



a **cicor** company



Axis Electronics Ltd.

Material Market Update: Q1-2024

January 2024

Contents

Semi-Conductor Market Sales & Forecasts	4
Wafer Fab and Cap Ex spending update	6
Passive - Market Trends	7
Component / Supplier Trend Info	9
Print Circuit Boards (Sources: Graphic PLC and Icape)	11
Metals Market	12
Macroeconomics	13
Contacts	15

Material Market Update – Q1-2024

Happy New Year

Welcome to Axis Electronics' Material Market Update for Q1 2024. I hope you find the following information of value.

Through 2023 we have highlighted the positive and negative impacts of the decline in the semi-conductor market. In this edition we reflect on some of that history and look towards what the future is potentially looking like.

The first key message is that the semiconductor industry is growing. This growth is welcomed, and although investments in new Wafer Fabs (and equipment) has been in decline, the market remains in a reasonable position to respond positively.

However, constraints do still exist in the supply chain, and it is important to understand how your specific technological requirements may be affected.

Stock situation continues to improve to support programs in 2024 and 2025, however Axis Electronics' message remains unchanged. We have clear evidence that the programs supported by a material pre-buy strategy (from 2021 – 2023) have benefited tremendously. We therefore continue to encourage all customers to extend their MRP horizons out to at least the end of 2026. To enable you to meet your business needs, your qualified data is crucial to Axis in mitigating ongoing Supply Chain pricing and lead time challenges.

There is still risk in the Supply Chain due to global events such as the active Red Sea crisis and upcoming US & UK elections.

Axis Electronics continues to offer risk mitigation solutions for your long-term forecasts by recommending material pre-buy options against your planned forecasts. This allows us to manage your demand within our Supply Chain.

The following pages provide Market Updates from our strategic suppliers and trusted sources to provide further evidence and detail.

The Axis team is ready to receive your enquiries and orders, to work with you to mitigate supply chain risks.

Thank you for your attention.



Howard Phillips
Head of Supply Chain
Email: howard.phillips@cicor.com

Electronic Components: Semi-Conductor Market Sales & Forecasts

2022 saw the steepest decline in Semi-Conductor revenues since 2001. A high point of approx. +25% growth in Jan 2022 preceded the dramatic slump we have reported in previous market updates. The decline to approximately -18% growth rate has been evident throughout 2023. See figure one for more detail.

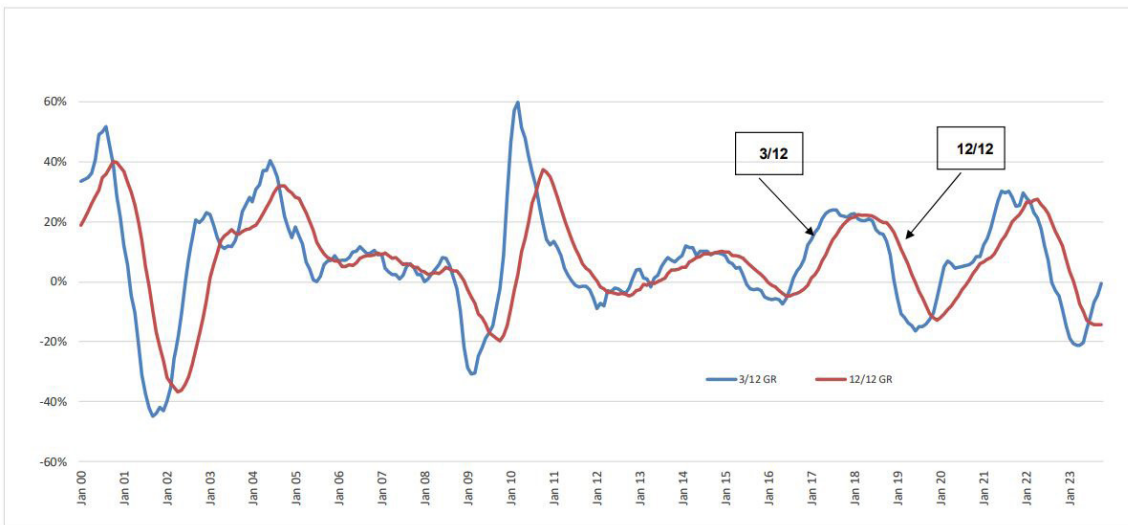
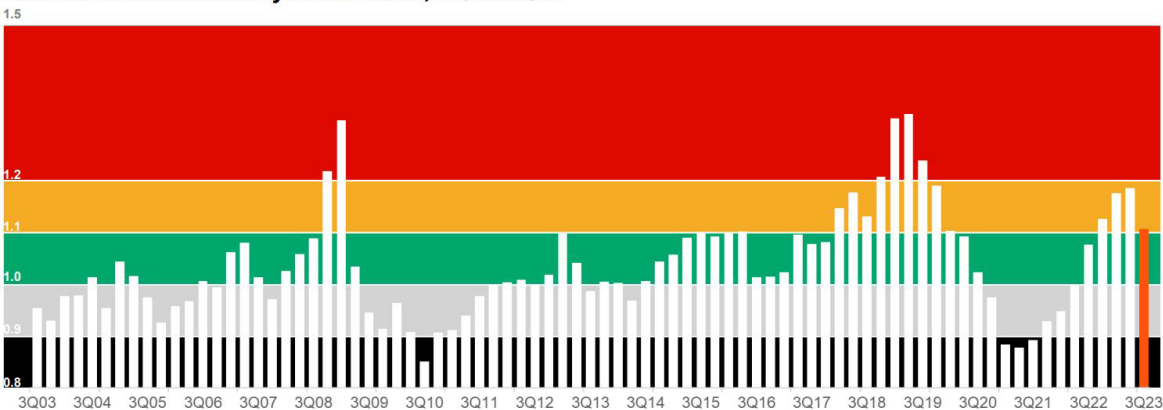


