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On the cover – September 2017

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Editor's Word



Obsolescence: my story

When I'm not editing the pages of *Electronics Sourcing* you will typically find me managing product and software development projects. One software-as-a-service application I designed is now over a decade old and in 24/7 use globally. Back in 2006 I was attempting to offer users a desktop experience in a cloud-based browser environment using nothing more than HTML 3.0. It was tough, too tough in fact, so we sought 3rd party help. It arrived in the nick of time: Macromedia Flash 1.0.

At the time I knew I was playing with fire, basing the application on a proprietary product in a world that was turning to open source. As it happens Flash has provided an incredibly robust solution for that whole period.

Sadly, technology and company politics stand still for no man. Ownership of Flash changed hands and both hardware and browser suppliers began questioning the future of Flash due to reasons ranging from security to power consumption. Ultimately nothing lasts forever and Flash was steadily being eaten away by new technology.

So what did I do? I knew the end was insight. I just didn't know when. Attempts to get an EOL notice from Adobe direct were pointless. Interestingly, when the notification did eventually arrive last week it came via the BBC. Adobe will stop support for Flash in 2020.

The secret is understanding everything will eventually go obsolete and seeing this as an opportunity rather than a problem. Rather than thanking my customers for a decade of business and shutting the company, I asked my development team to work on some proof-of-concept prototypes to show Flash-free operation is now possible.

With the concept proven we will have the new version ready by end 2017, three years ahead of the deadline. My overriding advice is assume everything will eventually be unavailable at some point and plan early while you have the time.

Jon Barrett

Big *gets* Bigger to meet market demand



Victoria Kickham is a freelance writer specializing in manufacturing, distribution and supply chain issues

Suppliers broaden reach, strengthen specialties to meet growing demand for communication/IoT solutions

Expansion and investment • By Victoria Kickham

Explosive demand for communication capabilities in everything from factory equipment to consumer vehicles continues to fuel expansion fires at some of the industry's largest distributors.

This summer's acquisition of semiconductor distributor Symmetry Electronics by IP&E specialist TTI is one of the latest cases in point and underscores the growth occurring in the electronic components distribution market. Symmetry specializes in wireless, cellular, Bluetooth, embedded and video technology.

TTI's senior vice president, Americas, Michael Knight, said: "We're going to build out a semiconductor specialist that runs parallel to the IP&E specialist that is TTI. We think that the market is missing that."

With no overlapping product lines, the two companies can support each other: similar to the way TTI works with its subsidiary Sager Power Systems. The plan is to offer the market a specialist in each area that has the support of a much larger organization behind it. TTI also is a sister company to catalog distributor Mouser Electronics. Adding a semiconductor specialist focused on communications and IoT aims to meet today's growing demand for a wider range of electronic components solutions.

Knight added: "A core part of this is IoT. Customers are putting communication functions into everything they're building: wireless, through the cloud, through the Internet. There's a lot going on there."

Tobey Gonnerman, executive vice president at independent electronic components distributor Fusion Worldwide agreed: "The expansion we're seeing is an example of how the distribution space for electronic components continues to grow exponentially. For instance, the semiconductor market is on an upward path. The pace of technology, the evolution, continues to accelerate; it's becoming a more and more digital world, so you're seeing semiconductor demand and distribution needs across a wider range of customers and industries."

Fusion is addressing growth via staffing, having implemented an aggressive hiring campaign over the last 12 to 18 months. Expanding with more offices is also on the agenda. Gonnerman added: "We will potentially open some new offices in strategic locations—but we will do that very carefully."

Facility expansion is another route some suppliers are taking to address growing demand: and another example of how the big continue to get bigger. Minnesota-based global catalog house Digi-Key announced a $300 million facility expansion project earlier this year. The company will build a one million square-foot distribution center adjacent to its Thief River Falls headquarters. The project is expected to create more than 1,000 new jobs and generate nearly $200 million in additional revenue for the state of Minnesota once it's up and running, according to Digi-Key.

TTI recently completed a new building project as well, unveiling a new multi-level distribution center in Fort Worth that should be fully operational by the end of the year. The company is working on an expansion to its main distribution center in Germany as well, which also should be complete this year. The projects follow a similar expansion to the company's Asia distribution center last year.

Such investments require confidence and a long-term view of both the industry and your business, Knight and others agree.

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News

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More choice on moldings

Electromechanical, interconnect and passive components distributor, Master Electronics, has added Davies Molding to its line card. The company's knobs, handles and custom moldings are used in several markets, including the oil and gas industry, as well as automotive, food service equipment, heating, ventilation and air conditioning and lighting. A broad portfolio of Davies part numbers will be added to Master Electronics' stock offering.

Supplier business development, Master Electronics, Shell Johnson, stated: "Davies has a long history of providing tools and molds across multiple industries. With over 9,000 variations across 600 products, we are confident we can offer solutions to our customers' needs."

www.masterelectronics.com



Easier access to wireless connectivity stack

Avnet is now able to offer UbiquiOS Technology's hardware-agnostic, wireless connectivity software in the Americas. Following a new distribution agreement, Avnet will offer UbiquiOS's integrated stack, accelerating the development of internet of things devices and systems.

Built on open standards to support end-to-end IoT applications across a variety of applications, UbiquiOS is a secure embedded software platform designed to provide a complete connectivity solution, from device driver to application layer. The platform also provides application programming interfaces for common system functions such as memory management, device configuration and provisioning and network protocol implementations.

Senior vice president, supplier development, Avnet, Alex Iuorio, said: "Security has been the top priority, and greatest challenge, for developers of IoT-enabled systems. The UbiquiOS stack offers customers a powerful, integrated security solution, without limiting designers' choice of microcontroller, wireless chipset, cloud platform or development environment."

www.avnet.com



Inertial sensors ready to ship

Following a new distribution agreement, Digi-Key Electronics can now supply Tronics' microelectromechanical Gyro sensors and Gypro evaluation boards.

Chief executive officer at Tronics, Pascal Langlois, said: "Expanding our distribution network with a partner like Digi-Key will enhance the exposure of Tronics' inertial sensors through a responsive and reliable supply chain. This demonstrates our willingness to provide our targeted markets with tailored solutions for their demanding applications."

Tronics' products are ideal for applications that require precise measurement such as guidance and navigation control, auto-pilot, inertial measurement units, attitude and heading reference systems and flight control.

www.digikey.com

Re-made in America

Reverse supply chain management provider, Re-Teck, believes the trend towards reshoring manufacturing in the United States could prompt increased interest in its supply chain services.

Manufacturing is returning to the United States with a focus on small batch-manufacturing, small and medium sized businesses and start-ups. With its emphasis on specialization and high-end engineering, Re-Teck believes today's lean, agile manufacturing supports a circular economy where waste is minimized and resources are reused, remanufactured, refurbished and recycled.

Re-Teck's end-to-end RSCM platform is designed to eliminate the logistical, compliance and technological issues associated with deploying take-back initiatives. As such, it considers the aftermarket value for devices, the primary market value for component parts and the recycling value of metals, extracting the usable elements for re-sale to the company's global partner exchange.

Chief strategy officer at Re-Teck, Linda Li, explained: "Re-Teck's expertise liberates circular economy manufacturers from complexity and regulations. This means they can locate closer to their customers in the cities and towns of America."

www.re-teck.com

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130 years later, Sager Electronics has grown into a leading North American distributor of interconnect, power and electromechanical electronic components. Acquired 5 years ago 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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News

In Brief

TTI acquires Symmetry
TTI has announced the acquisition of Symmetry Electronics, a privately held semiconductor component distributor headquartered in Hawthorne, California. CEO, Paul Andrews, said: "TTI has long heard customers express their desire to have a TTI-like semiconductor distributor as part of their supply chain. In Symmetry we envision a path to ultimately providing, on a large global scale, an answer to these wishes and desires."
www.ttiinc.com

New RF and microwave accessories
Pasternack has released a new series of RF and microwave power amplifier accessories that includes heat sinks with and without cooling fans and power control cable assemblies. Pasternack product manager, Tim Galla, said: "Our new amplifier accessories are for use in combination with a wide selection of our power amplifier models. Customers will find these accessories extremely valuable for use in test and system level applications."
www.pasternack.com

Sensors delivered fast
Sager has announced the addition of BEI Sensors to its line card. BEI specializes in speed and position sensors for extreme applications. Sager's supplier marketing & product manager, Pamela Berigan, said: "BEI's Express Encoders ship in 3 to 5 days, which really sets them apart from the competition. This service, coupled with Sager's inventory, is of great value to customers."
www.sager.com

PCB order growth
IPC states strong PCB order growth moved the book-to-bill ratio up to 1.08 in June, while sales remained sluggish. IPC's director of market research, Sharon Starr, said: "June's strong order growth and a five-month trend of book-to-bill ratios above parity (1.00) are possible indications of an upturn in North American PCB sales in the second half of this year."
www.IPC.org



MEMS sensor delivers on stability

Mouser Electronics is now stocking Murata's SCA3300-D01 three-axis accelerometer and inclinometer. This surface-mount microelectromechanical sensor features a user-selectable measurement range and self-diagnostics.

Described as robust, the SCA3300-D01 is said to reliably deliver bias stability, linearity and low noise under both mechanical vibration and shock, thanks to a mechanically-damped sensing element. Based on Murata's capacitive 3D-MEMS technology, the accelerometer provides a ±1.5 to ±6g user-selectable measurement range and features a 3.0 to 3.6V supply voltage with a 1mA current consumption.

The device performs signal processing using a mixed-signal ASIC, which is packaged with the sensor element in a tough plastic housing. This helps guarantee operation in applications such as professional leveling, platform angle measurement, motion analysis and control, tilt compression and navigation systems.
www.mouser.com

Enhanced support for diverse portfolio

Future Electronics has announced an expanded distribution agreement with Taiyo Yuden, covering North and South America. This will give engineers in the Americas access to Taiyo Yuden's diverse portfolio, which includes capacitors, inductors, circuit modules and energy devices, as well as RF filters and wireless modules.

President of Taiyo Yuden USA, Osamu Takahashi, stated: "We will increase the sales ratio in the internet of things, automotive and industrial markets using our strengths in product development. Along with these efforts, we will concentrate on creating new businesses that focus on high value-added products. Our new relationship with Future Electronics is a critical part of this strategy for us in the Americas."
www.futureelectronics.com

Offshore division offers flexible pricing

Advanced Circuits has created an offshore printed circuit board division to meet demand for enhanced pricing flexibility when sourcing higher-volume PCB production. The new division claims to offer a seamless and cost-effective solution for offshore PCB sourcing while strengthening Advanced Circuits' one-stop shop approach to PCB fabrication. With three US based manufacturing facilities, the company continues to offer US PCB manufacture with quick-turn options and advanced capabilities, as well as in-house prototype assembly.

President and chief executive officer of Advanced Circuits, John Yacoub, said: "Providing an offshore manufacturing solution affirms our in-house processes supporting customers' supply-chain needs. Unlike limited-service broker operations for offshore sourcing, Advanced Circuits Offshore provides the full-service support and quality standards that customers expect from Advanced Circuits."
www.4pcb.com

How Chinese cybersecurity could impact you

According to the ECIA, China's new cybersecurity law, which came into effect in June, is likely to affect many companies doing business in China. This law encompasses privacy protection and data handling and will impact electronic component manufacturers and distributors in two principal areas: protection of personal information and any business data considered by the government to be part of 'critical information infrastructure.'

The privacy protection sections focus on information about natural persons, rather than businesses, and how such information should be handled by 'network operators.' Any business that gathers personal information within China must store that data in China and must not export that information out of China, except for an acceptable business need after a security assessment. These requirements also apply when a business transmits information about its Chinese employees overseas.

ECIA chief operating officer and general counsel, Robin Gray, warned: "The law is both complex and overly broad and subject to open-ended interpretations by Chinese authorities. Companies doing business in China should consult with legal experts as to the specific applications of this law to their operations. Note also that the law provides for significant fines, shutting down companies and imprisonment for violation of the law."
www.ecianow.org



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The big shift: economies, business models and markets

Taking place October 22 to 24 at Loew's Chicago O'Hare Hotel, this year's ECIA 2017 Executive Conference offers attendees a strategic template needed to adapt and thrive in an increasingly volatile economy

The electronic components industry is experiencing unprecedented disruption in an increasingly volatile global macroeconomy. This industry has always had to respond to rapid change, but this isn't the same old shift. These changes are shaking the fundamental business relationships of the global component supply chain. New players, new customer-facing technology and new go-to-market strategies threaten margins and profitability: the old ways just won't cut it.

The Conference program is designed to bring attendees the strategic template needed to adapt and thrive. This jam-packed one-and-a-half-day conference combines a content-rich program, hosted receptions, ample networking breaks and frank debate. An event mobile app connects participants and speakers while delivering presentation materials. Hear top-rated presentations from accomplished experts and leave with broadened perspectives on industry advances and opportunities.

ECIA CEO, John Denslinger, summarized the conference: "The theme of this year's conference, 'Shift,' says so much. New mega-markets are exploding everywhere with IoT, autonomous vehicles, cybersecurity, AI and advance robotics leading the way. This coupled with a vibrant digital economy and surging demand for electronic components, it's no wonder ECIA's Executive Conference draws so many industry leaders looking for an edge to beat the shift."

Chairing this year's event, Bud Industries' CEO, Blair Haas, said: "The executive conference is a unique moment in the year when all facets of the industry are together in one room to gain insights into the trends and projections in the economy, the business community and our industry. The agenda is set to insure specific takeaways from each session that allow us to share new visions to apply with our teams at home."

ECIA vice present of member engagement, Debbie Conyers, added: "This year's conference program planning committee was a dream to work with, thanks to Blair's leadership and insights. Thanks to their input, we have designed a conference we are confident attendees will rave about."

Shifting economy

Chapman University's Dr James Doti, returns to the Conference to open the program with an overview of US economic trends and their impact on manufacturing to provide attendees with critical insights for 2018 strategic planning. The forecast is complemented by a presentation from Allied Electronics' chief financial officer Nick Hawtrey who explains the impact of these trends on the global components industry.

Shifting business models

Morey Corp's Rich Catizone kicks off a frank and focused dialogue on *Demand Creation from the Customer's Viewpoint*, including a discussion of direct factory support vs manufacturers' rep orgs vs distribution and what other channels/support vehicles exist for design engineers today. Rich will speak from his experiences on all sides of this table.

▸▸ *continued on page 12*



Tom Alexander, 1871



David Avrin, Visibility International





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ECIA Executive Conference Preview

- Texas Instruments' Dave Youngblood discusses *Digital Transformation: Beyond eCommerce*. Engineers working online aren't a new phenomenon, but what has truly accelerated the digital transformation is customers' expectations for online experiences in their lives at work that match their lives at home. This presentation is about how engineers' research, buy, and support behaviors are changing and how the industry is responding.

University of Chicago's Jean-Pierre Dubé presents *Analytics: Transforming Marketing and Pricing*. The classic marketing challenge is a fundamental lack of accountability on the ROI from marketing investments. Learn how the quantitative marketing revolution introduces marketing analytics into the decision-making process.

From 1871 & mHUB, Tom Alexander discusses *Public/Private Partnerships, Driving Innovation*. The story of the Great Chicago Fire of 1871 isn't really about the fire. It's about what happened next: A remarkable moment when the most brilliant engineers, architects and inventors came together to build a new city. What started 140 years ago continues to this day. 1871 was created to support Chicago's digital startup community. mHub exists to ensure that Chicago and the Heartland's manufacturing industry continues to accelerate, grow and thrive. Tom will share stories about these two initiatives.

Shifting markets

Gyro's Judy Begehr explains *The Science of Humor in B2B*. As B2B customer expectations have become indistinguishable from those in the B2C space, breaking through the noise using traditional messaging is less and less effective. Begehr brings the latest research about the power of humor in B2B marketing to this lively presentation on how to raise brand awareness and communicate your company's value in new and enjoyable ways.

IHS Markit's Dr Richard Dixon speaks about *Changes in the Automotive Electronics Industry*. The automotive industry is in an unprecedented state of flux and Dr Dixon will review the changes in electronics architectures needed to support autonomous and connected cars with higher amounts of electrification than today, including the subsequent implications for ECU market and component semiconductor markets and supply chain.

Reinventures' Dr Lynn Phillips discusses *Best Practices in Customer Experience Engineering*. The methodologies and protocols developed by Dr Phillips help business teams to 'become' their targeted customer community by 'spending a day in their life', thereby gaining an imaginative understanding of their unmet needs. Learn more about how this breakthrough approach, which is now the de facto standard deployed by countless leading-edge companies and practitioners pursuing global opportunities

Veteran Hiring Strategies' Eric Eversole presents on *Hiring Our Heroes*. This program of the US Chamber of Commerce Foundation was launched in March 2011 as a nationwide initiative to connect veterans, transitioning service members and military spouses with potential employers. Learn more about this important initiative and the resources available to your business.

From the International Success Academy, James Bird Guess speaks about *The Strategy of Diversity: Creating a Competitive Advantage by Leveraging Differences*. It's not the same old shift, so responding to change requires the right people, reflecting the global, diverse and multi-generational market for electronics. Learn how to attract, recruit and retain a dynamic and powerful workforce that reflects the customer of the future.

Visibility International's David Avrin talks about *Blink and They're Gone! — Why Today's Customers are Leaving You for Competitors and How to Win Them Back*. This shines a light on a challenging new dynamic in business: vast customer options and an increasingly impatient and demanding population. This popular speaker returns to close out this year's Executive Conference with a don't-miss send-off.

www.ecianow.org/executive-conference



Judy Begehr, Gyro



Eric Eversole, US Chamber of Commerce



Lynn Phillips, Reinventures



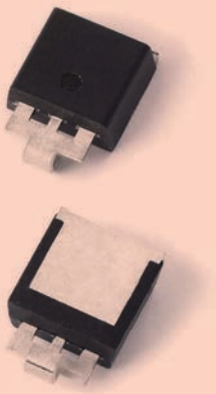
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Diodes overcome transient surges in vehicles

TTI can now supply Littlefuse SLD8S series automotive surface mount transient voltage suppression diodes with a choice of 7,000 or 2,200W peak pulse power dissipation ratings. These ratings enable power systems to pass ISO test standards used in the automotive industry as the basis for transient specifications. Specifically, SLD8S series components meet ISO7637-2 5a/5b protection and ISO16750 load dump test specifications.

