

Multilayer Chip Ceramic Capacitor-CC Series



FEATURES

- New monolithic structure, has high reliability.
- Small size, yet has high electrostatic capacitance.
- Internal electrodes use copper metal pa, High Q ,Can operate at high-voltage levels.
- Supplied in tape on reel.

APPLICATIONS

- The circuit filter and vibration bell of telephone,electrograph and modern. RF power amplifier and other equipments.

PRODUCT IDENTIFICATION

01 ZCC	02 1608	—	03 CG	04 100	05 J	06 500	07 N	08 T
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01 Type	
ZCC	Multilayer Chip Ceramic Capacitors

02 External Dimensions (LxW)(mm)	
0603 [0201]	0.6x 0.3
1005[0402]	1.0 x 0.5
1608 [0603]	1.6 x 0.8
2012 [0805]	2.0 x 1.25
3216 [1206]	3.2 x 1.6
3225 [1210]	3.2 x 2.5
4532 [1812]	4.5 x 3.2

03 Dielectric Type	
CG	COG or NPO
B	X7R
C	X5R
F	Y5V

04 Nominal Capacitance	
Example	Nominal value
1R0	1pF
100	10pF
102	1000pF

07 Termination Type	
N	Nickel Barrier Termination
S	Pure silver
C	Pure copper

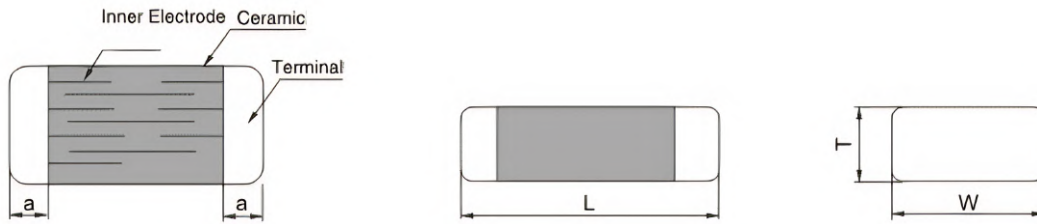
05 Tolerance	
B	±0.10pF
C	±0.25pF
D	±0.50pF
J	±5%
K	±10%
M	±20%

06 Rate Voltage	
6R3	6.3V
100	10V
500	50V
201	200V

08 Packing	
T	Tape & Reel

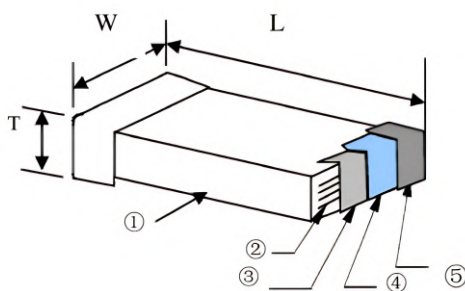
- These Capacitance tolerance B, C, D are just applicable the capacitance that equals to or less than 10pF.

SHAPE AND DIMENSIONS



Part Number	Dimensions(mm)			
	L	W	T	B
ZCC0603(0201)	0.6±0.05	0.3±0.05	0.3±0.05	0.1±0.05
ZCC1005(0402)	1.0±0.05	0.5±0.05	0.5±0.05	0.2±0.1
ZCC1608(0603)	1.60±0.15	0.80±0.15	0.85±0.15	0.3±0.1
ZCC2012(0805)	2.00±0.20	1.25±0.20	0.8±0.15	0.5±0.20
			1.25±0.20	
ZCC3216(1206)	3.20±0.20	1.60±0.20	0.8±0.20	0.60±0.30
			1.10±0.30	
ZCC3225(1210)	3.20±0.20	2.50±0.20	1.25±0.20	0.80±0.30
ZCC4532(1812)	4.50±0.20	3.20±0.20	1.25±0.20	0.80±0.30

STRUCTURE



NO	Name
①	Ceramic dielectri
②	Inner electrode (Cu)
③	Substrate electrode
④	Nickel Layer
⑤	Tin Layer

Temperature Coefficient/Characteristics

Dielectric	Reference Temperature Point	Temperature Coefficient	Operation Temperature Range
COG or NPO	20°C	0±30ppm/°C	-55°C~125°C
X5R	20°C	±15%	-55°C~85°C
X7R	20°C	±15%	-55°C~125°C
Y5V	20°C	-80%~+30%	-55°C~85°C
X7S	20°C	±22%	-55°C~125°C
X6S	20°C	±22%	-55°C~105°C

- Nominal temperature coefficient and allowed tolerance of class one are decided by the changing of the capacitance between 20°C and 85°C . Nominal temperature coefficient of class two are decided by the temperature of 20°C.