Figure 1: Worldwide Semi-Conductor Growth Movement Indicator. Source: WSTS / Future Horizons

As a result, a stock surplus scenario presented itself to the market through 2023. Whilst this was a good news story the surplus was heavily dominated by Memory and a severe surplus scenario did not come to fruition. In Q3-2023, Gartner’s Semiconductor Inventory Index Trend has reported the first movement towards a shortage scenario since around the middle of 2021. Figures 2 highlight this.

Semiconductor Inventory Index Trend, 3Q03-3Q23



Source: Gartner (October 2023)
Inventory Index Zones: ■ Severe Shortage (<0.9) ■ Moderate Shortage (0.9 to <1.0); ■ Normal (1.0 to <1.1) ■ Moderate Surplus (1.1 to <1.2); ■ Severe Surplus (≥1.2)

Figure 2: Source - Gartner Trends on Supply Chains: Gartner

With Semiconductor revenue growth rates trending sharply upwards since Q1-2023 (Figure 3) and the movement towards a shortage scenario evident, our recent predications of constraints in the supply of semiconductors in 2024 is more likely.

With an anticipated constraint period expected to hit the market, we would not expect the Supply Chain to react in any other than the standard way; Increased Lead Times and Pricing.

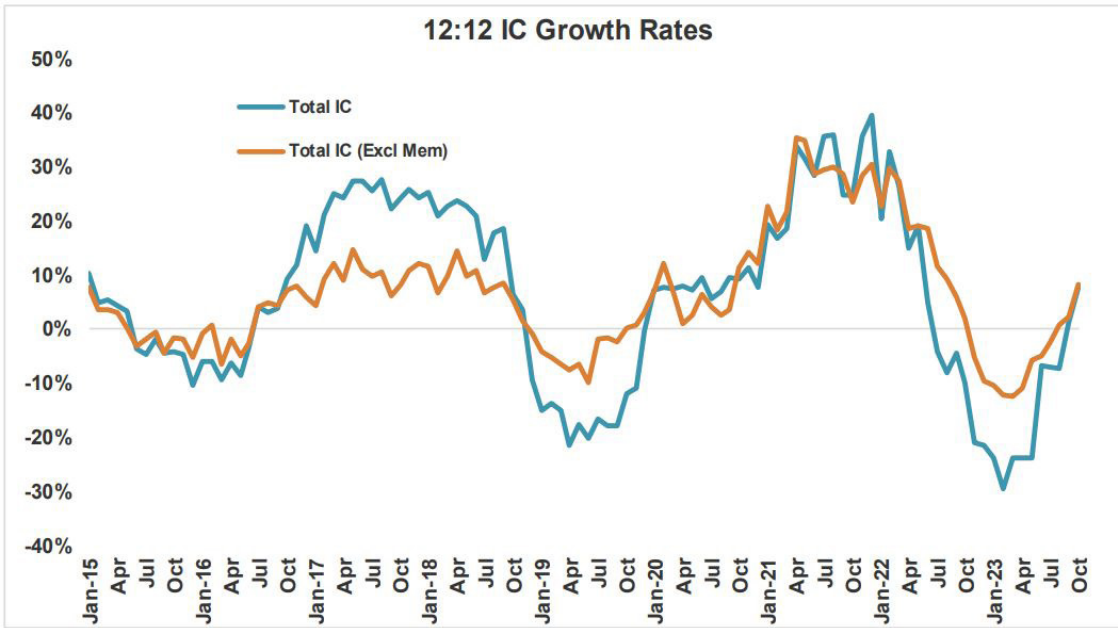


Figure 3: Worldwide IC Annual Growth Rate Trend. Source: WSTS / Future Horizons

In figure 4, we show Gartner’s Revenue Forecast out to 2027. Significant growth in the market in 2024 – 2027 will see the market push through the \$750 billion mark for the first time.

