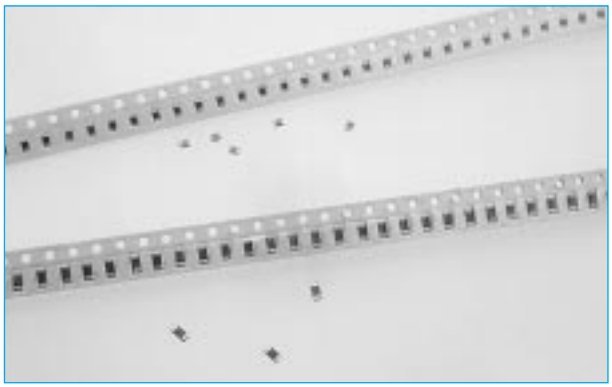
- NPO, X7R, Y5V/Z5U dielectric
- All standard chip sizes
- 13" reel size available

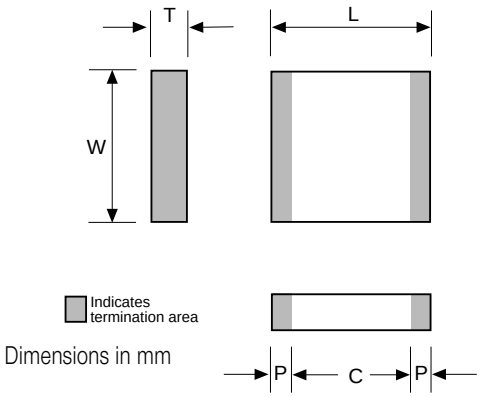
Our range of SMD multi-layer ceramic capacitors compliments the leaded capacitors available in radial and axial form.

All product packaging is fully marked with date and lot traceability information.

Most industry standard sizes are available, including 0603 and 1812.



OUTLINE DRAWING



Size Code	L mm	W mm	T mm	P mm
0402	1.0±0.1	0.5±0.05	0.6 MAX	0.2
0603	1.6±0.15	0.8±0.1	0.9 MAX	0.3
0805	2.0±0.2	1.25±0.15	1.3 MAX	0.5
1206	3.2±0.2	1.6±0.15	1.3 MAX	0.5
1210	3.2±0.3	2.5±0.3	1.7 MAX	0.5
1812	4.5±0.3	3.2±0.3	1.6 MAX	0.5
2220	5.7±0.4	5±0.4	2.0 MAX	0.5

TOLERANCES

Dielectric materials, capacitance values and tolerances are only available in the following combinations.

Dielectric	Available Tolerances	Capacitance	Tolerance Codes
COG	± 0.25pF, ± 0.5pF ± 1% ± 2% ± 5%, ± 10%, ± 20%	<10pF >25pF >13pF ≥10pF E12 Values	C = ± 0.25pF D = ± 0.5pF F = ± 1% G = ± 2% J = ± 5% K = ± 10% M = ± 20% Z = -20 + 80%
X7R	± 10%, ± 20%	E12 Values	**
Y5V	± 20%, -20 + 80%	E6 Values	
Z5U	± 20%, -20 + 80%	E6 Values	

ORDERING INFORMATION

DS	U	0805	C	101	J	N
Part	Voltage	Size	Dielectric	Value	Tolerance	Plating
	U = 50/63V A = 100V F = 200V E = 25V C = 16V B = 10V J = 500V G = 250V D = 6.3V	0402 0603 0805 1206 1210 1812 2220	C = NPO R =- X7R G = Y5V W = Z5U	Example 101 = 100pF 102 = 1nF 103 = 10nF 104 = 100nF	See Above ** for code	N = Nickel barrier E = Silver enhanced

