

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

Form 10-K

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

For the Fiscal Year Ended December 31, 2019
Commission File Number 000-29472

Amkor Technology, Inc.

(Exact name of registrant as specified in its charter)

Delaware

(State of incorporation)

23-1722724

(I.R.S. Employer
Identification Number)

2045 East Innovation Circle
Tempe, AZ 85284
(480) 821-5000

(Address of principal executive offices and zip code)

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

Title of Each Class	Trading Symbol	Name of Each Exchange on Which Registered
Common Stock, \$0.001 par value	AMKR	The NASDAQ Global Select Market

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

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

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, as amended, 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 during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐

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

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

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

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

The aggregate market value of the voting and non-voting common equity held by non-affiliates of the registrant as of June 28, 2019, based upon the closing price of the common stock as reported by the NASDAQ Global Select Market on that date, was approximately \$727 million.

The number of shares outstanding of each of the issuer’s classes of common equity, as of February 14, 2020, was as follows: 241,055,987 shares of Common Stock, \$0.001 par value.

DOCUMENTS INCORPORATED BY REFERENCE:

Portions of the registrant’s Proxy Statement relating to its 2020 Annual Meeting of Stockholders, to be filed subsequently, are incorporated by reference into Part III of this Report where indicated.

TABLE OF CONTENTS

	<u>Page</u>
<u>PART I</u>	
Item 1. Business	3
Item 1A. Risk Factors	16
Item 1B. Unresolved Staff Comments	30
Item 2. Properties	31
Item 3. Legal Proceedings	31
Item 4. Mine Safety Disclosures	31
<u>PART II</u>	
Item 5. Market for Registrant’s Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities	31
Item 6. Selected Financial Data	34
Item 7. Management’s Discussion and Analysis of Financial Condition and Results of Operations	35
Item 7A. Quantitative and Qualitative Disclosures About Market Risk	44
Item 8. Financial Statements and Supplementary Data	47
Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure	87
Item 9A. Controls and Procedures	87
Item 9B. Other Information	88
<u>PART III</u>	
Item 10. Directors, Executive Officers and Corporate Governance	88
Item 11. Executive Compensation	88
Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters	88
Item 13. Certain Relationships and Related Transactions and Director Independence	89
Item 14. Principal Accountant Fees and Services	89
<u>PART IV</u>	
Item 15. Exhibits and Financial Statement Schedules	89
Item 16. Form 10-K Summary	91

All references in this Annual Report on Form 10-K to “Amkor,” “we,” “us,” “our” or the “company” are to Amkor Technology, Inc. and its subsidiaries. We refer to the Republic of Korea, which is also commonly known as South Korea, as “Korea”. All references to “J-Devices” are to Amkor Technology Japan, Inc., formerly known as J-Devices Corporation, our wholly owned subsidiary in Japan. Amounts preceded by ¥ are in Japanese yen. Amkor®, Amkor Technology®, ChipArray®, FusionQuad®, J-Devices™, MicroLeadFrame®, TMV®, and SWIFT®, among others, are trademarks of Amkor Technology, Inc. All other trademarks appearing herein are held by their respective owners. Subsequent use of the above trademarks in this report may occur without the respective superscript symbol (® and ™) in order to facilitate the readability of the report and are not a waiver of any rights that may be associated with the relevant trademarks.

[Table of Contents](#)

This report contains forward-looking statements within the meaning of the federal securities laws, including but not limited to statements regarding (1) the amount, timing and focus of our expected capital investments in 2020 including expenditures in support of advanced packaging and test equipment, (2) our ability to fund our operating activities and financial requirements for the next twelve months, (3) the effect of changes in revenue levels and capacity utilization on our gross margin, (4) the focus of our research and development activities, (5) the anticipated impact of the Tax Cuts and Jobs Act (the “Tax Act”) and tax law changes in the jurisdictions in which we operate, (6) the grant and expiration of tax holidays in jurisdictions in which we operate and expectations regarding our effective tax rate and the availability of tax incentives, (7) the creation or release of valuation allowances related to taxes in the future, (8) our repurchase or repayment of outstanding debt, (9) payment of dividends, (10) compliance with our covenants, (11) expected contributions to foreign pension plans, (12) liability for unrecognized tax benefits and the potential impact of our unrecognized tax benefits on our effective tax rate, (13) the effect of foreign currency exchange rate exposure on our financial results, (14) the volatility of the trading price of our common stock, (15) changes to our internal controls related to integration of acquired operations and implementation of an enterprise resource planning system, (16) our efforts to enlarge our customer base in certain geographic areas and markets, (17) demand for advanced packages in mobile and automotive devices and our technology leadership and potential growth in this market, (18) our expected forfeiture rate for outstanding stock options and restricted shares, (19) our expected rate of return for pension plan assets, (20) projects to install or integrate new information technology systems or upgrade our existing systems and (21) other statements that are not historical facts. In some cases, you can identify forward-looking statements by terminology such as “may,” “will,” “should,” “expects,” “plans,” “anticipates,” “believes,” “estimates,” “predicts,” “potential,” “continue,” “intend” or the negative of these terms or other comparable terminology. Because such statements include risks and uncertainties, actual results may differ materially from those anticipated in such forward-looking statements as a result of various factors, including those set forth in the following report as well as in Part I, Item 1A of this Annual Report on Form 10-K.

PART I

Item 1. *Business*

OVERVIEW

Amkor is one of the world’s leading providers of outsourced semiconductor packaging and test services. Amkor pioneered the outsourcing of semiconductor packaging and test services through a predecessor corporation in 1968, and over the years we have built a leading position by:

- Designing and developing innovative packaging and test technologies;
- Offering a broad portfolio of cost-effective solutions and services;
- Focusing on strategic end markets that offer solid growth potential;
- Cultivating long-standing relationships with our customers, which include many of the world’s leading semiconductor companies;
- Collaborating with customers, original equipment manufacturers (“OEMs”) and equipment and material suppliers;
- Developing a competitive cost structure with disciplined capital investment;
- Building expertise in high-volume manufacturing processes and developing a reputation for high quality and solid execution; and
- Providing a geographically diverse operating base, with research and development, engineering support and production capabilities at various facilities in China, Japan, Korea, Malaysia, the Philippines, Portugal and Taiwan.

Our packaging and test services are designed to meet application and chip specific requirements including: the required type of interconnect technology; size; thickness; and electrical, mechanical and thermal performance. We provide turnkey packaging and test services including semiconductor wafer bump, wafer probe, wafer back-grind, package design, packaging, system-level and final test and drop shipment services. Our customers use us for one or more of these services.

We provide our services to integrated device manufacturers (“IDMs”), “fabless” semiconductor companies, OEMs and contract foundries. IDMs generally design, manufacture, package and test semiconductors in their own facilities. However, the availability of technologically advanced outsourced manufacturing services has encouraged IDMs to outsource a portion of their manufacturing. Fabless semiconductor companies do not have factories and focus exclusively on the semiconductor design process and outsource virtually every step of the manufacturing process. Fabless semiconductor companies utilize contract foundries to manufacture their semiconductors in wafer form and companies such as Amkor for their packaging and test needs. Some companies will engage a contract foundry to manage the complete semiconductor manufacturing process, and in turn, the contract foundry will outsource some of its packaging and test needs.

AVAILABLE INFORMATION

Amkor files annual, quarterly and current reports, proxy statements and other information with the U.S. Securities and Exchange Commission (the “SEC”). The SEC maintains a website that contains annual, quarterly and current reports, proxy statements and other information that issuers (including Amkor) file electronically with the SEC. The SEC’s website is <http://www.sec.gov>.

Amkor’s website is <https://www.amkor.com>. Amkor makes available, free of charge, through its website: our annual reports on Form 10-K; quarterly reports on Form 10-Q; current reports on Form 8-K; Forms 3, 4 and 5 filed on behalf of directors and executive officers and any amendments to those reports filed or furnished pursuant to the Securities Exchange Act of 1934, as amended (the “Exchange Act”), as soon as reasonably practicable after such material is electronically filed with, or furnished to, the SEC. We also make available, free of charge, through our website, our Corporate Governance Guidelines, the charters of the Audit Committee, Nominating and Governance Committee and Compensation Committee of our Board of Directors, our Code of Business Conduct, our Code of Ethics for Directors and other information and materials. The information on Amkor’s website is not incorporated by reference into this report.

INDUSTRY BACKGROUND

Semiconductor devices are the essential building blocks used in most electronic products. As electronic and semiconductor devices have evolved, several important trends have emerged that have fueled the growth of the overall semiconductor industry, as well as the market for outsourced semiconductor packaging and test services. These trends include:

- An increasing demand for mobile and connected devices, including the world-wide adoption of “smart” phones, tablets and other Internet-of-Things (IoT) devices that can access the internet and provide multimedia capabilities.
- An increase in mobility and connectivity capabilities and growing digital content driving demand for new broadband wired and wireless networking equipment.
- The proliferation of semiconductor devices into well-established end products such as automotive systems due to increased use of electronics for safety, navigation, fuel efficiency, emission reduction and entertainment systems.
- An overall increase in the semiconductor content within electronic products to provide greater functionality and higher levels of performance.
- The emergence of specialized chips designed to collect, analyze and store the digital content driven by the growth of cloud computing. These chips include data accelerators, artificial intelligence and machine learning devices.
- The growth of advanced System-in-Package (“SiP”) modules where multiple semiconductor and other electronic components with different functionalities are combined into a single package. The increasing demand for miniaturization and higher functionality at competitive cost is driving the adoption of advanced SiP in new products. Advanced SiPs are the primary vehicle for package-level integration, which allow customers to combine integrated circuits (“ICs”) from different silicon nodes and different foundries.

As a supplier in the semiconductor industry, our business is cyclical by nature and impacted by broad economic factors, such as world-wide gross domestic product and consumer spending. Historical trends indicate there has been a strong correlation between world-wide gross domestic product levels, consumer spending and semiconductor industry cycles.

Outsourcing Trends in Semiconductor Manufacturing

Semiconductor companies outsource their packaging and test needs to service providers such as Amkor for the following reasons:

Packaging and test service providers have developed expertise in advanced technologies.

The increasing demands for miniaturization, greater functionality, lower power consumption and improved thermal and electrical performance are driving the continuous development of semiconductor packaging and test technologies that are more sophisticated, complex and customized. This trend has led many semiconductor companies and OEMs to view packaging and test as enabling technologies requiring the kind of leading-edge expertise for technological innovation found in the leading outsourced assembly and test companies. At the same time, these companies are often looking to reduce the internal manufacturing and research and development costs in packaging and test. As a result, many of these companies are increasingly relying on packaging and test service providers as key sources for new package designs and advanced interconnect technologies.

Packaging and test service providers offer a cost-effective solution in a highly cyclical, capital intensive industry.

The semiconductor industry is cyclical by nature and impacted by broad economic factors, such as changes in worldwide gross domestic product and consumer spending. Semiconductor packaging and test are complex processes requiring substantial investment in specialized equipment, factories and human resources. As a result of this cyclicity and the large investments required, manufacturing facilities must operate at consistently high levels of utilization to be cost-effective. Shorter product life cycles, coupled with the need to update or replace packaging and test equipment to accommodate new package types, make it more difficult for integrated semiconductor companies to maintain cost-effective utilization of their packaging and test assets throughout semiconductor industry cycles. Packaging and test service providers, on the other

hand, can typically use their assets to support a broad range of customers and multiple end markets, potentially generating more efficient use of their production assets and a more cost-effective solution.

Packaging and test service providers can facilitate a more efficient supply chain and help shorten time-to-market for new products.

We believe that semiconductor companies, together with their customers, are seeking to shorten the time-to-market for their new products and that having an effective supply chain is a critical factor in facilitating timely and successful product introductions. Packaging and test service providers have the resources and expertise to timely develop their capabilities and implement new packaging technology in volume. For this reason, semiconductor companies and OEMs are leveraging the capabilities of packaging and test service providers to deliver their new products to market more quickly.

High quality packaging and test service providers enable semiconductor manufacturers to focus their resources on semiconductor design and wafer fabrication.

As semiconductor process technology migrates to larger wafers and smaller feature sizes, the cost of building a state-of-the-art wafer fabrication factory has risen significantly and can now be several billions of dollars. The high cost of investing in next generation silicon technology and equipment is causing many semiconductor companies to adopt or maintain a “fabless” or “fab-lite” strategy to reduce or eliminate their investment in wafer fabrication and associated packaging and test operations. As a result, these companies are increasing their reliance on outsourced providers of semiconductor manufacturing services, including packaging and test.

STRATEGY AND COMPETITIVE STRENGTHS

Strategy

Our financial goals are sales growth and improved profitability, and we are focusing on the following strategies to achieve these goals:

Leverage Our Investment in Services for Advanced Technologies

We are an industry leader in developing and commercializing cost-effective advanced packaging and test technologies. These advanced technology solutions provide increased value to our customers. An important factor for success in the advanced packaging and test area is to generate reasonably quick returns on investments made in support of customers seeking leading-edge technologies.

In recent years we have made significant investments in state-of-the-art facilities and equipment to provide services for the industry’s most complex devices. With approximately 650 employees engaged in research and development and manufacturing process engineering for new semiconductor packaging and test technologies, we are a technology leader in areas such as fine pitch bumping, advanced flip chip, wafer-level processing and advanced SiPs. During 2019, we had success capitalizing on our advanced technology to achieve design wins and new product introductions in areas such as: chips fabricated at 7, 10, 14 and 16 nanometer geometries; advanced SiP products including radio frequency (“RF”), front end modules and micro-electro-mechanical systems (“MEMS”) devices; optical sensors and cavity MEMS; advanced Flip Chip with Through Silicon Via (“TSV”) Technology; wafer-level Chip Scale Packaging (“CSP”); and wafer-level fan-out packages.

We work closely with our customers to develop cost-effective leading-edge packages for the next generation of devices. These include integrated technologies such as advanced SiP, wafer-level fan-out, Silicon Wafer Integrated Fan-out Technology (“SWIFT”), High Density Fan-Out (“HDFO”) and redistribution layer (“RDL”) solutions which enable very thin, very small products combining application processors, memory, baseband and other peripheral integrated circuits (“ICs”). They also include packages utilizing TSV interconnects and silicon interposers which enable the integration of high-performance chips such as high bandwidth memory and graphics processors into a single package.

We believe that advanced packaging services will continue to grow as our customers and leading electronics OEMs strive for smaller device geometries, higher levels of speed and performance and lower power consumption. We intend to continue to leverage our investment in advanced technology to meet the demand for these services.

Improve Utilization of Existing Assets and Broaden Our Customer Base

Another key to our success is to improve the utilization of our existing assets. The transition by leading edge customers to newer packaging and test equipment platforms typically frees up capacity in existing, previously installed equipment. As part of our strategy, we are focused on developing a second wave of customers to more effectively utilize these assets over a longer period of time. We are building and utilizing manufacturing lines which support multiple customers and increasing factory utilization through more sophisticated planning processes and more intensive efficiency improvement activities.

Balanced Growth

Revenue growth is a significant objective for Amkor. We strive to grow in a balanced way and avoid over-reliance on any single market or customer. Our goal is to achieve more consistent financial performance through all phases of the business cycle. Our balanced growth strategy consists of the following two components:

- First, we are increasing our revenue in markets beyond communications, including automotive, consumer and computing end markets. Revenue from these markets tends to be more stable, with less pronounced seasonality tied to the launch of flagship phones.
- Second, we continue to focus on share gains in the iOS and high-end Android ecosystems, leveraging our expertise in advanced SiP, MEMS and other advanced packages to expand our content in next generation 5G phones.

Selectively Grow Our Scale and Scope through Strategic Investments

From time to time we see attractive opportunities to grow our customer base and expand markets through strategic investments. For example, in 2017 we completed the acquisition of Nanium, S.A. (“Nanium”), a provider of wafer-level fan-out semiconductor packaging solutions. We believe that this acquisition has strengthened our position in the market for wafer-level packaging. In 2015, we completed the acquisition of 100% of J-Devices, our outsourced semiconductor assembly and test (“OSAT”) joint venture in Japan.

We believe that selective growth through joint ventures, acquisitions and other strategic investments can help diversify our revenue streams, improve our profits and maintain our technological leadership.

Competitive Strengths

The outsourced semiconductor packaging and test market is very competitive. We also compete with the internal semiconductor packaging and test capabilities of many of our customers and foundries. We believe we are well-positioned in the outsourced packaging and test services market. The following competitive strengths allow us to build upon our industry position and to remain one of the preferred providers of semiconductor packaging and test services.

Leading Technology Innovator

We are a leader in developing and deploying advanced semiconductor packaging and test solutions. We have designed and developed several state-of-the-art package formats and technologies, including our Package-on-Package (“PoP”) platform with Through Mold Via (“TMV”) technology, molded embedded packages, FusionQuad, flip chip ball grid array, multi-chip modules with a silicon interposer placed between the module chips and substrate, copper pillar bumping and fine pitch copper pillar flip chip packaging technologies. In addition, we believe that as semiconductor technology continues to achieve smaller device geometries with higher levels of speed and performance, packages will increasingly require wafer-level CSP, wafer-level fan-out, SWIFT and flip chip interconnect solutions and advanced SiP products.

We continue to invest in developing the key processes and packaging and test technologies required for our customers to deliver advanced integrated and modular solutions to market. We are a leader in wafer thinning, micro-bumping, die stacking,

hybrid packaging and TSV-based flip chip innovation. We are also a developer of environmentally friendly IC packaging, which involves the elimination of lead and certain other materials.

Long-Standing Relationships and Collaboration with Prominent Semiconductor Companies

Our customers include most of the world's largest semiconductor companies, and over the last five decades we have developed long-standing relationships with many of these companies. We believe that our production excellence has been a key factor in our success in attracting and retaining customers. We work with our customers and our suppliers to develop proprietary process technologies to enhance our existing capabilities, reduce time-to-market, increase quality and lower costs.

We believe that our focus on research and product development will enable us to enter new markets early, capture market share and promote the adoption of our new package designs as industry standards. We collaborate with customers and leading OEMs to develop comprehensive packaging solutions that make it easier for next-generation semiconductors to be designed into next-generation end products. By collaborating with leading semiconductor companies and OEM electronic companies, we gain access to technology roadmaps that allow us to focus resources on developing new packages that satisfy their future requirements.

Broad Offering of Semiconductor Package Design, Packaging and Test Services

Creating successful interconnect solutions for advanced semiconductor devices often poses unique thermal, electrical and mechanical design challenges, and we employ a large number of engineers to solve these challenges for a wide variety of products. This wide variety of packaging offerings is necessary to meet the diverse needs of our customers for the optimal combination of performance, size and cost attributes. Our solutions enable our customers to focus on semiconductor design and wafer fabrication while utilizing Amkor as their turnkey design, packaging and test services provider and, in many cases, their packaging technology innovator.

We also offer an extensive line of advanced probe and final test services for analog, digital, logic, mixed signal and RF semiconductor devices. We believe that the breadth of our design, packaging and test services is important to customers seeking to limit the number of their suppliers.

Geographically Diversified Operating Base

We have a broad and geographically diversified operating footprint strategically located in seven countries in many of the world's important electronics manufacturing regions. We believe that our scale and scope allow us to provide a flexible supply chain and cost-effective solutions to our customers by:

- Offering capacity to absorb large orders and accommodate quick turn-around times;
- Obtaining favorable pricing on materials and equipment, where possible, by using our purchasing power and leading industry position;
- Qualifying production of customer devices at multiple manufacturing sites to mitigate the risks of supply disruptions; and
- Providing capabilities and solutions for customer-specific requirements.

Competitive Cost Structure and Disciplined Capital Investment

There is a continuous push throughout the entire semiconductor supply chain for lower cost solutions. We work to maintain a competitive cost structure and make disciplined capital investment decisions so that we can provide cost-competitive solutions to our customers and achieve sustainable profitability and cash flow. Some of our cost control efforts have been directed at: (1) improving the utilization of our existing assets; (2) developing new manufacturing methods to reduce processing costs; (3) utilizing flexible manufacturing lines that can accommodate a variety of products and customers; (4) increasing test densities to drive higher throughput; (5) implementing more cost-effective materials; (6) utilizing our scale to drive world-wide purchasing leverage; and (7) increasing labor productivity.

We operate in a cyclical industry. During an industry downturn we seek to reduce our costs and drive greater factory and administrative efficiencies. Cost control efforts can include reducing labor costs by temporarily lowering compensation, reducing employee and contractor headcount, shortening work weeks and obtaining labor-related foreign government subsidies where available.

PACKAGING AND TEST SERVICES

Overview of Semiconductor Manufacturing Process

In general, the semiconductor manufacturing process consists of IC design, wafer fabrication, wafer probe, packaging and final test.

Integrated circuit design involves the laying out of electronic components, such as transistors, resistors, capacitors and the metallic interconnect of these components, to achieve the desired device functionality. Wafer fabrication is a multiple-step sequence of photolithographic and chemical processing steps during which the ICs are gradually created on semiconductor material, typically a silicon wafer. Individual ICs are generally known as a “chip” or “die”, and a single wafer will contain many die. Wafers are fabricated by two types of companies - IDMs, which design and fabricate wafers using their own in-house manufacturing facilities, and contract foundries, which manufacture wafers that are designed by fabless companies or other customers. Excluding the vertically integrated memory market, contract foundries account for the majority of leading edge wafer processing technology manufacturing digital semiconductor products.

The packaging and test services we provide occur subsequent to wafer fabrication. The wafers that we receive from our customers are generally consigned to us; we do not own the consigned wafers or record their value in our financial statements. During wafer probe, each individual die is electrically tested, or probed, for defects so that only good die are packaged. Packaging is the processing of bare die to facilitate electrical connections and heat dissipation and protect the die. The wafer is separated into individual die. Each good die is then assembled into a package that typically encapsulates the die for protection and creates the electrical connections used to connect the package to a printed circuit board, module or other part of the electronic device. In some packages, chips are attached to a substrate or leadframe carrier through wirebonding or flip chip interconnects and then encased in a protective material. Or, for a wafer-level package, the electrical interconnections are created directly on the surface of the die so that the chip may be attached directly to other parts of an electronic device without a substrate or leadframe. The packages are then tested using sophisticated equipment to ensure that each packaged chip meets its design and performance specifications.

Packaging and Test Technologies and Processes

Our packages employ wirebond, flip chip, copper clip and other interconnect technologies. We use leadframe and substrate package carriers, and we perform a variety of test services.

Interconnect Technologies

Wirebond: In packages that employ wirebond interconnect technology, the die is mounted face up on the package carrier and the interconnections between the die and package carrier are made through very fine gold, silver or copper wires which are attached from the bond pads of the die to the package carrier. The interconnections are placed along the perimeter of the die. Wirebonding is generally considered to be the most cost-effective and flexible interconnect technology and is used to assemble the majority of semiconductor packages.

Flip Chip: In packages that employ flip chip interconnect technology, the interconnections between the die and package carrier are made through conductive “bumps” that are placed directly on the die surface utilizing a process called wafer bumping. The bumped die is then “flipped over” and placed face down, with the bumps connecting directly to the package carrier. Flip chip allows a higher number of interconnects than wirebond as it uses the entire surface area of the die, and sometimes the perimeter as well, instead of just the perimeter as used by most wirebond packages. Flip chip also provides enhanced thermal and electrical performance and enables smaller die and thinner, smaller form factors (or physical package dimensions).

[Table of Contents](#)

The wafer bumping process consists of preparing the wafer for bumping and forming or placing the bumps. Preparation may include cleaning, removing insulating oxides and providing a pad metallurgy that will protect the interconnections while making good mechanical and electrical connection between the bump and the wafer.

Copper Clip: Copper clip interconnect technology uses a solid copper bridge or “clip” to connect the die to the package carrier. The clip allows a higher level of current flow than a wire and also provides a better method of heat transfer from the die. The clip is either spot welded, or more often re-flow soldered, to the die pads and the package carrier pads.

Package Carriers

Leadframe: A leadframe is a miniature sheet of metal, generally made of copper and silver alloys, on which a pattern of electrical connections (or “leads”) has been cut. The leads are generally placed around the perimeter of the leadframe and are used to connect the package to the system board. The number of leads on an individual leadframe is limited as electrical shorting can occur if the leads are placed too close together.

Substrate: A substrate is a laminate of either single or multiple layers of epoxy resin, woven glass fibers and metal conductors. Solder bumps provide the electrical connection to the system board. The bumps are typically distributed evenly across the bottom surface of the substrate (called a “ball grid array” format). This allows less distance between individual leads and a higher number of interconnects than leadframe packages.

Test Services

Amkor provides a complete range of semiconductor testing services including wafer testing or probe and final test. We offer a broad range of test software, hardware, integration and product engineering services, and we support a range of business models and test capabilities. Substantially all of our test business is derived from testing packages that we assemble.

Wafer Test Services: Wafer test, also referred to as wafer probe, is performed after wafer fabrication or wafer bumping to screen out defective devices prior to packaging. We offer a range of wafer test coverage that can be tailored based on the cost and complexity of the die, the package and the product. These services range from coarse level screening for major defects all the way up to probing at high digital speeds and can include full radio frequency transmit and receive as well as testing at multiple temperatures. Wafer testing can also involve a range of wafer mapping and inspection operations.

Final Test Services: After the packaging process, final test is performed to ensure that the packaged device meets the customer’s requirements. Final test spans a range of rigor and complexity depending on the device and end market application. More rigorous types of final test include testing multiple times under different electrical and temperature conditions and before and after device reliability stresses, such as burn-in. In addition to electrical testing, specialized solutions are required for packages that also process non-electric stimuli.

The electrical tests are a mix of functional, structural and system-level tests depending on the customer’s requirements and cost and reliability parameters. The electrical test equipment we use includes commercially available automated test equipment, customized and proprietary system level test equipment and innovative types of low cost test equipment developed by Amkor.

Advanced Products and Mainstream Products

We offer a broad range of advanced and mainstream packaging and test services to our customers. We refer to our flip chip, wafer-level processing and related test services as “Advanced Products”, and our wirebond packaging and related test services as “Mainstream Products”. The following table sets forth, for the periods indicated, the amount of advanced and mainstream packaging and test net sales and the percentage of such net sales:

	For the Year Ended December 31,								
	2019		2018		2017				
	(In millions, except percentage of net sales)								
Advanced Products	\$	2,111	52.1%	\$	2,118	49.1%	\$	1,966	46.7%
Mainstream Products		1,942	47.9%		2,198	50.9%		2,241	53.3%
Total net sales	\$	4,053	100.0%	\$	4,316	100.0%	\$	4,207	100.0%

Advanced Products

Our Advanced Products include flip chip chip scale packages, wafer-level packages and flip chip ball grid array packages. These package families use flip chip interconnect technology so that the die can be connected to a substrate package carrier or, in the case of wafer-level chip scale packages, directly to a printed circuit board.

Flip Chip Chip Scale Package (“FC CSP”) Products: FC CSP packages are small form factor packages where the substrate size is not much larger than the die itself. The size advantage provided by CSP technologies has made FC CSP an attractive choice for a wide variety of applications that require very small form factors such as smartphones, tablets and other mobile consumer electronic devices.

Flip chip stacked chip scale packages (“FC SCSP”) stack a second die on top of the original flip-chip die. The top die is typically a memory device, and wirebond interconnects are used to attach it to the substrate. FC SCSP is frequently used to stack memory on top of digital baseband and applications processors for use in mobile devices.

We continue to drive thinner package solutions for our PoP technology through the development of ultra-thin substrates and enhancing our pre-stacking and thin die handling capabilities.

We developed fine pitch copper pillar flip chip interconnect technology, which creates interconnections at finer pitches using a plating process to reduce the number of substrate layers to facilitate very thin packages. This innovative solution is also an enabling technology for package stacking with TSVs.

Flip Chip Ball Grid Array (“FC BGA”) Products: FC BGA packages are large form factor substrate-based packages which are used where processing power and speed are needed and small form factors are not required. Our FC BGA packages are assembled around state-of-the-art substrates. Utilizing multiple high density routing layers, laser drilled vias, and ultra-fine line and space metallization, FC BGA substrates have the highest routing density available. The variety of FC BGA package options allows package selection to be tailored to the specific thermal needs of the end product. We offer FC BGA packaging in a variety of product formats to fit a wide range of end application requirements, including networking, storage, computing and consumer applications.

Wafer-level Package Products: We offer three types of wafer-level packages: Wafer-level CSP; wafer-level fan-out; and SWIFT.

- Wafer-level CSP packages (also known as fan-in wafer-level packages) do not utilize a package carrier. The bumped wafer is singulated into individual die, and the wafer-level package is then attached directly to the system board. Wafer-level CSP offers one of the lowest total system costs, enabling higher semiconductor content while leveraging the smallest form factor and one of the highest performing, most reliable, semiconductor package platforms on the market today. We have seen consistent content gains in our wafer-level CSP business, driven largely by mobile communications. Applications for wafer-level CSP include power management, transceivers, sensors, wireless charging, codecs and specialty silicon for new or unique functionality.
- Wafer-level fan-out packages (also known as low-density fan-out packages) are utilized for ICs where the die surface area is too small to accommodate all of the bond pads. The fan-out package enlarges the bondable surface area by building a border around the die using low-cost molding compound. Wafer-level CSP and wafer-level fan-out are complementary technologies. Customers can choose between the two package types as their die sizes shrink or grow. With the acquisition of Nanium, we became a leader in low-density fan-out technology.

- Silicon Wafer Integrated Fan-out Technology (“SWIFT”, also known as high-density fan-out) replaces a laminate substrate with a thinner structure. SWIFT solutions enable very thin, very small products combining application processors, memory, baseband and other peripheral ICs.

Mainstream Products

Our Mainstream Products include leadframe packages, substrate-based wirebond packages and MEMS packages. These package families use wirebond interconnect technology to connect a die to a leadframe or substrate package carrier.

Leadframe Packages: Leadframe packages use wirebond or flip chip technology to interconnect a die to a leadframe package carrier. Leadframe packages are used in many electronic devices and remain the most practical and cost-effective solution for many low to medium pin count applications.

Traditional leadframe packages support a wide variety of device types and applications. Two of our most popular traditional leadframe package types are small outline integrated circuit and quad flat package, commonly known as “dual” and “quad” products, respectively, based upon the number of sides from which the leads extend. The traditional leadframe package family has evolved from “through hole design,” where the leads are plugged into holes on the circuit board to “surface mount design,” where the leads are soldered to the surface of the circuit board. We offer a wide range of lead counts and body sizes to satisfy variations in the size of customers’ semiconductor devices.

