

ELECTRICAL SPECIFICATIONS



	Item	Specification		Test Method												
		Temperature compensating type	High dielectric constant type													
1	Operating Temperature Range	NP0: -55 to 125 degree C	X7R: -55 to 125 degree C X5R: -55 to 85 degree C Y5V: -30 to 85 degree C	---												
2	Rated Voltage	Please refer to page 5 ~ page 7		The rated voltage is defined as the maximum voltage, which may be applied continuously to the capacitor.												
3	Appearance	No defects or abnormalities.		Visual inspection												
4	Dimensions	Within the specified dimension.		Using calipers												
5	Dielectric Strength	No defects or abnormalities.		No failure shall be observed when 250% of the rated voltage (HV/120%) is applied between the terminations for 1 to 5 seconds.												
6	Insulation Resistance (I.R.)	If C ≤ 10,000pF then IR □ 100GΩ If C > 10,000pF then IR □ 1000/CQ BME If C ≤ 100,000pF then IR □ 5GΩ If C > 100,000pF then IR □ 500/CQ		The insulation resistance shall be measured with a DC voltage not exceeding the rated voltage at 25□ and 75%RH max, and within 1 minute of charging.												
7	Capacitance	Within the specified tolerance at 5000 hours		The capacitance / D.F. shall be measured at 25□ at the frequency and voltage shown in the tables.												
8	Q/Dissipation Factor (D.F.)	For NP0, If C ≤ 30pF, DF ≤ 1/(400+20C) If C > 30pF, DF ≤ 0.1%. For high dielectric constant type please see table 1. Table 1		<table border="1"> <thead> <tr> <th>Item</th> <th>Class I (1,000pF and below)</th> <th>Class II (more than 1,000pF)</th> <th>Class III</th> </tr> </thead> <tbody> <tr> <td>Frequency</td> <td>1±0.2kHz</td> <td>1±0.2kHz</td> <td>1±0.2kHz</td> </tr> <tr> <td>Voltage</td> <td>1±0.2Vrms</td> <td>1±0.2Vrms</td> <td>1±0.2Vrms</td> </tr> </tbody> </table>	Item	Class I (1,000pF and below)	Class II (more than 1,000pF)	Class III	Frequency	1±0.2kHz	1±0.2kHz	1±0.2kHz	Voltage	1±0.2Vrms	1±0.2Vrms	1±0.2Vrms
Item	Class I (1,000pF and below)	Class II (more than 1,000pF)	Class III													
Frequency	1±0.2kHz	1±0.2kHz	1±0.2kHz													
Voltage	1±0.2Vrms	1±0.2Vrms	1±0.2Vrms													
9	Capacitance Temperature Characteristics	Capacitance change NP0 within ± 30 PPM	Capacitance change X7R within ±15% Y5V: -82 to + 22% X5R within ±15%	<p>1. Temperature compensating type: The capacitance value at 25□ and 85□ shall be measured and calculated from the formula given below. T.C. = (C₈₅ - C₂₅) / C₂₅ * ΔT * 10⁶ (PPM/□)</p> <p>2. High dielectric constant type: The ranges of capacitance change compared with the 25□ value over the temperature ranges shall be within the specified ranges.</p>												
10	Bending Strength	No cracking or marking defects shall occur at 1mm deflection.		Solder the capacitor to the test jig (glass epoxy boards) shown in Fig.a using an eutectic solder. Then apply a force in the direction shown in Fig.b. The soldering shall be done with the reflow method and shall be conducted with care so that the soldering is uniform and free of defects such as heat shock.												
11	Solderability of Termination	90% of the terminations is to be soldered evenly and continuously.		Immerse the test capacitor into a methanol solution containing rosin for 3 to 5 seconds, preheat it 150 to 180□ for 2 to 3 minutes and immerse it into molten solder of 230 ± 5□ for 5 ± 1 seconds.												
12	Resistance to Soldering Heat	Appearance	No marking defects	Preheat the capacitor at 120 to 150□ for 1 minute. Immerse the capacitor in a eutectic solder solution at 270±5□ for 10±0.5 seconds. Let sit at room temperature for 24±2 hours (temperature compensating type) or 48±4 hours (high dielectric constant type), then measure. HV: Preheat the capacitor at 120 to 150□ for 1 minute and 170 to 200□ for 1 minute.												
Cap. Change		NP0 within ±2.5% or 0.25pF (whichever is larger)	X7R within ±7.5% Y5V within ±20% X5R within ±7.5%													
Q/D.F.		If C ≤ 30pF, DF ≤ 1/(400+20C) If C > 30pF, DF ≤ 0.1%	Please see table 1 above.													
I.R.		More than 10GΩ or R _i C _r > 100sec	More than 1 GΩ or R _i C _r > 10sec For BME: More than 10G or 500QF (whichever is smaller)													
	Dielectric Strength	No failure														

