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On the cover – January/February 2018

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Editor's Word

Getting 2018 right

At this time of year magazine editors often take it upon themselves to predict the future, myself included. I don't relish the task for the simple reason that, over my life, I have managed to fail to predict some significant events and trends. For example, I didn't spot people's surging demand for charm bracelets. Likewise, I missed the rapid growth in ice-cream parlours. However, my biggest oversight was people's willingness to share their innermost secrets with the world's population via social media.

On the upside, I did see some potential for the internet when I witnessed my first page of hyper text mark-up language. More recently, I backed the idea of computerised ordering and table service in fast food restaurants and, wow, did I get that one right.

Closer to home, I'm guessing you are wondering what my predictions for the electronics industry in 2018 might be. Well it's simple. Everyone I've talked to over recent months has told me that, basically, the industry has never had it better, which is driving growing demand.

So 2018 will be the year of: device manufacturers who invested in production capacity; distributors who invested in inventory; and purchasers who invested in developing long-term supply chain relationships.

Thus, my prediction is simple. There is a real danger that purchasers (who chop and change suppliers; who themselves 'list' rather than 'stock'; brands which are produced in facilities with limited capacity) will end up waiting a long time for parts that were once on tap.

Jon Barrett

N ES News

View current editions online

www.electronics-sourcing.eu

Expanding sensor facilities for the future

Melexis is expanding its R&D and manufacturing facility in Ypres, Belgium. The site, which is focused on the company's flagship position sensors and sensor interfaces, will be extended by 1,300m², creating additional manufacturing space. This will support the company's future growth prospects and is planned for completion during Q1 2018.

With manufacturing, development, quality assurance and test engineering at the facility, Melexis also intends to increase staffing to 300 by hiring additional operators, technicians and engineers.

Commenting on the plans, Ypres site manager, Bertrand Leterme, said: "We are excited to expand our facility and create new employment opportunities to support the growth of Melexis' market leading products."

www.melexis.com

Acquisition drives automotive sensor support

Environmental and flow sensor specialist, Sensirion, has acquired the automotive business of Auto Industrial. The acquisition, which includes sites in China, South Korea and the US, will expand Sensirion's global footprint and strengthen its automotive sensor module business.

The acquisition covers AIC's sensor and module business, which designs, manufactures and sells automotive sensor modules. Its key products are auto defogging sensors, air quality sensors and carbon dioxide sensors.

Sensirion's product range will complement this line up, including gas and liquid flow sensors, differential pressure sensors and environmental sensors for the measurement of humidity and temperature, volatile organic compounds, carbon dioxide and particulate matter.

Chief executive officer of Sensirion, Marc von Waldkirch, said: "The integration of AIC's sensor module business strengthens our position as a comprehensive solution provider for the automotive market. Sensirion's broad sensor design-in and application know-how combined with AIC's module expertise will enable the new company, Sensirion Automotive Solutions, to provide turnkey sensing module solutions and bring automotive environmental sensing to the next level."

www.sensirion.com

High-current connectors hit the shelves

Rutronik is now offering Amphenol FCI's SheerPwr Circular high-current connectors via its e-commerce www.rutronik24.com platform.

Described as reliable and robust, SheerPwr Circular connectors provide a high-current, low-resistance interface for connecting busbars to circuit boards. The connectors feature a compliant power contact assembled in a circular orientation. This results in a power socket, designed to mate with traditional machined pins, which provides repeated low resistance, high misalignment and high current carrying capabilities. Essentially, even if all the pins are fully misaligned, all the silver-plated contacts will connect with the pin. A large beam deflection range handles up to ±0.64mm permanent misalignment.

Thanks to JEDEC-JS709 qualification, SheerPwr is ideal for many industrial applications, but can also be applied in other segments such as datacom, telecom and medical technology.

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NES News

In Brief

Battery recycling service
BMZ Group offers a return and recycling service for lithium ion batteries in any EU member state. Customers can access various supply chain services including cell sourcing and battery returns. After sales service includes long replacement part availability, loaner batteries and battery recycling. Battery disposal and recycling experts are also on hand.
www.bmz-group.com

Modules are first-to-market
Congatec is to support the new 64-bit NXP i.MX8 processors for the Qseven and SMARC module standards. Modules will be available in line with the launch of the new ARM Cortex A53 / A72 based processor family, supporting customers' first-to-market strategies, since they can start designing the carrier board for their applications now. The resulting modules will be ideal for a range of industrial, stationary and in-vehicle applications.
www.congatec.com

Preview passives online
Exxelia's new website is designed to enhance access to its complex passive components and precision sub-systems. A parametric search engine makes the portfolio easy to browse with more than 680 product series listed, complete with datasheets and 3D models. Dedicated product selections are also included for sub-environments such as avionics and cockpit, satellites, radars and medical imaging.
www.exxelia.com

Harting is Railsponsible
The Harting Technology Group has won a corporate social responsibility award from Railsponsible, the European rail vehicle industry sustainability initiative. The initiative aims to implement minimum social and ecological standards and fair competition practices at all stages of the supply chain, using a common tool to assess suppliers' sustainability performance. Harting was selected by a cross-disciplinary jury.
www.harting.com

Making medical connectivity affordable

RS Components can now supply Molex MediSpec medical plastic circular cable and panel-mount plug connectors in the EMEA region. The range is designed to meet stringent medical device requirements in applications such as disposable devices; electrophysiology; imaging; patient monitors; and surgical equipment.

Thanks to its 'custom-off-the-shelf' design, the MediSpec interconnect system is said to provide a high-performance, yet affordable alternative to typical medical products. Connectors boast a lightweight plastic housing made from medical-grade PPSU and can withstand common medical sterilisation processes including ethylene oxide, gamma radiation, chemical, or autoclave sterilisation.

Two diameter sizes are available, with the D1 accepting up to eight circuits and the D2 accepting up to 17 circuits. A push-pull mating mechanism with a locking sleeve ensures quick, secure mating, while the locking latch provides cable un-mating forces of 50N minimum for D1 types and 85N minimum for D2 types. Single-use disposable versions are also available with polycarbonate housings.
www.rs-online.com

Brands add to industrial offering

TTI has signed a European agreement with Sensata Industrial Solutions, a company that offers a diverse portfolio of pressure and temperature sensors and switches, position sensors and solid state relays. With brands such as Crydom, BEI Sensors and Kavlico, Sensata Industrial Solutions services various industrial markets including automation, material handling, food and beverage, building equipment, medical and energy.

Director of supplier marketing in Europe for e-mech, sensors and power at TTI, Ros Kruger, said: "We will be stocking a wide range of Sensata's industrial products, starting with Crydom solid state relays. We are delighted to add this name to our portfolio."

Sensata's global distribution director, Dave Foster, added: "We respect TTI's design-in technical knowledge, stocking policy and strong logistics systems and are sure that we will be able to deliver excellent customer service together as a team."
www.ttieurope.com

Internet of anything made easy

Mouser Electronics now stocks a broad selection of Microchip Technology's Ethernet of Everything solutions. Products in this range are designed to provide a simple method of networking connected things in a simplified development environment.

With development support for nearly any application, Ethernet of Everything solutions build on an established networking foundation to improve system performance and reduce latency, as well as facilitating the incorporation of Power over Ethernet (PoE) for single-line power and communications. Hybrid networks incorporate multiple networking technologies including wired, wireless, server management and cloud connectivity.

To reduce development time, engineers can use Microchip's Curiosity, Xplained or Power over Ethernet (PoE) development platforms to rapidly generate code for peripheral configuration and communications with either MPLAB Code Configurator, MPLAB Harmony Configurator or Atmel START tools. Customisation is further simplified via an extension header that allows easy incorporation of a variety of sensors, controllers and drivers.
www.mouser.com

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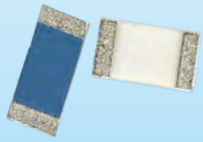
WRM - Precision Thin Film MELF Resistors

LRMA - Current Sense Metal Strip Resistors

WCRXXXA - Automotive Grade Thick Film Surface Mounted Resistors

WIN - Water Insoluble Nitride Tan Film Precision Chip Resistors



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Commit to safer battery choices

With demand for lithium-ion batteries growing, purchasers have a duty to ensure safety, without compromising product performance, advises president of Memory Protection Devices, Tom Blaha

Rechargeable lithium-ion battery technology continues to improve, with new products offering extended lifelong operation. In order to increase battery runtime, however, more active materials are packed into each cell, resulting in greater energy density. As a result, separators are becoming thinner, which increases the risk of foreign particles contaminating the battery cell.

If enough microscopic metal particles converge, an electrical short circuit can result in a current flow between the positive and negative plates, causing temperatures to rise. If this leads to thermal runaway, one failing cell can cause a chain reaction that impacts surrounding cells. For this reason, many Li-ion battery packs contain dividers that help protect adjacent cells.

Battery chemistries

Understanding the various battery chemistries helps purchasers make appropriate choices. Along with cobalt, manganese is one of the main types of lithium-ion chemistry. It offers superior thermal stability and features low internal resistance to deliver high current on demand, ideal for power tools and medical devices. The trade-off, however, is lower energy density, with a pure manganese cathode offering about half the capacity of cobalt.

Often the two metals are mixed, with safety enhanced by limiting the amount of active materials and by including additional safety protection: an electronic protection circuit that inhibits high current surges; a circuit interrupt device that opens the electrical path if a high charge voltage raises internal cell pressure to 10Bar; and a vent that allows a controlled release of gas in case of a rapid rise in cell pressure.

Safety risks

Other safety concerns involve static electricity or poorly made faulty battery chargers that can destroy the protection circuit. Cold temperature charging presents further potential problems, as consumer grade Li-ion batteries cannot be charged below 0°C. Although they may appear to be charging normally, the anode can become covered in a permanent metallic lithium plating. Repeated cold charging can compromise the safety of the pack, which is even more vulnerable to failure if subjected to impact, crush, or high rate charging.

