

● Part Numbering

Chip Monolithic Ceramic Capacitors

(Part Number)

GR	M	18	8	B1	1H	102	K	A01	K
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩

① Product ID

② Series

Product ID	Code	Series
GR	M	Tin Plated Layer
	4	Only for Information Devices / Tip & Ring
	7	Only for Camera Flash Circuit
ER	B	High Frequency Type
GQ	M	High Frequency for Flow/Reflow Soldering
GM	A	Monolithic Microchip
	D	for Bonding
GN	M	Capacitor Array
LL	L	Low ESL Wide Width Type
	A	Eight-termination Low ESL Type
	M	Ten-termination Low ESL Type
GJ	M	High Frequency Low Loss Type
GA	2	for AC250V (r.m.s.)
	3	Safety Standard Recognized Type

③ Dimension (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	015015
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	2.8×2.8mm	1111
31	3.2×1.6mm	1206
32	3.2×2.5mm	1210
42	4.5×2.0mm	1808
43	4.5×3.2mm	1812
52	5.7×2.8mm	2211
55	5.7×5.0mm	2220

④ Dimension (T)

Code	Dimension (T)
2	0.2mm
2	2-elements (Array Type)
3	0.3mm
4	4-elements (Array Type)
5	0.5mm
6	0.6mm
7	0.7mm
8	0.8mm
9	0.85mm
A	1.0mm
B	1.25mm
C	1.6mm
D	2.0mm
E	2.5mm
F	3.2mm
M	1.15mm
N	1.35mm
Q	1.5mm
R	1.8mm
S	2.8mm
X	Depends on individual standards.

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

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⑤ Temperature Characteristics

Temperature Characteristic Codes			Temperature Characteristics			Operating Temperature Range
Code	Public STD Code		Referance Temperature	Temperature Range	Capacitance Change or Temperature Coefficient	
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	0±60ppm/°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	0±120ppm/°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	0±250ppm/°C	-55 to 125°C
5C	C0G *1	EIA	25°C	25 to 125°C	0±30ppm/°C	-55 to 125°C
5G	X8G *1	EIA	25°C	25 to 150°C	0±30ppm/°C	-55 to 150°C
6C	C0H *1	EIA	25°C	25 to 125°C	0±60ppm/°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	B	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	Y5V	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
9E	ZLM	*3	20°C	-25 to 20°C	-4700+1000/-2500ppm/°C	-25 to 85°C
				20 to 85°C	-4700+500/-1000ppm/°C	
W0	-	-	25°C	-55 to 125°C	±10% *4	-55 to 125°C
				-55 to 125°C	+22, -33% *5	


*1 Please refer to table for Capacitance Change under reference temperature.

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

*3,*4 Murata Temperature Characteristic Code.

*4 Apply DC350V bias.

*5 No DC bias.

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●Capacitance Change from each temperature

JIS Code

Murata Code	Capacitance Change from 20°C (%)					
	-55°C		-25°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
2T	-	-	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
3T	-	-	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

Murata Code	Capacitance Change from 25°C (%)					
	-55°C		-30°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	2.16	2.81	1.49	1.79	0.95
6T	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

⑥Rated Voltage

Code	Rated Voltage
0G	DC4V
0J	DC6.3V
1A	DC10V
1C	DC16V
1E	DC25V
1H	DC50V
2A	DC100V
2D	DC200V
2E	DC250V
YD	DC300V
2H	DC500V
2J	DC630V
3A	DC1kV
3D	DC2kV
3F	DC3.15kV
BB	DC350V (for Camera Flash Circuit)
E2	AC250V
GB	X2; AC250V (Safety Standard Recognized Type GB)
GC	X1/Y2; AC250V (Safety Standard Recognized Type GC)
GD	Y3; AC250V (Safety Standard Recognized Type GD)
GF	Y2, X1/Y2; AC250V (Safety Standard Recognized Type GF)

⑦Capacitance

Expressed by three-digit alphanumerics. The unit is pico-farad (pF). 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 "R". In this case, all figures are significant digits.

Ex.)

