

Multilayer Ceramic Chip Capacitors Mid Voltage Type 100VDC – 630VDC

HC Series

MERITEK

FEATURE

- High voltage rating in a given case size.
- High reliability and thermal stability.
- Application: DC to DC converter, High Voltage Coupling/DC blocking, Back-lighting inverters, LAN/WLAN interface, Power supplies, Snubbers in HF power convertors.



PART NUMBERING SYSTEM

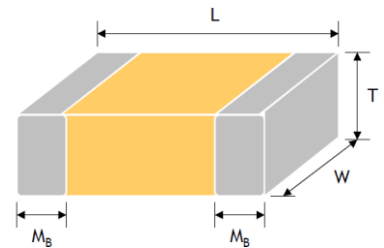


HC (1) 0805 (2) XR (3) 104 (4) K (5) 251 (6)

No	Item	Digit	Description	Reference
(1)	Meritek Series	HC	High-Voltage Ceramic Chip Capacitor	High voltage application with 100VDC – 630VDC
(2)	Size	0805	0805 inch (2012 mm)	1206,1210,1808,1812,1825,2211,2220,2225
(3)	Dielectric	XR	X7R	CG: C0G(NP0), XR: X7R, XF: X5R, YV: Y5V
(4)	Capacitance	104	104: $10 \times 10^4 \text{ pF} = 100 \text{ nF}$	103: $10 \times 10^3 \text{ pF}$, 4R7: 4.7pF
(5)	Tolerance	K	(K): $\pm 10\%$	F: $\pm 1\%$, G: $\pm 2\%$, J: $\pm 5\%$, K: $\pm 10\%$, M: $\pm 20\%$
(6)	Rated Voltage	251	Working Voltage: 250VDC	101: 100VDC, 501: 500VDC, 631: 630VDC

DIMENSIONS

Size Inch (mm)	L (mm)	W (mm)	Thickness	$M_B \text{ min (mm)}$
			T (mm) code	
0402 (1005)	$1.00 \pm 0.15 / -1.0$	$0.50 \pm 0.15 / -1.0$	See Thickness Specification Reference Table below	$0.25 \pm 0.05 / -0.10$
0603 (1608)	1.60 ± 0.20	0.80 ± 0.15		0.40 ± 0.15
0805 (2012)	2.10 ± 0.20	1.25 ± 0.20		0.50 ± 0.20
1206 (3216)	3.30 ± 0.30	$1.60 \pm 0.30 / -0.10$		0.60 ± 0.20
1210 (3225)	3.30 ± 0.40	2.50 ± 0.30		0.75 ± 0.35
1808 (4520)	4.60 ± 0.50	2.00 ± 0.20		0.75 ± 0.35
1812 (4532)	4.60 ± 0.50	3.20 ± 0.30		0.75 ± 0.35
1825 (4563)	4.60 ± 0.50	6.30 ± 0.40		0.75 ± 0.35
2220 (5750)	5.70 ± 0.50	5.00 ± 0.40		0.85 ± 0.35
2225 (5763)	5.70 ± 0.50	6.30 ± 0.40		0.85 ± 0.35



THICKNESS SPECIFICATION REFERENCE

Code	Thickness (mm)	Code	Thickness (mm)	Code	Thickness (mm)
A	0.60 ± 0.10	I	1.25 ± 0.20	Q	$0.50 + 0.02 / -0.05$
B	$0.8 + 0.15 / -0.10$	J	1.15 ± 0.15	R	3.10 ± 0.30
C	1.25 ± 0.10	K	0.50 ± 0.20	S	0.80 ± 0.07
D	1.40 ± 0.15	L	0.30 ± 0.03	T	0.85 ± 0.10
E	1.60 ± 0.20	M	0.95 ± 0.10	U	0.50 ± 0.10
F	2.00 ± 0.20	N	0.50 ± 0.05	V	0.20 ± 0.02
G	2.50 ± 0.30	O	3.50 ± 0.20	X	0.80 ± 0.10
H	2.80 ± 0.30	P	$1.60 + 0.3 / -0.10$	Z	0.25 ± 0.03

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ELECTRICAL CHARACTERISTICS

Properties	Characteristics			
Dielectric	C0G(NP0)	X7R	Y5V	
Chip Size	0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225	0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225	0805, 1206, 1210, 1812	
Rated Voltage	100V, 200V, 250V, 500V, 630V	100V, 200V, 250V, 500V, 630V	100V, 200V, 250V	
Capacitance Range	0.5pF ~ 180nF	100pF ~ 820nF	10nF to 820nF	
Capacitance Tolerance	See Capacitance Tolerance Reference Table Below			
Dissipation Factor	Cap. Range	Q Spec.	≤2.5%	
	Cap < 30pF	Q ≥ 400+20C		≤5%
	Cap ≥ 30pF	Q ≥ 1000		
Measured at the condition of 30~70% related humidity.				
Cap. & D.F. Test Condition (30~70% related humidity)	For 25°C at ambient temperature		* Preconditioning : Perform a heat treatment at 150±10°C for an hour, then leave in ambient condition for 24±2 hours before measurement	
	Cap. Range	Test Condition	1.0±0.2Vrms, 1.0KHz±10%, at 25°C ambient temperature	
	Cap≤1000pF	1.0±0.2Vrms, 1.0MHz±10%		1.0±0.2Vrms, 1.0kHz±10%, at 20°C ambient Temperature.
Cap>1000pF	1.0±0.2Vrms, 1.0KHz±10%			
Insulation Resistance	≥100GΩ or R•C≥5000Ω-F Whichever is smaller	≥10GΩ or R•C≥100Ω-F Whichever is smaller		
Operation Temperature	-55°C ~ +125°C		-25 to +85°C	
Temperature Coefficient	±30ppm/°C	±15%	+30/-80%	
Termination	Cu (or Ag)/Ni/Sn (lead-free)			

CAPACITANCE TOLERANCE REFERENCE

Code	Description	Code	Description	Code	Description	Code	Description
A	±0.05 pF	F	±1 %	J	±5 %	N	-5%~10%
B	±0.10 pF	G	±2 %	K	±10 %	P	±0.02 pF
C	±0.25 pF	H	±3 %	L	0%~10%	Q	±0.03 pF
D	±0.50 pF	I	-10%~0%	M	±20 %	Z	-20%~80%