Through a process of continuous engineering and customization, we have designed several leadframe package types that are thinner and smaller than traditional leadframe packages and can accommodate more leads on the perimeter of the package. These leadframe packages typically have superior thermal and electrical characteristics, which allow them to dissipate heat generated by high-powered semiconductor devices while providing enhanced electrical connectivity. We are developing increasingly smaller versions of these packages to keep pace with continually shrinking semiconductor device sizes and demand for miniaturization of portable electronic products. One of our more successful leadframe package offerings is the *MicroLeadFrame* family of quad flat no lead packages.

Power discrete devices use a leadframe as the package carrier and primarily use wirebond interconnect technology. However, power applications that require improved thermal and electrical performance will use packaging with copper clip interconnect technology.

Substrate-based Wirebond Packages: Substrate-based wirebond packages use wirebond technology to connect a die to a substrate. Some of our packages in this category include stacked CSP, wirebond ball grid array packages and plastic ball grid array (“PBGA”) packages.

Stacked CSP technology enables the stacking of a wide range of different semiconductor devices to deliver high levels of silicon integration and area efficiency. Stacked CSP utilizes high density thin core substrates and advanced materials, along with leading-edge wafer thinning, die attach and molding capabilities, to stack multiple die on a substrate. Stacked CSP is ideal for memory and mixed signal applications.

Wirebond ball grid array packages offer a broad selection of ball array pitches, ball counts and body sizes, single and multi-die layouts, stacked die and passive component integration. They are applicable for a wide range of semiconductors requiring a smaller package size than conventional PBGAs or leadframe packages.

PBGA packages are used in applications requiring higher pin count than leadframe packages, but typically have lower pin counts than flip chip. PBGA packages are designed for low inductance, improved thermal operation and enhanced surface-mount technology ability. Custom performance enhancements, like ground and power planes, are also available.

Micro-Electro-Mechanical Systems Packages: MEMS are miniaturized mechanical and electro-mechanical devices that can sense and provide information about the physical world and sometimes trigger a response. Examples of MEMS devices include microphones, accelerometers, airbag deployment sensors, gyrometers, magnetometers, and humidity, temperature and pressure sensors. We also specialize in sensor fusion products which utilize our cavity MEMS platform and combine multiple sensors into a single package. MEMS packages leverage our expertise in wafer thinning, die stacking, wirebonding and flip chip interconnect to deliver sophisticated products with a very small form factor.

Advanced System-in-Package Modules

Advanced SiP modules combine multiple semiconductor and other electronic components with different functionalities into a single package. These modules use wirebond, flip chip or wafer-level interconnect technologies. Components can include integrated circuits, passive devices (inductors, capacitors, resistors, filters and diplexers), antennas and mechanical parts.

The increasing demand for miniaturization and higher functionality at competitive cost is driving the adoption of advanced SiP in new products. Advanced SiP modules are used for many applications such as RF and front end modules, basebands, connectivity, fingerprint sensors, display and touch screen drivers, sensors and MEMS, NAND memory and solid state drives. Advanced SiP modules are found in many products including smartphones and tablets, automobiles, wearable electronics, high-performance gaming systems, computers and network systems.

In 2019, 2018 and 2017, we had net sales of approximately \$1,075 million, \$990 million and \$840 million, respectively, from our advanced SiP modules which are included in either Advanced Products or Mainstream Products depending upon the interconnect technology used in the module.

End Markets

The following table lists the end markets that use our products and sets forth, for the periods indicated, the percentage of net sales in each end market. All prior periods have been retrospectively recast to conform with current year presentation.

	2019	2018	2017
End Market Distribution Data (an approximation including representative devices and applications based on a sampling of our largest customers):			
Communications (handheld devices, smart phones, tablets)	38%	44%	43%
Automotive, industrial and other (driver assist, infotainment, performance, safety)	27%	26%	26%
Consumer (connected home, set-top boxes, televisions, visual imaging, wearables)	18%	12%	13%
Computing (data center, infrastructure, PC/laptops, storage)	17%	18%	18%
Total net sales	100%	100%	100%

RESEARCH AND DEVELOPMENT

Our research efforts focus on developing new packaging solutions and test services, as well as improving the efficiency and capabilities of our existing production processes. We believe that technology development is one of the keys to success in the semiconductor packaging and test industry. By concentrating our research and development on our customers' needs for innovative packages, increased performance and lower cost, we gain opportunities to enter markets early, capture market share and promote our new package offerings as industry standards.

One of our top priorities is developing low-cost packaging solutions for the next generation of mobile devices, which minimize material and processing costs, while maximizing yields and reliability. This development effort is particularly important for customers seeking cost-effective alternatives to further silicon-level integration. Another important focus area is the development of wafer-level packages for larger chips. These wafer-level chip-scale packages and wafer-level fan-out (low density) packages are increasingly the preferred package type for many chips used in mobile devices. They provide a very low-profile product at a competitive cost. We are also developing integrated (high density) wafer-level fan-out solutions called SWIFT which enable very thin, very small products by combining application processors, memory, baseband and other peripheral ICs into one packaged module. Through the use of die partitioning and heterogeneous die integration, these sub-system and system modules provide higher functionality at lower cost versus multi-package options. Many of the innovations developed for mobile devices migrate to other end markets, as customers in other end markets have similar challenges regarding miniaturization, power management and performance.

Our research and development employees are located in the United States and Portugal and throughout Asia. In 2019, we had approximately 650 employees engaged in research and development activities. In 2019, 2018 and 2017, we incurred \$137.6 million, \$157.2 million and \$166.6 million, respectively, of research and development expense.

SALES AND MARKETING

Our sales offices are located throughout Asia, Europe and North America. Our support personnel manage and promote our packaging and test services and provide key customer and technical support. To provide comprehensive sales and customer service, we typically assign our customers a direct support team consisting of an account manager, technical program manager, test program manager and both field and factory customer support representatives. We also support our largest multinational customers from multiple office locations to ensure that we are aligned with their global operational and business requirements.

Our direct support teams are further supported by an extended staff of product, process, quality and reliability engineers, as well as marketing and advertising specialists, information systems technicians and factory personnel. Together, these direct and extended support teams deliver an array of services to our customers.

SEASONALITY

Our sales have generally been higher in the second half of the year than in the first half due to the effect of consumer buying patterns in the U.S., Europe and Asia and the timing of flagship mobile device launches. In addition, semiconductor companies generally reduce their production during the holidays at the end of December, which generally results in a decrease in packaging and test services during the first quarter. General economic conditions, changes in our product mix or overall demand in any of our end-markets can impact our seasonality.

CUSTOMERS

In 2019, we had approximately 275 customers, including many of the largest semiconductor companies in the world. Our ten largest customers accounted for 63% of our net sales in 2019.

MATERIALS AND EQUIPMENT

Materials

Our materials are used primarily for packaging activities. Our packaging operations depend upon obtaining adequate supplies of materials on a timely basis. The principal materials used in our packaging process are leadframes, laminate substrates, gold and copper wire, mold compound, epoxy, tubes and trays. The silicon wafer is generally consigned from the customer. We generally do not take ownership of the customer consigned wafer, and title and risk of loss remains with the customer for these materials. Test materials constitute a very small portion of our total test cost. We purchase materials based on customer forecasts, and our customers are generally responsible for any unused materials which we purchased based on such forecasts.

We obtain the materials required for packaging services from various suppliers. We source most of our materials, including critical materials such as leadframes, laminate substrates and gold wire, from a limited group of suppliers. We work closely with our primary material suppliers in an effort to ensure consistent quality, availability and timely delivery. We also negotiate world-wide pricing agreements with our major suppliers to take advantage of the scale of our operations.

Equipment

Our ability to meet the changing demand from our customers for manufacturing capacity depends upon obtaining packaging and test equipment in a timely manner. We work closely with our main equipment suppliers to coordinate the ordering and delivery of equipment to meet our expected capacity needs.

The primary types of equipment used in providing our packaging services are wirebonders and die bonders. In addition, we maintain a variety of other packaging equipment, including mold, singulation, die attach, ball attach and wafer backgrind, along with numerous other types of manufacturing equipment. A substantial portion of our packaging equipment base can generally be used and adapted to support the manufacture of many of our packages through the use of relatively low cost tooling, although equipment used in advanced packaging can be more difficult to redeploy than equipment used in traditional wirebond packaging.

We also purchase wafer bumping equipment to facilitate our flip chip and wafer level packaging services. Wafer bump equipment includes sputter and spin coaters, electroplating equipment, reflow ovens and other types of equipment. This equipment tends to have longer lead times for delivery and installation than other packaging equipment and is sold in relatively larger increments of capacity.

The primary equipment used in the testing process includes testers, handlers and probers. Handlers are used to transfer individual or small groups of packaged ICs to a tester. Test equipment is generally a more capital intensive portion of the process and tends to have longer delivery lead times than most types of packaging equipment. We focus our capital expenditures on standardized tester platforms in order to maximize test equipment utilization where possible. In some cases, our customers will consign test equipment to us. In those cases, we operate the equipment on their behalf but do not own it.

ENVIRONMENTAL MATTERS

We use chemicals and materials in the semiconductor packaging process that generate byproducts such as wastewater, solid waste and flue gas. For example, water used for rinsing or cooling wafers being sawed or used in the etching or solder deposition process produces wastewater. Scraps from metal lead-frame or substrate or excessive molding resin produces solid waste. Emissions from solvents used for coating produce flue gases. In addition to byproducts, semiconductor packages have historically contained lead (“Pb”), a naturally occurring element that can be toxic. The use of Pb in our packages has decreased over time due to the use of Pb-free alternatives. The use and storage of chemicals and materials are subject to various laws and regulations governing waste disposal, water discharge, emissions into the atmosphere and employee health and safety. We are engaged in continuing efforts to comply with these environmental laws and regulations, including the establishment of Environmental Management Systems, safety training for employees and installation of pollution control equipment at our factories.

In the future we may be subject to changes to existing environmental regulations or new green initiatives required by our customers, investors or other stakeholders. We do not believe that capital expenditures or other costs attributable to compliance with environmental laws and regulations or green initiatives will have a material adverse effect on our business, liquidity, results of operations, financial condition or cash flows.

We are also committed to responsible environmental practices that go beyond legal requirements in conducting our business. These environmental practices include:

- Certification of our factories worldwide to International Organization for Standards (“ISO”) framework 14001, widely recognized as the standard for effective Environmental Management Systems.
- Measurement and independent verification of greenhouse gases (“GHG”) generated by our factories worldwide. Once collected, our GHG data is submitted to, and disclosed publicly by, the CDP, formerly known as the Carbon Disclosure Project. CDP is a leading organization that assesses the impact of climate change and promotes a sustainable economy.
- Membership in the Responsible Business Alliance (“RBA”), formerly known as the Electronic Industry Citizenship Coalition, an international industry group dedicated to corporate social responsibility. RBA members agree to follow a uniform Code of Conduct that includes standards of environmental responsibility, and our factories have been subject to independent audits to assess compliance with these standards.
- Capital investment and process optimization activities to reduce GHGs include installation of solar photovoltaic panels, replacement of or improvements to chiller unit systems and use of lighting based on Light Emitting Diode (“LED”) technology.

COMPETITION

The outsourced semiconductor packaging and test market is very competitive. We face substantial competition from established packaging and test service providers primarily located in Asia, including companies with significant manufacturing capacity, financial resources, research and development operations, marketing and other capabilities. These

companies include ASE Technology Holding Co., Ltd. and Jiangsu Changjiang Electronics Technology Co., Ltd. Such companies also have developed relationships with most of the world's largest semiconductor companies, including current or potential customers of Amkor.

We also compete with the internal semiconductor packaging and test capabilities of many of our customers. Our IDM customers continually evaluate the attractiveness of outsourced services against their own in-house packaging and test services and at times may decide to shift some or all of their outsourced packaging and test services to internally sourced capacity. We also compete with contract foundries, such as Taiwan Semiconductor Manufacturing Company Limited and Samsung Electronics Co., Ltd., which offer full turnkey services from silicon wafer fabrication through packaging and final test. In addition, we compete with companies that offer only test services and not packaging.

The principal elements of competition in the semiconductor packaging and test services market include:

- technical competence;
- quality;
- price;
- breadth of packaging and test services offered, including turnkey services;
- new package and test design, technology innovation and implementation;
- cycle times;
- customer service;
- available capacity; and
- ability to invest in capacity, geographic location and scale of manufacturing.

We believe that we compete favorably with respect to each of these elements.

INTELLECTUAL PROPERTY

We maintain an active program to protect and derive value from our investment in technology and the associated intellectual property rights. Intellectual property rights that apply to our various products and services include patents, copyrights, trade secrets and trademarks. We have filed and obtained a number of patents in the U.S. and abroad, and their durations vary depending on the jurisdiction in which each patent is filed. Although our patents are an important element of our intellectual property strategy as a whole, we are not materially dependent on any one patent or any one technology. We expect to continue to file patent applications when appropriate to protect our proprietary technologies, but we cannot assure you that we will receive patents from pending or future applications. In addition, any patents we obtain may be challenged, invalidated or circumvented and may not provide meaningful protection or other commercial advantage to us.

We also protect and maintain the confidentiality of certain information about our processes, products and strategies which we believe provides us with a competitive advantage. We have ongoing programs designed to maintain the confidentiality of such information. Further, to distinguish our products from our competitors' products, we have obtained certain trademarks and service marks and may promote our particular brands through advertising and other marketing techniques.

EMPLOYEES

In 2019, Amkor had approximately 29,650 full-time employees. We believe that our relations with our employees are good, and we have not experienced a work stoppage in any of our factories. Our employees in the Philippines, Singapore, Taiwan and the U.S. are not represented by any union. Certain employees at our factories in China, Japan, Korea, Malaysia and Portugal are members of a union, and we operate subject to collective bargaining agreements that we have entered into with these unions.

Item 1A. Risk Factors

The factors discussed below are cautionary statements that identify important factors and risks that could cause actual results to differ materially from those anticipated by the forward-looking statements contained in this report. For more information regarding the forward-looking statements contained in this report, see the Table of Contents of this Annual Report on Form 10-K. You should carefully consider the risks and uncertainties described below, together with all of the other information included in this report, in considering our business and prospects. The risks and uncertainties described below are not the only ones facing Amkor. Additional risks and uncertainties not presently known to us may also adversely affect our business operations. The occurrence of any of the following risks could affect our business, liquidity, results of operations, financial condition or cash flows.

Dependence on the Highly Cyclical Semiconductor Industry - Our Packaging and Test Services Are Used in Volatile Industries and Industry Downturns, and Declines in Global Economic and Financial Conditions Could Harm Our Performance.

Our business is impacted by market conditions in the semiconductor industry, which is cyclical by nature and impacted by broad economic factors, such as world-wide gross domestic product and consumer spending. The semiconductor industry has experienced significant and sometimes sudden and prolonged downturns in the past. If the industry or markets we compete in experience slower, or even negative growth, our business and results of operations may be adversely affected.

Since our business is, and will continue to be, dependent on the requirements of semiconductor companies for outsourced packaging and test services, any downturn in the semiconductor industry or any other industry that uses a significant number of semiconductor devices, such as telecommunications, automotive, consumer electronics, or computing, could have a material adverse effect on our business and operating results. During downturns, we have experienced, among other things, reduced demand, excess capacity and reduced sales. For example, an inventory correction in the smartphone market and weakness in the general market reduced demand during 2019, and generally soft economic conditions and a lack of compelling new mobile products constrained overall demand during 2015. We believe that the general semiconductor market is still going through a typical cyclical correction. Macroeconomic uncertainties and a cautious business climate are also expected to constrain the revenue growth in our business. It is difficult to predict the timing, strength or duration of any economic slowdown or subsequent economic recovery, which, in turn, makes it more challenging for us to forecast our operating results, make business decisions and identify risks that may affect our business, sources and uses of cash, financial condition and results of operations. Additionally, if industry conditions deteriorate, we could suffer significant losses, as we have in the past, which could materially impact our business, liquidity, results of operations, financial condition and cash flows.

Fluctuations in Operating Results and Cash Flows - Our Operating Results and Cash Flows Have Varied and May Vary Significantly as a Result of Factors That We Cannot Control.

Many factors, including the impact of adverse economic conditions, could have a material adverse effect on our net sales, gross profit, operating results and cash flows or lead to significant variability of quarterly or annual operating results. Our profitability and ability to generate cash from operations is principally dependent upon demand for semiconductors, the utilization of our capacity, semiconductor package mix, the average selling price of our services, our ability to manage our capital expenditures and our ability to control our costs including labor, material, overhead and financing costs.

Our net sales, gross margin, gross profit, operating income and cash flows have historically fluctuated significantly from quarter to quarter as a result of many of the following factors, over which we have little or no control and which we expect to continue to impact our business:

- fluctuation in demand for semiconductors and conditions in the semiconductor industry generally, as well as by specific customers, such as inventory reductions by our customers impacting demand in key markets;
- our ability to achieve our major growth objectives, including transitioning second-wave customers to advanced packages and increasing our share of the automotive market;
- changes in our capacity and capacity utilization rates;
- changes in average selling prices which can occur quickly due to the absence of long-term agreements on price;

- changes in the mix of the semiconductor packaging and test services that we sell;
- fluctuations in our manufacturing yields;
- the development, transition and ramp to high volume manufacture of more advanced silicon nodes and evolving wafer, packaging and test technologies may cause production delays, lower manufacturing yields and supply constraints for new wafers and other materials;
- absence of backlog, the short-term nature of our customers' commitments, double bookings by customers and deterioration in customer forecasts and the impact of these factors, including the possible delay, rescheduling and cancellation of large orders, or the timing and volume of orders relative to our production capacity;
- changes in costs, quality, availability and delivery times of raw materials, components and equipment;
- changes in labor costs to perform our services;
- wage inflation and fluctuations in commodity prices, including gold, copper and other precious metals;
- the timing of expenditures in anticipation of future orders;
- changes in effective tax rates;
- the availability and cost of financing;
- leverage and debt covenants;
- intellectual property transactions and disputes;
- warranty and product liability claims and the impact of quality excursions and customer disputes and returns;
- costs associated with legal claims, indemnification obligations, judgments and settlements;
- political instability and government shutdowns, civil disturbances or international events, such as the United Kingdom's departure from the European Union;
- environmental or natural disasters such as earthquakes, typhoons and volcanic eruptions;
- pandemics or other illnesses that may impact our labor force, operations and end-user demand for products which incorporate semiconductors;
- costs of acquisitions and divestitures and difficulties integrating acquisitions;
- our ability to attract and retain qualified personnel to support our global operations;
- fluctuations in interest rates and currency exchange rates, including the potential impact of the phase-out of LIBOR on our variable rate debt;
- our ability to penetrate new end markets or expand our business in existing end markets;
- dependence on key customers or concentration of customers in certain end markets, such as mobile communications and automotive; and
- restructuring charges, asset write-offs and impairments.

It is often difficult to predict the impact of these factors upon our results for a particular period. These factors may have a material and adverse effect on our business, liquidity, results of operations, financial condition and cash flows or lead to significant variability of quarterly or annual operating results. In addition, these factors may adversely affect our credit ratings, which could make it more difficult and expensive for us to raise capital and could adversely affect the price of our securities.

Risks Associated with International Operations - We Depend on Our Factories and Operations in China, Japan, Korea, Malaysia, the Philippines, Portugal, Singapore and Taiwan. Many of Our Customers' and Vendors' Operations Are Also Located Outside of the U.S.

We provide packaging and test services through our factories and other operations located in China, Japan, Korea, Malaysia, the Philippines, Portugal, Singapore and Taiwan. Substantially all of our property, plant and equipment is located outside of the United States. Moreover, many of our customers and the vendors in our supply chain are located outside the U.S. The following are some of the risks we face in doing business internationally:

- changes in consumer demand resulting from deteriorating conditions in local economies;
- laws, rules, regulations and policies imposed by U.S. or foreign governments in areas such as data privacy, cybersecurity, antitrust and competition, tax, currency and banking, labor, environmental;
- restrictive trade barriers considered or adopted by U.S. and foreign governments applicable to the semiconductor supply chain, including laws, rules, regulations and policies in areas such as national security, licensing requirements for exports, tariffs, customs and duties;
- health and safety concerns, including widespread outbreak of infectious diseases;
- laws, rules, regulations and policies within China and other countries that may favor domestic companies over non-domestic companies, including customer- or government-supported efforts to promote the development and growth of local competitors;
- the payment of dividends and other payments by non-U.S. subsidiaries may be subject to prohibitions, limitations or taxes in local jurisdictions;
- fluctuations in currency exchange rates, particularly the dollar/yen exchange rate for our operations in Japan;
- political and social conditions, and the potential for civil unrest, terrorism or other hostilities;
- disruptions or delays in shipments caused by customs brokers or government agencies;
- difficulties in attracting and retaining qualified personnel and managing foreign operations, including foreign labor disruptions;
- difficulty in enforcing contractual rights and protecting our intellectual property rights;
- potentially adverse tax consequences resulting from tax laws in the U.S. and in foreign jurisdictions in which we operate; and
- local business and cultural factors that differ from our normal standards and practices, including business practices that we are prohibited from engaging in by the Foreign Corrupt Practices Act and other anti-corruption laws and regulations.

In particular, we have significant facilities and other investments in South Korea, and there have been heightened security concerns in recent years stemming from North Korea's nuclear weapon and long-range missile programs as well as its military actions in the region. Furthermore, there has been a history of conflict and a recent rise in tensions within and among other countries in the region.

Customer Concentration and Loss of Customers - The Loss of Certain Customers or Reduced Orders or Pricing from Existing Customers May Have a Significant Adverse Effect on Our Operations and Financial Results.

We have derived and expect to continue to derive a large portion of our revenues from a small group of customers during any particular period due in part to the concentration of market share in the semiconductor industry. Our ten largest customers together accounted for 63% of our net sales for the year ended December 31, 2019. In addition, we have significant customer concentration within our end markets. The loss of a significant customer, a business combination among our customers, a reduction in orders or decrease in price from a significant customer or disruption in any of our significant strategic partnerships

or other commercial arrangements may result in a decline in our sales and profitability and could have a material adverse effect on our business, liquidity, results of operations, financial condition and cash flows.

The demand for our services from each customer is directly dependent upon that customer's financial health, level of business activity and purchasing decisions, the quality and price of our services, our cycle time and delivery performance, the customer's qualification of additional competitors on products we package or test and a number of other factors. Each of these factors could vary significantly from time to time resulting in the loss or reduction of customer orders. Our business is likely to remain subject to this variability in order levels, and we cannot assure you that our key customers or any other customers will continue to place orders with us in the future at the same levels as in past periods.

For example, if a key customer decides to purchase wafers from a semiconductor foundry that provides packaging and test services, our business could be reduced if the customer also engages that foundry for related packaging and test services. We cannot assure that customer decisions regarding the purchase of semiconductor wafers will not significantly and adversely impact customer demand for our packaging and test services.

In addition, from time to time we may acquire or build new facilities or migrate existing business among our facilities. In connection with these facility changes, our customers require us to qualify the new facilities even though we have already qualified to perform the services at our other facilities. We cannot assure that we will successfully qualify new facilities or that our customers will not qualify our competitors and move the business for such services.

Competition - We Compete Against Established Competitors in the Packaging and Test Business as Well as Internal Capabilities of Integrated Device Manufacturers and Face Competition from New Competitors, Including Foundries.

The outsourced semiconductor packaging and test market is very competitive. We face substantial competition from established and emerging packaging and test service providers primarily located in Asia, including companies with significantly greater processing capacity, financial resources, local presence, research and development operations, marketing, technology and other capabilities. We also may face increased competition from domestic companies located in China, where there are government-supported efforts to promote the development and growth of the local semiconductor industry. We may be at a disadvantage in attempting to compete with entities associated with such government-supported initiatives based on their lower cost of capital, access to government resources and incentives, preferential sourcing practices, stronger local relationships or otherwise. Our competitors may also have established relationships, or enter into new strategic relationships, with one or more of the large semiconductor companies that are our current or potential customers, or key suppliers to these customers. Consolidation among our competitors could also strengthen their competitive position. For example, Advanced Semiconductor Engineering, Inc. and Siliconware Precision Industries Co., Ltd. became sister companies under a new joint holding company, ASE Technology Holding Co. LTD., in April 2018.

We also face competition from the internal capabilities and capacity of many of our current and potential IDM and foundry customers. In addition, we compete with contract foundries, such as Taiwan Semiconductor Manufacturing Company Limited and Samsung Electronics Co., Ltd., which offer full turnkey services from silicon wafer fabrication through packaging and final test. These foundries, which are substantially larger and have greater financial resources than we do, have expanded their operations to include packaging and test services and may continue to expand these capabilities in the future.

We cannot assure you that we will be able to compete successfully in the future against our existing or potential competitors or that our customers will not rely on internal sources for packaging and test services, or that our business, liquidity, results of operations, financial condition and cash flows will not be adversely affected by such increased competition.

Decisions by Our Integrated Device Manufacturer and Foundry Customers to Curtail Outsourcing May Adversely Affect Our Business.

Historically, we have been dependent on the trend in outsourcing of packaging and test services by IDM customers. Our IDM and foundry customers continually evaluate the need for outsourced services against their own in-house packaging and test services. As a result, at any time and for a variety of reasons, IDMs and foundries may decide to shift some or all of their outsourced packaging and test services to internally sourced capacity.

In addition, to the extent we limit capacity commitments for certain customers, these customers may increase their level of in-house packaging and test capabilities, which could make it more difficult for us to regain their business when we have available capacity.

If we experience a significant loss of IDM or foundry business, it could have a material adverse effect on our business, liquidity, results of operations, financial condition and cash flows, especially during a prolonged industry downturn.

Absence of Backlog - The Lack of Contractually Committed Customer Demand May Adversely Affect Our Sales.

Our packaging and test business does not typically operate with any material backlog. Our quarterly net sales from packaging and test services are substantially dependent upon our customers' demand in that quarter. None of our customers have committed to purchase any significant amount of packaging or test services or to provide us with binding forecasts of demand for packaging and test services for any future period, in any material amount. In addition, we sometimes experience double booking by customers, and our customers often reduce, cancel or delay their purchases of packaging and test services for a variety of reasons including industry-wide, customer-specific and Amkor-specific reasons. This makes it difficult for us to forecast our capacity utilization and net sales in future periods. Since a large portion of our costs is fixed and our expense levels are based in part on our expectations of future sales, we may not be able to adjust costs in a timely manner to compensate for any sales shortfall. If we are unable to adjust costs in a timely manner, our margins, operating results, financial condition and cash flows would be adversely affected.

High Fixed Costs - Due to Our High Percentage of Fixed Costs, We Will Be Unable to Maintain Satisfactory Gross Margins if We Are Unable to Achieve Relatively High Capacity Utilization Rates.

Our operations are characterized by relatively high fixed costs and the absence of any material backlog. Our profitability depends in part not only on pricing levels for our packaging and test services but also on the efficient utilization of our human resources and packaging and test equipment. Increases or decreases in our capacity utilization can significantly affect gross margins. In periods of low demand, we experience relatively low capacity utilization in our operations, which leads to reduced margins during that period. Transitions between different packaging technologies, such as the transition from gold wirebond to flip chip and copper wirebond packages, can also impact our capacity utilization if we do not efficiently redeploy our equipment for other packaging and test opportunities. For example, in the past, the migration of some customer demand from wirebond to flip chip packages resulted in under-utilized wirebond assets which negatively impacted our capacity utilization and gross margin. We cannot assure you that we will be able to achieve consistently high capacity utilization, and if we fail to do so, our gross margins will be negatively impacted. If our gross margins decrease, our business, liquidity, results of operations, financial condition and cash flows could be materially adversely affected.

In addition, our fixed operating costs have increased in recent years in part as a result of our efforts to expand our capacity through significant capital expenditures. Forecasted customer demand for which we have made capital investments may not materialize, especially if industry conditions deteriorate. As a result, our sales may not adequately cover fixed costs, resulting in reduced profit levels or causing significant losses, either of which may adversely impact our business, liquidity, results of operations, financial condition and cash flows.

Dependence on Materials and Equipment Suppliers - Our Business May Suffer If the Cost, Quality or Supply of Materials or Equipment Changes Adversely Including Any Disruption that May Occur in the Supply of Certain Materials due to Regulations and Customer Requirements.

We obtain the materials and equipment required for the packaging and test services performed by our factories from various vendors. We source most of our materials, including critical materials such as leadframes, laminate substrates and gold wire, from a limited group of suppliers. A disruption to the operations of one or more of our suppliers could have a negative impact on our business. For example, severe earthquakes and tsunamis in the past have significantly and adversely affected the electronics industry supply chain by impacting the supply of specialty chemicals, substrates, silicon wafers, equipment and other supplies to the electronics industry. In addition, we purchase the majority of our materials on a purchase order basis. Our business may be harmed if we cannot obtain materials and other supplies from our vendors in a timely manner, in sufficient quantities, at acceptable quality or at competitive prices. Some of our customers are also dependent on a limited number of suppliers for certain materials and silicon wafers. Shortages or disruptions in our customers' supply channels could have a material adverse effect on our business, financial condition, results of operations and cash flows. For example,

the shortage in the supply of wafers to some of our customers in a prior year delayed or otherwise adversely impacted the demand for certain of our advanced packaging and test services.

Rules adopted by the SEC implementing the Dodd-Frank Wall Street Reform and Consumer Protection Act impose diligence and disclosure requirements regarding the use of certain minerals originating from the conflict zones of the Democratic Republic of Congo and adjoining countries in our products. Industry associations and many of our customers have implemented initiatives to improve transparency and accountability concerning the supply of these materials and, in some cases, requiring us to certify that the covered materials we use in our packages do not come from the conflict areas. We may incur additional costs associated with complying with these requirements and customer initiatives, and we may be required to increase our efforts in the future to cover additional materials and geographic areas. These requirements and customer initiatives could affect the pricing, sourcing and availability of materials used in the manufacture of semiconductor devices, and we cannot assure you that we will be able to obtain conflict-free materials in sufficient quantities and at competitive prices or that we will be able to verify the origin of all of the materials we use in our manufacturing process. If we are unable to meet these requirements and customer initiatives, it could adversely affect our business as some customers may move their business to other suppliers. Our reputation could also be adversely affected.

We purchase new packaging and test equipment to maintain and expand our operations. From time to time, increased demand for new equipment may cause lead times to extend beyond those normally required by equipment vendors. For example, in the past, increased demand for equipment caused some equipment suppliers to only partially satisfy our equipment orders in the normal time frame or to increase prices during market upturns for the semiconductor industry. The unavailability of equipment or failures to deliver equipment on a timely basis could delay or impair our ability to meet customer orders. If we are unable to meet customer orders, we could lose potential and existing customers. Generally, we acquire our equipment on a purchase order basis and do not enter into long-term equipment agreements. As a result, we could experience adverse changes in pricing, currency risk and potential shortages in equipment in a strong market, any of which could have a material adverse effect on our results of operations.

