

MULTILAYER CERAMIC CAPACITORS

Soft Termination NP0 (SH Series NP0)

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

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

3. APPLICATIONS

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

4. HOW TO ORDER

<u>SH</u>	<u>31</u>	<u>N</u>	<u>100</u>	<u>D</u>	<u>501</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	21=0805 (2012) 31=1206 (3216) 32=1210 (3225) 42=1808 (4520) 43=1812 (4532)	N=NP0 (COG)	Two significant digits followed by no. of zeros. And R is in place of decimal point. eg.: 0R5=0.5pF 1R0=1.0pF 100=10x10 ⁰ =10pF	B=±0.1pF C=±0.25pF D=±0.5pF F=±1% G=±2% J=±5% K=±10%	Two significant digits followed by no. of zeros. And R is in place of decimal point. 101=100 VDC 201=200 VDC 251=250 VDC 501=500 VDC 631=630 VDC 102=1000 VDC 202=2000 VDC 302=3000 VDC	C=Cu/Ni/Sn	T=7" reeled G=13" reeled

5. EXTERNAL DIMENSIONS

Size Inch (mm)	L (mm)	W (mm)	T (mm)/Symbol	Remark	M _B (mm)
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	
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	
	3.20+0.4/-0.1	1.60±0.20	1.60±0.20	G	
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	
1808 (4520)	4.50+0.6/-0.4	2.03±0.25	2.50±0.30	M	0.75±0.25
			1.25±0.10	D	
			2.00±0.20	K	
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	

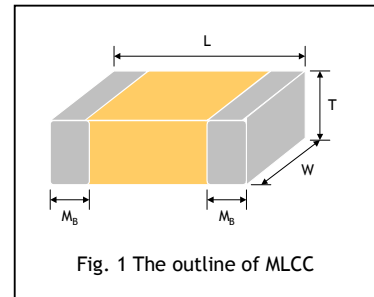


Fig. 1 The outline of MLCC

Reflow soldering only is recommended.

6. GENERAL ELECTRICAL DATA

Dielectric	NPO
Size	0805, 1206, 1210, 1808, 1812
Capacitance*	0.5pF to 8200pF
Capacitance tolerance***	Cap≤5pF: C (±0.25pF) 5pF<Cap<10pF: D (±0.5pF) Cap≥10pF: J (±5%), K (±10%)
Rated voltage (WVDC)	100V to 3000V
Q*	Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1000
Insulation resistance at Ur**	Ur=100-630V: ≥10GΩ or RxC≥100Ω·F whichever is smaller Ur=1000-3000V: ≥10GΩ
Dielectric strength	100V : ≥2.5 x WVDC 200-300V: ≥2 x WVDC 500-999V: ≥1.5 x WVDC 1000-3000V: ≥1.2 x WVDC
Operating temperature	-55 to +125 °C
Capacitance characteristic	±30ppm
Termination	Ni/Sn (lead-free termination)

* Measured at the condition of 30-70% related humidity.

NPO: Apply 1.0±0.2Vrms, 1.0MHz±10% for Cap≤1000pF and 1.0±0.2Vrms, 1.0kHz±10% for Cap>1000pF, 25 °C at ambient temperature

** Measured at 500VDC for 60 sec. for Ur>500VDC.

*** 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.

MULTILAYER CERAMIC CAPACITORS

Soft Termination NPO (SH Series NPO)

