

# Chip Monolithic Ceramic Capacitors

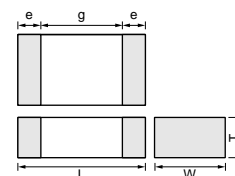


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## for Flow/Reflow Soldering GRM15/18/21/31 Series

### ■ Features

1. Terminations are made of metal highly resistant to migration.
2. The GRM series is a complete line of chip ceramic capacitors in 6.3V, 10V, 16V, 25V, 50V, 100V, 200V and 500V ratings. These capacitors have temperature characteristics ranging from C0G to Y5V.
3. A wide selection of sizes is available, from the miniature LxWxT: 1.0x0.5x0.5mm to LxWxT: 3.2x1.6x1.15mm.  
GRM18, 21 and GRM31 types are suited to flow and reflow soldering.  
GRM15 type is applied to only reflow soldering.
4. Stringent dimensional tolerances allow highly reliable, high speed automatic chip placement on PCBs.
5. The GRM series is available in paper or plastic embossed tape and reel packaging for automatic placement. Bulk case packaging is also available for GRM15, GRM18, GRM21 electronic equipment.



Part Number	Dimensions (mm)				
	L	W	T	e	g min.
<b>GRM155</b>	1.0 ±0.05	0.5 ±0.05	0.5 ±0.05	0.15 to 0.3	0.4
<b>GRM188*</b>	1.6 ±0.1	0.8 ±0.1	0.8 ±0.1	0.2 to 0.5	0.5
<b>GRM216</b>	2.0 ±0.1	1.25 ±0.1	0.6 ±0.1	0.2 to 0.7	0.7
<b>GRM219</b>			0.85 ±0.1		
<b>GRM21A</b>			1.0 +0/-0.2		
<b>GRM21B</b>			1.25 ±0.1		
<b>GRM316</b>	3.2 ±0.15	1.6 ±0.15	0.6 ±0.1	0.3 to 0.8	1.5
<b>GRM319</b>			0.85 ±0.1		
<b>GRM31M</b>			1.15 ±0.1		
<b>GRM31C</b>	3.2 ±0.2	1.6 ±0.2	1.6 ±0.2		

\* Bulk Case : 1.6 ±0.07(L)×0.8 ±0.07(W)×0.8 ±0.07(T)

### ■ Applications

General electronic equipment

## Temperature Compensating Type GRM15 Series (1.0x0.5 mm) 50V/25V

Part Number	GRM15							
L x W [EIA]	1.00x0.50 [0402]							
TC	C0G (5C)	P2H (6P)	R2H (6R)	S2H (6S)	SL (1X)		T2H (6T)	U2J (7U)
Rated Volt.	50 (1H)	50 (1H)	50 (1H)	50 (1H)	50 (1H)	25 (1E)	50 (1H)	50 (1H)
Capacitance (Capacitance part numbering code) and T (mm) Dimension (T Dimension part numbering code)								
0.50pF( <b>R50</b> )	0.50(5)							
0.75pF( <b>R75</b> )	0.50(5)							
1.0pF( <b>1R0</b> )	0.50(5)							
2.0pF( <b>2R0</b> )	0.50(5)							
3.0pF( <b>3R0</b> )	0.50(5)	0.50(5)	0.50(5)	0.50(5)			0.50(5)	0.50(5)
4.0pF( <b>4R0</b> )	0.50(5)	0.50(5)	0.50(5)	0.50(5)			0.50(5)	0.50(5)
5.0pF( <b>5R0</b> )	0.50(5)	0.50(5)	0.50(5)	0.50(5)			0.50(5)	0.50(5)
6.0pF( <b>6R0</b> )	0.50(5)	0.50(5)	0.50(5)	0.50(5)			0.50(5)	0.50(5)
7.0pF( <b>7R0</b> )	0.50(5)	0.50(5)	0.50(5)	0.50(5)			0.50(5)	0.50(5)
8.0pF( <b>8R0</b> )	0.50(5)	0.50(5)	0.50(5)	0.50(5)			0.50(5)	0.50(5)
9.0pF( <b>9R0</b> )	0.50(5)	0.50(5)	0.50(5)	0.50(5)			0.50(5)	0.50(5)
10pF( <b>100</b> )	0.50(5)	0.50(5)	0.50(5)	0.50(5)			0.50(5)	0.50(5)
12pF( <b>120</b> )	0.50(5)	0.50(5)	0.50(5)	0.50(5)			0.50(5)	0.50(5)
15pF( <b>150</b> )	0.50(5)	0.50(5)	0.50(5)	0.50(5)			0.50(5)	0.50(5)
18pF( <b>180</b> )	0.50(5)	0.50(5)	0.50(5)	0.50(5)			0.50(5)	0.50(5)
22pF( <b>220</b> )	0.50(5)	0.50(5)	0.50(5)	0.50(5)			0.50(5)	0.50(5)
27pF( <b>270</b> )	0.50(5)	0.50(5)	0.50(5)	0.50(5)			0.50(5)	0.50(5)
33pF( <b>330</b> )	0.50(5)		0.50(5)	0.50(5)			0.50(5)	0.50(5)

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Part Number	GRM15							
L x W [EIA]	1.00x0.50 [0402]							
TC	COG (5C)	P2H (6P)	R2H (6R)	S2H (6S)	SL (1X)		T2H (6T)	U2J (7U)
Rated Volt.	50 (1H)	50 (1H)	50 (1H)	50 (1H)	50 (1H)	25 (1E)	50 (1H)	50 (1H)
Capacitance (Capacitance part numbering code) and T (mm) Dimension (T Dimension part numbering code)								
39pF(390)	0.50(5)			0.50(5)			0.50(5)	0.50(5)
47pF(470)	0.50(5)				0.50(5)		0.50(5)	0.50(5)
56pF(560)	0.50(5)				0.50(5)		0.50(5)	0.50(5)
68pF(680)	0.50(5)				0.50(5)		0.50(5)	0.50(5)
82pF(820)	0.50(5)				0.50(5)		0.50(5)	0.50(5)
100pF(101)	0.50(5)				0.50(5)		0.50(5)	0.50(5)
120pF(121)	0.50(5)				0.50(5)			0.50(5)
150pF(151)	0.50(5)				0.50(5)			0.50(5)
180pF(181)	0.50(5)				0.50(5)			0.50(5)
220pF(221)	0.50(5)					0.50(5)		
270pF(271)	0.50(5)					0.50(5)		
330pF(331)	0.50(5)					0.50(5)		
390pF(391)	0.50(5)					0.50(5)		
470pF(471)	0.50(5)							
560pF(561)	0.50(5)							
680pF(681)	0.50(5)							
820pF(821)	0.50(5)							
1000pF(102)	0.50(5)							

The part numbering code is shown in ( ).