To combat this issue, industrial grade Li-ion batteries are now available that can be recharged and discharged at extremely cold temperatures with up to 5,000 recharge cycles.

Holder design

Battery holders can be an integral part of battery safety. For example, purchasers can now specify holders that accommodate the extended length of a cylindrical cell with built-in PTC. Custom battery holders are also available to accommodate circuit protect modules that are not integrated into the battery.

End-users can add to the risks. Problems often arise, for example, when hobbyists try to assemble their own battery packs or when consumers manipulate cell phone batteries to extend operational life. For this reason, many laptops contain embedded code that only allows OEM-approved battery packs.

To support increased safety, procurement professionals need to be wary of specifying inferior quality Li-ion batteries that may contain impurities or lack properly designed safeguards. With battery safety a growing concern, especially for airplane travel, the smart decision is to specify a Li-ion battery with built-in PTC protection and keep it properly secured with the right battery holder.

www.memoryprotectiondevices.com

Li-ion batteries often include additional safety protection

> **Repeated cold charging can compromise the safety of the pack**

Battery holders can be an integral part of battery safety

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The power of distribution

Distributors expect robust European sales growth in 2018

Component demand in Europe was unexpectedly strong in 2017 and orders for chips, passives and connectors will remain healthy through the first half of 2018 and maybe longer

James Carbone

Electronics distributors are optimistic that European component sales in 2018 will continue to post strong growth after revenue rose at double-digit rates in 2017.

Distributors report that component demand in 2017 was robust if not stellar as prices for many passives and semiconductors increased contributing to sales growth. With strong demand, lead times for many passives and discrete semiconductors increased. Lead times for components that typically were 8-12 weeks increased to 25 or more weeks with delivery times for some parts stretching to 40 weeks.

Because of strong demand and increasing prices, distribution sales in Europe will end up growing about 10-12 per cent in 2017, said Adam Fletcher, chairman of trade association Electronic Component Supply Network and chairman of International Distribution Electronics Association. As a result, distribution business in Europe will end 2017 growing an average of 10-12 per cent, he said.

Some distributors say their sales growth in Europe may end up stronger than average. For instance, Avnet says its sales in Europe, Middle East and Africa (EMEA) will finish calendar 2017 growing between 10-20 per cent. Mouser says its sales growth was up more than 30 per cent through late October. Digi-Key said it had 30 per cent year-to-year date sales growth in Europe as of November.

While there may be less price erosion and more stable lead times in 2018, distributors say that component demand in Europe will remain healthy, especially in the first half of the year. The European automotive and industrial market segments will continue to be drivers of component demand in 2018.

Some expect healthy sales growth in Europe to continue beyond 2018 and 2017 was in fact the beginning of a period of long-term growth for distributors.

"I think 2017 was an inflection point for the electronics component industry," said Fletcher. "I think we are at the beginning of a five-year period of growth because the products of major market drivers are starting to roll out."

Those market drivers are products related to transportation, including automotive and autonomous vehicles, trucks, trains and planes.

Going autonomous

The impact of development of the autonomous vehicle is being felt in the electronics supply chain. "Autonomous vehicles are really driving quite significant growth," said Fletcher. Automotive in general is contributing to sales growth as more safety and infotainment systems are designed into more models of vehicles. Even low-cost models are being equipped with more sophisticated electronic systems. Such systems require a wide range of semiconductors including wireless ICs, sensors, microcontrollers among others.

"I think 2017 was an inflection point for the electronics component industry. We are at the beginning of a five-year period of growth because the products of major market drivers are starting to roll out"

Adam Fletcher, chairman of trade association Electronic Component Supply Network and chairman of International Distribution Electronics Association

In addition, the development of 5G infrastructure will have a significant impact on the electronics supply chain. While standards for 5G are still being developed, the rollout of 5G infrastructure is expected to begin in 2020, which will further drive component demand over the next five years, said Fletcher. The fifth-generation wireless infrastructure "is going to have a huge impact in terms of base station deployments," he said. It will also result in more consumers upgrading their phones to be compatible with the new, faster wireless networks. As a result, Fletcher said while "2018 is going to be a time of pretty reasonable growth, 2019 and 2020 will be years of very strong growth."

He said in 2018 there should be 10-20 per cent growth in electronic component sales globally and about 12 per cent growth in Europe.

Carry over growth

Many distributors generally agree with that forecast because business in the second half of 2017 was strong and many believe it will carry over into 2018.

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Widest Selection

Mark Burr-Lonnon, senior vice president, EMEA and Asia for Mouser Electronics, said that Europe is Mouser's fastest growing region for sales.

"Europe is leading the way. Our business was up 34 per cent (year-to date as of late October) in Europe, while Asia was up 32.5 per cent and the Americas were up 18 per cent," he said. Mouser's sales in Europe in 2017 were up 10 points from 2016, said Burr-Lonnon.

While most of Mouser's sales are to engineers designing new products, some of the sales increase was due to component shortages. "We put in a lot of inventory this year and people came to us because of shortages," said Burr-Lonnon.

He said in 2018, Mouser's European business will remain healthy. Electronics component sales in Europe overall next year is "going to be pretty good at least through the first half of next year. Some are saying it is going to be a good for the full year, with just a few blips in the second half," he said.

Burr-Lonnon noted that adding new product lines was key to Mouser's continuing sales growth. "We have consistently added a lot of new lines in the last 10 years. We have over 650 lines and there's only so many big lines left," he said.

Burr-Lonnon added that Mouser continues to "backfill with niche lines" to give customers as much choice as possible. Doing so helps to attract new business for Mouser.

Kevin Hess, senior vice president of marketing for Mouser, noted that 20 per cent of Mouser's sales in 2017 were for products that Mouser added over the last four years. "So that's what we need to continue to do. We need to make sure when manufacturers launch new products, we are stocking and selling" them because those new products will represent nearly 30 per cent of Mouser's sales four years from now.

Burr-Lonnon said Mouser's goal was to have the broadest inventory of parts whether they are from Texas Instruments, ADI, TE, or Molex.

A pleasant surprise

For some distributors, robust component demand in 2017 was an unexpected, but pleasant surprise. "If you look at the calendar year, we are very satisfied. It was a surprisingly good year," said Georg Steinberger, vice president of marketing and communications for Avnet EMEA. He says sales would be up 10-20 per cent.

"Europe is leading the way. Our business was up 34 per cent (year-to date as of late October) in Europe"

Mark Burr-Lonnon, senior vice president, EMEA and Asia for Mouser Electronics

Georg Steinberger, vice president of marketing and communications for Avnet EMEA

"The automotive industry, including subcontractors, have discovered distribution is a reliable partner for their business whether it's on the design side or on the supply chain side"

"It has been very good business so far in Europe," he said. Unlike the Americas and Asia, the growth drivers in Europe are automotive and industrial, according to Steinberger. "We don't have a huge computer business or communications business. Our business is really around automotive and industrial."

Steinberger noted that in Europe, automotive represents about 35 per cent of semiconductor sales, while industrial accounts for 30-35 per cent although distribution sales to the segments are not as high. He noted that automakers and their first-tier suppliers have direct relationships with component manufacturers.

Steinberger said that industrial represents about 50 per cent of Avnet's European business, while automotive is about 25 per cent. However, Avnet is growing its sales to the automotive segment.

"Fifteen years ago, the automotive share of our business was about 15 per cent," he said.

"The automotive industry, including subcontractors, have discovered distribution is a reliable partner for their business whether it's on the design side or on the supply chain side," said Steinberger.

He noted that 70 per cent of distribution's business in Europe is for semiconductors, while interconnects, passives and electromechanical devices account for 30 per cent of distribution sales.

"Many of the subcontractors in automotive use distribution for semiconductors. But they still get a lot of attention by the manufacturers of connectors or passives," said Steinberger.

Steinberger said that consolidation impacted sales in 2017 and will likely affect business in 2018. He said in some cases, consolidated companies "cleaned out their product portfolios, resulting in shortages in some product areas" as well as higher prices.

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Buyers benefit from digital efficiency

Digi-Key is utilising new digital technologies to enhance the service level it offers purchasing professionals, both today and in the future

With so much buzz around 'digital' it's important to define the initiative: for Digi-Key it means utilising innovative technologies to deliver a world class customer experience, as well as achieving higher levels of efficiency for customers and Digi-Key teams. It goes beyond a specific technology, platform, application programming interface or automated solution. Rather, digital is a new way of doing business, where everyone benefits by aligning business moments, or passing opportunities, with efficient methods to meet that need and exceed customer expectations.

Designing a digital platform
Digi-Key has been a leader in the e-commerce aspect of digital for many years. Many of its processes and solutions are built around technologies that deliver an excellent customer experience, coupled with automation to keep delivery costs down and efficiencies high. As customers become accustomed to visual, voice, artificial intelligence and unified communication as methods to interact with technology, Digi-Key is working to ensure it designs a digital platform that best matches the expectations of legacy customers and new customer needs.

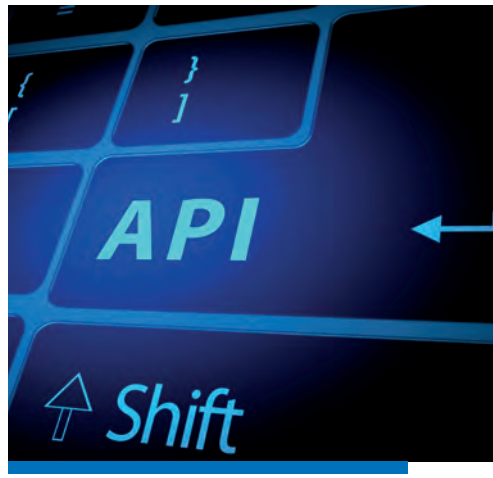
It's important to deliver the best solutions for all customers who visit Digi-Key sites or work with technical and customer service people directly. The company therefore has a number of updates planned over the next 18 to 24 months, with the first expected by mid-2018.

