Series: CCL

LEAD FREE

DESCRIPTION:

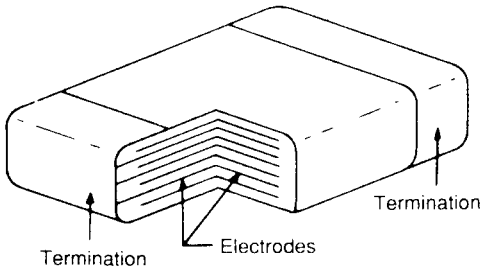
JARO's Lead Free Multilayer Ceramic Chip Capacitors supplied in bulk or tape & reel package are ideally suitable for thick-film hybrid circuits and automatic surface mounting on any printed circuit boards.

The nickel-barrier terminations consists of a nickel barrier layer over the silver metallization, and then finished by a layer of tin to ensure the terminations have good solderability.

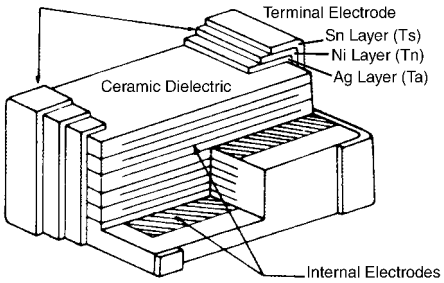
EXPLANATION OF PART NUMBERS:

CCL Series	0805 Size Code LxW	XR Dielectric	102 Capacitance (picofarads)	J Capacitance Tolerance (EIA Code)	T Termination	50 Voltage	ER Packaging
	0603=.060x.030″ 0805=.080x.050″ 1206=.120x.060″	CG=COG(NPO) XR=X7R ZU=Z5U YV=Y5V	Two significant digits followed by no. of zeros 102=1000pF	B=±0.1pF C=±0.25pF D=±0.50pF F=±1% G=±2% J=±5.0% K=±10% M=±20% Z= +80, –20% P= +100, –0%	N=Nickel Barrier	10V 16V 25V 50V 100V	ER = Plastic Tape & Reel PR = Paper Tape & Reel

CONFIGURATION



NICKEL-BARRIER TERMINATIONS



Ta: 40µm min. Tn: 1µm min. Ts: 2µm min.

STANDARD TEST CONDITIONS

Tests shall, unless otherwise specified, be carried out at 5 to 35°C and RH 45 to 85%. If any doubt has been encountered in judgement, the test shall be done at 25±2°C, RH 60 to 70% and 860~1060mbar.

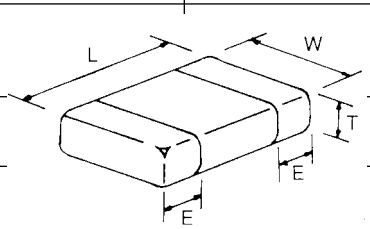
STORING CONDITION AND TERM

Recommends the storing of products within 6 months at temperature 15~35°C and humidity 70%RH max.

OPERATING TEMPERATURE RANGE

Y5V	–30~85°C
Z5U	+10~85°C
COG&X7R	-55~125°C

CAPACITANCE RANGE: COG

EIA/IEC Dielectric Code		COG/1BCG									
Size		**0603**	**0805**			**1206**					
Length	mm (in)	1.6 ± 0.1 (.063 ± .004)	2.0 ± 0.2 (.080 ± .080)			3.2 ± 0.2 (.126 ± .080)					
Width	mm (in)	0.80 ± 0.1 (.032 ± .004)	1.20 + 0.2/-0.15 (.050 + .080/-.006)			1.60 ± 0.20 (.063 ± .080)					
Thickness	mm (in)	0.80 ± 0.1 (.032 ± .004)	1.40 max (.055)			1.52 max (.06)					
MB	(min.)	0.20	0.25			0.25					
G	(min.)	0.3	0.7			1.4					
CONFIGURATION											
W. V. D. C.		**50**	**25**	**50**	**100**	**25**	**50**	**100**			
Cap. (PF)	0.5										
	1.0										
	1.2										
	1.5										
	1.8										
	2.2										
	2.7										
	3.3										
	3.9										
	4.7										
	5.6										
	6.8										
	8.2										
	10										
	12										
	15										
	18										
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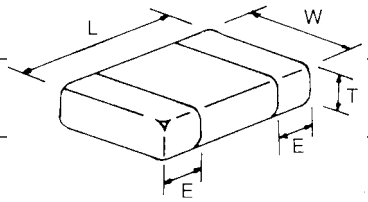
	56										
	68										
	82										
	100										
	120										
	150										
	180										
	220										
	270										
	330										
	390										
	470										
	560										
	680										
	820										
	1000										
	1200										
	1500										
	1800										
	2200										
	2700										
	3300										
	3900										
	4700										
	5600										
	6800										
	8200										
	.010										
Cap. (µF)	.012										
	.015										

Dimensions are in millimeters, dimensions in parenthesis are in inches. Other capacitance values and voltages are available upon request.

