

ELECTRONICS

NOVEMBER 2018

sourcing

ELECTRONICA SPECIAL EDITION

EUROPE



HALL C3
STAND 550
Nov 13-16, 2018

A man and a woman are standing in the center of the page, surrounded by a large, stylized graphic of various electronics company logos. The logos are arranged in a circular pattern around them, with some logos appearing larger and more prominent than others. The logos include:

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- TDK
- VISHAY
- TE
- Infineon
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On the cover – November 2018

Electronica 2018

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Planning for the year ahead



Around the world in 80 sweets

Having arrived at *Electronica*, I have some excellent news for you. Not only is *Electronics Sourcing's* energy boosting Pick and Mix sweet stall back, we have chosen an international selection of treats designed to appeal to sweet toothed visitors from mainland Europe the United Kingdom and North America.

Offering a quick 'pick me up' on your long walk, the selection is designed to provide a comforting reminder of home, regardless of how far you have travelled. So why not swing by stand C5-400 and refuel while chatting with our editorial team about the trials and tribulations of sourcing electronic components. Don't forget to eat your sweets responsibly.

If that isn't enough, step across to the *ebom.com* area of the stand where the content team will be on hand to guide you through the benefits of this new purchasing focused website. The most newsworthy feature being demonstrated at *Electronica* is a world-first function which allows buyers to read about new components, check stock from a range of authorized distributors, and then buy.

In addition to these two highlights, the editorial and content teams from *Electronics Sourcing* and *ebom.com* will be video interviewing a cross-section of distribution specialists for their opinions on the future of electronics purchasing. All the interviews will be available to watch on *ebom.com*.

Jon Barrett

Contact



EDITORIAL
Managing Editor: Jon Barrett
 jonb@electronics-sourcing.co.uk
Contributing Editor: Amy Barker
 amyb@electronics-sourcing.co.uk
Editorial & Production: Thomas Smart
 thomas.smart@electronics-sourcing.co.uk
Editorial & Production Assistant: Ben Kitching
 ben.kitching@electronics-sourcing.co.uk

ADVERTISING
Area Sales Executive: Emma Poole
 emma.poole@electronics-sourcing.co.uk
Director of Sales: Charlotte Morgan
 charlotte.morgan@electronics-sourcing.co.uk
Marketing Manager: Amy Leary
 amy.leary@electronics-sourcing.co.uk

CIRCULATION
Circulation Manager: Vicky Leary
 vicky.leary@electronics-sourcing.co.uk
Circulation Account Manager: Liz Poole
 liz.poole@electronics-sourcing.co.uk

DESIGN
Graphic Designer: Josh Hilton
 josh.hilton@electronics-sourcing.co.uk

PUBLISHER
Mark Leary
 mark.leary@electronics-sourcing.co.uk
Office Manager: Denise Patten
 denise.patten@mmgpublishing.co.uk

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www.electronics-sourcing.eu



Quality for all

French EMS company, **All Circuits**, will be showcasing its capabilities and sharing its vision at Electronica 2018, on stand number 240 in hall A1. With more than 25 surface mount lines, in 50,000m² of manufacturing space, All Circuits describes itself as the largest electronics manufacturing services provider in France and a top ten European EMS. It also boasts particular expertise in the automotive sector, backed by its acquisition in 2015 by IEE.

Over 2,000 staff are employed by All Circuits, with more than 25 years' experience in the automotive sector. This background has set a high bar for manufacturing quality and reliability, which All Circuits applies to a variety of end markets. The company will also highlight its Industry 4.0 initiatives, which support smart manufacturing, providing a digital overview of the entire manufacturing ecosystem.

www.allcircuits.com



Acquisition expands expertise

Display Technology, the UK subsidiary of German company, Fortec Elektronik, has acquired Components Bureau and Display Solutions. Purchasers will benefit from Display Technology's technical expertise, particularly with the Artista and Prisma range of boards, as well as from the large inventory of displays, which will provide ex-stock delivery for many products. The acquisition also allows Components Bureau to expand its precision range of wound components in Europe. Both companies will continue to operate from the UK.

www.displaytechnology.co.uk



Choose intelligent solutions for harsh environments

Bulgin will use Electronica as an opportunity to highlight a selection of its rugged connector, switch and sensor products designed to perform in harsh environments. The company will focus on optical fibre connectors, smart connectors and sensors. This reflects increasing demand for optical fibre connections in outdoor and extreme environments and rugged sensors to support the internet of things megatrend.

Situated in the electromechanical, interconnect and system peripherals hall, Bulgin's stand will feature the company's diverse range including Buccaneer circular power and data connectors, industrial automation connectors, switches, battery holders and sensors.

Various new products will be introduced, including the 4000 series fibre LC simplex and an environmentally sealed intelligent connector, containing an EEPROM device situated underneath the overmould.

www.bulgin.com

Displays simplify medical HMI

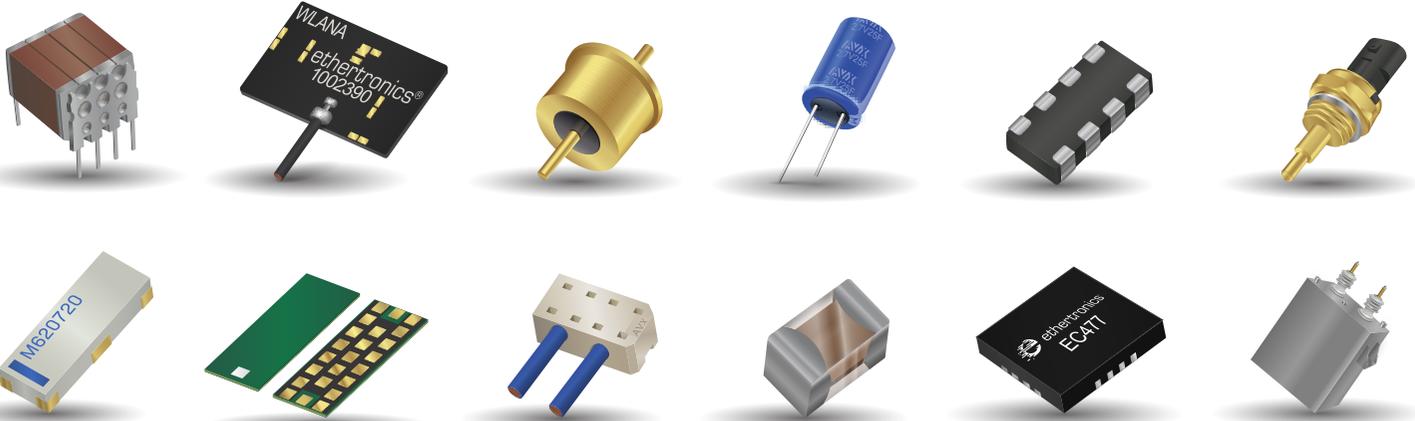
Electronic Assembly offers its EA uniTFT050 colour display, developed specially for use in compact medical devices. It features an integrated command set and object-based layout software to create modern user interfaces via drag-and-drop. This helps users build the well-structured easy to understand displays, which are vital in a medical environment.

Produced under strict quality management in accordance with ISO9001:2015, the display benefits from a compact 5in screen diagonal, ideal for use in medical equipment. It also boasts a vector graphic display of 800 by 480 pixels and a fast image build-up of 50fps for a streak-free display. Brightness of 900cd/m² is said to provide high contrast under all lighting conditions, including direct sunlight. The screens, which are said to offer long-term availability are also supplied with an EMC report to simplify complex medical certification.

www.lcd-module.com

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Aerospace



Consumer



Industrial



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Automotive Virtual Reality Experience

In Brief

Displaying advantages

Data Modul will launch an upgrade to its eMotion controller board series at Electronica. The new UHD II board responds to demand for high resolution and can be supplied with two HDMI2.0 and two DP1.2 video inputs. It supports a resolution of 3,840 by 2,160 at 60Hz at all inputs and integrates both picture-in-picture and picture-by-picture functionalities.

www.data-modul.com
Hall B4, Stand 101

Beyond the matrix

Display specialist, Tianma, will present various prototypes at Electronica showcasing its free-form touch displays. The company's non-standard displays are ideal for ergonomic products including industrial, medical, consumer and wearable devices. Examples include a round display, with a diameter of 12.7cm, featuring a hole in the centre and a concentric edge of 3mm.

www.tianma.eu
Hall B4, Stand 231

Winning the relay

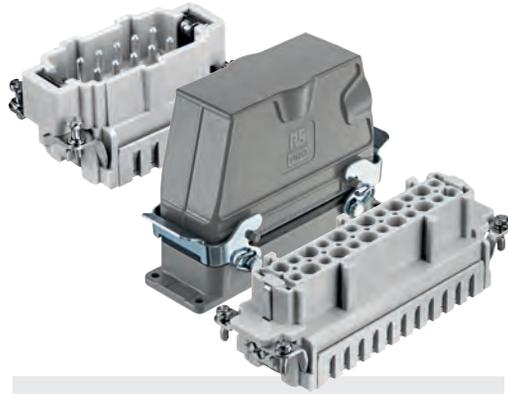
Zettler Group will showcase various new relays at Electronica, ideal for solar, e-mobility and other applications. Introductions include two new IEC mode-two electric vehicle charging relays scheduled for release in 2019. Designed to survive high momentary currents during short circuits, without contact welding, the AZEV116 and AZEV132 series also feature a potential monitoring contact, as required by IEC62752:2016.

www.zettlerelectronics.com
Hall A6, Stand 118

Improving industrial HMI

Zytronic will demonstrate its new range of multi-touch controllers at Electronica. Designed for interactive touch screens in hazardous and industrial environments, the ZXY500 range operates at a Tx drive voltage of up to 40V. This improves sensitivity to enable full multi-touch detection even when the screen is behind thick glass, the surface is contaminated, or the user is wearing gloves.

www.zytronic.co.uk
Hall B4, Stand 210



Heavy duty connectors match industrial demand

RS Components has unveiled a new range of RS Pro heavy-duty connectors including screw terminals, cage-clamp terminals and housings. The components are designed for industrial environments, especially sound and lighting applications and in the robotics and machinery sectors.

The RS Pro A and B series of inserts include screw and cage-clamp terminals said to offer excellent electrical and mechanical protection and UL approvals. All inserts have a grounded contact to stop incorrect polarisation with contacts mounted in the insert, which means no additional tooling is required. Inserts are available in popular contact-number sizes including 3 PE, 4 PE, 6 PE, 10 PE, 16 PE and 24 PE. Other features include: an industrial operating temperature range from -40 to 125°C and UL90V0 flammability rating.

www.rs-online.com

Get smart fast

Farnell element14 will present a range of technologies at Electronica including products, tools and solutions designed to accelerate time to market through intelligent design. Visitors to hall C5 stand 101 will see demonstrations of the latest technologies for embedded applications, internet of things, artificial intelligence, machine learning and 3D printing.

Technical experts will be on stand and Farnell element14 will also present the benefits of its support ecosystem, from its maker to market service to scaling for volume production. The stand will also feature Farnell element14's education and maker offering, including demonstrations using the BBC Micro:bit, robotics, Raspberry Pi and Lego.

Senior vice president sales and marketing for Premier Farnell and Farnell element14, Ralf Buehler, said: "At Electronica 2018, we will be showcasing a range of products that have the potential to disrupt the market and change the way products are designed and delivered."

www.element14.com

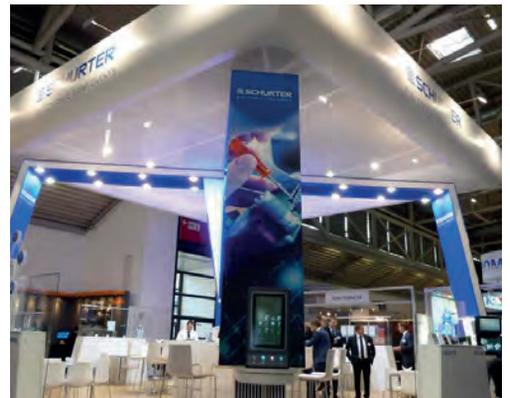


Smart homes need smart power

Now available from **Rutronik**, Recom's latest 15 and 20W AC/DC power supplies are designed for low power internet of things and household applications. Based on the footprint of the existing RAC10-K, the new modules boast high-efficiency over a wide load and minimal standby power consumption.

Both the RAC15-K and RAC20-K series are said to deliver ultra-low energy losses in light load conditions. Below 75mW, they have no load power consumption, which makes them ideal for the always-on and standby mode operations needed for IoT and smart home devices. A universal mains input range of 85 to 264V AC supports worldwide use and the converters come with international safety certifications for industrial, audio/video and IT equipment, as well as household standards.

www.rutronik.com



Ready for new input

Visitors to the **Schurter** stand at Electronica will see the company's latest input systems as well as components such as: circuit protection devices, connectors, switches and EMC products. Schurter will also highlight its electronic manufacturing capabilities including PCB assembly, which can be accessed through the business solutions unit. This service provides complete solutions utilising all the company's competencies. An example of a complete solution will be shown on the Schurter stand in hall B4 stand 227.

Other show highlights include: the new DG11 IEC appliance plug with integrated circuit breaker, the RTS surface mount temperature fuse, the FPBB DIN rail filter with overcurrent and overvoltage protection, the CDS1 configurable display switch and PCAP touch panels for demanding markets

www.schurter.com/electronica

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One-stop for niche power solutions

Gresham Power Electronics will use Electronica to introduce the full range of power solutions available from the recently formed power, defence and aerospace systems provider, Coolisys Technologies Group. The group offers worldwide design and manufacture of power conversion and distribution systems in a 'one-company' approach combining various diverse strengths.

With its solutions for mission critical applications and lifesaving services, Coolisys supplies markets such as defence, aerospace, naval, homeland security, medical, telecom, datacom and industrial markets. It targets markets that are characterised by high barriers to entry and require specialised products that are not likely to be commoditised.

Operations manager at Gresham Power Electronics, Karen Jay, commented: "Electronica 2018 is our first major opportunity to show European design engineers the full range of global power solutions available from Coolisys Technologies." www.greshampower.com

High frequency filters on show

Schaffner is to introduce a new series of RFI filters at Electronica with IEC Inlet C14 or C20. The dual-stage FN 9255 filter series has been developed for high frequency applications above 30MHz and is the first power inlet designed by Schaffner to operate up to 300MHz.