RANGE

ULTRA STABLE CERAMIC CHIP CAPACITORS NICKEL BARRIER TERMINATIONS FOR FLOW & REFLOW SOLDERING NPO

IEC/EIA Dielectric Code		NPO																								
Size Code		0402		0603			0805				1206					1210					1812				
Voltage		25	50	25	50	100	25	50	100	200	25	50	100	200	500	25	50	100	200	500	50	100			
Cap pF	Cap code																									
0.5	0R5																									
1.0	1R0																									
1.2	1R2																									
1.5	1R5																									
1.8	1R8																									
2.2	2R2																									
2.7	2R7																									
3.3	3R3																									
3.9	3R9																									
4.7	4R7																									
5.6	5R6																									
6.8	6R8																									
8.2	8R2																									
10	100																									
12	120																									
15	150																									
18	180																									
22	220																									
27	270																									
33	330																									
39	390																									
47	470																									
56	560																									
68	680																									
82	820																									
100	101																									
120	121																									
150	151																									
180	181																									
220	221																									
270	271																									
330	331																									
390	391																									
470	471																									
560	561																									
680	681																									
820	821																									
1000	102																									
1200	122																									
1500	152																									
1800	182																									
2200	222																									
3300	332																									
4700	472																									
5600	562																									
6800	682																									
8200	822																									
10000	103																									

RANGE

STABLE CERAMIC CHIP CAPACITORS NICKEL BARRIER TERMINATIONS FOR FLOW & REFLOW SOLDERING X7R

IEC/EIA Dielectric Code		X7R																													
Size Code		0402			0603						0805						1206							1210						1812	
Voltage		16	25	50	10	16	25	50	100	200	10	16	25	50	100	200	10	16	25	50	100	200	500	16	25	50	100	200	500	50	100
Cap pF	Cap code																														
220	221			■				■																							
270	271	■	■	■		■	■	■	■																						
330	331	■	■	■		■	■	■	■			■	■	■	■																
390	391	■	■	■		■	■	■	■			■	■	■	■																
470	471	■	■	■		■	■	■	■			■	■	■	■	■						■	■								
560	561	■	■	■		■	■	■	■			■	■	■	■	■						■	■								
680	681	■	■	■		■	■	■	■			■	■	■	■	■						■	■								
820	821	■	■	■		■	■	■	■			■	■	■	■	■						■	■								
1000	102	■	■	■		■	■	■	■	■		■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■		
1200	122	■	■	■		■	■	■	■	■		■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■		
1500	152	■	■	■		■	■	■	■	■		■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■		
1800	182	■	■	■		■	■	■	■	■		■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■		
2200	222	■	■	■		■	■	■	■	■		■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■		
2700	272	■	■	■		■	■	■	■			■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■		
3300	332	■	■	■		■	■	■	■			■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■		
3900	392	■	■	■		■	■	■	■			■	■	■	■			■	■	■	■	■	■	■	■	■	■	■	■		
4700	472	■	■	■		■	■	■	■			■	■	■	■			■	■	■	■	■	■	■	■	■	■	■	■		
5600	562	■	■			■	■	■	■			■	■	■	■			■	■	■	■	■	■	■	■	■	■	■	■		
6800	682	■	■			■	■	■	■			■	■	■	■			■	■	■	■	■		■	■	■	■	■	■		
8200	822	■	■			■	■	■	■			■	■	■	■			■	■	■	■	■		■	■	■	■	■	■		
10,000	103	■	■			■	■	■	■			■	■	■	■			■	■	■	■	■		■	■	■	■	■	■	■	■
12,000	123	■				■	■	■				■	■	■	■			■	■	■	■	■		■	■	■	■	■		■	■
15,000	153	■				■	■	■				■	■	■	■			■	■	■	■	■		■	■	■	■	■		■	■
18,000	183	■				■	■	■				■	■	■	■			■	■	■	■			■	■	■	■	■		■	■
22,000	223	■				■	■	■				■	■	■	■			■	■	■	■			■	■	■	■	■		■	■
27,000	273	■				■	■					■	■	■				■	■	■	■			■	■	■	■	■	■	■	■
33,000	333	■				■	■					■	■	■				■	■	■	■			■	■	■	■	■	■	■	■
39,000	393					■	■					■	■	■				■	■	■	■			■	■	■	■	■	■	■	■
47,000	473					■	■					■	■	■				■	■	■	■			■	■	■	■	■	■	■	■
56,000	563					■	■					■	■	■				■	■	■	■			■	■	■	■		■	■	■
68,000	683					■	■					■	■	■				■	■	■	■			■	■	■	■			■	■
82,000	823					■						■	■	■				■	■	■	■			■	■	■	■	■		■	■
100,000	104					■						■	■	■				■	■	■	■			■	■	■	■	■		■	■
120,000	124											■	■					■	■	■				■	■	■	■			■	■
150,000	154				■							■	■					■	■	■				■	■	■	■			■	■
180,000	184				■							■	■					■	■	■				■	■	■	■			■	■
220,000	224				■							■	■					■	■	■				■	■	■	■			■	■
270,000	274											■						■	■	■				■	■					■	■
330,000	334											■						■	■	■				■	■					■	■
470000	474											■						■	■					■	■					■	■
1000000	105										■						■	■	■					■	■					■	
2200000	225																■	■							■					■	

