

ELECTRONICS

APRIL 2021

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SQUEEZE DELAYS OUT OF YOUR SUPPLY CHAIN

Increased opportunities
from automotive
Page 14

Small but big impact
Page 18

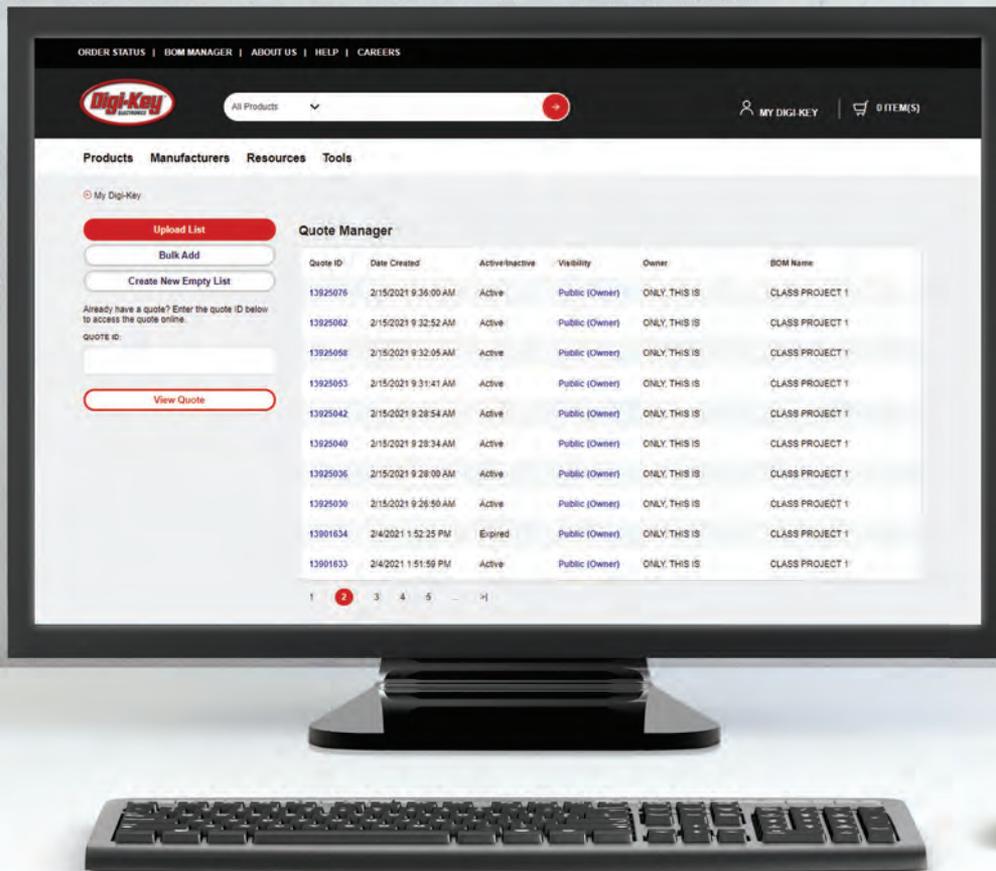
PMIC: strong demand,
limited capacity
Page 22

IoT, 5G and alternate
energy driving market
Page 28



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On the cover – April 2021

Squeeze delays out of your supply chain

Editor's Word



Contents

4

News

How to calculate capacitor life

8

Covid-19

Digitised purchasing: it's a game changer

17

What's new

Petite and powerful

24

Passives

Passives in a post-pandemic revenge economy

31

Buyers' Guide

All the facts and figures to help you buy

Supply chain conundrums

As a designer, I'm always on the lookout for conundrums as they are the sources of confusion from which innovations emerge. Looking at the landscape of the post pandemic electronics supply chain, I'm seeing conundrums everywhere. Allow me to shine a light on two.

One word I'm hearing more than most is 'digitisation' which can mean different things in different industries. In the supply chain, as of today, I take digitisation to mean 'real-time demand transparency'. In the most extreme example, the second an electronics retailer places a forward order, that demand cascades through the wholesaler, OEM, contract manufacturer, component distributors, device manufacturers and raw material suppliers.

This requires digital integration at every level, based on tight technological and commercial partnerships. However, at the same time, there are demands for new levels of supply chain resiliency based on more flexible, multi-sourcing agreements.

Another conundrum is forming around globalisation and sustainability. As entire countries chase the benefits of comparative advantage, the components they manufacture literally circle the earth seeking out their end application. Likewise, subassemblies may pass back and forth between countries, each of which specialises in adding value at a specific production step. Yet, at the same time, sustainability goals demand shorter, simpler supply chains which are designed to drive down a component's total carbon footprint year-after-year.

So, two sector scale conundrums, which I imagine will keep electronics supply chain professionals busy well into the middle of this century. It's too early to place bets but I am already seeing innovations starting to emerge which will be reported here.

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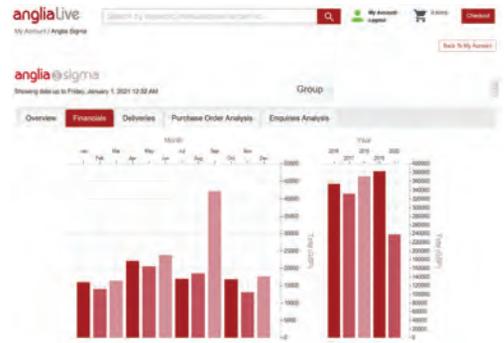
How to calculate capacitor life

TDK's online AlCap Useful Life Calculation Tool V4.0, for EPCOS aluminium electrolytic capacitors, covers high-voltage capacitors (>150VDC) with screw, snap-in and solder pin connections. These DC link capacitors suit new designs of converters for industrial applications, such as photovoltaics and wind power generation, plus uninterruptible power supplies.

The tool allows up to 15 load profiles to be simultaneously entered, calculated and stored for later use. This allows application development with single capacitors and capacitor banks. The tool can also perform on a customer-specific basis calculation. This requires the CSC code in the data sheet to be entered.

In addition to capacitors' useful life under defined load conditions, the user also gets data regarding hot-spot temperature, power dissipation and more.

www.tdk-electronics.tdk.com



Remote audits, an industry first

In an industry first, Anglia Components' Anglia Sigma service lets customers remotely carry out vendor ratings and audits. This suits customers who conduct mandatory inspections and evaluations for their ISO quality process but are constrained by Covid-19 restrictions.

This free tool provides a detailed overview of a customer's business with Anglia. The service comprises a dashboard, driven by Anglia's business system, which provides the data customers require to assess Anglia's performance over the last twelve months. This includes analysis of forward, current and historical orders and enquiries, plus key vendor rating features including on-time delivery performance. Anglia Sigma is available to customers registered on Anglia Live.

Anglia's quality & compliance manager, Claire Stevenson, said: "We believe we are still the only electronics distributor to offer this level of information free of charge to all our customers in an instantly accessible, online portal."

www.anglia-live.com

Current transformers conform to IEC regulations

SIGA's current transformer products now conform to IEC regulations from design, through manufacturing to final test. Standards including IEC61869 are addressed by specific conformance testing for current transformers, conducted in the company's Covid-19 secure UK workspaces.

The company's current transformers are designed for metering and protection purposes. These busbar mounted current transformers are used in applications including Parasense units in supermarket refrigeration.

Other uses include switchgear in data centre, aerospace, automotive, power generation, MoD and rail transport environments.

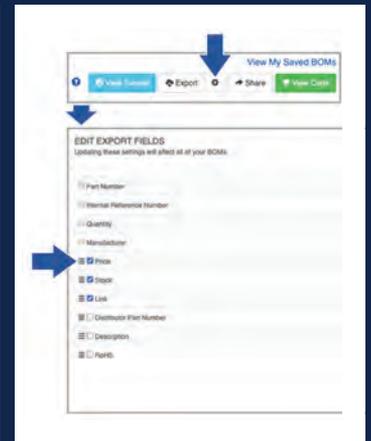
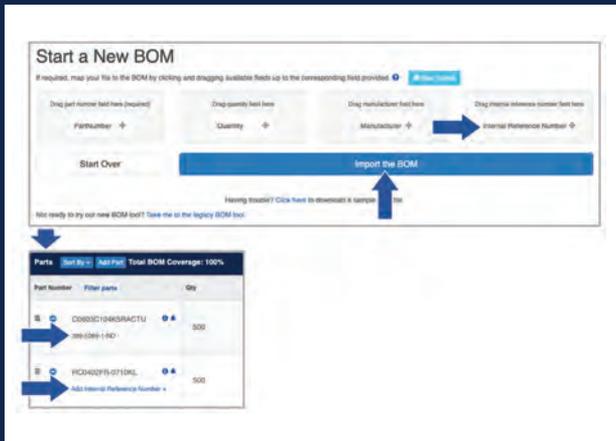
Circular or rectangular current transformers, full block or split core, are manufactured using UL recognised semi-rigid cast resin compound or an IP rated plastic box finish. Other finishes are available.



Specifications include primary currents of 50 to 10,000A (ring type) and 60 to 6,300A (rectangular). These meet accuracy classes from 0.2 (metering) and class PX (protection). In applications rated to 0.72/3kV, they can be built for 3kV insulation level for up to one minute.

www.sigatransformers.co.uk

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In Brief

Support for panel PCs

Crystal Display Systems has become Litemax Corporation's UK distributor and value-added support partner for its high brightness industrial panel PCs. CDS stocks and supports Litemax' range of ruggedised IP65 and IP68, standard and narrow bezel panel PCs, plus looks after OEM/ODM customised bespoke solutions for industries including defence, aerospace, medical and marine.

crystal-display.com

Understanding reed relays

Pickering Electronics has revamped the datasheets of its range of reed relays, providing more information in a clearer format with interactive links to further useful content. New information includes additional environmental specs, mechanical characteristics and relay weights, plus RF plots for coaxial relays, showing VSWR, isolation and insertion loss.

www.pickeringrelay.com

Buying into frequency

Abrakon has acquired AEL Crystals. AEL's MD, Gary Ramsdale, said: "We have long recognised that both AEL Crystals and Abrakon share the core values of customer service, an unparalleled range of frequency control products and a reputation for reliability. We look forward to bringing these principles to the European market."

abracon.com

Recognising supply chain performance

Specialist manufacturer of RF, waterproof and cryogenic connectors and cable harness assemblies, Intelliconnect, has been re-approved to the SC21 Silver Performance Standard Award for a third consecutive year. SC21 is a change programme designed to accelerate the competitiveness of the aerospace and defence industry by raising the performance and reliability of its supply chains.

www.intelliconnect.co.uk



Waterproof rotary switch ready to ship

Foremost Electronics has announced availability of the Elma MR50 multi rotary switch, ideal for harsh conditions such as agricultural vehicles. The switch is described as small and robust. Front panel sealing to IP60/68 and vibration resistance are two stated features.

