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DISTRIBUTORS REPORT

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On the cover – May 2018

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Scourge of fake

When I first sidestepped from engineering design to engineering journalism back in the pre-internet '80s, I recall the mantra of 'legal, honest and decent' being drummed into me regarding both editorial and advertising content. Unless I checked and double checked my facts I was in real danger of losing my job should a fake story makes the pages.

Then the internet happened and I remember thinking: 'If content creation moves from a managed professional status, to an unmanaged amateur status, that immediately becomes an open door to fake news'. Looks like I was right all along.

Now apply the same logic to ecommerce. By removing the traditional face-to-face nature of negotiation and purchasing and replacing it with fully or semi-automated e-commerce the rules change and the specter of fake orders emerges, a subject covered in past features and this issue's *Top 50 Report*.

It might seem like a joke but it's not. Component manufacturers can't invest in production capacity unless they can accurately confirm demand. However, if fake orders are entering the system, demand itself becomes unreliable and manufacturers play safe by deferring investment. Then, if demand turns out to be genuine a product shortage is the net result. It's a lose-lose for everyone.

I guess solutions could range from technical to legal but it would just be nice to think that all orders meet that professional standard of 'legal, honest and decent'.

Jon Barrett

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Electronics, machinery fuel industry growth

But growing demand puts pressure on supply chains to keep up



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

Sector growth • By Victoria Kickham

The improving global economy has translated to strong economic conditions in North America, especially the United States, where the manufacturing economy is doing better than it has in years. As proof, look no further than this spring's report from the Manufacturers Alliance for Productivity and Innovation predicting the best manufacturing outlook in a decade. The trade group said it expects U.S. manufacturing will regain all output lost in the 2008-2009 recession by next year.

This is good news for companies across the electronic components supply channel, but it also brings new pressures as supply chains try to keep pace with the growing demand. Those serving high-tech and industrial markets may be feeling it the most. MAPI and others point to particular strength in computer and electronic products as well as machinery/industrial sectors, both driven by a long-awaited return to growth in capital spending, but also influenced by the speed of technological change.

MAPI predicts 4.8 per cent annual growth in the computer and electronic products sector between 2018 and 2021—a vast improvement over the 2.6 per cent growth outlook the group reported in its previous report last fall. Others are emphasizing growth in the sector, too: Executives from computer and electronic products manufacturing firms were among those reporting growth during the first three months of 2018, according to the Institute for Supply Management's Report on Business for January, February and March.

The machinery sector is doing equally well. MAPI predicts 4.3 per cent annual growth in the sector over the next three years—much better than the 2.5 per cent growth it predicted in its fall outlook. Machinery industry executives responding to ISM's Report on Business likewise reported growth during the first three months of the year.

All of this adds up to increased business for makers of all kinds of electronic products and industrial machinery, as well as those who service and supply them. MAPI and others say business investment will continue to drive that growth, but they also point to innovation, and that's where information technology continues to play a major role. Advances in technologies such as the internet of things, artificial intelligence, augmented reality and others continue to shape the consumer, business, and industrial worlds as demand for newer, smarter, more connected products and services escalates. A look at the industrial internet of things market alone (IIoT) helps put this into perspective: The IIoT market size was valued at $115 billion in 2016 and is projected to reach $197 billion by 2023, achieving a compound annual growth rate of 7.5 per cent, according to recent data from Allied Market Research.

Again, this is all good news in terms of business activity, but it also means that suppliers will be challenged to keep up with growing demand for components along with the hardware, software, and services customers need to meet end-market demand. The electronic components supply chain is already dealing with long lead times and component shortages in some categories, and price increases remain an issue for many as well. There is also the problem of labor: the industrial economy, in general, continues to struggle to find qualified workers, making it hard for many companies to keep pace with growing business demands. As an example, ISM's employment index has remained strong over the last several months, indicating that companies are hiring to meet increased activity. But many industry executives say it's a struggle to keep up the pace.

As Timothy R. Fiore, chairman of ISM's Manufacturing Business Survey Committee said in a recent report on the subject: "Employment expansion remains strong, with many companies struggling to hire skilled workers and indirect personnel to replace natural attrition, and to some extent, an increase in turnover. Many respondents see the labor market as a constraint to production."

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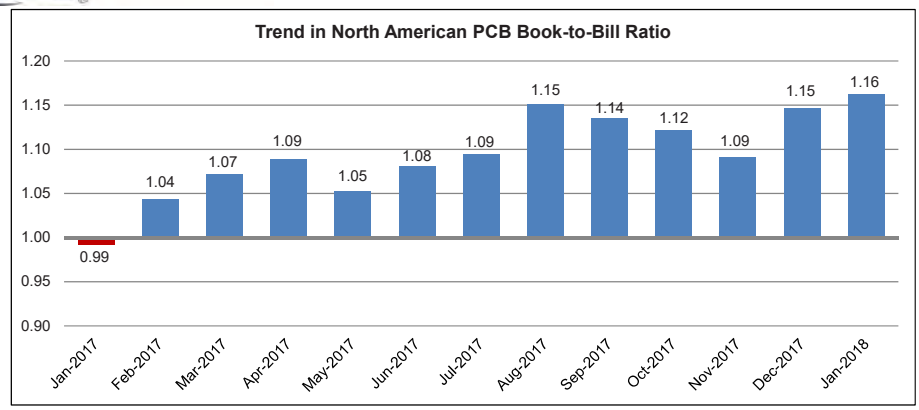






Association Connecting Electronics Industries

IPC



Making mobile satellite solutions accessible

Symmetry Electronics has signed a distribution agreement with mobile satellite voice and data services provider, Globalstar, thereby providing access to a range of Globalstar's satellite and multi-radio modems.

Vice president of marketing at Symmetry Electronics, David Beck, said: "Globalstar's innovative products complement our current offering and will enhance Symmetry's ability to offer premier technologies to our wireless and video customers."

With the addition of Globalstar products, Symmetry expands its traditional cellular, wireless and Bluetooth offering, to include satellite-based solutions. The company will begin by incorporating several of Globalstar's internet of things products including STX-3, STINGR and SmartOne C, among others.

Chairman and chief executive officer of Globalstar, Jay Monroe, added: "Our new partnership with Symmetry Electronics is a natural progression for both companies. We look forward to working with Symmetry to provide our voice, data, and location services and technology."

www.symmetryelectronics.com

PCB orders continue to climb

Both sales and orders were up year-over-year in January 2018, according to the latest findings from the IPC Association Connecting Electronics Industries' North American printed circuit board statistical program. Due to continued strong order growth in January, the book-to-bill ratio climbed to a 12-year high of 1.16.

Total North American PCB shipments in January 2018 were up 9.8 per cent compared to the same month last year, although January shipments decreased 8.5 per cent compared to the preceding month. PCB bookings in January also grew 25.3 per cent year-over-year.

IPC's director of market research Sharon Starr, commented: "Growth was positive for the fifth consecutive month. Strong bookings growth also continued, pushing the book-to-bill ratio to its highest point since September 2005. This performance, capping 12 consecutive months of positive book-to-bill ratios, offers a strong indication of continued sales growth in the first half of 2018."

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Design registrations are important for some distributors

Design registration is one way that distributors are rewarded for creating demand for manufacturers' products

James Carbone

Component manufacturers are increasingly looking to their distributors to help get their products designed into new OEM systems.

To help create demand for their suppliers' components, many distributors have field applications engineers (FAEs) and component engineers on staff who work with OEMs designers, suggesting which parts are the best fit for a system being designed.

Some semiconductor and other component manufacturers assign the distributor a design registration for a part when a distributor assists an OEM customer with a design that uses the manufacturer's component. The registration means that the distributor will get a discount for the part when the OEM's system that uses the component goes into production.

Design registrations are important for some distributors that have invested in design services, FAEs and other engineers, and sell production volumes of components. Because of those investments in technical personnel and time working with an OEM, some distributors want a design registration from a component manufacturer when they work with an OEM on a design that uses that manufacturer's part.

"Typically, distributors will get a discount from the manufacturer for a design registration," said Robin Gray, chief operating officer for the Electronic Components Industry Association (ECIA). "They get a better price break that helps the distributor when the design goes into production," he said.

Gray noted that if pricing is the "primary criteria for a buyer to select which distributor to buy from, the design registration can be a determining factor."

In fact, pricing is a very important factor to purchasers at electronics manufacturing services (EMS) providers. EMS buyers at small and mid-size companies often buy the bulk of parts on a bill of materials for an OEM system that they are building from distributors. Buyers spend a lot of time tracking down design registrations for the parts. They want to purchase the parts from distributors with registrations to get lower prices for the components.

The importance of design registrations varies with distributors and component manufacturers. Not all component makers have design registration programs for distributors. Many semiconductor manufacturers have programs, but design registrations "are not as widely used with passive manufacturers," said Gray.

Robin Gray, chief operating officer for the Electronic Components Industry Association (ECIA)



"Typically, distributors will get a discount from the manufacturer for a design registration"

"It's really kind of up to the manufacturer even if they have a design registration program," he said.

Useful to some

With distributors, design registrations are important for some, but not all, said Gray. Sunny Trinh, vice president demand creation at Avnet, said that design registrations are important to Avnet because "they are leading indicators for our design wins and future revenue. They allow us to plan and resource appropriately based on such factors as geography and market verticals of the registrations," he said.

They are important to OEM customers, according to Trinh. Design registrations allow Avnet "to allocate appropriate resources to support the designs of the OEMs. For EMS customers, registrations allow us to better manage the supply chain," he said.

Design registrations are also important to Symmetry Electronics. "They help protect our investments with customers where we provide free technical support and design assistance,"

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> **"Design registrations are important to Avnet because they are leading indicators for our design wins and future revenue and allow us to plan and resource appropriately based on such factors as geography and market verticals of the registrations,"**



Sunny Trinh, vice president demand creation at Avnet

vice president of marketing for Symmetry Electronics, based in San Jose, Calif. "A registration helps ensure that the distributor who supports the customer during design then retains the customer's business in production when they purchase the registered product. This enables distributors to provide the best support for customers," he said.

Beck said they are important to OEM customers. He said design registrations allow customers to receive the "best support available" from distributors. "Without a registration it would be difficult for demand creation distributors to provide months of support (and expense) only to be at risk of losing the production business to a competing distributor who did not invest any time or support<" he said.

Symmetry maintains a registration list with each of its suppliers that identifies which customers have approved registrations assigned to Symmetry. "We also use a customer relationship management (CRM) tool to track design support at an OEM customer to their chosen contract manufacturing partner which may be located in another country." He added that Symmetry may spend "months supporting our customer's engineering design team" before they select the contract manufacturer (CM)and location of manufacturing. "Our CRM tool helps us report this transfer business information to our suppliers who then allow us to pass the cost savings of a registration on to the customer's CM.

But design registrations are not important to all distributors. "We do design registrations, but we don't emphasize them a lot" said Dave Doherty, president and chief operating officer for Digi-Key. He noted demand creation and registrations can be important for high-volume production. Much of Digi-Key's business is lower volume.

"In our world, our belief is there is so much self-serve information that the notion of the design registration is different" than it was years ago when a distributor would have dedicated FAE for all manufacturers such as Motorola or Intel, he said.

Is it worth it?

He noted some of the big traditional distributors are getting away from FAEs in favor of call support. He said many distributors can't afford to have an FAE visit a customer for a 10,000-piece opportunity for a 35-cent microcontroller.

"The time has come to relook at demand identification, demand creation," said Doherty. Is it what it used to be or are we doing more work and jumping through more circles for lower and lower return? Is there return at all to the manufacturer to us," he asked.

Design registrations can be important to some specialist distributors. For instance, RFMW is a niche distributor based in San Jose, Calif., specializing RF and microwave components. The distributor has a lot of expertise on staff to help customers with component selection, said Joel Levine, company CEO.

"Microwave and RF is all we do," he said. "Our value is recommending the right components for the customers socket." Levine added "most of our sales organization and a good portion of our sales force are degreed RF engineers. Besides FAEs, "we have two apps engineers that sit at a bench and deal with power applications all day long," he said.

