

Multilayer Ceramic Chip Capacitor High Capacitance Type

MA Series

MERITEK

FEATURE

- A wide selection of sized is available (0201 to 2225)
- High capacitance in given case size
- Capacitor with lead-free termination
- RoHS and HALOGEN compliant.



PART NUMBERING SYSTEM

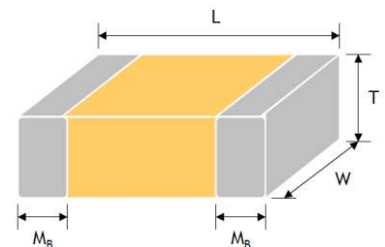
MA **1812** **XR** **105** **C** **250**
(1) (2) (3) (4) (5) (6)



No	Item	Code	Description	Series Reference
(1)	Meritek Series	MA	Multilayer Ceramic Chip Capacitor	High Capacitance Type
(2)	Size	1812	EIA size or footprint	0201, 0402, 0603, 0805, 1206, 1210, 1812, 1825, 2220, 2225
(3)	Dielectric	XR	XR: X7R	XF: X5R, YV: Y5V, XM: X6S, XS: X7S
(4)	Capacitance	105	105: $10 \times 10^5 \text{pF} = 1 \mu\text{F}$	$1 \mu\text{F} \sim 220 \mu\text{F}$
(5)	Tolerance	K	K: $\pm 10\%$	K: $\pm 10\%$, M: $\pm 20\%$, Z: $-20\% \sim +80\%$
(6)	Rated Voltage	250	Working Voltage: 25VDC	4R0: 4.0VDC \sim 631: 630VDC

DIMENSIONS

EIA Size	L(mm)	W(mm)	T	M _B (mm)
0201	0.60±0.03	0.30±0.03	See Thickness Specification Reference Table	0.15±0.05
0402	1.00±0.10	0.50±0.10		0.25±0.05/-0.10
0603	1.60±0.15	0.80±0.15		0.40±0.15
0805	2.00±0.20	1.25±0.20		0.50±0.20
1206	3.20±0.20	1.60±0.20		0.60±0.20
1210	3.20±0.30	2.50±0.30		0.75±0.35
1812	4.50±0.40	3.20±0.30		0.75±0.35
1825	4.50±0.40	6.30±0.40		0.75±0.35
2220	5.70±0.40	5.00±0.40		0.85±0.35
2225	5.70±0.40	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

Item	Characteristics				
	X7R	X7S	X6S	X5R	Y5V
Dielectric					
Chip Size	0402, 0603, 0805, 1206, 1210, 1812, 1825, 2220, 2225	0402, 0603, 0805, 1206, 1210	0201, 0402, 0603, 0805, 1206, 1210	0201, 0402, 0603, 0805, 1206, 1210	0402, 0603, 0805, 1206, 1210, 1812
Rated Voltage	6.3V, 10V, 16V, 25V, 50V, 100V, 250V, 500V, 630V	6.3V, 10V, 16V, 25V, 50V, 100V	6.3V, 10V, 16V, 25V, 35V, 50V	4V, 6.3V, 10V, 16V, 25V, 35V, 50V	6.3V, 10V, 16V, 25V, 35V, 50V, 100V
Capacitance	1 μ F ~ 47 μ F	1 μ F ~ 100 μ F	1 μ F ~ 100 μ F	1 μ F ~ 220 μ F	1 μ F ~ 100 μ F
Cap. Tolerance	K (\pm 10%), M (\pm 20%)	K (\pm 10%), M (\pm 20%)	K (\pm 10%), M (\pm 20%)	K (\pm 10%), M (\pm 20%)	Z (-20/+80%)
Dissipation Factor	See Dissipation Factor Table Below				
Operating Temperature	-55°C ~ 125°C	-55°C ~ 125°C	-55°C ~ 105°C	-55 ~ 85°C	-25 ~ 85°C
Temperature Coefficient	\pm 15%	\pm 22%	\pm 22%	\pm 15%	+30/-80%
Termination	Cu or Ag / Ni / Sn or Au (lead-free termination)				

