Multilayer Ceramic Capacitors (High Capacitance)

Series: **ECJ**

■ Features

- Small size and high capacitance
- Low ESR/ESL and excellent high-frequency characteristics
- Ideal alternative to TANTALUM CHIP CAPACITORS and ALUMINUM ELECTROLYTIC CAPACITORS
- RoHS compliant

■ Recommended Applications

- Class 2 (Hi-K Type)
  ·Power supply circuitry decoupling applications DC-DC converter power supply circuitry of the high-speed LSI smoothing circuit

■ Handling Precautions

See Page 48 to 53

■ Packaging Specifications

See Page 45, 46, 56

■ Discontinued / Revised Part Numbers, Alternative Part Numbers

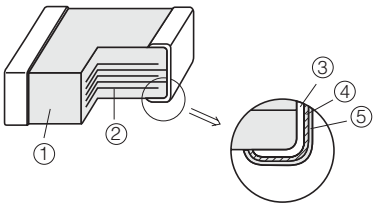
See Page 54, 55

■ Explanation of Part Numbers

1	2	3	4	5	6	7	8	9	10	11	12	
E	C	J	1	V	B	0	J	4	7	5	M	(Example)

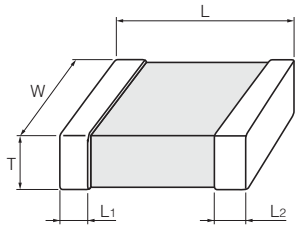
- 1 2 3: Product Code (ECJ:Multilayer Ceramic Chip Capacitors)
- 4: Size Code
- 5: Packaging Style Code
- 6: Temperature Characteristic Code
- 7 8: Rated Voltage Code
- 9 10 11: Nominal Capacitance
- 12: Capacitance Tolerance Code

■ Construction



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

■ Dimensions in mm (not to scale)



Size Code	Size (EIA)	L	W	T	L_1, L_2
0	0402	1.00±0.05	0.50±0.05	0.50±0.05	0.2±0.1
		$1.00^{+0.15}_{-0.05}$	$0.50^{+0.15}_{-0.05}$	$0.50^{+0.15}_{-0.05}$	
1	0603	1.6±0.1	0.8±0.1	0.8±0.1	0.3±0.2
		1.60±0.15	0.80±0.15	0.80±0.15	
2	0805	2.0±0.1	1.25±0.10	0.85±0.10	0.50±0.25
				1.25±0.10	
		2.00±0.15	1.25±0.15	1.25±0.15	
		2.0±0.2	1.25±0.20	1.25±0.20	
G		2.00±0.15	1.25±0.15	0.85±0.10	
3	1206	3.20±0.15	1.60±0.15	0.85±0.10	0.6±0.3
				1.15±0.10	
D		3.2±0.2	1.6±0.2	0.85±0.10	
M				1.15±0.10	

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.
Should a safety concern arise regarding this product, please be sure to contact us immediately.

00 Sep. 2008

■ Packaging Styles and Standard Packaging Quantities

Quantity : pcs./reel

Packaging Style Code	Packaging Styles \ Size / Thickness		0402	0603	0805		1206		
			T=0.5	T=0.8	T=0.85	T=1.25	T=0.85	T=1.15	T=1.6
E	φ180 reel	Paper taping (Pitch : 2 mm)	10,000	—	—	—	—	—	—
V		Paper taping (Pitch : 4 mm)	—	4,000	4,000	—	4,000	—	—
F		Embossed taping (Pitch : 4 mm)	—	—	—	3,000	—	3,000	—
Y			—	—	—	—	—	—	2,000

φ330 reel and Bulk case Type : Please contact us.

■ Temperature Characteristics

● Class 2

Temperature Characteristic Code	Temperature Characteristics	Capacitance Change	Measurement Temperature Range	Reference Temperature
B, X	B	±10 %	–25 to 85 °C	20 °C
	X7R	±15 %	–55 to 125 °C	25 °C
	X5R	±15 %	–55 to 85 °C	25 °C
F	F	+30, –80 %	–25 to 85 °C	20 °C
	Y5V	+22, –82 %	–30 to 85 °C	25 °C

For applicable “Temperature Characteristics”, see the lists of standard products on page 6 to 7.