Such expertise is needed even with all the web tools and all the websites, it's all a matter of human intelligence and insight with picking the right components," said Levine.

"Specs are one thing, but knowing how a component actually performs in a circuit or in a particular application is important to the customer," he said. There could be "five devices that look the same on paper, but in a specific circuit at specific frequency or bandwidth, we have the knowledge that can help a customer pick the right part," said Levine.

Design registrations are necessary for RFMW because the distributor needs to get "rewarded for the work that we have done and the investment that we have made in people," said Levine. He said it is also necessary in order for RFMW to track a design when it goes to a contract manufacturer overseas.

He said RFMW has a global IT platform that "tracks a design registration anywhere in the world from Israel to Asia or Eastern Europe to Western Europe.

Some suppliers are better than others concerning design registrations. "It depends on the supplier's programs and it depends on how good the supplier is at executing on the design registration program and what tools they use," said Levine.

But in some cases, some new or smaller suppliers may not be aware of the importance of design registrations. "That's a real challenge and struggle when either a design registration program is lacking or if you have to teach a new supplier or smaller supplier about distribution in the first place," he said.

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Shaping a buyer-friendly future

Acquisitions have transformed the semiconductor market in recent years. ESNA asked Symmetry Electronics' acting vice president and general manager, vice president of TTI, Mark Zack, how this dynamic has changed things for purchasers



Mark Zack is currently acting vice president and general manager of Symmetry Electronics, in addition to his role as a vice president for TTI

All companies under the TTI family offer complimentary services to help customers make the best decision for their project needs

Q Symmetry was acquired by Berkshire Hathaway company, TTI Electronics, in 2017. What benefits will this bring for readers?

A) Since the acquisition, Symmetry has experienced an expansion in the number of people involved with the company, especially in sales, application engineering and marketing. This allows us to provide even greater support and attention to each of our customers, as well as to improve our partnerships with suppliers. Similarly, we have greatly expanded our available inventory to provide enhanced service to customers.

Q Symmetry has announced international flat rate shipping for all orders placed on-line. What percentage of orders are now overseas?

A) Currently, around 25 per cent of our sales come from outside the US and our vision is to make Symmetry a global distributor of semiconductor products. For example, we already have an established presence in China, with sales and local inventory available for our Asia based customers.

Q Now Symmetry is in the Berkshire Hathaway group with TTI Electronics, Mouser and Sager, how will this benefit readers?

A) Because Symmetry is focused on the semiconductor space, there is certainly synergy between Mouser's line card and ours. This benefits engineers by allowing them to tap into Mouser's small quantity, overnight shipments, while Symmetry can continue to provide technical and ongoing production support. Furthermore, all companies under the TTI family offer complimentary services to help customers make the best decision for their project needs.

Q Counterfeiting is a serious problem in the semiconductor area. What precautions does Symmetry take to protect against it?

A) Symmetry maintains strong relationships with trusted partners, ensuring all in-coming shipments come straight from franchised suppliers.

Q How are lead times performing in the semiconductor market?

A) For the product categories that Symmetry specializes in, lead times have been stable. Our product managers work diligently with our suppliers to anticipate any changes in lead times, extending our on-order window to make sure we are in the queue. In fact, this comes back to a previous point about our expanded inventory, which helps make sure customers don't have to deal with extended lead times.

Q What advice would you give purchasing departments from a semiconductor perspective?

A) It's important for buyers to be involved early in the design cycle so that good supply lines can be established sooner rather than later. Symmetry understands the concerns that readers may have, and we encourage buyers to work with us early on to ensure the production cycle is able to run smoothly.

Q How has Symmetry's focus changed over the last five or 10 years?

A) Symmetry has spent the last few years concentrating on customer-service oriented distribution, developing a highly focused workforce that is well trained by our suppliers. Over time, we've evolved our focus towards niche specialization, curating our line card to better serve customers' needs.

With the recent addition of Berkshire Hathaway's working capital, we have been able to expand the stock keeping units that we sell, grow the inventory on hand, and add





> **We will continue to invest in our ability to support customers, our inventory, and our supplier relationships**

additional members to our on-site team. We are especially grateful for Gil Zaharoni and Joe Caravana, who were instrumental in building the company and evolving the business in a proactive way.

Q Finally, where do you see Symmetry in the next five or 10 years?

A) With the explosion of demand for the internet of things, Symmetry will continue to expand and grow in line with the technologies that we specialize in. We will continue to invest in our ability to support customers, our inventory, and our supplier relationships. We look forward to expanding internationally, bringing our specialized focus in wireless, IoT, and video to more original equipment manufacturers across the globe.

www.semiconductorstore.com







MEMS oscillators combine precision timing and reliability

Microchip Technology's new DSA family of automotive grade micro-electro-mechanical systems (MEMS) oscillators are designed to provide 20 times better reliability, 500 times better tolerance to shock and five times better vibration resistance than traditional quartz-based crystal devices. This makes them ideal for today's advanced automotive systems, which require timing precision, accuracy and tolerance to harsh environments.

The DSA family also includes what Microchip describes as the industry's first multiple output MEMS oscillator, offering a solution that can replace multiple crystals or oscillators with one device. The DSA2311 addresses board space limits, saves costs and enables customers to consolidate their bill of materials. It comes in a 2.5 by 2.0mm package and is well-suited for applications that require a complex board with multiple controllers, such as infotainment systems and camera modules.

Timing solutions with tight frequency stability over a wide temperature range are critical for applications such as advanced driver assistance systems, light detection and ranging, in-vehicle Ethernet and autonomous driving. Available in small package sizes, Microchip's new DSA1001, DSA11x1, DSA11x5 and DSA2311 all offer high tolerance to mechanical shock, jarring and stability in harsh environments over a frequency range of 2.3 to 170MHz. The devices are Automotive Electronics Council Q100 qualified with ±20 ppm stability between -40 and 125°C.
www.microchip.com

Lightweight connectors handle harsh environments

Purchasers sourcing rugged connectors for use in harsh environments will be interested to learn of Amphenol Industrial Operations' new Lean PT series. These IP67 rated connectors are ideal for use in factory automation, automotive, energy storage and process control applications.

Based on Amphenol's MIL-C-26482 series I and the original PT series, LPT products feature an aluminium shell design. The metal connectors also feature a standard PT shell with coupling nut, making them intermateable with the PT series.

Connectors in the series accept wire gauges from 0.34 to 3.5mm², boast quick positive coupling and five key/keyway mating to ensure users don't mis-mate when plugging into a receptacle.

Not only is the LPT series waterproof to IP67, it is also self-extinguishing to UL94 V-0 and can withstand 500 mating cycles. Operating temperature range is -40 to 125°C.
www.amphenol-industrial.com

High-power dissipation goes the distance

TTI's new Vishay GBS series vitreous resistors are designed to provide high continuous power dissipation in long lifetime harsh environments.

These wirewound resistors with corrugated ribbon boast a completely welded construction and can be used to provide high continuous power dissipation up to 1,000W. High pulse power capability makes them ideal as inrush limiters. Features include a high power rating of up to 100W, and with different corrugated ribbons and turn spacings, low ohmic values of less than one Ohm can be offered.

GBS resistors are also said to be robust and offer a lifetime of more than 20 years. Thanks to the vitreous coating, GBS resistors are stable over an extended lifetime and boast enhanced humidity protection.

Typical applications include heating elements, braking resistors for drive systems, or a load bank for continuous power applications.
www.ttiinc.com

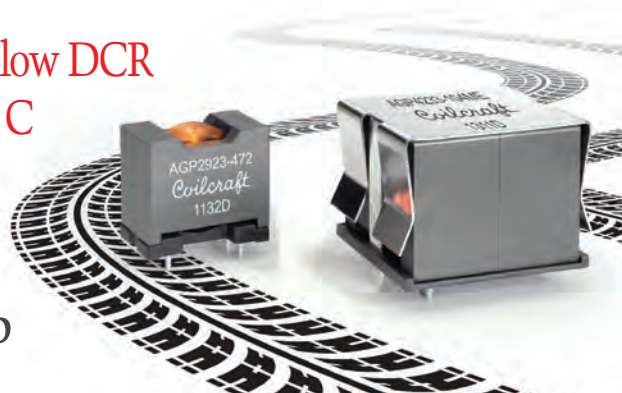
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Sourcing for harsh environments needn't be tough

To ensure electronic components can withstand their end-use environment, purchasers must navigate a host of international standards and certifications. Specialist advice can be invaluable, says Sager Electronics

Although the interpretation of harsh and hazardous conditions can vary, factors such as water, humidity, dust, chemicals, electrical surges, vibrations, electromagnetic interference and temperatures can all cause an electronic component to perform unexpectedly or possibly even to fail.

Clearly, failure is not an option in life-critical designs, so a thorough understanding of the environment where the application will be used and how it will be used is vital. Oil and gas exploration, nuclear power plants, hazardous waste, pharmaceuticals, outdoor environments, industrial facilities and even grain storage are often defined as harsh or hazardous environment industries, but extreme conditions can also be found across a range of more common applications and markets.

Reliable products

Once the criteria for environment and use have been determined, purchasing staff must ensure that the electronic components sourced meet the latest industry certifications and standards for that particular design.

When sourcing life-critical electronic components, key considerations could include: flame proofing, explosion proofing, pressurisation, oil immersion, hermetic sealing, encapsulation, mechanical integrity and intrinsic safety. The first step to ensuring components will operate reliably is to work directly with the manufacturer or through an authorised distributor. Purchasing components from an unqualified source can leave customers exposed to a myriad of potential problems.

Furthermore, by working with an authorised distributor, purchasers have access to the latest technologies and information on standards and certifications. Distributors can, for example, help customers understand relevant standards such as the IP rating used to describe sealing effectiveness for electrical enclosures.

In this rating, the first number relates to protection from solid objects or materials, while the second number relates to protection from liquids. Not used as frequently, the third number denotes protection against mechanical impacts, while an X specifies that there is only one class of protection in that field.

Beyond IP ratings, customers must also take into account a number of other standards such as ATEX, IEC and NEMA certifications. Depending on the type and severity of the expected conditions, purchasers may need to ensure components meet one or more standards issued by different authorising bodies, as well as ensuring that they adhere to any standards required in other countries or regions into which they intend to supply.

Reliable supply chain

Several suppliers design products specifically for harsh and hazardous environments. Honeywell, EBM-Papst, Mean Well, BEI / Sensata, Phoenix Contact, Laird and Traco Power are just a few of the suppliers operating in this market.

Bearing in mind the diverse options available, an authorised distributor that works closely with its suppliers will be best positioned to understand the product pipeline from supplier to customer and to react to economic and material influences. As lead times extend and prices increase, distributors that plan their inventory buys and position their backlog with care, particularly in relation to electronic components designed for life-critical environments, can minimise customer impact.

www.sager.com



Is there life after EOL?

When components are discontinued, Rochester Electronics offers several options to help purchasers continue production without running the risk of sourcing on the grey market

How does Rochester Electronics differentiate itself?

A: As a global stocking distributor and licensed semiconductor manufacturer, Rochester is authorized by over 70 semiconductor manufacturers. We have over 15 billion devices in stock providing the world's largest range of end of life semiconductors. We also have over 12 billion die in stock, having manufactured over 20,000 device types with the capability to manufacture in excess of a further 70,000.

Supply chain shortages are becoming more common – how can Rochester help?

A: Through authorized distribution and licensed manufacturing we provide a continuous source of supply of both active components to solve supply chain disruption and end of life semiconductors to meet long term needs. Focusing on our active components, we have over five billion devices in stock ready for immediate dispatch. During shortages when lead times are long and when faced with line down situations, it is important that purchasers can identify and obtain product risk free and not be tempted to procure outside authorized channels.

How can Rochester support ongoing product needs after EOL?

A: Supplier authorization means we offer a large supply of finished semiconductor devices, all traceable and guaranteed. Over 10 billion of our in-stock devices are classed as EOL by the original manufacturer. Rochester is also able to offer a continuous source of supply to customers whose end application extends the availability of a device. Our factory direct offering negates the need for re-design, re-qualification and re-certification and avoids the risk of sourcing hard to find products on the open market.

