# ELECTRONICS
# sourcing

APRIL 2023

UK & IRELAND

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## PURCHASING DECISIONS FOR E-MOBILITY CHARGING PRODUCTS

INCLUDED ON PAGE 20

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The Electronic Component Show

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## On the cover – April 2023

Purchasing decisions for e-mobility charging products
page 20

# Editor's Word

## Don't miss chance discoveries

With preparations for the *Electronic Component Show* complete and the event's 25 May 2023 date racing closer, now is a good time to explore the benefits of taking time out of your schedule to visit suppliers face-to-face.

Personally, I've lost count of the number of exhibitions I've attended over the last 35-years. The number one reason I keep going is serendipity. No matter how much I think I know about a technology or supplier, I always learn something new that is valuable to me.

One of the obvious reasons for these chance discoveries is the rate of technology change in the electronics industry. If technology change itself isn't difficult enough to track, add recent turmoil in the supply chain itself and the task of remaining knowledgeable is further compounded.

Magazines and supplier websites do their best to highlight the headline news but some change, by its nature, slips under the radar. This is where face-to-face conversations ride to the rescue. A ten minute chat with a product specialist, components to hand, can reveal a wealth of information regarding specifications, pricing, availability, lead times, obsolescence, customisation and much more.

So, with 69 exhibitors booked to attend, the *Electronic Component Show* offers visitors the opportunity to have some of the most valuable meetings and conversations of the year. Whether you are looking for parts, distribution partners or service providers, *ECS* will definitely have the answers.

I hope to see you there.

*Jon Barrett*

# SIMPLE, INTELLIGENT, INVENTORY MANAGEMENT
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## Algorithms streamline supply chain process

Anglia Components is showcasing a new level of supply chain flexibility offered through its AI enabled inventory management system, Anglia 80/20.

The free to use system gives a real-time vendor managed line side inventory (VMI) that intelligently manages low-value, high-volume commodity components using AI algorithms to reduce errors and streamline the supply chain.

Anglia 80/20 is a cloud-based system that automatically increases and decreases line side inventory quantities according to actual and forecasted usage, reducing the time and cost of managing commodity components. Anglia 80/20 protects customers against disruption by letting them hold increased levels of inventory on site at no extra cost, which is automatically invoiced when used in weekly or monthly consolidated invoices.

CEO, Steve Rawlins, said: "Anglia 80/20 has been hugely successful in addressing recent supply chain challenges. We haven't let a single Anglia 80/20 customer down over the last two years despite the huge disruption that we've seen to the supply chain."

*8020.anglia.com*

## Extended PCB pooling reduces costs

Multi-CB is now offering four-layer PCBs with 1.0mm thickness in its pooling production. According to the manufacturer, customers save up to 70 per cent compared to the previous special production price. Included are 0.1mm tracks, 0.2mm holes, FR4 Tg150 material and surface chemical gold (ENIG).

The weight and space saving of FR4 1.0mm is 42 per cent compared to standard FR4 1.55mm. This is a particular advantage for compact modules in smaller and lighter devices, which also reduces resource consumption.

In pooling production, PCBs from different customers with identical specifications are produced in the same production panel. This reduces production costs and increases flexibility. Both advantages benefit the customer. Whether pooling or conventional production has no influence on the product quality. Multi-CB generally manufactures according to IPC-A-600 Class 2 (Class 3 optional, for highest demands).

*www.multi-cb.com*

## Update streamline purchasing collaboration

Digi-Key Electronics has added new features to its myLists tool, further streamlining collaboration between engineers and procurement professionals. The latest features let users share their BOMs to external team members or publicly. List owners can allow edit or view only access so everyone gets the information they need, without risking list integrity.

The list is updated in real-time so collaborators are assured they're working from current information, which reduces communication gaps and errors. With revision management, assembly controls and approved alternates, teams can more accurately project the availability and cost of components, so projects stay on schedule.

This update streamlines the process between engineering and purchasing teams. Because these roles are at different stages of the value chain, information can often be lost. Now, myLists minimizes that loss by making collaboration between teams easier.

Digi-Key's global head of marketing and e-commerce, Tim Carroll, said: "We continue to enhance the digital buying experience for customers to make it as seamless, effective and efficient as possible."

*www.digikey.com*

## Buying into power interconnects

Molex' Micro-Fit 3.0 connector system offers a range of pole numbers and cable lengths for power and signal transmission. With a pitch of 3.0mm and maximum current carrying capacity of 8.5A, it is designed to ensure a reliable power supply in a compact design.

Optional features such as contact position assurance, blind mating and press-fit technology, offer OEMs flexibility in space-constrained applications including automotive, consumer, medical, telecommunications and networking.

Insulated terminals protect against damage during handling and mating, while minimising the risk of short circuits due to debris.

In hard-to-reach applications, such as slide-in units or fan trays, connections must be closed and opened with no or with limited visual contact. With its Micro-Fit Blind Mate Interface, Molex provides blind mateable cable-to-cable and cable-to-board connectors, with up to 2.54mm tolerance to misalignment and self-alignment capability.

A contact position assurance feature reduces slippage by providing redundant locking. It can only be closed when the contact is correctly positioned.

*www.rutronik24.com*

## Chassis with options

Foremost Electronics has announced availability of the new nVent Schroff eight slot PXI Express System which supports PCIe Gen 2 and Gen 3 in one chassis.

Foremost Electronics' business development director, Dave Martin, said: "PXI is an open standard with hardware available from more than 60 vendors and the new system is an ideal platform for populating with elements from Schroff or other suppliers."

The new PXIe chassis has been designed as a modular concept to make it cost effective and available on short lead-times. The chassis is designed to fit into any end system, offering customers the ability to change its size, colour and mechanical layouts. The PXIe Chassis are designed with EMC shielding to EN 61326-1 class B.

The chassis utilises a single PCI segment with dedicated PCIe-to-PCI bridge module for hybrid slots. The PXI specific high accuracy clocks and trigger signals are generated and controlled by an independent clock module attached to the rear side of the backplane.

*www.4most.co.uk*

# N
## ES News

**Step up supply chain monitoring**
A recent supply chain report found that while half of manufacturers are combating volatility through dashboards and analytics, less than 14 per cent are taking advantage of advanced capabilities, including real-time sensors, automation, artificial intelligence and machine learning. These under deployed technologies hold massive potential in delivering real value to boost decision velocity.
www.makeuk.org

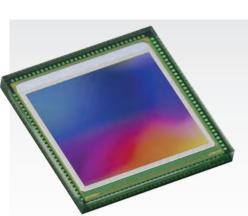**Reinforcing power systems leadership**
Infineon Technologies is acquiring GaN Systems. Infineon's CEO, Jochen Hanebeck, said: "GaN technology is paving the way for more energy-efficient and $CO_2$ saving solutions that support decarbonization. Adoption in applications like mobile charging, data centre power supplies, residential solar inverters and onboard EV chargers is at the tipping point."
www.gansystems.com

**Low lead time passive magnetics**
BEC Distribution has signed a UK and Ireland distribution agreement with LinkCom Manufacturing, a global vendor of passive magnetics. LinkCom's product range is an important addition to the BEC Select range of quality alternative passives, designed to offer affordable, quality alternatives to major manufacturers, with much-reduced lead times.
www.bec.co.uk

**Stronger cable assembly resources**
Harwin has expanded its custom cable assembly capabilities covering multiple configurations and cables of any length. Harwin's HRi high-reliability interconnect products for custom cabling include 1.25mm-pitch Gecko, 2mm-pitch Datamate, 3mm-pitch M300 and high-power Kona families, plus Mix-Tek combined power and data connectors. Applications include robotics, UAVs, AGVs, satellites and medical equipment.
www.harwin.com



## Global shutter image sensors now shipping

Mouser Electronics is now shipping the Mira220 global shutter sensors from AMS Osram. These sensors provide 2D and 3D solutions for industrial machine vision applications like mobile facial authentication, smart home appliances, QR readers, AR/VR, drones, smart wearable devices, structured light vision and more.

The 2.2 megapixel sensors support on-chip operations like external triggering, windowing, and horizontal/vertical mirroring with an effective resolution of 1,600 (H) by 1,400 (V) at a maximum frame rate of 90fps at 12-bit depth.

Back-side illumination stacks the sensor layer on top of the digital/readout layer. This design results in a chip-scale package with a footprint of just 5.3 by 5.3mm, giving manufacturers greater freedom to optimize the design of space-constrained products such as smart glasses and VR headsets. The Mira220 also features high sensitivity and quantum efficiency with a pixel size of 2.79µm and is supplied in a 1/2.7in optical format.

*www.mouser.com*



## Computing boards and AI platforms in stock

Farnell is stocking NVIDIA Jetson small form factor computer modules including Jetson Nano, Jetson AGX and Jetson Xavier NX.

Each computer is a system-on-a-module (SoM) designed to meet many power, performance and form-factor needs across multiple industries. The modules include a GPU, CPU, memory, power management and relevant interfaces. Applications include manufacturing, retail, agriculture, healthcare, waste management, smart cities and more.

Farnell's head of single board computing, Romain Soreau, said: "The Jetson range has truly been a game changer in the rapidly accelerating move to the AI and machine learning advances that underpin the new industrial age referred to as Industry 4.0. We are delighted to bring these NVIDIA modules to developers who need the most sophisticated tools for edge computing applications."

The modules and their associated development kits share a unified software architecture that makes it easier for developers to expand their product lines and maximise the benefits to be gained from their investment.

*uk.farnell.com*

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# MASQUERADING MICROCONTROLLERS

*In this month's counterfeit investigation, Princeps examines a microcontroller currently on long lead time using three techniques*

This month's entry into rogues' gallery is an MCU currently on 35-week lead time. The first technique is external visual inspection, using microscopy to look for evidence of tampering. Here we see a layer of overspray along the top edge (*Fig 1*). Counterfeiters often remove original markings followed by a resurfacing material, before re-marking the part as something it isn't.

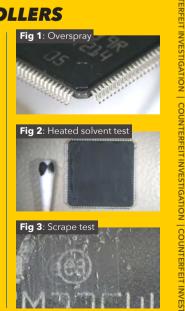The next technique is the heated solvent or resurfacing test. The device is exposed to a hot solvent blend for 45 mins before wiping with a swab. Any secondary coating will be removed by the swab (*Fig 2*). Due to the solvents involved, this technique should only be used by trained operatives in a fume cupboard.

The final technique is the scrape test. A scalpel is used to gently remove any resurfacing. In the picture (*Fig 3*), the fainter 'e' in a circle is a portion of original part marking.

The parts have been impounded and removed from the supply chain.

*www.princeps.co.uk*


**Fig 1**: Overspray


**Fig 2**: Heated solvent test


**Fig 3**: Scrape test

# Act now to strengthen supply chains

*Resilinc's founder and CEO, Bindiya Vakil, warns UK businesses to strengthen supply chains in face of China disruption, with mapping vital to minimise impact*

Using data from its EventWatchAI monitoring system to identify ongoing threats to the global supply chain, Resilinc predicts that any halt in Chinese production for over two to three weeks will cause a global ripple-effect which could be felt for months.

Resilinc's founder and CEO, Bindiya Vakil, explained: "While there has been some stockpiling by companies, the relaxation of China's zero-tolerance Covid policy means that many manufacturers will face labour shortages and self-imposed lockdowns.

"At the moment the spotlight is on large companies such as Apple and now Dell. However, the impact on supply chains should not just be the concern of big business. The very nature of supply chains being intrinsically linked across the globe and involving organisations of every size, means businesses of all sizes need to act now to strengthen and diversify their supply chains."

Resilinc has identified key areas of vulnerability that UK businesses should review to strengthen their supply chains.

**Mapping:** To counter areas of weakness, businesses must first identify them by mapping supply chains down multi-tiers. AI, cloud and enterprise networks make this task easier. Smaller businesses unable to deploy such systems can put policies and procedures in place to map and monitor suppliers.

**Size up the impact:** Any supplier can cause disruption, regardless of size. Businesses typically pay attention to the top 20 per cent of suppliers, which make up 80 per cent of spend. However, this means a significant risk with zero visibility over the remaining 80 per cent. Unfortunately, some businesses discover the hard way how a small supplier in trouble can clog their operations.

**Safety first:** Ensuring suppliers are operating to the latest health/safety standards and regulations is essential. Recent EventWatch data found the UK was the sixth most impacted country by factory fires, with 59 per cent of fires caused by faulty equipment and machinery. The impact of such events should not be underestimated. Nearly half these fires caused medium to high levels of damage, plus lost production and revenue.

**ESG in the spotlight:** Another consideration is suppliers' approach to environmental, social and corporate governance matters. If an OEM's supply chain isn't clean and clear of labour, safety and/or pollution violations the risk is substantial. In addition to misdemeanours negatively impacting the OEM's own brand and reputation, a supplier's compliance issue or violation could cause considerable disruption.

**Cyber smarts:** According to research by Make UK, 42 per cent of UK manufacturers have been victims of cyber-crimes in the past twelve months. With EventWatch cyber-attack alerts up by 90 per cent in the first half of 2022 compared to 2021, risks to supply chain continuity are not slowing. As threats become increasingly sophisticated, more businesses are implementing ongoing measurement of suppliers' cyber security practices to avoid weak spots. Businesses are treating their suppliers' networks as an extension of their own cyber security planning and incorporating them into their procedures and processes.