A wide standoff voltage range, from 12 to 57V, also helps fulfil design requirements for automotive applications. Quality and reliability make the devices ideal for load dump protection and electrostatic discharge protection in automotive applications like electronic control units, telematic control units, body control modules, battery management solutions, sensors, and entertainment systems, as well as in other long pulse applications. TVS diodes are also halogen-free and AEC-Q101 qualified.

Available in a SMTO-263 surface mount package, SLD8S diodes are suitable for automatic pick-and-place assembly and reflow processes. The components are claimed to reduce manufacturing costs and allow for higher soldering quality than axial lead packages.
www.ttieurope.com

Wirewound resistors offer low inductance



Stackpole's NWW non-inductive wirewound resistor series is ideal for applications requiring low inductance. Products in the series feature the Ayrton-Perry winding technique, which is said to reduce inductance by up to five times that of a standard wirewound resistor. This makes the technology suitable in high frequency and high switching applications such as power supply, control and automation, welding equipment, plasma cutters, elevators and escalators and aerospace instrumentation. The series is available in power ratings from half a Watt up to 10W.
www.seielect.com

Extended life caps meet military standards



Kemet has introduced a commercial off-the-shelf polymer electrolytic capacitor with a 1,000-hour life test option. Designed to qualify capacitors to the rigors of MIL-STD-202 method 103, the new biased humidity test option ensures capacitors can operate at 85°C with 85 per cent relative humidity at rated voltage for 1,000 hours.

The new T540 capacitors are typically used for decoupling in DC/DC converters or as hold-up capacitors in energy storage applications. Capacitance values up to 680µF are available with the extended life test option, with voltage ratings from 2.5 to 63V DC.

Senior vice president and chief technology officer at Kemet, Philip Lessner, said: "Exposing polymer electrolytic capacitors to humidity had been a challenge. We first introduced the T598 automotive grade KO-CAP in 2015; now we offer a COTS grade KO-CAP that passes the same extended life test. This is important because designers can take advantage of the polymer electrolytic technology in high reliability and mission critical applications."
www.kemet.com

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(Source: Electronic Design Magazine Brand Study)

A smooth transition to outsourcing

Director global transition management at Plexus, David Strachan, explains a structured outsourcing process, led by an experienced team, always yields the best results

The way products are manufactured has undeniably changed, particularly recently. Original equipment manufacturers (OEMs) are moving from an in-house manufacturing model to entrusting electronic manufacturing services companies (EMS) with their products.

For OEMs, the creation and marketing of products is often their sole focus, with product manufacturing or design a non-core activity. However, an EMS provider will generally have proven capability in the OEM company's specialist field. By transferring the responsibility of these tasks, OEMs can free up time to concentrate on core competencies and allow the EMS to focus on theirs.

In the past, an OEM would use a contract manufacturer to build circuit boards which would then be shipped back for final configuration, higher-level assembly and integration. Today, EMS providers work closely with OEMs and have consequently been rewarded with broader responsibilities. EMS providers will now design, build, repair and refurbish entire systems on the OEM's behalf as fully integrated partners.

Within the defence and security sector, companies have recognised the benefits of outsourcing to reduce costs and stay competitive. Such companies have seen increased pressure to improve efficiency and create a differentiated product whilst maintaining the high product quality this sector demands. Subsequently, OEM and EMS companies are collaborating more closely and more frequently, especially in high-complexity product areas.

So how do companies ensure successful processes, what qualities should be sought in a new partnership and how do partners manage the move?

The key to this process is a smooth transition, whether from design to manufacturing or manufacturing between two companies. In this sense, a structured process led by an experienced team will always yield the best results.

Companies should put a repeatable, global and standardised model in place to ensure the high standards of the OEM and their customers are maintained, regardless of geographical location.

Preferably, there should be a dedicated project team engaging with customers and stakeholders. By implementing their prior experience, the team can guarantee the project requirements are met.

Many companies will wait for a project to come in before assigning staff, which can mean those with capacity are prioritised over those with the right skillset. However, best practice means a dedicated team is implemented early in the transfer process, allowing teams from both sides to work closely and achieve the best result.

This team will work with an OEM to remove pain points and ensure the shift is smooth and simple. Partnering with an EMS company which has the same model will allow a seamless introduction of the product into its organisation and the marketplace. It will also reduce the impact on the business during the transition.

To best facilitate the change from an in-house to outsourced model, an OEM should partner with an EMS that meets its product needs, has relevant industry experience and cultural similarities. Instating the right team, processes and tools will result in a long-term, mutually beneficial partnership where both sides can focus on their own individual strengths and ensure their products are of the highest possible standards.

www.plexus.com



Security and defence sectors are increasingly important

> **Within the defence and security sector, companies have recognised the benefits of outsourcing to reduce costs and stay competitive**

A partnership should benefit from individual strengths





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Buyers look to partner with distributors



James Carbone
contributing editor

Having the right number of capable distributors can help EMS providers avoid shortages, reduce cost and manage supply chain risk *By James Carbone*

One of the most important challenges for electronics purchasers is determining the optimum number of suppliers their companies should use for the commodities needed for production.

Buyers want to have enough suppliers to guarantee continuity of supply and to ensure there is healthy competition for components and other production materials that are purchased. However, they also need to make sure they don't have too many suppliers because then they could lose purchasing leverage if a large number of suppliers were awarded a small amount of business for a commodity.

The issue can be especially challenging for buyers at electronics manufacturing services (EMS) providers, who often must purchase parts from suppliers that are on their OEM customers' approved vendor lists (AVL).

Adding to the challenge is that many EMS buyers by at least some – and in some cases the bulk – of the components needed for production from electronics distributors. Buyers at those companies must make sure that the distributors they use can provide the components and value-added and supply chain services to help the EMS provider meet the requirements of OEM customers.

One such EMS provider is Vexos, a small, full-service EMS provider based in Markham, Ontario, Canada that builds boards and systems for OEMs in the automotive, communications, medical, safety and security and other industries. "We buy almost exclusively through franchise distribution," said Stephanie Martin, senior vice president of supply chain management for Vexos. "We are in distributors' sweet spot."

Wanted: Fewer distributors

She said Vexos uses 38 authorized distributors for the semiconductors, passives, connectors, electromechanical devices and other components that Vexos needs for production.

"Last year we used about 50 distributors, but late last year we started to consolidate across the company in both North America and Asia. Now we are working with 17 distributors. However, most of Vexos' spend is with just five distributors and much of what it purchases is from global distributors such as Arrow, Avnet and Future and some specialist and catalog distributors such as Mouser.

"We have certain distributors for certain commodities," said Martin. "For instance, when I'm looking at my high-end active products, I'm going to focus on the top three distributors," she said. "If I'm looking at quick turn, startup or low-volume jobs, I'm going to look at Mouser or Digi-Key or Newark," said Martin.



"We buy almost exclusively through franchise distribution," said Stephanie Martin, senior vice president of supply chain management for Vexos

She said with resistors and capacitors "she leans in the direction of TTI because the distributor is much stronger in passives."

However, while Vexos is leveraging its spend with a fewer number of distributors, it is still challenging to have price competition because there has been consolidation in the distribution industry and distributors "tend to be very close in price."

The supply chain factor

In determining which suppliers are awarded business, Vexos factors in value-added and supply chain services that distributors offer. Such services can reduce cost of ownership, improve delivery and reduce supply chain risk. "

"We rely on them for various supply chain services," including bill of materials scrubbing, said Martin. She said about 70 per cent of components on a BOM have incorrect part numbers and Vexos relies on distributors to review the bills of materials and correct the part numbers.

Martin added that Vexos also uses distributors for forecast sharing, bonded inventory, tape and reeling and IC programming. "Actually, we tend to use most of the services" she said.

Vexos also purchases components from non-franchised independent distributors. "We do use some of them for spot shortages, but we limit the ones we use," said Martin. She said the independent distributors EMS provider uses are qualified by Vexos before purchase orders are placed.

"We qualify them differently than franchise distributors," said Martin. She noted that franchise distributors purchase components directly from component manufacturers and the parts are packaged on reels or tapes. When Vexos buys from them, the parts are still in the original packages. However, with independent distributors, the parts are often in packages that have already been opened so there could be potential quality problems with the parts.

"You have to inspect independent distributors' quality processes,

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their supplier selection process and you have to do extensive audits," said Martin.

Like Vexos, EMS provider Kimball Electronics, based in Jasper, Indiana, Ind., has also reduced the number of distributors it uses, concentrating much of its spend with a few proven distributors.

The number of distributors that Kimball uses is down significantly from five years ago," said Jamey Mann, director of global purchasing for the EMS provider. "Our top four global distributors make up 88 per cent of our electronic component distribution spend," he said.

Distribution reduction journey

"We have been on a journey to focus on reducing our distribution supplier base through consolidation to a smaller set that are able to deliver global services and leverage. We will continue to compress our spend into these major distributors," said Mann.

He said the four primary distributors that Kimball uses are able to deliver the "global scale that smaller, regionally based distributors can't deliver." In addition, Kimball's global distribution partners deliver the flexibility "required to support our global customers and operations."

Mann said while Kimball is concentrating the majority of its spend with several preferred distributors, there are times when it needs to purchase components from other smaller distributors. "Due to the complexity of components we procure, at times we must align with smaller, specialized distributors," said Mann. During times of shortages and for "small form-factor quantities," Kimball also purchases from catalog distributors.

"In addition to these suppliers we do have a very small, tightly controlled set of preferred independent distributors," said Mann. "We use these partners on a very limited basis and have a very strict process to govern the validation of materials procured as authentic prior to shipment and use," said Mann.

Kimball "leverages the strengths of our preferred global distribution partners" by using their supply chain programs and value-added services including tape & reeling services, programming, and other services that they offer related to product lifecycle management.

Partnering with distributors

Mann said Kimball regards its distributors as partners and as such they are expected to develop supply chain programs that Kimball needs and have the production materials when the parts are needed, "at the cost we require, and delivered to an agreed window."

He said distributors are monitored, measured, and reviewed on an ongoing basis to ensure that they are fulfilling the agreed solutions. Mann said distribution performance has improved. "Their performance is measured on an ongoing basis related to quality, service, and competitiveness and in recent years has seen solid improvements in all areas," said Mann.



"Not all of our customers are high volume. We have a lot of high-mix, low-volume business. In cases like that we use some catalog distributors to support that business," said Graham Scott, senior director global commodity management at Jabil Circuit



"Our top four global distributors make up 88 per cent of our electronic component distribution spend," said Jamey Mann, director of global purchasing for Kimball Electronics

Having the appropriate number and right combination of distribution partners is also important for large global electronics companies. While many large electronics OEMs and EMS providers have the purchasing volumes to buy directly from component manufacturers, many of them purchase a certain percentage of their production parts through distribution.

For example, Jabil Circuit, based in St. Petersburg, Fla., purchases more than 10 per cent of the components it needs through distributors, including large broad line, specialized, catalog and independent distributors, said Graham Scott, senior director global commodity management at Jabil Circuit.

"We probably deal with most distributors. With the market situation that we are today where it is undersupplied we end up using franchise distribution more than we do normally as we require inventory," said Scott.

Distributors help an EMS provider reduce costs, manage inventory, provide shortage components and supply chain value-added services that help reduce cost.

In some cases, Jabil needs to purchase components from specialized distributors for such products as radio frequency integrated circuits, said Lloyd Kaplan, senior advisor, Jabil Intelligent Digital Supply Chain Solutions. "In some cases, suppliers will only sell certain products through some of their specialty distributors," he said.

Scott said there are times when Jabil purchases from catalog distributors, although Jabil is an EMS provider and not an OEM. "Not all of our customers are high volume," said Scott. "We have a lot of high- mix, low-volume business. In cases like that we use some catalog distributors to support that business.

He says Jabil also purchases from independent distributors. "We limit the number of independents to less than 12,'" he said.

Having a set of preferred capable distributors is important for EMS providers to completely satisfy the needs of OEM customers. "We need support from our distributors to ensure that we have the flexibility to meet market requirements from customers," said Scott.

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Sidestep supply shortages

In this article, Rutronik's Reza Armin Maghdounieh, promotes stable, long-term partnerships as the solution to component shortages

2017 was partly defined by extremely high demand for electronic components in the major Asian markets: combined with some heavy increases in purchase prices. It's not uncommon to see prices in Asia reaching values above those in Europe or North America. The strong demand is causing a tense supply situation throughout the rest of the world, forcing not only customers but also distributors to act quickly and decisively.

Some manufacturers of passive components have already invoked allocations. Although most semiconductor manufacturers are still reluctant to take this step and have officially declared increased delivery times of 12 to 16-weeks at best, the reality is already dramatically different. Orders placed ahead of time have their shipping dates confirmed weeks and sometimes months later than requested, which has resulted in panic in the affected purchasing divisions.

That said, this shortage of components comes as no surprise. In fact, signs of a shortage became apparent back in the third quarter of 2016 when the first manufacturers of passive components mentioned a rising book-to-bill ratio and capacity utilization in the relevant fabs were starting

> **Strong demand is causing a tense supply situation throughout the rest of the world, forcing not only customers but also distributors to act quickly and decisively**

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to scrape the 100 per cent mark. This rise not only affects complex, high-technology components, it is also a problem that concerns almost all product segments and technologies.

These recent procurement problems have compelled specialist divisions to commit themselves to ensuring greater security of supply rather than obtaining any possible discount during price negotiations. A sense of proportion is required: can the supplier with the best price really deliver as quickly as my production planning requires the goods? These are questions that should be carefully considered among others before rash decisions are made.

Those who invested in stable, long-term partnerships with their suppliers and resisted the urge to demand every cent of discount will have an enviable competitive advantage. Long-term partnerships strengthen trust on both sides and make it easier for suppliers to build up more generous stocks. Conversely, customers who switch supply channels every year force suppliers to minimize risk. Who wants to sit on stock when a customer keeps switching suppliers?

Shortages tend to encourage suppliers, whose goods are from dubious sources, to emerge. Payment in advance and no warranty entitlement are commonplace. By the time a scam is unearthed, the supplier has usually disappeared, resurfacing later with a new address, website and email to resume their business.



Reza Armin Maghdounieh, head of purchasing semiconductor, Rutronik Electronic Components

During supply shortages buyers should rely on official, certified supply channels. This is the only way customers can be sure they are being provided with original goods. Should a technical issue arise, authorized distributors and their manufacturers will be happy to provide technical know-how and expertise. Rutronik's customers can depend on the company to source its products directly from contracted manufacturers, providing them with the greatest protection from forgeries.

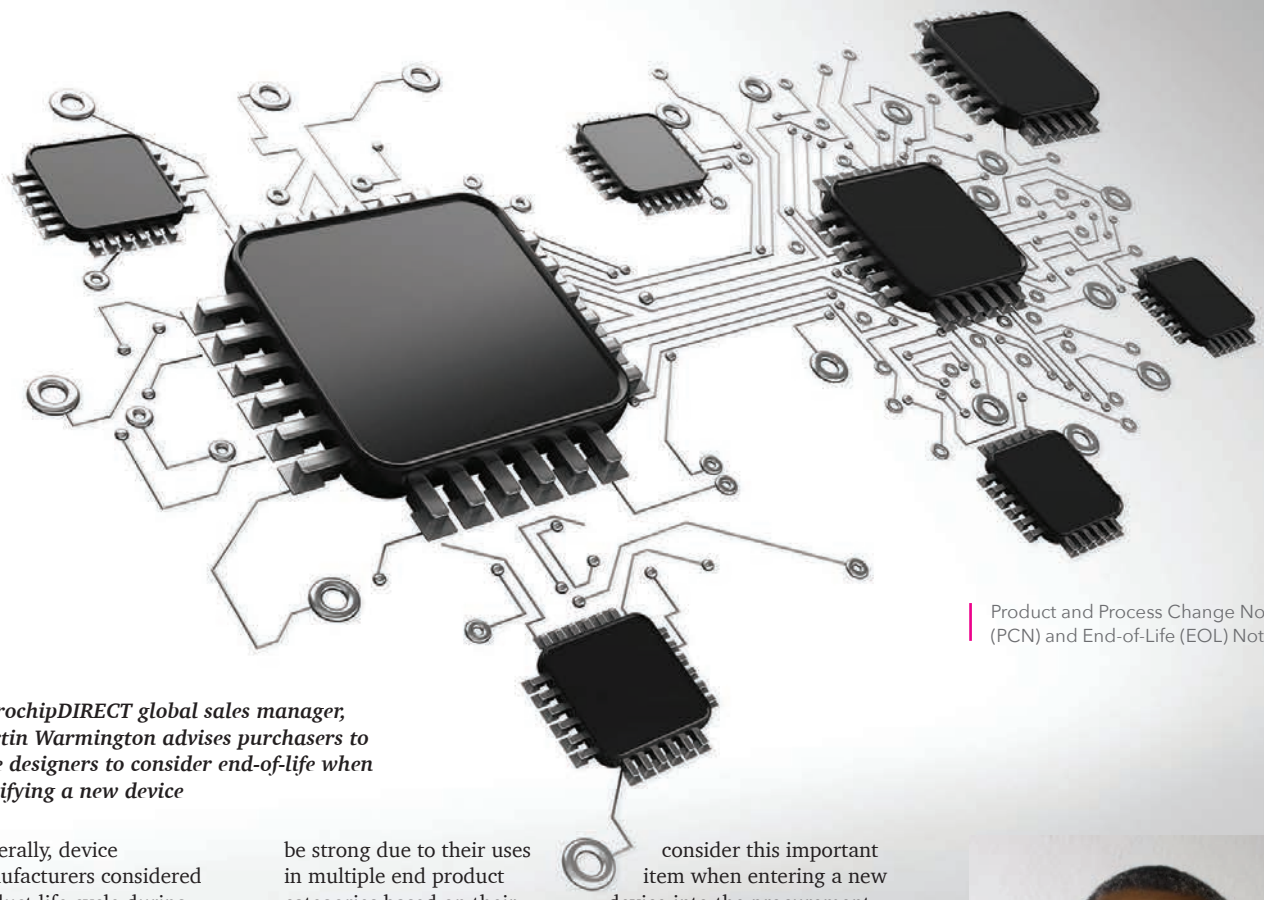
As a broadline distributor, Rutronik was aware of shortage risks early on. While some suppliers spoke about normal market conditions, Rutronik adapted its stocking strategy and built up additional inventory where possible to account for the manufacturers' increased shipping times. Customers throughout the world benefit from this today.

www.rutronik24.com

> **Those who invested in stable, long-term partnerships will have an enviable competitive advantage**



Product obsolescence and end-of-life: time to panic?



