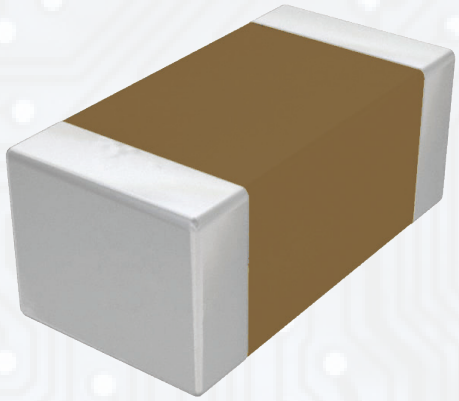
MULTILAYER HIGH TEMP CERAMIC CAPACITORS
- HTC SERIES -



TYPE

__04 [0402 inch], __06 [0603 inch], __21 [0805 inch], __31 [1206 inch], __32 [1210 inch], __43 [1812 inch], __55 [2220 inch]

SERIES OVERVIEW

- High temperature application HTC series, commercial grade of Cal-Chip Electronics, Inc. multilayer ceramic chip capacitor, is a product whose maximum operating temperature is 150°C. The capacitance range is up to 22µF

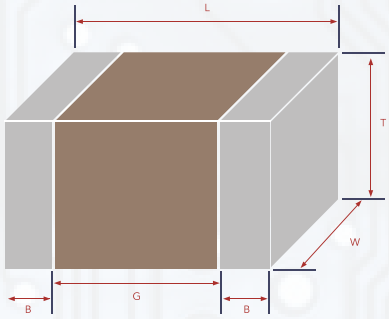
FEATURES

- Operating temperature range: –55 to +150°C
- Class I and Class II ceramic Dielectric having excellent stable temperature, –55 to +150°C)

APPLICATION

- Decoupling, smoothing, snubber and resonant circuits of equipment operating in a high-temperature environment
- Peripheral circuits of high-temperature devices such as IGBT, SiC, GaN

SHAPE AND DIMENSIONS

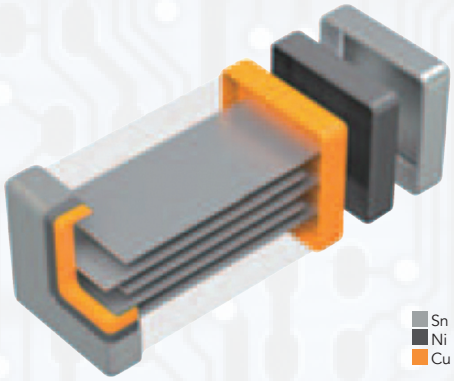


DIMENSIONS IN MM

TYPE	L (MM)	W (MM)	T (MM)	B (MM)	G (MM)
04	1.00±0.05	0.50±0.05	0.50±0.05	0.10 min.	0.30 min.
10	1.60±0.10	0.80±0.10	0.80±0.10	0.20 min.	0.30 min.
21	2.00±0.20	1.25±0.20	1.25±0.20	0.20 min.	0.50 min
31	3.20±0.20	1.60±0.20	1.60±0.20	0.20 min.	1.00 min
32	3.20±0.40	2.50±0.30	2.50±0.30	0.20 min.	—
43	4.50±0.40	3.20±0.40	3.20±0.30	0.20 min.	—
55	5.70±0.40	5.00±0.40	2.80±0.30	0.20 min.	—

*Dimensional tolerances are typical values.

PRODUCT STRUCTURE



- The structure which multiple sheets of dielectric and conductive material are layered alternately. The superior mechanical strength and reliability are realized by the monolithic and simple structure

TEMPERATURE CHARACTERISTICS	CAPACITANCE CHANGE	TEMPERATURE RANGE
X8G	0 ± 30ppm/°C	-55 to + 150°C
X8R	±15%	-55 to + 150°C
X8L	+15, - 40%	-55 to + 150°C

PART NUMBER

HTC	32	X8L	226	M	16	NT	G	1
SERIES	DIMENSIONS	DIELECTRIC	CAPACITANCE	TOLERANCE	RATED VOLTAGE	TERMINATION	REEL DIMENSION	REEL SIZE
HTC SERIES	04 (1005) - 0402 10 (1608) - 0603 21 (2012) - 0805 31 (3216) - 1206 32 (3225) - 1210 43 (4532) - 1812 55 (5750) - 2220	X8G X8R X8L	0R5: 0.5pF 101: 100pF 225: 2.2µF 226: 22µF	C: ± 0.25pF D: ± 0.50pF J: ± 5% K: ± 10% M:± 20%	4R0: 4V 6R3: 6.3V 10: 10V 16: 16V 25: 25V 50: 50V 100: 100V 250: 250V 450: 450V 630: 630V	NT: Sn/Ni	G: 13" diameter __: 7" diameter	1: 1K 2: 2K 3: 3K 4: 4K 6: 6K 8: 8K 10: 10K