We are a large buyer of gold and other commodity materials including substrates and copper. The prices of gold and other commodities used in our business fluctuate. Historically, we have been able to partially offset the effect of commodity price increases through price adjustments to some customers and changes in our product designs that reduce the material content and cost, such as the use of shorter, thinner, gold wire and migration to copper wire. However, we typically do not have long-term contracts that permit us to impose price adjustments, and market conditions may limit our ability to do so. Significant price increases may adversely impact our gross margin in future periods to the extent we are unable to pass along past or future commodity price increases to our customers.

Capital Expenditures - We Make Substantial Investments in Equipment and Facilities To Support the Demand Of Our Customers, Which May Adversely Affect Our Business If the Demand Of Our Customers Does Not Develop As We Expect or Is Adversely Affected.

We make significant investments in equipment and facilities in order to service the demand of our customers. For example, we had capital expenditures of \$472.4 million in 2019, \$547.1 million in 2018 and \$550.9 million in 2017. The amount of our capital expenditures depends on several factors, including the performance of our business, our assessment of future industry and customer demand, our capacity utilization levels and availability, advances in technology, our liquidity position and the availability of financing. Our ongoing capital expenditure requirements may strain our cash and short-term asset balances, and, in periods when we are expanding our capital base, we expect that depreciation expense and factory operating expenses associated with capital expenditures to increase production capacity will put downward pressure on our gross margin, at least in the near term. While we completed the initial phase of construction of our factory and research and development facility in Incheon, Korea in December 2016, there can be no assurance regarding when the facility will be fully utilized, or that the actual scope, costs, timeline or benefits of the project will be consistent with our expectations. From time to time, we also make significant capital expenditures based on specific business opportunities with one or a few key customers, and the additional equipment purchased may not be readily usable to support other customers. If demand is insufficient to fill our capacity, or we are unable to efficiently redeploy such equipment, our capacity utilization and gross margin could be negatively impacted. Our capital expenditures or cost per square foot may increase as we transition to new or more advanced packaging and test technologies because, among other things, new equipment used for these technologies is generally more expensive and often our existing equipment cannot be redeployed in whole or part for these technologies.

To the extent this occurs in the future, our business, liquidity, results of operations, financial condition and cash flows could be materially adversely affected.

Furthermore, if we cannot generate or raise additional funds to pay for capital expenditures, particularly in some of the advanced packaging and bumping areas, as well as research and development activities, our growth and future profitability may be adversely affected. Our ability to obtain external financing in the future is subject to a variety of uncertainties, including:

- our future financial condition, results of operations and cash flows;
- general market conditions for financing;
- volatility in fixed income, credit and equity markets; and
- economic, political and other global conditions.

Declining Average Selling Prices - Historically There Has Been Downward Pressure on the Prices of Our Packaging and Test Services.

Prices for packaging and test services have generally declined over time, and sometimes prices can change significantly in relatively short periods of time. We expect downward pressure on average selling prices for our packaging and test services to continue in the future, and this pressure may intensify during downturns in business. If we are unable to offset a decline in average selling prices by developing and marketing new packages with higher prices, reducing our purchasing costs, recovering more of our material cost increases from our customers and reducing our manufacturing costs, our business, liquidity, results of operations, financial condition and cash flows could be materially adversely affected.

We Face Warranty Claims, Product Return and Liability Risks, the Risk of Economic Damage Claims and the Risk of Negative Publicity if Our Packages Fail.

Our packages are incorporated into a number of end products, and our business is exposed to warranty claims, product return and liability risks, the risk of economic damage claims and the risk of negative publicity if our packages fail.

We receive warranty claims from our customers from time to time in the ordinary course of our business. If we were to experience an unusually high incidence of warranty claims, we could incur significant costs and our business could be adversely affected. In addition, we are exposed to the product and economic liability risks and the risk of negative publicity affecting our customers. Our sales may decline if any of our customers are sued on a product liability claim. We also may suffer a decline in sales from the negative publicity associated with such a lawsuit or with adverse public perceptions in general regarding our customers' products. Further, if our packages are delivered with defects, we could incur additional development, repair or replacement costs or suffer other economic losses, and our credibility and the market's acceptance of our packages could be harmed.

Our Substantial Indebtedness Could Adversely Affect Our Financial Condition and Prevent Us from Fulfilling Our Obligations.

We have a significant amount of indebtedness, and the terms of the agreements governing our indebtedness allow us and our subsidiaries to incur more debt, subject to certain limitations. As of December 31, 2019, our total debt balance was \$1,450.2 million, of which \$144.5 million was classified as a current liability and \$720.7 million was collateralized indebtedness at our subsidiaries. We may consider investments in joint ventures, increased capital expenditures, refinancings or acquisitions which may increase our indebtedness. If new debt is added to our consolidated debt level, the related risks that we face could intensify.

Our substantial indebtedness could:

- make it more difficult for us to satisfy our obligations with respect to our indebtedness, including our obligations under our indentures to purchase notes tendered as a result of a change in control of Amkor;
- increase our vulnerability to general adverse economic and industry conditions;

- limit our ability to fund future working capital, capital expenditures, research and development and other business opportunities, including joint ventures and acquisitions;
- require us to dedicate a substantial portion of our cash flow from operations to service payments of interest and principal on our debt, thereby reducing the availability of our cash flow to fund future working capital, capital expenditures, research and development expenditures and other general corporate requirements;
- increase the volatility of the price of our common stock;
- limit our flexibility to react to changes in our business and the industry in which we operate;
- place us at a competitive disadvantage to any of our competitors that have less debt;
- limit, along with the financial and other covenants in our indebtedness, our ability to borrow additional funds;
- limit our ability to refinance our existing indebtedness, particularly during periods of adverse credit market conditions when refinancing indebtedness may not be available under interest rates and other terms acceptable to us or at all; and
- increase our cost of borrowing.

In addition, certain of our credit agreements use LIBOR or other reference rates to determine the rate of interest payable on our borrowings. The United Kingdom's Financial Conduct Authority intends to phase out LIBOR by the end of 2021. Plans for alternative reference rates for other currencies have also been announced. At this time, we cannot predict how markets will respond to proposed alternative rates or the effect of any changes to, or discontinuation of, LIBOR. If reference rates under our credit agreements are no longer available or if our lenders have increased costs due to changes in reference rates, we may experience increases in interest rates on our variable rate debt, which could adversely impact our interest expense, results of operations and cash flows.

We May Have Difficulty Funding Liquidity Needs.

We assess our liquidity based on our current expectations regarding sales, operating expenses, capital spending, debt service requirements and other funding needs. We fund our operations, including capital expenditures and other investments and servicing principal and interest obligations with respect to our debt, from cash flows from our operations, existing cash and cash equivalents, borrowings under available debt facilities, or proceeds from any additional debt or equity financing. Our liquidity is affected by, among other factors, the performance of our business, our capital expenditure and other investment levels and our ability to repay debt and other long-term obligations out of our operating cash flows or with the proceeds of debt or equity financings.

Servicing our current and future customers requires that we incur significant operating expenses and continue to make significant capital expenditures and other investments, and the amount of our capital expenditures for 2020 and thereafter may vary materially and will depend on several factors. These factors include, among others, the amount, timing and implementation of our capital projects, the performance of our business, economic and market conditions, advances in technology, the cash needs and investment opportunities for the business, the need for additional capacity and facilities and the availability of cash flows from operations or financing.

The health of the worldwide banking system and capital markets affects our liquidity. If financial institutions that have extended credit commitments to us are adversely affected by the conditions of the U.S., foreign or international banking system and capital markets, they may refuse or be unable to fund borrowings under their credit commitments to us. Volatility in the banking system and capital markets, as well as any increase in interest rates or adverse economic, political and other global conditions, could also make it difficult or more expensive for us to maintain our existing credit facilities or refinance our debt.

The trading price of our common stock has been, and is likely to continue to be, highly volatile and could be subject to wide fluctuations. Such fluctuations could impact our decision or ability to utilize the equity markets as a potential source of our funding needs in the future.

In addition, there is a risk that we could fail to generate the necessary net income or operating cash flows to meet the funding needs of our business due to a variety of factors, including the other factors discussed in this “Risk Factors” section. If we fail to generate the necessary cash flows or we are unable to access the capital markets when needed, our liquidity would be adversely impacted.

Covenants in the Indentures and Agreements Governing Our Current and Future Indebtedness Could Restrict Our Operating Flexibility.

The indentures and agreements governing our existing debt, and debt we may incur in the future, contain, or may contain, affirmative and negative covenants that materially limit our ability to take certain actions, including our ability to incur debt, pay dividends and repurchase stock, make certain investments and other payments, enter into certain mergers and consolidations, engage in sale leaseback transactions and encumber and dispose of assets. In addition, certain of our debt agreements contain, and our future debt agreements may contain, financial covenants and ratios.

The breach of any of these covenants by us, or the failure by us to meet any of the financial ratios or conditions, could result in a default under any or all of such indebtedness. If a default occurs under any such indebtedness, all of the outstanding obligations thereunder could become immediately due and payable, which could result in a default under our other outstanding debt and could lead to an acceleration of obligations related to other outstanding debt. The existence of such a default or event of default could also preclude us from borrowing funds under our revolving credit facilities. Our ability to comply with the provisions of the indentures, credit facilities and other agreements governing our outstanding debt and indebtedness we may incur in the future can be affected by events beyond our control, and a default under any debt instrument, if not cured or waived, could have a material adverse effect on us.

We Have Significant Severance Plan Obligations Associated With Our Manufacturing Operations in Korea Which Could Reduce Our Cash Flow and Negatively Impact Our Financial Condition.

Our subsidiary in Korea maintains an unfunded severance plan under which we have an accrued liability of \$127.4 million as of December 31, 2019. The plan covers certain employees that were employed prior to August 1, 2015. In the event of a significant layoff or other reduction in our labor force in Korea, our subsidiary in Korea would be required to make lump-sum severance payments under the plan, which could have a material adverse effect on our liquidity, financial condition and cash flows. See Note 13 to our Consolidated Financial Statements in Part II, Item 8 of this Annual Report on Form 10-K.

If We Fail to Maintain an Effective System of Internal Controls, We May Not be Able to Accurately Report Financial Results or Prevent Fraud.

Effective internal controls are necessary to provide reliable financial reports and to assist in the effective prevention of fraud. We must annually evaluate our internal procedures to satisfy the requirements of Section 404 of the Sarbanes-Oxley Act of 2002, which requires management and our independent registered public accounting firm to assess the effectiveness of internal control over financial reporting.

Internal controls may not prevent or detect misstatements because of their inherent limitations, including the possibility of human error, the circumvention or overriding of controls, fraud or corruption. Therefore, even effective internal controls can provide only reasonable assurance with respect to the preparation and fair presentation of financial statements. In addition, projections of any evaluation of effectiveness of internal controls to future periods are subject to the risk that the internal controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

We assess our internal controls and systems on an ongoing basis, and from time-to-time, we update and make modifications to our global enterprise resource planning system. We have implemented several significant enterprise resource planning modules and expect to implement additional enterprise resource planning modules in the future. In addition, we have implemented new shop floor management systems in certain of our factories. Although we continue to monitor and assess our internal controls for these systems and operations, there is a risk that deficiencies may occur that could constitute significant deficiencies or, in the aggregate, a material weakness.

If we fail to remedy any deficiencies or maintain the adequacy of our internal controls, we could be subject to regulatory scrutiny, civil or criminal penalties or shareholder litigation. In addition, failure to maintain adequate internal controls could result in financial statements that do not accurately reflect our operating results or financial condition.

We Face Risks Trying to Attract, Retain or Replace Qualified Employees to Support Our Operations.

Our success depends to a significant extent upon the continued service of our key senior management, sales and technical personnel, any of whom may be difficult to replace. Competition for qualified employees is intense, and our business could be adversely affected by the loss of the services of any of our existing key personnel, including senior management, as a result of competition or for any other reason. Other than the agreement with our Chief Executive Officer, we do not have employment agreements with our key employees, including senior management, or other contracts that would prevent our key employees from working for our competitors in the event they cease working for us. We cannot assure you that we will be successful in our efforts to retain or replace key employees or in hiring and properly training sufficient numbers of qualified personnel and in effectively managing our growth. Our inability to attract, retain, motivate and train qualified new personnel could have a material adverse effect on our business.

We Face Risks in Connection with the Continuing Development and Implementation of Changes to, and Maintenance and Security of, Our Information Technology Systems.

We depend on our information technology systems for many aspects of our business. Our systems may be susceptible to damage, disruptions or shutdowns due to failures during the process of upgrading, replacing or maintaining software, databases or components thereof, power outages, hardware failures, interruption or failures of third-party provider systems, computer viruses, attacks by computer hackers, telecommunication failures, user errors, malfeasance or catastrophic events. Cybersecurity breaches could result in unauthorized disclosure of confidential information or disruptions to our operations. The IT systems in our factories are at varying levels of sophistication and maturity as the factories have different sets of products, processes and customer expectations. Some of our key software has been developed by our own programmers, and this software may not be easily integrated with other software and systems. From time to time we make additions or changes to our information technology systems. For example, we are integrating our Japan operations' information technology systems with our existing systems and processes and such integration has inherent risks to existing operations. In addition, in May 2017, we completed our acquisition of Nanium and continue to integrate its information technology systems into our existing systems and processes. We face risks in connection with current and future projects to install or integrate new information technology systems or upgrade our existing systems. These risks include:

- delays in the design and implementation of the system;
- costs may exceed our plans and expectations; and
- disruptions resulting from the implementation, integration or cybersecurity breach of the systems may impact our ability to process transactions and delay shipments to customers, impact our results of operations or financial condition or harm our control environment.

Our business could be materially and adversely affected if our information technology systems are disrupted or if we are unable to successfully install new systems or improve, upgrade, integrate or expand upon our existing systems.

Difficulties Consolidating and Integrating Our Operations - We Face Challenges as We Integrate Diverse Operations.

We have experienced, and expect to continue to experience, change in the scope and complexity of our operations resulting primarily from existing and future facility and operational consolidations, strategic acquisitions, joint ventures and other partnering arrangements. Some of the risks from these activities include those associated with the following:

- increasing the scope, geographic diversity and complexity of our operations;
- conforming an acquired company's standards, practices, systems and controls with our operations;
- increasing complexity from combining recent acquisitions of an acquired business;
- unexpected losses of key employees or customers of an acquired business;

- difficulties in the assimilation of acquired operations, technologies or products; and
- diversion of management and other resources from other parts of our operations and adverse effects on existing business relationships with customers.

In connection with these activities, we may:

- use a significant portion of our available cash;
- incur substantial debt;
- issue equity securities, which may dilute the ownership of current stockholders;
- incur or assume known or unknown contingent liabilities; and
- incur large, immediate accounting write offs and face antitrust or other regulatory inquiries or actions.

For example, the businesses we have acquired had, at the time of acquisition, multiple systems for managing their own production, sales, inventory and other operations. Migrating these businesses to our systems typically is a slow, expensive process requiring us to divert significant resources from other parts of our operations. We may continue to face these challenges in the future. As a result of the risks discussed above, the anticipated benefits of these or other future acquisitions, consolidations and partnering arrangements may not be fully realized, if at all, and these activities could have a material adverse effect on our business, financial condition and results of operations.

Litigation Incident to Our Business Could Adversely Affect Us.

We have been a party to various legal proceedings, including those described from time to time in our reports filed with the SEC, and may be a party to legal proceedings in the future. These proceedings could require significant management time and resources and, if an unfavorable ruling or outcome were to occur in these legal proceedings, there could be a material adverse impact on our business, liquidity, results of operations, financial condition, cash flows and the trading price of our securities.

We Could Suffer Adverse Tax and Other Financial Consequences if There Are Changes in Tax Laws or Taxing Authorities Do Not Agree with Our Interpretation of Applicable Tax Laws, Including Whether We Continue to Qualify for Tax Holidays, or if We Are Required to Establish or Adjust Valuation Allowances on Deferred Tax Assets.

We earn a substantial portion of our income in foreign countries and our operations are subject to tax in multiple jurisdictions with complicated and varied tax regimes. Tax laws and income tax rates in these jurisdictions are subject to change due to economic and political conditions. In addition, the Organisation for Economic Co-operation and Development has released recommendations and an action plan aimed to standardize and modernize global corporate tax policy, including changes to transfer pricing and other international tax matters to address base erosion and profit shifting impacting multinational companies like Amkor. Changes in U.S. or foreign tax laws arising out of such recommendations or otherwise could have a material adverse impact on our liquidity, results of operations, financial condition and cash flows.

Our tax liabilities are based, in part, on our corporate structure, interpretations of various U.S. and foreign tax laws, including withholding tax, compliance with tax holiday requirements, application of changes in tax law to our operations and other relevant laws of applicable taxing jurisdictions. From time to time, taxing authorities may conduct examinations of our income tax returns and other regulatory filings. We cannot assure you that the taxing authorities will agree with our interpretations, including whether we continue to qualify for tax holidays. If they do not agree, we may seek to enter into settlements with the taxing authorities. We may also appeal a taxing authority's determination to the appropriate governmental authorities, but we cannot be sure we will prevail. If we do not prevail or if we enter into settlements with taxing authorities, we may have to make significant payments or otherwise record charges (or reduce tax assets) that adversely affect our results of operations, financial condition and cash flows. Additionally, certain of our subsidiaries operate under tax holidays, which will expire in whole or in part at various dates in the future. As those tax holidays expire, we expect that our tax expense will increase as income from those jurisdictions becomes subject to higher statutory income tax rates, thereby reducing our liquidity and cash flow.

We monitor on an ongoing basis our ability to utilize our deferred tax assets and whether there is a need for a related valuation allowance. In evaluating our ability to recover our deferred tax assets, in the jurisdiction from which they arise, we consider all available positive and negative evidence, including scheduled reversals of deferred tax liabilities, projected future taxable income, tax-planning strategies and results of recent operations. For most of our foreign deferred tax assets, we believe that we will have sufficient taxable income to allow us to realize these deferred tax assets. In the event taxable income falls short of current expectations, we may need to establish a valuation allowance against such deferred tax assets that, if required, could materially affect our results of operations.

The Enactment of Tax Reform Could Materially Impact Our Financial Position and Results of Operations

On December 22, 2017, the Tax Act was signed into law. The Tax Act made significant changes to the U.S. tax code. Changes include a reduction of the U.S. federal corporate tax rate from 35% to 21%, a one-time transition tax on unremitted foreign earnings and profits applicable for our fiscal year ended December 31, 2017, limitations on tax deductions for interest expense for the period beginning January 1, 2018, and changes to other existing deductions and business-related exclusions in future periods. As a result, in the fourth quarter of 2017, we recognized a one-time net tax benefit of approximately \$41.6 million, primarily due to the release of a valuation allowance against U.S. deferred tax assets that we expected to realize as a result of the change to the U.S. tax law limiting the deductibility of interest expense. We also incurred charges for the one-time transition tax on our unremitted foreign earnings and profits offset by the anticipated utilization of foreign tax credits. We were also required to re-measure our deferred tax assets based on the new U.S. federal corporate tax rate of 21%. In 2018, we updated our provisional estimate of the impact of the Tax Act and recorded a \$22.3 million income tax expense to complete the accounting for the impact of the Tax Act, reducing our estimated net tax benefit of \$41.6 million from 2017. Our accounting for the impact of the Tax Act is now complete in accordance with SEC staff issued Staff Accounting Bulletin No. 118 (“SAB 118”). However, there is uncertainty in the application of many aspects of the Tax Act and additional guidance with respect to the Tax Act may affect our estimates and could have a material impact on our income tax expense.

Intellectual Property - Our Business Will Suffer if We Are Not Able to Develop New Proprietary Technology, Protect Our Proprietary Technology and Operate Without Infringing the Proprietary Rights of Others.

The complexity and breadth of semiconductor packaging, SiP modules and test services are rapidly increasing. As a result, we expect that we will need to develop, acquire and implement new manufacturing processes and packaging technologies and tools in order to respond to competitive industry conditions and customer requirements. Technological advances also typically lead to rapid and significant price erosion and may make our existing packages less competitive or our existing inventories obsolete. If we cannot achieve advances in packaging design or obtain access to advanced packaging designs developed by others, our business could suffer.

The need to develop and maintain advanced packaging capabilities and equipment could require significant research and development, capital expenditures and acquisitions in future years. In addition, converting to new packaging designs or process methodologies could result in delays in producing new package types, which could adversely affect our ability to meet customer orders and adversely impact our business.

The process of seeking patent protection takes a long time and is expensive. There can be no assurance that patents will issue from pending or future applications or that, if patents are issued, the rights granted under the patents will provide us with meaningful protection or any commercial advantage. Any patents we do obtain will eventually expire, may be challenged, invalidated or circumvented and may not provide meaningful protection or other commercial advantage to us.

Some of our technologies are not covered by any patent or patent application. The confidentiality agreements on which we rely to protect these technologies may be breached and may not be adequate to protect our proprietary technologies. There can be no assurance that other countries in which we market our services will protect our intellectual property rights to the same extent as the U.S.

Our competitors may develop, patent or gain access to know-how and technology similar or superior to our own. In addition, many of our patents are subject to cross licenses, several of which are with our competitors. The semiconductor industry is characterized by frequent claims regarding the infringement of patent and other intellectual property rights. If any third party makes an enforceable infringement claim against us or our customers, we could be required to:

- discontinue the use of certain processes or cease to provide the services at issue, which could curtail our business;
- pay substantial damages;
- develop non-infringing technologies, which may not be feasible; or
- acquire licenses to such technology, which may not be available on commercially reasonable terms or at all.

We may need to enforce our patents or other intellectual property rights, including our rights under patent and intellectual property licenses with third parties, or defend ourselves against claimed infringement of the rights of others through litigation, which could result in substantial cost and diversion of our resources and may not be successful. Furthermore, if we fail to obtain necessary licenses, our business could suffer, and we could be exposed to claims for damages and injunctions from third parties, as well as claims from our customers for indemnification. In the past, we have been involved in legal proceedings involving the acquisition and license of intellectual property rights, the enforcement of our existing intellectual property rights or the enforcement of the intellectual property rights of others, including settled legal proceedings described in more detail in Note 17 to the Consolidated Financial Statements in Part II, Item 8 of this Annual Report on Form 10-K. Unfavorable outcomes in any legal proceedings involving intellectual property could result in significant liabilities or loss of commercial advantage and could have a material adverse effect on our business, liquidity, results of operations, financial condition and cash flows. The potential impact from the legal proceedings referred to in this Annual Report on Form 10-K on our results of operations, financial condition and cash flows could change in the future.

Packaging and Test Processes Are Complex and Our Production Yields and Customer Relationships May Suffer from Defects in the Services We Provide or if We Do Not Successfully Implement New Technologies.

Semiconductor packaging and test services are complex processes that require significant technological and process expertise, and in line with industry practice, customers usually require us to pass a lengthy and rigorous qualification process that may take several months. Once qualified and in production, defective packages primarily result from:

- contaminants in the manufacturing environment;
- human error;
- equipment malfunction;
- changing processes to address environmental requirements;
- defective raw materials; or
- defective plating services.

Test is also complex and involves sophisticated equipment and software. Similar to many software programs, these software programs are complex and may contain programming errors or “bugs.” The test equipment is also subject to malfunction, and the test process is subject to operator error.

These and other factors have, from time to time, contributed to lower production yields. They may also do so in the future, particularly as we adjust our capacity, change our processing steps or ramp new technologies. In addition, we must continue to develop and implement new packaging and test technologies and expand our offering of packages to be competitive. Our production yields on new packages, particularly those packages which are based on new technologies, typically are significantly lower than our production yields on our more established packages.

Our failure to qualify new processes, maintain quality standards or acceptable production yields, if significant and prolonged, could result in loss of customers, increased costs of production, delays, substantial amounts of returned goods and claims by customers relating thereto. Any of these problems could have a material adverse effect on our business, liquidity, results of operations, financial condition and cash flows.

Environmental, Health & Safety Laws and Industry and Customer Initiatives - Future Environmental, Health & Safety Laws and Industry and Customer Sustainability Initiatives Could Place Additional Burdens on Our Manufacturing Operations.

The semiconductor packaging process generates byproducts that are subject to extensive governmental regulations. For example, at our foreign facilities we produce liquid waste when semiconductor wafers are diced into chips with the aid of diamond saws, then cooled with running water. In addition, semiconductor packages have historically utilized metallic alloys containing lead (Pb) within the interconnect terminals typically referred to as leads, pins or balls. Environmental, health and safety laws and regulations in places we do business impose various controls on the use, storage, handling, discharge and disposal of chemicals used in our production processes and on the factories we occupy and are increasingly imposing restrictions on the materials contained in semiconductor products. For example, the European Union's Restriction of Hazardous Substances in Electrical and Electronic Equipment directive and similar laws in other jurisdictions, including China, impose strict restrictions on the placement into the market of electrical and electronic equipment containing lead and certain other hazardous substances. We may become liable under these and other environmental, health and safety laws and regulations, including for the cost of compliance and cleanup of any disposal or release of hazardous materials arising out of our former or current operations, or otherwise as a result of the existence of hazardous materials on our properties or hazardous substances in the products we manufacture. We could also be held liable for damages, including fines, penalties and the cost of investigations and remedial actions, we could be subject to revocation of permits negatively affecting our ability to maintain or expand our operations, and we could suffer reputational harm.

There has also been an increase in public attention and industry and customer focus on the materials contained in semiconductor products, the environmental impact of semiconductor operations and the risk of chemical releases from such operations, climate change, sustainability and related environmental concerns. This increased focus on sustainability and the environmental impact of semiconductor operations and products has caused industry groups and customers to impose additional requirements on us and our suppliers, sometimes exceeding regulatory standards. These industry and customer requirements include increased tracking and reporting of greenhouse gas emissions, reductions in waste and wastewater from operations, additional reporting on the materials and components used in the products we manufacture, and the use of renewable energy sources in our factory operations. To comply with these additional requirements, we may need to procure additional equipment or make factory or process changes and our manufacturing costs may increase.

Our Business and Financial Condition Could be Adversely Affected by Natural Disasters and Other Calamities, Health Conditions or Pandemics, Political Instability, Hostilities, or Other Disruptions.

We have significant packaging and test and other operations in China, Japan, Korea, Malaysia, the Philippines, Portugal, Singapore, and Taiwan which are or could be subject to: natural disasters, such as earthquakes, tsunamis, typhoons, floods, droughts, volcanoes and other severe weather and geological events, and other calamities, such as fire; the outbreak of infectious diseases (such as coronaviruses, Ebola or flu); industrial strikes; government imposed travel restrictions or quarantines; breakdowns of equipment; difficulties or delays in obtaining materials, equipment, utilities and services; political events or instability; acts of war, armed conflict, terrorist incidents and other hostilities, including any such events that may arise out of increased tensions involving North Korea or in other regions where we have facilities; and industrial accidents and other events, that could disrupt or even shutdown our operations. In addition, our suppliers and customers also have significant operations in such locations. In the event of such a disruption or shutdown, we may be unable to reallocate production to other facilities in a timely or cost-effective manner (if at all) and we may not have sufficient capacity to service customer demands in our other facilities. A natural disaster or other calamity, political instability, the occurrence of hostilities or other event that results in a prolonged disruption to our operations, or the operations of our customers or suppliers, could have a material adverse effect on our business, financial condition, results of operations and cash flows.

For example, in April 2016, our Kumamoto factory was damaged by earthquakes in Japan. As a result of these earthquakes, our sales were reduced due to the temporary disruption in operations. We also incurred earthquake related costs for damaged inventory, buildings and equipment.

In addition, some of the processes that we utilize in our operations place us at risk of fire and other damage. For example, highly flammable gases are used in the preparation of wafers holding semiconductor devices for flip chip packaging.

We maintain insurance policies for various types of property, casualty and other risks, but we do not carry insurance for all the above referred risks. With regard to the insurance we do maintain, we cannot assure you that it would be sufficient to cover all of our potential losses. As a result, our business, financial condition, results of operations and cash flows could be adversely affected by natural disasters and other calamities.

Mr. James J. Kim and Members of His Family Can Effectively Determine or Substantially Influence The Outcome of All Matters Requiring Stockholder Approval.

As of December 31, 2019, Mr. James J. Kim, the Executive Chairman of our Board of Directors, Mr. John T. Kim, the Vice Chairman of our Board of Directors, Ms. Susan Y. Kim, a member of our Board of Directors, and members of the Kim family and affiliates owned approximately 141.7 million shares, or approximately 59%, of our outstanding common stock. The Kim family also has options to acquire approximately 0.5 million shares. If the options are exercised, the Kim family's total ownership would be an aggregate of approximately 142.2 million shares of our outstanding common stock or approximately 59% of our outstanding common stock.

In June 2013, the Kim family exchanged convertible notes issued by Amkor in 2009 for approximately 49.6 million shares of common stock (the "Convert Shares"). The Convert Shares are subject to a voting agreement. The voting agreement requires the Kim family to vote these shares in a "neutral manner" on all matters submitted to our stockholders for a vote, so that such Convert Shares are voted in the same proportion as all of the other outstanding securities (excluding the other shares owned by the Kim family) that are actually voted on a proposal submitted to Amkor's stockholders for approval. The Kim family is not required to vote in a "neutral manner" any Convert Shares that, when aggregated with all other voting shares held by the Kim family, represent 41.6% or less of the total then-outstanding voting shares of our common stock. The voting agreement for the Convert Shares terminates upon the earliest of (i) such time as the Kim family no longer beneficially owns any of the Convert Shares, (ii) consummation of a change of control (as defined in the voting agreement) or (iii) the mutual agreement of the Kim family and Amkor.

Mr. James J. Kim and his family and affiliates, acting together, have the ability to effectively determine or substantially influence matters submitted for approval by our stockholders by voting their shares or otherwise acting by written consent, including the election of our Board of Directors. There is also the potential, through the election of members of our Board of Directors, that the Kim family could substantially influence matters decided upon by our Board of Directors. This concentration of ownership may also have the effect of impeding a merger, consolidation, takeover or other business consolidation involving us, or discouraging a potential acquirer from making a tender offer for our shares, and could also negatively affect our stock's market price or decrease any premium over market price that an acquirer might otherwise pay. Concentration of ownership also reduces the public float of our common stock. There may be less liquidity and higher price volatility for the stock of companies with a smaller public float compared to companies with broader public ownership. Also, the sale or the prospect of the sale of a substantial portion of the Kim family shares may adversely affect the market price of our stock.

Item 1B. *Unresolved Staff Comments*

None.

Item 2. Properties

The location and size of our manufacturing and research and development facilities are set forth in the table below. All facilities are owned unless otherwise specified. Generally, our facilities are collateral for indebtedness incurred by our subsidiary for the jurisdiction in which the facilities are located.