Applications range from night vision systems and two-way radios, to portable devices in medical, sports and video sectors.

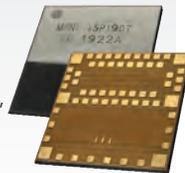
Measuring 12.7mm diameter, the MR50 offers up to 16 switch positions, with switching torques up to 6Ncm. It operates in shorting or non-shorting mode. With gold-plated contacts, operating temperature range is -45 to 85°C.

Foremost's sales director, Alan Vincent said: "The market for compact robust electromechanical HMI products offering operators safe and simple operation and direct tactile feedback continues to grow in industrial and vehicle systems. While touch screens are increasing in popularity as an HMI solution, they are not always suitable for noisy, harsh environments or when operators may have to wear protective clothing such as gloves. The new Elma MR50 multi rotary switch offers a compact, rugged, flexible control product."

www.4most.co.uk

Long-distance Bluetooth module in stock

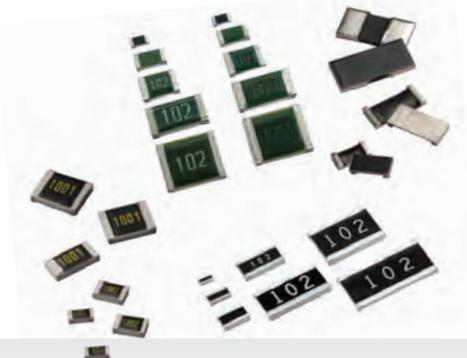
Rutronik UK is now stocking the Insight SiP ISP1907 series of Bluetooth Low Energy modules, claimed to combine compact design, resilient computing power and long battery life. Applications include object and ID tracking.



Based on the nRF52 system-on-chip from Nordic Semiconductor, the ISP1907 is a high-frequency transceiver with a clock frequency of 2.4GHz. The LL version comes with 192kB Flash and 24kB SRAM and is based on the nRF52811. It has 13 configurable GPIOs, including three ADCs. The HT version has 512kB Flash and 128kB SRAM and is based on the nRF52833. Some 30 GPIOs are available, eight planned as ADCs. Security includes an NFC-A tag for OoB pairing and an ARM Cortex M4F floating point processor. A USB interface is included in the HT.

The device measures 8 by 8 by 1mm.

www.rutronik.com



2,400 new passive lines

Farnell has strengthened its passive component portfolio with KOA's 2,400 lines, all in-stock for delivery in Europe. KOA specialises in thick film and thin film resistors for high reliability applications such as industrial, automotive, aerospace, telecommunications and medical, plus commercial. Its portfolio includes high reliability thin-film, pulse tolerant/anti-surge thick film, shunts/current sense, high voltage and wide terminal resistors.

Farnell's global head of IP&E, Simon Meadmore, said: "KOA continues to innovate and optimise its passive component solutions, ensuring engineers can easily overcome design and performance challenges. Our customers now have access to the highest quality passive components for automotive, environmental, industrial, medical and telecommunication applications as well as energy saving devices, home appliances, power supply units and more. The depth and breadth of KOA's market leading range of chip resistors greatly enhances Farnell's world-class portfolio of more than 360,000 passive components."

As an example of KOA's technologies, the SG73 series of pulse tolerant and anti-surge resistors is designed to protect electronic circuits against extreme pulses and surges, especially in I/O protection, snubber and gate drive circuits. Pulse handling capability is up to 10 times higher than standard flat chip resistors, suiting automotive, power supplies and motor control

uk.farnell.com

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Electronics Sourcing Online

Electronics Sourcing has got a new digital identity.

The new Electronics Sourcing website features more content from our editors and experts of the electronics industry with a focus on unique content not found anywhere else, all presented in a clean and user friendly design.



DIGITISED PURCHASING: it's a game changer

Farnell's regional sales director of UK, Ireland and Benelux, Mathew Thorpe, explains how a crisis became an opportunity for greater productivity and growth

While the world was reeling from the Coronavirus pandemic, Daletech Electronics, a mid-sized UK-based electronics subcontract manufacturer, saw the crisis as a catalyst for an extensive review of its operations. The company assessed its business model and pressed the 'pause' button. A strategic decision was made to upgrade the company's processes and embrace digitisation to ensure Daletech could procure electronic components and products with greater productivity and efficiency. It did this with the support of longstanding partner and distributor, Farnell.

Daletech's managing director, Tracey Dawson, said: "To achieve our goal of being not just world-class but also the best at what we do, we had to have world-class systems and processes in place. Yes, Covid-19 created an incredibly intense environment, but that meant we had the time to look at every single process, from the very beginning to the very end, and see how we could improve them through digitisation."

Daletech has had a longstanding strategic partnership with Farnell, sourcing products including semiconductors, passive components, onboard electronic components and connectors. The partnership has worked well because Farnell gives Daletech access to an extensive and resilient distribution network. Global procurement through Farnell is a key factor in Daletech guaranteeing a reliable supply chain.

Tracey continued: "Farnell has been our

preferred supplier for a good number of years. We absolutely need a partner like Farnell who can support us in the way that they do. When the unexpected happens, you need to be working with suppliers and customers that you trust and that can help you. We cannot survive unless our customers are successful, and we cannot support them properly unless we are fully supported in turn by our suppliers." Daletech chose to work even closer with Farnell, developing a robust working relationship to secure their product supply chain and integrate a new software system with a live application programming interface (API) link. By embracing digitisation this way, Daletech overcame a major challenge many contract manufacturers face: checking product availability in real-time while efficiently costing, quoting and invoicing components.

Farnell's ePass API reduces the time and costs associated with sourcing products by letting customers access condensed data for every product.

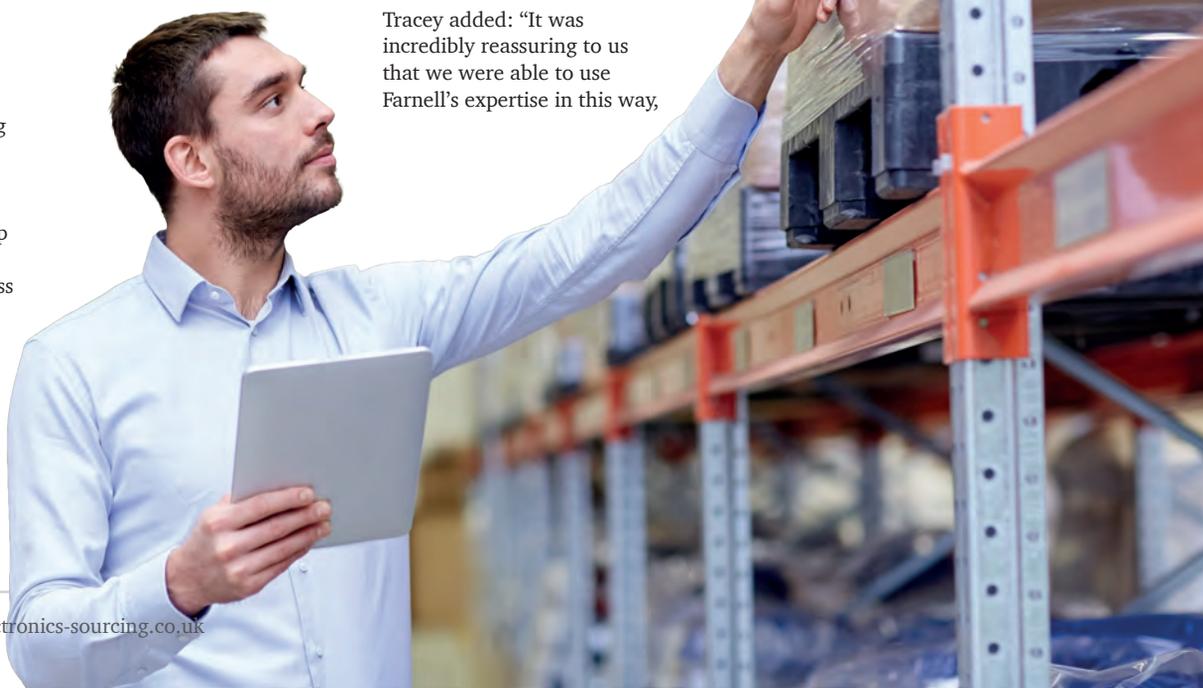
The system lets customers understand instantaneously what is available, how much an item costs and when it can be delivered. It also helps Daletech manage delays or order cancellations more efficiently by updating scheduled orders. Connected to this, Farnell's eInvoicing secure online portal offers companies rapid access to invoices and related documents. This removes a big headache associated with processing supplier invoices.

Tracey described the API system as game-changing: "Now that we have a direct digital link to the Farnell catalogue, we can be far more efficient when quoting because we have instant access to live prices and real-time stock availability. The system also tracks everything from end-to-end and manages all purchase orders and invoices more accurately than was possible before. Downloading and checking invoices is now a straightforward process which means we can concentrate our resources on manufacturing."

Tracey added: "It was incredibly reassuring to us that we were able to use Farnell's expertise in this way,



To achieve our goal of being not just world-class but also the best at what we do, we had to have world-class systems and processes in place



with live links and live data that we can rely on coming straight into our system. That's really important to us. At the same time, we didn't have any problems with delivery because Farnell didn't have any problems.

Knowing that our supply chain was solid became very important to us. Not only are Farnell's orders the easiest to book in than any other, but with this system we can now get a same day delivery when we've got a product shortage or when a customer wants something manufactured at very short notice. That's perfect for us because when we are producing prototypes we are in the realms of long-term manufacturing."

The APi's efficiency and direct access to a first-class distribution and supplier network proved beneficial when another Leeds-based manufacturer asked Daletech to help rework an existing product required for a demonstration. Responding to a change in LED specification, Daletech ordered a replacement

and completed the rework in 24-hours. As a result, Daletech is now a preferred supplier to this customer and has completed three new rework orders since the initial contract.