When EOL finished goods supply is exhausted, what can Rochester offer?

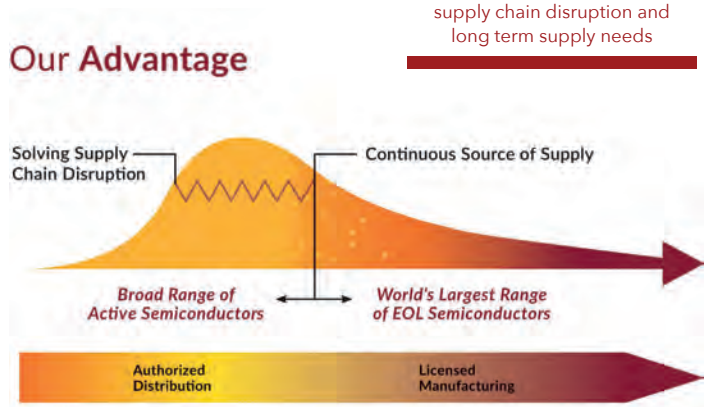
A: As a licensed semiconductor manufacturer, Rochester has over 12 billion die in stock. By carefully analyzing ongoing customer requests we manufacture a range of in stock semiconductors ready for immediate dispatch, in addition to our build to order devices, which we manufacture on request.

What does Rochester's licensed manufacturing solution involve?

A: Using information and technology transferred directly from the original component manufacturer, we utilize the original die or fab processes to provide a range of ongoing stocked and built to order product. The result is 100 per cent certified, guaranteed and sold with full approval under the original manufacturer's part number with no need for customer re-design or re-qualification. Our process flows include commercial, industrial, mil temp, Rochester R and B, MIL-STD 883, SMD/QML and space level s/v in addition to a range of industry standard packaging with a variety of lead finishes.

www.rocelec.com

Rochester Electronics addresses both immediate supply chain disruption and long term supply needs



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Cutting the cost of differentiation

High costs and design delays can make custom enclosures impractical, but by customizing standard enclosures, OKW Enclosures aims to offer a practical, fast-turnaround solution

Specifying bespoke electronics enclosures can present problems, with elevated costs and endless design meetings making it impractical in low volumes. Technology advances however, mean it's now easy and cost effective to order customized plastic or metal electronics enclosures, even in small batches.

Adding value

According to OKW Enclosures' vice president of marketing, Robert Cox, the associated time and money savings can be huge. And with a variety of standard enclosures available, even for specialized applications, it doesn't take much customization to create a housing that differentiates product from that of competitors.

Customization options are diverse. Purchasers can specify: CNC machining, plastic and aluminum panels, display windows, custom colors and finishes or printed logos and legends. Where required, they can opt for flame retardant materials, RFI/EMI shielding, power supplies, battery compartments and charging stations, as well as membrane keyboards and touchscreens. They can even outsource the installation of components and assembly of accessories so the entire manufacturing process is handled from beginning to end, which is ideal for non-core products.

Eliminating cost

For those in the know, there are some cunning ways to customize cost effectively. Where a specific color is required, the minimum order for moulding plastic in non-standard colors is usually 200 to 250 enclosures. Opt for lacquering, however, and that drops to just 25 units. This technology provides a choice of colors and patterns, such as metallic, wood effect, or animal print, and textures like matt, silk gloss or velvet-feel. Buyers can also request antibacterial paint for medical applications or ESD lacquer to prevent electrostatic discharge.

Digitally printing legends and logos instead of screen printing is another way to cut costs, particularly for low volumes where set-up costs are much reduced.

Consider extruded metal enclosures where a special size is required. OKW's Synergy or Smart-Terminal enclosures, or Rolec's mobilCase, are easy to customize because they can be cut to any length. Minimum order numbers can be as low as 10 units. Alternatively, when looking for 19in rack cases or instrument enclosures, specify one that can be customized in three dimensions such as Metcase's Technomet or Combimet enclosures. Again, the minimum order is just 10 units.

Enlist advice

Above all, OKW suggests purchasers partner with a manufacturer capable of offering single source supply, rather than spreading customization processes across a series of providers, which can lead to delays and errors.

Customized enclosures and front panels differentiate product



Choosing a supplier that provides 3D modelling can also speed customization. OKW and Metcase offer downloadable files so buyers can see how components will look in the finished housing, while Rolec offers a 3D product configuration tool. Delivery times will vary depending on the amount of work required, but typical delivery times will range from two to six weeks.

www.okwenclosures.com



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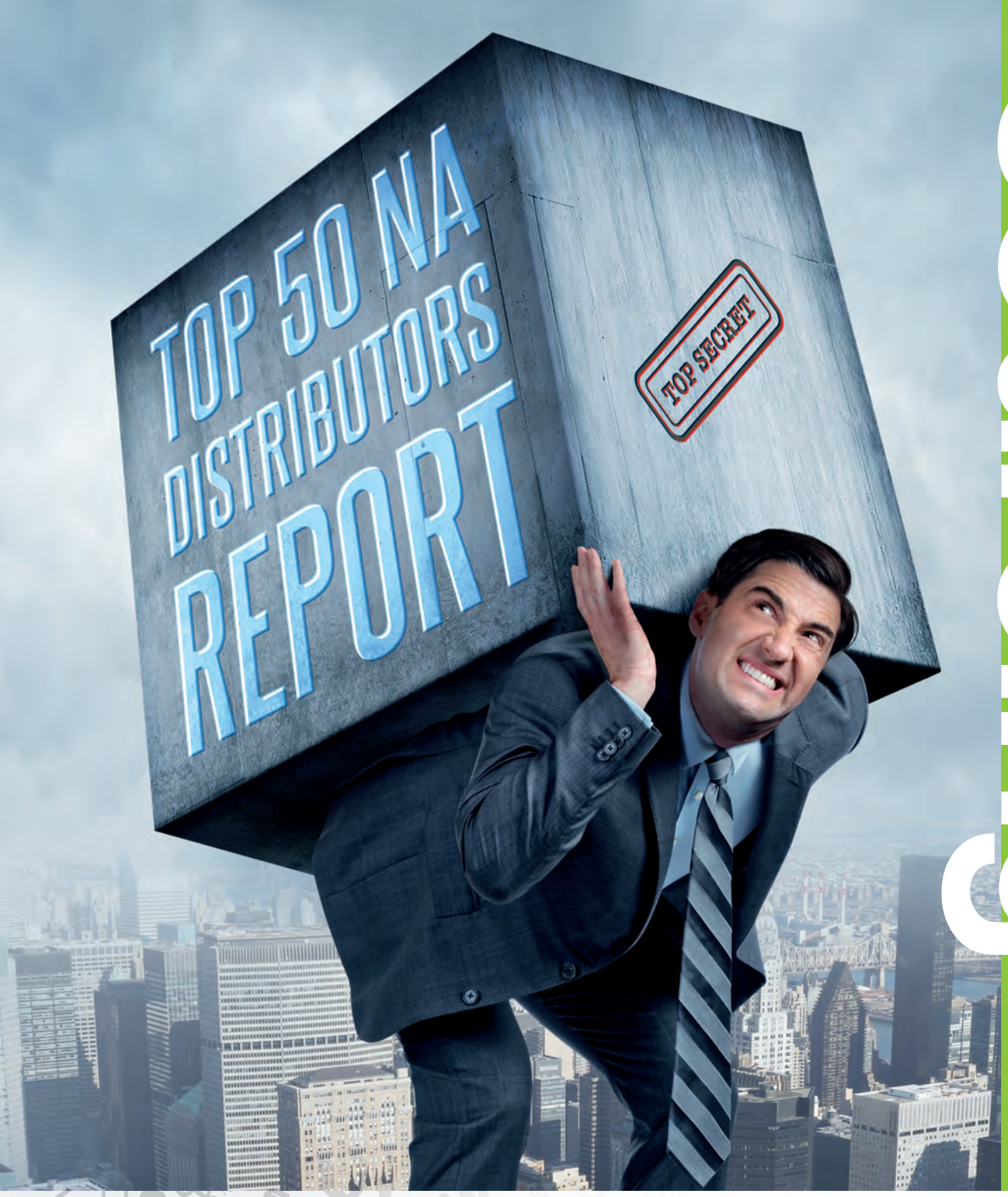
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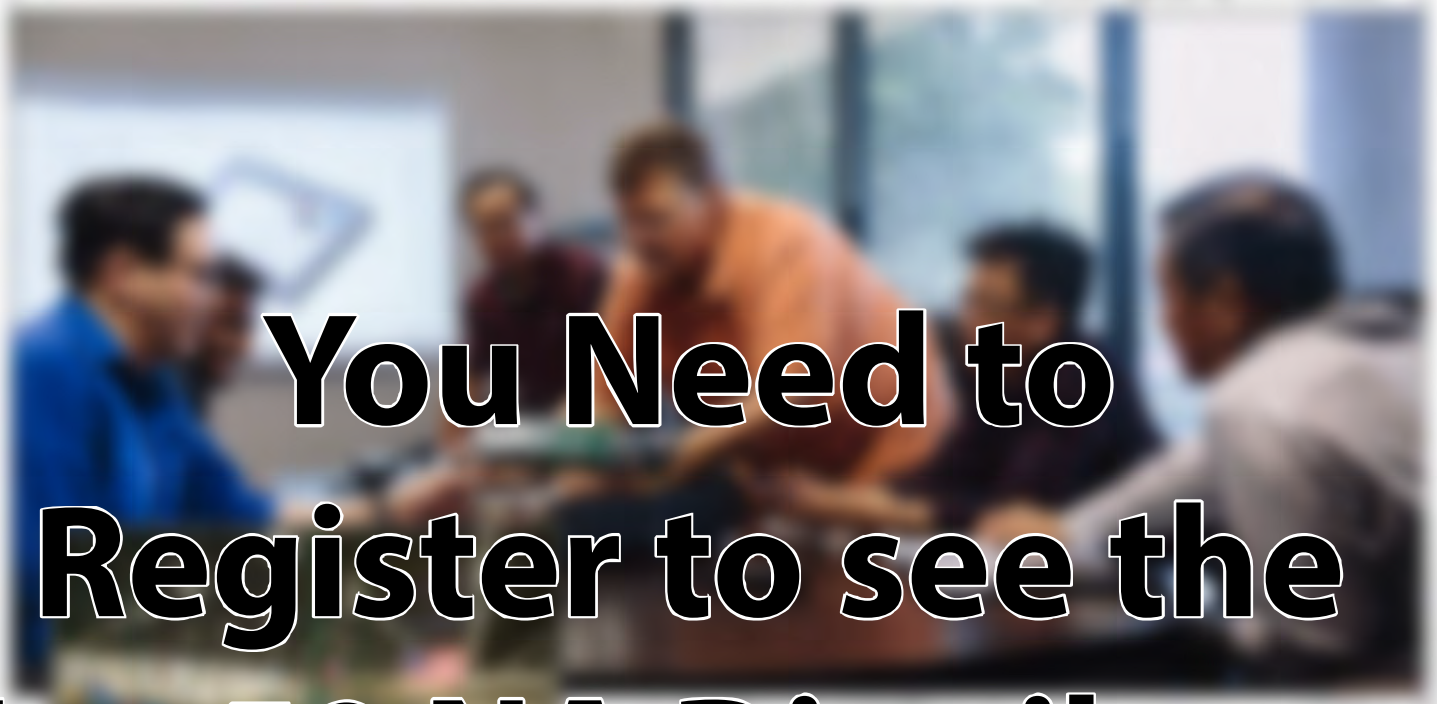

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Expect less price erosion for MCUs

More stable prices and continued strong demand from automotive, Internet of Things and industrial segments will drive MCU sales growth for the next five years

James Carbone

Semiconductor purchasers can expect continued downward price pressure on microcontroller prices for the rest of the year, but price declines won't be as steep as in 2017.

For instance, last year the average price of a 32-bit MCU declined 14.1 per cent to $.71. In 2018, the average price will decline about 2.9 per cent to $.69, according to Semico Research. Prices for MCUs have been falling steadily and sharply since 2011 when the average price for a 32-bit device was $2.65, according to the researcher.

