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On the cover – August 2019

Electric aircraft: flight of fancy?

Editor's Word



Electric aircraft: flight of fancy?

The ease at which an electronics purchasing professional can access the components they need, at a time of their choosing and an agreeable price is essentially down to supply and demand. Significant variables which upset this ratio range from the rise and fall in the availability of consumer debt to the mass adoption of new technology.

Regarding the latter, electrification is a case in point. Automotive may be the most obvious driver, but other sectors are joining the race, including aerospace. To me, it was always interesting that the thought of electrically powering a drone is considered common sense, yet the idea of electrically powering an airliner seems madness.

So I took it upon myself to find out more and after many hours studying the principles of powered flight it appears that electrification is a question of scale. Handheld drone, yes. Light aircraft, just. Airliner, no. If I recall correctly, battery power density needs to improve 40x before the idea of transporting large numbers of people over long distances becomes a reality.

Given enough time and money this will eventually happen. However, that's not the point. In the here and now, incremental improvements will feed the existing ability to electrify light aircraft which represents a huge global industry.

Let's hope this new demand feeds into the industry at a pace which power component manufacturers can accommodate.

Jon Barrett

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Buyers' Guide

All the facts and figures to help you buy



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Sourcing secure IoT solutions?

Arrow Electronics has announced a global agreement with Infineon and Arkessa that will further extend Arrow's ability to support secure cellular communications for the internet of things.

Infineon will provide secured hardware controllers based on GSMA's Embedded Subscriber Identity Module (eSIM) specification, while Arkessa will provide secured mobile data services with the ability to provision and manage IoT devices from the factory into the field.

Thus, Arrow customers can obtain all the technology and service elements required to provide consistent connectivity for IoT devices, underpinned by security features from Infineon and flexible network access and provisioning by Arkessa. eSIMs provide for greater security and reliability in multiple IoT applications and can be flexibly coupled with cellular, NB-IoT, and LTE-M services from Arkessa.

Vice president IoT, Arrow Electronics, Aiden Mitchell, said: "Cellular communication is an increasingly important strand of IoT. This new agreement will enable organisations to take advantage of the latest technologies to execute connected device strategies, using secure cellular services at scale, without being dependent on their clients' networks."

www.arrow.com

IoT modules in stock

Mouser Electronics is now stocking the SKY85726-11 front end module from Skyworks Solutions. This 5GHz WLAN device is ideal for Wi-Fi 6 based internet of things systems, offering a fully integrated solution in a three by three millimetre form factor.

In this single 16-pin QFN device, Skyworks offers a 5GHz power amplifier, single-pole double-throw transmit-receive switch, and low noise amplifier with bypass mode. LNA and PA disable functions help ensure low leakage current in off mode and an integrated power detector provides closed-loop power control within the system. The device also boasts excellent linearity with high gain and 50dB antenna for isolation.

www.mouser.com

Franchise adds over 1,400 power products

Farnell is enhancing its power supplies range with a new global franchise agreement with Mean Well. As a result, Farnell will stock over 1,400 lines including DC/DC converters, AC/DC converters, DIN rail mount converters, enclosed output converters, LED drivers and more.

Products stocked by Farnell will be available for same day shipping from warehouses in the UK and mainland Europe.

Global head of IP&E at Farnell, Simon Meadmore, said: "This new global franchise with Mean Well further expands our strong product range for power suppliers adding tremendous value and increased choice for customers."

www.premierfarnell.com



New HQ extends UK support

Semiconductor specialist, Analog Devices has established a new UK headquarters in Hayes, London, a location which will strengthen its ability to connect customers with engineering talent.

By locating its new office in London, close to Heathrow airport, the new site is convenient for Analog Devices' domain specialists in other locations such as Germany, the US and Ireland. These technology and applications experts can now take part more easily in UK customer meetings hosted by Analog Devices.

The new office also underpins the company's plans for UK growth, with capacity to accommodate customer meetings, visits by field engineers, training facilities and an expanding staff headcount.

EMEA sales director for mobility, Shalini Palmer, commented: "The UK is a hub of innovation and knowledge with many world-class companies in specific technology domains—the market is large, but fragmented. That means you need a prominent and enduring presence if you are going to be successful here. This impressive new office is a signal to the UK market that Analog Devices is in the UK for the long term and committed to providing all the technology and applications support that British customers need."

www.analog.com

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In Brief

Faster IoT PCBs

Eurocircuits has introduced a new defined impedance PCB pool service set to meet the needs of internet of things applications. With many IoT connections based on 50ohm characteristic and 90ohm differential impedance transmission lines, the new service is based on four, six and eight layer builds and uses one material with a guaranteed dielectric constant. Standard delivery is five working days. www.eurocircuits.com

Cutting IIoT complexity

Harting is cooperating with TE Connectivity to set single pair Ethernet as the de-facto infrastructure solution for the industrial internet of things. There are several SPE standards in IEEE 802.3, with the latest, 802.3cg 10Base-T1, for distances up to 1 km, released this year. According to Harting and TE Connectivity, SPE allows for a single open, scalable Ethernet-based network within the automation system, reducing complexity and cost. www.harting.com

Distribution centre expands

Mouser Electronics is expanding its global headquarters in Texas, adding more than 125,000ft² to the distribution centre, as well as a new 50,000ft² office building. The expansion, which meets future plans and responds to rapid growth in IoT, electric vehicles, artificial intelligence, robotics and 5G, will bring Mouser's total space to one million square feet, accommodating an inventory of one million unique SKUs. www.mouser.com

Reliability under pressure

When Protronix EMS was recently tasked by an academic research team to build a sensor to monitor pressure and other factors 2km below a glacier, it was able to meet tight turnaround requirements with completion in just one week. Despite the time constraints, the boards were collected, fully tested, and ready for a flight straight to Greenland. Protronix.co.uk



Passives portfolio steps up a gear

RS Components has announced a new global franchise agreement with passive component specialist, Yageo. One key product type now available from RS is Yageo's portfolio of chip resistors, including general-purpose thick-film components and thin-film high-precision high-stability resistors. Other highlights include automotive-grade components, current sensing devices, resistor array networks, high-voltage and surge resistors, RF attenuators, and sulphur-resistant devices.

Vice president product management for board level electronics at RS, Andy Keenan, commented: "This is a major global franchise agreement that means our passive component portfolio really steps up a gear. Bringing on board a world-leading maker in the form of Yageo solidifies our position as a major source of chip resistors and other passive devices, providing engineers and members of our DesignSpark community with a further alternative source of these important components."

uk.rs-online.com

Wireless connectivity made simple

Now available from Rutronik UK, the RS13100 Wireless MCU from Redpine Signals is an ultra-low power dual-mode system on chip with Bluetooth 5 and 802.15.4 capable of running ZigBee or Thread. It boasts the connectivity options and processing power for audio, data transfer, location and controlling applications, making it ideal for wearables, home automation, industrial automation, lighting and home appliances.

Based on an ARM Cortex M4F with up to 180MHz performance, up to 4MB dedicated flash and up to 400kB RAM, this SoC is designed to handle even demanding operations efficiently. To create a highly secure system, the RS13100 includes multiple levels of security including physically unclonable function, cryptographic hardware accelerators, secure boots and secure zone.

www.rutronik.com

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Customised enclosures delivered overnight

Demand for customised plastic enclosures prompted Spelsberg UK to invest in a centre of machining excellence at its Telford headquarters. With four CNC machines, each capable of a variety of secondary customisation processes, Spelsberg can provide first samples within 24 hours.

Each of the CNC machines features interchangeable bed fixtures, which allows any two or more of them to be set up to run the same job. With milling, drilling, countersinking, tapping and engraving capabilities available on all four CNC machines, Spelsberg can rapidly produce multiple units.

This ensures complex customisation needs can be met quickly, including non-round holes, counter sinking, chamfering and thread cutting. Logos, diagrams, other graphics and vital safety instructions can also be milled permanently into the enclosures.

Skilled staff support the service for fast turnaround and right-first-time operations.

www.spelsberg.co.uk

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ECS

The Electronic Component Show

Exciting new event supports purchasing professionals

MMG Publishing is delighted to announce the launch of **The Electronic Component Show**. Set to take place on 14 May 2020 at the Double Tree Hilton Hotel, Stadium MK in Milton Keynes, the one-day event will be supported by *Electronics Sourcing* magazine and by the *eBOM* website, making ECS an important addition to the electronics industry calendar.

The event aims to bring design engineers and purchasing professionals together with component manufacturers and distributors for a one-day table-top exhibition and seminar program. This makes ECS the perfect platform to network with customers and suppliers, meet new contacts and boost visibility within the industry.

Organised to run simultaneously alongside the exhibition, the informative seminar schedule is tailored for design engineers and component purchasers. Seminars will discuss current topics, highlight

industry challenges, and explore what the future holds.

Managing director of MMG Publishing, Mark Leary, revealed: "We have identified the need for a one-day table-top exhibition and seminar program specifically for UK electronics design engineers and procurement professionals. The blueprint for ECS is to provide visitors with a productive and beneficial day at the show discovering the latest components, technologies and innovations available to them.

"Exhibitors will benefit from three adverts in *Electronics Sourcing UK* or three months exposure on *eBOM.com*, as well as receiving their tabletop for free. Jack Pollard, formerly of CIE, joined MMG in July to head up the sales and direction of ECS moving forwards."

To book a stand or find out more, please contact 01892 613400, or email ecs-sales@electronic-component-show.co.uk

www.electronic-component-show.co.uk



Guide helps purchasers meet medical legislation

XP Power's new medical power supplies guide provides useful information for those seeking the optimum power solution for their project, incorporating an overview of XP Power, including its quality systems, manufacturing facilities and compliance regime.

Of particular benefit to specifiers is a quick reference guide to the main requirements of the latest standards within the medical arena. This is invaluable in ensuring that the products selected will meet the latest legislation. Throughout the guide, safety and

compliance related parameters and associated approvals are clearly indicated for each product series.

All XP Power medically focused power solutions are detailed, including AC/DC and DC/DC products, plus a number of specialist medical solutions that are not shown in XP Power's main catalogue. The guide also highlights several application examples including customised products supplied with full approvals.

www.xppower.com



Online orders fulfilled with ease

Switchtec has improved its productivity and efficiency with a new e-commerce website and upgraded software support. The company, which specialises in the supply of electromechanical, electrical and electronic components, carries over seven thousand product lines ex-stock, ready for despatch. Now, with its expanded on-line offering developed by OGL Computer, Switchtec has enhanced access to the range.

Previously, Switchtec had limited e-commerce presence and used bespoke software, manual processes and a separate customer relationship management system. Recognising the need for improvement, Switchtec launched a new e-commerce website using eShop, and overhauled its business processes by implementing an integrated CRM, accounts and purchasing software, called prof.ITplus.

Implementing the e-commerce website was a major step in expansion for Switchtec, with the added benefit of offering no minimum order value for online purchases. In addition to eShop, the prof.ITplus enterprise resource planning software has introduced more automation, streamlining the order process and improving stock management.

www.ogl.co.uk
www.switchtec.com

Searching for space savings?

Specialist distributor, TTI, can now supply Molex's PicoBlade wire-to-board and wire-to-wire connector series featuring a 1.25mm pitch with four header options.

Ideal for applications where space is limited and designed with reliability in mind, the connectors feature a two-point-contact design to maintain a reliable electrical connection under low current, low voltage and high-vibration conditions. Two latching ramps in the crimp receptacle also help minimise the possibility of accidental unmating due to mishandling or vibration.

Director supplier marketing Europe connectors, TTI Europe, Ronald Velda, said: "PicoBlade connectors can save approximately 45 per cent of PCB space, compared to 2.00mm wire-to-board systems, helping customers optimize available space in their applications, without compromising performance or durability."

www.ttieurope.com



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A healthy approach to medical purchasing

Stringent safety standards are a priority in any medical product, particularly one that connects directly to the patient. Selecting electronic components with appropriate approvals is key, explains TTI

As people become more concerned about their health and wellbeing, there are many new medical-grade products entering the market, for both professional and home use. Since most of these devices connect directly to the patient, and a significant proportion are powered from mains voltages, there are stringent safety requirements that must be met before the product can be offered for sale.

Vital regulatory requirements

IEC60601 is the central standard that defines the regulatory requirements

for medical devices, encompassing several standards that relate to the safety of electrical/electronic equipment used in healthcare. The standard was first published around 40 years ago and has progressed significantly to meet the needs of evolving medical technology. Its primary aim is to ensure the safety of both the patient and any medical professional operating the equipment in normal use, and in the event of any failure.

The requirements for products and their components vary depending

on their intended use. Clearly, the requirements for a life-support device will be somewhat more stringent than those for, say, a blood glucose meter. For this reason, the fourth edition of the standard, introduced in 2019, defines 'intended use environments' along with specific requirements for each environment.

Selecting components that have the requisite approvals is key to all medical purchasing. Alongside the IEC60601 requirements, UL safety approvals are often required, as is CE marking.



C&K medical device switches are robust, waterproof and easy to clean



While electrical safety is incredibly important, there are also other, more subtle requirements for medical devices

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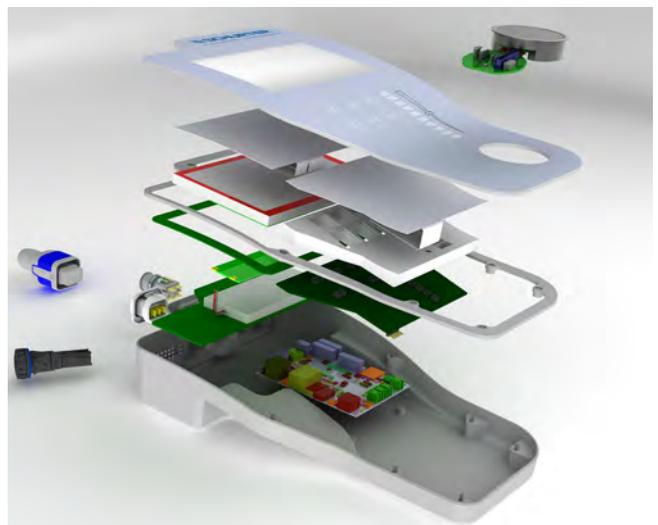
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Simplify safety approval

By designing-in and procuring components with relevant safety approvals, significant time and cost can be saved, as the process of achieving safety approval on the end-product is greatly simplified. Many manufacturers have specialist component ranges that are intended for medical applications, with all the relevant certifications listed on the datasheet. However, purchasing professionals should ensure that the components are certified as compliant with the latest version of the standard, particularly IEC60601, which moved from the third to the fourth edition in early 2019.

While electrical safety is incredibly important, there are also other, more subtle requirements for medical devices. Cleanliness and hygiene, for instance, are critically important. Devices that are typically used with one patient, then another, are cleaned regularly, often several times per day. This may involve liquids which, if they get inside the device, can cause failure.

Potential areas of liquid ingress include items such as push buttons, switches and connectors. Many of these components are available in waterproof versions, as defined by their ingress protection rating, which is also mentioned on manufacturers' datasheets.

Select an experienced supplier

Apart from the components themselves, selecting the right supplier is always a key decision. While it is possible to scour

manufacturers' websites to select individual components, it is often a better approach to work with a specialist distributor that has dedicated teams of technical experts available for support.

In addition to medical-sector expertise, TTI stocks an array of components and subsystems certified for use in medical applications. One of the most important elements in terms of safety is the power supply, as a failure of this device could cause a patient to be directly connected to the mains supply. TTI therefore carries a variety of medically certified power supplies from manufacturers such as Artesyn, Mean Well and Murata, which can be used with confidence.

Other highlights include reliable tactile switches from suppliers such as C&K Switches, which are robust, waterproof and easy to clean, making them ideal for front panel use in medical devices. Connectors are also important as they allow sensors to be changed rapidly, as well as facilitating the use of disposable probes for hygiene reasons. Eclipta edge card connectors from Smiths Interconnect, for example, are widely used in medical applications.

In short, the key to procuring components for medical applications is to know the standards relevant to your application, check for appropriate certification and work with experienced suppliers, such as TTI, that can guide you through the range of options available.

www.ttieurope.com

Eclipta connectors from Smiths Interconnect are widely used in medical applications



Medically certified power supplies ensure patient safety



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Buyers want more from distributors

Distributors have invested more in supply chain and design services, enhanced and enlarged warehouses and other facilities and expanded into new regions to attract new customers and gain more business with existing ones



James Carbone

Electronics distribution in North America has always been a competitive business, but it has become increasingly fierce over the last 10 years as OEMs and electronics manufacturing services (EMS) expect more from their distributors than just supplying components.

They expect their distributors to help them reduce total cost of ownership and time-to-market by providing a wide range of services including design and technical expertise, risk mitigation, supply chain, inventory services, forecasting and market intelligence. Many OEMs expect distributors to keep them apprised of technology advances and identify new business opportunities.

To be competitive and gain more business from existing customers and win business from new ones, OEMs and EMS providers want their distributors to be partners, not just parts purveyors.

Most electronics distributors have answered the clarion call and have invested in warehouse space, vendor managed inventory programs, design, and procurement tools and have beefed up their websites to provide as much relevant information as possible to buyers and engineers. Some have made strategic acquisitions to boost capabilities in specific technologies and components such as solid-state lighting, sensors, or specialised semiconductors.

Many distributors have decided to remain competitive they can no longer just service the North American market. Many have expanded operations to Europe and Asia to serve OEMs and EMS providers that have shifted manufacturing overseas. Distributors are also looking to attract new OEM and EMS customers in Europe and Asia that may not have used U.S.-based distributors in the past.

Competing overseas

Many distributors have boosted their overall sales in Europe and Asia. One distributor that has proven to be a strong competitor in Europe and Asia is Mouser Electronics, which specialises in providing components for design and prototypes.

Kevin Hess, Mouser's senior vice president of marketing, said that design used to mainly occur in the U.S. "But now you also have Germany, Korea, Japan and China more involved in design rather than just manufacturing," he said. "The opportunity for a company like Mouser moving forward is outstanding."

In fact, overseas sales were outstanding in 2018 for Mouser. The distributor grew its European sales 45 per cent and its revenue in Asia Pacific 49 per cent.

