

ELECTRONICS

FEBRUARY 2022

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GET ANGRY, GET EVEN**

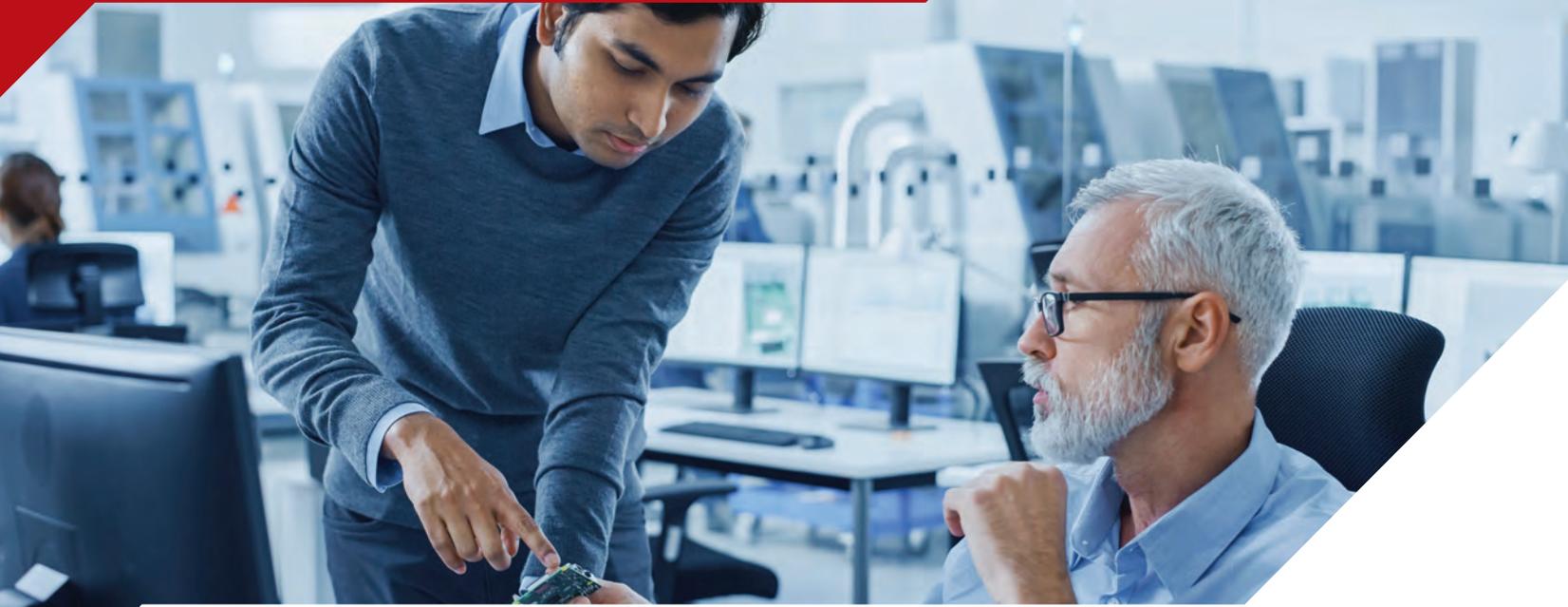


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On the cover – February 2022

Obsolescence, don't get angry, get even

Editor's Word



Shows: back with a vengeance

There was a point over the last two years where I was genuinely worried about the future of face-to-face exhibitions. Legal restrictions essentially banned shows and the tech sector moved in with virtual alternatives. This created a potential tipping point. To my joy it tipped back in favor of live events.

I never frame different media as better or worse than any other. They are just more or less aligned with a message, audience and expected outcome. For example, magazines offer a curated, laser-like focus to specific subjects, delivered to a reader's desk. Conversely, websites provide a deep and wide pool of information that visitors can wade through. Face-to-face shows offer something different again.

Step onto any booth and the product manager acts as a very efficient 'search engine', listening to your questions and literally handing you a potential solution to pore over. However, having attended many shows a year, for over 35-years, I have decided that the premium benefit of a show is tapping into the experience and knowledge of the person you are talking to in an environment actually designed to foster problem solving, collaboration and partnerships.

So, it is with great fanfare that this issue of *Electronics Sourcing North America* is publishing a *Diary of Events* on page 35 which highlights some of the shows planned in for 2022. Whether you are looking to vacuum up knowledge at a seminar, drill into the product offerings of a specific technology sector, or take a global overview of the electronics industry there is an event for you.

Jon Barrett

Contact

EDITORIAL

Managing Editor: Jon Barrett
jonb@electronics-sourcing.com
Contributing Editor: Amy Barker
amyb@electronics-sourcing.com
Director of Media & Communications:
Thomas Smart
thomas.smart@electronics-sourcing.com

ADVERTISING

Director of Sales: Emma Evernden
emma.evernden@electronics-sourcing.com
Sales Executive: Daniel Moon
daniel.moon@electronics-sourcing.com

DESIGN

Graphic Designer: Katie Williams
katie.williams@electronics-sourcing.com

CIRCULATION

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

PUBLISHER

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



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@Electrosourcing

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Connected panel meters in stock

Allied Electronics & Automation is now stocking Red Lion's new PM-50 graphical panel meter, designed to let machine operators unlock and use factory floor data. Applications include industrial factories, food/beverage, water/wastewater and packaging plants.

Red Lion product manager, Jeff Thornton, said: "Most panel meters in use today are essentially stranded assets; they're simply serving as displays and leaving the data on the factory floor. Our new PM-50 panel meter and app unlock that data in an extremely cost-effective way, so manufacturers and machine operators can put that data to use in real time.

"What we're doing with the PM-50 is giving OEM machine builders a way to offer a better product with wireless communication and offering plant managers a very simple, future-minded way to create a 'smart' workspace, connecting even older technology so that more data can be captured and acted upon to improve productivity and responsiveness."

www.alliedelec.com

Open frame AC/DC modules now shipping

Sager Electronics is now stocking Cincon's CFM70S 70W open frame AC/DC modules which offer a 90 to 264VAC input range, 5 to 48V output voltage and up to 91 per cent efficiency. Features include a 2 by 3in open-frame and compact design; multiple, high-efficiency output options; and IEC/EN/UL 62368-1 approval. Overvoltage and continuous short-circuit protection are offered, plus an operating altitude of 5000m.

The series suits applications including industrial, communications, lighting, broadcast and test/measurement.

www.sager.com



Global agreement covers capacitors, contactors and more

Mouser has announced a global distribution agreement with Hartland Controls, a Littelfuse company which supplies motor run capacitors, definite purpose contactors, transformers and other electrical control solutions.

Mouser VP supplier management, Andy Kerr, said: "HVAC solutions and other industrial applications require a broad range of mission-critical components, and Hartland Controls consistently delivers reliable performance with impressive service life. This distribution agreement gives customers around the globe an expanded choice of Littelfuse products when designing the next generation of electrical control solutions."

Hartland Controls HCK motor run capacitors boost the current or reduce the power factor to an electrical motor, delivering reliable power supply for a range of applications, including HVAC, food and beverage, electronics, and pools/spas. The start capacitors offer 370 and 440VAC rated voltage as standard, with 0.1 per cent maximum dissipation factor and 30µA maximum leakage current.

mouser.com





1887

Emile Berliner receives the patent for the gramophone.

James Blyth builds the first electricity generating wind turbine.

Herman Hollerith receives a U.S. patent for his punch-card calculator.

Sager opens its first location in Boston, Massachusetts.



All great things begin with a single step – or in Sager’s case a single storefront.

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In Brief

Rising material and labor costs
IPC's January 2022 global electronics manufacturing supply chain sentiment report found that materials and labor costs continue to be the largest issue facing the electronics supply chain, with nine in 10 electronics manufacturers reporting rising materials costs and more than three-fourths reporting rising labor costs.
www.IPC.org

Ordering info unchanged
The Yageo group has acquired Chilisin Electronics, a supplier of inductors, power transformers, RF components and ethernet transformer products. Chilisin, MagLayers, Magic and Bothhand brands will be retired and products rebranded under Pulse Electronics. The migration of Chilisin to Pulse will not change any of the ordering information or part numbers for existing Chilisin customers.
www.pulseelectronics.com

Modules receive CQC or CCC approval
Schurter's multi-functional power entry modules have received CQC or CCC approval for use in equipment for the Chinese market. Series 5707, DG12 and DG11, plus Distribution Unit series 4752, add to the company's range of passive and electromechanical components designed for global application. China Quality Certification (CQC) is mandatory for power entry modules (PEM) with an EMC filter. PEMs without EMC filter require China Compulsory Certification (CCC).
schurter.com

Supporting contactless connectivity
Molex has acquired core technology and intellectual property from Keyssa, a specialist in high-speed contactless connectors. The acquisition of this wireless chip-to-chip technology, including over 350 filed patent applications, will accelerate Molex's strategy to further expand and diversify its micro connector portfolio with flexible, cable-free connectors for near-field, device-to-device applications.
www.molex.com

Acquisition strengthens fiber optic offering

Samtec has announced the acquisition of Ultra Communications, a manufacturer of high-speed digital and RF fiber optic components based in Vista, CA. Ultra Communications' core competencies include circuit design, optoelectronic package design and manufacturing of fiber optic components. Founded in 2005, the company holds IP and technology, with active programs in the military, space/satellite, ground vehicles, radar and shipboard connectivity arenas.

Samtec's CTO, Brian Vicich, said: "Ultra Communications' expertise in high-speed mixed-signal circuit design, packaging for high fidelity electrical and optical coupling, and testing at the wafer and component level, combined with our advanced interconnect design expertise, will provide robust product and technology solutions for our customers."

Ultra Communications' president, Charlie Kuznia, added: "We are thrilled to be joining the Samtec Team. There are many synergies and new opportunities for us. Together we can bring new products to market faster and provide more value to our customers."

www.samtec.com

Modular connector enclosures for immediate delivery

Available for immediate delivery through Powell Electronics, Modice modular connector enclosures feature Cinch Connectivity Solutions' SHS harness connectors. The enclosures provide sealed packaging solutions for rugged electronic control modules.

Cinch's 1.5mm SHS system is used as the base interconnect technology for the enclosures. Offering sealed rugged I/O connectors, SHS series devices are designed for electronic control modules that function in extreme environmental conditions such as commercial and off-road vehicles and industrial equipment.

The enclosures are available in three sizes (ME, SE, LE) and with four different header configurations: 18, 30, 48 and 60 I/O. Resistant to most industrial fluids, the products are sealed to IP67 and IP69K and remain sealed when the harness connectors are unmated.



Global distribution agreement targets power and RF components

Gowanda Electronics has signed a global distribution agreement with TTI including sales operations in the Americas, Europe, Middle East, Africa and Asia and covering products manufactured by Gowanda and sister brands in the Inrcore family.

Products include RF, microwave and power components manufactured by Gowanda Electronics, Dyco Electronics (and its Hisonic brand), Bicorn Electronics and TTE Filters. Components include inductors, magnetics, transformers and filters. Market sectors include: military, aerospace, avionics, communication, medical, transportation and industrial.

