ELECTRONICS
sourcing
MAY 2020
NORTH AMERICA

MAY 2020

Top 50 Distributors Report 2020

AN UBM PUBLISHING TITLE

On the cover – May 2020

Top 50 Distributors Report
Starts page 21

Contents

Contact

ELECTRONICS sourcing MMG PUBLISHING US LTD

EDITORIAL
Managing Editor: Jon Barrett
jonb@electronics-sourcing.com
Contributing Editor: Amy Barker
amyb@electronics-sourcing.com
Editorial & Production: Thomas Smart
thomas.smart@electronics-sourcing.com

ADVERTISING
Director of New Business: Charlotte Morgan
charlotte.morgan@electronics-sourcing.com
Advertisement Manager: Emma Poole
emma.poole@electronics-sourcing.com

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

DESIGN
Graphic Designer: Josh Hilton
josh.hilton@electronics-sourcing.com

PUBLISHER
Mark Leary
mark.leary@electronics-sourcing.com
Office Manager: Denise Pattenden
denise.pattenden@mmgpublishing.co.uk

Issue 92, Vol.11 No.05

Published 12 times per year
by MMG Publishing US Ltd

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

Printed in the United States

abc ELECTRONICS SOURCING IS INDEPENDENTLY ABC AUDITED 2005/2017

ecia Connect. Influence. Optimize.

Editor's Word

The day my supply chain stood still

A few weeks ago, my wife heard a radio appeal by a local nurse asking if owners of 3D printing cells could help manufacture face visors for medical staff.

My machine was on tick-over, so I joined a WhatsApp team and started making. To start, I took a base design published by Prusa and redesigned it to get the print time under 60 minutes.

Then I tackled the three row BoM: a reel of PLA; 250-micron acetate sheet; and 25m of button elastic. The PLA and acetate were delivered next day. The acetate was cut/punched and attached to the printed headbands. Semi-finished visors were stacking up, awaiting their elastic rear headband.

Regarding the elastic, the button version (which has formed slots) is slightly unusual. My local haberdashery had closed so the only option was mail order. Most were offering very long lead times, in some cases months, while others were selling very short lengths, at very high prices.

Eventually I found some local stock on two to four-day delivery. On day four I still hadn't received a dispatch notification. The reply to my question was interesting. It hadn't been dispatched because the carrier hadn't picked it up. I offered to pay extra for next day but was told the carrier network was suffering and the delivery date was unknown. Ultimately, we swapped the button elastic for elastic bands.

It's not called a 'supply chain' for fun. It's there to remind us that every chain is as strong as its weakest link.

Jon Barrett

N

ES News

View current editions online – www.electronics-sourcing.com

Global IoT agreement

Rutronik is expanding its portfolio with products from HMS Industrial Networks, a manufacturer of solutions for industrial communication and IoT. The companies have entered a global distribution agreement.

HMS offers solutions for connecting devices and systems to all common industrial networks and views itself as a technology partner offering turnkey communication solutions. This is designed to save customers development costs and allow them to benefit from a shorter time-to-market.

HMS' general manager, Thilo Döring, said: "The global presence of Rutronik, the access to the market, as well as the technical know-how of the product marketing and FAE teams make Rutronik the ideal partner to successfully develop the market leadership of HMS even further."

Rutronik's senior manager product marketing boards, Mario Klug, said: "By partnering with HMS, we are expanding our product portfolio to include multiprotocol solutions for industrial communication in the embedded PC card segment and the microcontroller segment with the high-performance Anybus NP40 multi-network processor."

www.rutronik.com

Medical and ITE supplies now shipping

Sager is now stocking TDK-Lambda's CUS-M Series of 30W to 1500W medical and ITE power supplies. The product range is designed to offer high efficiency in a low profile. Medical and industrial applications include hospital, dental, broadcast and professional audio equipment.

The CUS-M product range includes 30, 60, 100, 150, 200, 350, 600 and 1,500W models, with 5V to 48V DC output range. The series features BF ready medical isolation (2x MOPP), efficiencies up to 94 per cent, an operating altitude up to 5,000m. Depending on model, warranty is three to seven-years.

www.sager.com

Linear re-launches Siliconix DMOS line

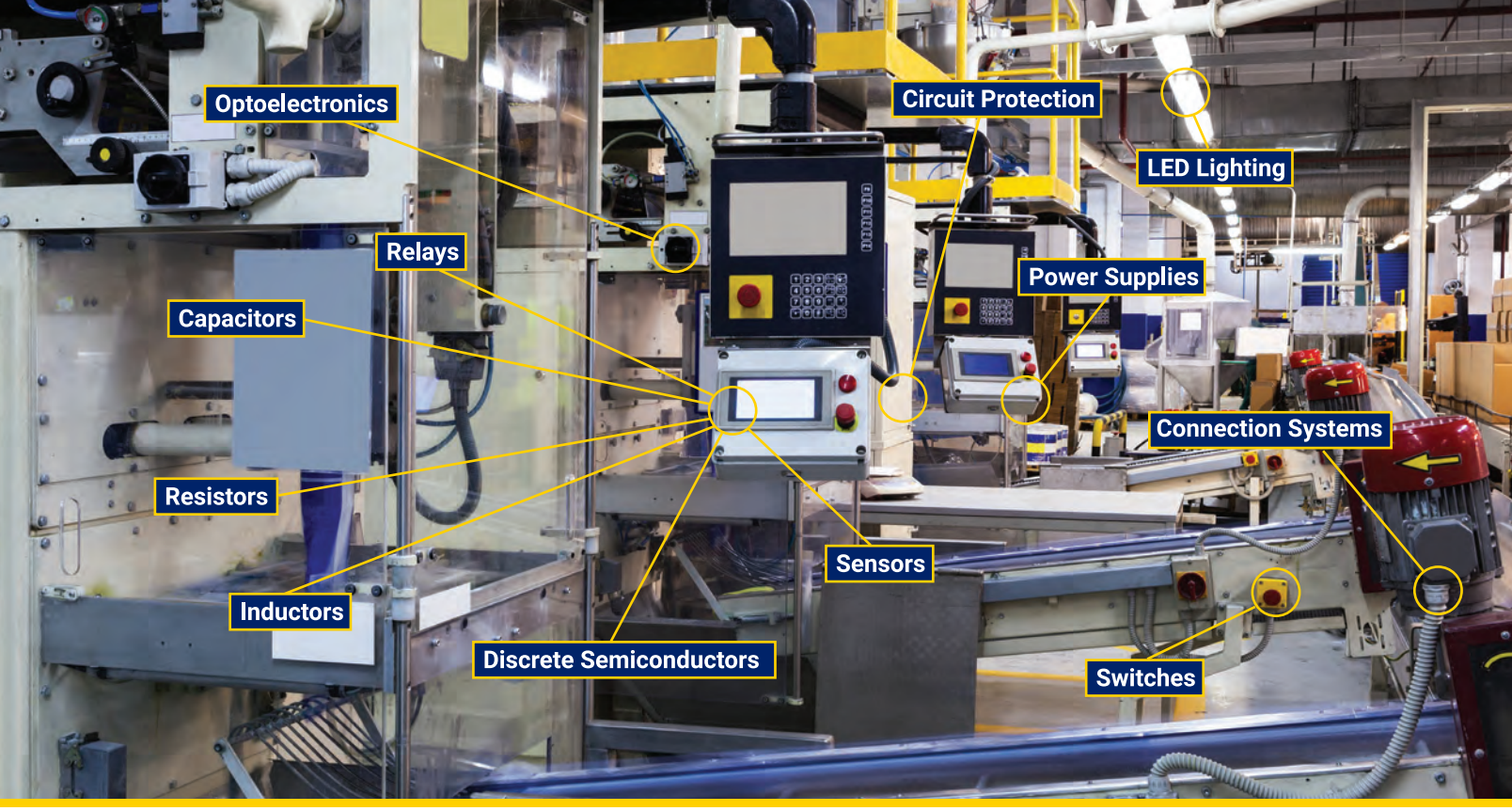
Linear Systems has re-released the SD-Series lateral DMOS switch product line acquired from Vishay/Siliconix in 2001. The company states the SD-series uses lateral construction to achieve low capacitance and ultra-fast switching speeds.

Linear Systems' president, Tim McCune, said: "The DMOS parts we produce meet every specification established by Vishay/Siliconix when they made them. The customers who relied on Siliconix for these parts transitioned smoothly to using ours, and we've welcomed many new customers since then."

These switches are key components in a variety of high-performance analog circuits where ultra-fast, nano-second switching times are critical. Linear Systems is the only company to build these parts using Siliconix' proprietary polysilicon gate technology and is the only Vishay/Siliconix-approved replacement manufacturer.

McCune added: "This line of lateral DMOS has been critical to a large number of high-end product developers, and it was important to Vishay that these customers not be forced to design these parts out or use inferior ones."

www.linearsystems.com



The Number to Know for Industry 4.0 is 1.800.CALL.TTI

America's Leading Inventory of Ready-to-Ship Electronic Components

TTI Industrial Specialists stock a broad and deep inventory of interconnect, passive and electromechanical components for factory floor applications. From harsh environment rated capacitors and resistors to lighting, sensors, and switches, to connectors, discretes, and wireless communications components for the Industrial Internet of Things, TTI has the components you need, on the shelf and ready to ship from our 800,000 square-foot distribution center in Fort Worth, Texas.

From our broad and deep inventory, to your production line, TTI Specialists have the components you need, when you need them at 1.800.CALL.TTI, visit us online at ttiinc.com or connect with us on social media @ttiinc

ttiinc.com
#ttiinc
1.800.CALL.TTI

A Berkshire Hathaway Company

Amphenol · AVX · BOURNS · Carling Technologies · EATON · HARWIN · Honeywell · KEMET · KOA · Littelfuse · molex · nichicon · OHMITE · OMRON · OSRAM · Panasonic · PHOENIX CONTACT · Sensata Technologies · TDK · TE · VISHAY

N ES News

In Brief

PCB booking up 21.8 per cent
IPC chief economist, Shawn DuBravac, said: "The coronavirus outbreak in China in late January and February created an unprecedented supply shock that idled significant global capacity and drove a historic increase in new bookings for the North American PCB industry. We expect to see further increases due to dis-allocations in the global supply chain and the medical supply chain ramping production."
www.ipc.org

Learn and buy on the move
Bourns has launched a mobile app to give customers easy, anytime access to the company's library of technical documents and product selection materials. Access is provided to Bourns data sheets, design tools, videos and technical training modules. Search capabilities include parametric, part number, keyword and competitor cross reference. Mobile product ordering is facilitated too.
www.bourns.com

Everything RF energy
RFMW has launched a micro-site for customers and suppliers supporting solid-state RF energy technology. RFMW offers components and solutions for the RF Energy bands (433, 915MHz, 2.45GHz and 5.8GHz), supporting customers with RF components such as signal generators, phase shifters, splitters, combiners, power amplifiers, circulators/isolators, terminations, cables and connectors.
www.rfmw.com

Powerful search
Flex Power Modules' revamped website includes parametric search, allowing customers to find products by using specific search criteria to match their precise needs. The website also has general product series pages, and more comprehensive links to pages with individual part numbers and related downloadable supporting documents such as technical specifications, application notes, design notes and much more.
www.flexpowermodules.com

Faster time-to-market

Mouser is now stocking the i.MX 8QuadMax and 8QuadPlus applications processors from NXP Semiconductors. The multi-core applications processors suit applications such as automotive infotainment, advanced industrial human machine interface (HMI) and control, heads-up displays, and machine vision and tracking devices.

The processors are designed to enable fast, multi-OS platform deployment through advanced full-chip hardware virtualisation and domain protection. Based on four Arm Cortex-A53 cores, two Cortex-M4F cores, and one (QuadPlus) or two (QuadMax) Cortex- A72 cores, the scalable processors also incorporate a HiFi 4 DSP core for pre- and post-audio processing and two graphics processing units.

The processors offer end-to-end vision processing, which suits vision-based HMI systems, and support up to four 1080p screens of independent content or a single 4K screen. The devices' hardware-based virtualisation, split GPU and display architecture, and resource partitioning support lower costs and faster time-to-market than using hypervisor techniques alone.

www.mouser.com

Supporting military connectivity

MilSource has announced availability of Techaya's Miltech VGA to round out the company's line of rugged MIL STD connectivity solutions for mobile military environments. Complementing rugged USB hubs and Ethernet switches, the Miltech VGA converts USB video traffic from rugged laptops/computers to VGA and Serial RS232/422/485/LVTTL protocols for monitors used in navigation systems, cameras, smart suits and more.

Claimed to offer the best size, weight and power (SWAP) in the industry, the product measures 3 by 2.8 by 0.97in (not including connectors) and weighs .29lbs. It provides 6V/8V power output, eliminating the need for power adapters often required on ground vehicles. All Techaya's mobile solutions meet MIL-STD 810G, 461G and IP68 rating.

MilSource's GM, Ronen Isaac, said: "This latest addition to Techaya's product line results in a complete, end-to-end connectivity solution for field-deployed networks that require ruggedized military-standards."

www.militaryethernet.com

Powering ahead

Digi-Key has expanded its portfolio with a global distribution partnership with UnitedSiC for its silicon carbide product portfolio.

UnitedSiC's vice president of global sales and marketing, Yalcin Bulut, said: "This partnership focuses on expanding the UnitedSiC product line to an even wider group of power designers by leveraging Digi-Key's world-class distribution expertise."

UnitedSiC develops silicon carbide FET and diode power semiconductors designed to deliver high efficiency and performance for electric vehicle chargers, DCDC converters and traction drives, plus telecom/server power supplies, variable speed motor drives and solar PV inverters. The products enable transition from traditional FETs to higher efficiency, faster switching and lower RDSon silicon carbide FETs.

Digi-Key's vice president of global supplier management, David Stein, said: "With ever increasing pressure on power engineers to deliver optimal efficiency and cost-effectiveness, it is critical for Digi-Key to work with companies who have market leading technology. We look forward to introducing UnitedSiC's product portfolio to our global engineering community."

digikey.com

Covid-19: Asia semiconductor supply chain impacts

McKinsey & Company's Sr partner and semiconductor practice lead, Mark Patel, summarised the impact of Covid-19 on the Asia semiconductor supply chain: " In Asia the semiconductor supply chain is working to overcome intractable challenges caused by Covid-19 including sourcing raw materials for chip manufacturing and maintaining assembly and test operations. Those problems cascade to foundries and IDMs even as they confront the compounding issue of a shortage of fab operators and engineers. Downstream, the inability to package, test and qualify products risks exacerbating the supply constraints."

Patel said another acute challenge is that most semiconductor manufacturers and suppliers are operating under restricted practices, making it harder to sustain engineering activities vital to new product introductions, new process development and capital equipment expansion. In the longer term, the supply chain fallout holds implications for product life cycles and investments in capacity and next-generation technology.

semi.org

Newark
AN AVNET COMPANY

1.800.463.9275
newark.com

Discover Over a Million
Engineering Products
from Suppliers You Know and Trust

900+ new products each week

Custom services such as kitting, panel meters, enclosures, and many more!

Market-leading online community of over 600,000 engineers

3M
AlphaWire
Amphenol
AVX
BELDEN
BOURNS
DURATOOL
EATON
FLUKE
HAMMOND MANUFACTURING
HARTING
Honeywell
KEITHLEY A Tektronix Company
KEMET
KEYSIGHT TECHNOLOGIES
ST
Life Is On Schneider Electric
maxim integrated
METCAL
micro:bit
MICROCHIP
molex
multicomp
NXP
OMRON
Panasonic
Raspberry Pi
ROHDE&SCHWARZ
SOLAHD
TDK·Lambda
TE
Tektronix
TENMA
VISHAY
Weller
XILINX

Protect and thrive

Rochester Electronics' executive vice president, Colin Strother, steps readers through the process of protecting their companies from counterfeit and obsolete components

Q Counterfeit and obsolete components are ESNA's readers biggest threat to their supply chain. How are companies like Rochester combatting this?

Not only does Rochester follow AS6496, we helped write that standard for authorized distribution. Every single component at Rochester Electronics has stayed within the authorized distribution channel. Rochester is an active member of the Semiconductor Industry Association Anticounterfeit Task Force and has been since its inception. With regards to obsolete components, Rochester Electronics has the world's largest die bank and largest inventory of in-stock finished goods, this clearly represents the largest fully authorized source of obsolete components in the world.

Q Can you explain the latest ways counterfeiters are getting components into circulation and what tricks-of-the-trade are they using?

Most counterfeit product is used, authentic product being sold as new. E-waste is a primary source of that product. Board rework stations and heat guns are the primary means by which components are removed and then cleaned up for sale.

When a component is purchased from a non-authorized source, often all the counterfeiters have to do is get through the visual checking of AS6081. Used authentic product has significantly lower reliability which can only be found through the dynamic and sometimes destructive component level testing called out in AS6171. If a non-authorized source must be used because there are no authorized solutions available, we recommend AS6171 is followed and not just AS6081 visual inspection.

Q A number of semiconductor manufacturers have acquired other manufactures over recent years. Has this impacted the licensed components Rochester manufactures?