Approximately 100 different filter types are available in this series, including versions designed for medical applications, one with and one without an earth line choke. Another new

feature is a rear mount version, which includes a press-in nut to allow reliable assembly without adding complexity to the system chassis.

This diversity, combined with comprehensive attenuation properties, means the FN 9255 series offers a filtered power inlet solution for a range of applications including household appliances, audio, video and medical devices.

www.schaffner.com

Compact connectors offer industrial safety

Phoenix Contact and EPT are launching a new series of robust board-to-board connectors with 0.8mm pitch at Electronica in hall B2, stand 139. The connectors are equipped with a new type of contact system designed to meet the safety requirements of industrial PCB connections.

Featuring contacts on both sides, ScaleX technology claims to ensure a long-term stable electromechanical connection, even in the event of stress caused by shock or vibration. The technology is said to show high tolerance

regarding connectors that are positioned differently due to assembly and at the same time, the insulating housing's geometry prevents incorrect connection.

Shielded versions with 12, 20, 32, 52, and 80 positions will be showcased. This closed shielding ensures a high electromagnetic compatibility and is therefore ideal for error-free data transmission with high-speed performance up to 16Gbps.

www.phoenixcontact.com



Discover the innovations driving energy efficiency

ON Semiconductor will fill its 400m² booth at Electronica with new products and demonstrations focused on the rapidly evolving markets of automotive, high performance power conversion and the internet of things. As part of its presence, ON Semiconductor will present detailed technical papers at numerous forums including the automotive conference. Here the company will lead a discussion about how innovative and energy efficient semiconductor solutions will accelerate the path of autonomous driving.

In the automotive world, the company's semiconductor and sensing technologies address megatrends within vehicle electrification, autonomous driving and lighting technology. ON Semiconductor's demos will showcase innovation in SiC devices, IGBTs, mosfets and power modules for vehicle electrification, imaging, radar and LiDAR for advanced driver assistance systems. Other highlights will include energy-efficient power management and control for front, rear and internal lighting applications.

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Shortages drive price increases

Those waiting for an end to current component shortages will be disappointed, says chief operating officer of Fusion Worldwide, Paul Romano, as MLCC lead times extend to six months or more

An unprecedented shortage has paralyzed the electronics industry this year, with demand far outstripping supply. Shortages have been extensive, with resistors and capacitors, transistors and diodes and a wide range of integrated circuits all affected. It's no wonder, since our lives are becoming increasingly driven by technology, from the cars we drive to the mobile devices to which we're constantly attached.

MLCC concerns

The shortages on multilayer ceramic circuits have been raising the most concern. According to many in the industry, it's the largest and longest MLCC shortage in history, largely driven by automotive, smartphone, big data and internet of things demand. Some predictions even point to issues lasting well into 2020.

As the shortage pushes past the one-year mark, the expectation among suppliers and end customers is that the situation will get worse before it gets better. The confluence of a strong global

economy driving demand and the ever-expanding adoption of electronics across a multiplicity of industries and product types continues to strain MLCC production capacities.

Pricing increases

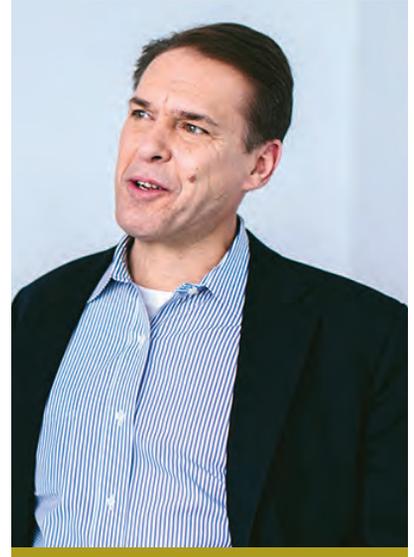
Some suppliers have reported seeing more than 20 per cent of MLCC lead times extend for six months or more and as a result, manufacturers are raising prices by as much as 40 to 50 per cent.

But MLCCs are not the only components affected. The global supply of mosfets remains very tight, mainly due to increased demand in new applications and insufficient supply of wafer. Thick film chip resistors remain active due to raw material shortages and increased demand. September also brought about drastic increases in pricing for PC central processor units, with some models trading 35 to 40 per cent higher than they did in August.

Memory oversupply

There is one sign of relief, however, in that a sustained shortage of memory products tracing back to the summer of 2016 has finally given way to oversupply in the market, with some DRAM and NAND market pricing even dropping below contract pricing.

fusionww.com



Fusion Worldwide chief operating officer, Paul Romano



As the shortage pushes past the one-year mark, the expectation among suppliers and end customers is that the situation will get worse before it gets better

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Starting with the news platform, eBOM.com provides a steady stream of industry news suitable for design, purchasing and manufacturing specialists. With subjects ranging from trade agreements and product launches, to corporate announcements and events, eBOM acts as a gateway into both the eBOM Authorized purchasing portal and Virtual Trade Show.

In collaboration with ECIA, eBOM Authorized offers a facility to: check which authorised distributors are stocking a specific part number; compare the prices those distributors are quoting; and then purchase the parts. To avoid issues of counterfeiting and obsolescence, eBOM Authorized only lists stock from authorised channels.

Branded eBOM LIVE, the growing Virtual Trade Show already features over 100 companies. Where available, each stand directs visitors to news, video, technical and contact resources. A facility to request information is also offered.

Read the world over

In response to an increase in international visitors, the site now features a 'Select Language' option where users can choose from over 100 languages. Other site improvements include Read More options on news pages and a clearer menu bar to improve navigation. The Events page lists locations where eBOM will be exhibiting.

Taking eBOM Authorized a step further, component stock, pricing and purchasing options are automatically added to product announcements originating from companies exhibiting in the Virtual Trade Show. Readers simply click the Buy Now button on the article which then directs them to the stock, price and purchasing options.



1

Read about the latest components



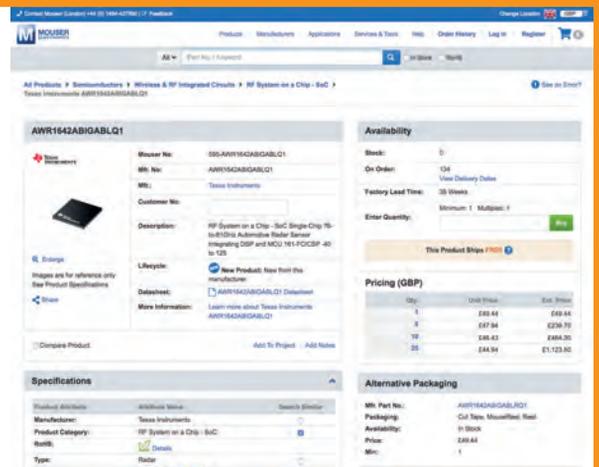
2

Compare price, stock and then select your preferred distributor



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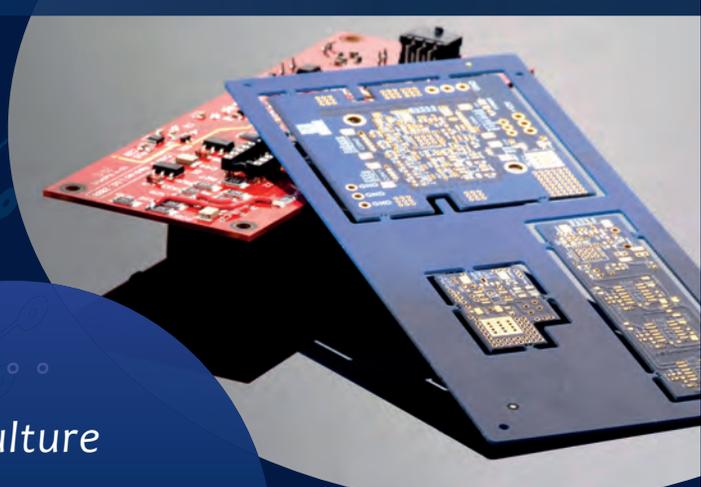
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Super-charge your battery know-how

Electronics Sourcing North America asked House of Batteries to run through the basics of buying rechargeable lithium batteries. Here are the facts every buyer should know

Q What is the difference between a primary and a secondary cell?

A) Primary lithium cells are non-rechargeable and, once fully depleted, cannot be recharged. Secondary lithium cells are rechargeable and can be recharged 500 to 1,000 times.

Q What is fuel gauging?

A) As the name implies, a fuel gauge on a lithium battery keeps track of the amount of charge remaining in the pack using a specialized integrated circuit.

Q Why are rechargeable lithium batteries shipped with a low charge level?

A) As of April 2016, the department of transportation stipulated that all lithium batteries being transported by air must have a state of charge of 30 per cent or less. All

rechargeable cells therefore leave the manufacturing facility at less than 30 per cent SOC.

Q What is the shelf life of a lithium cell?

A) Lithium-ion batteries self-discharge about two to four per cent per month. At this rate, it's best to recharge the batteries every six months.

Q What is the optimum storage method for rechargeable lithium batteries?

A) The self-discharge on a lithium-ion cell increases at higher temperatures, so it's best to store batteries in a cool dry environment, ideally at 20 to 25°C, with a 50 per cent state of charge.

Q Can I use any charger with rechargeable lithium batteries?

A) Never charge lithium batteries with a charger that

was not designed for that specific battery as chargers are customized for a specific chemistry.

Q What does the description, such as 2S4P or 3S1P, mean?

A) This nomenclature is used to define the pack configuration. For example, 2S4P refers to two cells in series and four cells in parallel. This configuration would yield a 7.4V output that has four times the capacity of single cell.

Q What's the difference between cylindrical and flat rechargeable batteries?

A) Cylindrical cells are typically enclosed in a steel cylinder, 18mm in diameter and 65mm in length, commonly referred to as 18650 cells. Flat cells are typically made of polymer materials and come in many different sizes.



Never charge lithium batteries with a charger that was not designed for that specific battery as chargers are customized for a specific chemistry

Q Do all rechargeable lithium batteries require protection circuitry?

A) Yes, for safety reasons all lithium cells must have a protection circuit that prevents over charging, over discharging and provides over current protection against short circuits.

Q Why are lithium rechargeable batteries used in hand held products?

A) Lithium batteries offer far great power density than other battery chemistries such as nickel metal hydride and lead acid.

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Steer clear of shortcuts

In times of product shortage, it is important to remain diligent and avoid shortcuts, says director of operations at 4 Star Electronics, Scott McKee

Q Are current market conditions causing an increase in counterfeit electronics?

A) The industry is currently experiencing large scale shortages across a wide spectrum of product lines, particularly memory devices such as NOR and NAND Flash, DRAMs, and older SRAMs, as well as low value passive components such as multilayer ceramic chip capacitors and surface-mount resistors. In some cases, lead-times are exceeding 50 weeks.

Shortages are caused by tremendous growth in the industrial, mobile, and automotive markets along with the proliferation of the internet of things. Unfortunately, component makers are not expanding capacity quickly enough to meet the increase in demand and counterfeiters have responded rapidly by seeding the market with remarked, refurbished, substandard, and substitute parts.

Q What type of parts are the highest risk?

A) With component manufacturers reluctant to dramatically increase production due to fears of double ordering and future surpluses, surface mount passive components are particularly hard hit. They are low value, but easy to reproduce and authentication can be difficult if bought from the open market. Since most are produced without markings, and electrical characteristics are easy to duplicate, authentication may be limited to packaging, labeling and comparison with known good samples.

There are a lot of opportunities for counterfeiters to infiltrate the market with substandard goods right now. The longer the shortages last, the higher risk certain parts become, especially passive devices.

Q How can purchasers manage their vendor list to minimise risks?

A) Shortages are expected to last into 2019 or longer, so buyers need to be more diligent than normal. In times of allocation, it's tempting to add more vendors to your approved vendor list to smooth the flow of parts, but procurement best practices still apply.

It's best to procure material from authorised sources: original component manufacturers, their authorised or franchised distributors, and authorised aftermarket manufacturers. When sudden shortages occur, turn to other trusted suppliers that have already been qualified, along with risk-based inspections and tests appropriate for the end-use of the parts.

Realistically, there is no need to add many brokers or independent distributors to the AVL. Find ones you can trust and build a solid relationship with them; they will be able to find the parts you need, if they are available anywhere.

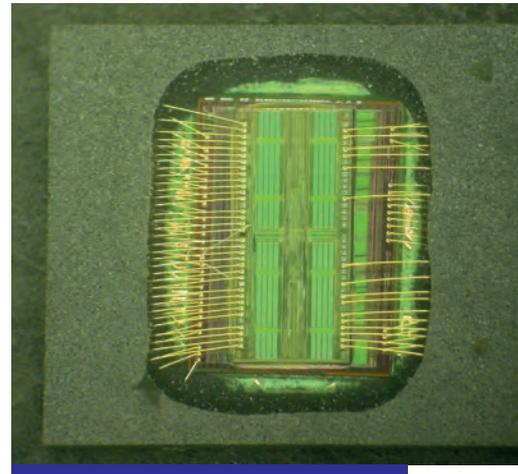
Q What should buyers know about component testing?

A) Once material has been located, applicable testing should be performed

by a qualified lab or the distributor's in-house lab. This will include a review of packaging and paperwork, visual inspection including marking and surface tests, x-ray, XRF, destructive and electrical tests, when warranted.