7. CAPACITANCE RANGE

NPO Dielectric

DIELECTRIC		NPO											
SIZE		0805					1206						
RATED VOLTAGE (VDC)		100	200	250	500	630	100	200	250	500	630	1000	2000
Capacitance	0.5pF (0R5)	A	A	A	A	A							
	1.0pF (1R0)	A	A	A	A	A							
	1.2pF (1R2)	A	A	A	A	A							
	1.5pF (1R5)	A	A	A	A	A	B	B	B	B	B	B	B
	1.8pF (1R8)	A	A	A	A	A	B	B	B	B	B	B	B
	2.2pF (2R2)	A	A	A	A	A	B	B	B	B	B	B	B
	2.7pF (2R7)	A	A	A	A	A	B	B	B	B	B	B	B
	3.3pF (3R3)	A	A	A	A	A	B	B	B	B	B	B	B
	3.9pF (3R9)	A	A	A	A	A	B	B	B	B	B	B	B
	4.7pF (4R7)	A	A	A	A	A	B	B	B	B	B	B	B
	5.6pF (5R6)	A	A	A	A	A	B	B	B	B	B	B	B
	6.8pF (6R8)	A	A	A	A	A	B	B	B	B	B	B	B
	8.2pF (8R2)	A	A	A	A	A	B	B	B	B	B	B	B
	10pF (100)	A	A	A	A	A	B	B	B	B	B	B	B
	12pF (120)	A	A	A	A	A	B	B	B	B	B	B	B
	15pF (150)	A	A	A	A	A	B	B	B	B	B	B	B
	18pF (180)	A	A	A	A	A	B	B	B	B	B	B	B
	22pF (220)	A	A	A	A	A	B	B	B	B	B	B	B
	27pF (270)	A	A	A	A	A	B	B	B	B	B	B	B
	33pF (330)	A	A	A	A	A	B	B	B	B	B	B	C
	39pF (390)	A	A	A	A	A	B	B	B	B	B	B	C
	47pF (470)	A	A	A	A	A	B	B	B	B	B	C	C
	56pF (560)	A	A	A	A	A	B	B	B	B	B	C	D
	68pF (680)	A	A	A	A	A	B	B	B	B	B	C	D
	82pF (820)	A	A	A	B	B	B	B	B	B	B	D	D
	100pF (101)	A	A	B	B	B	B	B	B	B	B	D	D
	120pF (121)	A	A	B	D	D	B	B	B	B	B	D	G
	150pF (151)	A	B	D	D	D	B	B	B	B	B	D	G
	180pF (181)	A	B	D	D	D	B	B	B	B	B	G	G
	220pF (221)	A	D	D	D	D	B	B	B	B	B	G	G
	270pF (271)	A	D	D	D	D	B	B	C	C	C	G	
	330pF (331)	A	D	D	D	D	B	B	C	C	C	G	
390pF (391)	B	D	D	D	D	B	B	C	C	C	G		
470pF (471)	B	D				B	C	C	C	C	G		
560pF (561)	B	D				B	C	D	D	D			
680pF (681)	B	D				B	C	D	D	D			
820pF (821)	B	D				B	C	G	G	G			
1,000pF (102)	B	D				B	C	G	G	G			
1,200pF (122)	B					B	C						
1,500pF (152)	B					B	D						
1,800pF (182)	B					B	D						
2,200pF (222)	B					B	D						
2,700pF (272)	D					B							
3,300pF (332)	D					B							
3,900pF (392)	D					B							
4,700pF (472)						B							
5,600pF (562)						B							
6,800pF (682)						C							
8,200pF (822)						D							

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.

MULTILAYER CERAMIC CAPACITORS

Soft Termination NPO (SH Series NPO)

