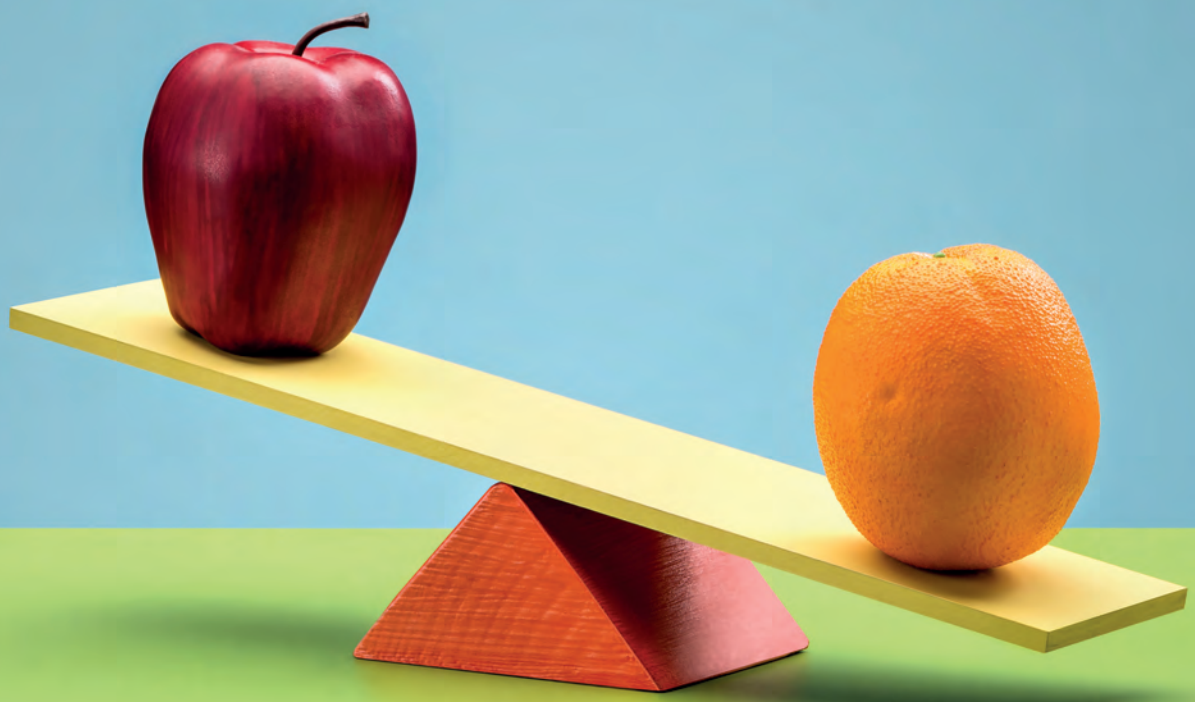
ELECTRONICS
sourcing
JULY 2023
NORTH AMERICA
AN MMG PUBLISHING TITLE

ANTI-COUNTERFEITING:
ORDER GENUINE COMPONENTS WITH CONFIDENCE

PAGE 24



On the cover – July 2023

Anti-counterfeiting: Order genuine components with confidence
page 24

Editor's Word

Automation, where next?

If there is one area of engineering where I have spent most of my time, both professionally and as a maker, it is automation. Interestingly, if the definition of automation is 'reduce human intervention in processes' my work with both physical machines and software applications must count towards my automation experience.

Everywhere I look I see opportunities to automate. However, for the electronics industry to implement an effective long-term supply chain strategy for automation technology it needs to know where future growth will originate. Here are some guesses.

Firstly, as populations age and birth rates fall, logically, the number of older, isolated individuals will increase. Social robots could ride to the rescue. Regardless of their form—human, animal or machine—they could act as a companion, helper, nurse, shopper and more. In fact, at a recent university open day I witnessed just such a project.

Secondly, I can visualise a future where domestic micro manufacturing allows households to become productive assets for the benefit of families and the state. This will be based around additive manufacturing and cobots.

Thirdly, as more businesses confront their Scope 1 and 2 emissions targets, they will need to improve their productivity while simultaneously reducing their energy consumption. This will require the wholesale replacement of old, dumb, energy hungry automation with new generations of smart, efficient systems.

I could go on. These three examples are the tip of a coming automation iceberg, pushed along by diverse individual, local, national and global goals. My guess is that any distributor with a finger in the automation pie is looking at a rosy future.

Jon Barrett

Contact

ELECTRONICS sourcing mmg PUBLISHING US LTD

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: Alex Mosqueda
alex.mosqueda@electronics-sourcing.com

PRODUCTION & DESIGN
Production Manager: Jo McCarthy
jo.mccarthy@mmgpublishing.com
Creative Artworker: Tom Claydon-Smith
tom.claydon-smith@electronics-sourcing.co.uk

CIRCULATION
Circulation Account Manager: Liz Poole
liz.poole@electronics-sourcing.co.uk
Data & Software Analyst: Thomas Smart
thomas.smart@mmgpublishing.co.uk

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

Issue 130, Vol.14 No.07

Published 12 times per year
by MMG Publishing US Ltd

MMG PUBLISHING US Ltd
Normandale Lake Center
8400 Normandale Lake Boulevard
Suite 920, Bloomington MN 55437
Tel: 866.364.0951
Fax: 952.378.2770
@Electrosourcing

Printed in the United States
ISSN 2835-0650

abc ELECTRONICS SOURCING IS INDEPENDENTLY ABC AUDITED 2005/2021

ecia Connect. Influence. Optimize.

N
ES News

Optimized for real-time control

Mouser Electronics is stocking Renesas Electronics' RZ/T2L high-performance microprocessor with EtherCAT. Optimized for high-speed processing and high-precision real-time control for applications adopting EtherCAT communication protocols, the RZ/T2L inherits the same hardware architecture from Renesas' RZ/T2M MPU.

Reducing its overall footprint by up to 50 percent over the RZ/T2M, the RZ/T2L is said to be a cost-effective and scalable alternative for OEMs looking to enter the EtherCAT market with a single-chip motor control solution. Applications include AC servos, inverters, industrial robots, medical equipment, wind turbines and elevators.

The microprocessor features an Arm Cortex-R52 CPU with a maximum operating frequency of 800MHz, an Ethernet MAC and three-port EtherCAT slave controller designed by Beckhoff Automation for Ethernet communication. The MPU's 576KB of memory is directly connected to the CPU. This reduces execution time unpredictability caused by cache memory, enabling reliable, deterministic processing. All RAM on the MPU is also equipped with an error correction code (ECC) function required for industrial applications.

www.mouser.com

Instant access to high performance storage

With the P44 Pro series, Rutronik's product portfolio includes Solidigm's most powerful client SSD. The storage solution offers sequential read speeds of up to 7,000MB/s, service life up to 1,200TBW (total bytes written) and power consumption of 5.3W.

Combining high cost-efficiency with compelling performance, the P41 Plus series is said to represent a new generation of solid-state drives. With a sequential read speed of up to 4,125MB/s and lifetime up to 800 TBW, the series is an alternative for storage solutions.

The company states the P44 Pro's performance is made possible by combining NAND technology with powerful software. Available in 512GB, 1TB and 2TB capacities, it suits data-intensive content creation and demanding gaming users. For example, the products are compatible with the specifications of Sony's Playstation 5 game console.

The P41 Plus features 144-layer 3D NAND and is available in M.2 2280 form factor with capacities of 512GB, 1TB and 2TB.

www.rutronik24.com

Automotive capacitor demand drives production boost

Toray Industries is increasing production capacity for Torayfan biaxially oriented polypropylene film, part of ongoing efforts to meet growing demand for automotive capacitor film in an expanding market for electrified vehicles. When online in 2025, the upgraded facilities will lift Torayfan production capacity by 40 per cent.

Film capacitors are a prime application for Torayfan, commonly used in appliances and IT equipment and inverter circuits for the power control units of electrified vehicle motors. An inverter is a power circuit or device with such that changes direct current to alternating current. The driving performance and efficiency of these vehicles have improved in recent years. Power control units and film capacitors have become smaller and lighter to enhance interior spaces and design flexibility. However, the downside has been lower voltage resistance. Toray Industries states Torayfan dominates the automotive capacitor film market because its unique technology maintains thinness and voltage resistance.

www.toray.com

N ES News

In Brief

Simplified procurement
FDH Aero has formally established the FDH Aero Electronic Products Group division, underscoring the company's commitment to simplifying procurement for the aerospace and defense industry. The new division comprises FDH Aero's brands in the electronics, electrical components and consumables space: Electro Enterprises, BTC Electronics Components and BJG Electronics Group.
www.fdhaero.com

NMC battery agreement signed
Umicore has obtained a non-exclusive IP license under CAMX's GEMX platform of nickel-based high-energy, high-power cathode active materials for use in lithium-ion batteries. Umicore's head of IP competence team at rechargeable battery materials, Julien Préat, said: "This expansion of our battery technology portfolio will best serve customers and partners transitioning to electric mobility."
www.camxpower.com

NA EMS industry up 14.3 per cent in April
April 2023 findings from IPCs North American EMS Statistical Program see a book-to-bill ratio at 1.21. Total NA EMS shipments in April 2023 were up 14.3 per cent compared to the same month last year. Compared to the preceding month, April shipments increased 5.5 per cent. EMS bookings in April decreased 6.1 percent year-over-year and decreased 1.2 per cent from the previous month.
www.ipc.org

Filters receive UL1283
TSS USA Manufacturing has announced the ETL Listed Mark (UL1283) for its low voltage filters. The ETL Listed Mark confirms product compliance to North American safety standards. These filters have been independently tested and must adhere to strict safety criteria. Customers can be confident they are receiving the highest quality product.
www.tssusamfg.com

Strategic agreement powers charging revolution

Onsemi has signed a strategic agreement to provide Kempower with EliteSiC MOSFETs and diodes for scalable electric vehicle chargers. The devices will be used in the active AC/DC front-end and in the primary and secondary DC/DC converters.

By incorporating this technology, Kempower states its EV charging solutions will benefit from superior power, performance and reliability. With low ON resistance and minimal gate and output capacitance, EliteSiC power devices exhibit lower power losses at high operating frequencies, leading to increased system efficiency and reduced end system size. These advantages translate into higher power density and greater overall reliability for Kempower's EV charging solutions.

Kempower's chief engineer, Petri Korhonen, said: "Onsemi EliteSiC power devices improve the efficiency and lower the size and weight of our EV charging solutions. In addition, Onsemi's vertically integrated supply chain and broad portfolio of intelligent power solutions give us the stability needed to continue delivering world-class EV charging solutions to the market."

www.onsemi.com

Investing in product build quality

NEOTech has invested in new automated production and inspection robots to enable higher levels of performance and efficiency of their customers' product builds. The company implemented recognition cameras on robotic arms, plus schematic diagram programming, to perform automated visual inspection of completed assemblies. This ensures orientation of items like buttons and switches are accurate before shipment. Quality assurance is achieved in much less time, increasing efficiency and reducing costs.