Product and Process Change Notification (PCN) and End-of-Life (EOL) Notifications

MicrochipDIRECT global sales manager, Martin Warmington advises purchasers to urge designers to consider end-of-life when specifying a new device

Generally, device manufacturers considered product life cycle during inception and early design. This is highly relevant for consumer items where the next two designs are already drawn up or sketched out, as their business is fast-moving.

For high-end semiconductors, the product life cycle can be similar. However, for general-purpose products (low pin count microcontrollers, memories, op-amps, regulators) product life cycle can be considerably longer, moving towards years or even decades, like the 555 timer. This is because demand for these products continues to be strong due to their uses in multiple end product categories based on their broad general functions.

Original equipment manufacturer (OEM) designers should consider the product life cycle of every part of their design. Even though most manufacturers cannot give definitive dates of life cycles they can give indications of current demand and may offer alternatives. However, end-of-life (EOL) or obsolescence is as certain as 'death and taxes' and therefore product life cycles should always be closely managed. Purchasers should urge their designers to consider this important item when entering a new device into the procurement system.

Once an EOL notice has been published, OEMs have a number of choices:

- Redesign the product to replace the EOL device
- Find drop-in alternatives from the same manufacturer or an alternative source
- Find similar parts from the same manufacturer or alternative source
- Buy a bulk supply of inventory before the published last-time buy date

▸▸ *continued on page 22*

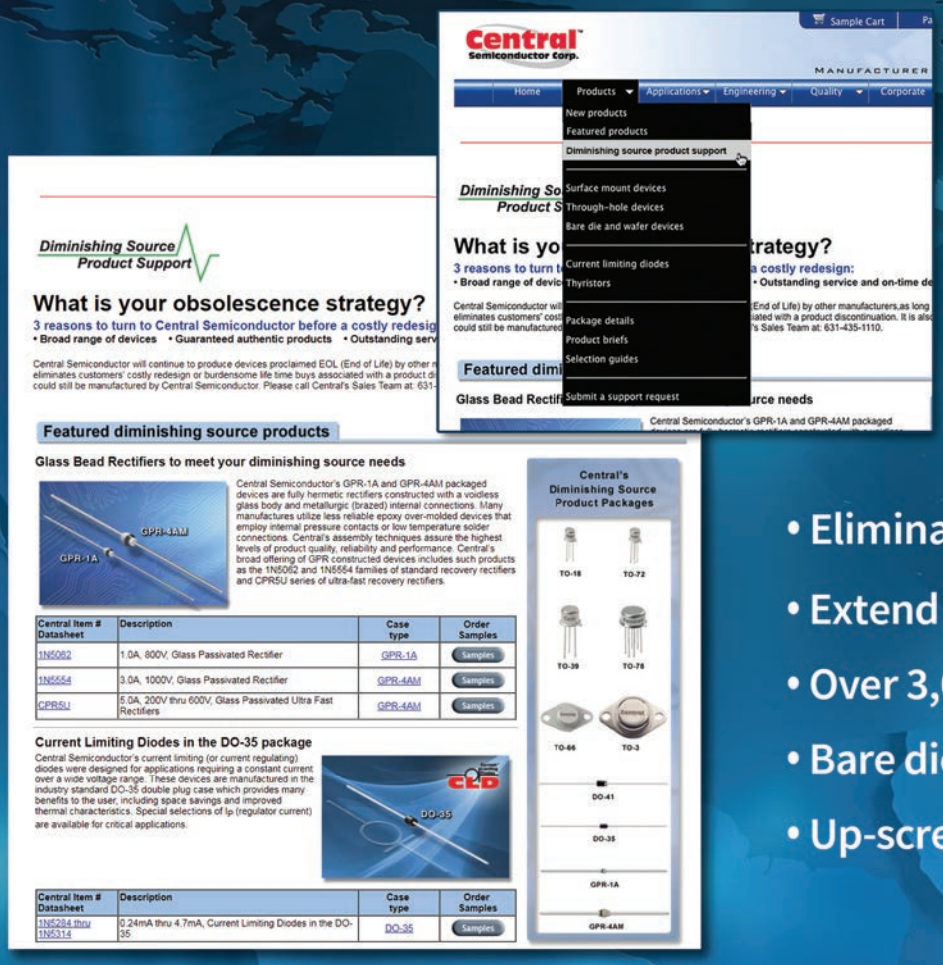


Martin Warmington, global sales manager, microchipDIRECT

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- Discover if the manufacturer can hold products in die bank and then package and test parts when needed

If the OEM's design is in the latter stages of life 'maturity or decline' other options may be applicable.

- Use a third party, such as a distributor or EMS to buffer parts for future use
- Use referral sites to discover which distributors have stock
- Find obsolete specialist suppliers

In most cases, if the OEM's end product is not in the mature phase of its own life cycle then customers would be advised to use the first option. All other options allow production to keep running but do not secure continued supply. For example, when I had to source supply for an obsolete part that cost $0.50 per device during its manufacture, the obsolete vendor sold the part for $15 each. Don't let engineering put you in this situation.

OEM customers should get as close to the manufacturer as possible to get the most accurate EOL information as the manufacturer will issue a last-time buy date with conditions. If the product is purchased from a distributor there is a third party in the transaction that may not have the latest information and may not be able to issue the last-time buy notice. The best alternative is to obtain information directly from the manufacturer.

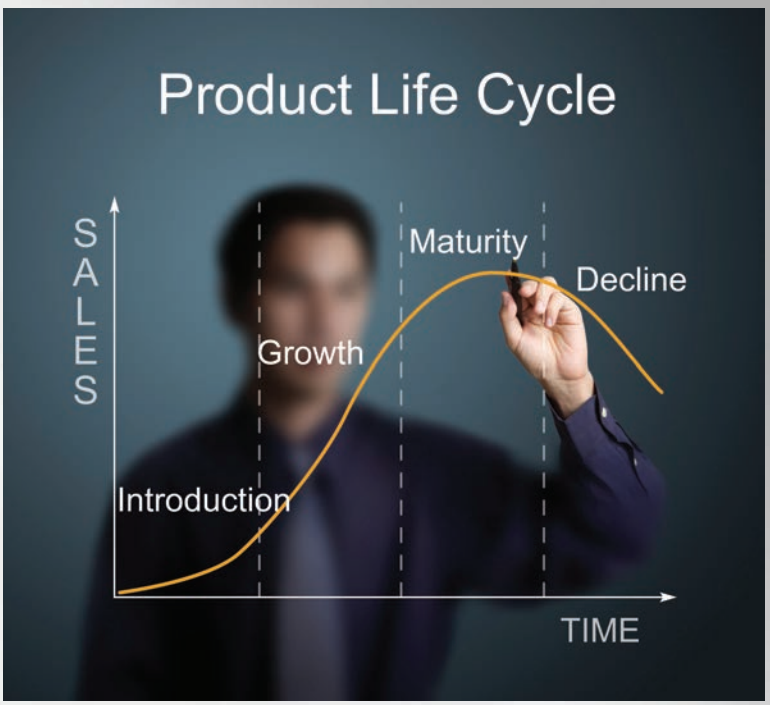
Most semiconductor manufacturers have a good product change notification (PCN) procedure in place to advise. Microchip offers such a service at www.microchip.com/pcn. Microchip uses a single sign-on for most of its online client facing services including their direct e-commerce channel, microchipDIRECT where over 90 per cent of Microchip's device portfolio can be purchased.

Microchip has one of the longest product life cycles of any semiconductor manufacturer. For example, the PIC16F877 microcontroller was released to production in 2003 and is still made today due to strong demand. In some markets such as automotive and medical, redesign cost can be considerable, running into tens of thousands of dollars, plus the cost for recertification and testing.

True direct replacements for EOL products are rare as most manufacturers do not generally want to launch a 100 per cent compatible part as that limits the new features they can add. A similar part may exist, but redesign is still the best solution if the product is in the introduction or growth phases of its life.

Manufacturers can help customers find an alternative device from a similar family of parts. This alternative family may not be any newer that the EOL device so the customer should request information regarding longevity of manufacture. Find out why the part is end-of-life and ask whether the replacement part is a good choice and still has 'legs'.

Parts go obsolete for many reasons. For example, demand for the part may have declined to a volume that is no longer cost-effective to manufacture. Other reasons are that the materials or machinery used to manufacture the part are no longer available or serviceable. Also, when manufacturers consolidate, similar devices may be made obsolete, with the most profitable parts wining.



Monitoring a products life cycle is critical

One of the knock-on effects of declining product demand is excess stock. Although not an indicator that a product is going end-of-life, it is good for the customer as they may be able to get these parts for a lower cost from the manufacturer. MicrochipDIRECT has a discount page that allows customers to find excess stock or older products at lower prices.

So, no need to panic. Stay close to the manufacturer and do not procrastinate on that redesign. The manufacturers and distributors have resources and are here to help.

www.microchip.com

Stay close to the manufacturer and do not procrastinate on that redesign. The manufacturers and distributors have resources and are here to help

Remember, connectors are different

TTI's VP supplier marketing and product management, Lew LaFornara, highlights the unique nature of purchasing connectors

As a purchasing professional working with a good bill-of-materials, knowing your cost targets and understanding your production schedule, it should be a safe assumption that connector procurement would be relatively straight forward. Ideally, you request multiple quotes, analyze them and award the business, right?

I have spent most of my career preaching 'connectors are different'. There are literally hundreds of thousands of types, styles and sizes. From inexpensive pins encased in plastic to technically advanced connection systems certified for extreme conditions.

Understandably, engineering will have specified the connector that best fits the application regarding data, signal, power, density, size, weight and much more. However, this can result in a specific part number unique to the application,

This is one way that connectors are different. A high percentage of connectors are customer or application specific and maybe limited to just one or two suppliers. The purchasing challenge of getting product at the targeted cost and in time for the production schedule just got a bit more complicated.

To compound matters, connector manufacturers want to produce a quality product, at the lowest cost and make a profit. This drives them to 'right size' their operations: streamlining production; moving to off-shore manufacturing; and maintaining their own just-in-time internal and external supply chains. There is remarkably little room for error. Weather events, unstable political climates, transportation disruptions, labor issues: the list of potentially delaying factors is large.

Connector manufacturers, with their right-sized, limited capacity, are scrambling to meet unexpected growth, causing lead times to double in some cases. Many lead times are now in the 14 to 18-week range with some stretching into the 24 to 28-week range. Twice as long to get connectors than we saw just a few months ago.

Supply chain constraints for some basic raw materials such as resins and some metals are also impacting manufacturers' ability to support increased demand. Likewise: increased labor costs; benefit and medical expenses; capacity expansion or plant moves/consolidation; new product development; and technology advancements are adding cost to connector manufacturers and are leading to price increases.

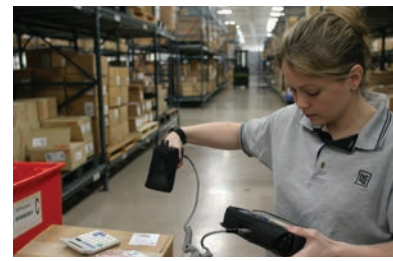
These challenges are all excellent reasons to have a solid relationship with an authorized distributor. At TTI our value proposition is to maintain 'available to sell' inventory and have enough product in the pipeline to act as a buffer to upstream delivery and pricing issues. We are often not only our suppliers' top performing distributor, but also one of their largest customers. Our purchasing power and business model aids them in maintaining efficient production levels, reserves our place in production schedules, and ensures that our customers have supply when lead times move out.

One way to overcome these challenges is working with an inventory management specialist to create a custom supply chain program. This uses your forecast data and supplies the connectors you need, when and where you need them. Your reserved orders are protected.

www.ttiinc.com



Lew LaFornara, VP supplier marketing and product management, TTI



With over a dozen distribution centers worldwide, TTI stocks connectors, passives and electromechanical components



A modular approach to power purchasing

Recom argues that a modular, off-the-shelf approach to buying power reduces time-to-market and costs

Using DC/DC converters or switching regulators for the on-board generation of the locally required direct current, product manufacturers can significantly simplify the structure of individual assemblies. Off-the-shelf modules are available for most applications and their prices have dropped drastically making discrete solutions a less viable option for many companies.

Buyers can choose from a wide range of competitively priced standard power supplies, DC/DC converters and switching regulators. By choosing to use an off-the-shelf solution, buyers can rest assured the module has already been tested and fully certified to EMI and international safety standards. This cuts down on time-to-market which saves bottom-line dollars via reduced labor costs and development timelines.

Recom's latest modular solution is the REM1 series of isolated unregulated DC/DC converters, specifically designed for medical applications. These modules provide 5.2kVDC isolation with 2MOPP/250VAC patient protection rating. They are certified to CB, IEC/EN and ANSI/AAMI 60601 third edition safety standards and come with a 5-year warranty. Given the strict requirements needed for most medical devices and the risk of EMC/safety certification failures, pre-certified modules such as the REM1 make the perfect argument for off-the-shelf solutions.

Another 2017 addition to Recom's portfolio is the R-78S. This single cell battery boost switching regulator with low standby consumption suits applications requiring local power supply such as microcontrollers, WLAN, Bluetooth, LoRa modules and IoT systems. In combination with a 1.5V cell, an application can be locally supplied for a significantly longer time compared to just using a button cell only. The R-78S is also protected against permanent short circuit and over-temperature conditions and has an under-voltage lockout to protect rechargeable cells from deep discharge.

The company has also announced the RACxx-G AC/DC series converters to complement the existing low-power RAC family, making modular solutions viable for smart homes and smart office applications. They are available as 1, 2, 3 and 4W solutions and have EN60335 household certification.



A universal input voltage range allows them to be used worldwide. The standard 5 or 12V DC outputs are suitable to power relays, gateways and building automation nodes. A typical no-load power consumption of only 180mW makes them particularly energy-saving solutions. Package dimensions are 33.7 x 22.2 x 19.0mm.

With the toughening of certifications and the standardization of the design process, there is less need for large engineering design teams; making pre-certified modules an overall cheaper and more attractive option. This is emphasised when considering the total cost of ownership and faster time-to-market benefits that off-the-shelf modules provide.

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> **With the toughening of certifications and the standardization of the design process, there is less need for large engineering design teams**



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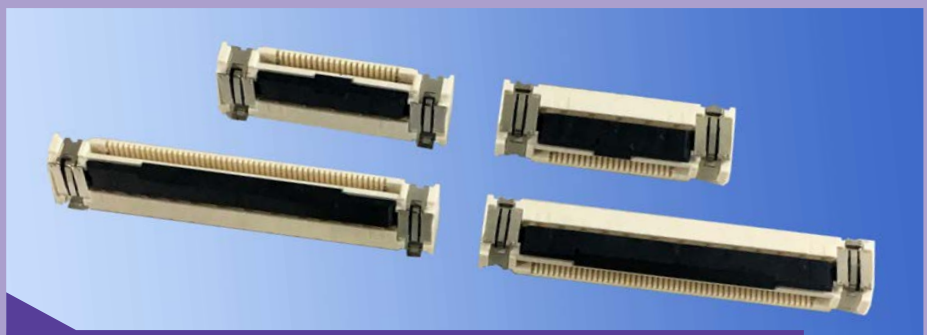
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One-touch locking facilitates robotic assembly

Kyocera has introduced its first electronic connectors to feature one-touch locking. The new 6810 series flexible printed circuit and flat-flex cable connectors provide automatic locking upon full insertion, a feature which supports automated manufacturing and robotic assembly. The RoHS-compliant series also boasts heat resistance up to 257°F for automotive, industrial and consumer electronics applications.

Unlike conventional connectors that require manual insertion and locking, Kyocera's one-touch locking 6810 series meets increased demand for components that support robotic assembly. The series features a proprietary structure that enables quick, stable connections in a single insertion, removing a significant impediment to fully automated assembly. It is also specifically designed to support automated optical inspection for high-speed quality assurance, potentially enhancing productivity in electronics manufacturing.

The new 6810 series connectors are available in two configurations: a straight type that mounts perpendicular to the circuit board for vertical insertion, and a right-angle type mounting parallel to the board for horizontal insertion.

global.kyocera.com

Connector underpins power supply improvements

Panasonic's latest 0.4mm pitch board-to-board and board-to-flexible printed circuit board connector is said to offer the industry's highest-level current-carrying capacity of up to 5A for power supply applications.

The new P4SP series meets demand for quick charging in both industrial and consumer equipment, whereby high current-carrying capacity is required for the connectors used to connect the power supply and control boards. With a maximum current carrying capacity of up to 5A for power supply applications, the P4SP series can reduce the number of terminals required for supplying power, saving space on the circuit board and contributing to compact equipment sizes.

Potential applications include board-to-board connection in industrial and consumer equipment such as notebook PCs, point of sale terminals, hand-held terminals, drones, compact robots and head-mount displays.

www.panasonic.com

Enhanced shell plating stands up to harsh environments



Amphenol Industrial Products Group has enhanced its shell plating from standard cadmium to gray zinc over electroless nickel for use in harsh environments. Initially designed for marine applications, this plating is now used in military and industrial applications, or where RoHS-compliant plating is required.

The Gray ZnNi plating boasts high corrosion resistance and no significant galvanic reaction when mated with standard market plating options. It is also cadmium-free, as well as being non-magnetic, so it can safely be used in magnetic environments. It has an operating temperature range of -65°C to 200°C.

General manager of Amphenol Industrial, Mark Cunningham, said: "Standard cadmium plating can only sustain 96 hours of salt spray and is not RoHS-compliant. Electroless nickel and zinc cobalt can only reach 48 and 96 hours, but our new Gray ZnNi is rated for 500 hours of salt spray and is RoHS-compliant."