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CAPACITANCE RANGE CHART

DIELECTRIC		X8G					X8R				X8G						X8R				X8L		X8G						X8R				X8L			
SIZE		0402									0603												0805													
RATED VOLTAGE		100	50	25	16	10	100	50	25	16	250	100	50	25	16	10	100	50	25	16	16	6.3	450	250	100	50	25	16	10	100	50	25	16	25	16	10	6.3
CAPACITANCE RANGE	0.1pF	0R1		B	B	B	B																		C	C	C	C	C								
	0.2pF	0R2		B	B	B	B																		C	C	C	C	C								
	0.4pF	0R4		B	B	B	B																		C	C	C	C	C								
	0.5pF	0R5		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	1pF	1R0		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	1.5pF	1R5		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	2pF	2R0		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	2.2pF	2R2		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	3	3R0		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	3.3	3R3		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	4	4R0		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	4.7	4R7		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	5	5R0		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	6	6R0		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	6.8	6R8		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	7	7R0		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	8	8R0		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	9	9R0		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	10	100		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	12	120		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	15	150		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	18	180		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	22	220		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	27	270		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	33	330		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	39	390		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	47	470		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	56	560		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	68	680		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	82pF	820		B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	100pF	101	B	B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	120	121	B	B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	150	151	B	B	B	B	B	B	B			D	D	D	D	D									C	C	C	C	C								
	180	181	B	B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	220	221	B	B	B	B	B	B	B			D	D	D	D	D									C	C	C	C	C								
	270	271	B	B	B	B	B					D	D	D	D	D									C	C	C	C	C								
	330	331	B	B	B	B	B	B	B			D	D	D	D	D									C	C	C	C	C								
	390	391	B	B	B	B	B					D	D	D	D	D							C		E	E	E	E	E								
	470	471	B	B	B	B	B	B	B			D	D	D	D	D							C		E	E	E	E	E								
	560	561		B	B	B	B					D	D	D	D	D							C		E	E	E	E	E								
	680	681		B	B	B	B	B	B			D	D	D	D	D							C		E	E	E	E	E								
	820	821		B	B	B	B				D	D	D	D	D	D							C		E	E	E	E	E								
	1,000	102		B	B	B	B	B	B		D	D	D	D	D	D	D	D					C		E	E	E	E	E								
	1,200	122									D	D	E	E	E	E							C		E	E	E	E	E								
	1,500	152						B	B		D	D	E	E	E	E	D	D					E		E	E	E	E	E								
	1,800	182									D	D	E	E	E	E							E		E	E	E	E	E								
	2,200	222						B	B		D	D	E	E	E	E	D	D					E		E	E	E	E	E								
	2,700	272										D	E	E	E	E							G		G	G	G	G	G								
	3,300	332						B	B			D	E	E	E	E	D	D					G	E	G	G	G	G	G								
	3,900	392											D										G	G	G	G	G	G	G								
	4,700	472							B				D				D	D					G	G	G	G	G	G	G								
	5,600	562											D										G	G	G	G	G	G	G								
	6,800	682							B	B			D				D	D						G	G	G	G	G	G								
	8,200	822											D											G	G	G	G	G	G								
	.01µF	103							B	B			D				D	D						G	G	G	G	G	G								
	.015	153								B							D	D								E										
	.022	223								B							D	D								G					G					
	.033	333								B	B						D	D								G					G					
	.047	473								B	B							D													G					
	.068	683																D	D												G	G				
	.1	104		D														D	D													G				
	.15	154																	D													G	E			
	.22	224																	D													G	G			
	.33	334																	D	D													G			
	.47	474																		D													G			
	.68	684																			D												G	G		
	1	105								G											D												G	G		
	1.5	155																				D												G		
	2.2	225																				D												G		
	3.3	335																																	G	
	4.7	475																																G	G	
	6.8	685																																		G
	10	106																																	G	G

B	C	D	E	G
0.50mm	0.60mm	0.80mm	0.85mm	1.25mm

MS LEVEL 1

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CAPACITANCE RANGE CHART

DIELECTRIC		X8G								X8R				X8L				X8G								X8R			X8L			NP0			NP0		
SIZE		1206																1210														1812			2220		
RATED VOLTAGE		630	450	250	100	50	25	16	10	100	50	25	16	50	25	16	4	630	450	250	100	50	25	16	10	100	25	16	100	50	16	630	450	250	450	250	100
1pF	1R0																																				
1.2pF	1R2					E	E	E	E																												
1.5pF	1R5					E	E	E	E																												
2pF	2R0					E	E	E	E																												
2.2pF	2R2					E	E	E	E																												
3	3R0					E	E	E	E																												
3.3	3R3					E	E	E	E																												
4	4R0					E	E	E	E																												
4.7	4R7					E	E	E	E																												
5	5R0					E	E	E	E																												
6	6R0					E	E	E	E																												
6.8	6R8					E	E	E	E																												
7	7R0					E	E	E	E																												
8	8R0					E	E	E	E																												
9	9R0					E	E	E	E																												
10	100					E	E	E	E												F	F	F	F	F												
12	120					E	E	E	E												F	F	F	F	F												
15	150					E	E	E	E												F	F	F	F	F												
18	180					E	E	E	E												F	F	F	F	F												
22	220					E	E	E	E												F	F	F	F	F												
27	270					E	E	E	E												F	F	F	F	F												
33	330					E	E	E	E												F	F	F	F	F												
39	390					E	E	E	E												F	F	F	F	F												
47	470					E	E	E	E												F	F	F	F	F												
56	560					E	E	E	E												F	F	F	F	F												
68	680					E	E	E	E												F	F	F	F	F												
82pF	820					E	E	E	E												F	F	F	F	F												
100pF	101					E	E	E	E												F	F	F	F	F												
120	121					E	E	E	E												F	F	F	F	F												
150	151					E	E	E	E												F	F	F	F	F												
180	181					E	E	E	E												F	F	F	F	F												
220	221					E	E	E	E												F	F	F	F	F												
270	271					E	E	E	E												F	F	F	F	F												
330	331					E	E	E	E												F	F	F	F	F												
390	391					E	E	E	E												F	F	F	F	F												
470	471					E	E	E	E												F	F	F	F	F												
560	561					E	E	E	E												F	F	F	F	F												
680	681					E	E	E	E												F	F	F	F	F												
820	821					E	E	E	E												F	F	F	F	F												
1,000	102					E	E	E	E												F	F	F	F	F												
1,200	122					E	E	E	E												F	F	F	F	F												
1,500	152					E	E	E	E												F	F	F	F	F												
1,800	182					E	E	E	E												F	F	F	F	F												
2,200	222					E	E	E	E												F	F	F	F	F												
2,700	272					E	E	E	E												F	F	F	F	F												
3,900pF	392	E			C	E	E	E	E												F	F	F	F	F												
4,700	472	E			E	E	E	E	E												F	F	F	F	F												
5,600	562	F			E	E	E	E	E												F	F	F	F	F												
6,800	682	F	F		F	F	F	F	F												F	F	F	F	F												
8,200	822	I	F		F	G	G	G	G									G			F	F	F	F	F												
.01µF	103	I	I	F	F	G	G	G	G									G			F	F	F	F	F												
.015	153		I	I	F	C												I																			
.022	223			I	I	C												K	K	I																	
.033	333				I	E				E								L	L	K												J					
.047	473					F				E										L	K											O	K				
.068	683					I				F																							O	K			
.1	104					I				F																								O	M			
.15	154									I	E																									K	K	
.22	224									I	F																											
.33	334									I	I	E																										
.47	474										I	E														J												
.68	684										I	F														L												
1	105										I	I																										
1.5	155											I		I													I										
2.2	225											I		I													J										
3.3	335											I	I	I													L			J							
4.7	475											I	I														L		J	J							
6.8	685														I												J	J									
10	106													I	I												L	L									
15	156																I														J						
22	226																I														L						

CAPACITANCE RANGE

C	E	F	G	I	J	K	L	M	O
0.60mm	0.85mm	1.15mm	1.25mm	1.60mm	2.0mm	2.30mm	2.50mm	2.80mm	3.20mm

MS LEVEL 1

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CAPACITANCE RANGE CHART

- Temperature Characteristics: X8G (-55 to +150°C, 0±30ppm/°C)

