

Distributors shine through daunting supply chain of 2021

Top Americas distributors deliver crucial value to distressed electronics components supply chain and achieve revenue jump of 21.9% in historically challenging year

In the midst of a multi-year, global crisis with impacts from multiple sources on the electronic components supply chain, top distributors have stepped up as vital partners of component manufacturers and customers in managing multiple challenges that have no precedent. Following a head fake by the markets and anticipating a major slowdown in electronics demand at the start of the COVID pandemic, the surge in demand for electronics completely outstripped the capacity of the electronics component industry to supply customer's needs. The cataclysmic events of the past 2+ years have reshaped the world and the electronics industry so profoundly that industry leaders do not see a future return to previous, typical patterns and business practices. Rather, executives are preparing to succeed in a "new normal" industry that will emerge from the wildfires of the early 2020s.

As the crises of 2020 grew and expanded in 2021, every stage of the supply chain, ranging from raw material supply to component & system manufacturing, shipping & logistics, and end-market demand were pressed to manage the convulsions of workforces in transition

and a critically strained operating environment. Shipping delays and prices added to the mounting supply chain pressures while workers and consumers were focused on adapting to a new world with unanticipated changes to lifestyle, social interactions, family life and work requirements. The vital support delivered by distributors throughout the past two years has enabled the electronics components industry and supply chain to not only survive but respond with resilience in the face of incredible difficulties. In assessing the events that have roiled the electronics industry it is amazing that the industry has not only survived but thrived in many ways. However, everybody understands that the road ahead is steep and rocky and will require continued innovation, adaptation, and perseverance. Following two years of declining revenues, the Top 50 Authorized Americas Distributors achieved revenue growth of 21.9% in Americas sales. Even more impressive, this group delivered 30.3% revenue growth on a worldwide basis as EMEA and Asia sales outpaced Americas sales growth.

Interviews with experienced distribution executives yield important understanding regarding

major issues confronting the electronics components supply chain participants. As part of a survey to identify the "Top 50 Americas Authorized Distributors," distributors were asked to rate the level of severity they expect the electronic components and supply chain industry will experience in 2022. The results of that survey are shown below and align with topics addressed in interviews with these leading industry executives.



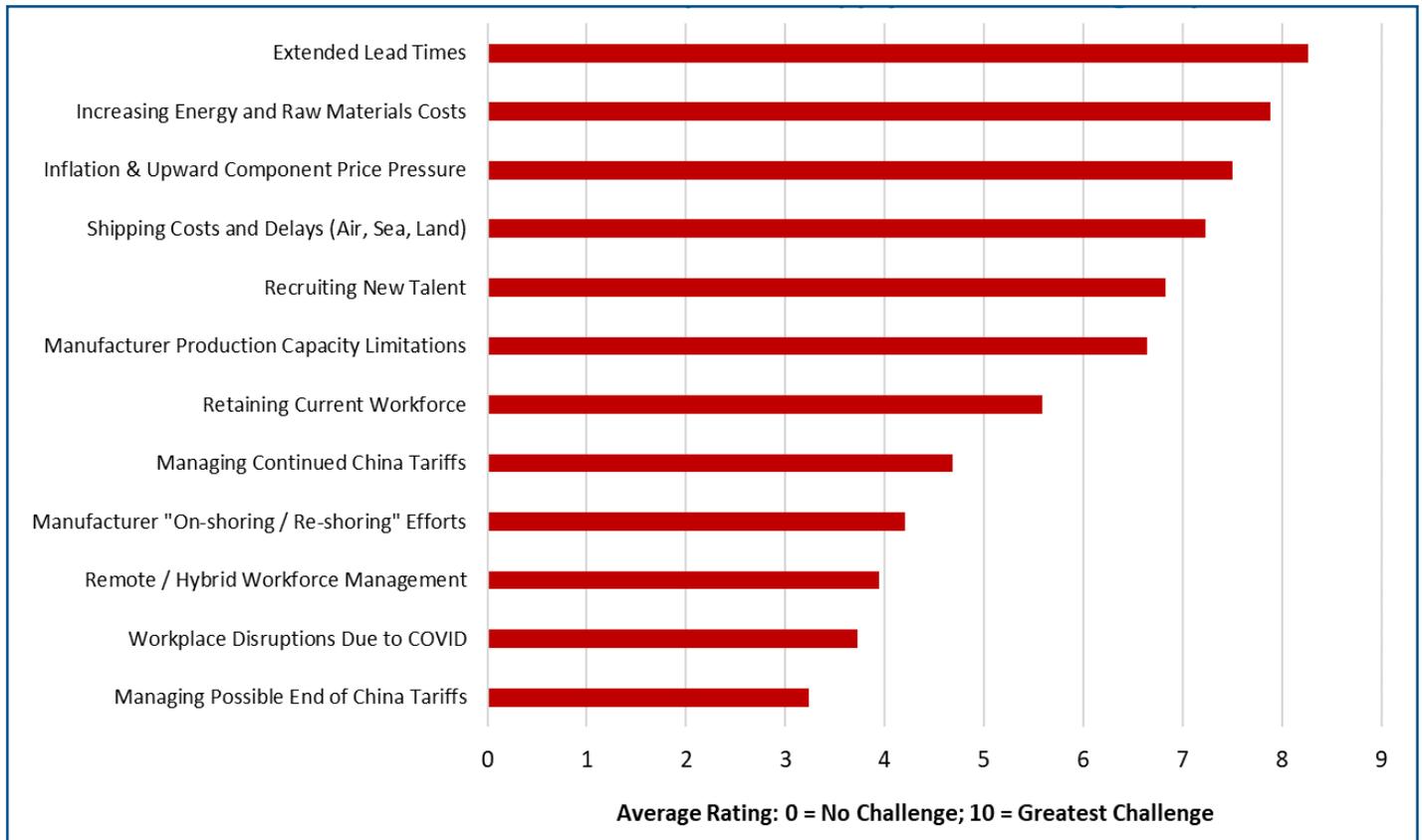
Dale Ford - ECIA Chief Analyst



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2022 Electronic component supply chain challenge expectations



Extended Lead Times “Don’t Stop Thinking About Tomorrow!”

While the overall, record-breaking lead times appear to be easing recently, the supply chain crisis is far from over as shipping solutions are still overwhelmed and shipping prices are highly inflated. The questions everybody is asking are: “How long will these extreme lead times continue?” and “How will the supply chain crisis be solved over time?” David Loftus, ECIA CEO, quoted a speaker at a recent ERA conference trying to reassure listeners saying, “Don’t worry. Nobody knows.” Loftus noted that, “Everybody is trying to compare this cycle to prior cycles. But each cycle has its own unique signature. Of all the cycles I have experienced or know about this is by far the most unique. It is like throwing darts trying to say when this cycle will end.” By added explanation he noted, “Look at what we have seen in the last few weeks. In addition, you can’t predict a worldwide pandemic & recovery, inflation, political turmoil, and the world pumping more than \$20 trillion dollars into stimulus. The M1 and M2 money supply is still at record levels. All this is causing confusion and hyperactivity.” Loftus believes market conditions will continue to be strong through 2022. However, he sees declining stimulus and increasing belt tightening starting to have an impact in 2022. “Four quarter-point raises in interest by the Federal Reserve should dissuade overexuberance.”

Dayna Badhorn, Avnet Regional President, Americas, shared helpful results from recent research conducted by Avnet. She states that, “While we are seeing lead times ease, challenges are still likely on the horizon. According to our recent Avnet Insights survey,

a strong majority of overall respondents still expect those lead times to worsen and prices to rise in the next year and a half. The shortages are already causing production delays – and three-fourths of those who have experienced delays say they have lasted up to six months – and these continued concerns imply that those delays may continue. Our survey found 96% of design engineers are concerned lead times will continue to get longer in the next year and a half.”

