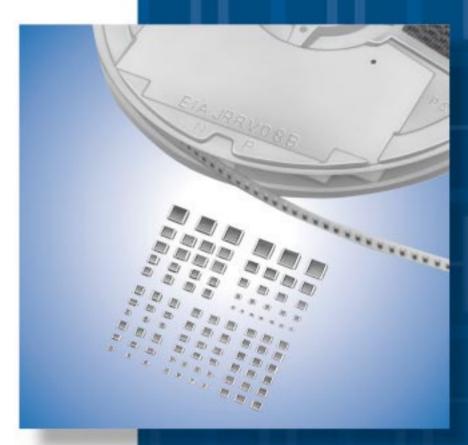
⚠Note • This PDF catalog is downloaded from the website of Murata Manufacturing co., ltd. Therefor sales representatives or product engineers before ordering.
• This PDF catalog has only typical specifications because there is no space for detailed specifications

# Chip Monolithic Ceramic Capacitors





Innovator in Electronics

Murata Manufacturing Co., Ltd.

Cat.No.C02E-14

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for EU RoHS Compliant
<ul> <li>All the products in this catalog comply with EU RoHS.</li> </ul>
$\cdot$ EU RoHS is "the European Directive 2002/95/EC on the Restriction of the Use
of Certain Hazardous Substances in Electrical and Electronic Equipment".
$\cdot$ For more details, please refer to our website 'Murata's Approach for EU RoHS'
(http://www.murata.com/info/rohs.html).



#### Part Numbering

#### Chip Monolithic Ceramic Capacitors

(Part Number)	GR	М	18	8	B1	1H	102	κ	A01	κ
	0	2	3	4	6	6	0	8	9	0

#### Product ID **O**Sorios

2 Series		
Product ID	Code	Series
	М	Tin Plated Layer
GR	4	Only for Information Devices /Tip & Ring
	7	Only for Camera Flash Circuit
ER	В	High Frequency Type
GQ	м	High Frequency for Flow /Reflow Soldering
GM	Α	Monolithic Microchip
Givi	D	for Bonding
GN	М	Capacitor Array
	L	Low ESL Wide Width Type
LL	Α	Eight-termination Low ESL Type
	М	Ten-termination Low ESL Type
GJ	М	High Frequency Low Loss Type
GA	2	for AC 250V (r.m.s.)
GA	3	Safety Standard Recognized Type

#### ③Dimension (L×W)

Code	Dimension (L×W)	EIA
02	0.4×0.2mm	01005
03	0.6×0.3mm	0201
05	0.5×0.5mm	0202
08	0.8×0.8mm	0303
0D	0.38×0.38mm	01 501 5
0M	0.9×0.6mm	0302
11	1.25×1.0mm	0504
15	1.0×0.5mm	0402
18	1.6×0.8mm	0603
1M	1.37×1.0mm	0504
21	2.0×1.25mm	0805
22	28×28mm	1111
31	3.2×1.6mm	1206
32	3.2×2.5mm	1210
42	4.5×20mm	1808
43	4.5×3.2mm	1812
52	5.7×28mm	2211
55	5.7×5.0mm	2220

●Dimension (T)	
Code	Dimension (T)
2	0.2mm
2	2-elements (Array Type)
3	0.3m m
4	4-elements (Array Type)
5	Q. 5m m
6	Q. Gm m
7	Q. 7m m
8	0.8m m
9	0.85m m
Α	1.Om m
В	1.25m m
С	1. Gm m
D	2.Om m
E	2.5m m
F	3.2mm
м	1.15mm
N	1.35m m
Q	1. <i>5</i> m m
R	1.8mm
S	2.8m m
x	Depends on individual standards.

With the array type GNM series, "Dimension (T)" indicates the number of elements.

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Temperature Characteristic Codes							
Code	Public STD	Code	le Referance Temperature	Temperature Range	Capacitance Change or Temperature Coefficient	Operating Temperature Range	
1X	SL *1	JIS	20°C	20 to 85°C	+350 to -1000ppm/°C	-55 to 125°C	
2C	CH *1	JIS	20°C	20 to 125°C	O±6Oppm./°C	-55 to 125°C	
2P	PH *1	JIS	20°C	20 to 85°C	-150±60ppm /°C	-25 to 85°C	
2R	RH *1	JIS	20°C	20 to 85°C	-220±60ppm /°C	-25 to 85°C	
2S	SH *1	JIS	20°C	20 to 85°C	-330±60ppm /°C	-25 to 85°C	
2T	TH *1	JIS	20°C	20 to 85°C	-470±60ppm /°C	-25 to 85°C	
3C	CJ *1	JIS	20°C	20 to 125°C	O±12Oppm /°C	-55 to 125°C	
3P	PJ *1	JIS	20°C	20 to 85°C	-150±120ppm /°C	-25 to 85°C	
3R	RJ *1	JIS	20°C	20 to 85°C	-220±120ppm /°C	-25 to 85°C	
3S	SJ *1	JIS	20°C	20 to 85°C	-330±120ppm /°C	-25 to 85°C	
3T	TJ *1	JIS	20°C	20 to 85°C	-470±120ppm /°C	-25 to 85°C	
3U	UJ *1	JIS	20°C	20 to 85°C	-750±120ppm /°C	-25 to 85°C	
4C	CK *1	JIS	20°C	20 to 125°C	O±250ppm /°C	-55 to 125°C	
5C	COG *1	EIA	25°C	25 to 125°C	O±3Oppm/°C	-55 to 125°C	
5G	X8G *1	EIA	25°C	25 to 150°C	O±3Cppm.^C	-55 to 150°C	
6C	COH *1	EIA	25°C	25 to 125°C	O±6Cppm./°C	-55 to 125°C	
6P	P2H *1	EIA	25°C	25 to 85°C	-150±60ppm./°C	-55 to 125°C	
6R	R2H *1	EIA	25°C	25 to 85°C	-220±60ppm /°C	-55 to 125°C	
6S	S2H *1	EIA	25°C	25 to 85°C	-330±60ppm /°C	-55 to 125°C	
6T	T2H *1	EIA	25°C	25 to 85°C	-470±60ppm /°C	-55 to 125°C	
7U	U2J *1	EIA	25°C	25 to 125°C	-750±120ppm /°C	-55 to 125°C	
B1	B *2	JIS	20°C	-25 to 85°C	±10%	-25 to 85°C	
B3	В	JIS	20°C	-25 to 85°C	±10%	-25 to 85°C	
C7	X7S	EIA	25°C	-55 to 125°C	±22%	-55 to 125°C	
C8	X6S	EIA	25°C	-55 to 105°C	±22%	-55 to 105°C	
D7	X7T	EIA	25°C	-55 to 125°C	+22, -33%	-55 to 125°C	
D8	X6T	EIA	25°C	-55 to 105°C	+22, -33%	-55 to 105°C	
E7	X7U	EIA	25°C	-55 to 125°C	+22, -56%	-55 to 125°C	
F1	F *2	JIS	20°C	-25 to 85°C	+30, -80%	-25 to 85°C	
F5	Y 5V	EIA	25°C	-30 to 85°C	+22, -82%	-30 to 85°C	
L8	X8L	EIA	25°C	-55 to 150°C	+15, -40%	-55 to 150°C	
R1	R *2	JIS	20°C	-55 to 125°C	±15%	-55 to 125°C	
R3	R	JIS	20°C	-55 to 125°C	±15%	-55 to 125°C	
R6	X5R	EIA	25°C	-55 to 85°C	±15%	-55 to 85°C	
R7	X7R	EIA	25°C	-55 to 125°C	±15%	-55 to 125°C	
R9	X8R	EIA	25°C	-55 to 150°C	±15%	-55 to 150°C	
<b>.</b>			0000	-25 to 20°C	-4700+1000/-2500ppm /°C		
9E	ZLM	*3	20°C	20 to 85°C	-4700+500/-1000ppm/°C	-25 to 85°C	
			05-0		±10% *4		
W0	-	-	25°C	-55 to 125°C	+22, -33% *5	55 to 125°C	

\*2 Capacitance change is specified with 50% rated voltage applied.

\*3, \*4 Murata Temperature Characteristic Code.

\*4 Apply DC 350V bias. \*5 No DC bias.

Continued on the following page.  $\square$ 



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•Capacitance Change from each temperature

JIS Code

	Capacitance Change from 20°C (%)						
Murata Code	-5	5°C	-2	5°C	–10°C		
	Max.	Min.	Max.	Min.	Max.	Min.	
1X	-	-	-	-	-	-	
2C	0.82	-0.45	0.49	-0.27	0.33	-0.18	
2P	-	-	1.32	0.41	0.88	0.27	
2R	_	-	1.70	0.72	1.13	0.48	
2S	_	-	2.30	1.22	1.54	0.81	
2Т	-	-	3.07	1.85	2.05	1.23	
3C	1.37	-0.90	0.82	-0.54	0.55	-0.36	
3P	_	-	1.65	0.14	1.10	0.09	
3R	_	-	2.03	0.45	1.35	0.30	
3S	_	-	2.63	0.95	1.76	0.63	
3Т	_	-	3.40	1.58	2.27	1.05	
3U	_	-	4.94	2.84	3.29	1.89	
4C	2.56	-1.88	1.54	-1.13	1.02	-0.75	

EIA Code

	Capacitance Change from 25°C (%)						
Murata Code	–55°C		-30	D <sub>0</sub> C	–10°C		
	Max.	Min.	Max.	Min.	Max.	Min.	
5C/5G	0.58	-0.24	0.40	-0.17	0.25	-0.11	
6C	0.87	-0.48	0.59	-0.33	0.38	-0.21	
6P	2 33	0.72	1.61	0.50	1.02	0.32	
6R	3.02	1.28	2.08	0.88	1.32	0.56	
6S	4.09	216	2.81	1.49	1.79	0.95	
6Т	5.46	3.28	3.75	2.26	2.39	1.44	
7U	8.78	5.04	6.04	3.47	3.84	2.21	

#### 6 Rated Voltage

Code	Rated Voltage
0G	DC 4V
0J	DC6.3V
1 <b>A</b>	DC10V
1C	DC16V
1E	DC 25V
1H	DC 50V
2A	DC100V
2D	DC 200V
2E	DC 250V
YD	DC 300V
2H	DC 500V
2J	DC 630V
3A	DC1kV
3D	DC2kV
3F	DC315kV
BB	DC 350V (for Camera Flash Circuit)
E2	AC 250V
GB	X2; AC250V (Safety Standard Recognized Type GB)
GC	X1/Y2, AC250V (Safety Standard Recognized Type GC)
GD	Y 3; AC 250V (Safety Standard Recognized Type GD)
GF	Y2, X1/Y2, AC250V (Safety Standard Recognized Type GF)

#### Capacitance

Expressed by three-digit alphanumerics. The unit is pico-farad ( $\phi F$ ). The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two numbers. If there is a decimal point, it is expressed by the capital letter " ${\bf R}$ ". In this case, all figures are significant digits.

Ex.)	Code	Capacitance
	R50	О. 5р F
	1R0	1. Cp F
	100	1 Cp F
	103	10000p F

Continued on the following page.  $\square$ 



Code	Capacitance Tolerance	TC	Series	Capac	itance Step				
w	±0.05p F	СД	GRM/GJM	≦9.9p F	0.1p F				
			GRM/GJM	≦9.9p F	O. 1 p F				
в	±0.1p F	СΔ	GQM	≦1p F	O. 1 p F				
Б	±0. ipr		GQIM	1.1 to 9.9p F	1pF and E24 Serie				
			ERB	≦9.9p F	1pF and E24 Serie				
		СΔ	GRM/GJM	≦9.9p F	0.1p F				
		except C∆	GRM	≦5p F	* 1p F				
С	±0.25p F		ERB	≦9.9p F	1pF and E24 Serie				
		СΔ	GQM	≦1p F	0.1p F				
			GQM	1.1 to 9.9p F	1pF and E24 Serie				
	±0.5pF	СΔ	GRM/GJM	5.1 to 9.9p F	O. 1p F				
D		except C∆	GRM	5.1 to 9.9p F	* 1p F				
		CΔ	ERB/GQM	5.1 to 9.9p F	1pF and E24 Serie				
G	±2%	СΔ	GJM	≧10p F	E12 Series				
G		CΔ	GQM/ERB	≧10p F	E 24 Series				
J	±5%	CA-SL	GRM/GA3	≧10p F	E12 Series				
J	10%	СΔ	ERB/GQM/GJM	≧10pF	E 24 Series				
		B, R, X7R, X5R, ZLM	GRM/GR7/GA3	E	6 Series				
к	±10%	COG	GNM	E	6 Series				
		B, R, X7R, X5R, ZLM	GR4, GMD	E1	2 Series				
		B, R, X7R, X7S	GRM/GMA	E	6 Series				
м	±20%	X5R, X7R, X7S	GNM	E	3 Series				
IAI	120/0	X7R	GA2	E	3 Series				
		X5R, X7R, X7S, X6S	LLL/LLA/LLM	E	3 Series				
Z	+80%, -20%	F, Y 5V	GRM	E	E 3 Series				
R		Depends on individual standards.							

\* E 24 series is also available.

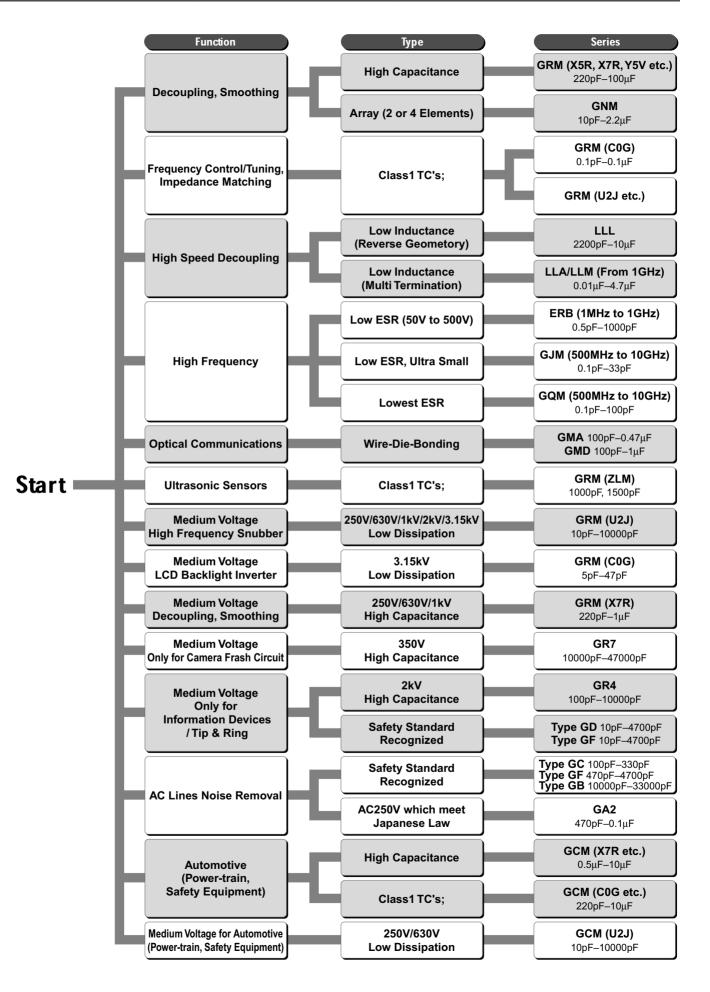
Individual Specification Code Expressed by three figures.

#### Packaging

Code	Packaging				
L	ø180mm Embossed Taping				
D	ø180mm Paper Taping				
E	ø180mm Paper Taping (LLL15)				
к	ø330mm Embossed Taping				
J	ø330mm Paper Taping				
F	ø 330mm Paper Taping (LLL15)				
В	Bulk				
С	Bulk Case				
т	Bulk Tray				



### **Selection Guide of Chip Monolithic Ceramic Capacitors**





## **Chip Monolithic Ceramic Capacitors**



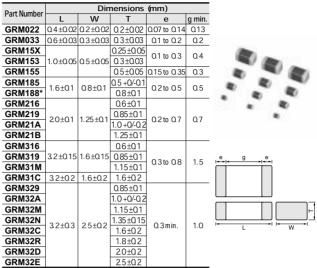
## for General Purpose GRM Series (Temperature Compensating Type)

#### Features

- Highter resistance of solder-leaching due to the Ni-barriered termination, applicable for reflow-soldering, and flow-soldering (GRM18/21/31 type only).
- 2. The GRM series is lead free product.
- 3. Smaller size and higher capacitance value.
- 4. High reliability and no polarity.
- 5. Excellent pulse responsibility and noise reduction due to the low impedance at high frequency.
- The GRM series is available in paper or embossed tape and reel packaging for automatic placement. Bulk case packaging is also available for GRM15/18/21(T=0.6,1.25).
- 7. Ta replacement.

#### Applications

General electronic equipment



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

## **Temperature Compensating Type C0G(5C) Characteristics**

Part Number L x W [EIA]		GRM02	!	GRM03	GRM15
		0.4x0.2 [01	005]	0.6x 0.3 [0201]	1.0x 0.5 [0402]
Rated Volt.		16 ( <b>1C</b> )	6.3 <b>(0J</b> )	50 ( <b>1H</b> )	50 ( <b>1H</b> )
тс		COG ( <b>5C</b> )	COG ( <b>5C</b> )	C OG ( <b>5C</b> )	COG ( <b>5C</b> )
Capacitance, Ca	apacitanc	e Tolerance and T Dimension			
0.10pF( <b>R10</b> )	W, B			O 3 <b>(3</b> )	0.5 <b>(5</b> )
0.20p F <b>(R20</b> )	<b>W</b> , B	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )
0.30p F <b>(R30</b> )	<b>W</b> , B	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )
0.40pF( <b>R40</b> )	<b>W</b> , B	0.2(2)		0.3 <b>(3)</b>	0.5 <b>(5</b> )
0.50pF <b>(R50</b> )	<b>W</b> , B	0.2(2)		0.3 <b>(3)</b>	0.5 <b>(5</b> )
0.60pF <b>(R60</b> )	<b>W</b> , B	0.2(2)		0.3 <b>(3)</b>	0.5 <b>(5</b> )
0.70pF <b>(R70</b> )	W, B	0.2 <b>2</b> )		O 3 <b>(3</b> )	0.5 <b>(5)</b>
0.80pF <b>(R80</b> )	<b>W</b> , B	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5)</b>
0.90pF( <b>R90</b> )	<b>W</b> , B	0.2 <b>2</b> )		0.3 <b>(3)</b>	0.5 <b>(5)</b>
1.Ср. F <b>(1 R 0</b> )	W, B, C	0.2 <b>2</b> )		O 3 <b>(3</b> )	0.5 <b>(5)</b>
1.1pF( <b>1R1</b> )	W, B, C	0.2 <b>2</b> )		0.3 <b>(3</b> )	0.5 <b>(5</b> )
1.2р F <b>(1R2</b> )	W, B, C	0.2 <b>2</b> )		O 3 <b>(3</b> )	0.5 <b>(5)</b>
1. Зр F <b>(1 R 3</b> )	W, B, C	0.2 <b>(2</b> )		0.3 <b>(3</b> )	0.5 <b>(5)</b>
1. 4р F ( <b>1 R4</b> )	W, B, C	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )
1.5р F <b>(1R5</b> )	W, B, C	0.2(2)		0.3 <b>(3)</b>	0.5 <b>(5</b> )
1.6p F ( <b>1R6</b> )	W, B, C	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )
1.7р F ( <b>1 R7</b> )	W, B, C	0.2(2)		0.3 <b>(3)</b>	0.5 <b>(5</b> )
1.8р F <b>(1R8</b> )	W, B, C	0.2(2)		0.3 <b>(3)</b>	0.5 <b>(5</b> )
1.9р F <b>(1 R9</b> )	W, B, C	0.2(2)		0.3 <b>(3)</b>	0.5 <b>(5</b> )
2.0pF <b>(2R0</b> )	W, B, C	0.2(2)		0.3 <b>(3)</b>	0.5 <b>(5</b> )
2 1p F <b>(2R1</b> )	W, B, C	0.2(2)		0.3 <b>(3)</b>	0.5 <b>(5</b> )
2.2pF <b>(2R2</b> )	W, B, C	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )

The part numbering code is shown in ().



