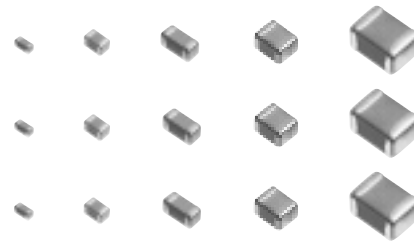


### Multilayer Ceramic Chip Capacitors (Large Capacitance)

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

#### ■ Recommended Applications

- Class 2 (Hi-K Type)
  - Power supply circuit decoupling applications
  - Power supply circuit of the High-speed LSI
  - Smoothing circuit of DC-DC converters

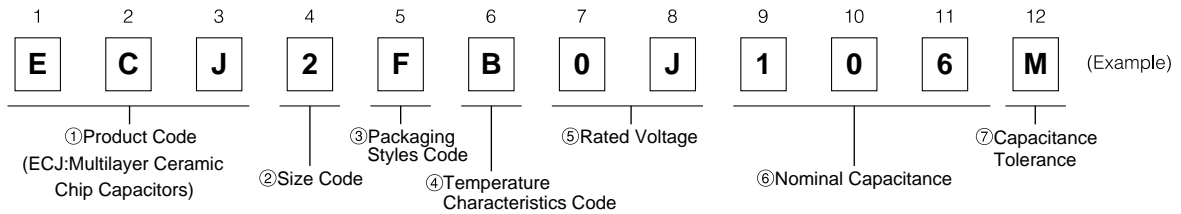
#### ■ Precaution for Handling

See Page 44 to 48

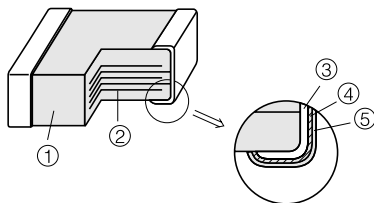
#### ■ Packaging method

See Page 82

#### ■ Explanation of Part Numbers

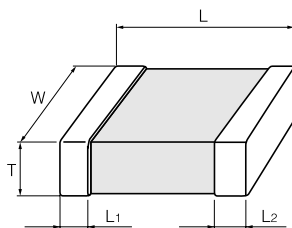


#### ■ Construction



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
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
		2.00±0.15	1.25±0.15	1.25±0.15	
		2.0±0.2	1.25±0.20	1.25±0.20	
3	Type "13" (1206)	3.20±0.15	1.60±0.15	0.85±0.10	0.6±0.3
		3.2±0.2	1.6±0.2	1.6±0.2	
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	
5	Type "34" (1812)	4.5±0.4	3.2±0.3	2.5±0.3	0.9±0.6
				3.2±0.3	

### ■ Packaging Styles and Standard Packaging Quantity

T : Thickness (mm)

Code	Packaging Styles		Type"11" (0603)	Type"12" (0805)		Type"13" (1206)			Type"23" (1210)		Type"34" (1812)	
			T=0.8	T=0.85	T=1.25	T=0.85	T=1.15	T=1.6	T=2.0	T=2.5	T=2.5	T=3.2
V	φ180 reel	Paper taping (Pitch:4mm)	4,000	4,000	—	4,000	—	—	—	—	—	—
F		Embossed taping (Pitch:4mm)	—	—	3,000	—	3,000	—	—	—	—	—
Y			—	—	—	—	—	2,000	2,000	1,000	—	—
Z	φ330 reel*	Paper taping (Pitch:4mm)	10,000	10,000	—	10,000	—	—	—	—	—	—

\* For Part Number applicable to φ330 reel, please contact us.

### ■ 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 7 to 8.

### ■ 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

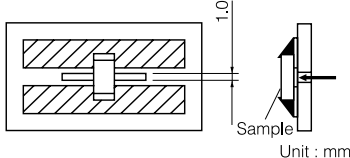
### ■ Nominal Capacitance

Ex.	105	225	106	226
Nominal Capacitance	1000000 pF (1μF)	2200000 pF (2.2μF)	10000000 pF (10μF)	22000000 pF (22μF)

