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SEPTEMBER 2022

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TOP 50 GLOBAL DISTRIBUTORS REPORT 2022

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Editor's Word



Energetic decades ahead

I have an odd side hobby which involves regularly checking electrical energy demand and generation around the world using a variety of real-time analytics websites and apps. Their graphical nature helps me visualise the numbers and make meaningful comparisons. Normally, this hobby simply makes me the number one bore at parties. However, with global energy in 'crisis' my fun observations are suddenly in demand.

I have no academic qualifications or practical experience in power generation (bicycle dynamo aside) so I class myself as a complete amateur. However, I think I'm reasonably observant and can do basic math.

Firstly, if you live in a large country, with a small population and access to unlimited geothermal or hydroelectric energy, you are looking good. Likewise, if you live in a country that committed to nuclear 30 or 40-years ago and stuck with the decision, you are also looking OK.

However, if you live in a landlocked country in the northern hemisphere that hasn't invested in nuclear, things might look a little different. I have no doubt the technologies required to generate, store and distribute more environmentally sound energy will evolve but I'm measuring this in decades and centuries.

Why am I bothering to discuss this in a magazine dedicated to sourcing electronic components. Well, I think its worth remembering that every component represents a 'claim on future energy'.

In my fantasy future, Thorium reactors will cover base load and hydrogen production, with wind, solar, hydro and geo filling the demand gaps.

Jon Barrett

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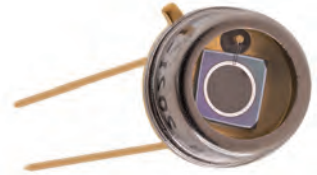


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Connect Influence. Optimize

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Power portfolio grows

Sager Electronics has added Bel Power Solutions and CUI product brands to its portfolio. BPS specializes in power products (25W to 25kW) for server architecture, storage, networking and telecommunications, while CUI offers a range of lower power (0.5 to 550W) power supplies.

Sager Electronics' supplier marketing and product manager, Kristin Bryant, said: "Already the largest distributor of power supplies in North America, the addition of these brands enables Sager to offer our customers an even broader specialized power product offering." Bel Power Solutions and Protection's president, Dennis Ackerman, added: "Sager's expertise specifying and selling

power supply products, coupled with their customization and value-add capabilities, makes them an ideal distribution partner for our Bel Power Solutions and CUI product lines. We look forward to our expanded relationship with Sager in developing new power customers with Bel's wide and diverse product offerings."

www.sager.com

Photodiodes and cells in stock

Mouser Electronics has announced a new global distribution agreement with Advanced Photonix, a provider of photonics, optoelectronics and electronic systems for aerospace, defense, medical and industrial OEMs. Mouser is stocking the company's silicon, InGaAs PIN, APD photodiodes and hybrids and CdS LDR photocells.

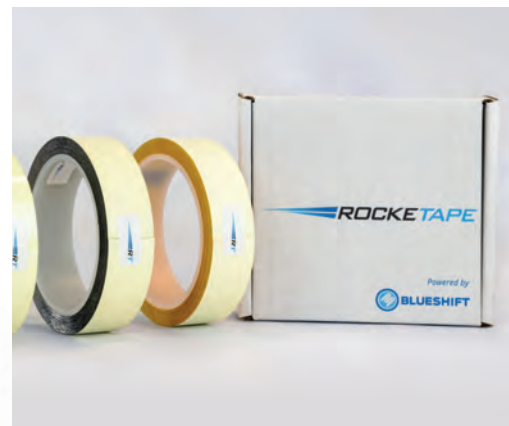


Advanced Photonix designs, develops and fabricates photodetectors, emitters and photoresistors. With in-house semiconductor fabrication services, the company offers 30-years' experience in optoelectronics.

UV enhanced silicon photodiodes are designed to offer a high-performance, cost-effective solution for applications requiring highly sensitive devices in the UV region. The component features low noise, high shunt resistance and increased response with an active area diameter of 2.54mm.

Red enhanced PIN and quadrant silicon photodiodes are available in various features and packages for a range of applications. The company states the devices feature high accuracy with a large active area and low crosstalk, ideal for accurate nulling, centering or measuring small positional changes.

www.mouser.com



Insulation tape handles the heat

Digi-Key Electronics is now offering a selection of RockeTape structured air thermal insulation tape. RockeTape products use Blueshift's patented AeroZero structured air polymeric aerogel technology to deliver a combination of low thermal conductivity and diffusivity.

This line of thin, lightweight thermal insulation tape is designed to deliver peak performance in demanding applications on or off planet. Its structured air aerogel composition is engineered to deliver superior thermal insulation performance and protection compared to traditional polyimide film tape.

Digi-Key senior product manager, Anissa Lauer, said: "We are always looking for ways to bring the latest advancements of thermal insulation technology to our customers. Blueshift will help Digi-Key penetrate market segments that have a need for an insulative as well as a high temperature tape."

Blueshift's president, Tim Burbey, added: "With our RockeTape launch, we needed a partner capable of matching our passion, commitment and reach. Digi-Key Electronics' reputation as the most advanced and comprehensive marketplace for electronic components means our products will be placed at the epicenter of the component marketplace."

www.digikey.com

It's The Human Component that sets TTI Apart

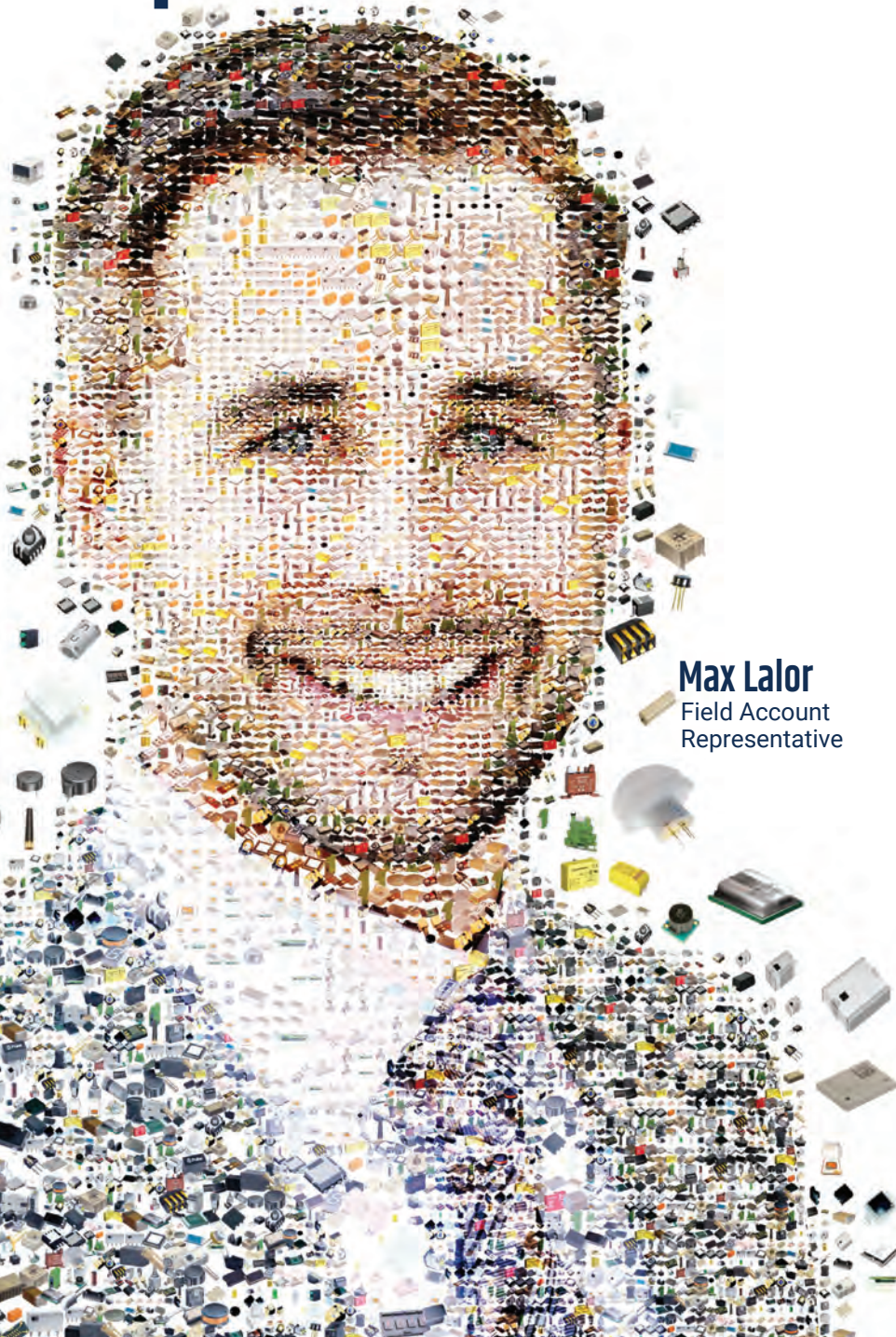
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In Brief

Atomic purchase

Naprotek has acquired MicroFab, a provider of precision RF circuit fabrication and atomic-level micro machining services. The company provides ion beam etching, plating, dicing and micro-machining services and thin film components for communications, microwave, biomedical sensors and fiber optics applications serving the defense, medical and telecom markets.
www.naprotek.com

Terminals for lawn equipment

ETCO Incorporated has introduced a line of standard and custom electrical and electronic connectors and terminals for gasoline and battery powered lawn and garden equipment. The products are manufactured in the USA to eliminate OEM delivery lead time issues. Items include spark plug terminals, boots, heavy rings and PCB/insulated/custom connectors and terminals.
www.etco.com

Rectangular QR code

Denso has introduced the rMQR Code—a rectangular micro QR code. It can be printed in long, narrow spaces, while retaining the scan speed and data capacity of a conventional QR Code. The code stores up to 361 numeric characters, 219 alphanumeric characters or 92 kanji characters. The code is ISO certified.
www.denso-wave.eu

In-mold update

Profile Plastics has become a TactoTek Design and Innovate licensee, with rights to design and produce in-mold structural electronics solutions that use TactoTek intellectual property, creating a complete IMSE supply ecosystem in North America. Profile Plastics supplies precision film-insert-molded parts to automotive OEMs and their tier one and two suppliers.
www.profilemn.com



IGBTs: reliable supply, reduced lead times

Bourns has entered the insulated-gate bipolar transistor (IGBT) market with the company's first high-efficiency 600/650V discrete product line co-packaged with a fast recovery diode.

Designed using advanced trench-gate field-stop technology that provides greater control of dynamic characteristics, the five new BID Series discrete IGBTs are engineered to deliver lower collector-emitter saturation voltage (VCE(sat)) and lower switching losses compared to previous generation non-punch-through IGBTs. In addition, this structure provides a positive temperature coefficient that helps increase device longevity and reduce power requirements in high voltage and high current designs.

Because Bourns' new IGBTs are available in thermally-efficient TO-252, TO-247 and TO-247N packages, these devices can provide a lower thermal resistance Rth(j-c), making them ideal solutions for switch-mode power supplies, uninterruptible power sources, induction heating and power factor correction applications.

Offering four voltage/current model options in 600V/5A, 600V/20A, 600V/30A and 650V/50A, BID Series discrete IGBTs have been tested and qualified according to JEDEC standards for power switching products.

www.bourns.com



SBC takes on tough tasks

Newark is now stocking DFRobot's LattePanda 3 Delta single board computer. The board is a pocket-sized hackable computer (125 by 78 by 16mm) which supports Linux, Windows 10 and Windows 11.

Newark's head of single board computing, Romain Soreau, said: "LattePanda 3 Delta is poised to define a new era of computing and will be a driving force behind new levels of creativity for developers, tech enthusiasts and industry innovators. Designed as the world's most compact SBC, LattePanda 3 Delta is an exceptional board for space constrained applications which require high performance such as AI localization, robotics, smart factory, home automation, gaming and handheld devices."

LattePanda Team's CMO, Sandy Zhang, added: "LattePanda Team is very proud to cooperate with Newark/Farnell on this launch. It delivers an exciting message to our customers that they can immediately acquire our high-performance and hackable LattePanda 3 Delta anywhere in the world. Our collaboration ensures we can provide even higher levels of customer service."

www.newark.com

Applauding semiconductor support

SEMI has applauded the signing of the CHIPS and Science Act of 2022 by US President Joe Biden. The legislation provides a 25 per cent tax credit for US facilities that produce semiconductors or chipmaking equipment and \$52 billion in funding for new semiconductor programs. The funding includes \$39 billion for grants available to chip manufacturers as well as semiconductor equipment and materials suppliers and \$11 billion for federal semiconductor research programs.

SEMI president and CEO, Ajit Manocha, said: "The CHIPS and Science Act secures landmark investments to bolster semiconductor manufacturing and R&D infrastructure as

well as a wide range of ancillary industries in the United States. We thank President Biden, Secretary Raimondo, the original CHIPS Act sponsors, leadership in Congress and the committees of jurisdiction for their support in enacting the investment tax credit and funding for CHIPS Act programs.

"SEMI looks forward to continuing collaboration with the US government and our member companies to ensure timely implementation of these programs to strengthen the US semiconductor supply chain."

www.semi.org

Connector issues: when supply chains break

Sager Electronics' director, supplier marketing and product management, David Smith, explores solutions to connector supply chain bottlenecks, including 3D printing services

Electronic systems designs pose many challenges and the impact of the recent raw material shortages and supply chain disruptions haven't helped. Supply chain issues can haunt a product even after the initial design and prototype are complete, and the current interruptions are impacting availability from specialty products to commodity parts alike.

While many types of connectors are considered commodities and the interchangeable nature of the product due to uniformity in form, fit and function lends itself to second sourcing, interconnect devices are no exception to the current challenges. Finding alternatives isn't always a simple or easy solution given certification and approvals, specific design requirements and material flexibility. Additionally, extending lead times—and in some instances, no defined lead times at all—leaves purchasing and design engineers scrambling to find the right connector for their design.

Lead times on just about everything are extending, even to the point of being unable to deliver. In the past, though rare, the Force Majeure clause would kick in, where both parties are free from liability and obligation when

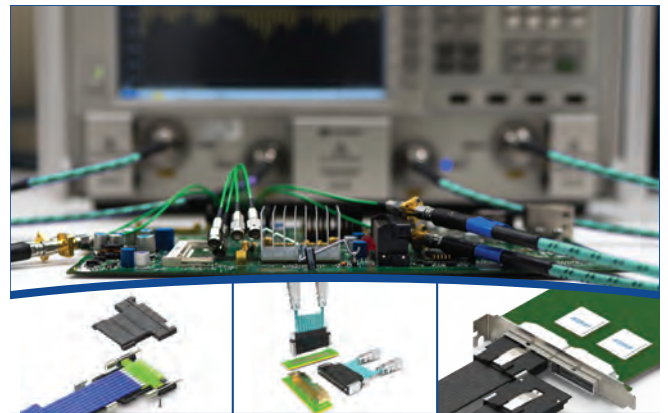
extraordinary events occur beyond anyone's control. Today, though, it is commonly employed as parts shortages make deliveries impossible and purchasing faces the unenviable task of procuring materials that just aren't available. Not only are suppliers listing longer lead times, but in many cases, they are listing 'no possible dates', meaning they can't tell when parts will ever be in the pipeline.

To make matters worse, counterfeit parts using inferior materials can suddenly appear to come to the rescue. This option should always be avoided because poor quality can affect performance and important product warranties may be invalid. This is especially true in critical applications like medical devices, radar or equipment in hazardous environments, where these inferiorities can be fatal.

Searching for a connector alternative requires considering both halves of the specification to provide the greatest flexibility while ensuring intermateability. OEMs need to work closely with their sources as cables must mate to whichever receptacle is used on the PCB or chassis. This is all the more critical if the application requires extensive

certification and approval processes. For example, military and medical designs cannot easily substitute parts without going through costly and lengthy recertification.

Sager Electronics' director, supplier marketing and product management, David Smith



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This is also true if working with a contract manufacturer: they may offer alternative sources, but those recommendations must also be verified for form and fit. This can halt entire product lines until validations and paperwork are in place.

Designers can either choose identical sources or place redundant footprints on the PCB. This way, the available part is used at the alternate location, although this may present challenges for the mechanical case or enclosures, especially for products that must adhere to pressure and water-tight specifications. Along

this same approach, many OEMs are taking the extra time when working on a new design to ensure there are at least two sources for the connector. Where before it wasn't critical, the extra time on the front end can help avoid delivery interruptions down the road.

In a critical line down situation, design engineers may need to rethink their requirements. For instance, is there flexibility with color? Choosing between different housing colors, using a non-latching/locking option when the latching option is specified, or using un-

shrouded headers in place of shrouded headers may make the difference. Is there flexibility with contact metals? Using tin plating versus gold plating on the terminals or a standard plastic versus 94V-0 rated plastic may be an option, while adding one's own metallic adhesive shielded shroud may eliminate the metal hood constraint.

Another long-term solution that piggybacks onto the services offered by distribution is to use 3D printers to make approved connectors in conjunction with the manufacturer. If material science can offer

printer plastics, metals and pins, a well-positioned distributor can fill the void.

The sooner options are reviewed with the OEM's engineering team the better. Take extra time to work closely with suppliers and distribution when working on a new design. Strategic partnerships with distributors and tapping into value-added services can better assure scheduled shipments while avoiding future delivery interruptions and reducing costs for manufacturers.

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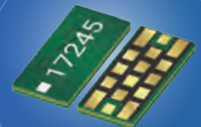
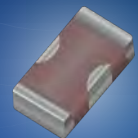
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Transportation • By John Denslinger

Will transport undermine supply continuity?



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 asks whether America's transportation links could undermine supply continuity just when the electronics industry needs it the most

There is an old adage describing resilience and persistence in the face of adversity: 'bend, not break'. Unfortunately, when it comes to global supply lines, the opposite seems our destiny: 'break, not bend'. US global supply chains once considered the ultimate in cost effectiveness, flexibility and reliability are procurement headaches. Today, nothing seems normal or consistent about everyday movement of raw materials, supplies and finished goods.

How robust are America's transportation links? A supplier's lifeline relies on transportation certainty whether it's ports, rail or truck. One might ask if supply lines built on multi-mode transit are a liability. In hindsight, the west coast port congestion at the beginning of the Covid era might have been the first indicator given: massive queues at seas; off-loading delays measured in months not days; disruption to the efficient recycling of containers and cargo ships; and a system seemingly overwhelmed as consumer demand continuously escalated throughout the pandemic.

To their credit though, ports still handle record imports. Regulatory relief from both Federal and California governments eased the logjam. Now, two years later, the current West Coast Port labor contract has expired with no agreement in place. Each has agreed to forego sanctioned work stoppages (union authorized strikes and management induced lockouts), but that still doesn't rule out slowdowns and shutdowns. Until negotiations are settled, this link is potentially disruptive.

Air transport aside, goods move about the continent by railroads and trucks to intermediate and last mile destinations completing the classic multi-mode transportation system. Question: is it likely rail and/or trucking will become the next weak link upsetting supply continuity?

Railroads: as West Coast port negotiations continue, the same is also true for railroads. Hopes of resolving

contract differences between the railroad unions and a management consortium have failed over the past two years despite multiple mediation and arbitration attempts. In July, President Biden found it necessary to appoint a Presidential Emergency Board (PEB) under the Railway Labor Act facilitating contract settlement. A couple of 30-day cooling off periods mandated by law, as well as the ever-present Congressional intervention forcing binding arbitration almost assures there won't be any organized disruption. Rail is probably not a weak link.

Trucking: the issue here is quite different and volatile. There are two issues. The first is specific to California law AB5, better known as California's gig worker law. While the law intended to regulate gig economy platforms like Uber, Lyft and DoorDash, it also snared 70,000 truckers who work as independent contractors. Despite appeals for reconsideration, the State has not been inclined to make the exception. In protest, independent truckers shutdown the Port of Oakland, the eight largest in the US. Similar, smaller protests have taken place at ports in Long Beach and LA. The combination of trucker blockades and dockworkers electing not to enter terminals is crippling Oakland Port productivity. The second issue is also central to California: as of January 1, 2023 a ban on diesel trucks with engines made before 2010 goes into effect. The new law, CARB's Truck and Bus Regulation, will make an estimated 80,000 trucks illegal in California. A prolonged truck shortage could make trucking the least reliable and weakest link of the three.

Are the transport issues described above solvable?

Yes, but settlements across so many domains is never quick, never easy. Until there is complete resolution, America's transportation links could undermine supply continuity just when we need it the most.

HEDGING YOUR BETS: HOW A STRATEGIC SUPPLIER RELATIONSHIP CAN BOOST YOUR BUSINESS

Has your business been struggling with supply chain challenges? You're not alone. As shocks have led to far-reaching consequences for business leaders and consumers, supply chain management is headed for a reset.

Demand for semiconductors has risen while supply has dwindled due to limited production capacity. Products like electric vehicles were heavily impacted by shortages, and many EV-makers slashed production timelines due to unstable supply and inflated prices.

Avoiding such outcomes can be difficult, but there are strategies to stabilize resources and alleviate supply chain disruptions. Forming strategic supplier relationships can lessen the burden on manufacturers and suppliers alike. However, like every good relationship, such arrangements are reciprocal and involve mutual effort.

How to Build a Strategic Partnership

Before entering a partnership, each side should clearly state their goals. Relationships between suppliers and manufacturers, or buyers, should build trust and provide equal benefits. Both sides must be prepared to follow through on commitments.

