

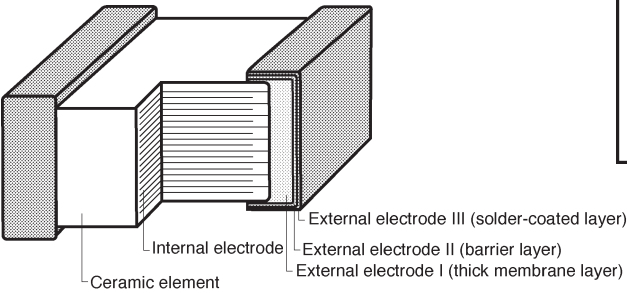
Multi-layer ceramic chip capacitors

MCH15 (1005 (0402) size, chip capacitor)

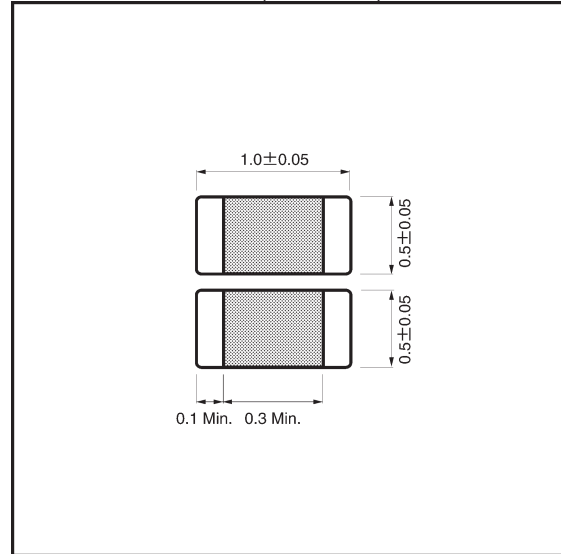
● Features

- 1) Small size (1.0 x 0.5 x 0.5 mm) makes it perfect for lightweight portable devices.
- 2) Comes packed either in tape to enable automatic mounting or in bulk cases.
- 3) Precise uniformity of shape and dimensions facilitates highly efficient automatic mounting.
- 4) Solder-coated terminals offer superior solderability and resistance to soldering heat.

● Structure



● External dimensions (Units: mm)



● Product Designation

Code	Product thickness	Packaging specifications	Reel	Basic ordering unit
K	0.5mm	Paper tape (width 8 mm, pitch 2 mm)	φ180mm (7in.)	10,000
L	0.5mm	Paper tape (width 8 mm, pitch 2 mm)	φ330mm (13in.)	50,000
C	0.5mm	Bulk case	—	50,000

Reel (φ180, φ330mm) : compatible with EIAJ ETX-7001
 Bulk case: according to EIAJ ET-7201A

Part No.

Packaging style



Rated voltage	
Code	Voltage
2	25V
3	16V
5	50V

Capacitance-temperature characteristics				Nominal capacitance	Capacitance tolerance	
Code	EIA code	Operating temperature (°C)	Temp. coefficient or percent change		Code	tolerance
A	C0G	-55 to +125	0±30ppm / °C	3-digit designation according to IEC	C	±0.25pF (0.5~5pF)
C	X7R	-55 to +125 (-25 to +85)	±15% (±10%)		D	±0.5pF (5.1~10pF)
F	Y5V	-30 to +85	+22%, -82%		J	±5% (11pF or more)
					K	±10%
					Z	+80%, -20%