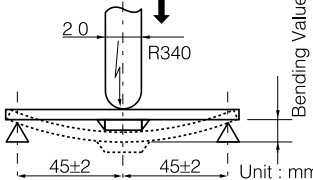
### ■ Capacitance tolerance

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% Electrification time: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 Measuring voltage time:60±5s Charge/discharge current:within 50 mA																																	
Capacitance	within the specified tolerance	Reference 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)	Rated Voltage	<table border="1"> <thead> <tr> <th>Nominal Capacitance</th> <th>C ≤ 10μF</th> <th>C &gt; 10μF</th> </tr> </thead> <tbody> <tr> <td>Measuring Frequency</td> <td>1kHz±10%</td> <td>120Hz±20%</td> </tr> <tr> <td>Measuring Voltage</td> <td>1.0±0.2Vrms</td> <td>0.5±0.2Vrms</td> </tr> </tbody> </table>	Nominal Capacitance	C ≤ 10μF	C > 10μF	Measuring Frequency	1kHz±10%	120Hz±20%	Measuring Voltage	1.0±0.2Vrms	0.5±0.2Vrms																								
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Temperature Characteristics	<table border="1"> <thead> <tr> <th rowspan="2">Rated Voltage</th> <th colspan="2">Temperature Characteristics</th> </tr> <tr> <th>B, X7R, X5R</th> <th>F, Y5V</th> </tr> </thead> <tbody> <tr> <td>50V</td> <td>0.025max.</td> <td>0.07max.</td> </tr> <tr> <td rowspan="2">25V</td> <td>0.025max.</td> <td>0.07max.</td> </tr> <tr> <td>0.05max. ( Type"13":C=4.7μF Type"23", "34" )</td> <td>0.1max. ( Type"12":C≥1μF Type"13":C=4.7μF Type"23", "34" )</td> </tr> <tr> <td rowspan="3">16V</td> <td>0.025max.</td> <td>0.1max.</td> </tr> <tr> <td>0.05max. ( Type"12": C=1μF Type"13":C≥4.7μF Type"23", "34" )</td> <td>0.125max. ( Type"11": C=1μF Type"12":C=4.7μF Type"13":C=10μF Type"23", "34" )</td> </tr> <tr> <td>0.075max. (Type"11": C=1μF)</td> <td></td> </tr> <tr> <td rowspan="3">10V</td> <td>0.05max.</td> <td>0.125max.</td> </tr> <tr> <td>0.075max. (Type"11": C=1μF)</td> <td>0.2max. ( Type"11": C=2.2μF Type"12":C=10μF Type"13":C=22μF Type"23", "34" )</td> </tr> <tr> <td>0.1max. ( Type"23":C=22μF Type"34" )</td> <td></td> </tr> <tr> <td rowspan="3">6.3V</td> <td>0.05max.</td> <td>0.2max.</td> </tr> <tr> <td>0.075max. (Type"11": C=1μF)</td> <td></td> </tr> <tr> <td>0.1max. ( Type"11", C=2.2μF Type"12", C≥4.7μF Type"13", C=22μF Type"23", "34" )</td> <td></td> </tr> </tbody> </table>	Rated Voltage	Temperature Characteristics		B, X7R, X5R	F, Y5V	50V	0.025max.	0.07max.	25V	0.025max.	0.07max.	0.05max. ( Type"13":C=4.7μF Type"23", "34" )	0.1max. ( Type"12":C≥1μF Type"13":C=4.7μF Type"23", "34" )	16V	0.025max.	0.1max.	0.05max. ( Type"12": C=1μF Type"13":C≥4.7μF Type"23", "34" )	0.125max. ( Type"11": C=1μF Type"12":C=4.7μF Type"13":C=10μF Type"23", "34" )	0.075max. (Type"11": C=1μF)		10V	0.05max.	0.125max.	0.075max. (Type"11": C=1μF)	0.2max. ( Type"11": C=2.2μF Type"12":C=10μF Type"13":C=22μF Type"23", "34" )	0.1max. ( Type"23":C=22μF Type"34" )		6.3V	0.05max.	0.2max.	0.075max. (Type"11": C=1μF)		0.1max. ( Type"11", C=2.2μF Type"12", C≥4.7μF Type"13", C=22μF Type"23", "34" )	
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Adhesion	The terminal electrode shall be free from peeling or signs of peeling.	Applied force:5N Duration:10s 																																	

