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ECIA MEMBER
Supporting The Authorized Channel



On the cover – December 2020

2021 Executive forecasts premiere showing from page 12 to 20

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Buyers' Guide

All the facts and figures to help you buy

Editor's Word



Press go for growth

I always look forward to the December issue of *Electronics Sourcing*. It's an opportunity to ask a wide range of manufacturers and distributors for their experience over the past 12-months and their expectations for the coming year.

Every year, for the last decade, these Forecast features have typically delivered a diversity of views. Some contributors are bullish, others are bearish. Some see growth in one industry, others in a different sector. Not this year. This year is different.

Looking back, all the contributors seem to have had a common experience. The pandemic hit hard and hit fast. It disrupted supply and demand simultaneously. However, it also quickly became clear that big problems create equally big opportunities. Likewise, distributors are like smoothing capacitors, they exist to manage disruption. Distributors drew on their skills, experience, systems and stock and 'managed the problems away'.

Looking forward, all the contributors have a common expectation. 2021 is going to be a gangbuster year, driven by 5G, electrification, IoT, medical, AI and more. As one commentator put it 'even a global pandemic can't stop the mega trends'. Likewise, some distributors which monitor new design activity have said 2020 was a record year.

Summarizing all the comments, distribution questions for 2021 will be more about pricing and availability than where is the next order coming from.

To be honest, the above is not what I imagined I'd be writing back in March. It just goes to show how resilient the world, the people and this industry really is.

Jon Barrett

Contact

EDITORIAL

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

ADVERTISING

Advertisement Manager: Emma Poole
emma.poole@electronics-sourcing.com

DESIGN

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

Electronics **sourcing** mmg PUBLISHING US LTD

CIRCULATION

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

PUBLISHER

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

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Tel: 866.364.0951
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@Electrosourcing

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Accessing 30,000 power products

Recom Power has announced Master Electronics as one of its trusted distributors.

Recom's president, Christoph Wolf, said: "Master Electronics is a great fit for Recom's extensive portfolio of over 30,000 compact power supplies. Their commitment to personal connection and collaboration with their customers, innovative design solutions, and long-term business initiatives are in line with Recom's values and growth as a company. We are excited to begin this partnership and are looking forward to its success."

Master Electronics' product management director, Paul Aspiras, added: "Master welcomes the Recom Group to our line card. Recom's reputation for design innovation, reliability and range of power converters and power supplies will certainly resonate with our power management customers. Master looks to enhance our line card when it benefits the customer. Our customers come first."

recom-power.com



UL polycarbonate enclosures now shipping

Sager Electronics is now stocking Bud Industries' PU Series IP68/NEMA 6P plastic enclosures. The polycarbonate enclosures feature a streamlined design and are designed to provide superior water ingress resistance. The PU series meets IP66 and IP68 requirements and is UL listed to UL508A. All models feature molded mounting flanges for easy installation.

The series is designed and tested for outdoor and adverse conditions and suit wi-fi, battery charging, wastewater, agriculture, automation and GPS tracking applications.

www.sager.com



North American support for thermal interface materials and more

Laird Performance Materials and TTI have reached an agreement where TTI will promote and sell Laird's full fine of engineered products throughout North America. Laird manufactures thermal interface materials, electromagnetic interference shielding materials or magnetic ceramic solutions, RF/microwave absorbers, precision and structural metals, and integrated solutions.

TTI's vice president corporate product management & supplier marketing, Jeff Ray, said: "TTI enjoys a prominent and growing market position throughout North America and this agreement aligns two powerhouse companies whose capabilities will greatly aid TTI's customers as they emerge from challenges spawned by the global coronavirus pandemic."

"Laird's strategic manufacturing footprint, skilled engineering teams and supply chain fulfillment strengths integrate well with TTI's sales capabilities and our own engineering, logistics and supply chain expertise."

Laird Performance Materials' director of channel management, Kurt Devlin, added: "TTI fulfills the complete passive solution match for our customers because of its strong solution set. It exhibits the type of distribution know-how we seek along with the level of selling skills we require to expand our brand preference. We anticipate a quick ramp up which will greatly benefit TTI customers as well as further serve Laird goals throughout North America."

www.tti.com

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In Brief

Accessible circuit boards

Gerber Labs is rolling out a platform that makes custom printed circuit boards accessible to small businesses, students and hobbyists. Gerber Labs is simplifying the process by allowing anyone to upload, order and ship a PCB with a couple clicks. No need to jump on the phone, no need to worry about time zones. www.gerberlabs.com

PCB sales up

IPC's September 2020 findings show book-to-bill at 0.93. Total North American PCB shipments in September 2020 were up seven per cent compared to the same month last year. Compared to the preceding month, September shipments grew 21.3 per cent. PCB bookings in September grew 17.2 percent year-over-year and increased 59.1 per cent from the previous month. www.ipc.org

Component information in real-time

CalcuQuote has partnered with Rochester Electronics to build a new integration that offers up-to-date information through the CalcuQuote platform. Rochester Electronics' standard component information is now available in real-time when producing quotes in QuoteCQ, CalcuQuote's flagship quoting software. www.calcuquote.com

Powerful agreement

XP Power has signed a distribution agreement with TRC Electronics. The new partnership will allow the specialist stocking distributor to sell XP Power's entire product portfolio across North America to the industrial electronics, healthcare, semiconductor manufacturing equipment and technology sectors. XP's AC/DC range of ITE and medical certified products covers 3W to 5kW. www.xppower.com

Compact DC-DC power modules now in stock

Mouser Electronics is now stocking FS1406 μ POL DC-DC power modules from TDK. Offering 15W in a 3.3 by 3.3 by 1.5mm package, the compact point-of-load modules support a range of applications including machine learning, artificial intelligence, big data, 5G cells, and IoT.

The modules integrate the matching Mosfet, inductor and driver in a single semiconductor embedded in substrate (SESUB) package. This reduces the device's form factor by up to 50 per cent compared with modules using side-by-side integrated circuit and inductor. Features include an on-chip PWM controller, integrated Mosfets and incorporated inductors and capacitors. This results in a highly accurate regulator with extremely high-power density of 1W/mm³.

The company states the plug-and-play devices reduce system cost and design time and suit high power density industrial applications including network communications, servers, and storage. The modules also support imaging, radars, security and other machines for the medical industry.

mouser.com



Quick access to current sensing

Digi-Key has expanded its Marketplace portfolio by signing Aceinna, a specialist in sensor, autonomous vehicle guidance and power management technologies. Digi-Key will be distributing the full range including RTK, INS, Tilt and IMU solutions, plus current sensing products.

Aceinna's integrated, AMR-based isolated Current Sensor family represents a single chip solution for high power conversions including those using fast switching wide bandgap silicon carbide and gallium nitride power switches.

Aceinna's CEO, Dr Yang Zhao, said: "By selecting Digi-Key as our key distributor partner, it will be much easier for developers and engineers worldwide to quickly receive access to the full breadth of Aceinna components and products."

www.digikey.com



Faster delivery times for AC/DC power solutions

Unipower is decreasing lead times and providing an easier order process for its AC/DC power solutions. This new program is designed to assist customers with time-critical delivery needs.

Unipower's vice president of marketing, John Ely, said: "We have recently invested in state-of-the-art testing equipment and process improvements to upgrade our manufacturing so that we can deliver our products more quickly to our customers: in as little as two weeks for many products and configurations. We are also investing in our technical support and field service teams to ensure the highest level of customer satisfaction from pre-order to post-sale assistance."

The first product lines to benefit from the faster delivery are ARE-M series Ferroresonant Chargers and ARE-S series SCR-Controlled Chargers designed for harsh environments. Both series are designed to operate from 32 to 122°F, feature long-life components and are engineered for serviceability to save time and cost in isolated locations. With single-phase AC input, users can select from 24, 48 or 130VDC output with 144W to 6500W (ARE-M series) and 48 or 130VDC output of 288W to 9750W (ARE-S Series).

Ely added: "Our robust ARE-M and ARE-S battery chargers offer ideal solutions for utility, communication and industrial power systems that are often located in remote settings. Some of our chargers have been in the field for 30 years, a testament to their high reliability, long life, low operating cost, easy-to-service modules and wide operating temperature range. These qualities make our ARE Series the go-to choice for power systems located in challenging environments, reducing truck rolls and other expensive service costs. With our upgraded manufacturing support, getting our battery chargers to customers faster to support their product rollouts makes them even more desirable."

www.unipowerco.com

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access to inventory,
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in real time*



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Accesses our custom-built global inventory management system and returns part information, lead times, available inventory and price



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Order API

Allows you to place your order rapidly via a direct link to our system

Learn more about TTI's API solutions and watch the customer video at

ttiinc.com/api



Pandemic limits distributors' semiconductor sales

Chip sales declined in the first half, but demand bounced back in the third and fourth quarters and distributors expect to post modest semiconductor sales growth for the year



James Carbone

When the coronavirus pandemic spread across the world, most distributors thought that their semiconductor sales would fall this year because the pandemic shut down production of electronics equipment and components.

However, the severity of impact on distributors' semiconductor business was somewhat muted as demand for chips from a range of industries increased in the second half. Many distributors now expect a modest low single-digit increase in semiconductor revenue for the year, while some expected double-digit revenue rises.

"It's very interesting," said Greg Peloquin, executive vice president of power and microwave technologies for Richardson Electronics based in LaFox, Ill. "Our business is up over double digits with a book-to-bill of 1.21. It's shaping up to be an amazing year."

He said much of semiconductor demand during the pandemic has been by the rollout of 5G networks. "5G is just booming right now. The bookings are through the roof and customer count is increasing," said Peloquin. Richardson is a niche semiconductor distributor that carries RF and wireless and power management ICs. The largest part of Richardson's RF and wireless business is communications infrastructure.