This has been the case for the 35-plus years Rochester Electronics has been in business and will likely continue going forward. For every case of mergers and acquisitions, there are product line decisions made and select product discontinuation may naturally result. Rochester has been and will continue to work with its valued suppliers to provide long-term solutions.

Q There are many methods of combatting counterfeiting, from holograms to z-ray inspection. What will be the next tamperproof solution to combat counterfeiting?

Simple: buy authorized and none of these anti-counterfeit measures are required.

www.rocelec.com

Rochester Electronics' executive vice president, **Colin Strother**

"Not only does Rochester follow AS6496, we helped write that standard for authorized distribution"

Distributors' e-commerce tools provide critical information and insight to buyers

Some e-commerce tools can help buyers manage component obsolescence and reduce supply chain risk

James Carbone

Most electronics distributors offer purchasers a range of online e-commerce tools to help them find parts to make the purchasing process easier and more efficient. However, there is no one-size-fits-all solution because the kind of tools that buyers need varies depending on the volume and mix of parts that are required.

Some purchasers need a robust suite of e-commerce tools that can handle and track multiple bills of materials and provide real-time information about lead times, prices, and product change and end of life notices. However, other buyers just need a tool that allows them to cut and paste a bill of materials into an online shopping cart.

For example, Integra, a distributor based in Anaheim, Calif., has limited e-commerce tools for buyers. "We have what we call a quick BOM which allows customers to come to our website and upload their bill of materials," said Mark Baker, director of business development for Integra, which sells passives, discrete semiconductors, connectors, switches and other components.

"A member of our inside sales team then goes through the BOM and fills out a spreadsheet for the customer and sends it back within 24 hours with information about the lead times of the parts, cross references and the availability of the parts that we have in stock and what we don't." Such a tool is what many of Integra's customers want.

However, many other purchasing professionals and engineers need a wider range of more complex purchasing tools that can handle a number of BOMs, cross reference the manufacturer's part numbers to a customer's part numbers, identify a part number when the exact number is not known by a customer and provide quick access to product attributes.

"Some organizations will integrate Mouser's application programming interface (API) so they can build Mouser's price and availability into their own corporate tools," said Hayne Shumate, senior vice president, Internet business for Mouser Electronics. He said the tools are available in 20 languages and list quantity-based pricing in many currencies.

Mouser's BOM tool has an order history application that keeps track of all past orders whether they came in through Mouser's website, phone, email, or EDI. Parts previously purchased can be added to a cart to reorder directly from history, said Shumate.

"We look at customer's relevant history with a product including purchases, quotes, carts and other signals and notify customers of critical product change notifications and end of life status changes"

Hayne Shumate, senior vice president, Internet business for **Mouser Electronics**

Identifying supply-chain issues

Mouser's tool can also help customers identify and manage component obsolescence and other supply chain issues in its BOM tool and in its project manager, shopping cart, search results and product pages, he said.

"We do get daily signals from many suppliers regarding life-cycle and risk of products," said Shumate. "Some of this is automated, but the best information from some suppliers comes through the regular meetings and calls we have with them and understanding their plans for product direction," he said.

By working with suppliers, Mouser can reflect their product evolution decisions through the "badges on our site that indicate product life-cycle status and through links that direct customers to replacements for obsolete products," said Shumate.

However, the tools will not have decision-making information if a buyer is "trying to determine if he will be able to source 100,000 of a part every month for the next 36 months," he said. Mouser's primary focus is keeping inventory on the shelf for design engineers.

Managing obsolescence
Mouser has tools that can help with managing obsolescence. Not only will the tool indicate products that are obsolete or end of life, "but we also show a status of not recommended for new designs," said Shumate. "This gives the designer an indication that the product may be available for some time, but there are better options for designs that will be going forward," he said.

If a supplier provides information on replacement products for an EOL part, that information is reflected in the tools. If no specific information is supplied, the "Find Similar" tool on the website in Mousers BOM tool allows the customer to find other products that most closely match based on our deep database of product attributes, said Shumate.

Mouser's tools push information to customers if the status of product has changed. "We look at customer's relevant history with a product including purchases, quotes, carts and other signals and notify customers of critical product change notifications and end of life status changes," he said.

Nishant Nishant, vice president and global head Digital for Avnet, said Avnet is seeing increased demand for "self-service tools across the spectrum of customers. Tools for purchasers and supply chain managers are getting more utilization," he said.

Avnet's key purchasing tool is MyAvnet. With MyAvnet, buyers can do parametric searches, receive product change and end of life notices, upload bills of materials, and check past bills of materials, stock levels and prices.

Avnet also offers a forecasting tool which keeps buyers apprised about the availability of scheduled parts using color-coded notifications, said Nishant. If an ordered part is coded green, the buyer knows there are no issues with the parts. An amber color means there are some issues, but it does not necessarily mean the "issue cannot be resolved. It just means we need to talk about that," said Nishant. The parts could still be delivered on time.

"If a part turns up amber, it could mean that the lead time of the component stretched," said Nishant. "It could be the quantities that the customer is asking for are not available immediately based on our lead time. The amber code gives buyers "some early warning signal so we can be proactive about the scheduled order versus coming to the 11th hour and needing to be reactive," said Nishant.

Nishant Nishant, vice president and global head Digital for **Avnet**

> "Avnet is seeing increased demand for self-service tools across the spectrum of customers. Tools for purchasers and supply chain managers are getting more utilization"

When a scheduled order is coded red, it means the "risk is high and we need to take some mitigation action," said Nishant. "It could be that production of the part shut down for some reason. It could mean we have to pull some parts in early or have to find alternative solutions," he said.

Avnet has a conversation with the customer about how critical the issue with a part is and what the alternatives are. In some cases, the solution may require a redesign of hardware, said Nishant.

Avnet's forecasting tool "gives the supply-chain manager a holistic view of everything that they have in their schedules at one glance," he said.

The forecasting tool is beneficial to customers of all sizes. "It is for any active customer that has transactions with us in a planned, scheduled manner. "The tool is extremely effective and the feedback that we got from our customers has been phenomenal," said Nishant.

Another key function in MyAvnet is providing notifications if parts that have been bought over the last 13 months are going end-of-life. "When an EOL notice has been issued by a component manufacturer, the buyer is notified," said Nishant.

He noted that customers often have different part numbers than the component manufacturer has for its part. Avnet's tool automatically matches the manufacturers' with the customers' so a buyer does not have to cross reference when an EOL notice is issued. Besides EOL notices, product change notices are also sent to buyers.

Varistors rated for 150°C operation

AVX' new series of high temperature, glass encapsulated multilayer varistors are qualified to AEC-Q200, rated for 150°C operation and are designed for harsh environments

Engineered for use in high-temperature, high-energy and harsh-environment automotive, industrial and oil/gas applications, TransGuard Automotive VGAH Series MLVs provide bidirectional overvoltage protection and broadband EMI/RFI filtering in a single, high-reliability SMT device.

Comprised of zinc oxide-based ceramic semiconductor devices with nonlinear, bidirectional voltage-current characteristics, the series exhibits: high current and energy-handling capabilities; fast, sub-nanosecond (<1nS) response times to ESD strikes; multiple-strike capabilities; high energy absorption/load dump; low leakage; and excellent solderability. Additional benefits include glass encapsulation for impermeable protection against harsh environments and processes (including acids, salt and chlorine flux) and no derating requirements for energy and current over the full range of operating temperatures extending from -55 to 150°C.

Specifications include: five chip sizes (1206, 1210, 1812, 2220 and 3220); 16 to 31VDC working voltages; 40 to 57V clamping voltages; 0.6 to 13J energy ratings; 1.5 to 50J load dump energy; 200 to 1,800A peak current ratings; and 700 to 15,000pF capacitance.

The series suits use in high-temperature, harsh-environment DC motor, pencil coil, local interconnect network bus, electrical control unit, turbocharger, sensor and relay applications in commercial, hybrid electric, plug-in hybrid electric and internal combustion engine vehicles. Other applications include power tools, automation, downhole drilling equipment and renewable energy systems.

AVX product marketing manager for circuit protection, Jiri Machanicek, said: "AVX's new TransGuard Automotive VGAH series high temperature, glass encapsulated multilayer varistors further extends its portfolio of high-reliability solutions for high-temperature, high-energy, and harsh-environment applications in the automotive, industrial, and oil and gas industries.

"The new VGAH series MLVs provide TVS protection in their on-state and broadband EMI/RFI filtering in their off-state, don't require any current or energy derating over the entire range of rated operating temperatures, which spans -55 to 150°C, and have a compact form factor that ruggedly withstands harsh environment conditions and processes and satisfies increasingly common demands for lightweight, space-saving, multifunctional components."

The MLVs also have RoHS-compliant nickel-barrier-over-pure-tin terminations, are compliant with the ESD performance requirements defined in the AEC-Q200, IEC 61000-4-2, and ISO 10605 standards, and are supplied on seven or 13in tape and reel for automated placement. Lead-time for the series is currently 14-weeks.

www.avx.com

Applications include power tools, automation, downhole drilling equipment and renewable energy systems

Proven components meet new applications

From down-hole drilling to electric vehicles, TTI sees advantages from specifying high-reliability mil-spec, space or automotive components in new applications

Testing components for new applications takes time and money. In fast-evolving industries, especially those with significant price pressures, it's often much easier to specify a component already rated to meet military or automotive specifications.

This line of thinking is common in the oil and gas industry. For example, offshore drilling equipment is a major investment, designed for a service life of over a decade. With continuous shock and vibration, exposure to saltwater and operating temperatures topping 200°C, oil and gas equipment requires components that withstand harsh conditions. Traditionally, offshore drillers have relied on mil/aero and space-level components to make sure tooling performs well in harsh conditions.

However, oil and gas is not the only industry where high bill-of-materials costs and price pressures can impact the amount manufacturers can invest in testing components. The ongoing electrification of transportation will place new demands on automobiles, trucks and agricultural equipment.

Unlike manufacturers of industrial equipment, the transportation industry typically hasn't had to think about issues surrounding working with high voltages. It's easy to see a future where electric vehicles and charging stations will require components that meet UL or CE standards, in addition to USCAR, AEC-Q200, SAE and similar standards these components do not necessarily have to meet right now.

While industry players such as Tesla are already accumulating knowledge about component performance for passenger vehicles, those who are designing and building the current generation of electric delivery vehicles, long-haul trucks and even electric aircraft will no doubt rely at first on components that have already been rated for other applications.

While new components are being developed to meet specific needs, the speed at which industries are evolving means customers who can specify off-the-shelf parts, rated for aerospace or military applications, can save costs and speed time-to-market in the short term, giving them a potential long-term competitive advantage.

In any fast-moving industry, especially those where customers are sensitive to base product cost, an authorized distributor like TTI can help identify solutions through industry knowledge and component manufacturer resources. The ability to cross-reference available components that meet similar specifications without expensive testing and certification can help buyers get out in front of the competition, while also saving money.

www.ttiinc.com

Exclusively sponsored by Digi-Key ELECTRONICS

Procurement: 2020 reboot

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 the post Covid-19 electronics manufacturing world a heavy burden will fall on procurement to help pick up the pieces and restore order

Procurement • By John Denslinger

While medical teams, financial institutions and governments continue working tirelessly on issues, the forecast ahead for procurement is almost as daunting. Faced with the aftermath of shelter-in-place and similar decrees, the great American industrial reboot is about to begin.

Containing the spread among citizens took precedence over business as usual. Yet for many of us, that decision ripped apart global supply lines, the life blood of our industry. Left in the wake were closed businesses big and small; employees asked to work remotely or temporarily laid off; and while e-commerce flourished, daily person-to-person commerce vaporized. Supply chains once considered reliable, almost invincible, unraveled. Surreal is an understatement! Now the burden falls on procurement to pick up the pieces and restore order.

The post-virus world will have its challenges as many industries, manufacturers and suppliers vie for needed resources. The resumption of business will not be smooth, and neither will the job of procurement. There will be countless problems to solve. Perhaps the first glaring one is component shortages, late deliveries and lack of alternatives. Unlike capacity issues that stymied supply in 2018, this time a number of new factors are at play. For example, not every supplier will restart at the same time. That consequence could delay flow of essential raw materials to some. It would be wise to assess each supplier's start up plan paying particular attention to country of origin. Be alert to newly designated virus hot spots, as well as, that locale's tendencies on constraints. The situation could change overnight, so nonstop monitoring is suggested.

The virus also exposed one other vulnerability not usually a concern: employees, people, labor. With so many individuals sidelined by shelter-in-place directives, the workforce will likely trickle back unevenly. For those companies who resorted to massive layoffs, the road back may be spasmodic. On the other hand, employers retaining core competencies throughout the downturn should experience moderate to seamless restarts. In either case, be cognizant that employees will also need time to recover. Many will need to overcome the personal trauma inflicted by the crisis. Furthermore, each must now adjust to new conditions, work rules and employment policies in a post Covid-19 environment. HR fatigue may take an early toll on productivity.

There are some helpful resources available. As mentioned last month, ECIA continues surveying manufacturers and distributors on Covid-19 impact. The third update compiled by Dale Ford, chief analyst, is now available. Also, Robin Gray, ECIA COO & general counsel, posted ECIA's efforts to make sure the electronic industry (manufacturers, distributors and corresponding supply chain) is designated essential and thus exempt from current and future shelter-in-place orders. This might be extremely important should there be a Covid recurrence.

Power supply production in China starts to get back to normal

Supply of AC-DC converters and DC-DC modules should not be a problem for buyers as production of power supplies has resumed

Buyers can expect normal lead times, ample availability and falling prices for most power supplies for the rest of the year, despite the impact that Coronavirus has had on the overall electronics supply chain including power supply manufacturers.

As of early April, power supply production in China resumed and was ramping up. About 60-70 per cent of all power supplies are made in China, according to Mohan Mankikar, president of Micro-Tech Consultants, a power supply research firm based in Santa Rosa, Calif. Most power supply manufacturing in China is in Shanghai and Shenzhen, which is "pretty far away from Wuhan," where the outbreak of Covid-19 originated, said Mankikar.

"Christoph Wolf, president RECOM Power, Inc., said RECOM operates one factory in Xiamen, China and two in Taiwan. "The Taiwan factories were minimally impacted. Our Chinese factory is almost running at full capacity, as the government lifted restrictions over there" he said in the first week of April. Wolf added RECOM's bookings and billing were strong and lead times have not been affected. "However component availability for our factories may become an issue moving forward, because of restrictions in other Asian countries where these components are made," said Wolf. This could impact lead times in the future across the industry."

Power supply manufacturing in China "may be OK, but it is not fantastic," said Mankikar. The bigger issue is the impact that coronavirus is having on demand. Many companies have shut down, furloughing or laying off workers. With no income, sales of televisions, mobile phones, computers, etc have declined. That obviously means less demand for power supplies.

"You can make all the power supplies that you want, but if there's nobody there to buy them it doesn't matter," said Mankikar. He said the overall impact of coronavirus on the power supply market will depend on the duration of the pandemic. "China seems to have recovered relatively quickly" but countries in other regions were still being ravaged by COVID-19 in early April and it was unknown when other regions would recover.

Recovery will happen

Despite the pandemic, the long-term outlook for the global power supply industry is positive, according to Mankikar. The switching power supply market grew from about $30.1 billion in 2018 to $31.6 billion in 2019, he said. Growth could have been stronger, but inventory levels were high in the electronics supply chain.

"In 2018 a lot of our distributors invested in inventory," said Wolf. "Some of them built up too much inventory, which led to fewer orders in 2019. But the point of sale level was slightly above 2018," said Wolf.

The inventory has been worked off and bookings improved at the end of the year and prior to the COVID-19 outbreak, RECOM was expecting business to be better in 2020. "The outlook for this year was pretty good on growth side but that was pre-coronavirus."

However, RECOM has a broad customer base which should help the company weather the storm. "Our customer base is diverse and power supplies are needed in every single application," said Wolf. It has a strong presence in medical and industrial IoT.