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

Item	Specification	Test Method																												
Bending Strength	Appearance: no mechanical damage Capacitance Change: Temp. Char. B, X7R, X5R: within $\pm 12.5\%$ F, Y5V: within $\pm 30\%$	Bending value: 1 mm Bending speed: 1 mm/s 																												
Solderability	More than 95 % of the soldered area of both terminal electrodes shall be covered with fresh solder.	Solder bath method Solder temperature: $230 \pm 5\text{ }^\circ\text{C}$ Dipping period: $4 \pm 1\text{ s}$ Solder: H63A (JIS-Z-3282)																												
Resistance to Solder Heat	Appearance: no mechanical damage Capacitance Change: Temp. Char. B, X7R, X5R: within $\pm 7.5\%$ F, Y5V: within $\pm 20\%$ $\tan\delta$ initial value IR: initial value With-stand voltage: no dielectric breakdown or damage	(1) Solder bath method Preconditioning: Heat Treatment ( $150\text{ }^\circ\text{C}$ , 1h) Solder temperature: $270 \pm 5\text{ }^\circ\text{C}$ Dipping period: $3.0 \pm 0.5\text{ s}$ Preheat Condition: <table border="1" data-bbox="1013 728 1452 817"> <thead> <tr> <th>Temp.</th> <th>Type "11", "12"</th> <th>Type "13", "23"</th> </tr> </thead> <tbody> <tr> <td>80 to <math>100\text{ }^\circ\text{C}</math></td> <td>120 to 180s</td> <td>300 to 360s</td> </tr> <tr> <td>150 to <math>200\text{ }^\circ\text{C}</math></td> <td>120 to 180s</td> <td>300 to 360s</td> </tr> </tbody> </table> Recovery (Standard condition): $48 \pm 4\text{ h}$ (2) Reflow soldering method Preconditioning: Heat Treatment ( $150\text{ }^\circ\text{C}$ , 1h) Solder temperature: $260 \pm 5\text{ }^\circ\text{C}$ Keeping period: $10 \pm 1\text{ s}$ Preheat Condition: <table border="1" data-bbox="1013 985 1452 1041"> <thead> <tr> <th>Temp.</th> <th>Type "34"</th> </tr> </thead> <tbody> <tr> <td><math>150 \pm 10\text{ }^\circ\text{C}</math></td> <td>120 to 180s</td> </tr> </tbody> </table> Recovery (Standard condition): $48 \pm 4\text{ h}$	Temp.	Type "11", "12"	Type "13", "23"	80 to $100\text{ }^\circ\text{C}$	120 to 180s	300 to 360s	150 to $200\text{ }^\circ\text{C}$	120 to 180s	300 to 360s	Temp.	Type "34"	$150 \pm 10\text{ }^\circ\text{C}$	120 to 180s															
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Temp.	Type "34"																													
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Temperature Cycle	Appearance: no mechanical damage Capacitance Change: Temp. Char. B, X7R, X5R: within $\pm 7.5\%$ F, Y5V: within $\pm 20\%$ $\tan\delta$ initial value IR: initial value With-stand voltage: no dielectric breakdown or damage	Preconditioning: Heat Treatment ( $150\text{ }^\circ\text{C}$ , 1h) Step 1: Minimum operation temp. $30 \pm 3\text{ min.}$ Step 2: Room temp. Step 3: Maximum operation temp. $30 \pm 3\text{ min.}$ Step 4: Room temp. Number of cycles: 5 cycles Recovery (Standard condition): $48 \pm 4\text{ h}$																												
Damp Heat (steady state)	Appearance: no mechanical damage Capacitance Change: Temp. Char. B, X7R, X5R: within $\pm 12.5\%$ F, Y5V: within $\pm 30\%$	Preconditioning: Heat Treatment ( $150\text{ }^\circ\text{C}$ , 1h) Temperature: $40 \pm 2\text{ }^\circ\text{C}$ Relative humidity: 90 to 95 % Test period: 500+24/0 h Recovery (Standard condition): $48 \pm 4\text{ h}$																												
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	IR: 50/C (M $\Omega$ ) min. Note: DC10V, DC6.3V; 10/C (M $\Omega$ ) min. (C: Nominal cap. in $\mu\text{F}$ )																													

Item	Specification	Test Method																																																																																
Loading Under Damp Heat	Appearance:no mechanical damage Capacitance Change: Temp. Char. B, X7R, X5R: within ±12.5 % F, Y5V: within ±30 %	Preconditioning: Voltage Treatment Temperature:40±2 °C Relative humidity:90 to 95 % Applied voltage:Rated voltage Test period:500+24/0 h Recovery(Standard condition):48 ± 4h																																																																																
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Note 1) Heat treatment:1 h of heat treatment at 150+0/-10°C followed by 48±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 ±4 h of recovery under the standead condition.

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

Capacitance (μF)	Code		B											
	Rated Voltage		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.		
1	±10%(K)	ECJ1VB1C105□	0.8	—	○	ECJ1VB1A105□	0.8	—	○	ECJ1VB0J105□	0.8	○	○	
2.2	or ±20%(M)									ECJ1VB0J225□	0.8	—	○	

Capacitance (μF)	Code		F											
	Rated Voltage		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.		
1	+80, -20%	ECJ1VF1C105Z	0.8	○	—	ECJ1VF1A105Z	0.8	○	○					
2.2	(Z)					ECJ1VF1A225Z	0.8	○	—	ECJ1VF0J225Z	0.8	○	—	

