

MULTILAYER CERAMIC CAPACITORS

Soft Termination_X7R (SH_10V~250V)

1. INTRODUCTION

WTC soft termination series MLCC is designed and with a polymer layer within end terminations of product, which can absorb mechanical stress caused by PCB handling in SMT line and reduce the mechanical impact for product. It will offer more robust and reliable performance in applications.

2. FEATURES

- b. MLCC's termination are with a soft & flexible polymer layer to withstand high bending stress in SMT line.
- c. Available for any item in standard series range.

3. APPLICATIONS

- a. Automotive industry.
- b. Power supply and related industries.
- c. Lighting industry.
- d. The other mechanical stress concerned products.

4. HOW TO ORDER

<u>SH</u>	<u>31</u>	<u>B</u>	<u>104</u>	<u>K</u>	<u>500</u>	<u>C</u>	<u>T</u>
<u>Series</u>	<u>Size</u>	<u>Dielectric</u>	<u>Capacitance</u>	<u>Tolerance</u>	<u>Rated voltage</u>	<u>Termination</u>	<u>Packaging</u>
SH=Soft termination	18=0603 (1608) 21=0805 (2012) 31=1206 (3216) 32=1210 (3225) 43=1812 (4532)	B=X7R	Two significant digits followed by no. of zeros. And R is in place of decimal point. Eg. 104=10x10 ⁴ =100nF	J=±5% K=±10% M=±20%	Two significant digits followed by no. of zeros. And R is in place of decimal point. 100=10 VDC 160=16 VDC 250=25 VDC 500=50 VDC 101=100VDC 201=200 VDC 251=250 VDC	C=Cu/Ni/Sn	T=7" reeled G=13" reeled

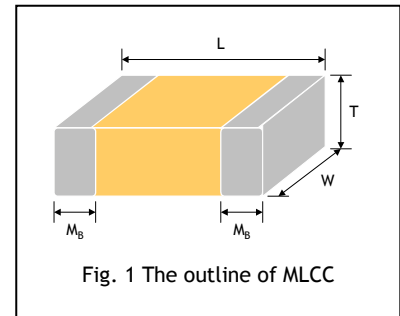
Note 1: Please see below product range to find right termination code.

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5. EXTERNAL DIMENSIONS

Size Inch (mm)	L (mm)	W (mm)	T (mm)/Symbol	Remark	M _B (mm)
0603 (1608)	1.60±0.20	0.80±0.10	0.80±0.07	S	0.40±0.15
	1.60 +0.20/-0.10	0.80 +0.15/-0.10	0.80 +0.15/-0.10	X	
0805 (2012)	2.00±0.20	1.25±0.10	0.60±0.10	A	0.50±0.20
			0.80±0.10	B	
			1.25±0.10	D	
	2.00+0.25/-0.2	1.25±0.20	1.25±0.20	I	#
1206 (3216)	3.20+0.4/-0.1	1.60±0.15	0.80±0.10	B	0.60±0.20
			0.95±0.10	C	
			1.15±0.15	J	
			1.25±0.10	D	
	3.20+0.4/-0.1	1.60±0.20	1.60±0.20	G	
3.20+0.4/-0.1	1.60+0.3/0.1	1.60+0.30/-0.10	P	#	
1210 (3225)	3.20±0.40	2.50±0.20	0.95±0.10	C	0.75±0.25
			1.25±0.10	D	
	3.20±0.50	2.50±0.30	1.60±0.20	G	
			2.00±0.20	K	
			2.50±0.30	M	
1812 (4532)	4.50+0.6/-0.4	3.20±0.30	1.25±0.10	D	0.75±0.25
			2.00±0.20	K	
		3.20±0.40	2.50±0.30	M	



Reflow soldering only is recommended.

6. GENERAL ELECTRICAL DATA

Dielectric	X7R
Size	0603,0805,1206,1210,1812
Capacitance*	100pF to 2.2μF
Capacitance tolerance**	J (±5%), K (±10%), M (±20%)
Rated voltage (WVDC)	10V to 250V
Tan δ*	Note 1
Insulation resistance at U _r	≥10GΩ or RxC≥100Ω·F whichever is smaller
Dielectric strength	≤100V : ≥2.5 x WVDC ; 200-300V ≥ 2 times VDC
Operating temperature	-55 to +125 °C
Capacitance characteristic	±15%
Termination	Ni/Sn (lead-free termination)

* Measured at 1.0±0.2Vrms, 1.0kHz±10% for C≤10μF, 30-70% related humidity, 25 °C ambient temperature for X7R

** Preconditioning for Class II MLCC: Perform a heat treatment at 150±10 °C for 1 hour, then leave in ambient condition for 24±2 hours before measurement.