NEOTech's president and chief operating officer, Kunal Sharma, said: "The highest levels of quality for our customers' product is our top priority. Whether it is a lifesaving medical device in a hospital, a radar tracking system in a military aircraft or a power generator being used at a hurricane disaster location, our team is honored to be part of the process in providing these products to the end user.

"That is our motivation to continually research, examine and test the newest high-tech equipment for our manufacturing processes. These investments result in better quality, improved efficiency and ultimately lower production costs. It's a win-win for everyone."

www.neotech.com

Fast delivery of connectivity and sensor solutions

Newark has increased its TE connectivity and sensor device portfolio. Regarding interconnect, Ampmodu connectors are 2mm board-to-board receptacles that provide increased surface contact for reliable signal transfer and can be used in various mounting processes.

The technology occupies 38 per cent less PCB space compared with 2.54mm centerline. The connectors offer two-point electrical stability for reliable header and receptacle interconnection, plus multiple options for board-to-board stacking by headers and receptacles combination.

Applications include servo drives, industrial controls, material handling, instrumentation, test equipment and building automation.

Another interconnect example is the Dynamic series, ranging from signal level circuitry to power circuit connectivity in a ruggedized, industrialized package. These connectors feature a robust housing structure and high-quality crimp contact system, suiting them to wire-to-board, wire-to-panel and wire-to-wire applications in harsh industrial environments.

Dynamic D8000 connectors carry currents up to 100A per pin for wire-to-wire and 90A for wire-to-board. Rated voltage is 1000VAC/DC and withstand voltage is up to 3000VAC.

www.newark.com

Ideal illumination and comfortable haptics

C&K has expanded its K12S series with the cold-white illuminated key switch which suits applications from joysticks to off-road transportation and automotive. The switch is described as robust for use in harsh environments and particularly suits switching circuits with low current signal.

The tamper-proof design is engineered for user comfort, even with off-center actuation. As a result, the switch is safe to operate with gloves and is said to offer excellent tactile feel. Electrical and mechanical functions are separate so overload up to 10kg is manageable. Gold plated contacts are self-cleaning, extending life up to 1,000,000 operations.

The switch is RoHs-compliant, compatible with lead-free SMT soldering processes and can be sealed to IP40 or IP67, making it ideal for use in almost any industrial, automotive or medical environment. It also suits applications on motorbikes or other products that have dedicated electrical circuitry requiring CAN-BUS.

www.rutronik24.com

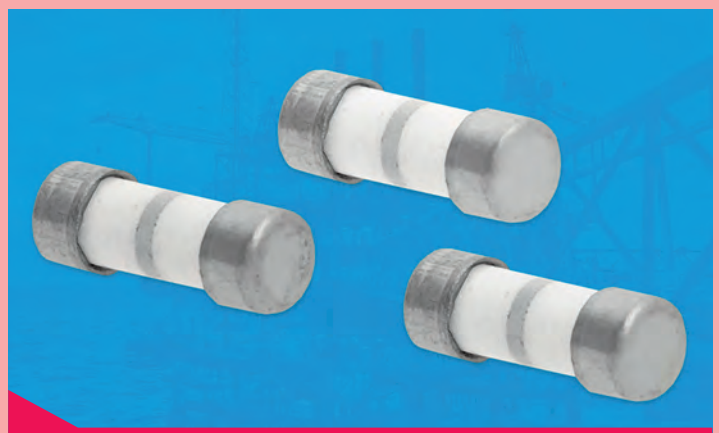
Relays safe for A2L refrigerant

TE Connectivity has announced some of its industrial relay series have been certified and approved for use in HVAC equipment using A2L mildly flammable refrigerant gases.

By January 2025, refrigerants using legacy HFC gases will no longer be allowed due to environmental regulations. By that point, all new residential HVAC units must operate with more eco-friendly gases (A2Ls). Because A2L gases are more flammable it is important to review all HVAC system components to ensure they are not a potential source of ignition. Using components with UL60335-2-40 A2L certification is an acceptable method of compliance for HVAC equipment design. TE is one of the first component manufacturers to receive this approval.

TE product manager, John Hamilton, said: "With this certification, we have a full product family to help our HVAC manufacturing customers feel confident knowing they have a suite of components that will provide the safer, more reliable performance they need, while meeting government regulations for more environmentally friendly refrigerants."

www.te.com



Fast-acting fuses for hazardous environments

Bel Fuse has released its Type 0AMA series of 3 by 8.4mm fast-acting fuses. Said to be competitively priced, they are designed for barrier circuits in intrinsic safety applications relating to hazardous locations, particularly medical and industrial environments.

These ceramic tube fuses feature a patented design that lets them withstand surges and excess overcurrent without blowing out prematurely or failing at higher temperatures. They are fast-acting, have a high interrupting rating of 4,000A at 250VAC/DC and can operate in temperatures from -55 to 125°C.

Ranging from 40 to 250mA, the series provides overcurrent protection solutions to fit many applications. They meet all electrical performance specifications for intrinsically safe (EN60079-11) applications. They also comply with EU Directive 2011/65/EU and amending directive 2015/863. The series also has UL recognition for the US and Canada.

There are nine SKUs in the series, rated for 40, 50, 63, 80, 100, 125, 160, 200 and 250mA. They are available through Digi-Key and Mouser.

www.belf.com

FUSION
WORLDWIDE

The Critical Link in Your Supply Chain

Fusion is your best source for quality electronic components.

Contact Us Today

Western distributors walk tightrope as China & US bicker on boles

As Western governments tighten export restrictions on China, component distributors similarly jack up compliance activities. They cannot afford to be caught, even unwittingly, in violation of export regulations

Staying out of Russia was easy. There just wasn't too much at stake in dollar terms or long-term relationships for Western component distributors. Moscow is a bit player in the electronics and high-tech market and serving Russia has never been a big interest of the world's leading distributors. Plus, the stance of the American government about engaging with Russian OEMs had been clear for decades. It was not encouraged. Stay-away-and-don't-engage-even-through-third-parties just about sums it up.

The Chinese electronics market is a different ball game, though. Market consulting and researcher Statista puts the value of the Chinese electronics market at a projected $375.7 billion for 2023, growing to $763 billion by 2027. By contrast, the Russian electronics market—though growing at a fast-rate—is valued at $12.5 billion for this year and projected to increase to $19 billion in the next four years. Furthermore, the number of consumers using electronics in China is projected to hit 1.1 billion by 2027 vs. 66.2 million for Russia. Clearly, these are two different markets, and the attraction varies widely for the global electronics supply chain.

The figures show why Western electronics companies—OEMs, chipmakers, IP&E suppliers, EMS providers and component distributors—are more gung-ho about China than Russia. All the major Western distributors are in China, supporting thousands of OEM customers who began shifting manufacturing activities to the communist country and surrounding Asian nations decades ago. The OEMs either outsourced production to contract manufacturers in the region or established their own production plants and wanted the same level of services they enjoyed back in Europe and North America from supply chain partners. With the initial support of politicians and regulators at the beginning, distributors eagerly poured into China, establishing warehouses and other support infrastructure.

Recent geo-political changes are altering the landscape, however. China remains a significant player in the electronics manufacturing ecosystem but restrictions on what can be done in the country or sold there by Western enterprises are being tightened by national governments concerned about military, security and economic issues. The leading worry of governments in the US and Europe is that China's growing economic clout is also turning the country into a major military power that can rival the United States, the world's No. 1 superpower. They have, as a result, expanded oversight of trading activities between the West and China, increasing the range of services and products that foreigners trading in the country must monitor to avoid tripping over regulatory hurdles.

In general, distributors have mostly avoided regulatory tripwires regarding China. But that task is getting more complicated, according to industry executives and observers. For example, the list of electronics components that cannot be sold to China without explicit clearance from regulators have lengthened, adding to control functions and paperwork at distributors, they said. Distributors that used to add technical resources to support product development primarily have extended this to the regulatory side, beefing up both automated computing applications and human expertise for assuring avoidance of export control problems. Industry experts said the biggest distributors are closely monitoring regulatory rules because of their presence in all the major electronics production and assembly regions.

"The large distributors or multinational companies are international in nature," said Dale Ford, chief analyst at the Electronics Components Industry Association. "They have facilities and store houses around the world. So, they must balance competing interests. [For them] it is not just a matter of reliability of supply. You've got geopolitical dynamics that come into play as well."

> "BIS's ability to determine whether a party is in compliance with our export control rules is a core tenet of our enforcement program"

Matthew Axelrod, Assistant Secretary for **Export Enforcement, Bureau of Industry and Security, U.S. Department of Commerce**

Not alone

Western governments have not left distributors and members of the electronics supply chain to wade through the thickets of exports legislations by themselves, however. Distributors have held meetings with government officials in the US, according to Ford, who said the ECIA Council has hosted representatives from the key security agencies involved in monitoring and assuring compliance. These include officials and agents from federal departments such as Homeland Security, Commerce and the Federal Bureau of Investigation (FBI).

"They visited us to have a discussion about how they would like companies in our industry to work together with them, to prevent parts from winding up where they shouldn't be in Russia and elsewhere," Dale said.

In addition to meeting with and providing direct guidance to exporters, the US government and the EU have also been active in publishing details of curbs on exports and enforcement requirements. Take the pronouncement in late 2022 of new exports controls on advanced computing and semiconductor manufacturing items on China. The Bureau of Industry and Security at the U.S. Department of Commerce sent out statements explaining why the government had imposed the restrictions and detailed the specific items that were forbidden from export to China. It also clarified the terms of the restrictions, including when they were supposed to go into effect. The list of foreign companies that were impacted was also updated, making it easier for electronics manufacturers to revise their own information technology systems.

"BIS's ability to determine whether a party is in compliance with our export control rules is a core tenet of our enforcement program," said Matthew Axelrod, assistant secretary of commerce for export enforcement at the BIS, in a statement announcing the new restrictions. "Where BIS is prevented by a host government from conducting our end-use checks in a timely manner, we will add parties to the Unverified List, and if the delay is extreme enough, the Entity List, to prevent the risk of diversion of any U.S. technology that could undermine our national security interests."

The Commerce Department said in the same statement that it would "work closely with industry as we implement all elements of the Administration's semiconductor agenda, to include ensuring compliance with these measures."

Limited exposure

While the regulatory environment has dramatically changed over the last several years, the burden on the distribution market is not as heavy as what governments have imposed on semiconductor equipment manufacturers, chipmakers and suppliers of associated software applications. Since distributors do not manufacture any of these devices, the first line of defense rests with semiconductor suppliers. The government has also made compliance easier for distributors by naming specific components and their manufacturers. In its statement last October for example, the BIS warned manufacturers and their distributors from exporting to China certain semiconductor components, including "logic chips with non-planar transistor architectures (i.e., FinFET or GAAFET) of 16nm or 14nm, or below; DRAM memory chips of 18nm half-pitch or less; NAND flash memory chips with 128 layers or more."