	Approximate Facility Size (Square Feet)		
	Owned	Leased	Total
China (1)	1,325,000	—	1,325,000
Japan	1,683,000	329,000	2,012,000
Korea	3,924,000	—	3,924,000
Malaysia (1)	386,000	—	386,000
Philippines (2)	758,000	557,000	1,315,000
Portugal	538,000	—	538,000
Taiwan (1)	1,098,000	—	1,098,000
Total all facilities	9,712,000	886,000	10,598,000

- (1) Land is leased.
- (2) As a result of foreign ownership restrictions in the Philippines, the land is leased. A portion of the land we lease is owned by realty companies in which we own a 40% interest.

Our executive offices, which are leased, are located in Tempe, Arizona and Singapore. We believe that our existing properties are in good condition and suitable for the conduct of our business and that the productive capacity of such properties is substantially being utilized or we have plans to utilize it.

Item 3. Legal Proceedings

From time to time, we may become involved in various disputes and litigation matters that arise in the ordinary course of our business. These include disputes and lawsuits related to intellectual property, acquisitions, licensing, contracts, tax, regulatory, employee relations and other matters. For a discussion of “Legal Proceedings,” see Note 17 to our Consolidated Financial Statements in Part II, Item 8 of this Annual Report on Form 10-K.

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
LISTING ON THE NASDAQ GLOBAL SELECT MARKET

Our common stock is traded on the NASDAQ Global Select Market under the symbol “AMKR”. There were approximately 120 holders of record of our common stock as of February 14, 2020.

DIVIDEND POLICY

Since our public offering in 1998, we have never paid a dividend to our stockholders, and we do not have any present plans for doing so. In addition, certain of our debt agreements limit our ability to pay dividends. Refer to the Liquidity and Capital Resources section in Item 7 of this Annual Report on Form 10-K.

RECENT SALES OF UNREGISTERED SECURITIES

None.

EQUITY COMPENSATION PLANS

The information required by this item regarding equity compensation plans is set forth in Part III, Item 12 of this Annual Report on Form 10-K.

PURCHASES OF EQUITY SECURITIES BY THE ISSUER AND AFFILIATED PURCHASERS

The following table provides information regarding repurchases of our common stock during the three months ended December 31, 2019.

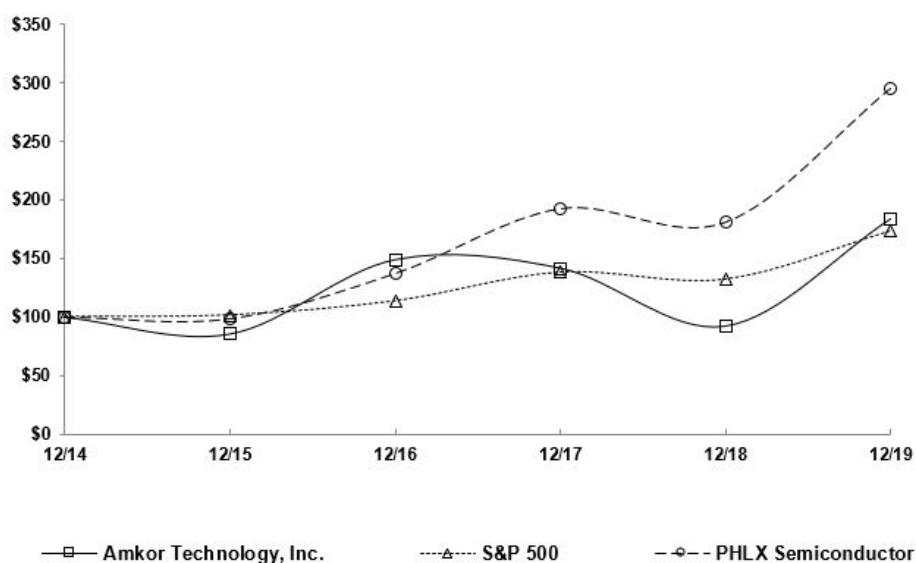
Period	Total Number of Shares Purchased (a)	Average Price Paid Per Share (\$)	Total Number of Shares Purchased as part of Publicly Announced Plans or Programs (b)	Approximate Dollar Value of Shares that May Yet Be Purchased Under the Plans or Programs (\$) (b)
October 1 - October 31	—	\$ —	—	\$ 91,586,032
November 1 - November 30	5,425	12.33	—	91,586,032
December 1 - December 31	—	—	—	91,586,032
Total	5,425	\$ 12.33	—	

- (a) Represents shares of common stock surrendered to us to satisfy tax withholding obligations associated with the vesting of restricted shares issued to employees.
- (b) Our Board of Directors previously authorized the repurchase of up to \$300.0 million of our common stock, \$150.0 million in August 2011 and \$150.0 million in February 2012, exclusive of any fees, commissions or other expenses. During 2018 and 2019, we made no common stock purchases, and at December 31, 2019, approximately \$91.6 million was available pursuant to the stock repurchase program.

PERFORMANCE GRAPH (1)

COMPARISON OF 5 YEAR CUMULATIVE TOTAL RETURN*

Among Amkor Technology, Inc., the S&P 500 Index
and the PHLX Semiconductor Index



*\$100 invested on 12/31/14 in stock or index, including reinvestment of dividends.
Fiscal year ending December 31.

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(1) The preceding Stock Performance Graph is not deemed filed with the SEC and shall not be incorporated by reference in any of our filings under the Securities Act of 1933, as amended, or the Exchange Act, whether made before or after the date hereof and irrespective of any general incorporation language in any such filing.

The following table sets forth the cumulative total returns included in the preceding Stock Performance Graph for the years ended December 31, 2014 through 2019.

	For the Year Ended December 31,					
	2014	2015	2016	2017	2018	2019
Amkor Technology, Inc.	\$ 100.00	\$ 85.63	\$ 148.59	\$ 141.55	\$ 92.39	\$ 183.10
S&P 500	100.00	101.38	113.51	138.29	132.23	173.86
PHLX Semiconductor	100.00	98.41	137.10	192.69	181.04	295.57

Item 6. Selected Financial Data

The following selected financial data should be read in conjunction with Management’s Discussion and Analysis of Financial Condition and Results of Operations and our Consolidated Financial Statements in Part II, Item 7 and Item 8, respectively, of this Annual Report on Form 10-K.

SELECTED HISTORICAL CONSOLIDATED FINANCIAL DATA

	For the Year Ended December 31,				
	2019	2018	2017 (d)	2016 (e)(f)	2015 (e)(f)
(In thousands, except per share data)					
Income Statement Data:					
Net sales	\$ 4,052,650	\$ 4,316,466	\$ 4,207,031	\$ 3,927,849	\$ 2,884,603
Gross profit	649,439	710,565	761,079	709,891	479,265
Gain on sale of real estate (a)	(3,302)	—	(108,109)	—	—
Operating income	233,170	258,144	405,540	308,587	164,839
Loss on debt retirement (b)	8,536	1,512	4,835	—	9,560
Income tax expense (c)	37,182	56,250	39,791	51,042	28,035
Equity in earnings of equity method investees	—	—	—	—	14,016
Net income	122,628	129,565	267,705	178,653	53,893
Net income attributable to Amkor	120,888	127,092	263,550	175,530	51,098
Net income attributable to Amkor per common share:					
Basic	\$ 0.50	\$ 0.53	\$ 1.10	\$ 0.74	\$ 0.22
Diluted	\$ 0.50	\$ 0.53	\$ 1.10	\$ 0.74	\$ 0.22
Other Financial Data:					
Depreciation and amortization	\$ 524,177	\$ 571,961	\$ 581,940	\$ 555,186	\$ 494,200
Payments for property, plant and equipment	472,433	547,122	550,943	650,038	537,975
Balance Sheet Data:					
Cash and cash equivalents	\$ 894,948	\$ 681,569	\$ 596,364	\$ 549,518	\$ 523,172
Working capital	941,730	512,785	325,945	404,035	299,296
Total assets (g)	4,695,615	4,495,447	4,508,388	4,092,086	4,026,428
Non-current liabilities, including debt (g)	1,645,573	1,481,124	1,470,620	1,683,021	1,790,708
Total Amkor stockholders’ equity	1,963,739	1,830,540	1,696,276	1,383,588	1,200,286

- (a) In May 2017, we sold the land and buildings comprising our K1 factory for \$142.4 million which resulted in a pre-tax gain of \$108.1 million.
- (b) In April 2019, we recorded an \$8.4 million loss on extinguishment related to the call premium paid and other debt related costs associated with redemption of the outstanding \$525 million aggregate principal amount of 6.375% Senior Notes due 2022. In July 2017, we recorded a loss on debt retirement of \$4.4 million relating to the partial early repayment of our 6.625% Senior Notes due 2021. During 2015, we recorded a loss on debt retirement of \$8.9 million relating to the early repayment of our 7.375% Senior Notes due May 2018.
- (c) In 2019, income tax expense includes a net \$11.1 million discrete income tax charge related to changes in the valuation of certain deferred tax assets. In 2018, we recorded a \$ 22.3 million income tax expense to complete the accounting for the impact of the Tax Act. This expense reduced our estimated net tax benefit of \$41.6 million recorded in 2017, primarily due to the reversal of a valuation allowance on certain U.S. deferred tax assets as a result of the enactment of the Tax Act.
- (d) On May 22, 2017, we completed the purchase of Nanium. Their financial results have been included in our Consolidated Financial Statements from the date of acquisition.

- (e) We increased our investment in J-Devices from 60% to 100% on December 30, 2015 through the exercise of additional options. As a result, our accounting for our Japan operations changed from the equity method to the consolidation method effective December 30, 2015. Our balance sheet data as of December 31, 2015 reflects the consolidation of our Japan operations. We began consolidating the operating results of our Japan operations in 2016. We recognized a net loss of \$13.5 million in other (income) expense, net in connection with the acquisition in 2015. The net loss resulted from a loss of \$29.6 million related to the release of certain accumulated foreign currency translation adjustments related to our Japan operations, offset by a gain of \$16.1 million related to the step-up to fair value of our previous investments in our Japan operations.
- (f) On January 1, 2018, we retrospectively adopted Accounting Standards Update (“ASU”) 2014-09, Revenue from Contracts with Customers (Topic 606). The selected financial data as of December 31, 2016 and 2015 and for the year ended December 31, 2015 was not adjusted for this new accounting standard.
- (g) On January 1, 2019, we adopted ASU 2016-02, *Leases (Topic 842)*. As of December 31, 2019, there was an increase to our consolidated balance sheet of approximately \$128 million for operating lease right of use assets and approximately \$132 million for operating lease liabilities.

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

This section includes comparisons of certain 2019 financial information to the same information for 2018. For discussion of 2018 results in comparison with 2017 results refer to “Management’s Discussion and Analysis of Financial Conditions and Results of Operations” in our Annual Report on Form 10-K filed with the Securities and Exchange Commission on February 22, 2019.

Overview

Amkor is one of the world’s leading providers of outsourced semiconductor packaging and test services. Our financial goals are sales growth and improved profitability. To achieve these goals, we are focused on generating increased value from our investments in advanced technologies, improving utilization of existing assets, executing our balanced growth strategy and selectively growing our scale and scope through strategic investments.

We are an industry leader in developing and commercializing cost-effective advanced packaging and test technologies. These advanced technology solutions provide increased value to our customers. This is particularly true in the mobile communications market, where growth generally outpaces the semiconductor industry rate. Advanced packages are now the preferred choice in both the high-end and the mid-range segments of the smartphone market, which together account for a high portion of mobile phone semiconductor value. The demand for advanced packages is also being driven by second-wave mobile device customers, who are transitioning out of wirebond into wafer-level and flip-chip packages. Our sales of advanced packages into the automotive market are growing as well, largely due to new, data-intensive applications, which require increased pin count and performance. We believe that our technology leadership and this technology transition create significant growth opportunities for us.

We typically look for opportunities in the advanced packaging and test area where we can generate reasonably quick returns on investments made for customers seeking leading edge technologies. We also focus on developing a second wave of customers to fill the capacity that becomes available when leading edge customers transition to newer packaging and test equipment and platforms. In addition, we are seeking new customers and deepening our engagement with existing customers. This includes an expanded emphasis on the automotive market where semiconductor content continues to grow and in the analog area for our mainstream wirebond technologies.

From time to time, we identify attractive opportunities to grow our customer base and expand the markets we serve through joint ventures, acquisitions and other strategic investments. For example, in May 2017 we acquired Nanium, which has strengthened our position in the market for wafer-level fan-out packaging, and in December 2015 we completed the acquisition of our Japan operations. We believe that taking advantage of these opportunities helps diversify our revenue streams, improve our profits, broaden our portfolio of services and maintain our technological leadership.

As a supplier in the semiconductor industry, our business is cyclical and impacted by broad economic factors. Historically, there has been a strong correlation between world-wide gross domestic product levels, consumer spending and semiconductor

industry cycles. The semiconductor industry has experienced significant and sometimes prolonged cyclical upturns and downturns in the past. We believe that the smartphone inventory correction that impacted the first half of 2019 has recovered, while the general semiconductor market is nearing stabilization and is likely to resume growth going forward. We cannot predict the timing, strength or duration of any correction, economic slowdown or subsequent economic recovery.

Our net sales, gross profit, operating income, cash flows, liquidity and capital resources have historically fluctuated significantly from quarter to quarter as a result of many factors, including the seasonality of our business, the cyclical nature of the semiconductor industry and other factors discussed in Part 1, Item 1A of this Annual Report on Form 10-K.

We operate in a capital intensive industry and have a significant level of debt. Servicing our current and future customers requires that we incur significant operating expenses and continue to make significant capital expenditures, which are generally made in advance of the related revenues and without firm customer commitments. We fund our operations, including capital expenditures and debt service requirements, with cash flows from operations, existing cash and cash equivalents, borrowings under available credit facilities and proceeds from any additional financing. Maintaining an appropriate level of liquidity is important to our business and depends on, among other considerations, the performance of our business, our capital expenditure levels, our ability to repay debt out of our operating cash flows or proceeds from debt or equity financings and our investment strategy.

2019 Financial Summary

Our net sales decreased \$263.8 million or 6.1% to \$4,052.7 million in 2019 from \$4,316.5 million in 2018. The decrease was generally attributable to a cyclical correction of the semiconductor market, partially offset by the introduction of a new high volume consumer product.

Gross profit decreased \$61.1 million in 2019 compared to 2018, primarily due to lower revenue, reduced capacity utilization and mix of products sold with higher material content in 2019, partially offset by our continued effort to control our manufacturing costs.

In March 2019, we issued \$525.0 million aggregate principal amount of our 6.625% Senior Notes due September 2027 (the “2027 Notes”). In April 2019, the net proceeds from this issuance were used, together with cash on hand, to redeem the outstanding \$525.0 million aggregate principal amount of our 6.375% Senior Notes due October 2022 (the “2022 Notes”).

In 2019, our capital expenditures totaled \$472.4 million, or 11.7% of net sales compared to \$547.1 million, or 12.7% of net sales in 2018. The decrease is primarily due to our decision to reduce spending on incremental capacity during a period of reduced demand.

Net cash provided by operating activities was \$563.9 million for the year ended December 31, 2019, compared to \$663.4 million for the year ended December 31, 2018. This decrease was primarily due to lower net sales, lower operating profit, and changes in working capital.

In December 2019, we entered into a ¥28.5 billion (\$260.6 million) term loan agreement due December 2024. We immediately drew down the full loan amount and used the proceeds to pay down \$80.0 million of our senior secured revolving credit facility due 2023. In January 2020, we also used these proceeds to pay down \$120.0 million of our term loan due December 2023. The remaining proceeds will be used for other general corporate purposes.

Results of Operations

The following table sets forth certain operating data as a percentage of net sales for the periods indicated:

	For the Year Ended December 31		
	2019	2018	2017
Net sales	100.0%	100.0%	100.0%
Materials	40.0%	38.7%	36.4%
Labor	16.0%	16.1%	15.6%
Other manufacturing costs	28.0%	28.7%	29.9%
Gross margin	16.0%	16.5%	18.1%
Operating income	5.8%	6.0%	9.6%
Net income attributable to Amkor	3.0%	2.9%	6.3%

Net Sales

							Change					
	2019		2018		2017		2019 over 2018		2018 over 2017			
	(In thousands, except percentages)											
Net sales	\$	4,052,650	\$	4,316,466	\$	4,207,031	\$	(263,816)	(6.1)%	\$	109,435	2.6%

The decrease in net sales in 2019 compared to 2018 was generally attributable to a cyclical correction of the semiconductor market, partially offset by the introduction of a new high volume consumer product.

Gross Profit and Gross Margin

				Change	
	2019	2018	2017	2019 over 2018	2018 over 2017
	(In thousands, except percentages)				
Gross profit	\$ 649,439	\$ 710,565	\$ 761,079	\$ (61,126)	\$ (50,514)
Gross margin	16.0%	16.5%	18.1%	(0.5)%	(1.6)%

Our cost of sales consists principally of materials, labor, depreciation and manufacturing overhead. Since a substantial portion of the costs at our factories is fixed, there tends to be a strong relationship between our revenue levels and gross margin. Accordingly, relatively modest increases or decreases in revenue can have a significant effect on margin, depending upon product mix, utilization and seasonality.

Gross profit and gross margin for 2019 decreased compared to 2018, primarily due to lower revenue, reduced capacity utilization and mix of products sold with higher material content in 2019, partially offset by our continued effort to control our manufacturing costs.

Selling, General and Administrative Expenses

					Change			
	2019	2018	2017	2019 over 2018		2018 over 2017		
	(In thousands, except percentages)							
Selling, general and administrative	\$ 281,933	\$ 295,239	\$ 297,021	\$ (13,306)	(4.5)%	\$ (1,782)	(0.6)%	

Selling, general and administrative expenses decreased in 2019 compared to 2018 primarily due to decreased employee compensation costs, a gain on sale of real estate in Japan and our continued effort to control expenses.

Research and Development

						Change						
	2019		2018		2017	2019 over 2018		2018 over 2017				
	(In thousands, except percentages)											
Research and development	\$	137,638	\$	157,182	\$	166,627	\$	(19,544)	(12.4)%	\$	(9,445)	(5.7)%

Research and development activities are focused on developing new packaging and test services and improving the efficiency and capabilities of our existing production processes. The costs related to our technology and product development projects are included in research and development expense until the project moves into production. Once production begins, the costs related to production become part of the cost of sales, including ongoing depreciation for the equipment previously held for research and development activities. Research and development expenses decreased in 2019 over 2018 due to projects that moved into production, partially offset by new development projects, primarily at our research and development facility in Korea.

Other Income and Expense

				Change								
	2019		2018		2017		2019 over 2018		2018 over 2017			
	(In thousands, except percentages)											
Interest expense	\$	71,587	\$	78,946	\$	85,554	\$	(7,359)	(9.3)%	\$	(6,608)	(7.7)%
Interest income		(6,655)		(4,133)		(3,215)	\$	(2,522)	61.0 %	\$	(918)	28.6 %
Foreign currency (gain) loss, net		1,944		1,451		11,823		493	34.0 %		(10,372)	(87.7)%
Loss on debt retirement		8,536		1,512		4,835		7,024	>100%		(3,323)	(68.7)%
Other		(2,052)		(5,447)		(953)		3,395	(62.3)%		(4,494)	>100%
Total other expense, net	\$	73,360	\$	72,329	\$	98,044	\$	1,031	1.4 %	\$	(25,715)	(26.2)%

Interest expense decreased in 2019 compared to 2018, primarily due to the redemption of \$200.0 million of our 6.625% Senior Notes due 2021 in August 2018. The 2018 redemption was funded with proceeds from our term loan due July 2023 which has a significantly lower interest rate. The interest expense decrease was partially offset by the interest incurred under our new \$525.0 million aggregate principal amount of our 2027 Notes, which were issued in March 2019.

Loss on debt retirement in 2019 is primarily due to the early redemption in April 2019 of the outstanding \$525 million aggregate principal amount of our 6.375% Senior Notes due 2022.

Income Tax Expense

	Change				
	2019	2018	2017	2019 over 2018	2018 over 2017
(In thousands, except percentages)					
Income tax expense	\$ 37,182	\$ 56,250	\$ 39,791	\$ (19,068)	\$ 16,459
Effective tax rate	23.3%	30.3%	12.9%		

The majority of our income is earned and taxed in foreign jurisdictions in the Asia Pacific region with applicable tax rates of approximately 25%. Income tax expense, which includes foreign withholding taxes and minimum taxes, reflects the applicable tax rates in effect in the various countries where our income is earned and is subject to volatility depending on the relative mix of earnings in each location.

The effective tax rate in 2017 includes a net tax benefit of \$41.6 million for the provisional estimate of the impact of the Tax Act. The effective tax rate in 2018 includes a \$22.3 million income tax expense to complete the accounting for the impact of the Tax Act, reducing our estimated net tax benefit of \$41.6 million from 2017.

During 2019, 2018 and 2017, our subsidiaries in Korea, Malaysia, the Philippines, Singapore and Taiwan operated under various tax holidays. The tax holidays granted to our Malaysia operations and certain operations in the Philippines expired during 2018. The tax holiday granted to certain operations in Taiwan expired as of December 31, 2017. As these tax holidays expire, income earned in these jurisdictions will be subject to higher statutory income tax rates, which may cause our effective tax rate to increase.

See Note 6 to our Consolidated Financial Statements included in Part II, Item 8 of this Annual Report on Form 10-K for additional information about our income tax expense.

Liquidity and Capital Resources

We assess our liquidity based on our current expectations regarding sales, operating expenses, capital spending, debt service requirements and other funding needs. Based on this assessment, we believe that our cash flow from operating activities, together with existing cash and cash equivalents and availability under our credit facilities, will be sufficient to fund our working capital, capital expenditure, debt service and other financial requirements for at least the next twelve months. Our liquidity is affected by, among other factors, volatility in the global economy and credit markets, the performance of our business, our capital expenditure levels, other uses of our cash including any purchases of stock under our stock repurchase program, any acquisitions or investments in joint ventures and our ability to either repay debt out of operating cash flow or refinance it at or prior to maturity with the proceeds of debt or equity offerings. There can be no assurance that we will generate the necessary net income or operating cash flows, or be able to borrow sufficient funds, to meet the funding needs of our business beyond the next twelve months due to a variety of factors, including the cyclical nature of the semiconductor industry and other factors discussed in Part I, Item 1A of this Annual Report on Form 10-K.

Our primary source of cash and the source of funds for our operations are cash flows from operations, current cash and cash equivalents, borrowings under available credit facilities and proceeds from any additional debt or equity financings. In March 2019, we issued \$525.0 million of our 2027 Notes. Additionally, in April 2019, we redeemed the outstanding \$525.0 million aggregate principal amount of our 2022 Notes. The redemption was funded with net proceeds from our issuance of the 2027 Notes, together with cash on hand. We refer you to Note 12 to our Consolidated Financial Statements in Part II, Item 8 of this Annual Report on Form 10-K for additional information.

As of December 31, 2019, we had cash and cash equivalents of \$894.9 million. Included in our cash balance as of December 31, 2019, is \$790.0 million held offshore by our foreign subsidiaries. We have the ability to access cash held offshore by our foreign subsidiaries primarily through the repayment of intercompany debt obligations. Due to the changes in the U.S. tax law under the Tax Act, distributions of cash to the U.S. as dividends generally will not be subject to U.S. federal income tax. We estimate that repatriation of this foreign cash would generate withholding taxes and state income taxes of approximately \$6.9 million.

In July 2018, the senior secured revolving credit facility of Amkor Technology, Inc. was terminated and replaced by a new senior secured revolving credit facility due July 2023 entered into by our subsidiary, Amkor Technology Singapore Holding Pte, Ltd. (“the Singapore Revolver”), and guaranteed by Amkor Technology, Inc. The availability for the Singapore Revolver is based on the amount of eligible accounts receivable. As of December 31, 2019, we had availability of \$250.0 million under the Singapore Revolver, with no outstanding standby letters of credit. We refer you to Note 12 to our Consolidated Financial Statements in Part II, Item 8 of this Annual Report on Form 10-K for additional information. As of December 31, 2019, our foreign subsidiaries had \$316.0 million available to be drawn under revolving credit facilities, including the Singapore Revolver, and \$110.0 million available to be borrowed under term loan credit facilities for working capital purposes and capital expenditures.

As of December 31, 2019, we had \$1,450.2 million of debt. Our scheduled principal repayments on debt include \$144.5 million due in 2020, \$113.4 million due in 2021, \$260.0 million due in 2022, \$297.8 million due in 2023, \$81.9 million due in 2024 and \$562.7 million due thereafter. We were in compliance with all debt covenants as of December 31, 2019, and we expect to remain in compliance with these covenants for at least the next twelve months.

In December 2019, we entered into a ¥28.5 billion (US\$260.6 million) term loan agreement due December 2024. We immediately drew down the full loan amount and used the proceeds to pay down the \$80.0 million of the Singapore Revolver. In January 2020, we also used these proceeds to repay \$120.0 million of our term loan due December 2023. The remaining

proceeds will be used for other general corporate purposes. We refer you to Note 12 to our Consolidated Financial Statements in Part II, Item 8 of this Annual Report on Form 10-K for additional information.

For certain accounts receivable, we use non-recourse factoring arrangements with third party financial institutions to manage our working capital and cash flows. Under this program, we sell receivables to a financial institution for cash at a discount to the face amount. Available capacity under these programs is dependent on the level of our trade accounts receivable eligible to be sold, the financial institutions' willingness to purchase such receivables and the limits provided by the financial institutions. These factoring arrangements can be reduced or eliminated at any time due to market conditions and changes in the credit worthiness of customers. For the year ended December 31, 2019 and 2018, we sold accounts receivable totaling \$680.4 million and \$873.9 million, net of discounts and fees of \$4.4 million and \$7.0 million, respectively.

In order to reduce our debt and future cash interest payments, we may from time to time repurchase or redeem our outstanding notes for cash or exchange shares of our common stock for our outstanding notes. Any such transaction may be made in the open market, through privately negotiated transactions or otherwise, and is subject to the terms of our indentures and other debt agreements, market conditions and other factors.

Certain debt agreements have restrictions on dividend payments and the repurchase of stock and subordinated securities. These restrictions are determined in part by calculations based upon cumulative net income or borrowing availability. We have never paid a dividend to our stockholders, and we do not have any present plans for doing so. From time to time, Amkor Technology, Inc. also guarantees certain debt of our subsidiaries.

We operate in a capital-intensive industry. Servicing our current and future customers may require that we incur significant operating expenses and make significant investments in equipment and facilities, which are generally made in advance of the related revenues and without firm customer commitments.

Our Board of Directors previously authorized the repurchase of up to \$300.0 million of our common stock, exclusive of any fees, commissions or other expenses. At December 31, 2019, approximately \$91.6 million was available to repurchase common stock pursuant to the stock repurchase program. The purchase of stock may be made in the open market or through privately negotiated transactions. The timing, manner, price and amount of any repurchases will be determined by us at our discretion and will depend upon a variety of factors including economic and market conditions, the cash needs and investment opportunities for the business, the current market price of our stock, applicable legal requirements and other factors. We have not purchased any stock under the program since 2012.

Investments

We make significant capital expenditures in order to service the demand of our customers, which is primarily focused on investments in advanced packaging and test equipment. In 2019, our capital expenditures totaled \$472.4 million or approximately 11.7% of net sales.

We expect that our 2020 capital expenditures will be approximately \$550 million. Ultimately, the amount of our 2020 capital expenditures will depend on several factors including, among others, the timing and implementation of any capital projects under review, the performance of our business, economic and market conditions, the cash needs and investment opportunities for the business, the need for additional capacity to service anticipated customer demand and the availability of cash flows from operations or financing.

In addition, we are subject to risks associated with our capital expenditures, including those discussed in Part I, Item 1A of this Annual Report on Form 10-K under the caption "Capital Expenditures - We Make Substantial Investments in Equipment and Facilities To Support the Demand Of Our Customers, Which May Adversely Affect Our Business If the Demand Of Our Customers Does Not Develop As We Expect or Is Adversely Affected."

Cash Flows

Net cash provided by (used in) operating, investing and financing activities for each of the three years ended December 31, 2019 was as follows:

	For the Year Ended December 31		
	2019	2018	2017
	(In thousands)		
Operating activities	\$ 563,850	\$ 663,410	\$ 618,267
Investing activities	(462,489)	(537,383)	(454,832)
Financing activities	108,250	(40,623)	(124,886)

Operating activities: Our cash flow provided by operating activities for the year ended December 31, 2019 decreased by \$99.6 million compared to the year ended December 31, 2018, primarily due to lower net sales, lower operating profit, and changes in working capital.

Investing activities: Our cash flow used in investing activities decreased compared to the year ended December 31, 2018 principally due to our initiative to reduce spending on incremental capacity during a period of reduced demand. The net cash used in investing activities for the year ended December 31, 2017, included the receipt of the remaining proceeds for the sale of the K1 factory in Korea and a payment for the acquisition of Nanium.

Financing activities: The net cash provided by financing activities for the year ended December 31, 2019 was primarily due to the issuance of the 2027 Notes and net borrowings in Japan, partially offset by the redemption of the 2022 Notes and net repayments in Korea. The net cash used in financing activities for the year ended December 31, 2018 was primarily driven by the full redemption of our 6.625% Senior Notes due 2021 and net repayments in China and Korea, partially offset by the net borrowings in Japan.

We provide the following supplemental data to assist our investors and analysts in understanding our liquidity and capital resources. We define free cash flow as net cash provided by operating activities less payments for property, plant and equipment, plus proceeds from the sale of and insurance recovery for property, plant and equipment, if applicable. Free cash flow is not defined by U.S. GAAP. We believe free cash flow to be relevant and useful information to our investors because it provides them with additional information in assessing our liquidity, capital resources and financial operating results. Our management uses free cash flow in evaluating our liquidity, our ability to service debt and our ability to fund capital expenditures. However, free cash flow has certain limitations, including that it does not represent the residual cash flow available for discretionary expenditures since other, non-discretionary expenditures, such as mandatory debt service, are not deducted from the measure. The amount of mandatory versus discretionary expenditures can vary significantly between periods. This measure should be considered in addition to, and not as a substitute for, or superior to, other measures of liquidity or financial performance prepared in accordance with U.S. GAAP, such as net cash provided by operating activities. Furthermore, our definition of free cash flow may not be comparable to similarly titled measures reported by other companies.

	For the Year Ended December 31		
	2019	2018	2017
	(In thousands)		
Net cash provided by operating activities	\$ 563,850	\$ 663,410	\$ 618,267
Payments for property, plant and equipment	(472,433)	(547,122)	(550,943)
Proceeds from sale of and insurance recovery for property, plant and equipment	11,655	4,212	141,530
Free cash flow	<u>\$ 103,072</u>	<u>\$ 120,500</u>	<u>\$ 208,854</u>

Contractual Obligations

The following table summarizes our contractual obligations at December 31, 2019, and the effect such obligations are expected to have on our liquidity and cash flows in future periods.