Peloquin said the pandemic has

expedited rollout of 5G networks and help drive demand for RF and wireless chips sold by Richardson. The pandemic resulted in lockdowns in various parts of the world, resulting in many employees working at home. Demand for Internet bandwidth increased which helped to boost rollout of 5G network infrastructure, he said.

Demand changes

Peloquin said Richardson saw demand slow down in March and April as manufacturers halted or eased back on production initially and lead times started to stretch. "But all that changed in the last few months," he said.

Besides the rollout of 5G infrastructure, semiconductor fab equipment manufacturing is also helping drive Richardson's sales, said Peloquin. Chip companies are building new 300mm fabs and investing in new semiconductor manufacturing equipment for those. Trade association SEMI says that 300mm Fab investments in 2020 will grow by 13 per cent and another 4 per cent in 2021.

Also driving semiconductor demand for Richardson is alternative energy including wind and solar applications. Richardson supplies power management chips to that segment. "We have a number of products like ultracapacitors that are replacing batteries in wind turbines," said Peloquin.

He added that Richardson's business had been growing



"5G is just booming right now. The bookings are through the roof. The sales are through the roof and customer count is increasing"

Greg Peloquin, executive vice president of power and microwave technologies for Richardson Electronics

before the end and will grow after as well. One reason is that chipmakers are sending more customers to their distributors. "The distribution model over the years has been able to put together a very efficient model to support" customers and semiconductor manufacturers, he said.

Peloquin said 90 per cent of Richardson's business involves demand creation. "Ninety-five per cent of our field salespeople are design engineers," he said. RF chip companies sign Richardson because "we have more field design" to help create demand for chipmakers' products, said Peloquin.

Richardson also has a design

center and a manufacturing center which can design and build boards for customers. It also has complete die and handling capability. "A lot of customers just want to buy the die or certain amount of the die and build their own boards. So, we have the ability to sell them the finished product from the supplier or buy the die and sort and test it," he said.

Design registrations rise

Other distributors also report increases in demand creation activity during the pandemic. Tony Roybal, Avnet regional president, core products, said Avnet's design activity is at an "all-time high with design registrations at their highest levels since fiscal year 2018.



We're seeing design wins and key vertical markets increasing year-over-year," he said.

Avnet said its "core electronic components" revenue, which includes semiconductors, increased sequentially and year-over-year in its last fiscal quarter which ended Sept. 30. It posted growth in 5G related products and products for automotive applications, he said.

While there has been an increase in design activity, there is uncertainty in the market and concern about what the impact will be of the second wave of COVID-19. "Our customers are focused on ensuring continuity of supply and, especially in times like these, we act as an extension of our customers' business to ensure they have a healthy supply chain. We've sharpened our focus on our primary components' distribution operations," he said.

There is also concern about the lead times for some components, said Roybal. Lead times are kind of a "mixed bag right now. We're seeing an increase in for certain components," he said. High-end microcontrollers "seem to be the

one that's going out the most as they're tied to 5G. The rest of them might be going out two to four weeks, something in that range. We're watching them closely," said Roybal.

Some distributors say the pandemic impacted their semiconductor business in different ways at different times. In the first and second quarters there were "supply chain constraint situations" that occurred which impeded sales, said David Stein, vice president, global supply management for Digi-Key. Early in the year there were problems with semiconductor supply because of factories being shut down due to COVID-19. "We had constrained semiconductor production in Q1 and Q2, but that got back to normal in June/July," said Stein.

Global demand returns

He said the last two quarters have been very strong with "activity coming back globally in all parts of the world." Digi-Key's semiconductor sales should have "small single-digit growth although unit shipments will be up close to 10 per cent," said Stein.

Tony Roybal, Avnet regional president, core products

"Avnet's design activity is at an all-time high with design registrations at their highest levels since fiscal year 2018"



Some industries and segments have had greater demand for semiconductors than others this year. Demand has been stronger from critical markets that "support communications infrastructure, medical products, work-from-home stations, industrial complications and handheld devices," said Stein.

"We've also started to see automotive resurface again, after it was shut down for the first part of the year," he said. Semiconductor demand from automotive "may not be as strong as past years, but it has a good uplift. And within automotive, vehicle electrification is on the rise in a big way," he said.

Demand for wireless chips, microcontrollers, and sensor-type products that have been used to support many medical applications have been in high demand, he said.

With commodity semiconductor unit sales growth is stronger than revenue growth "there has been some pressure on the average selling price of certain types of products," said Stein. But there have been "pricing changes both upwards and downwards, so depending on the type of products. We've seen both types of changes," he said.

Recently there also have been some "lead times push out again

with sensors, microcontrollers, MOSFETs," he said. Digi-Key is growing its inventory levels. "We have a focus to grow our inventory throughout the end of this year so that we start 2021 with a healthy foundation that is able to support some of the designs we focused on last year as well as to support the engineering community forward in 2021," he said.

Richardson is also building its semiconductor stockpiles. "Our backlogs are increasing so our inventories are increasing," said Peloquin. "Forecasting is very hard. We've increased inventory because we think 2021 is going to be a banner year for our market and our business," he said.

Sensing an electric future

AB Elektronik, an AVX Group Company, introduces its sensor portfolio which supports applications from industrial machines to agricultural vehicles

AB Elektronik's sensor portfolio includes custom and standard sensor systems and control units. With over 30-years experience in automotive-specific sensor solutions, the company develops and provides solutions for the global automotive industry. Position, speed, temperature, pressure and fluid quality sensors are vital components in passenger cars, commercial and off-road applications. Customers can order small quantities of standard versions. For industry-specific applications such as off-road, agricultural, mobile machines, and industrial machines, the company offers technical support for modular concepts with proven solutions designed to meet the needs of bespoke applications.

AB Elektronik's products are engineered to offer accurate, fast, reliable and robust solutions capable of withstanding the effects of dirt, vibration, temperature, mechanical stress and other challenges of demanding environmental conditions. As electronic devices continue to get smaller, innovative solutions and modular sensor concepts include smaller components to accommodate high demand in small devices. Likewise, they perform multiple functions with fewer components and less weight while retaining high performance.

The transition to electronic drives and emission-reduced solutions in all areas of mobility and industry require new solutions. AB Elektronik states its intelligent engineering and proficient technologies are backed by proven modular designs that minimize the need for testing and validation in new applications for the future.

For electric motors, the company offers rotor position sensors which detect the high revolutions of modern electric motors, outperforming VR resolvers in almost every aspect.

Position sensors monitor linear paths and the properties of battery cells which are key in modern vehicles, niche applications and industrial uses. In the field of temperature sensors, AB Elektronik offers solutions designed to ensure reliable monitoring of batteries in a variety of applications. The company's battery switch enables fast, safe and noiseless disconnections from the high-power batteries for electric vehicles in case of an emergency.

AB Elektronik offers key account teams located in all major global markets who work with customers to understand the product development roadmaps they have set and develop solutions to facilitate customers' needs.

Engineering expertise can be applied to support customers' needs by defining their objectives and understanding special requirements, along with local demands.

Using core technologies and product platforms, AB Elektronik's teams identify the best solutions to meet or exceed customer requirements for performance, reliability, size and cost. With its geographical footprint, AB Elektronik provides manufacturing and after-sales services and support in most major regions.

www.avx.com

SPINpad



Battery Switch



Position Sensor

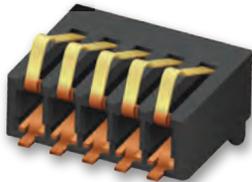




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AVX Corporation is a leading international manufacturer and supplier of advanced electronic components including, interconnect, sensor, control, and antenna solutions manufactured in 33 facilities in 16 countries around the world.

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For over four decades, the AB Elektronik brand has been synonymous with intelligent and robust sensors. Their sophisticated portfolio is available in small quantities for standard versions, with proven solutions on a high technical level and modular concepts recommended for off-road and agricultural applications, mobile machines, and versatile industrial applications.



WWW.ABELEKTRONIK.COM

WWW.AVX.COM

5G, IoT and sensing push ahead

As demand rises, Mouser Electronics' Mark Burr-Lonnon urges buyers to focus on authorized distribution to ensure supply chain continuity and part traceability

Covid has impacted the electronic component supply chain in 2020, how do you envisage the market will perform in 2021?

Against the backdrop of a global pandemic and economic downturn, we remain cautiously optimistic. It's really too soon to predict how manufacturing will play out as we come out of the global shutdowns from the pandemic, but at Mouser we are planning for growth ahead in 2021. The use of electronic devices and systems still seems to be strong worldwide.

What are your thoughts on the global economic outlook?

As an essential infrastructure business and part of the global supply chain, Mouser is still shipping hundreds of

thousands of components weekly. We are continuing to receive and ship products for our customers around the world and we expect to see our global business continue to increase steadily, particularly as the global economy rebounds from the pandemic.

Fully operational at all 27 of our global locations, the entire Mouser team is working diligently to provide the world's broadest selection of electronic components, in stock and available. Keep in mind, we always consider the needs of our customers and make it our focus to stock and ship the newest products from our 1,100 manufacturer brands. Currently, we have over \$855 million (USD) of inventory, ready to ship same day.

What are the positive forces that will push the electronic component distribution industry forward over the next 12 months?

Combined with the onset of 5G technology and increasing numbers of IoT-enabled applications and smart sensor technologies, we will likely see an acceleration of the digital revolution across many industries. Once market stability returns, the biggest challenge will be keeping up with demand. This is why it's more important than ever to purchase components from an authorized distributor to ensure continuity and traceability in the supply chain.

Mouser is excited and poised to handle the growth ahead. We've just completed a major



Mouser Electronics' senior vice president of global service & EMEA and APAC business, **Mark Burr-Lonnon**

expansion at our global corporate headquarters and distribution center in Texas, where we are stocking over one million different SKUs. We're investing heavily in state-of-the-art automation to streamline our logistics operations to serve our customers with inventory, accuracy and speed.

www.mouser.com

Moving industry forward

Fusion Worldwide's COO, Paul Romano see growth in a range of industries, from 5G to AI, leading to a strong 2021

Covid has impacted the electronic component supply chain in 2020, how do you envisage the market will perform in 2021?