When asked about his expectations for how long extremely elevated lead times would last, Chris Beeson, RS Components Group Sr Vice President – Electronics, professed that he, “would have answered this question differently before the start of Russia’s war on Ukraine.” Beeson explained that industry participants will need to develop a better understanding of the end-to-end manufacturing process including the critical materials that makeup a component such as copper, nickel, etc. In addition, he stated, “Gasoline and natural gas will come into play quickly. All these play into how you make a product.” In elaborating on the impact of a “hot war” Loftus explained, “The military conflict of a nuclear power trying to take over a huge next-door neighbor has led to unprecedented financial sanctions that have some self-penalties in their implementation. Sanctions are boomeranging on our own economy that could accelerate an economic slowdown and tip our economy and other major economies into recession.”

In describing the challenge of predicting when and how lead times will change, multiple executives used the example of trying to solve a complex equation. Sager President,

Frank Flynn, described a “long equation with many variables and new variables coming in. It is not linear.” In trying to solve these variables he shared that, “Some improvements have limited impact and some elements improve while others get worse.”

Sager explained, “there are still major logjams at key ports such as Shenzhen in China. How long will it take for products to move through ports? Are they stuck behind other containers? Ports in Florida and Houston instead of Los Angeles and Long Beach? Most of the other ports are not equipped to take a major influx of product. What is a more efficient shipping path and how long would it take to work? Is it better to stay with existing shipping paths or new ones? How long would it be sustainable? There are a lot of big models that need to be worked. The equation keeps lengthening instead of shortening” Elaborating on the theme of equations and predicting lead times, Beeson noted the “need to understand the totality of the equation. There are variables you can control and those that are beyond your control. Major wars such as Russia’s Ukraine invasion could add a lot of volatility to our industry. You get into the concept of scarcity quickly.”

A major variable in any effort to predict lead times is “demand.” Karim Yasmine, Future Electronics’ Corporate VP, Strategic Supplier Development, emphasizes that, “You have to look at supply AND demand. You can’t look at just one or the other. The difference now from prior cycles is that every segment and technology is impacted. Its ALL technologies and segments.” He observes that, “general demand is quite healthy still. We are in a different world from other markets. This is not a mature



**Dayna Badhorn, Avnet Regional
President, Americas**



**Chris Beeson, RS Components
Group Sr Vice President**

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industry. Demand will remain healthy with creativity from manufacturers.” Yasmine is concerned that, “The greatest pain today comes from legacy products. New semiconductor fabs don’t solve the challenge of supply because manufacturers are building new advanced technology fabs and not 200 mm lines. However, the issue is that there is still a lot of legacy demand. If this supply/demand gap continues, legacy products could be forced to move to higher-end manufacturing processes. Or, they may have to create more modular designs.”

Frank Flynn believes, “The free-market system is naturally addressing the many issues around raw materials, warehouse capacity, production workers, truckers, infrastructure, and shipping. As the industry contends with limited supply and rising prices, demand will ultimately correct the problems facing the supply chain.”

Distributors play an essential role in delivering solutions for the supply chain crisis. Jim Ricciardelli, Digi-Key; Executive VP, Sales & Marketing, explains, “Distributors are playing the critical and difficult role of projecting the necessary pipeline of electronic component inventory to support the demand from a multitude of industries and customers. We are also helping engineers with multi-sourcing and cross references has become more and more important over the past 2 years.” Elaborating on the value distributors deliver, Flynn states, “At this time the buying horizons are wide open, which provides us a lot of visibility into product needs. Today, distributors with an eye on double ordering and the ability to provide customers with other in-stock parts, are able to provide this view well past

what has been tradition. Our suppliers are seeing our product needs for all of this year and into 2023. We are all doing an end around the just-in-time planning that we have done in the past.”

Badhorn provides additional perspective on the value distributors deliver. “This series of disruptions has further underscored the value of supply chain capabilities to new and existing customers. In addition to bringing transparency and agility to supply chain strategies overall, distributors are also well positioned to help manage concerns around residual impacts of the crisis – such as counterfeit concerns, or design implications. Yasmine is concerned that, “The cash flow crunch felt by smaller players means we could see some customers not survive. Some companies may not be able to endure this challenge lasting more than it already has. This could become a bigger issue. We do not want to see customers go out of business. Major distributors can potentially help with financial support. For example, extended payment terms, flexibility in terms, etc.”

Bottom line - Among all the executives interviewed, there is near-unanimous agreement that highly elevated lead-times will continue through the rest of 2022 and into the first half of 2023.

Revealing Strengths, Exposing Weaknesses

Major challenges help identify both strengths and weaknesses. In looking at the experience of different distributors and customers over the past two years, Chris Wadsworth, Carlton-Bates VP, OEM Electronics, observed, “Those that made proactive inventory investments prior to the post-COVID recovery have been able to support the expanded demand best and grow well above peer

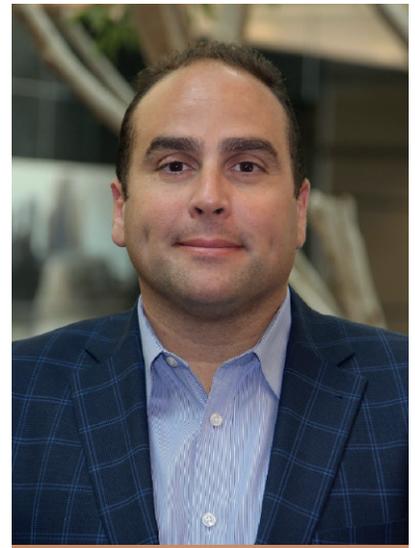
levels. Also, customers that were open to design work were able to find alternative products with better lead times. Those companies that had strong demand creation resources were able to help customers and grow sales above peer levels.”

The value of trusting relationships in the supply chain was highlighted over the past two years. Frank Flynn shared that, “In the face of shortages and rising prices, the long-term relationships paid off up and down the supply chain. Distributors kept their product for their long-term, loyal customers. Customers and suppliers who did not have strong relationships with their distribution partners or component manufacturers, respectively, had the most difficult time. Any company that didn’t have the relationships in place and simply moved around for pennies here or there, had the hardest time adjusting. Distributors worked with their suppliers and customers – customers who may have worked from a playbook but understood the magnitude of the market dynamics – to get through to the real costs.”

Dayna Badhorn commented, “The importance and the strength of distributors like Avnet is our ability to maintain visibility and agility within the supply chain. This has enabled us to orchestrate solutions for our customers and suppliers that account for variability in the market.” Underlying this strength is the power of electronic communication. David Loftus believes, “Electronic communication is better and more efficient than we have ever had. You can argue about accuracy of forecasts, but the communications infrastructure is far more advanced than one or two cycles ago. Once we get better lead times there will



Frank Flynn, Sager, President



Karim Yasmine, Future Electronics Corporate VP, Strategic Supplier Development

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be better joint management of production cycles.”

In Jim Ricciardelli’s experience, “Companies have been forced to drive for new efficiencies in managing their business. The importance of capturing and reacting to data has been raised to a new level. As Digi-Key saw the number of orders doubling and found themselves expediting all day, it caused us to analyze every aspect of our business and identify greater efficiencies in every aspect.” Once again, he observed that, “Resiliency is a strength.”

While Loftus notes the improved electronic communications, Flynn sees the need for “more seamless, automated communication between everybody. There is not enough continuous

information flow on product status, etc. Associations like ECIA can help with developing solutions. The recently introduced ETL tool delivered through ECIA is a good example. The speed of information getting into the pipe is just too slow.”

The growing push for “onshoring/reshoring/sure-shoring” was discussed by Wadsworth. “Most manufacturers are too reliant on products or subcomponents coming out of APAC. Capacity was too tight in the world for a spike in demand. Key raw material capacity is also a big gap and increasing capacity has not been successful in the short term. We need to have more capacity to build products in the Americas where the consumption is being used and have

more resilient and back up capacity for raw materials when weather and other related issues cause delays.”

In looking at the gaps that occur in volatile environments, Beeson commented that “we get conditioned to a typical supply/demand curve and fall into a comfort level. In the C-suite there is a need for a “Chief Worry Officer” - somebody who is focused on risk mitigation.”

What Goes Up... Must It Come Down?