Note 1:

X7R/X5R

Rated vol.	D.F. ≤	Exception of D.F. ≤
≥50V	2.5%	3% 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF
25V	3.5%	5% 0805 ≥ 1μF; 1210 ≥ 10μF
		7% 0603 ≥ 0.33μF; 1206 ≥ 4.7μF
		10% 0402 ≥ 0.10μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 6.8μF
16V	3.5%	5% 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF
		10% 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF
10V	5%	10% 0402 ≥ 0.33μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF;
		15% 0201 ≥ 0.1μF; 0402 ≥ 1μF
		15% 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1210 ≥ 100μF;
6.3V	10%	20% 0402 ≥ 2.2μF

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7. CAPACITANCE RANGE (X7R Dielectric)

7-1 10V to 250V (0603, 0805 Sizes)

DIELECTRIC		X7R											
SIZE		0603					0805						
RATED VOLTAGE (VDC)		10	16	25	50	100	10	16	25	50	100	200	250
Capacitance	100pF (101)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	B/D	B/D
	120pF (121)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	B/D	B/D
	150pF (151)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	B/D	B/D
	180pF (181)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	B/D	B/D
	220pF (221)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	B/D	B/D
	270pF (271)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	B/D	B/D
	330pF (331)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	B/D	B/D
	390pF (391)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	B/D	B/D
	470pF (471)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	B/D	B/D
	560pF (561)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	B/D	B/D
	680pF (681)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	B/D	B/D
	820pF (821)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	B/D	B/D
	1,000pF (102)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	B/D	B/D
	1,200pF (122)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	B/D	B/D
	1,500pF (152)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	B/D	B/D
	1,800pF (182)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	B/D	B/D
	2,200pF (222)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	B/D	B/D
	2,700pF (272)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	B/D	B/D
	3,300pF (332)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	B/D	B/D
	3,900pF (392)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	B/D	B/D
	4,700pF (472)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	B/D	B/D
	5,600pF (562)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	D	D
	6,800pF (682)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	D	D
	8,200pF (822)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	D	D
	0.010μF (103)	S	S	S	S	S	B/D	B/D	B/D	B/D	B/D	D	D
	0.012μF (123)	S	S	S	S		B/D	B/D	B/D	B/D	B/D	D	D
	0.015μF (153)	S	S	S	S		B/D	B/D	B/D	B/D	B/D	D	D
	0.018μF (183)	S	S	S	S		B/D	B/D	B/D	B/D	B/D	D	D
	0.022μF (223)	S	S	S	S		B/D	B/D	B/D	B/D	B/D	D	D
	0.027μF (273)	S	S	S	S		B/D	B/D	B/D	B/D	D		
	0.033μF (333)	S	S	S	X		B/D	B/D	B/D	B/D	D		
	0.039μF (393)	S	S	S	X		B/D	B/D	B/D	B/D	D		
	0.047μF (473)	S	S	S	X		B/D	B/D	B/D	B/D	D		
	0.056μF (563)	S	S	S	X		B/D	B/D	B/D	B/D	D		
	0.068μF (683)	S	S	S	X		B/D	B/D	B/D	B/D	D		
0.082μF (823)	S	S	S	X		B/D	B/D	B/D	B/D	D			
0.10μF (104)	S	S	S	X		B/D	B/D	B/D	B/D	D			
0.12μF (124)	S	S	X			B/D	B/D	B/D	D				
0.15μF (154)	S	S	X			D	D	D	D				
0.18μF (184)	S	S	X			D	D	D	D				
0.22μF (224)	S	S	X			D	D	D	D				
0.27μF (274)	X	X	X										
0.33μF (334)	X	X	X										
0.39μF (394)	X	X	X										
0.47μF (474)	X	X	X										
0.56μF (564)	X												
0.68μF (684)	X	X											
0.82μF (824)	X												
1.0μF (105)	X	X											

1. The letter in cell is expressed the symbol of product thickness.
2. For more information about products with special capacitance or other data, please contact WTC local representative.