The thickness of chip capacitors might be changed due to the improvement of the production technology.

CAPACITANCE RANGE: X7R

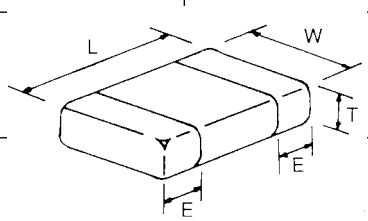
EIA/IEC Dielectric Code		X7R/2R1												
Size		**0603**			**0805**				**1206**					
Length	mm (in)	1.6 ± 0.1 (.063 ± .004)			2.0 ± 0.2 (.080 ± .080)				3.2 ± 0.2 (.126 ± .080)					
Width	mm (in)	0.80 ± 0.1 (.032 ± .004)			1.20 + 0.2/-0.15 (.050 + .080/-.006)				1.60 ± 0.20 (.063 ± .080)					
Thickness	mm (in)	0.80 ± 0.1 (.032 ± .004)			1.40 max (.055)				1.52 max (.06)					
MB	(min.)	0.20			0.25				0.25					
G	(min.)	0.3			0.7				1.4					
CONFIGURATION														
W. V. D. C.		**16**	**25**	**50**	**16**	**25**	**50**	**100**	**16**	**25**	**50**	**100**		
Cap. (PF)	150													
	180													
	220													
	270													
	330													
	390													
	470													
	560													
	680													
	820													
	1000													
	1200													
	1500													
	1800													
	2200													
	2700													
	3300													
	3900													
	4700													
	5600													
	6800													
	8200													
Cap. (µF)	.010													
	.012													
	.015													
	.018													
	.022													
	.027													
	.033													
	.039													
	.047													
	.056													
	.068													
	.082													
	.10													
	.12													
	.15													
	.18													
	.22													
	.27													
	.33													
	.39													
	.47													
	.56													
	.68													
	.82													
	1.0													



Dimensions are in millimeters, dimensions in parenthesis are in inches. Other capacitance values and voltages are available upon request.

The thickness of chip capacitors might be changed due to the improvement of the production technology.

CAPACITANCE RANGE: Z5U

EIA/IEC Dielectric Code		Z5U/2E6						
Size		**0603**	**0805**		**1206**			
Length	mm (in)	1.6 ± 0.1 (.063 ± .004)	2.0 ± 0.2 (.080 ± .080)		3.2 ± 0.2 (.126 ± .080)			
Width	mm (in)	0.80 ± 0.1 (.032 ± .004)	1.20 + 0.2/-0.15 (.050 + .080/-.006)		1.60 ± 0.20 (.063 ± .080)			
Thickness	mm (in)	0.80 ± 0.1 (.032 ± .004)	1.40 max (.055)		1.52 max (.06)			
MB	(min.)	0.20	0.25		0.25			
G	(min.)	0.3	0.7		1.4			
CONFIGURATION								
W. V. D. C.		**50**	**25**	**50**	**50**			
Cap. 1000								
(PF) 1200								
1500								
1800								
2200								
2700								
3300								
3900								
4700								
5600								
6800								
8200								
Cap. .010								
(µF) .012								
.015								
.018								
.022								
.027								
.033								
.039								
.047								
.056								
.068								
.082								
.10								
.12								
.15								
.18								
.22								

Dimensions are in millimeters, dimensions in parenthesis are in inches. Other capacitance values and voltages are available upon request.

The thickness of chip capacitors might be changed due to the improvement of the production technology.

CAPACITANCE RANGE: Y5V

EIA/IEC Dielectric Code		Y5V/2F4											
Size		**0603**				**0805**				**1206**			
Length	mm (in)	1.6 ± 0.1 (.063 ± .004)				2.0 ± 0.2 (.080 ± .080)				3.2 ± 0.2 (.126 ± .080)			
Width	mm (in)	0.80 ± 0.1 (.032 ± .004)				1.20 + 0.2/-0.15 (.050 + .080/-.006)				1.60 ± 0.20 (.063 ± .080)			
Thickness	mm (in)	0.80 ± 0.1 (.032 ± .004)				1.40 max (.055)				1.52 max (.06)			
MB	(min.)	0.20				0.25				0.25			
G	(min.)	0.3				0.7				1.4			
CONFIGURATION													
W. V. D. C.		**10**	**16**	**25**	**50**	**10**	**16**	**25**	**50**	**10**	**16**	**25**	**50**
Cap. (PF)	1000												
	1200												
	1500												
	1800												
	2200												
	2700												
	3300												
	3900												
	4700												
	5600												
	6800												
	8200												
Cap. (µF)	.010												
	.012												
	.015												
	.018												
	.022												
	.027												
	.033												
	.039												
	.047												
	.056												
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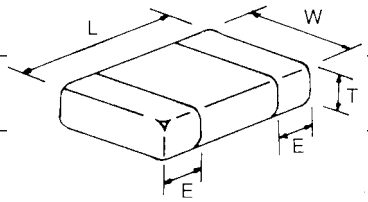
	6.8												
	8.2												
	10.0												



Dimensions are in millimeters, dimensions in parenthesis are in inches. Other capacitance values and voltages are available upon request.

