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Buyers' Guide

All the facts and figures to help you buy



Side stepping constraints

From a very young age I knew my mind worked slightly differently to the other kids on my road. While they all wanted to play with their new toys, all I wanted to do was break them apart to see how they worked, normally with disastrous consequences for the toys themselves and much to the annoyance of my parents.

Fast forward five decades and things are even worse. Not only do I still have an overwhelming desire to take things apart to see how they function, now I want to see if I can improve them as they are reassembled. I refuse to reveal my success rate.

I don't feel quite as lonely as I once did as I know there are others just like me. I meet them on factory tours, site visits, engineering exhibitions, technical forums and at my local tinker club.

Thus, it was with great anticipation that I started to read a new book titled *Think Like an Engineer* by Guru Madhavan. On page 12 there it was, a quote by Jim Plummer, the former dean of engineering at Stanford University who said: 'They work at the intersection of feasibility, viability and desirability'. Finally, someone who understands me.

Soon after, the book explains that one of the attributes of the engineering mindset is adeptness at designing under 'constraints', two of which are cost and availability. From my perspective, this is where the purchasing department can have an immediate impact on the design process by helping relieve such constraints by working hard to reduce component cost and improve availability via adroit negotiations with suppliers. Keep up the good work.

Jon Barrett

Contact			
EDITORIAL Managing Editor: Jon Barrett jonb@electronics-sourcing.com Contributing Editor: Amy Barker amyb@electronics-sourcing.com Editorial & Production: Thomas Smart thomas.smart@electronics-sourcing.com Editorial & Production Assistant: Ben Kitching ben.kitching@electronics-sourcing.com		CIRCULATION Circulation Manager: Vicky Leary vicky.leary@electronics-sourcing.com Circulation Account Manager: Liz Poole liz.poole@electronics-sourcing.com	
ADVERTISING Director of Sales: Charlotte Morgan charlotte.morgan@electronics-sourcing.com Area Sales Executive: Emma Poole emma.poole@electronics-sourcing.com		DESIGN Graphic Designer: Josh Hilton josh.hilton@electronics-sourcing.com	
		PUBLISHER Mark Leary mark.leary@electronics-sourcing.com Office Manager: Denise Pattenden denise.pattenden@mmgpublishing.co.uk	

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PCB purchasers beware

The IPC is warning industry regarding the reliability of printed board microvia, particularly in relation to high performance products. These concerns have arisen thanks to tighter microvia densities and signal integrity requirements, with several IPC OEM member companies providing examples of microvia failures that were not observed until after PCB fabrication, inspection and acceptance.

According to the IPC, the failures typically occur during reflow, however they are often undetectable at room temperature. Many of these failures occurred within products that had already passed traditional production lot acceptance testing in accordance with existing IPC-6010, printed board qualification and performance specifications.

A white paper, IPC-WP-023, was published by the IPC on this hidden threat in 2018 covering performance-based printed board OEM acceptance. A technology solutions subcommittee has also been established to investigate potential causes and to provide industry with resources on the topic. This group provided its first update to industry during an open forum held during IPC Apex Expo 2019 and will continue to provide updates as it progresses.

www.ipc.org



Pressure sensors calibrated and ready to ship

TTI is now offering the 116CP plastic ceramic capacitive pressure sensor from Sensata Technologies. Housed in a small plastic package, the 116CP series offers a range of configurations including various pressure ports, electrical outputs and pressure ranges from zero to four, up to zero to 16 bar. Ideal for boilers, pumps, and other light industrial applications, this series features multiple port and connector options and has drinking water safe options available. It comes with 100 per cent automated calibration and is also REACH, RoHS and CE compliant.

www.ttiinc.com



Cryptocurrency payments get the green light

Avnet is working with blockchain payment provider, BitPay, to accept cryptocurrency for its products and services, a move it says will offer purchasers a more convenient way to pay.

Vice president of demand creation, Avnet, Sunny Trinh, commented: "We're working with BitPay to facilitate secure blockchain payments for all types of customers so they can focus on developing their products, not how to pay for them. Whether it's Bitcoin or Bitcoin Cash, we can handle it."

When a buyer elects to make a purchase in this way, Avnet will work with BitPay to verify the funds, process the order and complete the transaction. Avnet and BitPay will process cryptocurrency requests outside the US on a country-by-country basis.

Chief commercial officer, BitPay, Sonny Singh, added: "Not only is paying with bitcoin easier and faster than with credit cards and bank wires, it is less expensive and acceptance of it is growing."

www.avnet.com

Long life sensors ready to roll-out

Future Electronics is now shipping the latest SPS30 particulate matter sensor from Sensiron. The SPS30 optical PM sensor uses a measurement principle based on laser scattering, as well as utilizing Sensiron's contamination-resistance technology. This, together with high-quality and long-lasting components, is said to support accurate measurements from the device's first operation and throughout its lifetime of more than eight years.

www.futureelectronics.com

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Over 130 years later, Sager Electronics has grown into a leading North American distributor of interconnect, power and electromechanical electronic components. Acquired in 2012 by TTI, Inc., a Berkshire Hathaway, Inc. company, Sager continues to operate with the same dedication to its core values – integrity, service and adaptability.



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In Brief

Prototype to production

Newark element14 has changed its name to Newark, An Avnet Company, in recognition of its role in the Avnet eco-system and the value that the two brands can add as one company. Avnet now provides support at every stage of the product lifecycle with end-to-end solutions that follow an idea from prototype to mass production, saving customers time and money. www.element14.com

Passive sales up 25%

The ECIA reports that last year's global passive sales were up 25.2 per cent in dollars and up 16.7 per cent in units. Resistor sales saw the most growth, up 23.7 per cent in units, while capacitor sales were up 12.5 per cent and inductors up 4.6 per cent. www.ecianow.org

PCB growth continues

IPC director of market research, Sharon Starr, has revealed that revised January data from the organization's North American PCB statistical program brought welcome changes to the 2019 results to date. After slowing growth in the latter part of 2018, strong growth has returned in 2019. The book-to-bill ratio also rebounded, indicating continued sales growth in the coming months. www.ipc.org

Appointments optimize purchasing

Smith has appointed Mike Pursley and Todd Snow as vice presidents of global purchasing. Their focus will be identifying and implementing flexible procurement strategies to support customers during obsolescence, lifecycle management, and shortage situations, as well as optimizing freight costs and net terms and to find both new and direct sourcing channels that better serve Smith. www.smithweb.com



Looking for smart solutions?

Mouser Electronics is now stocking Silicon Labs' EFM32Giant Gecko 12 microcontroller family, ideal for devices that require advanced processing during deep sleep. Applications include internet of things devices, sensors, smart meters, industrial automation, home security, and health and fitness wearables.

Designed to provide security during ultra-low-power performance, the microcontrollers offer low-energy peripherals to deliver autonomous performance while sleeping. Low-energy peripherals include two 12-bit analog-to-digital converters, a digital-to-analog converter, capacitive touch, and up to 83 general-purpose inputs/outputs.

Products in the new GG12 family also boast a 32-bit Arm Cortex-M4 processor running at 72MHz with up to 1Mbyte of on-chip flash and 192kB of RAM.

www.mouser.com

Home in on mil-spec resistors

New Yorker Electronics is offering Vishay's MIL-PRF-55342 military qualified resistors, suitable for use in the avionics, military and space markets, in both thick and thin film variants. Ideal for high reliability applications including aircraft, satellites, missiles and ships, the resistors are available in a variety of cases, product levels, temperature characteristics, tolerances and termination materials.

The thin film surface mount mil chip resistors feature all-sputtered wraparound termination, said to offer excellent adhesion and dimensional uniformity. This termination features a firm adhesion layer covered with an electroplated nickel barrier layer for up to 150°C operating conditions. Parts undergo extensive environmental testing and 100 per cent screening on every lot for T-level product assurance.

Vishay Dale's thick film chip resistors similarly provide established reliability in the military and aerospace industry. The resistors fully conform to the requirement of MIL-PRF-55342 and have a verified failure rate at M, P, R, S and T levels. They have an operating temperature range of -55 to 150°C and a tin/lead wraparound over nickel barrier termination.

www.newyorkerelectronics.com

Cutting the cost of industrial IoT

Newark element14 has introduced the Avnet SmartEdge Industrial IoT Gateway, a new low-cost industrial gateway powered by Raspberry Pi.

The gateway, which is designed to enable seamless and secure connectivity to the cloud through Avnet's IoT Connect platform on Microsoft Azure, is ideal for developing industrial automation applications such as remote monitoring, predictive maintenance, process control and automation.

According to Newark, SmartEdge addresses key industrial requirements such as additional ports to handle industrial protocols and a trusted computing module for added security on the hardware.

Senior vice-president, product marketing and eCommerce, at Newark element14, Ralf Buehler, said: "The Avnet SmartEdge Industrial IoT Gateway offers a level of simplicity, capability and accessibility never before achieved in this environment."

Avnet's vice president internet of things, Lou Lutostanski, added: "Developers familiar with prototyping on a Raspberry Pi device will find it a straightforward task to bring their designs to a production environment without ever having to switch platforms."

www.element14.com



Sixteenth-brick converters in stock

Sager Electronics is now stocking Murata Power's IRS-Q12 encapsulated sixteenth-brick converters. With this introduction, the IRS series makes another dramatic size shrink, down to a sixteenth-brick width, while still retaining a high power output and full 2,828V DC isolation.

The family, which accepts nine to 36V DC inputs, boasts excellent ripple and noise specifications for compatibility with circuits using CPUs, ASICs, programmable logic and FPGAs. No minimum load is required, and the synchronous flyback topology is said to yield high efficiency for minimal heat build-up and 'no fan' operation. This ensures IRS converters are ideal for industrial and railway applications, data and telecom applications, cell phone towers, data centers, server farms and network repeaters.

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Current sense chips are hard to resist

Stackpole's CSSH2512 all metal current sense chip resistor boasts precision tolerances as low as 0.5 per cent and temperature coefficient of resistance as low as 15ppm. This 3W 2512 size chip also features an expanded resistance range, from 0.5 up to 80milliohm. High precision combined with this wider value range and higher power rating make the CSSH2512 ideal for a variety of power monitoring and control applications in consumer and industrial electronics.

Pricing for the CSSH2512 depends on resistance value, and tolerance and ranges from \$0.275 to \$0.463 each in full package quantities.

www.seielect.com



SiC power gets a boost with new supply agreement

UnitedSiC has announced a strategic investment from Analog Devices, backed by a long-term supply agreement which will enhance access to the company's silicon carbide power semiconductors.

President and chief executive officer at UnitedSiC, Chris Dries, said: "The ADI Power team instantly understood the value of our SiC technology and the ease with which the devices could be scaled and utilized in their power platforms."

UnitedSiC and ADI have been collaborating on SiC-based products and devices for more than two years. As wide bandgap power devices, and SiC in particular, become more mainstream and cost effective, the inclusion of these devices will strengthen ADI's analog power portfolio.

www.unitedsic.com

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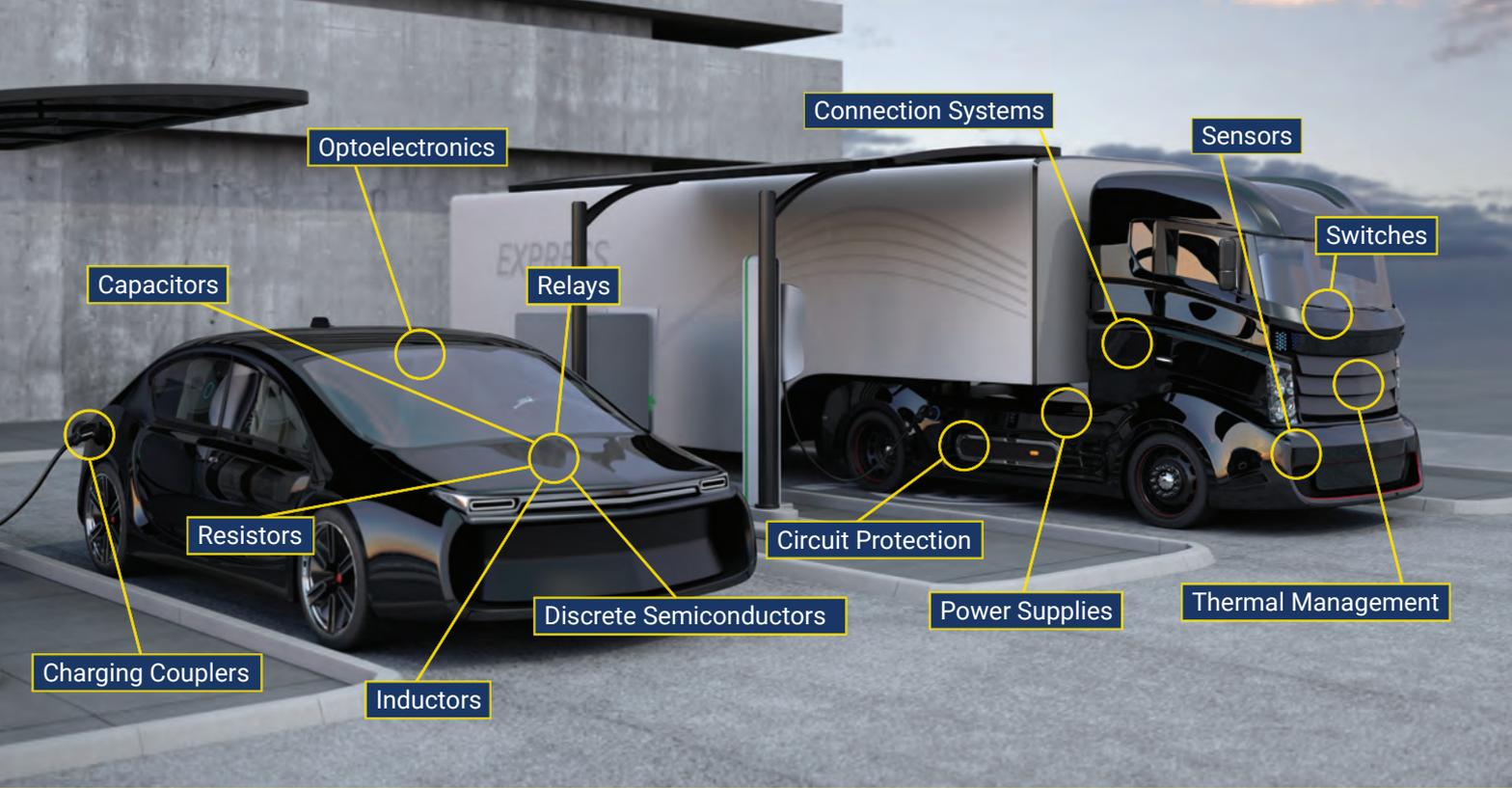


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Smaller OEMs and EMS providers need more from distributors than just parts

Often smaller companies need the same services as larger electronics manufacturers but on a smaller scale



James Carbone

Small and medium size OEMs and electronics manufacturing services (EMS) providers have always been the bread-and-butter business of electronics distributors as component manufacturers are unable to directly service the hundreds of thousands of electronics manufacturers that distributors do.

While smaller companies have always relied on distributors for components, increasingly they are becoming dependent on distributors for design expertise and assistance, value-added services, inventory management, demand forecasting, market intelligence and managing component obsolescence and supply chain risk.

Many smaller EMS providers also rely on distributors for bill of materials (BOM) scrubbing. Often, EMS providers get BOMs from their OEM customers. It's not unusual for part numbers on the BOM to not be industry-standard or be inaccurate because of the wrong number or letter in the part number.

Smaller customers often need such help because they lack the internal resources and abilities that larger OEMs and EMS providers have. Distributors are the go-to option for many such companies.

Distributors say for the most part, the needs and requirements of smaller customers are the same as larger companies that

may have the purchasing volumes to buy directly but choose to go through distributors in some cases.

Sue Leece, purchasing manager at EMS provider Saline Lectronics, based in Saline, Mich., said her company builds many types of board assemblies and has many quality certifications.

"It is very important for our suppliers to provide the same services to us as they would to any large EMS provider," she said. Saline manufactures printed circuit boards and electromechanical devices and provides testing and inspection services.

High expectations

Sean Sisson, vice president, North America, for distributor Rutronik, said that all customers including small ones expect a high level of service and quality. "They also are interested in supply chain programs and need support managing the supply chain," he said.

Sisson said value-added and supply chain services are just as important for small customers as large customers although "the level of services varies based on the customer needs."

Those programs are important because they reduce total cost for OEMs and EMS providers and allow them to operate leaner.

Many smaller customers also want technical support



Sue Leece, purchasing manager at Saline Lectronics

"It is very important for our suppliers to provide the same services to us as they would to any large EMS provider"

from their distributors. Some distributors offer design services to customers or can refer them to a design house. Many have field applications engineers to work with customers, and most provide data sheets, reference designs and development tools on their websites.

Sisson says customers expect Rutronik to provide them with insight about which parts are the best fit for a given application. Rutronik can assist them in the design of a board or subsystem through its technology center and with FAEs, said Sisson.

Wanted information, tools

Many companies, big and small, purchase from small-volume distributors, who specialize in

selling components for design. Often, they come to distributors, not just for parts, but for design tools and for information on technology trends and for help with part selection for a new design.

Mouser Electronics, based in Mansfield, Texas, provides a plethora of development tools for a wide range of products, including power management ICs, RF chips, optoelectronics, analog-to-digital ICs among others as well as bill of material tools

"We try to put as much content and tools on our website as possible to make it easy for them to find a part that they are looking for, and be able to see the cost, and the data sheets," said Kevin Hess,



senior vice president of marketing for Mouser. "We are giving them lots of what they need in order to source product," he said.

Hess noted that Mouser has customers of all sizes and its business is not dependent on a few large companies. In fact, it has 650,000 customers "buying from us in small amounts," he said. The average order is about \$350.

Distributors say that their smaller customers often look to them for market intelligence to keep them apprised of developments in the supply chain that may impact supply, prices and lead times. Leece says Saline buys components from six distributors that help keep Saline informed about developments in the supply chain.

"In this market, the more eyes and ears to help us fulfill our customers' requirements the better," she said. "Our distributors keep us informed on price increases, availability, obsolescence, lead times and substitutions and that helps us keep our customers informed," said Leece.

Dealing with tough issues

She added that some distributors visit Saline weekly to "build relationships and assist our

buyers with tough issues. This helps maintain the communication as well as providing us with the help we need to get the materials and the most aggressive pricing required by our customers," said Leece.

Some of the "tough Issues" involve managing risks in the supply chain including shortages, long lead times, component obsolescence, and supply disruptions caused by severe weather or natural disasters.

Matt Clark, global head of ecommerce for Newark, said Newark can provide sourcing assistance in shortage situations, as well as allow for some order scheduling. "We have inventory available from 8+ global distribution centers," he said.

A perfect forecast?

Paul Dosser, vice president business development for Digi-Key, said many tier "3 and 4 size customers are definitely asking for supply-chain support because of forecasting inaccuracy. "Smaller EMS companies can have heightened challenges because a lot of times their customer base that they support doesn't necessarily provide a lot of strong forecasting. There's never a perfect forecast," he said.

A lack of accurate forecasting can

Sean Sisson, vice president, North America, for distributor Rutronik

"They (smaller companies) also are interested in supply chain programs and need support managing the supply chain"



mean an EMS provider may not have enough parts on site if there is a sudden uptick in demand. The problem can be especially acute if parts that are needed, such as multi-layer ceramic capacitors or chip resistors, are in short supply.

He said Digi-key can provide customers with an "array of supply chain solutions" because of its "normal high in-stock model." Such solutions could include inventory management. "We offer a strong lineup of bonded inventory supply chain programs that cater to customer needs," said Dosser. "The key thing is whether you are small or large, there is no one size fits all solution," he said.

Besides inventory management, many smaller companies need assistance managing component obsolescence. Obsolescence is a problem for all size companies, but it may impact smaller OEMs and EMS providers more because they may not have the resources to keep track of end-of-life notices issued by component manufacturers when they decide to stop producing a part.

Dosser says Digi-Key keeps track of those notices and sends them to customers. "If someone bought a part from us over the last 1 to 2 years and we are notified by the manufacturer that the component is going EOL, we send customers an email about the notification and provide information about

substitute parts," he said. In fact, obsolescence is becoming more of a problem, according to a purchasing manager at an EMS provider based in Canada. "It's more of a problem because with the consolidation of manufacturers that has occurred over the last few years, they are obsoleting more and more components" and it's hard to keep track of them, she said.

Besides inventory management services and help with obsolete parts, many smaller companies also appreciate traditional distributor value-added services. One service that many customers use is custom tape and reel, said Dosser. Digi-Key takes parts from a large reel and puts them on a smaller reel as per the customer's needs. The customer does not need to buy a full manufacturer's reel.

Obsolescence: is anyone safe?

No longer the preserve of long lifecycle equipment, obsolescence can affect all manner of product and all kinds of buyer. Winslow Adaptics offers advice on handling unexpected EOL

As the relentless pace of innovation and globalisation continues across the supply chain, the search is on for cost effective solutions to the ever-increasing problem of electronic component obsolescence. This issue is no longer reserved for long lifecycle equipment such as aircraft or utilities infrastructure and in some cases, components have such a short lifecycle that they become end of life (EOL) before the production stage is reached.

It's not always easy to react in a timely manner to a last time buy notification. For example, purchasers may require decisions on commitment quantity, storage and who pays the bill before signing a purchase order. And of course, all of the above assumes awareness of the LTB in the first place.

It's also important to note that in times of product shortage and allocation, manufacturers are likely to bring forward end of life notices on slow moving products, sometimes with zero notice.

Hidden costs

The hidden costs associated with diminishing supply can be high and they should be considered before deciding which route to take for continued manufacture. Board redesigns are costly and time intensive. They can involve changing multiple components to maintain functionality and will often require submission for re-qualification. There are other costs too; the time a buyer spends trying to solve a

problem, the cost of scrapping PCBs as a result of a redesign, the cost of BOM changes and the resulting stock residues, and the cost of documentation changes.

As if that wasn't enough, the threat of counterfeiters taking advantage of a diminishing supply is also waiting in the wings to create havoc. A trusted supplier network is key to managing these risks to ensure authenticity and continued quality assurance.

Enlist support

Fortunately, there are organizations out there that can help with training and support to mitigate the risks associated with both obsolescence and counterfeiting.

ERAI provides its global members with a large searchable database of counterfeit components and high risk suppliers. It also provides InterCEPT, a web-based training program designed for the electronics industry. With a primary focus on counterfeit mitigation, InterCEPT programs tackle counterfeiting from different angles, including introducing new employees to complex supply chains and supporting adherence to industry standards.

IIOM International is dedicated to improving the knowledge and best practice of obsolescence practitioners through education, networking and process development. The US chapter of IIOM is expected to be licensed by June 2019

and will be holding meetings before the end of the year. The Department of Defense has expressed its support for the program and has started to send delegates to the UK for training.

