Multilayer Ceramic Capacitors [Stacked Capacitors]

SMC Series

MLCC Design, Suitable for Switchmode Power Supply Filters

◆ Features

- ❑ Stacked design offers the high capacitance similar to Tantalum but with extremely low ESR advantage.
- ❑ 'J', 'L' and 'N' Leaded configuration provide mechanical and thermal stress relief.
- ❑ Capacitance values up to 44μF. Voltage from 50V to 1KV.
- ❑ Available in NP0 and X7R dielectrics .
- ❑ HIREL screening available.
- ❑ RoHS compliant.

◆ Applications

- ❑ Power supplies
- ❑ DC-DC converters
- ❑ Surge protection
- ❑ Industrial control circuits
- ❑ Snubbers
- ❑ Filtering, smoothing, and decoupling application
- ❑ HIREL applications
- ❑ Custom applications

◆ Summary of Specifications

Operating Temperature	-55 to +125 ℃
Rated Voltage	50Vdc to 1000Vdc
Temperature Coefficient of Capacitance	NPO : ≤ ± 30ppm/ ℃ , -55 to +125 ℃ (EIA Class Ⅰ)
	X7R : ≤ ± 15% , -55 to +125 ℃ (EIA Class Ⅱ)
Capacitance Range	NPO: 2.2 nF to 550nF / X7R : 20.0nF to 44uF
Dissipation Factor	NPO : Q≧ 1000 at 1KHz / X7R : 2.5%max. at 1KHz
Insulation Resistance	10GΩ or 500/C Ω whichever is smaller
Aging	NPO : 0% , X7R : 1.0% per decade of time typical
Dielectric Withstanding Voltage	V ≤50V ; 200% Rated Voltage
	100V ≤ V <500V ; 200% Rated Voltage
	500V ≤ V <1KV ; 150% Rated Voltage
	1000V = 120% Rated Voltage
Tolerance	± 2% tolerances are only available in NPO
Patent Number	M505047