		Payments Due for Year Ending December 31,						
	Total	2020	2021	2022	2023	2024	Thereafter	
	(In thousands)							
Total debt	\$ 1,460,351	\$ 144,479	\$ 113,408	\$ 260,022	\$ 297,818	\$ 81,910	\$ 562,714	
Scheduled interest payment obligations (1)	362,403	58,722	56,789	52,686	48,137	37,909	108,160	
Purchase obligations (2)	87,000	75,775	3,587	2,942	1,293	1,293	2,110	
Operating lease obligations	147,800	46,204	35,686	21,015	11,046	9,605	24,244	
Finance lease obligations (3)	25,546	9,905	8,808	2,064	956	949	2,864	
Severance obligations (4)	127,386	13,408	10,178	9,286	8,456	7,687	78,371	
Total contractual obligations	\$ 2,210,486	\$ 348,493	\$ 228,456	\$ 348,015	\$ 367,706	\$ 139,353	\$ 778,463	

- (1) Represents interest payment obligations calculated using stated coupon rates for fixed rate debt and interest rates applicable at December 31, 2019, for variable rate debt.
- (2) Represents off-balance sheet purchase obligations for capital expenditures, long-term supply contracts and other contractual commitments outstanding at December 31, 2019.
- (3) Represents future minimum lease payments including interest payments.
- (4) Represents estimated benefit payments for our Korean subsidiary severance plan.

In addition to the obligations identified in the table above, other non-current liabilities recorded in our Consolidated Balance Sheet at December 31, 2019, include:

- \$62.8 million of foreign pension plan obligations, for which the timing and actual amount of impact on our future cash flow is uncertain.
- \$26.2 million net liability associated with unrecognized tax benefits. Due to the uncertainty regarding the amount and the timing of any future cash outflows associated with our unrecognized tax benefits, we are unable to reasonably estimate the amount and period of ultimate settlement, if any, with the various taxing authorities.

Off-Balance Sheet Arrangements

As of December 31, 2019, we had no off-balance sheet guarantees or other off-balance sheet arrangements as defined in Item 303(a)(4)(ii) of SEC Regulation S-K.

Contingencies, Indemnifications and Guarantees

We refer you to Note 17 to our Consolidated Financial Statements in Part II, Item 8 of this Annual Report on Form 10-K for a discussion of our contingencies related to litigation and other legal matters.

Critical Accounting Policies and Use of Estimates

We have identified the policies below as critical to our business operations and the understanding of our results of operations. A summary of our significant accounting policies used in the preparation of our Consolidated Financial Statements appears in Note 1 to our Consolidated Financial Statements included in Part II, Item 8 of this Annual Report on Form 10-K. Our preparation of this Annual Report on Form 10-K requires us to make estimates and assumptions that affect the reported amount of assets and liabilities, disclosure of contingent assets and liabilities at the date of our financial statements and the reported amounts of revenue and expenses during the reporting period. There can be no assurance that actual results will not differ from those estimates.

We believe the following critical accounting estimates and policies, which have been reviewed with the Audit Committee of our Board of Directors, affect our more significant judgments and estimates used in the preparation of our Consolidated Financial Statements.

Acquisitions. We account for businesses we acquire using the acquisition method of accounting and record the underlying net assets at their respective acquisition-date fair values. The accounting for acquisitions requires us to make significant estimates and assumptions, including those with respect to future cash flows, discount rates and asset lives, and therefore requires considerable judgment. These determinations affect the amount of depreciation and amortization expense recognized in future periods. Our estimates of fair value are based upon assumptions believed to be reasonable; however, they are inherently uncertain and unpredictable.

Revenue Recognition. We recognize revenue, net of sales, use, value-added and other similar taxes, as a performance obligation is satisfied in an amount reflecting the consideration to which we expect to be entitled. We apply a five-step approach in determining the amount and timing of revenue to be recognized: (1) identifying the contract with a customer; (2) identifying the performance obligations in the contract; (3) determining the transaction price; (4) allocating the transaction price to the performance obligations in the contract; and (5) recognizing revenue when the performance obligation is satisfied. Substantially all of our revenue is recognized as services are rendered.

Our packaging and test services are our performance obligations to our customers. Our packaging services include wafer bump, probe and assembly. We provide packaging and test services to our customers either individually or as part of a combined offering. In a combined offering, we account for the individual services separately if they are determined to be distinct. We determine a service to be distinct if it is separately identifiable from other services in the combined offering and if a customer can benefit from the unique service on its own or with other resources that are readily available to the customer.

The consideration, including variable consideration, is allocated between the distinct services in a combined offering based upon the stand-alone selling prices of the individual services. Our services involve a high degree of specialization which are unique based on the design and purpose of the customer's wafers. Accordingly, our negotiated pricing reflects the customized nature of our services and represents a customer-specific stand-alone selling price. We recognize revenue as services are rendered, which generally occurs over the course of two to three weeks. Services are generally billed at completion of each individual packaging or test service or in some instances at the completion of all services in a combined offering.

We recognize revenue over time as services are rendered because our services create or enhance the customer's wafer. We utilize an input method (cost incurred plus estimated margin) to determine the amount of revenue to recognize for in-process, but incomplete, customer orders at a reporting date. During the period of providing our services, we generally do not control or take ownership of customers' wafers, nor do we include the cost of the wafer in our cost calculations. We believe that a cost-based input method is the most appropriate manner to measure how we satisfy our performance obligations to customers because the effort and costs incurred to package and/or test customer wafers are not linear over the duration of these services.

Shipping and handling costs are accounted for as a cost to fulfill our performance obligations to customers. Accordingly, we record customer payments of shipping and handling costs as a component of net sales, and the costs incurred for shipping and handling are then charged to cost of sales.

Income Taxes. We operate in and file income tax returns in various U.S. and non-U.S. jurisdictions which are subject to examination by tax authorities. The tax returns for years where the statute of limitations remains open in all jurisdictions in which we do business are subject to change upon examination. We believe that we have estimated and provided adequate accruals for potential additional taxes and related interest expense that may ultimately result from such examinations. We believe that any additional taxes or related interest over the amounts accrued will not have a material effect on our financial condition, results of operations or cash flows. However, resolution of these matters involves uncertainties and there can be no assurance that the outcomes will be favorable. In addition, changes in the mix of income from our foreign subsidiaries, expiration of tax holidays or changes in tax laws or regulations could result in increased tax expense and effective tax rates in the future.

Additionally, we monitor on an ongoing basis our ability to utilize our deferred tax assets and whether there is a need for a related valuation allowance. In evaluating our ability to recover our deferred tax assets in the jurisdictions from which they

arise, we consider all available positive and negative evidence, including scheduled reversals of deferred tax liabilities, projected future taxable income, tax planning strategies and results of recent operations. For most of our deferred tax assets, we consider it more likely than not that we will have sufficient taxable income to allow us to realize these deferred tax assets. However, in the event taxable income falls short of current expectations, we may need to establish a valuation allowance against such deferred tax assets. We have valuation allowances on certain U.S. federal net operating loss and U.S. foreign tax credit carryforwards expected to expire unused and select deferred tax assets in certain foreign jurisdictions. Such valuation allowances are released as the related tax benefits are realized or when sufficient evidence exists to conclude that it is more likely than not that the deferred tax assets will be realized.

Valuation of Inventory. We order raw materials based on customers' forecasted demand. If our customers change their forecasted requirements and we are unable to cancel our raw materials order or if our vendors require that we order a minimum quantity that exceeds the current forecasted demand, we will experience a build-up in raw material inventory. We will either seek to recover the cost of the materials from our customers or utilize the inventory in production. However, we may not be successful in recovering the cost from our customers or be able to use the inventory in production and, accordingly, if we believe that it is probable that we will not be able to recover such costs, we reduce the carrying value of our inventory. Additionally, we reduce the carrying value of our inventories for the cost of inventory we estimate is excess and obsolete based on the age of our inventories. When a determination is made that the inventory will not be utilized in production or is not saleable, it is written-off.

Inventories consist of raw materials and purchased components and are stated at the lower of cost and net realizable value. Cost is principally determined by standard cost or the weighted moving average method, both of which approximate actual cost. For inventory valued using the standard cost method, we review and set our standard costs as needed, but at a minimum on an annual basis.

Valuation of Long-lived Assets. We review long-lived assets, which include property, plant and equipment and goodwill, for impairment whenever events or changes in circumstances indicate that the carrying amount may not be recoverable. Factors we consider important which could trigger an impairment review include the following:

- significant under-performance relative to expected historical or projected future operating results;
- significant changes in the manner of our use of the asset;
- significant negative industry or economic trends and
- our market capitalization relative to net book value.

Recoverability of a long-lived asset group to be held and used in operations is measured by a comparison of the carrying amount to the sum of the undiscounted cash flows expected to result from the use and eventual disposition of the asset group. If such asset group is considered to be impaired, the impairment loss is measured as the amount by which the carrying amount of the asset group exceeds its fair value. Long-lived assets to be disposed of are carried at the lower of cost or fair value less the costs of disposal.

We review goodwill for impairment annually during the fourth quarter of each year and whenever events or changes in circumstances indicate that an impairment may exist. Impairment losses are recorded when the carrying amount of the reporting unit exceeds its fair value.

Recently Adopted Standards

For information regarding recently adopted accounting standards, see Note 2 to our Consolidated Financial Statements included in Part II, Item 8 of this Annual Report on Form 10-K.

Item 7A. Quantitative and Qualitative Disclosures about Market Risk**Market Risk Sensitivity**

We are exposed to market risks, primarily related to foreign currency and interest rate fluctuations. In the normal course of business, we employ established policies and procedures to manage the exposure to fluctuations in foreign currency values and changes in interest rates.

Foreign Currency Risk

The U.S. dollar is our reporting and functional currency for our subsidiaries, except for our Japan operations, where the Japanese Yen is the functional currency. In order to reduce our exposure to foreign currency gains and losses, we generally use natural hedging techniques to reduce foreign currency rate risk. We also use forward contracts to mitigate foreign currency risk of certain monetary liabilities denominated in foreign currencies.

We have foreign currency exchange rate risk associated with the remeasurement of monetary assets and liabilities on our Consolidated Balance Sheets that are denominated in currencies other than the functional currency. We performed a sensitivity analysis of our foreign currency exposure as of December 31, 2019, to assess the potential impact of fluctuations in exchange rates for all foreign denominated assets and liabilities. Assuming that all foreign currencies appreciated 10% against the U.S. dollar, taking into account our foreign currency forward contracts, our income before taxes as of December 31, 2019 would have been approximately \$8 million lower, due to the remeasurement of monetary assets and liabilities.

In addition, we have foreign currency exchange rate exposure on our results of operations. For the year ended December 31, 2019, approximately 77% of our net sales were denominated in U.S. dollars. Our remaining net sales were principally denominated in Japanese Yen for local country sales. For the year ended December 31, 2019, approximately 51% of our cost of sales and operating expenses were denominated in U.S. dollars and were largely for raw materials and costs associated with property, plant and equipment. The remaining portion of our cost of sales and operating expenses was principally denominated in the Asian currencies where our production facilities are located and largely consisted of labor. To the extent that the U.S. dollar weakens against these Asian-based currencies, similar foreign currency denominated income and expenses in the future will result in higher sales, higher cost of sales and operating expenses, with cost of sales and operating expenses having the greater impact on our financial results. Similarly, our sales, cost of sales and operating expenses will decrease if the U.S. dollar strengthens against these foreign currencies. We performed a sensitivity analysis of our foreign currency exposure as of December 31, 2019, to assess the potential impact of fluctuations in exchange rates for all foreign denominated sales and operating expenses. Assuming that all foreign currencies appreciated 10% against the U.S. dollar, our operating income for the year ended December 31, 2019 would have been approximately \$106 million lower.

There are inherent limitations in the sensitivity analysis presented, primarily the assumption that foreign exchange rate movements across multiple jurisdictions would change instantaneously in an equal fashion. As a result, the analysis is unable to reflect the potential effects of more complex market or other changes that could arise which may positively or negatively affect our results of operations.

Our Consolidated Financial Statements are impacted by changes in exchange rates at the entity where the local currency is the functional currency. The effect of foreign exchange rate translation for these entities was a gain of \$2.8 million and \$4.9 million for the years ended December 31, 2019 and 2018, respectively, and was recognized as an adjustment to equity through other comprehensive income (loss).

Interest Rate Risk

We have interest rate risk with respect to our debt. Our fixed and variable rate debt includes foreign borrowings and revolving credit facilities. Our fixed rate debt also consists of senior notes. Changes in interest rates have different impacts on the fixed and variable rate portions of our debt portfolio. A change in interest rates on the fixed portion of the debt portfolio impacts the fair value of the debt instrument but has no impact on interest expense or cash flows. A change in interest rates on the variable portion of the debt portfolio impacts the interest incurred and cash flows but does not generally impact the fair value of the instrument.

The table below presents the interest rates, maturities and fair value of our fixed and variable rate debt as of December 31, 2019:

	2020	2021	2022	2023	2024	Thereafter	Total	Fair Value
	(\$ in thousands)							
Fixed rate debt	\$ 111,408	\$ 111,408	\$ 215,772	\$ 97,818	\$ 61,910	\$ 562,714	\$ 1,161,030	\$ 1,213,715
Average interest rate	1.3%	1.3%	2.5%	1.6%	1.8%	6.5%	4.1%	
Variable rate debt	\$ 33,071	\$ 2,000	\$ 44,250	\$ 200,000	\$ 20,000	\$ —	\$ 299,321	\$ 303,916
Average interest rate	3.1%	3.4%	3.4%	4.5%	3.4%	—%	4.1%	
Total debt maturities	<u>\$ 144,479</u>	<u>\$ 113,408</u>	<u>\$ 260,022</u>	<u>\$ 297,818</u>	<u>\$ 81,910</u>	<u>\$ 562,714</u>	<u>\$ 1,460,351</u>	<u>\$ 1,517,631</u>

For information regarding the fair value of our long-term debt, see Note 16 to our Consolidated Financial Statements in Part II, Item 8 of this Annual Report on Form 10-K.

[Table of Contents](#)

Item 8. *Financial Statements and Supplementary Data*

We present the information required by Item 8 of Form 10-K here in the following order:

	Page
Report of Independent Registered Public Accounting Firm	48
Consolidated Statements of Income — Years ended December 31, 2019, 2018 and 2017	51
Consolidated Statements of Comprehensive Income — Years ended December 31, 2019, 2018 and 2017	52
Consolidated Balance Sheets — December 31, 2019 and 2018	53
Consolidated Statements of Stockholders' Equity — Years ended December 31, 2019, 2018 and 2017	54
Consolidated Statements of Cash Flows — Years ended December 31, 2019, 2018 and 2017	55
Notes to Consolidated Financial Statements	57
Schedule II — Valuation and Qualifying Accounts — Years ended December 31, 2019, 2018 and 2017	86

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of Amkor Technology, Inc.

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of Amkor Technology, Inc. and its subsidiaries (the “Company”) as of December 31, 2019 and 2018, and the related consolidated statements of income, of comprehensive income, of stockholders’ equity and of cash flows for each of the three years in the period ended December 31, 2019, including the related notes and schedule of valuation and qualifying accounts for each of the three years in the period ended December 31, 2019 appearing under Item 8 (collectively referred to as the “consolidated financial statements”). We also have audited the Company’s internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above 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. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the COSO.

Change in Accounting Principle

As discussed in Note 2 to the consolidated financial statements, the Company changed the manner in which it accounts for leases in 2019.

Basis for Opinions

The Company’s management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in Management’s Report on Internal Control Over Financial Reporting appearing under Item 9A. Our responsibility is to express opinions on the Company’s consolidated financial statements and on the Company’s internal control over financial reporting 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 audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements 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. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

Definition and Limitations of Internal Control over Financial Reporting

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

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

Critical Audit Matters

The critical audit matter communicated below is a matter arising from the current period audit of the consolidated financial statements that was communicated or required to be communicated to the audit committee and that (i) relates to accounts or disclosures that are material to the consolidated financial statements and (ii) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matter below, providing a separate opinion on the critical audit matter or on the accounts or disclosures to which it relates.

Accounting for Income Taxes

As described in Notes 1 and 6 to the consolidated financial statements, the Company recorded income tax expense of \$37.2 million for the year ended December 31, 2019, and net deferred tax assets of \$90.3 million and unrecognized tax benefits of \$26.2 million as of December 31, 2019. Income taxes are accounted for using the asset and liability method. Under this method, deferred income tax assets and liabilities are recognized for the future tax consequences attributable to temporary differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax basis as well as for net operating loss and tax credit carryforwards. Management monitors on an ongoing basis its ability to utilize deferred tax assets and whether there is a need for a related valuation allowance. In evaluating the ability to recover deferred tax assets in the jurisdictions from which they arise, management considers all available positive and negative evidence, including scheduled reversals of deferred tax liabilities, projected future taxable income, tax-planning strategies and results of recent operations. The Company operates in and files income tax returns in various U.S. and foreign jurisdictions, which are subject to examination by tax authorities. Years open to examination contain matters that could be subject to differing interpretations of applicable tax laws and regulations related to the amount and/or timing of income, deductions and tax credits.

The principal considerations for our determination that performing procedures relating to accounting for income taxes is a critical audit matter are there was significant judgment by management in determining the income tax provision and other tax positions. This in turn led to a high degree of auditor judgment, subjectivity and effort in performing procedures and in evaluating audit evidence relating to income taxes. The audit effort involved the use of professionals with specialized skill and knowledge to assist in evaluating the audit evidence obtained.

[Table of Contents](#)

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to accounting for income taxes, including the controls addressing the completeness and accuracy of the data utilized. These procedures also included, among others (i) testing the income tax provision calculation and underlying data, including the effective tax rate reconciliation, significant return to provision adjustments, and permanent and temporary differences, (ii) evaluating management’s assessment of the realizability of deferred tax assets on a jurisdictional basis, (iii) evaluating the identification of reserves for unrecognized tax benefits and the reasonableness of the “more likely than not” determination considering the jurisdictions, court decisions, legislative actions, statute of limitations, and developments in tax examinations, and (iv) using professionals with specialized skill and knowledge to assist in evaluating the reasonableness of management’s judgment and estimates, including application of foreign and domestic tax laws and regulations.

/s/ PricewaterhouseCoopers LLP
Phoenix, Arizona
February 19, 2020

We have served as the Company’s auditor since 2000.

AMKOR TECHNOLOGY, INC.
CONSOLIDATED STATEMENTS OF INCOME

	For the Year Ended December 31,		
	2019	2018	2017
	(In thousands, except per share data)		
Net sales	\$ 4,052,650	\$ 4,316,466	\$ 4,207,031
Cost of sales	3,403,211	3,605,901	3,445,952
Gross profit	649,439	710,565	761,079
Selling, general and administrative	281,933	295,239	297,021
Research and development	137,638	157,182	166,627
Gain on sale of real estate	(3,302)	—	(108,109)
Total operating expenses	416,269	452,421	355,539
Operating income	233,170	258,144	405,540
Interest expense	71,587	78,946	83,839
Interest expense, related party	—	—	1,715
Other (income) expense, net	1,773	(6,617)	12,490
Total other expense, net	73,360	72,329	98,044
Income before taxes	159,810	185,815	307,496
Income tax expense	37,182	56,250	39,791
Net income	122,628	129,565	267,705
Net income attributable to noncontrolling interests	(1,740)	(2,473)	(4,155)
Net income attributable to Amkor	<u>\$ 120,888</u>	<u>\$ 127,092</u>	<u>\$ 263,550</u>
Net income attributable to Amkor per common share:			
Basic	<u>\$ 0.50</u>	<u>\$ 0.53</u>	<u>\$ 1.10</u>
Diluted	<u>\$ 0.50</u>	<u>\$ 0.53</u>	<u>\$ 1.10</u>
Shares used in computing per common share amounts:			
Basic	239,725	239,329	238,937
Diluted	240,122	239,741	239,651

The accompanying notes are an integral part of these statements.

AMKOR TECHNOLOGY, INC.
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME

	For the Year Ended December 31,		
	2019	2018	2017
	(In thousands)		
Net income	\$ 122,628	\$ 129,565	\$ 267,705
Other comprehensive income (loss), net of tax:			
Adjustments to unrealized components of defined benefit pension plans	(7,479)	(3,644)	5,165
Foreign currency translation	2,782	4,937	11,092
Total other comprehensive income (loss)	(4,697)	1,293	16,257
Comprehensive income	117,931	130,858	283,962
Comprehensive income attributable to noncontrolling interests	(1,740)	(2,473)	(4,155)
Comprehensive income attributable to Amkor	\$ 116,191	\$ 128,385	\$ 279,807

The accompanying notes are an integral part of these statements.

**AMKOR TECHNOLOGY, INC.
CONSOLIDATED BALANCE SHEETS**

	December 31,	
	2019	2018
	(In thousands, except per share data)	
ASSETS		
Current assets:		
Cash and cash equivalents	\$ 894,948	\$ 681,569
Restricted cash	610	2,589
Accounts receivable, net of allowances of \$1,314 and \$677, respectively	850,753	724,456
Inventories	220,602	230,589
Other current assets	34,620	32,005
Total current assets	2,001,533	1,671,208
Property, plant and equipment, net	2,404,850	2,650,448
Operating lease right of use assets	148,549	—
Goodwill	25,976	25,720
Restricted cash	2,974	3,893
Other assets	111,733	144,178
Total assets	\$ 4,695,615	\$ 4,495,447
LIABILITIES AND EQUITY		
Current liabilities:		
Short-term borrowings and current portion of long-term debt	\$ 144,479	\$ 114,579
Trade accounts payable	571,054	530,398
Capital expenditures payable	77,044	255,237
Accrued expenses	267,226	258,209
Total current liabilities	1,059,803	1,158,423
Long-term debt	1,305,755	1,217,732
Pension and severance obligations	176,971	184,321
Long-term operating lease liabilities	91,107	—
Other non-current liabilities	71,740	79,071
Total liabilities	2,705,376	2,639,547
Commitments and contingencies (Note 17)		
Stockholders' equity:		
Preferred stock, \$0.001 par value, 10,000 shares authorized, designated Series A, none issued	—	—
Common stock, \$0.001 par value, 500,000 shares authorized, 286,877 and 285,352 shares issued, and 240,805 and 239,385 shares outstanding, respectively	287	285
Additional paid-in capital	1,927,739	1,909,425
Retained earnings	234,077	113,189
Accumulated other comprehensive income (loss)	19,115	23,812
Treasury stock, at cost, 46,072 and 45,967 shares, respectively	(217,479)	(216,171)
Total Amkor stockholders' equity	1,963,739	1,830,540
Noncontrolling interests in subsidiaries	26,500	25,360
Total equity	1,990,239	1,855,900
Total liabilities and equity	\$ 4,695,615	\$ 4,495,447

The accompanying notes are an integral part of these statements.

AMKOR TECHNOLOGY, INC.
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY

	Common Stock		Additional Paid-In Capital	Retained Earnings (Accumulated Deficit)	Accumulated Other Comprehensive Income (Loss)	Treasury Stock		Total Amkor Stockholders' Equity	Noncontrolling Interest in Subsidiaries	Total Equity	
	Shares	Par Value				Shares	Cost				
	(In thousands)										
Balance at December 31, 2016	284,479	\$ 284	\$ 1,895,089	\$ (277,453)	\$ 6,262	(45,814)	\$ (214,490)	\$ 1,409,692	\$ 19,825	\$ 1,429,517	
Net income	—	—	—	263,550	—	—	—	263,550	4,155	267,705	
Other comprehensive income (loss)	—	—	—	—	16,257	—	—	16,257	—	16,257	
Treasury stock acquired through surrender of shares for tax withholding	—	—	—	—	—	(131)	(1,492)	(1,492)	—	(1,492)	
Issuance of stock through share-based compensation plans	650	1	3,123	—	—	—	—	3,124	—	3,124	
Share-based compensation	—	—	5,145	—	—	—	—	5,145	—	5,145	
Subsidiary dividends to noncontrolling interests	—	—	—	—	—	—	—	—	(547)	(547)	
Balance at December 31, 2017	285,129	\$ 285	\$ 1,903,357	\$ (13,903)	\$ 22,519	(45,945)	\$ (215,982)	\$ 1,696,276	\$ 23,433	\$ 1,719,709	
Net income	—	—	—	127,092	—	—	—	127,092	2,473	129,565	
Other comprehensive income (loss)	—	—	—	—	1,293	—	—	1,293	—	1,293	
Treasury stock acquired through surrender of shares for tax withholding	—	—	—	—	—	(22)	(189)	(189)	—	(189)	
Issuance of stock through share-based compensation plans	223	—	1,050	—	—	—	—	1,050	—	1,050	
Share-based compensation	—	—	5,018	—	—	—	—	5,018	—	5,018	
Subsidiary dividends to noncontrolling interests	—	—	—	—	—	—	—	—	(546)	(546)	
Balance at December 31, 2018	285,352	\$ 285	\$ 1,909,425	\$ 113,189	\$ 23,812	(45,967)	\$ (216,171)	\$ 1,830,540	\$ 25,360	\$ 1,855,900	
Net income	—	—	—	120,888	—	—	—	120,888	1,740	122,628	
Other comprehensive income (loss)	—	—	—	—	(4,697)	—	—	(4,697)	—	(4,697)	
Treasury stock acquired through surrender of shares for tax withholding	—	—	—	—	—	(105)	(1,308)	(1,308)	—	(1,308)	
Issuance of stock through share-based compensation plans	1,525	2	11,403	—	—	—	—	11,405	—	11,405	
Share-based compensation	—	—	6,911	—	—	—	—	6,911	—	6,911	
Subsidiary dividends to noncontrolling interests	—	—	—	—	—	—	—	—	(600)	(600)	
Balance at December 31, 2019	286,877	\$ 287	\$ 1,927,739	\$ 234,077	\$ 19,115	(46,072)	\$ (217,479)	\$ 1,963,739	\$ 26,500	\$ 1,990,239	

The accompanying notes are an integral part of these statements.

AMKOR TECHNOLOGY, INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS

	For the Year Ended December 31,		
	2019	2018	2017
	(In thousands)		
Cash flows from operating activities:			
Net income	\$ 122,628	\$ 129,565	\$ 267,705
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization	524,177	571,961	581,940
Gain on sale of real estate	(3,302)	—	(108,109)
Amortization of deferred debt issuance costs and premiums	1,640	1,120	1,235
Deferred income taxes	25,931	(13,110)	(42,189)
Loss on debt retirement	8,536	1,512	4,835
Loss (gain) on disposal of fixed assets, net	(1,175)	5,310	(2,648)
Share-based compensation	6,911	5,018	5,145
Other, net	4,394	2,558	(8,143)
Changes in assets and liabilities, net of acquisitions:			
Accounts receivable	(124,140)	80,571	(133,814)
Inventories	10,208	(16,310)	(36,307)
Other current assets	(2,369)	4,329	(2,473)
Other assets	2,253	1,986	(458)
Trade accounts payable	38,670	(43,490)	67,574
Accrued expenses	(33,297)	(78,136)	29,424
Pension and severance obligations	(12,216)	(4,653)	23,881
Net operating lease ROU asset	(127,743)	—	—
Operating lease liabilities	131,967	—	—
Other non-current liabilities	(9,223)	15,179	(29,331)
Net cash provided by operating activities	563,850	663,410	618,267
Cash flows from investing activities:			
Payments for property, plant and equipment	(472,433)	(547,122)	(550,943)
Proceeds from sale of property, plant and equipment	10,117	2,841	141,530
Proceeds from insurance recovery for property, plant and equipment	1,538	1,371	—
Proceeds from foreign exchange forward contracts	13,550	6,754	—
Payments for foreign exchange forward contracts	(15,593)	(5,864)	—
Acquisition of business, net of cash acquired	—	—	(43,771)
Other investing activities	332	4,637	(1,648)
Net cash used in investing activities	(462,489)	(537,383)	(454,832)
Cash flows from financing activities:			
Proceeds from revolving credit facilities	272,700	—	75,000
Payments of revolving credit facilities	(272,700)	(75,000)	—
Proceeds from short-term debt	51,434	23,341	77,781
Payments of short-term debt	(52,635)	(46,631)	(70,236)
Proceeds from issuance of long-term debt	975,575	596,226	223,976
Payments of long-term debt	(862,927)	(535,738)	(405,269)
Payments of long-term debt, related party	—	—	(17,837)
Payments for debt issuance costs	(7,027)	(3,796)	(156)
Payments of finance lease obligations	(6,574)	(3,930)	(5,340)
Payment of deferred consideration for purchase of facility	—	—	(3,890)
Proceeds from issuance of stock through share-based compensation plans	11,405	1,050	3,124
Other financing activities	(1,001)	3,855	(2,039)
Net cash provided by (used in) financing activities	108,250	(40,623)	(124,886)
Effect of exchange rate fluctuations on cash, cash equivalents and restricted cash	870	(204)	8,807
Net increase in cash, cash equivalents and restricted cash	210,481	85,200	47,356
Cash, cash equivalents and restricted cash, beginning of period	688,051	602,851	555,495
Cash, cash equivalents and restricted cash, end of period	\$ 898,532	\$ 688,051	\$ 602,851

The accompanying notes are an integral part of these statements.

AMKOR TECHNOLOGY, INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS

	For the Year Ended December 31,		
	2019	2018	2017
	(In thousands)		
Supplemental disclosures of cash flow information:			
Cash paid during the period for:			
Interest	\$ 65,992	\$ 77,575	\$ 83,808
Income taxes	44,495	63,080	61,878
Non-cash investing and financing activities:			
Property, plant and equipment included in capital expenditures payable	77,250	256,070	294,912
Right of use assets acquired through finance lease liabilities	10,835	17,163	929
Right of use assets acquired through operating lease liabilities	60,963	—	—

The accompanying notes are an integral part of these statements.

AMKOR TECHNOLOGY, INC.
Notes to Consolidated Financial Statements

1. Description of Business and Summary of Significant Accounting Policies

Description of Business

Amkor is one of the world's leading providers of outsourced semiconductor packaging and test services. Amkor pioneered the outsourcing of semiconductor packaging and test services through a predecessor corporation in 1968, and over the years we have built a leading position by:

- Designing and developing innovative packaging and test technologies;
- Offering a broad portfolio of cost-effective solutions and services;
- Focusing on strategic end markets that offer solid growth potential;
- Cultivating long-standing relationships with our customers, which include many of the world's leading semiconductor companies;
- Collaborating with customers, original equipment manufacturers ("OEMs") and equipment and material suppliers;
- Developing a competitive cost structure with disciplined capital investment;
- Building expertise in high-volume manufacturing processes and developing a reputation for high quality and solid execution and
- Providing a geographically diverse operating base, with research and development, engineering support and production capabilities at various facilities in China, Japan, Korea, Malaysia, the Philippines, Portugal and Taiwan.

