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JUNE 2021
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Editor's Word

All eyes on us

As a motorhome operator I have access to one of the world's most energy diverse systems. Let me explain. Motorhomes use diesel for the vehicle engine: petrol for AC generators; propane for heating and cooking; mains electricity for multiple high voltage systems; lead acid starter/leisure batteries for multiple low voltage systems; solar panels for charging the leisure batteries; and even charcoal for the BBQ.

These systems have been optimised over many decades and are fit for purpose. However, apart from the solar panels, they are fossil-based. So begins the slow march to renewable electrification.

In my mind, reducing energy diversity must surely increase risk. Thus, voluntary adoption will rely on electrification being affordable, practical, reliable, safe and secure. I have no doubt, given sufficient time and money, our industry will be able to deliver admirably on all these fronts.

However, this comes at a cost. From now, all eyes are on the electronics and electrical industries. If we fail, everything fails. There will be no other energy system to demonise and blame. Without really knowing it, this industry has just accepted responsibility for everything, forever.

To ensure the general public is willingly walking in lockstep with the introduction of electrification technology, our industry needs to share its achievements and successes. However, at the time of writing, the broadcast media is actually focussing on the industry's inability to deliver due to chip shortages and the horrific cost of maintaining EV vehicles. Not a great start.

Jon Barrett

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ES News

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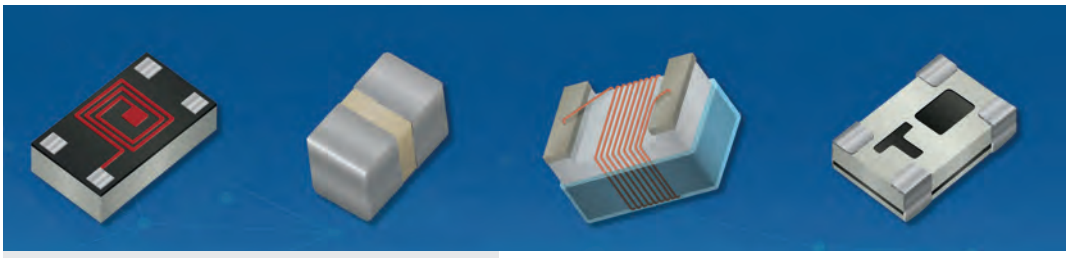
www.electronics-sourcing.co.uk



Leadership in high frequency

Anglia Components has expanded its range of high reliability RF and microwave components following the addition of the American Technical Ceramics (ATC) portfolio.

Anglia's marketing director, John Bowman, said: "At Anglia, we have seen significant growth in demand for RF and microwave components. ATC is a premier brand, and its addition broadens our offering of high reliability products in this area. They are well recognised for their leadership in the area of high frequency applications for a broad range of commercial, defence and aerospace applications."

Anglia has invested in inventory and its FAE team is trained on the full product portfolio. ATC designs, develops, manufactures and markets multilayer capacitors, single layer capacitors, resistive products, inductors and custom thin film products for RF, microwave and millimetre-wave applications. Its products focus on wireless communications infrastructure, fibre optic, medical electronics, semiconductor manufacturing equipment, defence, aerospace and satellite communications markets.

www.anglia.com

Certified for aerospace HMI

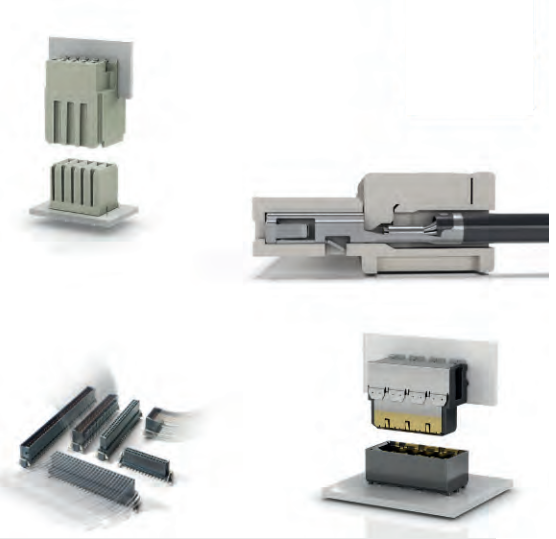
TT Electronics' Eastleigh facility has achieved AS9100D certification for the manufacture of aerospace systems.

TT Electronics' EVP, Charlie Peppiatt, said: "This certification is an important step in our aerospace growth strategy. Our facility in Eastleigh, which is also SC21 accredited, specialises in the design and manufacture of interior solutions for commercial aircraft.

"TT has supported technology innovations in this sector for decades, including lightweight, space-saving, and power-efficient cabin signage and mood lighting. While we have always been focused on providing our customers with quality products and services, achieving the AS9100D certification is a well-earned achievement that confirms our steadfast emphasis on quality management."

TT Electronics' Eastleigh plant has manufactured HMI products for the aircraft interiors market for over 30 years and holds SC21 accreditation, a designation that recognises its commitment to increase the performance of suppliers and ultimately their supply chains within the UK aerospace, security, space and defence industries.

www.ttelectronics.com



Buying into connector reliability

Digi-Key Electronics has secured a global distribution partnership with ERNI Electronics to offer connectors for industries including IoT, automotive, transportation, aerospace, military, industrial, medical, lighting, communications and instrumentation.

Digi-Key's vice president of global supplier management, David Stein, said: "The breadth and depth of the ERNI portfolio is one that designers from all industries look to for quality, robust and reliable solutions. We look forward to marketing and making available ERNI's Maxibridge and other surface mount connector solutions to our global engineering customer base."

ERNI connectors and cable assemblies are trusted for their security and strong vibration resistance, achieved through designs that include dual beam female contacts, terminal position assurance and scoop proof housings. A number of termination styles are available, including surface mount, pressfit and solder.

ERNI's portfolio includes board-to-board products such as DIN, 2mm HM ERmet and ZD, plus a line of wire-to-board products including the 2.54 mm pitch MaxiBridge with 12A and MicroBridge with a 1.27mm pitch that carries 9A per contact.

www.digikey.com

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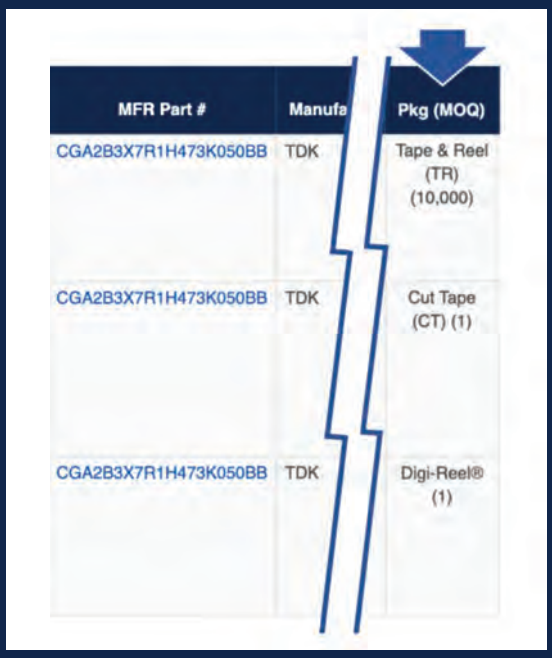

MFR Part #	Manufa	Pkg (MOQ)
CGA2B3X7R1H473K050BB	TDK	Tape & Reel (TR) (10,000)
CGA2B3X7R1H473K050BB	TDK	Cut Tape (CT) (1)
CGA2B3X7R1H473K050BB	TDK	Digi-Reel® (1)

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ES News

In Brief

Semiconductor sales increase 3.6 per cent
The Semiconductor Industry Association has reported worldwide sales of semiconductors totalled $123.1 billion during the first quarter of 2021, an increase of 3.6 per cent over the previous quarter and 17.8 per cent more than the first quarter of 2020. Global sales for the month of March 2021 were $41.0 billion, an increase of 3.7 per cent compared to the previous month.
semiconductors.org

Impressive power offering
Components Bureau has announced Mornsun has become a sales partner. Components Bureau's operations director, Andrew Ferrier, said: "Having the entire Mornsun product range as part of the Components Bureau portfolio opens up an incredible spectrum of options for our customers and strengthens our already impressive power offering.
www.componentsbureau.com

Expanding power range
Farnell has signed a global franchise agreement with CUI. A total of 780 products from CUI's range of power solutions are now available to Farnell customers manufacturing products for the consumer, IoT, industrial and medical industries. The range includes external and internal AC-DC power supplies and DC-DC converters.
www.farnell.com

Celebrating battery production
Since being established 40 years ago in 1981, GS Yuasa Battery Manufacturing UK has produced over 85 million batteries at its Ebbw Vale production facility, employing over 360 skilled workers from the local area. MD, Shaun Gardner, said: "The remarkable success we have witnessed is very much a tribute to the invaluable contribution of our exceptional workforce."
www.gs-yuasa.eu

A helping hand for IIoT

Solid State Supplies has announced a new partnership with industrial IoT specialist TT Electronics. TT's Speed to Connect is designed to help customers deploy IoT solutions faster, smarter and more cost effectively than 'going it alone'. The company describes the technology as scalable, flexible, secure and ready to deploy rapidly.

The solution comprises an end-to-end IoT framework that seamlessly delivers hardware, connectivity, infrastructure and user experience solutions, out-of-the-box and with minimal programming.

Solid State Supplies' IoT technology director, Scott A Brenton, said: "In the fast-paced world of IoT, the ability to get your product and IoT deployment to market quickly is critical. Project success is built on collaboration. We have a team of industry experts who specialise in accelerating the time to market for our customers. TT Electronics' Speed to Connect solution is an exciting addition to our industrial IoT solutions line-up and strengthens our ability to reduce project timescales."

www.sssltd.com

More expansive semiconductor array

RS Components has extended its supply chain agreement with STMicroelectronics, including a substantial increase in the breadth and volume of ST products stocked.

