Electronics Components Supply Chains & Imports

What is Shifting and Where is it Shifting?

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Issue

Strong supply chain management is critical to the success of all participants in the electronics industry. Procurement managers continually seek to optimize their understanding of the risks and evolving forces that continually reshape their supply ecosystem. A key element in their efforts is achieving the best visibility possible of both the macro and micro factors shaping the supply base. This typically means developing and managing data that can form the basis for informed decisions and action plans.

One highly valuable source of data on electronics and electronics components is found in the import/export data published by many governments. The US Census Bureau, part of the US Department of Commerce, publishes a vast and detailed set of U.S. import/export data covering the complete breadth of physical goods imported from 244 countries and entities on a monthly basis. This data is accessible through a powerful database maintained and hosted on the internet by the US Census Bureau, that can be searched and downloaded. However, the organization of this data does not necessarily follow the categories and standards commonly used in the electronics industry. In addition, categories are shifted and renamed over time as products and technologies evolve. This makes it very difficult to establish a set of data that is organized into useful categories and that can be analyzed consistently across time. Simply downloading data by various product codes results in a fragmented and incomplete picture that does not yield helpful insights.

To support association members, ECIA has developed a database that organizes data by common industry categories going back to 1992. Information extracted from this database can be used to understand the flow of imported electronics components into the U.S. and how the supply base is shifting around the world over time. The database developed to this point covers imports of components. Current plans anticipate future development of export data and expansion to the coverage of electronics equipment.

This report provides an initial analysis of the U.S. import data covering semiconductors, passive components and electromechanical components. While it has not been possible to extract and organize every component category in these three major segments the coverage of the data that has been developed provides visibility into component categories that represent approximately 90% of the revenues that flow through the authorized distribution channel. The top-level category coverage is shown in Table 1.

As a brief note, data for segments such as heat sinks, fans, transformers, filters, ferrites, sensors (including passive, MEMS and image sensors), etc. has not been identified cleanly from the import data and is not currently included in this database. Also, the category “Other ICs” covers a range of products from raw wafers to bare die that has not been identified by type such as memory, analog, etc.

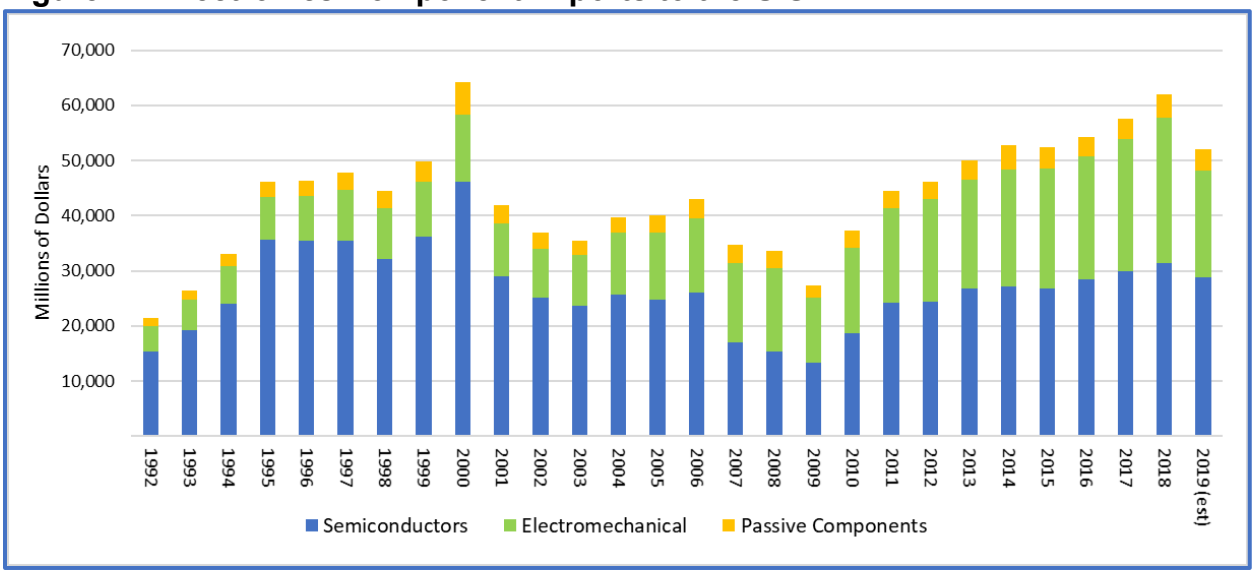
Table 1 – Electronics Component Categories Extracted from U.S. Import Data

TOTAL ELECTRONICS COMPONENTS
Semiconductors
Integrated Circuits (ICs)
Memory ICs
Processor & Logic ICs
Analog ICs
Other ICs
Discrete Components
Optical Components
Passive Components
Capacitors
Resistors
Inductors
Piezoelectric
Electromechanical Components
Connectors
Fuses, Circuit Breakers, Relays
Switches
Batteries
Power Supplies

The data charted in Figure 1 illustrates the annual import revenues from electronics components split out by semiconductors, electromechanical and passive components. The revenues are based on the "General Imports" revenue category which measures, "the total physical arrivals of merchandise from foreign countries, whether such merchandise enters consumption channels immediately or is entered into bonded warehouses or Foreign Trade Zones under Customs custody." Import revenues have grown fairly steadily from 2009 to 2018 reaching a peak of $62B in 2018. The highest annual peak recorded was in 2000 at $64.2B. Of course, this was part of the dot-com boom and bust when large levels of excess inventory bloated the supply chain and resulted in an extended downturn in factory shipments of electronics components and required significant value to be scrapped and written off as part of rebalancing the supply chain. The current weak electronics production environment is seen in the extrapolated revenues for 2019 with a projected drop of -16% to $52.1B.

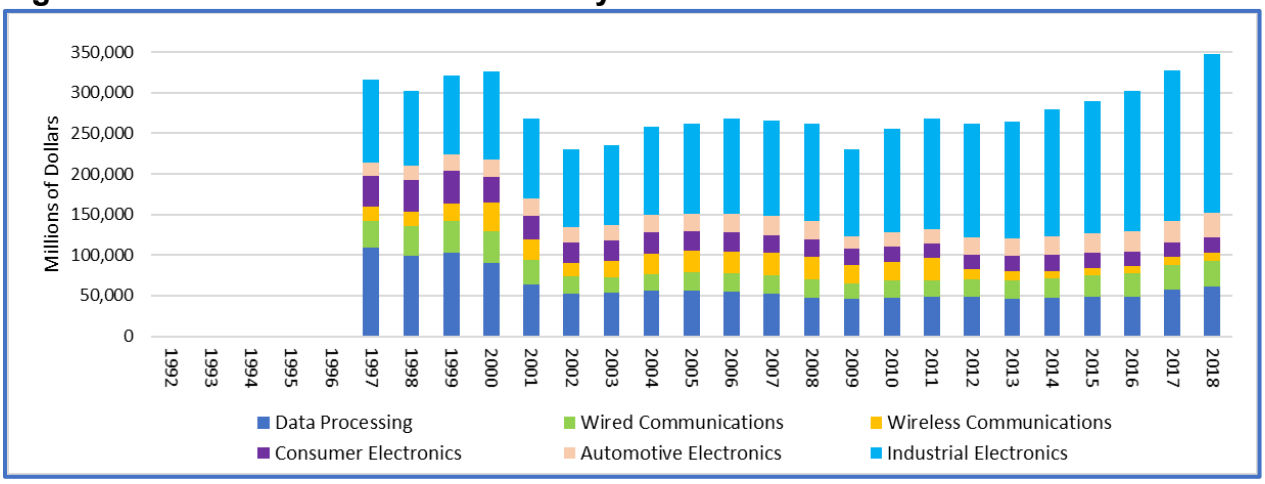
Figure 2 provides total electronic equipment production revenues for the Americas region published by Informa Tech, including the previous IHS Markit | Technology group. While this revenue represents revenue for the entire Americas region, the correlation with U.S. electronics component shipments is readily seen. The Americas accounted for 14.7% of Worldwide electronics equipment production in 2018. Industrial Electronics has been the primary driver of revenue growth in the Americas over the past decade, growing by over $76 billion between 2008 and 2018, to account for over 56% of all factory OEM electronics equipment revenue. Wireless Communications equipment revenue has fallen by nearly $18 billion during this time period. Factory OEM revenue for all electronics equipment reached a peak of $348 billion in 2018.

Figure 1 – Electronics Component Imports to the U.S.



Source – U.S. Department of Commerce

Figure 2 – Americas Electronics Factory OEM Revenues

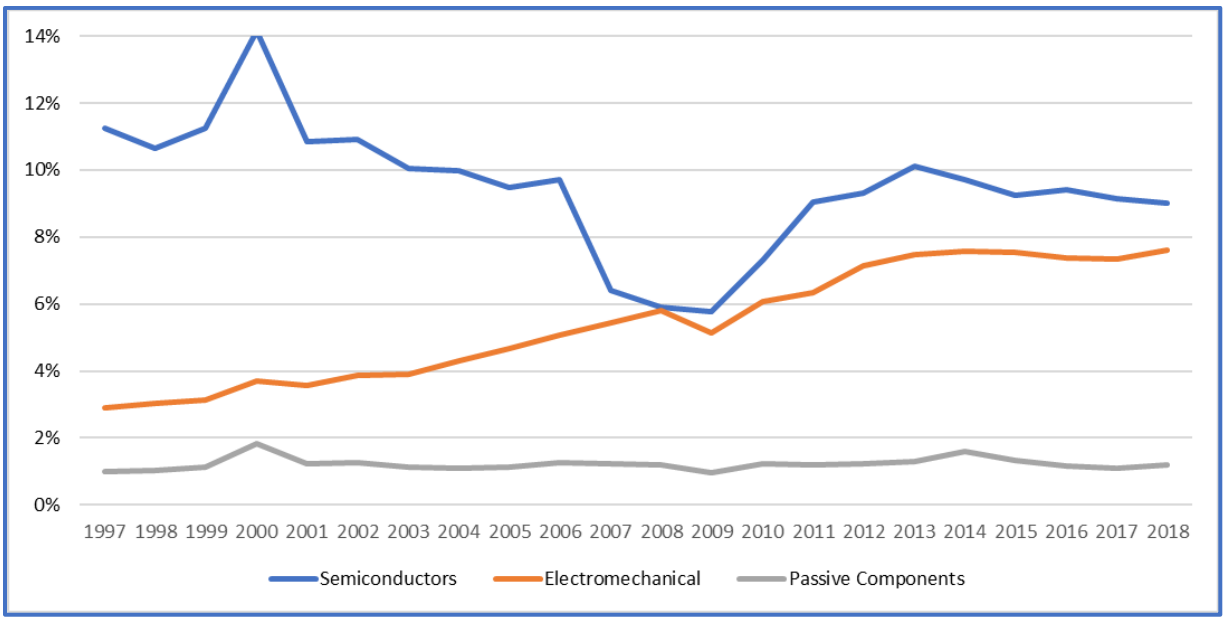


Source – IHS Markit | Technology, now part of Informa Tech, Derived in Part from Semiconductor Application Market Forecast Tool. Any reliance on these results is at the third-party's own risk.

Figure 3 shows the relative value of electronic components imported into the U.S. as a share of total electronics production in the Americas. Imported electromechanical components have continually increased their value while semiconductors have declined slightly over recent years. Passive components have maintained a relatively stable share.