Aftermarket solutions

An aftermarket solution is also a valuable resource when stock availability is scarce. Invariably, the die of the original package is available in another footprint and it is a simple process to adapt these packages to interface with your target board. Knowledge of alternative packaging options broadens the scope of component monitoring and visibility, maximizing the opportunity to secure continued supply from your approved manufacturer list.

When engineers conclude a redesign is the only viable route, design and qualification costs can reduce significantly by retargeting the function of your original component into a multichip module that emulates both the physical and performance attributes of its predecessor.

Winslow Adaptics, represented by NAC Semi, St Petersburg, boasts the design and manufacturing strengths to seamlessly integrate form, fit, and function alternatives at component level. Solutions include part manufacture alternatives for ASIC, FPGA, and intelligent LEDs along with simple footprint converters and daughter boards.

www.winslowadaptics.com



ERAI provides its global members with a large searchable database of counterfeit components and high risk suppliers. It also provides InterCEPT, a web-based training program designed for the electronics industry

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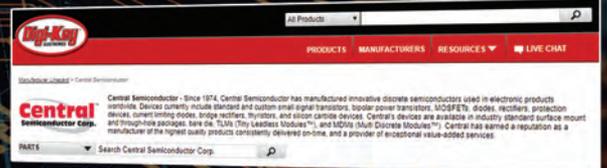
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John Denslinger is a former executive VP Murata, president SyChip Wireless, and president/CEO ECIA, the industry's trade association. His career spans 40 years in electronics

Anti-counterfeiting: protect the brand

In this article, John Denslinger argues that when faced with difficult purchasing decisions, buyers should make brand protection a prime objective

Anti-counterfeiting • By John Denslinger

For several years now, a lot has been written about the perils of counterfeit components. Countless articles have extolled the virtues of buying solely through the authorized channel. 'Caution and concern' are the typical descriptors employed by many raising and maintaining awareness. I too strongly recommend the procurement community should always source directly from suppliers and their authorized distributors. The authorized channel is still the best and only safeguard against counterfeit components entering the supply chain. Helping the industry resolve counterfeiting is a core tenant of ECIA, with its initiatives and recommendations presented at www.ecianow.org.

Under any buying scenario I can think of, caution and concern is a normal reaction. The next step though, taking action, is more about protecting the brand. Too often that one per cent sourcing problem consumes one hundred and ten per cent of your sourcing energy. I can easily appreciate the need to move swiftly when the heat is on. If you're the buyer, it's one thing to mistakenly purchase counterfeit components or take calculated risks with the best intentions, but it is a whole different matter when that action injures the company: injures its brand.

Brand is nothing more than your company's good name, goodwill, reputation and alike. Brand is how you want your company perceived by your customers, suppliers, employees, investors, shareholders, etc. In short, when the logo appears how do others see, feel, think, and regard the company. Historically, companies will go to great lengths to:

- Build the brand via promotion, image advertising, community engagement, education, etc
- Enhance the brand via product development, commitment to exceptional quality and customer service strategies, acquisitions, etc

- Protect the brand externally via patents, litigation, partnerships, etc
- Protect the brand internally via policies, procedures and processes

To a company, establishing and maintaining a best-in-class brand is everything and arguably most expensive.

Perhaps a sidebar is in order at this stage. It's important to connect two global dots that are often overlooked: is it counterfeit or is it fake? A little more than a year ago, I had the opportunity to address a large group of local Chinese and international component distributors and manufacturers in Shenzhen at an event hosted by CEDA. In the course of that presentation, I quickly realized fake was the term most commonly used in that part of the world, not counterfeit. Also of note, they too expressed a similar frustration in policing fake products similar to their western counterparts. So if your supply chain tends to be global in nature, keep in mind counterfeit and fake are one and the same.

So in summary, every counterfeit or fake product situation still demands a measure of caution and concern. Perhaps it is not realistic to say each and every shortage has an authorized channel solution, but if you find yourself in that situation, be vigilant. Protect your brand first and foremost. Make that the prime motivation for your sourcing decision.

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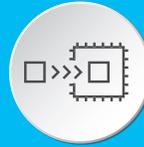


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Distributors become more strategic to buyers through acquisitions

Electronics purchasers are finding that consolidation in distribution is improving the capabilities and enhancing the value of distributors

Many strategic electronics purchasers are often skeptical when they hear about one large electronics supplier acquiring another, fearing it may lead to less competition, higher prices and poorer service.

In recent years, buyers have been especially concerned with consolidation in the semiconductor industry where there have been 74 mergers and acquisitions over the last four years, some of them involving the world's largest chipmakers, according to researcher IC Insights. However, there also has been consolidation in electronics distribution as larger distributors have acquired smaller, sometimes specialized distributors that have the product families that supplement the acquiring company's own portfolio or provide larger distributors with entry into an underserved geography.

Mergers and acquisitions in distribution aren't just about one distributor acquiring another. Distributors' acquisition strategies are changing because the needs of customers are changing. Some large distributors are acquiring software companies or companies that specialize in providing services to OEMs to help them bring products to market faster and more efficiently. Other

acquisitions have involved distributors buying companies that help OEMs develop and implement Internet of Things or artificial intelligence products and applications. Some acquisitions are for companies that provide product refurbishment and asset recovery and disposal services.

Large distributors are making acquisitions to help them service customers throughout the product lifecycle from product design to product disposal. They believe they need to have such capabilities to succeed in an ever-increasing competitive electronics marketplace.

This can be good news for buyers who purchase the bulk of their production requirements through distribution because distributors may be able to serve as a one-stop shop not only for semiconductors and other components, but for services throughout the lifetime of a product.

The acquisitions that large distributors have made in recent years reflect change in their M&A strategies as well as their overall business strategies. Arrow Electronics, based in Englewood, Colo., says it makes strategic acquisitions to grow sales faster than the market, increase the markets served,

grow profits faster than sales, and increase return on invested capital. The idea is to broaden Arrow's product and value-added service offerings, increase its market penetration, and expand its geographic reach.

The distributor says acquisitions supplement its organic growth and broaden its digital capabilities to meet the evolving needs of customers and suppliers. "These acquisitions also expanded the global components business segment's portfolio of products and services offerings at every phase of technology deployment, including custom hardware and software, and new Internet of Things based business models," the company said in a recent 10-K filing.

Arrow's recent acquisitions include eInfochips, Immixgroup, and Commtech. Einfochips is a product engineering and semiconductor design services house that specializes in IoT, and product transformation capabilities. Immixgroup is a value-added IT distributor. Commtech is a value-added distributor specializing in infrastructure and securities focusing on data centers.

One distributor that has been active with acquisitions is Avnet. Over the past four



Avnet CEO
Bill Amelio



We want to be able to service customers from the inception of an idea all the way through full-scale production and then to end-of-life, the full lifecycle of a product

years, Avnet has acquired distributors Premier Farnell and Orchestra Service GmbH, a specialist German IT distributor of storage solutions and services focusing on EMC products. But it has also acquired software and services companies including Softweb Solutions, Hackster Inc. and Dragon innovation. Softweb is a software and artificial intelligence company that provides software solutions for Internet of Things (IoT) applications and systems to ramp up efficiency and speed time to market for businesses. Dragon Innovation helps hardware companies of all sizes move from prototype to high-volume production quickly.



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Servicing the lifecycle

Avnet CEO Bill Amelio said that the acquisitions have helped Avnet better serve its customers. “We want to be able to service customers from the inception of an idea all the way through full-scale production and then to end-of-life, the full lifecycle of a product,” he said. At the same time, Avnet has been able to “take out complexity, cost and improve time-to-market for our customers because we have pieced together acquisitions in a very thoughtful way,” he said.

The acquisitions have also positioned Avnet “to be a technology solutions company and not just a distributor,” said Amelio.

In 2016, Avnet acquired Premier Farnell, a small-volume, high-service distributor that focuses on design and new product introduction. Premier Farnell is helping Avnet to grow organically because Premier Farnell works with OEMs on design of new products. Once those new products go into volume production, Premier Farnell can “hand over leads to Avnet,” he said.

Amelio said that it is rare for Avnet to make acquisitions to acquire product lines. “We already have kind of the Who’s Who of suppliers. When we do an acquisition, it’s typically to pick up a geography or to improve its footprint within a certain geography,” he said.

Amelio added when Avnet considers acquiring a company, it factors in whether the acquisition will help Avnet improve its business in high-growth vertical markets.

With Avnet’s existing customer base, those vertical markets include automotive, industrial, mil-aero, “and to a lesser extent, communications, consumer. We see plenty of growth potential in industrial and automotive space as more things are electrifying” and more components are needed for those products, Amelio said. For instance, even though unit sales of cars were “muted this past year, the electronic components inside the cars continue to accelerate. That’s a great growth position for us,” he said.

Avnet also factors in whether an acquisition will help attract new customers. One example is Internet of Things. “There probably isn’t a day that goes by when you don’t hear something about IoT,” said Amelio.

Many companies with little or no previous experience with electronics want to connect their products to the Internet. Startups are building new IoT products. “IoT is very difficult to implement for most companies,” he said.

One of the things that Avnet has done with its acquisition strategy is “put together one-stop shopping at Avnet” for customers looking for an IoT solution, said Amelio. “We’re able to do the device, the network, the gateway, the cloud, the analytics, write the applications and give the customer insights,” he said.

Another distributor that has made significant acquisitions is TTI, based in Fort Worth, Texas. TTI acquired Mouser Electronics in 2000 and a number of other distributors since then including Astrex, Sager, and Capsco. In 2017 TTI acquired semiconductor specialist Symmetry Electronics, and last year TTI bought RFMW, another semiconductor specialist and Changnam, a specialty

distributor of semiconductors for the automotive, consumer electronics, industrial and wireless end markets, based in South Korea. It also acquired Compona AG of Switzerland and Compona’s German subsidiary Cosy Electronics GmbH. Both Compona and Cosy are specialty distributors of interconnect products and provide services such as in-house assembly of specific connector ranges and full support on custom cable harnesses.

Some say no to M&A

Many distributors make acquisitions to grow sales and market share, but not all are convinced that acquisitions are necessary to improve financial performance. For instance, Future Electronics, based in Montréal, has only made about five acquisitions in the entire history of the company, said Dan Casey, executive vice president. All of the acquisitions were small.

“Sometimes it was for a supplier line or to gain immediate entry into a region of the world,” he said.

For instance, about 15 years ago, Future purchased Austrian distributor Steiner. “We thought rather than putting an office in Austria we would acquire a local Austrian distributor that was very strong on demand creation side, but didn’t have a big warehouse, didn’t really have an IT infrastructure,” said Casey. Future acquired some small distributors in China in the 1980s and acquired a company that specialized in production supplies. Its last acquisition was 2008 when it bought PN Electronics in France, a distributor of electromechanical, passives and semiconductors.

It has not made big acquisitions as Arrow, Avnet and some other global distributors have. “We have found that the acquisitions



Dan Casey, executive vice president at **Future Electronics**

have not been accretive to our business,” said Casey. “Acquisitions are a lot of work unless you have a team that specializes in M&A and we don’t. We’ve always grown organically, which suits us,” he said.

While acquisitions can be beneficial because a distributor can gain access to customers, acquire new product lines and boost sales, there are some advantages to not pursuing them, said Casey.

When a distributor acquires another, there can be issues with warehouses, inventory, and supplier alignment, according to Casey. In addition, the acquired company has to adapt to being part of a larger company “where maybe they (the acquired company) doesn’t make all the decisions at all times. That can be challenging for the management of the ownership of the company that was acquired,” said Casey.

He noted that Future has “a unique, very deep culture. It is one of our strengths globally and then when you bring someone in who is used to just doing things differently, it is quite a big adaptation for them to learn and accept,” said Casey.

Casey acknowledges that large global distributors such as Arrow, Avnet, WPG have been very “acquisitive” and have increased their top lines by purchasing other distributors and other companies. “They have bought companies that were well in excess of \$1 billion. Overnight they certainly added to the top line,” said Casey.

However, as more acquisitions occur, eventually it will be impossible to consolidate, according to Casey. “I don’t know if they can make any other acquisitions in North America except for some small regional distributors. If there is consolidation, it likely will be in Asia,” he said.

Organic growth only

Another distributor that is averse to acquisitions is Digi-Key, based in Thief River Falls, Minn. Digi-Key has chosen to grow organically, not through acquisitions. Dave Doherty, Digi-Key president and chief operating officer, said Digi-Key has had robust growth for years without acquisitions.

“We’ve been fortunate that organic growth has been more than sufficient to satisfy our needs and bring value to our customers,” he said. He noted there are several reasons why a distributor acquires another and they often are directed at serving the needs of shareholders, not customers.

Sometimes a distributor will acquire another distributor to grow market share or enter a region that the distributor is not currently serving. Some companies need to make acquisitions to be economically viable. For whatever reason, the distributor may be “in a difficult situation” financially and may decide to acquire a company to improve its economic standing.

“Often that goes hand-in-hand with cutting costs,” he said. “If they can acquire and consolidate backroom offices, whether it’s HR, IT or whatever” it can help improve the distributor’s financial status, said Doherty.

He said because Digi-Key is privately owned, it only has to serve its customer base, not shareholders. “I don’t know if you can serve shareholders and customers the same way,” said Doherty. “They have disparate needs and often times you’re compromising one versus the other,” he said.

Doherty added that there’s something about staying “smaller and nimble and to stick to what you’re good at.” He noted that while Digi-Key has not acquired companies, it works with IT and web partners to address the needs of customers.

“We’ve been fortunate that organic growth has been more than sufficient to satisfy our needs and bring value to our customers

While, Digi-Key has not made acquisitions to grow sales, “this is not a never strategy. We have just never found a need to have to do it,” said Doherty.



Dave Doherty, president and COO of **Digi-Key**



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Digging around for alternatives

With the growth of the fracking industry, TTI has been helping oilfield service companies cut the cost of drilling rigs with an innovative approach to specifying high reliability electronic components

Few environments are as inhospitable as those encountered by an oil and gas downhole tool searching for petroleum 10,000 feet below the surface. In offshore drilling operations, temperatures can reach over 200°C while shock and vibration are standard. Equipment also has to dive through the ocean before beginning operations, so specifying electronic components that can withstand these conditions creates an expensive bill of materials.

Traditionally, offshore drillers have relied on military, aviation and space level components to ensure tooling performs flawlessly for the equipment's ten- to fifteen-year service life.

Fracking growth

Jim McNeil, general manager of TTI's Houston branch and his team have worked with leading petrochemical companies for years. They understand the demands the

industry places on electronic components, but also the fickle nature of the oil and gas business and nothing, McNeil says, impacted that industry like the volatility of the fracking revolution.

Fracking, the process of injecting high-pressure liquids into oil rich subterranean formations to release oil and natural gas, changed the global landscape in petroleum production. As the majority of production moved back to land-based operations, the United States went from being a net importer of foreign petroleum, to the world's leading oil producer, with a rapidly expanding land-based rig count.

As the economic and geopolitical aspects of this oversupply played out, global oil prices crashed. Meanwhile McNeil and his team worked with oilfield service companies in North America to help pull costs out of their production process.

Cutting component costs

While land-based drilling still requires robust electronics to perform in harsh environments, the conditions are not as extreme as those found offshore. In many cases, McNeil explained, the solution could be found by looking just a few inches under the hood of an automobile, rather than thousands of feet underground. The hot, vibrating environment of automotive electronics, exposes components to water and grime, and the whims of Mother Nature. Even better, the millions of cars produced each year meant that these components were certified at a price point covering everything from motorcycles and passenger cars, to 18-wheelers, buses and tractors.

Oilfield service companies could take advantage of the smaller component sizes and lower power operations introduced with each new wave of component

architecture, as well as cross-referencing components to the automotive high-reliability standard, complete with certification and field proven capabilities, at a much lower cost.

Sourcing alternatives

This type of thinking can apply to many situations, not just global energy production and Fortune 500 companies. An authorized distributor like TTI combines in-house expertise with component manufacturer resources to cross-reference available components that meet similar specifications or even common-off-the-shelf components that can do the job without expensive testing certifications. So, when your next design calls for high-reliability components to operate in a harsh environment, it may be worth digging around for alternatives.

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About

Part of Berkshire Hathaway, Mouser specializes in the rapid introduction of new products and technologies for engineers and buyers worldwide. The company's extensive product offering includes semiconductors, interconnects, passives, electromechanical, plus a vast range of other components from more than 700 leading manufacturers. Mouser sells millions of tiny parts that function as the essential building blocks of new product design. Every day, multiple times a day, Mouser gets the newest, cutting-edge components that are smaller, faster and smarter. If your job is to solve new problems, invent new things and answer the questions no one has asked before, Mouser is your distributor.

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spearheads the development of new design ideas. Mouser also supplies engineers with new information to aid the design process — and lots of it. Detailed technical information can be found on its Newest Products and Applications & Technologies sites, turning knowledge into know-how.

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With a commitment to customer service excellence, 23 global Customer Support Centers, the widest product selection, plus same-day shipping, Mouser helps customers get innovative designs to market faster and easier. The company works hard to make sure customers always get what they need, when they need it. To help expedite orders and answer questions, each location provides local language support (17 languages) and can transact business in the preferred local currency, all from the same time zone. So, relax and rely on Mouser for your component needs.

DISTRIBUTOR SALES GROW AGAIN IN 2018 AS ELECTRONICS MARKET CONTINUES TO EXPAND

The global expansion of the electronics market continued in 2018 but the clouds are gathering for 2019

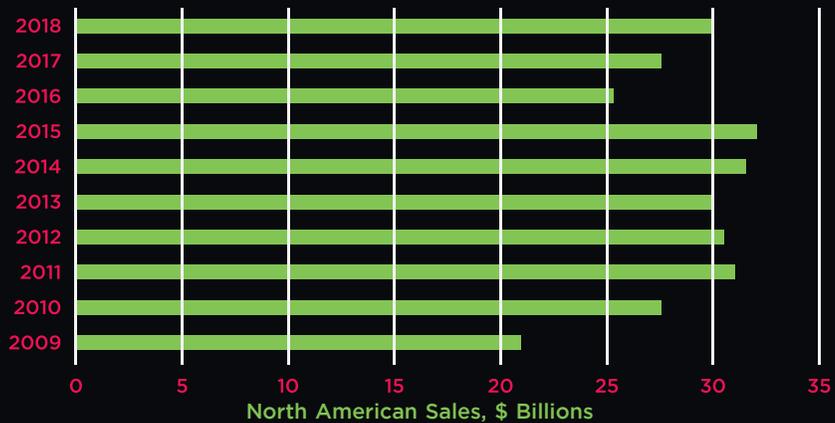
Aubrey Dunford
managing partner,
Europartners Consultants

The North American (NA) franchised distribution industry continued its growth in 2018. After an eight percent growth in 2017, 2018 growth accelerated to 9.8 percent. In compiling this year's top 50 distributors list we have considered only sales through franchised distributors. For some companies this means that we have reflected lower sales to reflect the non-franchised element of their business. Had we not done this then the overall growth in sales of the top 50 would have been 10.7 percent. Our figures therefore show that the sales of the top franchised distributors grew from \$27.5 billion in 2017 to \$30 billion in 2018. Historic data includes sales by Avnet through its Technology Solutions business prior to 2016 so direct comparison with years prior to that is not possible.

As in 2017, the increase in demand across virtually all market segments meant continuing shortages of some commodity components and long-lead times in every product category.

Sales of semiconductors (active components) by distributors in North America grew by 10.7 percent to \$14 billion whilst sales of passive and electromechanical products grew by 19.5 percent to just under \$6 billion. Sales of interconnect products fell by -6.5 percent in 2018 to \$2.43 billion although this figure has been influenced by our estimates in removing the sales of non-franchised components. Sales of computer products are becoming less important to the top distributors as this business moves away into other channels.

Throughout the main broadband distributors meeting demand continued to be the dominant issue in 2018. "In a



shortage we tend to do well because we have a lot of inventory that is focused on our customers", said Jeff Newell Sr. VP, Products at Mouser Electronics. "We were able to back-up our customer support with a very healthy inventory position".

Dave Doherty, President & COO at Digi-Key agreed. "We had some indication in 2016 that there were constraints in the market and so we were proactive in building inventory ahead of what turned out to be the upside cycle. We worked with the manufacturers to put things in place."

"We have had to be more aggressive with holding our inventory," said Don Wagner President & COO at Bisco Industries, a broadline non-semiconductor distributor. "We have made commitments to additional inventory to overcome longer lead times"

"When you get product shortages across a range of products, you get the emotional factor on top of that, a scarcity mentality starts to become part of the mindset. That only worsens the challenges. Customers want to hold more inventory which puts even more pressure on the supply side," explained Doherty.

Distributors have a vital role to play in times of shortage. Doherty continued, "Small customers cannot negotiate with the suppliers who are so big, so they rely

on us [the distributors] to make sure their voices are not drowned out by the large OEMs, particularly the automotive players. Everyone's voice needs to be heard."

"Also, today many customers do not have a component engineer, so we are able to help our customers. Sometimes people can use alternatives, such as a different tolerance, a different voltage or different temperature range. A buyer may have a specific part number but in times of shortage distributors can help. We have to be more creative in how we work together"

Could the manufacturers have done more to bring on more capacity, quicker? "Suppliers are not able to turn on supplies at the drop of a hat," said Newell. "We need to improve our communication," appealed Doherty, "Manufacturers have to sustain a level of profitability, so when prices go so low, they naturally were re-allocating capacity. Then when the demand shifted, they were unable to react. We need to have pro-active discussions up and down the supply chain. Customers always want the lowest price, but suppliers need to let customers know when they can't go any lower. With better communication maybe we could have avoided some of the situation." But the supply situation was not universal. "We saw some minor lengthening of lead-times, but we were not affected like other parts of the industry," commented Mark

Zack, President of Symmetry Electronics who were the fastest growing distributor in 2018 in our top 50 listing. Symmetry were acquired by TTI group in 2017 and forms part of the TTI Semiconductor Group. "We want to be a specialist, there is no desire to be broadline distributor," continued Zack. "We are going to maintain our focus and specialization, which is in IoT, wireless and video. TTI's strategy grew them into a major company and now we are bringing that strategy into the semiconductor world". When asked about their high growth in 2018, Zach replied, "Bringing good rich talent into our organization has fueled our growth." "We want to grow fast but not too fast," added Brett Smith, Symmetry's VP. "We have a roadmap of adding more sales people and more technical resources but we need to get the right people."



New product introductions in the long tail continue to show growth

Dave Doherty, president & COO, **Digi-Key**

Getting the right people is also an issue at Bisco Industries. "We have added 35 sales people to our 300+ sales team in the past year," said Wagner, "One of the challenges was in hiring the right people. We now have four full time recruiters working on finding the talent that we need." 2018 was a good solid year of growth for

the North American Distribution Industry, so what are distributors seeing in 2019?