Amphenol's AC Threaded, PT, and GT product lines are currently available in Gray ZnNi plating through distribution partners, Mouser Electronics and PEI-Genesis.

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Keeping mil-spec connectors flowing

Electro Enterprises offers a cautious outlook on mil-spec connector market in part due to Defense Logistics Agency Land and Maritime stop shipments

During the last 18-months the worldwide mil-spec connector market has been fraught with uncertainty over constant stop shipments imposed on the world's largest connector manufacturers. Procurement professionals have been impacted directly and indirectly, scrambling to find alternative ways to source the required parts. The most recent stop shipments have also created supply chain issues for both value-added distributors who assemble the affected connectors, as well as their competitors.

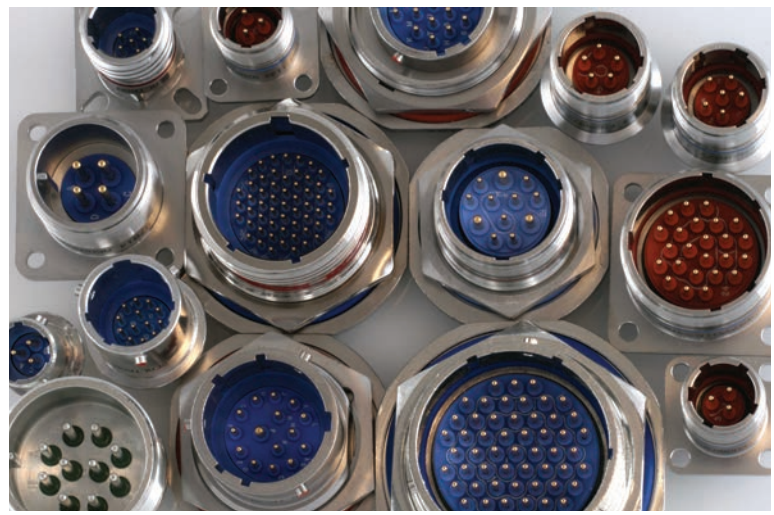
Historically the results of these stop shipments have been far-reaching, but have resulted in extended lead times and an increase in prices, both from manufacturers and value-added distributors alike.

Buyers are faced with the daunting task of deciding whether to wait out the stop-shipment in hopes that the manufacturers can resolve the issue with the DLA in a timely manner, look for other sources, or restart the design-in process completely.

Recent trends in stop shipments have led some smaller connector manufacturers, that do not derive the bulk of their sales from mil-spec product, to the decision not to re-qualify the mil-specs on many of their products. This becomes problematic to end-users whose engineering drawings call out specific manufacturers.

Electro Enterprises' director of operations, Andy Enright, said: "Many of our customers in the aerospace and defense industry recognize the significance of a stop shipment early on and quickly request crosses on all affected parts. Because this can seriously delay production times for our customers it is important that we as the distributor be prepared to provide the same mil-specs from alternative manufacturers."

Ultimately connector buyers must have a contingency plan in case a stop shipment occurs



Key stop-shipments

In March of 2017 one of the biggest connector manufacturers was issued a stop shipment on MIL-DTIL-38999, MIL-DTL-26482, MIL-DTL-83723, MIL-DTL-24308, MIL-DTL-83513, MIL-DTL-83733, FSC 5935, VQP-17-031226 and CN 055334. The DLA stated that they did not disclose field

▸▸ *continued on page 28*



Stop shipments can generally last longer than the manufacturer originally anticipates, so it is best to factor that in when deciding what course of action to take on the affected parts





failures and failures during the re-qualification testing process as main reasons for the stop shipment. This stop shipment comes only a year after the same company was instructed that they can no longer ship certain MIL-DTL-38999 series I and 3 connectors due to a leak test failure (the stop shipment has since been lifted.) MIL-DTL-38999 connectors are among the most common connectors used in the aerospace and defense industry.

In 2016 the world's second largest connector manufacturer was put on stop shipment from the DLA for numerous mil-spec connectors, including MIL-DTL-38999, MIL-DTL-83513, MIL-DTL-22992, MIL-DTL-26482, MIL-DTL-27599, MIL-DTL-55302, MIL-DTL-26500, and MIL-DTL-8372. This was the connector industry's largest stop shipment to date.

Stop shipments can last longer than the manufacturer originally anticipates, so it is best to factor that in when deciding what course of action to take on the affected parts.

Systemic effects on purchasing

Unsurprisingly any time a stop shipment is issued it causes major disruptions within the market, most notably from a procurement standpoint. Manufacturers and their authorized distributors are prohibited from shipping any product under the mil-spec number. Although it is still permissible to ship under the commercial part number

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Customers in the aerospace and defense industry recognize the significance of a stop shipment early on

many aerospace and defense companies must adhere to their drawings, which primarily tend to lean towards mil-spec parts.

The supply chain disruption is not just limited to those who distribute for the companies on stop ship, but also their competitors. The gap is quickly filled by those who can supply alternates, but at a cost; lead times skyrocket and stock becomes extremely valuable. Last year during the height of the stop ship crisis Electro Enterprises' build time for standard mil-spec value-added connectors was at a record-high 10 days. Typical build times range between two to three days. Even today companies that have been affected by the most recent round of stop shipments are at 10-day lead times on standard mil-spec products.

Ultimately connector buyers must have a contingency plan in case a stop shipment occurs on the products they are responsible for. If the choice is made to wait for the manufacturer to resolve the issue with the DLA it is important to note that price increases will be inevitable. In past instances where manufacturers were sourcing inexpensive foreign subcomponents from unapproved sources, the price increased due to an increase in the cost of materials.

Working with a distributor who can provide various sources and cross products quickly is highly recommended. Electro Enterprises also suggests that procurement and engineering work together on future projects to limit instances where drawings can accept only one manufacturer per mil-spec. Allowing any manufacturer who has passed the rigorous testing standards set forth by the DLA to supply mil-spec parts is a preventive measure that will make future stop shipments much less problematic.

Enright concluded: "The breadth and depth of our current stock levels have been an asset to us during these stop shipments: we want to be able to assist the customer when situations like this arise. By reaching out to us as the distributor, we can work with the manufacturers, cross the products in a timely manner, and mitigate any risk of disruption to the customer's production schedule."

www.electroenterprises.com



Standard logic market to bounce back

Strong demand and an increase in average prices are helping drive the standard logic market

By James Carbone

Buyers can expect average prices for standard logic to increase in the second half of the year as demand increases from several key customer segments.

As a result of robust demand and higher prices, 2017 will be a bounce-back year for standard logic after sales revenue fell 25.8 per cent in 2016, according to Semico Research.

"The standard logic market had been kind of declining," said Jim Feldhan, president of Semico. "In 2015 it was almost $2 billion, but fell to $1.5 billion in 2016." However, in 2017, "there's been a pretty good turnaround. The standard logic market is on a trajectory to grow 11 per cent and reach $1.6 billion in 2017," said Feldhan. Unit shipments in 2017 are expected to increase 7.4 per cent, "which will be the best year in the last four years for unit shipments," he said.

Standard logic includes OR, AND, NOR, NAND gates, buffers, drivers, transceivers, multiplexers, backplane logic, universal bus products, flip-flop, latch and register chips among others.

One reason for the turnaround is the overall recovery of the semiconductor industry and tightening of inventories compared to last year. Many manufacturers worked off their standard logic inventories and need to re-stock.

More price increases

Modest price increases are also contributing to market growth. Last year the average price for a standard logic product was 8.2 cents, according to Semico. Through May of this year, the average price for three months of the year was 8.4 cents; 7.8 cents for another month and 7.9 for the other for an overall average of 8.3 cents. While it is not a significant increase, "we think the price will increase for the remainder of the year," said Feldhan. He noted the average price for standard logic so far in 2017 is lower than it was two years ago when it was 11 cents.

Recovery of the standard logic market is welcome news to Texas Instruments, which has a broad product portfolio of logic chips used across multiple markets and applications.

"Logic is used in almost every product that people interact with on a daily basis," said Matt Kurtz, product line manager, logic at Texas Instruments. "With such a diverse business, we don't see any one "hot spot," but instead have seen strength across all the different markets, regions and customers we serve, he said.

Besides existing customers, TI continually sees "new customers and new applications that use TI logic products," including personal electronics devices, automotive systems and Internet of Things "which help make devices more efficient" Kurtz said.

Another standard logic manufacturer that is seeing growth in its standard logic business is ON Semiconductor. Guy Rahamim, product line manager for the logic and switch business unit at ON, said the chipmaker was posting "significant growth in the standard logic part of our portfolio." He said growth in demand was due to the overall standard logic market expanding and because of ON's alignment with key customers.

More growth in second half

ON saw increasing unit demand for its products in the first half of the year and expects more demand growth in the second half. "We traditionally see stronger demand in Q3 and most of Q4, with several key smartphone customers having big launches in the second half of the year," said Rahamim. "We see no signs of the market softening and we expect to see a traditionally stronger second half vs. first half."

He said demand is strong for ON's MiniGate and High Speed Logic products.

Rahamim said demand is robust from the automotive segment, particularly Advanced Driver Assistance Systems (ADAS). Automotive has "always been a strong area for ON Semiconductor and we are seeing significant growth as we capture share as the automotive market continues to perform and as more electronics are being integrated into cars," he said.

However, standard logic demand from smartphone and computer

By The Numbers

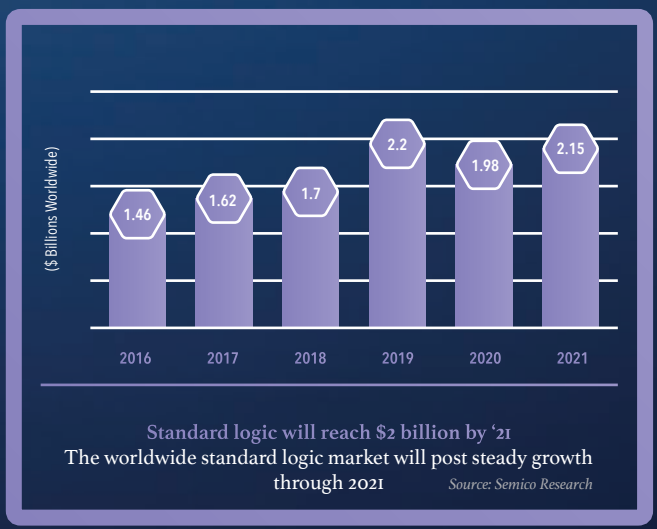
Source: Semico Research

$1.46 billion *The size of the global standard logic market in 2016*

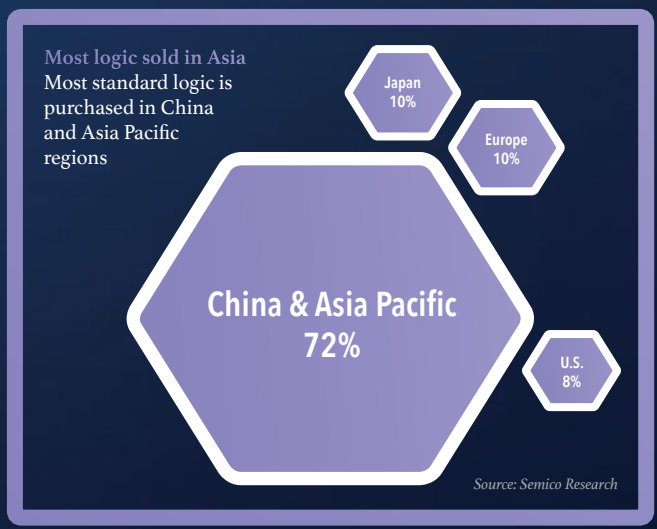
11% *The rate of sales growth for the 2017 standard logic market compared to 2016*

8.3 cents *The average price of a standard logic chip in the first five months of 2017*

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Standard logic will reach $2 billion by '21
The worldwide standard logic market will post steady growth through 2021 *Source: Semico Research*



segments has been sluggish. Those segments have reached their saturation point and the number of systems sold is trending flat or down, said Rahamim.

"The number of standard logic devices per system is also less than in the past so sales of standard logic devices are lower in these segments," he said. "However, due to increased functionality we are seeing significant growth of our high-performance products like voltage translators and analog switches," Rahamim said.

Industrial Internet of Things (IoT) is also helping drive sales of standard logic as more products and equipment are connected to the Internet.

Smaller packages wanted
While standard logic is used in many electronics systems and products and is being designed in new ones, there is not a lot of innovation with standard logic, said Feldhan. He noted that standard logic products are based on mature semiconductor technology.

"There are many standard logic families that have been around for 30 years such as TTL and the 7400 families," he said. "The only innovation has been in packaging."

Feldhan noted there is more demand for logic in very small packages from smart phones and wearable electronics. "You will find standard logic in multichip packages."

In fact, integration of standard logic with other chips into system on a chip (SoC) products is an ongoing trend and is impacting the standard logic market. Kurtz said logic integration tends to occur when end-equipment begins to mature or there is a single standard that OEMs use which allows dedicated chips to be integrated with several chips including logic.

"But at the same time, logic parts are generally the first devices needed when something becomes electronically 'smart' in all the various ways we see across markets and end equipment," said Kurtz.

More logic opportunities
As a result, "there are always new opportunities for logic devices in next generation end equipment to offset the integration happening on older more mature end equipment," said Kurtz. He added TI focuses on making sure the chipmaker releases new logic products that have the "right performance and packages for the next smart application."

Rahamim said it is very common for SoCs to integrate a logic device or "even one of our high-performance products like a voltage translator." SoC reduces the overall cost of a system and drives higher functionality which increases demand for the product and drives more sales, according to Rahamim.

He said that the growth in the number of systems sold such as computers, smartphones, TVs, and other consumer electronics equipment has outpaced the growth in standard logic over the last decade.

"That points to fewer logic devices per system, but many more systems being sold," said Rahamim. "The one exception to that is in the automotive segment, where the amount of ICs, including standard logic, per system has grown significantly, especially over the last 5 to 10 years," he said.

ON recently acquired Fairchild Semiconductor and the acquisition should help ON compete as the number of standard logic chips per system shrinks because of integration.

"Acquiring Fairchild has given us a much better perspective of the overall market," said Rahamim. He noted that ON has had a wide reach with its logic portfolio, but the acquisition of Fairchild has helped ON penetrate "previously underserved segments like networking and industrial. It also gives us increased scale and allows us to invest more in a bigger portfolio," said Rahamim.

7.4% *The amount standard logic unit shipments will increase in 2017*
$2.15 billion *The forecasted size of the worldwide standard logic market in 2021*

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Pace of electronics supply base consolidation slows

Mergers and acquisitions among electronics suppliers will continue, but many of the deals will be small and involve connector companies

By James Carbone

The bad news for electronics purchasers is that the consolidation in the electronics supply base that has occurred over the last two years will continue. The good news is that there will be less merger and acquisition activity.

While consolidation in the electronics supply chain is not a new phenomenon, it has been especially aggressive particularly in the semiconductor industry, which saw a record amount of mergers and acquisitions over the last two years.

Mergers and acquisitions announced in the chip industry in 2015 totaled $107.3 billion. In 2016 about $99.6 billion of consolidations occurred, according to researcher IC Insights. Rob Lineback, senior research analyst for the company, said 2015 "was the all-time high for mergers and acquisitions in the semiconductor industry and 2016 was the second all-time high. This is totally historic. The last big wave probably would've been during the dotcom era in the late 1990s," said Lineback.

M&A activity has also occurred with passives and connector manufacturers as well as with distributors and electronics manufacturing services (EMS) providers.

Sometimes consolidation can result in a stronger supply base because a struggling electronics manufacturer may be purchased by a larger, financially healthier company that continues to manufacture the acquired supplier's products.

However, many purchasers lament mergers and acquisitions because it can mean fewer sources of supply and result in less purchasing leverage with semiconductor and other component manufacturers. The good news for those buyers is that in the first half of 2017, it appears that M&A activity in the semiconductor industry will be nowhere near the level it was over the last years.

No M&A surge expected

IC Insights says in the first six months of 2017 there were only $1.4 billion of mergers and acquisitions announced, including MaxLinear's $687 million cash acquisition of analog and mixed-signal IC supplier Exar.

"We don't expect to see a major surge this year to the point where acquisitions will be at the level that there were over the last two years," said Lineback. However, he cautioned that there were few acquisitions announced in the first half of 2016, too, and it appeared there might be a slowdown in M&A activity for the year. "But then we had big ones hit in the second half of the year. In fact, 95 per cent of the acquisitions last year were announced in the second half," he said.

Those major mergers and acquisitions included SoftBank buying ARM for $32 billion; QUALCOMM purchasing and NXP for $47 billion, Analog Devices acquiring Linear Technology for $14.8 billion.

More consolidation is likely for the industry in the second half of this year, but it is unlikely there will be major consolidations like the ones in 2015 and 2016 with one possible exception.

"Everyone is waiting for Toshiba to announce the agreement to sell its flash memory business," said Lineback. "That is a big one and will be at least $18 billion," said Lineback. Toshiba announced in June that a group consisting of Bain Capital, SK Hynix and Japanese-government backed banks was its preferred bidder. Western Digital is also bidding and has filed suit in San Francisco County Superior Court arguing that a previous joint venture it had with Toshiba means Toshiba needs its consent to sell the flash business. It is not known when Toshiba will be allowed to sell its flash business.

The rate of mergers and acquisition activity in the semiconductor industry will lessen in 2017



Imagination Technologies is another company that may be sold. The company licenses intellectual property for graphics processors used in smart phones including Apple's iPhone. However, Apple announced it would stop using Imagination's IP in two years. Apple accounts for half of Imagination's revenue and because of Apple's announcement, Imagination put itself up for sale.

"Imagination has processor cores and technology that could be of interest to a large semiconductor company or a company like SoftBank," said Lineback. Other companies such as Qualcomm and MediaTech may also be interested in Imagination.