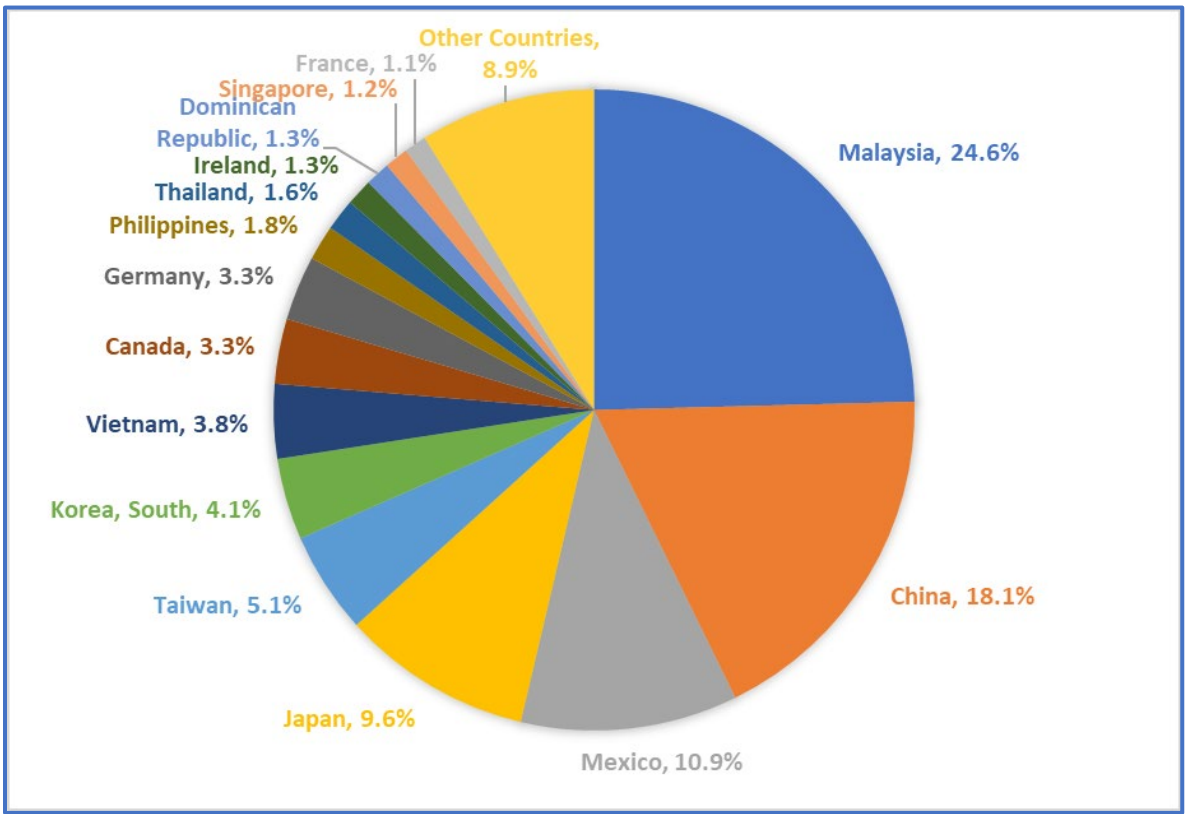
Figure 4 presents the top 15 countries exporting electronics components to the U.S. from Q1 to Q3 2019. These countries account for over 90% of revenue from all electronics components imported into the U.S. during this period. The top 20 countries represent over 95% of all electronics components import revenues. These same 20 countries represent 17 of the top 20 countries for all goods imported into the U.S. during this time and account for over 83% of all goods imported into the U.S.

Figure 3 –US Electronics Components Imports Share of Americas Electronics Factory OEM Revenue



Source – U.S. Department of Commerce and IHS Markit | Technology, now part of Informa Tech, Derived in Part from Semiconductor Application Market Forecast Tool. Any reliance on these results is at the third-party's own risk.

Figure 4 – Share by Country of US Electronics Component Imports, Q1-Q3 2019

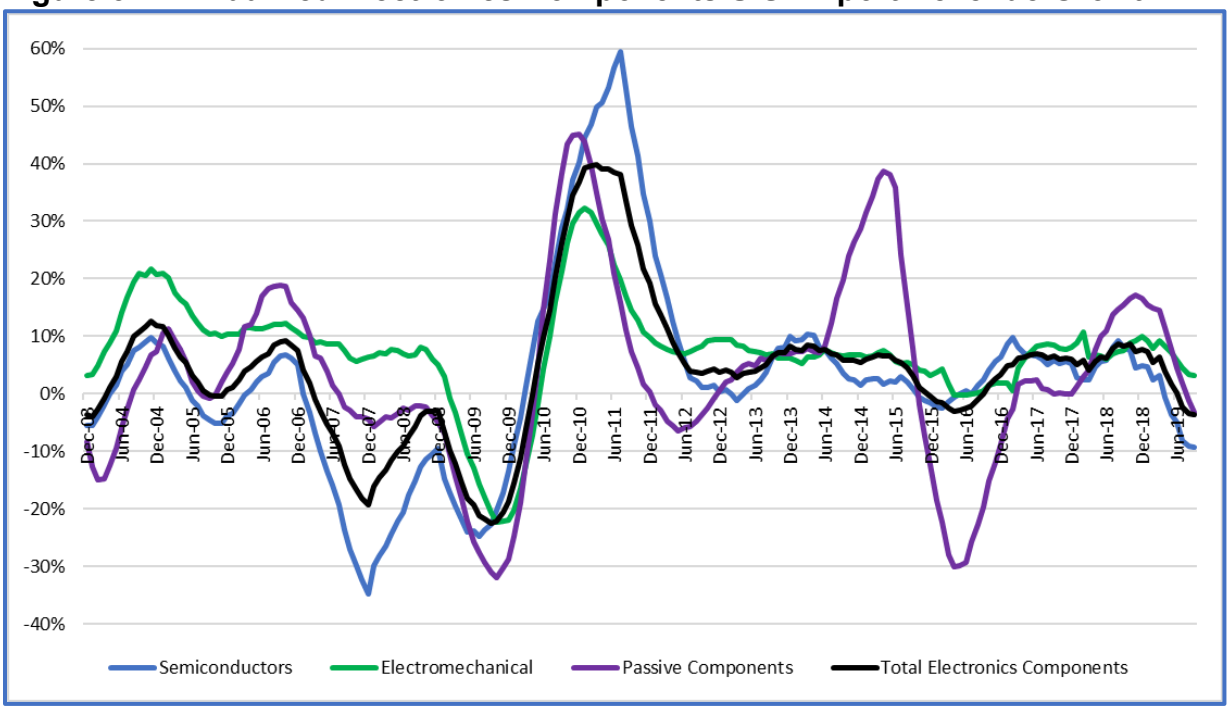


Source – U.S. Department of Commerce

Analysis

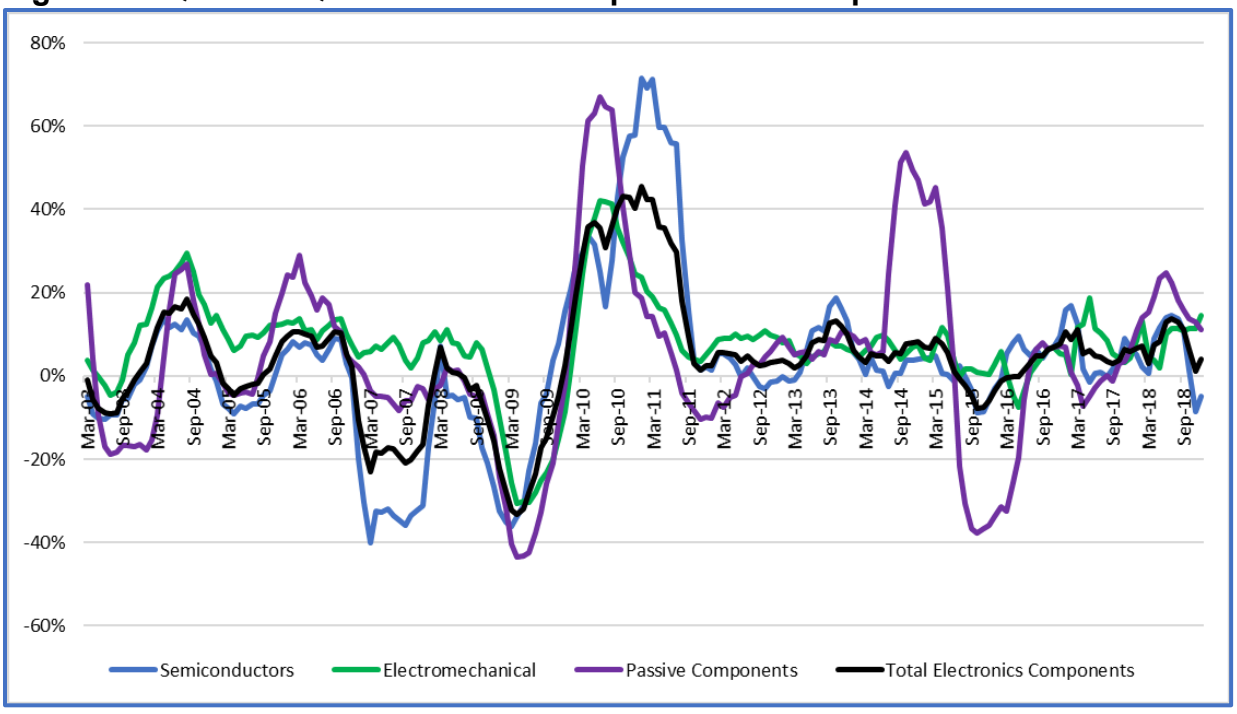
1- U.S. Imports of Electronics Components

Figure 5 – Annualized Electronics Components U.S. Import Revenue Growth



Source – U.S. Department of Commerce

Figure 6 – Qtr-over-Qtr Electronics Components U.S. Import Revenue Growth



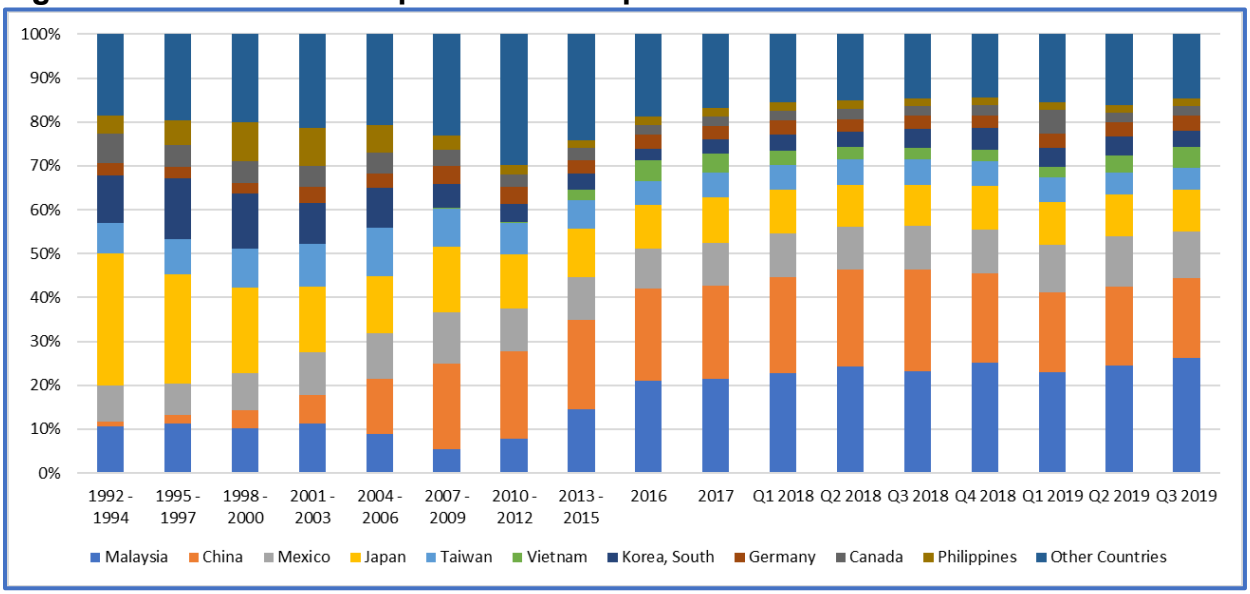
Source – U.S. Department of Commerce

Figures 5 and 6 present the historical growth of the major electronics component categories. The highly volatile growth pattern of passive components compared to semiconductors and electromechanical components is notable. However, in the current cycle, semiconductors are experiencing the deepest decline. On an encouraging note, overall growth appears to be showing a slight improvement in September 2019.

