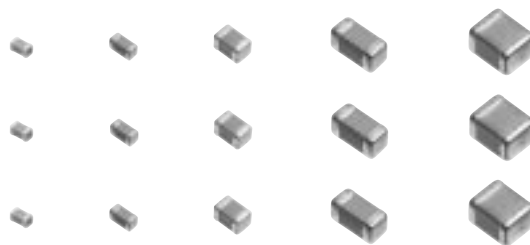


Multilayer Ceramic Chip Capacitors (High Capacitance)

Series: **ECJ**



■ Features

- Small and Large capacitance Multilayer Ceramic Chip Capacitor by Panasonic creative material technology and high precision lamination technology
- Low ESR, Low ESL and excellent High-frequency
- Optimal to change from TANTALUM CHIP CAPACITORS and ALUMINUM ELECTROLYTIC CAPACITORS

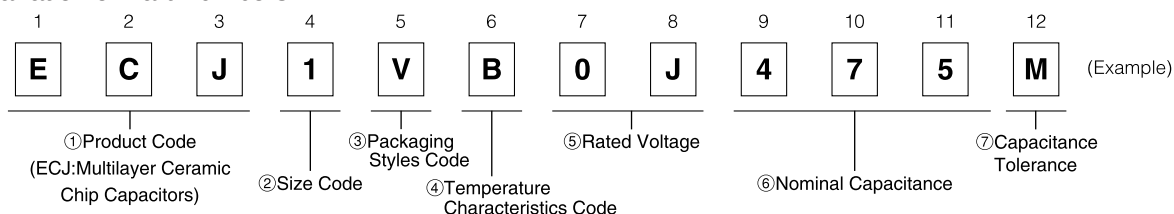
■ Precaution for Handling

See Page 51 to 57

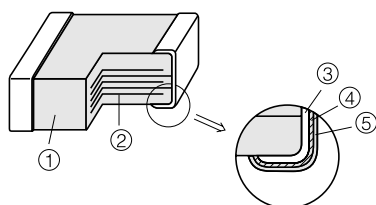
■ Discontinued / Revis Part Numbers

See Page 58

■ Explanation of Part Numbers



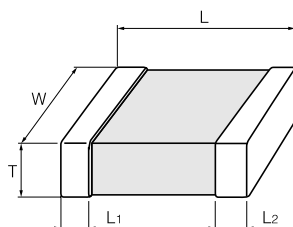
■ Construction



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)

Unit : mm



Code	Size Code (EIA)	L	W	T	L1, L2
0	Type "10" (0402)	1.00±0.05	0.50±0.05	0.50±0.05	0.2±0.1
1	Type "11" (0603)	1.6±0.1	0.8±0.1	0.8±0.1	0.3±0.2
2	Type "12" (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	
C		2.0±0.2	1.25±0.20	1.25±0.20	0.50±0.25
G		2.00±0.2	1.25±0.20	1.25±0.20	
		2.00±0.15	1.25±0.15	0.85±0.10	0.50±0.25
3	Type "13" (1206)	3.20±0.15	1.60±0.15	0.85±0.10	0.6±0.3
				1.15±0.10	
		3.2±0.2	1.6±0.2	1.6±0.2	0.6±0.3
D				0.85±0.10	
M		3.2±0.2	1.6±0.2	1.15±0.10	0.6±0.3
4	Type "23" (1210)	3.2±0.3	2.5±0.2	2.0±0.2	0.6±0.3
			2.5±0.3	2.5±0.3	
9		3.2±0.3	2.5±0.2	0.85±0.10	0.6±0.3

■ Packaging Styles and Standard Packaging Quantity

T : Thickness (mm)

Code	Packaging Styles		Quantity	Type"10" (0402)	Type"11" (0603)	Type"12" (0805)		Type"13" (1206)			Type"23" (1210)		
				T=0.5	T=0.8	T=0.85	T=1.25	T=0.85	T=1.15	T=1.6	T=0.85	T=2.0	T=2.5
E	ø180 reel	Paper taping (Pitch:4mm)	pcs./ reel	10,000	—	—	—	—	—	—	—	—	—
V				—	4,000	4,000	—	4,000	—	—	—	—	—
F		Embossed taping (Pitch:4mm)		—	—	—	3,000	—	3,000	—	3,000	—	—
Y				—	—	—	—	—	—	2,000	—	2,000	1,000

■ Temperature Characteristics

● Class 2 Capacitors

Code	Temp. Char.	Capacitance Change	Measurement Temperature Range	Reference Temperature
B	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 8 to 9.

