define an embedded memory that can execute embedded functions and algorithms internally, or “in-memory,” to allow software and hardware designers acceleration options to improve the performance of their applications.

The in-memory functions executed within the memory architecture in our Accelerator Engine products result in application-performance increases by reducing the number of external memory and computational operations needed to accomplish the same functions using traditional memories. Also, by executing in-memory, the resources of the packet processor and other ICs on the customer’s board are available to perform other functions.

Our Accelerator Engine ICs include an arithmetic logic unit, or ALU, which enables the performance of mathematical operations on data. Moving certain processing functions from the host data processor IC to the Accelerator Engine IC through the use of this embedded ALU, reduces the number of processing transactions and frees the host data processor IC to perform other important networking or micro-processing functions.

Our Programmable HyperSpeed Engine IC takes this concept one step further by incorporating integrated RISC processors optimized for processing data structures and graphs. Our Programmable HyperSpeed Engine IC integrates RISC cores optimized for operating data stored in the memory block. The integration of the cores with memory allows system algorithms or functions to be offloaded to the device and reduces overall system-task latency and increases throughput. The processors can be programmed by the user to offload and accelerate standard and/or customized functions from the main processor thereby reducing memory transactions and data path complexity to provide improved performance and lower system latency. New algorithms or functions can be added to or modified in the Programmable HyperSpeed Engine IC in software.

Our Strategy

Our primary business objective is to be a profitable IP-rich fabless semiconductor company offering ICs and related software and IP that deliver unparalleled memory bandwidth and access rate performance for high-performance data processing in cloud networking, security appliances, video, test and monitoring, and data center systems. The key components of our strategic plan include the following strategies:

Target Large and Growing Markets

Prior to 2019, our primary focus was the multi-billion dollar networking, telecommunications, security appliance and data center OEM equipment markets, as our products were developed to support the growth in 100Gbps and higher networking speeds. During 2019, we expanded our market focus to new markets, including video, test and measurement and computing markets. We are currently supporting numerous customers across these markets, with whom we have achieved design wins. We define a design win as a commitment from a customer to utilize one of our IC products in its system. We continue to actively pursue additional design wins for the use of our ICs in our target markets. We believe our design wins represent the potential for future revenue growth. However, there is no assurance that these customer designs will be shipped in large volume by our customers to their customers, how much revenue each design win is likely to generate, or how much revenue all of these (and future design wins) are likely to generate.

Build Long-Term Relationships with FPGA Vendors and Suppliers of Data Processing Solutions

We believe that having long-term relationships with FPGA providers is critical to our success, as such relationships enable us to reduce our time-to-market, provide us with a competitive advantage and expand our target markets. A key consideration of network system designers is to demonstrate interoperability between our IC products and the processor ICs utilized in their systems. To obtain design wins, we must demonstrate this interoperability, and also show that our IC works optimally with the packet processor to achieve the performance requirements. In addition, our current strategy requires packet processor suppliers to adopt our GCI interface. To that end, we have been working closely with FPGA and application specific standard product providers to enable interoperability between our Accelerator Engine IC products and their high-performance products. To facilitate the acceptance of our Accelerator Engine ICs, we have made available development and characterization kits for system designers to evaluate and develop code for next-generation networking systems. Our characterization kits are fully-functional hardware platforms that allow FPGA and ASIC providers, and their customers, to demonstrate interoperability of the Accelerator Engine IC with the ASIC or FPGA the designers use within their systems.

Our IC Products

Accelerator Engines

Our Accelerator Engine IC products, include the Bandwidth Engine, which is targeted for high-performance applications where throughput is critical, and the Programmable HyperSpeed Engine, which combines the features of the Bandwidth Engine with 32 RISC processors to allow user-defined functions or algorithms to be embedded in the Programmable HyperSpeed Engine.

Bandwidth Engine

The Bandwidth Engine is a memory-dominated IC that has been designed to be a high-performance companion IC to packet processors. While the Bandwidth Engine primarily functions as a memory device with a high-performance and high-efficiency interface, it also can accelerate certain processing operations by serving as a co-processor element. Our Bandwidth Engine ICs combine: (1) our proprietary high-density, high-speed, low latency embedded memory, (2) our high-speed serial interface technology, or SerDes, (3) an open-standard interface protocol and (4) intelligent access technology. We believe an IC combining our 1T-SRAM memory and serial interface with logic and other intelligence functions provides a system-level solution and significantly improves overall system performance at lower cost, size and power consumption. Our Bandwidth Engine ICs can provide up to and over 6.5 billion memory accesses per second externally and 12 billion memory accesses per second internally, which we believe is more than three times the performance of current memory-based solutions. They also can enable system designers to significantly narrow the gap between processor and memory IC performance. Our customers that design Bandwidth Engine ICs onto the line cards in their systems will re-architect their systems at the line-card level and use our product to replace traditional memory solutions. When compared with existing commercially available solutions, our Bandwidth Engine ICs may:

- provide up to four times the performance;
- reduce power consumption by approximately 50%;
- reduce cost by greater than 50%; and
- result in a dramatic reduction in IC pin counts on the line card.

Our Bandwidth Engine 2 IC products contain 576 megabits, or Mb, of memory and use a SerDes interface with up to 16 lanes operating at up to 12.5Gbps per lane. We have been shipping our Bandwidth Engine 2 IC products since 2013. We continue to win new designs for this device family, and expect these products to be our primary revenue source for the foreseeable future.

Our Bandwidth Engine 3 IC products contain 1152Mb of memory and use a SerDes interface with up to 16 lanes operating at up to 25Gbps per lane. Our Bandwidth Engine 3 ICs target support for packet-processing applications with up to five billion memory single word accesses per second, as well as burst mode to enable full duplex buffering up to 400 Gbps for ingress, egress and oversubscription applications. The devices provide benefits of size, power, pin count and cost savings to our customers.

Programmable HyperSpeed Engine

Our Programmable HyperSpeed Engine IC products further leverage our proven serial interface technology and high-density integrated memory with the processor engine architecture to enable high-speed customizable search, security, and data analysis functions for networking, security, and data center applications, as well as new markets such as video and compute acceleration. The product architecture features 32 search-optimized processor engines, data flow schedulers, and over a terabit of internal access bandwidth. The device leverages our GCI interface technology and high-density integrated memory (1152Mb of 1T-SRAM embedded memory).

LineSpeed Flex PHYs

Our LineSpeed Flex family of 100G PHYs, is designed to support industry standards and includes gearbox, Multi-Link Gearbox, or MLG, and high density CDR/retimer devices designed to enable Ethernet and OTN line card applications to support the latest electrical and optical interfaces. To date, we have announced four unique devices in this product family:

- MSH320, a 100Gbps Gearbox with RS-FEC: For adapting 10x10Gbps to 4x25Gbps from 100Gbps optical standards to a host ASIC, MAC/Framer, NPU or FPGA with 10x10Gbps interfaces. The MSH320 includes an integrated Reed-Solomon forward error correction, or RS-FEC, option to enable systems to also support 100G electrical and optical standards. The device also includes a 10x10Gbps retimer to allow seamless support of 10 and 40Gbps interfaces;
- MSH225, a 10 Lane Full-Duplex Retimer: For high-density retiming applications where the line rates may be up to 28Gbps per lane and connect to host ASIC, framer, NPU or FPGA ICs equipped with 25Gbps interfaces. Each one of the 20 total independent lanes can be configured to support 10, 25, 40 or 100Gbps standards. The MSH225 integrates optional 100GE RS-FEC capability;
- MSH322, a 100Gbps Multi-Link Gearbox for Line Cards for support of high-density, independent 10GE and 40GE interfaces multiplexed into a 100GE (4x25Gbps) host interface, while supporting electrical and optical industry standards. The device enables line cards with high-density switches based on 25Gbps interfaces to support two times the density of 10 and 40Gbps ports; and
- MSH321, a derivative Multi-Link Gearbox built into a highly compact package and optimized layout to support the MLG function in module and compact daughter card applications.

IP Licensing

Historically, we licensed our IT-SRAM memory and SerDes interface technologies on a worldwide basis to semiconductor companies, electronic product manufacturers, foundries, intellectual property companies and design companies. Most of these licensees incorporated our technology into ICs that they sold to their customers, and, in the case of IT-SRAM licenses, pay a royalty to us for each IC shipped that incorporates our technology. Royalty and other revenue generated from our legacy IP agreements represented 7%, 9% and 11% of our total revenues for 2019, 2018 and 2017, respectively.

Recently, we announced our new Software Accelerator product line consisting of software and IP available for license. This new product line will include multiple function accelerator platform products, which target specific application functions and will use a common software interface to allow performance scalability over multiple hardware environments. These function accelerator platform products are hardware agnostic and operate with or without one of our Accelerator Engine ICs. This software-defined, hardware-accelerated platform architecture utilizes an internally developed graphical memory engine architecture to provide flexible data classification and analysis capability. We believe the technology will generate new opportunities that require less up-front architectural changes by system designers and provide a scalable performance roadmap of options using our Accelerator Engine ICs. We expect our initial Software Accelerator products to be available for license in the first half of 2020.

Research and Development

Our ability to compete in the future depends on successfully improving our technology to meet the market's increasing demand for higher performance and lower cost solutions. Development of new IC products requires specialized chip design and product engineers, as well as significant fabrication and testing costs, including mask costs. We currently do not have internal resources for new IC products. That said, we believe our Accelerator Engine IC product portfolio will provide us with adequate revenue growth opportunity for the foreseeable future. We have focused our product development efforts on software-based capabilities and features that leverage our current technologies and core competencies, as well as our Accelerator Engine IC products. As discussed above, we recently announced our Software Accelerator product line, and the initial packet classification products will use our graph memory engine for performing embedded search and classification of packet headers. We intend to continue to devote the majority of our research and development efforts toward furthering the software accelerator product roadmap.

Sales and Marketing

We believe that systems OEMs typically prefer to extend the use of traditional memory solutions and their parallel interfaces, despite performance and costs challenges, and are reluctant to change their technology platforms and adopt new designs and technologies, such as serial interfaces, which are an integral part of our product solutions. Therefore, our principal selling and marketing activities to date have been focused on persuading these OEMs and key component specialists that our IC products provide critical performance advantages, as well as on securing design wins with them.

In addition to our direct sales personnel, we sell through sales representatives and distributors in the United States and Asia. We also have applications engineers who support our customer engagements and engage with the customers' system architects and designers to propose and implement our IC and IP solutions to address system design challenges.

In the markets we serve, the time from a design win to production volume shipments of our IC products can range from 18 to 36 months. Networking, communications and security appliance systems can have a product life from a few years to over 10 years once a product like ours has been designed into the system.

Our revenue has been highly concentrated, with a few customers accounting for a significant percentage of our total revenue. For the year ended December 31, 2019, Flextronics, which primarily purchases on behalf of Palo Alto Networks, Inc. and Nokia; Clavis Company our Japanese IC distributor; Sanmina and Palo Alto Networks, represented 30%, 17%, 14% and 13% of total revenue, respectively. For the year ended December 31, 2018, Flextronics, which primarily purchases on behalf of Palo Alto Networks, Inc. and Nokia; Clavis Company, our Japanese IC distributor; Palo Alto Networks; and Nokia, represented 32%, 18%, 18% and 15% of total revenue, respectively.

Intellectual Property

We regard our patents, copyrights, trademarks, trade secrets and similar intellectual property as critical to our success and rely on a combination of patent, trademark, copyright, and trade secret laws to protect our proprietary rights.

As of December 31, 2019, we held 62 U.S. and 34 foreign patents on various aspects of our technology, with expiration dates ranging from 2021 to 2037. We also held 6 pending patent applications in the U.S. and abroad. There can be no assurance that others will not independently develop or patent similar or competing technology or design around any patents that may be issued to us, or that we will be able to successfully enforce our patents against infringement by others.

The semiconductor industry is characterized by frequent litigation regarding patent and other intellectual property rights. Our licensees or we might, from time to time, receive notice of claims that we have infringed patents or other intellectual property rights owned by others. Our successful protection of our patents and other intellectual property rights and our ability to make, use, import, offer to sell, and sell products free from the intellectual property rights of others are subject to a number of factors, particularly those described in Part I, Item 1A, "Risk Factors."

Competition

The markets for our products are highly competitive. We believe that the principal competitive factors are:

- processing speed and performance;
- density and cost;
- power consumption;
- reliability;
- interface requirements;

- ease with which technology can be customized for and incorporated into customers' products; and
- level of technical support provided.

We believe that our products compete favorably with respect to each of these criteria. Our proprietary 1T-SRAM embedded memory and high-speed serial interface IP can provide our Accelerator Engine ICs with a competitive advantage over alternative devices. Alternative solutions are either DRAM or SRAM-based and can support either the memory size or speed requirements of high-performance networking systems, but generally not both. DRAM solutions provide a significant amount of memory at competitive cost, but DRAM solutions do not have the required fast access and cycle times to enable high-performance. The DRAM solutions currently used in networking systems include RLDRAM from Micron Technology, Inc., or Micron, LLDRAM from Renesas, DDR from Samsung Electronics Co., Ltd., Micron and others, and HBM, which is stacked memory from Samsung Electronics Co. and SK Hynix. SRAM solutions can meet high-speed performance requirements, but often lack adequate memory size. The SRAM solutions currently used in networking systems primarily include QDR or similar SRAM products from Cypress Semiconductor Corporation and GSI Technology, Inc. Most of the currently available SRAM and DRAM solutions use a parallel, rather than a serial interface. To offset these drawbacks, system designers generally must use more discrete memory ICs, resulting in higher power consumption and greater utilization of space on the line card.

Our competitors include established semiconductor companies with significantly longer operating histories, greater name recognition and reputation, large customer bases, dedicated manufacturing facilities and greater financial, technical, sales and marketing resources. This may allow them to respond more quickly than us to new or emerging technologies or changes in customer requirements. Generally, customers prefer suppliers with greater financial resources than we have currently. Many of our competitors also have significant influence in the semiconductor industry. They may be able to introduce new technologies or devote greater resources to the development, marketing and sales of their products than we can. Furthermore, in the event of a manufacturing capacity shortage, these competitors may be able to manufacture products when we are unable to do so.

Our Accelerator Engine ICs compete with embedded memory solutions, stand-alone memory ICs, including both DRAM and SRAM ICs, ASICs designed by customers in-house to meet their system requirements, and NPUs that use significant internal memory and customer-designed software to implement tasks. Our prospective customers may be unwilling to adopt and design-in our ICs due to the uncertainties and risks surrounding designing a new IC into their systems and relying on a supplier that has limited history of manufacturing such ICs and limited financial resources. In addition, Accelerator Engine ICs require the customer and its other IC suppliers to implement our chip-to-chip communication protocol, the GCI interface. These parties may be unwilling to do this if they believe it could adversely impact their own future product developments or competitive advantages, or, if they believe it might complicate their development process or increase the cost of their products. To remain competitive, we believe we must provide unparalleled memory IC solutions with the highest bandwidth capability for our target markets, which solutions are engineered and built for high-reliability carrier and enterprise applications.

Our LineSpeed PHY ICs compete with solutions offered by Broadcom Ltd., Inphi Corporation, M/A-COM Technology Solutions Holdings, Inc. and Semtech Corp., as well as other smaller analog signal processing companies. We also may compete with ASICs designed by customers in-house to meet their system requirements, as well as by optical module OEMs. The market for our LineSpeed products is highly competitive, and customers have a number of suppliers they can choose from. We must provide differentiated features with a reasonable IC power budget, while offering competitive pricing. To date, we have had limited success selling and marketing these products.

Manufacturing

We depend on third-party vendors to manufacture, package, assemble and test our IC products, as we do not own or operate a semiconductor fabrication, packaging or production testing facility. By outsourcing manufacturing, we can avoid the high cost associated with owning and operating our own facilities, allowing us to focus our efforts on the design and marketing of our products.

We perform an ongoing review of our product manufacturing and testing processes. Our IC products are subjected to extensive testing to assess whether their performance meets design specifications. Our test vendors provide us with immediate test data and the ability to generate characterization reports that are made available to our customers. We have achieved ISO 9001:2015 certification, and all of our significant manufacturing vendors have also achieved ISO 9001 certification.

Employees

As of December 31, 2019, we had 23 employees all of whom are located in the United States, consisting of 14 in research and development and manufacturing operations and 9 in sales, marketing and general and administrative functions.

Available Information

We were founded in 1991 and reincorporated in Delaware in September 2000. Our website address is www.mosys.com. The information in our website is not incorporated by reference into this report. Through a link on the Investor section of our website, we make available our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, and any amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as soon as reasonably practicable after they are filed with, or furnished to, the Securities and Exchange Commission, or SEC. You can also read any materials submitted electronically by us to the SEC on its website (www.sec.gov), which contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC, including us.

Item 1A. Risk Factors

The following risks could materially and adversely affect our business, financial condition, cash flows, and results of operations, and the trading price of our common stock could decline. These risk factors do not identify all risks that we face. Our operations could also be affected by factors that are not presently known to us or that we currently consider to be immaterial to our operations. Due to risks and uncertainties, known and unknown, our past financial results may not be a reliable indicator of future performance, and historical trends should not be used to anticipate results or trends in future periods. Refer also to the other information set forth in this Annual Report on Form 10-K, including in Part II, Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations" as well as our Consolidated Financial Statements and the related notes in Part II, Item 15.

We have a history of losses and we will need to raise additional capital in the future.

We recorded a net loss of approximately $2.6 million for the year ended December 31, 2019, and ended the period with an accumulated deficit of approximately $238 million. We recorded a net loss of approximately $11.4 million for the year ended December 31, 2018, and ended the period with an accumulated deficit of approximately $236 million. These and prior-year losses have resulted in significant negative cash flows and have required us to raise substantial amounts of additional capital during this period. To remain competitive and expand our product offerings to customers, we will need to increase revenues substantially beyond levels that we have attained in the past in order to generate sustainable operating profit and sufficient cash flows to continue doing business without raising additional capital from time to time. Given our history of fluctuating revenues and operating losses, and the challenges we face in securing customers for our IC products, we cannot be certain that we will be able to achieve and maintain profitability on either a quarterly or annual basis in the future. As a result, we will need to raise additional capital in the future, which may or may not be available to us at all or only on unfavorable terms.

Our failure to raise additional capital or generate the significant capital necessary to expand our operations and invest in new products could reduce our ability to compete and could harm our business.

We intend to continue spending to grow our business. Despite the successful completion of our public offering and repayment of a portion of and extension of the repayment date for our Senior Secured Convertible Notes in October 2018, we still might need to obtain additional financing to pursue our business strategy, develop new products, respond to competition and market opportunities and acquire complementary businesses or technologies, in addition to repaying these notes. There can be no assurance that such additional capital, whether in the form of debt or equity financing, will be sufficient or available and, if available, that such capital will be offered on terms and conditions acceptable to us.

If we were to raise additional capital through sales of our equity securities, our stockholders would suffer dilution of their equity ownership, as exemplified by the substantial share dilution resulting from our October 2018 public offering. If we engage in a subsequent debt financing, we may be required to accept terms that restrict our ability to incur additional indebtedness, prohibit us from paying dividends, repurchasing our stock or making investments, and force us to maintain specified liquidity or other ratios, any of which could harm our business, operating results and financial condition. If we need additional capital and cannot raise it on acceptable terms, we may not be able to, among other things:

- Develop or enhance our products;
- Continue to expand our product development and sales and marketing organizations;
- Acquire complementary technologies, products or businesses;

- Expand operations, in the United States or internationally;
- Hire, train and retain employees; or
- Respond to competitive pressures or unanticipated working capital requirements.

Our failure to successfully market our products could seriously harm our ability to execute our business strategy and may force us to curtail our research and development plans or existing operations.

Our success depends upon the acceptance of our ICs by equipment suppliers to the cloud networking, security and other systems markets. Our prospective customers may be unwilling to adopt and design-in our ICs due to the uncertainties and risks surrounding designing a new IC into their systems and relying on a supplier that has a limited history of manufacturing such ICs. For example, our Accelerator Engine IC products require our customers and their other IC suppliers to implement our proprietary GigaChip chip-to-chip communication protocol, which they may be unwilling to do. In the past, we have experienced reluctance by potential customers to adopt our GigaChip interface. Thus, currently, we do not know whether we will be able to generate adequate profit from making and selling our products.

An important part of our strategy to gain market acceptance is to penetrate new markets by targeting market leaders to accept our IC solutions. This strategy is designed to encourage other participants in those markets to follow these leaders in adopting our solutions. If a high-profile industry participant adopts our ICs for one or more of its products but fails to achieve success with those products, or is unable to successfully implement our ICs, other industry participants' perception of our solutions could be harmed. Any such event could reduce the amount of future sales of our IC products.

Future revenue growth depends on our winning designs with existing and new customers, retaining current customers, and having those customers design our solutions into their product offerings and successfully selling and marketing such products. If we do not continue to win designs in the short term, our product revenue in the following years will not grow.

We sell our ICs to OEM customers that include our ICs in their products. Our technology is generally incorporated into products at the design stage, which we refer to as a design win, and which we define as the point at which a customer has made a commitment to build a board against a fixed schematic for its system, and this board will utilize our ICs. As a result, our future revenue depends on our OEM customers designing our ICs into their products, and on those products being produced in volume and successfully commercialized. If we fail to retain our current customers or convince our current or prospective customers to include our ICs in their products and fail to achieve a consistent number of design wins, our results of operations and business will be harmed. In addition, if a current or prospective customer designs a competitor's offering into its product, it becomes significantly more difficult for us to sell our IC solutions to that customer because changing suppliers involves significant cost, time, effort and risk for the OEM. Even if a customer designs one of our ICs into its product, we cannot be assured that the OEM's product will be commercially successful over time, or at all, or that we will receive or continue to receive any revenue from that customer. Furthermore, the customer product for which we obtain a design win may be canceled before the product enters production or before or after it is introduced into the market. Because of our extended sales cycle, our revenue in future years is highly dependent on design wins we are awarded today. Our lack of capital and uncertainty about our future technology roadmap also may limit our success in achieving additional design wins, as discussed under "We may experience difficulties in transitioning to new wafer fabrication process technologies or in achieving higher levels of design integration, which may result in reduced manufacturing yields, delays in product deliveries and increased costs."

The design win process is generally a lengthy, expensive and competitive process, with no guarantee of revenue, and, if we fail to generate sufficient revenue to offset our expenses, our business and operating results would suffer.

Achieving a design win is typically a lengthy, expensive and competitive process because our customers generally take a considerable amount of time to evaluate our ICs. In the markets we serve, the time from initial customer engagement to design win to production volume shipments can range from two to three years, though it may take longer for new customers or markets we intend to address. In order to win designs, we are required to both incur design and development costs and dedicate substantial engineering resources in pursuit of a single customer opportunity. Even though we incur these costs we may not prevail in the competitive selection process, and, even if we do achieve a design win, we may never generate sufficient, or any, revenue to offset our development expenditures. Our customers have the option to decide whether or not to put our solutions into production after initially designing our products in the specification. The customer can make changes to its product after a design win has been awarded to us, which can have the effect of canceling a previous design win. This occurred in 2018 when a large customer decided to phase out its use of our products. The delays inherent in our protracted sales cycle increase the risk that a customer will decide to cancel, curtail, reduce or delay its product plans, causing us to lose anticipated revenue. In addition, any change, delay or cancellation of a customer's plans could harm our financial results, as we may have incurred significant expense while generating no revenue.

If our foundries do not achieve satisfactory yields or quality, our cost of net revenue will increase, our operating margins will decline and our reputation and customer relationships could be harmed.

We depend not only on sufficient foundry manufacturing capacity and wafer prices, but also on good production yields (the number of good die per wafer) and timely wafer delivery to meet customer demand and maintain profit margins. The fabrication of our products is a complex and technically demanding process. Minor deviations in the manufacturing process can cause substantial decreases in yields and, in some cases, cause production to be suspended. Our foundry, Taiwan Semiconductor Manufacturing Company, or TSMC, from time to time, experiences manufacturing defects and reduced manufacturing yields. Changes in manufacturing processes or the inadvertent use of defective or contaminated materials by our foundries could result in lower than anticipated manufacturing yields, which would harm our revenue or increase our costs. For example, in the past, our foundry produced ICs and met its process specification range but did not meet our customer's specifications causing us to write off a portion of our production lot. Many of these problems are difficult to detect at an early stage of the manufacturing process and may be time consuming and expensive to correct. Poor yields from our foundry, or defects, integration issues or other performance problems in our ICs, could cause us significant customer relations and business reputation problems, harm our operating results and give rise to financial or other damages to our customers. Our customers might consequently seek damages from us for their losses. A product liability claim brought against us, even if unsuccessful, would likely be time consuming and costly to defend.