CAPACITANCE RANGE AND OPERATING VOLTAGE

Size Code	Rate Voltage	Capacitance(pF)			
		COG(NPO)	X7R	X5R	Y5V
1005(0402)	6.3V	0.1-470	100~39,000	39,000~4,700,000	1,000~1,000,000
	10V	0.1-470	100~39,000	39,000~4,700,000	1,000~1,000,000
	16V	0.1-470	100~39,000	39,000~4,700,000	1,000~220,000
	25V	0.1-470	100~22,000	--	1,000~1,000,000
	50V	0.1-470	100~10,000	--	1,000~1,000,000
1608(0603)	6.3V	0.1-4700	100~220,000	220,000~4,700,000	1,000~4,700,000
	10V	0.1-4700	100~220,000	220,000~1,000,000	1,000~2,200,000
	16V	0.1-4700	100~220,000	220,000~1,000,000	1,000~1,000,000
	25V	0.1-4700	100~150,000	--	1,000~1,000,000
	50V	0.1-4700	100~100,000	--	1,000~220,000
2012(0805)	6.3V	0.3-10,000	100~1,000,000	1,000,000~10,000,000	1,000~10,000,000
	10V	0.3-10,000	100~1,000,000	1,000,000~4,700,000	1,000~10,000,000
	16V	0.3-10,000	100~1,000,000	--	1,000~2,200,000
	25V	0.3-10,000	100~1,000,000	--	1,000~2,200,000
	50V	0.3-10,000	100~100,000	--	1,000~1,000,000
3212(1206)	6.3V	0.5-33,000	100~1,200,000	1,200,000~10,000,000	1,000~47,000,000
	10V	0.5-33,000	100~1,200,000	1,200,000~10,000,000	1,000~22,000,000
	16V	0.5-33,000	100~1,200,000	1,200,000~10,000,000	1,000~10,000,000
	25V	0.5-33,000	100~4,700,000	--	1,000~2,200,000
	50V	0.5-12,000	100~470,000	--	1,000~1,000,000

Size Code	Rate Voltage	Capacitance(pF)			
		COG(NPO)	X7R	X5R	Y5V
3225(1210)	6.3V	10-10,000	220~3,300,000	3.3uF~22uF	4,700~47,000,000
	10V	10-10,000	220~3,300,000	3.3uF~22uF	4,700~47,000,000
	16V	10-10,000	220~3,300,000	3.3uF~10uF	4,700~10,000,000
	25V	10-10,000	220~2,200,000	--	4,700~10,000,000
	50V	10-8,200	220~1,000,000	--	4,700~1,500,000
4532(1812)	6.3V	10-15,000	470~10,000,000	10uF~22uF	10,000~33,000,000
	10V	10-15,000	470~10,000,000	10uF~22uF	10,000~22,000,000
	16V	10-15,000	470~10,000,000	10uF~22uF	10,000~22,000,000
	25V	10-15,000	470~10,000,000	--	10,000~10,000,000
	50V	10-12,000	470~2,200,000	--	10,000~10,000,000