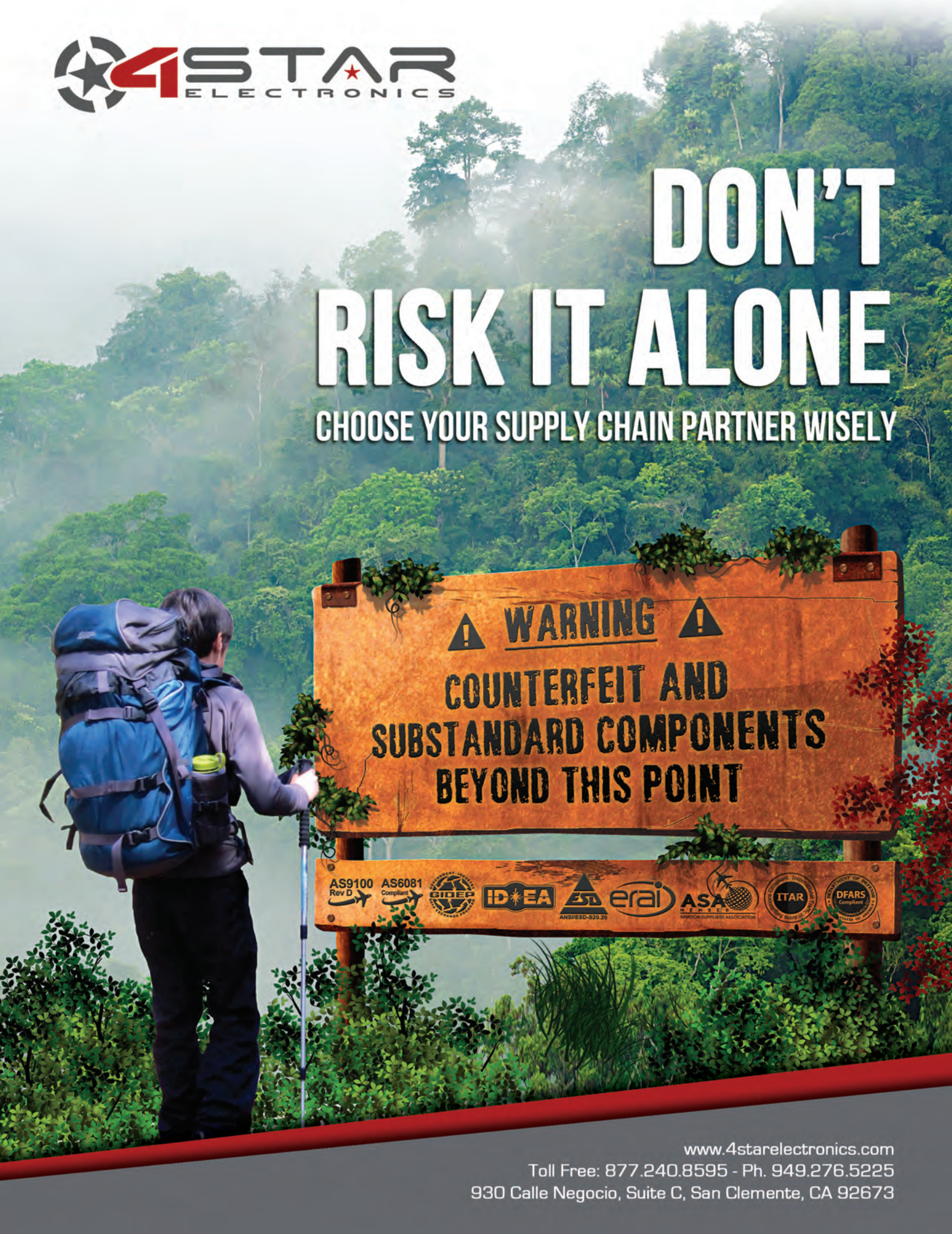
"Our bread-and-butter businesses is DC-DC converters. That continues to be very strong, but the biggest growth that we see is on the AC-DC modules," said Wolf.

RECOM and other power supply manufacturers may see some sales growth in 2020 despite of the pandemic. Micro-Tech Consultants is forecasting 1.1 per cent growth as sales rise from $31.6 billion in 2019 to about $3.2 billion in 2020. However, sales growth may end up being flat or down depending on the impact of coronavirus, said Mankikar. Longer term, Mankikar says annual sales growth for power supplies would be about 2.7 per cent from 2019 through 2024, he said.

Mankikar points out that power supplies, which include AC-DC and DC-DC converters, is a mature market. "It is

Christoph Wolf, president, Americas for power supply manufacturer **RECOM**

> **Our bread-and-butter businesses is DC-DC converters. That continues to be very strong, but the biggest growth that we see is on the AC-DC modules**


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

one of the oldest electronics industries. It started in 1945 at the end of World War II and is now 75 years old," he said. It is mature and mature industries tend to have lower annual sales growth rates. The power supplies business is steady, but double-digit growth is highly probable. Low to mid-single digit growth is more likely.

While sales growth in power supplies is steady, sales from certain customer segments are higher than others and sometimes reach double-digit thresholds. For instance, some manufacturers that sell power supplies for LED lighting applications have grown 15 per cent in some years.

Consumer electronics, which includes mobile phones, desktop computers, laptops, accounts for about 30 per cent of power supply revenue and is the largest customer segment for power supplies, according to Micro-Tech Consultants. Power supply sales to the consumer segments tends to be in the low-single digits.

Transportation, which includes cars, trucks and trains, is the second biggest segment, representing about 20 per cent of power supply revenue, said Mankikar. Computing and office equipment, which includes servers, buys about 13 per cent of all power supplies as measured by revenue, he said.

In 2019, transportation was a key driver for power supply sales. Much of power supply demand in transportation is for "battery chargers used for electric vehicles in different locations," said Mankikar. Some chargers are used in cars and trucks, while others are used in public places such as charging stations. Some are used at residences and in office parking lots, and demand for them continues to grow, he said.

The mobile devices and chargers market is estimated to be the largest segment of AC-DC and DC-DC merchant power supplies, accounting for 29 per cent of total revenues of AC-DC and DC-DC market, according to researcher OMDIA. However, the market is high-volume, low-margin nature and its share is expected to drop to 23 per cent of the total power supply market in 2023 because of stagnant growth and falling prices, the researcher said. Mobile device and chargers market will have a five-year compound annual growth rate of -2.1 per cent from 2019-2023, according to OMDIA.

The 5G bump

A key driver for power supply sales growth is 5G infrastructure, but it may be a short-term driver. "With telecom you get a big boost as the infrastructure is built, but then growth flattens" once the networks are completed and all the equipment is place, said Mankikar.

The industrial segment continues to be an important segment for power supply manufacturers. "It is pretty stable. It grew about 2.5 per cent last year because it is a mature segment," said Mankikar. However, it may be negatively impacted this year because of the decline in the oil and gas industry as energy prices fall.

While industrial and telecommunications are traditional segments for power supplies, "new applications for power supplies are always occurring and there's so much diversity in applications," said Mankikar. "There are smart speakers, artificial intelligence, machine learning applications and home and business security applications that continue to "pop up all the time and all of them require power supplies, he noted.

One application that has had strong growth in recent years is LED lighting systems. Many power supply manufacturers build LED drivers for such lighting systems. An LED driver is a self-contained power supply which regulates the power required for an LED or array of LEDs. Because LEDs are low energy lighting devices with long lifespans, they require specialized power supplies.

Wolfe said RECOM supplies LED drivers for some applications. "LED drivers are dominated by Asian suppliers. However, there are a lot of companies that make intelligent lighting controls and do a lot more than just controlling the lights. They are doing other IoT functions. That's where we're seeing the growth in the Americas," he said.

Manufacturers building power supply products for lighting systems manufacturers posted strong growth in 2017 and 2018, but business flattened in 2019.

The LED power supply segment was "going gangbusters in 2018 with a 15 per cent growth rate," but sales in the segment went down significantly in 2019, said Mankikar. "I don't know if it's a one-year deal or if it's a trend. There's a company called Mean Well which grew to a $1 billion company in 2018. Last year its sales remained flat. It was a big surprise," he said.

A Chinese company called MOSO Power makes LED drivers .The company had sales of $250 million in 2017, $190 million in 2018 and $181 last year. It is unclear why MOSO's LED drivers sales have declined, said Mankikar.

However, it is likely that in the long-term, LED lighting systems will continue to be an important segment for power supply manufacturers. LED lighting is projected to be the fastest-growing application sector in revenue terms from 2018 to 2023, according to researcher OMDIA. The market for merchant power supplies in LED lighting application was about $5.6 billion in 2018, accounting for 25 per cent of the total market. It is projected to increase to $7.6 billion in 2023. LEDs will account for 31 per cent of the total power supply market in 2023, the researcher said.

> **I see the power supply market getting more and more consolidated, but it is gradual**

Supply will meet demand

While there are many traditional and new applications for power supplies, the good news for electronics purchasers is there likely will be ample supply to meet demand for the foreseeable future. With adequate supply, buyers can expect short lead times and modest price declines through the rest of the year and probably longer.

There are many large, established power supply manufacturers such as Delta, Artesyn and TDK-Lambda, among others, as well as

thousands of smaller power supply manufacturers. Some specialize in power supplies for certain types of product.

In addition, it's likely that new power supply manufacturers will go into business. "Power supply design is not that difficult and it does not need a lot of capital equipment," said Mankikar. "It's not that difficult to get started. You may not become a big company, but you can get into the business," he said.

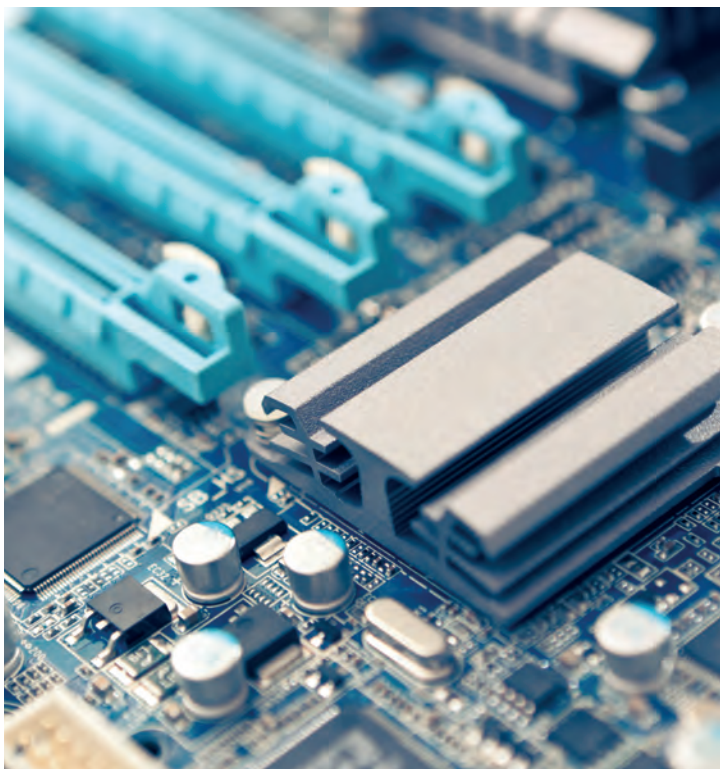
However, while some new power supply companies will form, there could be some mergers and acquisitions over the next several years. While there has not been much consolidation with power supply manufacturers compared to other segments of the electronics industry, there are indications that may change.

"I see the power supply market getting more and more consolidated, but it is gradual" said Dinesh Kithany, senior principal analyst, wireless power supplies for researcher OMDIA. He noted that in 2017 the top 10 companies had about 42 per cent of all power supply sales. In 2019 that grew to 45 per cent and that percentage will likely continue to increase. One reason that the big are getting bigger is the top 10 companies are acquiring some smaller power supply manufacturers.

"There is a change in the power supply landscape occurring," said Kithany. The big players are buying smaller companies and I'm expecting more and more mergers and acquisitions to happen in the power supply market," he said.

"Larger companies may be active with acquisitions because they want to expand within the market, within the same sector, or expand into new applications," he said.

A power supply manufacturer that doesn't supply much to the medical equipment or solid-state lighting industries may acquire a smaller company that does. Some small niche power supply manufacturers that are growing fast because of their narrow focus may be the targets of larger power supply manufacturers.



Inject calm into the chaos

Managing director of Kin + Carta's B2B team, Shawn DeVries advises manufacturers to carefully explore the implementation of new supply chain solutions using a 'minimum viable experience' approach

Q Amid Covid-19 uncertainty, what advice would you offer companies as they adjust to new realities?

Low touch, low friction commerce is a must-have. If you have not started, we propose taking a hard look at buy vs build. It is easy to fall into a trap to solve near-term pain, but vendor lock-in is a real risk. Consider a 'minimum viable experience' first to tackle the realities of product data, order flow, order tracking and customer communication, with a mindset of test-and-learn before going all-in.

When markets have shifted this fast commerce experiences may end up misaligned with supply chain realities. There are moments throughout the buying journey that can be adjusted, usually at low cost. Incremental changes add up, helping move order flow in the right directions.

Q Covid-19 is creating new hurdles regarding employee safety and overall productivity. How can leaders address this?

The plummeting cost of industrial connected sensors, combined with mesh-based operational connectivity, allows for a real-time proximity network on the plant floor. Historically, this has been applied in hazardous locations with success. With social distancing rules colliding with worker productivity and collaboration, this same solution can be applied to keeping workers safe from each other.

Taking a pragmatic approach to analyzing your backlog of low-touch initiatives will help repurpose workers to focus on tasks that can be tackled without traditional human interaction.

Q What is the role of predictive analytics during unpredictable times?

Knowing when a manufacturing system requires servicing allows you to methodically plan for maintenance. Enabling secure remote monitoring capabilities can be as simple as licensing a specific feature from a software vendor, hardware partner or system integrator. The limitation is willingness to change.

For manufacturers in the early stages of implementing connected shop-floor systems, hope is not lost. Focus on prototyping the connected systems that can help drive stability in your forecasting, supply chain and maintenance cycles. Doing so will inject a bit of calm into the chaos.

Q Do you think companies are re-prioritizing adaptable and responsive ways of working?

Too many organizations have kicked this technical challenge down the road, not realizing the business and risk reduction opportunity that emerges out of a modern, secure and scalable infrastructure. Consider what you have today and measure the impact of that system breaking. Will orders go through? Can you bill customers? Do employees get paid? Understanding the risk of maintaining a legacy system lets you balance against the cost and complexity of making a lasting change.

Once you have captured and classified your technical portfolio, get started. Consider retraining and refocusing previously furloughed employees, allowing them to own this change, which will set the business up for future flexibility and growth. This investment happens today, and further delay exposes the business to avoidable risk.

www.kinandcarta.com

Shawn DeVries, managing director of **Kin + Carta's** B2B team

> **For manufacturers in the early stages of implementing connected shop-floor systems, hope is not lost**

TOP 50
ELECTRONICS DISTRIBUTORS 2020

ELECTRONICS sourcing

MAY 2020

We're single-minded about your satisfaction

Join our growing list of customers

환상적인 고객 서비스. 정말 감사합니다!

感谢Mouser一直以来专业热心的服务与支持！

Excellent service client à chaque fois. Merci beaucoup

Jedes Mal ein hervorragender Kundenservice. Vielen Dank!

毎回素晴らしいカスタマーサービス。どうもありがとう。

Fantastic customer service every time. Many thanks!

Optimizing your purchasing experience across the globe.
Visit **mouser.com/customer-resource-center**

MOUSER ELECTRONICS

MOUSER ELECTRONICS

Industry's Widest Selection of the Newest Components

Mouser Electronics is a worldwide leading authorized distributor of semiconductors and electronic components with the widest selection in the industry. Part of Berkshire Hathaway, Mouser specializes in the rapid introduction of new products and technologies for engineers and buyers worldwide.

The company's extensive product offering includes semiconductors, interconnects, passives, electromechanical, plus a vast range of other components from more than

800 leading manufacturers. Mouser sells millions of tiny parts that function as the essential building blocks of new product design.

Every day, multiple times a day, Mouser gets the newest, cutting-edge components that

are smaller, faster and smarter. If your job is to help solve new problems, invent new things and answer the questions no one has asked before, Mouser is your distributor.

You can't design the future with products from the past, so Mouser's mission is to stock

more new products than any other distributor. Having access to the newest products spearheads the development of new design ideas. Mouser also supplies engineers and buyers with new information to aid the design and buying process — and lots of it. Detailed information can be found on its website, including Newest Products, Technical Resources and Services & Tools sites, turning knowledge into know-how.

With a commitment to customer service excellence, 27 global Customer Support Centers, the widest product selection, plus same-day shipping, Mouser helps customers get innovative designs to market faster and easier. The company works hard to make sure customers always get what they need, when they need it. To help expedite orders and answer questions, each location provides local language support and can transact business in the preferred local currency, all from the same time zone. Count on Mouser for all of your component needs.

Mouser Electronics
www.mouser.com
(800) 346-6873

By the numbers:

- On-time shipping arrival: 99% success rate.
- Authorized distributor for more than 800 manufacturers.
- Stocking industry's widest selection of components - over 1,050,000 parts in inventory.
- Over one million sq. ft. state-of-the-art facilities at Global Headquarters and distribution center.
- 55 new vertical lift modules in Distribution Center – the largest installation in North America.
- 27 Global Branch Offices.
- More than 5 miles of conveyor belts.
- Fast shipping ensures most packages are received next day in US (and 2-5 days internationally).

Distributor sales drop slightly in 2019 but optimism continues

There was consolidation in the global electronics market in 2019 but there was optimism about the outlook for 2020 until Covid 19 threw uncertainty into everything. By Aubrey Dunford

The North American distribution industry declined a little in 2019. After an eight per cent growth in 2017 and 9.8 per cent growth in 2018, in 2019 there was a fallback of 3.3 per cent. Figures show that sales of the top distributors fell from $31.4 billion in 2018 to $30.2 billion in 2019. It is estimated that the franchised distribution market fell from $30 billion to $29 billion.