Investing in API
The world is moving towards application programming interface technologies for efficient and direct business to business communications. Digi-Key aims to lead the industry by providing multiple API solutions today. These solutions are not prototypes; they are used by customers at all levels to get and provide the information required to receive the parts they need, utilizing the most efficient technology available. Digi-Key aims to have the documentation and support to help customers benefit via a real-world proven digital capability.

With growth on the horizon, Digi-Key is expanding its operation via a new product distribution centre. Here, the company will utilise new digital automation technologies designed to guarantee a continued positive experience for customers. Interestingly, it is also working to integrate technologies for its website that will maintain the legacy experience for the tens of thousands of design engineers who feel they would like it to remain 'as-is', while simultaneously accommodating visitors who need more assistance and guidance to find what they need.

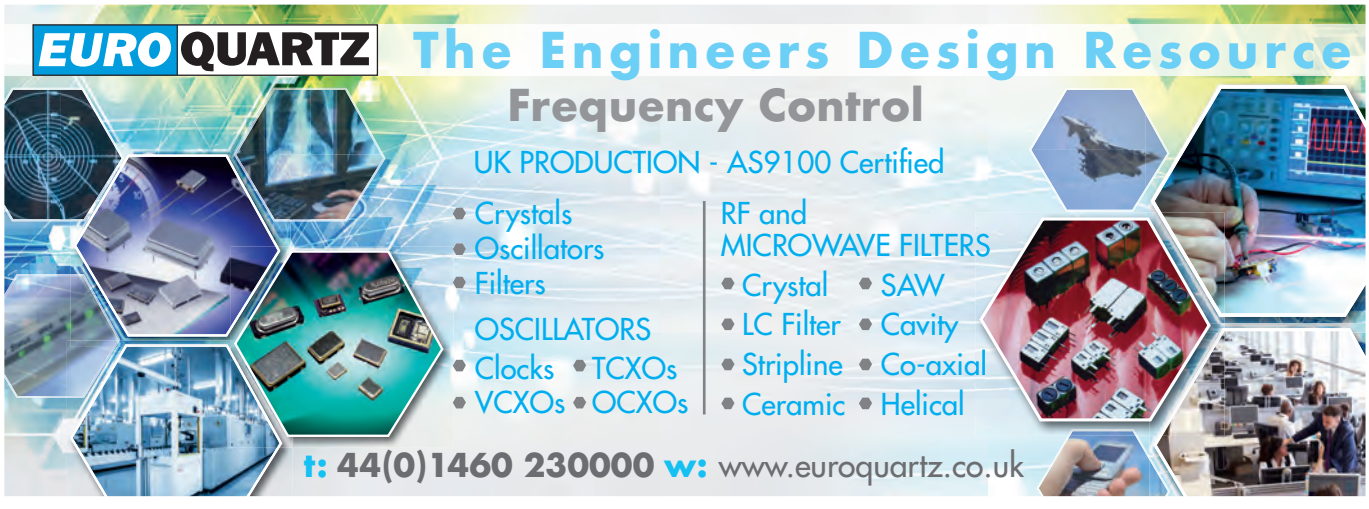
Embracing opportunity
Overall, Digi-Key is excited that digital is something customers are working to incorporate into their solutions to benefit their business. Having been involved in aspects of digital for many years, Digi-Key looks forward to helping customers achieve their digital goals by utilising the digital solutions it is working on today. The digital road is one of incredible opportunity and Digi-Key has many deliverables planned along the way that will benefit customers as it continues to build out its platform.

www.digikey.co.uk



Digi-Key is working to ensure it designs a digital platform that best matches customer expectations

'Digital' represents a new way of doing business



Cut out the commodity gamble

Availability of commodity parts is often taken for granted, but pricing can be volatile. A proactive purchasing strategy can minimize the risks, says microchipDIRECT global sales manager, Martin Warmington

Watching manufacturing lead-time trends on single-source products can become an obsession. When there is no other source for a part, the manufacturer's lead-time will dictate an original equipment manufacturer's procurement strategy. So, for example, when lead times go out, stocks may be depleted faster than forecast, but when lead times come in, the OEM may need to push out scheduled deliveries and relax its inventory levels.

This obsession with proprietary parts is understandable, but it can mean that commodity parts are not given the same level of attention. Where there are pin-for-pin replacements, there are usually multiple sources for devices such as low pin-count microcontrollers or standard memories. For this reason, manufacturers tend not to treat commodity parts as strategic devices.

Pricing fluctuations

But, while the availability of commodity parts is often taken for granted, pricing can be more volatile. Buyers will often have two or more sources for the same part at similar pricing levels, at least until one manufacturer cannot supply anymore. A single large order is all it takes to reduce market availability and increase pricing significantly, which is why commodity parts should carry the same importance as proprietary devices.

At a minimum, buyers should regularly check lead-times from the manufacturer, but there are more proactive methods that can provide greater protection against volatility.

Plan procurement

Including commodity parts in a distributor supply agreement is a useful tool for managing volatility. OEMs can ensure the supplier is ordering those parts into stock, rather than using back-to-back orders on the semiconductor manufacturer, as this practice will still leave the OEM susceptible to risk.

Alternatively, microchipDIRECT can send a lead-time email at the start of each week providing information on all the parts in the order book. This gives buyers a timely way to plan their commodity procurement for the months ahead.

Purchasers can also utilize microchipDIRECT's standard 30-day cancellation policy, whereby any order for standard non-custom parts can be cancelled up to 30 days before the shipping date. This allows buyers to secure availability without the risk of over-ordering and being left with unnecessary stock.

OEMs can access their order-book online, 24/7, to check the real-time status of each item and make changes immediately. This allows buyers to respond rapidly to dynamic changes in the market.

microchipDIRECT global sales manager, Microchip Technology, Martin Warmington

Treating all components with equal importance and sourcing from multiple suppliers brings many benefits because just below the surface of easy availability and low unit cost, there is always the potential for volatility. Many manufacturers in the semiconductor and passive markets have had 26-week lead-times for the simplest of commodity devices.

Commodities should therefore never be ignored — it's not worth the gamble. By applying simple procurement techniques, buyers can minimize their risk and greatly lessen the volatility inherent in the commodity component market.

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Expect 5% growth in European semiconductor market in 2018

Chip sales growth won't be as strong as 2017, but demand for integrated circuits from automakers and their suppliers and from industrial equipment manufacturers will continue to be robust

James Carbone

The growth rate of the European semiconductor market will slow in 2018 after a year of strong sales growth driven by healthy demand for chips by the automotive, industrial, communications and industrial segments and higher prices for many semiconductors.

Semiconductor sales in Europe increased 18 per cent in 2017, according to researcher IC Insights. "We saw exceptional growth in 2017 in Europe, much like what we saw across the broader global semiconductor market," said Brian Matas, vice president of market research for IC insights. Growth will continue, but at a slower rate. European IC sales will rise 5 per cent to $34.3 billion in 2018 and increase to $35.7 billion in 2021, he said.

"That's still pretty solid growth for Europe," said Matas. He noted that in 2016 sales in Europe increased just 1.7 per cent before growing 18 per cent in 2017.

In fact, semiconductor sales in Europe have a pattern of increasing one year and then falling the next. For instance, in 2008, European chip revenue increased about 10 per cent, but then fell 25 per cent in 2009, said Jim Feldhan, president of Semico Research. In 2010 sales increased 4 per cent and then declined 3.5 per cent in 2011 before increasing again in 2012 only to be flat in 2013, said Feldhan.

In Europe the automotive sector is a big driver for semiconductor sales. "For 2017, we have the automotive IC market in Europe growing 21 per cent," said Matas. "That's exceptional growth although there was also strong growth in the consumer and communications segments," said Matas.

He added that over the next five years automotive will be "near the top" in terms of driving European IC sales growth. More cars are being equipped with safety features such as collision avoidance, rear window cameras, and lane change warning features, which require a variety of semiconductors.

In addition, electric vehicles (EVs) and the continuing development of autonomous cars will further drive chip demand over the next five years. EVs require more semiconductors than a conventional car and EV sales are increasing. For instance, a gasoline-powered vehicle contains on average of $330 of semiconductors. Hybrid EVs contain $900 worth of chips and standard EVs have more than $1,000 of semiconductors, according to market research firm McKinsey.

Semiconductor manufacturers are also bullish about the electric vehicle market because sales of EVs will grow over the next 10 years. In 2016, EVs accounted for less than 1 per cent of vehicle sales. By 2020, EVs could represent 5-10 per cent of vehicles sales because expected advancements in battery charging and reduction of battery costs will make them more affordable. By 2030, 35-50 per cent of vehicles could will be electric, according to McKinsey.

As a result, electric vehicles are a focus for many semiconductor manufacturers, including STMicroelectronics, based in Geneva, Switzerland.

A clear growth driver

Electric vehicles represent "a clear growth driver for our industry in the next few years, with car electrification semiconductors growing more than three times faster than the average semiconductor," said Carlo Bozotti, president and chief executive officer of ST.

He said ST is ramping up production of its silicon carbide (SiC) MOSFETs used in electric inverters of EVs. It is also supplying new 1200V SiC diodes in electrical-vehicle charger platforms.

The chipmaker is also seeing growth in demand for its automotive microcontrollers used in body and gateway applications and in onboard charging applications and ignition systems.

Automotive is helping ST grow its sales in Europe and other regions. The chipmaker said it had 25 per

By the Numbers

$8.6 billion
The size of the analog semiconductor market in Europe in 2017
Source: Semico Research

$35.7 billion
The size of the European IC market in 2021
Source: IC Insights

18%
The growth rate of the European semiconductor market in 2017
Source: IC Insights

$6.2 billion
The forecasted size of the European memory IC market in 2018
Source: Semico Research

5.3%
The compound annual growth rate of the European integrated circuit market from 2016 to 2021

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Carlo Bozotti, president and chief executive officer of ST

Electric vehicles represent "a clear growth driver for our industry in the next few years, with car electrification semiconductors growing more than three times faster than the average semiconductor"

cent increase in sales in Europe through late 2017 and expected to post 18 per cent revenue growth globally for the year.

