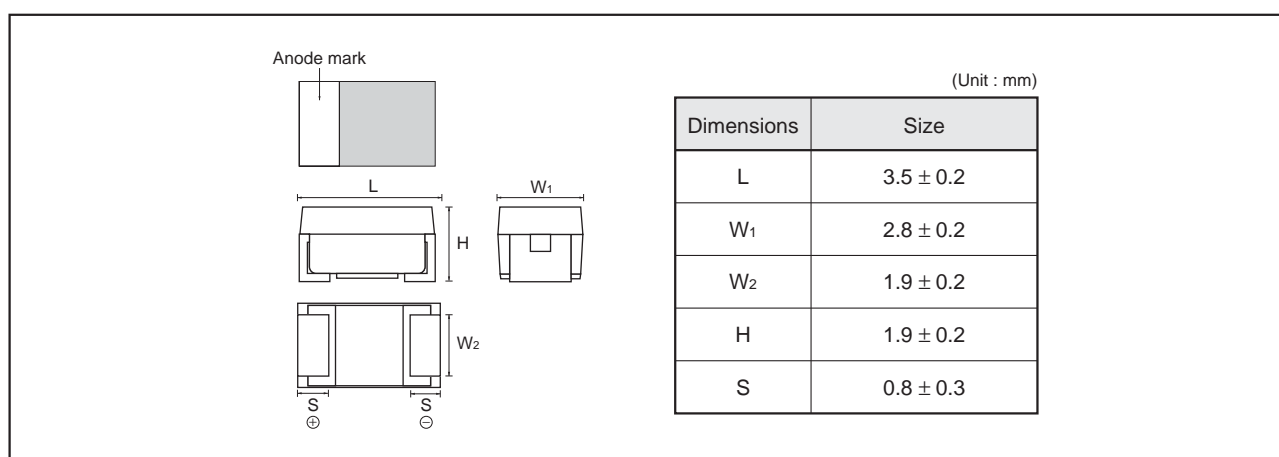


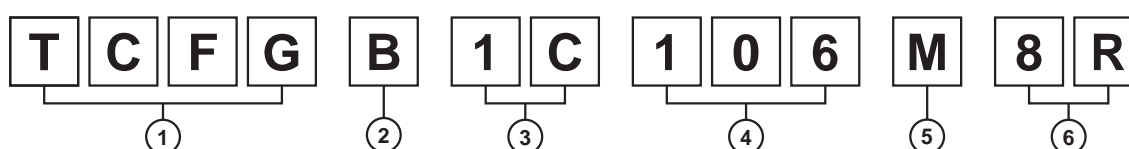
●Features

- 1) Open structure built in for superior flame retardance characteristics.
- 2) Advanced wire bonding technology enable to make compact packages.
- 3) Eco-friendly halogen-free products.
- 4) Screening by thermal shock.

●Dimensions



●Part No. Explanation



① Series name

TCFG

② Case style

B : 3528-21 (1411) size

③ Rated voltage

Rated voltage (V)	4	6.3	10	16	20	25
CODE	0G	0J	1A	1C	1D	1E

④ Nominal capacitance

Nominal capacitance in pF in 3 digits:
2 significant figures followed by the figure
representing the number of 0's.

⑤ Capacitance tolerance

M : $\pm 20\%$

⑥ Taping

8 : Reel width : 8mm

R : Positive electrode on the side opposite to sprocket hole

*This specification has possibility of charge, due to underdevelopment product.
Please ask for latest specification to our sales.

●Rated table

Capacitance (μF)	Rated voltage (V.DC)					
	4	6.3	10	16	20	25
3.3 (335)				B	☆B	B
4.7 (475)				B	B	B
10 (106)				B	☆B	
15 (156)				B		
22 (226)			B	B		
33 (336)			B	B		
47 (476)			B			
100 (107)	B	B	B			
150 (157)	B	B	B			
220 (227)	B	B				

Remark) Case size codes (B) in the above show products line-up.