"Europe has been our most consistent growing region," said Pete Shopp, senior vice president, business operations for Mouser. It's now 30 per cent of our total sales. Last year, Asia was our fastest growing region with 49



Kevin Hess, senior vice president of marketing for Mouser Electronics

"The opportunity for a company like Mouser moving forward is outstanding"

per cent growth, but that was really the first time Asia had been the fastest growing region."

While Mouser has posted strong sales growth in Europe and Asia, the Americas still account for 45 per cent of Mouser's overall business. While Europe represents 30 per cent and Asia, 25 per cent. However, those percentages are changing. Ten years ago, 95 per cent of Mouser's business was the US. In the future, each region will probably represent a third of Mouser's sales, said Shopp.

Mouser's customers cut across virtually every industry and its business grows every year because of its focus on design. While demand for electronics equipment will wax and wane,

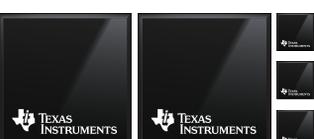
OEMs are always designing new products and supplying parts for new product introduction is at the core of Mouser's business.

Focus on automation

While many distributors are growing sales in Europe and Asia, some are finding success in North America by focusing on a limited number of products and customer segments. One example is Allied Electronics.

"Our main focus is on industrial automation," said Dan Stewart, vice president of marketing and e-commerce at Allied Electronics. Industrial automation spans various vertical markets including oil and gas, food, beverage, pharmaceuticals, water/wastewater and any type of

Mouser has the largest selection of authorized Texas Instruments products in stock





machine builder.

Allied supplies a range of components for machines used in factories. "I'm talking about power supplies, relays, programmable logic devices (PLD) PLCs and then there are things connected to that so wires and cabling, connectors and sensors," said Stewart. He said Allied does not focus on board-level sensors, but larger closed sensors used on the factory floor.

He said the distributor is well positioned to service the industrial automation segment. "Our position right now is better than anyone else's," said Stewart. "We have the suppliers and a portfolio of products that no one else can match by a wide margin," said Stewart.

Allied supplies to the two main customer segments in factory automation, according to Stewart. "One is OEM machine manufacturers building industrial equipment of some sort or another," he said. A good example would be a packaging machine that is going into a food and beverage facility. "Or you could have some sort of machinery or equipment, that's going into oil or gas operation," Stewart said.

The other segment is on the MRO side for companies that use those machines and need to maintain them on a regular basis.

He says that Allied helps customers with new product introduction. "We have a centralised technical support team and we have application engineers in the field," said Stewart. We also have a number of outside salespeople that can help walk our customers through a technical issue."

A large menu

While smaller distributors can compete with a limited number of products in a focused customer segment, large global distributors need to provide customers with a complete menu of components as well as wide range of services. They are often called on by OEM customers to be involved in the design stage of a new product offering both parts and technical ideas. Once the design is finished, large global distributors often support volume manufacturing of the product through its lifecycle and may provide parts for repair and refurbishment and be involved in asset recovery, recycling and disposal of the product.

Offering soup to nuts technology solutions to OEM and EMS customers is imperative for large global distributors to be successful in the global marketplace. "It is a matter of survival," said Bill Amelio, CEO of Avnet. He noted that there has been a lot of consolidation among

semiconductor and other manufacturers of these years.

"When suppliers consolidate, they look at the contracts that they have with their distributors and all their partners and they pick the ones that are best for them," said Amelio.

Obviously, suppliers want distributors that can provide as many products and technology solutions to as many OEMs and EMS providers as possible.

One key to Avnet's competitiveness is "we have this great engine which is our core distribution business which allows us to be in 140 countries around all the world," said Amelio.

Avnet has hundreds of thousands of customers which give the distributor entrée into selling more which are more important to customers.

"We ask customers where can we add more value?" said Amelio. Value can be added with hardware, software and printed circuit board design services, simulation verification, vendor managed inventory, and component obsolescence programs amongst others.

Amelio said such services support every phase of a product lifecycle and gives Avnet a competitive advantage.

Entering North America

While some North American based distributors such as Arrow, Avnet, TTI, and Mouser have grown sales by expanding into Europe and Asia, some European and Asian distributors, including WPG and Rutronik, sought sales growth by expanding operations North America.

The latest overseas distributor to delve into the North America market is RS Components, a high service distributor based in the United Kingdom. It had a "soft launch" in the U.S. in April. Cameron Ward, senior vice president global electronics at RS, said the company has launched its americas.rsdelivers.com platform, which provides "tools, knowhow and an extensive

selection of small design packs, enabling customers to learn, design and purchase from a single site," he said.

"The decision to come into the Americas was really driven by requests of suppliers," said Ward. "Suppliers said 'we really need you in the marketplace' so the decision was made."

He said RS's business model is similar to Mouser's and Digi-Key's. "We have similar line cards for electronics, but our range of product solutions is much different. We carry a very large industrial and MRO range of products in addition to our electronics offerings," said Ward.

RS has a design community called DesignSpark which has 800,000 members and about 105,000 in North America. Other high-service distributors have similar communities, such as Hackster and element14, Ward said. "But what's different is we have a lot of free design tools. We have printed circuit board tools and mechanical tools 3-D CAD software tools," he said.

Another distributor that entered the North American market about 11 years ago in an effort to boost sales and increase competitiveness is WPG Americas.

"We tend to consider ourselves more of a specialised distributor, not a broad line distributor in some key technology and vertical market areas" such as LED lighting and the embedded market, said Ian Basey, vice president of supplier marketing.

While WPG is a large broadline Asian distributor, WPG Americas is smaller, more focused.

"Being smaller we have quicker reaction time. I think that's what customers like about us," said Rich Davis, president of WPG Americas.



"We ask customers where can we add more value?"

Bill Amelio,
Avnet CEO

How x-ray inspection could save your skin

X-ray inspection is often associated with production line quality control, but as the ITA points out, it can also be used to ensure components are fit for purpose and adhere to relevant standards

On the production line, high quality x-ray inspection systems are often used to spot manufacturing defects such as open BGA joints or insufficiently filled through hole joints. However, x-ray inspection isn't just used in production environments; it's also found in third-party test houses and consultancies such as St Albans-based ITA Labs.

The facility, which is the laboratory section of the International Tin Association, provides contract testing and consultancy services globally to a broad range of industries including aerospace, automotive, electronics, telecommunications, energy and environment. Its scientists employ analytical techniques to ensure that customers' products meet required internal standards, comply with relevant legislation and are fit for purpose. ITA Labs is accredited by UKAS to ISO 17025.

Finding fault

X-ray inspection systems have long been an important part of ITA's toolkit, with the lab recently upgrading to the latest-technology Nordson Dage Quadra 3. Dominic Lodge, who is responsible for solder qualification, testing and failure analysis at ITA Labs, commented: "Apart from performing consistently and reliably, these systems give more realistic results than the pictures that frequently arrive with items for inspection."

"Additionally, we appreciate the Quadra 3's fine precision of control, which eases our search for exactly the viewing angle we're after. This

improves our confidence in pinpointing the true seat of the problem."

Customers can bring a board or system to ITA Labs for x-ray failure analysis after a breakdown in the field. This has many attractions as a preliminary stage of analysis. Inspection is non-destructive, and can be quick, with completion in 10 minutes sometimes. Apart from the obvious advantage of access to x-ray testing without investing in expensive equipment, ITA Labs also offers its expertise, which can often allow identification of factors that would otherwise have been missed.

Meanwhile, other customers use ITA Labs as part of their quality analysis strategy, sending, for example, 10 per cent of their boards' production run for inspection.

Independent arbitration

Occasionally, ITA Labs has performed a somewhat different role — that of an independent third-party advisor in pre-arbitration situations. In a typical scenario, an OEM will commission ITA to perform an investigation and then present their findings to all interested parties, including assemblers, solder suppliers, board manufacturers and end customers. This process generally works well, as ITA Labs is accepted as an independent organisation with no vested interest in assigning blame.

When inspecting PCBs, ITA Labs starts by checking for BGA and ground plane voiding and quality of hole fill for through-hole connections. Next, it checks

for faults on tracks and via holes. The Quadra 3's tilt function enables oblique angle viewing of joints to identify any that may be open, or where the solder and paste have not coalesced. This can also complement earlier customer testing that yielded an IPC pass, but without definitive results.

Dominic Lodge concluded: "While providing plenty of detail, the Quadra 3 is fast and easy to use, with the ability to edit image file names and organise them onto memory sticks for customers. This all-round user friendliness is essential, as our customers value our ability to turn around their inspection samples fast."

www.italabs.co.uk



X-ray inspection systems have long been an important part of ITA's toolkit, with the lab recently upgrading to the latest-technology Nordson Dage Quadra 3



ITA Labs provides contract testing and consultancy services to a range of industries including aerospace and automotive



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Connectors

On the hunt for innovation

When specifying mission critical connectors for defence or aerospace applications, buyers must pay attention to standards and performance, but could this stifle innovation, asks Lane Electronics' Nick Wheeler?

Matching the right connector to a given application is no easy task. The more demanding the application, the more stringent the performance requirements. When specifying connectors for aerospace and defence electronics equipment, for example, the risk of failure could have devastating consequences.

Before any selection is made, purchasers need to know how connectors will be expected to perform. This is chiefly addressed by aerospace and defence industry standards that carefully control connector form, fit and function. These are typically specified as minimum supply requirements, with example standards being denoted as MIL-DTL, MS, ARINC, VG and EN. In principle, any connector that is manufactured to these carefully regulated standards will ensure a universal

compliance to minimum levels of performance and interchangeability at component level, enhancing maintenance, repair and operations throughout the life of the equipment.

Adhere to industry standards

An understandable desire to minimise risk and to embrace industry-wide standardisation often results in the same tried and tested solution being used time and time again, even though advances in connector technology from other markets could provide significant benefits. For example, advances in fibre-optics and materials such as composites support the latest in high-speed secure data transmission and weight reduction and these are now fully embraced within standards.

However, connector designs that are not included in generic

standards can also provide significant improvements in performance and ease of assembly and this approach need not be dismissed. These solutions often represent relatively simple upgrades of established connector designs, offering common interface, materials and performance parameters, but packaged in a different format. Popular examples would be the provision of filtering and EMP, high power contacts and ROHS compliant finishes.

Scrutinise suppliers

Ultimately, the best connector solution will be the one that best suits your needs. Once the performance requirements have been carefully reviewed, however, it's time to scrutinise the supply. Typically, the higher performance and reliability requirements of aerospace and defence electronics demand higher grade materials and robust connector



Connectors



The best connector solution will be the one that best suits your needs

construction. Unit costs may be higher, while lower volumes can result in large manufacturing minimum order quantities and long leadtimes. Fortunately, with due consideration, this can be addressed by carefully evaluating supply chain partners.

Lane Electronics represents manufacturers whose connectors already comply to defence industry standards. Lane can also assemble connectors in its own facility to exacting MIL-DTL-38999 standards with official qualified products list release for Series I and Series III, including stainless steel

and composites. An ability to buy, build and stock a range of generic approved connectors in large quantities, allows Lane to offer a less restrictive supply, with competitive prices and significantly reduced leadtimes. For example, Lane can offer next-day delivery and no minimum order quantities or value on more than 90 per cent of the connectors it supplies.

Investigate bespoke adaptations

As a representative of sister company, Weald Electronics, Lane also has access to in-house design and development skills, which regularly provide innovative solutions

through bespoke yet simple changes to existing connector products that significantly improve equipment assembly and performance. In addition to suppliers' standards and aerospace and defence approvals, Lane Electronics and Weald Electronics maintain BS EN ISO 9001:2015, BS EN 9120:2018, CECC 200 024 and IPC/WHMA-A-620 accreditation, as well as long-established OEM approvals gained over 53 years of supplying connectors and accessories.

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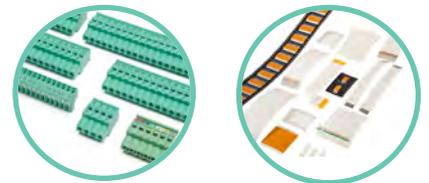
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Choosing specialist contacts

Selecting the right connector with appropriate specification and approvals for demanding aerospace and defence applications is an ongoing challenge. NYK Component Solutions addresses the issue head on



Companies operating in the demanding aerospace and defence sectors face an ongoing challenge to consistently select the best connector with the right specification and approvals. Over the past few years, interconnect solutions provider, NYK Component Solutions, has developed the expertise, partnerships, systems and processes to address this challenge head on. Not only has it has met rigorous approvals to achieve both AS9100 and AS9120, it also ensures all products are fully approved and supplied by OEM manufacturers, thereby alleviating any possibility of counterfeit products entering the supply chain.

Off the shelf mil-spec connectors have long been the preferred option for demanding applications. However, given the ever-increasing demands on connector performance, which dictate higher EMI/RFI protection, better environmental sealing and greater performance life, it may be necessary to consider

other types of specialist connector. NYK Component Solutions can provide interconnect solutions to suit most challenging applications.

Custom solutions

For example, filtered connectors provide systems with protection from rogue signals, voltage spikes or lightning strike, and are available in diverse forms. These include specialised electromagnetic or radio frequency interference connectors with single line and multi-channel configurations, as well as transient protection and protection for power supply systems. Manufacturer, Ametek, emphasises its ability to design customer specific protection solutions to electromagnetic and radio frequency threats and these are available in most connector formats as well as custom assemblies.

Where there is a high pressure differential between the inside and outside of an enclosure, or where a high level of sealing is

required, a purpose designed hermetically sealed connector may be needed. Hermetic connectors are available with high performance levels including sealing of 1×10^{-9} cc/s at one atmosphere and a temperature range from -197 to 440°C. These connectors are also available in a range of connector formats, as well as custom assemblies.

Extreme reliability

When extremely high reliability and performance is required, hyperboloid contacts may be the best solution. Products feature a socket with a hyperboloid-shaped sleeve formed by straight wires strung at an angle to the longitudinal axis. When the pin is inserted into this sleeve, the wires stretch to accommodate it. In so doing, the wires wrap themselves around the pin providing several continuous line contact paths. The inherent benefits of this technology include: immunity to shock and vibration, with no loss in contact in tests in excess of 300g; low insertion force; improved

Hermetic connectors provide a high level of sealing



Off the shelf mil-spec connectors have long been the preferred option for demanding applications



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current carrying capacity; and low contact resistance, often less than half of mil-spec allowances.

The construction of hyperboloid contacts is designed to offer to one of the most mechanically tolerant solutions, making them suitable for applications where electrical signal integrity needs to be ensured even under severe shock and vibration.

Focus on security

To support the secure transfer of data, NYKCS can supply electro-optic converters based on D38999 III connectors. These ACON solutions provide a secure data link between ground stations by converting the copper signals to fibre optic. Military purchasers have selected ACON to achieve an Ethernet bi-directional link, rated at 1Gb/s over fibre, between ground stations. This can help improve a system's flexibility by enabling the user to quickly change location while allowing secure data transfer via optical media between the two stations at a distance of up to 120m. Whatever the technical challenge, NYKCS has access to a range of high performance components and is unbiased in its selection, ensuring purchasers find the best solution for their applications needs.

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Purchasing PV power

Stäubli Electrical Connectors recommends its MC4 solar power connector system as delivering the bankability required for today's photovoltaic projects. The connectors have been installed in over 200GW of PV systems worldwide.

Highlights of the range include the MC4-EVO 2, which is said to minimise power losses thanks to its high current carrying capacity of up to 69A. A voltage rating of up to 1,500V DC means longer series strings can be used in PV arrays on large-scale solar projects.

Suitable for cable cross-sections of between four and 10mm², the connector features a polyamide casing with impact resistance and enhanced sealing for protection against ammonia and salt spray in harsh environments.

For use with micro or nano PV inverters, Stäubli offers the MC4-EVO AC three-pole AC connector. Designed for module and string level applications, its low profile fits within the panel framework, enabling modules to be stacked without spacers.

With a current carrying capacity of up to 32A, it has a rated voltage of 600V AC UL and 400V AC IEC. Accepted cable cross-sections range from 1.5 to 4.0mm².

www.staubli.com/electrical



Delivering data in industrial environments

Stewart Connector has introduced a new line of IP20-rated RJ45 modular plugs designed to bring reliable data connections to industrial environments. Available from Digi-Key and Mouser, the products provide Gigabit Ethernet through 10 Gigabit Ethernet data transfer rates while supporting Power over Ethernet applications.

Designed for termination to shielded or unshielded cable with solid or stranded conductors, the connectors can accommodate a range of overall cable and conductor diameters found on harsh environment and industrial cables. Double clamping strain relief delivers a robust connector to cable connection to support conditions found in industrial environments.

Applications for Stewart's IP20 plug line include data, telecommunications and industrial equipment, with the low-profile design proving ideal for high-density switches and routers as well as CAT5E through CAT6A premise networks.

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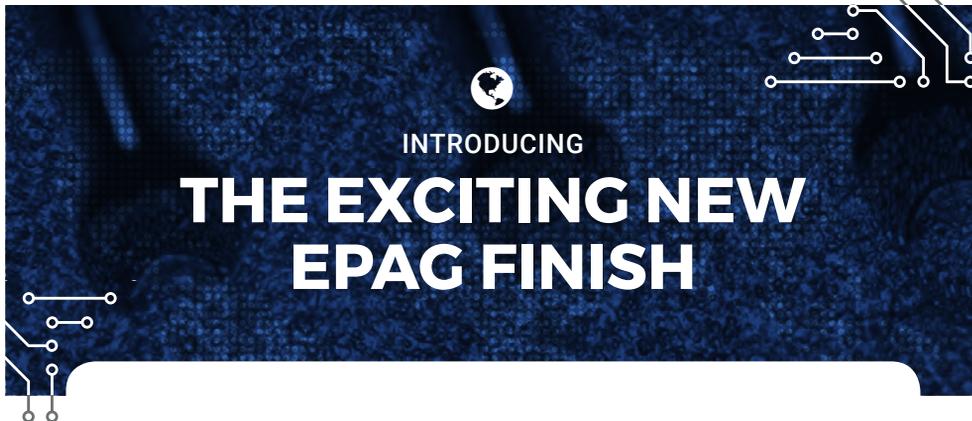
Nicomatic has launched a new series of 1.00mm pitch connectors for demanding space-constrained applications in harsh environments such as aerospace. Five standard layouts with 6, 10, 20, 34, or 50 contacts, distributed over two rows, are stocked in depth for immediate shipment.