Part Number		GRM02		GRM03	GRM15	
L x W [EIA]		0.4x0.2 [01	005]	0.6x0.3 [0201]	1.0x0.5 [0402]	
Rated Volt.		16 ( <b>1C</b> )	6.3 ( <b>0J</b> )	50 ( <b>1H</b> )	50 ( <b>1H</b> )	
с		COG ( <b>5C</b> )	COG ( <b>5C</b> )	COG ( <b>5C</b> )	COG ( <b>5C</b> )	
Capacitance, Cap	pacitance	e Tolerance and T Dimension				
2.3pF( <b>2R3</b> )	W, B, C	0.2(2)		0.3 <b>(3)</b>	0.5 <b>(5</b> )	
2.4pF( <b>2R4</b> )	W, B, C	0.2(2)		0.3 <b>(3)</b>	0.5 <b>(5</b> )	
2.5pF( <b>2R5</b> )	W, B, C	0.2(2)		0.3 <b>(3)</b>	0.5 <b>(5</b> )	
2.6pF( <b>2R6</b> )	W, B, C	0.2(2)		0.3 <b>(3)</b>	0.5 <b>(5</b> )	
2.7pF( <b>2R7</b> )	W, B, C	0.2(2)		0.3 <b>(3)</b>	0.5 <b>(5</b> )	
2.8pF( <b>2R8</b> )	W, B, C	0.2(2)		0.3 <b>(3)</b>	0.5 <b>(5</b> )	
2.9pF( <b>2R9</b> )	W, B, C	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )	
3.0pF( <b>3R0</b> )	W, B, C	0.2(2)		0.3 <b>(3)</b>	0.5 <b>(5</b> )	
3 1p F <b>(3R1</b> )	W, B, C	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )	
-	W, B, C	0.2(2)		0.3(3)	0.5 <b>(5)</b>	
	W, B, C	0.2(2)		0.3(3)	0.5 <b>(5</b> )	
	W, B, C	0.2(2)		0.3(3)	0.5(5)	
	W, B, C	0.2(2)		0.3(3)	0.5 <b>(5</b> )	
	W, B, C	0.2(2)		0.3(3)	0.5(5)	
-	W, B, C	0.2(2)		0.3(3)	0.5(5)	
	W, B, C	0.2(2)		0.3(3)	0.5(5)	
	W, B, C	0.2(2)		0.3(3)	0.5(5)	
	W, B, C	0.2(2)		0.3(3)	0.5(5)	
	W, B, C	0.2(2)		0.3(3)	0.5(5)	
	W, B, C	0.2(2)		0.3(3)	0.5(5)	
-	W, B, C	0.2(2)		0.3(3)	0.5(5)	
• • •	W, B, C	0.2(2)		0.3(3)	0.5(5)	
	W, B, C	0.2(2)		0.3(3)	0.5(5)	
,	W, B, C	0.2(2)		0.3(3)	0.5(5)	
	W, B, C	0.2(2)		0.3(3)	0.5(5)	
	W, B, C	0.2(2)		0.3(3)	0.5(5)	
	W, B, C	0.2(2)		0.3(3)	0.5(5)	
-	W, B, C	0.2(2)		0.3(3)	0.5(5)	
-	W, B, C, D	0.2(2)		0.3(3)	0.5(5)	
-	W, B, C, D W, B, C, D	0.2(2)		0.3(3)	0.5(5)	
	W, B, C, D W, B, C, D	0.2(2)		0.3(3)	0.5(5)	
	W, B, C, D	0.2(2)		0.3(3)	0.5(5)	
,	W, B, C, D	0.2(2)		0.3(3)	0.5(5)	
,	W, B, C, D	0.2(2)		0.3(3)	0.5(5)	
	W, B, C, D W, B, C, D	0.2(2)		0.3(3)	0.5(5)	
	W, B, C, D	0.2(2)		0.3(3)	0.5(5)	
-	W, B, C, D	0.2(2)		0.3(3)	0.5(5)	
-	W, B, C, D W, B, C, D	0.2(2)		0.3(3)	0.5(5)	
	W, B, C, D W, B, C, D	0.2(2)		0.3(3)	0.5(5)	
	W, B, C, D W, B, C, D	0.2(2)		0.3(3)	0.5(5)	
• • •	W, B, C, D W, B, C, D	0.2(2)		0.3(3)	0.5(5)	
-	W, B, C, D W, B, C, D	0.2(2)		0.3(3)	0.5(5)	
• • •	W, B, C, D W, B, C, D	0.2(2)		0.3(3)	0.5(5)	
	W, B, C, D W, B, C, D	0.2(2)		0.3(3)	0.5(5)	
-	W, B, C, D W, B, C, D	0.2(2)		0.3(3)	0.5(5)	
	W, B, C, D W, B, C, D			0.3(3)	0.5(5)	
	W, B, C, D	0.2(2)		0.3(3)	0.5(5)	

The part numbering code is shown in ().

W, B, C, D

W, B, C, D

6.9pF(6R9) W, B, C, D

7.2pF(7R2) W, B, C, D

7.0pF(**7R0**)

7.1pF(**7R1**)

Dimensions are shown in mm and Rated Voltage in Vdc.

0.2(2)

0.2(2)

0.2(2)

0.2(2)

0.5(5)

0.5(5)

0.5(5)

0.5(5)

0.3**(3**)

0.3(3)

0.3**(3**)

0.3(3)



This PDF catalog has only typical specifications because there is no space for detailed specifications. Therefore, please approve our product specifications
 D Continued from the preceding page.

Part Number		GRM		GRM03	GRM15	
L x W [EIA]		0.4x0.2	[01005]	0.6x0.3 [0201]	1.0x0.5 [0402]	
Rated Volt.		16 ( <b>1C</b> )	6.3 ( <b>0J</b> )	50 (1H)	50 ( <b>1H</b> )	
гс		COG ( <b>5C</b> )	COG ( <b>5C</b> )	COG ( <b>5C</b> )	COG ( <b>5C</b> )	
Capacitance, Ca	pacitance Tole	erance and T Dimension				
7.3pF( <b>7R3</b> )	W, B, C, D	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )	
7.4pF( <b>7R4</b> )	W, B, C, D	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )	
7.5pF( <b>7R5</b> )	W, B, C, D	0.2(2)		0.3 <b>(3)</b>	0.5 <b>(5</b> )	
7.6pF( <b>7R6</b> )	W, B, C, D	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )	
7.7pF( <b>7R7</b> )	W, B, C, D	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )	
7.8pF( <b>7R8</b> )	W, B, C, D	0.2(2)		0.3 <b>(3)</b>	0.5 <b>(5</b> )	
7.9pF( <b>7R9</b> )	W, B, C, D	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )	
8.0pF( <b>8R0</b> )	W, B, C, D	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5)</b>	
8.1pF <b>(8R1</b> )	W, B, C, D	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )	
8.2pF <b>(8R2</b> )	W, B, C, D	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )	
8.3pF( <b>8R3</b> )	W, B, C, D	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )	
8.4p F <b>(8R4</b> )	W, B, C, D	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )	
8.5p F <b>(8R5</b> )	W, B, C, D	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )	
8.6pF( <b>8R6</b> )	W, B, C, D	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )	
8.7p F (8R7)	W, B, C, D	0.2(2)		0.3(3)	0.5 <b>(5</b> )	
8.8pF( <b>8R8</b> )	W, B, C, D	0.2(2)		0.3(3)	0.5 <b>(5</b> )	
8.9pF( <b>8R9</b> )	W, B, C, D	0.2(2)		0.3(3)	0.5 <b>(5</b> )	
9.0pF( <b>9R0</b> )	W, B, C, D	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )	
9.1pF ( <b>9R1</b> )	W, B, C, D	0.2(2)		0.3 <b>(3</b> )	0.5(5)	
9.2pF( <b>9R2</b> )	W, B, C, D	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )	
9.3pF( <b>9R3</b> )	W, B, C, D	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )	
9.4pF ( <b>9R4</b> )	W, B, C, D	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )	
	W, B, C, D	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )	
9.6pF <b>(9R6</b> )	W, B, C, D	0.2(2)		0.3 <b>(3</b> )	0.5 <b>(5</b> )	
	W, B, C, D	0.2(2)		0.3 <b>(3</b> )	0.5(5)	
	W, B, C, D	0.2(2)		0.3(3)	0.5(5)	
	W, B, C, D	0.2(2)		0.3 <b>(3</b> )	0.5(5)	
10pF( <b>100</b> )	J	0.2(2)		0.3(3)	0.5 <b>(5</b> )	
12pF( <b>120</b> )	J	0.2(2)		0.3(3)	0.5(5)	
15p F ( <b>150</b> )	J	0.2(2)		0.3(3)	0.5(5)	
18pF( <b>180</b> )	J	0.2(2)		0.3(3)	0.5(5)	
22pF( <b>220</b> )	J	0.2(2)		0.3(3)	0.5(5)	
27p F ( <b>270</b> )	J	0.2(2)		0.3(3)	0.5(5)	
33p F ( <b>330</b> )	J	0.2(2)		0.3(3)	0.5(5)	
39p F <b>(390</b> )	J	0.2(2)		0.3(3)	0.5(5)	
47p F ( <b>470</b> )	J	0.2(2)		0.3(3)	0.5(5)	
56p F ( <b>560</b> )	J		0.2(2)	0.3(3)	0.5(5)	
68pF( <b>680</b> )	J		0.2(2)	0.3(3)	0.5(5)	
82pF( <b>820</b> )	J		0.2(2)	0.3(3)	0.5(5)	
100pF( <b>101</b> )	J		0.2(2)	0.3(3)	0.5(5)	
120pF( <b>121</b> )	J		. ,		0.5(5)	
150p F ( <b>151</b> )	J				0.5(5)	
180pF( <b>181</b> )	J				0.5(5)	
220p F ( <b>221</b> )	J				0.5(5)	
270p F <b>(271</b> )	J				0.5(5)	
330p F <b>(331</b> )	J				0.5(5)	
390p F ( <b>391</b> )	J				0.5(5)	
470p F ( <b>471</b> )	J				0.5(5)	
560p F ( <b>561</b> )	J				0.5(5)	
680p F ( <b>681</b> )	J				0.5(5)	

The part numbering code is shown in ().



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Part Number		GRM02		GRM03	GRM15	
L x W [EIA]		0.4x0.2 [01	005]	0.6x0.3 [0201]	1.0x0.5 [0402]	
Rated Volt.		16 ( <b>1C</b> )	6.3 ( <b>0J</b> )	50 ( <b>1H</b> )	50 ( <b>1H</b> )	
тс		COG ( <b>5C</b> )	COG ( <b>5C</b> )	COG ( <b>5C</b> )	COG (5C)	
Capacitance, Ca	pacitanc	e Tolerance and T Dimension				
820pF(821) J					0.5 <b>(5</b> )	
1000pF( <b>102</b> )	J				0.5 <b>(5</b> )	

The part numbering code is shown in ().

Dimensions are shown in mm and Rated Voltage in Vdc.

Part Number L x W [EIA]		GR	M18	GR	M21	GRI	<b>W</b> 31
		1.6x0.8	3 [0603]	20x1.2	25 [0805]	3.2x1.6 [1206]	
Rated Volt.		100 ( <b>2A</b> )	50 ( <b>1H</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )
тс		COG ( <b>5C</b> )					
Capacitance, Ca	pacitance	Tolerance and T D	Dimension				
0.10pF( <b>R10</b> )	В		0.8 <b>(8</b> )				
0.20pF( <b>R20</b> )	В		0.8 <b>(8</b> )				
0.30pF( <b>R30</b> )	С		0.8 <b>(8</b> )				
0.40pF( <b>R40</b> )	С		0.8 <b>(8</b> )				
0.50pF( <b>R50</b> )	С	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
0.60pF( <b>R60</b> )	С	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
О.7Ор F <b>(R70</b> )	С	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
0.80pF( <b>R80</b> )	С	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
0.90pF( <b>R90</b> )	С	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
1.0pF( <b>1R0</b> )	С	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
2.0pF( <b>2R0</b> )	С	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
3.0pF( <b>3R0</b> )	С	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
4.0pF( <b>4R0</b> )	С	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
5.0pF( <b>5R0</b> )	С	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
6.0pF <b>(6R0</b> )	D	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
7.0pF( <b>7R0</b> )	D	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
8.0pF( <b>8R0</b> )	D	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
9.0pF( <b>9R0</b> )	D	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
1 Op F ( <b>100</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
12pF( <b>120</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
15p F ( <b>150</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
18pF( <b>180</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
22p F <b>(220</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
27p F <b>(270</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
33p F <b>(330</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
39p F <b>(390</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
47p F ( <b>470</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
56p F <b>(560</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
68p F <b>(680</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
82p F <b>(820</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
100-р F ( <b>101</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
12Op F ( <b>121</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
15Op F ( <b>151</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
18Op F ( <b>181</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
22Op F <b>(221</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
270p F <b>(271</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )				
33Op F <b>(331</b> )	J	0.8 <b>(8</b> )	0.8(8)				

The part numbering code is shown in ().



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Part Number		GR	M18	GI	RM21	GRM31		
L x W [EIA]		1.6x0.8 [0603]		20x1.	25 [0805]	3.2x1.6 [1206]		
Rated Volt.		100 ( <b>2A</b> )	50 ( <b>1H</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )	
тс		COG ( <b>5C</b> )	COG ( <b>5C</b> )	COG (5C)	COG (5C)	COG (5 <b>C</b> )	COG ( <b>5C</b> )	
Capacitance, Ca	pacitance	e Tolerance and T D	imension			11		
390pF( <b>391</b> )	J	0.8(8)	0.8 <b>(8</b> )					
470pF( <b>471</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )					
560pF( <b>561</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )					
680pF( <b>681</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )					
820pF( <b>821</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )					
1000pF( <b>102</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )					
1200p F ( <b>122</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )					
1500pF( <b>152</b> )	J	0.8 <b>(8</b> )	0.8 <b>(8</b> )					
1800p F ( <b>182</b> )	J		0.8 <b>(8</b> )	0.6 <b>(6</b> )				
2200p F ( <b>222</b> )	J		0.8 <b>(8</b> )	0.6(6)				
2700p F <b>(272</b> )	J		0.8 <b>(8</b> )	0.6 <b>(6</b> )				
3300p F <b>(332</b> )	J		0.8 <b>(8</b> )	0.6(6)				
3900p F <b>(392</b> )	J		0.8 <b>(8</b> )			0.85 <b>(9</b> )		
4700p F ( <b>472</b> )	J				0.6 <b>(6</b> )	0.85 <b>(9</b> )		
5600p F <b>(562</b> )	J				0.85 <b>(9</b> )	0.85 <b>(9</b> )		
6800pF( <b>682</b> )	J				0.85 <b>(9</b> )	0.85 <b>(9</b> )		
8200p F ( <b>822</b> )	J				0.85 <b>(9</b> )	0.85 <b>(9</b> )		
10000р F ( <b>103</b> )	J				0.85 <b>(9</b> )	0.85 <b>(9</b> )		
12000pF( <b>123</b> )	J				0.85 <b>(9</b> )			
15000pF( <b>153</b> )	J				0.85 <b>(9</b> )			
18000р F ( <b>183</b> )	J				1.25 <b>(B</b> )			
22000p F <b>(223</b> )	J				1.25 <b>(B</b> )			
27000pF( <b>273</b> )	J						0.85 <b>(9</b> )	
33000pF ( <b>333</b> )	J						0.85 <b>(9</b> )	
39000pF ( <b>393</b> )	J						0.85 <b>(9</b> )	
47000pF( <b>473</b> )	J						1.15 <b>(M</b> )	
56000pF( <b>563</b> )	J						1.15 <b>(M</b> )	
68000pF( <b>683</b> )	J						1.6 <b>(C</b> )	
82000pF( <b>823</b> )	J						1.6 <b>(C</b> )	
Ο.1ΟμF ( <b>104</b> )	J						1.6 <b>(C</b> )	

The part numbering code is shown in ().

Dimensions are shown in mm and Rated Voltage in Vdc.

## Temperature Compensating Type C0G(5C) Characteristics Low Profile

Part Number		GRM15					
L x W [EIA]		1.0x0.5 [0402]					
Rated Volt.		50 ( <b>1H</b> )					
тс		COG ( <b>5C</b> )					
Capacitance, Ca	pacitanc	te Tolerance and T Dimension					
12Op F ( <b>121</b> )	J	0.3 <b>(3</b> )					
150p F ( <b>151</b> )	J	0.3 <b>(3</b> )					
18Op F ( <b>181</b> )	J	0.3 <b>(3</b> )					
220pF( <b>221</b> )	J	0.3(3)					
270p F ( <b>271</b> )	J	0.3 <b>(3</b> )					
33Op F ( <b>331</b> )	J	0.3 <b>(3</b> )					
390p F <b>(391</b> )	J	0.3 <b>(3</b> )					

The part numbering code is shown in ().