■ Rated Voltage

Code	1H	1E	1C	1A	0J	0G
Rated Voltage	DC 50 V	DC 25 V	DC 16 V	DC 10 V	DC 6.3 V	DC 4 V

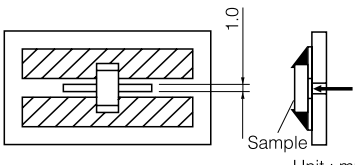
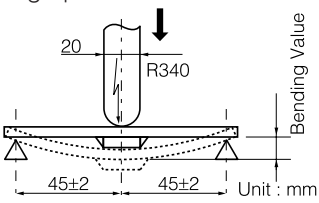
■ Nominal Capacitance

Ex.	105	225	106	226	107
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)	100,000,000 pF (100 µF)

■ Capacitance Tolerance

Class	Temp. Char.	Tol. Code	Capacitance Tolerance
2	B, X7R, X5R	K	±10 %
		M	±20 %
	F, Y5V	Z	+80, –20 %

■ Specification and Test Method

Item	Specification	Test Method																														
Operating Temperature Range	Temp. Char. B, X7R : -55 to 125 °C Temp. Char. B, X5R : -55 to 85 °C Temp. Char. F, Y5V : -30 to 85 °C	_____																														
Dielectric Withstanding Voltage	No break down	Test voltage: Rated voltage ×250% Duration:1 to 5s. Charge/discharge current:within 50 mA																														
Insulation Resistance (I R)	500/C (MΩ) min. Note:DC10V, DC6.3V;100/C(MΩ)min. (C:Nominal Cap. in μF)	Measuring voltage:Rated voltage Duration:60±5s Charge/discharge current:within 50 mA																														
Capacitance	within the specified tolerance	Measuring temperature:20±2°C Pretreatment:The capacitors shall be kept in a temperature of 150+0/-10°C for 1 hour and then shall be stored in standard condition* 48±4 hours, before initial measurement.																														
Dissipation Factor (tan δ)	0.2 max. Please confirmation to the technical reports for details.	<table><tr><td>Nominal capacitance</td><td>C≤10μF</td><td>C>10μF</td></tr><tr><td>Measuring frequency</td><td>1kHz±10%</td><td>120Hz±20%</td></tr><tr><td>Mesuring voltage</td><td>1.0±0.2Vrms</td><td>0.5±0.2Vrms</td></tr></table>	Nominal capacitance	C≤10μF	C>10μF	Measuring frequency	1kHz±10%	120Hz±20%	Mesuring voltage	1.0±0.2Vrms	0.5±0.2Vrms																					
Nominal capacitance	C≤10μF	C>10μF																														
Measuring frequency	1kHz±10%	120Hz±20%																														
Mesuring voltage	1.0±0.2Vrms	0.5±0.2Vrms																														
Temperature Characteristics	Temp. Char. B : ±10 % (-25 to 85 °C) X7R: ±15 % (-55 to 125 °C) X5R: ±15 % (-55 to 85 °C) F : +30, -80 % (-25 to 85 °C) Y5V: +22, -82 % (-30 to 85 °C)	Maximum capacitance change at stage 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> *ECJ0EB0J105□(0402/X5R/6.3V1.0μF), *ECJ1VB0J475□(0603/X5R/6.3V/4.7μF), *ECJ1VB0G106M(0603/X5R/4V/10μF) of 0.50±0.05 Vrms measurement voltage.	Temp. Char.	B, F	X7R	X5R	Y5V	Stage 1	20°C	25°C	25°C	25°C	Stage 2	-25°C	-55°C	-55°C	-30°C	Stage 3 (Ref. Temp.)	20°C	25°C	25°C	25°C	Stage 4	85°C	125°C	85°C	85°C	Stage 5	20°C	25°C	25°C	25°C
Temp. Char.	B, F	X7R	X5R	Y5V																												
Stage 1	20°C	25°C	25°C	25°C																												
Stage 2	-25°C	-55°C	-55°C	-30°C																												
Stage 3 (Ref. Temp.)	20°C	25°C	25°C	25°C																												
Stage 4	85°C	125°C	85°C	85°C																												
Stage 5	20°C	25°C	25°C	25°C																												
Adhesion	The terminal electrode shall be free from peeling or signs of peeling.	Applied force:5N Duration:10s  Unit : mm																														
Bending Strength	Appearance:no mechanical damage Capacitance change: Temp. Char. B, X7R, X5R: within ±12.5 % F, Y5V: within ±30 %	Bending value:1 mm Bending speed:1 mm/s  Unit : mm																														
Vibration Proof	Appearance: There shall be no cracks and other mechanical damage. Capacitance:Shall be within the specifiedtolerance tanδ:initial value	Apply a variable vibration of 1.5mm total amplitude in the 10 to 55 to 10Hz vibration frequency range swept in 1 min. in 3 mutually perpendicular directions for 2 hours each, a total of 6 hours.																														
Solderability	More than 95 % of the soldered area of both terminal electrodes shall be covered with fresh solder.	Solder bath method Solder temperature:230±5 °C Dipping period:4±1 s Solder:H63A (JIS-Z-3282)																														