Sentiment is also an important ingredient in a strategic partnership. Each side should express a willingness to maintain a partnership and contribute to their partner's success.

Lastly, an agreement defining the parameters and expectations should be put in place as a reference for both parties.

Starting with these conversations sets the tone for good communication, ensures future transparency and encourages long-term stability.

The Advantages of a Strategic Relationship

In times of supply constraints, casting a wide net can be tempting, but this approach is ultimately counterproductive. Working with multiple supply sources can heat up the market

and cause inflation, which negatively affects manufacturers and suppliers. Maintaining a committed singular partnership with a vetted, small group of suppliers is the simplest and most cost-efficient way to weather a volatile market.

Supplier Benefits:

- **Forecast commitments:** Manufacturers can provide suppliers with estimates for product launches, making allocation assignment easier.
- **Enhanced feedback:** Receiving informed comments on procedures and products improves supplier's offers.
- **Steady revenue stream:** Predictable financials help suppliers achieve fiscal targets.
- **Price assurance:** Manufacturers can strengthen their relationship with suppliers by extending rebates based on the volume of spend or market share, grant suppliers right of first refusal, and provide flexible timelines for review processes.

Buyer Benefits:

- **Improved responsiveness:** Buyers should receive timely responses since having a dedicated sales representative streamlines communication.
- **Guaranteed supply availability:** Suppliers can offer first and last looks at opportunities which can result in more efficient lead-time quotes. This gives manufacturers an advantage over the competition.
- **Price efficiency:** Working with a dedicated supplier reduces opportunities for bidding wars, keeping prices affordable.
- **Quality assurance:** Ensuring suppliers have an adequate quality assurance process builds trust and strengthens the relationship through consistent delivery of functional products.

Preventing Partnership Pitfalls

Keeping benefits equal is the best way to maintain a strategic supplier relationship. To keep the faith, both parties should continually meet expectations, evaluate risks and reap equal advantages. Best practices should include scheduling periodic business reviews to assess performance and specify action items. Reestablishing expectations on a regular basis helps align mutual goals, ensuring lasting success.





Inventory correction: How will distributors fare?

Distributors must proceed with caution and prepare strategic inventory management tools to deal with conflicting information about demand-supply patterns

The inventory story has changed dramatically in the electronics industry. The year opened with semiconductor suppliers unable to meet OEM component demand as extreme shortages crimped sales in almost all segments of the industry. A different scenario is emerging today.

As if by magic, the shortages have been replaced by inventory overage. Semiconductor industry executives say they have begun working with OEMs to draw down inventories and are warning that they have seen signs of double-ordering cropping up in many markets, and especially in the automotive IC sector.

Whittling down the inventories will require the assistance of component distributors, specialists who have extensive experience in managing the industry's notorious boom and bust cycles, according to observers. Their assistance may not be needed right now in the automotive industry. But while distributors service automotive OEMs they typically do not play as dominant a role in the sector as they do in other markets, including embedded solutions, memory and data storage, medical and industrial markets.

OEMs leaned heavily on distributors over the last couple of years as they strived to reduce the negative impact of the severe shortages on their operations. Distributors assisted in sourcing scarce components,

managed vendor lists and tight supply chains, provided insights into the dynamics of supply-demand conditions and were pulled into planning sessions for future production requirements.

Those were the brightest moments for distribution during the nightmarish shortages that followed the outbreak of Covid-19 two years ago, industry executives said. They worked with component suppliers, OEMs, and electronics manufacturing services (EMS) providers to develop a better understanding of the demand environment and the tools required to smoothen out wrinkles in the supply chain.

Digi-Key Electronics, for example, collaborated with suppliers to beef up their technology requirements and expanded its own fulfillment capabilities to meet changing customer needs, according to Dave Doherty, president, and COO of the company.

"As many of our suppliers learned over the past few years, it's paramount to invest in the development of your technologies. It's the one thing you do that nobody else can do," Doherty said, in an article recently posted on LinkedIn. "We're continually investing in our core capabilities, like fulfillment, and making those world-class logistics available to all of our valued suppliers."

Doherty could not be immediately reached for further comments, but the company

"There isn't a company I know of that isn't on some type of 'digital transformation path'"



Dave Doherty, president and COO, Digi-Key

has recently expanded its distribution center to "reduce turnaround time and boost same-day fulfillment to customers." The new distribution center of 2.2 million sq. ft. serves customers globally and is equipped with an automation system that can select the required 7.5 inch paper tape multiple times over the old process, according to Doherty.

"This expansion will dramatically increase the amount of space available for storing existing and new products," Doherty said, in his report. "There isn't a company I know of that isn't on some type of 'digital transformation path. As a recognized leader in e-commerce with a strong desire to enhance the customer's online experience, we are offering services and products to accelerate your journey."

Better service, higher ROI

Additions like the ones made by Digi-Key to fulfillment capabilities will be sorely tested over the next several quarters. OEMs are reporting swollen inventories, which will need to be trimmed down, a process industry sources say has already started. The impact of the ongoing inventory liquidation has already showed up in reduced sales at some semiconductor vendors. Others anticipate the effects would be more evident in the current quarter and stretch towards the end of the year.

Intel Corp. is in the first category. The company said it was hit in the second quarter by severe inventory adjustments and has been collaborating with customers to mitigate the



impact on their operations and its own sales. The change happened unexpectedly and so quickly that Intel had limited time to respond, according to CEO Patrick Gelsinger.

“We were well into the quarter, and we saw the market characteristics change quite suddenly, and that resulted in ... significant inventory adjustments,” Gelsinger said, in a discussion with financial analysts. “We worked with our customers on those inventory adjustments. As we said, these are like once in 10-year kind of inventory adjustments, because the customers were working through the quarter, catching up to demand that was short for years. We saw that they took quite significant adjustments to their inventory positions.”

The challenge varies from one company to the other. Some suppliers are struggling with ballooning inventory for which they would require distribution assistance to pare down while others—especially chipmakers serving automotive OEMs and Tier-one suppliers—are still focused on tightening up the demand-supply gap.

European chipmaker STMicroelectronics experienced long lead-times in the second quarter and does not anticipate running into inventory problems

soon. The company relies heavily on component distributors and sells as much as one-third of its products through the channel. It posted strong results in the second quarter but noted that inventories rose to \$2.31 billion, from \$1.97 billion, in the comparable year-ago quarter. Distributors accounted for 35 percent of sales during the just-ended quarter, down slightly from 36 percent, in the second quarter of 2021 as direct sales to OEMs took a larger chunk of revenue.

Due to strong sales and high order levels, ST believes inventories at its distribution partners remain “lean” in key markets, including in the automotive supply chain and industrial sectors. Even so, the company said it holds frequent discussions “every day, every week” with customers and distributors to match their needs with its supply capabilities. The company is wary because it has “detected potential double ordering” at least in the automotive segment, according to Jean-Marc Chery, president, and CEO of ST, in comments at a quarterly meeting with analysts.

“The inventory level at our distributor is lean,” said Chery. “There is still potential for inventory replenishment that we are not capable to do at this present time.”

STMicroelectronics sales by market channel

Net Revenues by Market Channel (%)	Q2 2022	Q1 2022	Q4 2021	Q3 2021	Q2 2021
Total OEM	65%	66%	67%	68%	64%
Distribution	35%	34%	33%	32%	36%

How will distributors fare in this uncertain situation? The limited and often conflicting information coming out of suppliers and customers will only complicate the challenges they face but actions taken in the past to get a handle on actual industry demand patterns will help mitigate the problems. Distributors took care during the Covid-19 pandemic fueled supply shortages to collaborate closely with customers to ensure a better reading of actual demand and supplier capabilities, according to executives.

While they invested in inventory during the shortages, they also took steps to insulate themselves financially from the added responsibility by transferring most of the burdens of supplier commitments to OEMs. Distributors like Avnet said they could have moved more inventory at the beginning of the year when demand for components was well ahead of supplies.

At the end of the first quarter, Phil Gallagher, CEO of Avnet said the company was “fine with the inventory going up” because at the time, “a lot of pain [was] in the supply chain.” It will take a few more months before distributors can determine how much of the inventory overload that is now being reported by semiconductor vendors will trickle down to the channel

and what actions they would be asked to take to reduce the impact on OEM sales.

What is obvious is that inventory management requires different strategies during periods of shortages and fast growth compared with times of slowing demand, uncertainties, higher inflation, and tight fiscal monetary management policies. Electronic companies across the entire supply chain stocked up on components voraciously during the last two years to benefit from the increased demand and improved pricing conditions but as growth continues to slow down globally, the same distributors who helped manage the upcycle will be called upon to help with efforts to trim the fat and return the market to demand-supply equilibrium.

How prepared are they to assist in this exercise and what will it do to their own financial performance? These are important questions, but we may not have answers until towards the end of the year when OEMs, component suppliers and distributors have more accurate data on actual demand and match this with stock levels across the channel.

Until then, the industry will rely on anecdotal information and proceed with caution.



“There is still potential of inventory replenishment that we are not capable to do at this present time”

Jean-Marc Chery, CEO, ST



Diodes protect automotive data interfaces

Nexperia has extended its portfolio of ESD protection diodes which is designed to protect high-speed data lines such as USB 3.2, HDMI 2.0, LVDS, automotive A/V monitors, displays and cameras. The portfolio also aims to address upcoming high-speed video-links as well as OPEN Alliance MGBit ethernet applications.

Latest additions include PESD5V0C1BLS-Q and PESD5V0C1ULS-Q, both two-pin single line devices with compact DFN1006BD-2 package for optimized routing flexibility. Also, PESD5V0C2UM and PESD5V0C2UM-Q are available as three-pin devices for both differential lines in DFN1006-3. All variants come in leadless packages to improve electrical performance and signal integrity.

Electrostatic discharge voltage clamping diodes protect data interfaces in automotive subsystems from damage. However, they must not degrade data signal integrity or negatively impact the EMC performance of the system. Nexperia states its long-standing expertise in the design of ESD protection solutions has allowed these diodes to provide best-in-class signal integrity performance because of their ultra-low device capacitance: as low as 0.3pF.

nexperia.com

Ferrite beads first to achieve 20A

Murata's new BLE32SN series of chip ferrite beads is claimed to be the world's first chip-type noise suppression components to have 20A current rating. Applications include noise suppression in circuits with large current flows, such as the battery charging systems and powertrains of electric vehicles, plus industrial equipment.

Previously no chip-type noise suppression filter could attain a 20A rating. This meant multiple chips had to be mounted in parallel, adding to BoM costs and taking up board space. By specifying the BLE32SN series, fewer chips will be required (compared to standard 10A noise suppression chips), enabling space savings and weight reductions.

BLE32SN series ferrite beads measure 3.2 by 2.5 by 2mm. Operating temperature range is -55 to 125°C or -55 to 150°C depending on application requirements.

www.murata.com



High power fuses meet UL248-13

Bourns has expanded its POWrFuse high power fuse product family with the PF-F and PF-M series high power rating industrial fuse links specially designed to meet the UL248-13 semiconductor (aR) standard. These fuses help protect sensitive power semiconductor devices against overcurrent events in power inverters, converters, rectifiers, AC/DC drives, UPS systems and reduced voltage motor starters.

The PF-F series features 800VAC/VDC voltage, power ratings from 50 to 400A and up to a 100kA@800 VAC and 50kA@800VDC interrupting rating. The PF-M series provides 240VAC/150VDC voltage, power ratings from 50 to 180A and up to a 160kA@240VAC and 50kA@150VDC interrupting rating.

Both series are bolt mounted, offer fast-acting protection under fault current, low resistance and power loss and have an operating temperature range of -55 to 125°C. They are UL recognized to help OEMs save qualification time, while enhancing quality and reliability.

The series is available now and RoHS compliant and halogen free.

www.bourns.com



Rapid energy boost

Würth Elektronik has introduced a new class of electrical double layer capacitor (EDLC) supercapacitors with snap-in terminals. WCAP-SISC capacitors

are available with capacitance values of 100F and 350F, suited to applications with high power and high energy requirements such as UPS or energy storage solutions. They can be used in smart metering devices, network components or energy harvesting applications and the like. Rated current is up to 75A.

The far higher energy density compared with conventional capacitors has made double-layer capacitors an environmentally friendly alternative to batteries. Compared to li-ion batteries, the supercapacitor with activated carbon technology offers benefits including: fast charging, service life of 500,000 cycles and lower fire hazard. Rated voltage is 2.7V and operating temperature range is -40 to 65°C.

The supercapacitors are available from stock without a minimum order quantity and free samples can be ordered online or through a representative.

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Boost Efficiency and Decrease Costs with APIs

by Nathan Pray, manager, digital technology office – B2B, and Stéphane Ratelet, director, business development/digital solutions - EMEA, at Digi-Key Electronics



Nathan Pray, manager, digital technology office – B2B



Stéphane Ratelet, director, business development/digital solutions - EMEA

Speed and access to information and data are critical in all forms of electronic product design and procurement, and an organization's time-to-market can mean the difference between a successful and marginal product acceptance. That's why Digi-Key developed the most advanced, complete suite of real-time APIs, completely free of charge to customers.

API solutions will likely be one of the most disruptive innovations in the electronics market during the next five to ten years, thanks to the benefits they provide to the procurement process. Digi-Key's API solutions provide a digital platform with a competitive advantage to customers. By streamlining

the purchasing process, APIs enable procurement, engineering and design teams to all receive critical real-time information on products they need at lightning speed through automated machine-to-machine connections. Customers using Digi-Key's API solutions save time and bring products to market faster and more efficiently, boosting revenue.

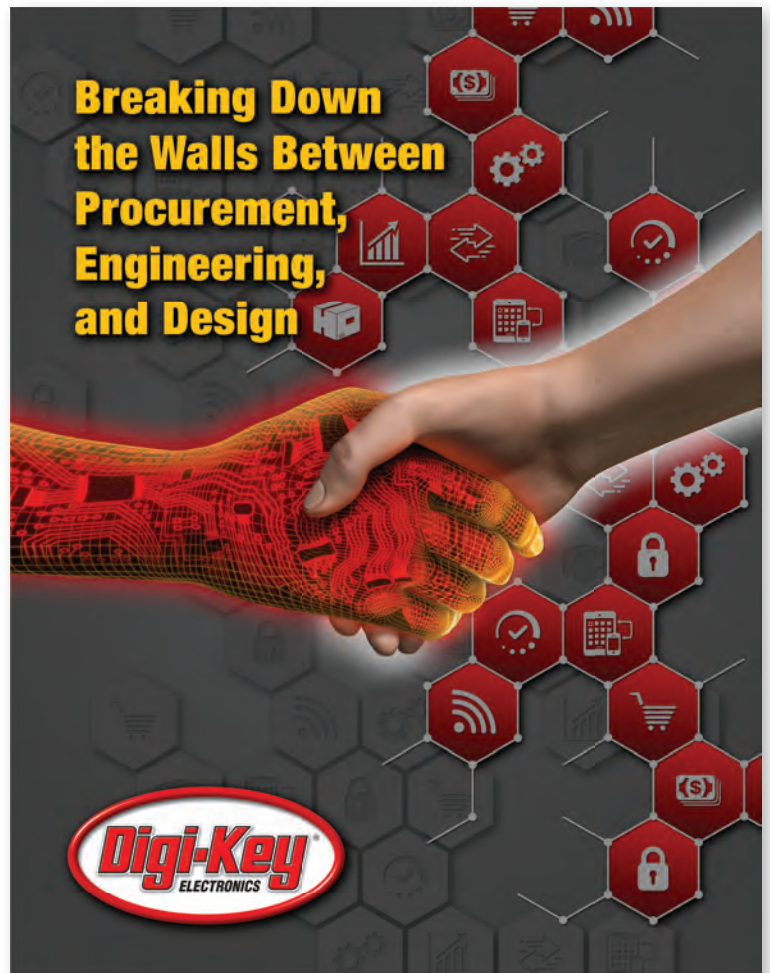
The APIs are free to use and allow customers to connect directly to Digi-Key systems to access automated, real-time product search, price and availability, quoting and ordering, barcoding, product change notifications and more. Digi-Key also collaborates with exceptional integration partners to provide customers with cost-effective and fast options to connect to Digi-Key's API solutions with less development investment.

Digi-Key further provides an ROI calculator that estimates how much you can save in one year by implementing Digi-Key's price and availability and ordering APIs. Customers have seen an average of \$50,000 to \$100,000 in cost savings by implementing API solutions.

In addition to real-time price and availability from Digi-Key's product information APIs, Digi-Key's quote

API secures pricing for 30 days, enabling purchasing professionals to experience a smoother ordering process with more efficient quoting and real-time data on demand. Digi-Key customers can have confidence in the prices they are quoted and do not need to invest in extensive software development to leverage the technology.

For more information about Digi-Key's API solutions, visit www.digikey.com/API to download a free eBook on the benefits of implementing API solutions and use the ROI calculator to see the return on investment that implementing APIs can deliver.



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Global distribution achieves exciting 2021 growth

In this article, ECIA's chief analyst, Dale Ford, updates unique research on the top worldwide authorized distributors

This report is the first update to the true original *Top 50 Worldwide Authorized Distributors* research that was published for the first-time last year. Once again, the goal of the research conducted to develop the data presented in this article is to include the

major authorized distributors from all three regions. Given, the dominating presence of Asia as a distribution market, a second goal was to provide total revenue data for the top electronics component country markets in Asia. According to the research presented in this article, Asia increased its share

of the worldwide market of the top 50 authorized distributors to 75% in 2021. The Americas and EMEA distribution markets see their share of the worldwide market continue to shrink as they come in at 13.6% and 11.4% respectively. In addition, 36 out of the top 50 authorized distributors



Dale Ford - ECIA chief analyst



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are headquartered in Asia and account for 61% of distribution revenues in this analysis.

The publication of this update is part of the plan to continue to develop additional research on the electronic component distribution markets. ECIA provides its members and the industry with a wide range of highly valuable research including detailed sizing of component total available market (TAM) and distribution total available market (DTAM) for the Americas, EMEA and Asia for selected key categories. In addition, it provides data on component lead times, bookings trends, electronics component industry sentiment, best practices for key distribution activities and more.

The top 50 worldwide authorized distributor research methodology and results

As noted in the original publication of top 50 worldwide authorized distributors, the task of identifying and sizing the top authorized distributors around the world presents significant challenges beyond the research developed for

the Americas authorized distributor data. For example, participation in surveys by industry companies is a well understood practice (if not always supported) by Americas and European companies. The same is not true in Asia where personal relationships

and communication are key to gathering helpful information. Surveys have a very low participation rate in Asia. In addition, most companies headquartered in China are private and not easily accessible for communication.

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During this challenging period of supply chain issues across the industry, Mouser teams are doing a great job trying to stay ahead of product availability

issues. Some sources are very limited in their component offerings, but that's not the case with Mouser. The company's wide breadth of inventory allows choices and alternative solutions for customers. Along with a focus on new product introductions, Mouser continues to expand its industry-leading website, mouser.com, with search enhancements, tools and technical resources for buyers and engineers.

No more important than ever, buying from an authorized distributor today is the only way to eliminate the risk of counterfeit or gray market products. With product supply shortages impacting many sectors, it has never been more critical to select genuine products that are 100% certified and fully traceable from each manufacturer.

As an authorized distributor with a commitment to

customer service excellence, Mouser offers 27 global Customer Support Centers and has the professionals, products and procedures in place to assist throughout the design and buying process.

Mouser also offers a full suite of online tools to help simplify the purchasing process, such as the Price and Availability Assistant, which makes online buying quick and efficient. It's the latest addition to a library of productivity and pricing tools from Mouser that includes the FORTE intelligent BOM tool, ECAD design resource solution, inventory management tool, API services and order automation, all accessible through the website.

www.mouser.com/servicesandtools/

By the Numbers

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ESNA Editorial features list for the first half of 2023

	Features*	Special Focus	Show Previews	Deadlines
January <i>Extra distribution at APEX, San Diego, CA</i>	Connectors, Crystals & Oscillators, Counterfeiting, Circuit Protection	Critical Supply Chain Strategies	APEX Expo Show Preview	Editorial: 12/02/22 Advert: 12/09/22 On Desk: 01/04/23
February	Diversity, Obsolescence, EMS, Printed Circuit Boards	Marine, EV Charging		Editorial: 01/06/23 Advert: 01/11/23 On Desk: 02/03/23
March <i>Extra distribution at APEC, Phoenix, AZ</i>	Enclosures, Power Supplies & Batteries, Semiconductors	Aerospace	APEC Show Preview	Editorial: 02/03/23 Advert: 02/08/23 On Desk: 03/03/23
April <i>Extra distribution at DEL MAR Electronics Show, San Diego, CA</i>	Connectors, Apps, Development Kits, Embedded Systems	Industry Trends	EDS Preview DEL MAR Electronics Show Preview	Editorial: 03/06/23 Advert: 03/09/23 On Desk: 04/03/23
May <i>Extra distribution at EDS, Las Vegas, NV</i>	Cable & Wire, EMS, Harsh Environment, Programming	Top 50 NA Distributors Report		Editorial: 04/07/23 Advert: 04/12/23 On Desk: 05/04/23
June <i>Extra distribution at Sensors coverage, Santa clara, CA</i>	Power & Batteries, Logistics, Obsolescence, PCBs	Transport	Sensors Coverage Show Preview	Editorial: 05/05/23 Advert: 05/10/23 On Desk: 06/03/23

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TTI, Inc. has built a global reputation as a distribution specialist not only because of the company's focus on quality, but because of "the Human Component" – hardworking, knowledgeable people who are committed to delivering quality to the manufacturers they serve. Fulfilling the vision of the company's late founder, Paul Andrews, TTI's core goal has remained the same ever since its founding in 1971: to be the best, rather than the biggest, distributor of interconnect, passive and electromechanical components.

