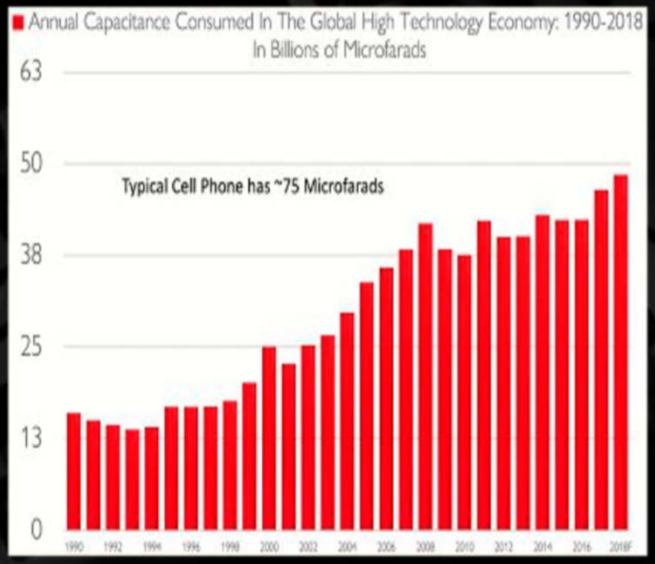
Ivent Solutions Market Trend Update

May 2018

MLCC Shortages Could Extend Into 2020 and Beyond

- Limited capacity expansion in the MLCC industry, specifically the ability to stack ceramic layers (limited capex in three-dimensional stacking capacity for barium titanate dielectric composition and nickel electrode paste) will extend shortages of MLCC to 2020 and beyond.
- As a result of expanding margins in ceramics - MLCC Manufacturers are NOT supporting low margin ceramic businesses, especially those that have exposure to precious metals such as ruthenium and palladium.
- MLCC are the "Workhorses of the Electronic Components Industry", they are relied upon and used across multiple industries. In fact, because of the scientific principal governing electrical and electronic circuits, the requirement for capacitance and resistance is mandatory. The most cost effective solution has been and will continue to be for the next ten years the stacking of ceramic, but anywhere that other dielectrics can be employed will now grow as manufacturers have no choice but to distance themselves from such a tremendous reliance on barium titanate based ceramic dielectric. This will impact demand and capacity for other dielectrics, and force the development of next generation ultra-small component technologies that are based upon new processes (but familiar materials).
- The near-term process will be that customers will lose support in key segments; especially in consumer AV and home appliance where the added loss of a key MLCC vendors in Y5V dielectric has placed added pressure on prices.
- Any manufacturer with ceramic production capability will be targeted and rapidly approved as a vendor of capacitors in markets, especially automotive, where they have not supplied before. Competition for MLCC will become more pronounced because the high-tech supply chain only reacts when it is under intense pressure, and then it tends to overreact in the opposite direction.