RELIABILITY TEST

项目 Item	技术规格 Technical Specification		测试方法 Test Method and Remarks		
容量 Capacitance	I类 Class I	应符合指定的误差级别 Should be within the specified tolerance.	标称容量 Capacitance	测试频率 Measuring Frequency	测试电压 Measuring Voltage
			≤1000pF	1MHZ±10%	1.0±0.2Vrms
			>1000 pF	1KHZ±10%	
	II类 Class II	应符合指定的误差级别 Should be within the specified tolerance.	测试温度: 25℃±3℃ Test Temperature: 25℃±3℃ C≤10μF: 测试频率: 1KHZ±10% 测试电压: 1.0±0.2Vrms Test Frequency: 1KHZ±10% Test Voltage: 1.0±0.2Vrms C>10μF X7R、X5R、X7S、X6S、Y5V: 测试频率: 120±24 HZ 测试电压: 0.5±0.1Vrms Test Frequency: 120±24 HZ Test Voltage: 0.5±0.1Vrms Z5U: 测试频率: 1±0.1KHZ 测试电压: 0.5±0.05Vrms Test Frequency: 1±0.1KHZ Test Voltage: 0.5±0.05Vrms		
损耗角正切 (DF, tan δ) Dissipation Factor	I类 Class I	DF	标称容量 Capacitance	测试频率 Measuring Frequency	测试电压 Measuring Voltage
		≤0.56%	Cr<5 pF	1MHZ±10%	1.0±0.2Vrms
		$1.5[(150/Cr)+7] \times 10^{-4}$	5pF≤Cr<50 pF	1MHZ±10%	
		≤0.15%	50pF≤Cr≤1000 pF	1MHZ±10%	
≤0.15%	>1000 pF	1KHZ±10%			

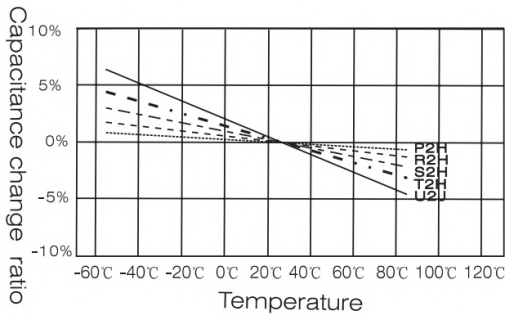
项目 Item	技术规格 Technical Specification						测试方法 Test Method and Remarks		
损耗角正切(DF, tan δ) Dissipation Factor	II类 Class II	X7R/ X5R/ X7S/ X6S (≥ 0402)	≥ 50V	25V	16V	10V	6.3V	C ≤ 10μF 测试频率: 1KHZ ± 10% 测试电压: 1.0 ± 0.2Vrms Test Frequency: 1KHZ ± 10% Test Voltage: 1.0 ± 0.2Vrms	
				≤ 3.5% (C < 0.47μF)	≤ 3.5% (C < 0.47μF)	≤ 5.0% (C < 0.15μF)	≤ 5.0% (C < 0.15μF)		
				≤ 10.0% (C ≥ 0.47μF)	≤ 10.0% (C ≥ 0.47μF)	≤ 10.0% (C ≥ 0.15μF)	≤ 10.0% (C ≥ 0.15μF)		
		X7R/ X5R/ X7S/ X6S (< 0402)	≥ 50V	25V	16V	10V	6.3V	C > 10μF X7R、X5R、X7S、X6S、Y5V 测试频率: 120 ± 24 HZ 测试电压: 0.5 ± 0.1Vrms Test Frequency: 120 ± 24HZ Test Voltage: 0.5 ± 0.1Vrms Z5U:测试频率: 1 ± 0.1KHZ 测试电压: 0.5 ± 0.05Vrms Test Frequency: 1 ± 0.1KHZ Test Voltage: 0.5 ± 0.05Vrms	
				≤ 5.0% (C < 0.047μF)	≤ 7.5% (C < 0.047μF)	≤ 7.5% (C < 0.047μF)			
				≤ 10% (C > 0.047μF)	≤ 10% (C > 0.047μF)	≤ 10% (C > 0.047μF)			
		Y5V Z5U	≥ 25V	16V	10V	6.3V			
				≤ 7.0% (C < 1.0μF)					
				≤ 9.0% (C ≥ 1.0μF)	≤ 15%	≤ 15%	≤ 15%		
绝缘电阻 (IR) Insulation Resistance	I类 Class I	C ≤ 10 nF, Ri ≥ 50000M Ω C > 10 nF, Ri • C _R ≥ 500S						测试电压: 额定电压 (最高 500V) 测试时间: 60 ± 5 秒 测试湿度: ≤ 75% 测试温度: 25°C ± 3°C 测试充放电电流: ≤ 50mA Measuring Voltage: Rated Voltage (Max 500V) Duration: 60 ± 5s Test Humidity: ≤ 75% Test Temperature: 25°C ± 5°C Test Current: ≤ 50mA	
	II类 Class II	X7R/ X5R/ X7S/ X6S	C ≤ 25 nF, Ri ≥ 10000M Ω C > 25 nF, Ri • C _R > 100S						
		Y5V Z5U	C ≤ 25 nF, Ri ≥ 4000M Ω C > 25 nF, Ri • C _R > 100S						
介质耐电强度(DWV) Dielectric Withstanding Voltage	不应有介质被击穿或损伤 No breakdown or damage.						测量电压: I类: 300% 额定电压 II类: 250% 额定电压 时间: 1~5 秒 充/放电电流: 不应超过 50mA (这部分说明不包括中高压 MLCC) Measuring Voltage: Class I : 300% Rated voltage Class II : 250% Rated voltage Duration: 1~5s Charge/ Discharge Current: 50mA max. (This method excludes high-voltage MLCC)		