■ Rated Voltage

Code	1H	1E	1C	1A	0J
Rated Voltage	DC 50 V	DC 25 V	DC 16 V	DC 10 V	DC 6.3 V

■ Nominal Capacitance

Ex.	105	225	106	226
Nominal Capacitance	1,000,000 pF (1 μF)	2,200,000 pF (2.2 μF)	10,000,000 pF (10 μF)	22,000,000 pF (22 μF)

■ Capacitance Tolerance

Class	Temperature Characteristics	Capacitance Tolerance Code	Capacitance Tolerance
2	B, X7R, X5R	K	±10 %
		M	±20 %
	F, Y5V	Z	+80, –20 %

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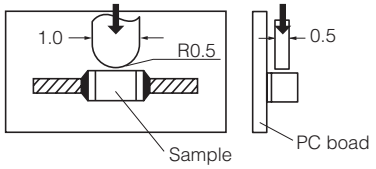
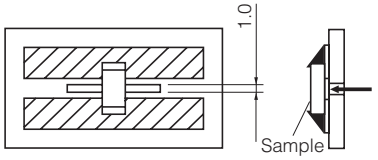
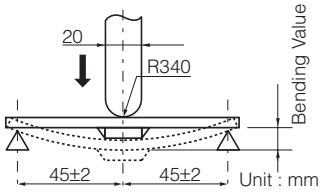
■ Specifications and Testing Methods

<table>
<tr><th>Item</th><th>Specification</th><th>Test Method</th></tr>
<tr><td>Operating Temperature Range</td><td>Temp. Char. B, X7R : –55 to 125 °C
Temp. Char. B, X5R : –55 to 85 °C
Temp. Char. F, Y5V : –30 to 85 °C</td><td>————</td></tr>
<tr><td>Dielectric Withstanding Voltage</td><td>No dielectric breakdown and/or damage</td><td>Test voltage : Rated voltage ×250 %
Duration:1 to 5 s.
Charge / Discharge current: 50 mA max.</td></tr>
<tr><td>Insulation Resistance (I.R.)</td><td>500/C (MΩ) min.
Note : 100/C(MΩ)min. for DC 10 V max.
C : Nominal Cap. in µF</td><td>Measuring voltage : Rated voltage
Duration : 60±5 s
Charge / Discharge current: 50 mA max.</td></tr>
<tr><td>Capacitance</td><td>Within the specified tolerance</td><td rowspan="2">Measuring temperature: 20±2 °C
Preconditioning: The capacitors shall be kept in temperature of 150 +0/–10 °C for 1 hour and subject to standard condition* 48±4 hours before initial measurement.
<table><tr><td>Nominal capacitance</td><td>C≦10 µF</td><td>C>10 µF</td></tr><tr><td>Measuring frequency</td><td>1 kHz±10 %</td><td>120 Hz±20 %</td></tr><tr><td>Measuring voltage</td><td>1.0±0.2 Vrms</td><td>0.5±0.2 Vrms</td></tr></table></td></tr>
<tr><td>Dissipation Factor (tan δ)</td><td>0.2 max.
Please see the technical specifications for details.</td></tr>
<tr><td>Temperature Characteristics</td><td>Temperature Characteristics
B : ±10 %
X7R : ±15 %
X5R : ±15 %
F : +30, –80 %
Y5V : +22, –82 %</td><td>Maximum capacitance change at stages 1 to 5
<table><tr><td>Temp. Char.</td><td>B, F</td><td>X7R</td><td>X5R</td><td>Y5V</td></tr><tr><td>Stage 1</td><td>20 °C</td><td>25 °C</td><td>25 °C</td><td>25 °C</td></tr><tr><td>Stage 2</td><td>–25 °C</td><td>–55 °C</td><td>–55 °C</td><td>–30 °C</td></tr><tr><td>Stage 3 (Ref. Temp.)</td><td>20 °C</td><td>25 °C</td><td>25 °C</td><td>25 °C</td></tr><tr><td>Stage 4</td><td>85 °C</td><td>125 °C</td><td>85 °C</td><td>85 °C</td></tr><tr><td>Stage 5</td><td>20 °C</td><td>25 °C</td><td>25 °C</td><td>25 °C</td></tr></table>See the technical specifications for details such as measuring voltage.</td></tr>
<tr><td>Adhesion</td><td>Terminal electrodes shall be free from peeling or signs of peeling.</td><td>Applied force : 5 N
Duration : 10 s
Size : 0402
 

