

ELECTRONICS

NOVEMBER/DECEMBER 2020

# Sourcing

EUROPE

NOVEMBER/DECEMBER 2020

## RAIL SOURCING: TAKE THE LONG VIEW

GETTING TO  
GRIPS WITH  
CHANGING TIMES

*page 06*

MANUFACTURING  
SUPERNOVA

*page 12*

QUALITY SIGNALS  
AT ANY HEIGHT

*page 15*

BUYERS DEAL WITH  
SUPPLY CHAIN UNCERTAINTY

*page 18*

THERMAL: WHAT PURCHASERS  
NEED TO KNOW

*page 24*

TURN  
THE PAGE  
ON YOUR  
PROCUREMENT  
PROCESS



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## On the cover – November/December 2020

Rail sourcing: take the long view

## Editor's Word



## Contents

# 04

### News

*E-paper displays available from stock*

# 08

### Supply chain

*A trustworthy supply chain solution*

# 14

### Connectors

*Medical device trends*

# 22

### Rail Products

*Three-year partnership for railway cables*

# IBC

### Buyers' Guide

*All the facts and figures to help you buy*

## Think, make or serve

It's been an interesting 55-years. Like many children of the '60s, I was born into a manufacturing economy. As the years ticked by this was subsequently swept away by the knowledge economy, which was looked upon as higher value, cleaner and more environmentally sound. Just as I got to grips with that concept, it too was pushed aside by the service economy, which itself spawned its little brother: the gig economy. Then along comes Covid-19 which destroys the service and gig sectors overnight.

I understand that in a globalised, interconnected world where people, products, services and money can cross back and forth across borders unimpeded, entire countries need to specialise so they can unleash their limited resources in a specific direction to reap the manual and mental economies of scale required to be competitive.

However, there seems to be a fundamental flaw in this idea. What happens if a country willingly abandons one economic direction for another, only to have the latter snatched away before it has had the opportunity to move on? I guess you are left with little or nothing and some important decisions to make.

How about diversifying across primary, secondary and tertiary economies (so we get to simultaneously think, make and serve) while implementing industry 4.0 techniques to remain globally competitive on a micro or medium scale? It's a plan.

*Jon Barnett*

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## E-paper displays available from stock

Pervasive Displays has engaged Mouser as a distribution partner, covering a range of ultra-low power e-paper displays and the EXT 2 extension kit development board. Products will be available from stock or on short lead times.

For those looking for a low-power, sunlight readable display which holds an image without power, Pervasive Displays' e-paper screens suit office signage, industrial tags, logistics labelling and more.

Pervasive Displays' general manager, Alchin Wang, said: "We have chosen to work with Mouser because their outstanding customer service and global foothold will ensure that our customers are fully supported throughout the order process."

Mouser's vice president of supplier management, Keith Privett added: "The three colour options and wide temperature range that these displays offer means there is a display that fits the criteria of a great many applications."

[www.pervasivedisplays.com](http://www.pervasivedisplays.com)

## Safe storage for Li-ion

Battery specialist BMZ Group is constructing a 7,000m<sup>2</sup> high-bay logistics centre designed to set a milestone regarding logistical processes, environmental protection and safety.

The facility will feature 12,000 pallet spaces, supermarket and fully automated small parts warehouse. Insurance and environmental requirements include: a 754m<sup>3</sup> fire water tank; fire alarm/sprinkler system that locates the source of the fire, reports it intelligently and extinguishes it; and fire water retention system that automatically retains contaminated fire water and prevents it from entering the groundwater.

Li-Ion cells are considered a very high risk in the insurance market due to their chemical and electrical nature. BMZ can thus offer a modern, secure facility in Bavaria, close to Frankfurt am Main.

[www.bmz-group.com](http://www.bmz-group.com)

## Expanding Russian presence

Omron Electronic Components Europe has expanded its Russian distribution network with the appointment of MT-Systems. The Russian distributor will focus on Omron's sensor solutions and electromechanical and solid state relays in industrial, security and medical markets.

Omron's sales manager for Russia, Ukraine and Belarus, Maria Smirnova, said: "With a wide database of over 20,000 small, medium and large customers, MT-Systems focusses on demand creation, and actively seeks new projects and customers that could benefit from Omron solutions."

MT-Systems' general manager, Sergey Nesterov added: "Omron is well known as a leader in innovation and a manufacturer of high-quality products. Our experienced team is ready to apply its technical skills and market knowledge to their portfolio."

[components.omron.eu](http://components.omron.eu)



## Intense power collaboration

Conrad Electronic and TDK-Lambda Germany have strengthened their partnership with TDK-Lambda's latest campaign centred around DC-DC converters. The move aims to boost TDK-Lambda's e-commerce offering, while expanding the current DC-DC converter range sold via the Conrad Sourcing Platform.

Conrad product manager, Kilian Braun, said: "Product designers and purchasing managers will be able to choose from a larger selection of TDK-Lambda DC-DC converters in the short, middle and long term, and be able to find an optimal solution for their specific requirements."

TDK-Lambda Germany's distribution manager, Thorsten Osteroth, added: "From talking to a large number of customers, we learnt that design engineers like to use e-commerce suppliers during early product development stages. This makes it really important to ensure quick and easy availability of the latest product versions. This is why we are strengthening our strategic e-commerce partnership and are specifically expanding our range of DC-DC converters."

[www.conrad.com](http://www.conrad.com)

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# Sustainability is a must

In this article, IDEA president, Georg Steinberger, lays clear the challenges facing the electronics component industry over coming years



IDEA PRESIDENT, GEORG STEINBERGER

Looking at 2020 and the disruption Covid-19 brought, you wonder what else is in store? For supply chain professionals, the visibility for market requirements has been lost: short-term. Surprisingly, 2020 will not turn negative but grow by a few per cent. In fact, for some products, lead times have gone up. Provided we are not brought down by a second wave the outlook for 2021 is positive rather than negative.

However, considering that some major societal problems are still present, climate change for example, it may be worth looking at longer-term trends in the high-tech sector, an industry that constantly tries to convey the promise of innovation for the greater good and the myth that only technology can change the game. Here are six challenges.

**Physical limits of semiconductor manufacturing:** Semiconductor scaling may reach its limits soon. Mass production of 5nm devices has started and plans for 3 and 2nm are in the pipeline. 2030 may mark a watershed as 1.5nm devices hit the market and it is widely speculated this will be the last node size before physical limits prevent further scaling. Even today, the speed of introducing new geometries is splitting the market in haves and have-nots. Currently, only Samsung, TSMC and Intel seem to have the investment to follow this super-expensive path.

**Semiconductor production cost:** In 2020 TSMC announced investment of \$15B into 5nm devices. Assuming the same for other foundries or manufacturers, the \$20B mark for 3nm chips or below is in sight. You could

only wonder what this means for 1.5nm: \$30B for one fab? In 2030, the semiconductor market will, at best, be \$1T. How many \$30B fabs can that justify?