"Inrcore CEO, Sarah Harris, said: "We see this agreement as a strategic step forward in our ability to efficiently and effectively serve the needs of design engineers around the world. By expanding our partnership with TTI through this agreement, we will be able to leverage their extensive sales network and specialty component expertise to reach more customers, and TTI will have access to a broader range of high performance components and expertise by way of our strong family of brands."

www.ttiinc.com



Specifications include a 10A (85°C) current capacity; <10mΩ contact resistance; >1000 MΩ insulation resistance; and -40 to 125°C operating temperature range. ME headers with integrated RF ports, headers with integrated ferrite filtering and blank headers are available. Integrated heat sinks and breather vents are also offered.

www.powell.com

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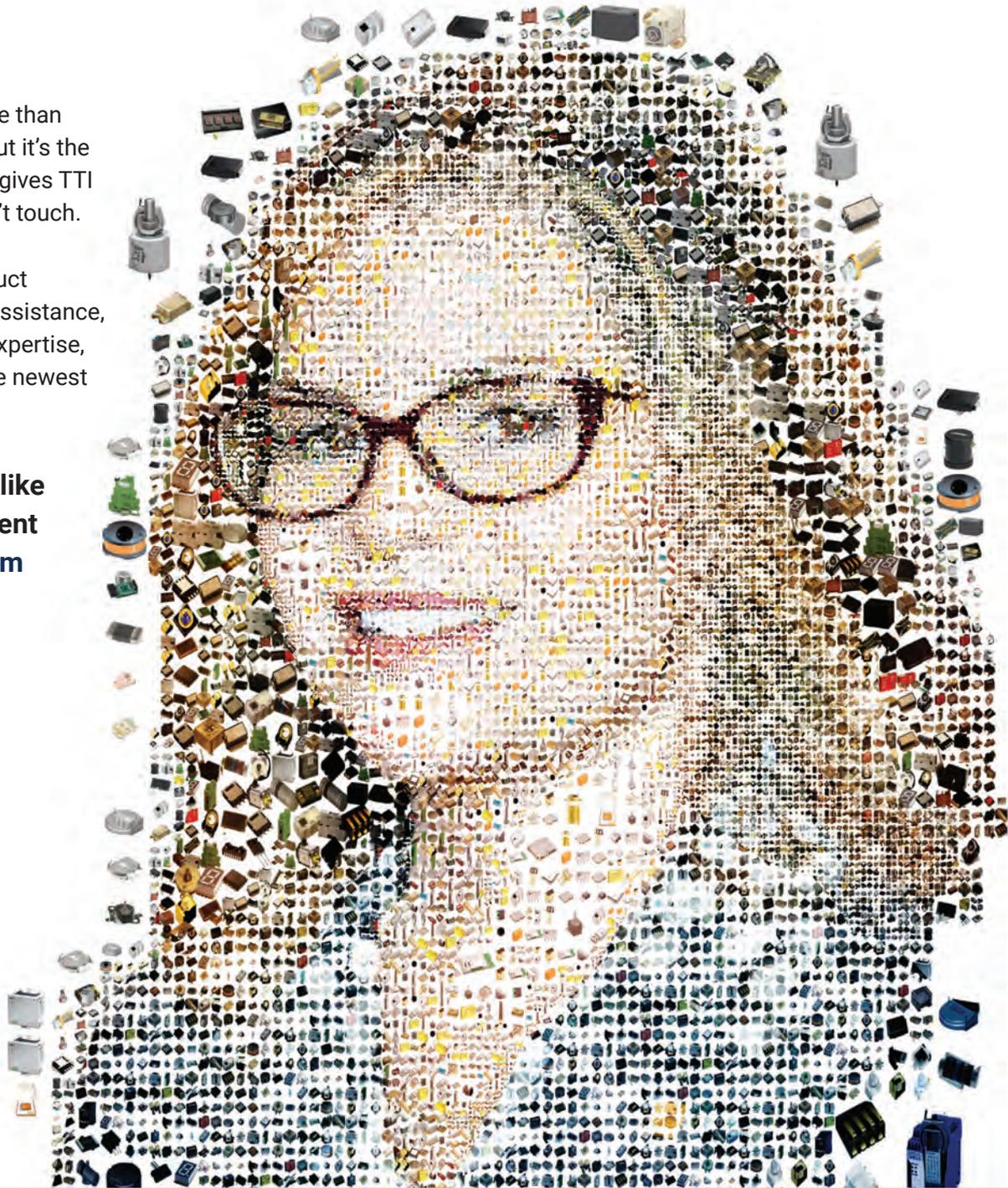
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Don't let supply chain issues dampen charging innovation

Knowles Precision Devices' key automotive key account manager, Brandon Peeler, explains why high voltage knowledge and flexible in-house manufacturing underpin EV innovation

While electric vehicles are rapidly gaining in popularity, many consumers are still concerned with charging times and range. To ease these fears, EV manufacturers need technologies that increase efficiency of on-board/external power conversion and management devices for charging and battery systems. Components are required that efficiently handle high voltages, such as capacitors that reduce losses in the AC/DC or DC/DC converter, or filters that eliminate noise on the AC line.

However, consumer demand for charging innovation and the practicalities of sourcing components during the current pandemic-induced materials shortage are at odds, presenting challenges for purchasing managers. Thus, it is critical to select a supplier that understands the high voltage EV space and can sidestep traditional manufacturing processes and materials that may require long lead times.

A supplier should provide a variety of AEC-Q200-qualified multilayer ceramic capacitors (MLCCs) designed for EVs. Knowles Precision Devices provides high-capacitance, small-size MLCCs rated to 5kV—the highest in the industry. These MLCCs offer EV friendly options. For example, MLCCs built with Hiteca dielectric deliver high-capacitance stability over high temperature and voltage, plus lower parasitic losses under common operating conditions. Safety-certified capacitors are also offered that comply with UL and TÜV specifications. Options include FlexiCap to reduce risk of mechanical cracking.

Consider a supplier's experience providing components for high-power electronic systems because many traditional automotive suppliers are accustomed to working with 12 or 24V applications, while EV components need to handle up to 800V. A supplier with EV experience can also add value

during the design process, helping avoid costly mistakes such as overheating, flashovers and current creepage.

Suppliers that traditionally provide commercial off-the-shelf components for combustion vehicles or consumer electronics are feeling the effects of supply chain disruptions the hardest. Knowles Precision Devices' unique in-house manufacturing techniques have helped the company avoid many of these issues, making it possible to continue offering some of the fastest lead times at around 10-weeks. The machinery and processes are also flexible so the company can quickly adjust to changes and produce multiple case sizes with a variety of capacitance levels.

As EV designs evolve the specifications are changing almost quarterly. This can pose an issue for most suppliers, even in a stable market. However, Knowles Precision Devices has built its business on solving new and quickly



Knowles Precision Devices'
automotive key account manager,
Brandon Peeler

changing design challenges, an approach that has helped the company become a market leader in supplying MLCCs to many of the major EV suppliers and charging station manufacturers around the world.

www.knowlesc capacitors.com

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Optoelectronic component tags will fall but revenue will rise

Buyers can expect modest price declines for LEDs and other optoelectronic components in 2022 but sales will increase nearly 14 per cent



James Carbone

While semiconductor buyers can expect continued price erosion for optoelectronic components in 2022, optoelectronics revenue will increase 13.9 per cent to \$54.2 billion, according to researcher IC Insights.

In 2021 the optoelectronics market posted 8.9 per cent sales growth but sales lagged behind the overall semiconductor market which grew 25 per cent. The average price of an optoelectronic part declined 5.5 per cent in 2021 and will decline 1.3 per cent in 2022, the researcher said.

"Optoelectronics was a little bit of a mixed bag in 2021," said Rob Lineback, senior market research analyst for IC Insights. "There were some really strong growth categories, but the big categories--image sensors and LEDs--did not have a boom year, which kind of held back overall growth," he said.

Optoelectronics includes lamps (mostly LEDs) CMOS image sensors, couplers, laser pick-ups and transmitters, light sensors,

infrared emitters and detectors. However, more than 70 per cent of the optoelectronics market revenue is from sales of lamps and CMOS image sensors. CMOS image sensors represent about 43 per cent of market and lamps account for 40 per cent of optoelectronics components, according to IC Insights.

World Semiconductor Trade Statistics (WSTS, which tracks sales of semiconductors, said optoelectronics had the weakest growth rate of all semiconductor categories in 2021. In November, WSTS said optoelectronics would end 2021 growing 7 per cent. While the growth rate for optoelectronics may be less than the overall growth rate of the chip market, sales growth was higher in 2021 than in 2020 when sales declined .2 per cent. In addition, the compound annual growth rate for optoelectronics through 2026 is expected to be 7.1 per cent, about the same as 2021, according to IC Insights.

Lineback said optoelectronics lagged the overall semiconductor market in 2021 in part because trade frictions between the U.S. and China limited some smart phone sales. Smart phones use a lot of image sensors. In addition, image sensors and LEDs are used in automobiles but shipments of vehicles were weak in 2021 because of overall supply chain issues and shortages of some semiconductors used by the auto industry. While optoelectronics sales to automotive grew, the growth rate was slower than in past years.

Strong growth for some
Some smaller optoelectronic product categories posted strong growth rates. For instance, optocouplers/isolators, which are widely used to protect circuits in many systems using light to protect against voltage surge, grew 25 per cent in 2021 to a record high of \$2.4 billion. "Prices in that category were up 10 per cent, which is a pretty good increase," said Lineback. In addition, light sensor

sales increased 31 per cent and infrared devices revenue increased 26 per cent because of robust demand and higher prices for those devices although overall optoelectronic tags fell by 5 per cent.

In 2022, the good news for buyers is that while there will be strong demand and higher sales growth than in 2021, there should be more-than-ample supply.

"Manufacturers have added a lot of capacity," said Lineback. "There was a real buildup in China last decade" after optoelectronics was identified by the Chinese government as a key segment and subsidies were given to LED manufacturers. In addition, LED production is moving to larger wafers which results in more chips per wafer and lower cost, he said.

Some LED manufacturers "are concerned about overcapacity due to the production ramp by Chinese suppliers," said Chee-Seng Tan, research analyst, components

By the Numbers



\$74.2 billion

The forecasted size of the optoelectronics component market in 2026



\$0.161

The forecasted average selling price of an optoelectronic component in 2022



\$47.9 billion

The size of the optoelectronics market in 2021



360 billion

The number of optoelectronic components that will ship in 2022



5.5%

The rate of decline of the average selling price of an optoelectronic component in 2021



7.1%

The compound annual growth rate of the optoelectronics market in 2022



& devices for researcher Omdia. Chinese manufacturers continue to make “substantial investments in capacity expansion” and there could be a “pricing crash in the next couple of years,” he said.

However, historically there often has been overcapacity for LEDs. However, in 2021 demand was strong and suppliers were able to reduce some inventory, according to Tan. As a result, LED prices increased in the first half of 2021, but then “returned to healthy levels,” according to Tan.

No overall changes

Paul Scheidt, senior product marketing manager for LED manufacturer Cree, said overall there have been no long-term changes to LED overcapacity. However, many LED suppliers had specific product lines with long lead times in the past year. “There was not a consistent pattern to it and largely seems related to shortages of specific materials in that supplier’s supply chain,” said Scheidt. The same is true with LED prices. Some products had price increases or decreases but prices overall “remained fairly stable in 2021,” he said. “All of us LED suppliers are ready for the

coming uptick in demand. Nobody seems too eager to stall growth with aggressive pricing just yet,” he said.

Average selling prices for LEDs will fall in 2022. Lineback noted that LED prices typically fall every year because manufacturers want to reach price points that open up new applications.