We may experience difficulties in transitioning to new wafer fabrication process technologies or in achieving higher levels of design integration, which may result in reduced manufacturing yields, delays in product deliveries and increased costs.

We aim to use the most advanced manufacturing process technology appropriate for our solutions that is available from TSMC. As a result, we periodically evaluate the benefits of migrating our solutions to other technologies in order to improve performance and reduce costs. These ongoing efforts require us from time to time to modify the manufacturing processes for our products and to redesign some products, which in turn may result in delays in product deliveries. We are dependent on TSMC to support the production of wafers for future versions of our ICs, as TSMC is our sole foundry. Such production may require changes to TSMC's existing process technology. If TSMC elects to not alter their process technology to support future versions of our ICs, we would need to identify a new foundry.

In addition, our 1T-SRAM technology used in our Accelerator Engine products is not available at process nodes below 40 nanometers. To date, we have not developed any memory products below the 40-nanometer process node. To continue the product roadmap for our Accelerator Engine products, we will need to identify a new foundry and/or no longer use our 1T-SRAM technology. We do not consider this to adversely affect our current product offerings, but we expect to face difficulties, delays and increased expense if we transition our products to new processes and potentially to new foundries for future products. For example, we believe any next generation of products will need to be designed using a more advanced process, which would require us to incur significantly high development costs for mask tooling and computer-aided design software. We currently lack the funds to pay for such development costs. Moreover, an inability to continue our product roadmap can adversely affect, and has in the past affected our efforts to win new customers, secure additional design wins and significantly grow our future revenues.

Because the manufacturing of integrated circuits is extremely complex, the process of qualifying a new foundry is a lengthy process and there can be no assurance that we will be able to find and qualify replacement suppliers without materially adversely affecting our business, financial condition, results of operations and prospects for future growth. We cannot assure you that we will be able to maintain our relationship with our current foundry or develop relationships with new foundries. If we or TSMC experience significant delays in transitioning to smaller geometries or fail to efficiently implement transitions, we could experience reduced manufacturing yields, delays in product deliveries and increased costs, any of which could harm our relationships with our customers and our operating results.

We may not achieve the anticipated benefits of a fabless semiconductor company by developing and bringing to market our IC products.

Our goal is to increase our total available market by creating high-performance ICs for networking communications and data center systems using our proprietary technology and design expertise. In recent years, this development effort has required that we add headcount and design resources, such as expensive software tools, which has increased our losses from, and cash used in, operations. Due to our limited financial resources, we have been unable to sustain these development efforts and curtailed them in 2017. We may not be successful in our development efforts to bring our ICs to market successfully nor be successful in selling ICs due to various risks and uncertainties, including, but not limited to:

- a lack of working capital;
- customer acceptance;
- adoption of the GCI interface, without which our Accelerator Engine products cannot function;
- difficulties and delays in our product development, manufacturing, testing and marketing activities;
- timeliness of new product introductions;
- the anticipated costs and technological risks of developing and bringing ICs to market;
- the willingness of our manufacturing partners to assist successfully with fabrication;
- our ability to qualify our products for mass production and achieve wafer yield levels and the final test results necessary to be price competitive;
- the availability of quantities of ICs supplied by our manufacturing partners at a competitive cost;
- our ability to generate the desired gross margin percentages and return on our product development investment;
- competition from established IC suppliers;
- the adequacy of our intellectual property protection for our proprietary IC designs and technologies;
- customer concerns over our financial condition and viability to be a long-term profitable supplier;
- the vigor and growth of markets served by our current and prospective customers; and
- our lack of recent experience as a fabless semiconductor company making and selling proprietary ICs.

If we experience significant delays in bringing our IC products to market or if customer adoption of our products is delayed, this could have a ma terial adverse effect on our anticipated revenues in upcoming years due to the potential loss of design wins and future revenues. We could experience significant delays in the future.

Our main objective is the development and sale of our products to cloud networking, security, test and video system providers and their subsystem and component vendors and, if demand for these products does not grow, we may not achieve revenue growth and our strategic objectives.

We market and sell our ICs to cloud networking, communications, data center and other equipment providers and their subsystem and component vendors. We believe our future business and financial success depends on market acceptance and increasing sales of these products. In order to meet our growth and strategic objectives, networking infrastructure OEMs must incorporate our products into their systems and the demand for their systems must grow as well. We cannot provide assurance that sales of our products to these OEMs will increase substantially in the future or that the demand for our customers' systems will increase. Our future revenues from these products may not increase in accordance with our growth and strategic objectives if, instead, our OEM customers modify their product designs, select products sold by our competitors or develop their own proprietary ICs. Moreover, demand for their products that incorporate our ICs may not grow or result in significant sales of such products due to factors affecting the customers and their business such as industry downturns, declines in capital spending in the enterprise and carrier markets or unfavorable macroeconomic conditions. Thus, the future success of our business depends in large part on factors outside our control, and sales of our products may not meet our revenue growth and strategic objectives.

Our failure to continue to develop new products and enhance our products on a timely basis could diminish our ability to attract and retain customers.

The existing and potential markets for our products are characterized by ever-increasing performance requirements, evolving industry standards, rapid technological change and product obsolescence. These characteristics lead to periodic changes in customer requirements, shorter product life cycles and changes in industry demands and mandate new product introductions and enhancements to maintain customer engagements and design wins. In order to attain and maintain a significant position in the market, we will need to continue to enhance and evolve our products and the underlying proprietary technologies in anticipation of these market trends although we do not have a large engineering staff.

Our future performance depends on a number of factors, including our ability to:

- identify target markets and relevant emerging technological trends;
- develop and maintain competitive technology by improving performance and adding innovative features that differentiate our products from alternative technologies;
- enable the incorporation of our products into customers' products on a timely basis and at competitive prices;
- develop our products to be manufactured at smaller process geometries; and
- respond effectively to new technological developments or new product introductions by others.

Our failure to enhance our existing IC products and develop future products that achieve broad market acceptance will harm our competitive position and impede our future growth.

Our ICs have a lengthy sales cycle, which makes it difficult to predict su ccess in this market and the timing of future revenue.

Our ICs have a lengthy sales cycle, ranging from six to 24 months from the date of our initial proposal to a prospective customer until the date on which the customer confirms that it has designed our product into its system. An even lengthier period could ensue before we would know the volume of products that such customer will, or is likely to, order. A number of factors can contribute to the length of the sales cycle including technical evaluations of our products by the customers, the design process required to integrate our products into the customers' products and the timing of the customers' new product announcements. In anticipation of product orders, we may incur substantial costs before the sales cycle is complete and before we receive any customer payments. As a result, in the event that a sale is not completed or is cancelled or delayed, we may have incurred substantial expenses, making it more difficult for us to become profitable or otherwise negatively impacting our financial results. Furthermore, because of this lengthy sales cycle, the recording of revenues from our selling efforts may be substantially delayed, our ability to forecast our future revenue may be more limited and our revenue may fluctuate significantly from quarter to quarter. We cannot provide any assurances that our efforts to build a strong and profitable business based on the sale of ICs will succeed. If these efforts are not successful, in light of the substantial resources that we have invested, our future operating results and cash flows could be materially and adversely affected.

The semiconductor industry is cyclical in nature and subject to periodic downturns, which can negatively affect our revenue.

The semiconductor industry is cyclical and has experienced pronounced downturns for sustained periods of up to several years. To respond to any downturn, many semiconductor manufacturers and their customers will slow their research and development activities, cancel or delay new product developments, reduce their workforces and inventories and take a cautious approach to acquiring new equipment and technologies. As a result, our business has been in the past and could be adversely affected in the future by an industry downturn which could negatively impact our future revenue and profitability. Also, the cyclical nature of the semiconductor industry may cause our operating results to fluctuate significantly from year-to-year.

We expect our royalty revenues to decrease compared with our historical results, and there is no guarantee revenues from our IC products will replace these lost revenues in the near future.

We are no longer actively pursuing new license arrangements for our 1T-SRAM technologies, and, as a result, our royalty and other revenues in 2018 declined when compared with prior years. In addition, the production volumes of the current royalty-bearing products shipped by our licensees are expected to decrease; therefore we expect our royalty revenue to decrease in 2020 and future periods. Historically, royalties have generated a 100% gross margin, and any decrease in royalties adversely affects our gross margin, operating results and cash flows.

Our revenue has been highly concentrated among a small number of customers, and our results of operations could be harmed if we lose a key revenue source and fail to replace it.

Our overall revenue has been highly concentrated, with a few customers accounting for a significant percentage of our total revenue. For the year ended December 31, 2019, our three largest customers represented 30%, 17% and 14% of total revenue, respectively. For the year ended December 31, 2018, our three largest customers represented 32%, 18% and 18% of total revenue, respectively. We expect that a relatively small number of customers will continue to account for a substantial portion of our revenue for the foreseeable future.

As a result of this revenue concentration, our results of operations could be adversely affec ted by the decision of a single key customer to cease using our technology or products or by a decline in the number of products that incorporate our technology that are sold by a single licensee or customer or by a small group of licensees or customers.

Our revenue concentration may also pose credit risks which could negatively affect our cash flow and financial condition.

We might also face credit risks associated with the concentration of our revenue among a small number of licensees and customers. As of December 31, 2019, four customers represented 85% of total trade receivables. Our failure to collect receivables from any customer that represents a large percentage of receivables on a timely basis, or at all, could adversely affect our cash flow or results of operations.

Our products must meet exact specifications and defects and failures may occur, which may cause customers to return or stop buying our products.

Our customers generally establish demanding specifications for quality, performance and reliability that our products must meet. However, our products are highly complex and may contain defects and failures when they are first introduced or as new versions are released. If defects and failures occur in our products during the design phase or after, we could experience lost revenues, increased costs, including warranty and customer support expenses and penalties for non-performance stipulated in customer purchase agreements, delays in or cancellations or rescheduling of orders or shipments, product returns or discounts, diversion of management resources or damage to our reputation and brand equity, and in some cases consequential damages, any of which would harm our operating results. In addition, delays in our ability to fill product orders as a result of quality control issues may negatively impact our relationship with our customers. We cannot assure you that we will have sufficient resources to satisfy any asserted claims. Furthermore, any such defects, failures or delays may be particularly damaging to us as we attempt to establish our reputation as a reliable provider of IC products.

Because we sell our products on a purchase order basis and rely on estimated forecasts of our customers' needs, inaccurate forecasts could adversely affect our business.

We sell our IC products pursuant to individual purchase orders rather than long-term purchase commitments. Therefore, we will rely on estimated demand forecasts, based upon input from our customers, to determine how much product to manufacture. Because our sales are based primarily on purchase orders, our customers may cancel, delay or otherwise modify their purchase commitments with little or no notice to us. For these reasons, we will generally have limited visibility regarding our customers' product needs. In addition, the product design cycle for networking OEMs is lengthy and it may be difficult for us to accurately anticipate when they will commence commercial shipments of products that include our ICs.

Furthermore, if we experience substantial warranty claims, our customers may cancel existing orders or cease to place future orders. Any cancellation, delay or other modification in our customers' orders could significantly reduce our revenue, cause our operating results to fluctuate from period to period and make it more difficult for us to predict our revenue. In the event of a cancellation or reduction of an order, we may not have enough time to reduce operating expenses to mitigate the effect of the lost revenue on our business.

If we overestimate customer demand for our products, we may purchase products from our manufacturers that we cannot sell. Conversely, if we underestimate customer demand or if sufficient manufacturing and testing capacity are unavailable, we would forego revenue opportunities and could lose market share in the markets served by our products and could incur penalty payments under our customer purchase agreements. In addition, our inability to meet customer requirements for our products could lead to delays in product shipments, force customers to identify alternative sources and otherwise adversely affect our ongoing relationships with our customers.

We depend on contract manufacturers for a significant portion of our revenue from the sale of our IC products.

Many of our current and prospective OEM customers use third party contract manufacturers to manufacture their systems and these contract manufacturers purchase our products directly from us on behalf of the OEMs. Although we expect to work with our OEM customers in the design and development phases of their systems, these OEMs often give contract manufacturers some authority in product purchasing decisions. If we cannot compete effectively for the business of these contract manufacturers, or if any of the contract manufacturers that work with our OEM customers experience financial or other difficulties in their businesses, our revenue and our business could be adversely affected. For example, if a contract manufacturer becomes subject to bankruptcy proceedings, we may not be able to obtain our products held by the contract manufacturer or recover payments owed to us by the contract manufacturer for products already delivered to the contract manufacturer. If we are unable to persuade contract manufacturers to purchase our products, or if the contract manufacturers are unable to deliver systems with our products to OEMs on a timely basis, our business would be adversely affected.

We rely on independent foundries and contractors for the manufacture, assembly, testing and packaging of our integrated circuits, and the failure of any of these third parties to deliver products or otherwise perform as requested could damage our relationships with our customers and harm our sales and financial results.

As a fabless semiconductor company, we rely on third parties for substantially all of our manufacturing operations. We depend on these parties to supply us with material in a timely manner that meets our standards for yield, cost and quality. We do not have long-term supply contracts with any of our suppliers or manufacturing service providers, and therefore they are not obligated to manufacture products for us for any specific period, in any specific quantity or at any specified price except as may be provided in a particular purchase order. Any problems with our manufacturing supply chain could adversely impact our ability to ship our products to our customers on time and in the quantity required which in turn could damage our customer relationships and impede market acceptance of our IC solutions.

Our third-party wafer foundries and testing and assembly vendors are located in regions at high risk for earthquakes and other natural disasters. Any disruption to the operations of these foundries and vendors resulting from earthquakes or other natural disasters could cause significant delays in the development, production, shipment and sales of our IC products.

TSMC, which manufactures our products, is located in Asia, as are other foundries we may use in the future. Our vendors that provide substrates and wafer sorting and handle the testing of our products are headquartered in either Asia or the San Francisco Bay Area of California. Our primary manufacturing operations are located in San Jose, California. The risk of an earthquake in the Pacific Rim region is significant due to the proximity of major earthquake fault lines. The occurrence of earthquakes or other natural disasters could result in the disruption of the wafer foundry or assembly and test capacity of the third parties that supply these services to us and may impede our research and development efforts as well as our ability to market and sell our products. We may not be able to obtain alternate capacity on favorable terms, if at all.

We face risks related to health epidemics which could adversely affect our business and results of operations.

Our business could be materially adversely affected by a widespread outbreak of contagious disease, including the recent outbreak of respiratory illness caused by a novel coronavirus first identified in China, known as COVID-19. We rely on TSMC and other suppliers, manufacturers and subcontractors located in nearby Taiwan for the manufacturing of our products. The effects of this outbreak could include disruptions or restrictions on our employees' ability to travel in Asia and other affected regions, as well as temporary closures of the facilities of our suppliers, customers, or other vendors in our supply chain, which could impact our business, interactions and relationships with our customers, third-party suppliers and contractors, and results of operations. In addition, a significant outbreak of contagious diseases in the human population could result in a widespread health crisis that could adversely affect the economies and financial markets of many countries, resulting in an economic downturn that could reduce the demand for our products and likely impact our results of operations.

Any claim that our products or technology infringe third party intellectual property rights could increase our costs of operation and distract management and could result in expensive settlement costs or the discontinuance of our technology licensing or product offerings. In addition, we may incur substantial litigation expense which would adversely affect our profitability.

The semiconductor industry is characterized by vigorous protection and pursuit of intellectual property rights or positions which has resulted in often protracted and expensive litigation. We are not aware of any third party intellectual property that our products or technology would infringe. However, like many companies of our size with limited resources, we have not searched for all potentially applicable intellectual property in the public databases. It is possible that a third party now has, or may in the future obtain, patents or other intellectual property rights that our products or technology may now, or in the future, infringe. Our licensees and IC customers, or we, might, from time to time, receive notice of claims that we have infringed patents or other intellectual property rights of others. Litigation against us can result in significant expense and divert the efforts of our technical and management personnel whether or not the litigation has merit or results in a determination adverse to us.

The discovery of defects in our technology and products could expose us to liability for damages.

The discovery of a defect in our technologies and products could lead our customers to seek damages from us. Many of our agreements with customers include provisions waiving implied warranties regarding our technology and products and limiting our liability to our customers. We cannot be certain, however, that the waivers or limitations of liability contained in our agreements with customers will be enforceable.

Royalty amounts owed to us might be difficult to verify, and we might find it difficult, expensive and time-consuming to enforce our license agreements.

The standard terms of our 1T-SRAM license agreements require our licensees to document the manufacture and sale of products that incorporate our technology and generally report this data to us after the end of each quarter. We have the right to audit these royalty reports periodically, although we have not conducted any such audits recently. These audits can be expensive, time-consuming and potentially detrimental to our business relationships. A failure to fully enforce the royalty provisions of our license agreements could cause our revenue to decrease and impede our ability to achieve and maintain profitability.

We might not be able to protect and enforce our intellectual property rights which could impair our ability to compete and reduce the value of our technology.

Our technology is complex and is intended for use in complex ICs and networking systems. Our licensees' products utilize our embedded memory and/or interface technology and a large number of companies manufacture and market these products. Because of these factors, policing the unauthorized use of our intellectual property is difficult and expensive. We cannot be certain that we will be able to detect unauthorized use of our technology or prevent other parties from designing and marketing unauthorized products based on our technology. In the event we identify any past or present infringement of our patents, copyrights or trademarks, or any violation of our trade secrets, confidentiality procedures or licensing agreements, we cannot assure you that the steps taken by us to protect our proprietary information will be adequate to prevent misappropriation of our technology. Our inability to adequately protect our intellectual property would reduce significantly the barriers of entry for directly competing technologies and could reduce the value of our technology. Furthermore, we might initiate claims or litigation against third parties for infringement of our proprietary rights or to establish the validity of our proprietary rights. Litigation by us could result in significant expense and divert the efforts of our technical and management personnel whether or not such litigation results in a determination favorable to us.

Our existing patents might not provide us with sufficient protection of our intellectual property, and our patent applications might not result in the issuance of patents, either of which could reduce the value of our core technology and harm our business.

We rely on a combination of patents, trademarks, trade secret laws and confidentiality procedures to protect our intellectual property rights. We cannot be sure that any patents will be issued from any of our pending applications or that any claims allowed from pending applications will be of sufficient scope or strength, or issued in all countries where our products can be sold, to provide meaningful protection or any commercial advantage to us. Failure of our patents or patent applications to provide meaningful protection might allow others to utilize our technology without any compensation to us.

If we fail to retain key personnel, our business and growth could be negatively affected.

Our business has been dependent to a significant degree upon the services of a small number of executive officers and technical employees. The loss of key personnel could negatively impact our technology development efforts, our ability to deliver products under our existing agreements, maintain strategic relationships with our partners and obtain new customers. We generally have not entered into employment or non-competition agreements with any of our employees and do not maintain key-man life insurance on the lives of any of our key personnel.

We may incur additional debt in the future, subject to certain limitations contained in our Senior Secured Convertible Notes.

The degree to which we are leveraged and the restrictions governing our indebtedness could have important consequences including, but not limited to:

- limiting our ability to service all of our debt obligations;
- impacting our ability to incur additional indebtedness or obtain additional financing in the future for working capital, capital expenditures, acquisitions or general corporate or other purposes;
- increasing our vulnerability to general economic downturns and adverse industry conditions;
- limiting our flexibility in planning for, or reacting to, changes in our business and our industry; and
- limiting our ability to engage in certain transactions or capitalize on acquisition or other business opportunities.

If we are in violation of the terms of our Senior Secured Convertible Notes in the future and do not receive a waiver, the note holders could choose to accelerate payment on all outstanding loan balances. If we needed to obtain replacement financing, we may not be able to quickly obtain equivalent or suitable replacement financing. If we are unable to secure alternative sources of funding, such acceleration would have a material adverse impact on our financial condition.

Provisions of our certificate of incorporation and bylaws or Delaware law might delay or prevent a change-of-control transaction and depress the market price of our stock.

Various provisions of our certificate of incorporation and bylaws might have the effect of making it more difficult for a third party to acquire, or discouraging a third party from attempting to acquire, control of our company. These provisions could limit the price that certain investors might be willing to pay in the future for shares of our common stock. Certain of these provisions eliminate cumulative voting in the election of directors, limit the right of stockholders to call special meetings and establish specific procedures for director nominations by stockholders and the submission of other proposals for consideration at stockholder meetings.

We are also subject to provisions of Delaware law that could delay or make more difficult a merger, tender offer or proxy contest involving our company. In particular, Section 203 of the Delaware General Corporation Law prohibits a Delaware corporation from engaging in any business combination with any interested stockholder for a period of three years unless specific conditions are met. Any of these provisions could have the effect of delaying, deferring or preventing a change in control, including without limitation, discouraging a proxy contest or making more difficult the acquisition of a substantial block of our common stock.

Under our certificate of incorporation, our board of directors may issue up to 20,000,000 shares of preferred stock without stockholder approval on such terms as the board might determine. The rights of the holders of common stock will be subject to, and might be adversely affected by, the rights of the holders of any preferred stock that might be issued in the future.

Our stockholder rights plan could prevent stockholders from receiving a premium over the market price for their shares from a potential acquirer.

We adopted a stockholder rights plan that generally entitles our stockholders to rights to acquire additional shares of our common stock when a third party acquires 15% of our common stock or commences or announces its intent to commence a tender offer for at least 15% of our common stock. The plan also includes an exception to permit the acquisition of shares representing more than 15% of our common stock by a brokerage firm that manages independent customer accounts and generally does not have any discretionary voting power with respect to such shares. This plan could delay, deter or prevent an investor from acquiring us in a transaction that could otherwise result in stockholders receiving a premium over the market price for their shares of common stock. Our intention is to maintain and enforce the terms of this plan, which could delay, deter or prevent an investor from acquiring us in a transaction that could otherwise result in stockholders receiving a premium over the market price for their shares of common stock.

Potential volatility of the price of our common stock could negatively affect your investment.

We cannot assure you that there will continue to be an active trading market for our common stock. Historically, the stock market, as well as our common stock, has experienced significant price and volume fluctuations. Market prices of securities of technology companies have been highly volatile and frequently reach levels that bear no relationship to the operating performance of such companies. These market prices generally are not sustainable and are subject to wide variations. If our common stock trades to unsustainably high levels, it is likely that the market price of our common stock will thereafter experience a material decline.

In the past, securities class action litigation has often been brought against a company following periods of volatility in the market price of its securities. We could be the target of similar litigation in the future. Securities litigation could cause us to incur substantial costs, divert management's attention and resources, harm our reputation in the industry and the securities markets and negatively impact our operating results.

We are a "smaller reporting company" and, as a result of the reduced disclosure and governance requirements applicable to smaller reporting companies, our common stock may be less attractive to investors.

We are a "smaller reporting company," and are subject to lesser disclosure obligations in our SEC filings compared to other issuers. Specifically, "smaller reporting companies" are able to provide simplified executive compensation disclosures in their filings, are exempt from the provisions of Section 404(b) of the Sarbanes-Oxley Act requiring that independent registered public accounting firms provide an attestation report on the effectiveness of internal control over financial reporting and have certain other decreased disclosure obligations in their SEC filings, including, among other things, only being required to provide two years of audited financial statements in annual reports. Decreased disclosures in our SEC filings due to our status as a "smaller reporting company" may make it harder for investors to analyze our operating results and financial prospects.

If we fail to maintain compliance with the continued listing requirements of the Nasdaq Stock Market, our common stock may be delisted and the price of our common stock and our ability to access the capital markets could be negatively impacted.

Our common stock currently trades on the Nasdaq Stock Market under the symbol "MOSY." This market has continued listing standards that we must comply with in order to maintain the listing of our common stock. The continued listing standards include, among others, a minimum bid price requirement of $1.00 per share and any of: (i) a minimum stockholders' equity of $2.5 million; (ii) a market value of listed securities of at least $35.0 million; or (iii) net income from continuing operations of $500,000 in the most recently completed fiscal year or in the two of the last three fiscal years. Our results of operations and fluctuating stock price directly impact our ability to satisfy these continued listing standards. In the event we are unable to maintain these continued listing standards, our common stock may be subject to delisting from the Nasdaq Stock Market.

