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JULY 2020

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TO HDMI

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 **ECIA MEMBER**
Supporting The Authorized Channel



On the cover – July 2020

Placing CEMs under the magnifying glass

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Buyers' Guide

All the facts and figures to help you buy

Editor's Word



Paper and print everywhere

Medical, social and economic impacts aside, Covid-19 has revealed some interesting aspects to life. One or two of them have the potential to be uncomfortable truths.

Thanks to forced homeworking and video conferencing I have had the pleasure of peeking inside more living rooms, kitchens, bedrooms, studies and box rooms than I would have previously seen in my whole life. Politicians, celebrities, newsreaders, medics, experts, the general public and more, I've seen it all.

I'm fascinated by how untidy some rooms are. I want to know why anyone would choose 'that' colour for a wall. I'm eager to discover the backstory to the photo on the mantelpiece.

However, what really caught my eye was books, books and more books. More often than not, the wall behind the presenter would be a bookcase. Everyone seems to be buying books. Everyone seems to be keeping books. Everyone seems to want their Zoom background to be books.

This is all wrong. For 20-years the great and good have repeatedly advised me to escape the world of print publishing while I can, before digital becomes all consuming. Why the divide between what I'm being told versus what I've just witnessed. My guess is that until recently these 'expert advisors' didn't have mass access to people's living rooms.

So, until I can Zoom into any home, at any time, and not see a single book, let alone an overflowing bookshelf, then I hold my confidence in print.

Now, flick the page and enjoy your read.

Jon Barrett

Contact

EDITORIAL

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

ADVERTISING

Director of New Business: Charlotte Morgan
charlotte.morgan@electronics-sourcing.co.uk
Advertisement Manager: Emma Poole
emma.poole@electronics-sourcing.co.uk
Marketing Manager: Amy Leary
amy.leary@electronics-sourcing.co.uk

ELECTRONICS
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CIRCULATION

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

DESIGN

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

PUBLISHER

Mark Leary
mark.leary@electronics-sourcing.co.uk
Office Manager: Denise Pattenden
denise.pattenden@mmgpublishing.co.uk

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www.electronics-sourcing.co.uk



Sensing IoT's future

Omron has expanded its UK distribution network with the appointment of Easby Electronics. Easby will work with IoT customers to identify opportunities for Omron MEMS based sensor solutions for building automation, industrial automation and other environmental monitoring applications.

Omron's European distribution manager, Hafeez Najumudeen, said, "Omron has a growing range of exceptionally innovative sensor solutions which have wide applications in industrial and building automation. Easby has considerable strength in these fields, and we have worked closely with their technical team to develop their understanding of our solutions. We look forward to partnering with them and their customers to design our solutions into IoT systems."

Easby's director of product marketing, Phil Clarke, added: "We have watched with great interest the expansion of Omron's portfolio of sensor technologies, many of which are unique to Omron and are based on capabilities such as MEMS manufacturing which are far from widespread. We are excited to be offered the opportunity to offer these technologies to our customers."

components.omron.eu



IoT connectivity at the touch of a button

Digi-Key has partnered with Truphone to bring cellular IoT connectivity services to manufacturers worldwide. The partnership will provide customers with connected cellular devices and a managed service.

Digi-Key will use Truphone's SIM technology to allow users to connect IoT devices to network providers from the moment they switch their device on. The technology requires no complicated activation process, it is simply connectivity from the touch of a button. The Truphone network supports 2G, 3G, 4G and CAT-M1/LTE-M worldwide with a single SIM.

Digi-Key's director of IoT business development, Robbie Paul, said: "The connectivity services industry is going through radical changes with the advent of 5G and the proliferation of IoT devices. Truphone allows for true worldwide coverage with one SIM card that can be purchased from Digi-Key along with the associated hardware, giving our customers the flexibility to monitor and manage their IoT devices in real-time, from anywhere in the world."

www.digikey.com

Integrated approach to buying power

Farnell has enhanced its semiconductor portfolio with a new range of compact, energy efficient power, motion control and sensor solutions by MPS. Since 1997, MPS has patented ground-breaking technologies, including its most notable achievement of integrating a power system onto a single chip, which continues to drive their integrated systems today. Its mission is simple: provide green, practical and compact solutions that help to reduce total energy consumption.

MPS specialises in small, energy efficient and easy-to-use power modules, commonly used in systems to support industrial applications, telecom infrastructures, cloud computing, automotive and consumer applications. Users benefit from MPS' single-package power modules which integrate components, including the inductor, to provide an entire power system in one device. Integrating all components into a single package accelerates the design process and provides greater flexibility for customers to focus on configuring a device's attributes.

www.farnell.com



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In Brief

Responding to Covid-19

A new report reveals how the UK electronics sector is prioritising innovation, flexibility and good financial management to ensure business continuity and growth. ByteSnap Design director, Dunstan Power, said: "Now, more than ever, electronics companies have an opportunity to show how we can support our healthcare systems and governments in fighting to protect lives, while also positioning ourselves to protect our businesses and employees." www.bytsnp.uk

Sri Lankan expansion

ETAL, a specialist in magnetic components for power and signal applications, has announced the relocation and expansion of its Sri Lankan manufacturing facility. The purpose designed, air-conditioned factory offers a valuable alternative source for volume production of magnetic components outside of China. ETAL Group Pvt remains certified to ISO 9001, 14001 and 45001. www.etalgroup.com

USA parcel costs up

Royal Mail is introducing a separate zone for the USA and increasing prices of its parcel services to the USA. The company states the changes are the result of exceptional cost increases outside its control including the UPU's decision to allow the US to set terminal dues/prices themselves from 1 July and a 95 per cent drop in passenger flights forcing a move to air freight instead. royalmail.com

Read all about it

Würth Elektronik has extended its range of coaxial connectors and published a new catalogue. Featuring 174 pages, the Coax Connectors publication presents nine product groups. The new SMB and SMP connector families are the highlights. SMBs suit applications up to 4GHz, while SMPs are designed for transmission rates up to 40GHz. www.we-online.com



Buying into computer-on-module technology

Mouser has announced a global distribution agreement with embedded computing company Toradex. Mouser now offers Toradex's Colibri and Apalis families of computer-on-modules based on NXP i.MX series applications processors. All Colibri and Apalis modules are pin compatible within a family to provide simple scalability and come with the Toradex Easy Installer pre-installed.

As an example of the Colibri range, the iMX8X CoMs are based on the NXP i.MX 8X applications processors, offering up to four 64-bit Armv8 Cortex-A35 cores. Available with a dual-band Wi-Fi and Bluetooth option, Colibri iMX8X CoMs are designed for high-reliability markets such as industrial automation, medical, and railway applications.

As an example of the Apalis range, the iMX8 CoMs are based on the NXP i.MX 8QuadMax or i.MX 8QuadPlus applications processor and are available in a dual-band Wi-Fi and Bluetooth option. The Apalis iMX8 CoMs incorporate dual-GC7000 GPU with support for OpenCL and OpenVX for accelerated computer vision and machine learning applications. These modules are built for harsh environments, with industrial operating temperature support from -40 to 85°C and product availability until 2030.

www.mouser.com

Opt for fast switching

Optimised for WLAN and Bluetooth applications, Infineon's BGS14WMA9 and BGS12WN6 RF switches offer wideband support with 0.05 to 6.0GHz coverage for FM Radio, LTE, LAA and 5G applications. The switches are available at Rutronik UK.

In addition to high switching speed, both types offer linearity up to 26dBm input power, plus low insertion loss and high port-to-port isolation up to 6GHz. Low current consumption enables power savings at system level.

The switches are manufactured using Infineon's patented MOS technology. They combine the performance of GaAs switches and the economy, integration and ESD robustness of traditional CMOS switches. Unlike switches with GaAs technology, external DC blocking capacitors at the RF ports are only



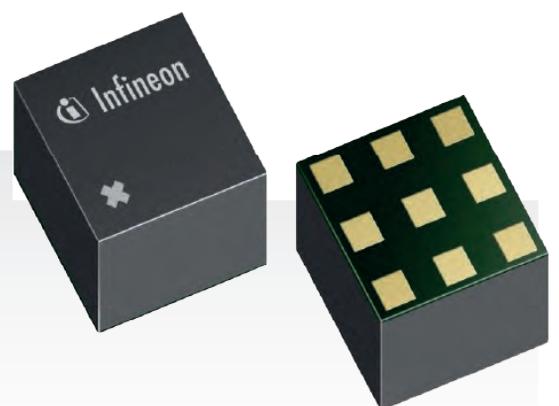
Packed with power

Relec Electronics has extended its range of AC/DC and DC/DC products with Artesyn's high reliability power conversion products. Artesyn's AC/DC product portfolio covers a power range of 3W to 24kW in form factors including open frame, enclosed, conduction cooled, modular configurable and rackmount. Many are available as standard as medically approved.

The iHP series is a configurable intelligent power system for medical and industrial applications. Models in this series are available with single or three phase inputs and provide modular 3kW blocks with up to eight modules in a single chassis. Modules can be used as voltage or current sources and can be programmed by analogue or digital means. Typical applications include semiconductor fabrication, horticultural lighting and medical products.

As another example of Artesyn's products the AI series of conduction cooled, PCB mount power factor correction modules accept 100 to 122VAC or 85 to 264VAC. They can accommodate AC supply frequencies up to 800Hz for avionic applications. The encapsulated design uses a baseplate cooling system.

www.relec.co.uk



required if the DC voltage is applied externally.

BGS12WN6 is a single pole dual throw (SPDT) diversity switch with two ports, while BGS14WMA9 is a single pole four throw (SP4T) switch including four RF ports, each of which can be used as termination of the diversity antenna, handling up to 26dBm.

www.rutronik.com



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Advocating electronics

Electronics Sourcing North America quizzes ECIA's president and chief executive officer, David Loftus, about the associations' current activities and future plans

Q Congratulations on your appointment as the ECIA's president and chief executive officer. How did you perceive the ECIA and what attracted you to the role?

I've known about ECIA for many years and its predecessor, NEDA. Both have established standards our industry utilizes daily. ECIA's integration of manufacturers, independent reps and distributors sets it apart from other associations which focused on a single part of the supply chain.

While I spent nearly 30-years with Silicon Valley semiconductor manufacturers, I was excited about leading the ECIA which integrates a broader cross section of industry. For example, ECIA's diverse manufacturer members include semiconductors, interconnect, passives and electromechanical.

Also, I will be working with long-time friends in distribution and the rep world. Many of the issues the association is addressing resonate with me from my earlier career. ECIA is a highly cooperative group committed to establishing and sharing best practices. So far, I am having a great time despite the Covid-19 challenges.

Q What changes, improvements or developments are you planning and what can readers expect over coming years?

I would like to facilitate greater interaction between our manufacturer, distributor and rep councils, particularly sharing best practices.

Currently a significant focus is providing guidance and information on Covid-19.

We are ramping several cross-functional projects tackling weighty issues such as Design Registrations for Demand Creation. A key improvement and investment is increasing our market research and data analytics. In these uncertain times, we need the best and latest information to help manage our businesses. Extensive fortnightly surveys help us stay on top of the rapidly changing environment. Late last year chief analyst, Dale Ford, started heading up these activities. Dale has deep experience in market research with iSuppli and IHS and is doing a great job with outreach to members and peer associations. Also, we are tracking government action, providing best practices and advocating electronics as an essential business.

Q Late last year there were rumours of a new global association. Is this still on the cards and will ECIA develop into new global regions?

We continue to expand our membership of global companies. Our staff are Americas-based but our membership includes many companies headquartered in EMEA and Asia and we look forward to continuing to build our international base. We continue to work with international associations where appropriate. Also, our authorized inventory website has localized versions in many languages.