There is growing concern that as demand falls and production ramps there will be a major discontinuity between the two that will result in a significant collapse in the electronics components market before



Jim Ricciardelli, Digi-Key Executive
VP, Sales & Marketing

the end of 2022. However, executives interviewed for this article uniformly expressed surprising optimism regarding the future growth of the electronics and electronics components industry. The optimism for managing the future demand cycle stems both from the growing diversity of the markets as well as the visibility and tools that have been developed to understand and manage declining demand.

Badhorn provided a summary that captures the overall sentiment of executives. “Today, electronics are in more applications than ever before. One cannot predict the future, but since there are so many more use cases for electronics, I hope that any downturn would be more contained than in the past. Plus, we have employed more tools than ever before to enable us to gain more visibility into upstream and downstream supply chains. Not only can we analyze historical usage (in addition to current trends), but partnerships between customers and distributors have strengthened.”

Elaborating on the benefits of a more diverse market as well as technological innovation, Flynn shared his vision of the future. “As an industry, we are always waiting for the other shoe to fall. The dot com boom followed by the bust in the 2000s cemented this psyche which was reinforced later in the ‘08 and ‘09 time frame and even to some degree in 2018. We are just used to it now, which is why there is always concern as demand falls and production ramps. What is different this time is we do not have signs of demand falling. The demand for new technologies is filling the gap. New markets, new infrastructure, and growth in 5G, IoT, EV and other green initiatives are creating opportunities. As with the beginning of the Internet in the 1995-2000 timeframe, the

industry is poised to be strong for the next ten years. There is too much technology to fill the void caused by a traditionally cyclical event thus sidestepping a significant collapse. Now, when one thing is down other things are up. This plays well for us. There are more selling opportunities. ‘Vectors of Growth’ that are strong. More diversity will lead to a more stable outcome over time.”

Ricciardelli believes that “while there probably is double booking, the demand is strong enough to consume the product. There does not appear to be large inventories building and not being consumed. The demand is so strong from so many different industries. At the moment a lot of product is on order. However, the impression from customers is that they are using product as fast as it is coming in and not stockpiling it. I do not see demand changing that much. Sure, there is double booking. Even with that the customers are using it up. When demand slows it will not be like it has been. A slowdown in consumer demand will just give supply a chance to catch up.”

Beeson is optimistic as he thinks about “the need and spirit around innovation. The things that drive us forward are not standing still. We are changing tires while going 60 mph. There is unsatisfied demand sitting on the sidelines today. In addition, there is a lot of capital sitting on the sideline today just waiting to manage through this time. The industry is going to get larger and broader in scope.”

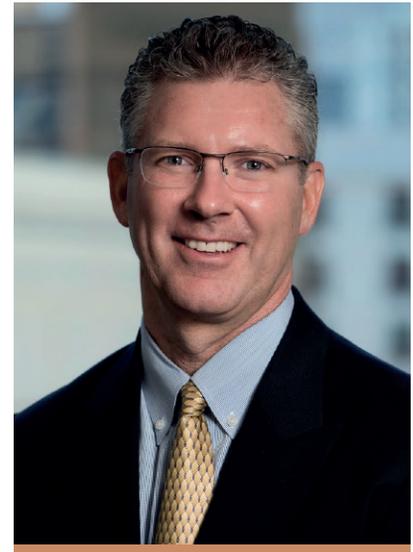
Wadsworth is a bit more cautious in his observations. “Customer demand has doubled and even tripled, driven by lead times and overall growth in demand. Book to bills have been well over 1.2 for many

consecutive months. It is very difficult to understand the bubble that is forming. The manufacturers are slowly adding capacity. I do expect a correction but feel that it will be softened by a slow decrease in lead times where distributors and customers can adjust their new orders to soften the blow.”

“Just-in-Time” to “Just-in-Case”?

With a shift in inventory management toward “Just-in-Case” from “Just-in-Time” how will this affect purchasing patterns moving forward? Executives expressed a range of opinions on how inventory management strategies will evolve. Beeson is representative of the more conservative view on the prospects for change. “If behavior predicts behavior, we won’t be able to change. We will go back. I would put it on your risk mitigation chart. It is always moving. The answer today will be different to the answer two years from now. The pendulum is always swinging. You try to assess and predict. If you take the top 50 distributors and ask them their forecast for 2021 vs. results, I don’t know how many would be +/- 5%. It’s not lack of understanding but rather the challenge of managing through. Even for RS a long-term planning horizon of 5 years is now reduced to looking at a half year or 90 days.”

By contrast, Badhorn states that, “We are already seeing suppliers expand capacity and move towards larger inventories and more “just in case” strategies to meet demand. But someone will need to manage that additional inventory and continue to mitigate ongoing logistics considerations. We think that supply chain agility will become more about positioning and managing inventory. Our ability to look across customers and



David Loftus,
ECIA CEO

geographies is a big part of the value that we add for the component manufacturers that we serve as well. We can bring them a clear view of global demand for their products – which in the end, will be critical to determining how supply chain strategies evolve moving forward.”

Yasmine sees the experience of the past two years “driving many people to the distribution network as they see the benefit of managing demand on their behalf and taking risks with them. There are important benefits from inventory management programs with distributors. Smaller companies cannot afford to go through a cycle like this again. Automotive too. Will they all learn or revert? Extended lead times could become the normal in the industry for some technologies. Everybody assumes everything goes back to the way it was but that may not be the case in the future. Distributors provide valuable support as companies change their inventory management and risk profiles.”

Highlighting the importance of partnering with distributors, Wadsworth “see(s) end

customers trying to push the inventory to the channel to hold and will want to continue to be just in time on their manufacturing floor. I see the end customers adjusting their MRPs to support the buffer stocks needed and will provide POs to distributors to cover but I see them wanting the channel to hold their inventory. This could lead to taking less product direct to manufacturers.”

In a final observation on this topic Ricciardelli states, “We are learning that just in time became too lean. We pushed it to the limit. This will magnify the importance of distribution. Making sure there is inventory somewhere in the pipeline. Distributors who planned for this are doing well now.”

End-Market Dynamics

Last year’s survey found that 58% of the distribution TAM in the Americas was driven by industrial type markets such as Automation, Military/aerospace, Energy & power generation/ distribution/management, Building & home control, and medical electronics. Will distribution make further inroads in the industrial markets moving forward? What other trends in end-market dynamics will create opportunities

for distributors? The figure below shows the results of the question in the distributor survey asking them to rate the greatest sales growth drivers in 2022 and 2026. The technologies generating the greatest optimism are: 5G, Electric Vehicles (EV/HEV), Internet of Things (IoT), Climate Technologies, Artificial Intelligence (AI) / Cloud Computing, and Robotics.

It is clear that industrial electronics will remain core to the end-market strategies of distributors. Selected comments from executives on these markets are below:

- **Badhorn** - The continued electronification of all products will inherently lend itself to growth opportunities throughout market segments. The industrial segment has always been the sweet spot for distributors and that’s continuing – including IoT-enabled preventative maintenance to solar inverter kits for the energy segment and temperature tracking, smart patches, and imaging devices for medical applications.
- **Flynn** - We live in the industrial market and it is already a big part

of our business. These are the high growth markets and having available inventory is a natural yes to supporting this growth. As these markets continue to grow, so will our inventory and our business.

- **Wadsworth** - I see all these verticals driving the next multiple years of growth except for Military/aerospace.
- **Ricciardelli** - Automation, Power, Medical are all growth industries for electronic components.
- **Yasmine** – The Industrial business remains very attractive. Designs that last a long time and have a lot of reusability are attractive. Technologies such as connectivity and robotics create opportunities.

The automotive industry was the first to take a potentially mortal blow from the inability to source key components such as semiconductors. Part of their difficulty came from a general decision to go direct rather than engage distributors and making a critical mistake in cancelling orders. Moving forward, there is an opportunity for distributors to illustrate the benefits they can deliver to the automotive sector.

