ELECTRONICS
# sourcing
DECEMBER 2020
UK & IRELAND

## How will the UK supply chain perform in 2021?

*The answers begin on page 16*





AN MMG PUBLISHING TITLE


## On the cover – December 2020

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## Editor's Word

### Press go for growth

I always look forward to the December issue of *Electronics Sourcing*. It's an opportunity to ask a wide range of manufacturers and distributors for their experience over the past 12-months and their expectations for the coming year.

Every year, for the last decade, these Forecast features have typically delivered a diversity of views. Some contributors are bullish, others are bearish. Some see growth in one industry, others in a different sector. Not this year. This year is different.

Looking back, all the contributors seem to have had a common experience. The pandemic hit hard and hit fast. It disrupted supply and demand simultaneously. However, it also quickly became clear that big problems create equally big opportunities. Likewise, distributors are like smoothing capacitors, they exist to manage disruption. Distributors drew on their skills, experience, systems and stock and 'managed the problems away'.

Looking forward, all the contributors have a common expectation. 2021 is going to be a gangbuster year, driven by 5G, electrification, IoT, medical, AI and more. As one commentator put it 'even a global pandemic can't stop the mega trends'. Likewise, some distributors which monitor new design activity have said 2020 was a record year.

Summarising all the comments, distribution questions for 2021 will be more about pricing and availability than where is the next order coming from.

To be honest, the above is not what I imagined I'd be writing back in March. It just goes to show how resilient the world, the people and this industry really is.

Jon Barrett

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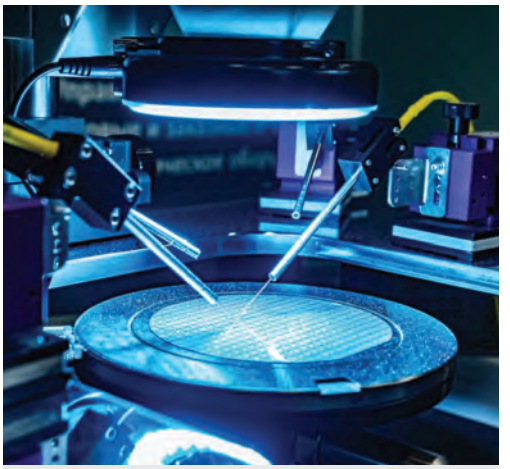
## ES News

### View current editions online

*www.electronics-sourcing.co.uk*



## Concept to shipping service for faster time-to-market

One of the biggest challenges for chip innovators is managing the supply chain from design to final shipping. To solve this, Sondrel is offering a turnkey service that manages every stage.

Sondrel's CEO and founder, Graham Curren, explained: "We have seen the issues that occur further down the supply chain after us so often that we now offer a complete service that extends to cover the whole supply chain."

The company's Silicon Operations Team supervises and manages all the companies that supply downstream stages after the design is done from liaising with the fabs through to selecting the most appropriate packaging OSAT, test development and logistics partner for shipping the final packaged and tested chips.

Silicon operations manager, Fabrice Debart, added: "This fully integrated, end-to-end service ensures that there are no discontinuities in the supply chain. It also means a faster time-to-market because we know where possible problems and bottlenecks may arise and how to solve them."

***www.sondrel.com***


## Intrinsically safe IoT batteries in stock

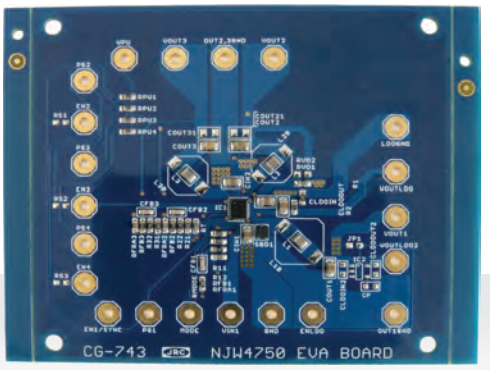
RS Components is now stocking CeraCharge, claimed to be industry's first rechargeable solid-state SMD battery from TDK. Small, easy to assemble, and intrinsically safe, CeraCharge combines the capacity of lithium-ion batteries with the safety and affordability of ceramic multilayer technology. It suits IoT devices from smart meters to wearables.

CeraCharge is based on a multilayer technology that resembles multilayer ceramic chip capacitors. Its solid ceramic electrolyte eliminates the risk of fire, explosion or leakage that comes with conventional liquid electrolytes.

CeraCharge comes in an EIA1812 case size. It can undergo reflow soldering and be connected in series or parallel. Operating temperature range is -20 to 80°C.

Offering over 1,000 recharging cycles, CeraCharge's 100µAh nominal capacity is approximately 1,000 times a conventional capacitor, but in the same case size.

***uk.rs-online.com***




## Small power management IC in stock

Rutronik UK is now stocking the NJW4750, said to be one of the market's smallest 4-channel power management ICs. Measuring 3.4 by 2.6mm, it incorporates three buck regulators and a LDO for precise voltage regulation.

Channel 1 is connected to the supply (40V max) and serves as the primary controller for the secondary synchronous buck regulators and the LDO. To increase flexibility, one of the two secondary regulators can be switched to LDO mode. Each controller has its own power-good pin and enables input, allowing for precise control of the output voltage during system power-on phase. The device is controlled either via the external sync input or via an internal oscillator, which covers a frequency range from 280kHz to 2.4MHz, enabling the use of compact coils.

Applications include industrial controls, camera systems, IoT boards, photoelectric sensors, single-board controllers, compact peripherals and sensors.

***www.rutronik.com***

# Differences in Argentine, Australian, and Chinese Plug Patterns


The Argentina plug is a Class I, 10A/250VAC which cycles at 50Hz. The standard plug rating in Australia is also 10A/250VAC. China's main grounded plug is also rated at 10A/250VAC. Are these sets compatible?

While the pin patterns for all three countries are similar, the wiring for the line and neutral are reversed in the Argentine plug as compared to the China and Australian plugs. And though the Australian and Chinese plugs appear similar—the Chinese pins are 1 mm longer than the Australian pins—the Australian plug will mate with the Chinese socket.

Australia's plug and socket is described in AS/NZS 3112 and its standard rating is 10A. The set can be terminated with many IEC 60320 connectors.

China requires that their plugs, couplers, and cable be tested by the China Quality Certification (CQC) center to obtain the China Compulsory Certification's "CCC" mark.

Argentina requires cord sets be approved by IRAM (mark) and the Argentine product safety mark.

# N
## ES News

## In Brief

**Solder dominates tin**
Solder still accounts for the largest global share of tin use, increasing slightly to 49 per cent in 2020. Forecasts for 2020 indicate global average decline of -8.1 per cent related to the pandemic, with China being much more positive. Some electronics use sectors were boosted by increased working and education from home.
*www.internationaltin.org*

**Expansion increases connector output**
Harwin has started production in its new Portsmouth-based manufacturing facilities. Providing an additional 1,200m² of factory floor, the facility is enabling the company to quickly and significantly scale up production of its high reliability connectors. The new equipment uses advanced Industry 4.0 technology to maximise efficiency.
*www.harwin.com*

**Attractive and ergonomic**
OKW has launched its new Smart-Panel wall-mount enclosures for intelligent building control and monitoring technology. They are designed to house modern control consoles in residential, commercial and industrial applications. They include building services systems, electrical installations, smart home, IoT/IIoT, wireless communications, measuring and control, medical and laboratory technology, security and access control.
*www.okw.co.uk*

**Cost effective switching regulators**
XP Power has introduced SVR surface mount and VR through-hole, non-isolated DC-DC switching regulators. With efficiencies of up to 96 per cent and operating temperatures of -40 to 85°C, the point-of-load devices are ideal as replacements for low efficiency linear regulators. They operate from a wide input range of up to 36V and feature a low quiescent current, making them suitable for a variety of applications and battery powered electronic equipment.
*www.xppower.com*


## First authorised global distributor for energy-harvesting PMICs

Mouser has announced a global distribution agreement with e-peas, a semiconductor company developing energy-harvesting PMICs, processing and sensing solutions. Mouser is the first authorised distributor to stock e-peas' products for immediate shipment.

E-peas' ICs suit applications such as industrial, building automation, agriculture, health monitoring and smart metering. The Ambient Energy Manager product line includes solar, thermal, vibration and RF methods for extracting energy to supply IoT devices.

The company's ICs are integrated energy management circuits that extract power from a harvester to simultaneously store energy in a rechargeable element and to supply the system with two independent regulated voltages. The ICs harvest input current up to 110mA, and integrate an ultra-low-power boost converter that operates with input voltages in a range from 50mV to 5V. With their unique cold-start circuit, they can start operating with empty storage elements at an input voltage as low as 380mV (50mV for thermal applications) and an input power of just 3µW.

***mouser.co.uk***


## Easy access to specialist memory

Flexxon has appointed Nexus Industrial Memory to distribute its industrial NAND flash products, including solid-state drives, cards, modules, standard form factor industrial removable memory devices and ICs. The agreement covers UK, Ireland, Germany, Switzerland and Austria.

Buyers now have easy access to Flexxon's data storage solutions which are designed for demanding applications within the cybersecurity, industrial, medical and automotive sectors.

Flexxon's sales director, Sky Chia, said: "Nexus has over thirty years of experience in sectors we're serving with our products. We're both 100 per cent committed to helping our customers make their data more reliable and secure, in harsh environment applications and in a world in which cyber-attacks are on the increase."

Nexus' managing director, Michael Barrett, added: "We're delighted with the appointment, as we've been aware of Flexxon's high-quality products for several years and have long-recognised how well they would fit alongside ATEK's Datakey products.

***www.nexusindustrialmemory.com***

## Quick access to current sensing

Digi-Key has expanded its Marketplace portfolio by signing Aceinna, a specialist in sensor, autonomous vehicle guidance and power management technologies. Digi-Key will be distributing the full range including RTK, INS, Tilt and IMU solutions, plus current sensing products.

Aceinna's integrated, AMR-based isolated Current Sensor family represents a single chip solution for high power conversions including those using fast switching wide bandgap silicon carbide and gallium nitride power switches.

Aceinna's CEO, Dr Yang Zhao, said: "By selecting Digi-Key as our key distributor partner, it will be much easier for developers and engineers worldwide to quickly receive access to the full breadth of Aceinna components and products."