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		0011/2
Part Number		GRM15
L x W [EIA]		1.0x0.5 [0402]
Rated Volt.		50 (1H)
тс		COG ( <b>5C</b> )
Capacitance, Ca	pacitanc	e Tolerance and T Dimension
470pF( <b>471</b> )	J	0.3 <b>(3</b> )

The part numbering code is shown in ().

Dimensions are shown in mm and Rated Voltage in Vdc.

## Temperature Compensating Type U2J(7U) Characteristics

Part Number		GR	M03	GRI	GRM15		118	GR	M21	GRM31
L x W [EIA]		0.6x0.3 [0201]		1.0x0.5 [0402]		1.6x0.8 [0603]		2.0x1.25 [0805]		3.2x1.6 [1206
Rated Volt.		50 ( <b>1H</b> )	25 ( <b>1E</b> )	50 ( <b>1H</b> )	10 ( <b>1A</b> )	50 (1H)	10 ( <b>1A</b> )	50 ( <b>1H</b> )	10 ( <b>1A</b> )	50 ( <b>1H</b> )
тс		U2J ( <b>7U</b> )	U2J ( <b>7U</b> )	U2J (7 <b>U</b> )	U2J <b>(7U</b> )	U 2J ( <b>7U</b> )	U2J ( <b>7U</b> )	U2J ( <b>7U</b> )	U2J ( <b>7U</b> )	U2J ( <b>7U</b> )
Capacitance, Ca	pacitanc	e Tolerance a	and T Dimensi	on					_	
1.0p F ( <b>1R0</b> )	С	0.3 <b>(3</b> )		0.5 <b>(5</b> )		0.8 <b>(8</b> )				
2.0pF( <b>2R0</b> )	С	0.3 <b>(3</b> )		0.5 <b>(5</b> )		0.8 <b>(8</b> )				
3.0pF( <b>3R0</b> )	С	0.3 <b>(3</b> )		0.5 <b>(5</b> )		0.8 <b>(8</b> )				
4. Op F ( <b>4R0</b> )	С	0.3 <b>(3</b> )		0.5 <b>(5</b> )		0.8 <b>(8</b> )				
5.0pF( <b>5R0</b> )	С	0.3 <b>(3</b> )		0.5 <b>(5</b> )		0.8 <b>(8</b> )				
6.0pF( <b>6R0</b> )	D	0.3 <b>(3</b> )		0.5 <b>(5</b> )		0.8 <b>(8</b> )				
7. Op F ( <b>7R0</b> )	D	0.3 <b>(3</b> )		0.5 <b>(5</b> )		0.8 <b>(8</b> )				
8.0pF( <b>8R0</b> )	D	0.3 <b>(3</b> )		0.5 <b>(5</b> )		0.8 <b>(8</b> )				
9.0pF( <b>9R0</b> )	D	0.3 <b>(3</b> )		0.5 <b>(5</b> )		0.8 <b>(8</b> )				
1 Op F ( <b>100</b> )	J	0.3 <b>(3</b> )		0.5 <b>(5</b> )		0.8 <b>(8</b> )				
12pF( <b>120</b> )	J	0.3( <b>3</b> )		0.5 <b>(5</b> )		0.8(8)				
15p F ( <b>150</b> )	J	0.3 <b>(3</b> )		0.5 <b>(5</b> )		0.8(8)				
18pF( <b>180</b> )	J		0.3 <b>(3</b> )	0.5 <b>(5</b> )		0.8 <b>(8</b> )				
22pF <b>(220</b> )	J		0.3 <b>(3</b> )	0.5 <b>(5</b> )		0.8(8)				
27p F <b>(270</b> )	J		0.3 <b>(3</b> )	0.5 <b>(5</b> )		0.8(8)				
33p F <b>(330</b> )	J		0.3 <b>(3</b> )	0.5 <b>(5</b> )		0.8 <b>(8</b> )				
39p F <b>(390</b> )	J		0.3 <b>(3</b> )	0.5 <b>(5</b> )		0.8(8)				
47p F ( <b>470</b> )	J		0.3 <b>(3</b> )	0.5 <b>(5</b> )		0.8(8)				
56pF( <b>560</b> )	J		0.3 <b>(3</b> )	0.5 <b>(5</b> )		0.8(8)				
68pF( <b>680</b> )	J		0.3 <b>(3</b> )	0.5 <b>(5</b> )		0.8 <b>(8</b> )				
82pF( <b>820</b> )	J		0.3 <b>(3</b> )	0.5 <b>(5</b> )		0.8(8)				
100pF( <b>101</b> )	J		0.3 <b>(3</b> )	0.5 <b>(5</b> )		0.8(8)				
120pF( <b>121</b> )	J			0.5 <b>(5</b> )		0.8(8)				
150pF( <b>151</b> )	J			0.5 <b>(5</b> )		0.8(8)				
180pF( <b>181</b> )	J			0.5 <b>(5</b> )		0.8(8)				
220pF( <b>221</b> )	J					0.8(8)				
270pF( <b>271</b> )	J					0.8(8)				
330pF( <b>331</b> )	J					0.8(8)				
390pF( <b>391</b> )	J					0.8 <b>(8</b> )				
470pF( <b>471</b> )	J					0.8 <b>(8</b> )				
560pF( <b>561</b> )	J					0.8 <b>(8</b> )				
680pF( <b>681</b> )	J					0.8 <b>(8</b> )				
1000pF( <b>102</b> )	J					0.8 <b>(8</b> )				
1200pF( <b>122</b> )	J				0.5 <b>(5</b> )	0.8 <b>(8</b> )				
1500pF( <b>152</b> )	J				0.5 <b>(5</b> )	0.8 <b>(8</b> )				
1800p F ( <b>182</b> )	J				0.5(5)	0.8(8)				

The part numbering code is shown in  $\ ($  ).

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Part Number		GR	M03	GR	M15	GR	M18	GR	M21	GRM31
L x W [EIA]		0.6x0.3	3 [0201]	1. Ox O.	5 [0402]	1.6x0.8	3 [0603]	2.0x1.2	5 [0805]	3.2x1.6 [1206
Rated Volt.		50 ( <b>1H</b> )	25 ( <b>1E</b> )	50 ( <b>1H</b> )	10 ( <b>1A</b> )	50 ( <b>1H</b> )	10 ( <b>1A</b> )	50 ( <b>1H</b> )	10 ( <b>1A</b> )	50 ( <b>1H</b> )
тс		U2J ( <b>7U</b> )	U2J ( <b>7U</b> )	U2J ( <b>7U</b> )	U2J ( <b>7U</b> )	U 2J ( <b>7U</b> )	U2J ( <b>7U</b> )	U2J ( <b>7U</b> )	U 2J ( <b>7U</b> )	U2J ( <b>7U</b> )
Capacitance, Ca	pacitanc	e Tolerance a	and T Dimensi	on						
2200p F <b>(222</b> )	J				0.5 <b>(5</b> )	0.8(8)				
2700p F <b>(272</b> )					0.5 <b>(5</b> )	0.8 <b>(8</b> )				
3300p F <b>(332</b> )	J				0.5 <b>(5</b> )	0.8(8)				
3900p F <b>(392</b> )	J				0.5 <b>(5</b> )	0.8(8)				
4700p F <b>(472</b> )	J				0.5 <b>(5</b> )	0.8 <b>(8</b> )				
5600p F ( <b>562</b> )	J					0.8(8)				
6800pF( <b>682</b> )	J					0.8(8)				
8200p F <b>(822</b> )	J					0.8(8)				
10000pF( <b>103</b> )	J					0.8(8)				
12000pF( <b>123</b> )	J						0.8 <b>(8</b> )	0.6 <b>(6</b> )		
15000pF( <b>153</b> )	J						0.8 <b>(8</b> )	0.6 <b>(6</b> )		
18000pF( <b>183</b> )	J						0.8 <b>(8</b> )	0.6 <b>(6</b> )		
22000pF( <b>223</b> )	J						0.8 <b>(8</b> )	0.85 <b>(9</b> )		
27000p F <b>(273</b> )	J							0.85 <b>(9</b> )		
33000p F ( <b>333</b> )	J							1.0 <b>(A</b> )		
39000p F ( <b>393</b> )	J							1.25 <b>(B</b> )		
47000p F <b>(473</b> )	J							1.25 <b>(B</b> )		
56000pF( <b>563</b> )	J								0.85 <b>(9</b> )	0.85 <b>(9</b> )
68000pF( <b>683</b> )	J								1.25 <b>(B</b> )	1.15 <b>(M</b> )
82000pF( <b>823</b> )	J								1.25 <b>(B</b> )	1.15 <b>(M</b> )
0.10µF( <b>104</b> )	J								1.25 <b>(B</b> )	1.15 <b>(M</b> )

The part numbering code is shown in ().

Dimensions are shown in mm and Rated Voltage in Vdc.

## **Temperature Compensating Type P2H(6P) Characteristics**

Part Number		GRM15	GRM18
L x W [EIA]		1.Qx Q.5 [0402]	1.6x0.8 [0603]
Rated Volt.		50 ( <b>1H</b> )	50 ( <b>1H</b> )
тс		P2H (6 <b>P</b> )	Р2Н <b>(6Р</b> )
Capacitance, Ca	pacitanc	e Tolerance and T Dimension	
1.0pF( <b>1R0</b> )	С	Q.5 <b>(5</b> )	0.8 <b>(8</b> )
2.0pF <b>(2R0</b> )	С	Q.5 <b>(5</b> )	0.8 <b>(8</b> )
3.0pF( <b>3R0</b> )	С	0.5 <b>(5</b> )	0.8 <b>(8</b> )
4.0pF( <b>4R0</b> )	С	Q.5 <b>(5</b> )	0.8 <b>(8</b> )
5.0pF( <b>5R0</b> )	С	Q.5 <b>(5</b> )	0.8 <b>(8</b> )
6.0pF( <b>6R0</b> )	D	Q.5 <b>(5</b> )	0.8 <b>(8</b> )
7. Op F ( <b>7R0</b> )	D	Q.5 <b>(5</b> )	0.8 <b>(8</b> )
8.0pF( <b>8R0</b> )	D	Q.5 <b>(5</b> )	0.8 <b>(8</b> )
9.0pF( <b>9R0</b> )	D	Q.5 <b>(5</b> )	0.8 <b>(8</b> )
1 Op F ( <b>100</b> )	J	Q.5 <b>(5</b> )	0.8 <b>(8)</b>
12pF( <b>120</b> )	J	Q.5 <b>(5</b> )	0.8 <b>(8</b> )
15pF( <b>150</b> )	J	Q.5 <b>(5</b> )	0.8 <b>(8)</b>
18pF( <b>180</b> )	J	Q.5 <b>(5</b> )	0.8 <b>(8)</b>
22p F <b>(220</b> )	J	Q.5 <b>(5</b> )	0.8 <b>(8)</b>
27p F <b>(270</b> )	J	Q.5 <b>(5</b> )	0.8 <b>(8)</b>
33pF( <b>330</b> )	J		0.8 <b>(8</b> )

The part numbering code is shown in ().

Dimensions are shown in mm and Rated Voltage in Vdc.



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Part Number		GRM15	GRM18
L x W [EIA]		1. Qx Q. 5 [O4O2]	1.6x0.8 [0603]
Rated Volt.		50 (1H)	50 ( <b>1H</b> )
тс		Р2Н ( <b>6Р</b> )	Р2Н <b>(6Р</b> )
Capacitance, Ca	pacitanc	e Tolerance and T Dimension	
39p F <b>(390</b> )	J		0.8 <b>(8</b> )
47p F <b>(470</b> )	J		0.8 <b>(8</b> )
56p F ( <b>560</b> )	J		0.8 <b>(8</b> )
68p F <b>(680</b> )	J		0.8(8)
82p F <b>(820</b> )	J		0.8 <b>(8</b> )
100pF( <b>101</b> )	J		0.8 <b>(8</b> )
12Op F ( <b>121</b> )	J		0.8(8)
150pF( <b>151</b> )	J		0.8 <b>(8</b> )

The part numbering code is shown in ().

Dimensions are shown in mm and Rated Voltage in Vdc.

## Temperature Compensating Type R2H(6R) Characteristics

Part Number		GRM03	GRM15	GRM18
L x W [EIA]		0.6x0.3 [0201]	1.Qx 0.5 [0402]	1.6x0.8 [0603]
Rated Volt.		25 ( <b>1E</b> )	50 ( <b>1H</b> )	50 ( <b>1H</b> )
тс		R2H <b>(6R</b> )	R2H <b>(6R</b> )	R 2H ( <b>6R</b> )
Capacitance, Ca	pacitance To	lerance and T Dimension		
1. Op F <b>(1 R 0</b> )	С	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
2.0pF( <b>2R0</b> )	С	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
3.0pF( <b>3R0</b> )	С	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8( <b>8</b> )
4. Op F ( <b>4R0</b> )	С	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
5.0pF( <b>5R0</b> )	С	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
6.0pF <b>(6R0</b> )	D	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
7. Op F <b>(7R0</b> )	D	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
8.0pF <b>(8R0</b> )	D	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
9.0pF( <b>9R0</b> )	D	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
1 Op F ( <b>100</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
12pF( <b>120</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
15pF( <b>150</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
18pF( <b>180</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
22pF( <b>220</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
27p F <b>(270</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
ЗЗр F <b>(330</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
39p F <b>(390</b> )	J	0.3 <b>(3</b> )		0.8 <b>(8</b> )
47p F <b>(470</b> )	J	0.3 <b>(3</b> )		0.8 <b>(8</b> )
56p F <b>(560</b> )	J	0.3 <b>(3</b> )		0.8 <b>(8</b> )
68pF( <b>680</b> )	J	0.3 <b>(3</b> )		0.8 <b>(8</b> )
82p F <b>(820</b> )	J	0.3 <b>(3</b> )		0.8 <b>(8</b> )
100pF( <b>101</b> )	J	0.3 <b>(3</b> )		0.8 <b>(8</b> )
120pF( <b>121</b> )	J			0.8 <b>(8</b> )
150pF( <b>151</b> )	J			0.8 <b>(8</b> )
18OpF( <b>181</b> )	J			0.8 <b>(8</b> )

The part numbering code is shown in ().

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### **Temperature Compensating Type S2H(6S) Characteristics**

Part Number		GRM03	GRM15	GRM18
L x W [EIA]		0.6x0.3 [0201]	1.Qx Q.5 [0402]	1.6x0.8 [0603]
Rated Volt.		25 ( <b>1E</b> )	50 ( <b>1H</b> )	50 ( <b>1H</b> )
тс		S2H <b>(6S</b> )	S 2H <b>(6S</b> )	S 2H <b>(6S</b> )
Capacitance, Ca	pacitance To	lerance and T Dimension		
1.0p F <b>(1R0</b> )	С	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
2.0pF <b>(2R0</b> )	С	0.3 <b>(3)</b>	0.5 <b>(5</b> )	0.8 <b>(8</b> )
3.0pF( <b>3R0</b> )	С	0.3 <b>(3)</b>	0.5 <b>(5</b> )	0.8 <b>(8</b> )
4.0pF( <b>4R0</b> )	С	0.3 <b>(3)</b>	0.5 <b>(5</b> )	0.8 <b>(8</b> )
5.0pF( <b>5R0</b> )	С	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
6.0pF <b>(6R0</b> )	D	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
7.0pF( <b>7R0</b> )	D	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
8.0pF( <b>8R0</b> )	D	0.3 <b>(3)</b>	0.5 <b>(5</b> )	0.8 <b>(8</b> )
9.0pF( <b>9R0</b> )	D	0.3 <b>(3)</b>	0.5 <b>(5</b> )	0.8 <b>(8</b> )
1 Op F ( <b>100</b> )	J	0.3 <b>(3)</b>	0.5 <b>(5</b> )	0.8 <b>(8</b> )
12pF( <b>120</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
15pF( <b>150</b> )	J	0.3 <b>(3)</b>	0.5 <b>(5</b> )	0.8 <b>(8</b> )
18pF( <b>180</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
22p F <b>(220</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
27p F <b>(270</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
ЗЗр F <b>(330</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
39p F <b>(390</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
47p F <b>(470</b> )	J	0.3 <b>(3</b> )		0.8 <b>(8</b> )
56p F <b>(560</b> )	J	0.3 <b>(3</b> )		0.8 <b>(8</b> )
68pF( <b>680</b> )	J	0.3 <b>(3</b> )		0.8 <b>(8</b> )
82p F <b>(820</b> )	J	0.3 <b>(3</b> )		0.8 <b>(8</b> )
100pF( <b>101</b> )	J	0.3 <b>(3</b> )		0.8 <b>(8</b> )
12Op F ( <b>121</b> )	J			0.8 <b>(8</b> )
15Op F ( <b>151</b> )	J			0.8 <b>(8</b> )
18Op F ( <b>181</b> )	J			0.8 <b>(8</b> )
220pF <b>(221</b> )	J			0.8( <b>8</b> )

The part numbering code is shown in ().

Dimensions are shown in mm and Rated Voltage in Vdc.

### **Temperature Compensating Type T2H(6T) Characteristics**

Part Number		GRM03	GRM15	GRM18
L x W [EIA]		0.6x0.3 [0201]	1.0x0.5 [0402]	1.6x0.8 [0603]
Rated Volt.		25 ( <b>1E</b> )	50 ( <b>1H</b> )	50 ( <b>1H</b> )
тс		⊤2H (6T)	Т2Н <b>(6Т</b> )	T2H <b>(6T</b> )
Capacitance, Ca	pacitanc	e Tolerance and T Dimension		
1.0pF( <b>1R0</b> )	С	Q 3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
2.0pF <b>(2R0</b> )	С	Q 3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
3.0pF( <b>3R0</b> )	С	Q.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
4.0pF( <b>4R0</b> )	С	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
5.0pF( <b>5R0</b> )	С	0.3(3)	0.5 <b>(5</b> )	0.8 <b>(8</b> )
6.ФрF <b>(6R0</b> )	D	0.3(3)	0.5 <b>(5</b> )	0.8 <b>(8</b> )
7.ФР <b>(7R0</b> )	D	Q.3( <b>3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
8.OpF( <b>8R0</b> )	D	0.3 <b>(3</b> )	0.5 <b>(5)</b>	0.8(8)

The part numbering code is shown in ().

Dimensions are shown in mm and Rated Voltage in Vdc.