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●Capacitance range

For thermal compensation

Part number		MCH15	
Capacitance (pF)	Temperature characteristics	A (COG)	
	Rated voltage (V)	50V	
Tolerance			
0.5	C (±0.25pF)	<input type="checkbox"/>	
0.75		<input type="checkbox"/>	
1		<input type="checkbox"/>	
1.1		<input type="checkbox"/>	
1.2		<input type="checkbox"/>	
1.3		<input type="checkbox"/>	
1.5		<input type="checkbox"/>	
1.6		<input type="checkbox"/>	
1.8		<input type="checkbox"/>	
2		<input type="checkbox"/>	
2.2		<input type="checkbox"/>	
2.4		<input type="checkbox"/>	
2.7		<input type="checkbox"/>	
3		<input type="checkbox"/>	
3.3		<input type="checkbox"/>	
3.6		<input type="checkbox"/>	
3.9		<input type="checkbox"/>	
4		<input type="checkbox"/>	
4.3		<input type="checkbox"/>	
4.7		<input type="checkbox"/>	
5		<input type="checkbox"/>	
5.1		D (±0.5pF)	<input type="checkbox"/>
5.6			<input type="checkbox"/>
6			<input type="checkbox"/>
6.2			<input type="checkbox"/>
6.8			<input type="checkbox"/>
7			<input type="checkbox"/>
7.5			<input type="checkbox"/>
8			<input type="checkbox"/>
8.2			<input type="checkbox"/>
9			<input type="checkbox"/>
9.1		<input type="checkbox"/>	
10		<input type="checkbox"/>	
11		J (±5%)	<input type="checkbox"/>
12			<input type="checkbox"/>
13			<input type="checkbox"/>
15			<input type="checkbox"/>
16			<input type="checkbox"/>
18			<input type="checkbox"/>
20			<input type="checkbox"/>
22	<input type="checkbox"/>		
24	<input type="checkbox"/>		
27	<input type="checkbox"/>		
30	<input type="checkbox"/>		
33	<input type="checkbox"/>		
36	<input type="checkbox"/>		
39	<input type="checkbox"/>		
43	<input type="checkbox"/>		

Part number		MCH15
Capacitance (pF)	Temperature characteristics	A (COG)
	Rated voltage (V)	50V
Tolerance		
47	J (±5%)	<input type="checkbox"/>
51		<input type="checkbox"/>
56		<input type="checkbox"/>
62		<input type="checkbox"/>
68		<input type="checkbox"/>
75		<input type="checkbox"/>
82		<input type="checkbox"/>
91		<input type="checkbox"/>
100		<input type="checkbox"/>
110		<input type="checkbox"/>
120		<input type="checkbox"/>
130		<input type="checkbox"/>
150		<input type="checkbox"/>
160		<input type="checkbox"/>
180		<input type="checkbox"/>
200		<input type="checkbox"/>
220		<input type="checkbox"/>
240		<input type="checkbox"/>
270		<input type="checkbox"/>
300		<input type="checkbox"/>
330		<input type="checkbox"/>
360		<input type="checkbox"/>
390		<input type="checkbox"/>
430		<input type="checkbox"/>
470		<input type="checkbox"/>
510		<input type="checkbox"/>
560		<input type="checkbox"/>

Product thickness (mm) 0.5±0.05

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● Capacitance range

High dielectric constant



Part number		MCH15					
Capacitance (pF)	Temperature characteristics	C (X7R)			F (Y5V)		
	Rated voltage (V)	50V	25V	16V	50V	25V	16V
	Tolerance	K ($\pm 10\%$)			Z ($+80, -20\%$)		
220		<input type="checkbox"/>					
270		<input type="checkbox"/>					
330		<input type="checkbox"/>					
390		<input type="checkbox"/>					
470		<input type="checkbox"/>					
560		<input type="checkbox"/>					
680		<input type="checkbox"/>					
820		<input type="checkbox"/>					
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1,200		<input type="checkbox"/>					
1,500		<input type="checkbox"/>					
1,800		<input type="checkbox"/>					
2,200		<input type="checkbox"/>			<input type="checkbox"/>		
2,700		<input type="checkbox"/>					
3,300		<input type="checkbox"/>					
3,900		<input type="checkbox"/>					
4,700			<input type="checkbox"/>		<input type="checkbox"/>		
5,600			<input type="checkbox"/>				
6,800			<input type="checkbox"/>				
8,200				<input type="checkbox"/>			
10,000 (0.01 μ F)				<input type="checkbox"/>	<input type="checkbox"/>		
12,000					<input type="checkbox"/>		
15,000					<input type="checkbox"/>		
18,000							
22,000						<input type="checkbox"/>	
27,000						<input type="checkbox"/>	
33,000						<input type="checkbox"/>	
39,000							<input type="checkbox"/>
47,000							<input type="checkbox"/>
56,000							<input type="checkbox"/>
68,000							<input type="checkbox"/>
82,000							<input type="checkbox"/>
100,000 (0.1 μ F)							<input type="checkbox"/>
120,000							
150,000							
180,000							
220,000							
270,000							
330,000							
390,000							
470,000							
560,000							