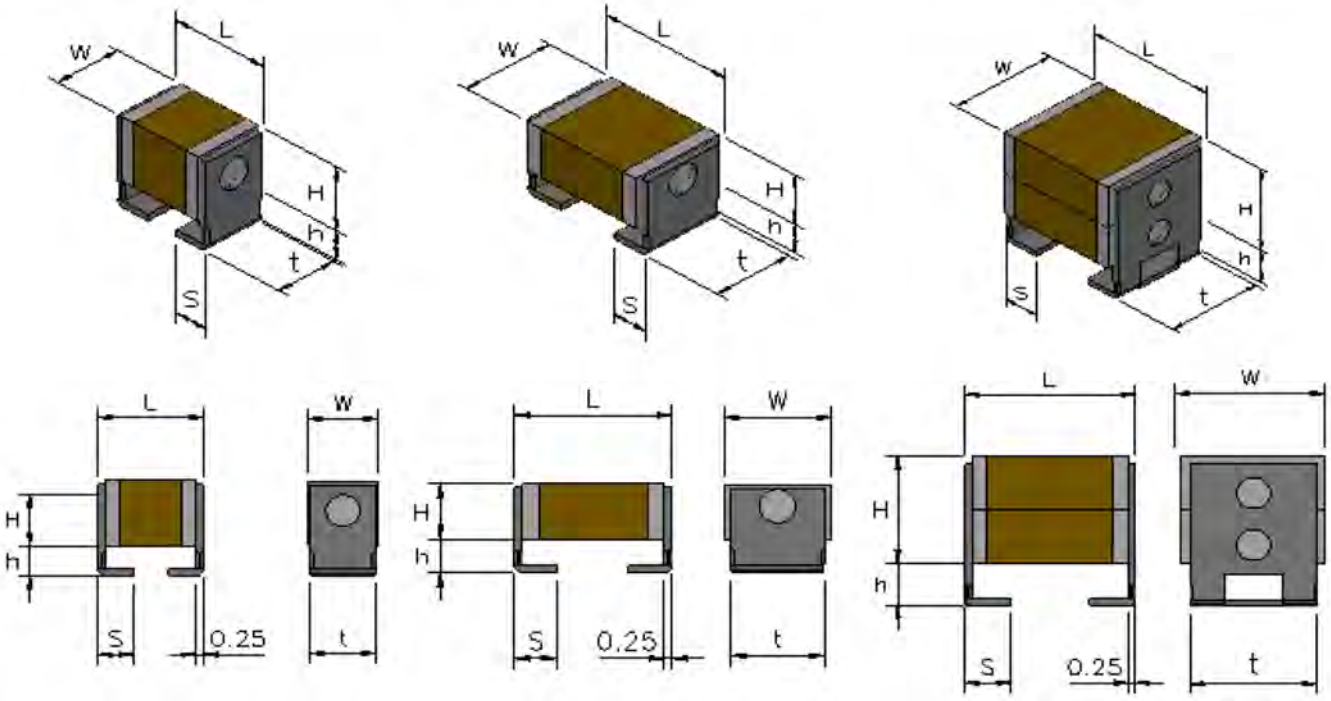
◆ How To Order

SMC	49	J	X	224	K	501	T	H	01

Product Code	Stack and Size	Lead Configuration	Material	Capacitance (pF)	Tolerance	Rated Voltage	Packaging	Special test Requirement	Special Requirement
SMC: Commercial Size Switchmode Stacked Capacitor	The first digit: # of chips in stack Second Digit: Chip Size 5: 1210 6: 1812 7: 2220 8: 1825 9: 2225	Ex.: J : J Lead for h=0.070" L: L Lead for h=0.070" N: Straight Lead P :J Lead for h=0.045" S : L Lead for h=0.045" A: Flat type Lead X: No lead frame	Ex.: N: NP0 X: X7R B: X5R	Ex.: 103:10x10^3 224:22x10^4 475:47x10^5	Ex.: G: +/-2.0% J: +/-5.0% K: +/- 10% M: +/- 20%	Ex.: 050: 50Vdc 101: 100Vdc 201: 200Vdc 501: 500Vdc 102:1000Vdc	Ex.: B: Bulk T:Tape&Reel W: Waffle pack	Ex.: Blank: Standard electrical test H: Hi-Rel Testing	Ex.: Blank: No special requirement 01~99: Customer special requirement