☆ Under development

●Marking

The indications listed below should be given on the surface of a capacitor.

- (1) Polarity : The polarity should be shown by □ bar. (on the anode side)
- (2) Rated DC voltage : A voltage code is shown as below table.
- (3) Capacitance : A capacitance code is shown as below table.

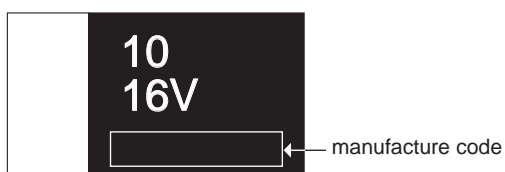
Visual typical example

voltage code and capacitance code are variable with parts number.

[B case]

EX.) $\frac{10}{(1)} \frac{16V}{(2)}$

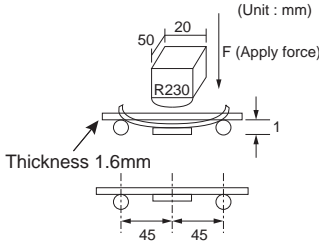
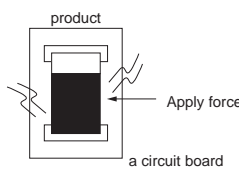
(1) capacitance (2) voltage



●Characteristics

Item		Performance	Test conditions (based on JIS C5101-1 and JIS C5101-3)
Operating Temperature		-55 °C to +125 °C	Voltage reduction when temperature exceeds +85°C
Maximum operating temperature with no voltage derating		+85 °C	
Rated Voltage (V.DC)		4 6.3 10 16 20 25	at 85°C
Category Voltage (V.DC)		2.5 4 6.3 10 13 16	at 125°C
Surge Voltage		5.0 8 13 20 26 32	at 85°C
DC leakage current		Shall be satisfied the value on "Standard list"	As per 4.9 JIS C 5101-1 As per 4.5.1 JIS C 5101-3 Voltage : Rated voltage for 1 min
Capacitance tolerance		Shall be satisfied allowance range. ±20%	As per 4.7 JIS C 5101-1 As per 4.5.2 JIS C 5101-3 Measuring frequency : 120±12Hz Measuring voltage : 0.5Vrms, +1.5V.DC Measuring circuit : DC Equivalent series circuit
Tangent of loss angle (Df, tanδ)		Shall be satisfied the value on "Standard list"	As per 4.8 JIS C 5101-1 As per 4.5.3 JIS C 5101-3 Measuring frequency : 120±12Hz Measuring voltage : 0.5Vrms, +1.5V.DC Measuring circuit : DC Equivalent series circuit
Impedance		Shall be satisfied the value on "Standard list"	As per 4.10 JIS C 5101-1 As per 4.5.4 JIS C 5101-3 Measuring frequency : 100±10kHz Measuring voltage : 0.5Vrms or less Measuring circuit : DC Equivalent series circuit
Resistance to soldering heat	Appearance	There should be no significant abnormality. The indications should be clear.	As per 4.14 JIS C 5101-1 As per 4.6 JIS C 5101-3