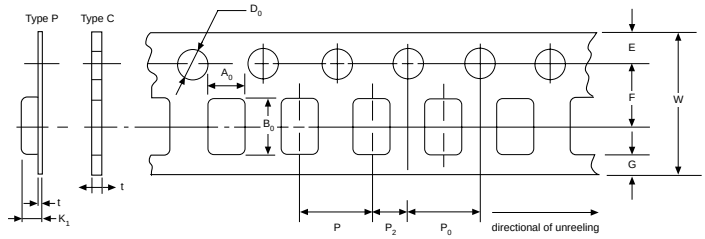
SECTION 5

RANGE

General Purpose Ceramic Chip Capacitors Y5V/Z5U Nickel Barrier Terminations for Flow and Reflow Soldering

IEC/EIA Dielectric Code		Y5V/Z5U																		
Size Code		0402				0603				0805				1206			1210			1812	
Voltage		10	16	25	50	10	16	25	50	10	16	25	50	16	25	50	16	25	50	25	50
Cap pF	Cap code																				
10,000	103																				
15,000	153																				
22,000	223																				
33,000	333																				
47,000	473																				
68,000	683																				
100,000	104																				
150,000	154																				
220,000	224																				
330,000	334																				
470,000	474																				
680,000	684																				
1.0µ	105																				
2.2µ	225																				
4.7µ	475																				
10µ	106																				

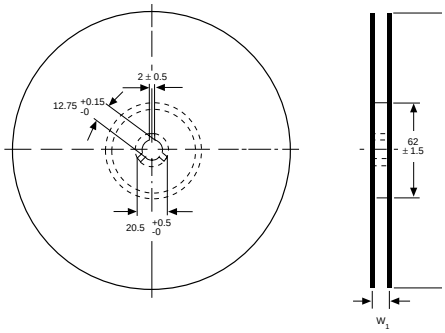
TAPE DIMENSIONS (mm)



W	Type	DO	P	PO	P2	E	F	G	t
8.0 ± 0.3	C	1.5 +0.1, -0	4.0 ± 0.1	4.0 ± 0.1	2.0 ± -0.05	1.75 ± 0.1	3.5 ± 0.05	0.75 min	1.1 max
8.0 ± 0.3	P	1.5 +0.1, -0	4.0 ± 0.1	4.0 ± 0.1	2.0 ± 0.05	1.75 ± 0.1	3.5 ± 0.05	0.75 min	0.3 max
12.0 ± 0.3	P	1.5 +0.1, -0	8.0 ± 0.1	4.0 ± 0.1	2.0 ± 0.05	1.75 ± 0.1	5.5 ± 0.05	0.75 min	0.1 max

C = Card P = Plastic

REEL DIMENSIONS (mm)