Code	Capacitance
R50	0.5pF
1R0	1.0pF
100	10pF
103	10000pF

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⑧ Capacitance Tolerance

Code	Capacitance Tolerance	TC	Series	Capacitance Step	
W	±0.05pF	CΔ	GRM/GJM	≤9.9pF	0.1pF
B	±0.1pF	CΔ	GRM/GJM	≤9.9pF	0.1pF
			GQM	≤1pF	0.1pF
			ERB	≤9.9pF	1pF and E24 Series
C	±0.25pF	CΔ	GRM/GJM	≤9.9pF	0.1pF
		except CΔ	GRM	≤5pF	* 1pF
		CΔ	ERB	≤9.9pF	1pF and E24 Series
			GQM	≤1pF	0.1pF
D	±0.5pF	CΔ	GRM/GJM	5.1 to 9.9pF	0.1pF
		except CΔ	GRM	5.1 to 9.9pF	* 1pF
		CΔ	ERB/GQM	5.1 to 9.9pF	1pF and E24 Series
G	±2%	CΔ	GJM	≥10pF	E12 Series
		CΔ	GQM/ERB	≥10pF	E24 Series
J	±5%	CΔ-SL	GRM/GA3	≥10pF	E12 Series
		CΔ	ERB/GQM/GJM	≥10pF	E24 Series
K	±10%	B, R, X7R, X5R, ZLM	GRM/GR7/GA3	E6 Series	
		C0G	GNM	E6 Series	
		B, R, X7R, X5R, ZLM	GR4, GMD	E12 Series	
M	±20%	B, R, X7R, X7S	GRM/GMA	E6 Series	
		X5R, X7R, X7S	GNM	E3 Series	
		X7R	GA2	E3 Series	
		X5R, X7R, X7S, X6S	LLL/LLA/LLM	E3 Series	
Z	+80%, -20%	F, Y5V	GRM	E3 Series	
R	Depends on individual standards.				

* E24 series is also available.

⑨ Individual Specification Code

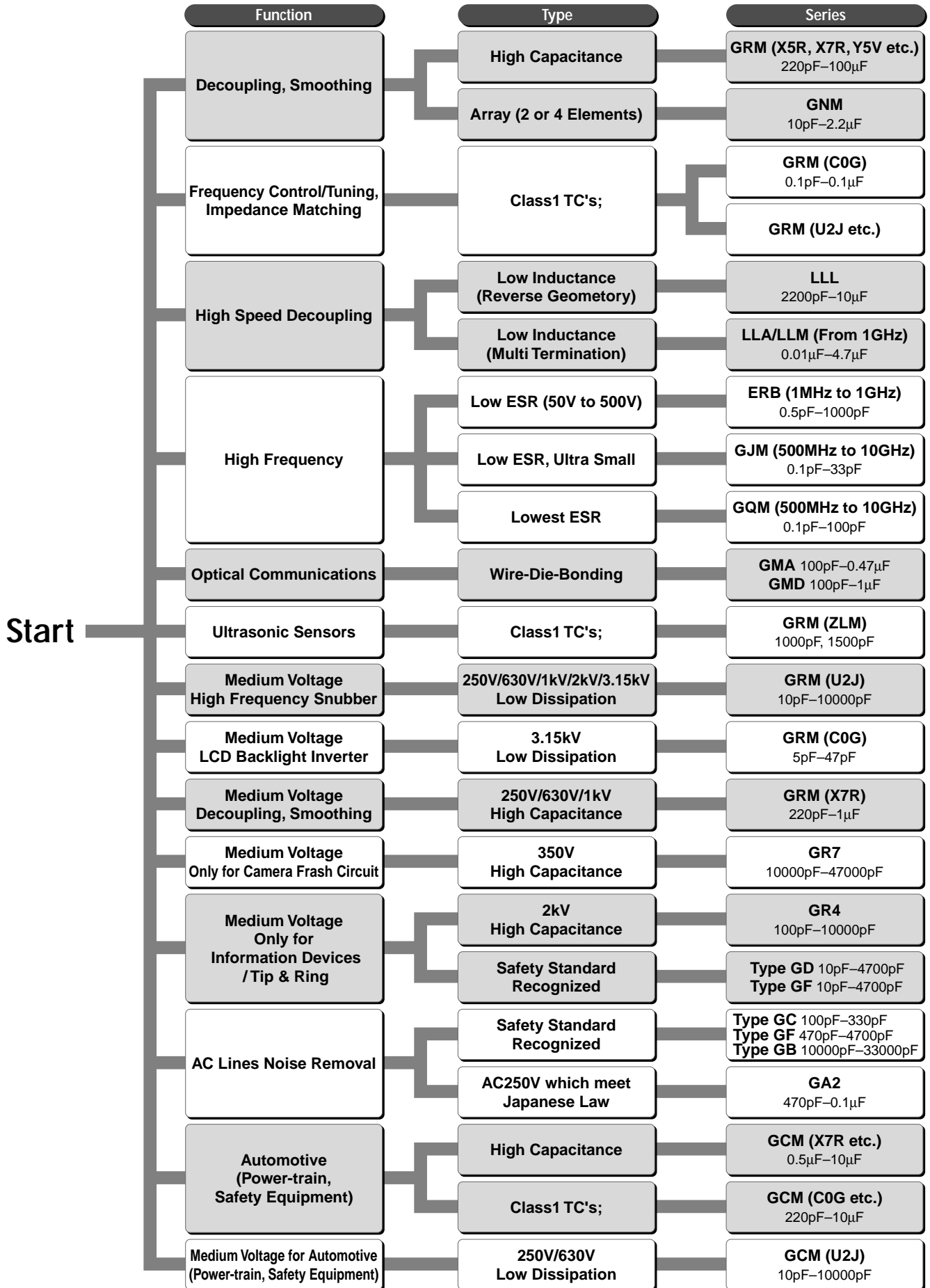
Expressed by three figures.

