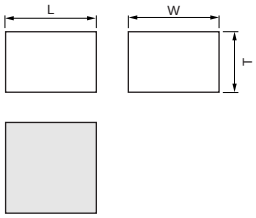
Chip Monolithic Ceramic Capacitors

Microchips

■ Features
1. Better microwave characteristics
2. Suitable for by-passing
3. High density mounting

■ Applications
1. Optical device for telecommunication
2. IC, IC packaging built-in
3. Measuring equipment



Part Number	Dimensions (mm)		
	L	W	T
GMA05X	0.5 ±0.05	0.5 ±0.05	0.35 ±0.05
GMA085	0.8 ±0.05	0.8 ±0.05	0.5 ±0.1

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Part Number	TC Cod (Standard)	Rated Voltage (Vdc)	Capacitance	Length L (mm)	Width W (mm)	Thickness T (mm)
GMA05XR71H471MD01	X7R (EIA)	50	470pF ±20%	0.5	0.5	0.35
GMA05XR71C102MD01	X7R (EIA)	16	1000pF ±20%	0.5	0.5	0.35
GMA05XR71C152MD01	X7R (EIA)	16	1500pF ±20%	0.5	0.5	0.35
GMA05XR71C222MD01	X7R (EIA)	16	2200pF ±20%	0.5	0.5	0.35
GMA085R71C103MD01	X7R (EIA)	16	10000pF ±20%	0.8	0.8	0.5
GMA05XF51C472ZD01	Y5V (EIA)	16	4700pF +80/-20%	0.5	0.5	0.35
GMA05XF51C682ZD01	Y5V (EIA)	16	6800pF +80/-20%	0.5	0.5	0.35
GMA085F51C473ZD01	Y5V (EIA)	16	47000pF +80/-20%	0.8	0.8	0.5
GMA05XF51A153ZD01	Y5V (EIA)	10	15000pF +80/-20%	0.5	0.5	0.35
GMA085F51A104ZD01	Y5V (EIA)	10	0.10μF +80/-20%	0.8	0.8	0.5

Specifications and Test Methods

<table>
<tr><th>No.</th><th colspan="2">Item</th><th>Specifications</th><th>Test Method</th></tr>
<tr><td>1</td><td colspan="2">Operating Temperature</td><td>R7 : −55℃ to +125℃
F5 : −30℃ to +85℃</td><td></td></tr>
<tr><td>2</td><td colspan="2">Rated Voltage</td><td>See the previous pages.</td><td>The rated voltage is defined as the maximum voltage which may be applied continuously to the capacitor.
When AC voltage is superimposed on DC voltage, V^{P-P} or V^{O-P}, whichever is larger, should be maintained within the rated voltage range.</td></tr>
<tr><td>3</td><td colspan="2">Appearance</td><td>No defects or abnormalities</td><td>Visual inspection</td></tr>
<tr><td>4</td><td colspan="2">Dimensions</td><td>See the previous pages.</td><td>Visual inspection</td></tr>
<tr><td>5</td><td colspan="2">Dielectric Strength</td><td>No defects or abnormalities</td><td>No failure should be observed when a voltage of 250% of the rated voltage is applied between the both terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA.</td></tr>
<tr><td>6</td><td colspan="2">Insulation Resistance (I.R.)</td><td>10,000MΩ min.</td><td>The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at normal temperature and humidity and within 2 minutes of charging.</td></tr>
<tr><td>7</td><td colspan="2">Capacitance</td><td>Within the specified tolerance</td><td>The capacitance should be measured at 25℃ with 1±0.1kHz in frequency and 1±0.2Vr.m.s. in voltage.</td></tr>
<tr><td>8</td><td colspan="2">Dissipation Factor (D.F.)</td><td>R7 : 0.035 max.
F5 : 0.09 max. (for 16V)
: 0.125 max. (for 10V)</td><td>D.F. should be measured under the same conditions at the capacitance.</td></tr>
<tr><td>9</td><td colspan="2">Capacitance Temperature Characteristics</td><td><table><tr><th>Char.</th><th>Temp. Range</th><th>Reference Temp.</th><th>Cap. Change Rate</th></tr><tr><td>R7</td><td>−55 to +125℃</td><td>25℃</td><td>Within±15%</td></tr><tr><td>F5</td><td>−30 to +85℃</td><td>25℃</td><td>Within$\pm^{22}_{82}$%</td></tr></table></td><td>The range of capacitance change in reference to 25℃ within the temperature range shown in the table should be within the specified ranges.
The capacitance change should be measured after 5 min. at each specified temperature stage.</td></tr>
<tr><td rowspan="2">10</td><td rowspan="2">Mechanical Strength</td><td>Bond Strength</td><td>Pull force : 3.0g min.</td><td>MIL-STD-883 Method 2011 Condition D
Mount the capacitor on a gold metallized alumina substrate with Au-Sn (80/20) and bond a 20μm (0.0008 inch) gold wire to the capacitor terminal using an ultrasonic wedge bond. Then, pull wire.</td></tr>
<tr><td>Die Shear Strength</td><td>Die Shear force : 200g min.</td><td>MIL-STD-883 Method 2019
Mount the capacitor on a gold metallized alumina substrate with Au-Sn (80/20). Apply the force parallel to the substrate.</td></tr>
<tr><td rowspan="3">11</td><td rowspan="3">Vibration Resistance</td><td>Appearance</td><td>No defects or abnormalities</td><td rowspan="3">Ramp frequency from 10 to 55Hz then return to 10Hz all within 1 minute. Amplitude : 1.5 mm (0.06 inch) max. total excursion. Apply this motion for a period of 2 hours in each of 3 mutually perpendicular directions (total 6 hours).</td></tr>
<tr><td>Capacitance</td><td>Within the specified tolerance</td></tr>
<tr><td>D.F.</td><td>R7 : 0.035 max.
F5 : 0.09 max. (for 16V)
: 0.125 max. (for 10V)</td></tr>
<tr><td>12</td><td colspan="2">Temperature Cycle</td><td>The measured values should satisfy the values in the following table.<table><tr><th>Item</th><th>Specifications</th></tr><tr><td>Appearance</td><td>No marked defect</td></tr><tr><td>Capacitance Change</td><td>R7 ····· Within±7.5%
F5 ····· Within±20%</td></tr><tr><td>I.R.</td><td>More than 10,000MΩ</td></tr><tr><td>D.F.</td><td>R7 ····· 0.035 max.
F5 ····· 0.09 max.(for 16V)
0.125 max.(for 10V)</td></tr><tr><td>Dielectric Strength</td><td>No failure</td></tr></table></td><td>The capacitor should be set for 48±4 hours at room temperature after one hour heat of treatment at 150^{+0}_{-10}℃, then measure for the initial measurement. Fix the capacitor to the supporting jig in the same manner and under the same conditions as (11) and conduct the five cycles according to the temperatures and time shown in the following table. Set it for 48±4 hours at room temperature, then measure.<table><tr><th>Step</th><th>1</th><th>2</th><th>3</th><th>4</th></tr><tr><td>Temp.(℃)</td><td>Min. Operating Temp.$^{+0}_{-3}$</td><td>Room Temp.</td><td>Max. Operating Temp.$^{+3}_{-0}$</td><td>Room Temp.</td></tr><tr><td>Time(min.)</td><td>30±3</td><td>2 to 3</td><td>30±3</td><td>2 to 3</td></tr></table></td></tr>
<tr><td>13</td><td colspan="2">Humidity (Steady State)</td><td>The measured values should satisfy the values in the following table.<table><tr><th>Item</th><th>Specifications</th></tr><tr><td>Appearance</td><td>No marked defect</td></tr><tr><td>Capacitance Change</td><td>R7 ····· Within±12.5%
F5 ····· Within±30%</td></tr><tr><td>I.R.</td><td>More than 1,000MΩ</td></tr><tr><td>D.F.</td><td>R7 ····· 0.05 max.
F5 ····· 0.125 max.(for 16V)
0.15 max.(for 10V)</td></tr><tr><td>Dielectric Strength</td><td>No failure</td></tr></table></td><td>Set the capacitor for 500±12 hours at 40±20℃, in 90 to 95% humidity.
Take it out and set it for 48±4 hours at room temperature, then measure.</td></tr>
</table>