Dimensions are shown in mm and Rated Voltage in Vdc.

## Temperature Compensating Type GRM18 Series (1.60x0.80 mm) 200V/100V/50V/25V

Part Number	GRM18											
L x W [EIA]	1.60x0.80 [0603]											
TC	COG (5C)			P2H (6P)	R2H (6R)	S2H (6S)	SL (1X)				T2H (6T)	U2J (7U)
Rated Volt.	200 (2D)	100 (2A)	50 (1H)	50 (1H)	50 (1H)	50 (1H)	200 (2D)	100 (2A)	50 (1H)	25 (1E)	50 (1H)	50 (1H)
Capacitance (Capacitance part numbering code) and T (mm) Dimension (T Dimension part numbering code)												
0.50pF(R50)	0.80(8)	0.80(8)	0.80(8)									
0.75pF(R75)	0.80(8)	0.80(8)	0.80(8)									
1.0pF(1R0)	0.80(8)	0.80(8)	0.80(8)									
2.0pF(2R0)	0.80(8)	0.80(8)	0.80(8)									
3.0pF(3R0)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)					0.80(8)	0.80(8)
4.0pF(4R0)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)					0.80(8)	0.80(8)
5.0pF(5R0)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)					0.80(8)	0.80(8)
6.0pF(6R0)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)					0.80(8)	0.80(8)
7.0pF(7R0)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)					0.80(8)	0.80(8)
8.0pF(8R0)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)					0.80(8)	0.80(8)
9.0pF(9R0)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)					0.80(8)	0.80(8)
10pF(100)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)					0.80(8)	0.80(8)
12pF(120)		0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)				0.80(8)	0.80(8)
15pF(150)		0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)				0.80(8)	0.80(8)
18pF(180)		0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)				0.80(8)	0.80(8)
22pF(220)		0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)				0.80(8)	0.80(8)
27pF(270)		0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)				0.80(8)	0.80(8)
33pF(330)		0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)				0.80(8)	0.80(8)
39pF(390)		0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)				0.80(8)	0.80(8)
47pF(470)		0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)				0.80(8)	0.80(8)
56pF(560)		0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)				0.80(8)	0.80(8)

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Part Number	GRM18											
L x W [EIA]	1.60x0.80 [0603]											
TC	C0G (5C)			P2H (6P)	R2H (6R)	S2H (6S)	SL (1X)				T2H (6T)	U2J (7U)
Rated Volt.	200 (2D)	100 (2A)	50 (1H)	50 (1H)	50 (1H)	50 (1H)	200 (2D)	100 (2A)	50 (1H)	25 (1E)	50 (1H)	50 (1H)
Capacitance (Capacitance part numbering code) and T (mm) Dimension (T Dimension part numbering code)												
68pF(680)		0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)		0.80(8)		0.80(8)	0.80(8)
82pF(820)		0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)		0.80(8)		0.80(8)	0.80(8)
100pF(101)		0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)		0.80(8)		0.80(8)	0.80(8)
120pF(121)		0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)		0.80(8)	0.80(8)		0.80(8)	0.80(8)
150pF(151)		0.80(8)	0.80(8)	0.80(8)	0.80(8)	0.80(8)		0.80(8)	0.80(8)		0.80(8)	0.80(8)
180pF(181)		0.80(8)	0.80(8)		0.80(8)	0.80(8)		0.80(8)	0.80(8)		0.80(8)	0.80(8)
220pF(221)		0.80(8)	0.80(8)			0.80(8)		0.80(8)	0.80(8)		0.80(8)	0.80(8)
270pF(271)		0.80(8)	0.80(8)					0.80(8)	0.80(8)		0.80(8)	0.80(8)
330pF(331)		0.80(8)	0.80(8)					0.80(8)	0.80(8)		0.80(8)	0.80(8)
390pF(391)		0.80(8)	0.80(8)					0.80(8)	0.80(8)		0.80(8)	0.80(8)
470pF(471)		0.80(8)	0.80(8)						0.80(8)			0.80(8)
560pF(561)		0.80(8)	0.80(8)						0.80(8)			0.80(8)
680pF(681)			0.80(8)						0.80(8)			0.80(8)
820pF(821)			0.80(8)							0.80(8)		
1000pF(102)			0.80(8)							0.80(8)		
1200pF(122)			0.80(8)							0.80(8)		
1500pF(152)			0.80(8)							0.80(8)		
1800pF(182)			0.80(8)									
2200pF(222)			0.80(8)									
2700pF(272)			0.80(8)									

The part numbering code is shown in ( ).

Dimensions are shown in mm and Rated Voltage in Vdc.

## Temperature Compensating Type GRM21 Series (2.00x1.25 mm) 200V/100V/50V/25V

Part Number	GRM21												
L x W [EIA]	2.00x1.25 [0805]												
TC	C0G (5C)			C0H (6C)	P2H (6P)	R2H (6R)	S2H (6S)	SL (1X)				T2H (6T)	U2J (7U)
Rated Volt.	200 (2D)	100 (2A)	50 (1H)	25 (1E)	50 (1H)	50 (1H)	50 (1H)	200 (2D)	100 (2A)	50 (1H)	25 (1E)	50 (1H)	50 (1H)
Capacitance (Capacitance part numbering code) and T (mm) Dimension (T Dimension part numbering code)													
12pF(120)	0.85(9)												
15pF(150)	0.85(9)												
18pF(180)	0.85(9)												
22pF(220)	0.85(9)												
27pF(270)	0.85(9)												
33pF(330)	0.85(9)												
39pF(390)	0.85(9)												
47pF(470)	0.85(9)												
56pF(560)	0.85(9)												
68pF(680)	1.25(B)	0.85(9)											
82pF(820)	1.25(B)	0.85(9)											
100pF(101)	1.25(B)	0.60(6)											
120pF(121)	1.25(B)	0.60(6)						0.85(9)					
150pF(151)	1.25(B)	0.60(6)						1.25(B)					
180pF(181)	1.25(B)	0.60(6)			0.85(9)			1.25(B)					
220pF(221)	1.25(B)	0.60(6)			0.85(9)	0.85(9)		1.25(B)					
270pF(271)		0.60(6)			0.85(9)	0.85(9)	0.85(9)	1.25(B)					
330pF(331)		0.60(6)			0.85(9)	0.85(9)	0.85(9)	1.25(B)					
390pF(391)		0.60(6)			1.25(B)	0.85(9)	0.85(9)	1.25(B)					