With 2021 quickly approaching, we are expecting a lot of volatility in supply chains due to the unpredictability of global markets. Because of the uncertainty of the pandemic, the biggest challenge faced is market planning and forecasting. It is difficult to predict what may be affected and when. As governments

mandate additional shutdowns due to spikes in cases, factories around the globe will be impacted on varying levels, causing supply shortages and significant uncertainty for manufacturers, transportation providers and suppliers.

What are the positive forces that will push the electronic component distribution industry forward over the next 12 months?

The biggest industries that will push the industry forward

in the coming year include the rollout of 5G, a rebound of the auto sector, an increased need in datacenters, and an increasing reliance on AI and IoT by companies. In addition, demand for applications like 5G base stations, gaming applications, servers and computer/notebooks has remained strong and is expected to continue in the coming months. The growth of these industries will lead to a strong 2021 for the industry.

www.fusionww.com



Fusion Worldwide's COO, **Paul Romano**

Underlying growth drivers remain intact

TTI Semiconductor Group's president, Michael Knight sees the resumption in growing demand that the electronics industry was experiencing pre pandemic

Covid has impacted the electronic component supply chain in 2020; how do you envisage the market will perform in 2021?

While Covid has certainly been disruptive for the electronic component supply chain, its impact on revenue has been relatively mild. The industry saw a short, sharp dip in Q2 and then, for most sectors, started climbing out of the dip in the third quarter. The sectors that continue to slump are largely ones that were struggling pre-Covid, like commercial aerospace, while many sectors and applications have actually been propelled forward by the pandemic.

With the result of the election now in, what are your thoughts on the US economic climate?

In the short term, the election's impact on the macroeconomic, good or bad, is likely to be minimal. Things like corporate liquidity and debt levels, both of which were in great shape going into the pandemic, and Federal Reserve Board policy will have more bearing on the near-term economy than the White House.

Executive branch decisions on things like tax policy and regulation certainly are significant factors in longer-term economic performance, but the current

election cycle is not likely to have that much real effect on 2021 results.

What are the positive forces that will push the electronic component distribution industry forward over the next 12 months?

As we work through and exit the pandemic, the industry will get back on a growth track. It won't be perfectly smooth up-and-to-the-right, but the trend will be healthy and broad-based and will apply to most end markets and suppliers.

Some of the more notable things driving the trend are the long term expansions in IoT, edge



TTI Semiconductor Group's president, **Michael Knight**

computing, processing and storage; the electrification of transportation; next-generation cellular networks; and satellite-based high-bandwidth, low-latency broadband connectivity that will deliver the internet to every corner of the earth.

www.tti.com

Design activity at an all-time high

Newark's business president, Uma Pingali sees encouraging signs of demand creation trends in key markets

Covid has impacted the electronic component supply chain in 2020, how do you envisage the market will perform in 2021?

We anticipate the continued need to work from home in the first half of 2021, as we experience a second wave and vaccines begin to become available. We hope to see vaccinations become increasingly available towards mid-2021 driving a return to a more normal business environment with demand recovery and even growth in certain pockets. Covid will inevitably continue to cause intermittent supply chain disruptions globally in the first

half of the year, but we anticipate some stabilization in the second half of 2021.

With the result of the election now in, what are your thoughts on the US economic climate?

We are cautiously optimistic about the US economic climate, as well as global recovery. There is still a good amount of uncertainty, but we are controlling what we can and are encouraged by positive signs from the quarter. For example, the increased demand in Asia and the strength we saw across a variety of industry verticals is reassuring for us.

We also saw design activity that was at an all-time high, with registrations at the highest levels since FY18.

Overall, we are staying nimble and focusing on strengthening the foundation of Newark. Having a strong foundation positions us to be ready for the recovery in demand. We're already seeing encouraging signs of demand creation trends in our key markets.

What are the positive forces that will push the electronic component distribution industry forward over the next 12 months?



Newark's business president, **Uma Pingali**

We are seeing demand building up strongly in segments such as industrial IoT, automotive, networking for SOHO and 5G technologies. We expect a second wave of stimulus in the US, helping customer demand from Q1 onwards.

www.newark.com

Electronics underpins healthier environment

Products that create healthier environments are in play for new componentry, driving growth potential for 2021

Covid has impacted the electronic component supply chain in 2020, how do you envisage the market will perform in 2021?

At Hughes-Peters we see incremental growth with the second half of 2021 carrying the bulk of the increase. Some of our Industrial customer base has been slow to recover, but our bookings have improved each month since June and we look for that to continue into 2021. Even though sales were better in Q3, Q4 will probably be flat based on the pandemic still growing and more companies laying off.

With the result of the election now in, what are your thoughts on the US economic climate?

I'm not sure if the results of the election will affect the US economy in 2021. Interest rates will stay low and the experts predict a 3.5 per cent growth rate for the US economy. Hughes-Peters will grow more than that based on our forecasts, as long as we continue to sell our value-added business model and implement our inventory management programs within our customer base. It is possible that higher taxes, healthcare changes and more stimulus could all be

impactful in 2021. It's still too early to tell.

What are the positive forces that will push the electronic component distribution industry forward over the next 12 months?

Our customers are pivoting with new products that adapt to the safer requirements and new designs for components that go into those products. Service industries, security and products that create healthier environments are in play for new componentry and winning those designs are crucial for Hughes-Peters. The US based supply chain



Hughes-Peters vice president of sales, **Mike Smith**

could be brought closer to home as a result of the virus, which would be good for our electronics distribution industry.

hughespeters.com

Good recent momentum

Digi-Key's executive vice president of sales and marketing, Jim Ricciardelli, sees 2021 as a frenetic year for purchasing professionals

Covid has impacted the electronic component supply chain in 2020, how do you envisage the market will perform in 2021?

We have seen good recent momentum with customers wanting to move their designs and projects forward and commence manufacturing. For 2021 we see continued growth in IoT as new technologies are bringing innovative solutions to real world problems. We will continue to see wireless modules and discrete solutions take off. Bluetooth 5.0, LoRa, 5G and NB-IoT will drive a lot of migration to these newer technologies.

inventory position to support their needs, as well as the digital platform solutions to offer value and efficiency.

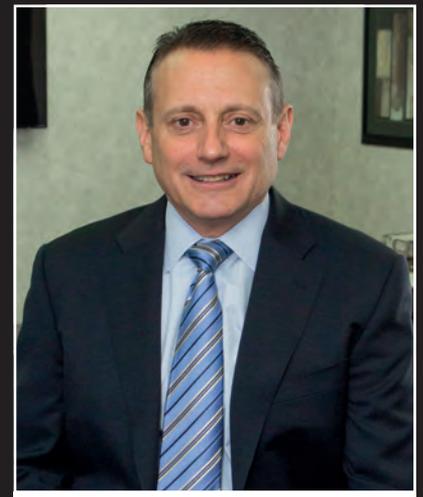
With the result of the election now in, what are your thoughts on the US economic climate?

After the unpredictability everyone faced in 2020, there is a more stable outlook for 2021, with elevated product demand increasing quarter-by-quarter. A vaccine appears to be on the horizon and we will resume with a new normal in the not-so-distant future. Our long-term outlook for the electronics market is very bullish.

forward over the next 12 months?

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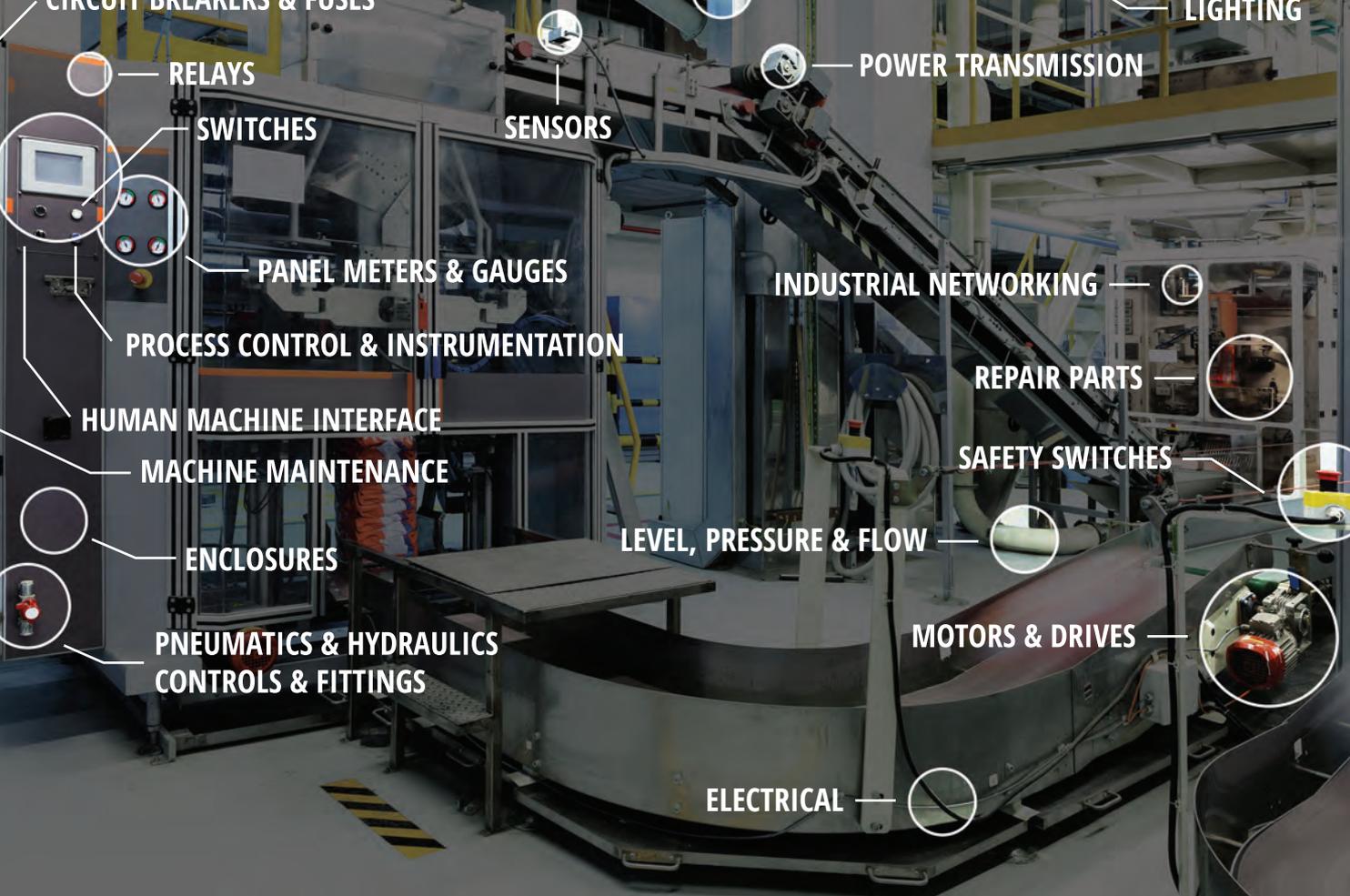