	L.C	TCFGB0G227M8R : Less than 150% of initial limit TCFGB0J227M8R : Less than 150% of initial limit TCFGB1A157M8R : Less than 150% of initial limit TCFGB1A107M8R : Less than 150% of initial limit TCFGB1E475M8R : Less than 150% of initial limit Others : Less than initial limit	Dip in the solder bath Solder temp : 260±5°C Duration : 5±0.5s Repetition : 1 After the specimens, leave it at room temperature for over 24h and then measure the sample.
	ΔC / C	TCFGB0G227M8R : Within ±15% of initial value TCFGB0J227M8R : Within ±15% of initial value TCFGB1A157M8R : Within ±15% of initial value TCFGB1A107M8R : Within ±15% of initial value TCFGB1E475M8R : Within ±10% of initial value Others : Within ± 5% of initial value	
	tanδ	3.3 to 33μF : Less than initial limit 47 to 150μF : Less than 150% of initial limit TCFGB0G227M8R : Less than 150% of initial limit TCFGB0J227M8R : Less than 150% of initial limit TCFGB1A157M8R : Less than 150% of initial limit TCFGB1A107M8R : Less than 150% of initial limit TCFGB1C336M8R : Less than 150% of initial limit	
Fail-Safe open unit actuation		Within 320°C – 20s	Dip in the solder bath Solder temp : 320±5°C
Temperature cycle	Appearance	There should be no significant abnormality.	As per 4.16 JIS C 5101-1 As per 4.10 JIS C 5101-3
	L.C	TCFGB0G227M8R : Less than 150% of initial limit TCFGB0J227M8R : Less than 200% of initial limit TCFGB1A157M8R : Less than 200% of initial limit TCFGB1A107M8R : Less than 200% of initial limit TCFGB1E475M8R : Less than 150% of initial limit Others : Less than initial limit	Repetition : 5 cycles (1 cycle : steps 1 to 4) without discontinuation.
	ΔC / C	TCFGB0G227M8R : Within ±15% of initial value TCFGB0J227M8R : Within ±20% of initial value TCFGB1A157M8R : Within ±20% of initial value TCFGB1A107M8R : Within ±20% of initial value Others : Within ±10% of initial value	
	tanδ	3.3 to 33μF : Less than initial limit 47 to 150μF : Less than 150% of initial limit TCFGB0G227M8R : Less than 150% of initial limit TCFGB0J227M8R : Less than 200% of initial limit TCFGB1A157M8R : Less than 200% of initial limit TCFGB1A107M8R : Less than 200% of initial limit TCFGB1C336M8R : Less than 150% of initial limit	After the specimens, leave it at room temperature for over 24h and then measure the sample.