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Part Number	GRM21												
L x W [EIA]	2.00x1.25 [0805]												
TC	C0G (5C)			C0H (6C)	P2H (6P)	R2H (6R)	S2H (6S)	SL (1X)				T2H (6T)	U2J (7U)
Rated Volt.	200 (2D)	100 (2A)	50 (1H)	25 (1E)	50 (1H)	50 (1H)	50 (1H)	200 (2D)	100 (2A)	50 (1H)	25 (1E)	50 (1H)	50 (1H)
Capacitance (Capacitance part numbering code) and T (mm) Dimension (T Dimension part numbering code)													
470pF(471)		0.60(6)			1.25(B)	0.85(9)	0.85(9)	1.25(B)	0.85(9)				
560pF(561)		0.60(6)			1.25(B)	1.25(B)	1.25(B)		0.85(9)			1.25(B)	
680pF(681)		0.85(9)				1.25(B)	1.25(B)		0.85(9)			1.25(B)	
820pF(821)		0.85(9)					1.25(B)		1.25(B)	0.60(6)		1.25(B)	0.60(6)
1000pF(102)		0.85(9)							1.25(B)	0.60(6)		1.25(B)	0.60(6)
1200pF(122)									1.25(B)	0.60(6)		1.25(B)	0.60(6)
1500pF(152)									1.25(B)	0.85(9)		1.25(B)	0.85(9)
1800pF(182)			0.60(6)						1.25(B)	0.85(9)		1.25(B)	0.85(9)
2200pF(222)			0.60(6)							0.85(9)			0.85(9)
2700pF(272)			0.60(6)	1.25(B)						1.25(B)			1.25(B)
3300pF(332)			0.60(6)	1.25(B)						1.25(B)			1.25(B)
3900pF(392)			0.60(6)	1.25(B)							0.85(9)		
4700pF(472)			0.60(6)								0.85(9)		
5600pF(562)			0.85(9)								1.25(B)		
6800pF(682)			0.85(9)								1.25(B)		
8200pF(822)			0.85(9)										
10000pF(103)			0.85(9)							0.60(6)			0.60(6)
12000pF(123)										0.60(6)			0.60(6)
15000pF(153)										0.60(6)			0.60(6)
18000pF(183)										0.60(6)			0.60(6)
22000pF(223)										0.85(9)			0.85(9)
27000pF(273)										0.85(9)			0.85(9)
33000pF(333)										1.00(A)			1.00(A)
39000pF(393)										1.25(B)			1.25(B)
47000pF(473)										1.25(B)			1.25(B)

The part numbering code is shown in ( ).

Dimensions are shown in mm and Rated Voltage in Vdc.

## Temperature Compensating Type GRM31 Series (3.20x1.60 mm) 500V/200V/100V/50V/25V

Part Number	GRM31													
L x W [EIA]	3.20x1.60 [1206]													
TC	C0G (5C)				C0H (6C)	P2H (6P)	R2H (6R)	S2H (6S)	SL (1X)				T2H (6T)	U2J (7U)
Rated Volt.	500 (2H)	200 (2D)	50 (1H)	25 (1E)	25 (1E)	50 (1H)	50 (1H)	50 (1H)	200 (2D)	100 (2A)	50 (1H)	25 (1E)	50 (1H)	50 (1H)
Capacitance (Capacitance part numbering code) and T (mm) Dimension (T Dimension part numbering code)														
1.0pF(1R0)	1.15(M)													
2.0pF(2R0)	1.15(M)													
3.0pF(3R0)	1.15(M)													
4.0pF(4R0)	1.15(M)													
5.0pF(5R0)	1.15(M)													
6.0pF(6R0)	1.15(M)													
7.0pF(7R0)	1.15(M)													
8.0pF(8R0)	1.15(M)													
9.0pF(9R0)	1.15(M)													
10pF(100)	1.15(M)													
12pF(120)	1.15(M)													
15pF(150)	1.15(M)													
18pF(180)	1.15(M)													
22pF(220)	1.15(M)													

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Part Number	GRM31													
L x W [EIA]	3.20x1.60 [1206]													
TC	COG (5C)				COH (6C)	P2H (6P)	R2H (6R)	S2H (6S)	SL (1X)				T2H (6T)	U2J (7U)
Rated Volt.	500 (2H)	200 (2D)	50 (1H)	25 (1E)	25 (1E)	50 (1H)	50 (1H)	50 (1H)	200 (2D)	100 (2A)	50 (1H)	25 (1E)	50 (1H)	50 (1H)
Capacitance (Capacitance part numbering code) and T (mm) Dimension (T Dimension part numbering code)														
27pF(270)	1.15(M)													
33pF(330)	1.15(M)													
39pF(390)	1.15(M)													
47pF(470)	1.15(M)													
56pF(560)	1.15(M)													
68pF(680)	1.15(M)													
82pF(820)	1.15(M)													
270pF(271)		1.15(M)												
330pF(331)		1.15(M)												
390pF(391)		1.15(M)												
470pF(471)		1.15(M)												
560pF(561)									1.15(M)					
680pF(681)						0.85(9)			1.15(M)					
820pF(821)						0.85(9)	0.85(9)		1.15(M)					
1000pF(102)						1.15(M)	1.15(M)	0.85(9)	1.15(M)					
1200pF(122)						1.15(M)	1.15(M)	1.15(M)	1.15(M)					
1500pF(152)						1.15(M)	1.15(M)	1.15(M)						
1800pF(182)								1.15(M)						
2200pF(222)										1.15(M)			1.15(M)	
2700pF(272)										1.15(M)			1.15(M)	
3300pF(332)										1.15(M)			1.15(M)	
3900pF(392)										1.15(M)	0.85(9)		1.15(M)	0.85(9)
4700pF(472)										1.15(M)	0.85(9)			0.85(9)
5600pF(562)			0.85(9)								0.85(9)			0.85(9)
6800pF(682)			0.85(9)		0.85(9)						1.15(M)			1.15(M)
8200pF(822)			0.85(9)		1.15(M)						1.15(M)			1.15(M)
10000pF(103)			0.85(9)									1.15(M)		
12000pF(123)												1.15(M)		
15000pF(153)												1.15(M)		
27000pF(273)			0.85(9)											
33000pF(333)			0.85(9)											
47000pF(473)			1.15(M)											
56000pF(563)											0.85(9)			0.85(9)
68000pF(683)											1.15(M)			1.15(M)
82000pF(823)											1.15(M)			1.15(M)
0.10μF(104)				1.60(C)							1.15(M)			1.15(M)