项目 Item	技术规格 Technical Specification			测试方法 Test Method and Remarks
可焊性 Solderability	上锡率应大于 95% 外观: 无可见损伤。 At least 95% of the terminal electrode is covered by new solder. Visual Appearance: No visible damage.			将电容在 80~120℃ 的温度下预热 10~30 秒。 Preheating conditions: 80 to 120℃; 10~30s.
	有铅焊料: (Sn/Pb: 63/37) 浸锡温度: 235±5℃ 浸锡时间: 2±0.5s Solder Temperature: 235±5℃ Duration: 2±0.5s		无铅焊料: 浸锡温度: 245±5℃ 浸锡时间: 2±0.5s Solder Temperature: 245±5℃ Duration: 2±0.5s	
耐焊接热 Resistance to Soldering Heat	项目 Item	NPO 至 SL NPO to SL	X7R/X5R/ X7S/X6S	Y5V、 Z5U
	ΔCC	≤ ± 0.5% 或 ± 0.5PF, 取较大值 ≤ ± 0.5% or ± 0.5PF, whichever is larger	-5~+10%	-10~+20%
	DF	同初始标准 Same to initial value.		
	IR	同初始标准 Same to initial value.		
	外观: 无可见损伤 上锡率: ≥95% Appearance: No visible damage. At least 95% of the terminal electrode is covered by new solder.			
抗弯曲强度 Resistance to Flexure of Substrate (Bending Strength)	外观: 无可见损伤。 Appearance: No visible damage.			试验基板: Al ₂ O ₃ 或 PCB 弯曲深度: 1mm 施压速度: 0.5mm/sec. 单位: mm 应在弯曲状态下进行测量。 
	Δ C/C	≤ ± 10%		
				Test Board: Al ₂ O ₃ or PCB Warp: 1mm Speed: 0.5mm/sec. Unit: mm The measurement should be made with the board in the bending position.