***www.digikey.co.uk***

# E-procurement solutions improve purchasing efficiencies

*Farnell's regional sales director of UK, Ireland and Benelux, Mathew Thorpe, shows how e-procurement is improving productivity when purchasing components*

**Farnell's** regional sales director of UK, Ireland and Benelux, **Mathew Thorpe**

Market trends, exacerbated by the pandemic, have presented new challenges and opportunities. Buyers had to quickly adapt to working remotely, placing greater reliance on online buying tools. At the same time, the need to improve efficiencies and showcase cost savings have never been so important.

A key issue when moving to digital is cost. Many buyers in small or medium-sized enterprises cannot warrant an investment in a large ERP system. To fill the gap, suppliers and distributors have invested in low-cost solutions. Buyers can access easy to use, accessible and free e-procurement solutions. Farnell's iBuy is an established solution offering automation, stock control and reporting to streamline the procurement cycle.

One company using iBuy is Staffordshire-based Incap Electronics which specialises in PCB, electro-mechanical, cable and wire harness assembly. Incap buyer, Leanne Smedley, has used a range of e-procurement systems throughout her career. She found iBuy particularly user-friendly as it enables her to liaise seamlessly with Incap's expediters who are also home-based. Up to 12 staff use the iBuy system remotely.

Leanne said: "It's just so easy to use iBuy to check prices and lead times, review stock availability and place orders. All our buyers are currently managing their usual workloads from home and iBuy has been brilliant. We are still processing the same volume of orders and can operate in the same way as before. Navigating through the system is easy and efficient. iBuy speeds up the process of placing orders and it is simple to schedule orders in advance and specify delivery dates. There's also an option to request a quote when we need to increase our order quantities."

Another company benefiting from iBuy is Derbyshire-based contract electronics manufacturer, Zeal Electronics. The company has been using iBuy since 2013 and, according to MD Daniel Hagin, the system helps Zeal turn orders around rapidly. Zeal uses iBuy with Farnell's ePass API (application programming interface) to automate the buying process and increase efficiencies by eliminating duplication of effort.

Daniel said: "We are doing a lot more online buying these days and iBuy is just so easy to use. It simplifies the whole process and is really flexible. We can specify custom fields, easily input urgent jobs as required, and more efficiently meet the deadlines that our customers set us. The automated alerts to approve smaller purchases are very helpful.

"One of our biggest strengths is that we offer fast turnaround and iBuy definitely supports us to achieve this. Any time we save on procurement directly enhances our customer service offering. We have won a lot of new business out of being more efficient and speed is extremely important in our business.

"We have so much work on now, so we need to turn things around quickly. We have 40 employees at our facility of which five are part of a strong technical team who feed into the iBuy system. IBuy enables our team to speed everything up and cut time checking or kitting when product arrives on-site. The iBuy system is going to play a key role in our future growth."

*uk.farnell.com*

## Super fine TFTs are full HD

RDS is offering a range of super fine TFT (SFT) Tianma Displays. Sizes are 11.6, 13.3, 15.6 and 18.5in Features include LVDS or eDP interfaces and backlight luminance from 400 to 1500cd/m$^2$. An anti-glare surface coating boosts daylight/outdoor viewing.

A temperature range of -30 to 85°C underpins stable performance even under harsh conditions. Proprietary wide-angle technology and super fine TFT are designed to provide ultra-wide viewing angles of 88deg in all directions without significant change in brightness or colour. These wide viewing angles support portrait or landscape mounting.

These displays also benefit from long-term availability.

Touch functionality, either resistive or PCAP, is also available. Designs can include custom sensors and cover glass solutions, with printing options such as logos and optical bonding to enhanced daylight viewability and impact resistance. EMI shielding, anti-reflective, anti-glare and anti-fingerprint surface treatments are also offered.

***www.review-displays.co.uk***


## Integrated displays ease installation

ViewSonic is introducing its latest all-in-one direct view LED Displays, which integrate display, image stitching, power supply and control systems to ease installation, operation, and maintenance. Applications include lobbies, auditoriums, boardrooms and conference rooms.

The displays support wireless presentation and can operate as a large interactive display via ViewSonic´s ViewBoard or touch monitor.

The ultra-thin and lightweight display is 35mm thick, while the slim bezel measures 10mm. For easy installation, operation and maintenance, multiple pre-assembled and pre-calibrated panels eliminate the need for a complicated setup process. The modular design, with wall mount or floor stand, allows easy installation which can be completed by two people in two hours. The system supports swappable modules, control systems and 100 per cent full front-maintenance using an electric vacuum suction tool.

***viewsoniceurope.com***

## Anti-bacterial film for any touch screen display

Display Technology is offering an anti-bacterial solution for public touch systems. GermBlok is an anti-bacterial film featuring a nano-silver anti-bacterial solution. It has been tested with the JIS Z2801 method using E coli and Staphylococcus aureus with resulting anti-bacterial value of R≧2 (99.99%).

Nano-silver is useful as an antibacterial because as overall silver surface area increases, contact with bacteria cells is also increased which enhances bacterial inhibition. Silver ions work by perforating the glycoprotein structure of the bacterial cell wall.

With a thickness of 155μm with a greater than 90 per cent transparency, AMT GermBlok film has a relatively small effect on LCD picture quality. GermBlok backing adhesive is silicone based, easy to apply, resists bubbling and seals well.

***www.displaytechnology.co.uk***

## Customisable mid-travel tact switch offers soft sound

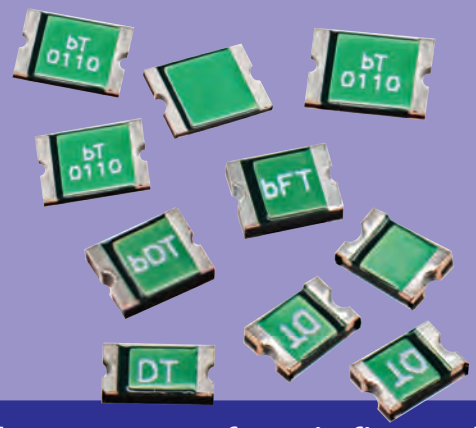
C&K has added a 12mm mid-travel tact switch with soft sound and positive haptic feeling solution. Featuring a 12 by 12mm footprint, the SFS series is rated to IP40 and supports up to 300k cycles. Three customisable actuation forces include 360, 680 and 970gf.

Offering soft sound and positive tactile feedback, the SFS series is commonly used in vehicle interiors, industrial automation and medical equipment control applications.

The switch has gold plated contacts designed to provide reliable switching with low contact resistance capable of handling the low currents. Available with SMT terminals, the SFS series reduces process time to deliver production costs saving for OEM/EMS manufacturers.

Specifications include 35VDC, 100 mA, 1W, 100 milliohms contact resistance, and -40 to 90°C operating temperature.

***www.ckswitches.com***




## High temperature fuses in five packages

Bel Fuse has announced its 0ZT series high-temperature SMD resettable PPTC fuses for automotive, ethernet and other applications which require a high operating temperature range of -40 to 125°C.

The fuses are small surface mountable, solid-state resettable fuses which feature a faster time to trip and lower resistance than standard SMD devices. All are AEC-200 compliant and suit automotive applications such as infotainment, climate control, lighting, advanced driver assistance and security.

RoHS 2 compliant, the fuses are halogen and lead-free. They are packaged in tape and reel for the auto-insert SMD process and meet the Bel automotive qualification, based on the AEC-Q200 test plan. The 0ZT series is stocked by Digi-Key, Mouser and Arrow in 2,000, 3,000, or 4,000 pieces in tape and reel.

***belfuse.com***

## Long cable, no problem

Switches used in wet rooms, spa and pool facilities often require unusually long cables. Schurter is meeting this requirement with its installation-ready PSE piezoelectric switch.

The pre-assembled polyurethane cable is potted, offering maximum flexibility and the highest IP protection. Waterproof from switch surface to connection, the cable is 15m long.

The stainless-steel housing resists corrosion, while the long service life is quoted at 20 million actuations. The cable resists chlorinated liquids and common pool chemicals.

The actuator has ring illumination with seven display colours. The five to 28VDC supply voltage maintains a constant brightness.

Originally developed for spa and pool applications, the technology suits any sanitary application such as medical, food processing and industrial

***schurter.com***

## Rugged CAN keypad suits harsh environments

EAO has expanded its Series 09 product line with a rugged CAN keypad and rotary cursor controller. Designed for E1 applications, the products are designed to offer functional safety compliance and CANbus integration in harsh environments.

The keypads are available in multicolour RGB four-segment halo-ring illumination, allowing for easy recognition of equipment status. Colours can be set for specific functions, animated with chasing/running or flashing sequences, and are programmable to add increased levels of awareness. LED intensity can be dimmed.

The rotary cursor controller features: full rotary function with 22 maintained positions; continuous rotation with no stop position; and a push function. It also features LED symbol illumination on the pushbuttons and LED halo illumination on both pushbuttons and the rotary cursor.

Typical applications include: roadmaking vehicles, cranes, rescue vehicles, garbage trucks and agricultural vehicles.

These modules are designed to ISO 26262 ASIL B and EN ISO 13849 PLD. Sealing levels are up to IP67.

***www.eao.com***

## Anti-vandal switches provide time saving termination

ULV series anti-vandal switches provide termination options including: solder lug, direct wired, wired moulded boot and detachable wired socket.

Regarding benefits: the solder lug option can be wired in-house; the direct wire option provides 300mm colour coded wire leads; the low pressure moulded boot with 500mm long wire leads provides extra protection to wire cables and solder joints; and the detachable socket provides a quick connect option between the switch and power source.

These termination options provide convenience and eliminate in-house labour/second sourcing, thus reducing lead-time and overall cost.

The UL certified series is available in three panel cut outs of 19, 22 and 25mm. Rated IP67 for dust and moisture protection, the switches are available in three finishes: nickel plated, stainless steel or black anodised. Options include function, lens style, non-illuminated or illumination colours and illumination voltage.

Applications include vending and ticket dispensers, electrical housewares, medical equipment, audio/visual equipment and dashboards on off-road, auto and boating vehicles.