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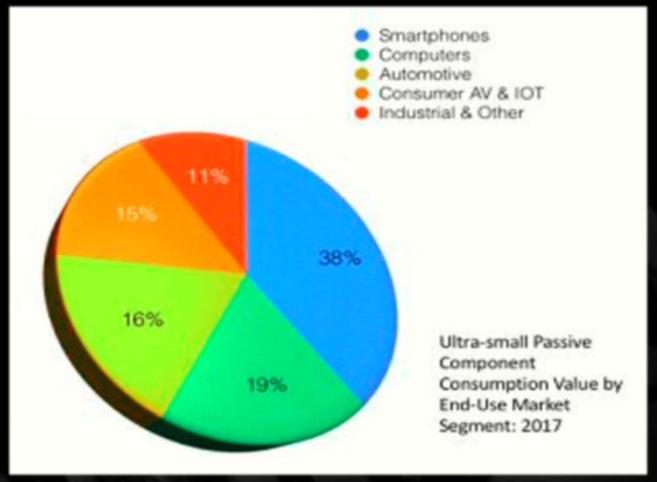
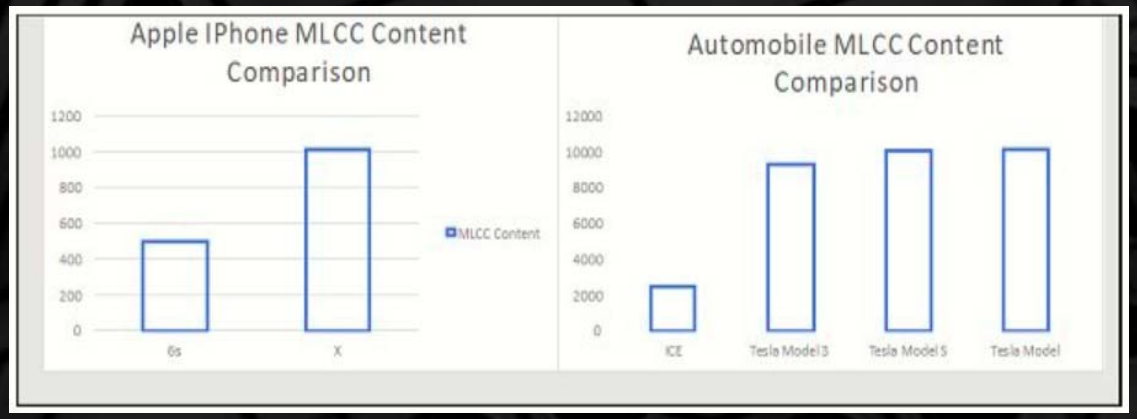
The traditional methods for addressing a parts shortage is to assume all manufacturers are the same and simply move down the supply base from tier one, to tier two, to tier three vendor levels and then target specific products that might be critical but unusual (high voltage, high temperature, NPO type) that may be sourced to smaller vendors in China, Singapore, Thailand, Malaysia, Slovenia, Hungary, Czech Republic, Japan, Australia, etc. The problem with this scenario is that everyone is already on this course of action as a viable strategy and capacity has already filled up in most of those areas due to the similar processes that buyers use to address problems like shortages of components. Some finance companies and manufacturers are already researching the raw material supply in China's of barium titanate, nickel, equipment, testing, to see who is best positioned to handle the coming shortages and who will benefit in FY 2020 as the market rushes to find alternative methods to produce MLCC and the PCB. From a many insiders views, the very limited supply base and technology hurdles required to compete in high capacitance MLCC makes outside challengers a very limited threat because the supply chain for advanced engineered materials is even more limited as the base in Japan supplies all the companies with captive BT and Ni powders.





Alternative methods outside the mainstream are already upon us in the form of thin and thick film integrated passive devices and integral passive substrates. This is the next generation of capacitance, resistance and inductance generation for volumetric efficiency and the next big area for passive component investment. The TDK investment in thin film barium strontium titanate production speaks volumes for the future, and Murata's purchase of IPDIA points the way toward the next requirements for handset module manufacturers and wearables to generate power, connect and provide the capacitance and energy density needed to create advanced functionality and complete autonomous black box systems, be it a module, handset or automobile.