Q What do you see as ECIA's key benefits and future challenges?

Our association's tag line is Connect, Influence, Optimize. ECIA is the ideal platform for meeting one's peers and learning from each other. It's important for leading companies to have a seat at the table when new standards are established. The biggest member benefit is Optimize because together we improve efficiency. With manufacturers, reps and distributors in the same room, we can quickly help companies improve their efficiency. The biggest bumps in the road are situations like Covid-19 that make it difficult for members to travel and meet. While we are learning new ways to increase our effectiveness working remotely, there is no substitute for face-to-face meetings on important topics.

Q With EDS cancelled this year, hopefully readers can meet you in person at October's Executive Conference. Is EDS scheduled to take place in 2021 in Las Vegas?

It was unfortunate we cancelled the event but it was certainly the correct decision for the safety of members and guests. We certainly hope life will be mostly back to normal by October and look forward to welcoming everyone to the Executive Conference in Chicago. We also eagerly look forward to welcoming the industry to EDS Las Vegas in 2021. We are working with venues and vendors to ensure the hard work in preparing for the 2020 show can be reapplied to 2021.

www.ecianow.org



ECIA president David Loftus

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Unprecedented success in medical device manufacturing

Digi-Key's vice president of global supplier management, David Stein, illustrates how the company is supporting suppliers and customers through Covid-19 supply chain challenges

Demand for medical equipment put tremendous pressure on supply chains and certain components. Suppliers who were running out of product requested we quarantine inventory for customers building critical medical technology. We provided this for medical and other key customers in dire straits, ensuring they had the components they needed when they needed them most.

This abnormal situation puts pressure on popular devices and they become scarce. Digi-Key's product management team worked closely with customers to identify options to keep their manufacturing processes moving. For example, one customer building ventilators specified a certain temperature sensor on its BoM. That part had already sold out but we had three other variations that our product management team felt could be substituted. Samples were sent overnight and the customer's design team used the parts to continue producing ventilators.

Digi-Key also partnered with Z2Data to offer priority support and component data for companies creating devices such as ventilators and testing solutions. By offering these services at no cost, Digi-Key helped medical device manufacturers source components quickly and ramp up production. Through the partnership, Z2Data offers no-cost access

to its database of over one billion electronic components through its Part Risk Manager and Supply Chain Watch tools. These tools help organisations meet market demand by: managing their BOM; making informed part selection decisions; finding cross-references and alternatives; and tracking inventory availability of parts alongside real-time pricing and lead times.

Digi-Key also reallocated its engineering resources to help create a new, open-source ventilator called the Coventor, in partnership with physicians at the University of Minnesota and several other companies. At about the size of a cereal box, the inexpensive and rapidly scalable device will help meet the demand for ventilators in the treatment of Covid-19 patients.

After physicians at the University of Minnesota reached out to Digi-Key the company quickly assigned a team to help with the life-saving project. Digi-Key's team of engineers focused on identifying parts and addressing supply chain issues, including identifying vendors who could provide the needed components with a much quicker turnaround time than normal.

From design through production, Digi-Key helped not only select the parts but design the Coventor and provide the parts needed for production. Supporting the

majority of parts on the BoM helped jumpstart the project and keep it moving. Digi-Key's sales team also played an important role, providing one point of contact.

Thanks to strong collaboration and speed, the Coventor was the first ventilator approved for use under the US Food and Drug Administration's Emergency Use Authorisation for the COVID-19 outbreak. It took just one month from concept to FDA approval: unheard of in the medical device world. The team also made sure this would be an open source device so manufacturers around the globe can quickly copy it: an unprecedented move in the medical device market.

www.digikey.co.uk



Digi-Key played an important role during the design and manufacture of the Coventor open-source ventilator



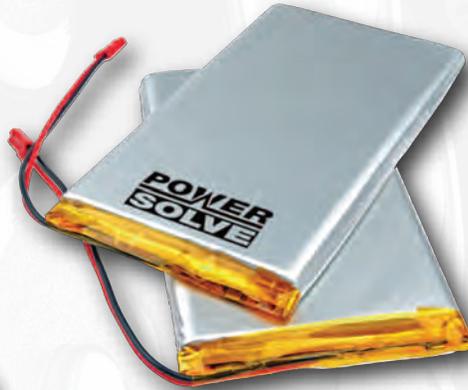
At about the size of a cereal box, the inexpensive and rapidly scalable device will help meet the demand for ventilators in the treatment of Covid-19 patients

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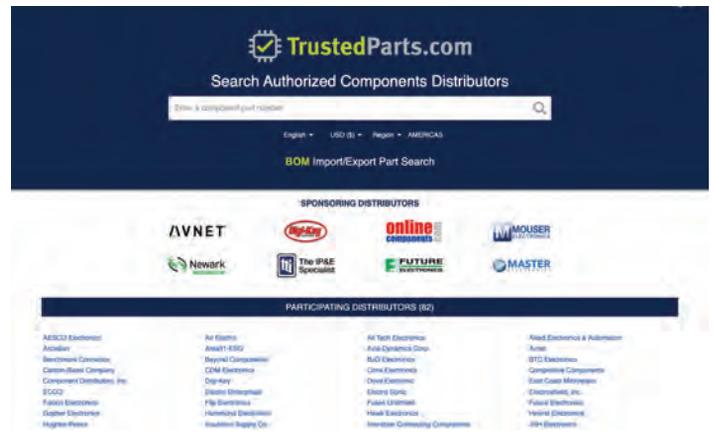
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Electronics Sourcing Europe asked ECIA to introduce its newly rebranded inventory aggregation site, [TrustedParts.com](https://www.trustedparts.com)



Q Our readers will be familiar with [ECIAauthorized.com](https://www.eciaauthorized.com). Can you share the strategy behind the rebrand to [TrustedParts.com](https://www.trustedparts.com)?

The site's primary value is listing genuine components from authorized sources. [TrustedParts.com](https://www.trustedparts.com) communicates this key differentiator more clearly compared with the old brand which promoted that participation was restricted to ECIA member distributors. Requiring ECIA membership to participate on the site limited our success in driving greater adoption, especially outside the Americas.

ECIA membership criteria is very strict, making it difficult to vet companies in other regions. To create a better user experience, and support manufacturer members, the ECIA Distributor Council decided that allowing non-members to display authorized inventory would increase participation, thus expanding the distributor network from which users can buy components.

Q Are there any functional changes?

While the site will have a new name, new logo and fresh look, functionality remains the same. Users who bookmarked the site will automatically be redirected to [TrustedParts.com](https://www.trustedparts.com). Accounts and tools will continue to work seamlessly. No action is required by users. We continually invest in new

features and tools to enable users to locate components they need more efficiently.

Q Will [TrustedParts.com](https://www.trustedparts.com) be 100 per cent authorised distribution focused?

[TrustedParts.com](https://www.trustedparts.com) only displays price and availability data for genuine components from authorized distributors. We continue our extensive efforts to verify this is so. Although ECIA membership is no longer required (neither is the need to be 100 per cent authorized for all the products a distributor sells) a manufacturer's proof of authorization will be needed before any products can be displayed. Since [TrustedParts.com](https://www.trustedparts.com) is funded by, and dedicated to, supporting the authorized distribution channel, only inventory from franchised distributors will be shown.

Q How do distributors include their inventories?

Distributors can participate in one of three ways. First, they can apply for ECIA membership and, if approved, they become eligible to display all their authorized products. Secondly, they can forgo ECIA membership, but are restricted to showing the ECIA member manufacturers' products for which they are authorized. Lastly, a manufacturer member that uses our Distributor Stock Search (DSS) widget or API to enable searches for their products on their site, can

request that an authorized distributor, who is not a [TrustedParts.com](https://www.trustedparts.com) participant, be added to the system for inclusion in search results on that manufacturer's site.

All participating distributors are required to upload their inventory files via FTP. Files are in a specific CSV format and most distributors update daily. Files are automatically loaded into the system when received, any time of day. Some larger distributors also send information in real-time via an API, in which case their files are used as a back-up in case of performance issues with the API. Each search result lets the user know the age of the information.

Q What message would you like to say to electronics purchasing professionals who have not yet tried [TrustedParts.com](https://www.trustedparts.com)?

Sourcing components through the authorized channel is the greatest safeguard against unknowingly introducing counterfeit products into your supply chain and ensures that the products you buy are fully warranted by the manufacturer. [TrustedParts.com](https://www.trustedparts.com) is the only inventory aggregation site that only displays price and availability information from authorized sources, so you can search for components you need with confidence. With over 24 million unique part numbers in the system, from more than 4,000

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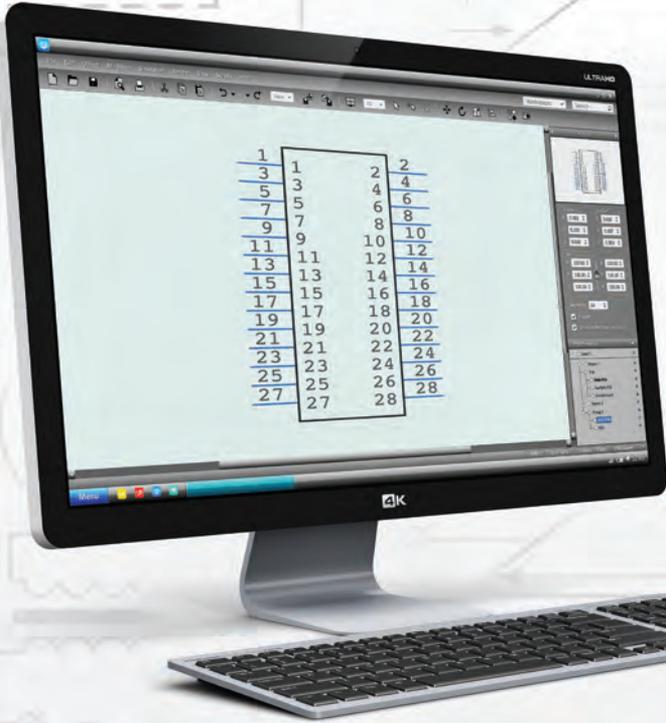
manufacturers, you can fulfill your requirements through the authorized distributors on [TrustedParts.com](https://www.trustedparts.com). We also offer local language and true local currency in various regions to enhance your search experience.

Unlike other sites and services, use of [TrustedParts.com](https://www.trustedparts.com), the BOM management tools and stock/price alerts is always free. Access to the API allows integration into your quote tool or ERP system to make your sourcing process more efficient. So, the next time you need electronic components I would encourage you to start your search on [TrustedParts.com](https://www.trustedparts.com). It is fast, easy, accurate and always authorized.

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4	NC	VBE	5



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Guide to procurement for your product

OEMs with products ready to manufacture face the challenge of sourcing an effective and reliable supply chain. Jalttek offers guidance

The earlier you involve a CEM in the process the more value they can add. As soon as a bill-of-materials is available, the CEM can help identify obsolete, end-of-life and long lead-time components and work to find alternatives. If components are unavailable a company with design capabilities can guide the customer through any issues, including amending designs to accommodate alternative parts.