**Protectionism:** The spread of IP, technology and production equipment across the global regions will not allow monopoly across the value chain (IP, wafers, manufacturing equipment, chemicals, production, assembly etc) but contains choke points that could create political disruptions. We have seen disruption in the US/China relationship over technology, which could become worse. Taiwan as a leading-edge foundry location and with its 53 per cent share of chip assembly could be a focal point of this bilateral trade war.

**Raw Materials:** Technology consumes raw materials which face challenges regarding availability: politically and geologically. Conflict minerals from Congo are the tip of the iceberg. Beyond that the conflict is around rare earth materials, 90 per cent of which currently comes from China (2018). Production is difficult and costly, and reserves don't automatically mean easy exploitation at break-even. Regarding cobalt and lithium, imagine the multiplication of electric cars and the pressure for cost-effective batteries.

**Waste:** Electronics is one of the biggest global waste issues, besides plastic, because so many materials are found in electronic products that throwing them away is not just hazardous to the planet and us, it is also a waste of resources. More than 50 million tons of electronics products are disposed of each year, and only 12.5 per cent are recycled. Precious resources not used and missing for future generations.

**Global Supply Chain:** Covid-19 has shown perfectly how easily the global production supply chain can be disrupted. We have not seen the end of this disruption and others are looming. Also, the global supply chain comes with a giant carbon footprint. Arguably far from sustainable.

So, where to go from here? If we want to be a real contributor to human and planetary betterment, a giant joint effort is required to make the high-tech industry as circular as possible.

[www.avnet.com](http://www.avnet.com)

# Getting to grips with changing times

*Future Electronics' corporate VP, Karim Yasmine, guides readers through the supply chain landscape*

**Q** What supply chain trends has Future Electronics witnessed over the last decade and what do purchasers need to prepare for over coming years?

Like every technology space, we have seen drastic changes in the supply chain. Over the past 10-years, aggregators have changed the way purchasing professionals access information. Today, application programming interfaces (APIs) are simplifying information exchange in the supply chain. Automation is also the norm. Although technology is evolving, the purchasing community still relies on distributors who physically stock inventory and offer differentiated supply chain services. The demand/supply equation is always in flux and buyers depend on stocking distributors to get their products to market quickly, regardless of demand spikes or external factors. Our Bonded Inventory Management program, for example, ensures customers enjoy on-time delivery, continuity of supply and flexibility.

**Q** Counterfeit and obsolete components are a threat to supply chains. How are companies like Future combatting this?

Counterfeit products are an industry-wide issue that Future Electronics has addressed with strict multi-point inspections on all product entering our facilities. Our distribution operations and trade/compliance departments manage this process, so every customer receives factory-

certified product. Future Electronics is also a member of ECIA, GEDA and other industry associations around the world that represent authorized distribution.

**Q** How has Future adapted during COVID-19 and how do you see future working patterns?

From the beginning of the pandemic, our number-one priority has been the well-being of our employees, customers, suppliers and rep partners. On the business side, we focused on continuity at our Distribution Centers. Our unified global IT platform allowed us to provide customers with seamless business continuity. We also offer customers virtual product training and other information services to get technologies to their engineering teams despite this constrained environment. Moving forward, we are looking at new ways to enhance our support levels for both purchasing and engineering.

**Q** The semiconductor sector has seen consolidation over recent years. How is this impacting the supply chain?

M&A has its benefits and challenges. Consolidation can mean fewer options, such as fewer sources on an AVL, which underlines the importance of a partner like Future Electronics which provides differentiated supply chain solutions. Also, acquisitions have merged some of the top companies, who are now offering a complete technology portfolio. As M&A continues,

our focus is ensuring continuity of supply and working with our customers in cases where product lines are pruned or end of life with recommended alternatives.

**Q** As lead times extend, which components are most impacted?

Lead times are stretching in specific technologies. Microcontroller and sensor lead times have extended, with some microcontroller lead times at 24-plus weeks right now. The market is very dynamic, with supply chains being affected at every level of the manufacturing process. Freight has become a major factor as well. Future's product marketing team is working closely with our suppliers and manufacturing reps to ensure we communicate the most up-to-date information and solutions to our customers.

[www.futureelectronics.com](http://www.futureelectronics.com)



Future Electronics' corporate VP, Karim Yasmine



**Although technology is evolving, the purchasing community still relies on distributors who physically stock inventory and offer differentiated supply chain services**

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# A trustworthy solution for end-to-end supply chain protection

*Lattice explains how its SupplyGuard service preserves trust throughout unprotected supply chains by protecting against counterfeiting, overbuilding and trojan insertion*

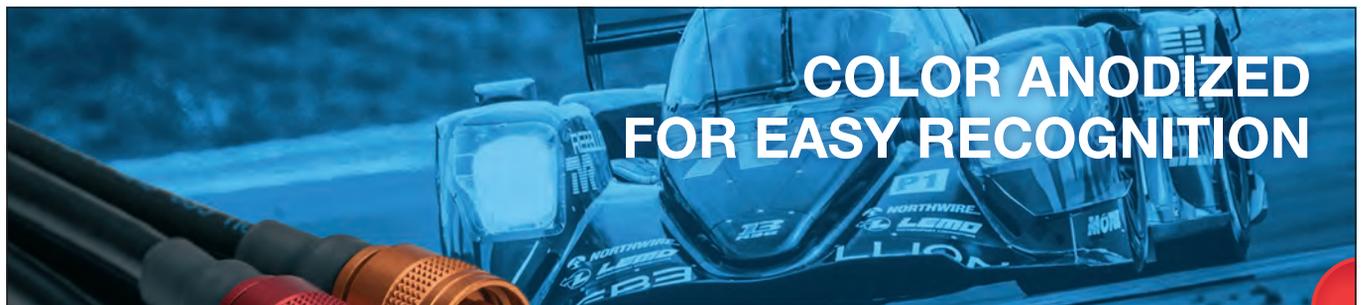
Lattice has launched its Sentry solutions stack and SupplyGuard supply chain protection service. Sentry stack comprises customizable embedded software, reference designs, IP and development tools to implement secure systems compliant with NIST Platform Firmware Resiliency (PFR) Guidelines (NIST SP-800-193). SupplyGuard extends this protection throughout the supply chain by delivering factory-locked devices protected from attacks like cloning and malware insertion. Application areas include communications, datacentre, industrial, automotive, aerospace and client computing.

SupplyGuard is a subscribed service that offers OEMs and ODMs peace of mind by tracking locked Lattice FPGAs through their entire lifecycle, from the point of manufacture, through transport through the global supply chain, system integration and assembly, initial configuration, and deployment.

The service ensures only authorised manufacturers can build an OEM's design, regardless of their location. It provides OEMs with a secure key infrastructure to prevent the activation of their IP on unauthorised components to stop product cloning and overbuilding.

SupplyGuard secures devices against the download and installation of trojans, malware, or other unauthorised software to protect platforms and systems against equipment hijacking or other cyberattacks. The

service can be customised to meet the specific security and supply chain needs of OEMs in different industries. Lattice states the service lowers the operating costs associated with implementing a secure manufacturing ecosystem.