Item		Performance	Test conditions (based on JIS C5101-1 and JIS C5101-3)
Moisture resistance	Appearance	There should be no significant abnormality. The indications should be clear.	As per 4.22 JIS C 5101-1 As per 4.12 JIS C 5101-3
	L.C	TCFGB0G227M8R : Less than 150% of initial limit TCFGB0J227M8R : Less than 200% of initial limit TCFGB1A157M8R : Less than 200% of initial limit TCFGB1A107M8R : Less than 200% of initial limit TCFGB1E475M8R : Less than 150% of initial limit Others : Less than initial limit	After leaving the sample under such atmospheric condition that the temperature and humidity are 40±2°C and 90 to 95%RH, respectively, for 500±12h level it at room temperature for over 24h and then measure the sample.
	$\Delta C / C$	TCFGB0G227M8R : Within ±15% of initial value TCFGB0J227M8R : Within ±20% of initial value TCFGB1A157M8R : Within ±20% of initial value TCFGB1A107M8R : Within ±20% of initial value Others : Within ±10% of initial value	
	tanδ	3.3 to 33μF : Less than initial limit 47 to 150μF : Less than 150% of initial limit TCFGB0G227M8R : Less than 150% of initial limit TCFGB0J227M8R : Less than 200% of initial limit TCFGB1A157M8R : Less than 200% of initial limit TCFGB1A107M8R : Less than 200% of initial limit TCFGB1C336M8R : Less than 150% of initial limit	
Temperature Stability	Temp.	−55°C	As per 4.29 JIS C 5101-1 As per 4.13 JIS C 5101-3
	$\Delta C / C$	TCFGB0G227M8R : Within 0/-15% of initial value TCFGB0J227M8R : Within 0/-30% of initial value TCFGB1A157M8R : Within 0/-30% of initial value TCFGB1A107M8R : Within 0/-30% of initial value Others : Within 0/-12% of initial value	
	tanδ	Shall be satisfied the value on Table5	
	L.C	—	
	Temp.	+85°C	
	$\Delta C / C$	TCFGB0G227M8R : Within +12/0% of initial value TCFGB0J227M8R : Within +15/0% of initial value TCFGB1A157M8R : Within +15/0% of initial value TCFGB1A107M8R : Within +15/0% of initial value Others : Within +10/0% of initial value	
	tanδ	Shall be satisfied the value on Table5	
	L.C	Less than 1000% of initial limit	
	Temp.	+125°C	
	$\Delta C / C$	TCFGB0J227M8R : Within +20/0% of initial value TCFGB1A157M8R : Within +20/0% of initial value TCFGB1A107M8R : Within +20/0% of initial value TCFGB1C336M8R : Within +20/0% of initial value Others : Within +15/0% of initial value	
	tanδ	Shall be satisfied the value on Table5	
	L.C	Less than 1250% of initial limit	
Surge Voltage	Appearance	There should be no significant abnormality. The indications should be clear.	As per 4.26 JIS C 5101-1 As per 4.14 JIS C 5101-3
	L.C	TCFGB0G227M8R : Less than 150% of initial limit TCFGB0J227M8R : Less than 200% of initial limit TCFGB1A157M8R : Less than 200% of initial limit TCFGB1A107M8R : Less than 200% of initial limit TCFGB1E475M8R : Less than 150% of initial limit Others : Less than initial limit	Apply the specified surge voltage via the serial resistance of 1kΩ every 5±0.5min. for 30±5 s. each time in the atmospheric condition of 85±2°C. Repeat this procedure 1,000 times. After the specimens, leave it at room temperature for over 24h and then measure the sample.
	$\Delta C / C$	TCFGB0G227M8R : Within ±15% of initial value TCFGB0J227M8R : Within ±20% of initial value TCFGB1A157M8R : Within ±20% of initial value TCFGB1A107M8R : Within ±20% of initial value Others : Within ±10% of initial value	
	tanδ	3.3 to 33μF : Less than initial limit 47 to 150μF : Less than 150% of initial limit TCFGB0G227M8R : Less than 200% of initial limit TCFGB0J227M8R : Less than 200% of initial limit TCFGB1A157M8R : Less than 200% of initial limit TCFGB1A107M8R : Less than 200% of initial limit TCFGB1C336M8R : Less than 150% of initial limit	