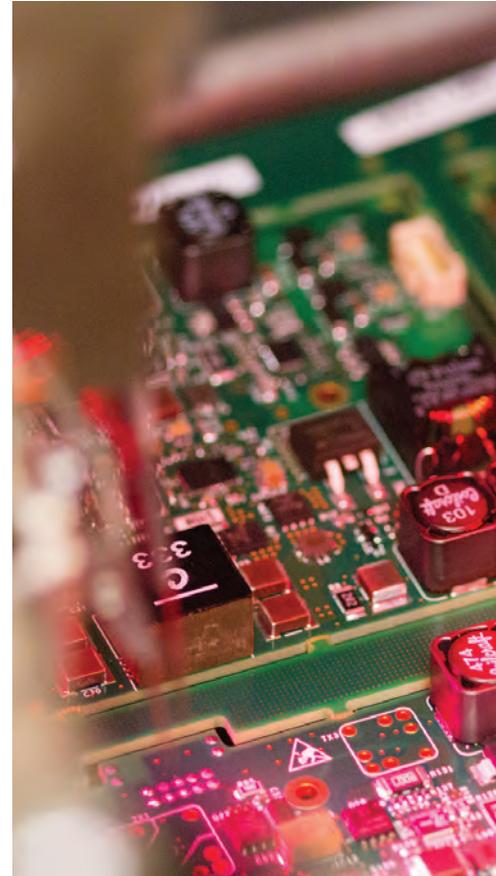
Costing a BoM should be straightforward. CEMs providing 'open book' costs will include information on

component supplier and manufacturer including: purchase price, lead time, minimum order quantity and pack size. This information helps make informed decisions regarding optimum quantities and timescales.

For manufacturing efficiency, depending on batch sizes, lead times and product complexity, the CEM will buy as many parts as possible in machine usable formats, including tape and reel or cut tape. Sometimes loose parts are the only option but they can be re-taped, re-reeled, loaded into waffle trays or hand applied.

If like Jalttek, the CEM is an aerospace, defence or medical industry supplier, they may have accreditations such as AS9100 or ISO 13485. As such they will have systems to ensure components are bought from a verified supply chain. For aerospace, suppliers are evaluated against AS9100 and associated standards AS5553 and AS9120 before being included on the approved vendor list (AVL).

Components are sourced from franchised distributors wherever possible where the minimum acceptance criteria

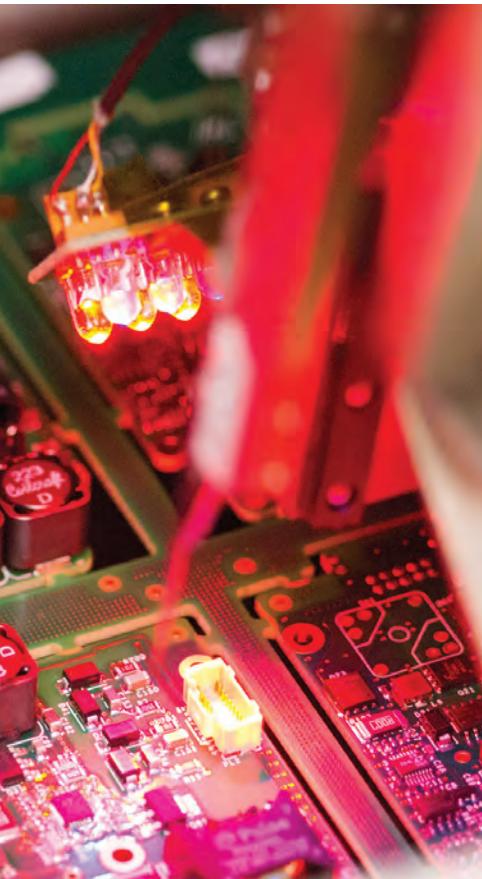


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is a Supplier Certificate of Conformance (CofC). Often CofCs are required to include manufacturer date and lot code information. Components from non-franchised sources must come from a fully approved supplier on the AVL and are regularly tested, often using the testing requirements in AS6081. A test report must be submitted for review before receiving parts. The focus is using the correct supply chain, rather than testing all incoming materials.

Purchasing and manufacturing systems track components from purchase order to production batch, machine, assembly operator and down to a BGA solder joint. The NPI first off process runs a pilot batch to check components, processes and component fitment at each build stage before releasing the main batch for production.

In addition to documentation checks, passive components placed by surface mount assembly machines are sample checked for values, while camera technology checks components visually. 3D AOI machines check components once they have been placed. X-ray is used to check components when solder joints are not accessible.

Various test options are available depending how complex the product is, how accessible test points are and volumes involved. Flying probe and JTAG can be cost effective for rapid turnaround, new product introduction and lower volumes. Functional and in-circuit test are more involved to set up but are an option for complex product and higher volumes. CEMs such as Jaltek have design and test engineers to guide customers through each stage.

Jaltek provides a complete order fulfilment service where products are manufactured, packed and shipped to the end user, providing through life product support, including warranties. We work closely with suppliers to ensure the supply chain is as effective as possible. An area of future development is provision of online capability.

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Move on up

Ability Tec invites readers to experience a new wave in UK electronics manufacturing following the company's move to a new Bury-based site

Manchester-based electronics manufacturing service provider Ability Tec has moved from the company's current Bolton site to a more strategic location for manufacturing and logistics in Bury.

The company's goal is to keep close to its customers and grow with them. The team believes doing business at a local and regional level helps form and develop long-term and sustainable relationships. Likewise, a locally managed supply chain enables transparency and simplicity, both vital for electronics manufacturing speed and efficiency.

Ability Tec states a critical success factor was its desire to boost the local economy by employing local people. The company emphasised the work ethic within Manchester, the industrial capital of the North, is well known throughout the UK and second to none. Connecting local people to local businesses means a shared set of cultures and values, which benefits all.

Ability Tec's managing director, Oli Randell, said: "Our business mantra is

to make the electronics manufacturing process easy for all. Manchester has always been at the cutting edge in manufacturing. Inclusion is next. We endorse our community by empowering all to contribute to society. We moved into our purpose-built electronics manufacturing facility considering our customers, suppliers and team members' needs, as we placed one brick on top of the other to create a new and unique space, dedicated to product realisation.

"We are often asked, what makes us different, and the answer is simple, we are an integrated manufacturing provider that enables partners to grow by offering in-house prototyping, design for manufacture, manufacturing, logistics capabilities, resources and our very own people power. People make the difference, as does our culture to just 'never stop making'.

"We aim to make it as easy as possible to do business with us, which is why we have invested in our new facility to ensure it is one of the most modern, automated and well-equipped electronic

manufacturing sites for a company our size or within our tier level. In moving with changing times, the need for speed, new product introduction, production, performance, efficiency and accuracy, we use automated processes seamlessly with manual intervention in both manufacture and inspection.

"Our new facility enables us to stand out from the crowd even further, especially during these challenging times, when investments are limited to none. We'd like to invite all interested parties to experience this new wave in UK electronics manufacturing."

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Contract manufacturing: what, how and why?

M-Tek's Frederick Kayrouz, guides readers through the make-up of a contract electronics manufacturer

Ever wondered how your most recent electronics gadgets came to life? Well, they started as an idea, evolved into a concept, transitioned via various iterations of prototyping to be turned into a final, proven product ready for manufacture via dedicated production lines.

A high percentage of products, from household appliances to industrial equipment, all start life in contracted manufacturing environments. This is because most original equipment manufacturers outsource manufacturing to control

costs while benefiting from the technical competences, resources capabilities and honed manufacturing expertise of established contract electronics manufacturers.

Although electronic manufacturing services can be tailored to a specific requirement, many larger providers have a broad portfolio of manufacturing, assembly and test services to suit a wider range of industries driven by their manufacturing specifications and requirements. Nevertheless, the make-up of each of these electronic

manufacturing services rests on four core areas and their interlinked functions: procurement and materials management; engineering and quality control; manufacturing and test; and finally support and logistics.

Subsequently, most strategic investments made by an established and growing CEM will address these four core areas. They will ensure the right amount of capital expenditure is dedicated to continuous improvement, recruitment and investment in people, machinery, plant and technology. This translates into committed and



A high percentage of products, from household appliances to industrial equipment, all start life in contracted manufacturing environments

Automated production maximises output and quality, while reducing expensive changeover and set-up times

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experienced professionals and dedicated materials, engineering, production, quality, test and logistics expertise supported by the latest machinery and enterprise resource planning systems.

Procurement and materials management

The selection of suppliers to realise cost-effective and timely acquisitions of various materials is based on understanding customers' needs and requirements. The synchronisation of material demand with production planning is a major emphasis of the procurement and materials management function.

External factors need to be considered to maximise value creation and profits while minimising exposure, cost and spend. These are suppliers' quality of service, obsolescence, standard or extended lead-times, global raw materials shortages, transit times to docks and currency exchange rates.

To effectively drive inventory velocity, it is essential for procurement and materials management to dynamically track and improve material planning cycle time, supplier lead time and transit times while assessing demand variability. The latter helps determine the type of re-ordering policy: Kanban v scheduled orders or to order when needed and not for stock.

Procurement and materials management must be able to issue purchase orders to suppliers, generate goods receipt notes, while accurately managing the timely payment of accrued materials invoices to leverage good credit standing and ensure external supply chain support.

To successfully deliver this function, professional procurement and materials management expertise is required alongside computerised material requirements planning (MRP) systems to integrate the live data collection effortlessly. Successful CEMs will have invested and continue to invest to secure the best procurement and materials management people and systems.

Engineering and quality management

To deliver products and services that meet customers' requirements and applicable industry and/or customer standards, while protecting its reputation, reducing costs and driving improvements, engineering and quality management are vital day-to-day behind the scenes CEM functions.

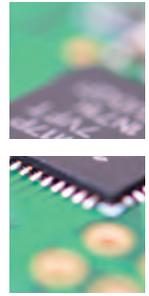
The engineering and quality management function is agile in nature and encompasses front-end engineering combined with a quality preventive approach to identify and mitigate risks. At this stage customers' requirements and specifications are reviewed and examined. The focus is on the technical requirements of the build and identifying main costs including tooling, material and equipment. It also covers skillset requirements, automation strategy, process flow diagrams, estimated build timelines and research materials specifications. The aim is to clear potential problems, assumptions and exclusions with the customer ahead of prototyping or volume manufacturing.

The engineering section can be further divided into disciplines such as printed circuit board fabrication, surface mount and through hole PCB assembly (PCBA) and finally electromechanical assembly. Engineering captures customers' manufacturing and assembly requirements. These are supplied in different formats and organised as a bill-of-materials, PCB and enclosure fabrication files, electronic diagrams and electromechanical schedule of assemblies. Engineering also clarifies customer information to ensure knowledge transfer back to the CEM to enable the engineering processes applicable to each manufacturing stage and its translation into the appropriate operation listed against a product fabrication and assembly routing card.

Quality ensures the CEM is operating sustainably and to International (ISO) Standards, Institute of Printed Circuits (IPC) and Underwriters Laboratories



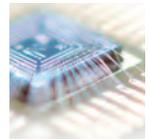
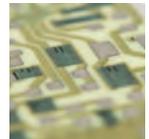
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(UL). It ensures processes and resources have been selected to established and up-to-date skills capabilities and training matrix. It also checks robots, machines and tools comply with maintenance and calibration schedules. It also ensures the workforce is meeting its training requirements and actively maintaining its certifications. Quality management undertakes gap analysis regarding current capabilities v specific customer manufacturing specifications and requirements and applicable special materials process specifications. The key is to drive a continuous quality improvement strategy and define action plans.

To successfully deliver this function, seasoned engineering and quality management expertise are required. They also need tools to integrate the engineering processes, detailed assembly materials requirements, assembly operations and quality requirements, while collecting real-time production data. Some CEMs go further by specifying and developing their own interactive quality systems. This lets them identify manufacturing trends, define action plans, provide accurate root cause analysis, issue corrective action, and measure the effectiveness of its preventive actions where required.

Similarly, CEMs commit substantial yearly funds to secure and maintain engineering software suites and hardware tools required to support their inhouse engineering team. These ensure engineers can: accept a variety of design and manufacturing files submitted by their customers; assist assembly processes R&D; and create work instructions, machine programs, quality plans and test outlines, while maximising collaboration.