Nom. Tape Width	A	W1
8	180 or 330 +0-2	8.4 +1.5-0
12	180 or 330 +0-2	12.4 +2-0

PERFORMANCE CHARACTERISTICS

1. ELECTRICAL

Dielectric Code (IEC/EIA)	C0G	X7R	Y5V	Z5U
General	C0G dielectrics are very stable. Temperature, frequency and time vary little.	X7R dielectrics offer higher capacitance for a given case size than C0G.	Y5V dielectrics offer the highest capacitance for a given case size than C0G.	Z5U dielectrics offer the highest capacitance for a given case size than C0G.
Examples of Applications	Typical applications are in tuned circuits, timing circuits and fast rise time circuits.	Applications would include bypass, coupling and filtering circuits.	Applications would include bypass and decoupling circuits or where temperature dependence is not of major importance.	Applications would include bypass and decoupling circuits or where temperature dependence is not of major importance.
Temperature Range	-55 to +125°C (IEC) -55 to +125°C (EIA)	-55 to +125°C (IEC) -55 to +125°C (EIA)	-25 to +85°C (IEC) -30 to +85°C (EIA)	-25 to +85°C (IEC) -30 to +85°C (EIA)
Insulation Resistance (I.R.) after 1 min charging at Rated Voltage	> 100G ohms or 1000 sec whichever is less	> 100G ohms or 1000 sec whichever is less	> 10G ohms or 100 sec whichever is less	> 10G ohms or 100 sec whichever is less
Voltage Ratings dc	63/50. 100, 200, 500	25, 63/50, 100, 200, 500	63/50	25/50
Proof Voltage	2.5 x rated voltage	2.5 x rated voltage	2 x rated voltage	2.5 rated voltage
Max allowable Capacitance Variation over Temperature Range	C > 20pF: 0 ± 300ppm/°C C ≤ 20pF: see CECC 32 101-801	± 20% (IEC 2C1) ± 15% (EIA X7R) ± 15% (IEC 2R1)	+30% to -80% (IEC 2F4) +22% to -82% (EIA Y5V)	+22% to -56% (EIA Z5U)
Measuring conditions for Capacitance and Tangent of Loss Angle	1MHz, 1Vrms (± 0.2) for C ≤ 1000pF 1KHz, 1Vrms (± 0.2) for C > 1000pF	1KHz, 1Vrms (± 0.2)	1KHz, 0.3Vrms (± 0.1)	-
Tangent of Loss Angle (tan ∂)	≤ 0.001 for C > 50pF $\leq (\frac{150}{C} + 7) \times 10\text{-}4$ for C ≤ 50pF	≤ 0.025	≤ 0.03	≤ 0.03
Climatic Category (IEC 68)	55/125/56	55/125/56	25/085/56	30/085/56
Ageing Characteristic	Zero	Typ. 1.0% per time decade	Typ. 4% per time decade	Typ. 6% per time decade

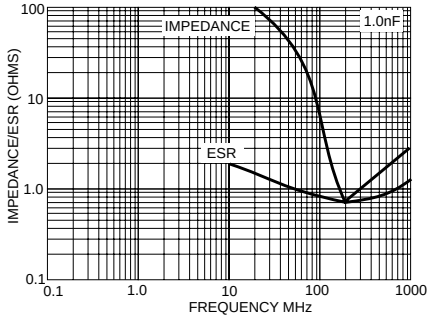
2. ENVIRONMENT

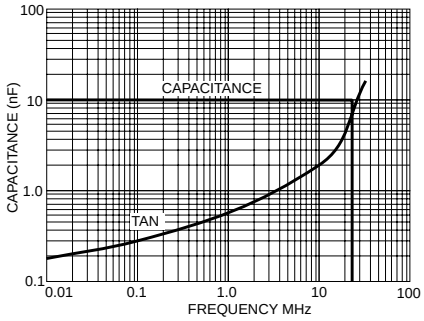
Test	Conditions	Requirement
Solderability	Components completely immersed in a solder bath at 230 ± 10°C for 5 secs.	Terminations to be well tinned
Adhesion	Component mounted to a substrate a force of 5N applied normal to the line joining the termination and in a line parallel to the substrate.	No visible damage
Termination Bond Strength	Tested as shown in diagram	No damage Δ C/C ≤ ± 1% or 1pF C0G Δ C/C ≤ ± 10% X7R Δ C/C ≤ ± 20% Y5V
Rapid change or Temperature	-55 to +125°C, 5 cycles (1B, 2C1) -25 to +85°C, 5 cycles (2F4)	No visible damage. After recovery Δ C/C ≤ ± 1% or 1pF C0G ≤ ± 10% X7R ≤ ± 20% Y5V Tan ∂ ≤ 1.5 x specified value IR. ≥ 0.25 x specified value
Endurance (1000 hrs)	1000 hrs at maximum temperature with 1.5 X rated voltage applied.	Δ C/C ≤ ± 2% or 2pF C0G ≤ ± 10% X7R ≤ ± 20% Y5V Tan ∂ ≤ 1.5 x specified value I.R. ≥ 0.25 x specified value