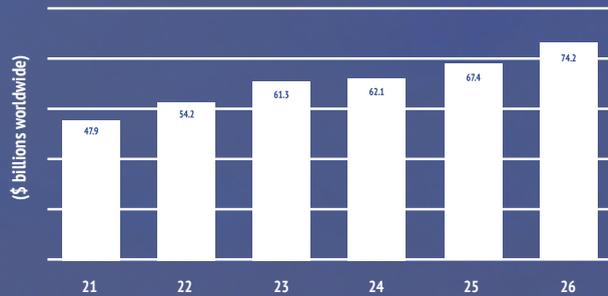
Within optoelectronics, the LED segment grew about 10 per cent in 2021 to about \$14 billion, but growth will slow to about 5.7 per cent in 2022 to about \$15 billion, according to Tan.

Automotive and signage are among the strongest segments for LEDs, said Tan. Sales of automotive LEDs grew about 13 per cent in 2021 with a market size of about \$2.3 billion.

Notebook PC and tablets also helped to drive LED demand in 2021 and will continue to be a driver this year. Tan said demand for LEDs was also growing in certain niche applications including high power lighting in outdoor applications.

The optoelectronics market will grow an average of 7.1 per cent per year through 2026 when revenue will reach \$74.2 billion
Source: IC Insights

Optoelectronics market rises



Uncertainty of UV-C LEDs

There has also been a “lot of hype about UV-C LEDs with its germicidal effects on Covid-19 virus,” said Tan. UV-C LEDs emit light that can kill pathogens in water, surface, and air. They are used in water purification systems, medical devices and air purifiers to provide disinfection. UV-C light can also kill SARS-CoV-2 or other coronaviruses in liquids, on surfaces, or in the air, according to studies.

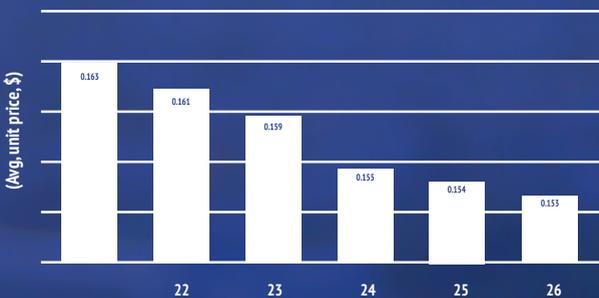
UV-C light includes wavelengths of light from 200 to 280 nanometers. Those UV-C wavelengths have the most energy of the three types of UV light and energy from UV-C wavelengths is absorbed by viruses, including Covid-19, and other microbes rendering them inactive, according to the National Academies of Sciences, Engineering, and Medicine.

However, after Covid-19 vaccines became more widely available interest in UV-C technology waned, but “it still has a lot of potential,” said Tan.

Scheidt said the LED industry “still isn’t sure about the size of the long-term growth of UV-C LEDs.” He said there are “good reasons” for UV-C LEDs to be adopted in certain applications. “But there are also a lot of players entering the market, which can cause rapid price erosion and stall market growth,” said Scheidt. Demand for IR LEDs was also estimated to be strong, driven by automotive, consumer, and industrial, medical and security, according to Tan. Automotive and signage are expected to grow the fastest segments for high-brightness LEDs.

Horticulture lighting is forecasted to be a rapidly growing application for LEDs, said Scheidt. “The legalization of cannabis, as well as food supply chain disruptions in the past two years, are driving purchases of new horticulture lighting systems,” he said. Many of these new systems use LEDs because of their broad-spectrum light output, high efficiency and long lifetime.

Optoelectronics tags will fall



The average price of an optoelectronic component will decline steadily through 2026
Source: IC Insights

Success lies in managing components across the board

TTI's vice president global accounts, Michael Kennedy, offers strategies to help EMS firms find success as global supply chains remain in flux

Electronics manufacturing service providers faced many challenges in 2021, including component shortages, inflationary pricing, logistics challenges and Covid-19-related restrictions and closures across multiple geographies. With average lead times for many components extending rapidly from a standard 12 to 16-weeks to more than 40-weeks, EMS providers and their end customers have been challenged to stay ahead of the increasing trend and source the components needed to complete end product builds.

While the press has focused on semiconductor shortages, the realities of long lead times and price increases on interconnect, passive, electromechanical and discrete products have also been difficult to manage. Compared to 2018 when primarily MLCCs were affected, today we are hard-pressed to find any component category not hit by labor, capacity or materials issues.

2022 started with extending lead times and constraints regarding connectors, relays, pressure/temperature sensors, tantalum capacitors and high-CV/auto-grade MLCCs. With the focus on the higher-dollar ICs and availability issues, these components may not be top-of-mind. Yet, any of these devices can stop a production line and prevent revenue.

The challenge is managing the full range of components across the board or harness assembly, maintaining a focus on inventory and cash flows, while assuring supply of low-cost, commodity parts.

This is where a distributor partner can help. For instance, TTI has experience working strategically with EMS providers to find more efficient ways of doing business, particularly interconnect, passive, electromechanical and discrete products that normally represent 20 per cent of the spend, but 80 per cent of the part count.

Our most successful EMS partners find value in multiple distributor-provided solutions such as: digital engagement with API or EDI; forecast management with buffer stock; on-site supply chain programs; proximity warehousing; flexibility related to rescheduling/cancellation and lower MOQs; influential component manufacturer relationships; and extensive available-to-sell inventory positions.

Distributors are also closely connected with component manufacturers and thus able to provide market updates and help EMS customers keep lead times up to date—often providing early identification of forthcoming challenges and buffering against supply chain gaps.

Combining supply chain solutions can help EMS customers minimize inventory holding costs and drive better inventory turn models. EMS inventories continued to rise throughout 2021 as product flowed in, only to sit idle because certain critical components had been delayed, preventing builds being completed. This results in potential cash flow challenges, although end customers have been more amenable to fund some portion of these inventories and accept higher pricing to source critical components to better meet build schedules.

Partnering with a distributor offers the advantage of lower total cost of ownership. EMS providers can reduce inventory holding costs, improve flexibility, mitigate a certain degree of increasing prices and leverage distributor relationships and supply chain solutions.

tti.com



TTI's vice president global accounts, **Michael Kennedy**



2022 started with extending lead times and constraints regarding connectors, relays, pressure/temperature sensors, tantalum capacitors and high-CV/auto-grade MLCCs



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Why hi-rel markets face increasing obsolescence

In this article, Flip Electronics' President Bill Bradford explains the forces driving component obsolescence and how to defend against it

Semiconductor demand is driven by high volume commercial applications such as cell phones, IoT, and consumer electronics. End equipment in these markets is constantly upgraded to compete with similar products from other manufacturers which, in turn, fuels demand for higher performance semiconductors. Moore's Law accommodates this demand, chasing ever-smaller circuits that deliver on speed and power. Thus, most new chip capacity coming online supports new technologies.

Legacy semiconductor components are built on more mature (>28nm lithography) processes. Recently this meant relatively low production costs because the wafers are generally considerably less expensive

and they are built on fully depreciated manufacturing lines. However, in the wake of the current semiconductor shortage, legacy component supply cannot meet demand and manufacturers are not investing enough in these mature technologies to improve availability. Doing so would disrupt their cost models, as they would no longer be building on depreciated equipment. That's if they can still buy replacement fab equipment for mature nodes.

Most applications use some legacy components for simple functions and interfaces, but a much larger percentage of a high-reliability BoM is made up of mature devices. Whether aerospace, defense, telecom, networking infrastructure, or industrial controls,

equipment is complex, new designs are costly/time-consuming to produce, and testing/qualification can add significantly to the expense and time. These factors make it prohibitive for high-reliability systems to go through the cadence of regular upgrades to ensure components remain state-of-the-art. In fact, many defense systems are expected to support a lifecycle of multiple decades.

Over time, manufacturers discontinue many legacy components because they have been replaced by a newer, more advanced, higher performance version, or because the equipment required to build the legacy components is no longer viable.

Continues on page 16 ->



Flip Electronics' President Bill Bradford



Semiconductor demand is driven by high volume commercial applications such as cell phones, IoT, and consumer electronics

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Semiconductor manufacturer consolidation has also reduced the number of legacy component sources, and the rate of product discontinuance notices (PDNs) is increasing. This trend, plus the long design/qualification time for high-reliability systems, means many components are obsolete before a system reaches production, and often most components are obsolete during the planned equipment lifecycle.

This obsolescence, referred to as diminishing manufacturing sources and material shortages (DMSMS), requires

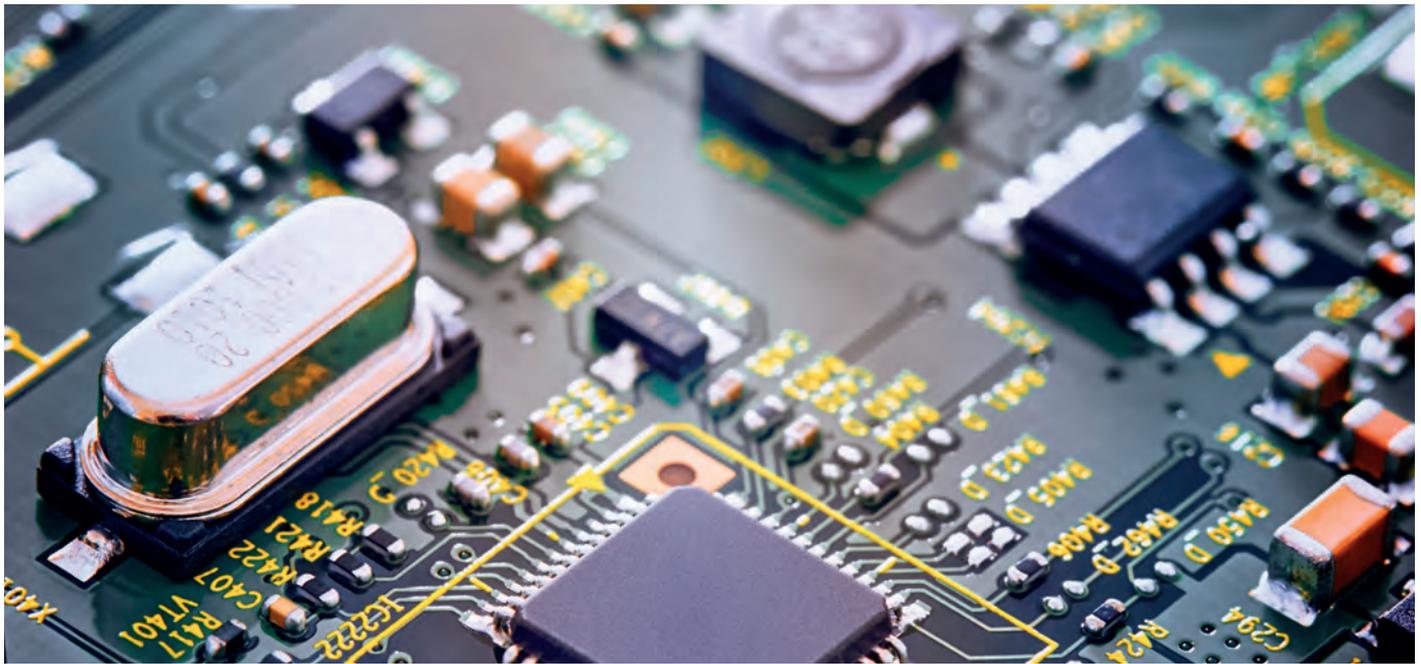
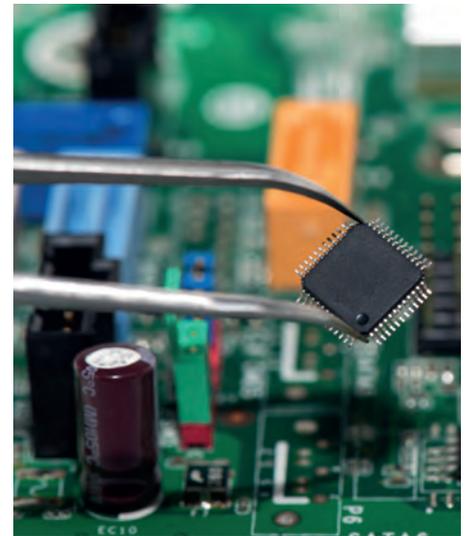
a sophisticated forecasting rigor to manage. Precursors to product discontinuance, such as manufacturer announcements, channel inventory trends, supplier consolidation, etc., should be observed. Data modeling can also be used to predict component obsolescence over a longer-term horizon.