The part numbering code is shown in ( ).

Dimensions are shown in mm and Rated Voltage in Vdc.

## High Dielectric Constant Type X5R (R6) Characteristics

TC	X5R (R6)							
Part Number	GRM15		GRM18		GRM21		GRM31	
L x W [EIA]	1.00x0.50 [0402]		1.60x0.80 [0603]		2.00x1.25 [0805]		3.20x1.60 [1206]	
Rated Volt.	16 (1C)	10 (1A)	10 (1A)	6.3 (0J)	10 (1A)	6.3 (0J)	10 (1A)	6.3 (0J)
Capacitance (Capacitance part numbering code) and T (mm) Dimension (T Dimension part numbering code)								
68000pF(683)		0.50(5)						
0.10μF(104)	0.50(5)	0.50(5)						
0.33μF(334)			0.80(8)					

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TC	X5R (R6)							
Part Number	GRM15		GRM18		GRM21		GRM31	
L x W [EIA]	1.00x0.50 [0402]		1.60x0.80 [0603]		2.00x1.25 [0805]		3.20x1.60 [1206]	
Rated Volt.	16 (1C)	10 (1A)	10 (1A)	6.3 (0J)	10 (1A)	6.3 (0J)	10 (1A)	6.3 (0J)
Capacitance (Capacitance part numbering code) and T (mm) Dimension (T Dimension part numbering code)								
0.47μF(474)			0.80(8)					
0.68μF(684)			0.80(8)					
1.0μF(105)			0.80(8)	0.80(8)	0.85(9)			
1.5μF(155)						0.85(9)		
2.2μF(225)					1.25(B)	1.25(B)	0.85(9)	
3.3μF(335)						1.25(B)	1.30(X)	
4.7μF(475)						1.25(B)	1.60(C)	1.15(M)
10μF(106)							1.60(C)	1.60(C)

The part numbering code is shown in each ( ).

3.3μF and 4.7μF, 6.3V rated are GRM21 series of L: 2±0.15, W: 1.25±0.15, T: 1.25±0.15.

T: 1.15±0.1mm is also available for GRM31 1.0μF for 16V.

L: 3.2±0.2, W: 1.6±0.2 for GRM31 16V 1.0μF type. Also L: 3.2±0.2, W: 1.6±0.2, T: 1.15±0.15 for GRM31 16V 1.5μF and 2.2μF type.

Dimensions are shown in mm and Rated Voltage in Vdc.

## High Dielectric Constant Type X7R (R7) Characteristics

TC	X7R (R7)																	
Part Number	GRM15				GRM18					GRM21				GRM31				
L x W [EIA]	1.00x0.50 [0402]				1.60x0.80 [0603]					2.00x1.25 [0805]				3.20x1.60 [1206]				
Rated Volt.	50 (1H)	25 (1E)	16 (1C)	10 (1A)	100 (2A)	50 (1H)	25 (1E)	16 (1C)	10 (1A)	100 (2A)	50 (1H)	25 (1E)	16 (1C)	100 (2A)	50 (1H)	25 (1E)	16 (1C)	10 (1A)
Capacitance (Capacitance part numbering code) and T (mm) Dimension (T Dimension part numbering code)																		
220pF (221)	0.50 (5)					0.80 (8)												
330pF (331)	0.50 (5)					0.80 (8)												
470pF (471)	0.50 (5)					0.80 (8)												
680pF (681)	0.50 (5)					0.80 (8)												
1000pF (102)	0.50 (5)					0.80 (8)												
1500pF (152)	0.50 (5)					0.80 (8)												
2200pF (222)	0.50 (5)				0.80 (8)	0.80 (8)												
3300pF (332)	0.50 (5)				0.80 (8)	0.80 (8)												
4700pF (472)	0.50 (5)					0.80 (8)				0.85 (9)								
6800pF (682)		0.50 (5)				0.80 (8)				0.85 (9)								
10000pF (103)		0.50 (5)				0.80 (8)				1.25 (B)								
15000pF (153)			0.50 (5)			0.80 (8)												
22000pF (223)			0.50 (5)			0.80 (8)												
33000pF (333)				0.50 (5)		0.80 (8)	0.80 (8)				0.85 (9)			1.15 (M)				

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TC	X7R (R7)																	
Part Number	GRM15				GRM18					GRM21				GRM31				
L x W [EIA]	1.00x0.50 [0402]				1.60x0.80 [0603]					2.00x1.25 [0805]				3.20x1.60 [1206]				
Rated Volt.	50 (1H)	25 (1E)	16 (1C)	10 (1A)	100 (2A)	50 (1H)	25 (1E)	16 (1C)	10 (1A)	100 (2A)	50 (1H)	25 (1E)	16 (1C)	100 (2A)	50 (1H)	25 (1E)	16 (1C)	10 (1A)
Capacitance (Capacitance part numbering code) and T (mm) Dimension (T Dimension part numbering code)																		
47000pF (473)				0.50 (5)		0.80 (8)	0.80 (8)				1.25 (B)			1.15 (M)				
68000pF (683)						0.80 (8)	0.80 (8)				1.25 (B)							
0.10μF (104)			0.50 (5)	0.50 (5)		0.80 (8)	0.80 (8)	0.80 (8)			1.25 (B)	1.25 (B)						
0.15μF (154)							0.80 (8)		0.80 (8)		1.25 (B)	1.25 (B)						
0.22μF (224)								0.80 (8)	0.80 (8)		1.25 (B)	0.85 (9)						
0.33μF (334)											0.85 (9)	1.25 (B)			0.85 (9)			
0.47μF (474)											1.25 (B)	1.25 (B)	0.85 (9)		1.15 (M)			
0.68μF (684)													0.85 (9)			0.85 (9)		
1.0μF (105)													1.25 (B)		1.15 (M)	1.15 (M)	0.85 (9)	0.85 (9)
1.5μF (155)															1.60 (C)		1.15 (M)	
2.2μF (225)															1.60 (C)		1.15 (M)	0.85 (9)
3.3μF (335)																1.60 (C)		
4.7μF (475)																1.60 (C)		

The part numbering code is shown in each ( ).