Customers can rely on us to guide them through unsteady market conditions

Terry Bassett, chief strategy and innovation officer, **Avnet**

"China experienced some slowing in the second half of 2018," observes Doherty. "Some of the shortages are starting to dissipate, and that allows us to focus on the core of NPI type customers and short-run production. In both these areas in EMEA and the USA it appears to be pretty strong. So [for 2019] growth will not be so strong, but it will allow us to take a breather and build up our infrastructure. It will not be ridiculous growth, but by no means are we slowing down, or any less aggressive or optimistic."

"We are seeing some softness coming into the market especially in China," said Newell. "When China has a cold then other countries get it. It is not all doom and gloom, but we are seeing a different demand profile hitting us this year. The market sectors are different and the products are different. There will be some inventory correction. Commodity MLCC's are getting back to normal but there are still issues on the higher end (older legacy products). The challenge will be getting

through the natural inventory cycle. The inventory will correct itself as the big distributors see their backlog reduce. We expect that there will be less 'shortage orders' than last year."

"In 2018, we had a strong year where demand for products exceeded capacity. Now in the first part of 2019, there are some mixed signals regarding market demand. The North America and EMEA regions are continuing to perform well; however, we are seeing some weakening demand across Asia," said Terry Bassett, chief strategy and innovation officer for Avnet.



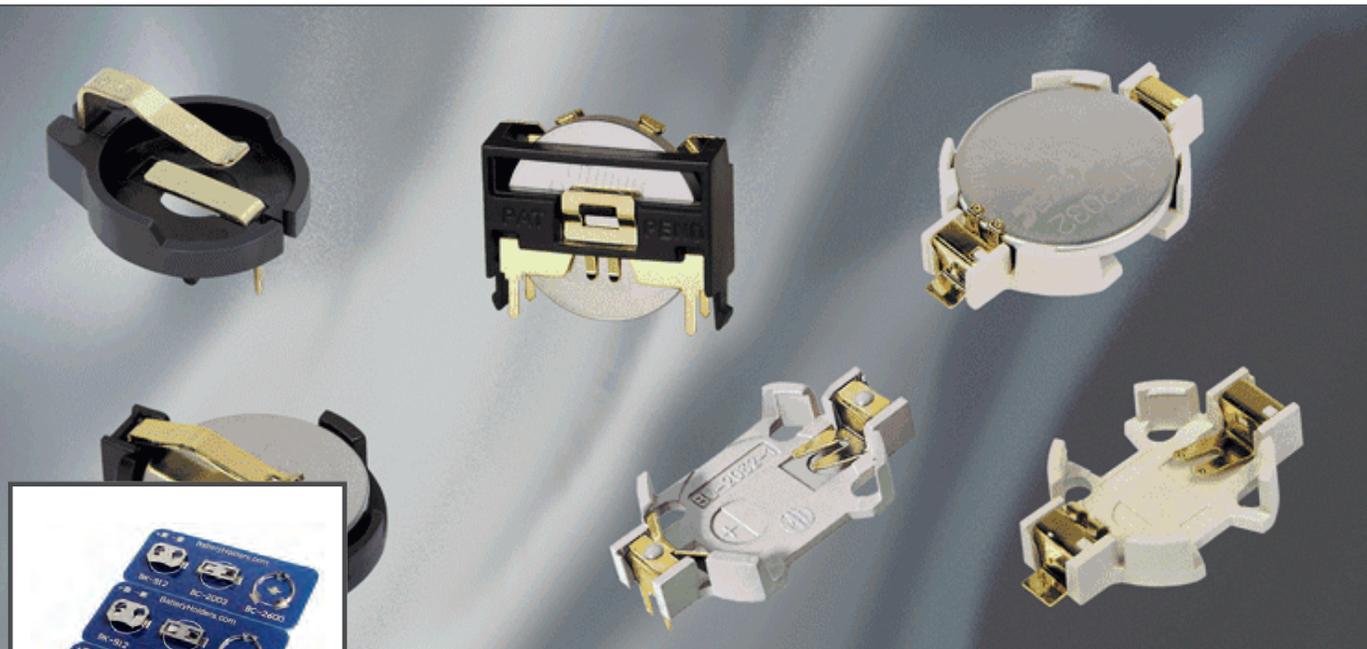
We see significant growth in our key market areas, especially in aerospace

Don Wagner, president & COO, **Bisco Industries**

"Lead-times seem to be stabilizing and getting better as the manufacturers have ramped up but there is still pressure on lead-times and in some cases pricing as well," said Wagner, "but we have not seen significant price increases from manufacturers over the past year even when lead times have been stretched - that is a little surprising. Customers however want long term agreements to lock in pricing for 24-36 months."

Continue on page 28 »

Company Profile



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ELECTRONICS DISTRIBUTORS SEE FURTHER REVENUE INCREASE IN 2018

Throughout the history of the electronics industry the market—and more especially the market for components, the value of the market on an annual basis looks like a design for a roller-coaster with dramatic ups and downs. After a decline in 2016, a rise of 8 percent in 2017 brought a different set of challenges. One of the key questions was—Is this upturn going to last? The data for 2018 shows that despite the difficulties, the revenue of the top distributors in North America grew by a further 10 percent.

Throughout 2018 as in 2017 there have been shortages in several areas mostly in commodity products such as passive components and also semiconductor products such as power transistors.

The revenue of the top electronics distributors increased by \$2.7 billion from \$27.3 billion to \$30 billion, according to a survey undertaken for *Electronics Sourcing North America*. The expansion of the sector could also be seen in other ways. Of the companies that provided employee data in our survey 53 percent had increased their headcount and 32 percent had maintained their employee numbers. 16 percent had cut their workforce.

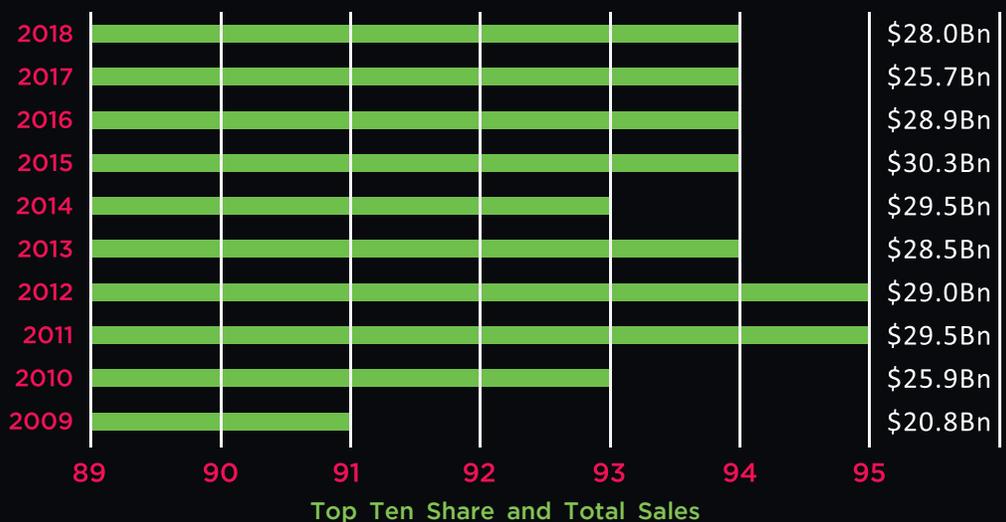
Sales of semiconductors (active components) accounted for 57 percent of the total NA distribution sales which is the same share as in 2017. Total sales for the top distributors increased by 10.7 percent although some of this increase

is due to bringing the NA sales of WPG into our top 50. Without this the increase would have been 9.4 percent. In our survey 26 companies provided figures for semiconductor sales. According to World Semiconductor Trade Statistics (WSTS) the total growth in semiconductors sales in the Americas as a total was 16.4 percent. Some of the highest growth areas for semiconductors are not in markets that are served by distributors.

Passive and electromechanical product sales accounted for 24 percent of the total sales up from 23 percent in 2017. This figure is based upon 37 companies who supplied sales figures. The total sales

of these companies was \$5.9 billion up from \$5 billion in 2017 an increase of 19.5 percent. According to The Electronic Components Industry Association (ECIA) global sales of passive products increased in 2018 by 25.2 percent. They report that global average selling prices increased by 7.3 percent. They also state that the Americas account for about 10 percent of the global sales. There can be little doubt that with the supply constraints that there were in 2018 around many passive products that sales price increase has contributed to the market growth.

Continue on page 32 »





Sager Electronics 130 Years and counting



About

Grounded in over 130 years of innovation and service, Sager Electronics is a North American electronic component distributor of interconnect, power and electromechanical products, and provider of value-add solutions. Our Distributing Confidence® business model goes beyond fulfillment to provide our customers and suppliers a unique combination of operational excellence and innovative business solutions.

Proud Tradition of Innovation and Service

Sager Electronics began in 1887 as a single storefront in downtown Boston that serviced the growing interest in radio technology. Under the vision and leadership of Joe Sager, the company rapidly established a statewide distribution system for home radios and related components. To further stimulate demand, Sager sponsored a weekly musical radio show and, in 1926, Sager developed the format for play-by-play broadcasts of the Boston Bruins' hockey games. Despite the onset of the Great Depression, Sager continued to grow by bringing new electrical products to Massachusetts' consumers.

From Retailer to Distributor

At the onset of WWII, Sager reacted to the critical demand for electronic

components. The company refocused its operations to supply electromechanical components to the U.S. military. This transition positioned us to emerge as the leading regional electronic component distributor at the beginning of the consumer electronics market in the 1950s and 60s.

From Regional to National Prominence

Anticipating the explosive growth in electronics, in 1977, we relocated our headquarters to more spacious facilities in Hingham, MA and began building a national network and infrastructure. This included the prudent acquisition of smaller regional distributors and the creation of regional support facilities to service our expanding network of customers and suppliers.

Today Sager services our growing customer base via headquarters and a state-of-the-art distribution center in Middleborough, MA, a national network of field account representatives and sales engineers, strategically located service centers across North America, and a Power Solutions Center offering value add capabilities in Carrollton, TX. In June 2014, Sager Electronics acquired PowerGate LLC, a premier North American power specialist distributor. The

acquisition preceded Sager's most recent purchase of Norvell Electronics in July 2015. Norvell was a North American power products distributor with extensive design and value-add capabilities.

From National Prominence to Distributing Confidence®

Throughout our long history, the key to our success has been our constant commitment to exceeding the expectations of our customers. Our unique Distributing Confidence® business model puts our customers' needs at the center of all our activities. From our customized services like bonded inventory programs, VMI, BOM quoting, credit, inventory management and value-added capabilities to our branded line card of authorized manufacturers, Sager Electronics has become a full partner with our customers.

In 2012, Sager Electronics was acquired by TTI Inc., a Berkshire Hathaway Inc. company. As a wholly owned subsidiary of TTI Inc., Sager continues to operate as it always has. Our customers can expect the same level of service and commitment from Sager with the added strength of TTI Inc. and Berkshire Hathaway Inc.



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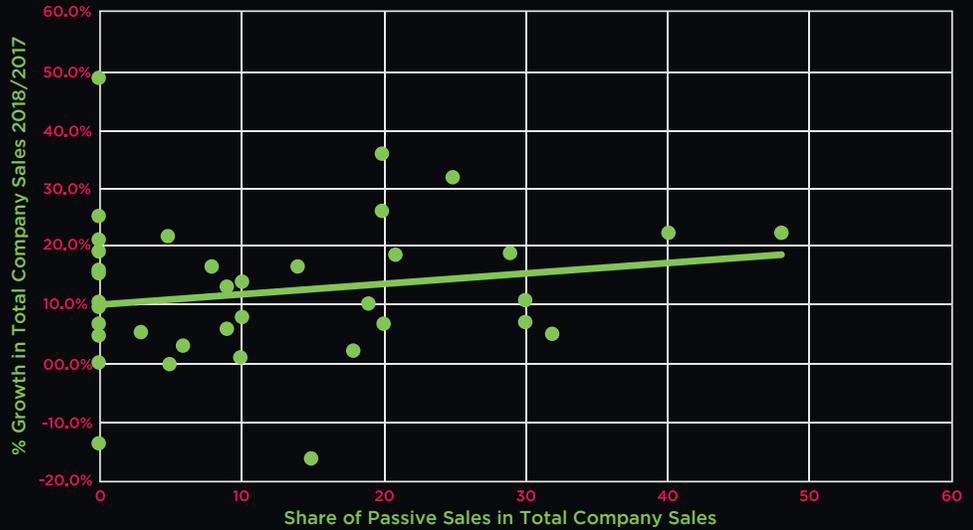
» Analysis of the sales growth reported by the top distributors shows that companies with no sales of passive components grew on average by 10 percent whereas companies with sales consisting of 30 percent of passive products grew by around 16 percent.

Interconnect products made up 10 percent of the top distributors sales in 2018, down slightly from 11 percent in 2017. 32 companies reported their sales in our survey. This brought the sales in 2018 to \$2.4 billion, down 6.5 percent from the \$2.6 billion in 2017. According to data published by Bishops & Associates total sales of Connectors in North America grew by about 12 percent in 2018.

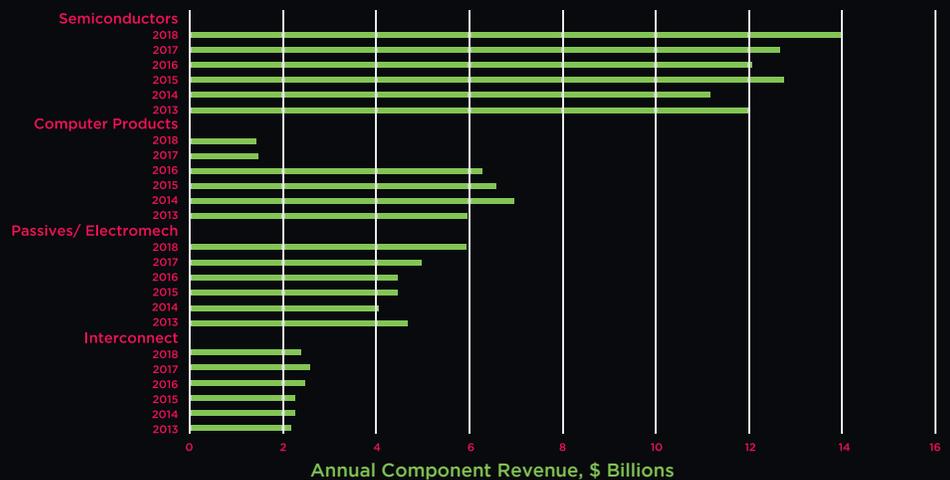
Computer products continue to be less important to the top distributors of electronic components. There are many distributors for computer products who do not hold franchises for electronic components and therefore do not appear in our survey. Only 15 companies reported sales of computer products and these totaled \$1.45 billion in 2018 down by 2.7 percent from \$1.5 billion in 2017. Overall this segment accounts for 6 percent of the total sales in 2018 down from 7 percent in 2017. Many large companies who had significant sales in this product area have withdrawn from this market segment for example, Avnet who sold its Technology Solutions business in 2016.

As with computer products as mentioned above, many of the authorized distributors for electronic components are increasingly concentrating on the sales of components and thus sales of other products are becoming less significant with only 21 companies reporting sales in this category. Other components cover a broad range of products including batteries, power products, thermal products, filters and test and measurement products. Of these the use of batteries as components is significant with two distributors in the survey reporting their sales almost totally within this category. House of Batteries (Ranked 29) and Fedco Batteries (Ranked 39T). Overall the reported sales increased by 34 percent from \$484 million to \$651 million.

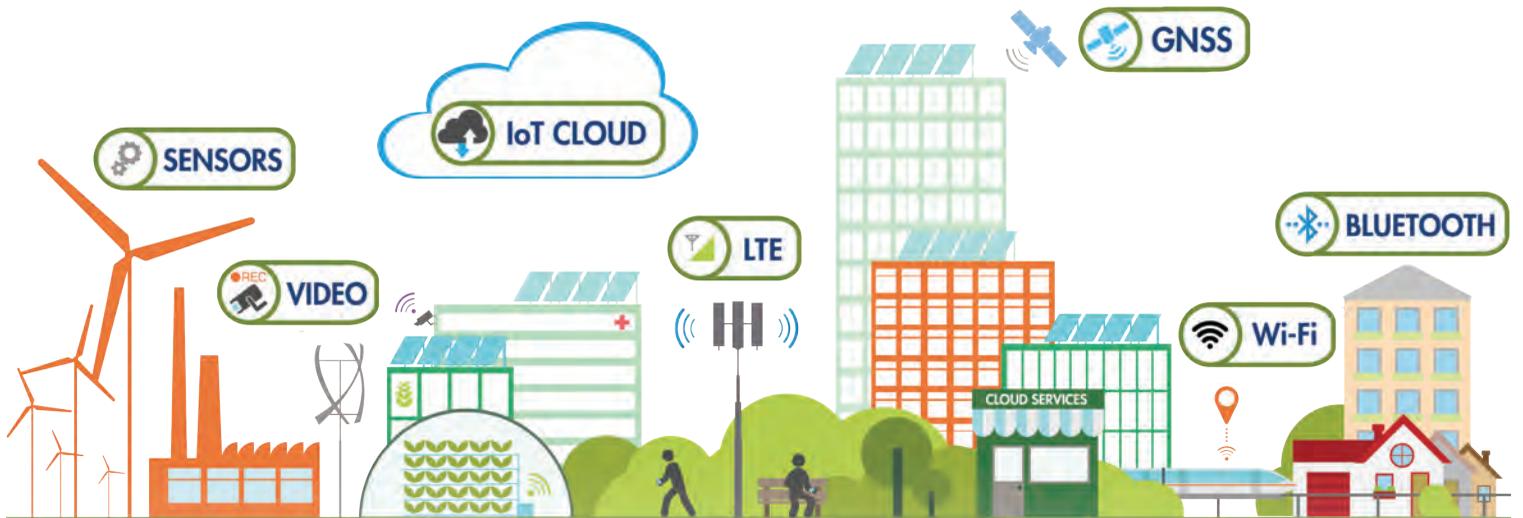
Companies with Higher Passive Sales Show Higher Growth



Passives/Electromechanical Show Strongest Growth in Component Categories



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Symmetry

ELECTRONICS

Symmetry Electronics is a global specialty semiconductor distributor offering advanced technologies in wireless, IoT and video, with a focus on technical expertise and customer service, supported by a worldwide sales and engineering team.

Founded in 1998, Symmetry Electronics is headquartered in Los Angeles, with international offices in Mexico, Brazil, Canada and China. In 2017, Symmetry was acquired by TTI, Inc., a Berkshire Hathaway company. Symmetry continues to expand globally by adding applications engineers and sales representatives domestically and internationally. Symmetry remains committed to unmatched customer service through highly trained applications engineers, ready-to-ship inventory, and a focused line card.



Engineering

Symmetry offers supplier trained technical support & applications engineers to assist with part selection and throughout the design process.



Inventory

With ever increasing inventory, Symmetry stocks thousands of parts for immediate delivery, so customers don't experience allocation issues.



Focus

Symmetry's line card offers an unparalleled wireless, IoT, and video focus, with an emphasis on strong customer service.

»Overall, 2018 saw a further expansion of the North American distribution market by 10 percent. Of the 48 companies who provided sales turnover for our survey, 38 companies reported sales growth with an average growth of 14.6 percent, seven companies reported flat sales and three reported a decline in sales. Twenty-Four companies had double digit growth up from 21 companies in 2017.

Within the top 10, six companies had double digit growth. Notably Mouser reported a growth of 35.6 percent, (although the highest growth was reported by Symmetry Electronics who were acquired in July 2017 by TTI). Mouser's growth was only marginally ahead of Digi-Key with a growth of 31.7 percent. TTI itself reported a growth of 22 percent.

The two top distributors also grew their sales with Arrow reporting a 10.1 percent increase whilst Avnet which had a more difficult year due to the changes brought about by consolidation in the semiconductor industry posted a growth of two percent.

Unusually the top two distributors did not make any acquisitions in 2018. TTI group expanded in 2018 by acquiring RFMW in North America (ranked 20 on our listing

for 2018), Compona AG (Cosy Electronics) in Europe and Changnam I.N.T in South Korea. Subsequently TTI announced the formation of a new TTI Semiconductor Group which consists of Symmetry Electronics, Changnam and RFMW.

Other distributors are looking to expand both their national and international reach. In May 2018 Mouser opened a new Canadian Customer Service Center, located in Kitchener-Waterloo, Ontario and Diverse Electronics also expanded its sales activity in Canada. Chip 1 Exchange an independent distributor headquartered in Germany are expanding their presence in Mexico. Waldom Electronics have introduced a new sales team into China and IBS Electronics is looking to expand into South East Asia.

In November 2018, the Aerospace & Defense Division of Magellan Distribution Corporation was acquired by Electronic Connector Company (ECCO). The key difficulty for almost all distributors in 2018 was being able to supply sufficient product to meet customer demands. There were severe shortages in some commodity areas such as MLCC capacitors and discrete semiconductors, especially power transistors, but manufacturers of many products were finding it difficult to meet

the growing global demand. Although towards the end of the year these pressures started to ease the shortages in some areas will continue into 2019.

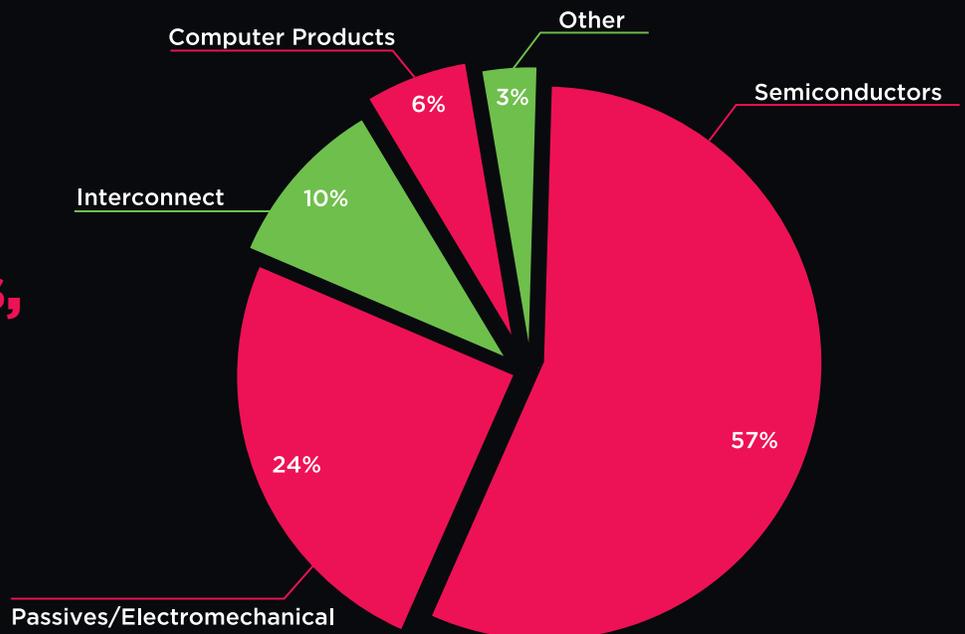
Many distributors in our survey mentioned the difficulty in finding good qualified people as many people who have worked in the electronic distribution industry are reaching retirement.