Manufacturing and Test

The function of manufacture and test is primarily

responsible for implementing and operating production planning to manufacture the prototypes and products a CEM is contracted to produce.

It relies on constant investment in production capabilities, capacity, automation systems, workforce, training, factory floor size, intelligent production machinery and automated process and inspection validation tools with adequate test capabilities.

CEMs have different factory layouts suited to their manufacturing site's operations. Whether the manufacturing model is based on a cellular or linear assembly model, the manufacturing function will emphasise load balancing its assembly lines or cells to ensure the most efficient production schedule to meet on time in full delivery.

To maximise output and quality, while reducing expensive changeover and set-up times, investments are required in automated production, inspection, test machinery, robust manufacturing planning systems and manufacturing resource planning systems.

Successful and growing CEMs will have a well-defined investment programme to provide continual momentum to their businesses by installing equipment and systems best suited to address customers' current and future need. Some will also be trend setters, creating additional value by exploring new production and inspection capabilities, flexible handling capabilities and faster production rates.

Large CEMs will replicate their automated assembly lines to ensure redundancy of capabilities to address disaster recovery scenarios if not just for the exponentially augmented throughput.

A typical high-tech CEM will

have a full turnkey offering with the capacity to handle the full box build inhouse.

- **PCB:** If not available in house, an established CEM will have a long-term partnership with a PCB fabricator with HDI technology, dedicated capabilities and its own offshore arm for price sensitive volume products. Blind, buried, microvias capacity, PTH in pad, 24-32 layers with 6 to 8oz copper weight. Up to 6.5mm maximum boards thickness and rigid, flexi-rigid, rigidised and full flexi PCB fabrication capabilities.
- **PCBA:** A minimum of two surface mount lines with flexible placement capabilities (0201 and 0.25mm pitch flip chips, high speed parts placements, mixed components format handling), inline AOI, 10-zone reflow, minimum of two selective soldering systems, wave soldering capability, ultrasonic cleaning, lead forming, dispensing capabilities, expert hand soldering, repairs and modifications capabilities, x-ray and inclined AOI.
- **Test:** A minimum of troubleshooting capabilities including flying probe, full parametric ICT, on-board device programming, boundary scan and functional test.
- **Electromechanical assembly and box build:** If not available in house, advanced machining capabilities such as CNC machining, CNC turning, CNC punching and laser cutting, sheet folding, welding, inserting equipment, metal finishing, powder coating, cable and looms assemblies (custom, over-moulded,

waterproof, military and RF) and vertical assembly with final functional and QC test.

Support and logistics

Operations and sales support teams are empowered with tools letting them connect and converse with customers. Ensuring each customer has the appropriate online and company interface capabilities ensures successful onboarding, troubleshooting and support assistance.

Similarly, developing logistics strategies which support international shipping, reach remote locations and facilitate quick entry into new markets, requires logistics providers to tailor and develop end-to-end solutions with global coverage and visibility from point of order to delivery.

CEM investments in automated solutions and freight forwarders provide extended logistics capabilities, helping assist customers entering new markets and taking advantage of existing and trialled global sourcing capabilities.

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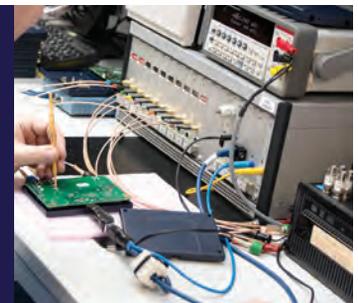
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Building the future

Nemco's managing director, Dave Pearce, walks readers through the company's capabilities, from shop floor processes to industrial standards

As a UK-based contract electronic manufacture (CEM) and electronic manufacturing services (EMS) provider, Nemco is built around a core offering of PCB population, GA assembly, full product build and cable/harness production.

Managing director, Dave Pearce, said: "Our vision is to be the contract electronics manufacturer of choice, providing world class manufacturing services to satisfied customers and to set the standard for quality, delivery and reliability. Investing in people as well as equipment is fundamental to this aim."

The company's 60,000ft², Stevenage-base

manufacturing plant offers a mix of services, from product proto-typing, to handling all aspects of the manufacturing and supply cycles including procurement, PCB population, product assembly, test, packaging and logistics.

The backbone of PCB assembly comprises six SMT lines, flow/selective soldering equipment, plus a conventional population team. General assembly services range from 'PCB in a box' to highly complex cables assemblies. Test and inspection facilities include AOI, x-ray, functional, ATE, JTAG and flying probe.

Given the increasingly challenging component purchasing environment,

Nemco has strengthened its procurement team to support sourcing difficult parts. To cover the technical aspects customers are allocated a specific member of the engineering team as a point of contact.

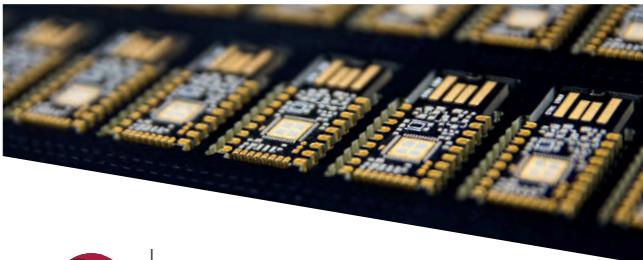
Nemco's customers operate in demanding markets including defence, aerospace, medical, laboratory equipment, scientific equipment, instrumentation and transport.

Accreditations include AS 9100, ISO14001 and SC21, for which the company has received a Silver Award for the fourth consecutive year.

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Nemco's managing director, **Dave Pearce**



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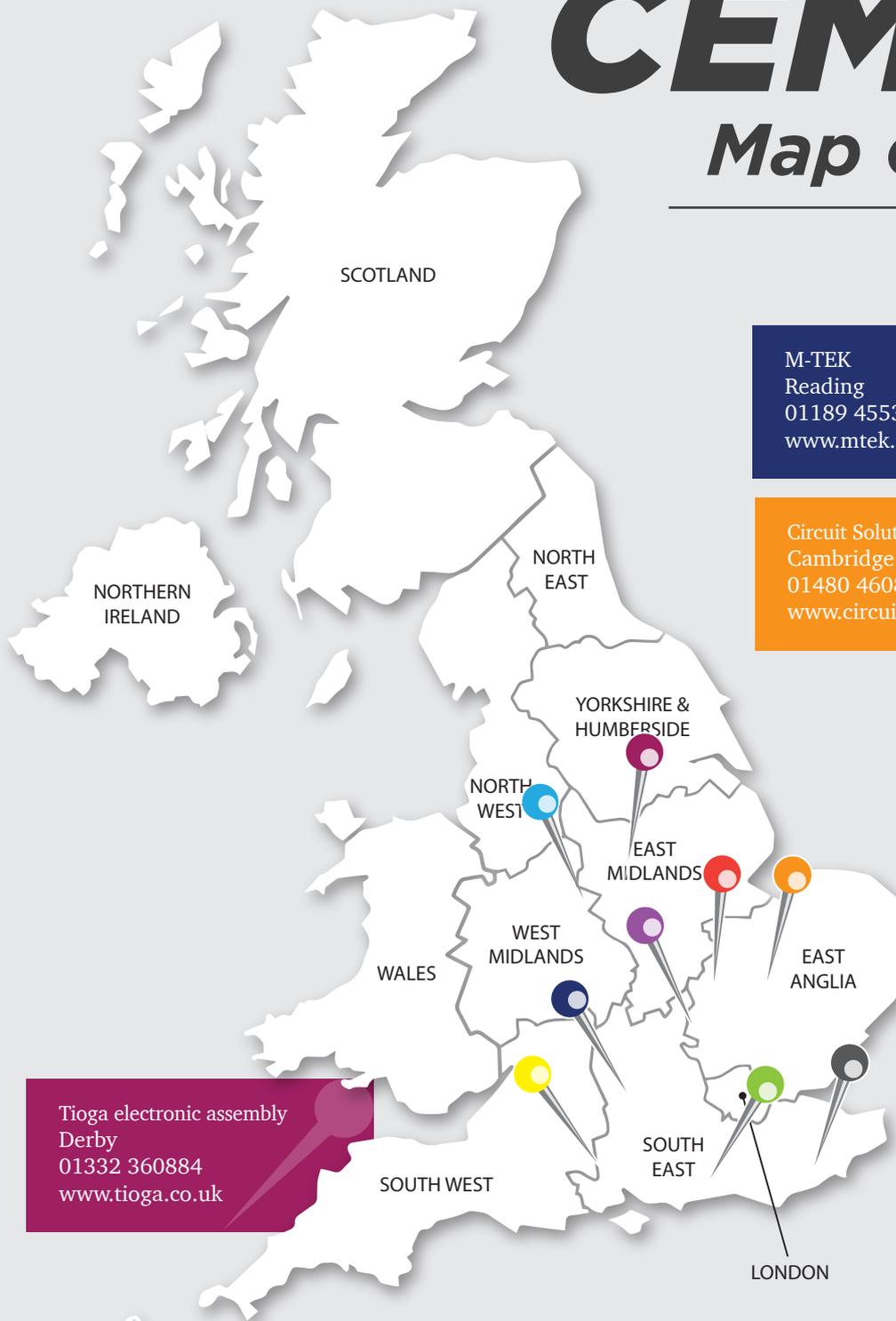
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Covid-19: race against time

OKW Enclosures' marketing director, Robert Cox explains the benefits of custom enclosure for medical electronics

Speed has been vital in the battle against Covid-19, with electronics manufacturers working hard to expand production of lifesaving

ventilators and medical devices. Every day of delay can be the difference between life and death for the most vulnerable patients.

Prototyping any new medical product is seldom quick, even in normal times. The medical electronics market sets the

quality bar high. Just creating a bespoke plastic enclosure can take months. Hurdles to overcome include designing the housing, prototyping the tooling and the big upfront investment. Manufacturers need to be producing thousands of products to consider such an undertaking. Meanwhile, time slips away. Surely, there must be a better way? Fortunately, there is.

Customising a standard plastic electronic enclosure so it looks purpose-designed for a medical device offers the best of all worlds: a tried and tested quality enclosure; supplied quickly; at a sensible price; in low volumes if needed. Also, the end product will look unique no one need know its enclosure was off-the-shelf.

It pays to choose a specialist enclosures manufacturer which offers customisable cases. These housings must be moulded from quality plastics that are robust, UV stable and easy to clean/sterilise. They must survive years of punishing life in hospitals, surgeries and care homes without showing wear.

OKW Enclosures' marketing director, Robert Cox, said: "It always pays to partner with a specialist manufacturer of enclosures on any electronics project. This is especially true for the medical sector because it requires such high levels of quality.

"An experienced enclosures manufacturer with a strong track record in the medical sector will be best placed to complete critical projects within the strict time pressures created by the pandemic."

The wider the range of standard enclosures, the more likely you will find one to transform into your perfect housing with minimum customisation. Choosing a single source specialist who can do it all in-house saves time, money and administration.



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OKW has a long history of manufacturing customised electronic enclosures for medical applications including: remote control units; emergency systems, monitoring and alarm equipment; portable solutions for personal protection and care and ambient assisted living (AAL); diagnostics and therapy; tracking and monitoring; IoT peripherals; and data acquisition.

The company's EVOTEC table-top plastic enclosures offer flat/sloping tops and ergonomic soft contours, suiting them to medical electronics. The housings are moulded from tough, UV-stable ASA+PC-FR as standard and are available in

five sizes. They are assembled using Torx tamperproof screws, a key requirement for the medical sector.