The thickness of chip capacitors might be changed due to the improvement of the production technology.

ELECTRICAL SPECIFICATIONS

Dielectric EIA	COG	X7R
Code IEC	1BCG	2R1
Temperature Characterisics *1	ΔC 0±30 ppm/°C Over -55 ~ +125°C	ΔC±15% Over -55 ~ +125°C
Operating Temperature Range	–55°C to +125°C	–55°C to +125°C
Measuring Conditions for *2 Capacitance and D.F.	>1000pF : 1KHz±50Hz ≤1000pF : 1MHz±100KHz	1KHz±50Hz
Dissipation Factor (D.F.) and Tangent of Loss Angle (tand)	≥ 30pF : Q ≥ 1000 < 30 pF : Q ≥ 400 + 20C	≥ 50V : 0.025max. < 50V : 0.035max.
Insulation Resistance (I.R.) after 60 secs. charging at rated votage, 25°C, 55% RH max.	100,000 MΩ or 10,000 MΩ • µF. Min whichever is less	10, 000 MΩ or 1,000 MΩ µF. Min whichever is less
Voltage Proof, 25°C, 1-5 secs.	2.5 x Rated Voltage	2.5 x Rated Voltage
Capacitance Aging	0	≈1.5% per decade hour

Dielectric EIA	Z5U	Y5V
Code IEC	2E6	2F4
Temperature Characteristics	ΔC +22% ~ -56% Over +10 ~ +85°C	ΔC +22% ~ -82% Over -30 ~ +85°C
Operating Temperature Range	+10°C to +85°C	–30°C to +85°C
Measuring Conditions for Capacitance and D.F.	1KHz±50Hz	1KHz±50Hz
Dissipation Factor (D.F.) and Tangent of Loss Angle (tan δ)	0.040max.	≥ 50V : 0.050max. ≤ 16V & C≥1.0 µF : 0.090max. < 50V : 0.070max. ≤ 10V : 0.125max.
Insulation Resistance (I.R.) after 60 secs. charging at rated voltage, 25°C, 55% RH max.	10, 000 MΩ or 1,000 MΩ µF. Min whichever is less	10, 000 MΩ or 1,000 MΩ µF. Min whichever is less
Voltage Proof, 25°C, 1-5 secs.	2.5 x Rated Voltage	2.5 x Rated Voltage
Capacitance Aging	≈ 5% per decade hour	≈ 3% per decade hour

* 1, 3 ~ 6: Class II (X7R, Z5U, Y5V) capacitors shall be made a special pre-conditioning before a test or a sequence of tests under the following conditions: Exposure at 150 ± 10°C for 1 hr, followed by setting the capacitor at room temperature for 24 ± 1 hr.

* 2: Capacitance is within specified tolerance; measured 1000 hours after date of manufacture because of capacitance aging of Class II capacitor.

ENVIRONMENTAL SPECIFICATIONS

Test	Test Conditions	Post-Test Inspection Requirements
Solderability	Solder- Sn (100% tin), 245±5 C Solder 60 Sn/40 Pb, 235 ±5°C Immersed for 5 secs.	At least 95% of termination area should be well tinned.
Resistance to Soldering Heat *3	Immersed in solder bath at 270 ± 5°C for 3 ± 0.5 secs. Recovery: 4 ~ 24 hrs. (COG) 24 ± 2 hrs. (X7R, Z5U, Y5V)	At least 75% of termination should be covered by solder.