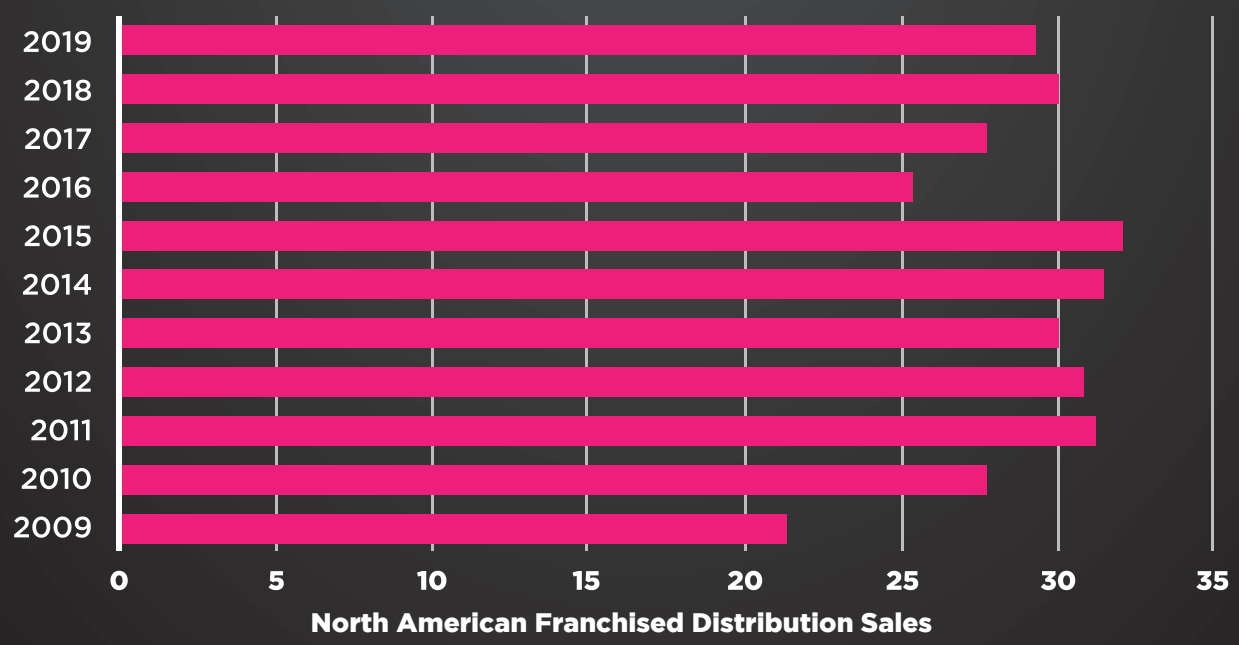
This drop in demand meant shortages of some commodity components and long-lead times ceased for most products although some shortages in some products did continue. Digi-key's executive vice president, digital business, Jim Ricciardelli, said: "Lead-times came way in and it happened really fast." ECCO president Bernard Gizzi added: "A lot of the connector manufacturers were oversold particularly in the military aerospace industrial sectors."

Decreasing demand was a key issue for distributors at the start of 2019. TTI Semiconductor Group president, Michael Knight, said: "There was excess inventory, the inventory had built up coming out of the boom times of 2018 and everybody had to work through that. The inventory was not just in distribution but contract manufacturing and customers. The first half of the year was soft because of inventory overhang."

Increased availability as the inventory in the whole supply chain adjusted also had an impact on pricing particularly in the semiconductor sector and especially in memory products.

Market decline was therefore a combination of inventory adjustment and a decline in pricing in some key areas. Knight observed: "It has left everybody with the impression that 2019 was not a great year for the industry across the

> **A lot of the connector manufacturers were oversold particularly in the military aerospace industrial sectors**



channel. The demand picture was actually remarkably stable, in fact it was perky. Unit volumes went up in 2019. In 2018 we overshot the mark a bit but most of us shipped more product in 2019 than in 2018."

Based on the survey it is estimated that total sales through distributors of semiconductors (active components) by distributors in North America was $16.9 billion, while sales of passive and electromechanical products were under $5.8 billion. Sales of interconnect products was $4.2 billion. Sales of computer products are becoming less important to the top distributors as this business moves away into other channels and we estimate that sales through component distributors was $1.6 billion although over $1 billion of this was through Arrow's Enterprise Computing Solutions division. Other products accounted for a further $1.4 billion to bring the total to $30.2 billion.

Although the overall market may have declined in 2019 some distributors were able to achieve significant growth. Bisco Industries' president and COO, Don Wagner, said: "In 2019 it seems like the industry itself was starting to see a little bit of slow-down." He admits the company had ambitious growth plans which were not achieved but was pleased that they had still been able to grow their business. Wagner added: "It's hard to be disappointed when it's still five or six per cent growth when it was 25 per cent."

One sector that remained strong in 2019 is aerospace and defense.

Electro Enterprises' director of marketing, Ty Diedrick, said: "Our business doesn't always fall in line exactly with the general components. Our market is more based on the defense spending. It was a successful year for us."

In this sector there was one issue that affected the business when Boeing were forced to cease production of its 787 Max. This caused disruption not only to Boeing's main contractors, it also rippled down the supply chain Wagner added: "A lot of the business has shifted, there are a lot of things that are related specifically to the Boeing situation."

A major issue mentioned in all interviews was trade tariffs. Ricciardelli said: "It has added a lot of operational complexity. We have spent hours in discussions on how to manage our way through the situation. We have established a Free Trade Zone so that we are able to bring in product and export again. This has reduced the complexity but there has been a cost."

Other distributors, depending on their business, took different approaches. Some distributors were able to pass on tariffs in the form of price increases or by introducing add-ons to cover increased costs. Others decided they would not pass on tariff costs.

Master Electronics' president, Amir Nizam, explained: "We declared ourselves to be a 'tariff free zone' for our customers. We decided to eat the fees and save ourselves time and administration costs. We were able to do this but not all distributors would have been able to do that. The industry did not really come together on this issue. One of the issues was that the situation kept changing."

Wagner confirmed Bisco had taken a similar approach: "At the end of the day for us it impacted our business very insignificantly, the reason being the majority of our product came from the US. We made a decision when there were tariffs, we did not hand them on."

Mouser's senior VP EMEA, Asia and Global Service, Mark Burr-Lonnon, said "The whole thing in the market between China and the US wasn't good for everybody. It caused a lot of confusion in the market as to what's really happening, we did see some customers bringing purchasing back into the US."

Although the market may have shown decline in 2019, the executives we interviewed were all stressing that 2019 had been a year in which their companies had invested. Many had invested in new warehouse facilities and were looking to expansion. Knight stated: "2019 was the year in which the resources that had been put in place were really put to work. In the back end of 2019 we again started proactive investment in capacity, both warehouse and people, in anticipation of a decent 2020 and very strong 2021."

Investment and expansion were not limited to the US as distributors are continuing to grow their global presence. Burr-Lonnon said: "We want to be a global distributor with a local face. "We absolutely have to make sure we have all the frontend functions locally, so in 2019 we have added new offices. We added Vietnam, we added the Philippines, we added Brazil, we added Canada, we have to be close to the customers."

Companies also invested in staff skills. Nizam stated: "You need new and different skills in distribution now and that is why we are investing in training for our people at all levels. We have to help our staff get through a paradigm shift and make sure we are looking to have the right talents to make the most of

Continue on page 28 »

Jim Ricciardelli executive vice president, digital business of **Digi-Key**

Michael Knight president of **TTI Semiconductor Group**

ECTRONICS
for PARTNERSHIP

UNIQUE CUSTOMER PROGRAMS
offering unparalleled flexibility and support

COMPREHENSIVE DESIGN SUPPORT
leveraging factory-level engineers and Global Design Centers

FUTURE ELECTRONICS

opportunities. For example, we now have a lot of data particularly about our customers so we are taking on a Data Science Team so that we can use that data to give our customers a better service."

Ricciardelli picked up the same theme: "The core of our business is the use of IT and that is why we are investing in having so many IT specialists in our staff."

Interviewees also mentioned the need to invest in the right inventory with many distributors looking to grow new lines. Nizam said: "We have taken on new lines and added 22,000 new SKUs in 2019 and there are plenty of opportunities in the market."

Clearly 2019 was the year in which the supply chain had to bring inventory back into balance after the product shortages of 2018, but distributors are carefully controlling their inventory not to decrease it but to make sure that it matches better to their customers' demands.

Burr-Lonnon said: "Mouser has a different model. It's not a better model than anybody else's it's just different. It's a strange model when you think about it from other people's standpoints. When they're looking at stock they think that nobody's buying. We're very much out there creating demands for the new parts so we have them in stock before people are buying them.

"On those volume parts people overstocked, we will never overstock because we stock those in a limited amount, but because we're not focusing on higher volume production, we didn't have billions of pieces on the shelf of things nobody needed. We saw a good upside of course in 2018 when whatever inventory we had, we were able to sell but we didn't suddenly get huge orders and therefore we were not stuck with loads of inventory now. Most people's inventory is getting back into a pretty good shape and I think as we all know as we start to get into 2020 the demand is going to suck up a lot more of the components which weren't able to be used before."

So, although 2019 was not a year of growth, it was a year for consolidation for the North American distribution channel. An opportunity for companies to prepare for what they were expecting to come in 2020.

We have taken on new lines and added 22,000 new SKUs in 2019 and there are plenty of opportunities in the market

Sager Electronics, 130 Years and counting

Sager Electronics is a North American electronic component distributor of interconnect, power and electromechanical products from leading manufacturers worldwide, and a provider of value-add solutions. Grounded in over 130 years of innovation and service, Sager provides customers and suppliers a unique combination of operational excellence and innovative business solutions through its Distributing Confidence® business model.

Proud Tradition of Innovation and Service

Sager Electronics began in 1887 as a single storefront in downtown Boston that serviced the growing interest in radio technology. Under the vision and leadership of Joe Sager, the company rapidly established a statewide distribution system for home radios and related components. Despite the onset of the Great Depression, Sager continued to grow by bringing new electrical products to Massachusetts' consumers.

From Retailer to Distributor

At the onset of WWII, Sager reacted to the critical demand for electronic components. The company refocused its operations to supply electromechanical components to the U.S. military. This transition positioned us to emerge as the leading regional electronic component distributor at the beginning of the consumer electronics market in the 1950s and 60s.

From Regional to National Prominence

Anticipating the explosive growth in electronics, in 1977, we relocated our headquarters to more spacious facilities in Hingham, MA and began building a national network and infrastructure. This included the prudent acquisition of smaller regional distributors and the creation of regional support facilities to service our expanding network of customers and suppliers.

In 2012, Sager Electronics was acquired by TTI Inc., a Berkshire Hathaway Inc. company. As a wholly owned subsidiary of TTI Inc., Sager continues to operate independently and has made a number of acquisitions to support its business. In June 2014, Sager acquired PowerGate LLC, a premier North American power specialist distributor. This acquisition preceded Sager's 2015 purchase of Norvell Electronics, a North American power products distributor with extensive design and value-add capabilities. Sager acquired Power Sources Unlimited Inc. in 2017, and in 2019 completed the acquisition of Technical Power Systems, a battery value-add solutions provider.

Headquartered in Middleborough, MA, Sager Electronics operates a network of field sales representatives and power systems sales engineers, strategically located service centers across North America, two state-of-the-art distribution centers (a 100,000 SF facility in MA and a 40,000 SF facility in TX), a value-add Power Solutions Center located in Carrollton, TX, and a value-add Battery Solutions Center in Lisle, IL.

From National Prominence to Distributing Confidence®

For nearly 135 years, the key to our success has been our constant commitment to exceeding the expectations of our customers. Our Distributing Confidence® business model puts our customers' needs at the center of all our activities. From our customized services like bonded inventory programs, VMI, BOM quoting, credit, inventory management and value-added capabilities to our branded line card of authorized manufacturers, Sager Electronics is a full partner with our customers.

bisco industries
Headquarters: Anaheim, CA
www.biscoind.com
info@biscoind.com
US: 800.323.1232
Canada: 800.258.2693

Company Overview:

- Founded in 1973
- 500+ Employees
- 350+ Sales Account Managers
- 3.8 Million Products
- 7 Distribution Centers
- AS9100/AS9120/ISO9001 Certified

About bisco

Since 1973, bisco industries has been a premier distributor of Electronic Components and Fasteners used for production in Aerospace, Communication, Computer, Fabrication, Industrial Equipment, Instrumentation, Marine, and Military Industries.

Unsurpassed Customer Service

bisco helps their customers reduce cost and increase efficiency in their supply chain by maintaining a local sales team, providing customized services, and housing a robust inventory across thousands of product categories.

bisco's 350+ sales representatives are located throughout 49 strategically placed offices to best serve their local markets. While other distributors refer smaller customers to call centers, bisco industries understands that every customer deserves personalized service. That is why every inquiry is directed to a local sales professional, specialized in an industry vertical, who will be able to quote, provide feedback, or recommend an alternative item within four hours. When you contact bisco, you can count on speaking with an account manager who will assist you with anything from finding the right part number to tracking your shipped order.
That's the bisco difference!

A Valuable Partner in Your Supply Chain

bisco's approach to supply chain management analyzes stock levels and usage trends to ensure strategic inventory in their 7 distribution centers, shorter lead times, and reduced costs to the entire chain.
bisco's distribution centers have been tactically placed so customers have the inventory they need without the use of expedited shipping.

These warehouses can be found in San Jose, CA, Anaheim, CA, Irving, TX, Chicago, IL, Atlanta, GA, Boston, MA and Toronto, Canada.

Equipped for Continued Growth Amidst the COVID-19 Pandemic

Throughout bisco's organization, teams have been preparing to reach new and unprecedented company milestones in sales, size, inventory levels, and beyond. They have recently doubled their footprint in all of their distribution centers.

The bisco sales and supply chain team's ability to quickly source hard-to-find items and create value in forecasting supply and demand has enabled them to shine during the coronavirus pandemic which has caused surges in demand for parts going into medial applications.

In addition to warehouse growth, bisco's quality management processes received new certifications for AS9120, AS9100 and ISO9001 to better serve target markets.

With the opening of their first International sales office on the horizon, bisco is advantageously positioned to continue their path onward and upward. Contact your local sales office or visit bisco industries online today to see how the bisco difference can help your organization grow.

7
Distribution Centers

400+
Industries Served

150+
Authorized Lines

350+
Local Sales Representatives

49
North American Sales Offices

47
Years of Continued Success

The inventory you need, where you need it.

The right partner can take you from good to **GREAT**.

Call Us Today!

bisco industries®

*Our new warehouse in Anaheim, CA

2019: Market takes a breath and prepares to move on

It is now about 50-years since the first organizations to represent companies working in the electronic component distribution channel and market data started to be collected and published. Looking back over the years it is clear that throughout that time the value of the component market on an annual basis has had dramatic ups and downs. This is particularly true of the semiconductor components sector.

One of the fundamental characteristics of the components market is that the longest and most capital-intensive production processes are at the start of the supply chain. Most electronic components are made in batches where quantities far exceed the requirements of all but the very largest customers. Hence the need for component distributors, who can procure from the manufacture and supply to most of the market, is fundamental to the electronic component supply chain. However, despite efforts to improve communication along the supply chain, market demands often remain disconnected from the capital expenditure decisions required to keep supply chains in balance. Hence dramatic ups and downs as the supply chain constantly stocks and destocks. Globalization has tended to exaggerate rather than relieve this issue.

After a decline in 2016, 2017 and 2018 brought rapid growth to global markets and the revenue of top distributors in North America. As described earlier in this article, 2019 was a year of consolidation as companies tried to rebalance the supply chain.

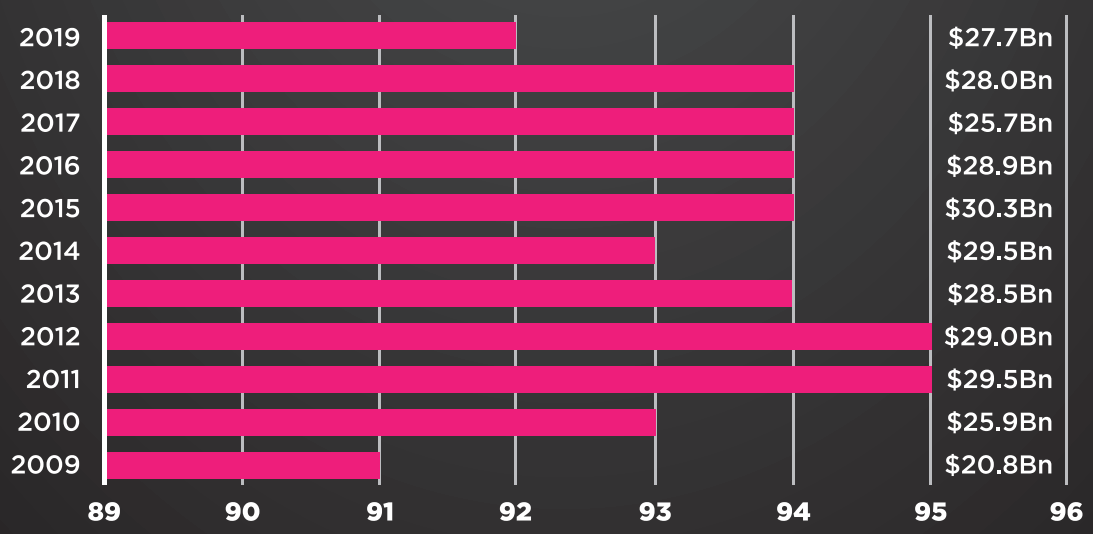
According to *Electronics Sourcing North America's* survey, sales of the top electronics authorized distributors decreased by $1 billion from $30 billion to $29 billion.