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

Item	Specification	Test Method									
Resistance to Solder Heat	Appearance:no mechanical damage Capacitance change: Temp. Char. B, X7R, X5R: within ± 7.5 % F, Y5V: within ± 20 % $\tan\delta$ initial value IR:initial value With-stand voltage:no dielectric breakdown or damage	Solder bath method Preconditioning: Heat treatment (150°C, 1h) Solder temperature:270 $\pm$ 5 °C Dipping period:3.0 $\pm$ 0.5 s Preheat condition: <table border="1"> <thead> <tr> <th>Temp.</th><th>Type "11", "12"</th><th>Type "13", "23"</th></tr> </thead> <tbody> <tr> <td>80 to 100 °C</td><td>120 to 180s</td><td>300 to 360s</td></tr> <tr> <td>150 to 200 °C</td><td>120 to 180s</td><td>300 to 360s</td></tr> </tbody> </table> Recovery(Standard condition):48 $\pm$ 4h	Temp.	Type "11", "12"	Type "13", "23"	80 to 100 °C	120 to 180s	300 to 360s	150 to 200 °C	120 to 180s	300 to 360s
Temp.	Type "11", "12"	Type "13", "23"									
80 to 100 °C	120 to 180s	300 to 360s									
150 to 200 °C	120 to 180s	300 to 360s									
Temperature Cycle	Appearance:no mechanical damage Capacitance change: Temp. Char. B, X7R, X5R: within ± 7.5 % F, Y5V: within ± 20 % $\tan\delta$ initial value IR:initial value With-stand voltage: no dielectric breakdown or damage	Preconditioning: Heat treatment (150°C,1h) Step 1:Minimum operation temp. 30 $\pm$ 3 min. Step 2:Room temp. 3 min. Step 3:Maximum operation temp. 30 $\pm$ 3 min. Step 4:Room temp. 3 min. Number of cycles:5 cycles Recovery(Standard condition):48 $\pm$ 4h									
Damp Heat (steady state)	Appearance:no mechanical damage Capacitance change: Temp. Char. B, X7R, X5R: within ± 12.5 % F, Y5V: within ± 30 % Note:ECJ0EB0J105□(0402/X5R/6.3V/1.0 μ F) ECJ1VB0J475□(0603/X5R/6.3V/4.7 μ F) ECJ1VB0G106M(0603/X5R/4V/10 μ F) within ± 20 % $\tan\delta$ 0.3 max. Please confirmation to the technical reports for details. IR:50/C (M Ω) min. Note:DC10V, DC6.3V;10/C (M Ω)min.(C:Nominal cap. in μ F)	Preconditioning: Heat treatment (150°C,1h) Temperature:40 $\pm$ 2 °C Relative humidity:90 to 95 % Test period:500+24/0 h Recovery(Standard condition):48 $\pm$ 4h									
Loading Under Damp Heat	Appearance:no mechanical damage Capacitance change: Temp. Char. B, X7R, X5R: within ± 12.5 % F, Y5V: within ± 30 % Note:ECJ0EB0J105□(0402/X5R/6.3V/1.0 μ F) ECJ1VB0J475□(0603/X5R/6.3V/4.7 μ F) ECJ1VB0G106M(0603/X5R/4V/10 μ F) within ± 20 % $\tan\delta$ 0.3 max. Please confirmation to the technical reports for details. IR:25/C (M Ω) min. Note:DC10V, DC6.3V;5/C (M Ω)min.(C:Nominal cap. in μ F)	Preconditioning: Voltage treatment Temperature:40 $\pm$ 2 °C Relative humidity:90 to 95 % Applied voltage:Rated voltage Test period:500+24/0 h Recovery(Standard condition):48 $\pm$ 4h									
Loading at High Temperature	Appearance:no mechanical damage Capacitance change: Temp. Char. B, X7R, X5R: within ± 12.5 % F, Y5V: within ± 30 % Note:ECJ0EB0J105□(0402/X5R/6.3V/1.0 μ F) ECJ1VB0J475□(0603/X5R/6.3V/4.7 μ F) ECJ1VB0G106M(0603/X5R/4V/10 μ F) within ± 20 % $\tan\delta$ 0.3 max. Please confirmation to the technical reports for details. IR:50/C (M Ω) min. Note:DC10V, DC6.3V;10/C (M Ω)min.(C:Nominal cap. in μ F)	Preconditioning: Voltage treatment Temperature: Maximum operation temp. ± 3 °C Applied voltage:①Rated voltage $\times$ 200% ②Rated voltage $\times$ 150% ③Rated voltage $\times$ 100% Please confirmation to the technical reports for details. Charge/discharge current: within 50mA Test period:1000+48/0 h Recovery(Standard condition):48 $\pm$ 4h									