The tolerance will be changed to L: 3.2±0.2, W: 1.6±0.2 for GRM31 16V 1.0μF type. Also L: 3.2±0.2, W: 1.6±0.2, T: 1.15±0.15 for GRM31 16V 1.5μF and 2.2μF type.  
Dimensions are shown in mm and Rated Voltage in Vdc.

## High Dielectric Constant Type Y5V (F5) Characteristics

TC	Y5V (F5)																
Part Number	GRM15			GRM18					GRM21				GRM31				
L x W [EIA]	1.00x0.50 [0402]			1.60x0.80 [0603]					2.00x1.25 [0805]				3.20x1.60 [1206]				
Rated Volt.	50 (1H)	25 (1E)	16 (1C)	100 (2A)	50 (1H)	25 (1E)	16 (1C)	10 (1A)	50 (1H)	25 (1E)	16 (1C)	10 (1A)	50 (1H)	25 (1E)	16 (1C)	10 (1A)	6.3 (0J)
Capacitance (Capacitance part numbering code) and T (mm) Dimension (T Dimension part numbering code)																	
2200pF (222)	0.50 (5)																
4700pF (472)	0.50 (5)			0.80 (8)													
10000pF (103)	0.50 (5)				0.80 (8)												
22000pF (223)		0.50 (5)			0.80 (8)												
47000pF (473)			0.50 (5)		0.80 (8)												
0.10μF (104)		0.50 (5)	0.50 (5)		0.80 (8)	0.80 (8)			0.85 (9)								

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TC	Y5V (F5)																
Part Number	GRM15			GRM18					GRM21				GRM31				
L x W [EIA]	1.00x0.50 [0402]			1.60x0.80 [0603]					2.00x1.25 [0805]				3.20x1.60 [1206]				
Rated Volt.	50 (1H)	25 (1E)	16 (1C)	100 (2A)	50 (1H)	25 (1E)	16 (1C)	10 (1A)	50 (1H)	25 (1E)	16 (1C)	10 (1A)	50 (1H)	25 (1E)	16 (1C)	10 (1A)	6.3 (0J)
Capacitance (Capacitance part numbering code) and T (mm) Dimension (T Dimension part numbering code)																	
0.22μF (224)							0.80 (8)		1.25 (B)	0.85 (9)							
0.47μF (474)							0.80 (8)	0.80 (8)		1.25 (B)			1.15 (M)				
1.0μF (105)							0.80 (8)	0.80 (8)		0.85 (9)	0.85 (9)	0.85 (9)		1.15 (M)	0.85 (9)		
2.2μF (225)										1.25 (B)	1.25 (B)	1.25 (B)			1.15 (M)	0.85 (9)	
4.7μF (475)												1.25 (B)		1.15 (M)	1.15 (M)	1.15 (M)	
10μF (106)														1.60 (C)		1.15 (M)	1.15 (M)

The part numbering code is shown in each ( ).

T: 1.25±0.1mm is also available for GRM21 25V or 16V 1.0μF type.

Dimensions are shown in mm and Rated Voltage in Vdc.

## High Dielectric Constant Type Z5U (E4) Characteristics

TC	Z5U (E4)		
Part Number	GRM18	GRM21	GRM31
L x W [EIA]	1.60x0.80 [0603]	2.00x1.25 [0805]	3.20x1.60 [1206]
Rated Volt.	50 (1H)	50 (1H)	50 (1H)
Capacitance (Capacitance part numbering code) and T (mm) Dimension (T Dimension part numbering code)			
10000pF(103)	0.80(8)		
22000pF(223)	0.80(8)		
47000pF(473)		0.60(6)	
0.10μF(104)		0.85(9)	
0.22μF(224)			0.85(9)

The part numbering code is shown in ( ).

Dimensions are shown in mm and Rated Voltage in Vdc.



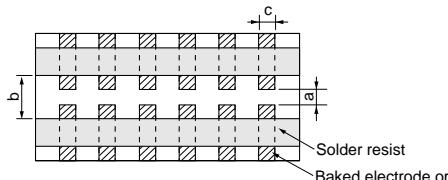
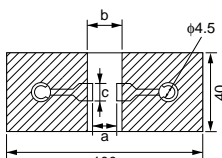
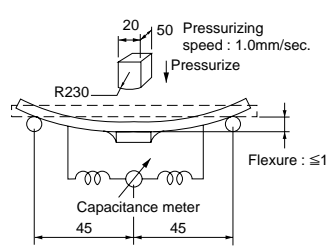
## GRM Series Specifications and Test Methods