*www.resilinc.com*

> **The impact on supply chains should not just be the concern of big business**

# Making sustainable electronics tangible

*IDTechEx's report Sustainable Electronics Manufacturing 2023-2033 discusses the commercial opportunities presented by sustainable innovation*

Enhancing sustainability is a widely held aspiration within the electronics industry but realising this transition is considerably more difficult. To this day, toxic chemicals, material waste and energy-intensive processing are commonplace. While many companies have demonstrated a clear interest in lowering their environmental impact, making changes while meeting the growing demand for increasingly sophisticated electronics is extremely challenging. Every year, vehicles, households, retailers and factories become smarter with the increased prevalence of IoT devices—a market expected to reach billions over the coming decade. Despite the many advantages of smartification,

the environmental footprint is high, with the number of devices increasing exponentially.

Is it possible to keep the wheel of innovation turning while being environmentally conscientious? The answer is yes. IDTechEx's report *Sustainable Electronics Manufacturing 2023-2033*, explores the key opportunities for sustainable innovation and the most promising new manufacturing approaches within the electronics industry. It discusses various approaches that can be implemented to reduce the environmental impact associated with the manufacturing of printed circuit boards and integrated circuits. The report also clarifies how various companies have achieved
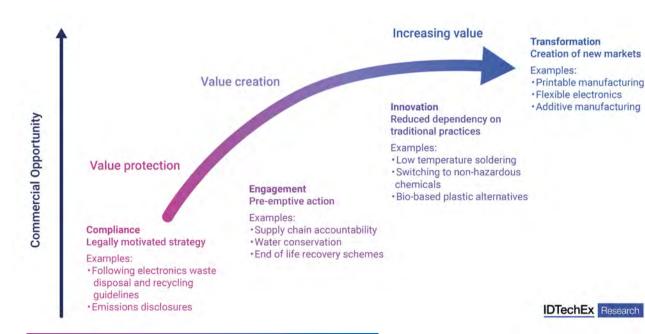
important milestones on their way to net zero and how emerging start-ups have developed impressive sustainable technologies that have the potential to transform the industry.

The newly founded *Semiconductor Climate Consortium* made itself known at the COP27 conference. The Consortium comprises 60 founding members, among whom are materials companies, research institutes and some of the biggest chip manufacturers, including Intel, Micron, TSMC and Samsung. Their ambition is to reduce greenhouse gas emissions across the supply chain with the collective target of reaching net zero by 2050.

By committing to net zero targets, manufacturers

are forced to re-evaluate their processes and adopt new methods. For example, some are utilizing renewable energy sources to reduce their emissions contributions. As energy prices become more volatile and supply chain disruptions more frequent, renewable energy is becoming an increasingly attractive asset. Access to renewable energy is becoming a major factor as companies build new fabrication facilities. Samsung has already achieved 100 per cent renewable energy for all of its sites in the US and China, with other household name companies following suit, such as Apple, IBM, Intel and Nokia.

Water conservation is becoming an increasingly important discussion point,



*IDTechEx's report Sustainable Electronics Manufacturing 2023-2033 discusses the commercial opportunities presented by sustainable innovation. Source: IDTechEx*

both from an environmental and economical perspective. It is estimated that 8,000 litres of water are consumed in the manufacturing of a single integrated circuit with a single fab using up to 15 million litres per day. Many fabs are located in water-stressed areas such as Singapore and Taiwan, as well as parts of the US and China. As droughts and climate disasters become more frequent and more drastic, water recovery and re-use is expected to de-risk the manufacturing process by supplementing the deficit. Additionally, being able to demonstrate high water conservation rates is excellent for improving public opinion and reputation. Among the household names, Intel and Samsung have shown strong commitment, conserving 70 and 60 per cent of the water they consumed, respectively. Enacting water conservation measures will lead to greater self-sufficiency and reduced costs.

Environmentalism is often perceived as an obstacle-laden with legislative red tape and burdensome disclosures. However, companies that embrace environmentalism reap long-term rewards and as such the negative perception is replaced by one of opportunity. The implementation of low-emission manufacturing processes or the adoption of material recycling and recovery schemes can be the financially astute choice presenting an opportunity to reduce costs associated with energy consumption, waste treatment and superfluous steps. Prioritizing environmentalism keeps the industry ahead of the curve as legislation becomes stricter while positioning individual companies well to benefit from designated ESG investment.

As energy prices rise globally, low temperatures and rapid processing methods become more attractive. Some of these methods employ additive approaches that substantially cut waste by printing material only where needed. This spares manufacturers the costs and emissions associated with excess materials and etching required in traditional subtractive manufacturing. For example, switching to printable or additive methods of PCB manufacturing can lower water consumption by up to 95 per cent—an outcome that could save the sector hundreds of millions of litres of water annually.

Component attachment materials, such as solder and electrically conductive adhesives, are also experiencing a period of transformation. New approaches are largely concentrated on reducing the required heat for reflow or curing. Employing lower-temperature processing will enable a wider range of materials that can be used, such as polymer substrates, organics and bio-based materials. It will also have the advantage of reducing manufacturing costs if energy consumption is reduced.

Reducing the carbon footprint of the electronics industry is a daunting task, particularly for well-established manufacturers that are reluctant to divert from traditional methods. Across the world, both government and consumer pressure are forcing manufacturers to take on a greater degree of responsibility in reducing their emissions. IDTechEx's analysis indicates that by embracing sustainable manufacturing methods, companies can benefit economically while making significant reductions in environmental impact. A comprehensive analysis and exploration of sustainable innovations within the field can be found in IDTechEx's report: *Sustainable Electronics Manufacturing 2023-2033*.

This report analyses the many innovations aiming to make electronics manufacturing more sustainable and how they are being deployed. It examines the current status and latest trends in technology performance, supply chain and manufacturing while exploring the influence of major environmental policies. It also identifies the key challenges, competition and innovation opportunities within sustainable electronics manufacturing.

*www.idtechex.com/ sustainableelectronics*

# Global sentiment reveals ups and downs

*After surveying hundreds of companies globally, IPC summarises the findings of its February 2023 Global Sentiment of the Electronics Supply Chain Report*

around the world, including a wide range of company sizes representing the full electronics manufacturing value chain.

*www.ipc.org*

Per IPC's *February 2023 Global Sentiment of the Electronics Supply Chain Report*, over the next six months, manufacturers expect to see continued increase in both labour and material costs, although to a lesser extent than previously anticipated. On a positive note, backlogs are expected to decline.

On average, electronics manufacturers expect: labour costs to increase 9.2 per cent over 2022 levels; materials costs to rise 9.9 per cent during the year; and most surprisingly, freight costs to rise 7.2 per cent in 2023.

IPC chief economist, Shawn DuBravac, said: "Though manufacturers anticipate freight costs to rise, depressed demand and improving supply chain dynamics are currently pulling freight costs down, a trend that should continue during the year.

"Downward cyclical pressures will curtail volume which should keep prices in check. For some companies, declining freight costs are likely to be their most significant cost savings in 2023."

Regarding digital project initiation, roughly 14 per cent reported ERP system implementation and enhancements were their number one project for 2023. Other top projects include equipment/tools/resources/technology investment and upgrades and pursuit of CMMC certification.

Profit margins are expected to decline at a significantly higher rate in APAC vs North America. Some 42 per cent of manufacturers in APEC anticipate profit margins to decline, while only 15 per cent of North American manufacturers are expecting the same.

For the report, IPC surveyed hundreds of companies from
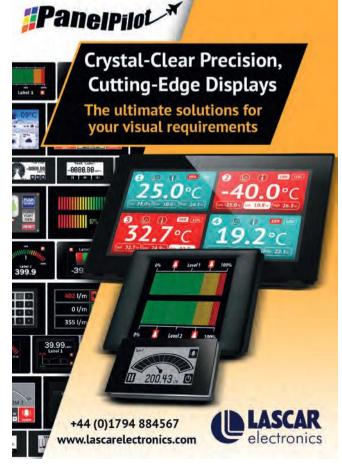
# Evolving display technology: micro LED displays

*RDS' business development manager, Mike Fowle, provides an overview of existing display technologies and investigates features and benefits of micro LED displays*

TFT LCD is considered a stable and established technology. The ubiquitous TFT (thin film transistor) LCD has been a mainstay for design engineers for over three decades and has been extensively used in a broad range of applications. During this time significant enhancements have included: wide viewing angle technologies including IPS (in-plane switching) and MVA (multi-domain vertical alignment); and high brightness, long-life white LED backlights. TFT displays are now produced with refined manufacturing techniques and high yield rates.

Next comes OLED which offers exceptional optical performance. Much acknowledged OLED (organic light emitting diode) display technology has seen significant investment and commercial success in high volume OEM markets such as flat screen televisions and mobile phones but remains seldom seen in medium-size (5 to 17in) display applications. OLED display technology provides excellent optical performance in terms of deeper, darker black levels, highly saturated, vivid colour reproduction, enhanced contrast ratios and fast response times. OLED technology, materials and derivative development continue apace but OLED displays remain complex and costly to manufacture.

Micro LED is an emerging potential. As a recent display technology development, micro LED is considered by some industry analysts to be a

potential long term successor to TFT and OLED display technology. Micro LED is a direct drive, emissive (no backlight needed) display technology, constructed with an array of microscopic (50 to 2$\mu$m) LEDs forming the individual pixels. Micro LEDs enable higher image quality in direct emission displays because each pixel is constructed of three subpixels—each composed of a red, green and blue micro LED. Manufacturing costs are reduced due to the simple physical structure of micro LED technology, while resolutions and sizes of micro LED displays can be scaled with relative ease.
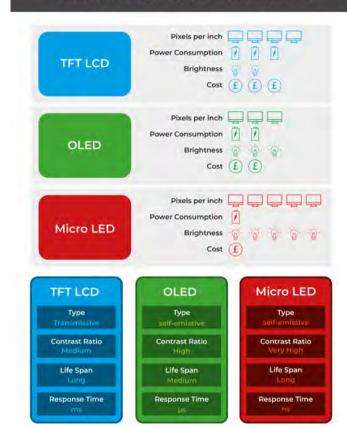
Micro LED technology is already being deployed in a scalable tile format to build displays of any size and resolution. Applications include smart watches, handheld tablets and video wall displays.
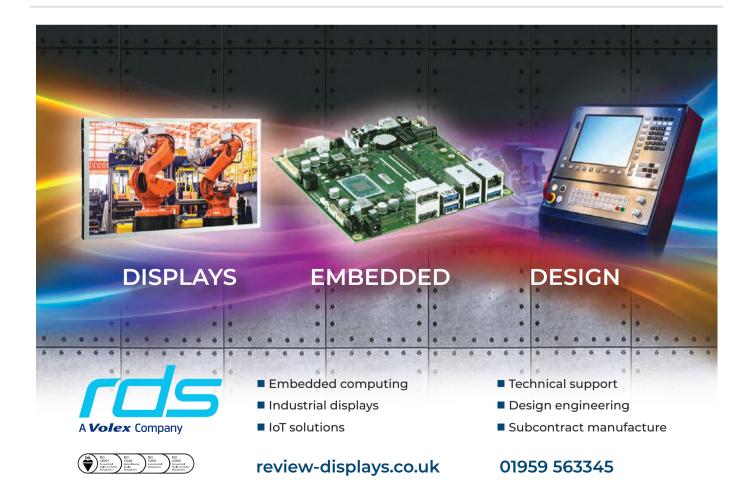
Micro LED displays have many individual components in comparison to conventional LCD displays. Direct emission micro LED display technology brings advantages to optical performance in terms of high luminous efficiency, increased brightness, enhanced contrast ratios and faster response times. Black levels are also enhanced with defined zones of the display image now appearing completely black, with the ability to create a genuine representation of 'true black'.

Smaller components, enhanced optical performance, reduced power consumption and the reduced costs of micro LEDs bring new possibilities for many display systems and applications. Micro LED technology promises to be more progressive, offering a display technology that can compete with OLED, with improved brightness, deeply saturated colours and enhanced reliability.

*www.review-displays.co.uk*



**DISPLAYS**   **EMBEDDED**   **DESIGN**

# Keeping an eye on display lead times

*As a cornerstone of its customer support during this challenging supply chain period, Midas Displays has increased its stock levels of many popular lines*

Recent years have witnessed a reduction in availability of many B2C and B2B products containing electronics, with lead times doubling, tripling and quadrupling in some cases. In the automotive sector customers have struggled as new vehicle supply dwindled, causing second hand car prices to soar, while phone manufacturers produced less stock of their latest smartphones around their release dates. In the medical industry, the pandemic caused an increase in demand for medical equipment too.

The reason behind increasing lead times for electronic products was a challenging supply chain in the component sector impacting parts including ICs, connectors and LCD glass. Reasons for these component shortages were many: high IC demand driven by 5G rollout; an incredible increase in demand for home-office and home-schooling equipment during the pandemic; plus the pandemic's impact on Asian manufacturing. Beyond the shortage of ICs and microcontrollers, TFT glass (used in laptops, mobile phones etc) was also limited.

While display lead-times are starting to improve, industry experts are expecting this supply shortage to continue to impact the market during 2023, continuing into 2024. Midas is striving to keep its customers updated, allowing them to prepare accordingly.

Midas is supporting its customers and doing all it can to mitigate any impacts to cost and lead times, wherever possible. As part of this support, the company has increased its stock levels of many popular lines. Midas has also worked closely with its distribution partners to ensure sample stocks of hundreds of products are available to buy online through Farnell, RS, Digi-Key and Rapid. Customers are still encouraged to place orders as early as possible.