***www.e-switch.com***

## TACT switches deliver joystick functionality

Offering a flexible solution to HMI control functionality the MEC Navimec switch concept offers a circular soft-touch TACT switch with joystick functionality. They allow navigation up, down, left and right, plus a centre function typically used as an enter key. Navimec switches are available with or without illumination. Non-illuminated versions may be over-printed.

Standard cap colours include grey, white, black, frosted white, ultra-blue, dusty blue, aqua blue, metal dark blue, metal light grey, metal dark grey and metal Bordeaux. Standard legend options include numeric, text and symbols. Legends can be pad printed or laser marked. Operating temperature range for solid cap versions is -40 to 65°C and for a transparent cap -40 to 85°C. Height above panel is 12.20mm.

The switch is available as a module or single parts for PCB mounting.

***www.4most.co.uk***

Exclusively sponsored by Digi-Key Electronics

# Will supply or demand be the problem in 2021?

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

*In this article, John Denslinger paints a picture of a fog of Covid uncertainty, then offers some tools to navigate a path through including a quick fix called stock*

Forecast • By John Denslinger

Conventional forecasts and resultant budgets typically track one of two models. When forecasted demand signals growth, additional manufacturing capacity is planned assuring ample supply. Similarly, when forecasted demand is depressed, planning typically shifts to spending cuts and cost control dampening supply. 2021 might be a challenge though.

Component manufacturers may find difficulty capturing true demand and syncing that to a timely supply plan. So, how does that differ from past planning practices? In a word, Covid-19. To borrow a weather analogy, Covid is dense fog. Visibility is clouded. Supply disruptions are just around the corner but you can't see it. Demand is there but perhaps just as obscure. In this situation, the tendency is to plan conservatively.

Here's the dilemma. By all accounts, 2021 demand is projected to be a growth year. Yet multiple Covid waves are anticipated. Lockdowns and other restrictive measures tend to stifle demand more than supply. Even if subsequent wave amplitudes gradually moderate, B2B and especially B2C demand will certainly be bumpy at best. Given this scenario, the unintended consequence of a conservative forecast may be insufficient supply.

But supply has its own disruptive factors: plant closures, reshoring operations, retraining of workers, virus proofing manufacturing workplaces, labor shortages, etc. Restarts have not been smooth either. There are several reports suggesting employee attendance is erratic. Then there is a concern about upstream suppliers who seem ill-prepared for rapid shifts in demand. Perhaps it's because more than a few are facing severe liquidity problems. Procurement may find itself in a no-win situation. Surges in demand will require immediate resourcing. Drops in demand will necessitate unplanned push outs. Each driven by little visibility.

Shortages in the general market are nothing new to procurement. The cause is often traced to specific events such as a natural catastrophe, new technology adoption or key supplier failure. Covid, on the other hand, disrupts unevenly. Global supply networks must react swiftly to local and national policy changes. Since the pathogen is unpredictable, the directives that affect industrial efficiency and output are at risk as well.

As always, some mitigation is possible. A number of publications report suppliers are reshoring operations away from China and closer to markets served. Likewise, procurement organisations have responded with in-house solutions of their own: ending sole sourcing; implementing more of a geographic diversity sourcing; augmenting supply chain transparency and visibility with advanced technologies; and the quickest fix of all: creating a larger, more robust safety stock.

In a perfect world, supply and demand are always in balance. Unfortunately, this is a Covid world. 2021 foretells a powerhouse year in several market segments: 5G, IOT, EV, AI, massive data centers, and healthcare to name the major drivers. So the question remains, will it be supply or demand that upsets a much anticipated banner year for electronic components?

# Encouraging signs of growth

***Rutronik's country manager UK, Guy Dann, sees the ongoing rollout of 5G as one of the key drivers of growth in the UK's electronic component distribution industry***

*Covid has impacted the electronic component supply chain in 2020, how do you envisage the market will perform in 2021?*

In recent months there have been encouraging signs of growth, with global sales of semiconductors up 11 per cent in Q3. We are confident that this trend will continue in 2021. Looking at the UK specifically, Rutronik has been experiencing steady growth throughout 2020, particularly in sectors such as security and automation. We are confident that we can keep the momentum going and continue to deliver high levels of customer service.

*How do you envisage Brexit will impact your business and within the supply chain?*

At the time of writing, we still don't know what the trading relationship will be with the EU. As a global, broadline distributor of electronic components, we can count on our robust supply chain. With our experience in transporting goods around all markets and across all borders, we have the expertise to manage any additional requirements that Brexit may bring.

*What are the positive forces that will push the electronic component distribution industry forward over the next 12 months?*

The ongoing rollout of 5G in the UK will continue to be one of the key drivers behind the growth of the electronic component distribution industry. The expansion of e-mobility will be another major driver, with the UK Government now planning to ban sales of petrol and diesel cars as early as 2030.

We are also seeing growth of technologies such as Bluetooth, with the recently introduced Low Energy Audio standard. The medical sector is, clearly, another important area of growth and so is industrial connectivity.

We feel that our ability to rely on a resilient supply chain and distribute components to virtually any markets, will be a key differentiator for us. We will also continue to invest in our value-added services.

*www.rutronik.com*

**Rutronik's** country manager UK, **Guy Dann**

# 2021: a boom year

***Anglia Components' CEO, Steve Rawlins, is planning for a busy 2021 as inventories are replenished and manufacturing projects are fast tracked***

Anglia Components' CEO, Steve Rawlins

*Covid has impacted the electronic component supply chain in 2020, how do you envisage the market will perform in 2021?*

Lead times are lengthening and the market is firming up. Fabs are filling up rapidly and forecasters are predicting 11per cent growth or more in 2021: admittedly from a very low base in 2020. Although this may sound surprising, the reasons aren't hard to see. In an uncertain economy, customers burn through their inventory and we are starting to see demand growing as they replenish. Also, high volume customers in the automotive and consumer sectors are ramping up quickly. New consoles are coming up and demand for 5G is kicking in. We expect to see lead times lengthening in 2021. It may even be a boom year.

*How do you envisage Brexit will impact your business and within the supply chain?*

Anglia holds its inventory in the UK and likes to maintain a high level in proportion to the business' size. This puts us in the best possible position to buffer UK customers against any short-term disruption as we exit the EU. We've also made in-plant stores an economic and practical option via Anglia 80/20. Customers just scan out stock as they use it and we replenish it automatically, providing a buffer in their warehouse.

Many customers are concerned about customs checks, duties and freight costs. Much of our stock comes from Japanese and other Asian suppliers, so these are largely unaffected by Brexit. Some supplies are routed via EU hubs so we may see some disruption while replenishing our own inventory. This will be minimised by working with customers and suppliers to plan ahead.

*What are the positive forces that will push the electronic component distribution industry forward over the next 12 months?*

Healthcare is booming but so are access controls, smart buildings and other public safety/well-being applications. Covid has accelerated technologies and concepts by up to ten years. Customers are shifting from 'we could add this function' to 'we must add it.' Projects sitting on shelves awaiting funding have been dusted down and implemented.

*www.anglia.com*

# 5G, IoT and sensing push ahead

***As demand rises, Mouser Electronics' Mark Burr-Lonnon urges buyers to focus on authorised distribution to ensure supply chain continuity and part traceability***

*Covid has impacted the electronic component supply chain in 2020, how do you envisage the market will perform in 2021?*

Against the backdrop of a global pandemic and economic downturn, we remain cautiously optimistic. It's really too soon to predict how manufacturing will play out as we come out of the global shutdowns from the pandemic, but at Mouser we are planning for growth ahead in 2021. The use of electronic devices and systems still seems to be strong worldwide.

*What are your thoughts on the global economic outlook?*

As an essential infrastructure business and part of the global supply chain, Mouser is still shipping hundreds of thousands of components weekly. We are continuing to receive and ship products for our customers around the world and we expect to see our international business continue to increase steadily, particularly as the global economy rebounds from the pandemic.

Fully operational at all 27 of our global locations, the entire Mouser team is working diligently to provide the world's broadest selection of electronic components, in stock and available. Keep in mind, we always consider the needs of our customers and make it our focus to stock and ship the newest products from our 1,100 manufacturer brands. Currently, we have over $855 million (USD) of inventory, ready to ship same day.

*What are the positive forces that will push the electronic component distribution industry forward over the next 12 months?*

Combined with the onset of 5G technology and increasing numbers of IoT-enabled applications and smart sensor technologies, we will likely see an acceleration of the digital revolution across many industries. Once market stability returns, the biggest challenge will be keeping up with demand. This is why it's more important than ever to purchase components from an authorised distributor to ensure continuity and traceability in the supply chain.

Mouser is excited and poised to handle the growth ahead. We've just completed a major expansion at our global corporate headquarters and distribution center in Texas, where we are stocking over one million different SKUs. We're investing heavily in state-of-the-art automation to streamline our logistics operations to serve our customers with inventory, accuracy and speed.

*www.mouser.co.uk*

**Mouser Electronics'** senior vice president of global service & EMEA and APAC business, **Mark Burr-Lonnon**

# Projects moving forward

***Digi-Key's director EMEA Business Development, Ian Wallace, has seen good recent momentum of customers wanting to move their designs to manufacturing***

*Covid has impacted the electronic component supply chain in 2020, how do you envisage the market will perform in 2021?*

September and October showed strong growth for Digi-Key in EMEA. Whilst I see challenges ahead for our lives in general and the electronics industry, I have seen good recent momentum of customers wanting to move their designs and projects forward and commence manufacturing. For 2021 I feel there will be strong activity from markets such as IoT, medical, IT infrastructure, AI and factory/home automation.

*How do you envisage Brexit will impact your business and within the supply chain?*

Brexit seems to have taken a backseat whilst Covid disrupted our lives. The transition period ends January 1, 2021 and there are still many points to clarify. The one point I would like to clarify for our customers is that we don't have a warehouse location in the EU or the UK. Therefore, we won't be shipping product from either region to the other. All our product is shipped out of the USA, so I don't foresee any major disruption to our current service.

*What are the positive forces that will push the electronic component distribution industry forward over the next 12 months?*

Customers have been adapting, showing flexibility and resilience during a tough 2020. Building on that, I see many companies progressing in 2021, maintaining or increasing productivity despite the difficult situation.

I think there will be some extending lead times on specific product categories so Digi-Key is investing in more inventory.