Tracey continued: "The longstanding partnership that we have developed with Farnell gives us greater reassurance in these challenging times as we move forward. Even now, our company is on a high growth trajectory and we're looking at ways we can diversify and increase our offering to customers. We need to work with suppliers who are on the same trajectory, so it is extremely important that we not only maintain the relationship we have with Farnell but also that we develop it further.

"As an SME, we don't have the knowledge or the breath of distribution that Farnell has. We need to be partners with suppliers that can deliver product to us on time. Distributors that we work with have to be totally synchronised with

our own vision because we don't have the time to be dealing with problems that are created by suppliers." 'Adapt to survive' is a mantra that Daletech and Farnell have followed before, during and after the initial Covid outbreak and they are determined to help other companies better prepare for the future. Daletech has learnt lessons it wants to pass on to customers who have also been affected by global lockdowns and restrictions. Tracey believes it is important to look at and understand what happened to customers due to Covid and how Daletech can improve the quality of its services to better support them.

Through a combination of maintaining strategic partnerships and embracing digitisation in product procurement and supply, Daletech Electronics and Farnell have shown SMEs they can face the future with confidence. Forging robust strategic partnerships and working collaboratively are essential if businesses



Daletech's MD,
Tracey Dawson

are to grow alongside their suppliers and customers. More specifically, this partnership has shown that crises such as the pandemic don't represent a setback, but an opportunity to do things differently, including taking a new, flexible and more efficient approach to supply chain management.

uk.farnell.com
www.daletechltd.com



Distributors that we work with have to be totally synchronised with our own vision because we don't have the time to be dealing with problems that are created by suppliers

Electronic displays: bringing it all back home?

BEC Group identifies what purchasing professionals should be looking for when considering reshoring or nearshoring

Image Credit: Cygnus Instruments

The Covid-19 pandemic has highlighted weaknesses in the global supply chain and potentially accelerated the trends to reshore or nearshore. Can the UK supply chain cope to the required standards?

The global electronic displays market will be worth over \$190 billion by 2023, according to a 2018 forecast by Zion Market Research. Whether that comes true, after Covid-19, is debatable but it still represents an awful lot of displays, for a diverse market that extends from

personal smartphone and tablet screens through to giant information displays.

Screen production is commoditised and dominated by Far East manufacturers, led by familiar names such as LG, Toshiba, Sony and Zenith working in highly automated mega factories. However, they do not always serve the needs of industry and specialist activities, including advanced electronics, opto-electronics, IT and metrology, to name a few. It's unlikely that mass production will

return to the UK or EU any time soon but not all needs can be served from the other side of the world.

UK suppliers have the advantage of proximity and availability to other UK companies. A short supply chain is less vulnerable to paperwork delays, is more secure and more responsive. Collaboration with people who speak the same technical language and are in the same time zone makes it simpler to evolve designs so development time can be slashed.



A short supply chain is less vulnerable to paperwork delays, is more secure and more responsive



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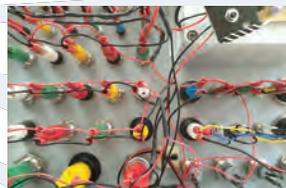
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Displays

For example, the Cygnus DIVE ultrasonic thickness gauge, a wrist-mounted, material thickness gauge, suitable for use underwater, is made in the UK. It is used by commercial divers, provides accurate and reliable measurements, has a bright, AMOLED display and is rated to 300m depth. It is contained within an injection moulded housing manufactured by Hampshire-based BEC Group. The UK company specialises in technical mouldings and, with an in-house toolroom, offers a complete solution.

Due diligence is always important but a UK supplier offers a strong base to begin with. A UK partner is more likely to be able to produce a unique solution. Specifying the product rating at the outset is critical to the selection process and finding a supplier with the relevant IP experience is recommended. Its experience becomes a major asset, guiding customers through the process and asking the right questions.

Questions when considering housing electronic displays:

Brief

What's the priority? The enclosure can't do everything so you must list in order of importance for example; portability, strength, flexibility, protection, display size, power source.

Design solution

What design can achieve this? Battery hatch, waterproof, permanent seal, inserts, snap fit, clamshell.

Environmental vs Industry Standards

Where is it going and what's the required standard? Marine, hazardous, laboratory, medical, military, chemical, IP rating, flame-retardant (UL), ATEX, FDA, UV, recyclability.

Aesthetics

How does it need to look? Consider surface finish, materials, colours and branding.

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Keeping pace with high power terminal block demand

In this article, Hitaltech explains that electric vehicle charging is driving a surge in demand for high power terminal blocks

High current requires high power terminal blocks and connectors. One field of high current application that has been growing faster than any other over the past few years is electric vehicle charging. Now the government has determined that no new petrol and diesel vehicles can be produced from 2030, the growth in electric vehicles, and demand for the infrastructure to support that growth, is set to accelerate.

As a connecting technologies specialist, Hitaltech has been tracking growth in the sector

and knew that increasing production of its high-power terminals, mounting headers and other components would be essential to enable the required growth in the number of EV charge points.

Capable of drawing high current, the components are suitable not just for EV charging but also the wider renewable energy market.

Sales manager, Matt Hughes, said: "Hitaltech's terminal blocks and connectors come in a range of sizes. Anything above 40A is classed as high power. We

have nine variants in the high-power range which are much bigger than their low power counterparts because they have to carry more current. The largest is rated at 135A and is used in inverters, servo drives and power supplies as well as EV charging. All our products have UL approval and documentation to help our clients ensure safety and meet their compliance requirements."

More than a components supplier, Hitaltech is working with EV and renewables manufacturers to customise its parts to ensure manufacturers can meet the rising demand as simply as possible.

Matt added: "Already our range includes PCB moulded screw-type blocks, screwless types and a pluggable range. To that we can add tailored printing, colours, kitting, machining and more. That supports manufacturers in their search for process efficiency, improves the quality of the end product and makes life easier for the people who will use, maintain and repair the charge points in the future."

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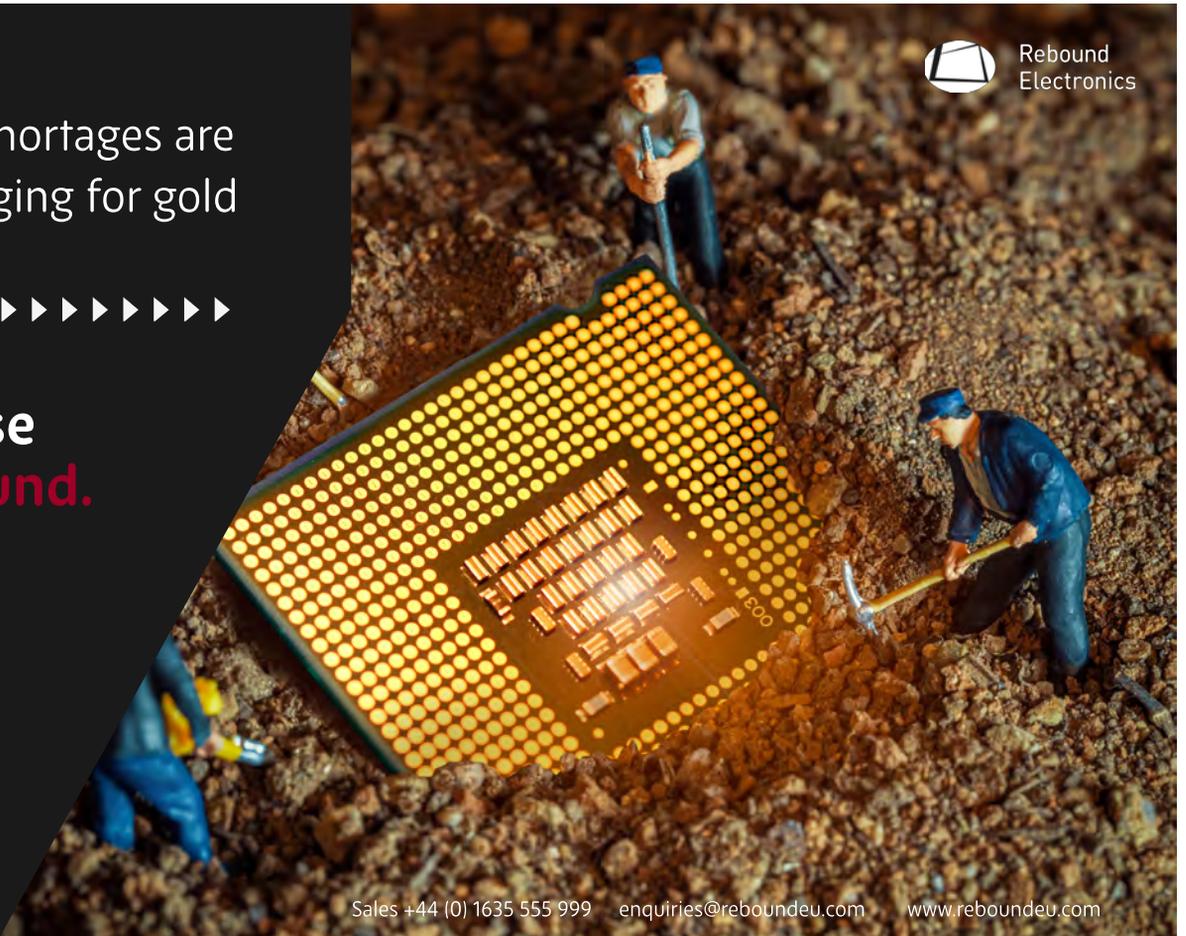
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Distributors see increased opportunities from automotive

Some distributors say their sales to the automotive supply chain are rising because of semiconductor shortages, rising electronic content in cars and the trend towards electric vehicles



James Carbone

Automotive represents a small percentage of electronics distributors' overall sales, but distributors say there has been a sharp increase in demand by automakers and their key systems suppliers and contract manufacturers fueled by severe shortages of some semiconductors.

Some distributors say demand by automotive customers may be short lived while others say there is a paradigm shift occurring and automotive OEMs will continue to use the distribution channel even after shortages abate.

Catalog distributors have a long history of servicing the auto industry. When automakers and their tier 1 suppliers design new systems, their engineers frequently turn to catalog distributors for components in the development of new systems.

Automotive customers buy a wide range of parts from distributors, including semiconductors, passives and connectors, among other components. "We sell everything from electromechanical devices to sensors to test and measurement equipment into the automotive customer," said Jeff Newell, senior vice president of products for Mouser Electronics. "It's an important customer segment from a design perspective," he said.