*www.midasdisplays.com*

> **" As part of this support, the company has increased its stock levels of many popular lines**

## Innovative panel PCs offer long-term availability

Review Display Systems has announced availability of a new range of multi-touch Panel PCs from Kontron. The Web Panel Line is available with three high resolution, widescreen IPS TFT displays, in: 7.0in (1,024 by 600px), 10.1in (1,280 by 800px) and 15.6in (1,366 by 768px) sizes, integrated PCap touch technology and flexible, scalable performance from Arm-based i.MX6 single or dual core, i.MX8M quad core and Intel Atom-based dual and quad core processors.

The Web Panels feature a robust, optically bonded glass PCap touchscreen, which is flush mounted in an aluminium or optional stainless-steel frame. All standard versions are designed to offer simple and straightforward panel mounting for use in control cabinets and equipment consoles. All three panels provide an IP65 protection rating on the front side and feature an operating temperature range of 0 to 55°C.

Kontron Web Panel Line PCs provide long-term availability and continuity of supply for use in industrial equipment and applications.

*www.review-displays.co.uk*

## High brightness TFT LCD easily fits in

Relec Electronics is offering a 21.5in HDMI TFT LCD. The HA-215HVEEUAB0-AA is designed for easy integration into equipment where a high quality, large display screen is required for indoor use.

The display provides an active area of 476.06mm (w) by 267.79mm (h) with an aspect ratio of 16:9. Resolution is 1,920 by 1,080.

Features include an HDMI interface, LED backlight driver and pre-installed EDID (extended display identification) which identifies the video source and display hardware so video resolution is appropriate and optimised.

Brightness measures 500cd/m², ensuring reliable performance in a variety of indoor applications and environments, from medical and industrial to marine and defence. Operating temperature range is -10 to 60°C and storage temperature range is -20 to 70°C. Supply voltage is 12Vdc.

Versatility is enhanced with a PCAP and resistive touch panel. Other modifications available are optical bonding, screen enhancements/enhancement films, mounting frames, custom cables and adaptor boards.

*www.relec.co.uk*

# Buying into custom sensor solutions

*Solid State Supplies' special projects group manager, Barney Mitchell, walks readers through the evolution of sensor technology and the vital role custom sensors now play*



**Solid State Supplies'** special projects group manager, **Barney Mitchell**

**From a buyers' perspective, how have sensors advanced over the years?**

Development of sensing technologies is driven by demand for better data, to enable better control of dynamic systems. Often, a sensor's role is to enable constant monitoring and control, to reduce variation as much as possible, increasing the value of its output. This typically means detecting smaller changes, requiring the sensor to give more precise and reliable data, at higher speeds.

This is true whether the sensor is monitoring temperature, pressure, humidity, chemistry, colour or other parameters. It applies equally whether a system is: producing a drug requiring high purity levels and consistent dosage; or seeking a trace electromagnetic/thermal signal for defence purposes.

The industry is also self-reliant, with greater process monitoring capability allowing more accurate production of sensor components, enabling development of smaller, faster, more sensitive and reliable sensors. This leads to earlier technologies becoming more manufacturable at higher volumes and lower cost, in turn allowing greater adoption of sensors in more price sensitive applications.

**What types of applications benefit from customised sensors?**

There is a concerted drive for customised sensors in sectors including healthcare, oil/gas, automotive, chemical, automation and robotics. Medical applications frequently require sensors for fluid diagnostics. For example, one customer needed a sensor to measure the volume of hazardous fluids filling a container. Solid State Supplies designed an optical fill level sensor, which triggers a warning when the container reaches a certain level. If there's no intervention and the fluids reach critical levels, the sensor disables the system automatically, preventing hazardous waste from overflowing.

One challenge facing users of optical sensors is variable ambient lighting conditions. Off-the-shelf sensors check for signal presence, but varying background conditions can trigger false readings. A finely tuned, customised sensor circuit will process data and discount noise accurately in these environments, enabling correct system function.

The electric vehicle market is also witnessing increasing demand for custom sensors. Sudden dramatic temperature rises can be extremely dangerous in electric vehicles, where lithium battery packs are used. Solid State Supplies is currently working on a project to develop a temperature sensor assembly for stator windings.

The oil/gas sector is also eager for bespoke sensors, an example being overfill sensors on fuel trucks. It takes less than two minutes to fill a 5,000l fuel container, so dangerous and costly overfilling can happen rapidly.

**What special relationships does Solid State Supplies have with suppliers and how does this benefit buyers sourcing custom sensors?**

Solid State Supplies' wide range of industry

> **The industry is self-reliant, with greater process monitoring capability allowing more accurate production of sensor components**

leading manufacturers of COTS component level sensors affords strong buying power where custom versions are built at source or customised and/or integrated into larger subsystems at one of Solid State Supplies' manufacturing facilities. This can result in favourable pricing. Where Solid State Supplies' own design team is used and demand grows for higher volumes and lower prices, the company has partnerships with Eastern manufacturers who will build to Solid State Supplies' designs and replicate the NPI process to ensure the same quality product at competitive high-volume rates.

Solid State Supplies' world class manufacturers are a key driver of quality system development and programs to design new sensors and systems. Solutions can often be developed based on existing core tested technologies, significantly reducing the timeline to design completion. This helps customers control costs and bring their product to market faster, with the reassurance of world-class quality production. Production equipment which is adaptable for new projects reduces the initial outlay and lets Solid State Supplies ramp production rates up and down at short notice.
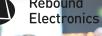
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# Maximise enclosure choice

*In this article, CamdenBoss highlights the versatility offered by today's enclosure marketplace and then focusses on the attributes of specific enclosure series*

With choices ranging from weatherproof and robust, to handheld and versatile, the variety offered by today's enclosure market means the decision to choose the right enclosure for a project is stronger than ever. As ranges across the market become increasingly alike, CamdenBoss encourages customers to explore the differentiation offered by Takachi's new suite.

Weatherproof enclosures are compulsory for outdoor devices. A product needs to be waterproof, rustproof and UV-resistant to demonstrate its outdoor capabilities. Demand for weatherproof enclosures is rising as outdoor monitoring applications become a necessity for many businesses and individuals. Takachi's 73 and 74 series are designed to ensure enclosures are safe and protected due to high-level safety ratings, product versatility and options for pole or wall mounting. These products provide the security that internal components are protected against rain and direct sunlight.

Over recent years, demand for products such as key fobs, sensors and IoT devices has grown rapidly. From temperature monitoring to air clarity control, demand for handheld enclosures continues to accelerate. Takachi's 98 and 99 series suit handheld enclosure applications. The ergonomic 98 series is ideal for key fobs and portable devices, while the 99 series features a robust structure and snap-in bracket, allowing pole or wall mounting. Both enclosures are IP40, while the off-white models are manufactured from weather-resistant ASA UL94HB which suits direct sunlight.

In addition to durability, these enclosures are designed to be aesthetically pleasing with sleek, modern profiles. Enclosures can be customised through CamdenBoss' in-house services including engraving, colour printing and cut outs. CamdenBoss' processes are located in a single 118,530ft² facility in Suffolk, including a recent investment in new injection moulding machinery.

*www.camdenboss.com*

# Purchasing decisions for e-mobility charging products

*Phoenix Contact's industry manager for e-mobility, Gary Chater, offers a plethora of purchasing advice for buyers tasked with sourcing electric vehicle charging systems*

Connectors, components and electronic modules for e-mobility products can be divided into two main groups: infrastructure (charging equipment) and vehicular (inlets and battery management). Design and procurement can be simplified by using ready-certified modules offering a quicker route to market.

Electric vehicle supply equipment (EVSE) describes the vehicle charger and is commonly applied to commercial infrastructure rather than domestic wall boxes. A domestic charger supplies AC current to charge a car relatively slowly which is applicable to long parking periods. Smart functions, such as smartphone integration, are not necessary but increasingly popular. Workplace chargers are often similar, again taking advantage of long parking periods. However, they are more likely to require metering and payment systems. More advanced chargers can benefit from a modular approach to design and purchasing.

High speed charging is provided by high current DC equipment. Again, design is simplified by using certified modules capable of interfacing with the back-office system and other charger components. This simplicity is reflected during purchasing, particularly regarding manufacturers like Phoenix Contact who can provide every item from one source.

It is useful to understand naming conventions when specifying and purchasing components. In the UK the two main standards are AC Type 2 and CCS Type 2. CCS stands for 'combined charging system' because it combines the Type 2 AC connector with DC contacts for high power charging. Most new electric vehicles use a CCS Type 2 inlet for AC or DC charging.

AC chargers may feature a cable or AC outlet socket, the latter requiring a separate AC cable. CCS chargers always feature a tethered cable.

CCS cables and AC charging cables, tethered or otherwise, are available in a bewildering variety. Purchasing is simplified by appreciating the parameters. Firstly, cables are manufactured in different lengths, with a typical maximum of ten metres. Cable handling is eased by specifying the correct length and there is also a cost benefit, given copper's high cost. Purchasing the correct cable type is important: AC cables may be single or three-phase, with typical current ratings from 16A to 63A. Typical current ratings for DC cables on CCS chargers are between 40A and 500A. These are matched to the CCS charger's power rating, usually between

**Phoenix Contact's** industry manager for e-mobility, **Gary Chater**

50kW and 350kW. The trend is increasing power to reduce charging time.

Similar observations apply to vehicle inlets. The huge variety is caused by variation in a relatively small number of parameters, making purchasing easier than it initially appears. For example, AC inlets are manufactured as well as CCS, both of which are available in a variety of current ratings and cable lengths. Outside automotive, there are many examples of specialist vehicles requiring inlets including boats, aircraft, earth moving vehicles, trucks and buses.

The heart of a charger system is the controller with interfaces for the system's functional areas including: the vehicle itself; optional operator display; RFID reader for charge card payments; and communication technology for back-office billing system and energy metering. Other components include: power supplies; surge protection; current monitoring;

terminal blocks; DIN rails; heavy-duty connectors; and marking material. High power DC chargers also require power conversion, usually AC to DC or DC to DC. Some suppliers manufacture all these parts, thus simplifying purchasing.

Design and procurement can be further simplified by a single-source manufacturer providing examples with associated bills-of-materials. It is helpful to err on the side of complexity, specifying all the parts which could conceivably be used. For example, an RFID reader may be part of an example bill-of-materials for cases when a charge card reader is required; it is then trivial to delete it for simpler designs.

*www.phoenixcontact.com*

## CHARX control
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The new CHARX control modular charging controllers combine all functions and full connectivity in a width of just 18.8 or 37.6 mm. Prepared for sector coupling, plug-and-charge, vehicle-to-grid, and much more, they are the core of a smart charging infrastructure on the road to carbon-neutral mobility.

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INSPIRING INNOVATIONS

# Safe, efficient and feature-rich vehicles drive demand

*Digi-Key's supply chain solutions director - EMEA, Arkadiusz Rataj, explains why the automotive electronics market will grow at over 7% for the foreseeable future*

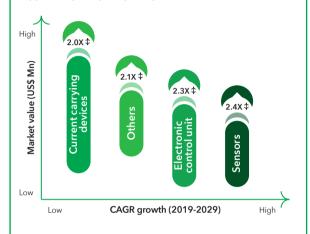**Digi-Key's** supply chain solutions director - EMEA, **Arkadiusz Rataj**

Rising numbers of electric and hybrid vehicles coming to market, combined with consumer interest in safety, connectivity and entertainment features, is fuelling automotive electronics growth.

Simultaneously, the pandemic and associated supply chain delays and drop in vehicle sales made things tough for automakers. According to the Organisation Internationale des Constructeurs d'Automobiles (OICA), global automobile production dropped by over 15% to 77.6 million units in 2020, compared to 91.7 million units in 2019. Further, US-China trade woes had an impact as China is a global manufacturing hub for power electronics for electric cars and motors. Still, projections for tech-heavy electronic vehicles are rosy over coming years.

Consider the current statistics: according to analysts, EVs (ranging from commercial vehicles to electric scooters) will represent $55.81 billion in 2022, growing 29.4% annually for seven years, reaching $570.47 billion by 2029. By volume, the market

is expected to reach 7.62 million units by 2029, from an estimated 1.54 million units in 2022, representing a CAGR of 25.75%. Supportive government policies and regulations, environmental concerns and rising acceptance of electric mobility are all driving adoption, along with the future promise of autonomous vehicles.

Along with entertainment, the benefits of automotive electronics include reduced costs, lower emissions, higher efficiency and improved safety. Various component types are spread across modern vehicles and their electrical and electronic distribution systems (EEDS). Component makers are offering customised electronic designs that resist temperature extremes while offering sophisticated features.

Microcontrollers account for the largest component share, contributing over one-fourth the total market in 2019. Electronic content is scattered throughout the vehicle, including 'carputers', engine management, ignition, radio, telematics, advanced driver assistance systems, safety systems, electronic

fuel injection, airbags and entertainment systems.

Illustrating the growth of automotive electronics: four out of five cars shipped last year had integrated connected technology; the global automotive electronics market will double between 2019 and 2029; the market will grow at an annual rate over 7% to reach $415.6 billion by 2027; and the sensor segment will grow at 10% year-over-year through 2029.