DISSIPATION FACTOR

X7R/X5R/X6S/X7S

Rated Vol.	D.F.	Exception of D.F.	
\geq 100V	\leq 2.5%	\leq 3%	1206 \geq 0.47 μ F
		\leq 5%	0805 \geq 0.1 μ F, 0603 \geq 0.068 μ F, 1206 \geq 1 μ F, 1210 \geq 2.2 μ F
		\leq 10%	0805 \geq 0.22 μ F, 1210 \geq 3.3 μ F
50V	\leq 2.5%	\leq 3%	0201(50V), 0603 \geq 0.047 μ F, 0805 \geq 0.18 μ F, 1206 \geq 0.47 μ F, 1210 \geq 3.3 μ F, 1812 \geq 10 μ F, 2220 \geq 22 μ F
		\leq 5%	0201 \geq 0.01 μ F, 1210 \geq 4.7 μ F
		\leq 10%	0402 \geq 0.1 μ F, 0603 \geq 0.1 μ F, 0805 \geq 1 μ F, 1206 \geq 2.2 μ F, 1210 \geq 10 μ F
35V	\leq 3.5%	\leq 10%	0603 \geq 1 μ F, 0805 \geq 2.2 μ F, 1206 \geq 2.2 μ F, 1210 \geq 10 μ F
25V	\leq 3.5%	\leq 5%	0201 \geq 0.01 μ F, 0805 \geq 1 μ F, 1210 \geq 10 μ F
		\leq 7%	0603 \geq 0.33 μ F, 1206 \geq 4.7 μ F
		\leq 10%	0201 \geq 0.1 μ F, 0402 \geq 0.10 μ F, 0603 \geq 0.47 μ F, 0805 \geq 2.2 μ F, 1206 \geq 6.8 μ F, 1210 \geq 22 μ F
		\leq 12.5%	0402 \geq 0.47 μ F
16V	\leq 3.5%	\leq 5%	0201 \geq 0.01 μ F, 0402 \geq 0.033 μ F, 0603 \geq 0.15 μ F, 0805 \geq 0.68 μ F, 1206 \geq 2.2 μ F, 1210 \geq 4.7 μ F
		\leq 10%	0201 \geq 0.1 μ F (0201/X7R \geq 0.022 μ F), 0402 \geq 0.22 μ F, 1206 \geq 4.7 μ F, 1210 \geq 22 μ F
10V	\leq 5%	\leq 10%	0201 \geq 0.012 μ F, 0402 \geq 0.33 μ F (0402/X7R \geq 0.22 μ F), 0603 \geq 0.33 μ F, 0805 \geq 2.2 μ F, 1206 \geq 4.7 μ F, 1210 \geq 22 μ F
		\leq 15%	0201 \geq 0.1 μ F, 0402 \geq 1 μ F
6.3V	\leq 10%	\leq 15%	0201 \geq 0.1 μ F, 0402 \geq 1 μ F, 0603 \geq 10 μ F, 0805 \geq 4.7 μ F, 1206 \geq 47 μ F, 1210 \geq 100 μ F
		\leq 20%	0402 \geq 2.2 μ F
4V	\leq 15%	---	---

Y5V

Rated Vol.	D.F.	Exception of D.F. \leq	
\geq 50V	\leq 5%	\leq 7%	0603 \geq 0.1 μ F, 0805 \geq 0.47 μ F, 1206 \geq 4.7 μ F
		\leq 12.5%	1210 \geq 6.8 μ F
35V	\leq 7%	---	---
25V	\leq 5%	\leq 7%	0402 \geq 0.047 μ F, 0603 \geq 0.1 μ F, 0805 \geq 0.33 μ F, 1206 \geq 1 μ F, 1210 \geq 4.7 μ F
		\leq 9%	0402 \geq 0.068 μ F, 0603 \geq 0.47 μ F, 1206 \geq 4.7 μ F, 1210 \geq 22 μ F
16V (C<1.0 μ F)	\leq 7%	\leq 9%	0402 \geq 0.068 μ F, 0603 \geq 0.68 μ F
		\leq 12.5%	0402 \geq 0.22 μ F
16V (C \geq 1.0 μ F)	\leq 9%	\leq 12.5%	0603 \geq 2.2 μ F, 0805 \geq 3.3 μ F, 1206 \geq 10 μ F, 1210 \geq 22 μ F, 1812 \geq 47 μ F
10V	\leq 12.5%	\leq 20%	0402 \geq 0.47 μ F
6.3V	\leq 20%	---	---

Notes:

- Measured at the condition of 30~70% related humidity.
- Class II (Except Y5V): Apply 1.0 \pm 0.2Vrms, 1.0kHz \pm 10% for Cap \leq 10 μ F and 0.5 \pm 0.2Vrms, 120Hz \pm 20% for Cap $>$ 10 μ F, at 20°C at ambient temperature
- Y5V: Apply 1.0 \pm 0.2Vrms, 1.0kHz \pm 10% for Cap. \leq 10 μ F and 0.5 \pm 0.2Vrms, 120Hz \pm 20% for Cap. $>$ 10 μ F, at 20°C ambient temperature.
- Preconditioning for class II MLCC: perform a heat treatment at 150 \pm 10°C for 1 hour, then leave in ambient condition for 24 \pm 2 hours before measurement.