NPO Dielectric

DIELECTRIC		NPO							
SIZE		1210		1808			1812		
RATED VOLTAGE (VDC)		1000	2000	1000	2000	3000	1000	2000	3000
Capacitance	0.5pF (0R5)								
	1.0pF (1R0)								
	1.2pF (1R2)								
	1.5pF (1R5)								
	1.8pF (1R8)								
	2.2pF (2R2)			D	D	D			
	2.7pF (2R7)			D	D	D			
	3.3pF (3R3)			D	D	D			
	3.9pF (3R9)			D	D	D			
	4.7pF (4R7)			D	D	D			
	5.6pF (5R6)			D	D	D			
	6.8pF (6R8)			D	D	D			
	8.2pF (8R2)			D	D	D			
	10pF (100)	C	C	D	D	D	D	D	D
	12pF (120)	C	C	D	D	D	D	D	D
	15pF (150)	C	C	D	D	D	D	D	D
	18pF (180)	C	C	D	D	D	D	D	D
	22pF (220)	C	C	D	D	D	D	D	D
	27pF (270)	C	C	D	D	D	D	D	D
	33pF (330)	C	C	D	D	D	D	D	D
	39pF (390)	C	C	D	D	D	D	D	D
	47pF (470)	C	C	D	D	D	D	D	D
	56pF (560)	C	D	D	D	D	D	D	D
	68pF (680)	C	D	D	D	D	D	D	D
	82pF (820)	C	D	D	D	D	D	D	D
	100pF (101)	D	D	D	D	K	D	D	D
	120pF (121)	D	D	D	D	K	D	D	D
	150pF (151)	D	G	D	K	K	D	D	D
	180pF (181)	D	G	D	K	K	D	D	K
	220pF (221)	G	G	D	K	K	D	D	K
	270pF (271)	G		K	K	K	D	K	K
	330pF (331)	G		K	K	K	D	K	K
	390pF (391)	G		K	K		D	K	K
	470pF (471)	G		K	K		K	K	K
	560pF (561)			K	K		K	K	
	680pF (681)			K	K		K	K	
	820pF (821)			K			K	K	
	1,000pF (102)			K			K	K	
	1,200pF (122)						K		
	1,500pF (152)						K		
1,800pF (182)									
2,200pF (222)									
2,700pF (272)									
3,300pF (332)									
3,900pF (392)									
4,700pF (472)									
5,600pF (562)									
6,800pF (682)									
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Soft Termination NPO (SH Series NPO)

8. PACKAGING DIMENSION AND QUANTITY

Size	Thickness/Symbol (mm)		Paper tape		Plastic tape	
			7" reel	13" reel	7" reel	13" reel
0805	0.60±0.10	A	4k	15k	-	-
	0.80±0.10	B	4k	15k	-	-
	1.25±0.10	D	-	-	3k	10k
1206	0.80±0.10	B	4k	15k	-	-
	0.95±0.10	C	-	-	3k	10k
	1.25±0.10	D	-	-	3k	10k
	1.60±0.20	G	-	-	2k	10k
1210	0.95±0.10	C	-	-	3k	10k
	1.25±0.10	D	-	-	3k	10k
	1.60±0.20	G	-	-	2k	-
	2.50±0.30	M	-	-	1k	-
1808	1.25±0.10	D	-	-	2k	-
	2.00±0.20	K	-	-	1k	-
1812	1.25±0.10	D	-	-	1k	-
	2.00±0.20	K	-	-	1k	-

Unit: pieces

APPENDIXES

■ Tape & reel dimensions

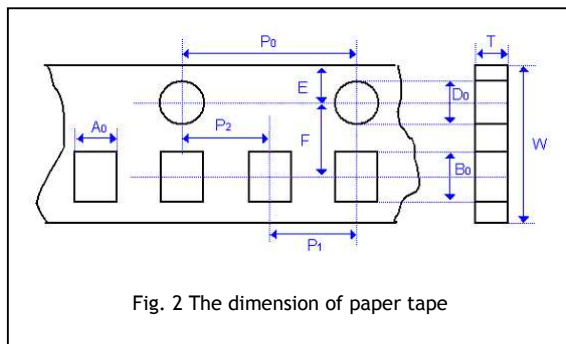


Fig. 2 The dimension of paper tape

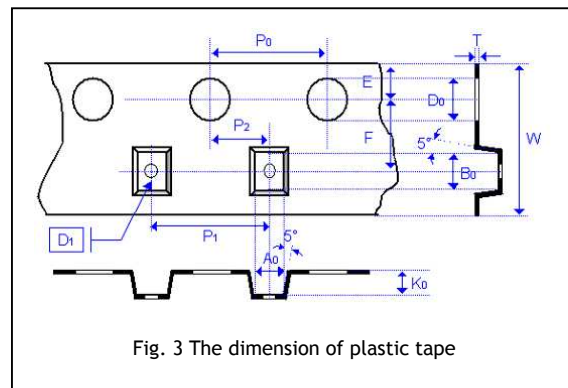


Fig. 3 The dimension of plastic tape

Size	0603	0805		1206			1210		1808		1812
Thickness	S, X	B	C, D, I	B	C, D	G	C, D, G	M	D	K	D, K
A ₀	1.02±0.05	1.50±0.10	<1.57	2.00±0.10	<1.85	<1.95	<2.97	<2.97	<2.35	<2.35	<3.81
B ₀	1.80±0.05	2.30±0.10	<2.40	3.50±0.10	<3.46	<3.67	<3.73	<3.73	<4.98	<5.00	<5.30
T	0.95±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	0.25±0.05	0.25±0.05
K ₀	-	-	<2.50	-	<2.50	<2.50	<2.50	<3.0	<2.50	<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	8.00±0.10	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	40.0±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	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	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	2.00±0.05
D ₀	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	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	1.50±0.10	1.50±0.10
E	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	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	5.50±0.05	5.50±0.05	5.50±0.05