The top countries' share of U.S. imports of electronic components is presented in Figures 7 and 8 and Table 2. On the strength of its semiconductor exports to the U.S, Malaysia is the number one source of components imported into the U.S. overall. China has seen its share decline significantly over the last two years as it has suffered from its trade war with the U.S. In the third spot, Mexico has consistently expanded its export revenues. Up and coming Vietnam is not only a growing destination for production of electronics systems but also a growing presence as an exporter of electronics components to the U.S. The top 30 countries shown in Table 2 account for 98% of all electronics components imported to the U.S.

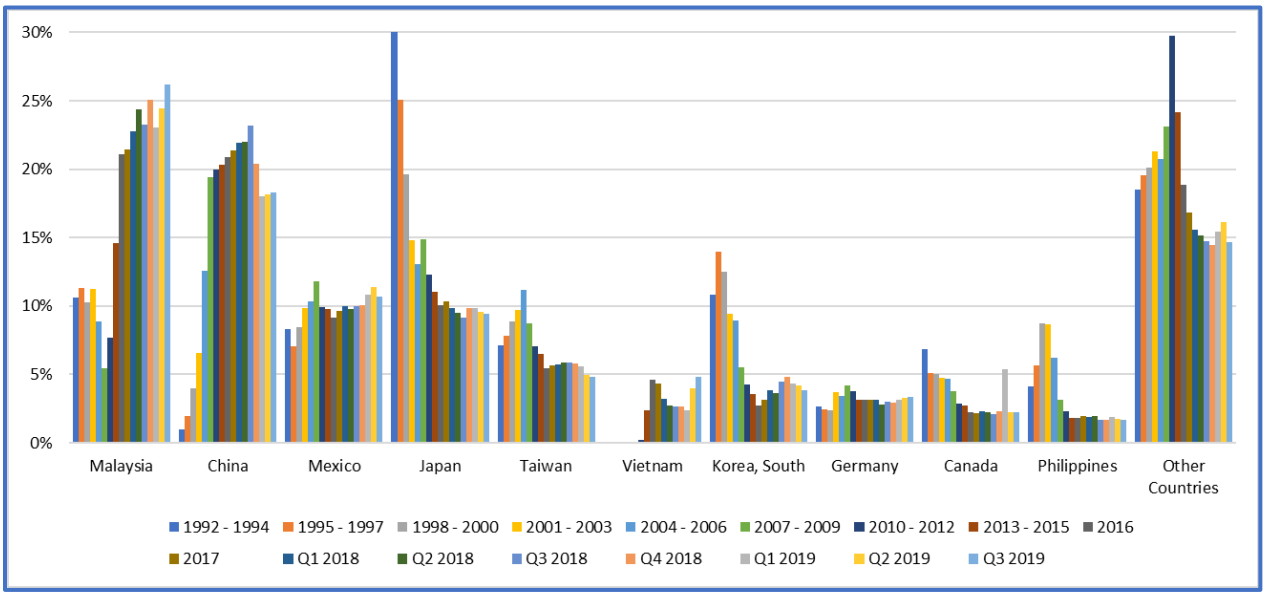
Electronics components represent 2.3% of revenues from all goods imported to the U.S. year-to-date in 2019. As shown in Figure 9, the share of import revenues for some countries is significantly higher than this average. Malaysia exports of electronics components to the U.S. accounts for 37 percent of all goods exported from Malaysia to the U.S. and the Dominican Republic exports to the U.S. are a surprising 13.2% of their total revenues from exports to the U.S. The Philippines and Taiwan also sit well above the average at 8.2% and 5.6% respectively.

Figure 7 – Electronic Component U.S. Import Revenue Share



Source – U.S. Department of Commerce

Figure 8 – Electronic Component U.S. Import Revenue Share



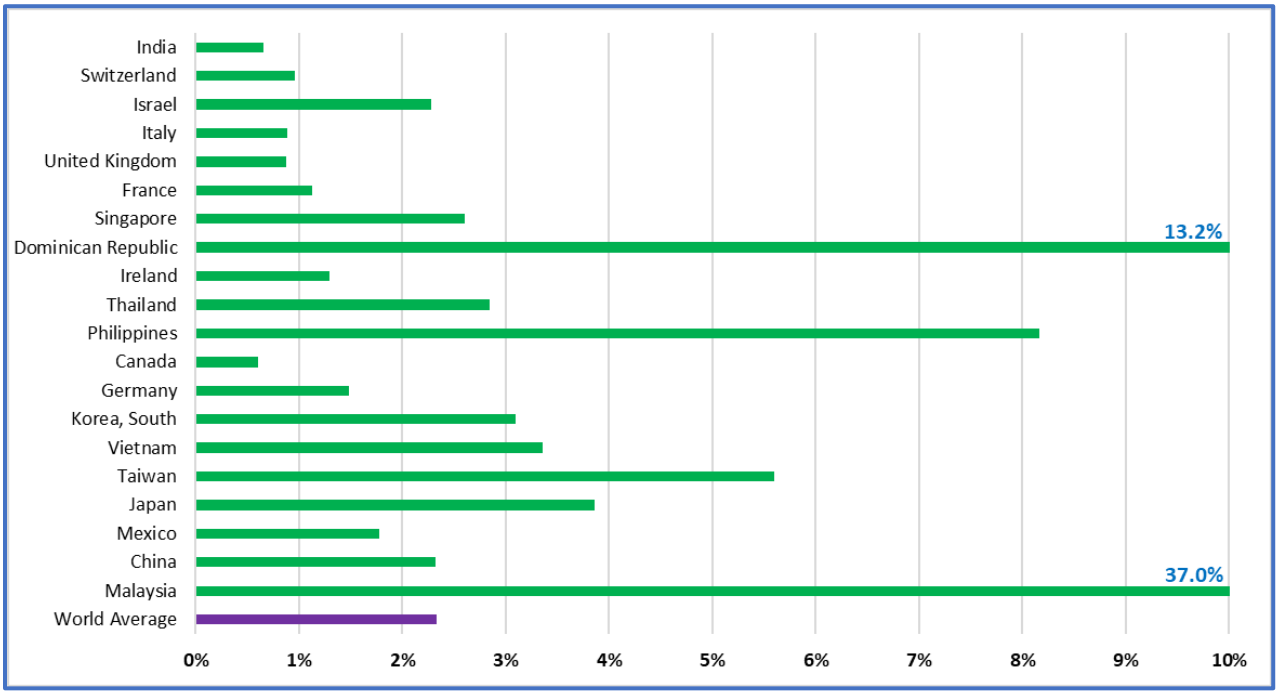
Source – U.S. Department of Commerce

Table 2 – Total Share of U.S. Electronics Components Import Revenue

	COUNTRY	2010 - 2012	2013 - 2015	2016	2017	Q1 2018	Q2 2018	Q3 2018	Q4 2018	Q1 2019	Q2 2019	Q3 2019
1	Malaysia	7.7%	14.6%	21.1%	21.4%	22.7%	24.3%	23.2%	25.1%	23.1%	24.4%	26.2%
2	China	20.0%	20.3%	20.9%	21.4%	21.9%	22.0%	23.1%	20.4%	18.0%	18.1%	18.3%
3	Mexico	9.9%	9.8%	9.1%	9.7%	10.0%	9.8%	10.0%	10.0%	10.8%	11.4%	10.7%
4	Japan	12.3%	11.0%	10.0%	10.3%	9.9%	9.5%	9.2%	9.8%	9.9%	9.5%	9.5%
5	Taiwan	7.1%	6.5%	5.5%	5.7%	5.7%	5.9%	5.9%	5.8%	5.6%	5.0%	4.8%
6	Vietnam	0.2%	2.3%	4.6%	4.3%	3.2%	2.7%	2.6%	2.7%	2.4%	4.0%	4.8%
7	Korea, South	4.2%	3.5%	2.7%	3.2%	3.8%	3.6%	4.5%	4.8%	4.3%	4.2%	3.8%
8	Germany	3.8%	3.2%	3.1%	3.1%	3.1%	2.8%	3.0%	3.0%	3.2%	3.3%	3.3%
9	Canada	2.8%	2.7%	2.3%	2.2%	2.3%	2.2%	2.1%	2.3%	5.4%	2.2%	2.2%
10	Philippines	2.3%	1.8%	1.8%	1.9%	1.9%	2.0%	1.7%	1.7%	1.9%	1.8%	1.7%
11	Thailand	1.7%	1.4%	1.4%	1.5%	1.5%	1.5%	1.6%	1.5%	1.7%	1.6%	1.6%
12	Ireland	0.1%	0.1%	4.9%	3.9%	2.6%	2.0%	1.3%	1.2%	1.4%	1.4%	1.2%
13	Dominican Republic	0.8%	0.8%	0.8%	0.8%	1.0%	1.3%	1.1%	1.1%	1.2%	1.3%	1.2%
14	Singapore	3.6%	2.2%	1.0%	1.1%	1.2%	1.2%	1.5%	1.2%	1.2%	1.4%	1.1%
15	France	1.2%	1.1%	1.0%	1.0%	1.0%	0.9%	0.9%	1.0%	1.1%	1.2%	1.1%
16	United Kingdom	1.2%	1.0%	0.9%	0.8%	0.8%	0.8%	0.8%	1.1%	0.9%	1.0%	1.0%
17	Italy	0.6%	0.9%	1.0%	1.0%	1.0%	1.0%	0.9%	0.9%	0.9%	0.8%	0.9%
18	Israel	0.9%	1.6%	2.0%	1.0%	0.6%	0.6%	0.6%	0.7%	0.8%	0.8%	0.7%
19	Switzerland	0.8%	0.8%	0.8%	0.7%	0.7%	0.7%	0.6%	0.6%	0.7%	0.7%	0.7%
20	India	0.5%	0.5%	0.5%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.7%	0.6%
21	Indonesia	0.6%	0.5%	0.5%	0.5%	0.4%	0.4%	0.5%	0.4%	0.4%	0.5%	0.5%
22	Spain	0.2%	0.2%	0.3%	0.2%	0.2%	0.3%	0.4%	0.4%	0.3%	0.4%	0.4%
23	Poland	0.1%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.3%	0.3%	0.4%	0.3%
24	Czech Republic	0.5%	0.4%	0.4%	0.4%	0.4%	0.3%	0.4%	0.3%	0.4%	0.4%	0.3%
25	Hungary	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%	0.3%	0.3%
26	Finland	0.3%	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.3%	0.3%
27	Costa Rica	13.1%	8.9%	0.4%	0.3%	0.2%	0.2%	0.2%	0.2%	0.3%	0.3%	0.2%
28	Sweden	0.2%	0.3%	0.2%	0.2%	0.2%	0.2%	0.3%	0.3%	0.3%	0.2%	0.2%
29	Romania	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
30	Austria	0.8%	0.7%	0.2%	0.3%	0.2%	0.2%	0.2%	0.2%	0.3%	0.2%	0.2%
	Combined Top 30	98.0%	98.1%	98.2%	98.3%	98.1%	98.1%	98.2%	98.3%	98.0%	98.0%	98.3%
	Other Countries	2.0%	1.9%	1.8%	1.7%	1.9%	1.9%	1.8%	1.7%	2.0%	2.0%	1.7%
	Total Import Revenue ($B)	**53,009**	**66,341**	**23,658**	**25,092**	**6,308**	**6,938**	**6,786**	**6,151**	**5,875**	**5,628**	**6,431**