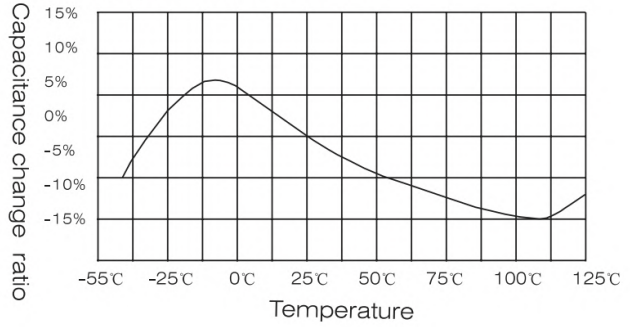
项目 Item	技术规格 Technical Specification	测试方法 Test Method and Remarks																														
端头结合强度 Termination Adhesion	外观无可见损伤 No visible damage.	施加的力: 5N 时间: 10±1S Applied Force: 5N Duration: 10±1S																														
温度循环 Temperature Cycle	<p>Δ C/C: I 类: ≤±1%或±1pF, 取两者中最大者 II 类: B,X,BS,DS: ≤±10% E,F: ≤±20%</p> <p>Class I : ≤±1% or ±1pF, whichever is larger. Class II : B,X,BS,DS: ≤±10% E,F: ≤±20%</p>	<p>预处理[※] (2类): 上限类别温度, 1小时 恢复: 24±1h 初始测量 循环次数: 5次, 一个循环分以下4步:</p> <table border="1"> <thead> <tr> <th>阶段</th> <th>温度 (°C)</th> <th>时间 (分钟)</th> </tr> </thead> <tbody> <tr> <td>第1步</td> <td>下限温度(^(NPO/X7R/X7S/X6S/X5R-55) _(Y5V-25 Z5U-10))</td> <td>30</td> </tr> <tr> <td>第2步</td> <td>常温 (+20)</td> <td>2~3</td> </tr> <tr> <td>第3步</td> <td>上限温度(^(NPO/X7R/X7S: +125) _(Y5V/Z5U/X5R: +85 X6S+105))</td> <td>30</td> </tr> <tr> <td>第4步</td> <td>常温 (+20)</td> <td>2~3</td> </tr> </tbody> </table> <p>试验后放置(恢复)时间: 24±2h Preheating conditions: up-category temperature, 1h Recovery time: 24±1h Initial Measurement Cycling Times: 5 times, 1 cycle, 4 steps:</p> <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Time (min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Low- category temp. (^(NPO/X7R/X7S/X6S/X5R-55) _(Y5V-25 Z5U-10))</td> <td>30</td> </tr> <tr> <td>2</td> <td>Normal temp. (+20)</td> <td>2~3</td> </tr> <tr> <td>3</td> <td>Up- category temp. (^(NPO/X7R/X7S: +125) _(Y5V/Z5U/X5R: +85 X6S+105))</td> <td>30</td> </tr> <tr> <td>4</td> <td>Normal temp. (+20)</td> <td>2~3</td> </tr> </tbody> </table> <p>Recovery time after test: 24±2h</p>	阶段	温度 (°C)	时间 (分钟)	第1步	下限温度(^(NPO/X7R/X7S/X6S/X5R-55) _(Y5V-25 Z5U-10))	30	第2步	常温 (+20)	2~3	第3步	上限温度(^(NPO/X7R/X7S: +125) _(Y5V/Z5U/X5R: +85 X6S+105))	30	第4步	常温 (+20)	2~3	Step	Temperature (°C)	Time (min.)	1	Low- category temp. (^(NPO/X7R/X7S/X6S/X5R-55) _(Y5V-25 Z5U-10))	30	2	Normal temp. (+20)	2~3	3	Up- category temp. (^(NPO/X7R/X7S: +125) _(Y5V/Z5U/X5R: +85 X6S+105))	30	4	Normal temp. (+20)	2~3
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潮湿试验 Moisture Resistance	<table border="1"> <tr> <td>Δ C/C</td> <td>I 类: ≤±2%或±1pF, 取两者之中较大者 II 类: B,X,BS,DS:≤±10% E,F: ≤±30% Class I : ≤±2% or ±1pF, whichever is larger. Class II : B,X,BS,DS:≤±10% E,F: ≤±30%</td> </tr> <tr> <td>DF</td> <td>≤2 倍初始标准 Not more than twice of initial value.</td> </tr> <tr> <td rowspan="2">IR</td> <td>I 类: Ri≥2500MΩ 或 Ri•CR≥25S 取两者之中较小者. Class I : Ri≥2500MΩ 或 Ri•CR≥ 25S whichever is smaller.</td> </tr> <tr> <td>II 类: Ri≥1000MΩ 或 Ri•CR≥25S 取两者之中较小者. Class II : Ri≥1000MΩ 或 Ri•CR≥ 25S whichever is smaller.</td> </tr> <tr> <td colspan="2">外观: 无损伤 Appearance: No visible damage.</td> </tr> </table>	Δ C/C	I 类: ≤±2%或±1pF, 取两者之中较大者 II 类: B,X,BS,DS:≤±10% E,F: ≤±30% Class I : ≤±2% or ±1pF, whichever is larger. Class II : B,X,BS,DS:≤±10% E,F: ≤±30%	DF	≤2 倍初始标准 Not more than twice of initial value.	IR	I 类: Ri≥2500MΩ 或 Ri•CR≥25S 取两者之中较小者. Class I : Ri≥2500MΩ 或 Ri•CR≥ 25S whichever is smaller.	II 类: Ri≥1000MΩ 或 Ri•CR≥25S 取两者之中较小者. Class II : Ri≥1000MΩ 或 Ri•CR≥ 25S whichever is smaller.	外观: 无损伤 Appearance: No visible damage.		<p>温度: 40±2°C 湿度: 90~95%RH 时间: 500 小时 放置条件: 室温 放置时间: 24 小时(I 类); 48 小时(II 类) Temperature: 40±2°C Humidity: 90~95%RH Duration: 500h Recovery conditions: Room temperature Recovery Time: 24h (Class1) or 48h (Class2)</p>																					
Δ C/C	I 类: ≤±2%或±1pF, 取两者之中较大者 II 类: B,X,BS,DS:≤±10% E,F: ≤±30% Class I : ≤±2% or ±1pF, whichever is larger. Class II : B,X,BS,DS:≤±10% E,F: ≤±30%																															
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CHARACTER PROFILES