Product thickness (mm) 0.5 ± 0.05

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● Characteristics



Class 1 (For thermal compensation)

Temperature characteristics		A (C0G)	Test methods/conditions (based on JIS C 5102)
Operating temperature		-55°C ~ +125°C	—————
Nominal capacitance (C)		Must be within the specified tolerance range.	Based on paragraph 7.8 and paragraph 9 Measured at room temperature and standard humidity, 1000pF or less Measurement frequency : 1±0.1MHz Measurement voltage : 1±0.1Vrms. Over 1000pF Measurement frequency : 1±0.1kHz Measurement voltage : 1±0.1Vrms.
Dissipation factor (tan δ)		100/(400+20C)% or less: Less than 30 pF 0.1% or less: 30 pF or larger	
Insulation resistance (IR)		10,000 MΩ or larger, or 500 ΩF or larger, whichever is smaller	Based on paragraph 7.6 Measurement is made after rated voltage is applied for 60±5s.
Withstanding voltage		The insulation must not be damaged.	Based on paragraph 7.1 Apply 300% of the rated voltage for 1 to 5s then measure.
Temperature characteristics		Within 0±30ppm/°C	The temperature coefficients in table 12, paragraph 7.12 are calculated at 20 °C and high temperature.
Terminal adherence		No detachment or signs of detachment.	Based on paragraph 8.11. 2. Apply 5N (0.51 kg · f) for 10±1s in the direction indicated by the arrow. 
Resistance to vibration	Appearance	There must be no mechanical damage.	Chip is mounted to a board in the manner shown on the right, subjected to vibration (type A in paragraph 8.2), and measured 24±2 hrs. later. 
	Rate of capacitance change	Must be within initial tolerance.	
	tan δ	Must satisfy initial specified value.	
Solderability		At least 3/4 of the surface of the two terminals must be covered with new solder.	Based on paragraph 8.13 Soldering temperature : 235±5°C Soldering time : 2±0.5s
Resistance to soldering heat	Appearance	There must be no mechanical damage.	Based on paragraph 8.14. Soldering temperature : 260±5°C Soldering time : 5±0.5s Preheating : 150±10°C for 1 to 2 min.
	Rate of capacitance change	±2.5% or less, or ±0.25 pF or less, whichever is larger.	
	tan δ	Must satisfy initial specified value.	
	Insulation resistance	10,000 MΩ or larger, or 500 ΩF or larger, whichever is smaller	
	Withstanding voltage	The insulation must not be damaged.	
Temperature cycling	Appearance	There must be no mechanical damage.	Based on paragraph 9.3 Number of cycles: 10 Capacitance measured after 24±2 hrs.
	Rate of capacitance change	±2.5% or less, or ±0.25 pF or less, whichever is larger.	
	tan δ	Must satisfy initial specified value.	
	Insulation resistance	10,000 MΩ or larger, or 500 ΩF or larger, whichever is smaller	
Humidity load test	Appearance	There must be no mechanical damage.	Based on paragraph 9.9 Test temperature : 40±2°C Relative humidity : 90% to 95% Applied voltage : rated voltage Test time : 500 to 524 hrs. Capacitance measured after 24±2 hrs.
	Rate of capacitance change	±7.5% or less, or ±0.75 pF or less, whichever is larger.	
	tan δ	0.5% or less	
	Insulation resistance	500 MΩ or larger, or 25 ΩF or larger, whichever is smaller	
High-temperature load test	Appearance	There must be no mechanical damage.	Based on paragraph 9.10 Test temperature : Max. operating temp. Applied voltage : rated voltage x 200% Test time : 1,000 to 1,048 hrs. Capacitance measured after 24±2 hrs.
	Rate of capacitance change	±3.0% or less, or ±0.3 pF or less, whichever is larger.	
	tan δ	0.3% or less	
	Insulation resistance	1,000 MΩ or larger, or 50 ΩF or larger, whichever is smaller	

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● Characteristics

Class 2 (High dielectric constant)