*www.digikey.co.uk*

**Digi-Key's** director EMEA Business Development, **Ian Wallace**

> "For 2021 I feel there will be strong activity from markets such as IoT, medical, IT infrastructure, AI and factory/home automation

# Strong demand from medical and industrial

***Charcroft Electronics director, Debbie Rowland, predicts new opportunities will emerge for applications supporting deep cleaning, sterilisation and safe working***

*Covid has impacted the electronic component supply chain in 2020, how do you envisage the market will perform in 2021?*

Inspiration and flexibility will be the drivers for 2021. For customers in harsh and high-end sectors, there have been changes in the pattern of demand which will continue into next year. The down-hole and rail sectors have seen lower demand or had projects pushed out, but demand has been strong from the military and industrial sectors.

Next year, new opportunities will emerge for applications which are designed to support deep cleaning, sterilisation and safe working conditions. A response to these opportunities will be seen in the medical and industrial sectors.

*How do you envisage Brexit will impact your business and within the supply chain?*

For Charcroft, the impact of Brexit will be minimised because all inventory will be held and shipped from the UK, rather than from the European warehouse hubs used by global distribution. The profile of the inventory has been matched to meet predicted demand in addition to customer forecasts. The combination of UK-based, in-house manufacturing and specialist technical support will provide alternative components to help customers to overcome potential delivery issues.

*What are the positive forces that will push the electronic component distribution industry forward over the next 12 months?*

Across all quality-led and industrial sectors, customers must rely on distribution to maintain the highest levels of on-time delivery to enable the industry to react to a changing world.

*www.charcroft.com*

**Charcroft Electronics** director, **Debbie Rowland**

# Companies cannot stand still

***Micronel UK director, John Roe, expects a K-shape recovery in 2021 with certain sectors performing well while others will be slower to recover***

*Covid has impacted the electronic component supply chain in 2020, how do you envisage the market will perform in 2021?*

Micronel blowers are used in air moving applications and we expect demand to continue for medical and scientific applications, from breathing therapy to personal protection. Our customer base fits a K-shape recovery such as medical continuing to grow, whilst aerospace was harder hit.

The second wave is holding back investment and low business confidence will weigh on recovery. New project design activity continues but many companies are 'making what they sell' and 'selling what they make' until they are confident to invest in new product launches/updates.

*How do you envisage Brexit will impact your business and within the supply chain?*

The Government is telling companies to prepare for Brexit without explaining how. Micronel products come from Switzerland which is outside of the EU. However, road shipments could face disruption at ports and customs next month. Consequently, Micronel UK is increasing buffer stocks and looking at direct airfreight as a contingency. Longer term, the pandemic and Brexit uncertainty could lead to more reshoring and an appetite for UK-based production.

*What are the positive forces that will push the electronic component distribution industry forward over the next 12 months?*

Eco-friendly product development will continue, such as Micronel's latest industrial blower products which are designed to provide energy savings. Everything from factory automation to homecare will become more connected via 5G and IoT technology, including app feedback for AI monitoring and control.

*www.micronel.co.uk*

**Micronel UK** director, **John Roe**

# Expecting a hard bounce back

***Astute's owner & managing director, Geoff Hill predicts the world will bounce back, and when it does it will bounce back hard***

*Covid has impacted the electronic component supply chain in 2020, how do you envisage the market will perform in 2021?*

We're maintaining a positive outlook for 2021 with an expectation of a hard bounce-back during Q2. We're anticipating an industry-wide back-to-business response on two fronts: to stimulate and regain the momentum of fast-growing industries as well as reinvigorating the worst affected industries: automotive, aerospace, aviation, rail and industrial automation.

Disruption and shortages are likely to continue. We'll need to remain versatile and responsive: mixing short-term ordering to fill gaps with longer-term commitments put in place as production returns to normal. The period will be marked by shorter forecasting as customer demand fluctuates, and probably more urgency to make short-term decisions.

*How do you envisage Brexit will impact your business and within the supply chain?*

Brexit's impact on our electronics distribution business will be minimal, as we're highly experienced at global supply-chain planning. However, there may be some aspects which, try as we might, we can only minimise such as shipping and short-term delays with customs processes.

We protect our customers by ensuring we understand and observe the latest changes within export controls, tariffs, trade agreements and geo-politics, and we advise them accordingly. UK and Japan have already signed a free-trade agreement and we remain hopeful there will be many more deals struck at least at bi-lateral level in 2021, particularly within the Commonwealth.

*What are the positive forces that will push the electronic component distribution industry forward over the next 12 months?*

**Astute's** owner & managing director, **Geoff Hill**

We live in a world increasingly defined by electronics with greater consumption every year. There's no stopping the continuous innovation of AI, IoT, 5G, cyber applications, driverless vehicles, wearable electronics, medical devices, consumables, satellites and even space travel applications. Yes, it's been a difficult year, but the world will bounce back, and when it does it will bounce back hard.

*www.astute.global*

# Plan and forecast for a strong 2021

***Fusion Worldwide's sales director EMEA, Behzad Monfared list the 5G, automotive, datacentre and AI/IoT sectors as leading drivers in 2021***

*Covid has impacted the electronic component supply chain in 2020, how do you envisage the market will perform in 2021?*

With 2021 quickly approaching, we are expecting a lot of volatility in supply chains due to the unpredictability of global markets. Because of the uncertainty of the pandemic, the biggest challenge is market planning and forecasting. It is difficult to predict what may be affected and when. As governments mandate additional shutdowns due to spikes in cases, factories around the globe will be impacted on varying levels, causing supply shortages and significant uncertainty for manufacturers, transportation providers and suppliers.

*How do you envisage Brexit will impact your business and within the supply chain?*

It's difficult to say how exactly Fusion Worldwide will be affected without the details of a final Brexit deal, but what we do know is that it will have an impact on the way we do business with UK customers. Because of the additional taxes, import charges, currency fluctuations and likely rise in long-term freight cost, the overall cost of trade for both importing and exporting parties is expected to rise.

*What are the positive forces that will push the electronic component distribution industry forward over the next 12 months?*

The biggest industries that will push the industry forward in the coming year includes: the rollout of 5G; rebound of the auto sector; increased need in datacentres; and an increasing reliance on AI/IoT. Also, demand for applications like 5G base stations, gaming applications, servers and computers/notebooks has remained strong and is expected to continue in the coming months. The growth of these industries will lead to a strong 2021.

**Fusion Worldwide's** sales director EMEA, **Behzad Monfared**

*www.fusionww.com*

# Investing in customer support

***As PEI Genesis' senior vice president & MD Europe, Jonathan Parry, explains, the company is investing in phone, online and in-person support for a post Covid/Brexit world***

*Covid has impacted the electronic component supply chain in 2020, how do you envisage the market will perform in 2021?*

I see that businesses are learning to adapt and continue to trade with established and reliable supply chain partners who have the strength, experience and capabilities to provide a dependable service. With the combined uncertainty around Brexit it has never been more important to have solid contingency plans, good communications and of course, great people in your organisation.

*How do you envisage Brexit will impact your business and within the supply chain?*

We now need to just get Brexit done. PEI Genesis has been planning for Brexit ever since the 2016 referendum and as an established global company we are already exporting to the four corners of the world. We are staying close to the final stages of the UK/EU negotiations to be able to respond to any last minute deals, but even in the case of a hard Brexit we have worked with our supplier partners and our logistics companies to ensure we maintain an uninterrupted service to all of our customers.

*What are the positive forces that will push the electronic component distribution industry forward over the next 12 months?*

There are undoubtedly many projects and industries in a holding pattern right now. As we move beyond Covid and Brexit, I believe that we will see growth coming back and a more optimistic return to business sentiment. We are tailoring our customer services to support customers in person, over the phone or online with significant investments coming onstream in 2021.

*www.peigenesis.com*

**PEI Genesis'** senior vice president & MD Europe, **Jonathan Parry**

# Megatrends don't go away

***Rapid Electronics' MD, James Bates, reminds readers that over time megatrends develop into new specialised industries which underpin future growth***

*Covid has impacted the electronic component supply chain in 2020, how do you envisage the market will perform in 2021?*

The supply chain has been impacted with shortages in specific materials, delays to manufacturing due to local restrictions and reduced capacity in sea and air freight. This is already delaying development, restricting manufacturing output and driving up costs. Confidence should gradually increase over time as the growth areas (green energy, electric vehicles etc) and new opportunities are maximised.

*How do you envisage Brexit will impact your business and within the supply chain?*

We have probably seen a bigger impact from Covid on the supply chain than we will see from Brexit. In my view the worst has already happened. The main impact is on the level of accountability. We will have to increase our due diligence on products purchased from the EU. Many manufacturers don't understand their compliance obligations and we spend time helping them to reach our standards. This will be a big learning curve for UK distributors or manufacturers working on behalf of European counterparts.

*What are the positive forces that will push the electronic component distribution industry forward over the next 12 months?*

Megatrends don't go away; they simply develop into new specialised industries and we will not see any difference in 2021. I do think however, there is a revised appreciation of our lives and freedoms which has even led businesses to be more grateful for the opportunities available to them. 'Local is the new Global' may be a poor catchphrase, but the sentiment has meaning which suggests big isn't necessarily better.

*www.rapidonline.com*

**Rapid Electronics'** MD, **James Bates**

# Frequency control: past, present, future

*ECS plots trends in the frequency control space, offers advice on avoiding counterfeits and explains how it has managed to maintain supply during the pandemic*

**Q Focusing on crystals and oscillators, what supply chain trends has ECS witnessed over recent years and what predictions can you share with electronics purchasing professionals for coming years?**

In the global frequency control space, we have seen some consolidation and even manufactures completely drop out of the industry. Due to the tariff issues beginning in late 2018 and almost all of 2019, we experienced a market softness due to an abundance of inventory in distribution. This forced a few manufactures to drop their expansion plans completely or to push them back. The market has rebounded in 2020 and there are discussions about expanding factory capacities.

This is an interesting question as it relates to what electronic purchasing professionals need to be aware of when it comes to frequency control products. Our main targeted audience is the electronic engineering design community, and our engagement with design teams is paramount to our success. Once awarded a design win, it is handed off to a procurement team within the customer's organisation.