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RELIABILITY TEST CONDITIONS AND REQUIREMENTS

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Visual and Dimensions	-	* No remarkable defect. * Dimensions to confirm to individual specification sheet.																																
Capacitance		* Shall not exceed the limits given in the detailed spec.																																
Q/ D.F. (Dissipation Factor)	Class I: C0G(NP0) Cap≤1000pF, 1.0±0.2Vrms, 1MHz±10% Cap>1000pF, 1.0±0.2Vrms, 1KHz±10% Class II: (X7R, Y5V) 1.0±0.2Vrms, 1kHz±10%	<table border="1"> <thead> <tr> <th>Dielectric</th> <th>Rated Voltage (V)</th> <th>Q/D.F.</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Class I (NP0)</td> <td rowspan="2">All</td> <td>Q≥1000</td> <td>Cap≥30pF</td> </tr> <tr> <td>Q≥400+20C</td> <td>Cap<30pF</td> </tr> <tr> <td rowspan="2">Class II (X7R)</td> <td rowspan="2">≥ 100</td> <td>D.F. < 2.5%</td> <td></td> </tr> <tr> <td>D.F. < 3.0%</td> <td>0603≥0.047μF; 0805≥0.18μF, 1206≥0.47μ F</td> </tr> <tr> <td>Class II (Y5V)</td> <td>≥ 100</td> <td>D.F. < 5.0%</td> <td></td> </tr> </tbody> </table>	Dielectric	Rated Voltage (V)	Q/D.F.	Remark	Class I (NP0)	All	Q≥1000	Cap≥30pF	Q≥400+20C	Cap<30pF	Class II (X7R)	≥ 100	D.F. < 2.5%		D.F. < 3.0%	0603≥0.047μF; 0805≥0.18μF, 1206≥0.47μ F	Class II (Y5V)	≥ 100	D.F. < 5.0%													
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Solderability	* Solder temperature: 235±5°C for (1206~1210) * Solder temperature: 245±5°C for (1808~2225) * Dipping time: 2±0.5 sec.	75% min. coverage of all metalized area.																																
Dielectric Strength	<table border="1"> <thead> <tr> <th>Rated Voltage</th> <th>Condition</th> </tr> </thead> <tbody> <tr> <td>≤ 250</td> <td>2 times of UR</td> </tr> <tr> <td>250<V≤500</td> <td>1.5 times of UR</td> </tr> <tr> <td>630≤V≤3000V</td> <td>1.2 times of UR</td> </tr> <tr> <td>3000<V≤5000V</td> <td>1.1 times of UR</td> </tr> <tr> <td>>5000V</td> <td>1.0 times of UR</td> </tr> </tbody> </table> <p>* Duration: 1 to 5 sec. * Charge and discharge current less than 50mA.</p>	Rated Voltage	Condition	≤ 250	2 times of UR	250<V≤500	1.5 times of UR	630≤V≤3000V	1.2 times of UR	3000<V≤5000V	1.1 times of UR	>5000V	1.0 times of UR	* No evidence of damage or flashover during test.																				
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Resistance to Soldering Heat	* Solder temperature: 260±5°C * Dipping time: 10±1 sec * Preheating: 120 to 150°C for 1 minute before immerse the capacitor in a eutectic solder. * Before initial measurement (Class II only): Perform 150+0/-10°C for 1 hr. and then set for 48±4 hrs. at room temp. * Measurement to be made after keeping at room temp. for 24±2 hrs (Class I) or 48±4 hrs (Class II).	<p>* No remarkable damage.</p> <table border="1"> <thead> <tr> <th>Dielectric</th> <th>Cap Change</th> <th>Q/D.F. & IR</th> </tr> </thead> <tbody> <tr> <td>Class I (NP0)</td> <td>Within ±2.5% or ±0.25pF whichever is larger.</td> <td rowspan="3">To meet Initial requirement</td> </tr> <tr> <td>Class II (X7R)</td> <td>within ±7.5%</td> </tr> <tr> <td>Class II (Y5V)</td> <td>within ±20%</td> </tr> </tbody> </table> <p>* 25% max. leaching on each edge.</p>	Dielectric	Cap Change	Q/D.F. & IR	Class I (NP0)	Within ±2.5% or ±0.25pF whichever is larger.	To meet Initial requirement	Class II (X7R)	within ±7.5%	Class II (Y5V)	within ±20%																						
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RELIABILITY TEST CONDITIONS AND REQUIREMENTS (CONTINUED)