CAPACITANCE		DIMENSIONS	THICKNESS (MM)	CAPACITANCE TOLERANCE	CATALOG NUMBER		
					RATED VOLTAGE EDC: 450V	RATED VOLTAGE EDC: 100V	RATED VOLTAGE EDC: 50V
1pF	1R0	1005	0.50±0.05	±0.25pF			HTC04X8G1R0C50NT
		1608	0.80±0.10	±0.25pF		HTC10X8G1R0C100NT	HTC10X8G1R0C50NT
1.5pF	1R5	1005	0.50±0.05	±0.25pF			HTC04X8G1R5C50NT
		1608	0.80±0.10	±0.25pF		HTC10X8G1R5C100NT	HTC10X8G1R5C50NT
2pF	2R0	1005	0.50±0.05	±0.25pF			HTC04X8G2R0C50NT
		1608	0.80±0.10	±0.25pF		HTC10X8G2R0C100NT	HTC10X8G2R0C50NT
2.2pF	2R2	1005	0.50±0.05	±0.25pF			HTC04X8G2R2C50NT
		1608	0.80±0.10	±0.25pF		HTC10X8G2R2C100NT	HTC10X8G2R2C50NT
3pF	3R0	1005	0.50±0.05	±0.25pF			HTC04X8G3R0C50NT
		1608	0.80±0.10	±0.25pF		HTC10X8G3R0C100NT	HTC10X8G3R0C50NT
3.3pF	3R3	1005	0.50±0.05	±0.25pF			HTC04X8G3R3C50NT
		1608	0.80±0.10	±0.25pF		HTC10X8G3R3C100NT	HTC10X8G3R3C50NT
4pF	4R0	1005	0.50±0.05	±0.25pF			HTC04X8G4R0C50NT
		1608	0.80±0.10	±0.25pF		HTC10X8G4R0C100NT	HTC10X8G4R0C50NT
4.7pF	4R7	1005	0.50±0.05	±0.25pF			HTC04X8G4R7C50NT
		1608	0.80±0.10	±0.25pF		HTC10X8G4R7C100NT	HTC10X8G4R7C50NT
5pF	5R0	1005	0.50±0.05	±0.25pF			HTC04X8G5R0C50NT
		1608	0.80±0.10	±0.25pF		HTC10X8G5R0C100NT	HTC10X8G5R0C50NT
6pF	6R0	1005	0.50±0.05	±0.50pF			HTC04X8G6R0C50NT
		1608	0.80±0.10	±0.50pF		HTC10X8G6R0D100NT	HTC10X8G6R0D50NT
6.8pF	6R8	1005	0.50±0.05	±0.50pF			HTC04X8G6R8D50NT
		1608	0.80±0.10	±0.50pF		HTC10X8G6R8D100NT	HTC10X8G6R8D50NT
7pF	7R0	1005	0.50±0.05	±0.50pF			HTC04X8G7R0D50NT
		1608	0.80±0.10	±0.50pF		HTC10X8G7R0D100NT	HTC10X8G7R0D50NT
8pF	8R0	1005	0.50±0.05	±0.50pF			HTC04X8G8R0D50NT
		1608	0.80±0.10	±0.50pF		HTC10X8G8R0D100NT	HTC10X8G8R0D50NT
9pF	9R0	1005	0.50±0.05	±0.50pF			HTC04X8G9R0D50NT
		1608	0.80±0.10	±0.50pF		HTC10X8G9R0D100NT	HTC10X8G9R0D50NT
10pF	100	1005	0.50±0.05	±0.50pF			HTC04X8G100D50NT
		1608	0.80±0.10	±0.50pF		HTC10X8G100D100NT	HTC10X8G100D50NT
12pF	120	1005	0.50±0.05	±5%			HTC04X8G120J50NT
		1608	0.80±0.10	±5%		HTC10X8G120J100NT	HTC10X8G120J50NT
15pF	150	1005	0.50±0.05	±5%			HTC04X8G150J50NT
		1608	0.80±0.10	±5%		HTC10X8G150J100NT	HTC10X8G150J50NT
18pF	180	1005	0.50±0.05	±5%			HTC04X8G180J50NT
		1608	0.80±0.10	±5%		HTC10X8G180J100NT	HTC10X8G180J50NT
22pF	220	1005	0.50±0.05	±5%			HTC04X8G220J50NT
		1608	0.80±0.10	±5%		HTC10X8G220J100NT	HTC10X8G220J50NT
27pF	270	1005	0.50±0.05	±5%			HTC04X8G270J50NT
		1608	0.80±0.10	±5%		HTC10X8G270J100NT	HTC10X8G270J50NT
33pF	330	1005	0.50±0.05	±5%			HTC04X8G330J50NT
		1608	0.80±0.10	±5%		HTC10X8G330J100NT	HTC10X8G330J50NT
39pF	390	1005	0.50±0.05	±5%			HTC04X8G390J50NT
		1608	0.80±0.10	±5%		HTC10X8G390J100NT	HTC10X8G390J50NT
47pF	470	1005	0.50±0.05	±5%			HTC04X8G470J50NT
		1608	0.80±0.10	±5%		HTC10X8G470J100NT	HTC10X8G470J50NT
56pF	560	1005	0.50±0.05	±5%			HTC04X8G560J50NT
		1608	0.80±0.10	±5%		HTC10X8G560J100NT	HTC10X8G560J50NT
68pF	680	1005	0.50±0.05	±5%			HTC04X8G680J50NT
		1608	0.80±0.10	±5%		HTC10X8G680J100NT	HTC10X8G680J50NT
82pF	820	1005	0.50±0.05	±5%			HTC04X8G820J50NT
		1608	0.80±0.10	±5%		HTC10X8G820J100NT	HTC10X8G820J50NT
100pF	101	1005	0.50±0.05	±5%		HTC04X8G101J200NT	HTC04X8G101J50NT
		1608	0.80±0.10	±5%		HTC10X8G101J200NT	HTC10X8G101J50NT
		2012	0.60±0.15	±5%	HTC21X8G101J450NT		
120pF	121	1005	0.50±0.05	±5%		HTC04X8G121J200NT	HTC04X8G121J50NT
		1608	0.80±0.10	±5%		HTC10X8G121J200NT	HTC10X8G121J50NT
		2012	0.60±0.15	±5%	HTC21X8G121J450NT		
150pF	151	1005	0.50±0.05	±5%		HTC04X8G151J200NT	HTC04X8G151J50NT
		1608	0.80±0.10	±5%		HTC10X8G151J200NT	HTC10X8G151J50NT
		2012	0.60±0.15	±5%	HTC21X8G151J450NT		
180pF	181	1005	0.50±0.05	±5%		HTC04X8G181J200NT	HTC04X8G181J50NT
		1608	0.80±0.10	±5%		HTC10X8G181J200NT	HTC10X8G181J50NT
		2012	0.60±0.15	±5%	HTC21X8G181J450NT		
220pF	221	1005	0.50±0.05	±5%		HTC04X8G221J200NT	HTC04X8G221J50NT
		1608	0.80±0.10	±5%		HTC10X8G221J200NT	HTC10X8G221J50NT
		2012	0.60±0.15	±5%	HTC21X8G221J450NT		

