MLCC – Tantalum Chip Substitution

Common Footprints

MLCC - TANTALUM

How To Use This Guide:

Many years ago, IPC 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. At the time they were developed, there was only one common footprint between MLCC & Ta chip – the 1206 size, which is common to both series.

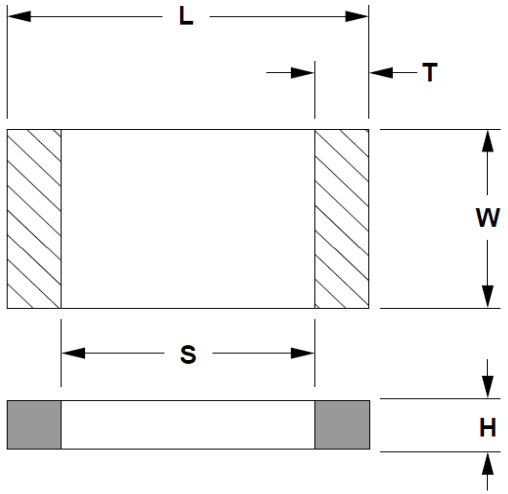
Since that time tantalum chip has added smaller case sizes, designed for compatibility with IPC MLCC footprints. This guide shows, by case size, which tantalum chip series and case sizes fit a common IPC footprint.

As tantalum capacitance / voltage ratings overlap with most Class II ratings (X7R, X5R, X7S etc.), when looking for a substitute first use this guide to establish a footprint compatible tantalum chip series then contact AVX to establish compatible electrical ratings.

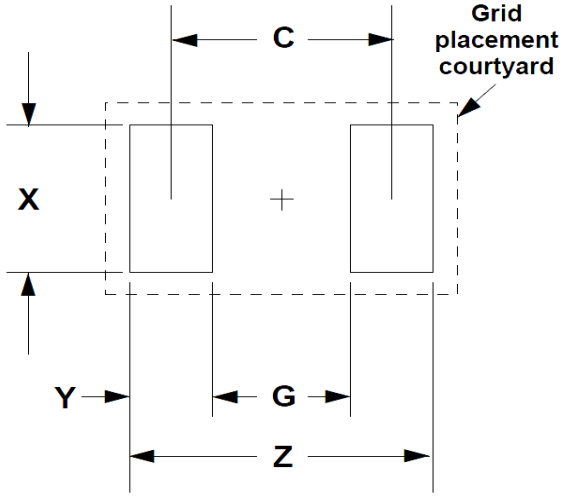
0402 | MLCC - TANTALUM

0402 MLCC vs Ta / NbO Series Case Sizes

Component: IPC-782-8-2-2



Footprint: IPC-782-8-2-3



Equivalent Footprint Compatibility:

Tantalum Undertab (LGA) Chip:		
Metric	Series	Case
1106-06	F98	U

Polymer Undertab (LGA) Chip:		
Metric	Series	Case
1106-06	F38	U

Microchip:		
Metric	Series	Case
1005-07	TAC	K
1005-07	TLC	K
1005-07	TPC	K

Component Outline:

All dims mm		L		S		W		T		H
Metric	EIA	min	max	min	max	min	max	min	max	max
1005	0402	0.9	1.1	0.3	0.65	0.4	0.6	0.1	0.3	0.6

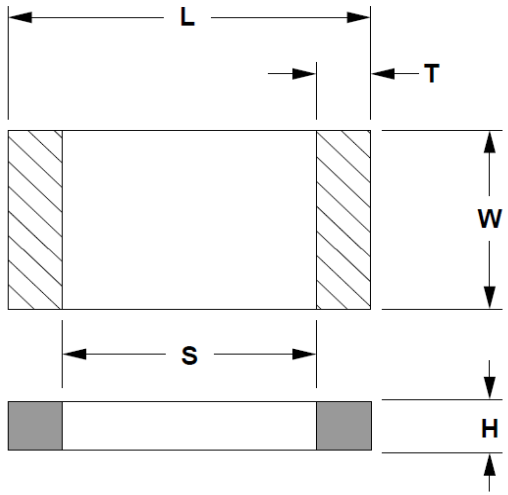
Footprint:

Metric	EIA	Z (mm)	G (mm)	X (mm)	Y (mm) ref	C (mm) ref	RLP
1005	0402	2.2	0.4	0.7	0.9	1.3	130A

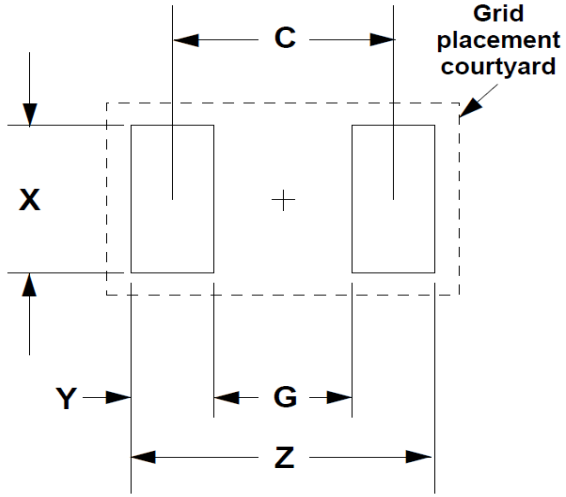
0603 | MLCC - TANTALUM

0603 MLCC vs Ta / NbO Series Case Sizes

Component: IPC-782-8-2-2



Footprint: IPC-782-8-2-3



Component Outline:

All dims mm		L		S		W		T		H
Metric	EIA	min	max	min	max	min	max	min	max	max
1608	[0603]	1.45	1.75	0.45	0.97	0.65	0.95	0.2	0.5	0.85

Footprint:

Metric	EIA	Z (mm)	G (mm)	X (mm)	Y (mm) ref	C (mm) ref	RLP
1608	[0603]	2.8	0.6	1	1.1	1.7	132A

Equivalent Footprint Compatibility:

Tantalum Undertab (LGA) Chip:		
Metric	Series	Case
1608-09	F98	M

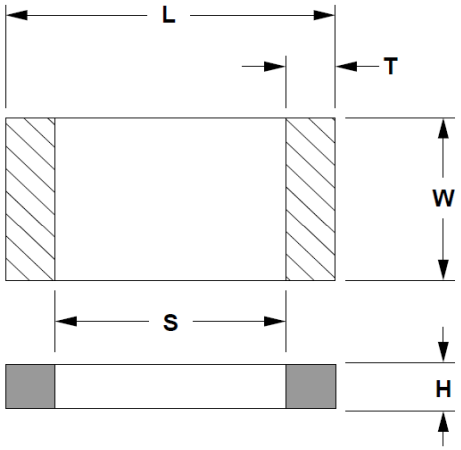
Polymer Undertab (LGA) Chip:		
Metric	Series	Case
1608-09	F38	M

Microchip:		
Metric	Series	Case
1608-10	TAC	L
1608-08	TAC	J
1608-10	TLC	L
1605-07	TLC	Z
1608-10	TPC	L

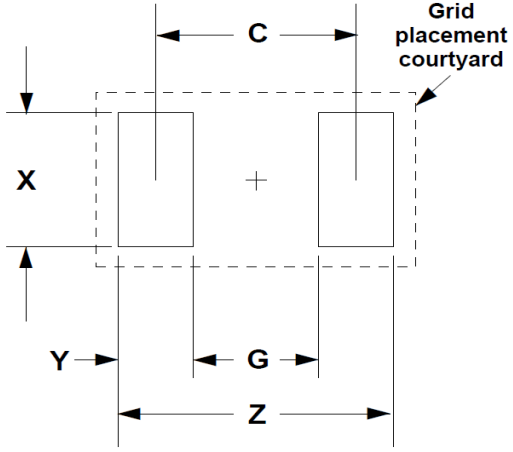
0805 | MLCC - TANTALUM

0805 MLCC vs Ta / NbO Series Case Sizes

Component: IPC-782-8-2-2



Footprint: IPC-782-8-2-3



Component Outline:

All dims mm		L		S		W		T		H
Metric	EIA	min	max	min	max	min	max	min	max	max
2012	[0805]	1.8	2.2	0.3	1.11	1.05	1.45	0.25	0.75	1.1

Footprint:

Metric	EIA	Z (mm)	G (mm)	X (mm)	Y (mm) ref	C (mm) ref	RLP
2012	[0805]	3.2	0.6	1.5	1.3	1.9	133A

Equivalent Footprint Compatibility:

Tantalum Chip:		
Metric	Series	Case
2012-15	TAJ	P
2012-12	TAJ	R
2012-12	F92	P
2012-15	TLJ	P
2012-12	TLJ	R
2012-15	TPS	P
2012-12	TPS	R

Microchip:		
Metric	Series	Case
2012-15	TAC	R
2012-10	TAC	H
2012-06	TAC	U
2012-15	TLC	R
2012-10	TLC	H
2012-06	TLC	U
2012-15	TPC	R
2012-10	TPC	H

Conformal Tantalum Chip:		
Metric	Series	Case
2212-12	F95	P
2212-065	F95	R

Niobium Oxide (OxiCap):		
Metric	Series	Case
2012-15	NOJ	P
2012-15	NLJ	P

Conductive Polymer:		
Metric	Series	Case
2012-15	TCJ	P
2012-12	TCJ	R
2012-10	TCJ	N

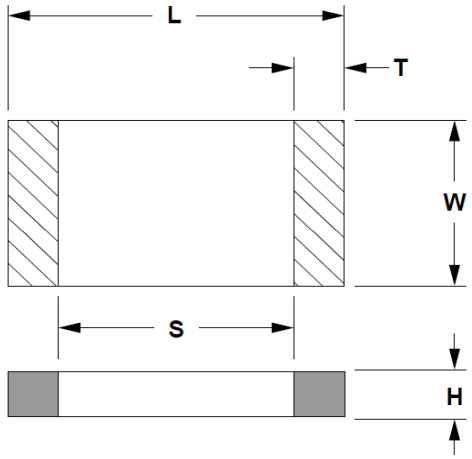
Tantalum Undertab (LGA) Chip:		
Metric	Series	Case
2012-09	TLN	M
2012-10	TLN	N
2012-09	F98	S
2012-09	F98-AS1	S

Polymer Undertab (LGA) Chip:		
Metric	Series	Case
2012-09	F38	S
2012-10	TCN	N
2012-09	TCN	M

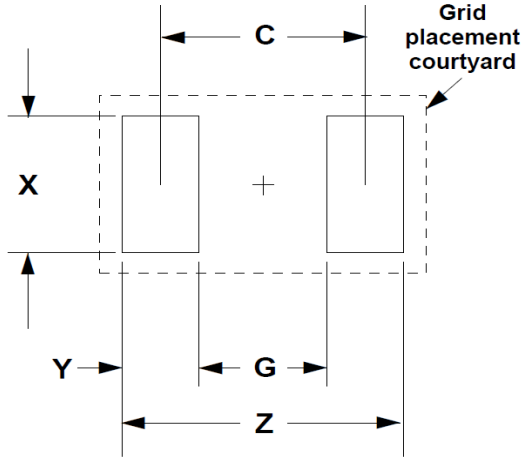
1206 | MLCC - TANTALUM

1206 MLCC vs Ta / NbO Series Case Sizes

Component: IPC-782-8-2-2



Footprint: IPC-782-8-2-3



Component Outline:

All dims mm		L		S		W		T		H
Metric	EIA	min	max	min	max	min	max	min	max	max
3216	[1206]	3	3.4	1.5	2.31	1.4	1.8	0.25	0.75	1.35

Footprint:

Metric	EIA	Z (mm)	G (mm)	X (mm)	Y (mm) ref	C (mm) ref	RLP
3216	[1206]	4.4	1.2	1.8	1.6	2.8	134A

Equivalent Footprint Compatibility:

Tantalum Chip:

Metric	Series	Case
3216-18	TAJ	A
3216-12	TAJ	S
3216-10	TAJ	K
3216-18	TAJ Auto	A
3216-12	F92	A
3216-18	F93	A
3216-18	F93-BE	A
3216-18	F93-AJ6	A
3216-18	TLJ	A
3216-15	TLJ	G
3216-12	TLJ	S
3216-10	TLJ	K
3216-18	TPS	A
3216-12	TPS	S
3216-18	TPS Auto	A
3216-18	F91-AJ6	A
3216-18	TRJ	A
3216-18	F97	A
3216-18	F97-HT3	A
3216-18	F97-HT5	A
3216-18	TMJ	A
3216-18	THJ	A