Even as the automotive market is pushed to grow through the adoption of electric vehicles and eventually autonomous cars, some gating factors remain. Automotive systems are increasing in complexity, which will increase replacement and maintenance costs. Further, certain systems are potentially prohibitively expensive. For example, ADAS is expensive enough that analysts expect that costs may restrain adoption.
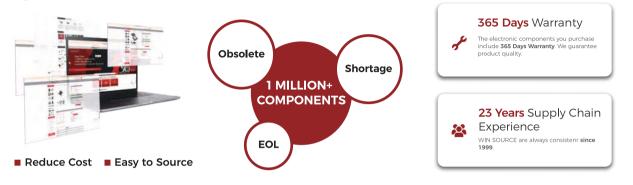
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**Global automotive electronics market:**
Opportunity analysis by component

**Fig 2:** Although sensors will capture the largest growth, other categories will likely double in the next decade *(Image source: Fact.MR)*

**Fig 1:** To increase safety and comfort, car makers will increase electronics *(Image source: Precedent Research)*



**Automotive electronics market size, 2020 to 2030 (USD billion)**

| Year | Value |
| --- | --- |
| 20 | $255.98 |
| 21 | $274.49 |
| 22 | $294.51 |
| 23 | $316.18 |
| 24 | $339.64 |
| 25 | $365.08 |
| 26 | $392.65 |
| 27 | $422.57 |
| 28 | $455.06 |
| 29 | $490.35 |
| 30 | $528.71 |

# Battle for rare earth minerals

*Recent years have highlighted the fragility of long, globalised supply chains and rare earth minerals are no exception. John Denslinger explores the subject*

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

To some, 'battle' might be overkill describing the outlook for rare earth minerals. Afterall, these minerals are actually abundant and found on every continent. Like most battles though, engagement with opposition occurs on multiple fronts. Such is the case for rare earth: trophy minerals are seldom extracted from a single, concentrated deposit; mineral processing entails a complex and expensive transformation to a useful alloy; and unfortunately, the US finds itself in a weak starting position with just a single operating mine and zero refining. Three massive fronts to remedy if we are serious about restoring one of America's vital supply chains.

While 17 elements are classified as rare earth, neodymium (Nd) may epitomize America's rare earth saga. NdFeB magnets are the devices that power motion. They are synonymous with innovative technology such as EVs, wind turbines, robots and a host of strategic defense applications. More than a dozen countries have documented reserves including the US and Canada. Brazil and Vietnam have huge reserves but mine just a tiny fraction. The rare earth powerhouse is definitely China with 40 per cent of the identified world reserves according to the last DoE published assessment. As for mine production, China leads again with 58 per cent of global output, 91 per cent of worldwide refining and 87 per cent of the oxide separation. And China excels at manufacturing too, producing a mind boggling 92 per cent of the world's magnets.

By comparison, the US has but one mine: MP Materials operating in Mountain Pass, CA. Even more troublesome, all of the mine's output is shipped to China for processing. It seems every aspect of our rare earth supply chain starts with China and ends with China. This is not the best scenario given today's geopolitical theatrics. No wonder rare earth production is now a Federal priority.

Domestic sourcing is limited to MP Materials which has no local rivals and no near-term competitive threats. With federal money readily available and EV manufacturers desperate for local sourcing, MP Materials announced plans to spend $700M building a complete end-to-end supply chain that adds refining, metal extraction, alloying and magnet manufacturing to its mining expertise. Recycling capability may also be included. The additional processing will take place in Fort Worth, TX with production start-up slated for late 2023. Another encouraging sign, GM recently formalized a long agreement with MP for alloy and finished magnets for GM's EV programs. Having the financial backing of a Fortune 25 company almost assures the venture's success.

Will we see additional onshore mining anytime soon? It's not likely within the continental US unless national security concerns prevail over a NIMBY regulatory history. On one hand, the Bureau of Land management is reluctant to grant surface mining permits on federal land. As for non-federal land, endless legal challenges by local communities and environmental groups effectively delays large scale domestic projects for years.

As mentioned, neodymium (Nd) is just one of 17 rare earth minerals, but the hardship story for each is much the same. For example, the Inflation Reduction Act set forth new sourcing conditions. It subsidized consumers based on US content with specific reference to mineral content in batteries. Qualifying mineral content could be US or from countries having a free-trade agreement with the US, but such agreements have yet to be negotiated with any western ally or resource rich country. So, America's businesses can only look to near-shore USMCA partners Mexico and Canada for sourcing. In the meantime, China dominates the battle in rare earth minerals.

# Information is everything

*Rapid explains how its longstanding relationships with manufacturers lets the company aggregate and communicate supply chain information for the benefit of customers*

Rapid states its longstanding global supply chain relationships are direct and responsive, providing quick access to the information required to provide customers with flexible distribution options bespoke to their needs. Using knowledge of pending availability or pricing challenges, Rapid proactively provides customers with purchasing options, allowing them to concentrate on core procurement activities.

Behind its distribution capability, Rapid also specialises in e-commerce and software, developing and improving its platforms with a focus on data efficiency. Rapid works to provide accurate component lead times, ensuring reliable and frequent shipments to customers. The company considers external market influences, increasing its 2021 stock volumes to reduce exposure to potentially unreliable lead times due to inevitable manufacturing challenges in China. Rapid's data is live on component comparison sites enabling

a wider audience to benefit from the company's efforts.

Customer communication is enhanced by pushing updated acknowledgment information to identify requirements for further actions. Two new lead time data points have been added to Rapid's website for replenishing stock and manufacturer's lead time to order.

Protecting customers from pending price increases and availability are prioritised to minimise impacts on manufacturing schedules. Rapid's gold service for forward orders provides guaranteed stock availability and pricing with flexibility around needs. Delivery dates can be pre-set or stock called off when required. All stock is purchased and allocated at the start of the order giving customers piece of mind.

Regarding sustainability, Rapid gained ISO14001 in 2020, the first step in making environmental sustainability a permanent part of business planning. The first task was

reducing energy consumption by installing LED lighting across the warehouse, offices and car parks, plus new air conditioning and the removal of heaters and fans.

To reduce $CO_2$ emissions, Rapid changed from paper void fill to air-cushioned HDPE packaging manufactured entirely from pre-consumer recycled plastics, creating a weight reduction of 88 per cent and reducing annual postal weight by 40.6 tonnes (13 fully loaded three-ton delivery vans). Removal of paper saves over 1,100 trees per year.

Introduction of green policies and EV charging bays led to a new fleet of EVs. However, the biggest win is reducing travel requirements. Rapid is retaining its hybrid working policy which delivers a 70 per cent reduction in commuting, with employees and the wider business becoming more effective.

*www.rapidonline.com*

**Rapid Electonics'** managing director, **James Bates**

# Moving Forward While Celebrating the Past

By **Dave Doherty**, president, **Digi-Key Electronics**

Dave Doherty

## A Notable Milestone

This year marks a notable milestone for Digi-Key Electronics. Like many great companies, Digi-Key evolved from a passion, and that passion was ham radio. In the early 1970s, Dr. Ronald Stordahl started selling the "Digi-Keyer" – a kit for ham radio operators that helped transmit Morse code. That led to selling components – first to electronic hobbyists, and then to the commercial market.

For 50 years now – thanks to the hard work, commitment and entrepreneurial spirit of our more than 5,000 employees worldwide, 929,000+ customers, 2,400+ suppliers and myriad of global partners – we've built upon that initial passion. Digi-Key now distributes not only electronic components but provides digital solutions and tools to engineers, designers and makers in more than 180 countries.

## Looking Ahead

While our initial passion 50 years ago was around the ham radio, the people of Digi-Key have consistently had their fingers on the pulse of the industry, reacting to changing needs and offering a vast spectrum of components to fuel production into the future. We're excited about industries like healthcare, automotive, energy, 5G and IoT, as they continue to drive innovation in 2023 and for many years to come. The electrification of everything is another key trend that will drive significant growth this year and beyond.

The long-term demand outlook for the upcoming decade is very robust based on every forecast indicator we have access to. Digi-Key's significantly increased capital infrastructure investments over the last three years puts us in a strong position to service those anticipated customer needs. These investments include our Product Distribution Center expansion, more robust and predictive web search functionality, higher inventory levels, and the start of more self-serve order management tools aimed at providing a frictionless digital experience. The impact of the recent economic cycles on Digi-Key and the industry has proven we have the resiliency, perseverance and grit to overcome obstacles.

We wholeheartedly believe the industry is at an important milestone this year, as we see designers and engineers get back to innovating. While some challenges of the past few years remain, engineers are ready to tackle new design challenges, and Digi-Key is ready to support them in their new endeavors.

Since those early years, we've always taken a longer-term perspective and maintained our core strategies to support high service levels throughout the industry cycles. As we move forward, we are looking at what high service means for both our customers and our suppliers. From a customer standpoint, our commitment to our core engineering audience is getting them what they need better than anyone else, and making it easier for them than anyone else. For our suppliers, we're evolving our partnerships and providing new options for them to reach new customers.

As we celebrate this milestone year, we want to thank our associates, customers, partners and suppliers. Our mutual success over these past 50 years has been driven by your passion, dedication and loyalty. Together, we've grown and excelled, and we know that an even brighter future awaits us all.

Learn more at **www.digikey.co.uk**

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FIND OUR EXHIBITOR INSIGHTS **INSIDE FROM PAGE 28-69**

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# Let the show commence

Preparations for the 2023 Electronic Component Show are complete. Join purchasing professionals and design engineers to explore products and services from across industry
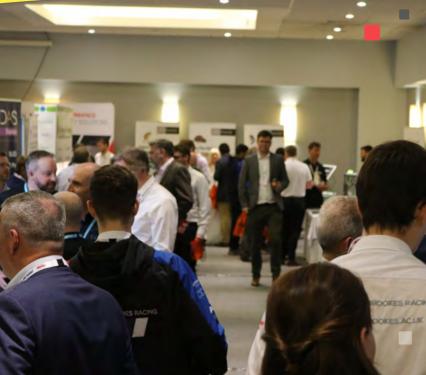
Everything is set for another successful *Electronic Component Show* to be held on Thursday 25 May at the Kassam Stadium, Oxford.

Readers of *Electronics Sourcing* are busy searching for components to keep their production lines rolling. So, why take time to visit *ECS*? With 69 exhibitors, visitors can meet with current, new or alternative suppliers, discover new components, technologies and service providers. All under one roof, in one day.

Exhibitors include many overseas companies, typically found at large European trade shows, yet available at *ECS* to discuss current or future requirements.

Likewise, the seminar schedule is tailored for both purchasing professionals and design engineers wanting to learn about trending subjects, future technologies and industry advances.

Event extras include 2,000 free car parking spaces adjacent to the Kassam Stadium; free entrance to the exhibition and seminars; complimentary tea and coffee served all day; a free £5 food voucher for the catering outlets; meeting spaces; and a separate eating area.

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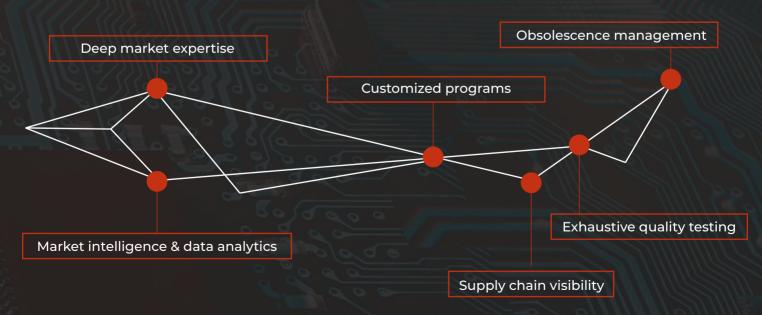
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# SEMINAR SCHEDULE

**10:30 - 11:00**

**Health & Wellbeing in the Workplace - dispelling the menopause myth**

Lucy Brookes, *BMR Health & Wellbeing*

**11:10 - 11:50**

**Additive Manufacturing for 3D Electronics**

Dr. Matthew Dyson, *IDTECHEX*

**12:00 - 12:40**

**Intelligence at the Edge**

Arun Rajasekaran, *Edge Impulse*

**12:50 - 13:30**

**Obsolescence and the Motivation for Change**

Daniel Grundy, *Jaguar Land Rover / IIOM UK*

**14:00 - 14:30**

**Design engineers: unsung heroes of the sustainability revolution**

Jon Barrett, *The Sustainable Engineering Project*

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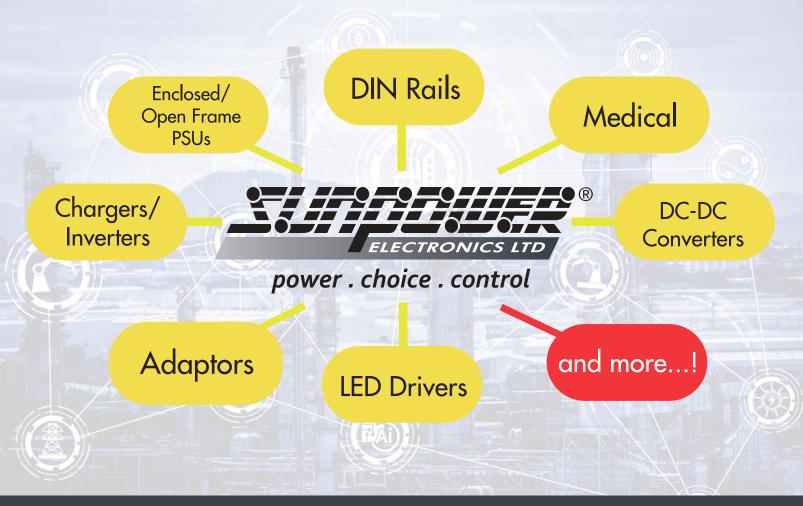
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# Design and purchasing advice

**Design engineers and purchasing professionals can share their technical and buying questions with Würth Electronics' business managers and field application engineers**

Würth Electronics is a leading brand in the European electronic and electromechanical components market with a product portfolio including: EMC components, capacitors, inductors, RF inductors, LTCC components, transformers, circuit protection components, power modules, LEDs, connectors, switches and press-fit power elements.