If we were to be delisted, we would expect our common stock to be traded in the over-the-counter market which could adversely affect the liquidity of our common stock. Additionally, we could face significant material adverse consequences, including:

- a limited availability of market quotations for our common stock;
- a reduced amount of analyst coverage;
- a decreased ability to issue additional securities or obtain additional financing in the future;
- reduced liquidity for our stockholders;
- potential loss of confidence by customers, collaboration partners and employees; and
- loss of institutional investor interest.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

Our principal administrative, sales, marketing, support and research and development functions are located in a leased facility in San Jose, California. We currently occupy approximately 10,000 square feet of space in the San Jose facility, and the lease extends through October 2020. We believe that our existing facility is adequate to meet our current needs.

Item 3. Legal Proceedings

The information set forth under the “Legal Matters” subheading in Note 9 (Commitments and Contingencies) of the Notes to Consolidated Financial Statements in Part II, Item 15, of this Annual Report on Form 10-K is incorporated herein by reference.

Item 4. Mine Safety Disclosures

Not applicable.

Part II

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

Our common stock is currently listed on the NASDAQ Stock Market under the symbol MOSY.

Holders of Record

As of December 31, 2019, there were three holders of record of our common stock. The actual number of stockholders is significantly greater than this number of record stockholders and includes stockholders who are beneficial owners but whose shares are held in street name by brokers and other nominees. This number of stockholders of record also does not include stockholders whose shares may be held in trust by other entities.

Securities Authorized for Issuance under Equity Compensation Plan

For information regarding securities authorized for issuance under equity compensation plans, please refer to Item 12—Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters.

Item 6. Selected Financial Data

Not applicable.

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

This Management's Discussion and Analysis of Financial Condition and Results of Operations should be read in conjunction with the accompanying consolidated financial statements and notes included in this report.

Overview

Our strategy and primary business objective is to be a profitable IP-rich fabless semiconductor company offering ICs and related software and IP that deliver unparalleled memory bandwidth and access rate performance for high-performance data processing in cloud networking, communications, security appliances, video, test and monitoring, and data center systems. Our solutions deliver time-to-market, performance, power, area and economic benefits for system original equipment manufacturers, or OEMs. Our primary product line is marketed under the Accelerator Engine name and comprises our Bandwidth Engine and Programmable HyperSpeed Engine IC products, which integrate our proprietary, 1T-SRAM high-density embedded memory and a highly-efficient serial interface protocol resulting in a monolithic memory IC solution optimized for memory bandwidth and transaction access performance. Our second-generation Bandwidth Engine, or Bandwidth Engine 2, products are expected to be our primary revenue source through at least 2021, and we expect these products to continue to generate significant revenue thereafter. As we are not developing new IC products, from a product development perspective, we continue to leverage our current technologies and core competencies to expand our product offerings without incurring significant additional R&D expenses. Recently, we announced our new Software Accelerator product line consisting of software and IP available for license. This new product line will include multiple function accelerator platform products, which target specific application functions and will use a common software interface to allow performance scalability over multiple hardware environments. These function accelerator platform products are hardware agnostic and operate with or without one of our Accelerator Engine ICs. This software-defined, hardware-accelerated platform architecture utilizes an internally developed graphical memory engine architecture to provide flexible data classification and analysis capability. We believe the technology will generate new opportunities that require less up-front architectural changes by system designers and provide a scalable performance roadmap of options using our Accelerator Engine ICs. We expect our initial software accelerator products to be available for license in the first half of 2020. Despite our limited new IC product development efforts, we believe our current hardware and software/firmware product portfolio positions us for future growth and profitability. We will continue to seek third-party funding for new product development efforts.

We incurred net losses of approximately $2.6 million and $11.4 million for the years ended December 31, 2019 and 2018, respectively, and had an accumulated deficit of approximately $238 million as of December 31, 2019. These and prior year losses have resulted in significant negative cash flows for almost a decade and have necessitated that we raise substantial amounts of additional capital during this period. To date, we have primarily financed our operations through multiple offerings of common stock to investors and affiliates, as well as asset sale transactions and one offering of convertible notes.

We may continue to incur operating losses and will need to increase revenues substantially beyond levels that we have attained in the past in order to generate sustainable operating profit and sufficient cash flows to continue doing business without raising additional capital from time to time.

Critical Accounting Policies and Use of Estimates

Our consolidated financial statements are prepared in conformity with accounting principles generally accepted in the United States of America. Note 1 to the consolidated financial statements in Item 15 of this report describes the significant accounting policies and methods used in the preparation of our consolidated financial statements.

We have identified the accounting policies below as some of the more critical to our business and the understanding of our results of operations. These policies may involve estimates and judgments that affect the reported amounts of assets, liabilities, revenues and expenses. Although we believe our judgments and estimates are appropriate, actual future results may differ from our estimates, and if different assumptions or conditions were to prevail, the results could be materially different from our reported results.

Revenue Recognition

We adopted Financial Accounting Standards Board ("FASB") Accounting Standards Codification Topic 606, Revenue from Contracts with Customers and all its related amendments ("ASC 606"), on January 1, 2018 using the modified retrospective method. We recognized the cumulative effect of initially applying the new revenue standard as an adjustment to the opening balance of accumulated deficit as of January 1, 2018. The comparative information for 2017 has not been recast and continues to be reported under the accounting standards in effect for that period. See Note 1 to the consolidated financial statements in Item 15 of this report for an additional description of our recognition of the cumulative effect upon the adoption of ASC 606.

We generate revenue primarily from sales of IC products and licensing of our intellectual property. Revenues are recognized when control is transferred to customers in amounts that reflect the consideration we expect to be entitled to receive in exchange for those goods. Revenue recognition is evaluated through the following five steps: (i) identification of the contract, or contracts, with a customer; (ii) identification of the performance obligations in the contract; (iii) determination of the transaction price; (iv) allocation of the transaction price to the performance obligations in the contract; and (v) recognition of revenue when or as a performance obligation is satisfied.

IC products

Revenue is recognized when performance obligations under the terms of a contract with a customer are satisfied.

The majority of our contracts have a single performance obligation to transfer products. Accordingly, we recognize revenue when title and risk of loss have been transferred to the customer, generally at the time of shipment of products. Revenue is measured as the amount of consideration we expect to receive in exchange for transferring products and is generally based upon a negotiated, formula, list or fixed price. We sell our products both directly to customers and through distributors generally under agreements with payment terms typically 60 days or less.

We may record an estimated allowance, at the time of shipment, for future returns and other charges against revenue consistent with the terms of sale.

Royalty and other

Our licensing contracts typically provide for royalties based on the licensee's use of our memory technology in its currently shipping commercial products. With the adoption of ASC 606 in January 2018, we estimate our royalty revenue in the calendar quarter in which the licensee uses the licensed technology. Payments are received in the subsequent quarter

Fair Value Measurements of Financial Instruments

We measure the fair value of financial instruments using a fair value hierarchy that prioritizes the inputs to valuation techniques used to measure fair value into three broad levels, as follows:

Level 1—Inputs used to measure fair value are unadjusted quoted prices that are available in active markets for the identical assets or liabilities as of the reporting date.

Level 2—Pricing is provided by third party sources of market information obtained from investment advisors rather than models. We do not adjust for or apply any additional assumptions or estimates to the pricing information we receive from advisors. Our Level 2 securities include cash equivalents and available-for-sale securities, which consisted primarily of corporate debt, and government agency and municipal debt securities from issuers with high quality credit ratings. Our investment advisors obtain pricing data from independent sources, such as Standard & Poor's, Bloomberg and Interactive Data Corporation, and rely on comparable pricing of other securities because the Level 2 securities we hold are not actively traded and have fewer observable transactions. We consider this the most reliable information available for the valuation of the securities.

Level 3—Unobservable inputs that are supported by little or no market activity and reflect the use of significant management judgment are used to measure fair value. These values are generally determined using pricing models for which the assumptions utilize management's estimates of market participant assumptions. The determination of fair value for Level 3 investments and other financial instruments involves the most management judgment and subjectivity.

Valuation of long-lived Assets

We evaluate our long-lived assets for impairment at least annually, or more frequently when a triggering event is deemed to have occurred. This assessment is subjective in nature and requires significant management judgment to forecast future operating results, projected cash flows and current period market capitalization levels. If our estimates and assumptions change in the future, it could result in a material write-down of long-lived assets. We amortize our finite-lived intangible assets, such as developed technology and patent license, on a straight-line basis over their estimated useful lives of three to seven years. We recognize an impairment charge as the difference between the net book value of such assets and the fair value of the assets on the measurement date.

Goodwill

We determine the amount of potential goodwill impairment by comparing the fair value of the reporting unit with its carrying amount. To the extent the carrying value of a reporting unit exceeds its fair value, a goodwill impairment charge is recognized. We have determined that we have a single reporting unit for purposes of performing our goodwill impairment test. As we use the market approach to determine the step one fair value, the price of our common stock is an important component of the fair value calculation. We review goodwill for impairment on an annual basis or whenever events or changes in circumstances indicate the carrying value of an asset may not be recoverable. We first assess qualitative factors to determine whether it is more-likely-than-not that the fair value of the reporting unit is less than the carrying amount as a basis for determining whether it is necessary to perform an impairment test.

We performed our annual test for goodwill impairment as of September 1, 2019, and, due to a decrease in the price per share of our common stock, the test results indicated the goodwill carrying value was greater than its implied fair value. Further, the Company concluded a triggering event had occurred due to the sustained decrease in the price per share of its common stock and related reduced market capitalization as of September 30, 2019 and performed an additional test for impairment of its goodwill asset resulting in further indication that the goodwill carrying value was still greater than its implied fair value. As a result of both of these tests, the Company recorded non-cash impairment charges of $0.4 million during the third quarter of 2019. As a result of these charges, the Company's goodwill balance was reduced to zero as of September 30, 2019.

Deferred tax valuation allowance

When we prepare our consolidated financial statements, we estimate our income tax liability for each of the various jurisdictions where we conduct business. This requires us to estimate our actual current tax exposure and to assess temporary differences that result from differing treatment of certain items for tax and accounting purposes. These differences result in deferred tax assets, which we show on our consolidated balance sheet under the category of other assets. The net deferred tax assets are reduced by a valuation allowance if, based upon weighted available evidence, it is more likely than not that some or all of the deferred tax assets will not be realized. We must make significant judgments to determine our provision for income taxes, our deferred tax assets and liabilities and any valuation allowance to be recorded against our net deferred tax asset. We believe that utilization of our net operating loss and tax credit carryforwards, which comprise the majority of our deferred tax assets, may be subject to a substantial annual limitation due to the ownership change limitations provided by the Internal Revenue Code and similar state provisions. See Note 4 to the consolidated financial statements in Item 15 of this report for an additional description of these limitations.

Stock-based compensation

We recognize stock-based compensation for equity awards on a straight-line basis over the requisite service period, usually the vesting period, based on the grant-date fair value. We estimate the value of employee stock options on the date of grant using the Black-Scholes model. The determination of fair value of share-based pa yment awards on the date of grant using an option-pricing model is affected by our stock price, as well as assumptions regarding a number of highly complex and subjective variables. These variables include, but are not limited to, the expected stock price volatility over the term of the awards, and actual and projected employee stock option exercise behaviors. The expected term of options granted is derived from historical data on employee exercises and post-vesting employment termination behavior. The expected volatility is based on the historical volatility of our stock price.

Results of Operations

Net Revenue

	Years Ended December 31,			Year-Over-Year Change			
	2019	2018	2017	2018 to 2019		2017 to 2018	
	(dollar amounts in thousands)						
Product	$ 9,377	$ 15,053	$ 7,833	$ (5,676)	(38)%	$ 7,220	92%
Percentage of total net revenue	93%	91%	89%				

Product revenue decreased in 2019 compared with 2018 due to reduced shipments of our Bandwidth engine products. Specifically, we completed final shipments of our Bandwidth Engine 1 product in the first half of 2019 and experienced reduced shipments to some of our large Bandwidth Engine 2 IC customers. The increase from 2017 to 2018 was due to increased volume of shipments for our ICs, mainly Bandwidth Engine products, as additional customer design wins commenced production.

	Years Ended December 31,			Year-Over-Year Change			
	2019	2018	2017	2018 to 2019		2017 to 2018	
	(dollar amounts in thousands)						
Royalty and other	$ 709	$ 1,547	$ 1,009	$ (838)	(54)%	$ 538	53%
Percentage of total net revenue	7%	9%	11%				

Royalty and other revenue primarily comprises revenue generated from licensing agreements. The decrease from 2018 to 2019 was primarily due to a reduction in revenue from a one-time license and service agreement entered into in 2017 for our analog technology. The increase from 2017 to 2018 was primarily due to a one-time license and service agreement entered into in 2017 for our analog technology, partially offset by a decline in royalty revenue.

Cost of Net Revenue and Gross Profit

	Years Ended December 31,			Year-Over-Year Change			
	2019	2018	2017	2018 to 2019		2017 to 2018	
	(dollar amounts in thousands)						
Cost of net revenue	$ 3,931	$ 6,346	$ 4,694	$ (2,415)	(38)%	$ 1,652	35%
Percentage of total net revenue	39%	38%	53%				

	Years Ended December 31,			Year-Over-Year Change			
	2019	2018	2017	2018 to 2019		2017 to 2018	
	(dollar amounts in thousands)						
Gross profit	$ 6,155	$ 10,254	$ 4,148	$ (4,099)	(40)%	$ 6,106	147%
Percentage of total net revenue	61%	62%	47%				

In each of 2019, 2018 and 2017, cost of net revenue primarily consisted of direct and indirect costs related to the sale of IC products.

Cost of net revenue decreased in 2019 from 2018 due to decreased product shipments. The increase in 2018 from 2017 was primarily due to the increase in material and production costs related to our increased IC shipments, partially offset by inventory write-downs recorded in 2017.

Gross profit decreased from 2018 to 2019 primarily due to the decrease in IC shipments and the decrease in our royalty and other revenue, which generally has no associated costs. Gross profit increased from 2017 to 2018 primarily due to the increase in IC shipments and improved manufacturing efficiencies and reduced material purchase prices as well as the increase in royalty and other revenues , which generally have little to no associated cost.

Research and Development

	Years Ended December 31,			Year-Over-Year Change			
	2019	2018	2017	2018 to 2019		2017 to 2018	
	(dollar amounts in thousands)						
Research and development	$ 4,182	$ 4,129	$ 8,158	$ 53	1%	$ (4,029)	(49)%
Percentage of total net revenue	41%	25%	92%				

Our research and development expenses include costs related to the development of our IC and software acceleration products. We expense research and development costs as they are incurred.

Research and development expenses increased slightly in 2019 compared with 2018 primarily due to increased personnel costs and higher development expenses for our Bandwidth Engine 3 and LineSpeed products in the first half of the year, which were offset by a decrease in depreciation and amortization expenses. The decrease in 2018 compared with 2017 was primarily due to our restructuring activities in 2017 that resulted in a significant decrease in headcount and related salaries and expenses and lower computer-aided software license fees, backend, depreciation and equipment rental charges.

Research and development expenses included stock-based compensation expenses of $0.1 million, $0.3 million and $0.4 million for the years ended December 31, 2019, 2018 and 2017, respectively. We expect that total research and development expenses will remain consistent in 2020.

Selling, General and Administrative (SG&A)

	Years Ended December 31,			Year-Over-Year Change			
	2019	2018	2017	2018 to 2019		2017 to 2018	
	(dollar amounts in thousands)						
SG&A	$ 4,016	$ 4,095	$ 4,702	$ (79)	(2)%	$ (607)	(13)%
Percentage of total net revenue	40%	25%	53%				

Selling, general and administrative expenses consist primarily of personnel and related overhead costs for sales, marketing, finance, human resources and general management.

Selling, general and administrative expenses decreased slightly for 2019, compared with the prior year, primarily as a result of reduced legal, sales commissions and stock based compensation expenses, offset by increased consulting fees and advertising and promotion.

Selling, general and administrative expenses decreased for 2018, compared with the prior year, primarily as a result of our 2017 restructuring activities, which resulted in a decrease in related salaries and expenses, as well as a decrease in franchise taxes.

Selling, general and administrative expenses included stock-based compensation expense of $0.2 million, $0.3 million and $0.3 million for the years ended December 31, 2019, 2018 and 2017, respectively. We expect total selling, general and administrative expenses to increase in 2020 due to increased sales and marketing efforts, as we expand our sales channels.

Impairment of Goodwill

	Years Ended December 31,			Year-Over-Year Change			
	2019	2018	2017	2018 to 2019		2017 to 2018	
	(dollar amounts in thousands)						
Impairment of goodwill	$ 420	$ 12,856	$ —	$ (12,436)	(97)%	$ 12,856	—
Percentage of total net revenue	4%	77%	0%				

In 2019 and 2018, we recorded goodwill impairment charges. See Note 1 of the consolidated financial statements in Item 15 of this Report for additional disclosure.

Interest expense

	Years Ended December 31,			Year-Over-Year Change			
	2019	2018	2017	2018 to 2019		2017 to 2018	
	(dollar amounts in thousands)						
Interest expense	$ 220	$ 582	$ 927	$ (362)	(62)%	$ (345)	(37)%
Percentage of total net revenue	2%	4%	10%				

Interest expense is incurred on our senior secured convertible notes. We have paid all accumulated interest since issuance of the convertible notes in March 2016 in-kind through the issuance of new senior-secured convertible notes subject to the same terms and conditions. See Note 11 in the consolidated financial statements in Item 15 of this Report for additional disclosure.

Liquidity and Capital Resources

As of December 31, 2019, we had cash, cash equivalents and short-term investments totaling $6.4 million compared with cash and cash equivalents of $7.1 million as of December 31, 2018. We believe that cash generated from our liquidity sources will be sufficient to meet our working capital and capital expenditure needs for at least the next 12 months.

In 2019, we used $0.7 million in cash from operating activities, which primarily resulted from the net loss of $2.6 million, adjusted for non-cash charges and gains, which included goodwill impairment of $0.4 million, stock-based compensation expenses of $0.3 million, depreciation and amortization expenses of $0.2 million, accrued interest of $0.2 million, and changes to operating assets and liabilities of approximately $0.8 million. The changes in assets and liabilities primarily related to the timing of the collection of receivables from customers and payments to vendors, including decreases in inventory.

In 2018, we generated $0.3 million in cash from operating activities, which primarily resulted from the net loss of $11.4 million, adjusted for non-cash charges and gains, which included goodwill impairment of $12.9 million, stock-based compensation expenses of $0.7 million, depreciation and amortization expenses of $0.7 million, accrued interest of $0.6 million, and changes to operating assets and liabilities of $3.1 million. The changes in assets and liabilities primarily related to the timing of the collection of receivables from customers and payments to vendors, including purchases of and increases in inventory.

In 2017, we used $7.6 million in operating activities, which primarily resulted from the net loss of $10.7 million, adjusted for non-cash charges and gains, which included stock-based compensation expenses of $0.7 million, depreciation and amortization expenses of $0.9 million, accrued interest of $0.9 million, and changes to operating assets and liabilities of $0.6 million. The changes in assets and liabilities primarily related to the timing of the collection of receivables from customers and payments to vendors, including purchases of and increases in inventory.

The majority of net cash used in investing activities in 2019 was due to the purchase of short-term investments of $1.6 million, which did not affect our liquidity, partially offset by proceeds from the maturities of short-term investments of $1.3 million. The majority of net cash provided by investing activities in 2017 was due to the proceeds from the maturities of marketable securities of $2.6 million, partially offset by the purchase of marketable securities of $1.6 million which did not affect our liquidity. The remaining investing activities in 2019, 2018 and 2017 consisted of $0.1 million, $0.1 million and $0.3 million, respectively, expended for purchases of fixed assets.

Our financing activities in 2018 primarily consisted of $10.4 million in net proceeds received from the sale of common stock and warrants to purchase common stock in an equity offering completed in October 2018, which were used to repay $7.4 million of our convertible debt. Our financing activities in 2017 primarily consisted of $2.0 million in net proceeds received from the sale of common stock and warrants to purchase common stock in an equity offering completed in July 2017.

Our future liquidity and capital requirements are expected to vary from quarter to quarter, depending on numerous factors, including:

- level of revenue;
- cost, timing and success of technology development efforts;
- inventory levels, timing of product shipments and length of billing and collection cycles;
- fabrication costs, including mask costs, of our ICs, currently under development;
- variations in manufacturing yields, materials costs and other manufacturing risks;
- costs of acquiring other businesses and integrating the acquired operations;
- profitability of our business; and
- whether interest payments on the Notes are paid in cash or, at our election, in kind through the issuance of new Notes with identical terms for the accrued interest.

Working Capital

Our primary need for liquidity is to fund working capital requirements of our businesses, capital expenditures and for general corporate purposes. We expect our cash expenditures to exceed receipts in 2020, as our revenues will not be sufficient to offset our working capital requirements. We incurred net losses of approximately $2.6 million and $11.4 million for the years ended December 31, 2019 and 2018, respectively, and had an accumulated deficit of approximately $238 million as of December 31, 2019. These and prior year losses have resulted in significant negative cash flows for more than a decade and have required us to raise substantial amounts of additional capital during this period. To date, we have primarily financed our operations through multiple offerings of common stock to investors and affiliates, as well as asset sale transactions. In March 2016, we entered into a 10% Senior Secured Convertible Note Purchase Agreement with the purchasers of $8.0 million principal amount of 10% Senior Secured Convertible Notes due August 15, 2018 (the Notes), at par, in a private placement transaction. Accrued interest was payable semi-annually in cash or in-kind through the issuance of identical new Notes, or with a combination of the two, at the Company’s option. Through February 15, 2020, the Company had made the interest payments in-kind through the issuance of additional notes totaling approximately $2.3 million. In October 2018, we used proceeds received in an equity offering to repay $7.4 million of the Notes. As of December 31, 2019, the outstanding balance of the Notes approximated $2.9 million.

Additionally, pursuant to amendments to the Notes and related loan documents effective in 2018, the interest rate was reduced to 8%, the maturity date of the Notes was extended to August 15, 2023, the optional conversion price has been reduced from $170.00 of Note principal per share of common stock to $11.434 of Note principal per share of common stock, and the redemption purchase price in the event of certain transactions, such as an acquisition, has been reduced from 120% to 100% of the total amount of debt to be redeemed. The Notes restrict our ability to incur any indebtedness for borrowed money, unless such indebtedness by its terms is expressly subordinated to the Notes in right of payment and to the security interest of the Note holder(s) in respect to the priority and enforcement of any security interest in our property securing such new debt; provided that the Note holder(s) security interest and cash payment rights under the Notes shall be subordinate to a maximum of $5 million of indebtedness for a secured accounts receivable line of credit facility under certain conditions. (See Note 11 to the consolidated financial statements included in Item 15 of this Report.)

We expect to raise additional capital, but there can be no assurance that such funding will be available to us on favorable terms, if at all. The failure to raise capital when needed could have a material adverse effect on our business and financial condition. We may not be able to obtain additional financing as needed on acceptable terms, or at all, which may require us to reduce our operating costs and other expenditures, including reductions of personnel, salaries and capital expenditures. Alternatively, or in addition to such potential measures, we may elect to implement additional cos t reduction actions as we may determine are necessary and in our best interests. Any such actions undertaken might limit our opportunities to realize plans for revenue growth and we might not be able to reduce our costs in amounts sufficient to achieve break-even or profitable operations.

If we were to raise additional capital through sales of our equity securities, our stockholders would suffer dilution of their equity ownership. If we engage in debt financing, we may be required to accept terms that restrict our ability to incur additional indebtedness, prohibit us from paying dividends, repurchasing our stock or making investments, and force us to maintain specified liquidity or other ratios, any of which could harm our business, operating results and financial condition. If we need additional capital and cannot raise it on acceptable terms, we may not be able to, among other things:

- develop or enhance our products;
- expand our product development and sales and marketing organizations;
- acquire complementary technologies, products or businesses;
- expand operations;
- hire, train and retain employees; or
- respond to competitive pressures or unanticipated working capital requirements.

Our failure to do any of these things could seriously harm our ability to execute our business strategy and may force us to curtail our existing operations or research and development plans.

Off-Balance Sheet Arrangements

We do not maintain any off-balance sheet arrangements or obligations that are reasonably likely to have a material current or future effect on our financial condition, results of operations, liquidity or capital resources.