Size : 0603 to 1206
 

Unit : mm</td></tr>
<tr><td>Bending Strength</td><td>Appearance: No mechanical damage
Capacitance change:
Temp. Char. B, X7R, X5R: within ±12.5 %
F, Y5V: within ±30 %</td><td>Bending value :1 mm
Bending speed : 1 mm/s
 

Unit : mm</td></tr>
<tr><td>Vibration Proof</td><td>Appearance : No mechanical damage.
Capacitance : Within the specified tolerance
tanδ : Initial standard value</td><td>Total amplitude : 1.5 mm
Vibration frequency : 10 to 55 to 10 Hz for 1 min
3 perpendicular directions for 2 hours each, a total of 6 hours</td></tr>
</table>

*Standard condition : Temperature 15 to 35 °C, Relative humidity 45 to 75 %

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Item	Specification	Test Method
Resistance to Soldering Heat	Appearance : No mechanical damage Capacitance change : Temp. Char. B, X7R, X5R : within ±7.5 % F, Y5V : within ±20 % tanδ : Initial standard value IR : Initial standard value Withstand voltage : No dielectric breakdown or damage	Soldering bath method Preconditioning : Heat treatment(*1) Solder temperature : 270±5 °C Dipping period : 3.0±0.5 s Preheat condition : Order / Temp. (°C) / Size 0805 max. / Size 1206 1 / 80 to 100 / 120 to 180s / 300 to 360s 2 / 150 to 200 / 120 to 180s / 300 to 360s Recovery (Standard condition) : 48±4 h
Solderability	More than 95 % of the soldered area of both terminal electrodes shall be covered with fresh solder.	Soldering bath method Solder temperature : 230±5 °C Dipping period : 4±1 s Solder : H63A (JIS–Z–3282)
Temperature Cycle	Appearance : No mechanical damage Capacitance change : Temp. Char. B, X7R, X5R : within ±7.5 % F, Y5V : within ±20 % tanδ : Initial standard value IR : Initial standard value Withstand voltage : No dielectric breakdown and/or damage	Preconditioning : Heat treatment(*1) Step 1: Minimum operating temp. 30±3 min Step 2: Room temp. 3 min max. Step 3: Maximum operating temp. 30±3 min Step 4: Room temp. 3 min max. Number of cycles : 5 cycles Recovery(Standard condition) : 48±4 h
Damp Heat (steady state)	Appearance : No mechanical damage Capacitance change : Temp. Char. B, X7R, X5R : within ±20 % F, Y5V : within ±30 % tanδ : Temp. Char. B, X7R, X5R : 0.25 max. F, Y5V : 0.3 max. IR : 50/C (MΩ) min. Note : 10/C (MΩ) min. for rated vol. DC 10 V max. C:Nominal cap. in µF Please see the technical specifications for details.	Preconditioning : Heat treatment(*1) Temperature : 40±2 °C Relative humidity : 90 to 95 % Test period : 500+24/0 h Recovery(Standard condition) : 48±4 h
Damp Heat Load	Appearance : No mechanical damage Capacitance change : Temp. Char. B, X7R, X5R : within ±20 % F, Y5V : within ±30 % tanδ : Temp. Char. B, X7R, X5R : 0.25 max. F, Y5V : 0.3 max. IR : 25/C (MΩ) min. Note : 5/C (MΩ) min. for rated vol. DC 10 V max. C:Nominal cap. in µF Please see the technical specifications for details.	Preconditioning : Voltage treatment(*2) Temperature : 40±2 °C Relative humidity : 90 to 95 % Applied voltage : Rated voltage Charge/discharge current : 50 mA max. Test period : 500+24/0 h Recovery(Standard condition) : 48±4 h
High Temperature Load	Appearance : no mechanical damage Capacitance change : Temp. Char. B, X7R, X5R : within ±20 % F, Y5V : within ±30 % tanδ : Temp. Char. B, X7R, X5R : 0.25 max. F, Y5V : 0.3 max. IR : 50/C (MΩ) min. Note : 10/C (MΩ) min. for rated vol. DC 10 V max. C:Nominal cap. in µF Please see the technical specifications for details.	Preconditioning : Voltage treatment(*2) Temperature : Maximum operation temp. ±3 °C Applied voltage : (1)Rated voltage×200 % (2)Rated voltage×150 % (3)Rated voltage×100 % Please see the technical specifications for details. Charge/discharge current : 50 mA max. Test period : 1000+48/0 h Recovery (Standard condition) : 48±4 h

(*1) Heat treatment : 1 h of heat treatment at 150+0/–10 °C followed by 48±4 h recovery under standard conditions.
(*2) Voltage treatment : 1 h of voltage treatment under the specified temperature and voltage for testing followed by 48±4 h of recovery under standard conditions.