"If you look at 32-bit microcontrollers, that market grew 19.5 per cent revenue, but average selling prices declined 14.1 per cent," said Jim Feldhan, president of Semico Research.

The good news for MCU manufacturers is price erosion will ease after 2018, but bounce up and down through 2022. The average price for a 32-bit MCU will increase to $.70 in 2019, decline to $0.67 in 2020 and increase to $0.71 in 2022, Semico said.

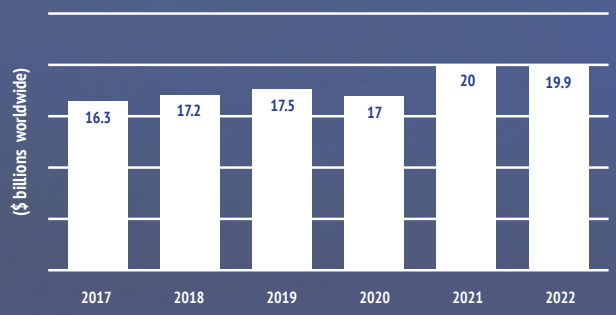
Despite price erosion in 2017, the MCU market, including 4-, 8-, 16-, 32- and 64-bit devices, grew 12.2 per cent to $16.3 billion. In 2018, sales will grow 5.1 per cent to $17.2 billion, said Semico. Mostly stable prices and strong demand from various customer segments, including automotive, Internet of Things and industrial, will help drive sales growth through 2022 when MCU revenue will total $19.9 billion, according to the researcher.

"Less torrid" growth

Ganesh Moorthy, chief operating officer for microcontroller manufacturer Microchip Technology, based in Phoenix, agrees that sales growth will be slower in 2018 than 2017.

The global microcontroller market will grow from $16.2 billion in 2017 to $20 billion in 2022
Source: Semico Research

MCUs to post uneven growth



"We believe that growth will be at a less torrid pace than what we saw in 2017," said Moorthy. However, business "will continue to have many growth drivers. The industrial, automotive and IoT markets are likely to be the stronger end markets in 2018, and we are extremely well positioned to capitalize on the growth opportunities from these and other markets," he said. Microchip derives about 62 per cent of its total revenue from microcontroller sales.

Feldhan said one reason for slower growth in 2018 is there will be less demand for MCUs from the smart card market. "Smart card MCUs comprised over 50 per cent of the total MCU units in 2017. Last year there was a boom in smart cards," which helped drive MCU sales, said Feldhan. However, smart card demand is cyclical. Last year there was a big increase in demand by smart card manufacturers and inventories grew.

This year smart card manufacturers are "consuming that inventory but they're not really buying" more MCUs, so there will be less demand for MCUs, he said.

While demand from smart cards may ease in 2018, there will be strong MCU demand growth from automotive and industrial segments, according to Feldhan. He noted that automotive has always been a big driver for microcontrollers. Automotive systems use 8-bit, 16-bit and 32-bit MCUs. "More than 30 per cent of MCUs go to automotive. It's a huge part of the market," said Feldhan.

Automotive will be an even bigger driver for MCUs as more cars are equipped with sophisticated electronics systems such as advanced driver assistance systems (ADAS).

Feldhan said hybrids and electric vehicles (EVs) are also helping drive MCU demand. Hybrids and some traditional internal

By the Numbers

$.69
The average price of a 32-bit microcontroller in 2018

59%
The share of the global microcontroller market held by 32-bit MCUs

12.2%
The growth rate of the microcontroller market in 2017

$17 billion
The forecasted size of the worldwide microcontroller market in 2018

19.5%
The growth rate of 32-bit microcontrollers in 2017

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combustion engine vehicles are using start/stop systems which require MCUs, said Feldhan. A start-stop system automatically shuts down and restarts a vehicle's engine to reduce fuel consumption and car emissions. Such systems will be designed into more cars in the future and are controlled by microcontrollers, said Feldhan.

IoT to drive MCUs

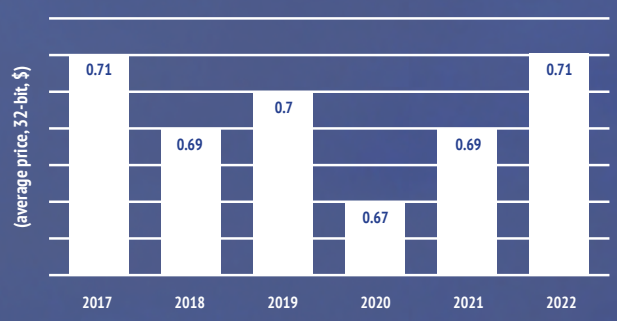
While automotive has driven MCU demand, IoT will help drive future demand for MCUs. "We continue to see IoT expand in wearables, household appliances and things like that," said Feldhan. "Industrial IoT is having strong design start growth," said Feldhan.

Kris Ardis, executive director Micros, security and software business unit for Maxim Integrated, said Maxim is getting "a lot of design activity from wearable and IoT type applications including industrial IoT to some extent, especially anything that is battery powered, low-power and wireless."

Maxim positions its microcontrollers with power regulation solutions and "we have some battery charging battery monitoring solutions. We also have a a wide range of security solutions, which is becoming increasingly important," said Ardis. Security is not just about the ability to decrypt data. It also involves the ability to ensure "your code can only be updated from a trusted source. We see that more and more," according to Ardis.

While microcontroller prices have declined in recent years, the average price of a 32-bit MCU will be up and down for the next several years
Source: Semico Research

Expect choppy ASPs for 32-bit MCUs



Demand grows for 32-bit MCUs

While the overall microcontroller (MCU) market is expected to grow about 22 percent over the next five years, 32-bit MCUs have the strongest growth rate and highest market share.

Thirty-two MCUs account for 40.4 per cent of MCU unit shipments, and 59 per cent of MCU revenue, according to Semico Research. Sixteen-bit microcontrollers represent about 26 per cent of MCU shipments and 24 per cent of revenue, while 8-bit accounts for about 31 per cent of unit shipments and 17 per cent of revenue, the researcher said.

MCU manufacturers say they see strong demand for 32-bit MCUs. Kris Ardis, executive director Micros, security and software business unit for Maxim Integrated, says his company makes 16-bit, 32-bit and some 8-bit MCUs. "But we see more interest in 32-bit at this point. The 800-pound gorilla in the 32-bit space is ARM. From an engineering standpoint ARM-based MCUs are easy to work with because there are tools and infrastructure," said Ardis.

"Thirty-two-bit microcontrollers have become dominate because they offer higher performance and the cost for a 32-bit core has come down," said Jim Feldhan, president of Semico Research. In addition, IP companies like ARM offer a "variety of performance levels for their 32-bit cores, from a very low end 32-bit M0 for IoT to the high-performance Cortex line," he said.

Tom Hackenberg, principal analyst, embedded processors, technology, media and telecom for researcher IHS Markit, said 32-bit microcontrollers are consistently growing market share and it is "very possible they could comprise half of all MCUs shipped in 2018."

He said 32-bit MCUs are used when more processing performance or speed is needed to handle faster real-time applications such as graphical displays, complex connectivity stacks, complex motor controls, large amounts of input data, and encryption on top of running an application.

Hackenberg noted over the years the difference in performance among MCUs has expanded. At the same time, the "price delta between a high-end 8-bit or 16-bit MCU is very close to an entry level 32-bit MCU that may have as many if not more features," he said.

In addition, code compatibility between MCUs and larger system-on-chip applications processors can lead to demand for 32-bit MCUs, according to Hackenberg. "Whether it's to make a single software solution more easily portable between an MCU or a system on chip (SoC) or compatible communication between core processor and coprocessor, having the same 32-bit architecture can speed platform development or reduce bottlenecks," he said.

Hackenberg said "ecosystem support for 32-bit applications is vastly larger for 32-bit processing versus smaller bus architectures." Developers can employ a variety of embedded operating system features, find many more libraries of support for common functions such as connectivity stacks and security standards, sensor data acquisition and control, display and human machine interfaces and more, he said.

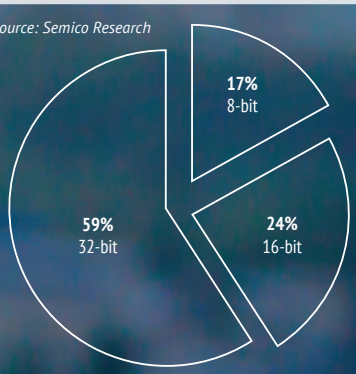
While 32-bit market share is growing, it does not mean that 8-bit or 16-bit MCUs will disappear or are declining.

"The only declining category has been 4-bit which has become highly commoditized," said Hackenberg. New systems that require ultra-low cost, low-power 8-bit and 16-bit solutions continue to be designed.

"Not every application needs high performance," he said. The main purpose for MCUs has always been for embedded simple applications. "While they may not be capturing the highest growth, these 8-bit and 16-bit solutions are still highly competitive when energy-efficiency, price and area are still the primary considerations," said Hackenberg.

Thirty-two-bit MCUs dominate market: Thirty-two-bit microcontrollers are the largest segment of the worldwide MCU market based on revenue

Source: Semico Research



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Future Technology Devices International, Ltd.
GainSpan Corporation
GC Electronics
GE Critical Power
General Cable
General Semiconductor (Vishay)
GeneSiC Semiconductor
Genuino (Arduino)
GHI Electronics, LLC
Global Power Technologies Group
Global Specialties
Grayhill, Inc.
Greenlee Communications
GWConnect - a Molex company
H&D Wireless
H.G. Schaevitz, LLC / Alliance Sensors Group
Hakko
Hakko USA
Hamlin / Littelfuse
Hammond Manufacturing
HARTING
Harwin
Heatron
HellermannTyton
Henkel/Loctite
Heraeus Sensor Technology USA
Hillcrest Labs
HiRel Systems / Vishay
Hirose
Hirschmann
Hittite (Analog Devices)
Hoffman Enclosures, Inc.
Hologram
Holsworthy Resistors / TE Connectivity
Holt Integrated Circuits, Inc.
Honeywell Microelectronics & Precision Sensors
Honeywell Sensing and Productivity Solutions
I/O Interconnect
IAR Systems Software Inc
ICCNexergy (Inventus Power)
IDEC
IDT (Integrated Device Technology)
II-VI Marlow
Illinois Capacitor
ILLUMRA
Industrial Fiber Optics, Inc.
Infineon Technologies
Initial State Technologies, Inc.
Innovasic Semiconductor / Analog Devices, Inc.
Inolux
Inphi
Insight SiP
Inspired LED
Integrated Device Technology (IDT)
Integrated Silicon Solution, Inc. (ISSI)
Intel® FPGAs
Intematix
Interconnect Systems - a Molex company
Interlink Electronics
International Rectifier (Infineon Technologies)
Intersil (Renesas Electronics America)
InvenSense / TDK
Inventek Systems
Inventus Power
IR (Infineon Technologies)
IRC / TT Electronics
IRTOUCH Systems Co., Ltd.
Isocom Components
ISSI (Integrated Silicon Solution, Inc.)
ITT Cannon, LLC
ITT Interconnect Solutions
ITW Chemtronics (Chemtronics)
IXYS Corporation
IXYS Integrated Circuits Division
IXYS RF
J.W. Miller / Bourns
JAE Electronics, Inc.
Jinlong Machinery & Electronics Co. Ltd.
JKL Components Corporation
Johanson Dielectrics, Inc.
Johanson Technology
Johnson / Cinch Connectivity Solutions
Jonard Tools
JRC Corporation / NJRC
JST
Judco Manufacturing, Inc.
Kavlico Pressure Sensors / Sensata Technologies
Keil (ARM)
KEMET
Kennedy Labs
Kester
Keystone Electronics Corp.
Khatod
Kilo International
Kilovac Relays / TE Connectivity
Kingbright
Kings (Winchester Electronics)
Kionix
Klein Tools
Knowles
Knowles DLI
Knowles NOVACAP
Knowles Syfer
Knowles Voltronics
Kyocera
Kyocera Display
Laird
Laird - Antennas
Laird - EMI
Laird - Signal Integrity Products
Laird Connectivity
Laird Connectivity (LSR)
Laird Thermal Materials
Lantronix
LAPIS Semiconductor
Lattice Semiconductor
Leader Tech Inc.
LeCroy (Teledyne LeCroy)
LED Engin
LEDdynamics, Inc.
LEDiL
LEM USA, Inc.
LEMO
Lighting Science
Lime Microsystems
Linear Technology / Analog Devices
Link Labs
Linx Technologies
Lite-On, Inc.
Littelfuse
LMB Heeger, Inc.
LOCTITE / Henkel
Logic PD, Inc.
Logical Systems
LTW (Amphenol LTW)
Lumberg Automation
Lumex, Inc.
Lumileds
Luminary Micro / Texas Instruments
Luminus Devices
Luna Optoelectronics
Luxo
MACOM Technology Solutions
Macraigor Systems LLC
Macronix
Maestro Wireless Solutions
Mag-LED Solutions
Magnasphere Corp.
Makeblock
Mallory Sonalert Products
Marktech Optoelectronics
Marlow Industries, Inc.
Martel Electronics
Marutsuelec
Master Appliance Corp.
Matrix Orbital
MaxBotix Inc.
Maxim Integrated