Visitors to the company's ECS stand can meet external business managers who look after the product ranges, plus field application engineers who will be on hand to offer technical support

for projects or products customers are working on.

Würth's business managers are knowledgeable on the product ranges they support and offer help with customer enquiries. Field application engineers have in-depth specialist engineering backgrounds and can provide any level of support required. From a free sample service for prototyping to high volume purchasing for production batches, business managers are available to help with purchasing requirements.

In recent years, WE has been expanding and offers a range of catalogue products from its Wireless

Connectivity division. As a leading supplier for low power ISM/SRD products in Europe, the division will supply compact short range RF-modules for rapid implementation of cable-free data links. These find application in home/building automation, automatic meter reading solutions, sensor networks, IoT, logistics, environmental monitoring, access control and healthcare.

Visit Würth Electronics at stand 44 for technical expertise, commercial advice and even some gummy bears.

*www.we-online.com*

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# What drives the cost of a circuit board?
## And how do those factors in turn impact the sustainability?

Whether your role is managerial, commercial or technical there is a good chance that you have an interest in ensuring that the printed circuit boards you are designing, purchasing and/or assembling are as efficient as they can be in terms of achieving the lowest total cost, sustainably, without compromising functionality or reliability of the end product.

The majority of the cost – 80-90%- is built into the product in the early stages of the design phase –before either the PCB supplier or EMS company has sight of the design. We have also found that many of the cost drivers directly impact all aspects in producing and delivering a more sustainable product. In our Sustainability Impact meter you can see the effects for each cost driver.

NCAB has divided the cost drivers into two categories, the 'hard costs' and the 'soft costs.' The hard cost drivers are covering aspects that relate to the physical printed circuit board itself. Examples being copper weights and

build complexity. In these cases the impacts on sustainability are more tangible. The soft cost drivers are those elements that unless considered can lead to delays in engineering, lost time and mis-specified demands that only serve to either drive cost upwards or fail to identify what is needed to achieve the desired quality or long-term reliability – this is not sustainable PCB production in our eyes. Many times these factors are a little less quantifiable, but can certainly have just as much of an impact on cost and sustainability.

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# Enclosures, fabrications, e-mech components and more

Buyers and engineers seeking innovative enclosures, trusted terminal blocks and premium interconnects should head to CamdenBoss' ECS stand

Visitors to CamdenBoss' stand can explore the latest in off-the-shelf enclosure solutions. First in the line-up is the award-winning Hex-Box IoT enclosure, which sports a six-sided design and choice between solid, vented or even Raspberry Pi compatible panels.

Next up is Easy Assembly, CamdenBoss' fastest and easiest enclosure to assemble thanks to its push-button or single screw lid. For customers looking for a versatile enclosure, the Room Sensor can easily be wall-mounted with a clip-together bracket on the back. New to the DIN Rail enclosure range is the CMEB

which is built with modularity and extendibility in mind.

A standout at ECS will be CamdenBoss' selection of components comprising fuses, switches and circular connectors. The company's comprehensive and trusted selection of terminal blocks are designed to provide an easy-to-fit and reliable connection between wires. With over 3,500 terminal blocks, the ranges are built up from a variety of styles and sizes, including standard PCB pin, pluggable and screwless types. Much of the range benefits from VDE and UL approvals, providing assurance at a competitive price.
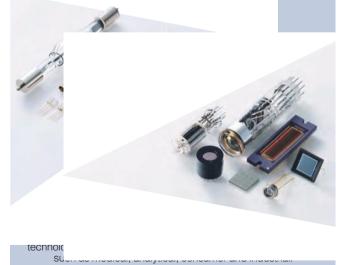
For applications where connection integrity is essential, premium circular connectors from the CamCirc range will be present at the show. Manufactured for fundamental wiring applications in various industries from medical to motor sport, CamdenBoss will be on hand to discuss requirements.

Speak to the CamdenBoss team on Stand 55 to see how over 50-years' experience as a UK-based manufacturer can support upcoming projects.

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Engaging with Review Display Systems as a design and manufacturing partner enables access to the latest technology, product portfolios and technical support in embedded computing, display technology and design services/solutions.

Review Display Systems is a specialist embedded computing and display solutions provider and system design partner. Long-term, est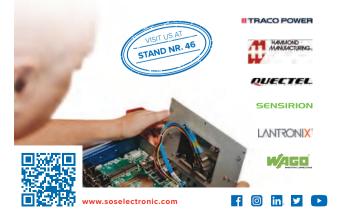ablished alliances with leading global supply partners and manufacturers ensures RDS has access to a comprehensive range of the latest embedded computing, display technology and system support peripherals. Established in 1982, Review

Display Systems engages and develops partnerships with electronics engineers, system architects and purchasing professionals in sectors including process control, industrial instrumentation, medical device technology, factory automation, facilities management, in-vehicle systems, point-of-information and more.

Encompassing an engineering design and production team with experience across a range of hardware and software systems, Review Display Systems can provide design and development support including hardware design, firmware development, mechanical fixtures/fittings,

project management, approval prototypes and sub-assemblies, to full system production and sub-contract manufacture.

The company maintains a strong commitment to environmental responsibility, sustainability, and quality with accreditation to the latest internationally recognised quality standards including ISO14001, ISO9001-2015 and ISO13485:2016 for the design and manufacture of medical technology devices.

*www.review-displays.co.uk*

> **Review Display Systems is a specialist embedded computing and display solutions provider and system design partner**

# Flexible interconnect solutions

Visitors to Flex Connection's ECS stand can expect to be met by an array of interconnect options from unique round flat cables to PET coated assemblies

As the electronics industries look to take advantage of the benefits of flat flexible interface solutions, Flex Connection is supporting customers in industries including medical, automotive, IT, aerospace and defence.

Flex Connection's work begins by listening to clients and understanding the design application. This design led approach lets its engineers propose custom application specific solutions drawing on their knowledge and experience.

Flex Connection's ECS stand will feature a wide range of flat flex solutions including a variety of FFC options with customised shielding, die-cut locking tabs to suit different connector designs and even the option of black PET coating which suits some applications.

Options include pitches from 0.3 to 5.08mm, tin or gold plating, printing, labelling, folding, plus high flex and high temp rated cables.

Also on display will be round flat cables (RFC). These cables' unique design combines the properties of flat insulated conductors which transition to round solder pins for soldering direct into a PCB or connector.

The flat insulated conductors act as a vibration damper making the jumpers suitable for the most arduous applications. Availability of different insulation materials ensures maximum reliability, even at high temperatures.

*www.flexconnection.global*

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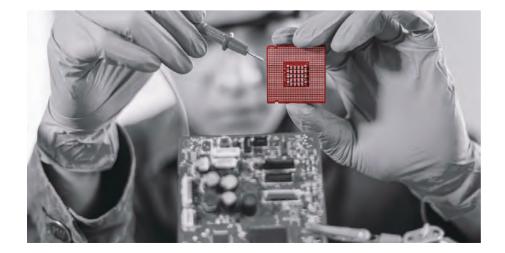
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# Smooth and efficient buying experience

### ASC's new e-commerce website distils 25-years distribution experience into a user-friendly interface for searching, purchasing and tracking orders

In today's fast-paced electronic industry, finding a reliable and trustworthy supplier is essential for businesses to stay ahead of competition. That's where American Sun Components (ASC) comes in. With over 25-years' experience, ASC has established itself as a dependable global stocking distributor of electronic components, serving a range of industries including automotive, industrial, medical, aviation, military and more. With the primary focus on OEM, CMS and EMS, ASC has become a leading supplier of electronic components globally.

ASC has strategically placed eight offices across the world to ensure customers have seamless access to components worldwide. ASC's workforce communicates in over 20 languages, offers 24/7/365 support and provides access to a global network and inventory exceeding five million parts.

Customer services include net 30 payment terms and a 10-year guarantee on all products. ASC's efficient and reliable shipping ensures global delivery within 24 to 48-hours, helping customers meet pressing deadlines. Free quality inspection and testing gives customers peace of mind and confidence in their products.

ASC has announced a new e-commerce website offering a user-friendly interface for searching, purchasing and tracking orders. The website features a robust search engine with filters that help customers find the parts they need quickly and efficiently. With real-time inventory updates, customers can be confident of availability.

The new website represents ASC's commitment to continuously improve its services and offer innovative solutions. With the launch of the website, ASC is confident that its customers will enjoy an even smoother and more efficient buying experience.

*www.ascglobal.com*

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# Power connectors, fuse holders, switches and more

In this article, TME highlights a range of Schurter products, including power connectors, fuse holders and switches, which visitors can explore on their stand

Schurter's power connectors, manufactured to IEC 60320, are popular in power supply connections. Specifications include 250VAC and currents up to 16A. Application environments include consumer appliances, industrial devices and medical equipment.

Cylindrical fuse holders offer simple overcurrent protection. Specifications include: accommodation of 5 by 20mm or 6.3 by 32mm fuses; UL94 V-0 flammability rating; and thermoplastic bodies with a temperature tolerance of -40 to 85°C. Applications for these products include consumer appliances, low volume products, prototypes and hobby projects.

PCB fuse holders integrate cylindrical fuses into the printed circuit, offering a popular design solution for consumer and industrial equipment.

Schurter's second major product group is switches. For example, vandal-resistant switches have a wide range of applications including: lifts, dispatchers, ticket machines and control panels.

Schurter offers switches with flat-pin plugs and LED illumination in numerous variants. Technical options include: leads for soldering wires, PCB-mounting or connectors; zinc alloy or stainless steel bodies; monostable and bistable switches; SPST and DPST contact configurations; rated from IP64 to IP67; up to 1,000,000 cycles; and low-profile versions.

TACT microswitches are frequently used as HMI components in domestic appliances and consumer electronics. Specifications include: SPST contacts (normally opened); contact rating 12V (0.05 A); 4.5mm, 4.5 by 6.5mm and 4.5 by 10mm lead spacing; THT or SMT mounting; and heights from 4.3 to 12.5mm.

Schurter's MCS 18 series standard switches are characterised by: shallow mounting depth; large choice of colours; square or round shape; panel mounting; 0.125A, 48VDC contact rating; and IP65 protection. Applications are found in control panels, industrial machines and automation.

www.tme.eu
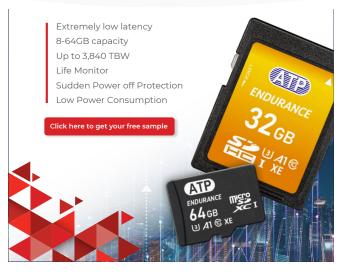
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## Empowering the All Electric Society

Single Pair Ethernet enables seamless IIoT communication up to the field level. Automation requires reliable networking of all machines, devices, sensors, and actuators to an Industrial Internet of Things. Here, Single Pair Ethernet ensures consistent Ethernet communication – resource-efficient thanks to a single pair of wires and from the sensor to the cloud.

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PHŒNIX CONTACT
INSPIRING INNOVATIONS

# PCB etching innovation unveiling

*In this article, Electron Electronics, describes the reintroduction of the Mega bubble etch tank and prepares visitors for the unveiling of the ultimate rota spray 2 etching machine*

In spring 2019, UK PCB processing equipment manufacturer, Mega Electronics, closed. Its products were used throughout education and industry for manufacturing prototypes and small quantities of PCBs. Over the last 40-years most students making their own PCBs would have used a Mega bubble etch tank.

In late 2019, a chance meeting with Mega's former technical director, Mark Hall, triggered a plan to restart bubble etch tank manufacturing. When the original manufacturer closed everything not auctioned was skipped, so every component had to be sourced from scratch, using original suppliers where possible. Moving into 2020 materials started to arrive, then Covid struck.
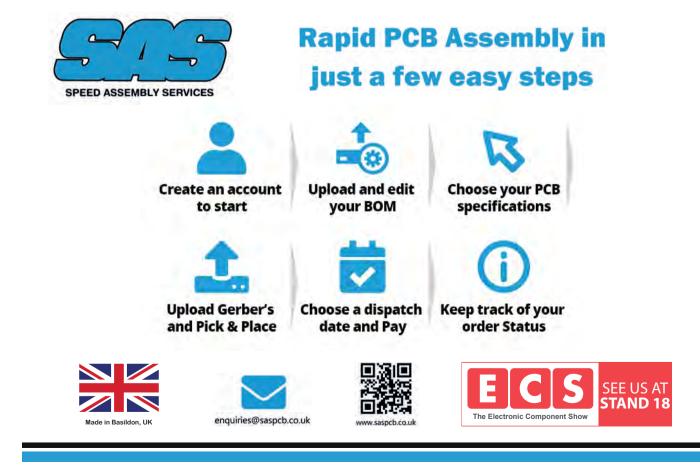
By the end of 2020 the single tank (PA104) and two-tank (PA210) models were available, and 2021 saw the completed line up with the tri-tank (PA310) unit. In addition, the PCB chemistry the original manufacturer was supplying was sourced

Electron Electronics is delighted to be attending the *Electronic Components Show 2023*, where it will exhibit the Mega bubble etch tanks which are now manufactured along with the chemistry, media film and photoresist PCB laminates. A redesigned Mega Rota Spray unit will also be unveiled at the show. This ultimate etching machine can etch a PCB in 90 seconds, making it an ideal upgrade from a bubble etch tank.

www.electronelec.co.uk

# Trustworthy solution to obsolescence

Winslow Adaptics invites visitors to explore its drop-in chip and PCB replacements as a solution to their obsolescence issues and supply-chain shortages

The Winslow Adaptics Program began in the early 1990s when Marconi approached the company for a solution to a critical, but obsolete, PGA device. Winslow's design team replaced the PGA with a functionally identical PLCC based solution. So, it is no wonder that engineers from SMEs to multinationals in the industrial automation, power, space, medical, automotive, rail, aviation and defence sectors, trust Winslow with their obsolescence or supply-chain issues.