MULTILAYER CERAMIC CAPACITORS

Soft Termination NPO (SH Series NPO)

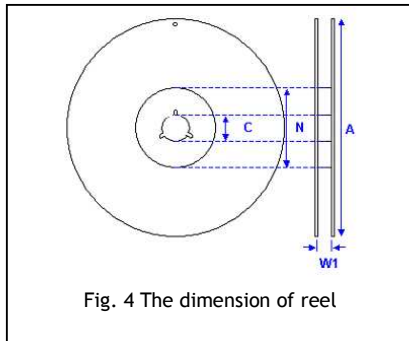
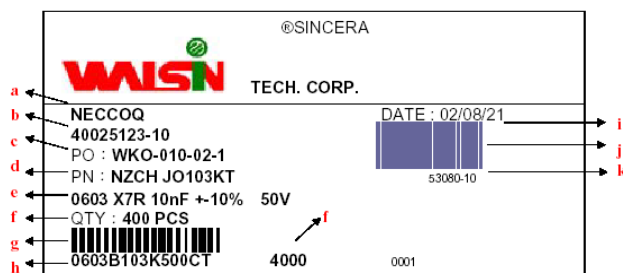


Fig. 4 The dimension of reel

Size	0603, 0805, 1206, 1210			1808, 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	100.0±1.0	100±1.0	60.5±1.0

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

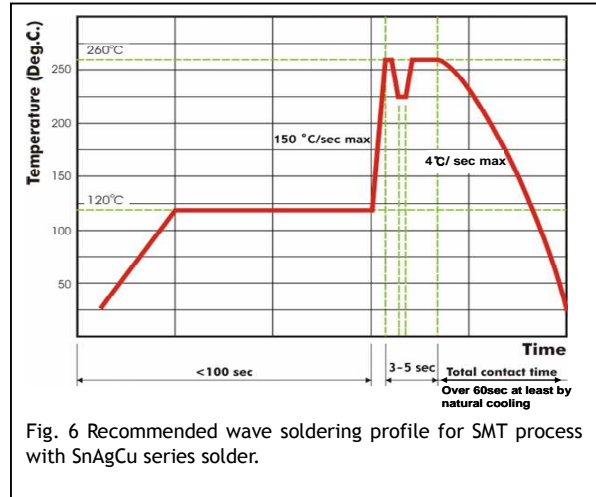
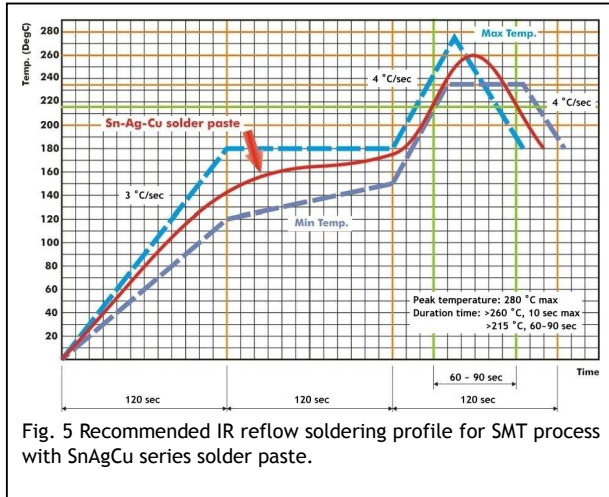
- (1) To store products at 5 to 40°C ambient temperature and 20 to 70% related humidity conditions.
- (2) The product is recommended to be used within one year after shipment. Check solderability in case of shelf life extension is needed.

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