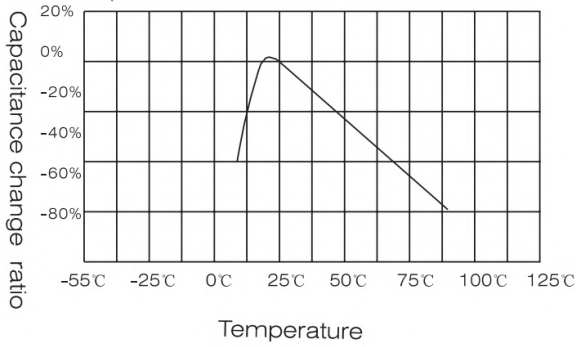
temperature coefficient



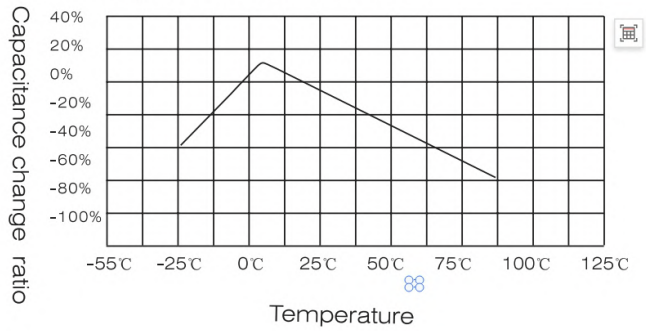
X7R temperature characteristics



Z5U temperature character

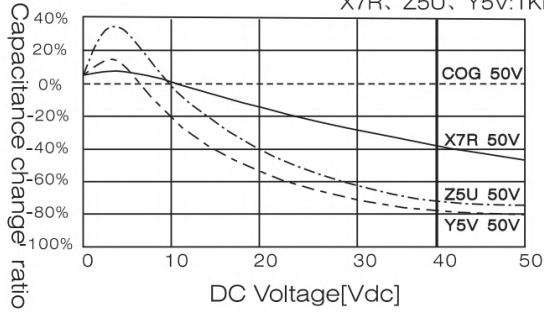


Y5V temperature characteristics



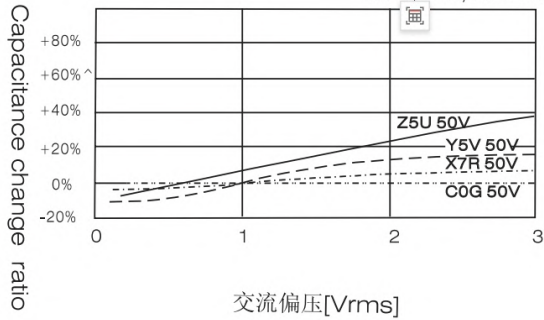
- DC Voltage Characteristics

Measuring condition COG :1MHz
X7R、Z5U、Y5V:1KHz

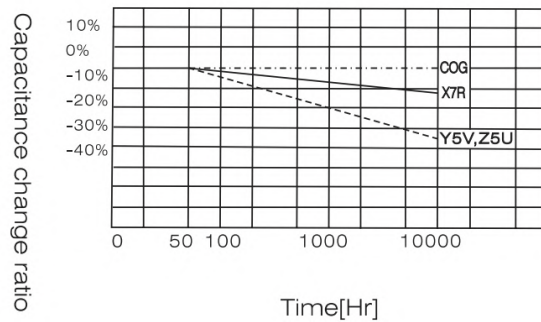


- Capacitance-AC Voltage Characteristics

Measuring condition: COG :1MHz
X7R,Z5U,Y5V:1KHz

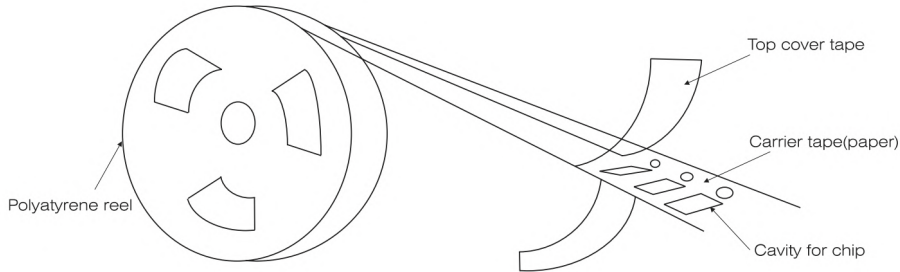


- Capacitance change aging

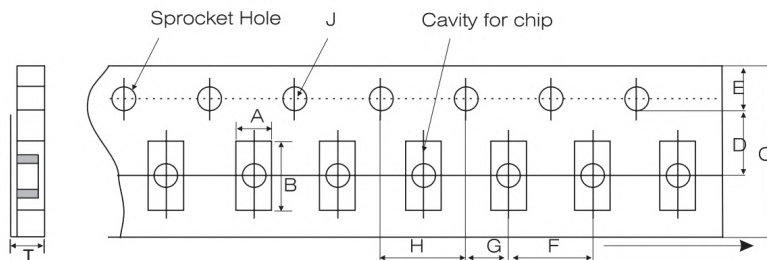


PACKAGING STYLE

• Taping Material



• Reel Dimensions(mm)



Size Code	A	B	C	D	E	F	G	H	J	T
1005	0.65±0.10	1.15±0.10	8.00±0.10	3.50±0.05	1.75±0.10	2.00±0.05	2.00±0.05	4.00±0.10	1.50±0.10	Below 0.80
1608	1.10±0.20	1.90±0.20	8.00±0.20	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.10	4.00±0.10	1.50±0.10	Below 1.10
2012	1.45±0.20	2.30±0.20	8.00±0.20	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.10	4.00±0.10	1.50±0.10	Below 1.50
1206	1.80±0.20	3.40±0.20	8.00±0.20	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.10	4.00±0.10	1.50±0.10	Below 1.80
3225	2.70±0.10	3.40±0.20	12.00±0.10	5.50±0.05	1.75±0.10	4.00±0.10	2.00±0.10	4.00±0.10	1.50±0.10	Below 3.20
4532	3.66±0.10	4.95±0.20	12.00±0.10	5.50±0.05	1.75±0.10	8.00±0.10	2.00±0.10	4.00±0.10	1.50±0.10	Below 4.00

STORAGE

• Quantity

Type	PCS/REEL	PCS/INNERBOX	PCS/OUTERBOX
1005(0402)	10000	60000	600,000
1608(0603)	4000	24000	240,000
2012(0805)	4000	24000	240,000
3216(1206)	4000	24000	240,000
3225(1210)	2000 or 1000	5000	500,000
4532(1812)	1000 or 500	2500	25,000