Basis of Presentation

Our Consolidated Financial Statements include the accounts of Amkor Technology, Inc. and our subsidiaries ("Amkor"). Our Consolidated Financial Statements reflect the elimination of all significant inter-company accounts and transactions. On May 22, 2017, we completed the purchase of Nanium, S.A. ("Nanium"). Nanium's financial results have been included in our Consolidated Financial Statements from the date of acquisition (Note 3). Our investments in variable interest entities in which we are the primary beneficiary are consolidated. We reflect the remaining portion of variable interest entities and foreign subsidiaries that are not wholly owned as noncontrolling interests.

The preparation of financial statements in conformity with U.S. generally accepted accounting principles requires management to make estimates and assumptions that affect the amounts reported in the financial statements and accompanying notes. On an ongoing basis, we evaluate our estimates, including those related to acquisitions, revenue recognition, income taxes, inventory, long lived assets and contingencies. These estimates are based on management's best knowledge of current events, historical experience, actions that we may undertake in the future and on various other assumptions that are believed to be reasonable under the circumstances. As a result, actual results could differ materially from these estimates and assumptions. Certain prior year amounts have been reclassified to conform to current year presentation.

Consolidation of Variable Interest Entities

We have variable interests in certain Philippine realty corporations in which we have a 40% ownership. We lease land and buildings in the Philippines from these entities and we are the primary beneficiary of these arrangements. As of December 31, 2019, the combined book value of the assets and liabilities associated with these Philippine realty corporations included in our Consolidated Balance Sheet was \$16.9 million and \$0.1 million, respectively. The impact of consolidating these variable interest entities on our Consolidated Statements of Income was not significant, and other than our lease payments, we have not provided any significant assistance or other financial support to these variable interest entities for the years ended December 31, 2019, 2018 or 2017. The creditors of the Philippine realty corporations have no recourse to our general credit.

AMKOR TECHNOLOGY, INC.**Notes to Consolidated Financial Statements — (Continued)*****Foreign Currency Translation***

The U.S. dollar is the functional currency of our subsidiaries other than our Japan operations, and the foreign currency asset and liability amounts at these subsidiaries are remeasured into U.S. dollars at end-of-period exchange rates, except for nonmonetary items which are remeasured at historical rates. Foreign currency income and expenses are remeasured at daily exchange rates, except for expenses related to balance sheet amounts which are remeasured at historical exchange rates. Exchange gains and losses arising from remeasurement of foreign currency-denominated monetary assets and liabilities are included in other (income) expense, net in the period in which they occur.

The Japanese Yen is the functional currency of our Japan operations. The asset and liability amounts of our Japan operations are translated into U.S. dollars at end-of-period exchange rates. Income and expenses are translated into U.S. dollars at average exchange rates in effect during the period. The resulting translation adjustments are reported as a component of accumulated other comprehensive income in the stockholders' equity section of the balance sheet. Assets and liabilities denominated in a currency other than the functional currency are remeasured into the functional currency prior to translation into U.S. dollars, and the resulting transaction exchange gains or losses are included in other expense (income) in the period in which they occur.

Risks and Concentrations

The semiconductor industry is characterized by rapid technological change, competitive pricing pressures and cyclical market patterns. Our financial results are affected by a wide variety of factors, including general economic conditions worldwide, economic conditions specific to the semiconductor industry, the timely implementation of new package and test technologies, the ability to safeguard patents and intellectual property in a rapidly evolving market and reliance on materials and equipment suppliers. In addition, the semiconductor market has historically been cyclical and subject to significant economic downturns at various times. Our profitability and ability to generate cash from operations is principally dependent upon demand for semiconductors, the utilization of our capacity, semiconductor package mix, the average selling price of our services, our ability to manage our capital expenditures and our ability to control our costs including labor, material, overhead and financing costs.

A significant portion of our revenues is concentrated with a small group of customers (Note 18). The loss of a significant customer, a business combination among customers, a reduction in orders or decrease in price from a significant customer or disruption in any of our significant strategic partnerships or other commercial arrangements could have a material adverse effect on our business, liquidity, results of operations, financial condition and cash flows.

Financial instruments, for which we are subject to credit risk, consist principally of accounts receivable and cash and cash equivalents. With respect to accounts receivable, we mitigate our credit risk by selling primarily to well-established companies, performing ongoing credit evaluations and making frequent contact with customers. In addition, we may utilize non-recourse factoring to mitigate credit risk when considered appropriate. We have historically mitigated our credit risk with respect to cash and cash equivalents through diversification of our holdings into various high quality money market funds and bank deposit accounts. At December 31, 2019, our cash and cash equivalents were maintained in various U.S. and foreign bank operating and time deposit accounts and invested in U.S. money market funds.

Contingencies and Litigation

We may be subject to certain legal proceedings, lawsuits and other claims, as discussed in Note 17. We accrue for a loss contingency, including legal proceedings, lawsuits, pending claims and other legal matters, when we conclude that the likelihood of a loss is probable and the amount of the loss can be reasonably estimated. When the reasonable estimate of the loss is within a range of amounts, and no amount in the range constitutes a better estimate than any other amount, we accrue for the amount at the low end of the range. We adjust our accruals from time to time as we receive additional information, but the loss we incur may be significantly greater than or less than the amount we have accrued. We disclose loss contingencies if we believe they are material and there is at least a reasonable possibility that a loss has been incurred. Attorney fees related to legal matters are expensed as incurred.

AMKOR TECHNOLOGY, INC.
Notes to Consolidated Financial Statements — (Continued)

Cash and Cash Equivalents

We consider all highly liquid investments with a maturity of three months or less when purchased to be cash equivalents. Our cash and cash equivalents are maintained in various U.S. and foreign bank operating and time deposit accounts and invested in U.S. money market funds.

Restricted Cash

Restricted cash, current, consists of short-term cash equivalents used to collateralize our daily banking services. Restricted cash, non-current, mainly consists of collateral to fulfill foreign trade compliance requirements.

Inventories

Inventories consist of raw materials and purchased components and are stated at the lower of cost and net realizable value. Cost is principally determined by standard cost or the weighted moving average method, both of which approximate actual cost. We review and set our standard costs as needed, but at a minimum on an annual basis. We reduce the carrying value of our inventories for the cost of inventory we estimate is excess and obsolete based on the age of our inventories. When a determination is made that the inventory will not be utilized in production or is not saleable, it is written-off.

Other Current Assets

Other current assets consist principally of prepaid assets and an investment in government securities by a foreign subsidiary to satisfy local regulatory requirements, which is recorded at amortized cost.

Property, Plant and Equipment

Property, plant and equipment are stated at cost. Depreciation is calculated by the straight-line method over the estimated useful lives of depreciable assets which are as follows:

Buildings and improvements	10 to 40 years
Machinery and equipment	2 to 7 years
Software and computer equipment	3 to 5 years
Furniture, fixtures and other equipment	4 to 10 years

Cost and accumulated depreciation for property retired or disposed of are removed from the accounts, and any resulting gain or loss is included in earnings. Expenditures for maintenance and repairs are charged to expense as incurred.

We review long-lived assets for impairment whenever events or changes in circumstances indicate that the carrying amount may not be recoverable. Recoverability of a long-lived asset group to be held and used in operations is measured by a comparison of the carrying amount to the sum of the undiscounted cash flows expected to result from the use and eventual disposition of the asset group. If such asset group is considered to be impaired, the impairment loss is measured as the amount by which the carrying amount of the asset group exceeds its fair value. Long-lived assets to be disposed of are carried at the lower of cost or fair value less the costs of disposal.

Leases

We lease certain machinery and equipment, office space, and manufacturing facilities. Leases with an initial term of 12 months or less are not recorded on the balance sheet, and we recognize lease expense for these leases on a straight-line basis over the lease term. We account for lease components (e.g., fixed payments including rent, real estate taxes and insurance costs) combined with the non-lease components (e.g., common-area maintenance costs). We use our incremental borrowing rate based on the information available at the lease commencement date to determine the lease liability. Our leases have remaining lease terms ranging from less than one year to 86 years. For purposes of calculating our lease liabilities, our

AMKOR TECHNOLOGY, INC.**Notes to Consolidated Financial Statements — (Continued)**

lease terms include options to extend or terminate the lease when it is reasonably certain that we will exercise those options. Certain leases also include options to purchase the leased property.

Goodwill

Goodwill is recorded when the cost of an acquisition exceeds the fair value of the net tangible and identifiable intangible assets acquired. We review goodwill for impairment annually during the fourth quarter of each year and whenever events or changes in circumstances indicate that an impairment may exist. Impairment losses are recorded when the carrying amount of the reporting unit exceeds its fair value. The balance of goodwill in our Consolidated Balance Sheets reflects adjustments for foreign currency translation.

Other Assets

Other assets consist principally of deferred tax assets and refundable security deposits.

Derivatives

We use foreign exchange forward contracts to manage exposure to foreign exchange risk which are generally settled monthly. The derivatives are recorded at the fair value either in other current assets or accrued expenses, with the associated gains and losses charged to other (income) expense, net in the period in which they occur. We do not apply hedge accounting to the derivatives. See Note 15 for further discussion about the derivatives.

Fair Value Measurements

We apply fair value accounting for assets and liabilities that are recognized or disclosed at fair value in the financial statements on a recurring or nonrecurring basis. We define fair value as the price that would be received from selling an asset or paid to transfer a liability in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants at the measurement date. See Note 16 for further discussion of fair value measurements.

Revenue Recognition

We recognize revenue, net of sales, use, value-added and other similar taxes, as a performance obligation is satisfied in an amount reflecting the consideration to which we expect to be entitled. We apply a five-step approach in determining the amount and timing of revenue to be recognized: (1) identifying the contract with a customer; (2) identifying the performance obligations in the contract; (3) determining the transaction price; (4) allocating the transaction price to the performance obligations in the contract; and (5) recognizing revenue when the performance obligation is satisfied. Substantially all of our revenue is recognized as services are rendered.

Our packaging and test services are our performance obligations to our customers. Our packaging services include wafer bump, probe and assembly. We provide packaging and test services to our customers either individually or as part of a combined offering. In a combined offering, we account for the individual services separately if they are determined to be distinct. We determine a service to be distinct if it is separately identifiable from other services in the combined offering and if a customer can benefit from the unique service on its own or with other resources that are readily available to the customer.

The consideration, including variable consideration, is allocated between the distinct services in a combined offering based upon the stand-alone selling prices of the individual services. Our services involve a high degree of specialization which are unique based on the design and purpose of the customer's wafers. Accordingly, our negotiated pricing reflects the customized nature of our services and represents a customer-specific stand-alone selling price. We recognize revenue as services are rendered, which generally occurs over the course of two to three weeks. Services are generally billed at completion of each individual packaging or test service or in some instances at the completion of all services in a combined offering.

AMKOR TECHNOLOGY, INC.**Notes to Consolidated Financial Statements — (Continued)**

We recognize revenue over time as services are rendered because our services create or enhance the customer's wafer. We utilize an input method (cost incurred plus estimated margin) to determine the amount of revenue to recognize for in-process, but incomplete, customer orders at a reporting date. During the period of providing our services, we generally do not control or take ownership of customers' wafers, nor do we include the cost of the wafer in our cost calculations. We believe that a cost-based input method is the most appropriate manner to measure how we satisfy our performance obligations to customers because the effort and costs incurred to package and/or test customer wafers are not linear over the duration of these services.

Shipping and handling costs are accounted for as a cost to fulfill our performance obligations to customers. Accordingly, we record customer payments of shipping and handling costs as a component of net sales, and the costs incurred for shipping and handling are then charged to cost of sales.

Unbilled receivables are revenues that have been recognized for performance obligations that have been satisfied, or partially satisfied, in advance of billing the customer. Revenue may be recognized in advance of billing as our contracts provide us with an unconditional right to consideration for work that is performed. Total unbilled receivables as of December 31, 2019 and 2018 were \$125.4 million and \$89.3 million, respectively. These amounts are included in accounts receivable, net of allowances in our Consolidated Balance Sheets.

Research and Development Costs

Research and development expenses include costs attributable to the conduct of research and development programs primarily related to the development of new package designs or technologies and improving the efficiency and capabilities of our existing production processes. Such costs include salaries, payroll taxes, employee benefit costs, materials, supplies, depreciation and maintenance of research equipment, services provided by outside contractors and the allocable portions of facility costs such as rent, utilities, insurance, repairs and maintenance, depreciation and general support services. Costs associated with research and development are expensed as incurred.

Income Taxes

Income taxes are accounted for using the asset and liability method. Under this method, deferred income tax assets and liabilities are recognized for the future tax consequences attributable to temporary differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax basis as well as for net operating loss and tax credit carryforwards. Deferred income tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which these temporary differences are expected to be recovered or settled. The effect on deferred tax assets and liabilities of a change in tax rates is recognized in income in the period that includes the enactment date. A valuation allowance is provided for those deferred tax assets for which it is more likely than not that the related tax benefits will not be realized.

We monitor on an ongoing basis our ability to utilize our deferred tax assets and whether there is a need for a related valuation allowance. In evaluating our ability to recover our deferred tax assets in the jurisdictions from which they arise, we consider all available positive and negative evidence, including scheduled reversals of deferred tax liabilities, projected future taxable income, tax-planning strategies and results of recent operations. For most of our U.S. and foreign deferred tax assets, we consider it more likely than not that we will have sufficient taxable income to allow us to realize these deferred tax assets. However, in the event taxable income falls short of current expectations, we may need to establish a valuation allowance against such deferred tax assets.

We recognize in our Consolidated Financial Statements the impact of an income tax position, if that position is more likely than not of being sustained on audit, based on the technical merits of the position. Related interest and penalties are classified as income taxes in the financial statements.

See Note 6 for further discussion regarding unrecognized income tax benefits.

AMKOR TECHNOLOGY, INC.

Notes to Consolidated Financial Statements — (Continued)

2. New Accounting Standards***Recently Adopted Standards***

In February 2016, the Financial Accounting Standards Board (“FASB”) issued Accounting Standards Update (“ASU”) 2016-02, *Leases (Topic 842)*, which was subsequently amended and clarified. Topic 842 requires a dual approach for lease accounting under which a lessee would account for leases as finance leases or operating leases. The standard also requires the lessee to recognize a right-of-use asset and a corresponding lease liability for both finance leases and operating leases. For finance leases, the lessee recognizes interest expense and amortization of the right-of-use asset, and for operating leases, the lessee recognizes a straight-line lease expense. The standard permits the use of two alternative transition approaches, either with application in all comparative periods presented or with application beginning with the effective date without restating comparative period financial statements.

Effective January 1, 2019, we adopted the requirements of Topic 842 using the modified transition approach without restating the comparative period financial statements. The new standard resulted in increases in our operating lease right of use assets, accrued expenses and long-term operating lease liabilities account balances to record our operating leases on our Consolidated Balance Sheet. The new standard also resulted in additional disclosures for our operating and finance leases (Note 10). In accordance with Topic 842, we applied practical expedients permitted under the transition guidance, which allowed us to not:

- Reassess whether any existing contracts are or contain a lease,
- Reassess the lease classification for any existing contracts,
- Reassess initial direct costs for any existing leases, and
- Separate non-lease components from lease components and instead to account for them as a single lease component for all asset classes.

3. Acquisitions***Acquisition of Nanium***

On May 22, 2017, we completed the purchase of 100% of the shares of Nanium, a provider of wafer-level fan-out semiconductor packaging solutions. We allocated the purchase price to the assets acquired and liabilities assumed based on their estimated fair values on the date of acquisition. We did not record goodwill as a result of the acquisition.

4. Share-Based Compensation Plans

Our share-based compensation is measured at fair value and expensed over the service period (generally the vesting period). The amount of compensation expense to be recognized is adjusted for an estimated forfeiture rate which is based on historical data. For the years ended December 31, 2019, 2018 and 2017, we recognized share-based compensation attributable to stock options and restricted shares of \$6.9 million, \$5.0 million and \$5.1 million, respectively, primarily in selling, general and administrative expenses. The corresponding deferred income tax benefits for stock options or restricted shares is \$1.3 million, \$1.0 million and \$2.4 million for 2019, 2018 and 2017 respectively.

Equity Incentive Plan

Second Amended and Restated 2007 Equity Incentive Plan. The Second Amended and Restated 2007 Equity Incentive Plan, (the “2007 Plan”) provides for the grant of the following types of incentive awards: (i) stock options, (ii) restricted stock, (iii) restricted stock units, (iv) stock appreciation rights, (v) performance units and performance shares and (vi) other stock or cash awards. Those eligible for awards include employees, directors and consultants who provide services to Amkor and its subsidiaries. The 2007 Plan is effective through 2027 and can be terminated at the discretion of the Board of Directors. There were originally 17.0 million shares of our common stock reserved for issuance under the 2007 Plan and at December 31, 2019 there were 5.2 million shares available for grant.

AMKOR TECHNOLOGY, INC.
Notes to Consolidated Financial Statements — (Continued)

Stock options

Stock options are generally granted with an exercise price equal to the market price of the stock at the date of grant. Substantially all of the options granted are exercisable pursuant to a one to four year vesting schedule and the term of the options granted is no longer than ten years. Upon option exercise, we may issue new shares of common or treasury stock.

In order to calculate the fair value of stock options at the date of grant, we use the Black-Scholes option pricing model. Expected volatilities are based on historical performance of our stock. We also use historical data to estimate the timing and amount of option exercises and forfeitures within the valuation model. The expected term of the options is based on evaluations of historical and expected future employee exercise behavior and represents the period of time that options granted are expected to be outstanding. The risk-free interest rate for periods within the contractual life of the option is based on the U.S. Treasury yield curve in effect at the time of grant.

The following table summarizes our stock option activity for the year ended December 31, 2019:

	Number of Shares (In thousands)	Weighted-Average Exercise Price per Share	Weighted-Average Remaining Contractual Term (Years)	Aggregate Intrinsic Value (In thousands)
Outstanding at December 31, 2018	4,743	\$ 8.79		
Granted	3,100	9.10		
Exercised	(1,442)	7.91		
Forfeited or expired	(556)	9.39		
Outstanding at December 31, 2019	5,845	\$ 9.11	7.74	\$ 22,738
Fully vested at December 31, 2019 and expected to vest thereafter	5,718	\$ 9.11	7.71	\$ 22,256
Exercisable at December 31, 2019	2,140	\$ 8.87	6.04	\$ 8,829

The following assumptions were used to calculate the weighted-average fair values of the options granted:

	For the Year Ended December 31,		
	2019	2018	2017
Expected life (in years)	6.0	6.0	5.7
Risk-free interest rate	2.5%	2.7%	1.9%
Volatility	43%	42%	43%
Dividend yield	—	—	—
Weighted-average grant date fair value per option granted	\$ 4.06	\$ 4.17	\$ 4.24

Total unrecognized compensation expense from stock options was \$11.8 million as of December 31, 2019, which is expected to be recognized over a weighted-average period of approximately 2.6 years beginning January 1, 2020.

Restricted Shares

We grant restricted shares to directors and employees under the 2007 Plan. Restricted shares granted to directors vest on the earlier of the one year anniversary of the grant date or the date of the next annual meeting of stockholders. All other restricted shares vest ratably over four years, with 6.25% of the shares vesting in equal quarterly installments such that 100% of the shares will become vested on the fourth anniversary of the award, subject to the recipient's continued employment with us on the applicable vesting dates. In addition, provided that the restricted shares have not been forfeited earlier, for certain grants, the restricted shares will vest upon the recipient's death or disability, or upon a change in control of Amkor. The value of the restricted shares is determined based on the fair market value of the underlying shares on the date of the

AMKOR TECHNOLOGY, INC.
Notes to Consolidated Financial Statements — (Continued)

grant and is recognized ratably over the vesting period. Upon vesting of restricted stock awards, we may issue new shares of common or treasury stock.

The following table summarizes our restricted share activity for the year ended December 31, 2019:

	Number of Shares (In thousands)	Weighted- average Grant Date Fair Value (Per Share)
Non-vested at December 31, 2018	147	\$ 9.63
Awards granted	82	7.29
Awards vested	(83)	9.32
Awards forfeited	—	—
Non-vested at December 31, 2019	<u>146</u>	<u>8.48</u>

Total unrecognized compensation cost from restricted shares was \$0.8 million as of December 31, 2019, which is expected to be recognized over a weighted-average period of approximately 0.7 years beginning January 1, 2020.

5. Other Income and Expense

Other income and expense consists of the following:

	For the Year Ended December 31,		
	2019	2018	2017
	(In thousands)		
Interest income	\$ (6,655)	\$ (4,133)	\$ (3,215)
Foreign currency (gain) loss, net	1,944	1,451	11,823
Loss on debt retirement	8,536	1,512	4,835
Other	(2,052)	(5,447)	(953)
Total other (income) expense, net	<u>\$ 1,773</u>	<u>\$ (6,617)</u>	<u>\$ 12,490</u>

6. Income Taxes

Geographic sources of income (loss) before taxes are as follows:

	For the Year Ended December 31,		
	2019	2018	2017
	(In thousands)		
United States	\$ 1,138	\$ 5,535	\$ 26,040
Foreign	158,672	180,280	281,456
Income before taxes	<u>\$ 159,810</u>	<u>\$ 185,815</u>	<u>\$ 307,496</u>

The provision for income taxes includes current federal, state and foreign taxes payable and those deferred because of temporary differences between the financial statement and the tax bases of assets and liabilities.

AMKOR TECHNOLOGY, INC.
Notes to Consolidated Financial Statements — (Continued)

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

	For the Year Ended December 31,		
	2019	2018	2017
	(In thousands)		
Current:			
Federal	\$ (179)	\$ 22,003	\$ —
State	3	39	11
Foreign	11,427	47,318	81,969
	<u>11,251</u>	<u>69,360</u>	<u>81,980</u>
Deferred:			
Federal	1,832	5,468	(34,787)
State	299	2,993	(4,072)
Foreign	23,800	(21,571)	(3,330)
	<u>25,931</u>	<u>(13,110)</u>	<u>(42,189)</u>
Income tax expense	<u>\$ 37,182</u>	<u>\$ 56,250</u>	<u>\$ 39,791</u>

The reconciliation between the U.S. federal statutory income tax rate of 21% for 2019 and 2018 and 35% for 2017 and our income tax expense is as follows:

	For the Year Ended December 31,		
	2019	2018	2017
	(In thousands)		
U.S. federal statutory income tax rate	\$ 33,560	\$ 39,021	\$ 107,623
State taxes, net of federal benefit	293	1,677	2,624
Foreign income taxed at different rates	(10,600)	6,340	(51,661)
Foreign exchange (loss) gain	84	(3,797)	29,756
Change in valuation allowance	18,374	(12,662)	(6,763)
Adjustments related to prior years	(3,190)	1,898	(558)
U.S. tax reform (the Tax Act)	—	22,284	(41,554)
Income tax credits generated	(9,006)	(18,106)	(7,296)
Foreign earnings and profits	3,360	387	719
Foreign derived intangible income	(3,195)	—	—
Expiration of net operating losses and credits	3,084	19,462	166
Settlements and changes in uncertain tax positions	3,256	(1,230)	5,305
Other	1,162	976	1,430
Income tax expense	<u>\$ 37,182</u>	<u>\$ 56,250</u>	<u>\$ 39,791</u>

The change in valuation allowance for 2019, 2018 and 2017, excluding the impact of the Tax Act, is primarily the result of changes in net operating loss, tax credit, and other carryforwards for which no tax expense or benefit has been recognized. Prior to 2018, the benefit of foreign income taxed at different rates increased as foreign income before tax has increased. The decrease in the U.S. federal statutory income tax rate to 21% in 2018 has reduced the impact of foreign income taxed at different rates than the U.S. rate.

AMKOR TECHNOLOGY, INC.
Notes to Consolidated Financial Statements — (Continued)

The following is a summary of the components of our deferred tax assets and liabilities:

	December 31,	
	2019	2018
	(In thousands)	
Deferred tax assets:		
Net operating loss carryforwards	\$ 25,905	\$ 13,207
Income tax credits	98,158	107,532
Property, plant and equipment	27,199	38,050
Deferred interest expense	12,361	5,415
Accrued liabilities	61,812	68,402
Receivable	30,558	31,729
Unrealized foreign exchange loss	2,750	1,410
Operating lease liabilities	18,164	—
Other	11,889	14,545
Total deferred tax assets	288,796	280,290
Valuation allowance	(136,934)	(118,560)
Total deferred tax assets net of valuation allowance	151,862	161,730
Deferred tax liabilities:		
Property, plant and equipment	23,747	14,605
Deferred gain	11,193	11,651
Unrealized foreign exchange gain	1,195	1,695
Unbilled receivables	3,580	9,515
Operating lease right of use assets	17,687	—
Other	4,125	5,805
Total deferred tax liabilities	61,527	43,271
Net deferred tax assets	\$ 90,335	\$ 118,459
Recognized as:		
Other assets	\$ 90,465	\$ 118,697
Other non-current liabilities	(130)	(238)
Total	\$ 90,335	\$ 118,459

Valuation allowance against deferred tax assets consist of the following:

	December 31,	
	2019	2018
	(In thousands)	
Valuation allowance:		
U.S.	\$ 80,241	\$ 77,580
Foreign	56,693	40,980
Total valuation allowance	\$ 136,934	\$ 118,560

As a result of certain capital investments, export commitments and employment levels, income from operations in Korea, Malaysia, the Philippines, Singapore and Taiwan was subject to reduced income tax rates and, in some cases, was exempt from income taxes. We recognized \$14.7 million, \$1.9 million and \$6.2 million in tax benefits as a result of the tax holidays

AMKOR TECHNOLOGY, INC.
Notes to Consolidated Financial Statements — (Continued)

in 2019, 2018 and 2017, respectively. The benefit of the tax holidays on diluted earnings per share was approximately \$0.06, \$0.01 and \$0.03 for 2019, 2018 and 2017, respectively.

Our net operating loss carryforwards (“NOLs”) are as follows:

	December 31,		Expiration
	2019	2018	
	(In thousands)		
U.S. Federal NOLs	\$ 23,977	\$ 25,272	2021-2024
U.S. State NOLs	93,674	108,011	2020-2036
Foreign NOLs	85,123	10,686	2022-2028

We monitor on an ongoing basis our ability to utilize our deferred tax assets and whether there is a need for a related valuation allowance. In evaluating our ability to recover our deferred tax assets in the jurisdictions from which they arise, we consider all available positive and negative evidence, including scheduled reversals of deferred tax liabilities, projected future taxable income, tax-planning strategies and results of recent operations. For most of our foreign net operating loss carryforwards, we consider it more likely than not that we will not have sufficient taxable income to allow us to realize these deferred tax assets.

At December 31, 2019 and 2018, a portion of our remaining U.S. federal net operating loss carryforward was reserved with a valuation allowance due to ownership change limitations from a prior year acquisition as well as certain state net operating loss carryforwards expected to expire unused.

Our tax credit carryforwards are as follows:

	December 31,		Expiration
	2019	2018	
	(In thousands)		
U.S. Foreign Tax Credits	\$ 77,983	\$ 84,056	2026-2028
U.S. Other Tax Credits	1,404	1,117	2026-2039
Foreign Tax Credits	18,771	22,359	2020-2029

At December 31, 2019 and 2018, a portion of our U.S. and foreign tax credit carryforwards were reserved with a valuation allowance for the amount expected to expire unused.

As a result of the deemed repatriation provision of the Tax Act, U.S. income taxes have been provided on approximately \$1.1 billion of the undistributed earnings of our foreign subsidiaries at December 31, 2017. The income tax expense from the deemed repatriation was offset by net operating loss carryforwards and income tax credits resulting in a transition tax payable of \$21.8 million. Under an election of the Tax Act, the remaining transition tax is payable over eight years beginning with tax year 2017, with 8% due in each of the first five years, 15% in year six, 20% in year seven, and 25% in year eight. We have not provided foreign withholding taxes or state income taxes on the undistributed earnings of our foreign subsidiaries, over which we have sufficient influence to control the distribution of such earnings and have determined that substantially all such earnings have been reinvested indefinitely. These earnings could become subject to foreign withholding tax if they are remitted as dividends. We estimate that repatriation of these foreign earnings would generate withholding taxes and state income taxes of approximately \$89.8 million.

We operate in and file income tax returns in various U.S. and foreign jurisdictions which are subject to examination by tax authorities. We have tax returns that are open to examination in various jurisdictions for tax years 2012-2019. The open years contain matters that could be subject to differing interpretations of applicable tax laws and regulations related to the amount and/or timing of income, deductions and tax credits. There can be no assurance that the outcome of examinations will be favorable. Our unrecognized tax benefits are subject to change as examinations of specific tax years are completed in the respective jurisdictions. In certain circumstances where we elect to appeal the results of an examination, we may be

AMKOR TECHNOLOGY, INC.
Notes to Consolidated Financial Statements — (Continued)

required to make tax assessment payments to proceed with the administrative appeal process. Current examinations include our 2012, 2013 and 2018 Philippine income tax returns.

A reconciliation of the beginning and ending gross amount of unrecognized tax benefits is as follows:

	For the Year Ended December 31,		
	2019	2018	2017
	(In thousands)		
Balance at January 1	\$ 25,268	\$ 27,211	\$ 23,149
Additions based on tax positions related to the current year	8,944	401	1,419
Additions for tax positions of prior years	188	636	2,661
Reductions for tax positions of prior years	(4,539)	(2,958)	(1)
Reductions related to settlements with tax authorities	(1,886)	—	—
Reductions from lapse of statutes of limitations	(1,733)	(22)	(17)
Balance at December 31	<u>\$ 26,242</u>	<u>\$ 25,268</u>	<u>\$ 27,211</u>

The net increase in our unrecognized tax benefits was \$1.0 million from December 31, 2018 to December 31, 2019. The increase was primarily related to income attribution offset by the settlement of an examination of our 2015-2018 Korea tax returns. At December 31, 2019, all of our gross unrecognized tax benefits would reduce our effective tax rate, if recognized. It is reasonably possible that unrecognized tax benefits related to entity classification and withholding taxes will decrease in the next 12 months by up to \$6.4 million due to the lapse of statutes of limitations in foreign jurisdictions.

The liability related to our unrecognized tax benefits is \$22.3 million as of December 31, 2019 and is reported as a component of other non-current liabilities. The unrecognized tax benefits presented in the table above also include positions that have reduced deferred tax assets. The balance of accrued and unpaid interest and penalties is \$3.9 million as of December 31, 2019 and is included as a component of other non-current liabilities in connection with our unrecognized tax benefits.