For larger desktop touchscreens, PROTEC is available in three versions, offering a recessed interface area, covered recess or extra deep cover. Torx screws are hidden on the underside.

New EASYTEC IP65 flanged enclosures are designed to be smart, simple and quick to install. Lugs enable them to be screwed or cable-tied in place. These contoured ASA+PC enclosures feature a rear concave recess enabling secure mounting on hospital bedrails.

Another new housing, SMART CONTROL, is designed for corner-based electronics. These wedge-shaped ASA+PC-FR cases feature tactile curves making them suitable for desktop use too.

CARRYTEC is the tough attaché case of medical enclosures, featuring optional zipped side pockets for diagnostics probes. The design offers a strong integrated handle which makes it easier to manoeuvre the housing if mounted on a suspension arm.

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Everyone is essential to recovery



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

In this article John Denslinger argues the best solution to a sustained recovery is a marketplace where all economic activity is seen as essential

Recovery • By John Denslinger

Essential versus non-essential must be one of the more disparaging labels applied to America's workforce and commerce in this new era of lockdowns. While I fully understand the good intentions safeguarding the health and well-being of the general population, the contrast should cease there. My take is that everyone is essential. Every opportunity to make a living is essential. Every business, big or small, is essential. Can anyone really argue each is indispensable to recovery, to growth, and to the absolute vitality of our industry?

The early decision in 2020 to lockdown a thriving economy created a staggering unemployment problem where more than 40 million people filed unemployment claims through May. Many were furloughed or temporarily laid off expecting a return to work soon. Others, not as fortunate, were immediately terminated and it's likely more will discover their jobs eliminated in the months ahead. The sheer magnitude can be summed in a recent *WSJ* article headline: Decade of job gains erased in April. No sector of the economy escaped this devastating ambush. If not for a massive work-from-home phenomenon, the unemployed casualty level would have been much worse.

Fortunately, the electronics industry was deemed essential early in the pandemic lockdown. Therefore, our employees, businesses and supply chains probably fared better than many of our customers and probably their customers as well. That is the point: customers are critical to our recovery. They are the ones creating demand. It takes a healthy customer base across all sectors of the economy to spur the type of growth needed for everyone to prosper, but according to Deutsche Bank only 30 to 40 per cent of lost output and employment in the US will

be recovered by year end 2020. That means, near term, the road to recovery will be challenging.

So why make such a big deal about essential vs non-essential? In a word, demand. It is demand from essential activity that drives this wonderfully intricate, American economic engine. To the contrary, non-essential activity does not. In a recent Thomas Insights report, 64 per cent of the manufacturers surveyed said the shutdown of non-essential business negatively impacted overall demand. It further detailed the sectors most affecting the decline as transportation, automotive, construction and agriculture. Make no mistake, that is a lot of ground to make up in some rather large segments.

Naturally, we hold out hope for a quick V-shaped recovery, but a gradual (hockey-stick) rebound is more logical. Steepening the slope of the curve hinges on how quickly we apply 'essential' to all aspects of America's economic activity. Bottom line, we need every person working and every business operating to stimulate maximum demand for goods and services.

Granted, government stimulus programs helped immensely steadying the ship and providing a lifeline to employers and employees alike. Still, the best solution to a sustained recovery is free enterprise, resumption of domestic and international commerce, and marketplace equilibrium where all economic activity is once again seen as essential.

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European robotics: different attitudes, same struggles

To gain insights into European robotics, Reichelt Elektronik commissioned a OnePoll study. Here we explore the findings

In almost all European countries surveyed, most respondents state their enterprise does not currently employ robotic solutions. Italy and Germany are the leaders, with 55 and 48.8 per cent relying on robots. They are followed by the Netherlands and France where 45.5 and 41.6 per cent of firms have invested. The UK at 34.8 per cent and Austria and Switzerland, each 31 per cent have the lowest prevalence.

Regarding a robot's purpose almost all countries agree that robots: take over repetitive, uniform tasks; facilitate physical work; and replace humans in dangerous assignments. Other application include education and test, significant in the UK.

Also, when asked which advantages did or could persuade enterprises to invest in robotics, all countries answer similarly. The main benefit is increasing productivity through

automation. Other positive aspects included: reduction of mistakes; supporting workers in physically demanding and dangerous tasks; and decreasing costs.

The study shows most European companies prefer to purchase robots from manufacturers as they place a huge emphasis on support services such as comprehensive technical advice. Other optional benefits include software platforms, hardware leasing, implementation/integration and maintenance.

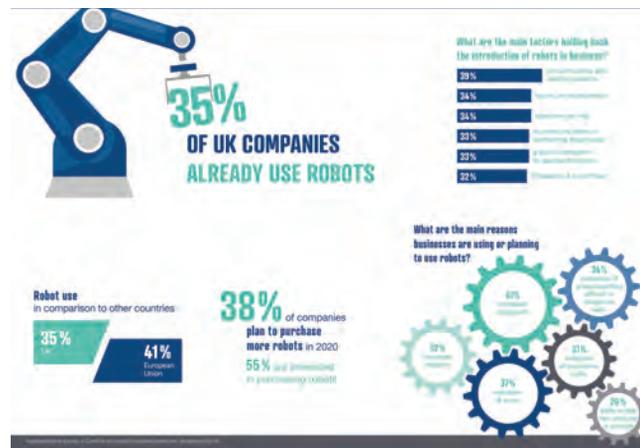
Asked about purchasing intentions over the following 12-months (before coronavirus), attitude was divided. Most enterprises in Germany, France, Italy and the Netherlands were planning to invest within a year. Austrian, Swiss and British organisations, for the most part, did not intend to. While acquisition costs were the number one concern in Germany (41.8 per cent), the country showed the

highest share of enterprises willing to spend more than €100,000 on robotic projects. Austria and Switzerland were the most hesitant to invest, but almost a third of organisations that decided to do so had a budget over €100,000. In Italy and France, the majority (30 and 29.6 per cent) claimed to have dedicated financial means of €50,000 to €100,000 for robots.

British interviewees stated the biggest challenge is the possible incompatibility of new robots with existing systems. The survey also shows a lack of trust in the capabilities of robots across all markets. In fact, a significant share thinks that tasks can be better executed by humans.

Collaborative robots have become increasingly interesting for enterprises to start their automation journey. Being smaller and more flexible, small and medium-sized firms have decided to invest in cobots.

In Germany, Switzerland, UK, France and Italy, the largest part of the decision makers reply that their enterprise already uses collaborative robots or plans to do so in the following 12-months. Austrian (57.81 per cent) and Dutch (48.18 per cent) firms show interest but haven't made the final decision for an investment yet. Attitude towards cobots is torn in Switzerland. Over half (56 per cent) of interviewees claim that collaborative robots are already being employed or will be implemented within 12-months, 41 per cent have clearly decided against the technology.

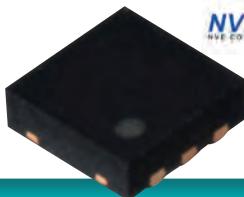


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Convert to photovoltaic

TME offers readers an introduction to the capabilities and part number protocol for photovoltaic and turbine converters

Recent years have witnessed a growing interest in green energy. Of the numerous applications making it possible to obtain energy from freely available sources, photovoltaic panels are the most popular. Prices have become so affordable they are even installed on small summer houses. When building such systems, it is important to understand the nature of the energy source. One should also understand the challenges faced by the manufacturers of green energy powered devices.

Photovoltaic panels are capricious because the panel's power depends on the intensity of incident light. Also, load current remains an important factor. In most cases, users of this energy source are unable to obtain constant lighting or constant load. Usually, the panels are fixed in one location, not on revolving supports that follow the sun. Thus, sunlight falls on the panel surface at

different angles. In addition, the sun can be obscured by clouds. Load varies according to users' needs. Under such conditions, the voltage on the panel's terminals will undergo significant changes.

Aimtec's photovoltaic converters will be of interest to manufacturers of DC devices powered by 5V to 48VDC. As the terminal voltage of photovoltaic panels and wind power generators has similar parameters, the series is recommended for both energy sources.

Called the AM5W to AM200W family, the number following the AM prefix indicates the maximum continuous output power. According to the manufacturer, nominal input voltage, output voltage and housing type are specified in the part number. Thus, part AM15W-60015S-NZ has 15W power; 15V DC output voltage; up to 600V DC nominal input voltage;

in a housing designed to be soldered into a PCB. Modules also offer screw terminals, an external fuse and EMC filter (-ST), mounting on a TH/TS35 bus with fuse and EMC filter (-STD, -STS) or without a fuse (-STF).

Most popular among OEM users are 5W to 40W converters, in a 70 by 48 by 23.5mm housing, designed to be soldered into a PCB. Converters in this family are enclosed in housings of the same dimensions and offer compatible output layout. This allows easy extension of the power source functionality without changing the PCB.

The table below shows basic parameters of converters in this series.

www.tme.eu



AM5W-60005S-NZ-ST

Series	Output power [W]	Nominal input voltage [V DC]	Output voltage [V DC]	Protection options
AM5W-NZ	5	100...1000	5	CSP ¹⁾ , OCP ²⁾ , OVP ³⁾ , RPP ⁴⁾
AM10W-NZ	10	100...1000 200...1500	5, 9, 24	
AM10WM-NZ	10	200...1500	5	
AM15W-NZ	15	100...1000 200...1500	12, 15, 24	
AM15WM-NZ	15	200...1500	12, 15, 24	
AM40W-NZ	40	100...1000 200...1500	12, 15, 24	
AM45W-NST	45	150...1500	2×15	
AM200W-NZ	200	300...1500	24, 48	

- 1) CSP – Continuous Shortcircuit Protection
- 2) OCP – Over Current Protection
- 3) OVP – Over Voltage Protection
- 4) RPP – Reverse Polarity Protection

Table 1: Basic parameters of Aimtec converters for photovoltaic panels and turbines

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Say hi to HDMI

Applications and development engineer at Anders, Adilson Jacob, discusses the advantages HDMI displays offer in embedded projects

HDMI displays are available in small sizes such as five or seven inch. These are popular in industrial embedded applications such as smart appliances, security devices, ticketing and

information systems, medical devices and machine controllers.

Are HDMI panels plug and play?

One advantage of the HDMI

interface is that displays can be regarded as plug and play. In the middle of a development project, one display can be easily swapped for another to try a different size or specification.

HDMI image processing power for industrial applications

Plug and play helps teams start work on the user interface without committing to a hardware platform or waiting until a prototype is ready. That can be helpful when it's time to demonstrate a proof-of-concept to secure a green light from management.

Anders offers a selection of HDMI displays that make rapid prototyping even easier by providing a Mini-USB port to connect the touchscreen to single-board computers that provide a USB connection.

Getting a head-start on the user-interface design, while also having the flexibility to make changes, can be a tremendous advantage, particularly when the look and feel is critical to the user experience.

However, HDMI was not created as an embedded interface. With its roots in the consumer world it is relatively expensive due to license fees. Power and board real estate also need to be considered.