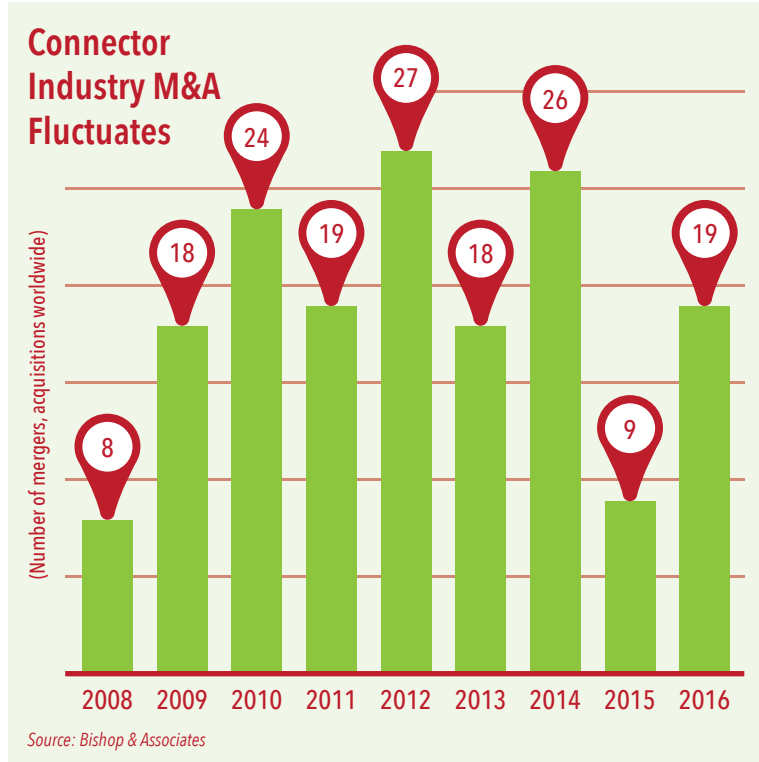
One reason why a slowdown in consolidation in the semiconductor industry may occur this year is companies that made big acquisitions last year are "off the table in terms of consolidation because they need time to digest what they've already purchased," said Lineback.

"In addition, we've seen a tremendous amount of government scrutiny of foreign acquisitions, especially with the Chinese and that in part could be putting the brakes" on some consolidation. He noted that both the European Union and the U.S. government have review committees concerning mergers and acquisitions.

Misplaced concern?
While buyers are always concerned about supply base consolidation, Lineback noted that mergers and acquisitions don't necessarily mean there will be fewer sources of supply for parts.

Sometimes a company will buy another component manufacturer to acquire the products and technologies the acquiring company currently doesn't have. Such was the case with Intel purchasing Altera which makes field programmable gate arrays (FPGA). "Some companies want to branch areas and are not buying their competitors," said Lineback.

In some cases, semiconductor companies sell off business units over regulatory concerns because governments don't want monopolies, said Lineback. "For instance, NXP had to sell off some of its businesses to buy Freescale. It sold its power and RF product business. Freescale had a strong power and RF transistor business," said Lineback. NXP sold its power products to Chinese investors that created a new company, said Lineback.



Source: Bishop & Associates

"Consolidating forever"
As with semiconductors, consolidation is a continuing trend in the connector industry. "The connector industry has been consolidating forever," said Ron Bishop, president of connector research firm Bishop & Associates. "Since 1980, we've recorded over 300 acquisitions," he said. There are years where there

▸▸ *continued on page 34*

The number of mergers and acquisition in the connector industry varies from year to year

"More consolidation is likely for the industry in the second half of this year"



may be 25 acquisitions and then the following year there may be less than 10, according to Bishop.

For instance, in 2014 there were 26 mergers and acquisitions in the connector industry. In 2015, the number dropped to 9 and then increased to 19 in 2016, said Bishop.

"A lot of the big mergers and acquisitions are probably over within the industry," said Bishop. "But there are a ton of smaller acquisitions. Larger and midsize companies are looking to acquire technology and they're also adding high-tech cable assembly capabilities to their portfolios," he said.

A lot of consolidation in the connector industry involves startups. "We keep getting new connector companies popping up in China and in various parts of the world," said Bishop. "One startup gets acquired and another one pops up. You can start a connector company without a lot of capital," he notes.

A new connector manufacturer may launch a business, develop a small, focused portfolio and serve a niche. The company may operate for 10 years, make a name for itself, and a larger company will "come in and make the startup an offer it can't refuse. It happens a lot," said Bishop.

He said there are many startups in Asia and "there is going to be an ongoing round of acquisitions for the foreseeable future."

Despite consolidation there are still more than 1,000 connector companies worldwide, according to Bishop.

He added that large connector companies such as Amphenol, Molex, and TE are trying to diversify their businesses to improve productivity. As a result, "they are going out to buy peripheral types of companies" such as sensor or test equipment manufacturers, said Bishop. The large connector manufacturers are looking to buy companies that "fit with their technology and their manufacturing knowledge. They are looking for companies with products that are related to the interconnect world, but are not interconnects themselves," he said.

He said connector industry consolidation often occurs when business is down and small or medium-size companies are looking for a larger partner. "When business is bad sometimes the bigger companies have a better opportunity to acquire than when things are going good," said Bishop.

"Cheap financing" available

Consolidation can occur in electronics distribution when business is good or bad and can depend on the availability of financing.

Robin Gray, chief operating officer and general counsel for the Electronic Components Industry Association (ECIA) said mergers and acquisitions have "picked up over the last year or two."

"I think it is because of cheap financing," he said. There is an expectation that the days of inexpensive borrowing is going to be ending so companies are looking for acquisition opportunities that they can do now. "Even if the timing isn't right, the money is certainly right," said Gray. Most acquisitions in distribution involve large distributors purchasing smaller distributors that may have an interesting niche.

"Other than Avnet's acquisition of Premier Farnell, it's mostly regional and smaller niche distributors being acquired by the bigger guys as well as some mid-size guys buying some niche distributors," said Gray.

In some cases, a distributor wants to expand its product reach. A passives distributor may decide to carry some semiconductors to reach new customers and to sell more products to existing ones.

For instance, passives and connector specialist distributor TTI in July announced it had acquired Symmetry Electronics, a semiconductor distributor. Symmetry carries integrated circuits for wireless, cellular, Bluetooth and video applications.

Mergers and acquisitions are occurring in the EMS industry, too. Some EMS providers may acquire a small contract manufacturer in a geography that the larger EMS company does not currently manufacture. In other cases, a provider may buy another company that serves a particular customer segments such as aerospace or automotive.

More services needed

Some M&A activity in the electronics outsourcing industry involves EMS providers buying companies that help the manufacturer offer more value-added services to OEM customers, according to researcher Gartner Inc.

Sam New, principal research analyst for Gartner, said OEM customers are expecting more end-to-end solutions from their EMS suppliers and not just core manufacturing and testing capabilities.

Many OEMs are looking to develop very strategic relationships with EMS providers that can offer everything from design services to direct shipment to customers, according to Virginia Howard, research director at Gartner.



'Mergers and acquisitions have picked up over the last year or two and many involve regional and smaller niche distributors being acquired by the bigger guys," said Robin Gray, chief operating officer and general counsel for the Electronic Components Industry Association (ECIA)

"Having these very deep, complex partnerships is very important to businesses," she said. It means that EMS providers need to add certain capabilities to meet the needs of OEM customers.

Many OEMs are using fewer EMS providers than in the past, relying on just two or three contract manufacturers rather than a dozen or more. As a result, some EMS providers are purchasing companies to help them fill out their suite of services that they can offer OEM customers according to Gartner.

In some cases, EMS providers are purchasing design services companies to help support OEMs. Others may need help managing supply chain risk or component obsolescence and may require a niche software, to help develop solutions to those supply chain challenges.

Encapsulated fuse provides intrinsic safety

Littelfuse has introduced an encapsulated surface mount fuse, certified to the UL 913 standard, and designed for intrinsic safety protection of equipment used in or near hazardous locations and explosive atmospheres.

During overcurrent and short circuit fault conditions, the Pico 304's one-millimeter thick encapsulation minimizes the amount of heat produced and contains any sparks or arcs inside the fuse assembly. This prevents exposure to explosive gases or dust in the environment and eliminates the need to pot or coat printed circuit boards or assemblies, saving production time and money.

The Pico 304 series is rated for 277V AC/DC with 1,500A breaking capacity, making it suitable for barrier circuits or circuits separating intrinsically safe circuits from non-intrinsically safe circuits. Available with current ratings from 50 to 750mA, the series is ideal for limiting fault power available in a circuit, helping to reduce required power ratings and the size of downstream components, wiring and circuit board traces.

Typical applications include measuring or processing electronic and electrical equipment, motor controllers, process control and automation equipment.
Littelfuse.com



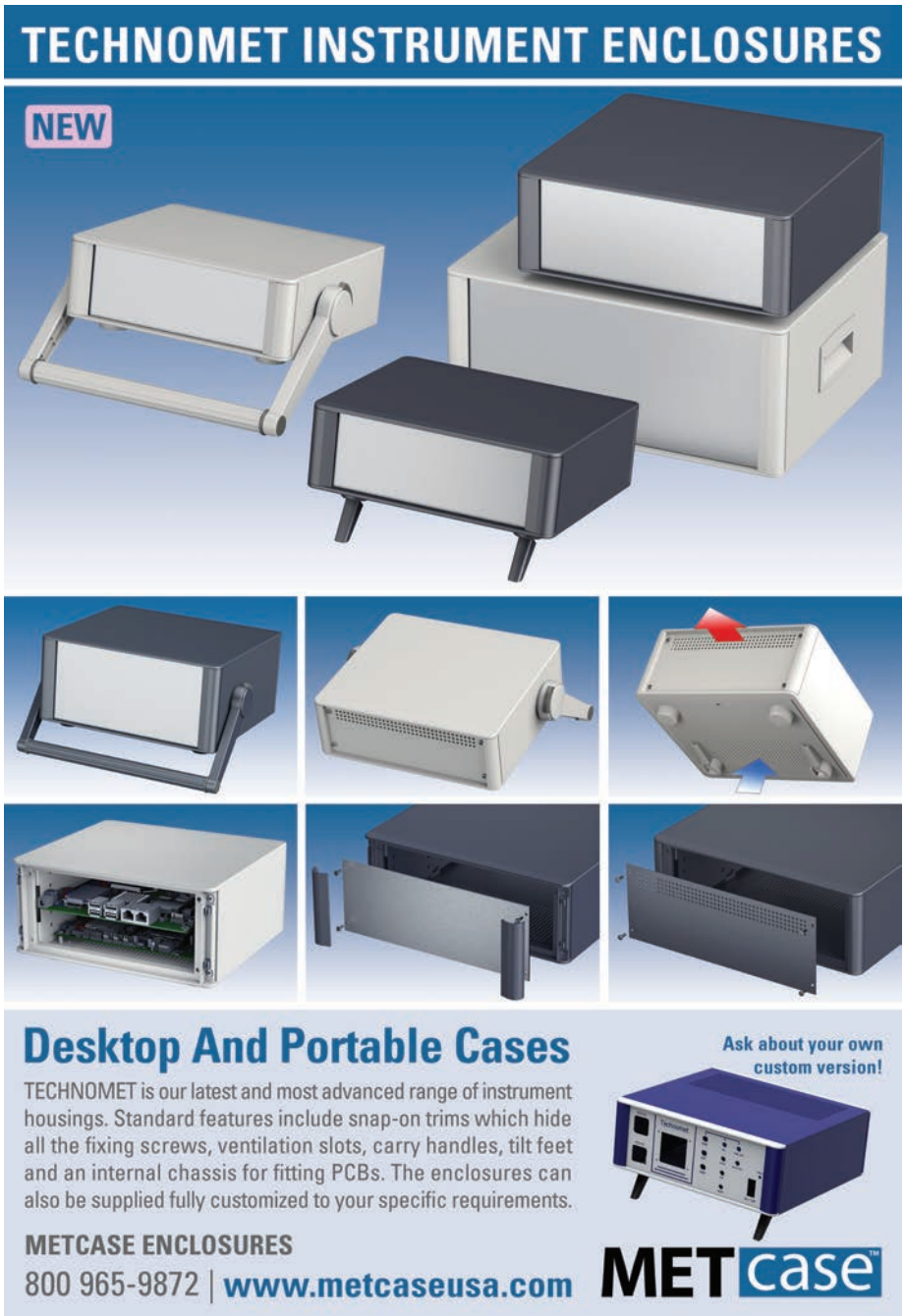
Strain-gage sensor boosts safety

Vishay Precision Group has introduced a new extensometer from its VPG Transducers brand. Model 182 is a high-performance strain gage-based force sensor designed for industrial, EN15000 and EN280 compliant off-highway vehicle and equipment safety applications.

The new extensometer accurately measures deformation, or changes in the length of a solid structural body, with a 500με full-scale sensing range and necessary redundancy for EN15000 and EN280 compliance in safety applications. Its robust design consists of a strain gage sensing element, housed in a corrosion resistant coated alloy steel, with mounting via two bolt holes. Model 182 units are also IP67 rated for dust and moisture protection, ensuring their reliability and repeatability in demanding environments.

Multiple output choices are available as standard, along with alternate connection options. For vehicle safety applications, customers can select from either a CAN Open or SAE J1939 protocol, with further choice of a DT or M12 connector.

Typical applications for the Model 182 include off-highway vehicle, telescopic handler and lifting machinery measurements. The extensometer is especially well-suited for applications where safety and device stability are of critical importance. It can also be specified for onboard vehicle machinery and chassis safety monitoring of construction equipment, scissor lifts, boom lifts, forklifts and materials handling equipment. Here, the extensometer effectively supports various lifting and loading scenarios, including overload measurements.
www.vpgtransducers.com





Hidden fixings offer discrete suspension

OKW's Synergy enclosures can now be wall mounted using a new concealed suspension element, designed to be even more discrete than the existing Synergy wall-suspension solution. The new hidden fixings are also compatible with the circular R120 and 140 Synergy variants.

Using the new system, an adapter is attached to the housing using customized double-sided foil on a foam rubber carrier. This adapter fits into a housing which is either screwed to the wall or attached using adhesive foils. A locking pin system provides removal protection.

All plastic components are molded from ASA+PC-FR for strength and UV stability.

www.okwenclosures.com



Deeper enclosures extend internal space

Hammond Manufacturing has introduced extended depth versions of its HN4FM floor-standing double door enclosure family. The additions address the need for additional internal space as more control, monitoring and communication equipment is installed in electrical cabinets. Drives are also becoming larger and more powerful, again requiring larger enclosures.

Four cabinet sizes are now available in 18.69in depths for each of the painted steel, 304 stainless steel and 316 stainless steel models.

The painted HN4 FM family is sealed to UL 508 Type 4, CSA Type 4 and IEC 60529 IP66. The HN4 FM SS stainless steel versions are sealed to UL 508 Type 4X, CSA Type 4X and IEC 60529 IP66. This ensures the enclosure can be hosed down, or installed in wet or dusty conditions, even outdoors.

A variety of heavy electrical, electronic, hydraulic or pneumatic controls and instruments can be housed in the enclosures. Doors are attached with heavy gauge continuous hinges, have a seamless gasket for long life environmental sealing and feature a three-point locking system with a padlockable handle for added security.

www.hammondmfg.com



Rugged VNA test assembly solves 70GHz challenges

W L Gore has expanded the functional frequency range of its FF series VNA microwave/RF test assemblies, which now offer reliable performance up to 70GHz. This upgrade addresses industry requirements for enhanced performance in the 60 to 70GHz range, where there is a need to maintain measurement accuracy, especially in vector network analyzers, communication testing and mm-wave applications.

Constant or repetitive movement of cables can compromise the measurement precision of high-performance vector network analyzers. Gore VNA microwave/RF test assemblies are designed to overcome this issue, leading to improved performance and reliability of equipment.

Gore product specialist, electrical cable and components, Chris Cox, said: "Gore VNA microwave/RF test assemblies are engineered to provide the most precise VNA measurements under laboratory conditions, delivering the highest accuracy and the greatest time interval between recalibrations. These assemblies have a rugged, lightweight construction that enables longer service life, reduced downtime and lower operating costs over the life of equipment."

The assemblies are said to maintain excellent insertion loss and VSWR as well as providing phase and amplitude stability with flexure. Prior to shipment, all assemblies are tested for return loss, insertion loss, phase stability and loss stability up to their maximum operating frequency.

www.gore.com

Go outdoors with sealed circular connectors

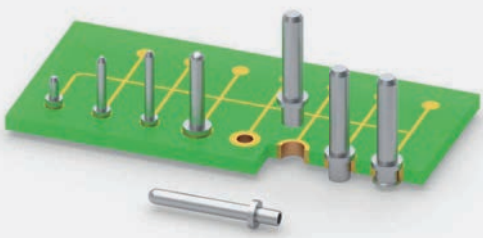


TE Connectivity offers the SlimSeal connector series, a compact IP67 sealed circular plastic connector for power and signal wire-to-wire applications operating in harsh environments. IP67 rating means the connectors are dust tight and resistant to water ingress at depths of up to one meter. This ensures they are suitable for use in applications such as outdoor LED lighting, architectural and garden lighting.

Connectors are available with two, three or four positions as an over-molded cable assembly. A pre-positioned quarter turn coupling ring with positive lock and alignment features simplifies installation, while a unique contact pattern for each position size helps prevent accidental mating. The two-position type operates at 7A, while three- and four-position types operate at 6A with a maximum operating voltage of 300V AC.

www.te.com

Swage mount pins offer cost-effective interconnect



Mill-Max is adding to its mix of swage mount PCB pins with six new offerings for interconnect applications. These swage mount terminals are designed to be mechanically fastened to a board or panel and plugged into sockets or soldered into mating boards in board stacking and other interconnect configurations.

According to Mill-Max, swage pins are a cost-effective choice for board-to-board interconnects. Their simple design doesn't require the precise PCB hole specifications associated with most press-fit pins and they can be processed in volume with semi-automatic or automatic equipment.

Various diameters and lengths are available to suit a variety of interconnect applications. This ensures they are useful when space is limited, near the edge of a board where a connector with its housing is not an option. Swaged pins are said to take up relatively little space and are secure without the need of an insulator.

www.mill-max.com

Chargers on track for increased flexibility

Bel Power Solutions has introduced a new ruggedized battery charger designed specifically for decentralized railway applications. The LBC series consists of two or three parallel independent AC/DC converter modules capable of converting the three-phase input voltage 400/480V AC to a bus voltage suitable for 110V battery charging in railway applications. Rolling stock and train manufacturers will then have the flexibility to distribute weight more efficiently, away from the traction inverters, pantograph and auxiliary converter.