◆ Dimensional Shape

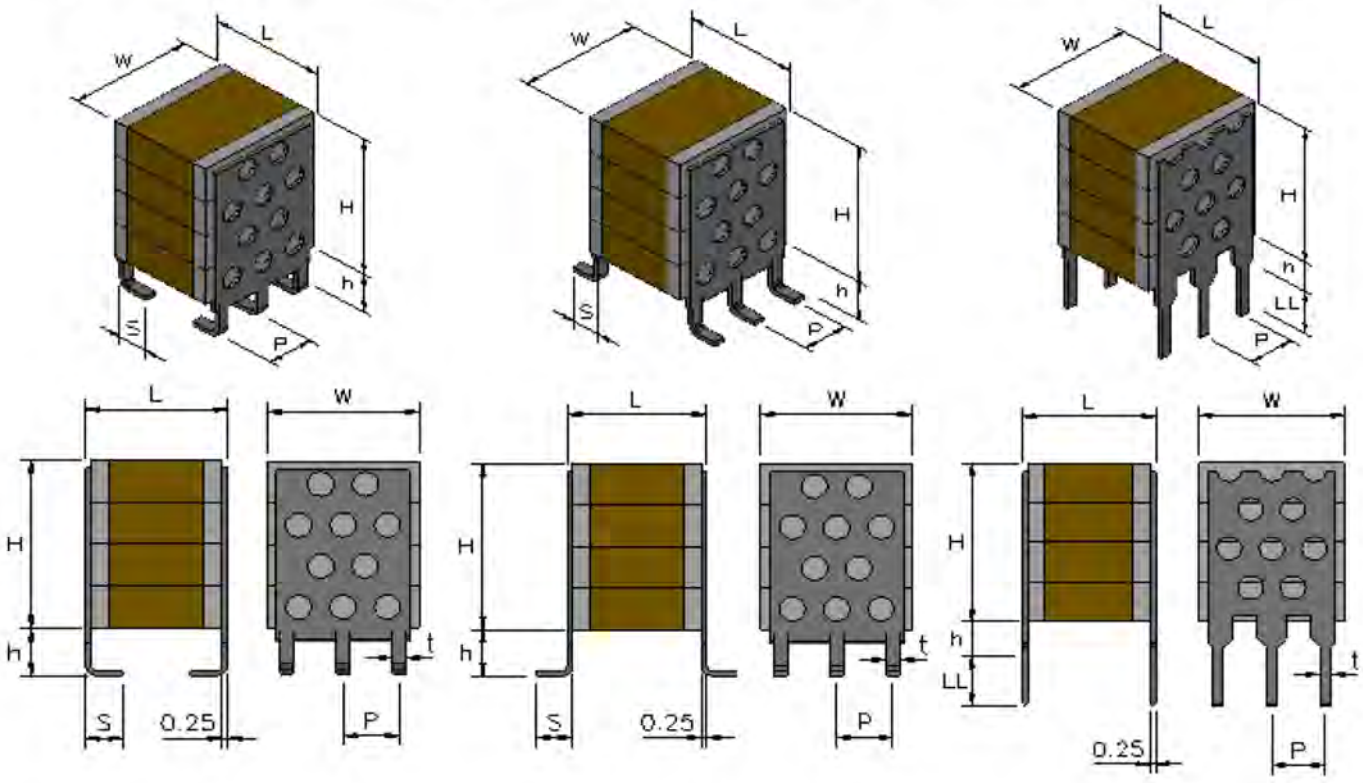
1210 Size



1812 Size

2220 Size

1825/2225 J Type

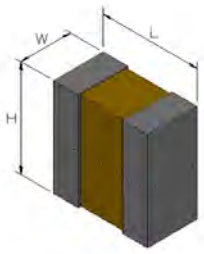


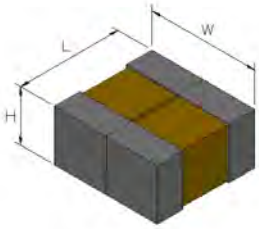
1825/2225 L Type

1825/2225 N Type

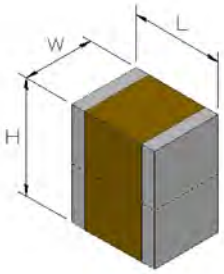
◆ Dimensional Shape

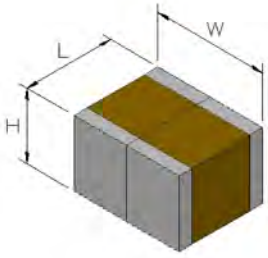
1206 X Type





1210 X Type





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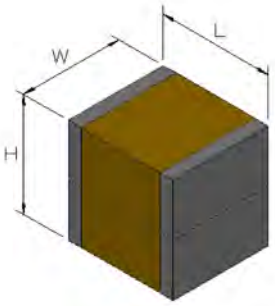

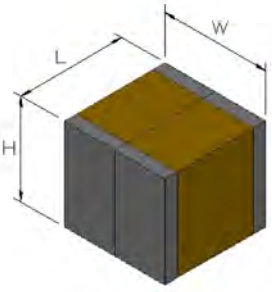

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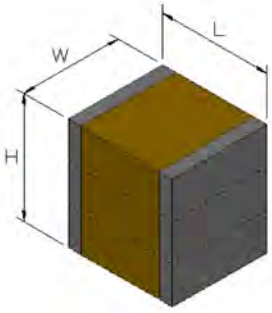

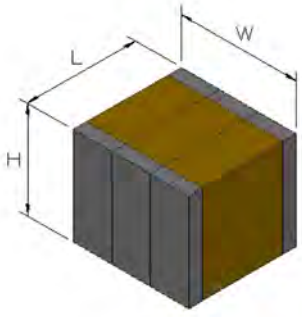

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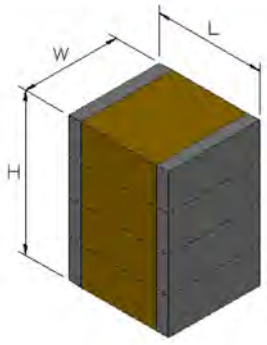
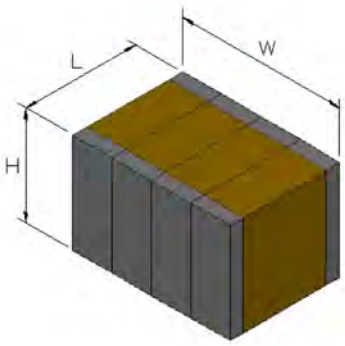
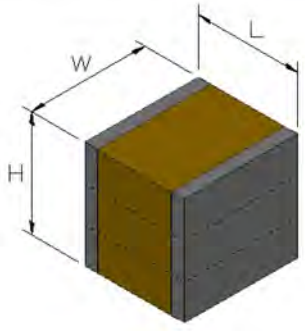
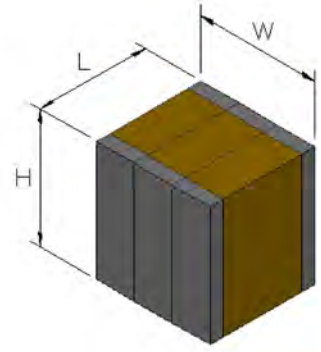




1825/2225 X Type





◆ Dimensions

Unit : mm [inches]

EIA Size Code	1210		1812		2220		1825	
Size Code	15	25	16	26	17	27	18	28
L	3.80 Max [.150 Max]	3.80 Max [.150 Max]	5.50 Max [.217 Max]	5.50 Max [.217 Max]	6.50 Max [.256 Max]	6.50 Max [.256 Max]	5.35±0.50 [.210±.020]	5.35±0.50 [.210±.020]
W (max.)	2.90 [.114]	2.90 [.114]	4.00 [.157]	4.00 [.157]	5.50 [.217]	5.50 [.217]	6.85 [.270]	6.85 [.270]
H(max.)	2.20 [.087]	4.40 [.173]	2.60 [.102]	5.20 [.205]	3.00 [.118]	6.00 [.236]	3.00 [.118]	6.00 [.236]
S	1.00±0.10 [.040±.004]	1.00±0.10 [.040±.004]	1.65±0.50 [.065±.020]	1.65±0.50 [.065±.020]	1.65±0.50 [.065±.020]	1.65±0.50 [.065±.020]	1.65±0.50 [.065±.020]	1.65±0.50 [.065±.020]
P			2.54±0.25 [.100±.010]	2.54±0.25 [.100±.010]	2.54±0.25 [.100±.010]	2.54±0.25 [.100±.010]	2.54±0.25 [.100±.010]	2.54±0.25 [.100±.010]
h* (Typical)	1.30 [.051]	1.30 [.051]	1.30 [.051]	1.30 [.051]	1.30 [.051]	1.30 [.051]	1.78 [.070]	1.78 [.070]
h* (P/S Type)							1.14 [.045]	1.14 [.045]
LL** (min.)					2.54 [.100]	2.54 [.100]	2.54 [.100]	2.54 [.100]
t	2.25±0.1 [.089±.004]	2.25±0.1 [.089±.004]	3.08±0.1 [.121±.004]	3.08±0.1 [.121±.004]	4.50±0.10 [.177±.004]	4.50±0.10 [.177±.004]	0.60±0.10 [.024±.004]	0.60±0.10 [.024±.004]
# of leads per side	1	1	1	1	1	1	3	3