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8. PACKAGING DIMENSION AND QUANTITY

Size	Thickness (mm)/Symbol		Paper tape		Plastic tape	
			7" reel	13" reel	7" reel	13" reel
0603 (1608)	0.80±0.07	S	4k	15k	-	-
	0.80+0.15/-0.10	X	4k	15k	-	-
0805 (2012)	0.80±0.10	B	4k	15k	-	-
	1.25±0.10	D	-	-	3k	10k
	1.25±0.20	I	-	-	3k	10k
1206 (3216)	0.80±0.10	B	4k	15k	-	-
	0.95±0.10	C	-	-	3k	10k
	1.15±0.15	J	-	-	3K	10K
	1.25±0.10	D	-	-	3k	10k
	1.60±0.20	G	-	-	2k	-
	1.60+0.30/-0.10	P	-	-	2k	-
1210 (3225)	0.95±0.10	C	-	-	3k	10k
	1.25±0.10	D	-	-	3k	10k
	1.60±0.20	G	-	-	2k	-
	2.00±0.20	K	-	-	1k	-
	2.50±0.30	M	-	-	1k	-
1812 (4532)	1.25±0.10	D	-	-	1k	-
	2.00±0.20	K	-	-	1k	-
	2.50±0.30	M	-	-	0.5k	-

Unit: pieces

APPENDIXES

■ Tape & reel dimensions

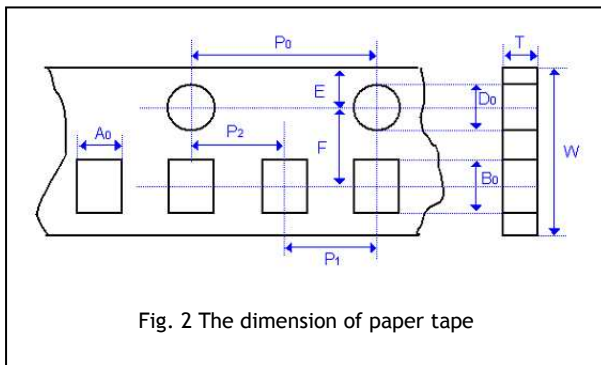


Fig. 2 The dimension of paper tape

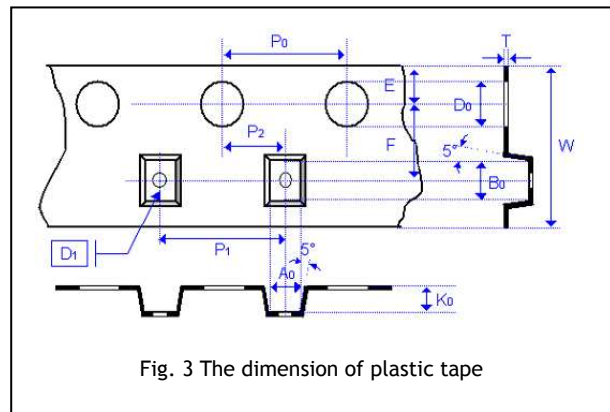


Fig. 3 The dimension of plastic tape

Size	0603	0805			1206			1210		1812
Thickness	S, X	A	B	C, D, I	B	C, J, D	G	C, D, G	M	D, K
A ₀	1.02±0.05	1.50±0.10	1.50±0.10	<1.57	2.00±0.10	<1.85	<1.95	<2.97	<2.97	<3.81
B ₀	1.80±0.05	2.30±0.10	2.30±0.10	<2.40	3.50±0.10	<3.46	<3.67	<3.73	<3.73	<5.30
T	0.95±0.05	0.75±0.05	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
K ₀	-	-	-	<2.50	-	<2.50	<2.50	<2.50	<3.00	<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	8.00±0.10	8.00±0.10	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
10xP ₀	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10
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	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
D ₀	1.55±0.05	1.55±0.05	1.55±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05
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
E	1.75±0.05	1.75±0.05	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
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	5.50±0.05