Comparison to golden samples can help determine authenticity, but be aware that many components, especially simpler parts, may have multiple manufacturing locations that produce slightly different characteristics. Manufacturing changes over time can also cause parts with a large span between date codes to appear different. In some cases, OCMs document the variations over time and place, but in other cases not. Therefore, it is important to have parts inspected and tested in an experienced lab with years of experience and historical data for comparison.

www.4starelectronics.com

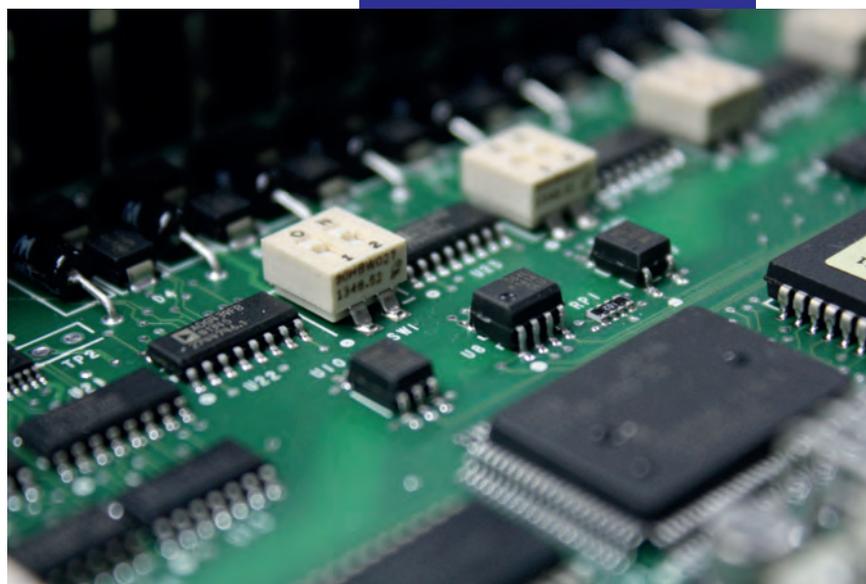


Testing should be performed by a qualified lab or the distributor's in-house lab



The longer shortages last, the higher risk certain parts become, especially passive devices

It's tempting to add more vendors to your approved vendor list, but procurement best practices still apply



Is there life after EOL?

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

Q How does Rochester Electronics differentiate itself?

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

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

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

Q How can Rochester support ongoing product needs after EOL?

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

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

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

Q What does Rochester's licensed manufacturing solution involve?

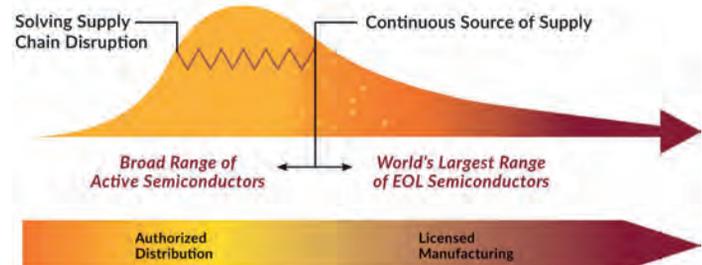
A: Using information and technology transferred directly

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

www.rocelec.com

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Message received

Communication between component manufacturers, distributors and buyers is the life blood of the supply chain. ESNA spoke to antenna specialist, AVX, to find out how this works in practice

AVX serves the medical, automotive, industrial, military, consumer electronics, communications and transportation markets

Q AVX recently acquired Ethertronics. What does this mean for procurement professionals sourcing antennas?

A) Ethertronics is a manufacturer of high-performance passive and active antenna systems for any application that transmits or receives wireless signals. This provides a new range of possibilities, especially when combined with our existing RF/microwave product range, which we continue to develop. AVX offers all the passive components and active antenna systems required for almost any RF/microwave circuit application, including: passive and active antennas, impedance matching capacitors and inductors, resistors, terminations, attenuators, filters, couplers, equalizers and more. Ultimately, AVX is a one-stop shop for passive RF/microwave components and active antenna systems.

Q How does AVX support the supply chain?

A) We have provided technical, commercial and logistics support to our North American customer base for decades. Our authorized distributor channel helps us provide even more services through credit facilities, bonded inventory, proximity warehouses and vendor managed inventory or consignment programs. They act as an extension of the AVX sales team, helping customers choose the right supply chain model for their production needs.

Q Has counterfeiting been an issue for AVX?

A) Counterfeiting is an undeniable problem in the electronics industry, but it's fairly easy to avoid. Our customers can ensure that they're sourcing genuine AVX products by exclusively sourcing our products through one of AVX's many authorized distributors or directly from us.

Q How do you communicate with the supply chain regarding component obsolescence?

A) A list of obsolete products is available on the AVX website and obsolescence information is provided to all inquiring parties via email and phone.

Q Can purchasers check stock information on-line?

A) Customers can use the distributor stock check tool on our website or visit ECIA Authorized to view stock of our products in distribution, based on region and quantity available.

Q On average how many new AVX components are launched per year?

A) AVX averages approximately 25 to 30 new products per year across all divisions. We look forward to growing our new product offering following recent acquisitions and continuing to provide trusted electronic component solutions across the board.

Q How are AVX products holding up regarding lead times?

A) Our goal is to offer competitive lead times for all customers. Lead times vary depending on the commodity



types and their respective market conditions. For instance, there is currently a global shortage of multilayer ceramic capacitors and specific smaller case size tantalum, which has rapidly extended all manufacturers' lead times and has even forced allocation in some cases.

AVX not only continues to make capital investments to serve this growing demand, but also maintains dedicated production lines for higher-reliability products, such as medical and military components, to protect these businesses from commodity market forces. We are also expanding our capacity in other areas, including connectors, supercapacitors,

varistors, and microwave and RF components, which will allow us to meet our growth goals for those divisions and to continue to offer best-in-class service.

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Counterfeiting is an undeniable problem in the electronics industry, but it's fairly easy to avoid



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Powering the industrial IoT take-over

Wireless sensors underpin the internet of things, yet consumer and industrial applications require very different battery solutions, as president of Memory Protection Devices, Tom Blaha, explains

A dynamic revolution is currently underway, with billions of wireless devices becoming interconnected through the internet of things. Consumer grade IoT devices commonly access data through wearable devices, smart phones, tablets, and laptops, often connecting to wireless sensors that operate in moderate indoor environments. Conversely, industrial wireless applications typically need to operate for longer periods, often in remote locations and extreme environments.

These fundamental differences mean purchasers sourcing products for consumer-oriented IoT face wildly different constraints to those working on industrial internet of things (IIoT) projects.

For example, IIoT-enabled sensors in inaccessible locations require extended battery life. This necessitates industrial-grade long-life lithium batteries, in combination with low power circuit architecture and low-power communications protocols. It also dictates low power networks, such as LPWAN and NB-IoT, and edge computing to manage copious amounts of data.

Consumer IoT systems, on the other hand, communicate via smart phone or WiFi, where battery access is simplified and where a consumer grade alkaline or rechargeable Lithium-ion battery will suffice.

Focus on reliability

The choice of battery and battery holder may well be cost-driven for consumer electronics, however for an industrial application, decision-making is more complex.

IIoT-enabled applications might have to operate for decades in a fixed location, requiring a 40-year lithium thionyl chloride (LiSOCl₂) battery and a battery holder that offers maximum reliability and corrosion-resistance, often with gold plated contacts. If the device is also exposed to extreme humidity, then a sealed enclosure is necessary.

Alternatively, if the IIoT-enabled device is portable and the battery can be replaced, extended battery life may not be a huge concern, but the battery holder will need to withstand shock, vibration, corrosion and extreme temperatures.

Environmental factors

As a rule, battery-powered solutions should be configured to deliver low mean times between failures. For example, mine safety equipment must be designed to withstand extreme humidity and corrosive gases, surviving ASTM B117 or equivalent salt spray tests. The battery holder must be constructed using superior quality raw materials that can withstand extreme temperatures.

Portable IIoT-enabled medical devices such as glucose

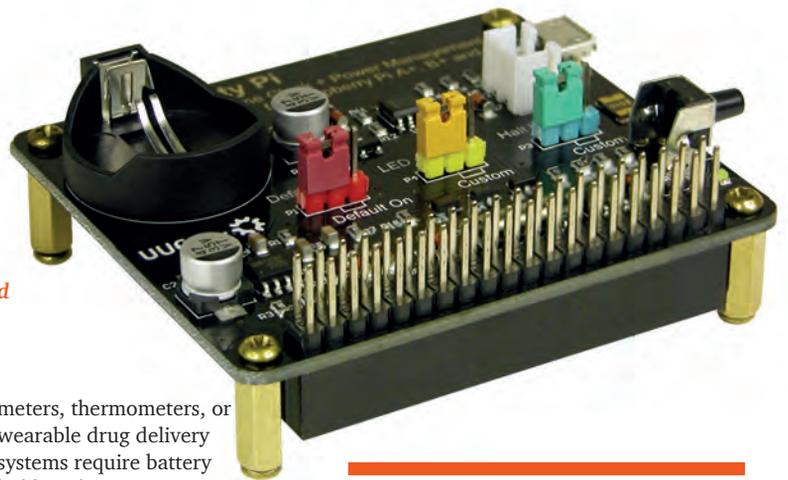
meters, thermometers, or wearable drug delivery systems require battery holders that can meet rigorous FDA-21 standards, including drop testing, salt spray, thermal and contact wear testing.

Certain industrial grade medical devices also need to undergo routine sterilisation, preferably without removing either the battery or the battery holder. Autoclave steam sterilisation dictates high pressure and temperatures, while chemical sterilisation can involve highly corrosive compounds. There are also radioactive sterilisation procedures that use gamma rays or electronic beams. While most primary batteries need to be kept within a temperature range of approximately zero to 55°C during sterilization, certain LiSOCl₂ cells can operate at 125°C.

Cost of failure

As these examples illustrate, careful due diligence is required when specifying battery-operated solutions for IIoT. Design and procurement professionals must work together to ensure that the solution delivers optimal battery life with rugged and reliable performance that exceeds customer expectations. These factors need to be balanced against overall profitability, but invariably, it pays to invest in superior grade materials, rather than risk high rates of product failure.

www.memoryprotectiondevices.com

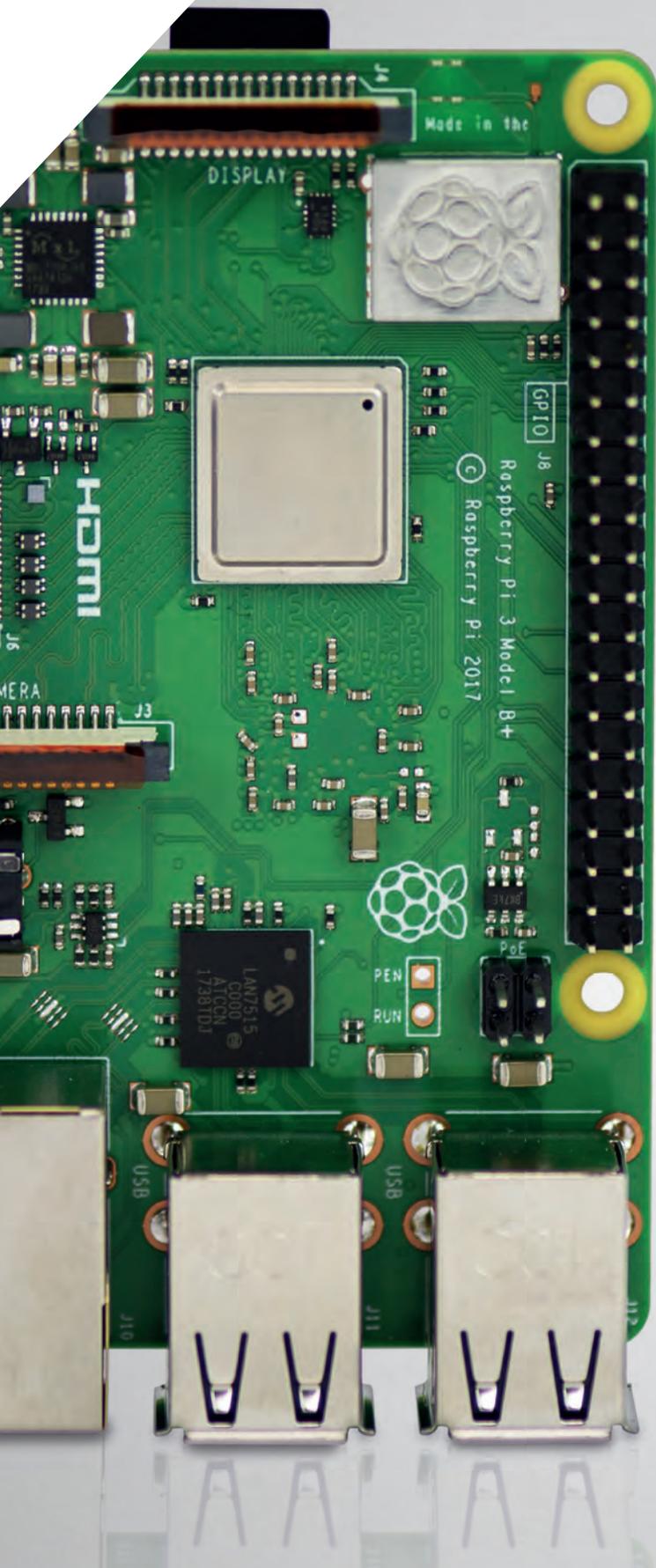


Battery-powered solutions should deliver low mean times between failures



Autoclave steam sterilisation dictates high pressure and temperatures, while chemical sterilisation can involve highly corrosive compounds





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Bucking the obsolescence trend

Technological growth and innovation have created massive demand for passive components, prompting component shortages and increased obsolescence. Senior application engineer at Knowles Precision Devices, Steve Hopwood, offers a solution

New and evolving markets, including automotive, defence, mobile, industrial, and the internet of things, are creating surges in demand. Those verticals that traditionally used electronic components are using more, while other markets are adding electronic content to their products.

Demand from the automotive industry, for example, has grown significantly over the last five years. Developments in electric and hybrid vehicles have led to a four-fold increase in demand for electronic, specifically ceramic, components. Meanwhile in the consumer sector, the boom in smart home devices is boosting demand for low power and low voltage chip capacitors for products such as smart central heating controls. That's in addition to demand from mobile phones, just one of which can contain up to 1,000 small chip size capacitors.

Component shortages

This explosion in demand has seen some manufacturers cease production of mature, unprofitable, lines, slimming ranges down, or phasing products out in favour of newer components. Current shortages focus on parts that have been around for 15 or 20 years, as suppliers push toward higher margin products. For example, ranges of larger chip sizes are disappearing as efforts focus on increasing capacity for smaller, high-demand capacitors.