RS' VP global product and supplier management for electronics, Andy Keenan, said: "ST is one of the world's foremost innovators in semiconductor technologies and leads the industry in areas such as power electronics, IoT, automotive, smart homes and artificial intelligence. Providing our customers with access to a more expansive array of ST products is certain to benefit their development work. Combining this with contributions to the multifaceted online technical programs that we offer via DesignSpark will be another huge plus point."

ST's EMEA VP head of channel sales, Frank Wolinski, added: "The complex nature of modern electronic engineering projects calls for more in-depth technical support. By extending access to a broader portfolio of ST products through DesignSpark, engineers can better utilise the resources they need to complete their projects more quickly and to achieve better results."

uk.rs-online.com

Sensor platform ready to ship

Mouser Electronics has announced a global distribution agreement with QuickLogic, a developer of embedded FPGA IP; ultra-low-power, multi-core, voice-enabled SoCs; and endpoint AI solutions. Mouser now stocks QuickLogic's EOS S3 microcontroller and FPGA-based platform and QuickFeather development kit.

The EOS S3 sensor processing platform is a multi-core SoC that enables an array of concurrent sensor applications, from basic to computationally demanding algorithms for smartphone, wearable and IoT devices. The platform integrates an ultra-low-power Arm Cortex-M4F microcontroller subsystem and embedded FPGA fabric, with optional sensory low-power sound detect for on-chip voice recognition.

eu.mouser.com

Harsh environment solutions more configurable than ever

Supplier marketing managers at TTI, John Sandy and Brian Wellhouse, explore ruggedized options for I/O, sensors and more

A challenge facing buyers today is not just locating connectors, housings or sensors for harsh conditions but also navigating the range of options to right-size the level of protection.

In the transportation and industrial spaces, there is increasing demand for ruggedized or sealed connectors. Design limitations and form factors are the primary drivers of choice.

For instance, customers are looking for sealed enclosures, with sealed connections to other systems. Instead of high volume bespoke solutions, there are now off-the-shelf options.

These solutions are useful in applications such as transportation (washdowns, dust, dirt and vibration) and energy (direct sunlight, weather and extreme temperatures). For IIoT, where more sensors and switches are being used, there are challenges where data I/O meets the outside world. Dust, oil, chemicals and more can damage antennas and hard connections.

In these cases, a distributor partner can determine the level of sealing or ruggedization needed and recommend the right level of protection: from simply preventing dust ingress, to sealing against corrosives, flammable gasses or other hazards.

Historically, circular connectors were popular for secure, sealed connections. Today with the advent of single pair Ethernet we see new options for ruggedized, sealed connectors. Expect these connectors to make their way to shop floors, vehicles and other installations to support data collection and transmission.

The range of sensors designed to collect data in harsh environments has also grown. Designers can choose from a range of media-isolated transducers which use film barriers to keep corrosive media, liquids or gasses out in applications involving oil, gas, hydrogen and other hazardous materials.

These sensors are configurable, but not custom, recognising that data collection and transmission applications range from clean rooms and factories to boiler rooms, basements, HVAC systems and more. Also, multi-sensor packages are available and capable of simultaneously monitoring multiple gasses and hazards.

For buyers, the standardisation of sealed connectors and housings, plus the greater number of options in ruggedized sensors and components such as non-contact switches, means more choices from among competitively priced and more readily available components. It's easy to find off-the-shelf solutions with either smaller minimum order quantities or none at all, as opposed to custom products.

Finally, distributors can help buyers select the best level of protection in other components, such as switches. An industrial machine may need a non-contact switch, or sealed switch for a critical function such as emergency stop, that must be just as rugged and reliable as the other components.

An authorised distributor partner can help buyers navigate this process, with understanding not only of an industry's requirements, but of the different levels of protection and solutions available in a market with more options than ever before.

tti.com

TTI supplier marketing manager, **John Sandy**

TTI supplier marketing manager, **Brian Wellhouse**

Cautiously welcome uptick

ECSN chairman, Adam Fletcher, has welcomed the uptick in bookings and billings in March as customers realign their order book in-line with extending manufacturer lead-times

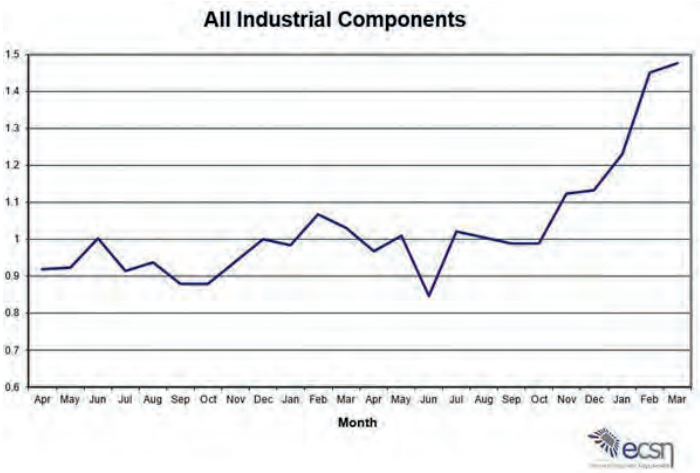
Total monthly billings (net sales invoiced less credits) in March 2021 increased 35 per cent compared to the previous month and 11 per cent compared to the same month 2020. Overall bookings (net sales entered) increased by 38 per cent compared to February 2021 and 59 per cent over the same month last year. Sales by month (three month moving average) for all electronic components suggests modest growth into the first half of the year, albeit lower than historical norms.

At 1.47:1 the book-to-bill ratio in March 2021 remained elevated over the preceding month, driven by the very strong bookings growth but Fletcher believes that Q1 2021 figures are being skewed by customer order placement activity. He said: "Probably around 80 per cent of the growth is merely a reflection of extending manufacturer lead-times and customers' response to tighter supply."

Fletcher continued: "Anecdotal indications do point to real underlying growth of circa 10 per cent in the current year but I think it's unlikely that 2021 will see our members' performance return to the historical trend of strong billings growth in the first half of the year."

Fletcher also added that country-of-origin rules continue to pose problems for UK companies exporting components from the UK into the EU: "Governments must get a grip on this issue or risk seriously disadvantaging authorised distributors who do not have EU based operations to support their customers based outside the UK and vice versa."

www.ecsn-uk.org



Crossing the MLCC supply void

Johanson Technology's vice president, Scott Horton, explains how domestic MLCC manufacturers are ramping capacity to fulfill orders for large format, high Q ceramic capacitors

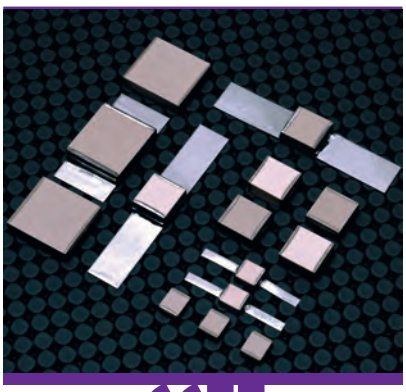
Industrial, medical and military demand for high quality, high-voltage, multi-layer ceramic capacitors (MLCCs) has been hit hard by the insatiable requirement for smaller, lower voltage—and in some way—lower performance MLCCs fueled by 5G networks, smart phones and mobile devices. OEMs are experiencing delays up to six months, jeopardizing product release schedules, industrial market share and potentially even military readiness.

Due to a slowdown in capacitor demand in 2019, many OEMs and distributors were left holding surplus inventory and were hesitant to order inventory in 2020. As the market ramps up, so does MLCC demand despite low capacitor inventory. This further exacerbates shortages of larger high voltage, high Q MLCCs, since some manufacturers have focused production on smaller/lower voltage devices.

Johanson Technology vice president, Scott Horton, said: "There is a ripple effect to the industrial and military market sector that is not really fully understood. Although a shortage of electronic products used to manufacture smartphones and automobiles would be national news, the lack of larger, higher voltage MLCCs for industrial and military applications are typically under-reported.

However, it will continue to squeeze business customers and eventually end users." Industrial, medical and military consumers of MLCCs depend on high voltage and high-Q capacitors for power supplies, amplifiers, MRI coils, plasma generators, lasers and many other specialized applications.

Examples of MLCCs



Not all MLCCs are created equal, even among the high performance MLCCs

In higher current circuits, higher-Q MLCCs are preferred to reduce self-heating.

The Q factor represents the efficiency of a capacitor's rate of energy loss. High Q capacitors lose less energy reducing the need to dissipate or cool the heat which protects the board from damage and performance loss in sensitive applications.

Not all MLCCs are created equal, even among the high performance MLCCs, yet ensuring a consistent level of performance is critical for the high reliability applications required by industrial and military end users.

Horton explained: "If an MLCC manufacturer is not tightly controlling the layer count, they might be providing 10-layer batches in one batch and then later deliver 17-layer parts in a subsequent batch. These two parts will not perform the same at high frequencies."

Domestic sources of MLCCs for industrial and military applications have been ramping up capacity. Increased domestic MLCC supply means industrial or military customers need not delay a product's build or shipment.

Drawing on its focus on high-Q and high voltage MLCCs, Johanson, for example, has expanded its capacity to fill some of the supply void caused by the market's shift to smaller capacitors.

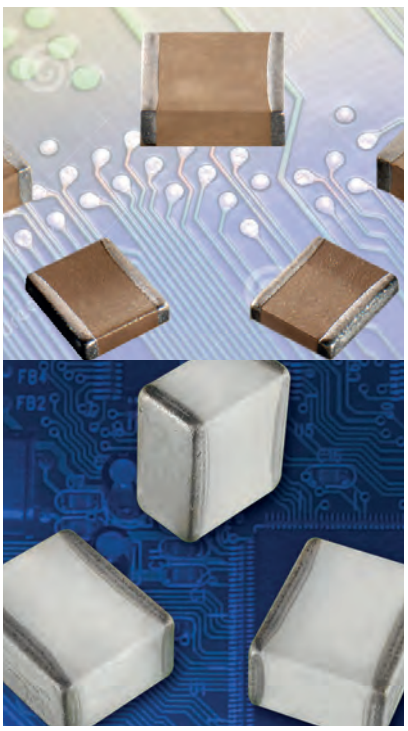
Horton added: "We've been investing in expanding our capacity for several years now through a modernization of our production facility and the opening of a second production line that will essentially double our MLCC output. We can take that even higher with more production shifts."