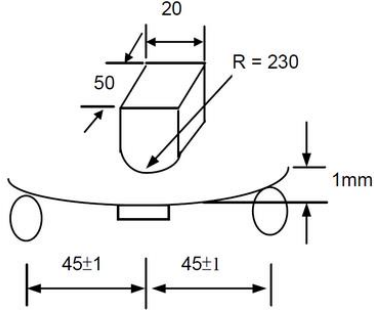
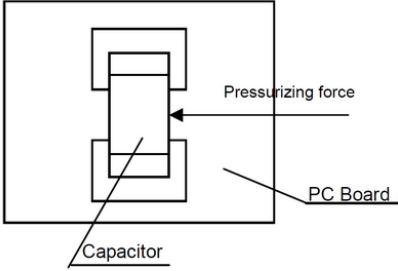
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Humidity (Damp Heat) Steady State	* Test temp.: 40±2°C * Humidity: 90~95% RH * Test time: 500+24/-0hrs. * To apply voltage :rated voltage * Measurement to be made after keeping at room temp. for 24±2 hrs. (Class I) or 48±4 hrs. (Class II).	* No remarkable damage. <table border="1"> <thead> <tr> <th>Dielectric</th> <th>I.R</th> <th>Cap Change</th> <th colspan="2">Q/D.F</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Class I (NP0)</td> <td rowspan="2">≥1GΩ or RxC≥ 50Ω-F whichever is smaller.</td> <td rowspan="2">within ± 5.0% or±0.5pF whichever is larger</td> <td>Cap ≥30pF</td> <td>Q≥350</td> </tr> <tr> <td>10pF ≤ Cap < 30pF</td> <td>Q≥275+2.5C</td> </tr> <tr> <td>Class II (X7R)</td> <td rowspan="2"></td> <td>within ±12.5%</td> <td colspan="2">D.F. ≤ 200% × Initial requirement</td> </tr> <tr> <td>Class II (Y5V)</td> <td>within ±30%</td> <td colspan="2">D.F. ≤ 200% × Initial requirement</td> </tr> </tbody> </table>	Dielectric	I.R	Cap Change	Q/D.F		Class I (NP0)	≥1GΩ or RxC≥ 50Ω-F whichever is smaller.	within ± 5.0% or±0.5pF whichever is larger	Cap ≥30pF	Q≥350	10pF ≤ Cap < 30pF	Q≥275+2.5C	Class II (X7R)		within ±12.5%	D.F. ≤ 200% × Initial requirement		Class II (Y5V)	within ±30%	D.F. ≤ 200% × Initial requirement										
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High Temperature Load (Endurance)	* Test temp.:NP0, X7R: 125±3°C, Y5V: 85±3°C <table border="1"> <thead> <tr> <th>Dielectric</th> <th>Rated Voltage (V)</th> <th>Apply Voltage</th> </tr> </thead> <tbody> <tr> <td rowspan="3">NP0, X7R, Y5V</td> <td>≤ 250</td> <td>2.0 times of U_R</td> </tr> <tr> <td>250 <V ≤ 500</td> <td>1.5 times of U_R</td> </tr> <tr> <td>= 630</td> <td>1.2 times of U_R</td> </tr> </tbody> </table>	Dielectric	Rated Voltage (V)	Apply Voltage	NP0, X7R, Y5V	≤ 250	2.0 times of U _R	250 <V ≤ 500	1.5 times of U _R	= 630	1.2 times of U _R	* No remarkable damage. <table border="1"> <thead> <tr> <th>Dielectric</th> <th>I.R</th> <th>Cap Change</th> <th>Q/D.F</th> </tr> </thead> <tbody> <tr> <td>Class I (NP0)</td> <td rowspan="3">≥1GΩ or RxC≥ 50Ω-F whichever is smaller.</td> <td>within ±3.0% or ±0.3pF whichever is larger</td> <td rowspan="3">D.F. ≤ 200% × Initial requirement</td> </tr> <tr> <td>Class II (X7R)</td> <td>within ±12.5%</td> </tr> <tr> <td>Class II (Y5V)</td> <td>within ±30%</td> </tr> </tbody> </table>	Dielectric	I.R	Cap Change	Q/D.F	Class I (NP0)	≥1GΩ or RxC≥ 50Ω-F whichever is smaller.	within ±3.0% or ±0.3pF whichever is larger	D.F. ≤ 200% × Initial requirement	Class II (X7R)	within ±12.5%	Class II (Y5V)	within ±30%								
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Class II (Y5V)		within ±30%																														
	Exception item (X7R only): <table border="1"> <thead> <tr> <th>Rated Vol. (V)</th> <th>Size</th> <th>Cap. Range</th> <th>Apply Voltage</th> </tr> </thead> <tbody> <tr> <td rowspan="5">100</td> <td>0805</td> <td>≥ 124</td> <td rowspan="6">1.5 times of U_R</td> </tr> <tr> <td>1206</td> <td>≥ 105</td> </tr> <tr> <td>1210</td> <td></td> </tr> <tr> <td>1825</td> <td></td> </tr> <tr> <td>2220</td> <td></td> </tr> <tr> <td>2225</td> <td></td> </tr> <tr> <td rowspan="4">200 & 250</td> <td>1210</td> <td>> 224</td> </tr> <tr> <td>1812</td> <td>> 474</td> </tr> <tr> <td>1825</td> <td>≥ 105</td> </tr> <tr> <td>2220</td> <td></td> </tr> <tr> <td>2225</td> <td></td> <td></td> </tr> </tbody> </table>	Rated Vol. (V)	Size	Cap. Range	Apply Voltage	100	0805	≥ 124	1.5 times of U _R	1206	≥ 105	1210		1825		2220		2225		200 & 250	1210	> 224	1812	> 474	1825	≥ 105	2220		2225			
Rated Vol. (V)	Size	Cap. Range	Apply Voltage																													
100	0805	≥ 124	1.5 times of U _R																													
	1206	≥ 105																														
	1210																															
	1825																															
	2220																															
2225																																
200 & 250	1210	> 224																														
	1812	> 474																														
	1825	≥ 105																														
	2220																															
2225																																
	* Test time: 1000+24/-0 hrs. * Measurement to be made after keeping at room temp. for 48±4 hrs.																															

**Multilayer Ceramic Chip Capacitors
Mid Voltage Type 100VDC – 630VDC**

HC Series

MERITEK

RELIABILITY TEST CONDITIONS AND REQUIREMENTS (CONTINUED)

<p>Resistance to Flexure of Substrate</p>	<p>* The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm per second until the deflection becomes 1 mm.</p> 	<p>* No remarkable damage.</p> <table border="1" data-bbox="815 409 1517 546"> <thead> <tr> <th>Dielectric</th> <th>Cap Change</th> </tr> </thead> <tbody> <tr> <td>Class I (NP0)</td> <td>within $\pm 3.0\%$ or $\pm 0.3\text{pF}$ whichever is larger</td> </tr> <tr> <td>Class II (X7R)</td> <td>within $\pm 12.5\%$</td> </tr> <tr> <td>Class II (Y5V)</td> <td>within $\pm 30\%$</td> </tr> </tbody> </table> <p>(This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test.)</p>	Dielectric	Cap Change	Class I (NP0)	within $\pm 3.0\%$ or $\pm 0.3\text{pF}$ whichever is larger	Class II (X7R)	within $\pm 12.5\%$	Class II (Y5V)	within $\pm 30\%$
Dielectric	Cap Change									
Class I (NP0)	within $\pm 3.0\%$ or $\pm 0.3\text{pF}$ whichever is larger									
Class II (X7R)	within $\pm 12.5\%$									
Class II (Y5V)	within $\pm 30\%$									
<p>Adhesive Strength of Termination</p>	<p>* Capacitors mounted on a substrate. A force of 10N applied perpendicular to the place of substrate and parallel the line joining the center of terminations for 10 ± 1 sec.</p> 	<p>* No remarkable damage or removal of the terminations.</p>								
<p>Vibration Resistance</p>	<p>* Vibration frequency: 10~55 Hz/min. * Total amplitude: 1.5mm * Test time: 6 hrs. (Two hrs. each in three mutually perpendicular directions.)</p>	<p>* No remarkable damage. * Cap change and Q/D.F.: To meet initial spec.</p>								