EIA Size Code	1825			2225				
Size Code	38	48	58	19	29	39	49	59
L	5.35±0.50 [.210±.020]	5.35±0.50 [.210±.020]	5.35±0.50 [.210±.020]	6.35±0.50 [.250±.020]	6.35±0.50 [.250±.020]	6.35±0.50 [.250±.020]	6.35±0.50 [.250±.020]	6.35±0.50 [.250±.020]
W (max.)	6.85 [.270]	6.85 [.270]	6.85 [.270]	6.85 [.270]	6.85 [.270]	6.85 [.270]	6.85 [.270]	6.85 [.270]
H(max.)	9.00 [.354]	10.85 [.427]	10.85 [.427]	3.00 [.118]	6.00 [.236]	9.00 [.354]	10.85 [.427]	10.85 [.427]
S	1.65±0.50 [.065±.020]	1.65±0.50 [.065±.020]	1.65±0.50 [.065±.020]	1.65±0.50 [.065±.020]	1.65±0.50 [.065±.020]	1.65±0.50 [.065±.020]	1.65±0.50 [.065±.020]	1.65±0.50 [.065±.020]
P	2.54±0.25 [.100±.010]	2.54±0.25 [.100±.010]	2.54±0.25 [.100±.010]	2.54±0.25 [.100±.010]	2.54±0.25 [.100±.010]	2.54±0.25 [.100±.010]	2.54±0.25 [.100±.010]	2.54±0.25 [.100±.010]
h* (Typical)	1.78 [.070]	1.78 [.070]	1.78 [.070]	1.78 [.070]	1.78 [.070]	1.78 [.070]	1.78 [.070]	1.78 [.070]
h* (P/S Type)	1.14 [.045]	1.14 [.045]	1.14 [.045]	1.14 [.045]	1.14 [.045]	1.14 [.045]	1.14 [.045]	1.14 [.045]
LL** (min.)	2.54 [.100]	2.54 [.100]	2.54 [.100]	2.54 [.100]	2.54 [.100]	2.54 [.100]	2.54 [.100]	2.54 [.100]
t	0.60±0.10 [.024±.004]	0.60±0.10 [.024±.004]	0.60±0.10 [.024±.004]	0.60±0.10 [.024±.004]	0.60±0.10 [.024±.004]	0.60±0.10 [.024±.004]	0.60±0.10 [.024±.004]	0.60±0.10 [.024±.004]
# of leads per side	3	3	3	3	3	3	3	3

- * 'h' varies depends on the lead style. See lead configuration above
- ** "LL" Applies only to Straight (N) leads

◆ X Type-Horizontal Dimensions

Unit : mm [inches]

EIA Size Code	1206	1210	1812			2220		
Size Code	22	25	26	36	46	27	37	47
L (max.)	3.60 [.142]	3.50 [.138]	4.90 [.193]	4.90 [.193]	4.90 [.193]	6.20 [.244]	6.10 [.240]	6.10 [.240]
W (max.)	2.00 [.079]	2.70 [.106]	3.50 [.138]	3.50 [.138]	3.50 [.138]	5.40 [.213]	5.40 [.213]	5.40 [.213]
H(max.)	3.90 [.154]	5.40 [.213]	5.40 [.213]	6.80 [.268]	9.00 [.354]	6.20 [.244]	8.00 [.315]	10.60 [.417]

EIA Size Code	1825				2225			
Size Code	28	38	48	58	29	39	49	59
L (max.)	4.9 [.193]	4.9 [.193]	4.9 [.193]	4.9 [.193]	6.10 [.240]	6.10 [.240]	6.10 [.240]	6.10 [.240]
W (max.)	6.75 [.266]	6.75 [.266]	6.75 [.266]	6.75 [.266]	6.75 [.266]	6.75 [.266]	6.75 [.266]	6.75 [.266]
H(max.)	5.40 [.213]	6.80 [.268]	9.00 [.354]	11.2 [.441]	6.20 [.244]	6.80 [.268]	9.00 [.354]	11.20 [.441]