MaxStream (Digi International)
Maxwell Technologies, Inc.
MCB Industrie / Vishay
McGraw-Hill Education
MEAN WELL
Measurement Specialties / TE Connectivity
MEC switches
Mechatronics
MegaChips
Melexis
Memory Protection Devices
MEMSIC
Menda/EasyBraid
Mentor Graphics
Metelics (MACOM Technology Solutions)
METZ CONNECT
MG Chemicals
Micrel / Microchip Technology
Micrium
Micro Commercial Components (MCC)
Micro/sys
Microchip Technology
microEngineering Labs Inc.
Micro-Measurements (VPG Micro-Measurements)
Micron Technology
Micronas / TDK
Microsemi
Microwave Technology
Midcom / Wurth Electronics
Mide Technology
Midwest Microwave / Cinch Connectivity Solutions
MikroElektronika
Mill-Max
Mills / Vishay
Milwaukee / Vishay
MMB Networks
Molex
Molex Affinity Medical Technologies
Molex Beau Interconnect
Molex Brad Harrison
Molex FCT Electronics
Molex Flamar
Molex GWConnect
Molex Interconnect Systems
Molex NuCurrent
Molex Oplink Communications, LLC.
Molex Phillips-Medisize
Molex PolyMicro Technologies
Molex Temp-Flex
Molex Woodhead
Monnit
Monolithic Power Systems
MPD (Memory Protection Devices)
MPS (Monolithic Power Systems)
Mueller Electric Co.
Multicore / Henkel
Multi-Tech Systems, Inc.
Murata Electronics
Murata Power Solutions
Nakagawa Manufacturing USA, Inc.
National Semiconductor / Texas Instruments
Navman Wireless (Telit)
NDK
Nearson
Neohm Resistors / TE Connectivity
Neonode
Nesscap Co., Ltd
NetBurner, Inc.
Newava Technology
Newhaven Display, Intl.
Nexperia
Nichicon
Nidec Copal Electronics
NimbeLink
Nippon Chemi-Con
NJR Corporation / NJRC
NKK Switches
NMB Technologies Corp.
NorComp
Nordic Semiconductor
Noritake Co., Inc.
NOVACAP
NovaSensor / GE Measurement & Control
NuCurrent - a Molex company
Nuvoton Technology Corporation America
NVE Corporation
NXP Semiconductors / Freescale
O.C. White Co.
Octavo Systems
OEG Relays / TE Connectivity
Ohmite
OK Industries (Jonard Tools)
Olimex
OmniVision Technologies
Omron Automation & Safety
Omron Electronic Components
ON Semiconductor
On-Shore Technology, Inc.
Oplink, a Molex company
Optek Technology / TT Electronics
Option NV
Opto Diode Corporation
Opulent Americas
O'Reilly Media, Inc.
Orion Fans
OSRAM Opto Semiconductors, Inc.
Packet Digital LLC
Paladin Tools (Greenlee Communications)
Panasonic
PanaVise
Panduit
Parallax, Inc.
Parlex Corp.
Particle
Patco Electronics
Patco Services
PCD / Amphenol
Peerless by Tymphany
Pentair
Peregrine Semiconductor (pSemi)
Pericom Semiconductor Corp. (Diodes Incorporated)
Pervasive Displays
PHIHONG USA
Phillips-Medisize - a Molex company
Phoenix Contact
Phoenix Mecano
Phoenix Passive Components / Vishay
Phyton, Inc.
Pi Supply
Pimoroni
PolyMicro Technologies - a Molex company
Polytech / Vishay
Pomona Electronics
Pontiac Coil, Inc.
Portescap
Potter & Brumfield Relays / TE Connectivity
Power Integrations
Powerex, Inc.
Power-One (Bel Power Solutions)
PowerStor (Eaton)
PRD Plastics
Preci-Dip
Precision Design Associates, Inc.
Precision Electronic Components Ltd.
Precision Technology, Inc.
ProAnt
Products Unlimited Transformers & Relays / TE Connectivity
Protektive Pak
pSemi
PUI Audio, Inc.
PULS
Pulsar
Pulse Electronics Corporation
PulseCore Semiconductor / ON Semiconductor
PulseLarsen Antennas
Pycom
Q-Cee's / TE Connectivity
Qoitech
QT Brightek
Quadcept
Qualcomm
Qualcomm (RF360 - A Qualcomm & TDK Joint Venture)
Qualtek Electronics Corp.
Quarton, Inc.
Quatech / B+B SmartWorx
Rabbit Semiconductor (Digi International)
Radial Magnet, Inc.
Radiocrafts
RAF
RAFI
Ramtron (Cypress Semiconductor)
Raspberry Pi
Raychem Cable Protection / TE Connectivity
RayVio
RECOM Power
Red Lion Controls
REDEL / LEMO
Renesas Electronics America
RF Digital
RF Solutions
RF360 - A Qualcomm-TDK joint venture
RFMD
Richco, Inc. (Essentra Components)
Richtek
Riedon
Rigado
Roederstein / Vishay
ROHM Semiconductor
Rose Bopla
Rose Enclosures
Rose+Krieger
Rosenberger
Roving Networks / Microchip Technology
RPM Systems
Rubycon
RushUp
Sagrad
Samsung Electro-Mechanics
Samsung Semiconductor
Samtec, Inc.
Sanken Electric Co., Ltd.
Sanyo Denki
Sanyo Semiconductor / ON Semiconductor
Schaffner EMC, Inc.
Schrack Relays / TE Connectivity
Schroff / Pentair
Schurter
SCS
Seeed
Segger Microcontroller Systems
Seiko Instruments, Inc.
Semflex / Cinch Connectivity Solutions
Semtech
Sensata Technologies
Sensata Technologies – Airpax
Sensata Technologies – BEI Sensors
Sensata Technologies – Crydom
Sensata Technologies – Kavlico Pressure Sensors
Sensirion
Sensitron Semiconductor / SMC Diode Solutions
Seoul Semiconductor
Serious Integrated
Serpac Electronic Enclosures
SGX Sensortech
Sharp Microelectronics
SICK
Sierra Wireless
Sigfox
Sigma Designs
Sigma Inductors / TE Connectivity
Signal Transformer
Silego Technology
Silicon Labs
SINE Systems / Amphenol
Siretta
SiTime
SkyeTek
Skyworks Solutions, Inc.
SL Power Electronics - Manufacturer of Condor / Ault Brands
SMC Diode Solutions
Soberton, Inc.
Socle Technology Corporation
SolidRun
Souriau Connection Technology
Spansion (Cypress Semiconductor)
SparkFun
Spec Sensors
Spectra Symbol
Spectra-Strip (Amphenol Spectra-Strip)
Spectrum Digital
Sprague Goodman
SSI Technologies, Inc.
Stackpole Electronics, Inc.
Staco Energy Products Co.
Standex-Meder Electronics
Stanley Electric
Steinel
steute Wireless
Stewart Connector
STMicroelectronics
Storm Interface
Sullins Connector Solutions
Sumida Corporation
SunLED
Sunon
Susumu
SV Microwave (Amphenol SV Microwave)
Swanstrom Tools
Swissbit
Switchcraft / Conxall
Syfer
Synapse Wireless
Tadiran Batteries
Tag-Connect
Taitien
Taiwan Semiconductor
Taiyo Yuden
Talema
Tallysman Wireless
Talon Communications, Inc.
Tamura
Taoglas
TAOS / ams
TDK Corporation
TDK InvenSense
TDK Micronas
TDK RF360
TDK-Lambda Americas, Inc.
TE Connectivity
TE Connectivity Aerospace Defense and Marine
TE Connectivity ALCOSWITCH Switches
TE Connectivity AMP Connectors
TE Connectivity Corcom Filters
TE Connectivity DEUTSCH Connectors
TE Connectivity DEUTSCH INDUSTRIAL & COMMERCIAL TRANSPORTATION
TE Connectivity Measurement Specialties
TE Connectivity Potter & Brumfield Relays
TE Connectivity Raychem Cable Protection
TE Connectivity Raychem Circuit Protection / Littelfuse
TE Connectivity's Agastat Relays
TE Connectivity's Axicom Relays
TE Connectivity's Buchanan Terminal Blocks
TE Connectivity's CGS Resistors
TE Connectivity's CII
TE Connectivity's Elcon Connectors
TE Connectivity's Holsworthy Resistors
TE Connectivity's Kilovac Relays
TE Connectivity's Neohm Resistors
TE Connectivity's OEG Relays
TE Connectivity's Products Unlimited Transformers & Relays
TE Connectivity's Q-Cee's
TE Connectivity's Schrack Relays
TE Connectivity's Sigma Inductors
Teccor / Littelfuse
Techflex
TechNexion
Techno / Vishay
Techspray
TechTools
Telcodium
Teledyne LeCroy
Telit
Temp-Flex - a Molex company
Tensility International Corporation
Terasic Technologies
Test Products International (TPI)
Texas Instruments
t-Global Technology
Thales Visionix, Inc.
Thermometrics / GE Measurement & Control
ThingMagic
Thinxtra Solutions Limited
Thomas Research Products
TinyCircuits
TOKO / Murata
Torex Semiconductor Ltd.
Toshiba Memory America, Inc.
Toshiba Semiconductor and Storage
Touchstone Semiconductor
TPI (Test Products International)
TPK America LLC
Transphorm
Trenz Electronic
Triad Magnetics
TRINAMIC Motion Control GmbH
Tripp Lite
Trompeter / Cinch Connectivity Solutions
Tronics
TRP Connector
TSC (Taiwan Semiconductor)
TT Electronics
TT Electronics / BI Technologies
TT Electronics / IRC
TT Electronics / Optek Technology
TT Electronics / Welwyn
Tuchel / Amphenol
Twin Industries
TXC Corporation
Tyco Electronics
Tymphany (Peerless by Tymphany)
U.S. Sensor/Littelfuse
u-blox
UDOO
Ultra Librarian®
Ungar / Weller
United Chemi-Con
US-Lasers, Inc.
Varitronix International Ltd.
VCC (Visual Communications Company)
VEAM
Vector Electronics & Technology, Inc.
Verivolt
VersaLogic Corporation
VersaSense
Vicor
Vicotee
Vifa (Peerless by Tymphany)
Viking Technology
Virtium Technology Inc.
Vishay
Vishay / BCcomponents
Vishay / Beyschlag
Vishay / Cera-Mite
Vishay / Dale
Vishay / Huntington Electric, Inc.
Vishay / Semiconductor - Diodes Division
Vishay / Semiconductor - Opto Division
Vishay / Sfernice
Vishay / Siliconix
Vishay / Spectrol
Vishay / Sprague
Vishay / Thin Film
Vishay / Vitramon
Visual Communications Company, LLC
Vitelec / Cinch Connectivity Solutions
Volgen / Division of Kaga Electronics USA
Voltronics (Knowles)
VPG Foil
VPG Micro-Measurements
VPG Sensors
Wakefield-Vette
Walsin Technology
Wandboard
WeEn Semiconductors Co., Ltd
Weidmuller
Weller
Welwyn / TT Electronics
Wickmann / Littelfuse
Wiha
Winbond Electronics Corporation
Winchester Electronics
Wintec Industries
Wiss
WIZnet
Wolfspeed - a Cree company
Woodhead - a Molex company
Wurth Electronics
Wurth Electronics iBE
Wurth Electronics Midcom
Xcelite
Xeltek
Xilinx
XMOS
XP Power
Xsens
Yageo
Zentri (Silicon Labs)
Zetex Semiconductors (Diodes Incorporated)
ZF Electronics
Zilog