No.	Item		Specifications		Test Method																								
			Temperature Compensating Type	High Dielectric Type																									
1	Operating Temperature		−55 to +125℃	R6 : −55 to +85℃ R7 : −55 to +125℃ E4 : +10 to +85℃ F5 : −30 to +85℃																									
2	Rated Voltage		See the previous page.		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.																								
3	Appearance		No defects or abnormalities		Visual inspection																								
4	Dimensions		Within the specified dimensions		Using calipers on micrometer																								
5	Dielectric Strength		No defects or abnormalities		No failure should be observed when *300% of the rated voltage (C0Δ to U2J and SL) or *250% of the rated voltage (X5R, X7R, Z5U and Y5V) is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA. *200% for 500V																								
6	Insulation Resistance		More than 10,000MΩ or 500Ω • F (Whichever is smaller)		The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at 25℃ and 75%RH max. and within 2 minutes of charging.																								
7	Capacitance		Within the specified tolerance		The capacitance/Q/D.F. should be measured at 25℃ at the frequency and voltage shown in the table.																								
8	Q/ Dissipation Factor (D.F.)		30pFmin. : Q≥1000 30pFmax. : Q≥400+20C C : Nominal Capacitance (pF)	[R6, R7] W.V. : 25Vmin. : 0.025max. W.V. : 16/10V : 0.035max. W.V. : 6.3V 0.05max.(C<3.3μF) 0.1max.(C≥3.3μF) [E4] W.V. : 25Vmin. : 0.025max. [F5] W.V. : 25Vmin. : 0.05max.(C<0.10μF) : 0.09max.(C≥0.10μF) W.V. : 16V/10V : 0.125max. W.V. : 6.3Vmax. : 0.15max.	<table><tr><th>Item</th><th>Char.</th><th>Frequency</th><th>Voltage</th></tr><tr><td>ΔC to 7U, 1X (1000pF and below)</td><td></td><td>1±0.1MHz</td><td>0.5 to 5Vrms</td></tr><tr><td>ΔC to 7U, 1X (more than 1000pF)</td><td></td><td>1±0.1kHz</td><td>1±0.2Vrms</td></tr><tr><td>R6, R7, F5 (10μF and below)</td><td></td><td>1±0.1kHz</td><td>1±0.2Vrms</td></tr><tr><td>R6, R7, F5 (more than 10μF)</td><td></td><td>120±24Hz</td><td>0.5±0.1Vrms</td></tr><tr><td>E4</td><td></td><td>1±0.1kHz</td><td>0.5±0.05Vrms</td></tr></table>	Item	Char.	Frequency	Voltage	ΔC to 7U, 1X (1000pF and below)		1±0.1MHz	0.5 to 5Vrms	ΔC to 7U, 1X (more than 1000pF)		1±0.1kHz	1±0.2Vrms	R6, R7, F5 (10μF and below)		1±0.1kHz	1±0.2Vrms	R6, R7, F5 (more than 10μF)		120±24Hz	0.5±0.1Vrms	E4		1±0.1kHz	0.5±0.05Vrms
					Item	Char.	Frequency	Voltage																					
					ΔC to 7U, 1X (1000pF and below)		1±0.1MHz	0.5 to 5Vrms																					
					ΔC to 7U, 1X (more than 1000pF)		1±0.1kHz	1±0.2Vrms																					
					R6, R7, F5 (10μF and below)		1±0.1kHz	1±0.2Vrms																					
					R6, R7, F5 (more than 10μF)		120±24Hz	0.5±0.1Vrms																					
E4		1±0.1kHz	0.5±0.05Vrms																										
9	Capacitance Temperature Characteristics	Capacitance Change	Within the specified tolerance (Table A)	R6 : Within±15% (−55 to +85℃) R7 : Within±15% (−55 to +125℃) E4 : Within +22/−56% (+10 to +85℃) F5 : Within +22/−82% (−30 to +85℃)	The capacitance change should be measured after 5 Min. at each specified temperature stage. (1) Temperature Compensating Type The temperature coefficient is determined using the Capacitance measured in step 3 as a reference. When cycling the temperature sequentially from step 1 through 5 (C0Δ : +25℃ to +125℃ : other temp. coeffs. : +25℃ to +85℃) the capacitance should be within the specified tolerance for the temperature coefficient and capacitance change as Table A. The capacitance drift is calculated by dividing the differences between the maximum and minimum measured values in steps 1, 3 and 5 by the capacitance value in step 3. <table><tr><th>Step</th><th>Temperature(℃)</th></tr><tr><td>1</td><td>25±2</td></tr><tr><td>2</td><td>−55±3 (for ΔC to 7U/1X/R6/R7) −30±3 (for F5) 10±3 (for E4)</td></tr><tr><td>3</td><td>25±2</td></tr><tr><td>4</td><td>125±3 (for ΔC/R7) 85±3 (for other TC)</td></tr><tr><td>5</td><td>25±2</td></tr></table>	Step	Temperature(℃)	1	25±2	2	−55±3 (for ΔC to 7U/1X/R6/R7) −30±3 (for F5) 10±3 (for E4)	3	25±2	4	125±3 (for ΔC/R7) 85±3 (for other TC)	5	25±2												
		Step	Temperature(℃)																										
		1	25±2																										
2	−55±3 (for ΔC to 7U/1X/R6/R7) −30±3 (for F5) 10±3 (for E4)																												
3	25±2																												
4	125±3 (for ΔC/R7) 85±3 (for other TC)																												
5	25±2																												
Temperature Coefficient	Within the specified tolerance (Table A)	—																											
Capacitance Drift	Within ±0.2% or ±0.05pF (Whichever is larger.) *Does not apply to 1X/25V	—																											
					(2) High Dielectric Constant Type The ranges of capacitance change compared with the above 25℃ value over the temperature ranges shown in the table should be within the specified ranges.																								

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## GRM Series Specifications and Test Methods