"The large distributors or multinational companies are international in nature"

Dale Ford, chief analyst, **ECIA**

That level of specificity benefits distributors as they can then work with suppliers to ensure the items are not included in shipments to China, according to industry executives. But while direct exports to restricted countries and regions can be easily curbed, reshipments from approved locations and partners to non-approved buyers have been known to happen. This is one reason why some companies have come under government radar when components manufactured by chipmakers end up in OEM devices sold in places like Russia that were under explicit government shipping restrictions. Suppliers like Advanced Micro Devices take all necessary actions to avoid this kind of scenario and often warn their distributors to remain vigilant about unapproved third-party shipments.

"Delivery of AMD cryptographic products does not imply third-party authority to import, distribute, or use restricted and non-restricted encryption," the company warned, in a statement on its website. "Importers, distributors, customers, and users are responsible for compliance with U.S. and local country export laws and regulations."

Chip suppliers lean on their supply chain partners for assistance in meeting these export restrictions. This is because distributors, for example, often have a presence in more locations than their suppliers. This explains the ECIA's active involvement in efforts to publicize and seek clarifications on export restrictions. In addition to holding meetings with the government to secure necessary support and clarification, it has also organized information sessions about defense laws, licensing and export controls for suppliers and distributors. In May, for example, the ECIA fielded a webinar on shipments to Russia and "other bad actors," for its members. The webinar featured presentations by Axelrod from the US Commerce Department who shared "the latest intelligence on tactics used by Russia to subvert US export controls on electronic components to support their missile and UAV (Unmanned Aerial Vehicle) programs," the ECIA said, in a statement. "Modern warfare is increasingly dependent on electronics and our industry must quickly step up its efforts to stop Russia and its allies from obtaining the technology to continue this terrible aggression."

These activities help demonstrate to the government that ECIA members are taking all necessary steps to comply with the export restrictions despite the negative impact on sales, according to Ford. Still, distributors, as well as the rest of the electronics supply chain, have found themselves juggling multiple rules and regulations imposed by various national and regional bodies. As they compile US rules, they must also stay on top of regulations in the EU, Japan and South Korea. Compliance with the rules of their home governments may not suffice, though. What if the Chinese government starts to pile pressure on foreign distributors operating in its territory in an indirect effort to remove some of the challenges facing local manufacturers? Is it possible, for example, that China could warn foreign distributors against holding back on the distribution of components it deem essential for electronics production in its territory? This would put distributors in a catch-22 position where they will have to determine whether the China business is still worth the hassle.

"At the end of the day, nobody wants to get in the crosshairs of a government agency [because] they can make your life very, very difficult," said the ECIA's Ford. "Our members want to be sure that the government sees them as cooperative in their efforts. There's no desire to be in any kind of an adversarial relationship with the government. But, by the same token, they need to be seen as cooperative with the EU, they need to be seen as cooperative with South Korea and Japan. And so, they have a challenge on their hands of being politically adept in this environment that we're moving into. That's one of the big issues now."

Global economy continues to cool: is recession imminent?

In this feature, IPC's chief economist, Shawn DuBravac, summarises the key take aways from the IPC's May 2023 Economic Outlook

Per IPC's May 2023 Economic Outlook report, the global economy continues to cool, but not quite as severely as expected at the start of the year. Stronger than expected growth in 2023 will come at the cost of weaker growth in 2024.

Labor markets remain extremely strong, despite the widely held view that recession is imminent. Both the United States and Europe are enjoying record low levels of unemployment. Strong labor markets and solid wage growth are likely to keep inflationary pressures stubbornly high.

IPC's chief economist, Shawn DuBravac, said: "Consumer confidence fell sharply in the last month, erasing half of the gains since the all-time low levels of June 2022. Business confidence has also been weak. Manufacturers report a subdued outlook in both the US and Europe. Leading economic indicators continue to suggest a high risk of recession this year, even if the timing continues to push later into the year."

Additional data in the Outlook show:

- US consumer sentiment fell in May, declining nearly seven per cent. The debate over the debt ceiling likely contributed to some of this decline
- US manufacturing sentiment contracted for the fifth consecutive month in April. The manufacturing PMI rose 0.8 percentage points in the last month, but not enough to move back into expansionary territory
- The European economy grew during the first quarter of the year, edging up 0.1 per cent in the euro area and up 0.2 percent in the EU
- Electronics manufacturing output fell in March, decreasing a sharp 5.9 per cent from the prior month and 1.7 per cent from the year-ago period

www.ipc.org

Exclusively sponsored by DigiKey

Design Flexibility and Innovation

by **Tim Carroll**, vice president, marketing and eCommerce at **DigiKey**

Often in our monthly columns for Electronics Sourcing, we share ideas and information about the digital tools and resources DigiKey offers procurement professionals, engineers and designers to make their jobs more efficient and flexible. DigiKey is continually innovating so we can accelerate progress for every engineer, designer and builder. Recently, we've also been working on design flexibility and innovation within our own brand and thinking about the way we're seen around the world.

The Updated "DigiKey"

To this end, DigiKey recently unveiled an update to its brand system including a refreshed logo, updated color palette and typeface, tagline, simplified name and updated brand voice.

The updated logo and brand system is an evolution of the company's historic look that allows for design flexibility across digital platforms while reinforcing an engineered feel in a more modern, timeless way. It was designed to emphasize progress and connection with suppliers and customers while reflecting DigiKey's digital-first, forward-looking perspective. The refreshed brand identity also features a simplified company name to better reflect its deep technical product and digital solutions portfolio.

For 50 years, our focus has centered on accelerating progress for engineers, designers, makers and procurement professionals. DigiKey's updated look and feel reflects that inspirational progress, our leadership position in the industry and our commitment to digital experiences and solutions that move goods and ideas forward.

We Get Technical

DigiKey's brand refresh combines its legacy of success with the vision for future opportunities and growth to support the core business and creates paths for bolder moves within an innovative industry. At DigiKey, we get technical because the technical aren't just who we serve, it's who we are.

DigiKey's commerce and logistics lead the industry by continually raising the bar on our operations, and the solutions we provide our clients. We build and apply a deep understanding of the market that translates into meaningful service for all. DigiKey delivers frictionless interactions to move people forward towards next-generation solutions, business growth and operational efficiency. Our new brand system reflects these deliverables that have always been at the core of who we are.

The timing for our design refresh also seems serendipitous. We've recently seen a rejuvenation from companies stressing the focus on new designs. The amount of engineering activity is extremely strong – companies now have the engineering resources at their disposal to focus on the products and designs of tomorrow and we're proud to help them accelerate that progress. We're still the same DigiKey, we'll just start to look different. You'll see the refreshed DigiKey look on our website, on our boxes and shipping tape, at tradeshows and in magazines like Electronics Sourcing as we roll out our updated branding over the next year. We're excited to share our design innovations with you.

www.digikey.com

Sourcing thermal management components post pandemic

Lead times may be normalizing but, as Sager Electronics' director supplier marketing, Aldo Guarino explains, a prudent buying strategy is a must

The past four years created significant sourcing obstacles across all electronic components, including thermal management. With heat issues accounting for 55 per cent of electronic system failures, sourcing adequate thermal management solutions is vital to many designs.

Most thermal products are manufactured in Asia and Europe and shipped to the US via ocean freight due to their size and weight. Global container prices surged throughout 2021 and by mid-2022 full container quotes for shipments—from Hong Kong to California ports—had increased by over 400 per cent, ranging from $18,000 to $20,000. Since late 2022, prices have moderated, with container prices returning to pre-pandemic price points and even lower in some cases as spot buys for excess available containers is becoming more prevalent.

During the second half of 2020, port congestion globally peaked, causing delays in sailings and contributing to extended transportation lead times. Pre-pandemic, sea freight shipping time from Hong Kong to the US through Long Beach, CA was typically three to six-weeks. Although three to four times more expensive, air-shipment became a more frequent request throughout the pandemic period and extended into 2022. Currently ocean transit times are holding around six to eight-weeks from Hong Kong to US and three to four-weeks from Europe to US east coast.

For thermal products, thermal interface materials (TIMs) and system level active thermal assemblies experienced some of the longest lead-times.

Historically, lead-times for fans and blowers ranged between 12 to 16-weeks—with OEMs and distributors operating on a just-in-time (JIT) model—and managing inventory based on customer forecasts. By the second half of 2021 lead-times were 26 to 40-weeks, peaking at 50 to 80-weeks in 2022 with some suppliers reaching over 100-weeks for specific series. Distribution inventory levels helped minimize the impact early in the pandemic but incremental large jumps in lead-time challenged the entire supply chain to keep pace.

Initially, air-mover suppliers' manufacturing lead-times were impacted by raw

Sager Electronics' director supplier marketing, **Aldo Guarino**

material and component shortages. However, as the pandemic continued, production capacity and labor availability became a bigger issue. The channel reacted by moving from JIT to 'just in case' ordering, laying in multiple orders to support future needs, putting further strain on supplier capacity.

In Q1 2023, fan manufacturers' lead-times began to stabilize and improve slightly, now averaging 26 to 40-weeks for new orders. Continued improvements in lead-times are expected in late 2023 as suppliers, channel partners and customers continue to adjust the extensive backlog. Additionally, multiple air-mover suppliers have increased manufacturing capacity by investing in new manufacturing sites in various geographic regions which should have a positive impact on lead-time in 2024.

Pre-pandemic lead-times for TIMs ranged between four to six-weeks; during the pandemic, lead-times averaged 12 to 16-weeks and in some cases 20 to 26-weeks. Raw materials used in the production of certain silicone-based products drove some suppliers to declare force majeure for those particular products. Post pandemic lead times are almost back to pre-pandemic levels, a welcome sign, as the $3.4B thermal interface market is expected to grow to $5.6B over the next five years in conjunction with growth in key markets such as EV, 5G, data center, ADAS and consumer electronics.

Active thermal products, with their internal make-up of multiple electronic components and raw materials, saw lead-times increase substantially during the pandemic: sourcing of fans was a common issue. These products began to normalize towards the end of 2022 and will remain stable throughout 2023. While several pandemic-related issues have improved, manufacturing lead-times for thermal products are still catching up as suppliers work through their backlog. For those procuring lead-time impacted thermal products, maintaining an extended buying horizon is still prudent.

A strategy to navigate fluctuations in the thermal market is to partner with an authorized distributor like Sager Electronics. With a world-class line card, expansive thermal inventory and continued product investment, Sager's technical sales team can assist in sourcing in stock and short lead-time thermal products, plus establish the appropriate dynamic inventory strategy to meet production requirements.

www.sager.com

Chipmakers see partnerships as solution to rising costs

A raft of factors ranging from spiraling design and manufacturing costs as well as time-to-market considerations is forcing semiconductor companies to forge ever closer ties amongst themselves

The lone wolf is out. Moving as a pack is in. Even in the ultra-competitive semiconductor world where companies win mainly and often on the uniqueness of their products, chipmakers are forging closer collaborations with one another and leveraging their joint resources to attract larger chunks of government support, solve innovation challenges and accelerate plans to increase production capacity. With the cost of new chip fabrication plants soaring—estimated now at $10 billion to $20 billion—not even the companies with the deepest pockets in the industry want to singlehandedly finance manufacturing fabrication facilities anymore.