Our survey shows that 66.1 percent of the sales of the distributors that provided the information, goes to OEM companies, with 29.2 percent going to EMS/ODM companies. The remainder of sales goes to other companies in many cases other distributors.

Looking at the market segments shows that Industrial remains the largest segment with over 28 percent of sales by distributor companies which is the same as in 2017. Aerospace/military has decreased from 24 percent in 2017 to 20 percent in 2018, whereas mobile has increased from two percent in 2017 to nine percent in 2018. The share in the other segments were:- automotive 11 percent, computers and peripherals four percent, energy three percent, medical six percent, telecommunications six percent and other segments 12 percent.

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Passives expand share of Market (% of NA revenue of top distributors, 2018)



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LOOKING TO THE FUTURE

» Virtually all of the distributors in our survey offer value-added services although not all provided the level of these services. From the responses the percentage of value-added services of sales varies from 99 percent to 1 percent indicating not only how wide and varied these services can be but also how value-added services are building the turnover of virtually all distributors. The perception of distributors as just shipping parts from stock when ordered no longer applies to the electronics distribution industry in 2018.

These services are particularly valuable in times of component shortages, as has been happening in 2018. Many supply chain services include inventory management. The closer the customer and distributor are able to work together the more efficient the supply chain can become, and many customers have been protected from the worst of the product shortages in many commodity products in 2018 through close co-operation.

Another key area in which distributors are seeking to bring more value to their customers is through assisting in counterfeit avoidance and helping to understand and mitigate the many legislative requirements, in particular in understanding the complexities around the avoidance of hazardous substances. Avoidance of counterfeit is best achieved by working only with a supplier's authorized distributors. The burden of compliance is ever increasing often brought about by issues way outside the scope of electronic components, but where electronic components get 'caught in the net' of requirements. Distributors and the work of the distributor trade association, the ECIA, can supply valuable information in helping customers navigate what can often become a minefield.

Looking to the future in our survey 28 cited value-added sales as one of the key drivers that distributors believe will deliver further growth in 2019. However, 33 companies indicated that growth will come from new products and 30 gave new markets as a growth driver. Only 8 indicated acquisitions as bringing growth in 2018.

The market sectors where distributors saw that growth would come from in the North American market in 2019 were aerospace and military, industrial, medical and transport. The sectors where fewest expected growth to come were communications, computing and mobile.

The internet of things (IOT) continues to be the biggest emerging market that will bring growth in 2019 with new lighting applications also scoring highly. As in previous years renewable energy areas such as solar and wind along with smart metering are not seen as strong emerging areas as they were in the past. Other emerging areas such as Self Driving Automobiles, Electric Vehicles and Artificial Intelligence were also mentioned but were seen as growth drivers for 2019

by only the larger broadline distributors or by some of the specialized distributors who have product lines that are well suited to these applications.

These new areas mean that customers—many of whom are small and emerging companies are looking for help with designs and distributors are well placed to engage with them and help them with designs and even complete solutions. Thirty two of our respondents offer design services and employ design engineers to support this activity. Avnet employ over 300 engineers globally to support designers and 1200 field application engineers.

Forty companies who responded to our survey are certified to ISO standard, although none of the five who are not certified stated that they intended to seek certification.

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Top Ten by Value-Added Sales

Rank	Company	2018 North American Sales (\$ millions)	% of Total Sales	2018 North American Value Add Sales (\$ millions)
1	Avnet	5,200	60	3,120.00
2	TTI, Inc	1,430	60	858.00
3	PEI Genesis	175	99	173.25
4	Phoenics	133	75	99.75
5	Sager	308	29	89.32
6	Electroenterprises	118	65	76.70
7	Mouser	861	8	68.88
8	Marsh Electronics	44	85	37.19
9	Hughes Peters	110	30	33.00
10	SMD Inc	46	64	29.44

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a bel group


Positronic®

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connectivity

 **GORE**  **CORSAIR**
ELECTRICAL CONNECTORS

smiths interconnect



SMITH

Smith's Intelligent Distribution

Smith's Intelligent Distribution™ Model in Action

To address the challenges of supply chain management, Smith has developed a customer-focused Intelligent Distribution™ model to fit your exact requirements. The model can adapt to ever-changing demands by providing seamless global electronics distribution, sourcing, and logistics, regardless of the channel or locale. Smith's market expertise, custom supply chain services, and flexible logistics capabilities make your supply chain leaner, faster, and more efficient.

Digital and specialized procurement solutions

Supplier selection and product sourcing are typically performed concurrently. By using historical product sourcing activities, suppliers are identified and selected based on their ability to meet the requirements of Smith's customers. To assure that this objective is met, suppliers are formally selected, qualified, and continually evaluated using Smith's digital supplier rating system (SRS). This proprietary software rates each supplier based on key performance metrics to ensure the authenticity of product.

Instant alert notifications help keep Smith's procurement solutions on track. Smith's sourcing supplier management team reviews suppliers monthly or as needed with automatic email alerts of discrepancies. Suppliers can be restricted to specific product types. Tariff alerts will also be displayed during the purchasing process.

Additionally, our e-commerce platform allows us to better communicate with customers and positions Smith as a digital partner for purchasing components. Smith's part search feature allows customers to view and directly purchase available inventory online through www.smithweb.com.

Transparent and automated operational processes

Smith's warehouses in Houston, Hong Kong, and Amsterdam utilize an automated climate-control system. The heating, ventilation, and air conditioning systems at each facility are designed to provide an environment that minimizes the presence of static electricity. Real-time temperature and humidity tracking are available via the company's internal, proprietary software. Computerized alerts are instantly displayed if temperature and humidity conditions are not within ESD-compliant range.

Adopting a freight management and logistics software at our Houston warehouse has allowed Smith to increase visibility into the movement of each individual order. Once material arrives from a supplier, Smith's certified electronic component inspectors use mobile devices to scan the package's airway bill and generate a barcode label associated with that specific purchase order. The unique label allows each product's location to be easily tracked in our 58,000 square-foot warehouse and all throughout the delivery process with email updates to our sales representatives.

The software also has the capability to digitally record the weight and dimensions of each box. Operational processes that used to be manual are now auto-populated, saving time and increasing efficiency.

Customizable and flexible service capabilities

Smith offers various inventory programs, all complete with online management tools. Customers have access to a secure portal for viewing their inventory by entering their unique username and password under MySmith from www.smithweb.com. The secure login gives customers visibility into product that has been shipped and what is on-hand at Smith's warehouse.

Real-time, custom reports detailing aging analysis, current stock levels, reorder points, slow-moving parts, and delivery schedules are available in the inventory portal. With specialized part cross-referencing and inventory buffering tools, customers can also identify approved substitute parts in the event of price availability and fluctuations.

The majority of our IT software and capabilities are designed in-house and customizable for each partner, making Smith's Intelligent Distribution™ model customer focused and simply smart.

Company Profile

LONG LEAD-TIME
PART MANAGEMENT

BOM
MANAGEMENT

INVENTORY PROGRAMS:
VMI & JIT

PROCUREMENT
SERVICES

LTB AND EOL
SUPPORT

ONLINE
VISIBILITY

COST
SAVINGS

GLOBAL
LOGISTICS

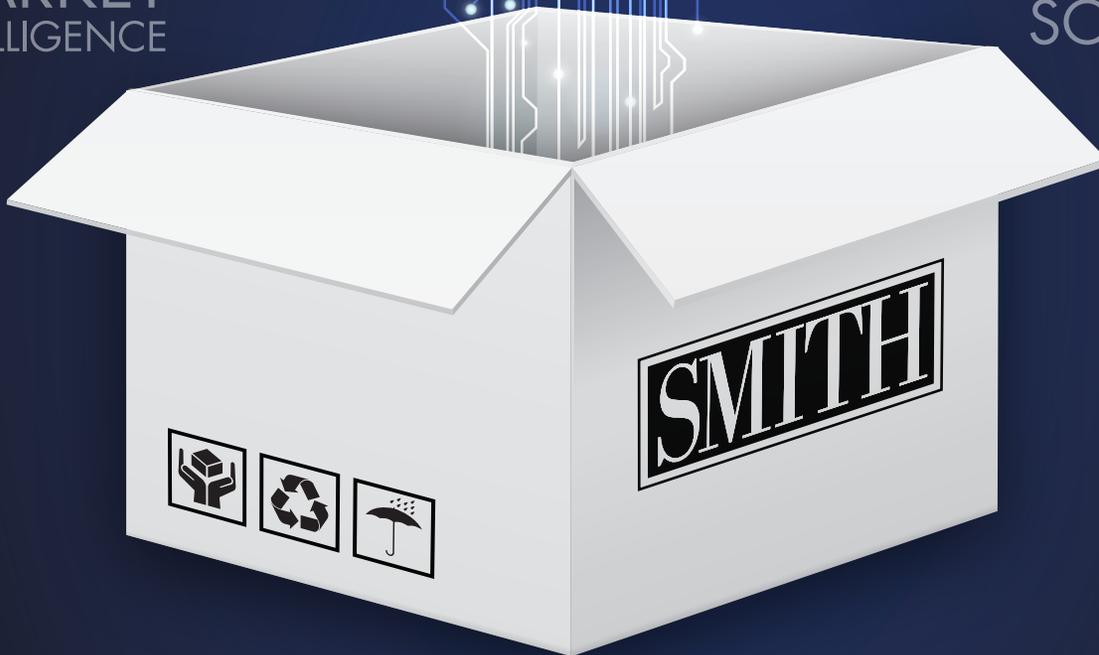
SHORTAGE
SOURCING

TESTING SERVICES

MARKET
INTELLIGENCE

ITAD SERVICES

EXCESS INVENTORY
SOLUTIONS



SMITH DELIVERS MORE.

Whether you need a reliable supply of scarce components or a solution for long-term inventory management, Smith will meet your unique needs with customized support. The best sourcing and above-and-beyond service - it's all part of the package.

SMITH

Intelligent Distribution™

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ARROW CONTINUE TO LEAD THE WAY

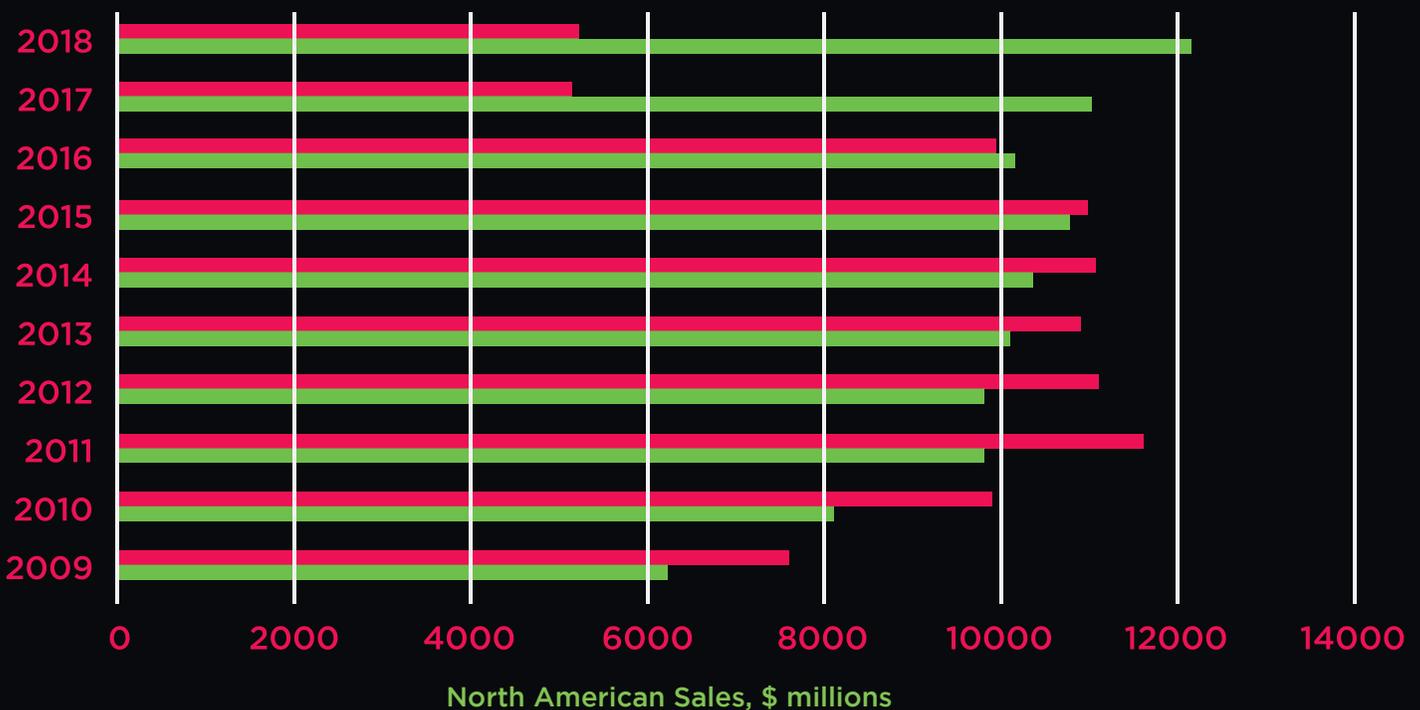
» Arrow Electronics remains at the top of our rankings for North American sales with the gap between them and the number two distributor widening a little further in 2018. Arrow's North American sales according to our survey have increased by 10.1 percent from \$11 billion to \$12.1 billion. However, these sales include both the Arrow Component Sales as well as their Enterprise Computing

Solutions activity. Figures given in the Arrow Electronics Inc. year end 2018 results give Component Sales in total Americas as \$7.8 billions an increase of 10.3 percent over the comparable figure in 2017. Global sales for the company grew by 11.8 percent in 2018 to \$29.6 billion and for the component activity sales increased by 12.2 percent to \$20.8 billion.

Avnet reported lower growth at two percent with North America sales rising from \$5.06 billion in 2017 to \$5.2 billion in 2018. Avnet sales have been more severely affected by the consolidation within the semiconductor industry than have Arrow's. Avnet's global sales including Premier Farnell grew by 9.7 percent in 2018 to \$20 billion.

The Market Leaders

■ Avnet ■ Arrow



TOP DISTRIBUTORS ARE GLOBAL PLAYERS

Of the 48 distributors who responded to our survey by supplying sales turnover for North America, 28 also supplied their global turnover. On a comparable basis the global sales of these distributors had increased by 13.5 percent from 2017 to 2018. Global sales of these companies

totaled \$59.3 billion in 2018. For these distributors the North America sales accounted for 40 percent of their total turnover. Some companies also reported their sales in Asia and for these companies, sales in Asia had increased overall by 16.6 percent, and their sales

into Europe, Middle East and Africa where sales measured in US dollars had increased by 19.5 percent. However, the change in the value of the US dollar between 2017 and 2018 will be a factor in this number.

WHAT NOW IS A 'CATALOG' DISTRIBUTOR?

Design engineers and purchasing staff over a certain age will well remember the big printed books which arrived in the mail and sat proudly on the corner of the desk. When any electronic component was needed it was just necessary to reach for the 'book' where the required component could be identified, the price obtained and with one quick phone call or fax the parts could be ordered. A few distributors specialized in this way of marketing and selling components two of whom Newark and Allied were part of worldwide groups that developed this business model. The invention of the internet has dramatically changed all of that—gone are the big catalogs—instead all the parts can be found by searches, data sheets and design circuits downloaded, availability obtained, and parts ordered for immediate delivery to virtually anywhere in the world with just a few clicks on a PC or even a phone. The internet revolution brought new players into the market, such as Mouser and Digi-Key with business models designed to maximize the possibilities brought by the 'internet'. The two original players still operate successfully in today's market although Newark is now part of the Avnet global family of companies. Yet strangely the term 'catalog distributor' is taking time to die. These companies would now be considered as broadline as the range of franchises that they are able to operate

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Delivering
Good Vibrations
to the World for over 35 Years!

Why Dove Electronic Components?
Dove invented Crystal & Oscillator Distribution 35 Years Ago!

- ✓ 100% Authorized distributor for over 35 frequency control suppliers
- ✓ Unmatched Line Card in Frequency Control Products
- ✓ Quick-turn In-house oscillator programming for multiple suppliers
- ✓ Committed to Quality: AS9100:2016 and ISO9001 2015 Certified

Dove Electronic Components is the most well-known, experienced distributor of crystals and oscillators, serving customers worldwide since 1983. Dove supports its partners' success by connecting more than 35 of the world's leading frequency control suppliers with a broad base of customers, providing cost-effective, value-added services and solutions.

Large-Scale Oscillator Programming
As lead times in our industry are increasing, Dove's programming center can be a quick-turn solution. Our state of the art programming center allows us to ship product in 1-3 business days. We program oscillators for all major premier frequency control lines. Our experienced sales team can help you determine the right solution for your needs!

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bisco industries

Headquarters: Anaheim, CA

www.biscoind.com

info@biscoind.com

US: 800.323.1232

Canada: 800.258.2693

Company Overview:

- Founded in 1973
- 450+ Employees
- 350+ Sales Account Managers
- 3.8 Million Products
- 7 Distribution Centers
- AS9100/AS9120/ISO9001 Certified

About bisco

Since 1973, bisco industries has been a premier distributor of Electronic Components and Fasteners used for production in Aerospace, Communication, Computer, Fabrication, Industrial Equipment, Instrumentation, Marine, and Military Industries.

Unsurpassed Customer Service

bisco helps their customers reduce cost and increase efficiency in their supply chain by maintaining a local sales team, providing customized services, and housing a robust inventory across thousands of product categories.

bisco's 350+ sales representatives are located throughout 48 strategically placed offices to best serve their local markets. While other distributors refer smaller customers to call centers, bisco industries understands that every customer deserves personalized service. That is why every inquiry is directed to a local sales professional, specialized in an industry vertical, who will be able to quote, provide feedback, or recommend an alternative item within four hours. When you contact bisco, you can count on speaking with an account manager who will assist you with anything from finding the right part number to tracking your shipped order. That's the bisco difference!

A Valuable Partner in Your Supply Chain

bisco's approach to supply chain management analyzes stock levels and usage trends to ensure strategic inventory in their 7 distribution centers, shorter lead times, and reduced costs to the entire chain.

bisco's distribution centers have been tactically placed so customers have the inventory they need without the use of expedited shipping. These warehouses can be found in San Jose, CA, Anaheim, CA, Irving, TX, Chicago, IL, Atlanta, GA, Boston, MA and Toronto, Canada.

Equipped for Continued Growth

Throughout bisco's organization, teams have been preparing to reach new and unprecedented company milestones in sales, size, inventory levels, and beyond. They have recently doubled their footprint in almost all of their distribution centers and are scheduled to continue that expansion in the near future. In addition to warehouse growth, bisco's quality management processes received new certifications for AS9120, AS9100 and ISO9001 to better serve target markets.

With the opening of their first International Sales Office on the horizon, bisco is advantageously positioned to continue their path onward and upward. Contact your local sales office or visit bisco industries online today to see how the bisco difference can help your organization grow.



7

Distribution Centers

400+

Industries Served

150+

Authorized Lines

350+

Local Sales Reps

48

North American Sales Offices

46

Years of Continued Success

**The
inventory
you need,
where you
need
it.**

**The right partner
can take you from
good to GREAT.
Call Us Today!**



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» on a global basis is truly staggering. At the same time other 'conventional' distributors have not been slow to cease the opportunities that the technology allows. In our survey 34 companies stated that they were able to transact sales via their websites whilst only 10 said that they did not and two did not answer the question. Although many did not provide the percentage of their sales that were transacted via their websites of those who did, four distributors transact more than 40 percent of sales through their websites. The leaders as in last year's survey were Digi-Key with 89 percent of their sales coming through the web-portal

and Mouser with 54 percent. However, this was not confined to the larger distributors. Smaller distributors such as Waldorn Electronics Corp and Chip 1 Exchange also take a large share of their sales through websites.

The range of services that distributors now offer has gone way beyond the replacement of the catalog. The full listing of services as reported in our survey is shown in the Top 50 Distributor Directory. Many companies offer web-chats and design advice on-line with developer forums moderated by field application engineers. The web is also allowing

distributors to think more globally with companies offering translation into other languages based upon the IP address of the enquirer—just one example of how the customer is becoming the focus of everything. The use of the web is allowing distributors to differentiate themselves beyond just price and availability. It truly is a revolution in engaging with the customers. Now that the catalog is dead maybe we can soon drop its use to categorize some distributors.

CHANGES IN THE TOP 50

Our Top 50 listing is built up from the responses that 48 distributors gave to our survey. 52 companies responded to the survey but not all provided sufficient information to allow them to be included in the rankings. The survey is primarily built up from North American Distributors, but we have been able to bring distributors who are headquartered outside of North America but have a significant presence in North America. The key one of these WPG Holdings which is one of the largest distributors in Asia Pacific but also operate in North America.

In our rankings for this year's survey we have attempted to rank companies based upon their turnover on franchised lines only and we have adjusted total turnover to reflect this. Also, there are some companies who have significant sales of products other than the product categories that we list, had to meet a specific percentage of 'components' to be considered. Some companies in our ranking may be owned by other distributors but they have been included where their sales have not been included in the sales of the owning company.

To earn a place on our Top 50 ranking it was necessary to have identified sales of more than \$4 million of franchised components.

Whereas all care has been taken to collect and process the data, errors and omissions are excepted.

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at every stage

Newark is a high service distributor of technology products, services, and solutions for electronic system design, maintenance, and repair. We bring together the latest products, services, and development software, all connected with a market-leading online engineering community where purchasers and engineers can access peers and experts, a wide range of independent technical information, and project resources.

THE BRANDS ENGINEERS TRUST

Our line card is one of the broadest in high-service distribution, covering a wide range of products, services, and solutions - from bench to board - all ready for fast delivery anywhere in the world. The direct relationships we have with

industry-leading manufacturers provides access to the latest technology and information first, with no minimum order requirement. Plus, we offer software and support from technology leaders like ARM, Cadsoft, and Micrium, unique development boards, and PCB services from proven providers.

GLOBAL ACCESS, WITH SERVICE THAT'S CLOSE TO HOME

We have operations in US, Canada, and Mexico, serviced from our regional distribution hub in South Carolina. We are committed to supporting local language, currency, product, and shipment needs across North America and around the world. Additionally, our global reach as part of the Avnet ecosystem provides greater access to stock and stronger relationships with

suppliers, ultimately allowing us to better serve your needs with the latest technologies and a wider range of products.