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Part Number		GRM03	GRM15	GRM18
L x W [EIA]		0.6x0.3 [0201]	1.Qx 0.5 [0402]	1.6x0.8 [0603]
Rated Volt.		25 ( <b>1E</b> )	50 ( <b>1H</b> )	50 ( <b>1H</b> )
тс		T 2H ( <b>6T</b> )	T2H (6T)	T2H <b>(6T</b> )
Capacitance, Ca	pacitance Tol	lerance and T Dimension		
9.0pF( <b>9R0</b> )	D	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
1 Op F ( <b>100</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
12pF( <b>120</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
15pF( <b>150</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
18pF( <b>180</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
22pF <b>(220</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
27p F <b>(270</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
33p F <b>(330</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
39p F <b>(390</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
47p F <b>(470</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
56pF( <b>560</b> )	J	0.3 <b>(3</b> )	Q.5 <b>(5</b> )	0.8 <b>(8</b> )
68pF( <b>680</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
82p F <b>(820</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
100pF( <b>101</b> )	J	0.3 <b>(3</b> )	0.5 <b>(5</b> )	0.8 <b>(8</b> )
120pF( <b>121</b> )	J			0.8 <b>(8</b> )
150pF( <b>151</b> )	J			0.8 <b>(8</b> )
180pF( <b>181</b> )	J			0.8 <b>(8</b> )
220pF( <b>221</b> )	J			0.8 <b>(8</b> )
270pF <b>(271</b> )	J			0.8 <b>(8</b> )
330pF( <b>331</b> )	J			0.8 <b>(8</b> )
390pF( <b>391</b> )	J			0.8 <b>(8</b> )
470pF( <b>471</b> )	J			0.8 <b>(8</b> )

The part numbering code is shown in ().





## **Chip Monolithic Ceramic Capacitors**



## for General Purpose GRM Series (High Dielectric Constant Type)

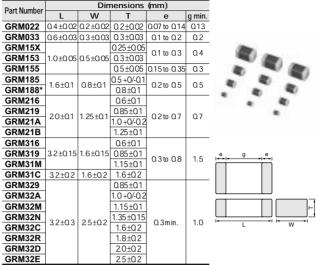
2

#### Features

- Highter resistance of solder-leaching due to the Ni-barriered termination, applicable for reflow-soldering, and flow-soldering (GRM18/21/31 type only).
- 2. The GRM series is lead free product.
- 3. Smaller size and higher capacitance value.
- 4. High reliability and no polarity.
- 5. Excellent pulse responsibility and noise reduction due to the low impedance at high frequency.
- The GRM series is available in paper or embossed tape and reel packaging for automatic placement. Bulk case packaging is also available for GRM15/18/21(T=0.6,1.25).
- 7. Ta replacement.

#### Applications

General electronic equipment



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

#### High Dielectric Constant Type X5R(R6) Characteristics

Part Number		GR	M02	GR	M03	0	GRM1	5		(	GRM1	8		(	GRM2	1		GR	M31		GRI	<b>M</b> 32
L x W [EIA]		0.4x0.2	[01005]	0.6x0.3	3 [0201]	1.Ox	0.5 (C	402]		1.6x	0.8 (C	603]		2x1	. 25 [8	305]	3	.2x1.6	6 [1 20	6]	3.2x2.5	5 [1210]
Rated Volt.		10 ( <b>1A</b> )	63 ( <b>0J</b> )	10 ( <b>1A</b> )	63 ( <b>0J</b> )	50 ( <b>1H</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	50 ( <b>1H</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	63 <b>(0J</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	63 <b>(0J</b> )	50 ( <b>1H</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	63 <b>(0J</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )
тс		X5R ( <b>R6</b> )			X5R ( <b>R6</b> )			X5R ( <b>R6</b> )		X5R ( <b>R6</b> )			X5R ( <b>R6</b> )		X5R ( <b>R6</b> )				X5R ( <b>R6</b> )		X5R ( <b>R6</b> )	X5R ( <b>R6</b> )
Capacitance, Ca	pacitan	ce Tole	erance	and	T Dim	ensior	ו				1	1		1		1	1		1	1		
68p F <b>(680</b> )	к	0.2 (2)																				
100pF ( <b>101</b> )	к	0.2 (2)																				
150pF ( <b>151</b> )	к	0.2 (2)																				
220pF ( <b>221</b> )	к	0.2 (2)																				
33CpF ( <b>331</b> )	к	0.2 (2)																				
470pF ( <b>471</b> )	к	0.2 (2)																				
680pF <b>(681</b> )	к		0.2* (2)																			
1000p F ( <b>102</b> )	к		0.2* (2)			0.5 ( <b>5</b> )			0.8 <b>(8</b> )													
1500pF ( <b>152</b> )	к		0.2* (2)	0.3 ( <b>3</b> )																		

The part numbering code is shown in ().

Dimensions are shown in mm and Rated Voltage in Vdc.

\*: Please refer to GRM Series Specifications and Test Methods (2) (P.29).

\*\*: In case of Rated Volt.6.3V, Capacitance Tolerance should be M.

GRM21B Series  $6.3V/22\mu$ F (L:  $2.0\pm0.15$ , W:  $1.25\pm0.15$ , T:  $1.25\pm0.15$ mm)

GRM31C Series 6.3V/100µF (L: 3.2±0.3, W: 1.6±0.3, T: 1.6±0.3mm)



Part Number		GRI		GR			GRM1				SRM1				GRM2			GRI			GRI	
L x W [EIA]		0.4x0.2		0.6x0.3	3 [0201 ]	1.Ox	0.5 (C	402]			0.8 [0	603]			. 25 [8	805]	3	.2x1.6	6 [120	6]	3.2x2.5	5 [121
Rated Volt.		10 ( <b>1A</b> )	63 <b>(0J</b> )	10 ( <b>1A</b> )	63 <b>(0J</b> )	50 ( <b>1H</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	50 ( <b>1H</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	63 <b>(0J</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	6.3 <b>(0J</b> )	50 ( <b>1H</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	63 <b>(0J</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b>
тс		X5R ( <b>R6</b> )	X5R ( <b>R6</b> )	X5R ( <b>R6</b> )	X5R ( <b>R6</b> )	X5R ( <b>R6</b> )	X5R ( <b>R6</b> )	X5R ( <b>R6</b> )	X5R ( <b>R6</b> )	X5 ( <b>R6</b>												
Capacitance, Ca	pacitanc	e Tole	erance	e and '	T Dim	ensior	<u>ו</u>															
2200p F ( <b>222</b> )	к		0.2* ( <b>2</b> )	0.3 ( <b>3</b> )		0.5 <b>(5</b> )			0.8 <b>(8</b> )													
3300p F <b>(332</b> )	к		0.2* ( <b>2</b> )	0.3 ( <b>3</b> )																		
47ΟΟρ F <b>(472</b> )	к		0.2* ( <b>2</b> )	0.3 ( <b>3</b> )		0.5 <b>(5</b> )			0.8 <b>(8</b> )													
6800pF <b>(682</b> )	к		0.2* ( <b>2</b> )	0.3 ( <b>3</b> )																		
10000p F ( <b>103</b> )	к		0.2* ( <b>2</b> )	0.3 ( <b>3</b> )			0.5 ( <b>5</b> )		0.8 ( <b>8</b> )													
15000p F ( <b>153</b> )	к				0.3* ( <b>3</b> )								<u> </u>									
22000p F ( <b>223</b> )	к				0.3* ( <b>3</b> )		0.5 ( <b>5</b> )		0.8 ( <b>8</b> )				<u> </u>									
33000p F ( <b>333</b> )	к				0.3* ( <b>3</b> )		0.5 ( <b>5</b> )															
47000p F ( <b>473</b> )	к				0.3* ( <b>3</b> )		0.5 ( <b>5</b> )															
68000p F (683)	к				0.3* ( <b>3</b> )		0.5 ( <b>5</b> )															
0.1QµF ( <b>104</b> )	к				0.3* ( <b>3</b> )		0.5 ( <b>5</b> )			0.8 ( <b>8</b> )												
0.15µF ( <b>154</b> )	к				(0)		(0)	0.5* <b>(5</b> )		(0)		0.8 ( <b>8</b> )										
0.22µF (224)	к							0.5* ( <b>5</b> )		0.8 ( <b>8</b> )		(0)										
0. ЗЗµF ( <b>334</b> )	к							0.5* (5)		(9)												
Ο.47μF ( <b>474</b> )	к							0.5* ( <b>5</b> )		0.8* ( <b>8</b> )												
0.68µF (684)	к							0.5* ( <b>5</b> )		(9)												
1μF ( <b>105</b> )	к							(5) (5)		0.8* ( <b>8</b> )												
2.2µF ( <b>225</b> )	к							()		(0)	0.8* ( <b>8</b> )			1.25* ( <b>B</b> )			1.6 ( <b>C</b> )					
4. 7μF ( <b>475</b> )	к				1						(-)		0.8* ( <b>8</b> )	( <b>B</b> )			(-)					
1ΟμF ( <b>106</b> )	K, M**												0.8* (8)		1.25* ( <b>B</b> )			1.6* ( <b>C</b> )				
22µF ( <b>226</b> )	м												(-)		(-)	1.25* ( <b>B</b> )			1.6* ( <b>C</b> )		2.5* (E)	
47μF ( <b>476</b> )	м																			1.6* ( <b>C</b> )	<i>ر</i> ـــ <i>ب</i>	2 (E
100μF ( <b>107</b> )	м																			( <b>c</b> ) 1.6* ( <b>C</b> )		=ب 

The part numbering code is shown in ().

Dimensions are shown in mm and Rated Voltage in Vdc.

\*: Please refer to GRM Series Specifications and Test Methods (2) (P.29).

\*\*: In case of Rated Volt.6.3V, Capacitance Tolerance should be M.

GRM21B Series 6.3V/22µF (L: 2.0 $\pm$ 0.15, W: 1.25 $\pm$ 0.15, T: 1.25 $\pm$ 0.15mm)

GRM31C Series 6.3V/100µF (L: 3.2±0.3, W: 1.6±0.3, T: 1.6±0.3mm)





#### High Dielectric Constant Type X6S/X6T(C8/D8) Characteristics

Part Number		GR	M03	GR	M15	GR	M18		GRM21			GRM31		GR	M32
L x W [EIA]		0.6x0.3	3 [0201 ]	1.0x0.5	5 [0402]	1.6x0.8	3 [0603]	20	x 1.25 [08	305]	3.2	3x1.6[12	06]	3.2x2.5	5 [1210]
Rated Volt.		63 <b>(0J</b> )	4 ( <b>0G</b> )	63 ( <b>0J</b> )	4 ( <b>0G</b> )	10 ( <b>1A</b> )	4 ( <b>0G</b> )	25 ( <b>1E</b> )	10 ( <b>1A</b> )	4 ( <b>0G</b> )	10 ( <b>1A</b> )		4 <b>G</b> )	10 ( <b>1A</b> )	6.3 ( <b>0J</b> )
тс		X6S ( <b>C8</b> )	X6S (C8)	X6S ( <b>C8</b> )	X6S ( <b>C8</b> )	X6S ( <b>C8</b> )	X6T ( <b>D8</b> )	X6S ( <b>C8</b> )	X6S ( <b>C8</b> )						
Capacitance, Ca	pacitan	ce Tolera	nce and	T Dimens	sion	<u> </u>	I	1	1	1	<u> </u>	<u> </u>	<u> </u>	1	1
15000pF( <b>153</b> )	к	0.3* <b>(3</b> )													
22000pF( <b>223</b> )	к	0.3* <b>(3</b> )													
33000p F ( <b>333</b> )	к	0.3* <b>(3</b> )													
47000p F ( <b>473</b> )	к	0.3* <b>(3</b> )													
0.10µF ( <b>104</b> )	к		0.3*( <b>3</b> )												
0.15µF( <b>154</b> )	к			0.5* <b>(5</b> )											
0.22µF <b>(224</b> )	к			0.5* <b>(5</b> )											
0.33µF <b>(334</b> )	к			0.5* <b>(5</b> )											
Ο.47μF <b>(474</b> )	к			0.5* <b>(5</b> )											
0.68µF <b>(684</b> )	к				0.5* <b>(5</b> )										
1.QμF <b>(105</b> )	к				0.5* <b>(5</b> )										
2.2µF <b>(225</b> )	к					0.8* <b>(8</b> )									
4.7μF <b>(475</b> )	к						0.8* <b>(8</b> )	1.25* <b>(B</b> )							
1QµF ( <b>106</b> )	к								1.25* <b>(B</b> )						
22µF <b>(226</b> )	М									1.25* <b>(B</b> )	1.6* <b>(C</b> )				
47μF <b>(476</b> )	М											1.6* <b>(C</b> )		2.5* <b>(E</b> )	
100µF( <b>107</b> )	м												1.6*( <b>C</b> )		2.5*(E)

The part numbering code is shown in ().

Dimensions are shown in mm and Rated Voltage in Vdc.

\*: Please refer to GRM Series Specifications and Test Methods (2) (P.29).

GRM21B Series 4V/22µF (L: 2.0±0.15, W: 1.25±0.15, T: 1.25±0.15mm)

GRM31C Series 4V/100µF (L: 3.2±0.3, W: 1.6±0.3, T: 1.6±0.3mm)

### High Dielectric Constant Type X7R/X7T/X7U(R7/D7/E7) Characteristics

Part Number		GRM 02	G	RM	03		GR	M15			G	RM	18				GR	M21				G	RM	31		1	G	RM	32	
L x W [EIA]		0.4x0.2 [01005]	0.6x	0.3 [0	0201]	1.C	)x O. 5	5 [04	Ю2]	1	.6x0	3.8 [	0603	3]		20	к1.2	5 [0	305]		(r)	3.2x^	1.6 [	1200	6]		3. 2x 2	25[	1210	)]
Rated Volt.		10 ( <b>1A</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	4 ( <b>0G</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )	25 ( <b>1E</b> )	10 ( <b>1A</b> )	4 ( <b>0G</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )	10 ( <b>1A</b> )	63 ( <b>0J</b> )	4 ( <b>0G</b> )
тс		X7R ( <b>R7</b> )	X7U (E7)	X7R ( <b>R7</b> )	X7R ( <b>R7</b> )	X7R ( <b>R7</b> )	X7R ( <b>R7</b> )	X7U ( <b>E7</b> )	X7R ( <b>R7</b> )	X7R ( <b>R7</b> )	X7R ( <b>R7</b> )	X7T ( <b>D7</b> )	X7U (E7)																	
Capacitance, Ca	pacitan	ce To	olera	nce	and	T Di	men	sion	ì																					
68pF <b>(680</b> )	к	0.2 (2)																												
100p F ( <b>101</b> )	к	0.2 (2)	0.3 ( <b>3</b> )																											
150p F ( <b>151</b> )	к	0.2 (2)	0.3 ( <b>3</b> )																											
220pF ( <b>221</b> )	к	0.2 (2)	0.3 ( <b>3</b> )			0.5 ( <b>5</b> )	0.5 ( <b>5</b> )			0.8 ( <b>8</b> )	0.8 (8)																			
330pF ( <b>331</b> )	к	0.2 (2)	0.3 ( <b>3</b> )			0.5 ( <b>5</b> )	0.5 ( <b>5</b> )			0.8 ( <b>8</b> )	0.8 (8)																			
47Ср F <b>(471</b> )	к	0.2 (2)	0.3 ( <b>3</b> )			0.5 ( <b>5</b> )	0.5 ( <b>5</b> )			0.8 ( <b>8</b> )	0.8 ( <b>8</b> )																			

The part numbering code is shown in ().

Dimensions are shown in mm and Rated Voltage in Vdc.

\*: Please refer to GRM Series Specifications and Test Methods (2) (P.29).

 $\text{GRM21B Series 100V} / 0.47 \mu\text{F}, 25 \text{V} / 2.2 \mu\text{F}, 16 \text{V} / 4.7 \mu\text{F}, 10 \text{V} / 10 \mu\text{F}, 4 \text{V} / 22 \mu\text{F} \text{ (L: } 2.0 \pm 0.15, \text{W: } 1.25 \pm 0.15, \text{T: } 1.25 \pm 0.15 \text{mm}) = 0.05 \text{ m} + 0.05 \text{ m} +$ 

GRM31M Series 100V/0.68 $\mu$ F, 25V/2.2 $\mu$ F (L: 3.2 $\pm$ 0.2, W: 1.6 $\pm$ 0.2, T: 1.15 $\pm$ 0.15mm)



sales representatives or product engineers before ordering.
This PDF catalog has only typical specifications because there is no space for detailed specifications. Therefore, please approve our product specifications or transact the approval sheet for product specifications.
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(A) (9)

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sa	is PDF catalog is downloaded from the v les representatives or product engineers is PDF catalog has only typical specifica Continued from the preced	before tions b	orderir	ng.		-							-		-															C02
	Part Number	GRM 02	9	RMO			GRI				G	RM	18				GR	M21				G	RM3	81			G	RM3	32	
	L x W [EIA]	0.4x0.2	0.6x(	0.3 [0	0201]	1.C	<b>x</b> O. 5	5 [04	02]	1	.6x0	0.8	0603	3]		20	x 1.2	5 [08	305]		(7)	3.2x^	1.6 [	1206	6]	З	3. 2x 2	2.5 [	1210	Ŋ
2	Rated Volt.	10 ( <b>1A</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	100 <b>(2A</b> )	50 ( <b>1H</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	4 ( <b>0G</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )	25 ( <b>1E</b> )	10 ( <b>1A</b> )	4 ( <b>0G</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )	10 ( <b>1A</b> )	6.3 <b>(0J</b> )	4 ( <b>0G</b> )
2								~	~ ~ ~					VTD		~~~	VTD						V75				~~~	~~~	VIT	

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(8)

(106) 22µF

The part numbering code is shown in ().

Dimensions are shown in mm and Rated Voltage in Vdc.

\*: Please refer to GRM Series Specifications and Test Methods (2) (P.29).

GRM31M Series 100V/0.68µF, 25V/2.2µF (L: 3.2 $\pm$ 0.2, W: 1.6 $\pm$ 0.2, T: 1.15 $\pm$ 0.15mm)

25

(E)

25

(E)

1.35

(N)



тс

680p F

1000pF

1500pF

2200pF

3300p F

4700pF

6800p F

10000pF

15000pF

22000pF

33000pF

47000pF

(681)

(102)

(152)

(222)

(332)

(472)

(682)

(103)

(153)

(223)

(333)

(473) 68000p F

(683)

(104) 0.15µF

(154)

(224)

(334)

(474)

(684)

1.QuF

(105)

2.2µF

(225)

4.7µF

(475)

1QµF

(226)

0.22µF

0.33uF

0.47µF

0.68uF

0.10µF

Capacitance, Capacitance Tolerance and T Dimension

κ

κ

κ

κ

Κ

κ

κ

κ

κ

κ

κ

κ

κ

κ

Κ

Κ

κ

κ

κ

κ

κ

κ

κ

Μ

0.3

(3)

0.3

(3)

0.3

(3)

0.3

(3)

0.3

(3)

0.5 0.5

0.5

(5)

(5)

0.5

(5)

0.5

(5)

05

(5)

0.5

(5)

0.5

(5)

0.5

(5)

0.5

(5)

(5) (8)

(5) (5)

0.5

(5) (5)

(5)

0.5 0.5

(5)

0.5 0.5

(5) (5)

0.3 0.5 0.5

(3) (5) (5)

0.3

(3)

0.3

(3)

0.5 0.5

 $\Box$  Continued from the preceding page.