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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
PUI Audio	PUI	1-800-551-4405	www.gopui.com	Y	1,256	N/A	$50	99.00%	5	33	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
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											
AAVID THERMALLOY	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,627	N/A	$0	60.42%	150	3500+	Y
ADVANCED THERMAL SOLUTIONS INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	109,878	N/A	$0	100.00%	150	3500+	Y
ALPHA WIRE	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	26,919	N/A	$0	97.04%	150	3500+	Y
APEM INC.	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	7,226	N/A	$0	100.00%	150	3500+	Y
APEX TOOL GROUP	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	2,744	N/A	$0	99.38%	150	3500+	Y
ARTESYN EMBEDDED TECHNOLOGIES	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	10,717	N/A	$0	89.62%	150	3500+	Y
B&K PRECISION	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	834	N/A	$0	100.00%	150	3500+	Y
BELDEN INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,157	N/A	$0	99.91%	150	3500+	Y
BUD INDUSTRIES	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	4,224	N/A	$0	100.00%	150	3500+	Y
C&K	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	2,940	N/A	$0	93.65%	150	3500+	Y
CHEMTRONICS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	604	N/A	$0	100.00%	150	3500+	Y



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
ELECTROMECHANICAL (continued)											
CINCH CONNECTIVITY/Bel	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	31,120	N/A	$0	78.21%	150	3500+	Y
CNC TECH LLC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	5,702	N/A	$0	100.00%	150	3500+	Y
COMAIR ROTRON	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	696	N/A	$0	100.00%	150	3500+	Y
COTO TECHNOLOGY	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,079	N/A	$0	99.63%	150	3500+	Y
CRYDOM CO	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	5,554	N/A	$0	100.00%	150	3500+	Y
CUI INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	17,410	N/A	$0	92.21%	150	3500+	Y
DELTA PRODUCT GROUPS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	3,215	N/A	$0	99.95%	150	3500+	Y
DESCO	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	3,589	N/A	$0	99.83%	150	3500+	Y
EBM-PAPST INC.	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,857	N/A	$0	99.89%	150	3500+	Y
ESSENTRA COMPONENTS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	17,288	N/A	$0	99.99%	150	3500+	Y
E-SWITCH	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	8,181	N/A	$0	98.45%	150	3500+	Y
GE CRITICAL POWER	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,905	N/A	$0	75.49%	150	3500+	Y
GENERAL CABLE/CAROL BRAND	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	7,556	N/A	$0	98.28%	150	3500+	Y
GRAYHILL INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	17,836	N/A	$0	97.33%	150	3500+	Y
HAMMOND MANUFACTURING	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	13,433	N/A	$0	99.47%	150	3500+	Y
HENKEL	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	456	N/A	$0	67.04%	150	3500+	Y
KEYSTONE ELECTRONICS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	6,315	N/A	$0	95.17%	150	3500+	Y
Laird	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	15,187	N/A	$0	97.20%	150	3500+	Y
MEMORY PROTECTION DEVICES	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	861	N/A	$0	99.65%	150	3500+	Y
Murata	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	66,179	N/A	$0	99.79%	150	3500+	Y
NIDEC COPAL ELECTRONICS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	5,797	N/A	$0	99.97%	150	3500+	Y
NKK SWITCHES	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	18,564	N/A	$0	95.73%	150	3500+	Y
NMB TECHNOLOGIES CORPORATION	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	3,057	N/A	$0	98.82%	150	3500+	Y
OMRON ELECTRONICS INC-EMC DIV	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	74,369	N/A	$0	95.47%	150	3500+	Y
ORION FANS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	3,049	N/A	$0	100.00%	150	3500+	Y
Panasonic	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	154,777	N/A	$0	94.42%	150	3500+	Y
PANDUIT CORP	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	31,977	N/A	$0	99.92%	150	3500+	Y
PHIHONG USA CORPORATION	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,481	N/A	$0	100.00%	150	3500+	Y
PORTESCAP	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	99	N/A	$0	98.99%	150	3500+	Y
QUALTEK	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	5,115	N/A	$0	99.98%	150	3500+	Y
RECOM POWER INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	27,153	N/A	$0	100.00%	150	3500+	Y
SANYO DENKI AMERICA INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,816	N/A	$0	100.00%	150	3500+	Y
SCHAFFNER EMC INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	2,154	N/A	$0	100.00%	150	3500+	Y
SCHURTER INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	12,140	N/A	$0	99.57%	150	3500+	Y
SL POWER ELECTRONICS MANUFACTURE OF CONDOR/AULT BRANDS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	3,733	N/A	$0	84.46%	150	3500+	Y
SUNON FANS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,860	N/A	$0	77.20%	150	3500+	Y
TDK	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	60,769	N/A	$0	99.20%	150	3500+	Y
TE	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	338,106	N/A	$0	79.40%	150	3500+	Y
TECHFLEX	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	2,184	N/A	$0	99.54%	150	3500+	Y
T-GLOBAL TECHNOLOGY	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,885	N/A	$0	99.95%	150	3500+	Y
THOMAS RESEARCH PRODUCTS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,596	N/A	$0	84.65%	150	3500+	Y
VICOR CORPORATION	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	196,048	N/A	$0	52.13%	150	3500+	Y
XP POWER	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	5,255	N/A	$0	100.00%	150	3500+	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

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
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	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											
ADAFRUIT INDUSTRIES LLC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,854	N/A	$0	99.51%	150	3500+	Y
AKM SEMICONDUCTOR INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,215	N/A	$0	100.00%	150	3500+	Y
ALLEGRO MICROSYSTEMS, LLC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	3,090	N/A	$0	87.22%	150	3500+	Y
ALPHA & OMEGA SEMICONDUCTOR INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	3,316	N/A	$0	100.00%	150	3500+	Y
ALTERA	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	10,901	N/A	$0	84.86%	150	3500+	Y
AMS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	3,288	N/A	$0	99.29%	150	3500+	Y
ANALOG DEVICES INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	52,308	N/A	$0	73.79%	150	3500+	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 INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	436	N/A	$0	75.46%	150	3500+	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 Electronics	1-800-344-4539	www.digikey.com	Y	710	N/A	$0	100.00%	150	3500+	Y
AVAGO/Broadcom	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	16,512	N/A	$0	91.38%	150	3500+	Y
BIVAR INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	17,728	N/A	$0	100.00%	150	3500+	Y
BRIDGELUX	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,853	N/A	$0	100.00%	150	3500+	Y
CEL CALIFORNIA EASTERN LABS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	3,529	N/A	$0	85.80%	150	3500+	Y
CENTRAL SEMICONDUCTOR CORP	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	6,054	N/A	$0	91.92%	150	3500+	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 Inc	Mouser Electronics	800-346-6873	www.mouser.com	Y	325	N/A	N/A	N/A	N/A	N/A	Y
CIRRUS LOGIC INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	2,187	N/A	$0	84.82%	150	3500+	Y
COMCHIP TECHNOLOGY	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	6,890	N/A	$0	100.00%	150	3500+	Y
CREE INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	28,807	N/A	$0	100.00%	150	3500+	Y
Cypress Semiconductor Corp	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,325	N/A	$0	81.00%	50	1,000+	Y
CYPRESS SEMICONDUCTOR CORP	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	27,423	N/A	$0	92.54%	150	3500+	Y
DECAWAVE LIMITED	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	15	N/A	$0	100.00%	150	3500+	Y
DIALIGHT	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	12,426	N/A	$0	78.05%	150	3500+	Y
DIGI INTERNATIONAL	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	4,355	N/A	$0	95.30%	150	3500+	Y
DIGILENT, INC.	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	406	N/A	$0	100.00%	150	3500+	Y
DIODES INCORPORATED	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	38,292	N/A	$0	90.02%	150	3500+	Y
EPC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	483	N/A	$0	90.68%	150	3500+	Y
Etron Technology Inc	PUI	1-800-551-4405	www.gopui.com	Y	1459	N/A	$50	99%	5	33	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 Electronics	1-800-344-4539	www.digikey.com	Y	2,327	N/A	$0	98.84%	150	3500+	Y
FOXCONN OPTICAL INTERCONNECT TECHNOLOGIES, INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	304	N/A	$0	99.67%	150	3500+	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 Electronics	1-800-344-4539	www.digikey.com	Y	569	N/A	$0	100.00%	150	3500+	Y
IDT	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	51,696	N/A	$0	87.69%	150	3500+	Y
Infineon	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,580	N/A	$0	63%	50	1,000+	Y
INFINEON TECHNOLOGIES	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	28,850	N/A	$0	93.70%	150	3500+	Y



MOUSER ELECTRONICS

ORDER WITH CONFIDENCE

Manufacturer	Distributor	Telephone	Website	Franchised Distributor (Y/N/M)	No. of Lines for Principle	Stock Value for Principle	Minimum Order Value	% Lead Free for Principle Range	No. of Technical Support Staff	Total No. of Staff	Pack and Hold
ICs & SEMICONDUCTORS (continued)											
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	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	21,865	N/A	$0	72.31%	150	3500+	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
ISSI	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	5,006	N/A	$0	85.36%	150	3500+	Y
IXYS INTEGRATED CIRCUITS DIVISION	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	7,377	N/A	$0	99.60%	150	3500+	Y
KINGBRIGHT COMPANY LLC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	3,803	N/A	$0	100.00%	150	3500+	Y
KYOCERA INTERNATIONAL, INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	757	N/A	$0	97.09%	150	3500+	Y
Laird	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	15,187	N/A	$0	97.20%	150	3500+	Y
LATTICE SEMICONDUCTOR CORPORATION	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	7,245	N/A	$0	65.92%	150	3500+	Y
LINEAR TECHNOLOGY	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	37,479	N/A	$0	77.62%	150	3500+	Y
LINX TECHNOLOGIES INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	928	N/A	$0	92.67%	150	3500+	Y
LITE-ON INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	3,759	N/A	$0	99.49%	150	3500+	Y
LUMEX OPTO/COMPONENTS INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	8,181	N/A	$0	96.61%	150	3500+	Y
M/A-COM TECHNOLOGY SOLUTIONS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,822	N/A	$0	86.17%	150	3500+	Y
Maxim Integrated	Mouser Electronics	800-346-6873	www.mouser.com	Y	9,200	N/A	$0	89.00%	50	1,000+	Y
MAXIM INTEGRATED	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	68,021	N/A	$0	78.22%	150	3500+	Y
MELEXIS TECHNOLOGIES NV	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,652	N/A	$0	95.16%	150	3500+	Y
MICRO COMMERCIAL CO	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	9,873	N/A	$0	97.15%	150	3500+	Y
Microchip	Mouser Electronics	800-346-6873	www.mouser.com	Y	5,800	N/A	$0	100%	50	1,000+	Y
MICROCHIP TECHNOLOGY	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	86,517	N/A	$0	86.12%	150	3500+	Y
MICRON TECHNOLOGY INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	11,216	N/A	$0	89.77%	150	3500+	Y
Microsemi	Mouser Electronics	800-346-6673	Mouser.com	Y	6,099	N/A	$0	50%	50	930+	Y
MICROSEMI COMMERCIAL COMPONENTS GROUP	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	59,698	N/A	$0	54.44%	150	3500+	Y
MULTI-TECH SYSTEMS INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,322	N/A	$0	99.64%	150	3500+	Y
NEWHAVEN DISPLAY INTL	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	758	N/A	$0	100.00%	150	3500+	Y
NEXPERIA USA INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	23,513	N/A	$0	99.29%	150	3500+	Y
NORDIC SEMICONDUCTOR ASA	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	219	N/A	$0	99.54%	150	3500+	Y
NXP	Mouser Electronics	800-346-6873	www.mouser.com	Y	7,205	N/A	$0	100%	50	1,000+	Y
NXP USA INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	36,258	N/A	$0	93.55%	150	3500+	Y
ON Semiconductor	Mouser Electronics	800-346-6873	www.mouser.com	Y	7,486	N/A	$0	96%	50	1,000+	Y
ON SEMICONDUCTOR	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	87,298	N/A	$0	85.61%	150	3500+	Y
OSRAM OPTO SEMICONDUCTORS INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	6,707	N/A	$0	98.48%	150	3500+	Y
PEREGRINE SEMICONDUCTOR	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	498	N/A	$0	99.60%	150	3500+	Y
POWER INTEGRATIONS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,751	N/A	$0	94.76%	150	3500+	Y
QUALCOMM TECHNOLOGIES INTERNATIONAL, LTD.	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,763	N/A	$0	99.88%	150	3500+	Y
QUATECH-DIVISION OF B&B ELECTRONICS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	210	N/A	$0	92.86%	150	3500+	Y
RENESAS ELECTRONICS AMERICA	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	13,028	N/A	$0	85.07%	150	3500+	Y
Rohm	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	55,139	N/A	$0	99.85%	150	3500+	Y
Samsung	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	37,336	N/A	$0	100.00%	150	3500+	Y
SEEED TECHNOLOGY CO., LTD	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,444	N/A	$0	100.00%	150	3500+	Y
SEGGER MICROCONTROLLER SYSTEMS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	71	N/A	$0	100.00%	150	3500+	Y
SEMTECH CORPORATION	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	4,532	N/A	$0	89.94%	150	3500+	Y
Silicon Laboratories Inc	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,141	N/A	$0	100.00%	50	1,000+	Y
SILICON LABORATORIES INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	19,667	N/A	$0	96.54%	150	3500+	Y
SKYWORKS SOLUTIONS INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	2,621	N/A	$0	99.66%	150	3500+	Y
SPARKFUN ELECTRONICS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,696	N/A	$0	96.58%	150	3500+	Y
ST Microelectronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	8,145	N/A	$0	96.00%	50	1,000+	Y
STMICROELECTRONICS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	39,201	N/A	$0	97.79%	150	3500+	Y
SWISSBIT NA INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,233	N/A	$0	100.00%	150	3500+	Y