Conductive Polymer:

Metric	Series	Case
3216-18	TCJ	A
3216-15	TCJ	G
3216-12	TCJ	S
3216-10	TCJ	K

Tantalum Undertab (LGA) Chip:

Metric	Series	Case
3216-12	TLN	S
3216-10	TLN	K

Polymer Undertab (LGA) Chip:

Metric	Series	Case
3216-12	TCN	S
3216-10	TCN	K
3216-06	TCN	O

Microchip:

Metric	Series	Case
3216-18	TAC	A
3216-08	TAC	V
3216-05	TAC	I
3216-08	TLC	V
3216-06	TLC	D

Conformal Tantalum Chip:

Metric	Series	Case
3217-16	F95	A
3216-12	F95	S
3216-10	F95	Q

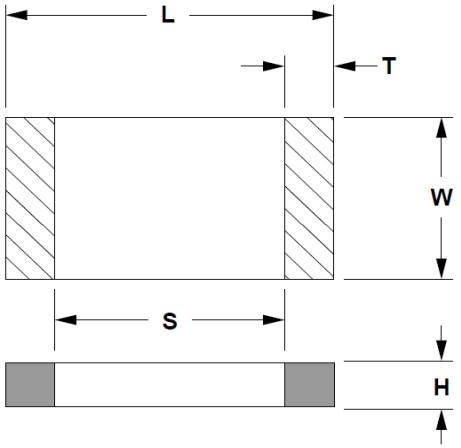
Niobium Oxide (OxiCap):

Metric	Series	Case
3216-18	NOJ	A
3216-12	NOJ	S
3216-18	NLJ	A
3216-12	NLJ	S
3216-18	NOS	A

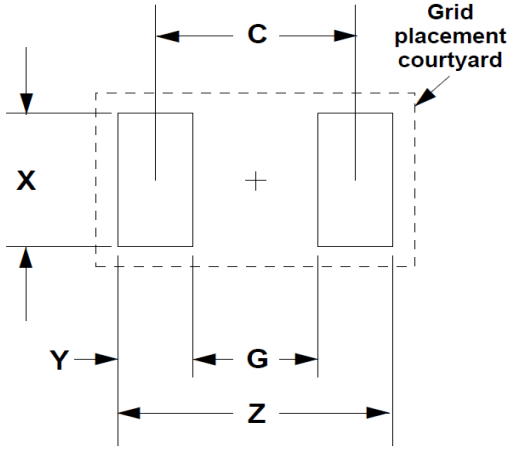
1210 | MLCC - TANTALUM

1210 MLCC vs Ta / NbO Series Case Sizes

Component: IPC-782-8-2-2



Footprint: IPC-782-8-2-3



Component Outline:

All dims mm		L		S		W		T		H
Metric	EIA	min	max	min	max	min	max	min	max	max
3225	[1210]	3	3.4	1.5	2.31	2.3	2.7	0.25	0.75	1.35

NOTE: All equivalent Ta / NbO 3528 case size alternatives listed are 0.2mm - 0.3mm longer than IPC 1210 component length dimension for MLCC; but all fit within the envelope for IPC 1210 (RLP 135A) footprint recommendation below:

Footprint:

Metric	EIA	Z (mm)	G (mm)	X (mm)	Y (mm) ref	C (mm) ref	RLP
3225	[1210]	4.4	1.2	2.7	1.6	2.8	135A

Equivalent Footprint Compatibility:

Tantalum Chip:

Metric	Series	Case
3528-21	TAJ	B
3528-15	TAJ	H
3528-12	TAJ	T
3528-21	TAJ Auto	B
3428-12	F92	B
3528-21	F93	B
3528-21	F93-BE	B
3528-21	F93-AJ6	B
3528-21	TLJ	B
3528-15	TLJ	H
3528-12	TLJ	T
3528-21	TPS	B
3528-12	TPS	T
3528-21	TPS Auto	B
3528-21	F91	B
3528-21	F91-AJ6	B
3528-21	TRJ	B
3528-21	F97	B
3528-21	F97-HT3	B
3528-21	F97-HT5	B
3528-21	TMJ	B
3528-21	THJ	B
3528-21	THJ-200	B