Sales of semiconductors (active Components) accounted for 56 per cent of the total NA distribution sales, slightly less than last year's figure. Sales of semiconductors through the top distributors decreased from $14 billion to $13.7 billion, a decrease of two percent. According to the World Semiconductor Trade Statistics' (WSTS) forecast issued in November 2019, total growth in semiconductor sales in the Americas was expected to decline by over 25 per cent. The biggest decline was in memory where there has been price erosion. This is one semiconductor product group not highly served by distributors.

Passive and electromechanical product sales accounted for about 20 per cent of the total sales. Total sales of surveyed companies decreased from $5.9 billion in 2018 to $4.7 billion in 2019, a decrease of over 20 per cent which took the market back to 2017 levels. There is little doubt that with 2018's supply constraints around many passive products, that sales price increase contributed to market growth. In 2019, with constraints easing, prices decreased and that, combined with too much inventory, produced a double whammy that brought the level back.

Analysis of 2018 sales growth showed companies with no passive components sales grew on average by 10 per cent, whereas companies

Continue on page ***36*** »



Top Ten Share and Total Sales


Fast. Focused.

with sales comprising 30 per cent passive products grew by around 16 per cent. The same analysis on 2019 data shows this trend has reversed.

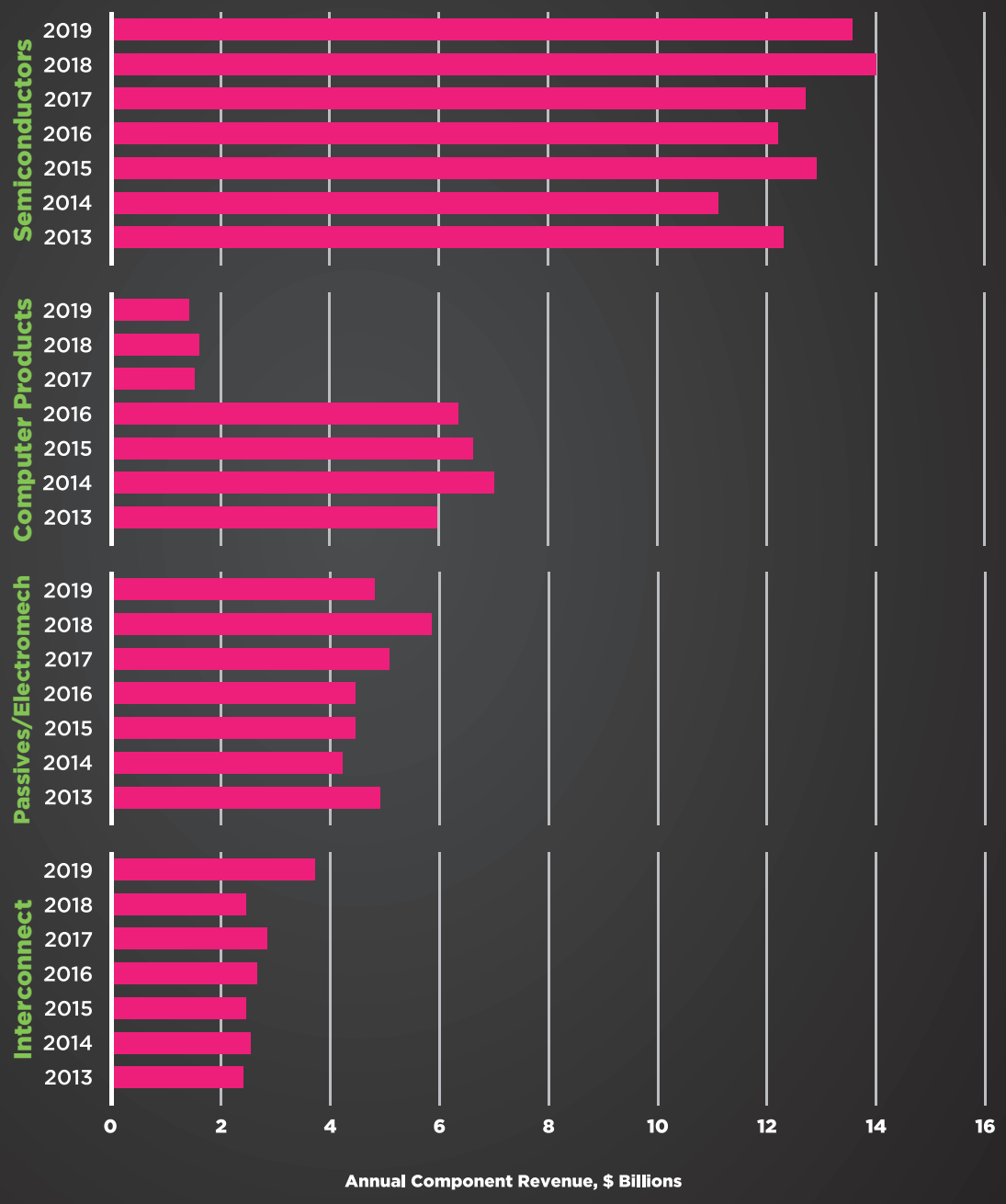
Interconnect products made up 14 per cent of top distributors' sales in 2019, up 10 per cent in 2018. This brought sales in 2019 to $3.4 billion. According to data published by Bishops & Associates total sales of connectors in North America was the same in 2019 as it was in 2018.

Computer products continue to be less important to the top distributors of electronic components. There are many distributors of computer products who do not hold franchises for electronic components and therefore do not appear in the survey. Only 14 companies reported sales of computer products and these totalled $1.3 billion in 2019 down by 10 per cent from $1.46 billion in 2018. Overall, this segment accounts for six per cent of total sales in 2019 unchanged from 2018. Many large companies who had significant sales in this product area have withdrawn from this market segment. For example, Avnet sold its Technology Solutions business in 2016. Arrow remain in this business and dominates these sales figures accounting for over 75 per cent of sales.

As with computer products, many authorized distributors of electronic components are increasingly concentrating on component sales, thus sales of other products are becoming less significant. Only 22 companies reported sales in this category. Other components cover a broad range of products including batteries, power, thermal, filters and test products. Overall, reported sales were $1.1 billion. This figure includes, in large part,

Continue on page 38 »

Interconnect products buck trend in component categories



LASCAR electronics

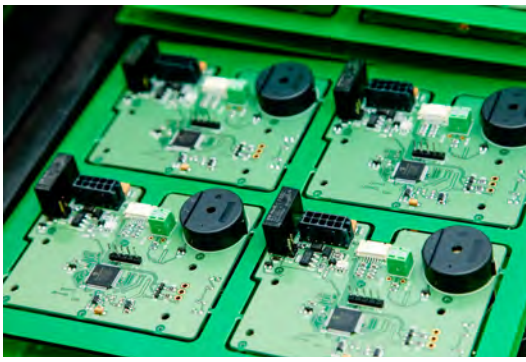
40 Years of exellence & Innovation

Lascar Electronics was established in 1977, and since its inception forty-seven years ago, it has gone on to provide graphic display, data logging and acquisition, and custom electronic design solutions, and became a global leader in the electronics landscape.

More than over 40 years of designing and manufacturing electronic instruments have equipped Lascar with the capabilities to design, procure, manufacture, and supply high-quality products to clients from all over the world.

Our broad scope of disciplines encompassed by the engineering design and development team combined with electronic and mechanical hardware expertise with digital services, including embedded firmware, software, cloud platforms, and mobile applications.

While selecting a partner for your business can be challenging – with a wrong decision leading to spiraling costs, lead times, shipping, and production quality issues – Lascar can manage the design process from conception to manufacture delivering final product that meets both your and your customer's needs.



unfranchised product lines. Overall, the North American distribution market 2019 saw a small contraction of 3.3 per cent which, after the rapid growth in the previous two years, means the overall trend is for growth. Of the 40 companies who provided sales turnover, average growth was 4.4 per cent. Average sales growth in the 20 largest respondents was 0.4 per cent, while in the smaller 20 respondents' average sales growth was 3.9 per cent, confirming that during 2019 smaller distributors maintained the 2018 gains. In total, 21 companies reported sales growth with 13 companies reporting a double-digit growth.

Within the top 10, three companies TTI, Mouser and Allied reported growth at 1.4 per cent, 2.1 per cent and 3.3 per cent respectively. DAC/Heilind sales were flat.

The two top distributors dropped back with Arrow reporting a 5.3 per cent decrease whilst Avnet posted a decline of 4.3 per cent.

Our survey shows that 66 per cent of distributors' sales that provided the information, goes to OEM companies, with 30 per cent going to EMS/ODM companies. The remaining four per cent of sales goes to other companies, in many cases other distributors.

Looking at market segments shows industrial remains the largest segment with over 26 per cent of sales, down from 28 per cent in 2018. Aerospace/military accounts for 20 per cent of distributor sales in 2019. Percentage share in 2019 in other segments were (2018 in brackets): automotive 8 (11), computers and peripherals 9.5 (4), energy 6.8 (3), medical 6.3 (6), telecommunications 7.4 (6) and other segments 12.4 (12).

Companies with a higher percentage of their sales in aerospace, showed higher growth in 2019.

Adding value, a key part of distribution in 2019

Virtually all surveyed distributors offer value-added services, although not all provided the level of these services. The percentage of value-added services of sales varies from 97 to one, indicating not only how wide and varied these services can be but also how value-added services are building the turnover of virtually all distributors. The perception of distributors as just shipping parts from stock no longer applies to the electronics distribution industry in 2019.

Services are particularly valuable in times of component shortages, as has happened in 2018. Many supply chain services include inventory management. The closer customers and distributors work together, the more efficient the supply chain becomes. Many customers were protected from the worst commodity shortages in 2018 through close co-operation. TTI's Michael Knight said: "There's a lot of work to be done in better transmitting data so that it can be shared securely and transparently up and down in supply chains."

Other areas where distributors are offering more value is assisting in counterfeit avoidance and helping understand and mitigate legislative requirements, in particular understanding the complexities around the avoidance of hazardous substances. Counterfeit avoidance is best achieved by only working with authorized distributors. The burden of compliance is ever increasing, often by issues outside the scope of electronic components, but where electronic components are 'caught in the net'. Distributors and the ECIA supply valuable information to help customers navigate this potential minefield.

2020: Year of the opportunity and uncertainty

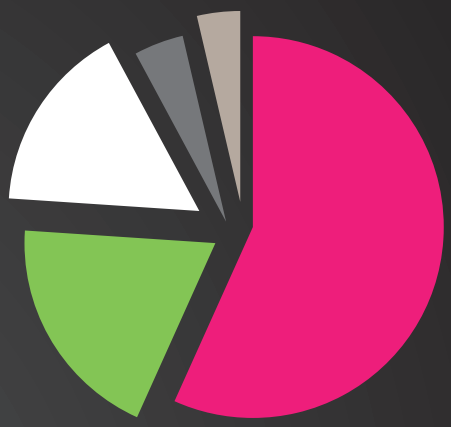
This survey and accompanying interviews were concluded in April 2020, just as the Covid 19 pandemic was escalating in the US. The impact of the outbreak on the distribution industry was at the forefront of everyone's thinking.

Looking to the future, 21 respondents cited value-added sales a key driver that distributors believe will deliver growth in 2020. However, 32 companies indicated growth will come from new products and 27 gave new markets as a growth driver. Only five indicated acquisitions as bringing growth in 2020.

The internet of things continues as the emerging market most cited as offering growth in 2020, with artificial intelligence highlighted as the key driver cited. Lighting applications, smart metering and self-driving also scoring well. As in previous years, renewable energy, including solar and wind, rated lower than in the past.

Passives market share drops in 2019

(% of NA revenue of top distributors, 2019)



- **56% Semiconductors**
- **19% Passives/Electromechanical**
- **14% Interconnect**
- **6% Computer Products**
- **5% Other**

Top ten by value-added sales

Rank 2019	Company	Rank 2018	2019 North American Sales ($ millions)	% of Total Sales	2019 North American Value Add Sales ($ millions)
1	TTI	5	1450	0.62	899
2	Sager Electronics	11	320	0.32	102.4
3	Electro Enterprises Inc	18	130	0.65	84.5
4	Mouser	7	879	0.08	70.32
5	Powell Electronics	15	178	0.30	53.4
6	Marsh Electronics Inc	23	61	0.85	51.51
7	Bisco Industries	13	217	0.15	32.48
8	SMD Inc	25	43	0.65	27.63
9	Steven Engineering Inc	21	78	0.23	17.92
10	Benchmark Connector Corp	37	17	0.97	16.78

In interviews, one subject mentioned by every company was 5G. Although 5G handsets are not manufactured in the US, most distributors are looking to the infrastructure and its effect on growth opportunities.

Knight said: "The world has got an insatiable appetite for computing power and storage because of all the data that's been generated. There is no driver for cleaning up our storage so it just sits there at this point pretty much forever, it just adds to the problem. The knock on effect is that 5G is going to crank up data generation which is going to put additional pressure on the cloud."

Burr-Lonnon agreed: "There's still a lot of talk about how 5G is going to make a big difference when it really starts to hit."

Bernard Gizzi commented: "5G is being considered across the product sectors. When you think about what's going up those towers, there's a lot of cables and connectors up there."

All executives said they had been confident 2020 would see growth pick up in almost all markets. However, all the companies were working to keep their companies running despite the Covid 19 crisis.

Jim Ricciardelli said: "Everything's changed. Our key task is to keep our employees safe. We have bought new laptops so that virtually everyone can work from home. We can keep the warehouse running and things are getting busier as customers are trying to ensure that they can catch-up quickly after the crisis and they want to have their components ready to go. Companies are going to be tight on cash so we may have to help some of our customers to keep going."

Ty Diedrick added: "We are fortunate that our key customers are considered essential. Our problems are with transport. That will hamper shipments and our vendors are all over the place so that has added two to three weeks to lead times immediately."

Although it was too early to assess the virus' immediate impact, everyone agreed it would largely depend on how long the situation goes on, not just in the US but globally.

Burr-Lonnon said: "Personally, I think once this is over it's going to bounce back pretty strongly because the fundamentals of our industry, in terms of what people need electronics for, are still very strong. So, I'm still very confident that the year's going to be a good year, we just need to get past the next probably eight to ten weeks.

"There's a good chance that Q3 will bounce back pretty strongly, Q4 will continue to be strong, then we start getting to the 5G whirl and then I think we'll just go crazy, so I think next year will be a very good year."

Knight was also upbeat: "There's a lot going on right now in terms of trying to practically resolve this situation but as we get thoroughly used to the virus effect we're going to go back to working on the trade issues and I'm still very bullish on the future. There are some big things but when they get solved that could uncork not just our economy but all economies."

Wagner added: "We may have to put some of our plans on hold for the moment, but we do think there will be a pick-up in demand. I am pretty optimistic."

Looking longer term, there is an abundance of opportunities as electronics continues to change the ways we live. Emerging areas such as self-driving automobiles, electric vehicles and artificial intelligence were also mentioned as coming on the back of the 5G wave but other areas such as robotics and smart cities are seen as longer-term projects.

Knight enthused: "At the moment half the population of the world has access to the internet, if you bring another four billion people onto the net, what kind of opportunities does that open up. We're on the cusp of some really good numbers and some really good news for our industry."

If there is a great outlook for the electronics industry, what about the longer-term issues facing the distribution supply chain?

Ricciardelli said: "This industry is so dynamic, you have to be able to adapt quickly. The big public companies are looking to Wall Street. The private companies can focus on the customers and what customers need. That is a big differentiator. There are plenty of opportunities, but we have to keep our focus on the customer. We have to be ready to change how we do things. Maybe Covid 19 will change how we do things permanently. It is already the case that you talk to the people you need to talk to rather than the people you happen to meet."

Knight also sees the need to change: "What we've spent the 2010s doing is getting cost out the old-fashioned way, by being efficient. There is going to be a huge demand for components in the future but how those components get sold, how they get controlled, there's no guarantee that's going to be the old way of doing things. We are going to have to get cost out by doing things differently."

Amir Nizam said: "We have to concentrate on satisfying the customer. It is no longer just a case of delivering orders. There are some very big companies now who are very good at doing that very efficiently and investing to do it even more so. We have to be giving the customers more than just that."

Don Wagner concluded: "We have 49 locations in the US so we believe in local salespeople, local presence and local inventory. You have to be always getting closer to the customer."