Winslow Adaptics designs, adapts and manufactures innovative solutions to short and long term diminished supply of electronic components. Its 3FI solutions (form, fit, function and interface) drop-in chip or PCB replacements can keep production running in the face of obsolescence and supply-chain shortages. Mid-term electronic technology upgrade such as an ASIC to FPGA replacement in small to large quantities is a house speciality.

Winslow's team of qualified and talented electronic and mechanical engineers work in partnership with customers through the development cycle: from initial design consultation and feasibility studies to pre-production and component manufacture/assembly. With many products in worldwide distribution and the company's impressive 99 per cent on time delivery statistics, customers can be confident of a timely resolution.

Critical industries have always looked to extend product lifecycles, but obsolescence has only recently been considered from the early design stage. Multiple footprint adapter or 'interposer' solutions can achieve this at a fraction of the cost of re-design and re-qualification. Extending the life of products is one of the most important contributions we can make to reduce our environmental and raw-material footprint.

www.winslowadaptics.com

# Make contact with power excellence

*Sunpower Electronics' CEO, Russell Parr, invites readers to Sunpower's ECS stand to explore its ranges of power supplies and LED lighting products*

Sunpower is making its first appearance at the *Electronics Component Show*. As a leading supplier of switch mode and industrial power management solutions, Sunpower supports customers with both standard and bespoke power requirements, ranging from primary power to back-up needs and everything in-between.

The company's extensive product range covers requirements from 1W to 25kW across open frame, enclosed and din-rail power supplies, plus adaptors, chargers, inverters, batteries, UPS solutions and configurable power.

Sunpower Group Holdings' CEO, Russell Parr, said: "At Sunpower, we support the simplest through to the most complex power solutions, taking a consultative approach to ensure we meet customers' needs with the most effective solution."

Sunpower has expertise across a range of markets including healthcare, security, defence, marine, hospitality and more. Not every requirement can be satisfied with an 'out of the box' solution, which is where the company's knowledge and expertise sets Sunpower apart.
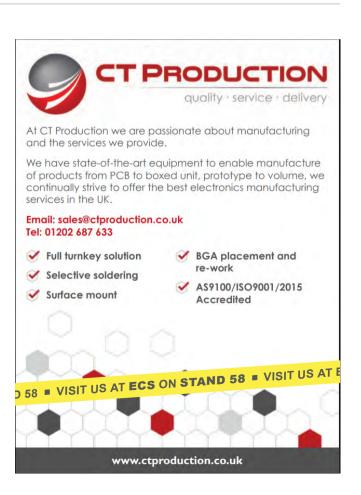
Sunpower is also a leading LED lighting solutions specialist.

www.sunpower-uk.com

> **Sunpower has the capability to support customers with both standard and bespoke power requirements**

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# A world of fault finding options

Cupio Services' Basingstoke-based 3,000ft² facility services clients across the UK and Europe. No manufacturing process can be 100 per cent guaranteed so there is always a need for inspection and test and, in the event of a final product issue, failure analysis. Cupio's skill lies in identifying which equipment best fits the task based on material, projected fault type, invasiveness and level of detail required. Once the equipment is agreed, Cupio goes to work identifying areas of non-compliance and reporting findings.

The company's analytical equipment has four core areas. SAM is a non-invasive and non-destructive technique used to inspect for defects in solid samples, components and materials or structures. X-ray is the best known technique for failure analysis due to its non-destructive ability to image the interior of products to identify hidden defects. AOI is an automated visual inspection where a camera is used to autonomously scan the device or board. Finally, electrical test looks for faults in boards and devices which can't be seen.
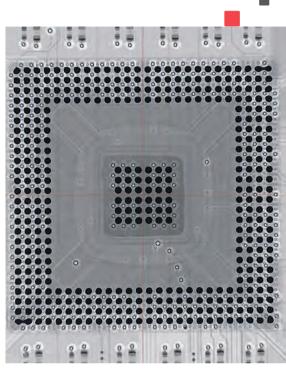
Cupio Services both sells systems (with product lifetime support) and provides a contract inspection and analysis service at its Basingstoke facility. It all comes down to three key elements: cost, time and reputation.

It can cost millions if products are recalled or returned. The further down the manufacturing process a fault gets, the higher the cost. A recall being the costliest of all. The sooner the fault is identified the lower the cost.

www.cupioservices.co.uk



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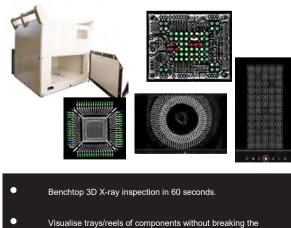


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# Strengthened DRAM portfolio

*In this article Simms' CSO, Kevin Howse, explains how a new partnership with Intelligent Memory will help buyers sidestep the pain of product discontinuation*

Memory and storage expert Simms International has announced a new partnership with memory manufacturer Intelligent Memory. Simms will distribute Intelligent Memory DRAM components and DRAM modules from its Kent-based facility.

Intelligent Memory specialises in third-party manufacture of DRAM and flash products with expertise in component and legacy DRAM. Headquartered in Hong Kong, with satellite offices around the globe, Intelligent Memory is part of the Memphis Electronic Group.

Simms' CSO, Kevin Howse, said: "Intelligent memory improves our overall memory portfolio as they are especially effective at relieving the pain of product discontinuation with their commitment to older technologies.

"By leveraging their expertise, we can stay ahead of the competition, adapt to market demands, and seamlessly transition our customers to alternative solutions.

"We are excited about this partnership and look forward to providing our customers with design choices that will help extended product lifecycles and deliver exceptional customer experiences."

Simms International was established in 1990 and is a specialist memory distributor and trusted partner for IT resellers, system builders/ integrators, OEMs and IT service providers. Simms offers solutions designed for a range of environments such as datacentres, industrial, embedded, workplace, consumer and gaming.

*www.simms.co.uk*
*www.intelligentmemory.com*

# Self-service PCB assemblies

*DVR is introducing a new fast turnaround prototyping service for the UK electronics industry, with buyers just one click away from next day delivery of prototype assemblies*

Speed Assembly Services is offering a low-cost fast turnaround PCB assembly manufacturing service for new electronic designs required at the pre-production bench top stage. The service is designed to support design engineers' needs to rapidly evaluate new and innovative electronic concepts. Engineers no longer need to consider making their own assemblies using existing outdated methods, offering the opportunity to have concepts produced professionally and quickly.

Double-sided PTH and multilayer PCBs can be ordered, with Speed Assembly Services delivering custom-made PCB assemblies to customers via online order submission within the UK. Delivery timeframe is dependent on component availability and lead time.

Like supermarket self-checkouts, customers upload their BOM and use the online ordering tool to empower engineers to self-serve and control the ordering process. All this while having customisation options and minimising quoting/ordering times.

SAS has cut out the middle-man so customers reap the cost savings. Engineers select components through the integrated search tool and communicate via a ticketing/chat system.

SAS has positioned itself as the ideal supplier for low quantities, NPI, prototypes and concept PCBs. The company works with customers during their electronics development journey as a dependable, trustworthy and quality supplier of boards.

*www.saspcb.co.uk*

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ecsn
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# Harness assembly right first time

Join Advanced Rework Technology to discuss, in particular, the new E revision of IPC/WHMA-A-620, Requirements and Acceptance for Cable and Wire Harness Assemblies

The 620 standard prescribes practices and requirements for the manufacture of cable, wire, and harness assemblies, describing materials, methods, tests and acceptability criteria for producing crimped, mechanically secured and soldered connections.

Revision E has significant changes including new figures and updates to several sections. Of significance was alignment of the soldering requirements with J-STD-001, Requirements for Soldered Electrical and Electronic Assemblies.

ART is an IPC Authorised Training Partner, giving the company the ability to teach IPC courses at all levels of instruction to include Certified IPC Trainer, Certified IPC Specialist and Certified Standards Expert.

ART staff are also active IPC committee members. Company director, Debbie Wade, is an experienced Master IPC Trainer and also chairs many IPC committees, European IPC Standards Development and IPC Training, Product Assurance and IPC-A-620 training to name a few. This gives the training staff the added advantage and skills required to teach the latest requirements and fully understand the changes to the technical standards and associated training courses.

ART offers the following IPC certified training:
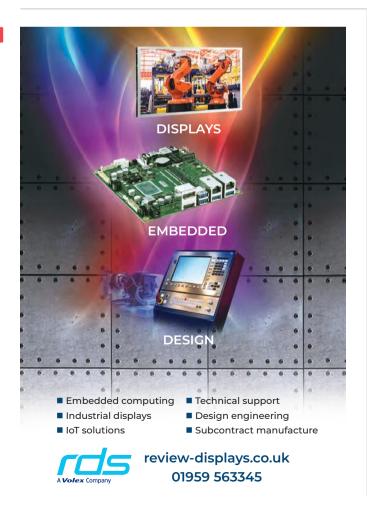
- IPC 6012, Qualification and Performance Specification for Rigid Printed Boards

- IPC-A-600, Acceptability of (Bare) Printed Boards

- IPC-A-610, Acceptability of Electronic Assemblies

- IPC/WHMA-A-620, Requirements and Acceptance for Cable and Wire Harness Assemblies Revision E now available.

- J-STD-001, Requirements for Soldered Electrical and Electronic Assemblies

- IPC-7711/7721, Rework, Modification and Repair of Printed Boards and Electronic Assemblies

*www.rework.co.uk*

**Advanced Rework Technology's** MD, **Debbie Wade**

# Keeping an eye on component inspection

*Adaptix' commercial director NDE, Andy Barnes, introduces inspection technologies designed to stop counterfeits in their tracks while letting genuine parts flow freely*

AdaptixNDE is using ECS to launch and demonstrate four technologies. Firstly, a 3D component-counting capability which images a stack of reeled components inside their box without breaking the manufacturer's seal. Secondly, 3D intelligent inspection for a stack of reels and/or trays to visualise missing or different/suspect components. Next comes component inspection, the essential requirement for 2D and 3D x-ray to see components down to 25 microns per AS6081 x-ray requirements. Finally, alpha-prototypes of automated BGA and bent-pin inspection.

ERAI reports an increase in suspect counterfeit and non-conformance parts over the last three years with a staggering 35 per cent increase in the last year (per its recently published 2022 Annual Report).

There is an obvious reason this has increased: higher customer demand for faster component delivery, coupled with a lack of manufacturing supply capability. This isn't just an economic problem for the sourcing industry as counterfeit components go into critical systems with life-threatening consequences.

If a counterfeiter is 'peppering' a batch to avoid detection, a solution is faster inspection, to a higher standard, with more data. This allows for increased, economically feasible, sampling for electronics brokers which is acceptably timely for customers.

AdaptixNDE's product roadmap includes delivery of a benchtop lab-in-a-box utilising multi-modal inspection, by bringing its transformative Digital Tomosynthesis 3D x-ray to the market allowing greater inspection capability

and reduced work-flow times during inspection.

This will be followed by automation and then data collection from good-actors in the broker channel to differentiate those and increase that barrier to counterfeit ingress.

*www.adaptixnde.com*

**Adaptix'** commercial director NDE, **Andy Barnes**

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# Design-to-manufacture solution

Visitors to Solid State Supplies' ECS stand will discover a broad product portfolio supplemented by a range of value added services

Solid State Supplies' range of semiconductor solutions includes communication technologies, high performance processor solutions, embedded control, low power FPGAs, high performance memory storage, optoelectronics, imaging, sensing, switching and power management.

Digi International provides processor and wireless solutions for secure connected IoT applications, including integrated System-on-Module solutions. Silicon Labs has in-depth expertise in IoT wireless protocols, such as Bluetooth and Matter running on Thread and Wi-Fi.

Quectel Wireless Solutions supplies 5G, LTE, LTE-A, LPWA, NBIOT, WiFi/Bluetooth, Automotive, Android Smart modules, UMTS/HSPA(+), GSM/GPRS and GNSS modules. Laird Connectivity's modules enable secure, reliable connectivity in harsh RF environments, and are certified with a selection of antenna types, enabling the highest performance and avoiding costly and time intensive EMC radio certifications.

Photonics solutions include defence and aerospace photodiodes, low light level detection modules, thermal infrared sensors, LEDs and adaptive lenses.

Display solutions range from small high brightness OLED, smart TFT and transparent EL to medical and military monitors and large public displays. Embedded control solutions include IP-rated panel PCs and powerful, energy-efficient single board computers (SBCs) with ultra-small form factors.