Indemnifications

In the ordinary course of business, we enter into contractual arrangements under which we may agree to indemnify the counter-party from losses relating to a breach of representations and warranties, a failure to perform certain covenants, or claims and losses arising from certain external events as outlined within the contract, which may include, for example, losses arising from litigation or claims relating to past performance. Such indemnification clauses may not be subject to maximum loss clauses. We have also entered into indemnification agreements with our officers and directors. No material amounts related to these indemnifications are reflected in our consolidated financial statements for the years ended December 31, 2019, 2018 or 2017.

Recent Accounting Pronouncements

See Note 1 to the consolidated financial statements in Item 15 of this report for a full description of recent accounting pronouncements.

Item 8. Financial Statements and Supplementary Data

Reference is made to the consolidated financial statements listed under the heading (a) (1) Consolidated Financial Statements and Report of Independent Registered Public Accounting Firm of Item 15, which consolidated financial statements are incorporated by reference in response to this Item 8.

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

None.

Item 9A. Controls and Procedures

Evaluation of Disclosure Controls and Procedures

Under the supervision and with the participation of our management, including our Chief Executive Officer and Chief Financial Officer, we conducted an evaluation of the effectiveness of the design and operation of our disclosure controls and procedures, as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934. Based on this evaluation, our management concluded that as of December 31, 2019, our disclosure controls and procedures were effective.

Management's Annual Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Rules 13a-15(f) and 15d-15(f) under the Securities Exchange Act of 1934. In designing and evaluating the disclosure controls and procedures, management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objectives, and management necessarily is required to apply its judgment in evaluating the cost-benefit relationship of possible controls. Under the supervision and with the participation of our management, including our Chief Executive Officer and Chief Financial Officer, we conducted an evaluation of the effectiveness of our internal control over financial reporting based on the framework in *Internal Control—Integrated Framework (2013 Framework)* issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on the evaluation, our management concluded that our internal control over financial reporting was effective as of December 31, 2019.

Changes in Internal Control over Financial Reporting

There were no changes in our internal controls over financial reporting during the fourth fiscal quarter of 2019 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information

None.

Item 10. Directors, Executive Officers and Corporate Governance

The names of our directors and certain information about each of them are set forth below.

Name	Age	Position(s) with the Company
Daniel Lewis	71	President and Chief Executive Officer
Scott Lewis(1)	64	Director
Robert Y. Newell(1)(2)	71	Director
Daniel J. O'Neil(1)(2)	49	Director

(1) Member of Audit Committee
(2) Member of Compensation Committee

The principal occupations and positions for at least the past five years of our directors are described below. There are no family relationships among any of our directors or executive officers.

Daniel Lewis. Mr. Lewis was appointed to our board of directors in September 2017, and has served as our president and chief executive officer since August 2018. He has served as the managing member and an owner of GMS Manufacturing Solution LLC, which provides engineering services to manufacturing companies, since 2013. From 2001 to 2013, Mr. Lewis served as chief executive officer of View Box Group, LLC, which provides management consulting services to small businesses. Prior to 2001, he served as vice president of worldwide sales at both Xicor, Inc. and Integrated Device Technology, Inc. Mr. Lewis has also held various sales and technical positions with Accelerant Networks, Inc. Intel Corporation, Zilog, Inc. and Digital Equipment Corporation. Mr. Lewis holds a B.S. in Electrical Engineering from the University of Michigan. We believe that Mr. Lewis's qualifications to serve on the board of directors include his extensive business experience, having held senior management positions at several companies in the semiconductor, computer and networking industries. He brings strategic and operational insight to the board of directors.

Scott Lewis. Mr. Lewis was appointed to our board of directors in October 2018. He brings more than 40 years of design, sales, and product and corporate marketing experience with technology and semiconductor companies. He is not related to our chief executive officer. Since February 2018, Mr. Lewis has been serving as executive marketing strategist at United Silicon Carbide, Inc., a leader in the silicon carbide power device market. Previously, he held multiple corporate and product-line marketing leadership positions at Maxim Integrated Products, Inc., Global Foundries, Ltd., Cadence Design Systems, Inc., Intersil Corp., Xilinx, Inc. and Integrated Device Technology, Inc. Mr. Lewis holds a B.S. in Electrical Engineering Technology from DeVry Institute of Technology. We believe that Mr. Lewis's qualifications to serve on the board of directors include his extensive business experience with over 40 years of design, sales, product and corporate marketing experience in high-technology industries, primarily in management positions at several companies in the semiconductor industry. He also can provide the board with valuable insight into sales and customer management relevant to our business.

Robert Y. Newell. Mr. Newell was appointed to our board of directors in October 2018. He is currently a consultant and advisor to emerging technology and healthcare companies, having held financial management positions with technology and healthcare companies in Silicon Valley for over 25 years. From 2003 to 2018, Mr. Newell was CFO of Dextera Surgical Inc., a developer of advanced stapling devices and automated medical systems. In December 2017, after entering into an agreement to sell substantially all of its assets, Dextera Surgical, Inc. filed a voluntary petition for reorganization under Chapter 11 of Title 11 of the United States Code in the United States Bankruptcy Court for the District of Delaware. Mr. Newell served on the board of directors of ARI Network Services, Inc., a leading supplier of SaaS and data-as-a-service solutions, from 2012 to 2017. Previously, Mr. Newell served as CFO of Omnicell, Inc., a hospital supply and medication management company, and held executive positions with the Beta Group, LLC and Cardiometrics, Inc. Prior to his business career, he was a pilot in the United States Air Force. Mr. Newell holds a BA in mathematics from the College of William & Mary and an MBA from Harvard Business School. We believe that Mr. Newell's qualifications to serve on the board of directors include his substantial financial and public-company experience, as he has served as chief financial officer at multiple medical device and other technology companies. He also has previous experience serving as a director on public-company boards of directors.

Daniel O'Neil. Mr. O'Neil was appointed to our board of directors in September 2017 and has served as a partner at Acme Strategy, LLC, a provider of strategic consulting and advisory services, which he founded, since 2010. From 2008 to 2010, he served as an investment banker at Signal Hill Capital Group LLC. Prior to 2008, Mr. O'Neil held business development and investment banking positions at Energy Services Group, Deutsche Bank AG and BT Alex. Brown. Mr. O'Neil holds an AB from Harvard College and an MBA from the Stanford University Graduate School of Business. We believe that Mr. O'Neil's qualifications to serve on the board of directors include his extensive business experience and expertise in corporate finance and strategy, including experience gained both as an investment banker and corporate executive focused on the semiconductor and electronics industries. In the past, Mr. O'Neil has provided financial advisory services to us. He also brings to our board extensive knowledge of the semiconductor industry, along with deep experience in transactional processes, mergers and acquisitions, and deal financing for a wide range of transactions.

The names of our executive officers and certain information about them are set forth either above or below, as the case may be:

Name	Age	Position(s) with the Company
Daniel Lewis	71	President and Chief Executive Officer
James W. Sullivan	51	Vice President of Finance and Chief Financial Officer

James W. Sullivan. Mr. Sullivan became our Vice President of Finance and Chief Financial Officer in January 2008. From July 2006 until January 2008, Mr. Sullivan served as Vice President of Finance and Chief Financial Officer at Apptera, Inc., a venture-backed company providing software for mobile advertising, search and commerce. From July 2002 until June 2006, Mr. Sullivan was the Chief Financial Officer at 8x8, Inc., a provider of voice-over-internet-protocol communication services. Mr. Sullivan's prior experience includes various positions at 8x8, Inc. and PricewaterhouseCoopers LLP. He received a Bachelor of Science degree in Accounting from New York University and is a certified public accountant.

Delinquent Section 16(a) Reports

Section 16(a) of the Exchange Act requires our directors, executive officers and persons who own more than 10% of a registered class of our equity securities to file with the SEC initial reports of ownership and reports of changes in ownership of common stock and other equity securities of ours. Directors, executive officers and greater than 10% holders are required by SEC regulation to furnish us with copies of all Section 16(a) reports they file. Based solely on our review of Forms 3 and 4 filed during 2019 (and any written representations to us by such persons), we believe that all directors, executive officers and 10% stockholders complied with all applicable Section 16(a) filing requirements during 2019 except that James Sullivan failed to timely file a Form 4 in August 2019.

Code of Ethics

We have adopted a code of ethics that applies to all of our employees. The code of ethics is designed to deter wrongdoing and to promote, among other things, honest and ethical conduct, full, fair, accurate, timely, and understandable disclosures in reports and documents submitted to the SEC and other public communications, compliance with applicable governmental laws, rules and regulations, the prompt internal reporting of violations of the code to an appropriate person or persons identified in the code and accountability for adherence to such code.

The code of ethics is available on our website, *www.mosys.com*. If we make any substantive amendments to the code of ethics or grant any waiver, including any implicit waiver, from a provision of the code to our Chief Executive Officer or Chief Financial Officer, or persons performing similar functions, where such amendment or waiver is required to be disclosed under applicable SEC rules, we intend to disclose the nature of such amendment or waiver on our website.

Audit Committee

Our board of directors established the Audit Committee for the purpose of overseeing the accounting and financial reporting processes and audits of our financial statements. The Audit Committee also is charged with reviewing reports regarding violations of our code of ethics and complaints with respect thereto, and internal control violations under our whistleblower policy are directed to the members of the Audit Committee. The responsibilities of our Audit Committee are described in the Audit Committee Charter adopted by our board of directors , a current copy of which can be found on the investors section of our website, www.mosys.com.

Scott Lewis, Daniel J. O'Neil, and Robert Y. Newell are the current members of the Audit Committee. All are independent, as determined in accordance with Rule 5605(a)(2) of the Nasdaq listing rules and Rule 10A-3 of the Securities Exchange Act of 1934, as amended (the "Exchange Act"). Mr. O'Neil serves as the chairman and has been designated by the board of directors as the "audit committee financial expert," as defined by Item 407(d)(5) of Regulation S-K under the Securities Act of 1933, as amended, and the Exchange Act. That status does not impose duties, liabilities or obligations that are greater than the duties, liabilities or obligations otherwise imposed on him as a member of the Audit Committee and the board of directors, however. The Audit Committee has delegated authority to Mr. O'Neil for review and pre-approval of services proposed to be provided by our independent registered public accounting firm.

Compensation Committee

Robert Y. Newell and Daniel J. O'Neil are the current members of the Compensation Committee, with Mr. Newell serving as the chairman. The Compensation Committee is responsible for reviewing, recommending and approving our compensation policies and benefits, including the compensation of all of our executive officers and directors. Our Compensation Committee also has the principal responsibility for the administration of our equity incentive and stock purchase plans. The responsibilities of our Compensation Committee are described in the Compensation Committee Charter adopted by our board of directors, a current copy of which can be found on the investors section of our website, www.mosys.com.

Nominations Process

We do not have a nominating committee, as we are a small company and currently only have four directors. Instead of having such a committee, our board of directors historically has appointed all of the independent directors on our board to search for and evaluate qualified individuals to become nominees for director and board committee members. The independent directors recommend candidates for nomination for election or reelection at each annual meeting of stockholders and, as necessary, to fill vacancies and newly created directorships, and evaluate candidates for appointment to and removal from committees. The independent directors operate in this capacity under authority granted by resolution of the board of directors, rather than by charter.

When new candidates for our board of directors are sought, the independent directors evaluate each candidate for nomination as a director within the context of the needs and the composition of the board of directors as a whole. The independent directors conduct any appropriate and necessary inquiries into the backgrounds and qualifications of candidates. When evaluating director nominees, our board of directors generally seeks to identify individuals with diverse, yet complementary business backgrounds. Although we have no formal policy regarding diversity, our directors consider both the personal characteristics and experience of director nominees, including each nominee's independence, diversity, age, skills, expertise, time availability and industry background in the context of the needs of the board of directors and the Company. The board of directors believes that director nominees should exhibit proven leadership capabilities and experience at a high level of responsibility within their chosen fields, and must have the experience and ability to analyze the complex business issues facing us, and specifically, the issues inherent in the semiconductor industry. In addition to business expertise, the board of directors requires that director nominees have the highest personal and professional ethics, integrity and values and, above all, are committed to representing the long-term interests of our stockholders and other stakeholders. To date, we have not paid any fee to a third party to assist in the process of identifying or evaluating director candidates. Our independent directors will consider candidates for nomination as director who are recommended by a stockholder and will not evaluate any candidate for nomination for director differently because the candidate was recommended by a stockholder. To date, we have not received or rejected any suggestions for a director candidate recommended by any stockholder or group of stockholders owning more than 5% of our common stock. The recommendation must include the information specified in our bylaws for stockholder nominees to be considered at an annual meeting, including the following:

- The stockholder's name and address and the beneficial owner, if any, on whose behalf the nomination is proposed;
- The stockholder's reason for making the nomination at the annual meeting, and the signed consent of the nominee to serve if elected;

- The number of shares owned by, and any material interest of, the record owner and the beneficial owner, if any, on whose behalf the record owner is proposing the nominee;
- A description of any arrangements or understandings between the stockholder, the nominee and any other person regarding the nomination; and
- Information regarding the nominee that would be required to be included in our proxy statement by the rules of the SEC, including the nominee's age, business experience for the past five years and any other directorships held by the nominee.

The information listed above is not a complete list of the information required by our bylaws. The secretary will forward any timely recommendations containing the required information to our independent directors for consideration.

Item 11. Executive Compensation

The information presented below has been modified to reflect the impact of a 1-for-20 reverse stock split effected in August 2019. See Note 1 of the consolidated financial statements in Item 15 of this Report for further discussion of the reverse stock split.

Compensation Committee

Robert Y. Newell and Daniel J. O'Neil are the current members of the Compensation Committee, with Mr. Newell serving as the chairman. The Compensation Committee is responsible for reviewing, recommending and approving our compensation policies and benefits, including the compensation of all of our executive officers and directors. Our Compensation Committee also has the principal responsibility for the administration of our equity incentive and stock purchase plans and the approval of equity awards to the named executive officers. The responsibilities of our Compensation Committee are described in the Compensation Committee Charter adopted by our board of directors, a current copy of which can be found on the investors section of our website, www.mosys.com.

Overview of Compensation Program

The Compensation Committee of the board of directors has responsibility for establishing, implementing and monitoring adherence to our compensation philosophy. The board of directors has delegated to the Compensation Committee the responsibility for determining our compensation policies and procedures for senior management, including the named executive officers, periodically reviewing these policies and procedures, and making recommendations concerning executive compensation to be considered by the full board of directors, when such approval is required under any of our plans or policies or by applicable laws.

The compensation received by our named executive officers in fiscal year 2019 is set forth in the Summary Compensation Table, below. For 2019, the named executive officers included Daniel Lewis, President and Chief Executive Officer, and James Sullivan, Vice President of Finance and Chief Financial Officer.

Compensation Philosophy

In general, our executive compensation policies are designed to recruit, retain and motivate qualified executives by providing them with a competitive total compensation package based in large part on the executive's contribution to our financial and operational success, the executive's personal performance and increases in stockholder value, as measured by the price of our common stock. We believe that the total compensation paid to our executives should be fair, reasonable and competitive.

We seek to have a balanced approach to executive compensation with each primary element of compensation (base salary, variable compensation and equity incentives) designed to play a specific role. Overall, we design our compensation programs to allow for the recruitment, retention and motivation of the key executives and high-level talent required in order for us to:

- supply high-value and high-quality integrated circuit solutions to our customer base;
- achieve or exceed our annual financial plan and be profitable;
- make continuous progression towards achieving our long-term strategic objectives to be a high-growth company with growing profitability; and

- increase our share price to provide greater value to our stockholders .

Role of Executive Officers in Compensation Decisions

The chief executive officer (CEO) makes recommendations for equity and non-equity compensation for executives to be approved by the Compensation Committee. The Compensation Committee reviews these guidelines annually. The CEO annually reviews the performance of our executives (other than himself) and presents his recommendations for proposed salary adjustments, bonuses and equity awards to the Compensation Committee once a year. In its discretion, the Compensation Committee may accept, modify or reject the CEO's recommendations. The Compensation Committee evaluates the compensation of the CEO on its own without the participation or involvement of the CEO. Only the Compensation Committee and the board of directors are authorized to approve the compensation for any named executive officer. Compensation of new executives is based on hiring negotiations between the individuals and our CEO and/or Compensation Committee.

Elements of Compensation

Consistent with our compensation philosophy and objectives, we offer executive compensation packages consisting of the following three components:

- base salary;
- annual incentive compensation; and
- equity awards.

In each fiscal year, the Compensation Committee determines the amount and relative weighting of each component for all executives, including the named executive officers. Base salaries are paid in fixed amounts and thus do not encourage risk taking. Our widespread use of long-term compensation consisting of stock options and restricted stock units (RSUs) focuses recipients on the achievement of our longer-term goals and conserves cash for other operating expenses. For example, the RSUs granted to our executives in 2019 vest in increments over three years, while stock options granted to our executives in 2019 vest over 36 months from the date of grant. The Compensation Committee does not believe that these awards encourage unnecessary or excessive risk taking because the ultimate value of the awards is tied to our stock price, and the use of multi-year vesting schedules helps to align our employees' interests even more closely with those of our long-term investors.

Base Salary

Because our compensation philosophy stresses performance-based awards, base salary is intended to be a smaller portion of total executive compensation relative to long-term equity. The Compensation Committee takes into account the executive's scope of responsibility and significance to the execution of our long-term strategy, past accomplishments, experience and personal performance and compares each executive's base salary with those of the other members of senior management. The Compensation Committee may give different weighting to each of these factors for each executive, as it deems appropriate. The Compensation Committee did not retain a compensation consultant or determine a compensation peer group for 2019. In 2019, there were no changes to the base salaries paid to our named executive officers.

Annual Incentive Compensation

The Compensation Committee did not authorize any incentive compensation for the named executive officers in 2019.

Equity Awards

Although we do not have a mandated policy regarding the ownership of shares of common stock by officers and directors, we believe that granting equity awards to executives and other key employees on an ongoing basis gives them a strong incentive to maximize stockholder value and aligns their interests with those of our other stockholders on a long-term basis. Our 2019 Stock Incentive Plan (the "Equity Plan"), which was approved by our stockholders and became effective in August 2019, enables us to grant equity awards, as well as other types of stock-based compensation, to our executive officers and other employees. The Compensation Committee reviews and approves all equity awards granted under the Equity Plan to the named executive officers. We grant equity awards to achieve retention and motivation:

- upon the hiring of key executives and other personnel;
- annually, when we review progress against corporate and personal goals; and
- when we believe that competitive forces or economic conditions threaten to cause our key executives to lose their motivation and/or where retention of these key executives is in jeopardy.

With the Compensation Committee's approval, we grant options to purchase shares of common stock when we initially hire executives and other employees, as a long-term performance incentive. The Compensation Committee has determined the size of the initial option grants to newly hired executives with reference to option grants held by existing executives, the percentage that such grant represents of our total shares outstanding and hiring negotiations with the individual. In addition, the Compensation Committee would consider other relevant information regarding the size and type of compensation package considered necessary to enable us to recruit, retain and motivate the executive.

Typically, when we hire an executive, the options vest with respect to one-fourth of the total number of shares subject to the grant on the first anniversary of the grant date and with respect to 1/48th of the shares monthly thereafter. The options granted to executives in connection with annual performance reviews typically vest monthly over a three-to-four-year period, and RSUs granted typically vest annually over a period of from one-to-three years, as the Compensation Committee may decide. As matters of policy and practice we grant stock options with an exercise price equal to fair market value, although the Equity Plan allows us to use a different exercise price. In determining fair market value, we use the closing price of the common stock on the Nasdaq, on the grant date.

Historically, no employee has been eligible for an annual performance grant until the employee has been employed for at least six months. Annual performance reviews are generally conducted in the first half of each fiscal year. Our CEO conducts the performance review of all other executives, and makes his recommendations to the Compensation Committee. The Compensation Committee also reviews the CEO's annual performance and determines whether he should receive additional equity awards. Aside from equity award grants in connection with annual performance reviews, we do not have a policy of granting additional awards to executives during the year. The board of directors and Compensation Committee have not adopted a policy with respect to setting the dates of award grants relative to the timing of the release of material non-public information. Our policy with respect to prohibiting insider trading restricts sales of shares during specified black-out periods, including at all times that our insiders are considered to possess material non-public information.

In determining the size of equity awards in connection with the annual performance reviews of our executives, the Compensation Committee takes into account the executive's current position with and responsibilities to us, and current and past equity awards to the executive.

Going forward, we intend to continue to evaluate and consider equity grants to our executives on an annual basis. We expect to consider potential equity awards for executives at the same time as we annually review our employees' performance and determine whether to award grants for all employees.

Accounting and Tax Considerations

Our Compensation Committee has reviewed the impact of tax and accounting treatment on the various components of our executive compensation program. Section 162(m) of the Internal Revenue Code (the "Code") generally disallows a tax deduction to publicly-held companies for compensation paid to "covered" executive officers, to the extent that compensation paid to such an officer exceeds $1 million during the taxable year. The Tax Cuts and Jobs Act repealed the performance-based exception to the deduction limit for remuneration that is deductible in tax years commencing after December 31, 2017. However, certain remuneration is specifically exempt from the deduction limit under a transition rule to the extent that it is "performance-based," as defined in Section 162(m) of the Code, and subject to a "written binding contract" in effect as of November 2, 2017 that is not later modified in any material respect. We endeavor to award compensation that will be deductible for income tax purposes, though other factors will also be considered. None of the compensation paid to our covered executive officers for the year ended December 31, 2019 that would be taken into account for purposes of Section 162(m) exceeded the $1 million limitation for 2019. Because of ambiguities and uncertainties as to the application and interpretation of Section 162(m) of the Code and the regulations issued thereunder, including the uncertain scope of the transition relief under the Tax Cuts and Jobs Act, no assurance can be given that compensation intended to satisfy the requirements for exemption from Section 162(m) of the Code in fact will satisfy such requirements. Our Compensation Committee may authorize compensation payments that do not comply with the exemptions to Section 162(m) when we believe that such payments are appropriate to attract and retain executive talent.

Say-on-Pay

In 2017, we gave our stockholders an opportunity to provide feedback on our executive compensation through an advisory vote at our annual stockholder meeting. Stockholders were asked to approve, on an advisory basis, the compensation paid to our named executive officers. A majority of stockholders indicated approval of the compensation of the named executive officers, with approximately 90% of the shares that voted on such matter voting in favor of the proposal. Additionally, stockholders were asked to approve, on an advisory basis, in favor of having a stockholder vote to approve the compensation of the Company's named executive officers every three years. A majority of stockholders indicated approval of having a stockholder vote to approve the compensation of the Company's named executive officers every three years, with approximately 60% of the shares that voted on such matter voting in favor of the proposal. Based on these results and consistent with the previous recommendation and determination of its board of directors, the Company will hold non-binding advisory votes on executive compensation every three years until the next vote on the frequency of the stockholder advisory vote on executive compensation. At the 2020 annual meeting of stockholders, our stockholders will be asked to approve, on an advisory basis, the compensation paid to our named executive officers.

In light of the results of the advisory vote, the Compensation Committee continued to apply principles that were substantially similar to those applied historically in determining compensation policies and decisions and did not make any significant changes to executive compensation decisions and policies with respect to 2019 executive compensation.

SUMMARY COMPENSATION TABLE

The following table sets forth compensation information for fiscal years 2019 and 2018 for each of our named executive officers.

Name and principal position	Year	Salary ($)	Stock Option Awards ($)(1)	Restricted Stock Awards ($)(1)	Non-Equity Incentive Plan Compensation ($)	Total ($)
Daniel Lewis	2019	250,000	153,000	88,200		491,200
Chief Executive Officer & President	2018	99,432	3,350 (2)	23,200 (2)		125,982
James Sullivan	2019	244,793	52,960	32,340		330,093
Chief Financial Officer & Vice President of Finance	2018	248,496	—	—	56,175 (3)	304,671

(1) Award amounts reflect the aggregate grant date fair value with respect to awards granted during the years indicated, as determined pursuant to FASB ASC Topic 718. The assumptions used to calculate the aggregate grant date fair value of option and stock awards are set forth in the notes to the consolidated financial statements included in item 15 of this Report. These amounts do not reflect actual compensation earned or to be earned by our named executive officers.

(2) Granted in his capacity as a director, prior to his hire as our chief executive officer in August 2018.

(3) Earned as a bonus in 2018.