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■ Standard Products for EIA Size "0402", Taped Version

● Class 2

◆ Temperature Characteristic Code : B (Temperature Characteristics : X5R)

Rated Voltage		DC 16 V			DC 10 V			DC 6.3 V		
Capacitance (μF)	Capacitance Tolerance	Part No.	Dim. T (mm)	Temp. Char. X5R	Part No.	Dim. T (mm)	Temp. Char. X5R	Part No.	Dim. T (mm)	Temp. Char. X5R
1	±10 %(K) or ±20 %(M)	ECJ0EB1C105M	0.5*	○	ECJ0EB1A105□	0.5	○	ECJ0EB0J105□	0.5	○
2.2								ECJ0EB0J225M	0.5	○
4.7								ECJ0EB0J475M	0.5*	○

□ : Capacitance tolerance code : "□" for "K" or "M"
Dimensional tolerance of L, W, T : ±0.05 mm for no mark, $^{+0.15}_{-0.05}$ mm for "✻" mark.
Standard packaging quantity of Packaging Style Code "E" (T = 0.5 mm) : 10,000 pcs./reel.
Recommend soldering method : Reflow soldering.

◆ Temperature Characteristic Code : F (Temperature Characteristics : F, Y5V)

Rated Voltage		DC 6.3 V			
Capacitance (μF)	Capacitance Tolerance	Part No.	Dim. T (mm)	Temp. Char. F	Y5V
1	+80, –20 % (Z)	ECJ0EF0J105Z	0.5	○	○

Standard packaging quantity of Packaging Style Code "E" (T = 0.5 mm): 10,000 pcs./reel.
Recommend soldering method : Reflow soldering.

■ Standard Products for EIA Size "0603", Taped Version

● Class 2

◆ Temperature Characteristic Code : B (Temperature Characteristics : X5R)

Rated Voltage		DC 25 V			DC 16 V			DC 10 V			DC 6.3 V		
Capacitance (μF)	Capacitance Tolerance	Part No.	Dim. T (mm)	Temp. Char. X5R	Part No.	Dim. T (mm)	Temp. Char. X5R	Part No.	Dim. T (mm)	Temp. Char. X5R	Part No.	Dim. T (mm)	Temp. Char. X5R
1	±10 %(K) or ±20 %(M)	ECJ1VB1E105□	0.8	○	ECJ1VB1C105□	0.8	○	ECJ1VB1A105□	0.8	○	ECJ1VB0J105□	0.8	○
2.2					ECJ1VB1C225□	0.8	○	ECJ1VB1A225□*	0.8	○	ECJ1VB0J225□	0.8	○
4.7					ECJ1VB1C475□	0.8	○	ECJ1VB1A475□*	0.8	○	ECJ1VB0J475□*	0.8	○
10								ECJ1VB1A106M*	0.8**	○	ECJ1VB0J106M*	0.8**	○

□ : Capacitance tolerance code : "□" for "K" or "M"
Standard packaging quantity of Packaging Style Code "V" (T = 0.8 mm): 4,000 pcs./reel.
Recommend soldering method: Reflow soldering.
"✻" : Soldering method ; Flow soldering shall not be applied.
"✻✻" : "L", "W", "T" Dimension Tolerance ±0.15 mm

◆ Temperature Characteristic Code : F (Temperature Characteristics : F, Y5V)

Rated Voltage		DC 25 V			DC 16 V			DC 10 V				DC 6.3 V			
Capacitance (μF)	Capacitance Tolerance	Part No.	Dim. T (mm)	Temp. Char. F	Part No.	Dim. T (mm)	Temp. Char. F	Part No.	Dim. T (mm)	Temp. Char. F	Y5V	Part No.	Dim. T (mm)	Temp. Char. F	Y5V
1	+80, –20 %(Z)	ECJ1VF1E105Z	0.8	○	ECJ1VF1C105Z	0.8	○	ECJ1VF1A105Z	0.8	○	○				
2.2								ECJ1VF1A225Z	0.8	○	○	ECJ1VF0J225Z	0.8	○	○

Standard packaging quantity of Packaging Style Code "V" (T = 0.8 mm): 4,000 pcs./reel.
Recommend soldering method: Reflow soldering.

