

ELECTRONICS

MAY/JUNE 2022

Sourcing

EUROPE

AN MMG PUBLISHING TITLE



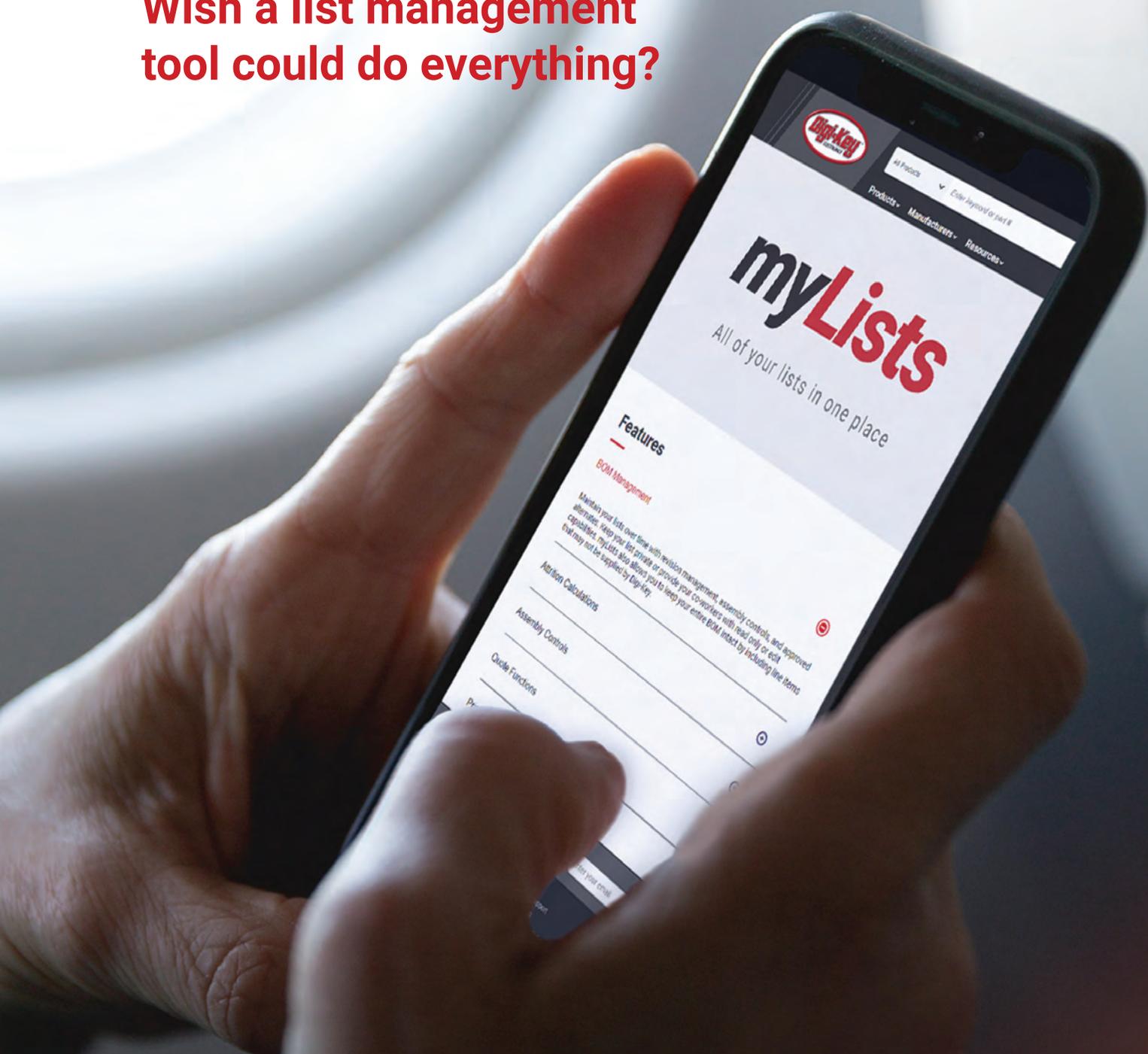
**AEROSPACE
OBSOLESCENCE:
DEPLOY YOUR
STRATEGIES EARLY**

Long to-do list?
Make it shorter.



DETAILS INSIDE

Wish a list management tool could do everything?



Check that off your list.

myLists lets you instantly generate quotes, check in-stock items, lead times, and more with one easy-to-use solution. Now you can cross “work more efficiently” off your list for good.

Give myLists a try today at digikey.com/mylists





On the cover – May/June 2022

Aerospace obsolescence: deploy your strategies early
page 29

Editor's Word



Show me the incentive

Today's technically complex, globalized world can easily become a confusing place. To help me make sense of things I have amassed a collection of useful phrases which I occasionally deploy. As I write this leader my current phrase of choice is: 'show me an incentive and I'll show you the future'.

The incentive, unsurprisingly, is the rising cost of energy. The future, accordingly, is efficiency.

Nothing happens on this planet without some form of energy being involved, from the food individuals consume, to the fuel they pour into their vehicles.

Personally, I feel as though I have lived through energy's heydays. I was born into an era of energy blackouts but since then energy has become more abundant, reliable and affordable. Sadly, nothing lasts forever and energy, in its different forms, is under siege on many fronts.

My stoic response is to remind myself that it is pointless worrying about the aspects of this beyond my control and focussing my attention on what I can control. One thing I can do is pay attention to the efficiency of the powered products I use.

When designing an electronic product, the engineering team will need to balance the bill-of-material's cost versus the end product's energy efficiency. From today, I imagine that balance will start tipping towards the latter. A one-off increase in the purchase price of a product is looking more appealing when compared to a lifetime of energy savings.

Jon Barrett

NEWS



Multizone time-of-flight sensors in stock

04

CONNECTORS



Future of HDMI connectors

20

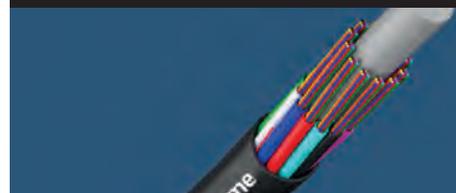
FREQUENCY



Trends, supply chain and looking forward

24

CABLE PRODUCTS



More fibres in less space

31

BUYERS' GUIDE



All the facts and figures to help you buy

32

Contact

ELECTRONICS **sourcing** **mma** PUBLISHING LIMITED

EDITORIAL

Managing Editor: Jon Barrett
jonb@electronics-sourcing.co.uk
Contributing Editor: Amy Barker
amyb@electronics-sourcing.co.uk

ADVERTISING

Director of Sales: Emma Evernden
emma.evernden@electronics-sourcing.co.uk
Sales Executive: Jim Powell
jim.powell@electronics-sourcing.co.uk

DESIGN

Production & Design Manager: Josh Hilton
josh.hilton@electronics-sourcing.co.uk
Junior Creative Artworker: Tom Claydon-Smith
tom.claydon-smith@electronics-sourcing.co.uk

CIRCULATION

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

PUBLISHER

Mark Leary
mark.leary@electronics-sourcing.co.uk
Director of Operations: Denise Pattenden
denise.pattenden@mmgpublishing.co.uk

Issue 98, Vol.15 No.03

Published 6 times per year
by MMG Publishing Limited
ANNUAL SUBSCRIPTION:
EU Countries €60 Rest of World €150

MMG PUBLISHING LTD
Suite 2, 1-3 Warren Court, Park Road,
Crowborough, East Sussex TN6 2QX
Tel: +44 (0)1892 613400
Fax: +44 (0)1892 613402
Printed by: Pensord Press Ltd
Electronics Sourcing is printed on
sustainably sourced paper stock
ISSN 2043-9504
© 2022 MMG Publishing Ltd

ecia
Connect. Influence. Optimize.

Articles appearing in this magazine do not necessarily express the views of the Editor or the publishers. Every effort is made to ensure the accuracy of information published. No legal responsibility will be accepted by the publishers for loss arising from articles / information contained and published. All rights reserved. No part of this publication may be reproduced or stored in a retrieval system or transmitted in any form without the written consent of the publishers.

View current editions online

www.electronics-sourcing.com



Investing in fibre to the antenna and more

Rosenberger has announced increased investment in its worldwide Site Solutions business, designed to enhance and advance its expertise in supporting customer infrastructure connectivity requirements in areas including FTTA/PTTA and low-PIM coax transmission lines including coax jumper cables.

Global EVP of Rosenberger Telecommunication Business Area, Marc Käumle, said: "The Rosenberger Site Solutions Group is well-known for its excellent on-site support and focus on meeting customer expectations, being a reliable and trusted partner instead of just a supplier. In offering customers a highly responsive single source end-to-end solution, Rosenberger enables them to always deliver on challenging roll-outs, respond more quickly to market opportunities, and reduce their total cost of ownership."

Rosenberger's CEO, Eric Kueppers, added: "Driven by 5G and the ongoing increasing demand of broadband services and connectivity across end-user, enterprise and verticals, Rosenberger delivers best-in-class on-the-ground support to our global mobile operators and OEM customers."

rosenberger.com

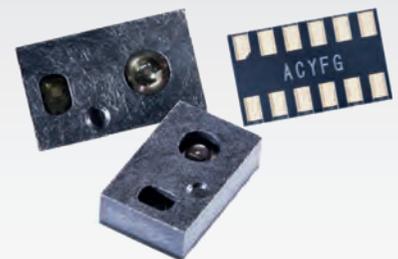
Expanding 3D flash memory capacity

Kioxia Europe has announced construction of a new fabrication facility at its Kitakami plant in Iwate Prefecture, Japan for production of its proprietary 3D flash memory BiCS FLASH. Construction is expected to complete in 2023.

The Fab2 facility will utilize AI-based manufacturing to increase production capacity of the entire Kitakami Plant. This will help the company expand its business organically and take advantage of the medium to long term growth of the flash memory market driven by the accelerating adoption of cloud services, 5G, IoT, AI, automated driving and the metaverse.

Kioxia Corporation's president and CEO, Nobuo Hayasaka, said: "The construction of Fab2 is a key milestone for Kioxia to further strengthen our strategic development and production capability for advanced memory products, so that we will be in an even better competitive position to address the increasing market demand for memory products."

www.kioxia.com



Multizone time-of-flight sensors in stock

Mouser Electronics is now offering the TMF8820, 21 and 28 multizone time-of-flight sensors from ams Osram. These direct-time-of-flight (dToF) sensors offer a 5m detection range, while the devices' multi-lens array widens the field of illumination.

The sensors are built using single-photon avalanche diode (SPAD) array, time-to-digital converter (TDC) and histogram technology. They feature an associated vertical-cavity surface-emitting laser (VCSEL), while the lens on the SPAD supports a dynamically adjustable field of view up to 63deg.

Mouser states these versatile sensors enable detection of the target area in multiple zones with extremely precise measurement results. They can also detect multiple objects per zone, letting automated robots gain additional sensory awareness and provide early alerts to potential obstacles.

All raw data processing is performed on chip and the devices report distance information and confidence values through an I²C interface. Applications include mobile phone cameras, object detection, collision avoidance, presence detection and light curtains.

TMF8820 and TMF8821 models are in stock, while the TMF8828 is available to order.

www.mouser.com

Interpower® NEMA Rewirable Plugs & Sockets



Interpower offers a full line of rewirable or “hand-wired” NEMA 5-15, 5-20, 6-15 and 6-20 plugs and sockets in addition to their molded line. These plugs and sockets are made of shock-resistant nylon with beveled housings for smooth sliding across surfaces.

Interpower NEMA rewirable plugs and sockets contain special terminal-tightening screws that accommodate Phillips or blade screwdrivers. As the screws tighten, the compression against the flange pushes the screwheads upward to tighten against a steel lug ensuring the screws lock in place.

The terminal and cord-grip screws come in a ready-to-use “open” position for fast installation. A universal clamp prevents wires from pulling free. The wires are sealed from dust, and the wire-entry holes are spaced

closely together for easy insertion into funnel-shaped guides eliminating tinning—tinning may lead to melting and arcing. The plugs come in straight or locking blades, the latter securely holding the connections in place.