GRANTS OF PLAN-BASED AWARDS

The following table provides information on plan-based awards granted in 2019 to each of the named executive officers:

Name	Grant Date	All Other Stock Awards: Number of Shares of Stock or Units (#)(1)	All Other Option Awards: Number of Securities Underlying Options (#)	Exercise or Base Price of Option Awards ($/Share)	Grant Date Fair Value of Stock and Option Awards ($)(2)
Daniel Lewis	2/6/2019	22,500	15,000	3.92	147,000
Daniel Lewis	11/20/2019	—	60,000	1.57	94,200
James Sullivan	2/6/2019	8,250	5,500	3.92	53,900
James Sullivan	11/20/2019	—	20,000	1.57	31,400

OUTSTANDING EQUITY AWARDS AT FISCAL YEAR-END

The following table sets forth information regarding the outstanding equity awards held by our named executive officers as of December 31, 2019.

	Option Awards							Stock Awards			
Name	Number of Securities Underlying Unexercised Options (#) Exercisable		Number of Securities Underlying Unexercised Options (#) Unexercisable	Equity Incentive Plan Awards: Number of Securities Underlying Unexercised Unearned Options (#)	Option Exercise Price($)	Option Expiration Date(1)		Number of Units That Have Not Vested (#)		Market Value of Units That Have Not Vested ($)	
Daniel Lewis	2,667	(2)	1,333	—	15.00	10/19/2023		—		—	
	667	(3)	333	—	25.60	1/4/2024		—		—	
	4,167	(4)	10,833	—	3.92	2/6/2029		—		—	
	1,667	(5)	58,333	—	1.57	11/20/2029		—		—	
	—		—	—	—	—		18,750	(6)	33,094	(7)
James Sullivan	300	(8)	—	—	410.00	3/30/2025		—		—	
	614	(9)	175	—	144.00	8/23/2026		—		—	
	1,528	(4)	3,972	—	3.92	2/6/2029		—		—	
	556	(5)	19,444	—	1.57	11/20/2029		—		—	
	—		—	—	—	—		6,875	(6)	12,134	(7)

(1) The standard option term is generally six to ten years, but all of the options expire automatically unless exercised within 90 days after the cessation of service as an employee, director or consultant.

(2) The stock option was granted on October 19, 2017 for service as a non-employee director, and the shares subject to this option vest annually over three years beginning September 26, 2018 subject to continued employment (or service as a director or consultant).

(3) The stock option was granted on January 4, 2018 for service as a non-employee director, and the shares subject to this option vest annually over three years beginning September 26, 2018 subject to continued service as an employee, director or consultant.

(4) The stock option was granted on February 6, 2019, and the shares subject to this option vest monthly over three years subject to continued service as an employee, director or consultant.

(5) The stock option was granted on November 20, 2019, and the shares subject to this option vest monthly over three years subject to continued service as an employee, director or consultant.

(6) The shares subject to each restricted stock unit grant vest on each semi-annual anniversary over a three-year period commencing on February 6, 2019 subject to continued employment (or service as a director or consultant).

(7) The amount is calculated using the Company's closing price of $1.765 per share of common stock on December 31, 2019.

(8) The stock option was granted on March 30, 2015, and the shares subject to this option vest monthly over 48 months subject to continued employment (or service as a director or consultant).

(9) In August 2016, officers tendered their eligible options and received new options at a rate of 1 replacement option share for each 1.75 option shares tendered. The stock option was granted on August 23, 2016, and the shares subject to this option vest monthly over 48 months subject to continued employment (or service as a director or consultant).

OPTION EXERCISES AND STOCK VESTED

The following table sets forth the number of shares acquired and aggregate dollar amount realized pursuant to the vesting of stock awards by our named executive officers during 2019.

	Option Awards		Stock Awards	
Name	Number of Shares Acquired on Exercise(#)	Value Realized on Exercise($)	Number of Shares Acquired on Vesting(#)	Value Realized on Vesting($)(1)
Daniel Lewis	—	—	4,750	15,173
James Sullivan	—	—	1,355	4,434

(1) The aggregate dollar value realized upon vesting represents the closing price of a share of common stock on the Nasdaq at the date of vesting, multiplied by the total number of shares vested.

Employment and Change-in-control Arrangements and Agreements

Our Executive Change-in-Control and Severance Policy (the "Policy") provides benefits that are intended to encourage the continued dedication of our executive officers and to mitigate potential disincentives to the consideration of a transaction that would result in a change in control, particularly where the services of our named executive officers may not be required by a potential acquirer. The Policy provides for benefits for our named executive officers in the event of a "Change-in-Control," which is generally defined as:

- an acquisition of 45% or more of our common stock or voting securities by any "person" as defined under the Exchange Act; or
- consummation of a complete liquidation or dissolution of the Company or a merger, consolidation, reorganization or sale of all or substantially all of our assets (collectively, a "Business Combination") other than a Business Combination in which (A) our stockholders receive 50% or more of the stock of the corporation resulting from the Business Combination and (B) at least a majority of the board of directors of such resulting corporation were our incumbent directors immediately prior to the consummation of the Business Combination, and (C) after which no individual, entity or group (excluding any corporation or other entity resulting from the Business Combination or any employee benefit plan of such corporation or of ours) who did not own 45% or more of the stock of the resulting corporation or other entity immediately before the Business Combination owns 45% or more of the stock of such resulting corporation or other entity.

Under the Policy, the following compensation and benefits are to be provided to our chief executive officer upon the occurrence of a Change-in-Control, and in the case of our other named executive officers, upon a Change-in-Control combined with a termination of the named executive officer's employment without cause, or due to disability or resignation for good reason (as defined in the Policy) in connection with the Change-in-Control or within 24 months after it:

- any base salary earned but not yet paid through the date of termination;
- any annual or discretionary bonus earned but not yet paid to him for any calendar year prior to the year in which his termination occurs;
- any compensation under any deferred compensation plan of ours or deferred compensation agreement with us then in effect;
- a single lump sum payment equal to the sum of (a) one year of his or her then-current base salary plus (b) the average of his or her annual bonus payments in the preceding three years or such shorter time as he or she has been employed by us (with prorated weighting assigned to any bonus earned for a partial year of employment), which payment will be made within 60 days following the Change-in-Control (in the case of the chief executive officer), or 60 days following the date of employment termination (in the case of all other named executive officers).

- Vesting in 100% of all outstanding equity awards as of the date of the Change-in-Control for the chief executive officer, or as of the date of termination of employment for all other named executive officers;
- reimbursement of any business expenses incurred by him through the date of termination but not yet paid;
- reimbursement of the cost of continuation of medical benefits for a period of 12 months; and
- outstanding equity awards that are structured as stock options, stock appreciation rights or similar awards shall be amended effective as of the date of termination to provide that such awards will remain outstanding and exercisable until the earlier of (a) 12 months following the date of the Change-in-Control for the chief executive officer, or the termination of employment for the other named executive officers, and (b) the expiration of the award's initial term

Under the Policy, "cause" means the executive's:

- willful failure to attend to the executive's duties that is not cured by the executive within 30 days of receiving written notice from the CEO (or, in the case of the CEO, from the board of directors) specifying such failure;
- material breach of the executive's then-current employment agreement (if any) that is not cured by the executive within 30 days of receiving written notice from the CEO (or, in the case of the CEO, from the board of directors) specifying such breach;
- conviction of (or plea of guilty or *nolo contendere* to) any felony or any misdemeanor involving theft or embezzlement; or
- misconduct resulting in material harm to our business or reputation, including fraud, embezzlement, misappropriation of funds or a material violation of the executive's Employment, Confidential Information, Invention Assignment and Arbitration Agreement; and

Under the Policy, "good reason" means the occurrence of any of the following conditions without the executive's consent, but only if such condition is reported by the executive within 90 days of the executive's knowledge of such condition and remains uncured 30 days after written notice from the executive to the board of directors of said condition:

- a material reduction in the executive's then-current base salary or annual target bonus (expressed as a percentage of Executive's then-current base salary), except for a reduction proportionate to reductions concurrently imposed on all other members of the Company's executive management;
- a material reduction in the executive's then-current employee benefits package, taken as a whole, except for a reduction proportionate to reductions concurrently imposed on all other members of executive management;
- a material reduction in the executive's responsibilities with respect to our overall operations, such that continuity of responsibilities with respect to business operations existing prior to a corporate transaction will serve as a material reduction in responsibilities if such business operations represent only a subsidiary or business unit of the larger enterprise after the corporate transaction;
- a material reduction in the responsibilities of the executive's direct reports, including a requirement for the chief executive officer to report to another officer as opposed to our board of directors or a requirement for any other executive to report to any officer other than our chief executive officer;
- a material breach by us of any material provision of the executive's then-current employment agreement (if any);
- a requirement that the executive relocate to a location more than 35 miles from the executive's then-current office location, unless such office relocation results in the distance between the new office and Executive's home being closer or equal to the distance between the prior office and the executive's home;
- a failure of a successor or transferee to assume our obligations under this Policy; or

- a failure to nominate the executive for election as a Board director, if, at the proper time for nomination, the executive is a member of the board of directors

The information below describes the severance benefits payable to our named executive officers under the Policy as if the Policy had been in effect and a Change-in-Control occurred on December 31, 2019, and the employment of each of our named executive officers was terminated without cause immediately following the Change-in-Control:

Name	Base Salary($)(1)	Incentive Plans($) (2)	Continuation of Benefits($)(3)	Stock Option Vesting($)(4)	Stock Award Vesting($)(5)	Total($)
Daniel Lewis	250,000	—	22,355	11,375	33,094	316,824
James Sullivan	250,000	31,075	22,355	3,792	12,170	319,392

(1) Represents cash severance payments based on the executive's salary at December 31, 2019, in an amount equal to one year of his base salary.

(2) Represents the average of executive's annual performance incentive payments in the preceding three years.

(3) Represents the aggregate amount of all premiums payable for the continuation of the executive's health benefits for one year, based on the amounts of such premiums at December 31, 2019.

(4) The value is calculated as the intrinsic value per share, multiplied by the number of shares that would become fully vested upon the Change-in-Control. The intrinsic value per share would be calculated as the excess of the closing price of the common stock on Nasdaq of $1.765 on December 31, 2019 over the exercise price of the option. If the value is less than zero, it is deemed to be zero for the purposes of these calculations.

(5) The value is calculated as the intrinsic value per share, multiplied by the number of shares that would become fully vested upon the Change-in-Control. The intrinsic value per share is considered as the closing price of the common stock on Nasdaq of $1.765 on December 31, 2019.

If a Change-in-Control occurred on December 31, 2019, under the Policy, the following numbers of option and award shares would have vested immediately as a result of acceleration on December 31, 2019:

Name	Number of Accelerated Option and Award Shares
Daniel Lewis	89,582
James Sullivan	30,486

Employment Agreements

In addition to the agreements containing the Change-in-Control provisions summarized above, we have entered into our standard form of employment, confidential information, invention assignment and arbitration agreement with each of the named executive officers.

We also have entered into agreements to indemnify our current and former directors and certain executive officers, in addition to the indemnification provided for in our certificate of incorporation and bylaws. These agreements, among other things, provide for indemnification of our directors and certain executive officers for many expenses, including attorneys' fees, judgments, fines and settlement amounts incurred by any such person in any action or proceeding, including any action by or in the right of the Company, arising out of such person's services as a director or executive officer of the Company, any subsidiary of the Company or any other company or enterprise to which the person provided services at our request.

Director Compensation

The following table summarizes the compensation we paid to our non-employee directors in 2019:

Name	Fee Compensation ($)	Restricted Stock Awards ($)(1)	Option Awards ($)(1)(2)	All Other Compensation	Total ($)
Scott Lewis	30,000	3,540	14,010	—	47,550
Robert Y. Newell	31,500	3,540	14,010	—	49,050
Daniel O'Neil	33,000	3,540	—	—	36,540

(1) Award amounts reflect the aggregate grant date fair value with respect to awards granted during the years indicated, as determined pursuant to FASB ASC Topic 718. The assumptions used to calculate the aggregate grant date fair value of option and stock awards are set forth in the notes to the consolidated financial statements included in item 15 of this Report. These amounts do not reflect actual compensation earned or to be earned by our named executive officers. Restricted stock award amounts consist of: awards granted to Messrs. Lewis, Newell and O'Neil on February 6, 2019 to purchase 1,000 shares each.

(2) As of December 31, 2019, our non-employee directors each held outstanding options to purchase 5,000 of shares of our common stock.

Director Fee Compensation

The challenges our business has faced have made it challenging for us to attract new non-employee directors. Nasdaq and SEC regulations require that a majority of the directors on our board of directors and its committees be independent, non-employee directors, as defined by each entity. We pay the following annual cash retainer fees, payable in quarterly installments, to our non-employee directors for their service on our board of directors and, as applicable, for service as chairperson of a committee of our board of directors:

- $30,000 for service on the board of directors;
- $3,000 for service as chairperson of the Audit Committee; and
- $1,500 for service as chairperson of the Compensation Committee.

Director Equity Compensation

In August 2019, the Company's stockholders approved the 2019 Stock Incentive Plan (the "2019 Plan").

The 2019 Plan permits the board of directors to establish by resolution the number of shares, up to a maximum of 2,000 each year for each non-employee director, to be covered by annual option grants or other awards for each year of service on our board. The 2019 Plan further provides that each non-employee director may be granted an award to acquire up to 6,000 shares upon his or her initial appointment or election to our board. The shares covered by these awards vest over a three year period at the rate of one third of the total number of shares each year, subject to the non-employee director's continuous service on the board. The 2019 Plan also permits a disinterested majority of the board of directors, in its discretion, to authorize additional shares to be awarded or granted to committee chairs and other non-employee directors for extraordinary service on the board.

The exercise price per share under each option grant is equal to the fair market value of a share of our common stock on the date of grant on the principal trading market for our common stock at the time of grant, which is the Nasdaq Capital Market, or the Nasdaq. In the event of a merger, sale of substantially all of our assets or similar transaction, vesting of all director options would accelerate as to 100% of the unvested shares subject to the award.

In recent years, our basic annual service award to a non-employee director has been a restricted stock unit award for 1,000 shares of common stock. In 2019, the board of directors once again determined that this was an appropriate award size. In October 2019, we awarded restricted stock units for 1,000 shares to each of Messrs., S. Lewis, Newell and O'Neil. These awards vest and become non-forfeitable on August 23, 2020, or, if earlier on the date of the 2020 annual meeting of stockholders.

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

The following table sets forth certain information as of March 1, 2020 concerning the ownership of our common stock by:

- each stockholder known by us to be the beneficial owner of more than 5% of the outstanding shares of our common stock (currently our only class of voting securities);
- each of our directors;
- each of the named executive officers; and
- all directors and executive officers as a group.

Beneficial ownership is determined in accordance with Rule 13d-3 of the Exchange Act, and includes all shares over which the beneficial owner exercises voting or investment power. Shares that are issuable upon the exercise of options, warrants and other rights to acquire common stock that are presently exercisable or exercisable within 60 days of March 1, 2020 are reflected in a separate column in the table below. These shares are taken into account in the calculation of the total number of shares beneficially owned by a particular holder and the total number of shares outstanding for the purpose of calculating percentage ownership of the particular holder. We have relied on information supplied by our officers, directors and certain stockholders and on information contained in filings with the SEC. Except as otherwise indicated, and subject to community property laws where applicable, we believe, based on information provided by these persons, that the persons named in the table have sole voting and investment power with respect to all shares of common stock shown as beneficially owned by them. The percentage of beneficial ownership is based on 2,314,512 shares of common stock outstanding as of March 1, 2020.

Unless otherwise stated, the business address of each of our directors and named executive officers listed in the table is 2309 Bering Drive, San Jose, California 95131.

	Amount and Nature of Beneficial Ownership		
Name and principal position	Number of Shares Beneficially Owned (Excluding Outstanding Options)(1)	Number of Shares Issuable on Exercise of Outstanding Options or Convertible Securities(2)	Percent of Class
Hudson Bay Capital Management LP 777 Third Avenue New York, NY 10017	—	241,681 (3)	9.45%
Ingalls & Snyder LLC 1325 Avenue of the Americas New York, NY 10019	314,423 (4)	—	13.58%
Ingalls & Snyder Value Partners, L.P. 1325 Avenue of the Americas New York, NY 10019	—	314,124 (5)	11.95%
Iroquois Capital Investment Group LLC 641 Lexington Avenue New York, NY 10022	—	133,333 (6)	5.45%
Directors and Officers:			
Daniel Lewis	11,000	17,500	1.22%
Scott Lewis	1,000	1,667	*
Robert Y. Newell	4,000	1,667	*
Daniel J. O'Neil	2,000	3,333	*
James Sullivan	3,321	6,003	*
All current directors and executive officers as a group (5 persons)	21,321	30,170	2.18%

* Represents holdings of less than one percent.

(1) Excludes shares subject to outstanding options, warrants, convertible securities or other rights to acquire common stock that are exercisable within 60 days of March 1, 2020.

(2) Represents the number of shares subject to outstanding options, warrants, convertible securities or other rights to acquire common stock that are exercisable within 60 days of March 1, 2020.

(3) Hudson Bay Capital Management LP. ("Hudson") filed a Form 13G/A with the SEC on February 6, 2020 on behalf of Hudson and Mr. Sander Gerber. These shares are issuable upon exercise of outstanding warrants to purchase shares of common stock. Pursuant to the terms of the warrants, the reporting persons cannot exercise such warrants if the reporting persons would beneficially own, after such exercise, more than 9.99% of the outstanding shares of our common stock.

(4) In a Form 13G/A filed with the SEC on February 7, 2020, Ingalls & Snyder LLC ("Ingalls") reported that it had shared dispositive power over all shares. These shares include securities owned by clients of Ingalls, a registered broker dealer and a registered investment advisor, in accounts managed under investment advisory contracts.

(5) ISVP is an investment partnership managed under an investment advisory contract by Ingalls, a registered broker dealer and a registered investment advisor. Thomas Boucher, a managing director of Ingalls, and Robert Gipson and Adam Janovic, senior directors of Ingalls, are the general partners of ISVP. Share ownership assumes the conversion of $1,786,344 par amount of our senior secured convertible notes due August 15, 2023 and the exercise of pre-funded warrants to purchase 115,539 shares of common stock issued October 4, 2018.

(6) Iroquois Capital Management LLC ("Iroquois Capital") filed a Form 13G with the SEC on February 14, 2020 on behalf of Iroquois Capital Investment Group LLC. ("Iroquois Investment"). Iroquois Capital is the investment advisor for Iroquois Investment and has discretionary authority to vote and dispose of shares held by Iroquois Master and may be deemed to be the beneficial owner of these shares. Richard Abbe, in his capacity as president of Iroquois Capital, may also be deemed to have investment discretion and voting power over the shares held by Iroquois Investment. Iroquois Capital and Mr. Abbe each disclaim any beneficial ownership of these shares. These shares are issuable upon exercise of outstanding warrants to purchase shares of common stock. Pursuant to the terms of the warrants, the reporting persons cannot exercise such warrants if the reporting persons would beneficially own, after such exercise, more than 9.99% of the outstanding shares of our common stock.

Securities Authorized for Issuance under Equity Compensation Plans

The following table provides information as of December 31, 2019 regarding equity compensation plans approved by our security holders. As of December 31, 2019, we had no awards outstanding under equity compensation plans that have not been approved by our security holders.

Plan Category	Number of Securities to be Issued Upon Exercise of Outstanding Options, Warrants and Rights	Weighted Average Exercise Price of Outstanding Options, Warrants and Rights	Number of Securities Remaining Available for Future Issuance under Equity Compensation Plans (excluding Securities reflected in Column (a))(1)
	(a)	(b)	(c)
Equity compensation plans approved by security holders	263,914	$ 10.85	97,336

(1) Consists of shares of common stock available for future issuance under the Equity Plan and 7,336 shares of common stock available for future issuance under the Amended and Restated 2010 Employee Stock Purchase Plan, which is currently suspended.

Item 13. Certain Relationships and Transactions with Related Persons

None.

Item 14. Principal Accountant Fees and Services

The following table shows the fees billed (in thousands of dollars) to us by BPM LLP, or BPM, our independent registered public accounting firm, for the financial statement audit and other services provided.

	2019	2018
Audit Fees(1)	$ 239	$ 248
Audit-Related Fees(2)	9	87
Total(3)	$ 248	$ 335

(1) Audit fees consisted of fees for professional services rendered for the audit of our annual consolidated financial statements, review of our quarterly financial statements and services normally provided in connection with statutory and regulatory filings.

(2) Audit-related fees consisted of fees related to the issuance of SEC registration statements.

(3) BPM did not provide any non-audit or other services other than those reported under “Audit Fees” and “Audit-Related Fees.”

The Audit Committee meets with our independent registered public accounting firm at least four times a year. At such times, the Audit Committee reviews both audit and non-audit services performed by the independent registered public accounting firm, as well as the fees charged for such services. The Audit Committee is responsible for pre-approving all auditing services and non-auditing services (other than non-audit services falling within the *de minimis* exception set forth in Section 10A(i)(1)(B) of the Exchange Act and non-audit services that independent auditors are prohibited from providing to us) in accordance with the following guidelines: (1) pre-approval policies and procedures must be detailed as to the particular services provided; (2) the Audit Committee must be informed about each service; and (3) the Audit Committee may delegate pre-approval authority to one or more of its members, who shall report to the full committee, but shall not delegate its pre-approval authority to management. Among other things, the Audit Committee examines the effect that performance of non-audit services may have upon the independence of the auditors.

Item 15. Exhibits

(a)**(1) Consolidated Financial Statements:**

The following documents are filed as part of this report:

Consolidated Financial Statements and Report of Independent Registered Public Accounting Firm, which are set forth in the Index to Consolidated Financial Statements on pages 59 through 81 of this report.

Report of Independent Registered Public Accounting Firm—BPM LLP	59
Consolidated Balance Sheets	60
Consolidated Statements of Operations	61
Consolidated Statements of Stockholders' Equity	62
Consolidated Statements of Cash Flows	63
Notes to Consolidated Financial Statements	64

(2) Financial Statement Schedules:

Financial statement schedules are omitted because they are not required, not applicable or because the required information is shown in the consolidated financial statements or notes thereto.

(3) Exhibits:

Required exhibits are incorporated by reference or are filed with this Annual Report on Form 10-K.

3.1(1)	Restated Certificate of Incorporation of the Registrant
3.1.1(1A)	Certificate of Amendment to Restated Certificate of Incorporation of the Registrant
3.1.2(1B)	Certificate of Amendment to the Amended and Restated Certificate of Incorporation of MoSys, Inc., filed with the Secretary of State of the State of Delaware on August 27, 2019
3.2(2)	Amended and Restated Bylaws of the Registrant
4.1(3)	Specimen Common Stock Certificate
4.2(4)	Form of Common Stock Purchase Warrant
4.3(5)	Form of Securities Purchase Agreement
4.4.1(6)	Rights Agreement, dated November 10, 2010, by and between Registrant and Wells Fargo Bank, N.A., as Rights Agent
4.4.2(7)	Form of Right Certificate
4.4.3(8)	Summary of Rights to Purchase Preferred Shares
4.4.4(9)	Amendment No. 1 to Rights Agreement, dated July 22, 2011, by and between Registrant and Wells Fargo Bank, N.A., as Rights Agent
4.4.5(10)	Amendment No. 2 to Rights Agreement, dated May 18, 2012, by and between Registrant and Wells Fargo Bank, N.A., as Rights Agent
4.5(11)	Form of Common Stock Purchase Warrant
4.6(12)	Form of Pre-Funded Warrant
4.7	Description of Securities
4.8.1(13)	MoSys, Inc. 2010 Amended and Restated Equity Incentive Plan
4.8.2(14)	MoSys, Inc. 2019 Stock Incentive Plan
4.9.1(15)	Form of Agreement for Stock Option Grant pursuant to the MoSys, Inc. Amended and Restated 2010 Equity Incentive Plan
4.9.2(16)	Form of Notice of Grant of Stock Option Award and Agreement pursuant to the MoSys, Inc. 2019 Stock Incentive Plan
4.10.1(17)	Form of Notice of Grant of Restricted Stock Unit Award and Agreement under the MoSys, Inc. Amended and Restated 2010 Equity Incentive Plan
4.10.2(18)	Form of Notice of Grant of Restricted Stock Unit Award and Agreement under the MoSys, Inc. 2019 Stock Incentive Plan

10.1(19)	Form of Indemnity Agreement between Registrant and each of its directors and executive officers used until June 2012
10.2(20)*	Form of New Employee Inducement Grant Stock Option Agreement
10.3(21)*	Employment offer letter agreement between Registrant and James Sullivan dated December 21, 2007
10.4(22)*	Change-in-control Agreement between Registrant and James Sullivan dated January 18, 2008
10.5(23)*	Form of Option Agreement for Stock Option Grant pursuant to 2010 Equity Incentive Plan
10.6(24)*	2010 Employee Stock Purchase Plan
10.7(25)*	Form of Notice of Restricted Stock Unit Award and Agreement under the MoSys, Inc. 2010 Amended and Restated Equity Incentive Plan
10.8(26)*	Form of New Employee Inducement Grant Stock Option Agreement (revised February 2012)
10.9(27)	Form of Indemnification Agreement used from June 2012 to present
10.10(28)	Sublease Agreement with Cyren, Inc. dated October 3, 2017
10.11(29)	10% Senior Secured Convertible Note Purchase Agreement dated March 14, 2016
10.12(30)	Security Agreement dated March 14, 2016
10.13(31)	10% Senior Secured Convertible Note due August 15, 2018
10.14(32)	Amendment to 10% Senior Secured Convertible Note Purchase Agreement and every 10% Senior Secured Convertible Note due August 15, 2018 Issued Thereunder
10.15(33)*	Executive Change-in-Control and Severance Policy
10.16(34)*	Employment offer letter agreement between Registrant and Daniel Lewis dated August 8, 2018
10.17(35)	Securities Purchase Agreement
10.18(36)	Amendment No. 2 to Note Purchase Agreement
21.1	List of Subsidiaries
23.1	Consent of Independent Registered Public Accounting Firm—BPM LLP
24.1	Power of Attorney (see signature page)
31.1	Rule 13a-14 certification
31.2	Rule 13a-14 certification
32	Section 1350 certification
101.INS	XBRL Instance Document
101.SCH	XBRL Taxonomy Extension Schema Document
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document
101.LAB	XBRL Taxonomy Extension Labels Linkbase Document
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document

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(1) Incorporated by reference to Exhibit 3.6 to Form 8-K filed by the Company on November 12, 2010 (Commission File No. 000-32929).