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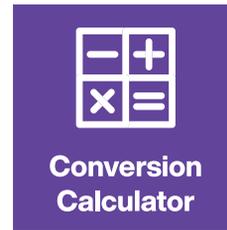
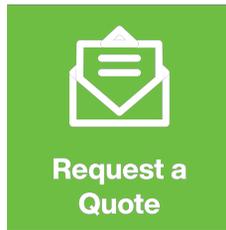
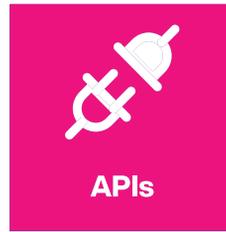
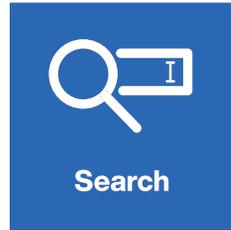
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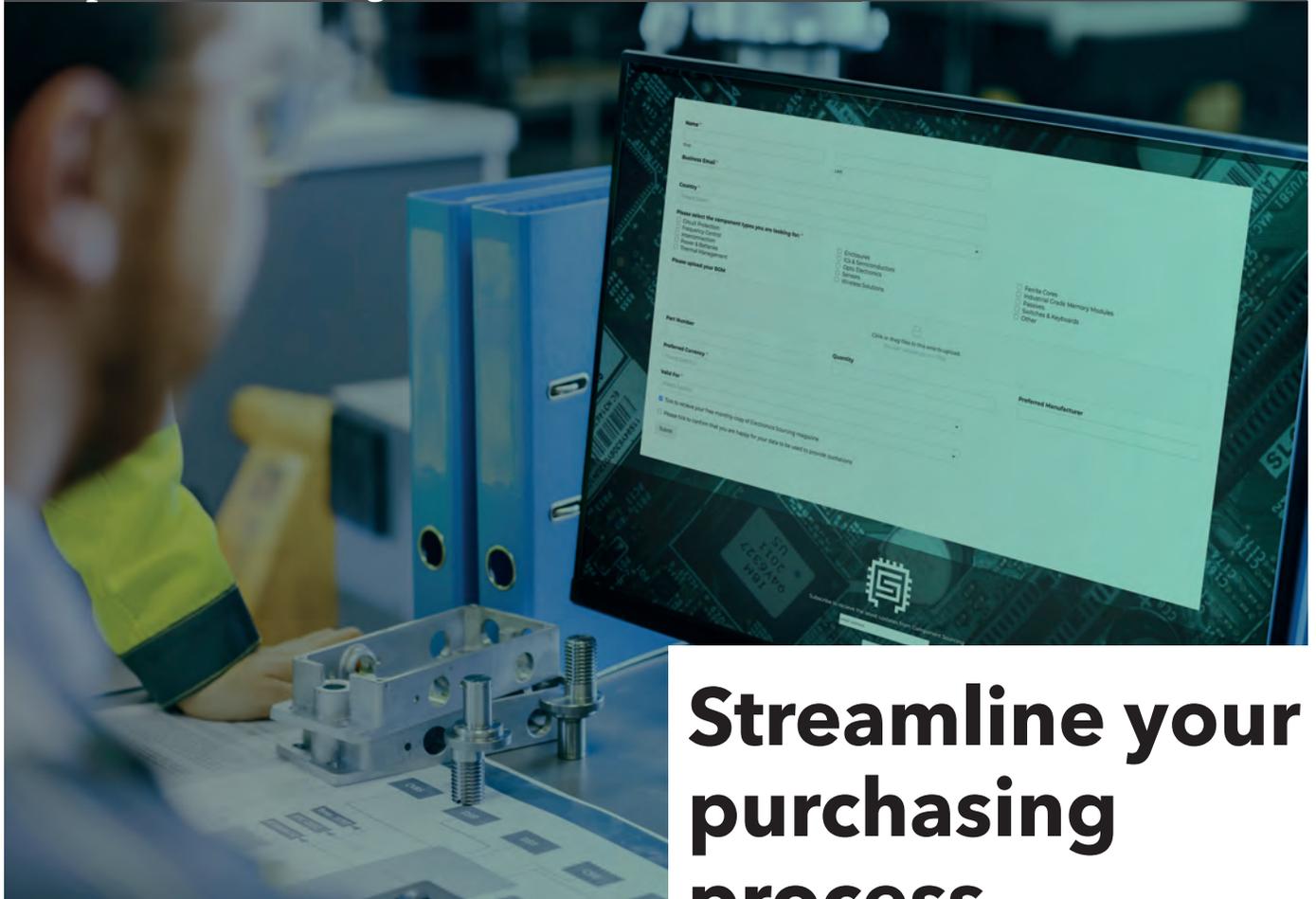
# Ordering made easy

Tools to search, check stock and purchase

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[mouser.com/servicesandtools](https://mouser.com/servicesandtools)





## Streamline your purchasing process

MMG Publishing, publisher of *Electronics Sourcing*, has announced *Component Sourcing*, a new service designed to streamline the purchasing process.

Free to use, the service lets purchasers quickly and easily request component pricing and availability from manufacturers and distributors who support *Electronics Sourcing* globally. Requests are sent instantly, with responses going straight to your inbox.

Faced with the impact of the pandemic, Electronic Sourcing readers have contacted MMG requesting help sourcing components due to workloads and stock problems with current, hard-to-find and obsolete components. This service is designed to help alleviate these issues and improve the efficiency of the purchasing process.

To use the service go to [www.component-sourcing.com](http://www.component-sourcing.com) and upload your BoM.

Alternatively enter the part number, quantity and preferred manufacturer.

As part of MMG Publishing's ongoing investment we appreciate feedback to help improve our services and your user experience. Please use the following link to provide your feedback: [www.surveygizmo.com/s3/5800820/Component-Sourcing-Feedback](http://www.surveygizmo.com/s3/5800820/Component-Sourcing-Feedback)

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# Industry 4.0: manufacturing's supernova



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

*John Denslinger argues Industry 4.0 is a manufacturing supernova on Earth, both for industry and the people enabling its transformation*

Industry 4.0 • By John Denslinger

The fourth industrial revolution was underway long before the pandemic touched every corner of the world. Covid might have limited adoption by those companies at implementation phase, but not among those with ongoing buildouts. Interestingly, had this revolution started earlier, robust digitalisation might have negated much of the Covid impact on manufacturing and their supply chains.

If you're not familiar with the term Industry 4.0 and its competitive implications, perhaps a history lesson is in order. Industry 1.0 applied to the era of initial mechanisation and application of steam power. Industry 2.0 saw the advent of mass production, assembly lines and electrification on a broad scale. Industry 3.0 gave rise to automation, use of computers and electronics replacing mechanics. Then we come to Industry 4.0. It is characterised by a collision of four remarkable technological advances: (1) unabridged connectivity with massive data mining supported by enormous computational power; (2) analytics and artificial intelligence; (3) human-machine interaction; and (4) ascension of concept-to-reality rapid engineering. According to a recently published McKinsey & Company assessment, Industry 4.0 'transforms operations in everything from production efficiency to product customisation with improvements in speed to market, service effectiveness, and new business creation'.