Manufacturers of high-reliability equipment can leverage specialty distribution partners to secure availability of obsolete components. Such distributors study the market, perform analytical models, and invest in discontinued

inventory when the product is still available to support the lengthy production runs of the manufacturer. In some cases, they can arrange to have additional inventory built to support post last-time-buy requirements.

With semiconductor shortages expected to persist through 2022, high-reliability equipment producers should leverage their distribution partners to assist in predicting and managing the added stress of component obsolescence.

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Foundations for sustainable growth

In this article, *Electronics Sourcing* quizzes Smith's chief globalization officer, Mark Bollinger, about the supply chain, environmental commitments and more

Q With ongoing chip shortages, plus other bumps in the road with Covid, truck driver shortages and staff isolating, how has Smith adapted to ensure component availability and delivery?

A: Smith has an in-house global logistics team that is fully prepared to help customers get the parts they need, when they need them. Our strategic hubs in Houston, Hong Kong and Amsterdam are our bases of operations for the extensive, customer-specific logistics and inventory-management programs that help power our customers' success. Supported by longstanding relationships

with all major logistics carriers and flexible solutions made to fit unique needs, Smith can safely and efficiently deliver electronic components to customers.

The health and safety of employees and partners around the globe is one of the most important factors we consider throughout our day-to-day business operations. By implementing requirements for periodic testing for onsite employees, staggering certain shifts to reduce crowding and utilizing recommended sanitization practices, Smith has been able to help reduce the risk of Covid-19 exposure and keep employees safe. Where possible, we also offer

employees flexibility around WFH, which helps further prevent unnecessary exposure.

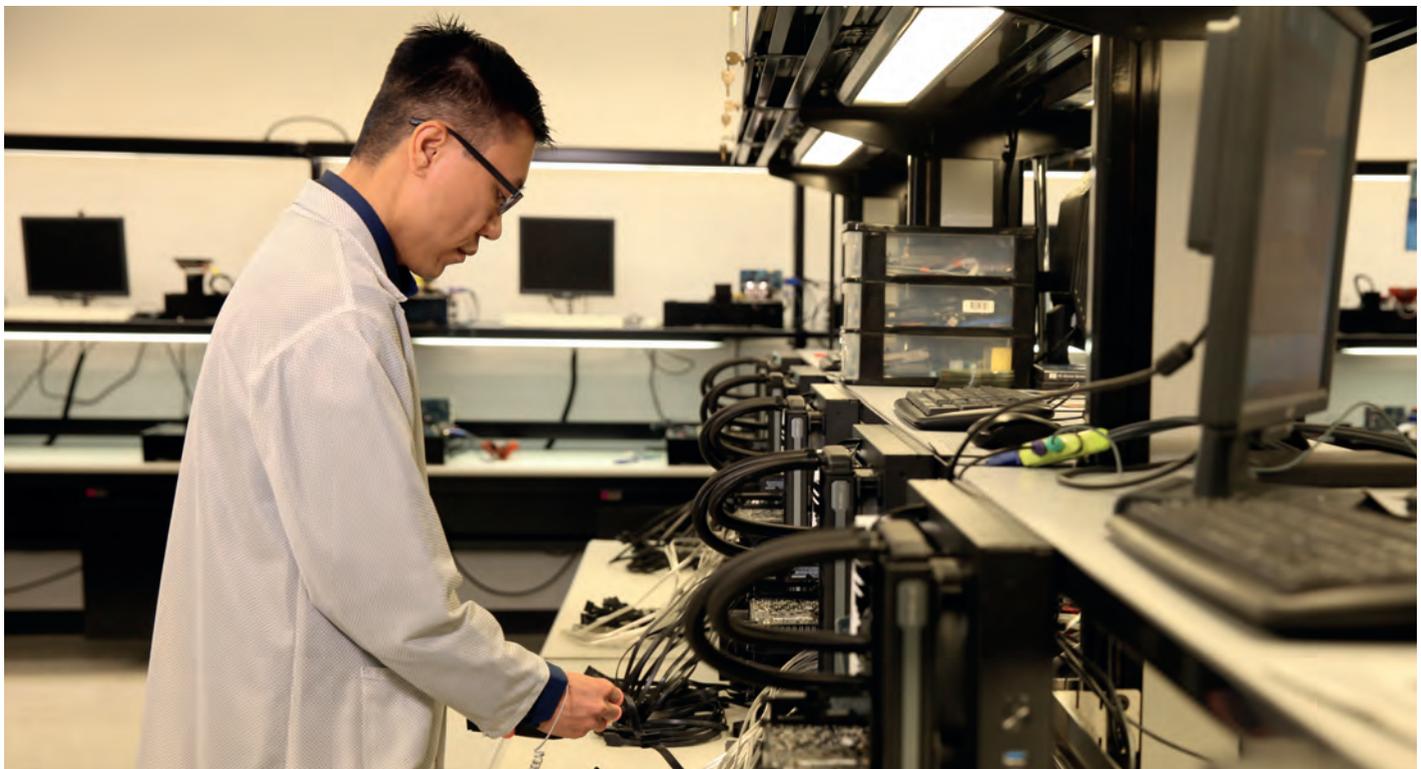
Q Electronic Sourcing's latest reader research shows purchasing professionals' increasing interest in environmental packaging. What is Smith's stance?

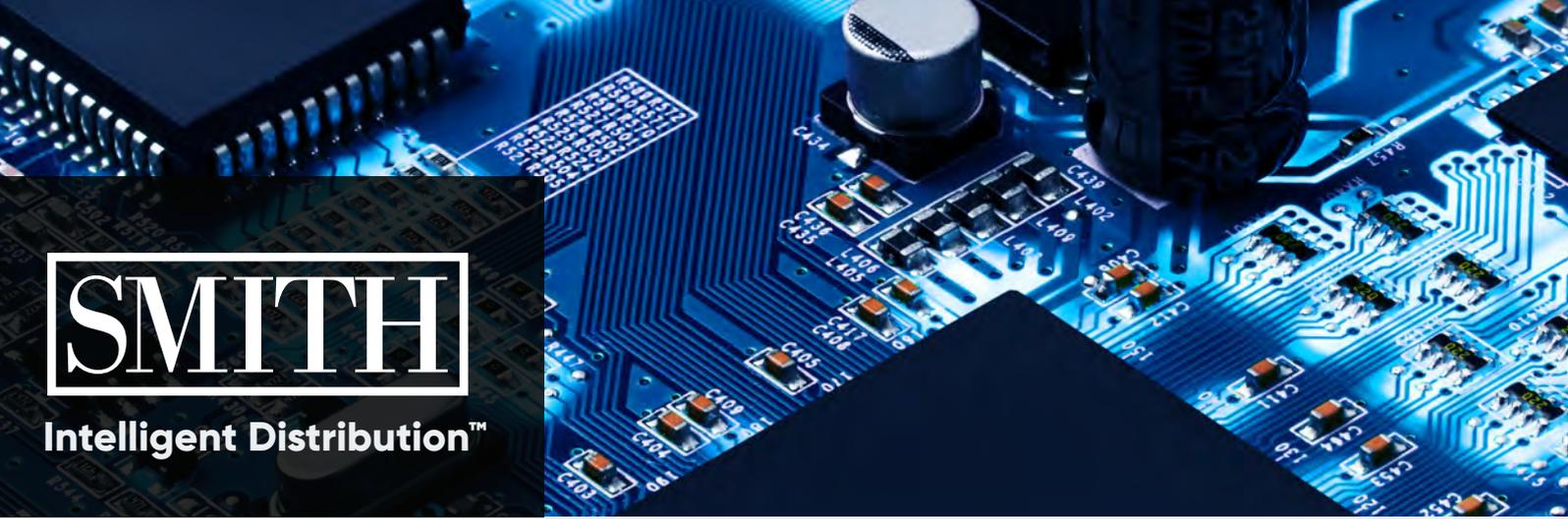
A: Smith is committed to protecting the environment through our procedures and practices, and we have adopted an environmental policy to identify packaging materials that meet international environmental standards. But, like everything at Smith, we aren't content to just meet expectations.

Continues on page 20 ->



Smith's chief globalization officer,
Mark Bollinger





SMITH

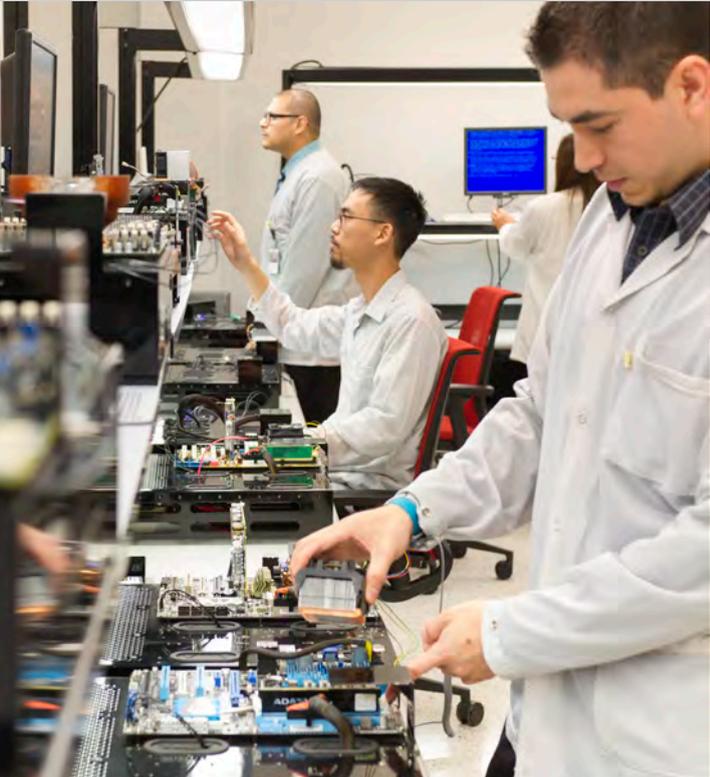
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new life and helps reduce waste in landfills while still maintaining high standards for ESD compliance and safety.

Smith is also globally certified to ISO14001:2015, which provides a framework for our environmental management systems and recognizes our commitment to following industry best practices for sustainability. Smith's Houston and Amsterdam operational hubs are R2-certified, which establishes guidelines for responsibly managing retired electronic equipment, components and materials.

Q Which manufacturing sectors are performing well at present and has Smith identified new sectors that will drive future manufacturing growth?

A: Like the widespread growth of the semiconductor market as a whole, Smith is experiencing significant growth across all customer industries. Most significantly, automotive customers are still not able to procure enough supply of semiconductors to meet growing vehicle demand. We expect our client base in the automotive sphere to continue to grow into the new year.

Additionally, the explosive growth of the cloud industry and its matching need for infrastructure has expanded opportunities for companies to procure product on the open market. Smith supports our customers across all industries with our sophisticated market intelligence information to help them make more informed purchasing decisions. We also offer crossmatching of parts where available.