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No.	Item	Specifications		Test Method																																				
		Temperature Compensating Type	High Dielectric Type																																					
10	Adhesive Strength of Termination	No removal of the terminations or other defect should occur.		<p>Solder the capacitor to the test jig (glass epoxy board) shown in Fig. 1 using a eutectic solder. Then apply 10N* force in parallel with the test jig for 10±1sec. The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. *2N (GR□03) 5N (GR□15, GRM18)</p>  <table><tr><th>Type</th><th>a</th><th>b</th><th>c</th></tr><tr><td>GR□03</td><td>0.3</td><td>0.9</td><td>0.3</td></tr><tr><td>GR□15</td><td>0.4</td><td>1.5</td><td>0.5</td></tr><tr><td>GRM18</td><td>1.0</td><td>3.0</td><td>1.2</td></tr><tr><td>GRM21</td><td>1.2</td><td>4.0</td><td>1.65</td></tr><tr><td>GRM31</td><td>2.2</td><td>5.0</td><td>2.0</td></tr><tr><td>GRM32</td><td>2.2</td><td>5.0</td><td>2.9</td></tr><tr><td>GRM43</td><td>3.5</td><td>7.0</td><td>3.7</td></tr><tr><td>GRM55</td><td>4.5</td><td>8.0</td><td>5.6</td></tr></table> <p>(in mm)</p> <p>Fig. 1</p>	Type	a	b	c	GR□03	0.3	0.9	0.3	GR□15	0.4	1.5	0.5	GRM18	1.0	3.0	1.2	GRM21	1.2	4.0	1.65	GRM31	2.2	5.0	2.0	GRM32	2.2	5.0	2.9	GRM43	3.5	7.0	3.7	GRM55	4.5	8.0	5.6
Type	a	b	c																																					
GR□03	0.3	0.9	0.3																																					
GR□15	0.4	1.5	0.5																																					
GRM18	1.0	3.0	1.2																																					
GRM21	1.2	4.0	1.65																																					
GRM31	2.2	5.0	2.0																																					
GRM32	2.2	5.0	2.9																																					
GRM43	3.5	7.0	3.7																																					
GRM55	4.5	8.0	5.6																																					
11	Vibration Resistance	<p>Appearance No defects or abnormalities</p> <p>Capacitance Within the specified tolerance</p> <p>Q/D.F.</p> <p>30pFmin. : Q≥1000 30pFmax. : Q≥400+20C C : Nominal Capacitance (pF)</p> <p>[R6, R7] W.V. : 25Vmin. : 0.025max. W.V. : 16/10V : 0.035max. W.V. : 6.3V : 0.05max. (C&lt;3.3μF) 0.1max. (C≥3.3μF)</p> <p>[E4] W.V. : 25Vmin. : 0.025max.</p> <p>[F5] W.V. : 25Vmin. : 0.05max. (C&lt;0.10μF) : 0.09max. (C≥0.10μF) W.V. : 16V/10V : 0.125max. W.V. : 6.3Vmax. : 0.15max.</p>	<p>Solder the capacitor to the test jig (glass epoxy board) in the same manner and under the same conditions as (10). The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should be applied for a period of 2 hours in each of 3 mutually perpendicular directions (total of 6 hours).</p>																																					
12	Deflection	<p>No crack or marked defect should occur.</p>  <table><tr><th>Type</th><th>a</th><th>b</th><th>c</th></tr><tr><td>GR□03</td><td>0.3</td><td>0.9</td><td>0.3</td></tr><tr><td>GR□15</td><td>0.4</td><td>1.5</td><td>0.5</td></tr><tr><td>GRM18</td><td>1.0</td><td>3.0</td><td>1.2</td></tr><tr><td>GRM21</td><td>1.2</td><td>4.0</td><td>1.65</td></tr><tr><td>GRM31</td><td>2.2</td><td>5.0</td><td>2.0</td></tr><tr><td>GRM32</td><td>2.2</td><td>5.0</td><td>2.9</td></tr><tr><td>GRM43</td><td>3.5</td><td>7.0</td><td>3.7</td></tr><tr><td>GRM55</td><td>4.5</td><td>8.0</td><td>5.6</td></tr></table> <p>(in mm)</p> <p>Fig. 2</p>	Type	a	b	c	GR□03	0.3	0.9	0.3	GR□15	0.4	1.5	0.5	GRM18	1.0	3.0	1.2	GRM21	1.2	4.0	1.65	GRM31	2.2	5.0	2.0	GRM32	2.2	5.0	2.9	GRM43	3.5	7.0	3.7	GRM55	4.5	8.0	5.6	<p>Solder the capacitor on the test jig (glass epoxy board) shown in Fig. 2 using a eutectic solder. Then apply a force in the direction shown in Fig. 3. The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.</p>  <p>Fig. 3</p>	
Type	a	b	c																																					
GR□03	0.3	0.9	0.3																																					
GR□15	0.4	1.5	0.5																																					
GRM18	1.0	3.0	1.2																																					
GRM21	1.2	4.0	1.65																																					
GRM31	2.2	5.0	2.0																																					
GRM32	2.2	5.0	2.9																																					
GRM43	3.5	7.0	3.7																																					
GRM55	4.5	8.0	5.6																																					

Continued on the following page.

## GRM Series Specifications and Test Methods

Continued from the preceding page.

No.	Item	Specifications		Test Method															
		Temperature Compensating Type	High Dielectric Type																
13	Solderability of Termination	75% of the terminations are to be soldered evenly and continuously.		Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight propotion). Preheat at 80 to 120°C for 10 to 30 seconds. After preheating, immerse in eutectic solder solution for 2±0.5 seconds at 230±5°C.															
14	Resistance to Soldering Heat		The measured and observed characteristics should satisfy the specifications in the following table.																
		Appearance	No marking defects																
		Capacitance Change	Within ±2.5% or ±0.25pF (Whichever is larger)	R6, R7 : Within ±7.5% E4, F5 : Within ±20%															
		Q/D.F.	30pFmin. : Q≥1000 30pFmax. : Q≥400+20C C : Nominal Capacitance (pF)	[R6, R7] W.V. : 25Vmin. : 0.025max. W.V. : 16/10V : 0.035max. W.V. : 6.3V : 0.05max. (C<3.3μF) 0.1max. (C≥3.3μF) [E4] W.V. : 25Vmin. : 0.025max. [F5] W.V. : 25Vmin. : 0.05max. (C<0.10μF) 0.09max. (C≥0.10μF) W.V. : 16V/10V : 0.125max. W.V. : 6.3Vmax. : 0.15max.															
		I.R.	More than 10,000MΩ or 500Ω • F (Whichever is smaller)																
		Dielectric Strength	No failure																
15	Temperature Cycle		The measured and observed characteristics should satisfy the specifications in the following table.																
		Appearance	No marking defects																
		Capacitance Change	Within ±2.5% or ±0.25pF (Whichever is larger)	R6, R7 : Within ±7.5% E4, F5 : Within ±20%															
		Q/D.F.	30pFmin. : Q≥1000 30pFmax. : Q≥400+20C C : Nominal Capacitance (pF)	[R6, R7] W.V. : 25Vmin. : 0.025max. W.V. : 16/10V : 0.035max. W.V. : 6.3V : 0.05max. (C<3.3μF) 0.1max. (C≥3.3μF) [E4] W.V. : 2.5Vmin. : 0.025max. [F5] W.V. : 25Vmin. : 0.05max. (C<0.10μF) 0.09max. (C≥0.10μF) W.V. : 16V/10V : 0.125max. W.V. : 6.3Vmax. : 0.15max.															
		I.R.	More than 10,000MΩ or 500Ω • F (Whichever is smaller)																
		Dielectric Strength	No failure																
				Preheat the capacitor at 120 to 150°C for 1 minute. Immerse the capacitor in a eutectic solder solution at 270±5°C 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.  •Initial measurement for high dielectric constant type Perform a heat treatment at 150 ±18°C for one hour and then let sit for 48±4 hours at room temperature. Perform the initial measurement.  *Preheating for GRM32/43/55															
				<table><tr><th>Step</th><th>Temperature</th><th>Time</th></tr><tr><td>1</td><td>100°C to 120°C</td><td>1 min.</td></tr><tr><td>2</td><td>170°C to 200°C</td><td>1 min.</td></tr></table>	Step	Temperature	Time	1	100°C to 120°C	1 min.	2	170°C to 200°C	1 min.						
Step	Temperature	Time																	
1	100°C to 120°C	1 min.																	
2	170°C to 200°C	1 min.																	
				Fix the capacitor to the supporting jig in the same manner and under the same conditions as (10). Perform the five cycles according to the four heat treatments listed in the following table. Let sit for 24±2 hours (temperature compensating type) or 48±4 hour (high dielectric constant type) 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. (°C)</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>	Step	1	2	3	4	Temp. (°C)	Min. Operating Temp.+0/−3	Room Temp.	Max. Operating Temp.+3/−0	Room Temp.	Time (min.)	30±3	2 to 3	30±3	2 to 3
Step	1	2	3	4															
Temp. (°C)	Min. Operating Temp.+0/−3	Room Temp.	Max. Operating Temp.+3/−0	Room Temp.															
Time (min.)	30±3	2 to 3	30±3	2 to 3															
				•Initial measurement for high dielectric constant type Perform a heat treatment at 150 ±18°C for one hour and then let sit for 48±4 hours at room temperature. Perform the initial measurement.															