- **In-stock hospital-grade cords ship the same day!**
- **Value-added options include lengths, colors, labeling and packaging**
- **No MOQ**



Order Online! www.interpower.com

Business Hours: 8:30 a.m.–5 p.m. GMT



In Brief

Single is more

Harting, Analog Devices and Würth Elektronik have joined forces to promote Single Pair Ethernet. Under the motto Single is More and in cooperation with Mouser, a joint landing page has been created. To strengthen the industrial use of the Ethernet variant the four companies summarize their matching products. www.we-online.com

Focus on connectivity

With over 70,000 TE products in stock, Mouser offers an ever-broadening selection of the newest TE interconnect, passive, and sensor solutions, adding new products every week. One example is TE's 2.0mm Signal Grace Inertia connectors, designed to offer a compact and space-saving design, 50VAC voltage rating and two to 10 positions. www.mouser.com

BattVO still in approval

New battery regulation (BattVO) planned for 1.1.2022 is still in the voting process, probably in the first half of 2022. The major goal of BattVO is: more resource conservation, less environmental impact, more recycling and higher minimum collection rate. Other points include minimum durability, transparent supply chain, no fixed installation in electrical devices and multiple use. www.fbdi.de

Understanding European EMS

The European EMS industry grew nine per cent from 2020 to 2021 to exceed 44 billion Euros according to the annual survey results collected and analysed by in4ma. In key takeaways, the top 109 companies, while representing less than six per cent of the overall companies in Europe, generated nearly 75 per cent of the production value. in4ma.de



Optical technology Europe wide

Rutronik has extended its existing franchise agreement with ams Osram to include the full product portfolio in the EMEA region. This partnership completes Rutronik's existing product portfolio of sensors, lighting and visualization products for applications in automotive, industrial, medical and more.

Ams Osram's vice president global distribution, Barron Crosby, said: "For decades there has been a strong and successful partnership with Rutronik, one of the leading distributors in our European distribution network. The franchise expansion means Rutronik will benefit from the

entire ams Osram product portfolio comprising of sensing, visualization and lighting products."

Rutronik's chief marketing officer, Markus Krieg, added: "It must always be about acting in the interests of the customers. With the expansion of the franchise, we are succeeding in doing just that, because the benefits are clear to see. We complete the high-quality, innovative technology and product portfolio of ams OSRAM and combine this with our specific expertise and services."

www.rutronik.com

ISO13485:2016 certification underpins medical manufacturing

Linxens' Mantes-la-Jolie plant has received ISO13485:2016 certification, for the design, industrialization and manufacture of sub-components for medical devices. The site is the group's first to receive this certification, letting it manufacture microcircuits on flexible substrates for medical device manufacturers.

Linxens' COO, Arnaud Brunetière, said: "The medical sector is currently undergoing a real transformation, with the arrival of new technologies that can be used in a number of ways: to combat medical deserts via telemedicine booths; to promote the early detection of illnesses with individual medical devices; and to shorten hospital stays through remote monitoring."

The Mantes-la-Jolie site was chosen to develop the group's medical activity, in particular because of the R&D capacity on site, with teams of 35 engineers and technicians that will grow in the coming years.

www.linxens.com

Buying into secure networking

Avnet Silica has announced availability of Miromico's Microsoft Azure Sphere enabled LoRaWAN gateways, enabling monitoring, tracking and management of data in buildings, factories, hospitals, agricultural, retail and smart cities. Integrating the platform from qiiio, the gateway supports cellular, Wi-Fi and Ethernet connectivity, with deployment and automatic management.

Regarding security, the Azure Sphere platform provides multiple layers of security to help guard the gateways against threats. It can be deployed flexibly to secure existing equipment and building protection into new IoT infrastructure development. Error reporting and automatic security update services help users stay ahead of current and evolving threats.

The platform also provides guaranteed maintenance for gateways throughout their operating lifetime, automatically handling security maintenance tasks such as daily authentication of hardware and software. Close integration between the platform and Miromico's gateway hardware enables a failsafe mechanism for over-the-air (OTA) updates, letting customers remotely upgrade gateways without fear of them becoming unreachable due to a glitch during the update.

www.avnet-silica.com





TrustedParts.com

Built by the companies you know and trust.

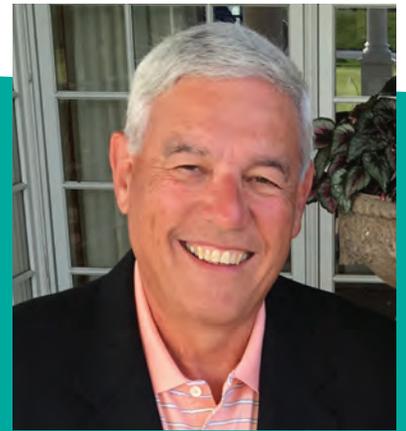


- ✓ Best defense against counterfeit components
- ✓ Proper packaging and handling
- ✓ Fully warrantied and supported by the manufacturer

FACTORY
AUTHORIZED

Search authorized distributors at  [TrustedParts.com](https://www.TrustedParts.com)

Unravelling global supply chains, a catalyst for smart factories



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

John Denslinger explores the idea that the cost savings offered by smart factories, Industry 4.0 and AI lay the foundations for a new generation of localized supply chains

Global supply chains • By John Denslinger

Since the early 1980s, global supply chains were developed with cost minimization as the driving force. Given that as the prime metric, success was commonplace and adoption flourished. In the decades that followed, combined advancements in systems, communication technology and transportation modes helped spearhead more complex multinational networks further lowering operational and procurement costs. The ability to build anywhere, in any country, across any region seemed limitless.

It was limitless until a series of unrelated disruptions eroded confidence in global supply chains. First there was an earthquake and tsunami in Japan, then extensive flooding in Thailand, followed by a US-China trade and tariff rift that continues to this day. Covid 19 hit next. Country after country locked down and rules of engagement differed greatly. It soon became abundantly clear the old metric of cost minimization wasn't nearly as important as sustaining supply at any cost. The final and most devastating disruption surfaced with the Russian invasion of Ukraine. The conflict is a sad reminder of growing geopolitical risk.

Foreign sourcing has always been a supply necessity. Typically, we think in terms of production and assembly, but the war and resultant sanctions highlighted a raw material risk as well. Crude oil and natural gas aside, Russia is a major exporter of critical minerals. Deloitte Insight notes 30 per cent of the world's supply of platinum/palladium, 13 per cent of titanium and 11 per cent of nickel comes from Russia. The war also closed two massive neon producing plants in Ukraine curtailing gas exports. Neon, used in lithography, will not immediately impact semiconductor production (adequate reserves reported), but a prolonged disruption could aggravate already long lead times. All this to say, products like electronic components, automotive parts, battery assemblies, etc rely heavily on these upstream commodities. Since critical minerals are usually negotiated in multiyear contracts, sourcing alternatives may be possible, but at what price?

Mitigating geopolitical risk by securing our industrial supply chains is gaining high-level attention. Raphael Bostic, Atlanta Fed president, recently said: "The tragic war in eastern Europe will further momentum towards reorienting production and supply networks away from pure cost minimization and more towards resilience and risk tolerance." Mr Bostic foresees production moving closer to final markets, bringing with it maximum reliability and supply assurance.

Adam Posen, economist and president of Peterson Institute, goes even further stating: "It now seems likely the world economy will split into blocs, each attempting to insulate itself." It would seem both gentlemen see security, resilience, sustainability and risk dominating the decision-making landscape in the near term.

So, does it really have to be an either/or proposition? Can resilience, risk and security co-exist with cost minimization? The answer could be yes if replacement supply chains are localized.

Smart factories! A 2019 Deloitte survey concluded companies achieved 10 to 12 per cent average gain in manufacturing output, factory utilization and labor productivity investing in smart factory technology. With additional advances in AI plus Industry 4.0, results should be even better.

The solution seems clear: localizing can offset much of the escalating international transport costs and global risk; and smart factories in markets served can offset most, if not all, cost minimization loss. Resilience, risk and security are secured without losing cost minimization. Perhaps, the unravelling of global supply chains is just the catalyst needed for smart factory acceleration.

FUSION IS TRANSPORTATION



FUSIONWORLDWIDE



SCAN HERE

SEARCH ELECTRONIC COMPONENTS

Do you really need a High Reliability Connector?



By David Pike on behalf of Mouser Electronics,

Choosing connectors for demanding applications is now more important than ever. Sophisticated devices are being deployed into harsh environments as industrial users adopt the latest technologies. Designers need to provide connectivity in the toughest conditions, and many are turning to high reliability solutions.

High reliability is the gold standard of the connector industry. It is a term that is often used to describe products with a military pedigree. For decades, manufacturers have offered connectors that conform to military specifications. Subjected to rigorous testing, connectors with a MIL-DTL or BS part number deliver superior reliability in the toughest environments.

This superior performance does come at a price, however, and an expensive MIL-Spec or BS part number is not the only way to obtain reliability. In an era of extended lead-times, rising costs and logistical challenges, perhaps now is the time to stop focussing on high reliability and instead start talking about appropriate reliability.

Mating Cycles

When choosing a connector for demanding roles, most manufacturers publish a minimum mating cycle count in their specifications, as it provides a good indication

of how long a connector will last. A military specification connector – the archetypal high reliability solution – might boast a published performance of 500 or even 1000 mating cycles. However, the humble USB connector that has been with us for nearly 3 decades is designed to provide up to 5000 mating cycles, and there are even versions available that will provide a service life of 20,000 mating cycles or more.

Almost all manufacturers who make products conforming to a MIL standard also make the same connector under their own part number. These are usually made on the same production line, using the same materials, and deliver the same performance. As an example, the ever-popular D38999 Series III circular connector is available from Amphenol as the TV, from Souriau as the 8D and from ITT Cannon as the KJA families.

The same is true for D-Sub connectors sold as M24308 and micro-D connectors as M83513. Finding out what manufacturers call their equivalent product can save a great deal of money.

An Alternative Choice

Mating cycles are not the only measure of a connector's reliability. The environment in which the connector will be used must also be considered. We talk regularly of IP ratings, shock and vibration, and resistance to electromagnetic interference

(EMI). The need to perform even under these conditions will have an enormous effect on the design of any connector. There are plenty of connectors that will provide excellent service.

This is important to remember, because connectors do not have to be designed for military specifications to be capable of military-grade performance. Manufacturers like LEMO have been making connectors for decades, subjecting them to a range of tests which prove their suitability in a wide range of industries.

Designed for use in applications where failure is not an option, high reliability connectors provide superior performance in tough conditions. However, the next time you need to choose a new product, ask whether the gold standard is the best solution, or even if a high-reliability connector is needed at all. The connector industry is huge and diverse, and the right solution need not have a high price tag to deliver high performance.

About the author/Mouser

David Pike is a freelance writer for Mouser Electronics. As a global authorised distributor, Mouser offers the world's widest selection of the newest semiconductors and electronic components — in stock and ready to ship™. Mouser's customers can expect 100% certified, genuine products that are fully traceable from each of its manufacturer partners. To help speed customers' designs, Mouser's website hosts an extensive library of technical resources, including a Technical Resource Centre, along with product data sheets, supplier-specific reference designs, application notes, technical design information, engineering tools and other helpful information. For more information, visit <https://www.mouser.com/>.

eBOM.com

The GAME CHANGING site for
the electronics industry

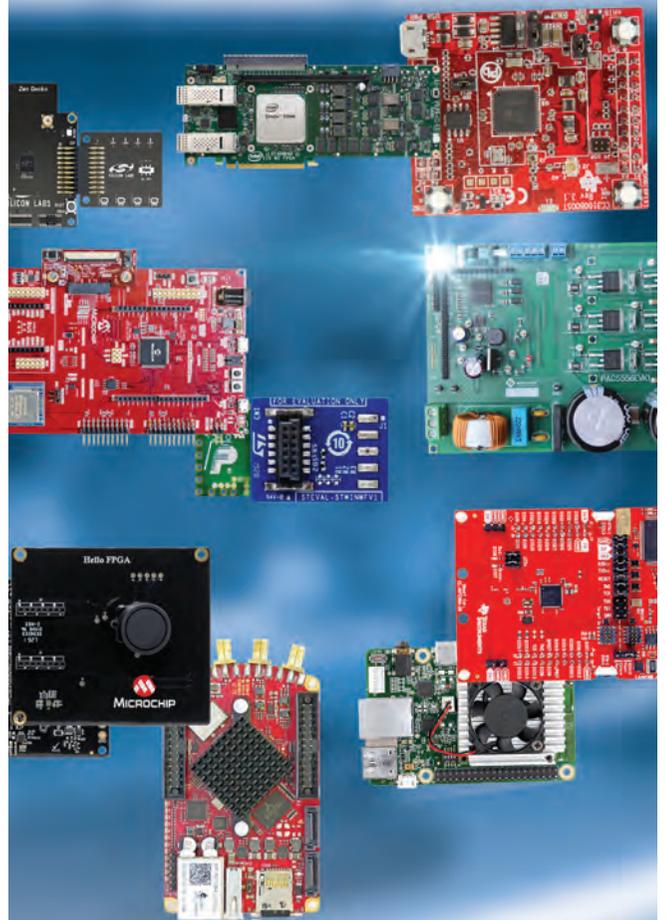


powered by
 TrustedParts.com

**DISCOVER | SOURCE |
COMPARE | BUY**

Development tools in one location

Thousands of tools from hundreds
of trusted manufacturers



Choose from our extensive selection at
[mouser.com/dev-tools](https://www.mouser.com/dev-tools)



**MOUSER
ELECTRONICS**

Exclusively sponsored by



FUSION WORLDWIDE EXTENDS OFFICES TO TOKYO, JAPAN

Continuing its rapid global expansion, Fusion Worldwide is proud to announce the opening of a new office in Japan. Located in the Marunouchi district of Tokyo, this is the company's fourth location in the region, with existing offices in Singapore, South Korea and China.