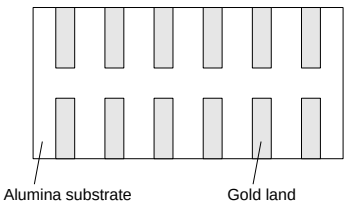
Continued on the following page.

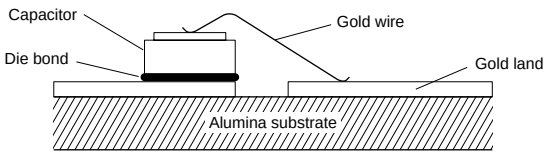
Specifications and Test Methods

Continued from the preceding page.

<table>
<tr><th>No.</th><th>Item</th><th>Specifications</th><th>Test Method</th></tr>
<tr><td>14</td><td>Humidity Load</td><td>The measured values should satisfy the values in the following table.
<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>Appearance</td><td>No marked defect</td></tr>
<tr><td>Capacitance Change</td><td>R7 ····· Within±12.5%
F5 ····· Within$\pm^{30}_{40}$%</td></tr>
<tr><td>I.R.</td><td>More than 500MΩ</td></tr>
<tr><td>D.F.</td><td>R7 ····· 0.05 max.
F5 ····· 0.125 max.(for 16V)
0.15 max.(for 10V)</td></tr>
<tr><td>Dielectric Strength</td><td>No failure</td></tr>
</table></td><td>Apply the rated voltage for 500±12 hours at 40±20℃, in 90 to 95% humidity and set it for 48±4 hours at room temperature, then measure. The charge/discharge current is less than 50mA.
• Initial measurement for Y5V
Perform a heat treatment at 150$^{+0}_{-10}$℃ for one hour and then let sit for 48±4 hours at room temperature. Perform the initial measurement.</td></tr>
<tr><td>15</td><td>High Temperature Load</td><td>The measured values should satisfy the values in the following table.
<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>Appearance</td><td>No marked defect</td></tr>
<tr><td>Capacitance Change</td><td>R7 ····· Within±12.5%
F5 ····· Within$\pm^{30}_{40}$%</td></tr>
<tr><td>I.R.</td><td>More than 1,000MΩ</td></tr>
<tr><td>D.F.</td><td>R7 ····· 0.05 max.
F5 ····· 0.125 max.(for 16V)
0.15 max.(for 10V)</td></tr>
<tr><td>Dielectric Strength</td><td>No failure</td></tr>
</table></td><td>A voltage treatment should be given to the capacitor, in which a DC voltage of 200% the rated voltage is applied for one hour at the maximum operating temperature ±3℃ then it should be set for 48±4 hours at room temperature and the initial measurement should be conducted.
Then apply the above mentioned voltage continuously for 1000±12 hours at the same temperature, remove it from the bath, and set it for 48±4 hours at room temperature, then measure. The charge/discharge current is less than 50mA.</td></tr>
</table>

Mounting for testing : The capacitors should be mounted on the substrate as shown below using die bonding and wire bonding when tests No. 11 to 15 are performed.





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