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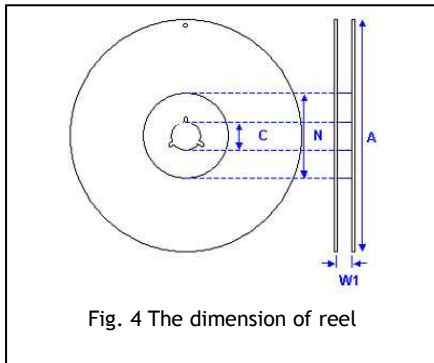
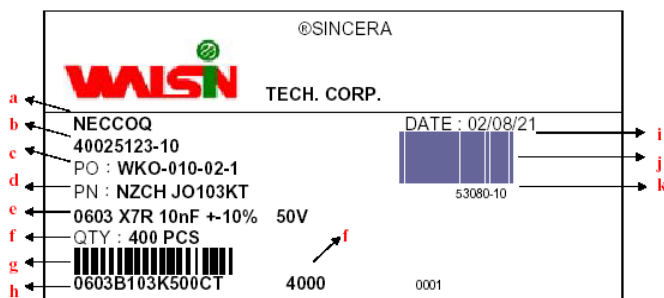


Fig. 4 The dimension of reel

Size	0402, 0603, 0805, 1206, 1210			1812
Reel size	7"	10"	13"	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
W ₁	8.4+1.5/-0	8.4+1.5/-0	8.4+1.5/-0	12.4+2.0/-0
A	178.0±0.10	250.0±1.0	330.0±1.0	178.0±0.10
N	60.0+1.0/-0	100.0±1.0	100±1.0	60.0+1.0/-0

Description of customer label



- a. Customer name
- b. WTC order series and item number
- c. Customer P/O
- d. Customer P/N
- e. Description of product
- f. Quantity
- g. Bar code including quantity & WTC P/N or customer
- h. WTC P/N
- i. Shipping date
- j. Order bar code including series and item numbers
- k. Serial number of label

Storage and handling conditions

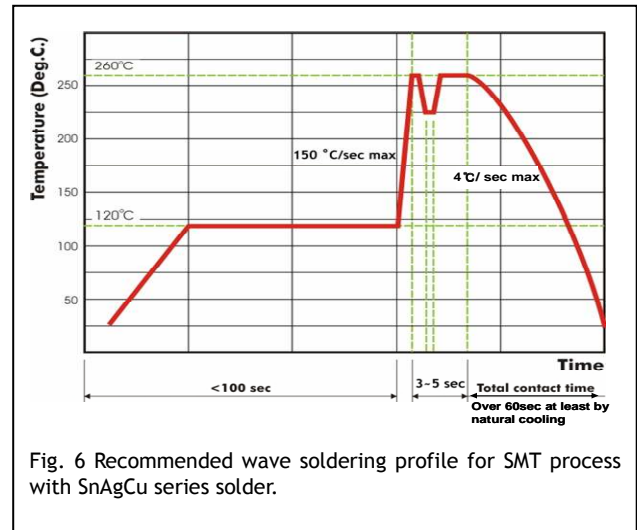
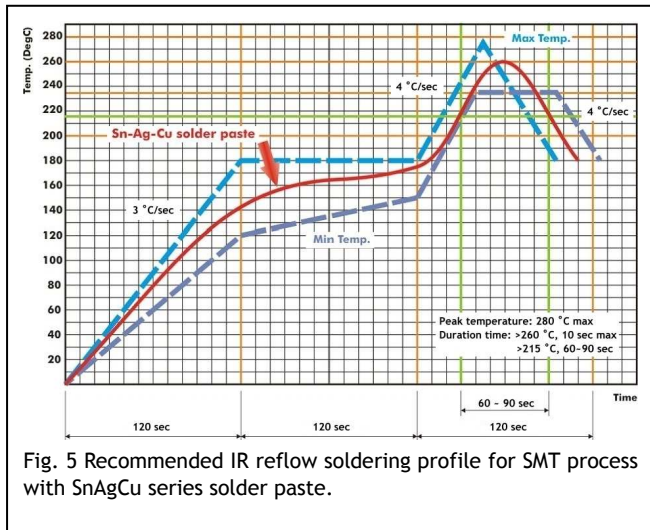
- (1) To store products at 5 to 40°C ambient temperature and 20 to 70% related humidity conditions.
- (2) The product is recommended to be used within one year after shipment. Check solderability in case of shelf life extension is needed.

Cautions:

- a. Don't store products in a corrosive environment such as sulfide, chloride gas, or acid. It may cause oxidization of electrode, which easily be resulted in poor soldering.
- b. To store products on the shelf and avoid exposure to moisture.
- c. Don't expose products to excessive shock, vibration, direct sunlight and so on.

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.



Use middy 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, 2220 and 2225, etc. wave soldering and hand soldering are not recommended.