He said transportation, which includes automotive, represents about three per cent of Mouser's sales. However, that figure does not include sales to electronics manufacturing services (EMS) providers that manufacture systems for automotive customers.

He said Mouser does business with all areas of the automotive supply chain. The distributor sells parts to automotive suppliers such as Continental, Delphi and Daimler-Benz, among others. "They are looking to us for new products in new product engineering quantities. We believe design engineers start their designs with us," said Newell. Mouser also sells components to lower tier suppliers as well. "We are probably more important to those folks because they find it easier to find the products that they need and we get the parts to them quickly with no hassle," said Newell.

Shortages boost business
Mouser, like other distributors, has seen an increase in sales over the last six months because of semiconductor shortages. Many automakers slowed down production last year because of COVID-19. As a result, automotive customers stopped ordering semiconductors for several months.

Business started to bounce back in the second half year and car makers started placing



Jeff Newell, senior vice president of products for Mouser Electronics.

"We sell everything from electromechanical devices to sensors to test and measurement equipment into the automotive segment"

purchase orders again. However, there was also robust demand from other customer segments including computers, 5G phones and consumer electronics gear.

With all the demand, semiconductor integrated device manufacturers and foundries could not keep up with demand resulting in shortages and many OEMs and their EMS providers turning to the distribution channel for parts. Strong demand continued into 2021 and distributors reported stellar sales in the first few months of the year.

For instance, Digi-Key's sales were up 40 per cent in January and February, said Jim Ricciardelli, executive vice

president of digital business. "How much of this can we attribute to automotive business? I'm sure it has a lot to do with it," he said. "I believe the automotive business triggered this crazy acceleration of business."

He said the recovery of the auto industry and strong continuing demand for laptops, smart phones, and consumer electronics products resulted in many electronics manufacturers placing annual buys for semiconductors. "Before they would buy every month because we have such good inventory position," said Ricciardelli. "Now they're saying, 'we will take all of our product all at once because we



don't know where the market is going this year," he said.

Ricciardelli predicts strong demand from automotive—and other industries—will continue. "I think our industry is going through a paradigm shift," said Ricciardelli. "The growth we are seeing in sales right now is not going to go away. We are seeing demand from many different industries because of strong demand for vehicles, smart phones, including 5G, and for smart home products," he said.

Sales to automotive will rise

Automotive is a small but growing customer segment for Digi-Key. The distributor has 700,000 customers and it is "hard to put our finger on how many of them are connected to automotive," said Ricciardelli. "It's not a huge percentage, but it is a good chunk. The tier ones for sure," he said.

Digi-Key provides parts for automotive engineers designing new systems. "But I think the bigger volume for us is contract manufacturers and subassembly houses that support automotive," he said. "Our volume business is high-mix, low-volume at the contract manufacturers."

One automotive subsegment that will further drive component demand for Digi-Key and other distributors is electric vehicles (EVs) and charging stations for EVs. "EV market sales are growing 30 per cent this year," said Ricciardelli. In addition, EVs have two times more semiconductors than internal combustion engine vehicles. Researcher IC insights says an average internal combustion engine vehicle has about \$600

of semiconductors, while an EV has about \$1,200 worth of chips. As a result as more vehicle production shifts to EVs, semiconductor demand from automotive will rise. EVs will also boost demand for passives. "There are more than 20,000 MLCCs in an electric vehicle," he said.

Latest and greatest wanted

Distributors say automakers and their systems manufacturers need the latest and greatest products when they design new systems. As a distributor, "it's all about having the newest products: battery management, diodes, sensors, microcontrollers," said Ricciardelli. "Design engineers are trying to stay ahead of the curve. That's what's most important," he said

However, because automotive has long lifecycles, obsolescence is an important issue for automakers and their systems suppliers and EMS providers. When an automotive OEM designs a product "they need to know the component is going to be around for a long time, more so than some other industries," said Ricciardelli. "That plays to our strengths. Because of our inventory solutions, auto companies like to work with Digi-Key because if anything goes obsolete, we are going to put in inventory to protect them for a long time," he said.

One distributor that expects its business to grow with automotive customers is Avnet. "Automotive has been a key strategic vertical for Avnet for many years," said Jason Skoczen, sales director-lightspeed and transportation for Avnet. Currently more than seven

Jason Skoczen, sales director-lightspeed and transportation for Avnet

"We fully expect our business in the automotive supply chain will grow substantially in the coming years and we are excited about the opportunity to play our part in helping to drive the transformation of the auto sector"



per cent of Avnet's business is in the transportation market segment. The distributor expects its business throughout the automotive supply chain will grow "substantially in the coming years and we are excited about the opportunity to play our part in helping to drive the transformation of the auto sector," he said.

Skoczen added the opportunities in the automotive market "are on a steady growth trajectory as advanced electronic functions proliferate and spread from premium models to lower-priced, high-volume models."

More chips for vehicles

He said because of the adoption of infotainment and advanced driver-assistance systems and the growth of EVs, semiconductor content per vehicle is growing. He said market research shows the global automotive semiconductor market will grow in value from about \$48 billion in 2019 to nearly \$130 billion by 2025. "Industry insiders say it is not out of the realm of possibility for the semiconductor content per vehicle to quadruple in the coming years," said Skoczen.

Such growth will have a positive impact on distribution sales although "auto OEMs have

been a little slower to embrace distribution," he said. However, Avnet sees "newer players in the sector actively seeking our support around not just sourcing but supporting their design and operations with the range of platforms and services we offer," said Skoczen.

More automotive companies are beginning to see the value of using distributors to manage the supply chain. Partnering with a global component distributor "can enable automotive brands—both traditional and emerging players—to leverage our experience, infrastructure and existing relationships with critical technology suppliers so they can quickly ramp up their ability to manage the complexity of technology supply chain," said Skoczen.

Servicing automotive customers may be more challenging for distributors because automakers have different requirements than customers in other industries. Because liability risks are particularly high in the automotive industry, the automotive industry is highly regulated, and electronic components must adhere to specific quality standards, such as IATF 16949, ISO 26262, AEC-Q100 and AEC-Q200, said Skoczen.



Equivalents keep the supply chain moving in uncertain markets

Anglia's CEO, Steve Rawlins, argues that to give an EMS the best chance of sourcing quality components, customers need to be pragmatic about generic devices

Successive cycles of chip passive shortages have accelerated the trend for customers to specify 'generic' parts on the bill-of-materials rather than a specific brand. Outside some really safety critical markets like aerospace and medical, most BoMs now simply specify a value and chip size for passives, or generic diode designation, leaving the EMS to select the vendor depending on what is in stock or what they can source.

This pragmatic approach has clear benefits for the customer, EMS and end-user. For the EMS, it reduces inventory, as they don't need to hold the same value and size from different manufacturers. They can

also make efficient use of inventory, using up reels left from previous projects. For parts costing a fraction of a penny, storing them can cost much more than acquiring them, so this is a substantial issue for EMS customers.

For the customer, generic specification reduces supply chain risk. In the current market, this risk is significant. For some time, demand for chip passives has exceeded supply and is unlikely to change in the next eighteen months or so. In this situation, available supplies are routed to volume customers in automotive and consumer electronics sectors. This is the market right now. High volume users are ramping up quickly. There are

now only three to four large tantalum chip manufacturers and, essentially, they service the industrial market when they can. In this context, insisting on a specific brand of passive or discrete semiconductor adds significant supply chain risk, usually completely needlessly. Flexibility allows them to offer greater continuity of supply to their end-user.

This flexibility should not, of course, extend to accepting devices of unknown provenance sourced on the grey market. We would rather not supply than deliver a product of unknown provenance. Where we can, we will expand our supplier base instead. For example, we have

signed a new partnership with Walsin, a top five manufacturer of MLCCs, leading to an enlarged inventory holding of these currently scarce devices.

Nevertheless, the fact remains that right now there is not much inventory in the global supply chain, especially for chip passives and discrete semiconductors. Customers need to give their EMS the best chance of sourcing quality components to build their design by being pragmatic about generic devices where reasonable and possible.

They also need a partnership with a strong distributor who understands the importance of maintaining sufficient inventory and watches the market as lead-times move in and out. Our policy is to run with high levels of inventory in relation to our overall business. We operate with a stock turn of near to one, holding inventory at a level of 50 per cent of our annual sales. This is five to six times industry levels. To fully benefit from this, they need to give us, and their EMS, their best possible forecast of forthcoming demand.



Anglia Components' CEO, Steve Rawlins





Petite and powerful

Schurter's UMT-H surface mount ceramic fuse family now includes 40A and 50A ratings with a breaking capacity rating of 500A at 125VAC/72VDC. Package size is 5.3 by 16mm.

The UMT-H was originally developed to provide a smaller alternative to through-hole mounted 5 by 20mm cartridge fuses, commonly used for primary circuit protection. The range has since grown to include 26 rated currents from 160mA to 50A. Rated voltage is maximum 277VAC/250 VDC, with an interrupt capacity rating of 1500A for current ratings up to 6.3A.

Applications include energy, data, medical, industrial control and automotive. It is also impermeable to conformal coatings and thus a good candidate for use in ATEX and IECEx rated devices for hazardous environments.

The UMT-H is designed to IEC 60127-7 and UL 248-14 and carries VDE and cURus approvals. IEC and MIL-STD 202 tests apply. Pricing starts at about \$1.30 each per reel of 1500 pieces.

www.schurter.com



Saving weight and space in SPE

ODU's Mini-Snap SPE allows Ethernet connection via a single twisted-pair of copper cables, with voltage supply of terminal devices via Power over Data Line (PoDL). The simpler design of this new generation of connectors is engineered to offer both weight and space reductions.

SPE standards are: 1000BASE-T1 (IEEE 802.3bp); 1000BASE-T1 (IEEE 802.3bw); and 10BASE-T1 (IEEE 802.3cq). Maximum bridgeable distances of the standards vary between 15.40 and 1,000m.