(1A) Incorporated by reference to Exhibit 3.1 to Form 8-K filed by the Company on February 14, 2017 (Commission File No. 000-32929).

(1B) Incorporated by reference to Exhibit 3.1 to Form 8-K filed by the Company on August 27, 2019 (Commission File No. 000-32929).

(2) Incorporated by reference to Exhibit 3.4 to Form 8-K filed by the Company on October 29, 2008 (Commission File No. 000-32929).

(3) Incorporated by reference to Exhibit 4.1 to the Company's Registration Statement on Form S-1, as amended, originally filed August 4, 2000, declared effective June 27, 2001 (Commission file No. 333-43122).

(4) Incorporated by reference to Exhibit 4.1 to Form 8-K filed by the Company on June 30, 2017 (Commission File No. 000-32929)

(5) Incorporated by reference to Exhibit 10.1 to Form 8-K filed by the Company on June 30, 2017 (Commission File No. 000-32929)

(6) Incorporated by reference to Exhibit 4.4 to Form 8-K filed by the Company on November 12, 2010 (Commission File No. 000-32929).

(7) Incorporated by reference to Exhibit 4.4.1 to Form 8-K filed by the Company on November 12, 2010 (Commission File No. 000-32929).

(8) Incorporated by reference to Exhibit 4.4.2 to Form 8-K filed by the Company on November 12, 2010 (Commission File No. 000-3292 9)

(9) Incorporated by reference to Exhibit 4.2.3 to the Current Report on Form 8-K, filed on July 27, 2011 (Commission File No. 000-32929).

(10) Incorporated by reference to Exhibit 4.2.4 to Current Report on Form 8-K filed by the Company on May 24, 2012 (Commission File No. 000-32929).

(11) Incorporated by reference to Exhibit 4.6 to Form 8-K filed by the Company on October 3, 2018 (Commission File No. 000-32929).

(12) Incorporated by reference to Exhibit 4.7 to Form 8-K filed by the Company on October 3, 2018 (Commission File No. 000-32929).

(13) Incorporated by reference to Exhibit 4.8 to the Company's Registration Statement on Form S-8, filed February 15, 2019 (Commission File No. 333-229728).

(14) Incorporated by reference to Appendix A to the Company's proxy statement on Schedule 14A filed with the Securities and Exchange Commission on July 3, 2019 (Commission File No. 000-32929).

(15) Incorporated by reference to Exhibit 4.10 to the Company's Registration Statement on Form S-8, filed July 28, 2010 (Commission File No. 333-168358).

(16) Incorporated by reference to Exhibit 4.10 to the Company's Registration Statement on Form S-8, filed November 13, 2019 (Commission File No. 333-234675).

(17) Incorporated by reference to Exhibit 10.23 to the Company's Form 10-Q filed August 8, 2013 (Commission File No. 000-32929).

(18) Incorporated by reference to Exhibit 4.13 to the Company 's Registration Statement on Form S-8, filed November 13, 2019 (Commission File No. 333-234675).

(19) Incorporated by reference to Exhibit 10.1 to the Company's Registration Statement on Form S-1, as amended, originally filed August 4, 2000, declared effective June 27, 2001 (Commission file No. 333-43122).

(20) Incorporated by reference to Exhibit 10.25 to Form 10-K filed by the Company on March 17, 2008 (Commission File No. 000-32929).

(21) Incorporated by reference to Exhibit 10.26 to Form 10-K filed by the Company on March 17, 2008 (Commission File No. 000-32929).

(22) Incorporated by reference to Exhibit 10.27 to Form 10-K filed by the Company on March 17 , 2008 (Commission File No. 000-32929).

(23) Incorporated by reference to Exhibit 4.10 to Form S-8 filed by the Company on July 28, 2010 (Commission File No. 333-168358).

(24) Incorporated by reference to Appendix B to the proxy statement on Schedule 14A filed by the Company on May 26, 2010 (Commission File No. 000-32929).

(25) Incorporated by reference to Exhibit 4.8 to Form S-8 filed by the Company on June 5, 2009 (Commission File No. 333-159753).

(26) Incorporated by reference to Exhibit 10.19 to Form 10-K filed by the Company on March 15, 2012 (Commission File No. 000-32929).

(27) Incorporated by reference to Exhibit 10.22 to Form 10-Q filed by the Company on August 9, 2012 (Commission File No. 000-32929).

(28) Incorporated by reference to Exhibit 99.2 to Form 10-Q filed by the Company on November 14, 2017 (Commission File No. 000-32929).

(29) Incorporated by reference to Exhibit 10.1 to Form 8-K filed by the Company on March 15, 2016 (Commission File No. 000-32929).

(30) Incorporated by reference to Exhibit 10.2 to Form 8-K filed by the Company on March 15, 2016 (Commission File No. 000-32929).

(31) Incorporated by reference to Exhibit 10.3 to Form 8-K filed by the Company on March 15, 2016 (Commission File No. 000-32929).

(32) Incorporated by reference to Exhibit 10.4 to Form 8-K filed by the Company on February 27, 2018 (Commission File No. 000-32929)

(33) Incorporated by reference to Exhibit 99 to Schedule TO filed by the Company on July 26, 2016 (Commission File No. 005-78033), as amended

(34) Incorporated by reference to Exhibit 10.28 to Form S-1/A filed by the Company on September 17, 2018 (Commission File No. 333-225193), as amended

(35) Incorporated by reference to Exhibit 10.26 to Form 8-K filed by the Company on October 3, 2018 (Commission File No. 000-32929).

(36) Incorporated by reference to Exhibit 10.30 to Form 8-K filed by the Company on October 3, 2018 (Commission File No. 000-32929).

* Management contract, compensatory plan or arrangement.

Item 16. Form 10-K Summary

Not applicable.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized, on the 17th day of March 2020.

MOSYS, INC.

By: /s/ DANIEL LEWIS

Daniel Lewis

President and Chief Executive Officer

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Daniel Lewis and James W. Sullivan as his true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for him and in his name, place and stead, in any and all capacities, to sign any and all amendments to this Report on Form 10-K, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorney-in-fact and agents full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorney-in- fact and agents, or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

Signature	Title	Date
/s/ DANIEL LEWIS Daniel Lewis	President, Chief Executive Officer, and Director (Principal Executive Officer)	March 17, 2020
/s/ JAMES W. SULLIVAN James W. Sullivan	Vice President of Finance and Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	March 17, 2020
/s/ SCOTT LEWIS Scott Lewis	Director	March 17, 2020
/s/ ROBERT Y. NEWELL Robert Y. Newell	Director	March 17, 2020
/s/ DANIEL O'NEIL Daniel O'Neil	Director	March 17, 2020

MOSYS, INC.
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Report of Independent Registered Public Accounting Firm

To the Stockholders and Board of Directors of
MoSys, Inc.

Opinion on the Consolidated Financial Statements

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

Change in Accounting Principle

As discussed in Note 1 to the consolidated financial statements, the Company changed its method of accounting for leases in 2019 due to the adoption of the new lease standard.

Basis for Opinion

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

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audits, we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

Our audits included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ BPM LLP

We have served as the Company's auditor since 2007.

San Jose, California
March 17, 2020

MOSYS, INC.

CONSOLIDATED BALANCE SHEETS

(In thousands, except par value data)

	December 31, 2019	December 31, 2018
ASSETS		
Current assets		
Cash and cash equivalents	$ 6,053	$ 7,104
Short-term investments	300	—
Accounts receivable	1,175	1,622
Inventories	968	1,148
Prepaid expenses and other	472	923
Total current assets	8,968	10,797
Property and equipment, net	197	279
Goodwill	—	420
Right-of-use lease asset	156	—
Other	78	260
Total assets	$ 9,399	$ 11,756
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities		
Accounts payable	$ 218	$ 236
Deferred revenue	166	273
Short-term lease liability	166	—
Accrued expenses and other	1,155	1,402
Total current liabilities	1,705	1,911
Long-term liabilities	-	17
Convertible notes payable	2,858	2,671
Total liabilities	4,563	4,599
Commitments and contingencies (Note 9)		
Stockholders' equity		
Preferred stock, $0.01 par value; 20,000 shares authorized; none issued and outstanding	—	—
Common stock, $0.001 par value; 120,000 shares authorized; 2,179 shares and 2,148 shares issued and outstanding at December 31, 2019 and December 31, 2018, respectively	2	2
Additional paid-in capital	243,281	243,022
Accumulated deficit	(238,447)	(235,867)
Total stockholders' equity	4,836	7,157
Total liabilities and stockholders' equity	$ 9,399	$ 11,756

Note: Share amounts as of December 31, 2018 have been adjusted to reflect the impact of a 1-for-20 reverse stock split effected in August 2019, as discussed in Note 1.

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

MOSYS, INC.

CONSOLIDATED STATEMENTS OF OPERATIONS

(In thousands, except per share data)

	Year Ended December 31, 2019	2018	2017
Net revenue			
Product	$ 9,377	$ 15,053	$ 7,833
Royalty and other	709	1,547	1,009
Total net revenue	10,086	16,600	8,842
Cost of net revenue	3,931	6,346	4,694
Gross profit	6,155	10,254	4,148
Operating expenses			
Research and development	4,182	4,129	8,158
Selling, general and administrative	4,016	4,095	4,702
Impairment of goodwill	420	12,856	—
Restructuring charges	—	—	1,321
Total operating expenses	8,618	21,080	14,181
Loss from operations	(2,463)	(10,826)	(10,033)
Interest expense	(220)	(582)	(927)
Other income, net	103	12	59
Loss before income taxes	(2,580)	(11,396)	(10,901)
Income tax provision (benefit)	—	13	(233)
Net loss	$ (2,580)	$ (11,409)	$ (10,668)
Net loss per share			
Basic and diluted	$ (1.19)	$ (14.82)	$ (29.07)
Shares used in computing net loss per share			
Basic and diluted	2,165	770	367

Note: Share and per share amounts for 2018 and 2017 have been adjusted to reflect the impact of a 1-for-20 reverse stock split effected in August 2019, as discussed in Note 1.

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

MOSYS, INC.

CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY

(In thousands)

	Common Stock		Additional Paid-In	Accumulated	
	Shares	Amount	Capital	Deficit	Total
Balance as of January 1, 2017	332	$ —	$ 229,348	$ (214,020)	$ 15,328
Issuance of common stock under stock plans, net	6	—	(20)	—	(20)
Issuance of common stock, net of issuance costs of $265	66	—	1,987	—	1,987
Stock-based compensation	—	—	719	—	719
Net loss	—	—	—	(10,668)	(10,668)
Balance as of December 31, 2017	404	—	232,034	(224,688)	7,346
Cumulative effect of accounting change	—	—	—	230	230
Issuance of common stock under stock plans, net	14	—	(46)	—	(46)
Issuance of common stock and warrants, net of issuance costs of $709	1,730	2	10,360	—	10,362
Stock-based compensation	—	—	674	—	674
Net loss	—	—	—	(11,409)	(11,409)
Balance as of December 31, 2018	2,148	2	243,022	(235,867)	7,157
Issuance of common stock under stock plans, net	31	—	(4)	—	(4)
Stock-based compensation	—	—	263	—	263
Net loss	—	—	—	(2,580)	(2,580)
Balance as of December 31, 2019	2,179	$ 2	$ 243,281	$ (238,447)	$ 4,836

Note: Share and per share amounts for 2017 and 2018 have been adjusted to reflect the impact of a 1-for-20 reverse stock split effected in August 2019, as discussed in Note 1.

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

MOSYS, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS

(In thousands)

	Year Ended December 31, 2019	2018	2017
Cash flows from operating activities:			
Net loss	$ (2,580)	$ (11,409)	$ (10,668)
Adjustments to reconcile net loss to net cash provided by (used in) operating activities:			
Depreciation and amortization	185	598	747
Stock-based compensation	263	674	719
Amortization of intangible assets	—	111	112
Impairment of goodwill	420	12,856	—
Amortization of debt issuance costs	—	30	45
Accrued interest	220	551	898
Gain on disposal of assets	—	—	(12)
Other	(13)	—	—
Changes in assets and liabilities			
Accounts receivable	447	289	(1,122)
Inventories	180	618	(315)
Prepaid expenses and other assets	416	440	(1,016)
Accounts payable	(18)	66	(402)
Deferred revenue and other liabilities	(171)	(4,489)	3,435
Net cash provided by (used in) operating activities	(651)	335	(7,579)
Cash flows from investing activities:			
Purchases of property and equipment	(103)	(50)	(300)
Net proceeds from sale of assets	—	—	12
Proceeds from maturities of marketable securities & short-term investments	1,275	—	2,604
Purchases of marketable securities & short-term investments	(1,568)	—	(1,602)
Net cash provided by (used in) investing activities	(396)	(50)	714
Cash flows from financing activities:			
Proceeds from sale of common stock and warrants, net of issuance costs	—	10,362	1,967
Taxes paid to net share settle equity awards	(4)	(46)	—
Payments on convertible notes	—	(7,365)	—
Net cash provided by (used in) financing activities	(4)	2,951	1,967
Net increase (decrease) in cash and cash equivalents	(1,051)	3,236	(4,898)
Cash and cash equivalents at beginning of year	7,104	3,868	8,766
Cash and cash equivalents at end of year	$ 6,053	$ 7,104	$ 3,868
Supplemental disclosure:			
Issuance of convertible notes in settlement of accrued interest	$ 187	$ 846	$ 854
Cash paid for income taxes	$ 2	$ 15	$ 2

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

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

Note 1: The Company and Summary of Significant Accounting Policies

The Company

MoSys, Inc. (the "Company") was incorporated in California in September 1991 and reincorporated in September 2000 in Delaware. The Company's strategy and primary business objective is to be an IP-rich fabless semiconductor company focused on the development and sale of integrated circuit ("IC") products. Its Bandwidth Engine ICs combine the Company's proprietary high-density embedded memory with its high-speed 10 gigabits per second and higher interface technology. The Company's future success and ability to achieve and maintain profitability depends on its success in developing a market for its ICs.

Basis of Presentation

The consolidated financial statements include the accounts of the Company and its wholly-owned subsidiaries. All significant intercompany transactions and balances have been eliminated in consolidation. The Company's fiscal year ends on December 31 of each calendar year.

Reverse Stock Split

On August 28, 2019, the Company effected a 1-for-20 reverse stock split of its common stock. As a result of the reverse stock split, every 20 shares of the Company's pre-reverse split outstanding common stock was combined and reclassified into one share of common stock. Proportionate voting rights and other rights of common stock holders were not affected by the reverse stock split. No fractional shares were issued in connection with the reverse stock split; stockholders who would otherwise hold a fractional share of common stock received cash in an amount equal to the product obtained by multiplying (i) the closing sale price of the Company's common stock on the effective date of the reverse stock split, by (ii) the number of shares of the Company's common stock held by the stockholder that would otherwise have been exchanged for the fractional share interest. All stock options and restricted stock units outstanding and common stock reserved for issuance under the Company's equity incentive plans immediately prior to the reverse stock split were adjusted by dividing the number of affected shares of common stock by 20 and, as applicable, multiplying the exercise price by 20, as a result of the reverse stock split. All share numbers, share prices, and exercise prices have been adjusted, on a retroactive basis to reflect this 1-for-20 reverse stock split.

Use of Estimates

The preparation of financial statements in accordance with accounting principles generally accepted in the United States requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, the disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses recognized during the reported period. Actual results could differ from those estimates.

Cash Equivalents and Investments

The Company has invested its excess cash in money market accounts, certificates of deposit, corporate debt, government-sponsored enterprise bonds and municipal bonds and considers all highly liquid debt instruments purchased with an original maturity of three months or less to be cash equivalents. Investments with original maturities greater than three months and remaining maturities less than one year are classified as short-term investments. Investments with remaining maturities greater than one year are classified as long-term investments. Management generally determines the appropriate classification of securities at the time of purchase. All securities are classified as available-for-sale. The Company's available-for-sale short-term and long-term investments are carried at fair value, with the unrealized holding gains and losses reported in accumulated other comprehensive income (loss). Realized gains and losses and declines in the value judged to be other-than-temporary are included in the other income, net line item in the consolidated statements of operations. The cost of securities sold is based on the specific identification method.

Fair Value Measurements

The Company measures the fair value of financial instruments using a fair value hierarchy that prioritizes the inputs to valuation techniques used to measure fair value into three broad levels:

Level 1—Inputs used to measure fair value are unadjusted quoted prices that are available in active markets for the identical assets or liabilities as of the reporting date.

Level 2—Pricing is provided by third party sources of market information obtained through the Company's investment advisors, rather than models. The Company does not adjust for, or apply, any additional assumptions or estimates to the pricing information it receives from advisors. The Company's Level 2 securities include cash equivalents and available-for-sale securities, which consisted primarily of certificates of deposit, corporate debt, and government agency and municipal debt securities from issuers with high-quality credit ratings. The Company's investment advisors obtain pricing data from independent sources, such as Standard & Poor's, Bloomberg and Interactive Data Corporation, and rely on comparable pricing of other securities because the Level 2 securities are not actively traded and have fewer observable transactions. The Company considers this the most reliable information available for the valuation of the securities.

Level 3—Unobservable inputs that are supported by little or no market activity and reflect the use of significant management judgment are used to measure fair value. These values are generally determined using pricing models for which the assumptions utilize management's estimates of market participant assumptions. The determination of fair value for Level 3 investments and other financial instruments involves the most management judgment and subjectivity.

Allowance for Doubtful Accounts

The Company establishes an allowance for doubtful accounts to ensure that its trade receivables balances are not overstated due to uncollectibility. The Company performs ongoing customer credit evaluations within the context of the industry in which it operates and generally does not require collateral from its customers. A specific allowance of up to 100% of the invoice value is provided for any problematic customer balances. Delinquent account balances are written off after management has determined that the likelihood of collection is remote. The Company grants credit only to customers deemed creditworthy in the judgment of management. There was no allowance for doubtful accounts receivable as of December 31, 2019 and 2018.

Inventories

The Company values its inventories at the lower of cost, which approximates actual cost on a first-in, first-out basis, or net realizable value. The Company records inventory reserves for estimated obsolescence or unmarketable inventories based upon assumptions about future demand and market conditions. Once a reserve is established, it is maintained until the product to which it relates is sold or otherwise disposed of. If actual market conditions are less favorable than those expected by management, additional adjustment to inventory valuation may be required. Charges for obsolete and slow-moving inventories are recorded based upon an analysis of specific identification of obsolete inventory items and quantification of slow-moving inventory items. The Company recorded inventory write-downs during the years ended December 31, 2019, 2018 and 2017 of $0.1 million $0.1 million and $0.3 million, respectively.

Property and Equipment

Property and equipment are originally recorded at cost. Depreciation is computed using the straight-line method over the estimated useful lives of the assets, generally three to five years. Depreciation is recorded in cost of sales and operating expenses in the consolidated statements of operations and comprehensive loss. Leasehold improvements and assets acquired through capital leases are amortized over the shorter of their estimated useful life or the lease term, and amortization is recorded in operating expenses in the consolidated statements of operations.

Valuation of Long-lived Assets

The Company evaluates the recoverability of long-lived assets with finite lives whenever events or changes in circumstances occur that indicate that the carrying value of the asset or asset group may not be recoverable. Finite-lived intangible assets are being amortized on a straight-line basis over their estimated useful lives of three to seven years. An impairment charge is recognized as the difference between the net book value of such assets and the fair value of such assets at the date of measurement. The measurement of impairment requires management to estimate future cash flows and the fair value of long-lived assets.

Intangible Assets

Intangible assets acquired in business combinations, referred to as purchased intangible assets, are accounted for based on the fair value of assets purchased and are amortized over the period in which economic benefit is estimated to be received.

Goodwill

The Company determines the amount of a potential goodwill impairment by comparing the fair value of the reporting unit with its carrying amount. To the extent the carrying value of a reporting unit exceeds its fair value, a goodwill impairment charge is recognized.

The Company has determined that it has a single reporting unit for purposes of performing its goodwill impairment test. As the Company uses the market approach to determine the step one fair value, the price of its common stock is an important component of the fair value calculation. If the Company's stock price continues to experience significant price and volume fluctuations, this will impact the fair value of the reporting unit, which can lead to potential impairment in future periods. The Company reviews goodwill for impairment on an annual basis or whenever events or changes in circumstances indicate the carrying value of an asset may not be recoverable. The Company first assesses qualitative factors to determine whether it is more-likely-than-not that the fair value of the reporting unit is less than the carrying amount as a basis for determining whether it is necessary to perform an impairment test. If the qualitative assessment warrants further analysis, the Company compares the fair value of the reporting unit to its carrying value. The fair value of the reporting unit is determined using the market approach. If the fair value of the reporting unit exceeds the carrying value of net assets of the reporting unit, goodwill is not impaired. If the carrying value of the reporting unit's goodwill exceeds its fair value, then the Company must record an impairment charge equal to the difference.

The Company performed its annual test for goodwill impairment as of September 1, 2019, and, due to a decrease in the price per share of its common stock, the test results indicated the goodwill carrying value was greater than its implied fair value. Further, the Company concluded a triggering event had occurred due to the sustained decrease in the price per share of its common stock and related reduced market capitalization as of September 30, 2019 and performed an additional test for impairment of its goodwill asset resulting in further indication that the goodwill carrying value was still greater than its implied fair value. As a result of both of these tests, the Company recorded non-cash impairment charges totaling $0.4 million. As a result of these charges, the Company's goodwill balance was reduced to zero as of September 30, 2019.

During the year ended December 31, 2018, the Company recorded non-cash goodwill impairment charges of approximately $12.9 million, as its impairment test results indicated the goodwill carrying value was greater than its implied fair value.

Revenue Recognition

On January 1, 2018, the Company adopted Financial Accounting Standards Board ("FASB") Accounting Standards Codification Topic 606, *Revenue from Contracts with Customers* and its amendments ("ASC 606") using the modified retrospective (cumulative effect) transition method. Under this transition method, results for reporting periods beginning January 1, 2018 or later are presented under ASC 606, while prior period results continue to be reported in accordance with previous guidance. The cumulative effect of the initial application of ASC 606 was recognized as an adjustment to accumulated deficit as of January 1, 2018 of $230,000. ASC 606 also requires additional disclosures about the nature, amount, timing and uncertainty of revenue and cash flows arising from customer contracts, including significant judgments and changes in judgments and assets recognized from costs incurred to fulfill a contract. As described below, the analysis of contracts under ASC 606 supports the recognition of revenue at a point in time, resulting in revenue recognition timing that is materially consistent with the Company's historical practice of recognizing product revenue when title and risk of loss pass to the customer.

