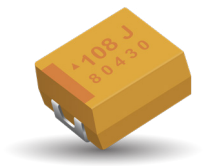
MLCC & Tantalum
Interchangeability Brochure

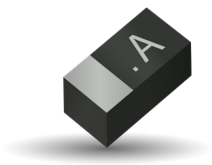
PRODUCT SELECTION

TANTALUM



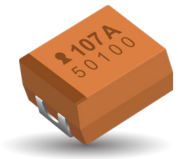
AVX is the number one tantalum capacitor supplier with manufacturing plants worldwide providing flexibility and capacity for all electronic industry demands. We are the global leader in MnO_2 solid tantalum technology, including the world's smallest case size tantalum chips, sharing common footprints with Hi CV MLCC.

POLYMER



AVX offers a broad range of conductive polymer solid electrolytic capacitors featuring high capacitance with low ESR in standard and low profile case sizes. With a benign failure mode under recommended usage conditions, they are a good choice in MLCC replacement applications.

NIOBIUM OXIDE



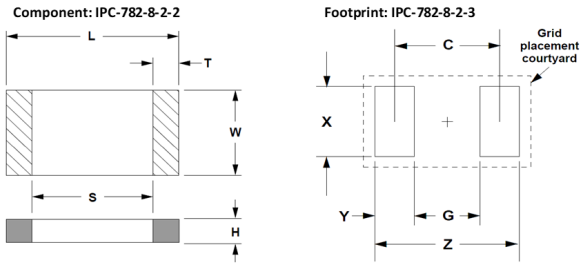
AVX OxiCap® capacitors are solid electrolytic capacitors using Niobium Oxide (NbO) anode material instead of traditional Tantalum. Niobium is a widely available material and has several advantages over tantalum including a non-short circuit failure mode. AVX OxiCap® is available with low ESR, Hi CV, and small, low profile case sizes for Hi CV MLCC replacement.

AVX ELECTROLYTIC ADVANTAGES

AVX is a leading international manufacturer and supplier of a wide range of advanced electronic components, including: capacitors, inductors, filters, and circuit protection devices.

The AVX tantalum electrolytic division has maintained a leadership position in automotive, industrial, medical, space, military, consumer electronics, communications, and transportation markets for nearly 50 years.

COMMON FOOTPRINTS



IPC has set a standard of recommended footprints for most classes of surface mount electronic components including resistors, capacitors and inductors.

Although many companies develop their own internal footprint guidelines, IPC standards for MLCC and tantalum chip are the starting point.

AVX SERIES - CASE SIZE AVAILABILITY

	0201	0402	0603	0805	1206	1210
TLC	X	X	X	X	X	X
TAC / TPC		X	X	X	X	X
F98		X	X	X		
TAJ / TLJ/ TLN / TPS				X	X	X
F38		X	X	X		
TCJ / TCN				X	X	X
TCQ AEC-Q200						X
NOJ / NLJ / NOS				X	X	X

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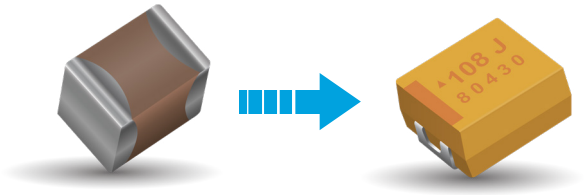
MLCC & TANTALUM INTERCHANGEABILITY



SURFACE MOUNT DEVICE CAPACITORS – FOOTPRINT COMPATIBILITY:

Tantalum chip and Hi CV MLCC have a large degree of overlap in available capacitance ratings in common footprints. As MLCC production increased, many applications converted from tantalum to MLCC for many filtering, bypass, and hold-up applications.

With the increasing demands seen for low voltage digital applications, tantalum electrolytic technologies have become a first choice for MLCC substitution.

LEARN MORE!

DESIGN PARAMETER

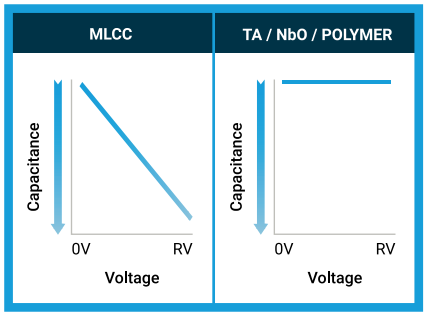
Maximum Available Capacitance by Case Size (6.3V):

µF	0402	0603	0805	1206	1210
Tantalum	22	100	100	220	220
Polymer	4.7	47	100	100	330
NbO	–	–	22	47	100

TECH COMPARISON

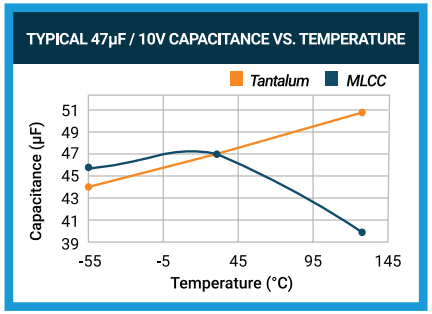
Voltage Coefficient:

The capacitance of a Hi CV MLCC will decrease as bias voltage increases. Tantalum, polymer, and niobium oxide show no voltage coefficient effect.