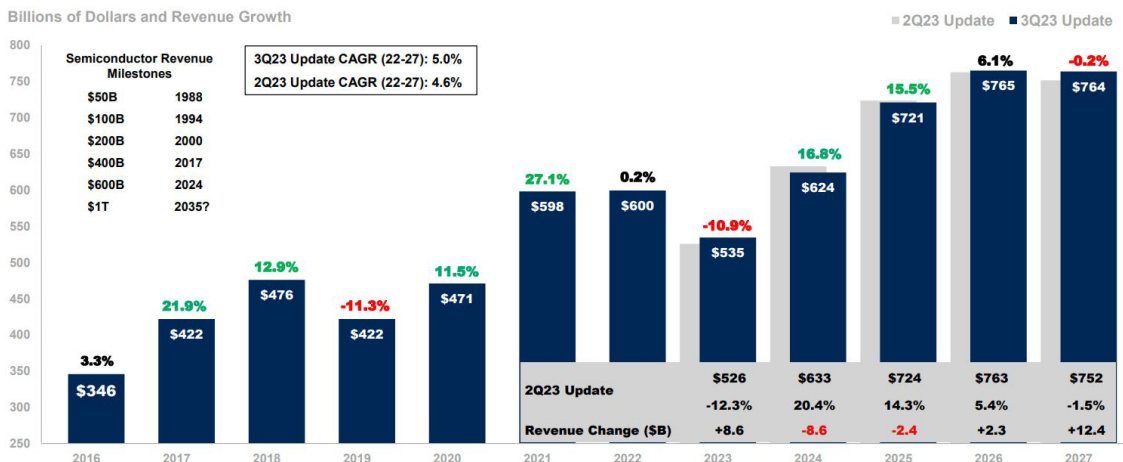


Figure 4: Semiconductor Revenue Forecast - Source: Gartner

Electronic Components: Wafer Fab and Cap Ex spending update

The term 'CAPEX correction' was used frequently during the second half of 2023. Fab utilization dipped below 75% in Q4-2023 which is 10 points below the markets 'ideal' utilization rate of 85%. As a result, investments in new equipment and facilities continue to decline. However, the numbers are still significant as can be seen in figure 5 below. Investment as a percentage of semiconductor sales is high and at similar levels to 2001.

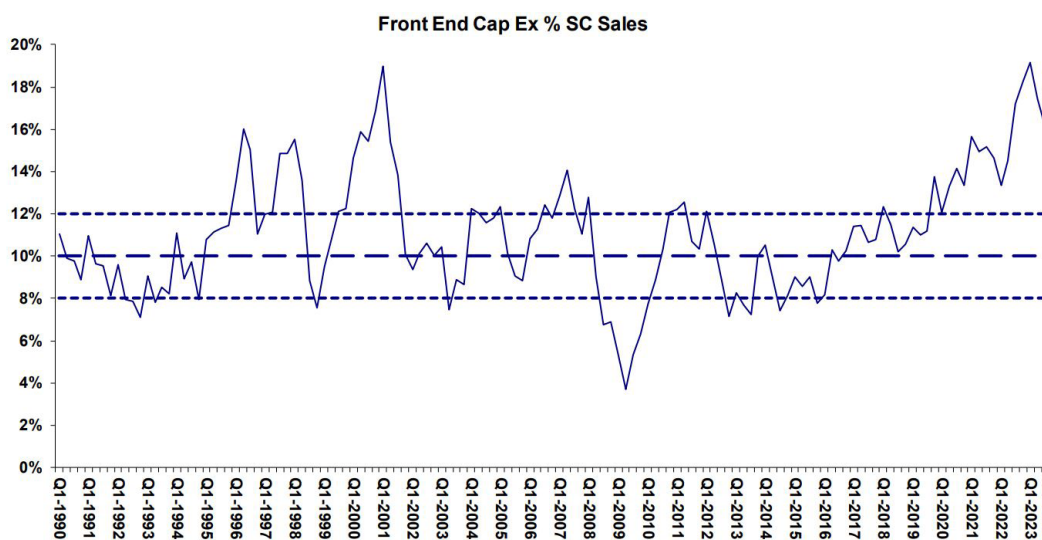


Figure 5: Front End Cap Ex as a % of SC sales – Source: Future Horizons

Investments in Wafer Fab facilities and equipment are welcome, but we continue to advise caution in this good news. We see evidence through Gartner's review (figure 6) that there are large CapEx investments forecasted in CPU and GPU (7nm and below) as the manufacturers continue to push their newer technologies into the market.

Investment in Analog, Discrete and MCU nodes (90nm and above) will see investment, but to a much smaller extent.

Location	Capacity by Technology Linewidth	Period						
		2021	2022	2023	2024	2025	2026	2027
Worldwide	0.002 Micron (2 nm)	0	0	0	0	135	515	1,263
* CPU, GPU: Large CapEx Investments, Process Yields still being optimized	0.003 Micron (3 nm)	0	115	758	1,821	2,451	2,996	3,442
	0.005 Micron (5 nm/4 nm)	2,095	3,262	4,054	4,893	5,174	5,722	5,967
	0.007 Micron (7 nm/6 nm)	3,731	4,268	4,700	5,141	5,235	5,303	5,362
* FPGA, PMIC, MCU: Constrained nodes, but demand and supply getting into balance	0.010 Micron (10 nm/8 nm)	1,120	1,384	1,212	696	605	655	725
	0.016 Micron (16 nm/14 nm)	5,303	6,375	6,788	7,138	7,345	7,520	7,737
	0.020 Micron (20 nm)	166	100	322	192	132	0	0
* Analog, Discretes, MCU: Constrained nodes, lower capex investments	0.032 Micron (32 nm/28 nm)	9,531	10,388	11,347	12,773	15,154	16,732	17,602
	0.045 Micron (45 nm/40 nm)	8,170	9,164	9,326	9,922	10,607	11,155	11,556
	0.065 Micron (65 nm)	12,525	13,930	14,383	15,396	15,970	17,442	18,656
	0.09 Micron (90 nm)	6,847	8,614	9,208	10,135	10,938	11,515	12,034
	0.13 Micron	8,439	9,364	9,664	9,767	10,031	10,174	10,368
	0.18 Micron	15,331	16,325	16,099	16,373	16,778	17,163	17,759
	0.25 Micron	6,754	7,115	7,885	7,940	7,947	8,071	8,192
	0.35 Micron	4,243	4,378	4,201	4,087	4,166	4,213	4,291
	0.5 Micron and Above	5,971	5,937	6,154	6,197	6,344	6,431	6,518
Worldwide Total		90,226	100,718	106,100	112,473	119,013	125,607	131,470