This, in addition to manufacturing changes or altered die dimensions,

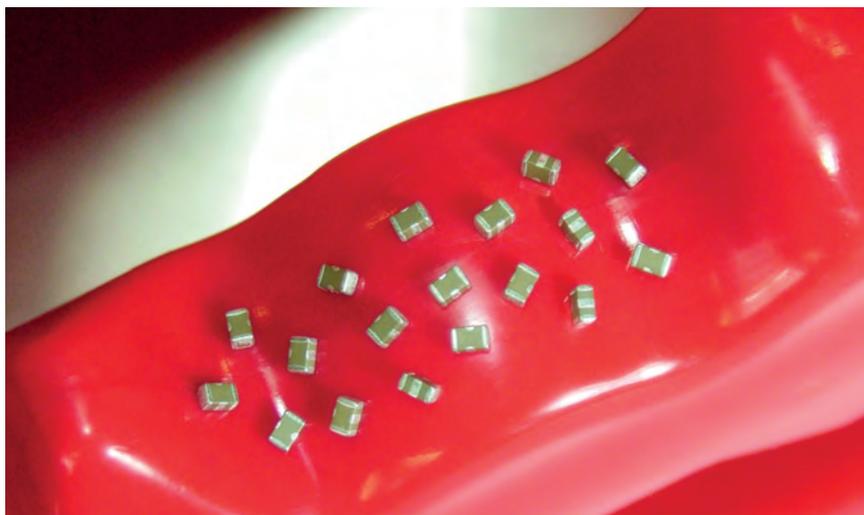
means original component manufacturers are discontinuing more part numbers per year. Overall, the rate of component obsolescence has been increasing over the last 15 years, further exacerbated by government regulations, economic slowdowns and catastrophic events such as earthquakes and floods that knocked out some electronics production.

Consequently, component makers are now faced with some difficult decisions. Adding capacity is expensive, but not adding capacity could mean lost sales. It takes a while for capacity to catch up to demand and expansion requires a significant investment in time and equipment.

Bucking the trend

Naturally, current shortages have caused nervousness in the market and concerns for what may lay ahead. Purchasers are trying to find multiple sources for larger cases, and with manufacturers putting customers on allocation, buyers are looking elsewhere. While large OCMs focus on smaller chip sizes, however, KPD is still focusing on specialist products such as high voltage, high temperature, high Q, electromagnetic interference filters and large case size capacitors. The three-terminal MLC chip in the 1806 size, for example, has been discontinued by many manufacturers. KPD still offers this part and in fact, due to demand, also supports the 0805, 1206 and 1812 case sizes.

Another example is KPD's E01 and E07 ranges under



E01 E07 0603 filters are designed to offer reduced inductance compared to conventional MLCCs

the Syfer brand. These feedthrough MLCC chip 'C' filters are three-terminal chip devices designed to offer reduced inductance compared to conventional multi-layer ceramic capacitors when used in signal line filtering. Available in COG/NP0 and X7R dielectrics, with current ratings of 300mA, 1A, 2A, 3A and voltage ratings of 25 to 200V DC, they are also available with FlexiCap termination, which is strongly recommended for new designs, to reduce the chances of mechanical stress failure. This meets automotive industry requirements and for this application, a range qualified to AEC-Q200 is available. KPD also offer feedthrough MLCC three-terminal chip devices in a Pi filter configuration.

As the pace of technological advancement quickens, the passive component market is beginning to implode, however, as these examples demonstrate, there are still some component manufacturers that can meet 'niche' requirements.

www.knowlescapacitors.com



Developments in electric and hybrid vehicles have led to a four-fold increase in demand for electronic, specifically ceramic, components

Make time for excess inventory management

Cleaning out surplus stock generates extra space and money says sales and marketing assistant, Jodie Glover of inventory management specialist, CCL. This step-by-step guide illustrates how

We live in an increasingly connected world, but the rapid growth of 'smart' technology means demand is outstripping supply. Lead times are sometimes not measured in days or weeks, but months, quarters and calendar years. This is hugely apparent in the current demand for multi-layer ceramic capacitors coming from the automotive industry's push towards electric cars.

Manufacturers are finding it harder to forecast component requirements and as a result, original equipment manufacturers are facing excess inventory issues. These parts drop value each day as more impressive parts replace them. During production runs, having a reserve of parts ready to go is prudent, but what about when projects end?

Know your stock

To manage stock effectively, you need to know what it is. Ensure an inventory

listing system is in place and regularly updated to keep track of stock. Note the date parts were bought in and when they were last required. A well-managed stock list should soon highlight excess stock.

Identify potential

Once an excess list has been compiled, assess its best potential. If there's no future requirement internally for production or repairs, that stock is taking up space, so it's time to sell. An outright excess buy is probably best for those who need an immediate return. Those with patience could achieve a higher return by using a specialist consignment program. With component shortages at an all-time high, it may be possible to get close to the original cost paid or in some cases, more. Discuss the ideal type of return for overstock and set return targets.

Source a specialist

A company focused primarily

on excess will have a network dedicated to getting maximum returns. Once an offer has come back, agree the deal and confirm with an invoice. This excess is now no longer an expense, but money back on the balance sheet.

Ship it out

The last stage is to ship the excess inventory. Most inventory management specialists will organise freight collection and any forwarding shipments. Simply package the parts like any other order and supply weights and dimensions.

Reap the benefits

There are many benefits to selling overstock. It clears space in the warehouse, puts money in your pocket and supports forecasting. Take time to consider how often a list could be compiled and make clearing out unused inventory a regular practice.

www.computercomponents.ltd.uk



CCL sales and marketing assistant, Jodie Glover

During production, having a reserve of parts is prudent, but what about when projects end?



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Shaping the future

Diversity in the workplace improves problem-solving and boosts creativity. Astute believes it's vital to recruiting and retaining the next generation of electronics industry professionals

A career in the electronics industry has a great deal to offer. Engineering positions promise higher employability for graduates, generous starting salaries and international positions with global companies. But engineering is not the only career option available. There are exciting positions in quality assurance, supply chain, account management, operations and more. Talent and expertise are vital in these areas to tackle demanding market conditions and it is down to manufacturers and distributors to promote the industry and invest in people long-term to entice and retain the calibre of candidate required.

Vacancies on the up
By 2030, automotive electronics are predicted to make up as much as 50 per cent of the total cost of a car. With technology evolving rapidly in every sector, it's no wonder that employment opportunities are on the rise,

particularly in areas such as engineering.

Unfortunately, a recent study by *Women in Engineering* revealed that just 11 per cent of the engineering workforce was female as of 2017. Nonetheless 84 per cent of the 300 female engineers surveyed were either happy or extremely happy with their career choice. Astute bucks the trend here, with 42.07 per cent of the workforce being female, but it begs the question: is enough being done to encourage women into the industry?

Advantages of diversity
There is a clear competitive advantage to be gained from employing a diverse workforce. Businesses stand to benefit from the differing ideas and approaches of people from dissimilar backgrounds, cultures and genders. Diversity can also have a positive impact on employee performance and innovation.

Mechanical engineer at European manufacturer of missile systems, MBDA, Jamie D'Ath commented: "Encouraging more women into science, technology, engineering and maths related industries is of critical importance and should be treated as a priority by employers. A number of these disciplines suffer from significant skills shortages which can be effectively tackled by encouraging more women to consider STEM as an option.

"In engineering, just 11 per cent of roles have been held by female professionals in recent years, which obviously needs to improve and, thankfully, it is. However, it's not just about tackling skills gaps. The most important reason for encouraging more women to take on STEM subjects is that having a diverse workforce is good for business. Having a team comprised solely of engineers from one gender and one background

Employment opportunities are on the rise, particularly in areas such as engineering



A recent study by *Women in Engineering* revealed that just 11 per cent of the engineering workforce was female as of 2017

encourages homogenous thinking, whereas having different perspectives and approaches on board can improve problem-solving capabilities and lead to improved decision making and creativity. Diversity is no longer a fluffy initiative, it's critical to delivering successful results."

A role model for young people considering STEM industry careers, Jamie was shortlisted for the *Young Woman Engineer of the Year in 2017* and awarded the Mary George memorial prize for apprentices.

Attracting female engineers

Interestingly, a recent campaign by WISE points out that women are more likely to articulate their self-identity using adjectives, whereas men are more likely to talk about themselves in terms of what they do using verbs. This suggests that girls are more likely to pursue an opportunity if adjectives are used to describe the attributes required in a STEM role. Essentially, this message could open up the industry to an audience that could not previously identify with a STEM profession.

Developing a communication method that speaks to all audiences is vital for the recruitment process and throughout the duration of an employer-employee relationship to retain an inclusive company culture and foster a creative working environment.

Building the future

Sales and marketing director at Astute Electronics, Mark Shanley, agrees, saying: "It is important to allow the next generation to take the lead in helping to move the business forward. It's difficult to learn when you're not trusted to make the decisions, but at Astute we are creating an environment for people who think differently and are empowered to make the right decisions.

"There needs to be more emphasis on coaching and mentoring younger business executives to help them expand their knowledge with support from experienced colleagues. At Astute, we have been creating several opportunities for forward-thinking individuals to join our teams in various roles. With new facilities recently opened in Austin Texas as well as Munich Germany, we have various exciting career openings

within sales, customer service, project management and, of course, engineering."

astute.global

Women are more likely to articulate their self-identity using adjectives



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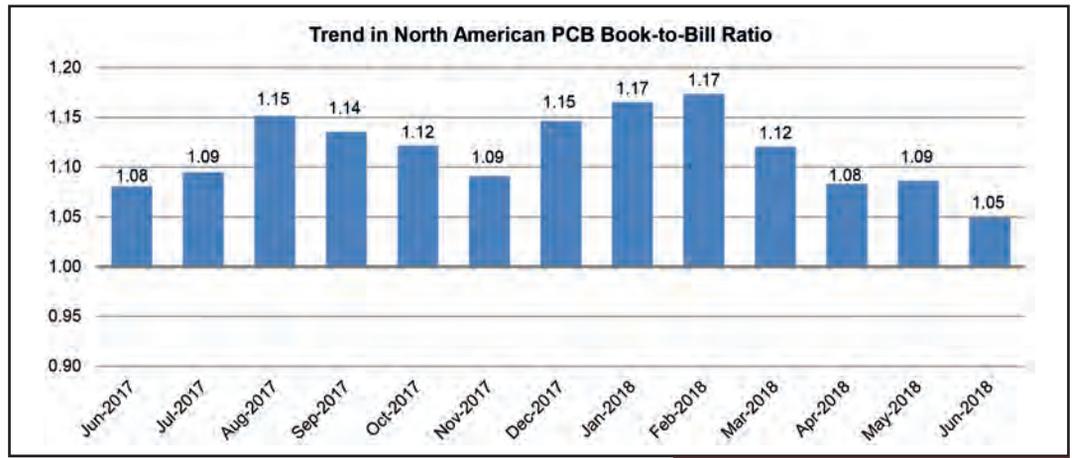
PCB industry growth continues apace

Reassuring results from the IPC's North American printed circuit board statistical program indicate continued expansion in this sector

Industry shipments and orders continued to grow at a strong pace according to the June 2018 findings of the IPC's statistical PCB program in North America. Readers will be encouraged to learn that the overall book-to-bill ratio for June is 1.05.

Commenting on the findings, IPC director of market research, Sharon Starr, confirmed that the North American PCB industry growth trend continued in June.

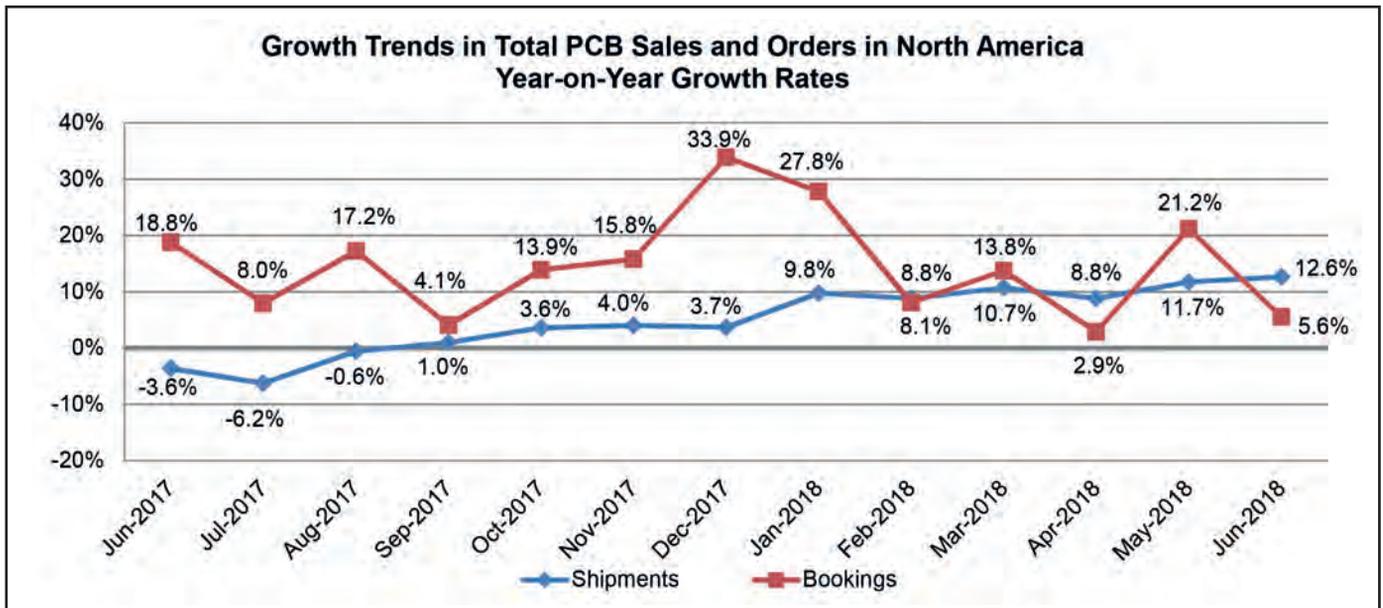
Looking more closely at the results, total North American PCB shipments in June 2018 were up 12.6 per cent



compared to the same month last year. This year-to-date, shipments were 10.5 per cent above the same period

last year and compared to the preceding month, June shipments increased 18.0 per cent.