The Company generates revenue primarily from sales of IC products and licensing of its intellectual property. Revenues are recognized when control is transferred to customers in amounts that reflect the consideration the Company expects to be entitled to receive in exchange for those goods. Revenue recognition is evaluated through the following five steps: (i) identification of the contract, or contracts, with a customer; (ii) identification of the performance obligations in the contract; (iii) determination of the transaction price; (iv) allocation of the transaction price to the performance obligations in the contract; and (v) recognition of revenue when or as a performance obligation is satisfied.

IC products

Revenue is recognized when performance obligations under the terms of a contract with a customer are satisfied. The majority of the Company's contracts have a single performance obligation to transfer products. Accordingly, the Company recognizes revenue when title and risk of loss have been transferred to the customer, generally at the time of shipment of products. Revenue is measured as the amount of consideration the Company expects to receive in exchange for transferring products and is generally based upon a negotiated, formula, list or fixed price. The Company sells its products both directly to customers and through distributors generally under agreements with payment terms typically 60 days or less.

The Company may record an estimated allowance, at the time of shipment, for future returns and other charges against revenue consistent with the terms of sale.

Royalty and other

The Company's licensing contracts typically provide for royalties based on the licensee's use of the Company's memory technology in its currently shipping commercial products. With the adoption of ASC 606 in January 2018, the Company estimates its royalty revenue in the calendar quarter in which the licensee uses the licensed technology. Payments are received in the subsequent quarter.

Contract liabilities – deferred revenue

The Company's contract liabilities consist of advance customer payments and deferred revenue. The Company classifies advance customer payments and deferred revenue as current or non-current based on the timing of when the Company expects to recognize revenue. As of December 31, 2019, contract liabilities were in a current position and included in deferred revenue.

During the year ended December 31, 2019, the Company recognized revenue of $0.3 million that had been included in deferred revenue as of December 31, 2018.

See Note 8 for disaggregation of revenue by geography

The Company does not have significant financing components, as payments from customers are typically due within 60 days of invoicing , and the Company has elected the practical expedient to net value financing components that are less than one year. Shipping and handling costs are generally incurred by the customer, and, therefore, are not recorded as revenue.

The following table summarizes the cumulative effect of the changes to the Company's unaudited consolidated balance sheet as of January 1, 2018 due to the adoption of ASC 606 (in thousands):

	Balance as of December 31, 2017	Adjustments due to ASC 606	Balance as of January 1, 2018
Assets			
Accounts receivable, net	$ 1,681	$ 230	$ 1,911
Equity			
Accumulated deficit	$ (224,688)	$ 230	$ (224,458)

The following tables summarize the current-period impacts of adopting ASC 606 on the Company's unaudited consolidated balance sheet and statement of operations and comprehensive loss (in thousands):

	December 31, 2018		
	As Reported	Effect of adoption	Balances without adoption of ASC 606
Assets			
Accounts receivable, net	$ 1,622	$ (220)	$ 1,402
Equity			
Accumulated deficit	$ (235,867)	$ (220)	$ (236,087)

	For the Year Ended December 31, 2018		
	As Reported	Effect of adoption	Balances without adoption of ASC 606
Product sales	$ 15,053	$ —	$ 15,053
Royalty and other	1,547	10	1,557
Cost of net revenue	6,346	—	6,346
Operating expenses	21,080	—	21,080
Interest expense	582	—	582
Other income, net	12	—	12
Income tax provision	13	—	13
Net loss	$ (11,409)	$ 10	$ (11,399)
Net loss per share:			
Basic and diluted	$ (14.82)	$ —	$ (14.80)

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Cost of Net Revenue

Cost of net revenue consists primarily of direct and indirect costs of IC product sales and engineering personnel costs directly related to maintenance and support services specified in licensing agreements. Maintenance and support typically include engineering support to assist in the commencement of production of a licensee's products.

Advertising Costs

Advertising costs are expensed as incurred. Advertising costs were not significant for the years ended December 31, 2019, 2018 and 2017.

Research and Development

Engineering costs are recorded as research and development expense in the period incurred.

Stock-Based Compensation

The Company recognizes stock-based compensation for awards on a straight-line basis over the requisite service period, usually the vesting period, based on the grant-date fair value.

The Company records stock-based compensation expense for stock options granted to non-employees, excluding non-employee directors, based upon the estimated then-current fair value of the equity instrument using the Black-Scholes pricing model. Assumptions used to value the equity instruments are consistent with equity instruments issued to employees. The Company charges the value of the equity instrument to earnings over the term of the service agreement and the unvested shares underlying the option are subject to periodic revaluation over the remaining vesting period.

Per Share Amounts

Basic net loss per share is computed by dividing net loss for the period by the weighted-average number of shares of common stock outstanding during the period. Diluted net loss per share gives effect to all potentially dilutive common shares outstanding during the period. Potentially dilutive common shares consist of incremental shares of common stock issuable upon the exercise of stock options, vesting of stock awards and purchases under the employee stock purchase plan, conversion of convertible debt and exercise of warrants. The following table sets forth securities outstanding which were excluded from the computation of diluted net loss per share as their inclusion would be anti-dilutive (in thousands):

	December 31,		
	2019	2018	2017
Options outstanding to purchase common stock	161	17	15
Unvested restricted common stock units	103	14	19
Convertible debt	254	234	54
Outstanding warrants	1,994	1,994	33
Total	2,512	2,259	121

Income Taxes

The Company determines deferred tax assets and liabilities based upon the differences between the financial statement and tax bases of the Company's assets and liabilities using tax rates in effect for the year in which the Company expects the differences to affect taxable income. A valuation allowance is established for any deferred tax assets for which it is more likely than not that all or a portion of the deferred tax assets will not be realized.

The Company files U.S. federal and state and foreign income tax returns in jurisdictions with varying statutes of limitations. The 2014 through 2018 tax years generally remain subject to examination by U.S. federal and state tax authorities, and the 2010 through 2018 tax years generally remain subject to examination by foreign tax authorities.

As of December 31, 2019, the Company did not have any material unrecognized tax benefits nor expect its unrecognized tax benefits to change significantly over the next 12 months. The Company recognizes interest related to unrecognized tax benefits as income tax expense and penalties related to unrecognized tax benefits as other income and expense. During the years ended December 31, 2019, 2018 and 2017, the Company did not recognize any interest or penalties related to unrecognized tax benefits.

Comprehensive Loss

Comprehensive loss represents the changes in equity of an enterprise, other than those resulting from stockholder transactions. Accordingly, comprehensive loss may include certain changes in equity that are excluded from net loss. For the years ended December 31, 2019, 2018 and 2017, the Company's comprehensive loss was the same as its net loss.

Recently Adopted Accounting Pronouncements

In 2016, the FASB issued Accounting Standards Update ("ASU") No. 2016-02, Leases (Topic 842), which sets out the principles for the recognition, measurement, presentation and disclosure of leases. The standard introduces a new lessee model that requires most leases to be recorded on the balance sheet and eliminates the required use of bright-line tests for determining lease classification. In July 2018, the FASB issued the following standards which clarified ASU No. 2016-02 and have the same effective date as the original standard: ASU No. 2018-10, Codification Improvements to Topic 842, Leases and ASU No. 2018-11, Leases (Topic 842): Targeted Improvements. ASU No. 2018-11 includes an option to not restate comparative periods in transition and elect to use the effective date of ASU No. 2016-02 as the date of initial application of transition. In March 2019, the FASB issued ASU No. 2019-01, Leases (Topic 842): Codification Improvements, which clarifies ASU No. 2016-02 and is effective for fiscal years beginning after December 15, 2019 and interim periods within those fiscal years. The Company adopted ASU No. 2016-02, as amended, on January 1, 2019 using the optional transition method provided by the FASB in ASU No. 2018-11. As the Company did not restate comparative periods, the adoption had no impact on previously reported results. The Company elected to use the practical expedient that allowed it to not reassess: (1) whether any expired or existing contracts are or contain leases, (2) lease classification for any expired or existing leases and (3) initial direct costs for any expired or existing leases as well as the practical expedient that allows lessees to treat the lease and non-lease components of leases as a single lease component for all asset classes. The adoption of this standard had a material impact on the Company's consolidated balance sheet due to the recognition of right of use assets and lease liabilities. Upon adoption, the Company recognized right-of-use assets and lease liabilities of approximately $0.4 million that reflected the present value of future lease payments. The adoption of this standard did not have a material impact on the Company's consolidated results of operations or cash flows. See Note 9 for further information.

In 2016, the FASB issued ASU No. 2016-09, Compensation—Stock Compensation (Topic 718), Improvements to Employee Share-based Payment Accounting. ASU No. 2016-09 simplifies several aspects of the accounting for employee share-based payment transactions, including the accounting for income taxes, forfeitures, and statutory tax withholding requirements, as well as classification in the statement of cash flows. The Company adopted ASU No. 2016-09 effective January 1, 2019, and has applied the effects of the adoption from that date. ASU No. 2016-09 permits entities to make an accounting policy election related to how forfeitures will impact the recognition of compensation cost for stock-based compensation to: estimate the total number of awards for which the requisite service period will not be rendered (as previously required) or account for forfeitures as they occur. Upon the adoption of ASU No. 2016-09, the Company elected to change its accounting policy to account for forfeitures as they occur. Historically, estimated forfeitures were immaterial to the consolidated financial statements. The amendments in the standard that required use of a modified retrospective transition method did not materially impact the Company. Therefore, the Company did not recognize a cumulative-effect adjustment to accumulated deficit upon adoption.

Note 2: Consolidated Balance Sheet Detail

	December 31, 2019	December 31, 2018
	(in thousands)	
Inventories:		
Work-in-process	$ 746	$ 548
Finished goods	222	600
	$ 968	$ 1,148
Prepaid expenses and other:		
Prepaid IC material and production costs	$ 174	$ 620
Prepaid insurance	122	128
Prepaid software	24	28
Refundable tax	61	86
Other	91	61
	$ 472	$ 923
Property and equipment, net:		
Equipment, furniture and fixtures and leasehold improvements	$ 4,239	$ 4,486
Acquired software	123	123
	4,362	4,609
Less: Accumulated depreciation and amortization	(4,165)	(4,330)
	$ 197	$ 279

Accrued expenses and other:

	December 31, 2019	December 31, 2018
	(in thousands)	
Accrued wages and employee benefits	$ 296	$ 327
Customer advance	—	300
Professional fees, legal and consulting	229	178
IC development and wafer purchases	104	90
Warranty accrual	63	73
Interest payable	84	51
Corporate taxes	20	21
Other	359	362
	$ 1,155	$ 1,402

As of December 31, 2018, the amount in long-term liabilities comprised of deferred rent.

Note 3: Fair Value of Financial Instruments

The estimated fair values of financial instruments outstanding were (in thousands):

	December 31, 2019			
	Cost	Unrealized Gains	Unrealized Losses	Fair Value
Cash and cash equivalents	$ 6,053	$ —	$ —	$ 6,053
Short-term investments	300	—	—	300
	$ 6,353	$ —	$ —	$ 6,353

	December 31, 2018			
	Cost	Unrealized Gains	Unrealized Losses	Fair Value
Cash and cash equivalents	$ 7,104	$ —	$ —	$ 7,104

The unrealized losses from available-for-sale securities as of December 31, 2019 and 2018 were not material.

The following table represents the Company's fair value hierarchy for its financial assets (cash equivalents and investments) as of December 31, 2019 and 2018 (in thousands):

	December 31, 2019			
	Fair Value	Level 1	Level 2	Level 3
Money market funds	$ 4,574	$ 4,574	$ —	$ —
Corporate notes and commercial paper	$ 300	$ —	$ 300	$ —

	December 31, 2018			
	Fair Value	Level 1	Level 2	Level 3
Money market funds	$ 632	$ 632	$ —	$ —

There were no transfers in or out of Level 1 and Level 2 securities during the years ended December 31, 2019 and 2018.

Note 4: Income Taxes

The income tax provision (benefit) consisted of the following (in thousands):

	Year Ended December 31,		
	2019	2018	2017
Current portion:			
Federal	$ (182)	$ —	$ —
State	—	2	3
Foreign	—	11	7
	(182)	13	10
Deferred portion:			
Federal	182	—	(243)
	$ —	$ 13	$ (233)

In December 2017, the Tax Cuts and Jobs Act ("the Act") was signed into law making significant changes to the Internal Revenue Code of 1986, as amended (the "IRC"). Changes included, but are not limited to, reducing the U.S. federal corporate tax rate from 35.0% to 21.0% as of January 1, 2018 and repealing the alternative minimum tax ("AMT") for tax years beginning in 2018.

Income tax effects resulting from changes in tax laws are accounted for by the Company in accordance with the authoritative guidance, which requires that these tax effects be recognized in the period in which the law is enacted and the effects are recorded as a component of provision for income taxes from continuing operations.

Under the Act, $0.2 million in federal AMT tax paid by the Company for 2011 is now refundable through 2022 subject to limitations by year, and was recorded as a deferred tax asset in 2017. As of December 31, 2019, $0.1 million of the federal AMT credit was refunded.

Deferred income taxes reflect the net tax effects of temporary differences between the carrying amount of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes.

Significant components of the Company's deferred tax assets and liabilities were (in thousands):

	Year Ended December 31,	
	2019	2018
Deferred tax assets:		
Federal and state loss carryforwards	$ 1,697	$ 681
Reserves, accruals and other	156	230
Depreciation and amortization	1,629	1,901
Deferred stock-based compensation	2,613	2,571
Research and development credit carryforwards	6,707	6,537
Foreign tax and other credits	61	242
Total deferred tax assets	12,863	12,162
Deferred tax liabilities:		
Acquired intangible assets and other	—	—
Less: Valuation allowance	(12,802)	(11,920)
Net deferred tax assets	$ 61	$ 242

The $0.9 million increase in the valuation allowance during 2019 was primarily the result of an increase to the net operating loss carryforwards for the current year. The valuation allowance decreased by $56.9 million during the year ended December 31, 2018.

Utilization of the Company's net operating losses ("NOLs") and tax credit carryforwards is subject to a substantial annual limitation due to the ownership change limitations provided by the IRC and similar state provisions. Section 382 of the IRC ("Section 382") imposes limitations on a corporation's ability to utilize its NOL and tax credit carryforwards, if it experiences an "ownership change." In general terms, an ownership change may result from transactions increasing the ownership percentage of certain stockholders in the stock of the corporation by more than 50% over a three-year period. In the event of an ownership change, utilization of the NOLs would be subject to an annual limitation under Section 382 determined by multiplying the value of the Company's stock at the time of the ownership change by the applicable long-term tax-exempt rate. While a formal study has not been performed, the Company believes that a Section 382 ownership change occurred as a result of the financing effected in October 2018 (see Note 6). The Company believes this Section 382 limitation will result in approximately 97% of the federal and state NOLs expiring before they can be utilized, and approximately 96% of the federal tax credit carryforwards expiring before they can be utilized.

As of December 31, 2019, the Company had NOLs of approximately $200.2 million for federal income tax purposes and approximately $122.9 million for state income tax purposes. Only approximately $6.3 million of the federal NOLs and $5.4 million of the state NOLs are expected to be available before expiration due to the Section 382 limitation. These NOLs are available to reduce future taxable income and will expire at various times from 2025 through 2039, except federal NOLs from 2018 and 2019 which will never expire.

The Company also had federal research and development tax credit carryforwards of approximately $8.9 million, which will begin expiring in 2020, and California research and development credits of approximately $8.3 million, which do not have an expiration date.

A reconciliation of income taxes provided at the federal statutory rate (21% for 2019 and 2018, 35% for 2017) to the actual income tax provision is as follows (in thousands):

	Year Ended December 31, 2019	2018	2017
Income tax benefit computed at U.S. statutory rate	$ (542)	$ (2,393)	$ (3,815)
State income tax (net of federal benefit)	—	2	3
Foreign income tax at rate different from U.S. statutory rate	—	12	3
Research and development credits	(170)	(194)	(480)
Stock-based compensation	—	—	(40)
Amortization of intangible assets	(60)	(60)	(100)
Goodwill impairment	17	1,482	—
Federal tax rate reduction	—	—	(26,617)
Valuation allowance changes affecting tax provision	752	1,158	30,811
Other	3	6	2
Income tax provision (benefit)	$ —	$ 13	$ (233)

The domestic and foreign components of loss before income tax provision were (in thousands):

	Year Ended December 31, 2019	2018	2017
U.S.	$ (2,580)	$ (11,353)	$ (11,063)
Non-U.S.	-	(43)	162
	$ (2,580)	$ (11,396)	$ (10,901)

Note 5: Stock-Based Compensation

Equity Compensation Plans

Common Stock Equity Plans

In 2010, the Company adopted the 2010 Equity Incentive Plan and later amended it in 2014, 2017 and 2018 (the “Amended 2010 Plan”). The Amended 2010 Plan was terminated in August 2019. As of December 31, 2019, no new awards may be made under the Amended 2010 Plan, and equity awards for approximately 172,000 shares were outstanding with a weighted-average exercise price of $20.00 per share. The Amended 2010 Plan will remain in effect as to outstanding equity awards granted under the plan prior to the date of expiration.

In August 2019, the Company’s stockholders approved the 2019 Stock Incentive Plan (the “2019 Plan”), and it replaced the Amended 2010 Plan. The 2019 Plan authorizes the board of directors or the compensation committee of the board of directors to grant a broad range of awards including stock options, stock appreciation rights, restricted stock, performance-based awards, and restricted stock units. Under the 2019 Plan, 182,500 shares have been reserved for issuance. The 2019 Plan provides for annual option grants or other awards to the Company’s non-employee directors to acquire up to 2,000 shares and for a one-time grant of an option or other award to a non-employee director to acquire up to 6,000 shares upon his or her initial appointment or election to the board of directors.

Under the 2019 Plan, the term of all incentive stock options granted to a person who, at the time of grant, owns stock representing more than 10% of the voting power of all classes of the Company’s stock may not exceed five years. The exercise price of stock options granted under the 2019 Plan must be at least equal to the fair market value of the shares on the date of grant. Generally, awards under the 2019 Plan will vest over a three to four-year period, and options will have a term of 10 years from the date of grant. In addition, the 2019 Plan provides for automatic acceleration of vesting for options granted to non-employee directors upon a change of control of the Company.

The Amended 2010 Plan and the 2019 Plan are referred to collectively as the “Plans.”

The Company may also award shares to new employees outside the Plans, as material inducements to the acceptance of employment with the Company, as permitted under the Listing Rules of the Nasdaq Stock Market. These awards must be approved by the compensation committee of the board of directors, a majority of the independent directors or, below a specified share level, by an authorized executive officer. As of December 31, 2019 and 2018, no such awards were outstanding.

Employee Stock Purchase Plan

In June 2010, the Company's stockholders approved the 2010 Employee Stock Purchase Plan (the "ESPP") with a total of 200,000 shares of common stock initially reserved for issuance. On September 1, 2010, the Company commenced the first offering period under the ESPP. In May 2015, the Company's stockholders approved an amendment increasing the number of shares reserved for issuance by 200,000 shares. The ESPP, which is intended to qualify under Section 423 of the IRC, is administered by the board of directors or the compensation committee of the board of directors. The ESPP provides that eligible employees may purchase up to $25,000 worth of the Company's common stock annually over the course of two six-month offering periods. The purchase price to be paid by participants is 85% of the price per share of the Company's common stock either at the beginning or the end of each six-month offering period, whichever is less.

In February 2017, the Company's board of directors canceled the ESPP purchase period that began September 1, 2016 and directed the Company to refund outstanding payroll contributions. As of December 31, 2019, there were approximately 7,500 shares authorized and unissued under the ESPP.

Stock-Based Compensation Expense

The unamortized compensation cost, as of December 31, 2019 was $0.2 million related to stock options and is expected to be recognized as expense over a weighted average period of approximately 2.2 years. The unamortized compensation cost, as of December 31, 2019 was $0.3 million related to restricted stock units and is expected to be recognized as expense over a weighted average period of approximately 2.1 years. For the year ended December 31, 2019, the fair value of options and awards vested was approximately $0.3 million.

The Company is required to present the tax benefits resulting from tax deductions in excess of the compensation cost recognized from the exercise of stock options as financing cash flows in the consolidated statements of cash flows. For the years ended December 31, 2019, 2018 and 2017, there were no such tax benefits associated with the exercise of stock options.

Valuation Assumptions and Expense Information for Stock-based Compensation

The fair value of the Company's share-based payment awards for the years ended December 31, 2018, 2017 and 2016 was estimated on the grant dates using the Black-Scholes valuation option-pricing model with the following assumptions:

	Year Ended December 31,		
	2019	2018	2017
Risk-free interest rate	1.6% - 2.5%	2.2%	1.6% - 1.8%
Volatility	128% - 138.5%	109.5%	70.2% - 101.5%
Expected life (years)	3.0 - 5.0	4.0	4.0
Dividend yield	0 %	0 %	0 %

The risk-free interest rate was derived from the Daily Treasury Yield Curve Rates as published by the U.S. Department of the Treasury as of the grant date for terms equal to the expected terms of the options. The expected volatility was based on the historical volatility of the Company's stock price over the expected term of the options. The expected term of options granted was derived from historical data based on employee exercises and post-vesting employment termination behavior. A dividend yield of zero is applied because the Company has never paid dividends and has no intention to pay dividends in the near future.

Prior to January 1, 2019, the stock-based compensation expense recorded is adjusted based on estimated forfeiture rates. An annualized forfeiture rate was used as a best estimate of future forfeitures based on the

Company's historical forfeiture experience. The stock-based compensation expense was adjusted in later periods if the actual forfeiture rate is different from the estimate. Upon the adoption of ASU No. 2016-09 on January 1, 2019, the Company elected to change its accounting policy to account for forfeitures as they occur. Historically, estimated forfeitures were immaterial to the consolidated financial statements

Common Stock Options and Restricted Stock

A summary of stock option and restricted stock unit ("RSU") award activity under the Plans is presented below (in thousands, except exercise price):

		Options outstanding	
	Shares Available for Grant	Number of Shares	Weighted Average Exercise Prices
Balance as of January 1, 2017	7	26	$ 277.62
Additional shares authorized under the Plan	12	—	—
RSUs granted	(21)	—	—
RSUs cancelled and returned to the Plan	3	—	—
Options granted	(8)	8	$ 15.15
Options cancelled and returned to the Plan	19	(19)	$ 313.80
Balance as of December 31, 2017	12	15	$ 96.24
Additional shares authorized under the Plan	202	—	—
RSUs granted	(13)	—	—
RSUs cancelled and returned to the Plan	1	—	—
Options granted	(2)	2	$ 25.60
Balance as of December 31, 2018	200	17	$ 83.84
Additional shares authorized under the Plan	183	—	—
RSUs granted	(120)	—	—
RSUs cancelled and returned to the Plan	1	—	—
Options granted	(145)	145	$ 2.64
Options cancelled and returned to the Plan	1	(1)	$ 144.00
Plan termination	(32)	—	$ —
Balance as of December 31, 2019	88	161	$ 10.85

A summary of RSU activity under the Plans is presented below (in thousands, except fair value):

	Number of Shares	Weighted Average Grant-Date Fair Value
Non-vested shares as of January 1, 2017	7	$ 162.55
Granted	21	$ 18.60
Vested	(6)	$ 115.24
Cancelled	(3)	$ 100.78
Non-vested shares as of December 31, 2017	19	$ 31.59
Granted	13	$ 17.26
Vested	(17)	$ 27.24
Cancelled	(1)	$ 24.14
Non-vested shares as of December 31, 2018	14	$ 24.31
Granted	120	$ 3.79
Vested	(30)	$ 12.89
Cancelled	(1)	$ 25.13
Non-vested shares as of December 31, 2019	103	$ 3.75

The total intrinsic value of the RSUs outstanding as of December 31, 2019 was $0.2 million.