Figure 6: Worldwide Foundry Capacity Forecast 2021-2027 – Source: Gartner

Electronic Components: Passive – Market Trends

The biggest drivers for Passive Component volumes are Smart Phone and Consumer and Automotive Electronics equipment. Manufacturers have been able to significantly increase capacities to meet demand through downsizing and performance improvements. As a result, standard small case MLCC and Chip Resistors have remained available on lead times of 8-10 weeks.

Supply challenges still exist for many components due to the utilisation of electronics in every application but driven by two macro trends – Renewable/sustainable energy supply and the electrification of transportation. These applications require larger, higher voltage, higher power and increased reliability (lifetime, tolerance, etc) performance components. Typically, it is more difficult to manufacture these in very high volume, production processes may require more time and labour and yield volumes may be lower. Manufacturers are investing to meet demand but in some cases the backlogs are over 18 months and therefore LTs remain longer. Typical technologies here are tight tolerance thin film and current sense resistor, film and aluminium capacitors, large case MLCC, transformers, Mosfets, IGBTs and power fuses.

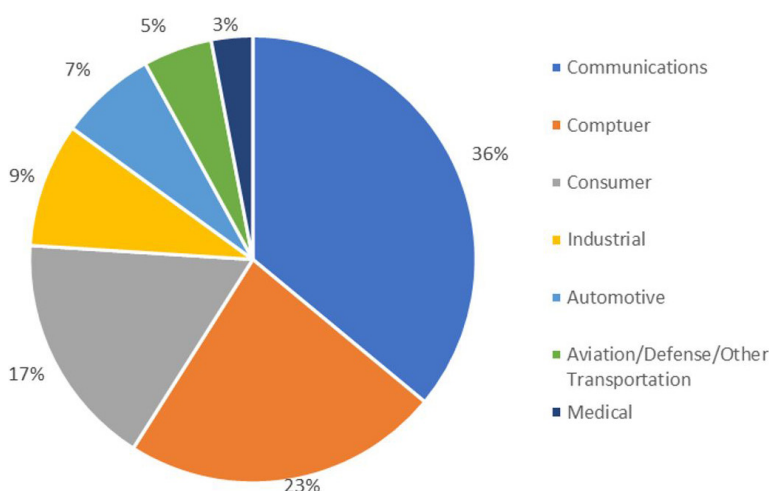


Figure 7: Passive Industry Breakdown – Source: TTI

MLCC Ceramic Capacitors

MLCC lead times have started to fall towards more normal levels of 8-10 weeks. Ultra-small parts such as the 0201, 0402 and 0603 (EIA case sizes) consumed in handsets have shown the biggest drop.

Tantalum Capacitors

Tantalum capacitor lead times started to drop from mid-2022 through to now as much of the pressure that was on the supply chain to support the global increase in demand for computing devices began to drop off. However, increases in demand from the Defence and Aerospace sector have kept longer LTs for Mil and COTs and Wet technologies.

Aluminium Capacitors

Smaller SMD V-Chip and radial leaded aluminium electrolytic capacitors have started to reduce in LT related to the supply chain for notebook and desktop computers. However larger power caps are still on longer LTs due to use in the infrastructure channels for power transmission and distribution. Hybrid Capacitors used mainly in automotive markets remain on longer LT than standard Low ESR SMD Aluminium but capacity is ramping up to meet demand.

Plastic Film Capacitors

Lead times for plastic film capacitors stabilized on a month-to-month basis but remain higher than pre-pandemic levels because of its key use in renewable energy systems, PHEV and EV propulsion.

Thick Film Chip Resistors

Thick film chip resistor lead times have declined steadily between mid-2022 and now, due to reduction in consumer product usage in China. High Power parts remain tighter due to increased demand in EV, infrastructure, and Defence/ Aerospace.

Thin Film Resistors

Auto grade, larger case sizes and tight tolerance items remain tight due to the strength of demand in EV and Industrial applications. Manufacturers are investing in more capacity for these longer lead time parts and reducing expansion in the consumer items. Mil and Aerospace demand also impacting availability of Hi Rel items.