	COG (1BCG)	X7R (2R1)	Z5U (2E6)	Y5V (2F4)
ΔC/C	±2.5%, or ±0.25 pF max. whichever is greater	±15%	≤ ±20%	≤ ±20%
D.F.	Meet the initial specification			
I.R.	Meet the initial specification			

Endurance *4
(Life Test)

1000 hrs. at maximum temperature with
1.5 x rated voltage applied
Recovery: 24 ± 2 hrs. (COG)
48 ± 4 hrs. (X7R, Z5U, Y5V)

No visible damage

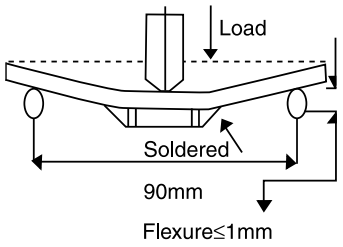
	COG (1BCG)	X7R (2R1)	Z5U (2E6)	Y5V (2F4)
ΔC/C	±3%, or ±.3pF max. whichever is greater	±15%	≤ ±30%	≤ ±30%
D.F.	(1)C≥30pF : Q≥350 (2)10pF≤C<30pF Q≥275 + 2.5C (3)C<10pF Q ≥200+10C	(1) ≥50V : 0.04max. (2) <50V : 0.05max.	0.075max.	≥50V : 0.075max. 16V ≤C<50V : 0.10max. 16V &C≥1.0μF : 0.125max. ≤10V : 0.15max.
I.R.	1,000 MΩ or 100 MΩ μF. Min whichever is less			

Humidity Test *5

500 hrs. at 40 ±2°C, 90-95% RH
Recovery: 24 ± 2 hrs. (COG)
48 ± 4 hrs. (X7R, Z5U, Y5V)

	COG (1BCG)	X7R (2R1)	Z5U (2E6)	Y5V (2F4)
ΔC/C	±5%, or ± 0.5 pF whichever is greater	±15%	≤ ±30%	≤ ±30%
D.F.	(1)≥30pF : Q≥350 (2)10pF≤C<30pF Q≥275 + 2.5C (3)<10pF Q ≥200+10C	0.05max.	0.075max.	≥50V : 0.075max. 16V ≤C<50V : 0.10max. 16V &C≥1.0μF : 0.125max. ≤10V : 0.15max.
I.R.	1,000 MΩ or 100 MΩ μF. Min whichever is less			

Deflection



No visible damage

	COG (1BCG)	X7R (2R1)	Z5U (2E6)	Y5V (2F4)
ΔC/C	≤±5% (C>10pF) ≤0.5pF (C≤10pF)	±12.5%	≤ ±20%	≤ ±20%

* 1, 3 ~ 5: Class II (X7R, Z5U, Y5V) capacitors shall be made a special pre-conditioning before a test or a sequence of tests under the following conditions: Exposure at 150 ± 10°C for 1 hr, followed by setting the capacitor at room temperature for 24 ± 1 hr.
* 2: Capacitance is within specified tolerance; measured 1000 hours after date of manufacture because of capacitance aging of Class II capacitor.

PACKAGING

REEL SPECIFICATIONS

Standard reel diameter is 7″ and 13″

STANDARD PACKING QUANTITY PER REEL

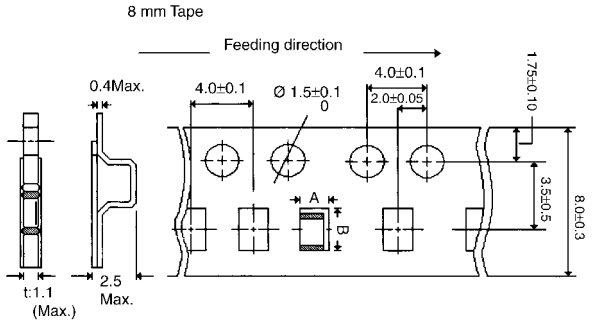
Chip Size	Tape Wide	Quantity per Reel
0603	8mm	4000
0805	8mm	3000/4000*
1206	8mm	3000/4000*

* Different size of reel base on different thickness of chips

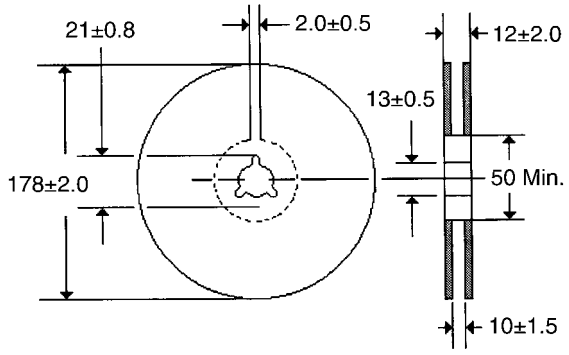
TAPE SPECIFICATION

Unit: mm

Symbol / Size Code	A	B
0603	1.05±0.1	1.85±0.1
0805	1.55±0.15	2.3±0.15
1206	2.0±0.2	3.6±0.2



DIMENSION OF REEL



PEELING OFF STRENGTH OF TOP TAPE

The angle between top tape and base tape is 165 ~ 180°, and the peeling speed is control in 300±10 mm/min, and the peeling force as follows

- 8mm tape or base tape 10 ~ 100 grams (0.1~1.0N)
- 12mm tape or base tape: 10 ~ 130 grams (0.1~1.3N)