Multilayer Ceramic Chip Capacitors Mid Voltage Type 100VDC – 630VDC

HC Series

MERITEK

CAPACITANCE RANGE

X7R Dielectric

Dimension		0603			0805				1206					
Cap(pF)	Code	100V	200V	250V	100V	200V	250V	500V	630V	100V	200V	250V	500V	630V
100	101	S	B	B	X	X	X	X	X	X	C	C	C	C
120	121	S	B	B	X	X	X	X	X	X	C	C	C	C
150	151	S	B	B	X	X	X	X	X	X	C	C	C	C
180	181	S	B	B	X	X	X	X	X	X	C	C	C	C
220	221	S	B	B	X	X	X	X	X	X	C	C	C	C
270	271	S	B	B	X	X	X	X	X	X	C	C	C	C
330	331	S	B	B	X	X	X	X	X	X	C	C	C	C
390	391	S	B	B	X	X	X	X	X	X	C	C	C	C
470	471	S	B	B	X	X	X	X	X	X	C	C	C	C
560	561	S	B	B	X	X	X	X	X	X	C	C	C	C
680	681	S	B	B	X	X	X	X	X	X	C	C	C	C
820	821	S	B	B	X	X	X	X	X	X	C	C	C	C
1000	102	S	B	B	X	X	X	X	X	X	C	C	C	C
1200	122	S	B	B	X	X	X	X	X	X	C	C	C	C
1500	152	S	B	B	X	X	X	X	X	X	C	C	C	C
1800	182	S	B	B	X	X	X	X	X	X	C	C	C	C
2200	222	S	B	B	X	X	X	X	X	X	C	C	C	C
2700	272	S	B	B	X	X	X	X	X	X	C	C	C	C
3300	332	S	B	B	X	X	X	X	X	X	C	C	C	C
3900	392	S	B	B	X	X	X	X	X	X	C	C	C	C
4700	472	S	B	B	X	X	X	C	C	X	C	C	C	C
5600	562	S	B	B	X	X	X	C	C	X	C	C	C	C
6800	682	S	B	B	X	X	X	C	C	X	C	C	C	C
8200	822	S	B	B	X	C	C	C	C	X	C	C	C	C
10000	103	S	B	B	X	C	C	C	C	X	C	C	C	C
12000	123	B	B	B	X	C	C	C	C	X	C	C	C	C
15000	153	B	B	B	X	C	C	C	C	X	C	C	C	C
18000	183	B			X	C	C	C	C	X	C	C	C	C
22000	223	B			X	C	C	C	C	X	C	C	E	E
27000	273	B			C	C	C			X	C	C	E	E
33000	333	B			C	C	C			X	E	E	E	E
39000	393	B			C	C	C			X	E	E	E	E
47000	473	B			C	C	C			X	E	E	E	E
56000	563	B			C	C	C			X	E	E	E	E
68000	683	B			C	C	C			X	E	E		
82000	823	B			C	C	C			C	E	E		
100000	104	B			C	C	C			C	E	E		
120000	124				C					C				
150000	154				C					E				
180000	184				C					E				
220000	224				C					E				
270000	274									E				
330000	334									E				
390000	394									E				
470000	474				I					E				
560000	564									P				
680000	684									P				
820000	824									P				

Multilayer Ceramic Chip Capacitors Mid Voltage Type 100VDC – 630VDC

HC Series

MERITEK

CAPACITANCE RANGE (CONTINUED)

X7R Dielectric

Dimension		1210					1808					1812				
Cap(pF)	Code	100V	200V	250V	500V	630V	100V	200V	250V	500V	630V	100V	200V	250V	500V	630V
150	151						C	C	C	C	C					
180	181						C	C	C	C	C					
220	221	M	M	M	C	C	C	C	C	C	C					
270	271	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C
330	331	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C
390	391	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C
470	471	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C
560	561	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C
680	681	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C
820	821	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C
1000	102	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C
1200	122	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C
1500	152	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C
1800	182	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C
2200	222	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C
2700	272	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C
3300	332	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C
3900	392	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C
4700	472	M	M	M	C	C	C	C	C	C	C	C	C	C	C	C
5600	562	M	M	M	C	C	E	E	E	F	F	C	C	C	C	C
6800	682	M	M	M	C	C	E	E	E	F	F	C	C	C	C	C
8200	822	M	M	M	C	C	E	E	E	F	F	C	C	C	C	C
10000	103	M	M	M	C	C	E	E	E	F	F	C	C	C	C	C
12000	123	M	M	M	C	C	E	E	E	F	F	C	C	C	C	C
15000	153	M	M	M	C	C	E	E	E	F	F	C	C	C	C	C
18000	183	M	M	M	C	C	E	E	E	F	F	C	C	C	C	C
22000	223	M	M	M	C	C	E	E	E	F	F	C	C	C	C	C
27000	273	M	M	M	E	E	E	E	E	F	F	C	C	C	C	C
33000	333	M	M	M	E	E	E	E	E	F	F	C	C	C	C	C
39000	393	M	M	M	E	E	E	E	E	F	F	C	C	C	C	C
47000	473	M	C	C	E	E	E	E	E	F	F	C	C	C	C	C
56000	563	M	C	C	E	E	E	E	E	F	F	C	C	C	F	F
68000	683	M	E	E	F	F	E	E	E	F	F	C	C	C	F	F
82000	823	M	E	E	G	G	E	E	E	F	F	C	C	C	F	F
100000	104	M	E	E	G	G	E	E	E	F	F	E	C	C	F	F
120000	124	M	E	E	G	G	E	E	E			E	C	C	G	G
150000	154	C	G	G	G	G	E	E	E			E	F	F	G	G
180000	184	C	G	G			E	F	F			E	F	F	G	G
220000	224	C	G	G			E	F	F			E	F	F	G	G
270000	274	E	G	G			F	F	F			E	F	F	G	
330000	334	E	G	G			F	F	F			E	F	F	G	
390000	394	G	G	G			F	F	F			E	F	F	G	
470000	474	G	G	G			F	F	F			E	F	F	G	
560000	564	G	G	G			F	F	F			F	G	G		
680000	684	F	G	G			F					F	G	G		
820000	824	F					F					F	G	G		

Multilayer Ceramic Chip Capacitors Mid Voltage Type 100VDC – 630VDC

HC Series

MERITEK

CAPACITANCE RANGE (CONTINUED)

X7R Dielectric

Dimension		1825					2220					2225				
Cap(pF)	Code	100V	200V	250V	500V	630V	100V	200V	250V	500V	630V	100V	200V	250V	500V	630V
150	151	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
180	181	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
220	221	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
270	271	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
330	331	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
390	391	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
470	471	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
560	561	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
680	681	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
820	821	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
1000	102	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
1200	122	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
1500	152	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
1800	182	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
2200	222	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
2700	272	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
3300	332	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
3900	392	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
4700	472	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
5600	562	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
6800	682	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
8200	822	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
10000	103	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
12000	123	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
15000	153	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
18000	183	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
22000	223	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
27000	273	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
33000	333	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
39000	393	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
47000	473	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
56000	563	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
68000	683	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
82000	823	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
100000	104	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
120000	124	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
150000	154	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
180000	184	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
220000	224	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
270000	274	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
330000	334	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
390000	394	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
470000	474	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
560000	564	F	F	F	G	G	F	F	F	G	G	F	F	F	F	F
680000	684	F	F	F	G	G	F	F	F	G	G	F	F	F	F	F
820000	824	F	F	F	H	H	F	F	F	H	H	F	F	F	G	G