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What are the positive forces that will push the electronic component distribution industry

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Recovery will not be linear

ECIA's president & CEO, David Loftus reminds readers that distribution demonstrates its highest value at inflection points in the economy

Covid has impacted the electronic component supply chain in 2020, how do you envisage the market will perform in 2021?

The timing of the worldwide pandemic has been particularly troubling for our ECIA members and the entire electronics industry. After a nearly two-year downturn, Covid stalled the nascent electronics rebound that had begun December/January and significantly disrupted the supply chain through Q2 2020. The good news is that demand is bouncing back strongly in late Q3 and Q4, and prospects for 2021 are looking highly favorable.

US consumer spending, durable goods and new home sales continue their strong recovery and the Fed is likely to keep interest rates near zero to

further stimulate the economy. Worldwide, 2021 semiconductor growth is projected at five per cent. The IP&E markets tend to lag the semiconductor market by a couple of months, so 2021 looks favorable across the board for electronic components.

With the result of the election now in, what are your thoughts on the US economic climate?

With the presidential election of Biden/Harris, the US economic outlook is mixed. On the plus side, Biden is highly likely to roll back Trump's China trade war by eliminating tariffs and lifting restrictions against Huawei and other major Chinese manufacturers. This move will immediately improve short term growth, longer term will depend on China's well-

publicized initiative to become more self-sufficient for electronics technology.

But Biden's promise to reverse the Trump era corporate tax reductions could reduce US corporate earnings, likely dampening growth and investment prospects for most US companies. Control of the Senate will be a key pivot point. If the remaining runoffs maintain Republican control, a divided government will likely slow radical tax changes that could derail the recovery. Recovery will be sustained with Q4 GDP growth projected at three per cent annualized, with four per cent growth expected for the whole of 2021.

What are the positive forces that will push the electronic component



Electronic Components Industry Association's president & CEO, David Loftus

distribution industry forward over the next 12 months?

Worldwide economic recovery will not be linear. There will certainly be fits and starts as countries continue to struggle with additional Covid outbreaks and partial lockdowns. Customers already suffering from the economic carnage of the last three years will need strong partnerships with their distributors to access inventory and assist with value-added services. Distribution demonstrates its highest value at inflection points in the economy, and the continued volatility due to Covid and political change will reinforce the importance of component distributors.

www.ecianow.org

Control what you can control

Avnet's CEO, Phil Gallagher sees increased demand in Asia and strength across a variety of industry verticals, notably auto and industrials

Covid has impacted the electronic component supply chain in 2020, how do you envisage the market will perform in 2021?

Our priority has remained ensuring the health and safety of all our employees while keeping our business running as smoothly as possible. Our customers are focused on ensuring continuity of supply and we act as an extension of our customers' business to ensure they have a healthy supply chain. Recent months have continued to be a time of transition, both for the global economy responding to the pandemic and here at Avnet as we've taken actions to reinvigorate the business investment vision.

We've sharpened our focus on our primary components' distribution operations, while taking steps to accelerate the profitable growth of Farnell.

With the result of the election now in, what are your thoughts on the US economic climate?

I believe it's too soon to say what impact the US election will have. We are cautiously optimistic about the US economic climate and global recovery because businesses and industries are resilient. Avnet has certainly proven our ability to adapt and grow throughout every geopolitical climate over our 100-year history, and we'll do it again. Resilience, perseverance and, above all, adaptability are key.

What are the positive forces that will push the electronic component distribution industry forward over the next 12 months?

Overall, we are cautiously optimistic about 2021. There is still a lot of uncertainty regarding macro environmental factors, but we are controlling what we can control and are encouraged by positive signs we're seeing. For example, we're seeing an increased demand in Asia and strength across a variety of industry verticals, notably auto and an uptick in industrials.

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Avnet's CEO, Phil Gallagher



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Steady, methodical recovery



TTI Americas' president, Don Akery

TTI Americas' president, Don Akery, reveals that positive book-to-bills bode well for future growth

Covid has impacted the electronic component supply chain in 2020; how do you

envisage the market will perform in 2021?

Our industry has learned how to operate within the constraints of a pandemic. Based on what we've seen in the second half of this year, we're expecting a steady, methodical recovery in 2021. Defense, space and the medical sector will continue to be strong. We've also seen the industrial sector continuing to do well.

One challenge is ongoing uncertainty around supply chains and logistics. Distributors will be here to help manufacturers meet those challenges and keep their lines running.

With the result of the election now in, what are your thoughts on the US economic climate?

We're optimistic on the economic climate for 2021. We've seen positive book-to-bills in our business, which bodes well for future growth. And we believe that US businesses are more resilient today than they were at the start of 2020.

What are the positive forces that will push the electronic component distribution industry forward over the next 12 months?

In 2021 we'll see renewed emphasis on health care and medical devices, not just related to Covid but for overall fitness, health monitoring and treatment. The transportation segment will continue to benefit from electrification. The industrial sector will continue to grow. And at the heart of everything will be the continued rollout

of 5G technology, which has the capability to connect everything within those and other markets.

We'll also see continued increases in defense spending and space exploration, in particular the commercialization of space. We'll continue to see NASA and the ESA relying on commercial launch providers in 2021 and beyond.

During the shutdowns our inventory helped essential businesses continue functioning even when their suppliers' factories were dark. No matter what we face in 2021, distributors will be here to smooth out uncertainties and keep businesses running.

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Outlook truly has never been brighter



Sager's senior vice president of marketing, Faris Aruri

Sager's senior vice president of marketing, Faris Aruri, views recent increases in new orders serving as momentum into the first quarter of 2021

Covid has impacted the electronic component supply chain in 2020, how do you envisage the market will perform in 2021?

While the virus disrupted the supply chain in the early days with factory shut downs, transportation issues and border closures, the supply chain recovered relatively quickly. Businesses that rely on large gatherings will continue to feel the strain. However, we saw a surge in the medical industry which will continue to grow into 2021.

With the result of the election now in, what are your thoughts on the US economic climate?

The election has produced a split government, which suggests less growth and economic stimulus.

Ambitious spending plans (infrastructure, health care, climate) will likely be held in check. Rescue packages may not reach the same magnitude we saw in 2020. Corporate tax cuts and easing of regulations are unlikely to be reversed in the next two years. One could reasonably expect modest to improving conditions into the second half of the year with mid-single digit growth and many businesses returning to 2019 levels and slightly higher.

What are the positive forces that will push the electronic component distribution industry forward over the next 12 months?

We must consider overall demand for products, the US economic climate, and what type of environment these factors set for

growth. Demand for electronic components in 2021 and beyond is strong. IoT alone will drive health care, transportation, retail, infrastructure and communications. 5G will provide growth for several years. Automotive is at an all-time high. The outlook truly has never been brighter.

The US economic climate in 2021 is cautiously trending positively. Covid is currently producing another wave of infections throughout the country, however businesses are better educated, better prepared and operating relatively well. The market has seen a recent increase in new orders, which may serve as momentum into the first quarter of 2021.

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Demand is coming down the cloud pipeline

Smith's president, Americas, Todd Burke sees 2021 growth being fueled by 5G, mobile, automotive, and products supporting school/work-from-home



Smith's president, Americas, **Todd Burke**

Covid has impacted the electronic component supply chain in 2020. How do you envisage the market will perform in 2021?

While Covid will still affect the market in 2021, we expect it to pick up somewhat compared to 2020. On a large global scale, there are still many supply-chain gaps for a variety of commodities. While there is an extra level of complexity forecasting these days, there are plenty of reasons to be optimistic for our industry.

With the result of the election now in, what are your thoughts on the US economic climate?

Smith specializes in supporting customers in any situation. From disruptions caused by natural disasters to political dynamics, we are uniquely positioned to navigate changing markets and circumstances, backed by our strategically located global hubs.

Product availability and lead times are currently fluctuating for US-based manufacturing companies, and, with tariffs

in effect, many companies are diversifying their manufacturing footprints to avoid extra fees and geopolitical concerns. We'll continue closely analyzing global markets to pass this intelligence on to customers and help them keep their supply chains connected.

What are the positive forces that will push the electronic component distribution industry forward over the next 12 months?

We've seen growth in several industries, including touchless

technology and work/school-from-home-related products. The automotive market is also picking up again, and we expect 5G to be a driving force. We have already seen an increase in consumer demand for mobile products.

Even though data-center demand has temporarily plateaued, the cloud segment will continue to grow in the next 12 months, and significant demand is coming down the cloud pipeline.