Inductors

Inductor lead times and demand remain stable. Investments in power choke capacity by a number of manufacturers has kept pace with the market growth. There are still supply issues related to bigger transformers for power applications, particularly custom magnetics.

Timing Devices

Manufacturers of Crystals and Oscillators have now been able to resource materials and fix supply chains to enable much better availability. Lead Times normalising.

Discrete Semiconductors

Lead times remain extended for Mosfets, especially high power and backlogs still high at all manufacturers as they try to increase capacity. Rectifiers, TVS and small signal diodes showing some signs of relief as demand in the consumer market subsides and Asian supply chains improve.


Opto


Stable lead times for most LEDs and indicators but some specific opto sensors still extended due to high demand in automation and automotive markets.

Electronic Components: Component / Supplier Trend Info


Manufacturer	Product	Lead Time (Wks)	Trend Direction	Commentary
Coilcraft	Shielded Power Inductors RF inductor, ceramic core	6- 16 weeks	↔	Stable Lead Time
Diodes Inc	Rectifiers, Schottkies	8 weeks	↓	Shorter Lead Times across all packages
	Power MOSFET	8-16 weeks	↓	Lead times back to normal for all Power Mosfets packages
Microchip	All	10-40 weeks	↔	Stable Lead Time
Micron Technology	DRAM Module	25 weeks +	↔	Long term support through 2025.
	DRAM	8-10 weeks	↑	Production capacity expected to drop end of 2023. Lead Times and Market prices are going up
	NOR Flash	16 weeks +	↔	Still good support on NOR and SLC Nand. Forecast is key
	e-MMC	25 weeks +	↔	Prices stable and Lead Time increasing a little
	SSD	25 weeks +	↑	Lead Time and price increases expected
Nexperia	Rectifiers, Schottkies	4-12 weeks	↔	Shorter Lead Times across all packages
	Power Mosfet	16-26 weeks	↓	Lead Times carry on decreasing for almost all packages . Some price improvements
Onsemi	Rectifiers, Schottkies	6-24 weeks	↓	Shorter Lead Times across all packages
	Power Mosfet	14-40 weeks	↓	Lead Times start to decrease for almost all packages , but remain extended
STMicroelectronics	Rectifiers, Schottkies, Bipolars , Triacs	15- 16 weeks	↓	Shorter Lead Times across all packages
	Power Mosfet	26-40 weeks	↔	No Lead Time improvement across all packages , but still very stable
	Eeprom (SPI & ASM)	40 weeks	↔	Allocation on all packages . Situation hasn't evolved

Figure 8: Selected Manufacturer Trend Information – Source: Avnet Trendliner Q4/2023

			
KYOCERA AVX	Lead Time	Trend	Pricing
Capacitors - Supercapacitors	14-16	↔	↔
Capacitors - Tantalum Molded	10-12	↙	↔
Capacitors - Tantalum Conformals	24	↔	↔
Capacitors - Polymer Tantalum	12-14	↔	↔
Surface Mount General Capacitors – Ceramic (Less than 1uf)	12-14	↔	↔
Surface Mount General Capacitors – Ceramic (greater than 1uf)	12-14	↔	↔
Leaded Capacitors - Ceramic	30-32	↔	↔
Specialty Capacitors	30-33	↔	↔
Surface Mount General Capacitors – Ceramic *Automotive grade	12-16	↔	↔

			
Panasonic	Lead Time	Trend	Pricing
Aluminum Electrolytic	18-30	↙	↔
Capacitors - Polymer Tantalum	10	↙	↔
Inductors / Transformers	22-28	↔	↔
Thick Film Resistors	20-52	↙	↔
Thin Film Resistors	18-30	↙	↔
Current Sense Resistors	30-48	↙	↔
Resistor Networks	18-28	↔	↔

			
TDK	Lead Time	Trend	Pricing
Filters	12-16	↗	↗
Inductors / Transformers	16-20	↔	↔
Surface Mount General Capacitors – Ceramic (Less than 1uf)	20-24	↔	↔
Surface Mount General Capacitors – Ceramic (greater than 1uf)	24-30	↙	↔
Surface Mount General Capacitors – Ceramic *Automotive grade	30-42	↔	↔

			
Yageo	Lead Time	Trend	Pricing
Filters	14-16	↔	↔
Inductors / Transformers	14-16	↔	↔
Thick Film Resistors	18-20	↙	↔
Thin Film Resistors	18-20	↔	↔
Current Sense Resistors	18-20	↔	↔
Resistor Networks	20-24	↔	↔
Surface Mount General Capacitors – Ceramic (Less than 1uf)	16-18	↔	↔
Surface Mount General Capacitors – Ceramic (greater than 1uf)	18-20	↔	↔
Surface Mount General Capacitors – Ceramic *Automotive grade	14-16	↔	↔

			
TT Electronics - IRC	Lead Time	Trend	Pricing
Thick Film Resistors	20-40	↗	↗
Thin Film Resistors	20-40	↙	↗
Current Sense Resistors	20-52	↗	↗

