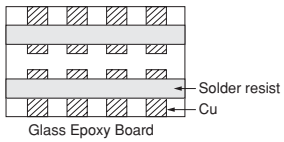
Medium Voltage High Capacitance for General Use Specifications and Test Methods

No.	Item		Specifications	Test Method
1	Operating Temperature Range		–55 to +125°C	–
2	Appearance		No defects or abnormalities	Visual inspection
3	Dimensions		Within the specified dimensions	Using calipers and micrometers
4	Dielectric Strength		No defects or abnormalities	No failure should be observed when 150% of the rated voltage (200% of the rated voltage in case of rated voltage: DC200V, DC250V, 120% of the rated voltage in case of rated voltage: DC1kV) is applied between the terminations for 1 to 5 sec., provided the charge/discharge current is less than 50mA.
5	Insulation Resistance (I.R.)		C≧0.01μF: More than 100MΩ • μF C<0.01μF: More than 10,000MΩ	The insulation resistance should be measured with rated voltage (DC500±50V in case of rated voltage: DC630V, DC1kV) and within 60±5 sec. of charging.
6	Capacitance		Within the specified tolerance	The capacitance/D.F. should be measured at a frequency of 1±0.2kHz and a voltage of AC1±0.2V(r.m.s.).
7	Dissipation Factor (D.F.)		0.025 max.	
8	Capacitance Temperature Characteristics		Cap. Change Within ±15% (Temp. Range: –55 to +125°C)	The capacitance measurement should be made at each step specified in the Table. Step / Temperature (°C) 1 / 25±2 2 / Min. Operating Temp.±3 3 / 25±2 4 / Max. Operating Temp.±2 5 / 25±2 •Pretreatment Perform a heat treatment at 150 $^{+0}_{-10}$°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.*
9	Adhesive Strength of Termination		No removal of the terminations or other defect should occur.	Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 1. Then apply 10N force in the direction of the arrow. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.  Fig. 1
10	Vibration Resistance	Appearance	No defects or abnormalities	Solder the capacitor to the test jig (glass epoxy board). The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 min. This motion should be applied for a period of 2 hrs. in each of 3 mutually perpendicular directions (total of 6 hrs.). 
		Capacitance	Within the specified tolerance	
		D.F.	0.025 max.	

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

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No.	Item		Specifications	Test Method
11	Deflection		No marking defects	Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 2. Then apply a force in the direction shown in Fig. 3. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.
12	Solderability of Termination		75% of the terminations are to be soldered evenly and continuously.	Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Immerse in solder solution for 2±0.5 sec. Immersing speed: 25±2.5mm/s Temp. of solder: 245±5°C Lead Free Solder (Sn-3.0Ag-0.5Cu) 235±5°C H60A or H63A Eutectic Solder
13	Resistance to Soldering Heat	Appearance	No marking defects	Preheat the capacitor at 120 to 150°C✻ for 1 min. Immerse the capacitor in solder solution at 260±5°C for 10±1 sec. Let sit at room condition* for 24±2 hrs., then measure. •**Immersing speed:** 25±2.5mm/s •**Pretreatment** Perform a heat treatment at 150$^{+0}_{-10}$°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.*
		Capacitance Change	Within ±10%	
		D.F.	0.025 max.	
		I.R.	C≧0.01μF: More than 100MΩ • μF C<0.01μF: More than 10,000MΩ	
		Dielectric Strength	In accordance with item No.4	
14	Temperature Cycle	Appearance	No marking defects	Fix the capacitor to the supporting jig (glass epoxy board) shown in Fig. 4. Perform the 5 cycles according to the 4 heat treatments listed in the following table. Let sit for 24±2 hrs. at room condition,* then measure. •**Pretreatment** Perform a heat treatment at 150$^{+0}_{-10}$°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.*
		Capacitance Change	Within ±7.5%	
		D.F.	0.025 max.	
		I.R.	C≧0.01μF: More than 100MΩ • μF C<0.01μF: More than 10,000MΩ	
		Dielectric Strength	In accordance with item No.4	
15	Humidity (Steady State)	Appearance	No marking defects	Let the capacitor sit at 40±2°C and relative humidity of 90 to 95% for 500$^{+24}_{-0}$hrs. Remove and let sit for 24±2 hrs. at room condition,* then measure. •**Pretreatment** Perform a heat treatment at 150$^{+0}_{-10}$°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.*
		Capacitance Change	Within ±15%	
		D.F.	0.05 max.	
		I.R.	C≧0.01μF: More than 10MΩ • μF C<0.01μF: More than 1,000MΩ	
		Dielectric Strength	In accordance with item No.4	

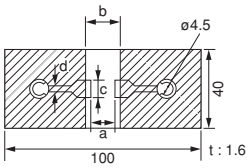
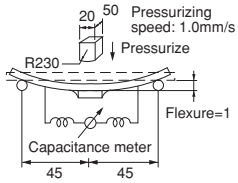


Fig. 2

L×W (mm)	Dimension (mm) a	b	c	d
1.6×0.8	1.0	3.0	1.2	1.0
2.0×1.25	1.2	4.0	1.65	
3.2×1.6	2.2	5.0	2.0	
3.2×2.5	2.2	5.0	2.9	
4.5×3.2	3.5	7.0	3.7	
5.7×5.0	4.5	8.0	5.6	



(in mm)

Fig. 3

Step	Temperature	Time
1	100 to 120°C	1 min.
2	170 to 200°C	1 min.

✻Preheating for more than 3.2×2.5mm

Step	Temperature (°C)	Time (min.)
1	Min. Operating Temp.±3	30±3
2	Room Temp.	2 to 3
3	Max. Operating Temp.±2	30±3
4	Room Temp.	2 to 3

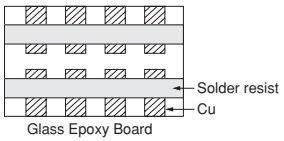


Fig. 4

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

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No.	Item		Specifications	Test Method
16	Life	Appearance	No marking defects	Apply 120% of the rated voltage (150% of the rated voltage in case of rated voltage: DC200V, DC250V, 110% of the rated voltage in case of rated voltage: DC1kV) for 1,000$^{+48}_{-0}$hrs. at maximum operating temperature ±3°C. Remove and let sit for 24±2hrs. at room condition,* then measure. The charge/discharge current is less than 50mA. **•Pretreatment** Apply test voltage for 60±5 min. at test temperature. Remove and let sit for 24±2 hrs. at room condition.*
		Capacitance Change	Within ±15% (rated voltage: DC200V, DC250V, DC500V, DC630V) Within ±20% (rated voltage: DC1kV)	
		D.F.	0.05 max.	
		I.R.	C≧0.01μF: More than 10MΩ • μF C<0.01μF: More than 1,000MΩ	
		Dielectric Strength	In accordance with item No.4	
17	Humidity Loading	Appearance	No marking defects	Apply the rated voltage at 40±2°C and relative humidity of 90 to 95% for 500$^{+24}_{-0}$hrs. Remove and let sit for 24±2 hrs. at room condition,* then measure. **•Pretreatment** Apply test voltage for 60±5 min. at test temperature. Remove and let sit for 24±2 hrs. at room condition.*
		Capacitance Change	Within ±15%	
		D.F.	0.05 max.	
		I.R.	C≧0.01μF: More than 10MΩ • μF C<0.01μF: More than 1,000MΩ	
		Dielectric Strength	In accordance with item No.4	

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa