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AEROSPACE AND DEFENCE:
SIMPLIFYING PROCUREMENT

PAGE 8

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On the cover – August 2023

Aerospace and defence: simplifying procurement
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Editor's Word

Opportunities for reshoring

I have no academic background in economics and whenever I delve into the subject I'm soon confronted by maths that is so many pay grades above me I can't even see the top. Thus, I keep my observations at ground level.

So, when I witness reshoring trends, it triggers memories of the '80s when offshoring was the management guru's go to move. At the time, I recall researching offshoring and stumbling across the theory of comparative advantage. I ignored the maths and went for the simplest explanation I could find.

Here goes: Imagine two countries would like access to commercial airliners and cruise ships. One has an abundance of aerospace engineers and the other has a long open coastline. The obvious solution is one country specialises in manufacturing commercial airliners, the other country specialises in manufacturing cruise ships and they exploit excess production capacity by trading products. Hopefully that description is right.

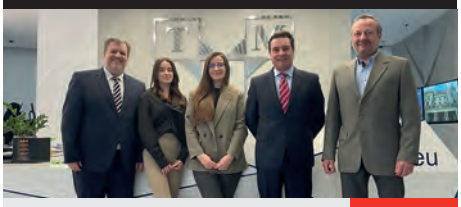
The fact the supply chain supporting such activity snapped a couple of years ago doesn't dissolve the logic of comparative advantage. Offshoring and reshoring will continue. However, the rate and direction depend on what different countries decide to specialise in.

That decision is split between political desire, culture, society and resources. In the world of manufacturing, resources surely must take the lead role: labour, IP, skills, raw materials, energy, space and more. Logically, if a country wants more manufacturing, a different sector will have to lose their share of such resources, voluntarily or by force.

I watch with interest as the battle lines are drawn, with labour and skills currently leading the charge.

Jon Barrett

NEWS



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ES News

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Interconnect distribution alliance announced

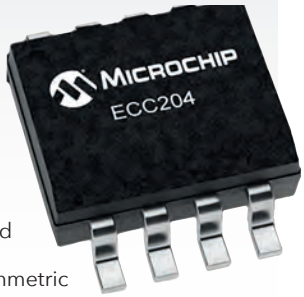
To strengthen its customer support, Harwin has signed a new supply channel partnership with Transfer Multisort Elektronik (TME). Headquartered in Ustronna, central Poland, TME has served the European electronics market for over 30-years. The distribution firm has 11 subsidiaries, covering the Czech Republic, Hungary, Slovakia and Romania, whilst also benefiting from operations in Germany, the UK, Spain and Italy.

TME's head of connector's division, Wojciech Pawłowski, said: "Harwin's optimised interconnect solutions and board-level hardware are certain to be valuable additions to the portfolio of products we offer. We are confident that its celebrated engineering prowess combined with our supply chain proficiency is going to be the foundation for a great alliance."

Harwin's head of distribution sales, Steve Miller, added: "The addition of TME as a franchised distributor will bring an extra dimension to our supply chain strategy. Eastern Europe has evolved from focusing on contract manufacturing to become a thriving hub for electronic design activity."

www.harwin.com

Secure authentication IC in stock



Mouser Electronics is now stocking Microchip Technology's ECC204 secure authentication IC, a cryptographic authentication device with protected storage for private keys, certificates, symmetric keys or user data. The hardware-based key storage solution supports secure authentication applications including: ecosystem control, disposables and accessory authentication, symmetric authentication using HMAC keys and disposable applications with select usage.

The device provides hardware support for asymmetric authentication, including a FIPS186-4 elliptic curve digital signature and NIST standard P-256 elliptic curve support. It also features an internal NIST SP 800-90A/B/C random number generator, supporting asymmetric key generation.

Features include hardware support for SHA-256 and HMAC, while the device's field-programmable electrically erasable, programmable read-only memory includes a single ECC private key, single symmetric secret key and 64-byte user memory. Extended industrial temperature range is -40 to 105°C. The device is offered in an eight-pad UDFN, eight-lead SOIC and three-lead contact package options for design flexibility.

www.mouser.com

Building the GaN ecosystem

Cambridge GaN Devices (CGD) has announced a distribution deal with DigiKey which will hold substantial stocks of CGD's ICeGaN HEMTs and related products.

CGD's chief commercial officer, Andrea Bricconi, said: "This agreement is a significant step for CGD as we are scaling-up the business and building a GaN ecosystem that will help engineers explore and utilise the benefits of ICeGaN for high voltage power conversion. DigiKey is very well respected and a trusted brand, and we are sure that this deal will enable CGD to penetrate and support new markets worldwide."

DigiKey's VP, new market development, Missy Hall, added: "We are pleased to add Cambridge GaN Devices to our Fulfilled by DigiKey program. By including CGD's ICeGaN series transistors in our portfolio, DigiKey is delivering even more energy-efficient options for our customers to choose from. DigiKey is always looking to fill the gaps for our customer base, and the addition of CGD to our supplier community is one more gap filled and one more step towards great innovation."

CGD recently launched its 650V H2 series ICeGaN gallium nitride HEMT family. The new parts reduce design complexity as they can be driven using commercially-available industry gate drivers.

www.camgandevices.com

THIS CORROSION...

This month's counterfeit investigation from Princeps shows the kind of damage that can be suffered by components during harvesting, clean up and re-marking

In their attempts to make old or used components appear brand new, counterfeiters typically use acids to 'recondition' leads—and even after thorough rinsing, corrosive residues can be left in situ. A combination of internal delamination caused by the counterfeiters' 'manufacturing process' and humidity from the atmosphere can cause such residues to penetrate the package and migrate along the interface between the mould compound and a bond wire, travelling all the way to the die and corroding the metallisation.

Figures 1 to 3 show the results of this. In this example, the part is a 4Mb CMOS SRAM memory chip and in Figures 1 to 3, we can see the gold bond wires sitting on what should be clean aluminium bond pads. However, Figures 1 and 2 show the corrosion spreading out from the bond pad. The purple corrosion seen in Figure 2 may indicate 'purple plague', a brittle intermetallic of gold and aluminium.

The often-excessive temperatures used during the counterfeiting process, in combination with the presence of corrosive residues, can also cause the bond between the wire and pad to become brittle, leading to the bond wire lifting from its pad (Figure 3 shows a ball bond lifted from the die). Meanwhile, Figure 4 shows what a normal ball bond from a genuine part should look like. As usual, the offending parts were removed from the supply chain.

www.princeps.co.uk

Figure 1 - Corrosion starts to spread

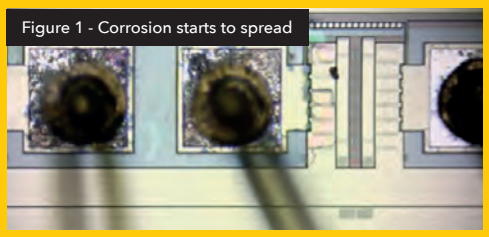


Figure 2 - Purple plague?

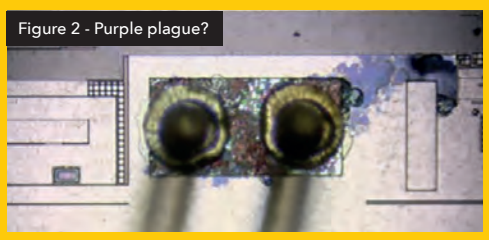


Figure 3 - Bond wire starts to lift

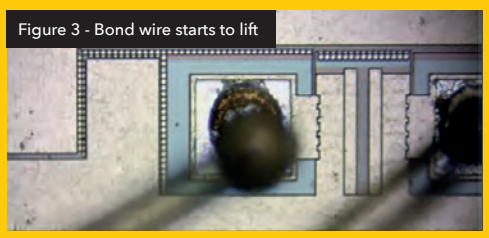
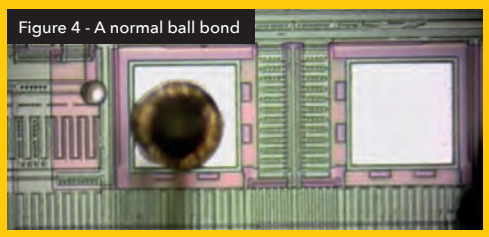


Figure 4 - A normal ball bond



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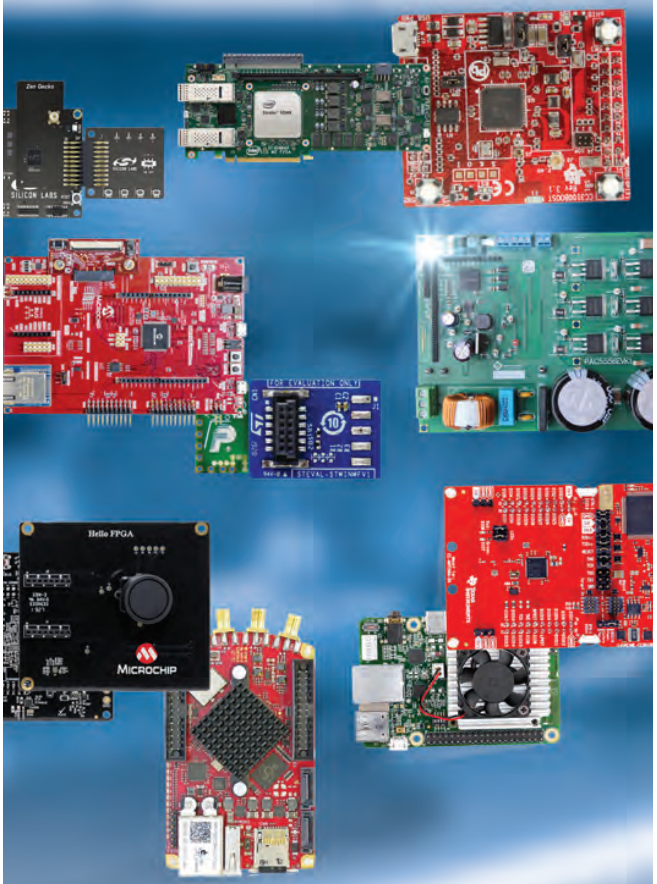

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MOUSER ELECTRONICS

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ES News

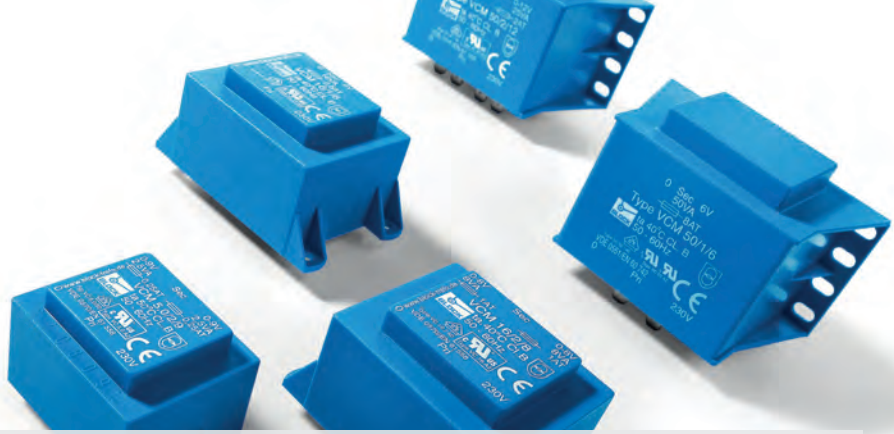
In Brief

Growing European presence
RS Group has completed its acquisition of Distrelec BV, a high-service, digital-led distributor of industrial and maintenance, repair and operations (MRO) products. RS Group CEO, Simon Pryce, said: "The acquisition of Distrelec materially strengthens our presence in key European markets. It is a complementary business to RS and has excellent value creation potential with a strong cultural and operational fit."
www.rsgroup.com

New IoT product guide
Advantech has published a comprehensive overview of its edge-to-edge-cloud solutions in the 2023 edition of its Industrial Systems and Devices Star Product Guide. The free to download 28-page brochure is a guide to its IIoT product range, providing customers with information to stay ahead of the IIoT deployment curve.
www.advantech.com

Expanding pick and place capabilities
Sensing and measurement specialist Mantracourt has invested £500k to upgrade its Exeter-based facility with a new SMT pick and place line, which will see the factory increase efficiency and cut waste thanks to improved quality control capabilities. The line will produce over 99 per cent of Mantracourt's products.
www.mantracourt.com

Boosting battery production
Fortescue is expanding its battery and electric powertrain production operations in the UK with an additional state-of-the-art facility in Oxfordshire, creating more than 120 jobs. Chairman, Andrew Forrest, said the expansion is part of Fortescue's commitment to grow its British presence through the recent integration of iconic British manufacturers WAE.
www.wae.com



PCB transformers now available

Agile Electronics can now supply PCB mounted power transformers from Block. The transformers are vacuum moulded to provide a rugged, reliable and high proof voltage device. When designed into a PCB mounted product for use as a power transformer they provide safe electrical isolation between power input and output sides, providing the function of an isolating or safety transformer.

Block's standard PCB transformer solutions are designed to provide an ideal power supply for circuit design, from basic transformers to devices offering absolute or limited short-circuit protection. Stated benefits include: minimal footprint with high power output; double input and output voltage for series or parallel connections; and power output from 0.35 to 50VA.

Agile Electronics' director, Sarah Eddowes, said: "The addition of Block PCB power transformers to our portfolio not only adds value to our kitting service but also provides UK customers with a local, reliable sales channel for their own requirements."

www.agileelectronics.co.uk

Ultra-subminiature switch ready to ship

Omron's D2EW sealed ultra-subminiature basic switch is designed to offer multi-angle operation without an additional lever. In addition to operation from above, it allows use from the side up to 90 degrees. Measuring 8.3 by 7.0 by 5.3mm, the product is said to be one of the smallest switches.

Target markets and applications include: automotive door locking, detection and EV charging; fire, smoke and gas detectors; robotics; smart metering; HVAC; and household appliances such as refrigerators, washing machines, dishwashers and power tools.

Features such as a left-right asymmetrical post and red/blue rubber boots for NO and NC, ensure correct mounting and confusion protection. The switch's sliding contact structure allows quiet operation up to 300,000 cycles at 30 operations per minute.

Energy efficiency is also important for switches so the D2EW scores with its minimum applicable load of 50µA. Operating temperature range is -40 to 85°C.

www.rutronik24.com

Board-to-board connectors suit RF applications

Powell Electronics is now stocking second generation GBB board-to-board connectors from Gigalane. Described as cost-effective and reliable, the devices benefit from a 25 per cent weight reduction thanks to a new material and manufacturing method. Other stated benefits include excellent mechanical and electric performance.

Key target applications are board-to-board and board-to-module RF interconnections.

Technical details include: DC to 8.5GHz frequency range; 50Ω impedance; 5000MΩ insulation resistance; and a 1,000Vrms dielectric withstand voltage. VSWR is 1.20:1 at 3.0GHz, 1.25:1 at 6.0GHz and 1.30:1 at 8.5GHz.

www.powell.com

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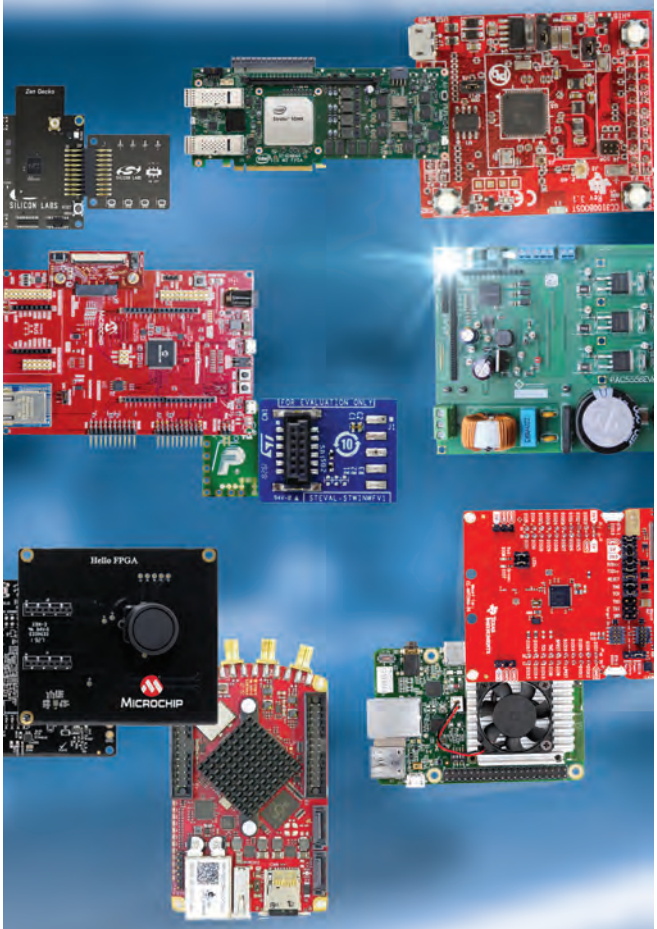

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MOUSER ELECTRONICS

Simplifying defence procurement

Charcroft Electronics director, Debbie Rowland, explains why higher levels of knowledge and experience underpin component supply in stringent applications

Knowledge needed to simplify defence procurement should cover a detailed understanding of component specifications and a willingness to deliver individual customer solutions.

A key example of specialist knowledge is a thorough understanding of capacitor failure rates. CKR capacitors are manufactured to the same specification by different manufacturers but are offered with a range of failure rates. Part number CKR05BX100K denotes a moulded, radial ceramic capacitor, with a 10pF capacitance value and voltage of 200V.

Adding an M suffix denotes a failure rate of 1.0 per cent for each 1,000h operation. The failure rates then progress to P (0.1 per cent) and R (0.01 per cent). The lowest failure rate and highest reliability is shown by an S suffix (0.001 per cent). Adding a V suffix shows the capacitor has a standoff case.

An understanding of this part number system gives greater scope for identifying an alternative if a capacitor with the original specification is not available. It is also important to interrogate franchised component manufacturers' systems, so Charcroft is certain it is offering the best availability and specification for each customer's enquiry or order.

Proactive not reactive

Being proactive when a part loses approval or goes obsolete, is essential to maintain continuity of supply. Obsolescence notifications are regularly received from franchises. Each time, Charcroft immediately checks to see who has ordered the parts and identify an alternative component.

Continues on page 10 >

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Being proactive means there is no waiting for customer demand before work starts.

To extend availability of obsolete passive components, Charcroft has also used acquisitions including mil-style mica and radial cased multilayer ceramic capacitors (MLCCs). Value added services, from flying leads to custom-built assemblies, further increase support for demanding industries.

Individual solutions

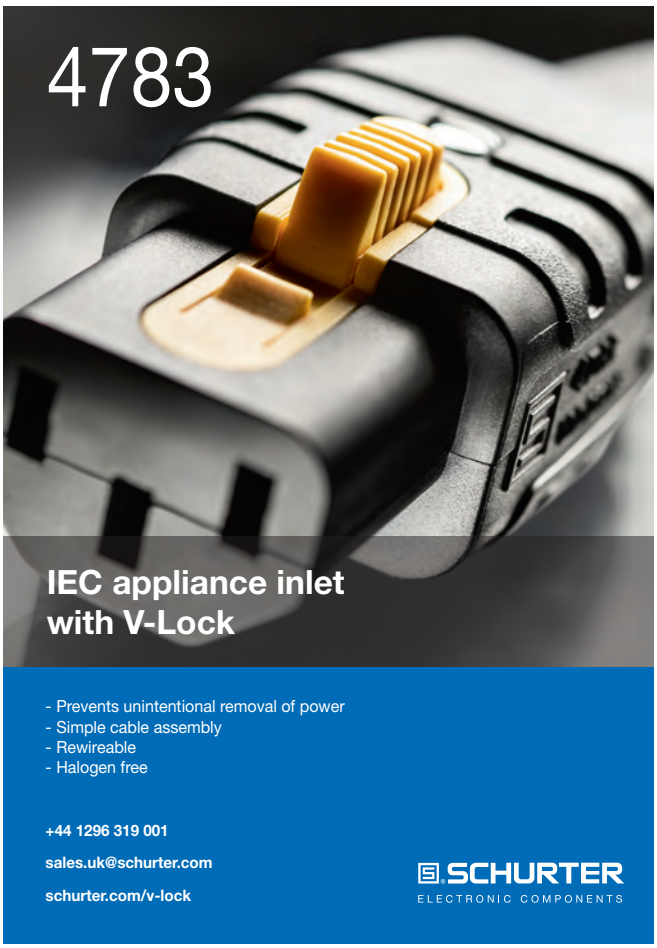
There must be a willingness to deliver individual solutions for customers and to provide high service on low-volume orders which have a high component mix. Individual solutions can cover long-term agreements for UK stockholding and working with franchised component manufacturers to provide serialised components with a data pack showing the specification of each component. Individual screening and reports can also be handled, such as pick and mix screening for NewSpace passive and semiconductor components.

Procurement can be streamlined offering the ability to provide the first article inspection reports, plus requirements for the automotive International Material Data System (IMDS), and Production Part Approval Process (PPAP).

A Designated Supplier Quality Representative (DSQR) programme is used by customers to act as a goods-in and goods-out quality team, with the possible addition of special labels for inbound stock. Final quality checks can be carried out for components used in harsh or hi-rel environments.

Almost 50-years of building specialist knowledge, experience and data, lets Charcroft simplify and streamline defence procurement for its customers.

www.charcroft.com



	Failure rate % per 1,000 hours			
Tolerance	1.0% M	0.1% P	0.01% R	0.001% S
10%				CKR05BX100KS
				CKR05BX100KSV
			CKR05BX100KR	
			CKR05BX100KRV	
		CKR05BX100KP		
		CKR05BX100KPV		
	CKR05BX100KM			
	CKR05BX100KMV			
20%				CKR05BX100MS
				CKR05BX100MSV
			CKR05BX100MR	
			CKR05BX100MRV	
		CKR05BX100MP		
		CKR05BX100MPV		
	CKR05BX100MM			
	CKR05BX100MMV			

Comparison of CKR05 capacitor failure rates

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Sourcing electronic components post-pandemic

Classic Components' Mike Thomas explains how independent distributors are managing surplus inventory, offering financial solutions and helping reduce costs

With the supply chain disruption of recent years in the rear-view mirror, the market is beginning to stabilise. However, the work has only begun. With hard-earned lessons from the pandemic, many manufacturers are securing their supply chains and preparing for future disruptions. They want to do so at reduced cost and capital outlay after paying a premium for parts over several years.

Classic Components' VP and global general manager, Mike Thomas, said: "We just went through one of the biggest supply chain disruptions in history outside of a world war. Now, things are starting to settle down. Interest rates have risen sharply, which is having the expected result of slowing the economy and so demand is down. However, the supply chain is still highly vulnerable to present and future disruptions."

Covid related supply chain shortages were not the only disruption to affect global manufacturers in recent years. In 2018, there was a worldwide shortage of multi-layer ceramic capacitors when demand outpaced supply. At the time, 60 per cent of the world's production of MLCCs was controlled by three suppliers. Even now, there are components in short supply due to the limited number of suppliers, geopolitical trade tensions and ever-changing technology.

Thus, manufacturers are taking steps to secure the supply chain over the long run. A key strategy is to be less dependent on China and more diversified in sourcing components.

There will also be a continued role for independent distributors. When franchised/authorized distributors were not able to supply the required parts, independent distributors played a critical role in helping keep many manufacturers' production lines running. Independent distributors can leverage their expertise and strategic relationships to find alternate sources through regional authorized/franchised distribution, manufacturer direct or surplus/excess inventories.

Many manufacturers are sitting on excess inventory due to stockpiling and multiple ordering. After paying exorbitant prices over recent years to secure parts, many manufacturers are also looking to reduce costs further, even as prices drop. Some are exploring the financial services some independent distributors provide to minimise cash outlay while ensuring access to inventory.

Reducing excess inventory

When manufacturers faced long lead times, many double, triple or quadruple ordered since they did not know who was going to deliver first. Thomas added: "Now that all these parts were delivered, some manufacturers have excess inventory and aren't sure what to do with it."

If it is true dead stock, an independent distributor like Classic Components can help liquidate the components and get them off the books through various arrangements. This type of service can be initiated with a simple email list of surplus items with the original pricing.

Continues on page 14 >

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Classic Components then searches its database to see if other customers use those parts and can broker a deal.

Classic Components can also list and sell surplus inventory on consignment with, or without, taking physical possession of the inventory.

Thomas continued: "Essentially, after coming to a consignment agreement, the list of items is uploaded to our website. We offer complete transparency throughout the consignment process. As we receive inquiries, we share the information so you can decide whether to sell [your surplus] at the offered rate."

Classic Components may even opt to purchase the inventory outright to resell later.

Reducing costs

With costs rising and inflation still not under control, manufacturers are looking to reduce the expense of procuring parts. Some independent distributors have found ways to lower the cost of parts by leveraging their global relationships.

For example, Classic Components procures material in its local markets and is not bound by regional price constraints. With its global network, the distributor can purchase in local markets that offer the lowest prices and pass the savings on.

Thomas explained: "By using regional quality centres and logistic hubs, we have the flexibility to purchase components from any country, in any currency, and then ship them to anywhere they are needed."

Customised financial services

To improve manufacturers' cashflow, independent distributors like Classic Components offer tailored programs of vendor managed inventory, which can simplify logistics, reduce total cost of ownership and enable the redirection of capital to other spending categories. In some cases, they can make speculative purchases for a customer and/or provide financing to purchase inventory when a qualified client has capital constraints.

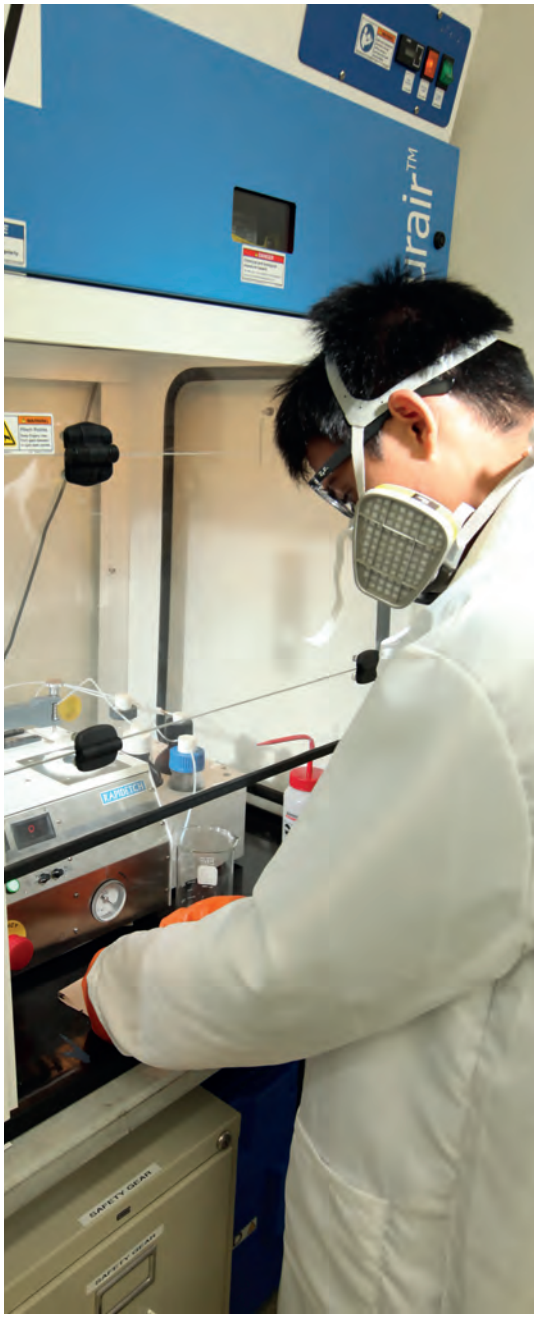
Thomas said: "Financial and logistical services can be customised to the manufacturer's particular needs and situation, which may evolve over time. The goal is a win-win partnership that mitigates their capital and logistical concerns."

Protecting against future disruptions

The up-and-down nature of the market means manufacturers need to prepare today, for whatever will come next Thomas concluded: "What happens in a year when the Federal Reserve decides to lower interest rates? There is still an incredible amount of pent-up demand. When the economy begins to return to normal it may not be like it was during covid, but a spike in demand will cause shortages again.

"You want to have that relationship with a partner that is flexible enough to shift gears in a moment's notice. You may be in shortage mode on Monday, and then Tuesday, you have excess and want help selling it. Then on Wednesday, you decide you don't want to sell any more and prefer we loan you money against it."

www.class-ic.com



Rising demand drives current trends in EV components

As the EV market emerges from major supply chain disruptions, demand is strong for power components and microcontrollers/ microprocessors. However, some shortages loom

Analysts are optimistic that 2023 will wrap as a growth year for the EV industry. Demand for two major component families, power and MCUs/ MPUs, is on the rise.

Power electronic components play a key role in converting the battery's DC voltage into the AC voltage necessary to drive the electric motor. These inverters, together with AC/DC converters for onboard charging and various DC/DC converters, rely on power semiconductors.

Examples are IGBTs, silicon power transistors, MOSFETs and SiC/GaN power devices. All have been in short supply since 2020 and remain the most constrained in the power stage portfolio. Many chip makers have announced plans to expand production and are looking to make long-term deals with ecosystem partners. For OEMs, distributors can be critical partners in helping navigate this shortage.

There is also a growing need for passive components and interconnect that can withstand the high voltages and power that need to be specially modified for EV power trains.

Considered the heart of an EV, the battery pack comprises numerous lithium-ion battery cells. Lithium is quite a rare element, although not technically a 'rare earth metal' as it is sometimes described. It's the most significant element in most rechargeable batteries, whether they're used in EVs or smartphones.

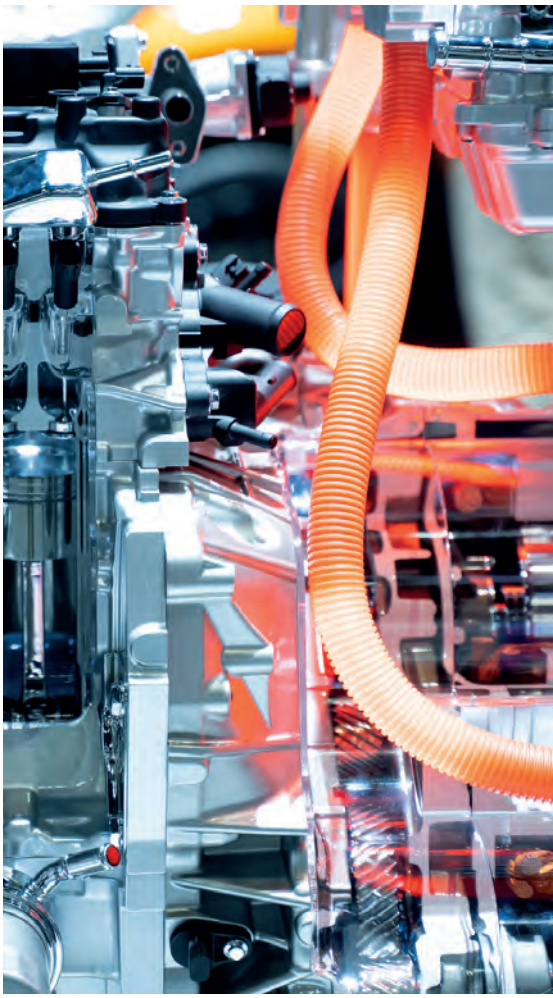
According to commodities price reporting agency Fastmarkets, EVs are likely to account for 73 per cent of all lithium demand. The firm expects 28 per cent year-on-year demand growth for lithium in 2023 and a further 24 per cent growth in 2024.

According to the US Geological Survey, Nevada is the only state to extract lithium and the US has access to just 3.6 per cent of global reserves. China has a lot more and analyst Wood Mackenzie estimates the country has 75 per cent of the world's lithium-ion battery manufacturing capacity. Argentina, Australia and Chile also have large lithium reserves.

Boston Consulting Group forecasts a lithium supply shortfall by 2030 and warns companies across the battery value chain must mobilize now to boost supplies and diversify their supply chains. In the short term, there seems to be plenty of lithium. Its price dropped dramatically earlier this year, but the EV industry and OEMs need to plan for longer-term potential shortages.

MCUs are ubiquitous in today's cars. More than 50 can be found in high-end models. They're used in infotainment and control systems with applications encompassing touchscreens, navigation systems, climate control, connectivity features and advanced driver assistance systems.

In EVs, MCUs are also used in monitoring and



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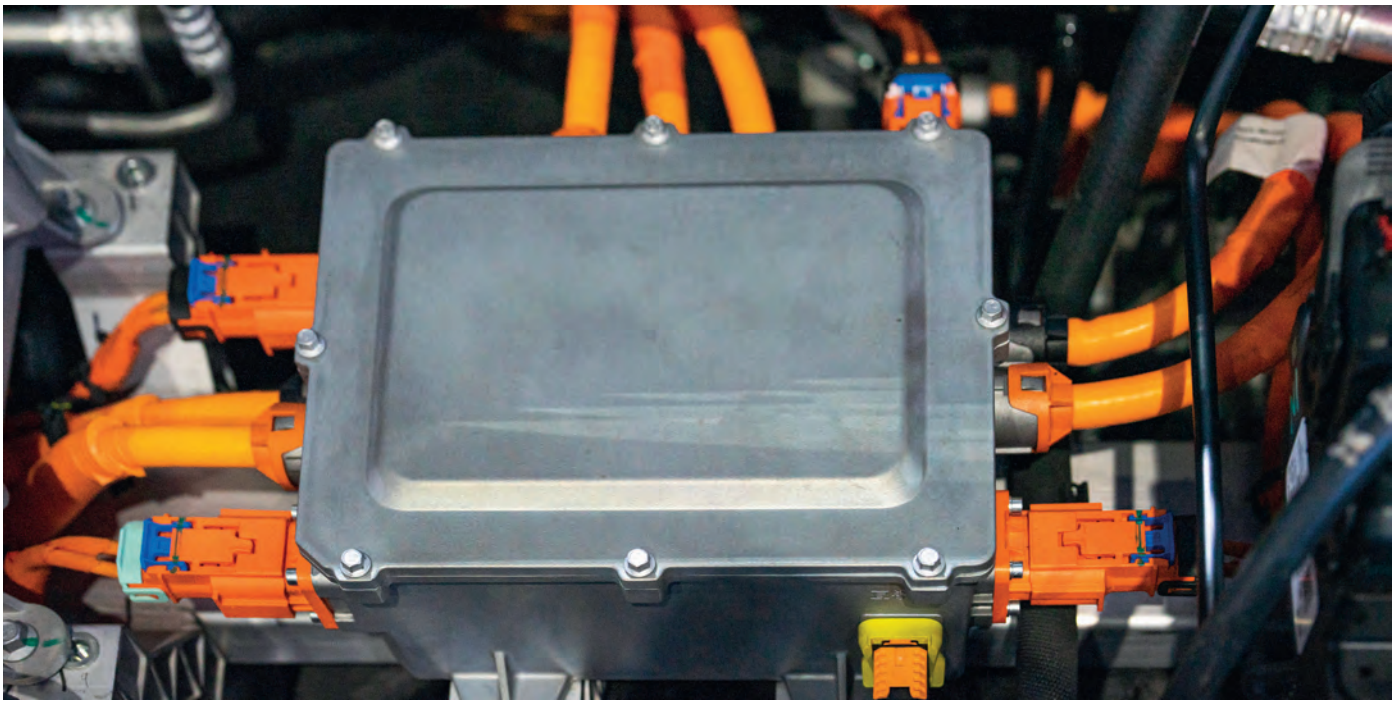

managing the battery pack via the battery management system. This continuously monitors individual battery cells within the pack, ensuring their optimal performance, balancing their charge levels and safeguarding their overall health and longevity. They're also central to the vehicle's thermal management systems which regulate the temperatures of critical components such as the battery, power electronics and electric motor. They incorporate cooling fans, radiators and liquid-cooling systems to maintain ideal operating conditions.