At the time of writing, Johanson is quoting large size high voltage MLCC order fulfillment times at 10-weeks.

Horton concluded: "There's just no reason to move away from ceramic for your high-voltage, high quality applications. There is now a growing domestic MLCC supply available to meet our domestic needs."

www.johansontechnology.com

Examples of MLCCs



Second sourcing power supplies

Fidus steps readers through reasons why they may choose to seek alternative parts

Securing multiple sources for power supplies is a good idea given the challenges of late. In the competitive market of standard pin outs and form factors there are often a number of alternative parts that could be exchanged like-for-like and pin-for-pin, particularly regarding DC/DC converters. Brands often use the same manufacturer and, apart from the part number and brand, the parts are identical.

So, why second source? Reasons include: lead time flexibility; driving competitive pricing; increasing purchasing potential (multiple credit accounts to promote cash flow); and reducing risk.

Currently, many manufacturers have extended lead times from six to eight weeks, to sixteen to twenty six weeks or longer. However, some solutions can still be obtained within six to eight weeks, with samples within one week. Keep your sourcing options open and search for alternatives.

Pandemic aside, there are global shortages of ICs, diodes and MOSFET switches resulting in manufacturing slowdowns. Should your existing supplier be unable to deliver, supply chain options could be crucial to output and jobs.

If alternatives are evenly matched (or even made in the same factory) the buyer is then in the driving seat for getting the best bargain. Naturally, product is not everything and the overall supply experience should be considered including technical support, service, delivery times and consignment stock holding. All play essential roles in the sourcing experience. Being transparent with costs and commercial arrangements will ensure all similar suppliers will keep a 'sharp pencil' on their terms.

Focussing on cash flow, particularly this year regarding troublesome sourcing for multiple system elements, unforeseen delays between invoicing of various parts may mean suppliers' invoicing can arrive many months before a system is built, dispatched and invoiced.

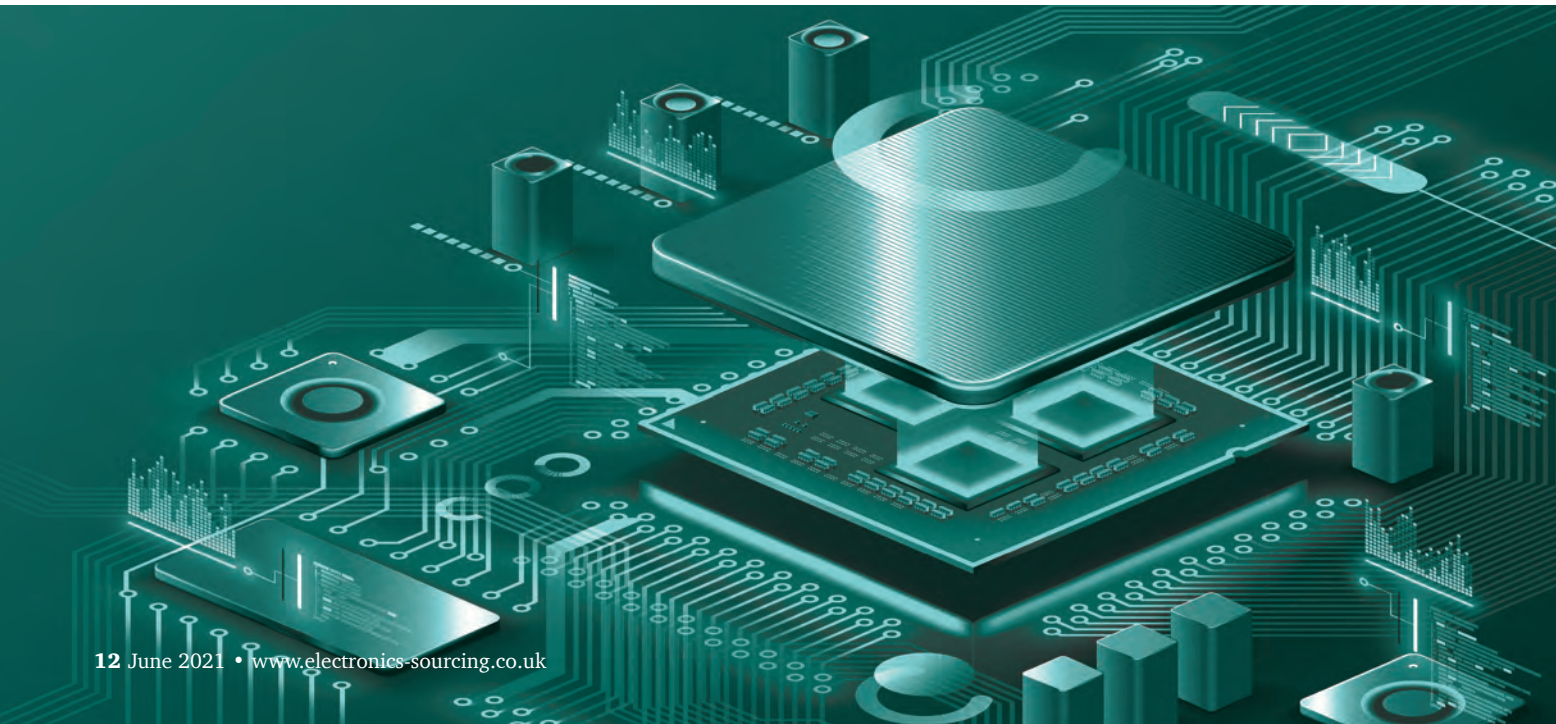
When it comes to risk, companies can be sold, supply agreements ended, products go end-of-life or lack upgrades to the latest approvals your product requires. Some alternatives are safety critical elements of a system (usually components offering electrical isolation from hazardous sources of energy) which is most certainly any AC/DC converter.

Equipment's design phase is the perfect opportunity for qualifying multiple safety critical elements, since these will affect the end product's CE marking and type test approvals which cannot be changed without a great deal of testing and reapproving. Options can be progressed in parallel to invest in secure second source alternatives should they be required in the future.

fiduspower.com

Examples of power supplies

Pandemic aside, there are global shortages of ICs, diodes and MOSFET switches resulting in manufacturing slowdowns



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Trends and challenges in fleet electrification

Director of sales engineering for the TTI Transportation Business Unit, Brian Dickerson and transportation sales engineer, Gabe Osorio, explore the electrification of mid-class' trucks

Readers may be familiar with the unique and amazing things happening in fleet electrification, from companies building new EVs to those converting diesel trucks and busses to BEV powertrains. The real inflection point, however, is in the last-mile fleet space. During the next two years, these Class 4 to 6 'mid-class' trucks will be prime targets for electrification.

In part, this is due to grants and cost-sharing agreements which help with installation of charging infrastructure.

More importantly, these fleets suit EV applications. Last-mile delivery trucks and vans serve predictable routes and travel fewer than 50 miles per day: well within the range capabilities of today's battery technology. These regional fleets serve needs in the electrification 'sweet spot', expending their batteries during the day and returning to the yard to charge overnight.

In these applications, the efficiencies of switching from diesel/gasoline to EVs are obvious and significant: elimination of fuel costs; reduced spending on IC engine wear and tear; lower maintenance costs and more.

However, for EV fleet end-users, there are many questions to answer which, in turn, pose challenges to those designing infrastructure for integration into the electric grid.

TTI's director of sales engineering Transportation Business Unit, **Brian Dickerson**

Last-mile delivery trucks and vans serve predictable routes and travel fewer than 50 miles per day

Transportation sales engineer, **Gabe Osorio**

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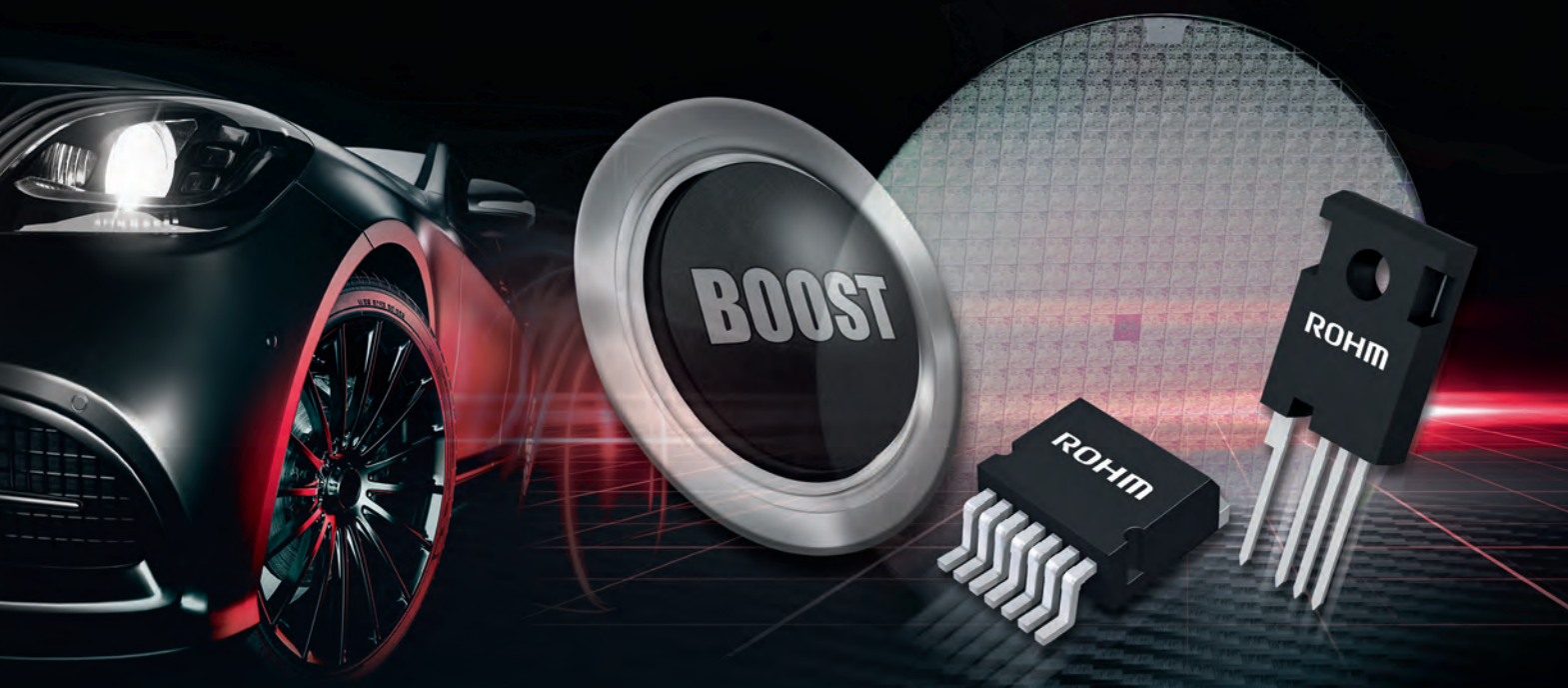

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Having taken part in discussions with suppliers and customers in recent months, we are hearing that charging-related challenges are top-of-mind.