The following table summarizes significant ranges of outstanding and exercisable options as of December 31, 2018 (in thousands, except contractual life and exercise price):

	Options Outstanding				Options Exercisable				
Range of Exercise Price	Number Outstanding	Weighted Average Remaining Contractual Life (in Years)		Weighted Average Exercise Price	Number Exercisable		Weighted Average Exercise Price		Aggregate Intrinsic value
\$1.57 - \$14.99	144	9.26	\$	2.64	21	\$	3.70	\$	—
\$15.00 - \$25.59	8	3.74	\$	15.00	5	\$	15.00	\$	—
\$25.60 - \$143.99	3	4.36	\$	41.88	2	\$	47.10	\$	—
\$144.00 - \$409.99	5	6.65	\$	144.00	5	\$	144.00	\$	—
\$410.00 - \$924.00	1	5.19	\$	430.64	1	\$	430.64	\$	—
\$1.57 - \$924.00	161	8.80	\$	10.85	34	\$	40.81	\$	—
Exercisable	34	7.78	\$	40.81					

There were no stock options exercised during the years ended December 31, 2019, 2018, or 2017. The intrinsic value of outstanding options as of December 31, 2019 was zero.

Note 6: Stockholders' Equity

In July 2017, the Company sold to certain institutional investors an aggregate of 66,250 shares of common stock at a purchase price of \$34.00 per share, for aggregate proceeds to the Company of \$1,987,000, net of transaction expenses.

In a concurrent private placement, the Company also sold to each of the purchasers a warrant to purchase one half of a share of the common stock for each share purchased for cash in the offering, pursuant to a common stock purchase warrant, by and between the Company and each Purchaser (each, a "Warrant," and collectively, the "Warrants") representing in the aggregate rights to purchase 33,125 shares of common stock at the exercise price. The Warrants became exercisable on January 6, 2018 at an exercise price of \$47.00 per share and will expire on January 6, 2023.

In October 2018, the Company completed a public offering of securities registered under an effective registration statement filed pursuant to the Securities Act of 1933, as amended. The gross proceeds from the offering were approximately \$11.1 million of which \$7.4 million was used to pay a portion of the principal amount of the Notes (see Note 11). In the offering, the Company sold 1,845,540 units, consisting of 403,250 common units, at a price to the public of \$6.00 per unit, and 1,442,290 pre-funded units, at a price to the public of \$6.00 per unit. Each common unit consisted of one share of common stock and a warrant to purchase one share of common stock ("common stock warrant"), and each pre-funded unit consisted of a pre-funded warrant to purchase one share of common stock for \$0.02 per share and a common stock warrant. The common stock warrants were immediately exercisable at an exercise price of \$6.00 per share (subject to adjustment) and expire on October 4, 2023. By their terms, the common stock warrants cannot be exercised at any time that the warrant holder would beneficially own, after such exercise, more than 9.99% of the outstanding shares of common stock. The common stock warrants are subject to adjustment, if, at any time while the common stock warrants are outstanding, the Company sells or grants any option to purchase, or sells or grants any right to reprice, or otherwise dispose of or issue (or announce any offer, sale, grant or any option to purchase or other disposition) any common stock or common stock equivalents, at an effective price per share that is less than the exercise price then in effect, the applicable exercise price shall be reduced, but not below \$2.40 per share (subject to adjustment for reverse and forward stock splits, recapitalizations and similar transactions). The exercise price adjustment provisions of the common stock warrants do not apply to certain ordinary course of business transactions, such as awards of equity securities to employees of the Company, and conversions or exercises of currently outstanding securities previously issued by the Company. As of December 31, 2019, 115,539 pre-funded warrants and 1,845,540 common stock warrants remained outstanding and exercisable.

Stockholder Rights Plan

In November 2010, the Company executed a rights agreement in connection with the declaration by the Company's board of directors of a dividend of one preferred stock purchase right (a Right) to be paid on November 10, 2010 (the Record Date) for each share of the Company's common stock issued and outstanding at the close of business on the Record Date. Each Right entitles the registered holder to purchase one one-thousandth of a share of Series AA Preferred Stock, $0.01 par value per share (a Preferred Share), of the Company at a price of $4.80 per one one-thousandth of a Preferred Share, subject to adjustment. The rights will not be exercisable until a third party acquires 15% of the Company's common stock or commences or announces its intent to commence a tender offer for at least 15% of the common stock.

Note 7: Retirement Savings Plan

Effective January 1997, the Company adopted the MoSys 401(k) Plan (the Savings Plan), which qualifies as a thrift plan under Section 401(k) of the Internal Revenue Code. Full-time and part-time employees who are at least 21 years of age are eligible to participate in the Savings Plan at the time of hire. Participants may contribute up to 15% of their earnings to the Savings Plan. No matching contributions were made by the Company during the years ended December 31, 2019, 2018 and 2017.

Note 8: Business Segments, Concentration of Credit Risk and Significant Customers

The Company operates in one business segment and uses one measurement of profitability for its business. Revenue attributed to the United States and to all foreign countries is based on the geographical location of the customer.

Financial instruments that potentially subject the Company to significant concentrations of credit risk consist principally of cash, cash equivalents, short-term and long-term investments and accounts receivable. Cash, cash equivalents and short-term and long-term investments are deposited with high credit-quality institutions.

The Company recognized revenue from licensing of its technologies and shipment of ICs to customers in the following geographical locations (in thousands):

	Year Ended December 31,		
	2019	2018	2017
North America	$ 7,585	$ 12,998	$ 6,531
Japan	1,734	2,956	1,520
Taiwan	345	399	613
Rest of world	422	247	178
Total net revenue	$ 10,086	$ 16,600	$ 8,842

Customers who accounted for at least 10% of total net revenues were:

	Year Ended December 31,		
	2019	2018	2017
Customer A	30%	32%	46%
Customer B	17%	18%	17%
Customer C	14%	*	*
Customer D	13%	18%	*
Customer E	*	15%	11%

* Represents percentage less than 10%.

Four customers accounted for 85% of net accounts receivable as of December 31, 2019. Three customer accounted for 63% of net accounts receivable as of December 31, 2018.

All net long-lived assets (property and equipment) were held in the United States.

Note 9: Commitments and Contingencies

Leases and Purchase Commitments

As discussed in Note 1, effective January 1, 2019, the Company adopted ASU No. 2016-02, as amended, using the alternative transition method, which allowed the Company to initially apply the new lease standard at the adoption date (the "effective date method"). The Company identified only one lease to be accounted for under ASU No. 2016-02, and this was the lease for its corporate facility in San Jose, California, which was entered into in October 2017 and expires in October 2020. The right-to-use asset and corresponding liability for the facility lease have been measured at the present value of the future minimum lease payments. The discount rate used to measure the lease asset and liability represents the interest rate on the Notes (8%). Lease expense is recognized on a straight line basis over the lease term. The Company has an option to extend the lease for an additional 20.5 month period, but, as the renewal is not reasonably certain, it has not included this renewal option in its accounting for the lease.

Future minimum payments under our facility operating lease as of December 31, 2019 are listed in the table below (in thousands).

Year ended December 31, 2019		Operating leases
Total future lease payments		187
Less: imputed interest		(21)
Present value of lease liabilities	$	166

		Year Ended December 31, 2019
Cash paid for amounts included in the measurement of lease liabilities:		
Operating cash flows for lease	$	219

In October 2017, the Company entered into a lease termination agreement with M West Propco XII LLC ("MWest") under which the Company and MWest agreed to terminate the Company's lease for its former Santa Clara headquarters facility effective October 31, 2017. In connection with the lease termination, the Company incurred fees of approximately $250,000, which were recorded as restructuring charges in the statements of operations and comprehensive loss.

Rent expense was approximately $212,000, $212,000 and $470,000 for the years ended December 31, 2019, 2018 and 2017, respectively. In addition to the minimum lease payments, the Company is responsible for property taxes, insurance and certain other operating costs.

Indemnification

In the ordinary course of business, the Company enters into contractual arrangements under which it may agree to indemnify the counterparties from any losses incurred relating to breach of representations and warranties, failure to perform certain covenants, or claims and losses arising from certain events as outlined within the particular contract, which may include, for example, losses arising from litigation or claims relating to past performance. Such indemnification clauses may not be subject to maximum loss clauses. The Company has also entered into indemnification agreements with its officers and directors. No material amounts were reflected in the Company's consolidated financial statements for the years ended December 31, 2019, 2018 or 2017 related to these indemnifications.

The Company has not estimated the maximum potential amount of indemnification liability under these agreements due to the limited history of prior claims and the unique facts and circumstances applicable to each particular agreement. To date, the Company has not made any payments related to these indemnification agreements.

Legal Matters

In October 2017, Trinity Technologies, Inc. (Trinity), the Company's former sales representative in the San Francisco Bay Area, filed a lawsuit against the Company in the Superior Court of California alleging non-payment of commissions. In April 2018, the Company and Trinity executed a settlement agreement, and Trinity dismissed the lawsuit. Under the terms of the settlement agreement, the Company agreed to pay Trinity for commissions related to both 2017 and 2018. Pursuant to the settlement agreement, the Company paid approximately $450,000, and recognized approximately $250,000 of expense in the year ended December 31, 2018.

Note 10: Restructuring

In the second quarter of 2017, the Company effected a reduction in its workforce and associated operating expenses, net loss and cash burn. The Company reduced headcount by approximately 60% with the majority of the reductions occurring in its U.S. headquarters facility. As a result of the restructuring, the Company recorded approximately $1.0 million of charges for severance benefits and future obligations under computer-aided design software licenses. In the third quarter of 2017, the Company closed its Japanese branch and Iowa locations and further reduced headcount resulting in additional expenses of approximately $50,000. In the fourth quarter of 2017, the Company terminated its existing headquarters facility lease and incurred lease termination expenses of approximately $270,000.

Expenses related to the restructure are included in the restructuring charges line in the consolidated statements of operations and comprehensive loss and the remaining liability is included in accrued expenses and other on the consolidated balance sheets consisting of (in thousands):

	Facility related	Contractual obligations and other termination costs	Total
Balance as of January 1, 2018	$ 89	$ 389	$ 478
Cash payments	(89)	(389)	(478)
Balance as of December 31, 2018	$ —	$ —	$ —

Note 11: Convertible Notes

In March 2016, the Company entered into a 10% Senior Secured Convertible Note Purchase Agreement (the "Purchase Agreement") with the purchasers of $8,000,000 principal amount of 10% Senior Secured Convertible Notes due August 15, 2018 (the "Notes"), at par, in a private placement transaction effected pursuant to an exemption from the registration requirements under the Securities Act of 1933, as amended. Pursuant to amendments to the Notes and related documents in February and October 2018, the interest rate was reduced to 8%, the maturity date of the Notes was extended to August 15, 2023, and the optional conversion price was reduced from $170.00 of Note principal per share of common stock to $11.434 of Note principal per share of common stock. The conversion price is subject to adjustment upon certain events, such as stock splits, reverse stock splits, stock dividends and similar kinds of transactions, as set forth in the Purchase Agreement. Pursuant to a security agreement entered into by the Company, the Notes are secured by a security interest in all of the assets of the Company.

Accrued interest is payable semi-annually in cash or in kind through the issuance of identical new Notes, or with a combination of the two, at the Company's option. The Notes are noncallable and nonredeemable by the Company. The Notes are redeemable at the election of the holders if the Company experiences a fundamental change (as defined in the Notes), which generally would occur in the event (i) any person acquires beneficial ownership of shares of common stock of the Company entitling such person to exercise at least 40% of the total voting power of all of the shares of capital stock of the Company entitled to vote generally in elections of directors, (ii) an acquisition of the Company by another person through a merger or consolidation, or the sale, transfer or lease of all or substantially all of the Company's assets, or (iii) the Company's current directors cease to constitute a majority of the board of directors of the Company within a 12-month period, disregarding for this purpose any director who voluntarily resigns as a director or dies while serving as a director. Effective February 18, 2018, pursuant to one amendment to the Notes, the redemption price was reduced from 120% to 100% of the principal amount of the Note to be repurchased plus accrued and unpaid interest as of the redemption date.

No Note holder shall be entitled to convert such holder's Notes if effective upon the applicable conversion date (i) the holder would have beneficial ownership of more than 19.9% of the voting capital stock of the Company as determined in accordance with Rul e 13d-3 under the Securities Exchange Act of 1934, as amended, (with exceptions specified in the Purchase Agreement), or (ii) if the shares are being acquired or held with a purpose or effect of changing or influencing control of the Company, or in connection with or as a participant in any transaction having that purpose or effect, as determined in the sole discretion of the board of directors of the Company. There is no required sinking fund for the Notes. The Notes have not been registered for resale, and the holder(s) do not have registration rights.

The Notes restrict the ability of the Company to incur any indebtedness for borrowed money, unless such indebtedness by its terms is expressly subordinated to the Notes in right of payment and to the security interest of the Note holder(s) in respect to the priority and enforcement of any security interest in property of the Company securing such new debt; provided that the Note holder(s) security interest and cash payment rights under the Notes shall be subordinate to a maximum of $5,000,000 of indebtedness for a secured accounts receivable line of credit facility provided to the Company by a bank or institutional lender; and, provided further, that in no event may the amount of indebtedness to which the security interest of the Note holder(s) is subordinated exceed the outstanding balance of accounts receivable less than 90 days old for which the Company has not recorded an allowance for doubtful accounts pledged under such credit facility.

The Notes define an event of default generally as any failure by the Company to pay an amount owed under the Notes when due (subject to cure periods), a default with respect to other indebtedness of the Company resulting in acceleration of such indebtedness, the commencement of bankruptcy or insolvency proceedings, or the cessation of business. If an event of default occurs under the Notes, the holder(s) of a majority-in-interest of the outstanding principal amount of the Notes may declare the outstanding principal amount thereof to be immediately due and payable and pursue all available remedies, including taking possession of the assets of the Company and selling them to pay the amount of debt then due, plus expenses, in accordance with applicable laws and procedures.

The Company incurred debt issuance costs of approximately $0.1 million, which were recorded as a debt discount and were amortized to interest expense over the repayment period for the original loan term using the effective interest rate method. The interest expense related to the debt discount during the year ended December 31, 2019 was approximately zero and during the years ended December 31, 2018 and 2017 was approximately $30,000 and $45,000, respectively.

In accordance with the October 2018 amendment to the Notes, the Company used $7.4 million of the proceeds from its public offering of securities effected in October 2018 to repay a portion of the Notes. Semi-annual interest payments have been made in each of February 2017, August 2017, February 2018, August 2018, February 2019 and August 2019, for approximately $420,000, $434,000, $463,000, $383,000, $78,000 and $109,000, respectively, in-kind with the issue of additional notes (Interest Notes) to the Purchasers. The Interest Notes have terms identical to the Notes. As of December 31, 2019, the Notes and Interest Notes could be converted into a maximum of 253,630 shares of common stock at $11.434 per share, excluding the effects of future payments of interest in-kind.

The $2.9 million of outstanding Notes are payable in full in 2023.

Note 12: Related Party Transaction

A related party to one of the Company's executive officers performed construction work at the Company's new corporate headquarters in the fourth quarter of 2017. The construction work was completed at a cost of approximately $195,000, which was paid in the fourth quarter of 2017.

Note 13: Subsequent Event

Conversion of Interest Payable to Note

In February 2020, the Company made payment in-kind of interest on the Notes and the Interest Notes for the period from August 16, 2018 to February 15, 2020 with the issue of an additional note to the Purchasers ("Interest Note 6"). Interest Note 6 has a principal amount of approximately $112,000 and has terms identical to the Notes and the Interest Notes.

EXHIBIT 4.7

DESCRIPTION OF THE REGISTRANT'S SECURITIES

REGISTERED PURSUANT TO SECTION 12 OF THE SECURITIES EXCHANGE ACT OF 1934

As of December 31, 2019, MoSys, Inc. (the "Registrant" or "MoSys") had one class of securities registered under Section 12 of the Securities Exchange Act of 1934, as amended, its common stock, par value $0.001 per share. The Registrant's common stock is listed on The Nasdaq Stock Market under the symbol "MOSY."

The following description of the Registrant's common stock and preferred stock does not purport to be complete and is subject to, and qualified in its entirety by, its amended and restated certificate of incorporation ("charter") and the its amended and restated bylaws ("bylaws"), each of which are incorporated by reference as an exhibit to the Annual Report on Form 10-K of which this exhibit is a part.

Common Stock

Each share of common stock entitles its holder to one vote on all matters to be voted on by its stockholders. A majority of the votes cast is required for stockholders to elect directors and to take action on all other matters, except as otherwise required by law. Subject to any preferences that may apply to any preferred stock that may at the time be outstanding, holders of MoSys common stock will receive ratably any dividends the board of directors declares out of funds legally available for that purpose. In the event of a liquidation, dissolution or winding up, holders of common stock will be entitled to share ratably in the net assets legally available for distribution to stockholders after the payment of all of our debts and other liabilities and the satisfaction of any liquidation preference granted to the holders of any then-outstanding shares of preferred stock. Holders of common stock have no cumulative voting rights, redemption rights or preemptive rights to purchase or subscribe for any shares of MoSys' common stock or other securities.

Preferred Stock

The Registrant's board of directors has the authority, without further action by the stockholders, to issue up to 20,000,000 shares of preferred stock in one or more series. The board of directors may designate the rights, preferences, privileges and restrictions of the preferred stock, including dividend rights, conversion rights, voting rights, terms of redemption, liquidation preference, sinking fund terms, and number of shares constituting any series or the designation of any series. The issuance of preferred stock could have the effect of restricting dividends on the common stock, diluting the voting power of the common stock, impairing the liquidation rights of the common stock, or delaying or preventing a change in control. MoSys has designated 20,000 shares of its preferred stock as Series AA preferred stock for issuance pursuant to the exercise of rights underthe Rights Agreement dated as of November 10, 2010 with Wells Fargo Bank, N.A., as rights agent (the "Rights Plan"). The ability to issue preferred stock, including the issuance of preferred stock under the terms ofthe Rights Plan, could delay or impede a change in control.

Anti-Takeover Provisions

Some provisions of Delaware law, the Registrant's amended and restated certificate of incorporation and its bylaws may have the effect of delaying, deferring or discouraging another party from acquiring control of us.

Delaware Law

MoSys is subject to Section 203 of the Delaware General Corporation Law, which regulates, subject to some exceptions, acquisitions of publicly-held Delaware corporations. In general, Section 203 prohibits MoSys from engaging in a "business combination" with an "interested stockholder" for a period of three years following the date the person becomes an interested stockholder, unless:

- the board of directors approved the business combination or the transaction in which the person became an interested stockholder prior to the date the person attained this status;
- upon consummation of the transaction that resulted in the person becoming an interested stockholder, the person owned at least 85 percent of the voting stock outstanding at the time the transaction commenced, excluding shares owned by persons who are directors and also officers and issued under employee stock plans under which employee participants do not have the right to determine confidentially whether shares held subject to the plan will be tendered in a tender or exchange offer; or
- on or subsequent to the date the person became an interested stockholder, the board of directors approved the business combination and the stockholders other than the interested stockholder authorized the transaction at an annual or special meeting of stockholders by the affirmative vote of at least 66 2/3 percent of the outstanding stock not owned by the interested stockholder.

Section 203 defines a "business combination" to include:

- any merger or consolidation involving MoSys and the interested stockholder;
- any sale, transfer, pledge or other disposition involving the interested stockholder of 10 percent or more of MoSys' assets;
- in general, any transaction that results in the issuance or transfer by MoSys of any of its stock to the interested stockholder;

- any transaction involving MoSys that has the effect of increasing the proportionate share ofits stock owned by the interested stockholders; and
- the receipt by the interested stockholder of the benefit of any loans, advances, guarantees, pledges, or other financial benefits provided by or through MoSys.

In general, Section 203 defines an "interested stockholder" as any person who, together with the person's affiliates and associates, owns, or within three years prior to the time of determination of interested stockholder status did own, 15 percent or more of a corporation's voting stock.

MoSys Charter and MoSys Bylaws

The charter and bylaws provide that:

- no action can be taken by stockholders except at an annual or special meeting of the stockholders called in accordance with the bylaws, and stockholders may not act by written consent;
- any provision may be adopted, amended or repealed by a vote of a majority of the directors of the board of directors or by an affirmative vote of the holders of a majority of the outstanding shares of stock having voting rights, voting as a single class;
- special meetings of the stockholders may be called only by the board of directors pursuant to a resolution adopted by a majority of the total number of authorized directors, the chairman of the board of directors, the chief executive officer or any individual holder of twenty five percent (25%) of the outstanding shares of common stock of the Registrant;
- the board of directors is authorized to issue preferred stock without stockholder approval;
- stockholders must satisfy advance notice procedures to submit proposals or nominate directors for consideration at a stockholders' meeting;
- stockholders may not cumulate votes in the election of directors; and
- MoSys will indemnify its officers and directors against losses that they may incur as a result of investigations and legal proceedings resulting from their services to MoSys, which may include services in connection with takeover defense measures.

Antitakeover Effects of the Rights Plan

On November 10, 2010, MoSys executed a rights agreement in connection with the declaration by its board of directors of a dividend of one preferred stock purchase right to be paid on November 10, 2010, referred to as the "record date," for each share of common stock issued and outstanding at the close of business on the record date. Each right entitles the registered holder to purchase one one-thousandth of a share of our Series AA Preferred Stock, $0.01 par value per share, at a price of $4.80 per one one-thousandth of a share of such Series AA Preferred Stock, subject to adjustment. Generally, the rights will not be exercisable until a third party acquires 15% of the Registrant's common stock or commences or announces its intent to commence a tender offer for at least 15% of the common stock, other than holders of “grandfathered stock,” as defined in the rights agreement.

Under the rights agreement, the firm of Ingalls & Snyder LLC, or Ingalls, and its managed account beneficial owners collectively will not trigger the rights, as long as none of their shares are held for the purpose of acquiring control or effecting change or influence in control of MoSys. This exclusion applies only to shares of common stock for which there is only shared dispositive power and Ingalls has only non-discretionary voting power.

The rights agreement could delay, deter or prevent an investor from acquiring MoSys in a transaction that could otherwise result in the stockholders receiving a premium over the market price for their shares of common stock.

EXHIBIT 21.1

SUBSIDIARIES OF REGISTRANT

NAME	JURISDICTION OF INCORPORATION
MoSys International, Inc.	California, USA

EXHIBIT 23.1

Consent of Independent Registered Public Accounting Firm

We hereby consent to the incorporation by reference in the Registration Statements on Form S-8 (Nos. 333-168358, 333-172828, 333-180119, 333-187187, 333-194563, 333-197989, 333-202735, 333-206209, 333-211273, 333-222739, 333-229728 and 333-234675), Form S-3 (No. 333-221011), and Form S-1 (Nos. 333-222417 and 225193) of MoSys, Inc. of our report dated March 17, 2020 relating to the consolidated financial statements, which appears in this Annual Report on Form 10-K.

/s/ BPM LLP

San Jose, California
March 17, 2020

Exhibit 31.1

**CERTIFICATION PURSUANT TO
RULE 13a-14 THE SECURITIES EXCHANGE ACT OF 1934**

I, Daniel Lewis, certify that:

1. I have reviewed this annual report on Form 10-K of MoSys, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 17, 2020

/s/ DANIEL LEWIS

Daniel Lewis
President and Chief Executive Officer

CERTIFICATION PURSUANT TO
RULE 13a-14 THE SECURITIES EXCHANGE ACT OF 1934

I, James W. Sullivan, certify that:

1. I have reviewed this annual report on Form 10-K of MoSys, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 17, 2020

/s/ JAMES W. SULLIVAN

James W. Sullivan
Vice President of Finance and Chief Financial Officer

Exhibit 32

**CERTIFICATION OF CEO AND CFO FURNISHED PURSUANT TO
18 U.S.C. § 1350,
AS ADOPTED PURSUANT TO
§ 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the Annual Report on Form 10-K of MoSys, Inc. (the "Company") for the year ended December 31, 2019, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), each of Daniel Lewis, Chief Executive Officer of the Company, and James W. Sullivan, Chief Financial Officer of the Company, hereby certifies, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, to the best of his knowledge, that:

(1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ DANIEL LEWIS

Daniel Lewis
President and Chief Executive Officer
March 17, 2020

/s/ JAMES W. SULLIVAN

James W. Sullivan
Vice President of Finance and Chief Financial Officer
March 17, 2020

This certification accompanies this Report pursuant to § 906 of the Sarbanes-Oxley Act of 2002 and shall not, except to the extent required by the Sarbanes-Oxley Act of 2002, or otherwise required, be deemed filed by the Company for purposes of § 18 of the Securities Exchange Act of 1934, as amended.