TTI is known for building close relationships with customers, as well as for deep knowledge of industry trends and technologies.

These differentiators allow the company to understand and meet today's changing landscape of supply chain and manufacturing challenges.

With a distribution network that achieves greater than 98 percent on-time delivery, TTI's reputation for quality and service consistently earns awards and recognition from both customers and suppliers.

A short drive from TTI's corporate headquarters in Fort Worth, Texas, is the heart of the company's operations in North America, the recently-expanded Paul E. Andrews, Jr. Distribution Center. Miles of conveyers connect the facility's shipping, inventory and receiving sections, while

dedicated spaces serve cut reel warehousing and production, as well as value-added customization of various circular and D-sub connectors for the military and aerospace market.

Globally, TTI, Inc. services customers through more than two million square feet of dedicated warehouse space, housing over 850,000 component part numbers. This global distribution effort is measured by a total quality program to ensure the right parts reach the right place, at the right time.

In addition, TTI works to maintain a broad and deep inventory of components, which in turn helps buffer customers from swings in lead times and other turbulence

in the global electronic components supply chain.

With strong partnerships and a dedication to quality, TTI has grown to become the connectors, passives, discretes and electromechanical components distributor of choice for many industrial, military, aerospace and transportation manufacturers worldwide.

tti.com



Given these and other issues, the methodology pursued for this research needs to be briefly explained again.

1. Surveys were used to gather information for this research and every effort was made to identify contacts at all companies to invite participation in the survey. As anticipated, the level of participation by companies headquartered in Asia was low. However, a number of companies headquartered in Asia did participate in the research for the first time this year.
2. To expand the data captured in this report, extensive research of published financial data for all public companies was pursued. A number of private companies also provide extremely helpful top-level financial data.
3. Inputs from major manufacturers and distributors was solicited to both identify top distributors and provide guidance on the revenues of private companies. Roughly 100 companies were identified for consideration in the top 50. Companies were excluded both for falling below the top 50 and because they were engaged as a broker instead of authorized distribution.
4. Finally, web-based secondary research was a source of additional data that supported modeling and analysis used to create estimates in areas where survey or published data was not available.

The tables and figures presented in this report have been created based on the methodology described above.

Distributors experienced a break-out year as strong demand propelled growth in the market to new heights. With Asia continuing in its primary driver role, the top 50 worldwide authorized distributors grew by an amazing 27.9% in 2021. By comparison, the top 50 authorized Americas distributors grew by an impressive 21.9 % in Americas sales. However, this same group of top 50 Americas distributors combined to outperform overall worldwide sales growth with 30.3% growth in worldwide revenues.

Total worldwide revenue for the top 50 authorized distributors in 2021 grew to \$188.1 B from \$147.1 B in 2020. Only four out of the top 50

distributors failed to achieve revenue growth in 2021. The highest growth was achieved by Smart-Core Holdings at an incredible 78.1% growth. The steepest decline was suffered by Marubun as its sales collapsed by -44.2% in 2021. On a worldwide basis, semiconductors continued to capture an ever-growing share of overall electronic component distribution revenues, accounting for nearly 78.7% of total revenues. By comparison,

semiconductors account for 56.4% of total Americas distribution sales in 2021. The strongest demand for revenues in 2021 was generated by the mobile communications market at \$39.8 B (21.1%) followed by industrial automation - \$31.1 B; computers/data processing/peripherals - \$26.8 B; and automotive electronics - \$22.3 B.

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Top 50 Authorized Distributor Report 2022 Global Edition

Top 10 Americas sales

Rank 2021	Company	2021 Worldwide (\$ Millions)	2020 Worldwide (\$ Millions)	Growth 2021/2020 (Percent)	Share of Top 50 Total Sales (Percent)
1	Arrow Electronics, Inc.	7,827.9	6,183.1	26.6	30.5
2	Avnet	5,005.5	4,660.1	7.4	19.5
3	Digi-Key	2,585.0	1,700.1	52.0	10.1
4	Future Electronics	2,480.0	2,000.0	24.0	9.7
5	TTI	1,760.0	1,461.0	20.5	6.9
6	Mouser Electronics	1,382.7	948.0	45.9	5.4
7	DAC / Heilind	948.9	796.0	19.2	3.7
8	RS Group	879.0	642.8	36.8	3.4
9	Sager	381.0	313.0	21.7	1.5
10	WPG	372.7	254.0	46.7	1.5

Top 10 EMEA sales

Rank 2021	Company	2021 Worldwide (\$ Millions)	2020 Worldwide (\$ Millions)	Growth 2021/2020 (Percent)	Share of Top 50 Total Sales (Percent)
1	Avnet	6,911.4	5,683.7	21.6	32.2
2	Arrow Electronics, Inc.	6,248.8	4,987.5	25.3	29.1
3	RS Group	2,051.0	1,578.4	29.9	9.6
4	Future Electronics	1,600.0	1,250.0	28.0	7.5
5	TTI	1,120.0	965.0	16.1	5.2
6	Rutronik	1,110.0	904.7	22.7	5.2
7	Mouser Electronics	1,017.8	568.9	78.9	4.7
8	Digi-Key	855.7	690.0	24.0	4.0
9	Nexty Electronics	227.9	211.1	8.0	1.1
10	DAC / Heilind	85.4	66.4	28.6	0.4

Top 10 Asian sales

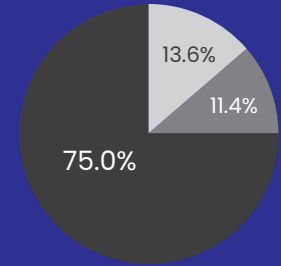
Rank 2021	Company	2021 Worldwide (\$ Millions)	2020 Worldwide (\$ Millions)	Growth 2021/2020 (Percent)	Share of Top 50 Total Sales (Percent)
1	WPG	27,437.3	20,396.0	34.5	19.5
2	WT Microelectronics	16,044.6	11,990.1	33.8	11.4
3	Arrow Electronics, Inc.	12,280.8	9,332.0	31.6	8.7
4	Avnet	9,676.4	7,517.0	28.7	6.9
5	Supreme Electronics	7,310.1	4,546.7	60.8	5.2
6	CECport	5,950.7	3,773.2	57.7	4.2
7	Macnica	5,690.0	4,226.0	34.6	4.0
8	S.A.S. Dragon	4,506.3	2,533.0	77.9	3.2
9	Nexty Electronics	4,404.3	3,804.0	15.8	3.1
10	Techtronics	4,020.0	3,200.0	25.6	2.9



With Asia continuing in its primary driver role, the top 50 worldwide authorized distributors grew by an amazing 27.9% in 2021

2021 top 50 total revenue share by region

- Americas
- EMEA
- Asia

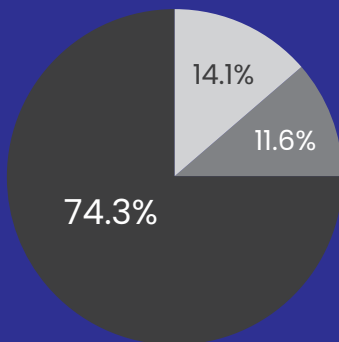


Total Revenue = \$188.1 B

2020 top 50 total revenue share by region

- Americas
- EMEA
- Asia

Total Revenue = \$147.1 B



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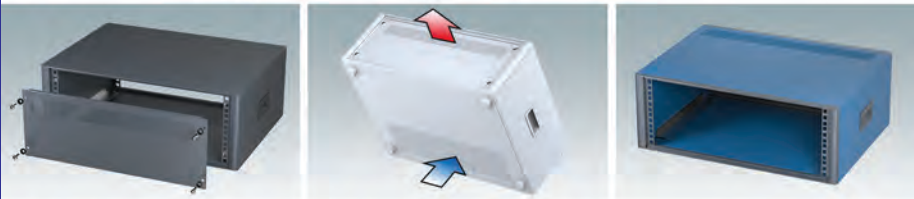
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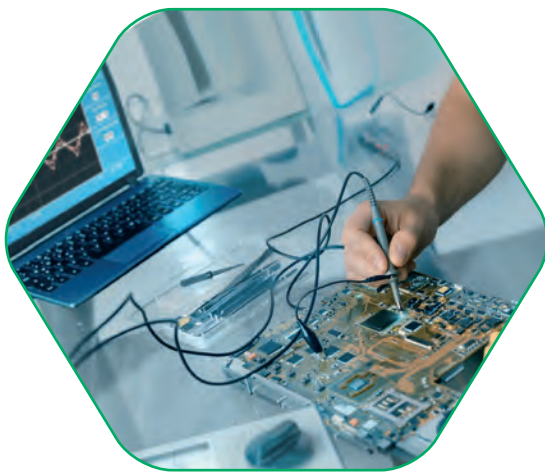


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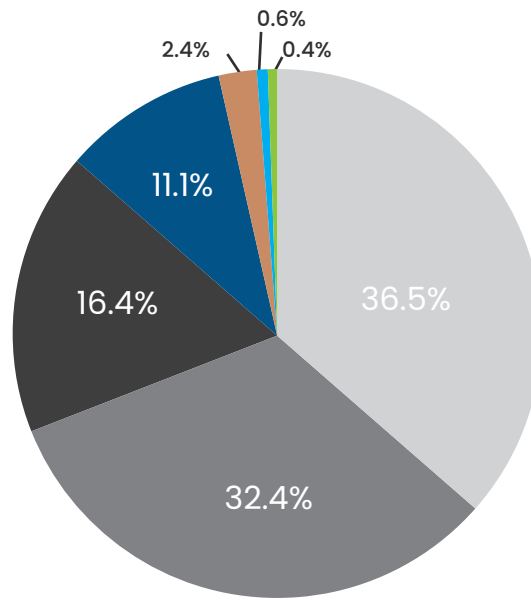
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2021 revenue share by headquarters location

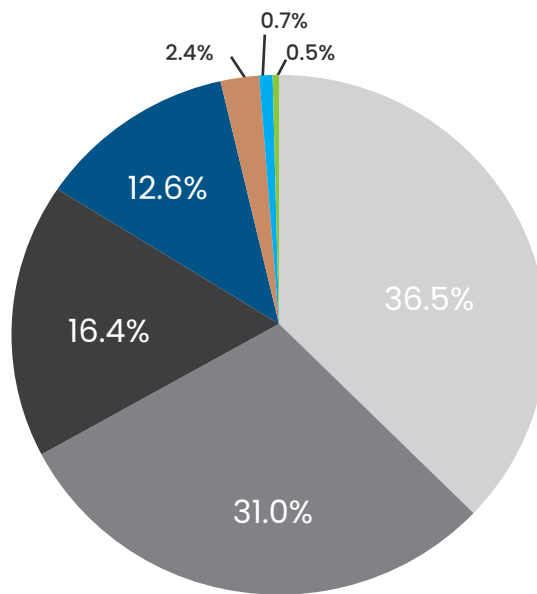
- Americas
- Taiwan
- China
- Japan
- Europe
- Singapore
- South Korea



Total Revenue = \$188.1 B

2020 revenue share by headquarters location

- Americas
- Taiwan
- China
- Japan
- Europe
- Singapore
- South Korea



Total Revenue = \$147.1 B

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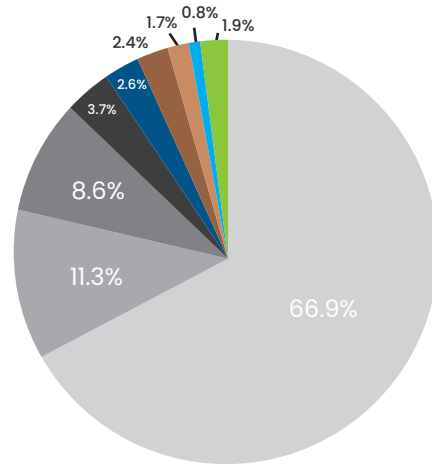
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USA MEXICO NETHERLANDS HUNGARY SINGAPORE HONG KONG TAIWAN INDIA

2021 top 50 revenue share by Asian countries

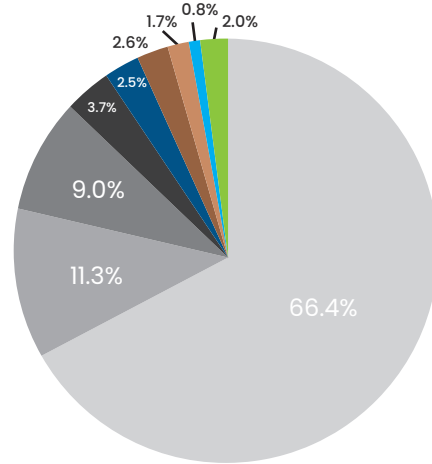
- Mainland China / Hong Kong
- Taiwan
- Japan
- Malaysia / Singapore
- India
- South Korea
- Vietnam
- Australia / New Zealand
- Other Asian Countries



Total Revenue = \$141.0 B

2020 top 50 revenue share by Asian countries

- Mainland China / Hong Kong
- Taiwan
- Japan
- Malaysia / Singapore
- India
- South Korea
- Vietnam
- Australia / New Zealand
- Other Asian Countries



Total Revenue = \$109.4 B



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RUTRONIK AUTOMOTIVE, RUTRONIK EMBEDDED, RUTRONIK POWER, and RUTRONIK SMART divisions to support specific products and services tailored to these respective applications. Decades of experience help provide technical support and service throughout our customers' entire product life cycle.

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In North America, diversity is key to our culture. Rutronik's unmatched product breadth ensures that our customers' needs are optimally covered. Our individually unique employees come together to form a team of dynamic

solution providers. With the newly relocated headquarters in Coral Springs, FL, we are rapidly expanding in North America.

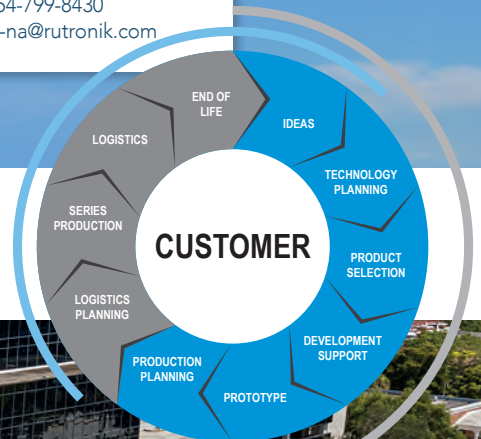
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/ AVNET: DELIVERING WHAT'S NEXT

As a leading global technology distributor and solutions provider, Avnet has served customers' evolving needs for more than a century. We support customers at each stage of a product's lifecycle, from idea to design and from prototype to production. Our unique position at the center of the technology value chain enables us to accelerate the design and supply stages of product development so customers can realize revenue faster.

Avnet started as a radio components distributor, and has adapted to wave after wave of technological change by expanding its capabilities to guide its customers through the greatest technology advances of the last century. Today, we act as an extension of our customers' teams, and they can leverage our deep technical and supply chain expertise throughout the product lifecycle. This helps maximize their return on investment.

Customers often come to us to accelerate product design or streamline their supply chain, and they can plug in our capabilities to optimize their own.

To reduce complexity during the product design process, Avnet offers comprehensive design expertise and services for technology selection and prototype guidance. As products move into production, customers find scale through flexible supply chain services and global infrastructure.

Support doesn't end once a product is launched - we also extend product longevity throughout the entire lifecycle and can support with any redesign requirements.

Avnet provides global technology solutions with connected regional support. It's how we confidently deliver what's next in design, supply chain and distribution.

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/ DELIVERING WHAT'S NEXT

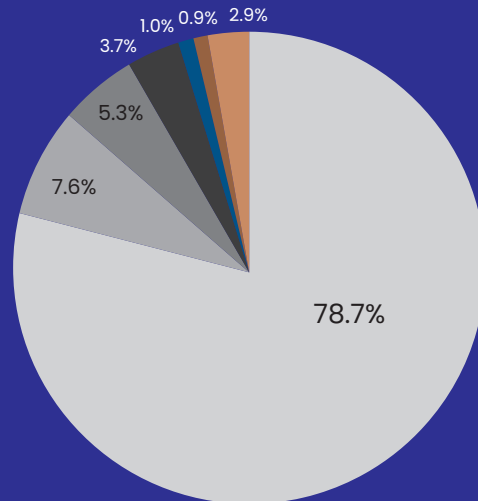
We enhance your team with ours. Our experts help you fill the gaps in technology design, supply chain and logistics so you can deliver what's next for the world.

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2021 worldwide revenue share by component

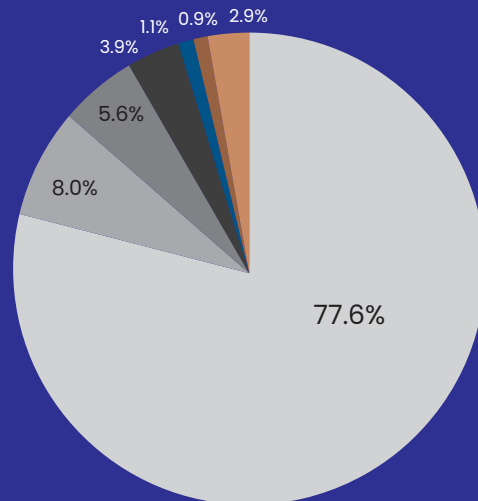
- Semiconductors
- Interconnect
- Passives
- Electro-Mechanical
- Computer/System
- Power & Batteries
- Other



Total Revenue = \$188.1 B

2020 worldwide revenue share by component

- Semiconductors
- Interconnect
- Passives
- Electro-Mechanical
- Computer/System
- Power & Batteries
- Other



Total Revenue = \$147.1 B



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WPG Americas Inc. (WPGA) is a member of WPG Holdings, the largest electronics distributor in Asia, and now one of the fastest growing in the United States. **Ranked #1 Semiconductor Distributor Worldwide, 2021 by Gartner.**

WPGA is a specialized distributor of semiconductor, passive, electromechanical, interconnect and embedded products for the lighting, power, memory, storage and embedded computing markets.

At WPGA we are focused on exceeding customers' expectations by delivering specialized technical services and complete solutions via our superior technical teams and engineers, global design and supply chain tools, a comprehensive selection of OEM products, and exceptional Quality service.

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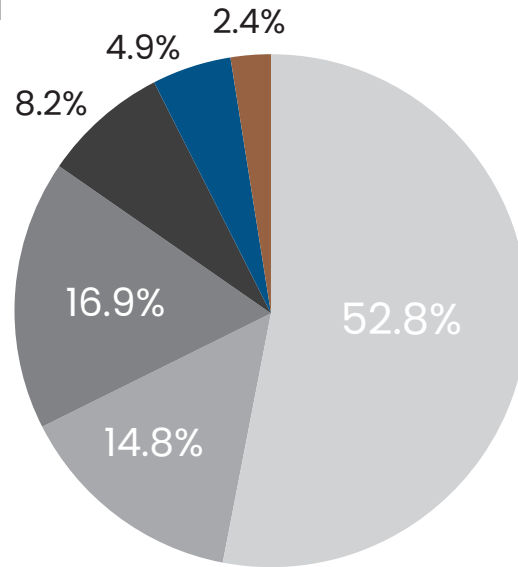
 A Member of WPG Holdings
WPG Americas Inc.