Source – U.S. Department of Commerce

Figure 9 – Electronic Components Share of Total Goods Exported to U.S. (Q1 to Q3 2019)

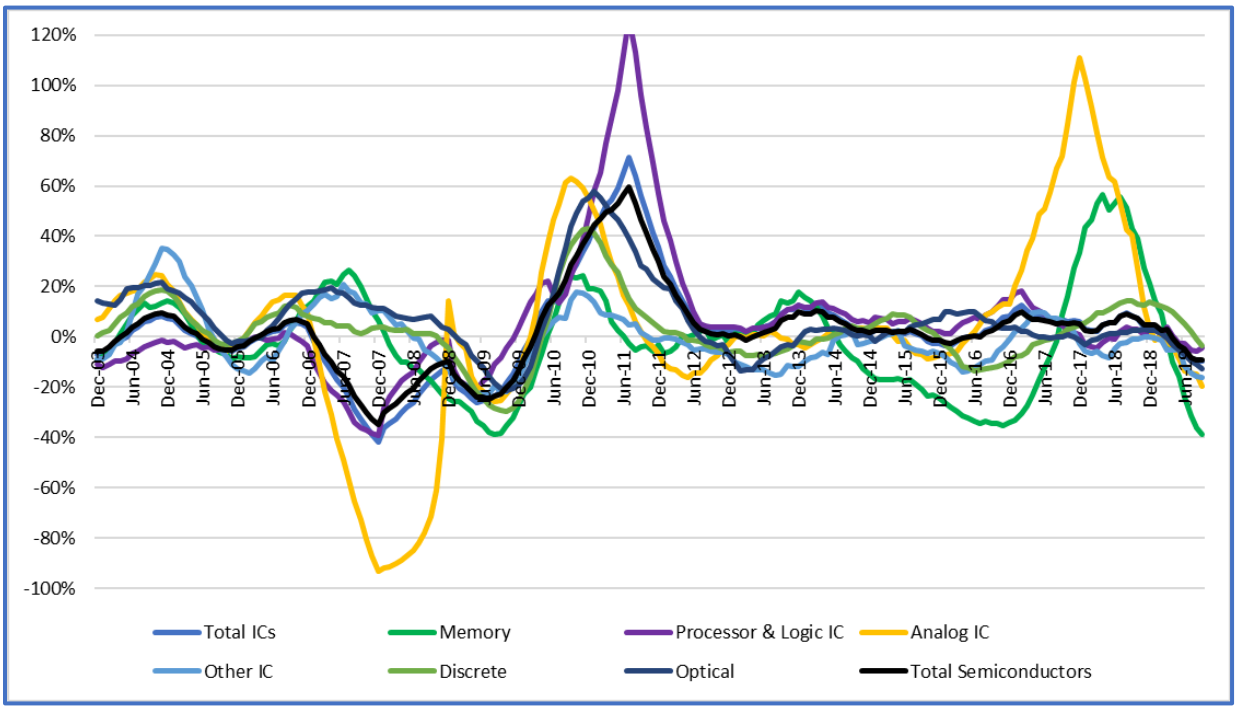


Source – U.S. Department of Commerce

2- Semiconductors

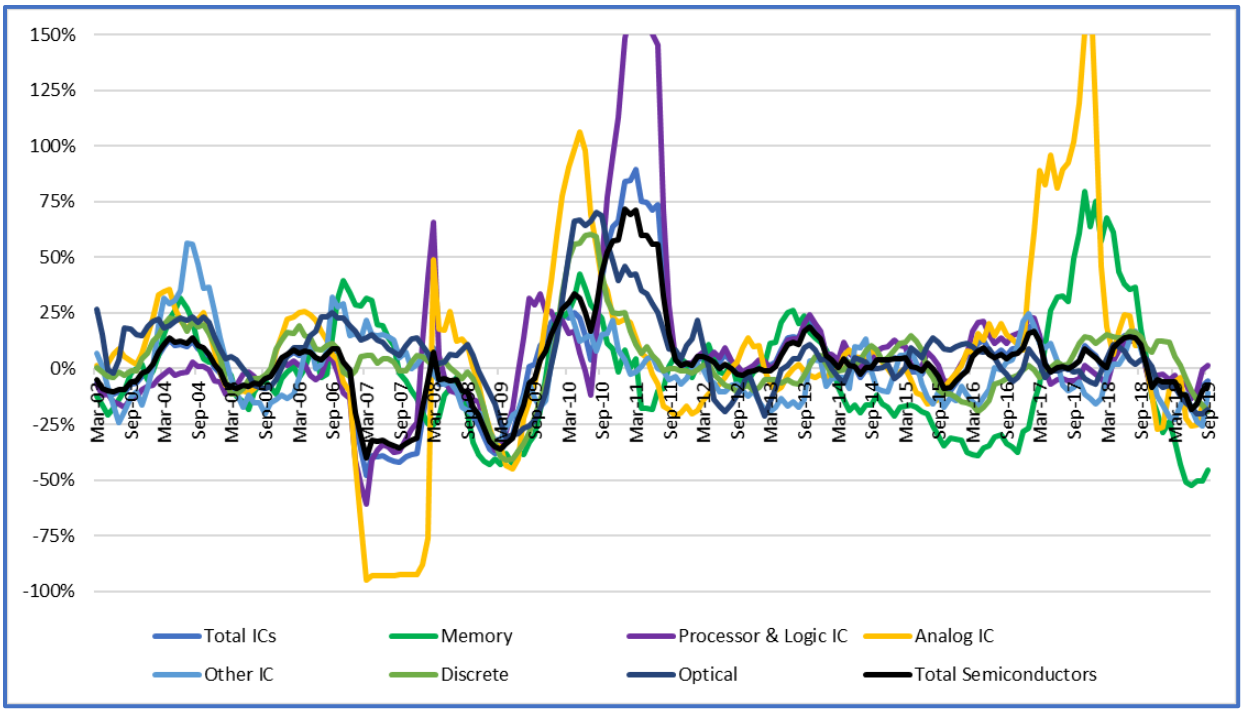
Semiconductor imports to the U.S. are typically aligned in their cyclical behavior. However, it is surprising to see that analog ICs show volatility similar to if not higher than memory ICs. Again, there are early indications that import growth of semiconductors may be improving as shown in Figures 10 and 11. With regard to imports into the U.S. by country, Figure 12 illustrates how Malaysia dominates the import of semiconductors into the U.S. on the strength of its exports of integrated circuits (ICs) to the U.S. This reveals a key role that Malaysia plays in the semiconductor supply chain. While not a major location for semiconductor fabs/foundries, Malaysia is a major location for packaging and test of semiconductors as seen in Table 3. While there are packaging and test operations in other countries the data seems to show that Malaysia is where the major share of packaging of ICs destined for the U.S. is performed. Once again, Vietnam has jumped up into the top tier as it sits most recently in the number two position as an exporter to the U.S. as it passes both China and Taiwan which have seen their imports decline significantly in recent quarters.

Figure 10 – Annualized Semiconductor U.S. Import Revenue Growth



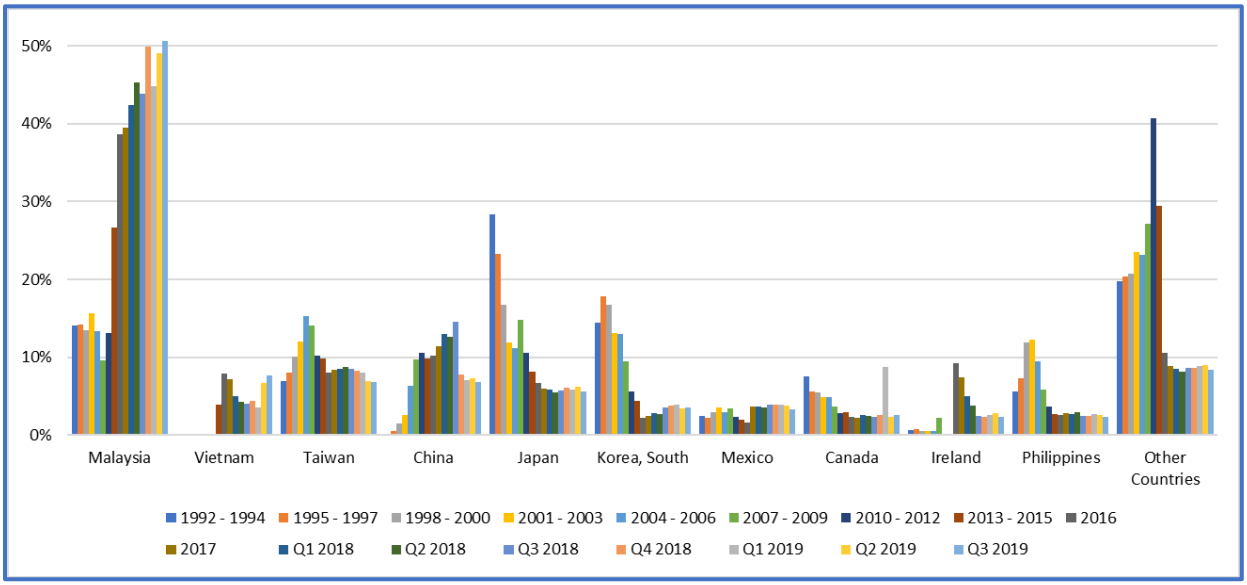
Source – U.S. Department of Commerce

Figure 11 – Qtr-over-Qtr Semiconductor U.S. Import Revenue Growth



Source – U.S. Department of Commerce

Figure 12 – Semiconductor U.S. Import Revenue Share



Source – U.S. Department of Commerce

Table 3 – Worldwide Top Ten OSAT Companies (Outsourced Semiconductor Assembly & Test)

Companies	ASE Technology	Amkor Technology	JCET (STATS ChipPAC)	Siliconware Precision Industries (SPIL)	Powertech Technology
2018 Revenue ($M)	5,700	4,300	3,970	2,800	2,170
Operations Country Locations	China Japan Malaysia Singapore South Korea Taiwan	China Japan Malaysia Philippines Portugal South Korea Taiwan	China Singapore South Korea	China Taiwan	China Japan Singapore Taiwan

Companies	Tianshui Huatian Technology	TongFu Microelectronics	UTAC Holdings	ChipMOS Technologies	King Yuan Electronics
2018 Revenue ($M)	1,070	982	788	603	315
Operations Country Locations	China USA	China Malaysia	China Indonesia Malaysia Singapore Taiwan Thailand	China Taiwan	China Taiwan