			
Murata	Lead Time	Trend	Pricing
Filters	12-16	↔	↔
Inductors / Transformers	12-20	↔	↔
Surface Mount General Capacitors – Ceramic (Less than 1uf)	10-14	↔	↔
Surface Mount General Capacitors – Ceramic (greater than 1uf)	10-12	↔	↔
Leaded Capacitors - Ceramic	16-18	↔	↔
Specialty Capacitors	15-16	↔	↔
Surface Mount General Capacitors – Ceramic *Automotive grade	14-16	↔	↔

			
ROHM	Lead Time	Trend	Pricing
Thick Film Resistors	28-30	↔	↗
Thin Film Resistors	28-30	↔	↔
Current Sense Resistors	20-24	↔	↗

			
TDK EPCOS	Lead Time	Trend	Pricing
Capacitors - Film	24-52+	↔	↔
Filters	12-16	↗	↔
Inductors / Transformers	16-20	↔	↔
Surface Mount General Capacitors – Ceramic **** automotive grade	30-42	↔	↔

			
Vishay	Lead Time	Trend	Pricing
Trimmers & Pots	10-25	↗	↗
Capacitors - Film	12-26	↙	↗
Capacitors - Supercapacitors	14-20	↔	↔
Capacitors - Tantalum Molded	10-12	↙	↔
Capacitors - Tantalum Conformals	24	↔	↔
Capacitors - Polymer Tantalum	15-20	↙	↔
Inductors / Transformers	12-20	↔	↔
Thick Film Resistors	12-16	↙	↔
Thin Film Resistors	52+	↙	↗
Current Sense Resistors	6-52	↙	↔
Surface Mount General Capacitors – Ceramic (Less than 1uf)	16	↙	↔
Surface Mount General Capacitors – Ceramic (greater than 1uf)	16	↙	↔
Leaded Capacitors - Ceramic	24-30	↔	↔
Specialty Capacitors	40-44	↔	↔

Figure 9-17 Selected Manufacturer Trend Information – Source: Future Market Conditions Report Q4-2023

Print Circuit Boards

(Sources: Graphic PLC and Icape)

The PCB Market

Revenues in the global PCB market have been in decline through 2023 and is expected to have contracted by approximately 19% on 2022. This downward trend is primarily linked to the decline in PC, server/data storage requirements. Despite this decline, Aerospace and Military applications specifically have grown 8.7% through 2023.

Material Lead Times

Supply of the wide range of materials has stabilised over the last 12 months, particularly in the last 6 months.

The most widely used FR4 laminate remain on a 20 day lead time with pre-pregs at 15 days. High speed/low loss materials that are in high demand are also on a 15 day LT, with some of the overseas product such as FR408HR being 2 weeks longer.

Flex laminates remain unchanged and lead times have levelled out at 35 w/days. Alternative flex laminate suppliers are available, as are alternative FR4 suppliers.

Raw Material Pricing

Copper Foil pricing has remained level through 2023, although there has been an increase of approximately 16% since the middle of 2022.

Pricing for laminates saw a huge spike during the initial post-pandemic recovery (see figure 9). However, since September '22, pricing has remained largely flat.

