

# High-Q Capacitors (Microwave Chip Capacitors) [High-accuracy Types of High-frequency Multilayer Chip Capacitors]

Series: **ECD**



## ■ Features

- Low Capacitance with tight tolerance.  
(0.1 to 15.0 pF,  $\pm 0.05$  pF to  $\pm 5$  %)
- High Q value / Low ESR at High Frequencies
- Ultra-Stable COG Performance ( $0 \pm 30$  ppm/°C)
- 0402/0201 Miniature Size  
(0.10 to 15.0 pF/0.10 to 2.0 pF,  $\pm 0.05$  pF,  $\pm 0.075$  pF etc)

## ■ Applications

- At Microwave Frequencies
  - Impedance Matching Circuit
  - Resonant Circuit
  - Coupling Circuit
- Application Examples
  - RF modules, VCO, BPF, DUP, PA, etc.
  - Cellular Phone, Bluetooth, Wireless LAN etc.

## ■ Product Code

ECD:High-Q Capacitors

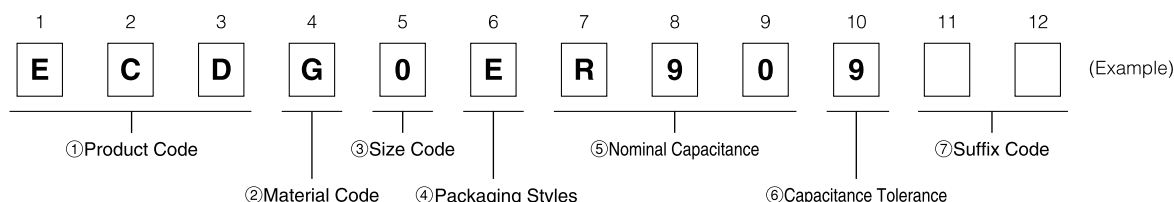
## ■ Precaution for Handling

See Page 51 to 57

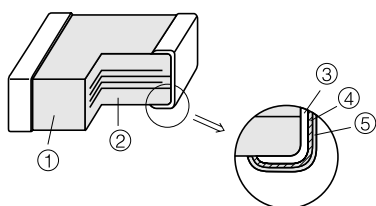
## ■ Packaging method

See Page 96

## ■ Explanation of Part Numbers

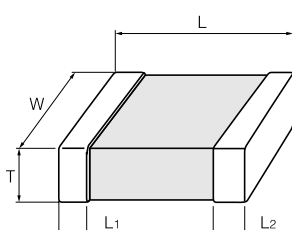


## ■ Construction



No	Name
①	Ceramic dielectric
②	Inner electrode
③	Substrate electrode
④	Intermediate electrode
⑤	External electrode

## ■ Dimensions in mm (not to scale)



Unit : mm (inch)

Code	Size Code (EIA)	L	W	T	L <sub>1</sub> , L <sub>2</sub>
Z	Type "06" (0201)	0.60 $\pm$ 0.03	0.30 $\pm$ 0.03	0.30 $\pm$ 0.03	0.15 $\pm$ 0.05
0	Type "10" (0402)	1.00 $\pm$ 0.05	0.50 $\pm$ 0.05	0.50 $\pm$ 0.05	0.2 $\pm$ 0.1

## ■ Packaging Styles

Code	Packaing Styles		Quantity	Type "06" (0201)	Type "10" (0402)
				T=0.3	T=0.5
E	φ 180 reel	Paper taping (Pitch : 2 mm)	pcs./reel	15,000 pcs. / reel	10,000 pcs. / reel

## ■ Temperature Coefficient

Characteristics	Temperature. Coefficient.
C0G	0 ± 30 ppm/°C

These temperature coefficient are calculated between 20°C and 85°C

## ■ Rated Voltage

Rated Voltage	DC25V
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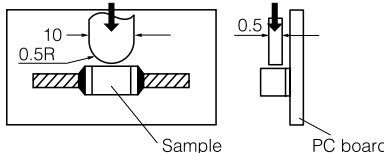
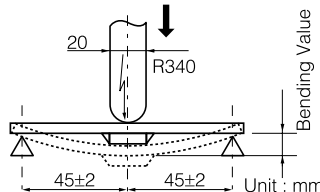
## ■ Nominal Capacitance