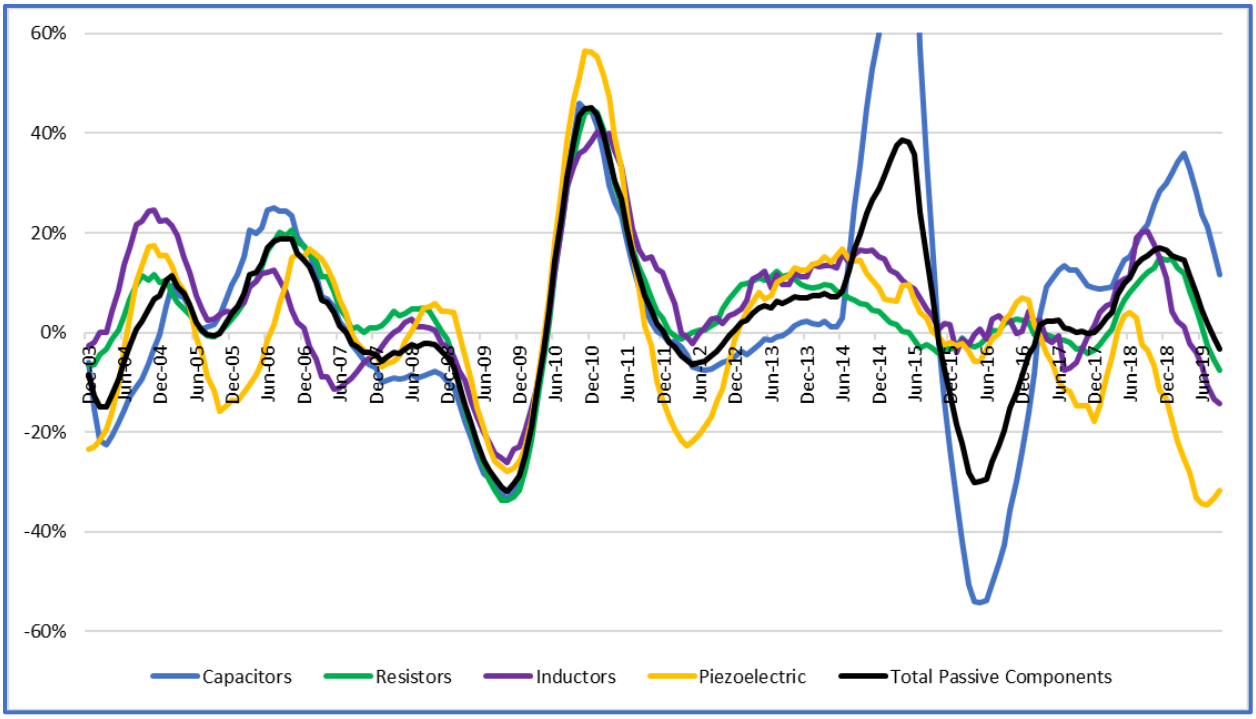
Source – MarketResearchReports.com

Passive Components

Over the past five years, capacitors have shown a very high degree of volatility in the value of their total U.S. imports as illustrated in Figures 13 and 14. Currently, capacitors are the only component family experiencing overall annual growth in import revenues. However, on a quarter-over-quarter basis all component families have seen a rapid decline in recent months with piezoelectrics and resistors leading the way down. While semiconductors seem to be poised for improved growth in import revenues, passive components appear to be mired in negative territory.

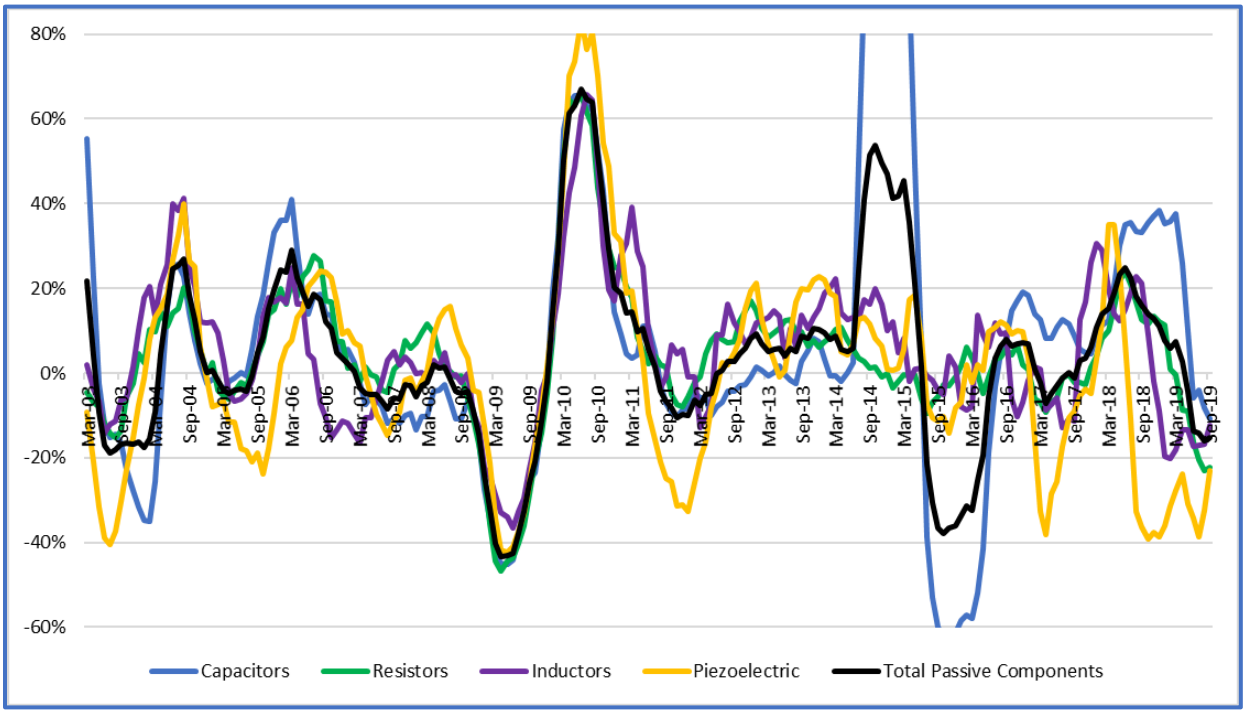
Figure 15 shows that in terms of electronics components, China has taken its biggest hit in its exports of passive components to the U.S. A significant level of production has shifted back to Japan as it has moved back into the top spot as a supplier to the U.S. with the need to avoid tariffs. Malaysia has shown a surprising bump in the last quarter. It may be that companies have identified Malaysia as another attractive location to avoid tariffs and production is now ramping up.

Figure 13 – Annualized Passive Component U.S. Import Revenue Growth



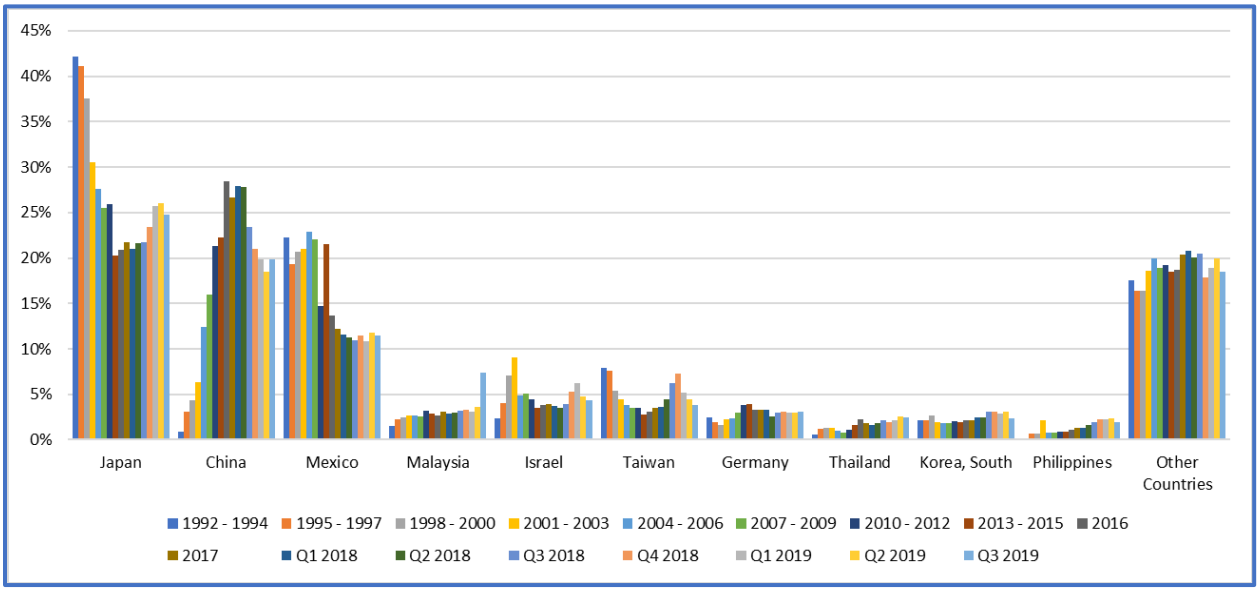
Source – U.S. Department of Commerce

Figure 14 – Qtr-over-Qtr Passive Component U.S. Import Revenue Growth



Source – U.S. Department of Commerce

Figure 15 – Passive Component U.S. Import Revenue Share



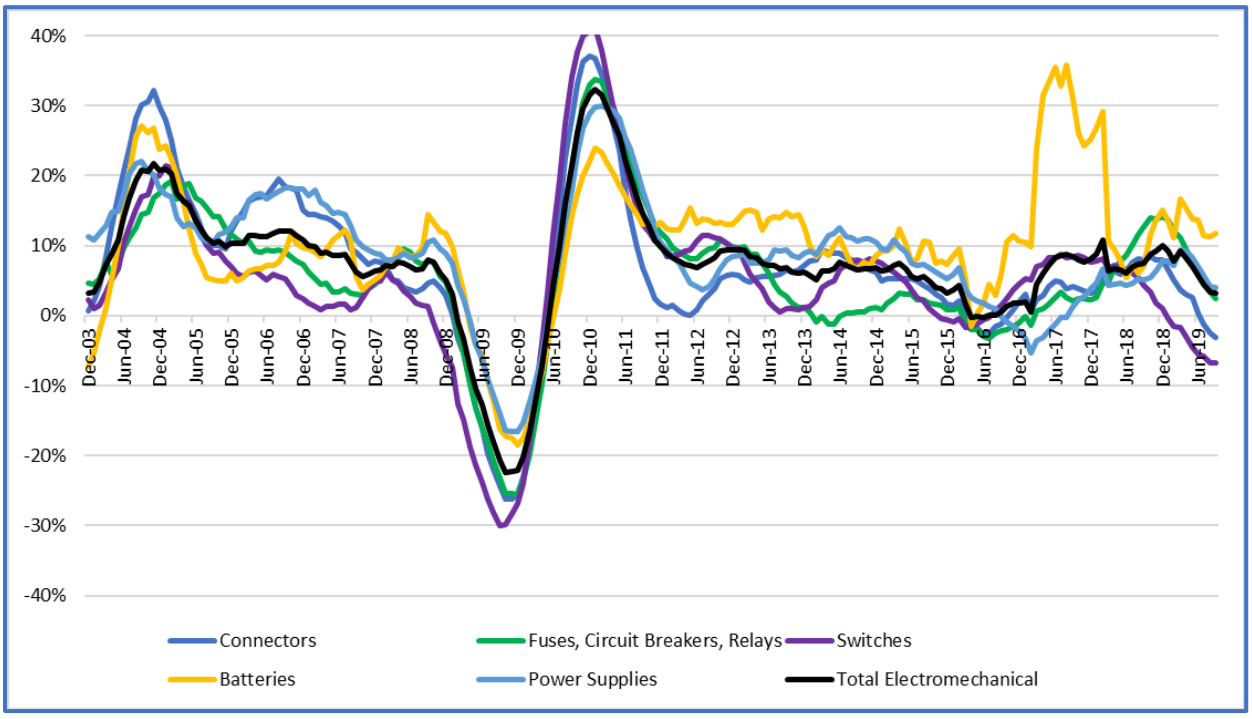
Source – U.S. Department of Commerce

3- Electromechanical

The good news for electromechanical components is the relatively stronger import revenue growth compared to semiconductors and passive components. Figure 16 shows overall growth on an annual basis and Figure 17 shows all areas improving in the most recent quarter. In this area, batteries are the most volatile in their behavior over recent years. This is a development that has taken place starting in 2016. In accounting for batteries, "Lead Batteries" have been excluded since they are primarily used in traditional automotive applications rather than electronics equipment. However, it may be that the use of other battery technologies in electric vehicles is driving the more recent volatility. It has not been possible to separate out batteries used in electric vehicles from other applications in this analysis.