Although the supply chains for automotive MCUs have been stabilising, rapid growth in EV sales led to some shortages, particularly for high-end 32-bit MCUs. Compared with 8-bit and 16-bit parts, 32-bit MCUs are the dominant type in automotive applications. As higher-performance parts, 32-bit MCUs tend to be manufactured using more advanced process nodes, sometimes down to 22nm. This limits the choice of foundries for MCU makers and represents an additional supply chain risk.

Estimates say TSMC makes approximately 70 per cent of MCUs used in automotive applications. Based in Taiwan, the company also has wholly owned subsidiaries in the US, Japan and China. It has invested some $40 million in US fabs over the past two years, in part to mitigate its own geo-political risks.

Research And Markets points to one factor that may curb future demand for discrete automotive MCUs. There's a tendency to move toward more centralized controller architectures that use high-performance systems-on-chip (SoCs) to tackle increased functional complexity. Many MCU functions may be implemented within these SoCs, which will also feature new memory architectures and growing AI capabilities. While MCU vendors seek to differentiate their products, OEMs are establishing closer ties with them to drive chip standardization and greater supply chain security.

EV component supply chains have improved significantly in the last year, and it looks like the trend will continue at least through 2024. Shortages loom for wide-bandgap power components and 32-bit MCUs. Predicting further out is tough, but an understanding of industry structures for both components and the raw materials can help component buyers navigate a path forward. Ecosystem partnership will become more critical as companies endeavour to meet market demand.

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Science, mystery and challenges of obsolescence management

Component obsolescence management is regaining attention in the electronics industry as more segments of the economy, including industrial equipment, digitalize their products. Distributors see opportunities to expand services and deepen engagement with OEMs

Some OEMs lose very little sleep over component obsolescence issues. Companies serving the consumer electronics market, especially, do not spend a lot of time wondering how to ensure replacement parts would still be available many years after their products hit retail stores. In fact, for smartphone OEMs which thrive on the introduction of new devices every six months, component obsolescence is a very distant concern.

The reverse is the case for automotive, aviation, medical and industrial equipment manufacturers. Products in this segment are often in use decades after leaving the production plant—as many as 30 to 40 or more years—and ensuring there is an extended supply chain capable of assuring adequate cost-efficient maintenance is always high on the OEMs' to-do list. Customers always ask about long-term service, maintenance, and availability of parts decades into the future and OEMs must be prepared to answer these questions, according to industry observers.

"Manufacturers of highly advanced, complex equipment—such as aerospace and defense (A&D) companies or heavy-equipment OEMs—face a recurring challenge," said analysts at McKinsey & Co., in a research report. "Their products have extremely long lifecycles of 30 years or more, during which they need to provide legacy-parts support."

The problem has become even more complicated. In recent years, the number and variety of semiconductors used in heavy industrial equipment have grown exponentially. The infusion of electronics into equipment that previously used basic mechanical and hydraulic systems has forced new obsolescence challenges upon the manufacturers. The old sourcing problems have not gone away either even as semiconductors, which typically have shorter lifespans, are getting added into industrial equipment.

"The internal components for [industrial] systems, including semiconductors, electronic boards, and mechanical parts, have much shorter life cycles, in some cases less than five years," the McKinsey analyst group of Hugo Del Campo, Giuletta Poltronieri, Alessandro Simoncini, Alfredo Vaghi and Simone Vesco, said in the report, which focused primarily on the aerospace and defense industries. "Because of this disparity, components can become harder to source over time and even grow obsolete as suppliers struggle to source the raw materials or stop manufacturing them altogether."

Distribution partnership for obsolescence management

This is one area where electronics component distributors have shown exceptional support in the industry. Distributors have learned over the years to anticipate and support the long-term component requirements of OEMs that serve markets with lengthy product lifecycles. Mouser Electronics, for example, has an active obsolescence support program that starts during the design stage and continues through the product lifecycle. The company said it handles obsolescence management in various ways, including by providing lifecycle information on thousands of components on its website. It also provides end-of-life (obsolete lifecycle) notices and regularly sends product change notification (PCN) notices to customers who "have purchased a part in the last two years, or has the part saved into a project."

> **"Customers continued to adopt the latest in high-value precision technologies, many of which include autonomous capabilities"**

John May, chairman and CEO, **John Deere**

Companies like Arrow Electronics owned Silicon Expert also offer dedicated obsolescence management strategy services where they assist OEMs in assessing their exposure and develop plans for tackling identified challenges. Silicon Expert also helps companies identify alternatives to obsolescent products in addition to offering pricing information on "last time buy" programs aimed at reducing the impact of obsolescence challenges. "The most common methods of the past for managing electronic components have entailed very manual or reactive processes that lead to chaos, human error, long lead times and excessive costs to the organisation," the company said, in a statement on its site. "The key to sustained profitability for effective and efficient obsolescence management is foresight and strategic process flow."

The semiconductor shortages that hurt automotive OEMs and other segments of the electronics industry in 2021 and 2022 caught many companies by surprise. In response, manufacturers turned to electronics components distributors for support and assistance navigating through the shortages. This pattern has played out for years with regards to obsolescence management, according to observers. All the leading distributors have extensive obsolescence management programs and work closely with OEM customers

and electronics manufacturing services (EMS) providers to identify potential problem areas and develop plans for averting supply challenges, they said.

Distributors have identified other tools that can help reduce or eliminate problems related to component obsolescence. In addition to flagging end-of-life notices, they offer second-sourcing information for products that may need replacement and leverage their bill-of-materials (BOM) management tools to keep customers updated on developments that could spark obsolescence problems. None of these tools is more important than having a good relationship with the components manufacturers, however, according to distribution industry sources. A close and enduring relationship with suppliers is a prerequisite for effective obsolescence management, analysts said.

Curbing obsolescence management cost

OEMs can be shocked by the ticker price of an inefficient obsolescence management program. When an OEM is forced to continue supporting specific equipment—for example, a leased, decades-old aircraft—the biggest expenses manufacturers often face are related to non-recurring redesign and engineering charges. When components are no longer being produced by the original supplier, the OEM could be compelled to redesign key parts of the equipment. The cost of doing this is typically higher and could run into multiples of the original charge, according to observers. In the case of the military market, for example, McKinsey analysts estimate non-recurring costs "in the range of $50 billion to $70 billion" adding, "the problem of non-recurring engineering costs is growing worse as technology cycles accelerate and supply chains become more interconnected."

Some distributors have stepped up with solutions that are more competitive, and which may, in some cases, eliminate the need for a product redesign. Rochester Electronics, for instance, offers a range of services that go beyond traditional component stocking. The company signs agreements with semiconductor companies to continue making some of their products when the original vendor terminates regular production of the components. "Rochester can replicate the original device, avoiding lengthy [and] expensive system re-qualification, re-certification or re-design," the company said, in a statement. "The end product is a form, fit and functional replacement guaranteed to the original data sheet performance.

Even so, the cost to the OEM of ensuring effective use of the original equipment can still be significantly higher than for the prototype. To ensure it can provide the "authorized product replication" service, for example, Rochester may have to acquire and stock the required wafers. The company offers long-term wafer storage service to ensure it can match the effectiveness of the original components. Test and assembly services may add to the buyers' costs although these would still be lower than if the OEM had to work on a complete redesign or re-engineering of the devices. Companies that engage with Rochester on services like this include Thyssenkrupp Elevator. One example where the two worked together was on a component from NXP Semiconductor designed into Thyssenkrupp elevators. Once the supplier sent the end-of-life notice for its NXP P80C592 single-chip microcontroller, Rochester said it "became Thyssenkrupp's key ally for a resolution." The distributor used the "original design and test data transferred from NXP," to replicate the chip, it said. "This allowed us to continue to support our customers without going through expensive and time-consuming redesign," said a Thyssenkrupp executive quoted by Rochester, in its report.

Even economic segments like the farming market have not been spared. Take the experience of John Deere & Company, a US-based vendor of agricultural machines, heavy equipment, diesel engines and forestry machinery. The company's products have undergone significant transformation in recent years as John Deere embraced electronics and automation. It has products that run on alternative energy and others that operate on a 24-hour basis without any direct manual control. Moving beyond the simple farming functions, John Deere said it has added what it called precision technology in the form of artificial intelligence into its equipment, a move that requires the inclusion of more semiconductors in each equipment. The objective, the company said in a statement on its web site, is to "deliver intelligent, connected machines and applications that will revolutionize production systems in agriculture and construction to unlock economic values across the lifecycle in ways that are sustainable for all." John Deere's customers have embraced technologies to improve productivity, the company said.

"Customers continued to adopt the latest in high-value precision technologies, many of which include autonomous capabilities," said John May, chairman and CEO of John Deere, in the company's annual filing with the U.S. Securities and Exchange Commission. "Deere is unleashing technological breakthroughs, transforming the industries we serve and bringing value to our customers that would have been scarcely imaginable not long ago." Like other industrial equipment manufacturers that have embraced innovations coming from the technology market, Deere too faced severe "supply-chain pressures and higher material costs," in its latest fiscal year. "Over the course of the year, many Deere factories experienced slowdowns or disruptions due to parts or component shortages," CEO May said.

Actions like this will become even more necessary in the future as electronics penetrate deeper into industrial equipment, according to analysts. While the main OEM equipment could last decades before being scrapped, the electronics in them would require constant updates. For hardware, this process may occur as frequently as every 5 years, but it may be much shorter for software upgrades. The McKinsey team identified 3 steps they suggest OEMs activate to manage obsolescence challenges. These are:

Step 1: Identify alternate suppliers for the component. The first step is to identify any potential alternate suppliers for a given component that faces obsolescence. This is the most attractive solution, as it avoids virtually all new engineering costs.

Step 2: Identify alternative components that can be modified. The second step is to find a similar component in the market—one that is close in fit, form, and function (FFF) to the component becoming obsolete—and then modify it as needed. This step allows companies to minimize nonrecurring engineering costs and avoid a full redesign.

Step 3: Redesign the component. The third option, if no exact or FFF replacements are available, is to redesign a new component while minimizing costs and reducing any disruption to the existing system design.

In the end, obsolescence management requires a multi-disciplinary approach. To succeed, companies must work together early in the product design process with suppliers and supply chain partners, including distributors, to identify potential challenges ahead and develop a plan for resolving these. Obsolescence management also requires a champion within the OEM organization. The individual must be able to influence, monitor and ensure decisions taken during the design phase are executed to help the organization avoid unpleasant surprises in the product lifecycle, according to Mckinsey.

"Designating 'obsolescence champions' in the organization can ensure that OEMs formally allocate responsibility for this issue to a single individual (or team) who can directly engage with suppliers to anticipate supply chain disruptions," they said. "OEMs of advanced industrial products should factor component obsolescence into the design of new offerings by identifying and addressing root causes in cooperation with engineering units, suppliers, and other stakeholders."

Visualising the connector supply chain

In this Q&A article, PEI-Genesis' Senior Buyer and Expedite Team Lead, Sally-Anne Giles and Senior Buyer Kyle Bennett walk readers through trends in connector purchasing, plus tools the company uses to support customers

From a purchaser's perspective, how has the circular connector sector advanced over recent years?

One trend we noticed is customers looking for more sustainable and eco-friendly connector solutions, so we have worked with many suppliers to bring RoHS and REACH compliant solutions to market. Over coming years, we expect purchasing of standard cadmium olive drab components for military solutions will start to decrease as demand for VG–J plating, RoHS and REACH compliant tin zinc nickel increases.

With prioritisation of smaller, lighter and faster circular connectors, purchasing has become more dynamic, leading to a closer working relationship with manufacturers to provide application specific connectors based on military standards. Examples are the many 38999 derivatives we now have available.