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ICs & SEMICONDUCTORS (continued)											
TAOGLAS LIMITED	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	628	N/A	$0	100.00%	150	3500+	Y
TDK	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	60,769	N/A	$0	99.20%	150	3500+	Y
Texas Instruments	Mouser Electronics	800-346-6873	www.mouser.com	Y	29,676	N/A	$0	94%	50	1,000+	Y
TEXAS INSTRUMENTS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	180,012	N/A	$0	91.94%	150	3500+	Y
Toshiba	Mouser Electronics	800-346-6873	www.mouser.com	Y	800	N/A	N/A	N/A	N/A	N/A	Y
TOSHIBA SEMICONDUCTOR AND STORAGE	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	14,145	N/A	$0	75.25%	150	3500+	Y
TRINAMIC MOTION CONTROL GMBH	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	333	N/A	$0	100.00%	150	3500+	Y
TT ELECTRONICS/OPTEK TECHNOLOGY	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	12,399	N/A	$0	96.55%	150	3500+	Y
U-BLOX AMERICA INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	165	N/A	$0	100.00%	150	3500+	Y
VERSALOGIC CORPORATION	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	623	N/A	$0	96.79%	150	3500+	Y
Vishay	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	581,798	N/A	$0	87.71%	150	3500+	Y
Vishay	Mouser Electronics	800-346-6873	www.mouser.com	Y	53,781	N/A	$0	77%	50	1,000+	Y
VISUAL COMMUNICATIONS COMPANY, LLC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	6,422	N/A	$0	96.61%	150	3500+	Y
WINBOND ELECTRONICS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,233	N/A	$0	99.84%	150	3500+	Y
WOLFSPEED	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	303	N/A	$0	97.69%	150	3500+	Y
XILINX INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	8,213	N/A	$0	51.46%	150	3500+	Y
INTERCONNECTION											
3M	Mouser Electronics	800-346-6873	www.mouser.com	Y	23,235	N/A	$0	46.00%	50	1,000+	Y
3M	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	62,421	N/A	$0	93.42%	150	3500+	Y
AMPHENOL	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	443,368	N/A	$0	75.92%	150	3500+	Y
Aero Conesys	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Amphenol	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Amphenol	Mouser Electronics	800-346-6873	www.mouser.com	Y	165,853	N/A	$0	31%	50	1,000+	Y
ASSMANN WSW COMPONENTS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	11,669	N/A	$0	92.37%	150	3500+	Y
BULGIN	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	4,059	N/A	$0	100.00%	150	3500+	Y
Cinch	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CINCH CONNECTIVITY/Bel	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	31,120	N/A	$0	78.21%	150	3500+	Y
CONEC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	8,202	N/A	$0	99.98%	150	3500+	Y
CW INDUSTRIES	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,989	N/A	$0	94.87%	150	3500+	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 Electronics	1-800-344-4539	www.digikey.com	Y	16,742	N/A	$0	99.96%	150	3500+	Y
HARWIN INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	11,191	N/A	$0	89.61%	150	3500+	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 Electronics	1-800-344-4539	www.digikey.com	Y	37,215	N/A	$0	90.98%	150	3500+	Y
ITT Cannon	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ITT CANNON, LLC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	151,353	N/A	$0	39.47%	150	3500+	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 Electronics	1-800-344-4539	www.digikey.com	Y	6,788	N/A	$0	95.58%	150	3500+	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 Electronics	1-800-344-4539	www.digikey.com	Y	5,109	N/A	$0	84.32%	150	3500+	Y
Kycon	PUI	1-800-551-4405	www.gopui.com	Y	1150	N/A	$50	99%	5	33	Y
LEMO	LEMO	800-444-5366	www.lemo.com	M	N/A	N/A	N/A	N/A	N/A	1,500	N/A
MILL-MAX MANUFACTURING CORP	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	60,434	N/A	$0	64.55%	150	3500+	Y
Molex	Mouser Electronics	800-346-6873	www.mouser.com	Y	85,634	N/A	$0	89%	50	1,000+	Y
MOLEX CONNECTOR CORPORATION	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	305	N/A	$0	100.00%	150	3500+	Y
MOLEX, LLC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	120,034	N/A	$0	97.98%	150	3500+	Y
Neutrik	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,563	N/A	$0	100%	50	1,000+	Y

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)											
NORCOMP INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	7,185	N/A	$0	57.87%	150	3500+	Y
ON SHORE TECHNOLOGY INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	13,026	N/A	$0	99.99%	150	3500+	Y
PARLEX USA LLC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	790	N/A	$0	98.35%	150	3500+	Y
Phoenix Contact	Mouser Electronics	800-346-6873	www.mouser.com	Y	30,044	N/A	$0	77.00%	50	1,000+	Y
PHOENIX CONTACT	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	54,845	N/A	$0	99.99%	150	3500+	Y
SAMTEC INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	427,448	N/A	$0	99.99%	150	3500+	Y
Souriau	Mouser Electronics	800-346-6873	www.mouser.com	Y	10,744	N/A	$0	27%	50	1,000+	Y
SOURIAU USA	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	65,743	N/A	$0	64.34%	150	3500+	Y
SULLINS CONNECTOR SOLUTIONS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	204,991	N/A	$0	97.59%	150	3500+	Y
Switchcraft Corporation	Mouser Electronics	800-346-6873	www.mouser.com	Y	300	N/A	$0	55%	50	1,000+	Y
SWITCHCRAFT INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	4,392	N/A	$0	80.56%	150	3500+	Y
TE	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	338,106	N/A	$0	79.40%	150	3500+	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 Electronics	1-800-344-4539	www.digikey.com	Y	1,292	N/A	$0	100.00%	150	3500+	Y
WEIDMULLER	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	42,913	N/A	$0	96.55%	150	3500+	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											
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											
ABRACON LLC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	41,991	N/A	$0	100.00%	150	3500+	Y
AMERICAN TECHNICAL CERAMICS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	2,978	N/A	$0	88.78%	150	3500+	Y
API DELEVAN INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	31,481	N/A	$0	44.15%	150	3500+	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 Electronics	1-800-344-4539	www.digikey.com	Y	70,131	N/A	$0	89.28%	150	3500+	Y
Bourns	Mouser Electronics	800-346-6873	www.mouser.com	Y	38	N/A	$0	78%	50	1,000+	Y
BOURNS INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	59,314	N/A	$0	82.47%	150	3500+	Y
CADDOCK ELECTRONICS INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	531	N/A	$0	98.87%	150	3500+	Y
CINCH CONNECTIVITY/Bel	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	31,120	N/A	$0	78.21%	150	3500+	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 (CDE)	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	26,367	N/A	$0	77.48%	150	3500+	Y
CRYSTEK CORPORATION	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,728	N/A	$0	100.00%	150	3500+	Y
CTS RESISTOR PRODUCTS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	9,604	N/A	$0	64.89%	150	3500+	Y
EATON	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	29,997	N/A	$0	86.82%	150	3500+	Y
ECS INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	9,122	N/A	$0	86.46%	150	3500+	Y
ENERGIZER BATTERY COMPANY	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	528	N/A	$0	97.73%	150	3500+	Y
EPCOS	Mouser Electronics	800-346-6873	www.mouser.com	Y	26,533	N/A	$0	98.00%	50	1,000+	Y
EPSON	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	21,166	N/A	$0	93.14%	150	3500+	Y
HONEYWELL MICROELECTRONICS & PRECISION SENSORS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	28,560	N/A	$0	89.87%	150	3500+	Y
JOHANSON DIELECTRICS INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,234	N/A	$0	95.79%	150	3500+	Y