■ Standard Products for EIA Size "0805", Taped Version

● Class 2

◆ Temperature Characteristic Code : B (Temperature Characteristics : B, X5R)

Rated Voltage		DC 25 V			DC 16 V			DC 10 V				DC 6.3 V		
Capacitance (μF)	Capacitance Tolerance	Part No.	Dim. T (mm)	Temp. Char. X5R	Part No.	Dim. T (mm)	Temp. Char. X5R	Part No.	Dim. T (mm)	Temp. Char. B	X5R	Part No.	Dim. T (mm)	Temp. Char. X5R
1	±10 %(K) or ±20 %(M)	ECJ2FB1E105□	1.25*	○	ECJ2FB1C105□	1.25*	○	ECJ2FB1A105□	1.25	○	○			
2.2		ECJ2FB1E225□	1.25*	○	ECJ2FB1C225□	1.25*	○	ECJ2FB1A225□	1.25*	—	○	ECJ2FB0J225□	1.25	○
4.7		ECJ2FB1E475□	1.25*	○	ECJ2FB1C475□	1.25*	○	ECJ2FB1A475□	1.25*	—	○	ECJ2FB0J475□	1.25*	○
10					ECJ2FB1C106□	1.25**	○	ECJ2FB1A106□	1.25**	—	○	ECJ2FB0J106□	1.25**	○
22								ECJ2FB1A226M	1.25**	—	○	ECJ2FB0J226M	1.25**	○

□ : Capacitance tolerance code : "□" for "K" or "M"
Dimensional tolerance of L, W, T : ±0.1 mm for no mark, ±0.15 mm for "✻" mark, ±0.2 mm for "✻✻"mark.
Standard packaging quantity of Packaging Style Code "F" (T = 1.25 mm): 3,000 pcs./reel.
Avoid flow soldering.

◆ Temperature Characteristic Code : F (Temperature Characteristics : F, Y5V)

Rated Voltage		DC 50 V			DC 25 V			DC 16 V				DC 10 V			
Capacitance (μF)	Capacitance Tolerance	Part No.	Dim. T (mm)	Temp. Char. F	Part No.	Dim. T (mm)	Temp. Char. F	Part No.	Dim. T (mm)	Temp. Char. F	Y5V	Part No.	Dim. T (mm)	Temp. Char. F	Y5V
1	+80, –20 %(Z)	ECJ2FF1H105Z	1.25*	○	ECJ2FF1E105Z	1.25*	○	ECJ2VF1C105Z	0.85	○	○				
2.2					ECJ2FF1E225Z	1.25*	○	ECJGVF1C225Z	0.85	○	○				
4.7								ECJGVF1C475Z	0.85	○	○	ECJGVF1A475Z	0.85	○	○
10												ECJ2FF1A106Z	1.25*	○	○

Dimensional tolerance of L, W, T : L, W: ±0.15 mm / T : ±0.1 mm for no mark, ±0.15 mm for "✻"mark.
Standard packaging quantity of Packaging Style Code "V" (T = 0.85 mm): 4,000 pcs./reel, "F" (T = 1.25 mm): 3,000 pcs./reel.
Soldering method of dimension T > 1 mm: Avoid flow soldering.

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■ Standard Products for EIA Size “1206”, Taped Version

● Class 2

◆ Temperature Characteristic Code : B (Temperature Characteristics : B, X7R, X5R)

Rated Voltage		DC 25 V					DC 16 V					DC 10 V					DC 6.3 V			
Capacitance (μF)	Capacitance Tolerance	Part No.	Dim. T (mm)	Temp. Char. B	X7R	X5R	Part No.	Dim. T (mm)	Temp. Char. B	X7R	X5R	Part No.	Dim. T (mm)	Temp. Char. B	X7R	X5R	Part No.	Dim. T (mm)	Temp. Char. X5R	
1	±10 %(K) or ±20 %(M)	ECJ3YB1E105□	1.6	○	○	—	ECJ3FB1C105□	1.15*	○	○	—									
2.2		ECJ3YB1E225□	1.6	—	—	○	ECJ3YB1C225□	1.6	○	○	—	ECJ3YB1A225□	1.6	○	○	—				
4.7		ECJ3YB1E475□	1.6	—	—	○	ECJ3YB1C475□	1.6	—	—	○	ECJ3YB1A475□	1.6	—	—	○	ECJ3YB0J475□	1.6	○	
10		ECJ3YB1E106□	1.6	—	—	○	ECJ3YB1C106□	1.6	—	—	○	ECJ3YB1A106□	1.6	—	—	○	ECJDV50J106M	0.85**	○	
22							ECJ3YB1C226M	1.6	—	—	○	ECJ3YB1A226M	1.6	—	—	○	ECJDV50J226M	0.85**	○	