Has PEI identified changes in general buying habits or specific industrial market sectors?

The new post-pandemic normal, coupled with climate and social challenges, have seen unprecedented cost increases and lead time escalations. This has changed the way we purchase for almost every market. As a value-add distributor we must ensure we have the right stock in place, at the right time. Circular connectors are often the last component an engineer thinks of, requiring a fast turnaround. Where possible, we have taken advantage of scheduling deliveries and/or increasing stock holding on top-moving lines. This lets us provide a solution well under standard lead times.

What are potential mistakes buyers make when purchasing connectors?

In the markets we serve, technologies are rapidly changing presenting a potential risk when purchasing components that may no longer be required. Differentiating between system generated demand and true demand is a fine balancing act.

Believing that history repeats itself could cause loss of visibility on current and future market demand. Enabling true demand through strategic partnerships will guide PEI to stay relevant. This is especially important when introducing new products to market.

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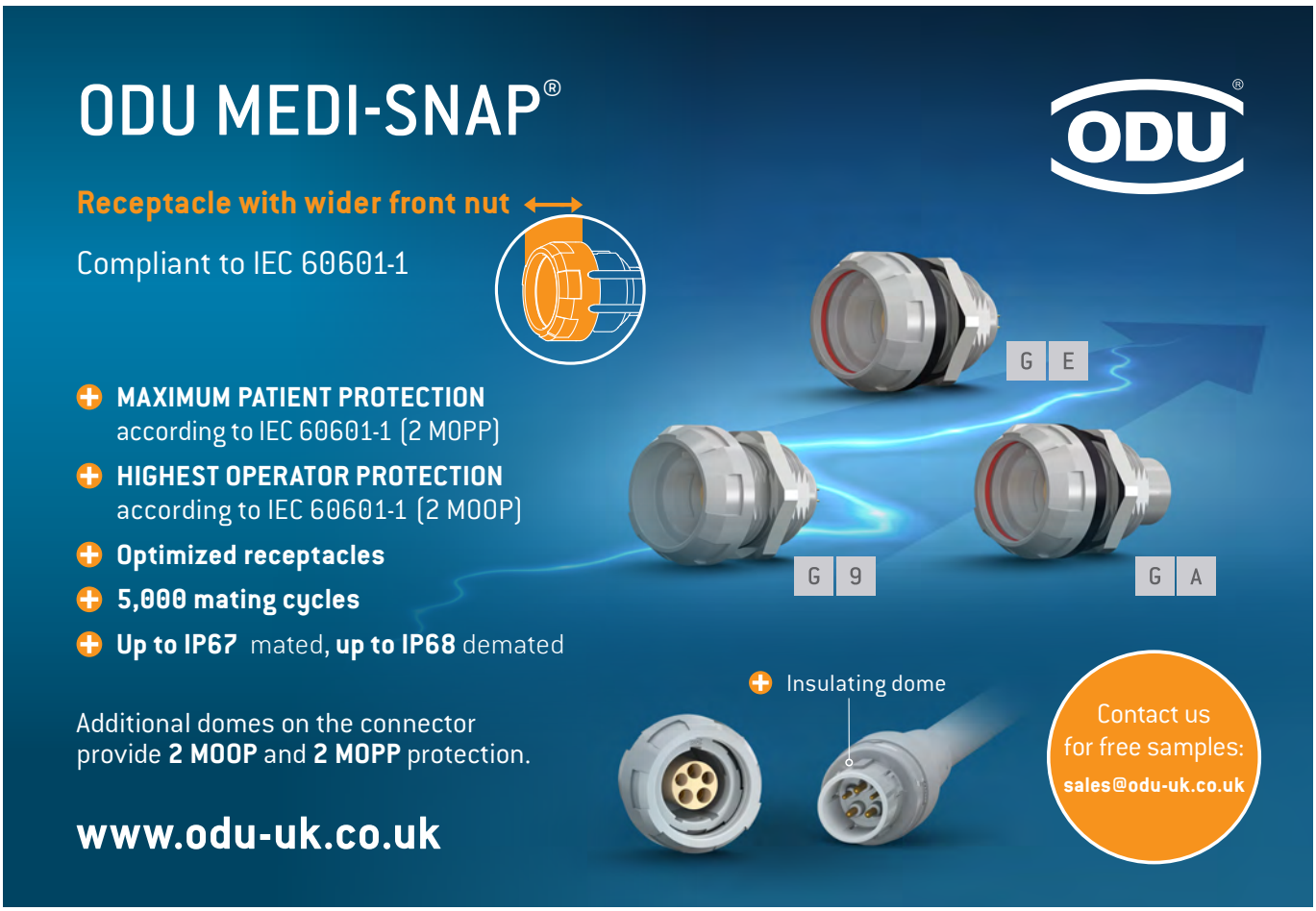
Has PEI introduced new tools or services to make connector selection or buying easier?

As industry "Trusted Advisors" we offer customers solutions guides, cookbooks, engineer driven technical support and datasheets via our website, blogs, videos, and much more to assist with the decision making process and buying journey. Customers are also able to search part numbers, alternatives, accessories and tools on our website, add to cart and easily checkout. We are guided by our core iCARE values of Innovation and Integrity; Continuous Measurable Improvement; A Team Approach; Respect; and Excellence to Others. Internally, purchasing work closely with business analysts to discover innovative tools to review and manage inventory levels. These tools are embedded in PEI and enable pro-active visualisation and decision making on inventory and NPI. This constant evaluation ensures that the customer stays top-of-mind and that they have access to all the information required to make connector selection an buying easier.

Customers can partner with PEI-Genesis and be confident that we will be much more to them than a typical distributor. We will work with them to understand their needs, their challenges and their operational context so that we can better serve them and exceed their expectations.

www.peigenesis.com



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Improving the **Purchasing Process** with **DigiKey's myLists**

by **David Stein,** vice president, semiconductors at **DigiKey**

DigiKey is making it easier than ever for sourcing and procurement professionals to purchase the products they need with our single list management and parts solution, myLists. We've taken the best, most useful capabilities from previous iterations of the tool, while also adding new features, controls and product information, to make myLists a one-stop resource.

A Customizable Solution

One of the most, or maybe the most, useful aspects of myLists is that it's completely customizable. These features include:

- **Custom Views and Filters** – myLists allows users to control many variables, including what information they want to see as products are added or deleted to their bill of materials (BOM). Plus, with one click, users can narrow down what they're looking for – whether that's resistors, microcontrollers or integrated circuits.
- **Real Time Collaboration** – Lists, or BOMs, can not only be saved and referenced for future use, but teams and personnel within organizations can collaborate within the same list without needing to download or export files, ensuring everyone is working from the most up-to-date version. Then once ready, lists can be downloaded and customized in a user's preferred file format (e.g. XLSX, CVS, TAB).

Streamlining the Purchasing Process

myLists makes it easy to create a product list, access part information, generate a quote, check the status of materials and more. Specific features include:

- **Substitution Recommendations** – myLists is able to recommend alternatives if a product is unavailable, soon to be obsolete or has a long lead time.
- **Easily Track Products and Details** – myLists offers a high level of detail on parts and products. Users can access information on country of origin, manufacturer quantities available, the status of raw materials, product lead times and more.
- **Ability to Generate Quotes** – Users can generate and reference quotes, locking in pricing for 30 days.
- **Obsolescence Checks** – Users can run through their active parts list and search for obsolete components on their BOM. At the same time, myLists can offer up alternative solutions.

Now is the Time to be Proactive

While most electronic components and automation products are currently plentiful, it's a good time to think ahead and identify alternative parts through myLists rather than wait until it's crunch time or there's another supply chain issue. At DigiKey, we recommend reviewing BOMs every six months to a year.

DigiKey as a Strategic Partner

DigiKey works directly with suppliers to gain insights into where they're planning to make changes, when they plan to introduce new products and what products may be discontinued. Engineers should be designing in the newest and most popular products and working alongside DigiKey will assist you in this effort.

DigiKey is continuously perfecting myLists by gathering supplier and customer feedback as well as listening to DigiKey's internal experts, ensuring myLists is the most holistic tool on the market. For more information on how DigiKey and myLists can improve your sourcing and procurement process, visit *www.digikey.co.uk/en/mylists*

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Expanding gasket range

EMKA is expanding its range of extruded gaskets. Applications include: cabinets and enclosures; commercial and specialist vehicles; and street furniture. Products include self-adhesive, clip-on, channel fixing and window types. Material options include EPDM, NBR, CR, PVC and silicone, as well as versions with EMC coating. Increasing requirements for compression locks and up to IP65 sealing are driving the development of these sections.

Profiles in neoprene, EPDM, PVC, black nitrile and natural rubber cover traditional expanded closed cell (self-adhesive) foam, through blade and bubble or P type sections, to more complex multi-functional and custom designs.

Profiles include wiping designs, fillers and flocked weather strips and supported sections with internal or flange structural support. Specialist considerations regarding shore hardness, tensile strength, recoil elasticity, abrasion resistance and climatic/chemical resistance can also be advised on and allowed for in custom production.

www.emka.com

More arm options

Rolec has added more components to its taraSMART range of modular suspension arms. Users can now configure arms from a choice of 22 components.

The arms support displays, panel PCs and HMI enclosures up to 45kg. Applications include smart factory automation, modern machine control systems, robotics, process automation, medical/laboratory technology and information stations.

There is a choice of round (48 and 70mm dia) or rectangular (40 by 60mm) profiles. Both offer space for cables and HDMI, DVI and USB connectors.

The range now features: four couplings and two adapters (VESA and Siemens); five joints, two elbows and a base; eight support profiles in lengths of 250, 500, 750 and 1,000mm (four round and four rectangular cross section). The round profiles suit enclosures from Siemens, Beckhoff and B&R. Set screws enable adjustment.

The extruded aluminium support profiles are silver anodised while all the diecast elements are powder coated in light grey (RAL 7035).

www.rolec-enclosures.co.uk

Time to sample IoT enclosures

BEC Distribution has announced availability of CamdenBoss' Hex-Box enclosures. UK manufactured, they suit IoT applications. The enclosures are designed to be user-friendly, offering rapid, flexible configuration and easy customisation. Free samples are available.

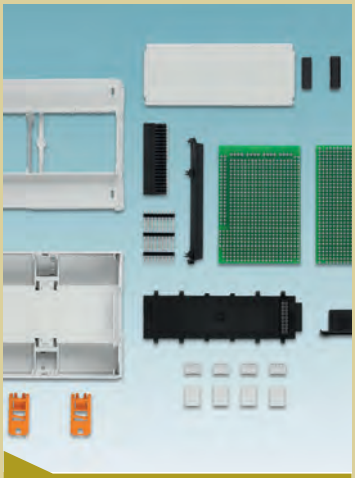
These enclosures are moulded from ABS UL94-V0 material, are 100 per cent recyclable and flame retardant to UL94-V0.

Three colours are white, grey and black. Mounting holes in the lid and base allow PCB attachment. A 25mm knock-out is provided on the wall mount bracket. Dimensions are 146 by 130 by 45mm and Hex-Box can accommodate PCBs up to 122.5mm. The PCB can be mounted in the base or lid.

The rugged enclosures conform to IK07 and can sit on desktops or be attached to walls using mounting brackets. Six self-retaining end panels are offered in closed or vented style, providing many different cable management options.

The lid is secured using three concealed screws to maintain the looks.

www.bec.co.uk



Protecting PCBs

Phoenix Contact's housing kits are designed to make it easier to select the entire housing for rapid prototyping. Both for mechanical mounting on a DIN rail in accordance with DIN EN 60715 and outside the control cabinet, the tailored housing system provides a solid base, plus integrable components for the interfaces.

To accommodate an electronic circuit board—including the corresponding connection technology—the kits contain all the components needed to assemble a complete housing that is ready for immediate use. In industrial electronics environments, this allows fast and cost-effective implementation of individual devices and test setups in volumes up to small series.

www.phoenixcontact.com

Shunt resistors enable accurate current sensing

TT Electronics has announced its EBW5216 series of shunt resistors for high current measurements in the hundreds of amps range. With a wide temperature range from –65 to 170°C and AEC-Q200 qualification, the series suits applications including welding power supplies, motor drives, battery management, energy metering and process control.