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CAPACITANCE RANGE AND THICKNESS X7R

Dimension		0402		0603				0805					1206					
Cap.	Code	6.3V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	100V
1.0µF	105	N	B	B	B	B	B		C	C	C	I		J	J	J	P	P
1.2µF	125															P	P	P
1.5µF	155								I	I	I		J	J	J	P	P	
1.8µF	185															P	P	
2.2µF	225		B	B	B			I	I	I	I	I	J	J	J	P	P	P
2.7µF	275																	
3.3µF	335													P	P	P	P	
3.9µF	395																	
4.7µF	475		B					I	I	I	I		P	P	P	P	P	
5.6µF	565																	
6.8µF	685																	
8.2µF	825																	
10µF	106							I	I	I*			P	P	P	P		
12µF	126																	
15µF	156																	
18µF	186																	
22µF	226												P	P	P*			
47µF	476																	

Dimension		1210						1812						1825					
Cap.	Code	6.3V	10V	16V	25V	50V	100V	10V	16V	25V	50V	100V	200V	250V	25V	50V	100V	200V	250V
1.0µF	105		C	C	C	C	F	C	C	C	F	F	G	G	G	F	F	F	F
1.2µF	125					G	G			C	F	F				F	F	G	G
1.5µF	155			E	E	G	G			C	F	F				F	F	G	G
1.8µF	185					G	G			E	F	F				F	F	G	G
2.2µF	225			E	E	G	G			E	F	G				F	F	G	G
2.7µF	275					G	G			F	F	G				F	F	H	H
3.3µF	335			E	E	G	G			F	F	G				F	F		
3.9µF	395									F	F	G				F	F		
4.7µF	475		F	F	F	G	G			G	G	G				F	G		
5.6µF	565									G	G	G				G	G		
6.8µF	685									G	G					G	G		
8.2µF	825									G	G					G	G		
10µF	106		F	F	F	G				G	G					G	G		
12µF	126																		
15µF	156																		
18µF	186																		
22µF	226		G	G	G														
47µF	476	G	G																

Dimension		2220							2225						
Cap.	Code	25V	50V	100V	200V	250V	500V	630V	25V	50V	100V	200V	250V	500V	630V
1.0µF	105	F	F	F	F	F	H	H	F	F	F	F	F	G	G
1.2µF	125	F	F	F	G	G			F	F	F	G	G	H	H
1.5µF	155	F	F	F	G	G			F	F	F	G	G	H	H
1.8µF	185	F	F	F	G	G			F	F	F	G	G		
2.2µF	225	F	F	F	G	G			F	F	F	G	G		
2.7µF	275	F	F	F	H	H			F	F	F	G	G		
3.3µF	335	F	F	F					F	F	F	H	H		
3.9µF	395	F	F	F					F	F	F	H	H		
4.7µF	475	F	F	F					F	F	G				
5.6µF	565	F	F	F					F	F	G				
6.8µF	685	F	F	F					F	F	G				
8.2µF	825	G	G	G					G	G	G				
10µF	106	G	G	G					G	G	G				
12µF	126	H							H						
15µF	156	H							H						
18µF	186	H							H						
22µF	226	H	H						H	H					
47µF	476														

Note: * indicates M tolerance only.

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CAPACITANCE RANGE AND THICKNESS (CONTINUED)

X7S

Dimension		0402		0603			0805				1206		1210
Cap.	Code	6.3V	10V	10V	16V	25V	16V	25V	50V	100V	6.3V	16V	6.3V
1.0μF	105		K							I			
2.2μF	225	K	K		B	B							
2.7μF	275												
4.7μF	475			B	B			I	I				
6.8μF	685												
10μF	106						I	I					
22μF	226											P*	
47μF	476											P*	
100μF	107												G*

X6S

Dimension		0201		0402				0603					0805					
Cap.	Code	4V	6.3V	6.3V	10V	16V	25V	4V	6.3V	10V	16V	25V	4V	6.3V	10V	16V	25V	50V
1.0μF	105	L	L*	K	K	K	K											
2.2μF	225			K	K	K					B	B						
4.7μF	475				K*					B	B	B					I	I
10μF	106			K*						B*	B*	B*	I	I	I	I	I	I
22μF	226							B*	B*					I*	I*	I*	I*	
47μF	476												I*	I*				
100μF	107												I*					

Dimension		1206				1210			
Cap.	Code	6.3V	10V	16V	25V	6.3V	10V	16V	25V
1.0μF	105								
2.2μF	225								
4.7μF	475								
10μF	106				P				
22μF	226		P	P*	P				G
47μF	476	P				G	G	G	
100μF	107					G*	G*		

X5R

Dimension		0201			0402					0603					
Cap.	Code	6.3V	10V	16V	4V	6.3V	10V	16V	25V	4V	6.3V	10V	16V	25V	50V
1.0μF	105	L	L	L		N	N	N	N		B	B	B	B	B
1.5μF	155										B				
2.2μF	225	L				N	N	K	K		B	B	B	B	B
3.3μF	335										B	B			
4.7μF	475					K	K	K			B	B	B	B	
6.8μF	685														
10μF	106				K	K	K			B	B	B	B	B	
22μF	226									B	B	B			
47μF	476									B	B				
100μF	107														
220μF	227														

