



Test Conditions and Specifications for Temperature Compensation Type (C Δ Characteristics) CM/ CU/ CF Series

Test Items		Test Conditions				Specifications	
Capacitance Value (C)		Capacitance Frequency Volt			Volt	Within tolerance	
Q		C≤1000pF 1MHz±10% C>1000pF 1kHz±10% 0.5 to 5Vrms		0.5 to 5Vrms	C≥30pF : Q≥1000 C<30pF : Q≥400+20C		
Insulation Resistance (IR)		Measured after the rated voltage is applied for 1 minute at room ambient. For the rated voltage of over 630V, apply 500V for 1 minute at room ambient. The charge and discharge current of the capacitor must not exceed 50mA.				Over 10000M\Omega or 500MΩ • $\mu\text{F},$ whichever is less .	
Dielectric Res	Apply 3 times of the rated voltage for 1 to 5 seconds. Apply 1.5 times when the rated voltage is 250V or over. Apply 1.2 times when the rated voltage is 630V or over. The charge and discharge current of the capacitor must not exceed 50mA.				No problem observed		
Appearance		Microscope				No problem observed	
Termination Strength		Apply a sideward force of 500g (5N) to a PCB- mounted sample. Apply 2N for 0201, and 1N for 01005 size.				No problem observed	
Bending Stren	gth	Glass epoxy PCB: Fulcrum spacing: 90mm, duration time 10 seconds.				No significant damage at 1mm bent	
Vibration	Appearance	Vibration fre	quency	: 10 to 55 (Hz)		No problem observed	
Test	ΔC	Amplitude: *	1.5mm ondition	: 10→55→10⊦	Iz/ 1 minute in X	Within Tolerance	
	Q	Y and Z Directions: 2	2 hours	each, 6 hours	total.	C≥30pF : Q≥1000 C<30pF : Q≥400+20C	
Soldering	Appearance	Soak the sa	mple in	260°C±5°C so	older for 10±0.5	No problem observed	
Heat Resistance	ΔC	seconds and after 24+2 h	d place	in room ambie	ent, and measure	Within ±2.5% or ±0.25pF, whichever is larger	
neolotanoe	Q	(Pre-heating conditions)				C≥30pF : Q≥1000	
		Order	Ter	nperature	Time	C<30pF : Q≥400+20C	
	IR	1	80	to 100°C	2 minutes	Over 10000Ms2 or 500Ms2 • µF whichever is less	
	Withstanding Voltage	The charge and discharge current of the capacitor must not exceed 50mA for IR and withstanding voltage measurement.				Resist without problem	
		Soaking cor	ndition				
Solderablity		Sn-3Ag-0.5Cu 245±5°C 3±0.5 sec. Sn63 Solder 235±5°C 2±0.5 sec.			3±0.5 sec. 2±0.5 sec.	Solder coverage : 90% min.	
Temperature	Appearance	(Cycle)				No problem observed	
Cycle	ΔC	Room temp	erature	(3min)→		Within $\pm 2.5\%$ or $\pm 0.25pF$, whichever is larger	
	Q	Lowest ope	ration te	emperature (30)min.)→	C≥30pF : Q≥1000	
	ID	Room temp	erature eration t	(3min.)→ emperature(30)min.)	Over 10000MO er 500MO eu E whichever is less	
	In				,		
	Withstanding Voltage	The charge must not ex voltage mea	and dis ceed 50 sureme	sure after 24±2 charge current 0mA for IR and ent.	2 nours. t of the capacitor I withstanding	Resist without problem	
Load	Appearance	After applyir	ng ratec	l voltage for 50	00+12/ -0 hours	No problem observed	
Test	ΔC	in pre-condi	tion at 4	40°C±2°C, hur s to stabilize fo	nidity 90 to or 24+2 hours, at	Within ±7.5% or ±0.75pF, whichever is larger	
(Except CF Series)	Q	room tempe	erature t and dis	charge current	ement. of the capacitor	C≥30pF : Q≥200 C<30pF : Q≥100+10C/ 3	
	IR	must not ex	ceed 50)mA for IR mea	asurement.	Over 500M or 25M Ω • $\mu\text{F},$ whichever is less	
High-	Appearance	After applying twice the rated voltage at the				No problem observed.	
vith Loading	ΔC	temperature	of 125	±3°C for 1000- e after 24+2 br	+12/ –0 hours,	Within ±3% or ±0.3pF, whichever is larger	
g	Q	Apply 1.5 tim Apply 1.2 tim	es when es when and dis	the rated voltage	ge is 250V or over. ge is 630V or over.	C≥30pF : Q≥350 10pF <c<30pf 2<br="" :="" q≥275+5c="">C<10pF : Q≥200+10C</c<30pf>	
	must not ex	ceed 50)mA for IR mea	asurement.	Over 1000M\Omega or 50M\Omega $\bullet\mu\text{F},$ whichever is less		

Please ask for individual specification for the hatched range in previous chart.