The component is an electron-beam welded resistance element sandwiched between large copper terminals with tin plating. The series offers values of 50 and 100μΩ at down to one per cent tolerance, 150ppm/°C TCR (measurement), 20ppm/°C TCR (alloy) and <1μV/°C thermal EMF. The ultra-low ohmic values reduce power loss and its low self-heating reduces equipment temperature and improves reliability.

TT Electronics' senior product line manager, Nick Atkinson, said: "The electron-beam welded shunt EBW5216 with its four-terminal contacts is the latest addition to TT's growing portfolio of current sense resistors with AEC-Q200 approval. Its low measurement error frees up the designer's error budget—and its compact footprint enables our customers to achieve accurate and surge-proof current measurement in busbar-connected assemblies."

www.ttelectronics.com

Low resistance relay suits chargers and PV-powered homes

Omron has expanded its high-power switching capability with a low contact resistance model for its two-pole contact type G7L-2A-X series relays. With a 6.0mm contact gap, the new relay provides low contact resistance of maximum 10mΩ and a rated load of 30A at 600V DC or 25A at 1,000V DC.

The series conforms to UK and IEC solar inverter standards, plus applicable UL and VDE electrical standards.

Features include an assisting magnetism circuit, to help achieve quick switchover. The relay contacts have been designed to handle high DC loads, a feature of these applications. Contact form is two-pole DPST, with its 6.0mm contact gap offering improved safety.

Driven by trends for higher capacity and increasing heat generation issues, the series offers reduced vehicle charging time and high capacity for residential energy storage systems and battery storage management.

The device is compact for a relay with this capacity, measuring 52.5 by 35.5 by 41.0mm.

www.omron.com/global/en

High performance interconnect offers three locking modes

ODU's AMC Series-T connectors are designed for military and security applications, offering three compatible plug locking options: push-pull, break-away and thread-lock. All fit to a common bulkhead or receptacle across the equipment.

The push-pull plug locks into the device with a ball-lock system. The break-away plug releases the connection with manual pull-force, allowing quick and easy disconnection in critical situations. The thread-lock suits applications dealing with vibration.

The series is designed to let emergency personnel quickly and easily clean the connectors and replace interfaces, even in the field under extreme conditions and stress, with mechanical and colour-coding preventing mis-mating.

The housings are waterproof up to IP6K9K being submersible to 20m for up to two hours.

The series meets the requirements of MIL-STD-38999, MIL-STD-1472 and MIL-STD-810, withstanding temperature extremes from -65 to 175°C and severe vibration. Standard 38999 crimps and back-shells suit this connector.

www.odu-connectors.com/uk

Rugged, durable display solutions

Review Display Systems has announced availability of a range of monochrome and colour e-paper displays from Holitech Technology Corporation.

Holitech e-paper displays operate in reflective mode, therefore in bright, ambient light environments the display image will appear brighter with enhanced levels of colour saturation. The need for an LED backlight is eliminated, which also reduces power consumption when compared to transmissive TFT LCD displays.

The displays suit applications including battery-powered devices, handheld equipment, wearables, medical systems, retail pricing displays, IoT devices and more.

Ideal for low-power applications, e-paper displays use a bi-stable display technology where no power is required to maintain a display image. The image is retained when power is removed. E-paper displays only consume power when the image is changed.

Plastic-based e-paper displays can also provide a more rugged, durable display, while glass-based TFTs can be susceptible to extreme shock, vibration and physical impacts.

www.review-displays.com

Choosing the right aerospace assembly stations

In this article, Treston offers purchasing professionals a 10-point buyer's guide to sourcing assembly stations for use in aerospace manufacturing applications

1) Identify the specific tasks and processes to be performed at the workstation

Identifying the tasks and processes to be performed at the workstation will help determine the workstation's size and layout, plus any specialised equipment or tools required. For example, if the task involves assembling small and delicate components, a workstation with a magnifying glass and tool holder for fine-tipped tools may be necessary.

2) Consider materials and components to be assembled

The materials and components to be assembled play a significant role in determining the type of workstation required. It should be designed to accommodate the size, weight and fragility of the materials and components, plus special handling requirements. For example, if the components are sensitive to electrostatic discharge, the workstation should be ESD protected.

3) Workstation layout

Available space should be evaluated to determine the workstation's size and layout. Additionally, any additional equipment or accessories should be considered, such as shelving, lighting or electrical outlets.

4) Determine flexibility requirements

Will the workstation be used for single or multiple processes? Will it need to be reconfigured for different tasks?

The flexibility required depends on the nature of the tasks and processes to be performed. If the workstation will be used for multiple processes or tasks, it should be designed with flexibility in mind, such as easily adjustable work surfaces or reconfigurable storage systems.

5) Consider ergonomics

The workstation's ergonomics is an important consideration. It should be designed to minimise physical strain and discomfort for workers and adjustable to accommodate different heights and body types. This can help reduce the risk of injury and increase productivity.

6) Ensure workstations meet safety requirements and regulations

Assembly workstations should meet all safety requirements and regulations, including features such as ventilation, electrical grounding and fire protection. Failure to comply with safety regulations can result in significant risks to workers and damage to equipment.

7) Choose a durable workstation to withstand harsh conditions

The harsh conditions of an aerospace environment require a workstation manufactured from durable materials and constructed to withstand wear and tear. This helps ensure workstations remain functional and safe over the long term, reducing the risk of costly downtime and repairs.

8) Ensure workstations can be easily cleaned and maintained

Cleanliness and maintenance are crucial in aerospace manufacturing environments and workstations should be designed for easy cleaning and

maintenance. This can help prevent contamination and keep the environment safe for workers and equipment.

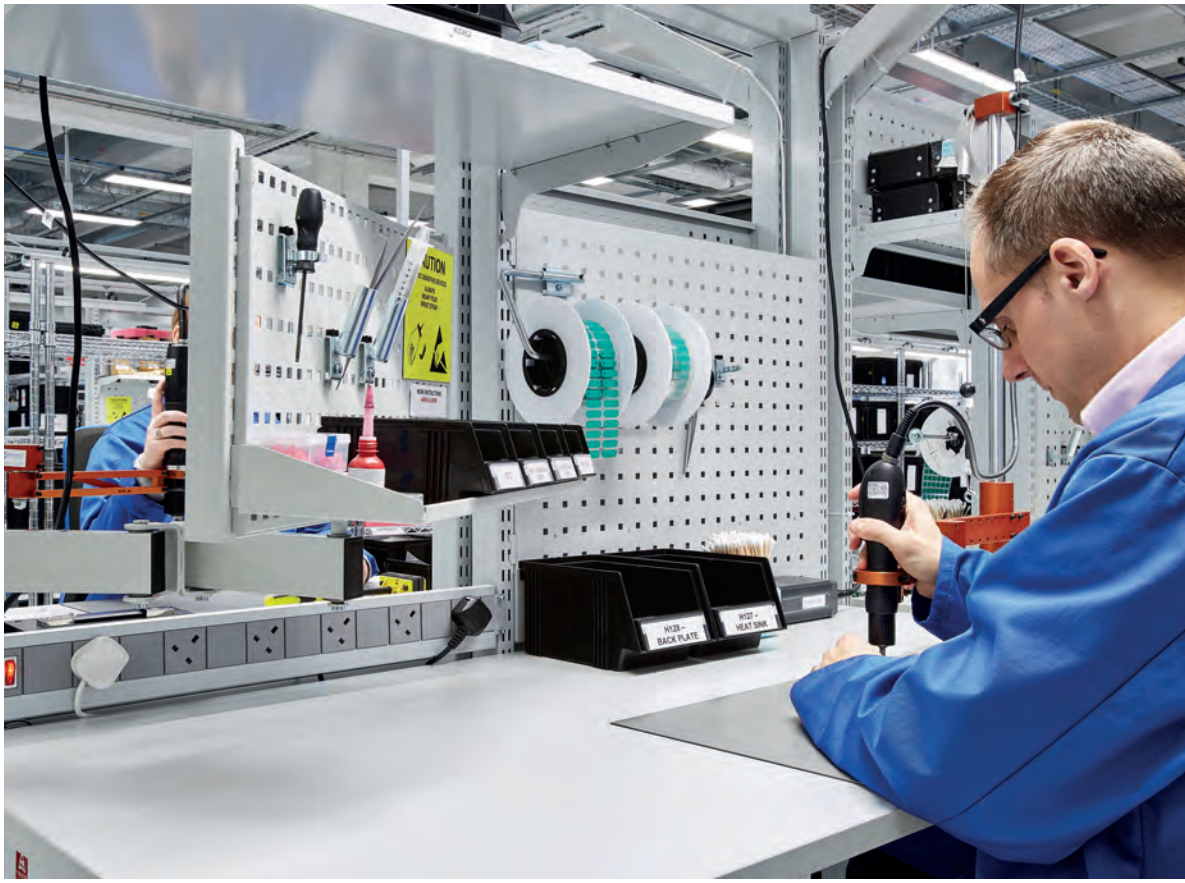
9) Future proofing

Ensuring workstations are futureproofed is crucial to avoid the need for frequent upgrades or replacements. By investing in a workstation that can adapt to evolving technologies and industry requirements can save costs and maintain productivity in the long run.

10) Why does the supplier matter?

Choosing a supplier who is sustainably responsible and cares about the environment is essential to align with the manufacturer's values and contributes to a greener future. It demonstrates corporate social responsibility and helps minimise the environmental impact of operations.

www.treston.com



Connector handle offers ergonomic benefits

ODU-MAC spindle locking is designed to offer easy ergonomic handling. Connection is made using a low effort rotary movement. The product is available in a variety of plastic and metal housings for the ODU-MAC Blue-Line and White-Line series.

In addition to its functionality, its aesthetics are improved, helping maintain the overall appearance and style of equipment. Regarding longevity the product offers at least 10,000 locking cycles. Further extending the service life, the spindle can be replaced in a few simple steps. If several identical connectors are used, optional coding is available.

When several connectors are required, such as in control cabinet applications, there is an added advantage of reduced space-envelope as less room is required around the connector for lever-locking.

www.odu-connectors.com/uk

Satellite locked temperature stability

RFX Group has redesigned its PT560-10-GPS surface mount OCXO range which now features a long term satellite locked temperature stability combined with a 20 per cent reduction in footprint and height.

Operating at 10MHz, the new design offers a GPS locked long term temperature stability of ±0.001ppb or reverts to ±20ppb over –40 to 70°C if unlocked. Delivering a 7dBm Sinewave output from 5VDC supply, load change performance has also improved from ±10ppb down to ±5ppb based on a 10 per cent load change whilst the new package now measures 24.2 by 22.5mm with a height of 9.1mm.

The PT560 meets vibration, mechanical and thermal shock to MIL 202F and is RoHS compliant. The design's flexible nature means that specification variations conforming to almost any application can be developed to meet individual customer requirements. This includes variants compliant with international Stratum 3/3E (per GR1244) standards.

www.rfx.co.uk

Reliable transmission of critical signals

Intelliconnect's Pisces connector range includes types including SAM, N, TNC and BNC, plus customisation options. They are available in configurations such as straight, right-angle and bulkhead and may be supplied pre-wired.

A key feature is environmental sealing. They are designed to meet or exceed IP68 and can withstand exposure to extreme temperatures, shock and vibration. Applications include defence, medical, industrial and oil/gas exploration.

Intelliconnect's sales and marketing director, Steve Groves, said: "Our Pisces connectors offer a high-quality, reliable and customisable connectivity solution for applications which require rugged, waterproof, high performance and excellent environmental sealing."