With rack dimensions of 13.7/16 by 23.6 by 6.5in, the system uses two or three parallel independent units inside the shelf with active current sharing. This helps safeguard reliability and provides partial redundancy of the system. The power supply unit includes digital signal processing, which enables monitoring of electrical parameters and control of the PSU from the system controller. Flexible communications are built-in, including CAN bus and Ethernet.

LBC series chargers are designed to meet railway standards EN 50155, EN 50121-3-2, EN 45545 and NFPA 130, and custom solutions can be configured for a variety of railway and industrial applications.

www.belfuse.com



Straight waveguide sections support over 13 bands

Pasternack has released a new series of straight waveguide sections in sizes ranging from WR-10 to WR-137. Typical applications include instrumentation, test benches, high-efficiency RF/microwave transmission, satellite communications military communications, radar and telecom networks.

There are 62 models available that operate in the frequency range of 5.85 to 110GHz and in 13 waveguide bands from C to W. They also deliver VSWR as low as 1.03:1. Buyers can specify section lengths from three to 12 inches, made of either painted copper alloy or gold-plated, oxygen-free hard copper with UG, CPR and UBR-style flanges.

www.pasternack.com

See the difference

Sager Electronics is now stocking Mallory Sonalert's ZT series of audible alarms with an added visual component. The addition of an LED to the existing 22mm panel alarm series provides more options for users.

Accordingly, the new ZT series of alarms allows for simultaneous visual and audible alerts. Some models also offer users the option of silencing the audible alarm, while leaving the LED visual indication blinking until power is removed. This lets the operator know the alarm condition is still present without the distraction of a prolonged audible alarm. These versatile options ensure the ZT alarms are suitable for a range of industrial controls, transportation, and medical applications.

www.sager.com

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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
ACOUSTIC COMPONENTS											
BeStar Electronics Ind. Co. Ltd.	BeStar Technologies Inc.	520-439-9204	www.bestartech.com	Y	N/A	$250,000	N/A	100.00%	50	900	Y
CABLE & WIRING											
Alpha Wire	Mouser Electronics	800-346-6873	www.mouser.com	Y	8,106	N/A	$0	93.00%	50	1,000+	Y
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
CIRCUIT PROTECTION											
Bourns	Mouser Electronics	800-346-6873	www.mouser.com	Y	4,462	N/A	$0	68.00%	50	1,000+	Y
Cooper Bussmann	Mouser Electronics	800-346-6873	www.mouser.com	Y	19,689	N/A	$0	42.00%	50	1,000+	Y
EPCOS	Mouser Electronics	800-346-6873	www.mouser.com	Y	3,487	N/A	$0	100%	50	1,000+	Y
Littelfuse	Mouser Electronics	800-346-6873	www.mouser.com	Y	28,790	N/A	$0	67%	50	1,000+	Y
Vishay	Mouser Electronics	800-346-6873	www.mouser.com	Y	31,445	N/A	$0	68%	50	1,000+	Y
DISPLAYS & LEDs											
Avago Technologies	Mouser Electronics	800-346-6873	www.mouser.com	Y	403	N/A	$0	100.00%	50	1,000+	Y
Cree	Mouser Electronics	800-346-6873	www.mouser.com	Y	12,390	N/A	$0	99.00%	50	1,000+	Y
Dialight	Mouser Electronics	800-346-6873	www.mouser.com	Y	6,179	N/A	$0	84.00%	50	1,000+	Y
Kingbright Company, LLC	Mouser Electronics	800-346-6873	www.mouser.com	Y	301	N/A	$0	100.00%	50	1,000+	Y
LUMEX	Digi-Key	800-344-4539	digikey.com	Y	7,714	N/A	$0	96.42%	150	3,400	Y
Osram Opto Semiconductors	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,690	N/A	$0	100.00%	50	1,000+	Y
SunLED Company, LLC	PUI	1-800-551-4405	www.gopui.com	Y	1,351	N/A	$50	99%	5	33	Y
ELECTROMECHANICAL (continued on next page)											
AAVID	Digi-Key	800-344-4539	digikey.com	Y	1,585	N/A	$0	60.44%	150	3,400	Y
ALPHA WIRE	Digi-Key	800-344-4539	digikey.com	Y	25,593	N/A	$0	99.46%	150	3,400	Y
APEM	Digi-Key	800-344-4539	digikey.com	Y	6,926	N/A	$0	99.99%	150	3,400	Y
APEX TOOL GROUP	Digi-Key	800-344-4539	digikey.com	Y	2,649	N/A	$0	99.36%	150	3,400	Y
ARTESYN EMBEDDED TECHNOLOGIES	Digi-Key	800-344-4539	digikey.com	Y	10,349	N/A	$0	89.32%	150	3,400	Y
B&K PRECISION	Digi-Key	800-344-4539	digikey.com	Y	3,214	N/A	$0	99.94%	150	3,400	Y
BEL FUSE	Digi-Key	800-344-4539	digikey.com	Y	4,207	N/A	$0	83.53%	150	3,400	Y
BERGQUIST	Digi-Key	800-344-4539	digikey.com	Y	523	N/A	$0	95.98%	150	3,400	Y
BUD INDUSTRIES INC	Digi-Key	800-344-4539	digikey.com	Y	4,161	N/A	$0	99.93%	150	3,400	Y
C&K COMPONENTS	Digi-Key	800-344-4539	digikey.com	Y	29,271	N/A	$0	95.29%	150	3,400	Y
CHERRY	Digi-Key	800-344-4539	digikey.com	Y	1,200	N/A	$0	92.25%	150	3,400	Y
CNC TECH	Digi-Key	800-344-4539	digikey.com	Y	4,553	N/A	$0	100%	150	3,400	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
COMAIR ROTRON	Digi-Key	800-344-4539	digikey.com	Y	616	N/A	$0	100%	150	3,400	Y
COPAL ELECTRONICS INC	Digi-Key	800-344-4539	digikey.com	Y	4,121	N/A	$0	99.93%	150	3,400	Y
COTO TECHNOLOGY	Digi-Key	800-344-4539	digikey.com	Y	1,071	N/A	$0	99.72%	150	3,400	Y
CRYDOM CO	Digi-Key	800-344-4539	digikey.com	Y	5,459	N/A	$0	100%	150	3,400	Y
CTS CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	31,504	N/A	$0	87.78%	150	3,400	Y
CUI CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	15,168	N/A	$0	91.34%	150	3,400	Y
DANAHER CORPORATION (Pomona, Fluke, Portescap, Amprobe)	Digi-Key	800-344-4539	digikey.com	Y	5,410	N/A	$0	96.65%	150	3,400	Y
DELTA PRODUCTS CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	2,063	N/A	$0	99.90%	150	3,400	Y
DESCO CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	3,500	N/A	$0	99.83%	150	3,400	Y
E-SWITCH	Digi-Key	800-344-4539	digikey.com	Y	8,625	N/A	$0	99.99%	150	3,400	Y
EBM-PAPST INC.	Digi-Key	800-344-4539	digikey.com	Y	1,779	N/A	$0	99.89%	150	3,400	Y
ESSENTRA COMPONENTS	Digi-Key	800-344-4539	digikey.com	Y	16,594	N/A	$0	100%	150	3,400	Y
EXCELSYS TECHNOLOGIES LTD	Digi-Key	800-344-4539	digikey.com	Y	616	N/A	$0	100%	150	3,400	Y
GENERAL CABLE CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	7,109	N/A	$0	98.51%	150	3,400	Y
GENERAL ELECTRIC CORPORATION (GE Critical Power)	Digi-Key	800-344-4539	digikey.com	Y	1,751	N/A	$0	68.30%	150	3,400	Y
GRAYHILL INC	Digi-Key	800-344-4539	digikey.com	Y	12,569	N/A	$0	96.26%	150	3,400	Y
HAMMOND CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	13,303	N/A	$0	99.47%	150	3,400	Y
INVENTUS POWER	Digi-Key	800-344-4539	digikey.com	Y	514	N/A	$0	56.23%	150	3,400	Y
KEYSTONE ELECTRONICS	Digi-Key	800-344-4539	digikey.com	Y	6,089	N/A	$0	98.80%	150	3,400	Y
MEMORY PROTECTION DEVICES	Digi-Key	800-344-4539	digikey.com	Y	814	N/A	$0	99.63%	150	3,400	Y
MURATA CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	61,903	N/A	$0	99.72%	150	3,400	Y
NKK SWITCHES	Digi-Key	800-344-4539	digikey.com	Y	21,343	N/A	$0	97.59%	150	3,400	Y
NMB TECHNOLOGIES CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	3,003	N/A	$0	98.80%	150	3,400	Y
OMRON CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	70,119	N/A	$0	95.28%	150	3,400	Y
ORION FANS	Digi-Key	800-344-4539	digikey.com	Y	2,949	N/A	$0	100.00%	150	3,400	Y
PANASONIC CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	156,533	N/A	$0	93.83%	150	3,400	Y
PANDUIT CORP	Digi-Key	800-344-4539	digikey.com	Y	23,108	N/A	$0	99.92%	150	3,400	Y
PHIHONG USA CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	1,450	N/A	$0	100.00%	150	3,400	Y
QUALTEK	Digi-Key	800-344-4539	digikey.com	Y	209	N/A	$0	92.52%	150	3,400	Y
RECOM POWER CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	27,095	N/A	$0	100.00%	150	3,400	Y
SCHAFFNER EMC INC	Digi-Key	800-344-4539	digikey.com	Y	2,111	N/A	$0	100.00%	150	3,400	Y
SCHURTER INC	Digi-Key	800-344-4539	digikey.com	Y	9,910	N/A	$0	99.48%	150	3,400	Y
SL POWER ELECTRONICS MANUFACTURE OF CONDOR/AULT BRANDS	Digi-Key	800-344-4539	digikey.com	Y	3,159	N/A	$0	88.76%	150	3,400	Y
SUNON FANS	Digi-Key	800-344-4539	digikey.com	Y	1,850	N/A	$0	77.14%	150	3,400	Y
TDK CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	64,978	N/A	$0	99.30%	150	3,400	Y
TE CONNECTIVITY CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	437,107	N/A	$0	75.47%	150	3,400	Y
TECHFLEX	Digi-Key	800-344-4539	digikey.com	Y	2,136	N/A	$0	99.72%	150	3,400	Y



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ELECTROMECHANICAL (continued from previous page)											
TELEDYNE LECROY	Digi-Key	800-344-4539	digikey.com	Y	628	N/A	$0	92.99%	150	3,400	Y
THOMAS RESEARCH PRODUCTS	Digi-Key	800-344-4539	digikey.com	Y	1,361	N/A	$0	82.15%	150	3,400	Y
VICOR CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	195,706	N/A	$0	52.15%	150	3,400	Y
XP POWER	Digi-Key	800-344-4539	digikey.com	Y	4,155	N/A	$0	100.00%	150	3,400	Y
ENCLOSURES											
Bud	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bud Industries	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,325	N/A	$0	80.00%	50	1,000+	Y
Hammond Manufacturing	Mouser Electronics	800-346-6873	www.mouser.com	Y	2,839	N/A	$0	82%	50	1,000+	Y
New Age Enclosures	Mouser Electronics	805-595-1310	www.newageenclosures.com	M	1,000+	N/A	$0	100.00%	32	N/A	Y
FREQUENCY MANAGEMENT											
Abracon Corporation	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,780	N/A	$0	100%	50	1,000+	Y
Citizen	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,723	N/A	$0	N/A	50	1,000+	Y
CTS Electronic Components	Mouser Electronics	800-346-6873	www.mouser.com	Y	3,889	N/A	$0	100%	50	1,000+	Y
ECS Inc	Mouser Electronics	800-346-6873	www.mouser.com	Y	2,070	N/A	$0	100%	50	1,000+	Y
Epson Toyocom	Mouser Electronics	800-346-6873	www.mouser.com	Y	178	N/A	$0	100%	50	1,000+	Y
Fox Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	325	N/A	$0	100.00%	50	1,000+	Y
ILSI-MMD, Ecliptek	PUI Changed	1-800-551-4405	www.gopui.com	Y	1,683	N/A	$50	99.00%	5	33	Y
Susumu Co Ltd	Mouser Electronics	800-346-6873	www.mouser.com	Y	2,500	N/A	N/A	N/A	N/A	N/A	Y
ICs & SEMICONDUCTORS (Continued on next page)											
ADAFRUIT INDUSTRIES	Digi-Key	800-344-4539	digikey.com	Y	1,153	N/A	$0	98.70%	150	3,400	Y
ADVANCED PHOTONIX (LUNA OPTOELECTRONICS)	Digi-Key	800-344-4539	digikey.com	Y	678	N/A	$0	29.94%	150	3,400	Y
ALLEGRO MICROSYSTEMS, LLC	Digi-Key	800-344-4539	digikey.com	Y	2,867	N/A	$0	86.22%	150	3,400	Y
ALPHA & OMEGA SEMICONDUCTOR INC	Digi-Key	800-344-4539	digikey.com	Y	2,830	N/A	$0	100.00%	150	3,400	Y
ALTERA	Digi-Key	800-344-4539	digikey.com	Y	10,502	N/A	$0	100.00%	150	3,400	Y
AMS	Digi-Key	800-344-4539	digikey.com	Y	2,911	N/A	$0	97.94%	150	3,400	Y
ANALOG DEVICES	Digi-Key	800-344-4539	digikey.com	Y	50,633	N/A	$0	73.33%	150	3,400	Y
Analog Devices, Inc	Mouser Electronics	800-346-6873	www.mouser.com	Y	18,749	N/A	$0	95%	50	1,000+	Y
APEX MICROTECHNOLOGY	Digi-Key	800-344-4539	digikey.com	Y	432	N/A	$0	75.23%	150	3,400	Y
Atmel Corporation	Mouser Electronics	800-346-6873	www.mouser.com	Y	3,840	N/A	$0	74%	50	1,000+	Y
ATP ELECTRONICS, INC.	Digi-Key	800-344-4539	digikey.com	Y	191	N/A	$0	100.00%	150	3,400	Y
B&B SMARTWORX	Digi-Key	800-344-4539	digikey.com	Y	2,414	N/A	$0	100.00%	150	3,400	Y
BIVAR	Digi-Key	800-344-4539	digikey.com	Y	17,303	N/A	$0	100%	150	3,400	Y
BRIDGELUX	Digi-Key	800-344-4539	digikey.com	Y	1,177	N/A	$0	100%	150	3,400	Y