Ex.	R10	1R0	2R7	120
Nominal Capacitance	0.10 pF	1.0 pF	2.7 pF	12 pF

## ■ Capacitance Tolerance

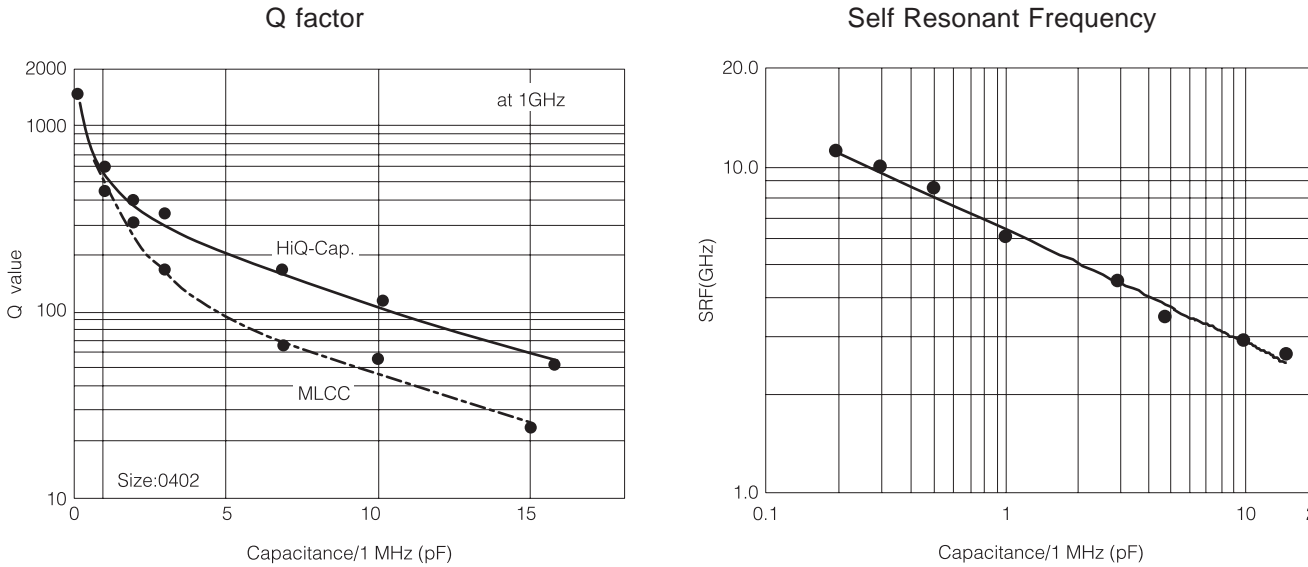
Size Code (EIA)	Tol. Code	Capacitance Range	Capacitance Tolerabce
Type "06" (0201)	8	0.10 to 0.50 pF	±0.05 pF
	9	0.60 to 0.90 pF	±0.075 pF
	B	1.0 to 3.0 pF	±0.1 pF
Type "10" (0402)	8	0.10 to 0.50 pF	±0.05 pF
	9	0.60 to 0.90 pF	±0.075 pF
	B	1.0 to 3.0 pF	±0.1 pF
	C	3.3 to 10.0 pF	±0.25 pF
	J	12 to 15 pF	±5 %

## ■ Specification

Characteristics	Specification	Test Method												
Operating Temperature Range	−55 to 125 °C													
Rated Voltage	25 VDC													
Dielectric Withstanding Voltage	No break down	Test voltage:Rated voltage ×300 % Duration:1 to 5s Limit suge current:50 mA max.												
Insulation Resistance (I R)	More than 10000 MΩ	Measuring voltage:Rated voltage Duration:60±5s Limit surge current:50 mA max.												
Capcitance	Within the specified tolerance	Temperature:20 °C Measuring frequency :1 MHz±10 % Measuring voltage:0.5 to 5 Vrms												
Dissipation Factor (tan δ)	$\tan \delta \leq 0.005$													
Temperature Characteristics	C0G:0±30 ppm/ °C	Maximum capacitance change at stage 1 to 5 <table><tr><td>Stage</td><td>Temperature</td></tr><tr><td>Stage 1</td><td>+20±2 °C</td></tr><tr><td>Stage 2</td><td>−25±2 °C</td></tr><tr><td>Stage 3 (Reference Temperature)</td><td>+20±2 °C</td></tr><tr><td>Stage 4</td><td>+85±2 °C</td></tr><tr><td>Stage 5</td><td>+20±2 °C</td></tr></table>	Stage	Temperature	Stage 1	+20±2 °C	Stage 2	−25±2 °C	Stage 3 (Reference Temperature)	+20±2 °C	Stage 4	+85±2 °C	Stage 5	+20±2 °C
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Stage 3 (Reference Temperature)	+20±2 °C													
Stage 4	+85±2 °C													
Stage 5	+20±2 °C													
Adhesion	The terminal electrode shall be free from peeling or signs of peeling.	Soldering the specimen to the testing jig shown in the figure, and apply at 5 N force to the arrow direction for 10 seconds. <div></div>												
Bending Strength	Appearance:no mechanical damage	Bending value:1 mm Bending speed:1 mm/s <div></div>												
Solderability	More than 75 % of the soldered area of both terminal electrodes shall be covered with fresh solder.	Solder temperature:230±5 °C Dipping period:4±1 s Solder:H63A(JIS-Z-3283)												
Resistance to Solder Heat	Appearance:no mechanical damage Capacitance change: IR:more than 10000 MΩ	Solder temperature:270±5 °C Dipping period:3.0±0.5 s  Preheat condition: <table><tr><td>Temp.</td><td>Period</td></tr><tr><td>80 to 100 °C</td><td>120 to 180s</td></tr><tr><td>150 to 200 °C</td><td>120 to 180s</td></tr></table> Recovery:24±2 h	Temp.	Period	80 to 100 °C	120 to 180s	150 to 200 °C	120 to 180s						
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80 to 100 °C	120 to 180s													
150 to 200 °C	120 to 180s													