Claimed to be lightweight and secure, the new AMM series connectors feature an integrated guidance pin for stacking. Capable of carrying up to 4.8 or 2.5A, the miniature connectors can withstand vibrations of 15G and shock of 100G; devices can handle up to 1,000 mating cycles and operate between -65 and 200°C.

Product manager at Nicomatic, Alexis de Lassat, said: "Although we have standard parts available for off-the-shelf delivery, because of the customization options we offer, AMM connectors can be supplied with exactly the number of pins required. Our ordering process is simple, intuitive and streamlined, and for maximum reliability and ease of use, AMM connectors are sold pre-cabled."

Devices are available in surface mount and through-hole versions with several fixing options.

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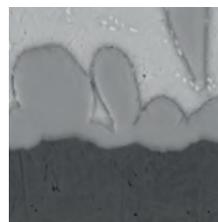


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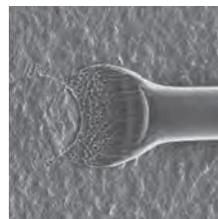
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The six-axis robot systems can apply foam bead to a range of substrates, including plastics, metals and glass. From flat parts to 3D profiles and double face applications, Techsil aims to offer short cycle times, with the foam gasket material curing in seconds to allow speedy delivery.

Robot automation also creates a highly repeatable, high performance foam gasket, making the FIPG subcontract service cost effective for small volumes or intermittent production requirements.

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Second half 2019: mayhem ahead



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

John Denslinger alerts buyers to the volatility and uncertainty they can expect to encounter during the remaining months of 2019

Supply chain demand • By John Denslinger

Are you having trouble projecting supply and demand in the second half of 2019? Truth be known, you're not alone. Given the daily barrage of headline news expounding the latest tariff tiff, the latest trade negotiation stalemate, the latest Fed monetary hint, the latest Brexit talk, the latest currency manipulation, the latest labor shortage, or the latest whatever, it's difficult to read the business landscape with any certainty. So, how does one account for the unforeseen and still plan with accuracy?

Typical to most companies today, identifying sales potential is rather routine. Most use book-to-bill as the best indicator of near-term shipments. That coupled with customer forecasts, new sales opportunities in the pipeline, new product introductions, share growth targets, and viable pricing strategies readily ballpark sales for the next horizon. Although time consuming, it's not terribly difficult building a forecast. The real challenge remains: execution. I would say, supply and demand today are far from normal. It begs the question, have you adequately considered the severity of these headline issues on execution in real-time?

In my experience two departments generally wear the collar for missed plans: sales (when bookings fail to materialize as planned) and procurement (when sales are delayed or lost due to supply or quality problems). Sales can always point to changing competitive conditions, delayed or cancelled programs, slow customer adoption of new products and production line transfers, all of which are normal, reasonable and generally outside one's control. The procurement department, on the other hand, is less likely to get a free pass when it comes to production line interruptions. Sourcing is not a last minute, flip-of-the-coin decision. Supply lines are supposed to be set and suppliers fully vetted. Vendor selection processes are designed to be rigorous and competitive. Contractual terms are naturally weighted in favor of the procurer.

Purchasing is therefore accountable for supplying quantity and quality on demand, and still, things do go wrong. Procurement never escapes the top-down pressure to fix disruptions and fix them fast. With so much at stake, I would encourage frequent communications with your top ten suppliers. Compare their supply perspectives. Look for undesirable trends. Move swiftly when you see a problem. It won't get any better with a wait-and-see approach.

To be clear, there is a lot of volatility in the market. At the beginning of 2019, the semiconductor forecast for the Americas ranged from one to five per cent growth. Entering the year, book-to-bill showed signs of decline but backlogs steady with inventory levels reasonable. Unfortunately, the 2018 tailwind never materialized as Q1 2019 sales results decreased 29 per cent from Q4 2018. Further, according to a June survey by TPC, industry professionals are seeing weakening demand and further erosion of bookings while noting undesirable increases in inventories and cancellation trends. The latest semi forecast now indicates a year-over-year drop of around 23 per cent in 2019 for the Americas.

Buckle up, mayhem ahead. Even without all the headline news, 2019 will be difficult.



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Delivering what defence buyers demand

Ahead of next month's DSEI exhibition, *Electronics Sourcing* spoke to ODU-UK managing director, Nick Harper, about the various connector innovations ODU has pioneered in response to military requirements

Q ODU connectors are back at DSEI, so what's new?

Our pedigree in the UK defence market is good, but technology is changing. This exhibition gives us the opportunity to show-off our latest developments.

ODU's first major UK opportunity came back in 2002 with the Bowman C41 tactical comms system and we have since supplied over 100,000 helmet connectors without a single reported in-service failure.

Later, we launched our Advanced Military Connector series, the ODU-AMC, to support the various global Future Soldier programmes. More recent UK design-in projects have included Thales Squadnet Radio, Racal Acoustics Magna RA4000 Headset and Selex Elsag Future Soldier Radio.

Q What are military buyers looking for?

One important thing learned from Future Soldier was that the foot soldier's biggest concern is 'can I clean it?' This gave rise to the ODU-

AMC Easy-Clean. Whether contaminated with mud, dust or slush, the contacts can be easily and quickly cleaned, because when the connector is unmated, the contacts lie flush with the insert face.

Q What's new at DSEI this time?

Soldier modernisation systems were just the start. ODU's current objective is to connect all interfaces around the soldier, such as weapons, comms systems and vehicle connections, with one connector family that meets all requirements.

Increasingly, in military and security technology, reliable high-speed data transfer is vital.

The ODU-AMC High Speed Data series meets this need by combining and transmitting all common data transmission protocols, with transfer rates up to 14.4Gbits/s.

Historically, most military data connectors incorporated commercial inserts in a MIL-STD shell. We chose a more elegant solution however, adapting our own multi-pin connectors to transmit the

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Aerospace (DSEI Preview)

required protocol in a much smaller connector with all the ruggedness and performance of a military connector.

And there's a double bonus. Not only are ODU-AMC connectors inherently smaller, but push-pull locking allows much higher panel density as finger-space for rotation locking is eliminated.

What other new products will ODU highlight?

Two further developments provide fresh options for in-vehicle applications. Firstly, the ODU-AMC High-Density series, available in four sizes, with shell diameters from under 10mm to 18.5mm with 40 contacts, plus options of power to 15A and combined data/power to 5A.

Secondly, in response to a military equipment OEM's problem with extremely high vibration levels, we introduced the ODU-AMC Threaded Connector, which utilises a screw-locking-with-ratchet

mechanism for situations where pressure, vibration and temperature could be problematic.

What makes ODU confident about the UK military market?

Given our success in the niche head-set sector, our extended product range should be of interest to all in-vehicle equipment OEMs. With growing demand for better data performance from yet smaller and lighter equipment, our rugged miniature connectors have the edge.

ODU is a 'problem-solving supplier'. Flexibility is our strength, helping our customers to produce the best possible products for the military market. Come and discover how at DSEI, 10 to 13 September, on stand S3-118.

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Partnering to thrive

Aerospace and defence projects bring unique challenges, so choosing a suitable supply partner requires careful consideration. As Challenger Solutions managing director, Andy Mair, explains, the right fit is vital

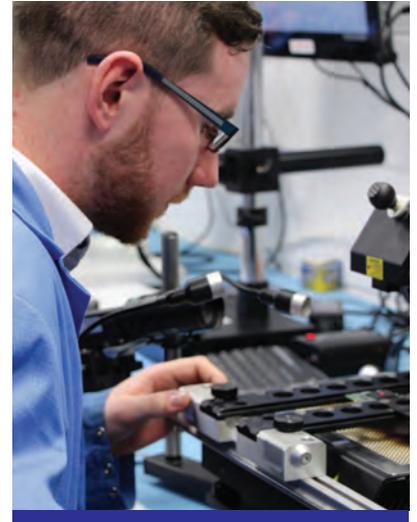
When it comes to choosing the right contract electronics manufacturing partner, the aerospace and defence industries present specific challenges. Questions of capability, compliance and security go beyond typical industry standards and any decision will consider several elements.

For example, the International Aerospace Quality Group's AS9100 standard establishes a quality management system based on the requirements of the aviation, space and defence industries worldwide. Suppliers to these industries

must be AS9100 certified, but there are also several other concerns to address.

For security reasons there may be MOD specific accreditations, export conditions or a regulatory environment to negotiate. Companies that are familiar with these obstacles are likely to understand government protective markings, ITAR/EAR restrictions and wider export compliance issues. Ethics and corporate social responsibility can also play an important role, as long term relationships rely on trust and integrity.

Another factor that will narrow the field is the high level of technology and reliability required. The right manufacturer will continually invest in capability and offer adequate verification. This requires comprehensive process control and is likely to include precision placement of complex components, in-house x-ray facilities and automated optical inspection. Lean manufacturing and continuous improvement demonstrate control, while a clearly defined technological roadmap shows commitment.



Manufacturing capabilities will narrow the field

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Aerospace (DSEI Preview)

Current component availability can be variable, so materials supply needs careful management. Issues concerning obsolescence, counterfeit avoidance and export control are everyday challenges. Controlled processes, effective communication and a good understanding of compliance are key.

Security is another important consideration, both in a national and a commercial sense. Cyber-attacks are an unfortunate feature of modern business, so it's important to engage with a supplier that can protect valuable intellectual property. Cyber Essentials accreditation helps demonstrate protection from online attack, but a robust approach to both cyber and physical security is vital.

Electronics manufacturing is fast-moving. In a year that has already seen the launch of the first 60 of a 12,000 satellite constellation and the first mining licence granted to enable a permanent base on

the moon, those that stand still will be left behind.

Back on earth, geo-politics mean we don't fully understand our future trading position. Aerospace and defence often involve complicated supply chains that stretch across territories, but although relationships may change, the essentials of contract electronics manufacturing won't.

A flexible, dynamic organisation will still be top of the wish list; one that's technologically capable with the facilities and experience to perform consistently at a high level. Currently celebrating its 25th year supplying to the aerospace, defence and security industries, Challenger Solutions is focused on building long-term relationships in this demanding sector.

Challenger Solutions will be exhibiting at DSEI 2019 on stand N3-568 within the Joint Zone.

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Defending against counterfeit dangers

When sourcing old design or obsolete connectors, as many aerospace and defence buyers must, there's a risk you could be supplied counterfeit products. Aerco offers advice on avoiding the pitfalls

Aerospace and defence projects often have a long life with a mandatory requirement for an exact component specification and traceability back to the original manufacturer. Products in this technical market are relatively expensive and there is great temptation for unscrupulous counterfeiters.

Aerco's experience is that rogue manufacturers don't usually copy an entire connector; more frequently the counterfeit component is made by combining parts, for example punching out the insert and refitting a different orientation. Instead of gold plated contacts, a connector might be supplied with contacts made from cheaper metals. Sometimes connectors have been removed from scrapped systems and reconditioned to be sold 'as new'.

Locating stock

A buyer's first step should always be to identify the exact part number and manufacturer required. Search the manufacturer's website for a list of

authorised distributors and contact them. If you find the product there, you should still check the provenance, but this is by far the most reliable route.

If there is no stock, contact the manufacturer to see if the product has been made obsolete. If so, or if you cannot live with the lead time offered, your next step is the so-called 'grey' market. Authorised distributors take out large stock packages, the remnants of which often end up as excess inventory. Your product might be available from companies that buy up that surplus.

Inventory stock listing sites are a good starting point, including: Partsbase, Netcomponents and Octoparts. Sometimes websites list the part number, but available stock is zero, other times multiple websites all list the same part, with the same quantity. Typically these will all be linked to the same source.

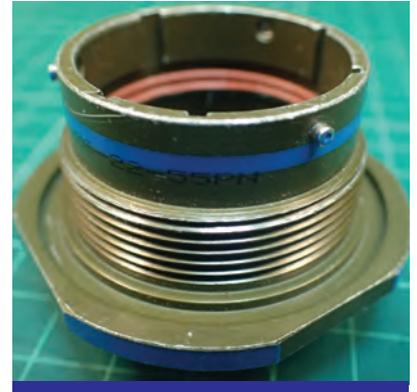
Mitigating risks

Once you have located stock, there are some basic

questions you should ask. Credit checks on the supplier will reveal the company size, age, location, and number of employees as a gauge of credibility. Does it have a no returns policy? If it does, this should concern you. The members-only ERAI offers another great tool. It maintains a database of products that have been counterfeited in the past, and of businesses that have been found to supply counterfeits.

Once you are happy with the supplier, product legitimacy checks need to be completed. Confirm availability of paperwork including lot traceability and a manufacturer's certificate of conformance. Request copies, along with photos of the product. The part number and date codes on the product images can be compared against paperwork photos. The manufacturer can be contacted to verify the date code if you are concerned.

Once the product is received, there are further checks. Does the product and paperwork match the photos? And is



This connector was sold as new, but has clearly been used

the product in the original manufacturer's branded packaging. Careful visual inspection should look for indications that the product has been modified, ideally using an illuminated microscope and HD camera.

One other option available to buyers is to use a specialist sourcing service such as Aerco's. With world-wide sourcing capabilities, Aerco is happy to search for and supply components, allowing customers to concentrate on their key priorities.

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Safe-Supply: Quality driven component sourcing services.

SUPPORT



ACAP: Market leading counterfeit avoidance program.



TLS: Product life-cycle & Obsolescence Management.



Astute 3PL: Smart Supply Chain Solutions.

Make the Right Start with Astute

Astute has enjoyed a very direct relationship with aerospace & defence since our inception in 1989; our founder's background was distribution with defence companies such as Plessey, Marconi and British Aerospace. Nothing has changed in the strength of our relationships, only the names of the companies and the type of services we now offer, which are far greater and wider in scope.

Going back a decade, we were supporting customers in the latter stages of an equipment's life cycle: obsolescence or a lack of supply in the market was the driver. Today, with equipment staying in service longer than ever, our customers now rely on us for support and involvement at the start of a product's life, as designing the right material in equipment during the concept phase is critical

to the through-life support of it. This has seen a real shift in our offering. With 40+ franchised lines across connectors, power, semiconductors and E-Mech, we now offer a full Design>Fulfilment>Support service.

Start the right way with Astute - visit us at Stand No S4-140

- Freddie Roe
Aerospace & Defence Director



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Astute Electronics Brings **Safe Supply** to DSEI 2019



Market turbulence, allocation and counterfeit product are just a few of the difficulties facing component suppliers to the defence & aerospace industry. Astute Electronics will be at DSEI 2019 to advise on mitigating risk.

Astute Electronics, global distributor and procurement specialist to the world's top defence companies, will be bringing their experts in electronics design, counterfeit-avoidance and procurement to DSEI 2019 - Stand No S4-140.

Joining the stellar line-up of global defence & aerospace companies, Astute Electronics will be welcoming customers and answering the key industry-wide questions: how to mitigate counterfeit product; procure safer and smarter; secure components in a volatile market; mitigate obsolescence.

Experts in Mil-Spec components including connectors, rugged memory and digital storage, COTS power supplies and batteries and E-Mech will be on-hand to answer technical questions and advise on new designs. Astute's E-Design team boasts a collective 250+ year's experience in franchised electromechanical, semiconductor, memory, interconnect and power components.

DSEI, a truly epic conference that connects governments, armed forces, industry thought-leaders and supply-chain experts, celebrates its 20th anniversary this year, but Astute Electronics surpasses this by a full decade!

Founder and MD, Geoff Hill, attributes their flourishing 30-year relationship with aerospace and defence to a deeply

committed, proactive approach to customer risk and requirements. ***“As a business, we've always asked the question: what benefits can we bring? Everything I've done in 30 years is customer-led,”*** says Geoff.

“For instance, counterfeit product has been a growing problem, especially in the last two decades. It exists in most industries but it's particularly hazardous in aerospace and defence equipment. That's why we set up component test labs in the UK and US and we incorporate the AS6081 standards into our extensive ACAP Anti-Counterfeit Avoidance Programme.”

With current volatility in the component supply chain, extended lead-times and rapid obsolescence cycles, it's even more important that we help customers to weed out these threats and focus on Safe Supply, says Geoff.



Astute Electronics was built from a desire within the industry for more flexible distribution and vendor reduction and remained true to its core values to this day. Geoff says: “There's a long history of mergers and acquisitions within electronics distribution, but here at Astute, we've found that through remaining independent and building trust and longevity, we are able to offer a more all-encompassing solution that adds great benefit and value to A&D projects.

“Since 1989, our aim is to provide flexible solutions to all industries on a variety of commodities. Our services, will continue to adapt to our customers' requirements and take us into the next decade of supporting rapidly advancing technologies.”

Safe Supply - Every Time

Astute's global sourcing experts work across a network of international procurement offices and authorised markets. Combined with our industry leading ACAP (Astute Counterfeit Avoidance Programme) ensures a safe supply - every time.

Our market-leading Astute Counterfeit Avoidance Programme (ACAP), offers a secure path for the rare occasion that we source supply through non-traceable routes to support obsolescent and hard to find/allocated component request. Astute will subject products to destructive and non-destructive testing through the ACAP scheme, encompassing the AS6081 anti-counterfeit standards. Following successful testing, Astute will issue the product with a 10-year warranty.

Astute Electronics is a highly-accredited electronics distributor and procurement specialist to the world's leading defence suppliers. As a member of the Counterfeit Avoidance Working Group (CAWG), Astute has played a leading role in defining and updating the MoD's Defence Standard 05-135, accompanied by the Counterfeit Avoidance Maturity Model, that defines how a supplier is managing the risk of counterfeit material entering the MoD's supply chain.

Astute Electronics will be attending DSEI along with many of its esteemed defence and aerospace customers including BAE, Leonardo, Thales, General Dynamics, Lockheed Martin and General Dynamics. **Find us at Stand No S4-140.**

Visit us at **DSEI STAND S4-140**

Plated backshells meet with approval



Circular connector specialist, NYK Component Solutions, makes a point of targeting military and aerospace needs. Now it has added EMCA's VG qualified accessories to its portfolio, complete with a tough new hybrid plating finish

QPL listed assembling distributor, NYK Component Solutions, has added connector accessories from EMCA to its extensive product portfolio, a move that will see NYKCS distribute a range of VG approved products including backshells, protection caps, dummy receptacles, conductive gaskets, O-rings and other custom assemblies.