Dimension		0805					1206					1210								
Cap.	Code	4V	6.3V	10V	16V	25V	50V	4V	6.3V	10V	16V	25V	50V	4V	6.3V	10V	16V	25V	35V	50V
1.0μF	105			C	C	C	I						P							
1.5μF	155		I	I	I	I				J	J					F	F			
2.2μF	225		I	I	I	I				J	J	P	P			F	F			
3.3μF	335		I	I	I	I				P	P	P								
4.7μF	475		I	I	I	I				P	P	P	P			F	F	F		
6.8μF	685									P	P									
10μF	106		I	I	I	I				P	P	P	P			F	F	F	F	G
22μF	226		I	I	I	I				P	P	P	P			G	G	G	G	G
47μF	476		I	I						P	P	P				G	G	G	G	
100μF	107	I	I							P						G	G	G		
220μF	227							P						G	G					

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CAPACITANCE RANGE AND THICKNESS (CONTINUED)

Y5V

Dimension		0402		0603				0805					1206					
Cap.	Code	6.3V	10V	6.3V	10V	16V	25V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	35V	50V
1.0μF	105	N	N		S	B	B		X	X	C	C		M	M	M		M
1.5μF	155				S				C	C				M	M	M		
2.2μF	225			S	S	B			C	C	I	I		M	M	M		J
3.3μF	335								C	C				J	J	J		
4.7μF	475			B	B				C	C	I			J	J	J	J	P
6.8μF	685								I					J	J			
10μF	106							I	I	I				J	J	P		
22μF	226							I	I					P	P			
47μF	476												P					
100μF	107																	

Dimension		1210						1812				
Cap.	Code	6.3V	10V	16V	25V	35V	50V	10V	16V	25V	50V	100V
1.0μF	105		M	M	M		M	C	C	C	C	C
1.5μF	155		M	M	M			C	C	C	C	
2.2μF	225		M	M	M		E	C	C	C	C	
3.3μF	335		M	M	M			C	C	C	C	
4.7μF	475		M	M	C		E	C	C	C	C	
6.8μF	685		M	M	C		F	C	C	C	C	
10μF	106		C	C	E	F	F	C	C	C	F	
22μF	226		F	F								
47μF	476	F	F					G				
100μF	107	G										

RELIABILITY TEST CONDITIONS AND REQUIREMENTS

Item	Test Condition	Requirements										
Visual and Dimensions	---	No remarkable defect. Dimensions to confirm to individual specification sheet.										
Capacitance Q/ D.F. (Dissipation Factor)	Class II: X7R, X7S, X6S, X5R, Y5V Cap≤10μF, 1.0±0.2Vrms, 1kHz±10% Cap>10μF, 0.5±0.2Vrms, 120Hz±20% Test condition: 0.5±0.2Vrms, 1KHz±10% X7R: 0603=475(6.3V), 0805=106(6.3V&10V) X6S: 0201≥104(6.3V&10V), 0402≥225(6.3V), 0402/475(10V), 0603/106(6.3V). X5R: 01R5≥103, 0201≥224 (6.3V, 10V, 16V), 0402≥475 (6.3V, 16V), 0402≥225(10V), 0603=106 (6.3V, 10V)	Within specification										
Dielectric Strength	To apply voltage : <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Rated Voltage</th> <th>Condition</th> </tr> </thead> <tbody> <tr> <td>≤100</td> <td>2.5 times of U_R</td> </tr> <tr> <td>100<V≤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> Duration: 1 to 5 sec. Charge and discharge current less than 50mA.	Rated Voltage	Condition	≤100	2.5 times of U _R	100<V≤250	2.0 times of U _R	250<V≤500	1.5 times of U _R	630	1.2 times of U _R	No evidence of damage or flashover during test.
Rated Voltage	Condition											
≤100	2.5 times of U _R											
100<V≤250	2.0 times of U _R											
250<V≤500	1.5 times of U _R											
630	1.2 times of U _R											
Solderability	Solder temperature: 235±5°C for (0201~1210) Solder temperature: 245±5°C for (1808~2225) Dipping time: 2±0.5 sec.	75% min. coverage of all metalized area.										
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°C for 1 hr. and then set for 24±2 hrs. at room temp. Measurement to be made after keeping at room temp. for 48±4 hrs	<ul style="list-style-type: none"> No remarkable damage. Cap change: Class II (Except Y5V): within ±7.5% Y5V: within ±20% D.F., I.R. and dielectric strength : To meet initial requirements. 25% max. leaching on each edge. 										