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Smith has an in-house global logistics team that is fully prepared to help customers get the parts they need, when they need them



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Component sourcing the green way

Rochester Electronics' EMEA technical sales manager, Ken Greenwood, explains how authorized after-market distributors are helping manufacturers extend equipment service life

The prime goal of environmental legislators everywhere is preventing waste. Laws covering waste reduction, such as the Waste from Electrical and Electronic Equipment (WEEE) Directive (2012/19/EU) and the UK's Right-to-Repair Law introduced in 2021, are aimed at preventing the creation of WEEE and encouraging the reuse/repair of end-equipment.

A key element to offering extended maintenance and service lives, is the longer-term availability of semiconductors. Rochester Electronics' long-standing partnership with leading semiconductor companies supports equipment in energy distribution, transport, industrial controls and aerospace, allowing the original designs to continue unchanged. This is achieved by leveraging end-of-life (EOL) and obsolete finished goods inventory, licensed manufacturing and authorized component replication.

Since the semiconductors supply chain works 'imperfectly' it is impossible to match production and demand absolutely. In the past, surplus components were scrapped rather than re-entering the market in a controlled manner. Raw materials were recovered, but the sunk costs were lost. Also, the recovery process is energy intensive, with a poor carbon-footprint.

Today, many semiconductor manufacturers have eliminated scrapping by engaging an authorized after-

market distributor. Companies such as Rochester Electronics receive surplus stock and keep it in an authorized AS6496 'bubble'. They act as a trusted instant source of product when demand starts outstripping supply. This way cyclical peaks and troughs are smoothed and production lines keep rolling.

The second part of the legislation—the extension of equipment service life—demands increased component longevity. Market trends are headed in the opposite direction. Thirty years of mergers and acquisitions mean fewer suppliers. Fab start-up costs for new geometries mean investment is the preserve of the few. Component lifecycles are reducing.

Component discontinuations present customers and service providers with a stark choice: commit to a last-time-buy (LTB) quantity to cover all future needs; and/or re-design and re-qualify the end-product. A LTB purchase will be based on the best market forecasts available at the time. However, what if circumstances change or in-service life increases?

Semiconductor manufacturers also struggle to match supply with LTB demand. Surpluses inevitably arise which risk scrap and waste. An authorized after-market distributor and licensed manufacturer can provide a risk-free safety net to protect against uncertainties and reduce waste.

Rochester Electronics receives billions of surplus EOL semiconductors each year. This authorized ready-to-ship stock provides a buffer against the uncertainties of the market and has allowed customers to: avoid production stops; extend service-life; avoid re-designs and re-qualifications; and resurrect older designs.

In many cases, in addition to finished goods, surplus wafer/die, test equipment and tooling are transferred allowing ongoing authorized production, sometimes 20 to 30-years after the original EOL.

Past focus was on applications where robustness and longevity are prized attributes. Legislation such as WEEE and The-Right-to-Repair highlight a need for these attributes in components across a broader spectrum of applications and markets. This will require even deeper co-operation between customers, semiconductor manufacturers and the after-market distributors to meet these new demands.

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Rochester Electronics, EMEA technical sales manager, Ken Greenwood



A key element to offering extended maintenance and service lives, is the longer-term availability of semiconductors



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Supply chain continues to hamper production

IPC's January 2022 Economic Outlook report finds that supply chain challenges remain acute and have improved little from the previous month

IPC reports that shortages continue to hamper production levels and lead-times remain long, with supply chain challenges lingering well into 2022 and, in some instances, into 2023. Economic growth will be severely muted at the start of the year as Omicron slows economic activity, with US GDP growth dropping to as low as 2.5 per cent in Q1.

European inflation shot up to 4.9 per cent in November, the highest level since records

began in 1997, two years before the euro was launched. Consumer sentiment improved marginally in December, but the gains might be short-lived thanks to rising Covid cases. Consumer sentiment reached lows in November not seen since 2011.

Covid's reemergence stymied Europe's recovery early in the year, but Europe is quickly getting growth back on track. Growth in the third quarter was 3.7 per cent higher than

a year ago. The number of people employed increased by 0.9 per cent in the Euro area and European Union during the third quarter, but the unemployment rate has declined slowly during the recovery.

IPC chief economist and report author, Shawn DuBravac, said: "It has been a tumultuous year and many of the risk factors that are prevalent today will continue through at least the first half of 2022.

Covid continues to be a major deterrent to economic growth and while the impact of the current outbreak remains unclear, the uncertainty it has created will hinder the recovery in the early months of the new year. While my expectations for growth for 2021 and 2022 are muted from prior months, I still expect the US economy to grow four per cent next year."

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Highest ever annual total

SIA president and CEO, John Neuffer, highlights how record sales are underpinned by chipmakers substantially ramping production to address high demand

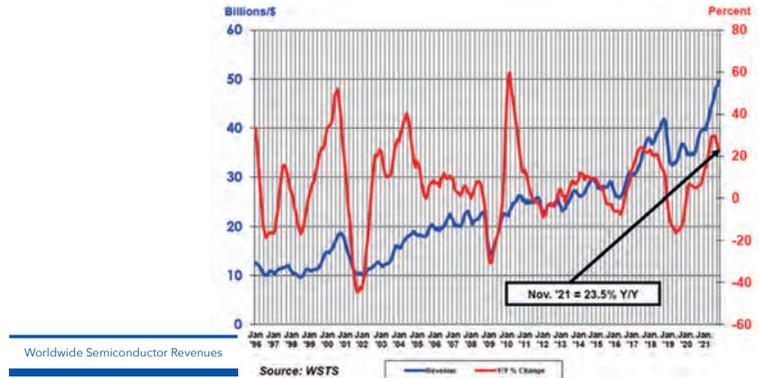
The Semiconductor Industry Association (SIA) has reported global semiconductor sales were \$49.7 billion in November 2021, an increase of 23.5 per cent over November 2020's total of \$40.2 billion and 1.5 per cent more than October 2021's total of \$49.0 billion. The cumulative annual total of semiconductors sold through November 2021 reached 1.05 trillion, which is the industry's highest ever annual total.

SIA president and CEO, John Neuffer, said: "Global semiconductor sales remained strong in November, increasing substantially on a year-to-year basis across all major regional markets and semiconductor product categories. With one month of 2021 sales data still to be reported, the industry has already set a new annual record for total semiconductor sales and units shipped, as chipmakers have substantially ramped up production to address high demand."

Regionally, year-to-year sales increased in the Americas (28.7%), Europe (26.3%), Asia Pacific/All Other (22.2%), China (21.4%) and Japan (19.5%). Month-to-month sales increased in the Americas (4.2%), Europe (3.1%), Japan (1.1%) and Asia Pacific/All Other (0.9%) but fell slightly in China (-0.2%).

Monthly sales are compiled by the World Semiconductor Trade Statistics (WSTS) organization and represent a three-month moving average. SIA represents 98 per cent of the US semiconductor industry by revenue and nearly two-thirds of non-US chip firms.

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Time to digitalize work, workforce and workplace



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

John Denslinger argues that in today's new working world, companies may find agile cultures, built on policies that are intentionally fluid, work best

Digitization • By John Denslinger

Every day, pundits and so-called experts offer simplistic views of the post-Covid workplace. Most describe it in terse, declarative statements: employees return to office; employees remain remote; or a mix of the two referred to as hybrid. They cite surveys, studies, interviews as rationale for their conclusion. But as the latest Omicron variant demonstrates, the post-Covid world is not behind us at all. Rather, it suggests work related decisions must consider Covid and its' future permutations as long-term workforce and workplace disruptors. That being the case, successful companies may find agile cultures built on policies that are intentionally fluid work best.

Unfortunately, confusion and challenges still abound everywhere. Political directives, medical guidance, regulatory edicts, media hype rarely sync on the baselines for a safe and secure America. Are vaccine and mask mandates reasonable and enforceable? Are lockdowns and gathering restrictions proven deterrents to community spread? How does one safeguard personal health and still respect individual rights? How many shots constitutes vaccination? According to CDC stats, 77 per cent of the US population age five and over received at least one vaccination. Is that sufficient coverage for containment? Challenged from all sides, courts are now weighing-in with mixed rulings. No wonder companies thinking ahead are embracing digital strategies for the workforce and workplace.

Transitioning one's view of how work is accomplished traditionally to one that is seamlessly digital may be a hallmark decision to post-Covid survival. A digital strategy is where it starts but involving both employer and employee remains fundamental to digital optimization. If concerns from either side are neglected the entire approach may fail. A Deloitte Insights Tech Trends 2021 article published earlier this year, suggested companies should ask themselves three basic questions:

- Work—what can be automated?
- Workforce—who can do the work?
- Workplace—where is work done?

Fortunately, work can be transformed today applying several existing technologies like AI, cloud, edge computing, robotics and a host of collaborative tools. Similarly, tomorrow's workforce can be energized by variety and continual investment in talent development. External resources (freelance, contract labor, Gig workers) will expand the workforce ushering in the era of advanced digital teamwork. And, then there is the workplace. The digital workplace becomes virtual, no longer limited by time and distance.

Borrowing a well-known phrase 'the genie is out of the bottle' the pandemic permanently altered the nature of work. Employees want jobs that accommodate individual preferences for flexibility and mobility. Employers still want development, productivity and measurability. Digitalization bridges both. Digitalization allows work to be accomplished by a satisfied workforce from any desirable workplace productively.

In the end, it's data, data, data. Collecting, analyzing and disseminating data ensures organizational productivity, employee inclusivity, professional development and recognition, streamlined communications, efficient work processes and continued innovation. The beauty of digitalization is the absence of traditional boundaries to work, workforce and workplace.



More EMS providers look to distributors for scarce parts and supply chain services

Many electronics manufacturing services buyers desperate to find shortage components have increased their reliance on distributors



James Carbone

Electronics manufacturing services (EMS) providers have always purchased components from distributors to varying degrees but over the last two years more have turned to the distribution channel for long lead time and shortage parts. In addition, more EMS providers are also buying more parts through distribution because the value they can provide through supply chain, value-added, and design services, which can reduce their overall cost of acquisition and ownership.

While small and medium size electronics manufacturers have always been the bread-and-butter business of many distributors, large EMS providers also purchase parts from distributors including large global broad line, specialized and high-service distributors for design, prototyping and small production runs as well for parts that are in short supply.

"We service a ton of EMS customers," said Coby Kleinjan, vice president, Americas, customer service and sales for high-service distributor Mouser Electronics. "EMS is our second largest category behind OEMs. We service small to medium and larger EMS providers," said Kleinjan.

Mouser's business with EMS providers has increased in part because of component shortages but that is not the only reason, he said. The role of the EMS provider has changed over the last few years, according to Kleinjan.

The change has benefited some distributors.

Providing more value

"EMS providers are becoming more of a value to their OEM customers," he said. Some are involved in OEM customers' product development efforts and new product introduction. If an EMS provider "does any kind of development or design, then they are utilizing Mouser for some of the first prototypes and new product introduction," he said. They also use Mouser to support small and medium production runs in some cases.

Mouser is increasing its business with EMS providers, even larger ones, according to Kleinjan. For instance, Mouser may sell a relatively small amount of parts to a large EMS provider as measured in dollars.

"We may be 15th or 20th in terms of dollars spent by the EMS provider," he said. But in terms of purchase orders and transactions, Mouser would be second or third because the distributor is growing its number of buyers and engineers within the provider who are purchasing parts, according to Kleinjan.

He said there is a greater focus on the value that high-service distribution brings to EMS providers and OEMs. "It has really developed and blossomed over the last five years," said Kleinjan.