Japan has the world's third-largest economy and is home to many of the world's largest consumer electronics, automotive, computing and industrial automation brands.

"While we have been supporting customers in Japan previously, we saw a sharp increase in Japanese businesses reaching out to us," says Olivia Seohyn Ju, Director of Sales in Korea and Japan. "Our sourcing services have become a necessary addition to companies' supply chains, particularly within the past couple of years as the market navigates ongoing and significant component and material shortages."

The addition of Japan to Fusion Worldwide's footprint in Asia demonstrates the commitment to better understand customer needs and expectations to quickly fulfill them.

"Suppliers with world-class quality assurances and capabilities are highly-sought after in this market," says Seohyn Ju. "Fusion Worldwide is the global leader."

About Fusion Worldwide

Fusion Worldwide was founded in 2001 and is headquartered in Boston, Mass. Since its inception, the company has grown into a \$3 billion global business with 14 offices throughout the Americas, EMEA and APAC. On top of having multiple quality and logistics hubs, Fusion Worldwide recently

acquired Prosemi, Singapore's largest electronics test house with over 22 years of experience. With the addition of Prosemi, Fusion Worldwide is now a one-stop shop for turnkey projects utilized by the semiconductor industry, CEMs and OEMs.

Ranked as the 11th largest electronic component distributor in the world, Fusion Worldwide focuses on providing efficient and innovative solutions for its valued customers. Fusion Worldwide serves customers across numerous verticals from aerospace to personal computing, industrial automation, automotive, medical, consumer electronics, telecommunications, contract manufacturing and more.

To find out more about Fusion Worldwide, visit www.fusionww.com



FUSION IS TRANSPORTATION

SEARCH ELECTRONIC COMPONENTS 





TrustedParts.com

Genuine electronic components from
only authorized sources.

Enter a component part number



54B+

PARTS
IN STOCK

25M+

UNIQUE PART
NUMBERS

4K+

LEADING
MANUFACTURERS

2.3M

USERS
PER YEAR

120M

SEARCHES
PER YEAR

ALWAYS REAL-TIME PRICING AND AVAILABILITY

Search authorized distributors at  **TrustedParts.com**

Exclusively sponsored by



Customer Trust is Key to E-Commerce Success

Ian Wallace, Vice President, Americas & EMEA Business Development, Digi-Key Electronics

In a crowded digital marketplace where it's tough to stand out, Digi-Key focuses on earning customer trust by making the customer experience as personalized, seamless and easy as possible.

We know how important it is for customers to source products that are in stock and access all the information they need to ensure they're getting the correct product the first time. We value and listen to customer feedback and input and have made significant investments in continuously improving the Digi-Key website to meet their changing needs.

Trust is Essential

We've earned our customers' trust by having powerful search tools, accurate product data, industry-leading inventory levels and same-day shipping. Everything we do focuses on getting customers to the right part as quickly and easily as possible. Our team invests thousands of hours into researching every part on our website, ensuring that customers have access to verified product specs, compliance details and more.

Rich Search Features

Searchability is key to providing an effective user experience, and Digi-Key has invested in it heavily. As one of the industry pioneers, we have continually enhanced our shopping experience to ensure that customers can easily find, research and order components that meet their exact specifications, as smoothly as possible. For example, our rich parametric search filters provide many options to filter results in real time, find the exact parts customers need and save search filters for the next time they visit. We've also built out a robust part cross-reference feature to help identify similar products: our database

has 45 million proprietary cross-references, so when you're looking at a certain part, the site can show all the other identical or similar options.

Personalized, Localized Experience

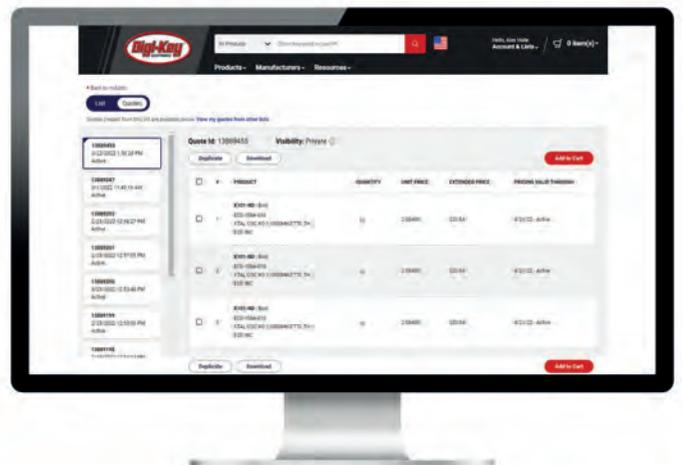
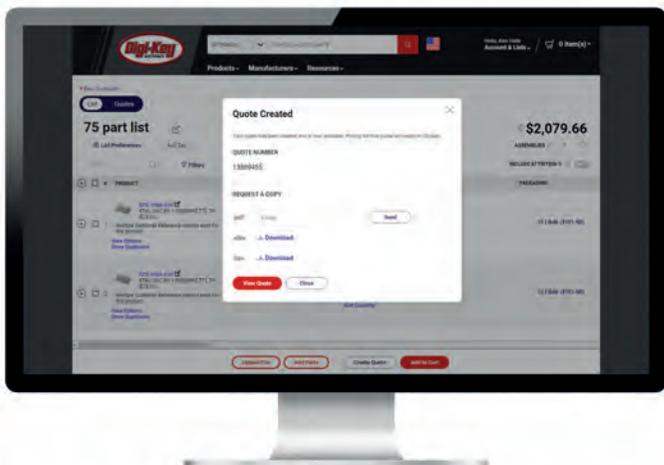
Because we do business with customers in 180 countries, our e-commerce site supports multiple languages and currencies. Digi-Key localizes experiences for different countries and regions to provide the most intuitive user experience to customers based on their location. We also tailor customer experiences based on their roles, interests and level of detail they prefer.

Continuous Improvement

Our e-commerce strategy is always evolving and improving: we're constantly looking for ways to enhance our digital platforms and offerings.

Launched last year, the Digi-Key Marketplace gives customers access to hundreds of thousands of new products, direct from suppliers through a singular shopping experience.

We also recently introduced the myLists feature, a consolidated list management system that streamlines customers' BOM Manager, Price and Availability (PANDA®), Favorites and Quotes into one convenient solution. Launching in May, myLists Quotes secures instant pricing for 30 days, plus fast access to stock availability and lead times. Our self-service myLists tools are easy to use, save you time and provide a better user experience with easier collaboration between purchasing and engineering, as lists can be shared with others in your organization. For more information and to use the myLists Quotes feature, visit the myLists landing page at www.digikey.com/mylists.



SPONSORED BY AVNET SILICA

“A Design Engineer’s Guide to 5G” – Avnet Silica’s new resource for designers

Now in the fourth year of its roll-out, the take-up of 5G is forecast to overshadow that of any previous cellular generation, with analysts estimating 2.7 billion connections by 2025. Before its launch, expectations were high over the impact that 5G would have on the global economy, and a wide range of applications, across multiple sectors, are now emerging to deliver this promise.

In this fast-paced and innovative environment engineers are constantly challenged to develop advanced 5G functionality for integration into next generation applications and devices. Recognising this challenge, Avnet Silica has created “A Design Engineer’s Guide to 5G”, an e-Book now available on their website at www.avnet-silica.com/5g

This eBook provides a comprehensive overview of 5G, containing a wealth of information on its

origins, capabilities, and applications. The key standards and technologies behind this latest mobile networking generation are described and its transformational power is illustrated through references to typical use cases along with details of current and emerging applications.

Starting with an overview of the various generations of cellular technology, the pressures on existing 4G/LTE networks are described, highlighting the drivers behind 5G’s development. Reference is made to the 3GPP standards process which governs the ongoing evolution of 5G and the reader is pointed to valuable sources of information on these standards.

The guide goes on to offer an insight into a 5G-enabled future, demonstrating how its core capabilities map on to a wide range of use cases. The transformative potential of this new networking technology

is further illustrated through a description of a range of existing 5G-enabled applications – in autonomous vehicles, remote telesurgery and the IoT.

To meet 5G’s ambitious specifications, engineers adopted a revolutionary approach to its design, using mmWave carrier frequencies and employing innovative technologies such as massive MIMO, beamforming, and advanced antenna systems, (AAS). An overview of these technologies is given in the later sections of this engineers’ guide, giving the reader an understanding of how 5G is delivered and an insight into the challenges of designing 5G-ready equipment.

The outbreak of the global pandemic in early 2020 initially threatened the 5G deployment, and analysts feared that the roll-out – and consequent economic value – would be compromised. Section three of this guide describes how these

concerns were unfounded as Covid restrictions obliged society to adopt virtual methods of communicating and interacting, both at work and in our leisure time. Although the Covid restrictions are now easing, many of the changes to our working and living practices are here to stay, further driving the business cases for a wide range of 5G-enabled applications.

5G’s substantial potential to deliver economic growth is dependent upon the continued emergence of innovative applications. To leverage 5G’s power these applications must integrate increasingly complex RF front-end designs along with sophisticated signal and data processing capabilities. The Avnet Silica Design Engineer’s Guide to 5G provides a valuable reference point for those embarking on their 5G journey.

GET STARTED WITH
YOUR 5G DESIGN

AN ENGINEER’S
GUIDE TO 5G

OUR PEOPLE ARE AT THE CORE OF WHAT WE DO



“Being passionate means being authentic as well as enthusiastic. Applying yourself without your full commitment can be very transparent and uninspiring, it’s just going through the motions. But being passionate and giving your all with full commitment and energy demands attention and is infectious, you get more if you give more in my experience”.

Catherine Read, HR Manager



“If your mind is filled with ideas, with new ways of doing things then you are creative. By accomplishing these ideas, you are innovative. By expressing these ideas awakens similar thinking in others and collectively improvements can be made or a new product invented. There is no creativity without failure, so keep trying and the best way to predict the future is to create it, so go do!”

Andrew Parker, Applications Engineer



“It’s the energy concentrated in the service of a particular goal. Anything that interferes with focus dissipates energy. Distractions are all around us, focus is key to our wellbeing and achieving our objectives. The more focus we give, makes for clarity, and takes away the stresses associated with that work. Managing focus creates an even workflow and enables growth not only towards your goals but that of your mindset too.”

Harj Handa, Supply Chain Specialist



PASSIONATE, INNOVATIVE AND FOCUSED

Each of us is built differently. Yet there are certain characteristics that connect the people of Astute.

Across our company, we have always had a strong sense of identity and purpose which are demonstrated through a set of core values which are being Passionate, Innovative, and Focused.

We are passionate about our people, our customers, and our suppliers. All three are equally as important.

To be innovative, you must create a landscape in which new ideas can be welcomed. We foster a culture that supports ideas and talent.

A focused business understands the customers’ market and their needs. We take care to fully understand our customers and how to serve them best.

We met the challenge of COVID with great tenacity and now, armed with these values: being Passionate, Innovative, and Focused - we are ready to take on the challenges of 2022.

We are looking for new people who share our values and want to be part of this journey. Get in touch to discover roles across multiple departments including Marketing, Finance, Sales and more.



SCAN
TO FIND
OUT MORE



SHORTAGES

FEEL LIKE AN UPHILL BATTLE?

