



## Product Specifications

No	Item	Characteristics		Outline of test method
1	Leakage current	(Standard) (S series) 2V to 4V $I \leq 0.06CV(\mu A)$ or $3\mu A$ 6.3V to 16V $I \leq 0.04CV(\mu A)$ or $3\mu A$ (Whichever is the greater)  (H series) $I \leq 0.1CV(\mu A)$	Series resistor: $1000\Omega$ Applied voltage: Rated Voltage Measuring: 2-minutes If you have any concerns about leakage current, please conduct pre-conditioning. Pre-conditioning · Temperature: $105^\circ C$ · Series resistor: $1000\Omega$ · Applied voltage: Rated Voltage · Charge time: 1h · Measuring : The tests in Sub-clause 1 shall be made after discharging the capacitors and storing them for a period of 24h to 48h at room temperature and low humidity.	
2	Capacitance tolerance	$\pm 20\%$		Measuring frequency: $120Hz \pm 10\%$ Measuring circuit: Equivalent series circuit
3	$\tan \delta$	See "Product Lists"		Measuring voltage: $+0.7$ to $1.0V.DC, \leq 0.5V_{rms}$ Measuring temperature: $20^\circ C$
4	ESR	See "Product Lists"		Measuring frequency: $100KHz \pm 10\%$ Measuring voltage: $+0.7$ to $1.0V.DC, \leq 0.5V_{rms}$ Measuring temperature: $20^\circ C$
5	Solderability	More than 75% of the terminal face to be covered by new solder.		Solder type: H60A or H63A Flux: About 25% rosin density melted ethanol. Solder temperature: $230 \pm 5^\circ C$ Immersing time: $2 \pm 0.5s$
6	Solubility resistance of marking	Appearance: No noticeable abnormal change shall occur.		Class of reagent: Extra grade 2-propanol (JIS K8839) or superior. Test temperature: $20$ to $25^\circ C$ Immersing time: $30 \pm 5s$
7	Solder heat resistance	Leakage Current	$\leq$ The value of item 1.	The capacitor is heated to and held at $235 \pm 5^\circ C$ in a high temperature oven for $200 \pm 10s$ . Measurements of the following performance characteristics are made after the capacitor cools to room temperature.
		Capacitance Change	$\pm 10\%$ of initial measured value.	
		$\tan \delta$	$\leq$ The value of item 3.	
		Appearance	No noticeable abnormal change shall occur.	



No	Item	Characteristics		Outline of test method
8	Adhesion	Appearance: Without mechanical damage such as breaks after test.		Push direction: Side Force:5.0N Holding time:10±0.5s
9	Damp heat, Steady state	Leakage Current	≤The value of item 1.	Test temperature:60±2°C Relative humidity:90%R.H. Test time:500 <sup>+24</sup> / <sub>-0</sub> h
		Capacitance Change	+70%,-20% (2V,2.5V) +60%,-20% (4V) +50%,-20% (6.3V) +40%,-20% (8V to 16V) of initial measured value.	
		tanδ	≤200% of item 3.	
		Appearance	No noticeable abnormal change shall occur.	
10	Damp heat, Steady state (Applied voltage)	Leakage Current	≤The value of item 1.	Test temperature:60±2°C Relative humidity:90%R.H. Applied voltage: Rated voltage Test time:500 <sup>+24</sup> / <sub>-0</sub> h
		Capacitance Change	+70%,-20% (2V,2.5V) +60%,-20% (4V) +50%,-20% (6.3V) +40%,-20% (8V to 16V) of initial measured value.	
		tanδ	≤200% of item 3.	
		Appearance	No noticeable abnormal change shall occur.	
11	Endurance	Leakage Current	≤The value of item 1.	Test temperature:105±2°C Applied voltage: Rated voltage Test time:1000 <sup>+48</sup> / <sub>-0</sub> h
		Capacitance Change	±10% of initial measured value.	
		tanδ	≤The value of item 3.	In case of <b>H series</b> , Test temperature:125±2°C Applied voltage: Rated voltage x0.75 Test time:1000 <sup>+48</sup> / <sub>-0</sub> h
		Appearance	No noticeable abnormal change shall occur.	
12	Shelf life	Leakage Current	≤The value of item 1.	Test temperature:105±2°C Test time:500 <sup>+24</sup> / <sub>-0</sub> h
		Capacitance Change	±10% of initial measured value.	
		tanδ	≤The value of item 3.	In case of <b>H series</b> , Test temperature:125±2°C Test time:500 <sup>+24</sup> / <sub>-0</sub> h
		Appearance	No noticeable abnormal change shall occur.	

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No	Item	Characteristics		Outline of test method	
13	Characteristics at high and low temperature	Step	Characteristics	Expose the capacitor at each temperature in following order and measure characteristics in step 2, 4 and 5 as described on the left.  Step conditions See "Step Table "	
		2	Capacitance		±15% of the value in step 1.
			ESR		≤115% times of the value of item 4.
		4	Capacitance		20% of the value in step 1.
		5	Leakage current		≤The value of item 1.
Capacitance	±5% of the value in step 1.				
	tanδ	The value of item 3.			
14	Surge	Leakage current	≤The value of item 1.	Test temperature: 15 to 35°C Series resistor: 1000Ω Test voltage: Surge voltage See "Surge-voltage Table " Applied voltage: 1000 cycles of 30±5s "ON" and 5 min 30s "OFF"	
		Capacitance change	±10% of initial measured value.		
		tanδ	The value of item 3.		
		Appearance	No noticeable abnormal change shall occur.		
15	Vibration	Appearance: No noticeable abnormal change shall occur.	Frequency: 10 to 2000 to 10 Hz (One cycle per 20 min) Total amplitude: 1.5mm Direction and duration of vibration: 2 hours for each of three right-angle directions, total 6 hours. Mounting method: The capacitor must be soldered in place.		
		Capacitance: During test, measured value to be stabilized. (When measured several times within 30 min, before completion of test.)			

Step Table

Step	Standard S series	H series
	Temperature	Temperature
1	20±2°C	20±2°C
2	-40±2°C	-40±2°C
3	20±2°C	20±2°C
4	105±2°C	125±2°C
5	20±2°C	20±2°C

Surge-voltage Table

Rated voltage (V)	2	2.5	4	6.3	8	12.5	16
Surge voltage (V)	2.5	3.1	5	8	10	16	20