Based in Germany, EMCA is a VG qualified company that manufactures accessories for a variety of connector types to mil-spec and German military VG standards such as MIL-DTL-38999, 26482, 83723 and VG95328, 95234, 96912. Other supported standards include JN1003, CECC75-201-002 and more.

Backshells from this impressive range are available in a variety of

materials such as aluminium, marine nickel aluminium bronze and stainless steel, with a selection of plating finishes including electroless nickel, cadmium olive drab and zinc nickel passivation.

RoHS and REACH compliance

One exciting aspect of the new franchise is that backshells in the range are also available with EMCA's VG 95319-1011 approved hybrid plating. This finish is both RoHS and REACH compliant yet offers the salt spray and electrical performance of cadmium olive drab.

The black, non-reflective hybrid plating has been tested and qualified on all EMCA products to VG 95319-1011 and VG9612. It is listed as 'J' finish under the VG approvals. Furthermore, the

new finish is also compatible and intermatable with cadmium, zinc nickel, zinc cobalt and other platings, which can reduce the variety of finishes required.

According to EMCA, the hybrid plating has passed rigorous VG approvals. It has a base plating of electroless nickel protected by a specialised two-layer, 2K epoxy and black PUR coating. The coupling nut is also hard anodised to achieve salt spray corrosion performance that is VG approved.

As many purchasers will be aware, this level of approval is now much harder to achieve as it requires a five-day dynamic cycle test in place of the previous 500 hours constant salt spray test. Shield connection and shield effectiveness have also been tested and approved to VG

95319-2, test number 5.11 achieving less than 0.5mV drop at 1.5V DC and a current of 0.1A.

With platings such as zinc nickel failing the five-day dynamic cycle test after two days and zinc-cobalt only specified to 48-hours salt spray, purchasers will be interested to discover the salt spray performance of this innovative Hybrid plating, which also features RoHS and REACH compliance.

Backshells and accessories with the hybrid plating are already in use by companies such as General Dynamics, Boeing Defense, Thales, Rheinmetall, KMW and Caterpillar.

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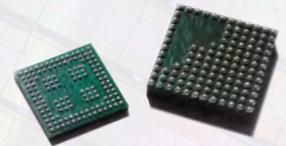


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Time for a mindset change?

Reclaim and reuse of electronic components is often ruled out as too risky, but with due care and the right service provider, it could provide a solution to allocation issues, says Retronix

For a market dominated by technological advancements, the electronics sector is also an industry with some outdated institutional ideas. The current paradigm is “but that’s how we have always done it”, however, that does not always allow companies to take advantage of new services that some of their competitors with a more open-minded approach to new technologies have embraced.

Retronix has seen this first hand and it is understandable to a degree. Attitudes such as ‘if it’s not broken why fix it’ and ‘too much of a risk’ do have a place, but not at the expense of progress, cost savings and delivery dates. Most companies will have some procedures that were written, for example, 10 years ago that they have not reviewed since then. For an industry that is always advancing, that seems rather counterproductive.

Decisions are made on past errors, and procedures written to ensure that these errors never happen again, which is the right thing to do in an industry like ours. But those procedures need to be reviewed as technology progresses and new ideas emerge. Most purchasers will know of certain things that are just never considered as an option due to history and possibly a previous costly mistake.

One of these ideas that seems written in stone with a lot of electronic companies is: thou shalt not reclaim components from PCBs.

Mostly, this is based on a past mistake or a general idea that this is too risky a process. But in the current climate of allocation, long lead times and obsolescence, can you really afford to be sitting on a bone pile of PCBs with thousands of pounds worth of the very components that

purchasing are pulling their hair out trying to source and battling lead times of over 25 weeks? That is not productive for anyone.

Supporting a circular economy

Millions of dollars of components are scrapped in manufacturing, repair and rework processes. If these components could be safely removed, and the BGAs reballed, companies could save huge amounts of money by recovering high value silicon, providing much needed allocated components and reducing the amount sent to landfill. As a bonus, it would also seriously damage the counterfeit industry, whose raw material supply would be reduced.

Our wide range of services to the electronics industry allow us to offer a complete service for reclaim and reuse of components. With safe removal procedures,

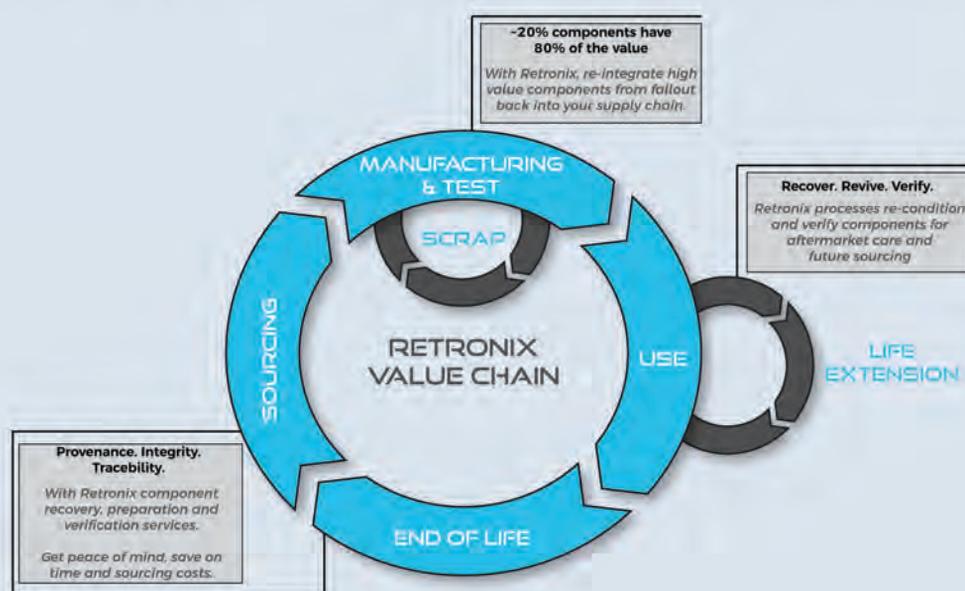
component revive options, testing, x-ray and re-reeling, Retronix offers a robust service and this has seen a mindset change in a lot of customers who have seen the benefits of these services. Their procedures no longer say, ‘no reclaim and reuse’ but rather ‘list Retronix as the only approved supplier of this service’, and their purchasing departments are very grateful for that.

Be part of the new mindset shift by talking to Retronix about how it can help your purchasing team retain their hair during this very challenging time for electronics sourcing.

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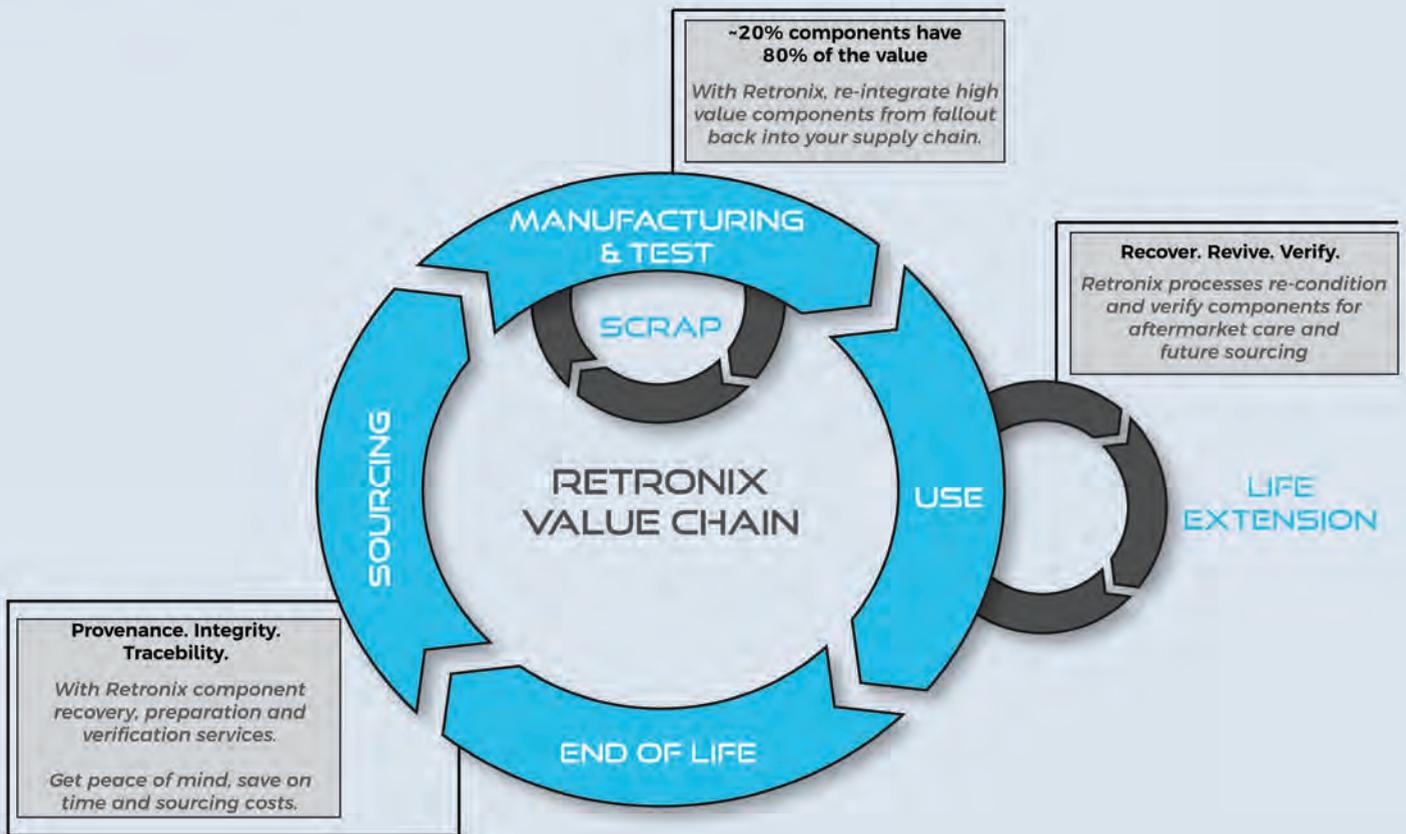
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For a market dominated by technological advancements, the electronics sector is also an industry with some outdated institutional ideas.

The current paradigm is “but that’s how we have always done it”

”

TIME FOR A MINDSET CHANGE



Our wide range of services to the electronics industry allow us to offer a complete & robust service for reclaim and re-use of components. With the safest removal procedures in the industry, testing, X-Ray and re-reeling.

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Electronic Component Show 2020

Electronic Component Show—one day event for design engineers and purchasing professionals—Thursday the 14th of May, 2020

MMG Publishing is delighted to announce the launch of *The Electronic Component Show*. The show will take place on the 14th May 2020 at the Double Tree Hilton Hotel, Stadium MK in Milton Keynes. Supported by industry leading titles *Electronics Sourcing* and *eBOM*; ECS is set to be an important addition to the UK electronics industry calendar.

This premier event aims to bring design engineers and purchasing professionals together with component manufacturers, distributors and associated services for a one-day table top exhibition. With a dual seminar program, *ECS* is the perfect platform to network with customers and suppliers; meet new contacts and boost visibility in the industry.

The dual seminar program will run simultaneously, offering seminars for design engineers and component purchasers. Seminars will be informative, unique to *ECS* and discuss current topics, challenges facing the industry and what the future holds. The full seminar schedule will be released in due course.

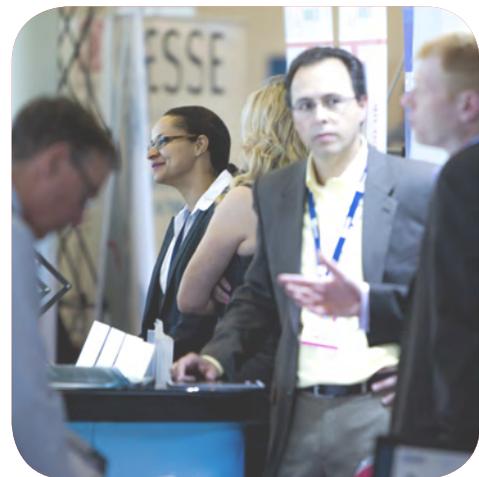
With over 100 table top exhibitor stands this electronic component focussed show provides engineers and procurement professionals the ideal time effective day to meet with new or alternative suppliers and to keep up to date with industry technologies.

Visitor registration will be open from November 2019 offering free entrance to

the exhibition and seminar programme, free car parking, free tea and coffee plus free WiFi.

Show opening times are 10am to 3pm allowing visitors time to travel to and from the event.

www.electronic-component-show.co.uk



To book a stand or find out more, please contact us on the following:
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Perfect timing

The complexity of frequency control devices and the vast range available can be daunting. To assist, AEL Crystals offers a break-down of the basic product types offered and explains how distributor expertise can help optimise selection

Throughout the specification process, AEL Crystals aims to assist buyers to ensure that the correct parts are selected. As a start point, AEL's broad product range can be broken down into various groups, the most common of which are: crystals, oscillators and filters.

Simple timing

Crystal resonators are the simplest form of timing device. AEL offers a host of package and specification options to cover all requirements from simple microprocessor timing solutions through to devices for high stability wireless and radio communications applications. Package sizes include all industry standard surface mount devices and through hole parts, with SMD parts available in packages as small as 1.2 by 1.0mm and with 1.0 by 0.8mm currently in development.

In order to supply a product that will work reliably in a customer's application, AEL must identify the correct frequency, stability, temperature range, capacitive loading and package size. In many cases this information will be available from the customer's own database, but if not, AEL is happy to discuss this with the customers' engineers and technical purchasing team to find the most suitable solution.

Understanding oscillators

Oscillators are essentially a crystal element and its driving circuitry combined into a single package. Included within this area are simple clock oscillators as well as temperature compensated oscillators (TCXO), voltage-controlled oscillators (VCXO) and voltage-controlled temperature compensated

oscillators (VCTCXO). A range of output types are available, including complementary metal oxide semiconductor (CMOS), low voltage differential signalling (LVDS), low-voltage positive emitter-coupled logic (LVPECL), high speed current steering logic (HCSL) and Sine wave.

Again, these parts are used across a range of applications with clock oscillators used in many commercial and consumer applications. More complex TCXO, VCTCXO and VCXO parts are used in telecoms, wireless and RF applications demanding more functionality.

To correctly supply these products, AEL must identify the correct frequency, stability, temperature range, input voltage, required output type and package size. For VCXO and VCTCXO parts, the pulling range and control voltage are also required. In many cases there will be additional requirements, such as phase noise, that must also be reviewed.

Experience in supplying parts for radio frequency applications means AEL can offer parts with exceptional stability down to parts per billion levels for emerging telecommunications applications.

Make the most of MEMs

Within this product group, AEL can also supply micro-electro-mechanical systems (MEMs), which provide a new silicon-based oscillator solution. Most current quartz clock oscillator applications can be replaced seamlessly with MEMs oscillators, with no changes to the PCB or effect on circuit operation.

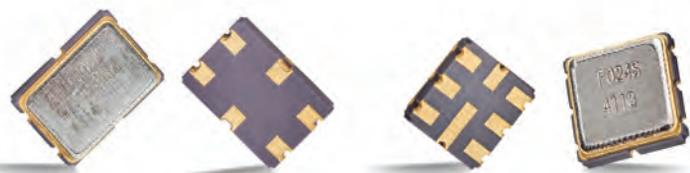
Put simply, MEMs are to quartz what integrated

circuits are to transistors, bringing frequency control into the 21st century. As a drop-in replacement for standard quartz oscillators they differ in using a silicon resonator controlled by an on-board application specific integrated circuit, rather than a quartz blank to derive the output frequency.



AEL can work with customers' engineers to identify the correct technical specifications

MEMs offer a comprehensive product range with a variety of specifications, outputs and package sizes. Outputs include high speed CMOS (HCMOS), LVDS, LVPECL and HCSL. Various industry standard packages are supplied with temperature ranges or -20 to 70°C through to -55 to 125°C.



AEL Crystals boasts extensive logistics, allowing products to be shipped to customers' manufacturing sites globally and supporting local stocking facilities

Furthermore, MEMs oscillators offer several advantages over quartz devices and can counter the main weaknesses in quartz technology. Size is a real advantage, since the resonator in a MEMs device measures only 50 by 50µm.



Due to the semiconductor construction, MEMS oscillators are inherently more resistant to shock and vibration than quartz. Parts also offer improved mean time between failure and failure in time performance.

Cost advantages are in evidence, particularly in the differential output devices, where costs can be up to 50 per cent lower than quartz. MEMS oscillators are available on short lead-times of typically 24 hours for low quantities and samples, and two to three weeks for production volumes. This is applicable to all output types, including differentials, and all package sizes.

Filter the results

Filters are used within most RF and communications equipment. AEL offers a range of standard ceramic and quartz parts, ranging from simple 455kHz ceramic filters through to custom designed devices.

AEL can also offer surface acoustic wave devices, antenna for global positioning systems, global navigation satellite system, Wi-Fi, Bluetooth, satellite digital audio radio service and radio frequency identification, plus dielectric filters for GPS and RFID and VCO.

When selecting the most appropriate components, purchasing should also consider the vendor's ability to support a customer's production model, including the design authority and local or offshore production facilities. To this end, AEL Crystals boasts an extensive logistics operation, allowing products to be shipped to customers' manufacturing sites globally and supporting local stocking facilities to aid lead-time reduction.

www.aelcrystals.co.uk

Experience in supplying parts for radio frequency applications means AEL can offer products with exceptional stability

Specify stability with automotive oscillators

Mercury Electronics Europe has announced a new range of wide operating temperature crystal oscillators ideal for use in automotive applications.