Are HDMI panels suitable for industrial applications

Despite these apparent drawbacks, embedded projects can benefit from a fast start, plug-and-play simplicity and the flexibility to make quick and easy design changes. Anders' LVDS to HDMI interface connects an embedded board to an HDMI display to let user-interface development begin

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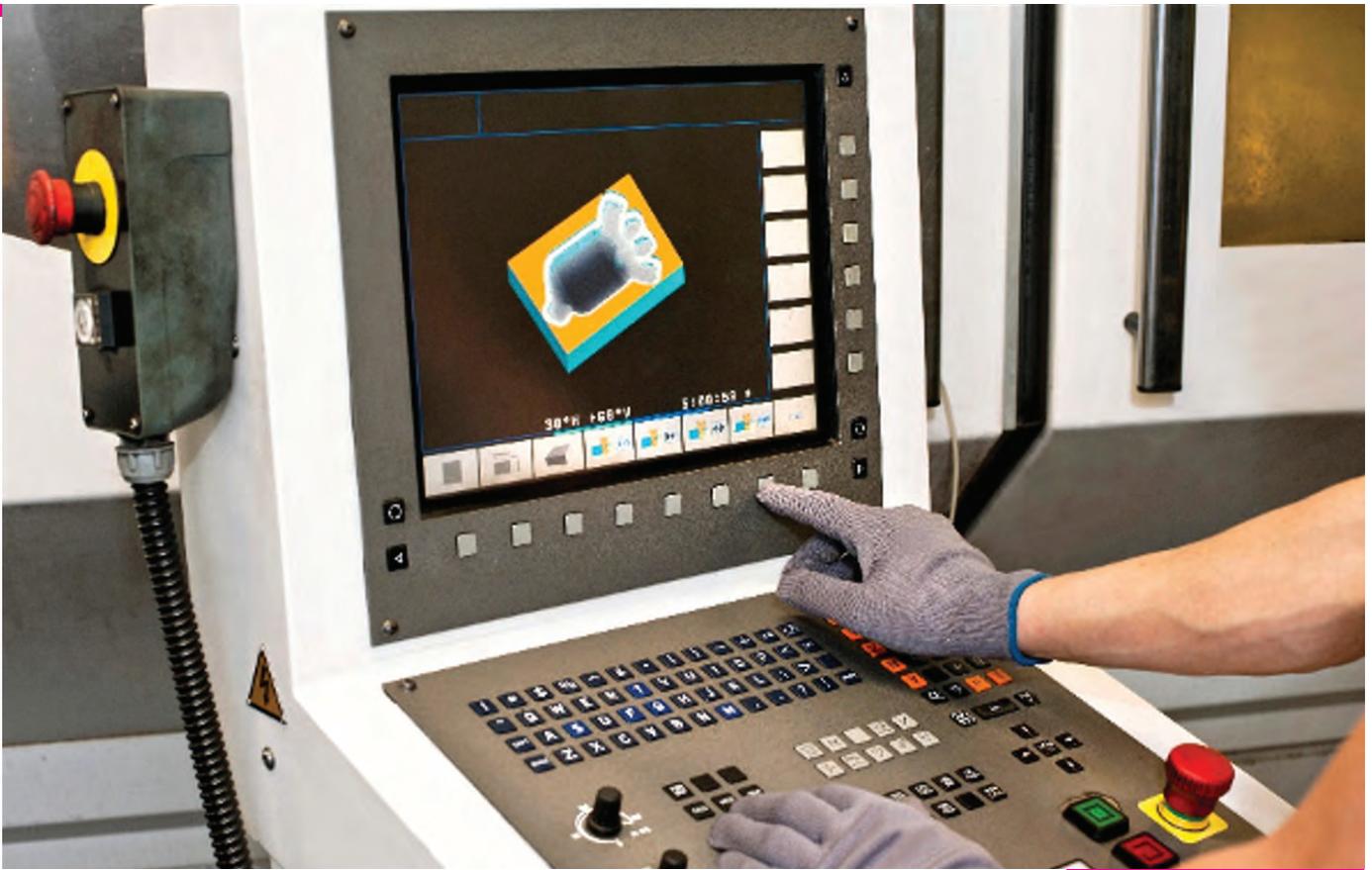
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Pat Mannion
Tel: +44 7525 237 429
Email: p.mannion@fineline-global.com



Example HDMI interface

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before committing to a particular hardware platform.

Later in the project, when the display size and specification are known, the HDMI interface board can be dropped for a lower-cost or lower-power embedded RGB or LVDS interface. The option remains to use the HDMI display in the product, either with the interface board or by integrating the conversion circuitry on the main board.

Alternatively, evaluation modules such as the Compulab SOM-iMX8 suit equipment that demands high graphics or image-processing performance such as medical imaging devices or high-end gaming terminals. They come with an HDMI interface. In-house tests have shown these boards offer easy plug-and-play compatibility with a variety of HDMI displays.

How can I connect my chosen display?

Other display interfaces have strong credentials for emerging embedded applications. MIPI-DSI is being adopted in

the automotive industry, AR/VR equipment and wearable electronics. An embedded board with a MIPI-DSI output may require conversion to RGB or LVDS to connect a chosen display.

Some companies may want to connect a MIPI display to a module with an ordinary RGB or LVDS output. Anders can handle most permutations using a selection of interface boards to help achieve a working model that can be used in the final product or adapted to satisfy other constraints such as cost or power consumption.

www.andersdx.com

Designed for Medical Applications

This 21.3" ultra-wide Superfine TFT Display is one in a range of panels designed specifically for medical applications. It has a high brightness of 800cd/m² and a high contrast ratio of 1,400:1. It comes with a long-life backlight, a built-in LED driver and has an anti-glare surface. Other features include a wide colour gamut, 16.77M colours, a resolution of 2048 x 1536 pixels and a 176/176 deg. viewing angle.

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Coronavirus adds to the sourcing challenges of medical industry buyers

Shutdowns and cutbacks in component production during the pandemic and unprecedented demand for medical equipment caused sourcing headaches for many medical OEM and EMS purchasers

Electronics purchasing in the medical equipment industry has always been challenging because of strict quality and regulatory requirements and long product lifecycles, but the recent coronavirus pandemic has made sourcing in the industry even more demanding.

Demand for medical equipment including ventilators, patient monitoring and anesthesiology equipment and other medical products increased during the pandemic. At the same time, many component manufacturers shutdowns factories or slowed production of semiconductors and other components needed by medical OEMs and their electronics manufacturing services providers.

As a result, there have been shortages and long lead times for a range of components, including processors, multilayer ceramic capacitors, field programmable gate arrays, and memory ICs. Medical equipment manufacturers have had to leverage their relationships with suppliers and purchase more products from distributors because of tight supply.

"We saw an unprecedented

demand for devices important in the diagnosis and treatment of COVID-19 patients, such as ventilators, anesthesia equipment, patient monitors, CT and mobile X-ray systems," said Carrie Uhl, chief procurement officer for GE Healthcare. As a result, the medical equipment supply chain has been stretched with the incredibly high demand for parts," said Uhl.

"GE has been able to manage through supply issues by working directly with suppliers to understand the specific challenges they're facing," she said. "Our teams worked across the organisation to understand and mitigate risks for each part and component in our supply chain to make sure we could continue to supply our customers with the equipment they needed," said Uhl.

Demand for medical equipment has also been a challenge for EMS providers building systems and subsystems for medical OEMs. One such provider is Jabil Circuit, based in St. Petersburg, Fla. Many of Jabil's healthcare customers are involved in either the prevention, identification, or treatment of COVID-19.

"As healthcare OEMs began

responding to the increased worldwide demand on these products, Jabil experienced significant upsides and new orders," said Keith Lipinski, supply chain director, Jabil Healthcare. "As the world moved into partial lockdown, Jabil had to navigate through the complex network of constraints, identify materials needed to address COVID-19, and work to prioritise manufacturing centers as 'essential services' for healthcare production," said Lipinski.

Jabil has developed close relationships with key suppliers over the years and was able to get access to materials and capacity to meet production demands, he said. "Working together with our supply base, Jabil has been able to respond with speed, agility, and commitment to deliver product as quickly as possible," he said.

Unique challenges

Another EMS provider impacted by the surge in demand for medical equipment was Kimball electronics, headquartered in Jasper, Ind. Tom Ferris, director of medical EMS market for Kimball, said during the coronavirus pandemic, Kimball experienced increased demand from medical OEM



We saw an unprecedented demand for devices important in the diagnosis and treatment of COVID-19 patients, such as ventilators, anesthesia equipment, patient monitors, CT and mobile X-ray systems

customers “specifically for those related to respiratory care and patient monitoring products.”

The pandemic presented sourcing challenges that usually don’t occur during stable market conditions, said Ferris. During the pandemic, there have been short-term spikes in demand for some components used in medical equipment to treat COVID-19 patients.

The surges in demand have created “many challenges from a supply chain perspective to the overall market,” said Ferris. “We leveraged our supply relationships with our component partners, our tools and processes, as well as our internal teams, to actively work solutions that fulfill our customers’ needs,” he said.

COVID-19 will likely be a temporary challenge for medical industry buyers as more component manufacturers are reopening and increasing production. Many analysts believe business will be back to normal next year. However, buyers at medical OEMs and EMS providers will continue to have unique supply chain challenges compared to buyers in other industries because of government regulations concerning medical products, long lifespans of medical equipment, and overall stricter quality requirements for parts used in medical equipment.

Ferris said medical OEM customers require the “highest quality and reliability” from EMS providers. He notes EMS providers serving medical OEMs must adhere to ISO 13485 requirements as well as U.S. Food and Drug Administration regulations. “Many are now expecting compliance to

MedAccred and looking for operations adhering to Good Manufacturing Practices (GMP),” said Ferris.

MedAccred is an industry managed supplier quality accreditation program focusing on critical manufacturing processes whose goal is to improve the quality and consistency of medical devices. The MedAccred program is managed by the Performance Review Institute (PRI).

ISO 13485 is a global quality management system standard that spells out the practices companies must follow in the design and manufacture of medical products. Good manufacturing practices (GMP) are the practices required in order to conform to the guidelines recommended by agencies that control the authorisation and licensing of the manufacture and sale of medical devices as well as other products such as pharmaceuticals and other products.

Rigorous qualification

Ferris said depending on the end product there may be more rigorous qualification for components used in medical products. Often components that are used in computer or industrial equipment are not allowed to be used in medical products because they do not meet the stringent durability, liability, and quality requirements of the medical equipment industry.

In many instances medical OEMs specify automotive grade components because of the rigidity of the testing requirements, said Ferris.

Medical industry buyers say strict quality requirements are all important because a defective part could result in a wrong diagnosis or the failure of a medical product which could result in death of

the patient.

“What differentiates healthcare from other industries is our end customer is also the patient,” said Lipinski. “Our product could have a major impact on someone’s quality of life, so the burden to deliver a quality product on time could be arguably at the highest level given today’s environment,” he said.

Besides choosing suppliers that can build highly reliable parts on robust manufacturing processes, purchasers must also select suppliers that commit to producing components for 10 or more years. That can be challenging because the electronics industry is largely driven by the consumer market, which is different than the medical market, said Uhl.

For instance, in the consumer market the rate of development of emerging technologies is very rapid and the lifespan of a consumer product is relatively short. “However, our medical products require a long application life,” she said. Not all component manufacturers want to produce parts for years and volumes are small, especially if there is a limited number of customers for those components.

She notes that while the medical segment is growing, it represents a small percentage of the overall electronics market. As a result, “obsolescence management is key,” said Uhl.

Because medical product lifecycles are long, most medical OEMs require EMS manufacturers to support components for up to five years post production of the product,” said Ferris. “That same requirement flows through the supply chain to the component manufacturers,” he said.



Keith Lipinski, supply chain director,
Jabil Healthcare



As healthcare OEMs began responding to the increased worldwide demand on these products, Jabil experienced significant upsides and new orders

A significant gap

Lipinski said lifecycles of medical equipment are typically 10 to 12 years but have been often known to stretch well beyond that period.

“When compared to electronic component life cycles which can range from 6 months to 7 years, there is a significant gap,” he said. As a result, medical OEMs often need to commit to large last time buys to make sure they have enough parts to support manufacturing of medical products.

“Of course, this has always been a risky move without a crystal ball that sees market demands, regulatory changes, and the potential for component quality issues,” said Lipinski. “It’s often a balancing act on what is the right quantity, how long will it last, what will be next?”