The January to March 2018 ratios have been revised due to updated data from statistical program participants



PCB bookings increased 5.6 per cent year-over-year and year-to-date order growth was 12.8 per cent above the same period last year. Encouragingly, bookings in June were also up 5.4 per cent from the previous month.

Sharon Starr commented: "Sales growth was positive year-over-year for the 10th consecutive month and order growth has been positive for the past 13 months. The book-to-bill ratio retreated in June due to stronger sales growth than order growth,

but it remains above parity for the 17th consecutive month, which is a positive indicator of continued growth for the remainder of this year."

www.ipc.org

The June 2017 and January to March 2018 growth rates have been revised due to updated data from statistical program participants

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Scaling the waste mountain

As Europe's 'packaging waste mountain' grows, distributor Farnell element14 helps customers divert used packaging away from landfill

The European Union has some of the highest environmental standards, protecting Europe's natural resources and safeguarding the health and wellbeing of people, yet packaging waste remains a problem. In the UK, in response to waste and recycling figures published by Defra, environmental groups are urging the UK Government to set legally binding targets. New data reveals that packaging waste recycled in the UK dropped in 2016 and despite 71.4 per cent of UK packaging waste being recycled, the amount sent to landfill has increased by an extra 446,000 tonnes since 2013.

For businesses, the challenge is that despite an increase in recyclable packaging, the means and the structure to recycle is not always there, leading to recyclable packaging still finding its way to landfill. Commercial and industrial sectors in the UK have begun to address the level of waste going to landfill but according to the Environmental Services Association, the UK is still likely to be left six million tonnes short of waste treatment capacity by 2030. Action therefore needs to be taken to identify new opportunities to reduce waste.

Reducing landfill

Farnell element14 provides one such solution for

businesses within the electronics industry. It has been working with customers across Europe for the last seven years to redirect packaging waste from its distribution operations away from landfill for recycling or reuse.

Over 250 Farnell element14 customers currently use the service, which redirects around 10 tonnes of waste each year, made up of Jedec waffle trays and seven-inch production reels. To date, 285,000 Jedec waffle trays and 2.1 million production reels have been returned, helping customers reduce the amount of waste going into landfill at no cost. Once reels and waffle trays are collected, Farnell element14 works with UK-based not for profit social enterprise co-operative, Enabled Works, and Her Majesty's Prison Humber to remove labels and prepare them for reuse.

Cutting costs

Vice president of sales at Farnell element14, Rob Rospedziowski, says that the company is committed to reducing the amount of waste that goes to landfill from its operations: "Offering this free-of-charge recycling scheme to customers across Europe delivers against this commitment, saving money for customers and helping them achieve their own targets for reduced waste."

Evidently, customers appreciate the service. Radek Mikulecký of Certuma, based in the Czech Republic, said: "The Farnell element14 recycling scheme is truly a unique, original and environmentally friendly service. I like the fact that Farnell element14 uses reels for other customers instead of throwing them out because they can be reused." Mateusz Leśniak from Nord Electronics Solutions in Poland added: "Thanks to the fact that we manage waste better, we care more about the environment and reduce our costs. I think more companies, distributors and manufacturers should implement this solution."

Since the scheme was launched in 2011, Farnell element14 has redirected 83 tonnes of packaging waste from landfill, winning a Green Apple Award in 2013.

uk.farnell.com



Since 2011, Farnell element14 has redirected 83 tonnes of packaging waste from landfill

2.1 million seven-inch production reels have been returned in Farnell element14's recycling scheme

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Component shortages: what's the hold up?

Managing director of REO UK, Steve Hughes, believes the electronic component supply chain faces a challenge to accelerate manufacturing capacity

Demand for electronic components is growing exponentially. Not only do we see greater use of handheld devices with their relatively short product lifecycles, there is also increased use of electronics in industries that did not traditionally use this type of technology. The rapid evolution of the automotive industry and the internet of things, for example, are two key factors that have resulted in stronger-than-expected demand for components; a demand with which manufacturers are struggling to keep pace.

Runaway demand

Like most modern electronic products, automotive systems use multi-layer ceramic capacitors. Traditional combustion engine cars can require approximately 3,000 capacitors, but as cars move from hardware driven machines to software driven machines, their infotainment, driver assistance and comfort systems require ever more components.

For example, the requirements for display systems, LED lighting, sensors and artificial intelligence features have all contributed to the inflation of components required by this market. As a

result, forecasts suggest that the number of MLCCs could rise to 22,000 in just one car in the near future.

In addition to this, annual production of electric vehicles is expected to reach 2.4 million units in 2021, compared to 409,000 in 2014. This substantial rise has been driven by new emissions regulations and incentives from governments, and it doesn't appear to be slowing down any time soon.

Similarly, IoT devices were nothing but a figment of the imagination 30 years ago, yet smart devices are now adding a further burden to an already constrained market. In fact, forecasts show that IoT devices are set to grow to almost 31 billion worldwide, understandably raising concerns among many manufacturers.

Navigating delays

As explained, nearly every industry uses electronic components and in many areas customers are double-ordering components and panic-buying to try and eliminate further production delays along the line. Unfortunately, this does not provide a suitable long-term solution.

Instead, REO UK is urging businesses to implement a more effective planning strategy and flexible ordering system for their projects. This kind of strategy can protect against any unexpected supply chain issues, such as the current shortage.

As it stands, analysts' predictions are varied, but it's expected that the shortage will continue into the early months of 2020 at the very least, so businesses need to set realistic expectations and regularly update their customers to retain good relations. This has been the approach taken by Tesla, which even now is trying to boost its production output and still generating orders.

This is not the first time there have been long delays for key components in this industry and we expect that it will not be the last, especially as buying behaviour and purchase decisions can be so unpredictable. By implementing a procedure that allows for longer lead times, purchasers will be able to better manage operations to respond effectively to fluctuating lead times in the future.

www.reo.co.uk



This is not the first time there have been long delays for key components in this industry and we expect that it will not be the last

The growing season

Chairman of the Electronic Components Supply Network, Adam Fletcher, reports continued revenue growth this summer, reflecting overall positivity in the global electronic components industry

Chairman of the ECSN, Adam Fletcher, was buoyant about the findings, despite acknowledging an unusual eight point fall in the book-to-bill ratio. He explained: “The decline in the B2B to 0.96.1 in August is unwelcome, however I believe that we’re simply returning closer to historical reporting levels. The polynomial trend line suggests the B2B ratio is likely to remain positive into the fourth quarter of 2018.”

In fact, overall bookings increased by 12 per cent compared to the same month in 2017, while total monthly billings increased by four per cent compared to the previous month and by 12

per cent when compared to the same month last year.

Slowing UK growth

Looking at the UK in the wider global context, Fletcher believes that manufacturing output is flatlining in the UK due to weaker domestic and export demand. Increasing vendor delivery times and availability of raw materials continue to be a global problem, however, as does rising input prices.

Adam commented: “Brexit is causing a lot of uncertainty in the UK, while the risk of an escalation of the trade war between the US and China is doing absolutely nothing positive for international

markets. The sales by month ‘three month moving average’ for all electronic components suggests continued but slowing UK growth into Q4 2018, which is broadly in-line with historical results and forecasts.”

Despite the slower rate of growth, Fletcher remains positive overall, concluding: “There has certainly been a slight decline in customer sentiment from earlier in the year but overall the outlook for our domestic electronic components industry remains strong.”

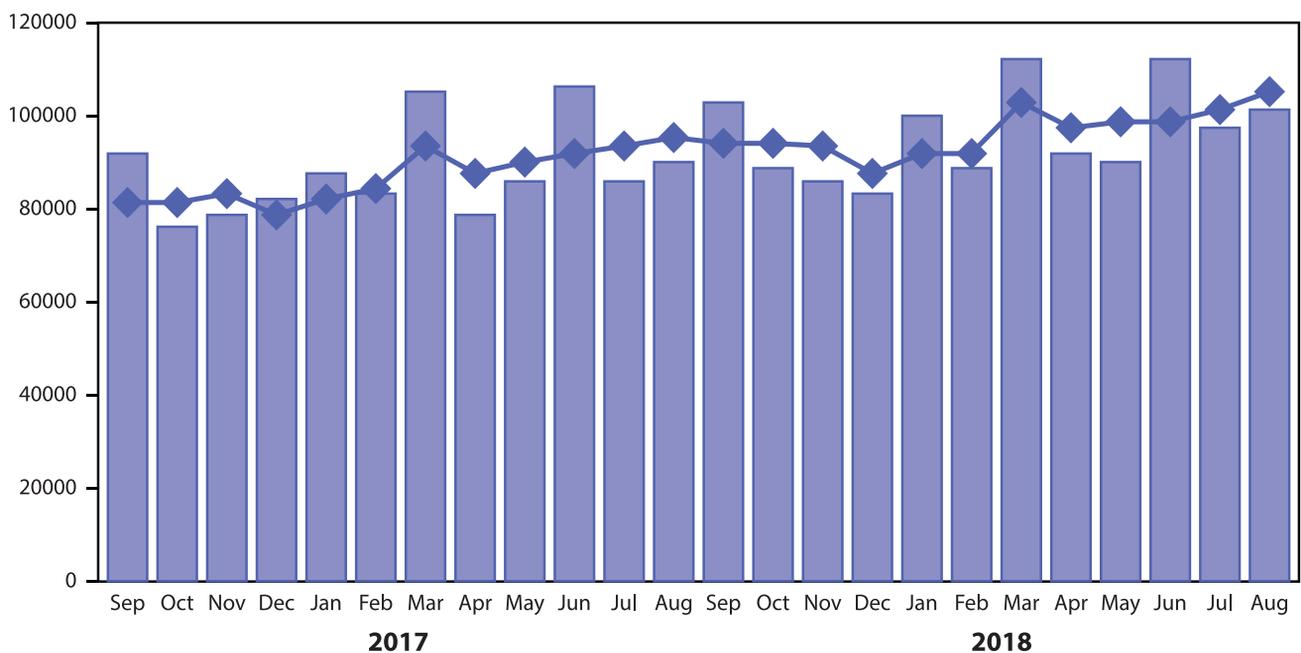
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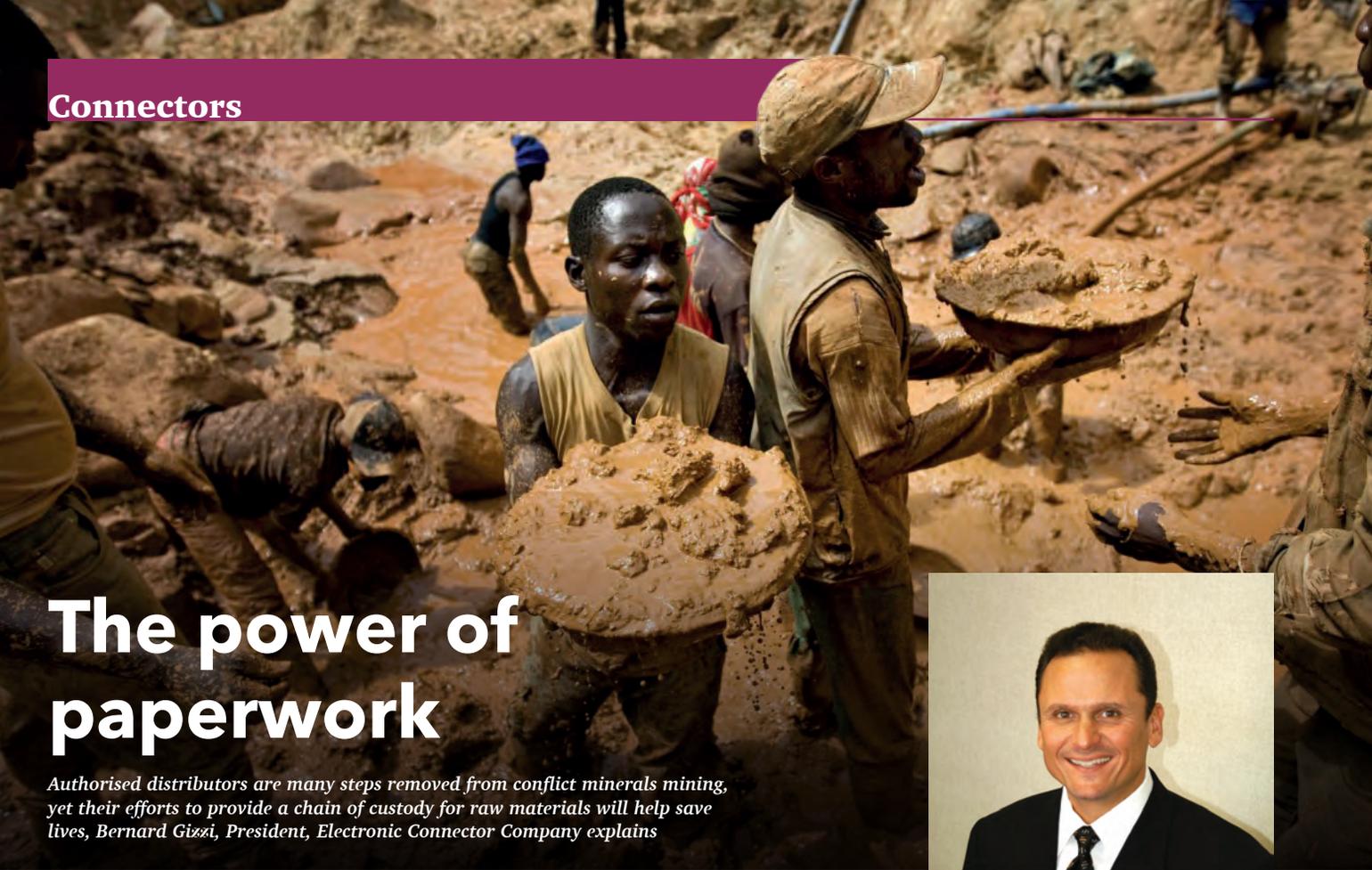
Chairman of the Electronic Components Supply Network, Adam Fletcher

The polynomial trend line suggests the B2B ratio is likely to remain positive

All Industrial Components (ie net of Semis to PC mkt)



Source: ecsn Ltd



The power of paperwork

Authorised distributors are many steps removed from conflict minerals mining, yet their efforts to provide a chain of custody for raw materials will help save lives, Bernard Gizzi, President, Electronic Connector Company explains



President, ECCO Electronic Connector Company, Bernard Gizzi

Electronic distributors are often asked to fill out lengthy forms to verify the origins of where materials are sourced. In the quest to properly disclose this information, distributors may need to fill out forms such as the conflict minerals reporting template, or subscribe to audit websites to comply with conflict mineral disclosure standards for the products they sell.