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## GRM Series Specifications and Test Methods

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No.	Item	Specifications		Test Method
		Temperature Compensating Type	High Dielectric Type	
16	Humidity Steady State	The measured and observed characteristics should satisfy the specifications in the following table.		Let the capacitor sit at 40±2°C 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.
		Appearance	No marking defects	
		Capacitance Change	Within ±5% or ±0.5pF (Whichever is larger)	
		Q/D.F.	30pF and over : $Q \geq 350$ 10pF and over : $Q \geq 275 + 5C/2$ 30pF and below : $Q \geq 200 + 10C$ C : Nominal Capacitance (pF)	
		I.R.	More than 1,000MΩ or 50Ω • F (Whichever is smaller)	
		Dielectric Strength	No failure	
17	Humidity Load	The measured and observed characteristics should satisfy the specifications in the following table.		Apply the rated voltage at 40±2°C 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.  •Initial measurement for F5/10V max. Apply the rated DC voltage for 1 hour at 40±2°C. Remove and let sit for 48±4 hours at room temperature. Perform initial measurement.
		Appearance	No marking defects	
		Capacitance Change	Within ±7.5% or ±0.75pF (Whichever is larger)	
		Q/D.F.	30pF and over : $Q \geq 200$ 30pF and below : $Q \geq 100 + 10C/3$ C : Nominal Capacitance (pF)	
		I.R.	More than 500MΩ or 25Ω • F (Whichever is smaller)	
		Dielectric Strength	No failure	

Continued on the following page. ➤

## GRM Series Specifications and Test Methods

Continued from the preceding page.

No.	Item	Specifications		Test Method
		Temperature Compensating Type	High Dielectric Type	
18	High Temperature Load	The measured and observed characteristics should satisfy the specifications in the following table.		<p>Apply 200% of the rated voltage for 1000±12 hours at the maximum operating temperature ±3°C. 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.</p> <p>•Initial measurement for high dielectric constant type. Apply 200% of the rated DC voltage for one hour at the maximum operating temperature ±3°C. Remove and let sit for 48±4 hours at room temperature. Perform initial measurement.</p> <p>*150% for 500V and C≥10μF</p>
		Appearance	No marking defects	
		Capacitance Change	<p>Within ±3% or ±0.3pF (Whichever is larger)</p> <p>R6, R7 : Within ±12.5% E4 : Within ±30% F5 : Within ±30% (Cap&lt;1.0μF) F5 : Within +30/-40% (Cap≥1.0μF)</p>	
		Q/D.F.	<p>30pF and over : Q≥350 10pF and over 30pF and below : Q≥275+5C/2 10pF and below : Q≥200+10C C : Nominal Capacitance (pF)</p> <p>[R6, R7] W.V. : 25Vmin. : 0.05max. W.V. : 16/10V : 0.05max. W.V. : 6.3V : 0.075max. (C&lt;3.3μF) 0.125max. (C≥3.3μF) [E4] W.V. : 25Vmin. : 0.05max [F5] W.V. : 25Vmin. : 0.075max. (C&lt;0.10μF) 0.125max. (C≥0.10μF) W.V. : 16V/10V : 0.15max. W.V. : 6.3Vmax. : 0.2max.</p>	
		I.R.	More than 1,000MΩ or 50Ω•F (Whichever is smaller)	
		Dielectric Strength	No failure	

Table A

Char. Code	Nominal Values (ppm/°C)*	Capacitance Change from 25°C (%)					
		-55		-30		-10	
		Max.	Min.	Max.	Min.	Max.	Min.
5C	0± 30	0.58	-0.24	0.40	-0.17	0.25	-0.11
6C	0± 60	0.87	-0.48	0.59	-0.33	0.38	-0.21
6P	-150± 60	2.33	0.72	1.61	0.50	1.02	0.32
6R	-220± 60	3.02	1.28	2.08	0.88	1.32	0.56
6S	-330± 60	4.09	2.16	2.81	1.49	1.79	0.95
6T	-470± 60	5.46	3.28	3.75	2.26	2.39	1.44
7U	-750±120	8.78	5.04	6.04	3.47	3.84	2.21
1X	+350 to -1000	—	—	—	—	—	—

\*Nominal values denote the temperature coefficient within a range of 25°C to 125°C (for ΔC)/85°C (for other TC).