CAPACITANCE RANGE CHART

- Temperature Characteristics: X8G (-55 to +150°C, 0±30ppm/°C)

CAPACITANCE		DIMENSIONS	THICKNESS (MM)	CAPACITANCE TOLERANCE	CATALOG NUMBER				
					RATED VOLTAGE EDC: 630V	RATED VOLTAGE EDC: 450V	RATED VOLTAGE EDC: 250V	RATED VOLTAGE EDC: 100V	RATED VOLTAGE EDC: 50V
270pF	271	1005	0.50±0.05	±5%				HTC04X8G271J100NT	HTC04X8G271J50NT
		1608	0.80±0.10	±5%				HTC10X8G271J100NT	HTC10X8G271J50NT
		2012	0.60±0.15	±5%		HTC21X8G271J450NT			
330pF	331	1005	0.50±0.05	±5%				HTC04X8G331J100NT	HTC04X8G331J50NT
		1608	0.80±0.10	±5%				HTC10X8G331J100NT	HTC10X8G331J50NT
		2012	0.60±0.15	±5%		HTC21X8G331J450NT			
390pF	391	1005	0.50±0.05	±5%				HTC04X8G391J100NT	HTC04X8G391J50NT
		1608	0.80±0.10	±5%				HTC10X8G391J100NT	HTC10X8G391J50NT
		2012	0.60±0.15	±5%		HTC21X8G390J450NT			
470pF	471	1005	0.50±0.05	±5%					HTC04X8G471J50NT
			0.50±0.10	±5%				HTC04X8G471J100NT	
		1608	0.80±0.10	±5%				HTC10X8G471J100NT	HTC10X8G471J50NT
		2012	0.60±0.15	±5%		HTC21X8G471J450NT			
560pF	561	1005	0.50±0.05	±5%					HTC04X8G561J50NT
		1608	0.80±0.10	±5%				HTC10X8G561J100NT	HTC10X8G561J50NT
		2012	0.60±0.15	±5%		HTC21X8G561J450NT			
680pF	681	1005	0.50±0.05	±5%					HTC04X8G681J50NT
		1608	0.80±0.10	±5%				HTC10X8G681J100NT	HTC10X8G681J50NT
		2012	0.60±0.15	±5%		HTC21X8G681J450NT			
820pF	821	1005	0.50±0.05	±5%					HTC04X8G821J50NT
		1608	0.80±0.10	±5%			HTC10X8G821J250NT	HTC10X8G821J100NT	HTC10X8G821J50NT
		2012	0.60±0.15	±5%		HTC21X8G821J450NT			
1nF	102	1005	0.50±0.05	±5%					HTC04X8G102J50NT
		1608	0.80±0.10	±5%			HTC10X8G102J250NT	HTC10X8G102J100NT	HTC10X8G102J50NT
		2012	0.60±0.15	±5%		HTC21X8G102J450NT		HTC21X8G102J100NT	
1.2nF	122	1608	0.80±0.10	±5%			HTC10X8G122J250NT	HTC10X8G122J100NT	HTC10X8G122J50NT
		2012	0.60±0.15	±5%		HTC21X8G122J450NT		HTC21X8G122J100NT	
1.5nF	152	1608	0.80±0.10	±5%			HTC10X8G152J250NT	HTC10X8G152J100NT	HTC10X8G152J50NT
		2012	0.60±0.15	±5%				HTC21X8G152J100NT	
			0.85±0.15	±5%		HTC21X8G152J450NT			
1.8nF	182	1608	0.80±0.10	±5%			HTC10X8G182J250NT	HTC10X8G182J100NT	HTC10X8G182J50NT
		2012	0.85±0.15	±5%		HTC21X8G182J450NT		HTC21X8G182J100NT	
2.2nF	222	1608	0.80±0.10	±5%				HTC10X8G222J100NT	HTC10X8G222J50NT
			0.80±0.20	±5%			HTC10X8G222J250NT		
		2012	0.85±0.15	±5%		HTC21X8G222J450NT		HTC21X8G222J100NT	
2.7nF	272	1608	0.80±0.10	±5%					HTC10X8G272J50NT
			0.80±0.20	±5%				HTC10X8G272J100NT	
		2012	0.60±0.15	±5%					HTC21X8G272J50NT
			1.25±0.20	±5%		HTC21X8G272J450NT		HTC21X8G272J100NT	
3.3nF	332	1608	0.80±0.10	±5%					HTC10X8G332J50NT
			0.80±0.20	±5%				HTC10X8G332J100NT	
		2012	0.60±0.15	±5%					HTC21X8G332J50NT
			0.85±0.15	±5%			HTC21X8G332J250NT		
			1.25±0.20	±5%		HTC21X8G332J450NT		HTC21X8G332J100NT	
3.9nF	392	1608	0.80±0.10	±5%					HTC10X8G392J50NT
		2012	0.60±0.15	±5%					HTC21X8G392J50NT
			1.25±0.20	±5%		HTC21X8G392J450NT	HTC21X8G392J250NT	HTC21CG392J100NT	
		3216	0.60±0.15	±5%				HTC31CG392J100NT	
			0.85±0.15	±5%	HTC31X8G392J630NT				
4.7nF	472	1608	0.80±0.10	±5%					HTC10X8G472J50NT
		2012	0.60±0.15	±5%					HTC21X8G472J50NT
			1.25±0.20	±5%		HTC21X8G472J450NT	HTC21X8G472J250NT	HTC21X8G472J100NT	
		3216	0.60±0.15	±5%					HTC31X8G472J50NT
			0.80±0.15	±5%	HTC31X8G472J630NT			HTC31X8G472J100NT	
5.6nF	562	1608	0.80±0.10	±5%					HTC10X8G562J50NT
		2012	0.60±0.15	±5%					HTC21X8G562J50NT
			1.25±0.20	±5%		HTC21X8G562J450NT	HTC21X8G562J250NT	HTC21X8G562J100NT	
		3216	0.60±0.15	±5%					HTC31X8G562J50NT
			0.85±0.15	±5%				HTC31X8G562J100NT	
			1.15±0.15	±5%	HTC31X8G562J630NT				
6.8nF	682	1608	0.80±0.10	±5%					HTC10X8G682J50NT
		2012	0.60±0.15	±5%					HTC21X8G682J50NT
			1.25±0.20	±5%			HTC21X8G682J250NT	HTC21X8G682J100NT	
		3216	0.60±0.15	±5%					HTC31X8G682J50NT
			1.15±0.15	±5%	HTC31X8G682J630NT			HTC31X8G682J100NT	