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Mouser Electronics has helped customers process over 11 million lines through its FORTE bill-of-materials management tool

In one year alone, customers completed more than 140,000 BoMs through FORTE, Mouser's tool designed to increase confidence, save time and improve order accuracy in specifying and purchasing electronic components. The buying tool is part of a suite of online productivity tools offered by Mouser through its new Customer Resource Center.

FORTE provides a Risk Evaluator feature based on a unique relevancy engine that analyzes partial part numbers and descriptions to suggest the best options for

customers. The tool, free to anyone with a My Mouser account, evaluates the millions of daily interactions of purchasing professionals and engineers. FORTE then validates part numbers, product availability and price, then recommends alternative products to reduce design and product lifecycle risks.

The company is constantly improving its tools to help buyers and engineers manage their specification and purchasing. FORTE is engineered to provide intelligent advice even when searching for outdated

or partial part numbers, helping customers understand the confidence and risk of each part.

The tool remembers users' preferences, spreadsheet layouts, naming conventions and previous product orders. It also offers legacy features like: translations for Mouser's supported languages; support for common file formats; real-time product pricing and availability; and easy purchasing directly from the BoM.

The Customer Resource Center serves as a central hub.

Along with the BoM tool, the Price and Availability Assistant lets customers check prices and availability on millions of semiconductors and electronic components. Using this tool, customers can drag-and-drop spreadsheet files or copy and paste order data, adding up to 200 part numbers, with up to three different quantities per part number. There's a link to create a My Mouser account, which helps customers further save time by saving contact, payment, order and subscription information.

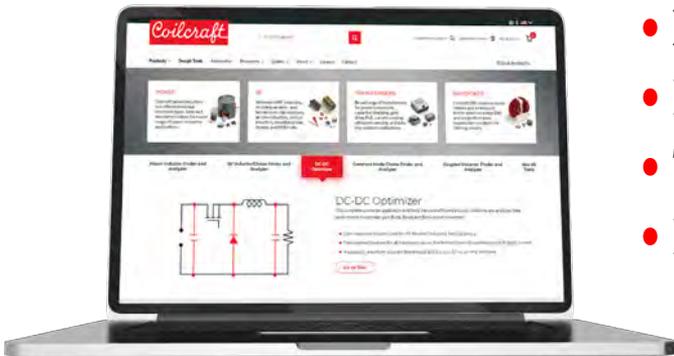
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Will supply or demand be the problem in 2021?



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

In this article, John Denslinger paints a picture of a fog of Covid uncertainty, then offers some tools to navigate a path through including a quick fix called stock

Forecast • By John Denslinger

Conventional forecasts and resultant budgets typically track one of two models. When forecasted demand signals growth, additional manufacturing capacity is planned assuring ample supply. Similarly, when forecasted demand is depressed, planning typically shifts to spending cuts and cost control dampening supply. 2021 might be a challenge though.

Component manufacturers may find difficulty capturing true demand and syncing that to a timely supply plan. So, how does that differ from past planning practices? In a word, Covid-19. To borrow a weather analogy, Covid is dense fog. Visibility is clouded. Supply disruptions are just around the corner but you can't see it. Demand is there but perhaps just as obscure. In this situation, the tendency is to plan conservatively.

Here's the dilemma. By all accounts, 2021 demand is projected to be a growth year. Yet multiple Covid waves are anticipated. Lockdowns and other restrictive measures tend to stifle demand more than supply. Even if subsequent wave amplitudes gradually moderate, B2B and especially B2C demand will certainly be bumpy at best. Given this scenario, the unintended consequence of a conservative forecast may be insufficient supply.

But supply has its own disruptive factors: plant closures, reshoring operations, retraining of workers, virus proofing manufacturing workplaces, labor shortages, etc. Restarts have not been smooth either. There are several reports suggesting employee attendance is erratic. Then there is a concern about upstream suppliers who seem ill-prepared for rapid shifts in demand. Perhaps it's because more than a few are facing severe liquidity problems. Procurement may find itself in a no-win situation. Surges in demand will require immediate resourcing. Drops in demand will necessitate unplanned push outs. Each driven by little visibility.

Shortages in the general market are nothing new to procurement. The cause is often traced to specific events such as a natural catastrophe, new technology adoption or key supplier failure. Covid, on the other hand, disrupts unevenly. Global supply networks must react swiftly to local and national policy changes. Since the pathogen is unpredictable, the directives that affect industrial efficiency and output are at risk as well.

As always, some mitigation is possible. A number of publications report suppliers are reshoring operations away from China and closer to markets served. Likewise, procurement organizations have responded with in-house solutions of their own: ending sole sourcing; implementing more of a geographic diversity sourcing; augmenting supply chain transparency and visibility with advanced technologies; and the quickest fix of all: creating a larger, more robust safety stock.

In a perfect world, supply and demand are always in balance. Unfortunately, this is a Covid world. 2021 foretells a powerhouse year in several market segments: 5G, IOT, EV, AI, massive data centers, and healthcare to name the major drivers. So the question remains, will it be supply or demand that upsets a much anticipated banner year for electronic components?

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MPU market will grow as demand, prices increase

Increased computer sales during the pandemic has resulted in greater demand for microprocessors



James Carbone

Semiconductor buyers can expect average prices for microprocessors to increase about 3.2 per cent over the next 12 months as demand rises because of higher sales of servers, notebooks and other PCs.

The average price for microprocessors used in computers will rise from \$93.67 in 2020 to \$96.70 in 2021 due to overall higher demand and because more higher end processors will be purchased, according to researcher IC Insights.

Higher average prices will help drive MPU revenue growth as the global microprocessor market will increase from \$41.6 billion in 2020 to \$45.2 billion in 2021, the researcher said. Unit demand will also rise from 445 million units in 2020 to 468 million in 2021, the researcher said. Longer term, the computer processor market will grow to \$48.9 billion by 2024 and the average price for an MPU will be \$99.95. Computer MPUs include x86 processors

from Intel and AMD, IBM's Power processors and ARM-based MPUs including Qualcomm's Snapdragon. The category does not include embedded processors or application processors used in cell phones, said IC Insights.

The increase in revenue and units shipments is welcome news to Intel, AMD and other microprocessor manufacturers. The microprocessor market declined in 2019 as revenue dropped to \$40.7 billion from \$41.9 billion in 2018. Many industry analysts thought that the processor market, as well as the overall semiconductor market, would suffer steep sales declines in 2020 because of the coronavirus pandemic.

Alan Priestly, VP analyst in the technology and service provider research team for Gartner Inc., said Gartner downgraded its MPU forecast after the pandemic hit. "We lowered the forecast after the first two quarters of the year from our original \$50.9 billion forecast" for the overall MPU

market," he said. "But then we had to bring it back up again" because Internet service providers were buying more servers which helped boost processor sales.

The increase in demand for servers happened after the pandemic spread from Asia to Europe and then to the Americas in the first and second quarters and countries locked down. Many people had to work from home and many children attended school virtually connected by computers and high-speed Internet. As a result, many stuck-at-home people purchased computers which helped drive microprocessor sales. Server sales also increase as more servers were needed to handle increased Internet traffic.

That trend continued into the fourth quarter. Sales of processors used in traditional PCs, tablets, servers, supercomputers, and all other types of computers are "benefitting from increased Internet usage during the global Covid-19 virus health

crisis," said Rob Lineback, senior market analyst for IC Insights. He said sales to these traditional computing segments will rise 2.2 per cent this year and account for 52 per cent of the total MPU market, which also includes application and embedded processors.

About 49 per cent of total MPU sales this year are expected to be generated by microprocessors built with the x86 architecture and sold by Intel and rival AMD for traditional PCs, servers, and mainframes. MPUs in touchscreen tablet computers—most of which are ARM-based system-on-chip (SoC) processors—are expected to account for 3 per cent of total MPU sales in 2020), while computer microprocessors made with architectures other than x86-based cores are forecast to be 1 per cent of the total.

Cloud drives demand

Lineback said that cloud computing and Internet service providers are driving up the server processor market by

By the Numbers Source: IC Insights



\$41.6 billion

The size of the computer microprocessor market in 2020.



3.2%

The amount that the average price of a microprocessor will increase in 2021



\$93.67

the average price of a microprocessor in 2020.



445 million

The number of microprocessors that will ship in 2020.



49%

The percentage of total microprocessor sales represented by the computer market.



\$48.9 billion

The forecasted size of the computer processor market in 2024.



“mid-single percentage increases after a weak first quarter. The cloud computing segment is the strongest part of the server market”, said Lineback. Intel is the “overwhelming leader” in server processors accounting for 90 per cent of units sold, he said.

While cloud computing and the Internet are driving server and MPU growth during the pandemic, there is diminished demand from the enterprise segment which includes corporate and government. In fact, that segment cut back on purchases in 2019 before the pandemic because of excess computing capacity and the end of an upgrade cycle in x86 MPU-based servers, and concern about the global economy last year, said Lineback.

“We see some corporate segments in servers weakened by the pandemic and the economic fallout of the global health crisis,” he said. Intel’s third quarter sales reflected weakness in the government and enterprise segment. Its sales to the segment fell 47 percent in the quarter, the company said. However, Intel’s processor sales for clouding computing grew 15 per cent in

the third quarter.

AMD had strong processor sales because of stronger overall PC sales and healthy demand from the gaming segment.

“Our business accelerated in the third quarter as strong demand for our PC, gaming and data center products drove record quarterly revenue,” said Dr. Lisa Su, AMD president and CEO. “We reported our fourth straight quarter with greater than 25 percent year-over-year revenue growth.”

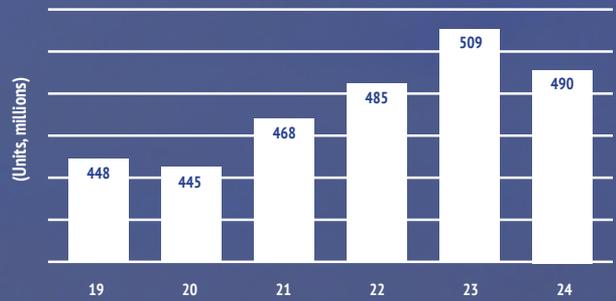
AMD’s revenue increased up 56 percent year-over-year and 45 percent quarter-over-quarter. Su said for the fourth quarter of 2020, AMD expects revenue to increase 41 percent year-over-year and 7 percent sequentially.