Temperature characteristics		C (X7R)	F (Y5V)	Test methods/conditions (based on JIS C 5102)
Operating temperature		-55°C ~ +125°C	-30°C ~ +85°C	—
Nominal capacitance (C)		Must be within the specified tolerance range.		Based on paragraph 7.8 Measured at room temperature and standard humidity, Measurement frequency: 1 ±0.1 kHz Measurement voltage : 1 ±0.2 Vrms.
Tan δ		2.5% or less (when rated voltage is 16V: 3.5% or less)	5.0% or less (when rated voltage is 16V: 7.5% or less)	
Insulation resistance (IR)		10,000 MΩ or larger, or 500 ΩF or larger, whichever is smaller		Based on paragraph 7.6 Measurement is made after rated voltage is applied for 60±5s.
Withstanding voltage		The insulation must not be damaged.		Based on paragraph 7.1 Apply 250% of the rated voltage for 1 to 5s then measure.
Temperature characteristics		Within ±15%	+22, -82%	The temperature coefficients in paragraph 7.12, table 8, condition B, are based on measurements carried out at 20°C, with no voltage applied.
Terminal adherence		No detachment or signs of detachment		Based on paragraph 8. 11. 2. Apply 5N (0.51 kg · f) for 10±1s in the direction indicated by the arrow. 
Resistance to vibration	Appearance	There must be no mechanical damage.		Chip is mounted to a board in the manner shown on the right, subjected to vibration (type A in paragraph 8.2), and measured 48±4 hrs. later. 
	Rate of capacitance change	Must be within initial tolerance.		
	Dissipation factor	Must satisfy initial specified value.		
Solderability		At least 3/4 of the surface of the two terminals must be covered with new solder.		Based on paragraph 8. 13 Soldering temperature: 235 ±5°C Soldering time : 2±0.5s
Resistance to soldering heat	Appearance	There must be no mechanical damage.		Based on paragraph 8. 14. Soldering temperature: 260±5°C Soldering time : 5±0.5s Preheating : 150±10°C for 1 to 2 min.
	Rate of capacitance change	Within ±5.0%	Within ±20.0%	
	Dissipation factor	Must satisfy initial specified value.		
	Insulation resistance	10,000 MΩ or larger, or 500 ΩF or larger, whichever is smaller		
	Withstanding voltage	The insulation must not be damaged.		
Temperature cycling	Appearance	There must be no mechanical damage.		Based on paragraph 9.3 Number of cycles: 10 Capacitance measured after 48 ±4 hrs.
	Rate of capacitance change	Within ±7.5%	Within ±20.0%	
	Dissipation factor	Must satisfy initial specified value.		
	Insulation resistance	10,000 MΩ or larger, or 500 ΩF or larger, whichever is smaller		
Humidity load test	Appearance	There must be no mechanical damage.		Based on paragraph 9.9 Test temperature: 40 ±2°C Relative humidity: 90% to 95% Applied voltage : rated voltage Test time : 500 to 524 hrs. Capacitance measured after 48 ±4 hrs.
	Rate of capacitance change	±12.5% or less	Within ±30.0%	
	Dissipation factor	5.0% or less	7.5% or less (when rated voltage is 16V: 10.0%)	
	Insulation resistance	500 MΩ or larger, or 25 ΩF or larger, whichever is smaller		
High-temperature load test	Appearance	There must be no mechanical damage.		Based on paragraph 9.10 Test temperature: Max. operating temp. Applied voltage : rated voltage x 200% Test time : 1,000 to 1,048 hrs. Capacitance measured after 48 ±4 hrs.
	Rate of capacitance change	Within ±10.0%	Within ±30.0%	
	Dissipation factor	5.0% or less	7.5% or less (when rated voltage is 16V: 10.0%)	
	Insulation resistance	1,000MΩ or larger, or 50 ΩF or larger, whichever is smaller		

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● Packaging specifications

(Unit : mm)

Taping	Reel
	<p>φ 180 mm plastic reel</p> <p>φ 330 mm plastic reel</p> <p>EIAJ ETX-7001 compliant</p>

Bulk case		
<p>EIAJ ET-7201 A compliant</p> <table border="1" data-bbox="422 1168 661 1197"> <tr> <td>MCH15</td> <td>50,000pcs/case</td> </tr> </table>	MCH15	50,000pcs/case
MCH15	50,000pcs/case	