VALUABLE SERVICES TO SAVE YOU TIME, MONEY AND RESOURCES

Along with your personal local support, we offer a multitude of services including online tools such as BOM upload, Quick Buy, and our eProcurement tool, iBuy. These services help you populate and place orders efficiently, while giving you more spend control and transparency. The Newark Custom Shop offers a variety of additional services including custom products, custom enclosures, design resources, stockroom solutions, and more. Our goal is to provide you with exactly what you need, when you need it.

Fast. Focused.



Falcon.

Fast. Advancements in technology should never take you by surprise. In the military and aerospace industry, if you're not on top of things, they're on top of you. To stay out front, you need a partner who's plugged into the industry - one who can react quickly to your needs, sometimes before even you know what those needs are.

Focused. It's Falcon's focus on the military and aerospace industry that has allowed us to forge long-term relationships with suppliers who are equally dedicated. Falcon's line card showcases superior, high-reliability product lines from the industry's top manufacturers - all with long-term Mil-Aero strategies - reducing the possibility of obsolescence.

It's Falcon's focus on our customer that enables us to become a dedicated partner. Whether managing individual inventory requirements, providing sophisticated levels of support, or supplying leading-edge technologies to meet rugged environmental demands, Falcon is committed to your success.

Falcon. Falcon Electronics is a Certified Small Disadvantaged Distributor of state-of-the-art semiconductor components, dedicated to the military and aerospace industry. Our suppliers have confidence in us. Our customers trust us. And Falcon is proud to be considered an ally of both.



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How does it work?

Principal Manufacturer launches New Component



Distributor / Principal

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Component release
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SOURCE

COMPARE

Live component pricing
+ quantities available

powered by  ecia
Electronic Components Industry Association

BUY!

Buy components from a
Distributor of your choice

eBOM **LIVE**

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GROWTH HAPPENS ACROSS THE TOP 50

The tables below list the top ten distributors in different areas. Although the top five distributors of semiconductors consist of five of the top six overall, the remainder of the top ten consist of some of the mid-ranking companies who specialize in semiconductor sales. The same is true for the ranking of distributors by the sales of passive components. In interconnect and computer sales specialist distributors and better represented in the top ten. Smaller companies also fare well in the top ten rating of sales per employee with Phoenixics Electronics again in the pole position. Smaller companies are also amongst the fastest growing. Of the 48 companies who provided sales turnover for our survey, 38 companies reported sales growth with an average growth of 14.6 percent, seven companies reported flat sales and three reported a decline in sales.

Top Ten Active Component Sales

Rank	Company	Rank 2017	2018 North American Sales (\$ millions)	% of Total Sales	Active Component Sales
1	Arrow	1	12,157	68	8266.8
2	Avnet	2	5,200	78	4056.0
3	Digi-Key	4	1,906	45	857.7
4	Mouser	6	861	44	378.8
5	WPG Holdings	11	180	91	163.8
6	Phoenixics	15	133	99	131.7
7	Symmetry Electronics	22	52	98	51.0
8	RFMW	20	77	60	46.2
9	Falcon	27T	32	100	32.0
10	CDIWeb	26	42	75	31.5

Top Ten Passive Component Sales

Rank	Company	Rank 2017	2018 North American Sales (\$ millions)	% of Total Sales	Passive Component Sales
1	Arrow	1	12,157	19	2309.8
2	Avnet	2	5,200	18	936.0
3	TTI	5	1,430	48	686.4
4	Digi-Key	4	1906	25	476.5
5	Mouser	6	861	20	172.2
6	Hughes Peters	17	110	30	33.0
7	Bisco Industries	14	146	20	29.2
8	Sager	9	308	9	27.7
9	RFMW	20	77	30	23.1
10	Marsh Electronics	25	44	29	12.7

Top Ten Interconnect Sales

Rank	Company	Rank 2017	2018 North American Sales (\$ millions)	% of Total Sales	Interconnect Sales
1	DAC	7	832	83.9	698.0
2	TTI	5	1,430	40	572.0
3	Digi-Key	4	1,906	14	266.8
4	PEI Genesis	12	175	100	175.0
5	Mouser	6	861	20	172.2
6	Powell	13	155	86	133.3
7	Electroenterprises	16	118	70	82.6
8	Sager	9	308	25	77.0
9	Waldom Electronics Corp	21	67	70	46.9
10	CDM Electronics	27T	32	94	30.1

Top Ten Computer Products Sales

Rank	Company	Rank 2017	2018 North American Sales (\$ millions)	% of Total Sales	Computer Products Sales
1	Arrow	1	12,157	10	1,215.7
2	Avnet	2	5,200	4	208.0
3	Edge	23	46	35	16.2
4	Steven Engineering Inc	18	83	7	5.8
5	Sherburn	32T	19	19	3.6
6	ESKC	35	16	20	3.2
7	(CE3S)	32T	19	10	1.9
8	Bisco Industries	14	146	1	1.5
9	Symmetry Electronics	22	52	2	1.0
10	Corestaff	46T	6	10	0.6

Top Ten Sales per Employee

Rank	Company	Rank 2017	2018 North American Sales (\$ millions)	No. of Employees	Sales per Employee
1	Phoenixics	15	133	35	3.80
2	Falcon	27T	32	18	1.78
3	Avnet	2	5,200	3587	1.45
4	Flamecorp	19	82	60	1.37
5	Edge	23	46	37	1.25
6	RFMW	20	77	64	1.20
7	Symmetry Electronics	22	52	53	0.98
8	Sherburn	32T	19	20	0.95
9	Sager	9	308	367	0.84
10	CDIWeb	26	42	55	0.76

Top Ten Growth rate

Rank	Company	Rank 2017	2018 North American Sales (\$ millions)	No. of Employees	% growth rate 2018/2017
1	Symmetry Electronics	22	52	53	48.6%
2	Mouser	6	861	1820	35.6%
3	Digi-Key	4	1,906	3908	31.7%
4	Bisco Industries	14	146	465	25.8%
5	Benchmark	36T	15	45	25.0%
6	Powell	13	155	213	24.8%
7	TTI	5	1,430	2000	22.2%
8	Gopui	30T	22	33	22.2%
9	Nasco	41T	10	30	21.4%
10	PEI Genesis	12	175	n/a	20.7%



Steven Engineering

Controls for Industry

Established in 1975, Steven Engineering has grown into one of the largest distributors of industrial controls and components in the nation. With over two million available part numbers and a vast supporting inventory, they service a wide range of industries providing electrical and electronic components, automated industrial controls, and pneumatic products.



Steven Engineering's 95,000 square foot corporate facility is headquartered less than one mile from the San Francisco International Airport and includes a main Fulfillment Center, Customer Training Centers, and Contract Manufacturing Department. Two additional branch offices and warehouse facilities are located in Southern California and Portland, Oregon. The use of state-of-the-art systems and logistic services allows for delivery of product within hours, or the next day.

With a staff of engineers (Sales Application, Automation Systems, Motion Systems, and Technical Services), Steven Engineering helps customers find and specify the latest technologies available. Whether on-site or remote, this service guarantees the right product for every application and will increase efficiency and functionality for your end product. In many instances, an additional benefit of this process is reduced product and operating costs.



Other customer oriented services offered include managed inventory programs and on-site stocking, as well as manufacturing services such as din-rail assembly, mechanical sub-assembly, kitting, enclosure modification and pneumatic assembly. Steven Engineering is the solution for all your product and service needs.

STEVEN
ENGINEERING

Today's Source for Tomorrow's Technology

www.StevenEngineering.com

A Certified Woman-Owned Small Business

STEVEN
ENGINEERING

Stop Monkeying Around with Other Sources.



At Steven Engineering, we don't deal in monkey business. With over 2 million available parts and a knowledgeable sales team, we'll get this guy off your back by providing the products you need, on time and on budget. Don't be second banana—contact us today to take advantage of our vast knowledge and extensive inventory. It'll put a smile on your face.

ABB

APP
Automated Power Protection

BANNER

Bussmann
by **F.T.N**

E-T-A
ENGINEERING TECHNOLOGY

HARTING

HellermannTyton

Honeywell
Sensing and Control

IDEC

LAPP

Littelfuse

MAGROM

MERSEN

MOOG
ANIMATICS

NSK

PANDUIT

PEPPERL+FUCHS

PHENIX CONTACT

red lion

RITTAL

Schneider Electric

SMC

Thomas&Betts

TURCK



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TOP ELECTRONICS DISTRIBUTORS 2018

Rank 2018	Rank 2017	Company	2018 North America (\$ millions)	% growth rate 2018/2017	Sales Breakdown %						% of sales derived from Value Add	Employees	Sales per employee (\$M)
					Active	Passive	Electro	Interconnect	Computer Products	Other			
1	1	Arrow (4)	12,157	10.1%	68	19	-	-	10	3	n/a	n/a	n/a
2	2	Avnet (1) (4)	5,200	2.0%	78	18	-	-	4	-	60	3,587	1.45
3	3	Future (2)	4,600	9.0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
4	4	Digi-Key	1,906	31.7%	45	25	16	14	-	-	n/a	3,908	0.49
5	5	TTI, Inc	1,430	22.2%	0	48	12	40	0	0	60	2,000	0.72
6		Smith	990		n/a	n/a	n/a	n/a	n/a	n/a	n/a	270	3.67
7	7	Mouser	861	35.6%	44	20	11	20	-	5	8	1,820	0.47
8	6	DAC	832	9.5%	-	-	16.1	83.9	-	-	n/a	n/a	n/a
9	8	Allied Electronics (2)	520	0.4%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
10	9	Sager	308	12.8%	-	9	30	25	-	36	29	367	0.84
11	10	Master Electronics (2)	250	12.6%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
12	-	WPG Holdings Limited (4)	180	2.9%	91	6	-	-	-	3	n/a	n/a	n/a
13	12	PEI Genesis	175	20.7%	-	-	-	100	-	-	99	n/a	n/a
14	13	Powell	155	24.8%	-	-	14	86	-	-	12	213	0.73
15	11	Bisco Industries (3)	146	25.8%	-	20	40	20	1	19	13	465	0.31
16	14	Phoenixics	133	14.7%	99	-	-	-	-	1	75	35	3.80
17	15	Electroenterprises	118	18.9%	-	-	30	70	-	-	65	240	0.49
18	16	Hughes Peters	110	10.6%	3	30	40	25	-	2	30	160	0.69
19	17	Steven Engineering Inc	83	-14.2%	-	-	35	35	7	23	23	123	0.67
20	18	Flamecorp (3)	82	6.6%	-	-	95	5	-	-	n/a	60	1.37
21	20	RFMW Ltd	77	6.9%	60	30	-	10	-	-	10	64	1.20
22	19	Waldom Electronics Corp	67	4.7%	-	3	27	70	-	-	5	120	0.56
23	25	Symmetry Electronics	52	48.6%	98	-	-	-	2	-	10	53	0.98
24	-	Edge (3)	46	16.0%	39	8	4	6	35	8	35	37	1.25
25	23	SMD Inc	46	16.2%	4	14	22	60	-	-	64	65	0.71
26	22	Marsh Electronics (3)	44	18.6%	-	29	45	6	-	20	85	n/a	n/a
27	24	CDIWeb	42	16.7%	75	8	2	7	-	8	1	55	0.76
28T	27	Falcon	32	10.3%	100	-	-	-	-	-	15	18	1.78
28T	26	CDM Electronics (2)	32	0.0%	-	-	6	94	-	-	35	120	0.27
30	31	House of Batteries	28	15.7%	-	-	-	-	-	100	80	115	0.24
31T	35	Air electro	22	4.8%	-	-	100	-	-	-	20	65	0.34
31T	37	Gopui	22	22.2%	15	40	34	11	-	-	65	33	0.67
33T	39	Sherburn	19	5.6%	10	9	30	32	19	-	55	20	0.95
33T	36	Cumberland Electronics Strategic Supply Solutions (CESS)	19	1.1%	10	10	20	20	10	30	75	40	0.48
35	40	Gopher Electronics	17	13.3%	-	10	60	30	-	-	28	50	0.34
36	41	ESKC	16	6.7%	10	20	15	5	20	30	50	30	0.53
37T	43	Benchmark	15	25.0%	-	-	100	-	-	-	90	45	0.33
37T	34	Diverse Electronics (3)	15	4.8%	20	32	10	17	-	21	21	42	0.35
39	42	Bluff City Electronics	14	7.7%	10	10	55	15	-	10	5	35	0.40
40T	44	Fedco Batteries	11	0.0%	2	-	-	-	-	98	60	39	0.28
40T	-	Schuster	11	0.0%	1	5	40	31	2	21	70	25	0.44
42T	-	Nasco (3)	10	21.4%	15	5	35	40	5	-	7	30	0.34
42T	32	Area 51-ESG, (3)	10	18.2%	10	21	26	33	2	8	12	55	0.17
44T	46	Metcaps	8	0.0%	-	40	40	20	-	-	1	20	0.40
44T	47	Ecco chicago	8	0.0%	-	-	1	99	-	-	75	26	0.31
44T	-	Americall	8	0.0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
47T	-	Corestaff	6	0.0%	30	-	10	-	10	50	n/a	n/a	n/a
47T	29	IBS Electronics Inc (3) (4)	6	-23.1%	30	35	30	-	5	-	80	25	0.22
49	48	Ursele	4	-16.7%	5	15	40	10	5	25	10	13	0.31

(1) Figures are for the Americas region, which includes North America, Argentina, Brazil and Puerto Rico. (2) Europartners Estimate (3) Sales adjusted to reflect Franchized products only (4) Sales breakdown based on global sales



← Paul Andrews,
Founder of TTI

TTI Builds Its Specialty Distribution Dream Home

In the 46 years since Paul Andrews started TTI at the kitchen table of his Fort Worth, Texas home, the now multi-billion-dollar distributor has housed its North American inventory of electronic components at seven different warehouses, each significantly larger than the one that came before. Now, the company has opened its newest facility aptly dedicated as the Andrews Distribution Center in honor of the company's founder and current CEO.

The Andrews DC is designed expressly for the needs of TTI's specialty mix of connectors, passives, discretes and electromechanical components. Over 1.7 miles of conveyers tie the facility's shipping, inventory and receiving sections together; linking multiple story carousels filled with bins of pepper-sized components and racks of palletized cases of larger components to a customer base stretching across North America.

The design team visited numerous warehousing and distribution facilities looking for innovative ways to handle the variety and mix of TTI products. The team knew from experience that dealing with components that range in size from almost microscopic resistors to large scale industrial switches and heavy-duty connection systems, has always presented a challenge. Combining these broad product

size differences with the extreme difference in inventory turn velocity between TTI's most requested components and the company's inventory of legacy parts, some of which are critical to electronics on defense systems that are decades old, added to the design task.

One entire section of the warehouse is served by wireguided lift systems allowing operators to reach both sides of racked aisles to a height of over 30 feet. This density of product storage increases the volume of the warehouse, speeds picking, and offers improved worker safety. Another section serves specifically palletized materials for high volume customers. A dedicated space serves cut reel warehousing and production, while another specialty area provides value added customization of various circular and D-Sub connectors for the military and aerospace market, as well as commercial off-the-shelf product.

It's a varied and fast-moving production environment and the quality program at TTI measures each area of the operation to ensure that the company provides the right parts, to the right place, at the right time. Internal benchmarks have shown that in spite of moving more than six billion individual components from the previous warehouse over a four-week period, the Andrews DC is consistently shipping parts

with a better than 98% on time efficiency. TTI expects this to improve even further as the staff settles into their new home and gains familiarity with the latest material handling systems.

Adding to the abilities of the warehouse are the information technologies that overlay the entire operation. Miles of cable, wireless systems, and dedicated systems control networks connect the conveying systems and carousel control systems to TTI's own Warehouse Control System software. This incredible application suite, developed in-house to meet the unique needs of TTI's product mix and customer requests, links TTI warehouses around the world to the Andrews DC, enabling sales representatives to ensure inventory status in real time. Because the same software had been used to run the overburdened previous 500,000 square foot warehouse, the switchover to the new distribution center was one of the most seamless handoffs in TTI history. TTI and the 300 team members at the Andrews Distribution Center are rightly proud of their new dream home and while they are working hard to bring it to full capacity, Mr. Andrews isn't worried, the team designed the building to be able to expand to a full 1,000,000 square feet of space when needed, and with the extraordinary recent growth of TTI, that time may be here sooner than the company anticipated.

AVNET

Headquarters: Phoenix, Arizona

Email: info@avnet.com

Web: www.avnet.com

Phone: 480-643-2000



ABOUT

Avnet started in 1921 as a radio components distributor. Now, we're the first ever to offer a true end-to-end solution in-house that takes an idea from prototype through to end of life whether you're a startup, an OEM or a major enterprise.

So, what does that mean for a buyer like you?

Your access to 5 million parts globally with regional accessibility helps you set the pace for technological change. Find your competitive edge by browsing what's new from Avnet and our 1,400 industry leading suppliers. That broad ecosystem means that we have 100% of the parts you need on the board from transistors to inductors and MCUs; however, we also have all the parts you need off the board, too, from assemblies to interconnects and more. Plus, our deep relationships will allow you to know ahead of the competition when a component is going EoL or when you need to consider drop-in replacements.

Whichever way you buy, Avnet helps speed your product's time to market while also boosting your financial key performance indicators for internal stakeholders.

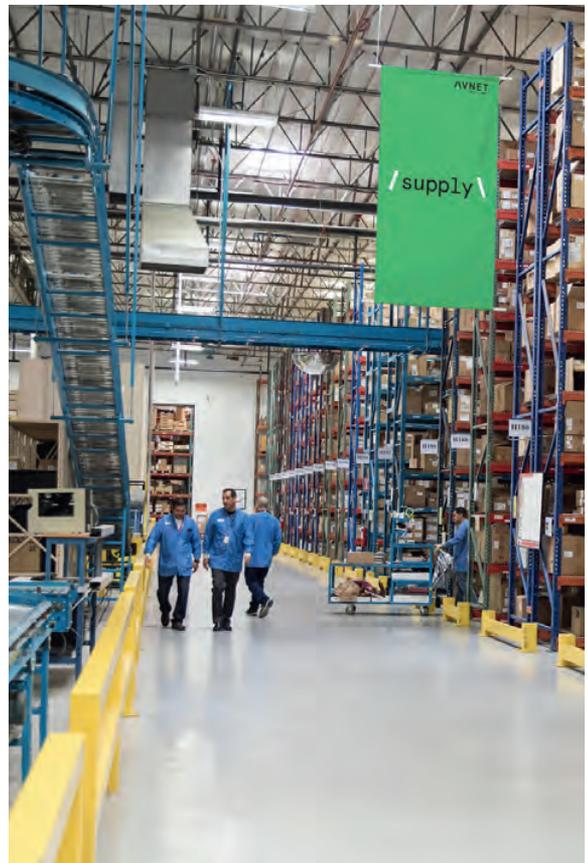
You'll find our deep expertise and established partnerships throughout a variety of markets help us identify the long-life technologies you require to reduce your lead times and excess inventory exposure. Online, you'll see our e-commerce platforms allow you to quickly buy the parts you know you need, viewing inventory in real time to buy in bulk and order with one-click—without having to create a bill of materials. What's more, when you come back, you can view a quick snapshot of previous orders and even statuses on orders still pending or finally build a BOM that allows you to order with two clicks.

Technology's next wonder is out there, somewhere. It may just be scribbles on a napkin right now, a possibility on paper, but tomorrow, it could change the world – with a little help from Avnet. That's why we're committed to helping your business Reach Further. How far can we take you?

AT A GLANCE

Avnet designs, makes, supplies & delivers technology solutions to customers of every size, in every corner of the world.

- Founded in 1921
- 15,000+ employees worldwide
- 2,500 engineers around the world
- 2.1 million customers in 140+ countries
- 1,400 technology suppliers globally
- 117 billion units shipped annually
- 125 locations across the globe
- Number 108 on the Fortune 500 in 2017



Ready to reach further?

With Avnet, you can get components in the quantities you need, whether you're tinkering with initial designs or supporting development at scale. As an end-to-end partner, we can support your needs no matter what part of the product development lifecycle you're in.

[avnet.com](https://www.avnet.com)

TOP 50 DIRECTORY

Air Electro-inc

Rank: 30T
9452 De Soto Ave, Chatsworth 800-4544128
Distributor Type: Specialized
Management: President - Steven Strull;
VP - Todd Walk; Sales Contact - Ben Strull
Major Lines: Souriau, Positronic, Glenair, Corsair,
TE Connectivity Deutsch, RMS, Radiall, Tri-star
Electronics, AEI Manufacturing, Amphenol PCD,
Filcon, ADI Electronics
Value Added Services: Connector Assembly,
Design, Kitting, Customization
Supply Chain Services: Kanban, VMI, SMI, DLF, EDI
ISO Certification: Yes
Website: airelectro.com
Website Services: RFQ forms, Product
Subcategories, Catalogs, Data sheets

Allied Electronics, Inc

Rank: 8
7151 Jack Newell Blvd, S. Fort Worth, Texas 76118
U.S.A. 866 433-5722
Distributor Type: Broadline
Management: Chairman - Steve Newland; CFO -
Nick Hawtrey; VP - Mark Simon Andy Jackson Dan
Stewart Frank Cantwell Patti Crozier Scott Jayes;
Sales Contact - Mark Simon
Major Lines: see website
Value Added Services: Custom Cable Assemblies
Technical Support Dedicated Inventory
eProcurement Contract Pricing Online Quotes
Extended Product Range Scheduled Orders Kitting,
Bagging & Labeling My Account Management GSA
Advantage
Website: alliedelec.com

America II Electronics

Rank: 43T
2600 118th Avenue North St. Petersburg, FL 33716
USA 727-573-0900
Distributor Type: Specialized
Management: CEO - Michael Galinski; COO - Jed
Pecchioli; VP - Britt Doughtie Mike Pointer
Major Lines: see website
Value Added Services: Solderability testing,
RoHS element analysis with the Niton Xlt XRF,
Analyzer Baking and dry-packing of components
onsite to JEDEC specifications, Tape and reel,
Vacuum sealing, Decapsulation, IC Programming,
CCAP counterfeit test requirements, X-ray,
Bonded inventory, Importing, JIT delivery, Kitting,
Purchasing services, Market analysis, Customer-
specific instructions, Certificate of destruction for
disposed inventory, Customer/supplier corrective
action for all service defaults
Website: americaii.com

Area 51-ESG, Inc

Rank: 41T
51 Post, Irvine, CA 92618 949-387-0051
Distributor Type: Broadline
Management: President - Steven Shammah; CEO -
Peter An Nguyen; COO - Daniel Nguyen; VP -
Daniel Nguyen Miroslav Maramica; Sales Contact -
Kevin Webb
Major Lines: AEM, Alpha Wire, Lcom, Black Box,
Panduit, P-Duke, Littelfuse, Edac, Samwha, Orion
Value Added Services: Cable & Harness
assemblies,, Device programming, Switch
Assemblies, Tape, reel, Barcoding labels, Kitting,
Connector assemblies
Supply Chain Services: Vendor managed
inventory, material planning, Bonded inventory,
Forecast management, Scheduled orders, Sourcing,
JIT, Counterfeit mitigation, Consignment
ISO Certification: Yes
Website: area51esg.com

Arrow Electronics, Inc

Rank: 1
9201 E. Dry Creek Rd., Centennial, Colorado 80112
303-824-4000

Distributor Type:

Broadline
Management: Chairman, President, CEO - Michael
Long
Value Added Services: Design services,
engineering, programming, assembly, etc.
Supply Chain Services: Design services, end-of-life,
etc.
ISO Certification: Yes
Website: arrow.com

Avnet, Inc

Rank: 2
2211 S 47th St, Phoenix, AZ 85034
480-643-2000
Distributor Type: Broadline
Management: Chairman - Rodney Adkins; President
- Phil Gallagher; Global President Electronic
Components CEO - William (Bill) Amelio; Sales
Contact - 1 800 408 8353 or OnlineSupportUS@
avnet.com
Major Lines: see link <https://www.avnet.com/shop/AllManufacturers?countryId=us&catalogId=10001&langId=-1&storeId=715839035&deflangId=-1>
Value Added Services: Customization Device
programming, Integration and Configuration
Interconnect Assembly
Supply Chain Services: Assessment & planning
Inventory Management and Warehousing Routes
to Market
ISO Certification: Yes
Website: avnet.com

Benchmark Connector Corp

Rank: 36T
4501 NW 103rd Avenue-Sunrise, Florida 33351 954-
746-9929
Distributor Type: Specialized
Management: CFO - Wayne Nelson (General
manager); CPO - Richard Pacecca; Sales Contact -
Jason Brand
Major Lines: ADI, Aiconics, Aero-Electric, American
Micro, Conesys, Elecsys, Division of DCX; Chol, Delta
Electronics, EMP, J-Tech, Deteronics, Preci-Dip,
Step N Components, Spacecraft Components and
SPI-Connects
Value Added Services: Custom assemble to
customer specifications several different series of
Mil-Spec, Electrical connectors. Plus, Government
packaging, Kitting, Cable assemblies.
Supply Chain Services: Bonded inventory, LTA
planning and forecasting, JIT scheduling of product
ISO Certification: Yes
Website: benchmarkconnector.com
Website Services: Catalogs, dimensional
information, stock check, real time chat services,
information about Benchmark and our products.