SPE is being introduced into new automotive designs, replacing CAN and other bus systems. In future, communication, control and security functions will be managed uniformly via Ethernet. The field of industrial automation is also keen to benefit from this, with SPE allowing the barrier-free connection of devices, sensor/actuator technology and more.

www.odu-uk.co.uk

What's new

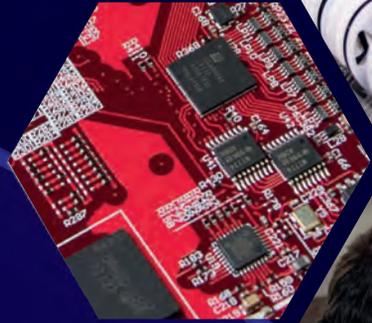
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Small but big impact



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 why supply constraints of the tiniest components can have significant consequences for even the biggest industries

Demand and supply • By John Denslinger

A WSJ article published in mid-February spoke to the impact of electronic components on the automotive supply chain. What prompted me to read the piece was the title: 'How car makers collided with a global chip shortage'. Curiosity set in. Could a massive market segment like automotive really miss the warning signals?

The warning signs were there and chief among them was scale. Automotive is a 100M vehicles per year market with EV accounting for less than three per cent of output. Despite the rapid digitalization of performance, safety and entertainment functions, automotive semiconductor consumption still pales in comparison to smartphone output which is already at a billion devices per year. 5G is just launching and likely driving mobile phone demand even higher. For chip and wafer manufacturers the reality is pecking order and priority when supplies are constrained.

Evidence suggests profit margins on high volume consumer electronics supersede that of automotive. Perhaps that is why the largest wafer fab company, TSMC's 2020 financials indicate only three per cent of capacity is assigned to automotive. Obviously, the procurement task of securing adequate automotive capacity now shifts to wafer fab, traditionally viewed as upstream in the supply chain.

The other big factor was insufficient investment in wafer capacity, specifically 200mm. Let's be honest, the pandemic didn't help. Governments everywhere shutdown businesses, shuttered most services, restricted movement of goods and personnel, and flip-flopped along the way. Economic uncertainty isn't a recipe for deep-pocket investment. Now that all market segments have bounced back strongly, demand understandably exceeds supply.

For more details and commentary on the chip shortage dilemma, I recommend the Executive Analysis prepared by ECIA's chief analyst, Dale Ford. His February summary covers a number of additional constraints on the semiconductor shortage worth reviewing.

Small, but big impact. Semiconductors are that and more, but let's not forget to include passive components as well. The purchasing community knows every bill-of-material has lots of resistors and capacitors. It's the lowest purchase value but largest part count on the bill. These are often called the 'after-thought' components: totally necessary but not fun to source.

In the case of resistors and capacitors, the constraint is a little different than chips. Since early 2020 when Covid first hit, lead times have pushed out an additional three weeks in resistors and five to six weeks more in capacitors. While that is manageable, a prolonged demand surge is just awakening. Fortunately for customers, major passive companies in Asia planned and built new capacity with most coming on-board during 2021, but this expanded capacity was intended to serve new demand from 5G, automotive and battery electronics, IoT, cloud enterprise, and global infrastructure buildouts. If these segments take-off and demand soars as predicted, capacity will remain constrained and lead times will stay extended through much of the year.

The electronics industry is about to benefit big time from several, concurrent technology deployments in 2021. More capacity across every component area is sorely needed. Maybe the car makers' collision with the chip shortage is the canary in the coal mine. On a macro-economic level, shortages in chip supply and persistent long lead times in passives will curtail industrial growth. That impact will ripple badly in our industry. That's big for such a small component.

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Safeguarding enclosure supply chains

Enclosure customisation facilities

OKW explains the best way to protect enclosure supply chains from unpredictable disruption is to shorten and simplify them

Disruption caused by Covid-19 has shown how fragile domestic and global supply chains can be. Even a small, highly localised outbreak can close a key supplier's factory and delay shipments. One employee tests positive, all others are sent home and production stops while the factory is cleaned.

That's not all. There are also ongoing issues with customs and border checks in the wake of Brexit. So, there's never been a better time to protect supply

chains by shortening and simplifying them.

Customising a standard enclosure has always been quicker and more cost-effective than opting for a one-off bespoke housing, especially in low volumes. However, customisation can involve a lot of individual processes: many more steps than simply printing logos/legends and machining apertures for potentiometer spindles, switches and connectors.

Plastic enclosures may need lacquering (special lustres,

metallic tones, soft-touch feel or other textures), decor foils for photo-quality graphics, EMC shielding, special materials or laser marking. That can create a lot of potential weak points in the supply chain.

The story is the same with fabricated aluminium enclosures. Getting standard cases machined and finished may involve two different suppliers who may not see eye-to-eye. That is because CNC machining is a precision process while finishing can involve variables that

are harder to control. Less predictable finishing can blemish or ruin beautifully machined cases, resulting in arguments between suppliers which create delays and administrative headaches.

The solution is to subcontract to an enclosures specialist offering a turnkey service, a single-source supplier capable of handling all the different customisation processes in-house: CNC machining, custom colours/finishes and digital printing or laser marking.

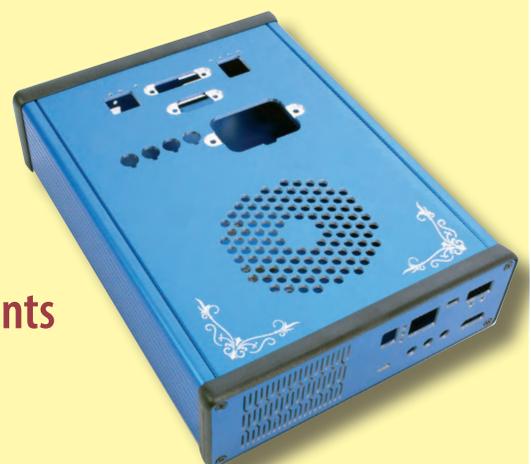


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The benefits of using one trusted partner become more apparent when specifying fabricated aluminium housings such as desktop instrument enclosures or 19in rack cases. Opting for aluminium offers the customisation services typically associated with standard plastic housings, plus custom sizes, customised front panels and additional fixings and inserts.

Enclosures
CNC machined
and with digital
printing



OKW Enclosures has specialised in this turnkey service for many years, manufacturing customisable standard plastic housings and aluminium cases through its metal enclosures division METCASE.

Marketing director, Robert Cox, said: "Enclosures can be fully customised ready for the installation of circuit boards and other components. The enclosures can go directly to the customer's production line: out of the box, on to the line. This speeds up manufacturing, reduces time-to-market and makes supply chains more secure."

Buyers can deal with one company which is fully accountable for the enclosures throughout the entire customisation process, providing added peace of mind. With no need to shuttle enclosures between different suppliers, there is less waste, fewer transportation miles, less hassle, lower administration costs and a reduced carbon footprint.

When a company is subcontracting a substantial part of its product, such as the enclosure, it makes sense to consider how much work it needs to do in-house and how much could be outsourced.

With an assembly service, OKW can arrange the purchase of components and perform all installation work including: assembling accessories (such as cable glands, clips and wall mountings); applying keyboard foils, display windows and mounting pillars; installing components, mounting assemblies, membrane keyboards and touchscreens; and providing customer specified packaging.

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Strong demand, limited capacity will boost PMIC tags

Expect a seller's market for power management integrated circuits for the rest of the year because of strong demand and limited production capacity



James Carbone

A double-digit increase in unit demand, tight supply and higher prices will result in the worldwide power management integrated circuit (PMIC) growing 19 per cent this year.

PMIC unit demand will rise 13 per cent while prices will increase five percent, resulting in revenue growing from \$14.6 billion in 2020 to \$17.4 billion in 2021, according to researcher IC Insights. Unit demand will increase through 2025. Unit shipments rose 68.4 billion in 2020 to 77.5 billion in 2021 and will rise to more than 110 billion in 2025. The average price will increase from \$0.21 in 2020 to \$0.22 in 2021 and hold steady through 2025, according to IC insights.

The researcher noted that despite the pandemic that shut down or slowed production of a lot of electronics equipment for weeks in the first half of last year, the PMIC market still grew four per cent as unit demand and prices increased about

two percent as equipment and component demand bounced back in the second half of 2021.

PMICs include linear and switching regulators, power management application specific standard products, battery charging and management chips, supervision/sequencing/motor control devices and voltage reference products.

The projected increase in revenue and demand for PMICs is coming from a wide range of customer segments including the automotive industry, computers, 5G handsets and infrastructure, among others.

"Power management ICs are critical components in just about every system," and demand for vehicles, computers, 5G phones and other equipment is rising, said Brian Matas, vice president, market research for IC insights. With increased demand and limited production capacity, there are shortages of PMICs and prices are increasing.

In fact, shortages started to occur in the second half of last year when demand for PMICs increased when the auto industry rebounded in the third quarter after suffering a downturn in the first and second quarters. When the auto industry recovered "other end-use segments were going strong such as computers, 5G cell phones and video game consoles," said Matas. There was not enough capacity to meet all the demand resulting in serious shortages for PMICs and other parts.

The bad news for chip buyers is shortages continued in the first quarter of 2021 as many semiconductor manufacturers, including foundries, are running at full capacity or near capacity, said Matas.

Low inventories for automotive

While shortages are affecting all industries, the auto industry's shortages problem is exacerbated because automakers and their key systems suppliers do not keep large inventories because of

the just-in-time system they use, said Paul Pickering, senior analyst, power semiconductors for researcher Omdia.

"The auto industry likes to minimize inventories. When the inventory gets depleted, if they don't have the next batch coming in within a couple of days then there's a problem," said Pickering.

Adding to the problem is the qualification requirements for power management ICs and other semiconductors "are much more rigorous than commercial industries so a similar chip used in other industries cannot be used for automotive systems," said Pickering. Automakers and their systems manufacturers that supply them "don't have the flexibility in the supply chain to find other sources of supply" quickly because new suppliers and their parts need to be qualified to automotive standards, he said.

Automakers require high volumes of parts and semiconductor

By the Numbers Source: IC Insights



\$17.4 billion

The size of the worldwide power management IC market in 2021



10%

The compound annual growth rate for power management ICs from 2020-2025



\$0.21

The average price of a power management IC 2020



19%

The expected growth rate of the global power management IC market in 2021



5%

The projected increase in the average price for a power management IC in 2021



\$23.8 billion

The projected size of the power management integrated circuit market in 2024



fabs have automotive demand “built into their manufacturing schedules,” Pickering said. But when automakers cut forecasts because of declining demand, semiconductor companies will reallocate chip manufacturing capacity to other customers in other industries which is what happened last year. Automakers initially had a sharp decline in vehicle demand that shut down production at many plants. Semiconductor capacity that was targeted for automotive was re-allocated to other industries. However, later in the year vehicle demand increased and there was not enough production for PMICs and other semiconductors needed by automakers and their system suppliers.