Those investing in EV charging infrastructure want to know how to maximize efficiency and which partners they should work with to design and install their charging systems.

While a lot of answers relate to the selected trucks, safety is also a primary concern. Fleet owners want to know who is qualified, from a tier-supplier standpoint, to produce EV charging solutions. Many people say they can build these systems, but customers need to know who can build them safely, to manufacturer standards.

Customers also need to understand how specific components in and around the battery pack contribute to battery health and system safety, avoiding thermal runaways and maximizing the life of their EV investment. These include sensors and harsh-environment interconnects, designed to withstand the heat associated with high-voltage applications and the environmental challenges of being exposed to the elements.

Production scalability is also a challenge. OEMs can struggle to navigate the breadth of available components to select the best options, to get access to data sheets or samples, and to learn about new releases.

A distribution partner with a strong inventory position helps clear away many of the obstacles and deliver the information that buyers and engineers need to know right now. Distributors build strategic partnerships with manufacturers of components, both on and off the board. We also help overcome inventory and supply-chain challenges by supplying multiple options for particular solutions.

From a buyer standpoint, a distributor partner gives you a strategic edge in design decisions, making it easier to get the necessary parts. Case in point: for a single HV connector, suppliers may offer ten or more different iterations based on cable size, connector angle, keying options or key codes, etc. A distributor with a strong technical team works with customers to help them select the best cable assembly to meet their production timelines.

www.tti.com

Many people say they can build these systems, but customers need to know who can build them safely to manufacturer standards

Understanding EMC markets

Kemtron's chairman, David Wall, walks readers through the past, present and future of the EMC sector

How has the EMC, RFI and EMI sector evolved over recent years and what is the impact for purchasers?

The last 10-years has seen little change in traditional EMI shielding products such as knitted wire mesh gasket strip and conductive fabric over foam. However, as higher frequencies become the norm, performance materials such as electrically conductive elastomers are becoming more popular. A decade ago, EMI shielding up to 18GHz represented the upper end of requirements but 40GHz is now common, with 5G possibly going higher. Higher frequencies, coupled with the electrification and automation of things, has made EMC more important to ensure equipment works in harmony.

What EMC compliance solutions are available when a product is at R&D stage?

Kemtron always recommends customers discuss their EMI/RFI shielding needs early in the design stage so its engineering team can offer the best shielding advice for the application. Kemtron's web site shows the product ranges on offer however, there can be many variations on a theme. The skill is knowing which questions to ask to direct customers to the best, cost-effective product for their application. Fifty per cent of Kemtron's manufacturing is bespoke to ensure it fully meets customers' needs.

What shielding sectors are showing growth?

The pandemic has seen a reduction in commercial aerospace markets but defence and other traditional markets remain buoyant. Dramatic growth was seen in medical markets initially for the ventilator business which quickly levelled off, but medical diagnostics is still growing for obvious reasons. Organic growth is taking place in developing industries such as 5G infrastructure and Industry 4.0, the ongoing automation of traditional manufacturing and industrial practices. Other growth areas are within renewable energy and the electrification of the automotive industry which includes charging infrastructure and vehicle EMI mitigation.

How will EMC solutions advance in coming years?

Electrically conductive elastomers, now known as performance materials, are where most advances are being made. These products are silicones and fluorosilicones heavily loaded with electrically conductive particles. The most popular being silver plated aluminium and nickel coated graphite. Kemtron is launching a range of nickel plated aluminium filled silicones and fluorosilicones which offer excellent shielding effectiveness while also addressing the problem of galvanic compatibility with the gasket mating surfaces. The company's research and development department is also working on graphene and carbon nanotube loaded polymers to exploit their superior electrical and thermal characteristics. 3D printing of flexible electrically conductive polymers is an area being actively developed to enable production of complex soft flexible electrically conductive components.

kemtron.co.uk

> **Performance materials such as electrically conductive elastomers are becoming more popular**

Kemtron's chairman, **David Wall**

Exploring global CEM activity

Manufacturing Market Insider's latest research highlights how the global CEM sector is responding to increasing demand across different regions and industry sectors.

Manufacturing Market Insider has released its annual MMI Top 50 list of the world's largest CEM providers. In 2020, Top 50 sales accounted for $384 billion in revenue, an increase of $17 billion from 2019. MMI mainly tabulates its ranking information through an annual survey of over 100 of the largest CEM companies worldwide.

Top 50 sales increased from the previous year by 4.6 per cent, largely because the top ten CEM firms dominated industry growth. This included Foxconn, Pegatron, Wistron, Jabil, Flex, BYD Electronics, USI, Sanmina, New Kinpo Group and Celestica with growth rates ranging from -22.1 per cent (Asteelflash) to 31.1 per cent (Katek SE).

Foxconn alone reportedly achieved revenue growth of 5.2 per cent from 2019 to 2020 and accounted for over half the Top Ten revenue. All MMI international currency conversions are based on average annual conversion rates established by the US Federal Reserve.

Overall, the APAC region accounted for around 81.9 per cent of the Top 50 CEM revenue, with the Americas representing 16.2 per cent and EMEA 1.9 per cent. The APAC region achieved the highest growth of 6.0 per cent, while the Americas saw a -0.2 per cent decline and EMEA experienced -3.4 per cent negative growth. This illustrates that the APAC region has been the main beneficiary of communications and computer replacement/upgrades that took place in 2020. The medical equipment market expanded strongly for all three regions, as did EV automotive.

In addition to ranking providers by 2020 sales, the MMI Top 50 listing includes sales growth, previous rank, number of employees, number of plants, facility space, space in low-cost regions, number of SMT lines and customer data. This special data was published in the March 2020 edition of MMI and in April included market segmentation data obtained from the MMI survey

www.mfgmkt.com

Rank 2020	Company	Headquaters	CEM Sales calendar 2020 (millions USD)	CEM Sales calendar 2019 (millions USD)	CEM 2019 rank	CEM Growth '19-'20 in US$ (%)
1	HonHai Precision (Foxconn)	New Taipei, Taiwan	181,893	172,878	1	5.2%
2	Pegatron	Taipei, Tawian	47,504	44,209	2	7.5%
3	Wistron	Taoyuan, Taiwan	28,868	28,418	5	1.6%
4	Jabil Circuit	St. Petersburg, FL	27,594	26,282	3	5.0%
5	Flex	San Jose, CA	24,578	24,951	4	-1.5%
6	BYD Electronics	Shenzhen, China	10,050	7,676	7	30.9%
7	USI	Shanghai, China	6,972	5,372	10	29.8%
8	Sanmina	San Jose, CA	6,876	7,886	6	-12.8%
9	New Kinpo Group	New Taipei, Taiwan	6,663	6,500	8	2.5%
10	Celestica	Toronto, ON, Canada	5,748	5,888	9	-2.4%
11	Plexus	Neenah, WI				
12	Venture	Singapore				
13	Shenzhen Kaifa	Shenzhen, China				
14	Benchmark Electronics	Scottsdale, AZ				
15	Zollner	Zandt, Germany				
16	Fabrinet	Grand Cayman, Cayman Islands				
17	SIIX Corp.	Osaka, Japan				
18	UMC	Saitama, Japan				
19	Kimball Electronics	Jasper, IN				
20	Integrated Micro-Electronics, Inc.	Laguna, Philippines				
21	Sumitronics	Tokyo, Japan				
22	ATA IMS Berhad	Johor Bahru, Malaysia				
23	Kaga Electronics	Tokyo, Japan				
24	VTech Communications	Hong Kong				
25	NEO Tech	Fremont, CA				
26	V.S. Industry Berhad	Senai, Malaysia				
27	Global Brands Mfg.	New Taipei City, Taiwan				
28	Asteelflash	Neuilly, France				
29	Pan International	Taipei, Tawian				
30	Scanfil	Sievi, Finland				
31	3CEMS Group	Taipei City, Taiwan				
32	VIDEOTON	Székesfehérvár, Hungary				
33	Creation Technologies	Burnaby, BC Canada				
34	Katolec	Japan				
35	TT electronics	Rogerstone, Wales, UK				
36	Enics AG	Zurich, Switzerland				
37	Neways Electronics	Son, The Netherlands				
38	DBG	Huizhou, China				
39	Shenzhen Zowee Tech	Shenzhen, China				
40	SKP Resources	Batu Pahat, Malaysia				
41	Katek SE	Munich, Germany				
42	Integrated Micro-Electronics, Inc.	Bangkadi, Pathumthani, Thailand				
43	Key Tronic	Spokane Valley, WA				
44	WKK Technology	Hong Kong				
45	Computime	Hong Kong				
46	Hana Microelectronics	Bangkok, Thailand				
47	GPV Group	Aars, Denmark				
48	Kitron	Billingstad, Norway				
49	Wong's Intl Holding, Ltd.	Hong Kong				
50	Ducommun, Inc.	Santa Ana, California				

A personal approach to purchasing

Incap Electronics UK's MD, Jamie Maughan, explains why meeting customers' requirements needs a more personal approach than ever

Incap Electronics UK's MD, Jamie Maughan

Recent rapid growth in the use of electronics and challenges regarding component availability have changed OEMs' purchasing requirements.