"It seems like Europe is always at the forefront of a lot of automotive innovation," said Matas. "Audi and Daimler-Benz are very innovative, forward thinking when it comes to electronics in automobiles," he said. Because of government mandates, consumer demand and the transition to more autonomy in vehicles the outlook is positive "for future demand of ICs in vehicles," he said.

Double-digit growth through '21

In fact, automotive IC sales in Europe will grow 14 per cent in 2018 and have a compound annual growth rate of 12.5 per cent through 2021, according to IC Insights.

That is of course good news for ST and other European chipmakers including and NXP and Infineon, the two top automotive IC manufacturers in the world. Forty-five percent of NXP's product revenue is from automotive. The company makes microcontrollers and microprocessors, power management ICs, sensors and other ICs for the auto industry. Its automotive business increased about 11 per cent year-to-date through October.

Infineon, which makes ICs for alternators, airbags and engine control, is also the leader in high IGBTs for hybrid electric cars. Automotive represents 42 per cent of its business.

The industrial segment, which includes factory automation, industrial Internet of Things, infrastructure and lighting controls also has had a positive impact on sales in 2017 and will continue to help drive revenue 2018, said Feldhan.

The industrial segment drives sales for wide range of semiconductors including analog chips.

"The analog market in Europe is $8.6 billion," said Feldhan. "That's probably the largest" semiconductor category in Europe. Analog chips are needed in a wide range of electronics equipment, not just smart phones and computers. "Industrial is where analog shines," said Feldhan.

Large electronics market segments such as computers, mobile phones also will continue to drive semiconductor sales. While shipment unit growth of computers and phones grew modestly in 2017, volumes are high. For instance, about 1.6 million smart phones shipped in 2017, up from 1.49 million in 2017. Computer sales slipped to 443 million in 2017 from 452 million in 2016, but will increase to 450 million in 2018, according to IC Insights.

Of course, computer and smart phones are packed with a wide variety of semiconductors, including microprocessors, power management ICs, discrete semiconductors and memory chips.

Strong memory IC growth in Europe

With memory, electronic OEMs are using more higher value memory devices which help contribute to memory IC revenue growth. For instance, the European memory IC market grew 52.7 per cent to $6.1 billion in 2017 and will rise to $6.2 billion in 2018, according to Semico Research.

Strong demand and limited capacity resulted in higher memory tags as average selling prices for DRAM increased 74 per cent compared to the previous year, said IC Insights. Prices could also increase in 2018 although not as much as last year as DRAM bit shipments should rise about 25-28 per cent and NAND flash bit shipments should rise 35-40 per cent, said Matas.

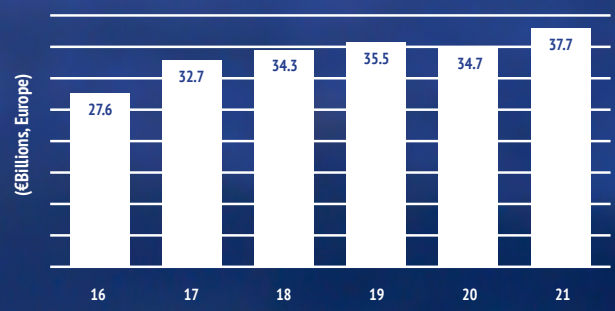
One reason that demand is growing for memory ICs is greater demand for servers by large global enterprise companies such as Google, Facebook and Amazon among others. Such companies need servers for cloud computing and big data storage center.

About 10.8 million servers shipped in 2017, up from 10.2 million in 2016. Next year, 11.5 million will ship, said Matas.

Such servers use fast microprocessors and need high-end memory, said Matas. "That's where most of the memory IC manufacturers are saying demand is coming from," said Matas.

The good news for memory IC buyers is that the memory chipmakers, including Samsung, SK Hynix and Micron are starting to add capacity which should improve DRAM and flash supply. Those three companies have been very careful about adding capacity in recent years, but apparently now believe that strong demand for memory will continue.

European IC market to post 5.3% annual growth



The European IC market will grow from $27.6 billion in 2016 to $35.7 billion in 2021
Source: IC Insights

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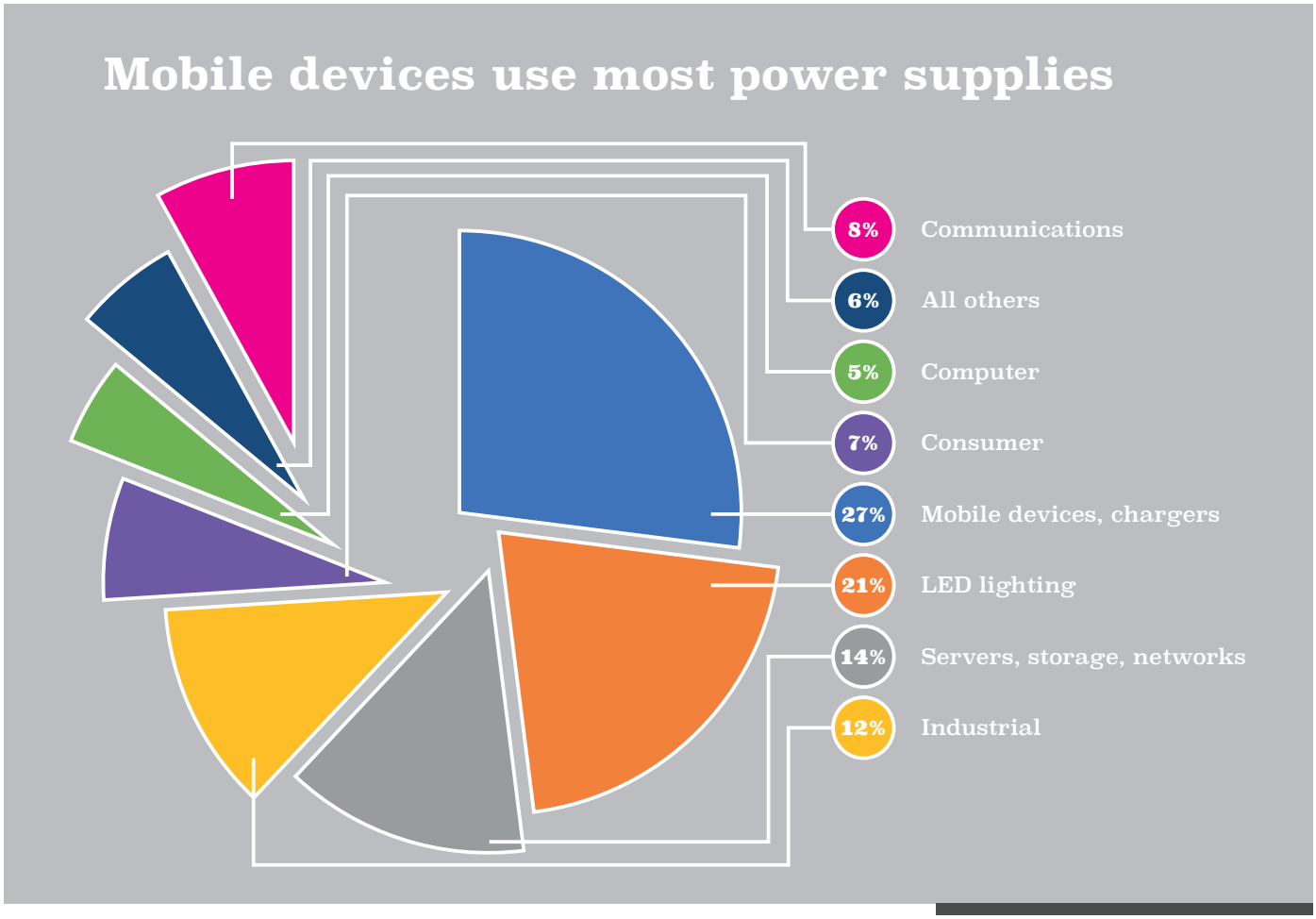
What buyers need to know about power supplies

Despite strong demand, buyers can expect ample supply, reasonable lead times and declining prices for power supplies over the next five years

By James Carbone



Mobile phones and other portable devices and charges account for 27 per cent of the power supply market

Source: IHS Markit

The global power supply market will post 5.6 per cent annual growth through 2021 when power supply revenue will total $30.9 billion, up from $23.5 billion in 2016, according to researcher IHS Markit.

However, while overall demand and revenue for power supplies will rise, there will be a significant change in which customer segments will drive power supply demand in revenue. In addition, demand for non-commodity power supplies will grow at a faster rate than commodity products.

While mobile phones and chargers were the largest customer segment for power supplies in 2016, that will change over the next five years. The mobile phones segment, which is a high-volume, low-margin business, was the largest market for both AC-DC and DC-DC power supplies in 2016, accounting for 27.3 per cent of power supply revenue, according to IHS Markit. However, power supply sales revenue from mobile phone and charger manufacturers will decline from $6.4 billion in 2016 to $6 billion in 2021, said Victoria Fodale, senior analyst, power supply intelligence service IHS Markit. As a result, cell phone chargers will represent only about 19.6 per cent of the power supply market in 2021, down from 27.3 per cent, according to IHS.

Mobile devices and charger sales will fall because of a decline in shipments of key applications. For example, the cellular infrastructure market is forecast to decline because of a changing product mix from macro cells to lower power, small cell equipment.

"One of the biggest stories

is the decline in (power supply) revenue from cellular infrastructures," said Fodale. "Cellular infrastructure networks have matured and 5G has not ramped up yet. What is happening is smaller cells are being used instead of the larger macro cells," she said. Larger macro cells require more power supplies than smaller cells.