Strong demand, limited supply

The bad news for PMIC buyers in the auto industry as well as other industries is PMIC and overall semiconductor supply will likely remain tight through 2021 because capacity will remain mostly limited and demand for PMICs will continue to grow especially from wireless communications, industrial and automotive.

“All together those segments make up about 70 per cent of the power IC market,” said Pickering. He said with each segment there are different demand drivers. In wireless communications “obviously the big story is 5G. We are just starting to see 5G handsets,” said Pickering. Five-G handsets have more power ICs than earlier generations of cell phones.

“The other side of it is the rollout of 5G infrastructure,” which will also need PMICs, said Pickering. Five-G phones operate at higher frequencies than 4G phones. Meter wave frequencies used in 5G “don’t go through walls very well,” he said. Cell phone carriers will have to install any micro-base stations for 5G, said Pickering.

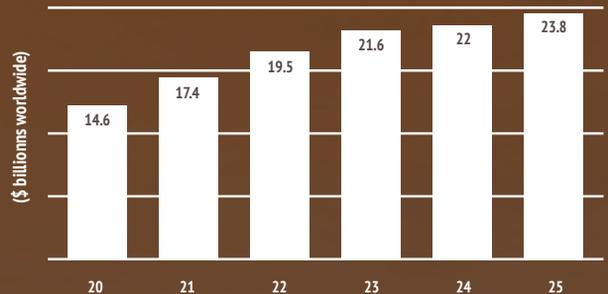
“Some people said every street in every city will have multiple cell phone micro towers and they will all need power management ICs. That will be a huge growth,” said Pickering.

EVs will boost PMIC usage

The electric vehicle subsegment also will drive PMIC sales next year and beyond. EVs use 2 to 3

Power management IC revenue will have a compound annual growth rate of 10 per cent through 2025 when sales reach \$23.8 billion. *Source: IC Insights*

PMIC sales power upward



times as many semiconductors as an internal combustion engine car, said Matas.

“Electric vehicles are clearly heavy users of power semiconductor devices,” said Pickering. Lithium electronic vehicle batteries “require careful management of the controller,” he said. “Lithium batteries are very sensitive to slight changes in their operating temperature,” he said. If they are charged too quickly or they are discharged too quickly, operating life declines, said Pickering. If the temperature is outside a certain range, operating life also declines.

“What that means is you have to continuously monitor the battery to make sure you’re always in the sweet spot – the safe operating area of the battery,” he said. Power management ICs are needed for that.

Power ICs are also needed for the traction motor itself which uses a lot of power, said Pickering. “That has spawned increases in the drive circuitry for the motors and the controllers,” said Pickering.

In addition, electric vehicle charging stations will drive power management IC growth. “It is hand in glove with electric vehicles,” he said. “There needs to be a large number of power

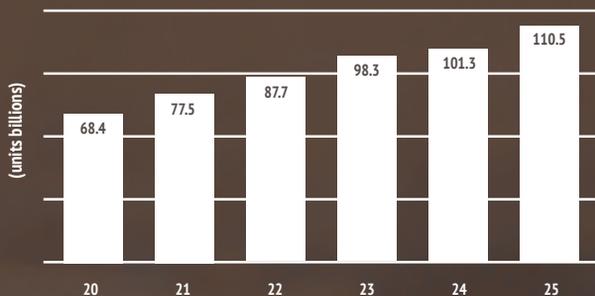
stations to charge EVs.”

PMICs are seeing growing demand from industrial IoT applications. “In general, factories are getting more and more electronic,” he said. More factory machines and processes are being connected to the Internet as manufacturers move towards Industry 4.0, which “is basically the next wave in manufacturing,” said Pickering.

Industry 4.0 involves monitoring and controlling every industrial process with computers and sending data to the cloud so decisions can be about how manufacturing can be optimized for different operations and when factory automation equipment needs to be serviced or if it is about to fail, according to Pickering.

For instance, a mechanical machine such as a lathe will have the ability to transmit all data of its operation to the cloud. “What that means is you need to have a microcontroller and sensors in a wired or wireless network to send all that information up the chain to the next level,” said Pickering. Power management ICs are needed in such an application. “That’s a big area of growth,” he said.

PMIC unit shipments skyrocket



Unit shipments of power management integrated circuits will rise from 68.4 billion units in 2020 to 110.5 billion units in 2025. *Source: IC Insights*



Passives in a post-pandemic revenge economy

In this article, Dennis M Zogbi offers a near-term, post-pandemic market outlook as of January 2021



Dennis M Zogbi has authored over 260 market research reports on the worldwide electronic components industry

The global passive electronic component industry, including capacitors, linear and non-linear resistors and discrete inductors of all types, will account for approximately USD\$33 billion in global revenues for FY 2021.

The overall market outlook for February through December 2021 remains robust due to high dollar value growth opportunities in automotive, telecommunications infrastructure and 5G handsets.

Meanwhile, stable environments in computers, gaming and home theater electronics are also expected to support an overall positive market environment, with growth rates further stimulated by global economies emerging from pandemic into a 'revenge economy', where global economic stimulus packages and technology are continually used to achieve the sustainability goals of the entire global population.

For full-year 2021, expect market drivers for capacitors, resistors and inductors to include:

- 5G infrastructure deployment
- Battery electric vehicle production, automotive telematics and driver-

assist technology

- Solid-state drives for cloud storage, higher-performance computing and IoT devices
- 2021 Olympics in Japan
- Smartphones, desktop and notebook personal computers and game

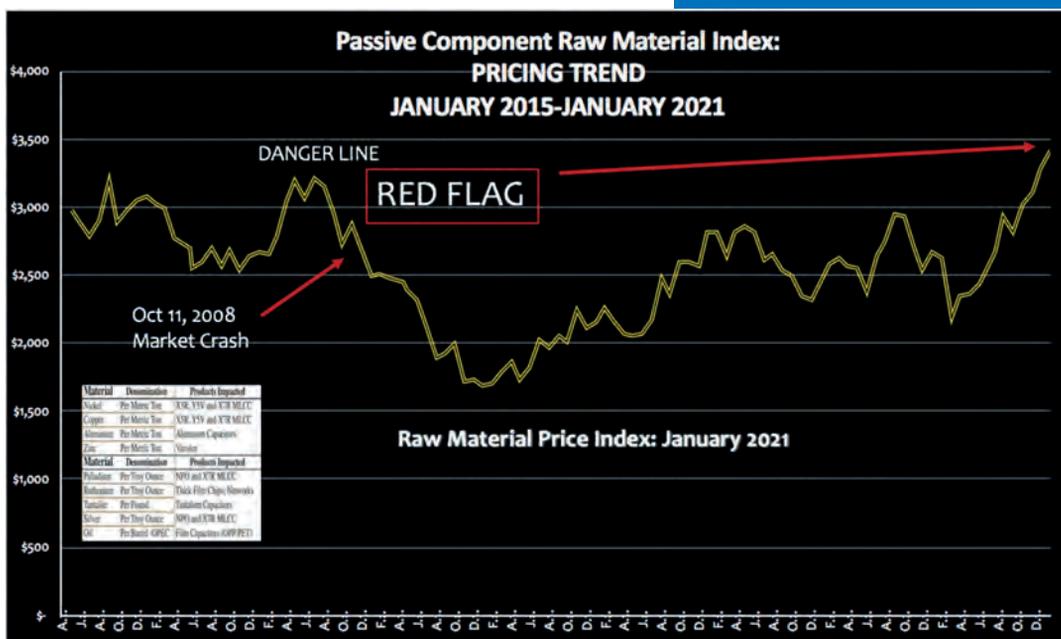


Fig 1: Passive Component Raw Material Price Index. Pricing Trends, Jan 2015 to Jan 2021

Source: Paumanok Publications, five-year analysis (60-months of data)

Passives

consoles to support the continuing remote working and learning trends worldwide

Recent reporting out of Asia suggests the global passive components markets experienced a slight contraction in the December quarter of 2020 that largely impacted the MLCC supply chain. MLCC sales in the prior (September 2020) quarter had been much higher than expectations, supporting 5G rollout in China. However, early reporting from Korea and China in January 2021 suggests that the market pulled back in the December 2020 quarter by low single digits. Meanwhile, other product lines, with emphasis on polymer tantalum, aluminum electrolytic and plastic film capacitors, experienced robust sales due to a revival of the automotive supply chain in this quarter.

Based upon full-year forecasts provided by Japanese vendors of passive components, we expect also that demand will grow in the March quarter and remain robust throughout the year. Early data (including vendor financial reporting, lead times and ballooning raw material prices) suggests passive component demand is in a growth part of the cycle, similar to that observed by Paumanok Publications in CY 2011.

The Passive Component Raw Material Pricing Index (which covers feedstock pricing for many of the primary raw materials consumed in the production of passive electronic components) showed a 3.6 per cent increase in January 2021 on a month-to-month

Material	Denomination	Products Impacted
Nickel	Per Metric Ton	X5R, Y5V and X7R MLCC
Copper	Per Metric Ton	X5R, Y5V and X7R MLCC
Aluminum	Per Metric Ton	Aluminum Capacitors
Zinc	Per Metric Ton	Varistor
Material	Denomination	Products Impacted
Palladium	Per Troy Ounce	NPO and X7R MLCC
Ruthenium	Per Troy Ounce	Thick Film Chips, Networks
Tantalite	Per Pound	Tantalum Capacitors
Silver	Per Troy Ounce	NPO and X7R MLCC
Oil	Per Barrel -OPEC	Film Capacitors (OPP/PET)

Fig 2: Correlation of Raw Materials with Individual Passive Component Product Lines

Source: Paumanok Publications

basis, following similar increases in December 2020.

These price increases continue to impact almost every raw material in the passive component supply chain, an indication of strong demand. A cause for concern is the fact that the last time this threshold was reached, it preceded a steep decline in global market value of both materials and components.

Note that the raw material price index for passive components has increased by 21 per cent since September 2020, and in step with increased demand for passive components. Prices for base metals such as nickel, copper, aluminum and zinc all have increased sharply between September 1, 2020 and January 30, 2021, as have the prices for precious and rare metals such as palladium, ruthenium and silver. This increase in the cost of production for passive components is historically indicative of strong demand.