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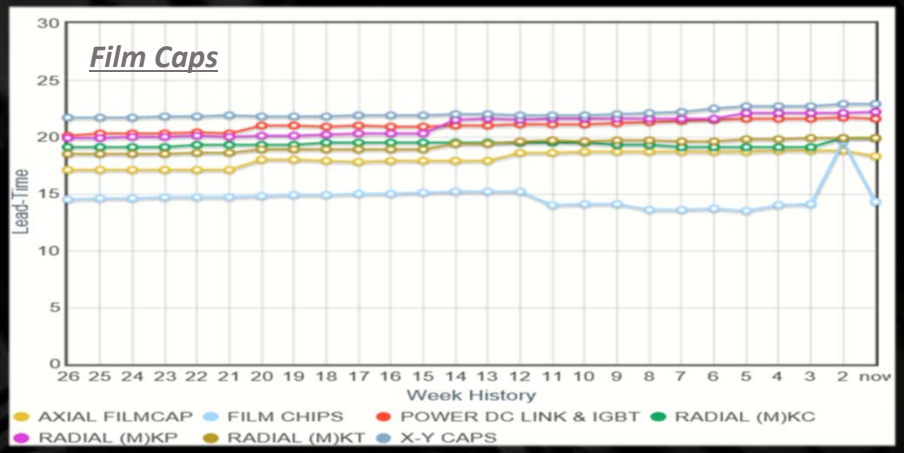
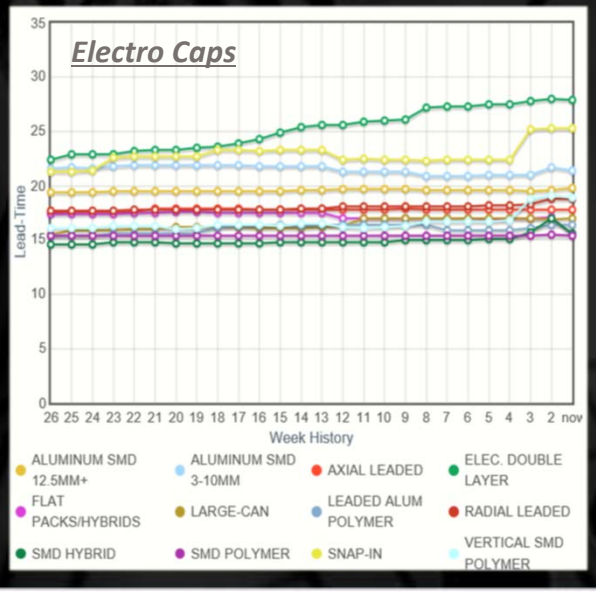
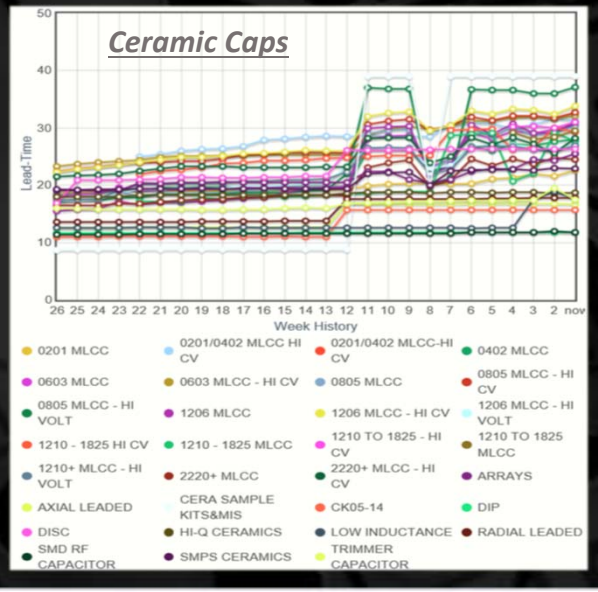
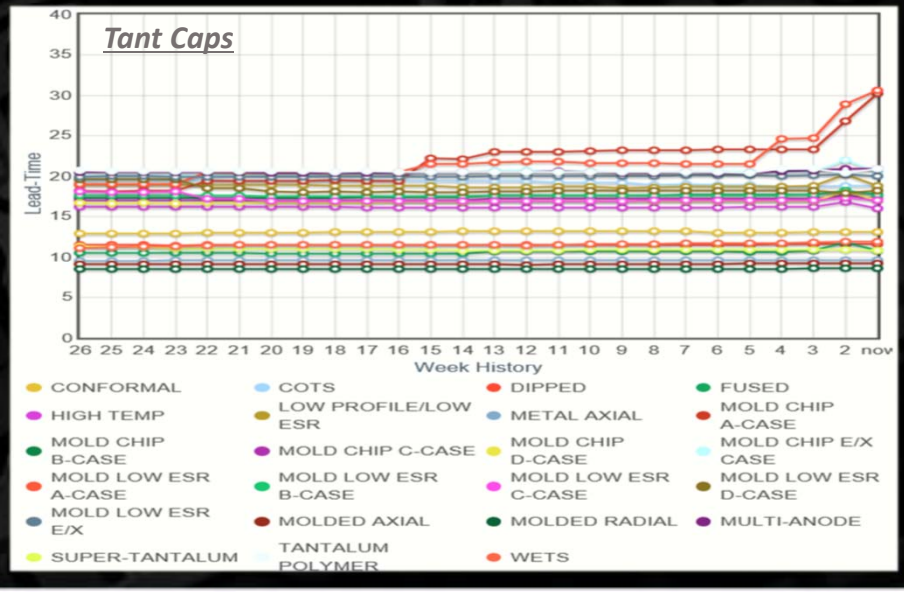
- *Leadtimes continue to increase*
- *No reductions noted across most major types and brands*
- *Tantalum capacitors are increasing in leadtime rapidly*
- *Standard leadtime for SMD MLCC now at around 40 weeks*
- *Film caps relatively stable, but still at over 20 weeks*
- *Most electrolytic caps are seeing leadtime increases*
- *Factories not committing to orders and are simply selling to the highest bidder when stock becomes available…*