□:Capacitance Tolerance code.  
 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.		Part No.	Dim. T (mm)	Temp. Char.		Part No.	Dim. T (mm)	Temp. Char.		Part No.	Dim. T (mm)	Temp. Char.		
1		Under development	1.25	—	○	ECJ2FB1C105□*	1.25	—	○	ECJ2FB1A105□	1.25	○	○					
2.2	±10%(K)	Under development	1.25	—	○	Under development	1.25	—	○	ECJ2FB1A225□*	1.25	—	○	ECJ2FB0J225□	1.25	○	○	
3.3	or									ECJ2FB1A335□*	1.25	—	○	ECJ2FB0J335□	1.25	○	○	
4.7	±20%(M)									Under development	1.25	—	○	ECJ2FB0J475□*	1.25	—	○	
10														ECJ2FB0J106M**	1.25	—	○	

Capacitance (μF)	Code		F															
	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		ECJ2FF1E105Z*	1.25	○	—	ECJ2VF1C105Z	0.85	○	○									
2.2	+80, -20%	ECJ2FF1E225Z*	1.25	○	—	ECJ2FF1C225Z	1.25	○	○									
4.7	(Z)					ECJ2FF1C475Z*	1.25	○	—	ECJ2FF1A475Z	1.25	○	○					
10										ECJ2FF1A106Z*	1.25	○	—	ECJ2FF0J106Z*	1.25	○	—	

□:Capacitance Tolerance code.  
 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		ECJ3YB1E105□	1.6	○	○	—	ECJ3FB1C105□	1.15	○	○	—										
1.5										ECJ3YB1A155□	1.6	○	—	○							
2.2	±10%(K)	ECJ3YB1E225□	1.6	—	—	○	ECJ3YB1C225□	1.6	○	○	—	ECJ3YB1A225□	1.6	○	—	○					
3.3	or									ECJ3YB1A335□	1.6	○	—	○							
4.7	±20%(M)	ECJ3YB1E475□	1.6	—	—	○	ECJ3YB1C475□	1.6	—	—	○	ECJ3YB1A475□	1.6	—	—	○	ECJ3YB0J475□	1.6	—	—	○
10		Under development	1.6	—	—	○	ECJ3YB1C106M	1.6	—	—	○	ECJ3YB1A106M	1.6	—	—	○	ECJ3YB0J106M	1.6	—	—	○
22																	ECJ3YB0J226M	1.6	—	—	○

□:Capacitance Tolerance code.  
 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 "13" (EIA "1206"), Taped Version

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.		
				F	Y5V			F	Y5V			F	Y5V			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										ECJ3YF1C106Z	1.6	○	—	ECJ3YF1A106Z	1.6	○	○	
22														ECJ3YF1A226Z	1.6	○	—	

Packaging Style Code: "V", "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.		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.		
				B	X5R			B	X5R			B	X5R			B	X5R			B	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	—	○	ECJ4YB1A106M	2.0	—	○					
22										Under development	2.5	—	○	ECJ4YB1A226M	2.5	—	○	ECJ4YB0J226M	2.5	—	○	
47																	ECJ4YB0J476M	2.5	—	○		

Capacitance (μF)	Code		F																			
	Rated Voltage		DC50V				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.		Part No.	Dim. T (mm)	Temp. Char.		
				F			F		F		F		F		F		F		F		F	
4.7	+80, -20% (Z)	ECJ4YF1H475Z	2.0	○																		
10		ECJ4YF1H106Z	2.0	○	ECJ4YF1E106Z	2.0	○	ECJ4YF1C106Z	2.0	○												
22									ECJ4YF1C226Z	2.0	○	ECJ4YF1A226Z	2.0	○								
47																		ECJ4YF0J476Z	2.0	○		

□:Capacitance Tolerance code.  
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"), Taped Version

Capacitance (μF)	Code		B																			
	Rated Voltage		DC50V				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.		Part No.	Dim. T (mm)	Temp. Char.		
				X5R			X5R		X5R			X5R		X5R		X5R		X5R		X5R		
3.3	±10%(K) or ±20%(M)	ECJ5YB1H335□	2.5	○																		
10					ECJ5YB1E106M	2.5	○															
22						Under development	2.5	○	ECJ5YB1C226M	2.5	○	ECJ5YB1A226M	2.5	○								
33												Under development	2.5	○								
47												Under development	3.2	○	ECJ5YB0J476M	3.2	○					
100														ECJ5YB0J107M	3.2	○						

Capacitance (μF)	Code		F															
	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.		
				F		F		F		F		F		F		F		
22	+80, -20% (Z)	ECJ5YF1E226Z	2.5	○	ECJ5YF1C226Z	2.5	○											
47								ECJ5YF1A476Z	2.5	○								
100														ECJ5YF0J107Z	2.5	○		

□:Capacitance Tolerance code.  
Packaging Style Code: "Y" for Taped Version (φ180 reel, Taping pitch: 8 mm) .  
Soldering method of Dimension T>1mm: Do not use the flow soldering.