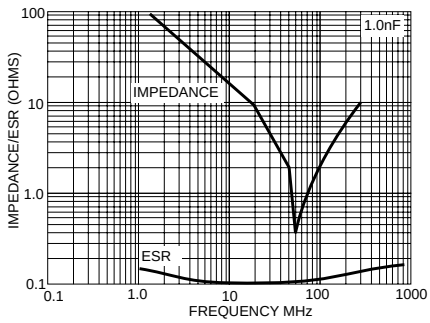
3. AGEING

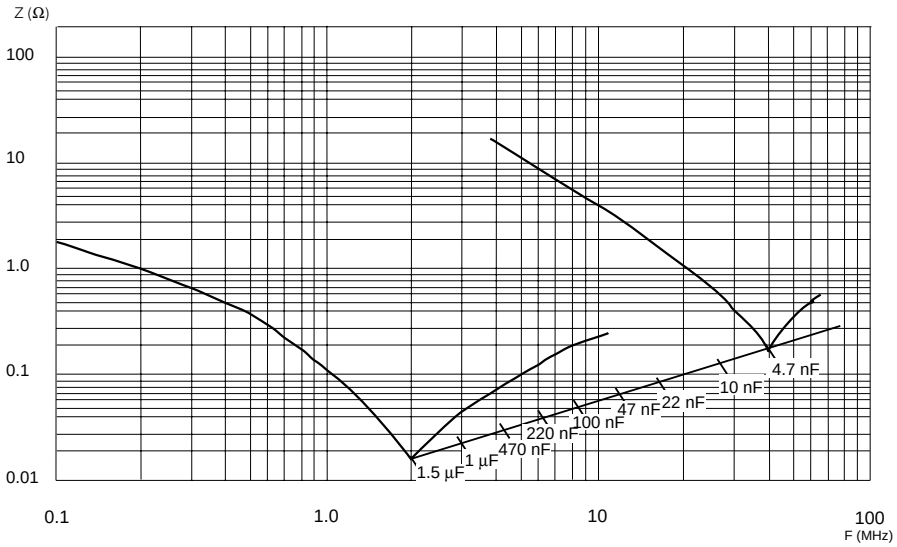
Capacitance and impedance will vary depending on circuit operating conditions and the type of dielectric used - typical performance graphs relating to these materials are shown below.

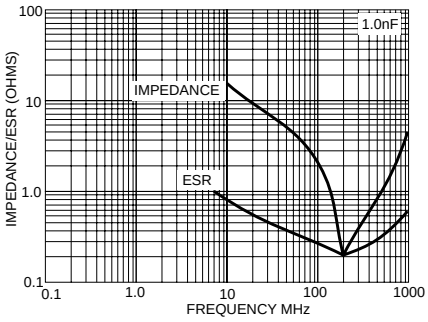
3.1 FREQUENCY

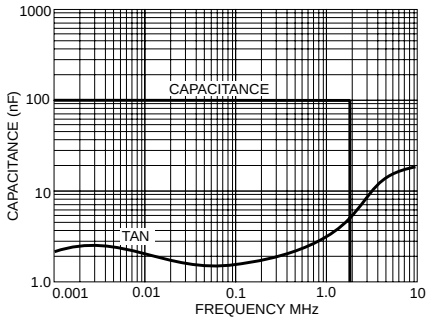












3.2 TEMPERATURE