◆ X Type-Vertical Dimensions

Unit : mm [inches]

EIA Size Code	1206	1210	1812			2220		
Size Code	22	25	26	36	46	27	37	47
L (max.)	3.60 [.142]	3.50 [.138]	4.90 [.193]	4.90 [.193]	4.90 [.193]	6.20 [.244]	6.10 [.240]	6.10 [.240]
W (max.)	3.90 [.154]	5.40 [.081]	5.40 [.213]	6.80 [.268]	9.00 [.354]	6.20 [.244]	8.00 [.315]	10.60 [.417]
H(max.)	2.00 [.079]	2.70 [.106]	3.50 [.138]	3.50 [.138]	3.50 [.138]	5.40 [.213]	5.40 [.213]	5.40 [.213]

EIA Size Code	1825				2225			
Size Code	28	38	48	58	29	39	49	59
L (max.)	4.9 [.193]	4.9 [.193]	4.9 [.193]	4.9 [.193]	6.10 [.240]	6.10 [.240]	6.10 [.240]	6.10 [.240]
W (max.)	5.40 [.213]	6.80 [.268]	9.00 [.354]	11.20 [.441]	6.20 [.244]	6.80 [.268]	9.00 [.354]	11.20 [.441]
H(max.)	6.75 [.266]	6.75 [.266]	6.75 [.266]	6.75 [.266]	6.75 [.266]	6.75 [.266]	6.75 [.266]	6.75 [.266]

◆ Capacitance Range

EIA Chip Size	Size Code	NPO Maximum Capacitance					X7R Maximum Capacitance				
		50V	100V	200V/250V	500V	1000V	50V	100V	200V/250V	500V	1000V
1206	12 (1×Cap)	104	104	223	472	332	475	335	564	683	223
	22 (2×Cap)	204	204	223	472	662	945	665	115	134	443
1210	15 (1×Cap)	104	104	473	123	153	106	475	564	124	473
	25 (2×Cap)	204	204	943	243	304	206	945	115	244	943
1812	16 (1×Cap)	224	104	104	223	223	106	475	105	474	104
	26 (2×Cap)	444	204	204	443	443	206	945	205	944	204
2220	17 (1×Cap)	273	273	333	273	333	106	106	225	105	224
	27 (2×Cap)	543	543	663	543	663	206	206	445	205	444
1825	18 (1×Cap)	104	104	104	104	123	225	105	105	474	154
	28 (2×Cap)	204	204	204	204	243	445	205	205	944	304
	38 (3×Cap)	304	304	304	304	363	665	305	305	145	454
	48 (4×Cap)	404	404	404	404	483	885	405	405	185	604
	58 (5×Cap)	504	504	504	504	603	116	505	505	235	754
2225	19 (1×Cap)	823	823	333	153	153	475	475	225	474	104
	29 (2×Cap)	164	164	663	303	303	945	945	445	944	204
	39 (3×Cap)	244	244	993	453	453	146	146	665	145	304
	49 (4×Cap)	334	334	134	603	603	186	186	885	185	404
	59 (5×Cap)	414	414	164	753	753	236	236	116	235	504

▪ ***Other Stacked configuration on other sizes, capacitance values and voltages rating are available. Please contact Holy Stone.***

◆ Soldering and Handling Precautions

The recommended method for soldering large SMC capacitor, is reflow soldering. Wave soldering and manual soldering with Iron is not recommended.

Ceramic capacitors must be preheated with less than 2ºC/sec rate to about 50ºC below the reflow temperature. Sudden increase, or decrease in temperature more than the recommended rate, during soldering, may cause internal thermal cracks.