Power supply demand brightens

At the same time, demand for LED lighting systems will grow and so will the need for power supplies for this segment. As a result, sales revenue from light emitting diode applications will rise from $4.9 billion in 2016 to $11.9 billion in 2021, a compound annual growth rate of 19.3 per cent. In fact, LED lighting will be the fastest-growing application by revenue from 2017 to 2021, said IHS. In 2016 LEDs accounted for 20.9 per cent of total power supply revenue. By 2021, that percentage will increase to about 38 per cent.

"LED luminaires is an interesting market because the power supply for luminaires is very specialized," said Fodale. "You won't see a networking power supply vendor have the same expertise as a power supply manufacturer that specializes in lighting," she said. "The power supply vendors that specialize tend to be smaller."

Growth in LED lighting systems is driving revenue for AC-DC non-commodity power supplies. The product segment is forecast to be the fastest growing segment from 2016-2021, said IHS. In fact, sales for the AC-DC non-commodity power supplies surpass revenue for the AC-DC commodity market. AC-DC non-commodity power supplies are now the largest merchant power supply segment

Fodale said that non-commodity power supplies are typically used in high-end networking equipment, medical equipment, LED luminaires and other specialty applications. Average selling prices range from the high 20 dollars to low 30 dollars. Commodity power supplies typically are used in consumer electronics equipment, low-end PCs and tablets and the mobile phones.

Revenue for the AC-DC commodity market peaked in 2015 as demand declined in key commodity applications such as computers and office equipment and mobile devices and chargers, according to IHS

Revenue for the DC-DC converter market declined by 4.1 per cent in 2016. Growth is predicted to be flat from 2017 to 2021 as demand for some segments of end-equipment market soften, particularly cellular infrastructure and storage, said IHS.

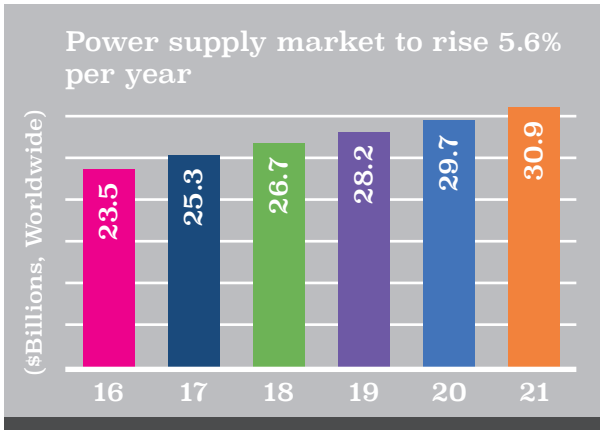
From a unit perspective, commodity power supplies in 2016 accounted for 43.3 per cent of power supply shipment, while non-commodity represented 56.7 per cent of shipments. By 2021, those percentages will change as commodity power supply shipments will fall to 31.4 per cent of all unit shipments while non-commodity will grow to 68.6 per cent.

Competing for business

The good news for buyers is despite healthy growth and demand for power supplies, there continues to be competition in the power supply market for business. Delta Electronics holds 15.5 per cent of the global power supply market and is the largest power supply manufacturer. However, Delta has plenty of competition, including Artesyn, Lite-On Technology, Mean Well, Salcomp, Chicony Power, TDK-Lambda, Acbel Polytech and Murata among many others. Major manufacturers, other than Delta and Artesyn, all have 4 per cent or less market share and compete fiercely for business.

Because there is healthy competition,

▶▶ *(continued on p.18)*



Global power supply revenue will grow from $23.5 billion in 2016 to $30.9 billion in 2021 *Source: IHS Markit*

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power supply average selling prices tend to decline year-over-year. "Average selling prices are interesting," said Fodale. "What drives price is wattage." The higher the wattage the higher the price. A rule of thumb is $1 per watt, but it often depends on the volume of power supplies being purchased, she said. "Prices will also vary based on shortages and the negotiating power of OEMs," said Fodale.

"Prices always go down," said Christoph Wolf, president of power supply manufacturer RECOM, based in Arvada, Colo. "We have to watch closely what other people are doing and what people are willing to pay," he said.

New power supply products often mitigate the impact of price erosion because newer products have higher prices than older established products and there are always new products being introduced.

Despite price erosion power supply manufacturers enjoyed healthy sales growth in 2017. The global power supply market was expected to finish 2017 growing 7.7 per cent to 25.3 billion, according to IHS Markit

"In the Americas, our sales increased 28 per cent, said Wolf, whose company makes AC-DC and DC-DC converters, switching regulators as well as LEDs drivers. "I think we are outperforming the market." He noted that sales in 2017 were actually stronger than 2016 when business increased 15 per cent.

Expecting steady growth

Wolf noted that sales growth is impacted by GDP. "GDP growth is about 2-3 per cent, but growth in electronics is more like 8-10 per cent," he said. RECOM expects "steady growth" next year because the economy is healthy and there are always new electronics products designed and manufactured that need power supplies, said Wolf.

"I don't see a reason why this growth should slow down."

He added that industrial Internet of Things (IoT) and LED lighting controls is helping drive power supply growth because IoT and LED applications require components as well as power supplies and demand for IoT and LED products continues to grow.

With healthy growth and demand for power supplies, lead times have stretched by a couple weeks because some components have been in short supply.

"There only needs to be one component that has a long lead time" to impact the lead times of power supplies, said Wolf. However, the increases in lead times have not been drastic. Lead times for RECOM have stretched from 6 to 8 weeks to 8 to 10 weeks, said Wolf.

"We are seeing substantial growth which means our factories are pretty busy these days," he said. "On the other hand, we have seen extended lead times for certain components" and the only way to mitigate that is to that is by "proper planning."

Part of that planning involves distributors. "What is helping is doing business with our distribution partners that are investing heavily in inventory," said Wolf.

		2015	2016	Difference 2015/2016
1	Delta Electronics	15.5%	15.5%	0.0%
2	Artesyn	8.5%	7.5%	-1.0%
3	Lite-On Technology	4.0%	4.5%	0.5%
4	Mean Well	3.0%	3.5%	0.5%
5	Salcomp	3.0%	3.0%	0.0%
6	Chicony Power	2.5%	2.5%	0.0%
6	Acbel Polytech	2.5%	2.5%	0.0%
7	TDK Lambda	2.5%	2.0%	-0.5%
7	FSP Group	2.0%	2.0%	0.0%
7	Murata	2.0%	2.0%	0.0%
	Others	54.5%	55.0%	0.5%

Delta is the top power supply manufacturer

2015 market size: $21,913.7 million
2016 market size: $23,600.7 million

Source: IHS Markit

By the Numbers

$23.5 billion The size of the global power supply market in 2016

5.6% The forecasted compound annual growth rate of the power supply market

$30.9 billion The size of the global power supply market in 2021

20.4% The percent of global power supplies that were sold in the America in 2018

$19.8 billion The size of the non-commodity power supply market in 2021

11% The expected growth rate of the power supply market in the Americas in 2021

4% The growth rate of the Asia-Pacific power supply market in 2021

What is helping is doing business with our distribution partners that are investing heavily in inventory

– Christoph Wolf, president of power supply manufacturer RECOM

Demand for power supplies in the Americas rises

Asia-Pacific will remain the largest market for power supplies over the next five years, although it will have a slower growth than the Americas and Europe.

The Asia-Pacific power supply market totaled about $15.7 billion in 2016 and the region accounted for 64.3 percent of the market, according to researcher IHS Markit. By 2021, the APAC power supply market will grow from to about $19 billion as sales grow annually in the range of 3-6 per cent. Asia Pacific will have the slowest grate rates because of the decline of revenue for commodity applications in AC-DC markets.

The Americas had power supply sales of close to $5 billion in 2016 and revenue increase to about $7 billion in 2021. The sales growth rate in the Americas vary from a low of about 1 per cent in 2018, but grow to more than 11 per cent in 2021, said IHS.

The Americas was the second largest market for power supplies in 2016, accounting for 20.4 per cent of revenue and 13.2 per cent of unit shipments.

Power supply market growth rates for Europe, Middle East and Africa will range from 9 per cent in 2017 to 13 per cent in 2018. By 2021 the EMRA growth rate will be about 9 per cent and sales will total nearly $6 billion, according to IHS.