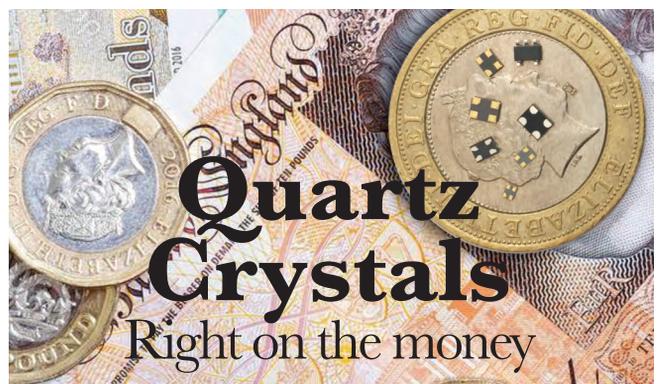
The new surface mount HY series offers 15pF load LVMOS output at frequencies from 1.25 to 50MHz over the temperature range -40 to 125°C with a frequency stability of ± 50 or ± 100 ppm. Frequency stability of ± 25 ppm is also available over commercial -10 to 70°C and industrial -40 to 85°C ranges. MEC Europe can also provide non-standard frequency stability specifications if required.

Offering phase noise characteristics of -155dBc/Hz at 10kHz and -160dBc/Hz at 100kHz offset, the new HY series oscillators are available in three package sizes. Supply voltages are 1.8, 2.5 and 3.3V and typical current consumption is 2.0 to 4.0mA from 1.25 to 19.99MHz and 4.0 to 6.0mA from 20 to 50MHz depending on package size.

MEC Europe is an approved supplier to the automotive industry with IATF16949 approval demonstrating the company's commitment to longevity and ruggedness in the taxing automotive environment.

www.mecxtal-europe.com

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AEL Crystals Ltd
Unit 28, The ioCentre, Salbrook Road, Salfords, Surrey, RH1 5GJ, UK
email: sales@aelcrystals.co.uk - web: www.aelcrystals.co.uk

Tel: +44 (0)1293 789200

Green power explained

Adopting responsible practices that reduce e-waste and make economic sense can positively influence consumer brand preferences, explains Thomas Blaha of Memory Protection Devices

Product designers and procurement professionals need to be mindful that successful brands demonstrate a strong commitment to environmental protection and sustainability. Addressing the growing problem of used alkaline batteries is a good place to start. Americans purchase nearly 3.3 billion alkaline cells annually, a staggering amount, which could be dramatically cut by substituting rechargeable batteries and battery holders.

This environmentally-conscious approach also makes good business sense. For example, equipping a device with four AA rechargeable Lithium-ion batteries could cost up to \$50 but provides in excess of five years of service with over 500 recharge cycles. Conversely, having to replace a set of four alkaline batteries multiple times over the life of the device could cost as much as \$1,000, making it nearly 20 times more expensive.

Growing e-waste regulations

Over the years, increased regulatory controls have transformed battery manufacturing, recycling, and shipping. In 1996, Congress passed the Mercury-Containing and Rechargeable Battery Act to address the collection and recycling of NiCd cells along with certain small sealed

lead-acid batteries intended for 'personal or household use' in cellular phones, laptops, personal computers, cordless power tools, video cameras, and uninterruptible power supplies.

The Battery Act required proper battery labeling that indicates consumer responsibility for appropriate recycling/disposal and requires easy battery access for removal at end-of-life. In addition, certain mercury-based chemistries were phased out, including most alkaline-manganese, zinc-carbon, and mercuric oxide batteries.

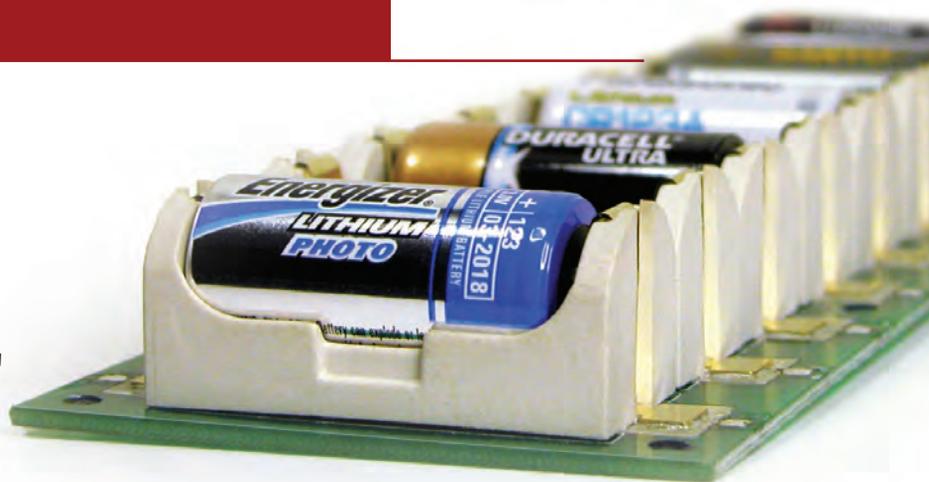
Since improperly packaged batteries can pose a fire hazard, the US DoT introduced Call2Recycle regulations that require all batteries to be individually bagged or taped prior to shipping. Li-ion batteries must be sorted separately from other recyclable batteries to ensure safe storage and shipping. If the shipping package is damaged, the batteries must be quarantined, inspected, and repackaged. Also, any package containing Li-ion batteries with a gross weight of over 66lb, must be marked 'LITHIUM BATTERY, UN 3090', carry the Class 9 miscellaneous hazard label, and be handled by specially trained shippers in accordance with US hazardous materials regulations.

Dozens of states have also passed some form of e-waste legislation, including mandatory electronics recycling and recovery programs for computers, peripherals, and other electronic devices. Battery manufacturers have independently funded the Rechargeable Battery Recycling Corporation, a non-profit organization dedicated to educating manufacturers, retailers and consumers about the benefits of rechargeable battery recycling. The RBRC has also established a national cadmium recovery facility in Ellwood City, PA.

Cheaper rechargeable batteries

Approximately 73 per cent of municipal solid waste is sent to landfill or incinerated. Intelligent practices are needed to ensure that batteries and other e-waste is properly disposed of or recycled to limit the amount of heavy metals and harmful chemicals, including many known carcinogens, that enter the food chain.

Fortunately, rechargeable batteries are becoming less toxic and less expensive, making them a cost viable alternative for consumer and industrial electronics. Battery holders offer additional benefits at minimal cost by firmly securing cells and enabling fast battery removal at end-of-life.



Battery holders secure cells firmly in place and facilitate fast battery removal at end-of-life



Since improperly packaged batteries can pose a fire hazard, the US DoT introduced Call2Recycle regulations that require all batteries to be individually bagged or taped prior to shipping

As the cost of rechargeable Li-ion batteries continues to drop, they are becoming an increasingly wise investment for OEMs that adopt a more consumer-focused approach, prioritizing environmental protection and a lower total cost of ownership over short-term profits. This is a winning strategy, as embracing corporate responsibility towards environmental protection and sustainability can serve to positively influence consumer brand preferences.

www.batteryholders.com

Sourcing for PoE?

Fidus Power has announced availability of a new low-profile, wide operating temperature range, 700W power supply with a five-year warranty. The new VQF700 series AC/DC power supplies can provide up to 700W from a fan cooled 93 by 182 by 41mm enclosure and are approved to the latest version of EN/IEC62368-1. Suitable for PoE, IT and industrial applications, the VQF700 meets international safety and EMC standards, providing output voltages of 12, 15, 24, 48 and 54V DC.

Key features are listed as excellent thermal performance from -30 to 70°C, output to ground isolation of 1,500V,

a 5V at 1A standby rating and remote on/off.

Engineering manager at Fidus Power, Mark Gibbons, commented: "This cost effective 700W power supply offers a compact and reliable power source for a number of applications including the growing high power over Ethernet market."

Free engineering samples can be delivered from stock on short leadtimes, say Fidus.

www.fiduspower.com



Connected supplies are IIoT ready

PULS Power has introduced its first DIN-rail power supply to provide real-time information on power, temperature and status. Data is supplied direct from the power supply via the company's proprietary IO-Link port.

UK country manager for PULS, Marco van der Linden, explained: "A power supply is situated at a central nodal point in any system. There is more than just output current flowing, a power supply can be used to record a significant amount of real-time information."

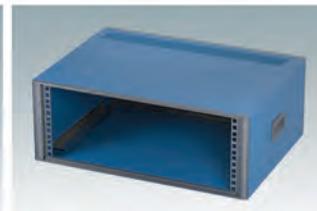
The Dimension QT40.241-B2 three-phase DIN rail power supply from PULS makes this system data available via an IEC 61131-9 IO-Link v1.1 networking function using a four-pole M12 plug connector.

With the IO-Link connected supply acting as a sensor node, system data can make a significant contribution to the industrial internet of things, potentially increasing system availability and reducing maintenance and operating costs.

www.pulspower.com

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Lead times for power transistors will continue to shrink in the second half

The days of 40+ week lead times for power transistors are over as suppliers have added capacity and demand growth is expected to slow



James Carbone

The worldwide power transistor market in 2019 will grow at a slower rate than last year as sales increase five per cent to \$17.1 billion, according to researcher IC Insights.

The growth rate in 2019 will be sharply lower than 2018 when power transistor sales grew 14 per cent and unit demand increased eight per cent.

Strong demand and limited capacity in 2018 resulted in long lead times, shortages and a six per cent increase in the average price of a power transistor, the researcher said. However, power transistor manufacturers have added capacity and supply is catching up with demand. The power transistor average price in 2019 will decline about one per cent and lead times will further shrink. In fact, lead times have fallen from more than 40 weeks last year to 12-18 weeks and will continue to fall in the second half, IC Insights said.

Manufacturers say while lead times have shrunk, power

transistor demand remained healthy if not stellar in the first half of this year. For instance, STMicroelectronics (ST) has seen five-6 per cent sales growth for power transistors in the first four months of the year, said Puccio Conti, marketing manager, analog & discretes group, Americas region. He said he expected similar growth to continue through 2019.

"The market will keep growing on the high side of single digits. We see growth at the same rate or slightly higher in the second half compared to the first," said Conti.

Vishay Intertechnology has also seen healthy growth for power transistors in the first half of the year. Demand for MOSFETs has remained strong, said Dave Valletta, executive vice president worldwide sales for Vishay. "The same drivers are there. Automotive has been strong and continues to be. Telecom has been strong. We've had a lot business coming in 5G programs. So, the outlook is good," he said.

Unit shipments to rise

In fact, underlying demand for power transistors is healthy and unit sales in 2019 should again increase six per cent, according to IC Insights. Sales in the first quarter of the year were up 10 per cent, the researcher said.

"We think it (power transistor sales) will slow quite a bit in the second half of the year. That's why we have a growth rate of five per cent," said Rob Lineback, senior market analyst for IC Insights.

Power transistors, which include power metal oxide semiconductor field emitting transistors (MOSFETs), insulated gate bipolar transistors (IGBT) and bipolar junction transistors (BJTs) are used in a wide range of electronics equipment. Power MOSFETs below 200V account for about 42 per cent of the power transistor market while. Power MOSFET above 200 V, which are used in servers, telecommunications and switching equipment, account for 14 per cent, according to IC Insights.

IBGTs used in modules represent about 23 per cent of the power transistor market, while individual IGBT sales account for nine per cent of the market. BJTs, which are mature products, represent five per cent of the market and RF and microwave transistors account for about six percent of power transistor revenue, the researcher said.

Power MOSFETs have posted the strongest growth rates over the last several years. In 2018, power FETs for 40-100V applications increased 21 per cent and insulated-gate bipolar transistors (IGBTs), rose 20.3 per cent, said IC Insights. Power FETs for up to 40V applications grew 17 per cent, while power FETs for 100-200V applications increased six per cent. IGBT power modules rose 15 per cent.

The only power transistor segment that suffered declining sales was RF/microwave power transistors. Revenue for the segment fell one per cent last year.

By the Numbers



62.8 billion

The number of power transistor units shipped in 2018



25.7 cents

The average price of a power transistor in 2019



5%

The expected growth rate for power transistors in 2019



3.3%

The compound annual growth rate for the power transistor market from 2018 through 2023



\$19.2 billion

The forecasted size of the global power transistor market in 2023



“Power transistor demand has been pretty much across the board because power transistors are used in everything,” said Lineback. “The automotive market was one of the strong segments driving power transistor growth over the past couple years,” he said. “The automotive market was one of the strong segments driving power transistor growth over the past couple years,” said Lineback.

Robust demand from automotive resulted in shortages which drove up prices and increased revenue growth for power transistor manufacturers, he said.

Capacity added

To meet rising demand, power transistor manufacturers have been steadily adding capacity over the last year. Some transitioned some power transistor manufacturing to 300mm wafers. By switching to larger size wafers, chipmakers can produce more chips per wafer to boost supply without having to add new production lines.

However, suppliers have been careful not to add too much capacity and in the first quarter of the year, most suppliers were still trying to catch up with demand, according to IC Insights.

The good news for buyers is that tight supplies of most power transistor product types are expected to end in the second half of the year because of the overall slowdown in the global economy and slower demand growth for power transistors, the researcher said. However, the continuing trade war between the US and China could adversely impact the power transistor market.

Because capacity has increased, power transistor lead times continue to shrink and could end up in the “normal” range of 8-12 weeks later in the year. “It may get to the point where there would not be a glut, but maybe a little bit of oversupply in the market,” he said.

In the next several years more capacity may be needed. While power transistors are used in a wide range of equipment, there could be new drivers for the power transistor market. Lineback said the transition to 5G networks will be “good news for the RF power transistor side of the business which has not done well” but it will not happen overnight.

He said 5G smart phone will eventually drive power transistor sales, but it may take several

Robust demand will prevent power transistor prices from falling too sharply
Source: IC Insights



years. “I don’t think it will cause a tremendous surge in power transistor sales” in the short term, he said. It will take several years before 5G cell phones have an impact on power transistor demand.

However, he noted 5G is not just about smart phone handsets. The next-generation wireless technology is going to involve “anything connected to the Internet or connected to things. Automotive will be a strong 5G market because cars” will be connected to a cellular network to have access to the Internet. Also, IoT will possibly run through 5G networks versus going through wired connections, said Lineback.

More SiC power transistors

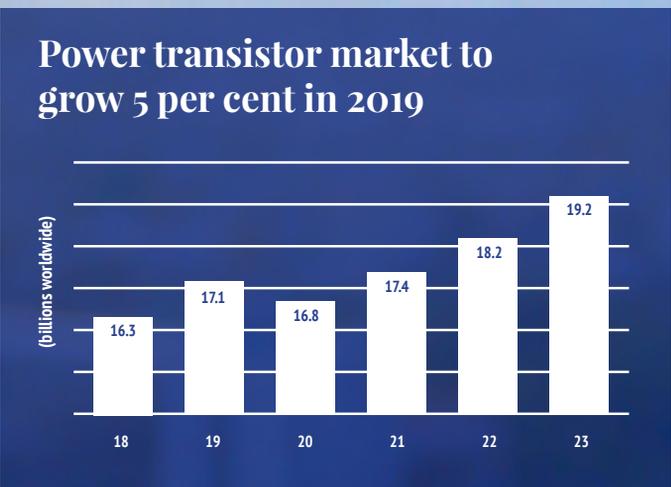
A key trend for buyers to watch is the transition of power transistors to silicon carbide and gallium nitride compounds.

“Every single supplier has transistors based on one or both of those technologies,” said Lineback. Gallium nitride/silicon carbide transistors are forecast to grow at a compound annual growth rate of 45 per cent and sales of the devices will reach more than \$900 million by 2023.

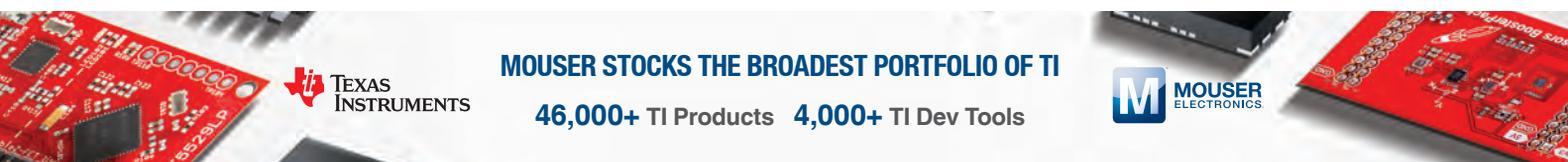
More silicon carbide and gallium nitride power transistors will be made because of the advantageous wide-bandgap properties of the materials. Conventional silicon semiconductors have a bandgap in the range of 1-1.5 electronvolt (eV). Wide-bandgap materials have bandgaps in the range of 2-4 eV. Having a wider bandgap means that chips using the compounds can operate at much higher voltages, frequencies and temperatures than silicon-based semiconductors.

Silicon carbide and gallium nitride are more widely used in RF and microwave power transistors. More power transistors will use silicon carbide and gallium nitride in the next five years.

Only about one per cent of power transistors use one of the compounds today, the figure will increase to five or six per cent in five years, said Lineback.



Power transistor revenue will grow 5 per cent to \$17.1 billion in 2019
Source: IC Insights



Switched on buyers opt for certification

Sourcing switches for use in hazardous or explosive environments brings serious safety concerns. Here Schurter explains the ATEX/IECx certification that underpins safe switch specification

Products in Schurter Electronics' Metal Line switch range are more than just mechanical switches. In order to offer switches capable of operating in the harshest of environments, Schurter makes use of different component technologies.

The PSE EX family, for example, is certified according to ATEX and IECEx regulations and its application is consistent with device group II, which covers areas other than mining. As a piezo switch, it can be used in hazardous environments with ATEX / IECEx certification due to the PSE EX certification. The fact that piezo technology has no moving parts allows for a fully sealed switch, ensuring it is ideally placed to deal with the rigors of the toughest industries.

Explosive atmospheres

The PSE EX family is approved for use in potentially explosive atmospheres containing air and gases. Further application areas also include industrial sectors such as mills, where solids are found in their smallest form as dust, which may be prone to self-ignition.

Flammable substances such as gases, vapours or mist released into the environment during production, transportation or storage, can ignite and pose serious consequences for people and property. The same is true for dust, which, in conjunction with air, can create an explosive atmosphere.