**Q Counterfeit and obsolete components are ESNA's readers' biggest supply chain threat. How are frequency component suppliers responding to this challenge?**

Many times the procurement community tries to maximise margins by finding a low-cost source without ensuring that they buy products through an authorised distributor. This sometimes is when issues surface that can create havoc for all, referring to counterfeit product. The issue is growing and is problematic for everyone in the electronic component world. It's unfortunate that there are operations that will claim to have our products in inventory and for sale. Typically, these parts are at a reduced cost, when in fact someone has forged our name on product that was not produced by us.

The lesson here is that the procurement teams must buy from our authorised distributors to eliminate counterfeit product. These counterfeit products have a high probability of being inferior and will cause product quality issues. When issues arise engineers will need to revert to ECS. Solving issues caused by counterfeit products can be complex and very expensive.

The issue with counterfeit products will continue for the foreseeable future because it's virtually impossible to find a solution. Procurement professionals also need to partner with their frequency control supplier of choice to ensure they are getting the quality component that was designed in by their engineering team.

Over the next decade there will be fewer frequency control sources due to consolidation and others exiting or closing their business. The buyers of these products need to perform their due diligence to ensure that they are working with companies such as ECS that have been around for over 40-years and will be around for another 40-plus years.

**Q How has ECS adapted during Covid-19 to ensure a stable supply chain?**

In the time of global pandemics and shutdowns, we have seen the supply of raw materials and finished goods slip out significantly. What was once <10 weeks is now over 16-weeks for build to order products. When managing inventories in the supply chain, it is vital to understand how and where products are used and keep an eye on product inventory trends. Following these market indicators and reacting to internal lead times and the manufacturing process times, allows us to maintain a constant flow of products to the market. Lead times are also mitigated by keeping significant quantities of product in our distribution sales channel.

*www.ecsxtal.com*

## Oscillator handles declining voltage

IQD has launched its IQXO 951 series standard packaged clock oscillator series, which operates from 1.6 to 3.3V. Many industrial and consumer applications use batteries as their power source. Thus, products must handle voltage changes as the battery discharges. This can lead to issues when using a standard oscillator with a fixed supply voltage. A discharging battery may cause a decrease in source voltage, which changes the oscillator frequency, leading to a decline in timing accuracy.

Measuring 3.2 by 2.5mm, 2.5 by 2.0mm or 2.0 by 1.6mm the device offers standard stability of ± 25ppm over the industrial temperature range from -40 to 85°C. An extended temperature range offers 125°C.

The oscillators suit most battery powered applications in telecommunications, IoT, communication, medical and more. Customers can reduce their BoM by using a single part instead of multiple oscillators with fixed supply voltages.

***www.iqdfrequencyproducts.com***


## Ready for base station applications

Crystek's CVCO33CC-2500-2500 voltage-controlled oscillator operates at 2500MHz with a control voltage range of 0 to 3.3V. Typical phase noise of -110dBc/Hz @ 10kHz offset. Output power is 5dBm minimum.

Engineered and manufactured in the USA, the device is packaged in an industry standard 0.3 by 0.3in SMD package. Input voltage is 3.3V, with a typical current consumption of 20mA. Pulling and pushing are minimised to 5MHz pk-pk and 1MHz/V, respectively. Second harmonic suppression is -20dBc typical.

The product suits applications including digital radio equipment, fixed wireless access, satellite communications systems and base stations.

***www.crystek.com***


## Ruggedised oscillators offer extended temperature range

Euroquartz has launched a new range of surface mount ruggedised clock oscillators offering an extended industrial operating temperature range from -40 to 105°C. They are manufactured in Euroquartz' UK-based cleanroom and are free of ITAR restrictions.

The EQXO-75UIE series crystal oscillators are designed to offer high-reliability in a standard format 7 by 5mm SMD ceramic package with hermetically sealed metal lid. Mechanical shock survivability is tested to 1500g Temperature stability options are ±50, ±75 and ±100ppm, tighter on request.

Featuring phase noise performance of -164dB/Hz (typical) at 100kHz and femtosecond integrated phase jitter of 150fs typical (12kHz to 20MHz integrated), the oscillators are available in frequencies ranging from 2.0 to 60.0MHz.

Additional specifications include LVCMOS output logic, 15pF load, rise time of 10ns maximum, start-up time of 3ms maximum and enable/disable function as standard. Current consumption is 6 to 16mA maximum depending on frequency. Ageing is ±1ppm maximum for first year with standard pre-age bake beyond 96 hours at 100°C and custom crystal pre-ageing options available. Solder profile is 260°C max.

***www.euroquartz.co.uk***

# Buyers may face rising prices and longer lead times in 2021

*Buyers are concerned there could be more shutdowns of electronics production in 2021 as uncertainty created last year by the pandemic carries over into 2021*

Possible shutdowns of component production because of coronavirus, rising prices for copper and other metals and potential shortages of multilayer ceramic capacitors, power MOSFETs and other components are some of the supply chain challenges that electronics buyers say they will face in 2021.

Covid-19 will remain front-and-center for many buyers in 2021 as the number of cases of coronavirus reached record levels in the U.S. and other countries in the fourth quarter stoking concerns that there could be more shutdowns or slowdowns in electronics production.

Judy Kile, senior manager, GE Healthcare Sourcing, based in Chicago, said she expects Covid-19 will continue to impact the supply chain and ability of suppliers to produce and deliver components in 2021."We will continue to monitor the supply chain closely through the first half of 2021 for allocation, lead time extensions and price fluctuations," said Kile. "We continue to see regions impacted by Covid closures and lockdowns as well as natural disasters and economic influences which have the potential to tighten the supply chain for some suppliers," she said.
Jamey Mann, director of global purchasing at electronics manufacturing services (EMS) provider Kimball Electronics, based in Jasper, Ind., said the unpredictability of this pandemic has the "potential to again cause negative influences on supply." He said as the number of Covid-19 cases have increased in the fourth quarter some countries could decide to reinstitute lock down measures in an effort to reduce the spread of the virus.

"What effect, if any, that will have on manufacturing is yet to be determined," said Mann. "Measures that could be implemented by government such as shutting down all businesses for multiple weeks at a time can and will have a negative impact," he said.

Shabnam Shaghafi, vice president of supply chain for EMS provider Benchmark Electronics, based in Tempe, Ariz., said it is difficult to predict the impact that the pandemic could have on supply in 2021 because of the "fluid nature of Covid-19." She said suppliers have worked hard to overcome challenges by adopting new ways of operating and improving their communication. The efforts helped reduce the impact of the virus on the supply chain date to date.

"We believe that the heightened supply chain awareness and knowledge the pandemic has brought, will better position us to continue managing our business through any future challenges that may emerge," she said.

## Expect shortages in 2021

With or without the pandemic, another potential issue for electronics buyers in 2021 could be component availability. Supply could be tight and shortages of some parts are likely because the global economy is restarting. Several key segments such as automotive, consumer and mobile 5G are quickly ramping, said Shagnafi. Some buyers fear that there could be shortages of some of the same parts that had availability issues 2017-2018, including MLCCs, MOSFETs and chip resistors.

"The increase in demand from these markets has led to raw material shortages and capacity constraints, resulting in extended lead-times on some electronic components," said Shaghafi. "Products such as MOSFETs, insulated gate bipolar transistors (IGBTs), sensors, microcontrollers to mention a few, are anticipated to stay constrained through the first half of 2021," she said.

The good news is that suppliers have added capacity since the 2017-2018 shortages. "Over the past 18 to 24 months there was significant manufacturing capacity added by the semiconductor industry" as well as passives manufacturers, said Mann. As a result, available manufacturing capacity in 2021 will be at all time high points, according to industry market analysts, he said.

Shaghafi said suppliers are working on increasing capacity, but it may take some time before standard lead times return. "We have been working feverishly with our suppliers, internal teams, and customers to provide as much up and downstream visibility as possible in an effort to secure supply and minimise any disruptions," she said.

Kile said in early November that there was "sufficient capacity for our semiconductor requirements based on an operational industry." She said many suppliers that experienced supply constraints in the second and third quarters of this year implemented plans to improved supply chain robustness.

**Products such as MOSFETs, insulated gate bipolar transistors (IGBTs), sensors, microcontrollers to mention a few, are anticipated to stay constrained through the first half of 2021**

**Shabnam Shaghafi**, vice president of supply chain for EMS provider **Benchmark Electronics**

## Will metals tags rise again?

Some buyers are concerned about the rising prices of copper and other metals. Kile said rising material prices have already impacted the prices of electromechanical devices and passives components. However, raw material prices

are actually down compared to several years ago. For instance, copper prices increased in 2020, but "when you look at the five-year trend, current pricing is still below the highs the market saw in 2017 and 2018," said Mann. Ideally manufacturers of products containing metals such as copper will base any price movements on the five-year trend instead of the one-year trend, he said. Several suppliers passed along price increases in 2017-2018 but did not make "comparable reductions in market prices" when material prices dropped in 2019, said Mann.

One issue that will continue to be a source of concern in 2021 is supply base consolidation. Some buyers say consolidation results in an overall healthier supply while others say too much consolidation can result in less competitive environment.

"A large portion of the consolidations that have occurred over the past five years has been complementary, where the combined product portfolio of both parties is creating a more robust technology offering under a common leadership team," said Mann. However, there are some cases where "both parties have common solutions so in theory, over time, competition could be reduced as competing solutions are eliminated or reduced," he said. With consolidation there can be "competitive leverage reduction as fewer suppliers in the market afford less data points to use in negotiations," said Mann.

Kile said competition in the supply chain is healthy "both commercially and from a supply chain risk mitigation perspective," said Kile. However, the mergers and acquisitions since 2016 have driven a significant number of end-of-life notifications on components "which can negatively impact a company's long-life cycle business."

Shaghafi said when competition is eliminated because of a merger or acquisition, it adversely affects customer prices and product choices.

"When this happens, we often see that product availability is impacted due to rationalisation of products, which in effect leads to end-of-life of redundant or similar products," she said. As a result, an alternative component may have to be qualified or a board may have to be redesigned. However, there are cases where supplier consolidation may help increase a customer's leverage by allowing for consolidation of spend and increased negotiation power, said Shaghafi.