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● Electrical characteristics

■ A (COG) Characteristics

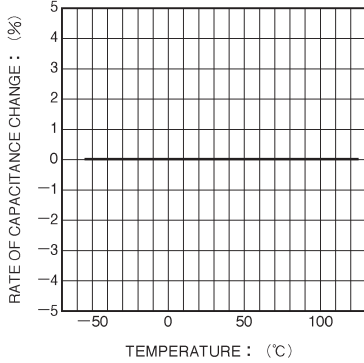


Fig.1 Capacitance-temperature characteristics

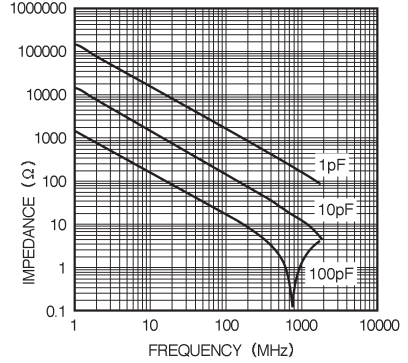


Fig.2 Impedance-frequency characteristics

■ C (X7R) Characteristics

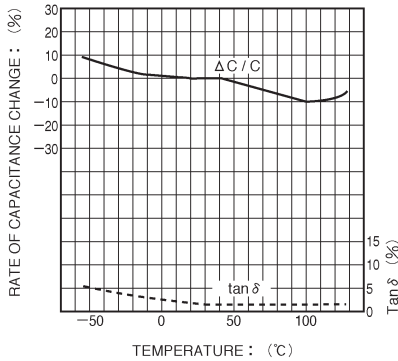


Fig.3 Capacitance-temperature characteristics

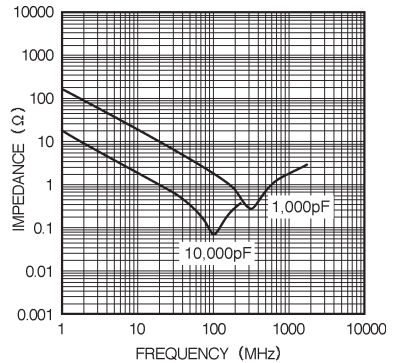


Fig.4 Impedance-frequency characteristics

■ F (Y5V) Characteristics

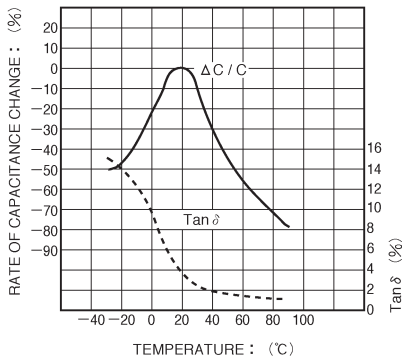


Fig.5 Capacitance-temperature characteristics

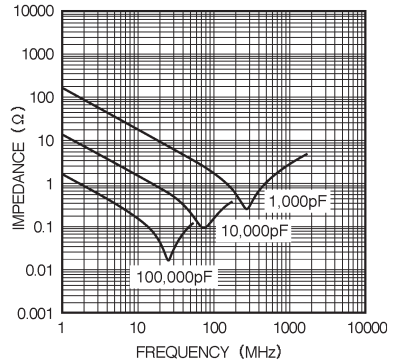


Fig.6 Impedance-frequency characteristics

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■ Temperature cycling test