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RELIABILITY TEST CONDITIONS AND REQUIREMENTS (CONTINUED)

Item	Test Condition	Requirements																			
Insulation Resistance	Before initial measurement (Class II only) : To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp. Apply rated voltage for max. 120 sec.	10GΩ or RxC≥500Ω-F whichever is smaller. Except:																			
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Temperature Cycle	Conduct the five cycles according to the temperatures and time.	<ul style="list-style-type: none"> No remarkable damage. Cap change: Class II (Except Y5V): within ±7.5% Y5V: within ±20% D.F.: ≤150% of initial requirements. I.R.: ≥25% of initial requirements. 																			
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Multilayer Ceramic Chip Capacitor High Capacitance Type

MA Series

MERITEK

RELIABILITY TEST CONDITIONS AND REQUIREMENTS (CONTINUED)

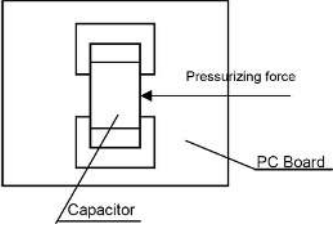
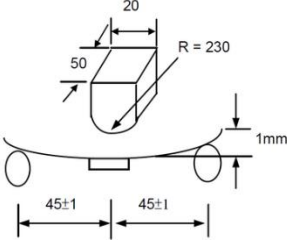
Item	Test Condition	Requirements																																																														
High Temperature Load (Endurance)	Test temp. : X7R, X7S : 125±3°C. X6S : 105±3°C. X5R, Y5V : 85±3°C. To apply voltage : (1) ≤6.3V or Cap.≥10μF : 150% of rated voltage. (2) 10V≤Ur<500V : 200% of rated voltage. (3) 500V : 150% of rated voltage. (4) Ur≥630V : 120% of rated voltage. (5) 100% of rated voltage for below range :	<ul style="list-style-type: none"> No remarkable damage. Cap change: Class II (Except Y5V): within ±12.5% for ≥10V¹, within ±25% for 6.3V. (Note1: 10V: within ±25% for 0603≥4.7μF, 0402≥1μF, 0201≥0.1μF) Y5V: within ±30% for ≥10V, with in +30/-40% for 6.3V D.F.: ≤200% of initial requirements. I.R.: for ≥10V, ≥1GΩ or RxC≥50Ω-F, whichever is smaller. Except: <table border="1" style="width: 100%;"> <thead> <tr> <th>Rated Voltage</th> <th>I.R.</th> </tr> </thead> <tbody> <tr> <td>≥100V: All X7R, 1210≥3.3μF</td> <td rowspan="10" style="text-align: center; vertical-align: middle;"> ≥1GΩ or RxC≥10Ω-F, whichever is smaller </td> </tr> <tr> <td>50V: 0402>0.01μF, 0603≥1μF, 0805≥1μF, 1206≥4.7μF, 1210≥4.7μF</td> </tr> <tr> <td>35V: 0603≥1μF, 0805≥2.2μF, 1206≥2.2μF, 1210≥10μF</td> </tr> <tr> <td>25V: 0201≥0.1μF, 0402≥0.22μF, 0603≥2.2μF, 0805≥2.2μF, 1206≥10μF, 1210≥10μF</td> </tr> <tr> <td>16V: 0201≥0.1μF, 0402≥0.22μF, 0603≥1μF, 0805≥2.2μF, 1206≥10μF, 1210≥47μF</td> </tr> <tr> <td>10V: 0201≥47nF, 0402≥0.47μF, 0603≥0.47μF, 0805≥2.2μF, 1206≥4.7μF, 1210≥47μF</td> </tr> <tr> <td>6.3V, 4V All X6S/X7S items, size≥1812</td> </tr> <tr> <td></td> </tr> <tr> <td></td> </tr> <tr> <td></td> </tr> </tbody> </table>	Rated Voltage	I.R.	≥100V: All X7R, 1210≥3.3μF	≥1GΩ or RxC≥10Ω-F, whichever is smaller	50V: 0402>0.01μF, 0603≥1μF, 0805≥1μF, 1206≥4.7μF, 1210≥4.7μF	35V: 0603≥1μF, 0805≥2.2μF, 1206≥2.2μF, 1210≥10μF	25V: 0201≥0.1μF, 0402≥0.22μF, 0603≥2.2μF, 0805≥2.2μF, 1206≥10μF, 1210≥10μF	16V: 0201≥0.1μF, 0402≥0.22μF, 0603≥1μF, 0805≥2.2μF, 1206≥10μF, 1210≥47μF	10V: 0201≥47nF, 0402≥0.47μF, 0603≥0.47μF, 0805≥2.2μF, 1206≥4.7μF, 1210≥47μF	6.3V, 4V All X6S/X7S items, size≥1812																																																				
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(7) 120% of rated voltage for below range :	<table border="1"> <thead> <tr> <th>Size</th> <th>Dielectric</th> <th>Rated</th> <th>Capacitance</th> </tr> </thead> <tbody> <tr> <td>1210</td> <td>X7R</td> <td>100V</td> <td>C≥3.3μF</td> </tr> </tbody> </table>	Size	Dielectric	Rated	Capacitance	1210	X7R	100V	C≥3.3μF																																																							
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Test time : 1000 +24/-0 hrs. Before initial measurement (Class II only) : To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp. Measurement to be made after keeping at room temp. for 48±4 hrs (Class II). De-rating conditions :																																																																