Advice on standalone displays vs integrated solutions is supplemented by customised displays assembled at Solid State Supplies' UK Custom Solutions Centre.

Value added services include: device programming; firmware version control; tape

and reeling; mini reeling and bake/seal; sourcing and obsolescence solutions; and a complete UK-based design-to-manufacture solution for optoelectronics, sensing and display technologies.

*www.sssltd.com*

# Transforming specialty electronics

Micross offers a single-source solution for the design and manufacture of specialty microelectronic components

With authorised access to die and wafer suppliers, plus advanced packaging, assembly, modification and test capabilities, Micross can provide solutions including bare die, fully packaged devices and complete program lifecycle sustainment. Applications include aerospace, defense, space, medical and industrial.

Regarding bare die, Micross has access to over 70,000 part types and offers the knowledge, capabilities and flexibility to adapt suppliers' standard products to the unique requirements of customers' devices or systems. From simple diodes to advanced analog ICs and digital components, Micross can support initial design and manufacture, to post-production end-of-life (EOL) lifecycle sustainment.

As a QML supplier certified to AS9100, ISO9001 and ISO14001 operating to MIL-STD-750, Micross operates in aerospace, defense, space, industrial-embedded and medical diagnostic markets. The company is certified to MIL-PRF-38535 Class Q & V, MIL-PRF-38534 Class H and has over 1,100 part numbers listed with DSCC, on various SMDs.

Micross offers a range of capabilities from design to test. For example, its DMEA Trusted Source facilities provide advanced packaging and electrical/environmental testing, while its counterfeit mitigation facility ensures authenticity to specification.

When military or space grade products are unavailable, Micross offers an array of solutions to provide these hard-to-get components.

An obsolete, long-lead time or high-priced device mounted on an otherwise defective or obsolete circuit assembly can be removed, refinished and verified for re-use by the original source, saving the costs of redesign or replacement. Micross salvages expensive and rare components, specialising in BGAs (removal and/or reballing) and provides these as either discrete components or installed on new boards. The company also offers a range of component/lead preparation services and can modify tooling to meet custom packaging requirements.

Micross offers robotic hot solder dip (RHSD) technology, the only process approved by the TMTI report to eliminate tin whisker risk without damaging the component. Micross states no one comes close to RHSD's precise controls, enabling it to service components most efficiently, accurately and consistently.

Micross supports application specific requirements where either leaded or non-leaded components are required and can convert to any device footprint with processes that are NADCAP certified and compliant to the IEC TS62647-4 international standard. The process has undergone extensive qualification at independent labs, validating the process as safe and reliable.

*www.micross.com*

Lemo UK is using ECS to exhibit its range of Swiss manufactured push-pull connectors, offering visitors an opportunity to handle products and witness new technology. Lemo will also explain how it is solving lead time issues that are a headache for the purchasing community.

Customers with high speed applications can explore new products for USB 3.1, Cat 6 and single pair ethernet (SPE). There will be an opportunity to handle the M Series high power connector which is designed to meet the needs of applications such as urban air mobility, mass transit and industrial machinery.

The stand will feature examples of cable assemblies manufactured at Lemo's West Sussex facility for applications in defence, medical and industrial markets. Also featured, will be trusted products going back 75-years which continue to support demanding applications. Lemo's team will be on hand to explain how the company's initiatives are embedding in its culture so products are easy to use, have guaranteed performance and a commitment to environmental policies.

Lemo's UK team is expanding due to sustained growth. The company is keen to speak with dynamic, ambitious people who are interested in joining the organisation. Opportunities exist in sales, manufacturing, cable assembly and purchasing.

*www.lemo.com*

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# Complete sourcing service

Solid State Supplies can now supply commercial and industrial hard-to-source parts from suppliers it is not franchised for, giving customers a more complete service

Solid State Supplies has responded to increasing demand for its sourcing and obsolescence solutions by strengthening its component sourcing team. The company now provides a wide range of component-level services to help customers overcome supply chain issues and keep production running.

The team has a proven track record in sourcing product from across the globe with a unique combination of assurance and agility. All sources are verified and full due diligence mitigates risk, providing full return rights and warranty on all goods supplied.

Buying counterfeit products is not something buyers need worry about as Solid State Supplies can provide product

testing of fit, form and function to the manufacturer's published datasheets and provide test reports. The level of testing is always customer driven.

Experience means Solid State Supplies is well positioned to avoid pitfalls and pre-empt problems, with the team working with customers to fill gaps in their BoMs and overcome sourcing or quality issues they are experiencing. Customers are protected with dedicated buffer stocks, while Solid State Supplies' close supplier relationships often lets it secure more product on behalf of key customers.

Military and Hi-Rel SOS is Solid State Supplies' specialist business unit offering a comprehensive sourcing service for obsolete

and hard-to-find electronic components for military and hi-rel applications including anti-counterfeit detection, electrical re-testing/re-qualification,

up-screening, long term storage and specialist kitting.

*www.sssltd.com/value-added-services/sos*

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| **CABLE ASSEMBLY & HARNESSING** | | | | | | | | | | | |
| Amphenol | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 3,000 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| FTDI | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 50 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Harwin | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 600 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Molex | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 2,550 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Phoenix Contact | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 2,200 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| **CIRCUIT PROTECTION** | | | | | | | | | | | |
| Bourns | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 2,800 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| EPCOS/TDK | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 1,950 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Littelfuse | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 11,450 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Vishay | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 3,150 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| **DISPLAYS** | | | | | | | | | | | |
| Midas Displays | | 01493 602602 | www.midasdisplays.com | N | 3,300 | N/A | £0 | 100% | 10 | 17+ | Y |
| **ENCLOSURES** | | | | | | | | | | | |
| Bud Industries | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 1,600 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| CamdenBoss | CamdenBoss | 01638-716101 | www.camdenboss.com | N | 1,199 | N/A | £0 | N/A | 10 | 106 | Y |
| Hammond | Switch Electronics | 01482-862255 | switchelectronics.co.uk | Y | 500 | N/A | £0 | 70% | 2 | 6 | Y |
| Hammond | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 3,350 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Metcase Enclosures | OKW Enclosures | 01489-583858 | www.metcase.co.uk | N | 288 | £40,000 | £0 | N/A | 5 | 22 | Y |
| New Age Enclosures | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 150 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| OKW Enclosures Ltd | OKW Enclosures | 01489 583858 | www.okw.co.uk | N | 1,955 | £40,000 | £0 | N/A | 5 | 22 | Y |
| Rolec Enclosures | OKW Enclosures | 01489 583858 | www.rolec-enclosures.co.uk | Y | 935 | £40,000 | £0 | N/A | 5 | 22 | Y |
| Teko Enclosures | OKW Enclosures | 01489 583858 | www.teko.co.uk | Y | 1,860 | £40,000 | £0 | N/A | 5 | 22 | Y |
| **FREQUENCY MANAGEMENT** | | | | | | | | | | | |
| ABRACON | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 2,750 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Analog Devices Inc. | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 150 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| ECS | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 2,050 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Epson | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 900 | N/A | 0 € | N/A | 50 | 2,500+ | Y |

## Services Sourcing

| Manufacturer | Distributor | Telephone | Website | Franchised Distributor | No. of Lines for Principal | Stock Value for Principal | Minimum Order Value | % Lead Free for Principal Range | No. of Technical Support Staff | Total No. of Staff | Buffer Stock Facility |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Golledge Electronics Ltd | Golledge Electronics Ltd | 01460 256 100 | www.golledge.com | N | N/A | £800,000 | £0 | 100% | 12 | 24 | Y |
| IQD Frequency Products | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 1,500 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Jauch Quartz | Digi-Key Electronics | 0800 587 0991 | www.digikey.co.uk | Y | 500 | £250,000 | 0 | 100% | 15 | 130 | Y |
| Kyocera | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 950 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Microchip | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 1,450 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Murata | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 550 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Silicon Laboratories | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 500 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| TXC Corporation | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 500 | N/A | 0 € | N/A | 50 | 2,500+ | Y |

### HEATSINKS

| Manufacturer | Distributor | Telephone | Website | Franchised Distributor | No. of Lines for Principal | Stock Value for Principal | Minimum Order Value | % Lead Free for Principal Range | No. of Technical Support Staff | Total No. of Staff | Buffer Stock Facility |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Aavid | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 200 | N/A | 0 € | N/A | 50 | 2,500+ | Y |

### ICs & SEMICONDUCTORS

| Manufacturer | Distributor | Telephone | Website | Franchised Distributor | No. of Lines for Principal | Stock Value for Principal | Minimum Order Value | % Lead Free for Principal Range | No. of Technical Support Staff | Total No. of Staff | Buffer Stock Facility |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Alliance Memory | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 500 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Analog Devices Inc. | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 18,700 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Broadcom Limited | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 200 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Central Semiconductor | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 1,250 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Cirrus Logic | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 200 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Cree, Inc. | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 200 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Diodes Incorporated | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 8,200 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| FTDI | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 100 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Infineon | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 8,300 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Intel | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 1,750 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Maxim Integrated | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 14,050 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Microchip | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 24,200 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Micron Technology | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 600 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Monolithic Power Systems (MPS) | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 850 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Nexperia | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 7,600 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Nordic Semiconductor | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 60 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| NXP | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 4,700 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| ON Semiconductor | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 18,700 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Power Integrations | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 750 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Qorvo | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 700 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Renesas Electronics | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 5,550 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| ROHM Semiconductor | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 6,900 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Semtech | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 350 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Silicon Laboratories | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 2,200 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Skyworks | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 550 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| STMicroelectronics | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 10,050 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Texas Instruments | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 39,050 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Toshiba | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 2,050 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Vishay | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 10,850 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Xilinx | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 1,900 | N/A | 0 € | N/A | 50 | 2,500+ | Y |

### INTERCONNECTION

| Manufacturer | Distributor | Telephone | Website | Franchised Distributor | No. of Lines for Principal | Stock Value for Principal | Minimum Order Value | % Lead Free for Principal Range | No. of Technical Support Staff | Total No. of Staff | Buffer Stock Facility |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3M | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 2,750 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Amphenol | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 33,200 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Cinch Connectivity Solutions | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 4,250 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| FCI / Amphenol | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 7,850 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| HARTING | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 6,800 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Harwin | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 2,950 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Hirose Electric | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 7,850 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Intelliconnect (Europe) Ltd | | 01245 347145 | www.intelliconnect.co.uk | N/A | N/A | N/A | N/A | 100% | 5 | 30 | |
| JAE Electronics | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 1,450 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Molex | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 23,600 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Phoenix Contact | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 17,150 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Radiall | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 2,350 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Samtec | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 16,300 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Souriau | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 3,300 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| TE Connectivity | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 41,850 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Wurth Elektronik | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 1,650 | N/A | 0 € | N/A | 50 | 2,500+ | Y |

| Manufacturer | Distributor | Telephone | Website | Franchised Distributor | No. of Lines for Principal | Stock Value for Principal | Minimum Order Value | % Lead Free for Principal Range | No. of Technical Support Staff | Total No. of Staff | Buffer Stock Facility |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **OBSOLESCENCE / HARD TO FIND** | | | | | | | | | | | |
| | Cyclops Electronics | 01904 415 415 | www.cyclops-electronics.com | N/A | 177,232 | £12m | £100 | 75% | 3 | 78 | Y |
| Rochester Electronics | Rochester Electronics | +44.1480.408400 | www.rocelec.com | Y | 299 | N/A | $250 | N/A | 10 | 400+ | Y |
| **OPTO ELECTRONICS** | | | | | | | | | | | |
| Broadcom Limited | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 2,300 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Cree, Inc. | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 3,800 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Intel | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 20 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Osram Opto Semiconductor | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 1,300 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Toshiba | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 450 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Vishay | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 2,350 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| **PASSIVES** | | | | | | | | | | | |
| AVX | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 17850 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Bourns | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 15,100 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Coilcraft | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 5,750 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| EPCOS / TDK | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 5,450 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| KEMET | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 23,650 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Murata | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 18700 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Ohmite | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 6,550 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Panasonic | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 25,450 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Taiyo Yuden | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 5,100 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| TDK | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 13,050 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| TE Connectivity | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 11,500 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| TT Electronics | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 5,050 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Vishay | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 43850 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Wurth Elektronik | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 6,750 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Yageo | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 21,450 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| **PASSIVES ALTERNATIVES** | | | | | | | | | | | |
| BEC Distribution Ltd | | 01844 275824 | www.bec.co.uk | | 5,000 | N/A | £0 | 100% | 3 | 5 | Y |
| **POWER & BATTERIES** | | | | | | | | | | | |
| FRIWO Gerätebau GmbH | Haredata Electronics | 01423 796240 | www.haredata.co.uk | Y | 250 - 500 | €1M | £250 | 100% | 7 | 14 | Y |
| Jauch Quartz | | 01276 605900 | www.jauch.com | | | £500,000 | 0 | 95 | 15 | 130 | Y |
| Mean Well | Ecopac (UK) Power Ltd | 01844 204420 | www.ecopacpower.co.uk | Y | 6,000 | £2M | £0 | 100% | 8 | 30 | Y |
| Bel Power Solutions | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 600 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| CUI Inc. | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 2,200 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| MEAN WELL | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 4,400 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Murata | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 1500 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| RECOM | Mouser Electronics | 01494-427400 | www.rocelec.com | Y | 3,150 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| TDK-Lambda | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 1,900 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| TRACO Power | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 4,000 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Vicor | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 2,300 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| XP Power | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 2,200 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| **SENSORS** | | | | | | | | | | | |
| ams | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 150 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Analog Devices Inc. | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 300 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Bosch | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 25 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Honeywell | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 2,200 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Maxim Integrated | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 350 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| NXP | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 300 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Sensirion | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 80 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| STMicroelectronics | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 75 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| TE Connectivity | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 650 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Texas Instruments | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 850 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| **SWITCHES & KEYBOARDS** | | | | | | | | | | | |
| Apem | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 2,850 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| C&K Switches | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 5,550 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| E-Switch | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 2,350 | N/A | 0 € | N/A | 50 | 2,500+ | Y |

| Manufacturer | Distributor | Telephone | Website | Franchised Distributor | No. of Lines for Principal | Stock Value for Principal | Minimum Order Value | % Lead Free for Principal Range | No. of Technical Support Staff | Total No. of Staff | Buffer Stock Facility |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EAO | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 1,800 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Honeywell | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 4,700 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| NKK Switches | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 4,000 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Omron | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 4,700 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Panasonic | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 550 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| TE Connectivity | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 1,350 | N/A | 0 € | N/A | 50 | 2,500+ | Y |