7. Earnings Per Share

Basic earnings per share (“EPS”) is computed by dividing net income attributable to Amkor common stockholders by the weighted-average number of common shares outstanding during the period. The weighted-average number of common shares outstanding includes restricted shares held by retirement eligible recipients and is reduced for treasury stock.

Diluted EPS is computed on the basis of the weighted-average number of shares of common stock plus the effect of dilutive potential common shares outstanding during the period. Dilutive potential common shares include outstanding stock options and unvested restricted shares.

AMKOR TECHNOLOGY, INC.
Notes to Consolidated Financial Statements — (Continued)

The following table summarizes the computations of basic and diluted EPS:

	For the Year Ended December 31,		
	2019	2018	2017
	(In thousands, except per share data)		
Net income available to Amkor common stockholders	\$ 120,888	\$ 127,092	\$ 263,550
Weighted-average shares outstanding — basic	239,725	239,329	238,937
Effect of dilutive securities:			
Stock options and restricted share awards	397	412	714
Weighted-average shares outstanding — diluted	240,122	239,741	239,651
Net income attributable to Amkor per common share:			
Basic	\$ 0.50	\$ 0.53	\$ 1.10
Diluted	0.50	0.53	1.10

The following table summarizes the potential shares of common stock that were excluded from diluted EPS, because the effect of including these potential shares was anti-dilutive:

	For the Year Ended December 31,		
	2019	2018	2017
	(In thousands)		
Stock options and restricted share awards	5,379	3,662	3,445

8. Factoring of Accounts Receivable

For certain accounts receivable, we use non-recourse factoring arrangements with third-party financial institutions to manage our working capital and cash flows. Under this program, we sell receivables to a financial institution for cash at a discount to the face amount. As part of the factoring arrangements, we perform certain collection and administrative functions for the receivables sold. For the year ended December 31, 2019 and 2018, we sold accounts receivable totaling \$680.4 million and \$873.9 million, net of discounts and fees of \$4.4 million and \$7.0 million, respectively.

AMKOR TECHNOLOGY, INC.
Notes to Consolidated Financial Statements — (Continued)

9. Property, Plant and Equipment

Property, plant and equipment consist of the following:

	December 31,	
	2019	2018
	(In thousands)	
Land	\$ 219,785	\$ 222,884
Land use rights (1)	—	26,845
Buildings and improvements	1,571,653	1,523,065
Machinery and equipment	5,303,729	5,196,930
Finance lease machinery and equipment	34,158	25,874
Software and computer equipment	220,264	213,440
Furniture, fixtures and other equipment	19,740	17,204
Construction in progress	12,593	44,381
Total property, plant and equipment	7,381,922	7,270,623
Less accumulated depreciation and amortization	(4,977,072)	(4,620,175)
Total property, plant and equipment, net	<u>\$ 2,404,850</u>	<u>\$ 2,650,448</u>

(1) Effective January 1, 2019, and in connection with the adoption of Topic 842, land use rights were reclassified to operating lease right of use asset within our Consolidated Balance Sheet.

The following table summarizes our depreciation expense:

	For the Year Ended December 31,		
	2019	2018	2017
	(In thousands)		
Depreciation expense	\$ 522,011	\$ 570,304	\$ 580,172

As part of our plan to consolidate factory operations in Korea, we sold the land and buildings comprising our K1 factory in May 2017 for \$142.4 million. We received 10% of the sale price at signing in November 2016 and the balance at closing, at which time we recognized a pre-tax gain of \$108.1 million.

10. Leases

The components of lease expense were as follows:

	For the Year Ended December 31, 2019
Operating lease cost	\$ 41,559
Finance lease cost	
Amortization of leased assets	5,240
Interest on lease liabilities	933
Total finance lease cost	6,173
Short-term lease cost	8,927
Variable lease cost	5,416
Net lease cost	<u>\$ 62,075</u>

AMKOR TECHNOLOGY, INC.
Notes to Consolidated Financial Statements — (Continued)

Rent expense was \$43.6 million and \$48.1 million for the for the year ended December 31, 2018 and 2017, respectively.

Other information related to leases was as follows:

	For the Year Ended December 31, 2019
Supplemental Cash Flows Information (in thousands)	
Cash paid for amounts included in the measurement of lease liabilities:	
Operating cash flows for operating leases	\$ 39,870
Operating cash flows for finance leases	893
Financing cash flows for finance leases	6,574
Weighted Average Remaining Lease Term (years)	
Operating leases	4.7
Finance leases	3.6
Weighted Average Discount Rate	
Operating leases	4.2%
Finance leases	4.6%

Maturities of lease liabilities were as follows:

December 31, 2019			December 31, 2018		
	Operating Leases	Finance Leases		Operating Leases	Finance Leases
	(In thousands)			(In thousands)	
2020	\$ 46,204	\$ 9,905	2019	\$ 32,461	\$ 6,430
2021	35,686	8,808	2020	24,630	4,555
2022	21,015	2,064	2021	17,676	4,748
2023	11,046	956	2022	10,942	936
2024	9,605	949	2023	9,008	936
Thereafter	24,244	2,864	Thereafter	26,070	3,807
Total future minimum lease payments	147,800	25,546		<u>\$ 120,787</u>	<u>\$ 21,412</u>
Less: Imputed interest	(15,721)	(2,317)			
Total	<u>\$ 132,079</u>	<u>\$ 23,229</u>			

As of December 31, 2019, we have entered into additional lease agreements that have not yet commenced of approximately \$6.2 million.

11. Accrued Expenses

Accrued expenses consist of the following:

	December 31,	
	2019	2018
	(In thousands)	
Payroll and benefits	\$ 115,693	\$ 124,943
Short-term operating lease liability	40,972	—
Deferred revenue and customer advances	16,177	16,736
Accrued severance plan obligations (Note 13)	13,408	13,179
Income taxes payable	11,661	38,567
Accrued interest	11,638	10,302
Short-term finance lease liability	9,121	6,028
Other accrued expenses	48,556	48,454
Total accrued expenses	<u>\$ 267,226</u>	<u>\$ 258,209</u>

AMKOR TECHNOLOGY, INC.
Notes to Consolidated Financial Statements — (Continued)

12. Debt

Short-term borrowings and long-term debt consist of the following:

	December 31,	
	2019	2018
	(In thousands)	
Debt of Amkor Technology, Inc.:		
Senior notes:		
6.375% Senior notes, due October 2022 (1)	\$ —	\$ 524,971
6.625% Senior notes, due September 2027 (1)	525,000	—
Debt of subsidiaries:		
Amkor Technology Korea, Inc.:		
\$30 million revolving credit facility, LIBOR plus the applicable bank rate, due October 2020 (2)	—	—
Term loan, fixed rate at 3.70%, due May 2020 (3)(5)	—	120,000
Term loan, fund floating rate plus 1.60%, due June 2020 (4) (5) (6)	24,000	125,000
Term loan, applicable bank rate plus 2.03%, due July 2022 (5)	40,000	—
Term loan, applicable bank rate plus 2.03%, due September 2022 (5)	60,000	—
Term loan, LIBOR plus 2.56%, due December 2023	200,000	200,000
Term loan, applicable bank rate plus 1.98%, due December 2028 (6)	66,000	24,000
Amkor Technology Japan, Inc.:		
Short-term term loans, variable rate (7)	7,071	8,232
Term loan, fixed rate at 0.86%, due June 2022	23,018	31,908
Term loan, fixed rate at 0.60%, due July 2022	5,064	6,838
Term loan, fixed rate at 1.30%, due July 2023	179,541	225,180
Term loan, fixed rate at 1.35%, due December 2024 (8)	262,407	—
Amkor Assembly & Test (Shanghai) Co., Ltd.:		
Term loan, LIBOR plus 1.80%, due December 2019 (9)	—	48,000
Term loan, LIBOR plus 1.60%, due March 2022 (9)	29,000	—
Term loan, LIBOR Plus 1.40%, due March 2022 (9)	19,250	—
Other:		
\$250 million senior secured revolving credit facility, LIBOR plus 1.25%-1.75%, due July 2023 (Singapore) (8) (10)	—	—
Revolving credit facility, TAIFX plus the applicable bank rate, due November 2020 (Taiwan) (11)	—	20,000
Revolving credit facility, TAIFX plus the applicable bank rate, due December 2024 (Taiwan) (11)	20,000	—
	1,460,351	1,334,129
Less: Unamortized premium, discount and deferred debt costs, net	(10,117)	(1,818)
Less: Short-term borrowings and current portion of long-term debt	(144,479)	(114,579)
Long-term debt	\$ 1,305,755	\$ 1,217,732

AMKOR TECHNOLOGY, INC.**Notes to Consolidated Financial Statements — (Continued)**

- (1) In April 2019, we redeemed the outstanding \$525.0 million aggregate principal amount of our 6.375% Senior Notes due 2022 (“2022 Notes”). In accordance with the terms of the indenture governing the 2022 Notes, the redemption price was 101.594% of the principal amount of the 2022 Notes plus accrued and unpaid interest. We recorded an \$8.4 million loss on extinguishment related to the call premium paid and other debt related costs associated with the 2022 Notes. The redemption of the 2022 Notes was funded with net proceeds from our issuance of \$525.0 million of 6.625% Senior Notes due September 2027 (“2027 Notes”) in March 2019, together with cash on hand. The 2027 Notes were issued at a discount of 99.5% or \$2.6 million and are senior unsecured obligations. Interest is payable semiannually on March 15 and September 15 of each year, commencing September 15, 2019. We incurred \$3.6 million of debt issuance costs associated with the 2027 Notes.
- (2) In October 2019, we renewed our revolving credit facility agreement with availability of \$30.0 million. Interest is payable monthly in arrears. Principal will be payable at the maturity date of October 2020. As of December 31, 2019, \$30.0 million was available to be drawn.
- (3) In May 2017, we entered into a \$120.0 million term loan agreement due May 2020. During 2019, we repaid all \$120.0 million of the outstanding balance of this term loan.
- (4) In May 2015, we entered into a term loan agreement pursuant to which we may borrow up to \$150.0 million for capital expenditures. Principal is payable at maturity in June 2020. Interest is payable quarterly in arrears. During 2019, we repaid \$101.0 million of the outstanding balance of this term loan. In February 2020, we repaid the remaining \$24.0 million of the outstanding balance.
- (5) In July 2019, we entered into an agreement pursuant to which we may borrow up to \$180.0 million for purchases of materials through two term loans. Principal is payable at maturity and interest is payable quarterly in arrears.

We borrowed the full balance of \$40.0 million under the first term loan in July 2019 to repay \$40.0 million of the outstanding balance for the term loan due May 2020. This term loan bears interest at a fixed rate of 3.80% and has a maturity date of July 2022.

We borrowed \$60.0 million under the second term loan in September 2019 to repay part of the term loan due June 2020. The \$60.0 million borrowing under the second term loan bears interest at a fixed rate of 3.59% and has a maturity date of September 2022. As of December 31, 2019, \$80.0 million was available to be drawn under the second term loan.

- (6) In December 2018, we entered into a term loan agreement pursuant to which we may borrow up to \$90.0 million for capital expenditures. During 2019, we borrowed \$42.0 million of this term loan and used the proceeds to repay part of the term loan due June 2020. Principal of this term loan is payable in semiannual installments beginning June 2022 and ending at maturity in December 2028. Interest is fixed at 4.5% and is payable quarterly in arrears. As of December 31, 2019, \$24.0 million was available to be drawn. In February 2020, we used the remaining \$24.0 million to repay, in full, the term loan due June 2020.
- (7) We entered into various short-term loans which mature semiannually. Principal is payable in monthly installments. As of December 31, 2019, \$6.0 million was available to be drawn.
- (8) In December 2019, we entered into a ¥28.5 billion (US\$260.6 million) term loan agreement due December 2024, guaranteed by Amkor Technology Inc. and our subsidiary, Amkor Technology Singapore Holding Pte, Ltd. Principal is due in 20 equal, quarterly installments plus accrued interest, through maturity. We immediately drew down \$260.6 million. In December 2019, we used the proceeds to pay down \$80.0 million of the senior secured revolving credit facility due July 2023. In January 2020, we also used these proceeds to repay \$120.0 million of our term loan due December 2023. The remaining proceeds will be used for other general corporate purposes.
- (9) In December 2016, we entered into a \$50.0 million term loan agreement. Principal is payable in semiannual installments of \$0.5 million, with the remaining balance due at maturity in December 2019. Interest is payable quarterly. During the twelve months ended December 31, 2019, we repaid the entire \$48.0 million outstanding balance of this term loan using the proceeds from our term loans due March 2022.

AMKOR TECHNOLOGY, INC.
Notes to Consolidated Financial Statements — (Continued)

In March 2019, we entered into a \$30.0 million term loan agreement due March 2022. We borrowed \$30.0 million under this term loan and used the proceeds to repay part of the term loan due December 2019. Principal is payable in semiannual installments of \$0.5 million, with the remaining balance due at maturity. Interest is payable quarterly.

In April 2019, we entered into a term loan agreement with availability of \$20.0 million due March 2022. We borrowed \$20.0 million under this term loan and used the proceeds to repay part of the term loan due December 2019. Principal is payable in semiannual installments of \$0.5 million, with the remaining balance due at maturity. Interest is payable quarterly.

- (10) In July 2018, the senior secured revolving credit facility of Amkor Technology, Inc. was terminated and replaced by a new facility due July 2023 entered into by our subsidiary, Amkor Technology Singapore Holding Pte, Ltd., and guaranteed by Amkor Technology, Inc. We recorded a \$0.4 million charge for the write-off of the associated unamortized debt issuance costs relating to the terminated credit facility. The availability for the new revolving credit facility is based on the amount of eligible accounts receivable. As of December 31, 2019, \$250.0 million was available to be drawn.
- (11) In November 2015, we entered into a \$39.0 million revolving credit facility due November 2020. In December 2019, we entered into a \$56.0 million revolving credit facility due December 2024 to replace the \$39.0 million revolving credit facility. We immediately drew \$20.0 million to repay the credit facility due November 2020. Principal is payable at maturity. As of December 31, 2019, \$36.0 million was available to be drawn under the credit facility due December 2024.

Certain of our foreign debt is collateralized by the land, buildings, equipment and accounts receivable in the respective locations. The carrying value of all collateral exceeds the carrying amount of the collateralized debt.

Interest Rates

Interest is payable semiannually on our senior notes and quarterly or monthly on our other fixed- and variable-rate debt. Refer to the table above for the interest rates on our fixed-rate debt and to the table below for the interest rates on our variable-rate debt.

	December 31,	
	2019	2018
Amkor Technology Korea, Inc.:		
Term Loan, fund floating rate plus 1.60%, due June 2020	3.90%	4.49%
Term loan, LIBOR plus 2.56%, due December 2023	4.49%	5.38%
Amkor Technology Japan, Inc:		
Short-term term loans, variable rate	0.22%	0.24%
Amkor Assembly & Test (Shanghai) Co., Ltd.:		
Term loan, LIBOR plus 1.80%, due December 2019	—	4.22%
Term loan, LIBOR plus 1.60%, due March 2022	3.53%	—
Term loan, LIBOR Plus 1.40%, due March 2022	3.30%	—
Amkor Technology Taiwan Ltd.:		
Revolving credit facility, TAIFX plus the applicable bank rate, due November 2020	—%	4.26
Revolving credit facility, TAIFX plus the applicable bank rate, due December 2024	3.35%	—

AMKOR TECHNOLOGY, INC.
Notes to Consolidated Financial Statements — (Continued)

Compliance with Debt Covenants

The debt of Amkor Technology, Inc. is structurally subordinated in right of payment to all existing and future debt and other liabilities of our subsidiaries. From time to time, Amkor Technology, Inc. and Amkor Technology Singapore Holding Pte, Ltd. guarantee certain debt of our subsidiaries. The agreements governing our indebtedness contain affirmative, negative and financial covenants which restrict our ability to pay dividends and could restrict our operations. We have never paid a dividend to our stockholders and we do not have any present plans for doing so. We were in compliance with all debt covenants at December 31, 2019 and 2018.

Maturities

	Total Debt
	(In thousands)
Payments due for the year ending December 31,	
2020	\$ 144,479
2021	113,408
2022	260,022
2023	297,818
2024	81,910
Thereafter	562,714
Total debt	<u>\$ 1,460,351</u>

13. Pension and Severance Plans

Korean Severance Plan

Our subsidiary in Korea maintains an unfunded severance plan that covers certain employees that were employed prior to August 1, 2015. To the extent eligible employees are terminated, our subsidiary in Korea would be required to make lump-sum severance payments on behalf of these eligible employees for service provided prior to August 1, 2015. Factors used to determine severance benefits include employees' length of service, seniority and rate of pay. The employees' length of service and seniority are fixed as of July 31, 2015. The employees' rate of pay is adjusted to the rate of pay at the time of termination. Accrued severance benefits are estimated assuming all eligible employees were to terminate their employment at the balance sheet date. Our contributions to the National Pension Plan of the Republic of Korea are deducted from accrued severance benefit liabilities. On August 1, 2015, our subsidiary in Korea began sponsoring a defined benefit pension plan and a defined contribution plan. Existing employees at that time were given the option of choosing either a defined benefit pension plan or a defined contribution plan for their future benefits and new employees since that date are enrolled in a defined contribution plan.

AMKOR TECHNOLOGY, INC.
Notes to Consolidated Financial Statements — (Continued)

The changes to the balance of our accrued severance plan obligations are as follows:

	For the Year Ended December 31,		
	2019	2018	2017
	(In thousands)		
Balance at January 1	\$ 142,298	\$ 153,920	\$ 136,396
Provision of severance benefits	1,306	1,939	11,714
Severance payments	(10,659)	(7,611)	(11,787)
Foreign currency (gain) loss	(5,398)	(5,950)	17,597
Balance at December 31	127,547	142,298	153,920
Payments remaining with the National Pension Fund	(161)	(172)	(185)
Total accrued severance plan obligations at December 31	127,386	142,126	153,735
Less current portion of accrued severance plan obligations (Note 11)	13,408	13,179	15,190
Non-current portion of accrued severance plan obligations	<u>\$ 113,978</u>	<u>\$ 128,947</u>	<u>\$ 138,545</u>

Foreign Defined Benefit Pension Plans

Our subsidiaries in Japan, Korea, Malaysia, the Philippines and Taiwan sponsor defined benefit plans (the “Plans”). Charges to expense are based upon actuarial analyses. The following table summarizes the changes to the Plans’ benefit obligations, fair value of the Plans’ assets and the funded status of the Plans at December 31, 2019 and 2018:

	For the Year Ended December 31,	
	2019	2018
	(In thousands)	
Change in projected benefit obligation:		
Projected benefit obligation at January 1	\$ 175,712	\$ 158,466
Service cost	31,355	32,913
Interest cost	5,244	4,867
Benefits paid	(11,742)	(6,137)
Actuarial (gain) loss	12,540	(5,991)
Settlement	(5,310)	(5,055)
Foreign exchange (gain) loss	(351)	(3,351)
Projected benefit obligation at December 31	<u>207,448</u>	<u>175,712</u>
Change in plan assets:		
Fair value of plan assets at January 1	123,370	115,725
Actual gain (loss) on plan assets	12,221	(4,210)
Employer contributions	27,134	26,899
Settlement	(5,310)	(5,055)
Benefits paid	(11,742)	(6,137)
Foreign exchange gain (loss)	(515)	(3,852)
Fair value of plan assets at December 31	<u>145,158</u>	<u>123,370</u>
Funded status of the Plans at December 31	<u>\$ (62,290)</u>	<u>\$ (52,342)</u>

AMKOR TECHNOLOGY, INC.
Notes to Consolidated Financial Statements — (Continued)

	December 31,	
	2019	2018
	(In thousands)	
Amounts recognized in the Consolidated Balance Sheets consist of:		
Prepaid benefit cost (included in non-current assets)	\$ 498	\$ 2,740
Accrued benefit liability (included in pension and severance obligations)	(62,788)	(55,082)
Net amount recognized at year end	\$ (62,290)	\$ (52,342)

The accumulated benefit obligation as of December 31, 2019 and 2018 was \$154.7 million and \$132.9 million, respectively.

The following table summarizes, by component, the change in accumulated other comprehensive income (loss), net of tax related to our Plans:

	Prior Service Cost	Actuarial Net Gain (Loss)	Total
	(In thousands)		
Balance at December 31, 2017	\$ 603	\$ 5,700	\$ 6,303
Amortization included in net periodic pension cost	(1)	(1,735)	(1,736)
Net gain (loss) arising during period	—	(1,908)	(1,908)
Adjustments to unrealized components of defined benefit pension plan included in other comprehensive income (loss)	(1)	(3,643)	(3,644)
Balance at December 31, 2018	602	2,057	2,659
Amortization and settlement gain included in net periodic pension cost	—	(589)	(589)
Net gain (loss) arising during period	—	(6,890)	(6,890)
Adjustments to unrealized components of defined benefit pension plan included in other comprehensive income (loss)	—	(7,479)	(7,479)
Balance at December 31, 2019	<u>\$ 602</u>	<u>\$ (5,422)</u>	<u>\$ (4,820)</u>
Estimated amortization of cost to be included in 2020 net periodic pension cost	\$ —	\$ 59	\$ 59

Information for pension plans with benefit obligations in excess of plan assets is as follows:

	December 31,	
	2019	2018
	(In thousands)	
Plans with underfunded or non-funded projected benefit obligation:		
Aggregate projected benefit obligation	\$ 197,377	\$ 135,967
Aggregate fair value of plan assets	134,589	80,885
Plans with underfunded or non-funded accumulated benefit obligation:		
Aggregate accumulated benefit obligation	71,059	63,274
Aggregate fair value of plan assets	24,043	20,094

AMKOR TECHNOLOGY, INC.
Notes to Consolidated Financial Statements — (Continued)

The following table summarizes total pension expense:

	For the Year Ended December 31,		
	2019	2018	2017
	(In thousands)		
Components of net periodic pension cost and total pension expense:			
Service cost	\$ 31,355	\$ 32,913	\$ 33,823
Interest cost	5,244	4,867	4,067
Expected return on plan assets	(6,412)	(5,640)	(4,537)
Amortization of prior service cost	—	6	30
Recognized actuarial (gain) loss	(374)	(147)	84
Net periodic pension cost	29,813	31,999	33,467
Curtailment loss	—	—	574
Settlement (gain) loss	(210)	(1,639)	383
Total pension expense	\$ 29,603	\$ 30,360	\$ 34,424

The components of net periodic pension cost other than the service cost component are included in other (income) expense, net in our Consolidated Statements of Income.

The following table summarizes the weighted-average assumptions used in computing the net periodic pension cost and projected benefit obligations:

	For the Year Ended December 31,		
	2019	2018	2017
Discount rate for determining net periodic pension cost	3.1%	3.2%	3.1%
Discount rate for determining benefit obligations at December 31	2.5%	3.1%	3.2%
Rate of compensation increase for determining net periodic pension cost	3.6%	3.8%	3.8%
Rate of compensation increase for determining benefit obligations at December 31	3.7%	3.6%	3.8%
Expected rate of return on plan assets for determining net periodic pension cost	5.1%	4.9%	4.9%

The measurement date for determining the Plans' assets and benefit obligations is December 31, each year. Discount rates are generally derived from yield curves constructed from high-quality corporate or foreign government bonds, for which the timing and amount of cash outflows approximate the estimated payouts.

The expected rate of return assumption is based on weighted-average expected returns for each asset class. Expected returns reflect a combination of historical performance analysis and the forward-looking views of the financial markets and include input from our actuaries. We have no control over the direction of our investments in our defined benefit plans in Taiwan as the local Labor Standards Law Fund mandates such contributions into a cash account balance at the Bank of Taiwan. Our defined benefit pension plan in Malaysia is a non-funded plan, and as such, no asset exists related to this plan. Our investment strategies for our defined benefit plans in Japan, Korea and the Philippines, are based on long-term, sustained asset growth through low to medium risk investments. The current rate of return assumption targets are based on asset allocation strategies as follows:

AMKOR TECHNOLOGY, INC.
Notes to Consolidated Financial Statements — (Continued)

	Allocation		
	Debt	Equity	Other
Japan defined benefit plan	65%	33%	2%
Korea defined benefit plan	15%	40%	45%
Philippine defined benefit plan	40%	50%	10%

The fair value of our pension plan assets, by asset category utilizing the fair value hierarchy as discussed in Note 16, is as follows:

	December 31,	
	2019	2018
	(In thousands)	
Cash and cash equivalents (Level 1)	\$ 3,614	\$ 6,640
Equity securities		
U.S. securities (Level 1)	19,276	15,069
U.S. securities (Level 2)	2	—
Foreign securities (Level 1)	11,854	10,162
Foreign securities (Level 2)	28	—
Foreign mutual funds (Level 1)	30,801	25,236
	61,961	50,467
Debt securities		
U.S. government bonds (Level 2)	1,442	1,039
U.S. corporate bonds (Level 2)	31	29
Foreign government bonds (Level 1)	3,338	4,427
Foreign government bonds (Level 2)	9,821	9,545
Foreign corporate bonds (Level 1)	379	5,713
Foreign corporate bonds (Level 2)	5,249	1,951
Foreign treasury notes (Level 1)	3,516	2,587
Foreign mutual funds (Level 1)	11,404	11,188
	35,180	36,479
Foreign guaranteed investment contracts (Level 2)	33,931	18,120
Taiwan retirement fund (Level 1)	11,359	10,451
Other, net (Level 1)	99	680
Other, net (Level 2)	(986)	533
Total fair value of pension plan assets	\$ 145,158	\$ 123,370

The Taiwan retirement fund category of our plan assets represents accounts that our subsidiaries in Taiwan have in a government labor retirement fund in the custody of the Bank of Taiwan. The accounts earn a minimum guaranteed rate of return and are invested in a mix of cash, domestic and foreign equity securities and domestic and foreign debt securities.

We expect to make contributions of approximately \$23 million during 2020. We closely monitor the funded status of the Plans with respect to legislative requirements. We intend to make at least the minimum contribution required by law each year.

AMKOR TECHNOLOGY, INC.
Notes to Consolidated Financial Statements — (Continued)

The estimated future benefit payments related to our foreign defined benefit plans are as follows:

	Payments
	(In thousands)
2020	\$ 9,569
2021	11,780
2022	13,093
2023	15,573
2024	18,584
2025 to 2029	137,242

Defined Contribution Plans

We sponsor defined contribution plans in Korea, Malaysia, Taiwan and the U.S. Total defined contribution expense was \$13.6 million, \$12.2 million and \$10.4 million for 2019, 2018 and 2017, respectively.

14. Accumulated Other Comprehensive Income (Loss)

The following table reflects the changes in accumulated other comprehensive income (loss), net of tax:

	Defined Benefit Pension	Foreign Currency Translation	Total
	(In thousands)		
Balance at December 31, 2017	\$ 6,303	\$ 16,216	\$ 22,519
Other comprehensive income (loss) before reclassifications	(1,908)	4,937	3,029
Amounts reclassified from accumulated other comprehensive income (loss)	(1,736)	—	(1,736)
Other comprehensive income (loss)	(3,644)	4,937	1,293
Balance at December 31, 2018	\$ 2,659	\$ 21,153	\$ 23,812
Other comprehensive income (loss) before reclassifications	(6,890)	2,782	(4,108)
Amounts reclassified from accumulated other comprehensive income (loss)	(589)	—	(589)
Other comprehensive income (loss)	(7,479)	2,782	(4,697)
Balance at December 31, 2019	\$ (4,820)	\$ 23,935	\$ 19,115

Amounts reclassified out of accumulated other comprehensive income (loss) are included as a component of net periodic pension cost (Note 13) or other (income) expense, net.

15. Derivatives

We use foreign currency forward contracts to mitigate foreign currency risk of certain assets and monetary liabilities denominated in foreign currencies. We do not enter into such contracts for trading or speculative purposes. These derivative instruments are not designated as hedging instruments.

AMKOR TECHNOLOGY, INC.
Notes to Consolidated Financial Statements — (Continued)

As of December 31, 2019 and 2018, our foreign exchange forward contracts consisted of the following:

	December 31, 2019			December 31, 2018		
	Notional Value	Fair Value (Level 2)	Balance Sheet Location	Notional Value	Fair Value (Level 2)	Balance Sheet Location
(In thousands)						
Japanese Yen	\$ 391,643	\$ 2,225	Other current assets	\$ 163,419	\$ 1,565	Other current assets
Korean Won	74,076	86	Other current assets	—	—	N/A
Total forward contracts	<u>\$ 465,719</u>	<u>\$ 2,311</u>		<u>\$ 163,419</u>	<u>\$ 1,565</u>	

For the years ended December 31, 2019 and 2018, the derivatives resulted in a net gain of \$0.1 million and \$2.5 million, respectively, which were offset by the foreign currency losses associated with the underlying net liabilities. We did not enter into any derivatives in 2017.

16. Fair Value Measurements

The accounting framework for determining fair value includes a hierarchy for ranking the quality and reliability of the information used to measure fair value, which enables the reader of the financial statements to assess the inputs used to develop those measurements. The fair value hierarchy consists of three tiers as follows: Level 1, defined as quoted market prices in active markets for identical assets or liabilities; Level 2, defined as inputs other than Level 1 that are observable, either directly or indirectly, such as quoted prices for similar assets or liabilities, quoted prices in markets that are not active, model-based valuation techniques for which all significant assumptions are observable in the market or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities; and Level 3, defined as unobservable inputs that are not corroborated by market data.

The fair values of cash, accounts receivable, trade accounts payable, capital expenditures payable, and certain other current assets and accrued expenses approximate carrying values because of their short-term nature. The carrying value of certain other non-current assets and liabilities approximates fair value. Our assets and liabilities recorded at fair value on a recurring basis include cash equivalent money market funds and restricted cash money market funds. We also review goodwill for impairment annually during the fourth quarter of each year. Cash equivalent money market funds and restricted cash money market funds are invested in U.S. money market funds and various U.S. and foreign bank operating and time deposit accounts, which are due on demand or carry a maturity date of less than three months when purchased. No restrictions have been imposed on us regarding withdrawal of balances with respect to our cash equivalents as a result of liquidity or other credit market issues affecting the money market funds we invest in or the counterparty financial institutions holding our deposits. Money market funds are valued using quoted market prices in active markets for identical assets.

Our derivative financial instruments (Note 15) are valued using quoted market prices for similar assets. Counterparties to these derivative contracts are highly rated financial institutions.

Recurring fair value measurements not otherwise disclosed elsewhere in our Consolidated Financial Statements consist of the following:

	December 31,	
	2019	2018
(In thousands)		
Cash equivalent money market funds (Level 1)	\$ 97,762	\$ 74,407
Restricted cash money market funds (Level 1)	610	2,589

We also measure certain assets and liabilities, including property, plant and equipment, operating lease right of use assets and goodwill, at fair value on a nonrecurring basis.