Badhorn notes that Avnet is “seeing a number of automotive brands reevaluating their supply chain models and leaning on us as distributors to help design those with more focus on flexibility than cyclical. This is happening due to the disaggregation of demand across the different players in their supply chain. Distributors such as Avnet help build in more visibility to help centralize that demand.” Similarly, Ricciardelli shares, “Segments of the auto industry who support the big four are engaging more with distribution and distributors are now shipping much more to Automotive markets. The EV market, particularly Tesla, has always turned to distributors. Its more about innovation. As they innovate they turn to Digi-Key to support product introductions.” Yasmine sees a slightly broader opportunity in the “transportation business.” He sees opportunities in “both traditional automotive as well as emerging solutions. There are both verticals but also mass horizontal opportunities like connectivity in automotive and transportation.”



Chris Wadsworth, Carlton-Bates, VP -
OEM Electronics

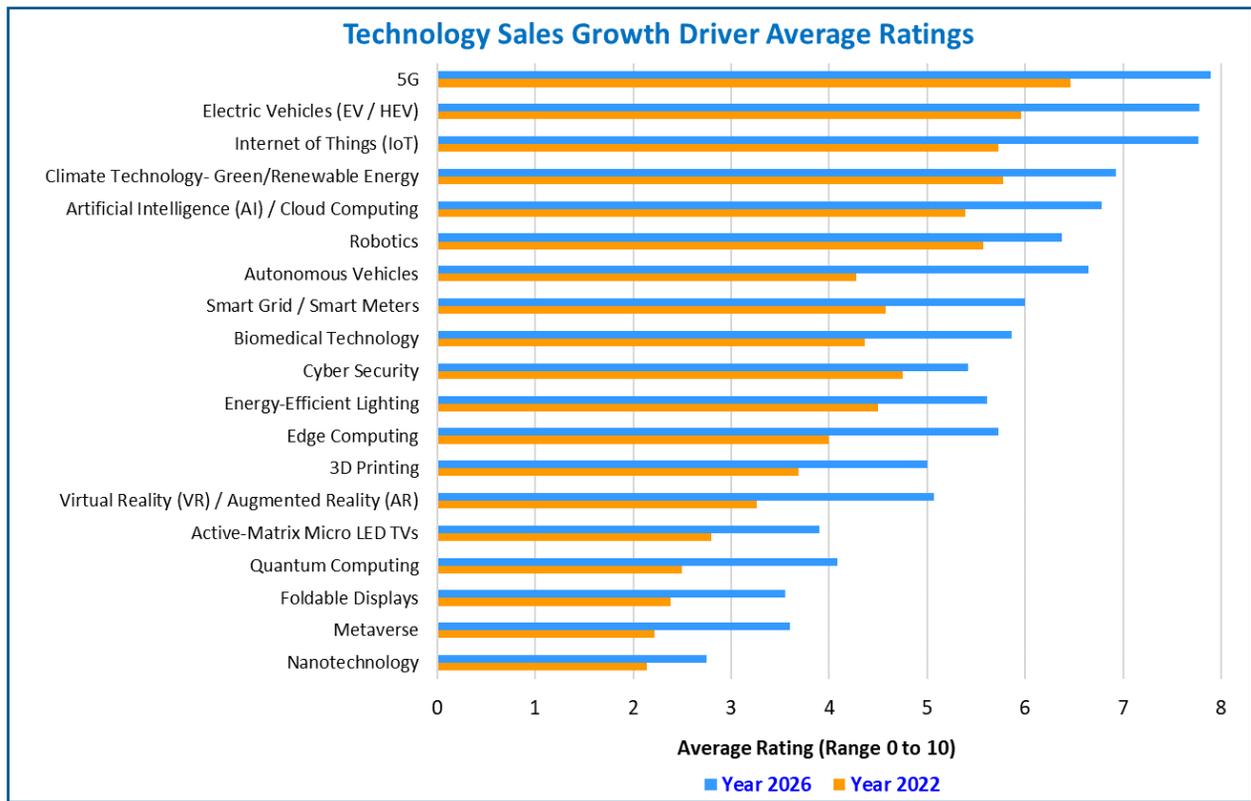
Looking at the bigger picture of value delivered by distribution to electronics manufacturers, Loftus observes, “The value proposition of distribution has gone up significantly in this cycle. Every company that has one lick of sense is looking at supply chain resiliency and JIT for consignment, etc. The customers, with the pain that they have had, will up the level of inventory in their own plants to cushion but will also increase the level of value-added support that they request from channel. Component suppliers will be pointing customers more to channel partners to get the supply chain resiliency that they desire. They certainly want to have distributors in the middle of the process to be able to soften the load on the manufacturing side and manage all the tremendous number of expedites that they are dealing with on a daily basis.

“Most component manufacturers are not built for a high level of customer interaction – inside/outside sales, planners with customers screaming that lines are down, etc. It is a tremendous load on the manufacturer. Their expertise is on designing, marketing, and producing product to be shipped in fairly large quantities and have distributors break down boxes to ship to thousands of customers. Most are not equipped for the amount and intensity of customer service load that is present in the market today. That will reinforce the value of distribution on both sides – manufacturers and

customers. This cycle has underscored and emphasized the value of distribution for the channel. One of the major dynamics that will come out of this is whenever a customer can design alternate products there will be more customer R&D and procurement effort to specify alternates on a BOM.” Beeson provides an eloquent view on the future of electronics opportunities. “The world is so curious about what it can become. It speaks to thirst for innovation, automation, efficiencies,

etc. What was mechanical that can now use more electronics? We all see aspects of that every day. The spirit of entrepreneurship. There is a lot of independence out there that will keep this industry healthy with growth of applications.”





Government Stimulus and/or Private Investment?

The US government has engaged in multiple surveys and studies to understand critical supply chain vulnerabilities in the US. The semiconductor supply chain has been identified as a critical issue including the need to develop sources of supply locally and from reliable partners. This has prompted proposals for government

investments in semiconductor manufacturing. Will US government stimulus programs yield any significant benefits compared to private investments and much larger investments planned by governments in other regions?

Distribution executives' opinions on government involvement in semiconductors and the electronics components industry range from negative/skeptical to desiring smart engagement.

Ricciardelli express the concern that planned government investment is inadequate. "At the current \$52B level of potential government investment commitment the impact will be minimal. In the big picture that is not a lot of money. That won't move the needle. It is really up to the private sector. The big electronic component private sector companies should have plenty of motivation to invest in this booming industry

and they have to step up. Those that can't invest will fall behind. It is good that government is helping but we shouldn't rely on it."

Loftus provides further detail and explanation regarding government plans. "\$52B is only three fabs – over a 10-year period that doesn't even keep up with the growth rate. It is an effort by US government to try to show some level of commitment to make the US a more attractive place to build.

Is cash up front the real issue? The US and other governments around the world need to look at their tax structure to get companies to build fabs on their soil. There is much more to do to even the field with Asian countries.

“Far less than 10 percent of fab operating expense is labor. It is the \$150 million EUV lithography machines that are the real investment. I hope the US government will at least have an appreciation of the issue that they need to be more competitive. Even if the US is able to build 10 more fabs, that does not provide a higher degree of US security. It is still a small percentage of overall semiconductor manufacturing capacity. Companies will still need the ability to get products from all over the world. Four out of five components are still likely to be sourced from offshore fabs. I would love to

say that a majority of suppliers are on friendly soil. But that ship sailed a couple of decades ago. The effort to change that needs to be much more than what is proposed from the US or the EU. It is critical that we have more control over our destiny in the US and EU but people in Washington are not thinking far enough or comprehensive enough.”

Beeson views the ECIA as an example of good governance. “I hope there is an industry roundtable that aids the government in what it needs to do. Stay away from one or two companies trying to monopolize or dictate the outcome. Most are comfortable with a free market orientation. Government has now recognized that we have lost capabilities that have been transferred to other regions. There have been some missteps along the way. Should this initiative

be done as a consortium, at the individual level, or government managed? Talking with peers, you don’t want to lead with the government because they are all global businesses. Most of us live in a global market. But there is always the opportunity for localization in North America. Look at how divided the government is in policy. This industry cannot be that divided. There has to be more harmony in strategies.”