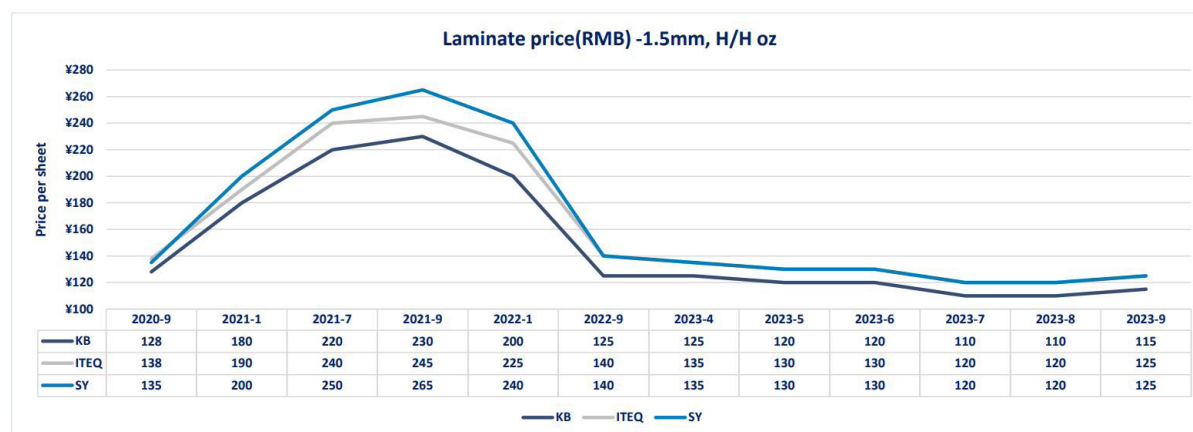


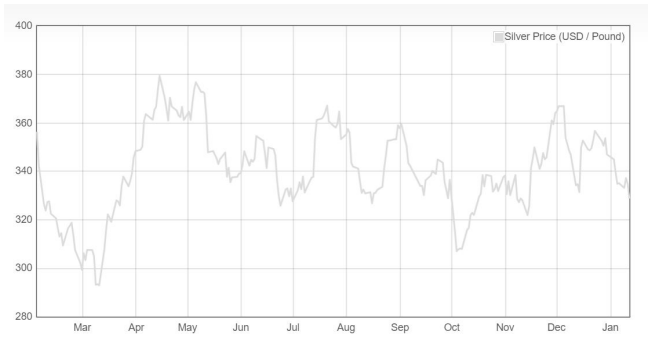
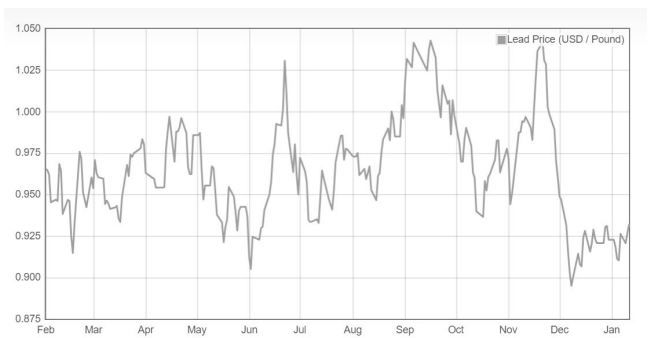
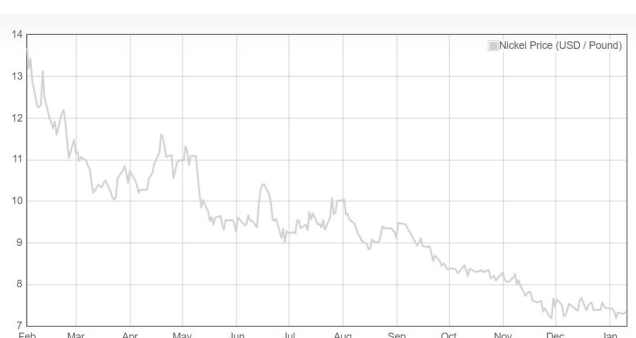
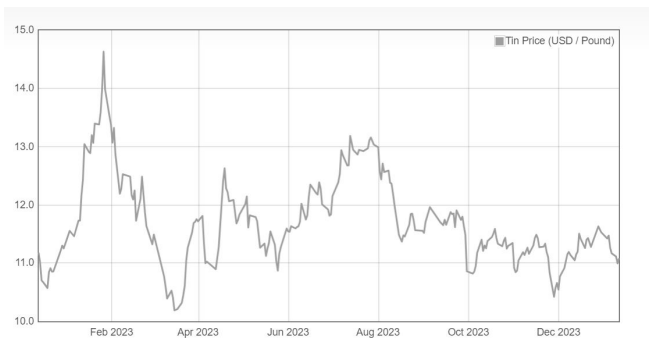
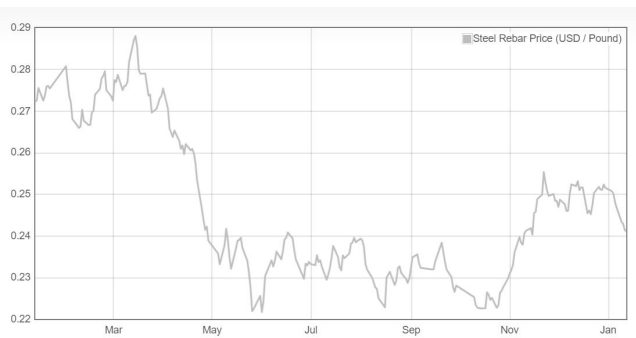
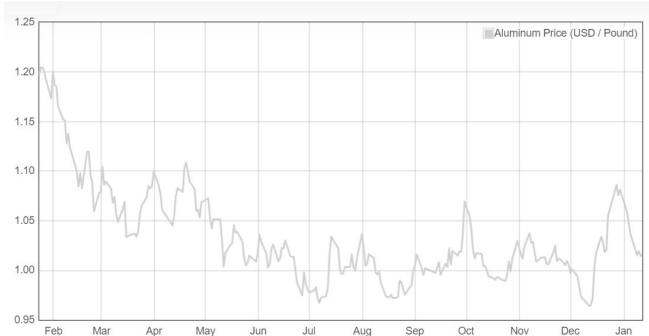
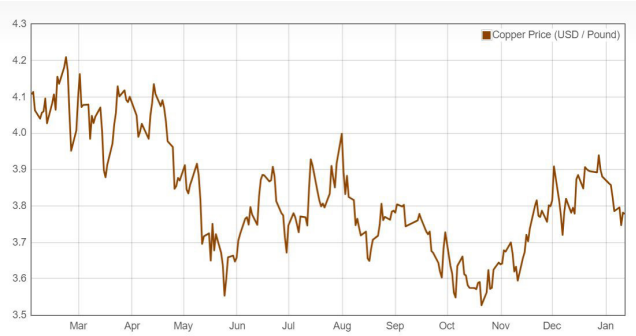
Figure 18: Laminate Pricing - Icape Q3-2023 update

Market Intelligence

The fastest growing markets over the next 4 years are forecasted to be: server/data storage (+44.0%), audio/video personal (+32.0%), industrial (+21.0%) and aerospace/military (+15.0%).