The Benchmark of Distribution

Worldwide revenue share by rank

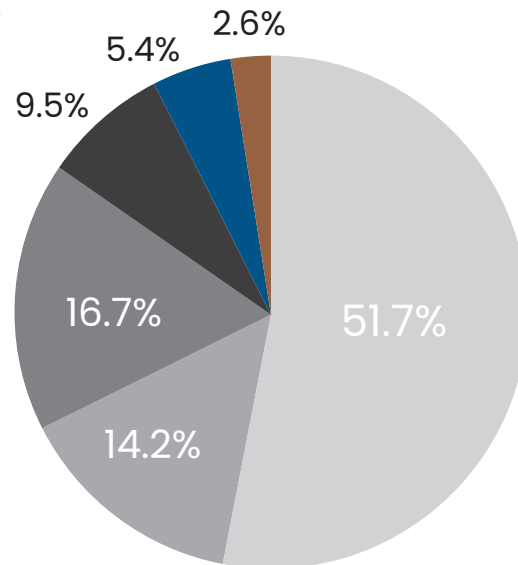
- Top 5
- Rank 6 to 10
- Rank 11 to 20
- Rank 21 to 30
- Rank 31 to 40
- Rank 41 to 50

2021



Total Revenue = \$188.1 B

2020



Total Revenue = \$147.1 B

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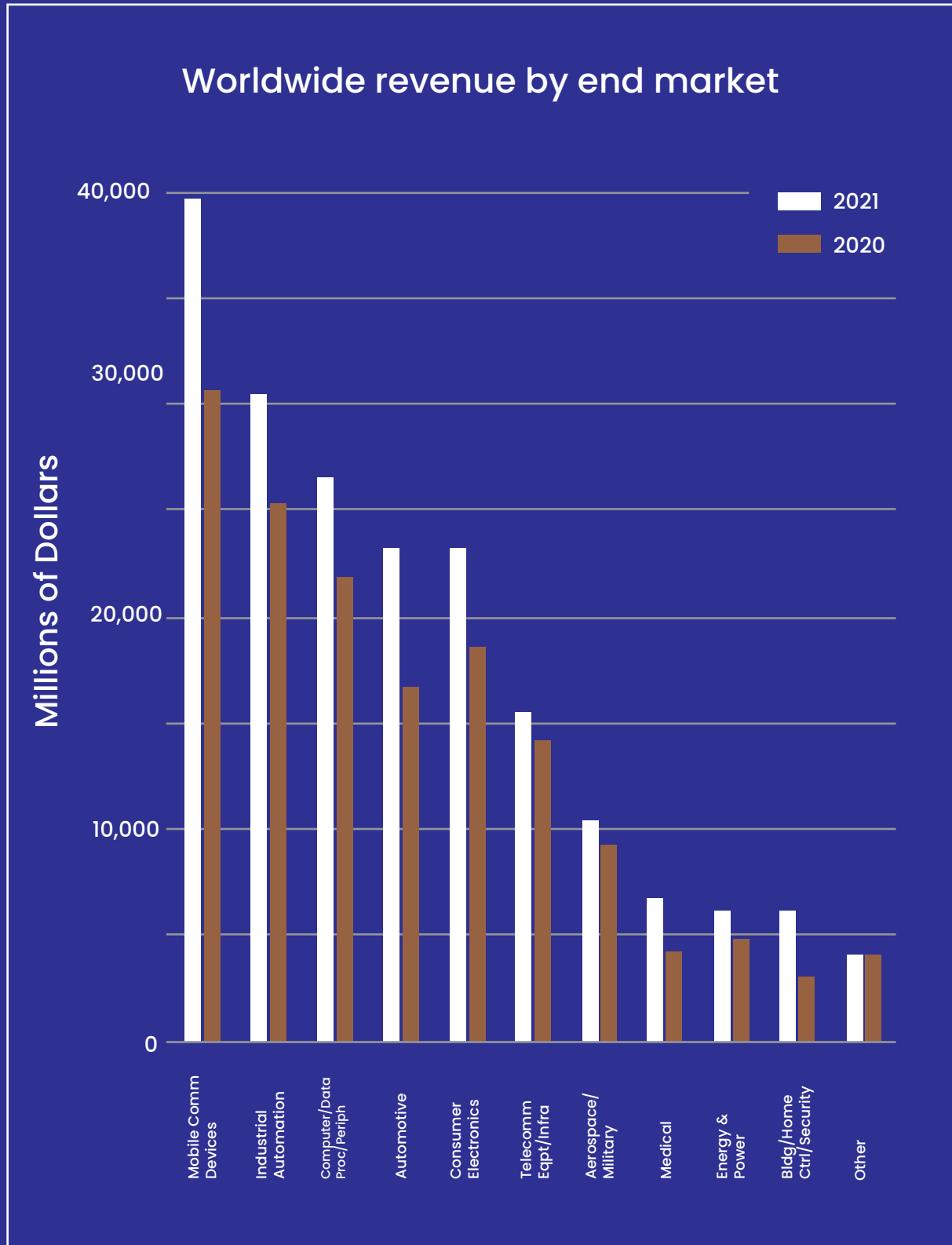
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From Humble Beginnings to Global Leadership

Headquartered in Thief River Falls, Minnesota, Digi-Key Electronics is recognized as both the leader and continuous innovator in the high service distribution of electronic components worldwide. As the original pioneer in this space, Digi-Key has been a key resource for engineers and procurement professionals for nearly 50 years. Today, Digi-Key provides more than 13.4 million components from over 2,300 quality name-brand manufacturers, with an industry-leading breadth and depth of product in stock and available for immediate shipment.

Digi-Key is a \$4.5 billion company and employs more than 5,000 people in northwest Minnesota and beyond, delivering over 27,000 packages per day to customers in 180+ countries around the world. Digi-Key had humble beginnings in

1972 as a small mail-order company selling leftover parts to a digital electronic keyer kit (the Digi-Keyer). Today, Digi-Key is a leading global e-commerce company with a strong heritage of serving as a critical partner for companies around the world. This year, the company is opening the doors to its new, 2.2 million square foot Product Distribution Center expansion, which will allow the organization to meet and exceed customers' expectations more efficiently.

Digi-Key is proud to be widely recognized as the leader for:

- Availability of products
- On-time delivery
- Overall performance
- Engineer-friendly website
- Customer service

From prototype to production, Digi-Key fuels innovation all over the world. Beyond the products that drive technology innovation,

Digi-Key also supports design engineers and procurement professionals with a wealth of digital solutions and tools to make their jobs more efficient.

To maintain a high level of customer and supplier satisfaction, Digi-Key continues finding creative ways to enhance its offerings and services. For example, Digi-Key has invested in more robust and predictive web search functionality, higher inventory levels and increased automation in its warehouse, which all benefit customers by providing an easy and efficient research, shopping and delivery experience.

Digi-Key has also invested in innovations, including cut tape printing, delivering more products and services within the ecosystem to provide customers around the world with even more reasons to make Digi-Key their first

stop in the design process. Digi-Key is a single source for all aspects of technology innovation, including bare PCB boards, automation and control, test and measurement, IoT solutions and virtually all things related and adjacent to technology innovation, all through a singular shopping experience.

Digi-Key is always developing new ways to make it easier for customers to digitally engage, including localizing their experience in markets around the world with local language, currency and support, and provides fast shipping times as well to remove barriers for global customers.

Digi-Key is excited to partner with suppliers and customers to inspire new innovations and automation that will enable the world's ideas. Learn more at www.digikey.com.



Top 10 global sales by category

Top 10 semiconductor (active) sales

Rank 2021	Company	2021 Worldwide (\$ Millions)	2020 Worldwide (\$ Millions)	Growth 2021/2020 (Percent)	Share of Top 50 Total Sales (Percent)
1	WPG	25,852.2	19,060.0	35.6	17.5
2	Arrow Electronics, Inc.	20,532.5	15,582.0	31.8	13.9
3	Avnet	16,195.0	13,574.2	19.3	10.9
4	WT Microelectronics	16,044.6	11,990.1	33.8	10.8
5	Supreme Electronics	6,880.5	4,257.1	61.6	4.7
6	CECport	5,848.6	3,697.1	58.2	4.0
7	Macnica	5,099.8	3,777.1	35.0	3.4
8	Future Electronics	4,953.4	3,952.5	25.3	3.3
9	Techtronics 泰科源	4,020.0	3,200.0	25.6	2.7
10	S.A.S. Dragon	3,906.9	2,109.4	85.2	2.6

Top 10 electro-mechanical sales

Rank 2021	Company	2021 Worldwide (\$ Millions)	2020 Worldwide (\$ Millions)	Growth 2021/2020 (Percent)	Share of Top 50 Total Sales (Percent)
1	Arrow Electronics, Inc.	817.1	697.1	17.2	11.9
2	Avnet	712.6	607.3	17.3	10.4
3	Digi-Key	589.3	358.8	64.2	8.6
4	Restar Group	516.0	413.4	24.8	7.5
5	Ryosan	433.3	535.0	(19.0)	6.3
6	RS Group	374.4	285.4	31.2	5.4
7	S.A.S. Dragon	346.5	232.2	49.2	5.0
8	Mouser Electronics	326.7	182.9	78.6	4.7
9	SaMT	280.8	241.9	16.1	4.1
10	Kanematsu	267.6	253.1	5.7	3.9

Top 10 power & batteries sales

Rank 2021	Company	2021 Worldwide (\$ Millions)	2020 Worldwide (\$ Millions)	Growth 2021/2020 (Percent)	Share of Top 50 Total Sales (Percent)
1	WPG	556.2	433.7	28.3	32.4
2	Avnet	431.9	267.9	61.2	25.1
3	Macnica	296.5	219.6	35.0	17.3
4	Restar Group	122.9	112.7	9.0	7.2
5	Sager	121.9	90.8	34.3	7.1
6	Mouser Electronics	98.0	61.0	60.8	5.7
7	RS Group	65.1	49.6	31.2	3.8
8	Carlton-Bates	16.1	41.6	(61.2)	0.9
9	bisco industries	5.1	4.6	10.8	0.3
10	Willas-Array	4.5	4.5	(0.3)	0.3

Top 10 passive component sales

Rank 2021	Company	2021 Worldwide (\$ Millions)	2020 Worldwide (\$ Millions)	Growth 2021/2020 (Percent)	Share of Top 50 Total Sales (Percent)
1	TTI	1,736.6	1,487.7	16.7	17.4
2	Arrow Electronics, Inc.	1,265.2	1,045.6	21.0	12.7
3	Digi-Key	1,178.5	660.1	78.5	11.8
4	Avnet	971.7	910.9	6.7	9.7
5	Mouser Electronics	653.4	406.4	60.8	6.5
6	WISEWHEEL 唯时信	432.1	443.9	(2.7)	4.3
7	WPG	417.2	309.8	34.7	4.2
8	Glorison 荣采集团	416.5	369.8	12.6	4.2
9	Future Electronics	331.5	280.5	18.2	3.3
10	Nexty Electronics	322.0	310.2	3.8	3.2

Top 10 interconnect sales

Rank 2021	Company	2021 Worldwide (\$ Millions)	2020 Worldwide (\$ Millions)	Growth 2021/2020 (Percent)	Share of Top 50 Total Sales (Percent)
1	Arrow Electronics, Inc.	2,925.7	2,357.8	24.1	20.5
2	Avnet	2,418.4	2,054.0	17.7	16.9
3	TTI	1,498.2	1,230.2	21.8	10.5
4	DAC / Heilind	1,011.7	816.1	24.0	7.1
5	Nexty Electronics	842.2	762.5	10.5	5.9
6	Future Electronics	828.8	663.0	25.0	5.8
7	Digi-Key	589.3	387.5	52.1	4.1
8	Mouser Electronics	588.0	365.8	60.8	4.1
9	RS Group	537.2	409.5	31.2	3.8
10	WPG	445.0	330.4	34.7	3.1

Top 10 computer/system/other product sales

Rank 2021	Company	2021 Worldwide (\$ Millions)	2020 Worldwide (\$ Millions)	Growth 2021/2020 (Percent)	Share of Top 50 Total Sales (Percent)
1	RS Group	1,823.1	1,414.6	28.9	25.2
2	Avnet	863.7	446.5	93.4	11.9
3	Arrow Electronics, Inc.	817.1	820.1	(0.4)	11.3
4	Gain Hero 蓝源实业	419.8	379.5	10.6	5.8
5	Restar Group	417.7	334.4	24.9	5.8
6	Macnica	415.1	307.4	35.0	5.7
7	WPG	344.8	371.7	(7.2)	4.8
8	Supreme Electronics	299.1	206.1	45.1	4.1
9	WISEWHEEL 唯时信	238.0	244.5	(2.7)	3.3
10	SUNRAY 新雷科技	182.6	165.6	10.3	2.5

Top 10 distributors by sales growth

Rank 2021	Company	Sales Growth 2021/2020 (Percentage)	2021 Worldwide (\$ Millions)	2020 Worldwide (\$ Millions)
1	Smart-Core Holdings 芯智控股	87.2	1,337.1	714.4
2	S.A.S. Dragon	76.6	4,542.9	2,572.5
3	Nanjing Sunlord Electronics 南京商络	71.8	689.2	401.1
4	Digi-Key	64.2	4,714.0	2,870.0
5	IngDan Innovation (Cogobuy.com 科通芯城)	63.7	1,466.2	895.9
6	Mouser Electronics	60.8	3,266.8	2,032.2
7	Supreme Electronics	60.2	7,477.5	4,668.7
8	CECport	57.7	5,950.7	3,773.2
9	Master Electronics	57.3	538.0	342.0
10	Macnica	35.0	5,930.0	4,392.0

The final tables of this report present the complete list of Top 50 worldwide authorized distributors for 2021 along with top 10 rankings for individual component categories and top sales growth. As a major enhancement to this research the revenues for the top 50 are presented for ten Asian countries that drive a large share of global

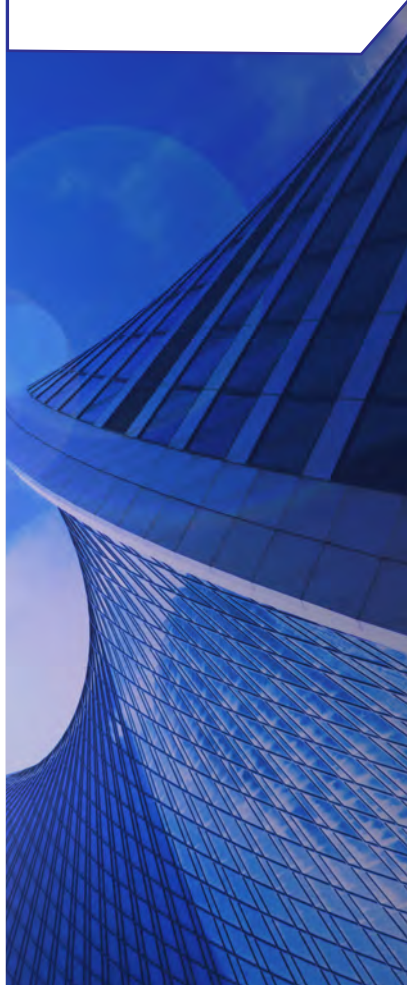
electronics equipment production: Mainland China/Hong Kong, Taiwan, Japan, Malaysia/Singapore, India, South Korea, Vietnam, and Australia/New Zealand. As expected, China is the dominant country for revenues with over 2/3rds of all Asian distribution revenue. The next largest country markets are Taiwan with 11.3% share and Japan with 8.6% share in 2021. The size of the emerging India and Vietnam

distribution markets is a common question. Based on the research for this report, the top 50 distributors account for \$3.7 B in India and \$2.3 B in Vietnam in 2021.

Continue on page 50 >



As expected, China is the dominant country for revenues with over 2/3rds of all Asian distribution revenue



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Sager Electronics is a leading North American distributor of Interconnect, Power, and Electromechanical products and custom solutions provider. Grounded in 135 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 Sager 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 operates 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 custom solutions provider.

Headquartered in Middleborough, MA, Sager 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, and custom design and manufacturing facilities.

From National Prominence to Distributing Confidence®

For 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.





1887

Emile Berliner receives the patent for the gramophone.

James Blyth builds the first electricity generating wind turbine.

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

Sager opens its first location in Boston, Massachusetts.



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

Recognized as the first distributor in the industry, Sager opened for business one hundred thirty-five years ago in downtown Boston, Massachusetts, servicing the growing interest in radio technology.

Under the vision and leadership of Joe Sager, the company established a thriving business that put the needs of its customers first. Since then Sager has grown into a North American distributor of interconnect, power, thermal and electromechanical products and a provider of custom design and manufacturing solutions.

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135 YEARS

And after 135 years, Sager still operates just as Joe envisioned – based on a commitment to exceeding expectations and keeping the customer at the center of its business philosophy.

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Top 50 Authorized Distributor Report 2022 Global Edition

Rank 2021	Rank 2020	Company	Type*	Headquarters	2021 Worldwide (\$ Millions)	Growth 2021/2020 (Percent)	Share of Top 50 Total Sales (Percent)	Sales Share by Region (Percent)		
								Americas	EMEA	Asia
1	1	WPG	1	Taiwan	27,810.0	34.7	14.79	1.3	0.0	98.7
2	2	Arrow Electronics, Inc.	1	USA	26,357.5	28.6	14.01	29.7	23.7	46.6
3	3	Avnet (1)	1	USA	21,593.3	20.9	11.48	23.2	32.0	44.8
4	4	WT Microelectronics	1	Taiwan	16,044.6	33.8	8.53	0.0	0.0	100.0
5	6	Supreme Electronics	1	Taiwan	7,477.5	60.2	3.98	2.2	0.0	97.8
6	5	Future Electronics	1	Canada	6,375.0	25.0	3.39	38.9	25.1	36.0
7	9	CECport	1	China	5,950.7	57.7	3.16	0.0	0.0	100.0
8	7	Macnica	1	Japan	5,930.0	35.0	3.15	2.8	1.3	96.0
9	8	Nexty Electronics (2)	1	Japan	4,954.2	15.0	2.63	6.5	4.6	88.9
10	12	Digi-Key	3	USA	4,714.0	64.2	2.51	54.8	18.2	27.0
11	14	S.A.S. Dragon	1	China	4,542.9	76.6	2.42	0.8	0.0	99.2
12	11	Techtronics 泰科源	1	China	4,020.0	25.6	2.14	0.0	0.0	100.0
13	10	EDOM Technology	1	Taiwan	3,868.0	5.0	2.06	1.8	0.6	97.6
14	13	TTI	2	USA	3,405.0	19.0	1.81	51.7	32.9	15.4
15	19	Mouser Electronics	3	USA	3,266.8	60.8	1.74	42.3	31.2	26.5
16	15	RS Group	1	U.K.	3,255.6	31.2	1.73	27.0	63.0	10.0
17	20	Weikeng	1	Taiwan	2,593.7	30.8	1.38	0.0	0.0	100.0
18	21	Restar Group (3)	2	Japan	2,457.0	30.8	1.31	0.1	0.0	99.9
19	17	Kanematsu	2	Japan	2,267.6	7.5	1.21	0.0	0.0	100.0
20	22	Ryosan	1	Japan	2,022.2	8.6	1.08	0.0	0.0	100.0
21	18	WISEWHEEL 唯时信	2	China	2,020.0	-2.7	1.07	0.0	0.0	100.0
22	23	Gain Hero 蓝源实业	1	China	1,825.0	10.6	0.97	0.0	0.0	100.0
23	25	Alltek Technology Corp	1	Taiwan	1,688.4	18.5	0.90	0.0	0.0	100.0
24	24	Wuhan P&S Information Technology 力源信息	1	China	1,616.7	7.7	0.86	0.0	0.0	100.0
25	27	Zenitron	4	Taiwan	1,506.1	29.0	0.80	0.0	0.0	100.0
26	33	IngDan Innovation (Cogobuy.com 科通芯城)	1	China	1,466.2	63.7	0.78	0.0	0.0	100.0
27	38	Smart-Core Holdings 芯智控股	1	China	1,337.1	87.2	0.71	0.0	0.0	100.0
28	29	Rutronik	1	Germany	1,336.0	22.6	0.71	1.9	83.1	15.0
29	16	Marubun	2	Japan	1,294.0	-44.2	0.69	0.3	0.2	99.5
30	26	Xiamen Holder Electronics 信和达 (Xiamen Xinheda Electronics)	4	China	1,250.0	6.4	0.66	0.0	0.0	100.0
31	31	Ryoden	1	Japan	1,222.0	20.5	0.65	2.4	1.1	96.5
32	32	DAC / Heilind	2	USA	1,193.0	24.0	0.63	79.5	7.2	13.3
33	30	SaMT	2	South Korea	1,170.0	11.2	0.62	0.0	0.0	100.0
34	36	SUNRAY 新普科技	1	China	830.0	10.3	0.44	0.0	0.0	100.0
35	34	Best of Best Holdings (4) 好上好控股	1	China	825.0	5.8	0.44	0.0	0.0	100.0
36	37	ROAD WELL 路必康	1	China	820.0	11.6	0.44	0.0	0.0	100.0
37	35	Tianhe Galaxy	1	China	818.0	7.5	0.43	0.0	0.0	100.0
38	39	Serial Microelectronics	1	Singapore	814.6	21.8	0.43	0.0	0.0	100.0
39	40	SIIX	1	Japan	805.0	25.4	0.43	9.3	4.7	86.0
40	28	YITOA 英唐智控	2	China	735.2	-35.1	0.39	0.0	0.0	100.0
41	41	Shenzhen Huaxinke Technology (HXK) 华信科	1	China	700.0	10.2	0.37	0.0	0.0	100.0
42	45	Nanjing Sunlord Electronics 南京商络	2	China	689.2	71.8	0.37	0.0	0.0	100.0
43	46	Master Electronics	1	USA	538.0	57.3	0.29	68.4	0.0	31.6
44	44	Glorison 荣采集团	2	China	490.0	12.6	0.26	0.0	0.0	100.0
45	43	Upstar Technology 博思达	2	China	475.0	8.4	0.25	0.0	0.0	100.0
46	42	Willas-Array	2	China	445.2	-0.3	0.24	0.0	0.0	100.0
47	47	Sager	2	USA	381.0	21.7	0.20	100.0	0.0	0.0
48	49	Carlton-Bates	1	USA	322.5	16.3	0.17	100.0	0.0	0.0
49	48	PEI-Genesis	2	USA	296.3	1.8	0.16	61.5	25.9	12.5
50	50	bisco industries	1	USA	252.5	10.8	0.13	95.0	1.4	3.6

Top 50 worldwide authorized distributors

Sales Share by Component (Percent)