By any measure, this is a manufacturing supernova on Earth. Every aspect of production, procurement and design can be enhanced, if not optimised via digitalisation. That means supplier management, production, resource planning, product design, prototyping, order management, asset utilisation, quality control, employee safety, warehousing, delivery and more. But operations is just one piece. End-to-end also includes markets, customers, suppliers, raw materials,

advanced technologies, financials, communication networks, energy management, environmental stewardship and real time feedback loops coupling it all.

Given the sheer size and scope of 4.0 adoption, the financial burden on companies is substantial. Then again, not investing is a likely path to non-competitiveness. There is hope and help though. One only has to look at global, national, state and even large metropolitan frenzies enticing 21st century high-tech companies to their jurisdictions. Governments everywhere are offering generous incentives recognising the significance of a digitally connected world. The accounting firm KPMG identified 17 countries pursuing advanced manufacturing facilities and cited more will follow. Each promotes an array of direct and indirect tax incentives. But study and plan carefully. There is a lot to consider. Just keep in mind, a 4.0 company is extremely attractive and has extraordinary negotiating power.

Finally, 4.0 has another significant player: the US Government. It too is throwing its mighty weight behind the 4.0 movement announcing \$1B investment creating 12 hubs dedicated to researching Industry 4.0 technologies. Of specific interest is AI, quantum information systems, and 5G. The idea is to create national R&D centers for these critical industries of the future, as well as stimulate regional economic growth and prepare a next-generation workforce. It appears another \$2B is earmarked by 2022 as a steadfast commitment to US future leadership.

When one thinks about the coming age of 4.0 manufacturing, productivity and efficiency improvements seem endless. It truly is manufacturing's supernova not only for our industry but for the many people enabling its transformation.

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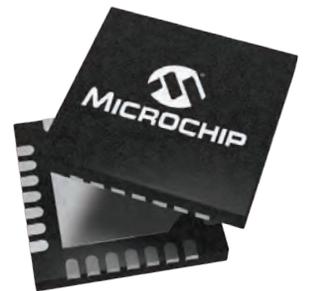


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# Medical device trends impacting connector manufacturing

*TTI supplier marketing manager, John Sandy, looks at the trends impacting connector design and selection in the medical device industry*

Medical technology is evolving rapidly and connectors are evolving to meet changing needs and design standards. In the past, diagnostic and therapeutic devices were larger and generally stationary. Mini-circular connectors were common, with standard cordsets often connected to power and signal cabling in the walls. Primary requirements for those connectors were: easy cleaning/sanitizing; easy mating; protection against mis-mating; and protection against movement or disconnection.

Today, medical connectors must meet more advanced needs. Signal and power requirements have grown as imaging and monitoring technology has advanced. Larger amounts of data are being read, analyzed and transferred between hospitals, clinics and offices.

Future medical devices may include connector products

originally developed for the data-communications industry, including mid to high-speed backplanes and connectors with higher pin counts. Established products offer more competitive pricing and future-proofing as data needs change during a machine's lifetime.

As more clinical devices make use of disposable or single-use probes, sensors, catheters and more, requirements for easy sterilization and secure mating won't change. However, device-side connectors must support high mating cycles: 1,000 to 5,000 operations isn't unusual.

Whether the device works with a card-edge connector or pin-and-socket, the disposable connector used on the probe, catheter or sensor needs to be easy to mate, reliable and guaranteed to be sanitary.

Manufacturers assemble and package single-use medical connectors in clean

rooms where sanitation is guaranteed. This value-add makes connector suppliers a key part of the medical device supply chain.

Suppliers have also responded to specialized medical industry needs by creating new families of connectors. For example, magnetic resonance imaging (MRI) led to the creation of an entire family of non-ferrous or magnetism-resistant connectors safe to use near or in this equipment.

Connected health care devices will move patient monitoring technology from doctors' offices and hospitals into people's homes. Inside such devices, reliable connectors that deliver greater signal, power and data in a smaller footprint will be the norm. As home health care continues to grow, nurses and caregivers will need devices with intuitive, secure connectors, plus smaller, cheaper probes and sensors.

**Future medical devices may include connector products originally developed for the data-communications industry**

Suppliers can provide a valuable service. Instead of simply supplying a connector, they can fabricate a sub-assembly in a clean-room environment to prevent contamination. Connector suppliers may increasingly be relied on to provide solutions in an evolving industry, plus value-added services.

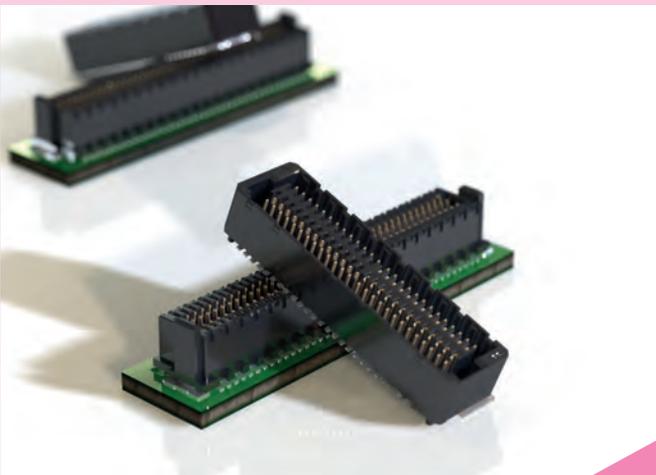
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### Quality signals at any height

High-speed Zero8 connectors featuring ScaleX technology will be available in different heights, as well as shielded and unshielded designs. Both plug and socket will be available in low and mid heights, and there is also an optional shielding concept for optimum protection against electromagnetic interference. Different heights can be combined, allowing Zero8 connectors to achieve board-to-board distances of six to 20mm.

EMC shielding protects signals, important for applications in industrial environments with large amounts of electromagnetic interference.

Zero8 connectors resist shock and vibration thanks to a double-sided connection concept: the signal arrives at the receiver at speeds up to 16Gbps. Adjacent components are also protected since the connector cannot act as a source of interference.

The company states this data transfer rate results from material properties and optimized contact geometry which also means it's virtually impossible to damage the contacts.

[www.ept.de](http://www.ept.de)



### Slimline design for industrial applications

Provertha's D-Sub connector range now includes a nine-pin slimline version for industrial applications. The TMC series connector's slimline design reduces PCB area by up to 33 per cent compared to a conventional D-Sub due to its 90deg angled SMT terminations in ultra-flat design. Its reliability under high mechanical loads suits harsh industrial applications. Thanks to its compact installation height of only 4.65mm, this connector offers industry and an excellent for miniaturising robust device interfaces.

Features include solid metal pegs firmly attached to the metal housing. They are designed to absorb insertion and withdrawal forces under mechanical stress and enable effective and reliable grounding.

The insulating body (made of high temperature resistant high-performance thermoplastic) and a solid large SMT connection area meet coplanarity requirement to ensure safe SMT application. The black insulator facilitates simple and clear vision system recognition. Automated SMT assembly and soldering process is aided by tape-and-reel packaging and an integrated pick-and-place area for the vacuum pipette. Soldering anchors absorb the insertion forces, protecting the contacts. A dual-beam female contact ensures maximum contact reliability.