With no clear end in sight, OEMs are really feeling the pressure when it comes to component shortages. The last couple of years have been plagued with a bombardment of macro-environmental challenges from staff shortages caused by covid to more recent raw material shortages effecting the manufacture of semiconductors caused by the Ukraine crisis. Astute are no strangers to adversity. Our team has the expertise and determination to find real solutions that work for you. Our in-house test lab, certified to aerospace and defence standards works to mitigate the risk of counterfeit material entering your supply. Our global sourcing team can locate and secure stock the moment it becomes available. If you are struggling to find stock contact us today. Let us take the weight.

SPEAK TO US ABOUT YOUR SHORTAGES



Specialist distributors expect another strong year for sales

Component demand remains healthy, prices are increasing and some component lead times are still long



James Carbone

Specialist electronics distributors are cautiously optimistic that strong component demand will continue through the year and sales growth will rise to high single-digit or double-digit levels this year.

Some specialist distributors express concern that electronics buyers scheduled orders last year for 2022 because of long lead times for crucial semiconductors and other components and that purchase orders would weaken this year. But lead times are still long for many parts and buyers may end up scheduling orders for 2023 later this year.

Greg Peloquin, executive vice president of power at Richardson Electronics Ltd, said in April that lead times for chips are mixed. "Some have improved but some have continued to extend. Overall it seems lead-times are consistently 24-36 weeks with some still in the 52 week+ range," he said.

He said Richardson has been working closely with its RF and power management technology partners to manage lead times to support customers. Demand for RF and power management chips this year is as robust as last year, he said. The satellite communications and 5G business segments are actually stronger than last year, according to Peloquin.

"It is amazing the revenue and booking records we have had in

the last couple of years in the middle of the pandemic," he said. "Our sales will be up over 60 per cent with a book-to-bill of 1.49 in the first nine months of our fiscal year," said Peloquin.

He added that demand for 5G infrastructure and green energy applications, the two main markets and applications that Richardson focuses on, "are extremely strong and we do not see any slowdown in 2022," said Peloquin.

Strong demand may be contributing to higher prices along with increases in material, fuel and transportation costs. "With all the issues now, the overall cost to make the product and then get it to the customer has increased," Peloquin noted.

He said Richardson's RF technology partners have increased capacity, which is helping keep lead times "at bay or improving them slightly." However, a lot of capacity being added "seems to be taken up by the automotive guys," said Peloquin.

Joel Levine, president of RFMW, a specialist RF and microwave distributor, said the distributor had 25 per cent sales growth in 2021 with strong demand from the defense, space, 5G and industrial segments.

Some buyers hesitate

He said business so far in 2022 has been healthy but some "customers in certain segments are taking a bit



Joel Levine, president of RFMW

"Some customers in certain segments are taking a bit of a wait-and-see attitude before they place large new orders"

of a wait-and-see attitude before they place large new orders." Some customers last year may have already bought enough parts to be "safe" and now may be hesitant to place orders for components with long lead times.

"We can't tell if people have been building their inventories," said Levine. However, with lead times being long many "smart customers scheduled things out in the middle last year" to make sure they had enough parts for 2022," he said.

Levine said prices for chips increased last year but in the first quarter of 2022, price increases seem to have slowed. "But it is still early

in the year and suppliers seem to have a price increase cadence now," he said.

"It feels that certain suppliers are increasing prices every quarter," said Levine. "I'm not saying they always do but they are watching their pricing very carefully."

Levine said he was "cautiously optimistic" for low double-digit sales growth in 2022. "As of now demand is steady. Time will tell regarding the effects that the macro economy and global disruptions will bring," he said. Levin added if the supply chains hold up, "it's going to be a really strong year. It's not impossible to see double-digit growth for this year," he said.



Robust connector demand

Connector specialist distributors also say that interconnect demand so far in 2022 remained as strong as last year. "Demand has been robust across all sectors of our business owing in part to rebounding markets such as commercial aerospace and energy," said Ernie Schilling Jr., president and CEO of Powell Electronics. In addition, there has been "pent up demand due to supply chain delays or aggressive ordering in anticipation of looming price increases," he said.

He said some connector brands have had longer lead times due to "planning and inventory models adopted by those companies. Those with robust raw material inventories have fared well. Those with just in time, price-driven supply chains with minimal raw material inventories have had the hardest time delivering," he said.

Connector prices continue to rise. Connectors have had "consistent price increases" quarterly or monthly depending on the raw materials and those parts, said Schilling. However, supply chain issues with connectors have not been as acute as the issues facing semiconductor manufacturers.

He said in the connector industry there has been "quite a bit of manufacturing movement from region to region to match customer base consumption or seek out lower cost structures," said Schilling. However, there has not been a lot of capacity increases.

Connector shipments rise

Schilling said there should be healthy growth this year. There should be a low-single digit increase in bookings this year but shipments will likely remain in the high single digits by year's end.

Certain market segments and applications will help drive connector demand over the next several years. "Stressful times, and environments always seem to inspire innovation and new technology leaps," said Schilling. "We see lots of hot flash points of innovation in medical, consumer, space and sensing devices," he said.

John Hufnagle, vice president, North American sales and engineered solutions at PEI-Genesis, said that business has rebounded since Covid disrupted the electronics industry in 2020. Connector demand has been healthy across all customer segments, he said.

John Hufnagle, vice president, North American sales and engineered solutions at PEI-Genesis

"We currently have a record backlog. Connector demand in our product portfolio has remained steady for the last 6 – 9 months"



"We currently have a record backlog. Connector demand in our product portfolio has remained steady for the last 6 – 9 months," said Hufnagle. He noted that there are "pockets of customers" who over ordered last fall due to supply chain issues. Now demand is steady."

Connector tags increase

He said there are a select number of product families that have long lead times, but "we don't see any real extreme changes" with lead times. However, connector prices have increased. The amount and number of price increases vary supplier to supplier and product family to product family. There were many price increases last year and the price hikes are continuing so far in 2022, said Hufnagle.

"In some instances, we have seen multiple increases over the course of the last year and there may be further increases as we traverse the year," he said. "These are some very different and challenging times we are navigating." In many cases price increases range from 3 to 7 per cent.

Hufnagle noted that PEI-Genesis's business is impacted by materials cost increases because PEI-Genesis is a value-

added distributor. PEI-Genesis buys component parts to build finished connectors. There are different insert materials, finishes and shell materials, most of which have been impacted in the raw materials market in some way, he said.

"We may receive an increase on one component of a connector that has a huge impact on the part as a finished good," said Hufnagle.

Besides the rising material costs, connector manufacturers face other challenges, including staffing and logistics. "Those challenges do not at this time look to be changing for the better very rapidly," said Hufnagle.

Wayne Nelson, general manager at Benchmark Connector, said due to some material shortages and cost and transportation issues, lead times are going to increase for the foreseeable future. He added there have been more price increases this year "Every supplier has increased prices in 2022 and more are likely," he said.

Despite raw materials, logistics and staffing issues, Hufnagle expects healthy high single-digit growth in the connector business in 2022.

Future of HDMI connectors

PEI-Genesis' European director of product and purchasing, Shaun Findley, explores the evolution of HDMI connectors and how they can be used in harsh environments while maintaining operational performance

Using high-definition multimedia interface (HDMI) connectors to transmit audio and video data at high speeds is the basis of modern entertainment and communications equipment. However, this technology is rapidly moving beyond TVs and computer monitors into many high-pressure applications.

HDMI connectors are an essential input-output (I/O) component in almost every modern piece of entertainment and communications equipment. By transferring uncompressed digital signals from a suitable audio-video (A/V) source to receivers and displays, these connectors can link everything from computer monitors to TV and games consoles.

Although originally developed for the commercial systems we find in our homes and workplaces, HDMI

connectors have evolved, and manufacturers have modified them over the years to ensure successful operational outcomes in challenging environments. These include military, medical and aviation applications, where electrical connections must be rugged and versatile.

Serving a need

HDMI connectors were developed to help simplify pre-existing connectors, namely the Digital Video Interface (DVI) and analog Red Green Blue (RGB) component cables. At the time, DVI connectors had a reputation for problematic mating and un-mating that would either damage the connector itself or the source. RGB cables had their own issues: because they would break down the source signal into three parts, interference often occurred, and the connections were

not always secure. Therefore, HDMI cables were engineered to streamline the mating/un-mating process and reduce the number of connectors required from three to one.

Manufacturers began developing HDMI cables in 2002 and there are now five different types available: The 19-pin Type-A is the standard and most widely used, found in almost every TV and computer monitor. Type-B was launched with the original standard in 2002 but was never used in products because of the introduction of HDMI 1.3, where the speed of a single link exceeded that of the old dual link. Type-C mini connectors are used in portable equipment, like DSLR cameras and satnavs. Meanwhile, Type-D connectors were introduced specifically for audio-visual connectivity in



HDMI connectors were developed to help simplify pre-existing connectors, namely the Digital Video Interface (DVI) and analog Red Green Blue (RGB) component cables

small and portable devices and Type-E was designed for high-speed data transmission in automotive applications.

Modified technology

For applications in harsh environments, a connector's modifications are just as important as its type. Harsh environment HDMI connectors can include several different modifications, such as IP-rated sealing against contaminants, like fluids and fine particulate matter. Housings can vary to suit the environment, with available options including metals (e.g., copper alloy, nickel and aluminium), thermoplastics and fluoropolymers. For example, Sure-Seal® HDMI connectors are rated to IP67 to resist the ingress of dust, water, chemicals and other

contaminants. They also have copper alloy, gold-plated contacts and operate over a wide temperature range.

Overmoulding and combining the wire and connector is one option when using harsh environment HDMI connectors since this provides strain relief and ensures a more reliable performance by protecting it from challenging surroundings. Using a coupling or locking mechanism can also help to maintain a secure connection even when blind mate connections or vibrations are involved.

Applications in harsh environments

Since their creation, HDMI connectors have simplified interconnectivity for a wide range of

applications. Harsh environments include outdoor digital signage, vehicle displays, military avionics and even electronic flight bag applications. Factory automation and control, machine tools, robotics, building automation and test and measurement are also examples.

The common denominator in all these applications is that HDMI connectors must be made to withstand heavy-duty use and exposure to chemicals, water, oils and extreme temperature. Often, this means selecting a connector that meets MIL-SPEC or certain UL ratings.

www.peigenesis.com



HDMI connectors have simplified interconnectivity for a wide range of applications. Harsh environments include outdoor digital signage, vehicle displays, military avionics and even electronic flight bag applications

TCL Elektronika
printed circuits

RELIABLE
PCB
PCBA
Manufacturing
For The **Medical**
Devices Industry

ON TIME DELIVERIES
QUALITY CONTROL

Reliability Security Agile
Quality Safety

www.tclelektronika.com
sales@tclelektronika.com

DISPLAY
INDUSTRIAL SOLUTIONS
VISIONS

- 2" - 4.3" incl. Touch
- Object based Graphic
- USB, SPI, I²C, RS232
- Control and Calculation
- Digital I/Os, Analogue in
- As stand-alone or
- Connected to any μ C
- WYSIWYG Tool
- Waterproof mounting
- 1000 cd/m²
- Brilliant IPS Displays
- Demopack available

unitFTS020
unitFTS028
unitFTS035
unitFTS043

SMART HMI

www.lcd-module.com

Is this the big reset?

Euroquartz imagines a near future where the frequency sector experiences a significant reset, leading to the formation of new supply chains

For years the drive to force down crystal and oscillator prices has been all consuming. Factories in Asia have played their part driving down costs, often at the expense of profitability. As a small scale crystal and oscillator manufacturer, Euroquartz has long suspected this was unsustainable and eventually prices would rise to ensure manufacturers remained in business.

The Chinese business model has focussed almost exclusively on turnover and foreign exchange payments rather than profitability, creating almost total dependence of Western supply chains on the Chinese production base.

The current supply chain crisis is the culmination of a perfect storm combining the Covid pandemic, sudden upturn in 5G development in China and rapidly increased demand from recovering economies. The automotive sector, having virtually ground to a standstill during the pandemic, suddenly

turned the supply taps on while 5G manufacturers were ramping production, completely outstripping production capacity.

With demand so high, now is the perfect time to rebalance pricing more in favour of manufacturers, so raw material suppliers have raised prices which are reflected in end customer pricing. Lead-times of >52-weeks are being seen, with some common oscillators going to 32-weeks, due mainly to ceramic package and semiconductor shortages.

To underpin their own manufacturing, customers are placing orders for 12 to 18-months in advance. However, the difficulty is knowing what the unit price will be at the time of shipment, presenting a headache for suppliers who have no indication of the final price.