Of course, most authorised distributors are many steps removed from the mining of conflict minerals and do not purchase in the covered countries. Distributors work closely with suppliers to identify products at risk of having conflict minerals and provide as much documentation as possible to provide chain of custody and originating sources for raw materials. Arrow and Avnet have spent considerable time and resources to address this problem and many suppliers approach conflict minerals similarly.

Understanding origins

Despite the inherent costs in reporting, disclosure requests are important and serve a vital purpose. That's because the conflict in

'conflict minerals' refers to ongoing wars and atrocities occurring in and around the Democratic Republic of Congo in Africa where mining for minerals used in electronics manufacturing occurs. These minerals are primarily tungsten, tantalum, tin and gold.

Conflict minerals reporting helps to disclose the origins of minerals that may come from this war-torn area. In the United States and some European countries, government bodies have enacted laws to bring attention to and prohibit products that have 'conflict minerals' in them if they came from mining operations in this area of Africa.

Change trading patterns

In the electronics industry, the issue really came to the fore after the passage of the Dodd-Frank Act in 2012. Section 1502 made it a requirement for companies to enact due diligence in the sourcing and chain of custody reporting when sourcing products that might contain conflict minerals.

For clarity, this legislation does not apply to everyone,

however all distributors want to prevent and eradicate those organisations that contribute to conflicts that accelerate the emergency humanitarian situation in Africa's Congo region. Identifying these minerals and their source will help de-fund the armed groups that commit offences against human rights.

Of course, there are many supply chain layers that separate distributors from smelters and mines, often making it impossible to verify if conflict minerals are present when ores are smelted, refined, and converted to ingots that are combined at operations outside the conflict area. Distributors still have a key role to play, however, as they continue to raise awareness and to improve sourcing from conflict-free regions.

With the guidance of the Electronic Components Industry Association, and the efforts of the authorised distributor community, the trading environment around these minerals will improve, reducing the problems for those living in and around the DRC.

www.eccoconnectors.com



There are many supply chain layers that separate distributors from smelters and mines



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Inspiring industry

A host of innovative solutions will be showcased by TTI at Electronica 2018, highlighting the company's complete distribution solution, from design right through to supply

TTI has supported Electronica for many years. This year it returns to Munich once again to exhibit with fellow Berkshire Hathaway company, Mouser Electronics, in Hall C3, stand 550 from November 13 to 16. Its motto for the show: 'From design chain to supply chain — your complete distribution solution.'

So how will this motto be reflected on TTI's booth and what will visitors be able to see? TTI offers broad and deep inventories of passive components, interconnect products, power and sensors, discretes and electromechanical devices. Ensuring that customers have access to the widest range of new technology devices is a key pillar of TTI's philosophy and it has invested heavily in infrastructure and inventory at its European headquarters near Munich to ensure that customers can rely on this. Even in challenging conditions where leadtimes are extending, as they are currently, TTI can support customers from stock, thanks to having foreseen shortages early and expanding stockholding significantly. The company therefore looks forward to discussing buyers' needs in detail at Electronica, where technical, logistical and commercial experts will be available to cover all product ranges.

Innovation in action
Of course, there will also be some eye-catching exhibits. As part of TTI's industrial electronics theme, it will showcase TALOS, a fully electrical humanoid robot featuring sensor-torque control in all its joints and using EtherCAT bus protocol to communicate. With its 6kg payload capacity in each

arm, TALOS is ready to tackle complex industrial production tasks.

In the transportation area, TTI will present an electric superbike by Energica that can accelerate from 0 to 100km/h in just three seconds, achieving a top speed of 240km/h. Electric vehicles of all descriptions require new types of rugged, high performance components and TTI is at the forefront thanks to authorised distribution deals with leading suppliers.

One of the highlights in TTI's defence/aerospace and space section will be the extended range of value-added services TTI offers, including QPL connector assembly and wire and heat shrink tubing and supply. These products are often subject to significant

minimum order quantities and take up valuable space while requiring specialist assembly skills. TTI aims to remove these headaches.

Sensors, too, will feature prominently, since every internet of things application — be that industrial IoT, smart building, smart home, smart office, connected auto, remote metering, home diagnostics, or wearables — begins with data capture via a sensor. TTI has amassed a wide portfolio of suppliers that cover the vast number of sensor technologies, and many of them will be on display.

Taking up 585m² of floorspace in total, TTI's booth at Electronica will be one of the largest in the show. Not only will it play host to the inspiring displays mentioned above,

but also to private one-to-one discussions where customers will be able to schedule time to discuss their very specific requirements. We are looking forward to meeting you in November!

www.ttieurope.com



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Wire & Heat shrink tubing; are you losing much valuable space and time storing large reels of product?
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For more information on what TTI Europe has to offer, contact +49 (0) 8142 6680 0 or sales@de.ttiinc.com

Don't miss the chance to see the humanoid robot TALOS, as well as the electric superbike Energica Ego that will be on our booth throughout the show.



We would be happy to welcome you at our booth!

Sidestep obsolescence stress

Vice president of sales and marketing, Colin Strother, explains how Rochester Electronics can help purchasers avoid many of the issues surrounding component obsolescence and counterfeiting

Q How can Rochester Electronics help purchasers tackle their biggest concerns: obsolescence and counterfeiting?

A) In 2006, Rochester Electronics launched an anti-counterfeit awareness campaign exposing the risks associated with counterfeit and substandard products. We initiated the Semiconductor Industry Association's Anti-Counterfeiting Task Force and actively promote best procurement practices to combat counterfeits. Rochester also offers bill of materials analysis to long-term system customers, providing insight and feedback to help them stay ahead of obsolescence.

Q What solutions can Rochester provide to procurement professionals in the Americas?

With many components showing longer lead times and shortages, I'd like to focus on Rochester's in stock active semiconductors. With over five billion devices in

stock, we solve supply chain disruption by ensuring a risk-free solution from an authorized source of supply.

Rochester also provides a continuous source of supply, with a large range of end of life semiconductors, in addition to a range of authorized manufacturing solutions and services.

Q Can you manufacture new semiconductor designs and bespoke components?

A) For legacy voltages of five and 3.3V, Rochester Electronics is authorized by LSI to manufacture new gate-array and cell-based application specific integrated circuit designs using its source technology and libraries. This allows Rochester to support customers where they have legacy voltage systems using their design IP that they wish to continue, without major board redesign.

Q What are the three most frequently asked questions and what are the answers?

A) Number one: you really have that in stock? Rochester specializes in providing solutions around hard to find products, be they EOL, or active with long lead times or shortages. Customers are delighted to find the product they need from an authorized source of supply.

Number two: you can really make that? Customers are surprised to find a continuous source of supply for devices that have long since passed EOL by the original manufacturer.

Rochester has over 12 billion die in stock, with the capability to manufacture over 70,000 device types using information transferred directly from the original component manufacturer. With the original manufacturers' approval, Rochester can also re-create the original device to provide a form, fit and function replacement, guaranteed to the original data sheet.

Number three: can you source this for me? Every time we are asked this question, we say no. Rochester only provides 100 per cent authorized, traceable, certified and guaranteed product.

Q Does Rochester offer pack and hold or logistics services?

A) Yes, Rochester can tailor scheduling and logistical solutions for both in-stock inventory and



Rochester Electronics' vice president of sales and marketing, Colin Strother

manufactured products to ensure a continuous supply that matches customer requirements. We also offer long term storage services for customer owned finished goods, wafer/die and intellectual property.

Finished goods are stored in a dedicated area with secure access and 24/7 surveillance, all in a temperature and humidity-controlled environment. Wafer and die are stored in nitrogen purged wafer dry boxes. Intellectual property is stored within Rochester's secure digital archives. We also offer media restoration, data recovery and format conversions.

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Wafer and die are stored in nitrogen purged wafer dry boxes

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Growth prompts expansion

Mouser's expansion continues to support its worldwide growth rate of 40 per cent. Extra space will help house over one million different parts, including wide stocks of Texas Instruments ICs

A further expansion of Mouser's Texas headquarters and warehouse has been announced in support of the company's business growth, which is currently expanding at a rate of over 40 per cent globally. Ground will soon be broken on an extra 11,600m² warehouse extension, following on from a significant previous building program, which was completed only two years ago.

Senior vice president, global service and EMEA and APAC, Mark Burr-Lonnon, explained: "We are starting to view the building works as a continuous process. To support the growth that we have been experiencing for a long time—don't forget, 2017 was a record year for us, and the previous years had also been records—we must have freely-available stock: that's our business model. We are committed to holding over one million different parts in stock by the end of 2018. Stock requires space, so we'll just keep adding. Luckily there's plenty of room in Texas."

Committed to inventory

As an example of the company's commitment to inventory, Mouser holds over 44,000 different Texas Instruments products on its shelves, including over 4,000 development kits. This is thought to be the broadest portfolio of the newest Texas Instruments solutions available through distribution, with more parts being added every day. The following are just a few of the latest TI products available:

AEC-Q100 qualified
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stereo I2S input Class-D amplifiers, which include hardware- and software-control modes, integrated digital clipper and several gain options for use in audio visual applications.

MSP430FR215x and MSP430FR235x embedded microcontrollers featuring a 16-bit RISC central processing unit, 16-bit registers, and a constant generator for maximum code efficiency.

BQ27Z561 Impedance Track gas gauge solution with a flash-programmable custom RISC and SHA-256 authentication for lithium-ion and lithium-polymer battery packs.

TMS320C6748 fixed- and floating-point digital signal processor featuring a two-level cache-based architecture, designed to facilitate devices with robust operating systems, rich user interfaces, and high processor performance.

Investing in logistics

For statistics fans, some other numbers may be illuminating. The company shipped 4.7 billion pieces in 2017. An average of more than 16,000 orders are fulfilled each day, with approximately 60,000 different items being picked. Automated shipping ensures 14 orders are processed per minute, while fast shipping ensures most packages are received next day in the USA and within two to four days internationally, with an on-time arrival rate of 99.9 per cent.

Mouser is authorised for more than 700 manufacturers, supplying parts to over 600,000

customers in 220 countries. The company will shortly add offices in Poland, Vietnam, Philippines and Brazil to its existing 23 locations and its website is available in 17 different languages, with Polish, Vietnamese and Filipino to be added in early 2019. Live chat is also available in eight languages and 27 currencies are accepted.

Burr-Lonnon concluded: "We'll just keep doing what has made us successful; supplying the latest new products and technologies and providing the knowledge base and design ecosystem that enables end-product differentiation."

mouser.com



We are committed to holding over one million different parts in stock by the end of 2018

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- *The Sourcing Guide* supplement published once a year to same circulation



ES North America and Offboard Sourcing

- Published 12 times a year
- Circulated to 72,000 purchasing professionals in North America
- Independently audited by ABC
- *Offboard Sourcing* supplement published twice a year to same circulation



ES Europe

- Published six times a year
- Circulated to 33,000 purchasing professionals in Europe



ES Deutschland

- Published six times a year
- Circulated to 13,500 purchasing professionals in D-A-C-H countries
- Independently audited by ABC

Are fabs investing enough?

Data from North America's semiconductor equipment manufacturers indicates a climate of overall growth, despite recent billing decreases, reveals SEMI

According to the equipment market data subscription billings report published by global industry association, SEMI, North American semiconductor equipment manufacturers posted \$2.36 billion in billings worldwide this July. Despite coming in 4.9 per cent lower than the June 2018 findings, this figure is 4.1 per cent higher than the \$2.27 billion of July 2017.

Ajit Manocha is president and chief executive officer of SEMI, an organisation representing companies that provide equipment, materials and services for the manufacture of semiconductors and related technologies. Commenting on the results, Ajit said: "Global billings declined for the second month in a row, which is indicative of customer push-outs. We expect the industry to weather this soft patch and end the year overall with strong growth."

To put these findings into context, SEMI not only publishes a monthly North American billings report, it also issues a worldwide semiconductor equipment market statistics report in collaboration with the Semiconductor Equipment Association of Japan. This reports billings for 24 equipment segments and seven end-market regions. SEMI also has a history of tracking semiconductor industry fab investments in detail on a company-by-company



We expect the industry to weather this soft patch and end the year overall with strong growth

- Ajit Manocha, president and chief executive officer of SEMI

and fab-by-fab basis in its world fab forecast and FabView databases. These tools provide access to spending forecasts, capacity ramp, technology transitions, and other information for over 1,000 fabs worldwide. www.semi.org



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Supply chain must haves

We asked vice president of engineering and manufacturing at STI Electronics, Mark McMeen, which purchasing support services he relies on most, and where he feels the distribution industry could do more

Q How has the purchasing role at STI changed over the last five years?

A) The purchasing role has changed significantly; component shortages mean STI buyers must not only find alternative components, but also demonstrate that the components are from master franchise distributors. As counterfeit and gray market components have become mainstream in the secondary markets, the ability to procure certified components from master franchised distributors has become more important. Certification of compliance provides traceability from the original component manufacturer, through certified distributors, to the contract manufacturer. This trail is the new link in the distribution channel. There is also emphasis on testing secondary market components to ensure they are non-counterfeit and to verify they are not gray market used components. Component age limits are also important, so a lot code cannot be older than two to three years on passives

and one to two years for active components.

Q Have you increased or decreased your preferred supply list and why?

A) Preferred supplier and approved vendor lists are growing with the need to add alternate components and suppliers. Approved test facilities have also been added to ensure secondary market components are viable and meet expectations. These new companies, or company divisions, procure from secondary markets then perform testing to ensure the components are not counterfeit or gray market products, before certifying and validating parts. These facilities are also testing electrical parameters to ensure the components are not seconds or defective original manufacturer.