Applying Digital Technology to Supply Chain Management

The importance and benefits of applying digital technologies to the supply chain management from both an IT and OT perspective continues to gain greater attention. Which digital technologies are most advanced in their adoption and use in the electronics components supply chain today and which technologies will yield the greatest long-term benefits? What are the barriers to the adoption of these digital technologies and how can they be overcome?

Dayna Badhorn emphasizes that, “Digital technologies such as cloud, machine learning and AI are becoming integral parts of not just corporate IT, but also overall operational technologies including the supply chain. New technologies such as blockchain are being researched. This is putting even more emphasis on the importance of having a supply chain partner who deeply understands these intricate technologies and how to apply them to a company’s overall component sourcing strategy to capitalize on the agility and transparency they can provide. Digital access to real time information to make informed supply chain decisions rapidly is becoming a necessary requirement, versus an optional one. Customers want end-to-end real time visibility of all supply chain nodes and flows; seamless order-to-delivery experiences.”

Looking at the progression over time, Frank Flynn observes,

“The industry has long adopted the exchange of data between suppliers, distributors, and customers, but how this exchange happens has evolved over time. A host of digital opportunities have replaced the days of emailing spreadsheets. From the earlier adoption of ecommerce, ETLs, flat file sharing and EDI to advancements in automation platforms, APIs, AI and machine learning, the ways we transfer data continue to evolve rapidly.”

Chris Beeson places the adoption of digital technologies into a larger perspective. “Even the term is open for interpretation. COVID alone drove a different means of work. This involves a greater need for content to be readily available. There is a need for use of data and data interpretation. You can be overwhelmed by data. As you get into terms like AI that have been discussed for a while you see companies that are beginning to derive benefits. However, we are still in early days. We still have a long way to go to be fully digital in our orientation in how we go to market.

“We are digital today. We are virtual today. Is there more value in a virtual trade show moving forward as compared to a few years ago? This is one of many examples where companies are considering how we go to market. More companies are using the term – Omni-channel. It is knowing when to apply different aspects of communication. [According to Frost & Sullivan, omnichannel is defined as “seamless and effortless, high-quality customer experiences that occur within and between contact channels”] How much can we do from a digital perspective knowing it is still a people business? There is a great opportunity to use the omni-channel.”

Employment and Employees – The Future is Now

Dramatic workforce changes have been amplified and accelerated by the pandemic. All industries, including the electronics components industry and the supply chain, are transitioning

their employee management, retention and recruiting practices to respond to the requirements of a new hybrid work reality and “The Great Resignation.”

Flynn provides a fairly comprehensive opinion on the transition of the workplace. “The tools developed, the comfort we have using those tools, and the expectation that we all share in moving that way have all added to the industry getting a high mark as far as managing the workforce disruption. Without the crisis where people had to work at home, we as an industry or a world would not have been forced to fully embrace and become comfortable socially and professionally using these tools. Limitations with face-to-face meetings and the advancement of online meeting technology changed what a sales call is, how we work together, and how we exchange documents, information, and data. Because it was necessary to function, everybody learned it.

“There are pros and cons to this new environment and the move to a hybrid office. But the market has spoken, and

the choice is no longer ours to make. A hybrid approach reduces commuting times, pollution, and stress while creating certain efficiencies and providing employees with more leisure time and an enhanced work / life balance. On the other side, there are benefits from in person interaction and in-house training that are lost, and there is an ongoing blurring of work / life schedules. We have become more efficient over time, and businesses will continue to find ways to improve and maximize the benefits of this new approach while overcoming the negatives.”

Beeson discusses the challenge companies face in managing employees in this new environment. “There has never been a greater need of focus on the ‘Greater HR’ backbone of your organization. To assess all the reasons as to why people come and go. What about: Culture? Career Planning? Dynamics of an aging organization? International organization? Wellness? These topics have all come front and center. Companies are now diving into the reasons for behavior.

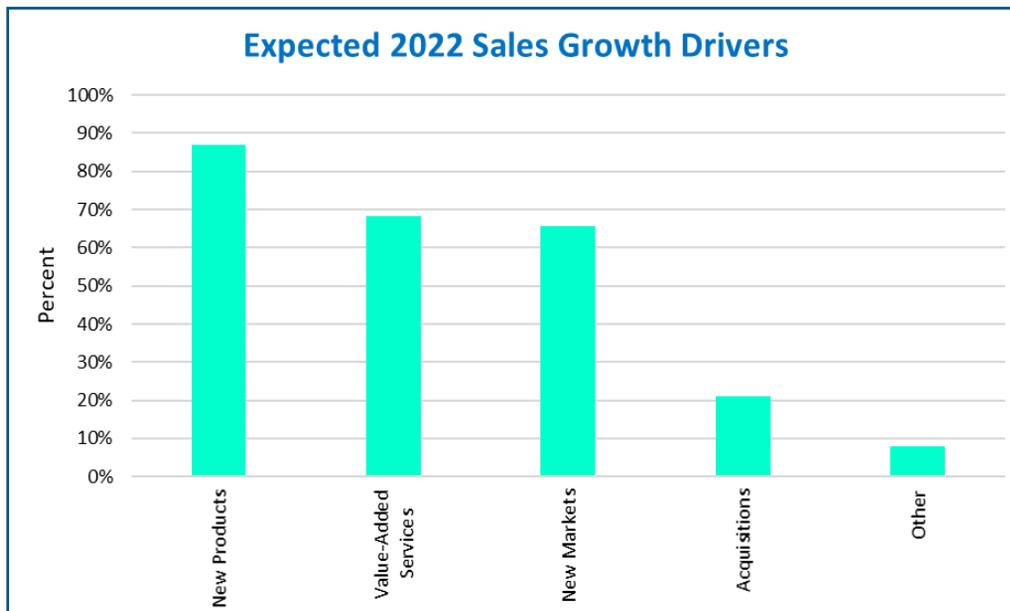
How much time have we put into understanding turnover and management of growth? It is a large topic and if there is a strategy session at any executive level, HR has to be involved. Involvement of HR is really key to organizations having greater self-awareness. Companies need to be in tune.”

Industry Growth Drivers – Beyond Technology

There are many powerful forces that drive growth in the electronics and electronics component industries beyond technology and innovation. Economic, social, political, environmental, and wider business forces all play a role in shaping the future of the industry. It is helpful to repeat an observation made by Tony Roybal last year as he discussed the growing emphasis on the principals of ESG. Tony stated, “We tend to think of innovation in terms of technological progress, but innovation is also about creating opportunity out of disruption. After the past year’s events — a global pandemic, the consequences of climate change and the urgent need for more diversity and inclusion in business and society — we must

deploy new approaches to enable everyone to access the opportunity for a better quality of life. Meeting some of these standards will empower new consumers with more spending capacity, significantly improving the gross domestic product and enabling new opportunities for growth. As a result, our actions as socially responsible global citizens promoting equity, diversity and inclusion can translate into real economic value.”

Once again distributors saw “New Products” representing their best opportunities for growth in 2022 with 87% expecting this area to be the most significant driver of growth. 68% of distributors saw “Value-Added Services” and 66% “New Markets” as growth drivers. Acquisition activity represented only modest expectations for growth with 21% identifying this as an opportunity. 31 of the Top 50 companies offer design services while 35 support online sales.