Characteristics	Specification	Test Method
Temperature cycle	Appearance:no mechanical damage IR:more than 1000 MΩ Capacitance change: Within ±7.5 % or ±0.02 pF whichever is lager.	Condition of one cycle Step1:-55±3 °C                   30±3 min. Step2:Room temp.               3 min. Step3:+125±3 °C               30±3 min. Step4:Room temp.               3 min. Number of cycles:5 Recovery:24±2 h
Moisture Resistance	Appearance:no mechanical damage IR:more than 1000 MΩ Capacitance change: Within ±7.5 % or ±0.02 pF whichever is lager. tanδ ≤ 0.005	Temperature:40±2 °C Relative humidity:90 to 95 % Test period:500+24/0 h Recovery:24±2 h
Moisture Resistant Loading	Appearance:no mechanical damage IR:more than 1000 MΩ	Temperature:40±2 °C Relative humidity:90 to 95 % Applied voltage:25 VDC Limit surge current:50 mA max. Test period:500+24/0 h Recovery:24±2 h
Loading at high temperature	Appearance:no mechanical damage IR:more than 10000 MΩ	Temperature:+125 °C ±3 °C Applied voltage:50 VDC (Rated voltage ×200 %) Limit surge current:50 mA max. Test period:1000+48/0 h Recovery:24±2 h

■ Typical Performance Data



■ Standard Products for Type “06” (EIA “0201”),  
Taped Version

Capacitance	Code		C	
	Rated voltage		DC 25V	
	Capacitance	Tolerance	Part No.	Dim T (mm)
0.1	±0.05 pF		ECDGZER108	0.3
0.2			ECDGZER208	0.3
0.3			ECDGZER308	0.3
0.4			ECDGZER408	0.3
0.5			ECDGZER508	0.3
0.6	±0.075 pF		ECDGZER609	0.3
0.7			ECDGZER709	0.3
0.8			ECDGZER809	0.3
0.9			ECDGZER909	0.3
1	±0.1 pF		ECDGZE1R0B	0.3
1.1			ECDGZE1R1B	0.3
1.2			ECDGZE1R2B	0.3
1.3			ECDGZE1R3B	0.3
1.5			ECDGZE1R5B	0.3
1.6			ECDGZE1R6B	0.3
1.8			ECDGZE1R8B	0.3
2			ECDGZE2R0B	0.3
2.2			ECDGZE2R2B	0.3
2.4			ECDGZE2R4B	0.3
2.7			ECDGZE2R7B	0.3
3			ECDGZE3R0B	0.3

Packaging Style Code : “E” for Taped Version (ø180 reel, Taping pitch : 2 mm)

■ Standard Products for Type “10” (EIA “0402”),  
Taped Version

Capacitance	Code		C	
	Rated voltage		DC 25V	
	Capacitance	Tolerance	Part No.	Dim T (mm)
0.1	±0.05 pF		ECDG0ER108	0.5
0.2			ECDG0ER208	0.5
0.3			ECDG0ER308	0.5
0.4			ECDG0ER408	0.5
0.5			ECDG0ER508	0.5
0.6	±0.075 pF		ECDG0ER609	0.5
0.7			ECDG0ER709	0.5
0.8			ECDG0ER809	0.5
0.9			ECDG0ER909	0.5
1	±0.1 pF		ECDG0E1R0B	0.5
1.1			ECDG0E1R1B	0.5
1.2			ECDG0E1R2B	0.5
1.3			ECDG0E1R3B	0.5
1.5			ECDG0E1R5B	0.5
1.6			ECDG0E1R6B	0.5
1.8			ECDG0E1R8B	0.5
2			ECDG0E2R0B	0.5
2.2			ECDG0E2R2B	0.5
2.4			ECDG0E2R4B	0.5
2.7			ECDG0E2R7B	0.5
3			ECDG0E3R0B	0.5
3.3	±0.25 pF		ECDG0E3R3C	0.5
3.9			ECDG0E3R9C	0.5
4.7			ECDG0E4R7C	0.5
5.6			ECDG0E5R6C	0.5
6.8			ECDG0E6R8C	0.5
8.2	±5 %		ECDG0E8R2C	0.5
10			ECDG0E100C	0.5
12			ECDG0E120J	0.5
15			ECDG0E150J	0.5

Packaging Style Code : “E” for Taped Version (ø180 reel, Taping pitch : 2 mm)