This is why the number of collaborative fab-building efforts across the industry has increased over the last couple of years compared with similar activities towards the end of the last decade. The severe shortages that hurt component suppliers and OEMs following the outbreak of the Covid pandemic recently made it clear that companies needed to hurriedly expand their manufacturing capacity to capture growing sales. But coming up with the huge capex required for fabs while also funding regular production and R&D activities proved onerous for many enterprises. One way out of the jam was to increase manufacturing and product development partnerships, industry observers said.

"In past industry cycles, the standard practice has been to hit the brakes—stop hiring, postpone capital investment, and cut overhead. This time, the state of the global industry is different, so the approach needs to be different," said Irene Signorino, Semiconductor Practice Strategy Lead at KPMG US, in a report. "Limiting or delaying capital investment could restrict a company's ability to meet future demand and squander a one-time opportunity to take advantage of the available funds."

The alternative to 100 per cent self-funding of major capital projects was partnership. As a result, all kinds of cooperative projects, marketing initiatives, joint ventures and other operational alliances have exploded across the industry, pooling OEMs into alliances with chipmakers, foundries, semiconductor equipment vendors, raw material suppliers, packaging and test and assembly companies and even non-traditional investors in the chip market. Even integrated device manufacturers (IDMs) that have stubbornly held onto their fabs are forging partnerships across the aisles and reaching out to foundries, competitors, and financial institutions for assistance with costly production plans. These companies, including Intel, STMicroelectronics, WolfSpeed and others, have not jettisoned the core argument that internal production offers time-to-market and other competitive advantages. They continue to make this case to investors and shareholders as the prime reason for not embracing the fabless manufacturing model. Nevertheless, they also see the opportunity to gain significant leverage in various areas of their operations from partnering with other players in the ecosystem, according to industry executives.

GlobalFoundries and STMicroelectronics have been eager participants in this type of initiative. Last month, the companies announced the conclusion of their plans to jointly set up a new fab at an existing ST site in Crolles, France. The partners first announced a memorandum of understanding to explore the creation of the €7.5 billion plant last July, noting that the final decision would depend on the support of the French government. It was not just a financial arrangement, however. The two companies hoped to leverage each other's technological strengths, with GlobalFoundries supporting with its FDX technology while ST said it would offer the planned 300mm fab its roadmap up to 18nm. The facility is expected to produce "up to 620,000 wafers" annually at full operation by 2026. GlobalFoundries will own 58 percent of the facility and ST the remainder, they said, in a statement while announcing the initiative last year.

The update provided in June indicated the companies have been able to convince the French government to support the new fab with substantial funding as part of the European Chips Act approved by the European Commission. The EU Chips Act mirrors another one the US passed into law to support local semiconductor manufacturing, and which has sparked a wave of fab construction announcements by many American chipmakers. The companies that have committed to building new fabs in the US include market leaders like Intel, Micron, ON Semiconductor and WolfSpeed. Many of these agreements involve joint investments with other enterprises. The GlobalFoundries-ST plan is centered on helping to fulfill the EU's hope for expanded chip production across the region, according to ST executives.

"Today marks an important milestone for ST, for GF as well as for Europe. This could not have been achieved without the support of the French government as well as of the European Commission," said Jean-Marc Chery, ST's CEO, in a statement. "We will further reinforce the European and French FD-SOI ecosystem, building more capacity for our European and global customers in complex, advanced technologies for key end-markets including automotive, industrial, IoT and communication infrastructure, as they transition to digitalization and decarbonization. This new manufacturing facility will support our $20 billion-plus revenue ambition."

Technology objectives

Technology companies need alliances like the one between GlobalFoundries and ST to stay competitive on the innovation and manufacturing fronts. The market has been changing so rapidly over the last decade that falling behind on any technological innovation could prove deadly. Nowhere is this happening faster than in artificial intelligence (AI). The segment recently attracted greater interest because of Nvidia Corp., the graphics processing unit (GPU) vendor that recently clinched the title of the first semiconductor company to reach the $1 trillion market valuation level. Nvidia, which controls most of the GPU market, has strengthened itself even further by expanding into AI and establishing a leading position in the segment.

Nvidia is not resting on its oars. The company won the early round of the AI race by out-innovating competitors in its specific segments and by being first to market, but it is now building on this by partnering with customers, other chipmakers, service providers and enterprises in segments of the economy that are leveraging the technology in their operations. The list of economic segments that Nvidia is participating has expanded in recent months beyond its core gaming market to include manufacturing, where it is now engaged with a bunch of contract manufacturers, including Foxconn, Pegatron, Quanta, and Wistron. Nvidia said its objective in working with these companies is to assist in their efforts to digitalize operations. The offerings here include generative AI, 3D collaboration, simulation and autonomous machines, the company said. These initiatives have been eagerly embraced by the contract manufacturers.

"Nvidia's strength in AI and its strong ecosystem of application partners are providing Foxconn Industrial Internet with a path to significant operational efficiency gains," said Tai-Yu Chou, an executive with Foxconn, in a statement. "The combination of Nvidia Metropolis for factories and Isaac Sim for robotics is helping us realize industrial automation goals faster than ever imagined."

Adds Nvidia president and CEO Jensen Huang: "The world's largest industries make physical things. Building them digitally first can save enormous cost. Nvidia makes it easy for electronics makers to build and operate virtual factories, digitalize their manufacturing and inspection workflows, and greatly improve quality and safety while reducing costly last-minute surprises and delays."

Another area of interest for Nvidia is the automotive market, a segment where it has limited exposure. To boost its presence in the segment, Nvidia recently announced an agreement to supply its chips and software to MediaTek. The two companies said they will work on helping to transform the automobiles market with AI and accelerated computing. As part of the agreement, MediaTek plans to develop "automotive SoCs and integrate the Nvidia GPU chiplet, featuring Nvidia AI and graphics intellectual property, into the design architecture," the Taiwanese company said. Nvidia would also provide its Nvidia drive OS, CUDA and other software technologies for safety as well as infotainment activities. MediaTek said the partnership would enable it to participate in a market valued at about $12 billion.

"Nvidia is a world-renowned pioneer and industry leader in AI and computing. With this partnership, our collaborative vision is to provide a global one-stop shop for the automotive industry, designing the next -generation of intelligent, always-connected vehicles," said Rick Tsai, CEO of MediaTek, at a news conference announcing the agreement. "Through this special collaboration with Nvidia, we will together be able to offer a truly unique platform for the compute-intensive, software-defined vehicle of the future."

Nvidia president and CEO, **Jensen Huang**

> "The world's largest industries make physical things. Building them digitally first can save enormous cost"

Spreading financial risks

Agreements like the one between Nvidia and MediaTek help these companies significantly accelerate product development and delivery times. But they also offer other benefits, including lower R&D and other operating costs. By leveraging each other's strengths—technology and manufacturing—the partners get to slash millions of dollars from R&D costs in addition to huge reductions in capital equipment expenses.

Furthermore, the risks involved in these critical operational activities get spread across multiple parties, including national and regional governments that are increasingly interested in localizing technology innovations and production. The agreement between ST and GlobalFoundries fall into this category. But there are occasions when the transactions are trans-regional, involving companies located in areas of huge growth but that are also known to hold geo-political risks for foreign technology companies. China has become such a delicate area for Western companies. But it is also a country with huge growth potential that semiconductor companies in the West are loath to avoid. A partnership with local Chinese entities can help foreign companies better navigate the terrain and avoid complications.

An agreement struck recently between ST and Chinese compound semiconductor vendor Sanan Optoelectronics falls in this category. ST wants to raise its SiC market revenue to $5 billion annually by 2030. The joint venture it created for a new 200mm silicon carbide (SiC) production plant in Chongqing, China, will contribute towards the achievement of this objective. The facility is expected to cost about $2.4 billion and would be financed by the two companies and the local government in China. It will allow the parties to better address opportunities in the automotive sector, they said.

"China is moving fast towards electrification in automotive and industrial and this is a market where ST is already well-established with many engaged customer programs," ST's Cherry said, in a statement. "The combination of Sanan Optoelectronics' future 200mm substrate manufacturing facility with the front-end JV and ST's existing back-end facility in Shenzhen, China, will enable ST to offer our Chinese customers a fully vertically integrated value chain. It is an important step to further scale up our global SiC manufacturing operations."

Jean-Marc Chery, ST's CEO

> "Today marks an important milestone for ST, for GF as well as for Europe. This could not have been achieved without the support of the French government as well as of the European Commission"

Keeping pace in the space race

TTI's VP military and aerospace, Gia Hayes, explains why premium components, flexible systems and trusted partners are essential in military and aerospace applications

Significant future technology and international relations/freedoms depend on how we harness the sky above. Data reporting and forwarding between CubeSats and ground infrastructure; internet service to underserved regions; military terrain and asset monitoring; global transport management; remote sensing; deep space exploration and more depend on how adeptly we develop these opportunities.

For those in the dynamic, critical and competitive military/aerospace industry that requires precision, dependability and coordination, the following are three areas to be mastered to remain competitive:

Premier products: A system is only as effective as its individual components. That means authentic and available ones. Dependable supply chains are crucial. Beyond that, the rigors of space's harsh environments require products to be robust, flexible, efficient, space-saving and secure.

Only space-grade or mil-spec parts will do for long-duration or human spaceflight missions. However, for low earth orbit and limited life systems, a quality distribution partner can help recommend commercial-grade off-the-shelf parts or even automotive-grade components to provide significant savings when budgets impact mission certification requirements.

Flexible Systems: Since design is a volatile and dynamic process, speed, flexibility and adaptability are necessities if, or more likely, when plan A gets sidetracked. Knowing how to coordinate and optimize the parts to complete the project is an exercise that requires an efficient, resilient system.