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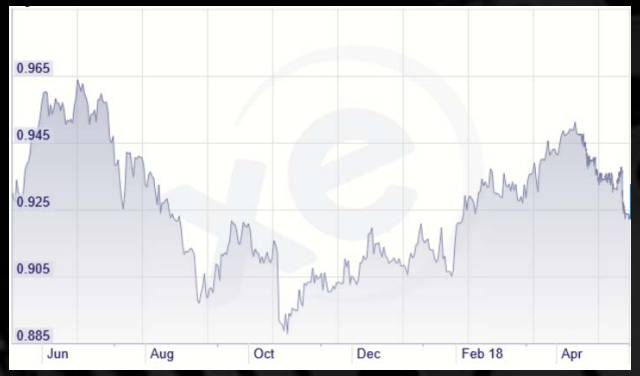
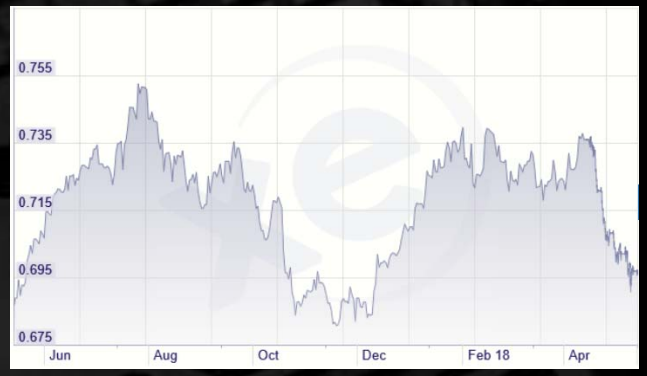
NZD versus AUD - AU$0.925 vs NZ$1.00

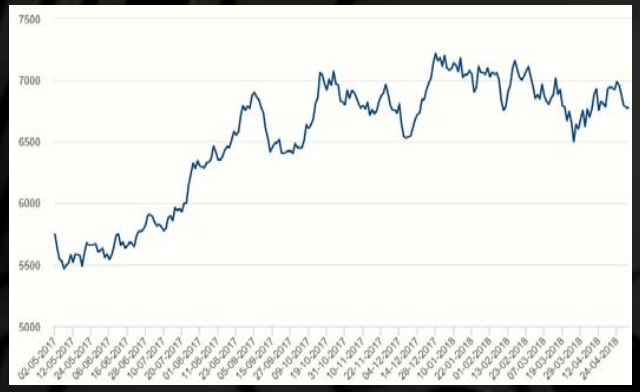


NZD versus USD - US$0.695 vs NZ$1.00

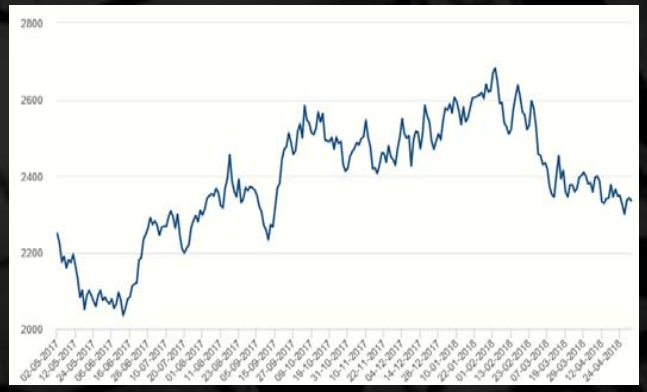


NZD versus EUR - EU$0.585 vs. NZ$1.00

Copper - USD6800 / tonne



Lead - USD2350 / tonne



Nickel - USD13750 / tonne