Because of long product lifecycles, obsolescence is a critical issue that medical industry buyers must manage. Kimball’s buyers must closely monitor and manage end-of-life and last time buy options, said Ferris. In some cases, Jabil will help customers redesign a product “to mitigate the impact of obsolescence.” He added that in new product introduction, Kimball will work with medical OEMs to “expand the approve vendor list (AVL)” to make sure there are no single sources for components.

“We offer supply chain services and engineering services where alternate components can be recommended to be specified,” said Ferris. He added Kimball tries to provide its medical OEM customers with solutions that consider cost, quality, risk, longevity of supply, and lead time of components for our customers.

“By optimising the bill of materials with multiple sources for each component,

we reduce the needs for future re-validation in cases of obsolescence,” said Ferris.

Identifying risky parts

Uhl said part of GE’s strategy to manage product obsolescence is to identify at-risk components and technology throughout the entire product lifecycle beginning with new product development. She said supply chain and sourcing teams are involved with new product development. “Our product teams bring together leaders from across GE Healthcare to ensure each aspect of the product lifecycle is considered, including strategic suppliers, manufacturability and serviceability across the life of the product—all of which impact total landed cost for the business,” said Uhl.

The company has a process to effectively manage bills of material to avoid line down situations, unplanned re-designs and costly last-time buys, said Uhl. “The component lifecycle process is ingrained in our product DNA.” Component lifecycle is reviewed during design, at new product introduction, bi-annual reviews throughout the life of the product, as well as with daily alerts on end of life notifications, according to Uhl.

Lipinski said there are several major trends in healthcare which will significantly change supply chain management and product development. Those trends include rapidly accelerating technology adoption, growth in aging population, value-based care, the consumerisation of healthcare, and patient choice.

An aging population represents the highest percentage of healthcare spending and as a result, there is a move towards Value Based Care, which standardises healthcare processes through best

practices and including the mining of data and evidence to determine which processes work and which don’t. Teams of doctors and healthcare professionals communicate with one another through the help of care coordinators to treat patients with more efficiency and less wasted time and effort.

As part of that effort the industry is moving quickly to integrate Internet of Medical Things applications and in-home therapy devices.

The Internet of Medical Things (IoMT) is the collection of medical devices and applications that connect to healthcare IT systems through online computer networks. IoMT devices, include such devices as heart monitors and pacemakers among other devices, collect and send patient health statistics over various networks to healthcare providers for monitoring, analysis, and remote configuration.

One example of IoMT is telemedicine in which patients are monitored at home and don’t have to go to the hospital or doctor’s office if they have a medical question or a change in their condition.

Other examples of IoMT include tracking patient medication orders and the ability to locate patients when they are in the hospital through the use of mHealth devices. IoMT applications are enabled by RFID and near field communication tags that can share information with IT systems.

Medical industry buyers will be challenged to find capable suppliers that produce highly reliable components for telemedicine devices at a competitive cost.



Tom Ferris, director of medical EMS market for **Kimball Electronics**



We leveraged our supply relationships with our component partners, our tools and processes, as well as our internal teams, to actively work solutions that fulfill our customers’ needs

Working together for IoT

Working in partnership with its franchises, Gateway offers customers access to the latest IoT innovations

In the world of IoT, Gateway has been involved in projects including global advertising, electric vehicle monitoring, temperature/humidity sensing, energy management, food waste reduction and aircraft.

Manufacturer Siretta offers industrial IoT M2M connectivity products, with its low powered modem (ZETA-NLP-LTE) proving valuable to companies looking for a reliable low power connectivity solution. Recent applications for this product include environmental monitoring, green energy and freight tracking. The Siretta product range also includes antennas, routers, cables and cellular signal analysers.

The Snyder-LTE+ and Snyder-LTE+ Spectrum signal analysers can be used to assess the strength of cellular 2G, 3G and 4G signals in any geographical area. The Snyder-Graphyte-LTE offers the user the additional functionality to perform sequential surveys and a future product launch will include a signal analyser which can measure the strength of NB-IOT and Cat M networks.

In a typical signal analyser application, Gateway was approached by a customer to provide a solution to overcome poor cellular connectivity. Using the Snyder-Graphyte-LTE to survey multiple sites, the customer was able to deploy monitoring equipment into remote locations without the need to trial multiple cellular providers, saving time and money whilst ensuring they

have a reliable signal and can react quickly in emergency situations.

How did Snyder-Graphyte-LTE deliver this? The product lets users identify the strongest cellular signal, having the option to run one survey or conduct a number of sequential surveys over a period of days, weeks or months to establish the most reliable signal at different times, day or night. The analyser can be left in the field unmanned and can be pre-programmed to run a series of surveys at chosen intervals. Once the surveys are complete the operator can download the information in a variety of formats, letting them clearly identify the most reliable signal. From there the operator can make an informed decision about the mobile operator to use for that location. The analyser reports on multiple cellular signals across 2G, 3G and 4G giving a complete map of the cellular options.

Other applications for signal analysers include crime prevention, developing communication networks, installing clean water provision in third world countries, construction and EPOS installation.

www.gatewaycando.com



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
CABLE ASSEMBLY & HARNESSING											
FTDI	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	100	N/A	0 €	N/A	50	1,500+	Y
Molex	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	300	N/A	0 €	97%	50	1,500+	Y
CIRCUIT PROTECTION											
Bourns	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	5,000	N/A	0 €	58%	50	1,500+	Y
EPCOS/TDK	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	5,000	N/A	0 €	58%	50	1,500+	Y
Littelfuse	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	35,000	N/A	0 €	67%	50	1,500+	Y
DISPLAYS & LEDs											
NLT Technologies Ltd	Review Display System Ltd	01959 563345	www.review-displays.co.uk	Y	All	N/A	£0	N/A	6	25	Y
ENCLOSURES											
Bud	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	2,500	N/A	0 €	80%	50	1,500+	Y
Hammond	Switch Electronics	01482 862255	switchelectronics.co.uk	Y	500	N/A	£0	70%	2	6	Y
Hammond	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	12,500	N/A	0 €	100%	50	1,500+	Y
Metcase Enclosures	OKW Enclosures	01489 583858	www.metcase.co.uk	N	288	£40,000	£0	N/A	5	22	Y
OKW Enclosures Ltd	OKW Enclosures	01489 583858	www.okw.co.uk	N	1,955	£40,000	£0	N/A	5	22	Y
Rolec Enclosures	OKW Enclosures	01489 583858	www.rolec-enclosures.co.uk	Y	935	£40,000	£0	N/A	5	22	Y
Teko Enclosures	OKW Enclosures	01489 583858	www.teko.co.uk	Y	1,860	£40,000	£0	N/A	5	22	Y
FREQUENCY MANAGEMENT											
AEL Crystals Ltd	AEL Crystals Ltd	01293 789200	www.aelcrystals.co.uk	N	N/A	£200,000	£50	100%	3	15	Y
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Epson	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	500	N/A	0 €	59%	50	1,500+	Y
Geyer Quartz Technology	Geyer Electronic UK Ltd	01794 329341	www.geyer-electronic.com	N	N/A	N/A	£0	100%	6	50+	Y
Golledge Electronics Ltd	Golledge Electronics Ltd	01460 256 100	www.golledge.com	N	N/A	£800,000	£0	100%	3	24	Y
Jauch Quartz	Digi-Key Electronics	0800 587 0991	www.digkey.co.uk	Y	500	£250,000	0	100%	15	130	Y
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Analog Devices Inc.	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	9,500	N/A	0 €	83%	50	1,500+	Y
Atmel	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	1,700	N/A	0 €	58%	50	1,500+	Y
Avago Technologies	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	400	N/A	0 €	84%	50	1,500+	Y
Broadcom	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	100	N/A	0 €	69%	50	1,500+	Y
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Cypress Semiconductor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	1,400	N/A	0 €	63%	50	1,500+	Y
Diodes Incorporated	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	1,600	N/A	0 €	98%	50	1,500+	Y
Exar	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	1,100	N/A	0 €	95%	50	1,500+	Y
Fairchild Semiconductor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	2,500	N/A	0 €	90%	50	1,500+	Y
Freescale Semiconductor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	2,500	N/A	0 €	42%	50	1,500+	Y
FTDI	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	100	N/A	0 €	97%	50	1,500+	Y
IDT (Integrated Device Technology)	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	2,100	N/A	0 €	97%	50	1,500+	Y
Infineon	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	800	N/A	0 €	66%	50	1,500+	Y
Intel	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	500	N/A	0 €	78%	50	1,500+	Y
International Rectifier	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	600	N/A	0 €	87%	50	1,500+	Y
Intersil	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	1,900	N/A	0 €	50%	50	1,500+	Y
ISSI	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	700	N/A	0 €	98%	50	1,500+	Y
Lattice	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	700	N/A	0 €	69%	50	1,500+	Y
Maxim Integrated	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	11,200	N/A	0 €	67%	50	1,500+	Y
Microchip	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	12,600	N/A	0 €	91%	50	1,500+	Y
Microsemi	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	400	N/A	0 €	90%	50	1,500+	Y
Monolithic Power Systems (MPS)	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	600	N/A	0 €	40%	50	1,500+	Y
NXP	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	3,900	N/A	0 €	91%	50	1,500+	Y
ON Semiconductor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	5,100	N/A	0 €	87%	50	1,500+	Y
Power Integrations	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	600	N/A	0 €	59%	50	1,500+	Y
Qorvo	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	300	N/A	0 €	90%	50	1,500+	Y
ROHM Semiconductor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	1,400	N/A	0 €	55%	50	1,500+	Y
Silicon Laboratories	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	1,500	N/A	0 €	96%	50	1,500+	Y
Skyworks	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	300	N/A	0 €	91%	50	1,500+	Y
Spanion Inc.	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	600	N/A	0 €	93%	50	1,500+	Y
STMicroelectronics	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	4,500	N/A	0 €	99%	50	1,500+	Y
Texas Instruments	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	36,900	N/A	0 €	41%	50	1,500+	Y
Toshiba	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	500	N/A	0 €	100%	50	1,500+	Y
INDUSTRIAL GRADE MEMORY MODULES											
ATP, Innodisk, APRO Kingston	Simms International Plc	01622 852 848	www.simms.co.uk	N	1000+	N/A	N/A	N/A	3	N/A	Y
INTERCONNECTION											
3M	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	3,100	N/A	0 €	16%	50	1,500+	Y
Amphenol	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	25,600	N/A	0 €	53%	50	1,500+	Y
Anderson Power Products	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	800	N/A	0 €	50%	50	1,500+	Y
Cinch Connectivity Solutions	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	1,900	N/A	0 €	82%	50	1,500+	Y
Delphi Connection Systems	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	3,300	N/A	0 €	67%	50	1,500+	Y
FCI	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	4,300	N/A	0 €	94%	50	1,500+	Y
Glenair	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	1,900	N/A	0 €	76%	50	1,500+	Y
HARTING	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	4,700	N/A	0 €	31%	50	1,500+	Y
Harwin	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	2,200	N/A	0 €	79%	50	1,500+	Y
Hellermann Tyton	Lane Electronics	01403 790661	www.fclane.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	Y
Hirose Electric	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	6,100	N/A	0 €	99%	50	1,500+	Y
Huber+Suhner	Lane Electronics	01403 790661	www.fclane.com	Y	766	£116,000	£0	100%	6	38	Y
ITW McMurdo	Lane Electronics	01403 790661	www.fclane.com	Y	866	£219,000	£0	100%	6	38	Y
JAE Electronics	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	1,200	N/A	0 €	32%	50	1,500+	Y
Kycon	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	700	N/A	0 €	99%	50	1,500+	Y
LEMO	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	2,900	N/A	0 €	65%	50	1,500+	Y
Molex	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	16,900	N/A	0 €	75%	50	1,500+	Y
Neutrik	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	1,000	N/A	0 €	86%	50	1,500+	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
NEC	Review Display System Ltd	01959 563345	www.review-displays.co.uk	Y	200	£200,000	£0	100%	5	20	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											
FRIWO Gerätebau GmbH	Haredata Electronics	01423 796240	www.haredata.co.uk	Y	250 - 500	€1M	£250	100%	7	14	Y
Jauch Quartz		01276 605900	www.jauch.com			£500,000	0	95	15	130	Y
Mean Well	Ecopac (UK) Power Ltd	01844 204420	www.ecopacpower.co.uk	Y	6,000	£2M	£0	100%	8	30	Y
Bel Power Solutions	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	1,400	N/A	0 €	94%	50	1,500+	Y
Cincon	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	5,500	N/A	0 €	60%	50	1,500+	Y
Cosel	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	11,800	N/A	0 €	99%	50	1,500+	Y
CUI Inc.	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	3,900	N/A	0 €	100%	50	1,500+	Y
Mean Well	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	4,500	N/A	0 €	75%	50	1,500+	Y
Murata	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	5,200	N/A	0 €	93%	50	1,500+	Y
RECOM	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	23,300	N/A	0 €	92%	50	1,500+	Y
Schaffner	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	900	N/A	0 €	98%	50	1,500+	Y
SL Power	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	2,100	N/A	0 €	87%	50	1,500+	Y
TDK-Lambda	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	4,600	N/A	0 €	99%	50	1,500+	Y
TRACO Power	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	3,400	N/A	0 €	95%	50	1,500+	Y
SENSORS											
All Sensors	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	2,300	N/A	0 €	70%	50	1,500+	Y
ams	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	400	N/A	0 €	77%	50	1,500+	Y
Analog Devices Inc.	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	500	N/A	0 €	78%	50	1,500+	Y
Bosch	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	100	N/A	0 €	94%	50	1,500+	Y
Freescale Semiconductor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	1,000	N/A	0 €	66%	50	1,500+	Y
Honeywell	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	15,500	N/A	0 €	80%	50	1,500+	Y
Maxim Integrated	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	900	N/A	0 €	N/A	50	1,500+	Y
Melexis	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	700	N/A	0 €	N/A	50	1,500+	Y
Omron	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	5,700	N/A	0 €	N/A	50	1,500+	Y