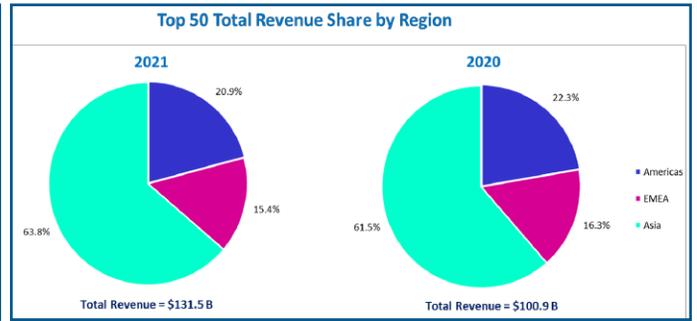
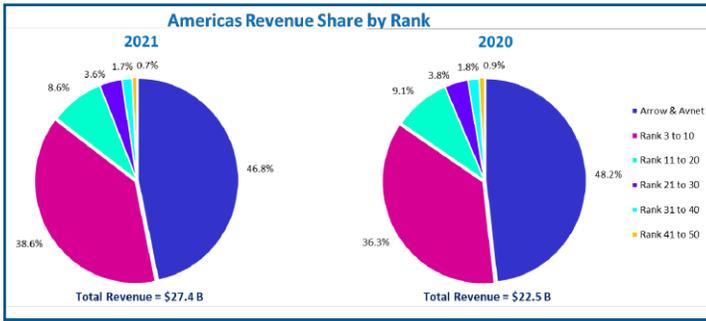
The top 50 Americas authorized distributor survey results

Before presenting the results for 2021 it is important to highlight key areas of methodology followed in preparing this report.

- 1. Only “Authorized Distributors” are included in the research and rankings. This is consistent with ECIA’s mission to support the Authorized Channel. As a result, brokers and others are no longer included and they have been replaced by authorized distributors.
- 2. The revenues for Arrow Electronics have been restated to include only their revenues associated with electronic component distribution. For Arrow Electronics this corresponds to their “Electronic Components” division.
- 3. In some cases, companies have not provided inputs in all areas of the survey. Where companies did not provide inputs for worldwide or Americas total revenues, estimates have been developed based on inputs from various sources including D&B. Where splits for revenues by component category or end market were not provided, estimates were developed based on various inputs and models.



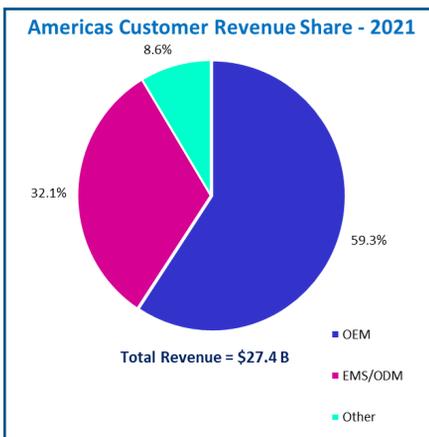
In addition to these basic points, it is important to explain significant changes to the companies included in the Top 50 rankings for 2021. In the course of creating the first true “Top 50 Worldwide Distributor” report it was discovered that seven companies headquartered in Asia/Pacific have sales revenues in the Americas that qualify them for inclusion in the Americas Top 50. Also, 10 companies that were included in the 2020 rankings chose to not participate in the survey for 2021. Since it was not possible to develop reasonable, reliable

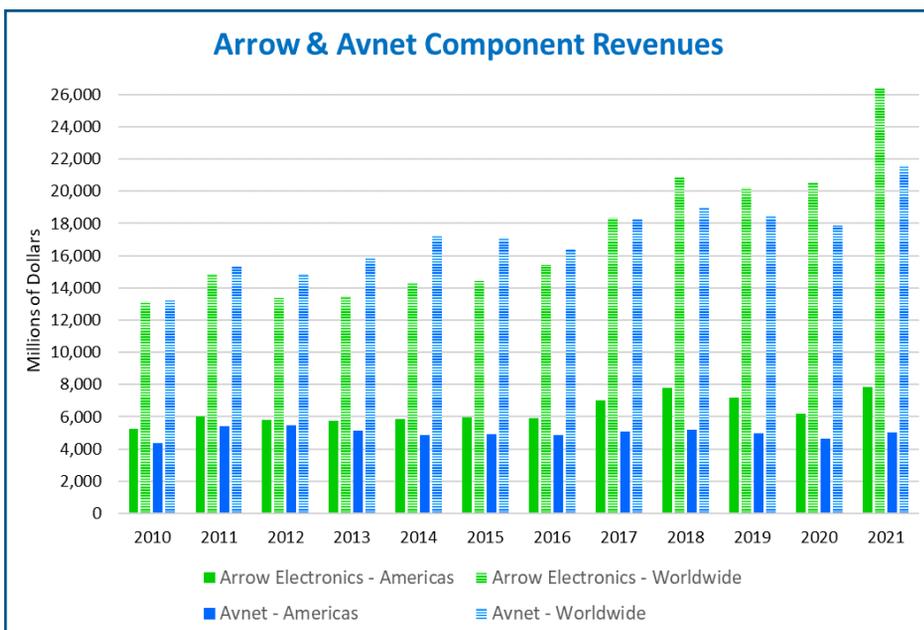
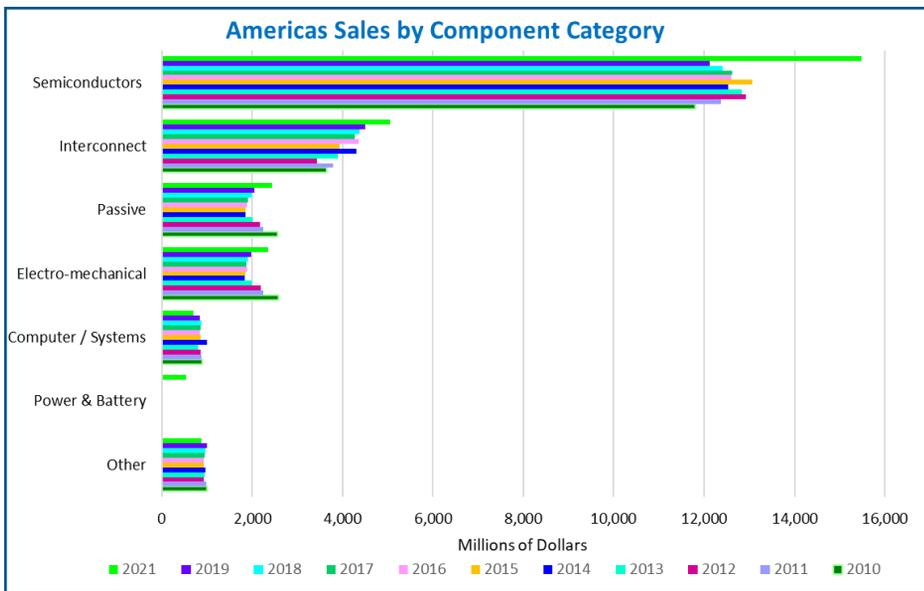
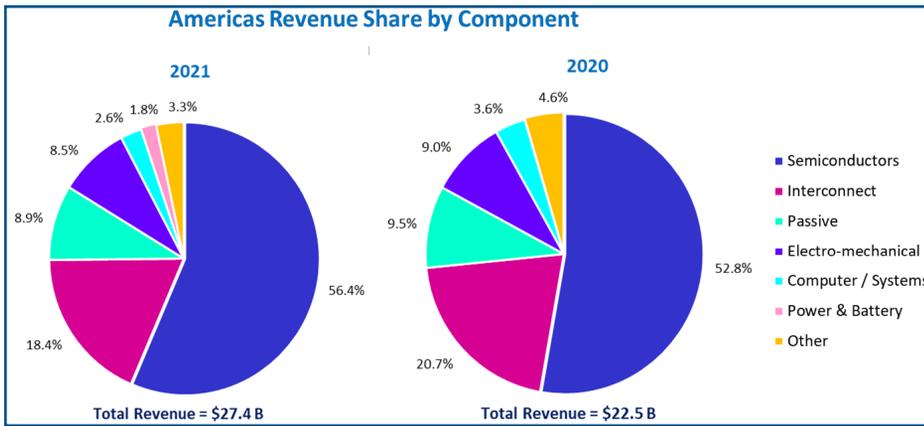


estimates for their revenues they have been dropped from the 2021 rankings.