Furthermore, duplicate orders are potentially tying up capacity unnecessarily as desperate manufacturers place orders on several

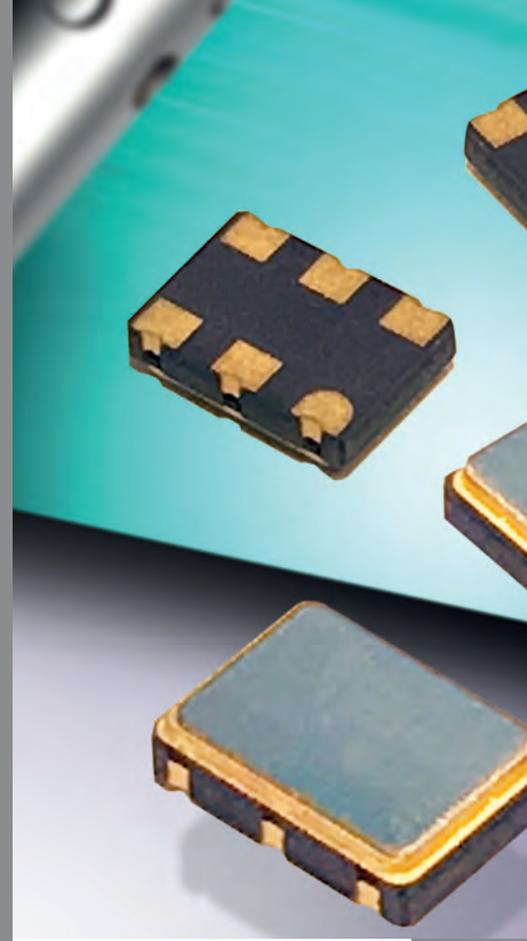
sources to try and get product from the first available supplier. Panic ordering, as such.

Thus, many order books are looking healthy, although shipments are not likely for six to 12-months leaving potential cashflow issues. With duplication likely leading to future cancellations, a further layer of uncertainty is baked into the supply chain.

Raw material suppliers are taking orders and, at the time of shipment, advising 30 to 50 per cent increases, leaving manufacturers with a choice of taking or leaving it.

Fluctuating exchange rates are, perhaps surprisingly, the lesser problem compared with sudden increases in unit costs. With energy costs also spiking upwards, there is potential for further pricing pressure.

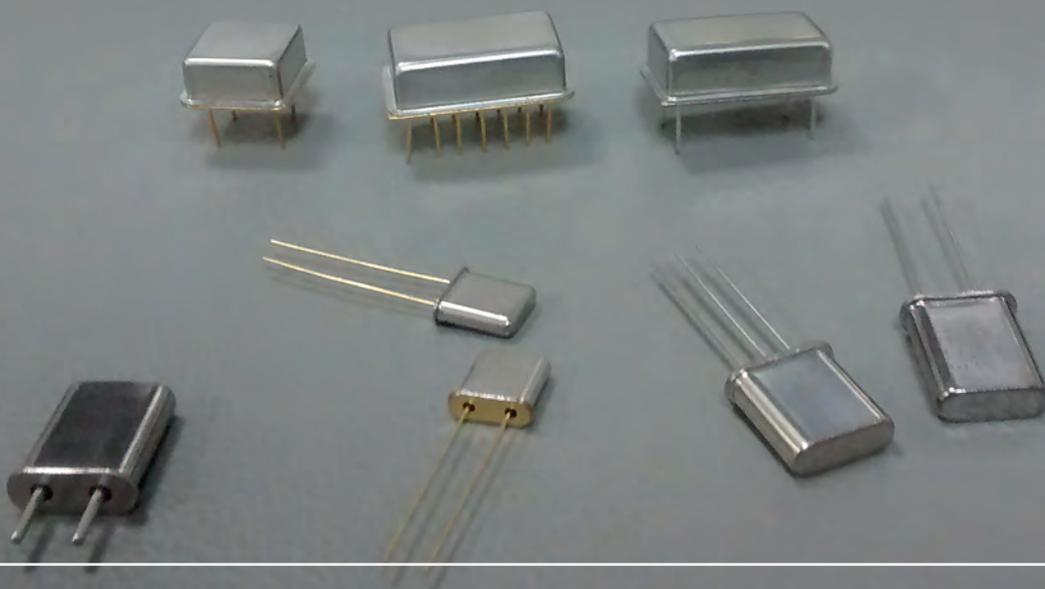
With semiconductor houses at full stretch due to silicon wafer shortages and such high demand, they have started rationalising

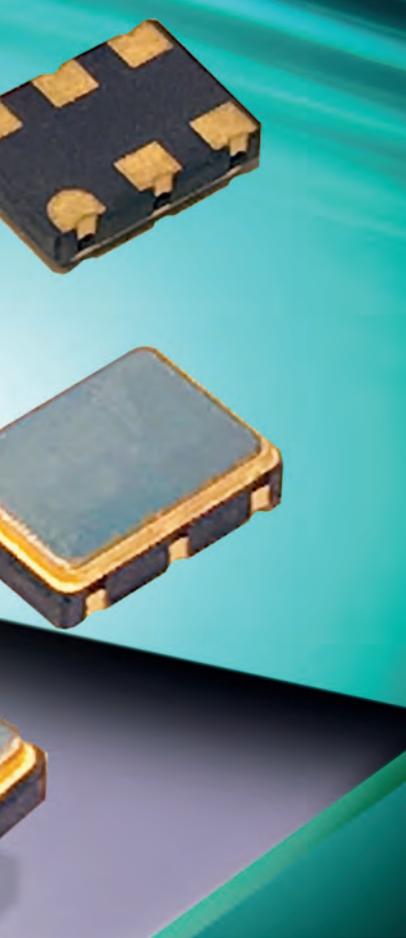


JF high frequency ultra-low jitter oscillators



The Chinese business model has focussed almost exclusively on turnover and foreign exchange payments rather than profitability





with most optimistic forecasts suggesting sometime in 2023.

In the meantime, companies are under great pressure to procure components at all costs to build their products, creating frustration all round. The truth is that despite suppliers' best efforts there is little that can be done as the global market is beyond the influence of all but the largest companies.

Over dependence on Asian suppliers has led to a reality check as to how hamstrung the West has become and serious discussions are taking place to re-investigate re-shoring and build more supply chain resilience.

From a security perspective, many military commercial off-the-shelf (COTS) programmes are in precarious positions since they lack the high-volume requirements to influence suppliers. It takes considerable time and resources to qualify COTS parts and more manufacturers are trying to avoid Asian sources where possible. Unfortunately, so great is the dependence on China, this is almost impossible.

It remains to be seen if more production returns to Europe—there are signs that semiconductor production may become more prevalent in Europe—but these are long term aspirations that will not solve the current difficulties overnight.

So, what does all this mean for the future? The cost base will certainly change as it is hard to imagine unit prices falling back to pre-pandemic levels. There may be more production returning to the UK and Europe if the respective governments provide incentives. Given the current environmental imperative, we may see more repairable equipment being produced to reduce the waste mountain. On this point, the startling statistic is that only approximately 12.5 per cent of electronic waste is recycled regardless of all the WEEE legislation.

Despite these problems product can keep flowing but it takes

good planning and supply chain information. Forward visibility of supplies is poor with suppliers unable to predict delivery time schedules and in some cases not accepting orders for certain products.

Investigating alternative design solutions to replace existing components is technically challenging for engineers and suppliers alike, as well as time consuming. This also requires product knowledge and engineering skills.

Customers and suppliers are working closely to overcome these problems and the situation is likely to continue well into 2022 and possibly 2023.

When we consider the issues raised in this article, it is not a wild speculation to suggest that a big reset is taking place and practices and supply chains are going to look very different in the future.

www.euroquartz.co.uk



From a security perspective, many military commercial off-the-shelf (COTS) programmes are in precarious positions since they lack the high-volume requirements to influence suppliers

their product ranges. Many less profitable products are being axed, with high drive clock oscillator chipsets offering a 50pF drive level being one prime example.

Another product suffering is the 7 by 5mm ceramic package which is seen as less profitable than the smaller sizes, with companies normally using 200,000 pieces per month only receiving 40,000pcs for instance.

Also, many products' built-in obsolescence has led to a repeatedly high component demand which is reaching a very high peak in today's market.

Knock-on effects of the above are being felt across the electronics industry leading to cashflow issues especially at EMS companies who are left with partially full assembly kits while awaiting one or two components before product can be built, shipped and invoiced.

Shortages also open the door for counterfeit products and inferior quality parts to enter the supply chain which introduces potential for added costs to verify parts or, even worse, failures in the field.

The most concerning aspect of the current crisis is that nobody has a clear indication of when things will improve,

ECS INC INTERNATIONAL

ALL NEW
MultiVolt™ Oscillators

ECS-1612MV Miniature HCMOS
ECS-2016MVQ Compact AEC-Q200
ECS-2520MVLC Low Current HCMOS

www.ecsxtal.com

Frequency control: trends, supply chain and looking forward

As OEMs develop new products, ECS Inc International's David Meaney encourages buyers to seek out a frequency control partner who can support their design journey

Over the past ten years, innovations in quartz geometries and performance have driven the importance of timing solutions in embedded systems. With increasing performance come many questions about which part to use, where to source solutions and when they will arrive. These questions are emphasized by the global pandemic, supply chain shortages and demand for a seemingly infinite number of connected devices.

All modern circuits require frequency control (or stable timing) solutions to ensure processes run at exact intervals. Tuning fork crystals and oscillators are examples of frequency control solutions. A tuning fork crystal will be more cost effective but less precise than other methods. An oscillator is self-contained but tends to be more expensive. An ideal solution is an oscillator that can operate on a range of

supplies, like ECS's MultiVolt oscillator series, letting engineers inventory less parts while providing the best specs.

Miniaturization is a trend driving component development. Currently, an industry leading frequency control package can measure 1.2 by 1.0mm, offering higher fundamental frequencies, lower jitter, lower phase noise, tight stabilities/tolerances and lower aging performance. While smaller packages allow use in new applications, the pivotal challenge is controlling operating temperatures.

When selecting and purchasing frequency control products, consider what advances might prolong the circuit's life. Modern designs will likely require multiple frequency control devices so research brands to determine whether they offer an array of product. When sourcing parts, consider a partnership with a supplier

that offers engineering support and technical resources alongside the product offering.

Frequency control suppliers have not been immune to today's global issues: the AKM fire, pandemic, supply chain disruptions and resource allocation. ECS Inc International has taken a proactive, support focused approach. The company quickly allocated resources to maintain a product development funnel that feeds customers even in the face of long lead times. While this year may see lead times stabilize, communication is key to ensure project timelines. When a design comes to fruition, contact the frequency control supplier to get the part in queue for samples and larger orders.

Product innovation will be a primary driver for the future of frequency control. As markets like IoT and EV continue to



ECS Inc International's David Meaney

advance, frequency control will follow. It is pivotal not just to find a supplier but a frequency control partner who will support your designs.

www.ecsxtal.com

MEC
Mercury
electronics europe

Automotive Industry Approval for Mercury

Mercury has become an approved supplier to the Automotive industry, gaining approval to IATF16949. This further reinforces Mercury's commitment to longevity and ruggedness as well as design innovation in the taxing automotive component environment.

Mercury Europe provides sales, customer service, engineering expertise and market promotion in the Europe-wide market for quartz crystal product.

t: +44 (0)1460 230010
f: +44 (0)1460 230011
www.mecxtal-europe.com

Choosing a rack-mount power supply

Distrelec's head of product management, Rodrigue Mao, explores important factors to consider when selecting a rack-mount power supply

There are different types of rack mounted supplies: floor-standing and compact. Rack enclosures are versatile and provide solutions for different applications. 42U, 45U and 48U are common heights for floor-standing racks and enclosures, with bespoke options up to 58U, where U equals 1.752in. Usually, width ranges from 19 to 24in. Wider enclosures can accommodate cabling without blocking airflow. If a system is operating in an environment with no temperature regulation, this is key.

The rack's load rating indicates the weight it can safely support. Total the weight of each rack item, then add a safety factor. If the rack is regularly moved, look for rolling or dynamic load rating, plus the fixed or static load rating.

Ensure rack depth is sufficient for items and

wiring. Consider the minimum bending radius of wires and connector depth. A cable with excessive bending radius is subjected to undue stress and may break.

Always select a supply without fans or forced air conditioning which have a very high efficiency and therefore generate little heat loss. The operational temperature range standard must be minimally cleared to verify the supply is valid.