AMKOR TECHNOLOGY, INC.
Notes to Consolidated Financial Statements — (Continued)

We measure the fair value of our debt for disclosure purposes. The following table presents the fair value of financial instruments that are not recorded at fair value on a recurring basis:

	December 31, 2019		December 31, 2018	
	Fair Value	Carrying Value	Fair Value	Carrying Value
(In thousands)				
Senior notes (Level 1)	\$ 576,875	\$ 519,211	\$ 526,131	\$ 524,978
Revolving credit facilities and term loans (Level 2)	940,756	931,023	803,867	807,333
Total financial instruments	<u>\$ 1,517,631</u>	<u>\$ 1,450,234</u>	<u>\$ 1,329,998</u>	<u>\$ 1,332,311</u>

The estimated fair value of our senior notes is based primarily on quoted market prices reported on or near the respective balance sheet dates. The estimated fair value of our revolving credit facilities and term loans is calculated using a discounted cash flow analysis, which utilizes market based assumptions including forward interest rates adjusted for credit risk.

17. Commitments and Contingencies

We generally warrant that our services will be performed in a professional and workmanlike manner and in compliance with our customers' specifications. We accrue costs for known warranty issues. Historically, our warranty costs have been immaterial.

Legal Proceedings

We are involved in claims and legal proceedings and may become involved in other legal matters arising in the ordinary course of our business. We evaluate these claims and legal matters on a case-by-case basis to make a determination as to the impact, if any, on our business, liquidity, results of operations, financial condition or cash flows. Although the outcome of these matters is uncertain, we believe that the ultimate outcome of these claims and proceedings, individually and in the aggregate, will not have a material adverse impact to us. Our evaluation of the potential impact of these claims and legal proceedings on our business, liquidity, results of operations, financial condition or cash flows could change in the future.

Settlement of Patent License Litigation

Under the terms of a January 2015 patent license litigation settlement, Amkor agreed to pay a total of \$155.0 million in 16 equal quarterly recurring payments commencing in the first quarter of 2015 and continuing through the fourth quarter of 2018.

At December 31, 2019 and 2018, we have no remaining liability under this settlement agreement.

Purchase Commitments

In order to provide packaging and test services, we purchase materials under various long-term supply contracts. Future minimum payments to be made under these contracts for the period 2020 through 2027 are \$12.3 million.

18. Business Segments, Customer Concentrations and Geographic Information

We operate as a single operating segment as managed by our Chief Executive Officer, who is considered our chief operating decision maker ("CODM"). The CODM bears the ultimate responsibility for, and is actively engaged in, the allocation of resources and the evaluation of our operating and financial results. We have concluded that we have a single operating segment based on the following:

- We are managed under a functionally-based organizational structure with the head of each function reporting directly to the CODM;

AMKOR TECHNOLOGY, INC.
Notes to Consolidated Financial Statements — (Continued)

- We assess performance, including incentive compensation, based on consolidated operating performance and financial results;
- Our CODM allocates resources and makes other operating decisions based on specific customer business opportunities and
- We have an integrated process for the design, development and manufacturing services we provide to all of our customers. We also have centralized sales and administrative functions.

Net sales by product group consist of the following:

	For the Year Ended December 31,		
	2019	2018	2017
	(In thousands)		
Advanced Products	\$ 2,110,815	\$ 2,118,571	\$ 1,966,483
Mainstream Products	1,941,835	2,197,895	2,240,548
Total net sales	<u>\$ 4,052,650</u>	<u>\$ 4,316,466</u>	<u>\$ 4,207,031</u>

- (1) Advanced products include flip chip and wafer-level processing and related test services.
- (2) Mainstream products include wirebond packaging and related test services.

Net sales by end market consist of the following:

	For the Year Ended December 31,		
	2019	2018	2017
Communications (handheld devices, smartphones, tablets)	38%	44%	43%
Automotive, industrial and other (driver assist, infotainment, performance, safety)	27%	26%	26%
Consumer (connected home, set-top boxes, televisions, visual imaging, wearables)	18%	12%	13%
Computing (datacenter, infrastructure, PC/laptop, storage)	17%	18%	18%
Total net sales	<u>100%</u>	<u>100%</u>	<u>100%</u>

Net sales by region based on customer headquarters location consist of the following:

	For the Year Ended December 31,		
	2019	2018	2017
	(In thousands)		
Japan	\$ 1,061,265	\$ 1,156,797	\$ 1,210,296
Europe, Middle East and Africa	625,592	605,932	540,126
Asia Pacific (excluding Japan)	487,406	535,894	837,014
Total foreign countries	2,174,263	2,298,623	2,587,436
United States	1,878,387	2,017,843	1,619,595
Total net sales	<u>\$ 4,052,650</u>	<u>\$ 4,316,466</u>	<u>\$ 4,207,031</u>

In 2019, no single customer accounted for more than 10% of total net sales. One customer accounted for 10.2%, and 14.3% of net sales in 2018 and 2017, respectively.

AMKOR TECHNOLOGY, INC.
Notes to Consolidated Financial Statements — (Continued)

Property, plant and equipment, net, based on physical location, consist of the following:

	December 31,	
	2019	2018
	(In thousands)	
China	\$ 419,749	\$ 472,858
Japan	177,936	219,373
Korea	1,179,966	1,213,838
Malaysia	41,030	47,491
Philippines	215,941	270,562
Portugal	63,975	63,323
Taiwan	298,982	352,576
Other foreign countries	1,167	170
Total foreign countries	2,398,746	2,640,191
United States	6,104	10,257
Total property, plant and equipment, net	\$ 2,404,850	\$ 2,650,448

19. Quarterly Results (unaudited)

The following table sets forth our consolidated unaudited financial data for the last eight quarters ended December 31, 2019. We believe that we have included all adjustments, consisting only of normal recurring adjustments necessary for a fair statement of our selected quarterly data. The calculation of basic and diluted per share amounts for each quarter is based on the weighted-average shares outstanding for that period; consequently, the sum of the quarters may not necessarily be equal to the full year basic and diluted net income per share.

	For the Quarter Ended							
	Dec 31, 2019 (a)	Sep 30, 2019	Jun 30, 2019 (b)	Mar 31, 2019 (c)	Dec 31, 2018 (d)	Sep 30, 2018	Jun 30, 2018	Mar 31, 2018
	(In thousands, except per share data)							
Net sales	\$ 1,178,464	\$ 1,083,917	\$ 895,305	\$ 894,964	\$ 1,081,271	\$ 1,144,192	\$ 1,065,684	\$ 1,025,319
Gross profit	222,984	182,240	123,454	120,761	182,370	200,707	169,717	157,771
Operating income	118,385	78,855	22,510	13,420	75,381	92,703	53,941	36,119
Income tax expense	764	9,141	5,897	21,380	28,812	14,326	10,631	2,481
Net income (loss)	99,816	54,486	(9,006)	(22,668)	28,894	57,292	33,184	10,195
Net income (loss) attributable to Amkor	99,147	54,070	(9,450)	(22,879)	28,295	56,662	32,591	9,544
Net income (loss) attributable to Amkor per common share:								
Basic	\$ 0.41	\$ 0.23	\$ (0.04)	\$ (0.10)	\$ 0.12	\$ 0.24	\$ 0.14	\$ 0.04
Diluted	\$ 0.41	\$ 0.23	\$ (0.04)	\$ (0.10)	\$ 0.12	\$ 0.24	\$ 0.14	\$ 0.04

- (a) In the fourth quarter of 2019, we recorded a \$3.8 million discrete income tax benefit, primarily related to changes in the valuation of certain deferred tax assets.
- (b) In the second quarter of 2019, we incurred an \$8.4 million charge related to the early redemption of our 2022 Notes.
- (c) In the first quarter of 2019, we recorded a \$14.9 million non-cash discrete income tax charge to reduce the value of certain deferred tax assets.
- (d) In the fourth quarter of 2018, we recorded a \$22.3 million income tax expense to complete the accounting for the impact of the Tax Act, reducing our estimated net tax benefit of \$41.6 million from 2017.

SCHEDULE II — VALUATION AND QUALIFYING ACCOUNTS

	Balance at Beginning of Period	Additions (Credited) Charged to Expense	Write-offs	(a) Other	Balance at End of Period
(In thousands)					
Deferred tax asset valuation allowance:					
Year ended at December 31, 2017	\$ 165,484	(117,121)	(489)	35,377	\$ 83,251
Year ended at December 31, 2018	\$ 83,251	54,421	(19,112)	—	\$ 118,560
Year ended at December 31, 2019	\$ 118,560	21,496	(3,122)	—	\$ 136,934

(a) Column represents adjustments to the deferred tax asset valuation allowance established as part of the purchase accounting related to Amkor's acquisition of Nanium in 2017 and adjustments directly through stockholders' equity for changes in accumulated other comprehensive income (loss) related to our foreign defined benefit pension plans.

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

We maintain disclosure controls and procedures that are designed to ensure that information required to be disclosed in our periodic reports to the Securities and Exchange Commission (“SEC”) is recorded, processed, summarized and reported within the time periods specified in the SEC’s rules and forms, and that such information is accumulated and communicated to our management, including the Chief Executive Officer and the Chief Financial Officer, as appropriate, to allow timely decisions regarding required disclosure, based on the definition of “disclosure controls and procedures” in Rule 13a-15(e) and Rule 15d-15(e) under the Securities Exchange Act of 1934, as amended. In designing and evaluating the disclosure controls and procedures, management recognizes that any disclosure 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 disclosure controls and procedures.

We carried out an evaluation, under the supervision and with the participation of management, including our Chief Executive Officer and our Chief Financial Officer, of the effectiveness of the design and operation of our disclosure controls and procedures as of December 31, 2019, and concluded those disclosure controls and procedures were effective as of that date.

Management’s Report on Internal Control Over Financial Reporting

Management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Exchange Act Rules 13a-15(f) and 15d-15(f). Internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles.

Internal control over financial reporting includes those policies and procedures that: (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company’s assets that could have a material effect on the financial statements.

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

Management conducted an assessment of the effectiveness of our internal control over financial reporting as of December 31, 2019, based on the framework established in Internal Control — Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (“COSO”). Based on the results of this evaluation, our management concluded that our internal control over financial reporting was effective as of December 31, 2019, based on criteria in Internal Control — Integrated Framework (2013) issued by the COSO.

The effectiveness of our internal control over financial reporting as of December 31, 2019, has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in their report which appears under Item 8 of this Annual Report on Form 10-K.

Changes in Internal Control Over Financial Reporting

There have been no changes in our internal control over financial reporting that occurred during the three months ended December 31, 2019 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information

None.

PART III**Item 10. Directors, Executive Officers and Corporate Governance**

The information required by this Item 10, with the exception of information relating to the Code of Business Conduct as disclosed below, is incorporated herein by reference from the material included under the captions “Election of Directors,” “Executive Officers,” and “Corporate Governance” in our definitive proxy statement (to be filed pursuant to Regulation 14A) for our 2020 Annual Meeting of Stockholders.

We have a written Code of Business Conduct applicable to all employees, including our Chief Executive Officer, Chief Financial Officer, and Controller. Our Code of Business Conduct, Code of Ethics for Directors, Corporate Governance Guidelines, and the charters of the Audit Committee, Nominating and Governance Committee and Compensation Committee of our Board of Directors are available and maintained on our website (<http://www.amkor.com>). We intend to disclose on our website future amendments or waivers of our Code of Business Conduct required to be disclosed pursuant to applicable rules and regulations.

Item 11. Executive Compensation

The information required by this Item 11 is incorporated herein by reference from the material included under the captions “Executive Compensation,” “Compensation Committee Interlocks and Insider Participation” and “Compensation Committee Report” in our definitive proxy statement (to be filed pursuant to Regulation 14A) for our 2020 Annual Meeting of Stockholders.

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

The information required by this Item 12, with the exception of the equity compensation plan information presented below, is incorporated herein by reference to our definitive proxy statement (to be filed pursuant to Regulation 14A) for our 2020 Annual Meeting of Stockholders.

EQUITY COMPENSATION PLAN

The following table summarizes our equity compensation plan as of December 31, 2019:

	(a) Number of Securities to be Issued Upon Exercise of Outstanding Options (In thousands)	(b) Weighted Average Exercise Price of Outstanding Options	(c) Number of Securities Remaining Available for Future Issuance Under Equity Compensation Plans (Excluding Securities Reflected in Column(a) (In thousands)
Equity compensation plan approved by stockholders (1)	5,845	\$ 9.11	5,223
Equity compensation plans not approved by stockholders	—	—	—
Total equity compensation plans	5,845		5,223

(1) As of December 31, 2019, a total of 5.2 million shares were reserved for issuance under the 2007 Plan. Shares available for issuance under our 2007 Plan can be granted pursuant to stock options, restricted stock, restricted stock units, stock appreciation rights, performance units and performance shares.

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

The information required by this Item 13 is incorporated herein by reference from the material included under the captions “Certain Relationships and Related Transactions” and “Proposal One — Election of Directors” in our definitive proxy statement (to be filed pursuant to Regulation 14A) for our 2020 Annual Meeting of Stockholders.

Item 14. *Principal Accountant Fees and Services*

The information required by this Item 14 is incorporated herein by reference from the material included under the proposal “Ratification of Appointment of Independent Registered Public Accounting Firm” in our definitive proxy statement (to be filed pursuant to Regulation 14A) for our 2020 Annual Meeting of Stockholders.

PART IV

Item 15. *Exhibits and Financial Statement Schedules*

(a) *Financial Statements, Financial Statement Schedules and Exhibits*

The financial statements and schedules filed as part of this Annual Report on Form 10-K are listed in the index under Part II, Item 8 of this Annual Report.

The exhibits required by Item 601 of Regulation S-K which are filed with this report or incorporated by reference herein are set forth below. Management contracts or compensatory plans or arrangements are identified by an asterisk.

Exhibit Number	Exhibit Description	Incorporated by Reference				Filed Herewith
		Form	Period Ending	Exhibit	Filing Date	
2.1	Sales Contract of Commodity Premises between Shanghai Waigaoqiao Free Trade Zone Xin Development Co., Ltd. and Amkor Assembly & Test (Shanghai) Co., Ltd. dated May 7, 2004.	10-Q	6/30/04	2.3	8/6/04	
3.1	Certificate of Incorporation.	S-1		3.1	10/6/97	
3.2	Certificate of Correction to Certificate of Incorporation.	S-1		3.1	4/8/98	
3.3	Restated Bylaws as amended on November 5, 2013.	10-K	12/31/13	3.3	2/28/14	
4.1	Specimen Common Stock Certificate.	S-1/A		4.1	3/31/98	
4.2	Indenture, dated March 15, 2019, by and between Amkor Technology, Inc. and U.S. Bank National Association, as trustee, regarding the 6.625% Senior Notes due 2027.	8-K		4.1	3/5/19	
4.3	Description of the Registrant's Securities Registered Pursuant to Section 12 of the Securities Exchange Act of 1934.					X
10.1	Form of Indemnification Agreement for directors and officers.	S-1/A		10.1	3/31/98	
10.2	2009 Voting Agreement, dated as of March 26, 2009, between Amkor Technology, Inc., James J. Kim and 915 Investments, LP.	8-K		10.1	4/1/09	
10.3	Employment Letter Agreement, dated February 27, 2017, between Amkor Technology, Inc. and Stephen D. Kelley.*	8-K		10.1	3/3/17	

Table of Contents

Exhibit Number	Exhibit Description	Incorporated by Reference				Filed Herewith
		Form	Period Ending	Exhibit	Filing Date	
10.4	Form of Stock Option Award Agreement under the Second Amended and Restated 2007 Equity Incentive Plan.*	10-Q	3/31/17	10.2	5/5/17	
10.5	Form of Restricted Stock Award Agreement under the Second Amended and Restated 2007 Equity Incentive Plan.*	10-Q	3/31/17	10.3	5/5/17	
10.6	Form of Outside Director Stock Option Award Agreement under the Second Amended and Restated 2007 Equity Incentive Plan.*	10-Q	3/31/17	10.4	5/5/17	
10.7	Second Amended and Restated 2007 Equity Incentive Plan*	8-K		10.1	5/5/17	
10.8	Amendment One to Second Amended and Restated 2007 Equity Incentive Plan*	10-Q	6/30/19	10.3	8/1/19	
10.9	Amended and Restated Executive Incentive Bonus Plan*	8-K		10.2	5/5/17	
10.10	Retirement and Release Agreement, dated May 15, 2019, between Amkor Technology, Inc. and Gil C. Tily*	10-Q	6/30/19	10.1	8/1/19	
10.11	Syndicated Loan Agreement among J-Devices Corporation, Sumitomo Mitsui Banking Corporation and other financial institutions, dated as of July 13, 2018 (English translation).	8-K		10.1	7/19/18	
10.12	Guaranty by Amkor Technology, Inc. in favor of Sumitomo Mitsui Banking Corporation and other financial institutions, dated as of July 13, 2018 (English translation).	8-K		10.2	7/19/18	
10.13	Loan and Security Agreement, dated as of July 13, 2018, by and among Amkor Technology Singapore Holding Pte, Ltd., Bank of America, N.A. and other financial institutions.	8-K		10.3	7/19/18	
10.14	Amendment to Loan and Security Agreement, dated as of July 8, 2019, by and amount Amkor Technology Singapore Holding Pte, Ltd., Bank of America, N.A. and other financial institutions.	10-Q	6/30/19	10.2	8/1/19	
10.15	Guaranty and Security Agreement, dated as of July 13, 2018, by and among Amkor Technology, Inc., and Bank of America, N.A.	8-K		10.4	7/19/18	
10.16	Syndicated Loan Agreement among J-Devices Corporation, Sumitomo Mitsui Banking Corporation and other financial institutions, dated as of December 23, 2019 (English translation).	8-K		10.1	12/26/19	
10.17	Guaranty by Amkor Technology, Inc. in favor of Sumitomo Mitsui Banking Corporation and other financial institutions, dated as of December 23, 2019 (English translation).	8-K		10.2	12/26/19	
10.18	Deed of Guaranty by Amkor Technology Singapore Holding Pte. Ltd. in favor of Sumitomo Mitsui Banking Corporation and other financial institutions, dated as of December 23, 2019 (English translation).	8-K		10.3	12/26/19	
21.1	List of subsidiaries of the Registrant.					X
23.1	Consent of PricewaterhouseCoopers LLP.					X

[Table of Contents](#)

Exhibit Number	Exhibit Description	Incorporated by Reference				Filed Herewith
		Form	Period Ending	Exhibit	Filing Date	
31.1	Certification of Stephen D. Kelley, Chief Executive Officer of Amkor Technology, Inc., Pursuant to Rule 13a-14(a) under the Securities Exchange Act of 1934, as amended.					X
31.2	Certification of Megan Faust, Chief Financial Officer of Amkor Technology, Inc., Pursuant to Rule 13a-14(a) under the Securities Exchange Act of 1934, as amended.					X
32.1	Certification of Chief Executive Officer and Chief Financial Officer Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.					X
101.INS	Inline XBRL Instance Document - the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.					X
101.SCH	Inline XBRL Taxonomy Extension Schema Document					X
101.CAL	Inline XBRL Taxonomy Extension Calculation Linkbase Document					X
101.LAB	Inline XBRL Taxonomy Extension Label Linkbase Document					X
101.PRE	Inline XBRL Taxonomy Extension Presentation Linkbase Document					X
101.DEF	Inline XBRL Taxonomy Extension Definition Linkbase Document					X
104	Cover Page Interactive Data File (formatted as Inline XBRL and contained in Exhibit 101)					X

* Indicates management compensatory plan, contract or arrangement.

Item 16. Form 10-K Summary

None.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, as amended, the registrant has duly caused this Annual Report on Form 10-K to be signed, on its behalf by the undersigned, thereunto duly authorized.

AMKOR TECHNOLOGY, INC.

By: /s/ Stephen D. Kelley

Stephen D. Kelley
President and Chief Executive Officer

Date: February 19, 2020

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Stephen D. Kelley and Megan Faust, and each of them, his attorneys-in-fact, and agents, each with the power of substitution, 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 all documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in and about the premises, as fully to all intents and purposes as he might or could do in person, hereby ratifying and conforming all that said attorneys-in-fact and agents of any of them, or his or their 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, as amended, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

Name	Title	Date
<u>/s/ Stephen D. Kelley</u> Stephen D. Kelley	President and Chief Executive Officer	February 19, 2020
<u>/s/ Megan Faust</u> Megan Faust	Executive Vice President and Chief Financial Officer	February 19, 2020
<u>/s/ James J. Kim</u> James J. Kim	Executive Chairman	February 19, 2020
<u>/s/ John T. Kim</u> John T. Kim	Vice Chairman	February 19, 2020
<u>/s/ Susan Y. Kim</u> Susan Y. Kim	Director	February 19, 2020
<u>/s/ Douglas A. Alexander</u> Douglas A. Alexander	Director	February 19, 2020
<u>/s/ Roger A. Carolin</u> Roger A. Carolin	Director	February 19, 2020

Name	Title	Date
/s/ Winston J. Churchill Winston J. Churchill	Director	February 19, 2020
/s/ Daniel Liao Daniel Liao	Director	February 19, 2020
/s/ MaryFrances McCourt MaryFrances McCourt	Director	February 19, 2020
/s/ Robert R. Morse Robert R. Morse	Director	February 19, 2020
/s/ Gil C. Tily Gil C. Tily	Director	February 19, 2020
/s/ David N. Watson David N. Watson	Director	February 19, 2020

**DESCRIPTION OF THE REGISTRANT’S SECURITIES REGISTERED
PURSUANT TO SECTION 12 OF THE SECURITIES EXCHANGE ACT OF 1934**

Amkor Technology, Inc. (“we,” “our,” or the “Company”) has one class of securities registered under Section 12 of the Securities Exchange Act of 1934, as amended: our common stock.

The general terms and provisions of our authorized common stock are summarized below. This summary does not purport to be complete and is subject to and is qualified in its entirety by the provisions of our Certificate of Incorporation, as amended (our “Charter”), and our Restated Bylaws (our “Bylaws”), each of which is filed as an exhibit to the Annual Report on Form 10-K of which this **Exhibit 4.3** is a part, as well as the General Corporation Law of the State of Delaware (the “DGCL”). We encourage you to read our Charter and Bylaws and the applicable provisions of the DGCL for additional information.

Authorized Shares of Capital Stock

Pursuant to our Charter, we are authorized to issue 500,000,000 shares of common stock, par value \$0.001 per share.

Pursuant to our Charter, we are also authorized to issue 10,000,000 shares of preferred stock, par value \$0.001 per share. Our board of directors is authorized to establish one or more series of preferred stock and to fix the designations, powers, preferences, and rights, and the qualifications, limitations or restrictions of such series, including, without limitation, dividend rights, dividend rates, conversion rights, voting rights, rights and terms of redemption (including sinking fund provisions), redemption prices, liquidation preferences and the number of shares constituting a series or the designation of such series, without any further vote or action by our stockholders, subject to limitations prescribed by applicable law and the Nasdaq Global Select Market. As of the date of the Annual Report on Form 10-K of which this Exhibit is a part, no shares of preferred stock are outstanding. The rights of the holders of our common stock would be subject to the rights of holders of any preferred stock issued in the future.

Voting Rights

Holders of our common stock are entitled to one vote per share on all matters to be voted on by our stockholders. Holders of our common stock do not have cumulative voting rights.

Dividend Rights

Holders of our common stock are entitled to receive such dividends as may be declared from time to time by our board of directors out of legally available funds, subject to the terms of any existing or future agreements of the Company and the prior rights of any holders of preferred stock then outstanding.

Liquidation Rights

In the event of the liquidation, dissolution or winding up of the Company, the holders of our common stock are entitled to share ratably in all assets legally available for distribution after payment of all debts and other liabilities and subject to the prior rights of any holders of any preferred stock then outstanding.

Composition of the Board of Directors; Election of Directors; Vacancies

Our board of directors consists of one or more members, and the number of directors is determined from time to time by the board of directors. Our board of directors is not classified. The directors are elected by our stockholders at each annual meeting, and each director holds office until his or her successor is elected and qualified or until such director’s earlier resignation or removal. Any newly created directorship or any vacancy occurring in the board of directors for any cause may be filled by a majority of the remaining members of the board of directors, although such majority is less than a quorum, or by a sole remaining director, or by a plurality of the votes cast at a meeting of stockholders, and each director so elected will hold office until the expiration of the term of office of the director whom he or she has replaced or until his or her successor is elected and qualified.

Other Matters

All issued and outstanding shares of our common stock are fully paid and nonassessable. The holders of our common stock have no preemptive, conversion or exchange rights. There are no redemption or sinking fund provisions applicable to our common stock. There are no restrictions on transfer of our common stock, except as required by law.

Listing

Our common stock is traded on the Nasdaq Global Select Market under the trading symbol “AMKR.”

Certain Anti-Takeover Effects

Certain provisions of the DGCL and our Charter and Bylaws could have certain anti-takeover effects and may delay, deter or prevent a tender offer or takeover attempt that a stockholder might consider to be in its best interests.

Additional Authorized Shares of Capital Stock

The additional shares of our authorized common stock and the authorized preferred stock available for issuance under our Charter may be issued without stockholder approval, subject to the requirements prescribed by applicable law and the Nasdaq Global Select Market, and may be issued at such times, under such circumstances, and with such terms and conditions as to impede a change in control.

Advance Notice Requirements

Our Bylaws establish an advance notice procedure for stockholders seeking to nominate candidates for election to the board of directors or for proposing matters which can be acted upon at stockholders’ meetings.

No Cumulative Voting

Our Charter and Bylaws do not provide for cumulative voting.

Delaware Business Combination Statute

As a Delaware corporation, we are subject to Section 203 of the DGCL. In general, Section 203 of the DGCL provides that we may not engage in certain “business combinations” with any “interested stockholder” for a three-year period following the time that such stockholder became an interested stockholder unless:

- prior to such time, our board of directors approved either the business combination or the transaction which resulted in the stockholder becoming an interested stockholder;
- upon consummation of the transaction which resulted in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85% of our voting stock outstanding at the time the transaction commenced, excluding for purposes of determining the voting stock outstanding those shares owned (i) by persons who are directors and also officers, and (ii) employee stock plans in 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
- at or subsequent to such time, the business combination is approved by our board of directors and authorized at an annual or special meeting of stockholders, and not by written consent, by the affirmative vote of at least two-thirds of the outstanding voting stock not owned by the interested stockholder.

Generally, a “business combination” includes a merger, asset or stock sale or other transaction resulting in a financial benefit to the interested stockholder. Subject to certain exceptions, an “interested stockholder” is a person who or which (i) beneficially owns 15% or more of the outstanding voting stock of the corporation, or (ii) any person affiliated or associated with or controlling or controlled by the corporation that was the owner of 15% or more of the outstanding voting stock of the corporation at any time within the three-year period immediately prior to the date of determination if such person is an interested stockholder, and the affiliates and associates of such person.

AMKOR TECHNOLOGY, INC.

LIST OF SUBSIDIARIES

Subsidiary	Jurisdiction of Organization
Amkor Advanced Technology Taiwan, Inc.	Taiwan
Amkor Assembly & Test (Shanghai) Co., Ltd.	China
Amkor Technology Euroservices, S.A.S.	France
Amkor Technology Holding, B.V.	Netherlands
Amkor Technology Holding, B.V., Germany (A Branch of a Netherlands Company)	Germany
Amkor Technology Korea, Inc.	Korea
Amkor Technology Limited	Cayman Islands
Amkor Technology Malaysia Sdn. Bhd.	Malaysia
Amkor Technology Philippines, Inc. (A Branch of a Singapore Company)	Philippines
Amkor Technology Singapore Investment Pte. Ltd.	Singapore
Amkor Technology Singapore Holding Pte. Ltd.	Singapore
Amkor Technology Taiwan Ltd.	Taiwan
Amkor Worldwide Services LLC	Delaware
ATEP - Amkor Technology Portugal, S.A.	Portugal
Guardian Assets, Inc.	Delaware
J-Devices Corporation	Japan

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statements on Form S-8 (Nos. 333-62891, 333-86161, 333-63430, 333-100814 and 333-149376) of Amkor Technology, Inc. of our report dated February 19, 2020, relating to the financial statements and financial statement schedule and the effectiveness of internal control over financial reporting, which appears in this Form 10-K.

/s/ PricewaterhouseCoopers LLP
Phoenix, Arizona
February 19, 2020

SECTION 302(a) CERTIFICATION

I, Stephen D. Kelley, certify that:

1. I have reviewed this Annual Report on Form 10-K of Amkor Technology, Inc.;
2. Based on my knowledge, this Annual 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 Annual Report;
3. Based on my knowledge, the financial statements, and other financial information included in this Annual 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 Annual 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 Annual 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 Annual Report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this Annual Report based on such evaluation; and
 - d) Disclosed in this Annual 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 this 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 controls over financial reporting.

/s/ Stephen D. Kelley

By: Stephen D. Kelley
Title: President and Chief Executive Officer
Date: February 19, 2020

SECTION 302(a) CERTIFICATION

I, Megan Faust, certify that:

1. I have reviewed this Annual Report on Form 10-K of Amkor Technology, Inc.;
2. Based on my knowledge, this Annual 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 Annual Report;
3. Based on my knowledge, the financial statements, and other financial information included in this Annual 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 Annual 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 Annual 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 Annual Report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this Annual Report based on such evaluation; and
 - d) Disclosed in this Annual 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 this 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 controls over financial reporting.

/s/ Megan Faust

By: Megan Faust
Title: Executive Vice President and Chief Financial Officer
Date: February 19, 2020

**CERTIFICATION OF CHIEF EXECUTIVE OFFICER AND CHIEF FINANCIAL OFFICER
PURSUANT TO 18 U.S.C. SECTION 1350, AS ADOPTED
PURSUANT TO SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

I, Stephen D. Kelley, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that the Annual Report of Amkor Technology, Inc. on Form 10-K for the year ended December 31, 2019 fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 and that information contained in such Form 10-K fairly presents in all material respects the financial condition and results of operations of Amkor Technology, Inc.

/s/ Stephen D. Kelley

By: Stephen D. Kelley
Title: President and Chief Executive Officer
Date: February 19, 2020

I, Megan Faust, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that the Annual Report of Amkor Technology, Inc. on Form 10-K for the year ended December 31, 2019 fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 and that information contained in such Form 10-K fairly presents in all material respects the financial condition and results of operations of Amkor Technology, Inc.

/s/ Megan Faust

By: Megan Faust
Title: Executive Vice President and Chief Financial Officer
Date: February 19, 2020