Jamie Maughan said: "Customers in the electronics manufacturing services industry continue to be very price-conscious and expect their manufacturing partners to continuously increase their efficiency and stay competitive."

Based on his experiences at global electronics manufacturing services company Incap, Maughan believes that while offering quality service, companies must work on more personal approaches for finding the best practices for efficiency from all areas where they have their operations adding: "The success factor in meeting the changing requirements of purchasing clients in the electronics industry is the ability to quickly adapt to these shifting demands."

Maughan explained that Incap has found a solution for this by focussing on managing the manufacturing process locally and across the group, suggesting this as a scalable strategy.

Maughan said: "We practice it all the way from prototype fast-tracking and offering extensive DFM up to beta builds and high volumes, while cooperating closely with different branches of the group. This gives us an opportunity to use our best skills, knowhow and machinery wherever it is located. In the end, the products are returning to Incap UK for lower volume EOL builds. Our highly skilled MRO team of Engineers ensure that upgrades and repairs on legacy products are carried out in a timely professional manner."

www.incapcorp.com

Annual stock takes become continuous monitoring

Nordson's head of sales, component counting, Björn Kronshage, introduces the benefits of x-ray based component counting technology

How has component counting technology advanced and what are the benefits at goods-in?

The evolution of component counting technology is driven by changing quantities, sizes and packaging types. Large DIP devices in tubes and PTH resistors are relatively easy to count. However, tens of thousands of devices on a reel makes counting by eye difficult. It can be done using a reel-to-reel counter or weight measurement but this is time consuming and inaccurate. Hence the birth of automated x-ray counters.

Some companies still consider component counting a chore, limiting the task to 'important' or 'expensive' components while leaving the smaller, cheaper components to their fate.

X-ray technology with image recognition and counting software is replacing the old, physical, manual counting methods. Modern systems also eliminate handling issues such as removing reels from bags or unwinding/rewinding reels. Processes that used to take minutes are now done in seconds, with improved accuracy. An annual stock take can now become continual monitoring.

Benefits of modern counting technologies include: maximised component flow to production lines; a guarantee that the components ordered and received match; full, per reel, traceability with unique identifiers; improved kitting accuracy; reduced safety stock and last-minute panic orders.

When does it make financial sense to invest in counting technology and move the process in house?

The following is a comparison between traditional reel-to-reel counting and an Assure x-ray counter.

Two hundred average size reels will take between two and 10 minutes each to count manually. Assuming a mean time of five minutes each, this gives a total of about 17 hours or two operating shifts just to count the parts. Using Assure and counting the same 200 reels, the count can be completed in about 35 minutes as it takes 10 seconds per reel regardless of size or part quantity. Even considering handling time on a manual system, it would take 60 to 70 minutes for the 200 reels. Generally, it can take multiple people up to three weeks to manually count the same number of reels that the Assure can count in a single shift. Also, the Assure will print labels and update ERP/storage systems, within 10 seconds, without removing the reels from their protective bags.

The ultimate contributing factor for ROI is improved assembly line efficiency and reduced machine downtime. This is achieved with precise inventory control and occurs at surprisingly small stock levels.

What advice would you offer readers considering investing in component counting technology?

When investigating the move away from manual inventory control, carefully consider the overall process before making decisions. What are your current storage methods and do you need to automate this process? If your stock is manageable with manual storage after counting do you have an efficient method for recording the stock and ordering new?

Once you have a good understanding of the process flow you can investigate the levels of automation in the counting process. Most systems cover the basics of counting and will reduce costs, time and errors.

Nordson's head of sales, component counting, **Björn Kronshage**

X-ray technology with image recognition and counting software is replacing the old physical, manual counting methods

However, explore their capabilities for smaller components; how do they handle odd shapes or multi pins; are inspection algorithms within the software or will you need 'specials' programmed for you. Then come considerations regarding automation (manual load to conveyor belt), integration into the ERP system; and backup/support over following years.

In short, look carefully before deciding on a strategy and counting system. What appears to be the cheapest isn't always the cheapest and it isn't necessarily as simple as it looks. All systems are not the same.

What makes Nordson Assure stand out?

Data security is vital, so everything is contained within the system algorithms removing the need for libraries, updates or cloud connection for programming specials. The systems are designed with a small footprint, while offering improved counting due to the low parallax configuration. The company offers a flexible range of systems, from manual to complete automation and storage.

www.cupio.co.uk

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America - Essential component battleground

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

John Denslinger investigates EV batteries and how their associated manufacturing and distribution supply chains represent new electronics industry frontiers

EV batteries • By John Denslinger

In April's editorial I discussed the 'small but big impact' semiconductors were having on the supply chain citing the auto industry's predicament in particular. Later that week, arguably the largest component, the EV battery, captured US headlines as LG Chem and SK Innovation settled a bitter lawsuit involving trade secrets. The resolution was significant. At risk was a $2.6B new plant investment under construction in Georgia. It represented a key piece of national security interest: that is, building critical technology in America.

Most resident automakers (domestic and foreign based brands) entering the EV market aren't vertically integrated with EV know-how or have the production capability to produce Li batteries in large volumes. Tesla might be the lone exception. The investment level is enormous with most automakers deciding to partner with EV battery specialists. Probably a wise move as far as shareholders are concerned.

Battery technology is one of the essential technologies of the future. Governments everywhere are trying to tilt the playing field in their direction. In the US, the Biden administration recently threatened to set aside rulings in the LG Chem vs SK Innovation case forcing both parties into a quick settlement. In Japan, more than 50 companies have drafted policy proposals for government action in the areas of raw material acquisition and recycling systems. In China, the government is only subsidizing vehicles equipped with Chinese made batteries. Each would like to dominate the market, but in the end, each will likely settle for sustainable domestic supply that fills every type of vehicle PO in local production.

At a macro level, the global EV battery market is dominated by six players. In share order they are: LG Chem, CATL, Panasonic, Samsung SDI, BYD, and SK Innovation per SNE Research through Q3 2020. One quickly notices all have Asian roots. Absent from the list is US and EU entrepreneurs.

Why does this matter? Producing an EV now requires a JV or long-term partnership with one or more large Li battery manufacturers. LG Chem touts a relationship with at least eight auto companies; CATL lists eight; Panasonic identifies four; Samsung SDI shows three; BYD supplies in-house only; and SK Innovation another six automakers. Bloomberg Green rightly points out the EV euphoria has made battery manufacturers the new power brokers in the deal.

Here's the gotcha! Will the consumer place more value on the auto or battery brand? Will sleek designs or battery range/fast-charging rates decide the vehicle sale? We may yet see another ironic 'Intel Inside' co-branding battle.

Momentum is building everywhere to replace internal combustion engines with EV. California already passed legislation banning sales of new gas-powered vehicles from 2035. The Biden administration has mentioned hefty investments in federal R&D, increased federal procurement of clean energy items, and subsidy consideration on EV purchases and charging stations.

It may take years for US automakers to build their own, scalable Li battery production. Meanwhile the gap will be filled stateside by LG Chem, Panasonic and SK Innovation having invested billions already in US GWh. It's a battleground moment. Branding recognition, national security, essential technology leadership and mountainous investment are but a few of the conflicts. Establishing a viable raw material supply chain isn't an easy undertaking either. Nevertheless, all are solvable, but there's no substitute for expedient action by the EV automakers and well-funded American start-ups.

Past, present and future

Electronics Sourcing invited CamdenBoss' MD, Katy Davies, to walk readers through the company's current activities and future plans

How has the last 12 months been for CamdenBoss?

It has been a rollercoaster for everyone. The business faced a host of challenges including keeping people safe in the workplace, managing the job retention scheme, interrupted supply chains and constantly analysing changes in customer demand.

Pandemic aside, we have continued with the original 100-day plan, with a full strategy review and organisational redesign to deliver our ambitious strategy.

We are lucky to have navigated the year without redundancies and no Covid in the workplace, while recruiting a fantastic team of talented leaders across the business. It's the start of an exciting time for CamdenBoss.

What market changes have you witnessed during this period?

We see a strong push towards reshoring production to the UK and have already repatriated the bulk of our mould tools to the UK. This is a trend we only see growing.

Regarding target markets, we remain industry agnostic with our products serving sectors from medical to EV charging. This has been a real strength as we have seen specific sectors thrive while others hibernate. More broadly we're seeing a surge in IOT and IIOT products and are constantly in awe of the amazing technologies we house for customers.

How do you see CamdenBoss advancing in coming years?

New product highlights include Easy Assembly and Hex Box enclosures. The company's NPD pipeline is customer focussed to ensure buyers get features they both want and never even knew they wanted.

Our delivery team offers a wealth of expertise, particularly in lean methodologies and quality. This will allow CamdenBoss to improve the customer experience for buyers and deliver excellently.

How are CamdenBoss' new premises benefiting buyers?

The new premises are about four times the size of the existing footprint, so the key enabler is more space. The move allows us to optimise workflows and layouts to maximise efficiencies, while permitting us to add additional capabilities in our five-year plan.

As a workplace, the new building enhances our wellbeing strategy, with access to landscaped outdoor space and leafy views from inside.

Is your plan to re-shore more products?

CamdenBoss started re-shoring mould tools back in 2018 and the current surge for UK manufacturing has validated that strategy. We constantly review our overseas tools and our strategy is to re-shore wherever it makes sense to do so.

How are lead times?