Multilayer Ceramic Chip Capacitors

Mid Voltage Type 100VDC – 630VDC

HC Series

MERITEK

CAPACITANCE RANGE

C0G (NP0) Dielectric

Dimension		0402	0603			0805					1206					1210				
Cap(pF)	Code	100V	100V	200V	250V	100V	200V	250V	500V	630V	100V	200V	250V	500V	630V	100V	200V	250V	500V	630V
0.5	0R5	N	S	S	S	A	A	A	A	A										
1.0	1R0	N	S	S	S	A	A	A	A	A										
1.2	1R2	N	S	S	S	A	A	A	A	A	X			X						
1.5	1R5	N	S	S	S	A	A	A	A	A	X	X	X	X	X					
1.8	1R8	N	S	S	S	A	A	A	A	A	X	X	X	X	X					
2.2	2R2	N	S	S	S	A	A	A	A	A	X	X	X	X	X					
2.7	2R7	N	S	S	S	A	A	A	A	A	X	X	X	X	X					
3.3	3R3	N	S	S	S	A	A	A	A	A	X	X	X	X	X					
3.9	3R9	N	S	S	S	A	A	A	A	A	X	X	X	X	X					
4.7	4R7	N	S	S	S	A	A	A	A	A	X	X	X	X	X					
5.6	5R6	N	S	S	S	A	A	A	A	A	X	X	X	X	X					
6.8	6R8	N	S	S	S	A	A	A	A	A	X	X	X	X	X					
8.2	8R2	N	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M	M
10	100	N	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M	M
12	120	N	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M	M
15	150	N	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M	M
18	180	N	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M	M
22	220	N	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M	M
27	270	N	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M	M
33	330	N	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M	M
39	390	N	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M	M
47	470	N	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M	M
56	560	N	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M	M
68	680	N	S	S	S	A	A	A	A	A	X	X	X	X	X	M	M	M	M	M
82	820	N	S	S	S	A	A	A	X	X	X	X	X	X	X	M	M	M	M	M
100	101	N	S	S	S	A	A	X	X	X	X	X	X	X	X	M	M	M	M	M
120	121	N	S	S	S	A	A	X	C	C	X	X	X	X	X	M	M	M	M	M
150	151	N	S	S	S	A	X	X	C	C	X	X	X	X	X	M	M	M	M	M
180	181	N	S	S	S	A	X	C	C	C	X	X	X	X	X	M	M	M	M	M
220	221	N	S	S	S	A	C	C	C	C	X	X	X	X	X	M	M	M	M	M
270	271		S	B	B	A	C	C	C	C	X	X	M	M	M	M	M	M	M	M
330	331		S	B	B	X	C	C	C	C	X	X	M	M	M	M	M	M	M	M
390	391		S	B	B	X	C	C	C	C	X	X	M	M	M	M	M	M	M	M
470	471		S	B	B	X	C	C	C	C	X	M	M	M	M	M	M	M	M	M
560	561		S	B	B	X	C	C	C	C	X	M	C	C	C	M	M	M	M	M
680	681		S	B	B	X	C	C	C	C	X	M	C	C	C	M	M	M	M	M
820	821		S	B	B	X	C	C	C	C	X	M	E	E	E	M	M	M	M	M
1000	102		S			X	C	C	C	C	X	M	E	E	E	M	C	C	C	C
1200	122		B			X	C	C	C	C	X	M	E	E	E	M	C	C	C	C
1500	152		B			X	C	C	C	C	X	C	E	E	E	M	C	C	C	C
1800	182					X	C	C	C	C	X	C	E	E	E	M	C	C	C	C
2200	222					X	C	C	C	C	X	C	E	E	E	M	C	C	C	C
2700	272					X	C	C	C	C	X	C	E	E	E	M	C	C	C	C
3300	332					C					X	C	E	E	E	M	C	C	C	C
3900	392					C					X	E	E	E	E	M	C	C	C	C
4700	472					C					X	E	E	E	E	C	C	C	C	C
5600	562					C					X	E	E	E	E	C	C	C	C	C
6800	682					C					M	E	E			E	E	E	E	E
8200	822										C	E	E			E	E	E	E	E
10000	103										C					E	F	F	F	F
12000	123										T					E	F	F	F	F
15000	153										T					F	G	G	G	G
18000	183										T					G	G	G		
22000	223										T					G	G	G		
27000	273															G				
33000	333															G				
39000	393															G				

Multilayer Ceramic Chip Capacitors

Mid Voltage Type 100VDC – 630VDC

HC Series

MERITEK

CAPACITANCE RANGE (CONTINUED)

C0G (NP0) Dielectric

Dimension		1808					1812					1825					2220				
Cap(pF)	Code	100V	200V	250V	500V	630V	100V	200V	250V	500V	630V	100V	200V	250V	500V	630V	100V	200V	250V	500V	630V
2.2	2R2	C	C	C	C	C															
2.7	2R7	C	C	C	C	C															
3.3	3R3	C	C	C	C	C															
3.9	3R9	C	C	C	C	C															
4.7	4R7	C	C	C	C	C															
5.6	5R6	C	C	C	C	C															
6.8	6R8	C	C	C	C	C															
8.2	8R2	C	C	C	C	C															
10	100	C	C	C	C	C	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
12	120	C	C	C	C	C	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
15	150	C	C	C	C	C	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
18	180	C	C	C	C	C	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
22	220	C	C	C	C	C	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
27	270	C	C	C	C	C	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
33	330	C	C	C	C	C	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
39	390	C	C	C	C	C	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
47	470	C	C	C	C	C	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
56	560	C	C	C	C	C	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
68	680	C	C	C	C	C	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
82	820	C	C	C	C	C	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
100	101	C	C	C	C	C	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
120	121	C	C	C	C	C	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
150	151	C	C	C	C	C	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
180	181	C	C	C	C	C	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
220	221	C	C	C	C	C	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
270	271	C	C	C	F	F	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
330	331	C	C	C	F	F	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
390	391	C	C	C	F	F	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
470	471	C	C	C	F	F	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
560	561	C	C	C	F	F	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
680	681	C	C	C	F	F	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
820	821	C	C	C	F	F	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
1000	102	C	C	C	F	F	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
1200	122	C	C	C	F	F	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
1500	152	C	C	C	F	F	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
1800	182	C	C	C	F	F	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
2200	222	C	C	C	F	F	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
2700	272	C	C	C	F	F	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
3300	332	C	C	C	F	F	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
3900	392	C	C	C	F	F	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
4700	472	C	E	E	F	F	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
5600	562	C	E	E	F	F	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
6800	682	E	F	F	F	F	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
8200	822	E	F	F	F	F	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
10000	103	F	F	F	F	F	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E
12000	123	F	F	F			C	E	E	E	E	E	E	E	E	E	E	E	E	E	E
15000	153	F					C	E	E	E	E	E	E	E	E	E	E	E	E	E	E
18000	183	F					E	F	F	F	F	E	E	E	E	E	E	E	E	E	E
22000	223						E	F	F	F	F	E	E	E	E	E	E	E	E	E	E
27000	273						F	G	G	G	G	E	E	E	F	F	E	E	E	F	F
33000	333						F	G	G	G	G	E	E	E	F	F	E	F	F	F	F
39000	393						G	G	G			E	F	F	G	G	E	F	F	G	G
47000	473						G	G	G			E	F	F	G	G	E	G	G	G	G
56000	563						G					F	G	G	G	G	F	G	G	G	G
68000	683						G					F	G	G	G	G	F	G	G		
82000	823											G	G	G			G	G	G		
100000	104											G					G				
120000	124																G				