Many buyers "look to Mouser for the basic blocking and tackling" of quoting and providing support,



Coby Kleinjan, vice president, Americas customer service and sales for **Mouser Electronics**.

Many EMS procurement folks are really using high-service distribution as a "terrific source of information. They're spending a lot of time on the Mouser site getting a lot of the detail about products"

he said. "They also take advantage of our technical expertise, which offers spec clarification and part identification," said Kleinjan.

Many EMS procurement folks are really using high-service distribution as a "terrific source of information. They're spending a lot of time on Mouser's website getting a lot of the detail about products," he said.

More business with EMS

Of course, EMS providers aren't just buying parts from high-service distributors. Broad line distributor Avnet's business with EMS providers has grown "significantly over the years and is a substantial part of our business today," according to Gary Colvin, vice president of Avnet United.

In fiscal year 2021, 38 per cent of Avnet's total business was with EMS providers, including tier 1 global customers as well as tier 2-3 providers, he said.

"We are absolutely seeing more business from mid-size and large companies," Colvin said. Such customers have often worked with suppliers directly but "markets have changed significantly over the last few cycles and they now need more flexibility and assurance of supply," he said. Often such customers look to Avnet for services that provide flexibility and supply assurance, said Colvin.

Many of Avnet's customers use the "full breadth of our offerings, especially our large, global



EMS customers that are further diversifying their businesses and need our well-rounded capabilities to scale," said Colvin. Such services include IC programming capabilities, managed inventory programs and in-plant stores.

"We also offer innovative supply chain solutions such as activity-based trading models, trade financing, digital-as-a-service and strategic inventory hubs," said Colvin.

Digital is a significant area that both EMS and OEMs are benefiting from, including EDI/API links with customers and quoting, he said. "It's our work in digital that's enabling Avnet to harness a vast amount of data for our customers' benefit," he said.

He said larger EMS providers look to Avnet for shortage parts but they also buy from Avnet on a regular basis for other components. "We're seeing a tremendous increase in business with EMS and OEM customers, across both Avnet's core electronic components business and Farnell," said Colvin.

"Our ability to provide both design win and supply chain support" have enabled Avnet to maintain long-term relationships with EMS customers, he said.

Avnet can provide these services to both OEM and EMS customers of all sizes, according to Colvin.

He said EMS customers are not looking to expand their supplier base. "If anything, they want to contract," he said. As a result, providing design and supply chain services to EMS providers is essential.

Business is diverse

Colvin noted the EMS business is becoming much more diverse and this is driving the need for different requirements. "We're seeing this particularly with some of Avnet's large, global EMS customers," he said.

Larger EMS providers are doing more than building circuit board assemblies. They continue to grow organically and some are diversifying and entering new market segments, said Colvin.

Denise S. Lingenfelter, senior director, global corporate accounts for Digi-Key Electronics, agrees that the EMS business has changed. "In the last 10 years, we have seen a significant shift in the mix of high-volume production, such as telecom and automotive being prevalent, to an increase in low-volume production in medical and industrial business sectors," she said.

There has been an increase in, prototyping and new product introduction (NPI) as many EMS providers move "deeper into the joint design/design services in all segments," said Lingenfelter. "Time to market is critical to success in this area. The shift has elevated the value of Digi-Key to all EMS providers, according to Lingenfelter.

Besides time to market low total cost is also important to EMS providers. She noted that EMS have a very low net margin model and material spend is traditionally the largest contributor to the product cost.

EMS providers are always looking for a competitive price. However, the need to reduce the total

Denise S. Lingenfelter, senior director, global corporate accounts for **Digi-Key Electronics**.

"In the last 10 years, we have seen a significant shift in the mix of high-volume production, such as telecom and automotive being prevalent, to an increase in low-volume production in medical and industrial business sectors"



cost of acquisition/total cost of ownership has increased in importance in the low-volume/high-mix production space, she said. Digi-Key's supply chain programs can drive their bottom line "much more favorably. We provide solutions that will combine supply chain risk mitigation, even in low-volume production, with maximum flexibility and, just as important, with minimal liability," said Lingenfelter.

More VA demand

Value added services also help reduce cost for EMS providers "Our value-add services, including custom reel sizes on surface-mount technology (SMT) product, has increased year-over-year with EMS customers," said Lingenfelter. EMS providers do not want to pay for a full reel of product when they only need a small number of the parts on the reel, she said.

Some EMS providers want to have strategic relationships with some distributors.

"This is driven by the shift in customer volumes, design services and increased NPI. They need a partner that can support their entire life cycle from design to end-of-life (EOL), she said. EMS providers will partner with select distributors that meet their needs for line card components and solutions, according to Lingenfelter. "They will still buy from regional distributors in some markets, specifically EMEA and Asia," she said.

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Semiconductor industry M&As are here to stay

David Stein is vice president of global supplier management for Digi-Key Electronics. Digi-Key is both the leader and continuous innovator in the high service distribution of electronic components and automation products worldwide, providing more than 13 million components from over 2,200 quality name-brand manufacturers.

Mergers and acquisitions have been prevalent in the semiconductor industry for the past two decades and have substantially increased in the last seven years or so, creating significant consolidation in the industry. These mergers and consolidations are major, multi-billion dollar deals that are streamlining the future of the semiconductor industry, and it's no wonder why: in 2021, semiconductor sales were expected to reach \$527.2 billion USD globally, according to Statista.

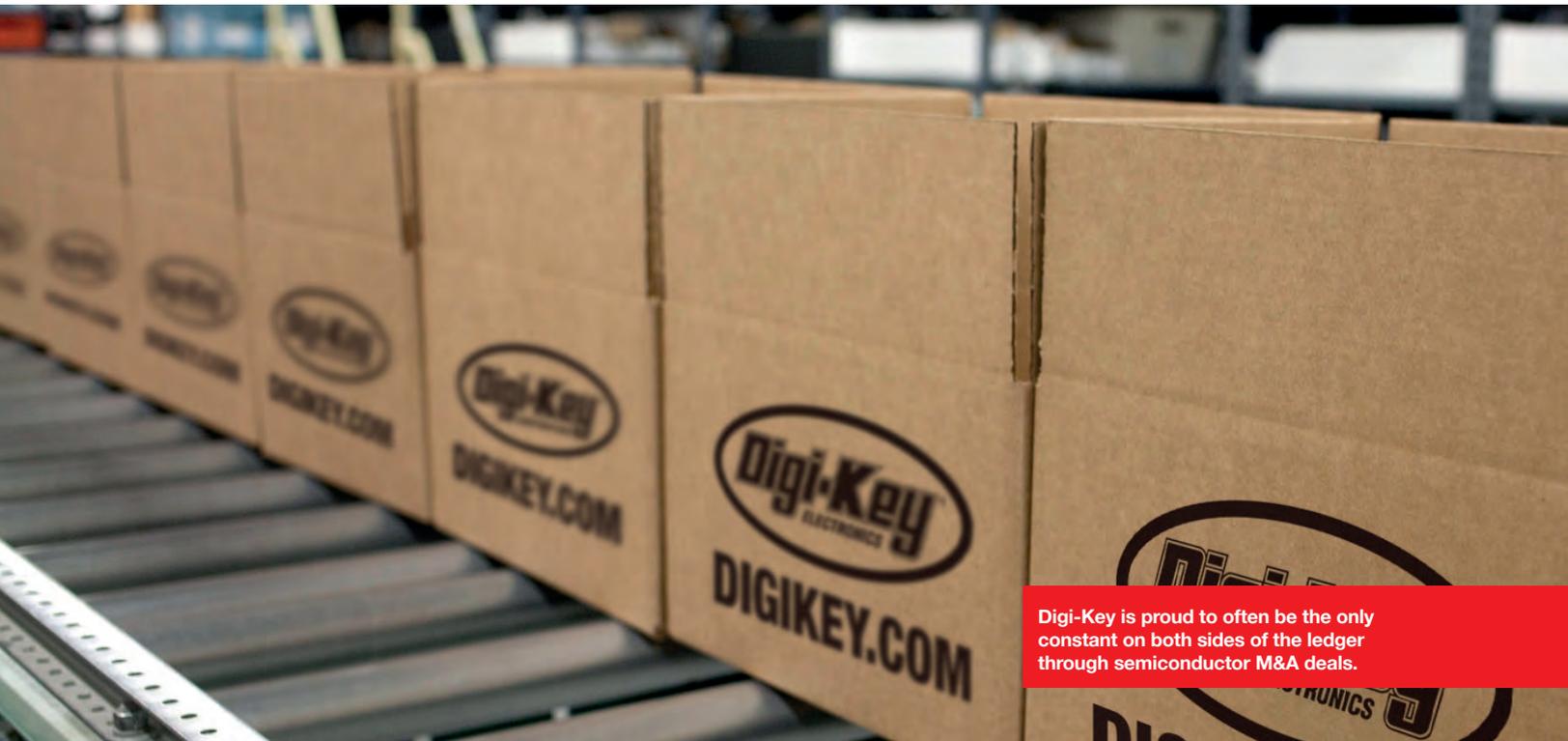
We expect these types of deals to continue for many reasons – technology continues to evolve, interest rates are low, and market caps and buyers' stock prices are high, which allow for easier stock deals and borrowing money. There are also a variety of new markets on the rise, including 5G, artificial intelligence, machine learning, automotive, electric vehicles and IoT sensors, creating many new uses for semiconductors. Acquisitions are an efficient way to fill out a supplier's product mix and provide end customers a robust solution offering.

Whenever there has been an acquisition, Digi-Key has nearly always already carried both lines. Of the major acquisitions in recent history, Digi-Key has been the only e-commerce distributor that has carried all the lines when the acquisitions were made. This has resulted in many synergies for the newly merged companies and exhibited further proof of the stability that Digi-Key provides our customers.

We're proud to be the only constant on both sides of the ledger and are honored to continue working with the companies as they complete their mergers and transformations. For Digi-Key, it's a seamless transition, because there's no learning curve on how to market the products, work with the supplier, and manage relationships with their team – we've got the familiarity on all fronts. And because of our team's technical know-how, we understand the product synergies very well. We're able to take the elements and strengths of both companies and market them to the global engineering community, promoting the newly merged company as stronger than ever.

Looking ahead, we predict the industry will see larger suppliers offering deeper product portfolios, since suppliers are purchasing companies with synergistic products in order to offer a broader range of choices to their customer base. Suppliers will be able to leverage their expanded resources to provide designers and engineers with a solution sell rather than a one-off widget.

Digi-Key is proud of our extensive portfolio and the trust we've built with our supplier partners, which have served us and our customers well through this market consolidation.



Digi-Key is proud to often be the only constant on both sides of the ledger through semiconductor M&A deals.



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DISTRIBUTION STABILIZES
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EV supply chains: ahead of the trend

Pat Wilson, commissioner of the Georgia Department of Economic Development explains how a wide-lens view of the world is driving the EV supply chain in Georgia

An enduring lesson of the pandemic is that supply chain disruptions can be a major problem for US businesses and consumers. Moving manufacturing overseas over recent decades has left the country more susceptible. However, the State of Georgia is pushing back. Through intentional investments and leaders focused on a wide-lens view of the world, Georgia is creating future-focused solutions and bringing key industries home.

Early on, Georgia identified the electrification of the American automotive landscape as an opportunity and began developing an entire electric vehicle (EV) and mobility supply chain. A domestic EV supply chain means stronger national

security, less dependence on unstable countries and easier operations for companies trying to meet consumer demand.