Another challenge that will likely carry over to 2021 is a continuing trade war between the U.S. and China. "The trade war between China and the U.S. has resulted in increased product cost to some customers in the U.S," said Shahafi. She said Benchmark has been working with its OEM customers on "alternative strategies and solutions" outside of China and within southeast Asia or India to maintain low production costs and minimise customer impact.

"In some cases, no immediate alternative outside of China exists, and therefore we must continue to source with China suppliers while we position ourselves to further develop our global supply base and close any potential supply chain gaps," said Shaghafi.

# Supply chain regionalisation and allocations

*Editor's note: Chris Hood is vice president of global purchasing for EMS provider Plexus. Electronics Sourcing North America (ESNA) recently interviewed him about the purchasing and supply chain Plexus and other electronics companies are expected to face in 2021*

**Q Do you expect there to be enough production capacity for semiconductors and other components in 2021? Is there any significant risk of component shortages, allocations, or longer lead times for components?**

From a buyer's perspective, there is never enough capacity. However, our team continues to leverage our robust supplier management and risk assessment tools to manage through longer lead times. Shortages and allocations are challenges that are not unique in our industry, even outside a pandemic landscape.

We have observed some pockets of memory lead times increasing. In semiconductors, there are some indications of high foundry capacity utilization, but so far it has not translated to constraints for us. We continue to monitor areas like tantalum capacitors, sensors and some relays which lend themselves to allocation challenges. Microcontrollers and programmable logic are seeing large lead time increases that we continue to manage. PCB laminate materials, which have seen extraordinarily long lead times.

**Q Prices for copper and other metals and materials used in electronics have increased this year. Will rising metals prices be an issue in 2021 and are you concerned it will impact the price of parts?**

Certainly, in the PCB space we are feeling the price of gold, which is up 25 per cent in 2020. But the application of gold on a raw PCB accounts for only a fraction of the overall raw board cost, making this impact a single-digit increase to the total unit price. While this is still a challenge, it is not as much as people might think. In theory, resins and polymers benefit from falling oil prices. Commodities rise and fall, sometimes offsetting each-other. But, as with the PCB example, raw material is just a slice of the aggregate cost in electronics. The bigger concern is how wage inflation and increased logistics cost affects the value-chain, plus long-term currency trends – namely a slide in the US dollar.

**Q Over the last five years, there has been a lot of supply base consolidation in electronics. Is reduction in the number of suppliers an issue for purchasers in that it could lead to reduced competition? Or is it a positive thing for buyers because it results in a healthier supply base?**

The pressure point in our business is balancing supply and demand. Our customers' competitive end markets can generate demand volatility. I'd like to see source/supply markets with ample capacity to offset that demand volatility risk. But in my opinion, electronics market consolidation threatens to make an existing problem worse. Sure, we're pleased when one of our preferred suppliers is the acquiring firm. We have many strong relationships with our suppliers, and that extends into supply chain coordination on supply/demand via IT integration and contracted inventory programs. But speaking for all buyers, more competition is always preferred in order to maintain rational prices and lead times.

**Q To what degree will the continuing trade conflict between China and the U.S. be a concern for buyers in 2021?**

Shortly after the U.S. government was weighing restrictions on Chinese semiconductor firm SMIC, we heard Taiwanese firms saying capacity on 200mm wafers was tight and prices will be increasing. So yes, when governments change the rules of the game, it can be felt by the supply chain. Increasingly, our customers are asking us to quote production at multiple sites and in multiple regions not only for more flexibility in the midst of trade concerns, but also for general risk mitigation, which the pandemic has underscored. At every site, we evaluate total landed cost from origin-to-destination and build supply chains accordingly. Sometimes China-based suppliers make sense, sometimes not. I don't see an 'across the board' kind of impact, though.

**Q Are there other purchasing/supply chain issues that you are concerned about?**

Yes. First, there is a potential risk mitigation trend driving increased regionalization of supply chains. Our customers take a first-tier view of the problem and feel better having production closer to end-users. Second, considering the third-tier of the supply chain, we still see widespread dependence on Asia. To fully mitigate risk, component manufacturers need to think about redundancy all the way through the supply chain. We have tools and processes in place that identify risk based on source location. But even the best databases don't have full visibility to the sub-tiers. As a result, I'm increasingly partial to supplier partners who are more fully integrated.

Lastly lead times have be a top priority on the minds of any component manufacturer or design engineer. We think of electronic components as the "high tech" industry, yet Toyota can build a car from start to finish in 18 hours while most component manufacturers quote lead time in double-digit weeks. For buyers, it is just intolerable. Combined with broad catalog options that fragment demand, and volatile end markets, part shortages are inevitable. So, I'd like component manufacturers to achieve lower lead times, and in parallel I'd like to see engineers selecting for lead time and continuity of supply as much as any other metric.