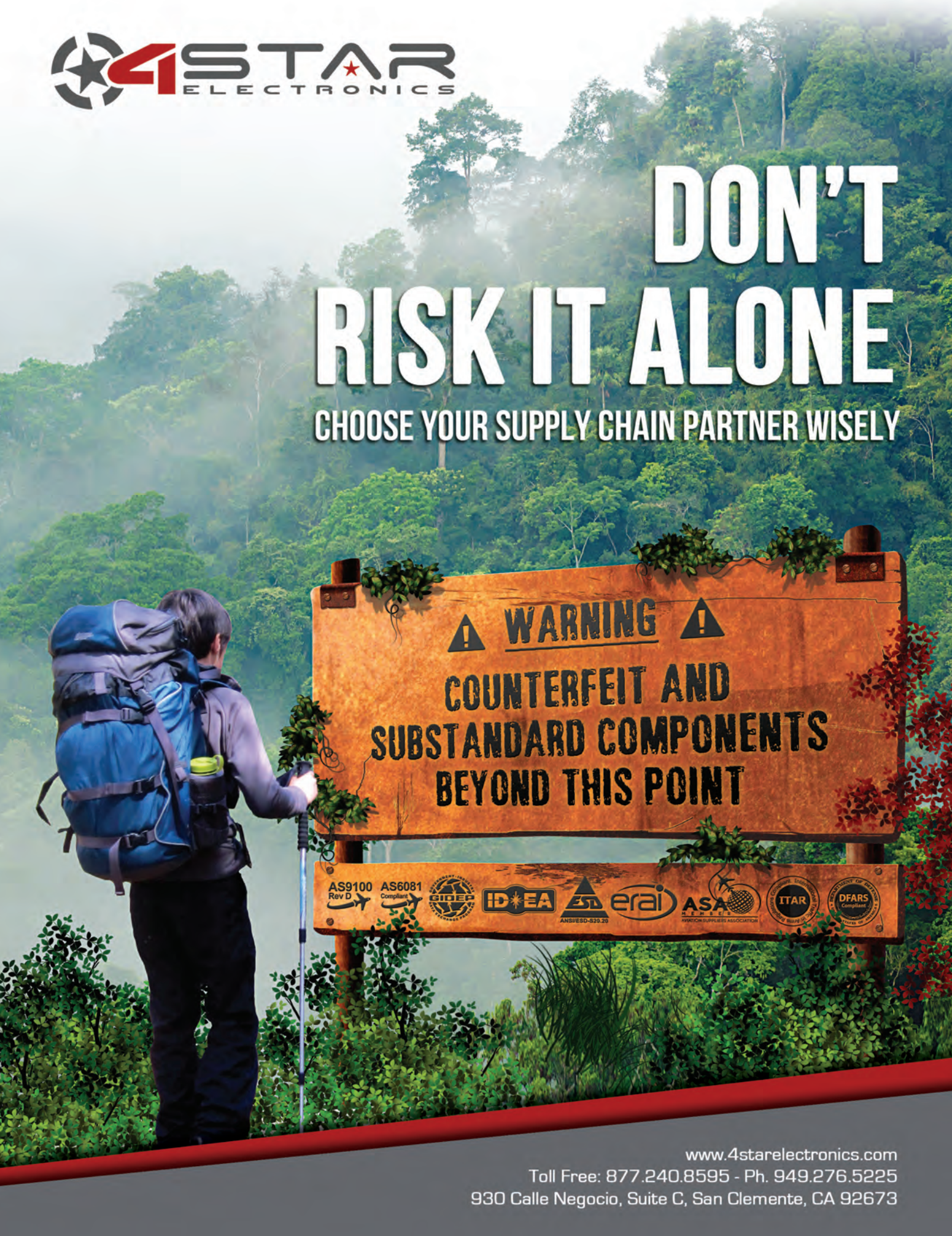
With space exploration companies doing more iterative testing programs where they launch, test and revise, they need a component source that can be fast and flexible with the right product on the shelf to make required changes a reality.

Trusted partners: The right partner is the one who can supply the component needs today and who knows the customer, their inventory and their corporate goals enough to know what their needs will be tomorrow—and then be able to deliver the goods.

Just as satellites need control rooms, tracking and monitoring capabilities on the ground, companies need component suppliers to keep them on the right track. With multiple launch operators trying to get systems into orbit before competitors and bills-of-materials changing overnight, customers need a reliable distributor with the speed, flexibility and capability to provide what they need, when they need it.

TTI has a long history of providing high-reliability, mil-spec and space-level components since the Apollo days when some of its first sales were high-performance passive components going into aircraft for defense systems. Today the company offers quality electronic components for everything from satellite constellations to launch vehicles. TTI is creating a new online Space Resource Center with articles, videos and news in space-age components.

www.tti.com


4STAR ELECTRONICS
DON'T RISK IT ALONE
CHOOSE YOUR SUPPLY CHAIN PARTNER WISELY
WARNING
COUNTERFEIT AND SUBSTANDARD COMPONENTS BEYOND THIS POINT
AS9100 Rev D
AS6081 Compliant
GIDEP
IDEA
ESD
ANSI/ESD-S20.20
erai
ASA MEMBER
ITAR
DFARS Compliant
www.4starelectronics.com
Toll Free: 877.240.8595 - Ph. 949.276.5225
930 Calle Negocio, Suite C, San Clemente, CA 92673

Packaging • By John Denslinger

America—intelligent packaging replaces smart

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

Starting with cardboard boxes, John Denslinger walks readers through the history of packaging innovations concluding with intelligent packaging bristling with electronics

It wasn't long ago goods shipped in simple cardboard boxes with little more than a sender's name and destination address. As years passed, package design and materials steadily improved, affording better product protection, brand graphics and lower overall costs. As e-commerce exploded, consumers began to expect more. They wanted the ability to track and verify home deliveries. Companies also sought more: eliminating routing delays, lost shipments and returns due to packaging failures. Both needs were reasonable but real-time information was absent. Smart packaging was born.

Smart packaging is nothing more than adding functionality to a package. One of the earliest applications was RFID. This technology pioneered low-cost asset management and tracking. Companies gained remote visibility for the first time while amassing tremendous amounts of data. Consumers gained convenience and better delivery information. The addition of QR codes and NFC tags mapped product lifecycles and provided security and authenticity. In general, smart packaging delivered enormous benefits to companies and consumers alike.

For those investing in smart packaging technology, the current market for electronic hardware is $0.6B according to IDTechEx. By 2033, that amount will grow to $2.6B primarily electronic labels and UHF RFID components. Both figures exclude infrastructure, software and services. It's a sizeable growth opportunity.

As with any technological success, consumers and companies wanted more. Not satisfied with gains in product quality, shelf life, asset tracking, product loss and real-time data collection attention turned to safety, security and theft deterrence across a broader range of commodities and markets. Then add lengthy Covid isolation and self-health worries and everything changed. In the post Covid era, consumers now demand greater protection particularly in healthcare, pharmaceuticals, personal care, ready-to-eat meals, food and beverage deliveries.

Until this point, smart technology focused on packaging surfaces and internal packaging conditions. Missing was any knowledge or record of the environment as the packaged product travelled through the supply chain. The need for a smarter smart package was obvious. The age of intelligent packaging begins.

The market opportunity for intelligent packaging is significant because its technology integration goes much further than smart functionality. Intelligent packaging employs indicators, sensors, and wireless communications tracking, analyzing and reporting not only a product's condition but also the ambient environment.

Imagine packaging designed with bio, gas, chemical and odor-sensitive sensors. Imagine that combined with freshness, time, temperature, relative humidity, pressure, pH and light exposure indicators. Imagine RFID tags that can monitor and transmit all this seamlessly. No imagination is required, that capability is available today. Consumers are the beneficiaries of knowledge. Knowledge that their package is safe, secure and delivered under appropriate ambient conditions.

And there are new intelligent applications on the horizon. Sustainability, for example, is a good bet to be next. Capturing a package's carbon neutral evidence for ESG reporting will be a significant need in the near-term.

Cesium atomic clock eliminates obsolescence concerns

Microchip's VP frequency and time systems business unit, Randy Brudzinski, explains how its upgraded cesium atomic clock offers confidence in continuity of supply

For applications such as complex underwater defense missions, the need for synchronized precise timing and frequency solutions is critical to safeguard and process data as intended. Many such applications rely on Global Navigation Satellite Systems (GNSS) to provide that precise time and frequency but GNSS is susceptible to jamming and spoofing attacks. To provide multiple industries—including aviation and defense—with a long-term and precise timing and frequency solution, Microchip Technology has introduced the 5071B cesium atomic clock that can perform autonomous time keeping for months in the event of GNSS denials.

Microchip's VP frequency and time systems business unit, Randy Brudzinski, said: "The 5071A has been the world's premier time and frequency standard for decades. With the upgraded 5071B, Microchip continues its position as the industry leader in complex timing solutions. Our customers can rely on the 5071B's technology for years to come and implement a timing and frequency solution with confidence in continuity of supply and modern components, which eliminates obsolescence concerns."

The 5071B is available in a three-unit height (3U) 19in rackmount enclosure, providing a compact product to work in environments where it can be easily transported and secured versus a larger alternative designed specifically for laboratory environments.

The 5071B has upgraded electronic components to address possible obsolescence or non-RoHS circuitry. The product provides 100ns holdover for more than two months, maintaining system synchronization when GNSS signals like GPS are denied. For example, this capability would enable a 5G network to remain fully operational for months without GNSS.

As a cesium beam tube product with no deterministic long-term frequency drift, the 5071B provides absolute frequency accuracy of 5E-13 or 500 quadrillionths over all specified environmental conditions for the product's life.

For military applications requiring rapid deployments for system radars, 5E-13 stability eliminates the need for the acquisition of external synchronization sources prior to radiating. In satellite communications, this enables the user to broadcast and transmit over very small frequency bands without drifting out of band for the entire duration of the product.

The 5071B is now compliant with RoHS, making it available in regions where regulatory policies are in place.

www.microchip.com

Mouser warehouse associates process orders

Order genuine components with confidence

OEMs looking to reduce the risk of counterfeit electronic parts entering the supply chain can accomplish this by using authorized distributors accredited to AS6496

Mouser was the electronic component industry's first authorized distributor to receive accreditation to AS6496, the aerospace industry's high standard for anti-counterfeit measures in authorized electronic component distribution.

Customers can order with confidence from Mouser knowing the authorized distributor has processes in place to prevent counterfeit products entering its inventory. With increasing global demand and supply shortages, counterfeit parts are on the rise and harder to detect. Thus, the threat of fake components entering the supply chain is a growing concern, making it more important to buy from an authorized distributor with tough anti-counterfeit policies in place to ensure customers receive 100 per cent certified, genuine products traceable to each manufacturer.

The AS6496 aerospace standard sets requirements for the avoidance, detection, mitigation and disposition of counterfeit products in the authorized distribution supply chain. Mouser received the AS6496 accreditation in Fall 2018 from the Performance Review Institute (PRI), as part of the Counterfeit Avoidance Accreditation Program (CAAP). The CAAP audit was based on audit criteria (AC7403) created jointly by PRI, the Electronic Components Industry Association (ECIA) and aerospace OEM representatives. This international standard requires authorized distributors to have a counterfeit mitigation policy and a counterfeit electronics parts control plan.

CAAP is a cooperative industry effort to mitigate the risk of introducing counterfeit parts into the supply chain and the cost for compliance throughout the aviation, space, and defense industries. Mouser is also registered to AS9100D/ ISO 9001:2015 and ANSI/ESD S20.20-2014, the industry's gold standards for quality, control and electrostatic discharge (ESD) protection.

Mouser's AS9100D/ ISO 9001:2015 Quality

> **The AS6496 aerospace standard sets requirements for the avoidance, detection, mitigation and disposition of counterfeit products in the authorized distribution supply chain**

Management System adds additional aviation, space and defense industry requirements, including procedures and processes for the prevention of counterfeit parts. Registration to these standards provides customers with the confidence that Mouser is an authorized distributor of the highest quality components by providing traceability, risk management, process control, customer support, product availability and document/record control.