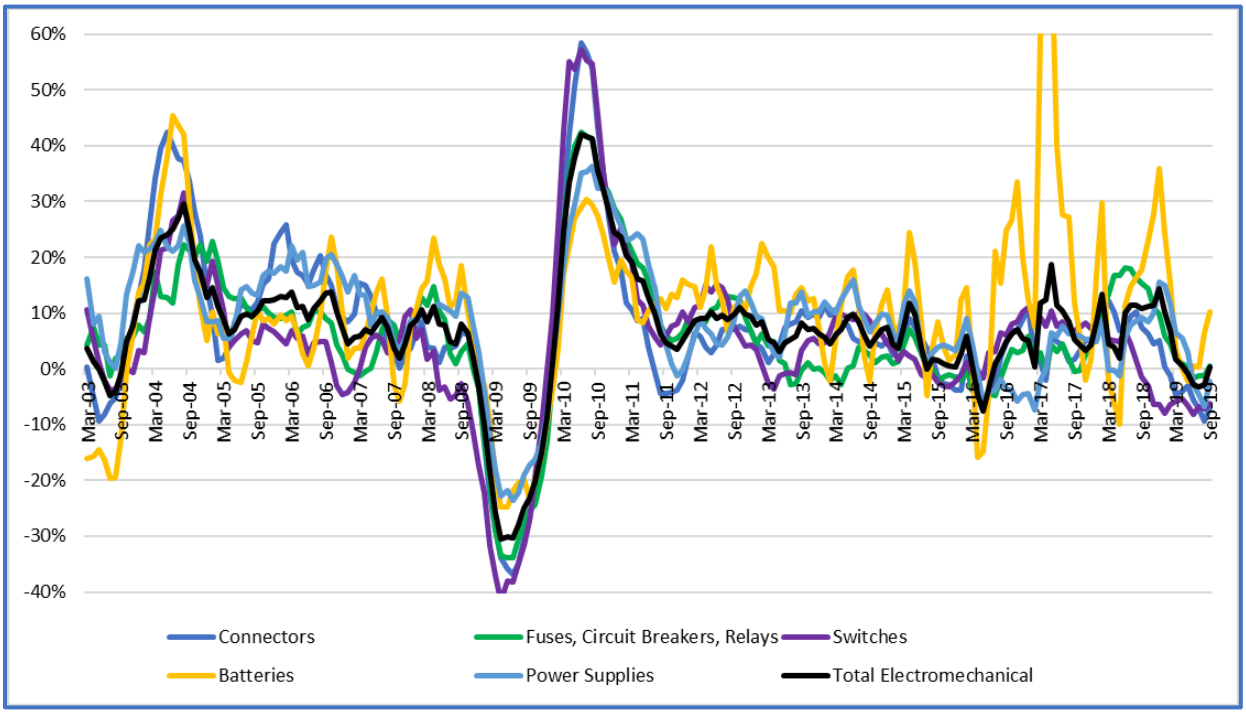
China has been able to maintain its top position in this category as shown in Figure 18. While declining, China's overall exports to the U.S. are strengthened by its strong position in battery materials, technology and production.

Figure 16 – Annualized Electromechanical U.S. Import Revenue Growth



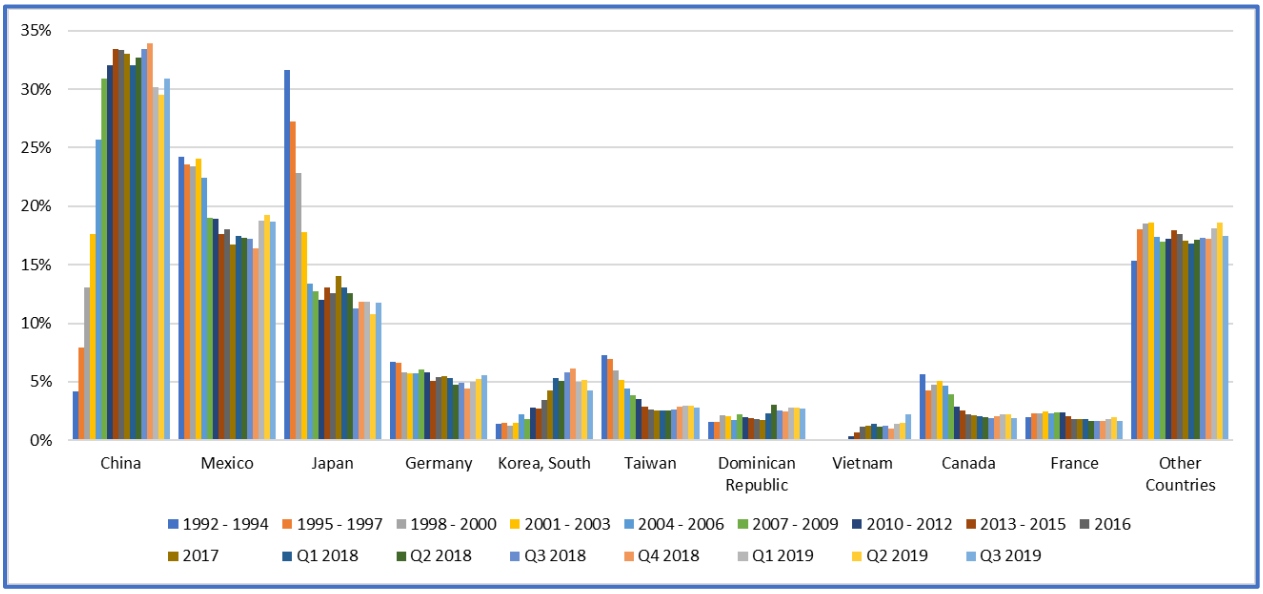
Source – U.S. Department of Commerce

Figure 17 – Qtr-over-Qtr Electromechanical U.S. Import Revenue Growth



Source – U.S. Department of Commerce

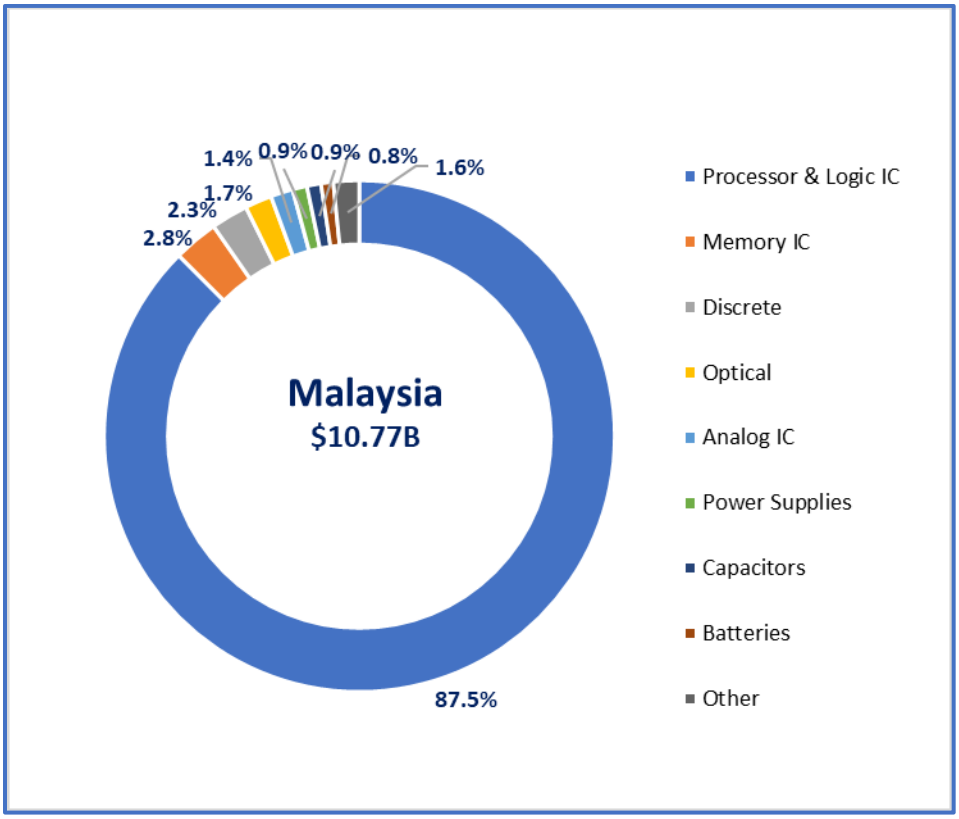
Figure 18 – Electromechanical Component U.S. Import Revenue Share