Because DIN rail power supplies are often small, their systems are frequently put on the backplate, protecting them from harsh environmental conditions.

DIN rail mounted power supplies are designed to operate safely without constant supervision. However, any piece of equipment could fail. To minimise risk, ensure the supply is secured against

short circuits, overloads, overheating and overvoltage.

AC/DC power supplies must meet IEC 60950-1 for IT and industrial equipment. Isolation testing is typically performed with two voltages: 3kVAC and 4kVAC. Each device must pass a 3kVAC input-to-output isolation test to comply. The 3kVAC test is also required by the IEC61010 standard, covering test and measurement equipment.

Optimal power supply efficiency is achieved under partial load. Most power supplies are rated at least 80 per cent. 80 Plus accreditation indicates at least 80 per cent efficiency at 20, 50 and 100 per cent loads. A 500 Watt power supply with 80 Plus certification would draw 625 watts of electrical power on the input side at full load (100%). Of this, 80% (500W) is delivered as electrical

power on the secondary side and 125 watts are losses that must be dissipated as heat. With an efficiency of 90%, the power loss is reduced to 55 watts. According to the EU directive, losses in stand-by mode must not be higher than 0.1 W.

Especially in test or development systems, DC voltage output accuracy is crucial. A stable DC voltage is often required in any fluctuations, outages, surges or changes to the current DC output. Also in industrial applications, current outputs ensure the power supply output remains stable during uncommon output surge current demands. Many modern power supplies are protected against over-voltage and over-current and often provide cooling by free air convection.

www.distrelec.com



Buying bi-directional power supplies

Sager Electronics' Don Baldwin introduces bi-directional power supply technology and how, through knowledge and proper sourcing, purchasing professionals can save both time and money

It is safe to say that power supplies and power conditioning are used in every electrical and electronic application. But while many choices exist for basic power supplies, there is a newer technology on the market that warrants further education.

Descendants of the uninterruptable power supply, bi-directional power supplies are a new technology that can deliver or return energy between a load and source, adding elasticity to an always-on electronic system. What this means is when power is available from a primary source, it is used to power the load and any control circuitry. When primary power is cut, the secondary power source, normally housed by the load, can take over and keep the load and the control circuitry alive.

Like a UPS for computers, bi-directional power keeps a computer from dying if line power fails. There are many other applications for bi-directional power supplies including solar power grid tier conversion, hybrid solar systems for households, and plug-in hybrids for electric motors with regenerative braking.

Purchasing professionals sourcing power supplies for equipment and devices that are always on should understand and consider the benefits of bi-directional power, especially those supporting requirements for communications equipment, utility-powered

homes and appliances, satellites, radar, automotive and military systems. These designs are often of critical use, and lives and equipment depend on the survivability of the electronics.

While this technology is newer to the market, designing in a bi-directional power supply has a number of benefits that make it an excellent choice. AC/DC and DC/DC converters are complex products with a large bill of materials that includes semiconductors, transformers and passive products. They typically have an 8-12 week manufacturing lead time, but over the last two years lead times have stretched from 12 to 40 to 52 weeks and beyond.

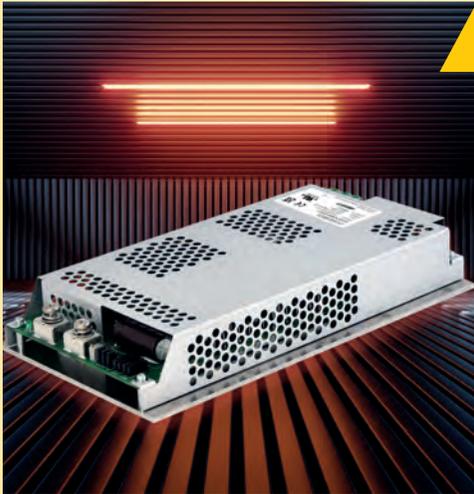
Bi-directional power supplies such as the BIC-2200 from MEAN WELL or the Calex BCA 3000 W are complete solutions, reducing the need for multiple units and multiple parts, thereby reducing reliance on other component requirements while decreasing the weight of the overall power supply package. The timing of discharging of the BIC-2200 can be programmed to achieve peak-shaving and valley-filling, reducing electricity costs while increasing energy utilization. Another plus is that certain manufacturers such as Calex are manufacturing bi-directional power supplies in North America, reducing transportation issues and costs while also eliminating overseas tariffs.



**Like a UPS
for computers,
bi-directional power
keeps a computer
from dying if line
power fails**

With extended lead-times, ever-existent supply chain issues and mounting certification requirements, partnering with the supply chain is more critical than ever before, especially with evolving technologies like bi-directional power supplies. A distributor with a commitment to technology makes a difference, and having access to a broad power supply offering and quick-turn samples, an educated sales and engineering team, custom manufacturing solutions, and inventory services like bonded inventory, scheduled shipments, and just-in-time delivery, can help alleviate the power supply sourcing concerns of many purchasing professionals.

power.sager.com



Adjustable near-to-zero output

Powerbox has announced a 1200W OFI1200A AC/DC power supply for industrial applications. Optimized for conduction cooling, the supply is said to deliver high performance levels across a baseplate temperature range of -40 to 95°C without a fan. Input range is 85 to 305VAC with power factor correction. Output voltage and current can be adjusted from near zero to maximum for each model.

To help customers precisely adjust voltage and current the OFI1200A offers two analog inputs, VTRM and ITRM. Output voltage and current

can be adjusted from near zero to the maximum specified per model. For example, the 28V output can be adjusted from near zero volts up to 33.6V, and the output current from near zero amps up to 43A. The output voltage can also be adjusted using the onboard potentiometer.

The OFI1200A series has a three-year warranty and conforms to the European RoHS, REACH and Low Voltage Directives. The product carries the CE, UKCA and cURus markings.

www.prbx.com

Converter features Supercap buffering

With its new DC2412-UPSP2, Bicker Elektronik is offering reliable protection against critical system failures and data loss. Featuring a 16 to 32VDC input range and 12V/5A output, the product combines a DC/DC converter and uninterruptible DC power supply.

Fast charging and maintenance-free Supercaps with more than 500,000 charging and discharging cycles act as buffer energy storage. The converter design allows fanless operation from -20 to 70°C. The product bridges power failures, voltage dips or flicker, thus ensuring uninterrupted power supply of 12VDC loads such as embedded IPCs, gateways, motors, sensors, actuators and cameras. It also suits sensitive and security relevant applications in IoT, Industry 4.0, kiosk, POI/POS, signage, medical technology and more.

Durable, cycle-resistant and maintenance-free ultra-capacitors are used to buffer the 12VDC output voltage. The unit is fully charged in approximately 180 seconds at maximum charging current. Under comparable operating conditions, Supercaps have a service life up to ten times longer than classic lead-acid batteries.

www.bicker.de

Small but tough

Cosel has added two open frame compact power supplies for demanding industrial applications to its LHA series. The LHA10F and LHA15F are said to be 15 per cent smaller and offer a leakage current 50 per cent lower than conventional products. Operating temperature range is -10 to 70°C. The supplies are UL/EN62368-1 certified.

Input voltage range is 85 to 264VAC single phase and conform to the safety standards input voltage range of 100-240VAC (50/60Hz). Five output voltages are 3.3, 5, 12, 15 and 24V with respective currents. On both versions, the 3.3V output voltage can be adjusted from 2.85 to 3.63V. All other voltages are fixed.

Features include: inrush current limitation; over-current protection with automatic recovery when the default is removed; and over-voltage protection.

The units suit applications including measurement and analysis equipment, machine tools and industrial robots, display equipment and semiconductor manufacturing equipment.

www.coseleurope.eu



AGM2222 Series

High-efficiency Power Inductors

Coilcraft

- Current ratings up to 110 Amps with very low DCR
- 75% smaller than previous generation for greater power density
- Ideal for Bi-directional 12 – 48 V DC-DC converters
- Qualified to AEC-Q200 Grade 1 (-40°C to +125°C)

Free Samples @ coilcraft.com



Increasing importance of UV-C infection prevention

Working with component partners, EBV has developed a UV-C Surface Disinfection Demonstrator, designed to help fight the spread of infectious pathogens

Leveraged correctly, UV has huge potential for preventing the spread of infections as it will inhibit DNA/RNA replication processes and make viruses inactive. This can be applied to liquids: during industrial production procedures; in the international space station; or in private households. It can also be applied to air through inclusion in buildings' HVAC systems. Surfaces may be disinfected by automated robots or items sterilised by placing them in UV irradiation units. For several years, use of UV in clinical and surgical environments has been of great interest. More recently, since the Covid pandemic emerged, substantial research has been conducted into how it can help keep workplaces and public areas safe.

UV-C wavelengths 100 to 280nm prove most effective in combatting infection, since they carry more energy than ones closer to the visible light spectrum. These wavelengths do not naturally occur on Earth, as they are predominantly blocked out of the sun's rays by the ozone layer. Instead, they need to be generated using

artificial light sources. The important thing is that the UV-C dose is an appropriate quantity, with light intensity and exposure period having a direct influence on this. Scientific studies show what dosage is needed to eradicate a specific pathogen. Also, it is critical that UV emissions do not pose a danger to humans.

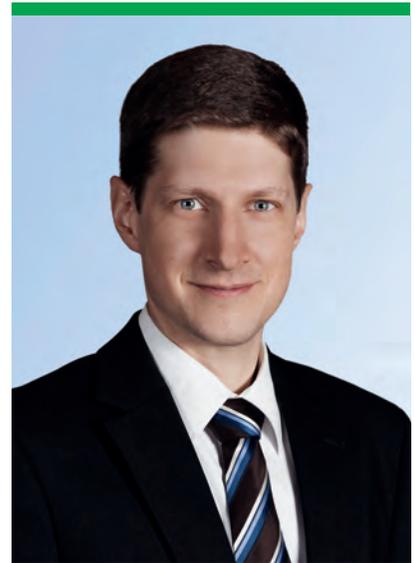
LED-based UV light sources offer many operational benefits over conventional mercury tubes. Being solid-state, these sources are more compact and robust. Furthermore, an LED approach is more flexible: they do not need time to warm up; allow unlimited switching cycles; and are dimmable. Pulse-width modulation (PWM) and analog amplitude dimming can be used to regulate UV-C LED output so the dose applied to any given media provides optimal disinfection while also minimising the power budget.

Developed in collaboration with key supply partners ams OSRAM, Luminus, Infineon and STMicroelectronics, EBV Elektronik has introduced a UV-C Surface Disinfection Demonstrator.

This equipment will be invaluable in tackling the spread of infection. Through it, a radiant output of 150mW and flux up to 1mW/cm² at a specimen can be delivered. The kit features UV-C LED emitters from either Luminus (XBT-1313-UV) or ams OSRAM (OSLON UV3636), plus an STMicroelectronics STM32F401 microcontroller for regulating (with a unique process control) the UV-C output according to the detected object's size and measured flux in the chamber, both based on the ams OSRAM AS7331TC spectral UV-sensor. An Infineon TLE4913 micro-warm up Hall switch is incorporated for safety. These units run off lithium-polymer batteries or through their USB-C connector.

www.ebv.com/uv-demo-box

EBV Elektronik's business development manager IoT, UV, home and building (CE), **Dr Dieter Gross**



EBV's UV-C surface disinfection demonstrator units



Obsolescence management strategies in aerospace and defense

A2 Global's CEO Frank Cavallaro shares strategies designed to help long-term planning, informed decision making and avoiding redesigns

Though exacerbated by the current chip shortage, the defense and aerospace industry's position in the electronic components market has significantly reduced over the years. Rapid technological advancement is driving suppliers to abandon low-demand, older technology products at a faster pace, while the US Department of Defense (DoD) seeks to prolong the life of weapon systems. This means components used in military systems are becoming obsolete before the product lifecycle is finished, making it increasingly difficult to find replacement parts.

Commonly known as Diminishing Manufacturing Sources and Material Shortages (DMSMS), it is a critical consideration when planning an obsolescence strategy. As component lifecycles decrease, defense and aerospace manufacturers are left with limited options to keep end products functioning reliably.

Obsolescence management is key in this industry as

manufacturers strategically plan to source components and track component end-of-life (EOL) to ensure they have inventory.

There are three strategies manufacturers should consider to stay ahead of component obsolescence:

- Strategize for obsolescence at the design phase
- Leverage supply chain networks to plan appropriate inventory needs and storage
- Expand sourcing channels and vendors to account for specific part needs

Strategize at the design phase: Up-to-date information on obsolete parts is only useful when used at the right time. Having a full picture of product lifecycle forecasts at the design stage lets manufacturers build their systems accordingly and avoids potentially costly fixes at the production stage. It also sets defense manufacturers on a path for long-term strategic

planning knowing components are viable for a definitive time.