ABMS is a special subminiature connector interface originally designed for cochlear implants. This series is based on MCX but with enhanced ruggedisation enabling 3,000 mating cycles. TNC has a portfolio of plugs, jacks, adaptors and cable assemblies. Because of its size, ruggedness and relative low cost it is a popular style. N Type is ultra rugged and available as plugs, jacks, adaptors and cable assemblies. SMA waterproof is a subminiature connector series offering small size and 18Ghz plus operating capacity.

www.intelliconnect.co.uk

Realising Raspberry Pi potential

Inelco Hunter has announced a rugged, industrial-grade steel case for its 10.1in PCAP Touch Screen Kit, developed to work with the Raspberry Pi. This cost-effective, pre-assembled display kit, with new steel enclosure, realises the potential of the Raspberry Pi, turning it into a complete industrial system with minimal effort.

Applications include factory automation, medical devices, home technology, IoT products, communication systems and payment terminals.

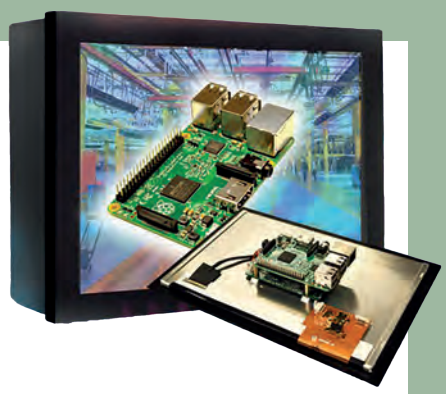
The kit comes pre-assembled to take the Raspberry Pi which is mounted onto the rear of the interface PCB using the supplied pillars and screws. The display provides a resolution up to WXGA.

Connection is via an onboard HDMI interface PCB which provides all power, signal and backlight conversion for the TFT display.

The kit requires 12V at 2A to drive the TFT display, touch panel and backlight, plus 5V at 2A to power the Pi.

Features include a multi-touch input PCAP touch screen, which can be either USB or I2C connected, a wide angle of view IPS display and a resolution of 1,280 by 800 pixels.

www.inelcohunter.co.uk



Manufacturer	Distributor	Telephone	Website	Franchised Distributor	No. of Lines for Principal	Stock Value for Principal	Minimum Order Value	% Lead Free for Principal Range	No. of Technical Support Staff	Total No. of Staff	Buffer Stock Facility
CABLE ASSEMBLY & HARNESSING											
Amphenol	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	3,000	N/A	0 €	N/A	50	2,500+	Y
FTDI	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	50	N/A	0 €	N/A	50	2,500+	Y
Harwin	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	600	N/A	0 €	N/A	50	2,500+	Y
Molex	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,550	N/A	0 €	N/A	50	2,500+	Y
Phoenix Contact	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,200	N/A	0 €	N/A	50	2,500+	Y
CIRCUIT PROTECTION											
Bourns	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,800	N/A	0 €	N/A	50	2,500+	Y
EPCOS/TDK	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,950	N/A	0 €	N/A	50	2,500+	Y
Littelfuse	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	11,450	N/A	0 €	N/A	50	2,500+	Y
Vishay	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	3,150	N/A	0 €	N/A	50	2,500+	Y
DISPLAYS											
Midas Displays		01493 602602	www.midasdisplays.com	N	3,300	N/A	£0	100%	10	17+	Y
ENCLOSURES											
Bud Industries	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,600	N/A	0 €	N/A	50	2,500+	Y
CamdenBoss	CamdenBoss	01638-716101	www.camdenboss.com	N	1,199	N/A	£0	N/A	10	106	Y
Hammond	Switch Electronics	01482-862255	switchelectronics.co.uk	Y	500	N/A	£0	70%	2	6	Y
Hammond	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	3,350	N/A	0 €	N/A	50	2,500+	Y
Metcase Enclosures	OKW Enclosures	01489-583858	www.metcase.co.uk	N	288	£40,000	£0	N/A	5	22	Y
New Age Enclosures	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	150	N/A	0 €	N/A	50	2,500+	Y
OKW Enclosures Ltd	OKW Enclosures	01489 583858	www.okw.co.uk	N	1,955	£40,000	£0	N/A	5	22	Y
Phoenix Mecano Ltd	BOPLA Enclosures & Accessories	01296 611660	www.bopla-enclosures.co.uk	Y	150	N/A	£0	N/A	3	2,000+	Y
Rolec Enclosures	OKW Enclosures	01489 583858	www.rolec-enclosures.co.uk	Y	935	£40,000	£0	N/A	5	22	Y
Teko Enclosures	OKW Enclosures	01489 583858	www.teko.co.uk	Y	1,860	£40,000	£0	N/A	5	22	Y
FREQUENCY MANAGEMENT											
ABRACON	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,750	N/A	0 €	N/A	50	2,500+	Y
Analog Devices Inc.	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	150	N/A	0 €	N/A	50	2,500+	Y

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ECS	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,050	N/A	0 €	N/A	50	2,500+	Y
Epson	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	900	N/A	0 €	N/A	50	2,500+	Y
Golledge Electronics Ltd	Golledge Electronics Ltd	01460 256 100	www.golledge.com	N	N/A	£800,000	£0	100%	12	24	Y
IQD Frequency Products	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,500	N/A	0 €	N/A	50	2,500+	Y
Jauch Quartz	Digi-Key Electronics	0800 587 0991	www.digikey.co.uk	Y	500	£250,000	0	100%	15	130	Y
Kyocera	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	950	N/A	0 €	N/A	50	2,500+	Y
Microchip	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,450	N/A	0 €	N/A	50	2,500+	Y
Murata	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	550	N/A	0 €	N/A	50	2,500+	Y
Silicon Laboratories	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	500	N/A	0 €	N/A	50	2,500+	Y
TXC Corporation	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	500	N/A	0 €	N/A	50	2,500+	Y
HEATSINKS											
Aavid	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	200	N/A	0 €	N/A	50	2,500+	Y
ICs & SEMICONDUCTORS											
Alliance Memory	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	500	N/A	0 €	N/A	50	2,500+	Y
Analog Devices Inc	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	18,700	N/A	0 €	N/A	50	2,500+	Y
Broadcom Limited	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	200	N/A	0 €	N/A	50	2,500+	Y
Central Semiconductor	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,250	N/A	0 €	N/A	50	2,500+	Y
Cirrus Logic	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	200	N/A	0 €	N/A	50	2,500+	Y
Cree, Inc	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	200	N/A	0 €	N/A	50	2,500+	Y
Diodes Incorporated	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	8,200	N/A	0 €	N/A	50	2,500+	Y
FTDI	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	100	N/A	0 €	N/A	50	2,500+	Y
Infineon	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	8,300	N/A	0 €	N/A	50	2,500+	Y
Intel	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,750	N/A	0 €	N/A	50	2,500+	Y
Maxim Integrated	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	14,050	N/A	0 €	N/A	50	2,500+	Y
Microchip	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	24,200	N/A	0 €	N/A	50	2,500+	Y
Micron Technology	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	600	N/A	0 €	N/A	50	2,500+	Y
Monolithic Power Systems (MPS)	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	850	N/A	0 €	N/A	50	2,500+	Y
Nexperia	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	7,600	N/A	0 €	N/A	50	2,500+	Y
Nordic Semiconductor	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	60	N/A	0 €	N/A	50	2,500+	Y
NXP	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	4,700	N/A	0 €	N/A	50	2,500+	Y
ON Semiconductor	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	18,700	N/A	0 €	N/A	50	2,500+	Y
Power Integrations	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	750	N/A	0 €	N/A	50	2,500+	Y
Qorvo	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	700	N/A	0 €	N/A	50	2,500+	Y
Renesas Electronics	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	5,550	N/A	0 €	N/A	50	2,500+	Y
ROHM Semiconductor	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	6,900	N/A	0 €	N/A	50	2,500+	Y
Semtech	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	350	N/A	0 €	N/A	50	2,500+	Y
Silicon Laboratories	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,200	N/A	0 €	N/A	50	2,500+	Y
Skyworks	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	550	N/A	0 €	N/A	50	2,500+	Y
STMicroelectronics	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	10,050	N/A	0 €	N/A	50	2,500+	Y
Texas Instruments	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	39,050	N/A	0 €	N/A	50	2,500+	Y
Toshiba	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,050	N/A	0 €	N/A	50	2,500+	Y
Vishay	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	10,850	N/A	0 €	N/A	50	2,500+	Y
Xilinx	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,900	N/A	0 €	N/A	50	2,500+	Y
INTERCONNECTION											
3M	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,750	N/A	0 €	N/A	50	2,500+	Y
Amphenol	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	33,200	N/A	0 €	N/A	50	2,500+	Y
Cinch Connectivity Solutions	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	4,250	N/A	0 €	N/A	50	2,500+	Y
FCI / Amphenol	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	7,850	N/A	0 €	N/A	50	2,500+	Y
HARTING	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	6,800	N/A	0 €	N/A	50	2,500+	Y
Harwin	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,950	N/A	0 €	N/A	50	2,500+	Y
Hirose Electric	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	7,850	N/A	0 €	N/A	50	2,500+	Y
Intelliconnect (Europe) Ltd		01245 347145	www.intelliconnect.co.uk	N/A	N/A	N/A	N/A	100%	5	30	
JAE Electronics	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,450	N/A	0 €	N/A	50	2,500+	Y
Molex	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	23,600	N/A	0 €	N/A	50	2,500+	Y
Phoenix Contact	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	17,150	N/A	0 €	N/A	50	2,500+	Y
Radiall	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,350	N/A	0 €	N/A	50	2,500+	Y
Samtec	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	16,300	N/A	0 €	N/A	50	2,500+	Y
Souriau	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	3,300	N/A	0 €	N/A	50	2,500+	Y

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TE Connectivity	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	41,850	N/A	0 €	N/A	50	2,500+	Y
Wurth Elektronik	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,650	N/A	0 €	N/A	50	2,500+	Y
OBSOLESCENCE / HARD TO FIND											
Rochester Electronics	Rochester Electronics	+44.1480.408400	www.rocelec.com	Y	299	N/A	$250	N/A	10	400+	Y
OPTO ELECTRONICS											
Broadcom Limited	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,300	N/A	0 €	N/A	50	2,500+	Y
Cree, Inc.	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	3,800	N/A	0 €	N/A	50	2,500+	Y
Intel	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	20	N/A	0 €	N/A	50	2,500+	Y
Osram Opto Semiconductor	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,300	N/A	0 €	N/A	50	2,500+	Y
Toshiba	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	450	N/A	0 €	N/A	50	2,500+	Y
Vishay	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,350	N/A	0 €	N/A	50	2,500+	Y
PASSIVES											
AVX	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	17850	N/A	0 €	N/A	50	2,500+	Y
Bourns	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	15,100	N/A	0 €	N/A	50	2,500+	Y
Coilcraft	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	5,750	N/A	0 €	N/A	50	2,500+	Y
EPCOS / TDK	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	5,450	N/A	0 €	N/A	50	2,500+	Y
KEMET	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	23,650	N/A	0 €	N/A	50	2,500+	Y
Murata	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	18700	N/A	0 €	N/A	50	2,500+	Y
Ohmite	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	6,550	N/A	0 €	N/A	50	2,500+	Y
Panasonic	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	25,450	N/A	0 €	N/A	50	2,500+	Y
Taiyo Yuden	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	5,100	N/A	0 €	N/A	50	2,500+	Y
TDK	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	13,050	N/A	0 €	N/A	50	2,500+	Y
TE Connectivity	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	11,500	N/A	0 €	N/A	50	2,500+	Y
TT Electronics	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	5,050	N/A	0 €	N/A	50	2,500+	Y
Vishay	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	43850	N/A	0 €	N/A	50	2,500+	Y
Wurth Elektronik	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	6,750	N/A	0 €	N/A	50	2,500+	Y
Yageo	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	21,450	N/A	0 €	N/A	50	2,500+	Y
POWER & BATTERIES											
FRIWO Gerätebau GmbH	Haredata Electronics	01423 796240	www.haredata.co.uk	Y	250 - 500	€1M	£250	100%	7	14	Y
Jauch Quartz		01276 605900	www.jauch.com			£500,000	0	95	15	130	Y
Mean Well	Ecopac (UK) Power Ltd	01844 204420	www.ecopacpower.co.uk	Y	6,000	£2M	£0	100%	8	30	Y
Bel Power Solutions	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	600	N/A	0 €	N/A	50	2,500+	Y
CUI Inc	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,200	N/A	0 €	N/A	50	2,500+	Y
MEAN WELL	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	4,400	N/A	0 €	N/A	50	2,500+	Y
Murata	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1500	N/A	0 €	N/A	50	2,500+	Y
RECOM	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	3,150	N/A	0 €	N/A	50	2,500+	Y
TDK-Lambda	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,900	N/A	0 €	N/A	50	2,500+	Y
TRACO Power	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	4,000	N/A	0 €	N/A	50	2,500+	Y
Vicor	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,300	N/A	0 €	N/A	50	2,500+	Y
XP Power	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,200	N/A	0 €	N/A	50	2,500+	Y
SENSORS											
ams	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	150	N/A	0 €	N/A	50	2,500+	Y
Analog Devices Inc	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	300	N/A	0 €	N/A	50	2,500+	Y
Bosch	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	25	N/A	0 €	N/A	50	2,500+	Y
Honeywell	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,200	N/A	0 €	N/A	50	2,500+	Y
Maxim Integrated	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	350	N/A	0 €	N/A	50	2,500+	Y
NXP	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	300	N/A	0 €	N/A	50	2,500+	Y
Sensirion	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	80	N/A	0 €	N/A	50	2,500+	Y
STMicroelectronics	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	75	N/A	0 €	N/A	50	2,500+	Y
TE Connectivity	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	650	N/A	0 €	N/A	50	2,500+	Y
Texas Instruments	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	850	N/A	0 €	N/A	50	2,500+	Y
SWITCHES & KEYBOARDS											
Apem	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,850	N/A	0 €	N/A	50	2,500+	Y
C&K Switches	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	5,550	N/A	0 €	N/A	50	2,500+	Y
E-Switch	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	2,350	N/A	0 €	N/A	50	2,500+	Y
EAO	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,800	N/A	0 €	N/A	50	2,500+	Y
Honeywell	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	4,700	N/A	0 €	N/A	50	2,500+	Y