	Semiconductor (Active)	Passive Component	Electro-Mechanical	Interconnect	Computer / Systems	Power & Batteries	Other
	93.0	1.5	0.7	1.6	1.0	2.0	0.2
	77.9	4.8	3.1	11.1	2.0	-	1.1
	75.0	4.5	3.3	11.2	1.0	2.0	3.0
	100.0	-	-	-	-	-	-
	92.0	4.0	-	-	-	-	4.0
	77.7	5.2	4.1	13.0	-	-	-
	98.3	-	-	-	-	-	1.7
	86.0	1.0	1.0	-	-	5.0	7.0
	71.7	6.5	4.8	17.0	-	-	-
	50.0	25.0	12.5	12.5	-	-	-
	86.0	6.0	7.6	-	-	-	0.4
	100.0	-	-	-	-	-	-
	98.0	-	-	-	2.0	-	-
	-	51.0	5.0	44.0	-	-	-
	45.0	20.0	10.0	18.0	4.0	3.0	-
	10.5	3.5	11.5	16.5	-	2.0	56.0
	88.0	2.0	3.0	2.0	-	-	5.0
	38.0	1.0	21.0	18.0	5.0	5.0	12.0
	65.0	7.5	11.8	9.8	-	-	5.9
	75.5	-	21.4	-	-	-	3.1
	36.4	21.4	9.1	21.3	3.4	-	8.4
	74.6	2.0	-	0.4	15.0	-	8.0
	100.0	-	-	-	-	-	-
	95.0	4.0	-	1.0	-	-	-
	93.0	5.0	-	2.0	-	-	-
	100.0	-	-	-	-	-	-
	100.0	-	-	-	-	-	-
	100.0	-	-	-	-	-	-
	90.0	-	-	6.0	-	-	4.0
	81.0	4.0	-	3.0	5.0	-	7.0
	89.0	11.0	-	-	-	-	-
	-	-	15.2	84.8	-	-	-
	22.0	26.0	24.0	28.0	-	-	-
	78.0	-	-	-	-	-	22.0
	65.0	6.0	7.0	5.0	5.0	-	12.0
	58.0	8.0	10.0	14.0	-	-	10.0
	50.0	12.0	15.0	16.0	-	-	7.0
	85.0	4.0	5.0	3.0	-	-	3.0
	95.0	-	-	-	-	-	5.0
	94.0	6.0	-	-	-	-	-
	55.8	30.5	6.3	7.5	-	-	-
	88.0	-	-	-	-	-	12.0
	73.0	4.0	6.0	9.0	5.0	-	3.0
	15.0	85.0	-	-	-	-	-
	79.0	9.0	-	12.0	-	-	-
	97.0	-	-	-	-	1.0	2.0
	-	-	34.0	25.0	-	32.0	9.0
	-	-	75.0	20.0	-	5.0	-
	-	-	-	100.0	-	-	-
	1.0	20.0	40.0	20.0	1.0	2.0	16.0

Average exchange rates used to convert to a common US dollar basis

Currency	2019	2020	2021
Chinese Yuan (¥)	6.904	6.898	6.452
Hong Kong Dollar (HK\$)	7.836	7.756	7.770
Taiwan Dollar (NT\$)	30.892	29.454	27.916
Japanese Yen (¥)	109.02	106.78	109.78
Korean Won (₩)	1,165.7	1,179.2	1,145.1

*Type of Distributor: 1 = Broadline; 2 = Specialized; 3 = High Service/E-Catalog; 4 = Limited Line

(1) Avnet includes Farnell (2) Nexty Electronics includes Toyota Tsusho and Tomen (3) Restar Group includes UKC Electronics and Restar Electronics (4) Best of Best Holdings includes Honestar & AsiaCom Technology Alliance

Top 50 Asian authorized distributors

Rank 2021	Company	2021 Asia Total (\$ Millions)	Growth 2021/2020 (%)	Share of Top 50 Total Sales (%)	2021 Revenue (\$ Millions)									
					Mainland China/Hong Kong	Taiwan	Japan	South Korea	India	Vietnam	Malaysia/Singapore	Australia/New Zealand	Other Asian Countries	
1	WPG	27,437.3	34.5	23.90	21,989.4	3,779.4	105.3	278.1	409.5	249.9	374.2	-	251.5	
2	WT Microelectronics	16,044.6	33.8	13.97	11,024.7	2,423.4	-	680.0	365.7	470.8	743.5	-	336.5	
3	Arrow Electronics, Inc.	12,280.8	31.6	10.70	6,067.2	1,182.4	1,040.1	329.1	1,268.6	572.2	569.9	668.7	582.5	
4	Avnet	9,676.4	28.7	8.43	4,925.3	1,403.1	1,132.1	290.3	561.2	445.1	435.4	212.9	270.9	
5	Supreme Electronics	7,310.1	60.8	6.37	5,617.4	1,640.9	-	-	-	-	51.7	-	-	
6	CECport	5,950.7	57.7	5.18	5,147.4	565.3	-	-	-	-	238.0	-	-	
7	Macnica	5,690.0	34.6	4.96	1,991.5	284.5	2,674.3	-	56.9	56.9	341.4	-	284.5	
8	S.A.S. Dragon	4,506.3	77.9	3.92	4,307.1	131.5	-	-	1.5	18.5	36.9	-	10.8	
9	Nexy Electronics	4,404.3	15.8	3.84	1,461.6	385.3	1,428.5	147.5	440.1	-	314.7	-	226.6	
10	Techtronics 泰科源	4,020.0	25.6	3.50	3,891.4	-	-	-	-	-	128.6	-	-	
11	EDOM Technology	3,776.0	3.8	3.29	2,301.5	1,081.4	1.5	5.3	45.3	149.5	159.7	-	31.7	
12	Weikeng	2,593.7	30.8	2.26	1,474.9	1,044.2	-	-	-	-	-	-	74.6	
13	Restar Group	2,455.0	30.8	2.14	815.1	233.2	908.4	270.1	-	90.8	81.0	-	56.5	
14	Future Electronics	2,295.0	24.1	2.00	1,342.6	144.6	98.7	91.8	94.1	91.8	344.3	87.2	-	
15	Kanematsu	2,267.6	7.5	1.97	340.1	158.7	1,337.9	113.4	90.7	90.7	68.0	-	68.0	
16	Ryosan	2,022.2	8.6	1.76	580.4	72.8	1,096.0	30.3	50.6	-	143.6	-	48.5	
17	WISEWHEEL 唯时信	2,020.0	(2.7)	1.76	2,020.0	-	-	-	-	-	-	-	-	
18	Gain Hero 蓝源实业	1,825.0	10.6	1.59	1,095.0	273.8	182.5	-	91.3	-	182.5	-	-	
19	Alltek Technology Corp	1,688.4	18.5	1.47	1,452.1	152.0	-	-	-	-	84.4	-	-	
20	Wuhan P&S Information Technology 力源信息	1,616.7	7.7	1.41	1,455.0	80.8	-	-	-	-	48.5	-	32.3	
21	Zenitron	1,506.1	29.0	1.31	1,200.4	248.5	-	-	-	-	-	-	57.3	
22	IngDan Innovation (Cogobuy.com 科通芯城)	1,466.2	63.7	1.28	1,402.5	-	-	-	-	-	63.7	-	-	
23	Smart-Core Holdings 芯智控股	1,337.1	87.2	1.16	1,305.5	-	-	-	-	-	30.9	-	0.7	
24	Marubun	1,288.0	(44.2)	1.12	154.6	64.4	875.8	128.8	-	-	38.6	-	25.8	
25	Digi-Key	1,273.3	165.3	1.11	471.1	63.7	178.3	101.9	76.4	12.7	165.5	89.1	114.6	
26	Xiamen Holder Electronics 信和达 (Xiamen Xinheda Electronics)	1,250.0	6.4	1.09	1,250.0	-	-	-	-	-	-	-	-	
27	Ryoden	1,179.0	20.5	1.03	294.8	90.8	695.6	-	-	23.6	53.1	-	21.2	
28	SaMT	1,170.0	11.2	1.02	409.5	-	-	760.5	-	-	-	-	-	
29	Mouser Electronics	866.3	68.1	0.75	381.2	60.6	121.3	69.3	52.0	8.7	86.6	43.3	43.3	
30	SUNRAY 新蕾科技	830.0	10.3	0.72	830.0	-	-	-	-	-	-	-	-	
31	Best of Best Holdings	825.0	5.8	0.72	775.5	33.0	-	-	-	-	16.5	-	-	
32	ROAD WELL 路必康	820.0	11.6	0.71	779.0	-	-	-	-	-	41.0	-	-	
33	Tianhe Galaxy	818.0	7.5	0.71	818.0	-	-	-	-	-	-	-	-	
34	Serial Microelectronics	814.6	21.8	0.71	562.1	48.9	-	48.9	36.7	20.4	65.2	-	32.6	
35	YITOA 英唐智控	735.2	(35.1)	0.64	735.2	-	-	-	-	-	-	-	-	
36	Shenzhen Huaxinke Technology (HXK) 华信科	700.0	10.2	0.61	700.0	-	-	-	-	-	-	-	-	
37	SIIX	692.0	26.5	0.60	221.5	124.6	244.7	-	-	27.7	41.5	-	32.0	
38	Nanjing Sunlord Electronics 南京商络	689.2	71.8	0.60	565.1	68.9	-	-	-	-	41.4	-	13.8	
39	TTI	525.0	20.7	0.46	346.5	31.5	-	5.3	15.8	5.3	84.0	5.3	31.5	
40	Glorison 荣采集团	490.0	12.6	0.43	416.5	44.1	-	-	29.4	-	-	-	-	
41	Upstar Technology 博思达	475.0	8.4	0.41	475.0	-	-	-	-	-	-	-	-	
42	Willas-Array	445.2	(0.3)	0.39	434.0	11.1	-	-	-	-	-	-	-	
43	RS Group	325.6	24.9	0.28	61.9	26.0	45.6	16.3	11.4	4.9	19.5	91.2	48.8	
44	Rutronik	200.0	22.3	0.17	130.0	24.0	-	-	10.0	-	24.0	-	12.0	
45	Master Electronics	170.0	198.2	0.15	119.0	-	-	-	-	-	51.0	-	-	
46	DAC / Heilind	158.7	58.7	0.14	119.0	19.0	-	0.6	7.9	0.6	11.1	-	0.3	
47	PEI-Genesis	37.1	6.1	0.03	37.1	-	-	-	-	-	-	-	-	
48	bisco industries	9.0	47.6	0.01	9.0	-	-	-	-	-	-	-	-	
49	Sager	-	-	-	-	-	-	-	-	-	-	-	-	
50	Carlton-Bates	-	-	-	-	-	-	-	-	-	-	-	-	

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Top 50 Authorized Distributor Report 2022 Global Edition

Top 10 mainland China / Hong Kong sales

Rank 2021	Company	2021 Mainland China / Hong Kong (\$ Millions)	Growth 2021/2020 (Percent)	Share of Top 50 Total Sales (Percent)
1	WPG	21,989.4	35.4	23.32
2	WT Microelectronics	11,024.7	39.9	11.69
3	Arrow Electronics, Inc.	6,067.2	22.7	6.43
4	Supreme Electronics	5,617.4	64.4	5.96
5	CECport	5,147.4	55.0	5.46
6	Avnet	4,925.3	20.9	5.22
7	S.A.S. Dragon	4,307.1	76.7	4.57
8	Techtronics 泰科源	3,891.4	25.4	4.13
9	EDOM Technology	2,301.5	0.3	2.44
10	WISEWHEEL 唯时信	2,020.0	(2.7)	2.14

Top 10 Japan sales

Rank 2021	Company	2021 Japan (\$ Millions)	Growth 2021/2020 (Percent)	Share of Top 50 Total Sales (Percent)
1	Macnica	2,674.3	34.6	21.98
2	Nexty Electronics	1,428.5	17.2	11.74
3	Kanematsu	1,337.9	9.3	11.00
4	Avnet	1,132.1	33.0	9.31
5	Ryosan	1,096.0	9.7	9.01
6	Arrow Electronics, Inc.	1,040.1	51.2	8.55
7	Restar Group	908.4	32.8	7.47
8	Marubun	875.8	(9.5)	7.20
9	Ryoden	695.6	18.5	5.72
10	SIIX	244.7	26.5	2.01

Top 10 India sales

Rank 2021	Company	2021 India (\$ Millions)	Growth 2021/2020 (Percent)	Share of Top 50 Total Sales (Percent)
1	Arrow Electronics, Inc.	1,268.6	41.2	34.15
2	Avnet	561.2	54.1	15.11
3	Nexty Electronics	440.1	18.1	11.85
4	WPG	409.5	33.6	11.02
5	WT Microelectronics	365.7	33.8	9.84
6	Future Electronics	94.1	27.2	2.53
7	Gain Hero 蓝源实业	91.3	10.6	2.46
8	Kanematsu	90.7	7.5	2.44
9	Digi-Key	76.4	-	2.06
10	Macnica	56.9	34.6	1.53

Top 10 Vietnam sales

Rank 2021	Company	2021 Vietnam (\$ Millions)	Growth 2021/2020 (Percent)	Share of Top 50 Total Sales (Percent)
1	Arrow Electronics, Inc.	572.2	47.4	24.45
2	WT Microelectronics	470.8	8.0	20.12
3	Avnet	445.1	45.1	19.02
4	WPG	249.9	33.8	10.68
5	EDOM Technology	149.5	0.5	6.39
6	Future Electronics	91.8	24.1	3.92
7	Restar Group	90.8	30.9	3.88
8	Kanematsu	90.7	7.5	3.88
9	Macnica	56.9	34.6	2.43
10	SIIX	27.7	26.5	1.18

Top 10 Taiwan sales

Rank 2021	Company	2021 Taiwan (\$ Millions)	Growth 2021/2020 (Percent)	Share of Top 50 Total Sales (Percent)
1	WPG	3,779.4	29.4	23.63
2	WT Microelectronics	2,423.4	30.7	15.15
3	Supreme Electronics	1,640.9	49.2	10.26
4	Avnet	1,403.1	31.4	8.77
5	Arrow Electronics, Inc.	1,182.4	30.8	7.39
6	EDOM Technology	1,081.4	2.7	6.76
7	WeiKeng	1,044.2	10.8	6.53
8	CECport	565.3	87.3	3.53
9	Nexty Electronics	385.3	19.9	2.41
10	Macnica	284.5	124.4	1.78

Top 10 Malaysia / Singapore sales

Rank 2021	Company	2021 Malaysia/Singapore (\$ Millions)	Growth 2021/2020 (Percent)	Share of Top 50 Total Sales (Percent)
1	WT Microelectronics	743.5	10.1	14.35
2	Arrow Electronics, Inc.	569.9	40.7	11.00
3	Avnet	435.4	39.1	8.41
4	WPG	374.2	33.5	7.22
5	Future Electronics	344.3	24.1	6.65
6	Macnica	341.4	34.6	6.59
7	Nexty Electronics	314.7	12.6	6.07
8	CECport	238.0	57.7	4.60
9	Gain Hero 蓝源实业	182.5	10.6	3.52
10	Digi-Key	165.5	165.3	3.20

Top 10 South Korea sales

Rank 2021	Company	2021 South Korea (\$ Millions)	Growth 2021/2020 (Percent)	Share of Top 50 Total Sales (Percent)
1	SaMT	760.5	16.6	22.58
2	WT Microelectronics	680.0	14.8	20.19
3	Arrow Electronics, Inc.	329.1	69.6	9.77
4	Avnet	290.3	52.0	8.62
5	WPG	278.1	34.7	8.26
6	Restar Group	270.1	30.3	8.02
7	Nexty Electronics	147.5	12.4	4.38
8	Marubun	128.8	(61.7)	3.83
9	Kanematsu	113.4	7.5	3.37
10	Digi-Key	101.9	-	3.03

Top 7 Australia / New Zealand sales

Rank 2021	Company	2021 Australia/New Zealand Total (\$ Millions)	Growth 2021/2020 (Percent)	Share of Top 50 Total Sales (Percent)
1	Arrow Electronics, Inc.	668.7	36.6	56.35
2	Avnet	212.9	36.0	17.10
3	RS Group	91.2	16.6	8.32
4	Digi-Key	89.1	-	8.09
5	Future Electronics	87.2	17.9	3.67
6	Mouser Electronics	43.3	68.1	3.62
7	TTI	5.3	20.7	2.84



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After two years of quarantine, social distance and disruption, the electronic component industry is enthusiastic to get together again to learn about the best way to move forward

The ECIA 2022 Executive Conference will once again take place October 23-25, 2022 at the Loew's Chicago O'Hare Hotel in Rosemont, Illinois. This year's conference theme—Bucking Normal, the Resilient Thrive Through Disruption—captures the mood.

Conference planning committee chair, Robert Derringer, said: "The committee resolved to develop a message indicative of where our industry is going and how we feel after these past two plus years. Blessed to have survived the pandemic—literally and in business—we tossed around the idea of 'the new normal' and quickly wanted to kick it to the curb.

"Credit to conference co-chair, Tobi Cornell, for suggesting the phrase 'bucking normal'. This phrase gave the committee the kick it needed to fully engage its creative spirit and we were suddenly bouncing one bucking idea off another. Ultimately, we came to agree that what we want is to do more than survive; shift will keep happening and what

we all desire is to be resilient and thrive through disruption."

Dean Kamen, founder of the FIRST Robotics competition and inventor of dozens of innovative products including the Segway, will deliver the keynote and participate in one of the roundtables. Other highlights include roundtables on cybersecurity, ESG, economic forecasts, inspiring sessions on leadership and much more. The schedule has been posted and the latest information on the conference is available now.

ECIA CEO and president, David Loftus, said: "The industry is anxious to get together again in Chicago. Thanks to our fantastic planning committee, this conference is a golden opportunity to network with peers, learn how to address the industry's challenges and hear the latest economic data to guide 2023 planning."

ECIA's Sr VP, Victor Meijers, added: "The ECIA's mission of promoting the authorized sale of electronic components is

especially important in periods of supply chain disruption such as we are now experiencing. ECIA's component search engine, Trustedparts.com, has grown to be an essential element in a component customer's strategy to mitigate the risk of counterfeit parts."

TrustedParts.com was created by ECIA, in collaboration with participating distributors, to support the authorized electronic components industry by giving users access to aggregated price and availability data for genuine parts from only authorized sources. Using this tool enables the industry to increase its resilience during component demand fluctuations, such as those occurring now.

While other inventory aggregation sites may include data from sources not authorized by the manufacturer, ECIA works extensively on an ongoing basis to verify that price and availability data displayed on TrustedParts.com is only for products for which the distributors

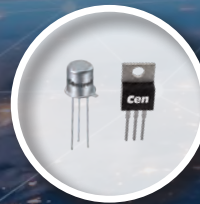
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TrustedParts.com was created as a free service to purchasing professionals, design engineers and anyone in need of electronic components price and availability information from franchised distributors. Membership in ECIA is not required to participate on the site.

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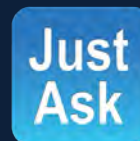
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CMLT3906E	Transistor	SOT-563
CMASH-4	Schottky Diode	SOD-923
CEDM7004	MOSFET (N-Ch.)	SOT-883L
CMPT2907A	Transistor	SOT-23
CMPT2222A	Transistor	SOT-23
CMPZDA18V	Zener Diode	SOT-23
CEDM8001	MOSFET (P-Ch.)	SOT-883L
CMPTA42E	Transistor	SOT-23
CMSZ5240B	Zener Diode	SOT-323
CMPZDA4V3	Zener Diode	SOT-23
CMPZ5235B	Zener Diode	SOT-23
CEDM8004	MOSFET (P-Ch.)	SOT-883L
CFSH01-30L	Schottky Diode	SOT-882L
CMMR1-10	Rectifier	SOD-123F
CEDM7001	MOSFET (N-Ch.)	SOT-883L
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Semiconductor demand weakens

Forecasters are calling for a semiconductor market downturn in 2023 but a few bright spots will keep some suppliers buoyant

Weeks after closing one of their best quarters in recent years, semiconductor manufacturers are confronting a different landscape with forecasters now calling for slower than expected market growth and a possible downturn in 2023. With some sectors remaining vibrant, though, chip suppliers are wary of calling an end to the upcycle they have enjoyed over the last couple of years.

As in the past, the consumer electronics and PC markets have been quick to show signs of weakening demand. Suppliers Intel and Advanced Micro Devices have pared their forecasts for the year amidst warning of a looming downturn.

Still, AMD shone brightly during the second quarter. Its revenue rose 83 percent from the year-ago quarter and 15 percent sequentially, boosted by strong demand for its server processors from cloud and enterprise customers. Demand from the data center market is expected to remain strong through the third quarter but sluggish growth in the PC segment could hurt sales, according to AMD executives.

“There are multiple dynamics that we’re looking at. In the current guidance for the full year and the second half, we continue to see strong demand in the data center,

in our embedded business, as well as in the console business,” said Lisa Su, chair and CEO of AMD. “We are being more conservative in our PC outlook. There was a bit of buildup in PC inventory, and we’ve taken that into account in the second half.”

Some other market segments are similarly constrained. Forecasters are beginning to reach the conclusion that the semiconductor industry will soon begin the next cycle of its infamous downturns. They point at efforts by manufacturers to reduce inventory, warnings of a global economic slowdown, inflationary pressures, and geopolitical tensions in many parts of the globe are combining to weaken consumer confidence and enterprise equipment demand.

“The outlook has darkened since April,” said Pierre-Olivier Gourinchas, chief economist at the International Monetary Fund, IMF. “The world may soon be teetering on the edge of a global recession, only two years after the last one. Under our baseline forecast, growth slows from last year’s 6.1 percent to 3.2 percent this year and 2.9 percent next year. This reflects stalling growth in the world’s three largest economies—the United States, China and the euro area—with important consequences for the global outlook.”

Semiconductors have become so ubiquitous in so many industries today that a global economic slowdown is bound to trigger a corresponding weakness in the electronics market. Forecasters have been updating their growth figures for the chip industry with many of them now calling for weaker results this year and negative growth in 2023.