Leverage supply chain networks: Manufacturers cannot know everything in a supply chain ecosystem to manage obsolete parts perfectly, especially in defense and aerospace which relies on legacy parts that can be difficult to find. Without a firm understanding, they may not know how much inventory to have on hand, where their best sourcing options come from or market conditions they should be aware of. It is critical they reach out to those active in supply chain analysis in real-time to make informed decisions.

Branch out sourcing channels: There is no 'one-size-fits-all' obsolescence management solution. It is easy to constantly rely on the same distributors but defense needs, market forces, product type, time in market and product volume mandate individualized planning by part. Branch out supplier lists, source information from third-party



A2 Global's CEO Frank Cavallaro

partners and be willing to adapt to changing supply chain circumstances to stay agile.

Obsolescence management is a complex issue for defense and aerospace, made more difficult by DMSMS. Having a strong obsolescence management system in place can help with long-term planning, making informed decisions quickly and avoiding costly redesigns or fines.

a2globalelectronics.com



PEI-Genesis™

WHEN THE DESIGN MATTERS,
PEI-Genesis DELIVERS.

Receive 10% off all qualifying online orders

Visit us at:
www.peigenesis.com



Preparing for growth in space and aviation

TTI's vice president military/aerospace segment, Gia Hayes, presents factors manufacturers should prepare for during post-pandemic disruption and growth

These are unprecedented times for commercial spaceflight. In addition to highly-publicized flights of SpaceX, Blue Origin and Virgin Galactic, smaller firms are striving to gain market share, including small-satellite launch provider Rocket Lab and launch vehicle company Astra Space.

At the same time, we are seeing new investments and innovations from industry leaders such as Boeing and Northrop Grumman. These contributions include rockets, engines, cargo/crew spacecraft, defense systems and the technology to support them.

This competition to bring future people and vehicles to low Earth orbit and beyond has the potential to make the dreams of science fiction become reality.

For example, with NASA's recent announcement that the International Space Station will be decommissioned after 2030, new space stations like Blue Origin's Orbital Reef concept could begin to move us toward a dream of more humans living and working in space.

This boom period in spaceflight will have far-reaching impacts beyond commercial space, creating new demand for mil-spec and space-rated components beyond anything we have experienced before.

Another factor to consider is the speed of recovery in commercial air. We do not yet know how quickly business travel will trend back toward pre-pandemic

levels, nor do we know how rapidly aircraft production will ramp back up.

Current trends seem to suggest that demand for single aisle and regional aircraft will continue to recover, reaching pre-pandemic levels much sooner than wide body aircraft. Although everyone agrees there are still many challenges to overcome, most of TTI's customer base is expecting to see some growth in 2022.

Recovery in air travel will prompt new aftermarket service revenue streams. Out-of-storage checks and return-to-service maintenance continue to drive an incremental 2022 aftermarket which could deplete existing inventory.

Even for components with shorter lead times, a rapid ramp-up in aircraft production alongside high demand from commercial space and defense could cause delays in manufacturers' programs. With the current long lead times for capacitors and other critical parts, this combination might create a new wave of supply-chain uncertainty and complications.

Now is the time for buyers to make sure their company has strong partnerships and assurance of component supply. As a specialist distributor serving the defense and aerospace industries, TTI is working with customers to make sure they understand the current state of the supply chain and help them plan in pace with market conditions.

Responding to the pandemic's supply chain disruptions, TTI has encouraged customers to share forecasts—by part number—to ensure they remain up-to-date with realistic lead times and inventory positions.

Also, while we frequently hear customers have on-hand inventory that needs to be consumed, we also want to make sure that demand during this critical period is as accurate as possible.

Solid planning and partnerships now can position a business to make the most of the recovery and growth in space, aviation and defense that we expect.

tti.com



TTI's vice president, military/aerospace segment, **Gia Hayes**



Responding to the pandemic's supply chain disruptions, TTI has encouraged customers to share forecasts—by part number—to ensure they remain up-to-date with realistic lead times and inventory positions



More fibres in less space

Prysmian Group has extended its Sirocco Extreme range of microduct cables to include its latest 576f cable which boasts 576 fibres in 8.2mm diameter, providing a 10.9 fibres/mm² fibre density. It can be installed in a 10mm duct. Sirocco Extreme microduct cables utilise Prysmian's BendBrightXS 180µm single-mode bend insensitive fibre which is compatible for splicing with standard fibre and offers a future-proof solution prepared for system evolution.

Prysmian Group's director R&D telecom business, Ian Griffiths, said: "Bend-insensitive fibre optic cables are a crucial part of the world's shift towards flexible and reliable connectivity. With their extreme fibre count and reduced diameter, Sirocco Extreme microduct cables make installations faster and more cost-effective. Designed for installation into microducts, they are ideally suited for blowing in high density access, FTTx and 5G networks."

Available in fibre counts from 192 to 576 and conforming to international standards for optical and mechanical performance, the Sirocco Extreme cables benefit from Prysmian's PicoTube technology. This makes them up to 15 per cent smaller than Sirocco HD microduct cables, Prysmian's previously record holding 200µm microduct cables. As a result, it is possible to install more fibres into a congested duct space and smaller ducts can be used for new installations, reducing installation costs and the use of less raw materials. This provides further benefits of a decreased total cost of network deployment and smaller environmental footprint.

prysmiangroup.com



In-house FFC manufacturing capacity

To respond to special customer requirements and offer a complete system of connectors and cables, Yamaichi has decided to introduce its own FFC series, the Y-FFC. This in-house FFC production is located at Yamaichi's manufacturing facility in Frankfurt/Oder which also outputs cable assemblies and Y-Circ industrial circular connectors.

The company has invested in lamination lines, plus punching and folding machines.

Yamaichi can respond to requirements including pitch, number of lines, lengths, surfaces, plug faces or folds. Special customer requests such as shielding and punching holes/slots are also possible. Intensive and automatic optical process monitoring ensures compliance with tolerances.

Yamaichi states its advantage as a system supplier is that customer-specific designs are supported from the design and development phase, followed by testing in the validation phase according to customer specification.

www.yamaichi.eu



Higher density. Lower losses. Higher data rates. It's precise performance, delivered.

Our CoreHC product family, Card Edge Contact systems, and Gen-Z solutions offer high-density interconnects with lower insertion and return losses at densities as high as 2.5 mm. CarlisleIT leads the way with high-performance interconnect solutions by offering unmatched signal integrity for today's faster and more complex communication systems operating up to 70 GHz.

That's Performance with Purpose.



DESIGN | BUILD | TEST | CERTIFY

CarlisleIT.com |

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
CABLE ASSEMBLY & HARNESSING												
Amphenol	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	3,000	N/A	0 €	N/A	50	2,500+	Y
FTDI	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	50	N/A	0 €	N/A	50	2,500+	Y
Harwin	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	600	N/A	0 €	N/A	50	2,500+	Y
Molex	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,550	N/A	0 €	N/A	50	2,500+	Y
Phoenix Contact	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,200	N/A	0 €	N/A	50	2,500+	Y
CIRCUIT PROTECTION												
Bourns	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,800	N/A	0 €	N/A	50	2,500+	Y
EPCOS/TKD	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,950	N/A	0 €	N/A	50	2,500+	Y
Littelfuse	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	11,450	N/A	0 €	N/A	50	2,500+	Y
Vishay	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	3,150	N/A	0 €	N/A	50	2,500+	Y
ENCLOSURES												
Bud Industries	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,600	N/A	0 €	N/A	50	2,500+	Y
Hammond	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	3,350	N/A	0 €	N/A	50	2,500+	Y
Metcase Enclosures	OKW Enclosures	+44 (0) 1489 583858	www.metcase.com	EU	N/A	288	£40K	0 €	100%	5	22	Y
New Age Enclosures	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	150	N/A	0 €	N/A	50	2,500+	Y
FREQUENCY MANAGEMENT												
ABRACON	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,750	N/A	0 €	N/A	50	2,500+	Y
Analog Devices Inc.	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	150	N/A	0 €	N/A	50	2,500+	Y
ECS	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,050	N/A	0 €	N/A	50	2,500+	Y
Epson	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	900	N/A	0 €	N/A	50	2,500+	Y
IQD Frequency Products	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,500	N/A	0 €	N/A	50	2,500+	Y
Kyocera	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	950	N/A	0 €	N/A	50	2,500+	Y
Microchip	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,450	N/A	0 €	N/A	50	2,500+	Y
Murata	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	550	N/A	0 €	N/A	50	2,500+	Y
Silicon Laboratories	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	500	N/A	0 €	N/A	50	2,500+	Y
TXC Corporation	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	500	N/A	0 €	N/A	50	2,500+	Y
HEATSINKS												
Aavid	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	200	N/A	0 €	N/A	50	2,500+	Y
ICs & SEMICONDUCTORS												
Alliance Memory	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	500	N/A	0 €	N/A	50	2,500+	Y
Analog Devices Inc.	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	18,700	N/A	0 €	N/A	50	2,500+	Y
Broadcom Limited	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	200	N/A	0 €	N/A	50	2,500+	Y
Central Semiconductor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,250	N/A	0 €	N/A	50	2,500+	Y
Cirrus Logic	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	200	N/A	0 €	N/A	50	2,500+	Y
Cree, Inc.	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	200	N/A	0 €	N/A	50	2,500+	Y
Diodes Incorporated	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	8,200	N/A	0 €	N/A	50	2,500+	Y
FTDI	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	100	N/A	0 €	N/A	50	2,500+	Y
Infineon	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	8,300	N/A	0 €	N/A	50	2,500+	Y
Intel	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,750	N/A	0 €	N/A	50	2,500+	Y
Maxim Integrated	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	14,050	N/A	0 €	N/A	50	2,500+	Y
Microchip	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	24,200	N/A	0 €	N/A	50	2,500+	Y
Micron Technology	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	600	N/A	0 €	N/A	50	2,500+	Y
Monolithic Power Systems (MPS)	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	850	N/A	0 €	N/A	50	2,500+	Y
Nexperia	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	7,600	N/A	0 €	N/A	50	2,500+	Y
Nordic Semiconductor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	60	N/A	0 €	N/A	50	2,500+	Y

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
NXP	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,700	N/A	0 €	N/A	50	2,500+	Y
ON Semiconductor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	18,700	N/A	0 €	N/A	50	2,500+	Y
Power Integrations	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	750	N/A	0 €	N/A	50	2,500+	Y
Qorvo	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	700	N/A	0 €	N/A	50	2,500+	Y
Renesas Electronics	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	5,550	N/A	0 €	N/A	50	2,500+	Y
ROHM Semiconductor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	6,900	N/A	0 €	N/A	50	2,500+	Y
Semtech	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	350	N/A	0 €	N/A	50	2,500+	Y
Silicon Laboratories	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,200	N/A	0 €	N/A	50	2,500+	Y
Skyworks	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	550	N/A	0 €	N/A	50	2,500+	Y
STMicroelectronics	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	10,050	N/A	0 €	N/A	50	2,500+	Y
Texas Instruments	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	39,050	N/A	0 €	N/A	50	2,500+	Y
Toshiba	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,050	N/A	0 €	N/A	50	2,500+	Y
Vishay	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	10,850	N/A	0 €	N/A	50	2,500+	Y
Xilinx	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,900	N/A	0 €	N/A	50	2,500+	Y
INTERCONNECTION												
3M	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,750	N/A	0 €	N/A	50	2,500+	Y
Amphenol	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	33,200	N/A	0 €	N/A	50	2,500+	Y
Amphenol	PEI Genesis	+44 8716060	www.peigenesis.com	EU	Y	N/A	£1.3m	10 €	N/A	N/A	85	Y
Cinch Connectivity Solutions	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,250	N/A	0 €	N/A	50	2,500+	Y
FCI / Amphenol	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	7,850	N/A	0 €	N/A	50	2,500+	Y
HARTING	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	6,800	N/A	0 €	N/A	50	2,500+	Y
Harwin	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,950	N/A	0 €	N/A	50	2,500+	Y
Hirose Electric	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	7,850	N/A	0 €	N/A	50	2,500+	Y
Hirose Electric Europe BV		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
JAE Electronics	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,450	N/A	0 €	N/A	50	2,500+	Y
Molex	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	23,600	N/A	0 €	N/A	50	2,500+	Y
ODU		+49 8631 6156-0	www.odu.de	EU, USA, ASIA			N/A	0 €	N/A	50	1,650	
Phoenix Contact	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	17,150	N/A	0 €	N/A	50	2,500+	Y
Radiall	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,350	N/A	0 €	N/A	50	2,500+	Y
Samtec	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	16,300	N/A	0 €	N/A	50	2,500+	Y
Souriau	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	3,300	N/A	0 €	N/A	50	2,500+	Y
TE Connectivity	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	41,850	N/A	0 €	N/A	50	2,500+	Y
Wurth Elektronik	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,650	N/A	0 €	N/A	50	2,500+	Y
OBSOLESCENCE/HARD TO FIND												
Cyclops electronics		+32 2 209 29 89	www.halfin.com	EU	N	20,000+	N/A	€ 100	N/A	4	7	Y
OPTO ELECTRONICS												
Broadcom Limited	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,300	N/A	0 €	N/A	50	2,500+	Y
Cree, Inc.	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	3,800	N/A	0 €	N/A	50	2,500+	Y
Intel	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	20	N/A	0 €	N/A	50	2,500+	Y
Osram Opto Semiconductor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,300	N/A	0 €	N/A	50	2,500+	Y
Toshiba	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	450	N/A	0 €	N/A	50	2,500+	Y
Vishay	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,350	N/A	0 €	N/A	50	2,500+	Y
PASSIVES												
AVX	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	17850	N/A	0 €	N/A	50	2,500+	Y
Bourns	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	15,100	N/A	0 €	N/A	50	2,500+	Y
Coilcraft	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	5,750	N/A	0 €	N/A	50	2,500+	Y