Supply chain lead times are challenging through a combination of Chinese freight capacity, availability of raw materials and persistent border delays. We are mitigating as far as possible with key partners and have taken several strategic buying decisions to get in front. This will ease. It's a matter of persistence, always striving to get the best outcomes for customers and making quick decisions to keep things moving.

www.camdenboss.com

CamdenBoss' MD, **Katy Davies**

"We see a strong push towards reshoring production to the UK and have already repatriated the bulk of our mould tools to the UK

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Managing aggressive EoL

Rebound Electronics' CEO, Simon Thake, offers purchasing professionals advice on mitigating risks when faced with aggressive component end-of-life issues

What advice would you offer purchasing professionals faced with obsolescence, extended lead times and rising product costs?

One solution to obsolescence is to work with an experienced and proactive distributor. They will help source hard-to-find components or, if they are no longer available, find a viable replacement. It's vital to ensure a distribution partner can offer multiple options to ensure your supply chain isn't held to ransom.

Rebound Electronics has invested heavily in a deep spread of supply worldwide to support clients with new sources and availability without compromising quality. In 2019 we created a new Asia focussed authorised line card focusing specifically on lesser known Chinese and Taiwanese brands. Our line card offers a broad technology mix covering a wide range of applications. It is designed to offer our clients more cost effective alternatives to tier one brands which are now under lead time pressure. It also offers a viable alternative on customers' AVL with the advent of aggressive obsolescence from major manufacturers.

How has demand for replacement components changed over the last 12-months?

We have seen a dramatic increase in lead time and supply restrictions since mid-2020, with the Covid-19 pandemic clearly compounding issues that were already in play. We are now in a true allocation phase with manufacturers across a broad range of product groups regularly de-committing on scheduled deliveries. This has led to severely depleted stocks within the traditional distribution network.

Tier one blue chip semiconductor manufacturers are facing unprecedented production challenges caused by many factors including: raw material shortages; geopolitics such as the US/China trade war; lack of manpower due to Covid-19; extreme weather; and even factory fires.

As demand for product grows as life returns to normal, we expect further supply chain strain, continued allocation and withdrawals by manufacturers and broadline distributors. Working with an independent distributor with a truly global network is key to exploring market options.

When a component is going obsolete what are the notification and last-time-buy time frames?

Obsolescence is one of the most substantial variables in clients' supply chains. Aggressive obsolescence will continue in the fast-moving semiconductor market. As such, real-time BoM/AVL analysis and data management are as integral as partnering with an experienced and proactive distributor.

To shield clients from some of the impacts, we have partnered exclusively with IHSMarkit as a third party data partner allowing us to amalgamate our own extensive trading data with their real-time priority data feeds to ensure we have access to and pass on critical market information to clients who partner with us. We have also enhanced our own cloud-based trading software to incorporate features such as PCN and EoL notice feeds, along with many other useful features designed to stay one step ahead.

Rebound Electronics' CEO, **Simon Thake** (centre)

It's vital to partner with a distributor who can work with you on data analytics including risk mitigation and product life cycle as you become aware that a component is reaching its end of life, collaborate with your supplier to research availability and pricing.

Work with a quality focused supplier who can walk you through counterfeit mitigation measures and testing options to ensure you are buying genuine reliable product. Consider testing and third party storage if products will be shelved for extended periods.

reboundeu.com

> **It's vital to partner with a distributor who can work with you on data analytics including risk mitigation and product life cycle**

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It's not just semiconductors that are in short supply

Lead times are stretching and prices are rising for passives, connectors and power supplies

It's no secret that electronics purchasers are being challenged by allocations, shortages and long lead times for a variety of semiconductors including microcontrollers, diodes, graphics RAM chips and power semiconductors, among others.

However, while chip shortages seem to be garnering most of the attention, supply is tight and lead times are stretching for many capacitors, resistors, and other passive components, connectors, electromechanical devices and power supplies. Prices are also increasing for many electronic components , ranging from the mid-single digits to 30 per cent.

David Stein, vice president, global supplier management for Digi-Key Electronics, said the "supply situation with passives is tight" with lead times stretching to 35 weeks for some passives. For instance, in March multilayer ceramic capacitor (MLCC) lead times were about 16 to 20 weeks. In early May they moved out to 30 to 35 weeks, he said.

One reason is strong demand from automotive systems manufacturers. "Automotive demand has put a strain on most suppliers to some degree depending on how entrenched a supplier is to the automotive area," he said. Stein added there is also tight supply for thick-film resistors with some suppliers and not so tight with others. "It varies with their engagements with the automotive industry as well," said Stein.

He added there is also tight supply with "a different type of resistors called sense resistors. Those lead times are hovering around the one-year mark," said Stein. "You can blame automotive for that as well."

A sense resistor helps measure the amount of current that is flowing in an electrical system. It senses the current and can moderate the current if necessary if the current is too high.

He said another challenge for buyers is aluminum capacitors because demand is up significantly. "The problem with aluminum caps is that they are pretty heavy so shipping them by air is not an option," according to Stein. "They have been constrained because some of the supply-chain limitations involving ocean freight," he said. Lead times have been extended by 6-10 weeks because of the backlog in the supply chain" relating to ocean freight including a lack of containers and port delays."

Relays are also experiencing extended lead times. Lead times for general-purpose relays are 24-28 weeks. Automotive relays have been extended to the past 12 months to about 35 weeks, said Stein.

Lead times vary by product

Eric Pratt, senior vice president of global marketing for component manufacturer AVX, said one reason for rising lead times is robust demand. Demand for tantalum, ceramic and polymer capacitors "has been very strong and we are projecting demand to remain strong through the balance of the calendar year and probably through the first half of next year," he said.

AVX's lead times "vary by product and can vary by a customer or where we have contracts. But our general lead times for passives have gone out 6 to 8 weeks" since the first of the year. Lead times range from 12 weeks to 22 weeks, depending on the product. Normally AVX's lead times would be off the shelf to 2-8 weeks.

"Supply is very tight. Some parts are in shortage situations, including certain mixes of ceramic capacitors, and tantalum capacitors," said Pratt.

While demand for AVX's components is strong, the passive manufacturer's business is being impacted by the semiconductor shortage. "If OEMs are not building boards because of a shortage of semiconductors, they don't need passive components either," said Pratt. However, some electronics manufacturing services providers seem to be very aggressive in trying to secure an inventory position for passives. "A materials manager does not want a build to be held because some lower-cost passive component" was not in stock, he said. AVX's business is also being

We need 30 to 50 different components and you only need one on allocation to sabotage our lead times

Christoph Wolf, president of power supply manufacturer **RECOM's** American business unit

impacted by tight supply and rising prices for raw materials. Pratt noted that the price of copper has tripled over the last year and the price of palladium has doubled. Prices for rubidium, silver and resins also have increased. "Resins have gone up significantly because of the petroleum industry. With the price of oil increasing that has a direct impact on the price of resin," said Pratt.

Higher material costs mean higher component prices. "When we see materials cost increases we certainly have to react to that," he said. Component prices have increased mid-single digits to 30 per cent due in large part to increased cost in raw materials and logistics costs, according to Pratt. "We don't do opportunistic pricing to the channel," he said. "We have long-term contracts with most of our partners and we honor all those contracts," said Pratt.

AVX is adding capacity which could help to lower lead times and prices eventually. "We have a long-term capacity expansion plan and we are holding to that. We are doing big investments in ceramic caps, tantalum and some other products," said Pratt.

He added AVX has 30 operational facilities. "Almost all of our facilities are now operating very close to 100 per cent" after production slowed or stopped last year because of the pandemic, he said.

Longer waits for power supplies

Long lead times for passives are impacting power supplies. Lead times for power supplies have stretched to about 30 weeks, according to Stein.

Christoph Wolf, president of power supply manufacturer RECOM's Americas business unit, said power supply lead times are stretching because of shortages of some semiconductors and passives used in power supplies. RECOM builds power supplies for industrial, medical and transportation systems.

"There are allocations for many of the components that we need to build our power supplies," said Wolf. "We need 30 to 50 different components and you only need one on allocation to sabotage our lead times." He said logistics is also an issue that is driving lead times. Demand for logistics services is surpassing capacity, which is contributing to longer wait times for parts and to higher prices.

Strong demand is also contributing to longer lead times and higher prices for power supplies and in sales increases for RECOM. Despite the pandemic, which temporarily halted a lot of electronics equipment production last year, RECOM's power supply sales increased 18 percent in 2020 and the company expects to post a 20 per cent increase in revenue in 2021, said Wolf.

RECOM was not the only power supply manufacturer that had robust sales in 2020. Mohan Mankikar, president of power supply research firm Micro-Tech Consultants, said the power supply market did better than expected last year. He said the global switching power supply market had been expected to decline about 1 per cent because of the disruption caused by COVID-19. However, revenue ended up rising about 4.5 per cent for the year. Switching power supplies should grow another 7.5 per cent in 2021, he said. However, there is uncertainty in the market.

Mankikar said the first half of 2021 will likely be strong "but we don't know what's going to happen in the second half. It could be the same as the first half of 2021 but nothing is simple anymore. Business is up and down. There are so many variables," because of the pandemic, he said.

Power supply demand strong

Still, Mankikar forecasts the global switching power supply market will rise to $35.4 billion in 2021 and will post a compound annual growth rate of 5.9 per cent through 2025. Strong demand, however, most likely means lead times will likely remain long for the year for power supplies and components.

"There are many verticals that need components besides automotive, " said Stein. Applications involving 5G, industrial automation, medical, and others all require components and demand for them continues to grow.

Stein said lead times will not get any shorter before the end of this year. If demand continues to grow, "I would not be surprised in a month or two suppliers might use the allocation word and a capacity reservation order will be necessary. It certainly is heading that way," he said.

Longer lead times for connectors

Strong demand is also occurring with connectors. Don Hnatyshin, senior vice president supply chain for connector manufacturer Molex, said connector demand is rising for a range of reasons including cloud and data center expansions, Industry 4.0 requirements, electric vehicle growth, greater adoption of factory automation, and advancements in technology such as artificial intelligence.

Strong demand combined with "force majeures" in the resin supply chain have contributed to long lead times for connectors. Production of resin, which is used in many components, connectors and printed circuit boards, slowed or shut down earlier in the year after a major storm knocked out power in Texas where a lot of resin is produced.