Metals Market

Copper and Steel prices have increased through Q4-2023 but have been on a downward trend since the New Year. Aluminium and Tin are at similar levels to the beginning of Q4-2023.



Figures 19-26: Various Metal Pricing Charts – Source: www.dailymetalprice.com

Macroeconomics

2023 saw several challenges presented to the Global Supply Chain. Longstanding global events continue to impact the supply of Electronic Components and then during December new events have occurred that will only serve to add further volatility into the marketplace.

US / China Trade war

This shows no sign of easing as move into 2024. Although no major changes, neither side appear to have the desire to soften their current approach towards each other.

Global Conflicts

Pressures remain in place on the supply of nickel, copper and iron due to the ongoing conflict in Ukraine.



In the second half of 2023, new EU sanction on the use and supply of Iron and Steel from Russian sources came into effect. The amendment made on 23 June 2023 to European Council Regulation (EU) N° 833/2014 seeks to ensure that Importer and/or purchaser of such products must then provide proof of evidence that any import into the European Union is exempt of any Russian origin iron and steel.

The troubles in Gaza continue, and although there is a minimal risk to the supply of components all intelligence suggests at this stage that supply from that region remains stable.

Red Sea

There has been a significant increase in attacks against commercial vessels in the Bab-el-Mandeb strait between the Arabian peninsula and the Horn of Africa since late November.

The Suez canal handles about 12% of global trade and is accessed by vessels travelling from Asia via the 30km wide Bab-el-Mandeb strait. Redirecting ships is expected to cost up to \$1m in extra fuel for every round trip between Europe and Asia, and adding 10 days to the duration of the trip.

There is risk that this issue could bring about a raise in inflation and ultimately effect Lead Time and Pricing of components supplied into the Electronics industry.

With this in mind, DHL recently commented in an article in Reuters, “we generally advise our customers to carefully examine their inventory strategy and, if necessary, adjust it”.



Japan Earthquake

On January 1st, 2024 a 7.5 magnitude earthquake hit the west coast of Japan. At time of writing, the full impact on global supply chains is not fully understood, however early reports suggest this is likely to have a greater impact on production equipment than electronic components. Preliminary inspections indicate no significant impact to sites in the region.

US / UK Elections

During 2024 elections will take place in the USA and United Kingdom. As ever, during potential periods of change, this can influence global markets and may result in changes or delays to strategies that support Supply Chain growth..

Minimum Wages

Minimum Wages in the EU, UK and USA continue to rise, with rates increasing 4.7% (US, 1st Jan '24), and 5.5% (UK, 1st Apr '24). In the EU rates of increase vary depending on the country of employment. However, through 2022-23 the European Union has worked to address the vast gap between differing nations.

As global manufacturers ensure that they are legally compliant, these increases will lead to higher prices for goods and services and create a real risk of inflation rises through 2024.

Exchange Rates

Exchange rates have been through an extended period of volatility since the both the Euro and the Pound crashed against the dollar in September 2022. Both currencies have rallied well since then returning to similar levels of May 2022.

More recently, the pound is in a period of stability which increases spending confidence. The Euro continues to fluctuate; however, the overall trend is upwards.



Figure 27: GBP : USD Exchange Rates (2 Years) – Source: www.xe.com

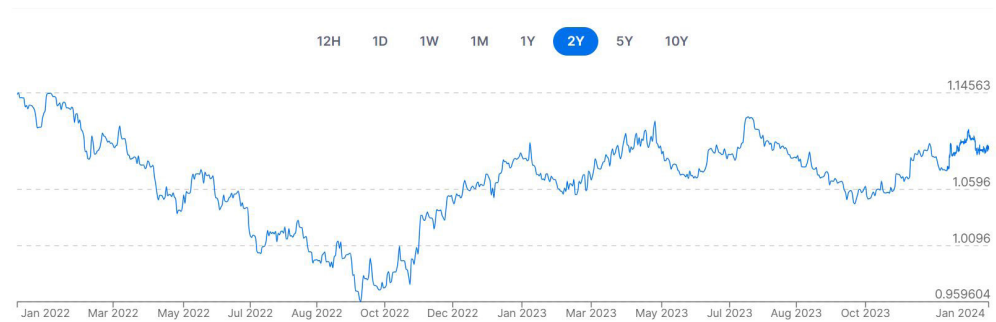


Figure 28: EUR : USD Exchange Rates (2 years) – Source: www.xe.com

Contacts

Howard Philips

Head of Supply Chain
+44 (0)7818 004699
howard.phillips@cicor.com

Jack Symonds

Head of Business Development
+44 (0)7772 216527
jack.symonds@cicor.com

Stuart Hill

Head of New Business Development
+44 (0)7585 331217
stuart.hill@cicor.com

Matthew Simms

Head of Programs
+44 (0)7708 390937
matthew.simms@cicor.com

Josh Cassell

Senior Account Manager
+44 (0)7973 266824
josh.cassell@cicor.com

Sarah Franklin

Quote Manager
+44 (0)7887 535682
sarah.franklin@cicor.com



a **cicor** company

Axis Electronics Ltd.
Bedford Heights
Manton Lane
MK41 7NY Bedford
United Kingdom

cicor.com
 