□ : Capacitance tolerance code : “□” for “K” or “M”
Dimensional tolerance of L, W, T: ±0.2 mm for no mark, L, W: ±0.15 mm / T: ±0.1 mm for “*” mark, L, W: ±0.2 mm / T: ±0.1 mm for “**” mark.
Standard packaging quantity of Packaging Style Code “V” (T = 0.85 mm) : 4,000 pcs./reel, “F” (T = 1.15 mm): 3,000 pcs./reel, “Y” (T = 1.6 mm): 2,000 pcs./reel
Avoid flow soldering.

◆ High Temperature Series : Temperature Characteristic Code : B, X (Temperature Characteristics : B, Y7R)

Rated Voltage		DC 50 V				DC 25 V				DC 16 V				DC 10 V			
Capacitance (μF)	Capacitance Tolerance	Part No.	Dim. T (mm)	Temp. Char. B	Y7R	Part No.	Dim. T (mm)	Temp. Char. B	Y7R	Part No.	Dim. T (mm)	Temp. Char. B	Y7R	Part No.	Dim. T (mm)	Temp. Char. B	Y7R
1	±10 %(K) or ±20 %(M)	ECJ3YX1H105□	1.6	○	○	ECJ3YB1E105□	1.6	○	○	ECJ3FB1C105□	1.15*	○	○				
2.2										ECJ3YB1C225□	1.6	○	○	ECJ3YB1A225□	1.6	○	○
4.7										ECJ3YX1C475□	1.6	○	○				
10										ECJ3YX1C106□	1.6	○	○				

□ : Capacitance tolerance code : “□” for “K” or “M”
Dimensional tolerance of L, W, T:±0.2 mm for no mark, L, W: ±0.15 mm / T: ±0.1 mm for “*” mark.
Standard packaging quantity of Packaging Style Code “F” (T = 1.15 mm): 3,000 pcs./reel, “Y” (T = 1.6 mm): 2,000 pcs./reel
Avoid flow soldering.

◆ Temperature Characteristic Code : F (Temperature Characteristics : F, Y5V)

Rated Voltage		DC 50 V			DC 25 V			DC 16 V			DC 10 V			
Capacitance (μF)	Capacitance Tolerance	Part No.	Dim. T (mm)	Temp. Char. F	Part No.	Dim. T (mm)	Temp. Char. F	Y5V	Part No.	Dim. T (mm)	Temp. Char. F	Y5V	Part No.	Dim. T (mm)	Temp. Char. F	Y5V
1	+80, –20 %(Z)	ECJ3FF1H105Z	1.15*	○	ECJ3FF1E105Z	1.15*	○	○	ECJ3VF1C105Z	0.85*	○	○				
2.2					ECJ3FF1E225Z	1.15*	○	○	ECJ3VF1C225Z	0.85*	○	○				
4.7					ECJ3FF1E475Z	1.15*	○	—	ECJ3FF1C475Z	1.15*	○	○				
10					ECJ3YF1E106Z	1.6	○	—	ECJMFF1C106Z	1.15**	○	○	ECJMFF1A106Z	1.15**	○	○
22													ECJMFF1A226Z	1.15**	○	○

Dimensional tolerance of L, W, T:±0.2 mm for no mark, L, W: ±0.15 mm / T: ±0.1 mm for “*” mark, L, W: ±0.2 mm / T: ±0.1 mm for “**”.
Standard packaging quantity of Packaging Style Code “V” (T = 0.85 mm): 4,000 pcs./reel, “F” (T = 1.15 mm): 3,000 pcs./reel, “Y” (T = 1.6 mm): 2,000 pcs./reel
Avoid flow soldering.

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.
Should a safety concern arise regarding this product, please be sure to contact us immediately.

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