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CGS Resistors / TE Connectivity
CH Products
Chemi-Con
Chemtronics
Cherry Americas
Cherry Switches (ZF Electronics)
Chip Quik, Inc.
Cicoil
CII / TE Connectivity
Cinch Connectivity Solutions
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Electro Corp (Honeywell Sensing and Productivity Solutions)
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Industrial Fiber Optics, Inc.
Infineon Technologies
Initial State Technologies, Inc.
Innovasic Semiconductor / Analog Devices, Inc.
Inphi
Insight SiP
Inspired LED
Integrated Device Technology (IDT)
Integrated Silicon Solution, Inc. (ISSI)
Intel® Programmable Solutions Group
Intematix
Interconnect Systems - a Molex company
Interlink Electronics
International Rectifier (Infineon Technologies)
Intersil
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
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.
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 - Embedded Wireless Solutions
Laird Technologies
Laird Technologies - Antennas
Laird Technologies - EMI
Laird Technologies - Signal Integrity Products
Laird Technologies - Thermal Products
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
LSR (Laird - Embedded Wireless Solutions)
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.
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
Measurement Specialties / TE Connectivity
MEC switches
Mechatronics
MegaChips
Melexis
Memory Protection Devices
MEMSIC
Menda
Mentor Graphics
Metelics (MACOM Technology Solutions)
METZ CONNECT
MG Chemicals
Micrel / Microchip Technology
Micrium
Micro Commercial Components (MCC)
Microchip Technology
microEngineering Labs Inc.
Micro-Measurements / Vishay Precision Group
Micron Technology
Micronas
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
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
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.
Patco Electronics
Patco Services
PCD / Amphenol
Peerless by Tymphany
Pentair
Peregrine Semiconductor
Pericom Semiconductor Corp. (Diodes Incorporated)
Pervasive Displays
PHIHONG USA
Phillips-Medisize - a Molex company
Phoenix Contact
Phoenix Mecano
Phoenix Passive Components / Vishay
Phyton, Inc.
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
PUI Audio, Inc.
PULS
Pulse Electronics Corporation
PulseCore Semiconductor / ON Semiconductor
PulseLarsen Antennas
Q-Cee's / TE Connectivity
QT Brightek
Quadcept
Qualcomm
Qualcomm (RF360 - A Qualcomm & TDK Joint Venture)
Qualtek Electronics Corp.
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
Richco, Inc. (Essentra Components)
Richtek
Riedon
Rigado
Roederstein / Vishay
ROHM Semiconductor
Rose Bopla
Rose Enclosures
Rose+Krieger
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, Airpax
Sensirion
Sensitron Semiconductor / SMC Diode Solutions
Seoul Semiconductor
Serious Integrated
Serpac Electronic Enclosures
SGX Sensortech
Sharp Microelectronics
Sierra Wireless
Sigma Designs
Sigma Inductors / TE Connectivity
Signal Transformer
SII Semiconductor Corporation
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)
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
Tag-Connect
Taitien
Taiwan Semiconductor
Taiyo Yuden
Talema
Tallysman Wireless
Talon Communications, Inc.
Tamura
Taoglas
TAOS / ams
TDK Corporation
TDK InvenSense
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 ICT
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
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
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
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
Vishay Foil Resistors
Vishay Precision Group
Vishay Precision Group / Micro-Measurements
Visual Communications Company, LLC
Vitelec / Cinch Connectivity Solutions
Volgen / Division of Kaga Electronics USA
Voltronics (Knowles)
VPG / Micro-Measurements
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	Location	Franchised Distributor	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	Buffer Stock Facility
CABLE ASSEMBLY												
FTDI	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	100	N/A	0 €		50	1,500+	Y
Molex	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	300	N/A	0 €	97%	50	1,500+	Y
CIRCUIT PROTECTION												
Bourns	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	5,000	N/A	0 €	58%	50	1,500+	Y
EPCOS/TDK	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	5,000	N/A	0 €	58%	50	1,500+	Y
Littelfuse	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	35,000	N/A	0 €	67%	50	1,500+	Y
ELECTROMECHANICAL												
BEL FUSE	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	4,207	N/A	0 €	83.53%	150	3,400	Y
CUI CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	15,168	N/A	0 €	91.34%	150	3,400	Y
MURATA CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	61,903	N/A	0 €	99.72%	150	3,400	Y
OMRON CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	70,119	N/A	0 €	95.28%	150	3,400	Y
PANASONIC CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	156,533	N/A	0 €	93.83%	150	3,400	Y
TDK CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	64,978	N/A	0 €	99.30%	150	3,400	Y
TE CONNECTIVITY CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	437,107	N/A	0 €	75.47%	150	3,400	Y
ENCLOSURES												
Bud	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,500	N/A	0 €	80%	50	1,500+	Y
Hammond	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	12,500	N/A	0 €	100%	50	1,500+	Y
Metcase Enclosures	OKW Enclosures	+44 (0) 1489 583858	www.metcase.com	EU	N/A	288	£40K	0 €	100%	5	22	Y
FREQUENCY												
ABRACON	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,000	N/A	0 €	91%	50	1,500+	Y
ECS	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	500	N/A	0 €	99%	50	1,500+	Y
Epson	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	500	N/A	0 €	59%	50	1,500+	Y
HEAT SINKS												
Aavid	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	700	N/A	0 €	67%	50	1,500+	Y
ICs & SEMICONDUCTORS												
ALLEGRO MICROSYSTEMS, LLC	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	2,867	N/A	0 €	86.22%	150	3,400	Y
Altera	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,600	N/A	0 €	60%	50	1,500+	Y
ALTERA	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	10,502	N/A	0 €	80.39%	150	3,400	Y
ANALOG DEVICES	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	50,633	N/A	0 €	73.33%	150	3,400	Y
Analog Devices Inc.	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	9,500	N/A	0 €	83%	50	1,500+	Y
Atmel	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,700	N/A	0 €	58%	50	1,500+	Y
Avago Technologies	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	400	N/A	0 €	84%	50	1,500+	Y
Broadcom	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	100	N/A	0 €	69%	50	1,500+	Y
BROADCOM LIMITED (AVAGO)	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	2,237	N/A	0 €	99.96%	150	3,400	Y
Central Semiconductor Corp.	Future Electronics	0049 40 547 277 000	www.futureelectronics.com	EU, UK	Y	N/A	N/A	N/A	N/A	N/A	N/A	Y
Cirrus Logic	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	300	N/A	0 €	80%	50	1,500+	Y
CREE INC	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	26,398	N/A	0 €	100.00%	150	3,400	Y
Cypress Semiconductor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,400	N/A	0 €	63%	50	1,500+	Y
CYPRESS SEMICONDUCTOR	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	26,030	N/A	0 €	89.02%	150	3,400	Y
DIODES INC	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	32,186	N/A	0 €	89.01%	150	3,400	Y
Diodes Incorporated	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,600	N/A	0 €	98%	50	1,500+	Y
Exar	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,100	N/A	0 €	95%	50	1,500+	Y
FAIRCHILD	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	39,380	N/A	0 €	97.62%	150	3,400	Y
Fairchild Semiconductor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,500	N/A	0 €	90%	50	1,500+	Y

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Buyers' Guide

Manufacturer	Distributor	Telephone	Website	Location	Franchised Distributor	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	Buffer Stock Facility
Freescale Semiconductor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,500	N/A	0 €	42%	50	1,500+	Y
FTDI	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	100	N/A	0 €	97%	50	1,500+	Y
FTDI	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	486	N/A	0 €	100.00%	150	3,400	Y
IDT (Integrated Device Technology)	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,100	N/A	0 €	97%	50	1,500+	Y
Infineon	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	800	N/A	0 €	66%	50	1,500+	Y
INFINEON TECHNOLOGIES CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	24,610	N/A	0 €	85.64%	150	3,400	Y
Intel	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	500	N/A	0 €	78%	50	1,500+	Y
International Rectifier	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	600	N/A	0 €	87%	50	1,500+	Y
Intersil	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,900	N/A	0 €	50%	50	1,500+	Y
INTERSIL CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	24,063	N/A	0 €	74.18%	150	3,400	Y
ISSI	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	700	N/A	0 €	98%	50	1,500+	Y
IXYS CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	7,268	N/A	0 €	99.55%	150	3,400	Y
Lattice	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	700	N/A	0 €	69%	50	1,500+	Y
LINEAR TECHNOLOGY CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	36,207	N/A	0 €	76.91%	150	3,400	Y
MAXIM CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	65,795	N/A	0 €	77.63%	150	3,400	Y
Maxim Integrated	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	11,200	N/A	0 €	67%	50	1,500+	Y
Microchip	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	12,600	N/A	0 €	91%	50	1,500+	Y
MICROCHIP CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	58,558	N/A	0 €	90.13%	150	3,400	Y
Microsemi	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	400	N/A	0 €	90%	50	1,500+	Y
Monolithic Power Systems (MPS)	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	600	N/A	0 €	40%	50	1,500+	Y
NXP	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	3,900	N/A	0 €	91%	50	1,500+	Y
NXP SEMICONDUCTOR CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	38,701	N/A	0 €	99.27%	150	3,400	Y
ON Semiconductor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	5,100	N/A	0 €	87%	50	1,500+	Y
ON SEMICONDUCTOR CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	57,566	N/A	0 €	79.85%	150	3,400	Y
Power Integrations	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	600	N/A	0 €	59%	50	1,500+	Y
Qorvo	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	300	N/A	0 €	90%	50	1,500+	Y
ROHM Semiconductor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,400	N/A	0 €	55%	50	1,500+	Y
SEMTECH CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	3,694	N/A	0 €	87.63%	150	3,400	Y
Silicon Laboratories	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,500	N/A	0 €	96%	50	1,500+	Y
SILICON LABORATORIES CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	17,747	N/A	0 €	96.09%	150	3,400	Y
Skyworks	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	300	N/A	0 €	91%	50	1,500+	Y
Spansion Inc.	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	600	N/A	0 €	93%	50	1,500+	Y
STMicroelectronics	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,500	N/A	0 €	99%	50	1,500+	Y
STMICROELECTRONICS CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	43,448	N/A	0 €	97.47%	150	3,400	Y
Texas Instruments	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	36,900	N/A	0 €	41%	50	1,500+	Y
TEXAS INSTRUMENTS CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	210,905	N/A	0 €	89.60%	150	3,400	Y
Toshiba	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	500	N/A	0 €	100%	50	1,500+	Y
XILINX INC	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	7,354	N/A	0 €	51.78%	150	3,400	Y
INTERCONNECTION												
3M	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	3,100	N/A	0 €	16%	50	1,500+	Y
3M	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	54,086	N/A	0 €	93.83%	150	3,400	Y
Amphenol	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	25,600	N/A	0 €	53%	50	1,500+	Y
Amphenol	PEI Genesis	+44 8716060	www.peigenesis.com	EU	Y	N/A	£1.3m	10 €	N/A	N/A	85	Y
AMPHENOL	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	426,945	N/A	0 €	82.42%	150	3,400	Y
Anderson Power Products	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	800	N/A	0 €	50%	50	1,500+	Y
Cinch Connectivity Solutions	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,900	N/A	0 €	82%	50	1,500+	Y
Delphi Connection Systems	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	3,300	N/A	0 €	67%	50	1,500+	Y
FCI	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,300	N/A	0 €	94%	50	1,500+	Y
Glenair	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,900	N/A	0 €	76%	50	1,500+	Y
HARTING	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,700	N/A	0 €	31%	50	1,500+	Y

