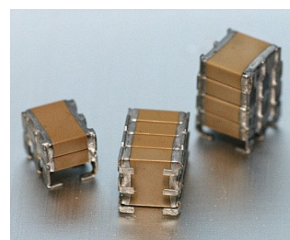


## Multilayer Ceramic Chip Capacitors [Stacked Capacitors]

### 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 1000V.
- Available in NPO and X7R dielectrics .
- HIREL screening available.
- RoHS compliant.

##### ◆ Application

- 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 °C
Rated Voltage	50Vdc to 1000Vdc
Temperature Coefficient of Capacitance	NPO : $\leq \pm 30\text{ppm}/^\circ\text{C}$ , -55 to +125 °C (EIA Class I )
	X7R : $\leq \pm 15\%$ , -55 to +125 °C (EIA Class II )
Capacitance Range	NPO: 2.2 nF to 550nF
	X7R : 20.0nF to 44μF
Dissipation Factor :	NPO : $Q \geq 1000$ 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	$V \leq 50V$ ; 250% Rated Voltage
	$100V \leq V < 500V$ ; 200% Rated Voltage
	$500V \leq V < 1KV$ ; 150% Rated Voltage
	1000V = 120% Rated Voltage
Tolerance	$\pm 2\%$ tolerances are only available in NPO

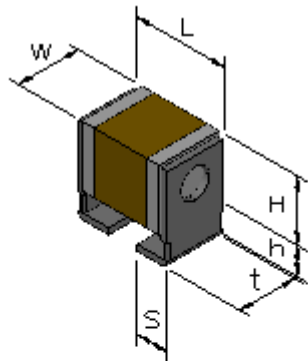
##### ◆ How To Order

SMC	49	J	X	224	K	501	T	H	01
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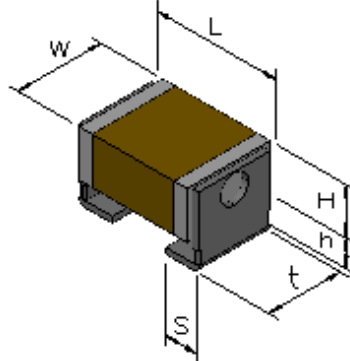
Product Code	Stack and Size	Lead Configuration	Material	Capacitance (pF)	Tolerance	Rated Voltage	Packaging	Special test Requirement	Special Requirement
SMC: Commercial Size Switchmode Stack Capacitor	The first digit: # of chips in stack  Second Digit: Chip Size 5: 1210 6: 1812 7: 2220 8: 1825 9: 2225	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	Ex.: N: NPO X: X7R B: X5R	Ex.: 103:10x10 <sup>3</sup> 224:22x10 <sup>4</sup> 475:47x10 <sup>5</sup>	Ex.: G: +/-2.0% J: +/-5.0% K: +/- 10% M: +/- 20%	Ex.: 050: 50Vdc 101: 100Vdc 201: 200Vdc 501: 500Vdc 102:1000Vdc	B: Bulk T:Tape&Reel W: Waffle pack	Blank: Standard electrical test H: Hi-Rel Testing	Blank: No special requirement 01~99: Customer special requirement

◆ Dimensions

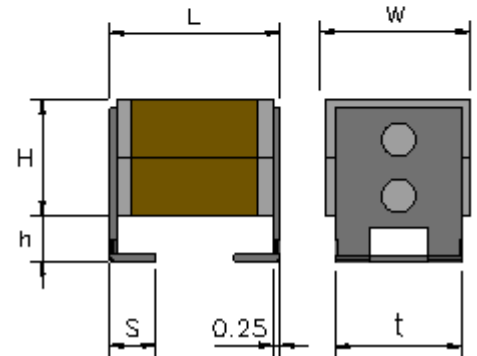
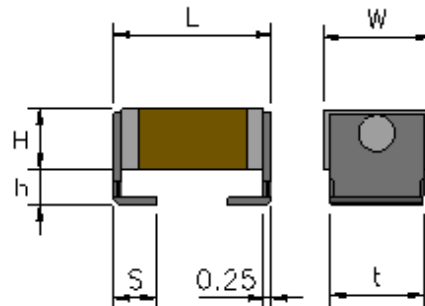
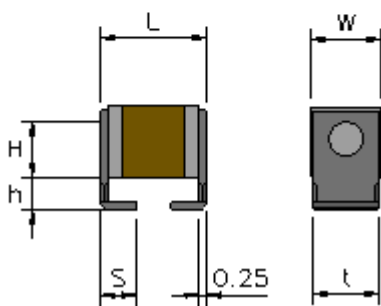
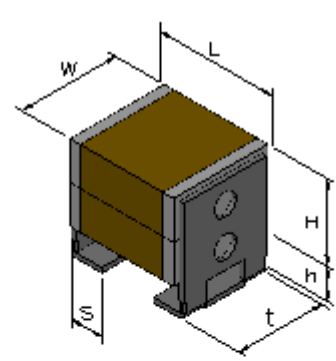
1210 Size