To ensure security in these environments, the Device Directives 94/9/EC features guidelines for the protection of personnel and devices working in such hazardous areas. This is achieved by eliminating all possible sources of fire and ignition in the products and systems used in these areas.

Approval markings

The approval marking is Ex II 2 GD according to ATEX regulations, and Ex ib IIC T6 T5 Gb and Ex ib IIIC T85°C T100°C Db according to IEC regulations, for gases and dust.

With the temperature class extended from T4 to T5 and T6, the permissible power dissipation of the PSE EX was limited accordingly, such that the piezo switch is intrinsically safe according to EN60079-11.

In addition, the flammability group was increased from IIB to IIC, and IIIC respectively. This extension will allow the use of the PSE EX in atmospheres with further types of gases, combustible dust, ignitable fibres and filings.

Typical applications include oil and gas exploration rigs,



Switches for hazardous use have a label with the particulars of the certification



Typical applications include oil and gas exploration rigs or petrochemical facilities



To ensure security in hazardous environments, the Device Directives 94/9/EC features guidelines for the protection of personnel and devices

petrochemical facilities, transportation and storage environments for combustible materials, paint mixing devices, grain mills, wood processing and chemical plants.

To meet the needs of these diverse applications, the PSE EX standard models are available with mounting diameters of 16, 19 and 22mm with pin connectors and housing colours in red, green

or natural aluminium. Other colours, housing diameters and connection versions are available on request. Installation instructions are included in the packaging according to the ATEX directives and for maximum safety, switches for hazardous use have a label with the particulars of the certification and an identification number.

www.schurter.co.uk

Piezo technology has no moving parts allowing for a fully sealed switch



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Distribution: fit for purpose

With a rapid surge in IoT innovation and customer needs evolving, vice president of sales for Farnell, Rob Rospedzihowski, explains how distributors are updating their offering

Distributors are the cornerstone of keeping businesses moving by providing essential supplies and support. In recent years, however, customers' buying behaviour has changed, causing those businesses that rely on distributors to change too—with a knock-on effect all the way up the supply chain and back again. Customers and buyers are not afraid to shop around, meaning distribution businesses face the challenge of meeting changing needs. In such a competitive marketplace, distributors need to focus on serving customers in the way that suits the customer best, which, in changing times, is quite a tall order.

A changing landscape

The rapid surge in connected devices and miniaturised wearables has driven growth in the internet of things, one of the most exciting and accessible markets for developers today. Digital transformation provides an opportunity to bring new products to a broader range of customers than ever before, each with different needs. In addition to traditional market entrants and smaller, experienced, design houses, start-ups and professional makers are getting in on the action. As they are new to developing products for market, however, these customers need guidance and support, especially when managing the challenges of high volume production, from careful inventory management to obsolescence support. With

so many opportunities in this market, anticipating customers' needs can be complex.

Extreme innovation

Rapid development in the IoT space, and growth in areas such as wearables and artificial intelligence is driving designers at all experience levels to tackle fresh challenges as they enter new markets and apply technology in previously unanticipated ways. This may mean negotiating compliance challenges within heavily regulated industries such as healthcare and automotive, or developing a deeper knowledge of existing technology as it is applied in different ways, in harsher environments or within flexible applications, such as clothing.

The pressure to keep up is felt strongly by design engineers and it's driving them to work with distributors that can offer support throughout the product development lifecycle. Their wishlist encompasses research and design expertise, a broad product portfolio for small to high volume distribution, supply chain support, logistics, finance and excellent customer service.

Distributor challenges

Traditionally, distributors provide competitive advantage by ensuring components are in stock in high volume and at a competitive price. The distributor will manage this stock, ensuring appropriate buffer levels, allowing

customers to place call-off orders and have them shipped quickly anywhere in the world. They make this process simple and easy by providing an account manager, online account management, or a combination of both, in addition to offering advice, both technical and commercial. Reliability and flexibility are therefore two of the big deliverables that mark out a distributor fit for these emerging markets' demands.

Purchasing departments still value price and availability over other factors. In today's market, however, business customers are focussed on the total cost of doing business, driving increased use of approved vendor lists. This means the variety of needs within any one customer will naturally place higher demands on a 'one stop shop' distributor.

Start-up growth

The growth of the start-up, professional maker and hobbyist sector is putting distributors under particular pressure, too. For this customer group, technical support is the biggest area in which a distributor can provide added value. Although their needs are similar to engineers in traditional companies, the IoT boom has meant that more makers and hobbyists, many with limited technical knowledge, are developing projects that demand greater levels of connectivity, flexibility and customisation.

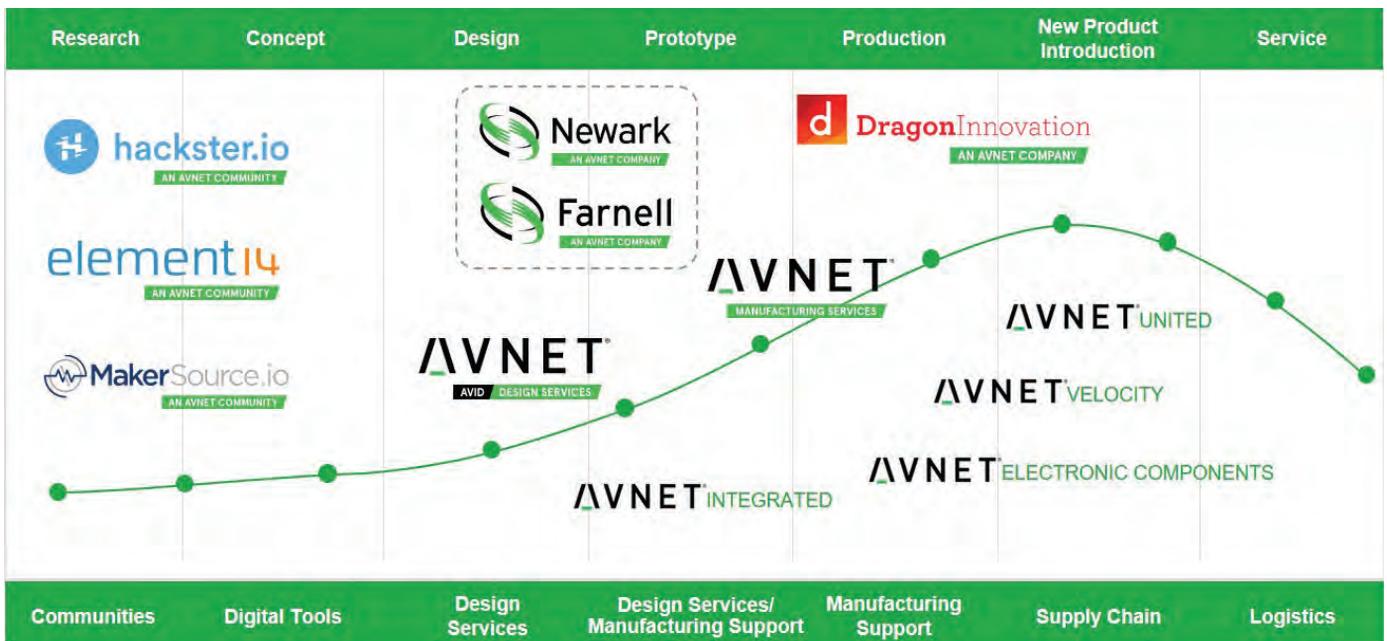
Despite the plug-and-play



Vice president sales for Farnell,
Rob Rospedzihowski



Distributors provide competitive advantage by ensuring components are in stock in high volume and at a competitive price



The Avnet ecosystem offers benefits for customers of all sizes, at each stage of their product development journey

modules available, start-ups, makers and hobbyists still require deeper levels of technical and product support. This need has been addressed in part through investment in distributor-led online forums and communities, as well as business modules focused purely on software and design services. Nevertheless, these customers, much like their established developer counterparts, favour a distributor that carries a broad linecard, has items in stock and offers excellent delivery options, technical support and customer service.

In order to better service the full breadth of customers, distributors are focusing attention on their web presence to attract new customers as well as support existing ones. With the overwhelming number of products now available online, standout distributor websites feature easy navigation with the right amount of technical information and support to retain customers and reach new audiences.

Bearing all of these factors in mind and the distinct but overlapping needs of the marketplace, is it possible for a distributor to keep everybody

happy or is it necessary to choose one target customer group and focus on them alone?

A new breed of distributor

When Avnet acquired Premier Farnell, which operates as Farnell Europe, the result was a technology distribution business that serves as a product development ecosystem for both established and emerging developers including design engineers and the maker and hobbyist markets.

Farnell specialises in helping creators of all experience levels, from product idea and design through to prototype and low-volume manufacturing. Described as the number one manufacturer and distributor of Raspberry Pi, exclusive manufacturer of BBC micro:bit and the official manufacturer of BeagleBone Black, Farnell also manufactures many of the products it provides. Avnet is a global high-volume oriented franchise distributor with expertise in large volume, broad line distribution and world-class global logistics and supply chain management.

When these two businesses joined forces, it created a new breed of distributor that we believe

offers better support at all stages of the product development process—from design through to volume manufacturing and product lifecycle management—providing a seamless service for all customers. It gave customers access to a global technology solutions provider with specialities across the product development journey. Two years later, we are realising these benefits for customers.

Seamless support

Colleagues at both Farnell and Avnet have worked together to introduce a process that provides seamless support to customers as they grow. As a high service distributor, Farnell holds a stocking profile about a mile wide and an inch deep, allowing customers to access the broadest range of products in the lower quantities they seek. As part of the Avnet group we guide customers all the way from early stage design and low volume production to high volume production. By monitoring customers' buying patterns, we can identify when they are moving into the next phase of their journey and introduce them to our sister businesses, which can support them as they grow further. These customers now

benefit from access to Avnet's ecosystem at the point where it adds new value to their business, without the need to onboard a new partner for this phase of their journey.

The combination of Avnet and Farnell offers the heavyweight resources needed by large manufacturers along with the finer touch to work with inventors, makers and engineers to help them turn their ideas into prototypes. The ability to engage with innovators at the earliest stages of product design and development, is fuelling a new chapter of growth.

Today's customers need the best of both worlds: to work with broad line companies offering scale, size and a global reach, while still having access to specialized capabilities for support through all stages of the product lifecycle. It's evident that this amalgamation offers benefits for all customers, no matter their level of experience, turnover or geographical location, ultimately setting a new bar for distributors the world over.

www.avnet.com

Just a small selection of the newest component launches on eBOM.com

Passives

New Yorker Electronics Announces Upgraded Status of Exxelia Mil Wet Tantalum Capacitor

New Yorker Electronics

Optoelectronics

Vishay Intertechnology Unveils Long-Life Ceramic / Quartz-Based UVC Emitting Diode in Compact SMD Package

Vishay Intertechnology

2.0 x 1.25 mm (0805package/2012 metric) Chip SMD LED

Visual Communications Company

Semiconductors

TTI Now Stocks Murata's LoRa Module

TTI Inc

MACOM's 10W GaN-on-Si Power Amp Module, Now at Mouser, Offers Design Flexibility

Mouser

Acromag Releases New Isolated Quad RS232 Serial Communication Modules in Ruggedized Mini PCIe Form Factor

Acromag

Improved Characteristics at Lower-Costs for the most popular style of 1-watt DC-DC Converter

Traco Power

Mouser Electronics Now Stocking Broad Portfolio of Xilinx Products

Mouser

congatec presents 10 new high-end modules for embedded edge computing

congatec

Frequency

L-com Releases New 900 MHz Omni and Sector Antennas Available with Same-Day Shipping

L-com

In Compact Land Grid Array Package, Analog Devices Offer 44 GHz Silicon Switches

Analog Devices

IoT Modules Enable Large-Scale LTE-M and NB-IoT Deployments

Telit

Connectors & Cabling

SMP Male Solderless PCB Compression Mount Connector, 2 Hole (Stripline)

SV Microwave

L-com Unveils Premium 8-Position, A-code, M12 Cable Assemblies for Sensor, Actuator and Fieldbus Applications

L-com

From Rapid Online - Brennenstuhl Ecolor 3 Way Switched Extension Sockets

Rapid

Assembly & Test

REDUX™ Wave Springs from Lee Spring - an enabling technology

Zestron

Thermal Management

From CUI - Weighing the Pros and Cons of Fan Bearing Types

CUI

Enclosures

How to choose your ideal enclosure

Camdenboss

CamdenBoss' Raspberry Pi 4 enclosures brought to market within days

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Sensors

Laser diodes: How smartphones and self-driving cars see the world

IDTechEx

TT Electronics introduces modular current sensor approach for customised aircraft electrical systems

TT Electronics

Switches

Not all Reed Relays are created equal

Pickering Group

Power

Bel Power Solutions Announces Melcher™ LR Series 300 W AC-DC Cassette Converters for Rugged Industrial App

Bel Power Solutions

From Rapid Online - Brennenstuhl Ecolor 3 Way Switched Extension Sockets

Rapid



How does it work?

Principal Manufacturer launches New Component



Distributor / Principal

DISCOVER

Component release
published on eBOM.com

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COMPARE

Live component pricing
+ quantities available

powered by  ecia
Electronic Components Industry Association

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Buy components from a
Distributor of your choice

eBOM **LIVE**

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Component supply conditions favour purchasers

Prices and lead times have fallen and most allocations are over as high inventory levels and weaker demand have improved supply conditions for electronics purchasers.

Electronic component buyers may not yet be singing “Happy days are here again,” but many purchasers are pleased supply conditions for passives and connectors have turned. There is adequate, if not plentiful, supply for many parts compared to last year when some components were on allocation, most had long lead times and prices for many increased.

Depending on the part, prices are falling or stable and lead times are down although not quite to pre-2018 levels. Most allocations are over and while lead times for all components may not be “normal,” many have retreated from 40 to 50 weeks to 20 weeks or less, while some are still more than 30 weeks, according to industry analysts and manufacturers buyers.

Lead times are likely to further shrink in the third quarter. And, while it may not be a buyer’s market, supply conditions for multilayer ceramic capacitors (MLCC), and other capacitors, resistors, and connectors will be more favourable to buyers through the second half of the year and maybe into 2020.

The reason buying conditions for purchasers have improved is that many component and connector manufacturers added capacity last year because of robust orders from OEMs and EMS providers across most industries. Distributors also boosted orders to manufacturers.

With resistors and capacitors. “There was a tremendous amount of capacity added,” said Dave Valletta, executive vice president, worldwide sales for Vishay Intertechnology. Distributors and OEM were trying to get their hands on as much product as they could. But all of a sudden everybody realised there was way too much inventory,” he said.

At the same time, toward the end of 2018, demand declined across most industries. There was also slower economic growth in China which resulted in less component demand. As a result, supply became plentiful and lead times and prices started to fall. “Automotive usage and handset demand along with handset accessories are way down which is freeing up a lot of inventory,” said Stephanie Martin, senior

vice president global supply for EMS provider Vexos. In China, business was expected to be sluggish in the first quarter because of the Chinese New Year, but business was worse than expected and Q2 wasn’t much better, she said.

“Some distributors based in China told us business was down 10 per cent in the fourth quarter of 2018, down 8 percent in Q1 and it looked like it would drop 8-10 per cent in Q2,” said Martin. Many distributors in China are “in an over inventory position because large EMS and OEM customers double and triple booked, then cancelled orders,” she said.

High inventory levels and weakened demand from key market segments has resulted in falling prices for components. Prices have declined 60 per cent for some components and are reaching 2017 price levels. “But remember we had a lot of price increases in 2018,” said Martin

Good news, bad news

The good news for buyers, but not so good news for component factors, is inventory levels have not

yet worked off, and it may take two more quarters for that to happen. It could be a bonafide buyer’s market in the second half of the year, at least temporarily.

“Right now, there’s still a lot of stock on customer shelves,” Valletta said in early July. “There is stock on distributors’ shelves. There is enough capacity.” Inventory is being worked off, but it could take several quarters, he said. “Most component manufacturers are in the doldrums right because of all of the inventory that is sitting there,” said Valletta.

On the positive side for component manufacturers, distribution business is doing well and “that inventory will move,” he said. “It would be a lot worse if distributors’ outlook wasn’t good. Distributors are more of an indicator of the health of the market.”

Obviously, most purchasers want buying conditions to improve and would welcome a buyer’s market. Lead times and prices for many components were falling at the beginning of the third quarter.

Purchasing by James Carbone

Supply continues to improve for many devices including MLCCs, which were a thorn in the side for most buyers in 2018. Last year, MLCCs from some manufacturers were on allocation. MLCC tags increased 40 to 50 per cent depending on the application, according to researcher Frost and Sullivan.

Today most devices that are 0402 or smaller case sizes are in the 12 to 16 week lead time range. However, MLCCs in large case sizes, including 0603, 0805 and 1206, have 30 to 40 week lead times, but those are down from 52 weeks last year.

Most manufacturers added about 10-15 per cent capacity last year for smaller size parts 0201 and 01005's, but manufacturers apparently are not adding capacity for parts in larger case sizes. In fact, some manufacturers earlier had stopped making such parts, while others don't plan to add additional capacity, which could result in longer lead times. However, there are exceptions. Samsung is focusing more production in larger case sizes including 0805 and above, according to Vexos. Vishay is also producing more parts in larger case sizes.

Murata has designated a number of MLCCs as Not Recommended for New Design (NRFND) which could be an indication that the manufacturer will soon discontinue the parts. Because overall business is sluggish, the company may hold off issuing end-of-life notices for the parts in larger case sizes until business picks up when they will need production lines for MLCCs in smaller case sizes, said Martin

MLCC demand will rise again

While supply conditions for capacitors are improving, the favourable conditions may be short lived because demand will likely pick up again. "The number of MLCCs is increasing significantly in every application/segment," said Aravind Seshagiri, global research manager, industrials for Frost & Sullivan. Besides traditional applications for capacitors, the buildout of 5G networks and the expansion of

Internet of Things applications will add capacity.

MLCC demand across industries has increased and the challenges in capacity, supply chain, technology requirements have certainly impacted the MLCC supply, said Seshagiri. In addition, there has been consolidation in the electronics industry, which has impacted supply.