Multilayer Ceramic Chip Capacitors Mid Voltage Type 100VDC – 630VDC

HC Series

MERITEK

CAPACITANCE RANGE (CONTINUED)

C0G (NP0) Dielectric

Y5V Dielectric

Dimension		2225				
Cap(pF)	Code	100V	200V	250V	500V	630V
10	100	E	E	E	E	E
12	120	E	E	E	E	E
15	150	E	E	E	E	E
18	180	E	E	E	E	E
22	220	E	E	E	E	E
27	270	E	E	E	E	E
33	330	E	E	E	E	E
39	390	E	E	E	E	E
47	470	E	E	E	E	E
56	560	E	E	E	E	E
68	680	E	E	E	E	E
82	820	E	E	E	E	E
100	101	E	E	E	E	E
120	121	E	E	E	E	E
150	151	E	E	E	E	E
180	181	E	E	E	E	E
220	221	E	E	E	E	E
270	271	E	E	E	E	E
330	331	E	E	E	E	E
390	391	E	E	E	E	E
470	471	E	E	E	E	E
560	561	E	E	E	E	E
680	681	E	E	E	E	E
820	821	E	E	E	E	E
1000	102	E	E	E	E	E
1200	122	E	E	E	E	E
1500	152	E	E	E	E	E
1800	182	E	E	E	E	E
2200	222	E	E	E	E	E
2700	272	E	E	E	E	E
3300	332	E	E	E	E	E
3900	392	E	E	E	E	E
4700	472	E	E	E	E	E
5600	562	E	E	E	E	E
6800	682	E	E	E	E	E
8200	822	E	E	E	E	E
10000	103	E	E	E	E	E
12000	123	E	E	E	E	E
15000	153	E	E	E	E	E
18000	183	E	E	E	E	E
22000	223	E	E	E	E	E
27000	273	E	E	E	E	E
33000	333	E	E	E	E	E
39000	393	F	F	F	F	F
47000	473	F	F	F	F	F
56000	563	G	G	G	G	G
68000	683	G	G	G	G	G
82000	823	G	G	G	G	G
100000	104	G	G			
120000	124	G	G			
150000	154					
180000	184					

Dimension		0805			1206		
Cap(pF)	Code	100V	200V	250V	100V	200V	250V
10	103	X	X	X	X	X	X
15	153	X	X	X	X	X	X
22	223	X	X	X	X	X	X
33	333	X	X	X	X	X	X
47	473	X	X	X	X	X	X
68	683	X	X	X	X	X	X
100	104	X			X	X	X
150	154				M	M	M
220	224				M		
330	334						
470	474						
680	684						
Dimension		1210			1812		
Cap(pF)	Code	100V	200V	250V	100V	200V	250V
10	103	M	M	M	C	C	C
15	153	M	M	M	C	C	C
22	223	M	M	M	C	C	C
33	333	M	M	M	C	C	C
47	473	M	M	M	C	C	C
68	683	M	M	M	C	C	C
100	104	M	M	M	C	C	C
150	154	M	M	M	C	C	C
220	224	M			C	C	C
330	334	M			C	C	C
470	474				C	C	C
680	684				C	C	C

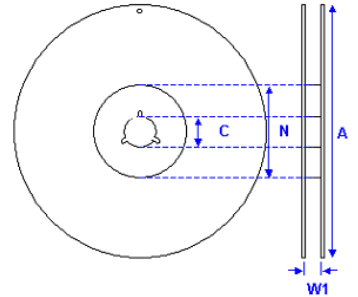
Multilayer Ceramic Chip Capacitors Mid Voltage Type 100VDC – 630VDC

HC Series

MERITEK

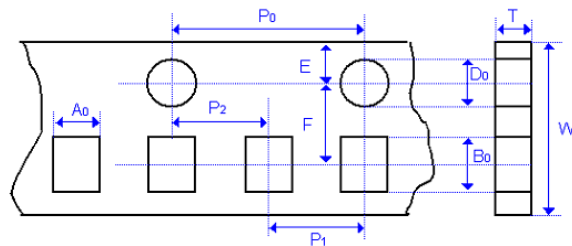
PACKAGE DIMENSION

Size	0805, 1206, 1210, 1812			1808, 1812, 1825, 2220, 2225	2211
Reel Size	7"	10"	7"	7"	7"
C	13.0+0.5/-0.2	13.0+0.5/-0.2	13.0+0.5/-0.2	13.0+0.5/-0.2	13.0+0.5/-0.2
W1	8.4+1.5/-0	8.4+1.5/-0	12.4+2.0/-0	12.4+2.0/-0	12.4+2.0/-0
A	178.0±0.10	250.0±1.0	178.0±0.10	178.0±0.10	178.0±0.10
N	65.0±1.0	100.0±1.0	80.0±	60.5±1.0	80.0±1.0