CAPACITANCE RANGE CHART

- Temperature Characteristics: X8G (-55 to +150°C, 0±30ppm/°C)

CAPACITANCE		DIMENSIONS	THICKNESS (MM)	CAPACITANCE TOLERANCE	CATALOG NUMBER				
					RATED VOLTAGE EDC: 630V	RATED VOLTAGE EDC: 450V	RATED VOLTAGE EDC: 250V	RATED VOLTAGE EDC: 100V	RATED VOLTAGE EDC: 50V
8.2nF	822	1608	0.80±0.10	±5%					HTC10X8G822J50NT
		2012	0.60±0.15	±5%					HTC21X8G822J50NT
			1.25±0.20	±5%			HTC21X8G822J250NT	HTC21X8G822J100NT	
		3216	0.60±0.15	±5%					HTC31X8G822J50NT
			1.15±0.15	±5%		HTC31X8G822J450NT		HTC31X8G822J100NT	
			1.60±0.20	±5%	HTC31X8G822J630NT				
		3225	1.25±0.20	±5%	HTC32X8G822J630NT				
10nF	103	1608	0.80±0.10	±5%					HTC10X8G8103J50NT
		2012	0.60±0.15	±5%					HTC21X8G8103J50NT
			1.25±0.20	±5%			HTC21X8G103J250NT	HTC21X8G103J100NT	
		3216	0.60±0.15	±5%					HTC31X8G8103J50NT
			1.15±0.15	±5%			HTC31X8G103J250NT	HTC31X8G103J100NT	
			1.60±0.20	±5%	HTC31X8G103J630NT	HTC31X8G103J450NT			
		3225	1.25±0.20	±5%	HTC32X8G103J630NT				
15nF	153	2012	0.85±0.15	±5%					HTC21X8G8153J50NT
		3216	0.60±0.15	±5%					HTC31X8G8153J50NT
			1.15±0.15	±5%				HTC31X8G153J100NT	
			1.60+0.30,-0.10	±5%		HTC31X8G153J450NT			
			1.60±0.20	±5%			HTC31X8G153J250NT		
		3225	1.60±0.20	±5%	HTC32X8G153J630NT				
22nF	223	2012	1.25±0.20	±5%					HTC21X8G223J50NT
		3216	0.60±0.15	±5%					HTC31X8G223J50NT
			1.60+0.30,-0.10	±5%			HTC31X8G223J250NT		
			1.60±0.20	±5%				HTC31X8G223J100NT	
		3225	1.60±0.20	±5%			HTC32X8G223J250NT		
			2.30±0.20	±5%	HTC32X8G223J630NT	HTC32X8G223J450NT			
33nF	333	2012	1.25±0.20	±5%					HTC21X8G333J50NT
		3216	0.85±0.15	±5%					HTC31X8G333J50NT
			1.60+0.30,-0.10	±5%				HTC31X8G333J100NT	
		3225	2.30±0.20	±5%			HTC32X8G333J250NT		
			2.50±0.30	±5%	HTC32X8G333J630NT	HTC32X8G333J450NT			
		4532	2.00±0.20	±5%	HTC43X8G333J630NT				
47nF	473	3216	1.15±0.15	±5%					HTC31X8G473J50NT
		3225	2.50±0.30	±5%			HTC32X8G473J250NT		
		4532	2.30±0.20	±5%		HTC43X8G473J450NT			
			3.20±0.30	±5%	HTC43X8G473J630NT				
68nF	683	3216	1.60±0.20	±5%					HTC31X8G683J50NT
		3225	2.30±0.20	±5%				HTC32X8G683J100NT	
		4532	2.30±0.20	±5%			HTC43X8G683J250NT		
			3.20±0.30	±5%		HTC43X8G683J450NT			
100nF	104	3216	1.60±0.20	±5%					HTC31X8G104J50NT
		4532	3.20±0.30	±5%			HTC43X8G104J250NT		
		5750	2.80±0.30	±5%		HTC55X8G104J450NT			
150nF	154	5750	2.30±0.20	±5%			HTC55X8G154J250NT	HTC55X8G154J100NT	

MS LEVEL 1

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CAPACITANCE RANGE CHART

- Temperature Characteristics: X8R (–55 to +150°C, ±15%)