Total Americas revenue for the Top 50 authorized distributors in 2021 grew by 21.9% to \$27.4 B from \$22.5 B. This same group of Top 50 companies grew their combined worldwide revenue from \$100.9 B to \$131.5 B between 2020 and 2021, a growth of 30.3%. With sales growth in Asia boosting overall global sales, the share of worldwide revenue accounted for by sales to Asia expanded from 61.5% of the total to 63.8% between 2020 and 2021. The share from Americas sales slipped by 1.4% from 22.3% to 20.9%.

Americas revenues for the Top 50 distributors grew for every component category except computer/systems in 2021. The best sales performance came from Semiconductors which saw revenues grow by 30.4% followed by Electro-Mechanical Components with growth of 15.9%. The largest component category, semiconductors, saw its share of the total Americas market grow





from 52.8% to 56.4%. Americas growth in semiconductor revenue moved from underperforming all other categories in 2020 to outperforming in 2021. Over the five-year period from 2016 to 2021 total Americas distribution revenue grew by 4.0% Compound Annual Growth Rate (CAGR) with Passive components leading the way followed by Electro-Mechanical components at 5.2% and 4.5% CAGR, respectively. Semiconductors grew by 4.2% CAGR and Interconnect components achieved 3.0% CAGR growth. Power & Battery was added as a separate category for the first time in 2021.

The top two Americas Distributors, Arrow Electronics and Avnet, both saw a boost in their Americas revenues in 2021. Arrow Electronics grew by 26.6% while Avnet's growth came in at 7.4%. However, on the global stage Arrow's growth rate moved much closer. Arrow Electronics grew their revenue by 28.6% and Avnet by 20.9%. The Top 10 companies in 2021 with revenues of \$23.4 B and a combined revenue share of 85.3% saw their revenues grow by 23.1%. By comparison, companies ranked between 11 and 50 with combined revenues of less than \$4.0 B and combined market share of 14.7% saw their revenues grow by 15.2%. Average 2021 revenue for the Top 10 companies was \$2.3 B while average revenue for companies ranked 11 through 50 was \$101 M.

The largest end-market segments for Americas distributors in 2021 were Industrial Automation, Automotive, and Aerospace/Military accounting for 25.7%, 15.1%, and 14.2% of the market, respectively. However, the market is fairly diversified with even the smallest segment, Mobile Communications, driving \$1.3 B in revenues in 2021. OEMs continued to be the largest customers of distributors with 59% of total Americas revenue.

*Type of Distributor: 1 = Broadline; 2 = Specialized; 3 = High Service/E-Catalog | (1) ECIA Estimate for Total North America Sales and Sales Breakdown | (2) ECIA Estimate for Sales Breakdown | (3) ECIA Estimate for Total North America Sales

Top 50 Americas authorized distributors

Sales Breakdown by Percent

Rank 2021	Rank 2020	Company	2021 Americas Sales (\$ Thousands)	Growth 2021/2020 (%)	Share of Top 50 Total Sales (%)	Americas Share of Worldwide Sales (%)	Type*	Semiconductor (Active)	Passive Component	Electro-Mechanical	Interconnect	Computer/Systems	Power & Battery	Other	Total Americas Employees	Sales per Employee (\$ Millions)
1	1	Arrow Electronics (2)	7,827,866	26.6	28.53	29.7	1	80.0	3.0	2.2	7.8	5.0	-	2.0	6,100	1.28
2	2	Avnet (Includes Farnell) (2)	5,005,733	7.4	18.25	23.2	1	75.0	4.6	3.2	11.2	2.5	0.5	3.0	3,967	1.26
3	4	Digi-Key Electronics (2)	2,585,000	52.0	9.42	54.8	3	43.3	15.1	16.4	18.7	0.8	4.4	1.3	4,200	0.62
4	3	Future Electronics (1)	2,480,000	24.0	9.04	38.9	1	75.0	6.2	4.8	14.0	-	-	-	2,725	0.91
5	5	TTI	1,760,000	20.5	6.42	51.7	2	-	49.0	6.0	45.0	-	-	-	3,475	0.51
6	6	Mouser Electronics	1,382,700	46.7	5.04	42.3	3	43.0	19.0	11.0	21.0	-	4.0	2.0	2,028	0.68
7	7	DAC / Heilind	948,900	19.2	3.46	79.5	2	-	-	16.2	83.8	-	-	-	700	1.36
8	8	Allied Electronics/RS Components	672,000	0.3	2.45	25.8	3	1.9	1.8	21.4	15.6	10.2	11.0	38.1	1,000	0.67
9	9	Sager Electronics	381,000	21.7	1.39	100.0	2	-	-	34.0	25.0	-	32.0	9.0	401	0.95
10	12	Master Electronics (1)	368,000	29.1	1.34	68.4	1	73.0	4.0	6.0	9.0	5.0	-	3.0	490	0.75
11	10	SIIX (1)	337,479	14.1	1.23	20.0	1	95.0	-	-	-	-	-	5.0	60	5.62
12	13	Carlton-Bates	322,485	16.3	1.18	100.0	1	-	-	75.0	20.0	-	5.0	-	300	1.07
13	11	Nexty Electronics (Toyota Tsusho +Tomen) (1)	322,023	9.9	1.17	6.5	1	85.0	4.0	3.0	5.0	1.0	-	2.0	130	2.48
14	15	WPG Americas	290,000	44.7	1.06	1.0	2	75.0	-	-	-	5.0	20.0	-	110	2.64
15	14	Bisco Industries	240,000	9.7	0.87	95.0	1	1.0	20.0	40.0	20.0	1.0	2.0	16.0	505	0.48
16	16	Powell Electronics	205,424	5.8	0.75	89.6	1	-	-	7.0	93.0	-	-	-	224	0.92
17	17	PEI-Genesis (3)	182,278	1.3	0.66	61.5	1	-	-	-	100.0	-	-	-	330	0.55
18	19	Macnica	165,248	21.1	0.60	2.8	1	81.0	-	7.0	-	-	8.0	4.0	87	1.90
19	22	RFMW	154,000	28.3	0.56	62.1	2	55.0	30.0	-	14.0	-	-	1.0	55	2.80
20	21	Supreme Electronics (1)	151,853	24.5	0.55	2.0	1	75.0	7.2	5.1	12.7	-	-	-	170	0.89
21	23	Galco (2)	146,000	21.7	0.53	97.3	1	6.0	8.0	10.0	7.0	19.0	-	50.0	200	0.73
22	18	Electro Enterprises, Inc.	140,832	3.2	0.51	85.0	1	-	-	30.0	70.0	-	-	-	310	0.45
23	20	BJG Electronics Group	119,400	-3.4	0.44	96.0	2	-	-	9.0	88.0	-	-	3.0	334	0.36
24	24	Hughes Peters	99,100	10.1	0.36	100.0	1	3.0	30.0	40.0	25.0	-	-	2.0	160	0.62
25	27	Steven Engineering	97,530	29.9	0.36	91.7	2	-	-	35.0	35.0	7.0	2.0	21.0	126	0.77
26	25	Richardson Electronics Ltd	97,513	25.9	0.36	46.9	2	65.0	15.0	1.0	4.0	-	5.0	10.0	305	0.32
27	26	Flame Enterprises	76,300	-1.3	0.28	64.7	2	-	-	100.0	-	-	-	-	58	1.32
28	30	Symmetry Electronics	75,000	36.4	0.27	83.3	2	96.0	-	-	-	2.0	2.0	-	80	0.94
29	29	Marsh Electronics	73,570	25.8	0.27	100.0	1	3.1	11.2	41.7	6.5	0.4	4.6	32.5	120	0.61
30	37	EDOM Technology	69,613	81.6	0.25	1.8	1	100.0	-	-	-	-	-	-	20	3.48
31	28	Peerless Electronics (1)	69,230	-3.1	0.25	100.0	1	4.0	4.0	75.0	8.0	-	-	9.0	105	0.66
32	33	SMD	48,500	14.1	0.18	96.8	2	4.0	22.0	3.0	70.0	-	1.0	-	58	0.84
33	35	S.A.S. Dragon (1)	48,400	22.4	0.18	1.0	1	82.0	8.0	10.0	-	-	-	-	15	3.23
34	31	Area51 Electronics	47,207	1.3	0.17	96.3	1	22.8	28.0	21.4	14.4	2.8	0.8	9.8	67	0.70
35	34	World Micro Components / MIT Distributors (1)	44,469	11.3	0.16	90.0	2	50.0	14.0	8.0	11.0	-	10.0	7.0	45	0.99
36	38	Brevan Electronics	44,200	37.7	0.16	100.0	1	45.0	25.0	15.0	7.0	2.0	-	6.0	49	0.90
37	44	Flip Electronics	41,900	96.7	0.15	56.2	2	100.0	-	-	-	-	-	-	59	0.71
38	36	Falcon Electronics	40,000	3.9	0.15	98.3	2	97.7	-	2.3	-	-	-	-	18	2.22
39	32	Edge Electronics, Inc.	39,927	-13.6	0.15	100.0	2	52.0	2.0	1.0	2.0	21.0	3.0	19.0	34	1.17
40	39	Diverse Electronics	33,900	28.9	0.12	82.9	1	5.0	21.0	30.0	15.0	10.0	9.0	10.0	49	0.69
41	41	NASCO Aerospace & Electronics	30,173	20.7	0.11	100.0	1	20.0	5.0	30.0	30.0	10.0	5.0	-	25	1.21
42	40	Ryoden (1)	28,348	11.8	0.10	2.4	1	87.6	12.4	-	-	-	-	-	10	2.83
43	43	Bluff City Electronics	22,000	-3.1	0.08	100.0	1	10.0	10.0	65.0	5.0	-	-	10.0	35	0.63
43	45	Sherburn Electronics	22,000	15.8	0.08	100.0	2	15.0	10.0	25.0	25.0	15.0	10.0	-	11	2.00
45	49	Microwave Components LLC	19,000	11.8	0.07	90.5	2	-	-	-	100.0	-	-	-	25	0.76
46	46	Kensington Electronics	18,895	1.5	0.07	92.2	1	-	95.0	-	4.0	-	-	1.0	29	0.65
47	47	Projections Unlimited, Inc. (PUI)	18,810	3.4	0.07	91.3	1	15.0	24.0	48.0	12.0	-	1.0	-	33	0.57
48	48	Benchmark Connector Corporation	16,000	-6.2	0.06	95.2	2	-	-	-	100.0	-	-	-	45	0.36
49	50	Inductors Inc (1)	14,751	13.0	0.05	90.0	2	4.0	95.0	1.0	-	-	-	-	42	0.35
50	42	PCX	11,047	-51.4	0.04	100.0	1	25.0	25.0	20.0	10.0	-	-	20.0	30	0.37