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
Sensiron	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	100	N/A	0 €	N/A	50	1,500+	Y
TE Connectivity	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	1,100	N/A	0 €	N/A	50	1,500+	Y
SWITCHES & KEYBOARDS											
ALPS	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	400	N/A	0 €	70%	50	1,500+	Y
Apem	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	700	N/A	0 €	96%	50	1,500+	Y
C&K Components	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	1,500	N/A	0 €	84%	50	1,500+	Y
Carling Technologies	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	300	N/A	0 €	87%	50	1,500+	Y
CHERRY	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	200	N/A	0 €	77%	50	1,500+	Y
E-Switch	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	700	N/A	0 €	94%	50	1,500+	Y
EAO Ltd	EAO Ltd	01444 236000	www.eao.co.uk	N	5,000	£500,000	£150	100%	6	22	Y
Grayhill	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	400	N/A	0 €	84%	50	1,500+	Y
Honeywell	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	700	N/A	0 €	98%	50	1,500+	Y
NKK Switches	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	1,100	N/A	0 €	94%	50	1,500+	Y
Omron	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	900	N/A	0 €	68%	50	1,500+	Y
TE Connectivity	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	400	N/A	0 €	98%	50	1,500+	Y
TERMINAL BLOCKS											
Marathon Special Products	Global Supply Services	01904 436 488	www.global-supply-services.com	Y	8,000	£800,000	£100	100%	3	11	Y
THERMAL MANAGEMENT											
ADDA	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	800	N/A	0 €	59%	50	1,500+	Y
Delta Electronics	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	500	N/A	0 €	28%	50	1,500+	Y
ebm-papst	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	2,200	N/A	0 €	99%	50	1,500+	Y
Sanyo Denki	EAO Ltd	01444 236000	www.eao.co.uk	Y	4,300	£150,000	£150	99%	6	22	Y
Sanyo Denki	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	2,900	N/A	0 €		50	1,500+	Y
Sunon	G.English Electronics Ltd	0208 855 0991	www.gelec.co.uk	Y	3,500	£1,000,000+	£0	100%	10	28	Y
Sunon	Thermaco Ltd	01684 566163	www.thermaco.co.uk	Y	3,500	£230,000	£100	100%	6	12	Y
TRANSFORMERS & INDUCTORS											
Best Windings	Best Windings	0044 (0)1394 448424	www.bestwindings.co.uk	N	300	N/A	£100	N/A	2	24	Y
WIRELESS SOLUTIONS											
Anaren	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	100	N/A	0 €	86%	50	1,500+	Y
B&B Electronics	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	100	N/A	0 €	87%	50	1,500+	Y
Bluegiga Technologies	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	100	N/A	0 €	93%	50	1,500+	Y
Digi International	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	200	N/A	0 €	92%	50	1,500+	Y
Laird Technologies	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	100	N/A	0 €	76%	50	1,500+	Y
Linx Technologies	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	100	N/A	0 €	99%	50	1,500+	Y
Microchip	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	100	N/A	0 €	85%	50	1,500+	Y
Murata	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	100	N/A	0 €	100%	50	1,500+	Y
Panasonic	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	100	N/A	0 €	91%	50	1,500+	Y
Redpine Signals	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	100	N/A	0 €	94%	50	1,500+	Y
RF Digital	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	100	N/A	0 €	100%	50	1,500+	Y
Texas Instruments	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	100	N/A	0 €	75%	50	1,500+	Y
Wi2Wi	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	Y	100	N/A	0 €	36%	50	1,500+	Y

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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
AWS Electronics Group	01782 753200	www.awselectronicsgroup.com	£40m	UK & Slovakia	430	11	AS9100, ISO9001, 13485, 14001, TS16949, IPC-A-610 Class 3, NADCAP	Y	Y	Y	Y	Y	Y
Challenger Solutions Ltd	01245 325252	www.challengersolutions.com	£10m	Essex/SE	100	7	AS9100 Rev D, ISO9001:2015, ISO 14001:2015, UL, CCC, IPC-610-G Class 3	Y	Y	Y	Y	Y	Y
CML Innovative Technologies (uk) Ltd	01284 714700	www.cml-it.com	£12M	UK/EU/China	65		ISO9001, TS16949, UL ISO9001 2015, IATF 16949 2016	N	Y	Y	Y	Y	Y
Corintech Ltd	+44(0)1425 655655	www.corintech.com	£11m	UK & Far East	72	3	AS9100, ISO9001, IPC-A-610 Class 3, J-STD-001	Y	Y	Y	Y	Y	Y
Custom Interconnect Ltd	01264 321321	www.cil-uk.co.uk	£18.6m	Andover (Hampshire)	130	6	AS9100 ISO13485 ISO9001 IPC-A-610 Class 3	Y	Y	Y	Y	Y	Y
Dynamic EMS Ltd	01383 822911	www.dynamic-ems.com	£9m	Scotland	94	3	ATEX, ISO9001:2015, OHSAS18001, IPC-610-F class 3, ISO14001, ISO 13485, IUL	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.etuk.co.uk	£3.5m	SE	55	2	AS9100, ISO9001, ISO14001, IPC610/620 Class 3	Y	Y	Y	Y	Y	Y
Esprit Electronics Ltd	02380 455411	www.espritelectronics.com	£9m	S/Malaysia	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.ievw.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	SCOTLAND	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	ISO9001:2008/IPC-A-610 Class 3/WHMA-620/ISO14001-2004/ IPC-7711/7721	Y	Y	Y	Y	Y	Y
Pektron	01332 832424	www.pektron.com	£50m	E-Midlands	350	8	ISO9001, ISO14001, TS16949, BEAB, VCA, TUV, UL	Y	Y	Y	Y	Y	Y
Protronix EMS	01582 418490	www.protronix.co.uk	£2.5m	Luton	10	2	ISO9001:2015, IPC-A610 Class 3	Y	Y	Y	Y	Y	Y
Season Electronics Limited	02392 452222	www.seasongroup.com	£5m/£100m	Havant, UK/USA/Mexico/China/Malaysia	65/1800	2/18	(AS9100 & ISO9001 in UK) (TS16949 & ISO13485 at sister sites)	Y	Y	Y	Y	Y	Y
Simtek EMS Ltd	01843 233120	www.simtekems.co.uk	£8.2m	SE	77	3	ISO9001:2008, ISO13485, IPC-A-610 Class 3 & IPC-7711	Y	Y	Y	Y	Y	Y
TEXCEL TECHNOLOGY PLC	+44(0)1322621700	www.texceltechnology.com	£15.5m	SE	131	7	ISO9001, ISO14001, IPC610 Class 3,	Y	Y	Y	Y	Y	Y
Tioga Limited	01332 360884	www.tioga.co.uk	£16m	Derby	130	6	ISO 9001, ISO 13485, ISO14001, IPC 610, 620, 7711/7721	Y	Y	Y	Y	Y	Y
Wilson Process Systems	01424 722222	www.wps.co.uk	£12m	SE	100	5	ISO9001:2015, IPC-A-610 Class 3	Y	Y	Y	Y	Y	Y

PCB Buyers' Guide

Manufacturer	Telephone	Website	Service Provided (ie. Broker, Manufacturer &/or Repair)	Location	Approvals	Volume - Small, Medium, Large	Double-sided	Multi-layer 4-10/10-20-50	Metal PCBs	Flexi / Flexi-Rigid	Obsolescence Solutions	Modifications	Prototyping
ABL Circuits Ltd	01462 894312	www.ablcircuits.co.uk	M	SE	ISO9000: 2015	SML	Y	4-10	Y	Y	Y	Y	Y
Cambridge Circuit Company Ltd	01223 423100	www.cambridge-circuit.co.uk	M	SE	ISO9001:2015, UL, ISO 14001:2015	SML	Y	4-16	Y	Y	Y	Y	Y
DK-Daleba Printed Circuits	01992 510000	www.dk-daleba.co.uk	B/M/R	UK, Europe, Asia, USA	UL, ISO9001:2008, TS16949:2009	SML	Y	4-30	Y	Y	Y	Y	Y
Fineline VAR Ltd	+44 (0)1249 815 815	www.fineline-global.com	B	UK / Global	ISO9001:2015 / UL/TS16949 / Nadcap/ AS9100/ISO14001	SML	Y	4-60	Y	Y	Y	Y	Y
GSPK Circuits Ltd	+44(0)1423 321100	www.gspkcircuits.ltd.uk	M/R	UK, Europe, Asia	IS 9001:2015, IATF 16949:2016, EN (AS) 9100	SML	Y	4-34	Y	Y	Y	Y	Y
LEF Circuits	0116 2891122	www.lefcircuits.co.uk	M/R	M	ISO 9001:2015, IPC-A-610	SML	Y	4-30	Y	F/R	Y	Y	Y
Stevanage Circuits Ltd	01438 761811	www.stevanagecircuits.co.uk	M/B	UK/China	ISO 9001:2008, ISO 14001, EN9100:2009, UL, OSCAR	SML	Y	4-44+	Y	F, F/R	Y	Y	Y
Tate Circuit Industries Ltd	01889 583627	www.tatecircuits.com	B	UK/China	ISO 9001:2015, UL	SML	Y	4-20	Y	Y	Y	Y	Y

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