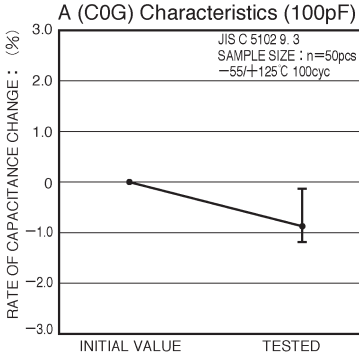


Fig. 7 Rate of capacitance change

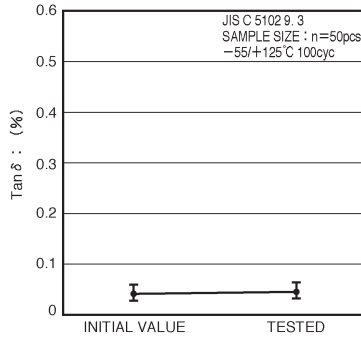


Fig. 8 Tan δ

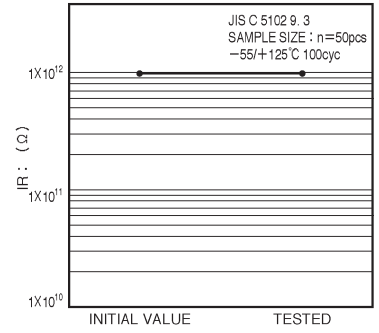


Fig. 9 Insulation resistance

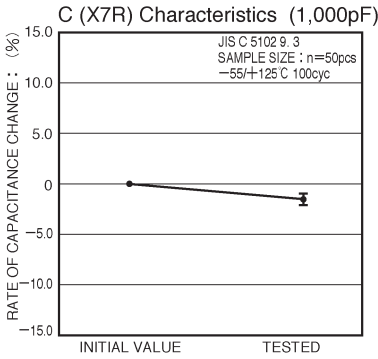


Fig. 10 Rate of capacitance change

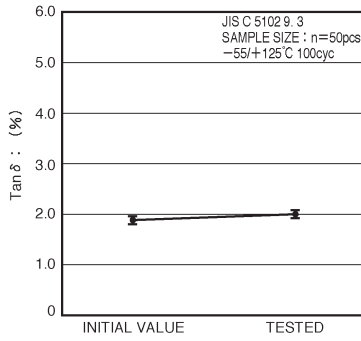


Fig. 11 Tan δ

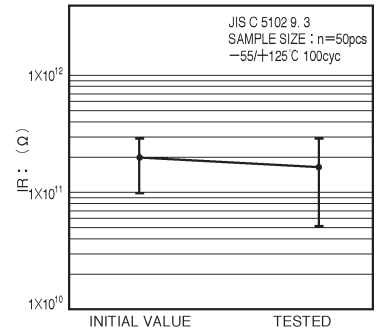


Fig. 12 Insulation resistance

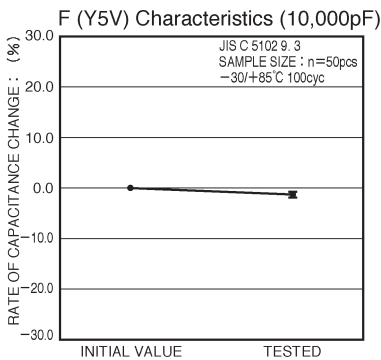


Fig. 13 Rate of capacitance change

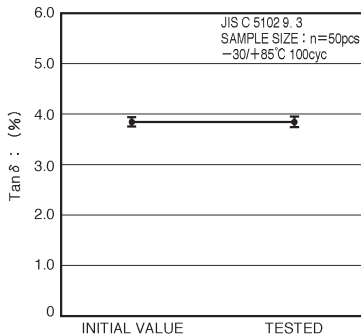


Fig. 14 Tan δ

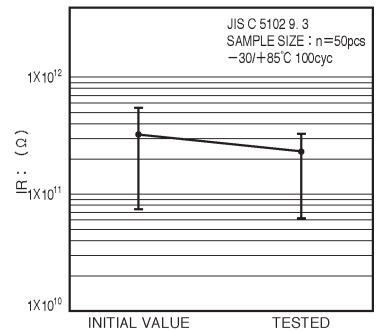


Fig. 15 Insulation resistance

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■ High-temperature load test