Current carrying capacity is 4A at 20°C, while extended mechanical life is 250 mating cycles. The connectors are available as male or female versions with mounting options including through-hole and threaded rivet for UNC 4-40 or M3.

[www.provertha.com](http://www.provertha.com)



### Ready for 5G networks

Rosenberger has developed a number of RPC-2.92 precision adaptors, microwave cable assemblies and compact calibration kits for applications up to 43.5GHz. These products are designed for test and measurement applications in future 5G networks where a frequency range up to 43.5GHz is required.

The updated portfolio covers in-series adaptors, adaptors RPC.2-92 to RPC-1.85 and RPC-2.92 to RPC-2.40, test port adaptors, standard cable assemblies with RTK 125 cable or RTK 092-70 cable as well as MSO (3-in-1) and MSOT (4-in-1) compact calibration kits.

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# Frequency control: past, present, future

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



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

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

This is an interesting question as it relates to what electronic purchasing professionals need to be aware of when it comes to frequency control products. Our main targeted audience is the electronic engineering design community, and our engagement with design

teams is paramount to our success. Once awarded a design win, it is handed off to a procurement team within the customer's organization.

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

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

The lesson here is that the

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

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

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

for another 40-plus years.

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

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

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# Rapid turnaround oscillator services

*Euroquartz introduces the benefits of rapid turnaround oscillators in applications where time is tight or stock is scarce*

It is important to understand what a fast turnaround oscillator is and what distinguishes it from a standard factory-manufactured part. Normally, fast turnaround implies a factory-programmed oscillator that can be set to virtually any desired frequency. However, there are two types of fast turnaround oscillator, the first is a part programmed in a similar fashion to an EPROM and the second is a factory-configured device.

The distinction may not be immediately obvious, but a factory-configured part requires some selection of componentry and specific links to be hard-wired to achieve the desired frequency output and specifications. A programmed type uses software to input the desired frequency. Each type has different advantages and disadvantages as detailed below.

The obvious advantage of a rapid turnaround product is the availability of any function and frequency within five to 15 working days depending on specification and available production capacity. This

means an engineer can try several non-standard frequencies to benchmark a design and reduce development time. They are also useful for quickly filling production shortfalls, especially if supply chain delays appear.

Are there disadvantages to fast turnaround product? Yes. For example, for a standard clock oscillator, jitter and current parameters tend to be higher for a factory-configured device compared with a frequency specific oscillator.

This is because fast turnaround product uses a base crystal from which all frequencies are derived via multipliers and dividers. A factory produced component uses a crystal tuned at the desired frequency, delivering much improved jitter and current performance.

Another factor is cost, with software programmed units tending to be significantly more expensive. However, for samples and development, this isn't usually a barrier. Advances in semiconductor engineering offer more formats such as current

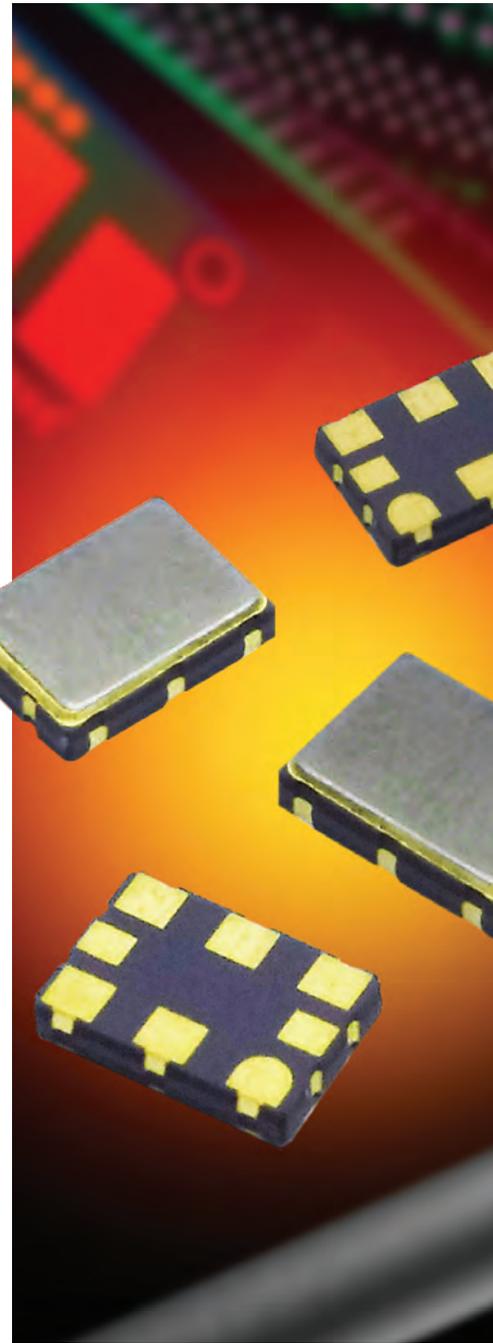
mode logic (CML) and high speed current steering logic (HCSL) and in much higher frequencies meaning these are usually configured units. The Euroquartz range, for example, offers frequencies up to 2.1GHz.

The latest products added to the fast turnaround range (factory-configured and programmable) offer extremely good jitter performance and operational characteristics.

Rapid turnaround crystal oscillators (XO) are not restricted to simple clocks but are also available in temperature compensated (TCXO), voltage controlled (VCXO), low voltage differential signalling (LVDS), positive emitter coupled logic (PECL) and the aforementioned HCSL and CML formats.

Provided the specification differences between factory-made and programmed or configured units are considered this range of parts offers a workable solution in time-sensitive applications.

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# EMS buyers deal with supply chain uncertainty and risk

*Component shortages, logistics delays, and overall supply chain uncertainty have been some of the challenges that EMS buyers had to deal with during the global pandemic*

If there is one word that describes the challenges buyers in the electronics manufacturing services industry face because of the coronavirus pandemic it is uncertainty.

When the pandemic hit China, it shut down electronics production in the country and there was uncertainty in the electronics supply chain on how long production would be stopped and uncertainty of where buyers could get the parts needed for production.

Uncertainty continued as the pandemic spread through southeast Asia, Europe and the Americas as it shut down or slowed electronics production in those regions. There was uncertainty about supply, demand and logistics.

Fortunately, supply disruptions were staggered. When component manufacturing shut down in Europe, it began to come back in China and Asia. When production stopped in the Americas, it started to come back in Europe.

EMS providers say the key to managing the pandemic was getting accurate information not only from suppliers, but from OEM customers about

how their production plans may have changed because of COVID-19.

EMS provider Flex set up a “war room” to help manage the impact of the pandemic on the supply chain and to collect pertinent data on the operations of their suppliers and OEM customers. “It was a dynamic situation because demand was changing and supply was changing,” said David Gessler, vice president of commodity management, mechanical for Flex.

“COVID-19 hit in the middle of Chinese New Year so there was already some buffer inventory in the system,” said Gessler. Many companies close for several weeks during Chinese New Year and build up inventories before they shut down.