Bisco Industries, Inc

Rank: 14
1500 Lakeview Loop, Anaheim, CA 92807, 714-693-
2901
Distributor Type: Broadline
Management: Chairman, CEO - Glen Ceiley;
President, COO - Don Wagner; VP - Zachary Ceiley;
Sales Contact - Zachary Ceiley
Major Lines: Southco, nVent Schroff (Pentair),
Mill-Max, RAF, Kato, Acme, Heyco, Essentra, Brady,
Keystone, Panduit, Accuride, Thomas & Betts/ABB
Value Added Services: VMI, JIT, Kanban,
EDI, Kitting, Bar coding, Consolidated billing,
Customized quality programs
Supply Chain Services: VMI, JIT, Kanban,
EDI, Kitting, Bar coding, Consolidated billing,
Customized quality programs
ISO Certification: Yes
Website: biscoind.com
Website Services: Procurement tools, Bill of
material upload, Request for quote, Invoicing, Order
status, Saved project lists

Bluff City Electronics

Rank: 38
3339 Fontaine Road Memphis TN 38116 901 345-

9500

Distributor Type: Broadline
Management: Chairman, President, CEO - Alfred
Cowles III; VP - Daniel Cowles; CPO - Laura Cantrell;
Sales Contact - Barry Gillespie
Major Lines: Turck, Banner, GE, Belden, P & F
Panduit, Avigilon, Pulus, General, Idec, Mag Power
Value Added Services: Vending machines, JIT
Inventory, Kitting
ISO Certification: No
Website: bluffcityelectronics.com
Website Services: Links to manufacturers, RFQ

CDM Electronics

Rank: 27T
130 American Blvd, Turnersville NJ 08012 USA
856-740-1200
Distributor Type: Specialized
Management: Private Ownership; VP - Lori Maeder,
Brian Miller, VP of Sales, Sales Contact - Brian Miller
Major Lines: Winchester Interconnect and
associated WIN and Kings brands Eaton / Wiring
Products Interconnect Division Times Microwave
Systems Amphenol PCD Delta RF Binder USA
Value Added Services: Cable Assembly Wiring
Harness Assembly RF and Specialty RF Cable
Assembly Component-level specialty interconnect
assembly Component-level specialty interconnect
assembly Box builds/Electromechanical
Supply Chain Services: Bonded inventory
Maintaining customer-specific specialty inventory
ISO Certification: Yes
Website: cdmelectronics.com
Website Services: Product information,
ecommerce

Chip 1 Exchange

Rank: Not Ranked
25652 Commercentre Dr Lake Forest, CA 92630
949 589 5400
Distributor Type: Franchise
Management: CEO - Susan Tabib; COO - Damon
Pouya; CPO - Salvador Lagos; Sales Contact -
Dennis Rex
Major Lines: See Line card
Value Added Services: In-house testing, Kitting,
Design Service
Supply Chain Services: Bonded inventory, EOL
Notifications
ISO Certification: Yes
Website: chip1.com
Website Services: Parts search, Live chat, Info
about company & services, Sending request for
quote directly, Autoselect language based on IP
address

Component Distributors Inc

Rank: 26
3963 Walnut St., Denver, CO 80205 800
777-7334
Distributor Type: Specialized
Management: Chairman, President, CEO - John
Williammee; COO - Lori Pacheco; VP - Whit Allen,
Doug Slansky; Sales Contact - Whit Allen
Major Lines: Skyworks, Sumitomo, TDK InvenSense,
Mean Well, Xicato, TE Connectivity, Solartron
Value Added Services: Evaluation Platforms,
kitting, special assemblies
ISO Certification: Yes
Website: www.cdiweb.com
Website Services: e-commerce, data sheets,
application notes, white papers & other supporting
documents, search capabilities, parametric search
over parts

CoreStaff Co.,Ltd

Rank: 46T
KDX Building 5F 3-14-29 Takada Toshima-ward
Tokyo 1710033 408-606-2609
Distributor Type: Specialized
Management: Chairman, President -
Masaki Tozawa
Value Added Services: FAE's, Counterfeit

mitigation, Supply chain services, Product life cycle management
Website: zaikostore.com

Cumberland Electronics Strategic Supply Solutions (CE3S)

Rank: 32T
 2501 Sycamore St., Harrisburg, PA 17111 888-565-3026
Distributor Type: Broadline
Management: President - Don Smeltz; VP - Jeremy Wagner; Sales Contact - Tom Misiti
Major Lines: Belden, 3m, Alpha Wire, Aim Solder, Chemtronics, Techspray, IDEC, Dymo, Panduit, Greenlee, Fluke, Desco, PACE, HAKKO, Wieland, SSAC, Symcom, Dremel, EATON, Weller
Value Added Services: Kitting, Production and rework support, Wire and tubing cutting, Vendor Managed Inventory, Cable assemblies, Repackaging
Supply Chain Services: In house Inventory Management, Shipment Scheduling, Supply chain Value Optimization, sourcing services
ISO Certification: Yes
Website: ce3s.com
Website Services: Information, Specials, order entry and product research

DAC

Rank: 7
 58 Jonspin Road, Wilmington, MA 01887 978-657-4870
Distributor Type: Specialized
Management: Chairman - Robert W. Clapp
ISO Certification: Yes
Website: heilind.com | droberts.com

Digi-Key Electronics

Rank: 4
 701 Brooks Ave, Thief River Falls, MN 56701, 800-344-4539
Distributor Type: Broadline
Management: Chairman - Ronald A Stordahl; (owner) President - Dave Doherty; Sales Contact - sales@digikey.com
Major Lines: Texas Instruments, Analog Devices, TE Connectivity,
Value Added Services: Assembly, Cut tape reeling, kitting, programming, battery packs
ISO Certification: Yes
Website: digikey.com
Website Services: Order status, BOM Manager, Lead time, Real time stock status, Product training, Live web chat, Quotes, Technology Zone, Dynamic Catalog, Reference Design Library, Scheme-it, Video library, EDA & design tools, Maker.io

Diverse Electronics Inc

Rank: 36T
 5400 Thimons, St-Laurent, QC H4R 2K9
 800-381-7308
Distributor Type: Broadline
Management: President, CEO - Rick Masciotra; COO - Eric Grados; VP - John Massi; CPO - Robert Miozzo; Sales Contact - Roussos Kouliakoudakis, Ingrid Bergh
Major Lines: MEAN WELL USA, GW Instek, Yageo, Henkel/Loctite/Bergquist, 3M, Panduit, JBC Soldering, Swanstrom Tools, SCS/Desco, Wieland, Brady, Keystone, E-Switch, SunLED, Apem, Hitano, HSM, Isocom, Kang Yang, UTC/Unisonic, ECS, ILSI, Apex-Weller, Stannol, MG Chemical
Value Added Services: Inventory Management (bin stocking programs, vendor-managed inventory, point-of-sale replenishment systems, customized programs), Supply Chain Services Tape & Reeling, Component Labeling, Device Programming, Pin Cutting, Lead Trimming & Forming, BGA Reb
Supply Chain Services: POU (Point-of-Use) Dispensing-Industrial Vending Program, Bonded Inventory (LOI), Just-in-time (JIT) Services, Locker Inventory Consignment, Vendor Managed Inventory (VMI)
ISO Certification: Yes
Website: diverseelectronics.com
Website Services: catalogue listing of 11,000 parts, including e-commerce store of 8,000 production floor products; technical data sheets, information guides, catalogues, informational videos, line card, listing of complete product offering, listing of product lines

ECCO (Electronic Connector Company)

Rank: 43T
 6332 S Central Ave. Chicago IL 60638

773-767-2200

Distributor Type: Specialized
Management: President, CEO - Bernard Gizzi; VP - Michele Thelen-Porter/finance, Kevin Hayes/operations
Major Lines: Amphenol, ITT Cannon, Cinch, Aero/Conesys
Value Added Services: connector and switch assembly, wire and cable assembly, marking & special logistics services such as bonded inventory, consignment, and packaging services, Electromechanical & interconnect design services, EMI RFI shielding and overmolding of interconnect
Supply Chain Services: connector and switch assembly, wire and cable assembly, marking & special logistics services such as bonded inventory, consignment, and packaging services, Electromechanical & interconnect design services, EMI RFI shielding and overmolding of interconnect
ISO Certi ication: Yes
Website: eccoconnectors.com
Website Services: inventory search, part search, pricing per SKU, ecommerce suite, quote requests/quote upload, company news and press updates

Edge Electronics, Inc

Rank: 23
 75 Orville Dr, Bohemia, NY 11716 800-647-3343
Distributor Type: Specialized
Management: President, COO - Adrienne Giannone; Sales Contact - Robert Tomasino
Major Lines: Micron, Tianma, JDI, Digital View, Fingerprint Cards, On Shore Technology, Mornsun, AMTouch, Aaeon
Value Added Services: Assemblies, Kitting, Integration, Design services
Supply Chain Services: Auto replenishment, Bonded inventory
ISO Certi ication: Yes
Website: edgeelectronics.com

Electro Enterprises Inc

Rank: 16
 3601 N I 35 Service Rd, Oklahoma City, OK 73111 405-427-6591
Distributor Type: Specialized
Management: President - Marilyn Enright; COO - Mitch Enright; Sales Contact - Nathan Little
Major Lines: TE Deutsch, TE Connectivity, Honeywell Sensing & IOT, Amphenol POD, Winchester Electronics, DRI Relays, RMS Connectors, Cinch Connectivity Solutions, Corsair Electrical Connectors, Harbour, Smiths Interconnect, Sumitomo, Aptiv Connection Systems, RSCC Ae
Value Added Services: Circular Connectors, Wire striping, Laser marking, VMI, Consignment, JIT, Bonded inventory programs
Supply Chain Services: VMI, Consignment, JIT, Bonded inventory programs
ISO Certi ication: Yes
Website: electroenterprises.com
Website Services: Prices, Spec sheets, Technical information, Cross reference information, Inventory

Electronics Supply Co., Inc

Rank: 35
 4100 Main St, Kansas City, MO 64111, 816-931-0250
Distributor Type: Broadline
Management: Chairman, CEO - Joanne LaBelle; President - Janet Niekamp; COO - Robert Niekamp; VP - Kirk LaBelle; CPO - Donn Weisser; Sales Contact - Bill Neustadt
Major Lines: APC, Belden, Commscope, Fluke, Leviton, NTE, Klein
Value Added Services: Kitting, Panel assemblies, Design Services
Supply Chain Services: Stock staging, Warehousing
ISO Certi ication: No
Website: eskc.com
Website Services: Shopping cart, product data sheets & technical information

Falcon Electronics Inc

Rank: 27T
 47 Mall Drive, Suite 5 Commack, NY 11725 631-351-8515
Distributor Type: Specialized
Management: Chairman, President, CEO - Brian Diaz; COO, VP - Richard Wecker; CPO - Carrie Wallrabe; Sales Contact - Ian Mikles

Major Lines: Microsemi (Microchip), Holt IO, Mercury Systems, FMJ Storage, Semelab (TT Electronics)
Value Added Services: VP Screening, Tape & Reel, Soldering testing, PIND, DPA
Supply Chain Services: Auto Replenishment, Dock to Stock, MRP
ISO Certification: Yes
Website: falconelec.com
Website Services: Information, quote requests, sample requests

Fedco Electronics Inc

Rank: 39T
 1363 Capital Dr, Fond du Lac, WI 54937, 920-922-6490
Distributor Type: Specialized
Management: Chairman, CEO - Steve Victor President - Peter Victor; CPO - Dennis Boelter Sales Contact - Peter Victor
Major Lines: Panasonic, Saft, Enersys, FDK, Ultralife, Energy Access, Varta, Renata, Maxell
Value Added Services: Design, Prototyping, Assembly, Fulfilment of battery packs & battery systems
Supply Chain Services: Battery fulfilment services for standard & custom batteries
ISO Certification: Yes
Website: fedcobatteries.com
Website Services: Product lookup, Quantity on hand, Pricing, Online ordering & tracking

Flame Enterprises

Rank: 19
 21500 Gledhill St, Chatsworth, CA 91311, 818-700-2905
Distributor Type: Specialized
Management: Chairman, President, CEO - Mike Epstein; COO - Neil Rostholder; VP - Peter Epstein, Dave Boush, Monica Beith; CPO - Dave Boush Sales Contact - Jim Finegan
Major Lines: Esterline/Leach, TE Connectivity, Safran Electrodynamics, Rebling Plastics, Amphenol PCD, Sagem, Hartman
ISO Certification: Yes
Website: flamecorp.com
Website Services: Drawings, Stock check, Contact info

Future Electronics

Rank: 3
 237 Hymus Blvd, Pointe-Claire, QC H9R 5C7 514-694-7710
Distributor Type: Broadline
Management: Chairman, President, CEO - Robert Miller; VP - Pierre Guilbault, Dan Casey, Sam Abrams, Jamie Singerman, Karim Yasmine, Helmut Lippmann, Frederick Miller, Omar Baig; Sales Contact - Karim Yasmine
Value Added Services: e-commerce, kitting, bonded, inventory program, tech support, auto inventory replenishment, lighting solutions
Supply Chain Services: Bonded inventory, supply chain consulting, MRP share, manufacturing seminars
ISO Certification: Yes
Website: futureelectronics.com
Website Services: online ordering, order management & tracking events, seminars, supplier product information

Gopher Electronics Company

Rank: 34
 222 Little Canada Rd E, St Paul, MN 55117 651-490-4900
Distributor Type: Broadline (Electomech Focus)
Management: Chairman - Jeff Mrozinski; VP - Dennis Tully, Kei Cheung; Sales Contact - Kei Cheung
Value Added Services: Flat flexible cable, Value added customization, Cable harness, DIN rail/panel build, Switch & sensor assemblies, Custom "connectorizing" of fan & blower assemblies, Heavy gauge wire assemblies
Supply Chain Services: Integrated supply chain, Point of use, Kanban, ASN, JIT, Bonding, Forecast management, Release on demand
ISO Certification: Yes
Website: gopherelectronics.com
Website Services: Quick order, Login, Product information, Pictures

Continue on page 60 »

Keystone Electronics Corp.

Quality Interconnect Components and Electronic Hardware

Leading edge technology and precision manufacturing have defined Keystone's performance since 1950. Their latest Catalog M65 reflects this tradition.

Keystone personnel take pride in meeting all requirements, efficiently and promptly. Our skilled and dedicated technicians, experienced production personnel and customer service teams have made us an industry leader.

All Keystone facilities are fully integrated with 3D/CAD product modeling and CAD/CAM precision tool and die operations. Applications and Engineering

specialists utilize progressive dies, four-slide, wire forming, in-die tapping and high-speed blanking along with automated machining to produce tight tolerance standard and custom products. Secondary operations include Tapping, Drilling, Assembly and Finishing.

Application engineering services are available for product modifications or special design requirements. Keystone is an ISO-9001:2015 certified company and complies with RoHS and REACH directives.

View inside the walls of Keystone Electronics and learn about

our design and manufacturing capabilities, our customer service team and our complete line of interconnect components and electronics hardware. www.youtube.com/watch?v=_Zt9R7oulSY

There's a Keystone is every great invention...

Follow our latest blog at www.keyelco.com/blog.cfm

Keystone Electronics Corp.
 55 South Denton Avenue
 New Hyde Park, NY 11040
 (800) 221-5510 or (516) 328-7500
www.keyelco.com



PCB Test Points & UL Approved Terminals

Low Profile and limited space drive today's PCB connectivity designs. Keystone is the right fit with Solder and Solderless PCB Quick-Fit, Snap-on, Snap-Fit and Screw-on Terminals as well as Color-Coded Screw Terminals & THM and SMT Test Points and more.



Spacers, Standoffs/Supports - Metallic & Non-Metallic

Diverse insulated and non-insulated spacers and standoffs are available in a wide range of lengths, thread sizes, hole sizes, mounting styles & materials. Choose from English or Metric type products for your PCB, panel and mounting applications.



Space-Saving Fuse Clips & Holders

Fuse clips and holders for Electronics, Datacom, Telecom, Automotive and Solar use. Keystone answers your needs with SMT, Thru-Hole and rivet mount products.



Panel Hardware, Handles, Screws & LED Spacers

Check out Keystone's value-added products: Fan Filters & Guards, LED Lens Caps, Holders & Spacer Mounts, Jack Screws and Connector Hardware, Instrumentation Handles, Cable Clamps, Knobs and more.



Battery Clips, Contacts, Holders & Retainers

Advances in portable electronics and Lithium-Ion battery technology demand dependable battery connections. Keystone leads the way with a vast range of reliable, high-quality, cost-effective products for most battery types.



Pins, Plugs, Jacks & Sockets, Industries Most Diverse Group

Keystone's USB 2.0, 3.0 & 3.1 Jacks & Plugs, Micro Pins/Jacks, Banana and Phono Plugs & Jacks are designed for use in the latest Mobile & Computer Electronics, Home Theatre, Test Gear and Industrial Interconnects.

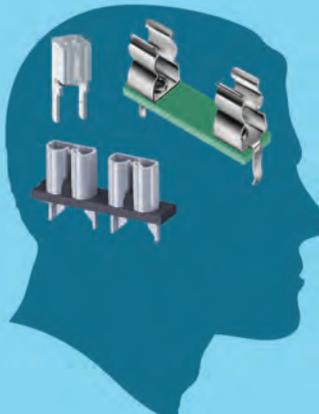
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Fuse Clips & Holders



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Spacers & Standoffs



Plugs & Jacks



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ELECTRONICS CORP.



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TOP 50 - DISTRIBUTORS REPORT 2019

» House of Batteries

Rank: 29
10910 Talbert Ave, Fountain Valley, CA 92708 800-432-3385

Distributor Type: Specialized
Management: President - Don West; CEO - Maggie West; COO - Mel Weis; CPO - Terry Ragone; Sales Contact - Carlos Gonzales

Major Lines: Duracell, Energiser, Enersys, Panasonic, LG Chem, Murata (Sony) Samsung Saft Tadiran

Value Added Services: Design of electronics for lithium battery packs, testing of battery packs, UN UL CE Certs Packaging & shipping Hazmat lithium
Supply Chain Services: Kanban, Guaranteed inventory

ISO Certification: Yes
Website: hobcustompower.com

Website Services: Selection & Engineering assistance

Hughes Peters

Rank: 17
8000 Technology Blvd, Dayton, OH 45424 937-235-7100

Distributor Type: Broadline
Management: President - Mike Okel; VP - Mike Smith

Major Lines: Honeywell, ebm-papst, Littelfuse, ZF, Apem, Omron, Mechatronics, NMB, Mean Well, Schurter, Schroff

ISO Certification: Yes

Website: hughespeters.com

Website Services: Partnered customer portal/login

IBS Electronics Inc

Rank: 46T
3506 W Lake Center Dr, Santa Ana, CA 92704 714-751-6633

Distributor Type: Franchise
Management: President - Bob Tavi; COO - Monsen Negnabat; VP - Rob Tavi (MD);

» CPO - Yassi Tavakoli; Sales Contact - sales@ibselectronics.com

Major Lines: Ametherm, Amtek, Camtec, Degson, Diotec, Burndy, Diptronics, Shawa (SWCC), Panduit, Omron, Nettron, Regal, LV, Harting, ASI Resistors, ASC Capacitors, HTR, Cai-chip, Gienteq, Coilmaster, Etal, ATE, Sumida, Yageo, WTL Crystal, Display Visions and more

Value Added Services: VMI, Global logistics, Cable assembly, RCB Assembly, FAE Support and more

Supply Chain Services: VMI, Global logistic warehouses, Vendor consolidation and more

ISO Certification: Yes

Website: ibselectronics.com

Website Services: Company profile, Ecom store, Sourcing & supply chain info

Kensington Electronics Inc

Rank: Not Ranked
11801 Stoneshollow Dr, Suite 150, Austin, TX 78758 512-339-3300

Distributor Type: Broadline
Management: Chairman - Doris Rabbitt; President - Patrick Rabbitt; VP - Terence Rabbitt, Casey Cavender; Sales Contact - Sean Donovan

Major Lines: Smiths Interconnect, Fischer Connectors, Autospace, Staubli, Conec, Halo Electronics, Kel

ISO Certification: Yes

Website: keiconn.com

Website Services: Pricing, Stock check, Manufacturer links, Data sheets

Marsh Electronics Inc

Rank: 25
1563 South 101st Street Milwaukee WI53214 414-475-6000

Distributor Type: Broadline
Management: CEO - James S Banovich; COO - Steve Banovich; Sales Contact - Steve Spaeth

Major Lines: Eaton, Vishay, ZF Electronics, Cornell Dubilier Electronics, ASC Capacitors, Littelfuse, Otto Controls, Song Chuan Relays, UCC, Carling, Sanyo Denki

Value Added Services: Cable Assembly, Wire Harnesses, Mechanical Sub-Assembly, Box Builds, Ribbon Cable Assembly, Kitting, Component Prep, Ultra-Sonic Welding, Wire Re-Spooling, Packaging

Supply Chain Services: Auto-Replenishment, Line-Stocking, KanBon, Bonded Inventory

ISO Certification: Yes

Website: marshelectronics.com

Website Services: Who we are, Request for quote, Contact us

Master Electronics

Rank: 10
2425 SOUTH 21ST STREET PHOENIX AZ 85034 602-267-1111

Distributor Type: Specialized
Management: President - Riad Nizam; CEO - Jamil Nizam

ISO Certification: Yes

Website: www.masterelectronics.com

Metuchen Capacitors Inc

Rank: 43T
2139 NJ-35 #2, Holmdel, NJ 07733, 800-899-6969

Distributor Type: Limited Line
Management: President - Gary Figsor; VP - Lisa Mace, Steven Young

Major Lines: API Technologies, Adam Tech, Kemet Electronics, EFC, Union Technologies, Oxley, ASC, Barker Microfarad
Value Added Services: Testing, Soldering, Burn in, Filter plates, Marking, Speciality Capacitors

ISO Certification: Yes

Website: metcaps.com

Website Services: Quotations, Order placement, Spec & data sheets

Mouser Electronics

Rank: 6
1000 N Main St, Mansfield, TX 76063 817-804-3800

Distributor Type: Catalog
Management: Chairman - Paul Andrews; President, CEO - Glenn Smith; VP - Pete Shopp, Jeff Newell, Mark Burr-Lonnen, Todd McAtee, Kevin Hess, Hayne Shumate, Raju Shah, Scott Brown, Sales Contact - Coby Kleinian

Major Lines: Texas Instruments, TE Connectivity, Analog Devices, Vishay, Molex, Maxim, Microchip, Murata, Amphenol, NXP, Panasonic, ST Micro, Phoenix Contact, AVX, Kemet, TDK, On Semi, Littelfuse, Avago, Altera
Value Added Services: Cable assembly Chip & Crystal programming, kitting BOM support, Broken pack quantities, Local tech support Scheduled orders

ISO Certification: Yes

Website: mouser.com

Website Services: Enhanced online catalog, Order history, BOM processing, Cart project sharing, 17 languages with 25 different currencies, Custom reel services

N.F. Smith & Associates, L.P.