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INTERCONNECTION (Continued)												
Harwin	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,200	N/A	0 €	79%	50	1,500+	Y
Hirose Electric	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	6,100	N/A	0 €	99%	50	1,500+	Y
HIROSE ELECTRIC CO LTD	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	39,499	N/A	0 €	91.53%	150	3,400	Y
Hirose Electric Europe B.V		0031-(0)2 655 7460	www.hirose.com/eu	EU	Y	50,000	N/A	0 €	N/A	N/A	4,190	Y
ITT Cannon	PEI Genesis	+44 8716060	www.peigenesis.com	EU	Y	N/A	£1.3m	10 €	N/A	N/A	85	Y
JAE Electronics	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,200	N/A	0 €	32%	50	1,500+	Y
JST SALES AMERICA INC	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	4,320	N/A	0 €	81.46%	150	3,400	Y
Kycon	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	700	N/A	0 €	99%	50	1,500+	Y
LEMO	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,900	N/A	0 €	65%	50	1,500+	Y
Molex	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	16,900	N/A	0 €	75%	50	1,500+	Y
MOLEX CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	123,772	N/A	0 €	95.41%	150	3,400	Y
Neutrik	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,000	N/A	0 €	86%	50	1,500+	Y
ODU		+49 8631 6156-0	www.odu.de	EU, USA, ASIA			N/A	0 €	N/A	50	1,650	
Phoenix Contact	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	12,000	N/A	0 €	99%	50	1,500+	Y
Switchcraft	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,200	N/A	0 €	69%	50	1,500+	Y
TE Connectivity	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	30,900	N/A	0 €	40%	50	1,500+	Y
OBSOLESCENCE / HARD TO FIND												
	America II Electronics	01462 707070	www.americaii.com	EU, G, UK	N	1,900	$1B	0 €	75%	59	550+	Y
OPTO ELECTRONICS												
Avago Technologies	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	8,200	N/A	0 €	89%	50	1,500+	Y
Cree, Inc.	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	22,500	N/A	0 €	74%	50	1,500+	Y
Dialight	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	9,800	N/A	0 €	99%	50	1,500+	Y
Kingbright	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	3,100	N/A	0 €	100%	50	1,500+	Y
Lumileds	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,100	N/A	0 €	99%	50	1,500+	Y
Newhaven Display	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	700	N/A	0 €	65%	50	1,500+	Y
Osram Opto Semiconductor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,800	N/A	0 €	99%	50	1,500+	Y
VCC	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	5,000	N/A	0 €	92%	50	1,500+	Y
Vishay	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	3,100	N/A	0 €	99%	50	1,500+	Y
PASSIVES												
ABRACON CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	28,548	N/A	0 €	98.89%	150	3,400	Y
AVX	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	70,700	N/A	0 €	58%	50	1,500+	Y
Bourns	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	49,500	N/A	0 €	98%	50	1,500+	Y
BOURNS	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	59,314	N/A	0 €	82.47%	150	3,400	Y
Coilcraft	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	10,400	N/A	0 €	98%	50	1,500+	Y
Cornell Dubilier	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	33,000	N/A	0 €	65%	50	1,500+	Y
EATON CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	28434	N/A	0 €	86.49%	150	3,400	Y
EPCOS / TDK	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	31,000	N/A	0 €	74%	50	1,500+	Y
Fair-Rite	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,000	N/A	0 €	94%	50	1,500+	Y
HONEYWELL CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	26,319	N/A	0 €	86.01%	150	3,400	Y
Kemet	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	135,800	N/A	0 €	93%	50	1,500+	Y
Kemet	RS Components	08457 201201	www.rs-components.com	EU	Y	N/A	£161m	0 €	N/A	50+	2,500	Y
KEMET CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	48,025	N/A	0 €	90.12%	150	3,400	Y
KOA Speer	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	107,900	N/A	0 €	82%	50	1,500+	Y
KYOCERA ELECTRONICS CORPORATION (AVX)	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	65,718	N/A	0 €	83.48%	150	3,400	Y
LAIRD CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	14,568	N/A	0 €	97.21%	150	3,400	Y
Laird Technologies	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,800	N/A	0 €	50%	50	1,500+	Y
LITTELFUSE CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	86,652	N/A	0 €	82.87%	150	3,400	Y

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Murata	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	67,300	N/A	0 €	99%	50	1,500+	Y
Nichicon	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	21,600	N/A	0 €	47%	50	1,500+	Y
NICHICON	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	35,421	N/A	0 €	96.30%	150	3,400	Y
Ohmite	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	17,300	N/A	0 €	99%	50	1,500+	Y
Panasonic	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	67,900	N/A	0 €	69%	50	1,500+	Y
PULSE CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	11,098	N/A	0 €	93.56%	150	3,400	Y
ROHM SEMICONDUCTOR CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	63,003	N/A	0 €	99.85%	150	3,400	Y
SAMSUNG ELECTRO-MECHANICS	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	21,522	N/A	0 €	100.00%	150	3,400	Y
Taiyo Yuden	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	6,400	N/A	0 €	82%	50	1,500+	Y
TAIYO YUDEN	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	16,677	N/A	0 €	99.96%	150	3,400	Y
TDK	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	25,300	N/A	0 €	85%	50	1,500+	Y
TT Electronics	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	32,800	N/A	0 €	55%	50	1,500+	Y
United Chemi-Con (UCC)	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	13,900	N/A	0 €	99%	50	1,500+	Y
Vishay	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	119,800	N/A	0 €	76%	50	1,500+	Y
VISHAY CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	275,942	N/A	0 €	88.52%	150	3,400	Y
WURTH CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	22,245	N/A	0 €	100.00%	150	3,400	Y
Wurth Electronics	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,500	N/A	0 €	63%	50	1,500+	Y
Würth Elektronik	Würth Elektronik	+49 (0) 7942 945 0	www.we-online.com	EU	Y	N/A	N/A	0 €	100%	250	4,000	Y
Yageo	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	45,300	N/A	0 €	99%	50	1,500+	Y
YAGEO CORPORATION	Digi-Key	1-800-552-170	digikey.com/europe	EU	Y	141,986	N/A	0 €	83.67%	150	3,400	Y
POWER & BATTERIES												
Bel Power Solutions	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,400	N/A	0 €	94%	50	1,500+	Y
Cincon	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	5,500	N/A	0 €	60%	50	1,500+	Y
Cosel	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	11,800	N/A	0 €	99%	50	1,500+	Y
CUI Inc.	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	3,900	N/A	0 €	100%	50	1,500+	Y
Mean Well	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,500	N/A	0 €	75%	50	1,500+	Y
Murata	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	5,200	N/A	0 €	93%	50	1,500+	Y
RECOM	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	23,300	N/A	0 €	92%	50	1,500+	Y
Sanyo Electronic Industries Co., Ltd.	Sanyo Electronic Industries Co., Ltd.	+81 36699 8080	www.eta.co.jp	JP	N	1,000	€3000k	20 €	90%	10	100	Y
Schaffner	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	900	N/A	0 €	98%	50	1,500+	Y
SL Power	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,100	N/A	0 €	87%	50	1,500+	Y
TDK-Lambda	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,600	N/A	0 €	99%	50	1,500+	Y
TRACO Power	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	3,400	N/A	0 €	95%	50	1,500+	Y
SENSORS												
All Sensors	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,300	N/A	0 €	70%	50	1,500+	Y
ams	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	400	N/A	0 €	77%	50	1,500+	Y
Analog Devices Inc.	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	500	N/A	0 €	78%	50	1,500+	Y
Bosch	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	100	N/A	0 €	94%	50	1,500+	Y
Freescale Semiconductor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,000	N/A	0 €	66%	50	1,500+	Y
Honeywell	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	15,500	N/A	0 €	80%	50	1,500+	Y
Maxim Integrated	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	900	N/A	0 €		50	1,500+	Y
Melexis	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	700	N/A	0 €		50	1,500+	Y
Omron	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	5,700	N/A	0 €		50	1,500+	Y
Sensirion	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	100	N/A	0 €		50	1,500+	Y
TE Connectivity	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,100	N/A	0 €		50	1,500+	Y
SWITCHES & KEYBOARDS												
ALPS	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	400	N/A	0 €	70%	50	1,500+	Y
Apem	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	700	N/A	0 €	96%	50	1,500+	Y

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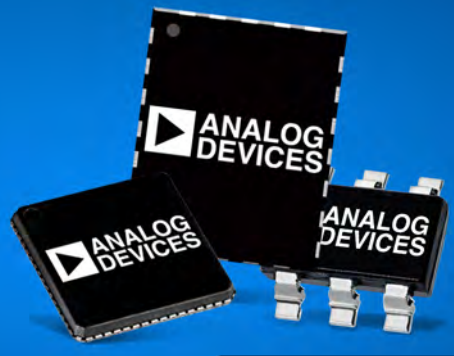