Q What service do you request most frequently from distribution companies?

A) The newest service that has grown over the last five years is engineering support to identify alternative components that will work in a certain location or to identify other vendor sources of similar components to help address component shortages. This is becoming a big service for master franchise distributors.

Q Is obsolescence and counterfeiting a problem in the electronics supply chain?

A) Obsolescence is an increasing problem for the industry as components are phased out in favor of smaller form factor devices. Counterfeiting is not seen in our master franchise



Mark McMeen is vice president of engineering and manufacturing at STI Electronics

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distributors because they maintain clean chains of traceability. Components procured in the secondary or gray markets, however, may pass initial tests for authenticity, but would fail in the age and previous use category. Gray market components are more difficult to validate because chemical decapsulation is required to review the integrated circuit or die markings to determine the original date of manufacture. STI has a full service analytical and materials laboratory in-house, making it easier to ensure we are not using gray market or counterfeit components.

Q What services would you like the supply chain to provide?

A) The availability of engineering support to find alternate components and sources is on a company by company basis and varies by component type as well. Some companies are excellent while others are poor to average. This is one area that should be improved and as market conditions demand it, it will become a discriminating

factor between component distributors.

Q What feedback would you give to distributors or principal component manufacturers?

A) My advice is to develop a stricter traceability method and chain of authority protocol to prevent lot code manipulation within the pedigree history. This increased safeguard would significantly increase confidence in component history, from source to end user. I personally think the open source block chain approach should be used because this prevents manipulation of the chain of authority, thereby preventing counterfeit or gray market components from entering the supply chain. Although this is a radical departure from the norm, traceability needs to be decentralized. Open source would help to prevent manipulation of past pedigree history by having it recorded in multiple sites.

stiusa.com

“ Obsolescence is an increasing problem for the industry as components are phased out in favor of smaller form factor devices **”**

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Getting the best from gaskets

Electromagnetic interference can have serious effects if equipment is not adequately protected. Gaskets provide a solution, but there are a multitude of options available, as Kemtron's David Wall explains

Think of electromagnetic interference as a form of pollution, or smog, that can affect electronic equipment that is not protected from its effects. EMI-related problems can range from annoying noises on the car radio, through to serious accidents when safety critical equipment is caused to malfunction.

Protection as standard

The electromagnetic compatibility directive seeks to alleviate these issues. It came into force in 1992 with a transitional period ending in December 1995. The directive is designed to ensure that a device, equipment or system functions satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbance to anything in that environment.

Over the years, the directive has had a few changes, but

in principle, it remains the same. The latest iteration is EMC directive 2014/30/EU, which came into force in April 2016. Compliance is usually ensured by testing to standards or the manufacturer can provide a technical file to demonstrate compliance. Products also need to be CE marked before they can go to market in the EU.

A mechanical fix

EMC shielding of an electronic enclosure is a mechanical fix for an electrical problem. The objective is to make the enclosure a Faraday cage, or to create lots of smaller Faraday cages within the enclosure. This is achieved using electrically conductive gaskets to seal any seams and gaps. It may also involve the use of components such as EMI shielded windows for shielding display devices, honeycomb ventilation panels, shielded cable glands and metal cans for shielding

components on the PCB. Filtering and absorption may be necessary and, of course, good design.

Various types of gaskets are available, and choice will depend on application. The most popular are electrically conductive elastomers, which are silicones or fluorosilicones loaded with electrically conductive particles. These materials are available as extrusions in various standard or custom profiles, mouldings and sheets.

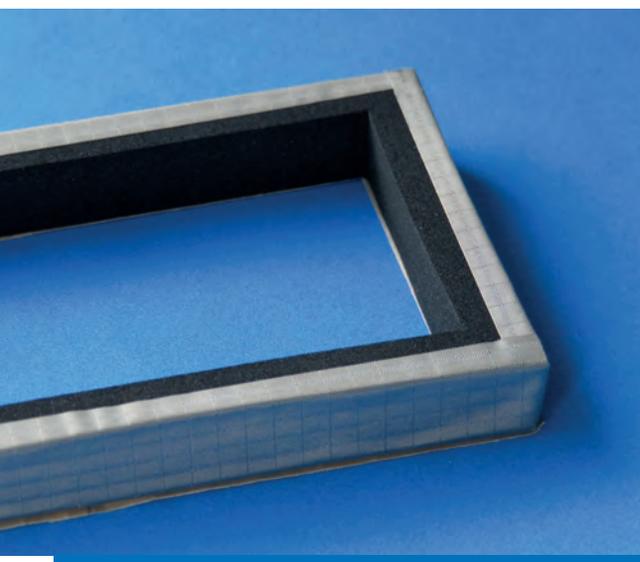
The most cost effective electrically conductive elastomer is nickel coated graphite in silicone, which boasts excellent shielding performance across a wide frequency range. Other fillers available are mainly silver based, such as silver-plated aluminium or copper. These materials are more electrically conductive but are considerably more expensive and the increase in shielding effectiveness is marginal, so they are best used in the most demanding of applications.

Beryllium copper complications

Beryllium copper fingers have been very popular, particularly for wiping applications such as card frames and knife edge door gaskets for shielded rooms. For other applications, however, alternative gasket types are becoming more popular.



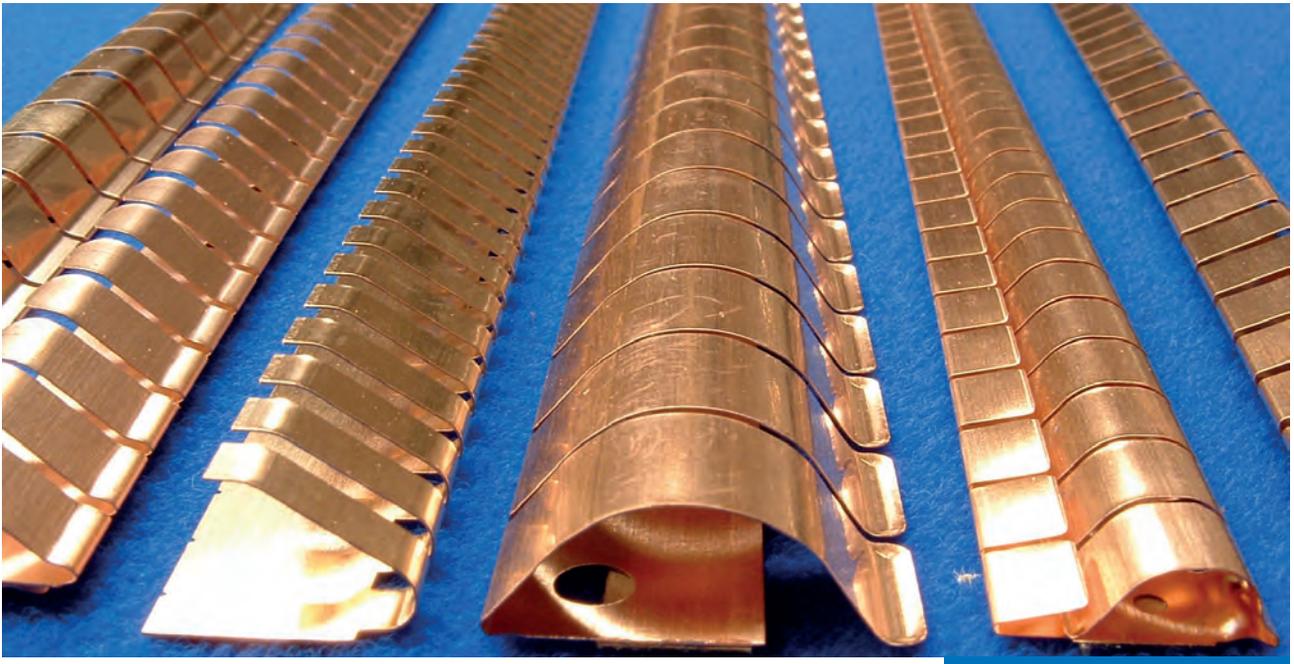
Knitted wire mesh is still widely used in the defense industry



Electrically conductive fabric over foam gasket strip is popular in commercial applications



Products need to be CE marked before they can go to market in the EU



Beryllium copper fingers are particularly popular for wiping applications

Conductive elastomers are available as extrusions in various standard or custom profiles, mouldings and sheets



Furthermore, there is a proposed EU ban of beryllium copper in the electronic products 'RoHS 2' regulation consultation pack 15. If this ban goes ahead, the impact on the electronics industry will be considerable as beryllium copper is used extensively in connectors, spring contacts and EMI/RFI shielding. There is currently no equivalent alternative that meets the electrical conductivity and spring characteristics of BeCu.

Standard or custom profiles

Electrically conductive fabric over foam gasket strip is popular in commercial applications. The material consists of a nickel and copper plated nylon over foam/sponge rubber. There are many standard profiles available to suit a myriad of applications. Bespoke half wrapped strips and fabricated gaskets give the added advantage of a galvanic neutral environmental seal.

In the defense industry, knitted wire mesh is still widely used for land systems where large profile metal gaskets are required for electromagnetic pulse applications. This is due to the high current carrying capability of knitted wire mesh. Knitted mesh is also still the most cost-effective EMC gasket, with the added advantage that it can be fabricated into complex gasket shapes when bonded to an environmental seal.

When sourcing EMC shielding products, it is important to talk to suppliers in the initial stages of a design as they will be able to help specify the correct profile and gasket material; one that can also address issues such as environmental sealing, galvanic compatibility, temperature range and chemical compatibility.

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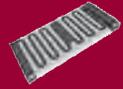
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Mouser becomes first distributor to earn AS6496 accreditation

Other distributors will follow suit and become certified to the anti-counterfeiting standard

 James Carbone

Mouser Electronics has become the first authorised distributor to be accredited to an aerospace industry standard designed to help stop the introduction of counterfeit parts in the aerospace supply chain.

Mouser, based in Mansfield, Texas, was accredited to the AS6496 standard after being audited by Performance Review Institute (PRI) under criteria developed by PRI, the Electronic Components Industry Association (ECIA) and aerospace OEM representatives.

The AS6496 aerospace standard sets requirements for the avoidance, detection, mitigation and disposition of counterfeit products in the authorised distribution supply chain. The international standard requires authorised distributors to have a counterfeit mitigation policy and a counterfeit electronics parts control plan.

The AS6496 standard was developed by an SAE Committee, G-19AD, comprised of representatives from authorised distributors, aerospace companies and government agencies.

Chuck Amsden, vice president of quality for Mouser, who served on the committee, said by becoming accredited to AS6496, the distributor demonstrates its commitment to providing customers with only genuine components. “We can provide full traceability to the manufacturer on everything we sell,” said Amsden, who thought of the idea for the standard after serving on another SAE committee.

Buyers and engineers concerned about counterfeit

parts can be assured that Mouser “has rigorous processes in place to mitigate the risk of counterfeit products penetrating its inventory,” he said. Amsden added besides being accredited to AS6496, Mouser is also accredited to other industry standards such as AS9100D and ISO 9001:2015 meaning Mouser provides “the highest quality components by providing traceability, risk management, process control, customer support, product availability and document control.”

Fake electronic components have been an issue in the aerospace industry—as well as other industries—for years. Bogus parts, often originating in China, have been found in commercial and military planes made by Boeing, Raytheon and L-3. More than 95 per cent of reported counterfeit issues are due to the procurement of components from distributors or brokers who are not authorised by the original component manufacturers to sell the manufacturers’ parts, according to Lockheed. Counterfeit parts can range from high-end semiconductors to lower-cost resistors, capacitors and connectors.

“Counterfeit parts got a leg hold in the aerospace industry because the mandate for saving money was more important than authenticity,” said Amsden. “So, buyers went and found parts that were cheap and before anyone knew it, they were buying them from China and over the web and they were saving lots of money,” he said. But unfortunately, some of those parts ended up being counterfeit.

First, not last

While Mouser is the first distributor to be authorised to the AS6496 standard, it will not be the last. TTI, based in Fort Worth, Texas, and parent company of Mouser, plans to get accredited.

“Mouser was the first company to undergo the audit and TTI attended to help us prepare as well,” said Kevin Sink, TTI’s vice president of quality. Sink was co-chair of the committee that developed the standard. “We plan to schedule our audit during Q4 of 2018,” he said.

Audit criteria is spelled out in the accreditation tool AC7403 which “established the objective evidence that PRI uses to ensure a company is performing in accord with AS6496,” said Sink. That evidence includes traceability of parts back to the original component manufacturer (OCM), purchases from authorised sources, control of customer returns, inventory controls that segregate any suspect material or materials from unauthorised sources in the event the distributor engages in independent distribution also, said Sink.

In the standard, there are requirements concerning an authorised distributor’s purchasing practices, according to ECIA. One provision requires the distributor to maintain a register of its suppliers, including a list of the manufacturers or other authorised distributors that provide products to the distributor for sale to customers.