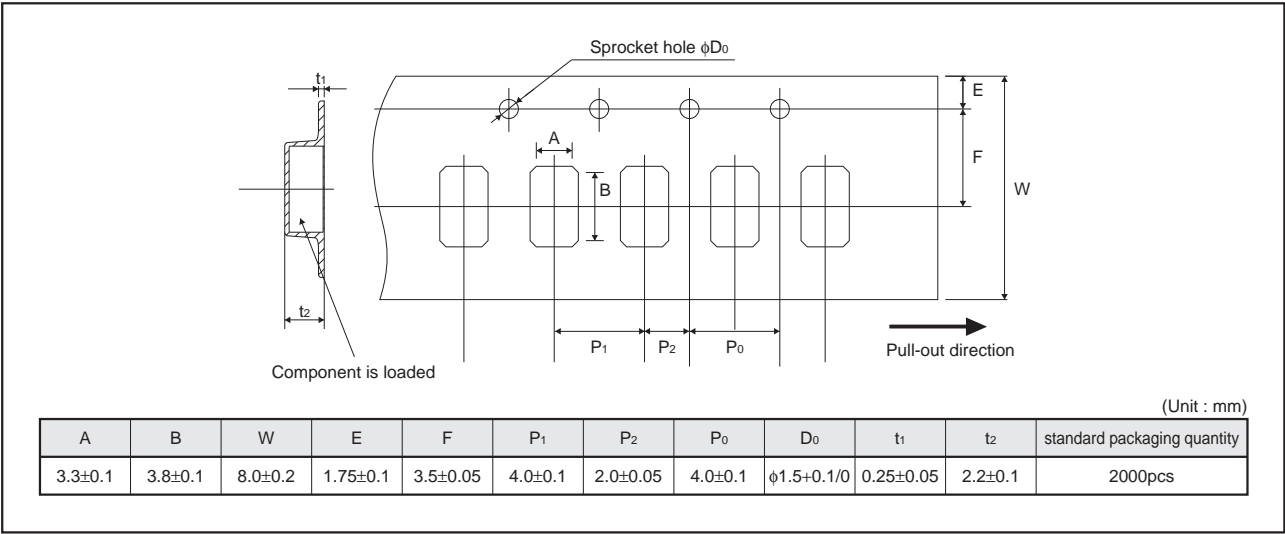
Item		Performance	Test conditions (based on JIS C5101-1 and JIS C5101-3)
Loading at High temperature	Appearance	There should be no significant abnormality. The indications should be clear.	As per 4.23 JIS C 5101-1 As per 4.15 JIS C 5101-3 After applying the rated voltage for 2000+72/0h without discontinuation via the serial resistance of 3Ω or less at a temperature of 85±2°C, leave the sample at room temperature/humidity for 1 to 2h and measure the value. After the specimens, leave it at room temperature for over 24h and then measure the sample.
	L.C	TCFGB0G227M8R : Less than 150% of initial limit TCFGB0J227M8R : Less than 200% of initial limit TCFGB1A157M8R : Less than 200% of initial limit TCFGB1A107M8R : Less than 200% of initial limit TCFGB1E475M8R : Less than 150% of initial limit Others : Less than initial limit	
	ΔC / C	TCFGB0G227M8R : Within ±15% of initial value TCFGB0J227M8R : Within ±20% of initial value TCFGB1A157M8R : Within ±20% of initial value TCFGB1A107M8R : Within ±20% of initial value Others : Within ±10% of initial value	
	tanδ	3.3 to 33μF : Less than initial limit 47 to 100μF : Less than 150% of initial limit TCFGB0G227M8R : Less than 200% of initial limit TCFGB0J227M8R : Less than 200% of initial limit TCFGB1A157M8R : Less than 200% of initial limit TCFGB1A107M8R : Less than 200% of initial limit TCFGB1C336M8R : Less than 150% of initial limit	
Terminal Strength	Capacitance	The measured value should be stable.	As per 4.35 JIS C 5101-1 As per 4.9 JIS C 5101-3 A force is applied to the terminal until it bends to 1mm and by a prescribed tool maintain the condition for 5s. (See the figure below.) 
	Appearance	There should be no significant abnormality.	
Adhesiveness		The terminal should not come off.	As per 4.34 JIS C 5101-1 As per 4.8 JIS C 5101-3 Apply force of 5N in the two directions shown in the figure below for 10±1s after mounting the terminal on a circuit board. 
Dimensions		Be based on "External dimensions"	Measure using a caliper of JIS B 7505 Class 2 or higher grade.
Resistance to solvents		The indication should be clear.	As per 4.32 JIS C 5101-1 As per 4.18 JIS C 5101-3 Dip in the isopropyl alcohol for 30±5s, at room temperature.
Solderability		3/4 or more surface area of the solder coated terminal dipped in the soldering bath should be covered with the new solder.	As per 4.15.2 JIS C 5101-1 As per 4.7 JIS C 5101-3 Dip speed = 25±2.5mm/s Pre-treatment (accelerated aging) : Leave the sample on the boiling distilled water for 1h. Solder temp. : 245±5°C Duration : 3±0.5s Solder : M705 Flux : Rosin 25%, IPA 75%
Vibration	Capacitance	Measure value should not fluctuate during the measurement.	As per 4.17 JIS C 5101-1 Frequency : 10 to 55 to 10Hz/min. Amplitude : 1.5mm Time : 2h each in X and Y directions Mounting : The terminal is soldered on a print circuit board.
	Appearance	There should be no significant abnormality.	