Part Number		GRM 02	<u>،</u>	GRM			GRI				G	RM1	8				GRI	M21				G	RM3	31			G	RM3	2	
L x W [EIA]		0.4x0.2	0.6	k (), 3 [(	0201]	1.0	<b>)x ()</b> . 5	5 [04	02]	1	.6x0	) 8 [	0603	3]		20	(1.2	5 [08	305]		3	3. 2x 1	.6[	1200	5]	9	3. 2x 2	25[	1210	)]
Rated Volt.		10 ( <b>1A</b> )	25 ( <b>1E</b>	5 16 ( <b>1C</b> )	10 ( <b>1A</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	4 ( <b>0G</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )	25 ( <b>1E</b> )	10 ( <b>1A</b> )	4 ( <b>0G</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )	10 ( <b>1A</b> )	6.3 <b>(0J</b> )	4 ( <b>0G</b> )
тс		X7R ( <b>R7</b> )	x 71 ( <b>R7</b>	r X7r ') ( <b>r7</b> )	2 X7R ) ( <b>R7</b> )	X7R ( <b>R7</b> )	X7R ( <b>R7</b> )	X7R <b>(R7</b> )	X7R ( <b>R7</b> )	X7R <b>(R7</b> )	X7R <b>(R7</b> )	X7R ( <b>R7</b> )	X7R ( <b>R7</b> )	X7U (E7)	X7R ( <b>R7</b> )	X7R ( <b>R7</b> )	X7R ( <b>R7</b> )	X7R <b>(R7</b> )	X7U (E7)	X7R <b>(R7</b> )	X7R ( <b>R7</b> )	X7R ( <b>R7</b> )	X7T ( <b>D7</b> )	X7U (E7)						
Capacitance, Ca	pacitanc	ce To	oler	ance	and	T Di	imen	sion																						
47µF	м																								1.6*			2.5*		
(476)																									(C)			<b>(E</b> )		
100µF ( <b>107</b> )	м																													2.5* <b>(E</b> )

The part numbering code is shown in ().

Dimensions are shown in mm and Rated Voltage in Vdc.

\*: Please refer to GRM Series Specifications and Test Methods (2) (P.29).

 $GRM21B \; Series\; 100V/0.47 \mu F,\; 25V/2.2 \mu F,\; 16V/4.7 \mu F,\; 10V/10 \mu F,\; 4V/22 \mu F\; (L:\; 2.0 \pm 0.15,\; W:\; 1.25 \pm 0.15,\; T:\; 1.25 \pm 0.15 mm)$ 

GRM31M Series 100V/0.68µF, 25V/2.2µF (L: 3.2 $\pm$ 0.2, W: 1.6 $\pm$ 0.2, T: 1.15 $\pm$ 0.15mm)

#### High Dielectric Constant Type Y5V(F5) Characteristics

Part Number			GR	M15		GR	M18	GRM21	GRM31	GRM32
L x W [EIA]			1.Ox 0.5	5 [0402]		1.6x0.	8 [0603]	2.0x1.25 [0805]	3.2x1.6 [1206]	3.2x25[1210]
Rated Volt.		50 ( <b>1H</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	50 ( <b>1H</b> )	25 ( <b>1E</b> )	50 ( <b>1H</b> )	63 <b>(0J</b> )	100 <b>(2A</b> )
тс		Y 5V (F5)	Y 5V (F5)	Y 5V (F5)						
Capacitance, Ca	pacitanc	e Tolerance a	and T Dimensi	on		1	1			1
1000pF( <b>102</b> )	Z	0.5 <b>(5</b> )				0.8 <b>(8</b> )				
2200p F <b>(222</b> )	Z	0.5 <b>(5</b> )				0.8 <b>(8</b> )				
4700p F ( <b>472</b> )	Z	0.5 <b>(5</b> )				0.8 <b>(8</b> )				
10000pF( <b>103</b> )	Z	0.5 <b>(5</b> )				0.8 <b>(8</b> )				
22000pF( <b>223</b> )	Z		0.5 <b>(5</b> )			0.8 <b>(8</b> )				
47000pF( <b>473</b> )	z		0.5 <b>(5</b> )			0.8 <b>(8</b> )				
0.1QµF ( <b>104</b> )	z		0.5 <b>(5</b> )			0.8 <b>(8</b> )				1.35 <b>(N</b> )
0.22µF <b>(224</b> )	z			0.5 <b>(5</b> )		0.8 <b>(8</b> )				
Ο.47μF <b>(474</b> )	Z			0.5 <b>(5</b> )			0.8 <b>(8</b> )	0.85 <b>(9</b> )		
1.QµF <b>(105</b> )	Z				0.5* <b>(5</b> )					
100µF ( <b>107</b> )	z								1.6* <b>(C</b> )	

The part numbering code is shown in ().

Dimensions are shown in mm and Rated Voltage in Vdc.

\*: Please refer to GRM Series Specifications and Test Methods (2) (P.29).

#### High Dielectric Constant Type X5R(R6) Characteristics Low Profile

Part Number		GRM15	GR	M18		GRM21		GR	M31
L x W [EIA]		1.0x0.5 [0402]	1.6x0.8	3 [0603]		2.0x1.25 [0805	]	3.2x1.6	6 [1 206]
Rated Volt.		4 ( <b>0G</b> )	16 ( <b>1C</b> )	6.3 ( <b>0J</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )
тс	X5R ( <b>R6</b> )		X5R <b>(R6</b> )	X5R ( <b>R6</b> )					
Capacitance, Ca	apacitano	ce Tolerance and	T Dimension	1		1		1	I
1.QµF <b>(105</b> )	K, M**	0.3* <b>(3</b> )	0.5* <b>(5</b> )		0.6*(6)		0.85 <b>(9</b> )		
2.2µF <b>(225</b> )	к			0.5* <b>(5</b> )	0.85* <b>(9</b> )			0.6* <b>(6</b> )	
4. 7μF <b>(475</b> )	к					0.85* <b>(9</b> )		0.85* <b>(9</b> )	
10µF ( <b>106</b> )							0.85* <b>(9</b> )		0.85*(9)

The part numbering code is shown in ().

Dimensions are shown in mm and Rated Voltage in Vdc.

\*: Please refer to GRM Series Specifications and Test Methods (2) (P.29).

\*\*: In case of Rated Volt.4V, Capacitance Tolerance should be M.

GRM219 Series 10V/10 $\mu$ F (L: 2.0±0.2, W: 1.25±0.2, T: 0.85±0.1mm)



### High Dielectric Constant Type X6S(C8) Characteristics Low Profile

Part Number		GR	M18		GRM21		GRM31
L x W [EIA]		1.6x0.8	8 [0603]		2.0x1.25 [0805]		3.2x1.6 [1206]
Rated Volt.		10 ( <b>1A</b> )	4 <b>(0G</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	6.3 ( <b>0J</b> )	16 ( <b>1C</b> )
тс		X6S (C8)	X6S ( <b>C8</b> )	X6S (C8)	X6S (C8)	X6S (C8)	X6S (C8)
Capacitance, Ca	pacitan	ce Tolerance and T D	imension	1	<u> </u>		
1.QμF <b>(105</b> )	к	0.5* <b>(5</b> )		0.6* <b>(6</b> )			
2.2µF <b>(225</b> )	К		0.5* <b>(5</b> )	0.85*(9)			0.6* <b>(6</b> )
4.7μF <b>(475</b> )	к				0.85*(9)		0.85*(9)
10µF ( <b>106</b> )	Κ					0.85*(9)	

The part numbering code is shown in ().

Dimensions are shown in mm and Rated Voltage in Vdc.

\*: Please refer to GRM Series Specifications and Test Methods (2) (P.29).

GRM219 Series 6.3V/10 $\mu F$  (L: 2.0 $\pm$ 0.2, W: 1.25 $\pm$ 0.2, T: 0.85 $\pm$ 0.1mm)

### High Dielectric Constant Type X7R/X7T(R7/D7) Characteristics Low Profile

Part Number			GRM15		GRM18	GRM21
L x W [EIA]			1.0x0.5 [0402]		1.6x0.8 [0603]	2.0x1.25 [0805]
Rated Volt.		50 ( <b>1H</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	25 ( <b>1E</b> )
тс		X7R <b>(R7</b> )	X7R ( <b>R7</b> )	X7R <b>(R7</b> )	X7T ( <b>D7</b> )	X7R ( <b>R7</b> )
Capacitance, Ca	pacitanc	e Tolerance and T Dime	ension			
220pF( <b>221</b> )	к	0.25(X)				
330p F <b>(331</b> )	к	0.25(X)				
470pF( <b>471</b> )	к	0.25(X)				
680pF( <b>681</b> )	к	0.25(X)				
1000p F ( <b>102</b> )	к	0.25(X)				
1500pF( <b>152</b> )	к	0.25(X)				
2200p F <b>(222</b> )	к		0.25(X)			
3300p F <b>(332</b> )	к			0.25(X)		
4700p F ( <b>472</b> )	к			0.25(X)		
6800pF( <b>682</b> )	к			0.25(X)		
10000pF( <b>103</b> )	к			0.25(X)		
1.QμF <b>(105</b> )	к				0.5* <b>(5</b> )	0.85 <b>(9</b> )

The part numbering code is shown in ().

Dimensions are shown in mm and Rated Voltage in Vdc.

\*: Please refer to GRM Series Specifications and Test Methods (2) (P.29).



## **GRM Series Specifications and Test Methods (1)**

Below GRM Series Specifications and Test Methods (1) are applied to Non "\*" PNs in capacitance table. In case "\*" is added in capacitance table, please refer to GRM Series Specifications and Test Methods (2) (P.29).

			cations	
No.	Item	Temperature Compensating Type	High Dielectric Type	Test Method
1	Operating Temperature Range	−55 to +125℃	B1, B3, F1: −25 to +85°C R1, R7: −55 to +125°C R6: −55 to +85°C C8: −55 to +105°C E4: +10 to +85°C F5: −30 to +85°C	Reference temperature: 25℃ (2∆, 3∆, 4∆, B1, B3, F1, R1: 20℃)
2	Rated Voltage	See the previous pages.		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 <sup>P,P</sup> or V <sup>O,P</sup> , 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 (GRM02 size is based on Microscope)
5	Dielectric Strength	No defects or abnormalities		No failure should be observed when 300%* of the rated voltage (temperature compensating type) or 250% of the rated voltage (high dielectric constant type) 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	C≤0.047µF: More than 10,000M C>0.047µF: More than $500\Omega \cdot I$		The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at 20/25°c and 75%RH max. and within 2 minutes of charging, provided the charge/ discharge current is less than 50mA.
7	Capacitance	Within the specified tolerance		
8	Q/ Dissipation Factor (D.F.)	30pF and over: Q≥1000 30pF and below: Q≥400+20C C: Nominal Capacitance (pF)	$\begin{array}{l} [\text{R6, R7, C8]} \\ \text{W.V.: 100V} \\ &: 0.025 \text{ max. } (C {<} 0.068 \mu \text{F}) \\ &: 0.05 \text{ max. } (C {\geq} 0.068 \mu \text{F}) \\ \text{W.V.: 50/25V:} \\ &: 0.025 \text{ max. } (C {<} 10 \mu \text{F}) \\ &: 0.035 \text{ max. } (C {\geq} 10 \mu \text{F}) \\ \text{W.V.: 16/10V: } 0.035 \text{ max. } \\ \text{W.V.: 6.3/4V} \\ &: 0.05 \text{ max. } (C {<} 3.3 \mu \text{F}) \\ &: 0.1 \text{ max. } (C {\geq} 3.3 \mu \text{F}) \\ &: 0.1 \text{ max. } (C {\geq} 3.3 \mu \text{F}) \\ \text{[E4]} \\ \text{W.V.: 25V min: } 0.025 \text{ max. } \\ \text{[F1, F5]} \\ \text{W.V.: 25V min.} \\ &: 0.05 \text{ max. } (C {<} 0.1 \mu \text{F}) \\ &: 0.09 \text{ max. } (C {\geq} 0.1 \mu \text{F}) \\ \text{W.V.: 16/10V: } 0.125 \text{ max.} \\ \\ \text{W.V.: 6.3V: 0.15 max.} \\ \end{array}$	The capacitance/Q/D.F. should be measured at 20/25°C at the frequency and voltage shown in the table. $\begin{array}{c cccc} \hline Char. & \Delta C & \Delta C \ to \ 7U, \ 1X \\ (to \ 7U, \ 1X \\ (1000pF \ and \ below) \\ \hline Item & below \\ \hline F5, \ B1, \ B3, \ F1 \\ \hline Frequency \ 1\pm 0.1 \text{MHz} \ 1\pm 0.1 \text{kHz} \\ \hline I20\pm 24 \text{kHz} \ 1\pm 0.1 \text{kHz} \\ \hline Voltage \ 0.5 \ to \ 5V \text{rms} \ 1\pm 0.2 \text{Vrms} \ 0.5\pm \\ 0.1 \text{Vrms} \ 0.05 \text{Vrms} \\ \hline \end{array}$



## GRM Series Specifications and Test Methods (1)

		Specifi	cations					
No.	ltem	Temperature Compensating Type	High Dielectric Type			Test Me	thod	
	No bias	Within the specified tolerance (Table A-1)	$\begin{array}{c} \text{B1, B3: Within } \pm 10\% \\ (-25 \text{ to } +85^{\circ}\text{C}) \\ \text{R1, R7: Within } \pm 15\% \\ (-55 \text{ to } +125^{\circ}\text{C}) \\ \text{R6: Within } \pm 15\% \\ (-55 \text{ to } +85^{\circ}\text{C}) \\ \text{E4: Within } \pm 22/-56\% \\ (+10 \text{ to } +85^{\circ}\text{C}) \\ \text{F1: Within } +30/-80\% \\ (-25 \text{ to } +85^{\circ}\text{C}) \\ \text{F5: Within } \pm 22/-82\% \\ (-30 \text{ to } +85^{\circ}\text{C}) \\ \text{C8: Within } \pm 22\% \\ (-55 \text{ to } +105^{\circ}\text{C}) \end{array}$	each speci (1)Temper The tempe capacitanc When cycli 5 (5C: +25 +25 to +80 the specific capacitanc The capaci between th step 1, 3 an	fied temp ature Con rature cod e measur ng the ten to +125° 5°C/+20 to ed toleran e change tance drift e maximu nd 5 by th	. stage. npensating Ty- efficient is defined in step 3 a mperature ser- $C/\Delta C$ : +20 to $D + 85^{\circ}C$ ) the of- C = for the ten- as Table A-1 ft is calculated um and minim- ne cap. value	ype termined as a refer quentiall +125°C: capacitan pperature d by divid num mea in step 3	rence. y from step 1 through to ther temp. coeffs.: nce should be within e coefficient and ding the differences issured values in the b.
		/	(-55 10 + 105 C)	St			emperat	
	50% of the Rated		B1: Within +10/-30% R1: Within +15/-40%		2	-55±3 (fo -30±3	r ∆C to 7 (for F5),	nperature ±2 /U/1X/R6/R7/C8) 10±3 (for E4) other TC)
	Voltage		F1: Within +30/–95%	3	3	Refere	nce Terr	nperature ±2
				4	۱ I			, 105±3 (for C8) other TC)
Capacita	nce				5		· ·	perature ±2
Characte	Capacitance Drift	Within ±0.2% or ±0.05pF (Whichever is larger.) ⊁Do not apply to 1X/25V	*Initial measurement for high dielectric constant type Perform a heat treatment at 150+0/–10°C for one hour and then set for 24±2 hours at room temperature. Perform the initial measurement.	value over be within th In case of a measured	the tempine specific applying v after 1 mm n of each -55± -25± -30±3 ( Referer 125 85± Referer -25 ( Referer 125 85±	erature range ed ranges.*	s shown apacitan applying ) ure ±2 , R6) , F1) (for E4) ure ±2 (7)/ R6 ure ±2 / -1) ure ±2 / -1) ure ±2	ared with the 20°C in the table should ce change should be voltage in Applying Voltage (/) No bias 50% of the rated voltage
10	esive Strength ermination	No removal of the terminations		Fig. 1a usin parallel wit The solder reflow meth soldering is	ng an eut h the test ing should nod and s s uniform 02), 2N (1 2 3 5 5 5 3 1 1 1 2 2 3 3 1 1 1 2 3	ectic solder. jig for 10±1 s d be done eith should be con	Then app sec. ner with a ducted v efects su	(in mm) c 0.23 0.3 0.5 1.2 1.65 2.0 2.9 3.7



## GRM Series Specifications and Test Methods (1)

			Specifi	ications				
No.	lte	em	Temperature Compensating Type	High Dielectric Type	-	Test M	ethod	
		Appearance	No defects or abnormalities	1				
		Capacitance	Within the specified tolerance					
11	Vibration Resistance	Q/D.F.	30pF and over: Q≥1000 30pF and below: Q≥400+20C C: Nominal Capacitance (pF)	$ \begin{array}{l} [B1, B3, R6, R7, C8] \\ W.V.: 100V \\ : 0.025 max. (C<0.068 \mu F) \\ : 0.05 max. (C\geq 0.068 \mu F) \\ W.V.: 50/25V: \\ : 0.025 max. (C \geq 10 \mu F) \\ : 0.035 max. (C \geq 10 \mu F) \\ W.V.: 16/10V: 0.035 max. \\ W.V.: 6.3/4V \\ : 0.05 max. (C \geq 3.3 \mu F) \\ : 0.1 max. (C \geq 3.3 \mu F) \\ [E4] \\ W.V.: 25Vmin: 0.025 max. \\ [F1, F5] \\ W.V.: 25V min. \\ : 0.05 max. (C < 0.1 \mu F) \\ : 0.09 max. (C \geq 0.1 \mu F) \\ W.V.: 16/10V: 0.125 max. \\ W.V.: 6.3V: 0.15 max. \\ W.V.: 6.3V: 0.15 max. \\ \end{array} $	Solder the capacit same manner and The capacitor shou having a total amp uniformly between frequency range, f be traversed in app applied for a perior perpendicular direct	under the sam uld be subjecte litude of 1.5mr the approxima rom 10 to 55H proximately 1 r d of 2 hours in	te conditions a d to a simple h n, the frequence ate limits of 10 z and return to ninute. This m each of 3 mutu	s (10). harmonic motion cy being varied and 55Hz. The 10Hz, should otion should be
			No crack or marked defect show	uld occur.	Solder the capacitude in Fig. 2a using an direction shown in done by the reflow so that the soldering shock.	eutectic solde Fig. 3a for 5± method and s	r. Then apply a 1 sec. The solo hould be cond	a force in the dering should be ucted with care
12	Deflection	n	R230	0 Pressurizing speed : 1.0mm/sec. Pressurize		+ + + + 100 Fig.	04.5	/03/15: t: 0.8mm)
				f Flexure : ≦1	Туре	а	b	С
					GRM02	0.2	0.56	0.23
			Capacitance r		GRM03	0.3	0.9	0.3
			45	45	GRM15	0.4	1.5	0.5
					GRM18	1.0	3.0	1.2
			Fig. 3a		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
								(in mm)
13	,		75% of the terminations are to t continuously.	be soldered evenly and	Immerse the capar rosin (JIS-K-5902) Preheat at 80 to 12 After preheating, ir $2\pm0.5$ seconds at	(25% rosin in 20℃ for 10 to 3 mmerse in an e	weight proport 0 seconds. eutectic solder	ion) . solution for