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **CABLE ASSEMBLY & HARNESSING** | | | | | | | | | | | |
| FTDI | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 100 | N/A | 0 € | N/A | 50 | 1,500+ | Y |
| Molex | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 300 | N/A | 0 € | 97% | 50 | 1,500+ | Y |
| **CIRCUIT PROTECTION** | | | | | | | | | | | |
| Bourns | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 5,000 | N/A | 0 € | 58% | 50 | 1,500+ | Y |
| EPCOS/TDK | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 5,000 | N/A | 0 € | 58% | 50 | 1,500+ | Y |
| Littelfuse | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 35,000 | N/A | 0 € | 67% | 50 | 1,500+ | Y |
| **ENCLOSURES** | | | | | | | | | | | |
| Bud | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 2,500 | N/A | 0 € | 80% | 50 | 1,500+ | Y |
| Hammond | Switch Electronics | 01482 862255 | switchelectronics.co.uk | Y | 500 | N/A | £0 | 70% | 2 | 6 | Y |
| Hammond | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 12,500 | N/A | 0 € | 100% | 50 | 1,500+ | Y |
| Metcase Enclosures | OKW Enclosures | 01489 583858 | www.metcase.co.uk | N | 288 | £40,000 | £0 | N/A | 5 | 22 | Y |
| OKW Enclosures Ltd | OKW Enclosures | 01489 583858 | www.okw.co.uk | N | 1,955 | £40,000 | £0 | N/A | 5 | 22 | Y |
| Rolec Enclosures | OKW Enclosures | 01489 583858 | www.rolec-enclosures.co.uk | Y | 935 | £40,000 | £0 | N/A | 5 | 22 | Y |
| Teko Enclosures | OKW Enclosures | 01489 583858 | www.teko.co.uk | Y | 1,860 | £40,000 | £0 | N/A | 5 | 22 | Y |
| **FREQUENCY MANAGEMENT** | | | | | | | | | | | |
| AEL Crystals Ltd | AEL Crystals Ltd | 01293 789200 | www.aelcrystals.co.uk | N | N/A | £200,000 | £50 | 100% | 3 | 15 | Y |
| ABRACON | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 1,000 | N/A | 0 € | 91% | 50 | 1,500+ | Y |
| ECS | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 500 | N/A | 0 € | 99% | 50 | 1,500+ | Y |
| Epson | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 500 | N/A | 0 € | 59% | 50 | 1,500+ | Y |
| Geyer Quartz Technology | Geyer Electronic UK Ltd | 01794 329341 | www.geyer-electronic.com | N | N/A | N/A | £0 | 100% | 6 | 50+ | Y |
| Golledge Electronics Ltd | Golledge Electronics Ltd | 01460 256 100 | www.golledge.com | N | N/A | £800,000 | £0 | 100% | 3 | 24 | Y |
| Jauch Quartz | Digi-Key Electronics | 0800 587 0991 | www.digikey.co.uk | Y | 500 | £250,000 | 0 | 100% | 15 | 130 | Y |
| **HEATSINKS** | | | | | | | | | | | |
| Aavid | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 700 | N/A | 0 € | 67% | 50 | 1,500+ | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **ICs & SEMICONDUCTORS** | | | | | | | | | | | |
| Altera | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 1,600 | N/A | 0 € | 60% | 50 | 1,500+ | Y |
| Analog Devices Inc. | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 9,500 | N/A | 0 € | 83% | 50 | 1,500+ | Y |
| Atmel | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 1,700 | N/A | 0 € | 58% | 50 | 1,500+ | Y |
| Avago Technologies | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 400 | N/A | 0 € | 84% | 50 | 1,500+ | Y |
| Broadcom | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 100 | N/A | 0 € | 69% | 50 | 1,500+ | Y |
| Cirrus Logic | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 300 | N/A | 0 € | 80% | 50 | 1,500+ | Y |
| Cypress Semiconductor | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 1,400 | N/A | 0 € | 63% | 50 | 1,500+ | Y |
| Diodes Incorporated | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 1,600 | N/A | 0 € | 98% | 50 | 1,500+ | Y |
| Exar | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 1,100 | N/A | 0 € | 95% | 50 | 1,500+ | Y |
| Fairchild Semiconductor | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 2,500 | N/A | 0 € | 90% | 50 | 1,500+ | Y |
| Freescale Semiconductor | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 2,500 | N/A | 0 € | 42% | 50 | 1,500+ | Y |
| FTDI | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 100 | N/A | 0 € | 97% | 50 | 1,500+ | Y |
| IDT (Integrated Device Technology) | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 2,100 | N/A | 0 € | 97% | 50 | 1,500+ | Y |
| Infineon | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 800 | N/A | 0 € | 66% | 50 | 1,500+ | Y |
| Intel | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 500 | N/A | 0 € | 78% | 50 | 1,500+ | Y |
| International Rectifier | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 600 | N/A | 0 € | 87% | 50 | 1,500+ | Y |
| Intersil | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 1,900 | N/A | 0 € | 50% | 50 | 1,500+ | Y |
| ISSI | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 700 | N/A | 0 € | 98% | 50 | 1,500+ | Y |
| Lattice | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 700 | N/A | 0 € | 69% | 50 | 1,500+ | Y |
| Maxim Integrated | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 11,200 | N/A | 0 € | 67% | 50 | 1,500+ | Y |
| Microchip | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 12,600 | N/A | 0 € | 91% | 50 | 1,500+ | Y |
| Microsemi | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 400 | N/A | 0 € | 90% | 50 | 1,500+ | Y |
| Monolithic Power Systems (MPS) | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 600 | N/A | 0 € | 40% | 50 | 1,500+ | Y |
| NXP | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 3,900 | N/A | 0 € | 91% | 50 | 1,500+ | Y |
| ON Semiconductor | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 5,100 | N/A | 0 € | 87% | 50 | 1,500+ | Y |
| Power Integrations | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 600 | N/A | 0 € | 59% | 50 | 1,500+ | Y |
| Qorvo | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 300 | N/A | 0 € | 90% | 50 | 1,500+ | Y |
| ROHM Semiconductor | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 1,400 | N/A | 0 € | 55% | 50 | 1,500+ | Y |
| Silicon Laboratories | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 1,500 | N/A | 0 € | 96% | 50 | 1,500+ | Y |
| Skyworks | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 300 | N/A | 0 € | 91% | 50 | 1,500+ | Y |
| Spansion Inc. | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 600 | N/A | 0 € | 93% | 50 | 1,500+ | Y |
| STMicroelectronics | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 4,500 | N/A | 0 € | 99% | 50 | 1,500+ | Y |
| Texas Instruments | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 36,900 | N/A | 0 € | 41% | 50 | 1,500+ | Y |
| Toshiba | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 500 | N/A | 0 € | 100% | 50 | 1,500+ | Y |
| **INDUSTRIAL GRADE MEMORY MODULES** | | | | | | | | | | | |
| ATP, Innodisk, APRO Kingston | Simms International Plc | 01622 852 848 | www.simms.co.uk | N | 1000+ | N/A | N/A | N/A | 3 | N/A | Y |
| **INTERCONNECTION** | | | | | | | | | | | |
| 3M | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 3,100 | N/A | 0 € | 16% | 50 | 1,500+ | Y |
| Amphenol | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 25,600 | N/A | 0 € | 53% | 50 | 1,500+ | Y |
| Anderson Power Products | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 800 | N/A | 0 € | 50% | 50 | 1,500+ | Y |
| Cinch Connectivity Solutions | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 1,900 | N/A | 0 € | 82% | 50 | 1,500+ | Y |
| Delphi Connection Systems | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 3,300 | N/A | 0 € | 67% | 50 | 1,500+ | Y |
| FCI | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 4,300 | N/A | 0 € | 94% | 50 | 1,500+ | Y |
| Glenair | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 1,900 | N/A | 0 € | 76% | 50 | 1,500+ | Y |
| HARTING | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 4,700 | N/A | 0 € | 31% | 50 | 1,500+ | Y |
| Harwin | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 2,200 | N/A | 0 € | 79% | 50 | 1,500+ | Y |
| Hellermann Tyton | Lane Electronics | 01403 790661 | www.fclane.com | Y | N/A | N/A | N/A | N/A | N/A | N/A | Y |
| Hirose Electric | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 6,100 | N/A | 0 € | 99% | 50 | 1,500+ | Y |
| Huber+Suhner | Lane Electronics | 01403 790661 | www.fclane.com | Y | 766 | £116,000 | £0 | 100% | 6 | 38 | Y |
| ITW McMurdo | Lane Electronics | 01403 790661 | www.fclane.com | Y | 866 | £219,000 | £0 | 100% | 6 | 38 | Y |
| JAE Electronics | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 1,200 | N/A | 0 € | 32% | 50 | 1,500+ | Y |
| Kycon | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 700 | N/A | 0 € | 99% | 50 | 1,500+ | Y |
| LEMO | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 2,900 | N/A | 0 € | 65% | 50 | 1,500+ | Y |
| Molex | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 16,900 | N/A | 0 € | 75% | 50 | 1,500+ | Y |
| Neutrik | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 1,000 | N/A | 0 € | 86% | 50 | 1,500+ | |
| Phoenix Contact | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 12,000 | N/A | 0 € | 99% | 50 | 1,500+ | Y |
| Polamco | Lane Electronics | 01403 790661 | www.fclane.com | Y | 218 | £146,000 | £0 | 100% | 6 | 38 | Y |
| Positronic | Lane Electronics | 01403 790661 | www.fclane.com | Y | N/A | N/A | N/A | N/A | N/A | N/A | Y |
| Souriau | Lane Electronics | 01403 790661 | www.fclane.com | Y | 1,929 | £806,000 | £0 | 100% | 6 | 38 | Y |
| Switchcraft | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 2,200 | N/A | 0 € | 69% | 50 | 1,500+ | Y |
| TE Connectivity | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 30,900 | N/A | 0 € | 40% | 50 | 1,500+ | 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 | £5M | £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 |
| | SeSemi Electronics LTD | 01264 731009 | www.sesemi.co.uk | Y | 2800 | N/A | £100 | N/A | 3 | 12 | Y |
| **OPTO ELECTRONICS** | | | | | | | | | | | |
| Avago Technologies | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 8,200 | N/A | 0 € | 89% | 50 | 1,500+ | Y |
| Cree, Inc. | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 22,500 | N/A | 0 € | 74% | 50 | 1,500+ | Y |
| Dialight | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 9,800 | N/A | 0 € | 99% | 50 | 1,500+ | Y |
| Kingbright | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 3,100 | N/A | 0 € | 100% | 50 | 1,500+ | Y |
| Lumileds | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 1,100 | N/A | 0 € | 99% | 50 | 1,500+ | Y |
| Newhaven Display | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 700 | N/A | 0 € | 65% | 50 | 1,500+ | Y |
| Osram Opto Semiconductor | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 2,800 | N/A | 0 € | 99% | 50 | 1,500+ | Y |
| VCC | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 5,000 | N/A | 0 € | 92% | 50 | 1,500+ | Y |
| Vishay | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 3,100 | N/A | 0 € | 99% | 50 | 1,500+ | Y |
| **PASSIVES** | | | | | | | | | | | |
| AVX | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 70,700 | N/A | 0 € | 58% | 50 | 1,500+ | Y |
| Bourns | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 49,500 | N/A | 0 € | 98% | 50 | 1,500+ | Y |
| Coilcraft | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 10,400 | N/A | 0 € | 98% | 50 | 1,500+ | Y |
| Cornell Dubilier | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 33,000 | N/A | 0 € | 65% | 50 | 1,500+ | Y |
| EPCOS / TDK | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 31,000 | N/A | 0 € | 74% | 50 | 1,500+ | Y |
| Fair-Rite | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 1,000 | N/A | 0 € | 94% | 50 | 1,500+ | Y |
| Kemet | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 135,800 | N/A | 0 € | 93% | 50 | 1,500+ | Y |
| KOA Speer | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 107,900 | N/A | 0 € | 82% | 50 | 1,500+ | Y |
| Laird Technologies | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 1,800 | N/A | 0 € | 50% | 50 | 1,500+ | Y |
| Murata | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 67,300 | N/A | 0 € | 99% | 50 | 1,500+ | Y |
| Nichicon | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 21,600 | N/A | 0 € | 47% | 50 | 1,500+ | Y |
| Ohmite | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 17,300 | N/A | 0 € | 99% | 50 | 1,500+ | Y |
| Panasonic | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 67,900 | N/A | 0 € | 69% | 50 | 1,500+ | Y |
| Taiyo Yuden | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 6,400 | N/A | 0 € | 82% | 50 | 1,500+ | Y |
| TDK | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 25,300 | N/A | 0 € | 85% | 50 | 1,500+ | Y |
| TT Electronics | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 32,800 | N/A | 0 € | 55% | 50 | 1,500+ | Y |
| United Chemi-Con (UCC) | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 13,900 | N/A | 0 € | 99% | 50 | 1,500+ | Y |
| Vishay | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 119,800 | N/A | 0 € | 76% | 50 | 1,500+ | Y |
| Wurth Electronics | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 4,500 | N/A | 0 € | 63% | 50 | 1,500+ | Y |
| Yageo | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 45,300 | N/A | 0 € | 99% | 50 | 1,500+ | 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 | 0049 (0)89 520 462 110 | www.mouser.com | Y | 1,400 | N/A | 0 € | 94% | 50 | 1,500+ | Y |
| Cincon | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 5,500 | N/A | 0 € | 60% | 50 | 1,500+ | Y |
| Cosel | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 11,800 | N/A | 0 € | 99% | 50 | 1,500+ | Y |
| CUI Inc. | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 3,900 | N/A | 0 € | 100% | 50 | 1,500+ | Y |
| Mean Well | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 4,500 | N/A | 0 € | 75% | 50 | 1,500+ | Y |
| Murata | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 5,200 | N/A | 0 € | 93% | 50 | 1,500+ | Y |
| RECOM | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 23,300 | N/A | 0 € | 92% | 50 | 1,500+ | Y |
| Schaffner | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 900 | N/A | 0 € | 98% | 50 | 1,500+ | Y |
| SL Power | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 2,100 | N/A | 0 € | 87% | 50 | 1,500+ | Y |
| TDK-Lambda | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 4,600 | N/A | 0 € | 99% | 50 | 1,500+ | Y |
| TRACO Power | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 3,400 | N/A | 0 € | 95% | 50 | 1,500+ | Y |
| **SENSORS** | | | | | | | | | | | |
| All Sensors | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 2,300 | N/A | 0 € | 70% | 50 | 1,500+ | Y |
| ams | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 400 | N/A | 0 € | 77% | 50 | 1,500+ | Y |
| Analog Devices Inc. | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 500 | N/A | 0 € | 78% | 50 | 1,500+ | Y |
| Bosch | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 100 | N/A | 0 € | 94% | 50 | 1,500+ | Y |
| Freescale Semiconductor | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 1,000 | N/A | 0 € | 66% | 50 | 1,500+ | Y |
| Honeywell | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 15,500 | N/A | 0 € | 80% | 50 | 1,500+ | Y |
| Maxim Integrated | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 900 | N/A | 0 € | N/A | 50 | 1,500+ | Y |
| Melexis | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 700 | N/A | 0 € | N/A | 50 | 1,500+ | Y |
| Omron | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 5,700 | N/A | 0 € | N/A | 50 | 1,500+ | Y |
| Sensirion | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 100 | N/A | 0 € | N/A | 50 | 1,500+ | Y |
| TE Connectivity | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 1,100 | N/A | 0 € | N/A | 50 | 1,500+ | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SWITCHES & KEYBOARDS** | | | | | | | | | | | |
| ALPS | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 400 | N/A | 0 € | 70% | 50 | 1,500+ | Y |
| Apem | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 700 | N/A | 0 € | 96% | 50 | 1,500+ | Y |
| C&K Components | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 1,500 | N/A | 0 € | 84% | 50 | 1,500+ | Y |
| Carling Technologies | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 300 | N/A | 0 € | 87% | 50 | 1,500+ | Y |
| CHERRY | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 200 | N/A | 0 € | 77% | 50 | 1,500+ | Y |
| E-Switch | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 700 | N/A | 0 € | 94% | 50 | 1,500+ | Y |
| EAO Ltd | EAO Ltd | 01444 236000 | www.eao.co.uk | N | 5,000 | £500,000 | £150 | 100% | 6 | 22 | Y |
| Grayhill | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 400 | N/A | 0 € | 84% | 50 | 1,500+ | Y |
| Honeywell | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 700 | N/A | 0 € | 98% | 50 | 1,500+ | Y |
| NKK Switches | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 1,100 | N/A | 0 € | 94% | 50 | 1,500+ | Y |
| Omron | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 900 | N/A | 0 € | 68% | 50 | 1,500+ | Y |
| TE Connectivity | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 400 | N/A | 0 € | 98% | 50 | 1,500+ | Y |
| **TERMINAL BLOCKS** | | | | | | | | | | | |
| Marathon Special Products | Global Supply Services | 01904 436 488 | www.global-supply-services.com | Y | 8,000 | £800,000 | £100 | 100% | 3 | 11 | Y |
| **THERMAL MANAGEMENT** | | | | | | | | | | | |
| ADDA | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 800 | N/A | 0 € | 59% | 50 | 1,500+ | Y |
| Delta Electronics | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 500 | N/A | 0 € | 28% | 50 | 1,500+ | Y |
| ebm-papst | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 2,200 | N/A | 0 € | 99% | 50 | 1,500+ | Y |
| Sanyo Denki | EAO Ltd | 01444 236000 | www.eao.co.uk | Y | 4,300 | £150,000 | £150 | 99% | 6 | 22 | Y |
| Sanyo Denki | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 2,900 | N/A | 0 € | | 50 | 1,500+ | Y |
| Sunon | G.English Electronics Ltd | 0208 855 0991 | www.gelec.co.uk | Y | 3,500 | £1,000,000+ | £0 | 100% | 10 | 28 | Y |
| Sunon | Thermaco Ltd | 01684 566163 | www.thermaco.co.uk | Y | 3,500 | £230,000 | £100 | 100% | 6 | 12 | Y |
| **TRANSFORMERS & INDUCTORS** | | | | | | | | | | | |
| Best Windings | Best Windings | 0044 (0)1394 448424 | www.bestwindings.co.uk | N | 300 | N/A | £100 | N/A | 2 | 24 | Y |
| **WIRELESS SOLUTIONS** | | | | | | | | | | | |
| Anaren | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 100 | N/A | 0 € | 86% | 50 | 1,500+ | Y |
| B&B Electronics | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 100 | N/A | 0 € | 87% | 50 | 1,500+ | Y |
| Bluegiga Technologies | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 100 | N/A | 0 € | 93% | 50 | 1,500+ | Y |
| Digi International | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 200 | N/A | 0 € | 92% | 50 | 1,500+ | Y |
| Laird Technologies | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 100 | N/A | 0 € | 76% | 50 | 1,500+ | Y |
| Linx Technologies | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 100 | N/A | 0 € | 99% | 50 | 1,500+ | Y |
| Microchip | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 100 | N/A | 0 € | 85% | 50 | 1,500+ | Y |
| Murata | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 100 | N/A | 0 € | 100% | 50 | 1,500+ | Y |
| Panasonic | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 100 | N/A | 0 € | 91% | 50 | 1,500+ | Y |
| Redpine Signals | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 100 | N/A | 0 € | 94% | 50 | 1,500+ | Y |
| RF Digital | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 100 | N/A | 0 € | 100% | 50 | 1,500+ | Y |
| Texas Instruments | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 100 | N/A | 0 € | 75% | 50 | 1,500+ | Y |
| Wi2Wi | Mouser Electronics | 0049 (0)89 520 462 110 | www.mouser.com | Y | 100 | N/A | 0 € | 36% | 50 | 1,500+ | Y |