Gartner Inc., for instance, says the market will shrink 2.5 percent in 2023 after a torrid expansion of 26.3 percent in

2021. The market research firm has also tamped down its prior growth estimate for this year, scaling it lower to 7.4 percent, from a prior forecast of 13.6 percent expansion. Demand for semiconductors has been sharply curtailed from many market segments, led by the computing and handset markets, Gartner said.

“We are already seeing weakness in semiconductor end markets, especially those exposed to consumer spending, said Richard

Worldwide shipments forecast by device type, 2021-2022 (million of units)

Device type	2021 Shipments	2021 Growth (%)	2022 Shipments	2022 Growth (%)
PC	342	11.0	310	-9.5
Tablet	156	-0.8	142	-9.0
Mobile phone	1,567	5.0	1,456	-7.1
Total devices	2,065	5.5	1,907	-7.6

The PC segment includes desk-based, notebooks, ultramobile premium and Chromebooks. Tablets include all Android and iOS. Source: Gartner



Gordon, vice president of practice at Gartner. "Rising inflation, taxes, and interest rates, together with higher energy and fuel costs, are putting pressure on consumer disposable income. This is affecting spending on electronic products such as PCs and smartphones."

PC sales rose strongly during the Covid-19 pandemic as workers transitioned to telecommuters and as companies aggressively encouraged employees to work remotely to curtail the likelihood of infection. As a result, PC sales increased at a double-digit rate in 2020 and 2021, according to data from IDC. Demand has since stagnated, though, and shipments are forecast to drop starting this year and extending through the next year. For the second quarter, IDC projects a 5.6 percent decrease in demand for desktops, notebooks and workstations.

"Shipments are still above pre-pandemic levels; however, growth has softened, which is an indication of the market reverting to normal seasonality," IDC said. "While the overall market contracted due to saturation in mature markets, Asia/Pacific (excluding Japan and China) still recorded growth in the quarter as there have been several large investments for digital education in the region."

PC OEMs are amongst the largest users of semiconductors globally and a reduction in demand for computing devices will hit them hard, analysts said. After the huge increases of the last couple of years, annual PC unit shipments will drop 9.5 percent in 2022, according to Gartner. The market researcher projects shipments of 310 million units in 2022, down from 342 million last year. The consumer PC segment and the EMEA region will lead the decline, it said.

"A perfect storm of geopolitics upheaval, high inflation, currency fluctuations and supply chain disruptions have lowered business and consumer demand for devices across the world and is set to impact the PC market the hardest in 2022," said Ranjit Atwal, an analyst at Gartner. "Consumer PC demand is on pace to decline 13.1 percent in 2022 and will plummet much faster than business PC demand, which is expected to decline 7.2 percent year over year."

Similar challenges are being seen in the smartphone and consumer electronics markets. The adoption of 5G devices rose globally over the last several years led by strong demand from Chinese consumers. Initial forecasts called for a 47 percent jump in global unit shipments this year. However, demand in the Greater China area sank by mid-year, drowning under measures taken to curb the spread of Covid-19. This will result in a decline of 2 percent in unit shipments of smartphones in the area this year, dropping from an increase of 65 percent in 2021, according to Gartner.

"At the beginning of the year, the Greater China 5G phone market was expected to show double-digit growth," Atwal said. "The impact of China's zero tolerance Covid-19 policy and resulting lockdowns have dramatically reversed this trend. Large numbers of consumers stopped buying non-essential items."

It's not all gloomy ahead, though. Demand for electronics is expected to remain strong in the next several years as companies forge ahead with efforts to digitalize their operations. Some industries are more aggressive and have made further progress in the digitalization efforts



Lisa Su, AMD
chair and CEO

than others. Sectors such as automotive, banking and finance, high-tech, medical and services were quick to adopt electronics since the beginning of the millennium while others are just beginning to catch up. But early adopters still have ways to go, according to industry sources who argue that even developed nations like the United States have not fully tapped the promises of technology advancements.

In addition, developing economies are generations behind in the use of certain technologies and are eager to widen the adoption to improve their competitiveness. This is boosting demand for chips and technology products, which means even a slowdown caused by efforts to control rising inflation will be shortlived, according to experts. A snapback in demand for semiconductors

within a few quarters is possible, they said.

Certain market segments will perform better than others over the next few months and during any market downturn, including the one projected to start in 2023. Areas such as artificial intelligence, IoT, cloud computing, data centers, automotive, industrial and transportation are seen leaping ahead of traditional growth drivers for semiconductors like PCs, enterprise computing and smartphones. The likelihood of a long-lasting slowdown is remote, according to observers.

"Driven by the trends of digitalization and sustainability, the demand for semiconductor solutions will increase significantly in the future," said researchers at Oxford Economics in a paper.

Selecting reliable passives for automotive applications

Knowles Precision Devices' global capacitor R&D and senior applications manager, Steve Hopwood, explains how higher voltages are impacting automotive passives

Electronic control units inside combustion vehicles and batteries required for EVs need reliable, high-quality components such as capacitors and filters. However, selecting components that can function reliably long-term in harsh environments is challenging.

The AEC-Q200 standard helps automotive companies identify high-reliability components. This standard defines the minimum stress test qualification requirements for passive electrical devices including ceramic capacitors. Components meeting AEC-Q200 are deemed suitable for automotive environments without additional component-level qualification testing. Thus, AEC-Q200-qualified parts save manufacturers time and money.

However, just because a part is AEC-Q200 qualified does not automatically mean it suits every automotive application. There are additional considerations, especially regarding high operational voltages.

A big factor for multilayer ceramic capacitors (MLCCs) is voltage rating. However, selecting an MLCC based on maximum operating voltage is actually not the limit to think about. To ensure reliability and human safety, the MLCC needs to be subjected to extremely

high-voltage insulation tests, up to five times the part's operating voltage. The voltage rating to consider when selecting an MLCC is the maximum test voltage, otherwise you can compromise the component during testing, reducing reliability and resulting in early failure of the MLCC (Fig 1).

Using safety-certified capacitors for high-voltage operations, even where they are not required, can help alleviate this issue as these capacitors are tested externally to various international standards. Knowles Precision Devices offers auto-grade safety-rated MLCCs that have 100 percent dielectric withstand voltage (DWV) at up to 4,000Vdc.

Typically, MLCCs are not large components. But successful operation at high voltages requires larger MLCCs. In Fig 2 the MLCCs on the right used to be considered the largest size MLCC used in automotive applications but today's high-voltage requirements demand much larger components like those shown on the left.

One reason MLCCs have become larger is because higher voltage requires a higher minimum creepage distance. If a component is too small it impacts the dielectric's ability to withstand the voltage

without a flashover. If a larger component can't be used, another option is conformal coating, although it must cover all the MLCC's surfaces, including underneath.

To avoid creepage and flashover, it may be tempting to use the largest applicable MLCC, however larger components are more susceptible to cracking due to board stresses (Fig 3).

One way to mitigate mechanical failures caused by cracking is open mode design, which moves the electrode overlap area into the chip to allow the MLCC to crack without going through the active area and causing an electrical failure. Another way is to build a tandem capacitor, where each capacitor is rated to take the full operating voltage if one shorts.

Knowles Precision Devices engineers prefer to address potential cracking failures by using a flexible termination. Invented by Knowles Precision Devices, flexible terminations absorb stress and increase the ability of the MLCC to withstand mistreatment. The company's FlexiCap™ flexible termination material can withstand a board bend of at least 5mm in a 100mm span directly under the chip.

www.knowlesc capacitors.com

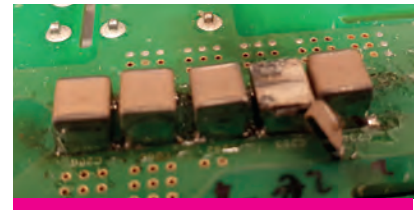


Fig 1: MLCCs failed due to overvoltage



Fig 1: MLCCs failed due to overvoltage

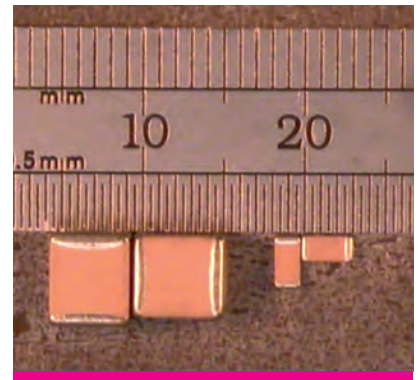


Fig 2: the MLCCs on the right used to be considered the largest size MLCC used in automotive applications but today's high-voltage requirements demand much larger components like those shown on the left



Fig 3: An MLCC that cracked and failed

Keys to sourcing parts in a tight market

Flip Electronics' president, Bill Bradford, offers practical advice for the times purchasing professionals find it necessary to turn to new sources of supply

The past few years have been unprecedented, plagued by a perfect storm of global pandemic, political turmoil, environmental shifts and semiconductor supply chain disruptions. Purchasing professionals must be more strategic than ever to get their jobs done.

Lead times, fed by capacity, materials and logistics constraints, have stretched to months—a trend likely to continue for at least a couple more years. These constraints extend across most component types.

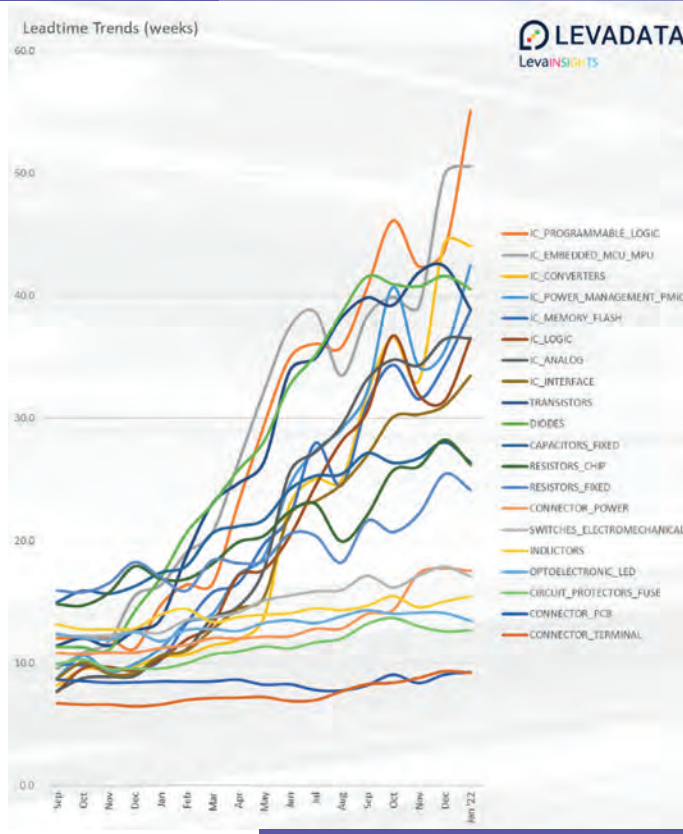
For many buyers, the challenge to fill critical requirements means bringing on new sources of supply, including specialty and independent distributors, or brokers. Buyers will have to think differently about working with these new partners safely and effectively. Then, if purchasing from the open market becomes unavoidable, organizations will need to focus on counterfeit avoidance. Before turning to the open market, procurement's first line of defense should include a strong

relationship with a reputable authorized specialist distributor who focuses on hard-to-find products. These partners will communicate clearly about parts they have and how many, plus pricing and delivery. These strategies help purchasers avoid counterfeits.

Disreputable sources will push buyers to make quick decisions and wire funds without providing product specifics, such as date or lot codes, that verify what is being purchased. If a deal seems too good to be true, it probably is. Consider leveraging existing distribution partners to verify new sources. If nobody has heard of them, there's a real risk they are not legitimate.

Sometimes it's necessary to turn to new partners. When buying in the open market, good practices around parts verification should become top priority. Define what a counterfeit part is and take steps to identify and eliminate them.

Bad actors are getting more sophisticated. For example, counterfeiters may put a dozen



Source: **LevaData**
levadata.com/semiconductor-lead-time-updates-the-forecast-for-2022

or more genuine parts on a reel, followed by counterfeit parts, hoping the real parts will be tested and the counterfeits will be passed into manufacturing. Others try slipping through working parts that fail to meet specifications.

As counterfeiters get more sophisticated, buyers must become savvier. If forced to the open market for parts, multiple testing levels

should be employed, particularly for applications where a parts failure could be devastating.

In this challenging market, the adage of 'trust but verify' holds true. Find trusted partners and work closely with them to verify that only genuine product is put into the manufacturing stream.

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10**

GLOBAL
INDEPENDENT
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REPORT

2022

Oversupply v undersupply

Independent distributors potentially face an unusual 2023 where some component categories will be in an oversupply state while others remain unavailable, allocated or on long lead times

During 2021, independent distributors witnessed strong growth, primarily fueled by global post-pandemic component shortages. A type of temporary obsolescence management has evolved, not driven by traditional end-of-life components but instead by purchasing professionals seeking alternative parts due to unprecedented increases in lead times.

ESNA's annual readership survey confirmed buyers increased their spend with independent distributors, with the key reason being 'component availability'.

Not surprisingly, all the independent distributors featured in this year's report have witnessed substantial revenue growth during the 2020 to 2021 time frame.

The next question is how will independent distributors perform over the coming 12-months, given the vast flows of components required to keep production lines at full capacity? With post-pandemic demand triggering shortages, there are signs the semiconductor sector is facing a slowdown. The electronics industry is accustomed to peaks and troughs and this potential slowdown will have market analysts scratching their heads as to how this will impact the 2023 market performance.

Reports indicate some large semiconductor manufacturers are reducing planned capital investment even though key segments, such as industrial, are still seeking components.

The recent Washington Chips Act passed law to subsidise increases in US based chip manufacturing which is good news for the supply chain moving forwards. However, there are reports of the supply chain simultaneously having a mix of excessive inventory and shortages.

This has been driven by rapid increases in chip supply from Q1, 2022. In February 2022 there were approximately 1.2 months of production inventory available. In June 2022 inventory levels jumped to 1.4, extending to 1.7 in July 2022. During the period of extended component lead times, many OEM manufacturers have been building inventory to ensure availability for their production processes.

With softening demand for smartphones and PCs, some component manufacturers fear an economic slowdown. Intel recently announced that latest quarterly revenue had fallen \$2.6B/15% which is short of predicted sales. Currently, most supply chain professionals anticipate performance of semiconductor demand in 2023 will have a relatively soft downturn, based on the US economy not retracting heavily.

A good indicator for 2023 semiconductor demand is whether OEMs and EMS adjust their inventory build-up or reduce inventory.

Electronics Sourcing North America Reader Survey – Do you buy from independent distributors?

2021 results

69% Yes

31% No

2020 results

41% Yes

59% No



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The top 10 global independent distributors

Rank 2021	Company	Headquarters	2020 Worldwide (\$ Millions)	2021 Worldwide (\$ Millions)	Percentage change from 2020 (%)	no. of employees
1	Shenzhen Huaqiang 深圳华强	China	2,367.60	4,000*	+ 68.97%	N/A
2	Kaga Electronics	Japan	1,719.90	3,500*	+103.50%	N/A
3	Smith	USA	1380	3,400	+146.37%	700
4	Fusion Worldwide	USA	1,264.30	2,498.7	+97.63%	525
5	NewPower Worldwide	USA	456.50	755	+65.93%	122
6	A2 Global Electronics + Solutions	USA	258	731	+183.33%	500
7	Velocity Electronics	USA	125	652	+421.60%	209
8	Chip 1	Germany	197	590	+199.49%	350
9	IBS Electronics	USA	15	81	+440.00%	120
10	Perfect Parts Corporation	USA	22.5	68	+202.22%	32

* Denotes predicted 2021 sales

The top 5 independent distributors year-on-year growth

Rank 2021	Company	Percentage change from 2020 (%)
1	Velocity Electronics	+421.60%
2	IBS Electronics	+440.00%
3	Perfect Parts Corporation	+202.22%
4	Chip 1 Exchange	+199.49%
5	A2 Global Electronics + Solutions	+183.33%

The top 5 NA independent distributors by total global sales in \$ millions

Rank 2021	Company	2021 Worldwide (\$ Millions)
1	Smith	\$3,400
2	Fusion Worldwide	\$2,498
3	NewPower Worldwide	\$755
4	A2 Global Electronics + Solutions	\$731
5	Velocity Electronics	\$652

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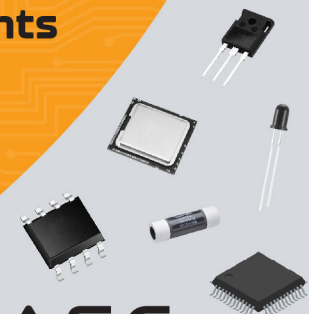
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Strengthening supply chain resiliency

IBS Electronics lists the benefits that certified independent distributors can offer purchasing professionals as they strengthen their supply chain via value added services

Finding stock and meeting delivery timeframe requirements is often an increasing challenge for purchasing professionals, given the market conditions. Now, more than ever, is the time for manufacturers to explore reinventing their supply chains. By expanding vendors and adopting independent distributors into supply chains, purchasing professionals should recognize those who can provide the maximum value.

Here are a few ways independent distributors—like IBS Electronics, an ISO:9001:2015, AS9120B and

AS6081 certified distributor—can provide maximum value to purchasing professionals.

- Multi-source strategies to meet demand
- Quality management systems and certifications are defining industry-leading counterfeit and risk mitigation
- Know-how and testing capabilities ensure performance and authenticity in the event of open-market sourcing
- Inventory management allows pull-ins and pushouts as needed
- Consolidating market stock available and delivering on time
- Data and reporting on market insights, enabling more intelligent purchasing strategies
- Alternative parts proposals to find drop-in-replacements or minimal re-designs
- BoM analysis becoming a seamless extension of the manufacturer's purchasing team
- Engineering and design support



IBS Electronics' global marketing & PR manager, **Matthew Amato**

- Flexibility and ability to adapt to market conditions

The best independent distributors can do much more than supply a part: they strengthen supply chain resiliency by delivering incomparable value-added services buyers may not have considered, easing the pressure on procurement success and helping purchasing professionals meet their performance targets.

www.ibselectronics.com

Maximize value through sourcing networks

Smith's chief globalization officer, Mark Bollinger, explains how buyers can get maximum value from independent distributors during current long lead times and allocation?

Independent distributors like Smith help partners achieve maximum value through sourcing networks and quality-control processes. From a procurement perspective, one goal is helping partners gain access to market intelligence information. Customers who partner with Smith and make the organization part of their overall sourcing strategy get a jump on peaks in demand, which results in faster deliveries and better pricing.

Smith's contacts and unique global view provide market insights that can be shared with customers to support

their procurement strategies. The operational approach to quality helps optimize purchasing professionals' efforts because Smith's processes adhere to industry-leading certifications that guide the company's individual quality standards, from inspection to delivery. Maintaining state-of-the-art testing laboratories on three continents helps mitigate risk and keep potential nonconforming product from entering the supply chain.

Disruptions around lead times and allocations are likely to continue in many sectors, especially more

specialized industries, so purchasing professionals can expect market fluctuations to also persist. Smith offers a multifaceted partnership where optimization and quality are key aspects of supply chain management and partners gain the advantages of this unique business model. Other supply chain services, such as vendor-managed inventory programs, are especially helpful for organizations looking to establish a steady or long-term supply of parts in the current volatile market.

www.smithweb.com



Smith's chief globalization officer, **Mark Bollinger**

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Credit Facility
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Fully Insured
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Cloud Technology
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Global Locations
11



Languages Spoken
22

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IBS Electronics Group understands there is no one-size-fits-all solution for every manufacturer and develops unique solutions that adapt dynamically to market conditions to solve customer challenges.

What's your story?

Discover endless possibilities from design to procurement with bespoke electronics manufacturing services and supply chain management tailored specific to your requirements.

Founded in 1980 in Southern California, IBS Electronics Group is ISO 9001:2015, AS9120B & AS6081 certified global franchise distributor with over 40 years of experience delivering innovative electronics manufacturing services and supply chain solutions to a wide range of customer

industries including automotive, industrial, telecom, medical, aerospace and more.

With customer experience in mind, IBS Electronics supports 360 degrees of its operation with the distribution of not only active, passive, and electromechanical components but also indirect materials and chemical products.

IBS Electronics creates an integrated supply chain with their customers and suppliers by becoming a seamless extension of their operations worldwide to only deliver "Best in Class" processes, information, technology tools, and people.

As a customer and people-centric organization, IBS Electronics customers experience dedicated support and endless possibilities. From vendor consolidation to value engineering, the results provide improved supply chain visibility and multi-source strategies building resilience to market disruptions regardless of geography, cost point, technology, or market demand.

IBS Electronics Group aims to provide a better, streamlined, and more durable company for future generations by investing in people and helping to improve supply chain visibility throughout the world with quality parts and services - ON TIME, EVERY TIME!



VALUE ENGINEERING

No matter what stage of your product lifecycle, IBS Electronics provides engineering support to deliver a bespoke solution. Whether it be a customized product or pin-to-pin cross-references for **alternative components saving cost, reducing lead times, and optimizing the assembly of your product, we will be there to guide you throughout the entire process.**



VENDOR CONSOLIDATION

Doing business with multiple vendors can be time-consuming. With an extensive line card, IBS Electronics offers the benefits of vendor consolidation. **Increase purchasing power, reduce freight costs, and reduce supply chain complexity.**



DEDICATED SUPPORT

IBS Electronics team of experts is dedicated to monitoring market trends, including stock availability and shifts in price, to provide an optimal customer experience by **anticipating manufacturers' unmet and emerging needs.**

www.ibselectronics.com

WHAT'S YOUR STORY?