In December 2021, EV truck manufacturer Rivian announced plans to invest \$5 billion in a carbon-conscious campus in Georgia, where the company will manufacture up to 400,000 electric adventure vehicles per year. This announcement follows news that German company Aurubis, one of the world's largest copper recyclers, will invest \$340 million in a recycling and secondary melting facility for multi-metal recycling in Augusta, Georgia. This will be the first factory of its kind in the US and marks an important step in the electric vehicle value chain.

Battery Resourcers has announced a commercial-scale lithium-ion battery recycling facility outside metro Atlanta that will have the capacity to process 30,000 metric tons of discarded lithium-ion batteries and scrap annually.

Georgia is already home to automotive OEM Kia and battery producer SK Innovation, and cascading investments bring even more suppliers and electric car companies to the state. Each time a piece to the EV ecosystem is added, it helps attract the next company.

Given that vital metals used to manufacture batteries and semiconductors are currently sourced almost exclusively outside of the US, the upcoming Aurubis facility



Commissioner of the Georgia Department of Economic Development, **Pat Wilson**



will bring sought-after metals for EV and mobility product manufacturers to the US market. Aurubis processes complex metal concentrates, scrap metals, organic and inorganic metal-bearing recycling materials, and industrial residues, into high quality metals. The company produces more than a million tons of copper cathodes annually and, from them, makes a variety of products ranging from wire rod to flat-rolled copper and copper alloy products. Aurubis produces several other metals, including precious metals, selenium, lead, nickel, tin and zinc, which are needed to produce microchips sought after by EV and mobility companies.

In addition to the nearly \$2.6 billion SK Innovation electric vehicle battery manufacturing facilities in Jackson County, Georgia has attracted other international investments in recent months, including Dutch e-mobility charging systems company Heliox, Turkish EV-parts manufacturer Teklas, German-owned lightweight automotive-body parts manufacturer GEDIA, and SK suppliers EnChem and Duckyang. A new investment from SK Group subsidiary SKC will manufacture glass-based substrates for semiconductor chips in Georgia. Even more exciting, Georgia Tech played a role in the development of this technology—an example of how Georgia's investments into academic assets not only drive economic development, but also contribute to finding solutions to global problems.

Georgia-made school bus manufacturer Blue Bird recently reported its 500th electric bus sold following its 2018 introduction of all-electric buses. Plug Power broke ground in August 2021 on its new fuel cell systems manufacturing facility for e-mobility on Georgia's coast.

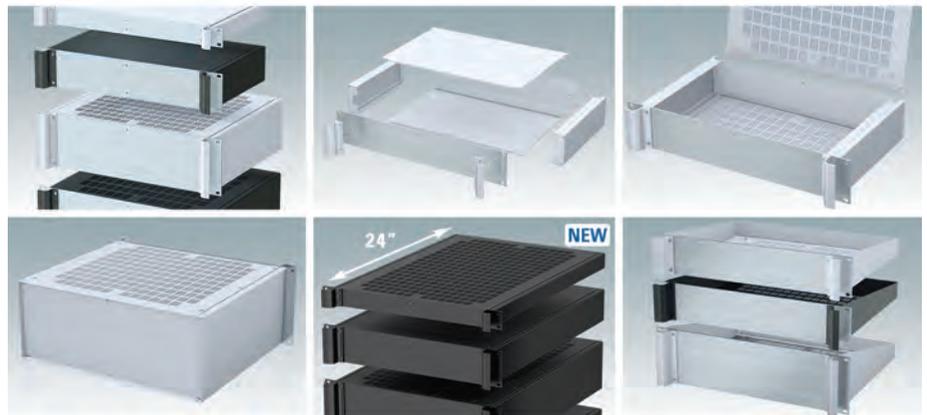
Recent infrastructure investments made by the Georgia Ports Authority will relieve supply chain bottlenecks and further help move products, parts and raw materials in and out of the country.

The new Mason Mega Rail facility at the Port of Savannah will expand service across inland markets. Construction is also underway at another Georgia inland port in Gainesville that will help further develop the logistics infrastructure into the northeast corner of the state, even closer to the center of the US market.



EV truck manufacturer Rivian announced plans to invest \$5 billion in a carbon-conscious campus in Georgia

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METCASE ENCLOSURES

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METcase



Heatsinks cool diverse components

Advanced Thermal Solutions now provides heat sinks for component sizes ranging from 27 to 70mm square. This wider size range accommodates semiconductor components, including FPGAs, ASICs and other package types, in applications such as telecom, optics, test/measurement, and military.

ATS fanSINKS feature cross-cut, straight aluminum fins. They support omni-directional airflow for optimum cooling from attached fans and ambient air. To optimize heat transfer, the sinks are provided with a pre-assembled thermal interface material.

fanSINKS attach securely to components using a plastic frame clip and stainless steel spring clip. For larger components, fanSINKS mount to the PCB using PEM pushpins that secure into 3.0mm through holes.

Each fanSINK requires its own fan, based on the application. Fans by Delta, Sunon, San Ace and other manufacturers are compatible. For secure fan attachment, ATS provides stainless steel mounting screws in a range of lengths for different fan heights.

www.qats.com



Camera modules add plug-and-play vision

Arrow Electronics has introduced a family of plug-and-play camera modules based on sensor technology from onsemi. The modules provide an effective way to incorporate camera functionality, supporting migration from proof-of-concept to mass production.

Arrow worked with Shiratech Solutions to create the camera mezzanine cards, which are compliant with the 96Boards specification. Each module is based on a different onsemi CMOS image sensor, enabling users to select functionality depending on their requirements. Target applications include artificial intelligence and machine vision, low-power IoT devices, and commercial and consumer security products.

Each mezzanine is also equipped with the onsemi AP1302 image signal processor, which takes over if the main processor does not have an integrated ISP. This IC can handle various tasks such as sensor configuration and calibration, image format conversion, basic transformations, and autofocus. Designed to improve overall system performance, the AP1302 supports onsemi image sensors up to 13MP.

www.arrow.com



Robust choke targets commercial applications

New Yorker Electronics has announced availability of the new Vishay IHCM common mode choke. Designed with a low-profile, surface-mount construction, the IHCM-2321AA-10 is said to be more robust than bulky toroid-based devices, while delivering superior performance across temperature ranges to 155°C.

Reduced size and volume help make the choke more resistant to shock and vibration, while the enhanced core design extends current saturation to as much as 35A. This makes the IHCM-2321AA-10 ideal for commercial-grade DC/DC converters, EMI filters and high current filters. It can also be used for noise suppression in motor control and other circuitry in industrial and telecom applications.

www.newyorkerelectronics.com



Specify custom color enclosures in any volumes

Metcase's Technomet enclosures can now be specified in custom colors, even in low volumes. Options range from trim and bezel highlights to bespoke colors for the whole enclosure. These desktop and portable instrument enclosures are ideal for medical and wellness devices, test and measurement equipment, industrial control, peripheral devices and interfaces, switchboxes, communications and laboratory equipment.

Enclosures in the range are engineered to fine tolerances with diecast front and rear bezels that fit flush with the case body for a smooth appearance. Snap-on trims hide the fixing screws and all sizes are available with either a bail arm that doubles as a desk stand or ABS side handles. Three sizes offer a sloping front bezel.

Purchasers can specify these aluminum enclosures in 11 sizes, in standard light gray or anthracite, with 'always in stock' custom colors costing no more than standard.

www.metcaseusa.com

2022 Show Diary

<p>February</p>	<p>15-17 Wafer-Level Packaging Symposium – www.smta.org The development of Advanced Package Technology is undergoing a massive change because Electrical System Architects are directly driving package performance requirements.</p>	<p>DoubleTree by Hilton San Jose, CA 95110</p>	<p>Wafer-Level Packaging Symposium</p> 
<p>February</p>	<p>27-1 ERA Conference – era.org This do-not-miss event provides an unparalleled opportunity to bring together manufacturers' representatives, distributors and manufacturers in a collaborative and energetic environment.</p>	<p>AT&T Executive Education and Conference Center Austin, TX 78705</p>	
<p>March</p>	<p>20-24 Applied Power Electronics Conference – apec-conf.org The Applied Power Electronics Conference (APEC) focuses on the practical and applied aspects of the power electronics business. This is not just a designer's conference; of interest for anyone involved in power electronics.</p>	<p>George R. Brown Convention Center Austin, TX 77010</p>	
<p>May</p>	<p>4-5 Del Mar Electronics & Manufacturing Show – manufacturing.show The Del Mar Electronic & Manufacturing Show is an event focusing on the consumer products and services in the field of home decor and electronics as well as technology based products.</p>	<p>Del Mar Fairgrounds San Diego, CA 92014</p>	
<p>May</p>	<p>10-13 Electronics Distribution Show – www.edssummit.com EDS is an important gathering of the movers, shakers and brightest minds that electronic component manufacturers, distributors and representatives have to offer.</p>	<p>Mirage Hotel & Resort Las Vegas, NV 89109</p>	
<p>June</p>	<p>27-29 Sensors Expo & Conference – sensorsconverge.com Join the sensors and electronics community June 27-29 at the one in-person and virtual event covering the biggest design engineering trends.</p>	<p>McEnery Convention Centre San Jose, CA 95113</p>	
<p>July</p>	<p>11-14 SEMICON West – www.semiconwest.org North America's premier microelectronics exhibition and conference that unites players across the entire electronics manufacturing and design supply chain.</p>	<p>Moscone Center San Francisco, CA 94103</p>	
<p>October</p>	<p>4-7 PCB West – www.pcbwest.com More than 2,500 designers, fabricators, assemblers and engineers register and more than 100 companies exhibit each year at the four-day technical conference and one-day sold-out exhibition.</p>	<p>Santa Clara Convention Center Santa Clara, CA 95054</p>	
<p>October</p>	<p>23-25 ECIA Executive Conference – www.ecianow.org Bringing together senior management teams from the electronics industry's leading companies - representing the entire supply chain - to understand and address cross-enterprise challenges.</p>	<p>Loews Chicago O'Hare Hotel Chicago O'hare, IL 60018</p>	
<p>November</p>	<p>15-18 Electronica – www.electronica.de Exhibitors from nearly every sub-sector of the electronics industry from at least 50 countries around the world with a comprehensive range of exhibits, all at a single location.</p>	<p>Messe München Munich, Germany 81829</p>	



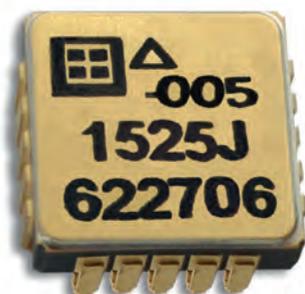
Made to order coax assemblies ship fast

NAI has launched a new line of Series-C coaxial cable assemblies under the Steady Link brand. Products feature flexible RF50 low PIM corrugated assemblies with straight connectors. All assemblies are made to order from inventoried materials, with quick shipment options available and an online configurator for rapid custom assembly design and quoting.

Said to provide reliable connections for transmitters, receivers, antennas, and other applications in antenna feeder systems on cell towers, the new assemblies feature low VSWR and strong shielding to reduce energy loss and provide protection from outside interference. As such, they are ideal for connections in low loss and VSWR signal transmission at high frequency.

NAI's Series-C flexible RF50 coax cable assemblies are also suitable for harsh outdoor environments with a ruggedized design engineered to withstand extreme temperatures. Assemblies are available in three cable sizes with custom lengths available.

www.nai-group.com



Accelerometer chips ready for rapid supply

Silicon Designs has announced a new series of MEMS DC accelerometer chip with stock quantities available for immediate shipment from the company's US-based ISO9001:2015 certified manufacturing site.

