

### 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

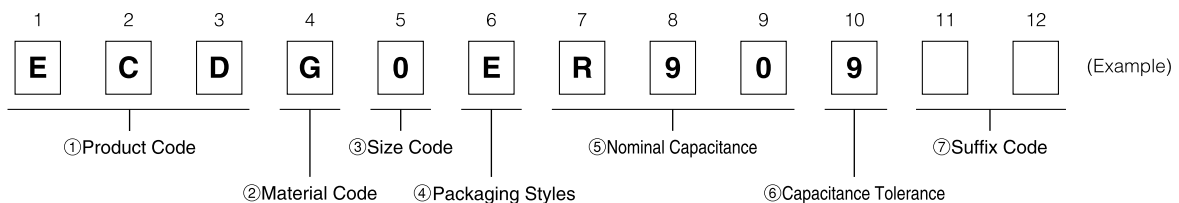
#### ■ Precaution for Handling

See Page 51 to 57

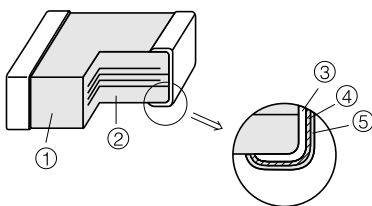
#### ■ Packaging method

See Page 96

#### ■ Explanation of Part Numbers

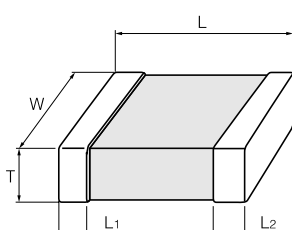


#### ■ Construction



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±0.03	0.30±0.03	0.30±0.03	0.15±0.05
0	Type "10" (0402)	1.00±0.05	0.50±0.05	0.50±0.05	0.2±0.1

### ■ Packaging Styles

Code	Packaging 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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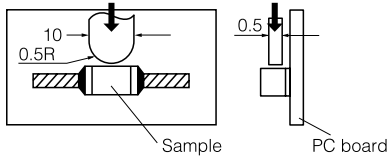
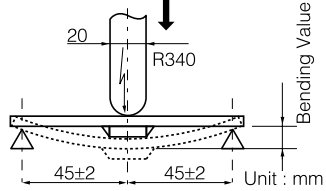
### ■ Nominal Capacitance

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

### ■ Capacitance Tolerance

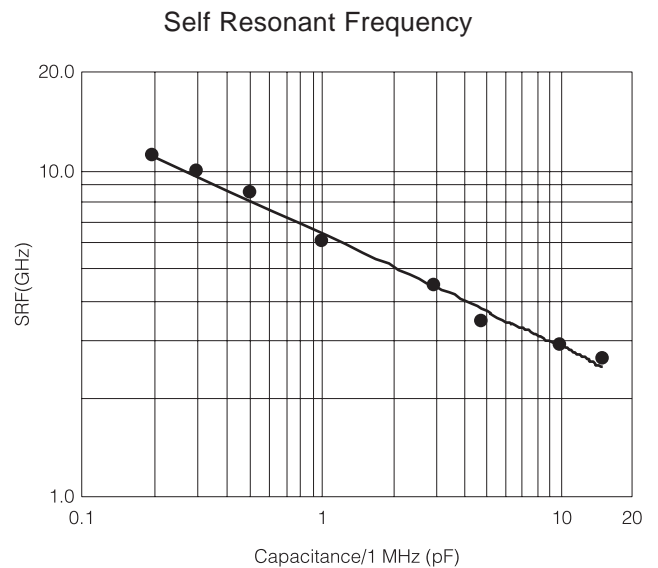
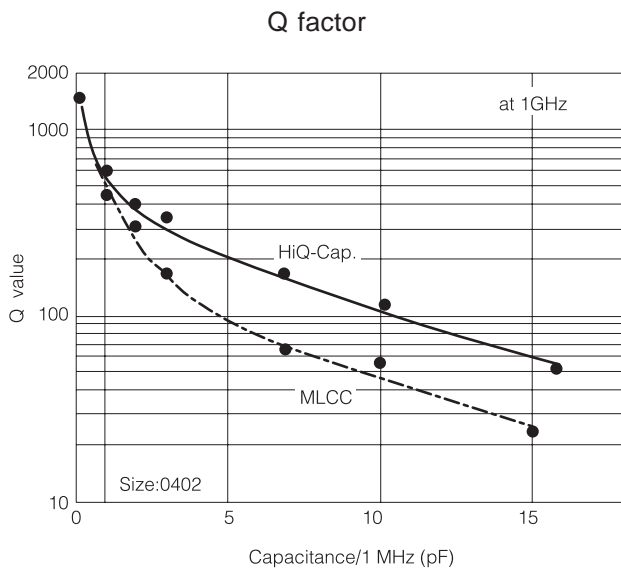
Size Code (EIA)	Tol. Code	Capacitance Range	Capacitance Tolerance
Type "06" (0201)	8	0.10 to 0.50 pF	±0.05 pF
	9	0.60 to 0.90 pF	±0.075 pF
	B	1.0 to 3.0 pF	±0.1 pF
Type "10" (0402)	8	0.10 to 0.50 pF	±0.05 pF
	9	0.60 to 0.90 pF	±0.075 pF
	B	1.0 to 3.0 pF	±0.1 pF
	C	3.3 to 10.0 pF	±0.25 pF
	J	12 to 15 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 surge 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.												
Capacitance	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	COG:0±30 ppm/ °C	Maximum capacitance change at stage 1 to 5 <table border="1"> <thead> <tr> <th>Stage</th> <th>Temperature</th> </tr> </thead> <tbody> <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> </tbody> </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 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. 												
Bending Strength	Appearance:no mechanical damage	Bending value:1 mm Bending speed:1 mm/s 												
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 border="1"> <thead> <tr> <th>Temp.</th> <th>Period</th> </tr> </thead> <tbody> <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> </tbody> </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 (φ180 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	ECDG0E8R2C		0.5	
10	ECDG0E100C		0.5	
12	±5 %	ECDG0E120J	0.5	
15		ECDG0E150J	0.5	

Packaging Style Code : "E" for Taped Version (φ180 reel, Taping pitch : 2 mm)