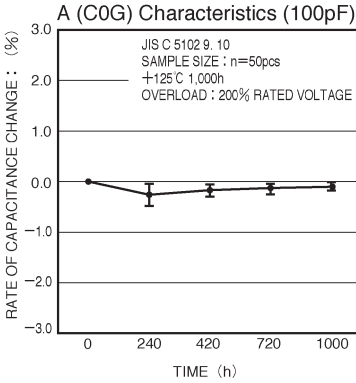


Fig. 16 Rate of capacitance change

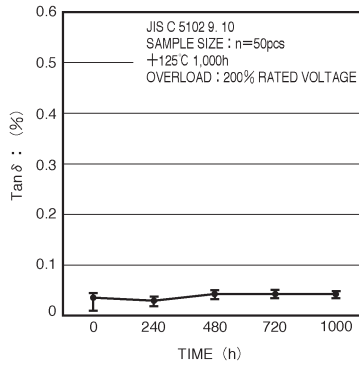


Fig. 17 Tan δ

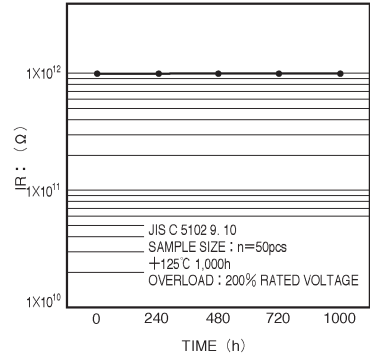


Fig. 18 Insulation resistance

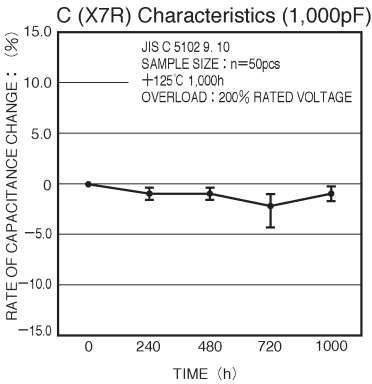


Fig. 19 Rate of capacitance change

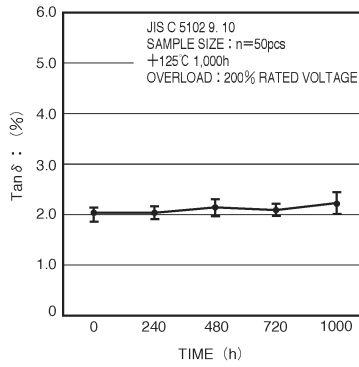


Fig. 20 Tan δ

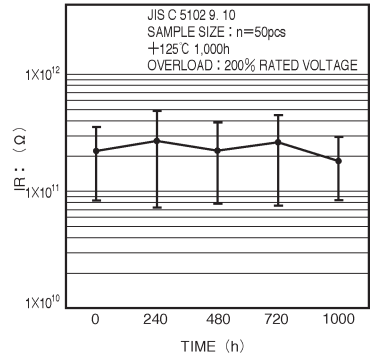


Fig. 21 Insulation resistance

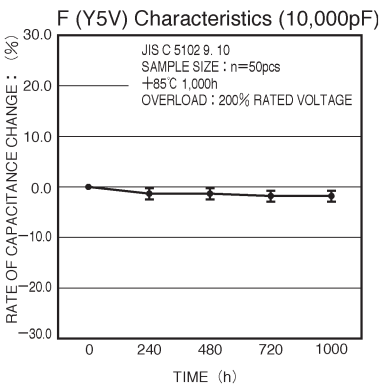


Fig. 22 Rate of capacitance change

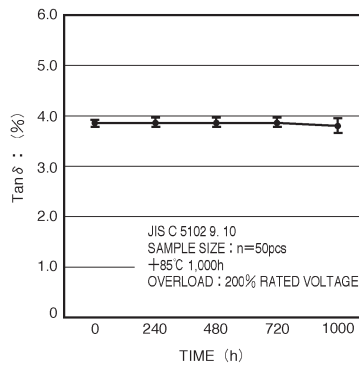


Fig. 23 Tan δ

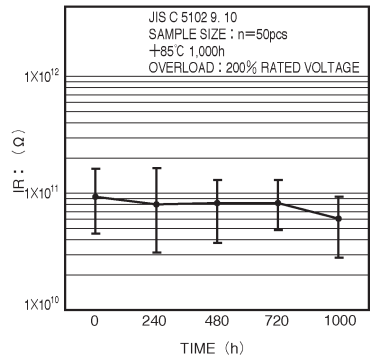


Fig. 24 Insulation resistance

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■ Humidity load test