## Contract Manufacturers Buyers' Guide

| Manufacturer | Telephone | Website | Turnover | Location | Employees | Number of Surface Mount Lines | Approvals | BGA Capacity | Lead Free Manufacturer | Prototyping | Design Capability | Full Turnkey | Cables and Harnessing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Challenger Solutions Ltd | 01245 325252 | www.challengersolutions.com | £10m | Essex/SE | 100 | 7 | AS9100 Rev D, ISO9001:2015, ISO 140001:2015, UL , CCC, IPC-610-G Class 3 | 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 | £11m | UK & Far East | 72 | 3 | 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 |
| Electrica Limited | 0161 343 7575 | www.electrica.co.uk | £2.4m | Cheshire | 26 | 3 | BSI ISO 9001:2015, IPC-A-610 to Class 3, IPC-J-STD-001, Cert IPC Trainer, UL | 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 |
| Esprit Electronics Ltd | 02380 455411 | www.espritelectronics.com | £11m | Hampshire | 80 | 4 | ISO9001:2008, IPC610 to Class 3 | Y | Y | Y | Y | Y | Y |
| FermionX Ltd | +44(0)1903 524600 | www.fermionx.com | £5m | Worthing, W. Sussex | 40 | 4 | ISO9001:2015, ISO14001:2015, IPC 610 A Class 2 & 3 | Y | Y | Y | Y | Y | Y |
| G&B Electronic Designs Ltd | 01420 474188 | www.gandbelectronics.co.uk | £4.6m | Hampshire | 60 | 2 | ISO9001, ISO13485, IPC-A-610, IPC J-STD-001, IPC 7711/7721 | Y | Y | Y | Y | Y | Y |
| Hallmark Electronics Ltd | 01782 562255 | www.hallmarkelectronics.com | £2m | M | 26 | 2 | ISO9000/UL, IPC610/D | Y | Y | Y | Y | Y | Y |
| Icon Electronics Limited | 01423 449080 | www.iconelectronics.co.uk | £6.5m | Hampshire & Yorkshire | 70 | 5 | AS9100, ISO9001, BS EN ISO/IEC 80079-34:2018 ATEX, IPC-A-610 Class 3 | Y | Y | Y | Y | Y | Y |
| Incap Electronics UK Limited | 01782 753200 | www.incapcorp.com | €113m+ | UK, Slovakia, Estonia & India | 1,300 | 20 | 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 | £10m | UK | 90 | 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 | £5 Million | UK | 65 | 2 | ISO9001:2015, J-STD-001, IPC-610/620 CLASS 3, IPC-7711, BS EN ISO13485:2016 | Y | Y | Y | N | 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 |
| Speedboard part of NOTE | 01753 746700 | www.speedboard.co.uk | £115m | UK/EU/China | 1,050 | 18 | IPC610 to Class 3, ISO9001:2015, 13485, 14001, 18001 | Y | Y | Y | Y | Y | Y |
| M-TEK (Assembly) Ltd | 01189 455377 | www.mtek.co.uk | £2.4m | SE | 30 | 4 | IS9001, IS014001, IPC-A-610 Class 3, 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 |
| Protronix EMS | 01582 418490 | www.protronix.co.uk | £2.5m | Luton | 10 | 2 | ISO9001:2015, IPC-A610 Class 3 | Y | Y | Y | Y | Y | Y |
| Season Electronics Limited | 02392 452222 | www.seasongroup.com | £5m/£100m | Havant, UK/USA/Mexico/China/Malaysia | 65/1800 | 2/18 | (AS9100 & ISO9001 in UK) (TS16949 & ISO13485 at sister sites) | 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 |
| **C-CLASS COMPONENTS** | | | | | | | | | | | | | |
| Essentra Components | 0845 758 5070 | www.essentracomponents.co.uk | £283.3m | UK | 2500 | | UL / CE / IATF | N | Y | Y | Y | N | Y |

## PCB Buyers' Guide

| Manufacturer | Telephone | Website | Service Provided (i.e Broker, Manufacture &/or Repair) | Location | Approvals | Volume - Small, Medium, Large | Double-sided | Multi-layer 4-10/10-20-20-30 | Metal PCBs | Flexi / Flexi-Rigid | Obsolescence Solutions | Modifications | Prototyping |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ABL Circuits Ltd | 01462 894312 | www.ablcircuits.co.uk | M | SE | ISO9000: 2015 | SML | Y | 4-10 | Y | Y | Y | Y | Y |
| Cambridge Circuit Company Ltd | 01223 423100 | www.cambridge-circuit.co.uk | M | SE | ISO9001:2015, UL, ISO 14001:2015 | SML | Y | 4-16 | Y | Y | Y | Y | Y |
| DK-Daleba Printed Circuits | 01992 510000 | www.dk-daleba.co.uk | B/M/R | UK,Europe,Asia,USA | UL, ISO9001:2008, TS16949:2009 | SML | Y | 4-30 | Y | Y | Y | Y | Y |
| Fineline VAR Ltd | +44 (0)1249 815 815 | www.fineline-global.com | B | UK / Global | ISO9001:2015 / UL/ TS16949 / Nadcap/ AS9100/ISO14001 | SML | Y | 4-60 | Y | Y | y | y | y |
| GSPK Circuits Ltd | +44(0)1423 321100 | www.gspkcircuits.ltd.uk | M/R | UK, Europe, Asia | IS 9001:2015, IATF 16949:2016, EN (AS) 9100 | SML | Y | 4-34 | Y | Y | Y | Y | Y |
| LEF Circuits Ltd | 0116 2891122 | www.lefcircuits.co.uk | M/R | M | ISO 9001:2015, IPC-A-610 | SML | Y | 4-30 | Y | F/R | Y | Y | Y |
| Stevenage Circuits Ltd | 01438 761811 | www.stevenagecircuits.co.uk | M/B | UK/China | ISO 9001:2008, ISO 14001, EN9100:2009, UL, JOSCAR | SML | Y | 4-44+ | Y | F, F/R | Y | Y | Y |
| Tate Circuit Industries Ltd | 01889 583627 | www.tatecircuits.com | B | UK/China | ISO 9001:2015, UL | SML | Y | 4-20 | Y | Y | Y | Y | Y |

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