## **GRM Series Specifications and Test Methods (1)**

			Specif	ications					
lo.	lte	em	Temperature Compensating Type	High Dielectric Type		Test	t Method		
		[	The measured and observed cl specifications in the following ta	•	_				
		Appearance	No defects or abnormalities	1	_				
		Capacitance Change	Within ±2.5% or ±0.25pF (Whichever is larger)	B1, B3, R1, R6, R7, C8 : Within ±7.5% F1, F5, E4: Within ±20%					
14	Resistance to Soldering Heat	Q/D.F.	30pF and over: Q≧1000 30pF and below: Q≧400+20C	[B1, B3, R6, R7, C8] W.V.: 100V : 0.025 max. (C<0.068µF) : 0.05 max. (C≥0.068µF) W.V.: 50/25V: : 0.025 max. (C<10µF) : 0.035 max. (C≥10µF) W.V.: 16/10V: 0.035 max. W.V.: 6.3/4V : 0.05 max. (C<3.3µF) : 0.1 max. (C≥3.3µF)	Immerse the c solder solution temperature for •Initial measur Perform a hea then set at roo Perform the initial	apacitor at 120 t apacitor in an e at 270±5°C for or 24±2 hours, t ement for high t treatment at 1 m temperature itial measurement r GRM32/43/55	eutectic s r 10 $\pm$ 0.5 then mea dielectric 50+0/7 for 24 $\pm$ 2 ent.	older or Sn-3.0 seconds. Set a sure. constant type 10°C for one hot	at room
			C: Nominal Capacitance (pF)	[E4] W.V.: 25Vmin: 0.025 max.	Step	Tempera		Tim	
	Dielectric Strength No defects		[F1, F5]	1 2	100 to 1 170 to 2		<u>1 mi</u> 1 mi		
				<ul> <li>W.V.: 25V min.</li> <li>: 0.05 max. (C&lt;0.1μF)</li> <li>: 0.09 max. (C≥0.1μF)</li> <li>W.V.: 16/10V: 0.125 max.</li> <li>W.V.: 6.3V: 0.15 max.</li> </ul>		170102			
				VV.V 0.3V. 0.13 max.					
		I.R.	More than 10,000M $\Omega$ or 500 $\Omega$		-				
		Dielectric			-				
		Dielectric		F (Whichever is smaller)	-				
		Dielectric	No defects The measured and observed cl	F (Whichever is smaller)	-				
		Dielectric Strength	No defects The measured and observed cl specifications in the following ta	F (Whichever is smaller)	- - - - Eix the capacit	or to the suppo	orting iig i	n the same	
		Dielectric Strength Appearance Capacitance	No defects The measured and observed cl specifications in the following ta No defects or abnormalities Within $\pm 2.5\%$ or $\pm 0.25pF$	F (Whichever is smaller) haracteristics should satisfy the able. B1, B3, R1, R6, R7, C8 : Within ±7.5%	manner and ur Perform the fiv shown in the fo Set for 24±2 h	tor to the support nder the same of re cycles accorr collowing table. nours at room te	condition ding to th	s as (10). le four heat trea	ıre.
		Dielectric Strength Appearance Capacitance	No defects The measured and observed cl specifications in the following ta No defects or abnormalities Within $\pm 2.5\%$ or $\pm 0.25pF$	F (Whichever is smaller) aracteristics should satisfy the able. B1, B3, R1, R6, R7, C8 : Within ±7.5% F1, F5, E4: Within ±20% [B1, B3, R6, R7, C8] W.V.: 100V : 0.025 max. (C<0.068μF) : 0.05 max. (C<0.068μF) W.V.: 50/25V: : 0.025 max. (C<10μF)	manner and un Perform the fiv shown in the fo	nder the same of ve cycles accord ollowing table.	condition ding to th emperatu	s as (10). le four heat trea re, then measu	ire. 4
	Temperature	Dielectric Strength Appearance Capacitance	No defects The measured and observed cl specifications in the following ta No defects or abnormalities Within ±2.5% or ±0.25pF (Whichever is larger)	F (Whichever is smaller) F (Whichever is smaller) haracteristics should satisfy the able. B1, B3, R1, R6, R7, C8 : Within ±7.5% F1, F5, E4: Within ±20% [B1, B3, R6, R7, C8] W.V.: 100V : 0.025 max. (C<0.068μF) : 0.05 max. (C<0.068μF) W.V.: 50/25V: : 0.025 max. (C<10μF) : 0.035 max. (C≥10μF)	manner and ur Perform the fiv shown in the fo Set for 24±2 h	nder the same ( ve cycles accord bllowing table, iours at room te <u>1</u> Min, Operating	condition ding to th	s as (10). le four heat trea re, then measu <u>3</u> Max. Operating	ıre.
5	Temperature Cycle	Dielectric Strength Appearance Capacitance	No defects The measured and observed cl specifications in the following ta No defects or abnormalities Within $\pm 2.5\%$ or $\pm 0.25pF$	F (Whichever is smaller)         F (Whichever is smaller)         naracteristics should satisfy the able.         B1, B3, R1, R6, R7, C8 : Within ±7.5%         F1, F5, E4: Within ±20%         [B1, B3, R6, R7, C8]         W.V.: 100V         : 0.025 max. (C<0.068µF)	manner and ur Perform the fiv shown in the fo Set for 24±2 h Step Temp. (°C)	nder the same of re cycles accord bilowing table. Nours at room te <u>1</u> Min. Operating Temp. +0/-3	condition ding to th emperatu 2 Room Temp.	s as (10). The four heat treat re, then measu 3 Max. Operating Temp. +3/-0	ire. 4 Room Temp.
5		Dielectric Strength Appearance Capacitance	No defects The measured and observed cl specifications in the following ta No defects or abnormalities Within ±2.5% or ±0.25pF (Whichever is larger) 30pF and over: Q≧1000	F (Whichever is smaller)         F (Whichever is smaller)         haracteristics should satisfy the able.         B1, B3, R1, R6, R7, C8 : Within ±7.5%         F1, F5, E4: Within ±20%         [B1, B3, R6, R7, C8]         W.V.: 100V         : 0.025 max. (C<0.068µF)	manner and ur Perform the fiv shown in the fo Set for 24±2 h Step Temp. (°C) Time (min.)	nder the same of re cycles accorr blowing table. iours at room te Min. Operating Temp. +0/-3 30±3	condition ding to th emperatu 2 Room Temp. 2 to 3	s as (10). e four heat trea re, then measu Max. Operating Temp. +3/-0 30±3	re. 4 Room Temp. 2 to 3
15		Dielectric Strength Appearance Capacitance Change	No defects The measured and observed cl specifications in the following ta No defects or abnormalities Within ±2.5% or ±0.25pF (Whichever is larger) 30pF and over: Q≥1000 30pF and below:	F (Whichever is smaller)         F (Whichever is smaller)         aracteristics should satisfy the able.         B1, B3, R1, R6, R7, C8 : Within ±7.5%         F1, F5, E4: Within ±20%         [B1, B3, R6, R7, C8]         W.V.: 100V         : 0.025 max. (C<0.068µF)	manner and ur Perform the fiv shown in the fo Set for 24±2 h <u>Step</u> Temp. (℃) <u>Time (min.)</u> •Initial measur Perform a hea then set at roo	nder the same of re cycles accord bilowing table. Nours at room te <u>1</u> Min. Operating Temp. +0/-3	condition ding to the emperatu 2 Room Temp. 2 to 3 dielectric 50+0/	s as (10). the four heat treat re, then measure Max. Operating Temp. +3/-0 30±3 c constant type 10°C for one hour	re. 4 Room Temp. 2 to 3
15		Dielectric Strength Appearance Capacitance Change	No defects         The measured and observed cl specifications in the following ta         No defects or abnormalities         Within ±2.5% or ±0.25pF (Whichever is larger)         30pF and over: Q≥1000 30pF and below: Q≥400+20C	<ul> <li>F (Whichever is smaller)</li> <li>F (Whichever is smaller)</li> <li>B1, B3, R1, R6, R7, C8 : Within ±7.5%</li> <li>F1, F5, E4: Within ±20%</li> <li>[B1, B3, R6, R7, C8]</li> <li>W.V.: 100V : 0.025 max. (C&lt;0.068µF)</li> <li>: 0.05 max. (C&lt;0.068µF)</li> <li>W.V.: 50/25V: : 0.025 max. (C&lt;10µF)</li> <li>: 0.035 max. (C&lt;10µF)</li> <li>: 0.035 max. (C&lt;10µF)</li> <li>: 0.035 max. (C&lt;10µF)</li> <li>: 0.05 max. (C&lt;3.3µF)</li> <li>: 0.1 max. (C≥3.3µF)</li> <li>[E4]</li> <li>W.V.: 25Vmin: 0.05 max.</li> <li>[F1, F5]</li> <li>W.V.: 25V min.</li> <li>: 0.05 max. (C&lt;0.1µF)</li> </ul>	manner and ur Perform the fiv shown in the fo Set for 24±2 h <u>Step</u> Temp. (℃) <u>Time (min.)</u> •Initial measur Perform a hea then set at roo	nder the same of re cycles accord billowing table. Hours at room te 1 Min. Operating Temp. +0/-3 30±3 ement for high t treatment at 1 m temperature	condition ding to the emperatu 2 Room Temp. 2 to 3 dielectric 50+0/	s as (10). the four heat treat re, then measure Max. Operating Temp. +3/-0 30±3 c constant type 10°C for one hour	re. 4 Room Temp. 2 to 3
15		Dielectric Strength Appearance Capacitance Change	No defects         The measured and observed cl specifications in the following ta         No defects or abnormalities         Within ±2.5% or ±0.25pF (Whichever is larger)         30pF and over: Q≥1000 30pF and below: Q≥400+20C	F (Whichever is smaller)         F (Whichever is smaller)         haracteristics should satisfy the able.         B1, B3, R1, R6, R7, C8 : Within ±7.5%         F1, F5, E4: Within ±20%         [B1, B3, R6, R7, C8]         W.V.: 100V         : 0.025 max. (C<0.068µF)	manner and ur Perform the fiv shown in the fo Set for 24±2 h <u>Step</u> Temp. (℃) <u>Time (min.)</u> •Initial measur Perform a hea then set at roo	nder the same of re cycles accord billowing table. Hours at room te 1 Min. Operating Temp. +0/-3 30±3 ement for high t treatment at 1 m temperature	condition ding to the emperatu 2 Room Temp. 2 to 3 dielectric 50+0/	s as (10). the four heat treat re, then measure Max. Operating Temp. +3/-0 30±3 c constant type 10°C for one hour	re. 4 Room Temp. 2 to 3



## GRM Series Specifications and Test Methods (1)

			Specifi	ications	
lo.	lte	m	Temperature Compensating Type	High Dielectric Type	Test Nethod
			The measured and observed ch specifications in the following ta	•	
		Appearance	No defects or abnormalities	1	
		Capacitance Change	Within ±5% or ±0.5pF (Whichever is larger)	B1, B3, R1, R6, R7, C8 : Within ±12.5% F1, F5, E4: Within ±30%	
16	Humidity (Steady State)	Q/D.F.	30pF and over: Q≧350 10pF and over 30pF and below: Q≧275+2.5C 10pF and below: Q≧200+10C C: Nominal Capacitance (pF)	$\begin{array}{l} [R6, R7, C8] \\ W.V.: 100V \\ &: 0.05 \mbox{max.} (C{<}0.068\muF) \\ &: 0.075 \mbox{max.} (C{\geq}0.068\muF) \\ W.V.: 50/25/16/10V \\ &: 0.05 \mbox{max.} \\ W.V.: 6.3/4V \\ &: 0.075 \mbox{max.} (C{<}3.3\muF) \\ &: 0.125 \mbox{max.} (C{\geq}3.3\muF) \\ $$ [E4] \\ W.V.: 25Vmin. \\ &: 0.075 \mbox{max.} (C{<}0.1\muF) \\ &: 0.125 \mbox{max.} \\ &: 0.05 \mbox{max.} \\ &: 0.05$	Set the capacitor at 40±2℃ and in 90 to 95% humidity for 500±12 hours. Remove and set for 24±2 hours at room temperature, then measure.
		I.R.	More than 1,000M $\Omega$ or 50 $\Omega \cdot F$	(Whichever is smaller)	
			The measured and observed ch specifications in the following ta		
		Appearance	No defects or abnormalities		
		Capacitance Change	Within $\pm$ 7.5% or $\pm$ 0.75pF (Whichever is larger)	B1, B3, R1, R6, R7, C8 : Within ±12.5% F1, F5, E4: Within ±30% [W.V.: 10V max.] F1, F5: Within +30/-40%	
17	Humidity Load	Q/D.F.	30pF and over: Q≧200 30pF and below: Q≧100+10C/3 C: Nominal Capacitance (pF)	$ \begin{array}{l} [B1, B3, R6, R7, C8] \\ W.V.: 100V \\ &: 0.05 \mbox{max.} (C<0.068 \mu F) \\ &: 0.075 \mbox{max.} (C \ge 0.068 \mu F) \\ W.V.: 50/25/16/10V \\ &: 0.05 \mbox{max.} \\ W.V.: 6.3/4V \\ &: 0.075 \mbox{max.} (C < 3.3 \mu F) \\ &: 0.125 \mbox{max.} (C \ge 3.3 \mu F) \\ [E4] \\ W.V.: 25V \mbox{min.} \\ &: 0.075 \mbox{max.} (C < 0.1 \mu F) \\ &: 0.125 \mbox{max.} (C < 0.1 \mu F) \\ &: 0.125 \mbox{max.} (C \ge 0.1 \mu F) \\ &: 0.125 \mbox{max.} \\ &: 0.0125 \$	Apply the rated voltage at 40±2°C and 90 to 95% humidity for 500±12 hours. Remove and set for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA. •Initial measurement for F1, F5/10V max. Apply the rated DC voltage for 1 hour at 40±2°C. Remove and set for 24±2 hours at room temperature. Perform initial measurement.
			1	1	

Continued on the following page.  $\checkmark$ 



### **GRM Series Specifications and Test Methods (1)**

Below GRM Series Specifications and Test Methods (1) are applied to Non "\*" PNs in capacitance table. Continued from the preceding page. In case "\*" is added in capacitance table, please refer to GRM Series Specifications and Test Methods (2) (P.29).

			Specif	ications	
No.	lte	em	Temperature Compensating Type	High Dielectric Type	Test Method
			The measured and observed ch specifications in the following ta		
		Appearance	No defects or abnormalities		
		Capacitance Change	Within ±3% or ±0.3pF (Whichever is larger)	B1, B3, R1, R6, R7, C8 : Within ±12.5% F1, F5, E4: Within ±30% [Except 10V max. and. C≥1.0μF] F1, F5: Within +30/−40% [10V max. and C≥1.0μF]	Apply 200% (GRM21BR71H105, GRM21BR72A474, GRM31CR71H475: 150% of the rated voltage) of the rated
18	High Temperature Load	Q/D.F.	30pF and over: Q≧350 10pF and over 30pF and below: Q≧275+2.5C 10pF and below: Q≧200+10C C: Nominal Capacitance (pF)	$ \begin{array}{l} [B1, B3, R6, R7, C8] \\ W.V.: 100V \\ : 0.05 max. (C<0.068 \mu F) \\ : 0.075 max. (C\geq0.068 \mu F) \\ W.V.: 50/25/16/10V \\ : 0.05 max. \\ W.V.: 6.3/4V \\ : 0.075 max. (C<3.3 \mu F) \\ : 0.125 max. (C\geq3.3 \mu F) \\ [E4] \\ W.V.: 25Vmin: 0.05 max. \\ [F1, F5] \\ W.V.: 25V min. \\ : 0.075 max.(C<0.1 \mu F) \\ : 0.125 max.(C\geq0.1 \mu F) \\ : 0.125 max.(C\geq0.1 \mu F) \\ W.V.: 16/10V: 0.15 max. \\ W.V.: 6.3V: 0.2 max. \\ \end{array} $	<ul> <li>voltage at the maximum operating temperature ±3°C for 1000±12 hours.</li> <li>Set for 24±2 hours at room temperature, then measure.</li> <li>The charge/discharge current is less than 50mA.</li> <li>Initial measurement for high dielectric constant type.</li> <li>Apply 200% of the rated DC voltage at the maximum operating temperature ±3°C for one hour. Remove and set for 24±2 hours at room temperature.</li> <li>Perform initial measurement.</li> </ul>
		I.R.	More than 1,000M $\Omega$ or 50 $\Omega$ $\cdot$ F	(Whichever is smaller)	

#### Table A-1

(1) Capacitance Change from 25°C (%) Nominal Values (ppm/°C)\*1 -55 -10 Char. -30 Max. Min. Max. Min. Max. Min.  $0\pm 30$ 0.58 0.40 -0.17 5C -0.240.25 -0.1160 0± 60 0.87 -0.48 0.59 -0.33 0.38 -0.21 1.61 0.50  $-150\pm 60$ 2.33 0.72 1.02 0.32 6P 6R  $-220\pm 60$ 3.02 1.28 2.08 0.88 1.32 0.56 65  $-330\pm 60$ 4.09 2.16 2.81 1.49 1.79 0.95  $-470\pm 60$ 5.46 3.28 3.75 2.26 2.39 1.44 6T 5.04 2.21 7U  $-750 \pm 120$ 8.78 6.04 3.47 3.84 1X +350 to -1000

\*1: Nominal values denote the temperature coefficient within a range of 25°C to 125°C (for  $\Delta$ C)/85°C (for other TC).