Rank: Not Ranked
5306 Hollister Street Houston TX 77040 713 430 3000

Distributor Type: Independent
Management: Chairman - Bob Ackerley; President - Lee Ackerley; CEO - Marc Barnhill; COO - Kirk Werby; CFO - Sean Evans; VP - Margo Evans, Todd Burke, Art Figueroa, Cleat Kimbrough, Minji Hong, Kent Pang, Todd Snow, Mike Pursley, Sean Trinh; Sales Contact - Marc Barnhill

Value Added Services: HDD & SDD wiping, Flashing & shredding, Dry packing & packaging, Tape & reeling, Labelling, Baking, Kitting, Rework services, Component recovery

Supply Chain Services: Cost savings, Lifecycle management, Vendor-managed inventory, Excess inventory solutions, EOL,LTB, Purchasing services, Asset disposition

ISO Certification: Yes

Website: smithweb.com

Website Services: Online purchasing, Reporting, Inventory search, Partner intranet, Real time market information, Ability to submit a requirement

NASCO Aerospace and Electronics

Rank: 41T
3232 44th Avenue North Saint Petersburg, FL 33714 727-344-7554

Distributor Type: Broadline
Management: Chairman, President, CEO - Rick Bagnasco; Chairman, CEO, COO - Frank Bagnasco; CPO - Bobbi Ellis; Sales Contact - Rick Bagnasco

Major Lines: See website

Value Added Services: Quality testing supplier list Kitting, Class 2 & 3 threaded fastener inspection, Excess inventory, Testing services

Supply Chain Services: See website

ISO Certification: Yes

Website: nascosales.com

Website Services: E-commerce information, Part search inventory

NRC Electronics Inc

Rank: Not Ranked
6600 Park of Commerce Blvd, Boca Raton, FL 33487 561-241-8600

Distributor Type: Specialized
Management: CEO - Dennis Eisen; COO - Eric Eisen; CPO - Tom Consiglio; Sales Contact - Michael Thomas, Dennis Eisen

Major Lines: nrcelectronics.com/products.aspx
Value Added Services: Full onsite FAE engineering support from certified FAE, Bar coding, In house testing, Quality certifications, (such as ISO), Bread man delivery programs and their JIT delivery programs, Customised software that integrates, incorporates and documents custo

Supply Chain Services: Fully logistics based operation with a 20,000 stocking facility & additional spacing as needed, Plan control & optimize the supply chain by utilizing experience, connections and trained personnel resources

ISO Certification: Yes

Website: nrcelectronics.com

Website Services: Stock check, New product (technology), news not found elsewhere, Access & Guidance from engineers along with one of the best franchised manufacturer offerings in the industry.

PEI Genesis

Rank: 12
2180 Hornig Road Philadelphia, PA 19116 215-673-0400

Distributor Type: Specialized
Management: Chairman, President, CEO - Steven Fisher; VP - Peter Austin; Sales Contact - John Hunagle

Major Lines: ITT Cannon, Amphenol, TE Connectivity, SOURIAU-SUNBANK, LEMO, Cinch Connectivity Solutions, Anderson Power Products

Value Added Services: Connectors, cable assemblies, kitting, custom bar coding, marking, labeling, and specialty services

Supply Chain Services: JIT, Bonded Inventory, EDI, Supply Chain Analysis, Webstore

ISO Certification: Yes

Website: peigenesis.com

Website Services: Technical web support, placing/viewing orders, track shipments, quotes, invoices, digital resources, WebChat

Phoenics Electronics Group

Rank: 15
31 Nagog Park, Acton, MA 01720, USA 978-856-0111

Distributor Type: Specialized
Management: Chairman, President, CEO, COO - Peter Rooks; VP, CPO - Sheri Klatsky; Sales Contact - David Owens

Major Lines: Marvell/Cavium Micron Microchip/Microsemi Qlogic Gigabyte ABB Parade ATP Viking Monta Vista

Value Added Services: Firmware maintenance, Kitting, Fiber optic transceiver integration
Supply Chain Services: VMI/SMI, Buffer management

ISO Certification: Yes

Website: phoenicselectronics.com

Website Services: Request for quotes, Inventory lookup, Email to sales department

PUI Projections Unlimited Inc

Rank: 30T
15311 Barranca Pkwy, Irvine, CA 92618, 714-544-2700

Distributor Type: Specialized
Management: President - David Herring; VP - David Burgener, Travis Griffin; Sales Contact - Bob Gau

Major Lines: Apem, Cornell Dubilier/Illinois Capacitors, Delta, Kycon, Mill-Max, PUI Audio, Samtec, Sanyo Denki, SunLED, TT Electronics, United Chemi-Con

Value Added Services: Fan & Fan tray assembly, Cable & Harness assembly, Sensor & switch assembly, Heat sink & thermal management assembly, Power supply customization

Supply Chain Services: Bonded Inventory, VMI (Vendor managed inventory), Auto replenishment, Consigned stores

ISO Certification: No

Website: shoppui.com
Website Services: Online shopping, Order status/tracking of shipments, RoHS/reach info, Part search, Specification/Drawings, Online request for quote, Suppliers, Links, Product knowledge

RFMW Ltd

Rank: 20
 188 Martinvale Ln, San Jose CA 95119
 877 367-7369
Distributor Type: Specialized
Management: President - Joel Levine; VP - Steve Takaki, John Hamilton, Josh Levine, Mike Carroll
Major Lines: Qorvo, pSemi, Skyworks, Ampleon, EMC RF Labs, MACOM Metelics, Aethercomm, Rosenberger, Sangshin, P1dB, Carlisle, API
Value Added Services: Cable assemblies, Die handling, Die Visual Inspection, Special Marking, Tape and Reel, Hybrid Assembly, Custom Packaging, Parametric Test, Evaluation Boards, Part Screening/Sorting/Binning, Lead Trimming/Forming/Tinning
Supply Chain Services: Bonded inventory, vendor managed inventory
ISO Certification: Yes
Website: rfmw.com
Website Services: Parametric search, Generic Search, Pricing information, Inventory information, Product Data Sheets, Supplier overviews, On-Line purchasing

Sager Electronics

Rank: 9
 19 Leona Drive Middleborough, MA 02346 508 947-8888
Distributor Type: Specialized
Management: Chairman - Paul Andrews; President - Frank Flynn; VP - Faris Aruri, Bruce Kellar, Shannon Freise; Sales Contact - Bruce Kellar
Major Lines: Honeywell, TE Connectivity, Phoenix Contact, Samtec, Mean Well, SL Power, Sensata Technologies, ebm-papst, Artesyn, Laird Technologies, Molex, Omron
Value Added Services: Modular power supplies, Custom modifications, Setpoints & adjustments, Power cycling & HALT testing, Wire harnessing, Series & Parallel connections, Enclosures, Firmware updates, Fan assemblies, Fan trays, DIN Rail, Rail cutting & assembly, Marking/Label
Supply Chain Services: Bonded inventory, Consignment, JIT Delivery, VMI, Special order handling, MRP management, EDI, advanced shipping notifications, 2D barcoding
ISO Certification: Yes
Website: sager.com
Website Services: Online catalog, shopping cart quoting order and quote tracking account management, customer specific terms

Schuster Electronics, Inc

Rank: 39T
 11500 Northlake Dr. Ste 117, Cincinnati, Ohio. 45249 800-877-6875
Distributor Type: Broadline
Management: Chairman - Ted Ludeke; President - Michael Fine
Major Lines: Phoenix Contact, Samtec, Cosel, JST, Harting
Value Added Services: Kitting, Cable assemblies, Din rail assemblies, Fan & power supply modifications, Markers, Special inventory programs, Flexible supply chain services
Supply Chain Services: Auto replenishment, Bonding, EDI, Kitting, Custom inventory management programs
ISO Certification: Yes
Website: schusterusa.com

Sherburn Electronics Inc

Rank: 32T
 175 Commerce Dr # K, Hauppauge, NY 11788 631-231-4300
Distributor Type: Specialized
Management: President - James Burke; VP - John Odenthal; Sales Contact - Gerard Barry
Major Lines: TE Connectivity, Dell, H/P, Burndy, Tripp-Lite, Struthers Dunn, Ohmite, PEC, EHC, Boeing, PAAL Technologies, Zippertubing, Schneider Electric
ISO Certification: Yes
Website: sherburn.com
Website Services: Buy now, Quote, Line card & product information, Quality certificates

SMD Inc

Rank: 24
 1 Oldfield Irvine, CA 92618 949-470-7700
Distributor Type: Specialized
Management: President - Rich Unruh; VP - Dave Herrera, Sean O'Bannon, Pete Ainsworth; CPO - Jeni Rodriguez; Sales Contact - sales@smdinc.com
Major Lines: Avery Dennison, Bussman, Cal Chip, CIT, EDAC, EPCOS, E-Switch, HellermannTyton, Keystone, King Cord, KEMET, Kycon, NKK Switches, NMB Fans, Novacap, OST, Oupiin, Panduit, Pentair, Singatron, Samtec, TDK, Yazaki
Value Added Services: Cable Assembly and Testing, Kitting
Supply Chain Services: Bonded Inventory, MRP Share, EDI, Automatic Replenishment, Consignment Programs, Logistics Management, Freight Management, VMI Programs
ISO Certification: Yes
Website: smdinc.com
Website Services: Stock Checks, Links to all supplier's sites and data sheets, credit application, sample ordering, News updates, ISO and similar documentation, Process RFQ's, New product announcements, supplier and customer portoles

Steven Engineering Inc

Rank: 18
 230 Ryan Way, South San Francisco, CA 94080 800 258-9200
Distributor Type: Specialized
Management: Chairman - Bonnie A. Walter; President - Paul E. Burk III; CEO, COO - Bryan J. Wolfram; CPO - Kevin F. Mutto; Sales Contact - Paul E. Burk III
Major Lines: SMC Pneumatics, Phoenix Contact, Schneider Electric, Rittal, Banner Engineering, Turck, Idec, Moog - Animatics, ABB, Pepperl + Fuchs, Macron, Mersen, Honeywell, E-T-A. Value added services
Value Added Services: Kitting, cable assemblies, rail assemblies, engraving, enclosure modifications, pneumatic assemblies, terminal block marking, custom modification etc.
Supply Chain Services: Bonded inventory, consignment inventory, J.I.T., vendor managed "VMI" inventory, dedicated warehousing, automatic shelf restocking
ISO Certification: No
Website: StevenEngineering.com
Website Services: Product specification data for over 2.5M products, product attribute search functionality, customer specific warehouse and general warehouse visibility, customer specific contract pricing, self-serve post sale functionality, i.e. invoice review, account review

Symmetry Electronics Corp

Rank: 22
 5400 W. Rosecrans Avenue, Hawthorne, CA 90250 310 536-6190
Distributor Type: Specialized
Management: President - Mark Zack; VP - Brett Smith, Clancy Barham; CPO - Stephan Buba
Major Lines: Telit, Lattice Semiconductor, Silicon Labs, Nordic Semiconductor, Digi International, Micronas
Value Added Services: Proximity warehouses, field and in-house applications engineers, Cellular and Cloud Services, testing, custom engineered solutions, exclusive development kits, design services, cellular & cloud programs for M2M/IOT applications, Programming, kitting.
Supply Chain Services: VMI, Consignment, bonded inventory, JIT programs, drop ship, bonded warehousing, custom labeling & packaging, EDI
ISO Certification: Yes
Website: symmetryelectronics.com
Website Services: Research and Buy, Technical Support and Information, Development Kits, Evaluation Tools, Product Marketing

The Powell Electronics Corp

Rank: 13
 200 Commodore Dr, Swedesboro, NJ 08085 856-241-8000
Distributor Type: Broadline
Management: Chairman, President - Ernie Schilling; CFO - Schawn Beatty; VP - John Barrington, Todd Bethea, Rodney Sellers, Tony Strope
Major Lines: TE, Amphenol, Glenair, Honeywell, AirBorn, Conesys, Positronic
Value Added Services: Connector assembly, cable

assembly, Kitting, switch assembly, test kits,
Supply Chain Services: Inventory reserve, VMI, bonded inventory, EDI
ISO Certification: Yes
Website: powell.com

TTI, Inc

Rank: 5
 2441 Northeast Parkway, Fort Worth, TX 76106 817 740 9000
Distributor Type: Specialized
Management: CEO - Paul Andrews; COO - Mike Morton; CFO - Chris Goodman; Sales Contact - Tom Vanderheyden Sr. VP Sales
Major Lines: AVX Amphenol APTIV Bourns FCI Glenair Honeywell Kemet KOA Littelfuse Molex Nichicon Ohmite Osram Panasonic Phoenix Contact TE Connectivity TDK/Epcos Vishay
Value Added Services: Customer supply chain management, integrated logistics, automated replenishment, EDI, MRP, Internet interface, Customer managed inventories, schedule sharing, JIT replenishment, In-plant terminals, Connector Assembly, Packaging, Labeling, Product special
Supply Chain Services: Total acquisition analysis, Advanced inventory management system, Bonding consignment
ISO Certification: Yes
Website: ttiinc.com
Website Services: Inventory availability, Product specification, Parametric search, Part comparison, Multi-part upload, Project list (BOM mgmt) Quoting resources, Order status, Industry trends, Service tools inc. customer specific part numbers, pricing & availability

URS Electronics

Rank: 48
 123 NE 7th Ave, Portland, OR 97232 503-233-5341
Distributor Type: Broadline
Management: Chairman - Earl Twietmeyer; President - Mark Twietmeyer; CPO - Mark Godfrey; Sales Contact - Mark Twietmeyer
Major Lines: Pelco by Schneider Electric, Panduit, Weidmuller, Eaton, Raytec Systems, Vicon, Belden, APC, on, Alpha Wire
Value Added Services: Kitting, Design support, Cable assemblies, Terminal block assemblies, labelling, Control panels
Supply Chain Services: Third party logistics, Recalibration/restocking of service kits
ISO Certification: No
Website: ursele.com
Website Services: Link to authorized manufacturers, Newsletter/industry updates, Contact list

Waldom Electronics Corp

Rank: 21
 1801 Morgan Street Rockford, IL 61102 800-435-2931
Distributor Type: Wholesaler
Management: President - Jamil Nizam; VP - Peter Rovekamp, Jelger Bos; Sales Contact - Hillary Bagley
Major Lines: TE Connectivity, Molex, Amphenol, Kemet, C&K Switches, ZF Electronics, Dialight, Bulgin, Honeywell, Sensata, The Bell Company, Omron
Value Added Services: Kitting, Retail Packaging, Mini-Reels,
Supply Chain Services: Blind Fulfillment, Excess Management
ISO Certification: Yes
Website: waldom.com
Website Services: Stock Availability, Purchases, Confirmations, BOM, Quotes, Delivery Dates

WPG Holdings Limited

Rank: 11
 8F., No.489, Sec. 2, Tiding Blvd., Neihu Dist., Taipei City 114, Taiwan (R.O.C. 978 657-0023
Distributor Type: Broadline
Management: Chairman - Simon Huang
Major Lines: Intel, TI, NXP, Toshiba, Micron, Samsung, Infineon, ST, ON Semiconductor
ISO Certification: Yes
Website: wpgholdings.com
Website Services: line card and sales office information, reference design, e-commerce

Building a Dynamic Thermal Product Purchasing Strategy

Thermal management products play a vital role in many intensive and specialized applications in industries subject to extremely high temperatures. We asked Smith's Vice President of Business Development, Todd Burke, how purchasing is affected

Q What should be on a purchaser's shopping list when sourcing thermal management products?

First, purchasing professionals need to have the full part number, product description, quantity, and target price for the specific product being sourced. Secondly, identify any lead time requirements and request a copy of the manufacturer's product specification sheet. Finally, to ensure the right product is sourced, purchasers will benefit greatly from a thorough understanding of the thermal management product's intended application.

Q What different thermal management products are available and in what kind of applications are they used?

Heatsinks, fans, and blowers are the most common thermal management products in the supply chain. Customers across the electronics industry also require thermal materials such as coatings and plastics. From aerospace and defense to medical industry applications, thermal products play a vital role in many intensive and highly specialized sectors. The automotive and oil and gas industries, for example, utilize thermal management products in applications that must withstand extreme temperatures, often ranging from -40 to 200°C.

Q What are lead times like for thermal products in the Americas?

Thermal product lead times depend on the lifecycle of the product and the quantity needed. If a customer is open to cross-matching thermal management part numbers and the part is in stock, lead times are running at about one to two weeks for products like blowers and heatsinks. If the part is not in stock and there is not much flexibility, lead times in the Americas are ranging from eight to ten weeks.

Q How have thermal products advanced over the last few years?

With computers and mobile computing devices becoming smaller and thinner over the years, the need to dissipate heat has become more urgent. Chip technology has also advanced in these types of products, so thermal management solutions have adapted. Fans and their packaging have become significantly smaller than a few years ago to be more cooling efficient.

Q What are the most popular thermal products distributed by Smith?

Smith sources a wide variety of thermal management products. Our worldwide headquarters in Houston is located near the Gulf of Mexico. This region is a hotspot for oil and gas customers who need products that can operate under

extreme conditions. Heatsinks, fans, and blowers are the most popular thermal products that Smith distributes. We've been distributing these product types since our founding in 1984, and they are still popular in thermal management today.

Q What can we expect from thermal management technology in the future and what benefits will this provide?

We expect thermal management products and technology to keep up with the 'smaller is better' trend. Smaller, more efficient thermal products will replace older, larger ones, and inevitably, purchasers will need to source new parts.

www.smithweb.com



Smith's Vice President of Business Development, **Todd Burke**

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Sidestep supply chain risks

It's a constant battle to avoid counterfeit components, particularly when purchasing end of life or obsolete parts. 4 Star Electronics highlights the tools available to help avoid counterfeits

Procuring electronic components can be a difficult task. One of the trickiest challenges is the battle against counterfeit parts so it's important for buyers and procurement specialists to be aware of the risks in the supply chain, and for their employers to develop programs to reduce the probability of receiving counterfeits. Luckily, as counterfeiting has gotten more sophisticated, the processes and tools required to combat it have also evolved.

Counterfeit programs

The SAE standard AS5553 covers counterfeit electrical, electronic, and electromechanical parts; avoidance, detection, mitigation, and disposition. As this standard outlines, effective counterfeit avoidance includes a preference to source material from authorized sources, including original component manufacturers, their authorized or franchised distributors, and authorized aftermarket manufacturers. When these sources are unavailable due to obsolescence, use trusted suppliers that have been fully qualified along with risk-based

inspections and tests that are appropriate for the end-use of the parts.

It's also important to research and understand the lifecycle and market conditions of the components you use. If you stay current with product change and end of life notices through forecasting and vendor communication, you can execute last time buys and minimize higher risk purchases.

Updated standards

Introduced in 2009, SAE AS5553 set out general requirements that could be used by original equipment manufacturers and contract manufacturers and flowed down throughout their supply chains. Over time this standard has evolved to better address the risk-based nature of counterfeit mitigation, and to refine the industries' definitions and best practices. Rev C of AS5553 was released in March 2019 and is a good starting point to developing a mitigation program.

The other recent development in counterfeit standards is AS6171, a test methods standard covering general requirements, suspect/counterfeit, electrical, electronic, and electromechanical parts. This standard is meant to be used by test labs and independent distributors who work most closely with obsolete and end of life product. It aims to ensure consistency of inspection and test procedures, workmanship, and training, and can be used wherever these functions are performed in the procurement process. This is most important when procuring open market components that do not have an unbroken chain of traceability to the original component manufacturer.

Invest in testing

Test labs and independent distributors can achieve accreditation to ISO 17025, including AS6171 test methods. AS6171 outlines the requirements of various test methods, such as: reviewing packaging and documentation; external visual inspections, including surface analysis and marking tests; x-ray

and XRF analysis; decapsulation and die examination; functional electrical testing; electron microscopy; and acoustic microscopy.

Additional methods can be used on a case-by-case basis if the end-use application is particularly high risk or if any anomalies are found during lower level testing. Although AS standards are targeted to the high-reliability world of military and aerospace electronics, the principles apply just as well to the commercial and industrial sectors.