⑩ Packaging

Code	Packaging
L	ø180mm Embossed Taping
D	ø180mm Paper Taping
E	ø180mm Paper Taping (LLL15)
K	ø330mm Embossed Taping
J	ø330mm Paper Taping
F	ø330mm Paper Taping (LLL15)
B	Bulk
C	Bulk Case
T	Bulk Tray

Please check MURATA home page (<http://www.murata.com/index.html>) in case you can not find the part number on the catalog.

Selection Guide of Chip Monolithic Ceramic Capacitors



Chip Monolithic Ceramic Capacitors

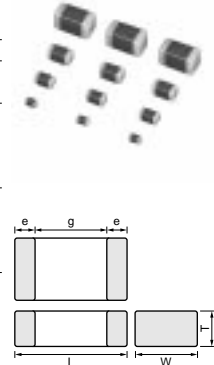


for General Purpose GRM Series (Temperature Compensating Type)

■ Features

1. Higher 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.
6. 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.

Part Number	Dimensions (mm)				
	L	W	T	e	g min.
GRM022	0.4 ±0.02	0.2 ±0.02	0.2 ±0.02	0.07 to 0.14	0.13
GRM033	0.6 ±0.03	0.3 ±0.03	0.3 ±0.03	0.1 to 0.2	0.2
GRM15X	1.0 ±0.05	0.5 ±0.05	0.25 ±0.05	0.1 to 0.3	0.4
GRM153			0.3 ±0.03		
GRM155			0.5 ±0.05		
GRM185	1.6 ±0.1	0.8 ±0.1	0.5 +0/-0.1	0.2 to 0.5	0.5
GRM188*			0.8 ±0.1		
GRM216	2.0 ±0.1	1.25 ±0.1	0.6 ±0.1	0.2 to 0.7	0.7
GRM219			0.85 ±0.1		
GRM21A			1.0 +0/-0.2		
GRM21B			1.25 ±0.1		
GRM316			0.6 ±0.1		
GRM319	3.2 ±0.15	1.6 ±0.15	0.85 ±0.1	0.3 to 0.8	1.5
GRM31M			1.15 ±0.1		
GRM31C			1.6 ±0.2		
GRM329	3.2 ±0.2	1.6 ±0.2	1.6 ±0.2	0.3 min.	1.0
GRM32A			0.85 ±0.1		
GRM32M			1.0 +0/-0.2		
GRM32M			1.15 ±0.1		
GRM32C			1.35 ±0.15		
GRM32N	3.2 ±0.3	2.5 ±0.2	1.6 ±0.2	0.3 min.	1.0
GRM32R			1.8 ±0.2		
GRM32D			2.0 ±0.2		
GRM32E			2.5 ±0.2		