Multilayer Ceramic Chip Capacitor High Capacitance Type

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RELIABILITY TEST CONDITIONS AND REQUIREMENTS (CONTINUED)

Item	Test Condition	Requirements										
Humidity (Damp Heat) Steady State	<ul style="list-style-type: none"> Test temp.: 40±2°C Humidity: 90~95% RH Test time: 500+24/-0hrs. Before initial measurement (Class II only) : To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp. Measurement to be made after keeping at room temp. for 48±4 hrs. (Class II). 	<ul style="list-style-type: none"> No remarkable damage. Cap change: Class II (Except Y5V): within ±12.5% for ≥10V¹, within ±25% for 6.3V. (Note1: 10V: within ±25% for 0603≥4.7μF, 0402≥1μF, 0201≥0.1μF) Y5V: within ±30% for ≥10V, with in +30/-40% for 6.3V D.F.: ≤200% of initial requirements. I.R.: for ≥10V, ≥1GΩ or RxC≥50Ω-F, whichever is smaller. 6.3V, RxC≥10Ω-F. 										
Humidity (Damp Heat) Load	<ul style="list-style-type: none"> Test temp.: 40±2°C Humidity: 90~95% RH Test time: 500+24/-0hrs. To apply voltage :rated voltage (500V max.) Before initial measurement (Class II only) : To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp. Measurement to be made after keeping at room temp. for 48±4 hrs (Class II). 	<ul style="list-style-type: none"> No remarkable damage. Cap change: Class II (Except Y5V): within ±12.5% for ≥10V¹, within ±25% for 6.3V. (Note1: 10V: within ±25% for 0603≥4.7μF, 0402≥1μF, 0201≥0.1μF) Y5V: within ±30% for ≥10V, with in +30/-40% for 6.3V D.F.: ≤200% of initial requirements. I.R.: for ≥10V, ≥500MΩ or RxC≥25Ω-F, whichever is smaller. <p>Except:</p> <table border="1"> <thead> <tr> <th>Rated Voltage</th> <th>I.R.</th> </tr> </thead> <tbody> <tr> <td>≥100V: All X7R, 1210≥3.3μF</td> <td rowspan="7">≥500MΩ or RxC≥5Ω-F, whichever is smaller</td> </tr> <tr> <td>50V: 0402>0.01μF, 0603≥1μF, 0805≥1μF, 1206≥4.7μF, 1210≥4.7μF</td> </tr> <tr> <td>35V: 0603≥1μF, 0805≥2.2μF, 1206≥2.2μF, 1210≥10μF</td> </tr> <tr> <td>25V: 0201≥0.1μF, 0402≥0.22μF, 0603≥2.2μF, 0805≥2.2μF, 1206≥10μF, 1210≥10μF</td> </tr> <tr> <td>16V: 0201≥0.1μF, 0402≥0.22μF, 0603≥1μF, 0805≥2.2μF, 1206≥10μF, 1210≥47μF</td> </tr> <tr> <td>10V: 0201≥47nF, 0402≥0.47μF, 0603≥0.47μF, 0805≥2.2μF, 1206≥4.7μF, 1210≥47μF</td> </tr> <tr> <td>6.3V, 4V All X6S/X7S items, size≥1812</td> </tr> </tbody> </table>	Rated Voltage	I.R.	≥100V: All X7R, 1210≥3.3μF	≥500MΩ or RxC≥5Ω-F, whichever is smaller	50V: 0402>0.01μF, 0603≥1μF, 0805≥1μF, 1206≥4.7μF, 1210≥4.7μF	35V: 0603≥1μF, 0805≥2.2μF, 1206≥2.2μF, 1210≥10μF	25V: 0201≥0.1μF, 0402≥0.22μF, 0603≥2.2μF, 0805≥2.2μF, 1206≥10μF, 1210≥10μF	16V: 0201≥0.1μF, 0402≥0.22μF, 0603≥1μF, 0805≥2.2μF, 1206≥10μF, 1210≥47μF	10V: 0201≥47nF, 0402≥0.47μF, 0603≥0.47μF, 0805≥2.2μF, 1206≥4.7μF, 1210≥47μF	6.3V, 4V All X6S/X7S items, size≥1812
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6.3V, 4V All X6S/X7S items, size≥1812												
Adhesive Strength of Termination	<ul style="list-style-type: none"> Capacitors mounted on a substrate. A force of 5N(≤0603) or 10N(> 0603) applied perpendicular to the place of substrate and parallel the line joining the center of terminations for 10±1 second.  <ul style="list-style-type: none"> Test time: 10±1 sec. 	<ul style="list-style-type: none"> No remarkable damage or removal of the terminations. 										
Benting Test	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> No remarkable damage. <table border="1"> <thead> <tr> <th>Dielectric</th> <th>Cap Change</th> </tr> </thead> <tbody> <tr> <td>Class II (Except Y5V)</td> <td>within ±12.5%</td> </tr> <tr> <td>Class II (Y5V)</td> <td>within ±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 II (Except Y5V)	within ±12.5%	Class II (Y5V)	within ±30%				
Dielectric	Cap Change											
Class II (Except Y5V)	within ±12.5%											
Class II (Y5V)	within ±30%											
Vibration Resistance	<ul style="list-style-type: none"> Vibration frequency: 10~55 Hz/min. Total amplitude: 1.5mm Test time: 6 hrs. (Two hrs. each in three mutually perpendicular directions.) Before initial measurement (Class II Only): To apply de-aging at 150°C for 1 hr then set for 24±2 hrs at room temp. Measurement to be made after keeping at room temp. for 48±4 hrs. 	<ul style="list-style-type: none"> No remarkable damage. Cap change and Q/D.F.: To meet initial spec. 										