To help speed customers' designs, Mouser's website hosts an extensive library of technical resources, including a Technical Resource Center, along with product data sheets, supplier-specific reference designs, application notes, technical design information, engineering tools and other helpful information.

www.mouser.com/quality

Mouser stock associate identifying and pulling components

Confronting counterfeit semiconductors

Rochester Electronics EMEA's technical sales manager, Ken Greenwood, discusses how companies can fight counterfeiting and ensure an authorized supply

Counterfeit semiconductors come in many disguises. The definition of a counterfeit is 'an imitation intended to be passed off fraudulently or deceptively as genuine, for profit'. In the world of semiconductors, counterfeits include:

- Non-functional or scrap product, re-marked as good and resold
- Second-hand original components, re-marked, repacked but claim to be new
- Functional, substandard product purchased by the counterfeiter, re-marked and resold as a higher spec product at an increased price
- Unauthorized functional copies
- Genuine original components with forged traceability and authenticity documentation

Counterfeiters have moved beyond fraudulent copies of manufacturers' logos and IC packages with no die inside, that can be caught by AS6081 visual testing. Counterfeiters now have sophisticated operations, utilizing impeccable component finishes, plus seemingly perfect paperwork trails, as the potential gains for counterfeiters are enormous.

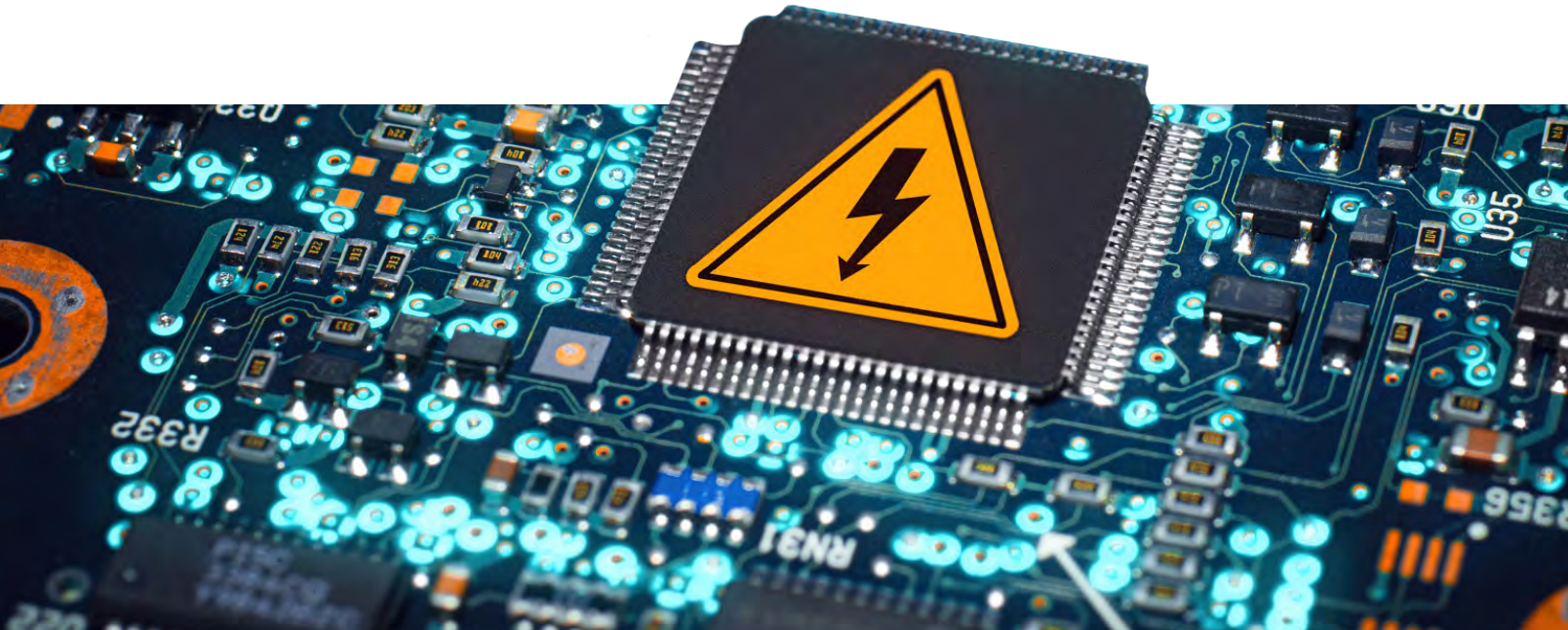
Quality does not mean reliability

What are the risks of using counterfeits? Risks to purchasers are many and the misconception that 'testing' can provide a 100 per cent guarantee of quality is all too common. The key question here is: which tests? Many anti-counterfeiting measures only cover certain levels of visual, re-marking and x-ray testing. While this will catch many counterfeits, more sophisticated examples may not be identified.

Some examples of when counterfeiting may lead to compromised long-term reliability:

- In re-marking cases, the process of etching back the original external markings with aggressive chemicals or mechanical grinders can result in internal bond or substrate damage. Chemical residues from the cleaning process slowly enter and contaminate the device, causing bond-pad or bond-wire failures
- Non-authorized handling and storage that is not in compliance with AS6496 can lead to moisture ingress and ESD damage. This risk is possible for any product purchased through non-authorized, routes regardless of date-code
- The process of recovering previously

Rochester Electronics' technical sales manager, **Ken Greenwood**



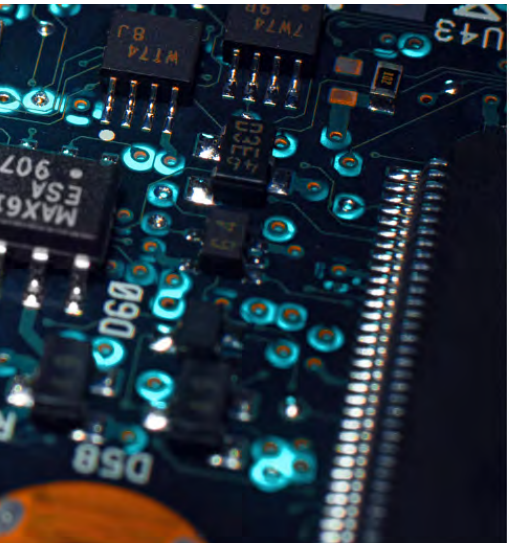
used semiconductors from old PCBs can result in catastrophic heat and mechanical damage. Recovery of the IC from the PCB is normally the last step of a scrap trail, which includes the product's prior use, and a return-for-recovery route through an uncontrolled storage environment. Exposure to excessive humidity, water and salt is common. This process produces an authentic used product with questionable reliability

Third-party testing can never guarantee to identify every counterfeit and cannot offer a guarantee of product reliability.

What does 100 per cent authorized and tested really mean?

All product provided by an authorized source has been 100 per cent fault-coverage tested and is guaranteed to meet the original component manufacturer's (OCM) datasheet. More crucially, it is guaranteed to meet their reliability standards. Products have been fully tested by the OCM or, in the case of ongoing production of discontinued product, by an authorized obsolescence partner. Partners are authorized to use the original test programs to offer a full guarantee of quality. The ultimate tool in the fight against counterfeits is authorization.

Authorized after-market suppliers and manufacturers, as identified by the US Department of Defense (DFARS), such as Rochester Electronics, provide a 100 per cent guaranteed and counterfeit-free source for active-shortage and obsolete semiconductors.



Finished devices stored and supplied by authorized sources are guaranteed to come from the OCM and to have been stored in-line with the OCM's specifications. These products are 100 per cent conformance guaranteed.

As a licensed manufacturer, Rochester Electronics can offer ongoing production of obsolete devices. Built from known-good die, these products are tested using the OCM's test procedures and, in many cases, the original test equipment. Each of these components are 100 per cent compliant to the original specifications.

Rochester Electronics is authorized by OCMs to mark products with the original part numbers and the current date-codes. Many devices are still in production 20 years after the original discontinuations.

www.rocelec.com

Round industrial enclosures now in four sizes

Rolec's round technoDISC plastic enclosures for IIoT and Industry 4.0 electronics are now available in four sizes. The design suits applications such as industrial sensors, machine building, automation systems, IIoT control nodes and shipboard monitoring equipment.

These 'go anywhere' enclosures can be installed on walls, bulkheads and machines. The lid can remain closed during installation in challenging environments–safeguarding electronics with IP66 (IP67 optional) ingress protection.

TechnoDISC's shape is based on a wristwatch, with a round recessed area on the lid for a membrane keypad or front plate. Two sides are flat to accommodate cable glands and interfaces. All lid and mounting screws are concealed beneath snap-on trims. Inside, the lid and base have screw pillars for PCBs and mounting plates.

The enclosures are now available in four sizes from: 3.82 by 4.33 by 2.17in, to 7.05 by 7.48 by 3.54in. They are molded from UV-stable ASA+PC (UL94 V-0) in light gray, similar to RAL 7035. The POM trims are anthracite gray (RAL 7016).

www.rolec-usa.com

LCOS panel suits next-gen glasses

Omnivision has announced a new 648p single-chip liquid crystal on silicon (LCOS) panel for next-generation augmented reality, extended reality and mixed reality glasses and head-mounted displays. The OP03011 LCOS panel features 3.8µm pixels in one of the world's smallest 0.14in optical formats. The low-power, lightweight design is ideal for next-generation glasses that can be worn 24/7.

Omnivision's marketing director for the IoT and emerging segment, Devang Patel, said: "While the market for AR glasses is still in its infancy, there is growing interest among consumers. This has led OEMs to design more functionality into slim, fashionable designs that consume very little power and are lightweight, allowing them to be worn nearly 24/7.

"The OP03011 is the only single-chip solution that is designed in an ultra-compact format for applications requiring a smaller field of view and lower resolution, making it well suited for some of the sleekest, most innovatively designed AR glasses."

www.ovt.com

High-capacity smart meter battery coming

Ultralife Corporation used the American Water Works Association's conference to launch its 19Ah D cell battery, specifically designed for water and other utility meters.

In recent years, Ultralife has enhanced its range of non-rechargeable lithium thionyl chloride cells, which are often embedded into utility meters for the duration of the product's life. The new 19Ah D cell offers industry leading capacity, which results in a long service life and it has already been verified by a leading metering original equipment manufacturer.

Ultralife Corporation's VP, Eric Lind, said: "Research suggests that, by 2027, smart meter deployment will generate around $60 billion in revenue for vendors globally. However, to make this growth a success, energy companies must have confidence that the smart meter is providing an uninterrupted stream of data, so that customers can be billed accurately. Reliable battery power is key to this."

www.ultralifecorporation.com

Supporting next-gen data centers and generative AI

Molex has introduced a chip-to-chip 224G product portfolio, encompassing next-gen cables, backplanes, board-to-board connectors and near-ASIC connector-to-cable solutions operating at speeds up to 224 Gbps-PAM4. As a result, the company is positioned to meet demands for the fastest available data rates powering advanced technology including generative AI, machine learning, 1.6T networking and other high-speed applications.