Reinvent Your Supply Chain



AS9120B & AS6081
CERTIFIED

Discover
Endless
POSSIBILITIES
BESPOKE
**SUPPLY CHAIN
MANAGEMENT**

IBS ELECTRONICS GROUP



SINCE 1980

BESPOKE SUPPLY CHAIN MANAGEMENT

VALUE ENGINEERING

GLOBAL FRANCHISE DISTRIBUTION

MULTI-SOURCE STRATEGIES

CUSTOMER & PEOPLE CENTRIC

FUTURE READY



@ibselectronics | www.ibselectronics.com

THE PERFECT SOURCE

Today's market shortages and lead-times of over 52 weeks make it clear that no one's supply chain is safe. Given major constraints that are being experienced by both design and supply chain departments, many OEMs are realizing that partnering with the right distributor is the missing link in their supply chain. Partnering with a distributor that knows reverse logistics, has global reach, a good reputation, and third-party testing capabilities to ensure that your products meet your end user requirements is needed in order to be successful.

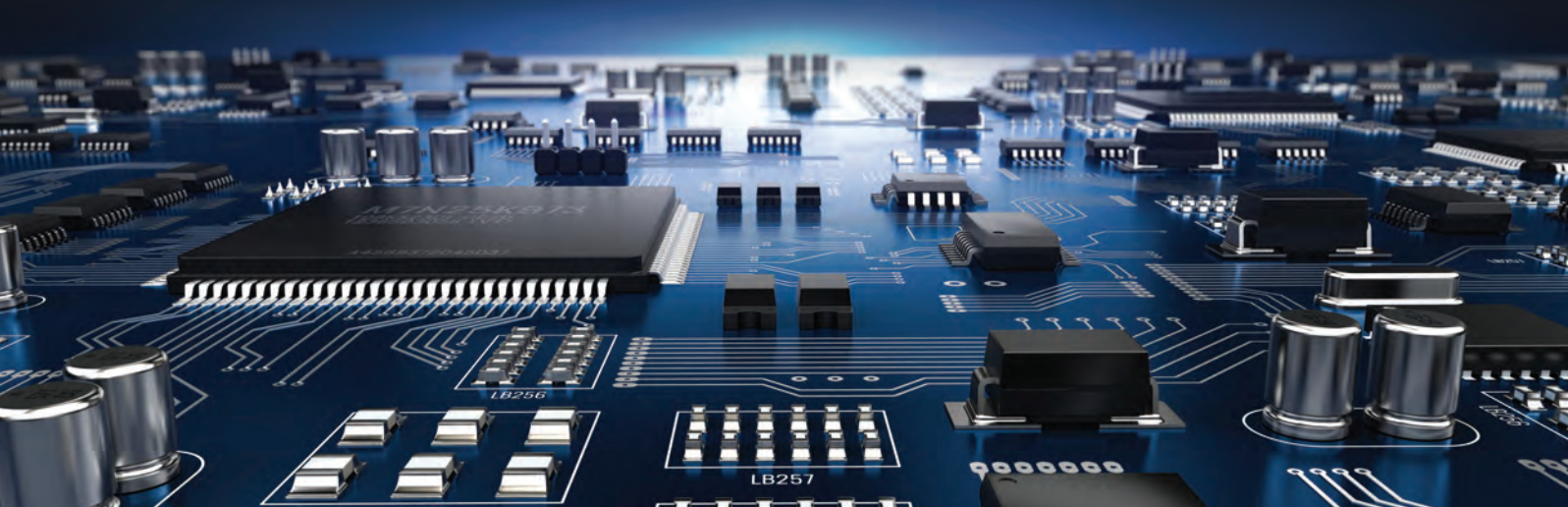
Sourcing from the open market can be daunting with counterfeit parts and sub-standard materials posing as a constant threat to your supply chain. Material procured from the open market that is improperly tested can cause loss of relationships, increased liability,

major delays, and line down situations. Many distributors test material in house or not fully leaving your supply chain exposed. Perfect Parts works with 3rd party fully accredited test labs which are specialized in performing comprehensive testing including those which are for high reliability applications. By utilizing third party laboratories you can rest assured that there is no conflict of interest when testing material for your supply chain.

With an eight-year streak of zero RMAs due to sub-standard materials, Perfect Parts is the only USA distributor that can boast zero RMAs due to a counterfeit or substandard part deliveries. When you work with Perfect Parts you can expect a level of quality that is unrivaled in the electronic component industry. Perfect Parts is a global online distributor of electronic components

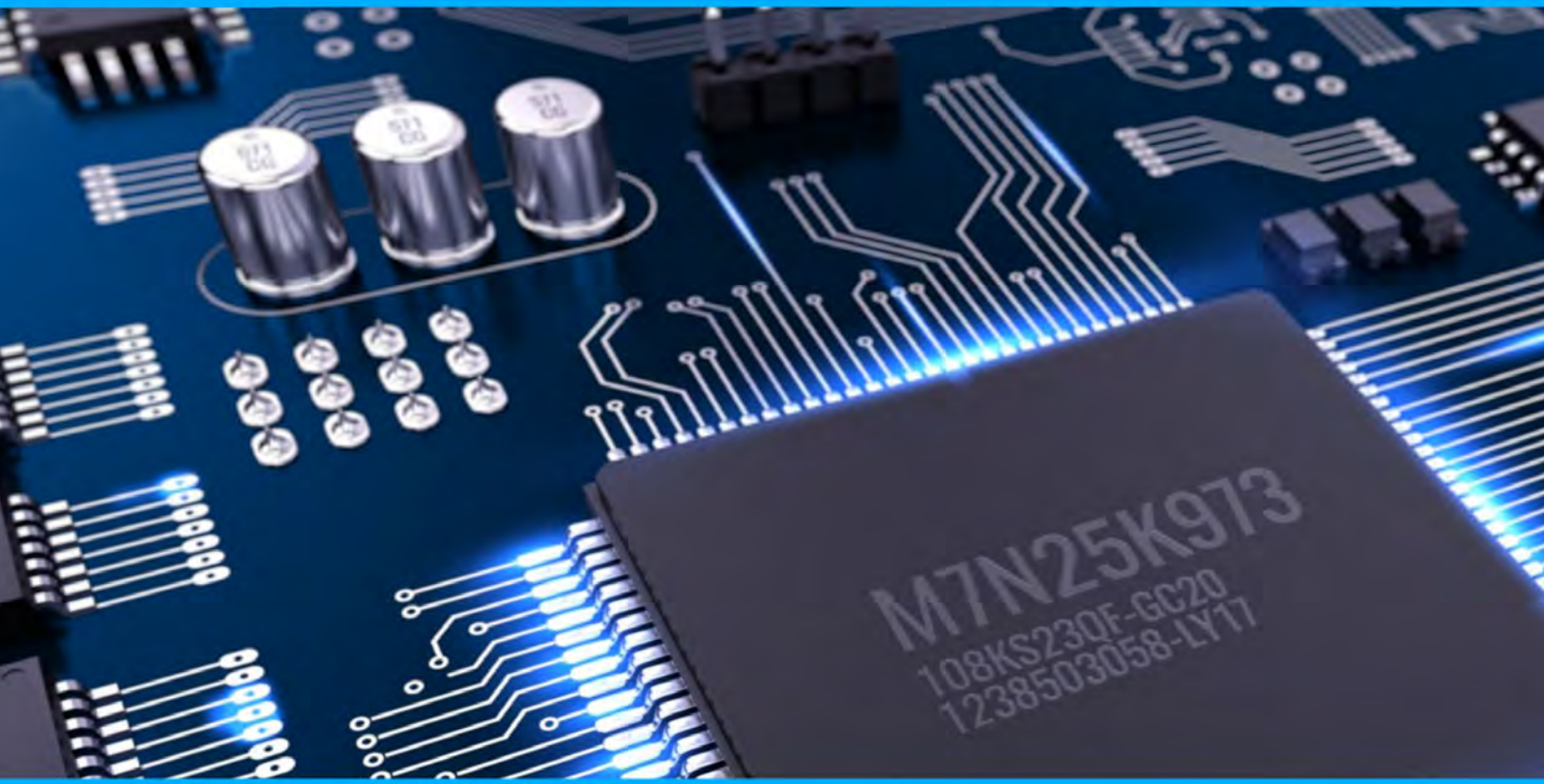
that specializes in testing requirements, sourcing, and distribution. With access to over 30 million unique inventory lots from our global network of manufacturers, OEMs, contract manufacturers, authorized channels, and other vetted suppliers you will find everything you need for your builds. With a focus on providing value-added services and advanced web tools, Perfect Parts will change the way you design and procure components for your organization.

www.perfectelectronicparts.com





Perfect Parts
CORPORATION



100% Quality Driven 100% Of The Time

The Only Distributor With A Perfect Track Record



New purchasing strategies

A2 Global Electronics + Solutions describes how independent distributors are helping buyers develop and implement new purchasing strategies to mitigate the problems of demand spikes

Mounting demand has increased the need for suppliers to deliver a reliable and secure stream of semiconductors. One challenge is identifying ways to help customers plan when the market is unclear. Managing new and legacy component inventory requires planning, re-design or strategically sourcing parts. Working with an independent distributor, customers can identify larger sourcing channels, design long-term custom solutions and take quality measures

to mitigate risk when the market gets cloudy.

While certain customer segments and product classes still struggle with supply, we expect a gradual softening in demand. We see longer lead times for various in-demand parts. For example, currently MOSFETs are in particular demand, with two-year wait times. Identifying a strong independent distributor can assist with a long-term custom solution to plan for the next 12-months and beyond.

Successful sourcing is more important than ever. An independent distributor can evaluate customers' specific supply chain pain-points, provide available custom solutions and develop proactive strategies for managing long lead times while maintaining quality-ensured components.

Alternatives can offer solutions for sourcing hard-to-find components when they are suitable. A quality independent distributor provides custom services that

offer inventory solutions that help mitigate costs, production delays and other challenges associated with a component becoming unavailable. The right partner can assist in monitoring EoL notifications, provide immediate alerts and arrange for LTBs appropriate to demand. Buyers must create a strategy to get the parts they need—especially if they make long-lifecycle equipment for the military, aerospace, automotive and medical industries.

www.a2globalelectronics.com

Extended lead times persist

Fusion Worldwide's CRO, Luke LeSaffre, explains how lead times continue to be impacted by strong demand from the automotive, industrial and enterprise segments

Over the last 16-months, lead times have been expanding rapidly at unprecedented rates, creating lead times of 52-weeks or more and making missed delivery dates the norm. In the last two months, we have started to see data that suggests contraction in certain segments. The question remains how long it will take for lead times to return to normal levels?

Given the protracted period over which lead times were extending—we started to see them take off in February 2021—

recent data and feedback from customers indicates the decline will be more gradual. For each instance of a customer reporting an improvement of deliveries or order cancellation (thereby providing some relief to overall demand), we hear just as many instances of extended lead times into late 2023 and beyond.

Weakened demand may bring a quicker decline in lead times, as well as concerns about the global macroeconomic state. Assuming less pronounced changes in demand, we anticipate that lead times

will remain extended for at least the first half of 2023, and possibly beyond for certain product categories such as older technologies. While demand for consumer-oriented end products is slowing down, markets for more automotive, industrial and enterprise segments are showing more resilience, and we expect that dynamic to provide some headwinds in the effort to bring down lead times in the quarters ahead.

www.fusionww.com



Fusion Worldwide's CRO,
Luke LeSaffre



Triman
INDUSTRIES

CTG

Brighton Cromwell
MISSION READY™

ELECTRONIC COMPONENTS SHORTAGE?

WE CAN HELP.

CTG, a Triman Holdings company, is your trusted supplier with unequalled certifications and standards for quality assurance and counterfeit prevention.

We stock long lead time parts and have access to a global inventory of heavily allocated parts for quick delivery.

What Sets Us Apart

- Global Parts Inventory and Supplier Network
- First-Class Counterfeit Detection Lab and Testing Facility
- CTG Leads the Industry in Certifications

COUNTERFEIT PREVENTION



QUALITY ASSURANCE



MEMBERSHIPS



Triman
INDUSTRIES

CTG

Brighton Cromwell
MISSION READY™

914-274-6124 | denise@ctgnow.com | CTGNOW.COM

THE FUSION WORLDWIDE ADVANTAGE:

THE FUTURE OF ELECTRONIC COMPONENT SOURCING

Fusion Worldwide has spent more than 20 years partnering with customers to resolve their day-to-day supply chain imbalances. As one of the world's largest independent distributors of electronic components and finished goods, we are experts in sourcing quality components across all types of supply and demand fluctuations, solving our customers' challenges, and keeping businesses on track.

Headquartered in Boston, Mass., Fusion Worldwide has 28 offices worldwide and four quality hubs on four continents. More than 500 employees provide services to an ever-growing number of customers – from Fortune 100 enterprises to start-ups – across verticals including: computing, industrial automation, automotive, aerospace, energy, consumer electronics and more.

Strategic Partners In Problem-Solving

At Fusion Worldwide, we have been sourcing quality electronic components for our customers since 2001. We use our industry expertise and vetted supplier network to help resolve supply chain disruptions and keep our customers on track, regardless of regularly changing market effects.

Whether solving for product obsolescence and lengthy lead times, or responding to geopolitical factors and unpredictable price increases, Fusion's mission is to help our customers pivot and react to changes quickly to stay on track.

Fusion is proud to have earned a reputation for reliability and integrity within the electronic component and finished products markets. We continue to grow our presence the world over, with ongoing dedication to providing speed, experience and market insights to help customers complete their supply chains.

Responding to Customer Challengings in Real Time

Fusion Worldwide is not only dedicated to helping customers weather supply chain challenges when they occur, we're also constantly informing ourselves and our customers of regularly changing market conditions to help head off supply chain issues before they happen. Through ear-to-the-ground trend monitoring and information gathering via our vast supplier network, our team is on top of market changes in real time, which allows us to spot challenges – and opportunities – for our customers.

By tracking market variables like geopolitical tensions, prolonged lead times, price increases and other supply chain effects, Fusion can proactively advise and inform our customers on necessary actions to take to offset unanticipated issues in their sourcing processes. By doing so, we add value and reduce risk for our customers, regardless of the obstacles the market may throw.

Defining Industry Standards

Fusion Worldwide has not only set the standard for quality within the semiconductor industry over the last 20+ years, but we also remain committed to constantly enhancing our reliable service and innovative solutions to our customers around the world. Fusion Worldwide is now a one-stop shop for turnkey projects used by the semiconductor industry, CMs and OEMs. To learn more about Fusion Worldwide, visit www.fusionww.com.

In-House Testing for Game-Changing Customer Service

In the interest of improving customer satisfaction and lead times, Fusion Worldwide recently acquired Prosemi, Singapore's largest independent test facility. Fusion has always focused on putting the customer first, and with Prosemi, Fusion has set a new bar for order fulfillment speed and quality assurance. By adding Prosemi to the Fusion family, Fusion Worldwide has become the only independent distributor in the world to partner exclusively with a third-party test house.

By integrating a third-party test house, Fusion is stepping up its commitment to our customer-first mantra. Conducting services in-house will improve lead times, reduce reliance on outsourced testing, and expand Fusion's capacity to store inventory. The expanded services include tape and reeling, baking, solderability and programming. Fusion customers now receive the quickest turnaround time and highest quality possible.

FUSION IS TRANSPORTATION



WHAT DIFFERENTIATES SMITH'S SERVICE OFFERINGS?

Supply chains in the global electronics sphere are one of a kind and complex, and companies in this space often need to lean on specialized service programs to help meet their long-term business goals. As an independent distributor of electronic components, Smith has the capabilities needed to match and exceed our global partners' complex requirements with tailored support. Driven by the uniqueness of our people, processes, and places, our service offerings provide leading supply chain solutions. The industry expertise and tenure of our employees, coupled with our in-house proprietary systems and state-of-the-art facilities, set Smith's service offerings apart from others.

HOW HAVE SMITH'S SERVICE PROGRAMS CHANGED OVER THE PAST DECADES?

Our service programs have adapted over the decades to comprehensively meet the needs of our partners and the continually evolving technology industry. Since our founding in 1984, we have greatly expanded the breadth of our supply chain services to include more in-depth capabilities. From establishing in-house vendor-managed inventory (VMI) programs and IT asset disposition services on three continents to diversifying supplier-consolidation strategies, we have developed our services to more expansively support our partners' needs within the evolving electronics supply chain.



ABOUT SMITH

- **A global leader in independent distribution - seamlessly connecting businesses to the electronic components they need**
- **Founded in 1984**
- **17 locations worldwide**
- **700+ employees**
- **25+ certifications and affiliations**

SERVICE OFFERINGS

- **Excess inventory solutions**
- **VMI**
- **Shortage sourcing**
- **ITAD**
- **Supplier consolidation**
- **Market intelligence**
- **And more**

WHAT ROLE DOES QUALITY PLAY IN SMITH'S SERVICE PROGRAMS?

Quality plays the leading role in all of Smith's service programs, from procurement to logistics. Before we secure product, we run our suppliers through a rigorous vetting process with specific qualifying standards. We approach each stage of our distribution process in the same way – with an uncompromising focus on quality and commitment to providing authentic semiconductors and other electronics components. Establishing customizable and agile service programs backed by strong quality-control procedures helps our partners meet both their current and long-term needs.

WHAT LONG-TERM SERVICE STRATEGIES CAN SMITH OFFER TO HELP MANUFACTURERS KEEP THEIR LINES ACTIVE?

During these unprecedented times, companies across many industries and verticals are struggling to meet objectives and keep their lines running smoothly. To help ease some of these challenges, we encourage our partners to keep a few priorities top-of-mind when implementing service programs: Plan early, remain vigilant, and use trusted, data-driven market intelligence information to help guide business decisions. VMI programs and supplier consolidation and diversification management are a few important service strategies to keep in mind during the ongoing shortage situation.



LEADING SUPPLY CHAIN SERVICES SINCE 1984



Tailored support to sell or purchase excess electronic components



State-of-the-art operational facilities and storage solutions on three continents



Shortage sourcing for a full product range — motherboards, CPUs, HDDs, SSDs, ICs, memory, and more



Dedicated IT asset management team to provide end-to-end support



Tenured professionals and commodity experts to help guide decision making



Data-driven market intelligence information supported by Smith's global network of trusted partners

EXPERT SERVICES THAT CONNECT BUSINESSES TO THE ELECTRONIC COMPONENTS THEY NEED

CONTACT US TO LEARN MORE



smithweb.com



Sourceability: innovation, integrity, and customer engagement

Sourceability is a global technology company transforming how businesses bring products to market through a digitalized supply chain. Our mission is to support the needs of the electronic industry's supply chain with a comprehensive suite of forward-thinking digital products and services by providing access to reliable technology intelligence and enabling engineering sourcing for product design requirements.

Headquartered in Doral, Florida, the company operates 20 locations across North America, Europe, and Asia and employs over 300 people worldwide. The backbone of Sourceability is innovation, quality, and logistics with global distribution centers in Singapore, Hong Kong, and Miami. Regional offices support each distribution center to maintain a deep understanding of customer supply chain needs. The company is led by founder and CEO, Jens Gamperl, an established technology leader with 30+ years in the electronic components industry across both Europe and the United States. Prior to founding Sourceability, Jens held various management positions at global businesses including Tech Data, CE Global Sourcing, and Advanced MP.

Sourceability's cutting-edge digital supply chain tools make the procurement process faster and easier for customers in a wide range of sectors, including the communications/cellular, computer, and auto manufacturing spaces. These tools include Sourcengine, the electronic component industry's leading e-commerce marketplace helping the world's largest OEMs and suppliers

source, negotiate and purchase on one platform. Powered by more than 3,000 suppliers, billions of parts, and billions of data points, Sourcengine empowers electronic component purchasers with e-commerce functionality that provides new market insights and streamlines purchasing and procurement. Suppliers face a comprehensive inspection process to confirm the integrity of their parts before joining the network. As a result, buyers can rest assured that they are purchasing the trustworthy components needed to keep their production lines running at the speed of the Internet.

Beyond the unique technological capabilities of Sourcengine, Sourceability also offers multiple ERP integrations, MOQ management among EMS partners, EOL/LBT program, excess inventory trade, price benchmarking, data-driven vendor reduction, and in-depth market intelligence. These functionalities give buyers a more complete view of the marketplace and empower them to make purchase decisions based on a more complete set of information that they can track directly back to their specific needs. Sourceability's powerful purchasing portfolio includes everything from semiconductors to MCUs to thermal support devices.

Pandemic-related challenges opened many eyes to the weaknesses of existing procurement and supply chain processes worldwide. Sourceability has been working to address these challenges for over seven years now by offering a more digital solution that eliminates the need for manual and time-consuming piecemeal negotiation streams. By optimizing

e-commerce for electronics components and modernizing the negotiation and purchasing process with unmatched traceability, Sourceability removes the biggest barriers holding the supply chain from the digital age. Across its entire global ecosystem, three fundamental values guide the work of Sourceability: innovation, integrity, and customer engagement.



A2 GLOBAL[®]

electronics + solutions



WHO IS A2 GLOBAL?

For over 40 years, A2 Global Electronics + Solutions has set the quality standard with easy, fair, and uncomplicated electronic component distribution and supply chain solutions.

WHAT SOLUTIONS DOES A2 OFFER?

We offer a full-range of supply chain solutions including shortage mitigation, inventory solutions, cost reduction services, obsolescence management. We also offer customizable solutions.