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

■ Applications

General electronic equipment

Temperature Compensating Type C0G(5C) Characteristics

Part Number	GRM02		GRM03	GRM15
L x W [EIA]	0.4x0.2 [01005]		0.6x0.3 [0201]	1.0x0.5 [0402]
Rated Volt.	16 (1C)	6.3 (0J)	50 (1H)	50 (1H)
TC	C0G (5C)	C0G (5C)	C0G (5C)	C0G (5C)
Capacitance, Capacitance Tolerance and T Dimension				
0.10pF(R10)	W, B		0.3(3)	0.5(5)
0.20pF(R20)	W, B	0.2(2)	0.3(3)	0.5(5)
0.30pF(R30)	W, B	0.2(2)	0.3(3)	0.5(5)
0.40pF(R40)	W, B	0.2(2)	0.3(3)	0.5(5)
0.50pF(R50)	W, B	0.2(2)	0.3(3)	0.5(5)
0.60pF(R60)	W, B	0.2(2)	0.3(3)	0.5(5)
0.70pF(R70)	W, B	0.2(2)	0.3(3)	0.5(5)
0.80pF(R80)	W, B	0.2(2)	0.3(3)	0.5(5)
0.90pF(R90)	W, B	0.2(2)	0.3(3)	0.5(5)
1.0pF(1R0)	W, B, C	0.2(2)	0.3(3)	0.5(5)
1.1pF(1R1)	W, B, C	0.2(2)	0.3(3)	0.5(5)
1.2pF(1R2)	W, B, C	0.2(2)	0.3(3)	0.5(5)
1.3pF(1R3)	W, B, C	0.2(2)	0.3(3)	0.5(5)
1.4pF(1R4)	W, B, C	0.2(2)	0.3(3)	0.5(5)
1.5pF(1R5)	W, B, C	0.2(2)	0.3(3)	0.5(5)
1.6pF(1R6)	W, B, C	0.2(2)	0.3(3)	0.5(5)
1.7pF(1R7)	W, B, C	0.2(2)	0.3(3)	0.5(5)
1.8pF(1R8)	W, B, C	0.2(2)	0.3(3)	0.5(5)
1.9pF(1R9)	W, B, C	0.2(2)	0.3(3)	0.5(5)
2.0pF(2R0)	W, B, C	0.2(2)	0.3(3)	0.5(5)
2.1pF(2R1)	W, B, C	0.2(2)	0.3(3)	0.5(5)
2.2pF(2R2)	W, B, C	0.2(2)	0.3(3)	0.5(5)


The part numbering code is shown in ().
Dimensions are shown in mm and Rated Voltage in Vdc.