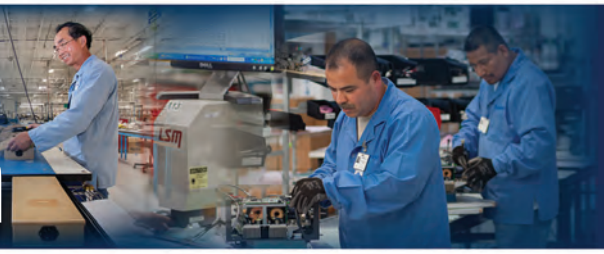
Molex' VP and GM copper solutions, Jairo Guerrero, said: "Molex is collaborating closely with major technology innovators, as well as key data center and enterprise customers, to set an aggressive pace for 224G product introductions.

"Our transparent, co-development approach facilitates early engagement with stakeholders across the 224G ecosystem to identify and resolve potential performance bottlenecks and design challenges, ranging from signal integrity and EMI reduction to the need for more efficient thermal management."

Samples of Mirror Mezz Enhanced, Inception and CX2 Dual Speed will be available this summer, with product samples of Molex's new OSFP and QSFP offerings slated for release in the fall.

www.molex.com

Nearshore or Offshore, We've Got the Right Solution



Product Lifecycle Management
Supply Chain Management
Traceability
Project Status Visibility
Outsourcing
Quality
Manufacturing
Responsiveness
Lowest Total Cost
Geographic Flexibility
IP Protection
Logistics Support

Change has become a constant in the outsourcing equation. At SigmaTron International, we've developed a business strategy that gives your team the flexibility needed to deal with change. Our engineering team can help you cut product development time, improve manufacturability on the front-end or address cost or obsolescence issues over time. Our global facility network gives you choices which can change as your manufacturing location needs evolve. We can also customize a repair depot solution and support legacy product.

SigmaTron's advantages include:

- Agile PLM-driven project launch support
- End-to-end scalable production solutions
- Access to a global network of facilities in the U.S., Mexico, China and Vietnam
- 24/7 visibility into project status around the globe via our proprietary SCORE system
- A global supply chain management strategy that supports electronic and mechanical products
- Robust systems for serialization, traceability and device history recordkeeping
- An experienced team capable of supporting your project's changing needs.

We have built our business around mid-to-high volume accounts who want Tier One caliber solutions, customized service and responsiveness. All of our facilities are registered to ISO 9001 and those building mission critical products are also registered to ISO 13485, IATF 16949 and/or AS 9100D. You will have access to global manufacturing options that support both nearshore and offshore strategies plus a trusted partner who truly values your business.

Call us today at **510-477-5004** or visit us on the web at: **www.sigmatronintl.com/ca** and download our new white paper: ***Real-time Project Status Visibility: How Robust Are Your Contract Manufacturer's Systems?***

Let us show you how our options can help your company thrive in a changing world.

ONE SOURCE. GLOBAL OPTIONS.®

SIGMATRON INTERNATIONAL

Manufacturer	Distributor	Telephone	Website	Franchised Distributor (Y/N/M)	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	Pack and Hold
CABLE & WIRING											
3M	Mouser Electronics	800-346-6873	www.mouser.com	Y	23,235	N/A	$0	0.46	50	1,000+	Y
Alpha Wire	Mouser Electronics	800-346-6873	www.mouser.com	Y	8,106	N/A	$0	93%	50	1,000+	Y
Belden Wire & Cable	Mouser Electronics	800-346-6874	www.mouser.com	Y	5,863	N/A	$0	97%	50	1,000+	Y
Molex	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Molex	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
TE Connectivity	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
CIRCUIT PROTECTION											
Bel Fuse		+1 201 432 0463	belfuse.com/circuit-protection	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bourns	Mouser Electronics	800-346-6873	www.mouser.com	Y	4,462	N/A	$0	68%	50	1,000+	Y
Eaton	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
EPCOS	Mouser Electronics	800-346-6873	www.mouser.com	Y	3,487	N/A	$0	100%	50	1,000+	Y
KYOCERA AVX	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50+	1,000+	Y
KYOCERA AVX	Digi-Key	800-344-4539	www.digikey.com	Y	N/A	N/A	$0	N/A	50+	1,000+	Y
Littelfuse	Mouser Electronics	800-346-6873	www.mouser.com	Y	28,790	N/A	$0	67%	50	1,000+	Y
Schurter	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Vishay	Mouser Electronics	800-346-6873	www.mouser.com	Y	31,445	N/A	$0	68%	50	1,000+	Y
DISPLAYS & LEDs											
BIVAR	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Broadcom	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Cree LED	Mouser Electronics	800-346-6873	www.mouser.com	Y	12,390	N/A	$0	99%	50	1,000+	Y
Dialight	Mouser Electronics	800-346-6873	www.mouser.com	Y	6,179	N/A	$0	84%	50	1,000+	Y
Displaytech	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Hantronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Kingbright Company, LLC	Mouser Electronics	800-346-6873	www.mouser.com	Y	301	N/A	$0	100%	50	1,000+	Y
Lumileds	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Luminus	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Newhaven Display	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
ams OSRAM	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,690	N/A	$0	100%	50	1,000+	Y
Tianma	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
ELECTROMECHANICAL											
ALPS	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Apem, Inc.	Mouser Electronics	800-346-6873	www.mouser.com	Y	4,326	N/A	$0	83%	50	1,000+	Y
E-Switch	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Grayhill	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Honeywell	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Keystone Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Littelfuse	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Nidec	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
NKK Switches	Mouser Electronics	800-346-6873	www.mouser.com	Y	13,976	N/A	$0	86%	50	1,000+	Y
Omron	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y

Advert Index

Manufacturer	Distributor	Telephone	Website	Franchised Distributor (Y/N/M)	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	Pack and Hold
Panasonic	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Phoenix Contact	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
PUI Audio	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Schneider Electric	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Sensata	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
TE Connectivity	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Teledyne Relays	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
ENCLOSURES											
Bud	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bud Industries	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,325	N/A	$0	80%	50	1,000+	Y
Hammond Manufacturing	Mouser Electronics	800-346-6873	www.mouser.com	Y	2,839	N/A	$0	82%	50	1,000+	Y
METCASE Enclosures	OKW Enclosures, Inc.	(800) 965-9872	www.metcaseusa.com		322	N/A	$0	N/A	10	20	Y
New Age Enclosures	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
OKW Gehäusesysteme GmbH	OKW Enclosures, Inc.	(800) 965-9872	www.okwenclosures.com		2,450	N/A	$0	N/A	10	20	Y
ROLEC Gehäuse-Systeme GmbH	ROLEC Enclosures Inc	(888) 658-5774	www.rolec-usa.com		1,960	N/A	$0	N/A	4	6	Y
FREQUENCY MANAGEMENT											
Abracon Corporation	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,780	N/A	$0	100%	50	1,000+	Y
CTS Electronic Components	Mouser Electronics	800-346-6873	www.mouser.com	Y	3,889	N/A	$0	100%	50	1,000+	Y
ECS Inc	Mouser Electronics	800-346-6873	www.mouser.com	Y	2,070	N/A	$0	100%	50	1,000+	Y
Epson Toyocom	Mouser Electronics	800-346-6873	www.mouser.com	Y	178	N/A	$0	100%	50	1,000+	Y
IQD Frequency Products	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
KYOCERA AVX	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50+	1,000+	Y
KYOCERA AVX	Digi-Key	800-344-4539	www.digikey.com	Y	N/A	N/A	$0	N/A	50+	1,000+	Y
SiTime	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
ICs & SEMICONDUCTORS											
Analog Devices, Inc	Mouser Electronics	800-346-6873	www.mouser.com	Y	18,749	N/A	$0	95%	50	1,000+	Y
Broadcom Limited	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Central Semiconductor	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Central Semiconductor Corp.	Future Electronics	(800) 675-1619	www.futureelectronics.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	Y
Digi International	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Diodes Incorporated	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
FTDI Chip	Mouser Electronics	800-346-6873	www.mouser.com	Y	94	N/A	$0	100%	50	1,000+	Y
Infineon	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,580	N/A	$0	63%	50	1,000+	Y
Intel	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
ISSI	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Lattice	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Littelfuse	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
MACOM	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Maxim Integrated	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Microchip	Mouser Electronics	800-346-6873	www.mouser.com	Y	5,800	N/A	$0	100%	50	1,000+	Y
Monolithic Power Systems (MPS)	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Nexperia	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
NXP	Mouser Electronics	800-346-6873	www.mouser.com	Y	7,205	N/A	$0	100%	50	1,000+	Y
onsemi	Mouser Electronics	800-346-6873	www.mouser.com	Y	7,486	N/A	$0	96%	50	1,000+	Y
Power Integrations	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Qorvo	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Renesas Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
ROHM Semiconductor	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Silicon Laboratories Inc	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,141	N/A	$0	100%	50	1,000+	Y
Skyworks	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
ST Microelectronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	8,145	N/A	$0	96%	50	1,000+	Y
Swissbit	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Texas Instruments	Mouser Electronics	800-346-6873	www.mouser.com	Y	29,676	N/A	$0	94%	50	1,000+	Y
Toshiba	Mouser Electronics	800-346-6873	www.mouser.com	Y	800	N/A	N/A	N/A	N/A	N/A	Y
Vishay	Mouser Electronics	800-346-6873	www.mouser.com	Y	53,781	N/A	$0	77%	50	1,000+	Y
Wolfspeed	Mouser Electronics	800-346-6873	www.mouser.com	Y	53,781	N/A	$0	77%	50	1,000+	Y
INTERCONNECTION											
Bel		+1 858 676 9650	belfuse.com/magnetic-solutions	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3M	Mouser Electronics	800-346-6873	www.mouser.com	Y	23,235	N/A	$0	46%	50	1,000+	Y
Aero Conesys	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Amphenol	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Amphenol	Mouser Electronics	800-346-6873	www.mouser.com	Y	165,853	N/A	$0	31%	50	1,000+	Y
Anderson Power Products	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Aptive (Delphi)	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Bel Magnetic Solutions		+1 858 676 9650	belfuse.com/magnetic-solutions	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