WHERE DOES A2 OPERATE?

We have global offices and strategically located distribution centers in the Americas, EMEA, and APAC regions.

For a full list of our global locations, visit our website at a2globalelectronics.com



Industries We Serve:



Healthcare



Lighting / LED



Oil & Gas



Automotive



Energy



Defense



Aerospace



Cloud



Embedded



Consumer



Industrial



Telecom



Security

...AND MANY OTHERS.

YOUR GO-TO RESOURCE FOR SOURCING ELECTRONIC COMPONENTS

SHORTAGE MITIGATION

Address unexpected electronic component shortages caused by extended lead times, changed forecasts, and other supply chain disruptions.

We will provide a comprehensive assessment of your excess inventory value with expert recommendations on the quickest way to maximize inventory value recovery.

INVENTORY SOLUTIONS

COST REDUCTION

Lower the cost of components beyond single buys with benchmarking programs, volume buys, and lifecycle analysis.

Source EOL products, facilitate multi-year purchases (MYP), and receive Life Cycle Assessment (LCA) support for the preemptive planning of at-risk components.

OBSOLESCENCE MANAGEMENT

GLOBAL SOURCING

Find the components you need – at the right price – from our sourcing hubs in the Americas, Asia, Japan, and Europe.

YOUR GLOBAL PARTNER

Contact **A2** today to learn more:

a2globalelectronics.com



CHIP 1 EXCHANGE

DELIVERING READINESS, REDUCING COSTS.

Chip 1 Exchange is an industry-leading, global, hybrid, Franchise/ Full-Service

Distributor of Electronic Components and peripherals. Being a hybrid distributor, we have a broad offering of Franchise lines. Still, we are also one of the largest top-quality open market FACTORY ORIGINAL suppliers of Electronic Components and Peripherals worldwide. We have been supply chain partners for more than two decades. Our service excellence and high-level expertise have been the backbone of our brand as a trusted and reliable partner in providing solutions for our customers. Here's what we can do for you:

Procurement

Our worldwide network includes relationships with manufacturers, franchised distributors and independent distributors. Whether difficult to find, obsolete or end of life product, Chip 1 has the contacts and sourcing to find and deliver the correct parts to our customers in a timely manner all at competitive prices.

Our successful concept is based on the following items:

- Constant tracking of components and we only purchase from reliable suppliers.
- Delivery over night or just in time.
- The purchasing department has relationships established with most of our suppliers whether domestically or internationally, this enables the best possible prices for each component.
- Due to our central location in

Europe we are able to deliver any parcel within hours, even to the remotest cities in Europe, this is also true with North America and our Asia offices.

- Own stock with a constant market value of millions of Euros.
- We offer competitive terms as well as volume purchase agreements for our customers.

Excess Management

Chip 1 Exchange offers a number of standard solutions for inventory management and reduction.

Below are four of our most popular programs, however, we are always open to designing a custom solution that better meets the requirements of your business.

Lot Buy:

This solution is for customers that would like to sell their entire excess inventory at once and remove the product from their books, warehouse etc.

Consignment inventory:

You would send us a list of the product you would like to remove from your inventory. We would then market the product worldwide through our vast network of customers and Internet based sites.

We presently have tens of thousands of customers in our database and we will market the product to this extensive list of customers. This is a slower approach than the first solution; however, in some cases it may yield a better return for you.

Line buy:

In this option you would send us a

number of items that you would like to remove from your inventory. We would then bid on each line item separately.

Customer in-house-consignment:

In this solution you would keep the inventory in your warehouse and we would market the product as we would in in option number two above.

Design and Engineering

Chip 1 Exchange guides customers through technology's most challenging issues, providing a real world solution to today's most complex and challenging designs. Additionally, Chip 1 Exchange employs many Electrical Engineers that are thoroughly trained by our manufactures to ensure they are equipped with the latest knowledge and services to assist the customer through the most difficult designs.

Services offered:

- Technical Support
- Engineering assistance
- Unbiased design guidance
- Training
- In-house technical seminars
- Local seminars
- Development tools
- Samples
- Thermal evaluation

Shortage Management

Whether you're in quest of reducing extended lead times or to locate allocated, obsolete, and/or end-of-life electronic components, semiconductors, and other difficult-to-locate electronic components like murata multilayer ceramic capacitors, Chip 1 has the supply-chain expertise

to resolve your material shortages.

An increase in production or supply delay by another supplier may lead to shortage issues and possibly the risk of a line down situation. With Chip 1's rapid response times, unmatched sourcing and experience in global logistics, we can eliminate the stress of shortage situations and deliver the solutions you require, thus removing disruption to your production lines.

Chip 1 understands the importance of shortage elimination and our team of highly qualified sales people are ready and capable to quickly source electronic components from around the world.

From the first point of contact each customer is assigned a dedicated account manager who will handle component sourcing and logistics to ensure that your production lines remain in full production mode.

We employ the identical practice for obsolete parts and End-of-Life material, therefore, providing our customers with the best solution for all of your supply chain requirements.

Services:

- Worldwide search
- Swift fulfillment
- Meticulous quality inspection process
- Competitive pricing
- Broad product offering
- Shortage solutions
- EOL/Obsolete solutions
- Extensive inventory



DELIVERING READINESS. REDUCING COSTS.



AUTOMOTIVE



MEDICAL



CONSUMER



INDUSTRIAL



AEROSPACE



IOT



DEFENSE

YOUR TRUSTED SUPPLY CHAIN PARTNER FOR ELECTRONIC COMPONENTS.



FRANCHISE
LINE CARD



LEADING GLOBAL FULL SERVICE DISTRIBUTOR OF ELECTRONIC COMPONENTS

Chip 1 Exchange is an industry leading, global, hybrid, Franchise/Full Service Distributor of Electronic Components and peripherals. Being a hybrid distributor, not only do we have a broad offering of Franchise lines, but we are also one of the largest top-quality open market FACTORY ORIGINAL suppliers of Electronic Components and Peripherals in the world.

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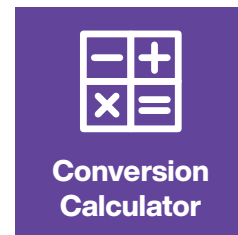
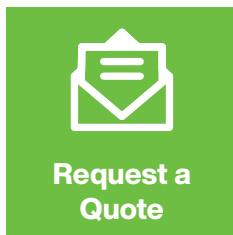
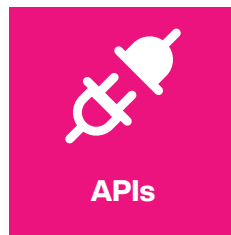
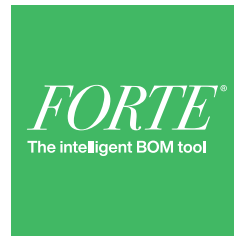
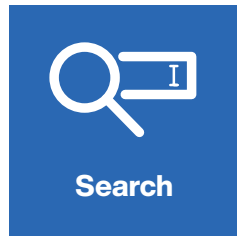
CERTIFICATIONS



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
KYOCERA AVX	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50+	1,000+	Y
KYOCERA AVX	Digi-Key	800-344-4539	www.digikey.com	Y	N/A	N/A	\$0	N/A	50+	1,000+	Y
Littelfuse	Mouser Electronics	800-346-6873	www.mouser.com	Y	28,790	N/A	\$0	67%	50	1,000+	Y
Schurter	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Vishay	Mouser Electronics	800-346-6873	www.mouser.com	Y	31,445	N/A	\$0	68%	50	1,000+	Y
DISPLAYS & LEDs											
BIVAR	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Broadcom	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Cree	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

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Manufacturer	Distributor	Telephone	Website	Franchised Distributor (Y/N/M)	No. of Lines for Principle	Stock Value for Principle	Minimum Order Value	% Lead Free for Principle Range	No. of Technical Support Staff	Total No. of Staff	Pack and Hold
Keystone Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
NKK Switches	Mouser Electronics	800-346-6873	www.mouser.com	Y	13,976	N/A	\$0	86.00%	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
METCASE Enclosures	OKW Enclosures, Inc.	(800) 965-9872	www.metcaseusa.com		322	N/A	\$0	N/A	10	20	Y
New Age Enclosures	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
OKW Gehäusesysteme GmbH	OKW Enclosures, Inc.	(800) 965-9872	www.okwenclosures.com		2,450	N/A	\$0	N/A	10	20	Y
ROLEC Gehäuse-Systeme GmbH	ROLEC Enclosures Inc	(888) 658-5774	www.rolec-usa.com		1,960	N/A	\$0	N/A	4	6	Y

FREQUENCY MANAGEMENT

Abrakon Corporation	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,780	N/A	\$0	100%	50	1,000+	Y
CTS Electronic Components	Mouser Electronics	800-346-6873	www.mouser.com	Y	3,889	N/A	\$0	100%	50	1,000+	Y
ECS Inc	Mouser Electronics	800-346-6873	www.mouser.com	Y	2,070	N/A	\$0	100%	50	1,000+	Y
Epson Toyocom	Mouser Electronics	800-346-6873	www.mouser.com	Y	178	N/A	\$0	100%	50	1,000+	Y
IQD Frequency Products	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
KYOCERA AVX	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50+	1,000+	Y
KYOCERA AVX	Digi-Key	800-344-4539	www.digikey.com	Y	N/A	N/A	\$0	N/A	50+	1,000+	Y
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

INTERCONNECTION

3M	Mouser Electronics	800-346-6873	www.mouser.com	Y	23,235	N/A	\$0	46.00%	50	1,000+	Y
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Buyers' Guide

Manufacturer	Distributor	Telephone	Website	Franchised Distributor (Y/N/M)	No. of Lines for Principle	Stock Value for Principle	Minimum Order Value	% Lead Free for Principle Range	No. of Technical Support Staff	Total No. of Staff	Pack and Hold
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
KYOCERA AVX	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50+	1,000+	Y
KYOCERA AVX	Digi-Key	800-344-4539	www.digikey.com	Y	N/A	N/A	\$0	N/A	50+	1,000+	Y
LEMO	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Mill-Max	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Molex	Mouser Electronics	800-346-6873	www.mouser.com	Y	85,634	N/A	\$0	89%	50	1,000+	Y
Neutrik	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,563	N/A	\$0	100%	50	1,000+	Y
NorComp	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Phoenix Contact	Mouser Electronics	800-346-6873	www.mouser.com	Y	30,044	N/A	\$0	77.00%	50	1,000+	Y
Radiall	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Souriau	Mouser Electronics	800-346-6873	www.mouser.com	Y	10,744	N/A	\$0	27%	50	1,000+	Y
Stewart Connector	Bel Fuse	+1 717 235 7512	belfuse.com/stewart-connector	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Switchcraft Corporation	Mouser Electronics	800-346-6873	www.mouser.com	Y	300	N/A	\$0	55%	50	1,000+	Y
TE Connectivity	Mouser Electronics	800-346-6873	www.mouser.com	Y	123,613	N/A	\$0	69%	50	1,000+	Y

OBSOLESCENCE / HARD TO FIND

Lansdale	602-438-0123	lansdale.com	Y								
Lantek Corp.	973-579-8100	www.lantekcorp.com	M	186,000	\$22M	\$0	75.00%	5	62	Y	
Rochester Electronics	978-462-9332	www.rocelec.com	Y		N/A	\$250		10	400+	Y	

OPTO ELECTRONICS

Broadcom	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Cree	Mouser Electronics	800-346-6873	www.mouser.com	Y	582	N/A	\$0	99.00%	50	1,000+	Y
Finisar	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Osram Opto Semiconductors	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,927	N/A	\$0	99%	50	1,000+	Y
ROHM Semiconductor	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Vishay	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y

PASSIVES

ABRACON	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
AVX	Mouser Electronics	800-346-6873	www.mouser.com	Y	42,454	N/A	\$0	72%	50	1,000+	Y
Bourns	Mouser Electronics	800-346-6873	www.mouser.com	Y	38	N/A	\$0	78%	50	1,000+	Y
Cornell Dubilier	Mouser Electronics	800-346-6873	www.mouser.com	Y	24,145	N/A	\$0	71%	50	1,000+	Y
Coilcraft	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
EPCOS	Mouser Electronics	800-346-6873	www.mouser.com	Y	26,533	N/A	\$0	98.00%	50	1,000+	Y
Fair-Rite	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Kemet	Mouser Electronics	800-346-6873	www.mouser.com	Y	77,568	N/A	\$0	66%	50	1,000+	Y
KOA Speer	Mouser Electronics	800-346-6873	www.mouser.com	Y	34,078	N/A	\$0	58%	50	1,000+	Y
KYOCERA AVX	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50+	1,000+	Y
KYOCERA AVX	Digi-Key	800-344-4539	www.digikey.com	Y	N/A	N/A	\$0	N/A	50+	1,000+	Y
Murata	Mouser Electronics	800-346-6873	www.mouser.com	Y	33,780	N/A	\$0	99%	50	1,000+	Y
Nichicon	Mouser Electronics	800-346-6873	www.mouser.com	Y	20,389	N/A	\$0	84.00%	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
TDK	Mouser Electronics	800-346-6873	www.mouser.com	Y	6,663	N/A	\$0	100.00%	50	1,000+	Y
TT Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
United Chemi-Con (UCC)	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Vishay	Mouser Electronics	800-346-6873	www.mouser.com	Y	102,917	N/A	\$0	64.00%	50	1,000+	Y
Würth	Mouser Electronics	800-346-6873	www.mouser.com	Y	934	N/A	\$0	99.00%	50	1,000+	Y

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
Yageo Corporation	Mouser Electronics	800-346-6873	www.mouser.com	Y	18,246	N/A	\$0	100.00%	50	1,000+	Y
POWER & BATTERIES											
Artesyn Embedded Technologies	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Bel Power Solutions	Bel Fuse	Power & Batteries	belfuse.com/power-solutions	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cincon	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Cosel	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
CUI Inc.	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Delta Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
MEAN WELL	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Mornsun		+1-978-567-9610/+1-978-293-3923	www.mornsunamerica.com		N/A	N/A	\$0	100%	N/A	2000+	Y
Phihong	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Phoenix Contact	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
RECOM	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Schaffner	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Texas Instruments	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
TDK Lambda	Mouser Electronics	800-346-6873	www.mouser.com	Y	405	N/A	\$0	80.00%	N/A	N/A	Y
TRACO Power	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Vicor	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
TRACO Power	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
REED SWITCHES											
HSI Sensing	HSI Sensing	405-224-4046	www.hsisensing.com	M	75	N/A	\$200	100.00%	15	275	N
SENSORS											
ams	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Analog Devices Inc.	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Bosch	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Honeywell Sensing and Control	Mouser Electronics	800-346-6873	www.mouser.com	Y	12,059	N/A	\$0	64.00%	50	1,000+	Y
KYOCERA AVX	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50+	1,000+	Y
KYOCERA AVX	Digi-Key	800-344-4539	www.digikey.com	Y	N/A	N/A	\$0	N/A	50+	1,000+	Y
Littelfuse	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
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
Lasca 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
THERMAL MANAGEMENT											
Materials Direct	Materials Direct	+44 (0)1908 222 211	www.materials-direct.com	N/A	N/A	£1,000,000	N/A	N/A	5	55	Y
Universal Science	Universal Science	+44 (0)1908 222 211	www.universal-science.com	N/A	N/A	£1,000,000	N/A	N/A	5	55	Y
WIRELESS SOLUTIONS											
KYOCERA AVX	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50+	1,000+	Y
KYOCERA AVX	Digi-Key	800-344-4539	www.digikey.com	Y	N/A	N/A	\$0	N/A	50+	1,000+	Y

Contract Manufacturers Buyers' Guide

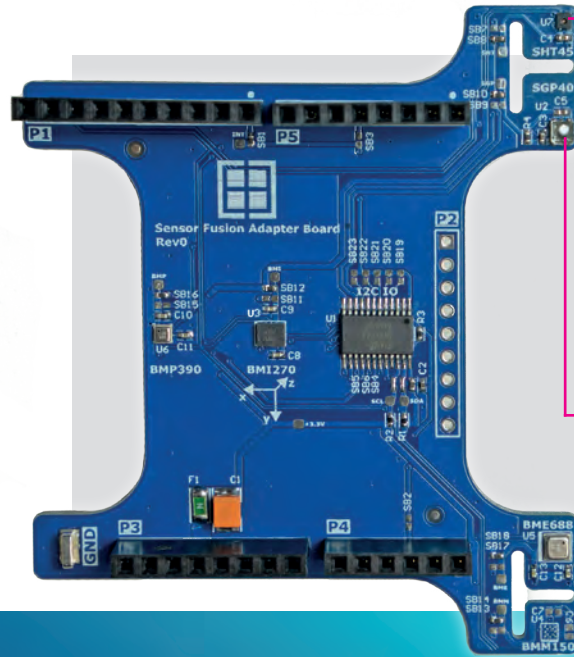
Manufacturer	Telephone	Website	Turnover	Location	Employees	Number of Surface Mount Lines	Approvals	BGA Capacity	Lead Free Manufacturer	Prototyping	Design Capability	Full Turnkey	Cables and Harnessing
Pektron	1-248-677-4838	www.pektron.com	\$66m	Michigan & UK	350	8	ISO9001, ISO14001, TS16949, BEAB, VCA,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

RUTRONIK SYSTEM SOLUTIONS & SENSIRION BRINGING INTELLIGENCE TO A NEW LEVEL WITH SENSORFUSION

Rutronik sensorfusion board based on Sensirion sensors – Easy approach for the usage of sensor outputs and different sensor combinations.

Benefits & Key Features

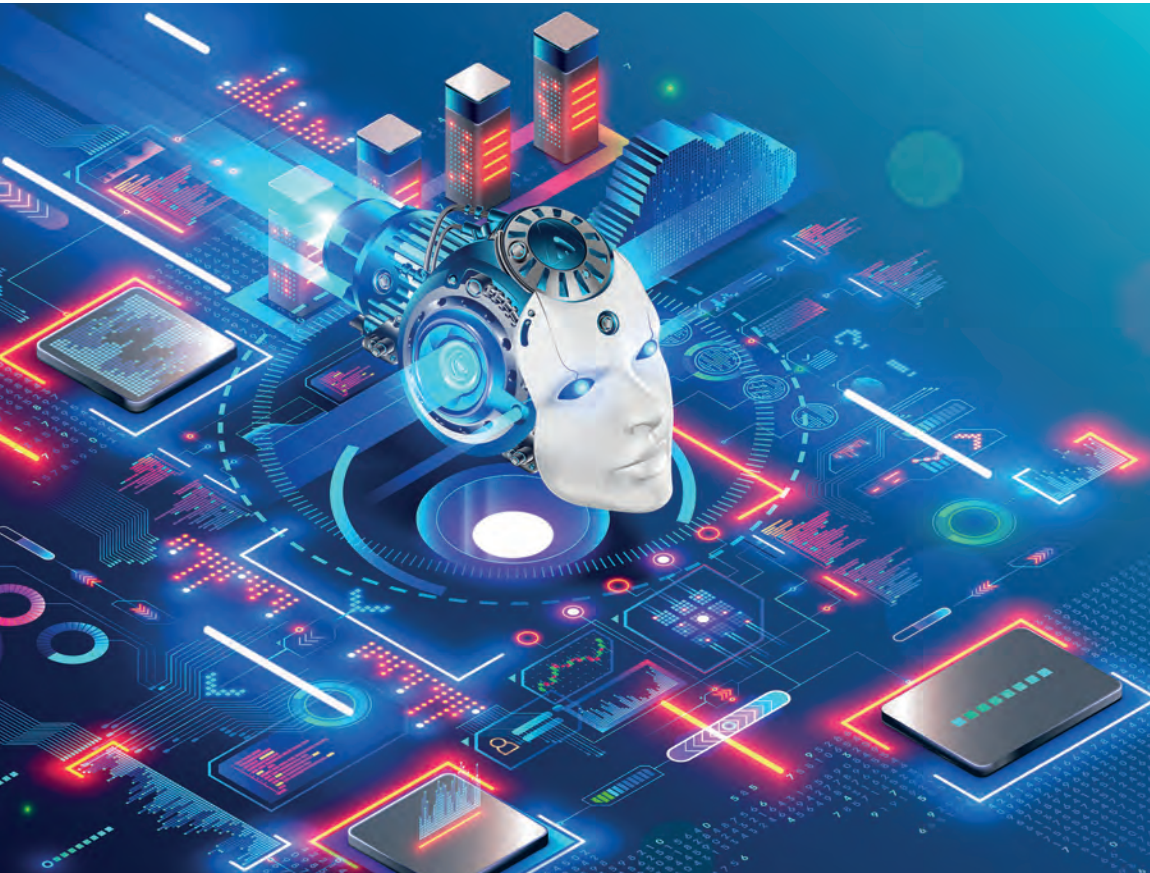
- With state of the art sensors for all sensorfusion applications
- User can access all pins via supplied headers
- Operates on any evaluation board with Arduino interface and perfect fit for the Rutronik baseboard (RDK2)
- Additional inertial MEMS sensor for manipulation detection or navigation function
- Can be combined with all other Rutronik evaluation boards
- Many firmware examples are available on the Rutronik System Solutions homepage



SHT4X FAMILY
Relative Humidity
and Temperature
Sensor



SGP40-D-R4
VOC Sensor



ALL COMPONENTS OF THE BOM CAN BE FOUND IN THE RUTRONIK PORTFOLIO



RUTRONIK
SOLUTIONS