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
EPCOS / TDK	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	5,450	N/A	0 €	N/A	50	2,500+	Y
KEMET	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	23,650	N/A	0 €	N/A	50	2,500+	Y
Kemet	RS Components	08457 201201	www.rs-components.com	EU	Y	N/A	£161m	0 €	N/A	50+	2,500	Y
Murata	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	18700	N/A	0 €	N/A	50	2,500+	Y
Ohmite	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	6,550	N/A	0 €	N/A	50	2,500+	Y
Panasonic	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	25,450	N/A	0 €	N/A	50	2,500+	Y
Taiyo Yuden	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	5,100	N/A	0 €	N/A	50	2,500+	Y
TDK	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	13,050	N/A	0 €	N/A	50	2,500+	Y
TE Connectivity	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	11,500	N/A	0 €	N/A	50	2,500+	Y
TT Electronics	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	5,050	N/A	0 €	N/A	50	2,500+	Y
Vishay	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	43850	N/A	0 €	N/A	50	2,500+	Y
Würth Elektronik	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	6,750	N/A	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
Yageo	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	21,450	N/A	0 €	N/A	50	2,500+	Y
POWER & BATTERIES												
RECOM Power GmbH	Various Distributor	+43 7612 88 325 700	www.recom-power.com					0 €	100%	3	560	Y
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
Bel Power Solutions	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	600	N/A	0 €	N/A	50	2,500+	Y
CUI Inc.	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,200	N/A	0 €	N/A	50	2,500+	Y
MEAN WELL	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,400	N/A	0 €	N/A	50	2,500+	Y
Murata	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1500	N/A	0 €	N/A	50	2,500+	Y
RECOM	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	3,150	N/A	0 €	N/A	50	2,500+	Y
TDK-Lambda	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,900	N/A	0 €	N/A	50	2,500+	Y
TRACO Power	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,000	N/A	0 €	N/A	50	2,500+	Y
Vicor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,300	N/A	0 €	N/A	50	2,500+	Y
XP Power	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,200	N/A	0 €	N/A	50	2,500+	Y
SENSORS												
ams	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	150	N/A	0 €	N/A	50	2,500+	Y
Analog Devices Inc.	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	300	N/A	0 €	N/A	50	2,500+	Y
Bosch	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	25	N/A	0 €	N/A	50	2,500+	Y
Honeywell	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,200	N/A	0 €	N/A	50	2,500+	Y
Maxim Integrated	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	350	N/A	0 €	N/A	50	2,500+	Y
NXP	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	300	N/A	0 €	N/A	50	2,500+	Y
Sensirion	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	80	N/A	0 €	N/A	50	2,500+	Y
STMicroelectronics	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	75	N/A	0 €	N/A	50	2,500+	Y
TE Connectivity	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	650	N/A	0 €	N/A	50	2,500+	Y
Texas Instruments	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	850	N/A	0 €	N/A	50	2,500+	Y
SWITCHES & KEYBOARDS												
Apem	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,850	N/A	0 €	N/A	50	2,500+	Y
C&K Switches	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	5,550	N/A	0 €	N/A	50	2,500+	Y
CHERRY	RS Components	08457 201201	www.rs-components.com	EU	Y	600	N/A	0 €	N/A	50+	3,500+	Y
E-Switch	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,350	N/A	0 €	N/A	50	2,500+	Y
EAO	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,800	N/A	0 €	N/A	50	2,500+	Y
Honeywell	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,700	N/A	0 €	N/A	50	2,500+	Y
NKK Switches	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,000	N/A	0 €	N/A	50	2,500+	Y
Omron	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,700	N/A	0 €	N/A	50	2,500+	Y
Panasonic	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	550	N/A	0 €	N/A	50	2,500+	Y

Buyers' Guide

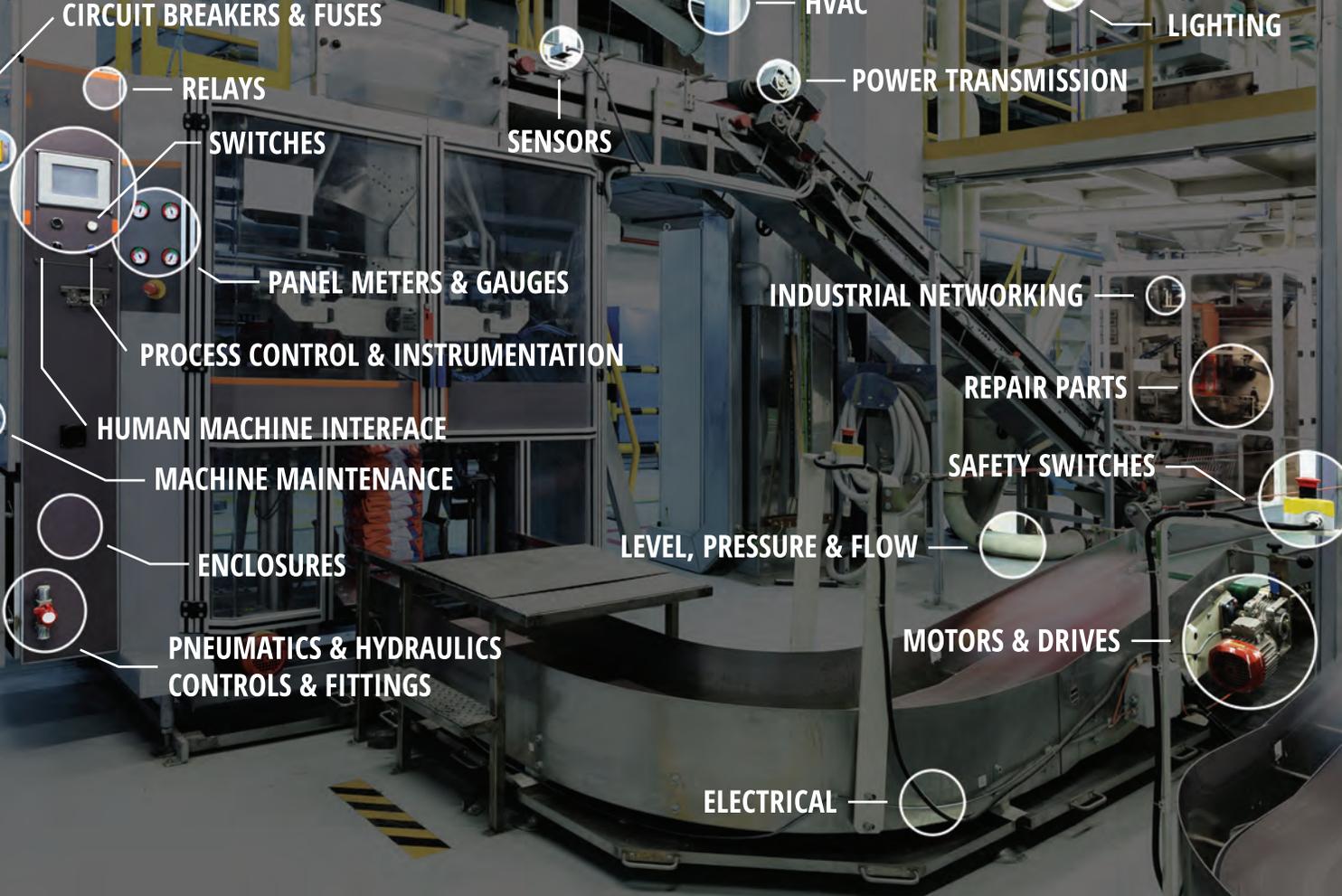
Manufacturer	Distributor	Telephone	Website	Location	Franchised Distributor	No. of Lines for Principle	Stock Value for Principle	Minimum Order Value	% Lead Free for Principle Range	No. of Technical Support Staff	Total No. of Staff	Buffer Stock Facility
TE Connectivity	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,350	N/A	0 €	N/A	50	2,500+	Y
TERMINAL BLOCKS												
Molex	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,850	N/A	0 €	N/A	50	2,500+	Y
Phoenix Contact	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	13,550	N/A	0 €	N/A	50	2,500+	Y
TE Connectivity	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,750	N/A	0 €	N/A	50	2,500+	Y
THERMAL MANAGEMENT												
Bergquist Company	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	250	N/A	0 €	N/A	50	2,500+	Y
Delta Electronics	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	700	N/A	0 €	N/A	50	2,500+	Y
ebm-papst	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,450	N/A	0 €	N/A	50	2,500+	Y
Materials Direct	Materials Direct	+44 (0)1908 222 211	www.materials-direct.com	EU	N/A	N/A	£1,000,000	0 €	N/A	5	55	Y
Sanyo Denki	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,450	N/A	0 €	N/A	50	2,500+	Y
Universal Science	Universal Science	+44 (0)1908 222 211	www.universal-science.com	EU	N/A	N/A	£1,000,000	0 €	N/A	5	55	Y
TRANSFORMERS & INDUCTORS												
Bourns	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,900	N/A	0 €	N/A	50	2,500+	Y
Coilcraft	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	5,500	N/A	0 €	N/A	50	2,500+	Y
EPCOS / TDK	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,300	N/A	0 €	N/A	50	2,500+	Y
Murata	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	6,900	N/A	0 €	N/A	50	2,500+	Y
TDK	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,050	N/A	0 €	N/A	50	2,500+	Y
Vishay	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,200	N/A	0 €	N/A	50	2,500+	Y
Würth Elektronik	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	3,400	N/A	0 €	N/A	50	2,500+	Y
WIRELESS SOLUTIONS												
DIGI	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	200	N/A	0 €	N/A	50	2,500+	Y
Espressif	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	30	N/A	0 €	N/A	50	2,500+	Y
Laird Connectivity	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	100	N/A	0 €	N/A	50	2,500+	Y
Lantronix	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	25	N/A	0 €	N/A	50	2,500+	Y
Microchip	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	150	N/A	0 €	N/A	50	2,500+	Y
Murata	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	30	N/A	0 €	N/A	50	2,500+	Y
Silicon Laboratories	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	150	N/A	0 €	N/A	50	2,500+	Y
Texas Instruments	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	20	N/A	0 €	N/A	50	2,500+	Y
u-blox	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	10	N/A	0 €	N/A	50	2,500+	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 4-10/10-20-30	Metal PCBs	Flexi / Flexi-Rigid	Obsolete Solutions	Modifications	Prototyping
Elvia PCB Group	+33 233 763 200	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, AISO14001, OHSAS 18001, MIL 31032, 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



MILLIONS OF PRODUCTS. THOUSANDS OF APPLICATIONS. YOUR GLOBAL RESOURCE.

Your Source for Industrial Electronics & Automation

Finding the right part for the job has never been easier. Galco carries more than 3 million electrical products, with free technical support to help you find the part you need and get it quickly.



WORLDWIDE SHIPPING

GALCO

Galco.com • +1 888-851-0301