●Standard products list

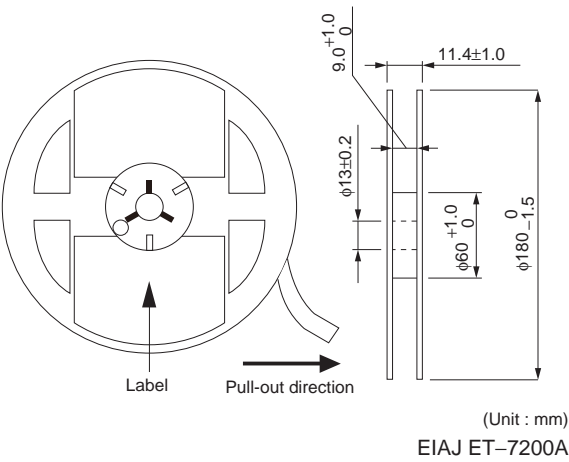
Part No.	Rated voltage 85°C (V)	Category voltage 125°C (V)	Surge voltage 85°C (V)	Cap. 120Hz (μF)	Tolerance (%)	Leakage current 25°C 1WV.60s (μA)	Df 120Hz (%)			Impedance 100kHz (Ω)
							-55°C	25°C 85°C	125°C	
TCFG B 0G 107 M8R	4	2.5	5	100	± 20	4.0	30	12	16	1.6
TCFG B 0G 157 M8R	4	2.5	5	150	± 20	6.3	34	18	22	1.3
TCFG B 0G 227 M8R	4	2.5	5	220	± 20	8.8	40	20	30	1.3
TCFG B 0J 107 M8R	6.3	4	8	100	± 20	6.3	30	12	16	1.5
TCFG B 0J 157 M8R	6.3	4	8	150	± 20	9.5	34	18	22	1.5
TCFG B 0J 227 M8R	6.3	4	8	220	± 20	70	60	30	45	1.3
TCFG B 1A 226 M8R	10	6.3	13	22	± 20	2.2	12	8	10	2.0
TCFG B 1A 336 M8R	10	6.3	13	33	± 20	3.3	14	10	12	1.9
TCFG B 1A 476 M8R	10	6.3	13	47	± 20	4.7	14	10	12	1.6
TCFG B 1A 107 M8R	10	6.3	13	100	± 20	20	40	20	30	1.5
TCFG B 1A 157 M8R	10	6.3	13	150	± 20	75	60	30	45	1.5
TCFG B 1C 335 M8R	16	10	20	3.3	± 20	0.5	10	6	8	4.2
TCFG B 1C 475 M8R	16	10	20	4.7	± 20	0.8	10	6	8	3.0
TCFG B 1C 106 M8R	16	10	20	10	± 20	1.6	10	6	8	2.5
TCFG B 1C 156 M8R	16	10	20	15	± 20	2.4	10	6	8	2.0
TCFG B 1C 226 M8R	16	10	20	22	± 20	3.5	10	6	8	1.9
TCFG B 1C 336 M8R	16	10	20	33	± 20	5.3	16	14	16	1.9
* TCFG B 1D 335 M8R	20	13	26	3.3	± 20	0.66	10	6	8	4.2
TCFG B 1D 475 M8R	20	13	26	4.7	± 20	1.0	10	6	8	3.0
* TCFG B 1D 106 M8R	20	13	26	10	± 20	2.0	12	8	10	15.0
TCFG B 1E 335 M8R	25	16	32	3.3	± 20	0.83	10	6	8	4.2
TCFG B 1E 475 M8R	25	16	32	4.7	± 20	1.2	10	6	8	3.0

* = Under development

●Packaging specifications



●Reel dimensions



Notes

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