"There's a good chance that Q3 will bounce back pretty strongly, Q4 will continue to be strong, then we start getting to the 5G whirl and then I think we'll just go crazy, so I think next year will be a very good year

AVNET

Avnet: Distribution that reaches further

Headquarters: Phoenix, Arizona
Web: www.avnet.com
Phone: 480-643-2000
Twitter: @Avnet
Facebook: @AvnetInc
Linkedin: @Avnet

We serve 2 million customers — all unique, but with three common needs:

Speed to market. You'll need this essential ingredient for capitalizing on a great product idea in an ultra-heated environment.

Cost efficiency. It's expensive to move from product design to manufacturing to global scale, and no one can afford to waste money in the process.

Simplicity. Mastering all the technical complexity of today's increasingly sophisticated products, including regulations, standards and IoT integration requirements, is bigger than one team or person.

Who can manage all this with you? Our 15,000+ employees, in collaboration with our 1,400 technology suppliers.

Whatever your area of innovation, you need a partner who can supply you with all the components you need at every stage of the product lifecycle and in every global market. And you also need an ecosystem to support you through design, specification, supply chain, distribution and logistics so you can meet your speed, efficiency and simplicity demands.

Design — Rather than spend time and money hiring hard-to-find experts, work with us. You'll gain our expertise in hardware, embedded software/firmware, IoT, application and cloud computing development as well as a suite of tools to automate difficult decisions.

Component procurement — Order from our 5 million parts with one click. We've built relationships and accumulated expertise across markets and geographies to help you identify long-life technologies that will shorten lead times and reduce inventory.

Supply chain — Avnet's supply chain engagements include a review of your end-to-end materials flow and customized models to address your specific needs. We also manage pipelines, production, manufacturing, inventory flow, shipping and more.

Distribution/logistics — You need to get your products in the right place at the right time in the right volume while managing demand, technical certifications, supply-chain efficiency, shipping costs, technical issues and more. We customize distribution flows and operate multiple distribution centers in each region — and we program over 250 million devices per year.

The new form of distribution is less about fulfillment and more about what's valuable to you.

Avnet's robust ecosystem provides global technology solutions with connected regional support. It's how we help you satisfy your needs for speed, efficiency and clarity amid complexity. Contact your Avnet representative today to find out how we can help you.

AT A GLANCE:
Avnet designs, makes, supplies and delivers technology solutions to customers of every size, in every corner of the world.

Founded in 1921

15,000+ employees worldwide

2.1 million customers in 140+ countries

1,400 technology suppliers globally

117 billion units shipped annually

125 locations across the globe

Ready to reach further?

With Avnet, you can get components in the quantities you need, whether you're tinkering with initial designs or supporting development at scale. As an end-to-end partner, we can support your needs no matter what part of the product development lifecycle you're in.

avnet.com

Sales of top two decline slightly

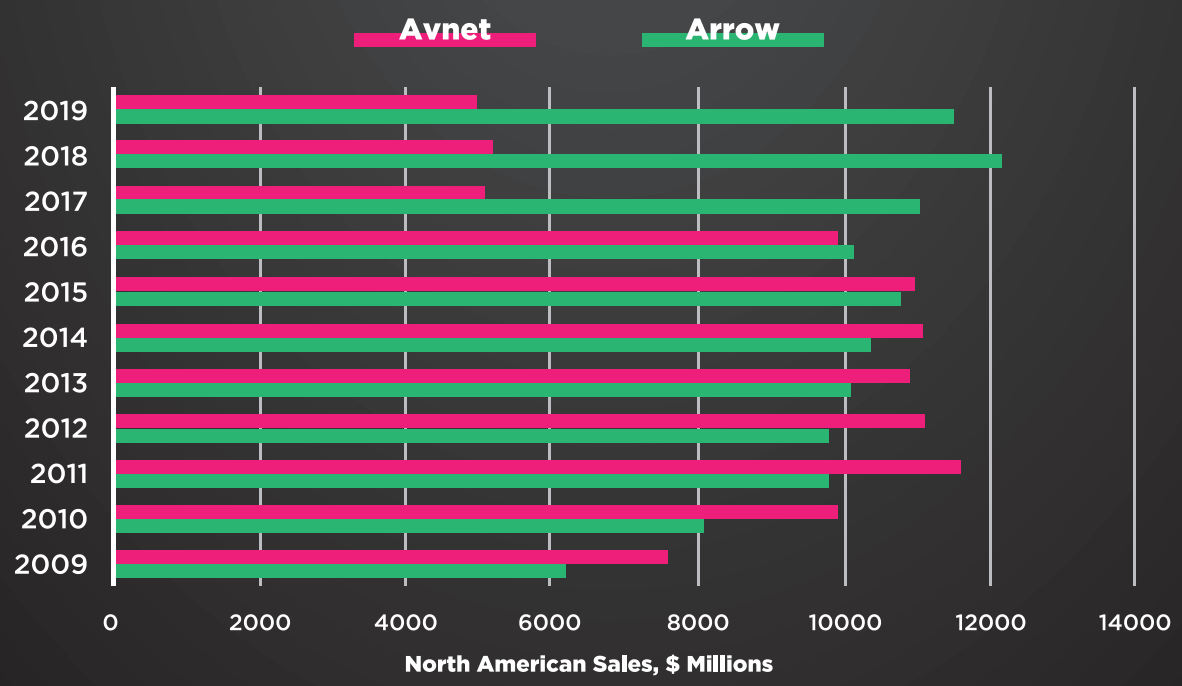
Arrow Electronics remains at the top of our rankings for North American sales with the gap between it and the number two distributor (Avnet) narrowing a little compared to 2018. Arrow's North American sales according to our survey have decreased by 5.3 per cent from $12.1 billion to $11.5 billion. However, these sales include both the Arrow component sales as well as its Enterprise Computing Solutions activity. Figures given in Arrow Electronics end of year results (2019) show component sales for the Americas at a total of $6.5 Billion, a decrease of 16 per cent over the comparable figure in 2018 which would still mean that they are the largest component distributor in North America. Global sales for the company declined from to $29.6 billion in 2018 to $28.9 in 2019 with component sales decreasing from $20.8 billion to $20.2 billion a decline of just 2.9 per cent.

Avnet Inc reported a marginally smaller decline of 4.3 per cent with North America sales falling from $5.2 billion in 2018 to $5 billion in 2019. Avnet figures include the sales of Farnell (Newark). Avnet's global sales (including Farnell) fell by seven per cent in 2019 to $18.5 billion. In 2019 Avnet's global sales were divided Asia 40 per cent; EMEA 33 per cent and Americas 27 per cent.

What kind of distributor are you?

Our survey asked each company what kind of distributor they were. Forty two companies responded: broadline 22; specialized 16; limited line 1; catalog 2 with Avnet responding that Avnet was broadline but Newark/ Farnell was catalog. The term catalog goes back to the time when distributors produced big printed books where required components could be identified, the price obtained and with one quick phone

> **Arrow's North American sales according to our survey have decreased by 5.3 per cent from $12.1 billion to $11.5 billion**



call or fax the parts could be ordered. The first two major distributors to specialize in this way of marketing and selling components were Newark and Allied and were both part of worldwide groups that developed this business model.

This has dramatically changed with the use of the internet. Today parts can be found by searches; data sheets and design circuits downloaded; availability obtained; and parts ordered for immediate delivery to virtually anywhere in the world with just a few clicks on a PC or even a phone. The internet revolution brought new players into the market, such as Mouser and Digi-Key with business models designed to maximize the possibilities brought by the internet. These two classified themselves as catalog along with Newark/ Farnell. Allied classified itself as broadline. This is probably the correct term for all these distributors as the range of franchises they operate on a global basis is truly staggering. At the same time other distributors, whether broadline or specialized, have not been slow to grasp the opportunities that the technology allows.

In our survey 28 companies stated that they were able to transact sales via their websites, whilst only 13 said that they did not and six did not answer. Although some did not provide the percentage of their sales that were transacted via their websites of those who did, not surprisingly the highest percentages of sales via the web were led by Digi-Key at 89 per cent, with Newark/ Farnell, Mouser and Allied all within the top six. Smaller distributors such as Chip 1 Exchange, Corestaff and Waldom Electronics Corp also take a large share of their sales through websites all reporting figures over 50 per cent.

The range of services that distributors now offer has gone way beyond the replacement of the catalog. The continuing pervasion of electronics into virtually all areas of modern life where electronic devices connected via the internet means there are many new customers, many of whom are small and emerging companies, who are looking for help with designs. Distributors are well placed to engage with them and help them with designs, and even complete solutions. Many distributors offer webchats and on-line design advice with developer forums moderated by field application engineers. Twenty six of our respondents stated they offer design services and employ design engineers to support this activity.

The web is also allowing distributors to think more globally with companies offering translation into other languages based upon the IP address of the enquirer: just one example of how the customer is becoming the focus of everything. The use of the web is allowing distributors to differentiate themselves. Long gone is the distributor who just provided price and availability. It truly is a revolution in engaging with the thousands of customers on behalf of the component manufacturers.

Thirty eight companies who responded to our survey are certified to ISO standard, although none of the ones who answered that they are not certified, stated that they intended to seek certification.

Global growth continues, slowly

Of the 41 distributors who responded to our survey by supplying sales turnover for North America, 34 also supplied their global turnover. On a comparable basis the global sales of these distributors had increased by 1.3 per cent from 2018 to 2019, which although much lower than the 13.5 per cent growth we recorded between 2018 and 2017 was still growth. Global sales of these companies totaled $61.9 billion in 2019. For these distributors the North America sales accounted for 41 per cent of their total turnover. Some companies also reported their sales in Asia and for these companies, sales in Asia had decreased overall by 1.3 per cent, and their sales into Europe, Middle East and Africa where sales are measured in US dollars had decreased by six per cent. However, care must be taken with these numbers as the change in the value of the US dollar between 2018 and 2017 must also be considered.

Changes in the listing

Our Top Distributor Listing is built up from the responses that 47 distributors gave to our survey this was a little lower than previous years as we were collecting information at the time as Covid 19 was spreading across the US and many companies were concerned with making arrangements to keep their staff safe and to implement measures to keep the supply chain operating. The survey is built up from North American distributors.
In our rankings for this year's survey we have reverted to ranking companies based upon their total turnover and we have shown rankings on this basis for 2019 and 2018, which may vary from the ranking given last year which was based on sales of franchised lines only.

On this like-for-like basis there have been no changes in ranking in the top 13 companies. Some companies in our ranking may be owned by other distributors but they have been included where their sales have not been included in the sales of the owning company.

*Continue on page **46** »*

The continuing pervasion of electronics into virtually all areas of modern life where electronic devices connected via the internet means there are many new customers, many of whom are small and emerging companies, who are looking for help with designs

The Components Distribution Specialist

From its headquarters in Fort Worth, Texas, TTI, Inc. has built a global reputation as a distribution specialist. Today, almost five decades after the company was founded by Paul Andrews (who famously started the company from his kitchen table), TTI has grown to become the connectors, passives, discretes and electromechanical components distributor of choice for many industrial, military, aerospace and transportation manufacturers around the world.

TTI believes in close relationships with customers that allow the company to understand and meet their distribution challenges. This deep knowledge of industry has given them the insight to build a distribution network that achieves greater than 98 percent on-time delivery – and a reputation for quality and service that consistently earns them awards and recognition from customers and suppliers alike.

The Americas Distribution Center is the heart of TTI's operations in North America. Over 1.7 miles of conveyers tie this facility's shipping, inventory and receiving sections together. Multi-story carousels filled with bins of tiny components and racks of palletized cases of larger parts are picked for distribution.

A dedicated space serves cut reel warehousing and production, while another specialty area provides value added customization of various circular and D-Sub connectors for the military and aerospace market, as well as commercial off-the-shelf product. Growth in inventory and demand were designed into the plans for this distribution center. The building is ready for future expansion to a full 1,000,000 square feet.

This fast-moving production environment is measured by a quality program that ensures TTI provides the right parts to the right place, at the right time. Not only does TTI have a quality goal for its customers, but for every department within the company (Sales, Product, Suppliers, Operations, etc.)

TTI also works to maintain a broad and deep inventory of components, which in turn buffer customers from swings in lead times and other supply chain events.

Globally, TTI, Inc. services customers through more than two million square feet of dedicated warehouse space, housing over 850,000 component part numbers.

With Paul Andrews' continued leadership and direction, TTI's core goal has remained the same ever since its founding: to be the best, rather than the biggest, distributor of interconnect, passive and electromechanical components. This goal is achieved every day by hardworking, knowledgeable people who are committed to the philosophy of TTI's mission.

» Whereas all care has been taken to collect and process the data, errors and omissions are excepted.

Still growth opportunities in 2019

The tables below list the top ten distributors in different areas. Although the top four distributors of semiconductors are all from within the top seven overall, the other six are from some of the mid-ranking companies who specialize in semiconductor sales. The same is true for the ranking of distributors by the sales of passive components. The table for interconnect distributors show that seven of the companies are from the top 10 overall companies. In computer sales only five of the top ten are from the top ten overall, although this category is dominated by the sales of Arrow.

Smaller companies fare better in the top ten rating of sales per employee with only two of the overall top ten companies appearing. Smaller companies are also amongst the fastest growing. Of the 46 companies who provided sales turnover for our survey, 22 companies reported sales growth, one company reported flat sales and 23 reported a decline in sales. Only three of the top ten companies overall reported growth. The highest growth among the top ten was Allied Electronics with a growth of 3.3 per cent.

Top Ten Active Component Sales

Rank 2019	Company	Rank 2018	2019 North American Sales ($ millions)	% of Total Sales	Active Component Sales
1	Arrow	1	11511	72	8288
2	Avnet	2	4966	77	3824
3	Digi-Key	4	1765	41	724
4	Mouser	7	879	44	387
5	Fusion Worldwide	10	347	73	253
6	RFMW Ltd	20	85	60	51
7	Symmetry Electronics Corp	24	50	98	49
8	NewPower Worldwide	14	190	22	42
9	Falcon Electronics Inc	27	38	96	36
10	CDI	26	38	75	29

Top Ten Passive Component Sales

Rank 2019	Company	Rank 2018	2019 North American Sales ($ millions)	% of Total Sales	Passive Component Sales
1	Arrow (1)	1	11511	8	921
2	TTI	5	1450	47	682
3	Avnet (1)	2	4966	10	497
4	Digi-Key	4	1765	22	388
5	Mouser	7	879	20	176
6	Fusion Worldwide	10	347	13	45
7	Bisco Industries	13	217	15	32
8	RFMW Ltd	20	85	30	26
9	Kensington Electronics Inc	33	20	100	20
10	NewPower Worldwide	14	190	9	17

Top Ten Electromechanical Component Sales

Rank 2019	Company	Rank 2018	2019 North American Sales ($ millions)	% of Total Sales	Electro Mechanical Component Sales
1	Arrow (1)	1	11511	4	460
2	Avnet (1)	2	4966	4	199
3	Digi-Key	4	1765	11	194
4	Allied Electronics	9	600	27	162
5	DAC/Heilind	8	832	16	132
6	Bisco Industries	13	217	50	108
7	Mouser	7	879	11	97
8	Flame Enterprises	19	96	100	96
9	TTI	5	1450	6	87
10	Sager Electronics	11	320	27	86

Top Ten Interconnect Sales

Rank 2019	Company	Rank 2018	2019 North American Sales ($ millions)	% of Total Sales	Interconnect Sales
1	DAC/Heilind	8	832	84	700
2	TTI	5	1450	47	682
3	Arrow (1)	1	11511	4	460
4	Digi-Key	4	1765	24	424
5	Avnet (1)	2	4966	4	199
6	Mouser	7	879	20	176
7	PEI Genesis	16	170	100	170
8	Powell Electronics	15	178	80	142
9	Allied Electronics	9	600	17	102
10	Electro Enterprises Inc	18	130	70	91

Top Ten Computer Products Sales

Rank 2019	Company	Rank 2018	2019 North American Sales ($ millions)	% of Total Sales	Computer Products Sales
1	Arrow	1	11511	9	1036
2	Avnet	2	4966	3	149
3	Allied Electronics	9	600	10	60
4	Fusion Worldwide	10	347	12	42
5	NewPower Worldwide	14	190	7	13
6	Digi-Key	4	1765	1	11
7	Electronics Supply Co., Inc	40	14	51	7
8	Steven Engineering Inc	21	78	7	5
9	Brevan	30	28	10	3
10	Nasco	32	22	5	1

Top Ten Sales per Employee

Rank 2019	Company	Rank 2018	2019 North American Sales ($ millions)	Number of Employees	Sales per Employee
1	NewPower Worldwide	14	190	31	6.13
2	Fusion Worldwide	10	347	79	4.39
3	NF Smith	6	1073	293	3.66
4	Falcon Electronics Inc	27	38	18	2.08
5	Brevan	30	28	16	1.72
6	Flame Enterprises	19	96	61	1.57
7	RFMW Ltd	20	85	64	1.33
8	Avnet	2	4966	4134	1.20
9	Corestaff	46	5	6	0.83
10	Powell Electronics	15	178	218	0.82