The list must also show authorisation status and scope. Authorised

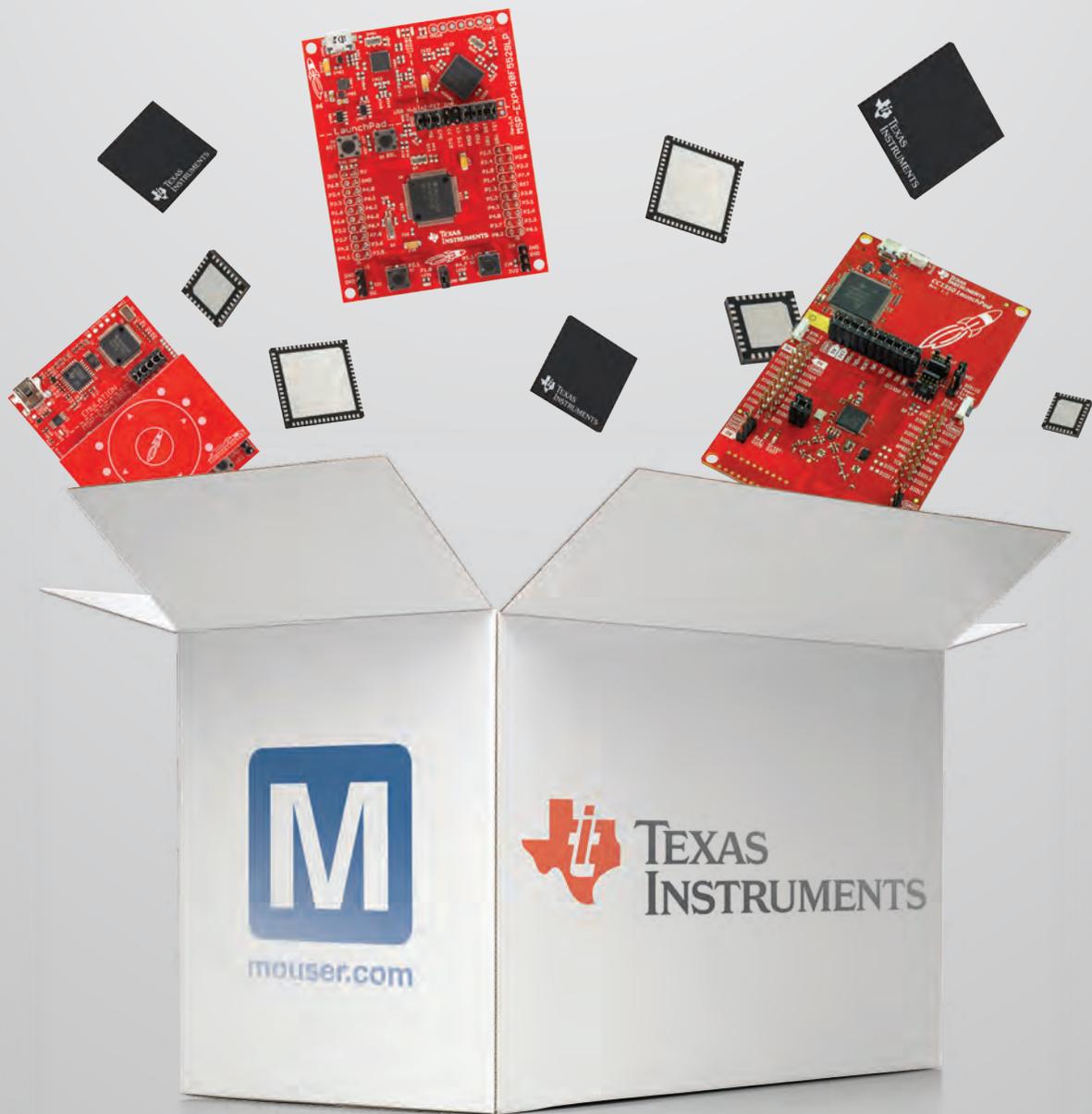


Chuck Amsden, vice president of quality for Mouser Electronics



We can provide full traceability to the manufacturer on everything we sell

au·thor·ized *adjective*
having permission or approval
as in, "Mouser is an authorized source."



More TI products in stock for your next design.
[mouser.com/ti](https://www.mouser.com/ti)



distribution is defined as “transactions conducted by a manufacturer-authorized distributor distributing product within the terms of a distribution agreement,” according to ECIA. If sales are done without a distribution agreement in place, then the distributor is not performing authorized distribution and a different SAE standard, AS6081 applies. AS6081 covers independent distributors/brokers. Another part of the standard makes it clear that it is only authorized distribution if an authorized distributor buys solely from the manufacturer or the manufacturer’s authorized distributor.

Part of the standard deals with documentation requirements for military and commercial industrial components. For instance, military parts require both the manufacturer’s and the distributor’s certificate of conformance, while only the distributor’s certificate of conformance is required for commercial parts.

Handling returns

The standard also has requirements concerning how component returns from customers are handled. “Customer returns are the greatest point of risk for authorized distributors,” said Sink. “Customers occasionally return parts from other sources in error,” he said. Some of those parts could be counterfeit if they were purchased from an unauthorized source such as a part broker.

The standard requires the distributor to issue an RMA (return merchandise authorization) if the distributor elects to accept a return. The RMA must require that the parts returned by the customer were the same parts sold to the customer.

If the distributor agrees to accept parts that it did not sell, then those parts must not be co-mingled in inventory nor sold to anyone

else as authorized product. In addition, parts returned by independent distributors/brokers must be treated as suspect counterfeit parts, according to the standard.

The customer return verification provisions specify the elements necessary to prove that the parts returned by the customer to the distributor were purchased directly from the distributor and not some other source. This includes matching the returned parts against the distributor’s traceability records, which should include date/lot codes if available. If date/lot codes are not available or don’t match, then the returned parts should be treated as suspect counterfeit parts.

Customer returned parts need to be inspected for any evidence of alteration, mishandling, improper packaging or repackaging, under the standard.

AS6496 also says that suspect, fraudulent or counterfeit parts must be quarantined pending proper disposition. The parts may be returned to the manufacturer for analysis and disposition. Confirmed counterfeit parts should not be returned to the customer and should be held in quarantine for five years, or longer if required by law.

The re-stocking provisions reiterate that suspect, fraudulent and counterfeit parts must not be reintroduced into the supply chain, restocked or returned to the manufacturer in a stock rotation. In addition, returned parts shall not be restocked into authorized inventory if purchased from non-authorized sources.

Distributors and OCMs alike must ensure that the parts returned are indeed the same parts they shipped to the customer, said Sink. “Properly controlled, this filters out even inadvertent returns of potentially suspect components,” said Sink. Distributors are also

required to have a system for controlling inventory that includes the segregation of authorized parts from unauthorized parts and the traceability of customer returned parts.

No problem with accreditation

While provisions of the standard may appear challenging, Amsden said getting accreditation “should not be difficult for someone who is been doing authorized distribution right.” Most large authorized distributors already have the necessary controls in place.

Distributors such as Arrow and Avnet and other distributors that are members of ECIA “will probably have no problem getting accreditation” said Amsden said. However, getting accredited to the standard, may require additional investment to set up records specific to purchase or return control” to show due diligence, said Sink.

He added to get accredited it may be necessary for “some awareness training would be appropriate to all employees who handle or purchase product. In most cases, distributors have goods controls, but it is not necessarily understood by a distributor’s staff how those processes also protect against counterfeit infiltration,” said Sink.

Framing their tasks around counterfeit mitigation is important to ensure every employee the auditor interacts with can respond appropriately, according to Sink.

The audit itself takes about two days and will involve 24-30 man-hours between the management representative and the various staff being audited, he said.

More accreditation likely

While Mouser is the only distributed accredited to this standard so far, “I suspect more distributors will become

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



I suspect more distributors will become accredited to the AQS646 standard

accredited,” said Robin Gray, ECIA’s chief operating officer, who was a co-chair of the G-19AD Committee that developed the AS6496 standard. However, how many distributors will be accredited and how soon remains to be seen.

“It will be driven by the customer,” said Gray. The customer is the one that’s going to ask for the distributor to have the audit.” Customers include large aerospace OEMS and defense contractors such as Boeing, Lockheed, Raytheon and L-3 among many others. Distributors may find it is advantageous to become credited sooner rather than later. “One of the advantages for distributors to become accredited is once you have it done you’re more than likely not going to have multiple audits by multiple customers,” said Gray. “The distributor can say ‘hey I’ve had the audit. I’ve complied with the standard and here is my certificate showing that,’” he said.

Gray added, “as a distributor you can be proactive. You can have it done perhaps to forestall future customer requirements or you can wait until customers start asking for that certificate,” said Gray.

One distributor that sees the value of becoming accredited to AS6496 is Digi-Key, based in Thief River Falls. Teri Ivaniszyn, vice president, operational excellence at Digi-Key, said the distributor is working with the ECIA and PRI to receive accreditation as part of the Counterfeit Avoidance Accreditation Program (CAAP). CAAP is a cooperative industry effort to stop the introduction of counterfeit parts in the aviation, space, and defense industries,

“This standard has been recognized in the aerospace industry since 2014, but this is the first time we are seeing a certifying body give accreditation to it,” she said. Ivaniszyn said the cost to become accredited is minimal. “There is counterfeit training for all required

staff, document processes, and system capabilities are already available,” at Digi-Key, she said.

AS6496 may eventually become required for distributors to do business with aerospace companies. “In the long run, we expect certification to be necessary in order to work with top tier military/aerospace customers,” said Sink. However, in the short term, authorised distributors will be given time to phase in their compliance.

To what degree the standard will help stop the introduction and proliferation of parts to the aerospace industry remains to be seen. However, by defining the processes an authorised distributor should have in place to keep suspect parts out of their inventory purchasing and customer return controls, the standard should be a useful tool in the anti-counterfeiting efforts of the aerospace industry and with electronics distributors.



Kevin Sink, vice president of quality for TTI



Customer returns are the greatest point of risk for authorised distributors

2019 Editorial Features List



				
January	2019 Annual Special Edition - Distributor & Supplier Focus	Connectors, Crystals & Oscillators, Counterfeiting, Circuit Protection	Annual Edition - Distributor & Supplier Focus	Displays, OLEDs, Connectors, EMC, Embedded Computing
February	Connectors, Obsolescence, Kitting, IoT, PCBs	Diversity, Obsolescence, EMS, Printed Circuit Boards		
March	Cable & Wiring, Power, Frequency, CEM Sourcing	Enclosures, Power Supplies & Batteries, Semiconductors	Connectors, Power & Batteries, Enclosures, Semiconductors, CEM	Renewable Energy, Power, Supply Chain Management
April	Displays & LEDs, Enclosures, Component Comparisons	Connectors, Apps, Development Kits, Embedded Systems		
May	Connectors, PCBs, Thermal Management	Cable & Wire, EMS, Harsh Environment, Programming	Switches & Keyboards, Thermal Management, Cable & Wiring	Sensors, IoT, Industrial Automation, Power & Battery
June	Power, Obsolescence, IoT, EMC	Power & Batteries, Logistics, Obsolescence, PCBs		
July	Displays & LEDs, Enclosures, Passives, Packaging	Thermal Management, Switches, Counterfeiting, Time to Market	Connectors, Power & Batteries, Obsolescence	Packaging Technology, Logistics, Connectors, EMC
August	Connectors, Switches, Frequency	Component Comparisons, EMC, Displays & LEDs		
September	Kitting, Obsolescence, Semiconductors, IoT	Connectors, Semiconductors, Passives, Development Kits	Displays & LEDs, Cable & Wiring, PCB, Enclosures	Connectors, PCBs, Thermal Management
October	Power, PCBs, Thermal Management, EMC	Power & Batteries, PCBs, Thermal Management, Crystals & Oscillators		
November	Connectors, Enclosures, Cable & Wiring, CEM Sourcing	Enclosures, Obsolescence, EMS, Switches	Connectors, Frequency Management, CEM, 2020 Industry Forecasts	Industrial Automation, Harsh Environments
December	Displays & LEDs, Switches, Frequency	Component Comparisons, Newest Products, Sensors, BOM Tools		

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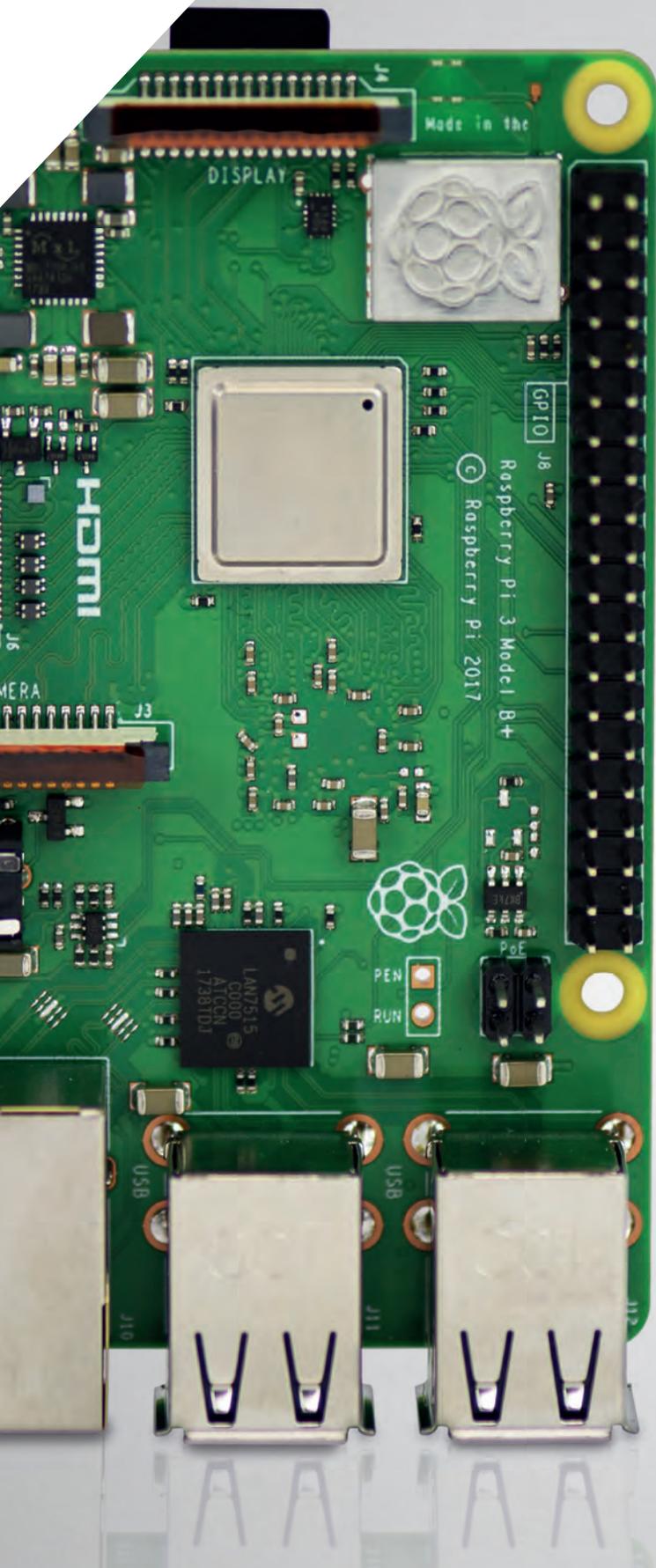
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