Manufacturer	Distributor	Telephone	Website	Franchised Distributor	No. of Lines for Principal	Stock Value for Principal	Minimum Order Value	% Lead Free for Principal Range	No. of Technical Support Staff	Total No. of Staff	Buffer Stock Facility
NKK Switches	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	4,000	N/A	0 €	N/A	50	2,500+	Y
Omron	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	4,700	N/A	0 €	N/A	50	2,500+	Y
Panasonic	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	550	N/A	0 €	N/A	50	2,500+	Y
TE Connectivity	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,350	N/A	0 €	N/A	50	2,500+	Y
TERMINAL BLOCKS											
CamdenBoss	CamdenBoss	01638-716101	www.camdenboss.com	N	930	N/A	£0	N/A	10	106	Y
Marathon Special Products	Global Supply Services	01904 436 488	www.global-supply-services.com	Y	8,000	£800,000	£100	100%	3	11	Y
Molex	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,850	N/A	0 €	N/A	50	2,500+	Y
Phoenix Contact	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	13,550	N/A	0 €	N/A	50	2,500+	Y
TE Connectivity	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,750	N/A	0 €	N/A	50	2,500+	Y
THERMAL MANAGEMENT											
Bergquist Company	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	250	N/A	0 €	N/A	50	2,500+	Y
Delta Electronics	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	700	N/A	0 €	N/A	50	2,500+	Y
ebm-papst	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,450	N/A	0 €	N/A	50	2,500+	Y
EMI Thermal	EMI Thermal	01992 510000	www.emithermal.com	N	800	N/A	£20	100%	12	200	Y
Multiple Manufacturers	Materials Direct	+44 (0)1908 222 211	www.materials-direct.com	N/A	N/A	£1,000,000+	£0	N/A	5	55	Y
Sanyo Denki	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,450	N/A	0 €	N/A	50	2,500+	Y
Sunon	G.English Electronics Ltd	0208 855 0991	www.gelec.co.uk	Y	3,500	£1,000,000+	£0	100%	10	28	Y
Sunon	Thermaco Ltd	01684 566163	www.thermaco.co.uk	Y	3,500	£450,000	£100	100%	7	15	Y
Universal Science	Universal Science	+44 (0)1908 222 211	www.universal-science.com	N/A	N/A	£1,000,000	£0	N/A	5	55	Y
TRANSFORMERS & INDUCTORS											
Best Windings	Best Windings	0044 (0)1394 448424	www.bestwindings.co.uk	N	300	N/A	£100	N/A	2	24	Y
Bourns	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	4,900	N/A	0 €	N/A	50	2,500+	Y
Coilcraft	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	5,500	N/A	0 €	N/A	50	2,500+	Y
EPCOS / TDK	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,300	N/A	0 €	N/A	50	2,500+	Y
Murata	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	6,900	N/A	0 €	N/A	50	2,500+	Y
TDK	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	4,050	N/A	0 €	N/A	50	2,500+	Y
Vishay	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	1,200	N/A	0 €	N/A	50	2,500+	Y
Wurth Elektronik	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	3,400	N/A	0 €	N/A	50	2,500+	Y
WIRELESS SOLUTIONS											
DIGI	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	200	N/A	0 €	N/A	50	2,500+	Y
Espressif	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	30	N/A	0 €	N/A	50	2,500+	Y
Laird Connectivity	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	100	N/A	0 €	N/A	50	2,500+	Y
Lantronix	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	25	N/A	0 €	N/A	50	2,500+	Y
Microchip	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	150	N/A	0 €	N/A	50	2,500+	Y
Murata	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	30	N/A	0 €	N/A	50	2,500+	Y
Silicon Laboratories	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	150	N/A	0 €	N/A	50	2,500+	Y
Texas Instruments	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	20	N/A	0 €	N/A	50	2,500+	Y
u-blox	Mouser Electronics	01494-427500	www.mouser.co.uk	Y	10	N/A	0 €	N/A	50	2,500+	Y

Contract Manufacturers Buyers' Guide

Manufacturer	Telephone	Website	Turnover	Location	Employees	Number of Surface Mount Lines	Approvals	BGA Capacity	Lead Free Manufacturer	Prototyping	Design Capability	Full Turnkey	Cables and Harnessing
Alan Anderson Manufacturing Ltd	+44 (0) 333 322 7222	www.aa-manufacturing.co.uk	£21m	Hertfordshire UK	40	2	ISO9001:2015 , IPC-A-610	Y	Y	Y	Y	Y	Y
Challenger Solutions Ltd	01245 325252	www.challengersolutions.com	£14m	Essex/SE	85	12	AS9100 Rev D, ISO9001:2015, ISO 140001:2015, UL , CCC, IPC-610-G Class 3, TUV	Y	Y	Y	Y	Y	Y
CML Innovative Technologies (uk) Ltd	01284 714700	www.cml-it.com	£12M	UK/EU/China	65		ISO9001, TS16949, UL ISO9001 2015, IATF 16949 2016	N	Y	Y	Y	Y	Y
Corintech Ltd	+44 (0)1425 655655	www.corintech.com	£16.9m	UK & Far East	80	6	AS9100, ISO9001, IPC-A-610 Class 3, J-STD-001	Y	Y	Y	Y	Y	Y
Custom Interconnect Ltd	01264 321321	www.cil-uk.co.uk	£18.6m	Andover (Hampshire)	130	6	AS9100 ISO13485 ISO9001 IPC-A-610 Class 3	Y	Y	Y	Y	Y	Y
Electronic Technicians Ltd	01202 897722	www.etluk.co.uk	£3.7m	SE	50	2	AS9100, ISO9001, ISO14001, IPC610/620 Class 3	Y	Y	Y	Y	Y	Y
FermionX Ltd	+44(0)1903 524600	www.fermionx.com	£6.5m	Worthing, W. Sussex	56	3	ISO9001:2015, ISO4001:2015, IPC-A-610 Class 2& 3, IPC-J-STD-001	Y	Y	Y	Y	Y	Y
GSPK Design Ltd	01423 798254	www.gspkdesign.ltd.uk/	£1m	North Yorkshire, UK	12	2	ISO 13485:2016, ISO 9001:2015, GS ATEX 7422	Y	Y	Y	Y	Y	Y
Hallmark Electronics Ltd	01782 562255	www.hallmarkelectronics.com	£4.1m	Staffordshire	27	2	ISO9001:2015, IPC-A-610 to Class 3, UL	Y	Y	Y	Y	Y	Y
Incap Electronics UK Ltd	01782 753200	www.incapcorp.com	€169,8m	UK, Slovakia, Estonia & India	2,500	22	ISO9100, ISO14001, ISO13485, AS9100D, ISO45001 & IATF16949	Y	Y	Y	Y	Y	Y
Industrial Electonic Wiring Ltd	+44(0)1793 694033	www.iew.co.uk	£5.5m	Swindon, UK	60	N/A	ISO9001:2015, IPC610, IPC620	N	Y	Y	N	Y	Y
Jaltek	01582578170	jaltek.com	£15m	UK	105	3	AS9100, ISO9001, ISO13485, IPC-A-610 Class 3, Certified IPC Trainer (IPC-A-610, J-STD-001 & J-STD-001 Space Addendum)	Y	Y	Y	Y	Y	Y
Nano Electronic Services Ltd	01388 247152	www.nanoelectronicservices.com	£1M	County Durham	2	15	ISO13485, ISO9001:2015 & IPC610 to Class 3	Y	Y	Y	Y	Y	Y
Nemco Ltd	01438 346600	www.nemco.co.uk	£15.9m	SE	120	6	AS9100, ISO9001:2008, IPC610/620 to Class 3, ISO14001-2004, SC21	Y	Y	Y	Y	Y	Y
NOTE Group	01753 746700	www.note-uk.co.uk	£207m	UK/EU/China	1,200	20	IPC610 to Class 3, ISO9001:2015, 13485, 14001, 18001	Y	Y	Y	Y	Y	Y
M-TEK (Assembly) Ltd	01189 455377	www.mtek.co.uk	£2.4m	SE	30	4	IS9001,ISO14001, IPC-A-610 Class 3, IPC-7711/7721, WHMA-3620, Certified IPC Trainer	Y	Y	Y	Y	Y	Y
Pektron	01332 832424	www.pektron.com	£50m	E-Midlands	350	8	ISO9001, ISO14001, TS16949, BEAB, VCA, TUV, UL	Y	Y	Y	Y	Y	Y
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	£18m	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 (i.e Broker, Manufacture &/or Repair)	Location	Approvals	Volume - Small, Medium, Large	Double-sided	Multi-layer 4-10/10-20-20-30	Metal PCBs	Ceramic PCBs	Heavy Copper PCBs	Flexi / Flexi-Rigid	Obsolescence Solutions	Modifications	Prototyping
Cambridge Circuit Company Ltd	01223 423100	www.cambridge-circuit.co.uk	M	SE	ISO9001:2015, UL, ISO 14001:2015	SML	Y	4-16	Y	N/A	N/A	Y	Y	Y	Y
DK-Daleba Printed Circuit Boards	01992 510000	www.dk-daleba.co.uk	M	UK, Europe, Asia	ISO 9001:2015, UL, TS16949, JOSCAR	SML	Y	4-58	Y	Y	Y	Y	Y	Y	Y
GSPK Circuits Ltd	+44 (0)1423 798 740	www.gspkcircuits.ltd.uk	M/R	UK, Europe, Asia	IS 9001:2015, IATF 16949:2016, EN (AS) 9100, Joscar	SML	Y	4-34	Y	Y	Y	Y	Y	Y	Y
Stevenage Circuits Ltd	01438 761811	www.stevenagecircuits.co.uk	M/B	UK/China	ISO 9001:2015, EN 9100:2018, EN 9104:2013, UL796, ISO 14001:2015	SML	Y	4-44+	Y	N/A	N/A	F, F/R	Y	Y	Y
Tate Circuit Industries Ltd	01543 622 435	www.tatecircuits.com	M/B	UK/China	ISO 9001:2015, UL	SML	Y	4-20	Y	N/A	N/A	Y	Y	Y	Y

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