### TERMINAL BLOCKS

| Manufacturer | Distributor | Telephone | Website | Franchised Distributor | No. of Lines for Principal | Stock Value for Principal | Minimum Order Value | % Lead Free for Principal Range | No. of Technical Support Staff | Total No. of Staff | Buffer Stock Facility |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CamdenBoss | CamdenBoss | 01638-716101 | www.camdenboss.com | N | 930 | N/A | £0 | N/A | 10 | 106 | Y |
| Marathon Special Products | Global Supply Services | 01904 436 488 | www.global-supply-services.com | Y | 8,000 | £800,000 | £100 | 100% | 3 | 11 | Y |
| Molex | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 1,850 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Phoenix Contact | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 13,550 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| TE Connectivity | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 1,750 | N/A | 0 € | N/A | 50 | 2,500+ | Y |

### THERMAL MANAGEMENT

| Manufacturer | Distributor | Telephone | Website | Franchised Distributor | No. of Lines for Principal | Stock Value for Principal | Minimum Order Value | % Lead Free for Principal Range | No. of Technical Support Staff | Total No. of Staff | Buffer Stock Facility |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Bergquist Company | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 250 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Delta Electronics | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 700 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| ebm-papst | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 1,450 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| EMI Thermal | EMI Thermal | 01992 510000 | www.emithermal.com | N | 800 | N/A | £20 | 100% | 12 | 200 | Y |
| Multiple Manufacturers | Materials Direct | +44 (0)1908 222 211 | www.materials-direct.com | N/A | N/A | £1,000,000+ | £0 | N/A | 5 | 55 | Y |
| Sanyo Denki | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 1,450 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Sunon | G.English Electronics Ltd | 0208 855 0991 | www.gelec.co.uk | Y | 3,500 | £1,000,000+ | £0 | 100% | 10 | 28 | Y |
| Sunon | Thermaco Ltd | 01684 566163 | www.thermaco.co.uk | Y | 3,500 | £450,000 | £100 | 100% | 7 | 15 | Y |
| Universal Science | Universal Science | +44 (0)1908 222 211 | www.universal-science.com | N/A | N/A | £1,000,000 | £0 | N/A | 5 | 55 | Y |

### TRANSFORMERS & INDUCTORS

| Manufacturer | Distributor | Telephone | Website | Franchised Distributor | No. of Lines for Principal | Stock Value for Principal | Minimum Order Value | % Lead Free for Principal Range | No. of Technical Support Staff | Total No. of Staff | Buffer Stock Facility |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Best Windings | Best Windings | 0044 (0)1394 448424 | www.bestwindings.co.uk | N | 300 | N/A | £100 | N/A | 2 | 24 | Y |
| Bourns | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 4,900 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Coilcraft | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 5,500 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| EPCOS / TDK | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 1,300 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Murata | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 6,900 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| TDK | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 4,050 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Vishay | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 1,200 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Wurth Elektronik | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 3,400 | N/A | 0 € | N/A | 50 | 2,500+ | Y |

### WIRELESS SOLUTIONS

| Manufacturer | Distributor | Telephone | Website | Franchised Distributor | No. of Lines for Principal | Stock Value for Principal | Minimum Order Value | % Lead Free for Principal Range | No. of Technical Support Staff | Total No. of Staff | Buffer Stock Facility |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DIGI | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 200 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Espressif | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 30 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Laird Connectivity | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 100 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Lantronix | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 25 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Microchip | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 150 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Murata | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 30 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Silicon Laboratories | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 150 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| Texas Instruments | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 20 | N/A | 0 € | N/A | 50 | 2,500+ | Y |
| u-blox | Mouser Electronics | 01494-427500 | www.mouser.co.uk | Y | 10 | N/A | 0 € | N/A | 50 | 2,500+ | Y |

| Manufacturer | Telephone | Website | Turnover | Location | Employees | Number of Surface Mount Lines | Approvals | BGA Capacity | Lead Free Manufacturer | Prototyping | Design Capability | Full Turnkey | Cables and Harnessing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alan Anderson Manufacturing Ltd | +44 (0) 333 322 7222 | www.aa-manufacturing.co.uk | £21m | Hertfordshire UK | 40 | 2 | ISO9001:2015 , IPC-A-610 | Y | Y | Y | Y | Y | Y |
| Challenger Solutions Ltd | 01245 325252 | www.challengersolutions.com | £14m | Essex/SE | 85 | 12 | AS9100 Rev D, ISO9001:2015, ISO 140001:2015, UL , CCC, IPC-610-G Class 3, TUV | Y | Y | Y | Y | Y | Y |
| CML Innovative Technologies (uk) Ltd | 01284 714700 | www.cml-it.com | £12M | UK/EU/China | 65 | | ISO9001, TS16949, UL ISO9001 2015, IATF 16949 2016 | N | Y | Y | Y | Y | Y |
| Corintech Ltd | +44 (0)1425 655655 | www.corintech.com | £16.9m | UK & Far East | 80 | 6 | AS9100, ISO9001, IPC-A-610 Class 3, J-STD-001 | Y | Y | Y | Y | Y | Y |
| Custom Interconnect Ltd | 01264 321321 | www.cil-uk.co.uk | £18.6m | Andover (Hampshire) | 130 | 6 | AS9100  ISO13485  ISO9001  IPC-A-610 Class 3 | Y | Y | Y | Y | Y | Y |
| Electronic Technicians Ltd | 01202 897722 | www.etluk.co.uk | £3.7m | SE | 50 | 2 | AS9100, ISO9001, ISO14001, IPC610/620 Class 3 | Y | Y | Y | Y | Y | Y |
| FermionX Ltd | +44(0)1903 524600 | www.fermionx.com | £6.5m | Worthing, W. Sussex | 56 | 3 | ISO9001:2015, ISO4001:2015, IPC-A-610 Class 2& 3, IPC-J-STD-001 | Y | Y | Y | Y | Y | Y |
| G&B Electronic Designs Ltd | 01420 474188 | www.gandbelectronics.co.uk | £4.6m | Hampshire | 60 | 2 | ISO9001, ISO13485, IPC-A-610, IPC J-STD-001, IPC 7711/7721 | Y | Y | Y | N | Y | N |
| GSPK Design Ltd | 01423 798254 | www.gspkdesign.ltd.uk/ | £1m | North Yorkshire, UK | 12 | 2 | ISO 13485:2016, ISO 9001:2015, GS ATEX 7422 | Y | Y | Y | Y | Y | Y |
| Hallmark Electronics Ltd | 01782 562255 | www.hallmarkelectronics.com | £2.4m | Staffordshire | 26 | 2 | ISO9001:2015, IPC-A-610 to Class 3, UL | Y | Y | Y | Y | Y | Y |
| Icon Electronics Limited | 01423 449080 | www.iconelectronics.co.uk | £8.5m | Hampshire & Yorkshire | 75 | 6 | AS9100, ISO9001, BS EN ISO/IEC 80079-34:2018 ATEX, IPC-A-610 Class 3 | Y | Y | Y | Y | Y | Y |
| Incap Electronics UK Limited | 01782 753200 | www.incapcorp.com | €169,8m | UK, Slovakia, Estonia & India | 2,500 | 22 | ISO9100, ISO14001, ISO13485, AS9100D, ISO45001 & IATF16949 | Y | Y | Y | Y | Y | Y |
| Industrial Electonic Wiring Ltd. | +44(0)1793 694033 | www.iew.co.uk | £5.5m | Swindon, UK | 60 | N/A | ISO9001:2015, IPC610, IPC620 | N | Y | Y | N | Y | Y |
| Jaltek | 01582578170 | jaltek.com | £15m | UK | 105 | 3 | AS9100, ISO9001, ISO13485, IPC-A-610 Class 3, (Certified IPC Trainer (IPC-A-610, J-STD-001 & J-STD-001 Space Addendum) | Y | Y | Y | Y | Y | Y |
| KEY-TECH ELECTRONIC SYSTEMS | 01592 597711 | www.key-tech.co.uk | £7m | Scotland | 65 | 2 | ISO9001:2015, J-STD-001, IPC-610/620 CLASS 3, IPC-7711, BS EN ISO13485:2016, ISO 13485 | Y | Y | Y | N | Y | Y |
| Nano Electronic Services Ltd | 01388 247152 | www.nanoelectronicservices.com | £1M | County Durham | 2 | 15 | ISO13485, ISO9001:2015 & IPC610 to Class 3 | Y | Y | Y | Y | Y | Y |
| Nemco Limited | 01438 346600 | www.nemco.co.uk | £15.9m | SE | 120 | 6 | AS9100, ISO9001:2008, IPC610/620 to Class 3, ISO14001-2004, SC21 | Y | Y | Y | Y | Y | Y |
| NOTE Group | 01753 746700 | www.note-uk.co.uk | £207m | UK/EU/China | 1,200 | 20 | IPC610 to Class 3, ISO9001:2015, 13485, 14001, 18001 | Y | Y | Y | Y | Y | Y |
| M-TEK (Assembly) Ltd | 01189 455377 | www.mtek.co.uk | £2.4m | SE | 30 | 4 | ISO9001,ISO14001, IPC-A-610 Class 3 IPC, IPC-7711/7721, WHMA-3620, Certified IPC Trainer | Y | Y | Y | Y | Y | Y |
| Pektron | 01332 832424 | www.pektron.com | £50m | E-Midlands | 350 | 8 | ISO9001, ISO14001, TS16949, BEAB, VCA, TUV, UL | Y | Y | Y | Y | Y | Y |
| Simtek EMS Ltd | 01843 233120 | www.simtekems.co.uk | £8.2m | SE | 77 | 3 | ISO9001:2008, ISO13485, IPC-A-610 Class 3 & IPC-7711 | Y | Y | Y | Y | Y | Y |
| TEXCEL TECHNOLOGY PLC | +44(0)1322621700 | www.texceltechnology.com | £15.5m | SE | 131 | 7 | ISO9001, ISO14001, IPC610 Class 3, | Y | Y | Y | Y | Y | Y |
| Tioga Limited | 01332 360884 | www.tioga.co.uk | £16m | Derby | 130 | 6 | ISO 9001, ISO 13485, ISO14001, IPC 610, 620, 7711/7721 | Y | Y | Y | Y | Y | Y |
| Wilson Process Systems | 01424 722222 | www.wps.co.uk | £12m | SE | 100 | 5 | ISO9001:2015, IPC-A-610 Class 3 | Y | Y | Y | Y | Y | Y |

# PCB Buyers' Guide

| Manufacturer | Telephone | Website | Service Provided (ie Broker/ Manufacture &/or Repair) | Location | Approvals | Volume - Small, Medium, Large | Double-sided | Multi-layer 4-10/10-20-20-30 | Metal PCBs | Ceramic PCBs | Heavy Copper PCBs | Flexi / Flexi-Rigid | Obsolescence Solutions | Modifications | Prototyping |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cambridge Circuit Company Ltd | 01223 423100 | www.cambridge-circuit.co.uk | M | SE | ISO9001:2015, UL, ISO 14001:2015 | SML | Y | 4-16 | Y | N/A | N/A | Y | Y | Y | Y |
| DK-Daleba Printed Circuit Boards | 01992 510000 | www.dk-daleba.co.uk | M | UK, Europe, Asia | ISO 9001:2015, UL, TS16949, JOSCAR | SML | Y | 4-58 | Y | Y | Y | Y | Y | Y | Y |
| GSPK Circuits Ltd | +44 (0)1423 798 740 | www.gspkcircuits.ltd.uk | M/R | UK, Europe, Asia | IS 9001:2015, IATF 16949:2016, EN (AS) 9100, Joscar | SML | Y | 4-34 | Y | Y | Y | Y | Y | Y | Y |
| Stevenage Circuits Ltd | 01438 761811 | www.stevenagecircuits.co.uk | M/B | UK/China | ISO 9001:2015, EN 9100:2018, EN 9104:2013, UL796, ISO 14001:2015 | SML | Y | 4-44+ | Y | N/A | N/A | F, F/R | Y | Y | Y |
| Tate Circuit Industries Ltd | 01543 622 435 | www.tatecircuits.com | M/B | UK/China | ISO 9001:2015, UL | SML | Y | 4-20 | Y | N/A | N/A | Y | Y | Y | Y |