Impact of Chromebooks

Strong demand, especially for processors used in servers, will also increase in 2021. However, processor demand is also being driven by lower-cost Chromebooks. “Chromebook runs on the Google Chrome operating system and it is an inexpensive platform. It tends to be one that

Unit shipments of microprocessors used in computer applications will rise from 445 million in 2020 to 490 million in 2024.
Source: IC Insights

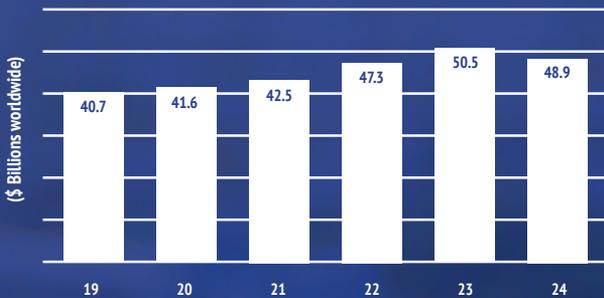
MPU unit shipments rise



school kids use quite a bit,” said Lineback.

of the “economic fallout” from the pandemic, said Lineback.

Computer MPU market to grow through 2023



The global microprocessor market will post steady sales growth through 2023, but then dip in 2024. Source: IC Insights

Chromebook shipments will grow from about 4 per cent of total personal computing systems shipments in 2019 to about 10 per cent in 2020, said IC Insights. Chromebook shipments will rise 140 per cent to about 43 million systems in 2020, said Lineback. That is good news for Intel which is the leading supplier of processors for Chromebooks.

For instance, HP uses a range of Intel x86 processors from low-end Celeron and Pentium processors up to 10th-generation Core i3, i5 and i7 MPUs in laptop Chromebooks that sell from \$150 to a little over \$1,000, said Lineback. AMD also builds processors for Chromebook segment and supplies them to HP and Lenovo among others.

While sales will increase for processors used in computers, revenue will decline for application processors used in mobile phones. Sales of applications processors will drop 3 percent to \$20.9 billion because

However, cell phone sales are expected to improve in the fourth quarter as demand grows for new 5G handsets. As a result, application processor sales should increase and higher demand should carry over into 2021.

Demand has increased for processors used in embedded applications such as automotive systems, data networking, communications, industrial and medical equipment and consumer products.

The embedded-processor portion of the MPU market is expected to grow 5 per cent to \$16.7 billion in 2020, according to IC Insights. Embedded applications will account for about 21 per cent of MPU sales in 2020, compared to 49 percent for x86 based computers; 26 per cent for cell phones, and 3 percent for tablets that use ARM-based or x86 architectures, the researcher said.

Buyers may face rising prices and longer lead times in 2021

Buyers are concerned there could be more shutdowns of electronics production in 2021 as uncertainty created last year by the pandemic carries over into 2021

Possible shutdowns of component production because of coronavirus, rising prices for copper and other metals and potential shortages of multilayer ceramic capacitors, power MOSFETs and other components are some of the supply chain challenges that electronics buyers say they will face in 2021.

Covid-19 will remain a front-and-center purchasing for many buyers in 2021 as the number of cases of coronavirus reached record levels in the U.S. and other countries in the fourth quarter stoking concerns that there could be more shutdowns or slowdowns in electronics production.

Judy Kile, senior manager, GE Healthcare Sourcing, based in Chicago, said she expects Covid-19 will continue to impact the supply chain and ability of suppliers to produce and deliver components in 2021. "We will continue to monitor the supply chain closely through the first half of 2021 for allocation, lead time extensions and price fluctuations," said Kile. "We continue to see regions impacted by Covid closures and lockdowns as well as natural disasters and economic influences which have the potential to tighten the supply chain for some suppliers," she said.

Jamey Mann, director of global purchasing at electronics manufacturing services (EMS) provider Kimball Electronics, based in Jasper, Ind., said the unpredictability of this pandemic has the "potential to again cause negative influences on supply." He said as the number of Covid-19 cases have increased in the fourth quarter some countries could decide to reinstitute lock down measures in an effort to reduce the spread of the virus.

"What effect, if any, that will have on manufacturing is yet to be determined," said Mann. "Measures that could be implemented by government such as shutting down all businesses for multiple weeks at a time can and will have a negative impact," he said.

Shabnam Shaghafi, vice president of supply chain for EMS provider Benchmark Electronics, based in Tempe, Ariz., said it is difficult to predict the impact that the pandemic could have on supply in 2021 because of the "fluid nature of Covid-19." She said suppliers have worked hard to overcome challenges by adopting new ways of operating and improving their communication. The efforts helped reduce the impact of the virus on the supply chain date to date.

"We believe that the heightened supply chain awareness and knowledge the pandemic has brought, will better position us to continue managing our business through any future challenges that may emerge," she said.

Expect shortages in 2021

With or without the pandemic, another potential issue for electronics buyers in 2021 could be component availability. Supply could be tight and shortages of some parts are likely because the global economy is restarting. Several key segments such as automotive, consumer and mobile 5G are quickly ramping, said Shaghafi. Some buyers fear that there could be shortages of some of the same parts that had availability issues 2017-2018, including MLCCs, MOSFETs and chip resistors.

"The increase in demand from these markets has led to raw material shortages and capacity constraints, resulting in extended lead-times on some electronic components," said Shaghafi. "Products such as MOSFETs, insulated gate bipolar transistors (IGBTs), sensors, microcontrollers to mention a few, are anticipated to stay constrained through the first half of 2021," she said.

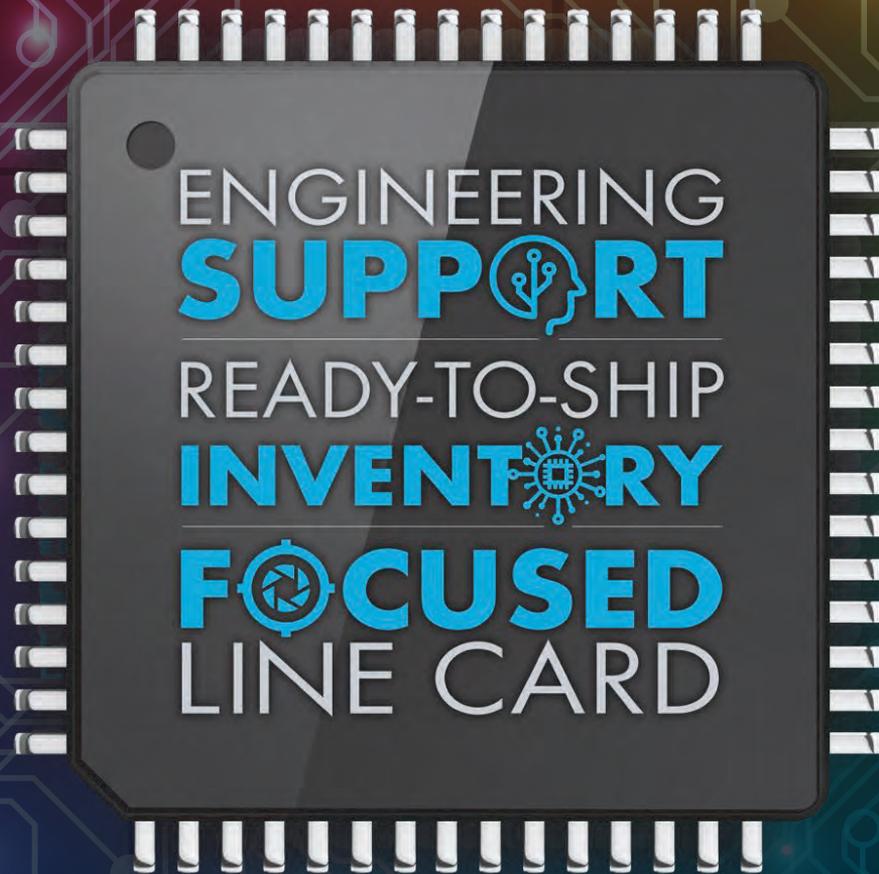
The good news is that suppliers have added



Products such as MOSFETs, insulated gate bipolar transistors (IGBTs), sensors, microcontrollers to mention a few, are anticipated to stay constrained through the first half of 2021

Shabnam Shaghafi, vice president of supply chain for EMS provider **Benchmark Electronics**

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capacity since the 2017-2018 shortages. “Over the past 18 to 24 months there was significant manufacturing capacity added by the semiconductor industry” as well as passives manufacturers, said Mann. As a result, available manufacturing capacity in 2021 will be at all time high points, according to industry market analysts, he said.

Shaghafi said suppliers are working on increasing capacity, but it may take some time before standard lead times return. “We have been working feverishly with our suppliers, internal teams, and customers to provide as much up and downstream visibility as possible in an effort to secure supply and minimize any disruptions,” she said.

Kile said in early November that there was “sufficient capacity for our semiconductor requirements based on an operational industry.” She said many suppliers that experienced supply constraints in the second and third quarters of this year implemented plans to improved supply chain robustness.

Will metals tags rise again?

Some buyers are concerned about the rising prices of copper and other metals. Kile said rising material prices have already impacted the prices of electromechanical devices and passives components.

However, raw material prices are actually down compared to several years ago. For instance, copper prices increased in 2020, but “when you look at the five-year trend, current pricing is still below the highs the market saw in 2017 and 2018,” said Mann. Ideally manufacturers

of products containing metals such as copper will base any price movements on the five-year trend instead of the one-year trend, he said. Several suppliers passed along price increases in 2017-2018 but did not make “comparable reductions in market prices” when material prices dropped in 2019, said Mann.