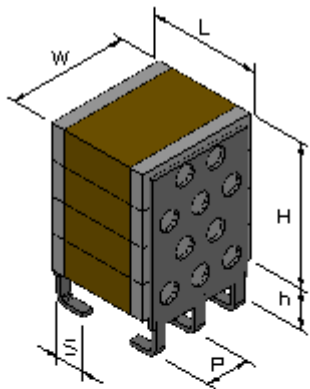
1812 Size



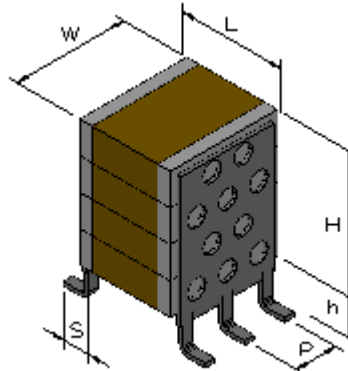
2220 Size



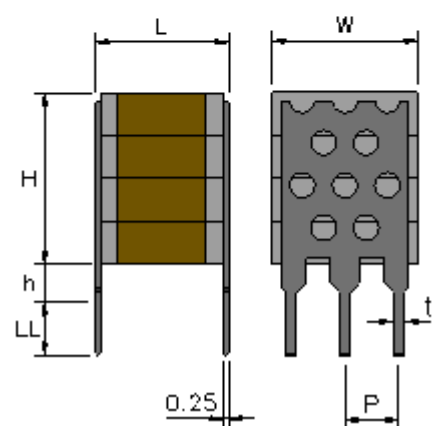
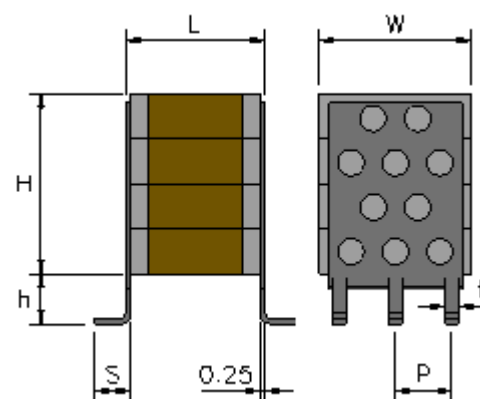
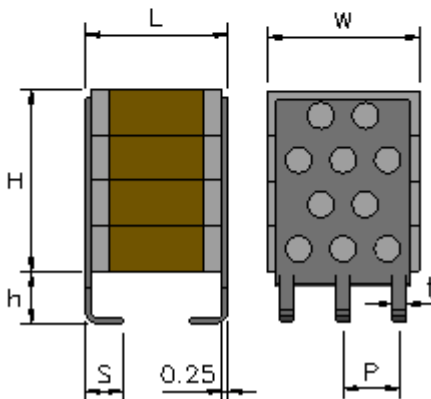
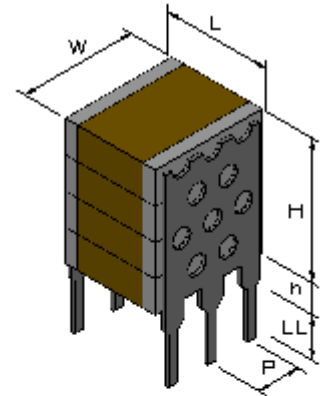
1825/2225 J Type



1825/2225 L Type



1825/2225 N Type



# SMC Series-Stacked Capacitors



Holy Stone

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	1.65±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]
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]	0.50±0.05 [.020±.002]	0.50±0.05 [.020±.002]	0.50±0.10 [.020±.004]	0.50±0.10 [.020±.004]	0.50±0.10 [.020±.004]	0.50±0.10 [.020±.004]
# of leads per side	1	1	2	2	2	2	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]	12.00 [.472]	15.00 [.591]	3.00 [.118]	6.00 [.236]	9.00 [.354]	12.00 [.472]	15.00 [.591]
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	0.50±0.10 [.020±.004]	0.50±0.10 [.020±.004]	0.50±0.10 [.020±.004]	0.50±0.10 [.020±.004]	0.50±0.10 [.020±.004]	0.50±0.10 [.020±.004]	0.50±0.10 [.020±.004]	0.50±0.10 [.020±.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

## 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
1210	15 (1×Cap)	104	473	682	382	332	475	475	684	124	473
	25 (2×Cap)	204	943	133	762	662	945	945	135	244	943
1812	16 (1×Cap)	124	104	273	822	682	105	105	105	474	104
	26 (2×Cap)	244	204	543	163	133	205	205	205	944	204
2220	17 (1×Cap)	273	273	333	273	183	226	106	225	105	394
	27 (2×Cap)	543	543	663	543	363	446	206	445	205	784
1825	18 (1×Cap)	104	104	104	104	473	225	105	105	474	823
	28 (2×Cap)	204	204	204	204	943	445	205	205	944	164
	38 (3×Cap)	304	304	304	304	144	665	305	305	145	244
	48 (4×Cap)	404	404	404	404	184	885	405	405	185	324
	58 (5×Cap)	504	504	504	504	234	116	505	505	235	414
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)	324	324	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 HEC.

### \*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 2°C/sec rate to about 50°C below the reflow temperature. Sudden increase, or decrease in temperature more than the recommended rate, during soldering, may cause internal thermal cracks.