OEMs and contract manufacturers all have need of obsolete and hard-to-find parts and should choose vendors wisely to limit open market sources to trusted independent distributors who understand the risks inherent in the supply chain. Furthermore, utilizing distributors or test labs to conduct detailed inspection and test based on the most updated standards will ensure that current best practices are used, and that material is as safe as possible.

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Quick-ship D-subminiature connectors built to order

Value-add distributor, PEI-Genesis, has introduced a quick turn assembly service for Positronic's D-subminiature connectors, with many products assembled and shipped within 48 hours

High reliability connector manufacturer, Positronic, has certified PEI-Genesis to provide its customers with value-added connector assembly services. PEI-Genesis is the first authorized distributor to be certified as a value-added assembly partner for Positronic.

Under the arrangement, PEI-Genesis will assemble a range of Positronic D-subminiature

connectors, including nearly 90,000 potential configurations. Connectors will be assembled at PEI-Genesis' AS9100 and ISO9001 certified facility in South Bend, Indiana. Many of these Positronic D-subminiatures will be assembled, tested, packaged and shipped from PEI within 48 hours.

Director of supplier relations at PEI-Genesis, Julie Trunk,

commented: "We are excited to offer Positronic D-sub connector configurations with quick turn-around times. Expanding our offering with quality products means customers enjoy more variety when searching for interconnect solutions."

Director of inside sales and distribution at Positronic, Anita Warner, added: "Providing quick-ship

capability for versions of our D-subminiature connector line will be a valuable resource for Positronic customers. PEI-Genesis will now be able to satisfy a market need for delivering high reliability Positronic connectors in days, instead of weeks."

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High-brightness LED shipments will rise, but tags will fall

Expect a buyer's market for LEDs through 2019 despite healthy unit demand



James Carbone

Despite healthy unit demand, prices for high-brightness light emitting diodes (LEDs) will decline an average of 3.2 per cent in 2019 because overcapacity has resulted in a supply glut.

While LED tags will decline, the worldwide high-brightness LED market will grow 7.6 per cent because of strong demand from automotive systems and interior and exterior lighting applications.

The global high-brightness LED market grew 11.8 per cent to \$13.5 billion in 2018 and will rise to \$14.5 billion in 2019, according to researcher IC Insights. LED shipments will increase from 233 million units in 2018 to 257.5 million in 2019 and to 274.2 million in 2020, the researcher said.

However, overall slower economic growth that is expected in 2020 will result in only 2 per cent revenue growth for LEDs when the market will total \$14.8 billion. "Then the LED market will start to recover after 2020," said

Rob Lineback, senior research analyst for IC Insights. "We won't see a real setback in 2020, but a slowing," he said.

Continuing overcapacity will also contribute to slower growth for LEDs. "We had a glut of high brightness LEDs for a few years and we still do," said Lineback. "Oversupply resulted in all suppliers cutting prices, which is good for buyers, but not for LED manufacturers," he said. Such suppliers include Nichia, Osram, Lumileds, Seoul Semiconductor and Samsung among others.

Buyers can expect oversupply to continue for a while. Some manufacturers may transition LED production to larger size wafers which would result in more LED chips per wafer. Most LEDs are produced on 100mm and 150mm wafers. "There's been a lot of talk about moving to 200mm wafers," said Lineback. "Samsung has done some work on it and a Chinese manufacturer has said it is developing the technology."

If LED production switches to 200mm wafers, it will result in more capacity at a time when the LED industry is trying to deal with overcapacity. "Extra capacity is not needed," said Lineback.

Another issue with moving to a larger wafer is quality. "The long-term quality and reliability of these devices is getting a lot more attention. As you keep increasing the wafer size it puts pressure on maintaining some consistency," said Lineback.

Demand stays strong

While there is an overabundance of capacity, demand for LEDs remains strong. Interior and exterior lighting are the biggest end market segments for high brightness LEDs. Interior lighting represents 18 per cent of total sales, while exterior lighting applications account for 13 per cent of LED revenue.

"Those segments are growing pretty well, but the high growth is really in automotive," said Lineback. "It was 11 per cent of

total sales last year and will grow to 15 per cent in 2023," he said.

"LED is not close to saturation in automotive," said Lineback. "They keep adding sockets in cars for LEDs." Headlamps have been in to a big area of growth because LEDs are increasingly being designed into less expensive cars and not just luxury models, he said.

However, while automotive is designing in more LEDs into more vehicles, other market segments have already become saturated with the devices and growth in those segments will be muted over the next several years. Those segments include cell phones, computers and televisions.

Backlighting in cell phones and mobile devices like tablets account for about 16 per cent of the LED market. LEDs used in computer and televisions represent 13 per cent of global LED revenue, according to IC Insights. "Backlighting in televisions was really a hot area

By the Numbers



7.6%

The expect rate of growth for the global high-brightness LED market in 2019 Source: IC Insights



6.1¢

The forecasted average selling price of a LED in 2019 Source: IC Insights



\$19.4 billion

The forecast sized of the high-brightness LED market in 2023 Source: IC Insights



2.6%

The forecasted annual decline of the average price of an LED from 2018-2023 Source: IC Insights



\$13.5 billion

The size of the worldwide high-brightness LED market in 2018 Source: IC Insights



that was driving a lot of sales at the beginning of the decade," said Lineback. "However, that is one segment that got saturated because Chinese manufacturers started to build LEDs for televisions as televisions reached LED saturation.

"Chinese poured a lot of money to increase their capacity to become more self-sufficient and to take a position as well as a global supplier," said Lineback. "That put a lot of pressure on the average selling price because there was a glut of capacity for backlighting in televisions and computer displays," he said.

Then the PC market stalled out and there were over optimistic forecasts for televisions sales. As a result, there was excess LED capacity and supply which drove down prices, said Lineback. That overcapacity continues today.

The industry is working through overcapacity but there is still price pressure on ASPs. In fact, the average selling prices is expected to drop 3.2 percent in 2019 and 4.4 percent in 2020. From 2018-2023, the average LED selling price will decline 2.6 percent, the researcher said.

New construction drives LEDs

Besides automotive, more LEDs will be used in general illumination applications in homes and businesses. LED lighting fixtures are often used when new houses and businesses are built. In 2018, the installed base of LEDs in residences, businesses was about 20 per cent. By 2023 will grow to 50 per cent, said Lineback.

"The U.S. Department of Energy has forecast that light emitting diodes will account for 86 per cent of installed lights by 2035, said Lineback.

However, while there is growth in LED demand for new construction, LED demand may drop off over time because LEDs have lifecycles of 8 to 10 years. That means they don't have to be replaced as much as other types of illumination such as incandescent, fluorescent and halogen.

Because of saturation in some market segments and a long replacement cycle, the growth rate overall for LEDs is slowing compared to 10 years ago.

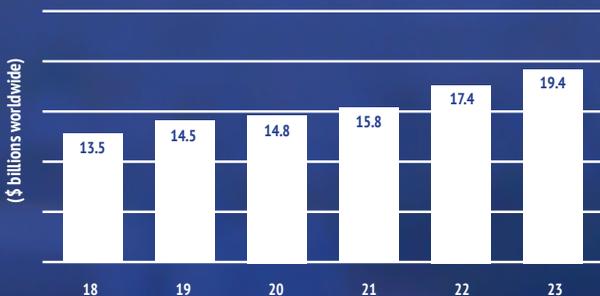
Prices for LEDs will fall through 2023 when the average price is 5.5 cents

Source: IC Insights

LED tags to fall



High brightness LED market shines



The worldwide market for high brightness LEDs will post healthy growth through 2023 when the market totals \$19.4 billion.

Source: IC Insights

LED market matures

Analysts say slower growth rate is indicative of a mature market. "You used to be able to characterize the LED market as a high growth market," said Jamie Fox principal analyst technology for IHS Markit. "But things have changed a little bit and you can more or less characterize it now as a more mature market," he said. But that doesn't mean it's a steady market.

"There is still a long way to go to the point where it's become a stable market," said Fox. "Even though there is unit growth, there is price erosion. It has its up and downs. Some years there's double-digit growth. Some years it has declined," he said.

While the LED market may be considered mature, it does not mean it won't grow in the future. In fact, future growth is likely as LED technology changes which will boost demand.

One technology that buyers should keep an eye on because it could increase LED demand is microLEDs, according to Fox.

Micro-LEDs are comprised of an array of microscopic LEDs that deliver better contrast, higher brightness, greater energy efficiency and response times than LCDs.

MicroLEDs will be used in small, low-energy devices such as smart watch and smart phones as well as large screens. In fact, Samsung has displayed a 146-inch TV that uses micro-LEDs. MicroLEDs used in televisions will have greatly reduced energy requirements. Micro-LEDs could also be used in large outdoor displays such as stadium displays.

"MicroLEDs could add multi millions of dollars into the LED market," said Fox. However, it may not happen for a while as microLEDs are difficult to manufacture. "Micro-LEDs are in the development stage and not yet mass-produced," said Fox. "Mass production is negligible." It may take five years before they are produced in large volumes.

Manufacturer	Distributor	Telephone	Website	Franchised Distributor (Y/N/M)	No. of Lines for Principle	Stock Value for Principle	Minimum Order Value	% Lead Free for Principle Range	No. of Technical Support Staff	Total No. of Staff	Pack and Hold
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Belden Wire & Cable	Mouser Electronics	800-346-6874	www.mouser.com	Y	5,863	N/A	\$0	97%	50	1,000+	Y
Molex	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Molex	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
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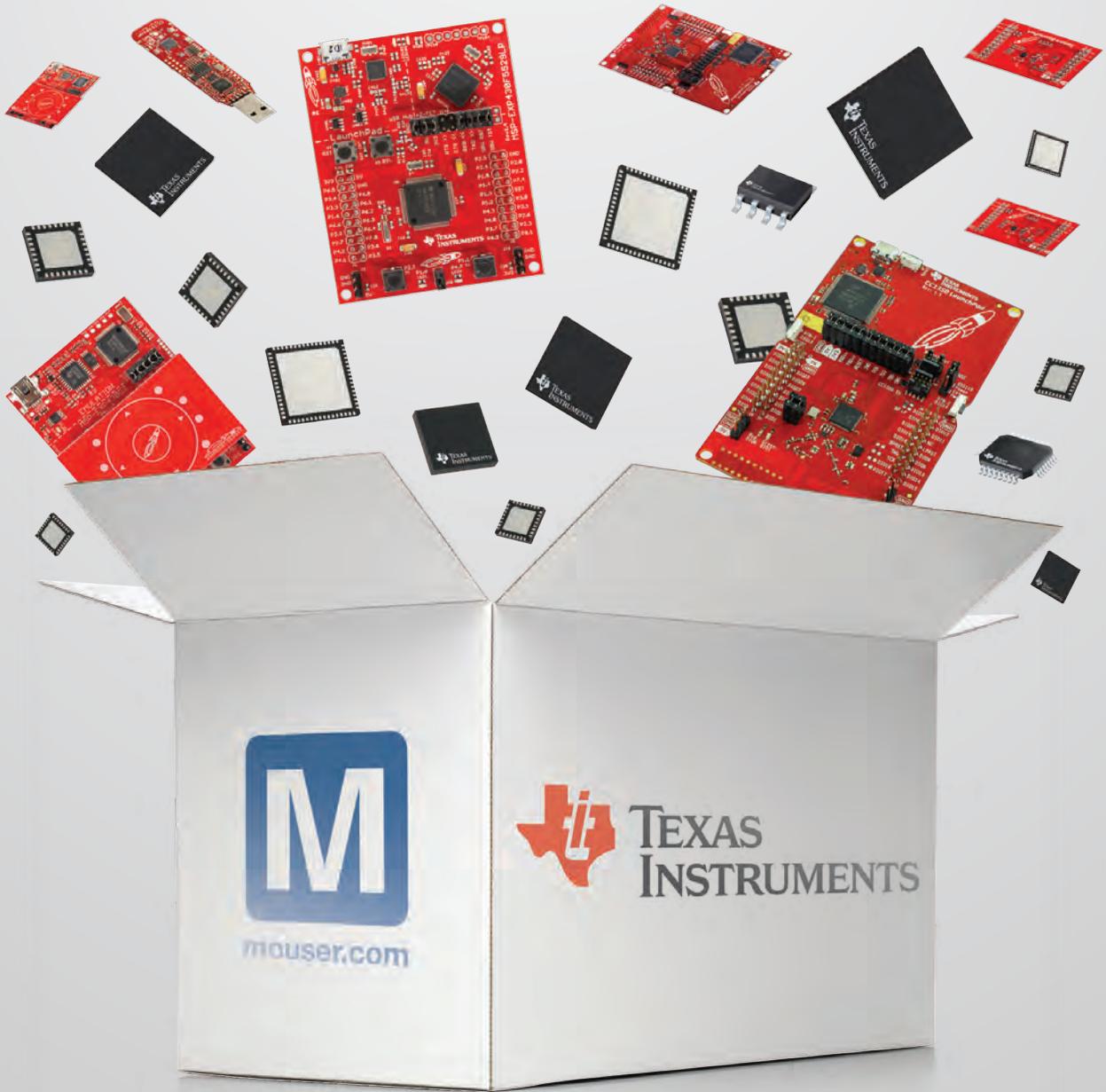
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Digi International	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
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IXYS	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Lattice	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
MACOM	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Maxim Integrated	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Microchip	Mouser Electronics	800-346-6873	www.mouser.com	Y	5,800	N/A	\$0	100%	50	1,000+	Y
Microsemi	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Monolithic Power Systems (MPS)	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Nexperia	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
NXP	Mouser Electronics	800-346-6873	www.mouser.com	Y	7,205	N/A	\$0	100%	50	1,000+	Y
ON Semiconductor	Mouser Electronics	800-346-6873	www.mouser.com	Y	7,486	N/A	\$0	96%	50	1,000+	Y
Power Integrations	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Qorvo	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Renesas Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
ROHM Semiconductor	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
SanDisk	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Silicon Laboratories Inc	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,141	N/A	\$0	100.00%	50	1,000+	Y
Skyworks	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
ST Microelectronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	8,145	N/A	\$0	96.00%	50	1,000+	Y
Swissbit	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Texas Instruments	Mouser Electronics	800-346-6873	www.mouser.com	Y	29,676	N/A	\$0	94%	50	1,000+	Y

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Manufacturer	Distributor	Telephone	Website	Franchised Distributor (Y/N/M)	No. of Lines for Principle	Stock Value for Principle	Minimum Order Value	% Lead Free for Principle Range	No. of Technical Support Staff	Total No. of Staff	Pack and Hold
ICs & SEMICONDUCTORS (Continued)											
Toshiba	Mouser Electronics	800-346-6873	www.mouser.com	Y	800	N/A	N/A	N/A	N/A	N/A	Y
Vishay	Mouser Electronics	800-346-6873	www.mouser.com	Y	53,781	N/A	\$0	77%	50	1,000+	Y
INTERCONNECTION											
3M	Mouser Electronics	800-346-6873	www.mouser.com	Y	23,235	N/A	\$0	46.00%	50	1,000+	Y
Aero Conesys	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Amphenol	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Amphenol	Mouser Electronics	800-346-6873	www.mouser.com	Y	165,853	N/A	\$0	31%	50	1,000+	Y
Anderson Power Products	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Aptive (Delphi)	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Cinch	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cinch Connectivity/Bel	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
ERNI Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
FCI	Mouser Electronics	800-346-6873	www.mouser.com	Y	3,394	N/A	\$0	73.00%	50	1,000+	Y
Glenair	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Harting	Mouser Electronics	800-346-6873	www.mouser.com	Y	2,160	N/A	\$0	51.00%	50	1,000+	Y
Harwin	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Hirose Electric	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
ITT Cannon	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ITT Cannon	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
JAE Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	6,02	N/A	\$0	100%	N/A	N/A	Y
JST	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
LEMO	LEMO	800-444-5366	www.lemo.com	M	N/A	N/A	N/A	N/A	N/A	1,500	N/A
LEMO	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Mill-Max	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Molex	Mouser Electronics	800-346-6873	www.mouser.com	Y	85,634	N/A	\$0	89%	50	1,000+	Y
Neutrik	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,563	N/A	\$0	100%	50	1,000+	Y
NorComp	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Phoenix Contact	Mouser Electronics	800-346-6873	www.mouser.com	Y	30,044	N/A	\$0	77.00%	50	1,000+	Y
Radiall	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Souriau	Mouser Electronics	800-346-6873	www.mouser.com	Y	10,744	N/A	\$0	27%	50	1,000+	Y
Switchcraft Corporation	Mouser Electronics	800-346-6873	www.mouser.com	Y	300	N/A	\$0	55%	50	1,000+	Y
TE Connectivity	Mouser Electronics	800-346-6873	www.mouser.com	Y	123,613	N/A	\$0	69%	50	1,000+	Y
OBSOLESCENCE / HARD TO FIND											
	America II Electronics	800-767-2637	www.americaii.com	M	1,900	\$1B	\$0	75.00%	59	550+	Y
	Lantek Corp.	973-579-8100	www.lantekcorp.com	M	186,000	\$22M	\$0	75.00%	5	62	Y
	Chip 1 Exchange USA, Inc.	949-589-5400	www.chip1.com	Y	850,000	N/A	\$0	85%	20	150	Y
	Rochester Electronics	978-462-9332	www.rocelec.com	Y		N/A	\$250		10	400+	Y
OPTO ELECTRONICS											
Broadcom	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Cree	Mouser Electronics	800-346-6873	www.mouser.com	Y	582	N/A	\$0	99.00%	50	1,000+	Y
Finisar	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Osram Opto Semiconductors	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,927	N/A	\$0	99%	50	1,000+	Y
ROHM Semiconductor	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Vishay	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
PASSIVES											
ABRACON	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
AVX	Mouser Electronics	800-346-6873	www.mouser.com	Y	42,454	N/A	\$0	72%	50	1,000+	Y
Bourns	Mouser Electronics	800-346-6873	www.mouser.com	Y	38	N/A	\$0	78%	50	1,000+	Y
Cornell Dubilier	Mouser Electronics	800-346-6873	www.mouser.com	Y	24,145	N/A	\$0	71%	50	1,000+	Y
Coilcraft	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
EPCOS	Mouser Electronics	800-346-6873	www.mouser.com	Y	26,533	N/A	\$0	98.00%	50	1,000+	Y
Fair-Rite	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Kemet	Mouser Electronics	800-346-6873	www.mouser.com	Y	77,568	N/A	\$0	66%	50	1,000+	Y
KOA Speer	Mouser Electronics	800-346-6873	www.mouser.com	Y	34,078	N/A	\$0	58%	50	1,000+	Y
Murata	Mouser Electronics	800-346-6873	www.mouser.com	Y	33,780	N/A	\$0	99%	50	1,000+	Y
Nichicon	Mouser Electronics	800-346-6873	www.mouser.com	Y	20,389	N/A	\$0	84.00%	50	1,000+	Y
Ohmite	Mouser Electronics	800-346-6873	www.mouser.com	Y	14,293	N/A	\$0	55.00%	50	1,000+	Y
Panasonic Electronic Components	Mouser Electronics	800-346-6873	www.mouser.com	Y	14,948	N/A	\$0	100.00%	50	1,000+	Y

Buyers' Guide

Manufacturer	Distributor	Telephone	Website	Franchised Distributor (Y/N/M)	No. of Lines for Principle	Stock Value for Principle	Minimum Order Value	% Lead Free for Principle Range	No. of Technical Support Staff	Total No. of Staff	Pack and Hold
PASSIVES (Continued)											
Taiyo Yuden	Mouser Electronics	800-346-6873	www.mouser.com	Y	4,620	N/A	\$0	98.00%	50	1,000+	Y
TDK	Mouser Electronics	800-346-6873	www.mouser.com	Y	6,663	N/A	\$0	100.00%	50	1,000+	Y
TT Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
United Chemi-Con (UCC)	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Vishay	Mouser Electronics	800-346-6873	www.mouser.com	Y	102,917	N/A	\$0	64.00%	50	1,000+	Y
Würth	Mouser Electronics	800-346-6873	www.mouser.com	Y	934	N/A	\$0	99.00%	50	1,000+	Y
Yageo Corporation	Mouser Electronics	800-346-6873	www.mouser.com	Y	18,246	N/A	\$0	100.00%	50	1,000+	Y
POWER & BATTERIES											
Artesyn Embedded Technologies	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Cincon	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Cosel	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
CUI Inc.	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Delta Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
MEAN WELL	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Mornsun	+1-978-567-9610/+1-978-293-3923	www.mornsunamerica.com				N/A	\$0	100%	N/A	2000+	Y
Murata	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Phihong	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Phoenix Contact	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
RECOM	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Schaffner	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Texas Instruments	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
TDK Lambda	Mouser Electronics	800-346-6873	www.mouser.com	Y	405	N/A	\$0	80.00%	N/A	N/A	Y
TRACO Power	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Vicor	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
REED SWITCHES											
HSI Sensing	HSI Sensing	405-224-4046	www.hsisensing.com	M	75	N/A	\$200	100.00%	15	275	N
SENSORS											
ams	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Analog Devices Inc.	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Bosch	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Honeywell Sensing and Control	Mouser Electronics	800-346-6873	www.mouser.com	Y	12,059	N/A	\$0	64.00%	50	1,000+	Y
Littelfuse	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Maxim Integrated	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,379	N/A	\$0	45.00%	50	1,000+	Y
Melexis	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Microchip	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
NXP	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
ON Semiconductor	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Omron	Mouser Electronics	800-346-6873	www.mouser.com	Y	4,915	N/A	\$0	59.00%	50	1,000+	Y
Sensirion	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
STMicroelectronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
TDK	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
TE Connectivity	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Texas Instruments	Mouser Electronics	800-346-6873	www.mouser.com	Y	914	N/A	\$0	65.00%	50	1,000+	Y
SWITCHES & KEYBOARDS											
OTTO	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TEST & MEASUREMENT											
B&K Precision	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Fluke	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,008	N/A	\$0	94.00%	50	1,000+	Y
Keysight	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Lascar Electronics		814-835-0621	www.lascarelectronics.com	Y	130	\$602,000	\$0	100%	10	175	Y
Tektronix	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Teledyne LeCroy	Mouser Electronics	800-346-6873	www.mouser.com	Y	194	N/A	\$0	96.00%	50	1,000+	Y

Contract Manufacturers Buyers' Guide

Manufacturer	Telephone	Website	Turnover	Location	Employees	Number of Surface Mount Lines	Approvals	BGA Capacity	Lead Free Manufacturer	Prototyping	Design Capability	Full Turnkey Cables and Harnessing
Pektron	1-248-677-4838	www.pektron.com	\$66m	Michigan & UK	350	8	ISO9001, ISO14001, TS16949, BEAB, VCA, TUV, UL	Y	Y	Y	Y	Y



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spark ELECT

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OSRAM Opto Semiconductors





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