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MOUSER ELECTRONICS

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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)								
Kemet	Mouser Electronics	800-346-6873	www.mouser.com	Y	77,568	N/A	$0	66%	50	1,000+	Y
KEMET	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	101,257	N/A	$0	91.57%	150	3500+	Y
KNOWLES	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	271,696	N/A	$0	87.06%	150	3500+	Y
KOA Speer	Mouser Electronics	800-346-6873	www.mouser.com	Y	34,078	N/A	$0	58%	50	1,000+	Y
Laird	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	15,187	N/A	$0	97.20%	150	3500+	Y
LEM USA INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	401	N/A	$0	98.50%	150	3500+	Y
LITTELFUSE INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	59,517	N/A	$0	91.54%	150	3500+	Y
Murata	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	66,179	N/A	$0	99.79%	150	3500+	Y
Murata	Mouser Electronics	800-346-6873	www.mouser.com	Y	33,780	N/A	$0	99%	50	1,000+	Y
NDK AMERICA, INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	1,035	N/A	$0	100.00%	150	3500+	Y
NESSCAP CO LTD	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	34	N/A	$0	100.00%	150	3500+	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 Electronics	1-800-344-4539	www.digikey.com	Y	39,747	N/A	$0	96.70%	150	3500+	Y
NVE CORP/ISOLATION PRODUCTS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	270	N/A	$0	67.41%	150	3500+	Y
Ohmite	Mouser Electronics	800-346-6873	www.mouser.com	Y	14,293	N/A	$0	55.00%	50	1,000+	Y
OHMITE	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	17,487	N/A	$0	65.22%	150	3500+	Y
Panasonic	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	154,777	N/A	$0	94.42%	150	3500+	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 Electronics	1-800-344-4539	www.digikey.com	Y	1,155	N/A	$0	71.69%	150	3500+	Y
PULSE ELECTRONICS POWER	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	10,065	N/A	$0	93.11%	150	3500+	Y
RIEDON	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	3,756	N/A	$0	99.87%	150	3500+	Y
Rohm	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	55,139	N/A	$0	99.85%	150	3500+	Y
RUBYCON	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	13,950	N/A	$0	94.54%	150	3500+	Y
Samsung	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	37,336	N/A	$0	100.00%	150	3500+	Y
Samsung Electro-Mechanics	PUI	1-800-551-4405	www.gopui.com	Y	3,852	N/A	$50	99.00%	5	33	Y
SOBERTON INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	256	N/A	$0	100.00%	150	3500+	Y
STACKPOLE ELECTRONICS INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	94,176	N/A	$0	99.55%	150	3500+	Y
STANDEX-MEDER ELECTRONICS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	656	N/A	$0	99.85%	150	3500+	Y
SUMIDA AMERICA COMPONENTS INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	7,201	N/A	$0	86.64%	150	3500+	Y
SUSUMU	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	43,346	N/A	$0	99.98%	150	3500+	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 Electronics	1-800-344-4539	www.digikey.com	Y	21,540	N/A	$0	99.97%	150	3500+	Y
TDK	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	60,769	N/A	$0	99.20%	150	3500+	Y
TDK	Mouser Electronics	800-346-6873	www.mouser.com	Y	6,663	N/A	$0	100.00%	50	1,000+	Y
TE	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	338,106	N/A	$0	79.40%	150	3500+	Y
TRIAD MAGNETICS	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	2,144	N/A	$0	99.11%	150	3500+	Y
TRIPP LITE	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	4,484	N/A	$0	90.83%	150	3500+	Y
TXC CORPORATION	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	10,542	N/A	$0	100.00%	150	3500+	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 Electronics	1-800-344-4539	www.digikey.com	Y	16,382	N/A	$0	87.60%	150	3500+	Y
Vishay	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	581,798	N/A	$0	87.71%	150	3500+	Y
Vishay	Mouser Electronics	800-346-6873	www.mouser.com	Y	102,917	N/A	$0	64.00%	50	1,000+	Y
VISHAY FOIL RESISTORS (DIVISION OF VISHAY PRECISION GROUP)	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	28,346	N/A	$0	52.45%	150	3500+	Y
Wurth	Mouser Electronics	800-346-6873	www.mouser.com	Y	934	N/A	$0	99.00%	50	1,000+	Y
WURTH ELECTRONICS INC	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	23,733	N/A	$0	100.00%	150	3500+	Y
YAGEO	Digi-Key Electronics	1-800-344-4539	www.digikey.com	Y	147,833	N/A	$0	84.31%	150	3500+	Y
Yageo Corporation	Mouser Electronics	800-346-6873	www.mouser.com	Y	18,246	N/A	$0	100.00%	50	1,000+	Y

Buyers' Guide

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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
Mornsun		+1-978-567-9610/+1-978-293-3923	www.mornsunamerica.com			N/A	$0	100%	N/A	2000+	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
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
Lascar Electronics		814-835-0621	www.lascarelectronics.com	Y	130	$602,000	$0	100%	10	175	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
RFM	Mouser Electronics	800-346-6873	www.mouser.com	Y	312	N/A	$0	90.00%	50	1,000+	Y

MOUSER MANUFACTURERS

0 - 9

3M
3M Touch Systems
4D Systems

A

AAEON
Aavid Thermalloy
Abracon
aconno
Adafruit
Adaptive Interconnect Electronics
Adesto Technologies
ADI Engineering
ADLINK Technology
Advanced Energy
Advanced Linear Devices
Advanced Thermal Solutions
Advantech
AIM
Alliance Memory
All Sensors
Alorium Technology
Alpha Wire
ALPS
Altech
Altera / Intel
Altitude Technology
AME
American Technical Ceramics
Ametherm
Amphenol
Amprobe
ams
AMSECO / Potier
Amulet Technologies
Analog Devices Inc.
AnalogicTech
Anaren
Anderson Power Products
Antenna Factor
Antenova
Apacer Technology Inc.
APC by Schneider Electric
APEM
Apex Tool Group
API Delevan
APM HEXSEAL
Applied Motion
Aptiv
Arbor Technology
Arcol / Ohmite
Arduino
Aries
Artesyn Embedded Technologies
Astrodyne TDI
Atollic
Ault / SL Power
Auvidea
Avago Technologies
Avery Dennison
AVX
Axiomtek
Azoteq

B

B&B Smart Worx
B&K Precision
Basler, Inc.
BeagleBoard
BEI Sensors
Bel
Bel Fuse
Bel Power Solutions
Belden
Bellin Dynamic Systems
Bergquist
Bias Power
BI Technologies / TT Electronics
BIVAR
Blackhawk
Bluegiga / Silicon Labs
Bluetechnix
Bomar Interconnect
Bosch Sensortec
Bosch Connected Devices
Boundary Devices
Bourns
BPS
Bridgetek
Broadcom
Bud Industries
Bulgin

C

C&K
Caddock
Cal Test
Califia Lighting
California Eastern Labs / CEL
Carling Technologies
Carclo Technical Plastics
CCS
Central Semiconductor
Chemtronics
CHERRY
Chip Quik
Cinch Connectivity Solutions
Cincon
Cirrus Logic
Cirque Corporation
Citizen Finetech Miyota
Clare
Coilcraft
Comchip Technology
Condor / SL Power
CONEC
congatec
Connect One
Conxall
Cornell Dubilier
Cosel
Coto Technology
Cree
Critical Link
Crocus Technology
Crouzet
Crowd Supply
Crydom
CRYSTEK CRYSTALS
CSB
CTS Electronic Components
CUI Inc.
CW Industries
Cypress Semiconductor

D

D3 Semiconductor
DAVE Embedded Systems
Davies Molding
DBM Optix
DB Unlimited
Dell
Delta Electronics
Deltron
Desco
Design Gateway
DFRobot
Dialight
Dialog Semiconductor
Dielectric Laboratories
Digi International
Digilent
Digital View
Diode Laser Concepts
Diodes Incorporated
DIOO Microcircuits
Displaytech Ltd.
DLP Design
DMC Tools (Daniels Manufacturing Corp)
Doodle Labs

E

Eagle-Picher
EAO
EasySync
Eaton
ebm-papst
Ecliptek
ECS
EDAC
EE Tools
eInfochips
Electronic Assembly
Electroswitch
Elna
Elprotronic Inc.
Embedded Artists
Energy Micro
enmo
Enterpoint, Ltd.
EPCOS / TDK
Epson
ERP Power
ERNI Electronics
E-Switch
Esquilo
ETA-USA
E-T-A Circuit Breakers
ETI Systems
Eupec
Eurotech
Everspin Technologies
Everlight
EXAR
Extech

F

Fair-Rite
Fascomp
Fastron
FCI / Amphenol
FCT Electronics
Finisar
Flamar
Flambeau
Flir
FlexiPanel
Fluke
Fox
FTDI
Fujitsu
Future Designs, Inc. (FDI)

G

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

H

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

I

IAR Systems
iBASE Technology
ICE Components
iEi Technology
IET Labs
ilumi
Illumitex
Imagination Technologies
Industruino
Infineon
Inolux
Insight SiP
Inspired LED
Intel
Integrated Device Technology
International Power
Intersil
Inventus Power
Ioxus
IPDiA / Murata
IQD Frequency Products
IRC / TT Electronics
Iso-Tip
ISSI
ITT Cannon
ITW Switches
IXYS Colorado
IXYS Integrated Circuits

J

J.W. Miller
Jadak
JAE Electronics
Jewell Modutec
JKL Components
Johanson
Johnson / Cinch
JST Automotive Connectors

K

Kamaya
Ka-Ro Electronics
Kavlico
Keil (Arm®)
Keithley
KEMET
Kester
Keterex
Keysight Technologies
Keystone Electronics
Kionix / ROHM Semiconductor
Kingbright
Knowles Acoustics
KOA Speer
Kostal
Kycon
KYOCERA / AVX

L

Laird Technologies
Lantronix
Lattice Semiconductor
LedEngin
Ledil
LedLink
LEMO
Leopard Imaging
Leviton
Linear Technology / Analog Devices
LinkSprite
Linx Technologies
Lite-On
Littelfuse
LMB/Heeger
Lorlin
LPRS
LS Research (Laird Technologies)
Lumberg Automation
Lumberg Automation / Hirschman
Lumex
Lumileds
Luminus Devices
Luxo Corporation

M

MACOM
Macraigor Systems
Maestro Wireless
Magnecraft
Mallory
Mallory Sonalert
Marquardt Switches
Matrix Orbital
Maxim Integrated
Maxwell Technologies
MCC
MCS Electronics
MEAN WELL
Measurement Specialties
Meder
Melexis
Memsic
Menda
Merit Sensor
Metcal
MG Chemicals
Micrel
Micro Crystal
Microchip
Micron Technology
Micronas
Microsemi
Microtips
Mide Technology
MikroElektronika
Mill-Max
Mitsubishi Electric
Molex
Monolithic Power Systems (MPS)
Mpression
MSI Sensors
Mueller Electric
Murata
Murata Power Solutions

N

National Instruments
NEC Relays
NetBurner
Netduino
Neutrik
NewAE Technology
New Age Enclosures
Newhaven Display
Nexperia
Nichicon
NJR
NKK Switches
NMB
NorComp
Nordic Semiconductor
Noritake
NOVACAP
NovaSensor / GE Sensing
NovTech
Nutaq
NXP Semiconductors

O

Octavo Systems
Ohmite
OK Industries
Olimex Ltd.
Olmatic
Omron
ON Semiconductor
Onion
Oplink
Optek Technologies
Optrex-Kyocera
Opulent Americas
Orion Fans
OSEPP
OSRAM Opto Semiconductors
OTTO

P

Pacific Silicon Sensor
PacTec
Panasonic
PanaVise
PandaBoard
Panduit
Parallax
Particle
Pericom (Diodes Inc.)
Phihong
Phoenix Contact
Piher
Plato
Plessey Semiconductors
PLX Technology
Pomona
Powercast
Power Dynamics
Power Integrations
Power-Sonic
Preci-Dip
Precision Technology
Protek
Protektive Pak
PUI Audio
Pulse Electronics
Pycom

Q, R

Q-Cee's / TE Connectivity
Qualcomm RF360
Qualtek
Quatech
Radiall
RAF Electronic Hardware
RAFI
Ramtron
Raspberry Pi
RECOM
Rectron
Red Pitaya
Redpine Signals
ReFLEX CES
Renata
Renesas
RF Digital
Ricoh Electronic Devices
Rigado
ROBOTIS
ROHM Semiconductor
Rosenberger
Rowley Associates
RushUP

S

Sagrad, Inc.
Samsung ARTIK
SanDisk
Sanyo Denki
Sargent Tools
Schaffner
SchmartBoard
Schneider Electric
Schurter
SEEED STUDIO
SEGGER Microcontroller
Seiko Printers
Sensata Technologies
SensiEDGE
Seoul Semiconductor
Semelab
Semflex / Cinch
Semitec USA
Semtech
Sensyst
Serpac
Sferalabs
Sharp Microelectronics
Shindengen
Sierra Monitor
Signal Transformer
Silex Technology
Silicon Microstructures
Silicon Labs
Simpson
SiTime
Skyworks Solutions Inc.
Smiths Interconnect
SMSC / Microchip
SolaHD
SolderCore
Song Chuan
Souriau
SL Power
Spansion
SparkFun Electronics
Spectra Symbol
Spectrum Control
Spectrum Digital
SPI Westek
Sprague Goodman
Stadium Group
Staco
Standex-Meder
Steute Wireless
STMicroelectronics
Stratos / Cinch
Sumida
Sunon
Susumu
Sutronics
Swissbit
Switchcraft
Syfer
Symmetry Electronics

T

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

U

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

V

Vacuumschmelze (VAC)
Varitronix
VCC
Vector
Vectron International
Versarion Technologies
VIA Embedded
Vicor
VISATON
Vishay
Vishay Precision Group
Vision Engineering
Visionox
Vitelec / Cinch
Virtium
Volex
Voltronics
VORAGO Technologies

W

W.L. Gore
Wakefield-Vette
Walsin
Wandboard
WeEn Semiconductor
Welwyn / TT Electronics
White-Rodgers
Wi2Wi
WIMA
Wiremold
WIZnet
Wolfson/Cirrus Logic
Wolfspeed
Wurth Electronics

X, Y, Z

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