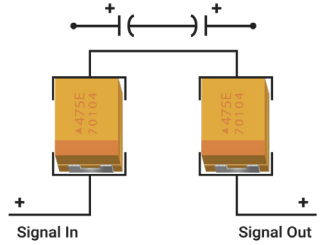
Temperature Coefficient:

The capacitance of a Hi CV MLCC will decrease at both high and low temperatures. Tantalum, polymer, and niobium oxide show no voltage coefficient effect.



Reverse Bias / Non-Polar Operation:

For non-polar operation, connect two electrolytic capacitors in series back-to-back (typically common negative). Two identical capacitors in series will have half the capacitance of a single capacitor, the same voltage rating, but will now be bidirectional (non-polar).



SPECIFICATION COMPARISON

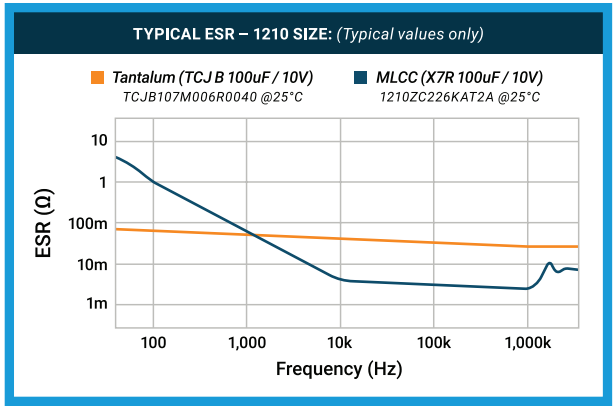
ATTRIBUTES	MLCC		TANTALUM CHIP		POLYMER CHIP		NbO CHIP OxiCap®	
	COMMERCIAL	AEC-Q200	COMMERCIAL	AEC-Q200	COMMERCIAL	AEC-Q200	COMMERCIAL	AEC-Q200
Max Capacitance 1210	330µF	33µF	330µF	100µF	220µF	100µF	150µF	100µF
Voltage Range 1210	4V - 50V	16V - 100V	4V - 50V	4V - 50V	2V - 63V	4V - 35V	1.8V - 10V	1.8V - 10V
Typical ESR 1210	7 - 15mOhms	10 - 40mOhms	300 - 800mOhms	300- 800mOhms	30-200mOhms	70 - 250mOhms	300 -600mOhms	300 -600mOhms
Temperature Range	-55°C to +85°C	-55°C to +125 / +150°C	-55°C to +125°C	-55°C to +125 / +200°C	-55°C to +105 / +125°C	-55°C to +125°C	-55°C to +105°C	-55°C to +105 / +125°C
Primary Failure Mode	Short	Short	Short	Short	Short	Short	Resistive	Resistive
Lifetime (10% Cap loss at Tmax/Vmax)	Indefinite	Indefinite	Indefinite	Indefinite	Application Dependent	Application Dependent	Indefinite	Indefinite
Recommended Voltage Derating	20%	20%	50%	50%	20%	20%	20%	20%
CHECK FOR:								
Voltage Coefficient	Cap Loss vs V	Cap Loss vs V						
Piezo Noise	@ Audio Frequencies	@ Audio Frequencies						
Reverse Voltage			Not Allowed					
To Be Considered	Parametric Stability vs DC Bias, Ripple & Temperature		Derating Rules		Check for MLS		Max Rated Voltage 10V	

ESR (Equivalent Series Resistance):

The impedance curve of a Hi CV MLCC has a high Q (sharp resonance) and very low ESR.

The impedance curve of tantalum and niobium electrolytic capacitors has a broadband characteristic with low ESR, which increases at low temperatures.

The impedance curve of polymer electrolytic capacitors also has a broadband characteristic, but with lower ESR than tantalum and niobium oxide electrolytics, and remains low at low temperatures.



SMD TECHNOLOGY OVERLAP:

FILM / Hi CV MLCC / TA / NbO / POLYMER