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SWITCHES & KEYBOARDS (Continued)												
C&K Components	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,500	N/A	0 €	84%	50	1,500+	Y
Carling Technologies	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	300	N/A	0 €	87%	50	1,500+	Y
CHERRY	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	200	N/A	0 €	77%	50	1,500+	Y
CHERRY	RS Components	08457 201201	www.rs-components.com	EU	Y	600	N/A	0 €	N/A	50+	3,500+	Y
E-Switch	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	700	N/A	0 €	94%	50	1,500+	Y
Grayhill	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	400	N/A	0 €	84%	50	1,500+	Y
Honeywell	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	700	N/A	0 €	98%	50	1,500+	Y
NKK Switches	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,100	N/A	0 €	94%	50	1,500+	Y
Omron	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	900	N/A	0 €	68%	50	1,500+	Y
Rubbertech 2000	Rubbertech 2000	+44 1594 826019	www.rubbertech2000.co.uk	EU	N/A	N/A	£40k	100 €	N/A	N/A	25	Y
TE Connectivity	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	400	N/A	0 €	98%	50	1,500+	Y
THERMAL MANAGEMENT												
ADDA	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	800	N/A	0 €	59%	50	1,500+	Y
Delta Electronics	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	500	N/A	0 €	28%	50	1,500+	Y
ebm-papst	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,200	N/A	0 €	99%	50	1,500+	Y
Sanyo Denki	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,900	N/A	0 €		50	1,500+	Y
WIRELESS												
Anaren	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	100	N/A	0 €	86%	50	1,500+	Y
B&B Electronics	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	100	N/A	0 €	87%	50	1,500+	Y
Bluegiga Technologies	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	100	N/A	0 €	93%	50	1,500+	Y
Digi International	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	200	N/A	0 €	92%	50	1,500+	Y
Laird Technologies	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	100	N/A	0 €	76%	50	1,500+	Y
Linx Technologies	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	100	N/A	0 €	99%	50	1,500+	Y
Microchip	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	100	N/A	0 €	85%	50	1,500+	Y
Murata	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	100	N/A	0 €	100%	50	1,500+	Y
Panasonic	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	100	N/A	0 €	91%	50	1,500+	Y
Redpine Signals	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	100	N/A	0 €	94%	50	1,500+	Y
RF Digital	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	100	N/A	0 €	100%	50	1,500+	Y
Texas Instruments	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	100	N/A	0 €	75%	50	1,500+	Y
Wi2Wi	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	100	N/A	0 €	36%	50	1,500+	Y

PCB Buyers' Guide

Manufacturer	Telephone	Website	Service Provided (i.e Broker, Manufacture &/or Repair)	Location	Approvals	Volume - Small, Medium, Large	Double-sided	Multi-layer 4-10/10-20-20-30	Metal PCBs	Flexi / Flexi-Rigid	Obsolescence Solutions	Modifications	Prototyping
Elvia PCB Group	+33 233 763 200	www.gepcb.com	M/B	France, Tunisia, China	AS9100, PRI-NADCAP, ISO-TS16949, ESA, UL, ISO9001, ISO14001	S/M/L	Y	1-30	Y	F, F/R	Y	Y	Y
Graphic Plc	00441363 774874	www.graphic.plc.uk	M	UK/China	AS9100, NADCAP, ISO 9001, AISO14001, OHSAS 18001, Mil 31032, Mil 55110, Mil 50884	S/M/L	N	4-10	Y	Y	N	Y	Y

Contract Manufacturers Buyers' Guide

Manufacturer	Telephone	Website	Turnover	Location	Approvals	Employees	Number of Surface Mount Lines	BGA Capacity	Lead Free Manufacturer	Prototyping	Design Capability	Full Turnkey	Cables and Harnessing
AWS Electronics Group	+44 (0)1782 753200	www.awselectronicsgroup.com	£40m	UK & Slovakia	AS9100, ISO9001, 13485, 14001, TS16949, IPC-A-610 Class 3, NADCAP	430	11	Y	Y	Y	Y	Y	Y

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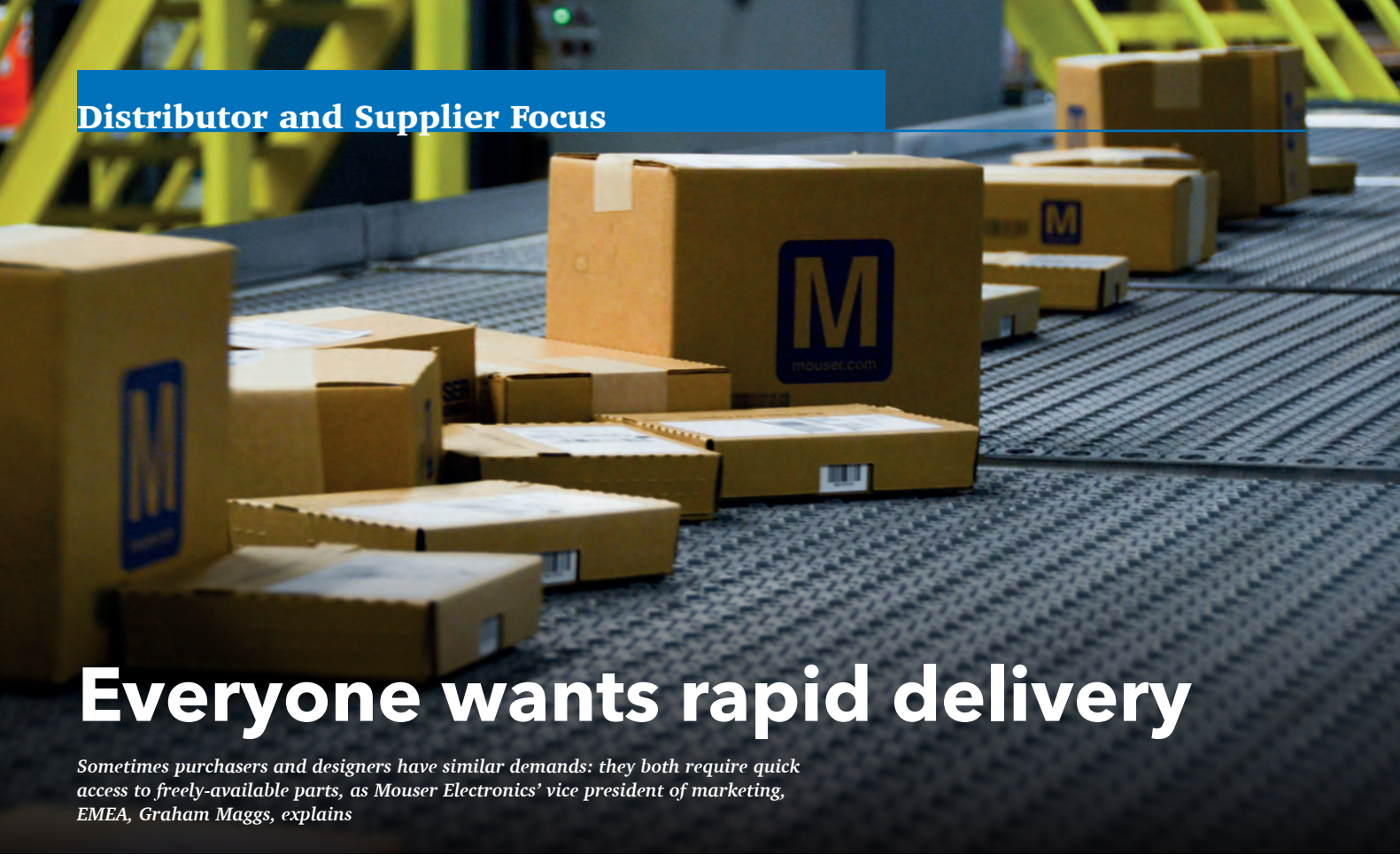

Everyone wants rapid delivery

Sometimes purchasers and designers have similar demands: they both require quick access to freely-available parts, as Mouser Electronics' vice president of marketing, EMEA, Graham Maggs, explains

It may seem counter-intuitive, but sometimes the needs of the purchaser and the designer coincide. For the purchaser, this may be because they have been let down and are facing the extreme prospect of a manufacturing line standstill for want of a specific part. For the design engineer, having immediate access to the latest technology means new projects gain competitive edge by increasing performance and adding functionality.

The answer for both situations is the same — they need a distributor that believes in holding stock. This may seem obvious, but inventory is expensive. Mouser president, Glenn Smith, takes a different view. He sees inventory as Mouser's 'secret sauce', except that Mouser doesn't mind sharing the secret: having a broad inventory selection is the central pillar of its business model. Those who need parts fast, for whatever reason, should visit Mouser's website.

Investing in service

Of course, having a wide and freely-available inventory is only part of the solution. In order to achieve the rapid delivery of components anywhere in the world, Mouser has to provide best-in-class customer service.

In Europe, Mouser delivers to most locations within two days. To support this, the company has invested heavily at its worldwide headquarters and warehouse in Texas. Selection, speed and accuracy are the core principles of the warehouse team, with sophisticated equipment enabling orders to be processed 24/7.

A wireless warehouse management system provides nearly perfect pick-and-ship operations, delivering a five-Sigma confidence rating, better than 99 per cent. Orders are processed and ready to ship in 15 minutes in most cases, enabling same-day shipping on most orders to nearly 500,000 customers in 170 countries.

Providing BOM tools

Another part of achieving great customer service is providing customers with the tools they need to be more effective. Mouser hosts a range of free, online tools for all business functions.

The most recent addition is Forte, an intelligent BOM tool that quickly evaluates millions of parts to improve order accuracy, save time and increase confidence in specifying and purchasing semiconductors and electronic components. Even better, it's free to anyone with a My Mouser account.

Key features of the tool include a time-saving, one-step BOM spreadsheet importer that maintains customers' original format. Using this interface, buyers can access millions of orderable part numbers online, adding and deleting parts, with visibility on multiple quantities and prices.

Where only partial part numbers or descriptions are available, software analysis can intelligently suggest parts. Design risk indicators help buyers match and choose the best parts for a design, as well as recommending alternative products to reduce design and product lifecycle risks.

Despite investment in automation and online tools, Mouser also recognises that sometimes customers need to speak to someone, in their own language and time zone, who understands their business culture. To this end, local support has not been centralised. In Europe, Mouser operates nine offices that can provide help and information at a personal level.

So, from initial conceptualisation right through to manufacture, Mouser is set up to provide fast, accurate and intelligent support.

www.mouser.co.uk

Selection, speed and accuracy are the core principles of the warehouse team, with sophisticated equipment enabling orders to be processed 24/7

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