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Part Number	GRM02		GRM03	GRM15
L x W [EIA]	0.4x0.2 [01005]		0.6x0.3 [0201]	1.0x0.5 [0402]
Rated Volt.	16 (1C)	6.3 (0J)	50 (1H)	50 (1H)
TC	C0G (5C)	C0G (5C)	C0G (5C)	C0G (5C)
Capacitance, Capacitance Tolerance and T Dimension				
2.3pF(2R3)	W, B, C	0.2(2)	0.3(3)	0.5(5)
2.4pF(2R4)	W, B, C	0.2(2)	0.3(3)	0.5(5)
2.5pF(2R5)	W, B, C	0.2(2)	0.3(3)	0.5(5)
2.6pF(2R6)	W, B, C	0.2(2)	0.3(3)	0.5(5)
2.7pF(2R7)	W, B, C	0.2(2)	0.3(3)	0.5(5)
2.8pF(2R8)	W, B, C	0.2(2)	0.3(3)	0.5(5)
2.9pF(2R9)	W, B, C	0.2(2)	0.3(3)	0.5(5)
3.0pF(3R0)	W, B, C	0.2(2)	0.3(3)	0.5(5)
3.1pF(3R1)	W, B, C	0.2(2)	0.3(3)	0.5(5)
3.2pF(3R2)	W, B, C	0.2(2)	0.3(3)	0.5(5)
3.3pF(3R3)	W, B, C	0.2(2)	0.3(3)	0.5(5)
3.4pF(3R4)	W, B, C	0.2(2)	0.3(3)	0.5(5)
3.5pF(3R5)	W, B, C	0.2(2)	0.3(3)	0.5(5)
3.6pF(3R6)	W, B, C	0.2(2)	0.3(3)	0.5(5)
3.7pF(3R7)	W, B, C	0.2(2)	0.3(3)	0.5(5)
3.8pF(3R8)	W, B, C	0.2(2)	0.3(3)	0.5(5)
3.9pF(3R9)	W, B, C	0.2(2)	0.3(3)	0.5(5)
4.0pF(4R0)	W, B, C	0.2(2)	0.3(3)	0.5(5)
4.1pF(4R1)	W, B, C	0.2(2)	0.3(3)	0.5(5)
4.2pF(4R2)	W, B, C	0.2(2)	0.3(3)	0.5(5)
4.3pF(4R3)	W, B, C	0.2(2)	0.3(3)	0.5(5)
4.4pF(4R4)	W, B, C	0.2(2)	0.3(3)	0.5(5)
4.5pF(4R5)	W, B, C	0.2(2)	0.3(3)	0.5(5)
4.6pF(4R6)	W, B, C	0.2(2)	0.3(3)	0.5(5)
4.7pF(4R7)	W, B, C	0.2(2)	0.3(3)	0.5(5)
4.8pF(4R8)	W, B, C	0.2(2)	0.3(3)	0.5(5)
4.9pF(4R9)	W, B, C	0.2(2)	0.3(3)	0.5(5)
5.0pF(5R0)	W, B, C	0.2(2)	0.3(3)	0.5(5)
5.1pF(5R1)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
5.2pF(5R2)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
5.3pF(5R3)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
5.4pF(5R4)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
5.5pF(5R5)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
5.6pF(5R6)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
5.7pF(5R7)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
5.8pF(5R8)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
5.9pF(5R9)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
6.0pF(6R0)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
6.1pF(6R1)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
6.2pF(6R2)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
6.3pF(6R3)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
6.4pF(6R4)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
6.5pF(6R5)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
6.6pF(6R6)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
6.7pF(6R7)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
6.8pF(6R8)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
6.9pF(6R9)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
7.0pF(7R0)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
7.1pF(7R1)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
7.2pF(7R2)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)


The part numbering code is shown in ().
 Dimensions are shown in mm and Rated Voltage in Vdc.

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Part Number	GRM02		GRM03	GRM15
L x W [EIA]	0.4x0.2 [01005]		0.6x0.3 [0201]	1.0x0.5 [0402]
Rated Volt.	16 (1C)	6.3 (0J)	50 (1H)	50 (1H)
TC	COG (5C)	COG (5C)	COG (5C)	COG (5C)
Capacitance, Capacitance Tolerance and T Dimension				
7.3pF(7R3)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
7.4pF(7R4)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
7.5pF(7R5)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
7.6pF(7R6)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
7.7pF(7R7)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
7.8pF(7R8)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
7.9pF(7R9)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
8.0pF(8R0)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
8.1pF(8R1)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
8.2pF(8R2)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
8.3pF(8R3)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
8.4pF(8R4)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
8.5pF(8R5)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
8.6pF(8R6)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
8.7pF(8R7)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
8.8pF(8R8)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
8.9pF(8R9)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
9.0pF(9R0)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
9.1pF(9R1)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
9.2pF(9R2)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
9.3pF(9R3)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
9.4pF(9R4)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
9.5pF(9R5)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
9.6pF(9R6)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
9.7pF(9R7)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
9.8pF(9R8)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
9.9pF(9R9)	W, B, C, D	0.2(2)	0.3(3)	0.5(5)
10pF(100)	J	0.2(2)	0.3(3)	0.5(5)
12pF(120)	J	0.2(2)	0.3(3)	0.5(5)
15pF(150)	J	0.2(2)	0.3(3)	0.5(5)
18pF(180)	J	0.2(2)	0.3(3)	0.5(5)
22pF(220)	J	0.2(2)	0.3(3)	0.5(5)
27pF(270)	J	0.2(2)	0.3(3)	0.5(5)
33pF(330)	J	0.2(2)	0.3(3)	0.5(5)
39pF(390)	J	0.2(2)	0.3(3)	0.5(5)
47pF(470)	J	0.2(2)	0.3(3)	0.5(5)
56pF(560)	J	0.2(2)	0.3(3)	0.5(5)
68pF(680)	J	0.2(2)	0.3(3)	0.5(5)
82pF(820)	J	0.2(2)	0.3(3)	0.5(5)
100pF(101)	J	0.2(2)	0.3(3)	0.5(5)
120pF(121)	J			0.5(5)
150pF(151)	J			0.5(5)
180pF(181)	J			0.5(5)
220pF(221)	J			0.5(5)
270pF(271)	J			0.5(5)
330pF(331)	J			0.5(5)
390pF(391)	J			0.5(5)
470pF(471)	J			0.5(5)
560pF(561)	J			0.5(5)
680pF(681)	J			0.5(5)

The part numbering code is shown in ().
 Dimensions are shown in mm and Rated Voltage in Vdc.