One issue that will continue to be a source of concern in 2021 is supply base consolidation. Some buyers say consolidation results in an overall healthier supply while others say too much consolidation can result in less competitive environment.

“A large portion of the consolidations that have occurred over the past five years has been complementary, where the combined product portfolio of both parties is creating a more robust technology offering under a common leadership team,” said Mann. However, there are some cases where “both parties have common solutions so in theory, over time, competition could be reduced as competing solutions are eliminated or reduced,” he said. With consolidation there can be “competitive leverage reduction as fewer suppliers in the market afford less data points to use in negotiations,” said Mann.

Kile said competition in the supply chain is healthy “both commercially and from a supply chain risk mitigation perspective,” said Kile. However, the mergers and acquisitions since 2016 have driven a significant number of end-of-life notifications on components “which can negatively impact a company’s long-life cycle business.”

Shaghafi said when competition is eliminated

because of a merger or acquisition, it adversely affects customer prices and product choices.

“When this happens, we often see that product availability is impacted due to rationalization of products, which in effect leads to end-of-life of redundant or similar products,” she said. As a result, an alternative component may have to be qualified or a board may have to be redesigned. However, there are cases where supplier consolidation may help increase a customer’s leverage by allowing for consolidation of spend and increased negotiation power, said Shaghafi.

Another challenge that will likely carry over to 2021 is a continuing trade war between the U.S. and China. “The trade war between China and the U.S. has resulted in increased product cost to some customers in the U.S.,” said Shahafi. She said Benchmark has been working with its OEM customers on “alternative strategies and solutions” outside of China and within southeast Asia or India to maintain low production costs and minimize customer impact.

“In some cases, no immediate alternative outside of China exists, and therefore we must continue to source with China suppliers while we position ourselves to further develop our global supply base and close any potential supply chain gaps,” said Shaghafi.



A large portion of the consolidations that have occurred over the past five years have been complementary, where the combined product portfolio of both parties is creating a more robust technology offering

Jamey Mann, director of global purchasing at electronics manufacturing services (EMS) provider **Kimball Electronics**

Supply chain regionalization and possible allocations will be key challenges for Plexus and other EMS providers in 2021

Editor's note: Chris Hood is vice president of global purchasing for EMS provider Plexus. Electronics Sourcing North America (ESNA) recently interviewed him about the purchasing and supply chain issues Plexus and other electronics companies are expected to face in 2021

Q Do you expect there to be enough production capacity for semiconductors and other components in 2021? Is there any significant risk of component shortages, allocations, or longer lead times for components?

From a buyer's perspective, there is never enough capacity. However, our team continues to leverage our robust supplier management and risk assessment tools to manage through longer lead times. Shortages and allocations are challenges that are not unique in our industry, even outside a pandemic landscape.

We have observed some pockets of memory lead times increasing. In semiconductors, there are some indications of high foundry capacity utilization, but so far it has not translated to constraints for us. We continue to monitor areas like tantalum capacitors, sensors and some relays which lend themselves to allocation challenges. Microcontrollers and programmable logic are seeing large lead time increases that we continue to solution.

Q Prices for copper and other metals and materials used in electronics have increased this year. Will rising metals prices be an issue in 2021 and are you concerned it will impact the price of parts?

Certainly, in the PCB space we are feeling the price of gold, which is up 25 per cent in 2020. But the application of gold on a raw

PCB accounts for only a fraction of the overall raw board cost, making this impact a single-digit increase to the total unit price. While this is still a challenge, it is not as much as people might think. In theory, resins and polymers benefit from falling oil prices. Commodities rise and fall, sometimes offsetting each-other. But, as with the PCB example, raw material is just a slice of the aggregate cost in electronics. The bigger concern is how wage inflation and increased logistics cost affects the value-chain, plus long-term currency trends – namely a slide in the US dollar.

Q Over the last five years, there has been a lot of supply base consolidation in electronics. Is reduction in the number of suppliers an issue for purchasers in that it could lead to reduced competition? Or is it a positive thing for buyers because it results in a healthier supply base?

The pressure point in our business is balancing supply and demand. Our customers' competitive end markets can generate demand volatility. I'd like to see source/supply markets with ample capacity to offset that demand volatility risk. But in my opinion, electronics market consolidation threatens to make an existing problem worse. Sure, we're pleased when one of our preferred suppliers is the acquiring firm. We have many strong relationships with our suppliers, and that extends into supply chain coordination on

supply/demand via IT integration and contracted inventory programs. But speaking for all buyers, more competition is always preferred in order to maintain rational prices and lead times.

Q To what degree will the continuing trade conflict between China and the U.S. be a concern for buyers in 2021?

Shortly after the U.S. government was weighing restrictions on Chinese semiconductor firm SMIC, we heard Taiwanese firms saying capacity on 200mm wafers was tight and prices will be increasing. So yes, when governments change the rules of the game, it can be felt by the supply chain. Increasingly, our customers are asking us to quote production at multiple sites and in multiple regions not only for more flexibility in the midst of trade concerns, but also for general risk mitigation, which the pandemic has underscored. At every site, we evaluate total landed cost from origin-to-destination and build supply chains accordingly. Sometimes China-based suppliers make sense, sometimes not. I don't see an 'across the board' kind of impact, though.

Q Are there other purchasing/supply chain issues that you are concerned about?

Yes. First, there is a potential risk mitigation trend driving

increased regionalization of supply chains. Our customers take a first-tier view of the problem and feel better having production closer to end-users. Second, considering the third-tier of the supply chain, we still see widespread dependence on Asia. To fully mitigate risk, component manufacturers need to think about redundancy all the way through the supply chain. We have tools and processes in place that identify risk based on source location. But even the best databases don't have full visibility to the sub-tiers. As a result, I'm increasingly partial to supplier partners who are more fully integrated.

Lastly lead times have been a top priority on the minds of any component manufacturer or design engineer. We think of electronic components as the "high tech" industry, yet Toyota can build a car from start to finish in 18 hours while most component manufacturers quote lead time in double-digit weeks. For buyers, it is just intolerable. Combined with broad catalog options that fragment demand, and volatile end markets, part shortages are inevitable. So, I'd like component manufacturers to achieve lower lead times, and in parallel I'd like to see engineers selecting for lead time and continuity of supply as much as any other metric.

Manufacturer	Distributor	Telephone	Website	Franchised Distributor (Y/N/M)	No. of Lines for Principle	Stock Value for Principle	Minimum Order Value	% Lead Free for Principle Range	No. of Technical Support Staff	Total No. of Staff	Pack and Hold
ACOUSTIC COMPONENTS											
BeStar Electronics Ind. Co. Ltd.	BeStar Technologies Inc.	520-439-9204	www.bestartech.com	Y	N/A	\$250,000	N/A	100.00%	50	900	Y
CABLE & WIRING											
3M	Mouser Electronics	800-346-6873	www.mouser.com	Y	23235	N/A	\$0	0.46	50	1,000+	Y
Alpha Wire	Mouser Electronics	800-346-6873	www.mouser.com	Y	8,106	N/A	\$0	93.00%	50	1,000+	Y
Belden Wire & Cable	Mouser Electronics	800-346-6874	www.mouser.com	Y	5,863	N/A	\$0	97%	50	1,000+	Y
Molex	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Molex	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
TE Connectivity	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
CIRCUIT PROTECTION											
Bel Fuse	Bel Fuse	+1 201 432 0463	belfuse.com/circuit-protection	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bourns	Mouser Electronics	800-346-6873	www.mouser.com	Y	4,462	N/A	\$0	68.00%	50	1,000+	Y
Eaton	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
EPCOS	Mouser Electronics	800-346-6873	www.mouser.com	Y	3,487	N/A	\$0	100%	50	1,000+	Y
Littelfuse	Mouser Electronics	800-346-6873	www.mouser.com	Y	28,790	N/A	\$0	67%	50	1,000+	Y
Schurter	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Vishay	Mouser Electronics	800-346-6873	www.mouser.com	Y	31,445	N/A	\$0	68%	50	1,000+	Y
DISPLAYS & LEDs											
BIVAR	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Broadcom	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Cree	Mouser Electronics	800-346-6873	www.mouser.com	Y	12,390	N/A	\$0	99.00%	50	1,000+	Y
Dialight	Mouser Electronics	800-346-6873	www.mouser.com	Y	6,179	N/A	\$0	84.00%	50	1,000+	Y
Displaytech	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Electronic Assembly	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Kingbright Company, LLC	Mouser Electronics	800-346-6873	www.mouser.com	Y	301	N/A	\$0	100.00%	50	1,000+	Y
Lumileds	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Newhaven Display	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Osram Opto Semiconductors	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,690	N/A	\$0	100.00%	50	1,000+	Y
VCC	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Vishay	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
ELECTROMECHANICAL											
ALPS	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Apem, Inc.	Mouser Electronics	800-346-6873	www.mouser.com	Y	4,326	N/A	\$0	83.00%	50	1,000+	Y
C&K Switches	Mouser Electronics	800-346-6873	www.mouser.com	Y	27,230	N/A	\$0	90.00%	50	1,000+	Y
E-Switch	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Grayhill	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Honeywell	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
IXYS	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Keystone Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y

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PUI Audio	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Schneider Electric	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Sensata	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
TE Connectivity	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Teledyne Relays	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
ENCLOSURES											
Bud	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bud Industries	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,325	N/A	\$0	80.00%	50	1,000+	Y
Hammond Manufacturing	Mouser Electronics	800-346-6873	www.mouser.com	Y	2,839	N/A	\$0	82%	50	1,000+	Y
New Age Enclosures	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
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ECS Inc	Mouser Electronics	800-346-6873	www.mouser.com	Y	2,070	N/A	\$0	100%	50	1,000+	Y
Epson Toyocom	Mouser Electronics	800-346-6873	www.mouser.com	Y	178	N/A	\$0	100%	50	1,000+	Y
IQD Frequency Products	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Kyocera	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Silicon Labs	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
ICs & SEMICONDUCTORS											
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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
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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
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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