Model 1525 Low-G series products are designed to offer accurate low-frequency vibration and acceleration measurements in a variety of inertial- and industrial-grade applications, particularly where repeatability, low noise, and stability are required.

Key features include price-for-performance, in-run bias stability, zero cross-coupling, and Allan Variances from 5 μ g. With availability in five ranges, each chip incorporates one of Silicon Designs' high-performance sense elements, together with a \pm 4.0V differential analog output stage, internal temperature sensor, and integral sense amplifier. Components are housed in a hermetically sealed, Nitrogen damped, 20-pin JLC surface mount package, measuring 0.35in².

Designed to be relatively insensitive to temperature changes and gradients, the accelerometers have a standard operating temperature range of -40 to 85° C. All devices are supplied with a calibration test sheet and are marked, top and bottom, for traceability.

www.silicondesigns.com



Slash energy waste in smart appliances

Power Integrations has introduced a new family of InnoSwitch3 ICs designed to cut energy waste in appliance power supplies. The InnoSwitch3-TN off-line, CV/CC flyback switcher ICs are ideal for appliance and industrial auxiliary applications up to 21W.

Devices are offered in a safety-qualified, MinSOP-16A package and incorporate a 725V primary MOSFET, isolated feedback, synchronous rectification and secondary-side control. The controllers also boast constant efficiency across the load range and less than 5mW no-load consumption. As a further benefit, the small package and low number of external components required for a full PSU design make the InnoSwitch3-TN ideal for compact implementations.

Senior product marketing manager at Power Integrations, Silvestro Fimiani, said: "InnoSwitch3-TN devices support the high output current needed in smart-connected appliances at efficiencies of up to 90 per cent, compared to buck regulators that are often less than 60 per cent efficient."

www.power.com



Converters approved for medical use

Traco Power has announced the new THM 60W series of quarter brick DC-DC converters with safety approvals for both medical and industrial applications. Available through distribution from stock, or with manufacturing lead times of 14 to 16 weeks, the range consists of 12 models. Products offer nine to 75 or 18 to 75Vin ranges with single and dual outputs of 5.1, 12, 15, 24, \pm 12, \pm 15V and up to 92 per cent efficiency.

All models feature EMC compliance to IEC 60601-1-2 fourth edition, plus 5,000V AC reinforced I/O isolation and low leakage current of less than 4.5 μ A. Products also offer remote on/off control, remote sense, and output voltage trim. Operating temperature is -40 up to 75°C.

For patient and operator safety, the THM 60W series is two times MOPP compliant and BF rated for applied parts applications. All models are supported with an ISO 14971 risk management file and safety approved to IEC / EN / ES 60601-1 and IEC / EN / UL 62368-1.

tracopower.com



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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
ACOUSTIC COMPONENTS											
BeStar Electronics Ind. Co. Ltd.	BeStar Technologies Inc.	520-439-9204	www.bestartech.com	Y	N/A	\$250,000	N/A	100.00%	50	900	Y
CABLE & WIRING											
3M	Mouser Electronics	800-346-6873	www.mouser.com	Y	23235	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	93.00%	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	Bel Fuse	+1 201 432 0463	belfuse.com/circuit-protection	Y	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	68.00%	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
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	Mouser Electronics	800-346-6873	www.mouser.com	Y	12,390	N/A	\$0	99.00%	50	1,000+	Y
Dialight	Mouser Electronics	800-346-6873	www.mouser.com	Y	6,179	N/A	\$0	84.00%	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
Electronic Assembly	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	100.00%	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
Newhaven Display	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Osram Opto Semiconductors	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,690	N/A	\$0	100.00%	50	1,000+	Y
VCC	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
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	83.00%	50	1,000+	Y
C&K Switches	Mouser Electronics	800-346-6873	www.mouser.com	Y	27,230	N/A	\$0	90.00%	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
IXYS	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

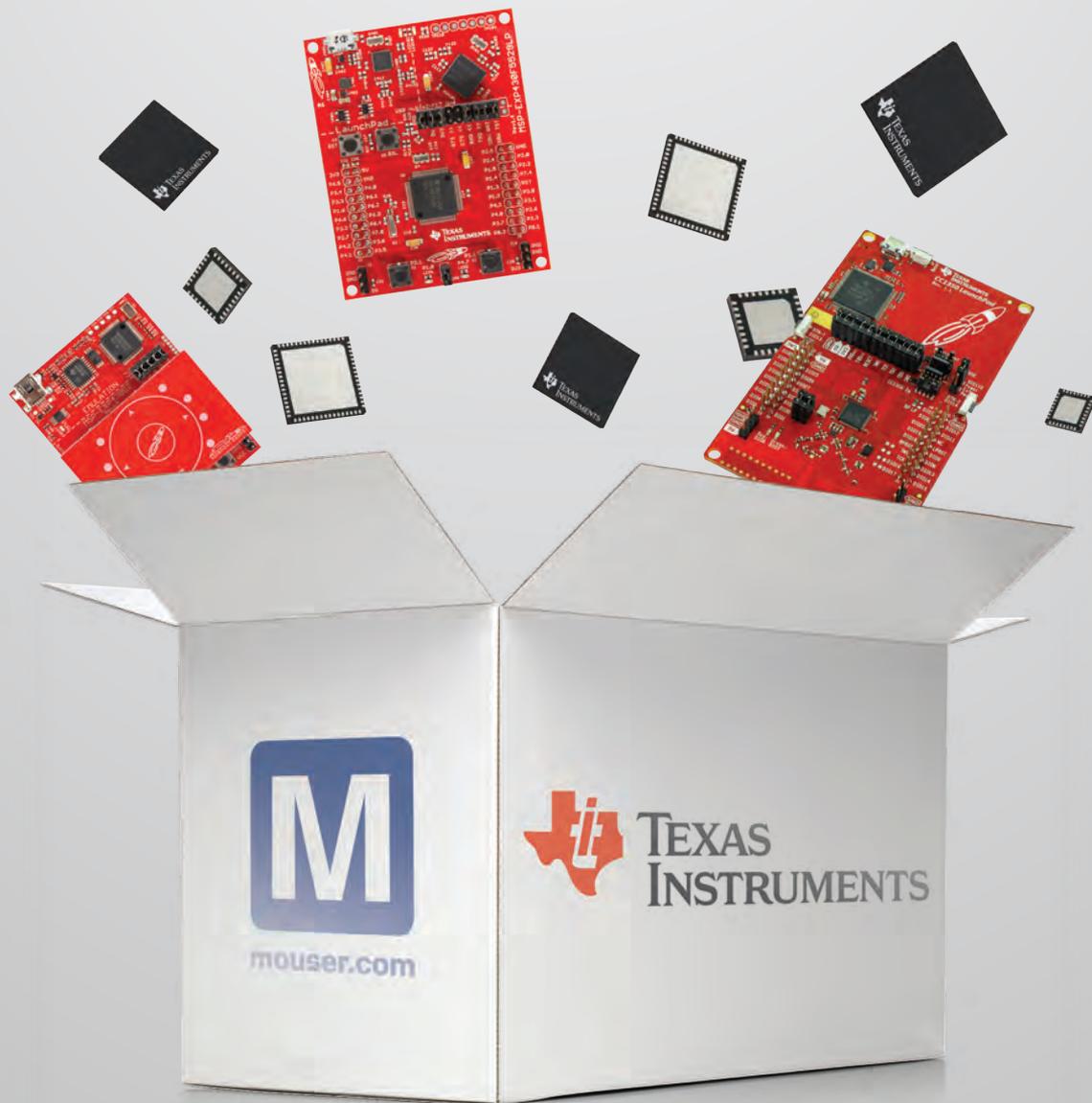
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au·thor·ized

adjective

having permission or approval as
in, "Mouser is an authorized source."



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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
ELECTROMECHANICAL (Continued)											
NKK Switches	Mouser Electronics	800-346-6873	www.mouser.com	Y	13,976	N/A	\$0	86.00%	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
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
Tedyne 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	80.00%	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	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Silicon Labs	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
Cree, Inc.	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Cypress Semiconductor Corp	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,325	N/A	\$0	81.00%	50	1,000+	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	Mouser Electronics	800-346-6873	www.mouser.com	Y	94	N/A	\$0	100%	50	1,000+	Y
IDT (Integrated Device Technology)	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	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
IXYS	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
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
Microsemi	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	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
ON Semiconductor	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
SanDisk	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	100.00%	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	96.00%	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

Manufacturer	Distributor	Telephone	Website	Franchised Distributor (Y/N/A)	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
INTERCONNECTION											
3M	Mouser Electronics	800-346-6873	www.mouser.com	Y	23,235	N/A	\$0	46.00%	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
Active (Delphi)	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Bel Magnetic Solutions	Bel Fuse	+1 858 676 9650	belfuse.com/magnetic-solutions	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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	Bel Fuse	+1 507 833 8822	+1 507 833 8822	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ERNI Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
FCI	Mouser Electronics	800-346-6873	www.mouser.com	Y	3,394	N/A	\$0	73.00%	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	51.00%	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
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	77.00%	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
Souriau	Mouser Electronics	800-346-6873	www.mouser.com	Y	10,744	N/A	\$0	27%	50	1,000+	Y
Stewart Connector	Bel Fuse	+ 1 717 235 7512	belfuse.com/stewart-connector	Y	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	Mouser Electronics	800-346-6873	www.mouser.com	Y	582	N/A	\$0	99.00%	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
Osram Opto Semiconductors	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
AVX	Mouser Electronics	800-346-6873	www.mouser.com	Y	42,454	N/A	\$0	72%	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	98.00%	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
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	84.00%	50	1,000+	Y
Ohmite	Mouser Electronics	800-346-6873	www.mouser.com	Y	14,293	N/A	\$0	55.00%	50	1,000+	Y
Panasonic Electronic Components	Mouser Electronics	800-346-6873	www.mouser.com	Y	14,948	N/A	\$0	100.00%	50	1,000+	Y
Signal Transformer	Bel Fuse	+1 516 239 5777	belfuse.com/signal	Y	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	98.00%	50	1,000+	Y

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
PASSIVES (Continued)											
TDK	Mouser Electronics	800-346-6873	www.mouser.com	Y	6,663	N/A	\$0	100.00%	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	64.00%	50	1,000+	Y
Würth	Mouser Electronics	800-346-6873	www.mouser.com	Y	934	N/A	\$0	99.00%	50	1,000+	Y
Yageo Corporation	Mouser Electronics	800-346-6873	www.mouser.com	Y	18,246	N/A	\$0	100.00%	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
Bel Power Solutions	Bel Fuse	Power & Batteries	belfuse.com/power-solutions	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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
Mornsun		+1-978-567-9610/+1-978-293-3923	www.mornsunamerica.com		N/A	N/A	\$0	100%	N/A	2000+	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
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	80.00%	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
TRACO Power	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
REED SWITCHES											
HSI Sensing	HSI Sensing	405-224-4046	www.hsisensing.com	M	75	N/A	\$200	100.00%	15	275	N
SENSORS											
ams	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 Sensing and Control	Mouser Electronics	800-346-6873	www.mouser.com	Y	12,059	N/A	\$0	64.00%	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
Maxim Integrated	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,379	N/A	\$0	45.00%	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
ON Semiconductor	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	59.00%	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	65.00%	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	94.00%	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	96.00%	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
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



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Field Sales Engineer

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Field Application Engineer

Midwest, East Coast, West Coast, Florida, Texas

Internal Sales Assistant

Texas, Florida

Product Sales Manager

Texas, Florida