While suppliers have added capacity, the expansion and increase in production has been slow and this is likely to continue as manufacturers are "more focused on high volume, as well as margin segments such as automotive, aerospace and defense, and healthcare," said Seshagiri.

Resistor lead times fall

Supply conditions for resistors have also done an about-face. Generally, resistor lead times are in the 8 to 16 week range with parts from Yageo running at about 8 to 10 weeks, according to Martin.

The times for chip resistors were in the 12 to 24 week range. The CRCW series from Vishay is down from 78 weeks to 40 to 52 weeks, while the ERJ series from Panasonic is off of allocation and in the 17 to 21 week range, according to Vexos.

As with capacitors and resistors, there is weaker demand for connectors this year than in 2018. "Demand is slowing worldwide," said Ron Bishop, president and founder of connector research firm Bishop & Associates. He said for all regions, connector sales through May were down 3.5 percent. Only North America is showing year-over-year growth. North American connector sales are up 3.6 per cent year to date over 2018. However, sales in North America declined 1.7 per cent in April and May after posting growth in each month of the first quarter.

Europe's year-to-date's sales were down 5.4 per cent, China's sale fell 8.5 per cent and Japan was down 6.7 per cent, while the Asian-Pacific year-to-date sales dropped 1.3 per cent.

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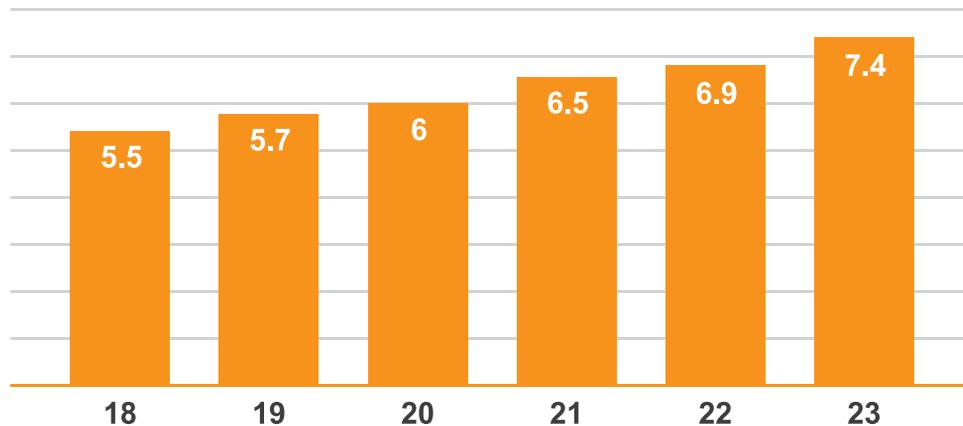
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MLCC will stay in high demand



Demand for multilayer ceramic capacitors will remain strong through 2023 driven by multiple end market customer segments ranging from computers to new 5G handsets.

Despite the slowdown in connector sales in recent months, industry revenue for the year will still grow, but it won't be as strong as last year. Earlier Bishop had forecast the connector market would rise 6.5 per cent to \$71.1 billion in 2019. However, with demand weakening, the growth rate would be in the low single digits, said Bishop.

Bishop added that connector lead times and prices were stable at the beginning of the second half and "we expect that to remain so for the remainder of the year." He added connector companies are not increasing capacity right now. "Demand is a little soft and companies are watching for market direction. Raw material costs are up a little but nothing that is causing great concern," he said.

Decline in critical markets

Connector and passive component sales declined in the first quarter because several key market segments suffered downturns. For instance, revenue in the telecom/data market declined 11 per cent in the first quarter, compared to the first quarter of 2018, according to Bishop. Automotive had been a

strong market for many component manufacturers, but sales in the segment declined 5.2 per cent in the first quarter.

The industrial, computer and peripheral segments also posted declining sales in the first three months of 2019. However, the mil/aero segment grew 10.4 per cent while transportation revenue rose 4.4 per cent according to Bishop.

One indication of slowing growth is the printed circuit board (PCB) book-to-bill ratio fell to 0.99 in May from 1.02 in April, according to the Association Connecting Electronics Industries (ACEI). A book-to-bill ratio of 0.99 means that for every \$100 of printed circuit boards that manufacturers shipped in May, PCB makers received only \$99 in new orders, an indication of slowing business. May's board book-to-bill ratio was a drastic change from 2018 when the ratio was 1.09.

"Although sales and order growth continued in May for the North American PCB industry, slowing order growth rates pushed the book-to-bill ratio below parity," said Sharon Starr, IPC's director of market research." She noted that

May 2019 was the first time since January 2017 that the industry registered a book-to-bill ratio below parity (1.00). "Recent ratios hovering around parity indicate continued but slower growth in the coming months," she said.

Industry analysts, component manufacturers and electronics buyers don't know how long the slowdown will last. Some component manufacturers and electronics distributors say component demand will pick up in second half of the year once high inventory levels in the supply chain are worked off. Others say business will remain sluggish through the year and higher than average inventory levels and lower prices will take their toll on component revenue for the year. For instance, Vishay's sales for the year will be flat to down, according to Valletta.

Buyers are hoping that lead times and prices continue to fall and get back to 2017 levels, but there is no certainty that will happen. Favourable business conditions for buyers will continue through at least the third quarter, according to Martin. "Q4 is an unknown at this time, but I'm not hearing any increased orders with our

suppliers yet that indicate a spike. We are just happy to have stable and decent lead times again," she said.

However, some buyers are concerned about what the impact of 5G networks and handsets will have on electronic components supply. When the technology kicks in, the expectation is that the market for components in larger case sizes will become constrained again, since no additional capacity is being added for parts in larger cases. If demand from automotive system and handset manufacturers bounces back, component supply will become even more constrained.

The market is in a lull because of cancelled orders and double/triple bookings by the large EMS providers and OEMs, which has resulted in high inventory levels the supply chain. "When this excess inventory is consumed and demand spikes up again, we expect the roller coaster to start again. I believe it will be in late Q4 or early Q1 next year," said Martin.

So rather than singing 'Happy days are here again, many buyers may just be singing the blues in a few months.

The top 30 distributors report is coming to the UK

After the continued success of the North America Top 50 Distributors Report MMG Publishing is happy to announce the inaugural Electronics Sourcing UK Top 30 Distributors Report. The report will examine the top 30 distributors within the UK marketplace, explore the growing trends being encountered, highlight the biggest challenges facing the industry, glean insight from various top industry professionals on what we can expect from the industry in

the years to come, feature extensive company profiles as well as an in-depth directory of all companies featured within the report.

This report will be put written by Thomas Smart, Special Projects Editor, Electronics Sourcing and will only be available to view within the upcoming October issue of Electronics Sourcing UK.



This years successful **Top 50 North America Distributors report**

The advertisement features a large, stylized Union Jack graphic in the background, composed of a grid of dots in red, white, and blue. In the top left corner, the 'ELECTRONICS Sourcing exclusive' logo is present. The main headline reads 'THE UK TOP 30 DISTRIBUTORS REPORT THIS OCTOBER 2019'. In the top right corner, the 'The Electronics Sourcing UK TOP30' logo is displayed. A white callout box on the left contains the following text: 'A complete breakdown and in-depth analysis of the top 30 United Kingdom distributors available in this year's new Top 30 Distributors Report featured in the October 2019 issue of Electronics Sourcing UK'. Below this, contact information is provided: 'For advertising queries please contact: sales@electronics-sourcing.co.uk'. A large, circular, metallic-looking frame containing a Union Jack flag is positioned on the right side of the advertisement.

Buyers' Guide

Manufacturer	Distributor	Telephone	Website	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 & HARNESSING											
FTDI	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	100	N/A	£0	N/A	50	1,500+	Y
Molex	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	300	N/A	£0	97%	50	1,500+	Y
CIRCUIT PROTECTION											
Bourns	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	5,000	N/A	£0	58%	50	1,500+	Y
EPCOS/TDK	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	5,000	N/A	£0	58%	50	1,500+	Y
Littelfuse	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	35,000	N/A	£0	67%	50	1,500+	Y
DISPLAYS & LEDs											
NLT Technologies Ltd	Review Display System Ltd	01959 563345	www.review-displays.co.uk	Y	All	N/A	£0	N/A	6	25	Y
ENCLOSURES											
Bud	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	2,500	N/A	£0	80%	50	1,500+	Y
Hammond	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	12,500	N/A	£0	100%	50	1,500+	Y
Hammond	Switch Electronics	01482 862255	switchelectronics.co.uk	Y	500	N/A	£0	70%	2	6	Y
Metcase Enclosures	OKW Enclosures	01489 583858	www.metcase.co.uk	N	288	£40,000	£0	N/A	5	22	Y
OKW Enclosures Ltd	OKW Enclosures	01489 583858	www.okw.co.uk	N	1,955	£40,000	£0	N/A	5	22	Y
Rolec Enclosures	OKW Enclosures	01489 583858	www.rolec-enclosures.co.uk	Y	935	£40,000	£0	N/A	5	22	Y
Teko Enclosures	OKW Enclosures	01489 583858	www.teko.co.uk	Y	1,860	£40,000	£0	N/A	5	22	Y
FREQUENCY MANAGEMENT											
ABRACON	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	1,000	N/A	£0	91%	50	1,500+	Y
AEL Crystals Ltd	AEL Crystals Ltd	01293 789200	www.aelcrystals.co.uk	N	N/A	£200,000	£50	100%	3	15	Y
ECS	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	500	N/A	£0	99%	50	1,500+	Y
Epson	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	500	N/A	£0	59%	50	1,500+	Y
Geyer Quartz Technology	Geyer Electronic UK Ltd	01794 329341	www.geyer-electronic.com	N	N/A	N/A	£0	100%	6	50+	Y
Golledge Electronics Ltd	Golledge Electronics Ltd	01460 256 100	www.golledge.com	N	N/A	£800,000	£0	100%	3	24	Y
Jauch Quartz	Digi-Key Electronics	0800 587 0991	www.digikey.co.uk	Y	500	£250,000	0	100	15	130	Y
HEATSINKS											
Aavid	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	700	N/A	£0	67%	50	1,500+	Y
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Analog Devices Inc.	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	9,500	N/A	£0	83.00%	50	1,500+	Y

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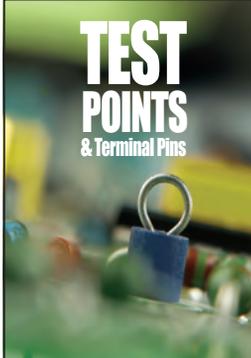
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Buyers' Guide

Manufacturer	Distributor	Telephone	Website	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
Atmel	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	1,700	N/A	£0	58.00%	50	1,500+	Y
Avago Technologies	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	400	N/A	£0	84.00%	50	1,500+	Y
Broadcom	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	100	N/A	£0	69%	50	1,500+	Y
Cirrus Logic	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	300	N/A	£0	80.00%	50	1,500+	Y
Cypress Semiconductor	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	1,400	N/A	£0	63.00%	50	1,500+	Y
Diodes Incorporated	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	1,600	N/A	£0	98%	50	1,500+	Y
Exar	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	1,100	N/A	£0	95.00%	50	1,500+	Y
Fairchild Semiconductor	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	2,500	N/A	£0	90.00%	50	1,500+	Y
Freescale Semiconductor	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	2,500	N/A	£0	42.00%	50	1,500+	Y
FTDI	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	100	N/A	£0	97%	50	1,500+	Y
IDT (Integrated Device Technology)	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	2,100	N/A	£0	97%	50	1,500+	Y
Infineon	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	800	N/A	£0	66.00%	50	1,500+	Y
Intel	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	500	N/A	£0	78%	50	1,500+	Y
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Intersil	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	1,900	N/A	£0	50.00%	50	1,500+	Y
ISSI	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	700	N/A	£0	98.00%	50	1,500+	Y
Lattice	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	700	N/A	£0	69%	50	1,500+	Y
Maxim Integrated	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	11,200	N/A	£0	67.00%	50	1,500+	Y
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Huber+Suhner	Lane Electronics	01403 790661	www.fclane.com	Y	766	£116,000	£0	100%	6	38	Y
ITW McMurdo	Lane Electronics	01403 790661	www.fclane.com	Y	866	£219,000	£0	100.00%	6	38	Y
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Phoenix Contact	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	12,000	N/A	£0	99.00%	50	1,500+	Y
Polamco	Lane Electronics	01403 790661	www.fclane.com	Y	218	£146,000	£0	100%	6	38	Y
Positronic	Lane Electronics	01403 790661	www.fclane.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	Y
Souriau	Lane Electronics	01403 790661	www.fclane.com	Y	1,929	£806,000	£0	100%	6	38	Y
Switchcraft	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	2,200	N/A	£0	69%	50	1,500+	Y
TE Connectivity	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	30,900	N/A	£0	40%	50	1,500+	Y
OBSOLESCENCE / HARD TO FIND											
	America II Europe	01462 707070	www.americaiiurope.com	N/A	1,900	\$1B	£0	75%	59	500+	Y
	Cyclops Electronics	01904 415 415	www.cyclops-electronics.com	N/A	177,232	£5M	£100	75%	3	78	Y
	Rochester Electronics	+44.1480.408400	www.rocelec.com	Y	299	N/A	\$250		10	400+	Y
	SeSemi Electronics LTD	01264 731009	www.sesemi.co.uk	Y	2800	N/A	£100		3	12	Y

Manufacturer	Distributor	Telephone	Website	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
OPTO ELECTRONICS											
Avago Technologies	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	8,200	N/A	£0	89%	50	1,500+	Y
Cree, Inc.	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	22,500	N/A	£0	74%	50	1,500+	Y
Dialight	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	9,800	N/A	£0	99%	50	1,500+	Y
Kingbright	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	3,100	N/A	£0	100%	50	1,500+	Y
Lumileds	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	1,100	N/A	£0	99%	50	1,500+	Y
NEC	Review Display System Ltd	01959 563345	www.review-displays.co.uk	Y	200	£200,000	£0	100%	5	20	Y
Newhaven Display	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	700	N/A	£0	65%	50	1,500+	Y
Osram Opto Semiconductor	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	2,800	N/A	£0	99%	50	1,500+	Y
VCC	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	5,000	N/A	£0	92%	50	1,500+	Y
Vishay	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	3,100	N/A	£0	99%	50	1,500+	Y
PASSIVES											
AVX	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	70,700	N/A	£0	58.00%	50	1,500+	Y
Bourns	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	49,500	N/A	£0	98%	50	1,500+	Y
Coilcraft	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	10,400	N/A	£0	98%	50	1,500+	Y
Cornell Dubilier	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	33,000	N/A	£0	65.00%	50	1,500+	Y
EPCOS / TDK	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	31,000	N/A	£0	74.00%	50	1,500+	Y
Fair-Rite	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	1,000	N/A	£0	94.00%	50	1,500+	Y
Kemet	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	135,800	N/A	£0	93%	50	1,500+	Y
KOA Speer	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	107,900	N/A	£0	82%	50	1,500+	Y
Laird Technologies	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	1,800	N/A	£0	50.00%	50	1,500+	Y
Murata	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	67,300	N/A	£0	99%	50	1,500+	Y
Nichicon	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	21,600	N/A	£0	47.00%	50	1,500+	Y
Ohmite	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	17,300	N/A	£0	99.00%	50	1,500+	Y
Panasonic	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	67,900	N/A	£0	69.00%	50	1,500+	Y
Taiyo Yuden	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	6,400	N/A	£0	82%	50	1,500+	Y
TDK	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	25,300	N/A	£0	85.00%	50	1,500+	Y
TT Electronics	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	32,800	N/A	£0	55%	50	1,500+	Y
United Chemi-Con (UCC)	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	13,900	N/A	£0	99.00%	50	1,500+	Y
Vishay	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	119,800	N/A	£0	76%	50	1,500+	Y
Würth Electronics	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	4,500	N/A	£0	63%	50	1,500+	Y
Yageo	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	45,300	N/A	£0	99%	50	1,500+	Y
POWER & BATTERIES											
Bel Power Solutions	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	1,400	N/A	£0	94.00%	50	1,500+	Y
Cincon	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	5,500	N/A	£0	60%	50	1,500+	Y
Cosel	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	11,800	N/A	£0	99%	50	1,500+	Y
CUI Inc.	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	3,900	N/A	£0	100%	50	1,500+	Y
FRIVO Gerätebau GmbH	Haredata Electronics	01423 796240	www.haredata.co.uk	Y	250 - 500	€1M	£250	100%	7	14	Y
Jauch Quartz		01276 605900	www.jauch.com			£500,000	0	95	15	130	Y
Mean Well	Ecopac (UK) Power Ltd	01844 204420	www.ecopacpower.co.uk	Y	6,000	£2M	£0	100%	8	30	Y
Mean Well	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	4,500	N/A	£0	75%	50	1,500+	Y
Murata	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	5,200	N/A	£0	93%	50	1,500+	Y
RECOM	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	23,300	N/A	£0	92%	50	1,500+	Y
Schaffner	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	900	N/A	£0	98%	50	1,500+	Y
SL Power	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	2,100	N/A	£0	87%	50	1,500+	Y
TDK-Lambda	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	4,600	N/A	£0	99%	50	1,500+	Y
TRACO Power	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	3,400	N/A	£0	95%	50	1,500+	Y
SENSORS											
All Sensors	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	2,300	N/A	£0	70.00%	50	1,500+	Y
ams	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	400	N/A	£0	77%	50	1,500+	Y
Analog Devices Inc.	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	500	N/A	£0	78%	50	1,500+	Y
Bosch	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	100	N/A	£0	94.00%	50	1,500+	Y
Freescale Semiconductor	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	1,000	N/A	£0	66%	50	1,500+	Y
Honeywell	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	15,500	N/A	£0	80%	50	1,500+	Y
Maxim Integrated	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	900	N/A	£0	N/A	50	1,500+	Y
Melexis	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	700	N/A	£0	N/A	50	1,500+	Y
Omron	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	5,700	N/A	£0	N/A	50	1,500+	Y
Sensirion	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	100	N/A	£0	N/A	50	1,500+	Y
TE Connectivity	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	1,100	N/A	£0	N/A	50	1,500+	Y
SWITCHES & KEYBOARDS											
ALPS	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	400	N/A	£0	70.00%	50	1,500+	Y
Apem	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	700	N/A	£0	96%	50	1,500+	Y
C&K Components	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	1,500	N/A	£0	84%	50	1,500+	Y
Carlting Technologies	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	300	N/A	£0	87%	50	1,500+	Y