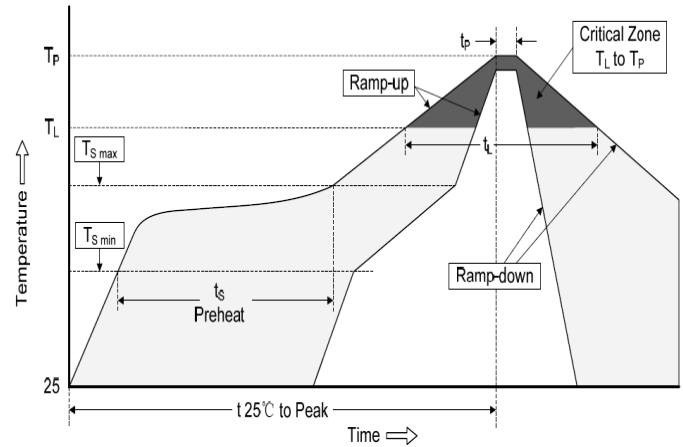
Multilayer Ceramic Chip Capacitor High Capacitance Type

MA Series

MERITEK

RECOMMENDED SOLDERING PROFILES

Reflow Condition		
Pre Heat	Temp. Min $T_{s(min)}$	150°C
	Temp. Max $T_{s(max)}$	200°C
	Time (min. to max.) (t_s)	60~120 seconds
$T_{s(max)}$ to T_L (Ramp-up rate)		3°C/second max.
Average ramp up rate (T_L) to peak		3°C/second max.
Reflow	Temp. (T_L)	217°C
	Time (min. to max.) (t_L)	60~150 seconds
Peak Temperature (T_P)		255°C ~260°C
Time within 5°C of actual peak Temperature (t_p)		30 seconds max.
Ramp-down Rate		6°C/second



REEL DIMENSION AND QUANTITY (UNIT: PCS)

Size	Thickness (mm)	Paper Tape		Plastic Tape	
		7" reel	13" reel	7" reel	13" reel
0201	0.30±0.03	15k	70k	-	-
	0.30±0.05	15k	-	-	-
	0.30±0.09	15k	-	-	-
0402	0.50±0.05	10k	50k	-	-
	0.50+0.02/-0.05	10k	50k	-	-
	0.50±0.20	10k	-	-	-
0603	0.50±0.10	4k	-	-	-
	0.80±0.07	4k	15k	-	-
	0.80+0.15/-0.10	4k	15k	-	-
0805	0.50±0.10	4k	15k	-	-
	0.60±0.10	4k	15k	-	-
	0.80±0.10	4k	15k	-	-
	0.85±0.10	4k	15k	-	-
	1.25±0.10	-	-	3k	10k
	1.25±0.20	-	-	3k	10k
1206	0.80±0.10	4k	15k	-	-
	0.85±0.10	4k	15k	-	-
	0.95±0.10	-	-	3k	10k
	1.15±0.15	-	-	3k	10k
	1.25±0.10	-	-	3k	10k
	1.60±0.20	-	-	2k	10k
1210	1.60+0.30/-0.10	-	-	2k	9k
	0.85±0.10	-	-	3k	10k
	0.95±0.10	-	-	3k	10k
	1.25±0.10	-	-	3k	10k
	1.60±0.20	-	-	2k	-
	2.00±0.20	-	-	1k	6k
1808	2.50±0.30	-	-	1k	6k
	1.25±0.10	-	-	2k	10k
	1.60±0.20	-	-	2k	8k
	2.00±0.20	-	-	1k	6k
	1.25±0.10	-	-	1k	5k
1812	1.60±0.20	-	-	1k	-
	2.00±0.20	-	-	1k	-
	2.50±0.30	-	-	0.5k	-
	2.80±0.30	-	-	0.5k	-
1825 2220 2225	1.60±0.20	-	-	1k	-
	2.00±0.20	-	-	1k	-
	2.50±0.30	-	-	0.5k	-
	2.80±0.30	-	-	0.5k	-