Note 1) Heat treatment:1 h of heat treatment at 150+0/-10°C followed by 48 $\pm$ 4 h recovery under the standead condition.

Note 2) Voltage treatment:1 h of voltage treatment under the specified temperature and voltage for testing followed by 48 $\pm$ 4 h of recovery under the standead condition.

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

Capacitance (μF)	Code	B		
	Rated Voltage	DC6.3V		
	Capacitance Tolerance	Part No.	Dim. T (mm)	Temp. Char. X5R
1	±10%(K) or ±20%(M)	ECJ0EB0J105□	0.5	○

Capacitance (μF)	Code	F		
	Rated Voltage	DC6.3V		
	Capacitance Tolerance	Part No.	Dim. T (mm)	Temp. Char. F Y5V
1	+80, -20%(Z)	ECJ0EF0J105Z	0.5	○ ○

Packaging style code: "E" for taped version (φ180 reel, taping pitch: 2 mm) .

■ Standard Products for Type "11" (EIA "0603"), Taped Version

Capacitance (μF)	Code	B											
	Rated Voltage	DC16V			DC10V			DC6.3V			DC4V		
	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)	ECJ1VB1C105□	0.8	○	ECJ1VB1A105□	0.8	○	ECJ1VB0J105□	0.8	○			
2.2	or				ECJ1VB1A225□	0.8	○	ECJ1VB0J225□	0.8	○			
4.7	or							ECJ1VB0J475□	0.8	○			
10	±20%(M)										ECJ1VB0G106M	0.8	○

Capacitance (μF)	Code	F											
	Rated Voltage	DC25V			DC16V			DC10V			DC6.3V		
	Capacitance Tolerance	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	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	○

□:Capacitance tolerance code : "□" for "K" or "M"

Packaging style code: "V" for taped version (φ180 reel, taping pitch: 4 mm) .

■ Standard Products for Type "12" (EIA "0805"), Taped Version

Capacitance (μF)	Code	B											
	Rated Voltage	DC25V			DC16V			DC10V			DC6.3V		
	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)	ECJ2FB1E105□*	1.25	○	ECJ2FB1C105□*	1.25	○	ECJ2FB1A105□*	1.25	○ ○			
2.2	or	ECJ2FB1E225□*	1.25	○	ECJ2FB1C225□*	1.25	○	ECJ2FB1A225□*	1.25	— ○	ECJCV50J225M	0.85	○
4.7	or	ECJ2FB1E475M	1.25	○	ECJ2FB1C475□*	1.25	○	ECJ2FB1A475□*	1.25	— ○	ECJCV50J475M	0.85	○
10	±20%(M)							Under development	1.25	— ○	ECJCV50J106M	0.85	○
22												Under development	1.25 ○

Capacitance (μF)	Code	F											
	Rated Voltage	DC50V			DC25V			DC16V			DC10V		
	Capacitance Tolerance	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	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	○ ○

□:Capacitance tolerance code : "□" for "K" or "M"

Packaging style code: "V" or "F" for taped version (φ180 reel, taping pitch: 4 mm) .

*:"L", "W", "T" Dimension tolerance ±0.15mm

**:"L", "W", "T" Dimension tolerance ±0.2mm

Soldering method of dimension T>1mm: Do not use the flow soldering.