(2)

			Capacitance Change from 20°C (%)						
Char.	Nominal Values (ppm//c)*2	-	-55	-	25	-10			
		Max.	Min.	Max.	Min.	Max.	Min.		
2C	0± 60	0.82	-0.45	0.49	-0.27	0.33	-0.18		
3C	0±120	1.37	-0.90	0.82	-0.54	0.55	-0.36		
4C	0±250	2.56	-1.88	1.54	-1.13	1.02	-0.75		
2P	$-150\pm 60$	_	_	1.32	0.41	0.88	0.27		
3P	-150±120	-	-	1.65	0.14	1.10	0.09		
4P	-150±250	-	_	2.36	-0.45	1.57	-0.30		
2R	-220± 60	—	_	1.70	0.72	1.13	0.48		
3R	-220±120	-	_	2.03	0.45	1.35	0.30		
4R	-220±250	_	_	2.74	-0.14	1.83	-0.09		
25	$-330\pm 60$	-	_	2.30	1.22	1.54	0.81		
35	-330±120	_	_	2.63	0.95	1.76	0.63		
4S	-330±250	-	_	3.35	0.36	2.23	0.24		
2T	-470± 60	-	_	3.07	1.85	2.05	1.23		
आ	-470±120	—	-	3.40	1.58	2.27	1.05		
4T	-470±250	-	_	4.12	0.99	2.74	0.66		
3U	-750±120	_	_	4.94	2.84	3.29	1.89		
4U	-750±250	_	-	5.65	2.25	3.77	1.50		

\*2: Nominal values denote the temperature coefficient within a range of 20°C to 125°C (for ΔC)/85°C (for other TC).



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## **GRM Series Specifications and Test Methods (2)**

Below GRM Series Specifications and Test Methods (2) are applied to "\*" PNs in capacitance table. In case "\*" is not added in capacitance table, please refer to GRM Series Specifications and Test Methods (1) (P.23).

				e refer to GRM Series Specifications and Test Methods (1) (P.23).					
No.	lte	em	Specifications	Test Nethod					
1	Operating Temperat Range		B1, B3, F1: −25 to +85°C R1, R7, C7, D7, E7: -55 to +125°C C6, R6: −55 to +85°C F5: −30 to +85°C C8, D8: −55 to +105°C,	Reference temperature: 25℃ (B1, B3, R1, F1: 20℃)					
2	Rated Vo	ltage	See the previous pages.	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 <sup>P,P</sup> or V <sup>0,P</sup> , whichever is larger, should be maintained within the rated voltage range.					
3	Appearar	nce	No defects or abnormalities	Visual inspection					
4	Dimensio	ns	Within the specified dimensions	Using calipers					
5	Dielectric Strength		No defects or abnormalities	No failure should be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA.					
6	Insulation Resistance		More than $50\Omega \cdot F$	The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at reference temperature and 75%RH max. and within 1 minutes of charging, provided the charge/discharge current is less than 50mA.					
7	7 Capacitance		*Table 1         GRM155       B3/R6       1A       124 to       105         GRM185       B3/R6       1C/1A       105         GRM185       C8/D7       1A       105         GRM185       C8/D7       1A       105         GRM188       B3/R6       1C/1A       225         GRM188       B3/R6       1A       335         GRM188       B3/R6       1C/1A       475         GRM219       B3/R6       1C/1A       106         GRM219       C8       1A       475         GRM218       B3/R6       1C/1A       106         GRM219       C8       1A       475         GRM219       B3/R6       1C/1A       106         GRM218       R7/C8       1A       106         GRM319       B3/R6       1C/1A       106	The capacitance/D.F. should be measured at reference temperature at the frequency and voltage shown in the table. $\begin{array}{ c c c c c c c c c c c c c c c c c c c$					
8	Dissipatio (D.F.)	on Factor	B1, B3, R6* <sup>2</sup> , R7* <sup>3</sup> , C7, C8, D8* <sup>2</sup> : 0.1 max. F1, F5: 0.2 max.						
		No bias	B1, B3 : Within ±10% (-25 to +85℃) F1 : Within +30/-80% (-25 to +85℃) R6 : Within ±15% (-55 to +85℃) R1, R7 : Within ±15% (-55 to +125℃) F5 : Within ±22/-82% (-30 to +85℃) C6 : Within ±22% (-55 to +85℃) C7 : Within ±22% (-55 to +125℃) C8 : Within ±22% (-55 to +105℃) D7 : Within ±22/-33% (-55 to +125℃) E7 : Within +22/-56% (-55 to +125℃)	The capacitance change should be measured after 5 min. at each specified temp. stage. The ranges of capacitance change compared with the reference temperature value over the temperature ranges shown in the table should be within the specified ranges.* In case of applying voltage, the capacitance change should be measured after 1 more min. with applying voltage in equilibration of each temp. stage. *GRM43 B1/R6 0J/1A 336/476 only: 1.0±0.2Vrms					
			D8 : Within +22/-33% (-55 to +105℃)	Step         Temperature (°C)         Applying Voltage (V)					
				1 25±2 (for R6, R7, C6, C7, C8, D7, D8, E7, F5) 20±2 (for B1, B3, F1, R1)					
9	Capacitance Temperature			-55±3 (for R1, R6, R7, C6, C7, C8, D7, D8, E7) -30±3 (for F5) -25±3 (for B1, B3, F1)					
9	Characteristics			3 25±2 (for R6, R7, C6, C7, C8, D7, D8, E7, F5) 20±2 (for B1, B3, F1, R1) No bias					
		50% of	B1: Within +10/-30%	125±3 (for R1, R7, C7, D7, E7) 4 105±3 (for C8, D8) 85±3 (for B1, B3, F1, F5, R6, C6)					
		the Rated Voltage	R1: Within +15/-40% F1: Within +30/-95%	5 20±2 (for B1, F1, R1)					
				6 -55±3 (for R1) -25±3 (for B1, F1) 50% of the					
				7         20±2 (for B1, F1, R1)         50% of the rated voltage					
				8 125±3 (for R1) 85±3 (for B1, F1)					
				<ul> <li>85±3 (for B1, F1)</li> <li>Initial measurement for high dielectric constant type Perform a heat treatment at 150 +0/-10°C for one hour and then set for 24±2 hours at room temperature. Perform the initial measurement.</li> </ul>					

\*2: GRM31CR60J107, GRM31CD80G107: 0.15 max.

\*3: GRM31CR71E106: 0.125 max.



## GRM Series Specifications and Test Methods (2)

	tem	Specifications		Test M	ethod			
		No removal of the terminations or other defects should occur.	<ul> <li>Solder the capacitor on the test jig (glass epoxy board) sho in Fig. 1a using an eutectic solder. Then apply 10N* force ir parallel with the test jig for 10±1sec.</li> <li>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 *1N: GRM02, 2N: GRM03, 5N: GRM15/GRM18</li> </ul>					
			Type	a	b	c		
Adhesiv	e Strength		GRM02	0.2	0.56	0.23		
of Term	ination		GRM03	0.3	0.9	0.3		
			GRM15	0.4	1.5	0.5		
		Solder resist	GRM18	1.0	3.0	1.2		
		Baked electrode or	GRM21	1.2	4.0	1.65		
		copper foil	GRM31	2.2	5.0	2.0		
		Fig. 1a	GRM32	2.2	5.0	2.9		
			GRM43	3.5	7.0	3.7		
			GRM55	4.5	8.0	5.6		
	Appearance	No defects or abnormalities	Coldentis	tor on the first "		( hog = 1) !: (!		
	Capacitance	Within the specified tolerance	Solder the capaci	-				
	Capacitance		The capacitor sho			( )		
	D.F.	C6: 0.125 max. F1, F5: 0.2 max.	frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should b applied for a period of 2 hours in each of 3 mutually perpendicular directions (total of 6 hours).					
		No cracking or marking defects should occur	perpendicular dire	ections (total of	6 hours).	_		
		No cracking or marking defects should occur.		ections (total of tor on the test ji n eutectic solde n Fig. 3a for 5± v method and s sing is uniform a	6 hours). ig (glass epoxy r. Then apply a 1 sec. The sold hould be cond	/ board) show a force in the dering should ucted with ca		
Doflecti	0.0	20 50 Pressurizing speed : 1.0mm/sec. Pressurize	perpendicular dire         Solder the capaci         in Fig. 2a using au         direction shown ir         done by the reflow         so that the solder	ections (total of tor on the test ji n eutectic solde n Fig. 3a for $5\pm$ v method and s ing is uniform a	6 hours). ig (glass epoxy) r. Then apply a 1 sec. The sold hould be cond nd free of defe	v board) shov a force in the dering should ucted with ca ucted with ca icts such as l		
Deflecti	on	20 speed : 1.0mm/sec. Pressurize r Flexure : ≤1	perpendicular dire         Solder the capaci         in Fig. 2a using au         direction shown ir         done by the reflow         so that the solder	ections (total of tor on the test ji n eutectic solde n Fig. 3a for 5± v method and s sing is uniform a	6 hours). ig (glass epoxy, r. Then apply a 1 sec. The sold hould be cond nd free of defe	v board) show a force in the dering should ucted with ca ucted with ca icts such as t: 1.6mm		
Deflecti	on	20 50 Pressurizing speed : 1.0mm/sec. Pressurize Flexure : ≤1	perpendicular dire Solder the capaci in Fig. 2a using an direction shown in done by the reflow so that the solder shock.	ections (total of tor on the test ji in eutectic solde n Fig. 3a for 5± v method and s ing is uniform a $b = \frac{b}{100}$ Fig. 2	6 hours). ig (glass epoxy r. Then apply a 1 sec. The sold hould be cond nd free of defe	y board) show a force in the dering should ucted with ca cts such as h t: 1.6mm 1/03/15: t: 0.8mm		
Deflecti	on	20 50 Pressurizing speed : 1.0mm/sec. Pressurize Flexure : ≤1	perpendicular dire Solder the capaci in Fig. 2a using an direction shown ir done by the reflow so that the solder shock.	ections (total of tor on the test ji in eutectic solde n Fig. 3a for $5\pm$ v method and s ing is uniform a $b^{b}$ $b^{t}$ $b^$	6 hours). ig (glass epoxy, r. Then apply a 1 sec. The sold hould be cond nd free of defe	v board) show a force in the dering should ucted with ca cts such as t: 1.6mn //03/15: t: 0.8mm		
Deflecti	on	20 50 Pressurizing speed : 1.0mm/sec. Pressurize Flexure : ≤1	perpendicular dire         Solder the capaci         in Fig. 2a using an         direction shown ir         done by the reflow         so that the solder         shock.	ections (total of tor on the test ji in eutectic solde n Fig. 3a for 5± v method and s ing is uniform a b t t t t t t t t t t t t t t t t t t	6 hours). ig (glass epoxy, r. Then apply a 1 sec. The sold hould be cond nd free of defe 04.5 0	y board) show a force in the dering should ucted with ca ects such as l t: 1.6mn //03/15: t: 0.8mm c 0.23		
Deflecti	on	20 50 Pressurizing speed : 1.0mm/sec. Pressurize Flexure : ≤1	perpendicular direction         Solder the capaci         in Fig. 2a using and         direction shown in         done by the reflow         so that the solder         shock.	ections (total of tor on the test ji in eutectic solde n Fig. 3a for 5± v method and s ing is uniform a b t t t t t t t t t t t t t t t t t t	6 hours). ig (glass epoxy, r. Then apply a 1 sec. The sold hould be cond nd free of defe 04.5 04.5 04.5 04.5 05 05 0.9	t board) show a force in the dering should ucted with ca ects such as t: 1.6mm //03/15: t: 0.8mm c 0.23 0.3		
Deflecti	on	20 50 Pressurizing speed : 1.0mm/sec. Pressurize Flexure : ≤1	perpendicular dire         Solder the capaci         in Fig. 2a using an         direction shown ir         done by the reflow         so that the solder         shock.	ections (total of tor on the test ji n eutectic solde n Fig. 3a for 5± v method and s ing is uniform a b b v method and s ing is uniform a fig. 2 a 0.2 0.3 0.4	6 hours). ig (glass epoxy) r. Then apply a 1 sec. The sold hould be cond nd free of defe 04.5 04.5 0.5 0.9 0.56 0.9 1.5	t board) show a force in the dering should ucted with ca ects such as t: 1.6mr //03/15: t: 0.8mm c 0.23 0.3 0.5		
Deflecti	on	20 50 Pressurizing speed : 1.0mm/sec. Pressurize Flexure : ≤1	perpendicular dire         Solder the capaci         in Fig. 2a using an         direction shown ir         done by the reflow         so that the solder         shock.	ections (total of tor on the test ji n eutectic solde n Fig. 3a for 5± v method and s ing is uniform a b to to to to to to to to to to to to to	6 hours). ig (glass epoxy) r. Then apply a 1 sec. The sold hould be cond nd free of defe 04.5 0.5 0.5 0.9 1.5 3.0	t board) show a force in the dering should ucted with c tects such as t: 1.6mr (/03/15: t: 0.8mr c 0.23 0.3 0.5 1.2		
Deflecti	on	20 50 Pressurizing speed : 1.0mm/sec. Pressurize Flexure : ≤1	perpendicular dire         Solder the capaci         in Fig. 2a using au         direction shown ir         done by the reflow         so that the solder         shock.	ections (total of tor on the test ji in eutectic solde h Fig. 3a for 5± v method and s ing is uniform a b t t t t t t t t t t t t t t t t t t	6 hours). ig (glass epoxy r. Then apply a 1 sec. The sold hould be cond nd free of defe e4.5 (GRM02 b 0.56 0.9 1.5 3.0 4.0	t board) show a force in the dering should ucted with cu tcts such as t 1.6mr (003/15: t: 0.8mm c 0.23 0.3 0.5 1.2 1.65		
Deflecti	on	20 50 Pressurizing speed : 1.0mm/sec. Pressurize Flexure : ≤1	perpendicular dire         Solder the capaci         in Fig. 2a using au         direction shown ir         done by the reflow         so that the solder         shock.	ections (total of tor on the test ji in eutectic solde n Fig. 3a for 5± w method and s ing is uniform a b to fig. 2 a 0.2 0.3 0.4 1.0 1.2 2.2	6 hours). ig (glass epoxy r. Then apply a 1 sec. The sold hould be cond nd free of defe 04.5 04.5 0.9 1.5 3.0 4.0 5.0	t 1.6mr (0.23 0.5 1.2 1.65 2.0		
Deflecti	on	20 50 Pressurizing speed : 1.0mm/sec. Pressurize Flexure : ≤1	perpendicular dire         Solder the capaci         in Fig. 2a using ai         direction shown in         done by the reflow         so that the solder         shock.	ections (total of tor on the test ji in eutectic solde n Fig. 3a for 5± v method and s ing is uniform a b to fig. 2 a 0.2 0.3 0.4 1.0 1.2 2.2 2.2	6 hours). ig (glass epoxy, r. Then apply a 1 sec. The sold hould be cond nd free of defe 04.5 04.5 0.9 1.5 3.0 4.0 5.0	t board) show a force in the dering should ucted with ca icts such as l t: 1.6mm (03/15: t: 0.8mm c 0.23 0.3 0.5 1.2 1.65		
Deflecti	on	20 50 Pressurizing speed : 1.0mm/sec. Pressurize Flexure : ≤1	perpendicular dire         Solder the capaci         in Fig. 2a using au         direction shown ir         done by the reflow         so that the solder         shock.	ections (total of tor on the test ji in eutectic solde n Fig. 3a for 5± w method and s ing is uniform a b to fig. 2 a 0.2 0.3 0.4 1.0 1.2 2.2	6 hours). ig (glass epoxy r. Then apply a 1 sec. The sold hould be cond nd free of defe 04.5 04.5 0.9 1.5 3.0 4.0 5.0	t 1.6mm v board) shou a force in the dering should ucted with ca cts such as vot such as vot to the vot to the		
Deflecti	on	20 50 Pressurizing speed : 1.0mm/sec. Pressurize Flexure : ≤1	perpendicular dire         Solder the capaci         in Fig. 2a using an         direction shown in         done by the reflow         so that the solder         shock.	ections (total of tor on the test ji in eutectic solde n Fig. 3a for $5\pm$ w method and s ing is uniform a b f f f f f f f f f f	6 hours). ig (glass epoxy, r. Then apply a 1 sec. The sold hould be cond nd free of defe 04.5 04.5 0.56 0.9 1.5 3.0 4.0 5.0 5.0 7.0	t board) show a force in the dering should ucted with ca ccts such as l ccts such as l v/03/15: t: 0.8mm c 0.23 0.3 0.5 1.2 1.65 2.0 2.9 3.7		

\*2: GRM31CR60J107, GRM31CD80G107: 0.15 max.

\*3: GRM31CR71E106: 0.125 max.