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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
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Hirose Electric	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
ITT Cannon	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ITT Cannon	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
JAE Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	6,02	N/A	\$0	100%	N/A	N/A	Y
JST	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
LEMO	LEMO	800-444-5366	www.lemo.com	M	N/A	N/A	N/A	N/A	N/A	1,500	N/A
LEMO	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Mill-Max	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Molex	Mouser Electronics	800-346-6873	www.mouser.com	Y	85,634	N/A	\$0	89%	50	1,000+	Y
Neutrik	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,563	N/A	\$0	100%	50	1,000+	Y
NorComp	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Phoenix Contact	Mouser Electronics	800-346-6873	www.mouser.com	Y	30,044	N/A	\$0	77.00%	50	1,000+	Y
Radiall	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Souriau	Mouser Electronics	800-346-6873	www.mouser.com	Y	10,744	N/A	\$0	27%	50	1,000+	Y
Stewart Connector	Bel Fuse	+ 1 717 235 7512	belfuse.com/stewart-connector	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Switchcraft Corporation	Mouser Electronics	800-346-6873	www.mouser.com	Y	300	N/A	\$0	55%	50	1,000+	Y
TE Connectivity	Mouser Electronics	800-346-6873	www.mouser.com	Y	123,613	N/A	\$0	69%	50	1,000+	Y
OBSOLESCENCE / HARD TO FIND											
	Chip 1 Exchange USA, Inc.	949-589-5400	www.chip1.com/es	Y	850,000	N/A	\$0	85%	20	150	
	Lansdale	602-438-0123	lansdale.com	Y							
	Lantek Corp.	973-579-8100	www.lantekcorp.com	M	186,000	\$22M	\$0	75.00%	5	62	Y
	Rochester Electronics	978-462-9332	www.rocelec.com	Y		N/A	\$250		10	400+	Y
OPTO ELECTRONICS											
Broadcom	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Cree	Mouser Electronics	800-346-6873	www.mouser.com	Y	582	N/A	\$0	99.00%	50	1,000+	Y
Finisar	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Osram Opto Semiconductors	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,927	N/A	\$0	99%	50	1,000+	Y
ROHM Semiconductor	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Vishay	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
PASSIVES											
ABRACON	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
AVX	Mouser Electronics	800-346-6873	www.mouser.com	Y	42,454	N/A	\$0	72%	50	1,000+	Y
Bourns	Mouser Electronics	800-346-6873	www.mouser.com	Y	38	N/A	\$0	78%	50	1,000+	Y
Cornell Dubilier	Mouser Electronics	800-346-6873	www.mouser.com	Y	24,145	N/A	\$0	71%	50	1,000+	Y
Coilcraft	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
EPCOS	Mouser Electronics	800-346-6873	www.mouser.com	Y	26,533	N/A	\$0	98.00%	50	1,000+	Y
Fair-Rite	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Kemet	Mouser Electronics	800-346-6873	www.mouser.com	Y	77,568	N/A	\$0	66%	50	1,000+	Y
KOA Speer	Mouser Electronics	800-346-6873	www.mouser.com	Y	34,078	N/A	\$0	58%	50	1,000+	Y
Murata	Mouser Electronics	800-346-6873	www.mouser.com	Y	33,780	N/A	\$0	99%	50	1,000+	Y
Nichicon	Mouser Electronics	800-346-6873	www.mouser.com	Y	20,389	N/A	\$0	84.00%	50	1,000+	Y
Ohmite	Mouser Electronics	800-346-6873	www.mouser.com	Y	14,293	N/A	\$0	55.00%	50	1,000+	Y
Panasonic Electronic Components	Mouser Electronics	800-346-6873	www.mouser.com	Y	14,948	N/A	\$0	100.00%	50	1,000+	Y
Signal Transformer	Bel Fuse	+1 516 239 5777	belfuse.com/signal	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Taiyo Yuden	Mouser Electronics	800-346-6873	www.mouser.com	Y	4,620	N/A	\$0	98.00%	50	1,000+	Y

Buyers' Guide

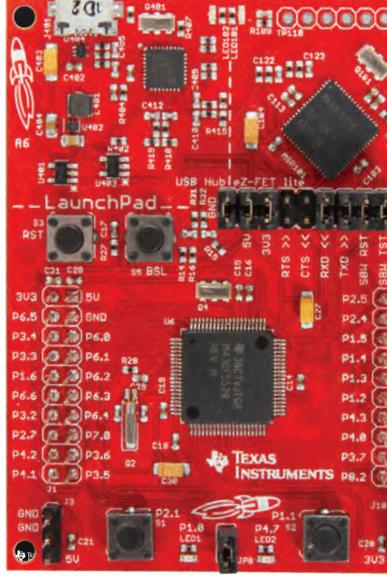
Manufacturer	Distributor	Telephone	Website	Franchised Distributor (Y/N/M)	No. of Lines for Principle	Stock Value for Principle	Minimum Order Value	% Lead Free for Principle Range	No. of Technical Support Staff	Total No. of Staff	Pack and Hold
PASSIVES (Continued)											
TDK	Mouser Electronics	800-346-6873	www.mouser.com	Y	6,663	N/A	\$0	100.00%	50	1,000+	Y
TT Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
United Chemi-Con (UCC)	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Vishay	Mouser Electronics	800-346-6873	www.mouser.com	Y	102,917	N/A	\$0	64.00%	50	1,000+	Y
Würth	Mouser Electronics	800-346-6873	www.mouser.com	Y	934	N/A	\$0	99.00%	50	1,000+	Y
Yageo Corporation	Mouser Electronics	800-346-6873	www.mouser.com	Y	18,246	N/A	\$0	100.00%	50	1,000+	Y
POWER & BATTERIES											
Artesyn Embedded Technologies	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Bel Power Solutions	Bel Fuse	Power & Batteries	belfuse.com/power-solutions	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cincon	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Cosel	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
CUI Inc.	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Delta Electronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
MEAN WELL	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Mornsun		+1-978-567-9610/+1-978-293-3923	www.mornsunamerica.com				N/A	\$0	100%	N/A	2000+
Murata	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Phihong	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Phoenix Contact	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
RECOM	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Schaffner	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Texas Instruments	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
TDK Lambda	Mouser Electronics	800-346-6873	www.mouser.com	Y	405	N/A	\$0	80.00%	N/A	N/A	Y
TRACO Power	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Vicor	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
REED SWITCHES											
HSI Sensing	HSI Sensing	405-224-4046	www.hsisensing.com	M	75	N/A	\$200	100.00%	15	275	N
SENSORS											
ams	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Analog Devices Inc.	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Bosch	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Honeywell Sensing and Control	Mouser Electronics	800-346-6873	www.mouser.com	Y	12,059	N/A	\$0	64.00%	50	1,000+	Y
Littelfuse	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Maxim Integrated	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,379	N/A	\$0	45.00%	50	1,000+	Y
Melexis	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Microchip	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
NXP	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
ON Semiconductor	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Omron	Mouser Electronics	800-346-6873	www.mouser.com	Y	4,915	N/A	\$0	59.00%	50	1,000+	Y
Sensirion	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
STMicroelectronics	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
TDK	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
TE Connectivity	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Texas Instruments	Mouser Electronics	800-346-6873	www.mouser.com	Y	914	N/A	\$0	65.00%	50	1,000+	Y
SWITCHES & KEYBOARDS											
OTTO	ECCO	773-767-2200	www.eccoconnectors.com	Y	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TEST & MEASUREMENT											
B&K Precision	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Fluke	Mouser Electronics	800-346-6873	www.mouser.com	Y	1,008	N/A	\$0	94.00%	50	1,000+	Y
Keysight	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Lascar Electronics		814-835-0621	www.lascarelectronics.com	Y	130	\$602,000	\$0	100%	10	175	Y
Tektronix	Mouser Electronics	800-346-6873	www.mouser.com	Y	N/A	N/A	\$0	N/A	50	1,000+	Y
Teledyne LeCroy	Mouser Electronics	800-346-6873	www.mouser.com	Y	194	N/A	\$0	96.00%	50	1,000+	Y

Contract Manufacturers Buyers' Guide

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



Mouser has the largest selection of authorized Texas Instruments products in stock

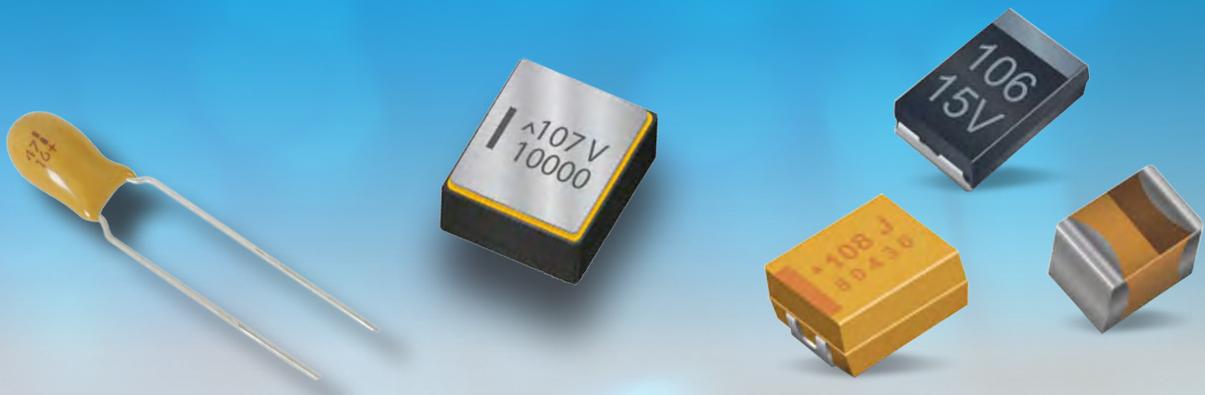


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