CAPACITANCE		DIMENSIONS	THICKNESS (MM)	CAPACITANCE TOLERANCE	CATALOG NUMBER			
					RATED VOLTAGE EDC: 100V	RATED VOLTAGE EDC: 50V	RATED VOLTAGE EDC: 25V	RATED VOLTAGE EDC: 16V
150pF	151	1005	0.50±0.05	±10%	HTC04X8R151K100NT	HTC04X8R151K50NT		
				±20%	HTC04X8R151M100NT	HTC04X8R151M50NT		
220pF	221	1005	0.50±0.05	±10%	HTC04X8R221K100NT	HTC04X8R221K50NT		
				±20%	HTC04X8R221M100NT	HTC04X8R221M50NT		
330pF	331	1005	0.50±0.05	±10%	HTC04X8R331K100NT	HTC04X8R331K50NT		
				±20%	HTC04X8R331M100NT	HTC04X8R331M50NT		
470pF	471	1005	0.50±0.05	±10%	HTC04X8R471K100NT	HTC04X8R471K50NT		
				±20%	HTC04X8R471M100NT	HTC04X8R471M50NT		
680pF	681	1005	0.50±0.05	±10%	HTC04X8R681K100NT	HTC04X8R681K50NT		
				±20%	HTC04X8R681M100NT	HTC04X8R681M50NT		
1nF	102	1005	0.50±0.05	±10%	HTC04X8R102K100NT	HTC04X8R102K50NT		
				±20%	HTC04X8R102M100NT	HTC04X8R102M50NT		
		1608	0.80±0.10	±10%	HTC10X8R102K100NT	HTC10X8R102K50NT		
				±20%	HTC10X8R102M100NT	HTC10X8R102M50NT		
1.5nF	152	1005	0.50±0.05	±10%	HTC04X8R152K100NT	HTC04X8R152K50NT		
				±20%	HTC04X8R152M100NT	HTC04X8R152M50NT		
		1608	0.80±0.10	±10%	HTC10X8R152K100NT	HTC10X8R152K50NT		
				±20%	HTC10X8R152M100NT	HTC10X8R152M50NT		
2.2nF	222	1005	0.50±0.05	±10%	HTC04X8R222K100NT	HTC04X8R222K50NT		
				±20%	HTC04X8R222M100NT	HTC04X8R222M50NT		
		1608	0.80±0.10	±10%	HTC10X8R222K100NT	HTC10X8R222K50NT		
				±20%	HTC10X8R222M100NT	HTC10X8R222M50NT		
3.3nF	332	1005	0.50±0.05	±10%	HTC04X8R332K100NT	HTC04X8R332K50NT		
				±20%	HTC04X8R332M100NT	HTC04X8R332M50NT		
		1608	0.80±0.10	±10%	HTC10X8R332K100NT	HTC10X8R332K50NT		
				±20%	HTC10X8R332M100NT	HTC10X8R332M50NT		
4.7nF	472	1005	0.60±0.15	±10%		HTC04X8R472K50NT		
			0.50±0.05	±20%		HTC04X8R472M50NT		
		1608	0.80±0.10	±10%	HTC10X8R472K100NT	HTC10X8R472K50NT		
			0.60±0.15	±20%	HTC10X8R472M100NT	HTC10X8R472M50N		
6.8nF	682	1005	0.50±0.05	±10%		HTC04X8R682K50NT	HTC04X8R682K25NT	
				±20%		HTC04X8R682M50NT	HTC04X8R682M25NT	
		1608	0.80±0.10	±10%	HTC10X8R682K100NT	HTC10X8R682K50NT		
				±20%	HTC10X8R682M100NT	HTC10X8R682M50NT		
10nF	103	1005	0.85±0.15	±10%		HTC04X8R103K50NT	HTC04X8R103K25NT	
			0.80±0.10	±20%		HTC04X8R103M50NT	HTC04X8R103M25NT	
		1608	0.85±0.15	±10%	HTC10X8R103K100NT	HTC10X8R103K50NT		
			0.80±0.10	±20%	HTC10X8R103M100NT	HTC10X8R103M50NT		
15nF	153	1005	0.50±0.05	±10%			HTC04X8R153K25NT	
				±20%			HTC04X8R153M25NT	
		1608	0.80±0.10	±10%	HTC10X8R153K100NT	HTC10X8R153K50NT		
				±20%	HTC10X8R153M100NT	HTC10X8R153M50NT		
22nF	223	1005	0.50±0.05	±10%			HTC04X8R223K25NT	
				±20%			HTC04X8R223M25NT	
		1608	0.80±0.10	±10%	HTC10X8R223K100NT	HTC10X8R223K50NT		
				±20%	HTC10X8R223M100NT	HTC10X8R223M50NT		
		2012	1.25±0.20	±10%	HTC21X8R223K100NT			
				±20%	HTC21X8R223M100NT			
33nF	333	1005	0.50±0.05	±10%			HTC04X8R333K25NT	HTC04X8R333K16NT
				±20%			HTC04X8R333M25NT	HTC04X8R333M16NT
		1608	0.80±0.10	±10%	HTC10X8R333K100NT	HTC10X8R333K50NT		
				±20%	HTC10X8R333M100NT	HTC10X8R333M50NT		
		2012	1.25±0.20	±10%	HTC21X8R333K100NT			
				±20%	HTC21X8R333M100NT			
		3216	0.85±0.15	±10%	HTC31X8R333K100NT			
				±20%	HTC31X8R333M100NT			
47nF	473	1005	0.50±0.05	±10%			HTC04X8R473K25NT	HTC04X8R473K16NT
				±20%			HTC04X8R473M25NT	HTC04X8R473M16NT
		1608	0.80±0.10	±10%		HTC10X8R473K50NT		
				±20%		HTC10X8R473M50NT		
		2012	1.25±0.20	±10%	HTC21X8R473K100NT			
				±20%	HTC21X8R473M100NT			
		3216	0.85±0.15	±10%	HTC31X8R473K100NT			
				±20%	HTC31X8R473M100NT			
68nF	683	1608	0.80±0.10	±10%		HTC10X8R683K50NT	HTC10X8R683K25NT	
				±20%		HTC10X8R683M50NT	HTC10X8R683M25NT	
		2012	1.25±0.20	±10%	HTC21X8R683K100NT	HTC21X8R683K50NT		
				±20%	HTC21X8R683M100NT	HTC21X8R683M50NT		
		3216	1.15±0.15	±10%	HTC31X8R683K100NT			
				±20%	HTC31X8R683M100NT			

CAPACITANCE RANGE CHART

- Temperature Characteristics: X8R (–55 to +150°C, ±15%)