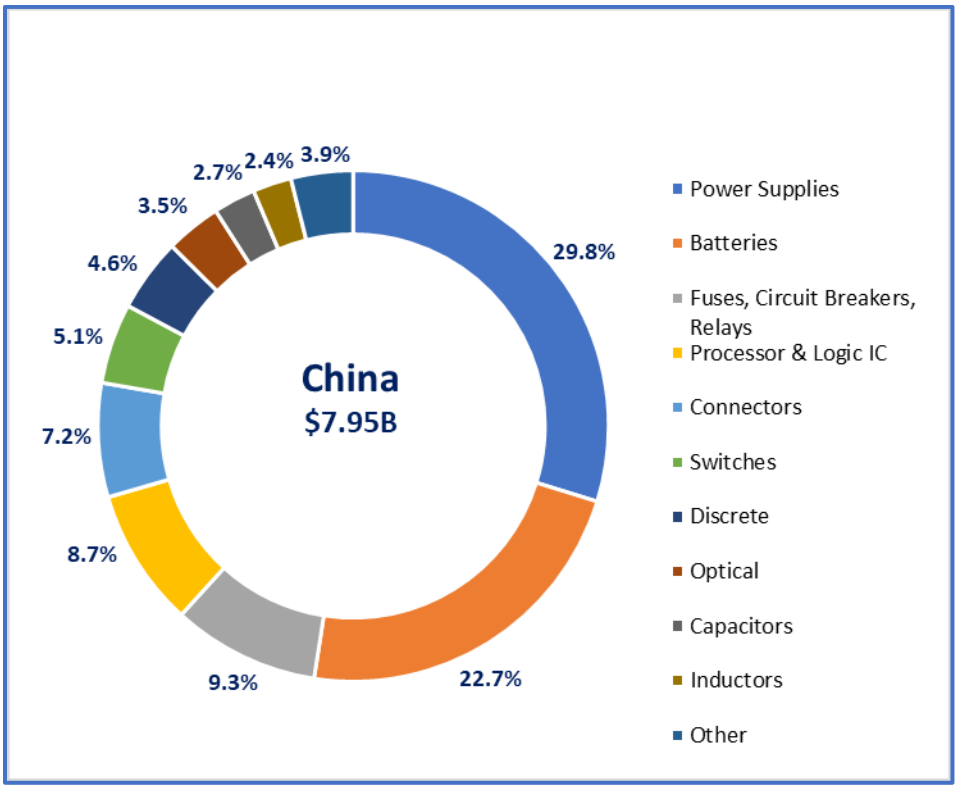


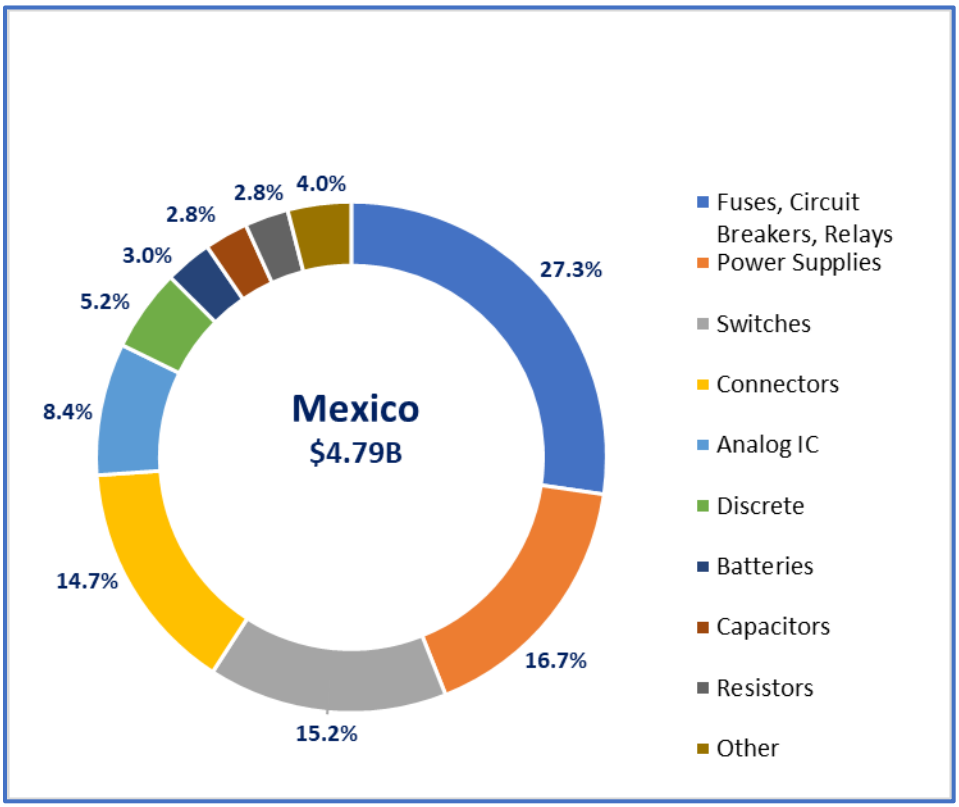
Source – U.S. Department of Commerce

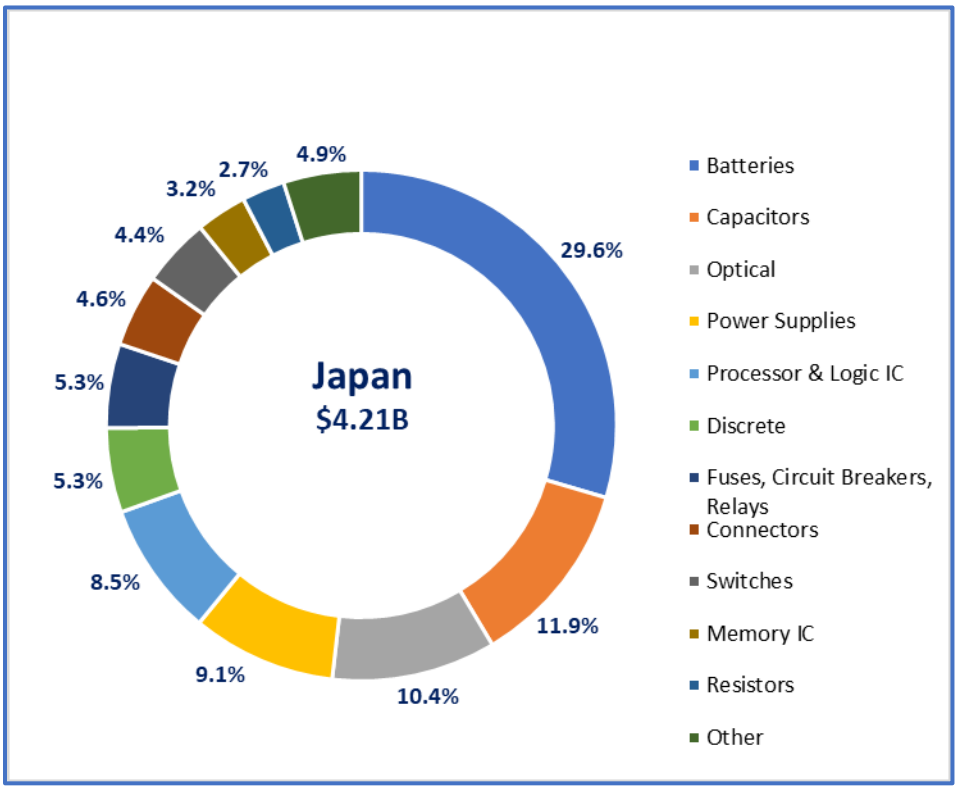
4- Top Countries for Electronics Component Exports to the U.S.

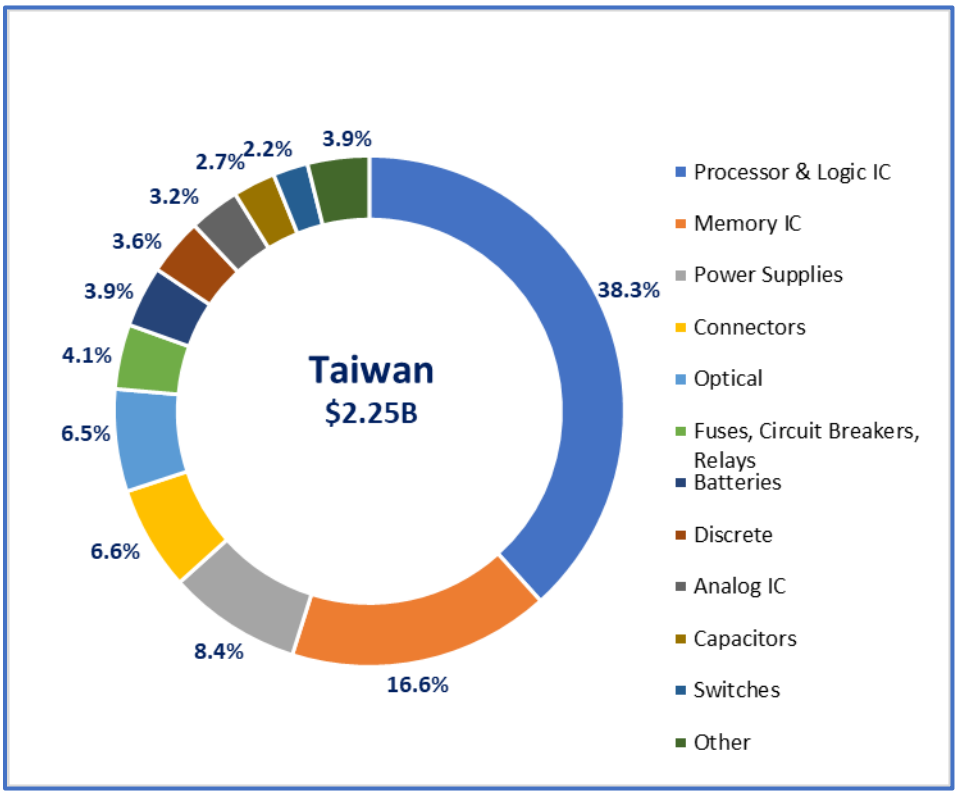
Figures 19 - 28 – Revenue from Exports to U.S. by Component Type (Q1-Q3 2019)