Fig 3: Global Lead Time Trend for Capacitors in Weeks, January 2015 to January 2021

Source: Paumanok Publications



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The pricing for passive components has been elevated in conjunction with these increases in materials costs, in direct correlation to demand and the long-lasting impact of shortages of key parts over the past three years.

While many individual ingredients go into the production of individual passive component lines, the products shown in the materials index are part of the supply chain and are trackable via third-party data sources, which we collectively pool here to form the Pricing Index.

Historically, the price and availability of two metals, palladium and tantalum/tantalite ore, have had a major impact on component availability over the past 35-years. Ruthenium is creating concern in 2021 as the price for this precious metal consumed in resistors increased in the first month of the new calendar year.

Base metals such as nickel and copper are used as the electrode and termination materials in ceramic chip capacitors, while aluminum is used as the anode and cathode material in aluminum electrolytic capacitors. Zinc is the active ingredient in non-linear resistor products, and in metal oxide varistors used for circuit protection in almost all AC line electronics.

In the more exotic materials, including precious metals, rare metals and crude oil, we note that palladium is used in MLCC electrodes and ruthenium is used as the resistive ingredient

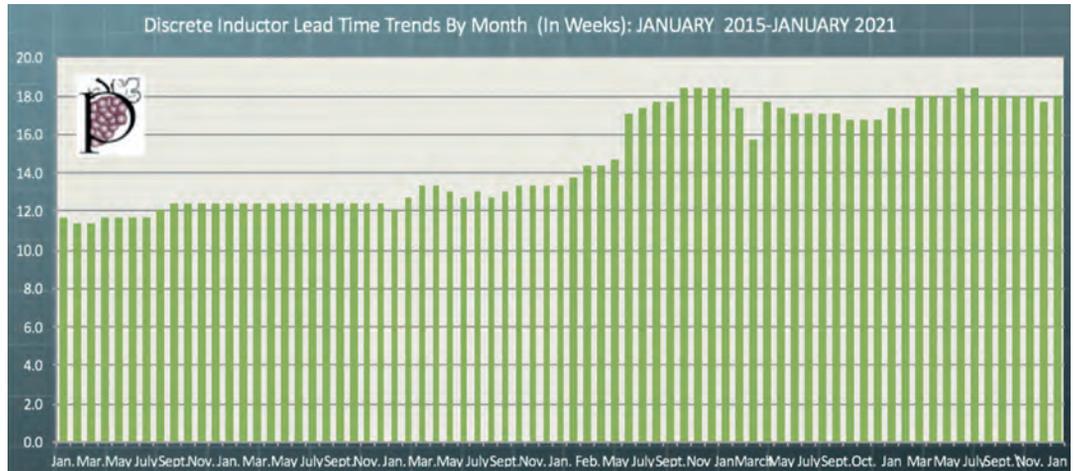


Fig 5: Discrete Inductor Lead Time Trends by Month, January 2015 to January 2021

Source: Paumanok Publications

in film metallisation for resistors. This category also includes the tantalite or tantalum ores consumed in tantalum capacitors, as well as the silver consumed in MLCC terminations and SLC electrodes. Crude oil is the feedstock for plastics, consumed in AC film and DC

produced in any given year.

Capacitor lead time trends
In January 2021, the lead times for all capacitors, including MLCCs, plastic film capacitors, and tantalum and aluminum electrolytic capacitors, continued to tighten, as they had also

Fig 4: Global Lead Time Trend for Resistors in Weeks, January 2015 to January 2021

Source: Paumanok Publications, five-year analysis (60-months of data)

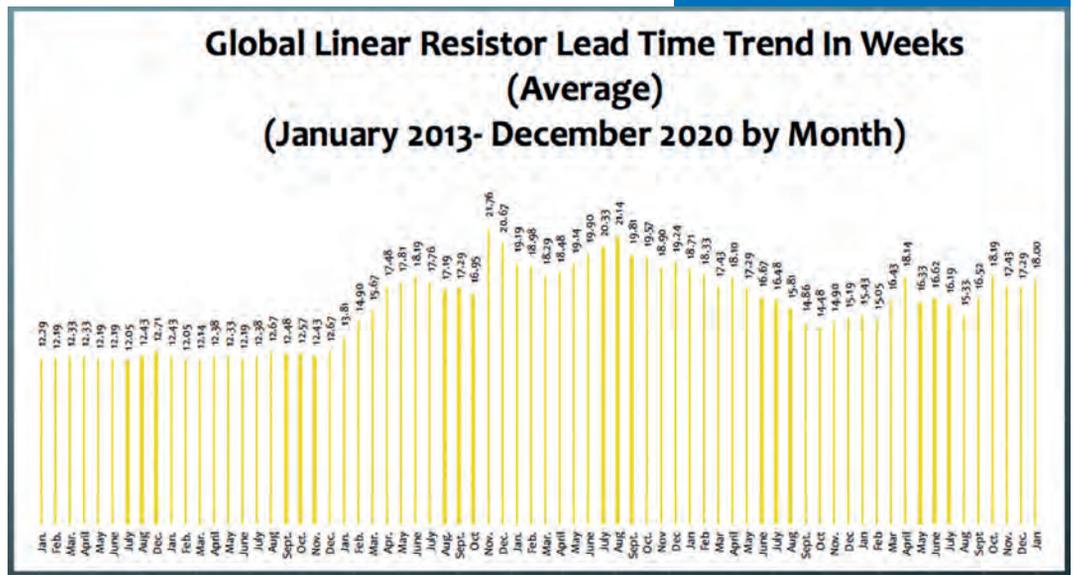


Fig 6: Exchange Rate Trends and Forecasts - Yen, Won and NT\$ Currencies to USD, Quarterly Exchange Rates

Source: Google Finance. In USD per currency, Jun 2013 to Jan 2021, by month

film capacitors. Ultimately, this index covers materials consumed in more than 90 per cent of the total passive component units

done in December 2020. Note that the tightening of supply is appearing in tantalum, aluminum and film capacitors more



than in MLCCs, where the supply concern is greatest.

There is an expectation of strong market demand for passive components for 2021 to support 5G infrastructure and battery-operated vehicle development. Each of these are either high-frequency or high-voltage, requiring a unique suite of products for base station, converter, inverter and/or charger architectures. For the month of January 2021, lead times increased slightly on a month-to-month basis for capacitors due to strong demand from electric automotive and telecom infrastructure sectors, while computing and gaming remain at above normal levels of demand to support the global stay-at-home trend.

Resistor lead times

In January 2021, the resistor markets tightened for resistors, with demand increasing for large case size thick-film chips and thin-film chips. Axial and radial leaded designs and networks showed mixed results for the month.

There was an increase in lead times for the month of January 2021 as demand for thick and thin-film chips increased on a month-to-month basis to support telecom infrastructure and automotive electronics demand. Thick-film chip resistors registered a sudden increase in demand in December 2020 on a month-to-month basis for larger chips consumed in high voltage electric vehicles, this trend continued in January 2021. Demand increased for all large case size chip resistors 1206 and above in January 2021.

Inductor lead times

Discrete inductor demand increased in January 2021 after weakening in December 2020 on a month-to-month basis. In January 2021, increases centered in the axial and radial leaded inductor designs. Overall, inductor markets remain elevated as these are key components in noise suppression. This demand is 5G base-station related, but auto telematics and auto radar circuits are

also driving up demand for robust discrete inductors for challenging environments.

Currency translation

As we have noted, the exchange rates of foreign currencies that define the passive component market index have been having a major impact on vendors that report in US dollars. In January 2021, the global currencies that impact the passive component supply chain all continued to gain strength against the US dollar.

However, the shifts in valuation are not so great as to create any added negative impact on the supply chain or favor any region in terms of pricing in any meaningful way. In passives, due to recent shortages of MLCCs and related components, pricing has become secondary to availability and higher price norms are now built into the system. The won is notable now in terms of its growth against the US dollar, as is the NT\$, but the yen is quite stable.

We now estimate that year-over-year demand for passive components through the March 2021 quarter will decline five per cent in dollar value, but with high-capacitance MLCCs showing slight growth of about three per cent while all other product lines slow down and register a year-on-year decline.

Regardless of this, the outlook for specific markets remains robust for CY 2021. The value of demand for passive components consumed in battery electric vehicles in CY 2021 will increase dramatically and revive old technologies that have had little technical innovation over the past 25 years.

The cycle for CY 2021 should mirror that of CY 2011. The data are similar and the anticipation of a global stimulus package is also comparable. The outlook for April 1, 2021 to March 31, 2022 should grow by 10 per cent to 20 per cent in value year-on-year due to global recovery post-pandemic; the advent of the EVx market; and the 5G rollout.

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Article Credit: TTI's MarketEYE Resource Center



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IoT, 5G and alternate energy will help drive the North American EMS market

EMS providers say while the pandemic slowed production of equipment last year, demand is recovering and single-digit growth for many contract manufacturers is possible

Electronic manufacturing services providers say they are optimistic that they will grow business over the next five years because of rising demand from companies making products for alternative and clean energy, industrial applications, 5G and Internet of Things (IoT) and an overall increase in outsourcing by OEMs in some industries.

Many North American EMS providers struggled last year as some industries shut down production for a time because of the pandemic, but many contract manufacturers still managed to post sales increases for the year when demand picked up in the second half. EMS providers say demand in the first three months of this year has been healthy and they believe demand for manufacturing services will continue through the year and in the near future. The North American EMS industry is off to a good start in 2021. Trade association IPC said EMS shipments grew 9.7 per cent in January over January 2020 and bookings increased 10.2 per cent from December 2020.

Contributing to sales growth will be the trend

of OEMs and their EMS providers to build products in or near the markets where the products will be sold rather than in low-labor cost Asian countries. In fact, some manufacturing that had moved to China years ago has moved back to North America.

While year-in, year-out double-digit growth of North American EMS business probably is not possible, many EMS providers say that mid-single-digit growth is achievable and there will be double-digit growth in certain segments. The idea of single-digit growth would have been considered unlikely early last year after production of many electronic products and systems were shut down or slowed because of the pandemic.

Ed Smith, CEO of EMS provider SMTC, based in Markham, Ont., Canada, said when COVID hit last year, “some parts of our business went to zero but overall we are going to grow year on year even with COVID.” SMTC builds products and systems for a wide range of industries including medical, semiconductor, defense and aerospace, retail, test and measurement, telecom

and networking and clean energy, among others.