The impact is still being felt. Hnatyshin said lead times for some connectors, such as FAKRA connectors used by the auto industry, have increased byalmost 100 per cent.

We see demand for connectors continuing to increase, especially for 5G and 5G-related systems and device implementation in computers, communications and consumer electronics.

Don Hnatyshin, senior vice president supply chain for connector manufacturer **Molex.**

"Lead times for mini-FAKRA connectors are expected to increase as this technology ramps in automotive," he said. Capacity constraints for custom connectors also will occur without long-term forecasts in place. Lead times for off-the-shelf connectors have increased from 12 to 26 weeks, while lead times for USB connectors now are stable, according to Hnatyshin.

Some of the tight supply of connectors is due to extended lead times from material suppliers, he said. Metals used for contacts and assemblies and resins are in very tight supply. "Due to the February storms in the southern and central parts of the United States, many resin suppliers have applied force majeure contract clauses and are not able to supply materials," said Hnatyshin.

He said many metal and resin suppliers were unprepared for the "quick snap back in demand, particularly in automotive segments" and most are extending their lead times.

Prices increase

He said connector prices are rising because of higher materials and logistics costs. "Copper, gold, zinc, aluminum and other metals, in addition to resins are all at multiyear record highs," said Hnatyshin. Some of the cost has been absorbed by connector manufacturers but some are being passed along to customers.

The same is true with increased freight and logistics costs. "The cost of air freight since the beginning of the pandemic has increased as much as 4X, in some cases," said Hnatyshin. At the same time, overall capacity has been drastically reduced, due to commercial airlines operating fewer transpacific and transatlantic routes. As an alternative, relying on ocean freight has added to lead times in the supply chain that then have been compounded by port backups, he said.

Connector supply will likely remain tight this year due in part to the auto industry, said Hnatyshin. In fact, the largest demand for connectors for Molex will be the auto industry. " Primarily, this is due to the rapid increase in the production of electric vehicles (EVs)," he said. "Electronic content in EVs is considerably higher than combustion engine vehicles and both are getting tailwinds from the growth of autonomous capabilities."

Strong demand from automotive combined with growing demand from other customer segments could mean tight supply and long lead times for several years unless substantial capacity is added.

"We see demand for connectors continuing to increase, especially for 5G and 5G-related systems and device implementation in computers, communications and consumer electronics," said Hnatyshin. " The rollout of 5G technology is gaining momentum at all levels, spanning infrastructure to handsets, he said.

Also contributing to greater connector demand by automotive is the quickening pace of "new product cycle times, which will result in the full-scale transformation of cars and the entire automotive industry," said Hnatyshin This includes everything from electrification, autonomous vehicles, ridesharing, 5G communication and other functions delivered via the cloud, he said.

As these trends accelerate, so does the need for more connectors, resulting in a positive outlook for the connectors market from a long-term perspective, according to Hnatyshin. "We estimate a compound average annual growth rate of greater than 5 per cent percent for the next three-to-five years as the market expands to fulfill continued demand."

> **Due to the February storms in the southern and central parts of the United States, many resin suppliers have applied force majeure contract clauses and are not able to supply materials**

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											
Amphenol	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	3,000	N/A	0 €	N/A	50	2,500+	Y
FTDI	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	50	N/A	0 €	N/A	50	2,500+	Y
Harwin	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	600	N/A	0 €	N/A	50	2,500+	Y
Molex	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,550	N/A	0 €	N/A	50	2,500+	Y
Phoenix Contact	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,200	N/A	0 €	N/A	50	2,500+	Y
CIRCUIT PROTECTION											
Bourns	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,800	N/A	0 €	N/A	50	2,500+	Y
EPCOS/TDK	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,950	N/A	0 €	N/A	50	2,500+	Y
Littelfuse	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	11,450	N/A	0 €	N/A	50	2,500+	Y
Vishay	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	3,150	N/A	0 €	N/A	50	2,500+	Y
ENCLOSURES											
Bud Industries	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,600	N/A	0 €	N/A	50	2,500+	Y
Hammond	Switch Electronics	01482 862255	switchelectronics.co.uk	Y	500	N/A	£0	70%	2	6	Y
Hammond	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	3,350	N/A	0 €	N/A	50	2,500+	Y
Metcase Enclosures	OKW Enclosures	01489 583858	www.metcase.co.uk	N	288	£40,000	£0	N/A	5	22	Y
New Age Enclosures	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	150	N/A	0 €	N/A	50	2,500+	Y
OKW Enclosures Ltd	OKW Enclosures	01489 583858	www.okw.co.uk	N	1,955	£40,000	£0	N/A	5	22	Y
Rolec Enclosures	OKW Enclosures	01489 583858	www.rolec-enclosures.co.uk	Y	935	£40,000	£0	N/A	5	22	Y
Teko Enclosures	OKW Enclosures	01489 583858	www.teko.co.uk	Y	1,860	£40,000	£0	N/A	5	22	Y
FREQUENCY MANAGEMENT											
ABRACON	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,750	N/A	0 €	N/A	50	2,500+	Y
AEL Crystals Ltd	AEL Crystals Ltd	01293 789200	www.aelcrystals.co.uk	N	N/A	£200,000	£50	100%	3	15	Y
Analog Devices Inc.	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	150	N/A	0 €	N/A	50	2,500+	Y
ECS	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,050	N/A	0 €	N/A	50	2,500+	Y
Epson	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	900	N/A	0 €	N/A	50	2,500+	Y