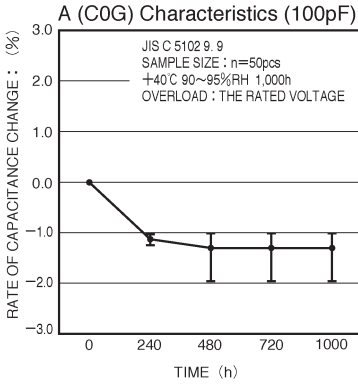


Fig.25 Rate of capacitance change

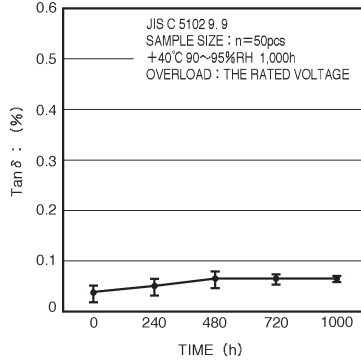


Fig.26 Tan δ

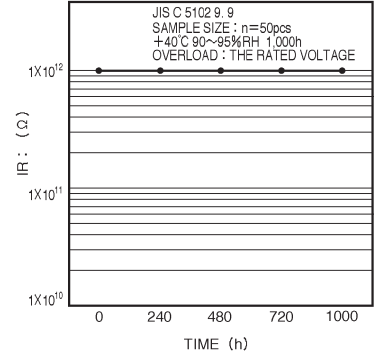


Fig.27 Insulation resistance

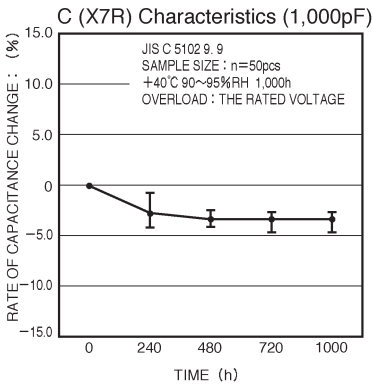


Fig.28 Rate of capacitance change

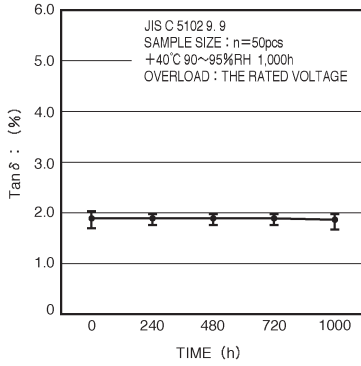


Fig.29 Tan δ

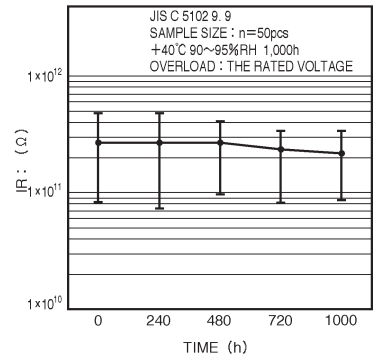


Fig.30 Insulation resistance

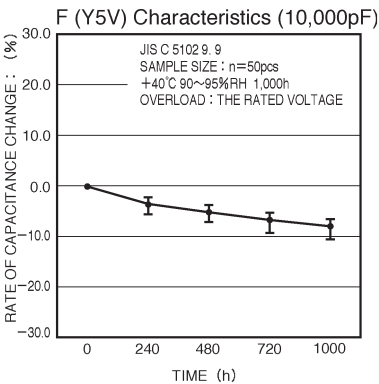


Fig.31 Rate of capacitance change

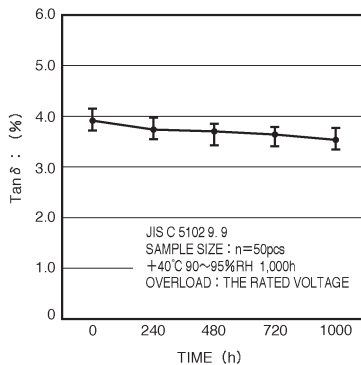


Fig.32 Tan δ

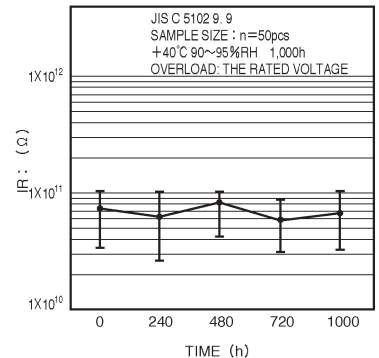


Fig.33 Insulation resistance

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