Top 10 semiconductor (active) sales

Rank 2021	Company	2021 Americas Sales (\$ Millions)	Share of Top 50 Total Sales (Percent)
1	Arrow Electronics (1)	6,262.3	40.45
2	Avnet (Includes Farnell) (1)	3,754.3	24.25
3	Future Electronics (1)	1,860.0	12.01
4	Digi-Key Electronics (1)	1,119.3	7.23
5	Mouser Electronics	594.6	3.84
6	SIIX (1)	320.6	2.07
7	Nexty Electronics (Toyota Tsusho +Tomen) (1)	273.7	1.77
8	Master Electronics (1)	268.6	1.74
9	WPG Americas	217.5	1.40
10	Macnica	133.9	0.86

Top 10 passive component sales

Rank 2021	Company	2021 Americas Sales (\$ Millions)	Share of Top 50 Total Sales (Percent)
1	TTI	862.4	35.23
2	Digi-Key Electronics (1)	390.3	15.95
3	Mouser Electronics	262.7	10.73
4	Arrow Electronics (1)	234.8	9.59
5	Avnet (Includes Farnell) (1)	230.3	9.41
6	Future Electronics (1)	153.8	6.28
7	Bisco Industries	48.0	1.96
8	RFMW	46.2	1.89
9	Hughes Peters	29.7	1.21
10	Kensington Electronics	18.0	0.73

Top 10 electro-mechanical sales

Rank 2021	Company	2021 Americas Sales (\$ Millions)	Share of Top 50 Total Sales (Percent)
1	Digi-Key Electronics (1)	423.9	18.09
2	Carlton-Bates	241.9	10.32
3	Arrow Electronics (1)	172.2	7.35
4	Avnet (Includes Farnell) (1)	160.2	6.84
5	DAC / Heilind	153.7	6.56
6	Mouser Electronics	152.1	6.49
7	Allied Electronics/RS Components	143.8	6.14
8	Sager Electronics	129.5	5.53
9	Future Electronics (1)	119.0	5.08
10	TTI	105.6	4.51

Top 10 interconnect sales

Rank 2021	Company	2021 Americas Sales (\$ Millions)	Share of Top 50 Total Sales (Percent)
1	DAC / Heilind	795.2	15.74
2	TTI	792.0	15.68
3	Arrow Electronics (1)	610.6	12.09
4	Avnet (Includes Farnell) (1)	560.6	11.10
5	Digi-Key Electronics (1)	483.4	9.57
6	Future Electronics (1)	347.2	6.87
7	Mouser Electronics	290.4	5.75
8	Powell Electronics	191.0	3.78
9	PEI-Genesis (1)	182.3	3.61
10	BJG Electronics Group	105.1	2.08

Top 10 computer/system product sales

Rank 2021	Company	2021 Americas Sales (\$ Millions)	Share of Top 50 Total Sales (Percent)
1	Arrow Electronics (1)	391.4	55.84
2	Avnet (Includes Farnell) (1)	125.1	17.85
3	Allied Electronics/RS Components	68.5	9.78
4	Galco (1)	27.7	3.96
5	Digi-Key Electronics (1)	20.7	2.95
6	Master Electronics (1)	18.4	2.63
7	WPG Americas	14.5	2.07
8	Edge Electronics, Inc.	8.4	1.20
9	Steven Engineering	6.8	0.97
10	Diverse Electronics	3.4	0.48

Top 10 power & battery sales

Rank 2021	Company	2021 Americas Sales (\$ Millions)	Share of Top 50 Total Sales (Percent)
1	Sager Electronics	121.9	24.04
2	Digi-Key Electronics (1)	113.7	22.42
3	Allied Electronics/RS Components	73.9	14.57
4	WPG Americas	58.0	11.43
5	Mouser Electronics	55.3	10.90
6	Avnet (Includes Farnell) (1)	25.0	4.93
7	Carlton-Bates	16.1	3.18
8	Macnica	13.2	2.61
9	Richardson Electronics Ltd	4.9	0.96
10	Bisco Industries	4.8	0.95

Top 10 distributors by sales growth

Rank 2021	Company	Sales Growth 2021/2020 (%)	2021 Americas Sales (\$ Millions)	2020 Americas Sales (\$ Millions)
1	Flip Electronics	96.7	41.9	21.3
2	EDOM Technology	81.6	69.6	38.3
3	Digi-Key Electronics	52.0	2,585.0	1,700.1
4	Mouser Electronics	46.7	1,382.7	942.6
5	WPG Americas	44.7	290.0	200.5
6	Brevan Electronics	37.7	44.2	32.1
7	Symmetry Electronics	36.4	75.0	55.0
8	Steven Engineering	29.9	97.5	75.1
9	Master Electronics (1)	29.1	368.0	285.0
10	Diverse Electronics	28.9	33.9	26.3

Top 10 sales per employee

Rank 2021	Company	2021 Americas Sales (\$ Millions)	Americas Employees	Sales per Employee (\$ Millions)
1	SIIX (1)	38.5	60	5.62
2	EDOM Technology	200.0	20	3.48
3	S.A.S. Dragon (1)	112.0	15	3.23
4	Ryoden (1)	16.9	10	2.83
5	RFMW	77.3	55	2.80
6	WPG Americas	46.2	110	2.64
7	Nexty Electronics (Toyota Tsusho +Tomen) (1)	6,183.1	130	2.48
8	Falcon Electronics	4,660.1	18	2.22
9	Sherburn Electronics	796.0	11	2.00
10	Macnica	32.1	87	1.90