■ Standard Products for Type "13" (EIA "1206"), Taped Version

Capacitance (μF)	Code	B											
	Rated Voltage	DC25V			DC16V			DC10V			DC6.3V		
	Capacitance Tolerance	Part No.	Dim. T (mm)	Temp. Char.	Part No.	Dim. T (mm)	Temp. Char.	Part No.	Dim. T (mm)	Temp. Char.	Part No.	Dim. T (mm)	Temp. Char.
1	±10%(K) or ±20%(M)	ECJ3YB1E105□	1.6	○	ECJ3FB1C105□	1.15	○	ECJ3YB1A225□	1.6	○			
2.2		ECJ3YB1E225□	1.6	—	ECJ3YB1C225□	1.6	○	ECJ3YB1A475□	1.6	—			
4.7		ECJ3YB1E475□	1.6	—	ECJ3YB1C475□	1.6	—	ECJ3YB1A475□	1.6	—	ECJ3YB0J475□	1.6	○
10		ECJ3YB1E106□	1.6	—	ECJ3YB1C106□	1.6	—	ECJ3YB1A106M	1.6	—	ECJ3YB0J106M	0.85	○
22		Under development	1.6	—	Under development	1.6	—	Under development	1.6	—	ECJ3YB0J226M	0.85	○
47											Under development	1.6	○

Capacitance (μF)	Code	F											
	Rated Voltage	DC50V			DC25V			DC16V			DC10V		
	Capacitance Tolerance	Part No.	Dim. T (mm)	Temp. Char.	Part No.	Dim. T (mm)	Temp. Char.	Part No.	Dim. T (mm)	Temp. Char.	Part No.	Dim. T (mm)	Temp. Char.
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	○	ECJ3VF1C475Z	1.15	○			
10					ECJ3YF1E106Z	1.60	○	ECJ3VF1C106Z	1.15	○	ECJ3YB0J106Z	1.15	○
22								ECJ3YF1A226Z	1.15	○	ECJ3YB0J226Z	1.15	○

□:Capacitance tolerance code. : "□" for "K" or "M"

Packaging style code: "F" and "Y" for taped version (φ180 reel, taping pitch: 4 mm) .

Soldering method of dimension T>1mm: Do not use the flow soldering.

■ Standard Products for Type "23" (EIA "1210"), Taped Version

Capacitance (μF)	Code	B														
	Rated Voltage	DC50V			DC25V			DC16V			DC10V			DC6.3V		
	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	Part No.	Dim. T (mm)	Temp. Char. X5R
1	±10%(K) or ±20%(M)	ECJ4YB1H105□	2.0	○												
2.2					ECJ4YB1E225□	2.0	○									
4.7					ECJ4YB1E475□	2.0	○	ECJ4YB1C475□	2.0	○						
10					ECJ4YB1E106M	2.5	○	ECJ4YB1C106M	2.0	○	ECJ4YB1A106□	2.0	○			
22					ECJ4YB1E226M	2.5	○	ECJ4YB1C226M	2.5	○	ECJ4YB1A226M	2.5	○	ECJ4YB0J226M	2.5	○
47								ECJ4YB1C476M	2.5	○	ECJ4YB1A476M	2.5	○	ECJ4YB0J476M	2.5	○
100														ECJ4YB0J107M	2.5	○

Capacitance (μF)	Code	F														
	Rated Voltage	DC50V			DC25V			DC16V			DC10V			DC6.3V		
	Capacitance Tolerance	Part No.	Dim. T	Temp. Char.	Part No.	Dim. T	Temp. Char.	Part No.	Dim. T	Temp. Char.	Part No.	Dim. T	Temp. Char.	Part No.	Dim. T	Temp. Char.
			(mm)	F		(mm)	F		Y5V	(mm)		F	Y5V		(mm)	F
4.7	+80, -20%(Z)	ECJ4YF1H475Z	2.0	○	ECJ4YF1E475Z	2.0	○ ○									
10		ECJ4YF1H106Z	2.0	○	ECJ4YF1E106Z	2.0	○ —	ECJ4YF1C106Z	2.0	○						
22					ECJ4YF1E226Z	2.0	○ ○	ECJ4YF1C226Z	2.0	○	ECJ9FF1A226Z	0.85	○ —			
47											ECJ4YF1A476Z	2.0	○ ○	ECJ4YF0J476Z	2.0	○ ○
100														ECJ4YF0J107Z	2.5	○ ○

□:Capacitance tolerance code. : "□" for "K" or "M"

Packaging style code: "Y" for taped version (φ180 reel, taping pitch: 4 mm) .

Soldering method of dimension T>1mm: Do not use the flow soldering.

■ Standard Products for Type "34" (EIA "1812") Will carry out a product end.

With March, 2004. In addition, please refer to this catalog table (58 pages) about alternative goods.