Conductive Polymer:

Metric	Series	Case
3528-21	TCJ	B
3528-15	TCJ	H
3528-12	TCJ	T
3528-21	TCQ	B
3528-21	TCR	B

Niobium Oxide (OxiCap):

Metric	Series	Case
3528-20	NOJ	B
3527-12	NOJ	T
3528-20	NLJ	B
3527-12	NLJ	T
3528-20	NOS	B
3527-12	NOS	T

Microchip:

Metric	Series	Case
3528-15	TAC	B
3528-12	TAC	T
3528-12	TLC	T

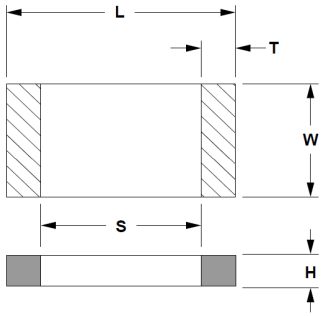
Conformal Tantalum Chip:

Metric	Series	Case
3528-20	F95	B
3527-12	F95	T
3528-20	Audio F95	B

APPENDIX: IPC MLCC Recommendations

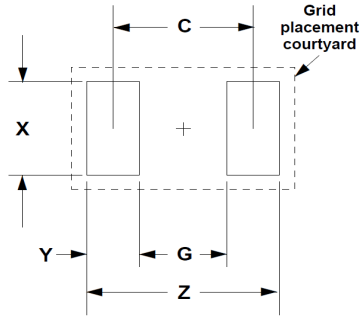
3.3.3.4 Land Pattern Registration Each land pattern has received a registration number. The RLP (Registered Land Pattern) number is a three digit number with a set of numbers assigned to land patterns for a particular family of components. The original number assigned to a particular component, uses that analysis shown for the specific section (sections 8 through 16). The analyses assume certain tolerances for board fabrication, placement machine accuracy and minimum desired solder joint. Changes in the assumptions will result in a revision letter to the number. Thus the first change to RLP 106 would be identified as RLP 106A, the second change would be RLP 106B etc. The letters x, y & z are reserved for user modifications to the standard land pattern. If a company wishes to change the approved standard land pattern the user would identify his customized version as RLP 106X, RLP 106Y or RLP 106Z. It should be recognized that X, Y & Z type RLP's reflect unique land patterns and will differ company to company.

Component:



		L		S		W		T		H
Metric	EIA	min	max	min	max	min	max	min	max	max
1005	[0402]	0.9	1.1	0.3	0.65	0.4	0.6	0.1	0.3	0.6
1310	[0504]	1.02	1.32	0.26	0.72	0.77	1.27	0.13	0.38	1.02
1608	[0603]	1.45	1.75	0.45	0.97	0.65	0.95	0.2	0.5	0.85
2012	[0805]	1.8	2.2	0.3	1.11	1.05	1.45	0.25	0.75	1.1
3216	[1206]	3.0	3.4	1.5	2.31	1.4	1.8	0.25	0.75	1.35
3225	[1210]	3.0	3.4	1.5	2.31	2.3	2.7	0.25	0.75	1.35
4532	[1812]	4.2	4.8	2.3	3.46	3.0	3.4	0.25	0.95	1.35
4564	[1825]	4.2	4.8	2.3	3.46	6.0	6.8	0.25	0.95	1.1

Footprint:



Metric	EIA	Z (mm)	G (mm)	X (mm)	Y (mm) ref	C (mm) ref	RLP*
1005	[0402]	2.2	0.4	0.7	0.9	1.3	130A
1310	[0504]	2.4	0.4	1.3	1.0	1.4	131A
1608	[0603]	2.8	0.6	1.0	1.1	1.7	132A
2012	[0805]	3.2	0.6	1.5	1.3	1.9	133A
3216	[1206]	4.4	1.2	1.8	1.6	2.8	134A
3225	[1210]	4.4	1.2	2.7	1.6	2.8	135A
4532	[1812]	5.8	2.0	3.4	1.9	3.9	136A
4564	[1825]	5.8	2.0	6.8	1.9	3.9	137A

*** RLP = IPC Registered Land Pattern Number**

THANK YOU