Test Conditions and Specifications for High Dielectric Type (X5R, X7R) CM/ CT Series

Test Items		Test Conditions	Specifications		
Capacitance Value (C)		Measure after heat treatment	Within tolerance		
		Capacitance Frequency Volt			
Tan ∂ (%)		C≤10µF 1kHz±10% 1.0±0.2Vrms	Refer to capacitance chart		
		C>10µF 120Hz±10% 0.5±0.2Vrms			
		Measured after the rated voltage is applied for 1	Over 10000M\Omega or 500MΩ • μ F, whichever is less		
Insulation Res	sistance (IR)	The charge and discharge current of the capacitor			
		must not exceed 50mA.			
Dielectric Res	istanco	Apply 2.5 times of the rated voltage for 1 to 5 seconds.	No problem observed		
Dicicouno neo	istanoe	must not exceed 50mA.			
Appearance		Microscope	No problem observed		
Toursingsting		Apply a sideward force of 500g (5N) to a PCB-mounted sample.	No problem observed		
Termination St	trengtn	Fxclude CT series with thickness of less than 0.66mm.			
		Glass epoxy PCB: Fulcrum spacing: 90mm, duration			
Bending Stren	igth	time 10 seconds.	No significant damage at 1mm bent		
Vibration	Appearance	Exclude C1 series with thickness of less than 0.66mm.			
Test	Appearance	Vibration frequency: 10 to 55 (Hz)	Within tolerance		
		Amplitude: 1.5mm			
	Tan δ (%)	Directions: 2 hours each 6 hours total	Within tolerance		
Soldering	Appearance	Take the initial value after heat treatment.	No problem observed		
Heat	ΔC	Soak the sample in 260°C±5°C solder for 10±0.5	Within ±7.5%		
Resistance	Τan δ (%)	seconds and place in room ambient, and measure after 24+2 hours.	Within tolerance		
	IR	(Pre-heating conditions)	Over 10000M Ω or 500M $\Omega \bullet \mu F\!$		
		Order Temperature Time			
	Withstanding Voltage	1 80 to 100°C 2 minutes			
		2 150 to 200°C 2 minutes	Resist without problem		
		The charge and discharge current of the capacitor must not exceed 50mA for IB and withstanding voltage measurement			
	I	Soaking condition	Solder coverage : 90% min.		
Solderablity		Sn-3Ag-0.5Cu 245±5°C 3±0.5 sec.			
		Sn63 Solder 235±5°C 2±0.5 sec.			
Temperature	Appearance	Take the initial value after heat treatment.	No problem observed		
Cycle	ΔC	Cycle) Boom temperature (3min)→	Within ±7.5%		
	Ταη δ (%)	Lowest operation temperature (30min.) \rightarrow	Within tolerance		
	IR	Room temperature (3min.) \rightarrow	Over 10000MΩ or 500MΩ • μF, whichever is less		
	Withstanding	After 5 cycles, measure after 24±2 hours.			
	Voltage	The charge and discharge current of the capacitor must not	Resist without problem		
Load	Appoarance	exceed 50mA for IR and withstanding voltage measurement.	No problem observed		
Humidity	Appearance	After applying rated voltage for 500+12/ –0 hours	Within +12.5%		
Test	Tanδ (%)	in pre-condition at 40°C±2°C, humidity 90 to	200% max of initial value		
		room temperature before measurement.	Over 500M Ω or 25M Ω • μ F, whichever is less		
	IR	The charge and discharge current of the capacitor			
11.1		must not exceed 50mA for IR measurement.			
High- Temperature	Appearance	After applying twice the rated voltage at the highest	No problem observed		
with		operation temperature for 1000+12/ -0 hours,	$\frac{1}{200\%}$		
Loading		measure the sample after 24±2 hours.	200% max. of initial value		
	п	must not exceed 50mA for IR measurement.	Over 1000MO or 50MO • UE whichever is less		
Apply 1.5 times when the rated voltage is 10V or less. Applied		Apply 1.5 times when the rated voltage is 10V or less. Applied	Over 1000ivis2 or 50ivis2 • µF, whichever is less		
		voitages for respective products are indicated in the below chart.			
Pre-treat-	Heat	Keep specimen at 150+0/ -10°C for 1 hour,	leave specimen at room ambient for 24±2 hours.		
ment	Voltage	Apply the same test condition for 1 hour, then leave the specimen at room ambient for 24±2 hours.			

High-temperature with Loading Applied Voltage (Rated Voltage \times \square)

Applied Voltage	Rated Voltage	Products				
×1.3	4V	CT03X5R104				
	6.3V	CM105X5R475, CM316X5R476, CM02X5R153-104				
		CT05X5R104, CT21X5R106, CT03X5R104				
×1.5 2	161/	CM02X7R101-222, CM05X7R333-104, CM105X7R474-105, CM21X7R105-475, CM316X7R475-106, CM32X7R106-226, CM05X5R224, CM105X5R225, CM21X5R475-106, CM316X5R226				
	100	CT105X5R105, CT21X5R225-475, CT316X5R106, CM03X5R332-103, CM02X5R101-103				
	251/	CM105X7R474, CM21X7R105-225, CM316X7R475, CM32X7R106, CM105X5R474-105, CM21X5R225-106, CM316X5R106, CM32X5R106-226				
	237	CT316X5R225-106, CM03X5R152-103, CM05X7R103-104				
	50V	CM21X5R105, CM32X5R106, CM32X7R106				
		CT21X5R225, CT316X5R105-475				
	100V	CM32X7RK74, CM43X7R105				

Please ask for individual specification for the hatched range in previous chart.





Substrate for Electrical Tests



			(Unit: mm)
Size (EIA Code)	а	b	с
02 (01005)	0.15	0.50	0.20
03 (0201)	0.26	0.92	0.32
05 (0402)	0.4	1.4	0.5
105 (0603)	1.0	3.0	1.2
21 (0805)	1.2	4.0	1.65
316 (1206)	2.2	5.0	2.0
32 (1210)	2.2	5.0	2.9
42 (1808)	3.5	7.0	3.7
43 (1812)	3.5	7.0	3.7
52 (2208)	4.5	8.0	5.6
55 (2220)	4.5	8.0	5.6

Substrate for Adhesion Strength Test



* 02, 03, 05 size 0.8±0.1mm