CAPACITANCE		DIMENSIONS	THICKNESS (MM)	CAPACITANCE TOLERANCE	CATALOG NUMBER			
					RATED VOLTAGE EDC: 100V	RATED VOLTAGE EDC: 50V	RATED VOLTAGE EDC: 25V	RATED VOLTAGE EDC: 16V
100nF	104	1608	0.80±0.10	±10%		HTC10X8R104K50NT	HTC10X8R104K25NT	
				±20%		HTC10X8R104M50NT	HTC10X8R104M25NT	
		2012	1.25±0.20	±10%		HTC21X8R104K50NT		
				±20%		HTC21X8R104M50NT		
		3216	1.15±0.15	±10%	HTC31X8R104K100NT			
				±20%	HTC31X8R104M100NT			
150nF	154	1608	0.80±0.10	±10%			HTC10X8R154K25NT	
				±20%			HTC10X8R154M25NT	
		2012	0.85±0.05	±10%			HTC21X8R154K25NT	
				±20%			HTC21X8R154M25NT	
			1.25±0.20	±10%		HTC21X8R154K50NT		
				±20%		HTC21X8R154M50NT		
		3216	0.85+/-0.15	±10%		HTC31X8R154K50NT		
				±20%		HTC31X8R154M50NT		
			1.60±0.20	±10%	HTC31X8R154K100NT			
				±20%	HTC31X8R154M100NT			
220nF	224	1608	0.80±0.15	±10%			HTC10X8R224K25NT	
				±20%			HTC10X8R224M25NT	
		2012	1.25±0.20	±10%		HTC21X8R224K50NT	HTC21X8R224K25NT	
				±20%		HTC21X8R224M50NT	HTC21X8R224M25NT	
		3216	1.15±0.15	±10%		HTC31X8R224K50NT		
				±20%		HTC31X8R224M50NT		
			1.60±0.20	±10%	HTC31X8R224K100NT			
				±20%	HTC31X8R224M100NT			
330nF	334	1608	0.80±0.10	±10%			HTC10X8R334K25NT	HTC10X8R334K16NT
				±20%			HTC10X8R334M25NT	HTC10X8R334M16NT
		2012	1.25±0.20	±10%			HTC21X8R334K25NT	
				±20%			HTC21X8R334M25NT	
		3216	0.85±0.15	±10%			HTC31X8R334K25NT	
				±20%			HTC31X8R334M25NT	
			1.60±0.20	±10%	HTC31X8R334K100NT	HTC31X8R334K50NT		
				±20%	HTC31X8R334M100NT	HTC31X8R334M50NT		
470nF	474	1608	0.80±0.15	±10%				HTC10X8R474K16NT
				±20%				HTC10X8R474M16NT
		2012	1.25±0.20	±10%			HTC21X8R474K25NT	
				±20%			HTC21X8R474M25NT	
		3216	0.85±0.15	±10%			HTC31X8R474K25NT	
				±20%			HTC31X8R474M25NT	
			1.60±0.20	±10%		HTC31X8R474K50NT		
				±20%		HTC31X8R474M50NT		
		32215	2.00±0.20	±10%	HTC31X8R474K100NT			
				±20%	HTC31X8R474M100NT			
680nF	684	2012	1.25±0.20	±10%			HTC21X8R684K25NT	HTC21X8R684K16NT
				±20%			HTC21X8R684M25NT	HTC21X8R684M16NT
		3216	1.15±0.15	±10%			HTC31X8R684K25NT	
				±20%			HTC31X8R684M25NT	
			1.60±0.20	±10%		HTC31X8R684K50NT		
				±20%		HTC31X8R684M50NT		
		3225	2.50±0.30	±10%	HTC32X8R684K100NT			
				±20%	HTC32X8R684M100NT			
1µF	105	2012	1.25±0.20	±10%			HTC21X8R105K25NT	HTC21X8R105K16NT
				±20%			HTC21X8R105M25NT	HTC21X8R105M16NT
		3216	1.60±0.20	±10%		HTC31X8R105K50NT	HTC31X8R105K25NT	
				±20%		HTC31X8R105M50NT	HTC31X8R105M25NT	
1.5µF	155	3216	1.60±0.20	±10%			HTC31X8R155K25NT	
				±20%			HTC31X8R155M25NT	
		3225	1.60±0.20	±10%			HTC32X8R155K25NT	
				±20%			HTC32X8R155M25NT	
2.2µF	225	3216	1.60±0.20	±10%			HTC31X8R225K25NT	
				±20%			HTC31X8R225M25NT	
		3225	2.00±0.20	±10%			HTC32X8R225K25NT	
				±20%			HTC32X8R225M25NT	
3.3µF	335	3216	1.60±0.20	±10%			HTC31X8R335K25NT	HTC31X8R335K16NT
				±20%			HTC31X8R335M25NT	HTC31X8R335M16NT
		3225	2.50±0.30	±10%			HTC32X8R335K25NT	
				±20%			HTC32X8R335M25NT	
4.7µF	475	3216	1.60±0.20	±10%			HTC31X8R475K25NT	HTC31X8R475K16NT
				±20%			HTC31X8R475M25NT	HTC31X8R475M16NT
		3225	2.50±0.30	±10%			HTC32X8R475K25NT	
				±20%			HTC32X8R475M25NT	
6.8µF	685	3225	2.00±0.20	±10%			HTC32X8R685K25NT	HTC32X8R685K16NT
				±20%			HTC32X8R685M25NT	HTC32X8R685M16NT
10µF	10	3225	2.50±0.30	±10%			HTC32X8R106K25NT	HTC32X8R106K16NT
				±20%			HTC32X8R106M25NT	HTC32X8R106M16NT

MS LEVEL 1

Cal-Chip Electronics Inc.
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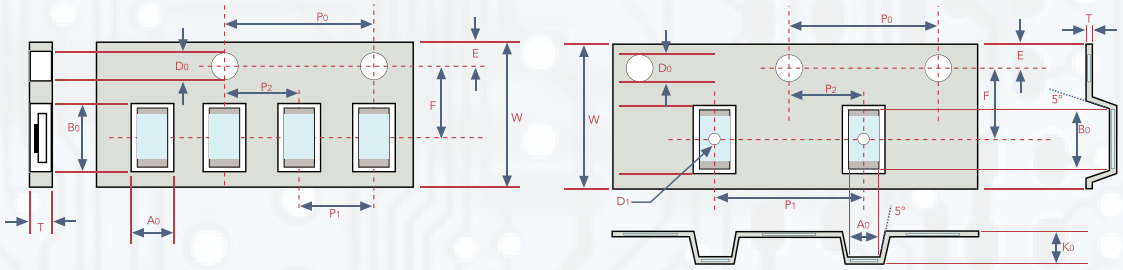
CAPACITANCE RANGE CHART

- Temperature Characteristics: X8L (–55 to +150°C, ±15, -40%)

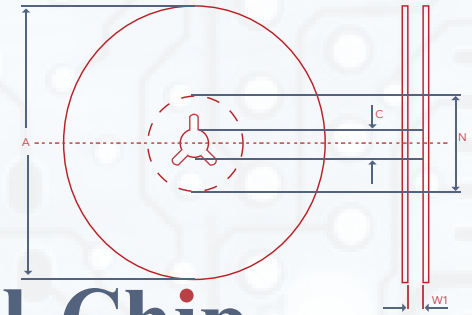
CAPACITANCE		DIMENSIONS	THICKNESS (MM)	CAPACITANCE TOLERANCE	CATALOG NUMBER			
					RATED VOLTAGE EDC: 100V	RATED VOLTAGE EDC: 50V	RATED VOLTAGE EDC: 25V	RATED VOLTAGE EDC: 16V
680nF	684	1608	0.80±0.10	±10%				HTC10X8L684K16NT
1μF	105	1608	0.80±0.10	±10%				HTC10X8L105K16NT
1.5μF	155	2012	1.25±0.20	±10%			HTC21X8L155K25NT	
		3216	1.60±0.20	±10%		HTC31X8L155K50NT		
2.2μF	225	2012	1.25±0.20	±10%			HTC21X8L225K25NT	
		3216	1.60±0.20	±10%		HTC31X8L225K50NT		
3.3μF	335	2012	1.25±0.20	±10%				HTC21X8L335K16NT
		3216	1.60+0.30,-0.10	±10%		HTC31X8L335K50NT		
		3225	2.00±0.20	±10%		HTC32X8L335K50NT		
4.7μF	475	2012	1.25+0.25,-0.15	±10%			HTC21X8L475K25NT	
			1.25±0.20	±10%				HTC21X8L475K16NT
		3225	2.00±0.20	±10%	HTC32X8L475K100NT	HTC32X8L475K50NT		
6.8μF	685	3216	1.60+0.30,-0.10	±10%				HTC31X8L685K16NT
10μF	10	3216	1.60+0.30,-0.10	±10%			HTC31X8L106K25NT	HTC31X8L106K16NT
15μF	15	3225	2.00±0.20	±10%				HTC32X8L156K16NT
22μF	22	3225	2.50±0.30	±20%				HTC32X8L226K16NT

CAPACITANCE		DIMENSIONS	THICKNESS (MM)	CAPACITANCE TOLERANCE	CATALOG NUMBER		
					RATED VOLTAGE EDC: 10V	RATED VOLTAGE EDC: 6.3V	RATED VOLTAGE EDC: 4V
1.5μF	155	1608	0.80±0.10	±10%		HTC10X8L155K6R3NT	
2.2μF	225	1608	0.80±0.10	±10%		HTC10X8L225K6R3NT	
6.8μF	685	2012	1.25±0.20	±10%		HTC21X8L685K6R3NT	
10μF	10	2012	1.25+0.25,-0.15	±10%	HTC21X8L106K10NT		
			1.25±0.20	±10%		HTC21X8L106K6R3NT	
15μF	15	3216	1.60+0.30,-0.10	20%			HTC31X8L156M4R0NT
22μF	22	3216	1.60+0.30,-0.10.30	±20%			HTC31X8L226M4R0NT

TAPE & REEL DIMENSIONS



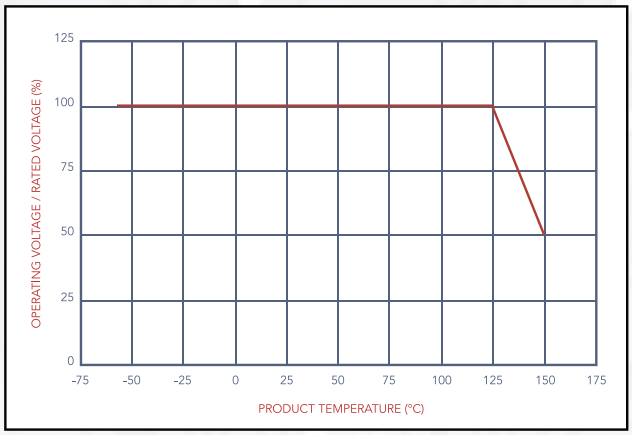
SIZE	0402	0603	0805			1206			1210		
THICKNESS	N, E	S, H, X	A, H	B, T	D, I	B, T	C, J, D	G, P	T	C, D, G, K	M
A_0	0.70±0.20	1.05±0.30	1.50±0.20	1.50±0.20	< 1.80	1.90±0.50	< 2.00	<2.30	< 3.05	< 3.05	< 3.20
B_0	1.20±0.20	1.80±0.30	2.30±0.20	2.30±0.20	< 2.70	3.50±0.50	< 3.70	< 4.00	< 3.80	< 3.80	<4.00
T	≤0.80	≤1.20	≤1.15	≤1.20	0.23±0.1	≤1.20	0.23±0.1	0.23±0.1	0.23±0.1	0.23±0.1	0.23±0.1
K_0	-	-	-	-	< 2.50	-	< 2.50	< 2.50	< 1.50	< 2.50	< 3.20
W	8.00±0.30	8.00±0.30	8.00±0.30	8.00±0.30	8.00±0.30	8.00±0.30	8.00±0.30	8.00±0.30	8.00±0.30	8.00±0.30	8.00±0.30
P_0	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10
10 X P_0	40.00±0.10	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20
P_1	2.00±0.05	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10
P_2	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05
D_0	1.50+0.1/-0	1.50+0.1/-0	1.50+0.1/-0	1.50+0.1/-0	1.50+0.1/-0	1.50+0.1/-0	1.50+0.1/-0	1.50+0.1/-0	1.50+0.1/-0	1.50+0.1/-0	1.50+0.1/-0
D_1	-	-	-	-	1.00±0.10	-	1.00±0.10	1.00±0.10	1.00±0.10	1.00±0.10	1.00±0.10
E	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10
F	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05



	PAPER TAPE		PLASTIC TAPE	
REEL SIZE	7"	13"	7"	13"
0402	10,000	50,000		
0603	4,000	15,000		
0805	4,000	15,000	2,000 3,000	10,000
1206	2000 3000 4000	15,000	2000 3000	9,000 10,000
1210			1000 2000 3000	6000 8000 10,000

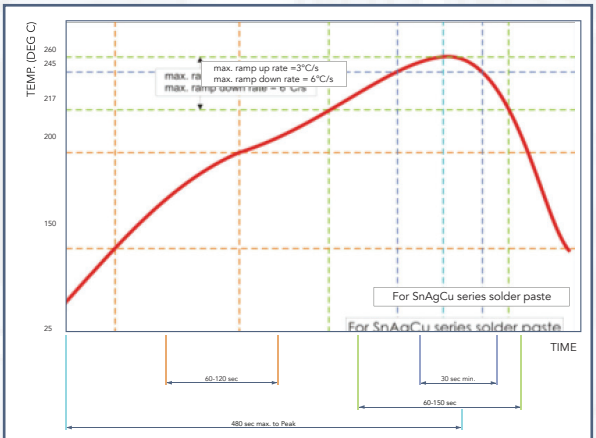
RATED VOLTAGE DERATING

- When the product temperature exceeds 125°C, please use the product within the derated voltage/temperature condition in the figure below

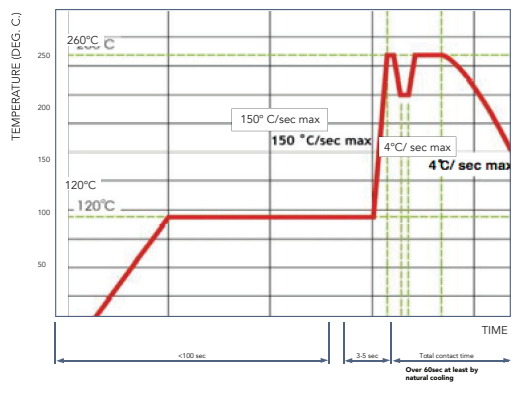


RECOMMENDED SOLDERING CONDITIONS

- The lead-free termination MLCCs are not only to be used on SMT against lead-free solder paste, but also suitable against lead-containing solder paste. If the optimized solder joint is requested, increasing soldering time, temperature and concentration of N2 within oven are recommended.



Recommeded reflow soldering profile for SMT process with SnAgCu series paste.



Recommeded wave soldering profile for SMT process with SnAgCu series solder.

WARRANTY: All passive components supplied by Cal-Chip Electronics, 59 Steamwhistle Drive, Ivyland, PA 18974, are under warranty for a period of 2 years from the date of manufacture. Product will meet or exceed all reliability and test specifications expressed by Cal-Chip for the above mentioned time period provided storage conditions (stated below) are met.

PRODUCT STORAGE INSTRUCTIONS:

1) Product must be kept away from direct sunlight.
2) Product must be stored in the following conditions
   Temperature; 5 to 35°C / 30 to 90°F
   Humidity; 45 to 85%
3) Product to be kept free of moisture, dirt and debris.

*****WHEN THESE CONDITIONS ARE NOT MET, PRODUCT LIFE COULD BE SHORTENED****