Flex had daily war room calls. When the pandemic first impacted Wuhan, China in January, “we tried to figure out what the impact was going to be on supply coming out of China and what the demand was going to be,” he said.

He said Flex contacted every supplier and we confirmed every order. That was no easy task. “There were suppliers

that could not even get back to their factories” so it was difficult to determine the status of an order.

## Validating demand

Flex also wanted customers to validate their demand. “There was a point in time where we considered bringing in extra inventory for certain parts because we were uncertain about what the future was going to hold” in terms of demand. Flex weighed whether it was worth the risk to take on extra inventory.

“We made the decision not to increase inventory and I am glad we did because component demand shifted,” said Gessler. The extra inventory was not needed.

However, one EMS provider that took a different approach to inventory was SMTC Corp., based in Toronto. It increased inventory for some parts, although some of the inventory buildup originated from component shortages of several years ago when multilayer ceramic capacitors (MLCCs), and metal oxide semiconductor field transistors (MOSFETs) were in short supply.

“We systematically started



**There was a point in time where we considered bringing in extra inventory for certain parts because we were uncertain about what the future was going to hold**

**David Gessler**, vice president commodity management, mechanicals for **Flex**

increasing lead times for certain parts and making the decision to carry more inventory on these and other commodities to protect ourselves and our customers from a supply perspective,” said Phil Wehrli, senior vice president global supply chain for SMTC. “If a part had a 16-week lead time, we added eight weeks of lead time so we were buying and holding eight weeks more than we did historically,” he said. “That really helped us and our customers out.” So when COVID-19 hit and disrupted production in China and Asia, SMTC already had strategic inventory in place,” said Phil Wehrli, senior vice president global supply chain for SMTC. The only challenges SMTC had was on specialty single sourced parts that were customer directed, but we did not have any supply constraints that impacted any of our customer demand.

Some supply constraints were not caused by a lack of production capacity, but because of unforeseen demand from one or two customer segments. For instance, in the first and second quarters there was strong demand for medical equipment such as ventilators and other breathing apparatus to treat coronavirus patients. Demand for some medical products that Flex builds for medical OEMs increased 200 to 300 per cent, which caused shortages of some semiconductors and other parts used in the equipment.

Flex was able to work with suppliers to get parts it needed for production. “We did not come through unscathed but we never shut down” production of customer’s product,” he said.

#### Uneven demand

Through much of the first half of the year there was uneven demand from some

customer segments. “It was not an issue of lack of supply,” said Vincent Cellard, vice president commodity management, electrical for Flex. “It was more due to changes in demand. We saw the automotive business dropping to almost zero, then jump up again,” he said. Demand from the medical segment was high earlier in the year but demand has since weakened.

“So, we’ve seen a change of mix over the last few months,” said Cellard. “As a result, we have more shortages now that we would’ve had a year ago because our business has been so dynamic on the demand side.

#### Planning for disaster

Whether shortages are short-term problems caused by unexpected demand from a particular customer segment or longer term because of a lack of investment in production capacity by suppliers, component shortages are usually one of the problems that EMS buyers plan for in risk mitigation strategies. Many electronics OEMs and EMS providers beefed up their supply chain risk management strategies after the 2011 earthquake and tsunami in Japan and flooding in Thailand disrupted the supply. The companies hope to minimise the impact of any future disasters or other events that could affect supply.

Many companies have risk mitigation plans and “playbooks” that are supposed to provide guidance on how to deal with disruptions to the supply chain. However, the coronavirus pandemic seemed to catch many companies by surprise.

Flex has risk mitigation plans. “A lot of those plans are good

and I think they help you to the extent that you have the organisational framework and IT framework,” said Gessler. However, disasters and other catastrophic events don’t always go to plan and often cannot be forecasted.

“I seriously doubt if anyone was ready for a pandemic,” said Gessler. “No one could’ve predicted COVID 12 months ago.”

Cellard said that the pandemic was different from the natural disasters that shut down production and disrupted the supply chain in 2011.

“Those disruptions were big but they were at a country or region level,” he said. The number of suppliers impacted by the tsunami in Japan and flooding in Thailand was limited. With the pandemic, supply disruption was global and many suppliers were affected.

“Very few suppliers can say they had zero impact at all,” said Cellard. With the pandemic, “we got a reminder about how complicated the supply-chain model is in the electronics industry. There are so many tiers, so many subcontractors, so many touch points,” said Cellard.

For instance, a micro controller may go to multiple sites in the supply chain before being available as a finished product, he said. Raw materials suppliers are needed in order for the chip to be made. The part may be purchased from a supplier in China, but the reality is some of the assembly of the chip may be done in the Philippines, some testing is done in Singapore. Then there are logistics issues involved when the part is sent to multiple locations, said Cellard.



**When we had big supply constraints of MLCCs, a lot of the parts came from Asia and we decided to do risk mitigation**

**Phil Wehrli**, senior vice president global supply chain for **SMTC**

Logistics was severely impacted by the pandemic and component manufacturers and EMS providers had to scramble to find ways to ship products. Logistics continue to be an issue as of early October.

Most passenger flights have been canceled which reduced cargo capacity for electronics shipments. “We’ve seen bottlenecks in some of the harbors in Asia. We’ve seen an increase in the amount of freight that is going by rail, he said.

### Returning to normal

Cellard said the good news is that the supply-chain is returning to normal, although it’s not there yet. “The first phase of the impact is definitely behind us,” he said. So, issues such as lockdowns and partial labor availability, which impacted production, are over. Disruption of the supply chain peaked at the end of May or beginning of June. Supply conditions improved since then and are almost back to normal.

He noted there are still long lead times with “some high-end semiconductors and network products. There’s definitely some shortages of raw material and shortages of die in some cases,” he said.

EMS providers are hopeful that business will improve and the supply chain issues they faced this year will not return in 2021. However, longer lead times are likely for some components and logistics issues may continue to be felt for a while. In fact, Gessler said the impact of COVID-19 in the supply chain may be felt for the next 6 to 12 months.

“The number of passenger airline flights are down which impacts freight, which impacts logistics,” he said. In addition, suppliers are being careful about going back to full capacity because “they

still don’t know if there’s going to be a global recession so they are controlling what they put back into their factories,” he said. A lack of investment in new capacity could mean more shortages if business spikes up next year.

Another issue is the impact that COVID-19 may have had on the financial viability of suppliers, especially smaller ones. “They were definitely financially challenged during the last six to nine months,” said Gessler. “There’s a risk of going out of business,” he said. Flex is looking at the financial positions of its suppliers closely.

### More allocations?

There are other non-COVID-19 issues that could impact EMS business in the near future. “We tend to forget what’s happened in the past with allocations of MOSFETs and MLCCs and other parts,” said Cellard. “We could quickly go back into the mode of allocations on some technologies. That’s what keeps me awake at night,” he said.

He noted there are some industries where lifecycles are short and we “need products to ramp up really, really fast. We’ve seen it on the medical side. Demand for components for cloud computing and infrastructure applications also creates a lot of stress in the supply-chain,” said Cellard.

While the coronavirus pandemic has created stress on the electronics supply chain, EMS buyers may have learned some lessons that may be useful in mitigating supply chain risk in the future. For instance, with COVID-19, production of end equipment and components did not come to a halt in all regions of the world at all once. Rather, supply disruption happened one region at a time which meant that was available

in multiple regions at any one time, which is a likely reason that there were not widespread component shortages.

“The virus spread across the globe, starting in Asia. It went to Europe, hit the US and then Mexico,” said Wehrli. “Asia was the first to come back with reduced capacity at first and it was the same thing with Europe, US and Mexico” he said. The pattern repeated in other regions as well.



**With the pandemic, we got a reminder about how complicated the supply-chain model is in the electronics industry. There are so many tiers, so many subcontractors, so many touch points**

Vincent Cellard, vice president  
commodity management electrical  
for Flex

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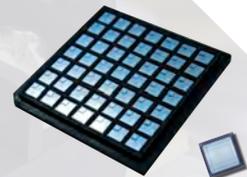
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### Three-year partnership for railway cables

Huber+Suhner has been chosen as a preferred supplier of railway cables to Stadler as both companies extend their collaboration with a new agreement until 2023.

Under the agreement, Huber+Suhner will provide Stadler with Radox railway cables, for the power, control and communication connectivity across all its vehicle platforms, including electric commuter trains, electric high-speed trains, metro, light rail vehicles and tailor-made vehicles.

Stadler's global lead buyer for wires and cables, Damiano Freda, said: "We are very happy to select Huber+Suhner

as our preferred cable partner for a further three years. The reputation of Huber+Suhner within Stadler has been enhanced through the technical strength and quality of its products which is combined with excellent delivery performance."

Huber+Suhner's market segment manager railway DACH, Reto Jaeck, added: "We are pleased to continue collaborating with Stadler as the supplier of choice for wire and cable products and to provide a service which supports the performance potential of this company now and in the future."

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### Railway DC/DC converters meet EMV06

In addition to EMC compliance certification to EN 50121-3-2, MTM Power can now also prove compliance with EMV06 (verification of radio compatibility of rail vehicles with railway radio communication services) through certification from an accredited laboratory.

Interference-free railway radio communication services are one of the basic requirements for safe and reliable railway transportation. The technical regulation EMV06 describes the requirements for the radio compatibility of rail vehicles and systems/components.

MTM Power has examined a representative selection of DC/DC converters for railway applications carried out by an independent, accredited laboratory regarding the EMV06 regulation. All tested devices remain well below the critical values of the highest protection class S0 and can be used without restrictions.

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### Applications processors suit rail applications

Sysgo has expanded its cooperation with SoC manufacturer NXP and now supports the i.MX 8X applications processor family with the new 5.0 version of its real-time operating system PikeOS.

The partitioning of the PikeOS separation kernel complements the comprehensive hardware virtualization of NXP i.MX 8X processors to achieve a strict separation of applications. This also supports mixed-criticality designs in which critical and non-critical applications run on the same hardware.

NXP Semiconductors' senior vice president and general manager, edge processing business, Ron Martino, said: "Sysgo's PikeOS 5 expands capability of NXP's popular i.MX 8X family of applications processors for the high demands of critical embedded system infrastructure in industrial automation, automotive, railway and avionics. Automotive and industrial transportation systems can leverage the hardware separation capability and safe OS to achieve reliable systems that are critical for the safety of the users."

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# Thermal: what purchasers need to know

*Digi-Key's manager applications engineering and tech support, Dany Haikin, guides readers through the world of thermal management*

Thermal management is the unsung hero of electronics, keeping devices cool and working properly. For purchasing professionals, identifying different types of thermal products, understanding of how they work and recognizing considerations for lead times can help them source the best solution.

Designing a thermal solution is not something purchasing professionals can typically do alone. Engineers should be involved because it requires a different approach than sourcing standard electronic components.

One way to divide different types of thermal products is by active cooling and passive cooling. Active cooling uses power to provide cooling, like a fan or Peltier. Cooling technologies which don't require power include grease, putty or thermal pads.

### Space

The most important consideration is how much space is available? For example, computers with large enclosures have plenty of space for a fan.

Faced with applications like wearables or mobile phones, space is a critical consideration. Big thermal solutions won't work. Instead we need to utilize thermal pads, gels or grease. These are the types of solutions that can be used to mitigate space constraints. It's also important to note the types of components and modules

which generate heat, such as wireless RF modules and power supplies.

### Heat dissipation

Heat generated by a component must be dissipated outside of the application. It's not enough to absorb the heat, it needs to be transferred to something else, either the case, another area or into the air.

Thermal management is all about taking heat out of the component and dissipating it in other places. If heat is absorbed by the component, rather than being removed, it will, in the best case, slow down performance and in the worst case, destroy the part.

In applications where space is available, heat sinks can be used. A heat sink is a metal or ceramic sink which is placed on the component. Heat sinks have fins or ribs which transfer heat from the component to air. The heatsink must be mounted tightly to the component. The component's surface might seem smooth but is actually not. The surface between the heat sink and component needs to be filled with an intermediate material such as a flexible pad, gel or grease. Some heat sinks are supplied with the intermediate pad integrated to the base.

### Timing

Just as important as the solution you choose, is when you choose it. The two most important technical parameters for a thermal pad,

which is a popular solution, is how much heat they can dissipate and how fast they can do it. That is something which needs to be calculated before or during the design process. It then needs to be tested in the actual application, which is where engineers should be involved.

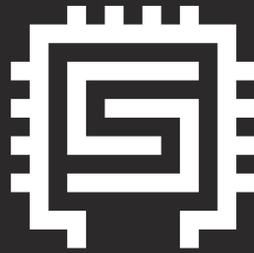
The next major parameter to consider is how flexible the pad needs to be. At this point, it's also important to consider whether the application should use a pad or a gel. A gel can be either a grease or putty. One problem with grease is that



**A heat sink is a metal or ceramic sink which is placed on the component**



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maintenance can become problematic, dirty and messy if a greased component needs to be reworked or repaired. Also, in the long-term grease is not very reliable because sometimes it can lose its shape and doesn't spread equally across the component's surface. On the other hand, grease is much cheaper than other solutions.

A pad is better in most cases but it should be cut to fit the component's shape. The custom nature of using a pad solution means it can cost more. Purchasing professionals should take all of these variables into account, plus the quality and additional time it takes the manufacturer to cut the pads.

For lead times, most manufacturers will quote a standard time scale of something like five to six-weeks, plus maybe one to two additional weeks for pre-cutting. Some manufacturers might quote up to 12-weeks because the material used is a combination of many raw materials and is thus dependent on other manufacturers. Thus, external issues can delay lead times.

For example, the Japanese earthquake which occurred some years ago ruined many of the glue factories. Glue is a key component of pads, so lead times extended to 16-weeks or longer. With Covid-19, some factories closed. However, due to its stock holding, Digi-Key's lead time remained unaffected and the influence of the pandemic has been minimal. Ultimately, it depends on the application and how things compete on price.