He said SMTC’s avionics and restaurant payment systems business was hard hit especially in the second quarter of last year. Those segments are not back to pre-COVID levels but are recovering. Other EMS providers suffered sales losses early in 2020, but eventually recovered in the second half.

Shifting focus

“For some EMS providers, the pandemic had impacts on business other than lost sales. Rob Crawford, chief revenue officer for EMS provider Benchmark, said the pandemic resulted in Benchmark shifting “its focus in the connected point of care medical device space” because demand for certain medical products increased sharply last year.

“Technology trends related to patient-centric healthcare and healthcare solutions that don’t require a visit to the hospital or doctor’s office had been growing, but the pandemic accelerated the demand for it greatly,” he said. Benchmark, based in Tempe, Ariz., builds devices for medical OEMs including connected and portable medical products,



When COVID hit last year some parts of our business went to zero, but overall we are going to grow year on year

Ed Smith, CEO of EMS provider **SMTC**

medical resonance and imaging (MRI) systems, computerized tomography (CT) scanners, optical imaging products such as endoscopes, among others. It also services, aerospace, industrial, defense and semiconductor capital equipment markets.

While 2020 was challenging for EMS providers, many contract manufacturers are upbeat about 2021. One reason is industrial IoT. Some EMS providers think there will be strong growth for the segment in 2021 and for several years after because of the rollout of 5G networks, which many industry analysts and electronics executives say is pivotal to IoT growth.

IoT is not new, but it has not grown as robustly as many executives believed it should have. For instance, Smith said he had expected IoT products and solutions would have posted double-digit plus growth, but “it pretty much has grown at the same rate as the overall market. I think everyone was waiting for 5G networks to be built. Now that 5G is getting to be more in place and starting to become mainstream, IoT will pick up,” he said.

Analysts say 5G technology will be an enabler for many IoT applications. Once fully deployed, 5G will boost capacity. It will have data transmission speeds 10-100 times faster than 4G. It will also have very low latency, less than a millisecond compared to tens of milliseconds for 4G. It will allow more than 1 million devices per square mile to be connected to the Internet simultaneously.

When 5G infrastructure gets more prevalent, “I think we will get to

double-digit growth at some point,” said Smith.

IoT, 5G drive growth

Graham Scott, vice president of procurement for EMS provider Jabil, based in St. Petersburg, Fla., said enabling technologies such as 5G and IoT are already driving significant growth in industries such as automotive, connected healthcare, mobile, consumer packaged goods, retail (POS) and alternative energy.”

He said as 5G adoption increases over the next few years, so will the ability for connected and autonomous vehicles to take advantage of 5G’s high bandwidth and low latency benefits. Scott noted while 4G is well suited for most IoT applications in today’s automobiles, the “full promise of 5G remains a few years away for connecting into these high-speed networks and infrastructure.

Scott is also bullish about alternative/renewable energy and smart power products used in data centers and electric vehicles. He said Jabil is finding opportunities in alternative energy. “We’re seeing an increased demand for renewables, microgrids and EV charging.” In addition, there are also opportunities in solar photovoltaic systems and energy storage, said Scott.

SMTC also builds battery charging products for the EV industry. “I think those markets will continue to grow for us faster than the rest of our markets,” said Smith.

Scott added that there are also growing opportunities building systems that support data centers,

the cloud and the retail industry, which is shifting to digital, no-touch customer experience and the IoT. AI and data analytics heighten the levels of consumer personalization and inventory precision, he said.

Other opportunities

While alternative energy, electric vehicles, 5G and IoT will help drive EMS providers sales over the next five years, EMS providers say there are also opportunities for sales growth with traditional customer segments. Computing and telecommunications historically have been industries that have outsourced production.

“That model will continue,” said Crawford. However, higher value markets of medical, industrials, including semiconductor, and aerospace and defense “still retain a lot of internal manufacturing capacity,” said Crawford.

“By our estimates, these higher value market sectors are less than 50 per cent outsourced” to EMS providers. “We see future growth in the North American market primarily from these sectors as they re-evaluate their long-term investments in internal manufacturing,” said Crawford. In addition, the medical segment and some industrial markets tend to be highly regulated and some products can’t be built offshore.

Crawford noted in the recent past with more stringent tariffs, increasing international labor costs, and higher freight and logistics costs, some companies have rethought their entire global supply chain to balance flexibility, time-to-



market, and overall costs.

“Some customers have chosen to maintain manufacturing in Asia for their Asian customers, and dual source those products in Mexico for their North American customers,” said Crawford. However, it varies by industry and by global strategy of end customers, he said. Crawford added demand for outsourced manufacturing operations in Asia remains strong for many industries that ship products within Asia and export as well.

Smith noted that SMTC had operations in China but closed the facility in 2019 because of customer concerns about uncertainties relating to the prolonged impact of tariffs and microeconomic factors.

Facing challenges

While EMS providers are optimistic about business in North America, there are some challenges they face that could impede sales growth this year and beyond. Tariffs, the possibility of higher interest rates and logistics issues could impact both sales and profitability of EMS providers.

Logistics has been a problem for many companies since the pandemic began. “There are fewer planes in the air going internationally and more things being transported by ships,” said Smith. “There’s less room on boats, so prices have gone up.” In addition, the time to “load and unload has significantly increased,” said Smith.

Smith said interest rates “make me very nervous. If inflation increases, the Federal Reserve could raise

interest rates. The federal deficit is also increasing and some EMS providers fear taxes could be increased.

One challenge for EMS providers is building a supply chain in North America that is as strong as the Asian markets, according to Crawford. He noted many of the electronic components used for manufacturing will continue to be fabricated in Asia.

“There is still some work to do to build a strong supply chain in North America for custom and build-to-print items to support further manufacturing growth in the region,” he said. Transferring manufacturing takes much less time than moving a supply chain. So, suppliers will need to adjust to meet the rising demands in North America, said Crawford.

Attracting new customers

A key and continuing challenge for any company is attracting and retaining OEM customers. To do so, some EMS providers believe they have to offer customers more services and expertise to compete and grow their businesses.

Scott said Jabil will introduce value-added offerings, such as design services, and end-to-end supply chain services. He said offering such services will be important to the health of EMS providers.

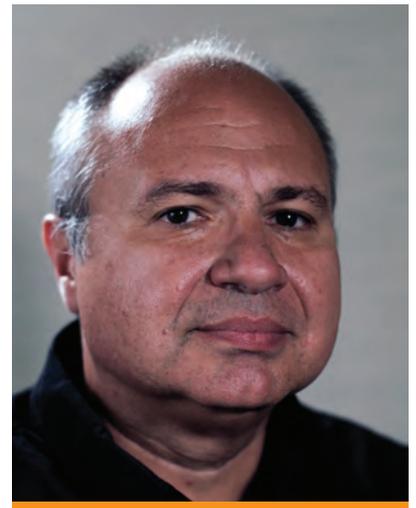
Pandemics, trade policy uncertainty, climate change, geopolitical tensions and evolving macroeconomic conditions “will compel OEMs to re-examine their manufacturing and supply chain networks and continue to seek out EMS

providers in support of their business initiatives.” Flavio Magalhaes, senior vice president of operations for EMS provider Flex, said as product ideas become more complex, integrating more features and technologies is required. “Customers are looking for partners who have the advanced design and engineering capabilities to help turn these ideas into manufacturable products,” said Magalhaes.

EMS providers must have a deep understanding of the industry specific applications because “there are no one-size-fits-all solutions,” he said. “You must have specific domain expertise to apply to your customers’ challenges.

He said an example is Flex’s “homegrown battery backup module for data centers that was developed by our industrial business.” He said there is a trend away from traditional backup systems to battery backup systems. “We can combine this capability with our in-house developed battery management system technology and offer it to our automotive electrification platform,” said Magalhaes.

Crawford said OEM customers are looking for additional support in design engineering and solutions to get their products to market faster and at a lower cost. “There is an opportunity for North American EMS providers who can deliver on these needs through innovative technologies, state-of-the-art manufacturing expertise, and an efficient supply chain, especially in medical, industrial, and A&D markets, said Crawford.



Customers are looking for partners who have the advanced design and engineering capabilities to help turn these ideas into manufacturable products

Flavio Magalhaes, senior vice president of operations for EMS provider **Flex**

Buyers' Guide

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
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Molex	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	300	N/A	0 €	97%	50	1,500+	Y
CIRCUIT PROTECTION											
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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
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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.digikkey.co.uk	Y	500	£250,000	0	100%	15	130	Y
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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
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Microchip	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	12,600	N/A	0 €	91%	50	1,500+	Y
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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
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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
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	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
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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+	Y
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
Würth 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											
FRIVO Gerätebau GmbH	Haredata Electronics	01423 796240	www.haredata.co.uk	Y	250 - 500	€1M	£250	100%	7	14	Y
Jauch Quartz		01276 605900	www.jauch.com			£500,000	0	95	15	130	Y
Mean Well	Ecopac (UK) Power Ltd	01844 204420	www.ecopacpower.co.uk	Y	6,000	£2M	£0	100%	8	30	Y
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

Buyers' Guide

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
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
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
Carlting 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
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	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

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Contract Manufacturers Buyers' Guide

Manufacturer	Telephone	Website	Turnover	Location	Employees	Number of Surface Mount Lines	Approvals	BCA Capacity	Lead Free Manufacturer	Prototyping	Design Capability	Full Turnkey	Cables and Harnessing
Challenger Solutions Ltd	01245 325252	www.challengersolutions.com	£10m	Essex/SE	70	9	AS9100 Rev D, ISO9001:2015, ISO 14001:2015, 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	£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 Electronic Wiring Ltd.	+44(0)1793 694033	www.view.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	ISO9001, 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.simtekms.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	Flex / Flex-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, IOSCAR	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	ISO 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
Stevanage Circuits Ltd	01438 761811	www.stevanagecircuits.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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Advert	Page	Advert	Page
Anglia	BC	Industrial Electronic Wiring (IEW) Ltd	12
Best Windings	33	Midas Displays	11
CML	10	Mouser Electronics	25 & 27
Digi-Key Electronics	FC, IFC & 18	OKW Enclosures Ltd	21
eBOM.com	19	Rebound Electronics	13
ECIA (Trusted Parts)	5	Schurter UK	11
Electronics Sourcing	7	Somerset Solders	13
Hammond	20	Wilson Process Systems	17



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