Buyers' Guide

Manufacturer	Distributor	Telephone	Website	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
CHERRY	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	200	N/A	£0	77%	50	1,500+	Y
EAO Ltd	EAO Ltd	01444 236000	www.eao.co.uk	N	5,000	£500,000	£150	100%	6	22	Y
E-Switch	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	700	N/A	£0	94%	50	1,500+	Y
Grayhill	EAO Ltd	01444 236000	www.eao.co.uk	Y	2,300	£150,000	£150	99%	6	22	Y
Grayhill	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	400	N/A	£0	84.00%	50	1,500+	Y
Honeywell	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	700	N/A	£0	98%	50	1,500+	Y
NKK Switches	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	1,100	N/A	£0	94%	50	1,500+	Y
Omron	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	900	N/A	£0	68%	50	1,500+	Y
TE Connectivity	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	400	N/A	£0	98%	50	1,500+	Y
TERMINAL BLOCKS											
Marathon Special Products	Global Supply Services	01904 436 488	www.global-supply-services.com	Y	8,000	£800,000	£100	100%	3	11	Y
THERMAL MANAGEMENT											
ADDA	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	800	N/A	£0	59.00%	50	1,500+	Y
Delta Electronics	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	500	N/A	£0	28%	50	1,500+	Y
ebm-papst	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	2,200	N/A	£0	99%	50	1,500+	Y
Sanyo Denki	EAO Ltd	01444 236000	www.eao.co.uk	Y	3,000	£150,000	£150	99%	6	22	Y
Sanyo Denki	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	2,900	N/A	£0	N/A	50	1,500+	Y
Sunon	G.English Electronics Ltd	0208 855 0991	www.gelec.co.uk	Y	3,500	£1,000,000+	£0	100%	10	28	Y
Sunon	Thermaco Ltd	01684 566163	www.thermaco.co.uk	Y	3,500	£230,000	£100	100%	6	12	Y
TRANSFORMERS & INDUCTORS											
Best Windings	Best Windings	0044 (0)1394 448424	www.bestwindings.co.uk	N	300	N/A	£100	N/A	2	14	Y
WIRELESS SOLUTIONS											
Anaren	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	100	N/A	£0	86.00%	50	1,500+	Y
B&B Electronics	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	100	N/A	£0	87%	50	1,500+	Y
Bluegiga Technologies	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	100	N/A	£0	93.00%	50	1,500+	Y
Digi International	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	200	N/A	£0	92%	50	1,500+	Y
Laird Technologies	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	100	N/A	£0	76%	50	1,500+	Y
Linx Technologies	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	100	N/A	£0	99%	50	1,500+	Y
Microchip	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	100	N/A	£0	85%	50	1,500+	Y
Murata	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	100	N/A	£0	100%	50	1,500+	Y
Panasonic	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	100	N/A	£0	91%	50	1,500+	Y
Redpine Signals	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	100	N/A	£0	94%	50	1,500+	Y
RF Digital	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	100	N/A	£0	100%	50	1,500+	Y
Texas Instruments	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	100	N/A	£0	75%	50	1,500+	Y
Wi2Wi	Mouser Electronics	0044 (0)1494-467490	www.mouser.co.uk	Y	100	N/A	£0	36%	50	1,500+	Y

Contract Manufacturers Buyers' Guide

Manufacturer	Telephone	Website	Turnover	Location	Employees	Number of Surface Mount Lines	Approvals	BGA Capacity	Lead Free Manufacturer	Prototyping	Design Capability	Full Turnkey Cables and Harnessing
AWS Electronics Group	01782 753200	www.awselectronicsgroup.com	£40m	UK & Slovakia	430	11	AS9100, ISO9001, 13485, 14001, TS16949, IPC-A-610 Class 3, NADCAP	Y	Y	Y	Y	Y
Axiom Manuf. Services	01495 242130	www.axiom-ms.com	£40m	SW	300	3	ISO9001, AS9100, ISO13485, ISO14001, SC21, IPC610E, BSI Kitemark, NADCAP, ISO27001	Y	Y	Y	Y	Y
Challenger Solutions Ltd	01245 325252	www.challengersolutions.com	£8m	Essex/SE	95	7	AS9100 Rev D, ISO9001:2015, ISO 140001:2015, UL, CCC, IPC-610-G Class 3	Y	Y	Y	Y	Y
CML Innovative Technologies (uk) Ltd	01284 714700	WWW.CML-IT.com	£12M	UK/EU/China	65		ISO9001 TS16949 UL	N	Y	Y	Y	Y

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Contract Manufacturers Buyers' Guide

Manufacturer	Telephone	Website	Turnover	Location	Employees	Number of Surface Mount Lines	Approvals	BCA Capacity	Lead Free Manufacturer	Prototyping	Design Capability	Full Turnkey	Cables and Harnessing
Corintech Ltd	+44 (0)1425 655655	www.corintech.com	£7.5m	UK	72	3	AS9100, ISO9001, IPC-A-610 Class 3	Y	Y	Y	Y	Y	Y
CSI EMS Ltd	01376 500050	www.csiems.co.uk	£5m	Essex	50	3	ISO 9001, UL, IPC610	Y	Y	Y	Y	Y	Y
Custom Interconnect Ltd	01264 321321	www.cil-uk.co.uk	£14m	Andover (Hampshire)	130	6	ISO 9000, IPC610, ISO 13485	Y	Y	Y	Y	Y	Y
DJ Assembly	01904 436 456	www.djassembly.com	£1.25m	North Yorkshire	15	2	ISO9001:2008, IPC-A-610 Class 3	Y	Y	Y	Y	Y	Y
Dynamic EMS Ltd	01383 822911	www.dynamic-ems.com	£9m	Scotland	94	3	ATEX, ISO9001:2015, OHSAS18001, IPC-610-F class 3, ISO14001, ISO 13485, UL	Y	Y	Y	Y	Y	Y
Electrica Limited	0161 343 7575	www.electricalimited.com	£1.75m	Cheshire	26	3	BSI ISO 9001:2015, IPC-A-610 to Class 3, IPC-3-STD-001, Cert IPC Trainer, UL	Y	Y	Y	Y	Y	Y
Electronic Technicians Ltd	01202 897722	www.etuk.co.uk	£3.5m	SE	55	2	AS9100, ISO9001, ISO14001, IPC610/620 Class 3	Y	Y	Y	Y	Y	Y
Elite Electronic Systems Ltd	028 6632 7172	www.elitees.com	£20m	UK	230	5	ISO9001, ISO13485, UL, IPC610/620 Class 3	Y	Y	Y	Y	Y	Y
Esprit Electronics Ltd	02380 455411	www.espritelectronics.com	£9m	S/Malaysia	80	4	ISO9001:2008, IPC610 to Class 3	Y	Y	Y	Y	Y	Y
FermonX Ltd	+44(0)1903 524600	www.fermonx.com	£5m	Worthing, W. Sussex	40	4	ISO9001:2015, ISO14001:2015, IPC 610 A Class 2 & 3	Y	Y	Y	Y	Y	Y
G&B Electronic Designs Ltd	01420 474188	www.gandbelectronics.co.uk	£4.2m	Hampshire	60	2	ISO9001, ISO13485, IPC-A-610, IPC-3-STD-001, IPC7711/7721, BS EN 61340-5-1 (ESD)	Y	Y	Y	Y	Y	Y
Hallmark Electronics Ltd	01782 562255	www.hallmarkelectronics.com	£2m	M	26	2	ISO9000/UL, IPC610/D	Y	Y	Y	Y	Y	Y
Icon Electronics Limited	01423 449080	www.iconelectronics.co.uk	£6.5m	Hampshire & Yorkshire	70	5	AS9100, ISO9001, BS EN ISO/IEC 80079-34:2018 ATEX, IPC-A-610 Class 3	Y	Y	Y	Y	Y	Y
Industrial Electronic Wiring Ltd.	+44(0)1793 694033	www.iwew.co.uk	£5.5m	Swindon, UK	60	N/A	ISO9001:2015, IPC610, IPC620	N	Y	Y	N	Y	Y
Jaltek	01582578170	jaltek.com	£8m	UK	80	3	AS9100, ISO9001, ISO13485, IPC-A-610 Class 3, (Certified IPC Trainer (IPC-A-610), I-STD-001 & I-STD-001 Space Attendant)	Y	Y	Y	Y	Y	Y
JJS Manufacturing Ltd	01455 555500	www.jjsmanufacturing.com	£35m	Bedford, Lutetworth, (CZ)	420	3	ISO9001:2015, ISO14001:2015, IPC 610 A Class 2 & 3	Y	Y	Y	Y	Y	Y
Nemco Limited	01438 346600	www.nemco.co.uk	£13.4m	SE	120	6	AS9100, ISO9001:2008, IPC610/620 to Class 3, ISO14001-2004, SC21	Y	Y	Y	Y	Y	Y
NOTE including Speedboard	01453 797580 01753 746700	www.note.eu www.speedboard.co.uk	£115m	UK/EU/China	1,050	18	IPC610 to Class 3, ISO9001:2015, 13485, 14001, 18001	Y	Y	Y	Y	Y	Y
M-TEK (Assembly) Ltd	01189 455377	www.mtek.co.uk	£2.4m	SE	30	4	ISO9001:2008/IPC-A-610 Class 3/MHMA-620/ISO14001-2004/IPC-7711/7721	Y	Y	Y	Y	Y	Y
Pektron	01332 832424	www.pektron.com	£50m	E-Midlands	350	8	ISO9001, ISO14001, TS16949, BEAB, VCA, TÜV, UL	Y	Y	Y	Y	Y	Y
Protronix EMS	01352 418490	www.protronix.co.uk	£2.5m	Luton	10	2	ISO9001:2015, IPC-A610 Class 3	Y	Y	Y	Y	Y	Y
Season Electronics Limited	02392 452222	www.seasongroup.com	£5m/£95m	Havant/Global	65/1800	2/18	(AS9100 & ISO9001 in UK) (TS16949 at sister sites)	Y	Y	Y	Y	Y	Y
Simtek EMS Ltd	01843 233120	www.simtekems.co.uk	£6m	SE	60	3	ISO9001:2008, ISO13485, IPC-A-610 Class 3 & IPC-7711	Y	Y	Y	Y	Y	Y
Tenkay Electronics Ltd	01903 855455	www.tenkay.co.uk	£4.1m	West Sussex	50	1	ISO 9001:2008, ISO 14001:2004, OHSAS 18001:2007	N	Y	N	N	Y	Y
TEXCEL TECHNOLOGY PLC	+44(0)1322621700	www.texceltechnology.com	£15.5m	SE	131	7	ISO9001, ISO14001, IPC610 Class 3,	Y	Y	Y	Y	Y	Y
Tioga Limited	01332 360884	www.tioga.co.uk	£15m	Derby	110	6	ISO 9001:2015, ISO 13485:2016, IPC 610, IPC 7711/7721	Y	Y	Y	Y	Y	Y
Trojan Electronics Limited	01792 469020	www.trojanelectronics.co.uk	£2m	South Wales	20	2	BS EN ISO 9001 2008, ISO 14001 2007	Y	Y	Y	Y	Y	Y
Wilson Process Systems	01424 722222	www.wps.co.uk	£12m	SE	100	4	ISO9001:2015, IPC-A-610 Class 3	Y	Y	Y	Y	Y	Y

PCB Buyers' Guide

Manufacturer	Telephone	Website	Service Provided (ie Broker, Manufacture &/or Repair)	Location	Approvals	Volume - Small, Medium, Large	Double-sided	Multi-layer 4-10/10-20-30	Metal PCBs	Flexi / Flex-Rigid	Obsolescence Solutions	Modifications	Prototyping
ABL Circuits Ltd	01462 894312	www.ablcircuits.co.uk	M	SE	ISO 9001:2008	SML	Y	4-10	Y	Y	Y	Y	Y
Cambridge Circuit Company Ltd	01223 423100	www.cambridge-circuit.co.uk	M	SE	ISO9001:2015, UL	SML	Y	4-16	Y	Y	Y	Y	Y
Daleba Electronics Ltd	+44(0)1992 510000	www.daleba.co.uk	B/M	UK, Europe, Asia, USA	UL, ISO9001:2008, TS16949:2009	SML	Y	4-30	Y	Y	Y	Y	Y
DK Thermal Ltd	+44(0)1992 514200	www.dkthermal.co.uk	M/R	UK, Europe, Asia, USA	UL, ISO9001:2008, TS16949:2009	SML	Y	N	Y	N	Y	Y	Y
Fineline VAR Ltd	+44 (0)1249 815 815	www.fineline-global.com	B	UK / Global	ISO9001:2015 / UL / TS16949 / Nadcap / AS9100 / ISO14001	SML	Y	4-60	Y	Y	Y	Y	Y
GSPK Circuits Ltd	+44(0)1423 321100	www.gspkcircuits.ltd.uk	M/R	UK, Europe, Asia	IS 9001:2015, IATF 16949:2016, EN (AS) 9100	SML	Y	4-16	Y	Y	Y	Y	Y
LEF Circuits	0116 2891122	www.lefcircuits.co.uk	M/R	M	ISO 9001:2015, UL	SML	Y	4-30	Y	F/R	Y	Y	Y
Photronix Group	01903 231901	www.photronix.co.uk	B	SE	ISO9001:2015, ISO14001:2004, AS9100-B, NADCAP, TS16949:2002	SML	Y	4-58	Y	F, F/R	Y	Y	Y
Stevenage Circuits Ltd	01438 761811	www.stevenagecircuits.co.uk	M/B	UK/China	ISO 9001:2008, ISO 14001, EN9100:2009, UL, OSCAR	SML	Y	4-44+	Y	F, F/R	Y	Y	Y
Tate Circuit Industries Ltd	01889 583627	www.tatecircuits.com	B	UK/China	ISO 9001:2015, UL	SML	Y	4-20	Y	Y	Y	Y	Y
Tecbridge Circuits	0207 993 6503	www.tecbridgecircuits.co.uk	M Rep.	UK Europe	UL, TS16949(2009), ISO14001(2004), ISO9001(2008)	SML	Y	4-16	Y	N	Y	Y	Y

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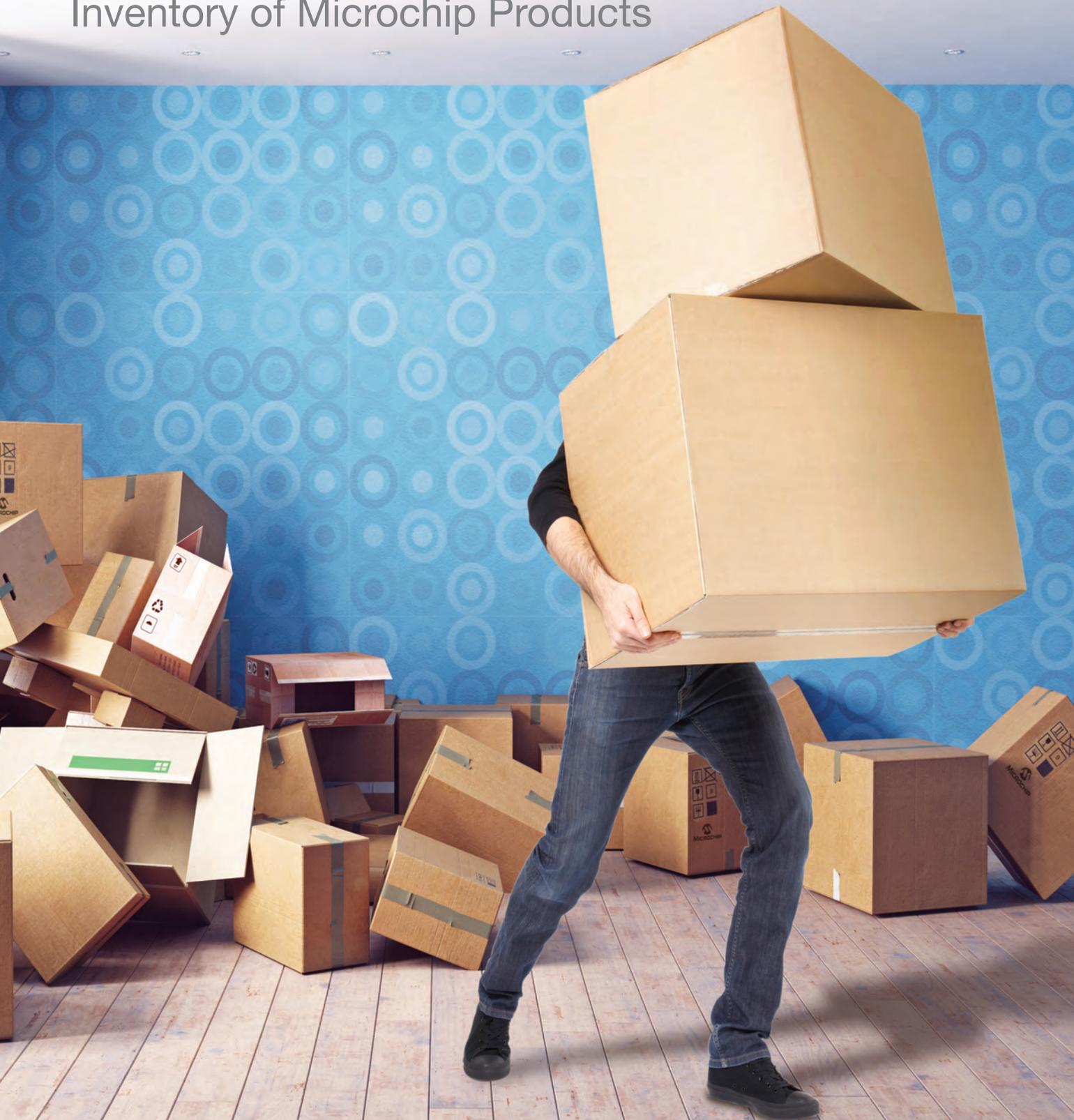
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