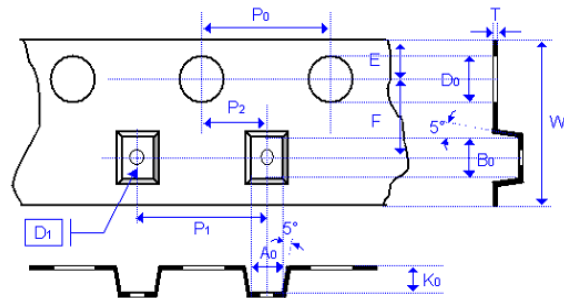


Size	0402	0603	
Chip Size	0.50 ±0.05	0.80 ±0.07	0.80±0.15 /-0.10
A ₀	0.62±0.05	1.00+0.05 /-0.10	1.02+0.05 /-0.10
B ₀	1.12±0.05	1.80±0.10	1.80±0.10
T	0.60±0.05	0.95±0.05	0.97±0.05
K ₀	-	-	-
W	8.00±0.10	8.00±0.10	8.00±0.10
P ₀	4.00±0.10	4.00±0.10	4.00±0.10
10xP ₀	40.00±0.20	40.0±0.20	40.00±0.20
P ₁	4.00±0.10	4.00±0.10	4.00±0.10
P ₂	2.00±0.05	2.00±0.05	2.00±0.05
D ₀	1.55±0.05	1.55±0.05	1.55±0.1/-0
D ₁	-	-	-
E	1.75±0.05	1.75±0.10	1.75±0.10
F	3.50±0.05	3.50±0.05	3.50±0.05

Paper Tape:



Plastic Tape:



Size	0805		1206			1210		1808	
Chip Size	0.80 ±0.10	1.25 ±0.10	0.80 ±0.10	0.95±0.10 1.25±0.10	1.60±0.20 1.60+0.3/-0.1	0.95±0.10 1.25±0.10 1.60±0.20 2.00±0.20	2.50±0.30	1.25±0.10 1.40±0.15 1.60±0.20	2.00±0.20
A ₀	1.50±0.10	<1.65	2.00±0.10	<2.00	<2.00	<3.05	<3.10	<2.50	<2.50
B ₀	2.30±0.10	<2.40	3.50±0.10	<3.60	<3.70	<3.80	<4.00	<5.30	<5.30
T	0.95±0.05	0.23±0.05	0.95±0.05	0.23±0.05	0.23±0.05	0.23±0.05	0.23±0.05	0.25±0.05	0.25±0.05
K ₀	-	<2.50	-	<2.50	<2.50	<2.50	<3.50	<2.50	<2.50
W	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	12.0±0.20	12.0±0.20
P ₀	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.100	4.00±0.10	4.00±0.10	4.00±0.10
10xP ₀	40.00±0.20	40.00±0.20	40.0±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.0±0.20	40.0±0.20	40.0±0.20
P ₁	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
D ₀	1.55±0.05	1.50±0.1/-0	1.50±0.05	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	1.50±0.10	1.50±0.10
E	1.75±0.05	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	5.50±0.05	5.50±0.05

Multilayer Ceramic Chip Capacitors Mid Voltage Type 100VDC – 630VDC

HC Series

MERITEK

PACKAGE DIMENSION (CONTINUED)

Size	2211			1812		1825		2220		2225	
Chip Size	1.60 ±0.20	2.00 ±0.20	2.50 ±0.20	2.00 ±0.20	2.50 ±0.30	2.00 ±0.20	2.50 ±0.30	1.40±0.15 1.60±0.20 2.00±0.20	2.50 ±0.30	2.00 ±0.20	2.50 ±0.30
A ₀	< 3.30	< 3.30	< 3.30	<3.90	<3.90	<6.80	<6.80	<5.80	<5.80	<6.80	<6.80
B ₀	< 6.50	< 6.50	< 6.50	<5.30	<5.30	<5.30	<5.30	<6.50	<6.50	<6.50	<6.50
T	0.30±0.10	0.30±0.10	0.30±0.10	0.25±0.05	0.25±0.05	0.30±0.10	0.30±0.10	0.30±0.10	0.30±0.10	0.30±0.10	0.30±0.10
K ₀	< 2.50	< 3.10	<2.50	<3.0	<2.50	<3.10	<2.50	<3.10	<2.50	<3.10	<3.10
W	12.0±0.20	12.0±0.20	12.0±0.20	12.0±0.20	12.0±0.20	12.0±0.20	12.0±0.20	12.0±0.20	12.0±0.20	12.0±0.20	12.0±0.20
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
10xP ₀	40.00±0.2	40.00±0.2	40.00±0.2	40.0±0.20	40.00±0.2	40.00±0.2	40.00±0.2	40.0±0.20	40.0±0.20	40.0±0.20	40.0±0.20
P ₁	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±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 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0
D ₁	1.50±0.10	1.50±0.10	1.50±0.10	1.50±0.10	1.50+/-0.1	1.50±0.10	1.50±0.10	1.50±0.10	1.50±0.10	1.50±0.10	1.50±0.10
E	1.75±0.1	1.75±0.1	1.75±0.1	1.75±0.10	1.75+/-0.1	1.75±0.1	1.75±0.10	1.75±0.1	1.75±0.10	1.75±0.10	1.75±0.10
F	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05	5.50+/-0.05	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05

REEL DIMENSION AND QUANTITY

Size	Thickness (mm)	Paper Tape-		Plastic Tape	
		7" reel	13" reel	7" reel	13" reel
0402 (1005)	0.50±0.05	10K	50K	-	-
0603 (1608)	0.80±0.07	4K	15K	-	-
	0.80±0.15	4k	15K	-	-
0805 (2012)	0.60±0.10	4K	15K	-	-
	0.80±0.10	4K	15K	-	-
	0.95±0.10	-	-	3K	10K
	1.25±0.10	-	-	3K	-
1206 (3216)	0.80±0.10	4K	15K	-	-
	0.95±0.10	-	-	3K	10K
	1.25±0.10	-	-	3K	10K
	1.60±0.20	-	-	2K	-
1210 (3225)	0.95±0.10	-	-	3K	10K
	1.25±0.10	-	-	3K	10K
	1.60±0.20	-	-	2K	-
	2.00±0.20	-	-	1K	-
	2.50±0.30	-	-	1K	-
1808 (4520)	1.25±0.10	-	-	2K	-
	1.60±0.20	-	-	2K	-
	2.00±0.20	-	-	1K	-
1812 (4532)	1.25±0.10	-	-	1k	-
	1.60±0.20	-	-	1K	-
	2.00±0.20	-	-	1K	-
	2.50±0.30	-	-	0.5K	3k
1825 (4563)	1.60±0.20	-	-	1K	-
	2.00±0.20	-	-	1K	-
	2.50±0.30	-	-	0.5K	-
2220 (5750)	1.60±0.20	-	-	1K	-
	2.00±0.20	-	-	1K	-
	2.50±0.30	-	-	0.5K	-
2225 (5763)	2.00±0.20	-	-	1K	-
	2.50±0.30	-	-	0.5K	-

Unit: pieces

APPLICATION NOTES

STORAGE

To prevent the damage of solderability of terminations, the following storage conditions are recommended:

1. Indoors under 5°C~ 40°C and 20% ~ 70% RH.
 2. No harmful gases containing sulfuric acid, ammonia, hydrogen sulfide or chlorine.
- Packaging should not be opened until the capacitors are required for use. If opened, the pack should be re-sealed as soon as is practicable. Taped product should be stored out of direct sunlight, which might promote deterioration in tape or adhesion performance. The product is recommended to be used within 6 months and checked the solderability before use.