### Traceability

For thermal management, component traceability is also an important consideration. Digi-Key only buys directly from manufacturers to ensure authenticity. This also helps buyers quickly isolate any potential issues with prototypes and get to the source of the problem faster.

Another reason traceability is important with thermal management is shelf life. With specialty thermal pads, grease or putties, it is important the distributor is paying attention to shelf life. Different pads, manufacturers and chemistries all have different shelf lives: sometimes it can be one-year, sometimes it can be five-years, others can be indefinite. Regardless, it must be taken into account by sourcing professionals during

the purchasing process.

While sourcing thermal management solutions can be more complex than typical electronic components, it can be a really rewarding experience, providing new pathways for the engineering and purchasing teams to work together. Digi-Key offers thousands of different thermal management parts from stock for immediate shipment from more than 65 quality, name-brand

manufacturers. As always, Digi-Key and its in-house team of engineers are available to provide 24/7 customer support for purchasing professionals who are making decisions on thermal management solutions.

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## Buyers' Guide

| Manufacturer                          | Distributor                           | Telephone           | Website                  | Location      | Franchised Distributor | No. of Lines for Principle | Stock Value for Principle | Minimum Order Value | % Lead Free for Principle Range | No. of Technical Support Staff | Total No. of Staff | Buffer Stock Facility |
|---------------------------------------|---------------------------------------|---------------------|--------------------------|---------------|------------------------|----------------------------|---------------------------|---------------------|---------------------------------|--------------------------------|--------------------|-----------------------|
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| Amphenol                              | PEI Genesis                           | +44 8716060         | www.peigenesis.com       | EU            | Y                      | N/A                        | £1.3m                     | 10 €                | N/A                             | N/A                            | 85                 | Y                     |
| Hirose Electric Europe B.V.           |                                       | 0031-(0)2 655 7460  | www.hirose.com/eu        | EU            | Y                      | 50,000                     | N/A                       | 0 €                 | N/A                             | N/A                            | 4,190              | Y                     |
| ITT Cannon                            | PEI Genesis                           | +44 8716060         | www.peigenesis.com       | EU            | Y                      | N/A                        | £1.3m                     | 10 €                | N/A                             | N/A                            | 85                 | Y                     |
| ODU                                   |                                       | +49 8631 6156-0     | www.odu.de               | EU, USA, ASIA |                        |                            | N/A                       | 0 €                 | N/A                             | 50                             | 1,650              |                       |
| <b>OBSOLESCENCE / HARD TO FIND</b>    |                                       |                     |                          |               |                        |                            |                           |                     |                                 |                                |                    |                       |
|                                       | Chip 1 Exchange                       | 949-589-5400        | www.chip1.com            |               | Y                      | 850,000                    | N/A                       | \$0                 | 85%                             | 20                             | 150                |                       |
| <b>PASSIVES</b>                       |                                       |                     |                          |               |                        |                            |                           |                     |                                 |                                |                    |                       |
| Kemet                                 | RS Components                         | 08457 201201        | www.rs-components.com    | EU            | Y                      | N/A                        | £161m                     | 0 €                 | N/A                             | 50+                            | 2,500              | Y                     |
| Würth Elektronik                      | Würth Elektronik                      | +49 (0) 7942 945 0  | www.we-online.com        | EU            | Y                      | N/A                        | N/A                       | 0 €                 | 100%                            | 250                            | 4,000              | Y                     |
| <b>POWER &amp; BATTERIES</b>          |                                       |                     |                          |               |                        |                            |                           |                     |                                 |                                |                    |                       |
| Sanyo Electronic Industries Co., Ltd. | Sanyo Electronic Industries Co., Ltd. | +81 36699 8080      | www.eta.co.jp            | JP            | N                      | 1,000                      | €3000k                    | 20 €                | 90%                             | 10                             | 100                | Y                     |
| <b>SWITCHES &amp; KEYBOARDS</b>       |                                       |                     |                          |               |                        |                            |                           |                     |                                 |                                |                    |                       |
| CHERRY                                | RS Components                         | 08457 201201        | www.rs-components.com    | EU            | Y                      | 600                        | N/A                       | 0 €                 | N/A                             | 50+                            | 3,500+             | Y                     |
| Rubbertech 2000                       | Rubbertech 2000                       | +44 1594 826019     | www.rubbertech2000.co.uk | EU            | N/A                    | N/A                        | £40k                      | 100 €               | N/A                             | N/A                            | 25                 | Y                     |

## PCB Buyers' Guide

| Manufacturer    | Telephone       | Website            | Service Provided (ie. Board Manufacture &/or Repair) | Location               | Approvals   | Volume - Small, Medium, Large | Double-sided | Multi-layer 4-10/10-20-20-30 | Metal PCBs | Flexi / Flexi-Rigid | Obsolescence Solutions | Modifications | Prototyping |
|-----------------|-----------------|--------------------|--|------------------------|---|-------------------------------|--------------|------------------------------|------------|---------------------|------------------------|---------------|-------------|
| Elvia PCB Group | +33 233 765 200 | www.gepcb.com      | M/B  | France, Tunisia, China | AS9100, PRI-NADCAP, ISO-TS16949, ESA, UL, ISO9001, ISO14001                       | S/M/L                         | Y            | 1-30                         | Y          | F, F/R              | Y                      | Y             | Y           |
| Graphic Plc     | 00441363 774874 | www.graphic.plc.uk | M  | UK/China               | AS9100, NADCAP, ISO 9001, AISI14001, OHSAS 18001, MIL 31052, MIL 55110, MIL 50884 | S/M/L                         | N            | 4-10                         | Y          | Y                   | N                      | Y             | Y           |

## Contract Manufacturers Buyers' Guide

| Manufacturer          | Telephone          | Website                     | Turnover | Location      | Approvals   | Employees | Number of Surface Mount Lines | BGA Capacity | Lead-Free Manufacturer | Prototyping | Design Capability | Full Turnkey | Cables and Harnessing |
|-----------------------|--------------------|-----------------------------|----------|---------------|---|-----------|-------------------------------|--------------|------------------------|-------------|-------------------|--------------|-----------------------|
| AWS Electronics Group | +44 (0)1782 753200 | www.awselectronicsgroup.com | £40m     | UK & Slovakia | AS9100, ISO9001, 13485, 14001, TS16949, IPC-A-610 Class 3, NADCAP | 430       | 11                            | Y            | Y                      | Y           | Y                 | Y            | Y                     |

## Advert Index

| Advert                     | Page         | Advert             | Page |
|----------------------------|--------------|--------------------|------|
| Astute                     | 23           | Fusion Worldwide   | 11   |
| Central Semiconductor Corp | 21           | Lemo               | 8    |
| Coilcraft                  | 17 & 22      | Microchip          | 13   |
| Component Sourcing         | 25           | Mouser Electronics | 9    |
| Digi-Key Electronics       | FC, IFC & 12 | PEI-Genesis        | 15   |
| ECIA (Trusted Parts)       | 7            | Rochester          | BC   |
| Euroquartz Ltd             | 16           | TCL Elektronika    | 10   |
| FC Lane                    | 14           |                    |      |



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