## GRM Series Specifications and Test Methods (2)

lo.	lte	m	Specifications		Tes	t Metho	d				
		Appearance Capacitance	No defects or abnormalities B1, B3, R1, R6*4, R7, C6, C7, C8, E7, D7, D8: Within ±7.5% F1, F5: Within ±20%	Immerse the	apacitor at 120 capacitor in an n at 270±5℃ fo	eutectic s	solder or Sn-3.0	•			
	Resistance	Change D.F.	B1, B3, R1, R6* <sup>2</sup> , R7* <sup>3</sup> , C7, C8, E7, D7, D8* <sup>2</sup> : 0.1 max. C6: 0.125 max. F1, F5: 0.2 max.	*Do not apply	rement for high	dielectri	c constant type				
4	to Soldering	I.R.	More than $50\Omega \cdot F$		at treatment at om temperature			our and			
	Heat	Dielectric	No defects	Perform the in	nitial measurem or GRM32/43/5	ent.		me			
		Strength		<u> </u>	· · ·	o 120℃		min.			
				2	170 to	o 200℃		min.			
		Appearance	No defects or abnormalities	Fix the capac	itor to the supp	orting jig	in the same m	anner and			
		Capacitance Change	B1, B3, R1, R6, R7, C6, C7, C8, D7, D8: Within ±7.5% E7: Within ±30% F1, F5: Within ±20%	Perform the f shown in the	<ul> <li>Fix the capacitor to the supporting jig in the same manner an under the same conditions as (10).</li> <li>Perform the five cycles according to the four heat treatments shown in the following table.</li> <li>Set for 24±2 hours at room temperature, then measure.</li> </ul>						
	Temperature 5 Sudden Change	B1, B3, R1, R6*2, R7*3, C7, C8, E7, D7, D8*2: 0.1 max.           D.F.         C6: 0.125 max.           E1 E5: 0.2 max.		Step	1	2	3	4			
5		I.R.	F1, F5: 0.2 max. More than 50Ω · F	 Temp. (℃)	Min. Operating	Room Temp.	Max. Operating	Room Temp.			
	onungo			Time (min.)	Temp. +0/-3 30±3	2 to 3	Temp. +3/-0 30±3	2 to 3			
		Dielectric Strength	No defects	<ul> <li>Initial measurement for high dielectric constant type Perform a heat treatment at 150+0/−10°C for one hour and then set at room temperature for 24±2 hours. Perform the initial measurement.</li> </ul>							
		Appearance	No defects or abnormalities	Apply the rate	ed voltage at 40	±2℃ and	d 90 to 95% hu	midity for			
	High	Capacitance Change	B1, B3, R1, R6, R7, C6, C7, C8, E7, D7, D8: Within ±12.5% F1, F5: Within ±30%	500±12 hour	s. The charge/d	ischarge	current is less	than 50m			
6	Temperature High	D.F.	B1, B3, R1, R6, R7, C6, C7, C8, E7, D7, D8: 0.2 max. F1, F5: 0.4 max.	Perform a heat then let sit for	at treatment at 24±2 hours at						
	Humidity (Steady)	I.R.	More than 12.5 $\Omega$ · F	•Measurement Perform a head	<ul> <li>initial measurement.</li> <li>Measurement after test Perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature, then measure.</li> </ul>						
		Appearance	No defects or abnormalities		of the rated volta						
		Capacitance Change	B1, B3, R1, R6, R7, C6, C7, C8, E7, D7, D8: Within ±12.5% F1, F5: Within ±30%	room tempera	erating tempera ature, then mea	sure.		±2 hours a			
		D.F.	B1, B3, R1, R6, R7, C6, C7, C8, E7, D7, D8: 0.2 max. F1, F5: 0.4 max.	•Initial measu	<ul> <li>The charge/discharge current is less than 50mA.</li> <li>Initial measurement</li> <li>Perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement.</li> <li>Measurement after test</li> </ul>						
7	Durability	I.R.	More than $25\Omega\cdot F$	then let sit for initial measur							

\*2: GRM31CR60J107, GRM31CD80G107: 0.15 max.

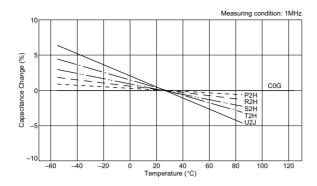
\*3: GRM31CR71E106: 0.125 max.

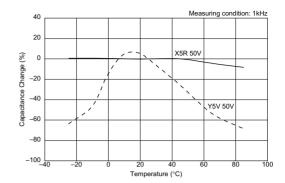
\*4: GRM153R60G105, GRM188R60J106: Within  $\pm 12.5\%$ 



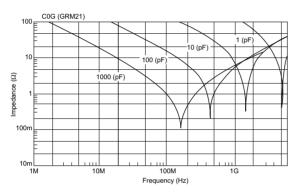
## **GRM Series Data**

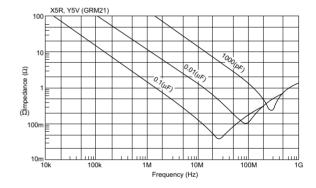
#### Capacitance - Temperature Characteristics



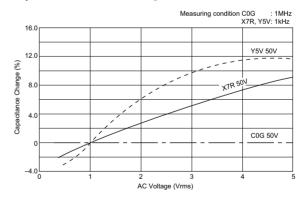


#### ■ Impedance - F requency C haracteristics





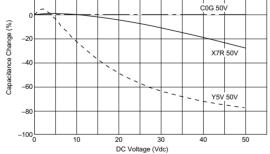
#### ■ Capacitance - AC Voltage Characteristics



Continued on the following page.  $\square$ 

Measuring condition C0G : 1MHz X7R, Y5V: 1kHz

■ Capacitance - DC Voltage Characteristics

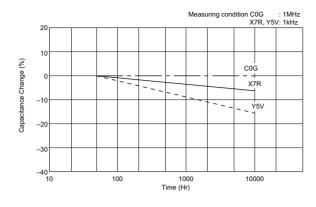




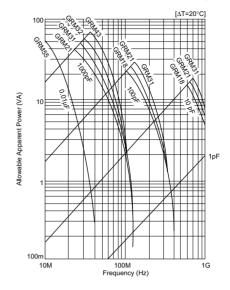
#### **GRM Series Data**

Continued from the preceding page.

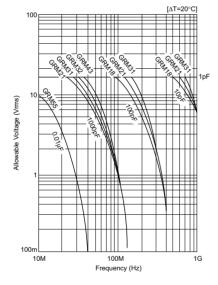
Capacitance Change - Aging



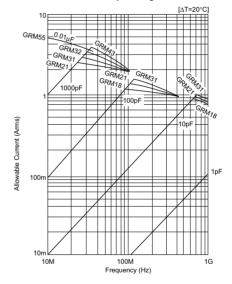
#### ■ Allowable Apparent Power - Frequency



#### A llowable Voltage - F requency



#### ■ Allowable Current - Frequency





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## **Chip Monolithic Ceramic Capacitors**



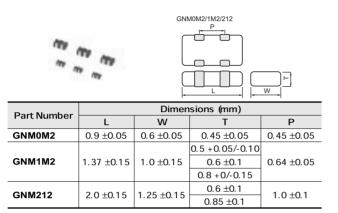
## **Capacitor Array GNM Series**

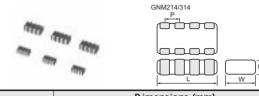
#### ■ F eatures

- 1. High density mounting due to mounting space saving
- 2. Mounting cost saving

#### ■ Applications

General electronic equipment





Part Number	D imensions (mm)								
Farthumber	L W		Т	Р					
GNM214	2.0 +0.15	1.25 +0.15	0.6 ±0.1	0.5 +0.05					
GINWZ 14	2.0 ±0.15	1.25 ±0.15	0.85 ±0.1	0.5 ±0.05					
			0.8 ±0.1						
GNM314	221015	1.6 +0.15	0.85 ±0.1	0.0.10.1					
GNW314	3.2 ±0.15	1.6 ±0.15	1.0 ±0.1	0.8 ±0.1					
			1.15 ±0.1						

## Temperature Compensating Type C0G(5C) Characteristics

Part Number		GNM1M	GNM21	GN	M31		
L x W [EIA]		1.37x1.0 [0504]	2.0x1.25 [0805]	3.2x1.6 [1206]			
Rated Volt.		50 ( <b>1H</b> )	50 ( <b>1H</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )		
TC COG (5C)			C OG ( <b>5C</b> )	C OG ( <b>5C</b> )	C OG ( <b>5C</b> )		
Capacitance, Ca	pacitan	ce Tolerance and T Dimension					
10pF ( <b>100</b> )	к	0.6(2)	0.6(4)	0.8(4)	0.8(4)		
15pF ( <b>150</b> )	К	0.6(2)	0.6(4)	0.8(4)	0.8(4)		
22pF ( <b>220</b> )	К	0.6(2)	0.6(4)	0.8(4)	0.8(4)		
33pF ( <b>330</b> )	К	0.6(2)	0.6(4)	0.8(4)	0.8(4)		
47pF ( <b>470</b> )	К	0.6(2)	0.6(4)	0.8(4)	0.8(4)		
68pF ( <b>680</b> )	К	0.6(2)	0.6(4)	0.8(4)	0.8( <b>4</b> )		
100pF ( <b>101</b> )	К	0.6(2)	0.6(4)	0.8(4)	0.8(4)		
150pF ( <b>151</b> )	К	0.6(2)	0.6(4)	0.8(4)	0.8(4)		
220pF ( <b>221</b> )	К	0.6(2)	0.6(4)		0.8(4)		
330pF ( <b>331</b> )	к				0.8(4)		

The part numbering code is shown in each (). The (2) & (4) code in T (mm) means number of elements (two) & (four).



### High Dielectric Constant Type X5R(R6) Characteristics

Part Number			<b>GNM0M</b>				GNM1M				GNM21		GNM31	
L x W [EIA]		0.9	9x0.6 [030	02]		1.3	7x1.0 [05	04]		2.0	x1.25 [08	805]	3.2x1.6	6 [1 206]
Rated Volt.		16 ( <b>1C</b> )	10 ( <b>1A</b> )	6.3 ( <b>0J</b> )	50 ( <b>1H</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	6.3 ( <b>0J</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	6.3 ( <b>0J</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )
тс		X 5R ( <b>R6</b> )												
Capacitance, Ca	pacitan	ce Tolerar	ice and T	Dimensio	n			1	1	1	1		1	
1000pF ( <b>102</b> )	М				0.6( <b>2</b> )									
2200pF ( <b>222</b> )	М					0.6( <b>2</b> )								
4700pF ( <b>472</b> )	М					0.6( <b>2</b> )								
10000pF ( <b>103</b> )	М	0.45*( <b>2</b> )	0.45*( <b>2</b> )	0.45*( <b>2</b> )		0.6( <b>2</b> )								
22000pF ( <b>223</b> )	М	0.45*( <b>2</b> )	0.45*( <b>2</b> )	0.45*( <b>2</b> )			0.6( <b>2</b> )	0.6( <b>2</b> )						
47000pF ( <b>473</b> )	М	0.45*( <b>2</b> )	0.45*( <b>2</b> )	0.45*( <b>2</b> )			0.6( <b>2</b> )	0.6( <b>2</b> )						
0.10μF ( <b>104</b> )	М	0.45*( <b>2</b> )	0.45*( <b>2</b> )	0.45*( <b>2</b> )				0.6( <b>2</b> )						
0.22μF ( <b>224</b> )	М						0.8*( <b>2</b> )							
0.47μF ( <b>474</b> )	М									0.85( <b>2</b> )				
1.0μF ( <b>105</b> )	М						0.8*( <b>2</b> )	0.5*( <b>2</b> )	0.8*( <b>2</b> )	0.85( <b>2</b> )	0.85*( <b>4</b> )	0.85*( <b>4</b> )	0.85( <b>4</b> )	0.85( <b>4</b> )
2.2μF ( <b>225</b> )	М							0.8*(2)	0.8*(2)		0.85*(2)	0.85*(2)		

The part numbering code is shown in each ( ). The (2) & (4) code in T (mm) means number of elements (two) & (four).

Dimensions are shown in mm and Rated Voltage in Vdc.

\*: Please refer to GNM Series Specifications and Test Methods (2)(P.40)

### High Dielectric Constant Type X7R/7S(R7/C7) Characteristics

Part Number				GNM1M			GNM21			GNM31				
L x W [EIA]			1.3	37x1.0 [05	504] 2.0x1.25 [0805]						3.2x1.6 [1206]			
Rated Volt.	50         25         16         10           (1H)         (1E)         (1C)         (1A)				50 ( <b>1H</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	50 ( <b>1H</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	6.3 ( <b>0J</b> )			
тс	TC X7R X7R X7R X7R X7R X7R X7R X7S (C7)				X7R ( <b>R7</b> )	X7R ( <b>R7</b> )	X7R ( <b>R7</b> )	X 7R ( <b>R7</b> )						
Capacitance, Ca	pacitan	ce Toleran	ce and T D	imension	1	1	1		1	1	1	1	.1	
470pF ( <b>471</b> )	М						0.6(4)							
1000pF ( <b>102</b> )	М	0.6(2)					0.6(4)							
2200pF ( <b>222</b> )	М		0.6(2)					0.6(4)						
4700pF ( <b>472</b> )	М		0.6( <b>2</b> )					0.6(4)						
10000pF ( <b>103</b> )	М		0.6( <b>2</b> )					0.6(4)						
22000pF ( <b>223</b> )	М			0.6( <b>2</b> )	0.6( <b>2</b> )				0.85( <b>4</b> )					
47000pF ( <b>473</b> )	М			0.6( <b>2</b> )	0.6(2)				0.85(4)	0.85( <b>4</b> )		1.0( <b>4</b> )		
0.10μF ( <b>104</b> )	М			0.6( <b>2</b> )		0.6( <b>2</b> )			0.85( <b>4</b> )	0.85( <b>4</b> )	0.85( <b>4</b> )	1.0( <b>4</b> )		
1.0μF ( <b>105</b> )	М												1.15( <b>4</b> )	

The part numbering code is shown in each ( ). The (2) & (4) code in T (mm) means number of elements (two) & (four). Dimensions are shown in mm and Rated Voltage in Vdc.



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## **GNM Series Specifications and Test Methods (1)**

Below GNM Series Specifications and Test Methods (1) are applied to Non "\*" PNs in capacitance table. In case "\*" is added in capacitance table, please refer to GNM Series Specifications and Test Methods (2) (P.40).

		Specifications						_					
No.	lter	m	Temperature Compensating Type	High Dielectr	іс Туре			lest	t Method				
1	Operating Temperatu Range		5C: –55 to +125°C	R7, C7: –55 to +125°C R6: –55 to +85°C									
2	Rated Volt	tage	See the previous pag	ges.			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, $V^{\text{p.p}}$ or $V^{\text{o.p}}$ , whichever is larger, should be maintained within the rated voltage range.						
3	Appearan	се	No defects or abnorr	nalities			Visual inspection						
4	Dimensior	าร	Within the specified	dimensions			Using calipers						
5	5 Dielectric Strength		No defects or abnorr	No failure should to (5C) or 250% of the terminations for 1 current is less than	ne rated volt to 5 second	tage (R7) is	s applied be	etween the					
6	Insulation Resistance		More than 10,000MΩ (Whichever is smalle				The insulation resivent voltage not exceed max. and within 2	ding the rate	ed voltage				
7	Capacitance		Within the specified	olerance			The capacitance/0	 ۵/D.F. shou	ld be meas	sured at 25	°C at the		
			30pF min.: Q≧1000				frequency and volt	tage shown	in the tabl	е.			
8	Q/         30pF max.: Q≥400+20C         Char.         25V min.         16V         10V         6.3V           Dissipation Factor         Q≥400+20C         R7, R6,         0.025         0.035         0.035         0.05			Item	5C		R	7					
0	(D.F.)	IIFactor	C: Nominal	C7 max. max.	max. ma		Frequency Voltage	1±0.1M		1±0.1 1.0±0.2			
			Capacitance (pF)				voltage	0.5 to 5\	//////	1.0±0.4	2 11115		
		Capacitance Change	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$			Char.RangeTemp.ChangeR7 $-55^{\circ}$ C to $+125^{\circ}$ CWithin $\pm15\%$ R6 $-55^{\circ}$ C to $+85^{\circ}$ C $25^{\circ}$ CWithin $\pm15\%$ C7 $-55^{\circ}$ C to $\pm55^{\circ}$ CWithin			tage. ng Type s determine a reference n step1 thro l tolerance hange as T lated by div	for the tem	e capaci- cling the capacitance perature ifferences		
9		Temperature Coefficent	Within the specified tolerance (Table A)				steps 1, 3 and 5 b	· ·	alue in ste				
		Capacitance	Within ±0.2% or ±0.05pF				1 2 3	-55±3 (for 5	25±2 5C/R7/C7), 25±2	-30±3 (for			
		Drift	(Whichever is larger.)					Constant T acitance ch ne temperat ne specified	ange com				
10	10 Adhesive Strength of Termination			GNM 2 GNM 2 Solder resist Solder resist		solder resist		_	Solder the capacito Fig.1 using a euter the test jig for 10± The soldering shour reflow method and soldering is uniform Type GNM1M2 GNM212 GNM214 GNM314	ctic solder. T 1 sec. Ild be done should be c	ihen apply seither with a conducted w	5N force in an iron or u vith care so	parallel with sing the that the shock.
							(in mm) Fig. 1						



			GNM Series S	pecifications and Test Methods (1)				
7	Continued fr	om the prec	Below GNM Series Specifications and Te	st Methods (1) are applied to Non "*" PNs in capacitance table. efer to GNM Series Specifications and Test Methods (2) (P.40).				
			Specifications					
lo.	Ite	em	Temperature Compensating Type High Dielectric Type	Test Method				
		Appearance	No defects or abnormalities	Solder the capacitor to the test jig (glass epoxy board) in the				
		Capacitance	Within the specified tolerance	same manner and under the same conditions as (10). The capacitor should be subjected to a simple harmonic motion				
1	Vibration Resistance	Q/D.F.	30pF min.: Q≥1000         Char.         25V min.         16V         10V         6.3V           Q≥400+20C         R7, R6,         0.025         0.035         0.035         0.05           C: Nominal Capacitance (pF)         Capacitance (pF)         max.         max.         max.         max.	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 perpendic- ular directions (total of 6 hours).				
			No cracking or marking defects should occur.	Solder the capacitor on the test jig (glass epoxy board) shown				
	Deflection			in Fig. 2 using a eutectic solder. Then apply a force in the direction shown in Fig. 3 for 5±1 sec. The soldering should be done by the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.				
12				20 50 Pressurizing speed : 1.0mm/sec. Pressurize				
			Type         a         b         c         d           GNM1M2         2.0±0.05         0.5±0.05         0.32±0.05         0.32±0.05           GNM212         2.0±0.05         0.6±0.05         0.5±0.05         0.5±0.05           GNM214         2.0±0.05         0.7±0.05         0.3±0.05         0.2±0.05           GNM314         2.5±0.05         0.8±0.05         0.4±0.05         0.4±0.05	Capacitance meter 45 45 45 Flexure : ≤1				
			(in mm) Fig. 2	Fig. 3				
13	Solderabi Terminati	2	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 proportion). Preheat at 80 to 120°C for 10 to 30 seconds. After preheating, immerse in eutectic solder solution for $2\pm0.5$ seconds at $230\pm5^{\circ}$ C or Sn-3.0Ag-0.5Cu solder solution for $2\pm0.5$ seconds at $245\pm5^{\circ}$ C.				
	Resistanc Soldering		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) R7, R6, C7: Within ±7.5%	Preheat the capacitor at 120 to $150^{\circ}$ C for 1 minute. Immerse the capacitor in a eutectic solder or Sn-3.0Ag-0.5Cu solder solution at $270\pm5^{\circ}$ C for $10\pm0.5$ seconds. Let sit at room temperature for $21\pm2$				
4		Q/D.F.	30pF min.: Q≥1000         Char.         25V min.         16V         10V         6.3V           30pF max.:         Q≥400+20C         R7, R6,         0.025         0.035         0.035         0.05           C: Nominal         Capacitance (pF)         max.         max.         max.         max.         max.	<ul> <li>temperature for 24±2 hours, then measure.</li> <li>Initial measurement for high dielectric constant type Perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement.</li> </ul>				
		I.R.	More than 10,000M $\Omega$ or 500 $\Omega$ · F (Whichever is smaller)					
		Dielectric Strength	No failure					