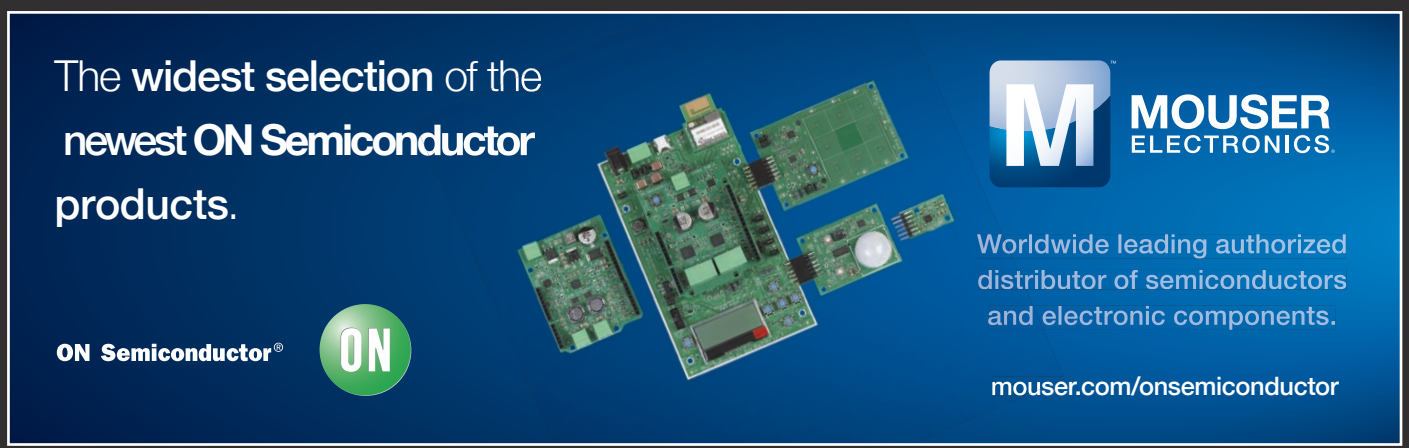


Buyers' Guide

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
BROADCOM LIMITED (AVAGO)	Digi-Key	800-344-4539	digikey.com	Y	13,051	N/A	$0	89.20%	150	3,400	Y
CALIFORNIA EASTERN LABORATORIES (CEL)	Digi-Key	800-344-4539	digikey.com	Y	3,359	N/A	$0	85.23%	150	3,400	Y
CENTRAL SEMICONDUCTOR	Digi-Key	800-344-4539	digikey.com	Y	5,526	N/A	$0	92.45%	150	3,400	Y
Central Semiconductor Corp.	Future Electronics	(800) 675-1619	www.futureelectronics.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	Y
CIRRUS LOGIC	Digi-Key	800-344-4539	digikey.com	Y	2,759	N/A	$0	79.16%	150	3,400	Y
Cirrus Logic Inc	Mouser Electronics	800-346-6873	www.mouser.com	Y	325	N/A	N/A	N/A	N/A	N/A	Y
COMCHIP CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	6,678	N/A	$0	100%	150	3,400	Y
CREE INC	Digi-Key	800-344-4539	digikey.com	Y	26,398	N/A	$0	100%	150	3,400	Y
CYPRESS SEMICONDUCTOR	Digi-Key	800-344-4539	digikey.com	Y	26,030	N/A	$0	89.02%	150	3,400	Y
Cypress Semiconductor Corp	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,325	N/A	$0	81.00%	50	1,000+	Y
DIALIGHT	Digi-Key	800-344-4539	digikey.com	Y	10,510	N/A	$0	74.29%	150	3,400	Y
DIGI INTERNATIONAL CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	4,015	N/A	$0	89.51%	150	3,400	Y
DIODES INC	Digi-Key	800-344-4539	digikey.com	Y	32,186	N/A	$0	89.01%	150	3,400	Y
Etron Technology Inc	PUI	1-800-551-4405	www.gopui.com	Y	1459	N/A	$50	99%	5	33	Y
EXAR CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	3,605	N/A	$0	99.97%	150	3,400	Y
FAIRCHILD	Digi-Key	800-344-4539	digikey.com	Y	39,473	N/A	$0	98.81%	150	3,400	Y
Fairchild Semiconductor	Mouser Electronics	800-346-6873	www.mouser.com	Y	8,654	N/A	$0	98.00%	50	1,000+	Y
FINISAR CORP	Digi-Key	800-344-4539	digikey.com	Y	1,852	N/A	$0	98.38%	150	3,400	Y
Freescale Semiconductor	Mouser Electronics	800-346-6873	www.mouser.com	Y	5,866	N/A	$0	70.00%	50	1,000+	Y
FTDI	Mouser Electronics	800-346-6873	www.mouser.com	Y	94	N/A	$0	100%	50	1,000+	Y
FTDI	Digi-Key	800-344-4539	digikey.com	Y	486	N/A	$0	100%	150	3,400	Y
IDT (Integrated Device Technology)	Digi-Key	800-344-4539	digikey.com	Y	49,881	N/A	$0	63.29%	150	3,400	Y
Infineon	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,580	N/A	$0	63%	50	1,000+	Y
INFINEON TECHNOLOGIES CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	24,610	N/A	$0	73.25%	150	3,400	Y
International Rectifier Corp	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,980	N/A	N/A	N/A	N/A	N/A	Y
Intersil Corporation	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,782	N/A	N/A	N/A	N/A	N/A	Y
INTERSIL CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	24,063	N/A	$0	74.18%	150	3,400	Y
INVENSENSE	Digi-Key	800-344-4539	digikey.com	Y	200	N/A	$0	100%	150	3,400	Y
IXYS CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	7,268	N/A	$0	99.55%	150	3,400	Y
KINGBRIGHT COMPANY LLC	Digi-Key	800-344-4539	digikey.com	Y	3,358	N/A	$0	99.85%	150	3,400	Y
LATTICE SEMICONDUCTOR CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	6,946	N/A	$0	64.44%	150	3,400	Y
LINEAR TECHNOLOGY CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	36,207	N/A	$0	76.91%	150	3,400	Y
LINX TECHNOLOGIES INC	Digi-Key	800-344-4539	digikey.com	Y	833	N/A	$0	91.72%	150	3,400	Y
LITE-ON INC	Digi-Key	800-344-4539	digikey.com	Y	3,563	N/A	$0	99.49%	150	3,400	Y
LOGIC PD, INC.	Digi-Key	800-344-4539	digikey.com	Y	195	N/A	$0	62.56%	150	3,400	Y
MACOM TECHNOLOGY SOLUTIONS	Digi-Key	800-344-4539	digikey.com	Y	1,376	N/A	$0	97.53%	150	3,400	Y
MAXIM CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	65,795	N/A	$0	77.63%	150	3,400	Y



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Maxim Integrated	Mouser Electronics	800-346-6873	www.mouser.com	Y	9,200	N/A	$0	89.00%	50	1,000+	Y
MELEXIS TECHNOLOGIES NV	Digi-Key	800-344-4539	digikey.com	Y	1,444	N/A	$0	94.94%	150	3,400	Y
MICRO COMMERCIAL COMPONENTS (MCC)	Digi-Key	800-344-4539	digikey.com	Y	11,183	N/A	$0	97.43%	150	3,400	Y
Microchip	Mouser Electronics	800-346-6873	www.mouser.com	Y	5,800	N/A	$0	100%	50	1,000+	Y
MICROCHIP CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	58,558	N/A	$0	90.13%	150	3,400	Y
MICRON CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	11,504	N/A	$0	88.34%	150	3,400	Y
Microsemi	Mouser Electronics	800-346-6673	Mouser.com	Y	6,099	N/A	$0	50%	50	930+	Y
MICROSEMI CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	27,580	N/A	$0	80.18%	150	3,400	Y
MULTI-TECH CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	922	N/A	$0	99.46%	150	3,400	Y
NEWHAVEN DISPLAY INTERNATIONAL CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	707	N/A	$0	100.00%	150	3,400	Y
NIMBELINK, LLC	Digi-Key	800-344-4539	digikey.com	Y	45	N/A	$0	100.00%	150	3,400	Y
NXP	Mouser Electronics	800-346-6873	www.mouser.com	Y	7,205	N/A	$0	100%	50	1,000+	Y
NXP SEMICONDUCTOR CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	38,701	N/A	$0	99.27%	150	3,400	Y
ON Semiconductor	Mouser Electronics	800-346-6873	www.mouser.com	Y	7,486	N/A	$0	96%	50	1,000+	Y
ON SEMICONDUCTOR CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	57,566	N/A	$0	79.85%	150	3,400	Y
OSRAM OPTO SEMICONDUCTORS INC	Digi-Key	800-344-4539	digikey.com	Y	6,045	N/A	$0	96.33%	150	3,400	Y
PEREGRINE SEMICONDUCTOR	Digi-Key	800-344-4539	digikey.com	Y	463	N/A	$0	99.57%	150	3,400	Y
POWER INTEGRATIONS	Digi-Key	800-344-4539	digikey.com	Y	1,447	N/A	$0	87.49%	150	3,400	Y
POWEREX INC	Digi-Key	800-344-4539	digikey.com	Y	3,395	N/A	$0	92.72%	150	3,400	Y
QUALCOMM TECHNOLOGIES INTERNATIONAL, LTD.	Digi-Key	800-344-4539	digikey.com	Y	4,984	N/A	$0	100.00%	150	3,400	Y
RENESAS ELECTRONICS AMERICA	Digi-Key	800-344-4539	digikey.com	Y	12,614	N/A	$0	84.65%	150	3,400	Y
RFMD CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	912	N/A	$0	87.17%	150	3,400	Y
SEGGER MICROCONTROLLER SYSTEMS	Digi-Key	800-344-4539	digikey.com	Y	45	N/A	$0	100.00%	150	3,400	Y
SEMTECH CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	3,694	N/A	$0	87.63%	150	3,400	Y
SEOUL SEMICONDUCTOR INC	Digi-Key	800-344-4539	digikey.com	Y	892	N/A	$0	88.98%	150	3,400	Y
SHARP CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	505	N/A	$0	62.18%	150	3,400	Y
SILICON LABORATORIES CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	17,747	N/A	$0	96.09%	150	3,400	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 CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	2,311	N/A	$0	99.61%	150	3,400	Y
ST Microelectronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	8,145	N/A	$0	96.00%	50	1,000+	Y
STMICROELECTRONICS CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	43,448	N/A	$0	97.47%	150	3,400	Y
SWISSBIT NA INC	Digi-Key	800-344-4539	digikey.com	Y	865	N/A	$0	100.00%	150	3,400	Y
TAOGLAS LIMITED	Digi-Key	800-344-4539	digikey.com	Y	537	N/A	$0	100.00%	150	3,400	Y
Texas Instruments	Mouser Electronics	800-346-6873	www.mouser.com	Y	29,676	N/A	$0	94%	50	1,000+	Y
TEXAS INSTRUMENTS CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	210,905	N/A	$0	89.60%	150	3,400	Y
Toshiba	Mouser Electronics	800-346-6873	www.mouser.com	Y	800	N/A	N/A	N/A	N/A	N/A	Y



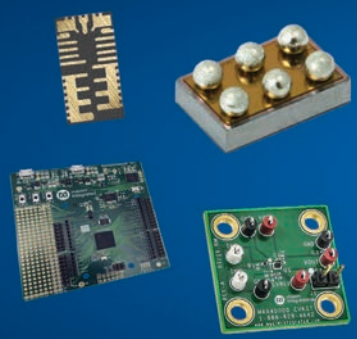
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TOSHIBA CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	12,097	N/A	$0	88.81%	150	3,400	Y
VERSALOGIC CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	444	N/A	$0	95.50%	150	3,400	Y
Vishay	Mouser Electronics	800-346-6873	www.mouser.com	Y	53,781	N/A	$0	77%	50	1,000+	Y
VISUAL COMMUNICATIONS COMPANY (CML)	Digi-Key	800-344-4539	digikey.com	Y	5,698	N/A	$0	96.12%	150	3,400	Y
XILINX INC	Digi-Key	800-344-4539	digikey.com	Y	7,354	N/A	$0	51.78%	150	3,400	Y

INTERCONNECTION (Continued on next page)

3M	Mouser Electronics	800-346-6873	www.mouser.com	Y	23,235	N/A	$0	46.00%	50	1,000+	Y
3M	Digi-Key	800-344-4539	digikey.com	Y	54,086	N/A	$0	93.83%	150	3,400	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
AMERICAN ELECTRICAL INC	Digi-Key	800-344-4539	digikey.com	Y	1,140	N/A	$0	100.00%	150	3,400	Y
Amphenol	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AMPHENOL	Digi-Key	800-344-4539	digikey.com	Y	426,945	N/A	$0	82.42%	150	3,400	Y
Amphenol	Mouser Electronics	800-346-6873	www.mouser.com	Y	165,853	N/A	$0	31%	50	1,000+	Y
ASSMANN WSW COMPONENTS	Digi-Key	800-344-4539	digikey.com	Y	10,433	N/A	$0	91.47%	150	3,400	Y
Cinch	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CONEC	Digi-Key	800-344-4539	digikey.com	Y	7,793	N/A	$0	99.99%	150	3,400	Y
CW INDUSTRIES	Digi-Key	800-344-4539	digikey.com	Y	8,384	N/A	$0	73.71%	150	3,400	Y
EDAC CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	9,720	N/A	$0	99.87%	150	3,400	Y
ELEKTRON TECHNOLOGY CORPORATION (Bulgin,ArcoLectric)	Digi-Key	800-344-4539	digikey.com	Y	3,936	N/A	$0	100%	150	3,400	Y
FCI	Mouser Electronics	800-346-6873	www.mouser.com	Y	3,394	N/A	$0	73.00%	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
HARTING	Digi-Key	800-344-4539	digikey.com	Y	16,347	N/A	$0	99.96%	150	3,400	Y
HARWIN INC	Digi-Key	800-344-4539	digikey.com	Y	10,186	N/A	$0	89.51%	150	3,400	Y
Hirose Electric	Mouser Electronics	800-346-6873	www.mouser.com	Y	4,322	N/A	$0	86%	50	1,000+	Y
HIROSE ELECTRIC CO LTD	Digi-Key	800-344-4539	digikey.com	Y	39,499	N/A	$0	91.53%	150	3,400	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 CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	141,017	N/A	$0	27.97%	150	3,400	Y
JAE Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	6,02	N/A	$0	100%	N/A	N/A	Y
JAE ELECTRONICS	Digi-Key	800-344-4539	digikey.com	Y	6,844	N/A	$0	100.00%	150	3,400	Y
JST	PUI	1-800-551-4405	www.gopui.com	Y	1,225	N/A	$50	99.00%	5	33	Y
JST SALES AMERICA INC	Digi-Key	800-344-4539	digikey.com	Y	4,320	N/A	$0	81.46%	150	3,400	Y
Kycon	PUI	1-800-551-4405	www.gopui.com	Y	1150	N/A	$50	99%	5	33	Y
LEMO	Digi-Key	800-344-4539	digikey.com	Y	27,601	N/A	$0	100.00%	150	3,400	Y
MILL-MAX MANUFACTURING CORP	Digi-Key	800-344-4539	digikey.com	Y	16,704	N/A	$0	61.28%	150	3,400	Y
Molex	Mouser Electronics	800-346-6873	www.mouser.com	Y	85,634	N/A	$0	89%	50	1,000+	Y
MOLEX CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	123,772	N/A	$0	95.41%	150	3,400	Y

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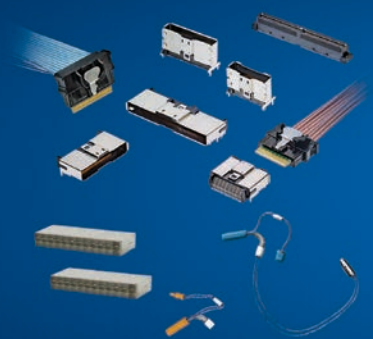
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Manufacturer	Distributor	Telephone	Website	Franchised Distributor (Y/N/M)	No. of Lines for Principle	Stock Value for Principle	Minimum Order Value	% Lead Free for Principle Range	No. of Technical Support Staff	Total No. of Staff	Pack and Hold
INTERCONNECTION (Continued from previous page)											
Neutrik	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,563	N/A	$0	100%	50	1,000+	Y
ON SHORE TECHNOLOGY INC	Digi-Key	800-344-4539	digikey.com	Y	12,793	N/A	$0	99.99%	150	3,400	Y
PARLEX USA LLC	Digi-Key	800-344-4539	digikey.com	Y	785	N/A	$0	98.34%	150	3,400	Y
PHOENIX CONTACT	Digi-Key	800-344-4539	digikey.com	Y	49,643	N/A	$0	99.99%	150	3,400	Y
Phoenix Contact	Mouser Electronics	800-346-6873	www.mouser.com	Y	30,044	N/A	$0	77.00%	50	1,000+	Y
SAMTEC INC	Digi-Key	800-344-4539	digikey.com	Y	20,270	N/A	$0	99.91%	150	3,400	Y
Souriau	Mouser Electronics	800-346-6873	www.mouser.com	Y	10,744	N/A	$0	27%	50	1,000+	Y
SOURIAU CONNECTION TECHNOLOGY CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	19,134	N/A	$0	89.06%	150	3,400	Y
SULLINS CONNECTOR SOLUTIONS	Digi-Key	800-344-4539	digikey.com	Y	204,896	N/A	$0	97.59%	150	3,400	Y
Switchcraft Corporation	Mouser Electronics	800-346-6873	www.mouser.com	Y	300	N/A	$0	55%	50	1,000+	Y
SWITCHCRAFT CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	4,228	N/A	$0	80.39%	150	3,400	Y
TE Connectivity	Mouser Electronics	800-346-6873	www.mouser.com	Y	123,613	N/A	$0	69%	50	1,000+	Y
TENSILITY INTERNATIONAL CORP	Digi-Key	800-344-4539	digikey.com	Y	1,209	N/A	$0	100.00%	150	3,400	Y
WEIDMULLER	Digi-Key	800-344-4539	digikey.com	Y	42,770	N/A	$0	96.54%	150	3,400	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
OPTO ELECTRONICS (Continued on next page)											
Avago Technologies	Mouser Electronics	800-346-6873	www.mouser.com	Y	7,165	N/A	$0	87.00%	50	1,000+	Y
Cree	Mouser Electronics	800-346-6873	www.mouser.com	Y	582	N/A	$0	99.00%	50	1,000+	Y
LedEngin, Inc	Mouser Electronics	800-346-6873	www.mouser.com	Y	437	N/A	$0	100.00%	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
Sharp Microelectronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,415	N/A	$0	97%	50	1,000+	Y
PASSIVES (Continued on next page)											
ABRACON CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	28,548	N/A	$0	98.89%	150	3,400	Y
AMERICAN TECHNICAL CERAMICS	Digi-Key	800-344-4539	digikey.com	Y	2,021	N/A	$0	84.02%	150	3,400	Y
API DELEVAN	Digi-Key	800-344-4539	digikey.com	Y	28,483	N/A	$0	46.93%	150	3,400	Y
AVX	Mouser Electronics	800-346-6873	www.mouser.com	Y	42,454	N/A	$0	72%	50	1,000+	Y
AVX CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	65,718	N/A	$0	83.48%	150	3,400	Y
BOURNS	Digi-Key	800-344-4539	digikey.com	Y	59,314	N/A	$0	82.47%	150	3,400	Y
Bourns	Mouser Electronics	800-346-6873	www.mouser.com	Y	38	N/A	$0	78%	50	1,000+	Y
CADDOCK ELECTRONICS INC	Digi-Key	800-344-4539	digikey.com	Y	492	N/A	$0	98.78%	150	3,400	Y
CANTHERM	Digi-Key	800-344-4539	digikey.com	Y	823	N/A	$0	100%	150	3,400	Y

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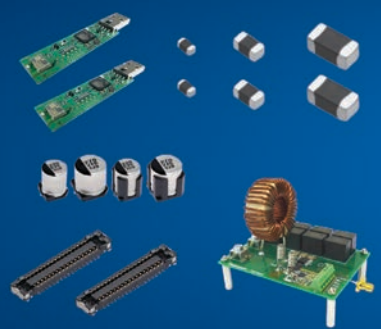
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Buyers' Guide