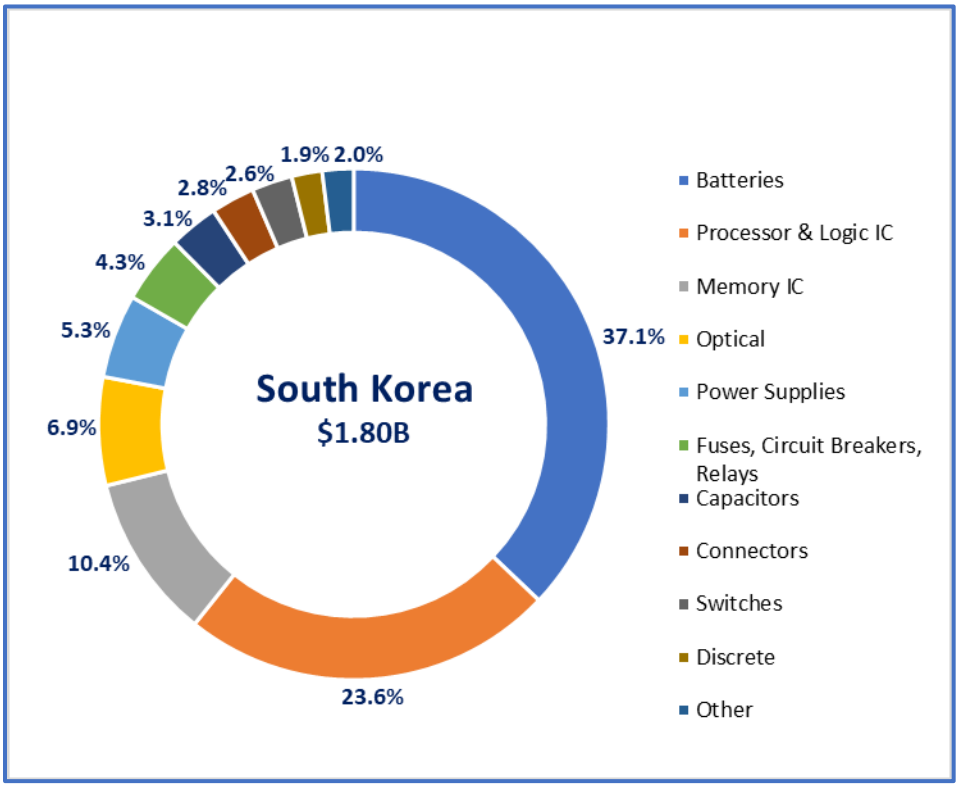


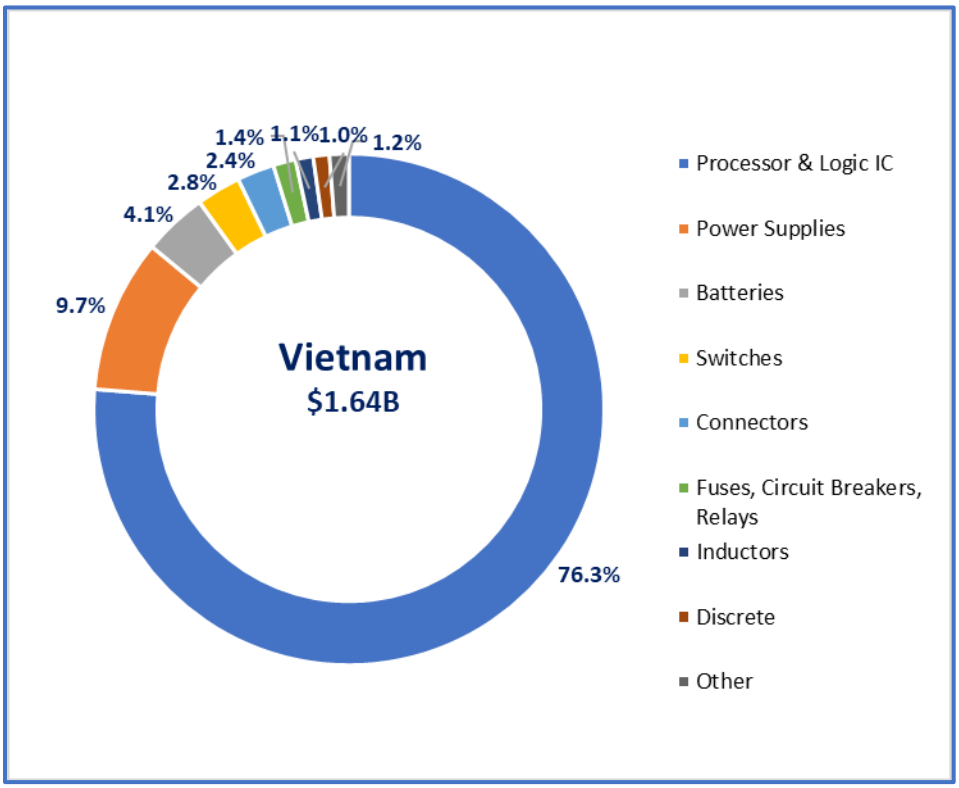


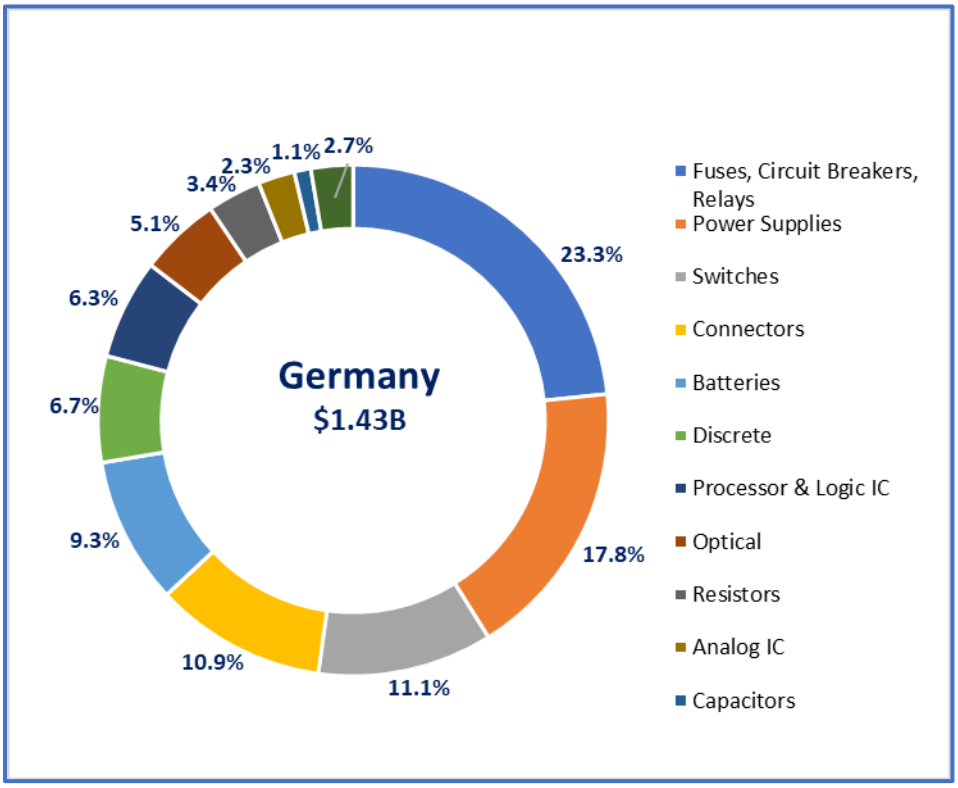

Mexico
$4.79B
27.3%
16.7%
15.2%
14.7%
8.4%
5.2%
3.0%
2.8%
2.8%
4.0%
Fuses, Circuit Breakers, Relays
Power Supplies
Switches
Connectors
Analog IC
Discrete
Batteries
Capacitors
Resistors
Other

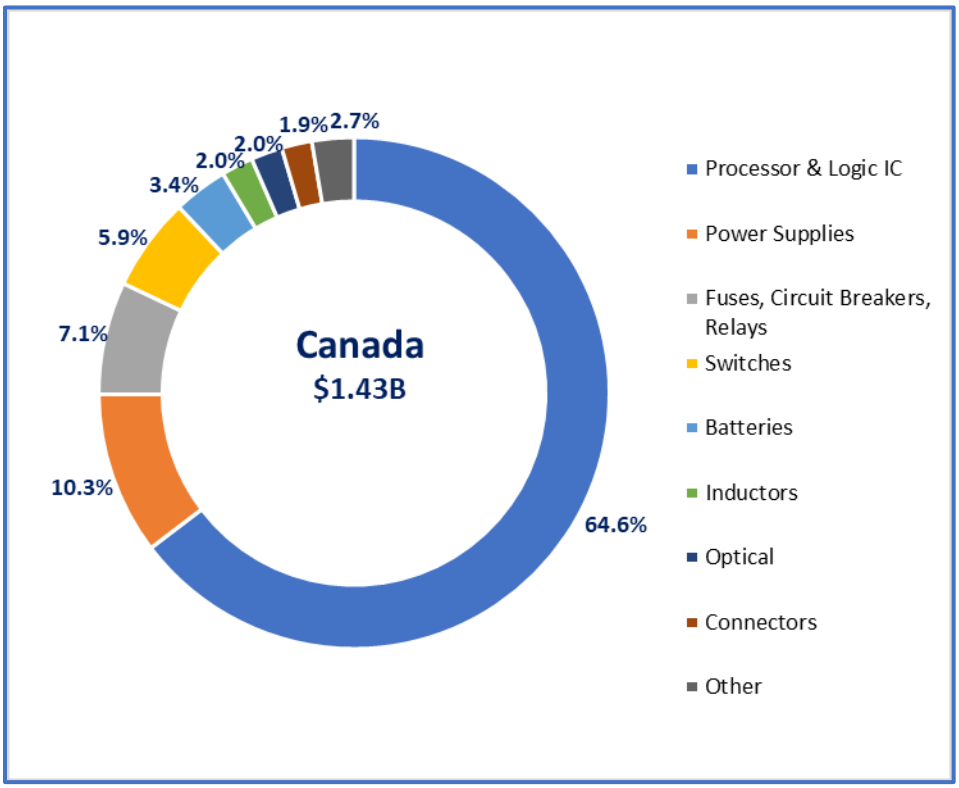

Japan
$4.21B
29.6%
11.9%
10.4%
9.1%
8.5%
5.3%
5.3%
4.6%
4.4%
3.2%
2.7%
4.9%
Batteries
Capacitors
Optical
Power Supplies
Processor & Logic IC
Discrete
Fuses, Circuit Breakers, Relays
Connectors
Switches
Memory IC
Resistors
Other

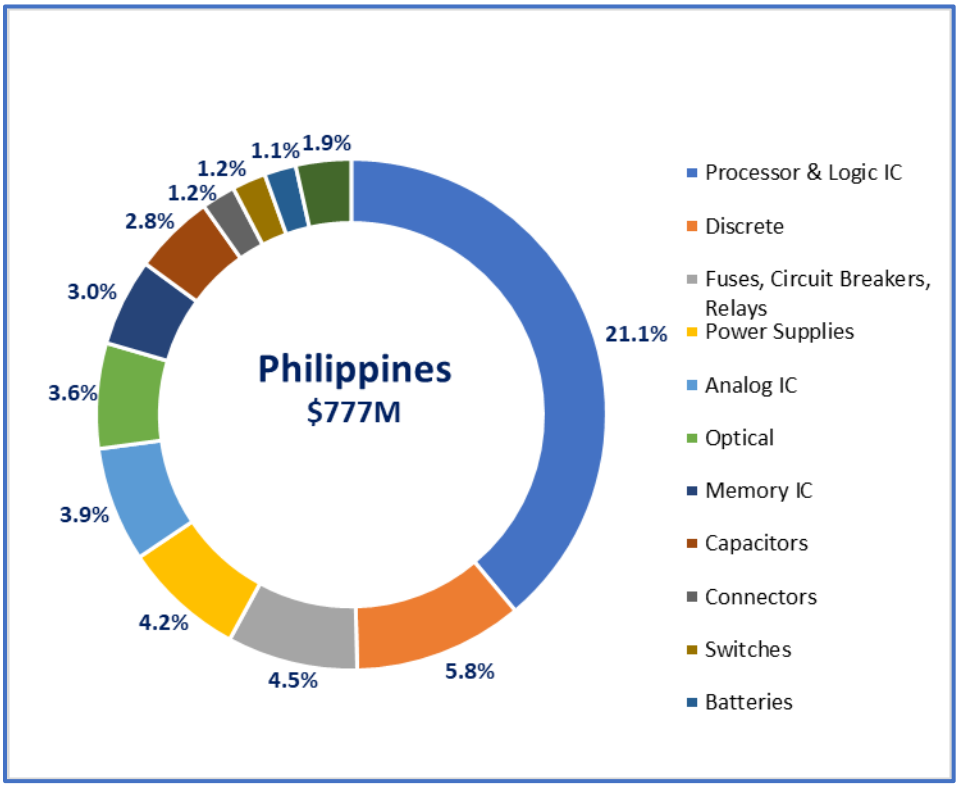

Taiwan
$2.25B
38.3%
16.6%
8.4%
6.6%
6.5%
4.1%
3.9%
3.6%
3.2%
2.7%
2.2%
3.9%
Processor & Logic IC
Memory IC
Power Supplies
Connectors
Optical
Fuses, Circuit Breakers, Relays
Batteries
Discrete
Analog IC
Capacitors
Switches
Other


South Korea
$1.80B
37.1%
23.6%
10.4%
6.9%
5.3%
4.3%
3.1%
2.8%
2.6%
1.9%
2.0%
Batteries
Processor & Logic IC
Memory IC
Optical
Power Supplies
Fuses, Circuit Breakers, Relays
Capacitors
Connectors
Switches
Discrete
Other


Vietnam
$1.64B
76.3%
9.7%
4.1%
2.8%
2.4%
1.4%
1.1%
1.0%
1.2%
Processor & Logic IC
Power Supplies
Batteries
Switches
Connectors
Fuses, Circuit Breakers, Relays
Inductors
Discrete
Other


Germany
$1.43B
23.3%
17.8%
11.1%
10.9%
9.3%
6.7%
6.3%
5.1%
3.4%
2.3%
1.1%
2.7%
Fuses, Circuit Breakers, Relays
Power Supplies
Switches
Connectors
Batteries
Discrete
Processor & Logic IC
Optical
Resistors
Analog IC
Capacitors





Source – U.S. Department of Commerce

Figures 19 through 28 present profiles of the top importers of electronics components to the U.S.

Action

- Participants in the electronics components value chain should regularly update their understanding of global supply chain risks and develop a strong understanding of the multiple dependencies in their supply network.
- Understand how and why sources of supply are shifting around the world and be prepared to take advantage of competitive benefits that could be delivered by countries and regions anxious to engage in the electronics industry.
- Use import data as a barometer of local electronics production expectations and market trends. Imports offer insight into domestic electronics production and market trends.
- Track the progress of approval and implementation of the new USMCA (U.S./Mexico/Canada) trade agreement. While the government analysis indicates some expected benefits for the electronics industry in intellectual property protection it is cautious about any significant upside for electronics. This assessment may be too narrow and short-sighted. With the continual evolution of business, political, social and environmental pressures, a stronger trade environment in North America may lead to a notable increase in cross-border trade in electronics between the U.S., Mexico and Canada.
- Look for the new import database that will be maintained on the ECIAnow.org website in the near future.