(1) Estimated Sales (2) Sales breakdown based on global sales

TOP ELECTRONICS DISTRIBUTORS 2019

Rank 2019	Rank 2018	Company	2019 North America ($ millions)	% growth rate 2019/ 2018	Sales Breakdown: Active	Passive	Electro	Interconnect	Computer Products	Other	% of sales derived from Value Add	Employees	Sales per employee ($M)
1	1	Arrow (2)	11511.0	-5.3	72	16	-	-	9	3	-	-	-
2	2	Avnet (2)	4965.9	-4.3	77	18	-	-	3	2	-	4134	1.20
3	3	Future (1)	4300.0	-6.5	-	-	-	-	-	-	-	-	-
4	4	Digi-Key	1765.0	-7.4	41	22	11	24	0.6	1.4	-	3760	0.47
5	5	TTI	1450.0	1.4	-	47	6	47	-	-	0.62	2049	0.71
6	6	NF Smith	1073.0	-5.7	-	-	-	-	-	-	-	293	3.70
7	7	Mouser	879.0	2.1	44	20	11	20	-	5	0.08	1797	0.48
8	8	DAC/Heilind	832.4	0.1	-	-	15.9	84.2	-	-	-	-	-
9	9	Allied Electronics	600.0	3.3	1	2	27	17	10	43	-	900	0.66
10	10	Fusion Worldwide	346.5	-1.3	73	13	-	2	12	-	0.01	79	4.39
11	11	Sager Electronics	320.0	3.9	-	-	27	27	-	46	0.32	406	0.79
12	12	**Master Electronics**	256.0	2.4	-	-	-	-	-	-	-	-	-
13	13	Bisco Industries	216.5	11.9	5	15	50	10	0	20	0.15	495	0.44
14	17	NewPower Worldwide (1) (2)	190.0	26.7	22	9	0.5	0.5	7	61	0.04	31	6.13
15	16	Powell Electronics (2)	178.0	14.8	-	-	20	80	-	-	0.30	218	0.82
16	15	PEI Genesis	170.0	-2.9	-	-	-	100	-	-	-	-	-
17	14	WPG Americas (1)	165.0	-8.3	-	-	-	-	-	-	-	-	-
18	18	Electro Enterprises Inc	130.0	10.2	-	-	30	70	-	-	0.65	240	0.54
19	19	Flame Enterprises	96.0	-1.0	-	-	100	-	-	-	-	61	1.57
20	21	RFMW Ltd	85.0	10.4	60	30	-	10	-	-	0.15	64	1.33
21	20	Steven Engineering Inc	77.9	-6.4	-	-	35	35	7	23	0.23	116	0.67
22	22	Waldom Electronics Corp	62.6	-6.4	-	3	26	71	-	-	0.05	-	-
23	23	Marsh Electronics Inc	60.6	-3.0	-	18	53	5	-	24	0.85	120	0.51
24	24	Symmetry Electronics Corp	50.0	-3.8	98	-	-	-	2	-	0.15	65	0.77
25	25	SMD Inc	42.5	-7.2	4	15	20	61	-	-	0.65	62	0.70
26	26	CDI	38.0	-9.5	75	8	2	7	-	8	0.03	53	0.72
27	27	Falcon Electronics Inc	37.5	14.7	96	-	3	-	1	-	0.15	18	2.08
28	29	Area 51-ESG, Inc	30.8	18.9	25	25	25	15.2	0	9.8	0.02	59	0.50
29	28	CDM Electronics (1)	30.0	-6.3	-	-	-	-	-	-	0.35	265	0.10
30	35	Brevan	27.5	57.1	20	30	20	15	10	5	0.08	16	1.70
31	31	Diverse Electronics Inc	24.6	11.3	18	30	15	22	-	15	0.23	46	0.53
32	36	Nasco	22.3	34.3	15	5	35	40	5	-	0.07	30	0.74
33	32	Kensington Electronics Inc	20.2	-3.8	-	100	-	-	-	-	0.40	-	-
34	34	PUI Projections Unlimited Inc	18.2	-4.2	17	32	38	13	-	-	0.13	34	0.54
35	33	IBS Electronics	18.0	-10.0	-	-	-	-	-	-	-	-	-
36	39	Astute Electronic Inc	18.0	28.6	70	5	5	10	5	5	0.60	25	0.72
37	38	Benchmark Connector Corp	17.3	13.4	-	-	100	-	-	-	0.97	45	0.38
38	40	Bluff City Electronics	16.0	15.9	10	10	60	10	-	10	0.10	35	0.46
39	30	Chip 1 Exchange (1) (2)	15.0	-40.0	55	25	8	5	2	5	0.05	65	0.23
40	37	Electronics Supply Co., Inc	14.0	-12.5	2.1	2.1	0.7	1.4	51	43	0.29	25	0.56
41	41	Flip Electronics L.L.C. (1)	14.0	16.7	94.8	3.2	1	1	-	-	0.50	-	-
42	42	Fedco Electronics Inc	11.1	3.7	2	-	-	-	-	98	0.62	36	0.31
43	44	ECCO	9.1	13.8	-	-	2	98	-	-	0.75	26	0.35
44	43	America II (1)	7.6	-5.0	-	-	-	-	-	-	-	-	-
45	46	DB Lectro Inc.	5.7	7.5	1	6.1	30.6	17.3	10	35	0.90	10	0.57
46	45	Corestaff	5.0	-16.7	30	30	-	20	-	20	-	6	0.80
47	47	URS Electronics	4.8	-2.0	3	11	25	16	14	31	0.08	12	0.40
48	48	Ursele	4.0	-16.7	5	15	40	10	5	25	10.00	13	0.31

(1) Estimated Sales **(2)** Sales breakdown based on global sales

SMITH

Doing Our Part Against COVID-19

The coronavirus outbreak is heavily uncharted territory for all industries, but mitigating supply chain disruptions during troubling times is familiar to Smith.

As the coronavirus situation continues to evolve, manufacturers across all industries are seeking electronic component sourcing and service support. Smith is the world's leading independent distributor of semiconductors and electronic components. To help fight against the COVID-19 crisis, we're doing what we do best – sourcing and delivering parts that are hard to find. There is no other company with more experience or that is better positioned to help during this situation.

Mitigating supply chain disruptions since 1984

Smith has been there to help our partners through all the supply disruptions of the last 36 years. We have real-world experience operating under the challenging conditions of world events such as the SARS epidemic of 2003, the global financial crisis of 2008, and natural disasters such as 2017's Hurricane Harvey.

Experienced in sourcing for medical builds

As many manufacturers begin to increase their production capacity and even retool to fit ventilator and medical-device builds, the demand for electronic components is higher than ever. Smith sources parts found in the production of the ventilators and other life-saving equipment that are being rapidly manufactured to fight COVID-19. From ICs and sensors to fuses and displays, our global sales team is prepared to source the right parts for all requirements.

Sourcing and quality to the highest standards

Medical orders are held to the highest sourcing standards and are prioritized and tracked through our internal trading and operations platform. We understand that the manufacturing of medical devices calls for unwavering quality control. Smith is certified to stringent medical and aerospace and defense standards, including ISO 13485, AS6081, and AS9120.

Customized supply chain support

Smith's service offerings don't end with procurement. We're a prime partner for hubbing programs and inventory-stocking solutions. Especially as the COVID-19 situation continues to change daily, it's important for companies to have contingency plans in place with proper inventory management solutions. Companies across all industries can benefit from Smith's customizable supply chain services. We understand that each company and industry is unique, so we have created flexible solutions to fit all requirements.

Mobilized and ready to help

Smith's shipping and logistics hubs in Houston, Hong Kong, and Amsterdam have mirrored capabilities, and, as a critical supplier of electronic components, we've been able to keep our operations running uninterrupted throughout the coronavirus outbreak. Our global team is fully mobilized and ready to help our customers navigate the unprecedented supply chain disruptions caused by the COVID-19 crisis.

Mitigating Supply Chain Disruptions Since 1984

The continually evolving COVID-19 crisis is impacting manufacturers around the world. Smith is prepared to help you navigate these challenges.

Leading Distribution Partner

Smith is the world's leading independent distributor of semiconductors and electronic components.

Decades of Experience

Founded in 1984, we've helped our partners through all the supply disruptions of the last 36 years.

Primed to Navigate Disruptions

Mitigating supply chain disruptions during troubling times is one of Smith's greatest strengths.

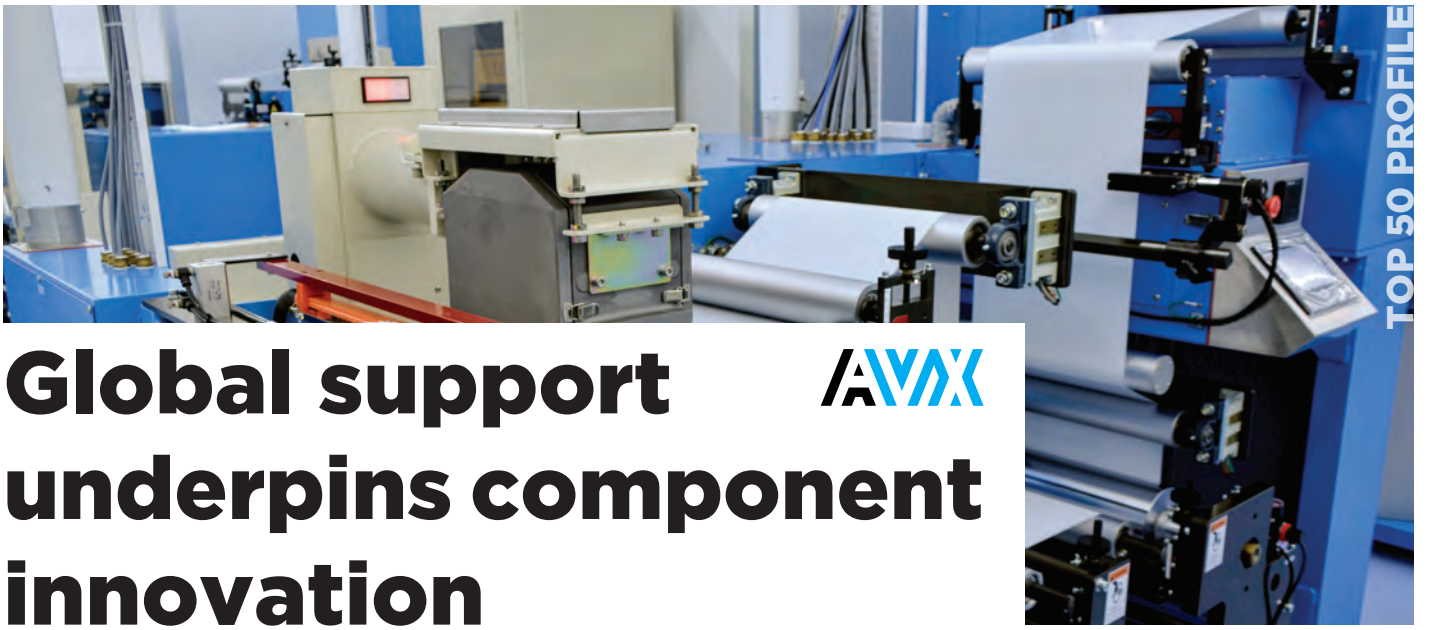
We help customers keep moving — no matter the supply chain challenges.

- **Fully Mobilized**
  Our 475+ employees are mobilized around the world to keep providing uninterrupted, optimal support.
- **Flexible Services**
  From shortage sourcing to inventory management programs, our full range of services is available.
- **Multichannel Sourcing Capabilities**
  Franchised, direct, and open-market sourcing channels help us find the components you need.
- **Reliable Quality**
  Our unmatched in-house testing and QC processes deliver the quality you trust.

SMITH

Intelligent Distribution™

www.smithweb.com



Global support underpins component innovation

AVX is a leading international manufacturer and supplier of advanced electronic components, including: capacitors, inductors, filters, resistors, couplers, diodes, and circuit protection devices, as well as a broad range of innovative sensor, control, interconnect and antenna solutions. With 29 research, design, manufacturing, and customer support facilities in 16 countries around the world, AVX offers significant competitive advantages. Delivery and production capabilities are optimized to suit each individual customer's just-in-time inventory requirements, and the AVX global engineering teams are experienced in developing new-to-market product solutions specifically designed to fulfill customer's unique application requirements.

AVX has successfully served the automotive, industrial, medical, military, consumer electronics, communications, and transportation markets for nearly 50 years. In the automotive sector, AVX actively contributes to the development of new safety, engine control, infotainment, and chassis control technologies. In the medical sector, advanced AVX products provide critical support for a wide range of implantable, life-supporting, treatment, imaging, and diagnostic devices. Devices include pacemakers that regulate patients' heartbeats, cochlear implants that provide audio input for the hearing-impaired, and diagnostic equipment that helps medical professionals identify and cure patients' ailments. In the communications sector, the AVX research and development (R&D) teams regularly anticipate customers' needs and adapt and innovate products to support the explosive growth of next-generation technologies spanning from smart phones and tablets to networks and datacenters.

Backed by decades of in-depth R&D, AVX products also provide critical enabling support for a wide variety of green technologies designed to conserve existing energy resources and create dependable, affordable electronic systems capable of effectively harnessing renewable energy sources, such as wind, solar, and hydroelectric power. High-reliability AVX components are at the forefront of countless products that are helping to ensure that both this generation and generations to come will benefit from cleaner, greener technologies designed to preserve and protect the environment, ranging from clean power generation and conversion systems to hybrid and electric vehicles in the personal and commercial vehicle and mass transportation markets, including cars, trucks, trams, and trains.

AVX has an abundance of patents, continues to invest heavily in R&D, and submits several new patent applications every year to further expand the company's strong technology base with newly innovated, next-generation product solutions. Our history of innovation across an unparalleled portfolio of advanced passive components, sensors, controls, and interconnect solutions will continue to be developed, expanded, and improved upon to continue solving tomorrow's design challenges today.

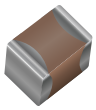
For more information and to learn more about AVX products and component solutions, please visit avx.com!

avx.com

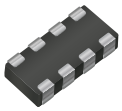
ACCELERATING INNOVATION

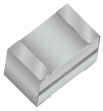
AVX®

COMPONENT SOLUTIONS:


Ceramic Capacitors


Power Film/Chip Film


Circuit Protection


RF/Microwave


SuperCapacitors

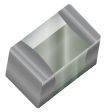

Connectors


Tantalum/Polymer


Antennas


Filters


Sensing and Control


Fuses

and more...
Visit our site to see all of our product offerings

ABOUT AVX

A worldwide leading provider of electronic components for demanding applications, from medical to defense and everything in between.

MARKET SOLUTIONS

Medical

Automotive

Telecom

Renewable

Industrial

Defense

Newark, An Avnet Company

Supporting your journey at every stage

Farnell operates as Newark in North America. Newark is a high-service distributor of technology products, services and solutions for electronic system design, maintenance and repair.

Global access, with service that's close to home

Newark has operations in the US, Canada and Mexico, serviced from our regional distribution hub in South Carolina. We are committed to supporting local language, currency, product and shipment needs across North America and around the world. As part of Farnell's global operations, our access to stock and stronger relationships with suppliers, we are better able to serve your needs.

A commitment to innovation that powers change

We have a history of innovation and have developed many industry firsts that save precious time for our Design Engineer customers, such as the first online Community for engineers – element14. More recently we continue to bring the latest technologies to market, from development tools that speed up the design process to modular devices that engineers can quickly and easily build into their devices and the latest in easy-to-deploy artificial intelligence.

We are focussed on making it easier to get the products you need, when you need them.

Fast access to the latest technology

Over 900,000 in-stock products, services, software and solutions ready for same-day shipping.

Local personal service

In person, by phone or online in multiple languages to help you get what you need fast.

Buying tools to simplify your work process

Simplify your work processes with our bespoke buying tools.

Complete design solutions

View our range of software and services available through element14 Design Center on the element14 community.

Engineering expertise and free technical support

Contact our team of experts 24/5 via Live Chat or phone.

Innovative online engineering community – element14

Direct access to peers and experts plus a wide range of technical information and tools.

FUSIONWORLDWIDE

Fusion Worldwide is one of the world's largest open-market distributors of electronic components and finished products. Headquartered in Boston, Mass., the company has nine offices with over 200 employees spread across North America, Europe and Asia.

Solving Supply Chain Shocks with Strategic Sourcing Solutions

Fusion Worldwide has a history of being a trusted partner as we mitigate supply chain issues and challenges for customers. Whether facing increased lead times, EOL / Legacy situations, price increases, forecasting unpredictability, or other supply chain shocks, we can source and procure components quickly through our global network of suppliers.

Our services include:

- Shortage sourcing
- Cost-reduction strategies
- Excess management
- End of Life / Last Time Buys
- VMI / Hubbing
- Kitting
- Global logistics
- Market Intelligence
- In-house component testing

Fusion Worldwide knows each customer has unique needs. Beyond providing components, our team can create customized, value-added solutions to optimize supply chains, and reduce risk and inefficiencies. Fusion is a service provider, and we aim to make our customers' lives easier by solving their supply chain challenges.

Keeping Our Customers' Vision First

Fusion Worldwide was created to fill gaps and improve inefficiencies in the supply chain, which is why we strive to be the most knowledgeable about electronic component commodities. We do so with sourcing specialists and commodity experts who live and breathe their specific component commodity.