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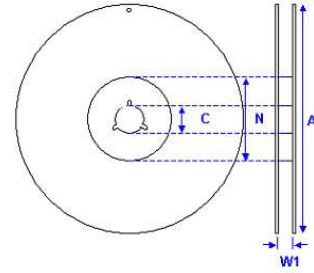
MA Series

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PACKAGE DIMENSION

Reel Dimension (mm)

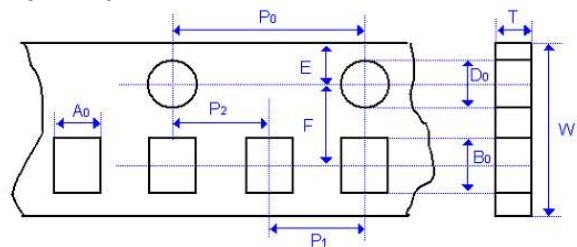
Reel Size	7"	7"	13"
C	13.0 +0.5/-0.2	13.0 +0.5/-0.2	13.0+0.5/-0.2
W1	8.4 +1.5/-0	12.4 +2.0/-0	8.4+1.5/-0
A	178.0 ±0.10	178.0 ±0.10	330.0±1.0
N	60.0 +1.0/-0	80.0±1.0	100±1.0



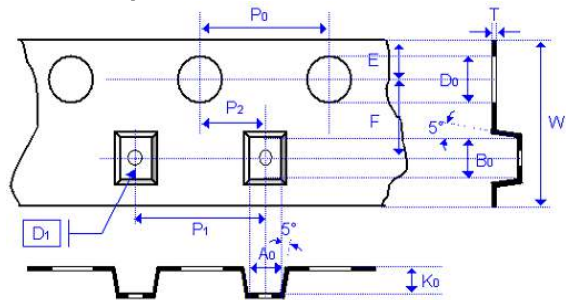
Tape Dimension (mm)

Chip Size	0201		0402		0603	
	0.30±0.03	0.50±0.10	0.80±0.07	0.80 +0.15/-0.1		
A ₀	0.39±0.07	0.70±0.2	1.00±0.05/-0.1	1.02±0.05/-0.1		
B ₀	0.69±0.07	1.20±0.2	1.80±0.10	1.80±0.10		
T	≤0.50	≤0.80	0.95±0.05	0.97±0.05		
K ₀	-	-	-	-		
W	8.00±0.10	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	4.00±0.10		
10xP ₀	40.00±0.10	40.00±0.10	40.00±0.20	40.00±0.20		
P ₁	2.00±0.05	2.00±0.05	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		
D ₀	1.55±0.05	1.55±0.05	1.55±0.05	1.55±0.05		
D ₁	-	-	-	-		
E	1.75±0.05	1.75±0.05	1.75±0.05	1.75±0.05		
F	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05		

Paper Tape:



Plastic Tape:



Tape Dimension (mm)

Chip Size	0805		1206			1210		1812	
	0.80±0.10	1.25±0.10 1.25±0.20	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	2.50±0.30	1.25±0.10 1.60±0.20 2.00±0.20	2.50±0.30
A ₀	1.50±0.10	<1.65	2.00±0.10	<2.00	<2.00	<3.05	<3.10	<3.90	<3.90
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	<3.00
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±0.2	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.0±0.10	40.00±0.20	40.00±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	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
D ₀	1.55±0.05	1.50±0.10/-0	1.55±0.05	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	-	1.00±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±/-0.1
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

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Tape Dimension (mm)

Chip Size	1825		2220		2225	
Thickness	1.60±0.20 2.00±0.20	2.50±0.30	1.40±0.15 1.60±0.20 2.00±0.20	2.50±0.30	1.60±0.20 2.00±0.20	2.50±0.30
A ₀	<6.80	<6.80	<5.80	<5.80	<6.80	<6.80
B ₀	<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	0.30±0.10	0.30±0.10	0.30±0.10
K ₀	<2.50	<3.10	<2.50	<3.10	<2.50	<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
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
10xP ₀	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	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
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
D 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±0.10	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

APPLICATION NOTES

STORAGE

- To prevent the damage of solderability of terminations, the following storage conditions are recommended:
Indoors under 5°C~ 40°C and 20% ~ 70% RH.
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 12 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 3°C per second.

SOLDERING

- Use rosin activated fluxes (RA and RMA) 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 20 watts and diameter of tip less than 1.0 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.

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.

*Specifications subject to change without notice.