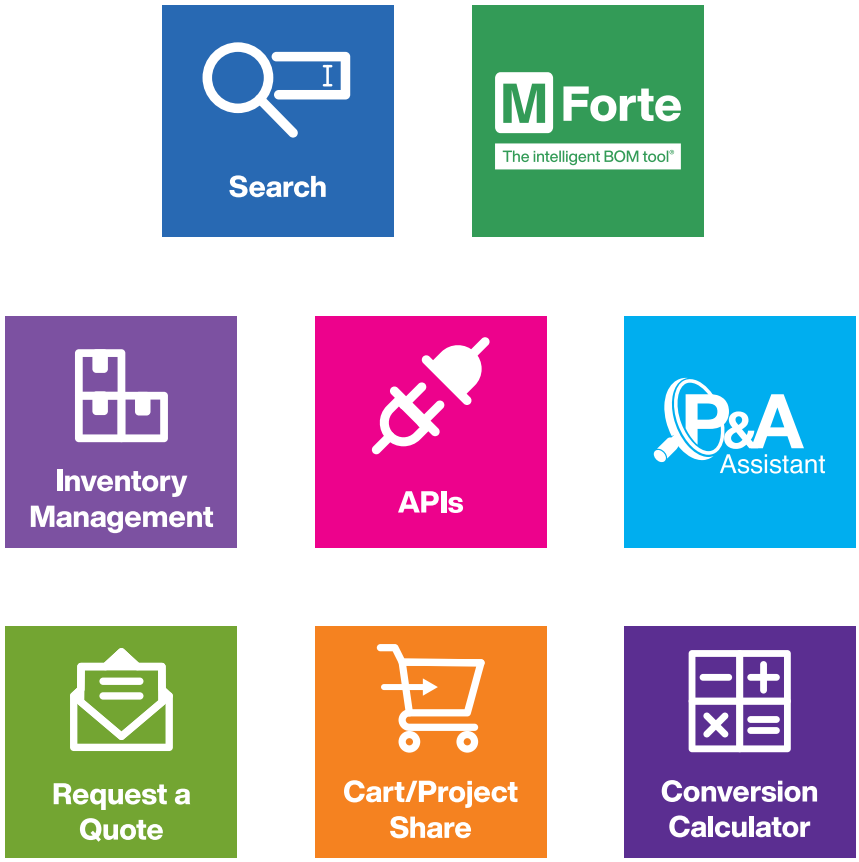
Manufacturer	Distributor	Telephone	Website	Franchised Distributor (Y/N/M)	No. of Lines for Principle	Stock Value for Principle	Minimum Order Value	% Lead Free for Principle Range	No. of Technical Support Staff	Total No. of Staff	Pack and Hold
Cinch	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cinch Connectivity/Bel	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Cinch Connectivity Solutions		+1 507 833 8822	belfuse.com/cinch	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Eaton	Mouser Electronics	800-346-6873	www.mouser.com	Y	10,744	N/A	$0	27%	50	1,000+	Y
ERNI Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Glenair	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Harting	Mouser Electronics	800-346-6873	www.mouser.com	Y	2,160	N/A	$0	51%	50	1,000+	Y
Harwin	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Hirose Electric	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
ITT Cannon	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ITT Cannon	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
JAE Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	6,02	N/A	$0	100%	N/A	N/A	Y
JST	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
KYOCERA AVX	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50+	1,000+	Y
KYOCERA AVX	Digi-Key	800-344-4539	www.digikey.com	Y	N/A	N/A	$0	N/A	50+	1,000+	Y
LEMO	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Mill-Max	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Molex	Mouser Electronics	800-346-6873	www.mouser.com	Y	85,634	N/A	$0	89%	50	1,000+	Y
Neutrik	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,563	N/A	$0	100%	50	1,000+	Y
NorComp	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Phoenix Contact	Mouser Electronics	800-346-6873	www.mouser.com	Y	30,044	N/A	$0	77%	50	1,000+	Y
Radiall	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Samtec	Mouser Electronics	800-346-6873	www.mouser.com	Y	123,613	N/A	$0	69%	50	1,000+	Y
Stewart Connector		+ 1 717 235 7512	belfuse.com/stewart-connector	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Switchcraft Corporation	Mouser Electronics	800-346-6873	www.mouser.com	Y	300	N/A	$0	55%	50	1,000+	Y
TE Connectivity	Mouser Electronics	800-346-6873	www.mouser.com	Y	123,613	N/A	$0	69%	50	1,000+	Y
OBSOLESCENCE / HARD TO FIND											
	Lansdale	602-438-0123	lansdale.com	Y							
	Lantek Corp.	973-579-8100	www.lantekcorp.com	M	186,000	$22M	$0	75.00%	5	62	Y
	Rochester Electronics	978-462-9332	www.rocelec.com	Y		N/A	$250		10	400+	Y
OPTO ELECTRONICS											
Broadcom	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Cree LED	Mouser Electronics	800-346-6873	www.mouser.com	Y	582	N/A	$0	99%	50	1,000+	Y
Finisar	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
ams OSRAM	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,927	N/A	$0	99%	50	1,000+	Y
ROHM Semiconductor	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Vishay	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
PASSIVES											
ABRACON	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Bourns	Mouser Electronics	800-346-6873	www.mouser.com	Y	38	N/A	$0	78%	50	1,000+	Y
Cornell Dubilier	Mouser Electronics	800-346-6873	www.mouser.com	Y	24,145	N/A	$0	71%	50	1,000+	Y
Coilcraft	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
EPCOS	Mouser Electronics	800-346-6873	www.mouser.com	Y	26,533	N/A	$0	98%	50	1,000+	Y
Fair-Rite	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
KEMET	Mouser Electronics	800-346-6873	www.mouser.com	Y	77,568	N/A	$0	66%	50	1,000+	Y
KOA Speer	Mouser Electronics	800-346-6873	www.mouser.com	Y	34,078	N/A	$0	58%	50	1,000+	Y
KYOCERA AVX	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50+	1,000+	Y
KYOCERA AVX	Digi-Key	800-344-4539	www.digikey.com	Y	N/A	N/A	$0	N/A	50+	1,000+	Y
Murata	Mouser Electronics	800-346-6873	www.mouser.com	Y	33,780	N/A	$0	99%	50	1,000+	Y
Nichicon	Mouser Electronics	800-346-6873	www.mouser.com	Y	20,389	N/A	$0	84%	50	1,000+	Y
Ohmite	Mouser Electronics	800-346-6873	www.mouser.com	Y	14,293	N/A	$0	55%	50	1,000+	Y
Panasonic Electronic Components	Mouser Electronics	800-346-6873	www.mouser.com	Y	14,948	N/A	$0	100%	50	1,000+	Y
Signal Transformer		+1 516 239 5777	belfuse.com/signal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Taiyo Yuden	Mouser Electronics	800-346-6873	www.mouser.com	Y	4,620	N/A	$0	98%	50	1,000+	Y
TE Connectivity	Mouser Electronics	800-346-6873	www.mouser.com	Y	6,663	N/A	$0	100%	50	1,000+	Y
TDK	Mouser Electronics	800-346-6873	www.mouser.com	Y	6,663	N/A	$0	100%	50	1,000+	Y
TT Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
United Chemi-Con (UCC)	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Vishay	Mouser Electronics	800-346-6873	www.mouser.com	Y	102,917	N/A	$0	64%	50	1,000+	Y
Wurth	Mouser Electronics	800-346-6873	www.mouser.com	Y	934	N/A	$0	99%	50	1,000+	Y
Yageo Corporation	Mouser Electronics	800-346-6873	www.mouser.com	Y	18,246	N/A	$0	100%	50	1,000+	Y
POWER & BATTERIES											
Artesyn Embedded Technologies	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
B&K Precision	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Bel Power Solutions		+1 866 513 2839	belfuse.com/power-solutions	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Buyers' Guide

Manufacturer	Distributor	Telephone	Website	Franchised Distributor (Y/N/M)	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	Pack and Hold
Cincon	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Cosel	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
CUI Inc.	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Delta Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
MEAN WELL	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Murata	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Phihong	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Phoenix Contact	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
RECOM	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Schaffner	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
SL Power	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Texas Instruments	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
TDK Lambda	Mouser Electronics	800-346-6873	www.mouser.com	Y	405	N/A	$0	80%	N/A	N/A	Y
TRACO Power	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Vicor	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
XP Power	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
SENSORS											
ams OSRAM	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Amphenol	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Analog Devices Inc.	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Bosch	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Honeywell	Mouser Electronics	800-346-6873	www.mouser.com	Y	12,059	N/A	$0	64%	50	1,000+	Y
KYOCERA AVX	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50+	1,000+	Y
KYOCERA AVX	Digi-Key	800-344-4539	www.digikey.com	Y	N/A	N/A	$0	N/A	50+	1,000+	Y
Littelfuse	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Melexis	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Microchip	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
NXP	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
onsemi	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Omron	Mouser Electronics	800-346-6873	www.mouser.com	Y	4,915	N/A	$0	59%	50	1,000+	Y
Renesas	Mouser Electronics	800-346-6873	www.mouser.com	Y	4,915	N/A	$0	59%	50	1,000+	Y
Sensirion	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
STMicroelectronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
TDK	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
TE Connectivity	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Texas Instruments	Mouser Electronics	800-346-6873	www.mouser.com	Y	914	N/A	$0	65%	50	1,000+	Y
Vishay	Mouser Electronics	800-346-6873	www.mouser.com	Y	914	N/A	$0	65%	50	1,000+	Y
SWITCHES & KEYBOARDS											
OTTO	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TEST & MEASUREMENT											
B&K Precision	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Fluke	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,008	N/A	$0	94%	50	1,000+	Y
Keysight	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Lascar Electronics		814-835-0621	www.lascarelectronics.com	Y	130	$602,000	$0	100%	10	175	Y
Tektronix	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Teledyne LeCroy	Mouser Electronics	800-346-6873	www.mouser.com	Y	194	N/A	$0	96%	50	1,000+	Y
THERMAL MANAGEMENT											
Materials Direct	Materials Direct	01908 222 211	www.materials-direct.com	N/A	N/A	£1,000,000	£0	N/A	5	55	Y
ebm-papst	Mouser Electronics	800-346-6873	www.mouser.com	Y	194	N/A	$0	96%	50	1,000+	Y
Sanyo Denki	Mouser Electronics	800-346-6873	www.mouser.com	Y	194	N/A	$0	96%	50	1,000+	Y
CUI Devices	Mouser Electronics	800-346-6873	www.mouser.com	Y	194	N/A	$0	96%	50	1,000+	Y
Universal Science	Universal Science	01908 222 211	www.universal-science.com	N/A	N/A	£1,000,000	£0	N/A	5	55	Y
WIRELESS SOLUTIONS											
KYOCERA AVX	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50+	1,000+	Y
KYOCERA AVX	Digi-Key	800-344-4539	www.digikey.com	Y	N/A	N/A	$0	N/A	50+	1,000+	Y

Contract Manufacturers Buyers' Guide

Manufacturer	Telephone	Website	Turnover	Location	Employees	Number of Surface Mount Lines	Approvals	BGA Capacity	Lead Free Manufacturer	Prototyping	Design Capability	Full Turnkey	Cables and Harnessing
Alan Anderson Manufacturing Ltd	+44 (0) 333 322 7222	www.aa-manufacturing.co.uk	£21m	Hertfordshire UK	40	2	ISO9001:2015 , IPC-A-610	Y	Y	Y	Y	Y	Y
Pektron	1-248-677-4838	www.pektron.com	$66m	Michigan & UK	350	8	ISO9001, ISO14001, TS16949, BEAB, VCA, TUV, UL	Y	Y	Y	Y	Y	Y



Ordering made easy

Tools to search, check stock and purchase

mouser.com/servicesandtools

MOUSER ELECTRONICS