Over our 20-year history, Fusion Worldwide has built a vast network of global suppliers, and our customers are often our best ones. We can find components our customers need when they need them.

Our product portfolio includes:

- Integrated Circuits
- Storage
- Memory
- Networking
- Peripherals
- CPUs
- Boards
- Finished Products
- Passives
- Cards
- Computer Products
- Electromechanical

Continuously Raising Quality Standards

At Fusion Worldwide quality is a given and part of everything we do. We operate full test centers and warehouses in Boston, Hong Kong and Amsterdam. We are process driven, which guarantees customers receive the same high level of quality with each shipment.

Our certifications and memberships include:

- ISO 9001:2015
- ANSI ESD S 20.20
- CCAP-101
- IDEA QMS STD 9090
- IDEA
- ERAI
- GIDEP
- Cage Code 4UJG4
- ISO 14001:2015
- AS9120B:2016
- AS6081
- ISO 17025 (in process)

Fusion Worldwide is committed to sustainability within our own supply chain, and we have been recognized by Supply & Demand Chain Executive for our efforts. Each year the publication recognizes companies making sustainability a core part of their supply chain strategy, as well as those working to achieve measurable goals within their operations.

NORTH AMERICA
Boston • Guadalajara • Austin
San Francisco • San Jose

EUROPE
Amsterdam • Munich
Venice

ASIA
Singapore • Seoul
Hong Kong

FUSIONWORLDWIDE

WORLD-CLASS SOURCING. WORLD-CLASS SERVICE.

Fusion Worldwide is a premier electronic sourcing distributor of electronic components and finished products that works alongside customers to create customized solutions to overcome their biggest supply chain challenges.

www.fusionww.com

Keeping lines running smoothly

In this Q&A, Smith's president Americas, Todd Burke, guides readers through the company's procurement, recycling and supply chain solutions

Todd Burke, Smith's
President, Americas

Q Smith has been appointed official distributor for various component brands over the years. Is this a growth area and do you envisage this list increasing?

Since our founding in 1984, Smith has been a leading independent distributor of electronic components. Sourcing from the open market gives us and our customers the advantage of procuring from an infinite line card without geographic limitations. One of the recent trends for companies in our space has been to take on franchised lines. Smith has done so, but with a little different tack than others. Right now, Smith is authorized for a few select manufacturers, like AUO, that we have strategically added to our portfolio. As our customers' needs evolve, Smith will evaluate all partnerships with the foremost goal of better meeting customer requirements.

Q Can you explain ITAD and how this supports electronics purchasing professionals' sourcing requirements?

Smith's IT asset disposition (ITAD) services offer a multifaceted approach to the reuse and recycling of retired equipment. We provide customers with safe and secure hardware disposal services and the unique option to recover value by selling equipment on the secondary market. For many electronics purchasing professionals, ITAD services are a value-add supply chain solution that provides an additional option for product sourcing and disposition. In a sense, we've been in the ITAD space for a while doing one-off programs and projects for key accounts. We've made significant investments in facilities, certifications and human resources. We view ITAD as a key growth opportunity as the cloud and related businesses grow and it becomes necessary for them to properly dispose of IT equipment.

Q In addition to component procurement services, what supply chain services does Smith provide?

At our global hubs in Houston, Hong Kong and Amsterdam, Smith has mirrored supply chain service capabilities. Sales representatives help customers manage their inventory with our unique VMI, EOL and LTB solutions. To protect inventory our warehouses are: access-controlled; fully secured; and ESD, climate and temperature controlled. Additionally, customers have real-time visibility of their inventory management through our proprietary customer portal. VMI solutions are one of the prime supply chain services we provide to help customers manage their lines with forecast planning and projections of parts.

Q Regarding Covid-19, are you witnessing any sourcing trends and is Smith supporting medical device manufacturing?

The coronavirus situation is affecting electronic component availability across the board. With many manufacturers still running at limited capacity due to plant shutdowns, supply for many key parts is either limited or delayed. We have definitely seen an uptick in demand from our medical customers. Smith is absolutely doing its part to support this critical need. Our trading force is completely mobilized around the world, and our logistics hubs have been able to maintain operation throughout the pandemic. We're seeing a lot of passive component requirements on ventilators and other medical devices.

Q Finally, what advice can you offer our 72,000 readers to ensure their supply chain efficiency?

Maintaining a strategic partnership with a qualified independent distributor like Smith is very important when the supply chain is disrupted. When direct sourcing channels are unavailable, purchasing on the open market is often the most efficient source for products in shortage. Seek a partner who meets your quality standards and who can offer you valuable market information. Understanding the supply and demand trends of products will provide customers the insight needed to stay proactive and keep lines running smoothly.

www.smithweb.com

Prices for optoelectronic components will fall

Overall weaker demand and high inventory levels for some optoelectronic components such as LEDs mean buyers can expect short lead times and soft prices

James Carbone

Prices for optoelectronic components, including LEDs, image and light sensors, will decline this year due in part to the coronavirus pandemic, which has resulted in weakened demand.

The average price for an optoelectronic component will fall about 2 per cent to 16.7 cents on average as demand slows. Weaker demand also means that the overall optoelectronics market will drop 6 per cent in 2020 to $41.7 billion from $44 billion in 2019, according to researcher IC Insights. Unit shipments will decline 3.2 per cent from 258.4 billion in 2019 to 250.1 billion in 2020, the researcher said.

However, prices for some optoelectronic components from some manufacturers increased following the spread of COVID-19. For instance, Lumileds increased prices 4 per cent for LEDs. The company said the pandemic resulted in higher costs for transportation and some raw materials. Signify, formerly Phillips Lighting, increased prices 3 per cent for LEDs and lamp products.

The good news for optoelectronics manufacturers is that the slide in revenue and demand may be relatively short lived. In 2021, sales should increase 10 per cent to $45.8 billion as unit shipments rise 12 per cent to 281.1 billion, according to IC insights. While demand will rise, buyers can expect lead times to be mostly stable and prices will decline 1 to 2 per cent depending on the type of optoelectronic component.

The forecast assumes that containment of the COVID-19 will take hold around the middle of the year, the researcher said. "The market decline in 2020 could be greater if containment of the virus doesn't happen until later in the summer," said Rob Lineback, senior market analyst for IC insights. He said there could be stronger growth for optoelectronics if there is faster recovery from coronavirus.

The Chinese connection

China is a big market for optoelectronics accounting for about one third of all sales. The rest of Asia-Pacific accounts for about 27 per cent sales. However, even if demand begins to increase in China and other Asian countries "we do not anticipate a 'snapback recovery' in the second half of 2020 as we saw in the recovery from the financial crisis-driven industry downturn in 2009," said Lineback.

The optoelectronics recovery is expected to be more gradual with fairly strong sales and unit shipment increases in 2021. However, sales will not be "over the top as they were in 2010 when optoelectronics sales surged 30 per cent and unit volume jumped 29 per cent after 2009 declines of 5 percent in revenue but 15 per cent growth in units, he said. The increase in unit occurred in the downturn year mostly because high-brightness LEDs were emerging in display-backlighting applications, he said.

While all optoelectronic components will suffer sales declines, some parts will be more impacted than others. CCD image sensors will have the biggest decline as revenue falls 7 per cent. However, CMOS sensor revenue will drop only 3 per cent and unit shipments will be flat compared to last year, according to IC Insights.

LED lamp device sales are forecast to drop 7 per cent in 2020 to $13.2 billion and unit shipments will fall 3 per cent to 203.4 billion, the researcher said.

While the overall optoelectronics market had been growing prior to the coronavirus outbreak, most of the growth was due to a few product segments. "We had three product segments that all record revenue and double-digit growth in 2019," said Lineback. Those products include CMOS image sensors, laser transmitters, and light sensors. "But there was single-digit per cent declines

By the Numbers

Source: IC Insights

5%
The compound annual growth rate for optoelectronic components from 2019 through 2020

$44 billion
The size of the global optoelectronic components market in 2019

16.7 cents
The average price for an optoelectronic component in 2020

30%
The size of the revenue increase for CMOS image sensors 2019

$56 billion
The size of the worldwide optoelectronic component market in 2024

in other optoelectronic product segments," said Lineback.

In 2019, CMOS image sensors revenue increased 30 per cent, light sensor sales rose 32 per cent and laser transmitters revenue grew 14 per cent. However, LED sales declined 4 per cent, optocoupler revenue fell 6 per cent. CCD image sensor sales dropped 11 per cent and infrared device revenue declined 4 per cent, said Lineback.

LED supply glut

LEDs were hit by a 10 percent drop in unit purchases mostly because of the oversupply in the market, said Lineback. "There's a bit of a glut of LEDs in the market rate because of China's overinvestment. They made high-brightness LEDs a priority because they wanted to be self-sufficient. That's what drove the market in 2019," said Lineback.

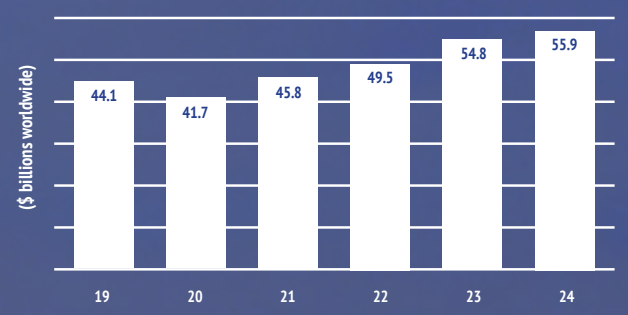
Oversupply will likely continue through the year due in part to the pandemic which slowed production in China, which means high inventory levels of LEDs will continue for a while. Most LED production in China is outside of Wuhan, Hubei province, which was the center of the outbreak. However, LED manufacturers in other parts of China could not resume full production because workers, many of whom had traveled to other regions of China or other countries for Chinese New Year, could not get back to factories because of travel restrictions. In addition, workers returning were quarantined for a period of time before they could go back to the production line, so some factories were only at 50 to 60 per cent capacity in March, according to research firm TrendForce.

While there is a lot of uncertainty in the optoelectronics market, the long-term outlook is positive and there will continue to be growth in demand and revenue for optoelectronic components.

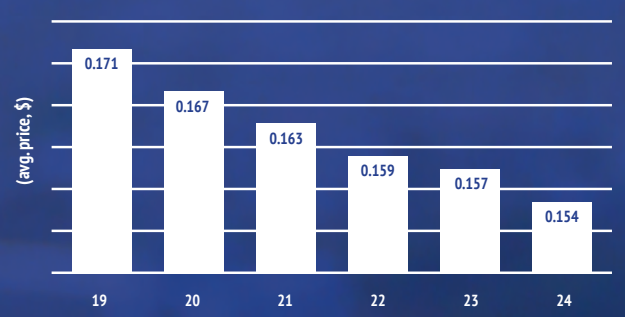
The compound annual growth rate (CAGR) for the optoelectronics revenue will be about 5 per cent from 2019 through 2024. The market will grow from $44.7 billion in 2019 to nearly $56 billion in 2024, according to IC Insights. Unit shipment CAGR will be about 7 per cent.

The worldwide optoelectronics market will decline in 2020, sales growth will return in 2021 and continue through 2024
Source: IC Insights

Optoelectronics market will bounce back



Tags for optoelectronic parts, will fall



Buyers can expect slow but steady price declines for optoelectronic parts through 2024
Source: IC Insights

One reason for the growth will be rising demand for image sensors. "The applications that are really driving CMOS image sensors are strong" and there are new applications emerging, said Lineback. Such applications include machine vision, security, video surveillance products which all use cameras that are equipped with image sensors.

In addition, more cameras are being used in smart phones. Smart phones used to have two cameras, but now more are being shipped with three or more cameras, so more image sensors are needed, he said.

Strong demand from automotive

Automotive is also using more optoelectronics. Automotive optoelectronics sales are forecast to rise 10 per cent per year from 2019 through 2024, reaching $8.5 billion, said Lineback.

"We are seeing a lot of high-brightness headlights and more image sensors being used more in automotive systems," he said. For instance , automatic braking, which prevents a vehicle from crashing, uses image sensors and more vehicles are being equipped with the safety feature.

In 2014, automotive accounted for only about 7 per cent of optoelectronics sales. In 2018, that percentage was 12 per cent. By 2024, automotive will represent about 14 per cent of our control electronic component sales, according to IC Insights.

Communications, which includes optical transmission networks and smart phones, is the single biggest customer segment for optoelectronics components representing 44 per cent total revenue. Industrial is the second biggest segment at 24 per cent. Industrial include robotics and a lot of commercial systems which use optocouplers and infrared devices and light sensors, said Lineback.

Consumer electronics accounts for about 14 per cent of sales, but it's percentage is shrinking as other segments have used more optoelectronic components.

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

Continue on page 64

Advert Index

Manufacturer	Distributor	Telephone	Website	Franchised Distributor (Y/N/M)	No. of Lines for Principle	Stock Value for Principle	Minimum Order Value	% Lead Free for Principle Range	No. of Technical Support Staff	Total No. of Staff	Pack and Hold
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
Teledyne Relays	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
ENCLOSURES											
Bud	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bud Industries	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,325	N/A	$0	80.00%	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
New Age Enclosures	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	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/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
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
Aptive (Delphi)	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Bel Magnetic Solutions	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	LEMO	800-444-5366	www.lemo.com	M	N/A	N/A	N/A	N/A	N/A	1,500	N/A
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											
	Lantek Corp.	973-579-8100	www.lantekcorp.com	M	186,000	$22M	$0	75.00%	5	62	Y
	Chip 1 Exchange USA, Inc.	949-589-5400	www.chip1.com/es	Y	850,000	N/A	$0	85%	20	150	
	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

Continue on page 66

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
Wurth	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	$0	100%	N/A	2000+	Y
Murata	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Phihong	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Phoenix Contact	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
RECOM	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
Schaffner	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	$0	N/A	50	1,000+	Y
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
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

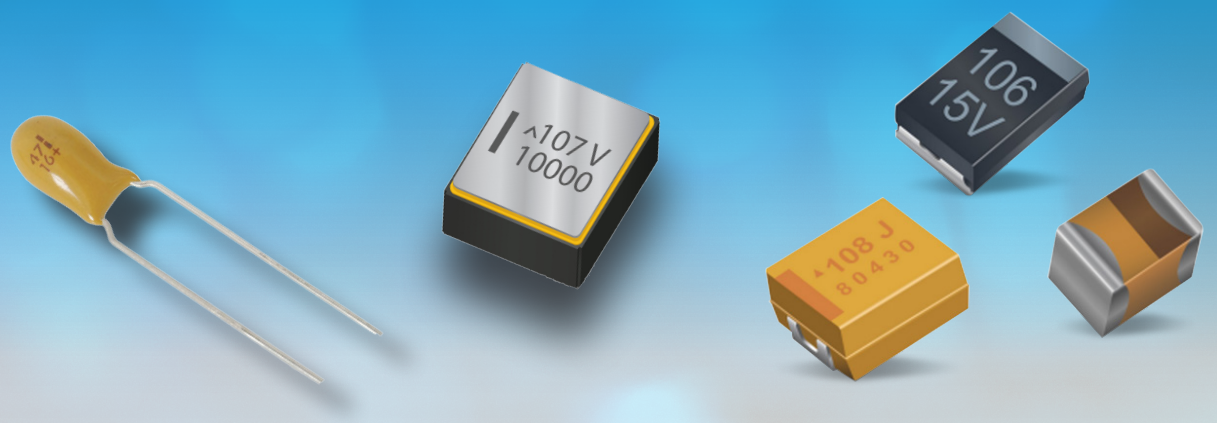
Manufacturer	Telephone	Website	Turnover	Location	Employees	Number of Surface Mount Lines	Approvals	BGA Capacity	Lead Free Manufacturer	Prototyping	Design Capability	Full Turnkey	Cables and Harnessing
Pektron	1-248-677-4838	www.pektron.com	$66m	Michigan & UK	350	8	ISO9001, ISO14001, TS16949, BEAB, VCA, TUV, UL	Y	Y	Y	Y	Y	Y

AVX® TANTALUM CAPACITORS ARE IN STOCK

LOCATED AT OUR WAREHOUSE IN TEXAS, USA

Rutronik can fulfill all your needs with our wide variety of solid tantalum, niobium oxide and conductive polymer capacitors. AVX's electrolytic capacitors are suitable for demanding applications, such as commercial, industrial or automotive.
AVX offers a wide array of product ranges that include low DCL, temperatures up to 200 °C, high CV, ultra-low profile and more.

AVX is the leading supplier of high reliability surface mount tantalum capacitors for military, aerospace and medical applications. As the tantalum technology continues to develop, we are able to offer extended ratings in our products by providing more downsizing opportunities, higher capacitance ratings, new case sizes and low ESR options.



Now available in Stock:
Standard Tantalum TAxxx | Low ESR Tantalum TPSxxx | Polymer Tantalum TCNxxx, F38xxx

For more information about AVX capacitors, visit:
www.rutronik24.com/avx_tantalum_capacitors
Tel. +1 469-782-0917 | sales-na@rutronik.com

ecia MEMBER