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
CITIZEN SYSTEMS AMERICA CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	4,309	N/A	$0	87.42%	150	3,400	Y
CONNOR-WINFIELD	Digi-Key	800-344-4539	digikey.com	Y	1,375	N/A	$0	98.62%	150	3,400	Y
Cornell Dubilier	Mouser Electronics	800-346-6873	www.mouser.com	Y	24,145	N/A	$0	71%	50	1,000+	Y
Cornell Dubilier	PUI	1-800-551-4405	www.gopui.com	Y	1420	N/A	$50	99%	5	33	Y
CORNELL DUBILIER ELECTRONICS	Digi-Key	800-344-4539	digikey.com	Y	25,597	N/A	$0	75.97%	150	3,400	Y
CRYSTEK CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	1,721	N/A	$0	100%	150	3,400	Y
EATON CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	28,434	N/A	$0	86.49%	150	3,400	Y
ECS INC	Digi-Key	800-344-4539	digikey.com	Y	8,236	N/A	$0	85.07%	150	3,400	Y
ENERGIZER BATTERY COMPANY	Digi-Key	800-344-4539	digikey.com	Y	453	N/A	$0	63.13%	150	3,400	Y
EPCOS	Mouser Electronics	800-346-6873	www.mouser.com	Y	26,533	N/A	$0	98.00%	50	1,000+	Y
EPSON CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	2,202	N/A	$0	82.60%	150	3,400	Y
FOX ELECTRONICS	Digi-Key	800-344-4539	digikey.com	Y	617	N/A	$0	100%	150	3,400	Y
HEICO CORPORATION (Ohmite)	Digi-Key	800-344-4539	digikey.com	Y	17,385	N/A	$0	64.94%	150	3,400	Y
HONEYWELL CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	26,319	N/A	$0	86.01%	150	3,400	Y
JOHANSON CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	5,039	N/A	$0	97.60%	150	3,400	Y
Kemet	Mouser Electronics	800-346-6873	www.mouser.com	Y	77,568	N/A	$0	66%	50	1,000+	Y
KEMET CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	48,025	N/A	$0	90.12%	150	3,400	Y
KNOWLES CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	2,987	N/A	$0	91.16%	150	3,400	Y
KOA Speer	Mouser Electronics	800-346-6873	www.mouser.com	Y	34,078	N/A	$0	58%	50	1,000+	Y
LAIRD CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	14,568	N/A	$0	97.21%	150	3,400	Y
LEM USA INC	Digi-Key	800-344-4539	digikey.com	Y	377	N/A	$0	98.41%	150	3,400	Y
LITTELFUSE CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	86,652	N/A	$0	82.87%	150	3,400	Y
MALLORY SONALERT PRODUCTS INC	Digi-Key	800-344-4539	digikey.com	Y	1,893	N/A	$0	92.92%	150	3,400	Y
Murata	Mouser Electronics	800-346-6873	www.mouser.com	Y	33,780	N/A	$0	99%	50	1,000+	Y
NDK	Digi-Key	800-344-4539	digikey.com	Y	936	N/A	$0	100.00%	150	3,400	Y
NESSCAP CO LTD	Digi-Key	800-344-4539	digikey.com	Y	24	N/A	$0	100.00%	150	3,400	Y
Nichicon	Mouser Electronics	800-346-6873	www.mouser.com	Y	20,389	N/A	$0	84.00%	50	1,000+	Y
NICHICON	Digi-Key	800-344-4539	digikey.com	Y	35,421	N/A	$0	96.30%	150	3,400	Y
NVE CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	617	N/A	$0	60.25%	150	3,400	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
PUI AUDIO, INC.	Digi-Key	800-344-4539	digikey.com	Y	1,285	N/A	$0	75.55%	150	3,400	Y
PULSE CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	11,098	N/A	$0	93.56%	150	3,400	Y
RIEDON	Digi-Key	800-344-4539	digikey.com	Y	3,411	N/A	$0	99.82%	150	3,400	Y
ROHM SEMICONDUCTOR CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	63,003	N/A	$0	99.85%	150	3,400	Y
Samsung Electro-Mechanics	PUI	1-800-551-4405	www.gopui.com	Y	3,852	N/A	$50	99.00%	5	33	Y
Samsung Electro-Mechanics	Digi-Key	800-344-4539	digikey.com	Y	21,522	N/A	$0	100.00%	150	3,400	Y

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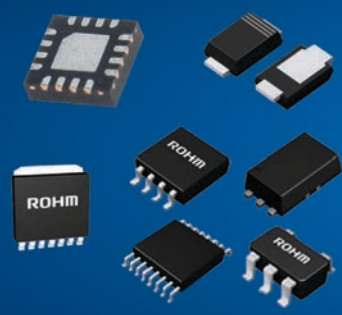
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Manufacturer	Distributor	Telephone	Website	Franchised Distributor (Y/N/M)	No. of Lines for Principle	Stock Value for Principle	Minimum Order Value	% Lead Free for Principle Range	No. of Technical Support Staff	Total No. of Staff	Pack and Hold
PASSIVES (Continued from previous page)											
STACKPOLE CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	55,938	N/A	$0	99.49%	150	3,400	Y
STANDEX-MEDER ELECTRONICS	Digi-Key	800-344-4539	digikey.com	Y	648	N/A	$0	99.69%	150	3,400	Y
SUMIDA AMERICA COMPONENTS INC	Digi-Key	800-344-4539	digikey.com	Y	7,157	N/A	$0	86.24%	150	3,400	Y
SUSUMU	Digi-Key	800-344-4539	digikey.com	Y	43,474	N/A	$0	99.98%	150	3,400	Y
TADIRAN BATTERIES	Digi-Key	800-344-4539	digikey.com	Y	65	N/A	$0	100.00%	150	3,400	Y
Taiyo Yuden	Mouser Electronics	800-346-6873	www.mouser.com	Y	4,620	N/A	$0	98.00%	50	1,000+	Y
TAIYO YUDEN	Digi-Key	800-344-4539	digikey.com	Y	16,677	N/A	$0	99.96%	150	3,400	Y
TAMURA	Digi-Key	800-344-4539	digikey.com	Y	1,355	N/A	$0	92.25%	150	3,400	Y
TDK	Mouser Electronics	800-346-6873	www.mouser.com	Y	6,663	N/A	$0	100.00%	50	1,000+	Y
TRIAD MAGNETICS	Digi-Key	800-344-4539	digikey.com	Y	1,608	N/A	$0	98.82%	150	3,400	Y
TRIPP LITE	Digi-Key	800-344-4539	digikey.com	Y	3,646	N/A	$0	88.65%	150	3,400	Y
TT ELECTRONICS CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	8,975	N/A	$0	80.34%	150	3,400	Y
TXC CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	9,066	N/A	$0	100.00%	150	3,400	Y
United Chemi-Con	PUI	1-800-551-4405	www.gopui.com	Y	1,145	N/A	$50	99.00%	5	33	Y
UNITED CHEMI-CON	Digi-Key	800-344-4539	digikey.com	Y	16,160	N/A	$0	87.44%	150	3,400	Y
Vishay	Mouser Electronics	800-346-6873	www.mouser.com	Y	102,917	N/A	$0	64.00%	50	1,000+	Y
VISHAY CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	275,942	N/A	$0	88.52%	150	3,400	Y
VISHAY PRECISION GROUP CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	28,238	N/A	$0	52.21%	150	3,400	Y
Wurth	Mouser Electronics	800-346-6873	www.mouser.com	Y	934	N/A	$0	99.00%	50	1,000+	Y
WURTH CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	22,245	N/A	$0	100.00%	150	3,400	Y
Yageo Corporation	Mouser Electronics	800-346-6873	www.mouser.com	Y	18,246	N/A	$0	100.00%	50	1,000+	Y
YAGEO CORPORATION	Digi-Key	800-344-4539	digikey.com	Y	141,986	N/A	$0	83.67%	150	3,400	Y
POWER & BATTERIES											
Emerson	Mouser Electronics	800-346-6873	www.mouser.com	Y	358	N/A	$1	85.00%	N/A	N/A	Y
Lineage Power	Mouser Electronics	800-346-6873	www.mouser.com	Y	301	N/A	$0	100.00%	N/A	N/A	Y
N2Power	PUI	1-800-551-4405	www.gopui.com	Y	1,241	N/A	$50	99.00%	5	33	Y
Power-One	Mouser Electronics	800-346-6873	www.mouser.com	Y	170	N/A	$0	60.00%	N/A	N/A	Y
TDK Lambda	Mouser Electronics	800-346-6873	www.mouser.com	Y	405	N/A	$0	80.00%	N/A	N/A	Y
REED SWITCHES											
HSI Sensing	HSI Sensing	405-224-4046	www.hsisensing.com	M	75	N/A	$200	100.00%	15	275	N
Standex-Meder Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	120	N/A	$0	82.00%	50	1,000+	Y
Standex - Meder	PUI	1-800-551-4406	www.gopui.com	Y	2,123	N/A	$50	99.00%	5	33	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
SENSORS											
Freescale	Mouser Electronics	800-346-6873	www.mouser.com	Y	842	N/A	$0	97.00%	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
Maxim Integrated	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,379	N/A	$0	45.00%	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
Standex-Meder Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	120	N/A	$0	82.00%	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											
Apem, Inc.	Mouser Electronics	800-346-6873	www.mouser.com	Y	4,326	N/A	$0	83.00%	50	1,000+	Y
Apem, Inc.	PUI	1-800-551-4405	www.gopui.com	Y	988	N/A	$50	99.00%	5	33	Y
C&K Components	Mouser Electronics	800-346-6873	www.mouser.com	Y	27,230	N/A	$0	90.00%	50	1,000+	Y
Honeywell Sensing and Control	Mouser Electronics	800-346-6873	www.mouser.com	Y	15,149	N/A	$0	73.00%	50	1,000+	Y
NKK Switches	Mouser Electronics	800-346-6873	www.mouser.com	Y	13,976	N/A	$0	86.00%	50	1,000+	Y
Omron	Mouser Electronics	800-346-6873	www.mouser.com	Y	10,669	N/A	$0	89.00%	50	1,000+	Y
OTTO	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
OTTO	Mouser Electronics	800-346-6873	www.mouser.com	Y	500+	N/A	$0	100.00%	75	500	Y
Panasonic Electric Works	Mouser Electronics	800-346-6873	www.mouser.com	Y	2,748	N/A	$0	100.00%	50	1,000+	Y
Standex-Meder Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	120	N/A	$0	82.00%	50	1,000+	Y
Switchcraft Corporation	Mouser Electronics	800-346-6873	www.mouser.com	Y	300	N/A	$0	55.00%	50	1,000+	Y
TEST & MEASUREMENT											
Fluke	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,008	N/A	$0	94.00%	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
THERMAL MANAGEMENT											
Aavid Thermalloy	Mouser Electronics	800-346-6873	www.mouser.com	Y	826	N/A	$0	73.00%	50	1,000+	Y
Aavid Thermalloy	PUI	1-800-551-4404	www.gopui.com	Y	987	N/A	$50	99.00%	5	33	Y
Delta Products	PUI	1-800-551-4406	www.gopui.com	Y	1,421	N/A	$50	99.00%	5	33	Y
Orion Fans	PUI	1-800-551-4406	www.gopui.com	Y	1,242	N/A	$50	99.00%	5	33	Y
Sanyo Denki America, Inc.	PUI	1-800-551-4405	www.gopui.com	Y	2,122	N/A	$50	99.00%	5	33	Y
STEGO, Inc		770-984-0858	www.stegousa.com	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WIRELESS SOLUTIONS											
Panasonic Electronic Components	Mouser Electronics	800-346-6873	www.mouser.com	Y	48	N/A	$0	100.00%	50	1,000+	Y

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Alliance Memory
All Sensors
Alorium Technology NEW
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ALPS
Altech
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Amprobe
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Amulet Technologies
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AnalogicTech
Anaren
Anderson Power
Antenna Factor
Antenova
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APC by Schneider Electric
APEM
Apex Tool Group
API Delevan
APM HEXSEAL
Applied Motion
Arcol
Arduino NEW
Aries
Artesyn Embedded Technologies
Atollic NEW
Ault / SL Power
Avago Technologies
Avery Dennison
AVX
Axiomtek NEW
Azoteq

B

B&K Precision
BeagleBoard by CircuitCo
BEI Sensors
Bel Power Solutions
Bel Signal Transformer
Belden
Bellin Dynamic Systems
Bergquist
Bias Power
BI Technologies
BIVAR
Blackhawk
Bluegiga / Silicon Labs
Bluetechnix NEW
Bomar Interconnect
Bosch Sensortec NEW
Bosch Connected Devices NEW
Boundary Devices NEW
Bourns
BPS
Broadcom NEW
Bud Industries
Bulgin

C

C&K Components
Caddock
Califia Lighting
California Eastern Labs / CEL
Carling Technologies
Carclo Technical Plastics
CCS
Central Semiconductor
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CHERRY
Cinch Connectivity Solutions
Cincon
Cirrus Logic
Citizen Finetech Miyota
Clare
CMOSIS NEW
Code Red Technologies
Coilcraft NEW
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Continental Industries
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D

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Dielectric Laboratories
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Digital View
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DIOO Microcircuits NEW
Displaytech Ltd.
DLP Design
DMC Tools (Daniels Manufacturing Corp) NEW

E

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EasySync
Eaton
ebm-papst
Ecliptek
ECS
EDAC
EE Tools
Electronic Assembly
Electroswitch
Elna
Elprotronic Inc.
Embedded Artists
Energy Micro
Enterpoint, Ltd. NEW
EPCOS
Epson
Ericsson Power Modules
ERP NEW
E-Switch
Esquilo NEW
ETA-USA
E-T-A Circuit Breakers NEW
ETI Systems
Eupec
Everspin Technologies
Everlight
EXAR
Extech

F

Fairchild Semiconductor
Fair-Rite
Fascomp
Fastron
FCT Electronics
Finisar NEW
Flamar NEW
FlexiPanel
Fluke
Fox
FTDI
Fujitsu
Future Designs, Inc. (FDI)

G

GeneSiC Semiconductor
GE Critical Power
GHI Electronics
Glenair
Global Specialties
Gravitech
Greenlee
Greenliant
GSI Technology NEW
Guerrilla RF NEW

H

Hammond Enclosures
Hantronix
HARTING
Harwin
Heatron
Heyco
Hirose Electric
Honeywell
HUBER+SUHNER NEW

I

IAR Systems
ICE Components
IDI
iEi Technology NEW
IET Labs
Illumitex
Imagination Technologies NEW
Infineon
Inolux
Inspired LED
Intel NEW
Integrated Device Technology
International Power
Intersil NEW
Inventus Power
Ioxus
IQD Frequency Products NEW
IRC
ISSI
ITT Cannon
ITW Switches
IXYS Integrated Circuits

J

J.W. Miller
JAE Electronics
Jewell Modutec
JKL Components
Johanson NEW
Johnson / Cinch

K

Kamaya
Ka-Ro Electronics NEW
Kavlico NEW
Keil (ARM®)
Keithley
KEMET
KEMET / NEC TOKIN NEW
Kester
Keterex
Keystone Electronics
Kionix
Kingbright
Knowles Acoustics
KOA Speer
Kostal NEW
Kycon
KYOCERA / AVX

L

Laird Technologies
Lantronix
Lattice Semiconductor
LedEngin
Ledil
LedLink
LEMO
Leopard Imaging
Leviton
LHV Power
Linx Technologies
Lite-On
Littelfuse
LMB/Heeger
Lorlin
LPRS NEW
LS Research
Lumex
Lumileds NEW
Luminus Devices
Luxo Corporation

M

MACOM
Macraigor Systems
Maestro Wireless
Magnecraft
Mallory
Mallory Sonalert
Marquardt Switches
Matrix Orbital
Maxim Integrated
Maxwell Technologies
MCC
Mean Well
Measurement Specialties
Meder
Melexis NEW
Memsic NEW
Menda
Merit Sensor NEW
Metcal
MG Chemicals
Micrel NEW
Microchip
Micronas NEW
MicroSemi SoC Group
Microtips
Mide Technology NEW
MikroElektronika
Mill-Max
Mitsubishi Electric
Molex
Monolithic Power Systems (MPS)
MSI Sensors
Mueller Electric
Murata
Murata Power Solutions
Murata Wireless Solutions NEW

N

NEC Relays
NetBurner
Netduino
Neutrik
New Age Enclosures
Newhaven Display
Nexperia NEW
Nichicon
NJR
NKK Switches
NMB
NorComp
Nordic Semiconductor
Noritake
NOVACAP
NovaSensor / GE Sensing
NXP Semiconductors

O

Octavo Systems NEW
Ohmite
OK Industries
Olimex Ltd.
Omron
ON Semiconductor
Oplink NEW
Optek Technologies
Optrex-Kyocera
Opulent NA NEW
Orion Fans
OSRAM Opto Semiconductors
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P

Pacific Silicon Sensor
PacTec
Panasonic
PanaVise
PandaBoard
Panduit
Parallax
Particle NEW
Pericom
Phihong
Phoenix Contact
Piher
Plato
Plessey Semiconductors NEW
PLX Technology
Pomona
Powercast
Power Dynamics NEW
Power Integrations
Power-Sonic
Precision Technology NEW
Protek
Protektive Pak
PUI Audio
Pulse

Q, R

Q-Cee's / TE Connectivity
Qualtek
Quatech
Radiall NEW
RAF Electronic Hardware Ramtron
RECOM
Rectron
Red Pitaya NEW
Redpine Signals
ReFLEX CES NEW
Renata
Renesas
RF Digital
RF360 Technologies
Ricoh Electronic Devices NEW
ROHM Semiconductor
Rosenberger NEW

S

Sagrad, Inc.
Samsung ARTIK
SanDisk NEW
Sanyo Denki
Sargent Tools
Schaffner
SchmartBoard
Schneider Electric NEW
Schurter
SEEED STUDIO NEW
SEGGER Microcontroller
Seiko Printers
Seoul Semiconductor
Semelab
Semflex / Cinch
Semitec USA
Semtech NEW
Sensirion
Serpac
Sharp Microelectronics
Shindengen
Silex Technology
Silicon Microstructures NEW
Silicon Labs
Simpson
SiTime
SkyeTek
Skyworks Solutions Inc. NEW
Smart Modular Technologies NEW
SMSC / Microchip
SolaHD
SolderCore
SOMNIUM Technologies NEW
Song Chuan
Souriau
SL Power
Spansion
SparkFun Electronics NEW
Spectra Symbol
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Sumida
Susumu
Swissbit NEW
Switchcraft
Syfer

T

Tadiran
Taica NEW
Taiwan Semiconductor
Taiyo Yuden
Tamura
Taoglas
TDK
TDK-Lambda NEW
TE Connectivity
TechNexion NEW
Techspray
Tektronix
Teledyne LeCroy
Temp-Flex Cable
Terasic Technologies NEW
Texas Instruments
THAT Corporation
Thermometrics
Torex Semiconductor NEW
Toshiba
Triad Magnetics
Tripp Lite
TriQuint Semiconductor
Triune Systems
Trompeter / Cinch
TT Electronics
Tusonix
Twin Industries
TXC
Tyco Electronics

U

UDOO NEW
Ultralife
United Chemi-Con
United Silicon Carbide
US Sensor

V

Vacuumschmelze (VAC) NEW
Varitronix
VCC
Vector
Vectron International
VIA Embedded NEW
Vishay
Visiton
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W

W.L. Gore
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Wandboard NEW
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