Services Sourcing

CEM

DEVICE PROGRAMMING

INTERCONNECTION

TAPE REELING

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
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
IQD Frequency Products	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,500	N/A	0 €	N/A	50	2,500+	Y
Jauch Quartz	Digi-Key Electronics	0800 587 0991	www.digikey.co.uk	Y	500	£250,000	0	100%	15	130	Y
Kyocera	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	950	N/A	0 €	N/A	50	2,500+	Y
Microchip	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,450	N/A	0 €	N/A	50	2,500+	Y
Murata	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	550	N/A	0 €	N/A	50	2,500+	Y
Silicon Laboratories	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	500	N/A	0 €	N/A	50	2,500+	Y
TXC Corporation	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	500	N/A	0 €	N/A	50	2,500+	Y
HEATSINKS											
Aavid	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	200	N/A	0 €	N/A	50	2,500+	Y
ICs & SEMICONDUCTORS											
Alliance Memory	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	500	N/A	0 €	N/A	50	2,500+	Y
Analog Devices Inc.	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	18,700	N/A	0 €	N/A	50	2,500+	Y
Broadcom Limited	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	200	N/A	0 €	N/A	50	2,500+	Y
Central Semiconductor	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,250	N/A	0 €	N/A	50	2,500+	Y
Cirrus Logic	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	200	N/A	0 €	N/A	50	2,500+	Y
Cree, Inc.	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	200	N/A	0 €	N/A	50	2,500+	Y
Diodes Incorporated	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	8,200	N/A	0 €	N/A	50	2,500+	Y
FTDI	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	100	N/A	0 €	N/A	50	2,500+	Y
Infineon	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	8,300	N/A	0 €	N/A	50	2,500+	Y
Intel	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,750	N/A	0 €	N/A	50	2,500+	Y
Maxim Integrated	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	14,050	N/A	0 €	N/A	50	2,500+	Y
Microchip	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	24,200	N/A	0 €	N/A	50	2,500+	Y
Micron Technology	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	600	N/A	0 €	N/A	50	2,500+	Y
Monolithic Power Systems (MPS)	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	850	N/A	0 €	N/A	50	2,500+	Y
Nexperia	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	7,600	N/A	0 €	N/A	50	2,500+	Y
Nordic Semiconductor	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	60	N/A	0 €	N/A	50	2,500+	Y
NXP	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	4,700	N/A	0 €	N/A	50	2,500+	Y
ON Semiconductor	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	18,700	N/A	0 €	N/A	50	2,500+	Y
Power Integrations	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	750	N/A	0 €	N/A	50	2,500+	Y
Qorvo	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	700	N/A	0 €	N/A	50	2,500+	Y
Renesas Electronics	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	5,550	N/A	0 €	N/A	50	2,500+	Y
ROHM Semiconductor	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	6,900	N/A	0 €	N/A	50	2,500+	Y
Semtech	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	350	N/A	0 €	N/A	50	2,500+	Y
Silicon Laboratories	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,200	N/A	0 €	N/A	50	2,500+	Y
Skyworks	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	550	N/A	0 €	N/A	50	2,500+	Y
STMicroelectronics	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	10,050	N/A	0 €	N/A	50	2,500+	Y
Texas Instruments	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	39,050	N/A	0 €	N/A	50	2,500+	Y
Toshiba	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,050	N/A	0 €	N/A	50	2,500+	Y
Vishay	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	10,850	N/A	0 €	N/A	50	2,500+	Y
Xilinx	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,900	N/A	0 €	N/A	50	2,500+	Y
INTERCONNECTION											
3M	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,750	N/A	0 €	N/A	50	2,500+	Y
Amphenol	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	33,200	N/A	0 €	N/A	50	2,500+	Y
Cinch Connectivity Solutions	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	4,250	N/A	0 €	N/A	50	2,500+	Y
FCI / Amphenol	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	7,850	N/A	0 €	N/A	50	2,500+	Y
HARTING	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	6,800	N/A	0 €	N/A	50	2,500+	Y
Harwin	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,950	N/A	0 €	N/A	50	2,500+	Y
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	01494-427500	www.mouser.co.uk	Y	7,850	N/A	0 €	N/A	50	2,500+	Y
Huber+Suhner	Lane Electronics	01403 790661	www.fclane.com	Y	766	£116,000	£0	100%	6	38	Y
Intelliconnect (Europe) Ltd		01245 347145	www.intelliconnect.co.uk	N/A	N/A	N/A	N/A	100%	5	30	
ITW McMurdo	Lane Electronics	01403 790661	www.fclane.com	Y	866	£219,000	£0	100%	6	38	Y
JAE Electronics	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,450	N/A	0 €	N/A	50	2,500+	Y
Molex	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	23,600	N/A	0 €	N/A	50	2,500+	Y
Phoenix Contact	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	17,150	N/A	0 €	N/A	50	2,500+	Y
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
Radiall	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,350	N/A	0 €	N/A	50	2,500+	Y
Samtec	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	16,300	N/A	0 €	N/A	50	2,500+	Y
Souriau	Lane Electronics	01403 790661	www.fclane.com	Y	1,929	£806,000	£0	100%	6	38	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
Souriau	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	3,300	N/A	0 €	N/A	50	2,500+	Y
TE Connectivity	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	41,850	N/A	0 €	N/A	50	2,500+	Y
Wurth Elektronik	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,650	N/A	0 €	N/A	50	2,500+	Y
MEDICAL CERTIFIED											
Review Display Systems		01959 563 345	www.review-displays.co.uk				£100				
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											
Broadcom Limited	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,300	N/A	0 €	N/A	50	2,500+	Y
Cree, Inc.	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	3,800	N/A	0 €	N/A	50	2,500+	Y
Intel	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	20	N/A	0 €	N/A	50	2,500+	Y
Osram Opto Semiconductor	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,300	N/A	0 €	N/A	50	2,500+	Y
Toshiba	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	450	N/A	0 €	N/A	50	2,500+	Y
Vishay	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,350	N/A	0 €	N/A	50	2,500+	Y
PASSIVES											
AVX	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	17850	N/A	0 €	N/A	50	2,500+	Y
Bourns	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	15,100	N/A	0 €	N/A	50	2,500+	Y
Coilcraft	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	5,750	N/A	0 €	N/A	50	2,500+	Y
EPCOS / TDK	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	5,450	N/A	0 €	N/A	50	2,500+	Y
KEMET	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	23,650	N/A	0 €	N/A	50	2,500+	Y
Murata	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	18700	N/A	0 €	N/A	50	2,500+	Y
Ohmite	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	6,550	N/A	0 €	N/A	50	2,500+	Y
Panasonic	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	25,450	N/A	0 €	N/A	50	2,500+	Y
Taiyo Yuden	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	5,100	N/A	0 €	N/A	50	2,500+	Y
TDK	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	13,050	N/A	0 €	N/A	50	2,500+	Y
TE Connectivity	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	11,500	N/A	0 €	N/A	50	2,500+	Y
TT Electronics	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	5,050	N/A	0 €	N/A	50	2,500+	Y
Vishay	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	43850	N/A	0 €	N/A	50	2,500+	Y
Wurth Elektronik	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	6,750	N/A	0 €	N/A	50	2,500+	Y
Yageo	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	21,450	N/A	0 €	N/A	50	2,500+	Y
PASSIVES ALTERNATIVES											
BEC Distribution Ltd		01844 275824	www.bec.co.uk		5,000	N/A	£0	100%	3	5	Y
POWER & BATTERIES											
FRIWO Gerätebau GmbH	Haredata Electronics	01423 796240	www.haredata.co.uk	Y	250 - 500	€1M	£250	100%	7	14	Y
Jauch Quartz		01276 605900	www.jauch.com			£500,000	0	95	15	130	Y
Mean Well	Ecopac (UK) Power Ltd	01844 204420	www.ecopacpower.co.uk	Y	6,000	£2M	£0	100%	8	30	Y
Bel Power Solutions	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	600	N/A	0 €	N/A	50	2,500+	Y
CUI Inc.	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,200	N/A	0 €	N/A	50	2,500+	Y
MEAN WELL	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	4,400	N/A	0 €	N/A	50	2,500+	Y
Murata	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1500	N/A	0 €	N/A	50	2,500+	Y
RECOM	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	3,150	N/A	0 €	N/A	50	2,500+	Y
TDK-Lambda	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,900	N/A	0 €	N/A	50	2,500+	Y
TRACO Power	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	4,000	N/A	0 €	N/A	50	2,500+	Y
Vicor	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,300	N/A	0 €	N/A	50	2,500+	Y
XP Power	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,200	N/A	0 €	N/A	50	2,500+	Y
SENSORS											
ams	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	150	N/A	0 €	N/A	50	2,500+	Y
Analog Devices Inc.	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	300	N/A	0 €	N/A	50	2,500+	Y
Bosch	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	25	N/A	0 €	N/A	50	2,500+	Y
Honeywell	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,200	N/A	0 €	N/A	50	2,500+	Y
Maxim Integrated	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	350	N/A	0 €	N/A	50	2,500+	Y
NXP	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	300	N/A	0 €	N/A	50	2,500+	Y
Sensirion	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	80	N/A	0 €	N/A	50	2,500+	Y
STMicroelectronics	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	75	N/A	0 €	N/A	50	2,500+	Y
TE Connectivity	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	650	N/A	0 €	N/A	50	2,500+	Y
Texas Instruments	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	850	N/A	0 €	N/A	50	2,500+	Y

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											
Apem	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,850	N/A	0 €	N/A	50	2,500+	Y
C&K Switches	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	5,550	N/A	0 €	N/A	50	2,500+	Y
E-Switch	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,350	N/A	0 €	N/A	50	2,500+	Y
EAO	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,800	N/A	0 €	N/A	50	2,500+	Y
EAO Ltd	EAO Ltd	01444 236000	www.eao.co.uk	N	5,000	£500,000	£150	100%	6	22	Y
Honeywell	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	4,700	N/A	0 €	N/A	50	2,500+	Y
NKK Switches	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	4,000	N/A	0 €	N/A	50	2,500+	Y
Omron	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	4,700	N/A	0 €	N/A	50	2,500+	Y
Panasonic	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	550	N/A	0 €	N/A	50	2,500+	Y
TE Connectivity	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,350	N/A	0 €	N/A	50	2,500+	Y
TERMINAL BLOCKS											
Marathon Special Products	Global Supply Services	01904 436 488	www.global-supply-services.com	Y	8,000	£800,000	£100	100%	3	11	Y
Molex	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,850	N/A	0 €	N/A	50	2,500+	Y
Phoenix Contact	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	13,550	N/A	0 €	N/A	50	2,500+	Y
TE Connectivity	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,750	N/A	0 €	N/A	50	2,500+	Y
THERMAL MANAGEMENT											
Bergquist Company	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	250	N/A	0 €	N/A	50	2,500+	Y
Delta Electronics	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	700	N/A	0 €	N/A	50	2,500+	Y
ebm-papst	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,450	N/A	0 €	N/A	50	2,500+	Y
EMI Thermal	EMI Thermal	01992 510000	www.emithermal.com	N	800	N/A	£20	100%	12	200	Y
Sanyo Denki	EAO Ltd	01444 236000	www.eao.co.uk	Y	4,300	£150,000	£150	99%	6	22	Y
Sanyo Denki	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,450	N/A	0 €	N/A	50	2,500+	Y
Sunon	G.English Electronics Ltd	0208 855 0991	www.gelec.co.uk	Y	3,500	£1,000,000+	£0	100%	10	28	Y
Sunon	Thermaco Ltd	01684 566163	www.thermaco.co.uk	Y	3,500	£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
Bourns	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	4,900	N/A	0 €	N/A	50	2,500+	Y
Coilcraft	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	5,500	N/A	0 €	N/A	50	2,500+	Y
EPCOS / TDK	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,300	N/A	0 €	N/A	50	2,500+	Y
Murata	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	6,900	N/A	0 €	N/A	50	2,500+	Y
TDK	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	4,050	N/A	0 €	N/A	50	2,500+	Y
Vishay	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,200	N/A	0 €	N/A	50	2,500+	Y
Wurth Elektronik	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	3,400	N/A	0 €	N/A	50	2,500+	Y
WIRELESS SOLUTIONS											
DIGI	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	200	N/A	0 €	N/A	50	2,500+	Y
Espressif	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	30	N/A	0 €	N/A	50	2,500+	Y
Laird Connectivity	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	100	N/A	0 €	N/A	50	2,500+	Y
Lantronix	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	25	N/A	0 €	N/A	50	2,500+	Y
Microchip	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	150	N/A	0 €	N/A	50	2,500+	Y
Murata	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	30	N/A	0 €	N/A	50	2,500+	Y
Silicon Laboratories	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	150	N/A	0 €	N/A	50	2,500+	Y
Texas Instruments	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	20	N/A	0 €	N/A	50	2,500+	Y
u-blox	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	10	N/A	0 €	N/A	50	2,500+	Y

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	70	9	AS9100 Rev D, ISO9001:2015, ISO 140001:2015, UL , CCC, IPC-610-G Class 3, TUV	Y	Y	Y	Y	Y	Y
CML Innovative Technologies (uk) Ltd	01284 714700	www.cml-it.com	£12M	UK/EU/China	65		ISO9001, TS16949, UL ISO9001 2015, IATF 16949 2016	N	Y	Y	Y	Y	Y
Corintech Ltd	+44 (0)1425 655655	www.corintech.com	£12.5m	UK & Far East	72	10	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	£2.4m	Staffordshire	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	2,000	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
NOTE Group	01753 746700	www.note-uk.co.uk	£151m	UK/EU/China	1,100	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,ISO14001, 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
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	Ceramic PCBs	Heavy Copper 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	N/A	N/A	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	N/A	N/A	Y	Y	Y	Y
DK-Daleba Printed Circuit Boards	01992 510000	www.dk-daleba.co.uk	M	UK, Europe, Asia	ISO 9001:2015, UL, TS16949, JOSCAR	SML	Y	4-58	Y	Y	Y	Y	Y	Y	Y
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	N/A	N/A	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	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	N/A	N/A	F/R	Y	Y	Y
Stevenage Circuits Ltd	01438 761811	www.stevenagecircuits.co.uk	M/B	UK/China	ISO 9001:2015, EN 9100:2018, EN 9104:2013, UL796, ISO 14001:2015	SML	Y	4-44+	Y	N/A	N/A	F, F/R	Y	Y	Y
Tate Circuit Industries Ltd	01543 622 435	www.tatecircuits.com	M/B	UK/China	ISO 9001:2015, UL	SML	Y	4-20	Y	N/A	N/A	Y	Y	Y	Y

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