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13	Temperature cycle (Thermal shock)	Appearance	No marking defects		1. Fix the capacitor to supporting jig (glass epoxy board) and perform the five cycles according to the four heat treatments listed in the following table. 2. Initial measurement for high dielectric constant type, perform a heat treatment at 150□ for one hour and then let sit for 48±4 hours at room temperature then perform the initial measurement.
		Cap. Change	NP0 within ±2.5% or 0.25pF (whichever is larger)	X7R within ±7.5% Y5V within ±20% X5R within ±7.5%	
		Q/D.F.	If C≤30pF, DF≤1/(400+20C) If C >30pF, DF≤0.1%	X7R 200% max of initial value Y5V 150% max of initial value X5R 200% max of initial value	
		I.R.	More than 10GΩ or R _C >100sec	More than 500MΩ or 25ΩF (whichever is smaller)	
		Dielectric Strength	No failure		
14	Humidity load	Appearance	No marking defects		Apply the rated voltage at 40±2□ and 90 to 95% humidity for 500±12 hours. Remove and let sit for 24±2 hours (temperature compensating type) or 48±4 hours (high dielectric constant type) at room temperature, then measure. The charge/discharge current is less than 50mA. BME Initial measurement for high dielectric type. Apply the rated DC voltage for 1 hour at 40±2□. Remove and let sit for 48±4 hours at room temperature then perform initial measurement.
		Cap. Change	NP0 within ±7.5% or 0.75pF (whichever is larger)	X7R within ±12.5% Y5V within ±30% X5R within ±12.5%	
		Q/D.F.	2* specified value	X7R 200% max of initial value Y5V 150% max of initial value X5R 200% max of initial value	
		I.R.	More than 2.5 GΩ or R _C >25 sec whichever is less.	More than 500MΩ or 25ΩF (whichever is smaller)	
		Dielectric Strength	No failure		
15	High temperature load life test	Appearance	No marking defects		Apply 200% of the rated voltage (HV:100%) for 500±12 hours at the maximum operating temperature ± 3□. Let sit for 24± 2 hours (temperature compensating type) or 48±4 hours (high dielectric constant type) at room temperature, then measure. The charge/discharge current is less than 50mA. BME Initial measurement for high dielectric constant type. Apply 200% of the rated DC voltage for one hour at the maximum operating temperature ± 3□. Remove and let sit for 48±4 hours at room temperature then perform initial measurement.
		Cap. Change	NP0 within ±7.5% or 0.75pF (whichever is larger)	X7R within ±20% Y5V within ±30% BME/HV : X7R within ±12.5%	
		Q/D.F.	2* specified value	X7R 200% max of initial value Y5V 150% max of initial value X5R 200% max of initial value	
		I.R.	More than 5 GΩ or R _C >50 sec whichever is less.	More than 500MΩ or 25ΩF (whichever is smaller)	
		Dielectric Strength	No failure		

Type / Step	1	2	3	4
NP0&X7R	Temp.(□) : -55□	Room temp.	+125	Room temp.
	Time (min) : 30±3	1 to 2	30±3	1 to 2
Y5V	Temp.(□) : -30□	Room temp.	+85□	Room temp.
	Time (min) : 30±3	1 to 2	30±3	1 to 2

Notice: When mounting capacitor on 500V rated voltage, perform the epoxy resin coating (min. 1.0mm thickness)

#1: 7% max for 0603 25V and 50V products.

#2 12.5% max for 0402 16V/100nF products.

#3 16% max for 0603 16V/1uF products.