HANDLING

Chip capacitors are dense, hard, brittle, and abrasive materials. They are liable to suffer mechanical damage, in the form of cracks or chips. Chip Capacitors should be handled with care to avoid contamination or damage. To use vacuum or plastic tweezers to pick up or plastic tweezers is recommended for manual placement. Tape and reeled packages are suitable for automatic pick and placement machine.

PREHEAT

In order to minimize the risk of thermal shock during soldering, a carefully controlled preheat is required. The rate of preheat should not exceed 4°C per second. and the final preheat temperature should be within 100°C of the soldering temperature for small chips such as 0805,1206, within 50°C of the soldering temperature for bigger chips such as 1210, 1808, 1812, 1825, 2211, 2220 and 2225, etc.

SOLDERING

Use mildly activated rosin RA and RMA fluxes do not use activated flux. The amount of solder in each solder joint should be controlled to prevent the damage of chip capacitors caused by the stress between solder, chips, and substrate. Hand soldering with temperature-controlled iron not exceeding 30 watts and diameter of tip less than 1.2 mm is recommended, tip of iron should not contact the ceramic body directly, and the temperature of iron should be set to not more than 260°C.

For bigger chips such as 1210, 1808, 1812, 2211, 2220 and 2225, etc. wave soldering and hand soldering are not recommended.

Refer IPC/JEDEC J-STD-020D Method recommended soldering profiles:

Reflow not sooner than 15 minutes and not longer than 4 hrs after removal from the temperature/humidity chamber, subject the sample to 3 cycle of the appropriate reflow conditions as the table description below.

Profile Feature		Pb-Free Assembly
Preheat/Soak	Temperature MIN (T_{smin})	150°C
	Temperature MAX. (T_{sMAX})	200°C
	Time(t_s) from (T_{smin} to T_{smax})	60~120 seconds
Ramp-up rate (T_L to T_P)		3°C/second max.
Liquidous Temperature (T_L) Time(T_L) maintained above T_L		217°C 60~150 seconds
Pek package body temperature(T_P)		For user T_P must not exceed the classification temp 260°C For supplier T_P must equal or exceed the classification temp 260°C
Time(T_P)* within 5°C of the specified classification temperature(T_C)		30 seconds
Ramp-down rate (T_P to T_L)		6°C/second MAX.
Time 25°C to peak temperature 260°C		8 minutes MAX.

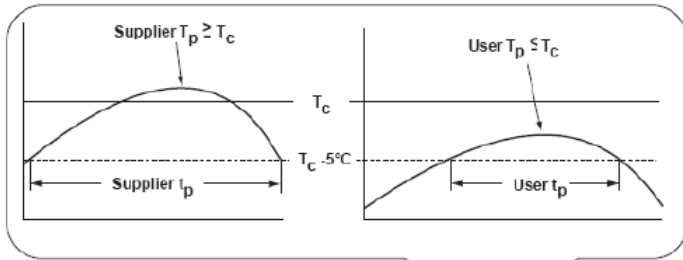
* Lead-free: Soldering temperature = 235 to 260°C, depending on product.

* Maximum temperature = Minimum temperature (235°C) + ΔT + Tolerance for oven process and measurement (5 ~ 7°C)

* Time at peak temperature = 10sec, Dwell above 217°C = 90sec, Ramping rate = 3°C/sec (heating) and 6°C/sec (heating).

APPLICATION NOTES (CONTINUED)

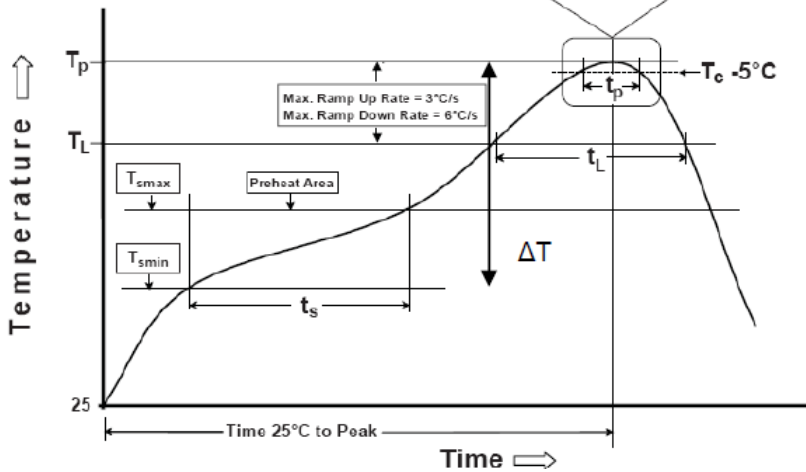
CLASSIFICATION REFLOW PROFILES



Chip Size	ΔT
0805, 1206	100°C
1210, 1808, 1812, 1825, 2211, 2220, 2225	50°C

Soldering	Solder Temp. (Tc)	Soldering Time (tp)
Reflow	235~260°C	< 15sec.

Note:
For example: Tc is 260°C and time tp is 15sec.
For user: The peak temperature must not exceed 260°C. The time above 255°C must not exceed 15 seconds.



COOLING

After soldering, cool the chips and the substrate gradually to room temperature. Natural cooling in air is recommended to minimize stress in the solder joint. A cooling rate not exceeding 4 per second should °C be used when forced cooling is necessary.

CLEANING

All flux residues must be removed by using suitable electronic-grade vapor-cleaning solvents to eliminate contamination that could cause electrolytic surface corrosion. Good results can be obtained by using ultrasonic cleaning of the solvent. The choice of the proper system is depends upon many factors such as component mix, flux, and solder paste and assembly method. The ability of the cleaning system to remove flux residues and contamination from under the chips is very important.