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1


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Part Number	GRM02		GRM03	GRM15
L x W [EIA]	0.4x0.2 [01005]		0.6x0.3 [0201]	1.0x0.5 [0402]
Rated Volt.	16 (1C)	6.3 (0J)	50 (1H)	50 (1H)
TC	COG (5C)	COG (5C)	COG (5C)	COG (5C)
Capacitance, Capacitance Tolerance and T Dimension				
820pF(821)	J			0.5(5)
1000pF(102)	J			0.5(5)

The part numbering code is shown in ().
 Dimensions are shown in mm and Rated Voltage in Vdc.

Part Number	GRM18		GRM21		GRM31	
L x W [EIA]	1.6x0.8 [0603]		2.0 x1.25 [0805]		3.2x1.6 [1206]	
Rated Volt.	100 (2A)	50 (1H)	100 (2A)	50 (1H)	100 (2A)	50 (1H)
TC	COG (5C)	COG (5C)	COG (5C)	COG (5C)	COG (5C)	COG (5C)
Capacitance, Capacitance Tolerance and T Dimension						
0.10pF(R10)	B		0.8(8)			
0.20pF(R20)	B		0.8(8)			
0.30pF(R30)	C		0.8(8)			
0.40pF(R40)	C		0.8(8)			
0.50pF(R50)	C	0.8(8)	0.8(8)			
0.60pF(R60)	C	0.8(8)	0.8(8)			
0.70pF(R70)	C	0.8(8)	0.8(8)			
0.80pF(R80)	C	0.8(8)	0.8(8)			
0.90pF(R90)	C	0.8(8)	0.8(8)			
1.0pF(1R0)	C	0.8(8)	0.8(8)			
2.0pF(2R0)	C	0.8(8)	0.8(8)			
3.0pF(3R0)	C	0.8(8)	0.8(8)			
4.0pF(4R0)	C	0.8(8)	0.8(8)			
5.0pF(5R0)	C	0.8(8)	0.8(8)			
6.0pF(6R0)	D	0.8(8)	0.8(8)			
7.0pF(7R0)	D	0.8(8)	0.8(8)			
8.0pF(8R0)	D	0.8(8)	0.8(8)			
9.0pF(9R0)	D	0.8(8)	0.8(8)			
10pF(100)	J	0.8(8)	0.8(8)			
12pF(120)	J	0.8(8)	0.8(8)			
15pF(150)	J	0.8(8)	0.8(8)			
18pF(180)	J	0.8(8)	0.8(8)			
22pF(220)	J	0.8(8)	0.8(8)			
27pF(270)	J	0.8(8)	0.8(8)			
33pF(330)	J	0.8(8)	0.8(8)			
39pF(390)	J	0.8(8)	0.8(8)			
47pF(470)	J	0.8(8)	0.8(8)			
56pF(560)	J	0.8(8)	0.8(8)			
68pF(680)	J	0.8(8)	0.8(8)			
82pF(820)	J	0.8(8)	0.8(8)			
100pF(101)	J	0.8(8)	0.8(8)			
120pF(121)	J	0.8(8)	0.8(8)			
150pF(151)	J	0.8(8)	0.8(8)			
180pF(181)	J	0.8(8)	0.8(8)			
220pF(221)	J	0.8(8)	0.8(8)			
270pF(271)	J	0.8(8)	0.8(8)			
330pF(331)	J	0.8(8)	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	GRM18		GRM21		GRM31	
L x W [EIA]	1.6x0.8 [0603]		2.0 x1.25 [0805]		3.2x1.6 [1206]	
Rated Volt.	100 (2A)	50 (1H)	100 (2A)	50 (1H)	100 (2A)	50 (1H)
TC	C0G (5C)	C0G (5C)	C0G (5C)	C0G (5C)	C0G (5C)	C0G (5C)
Capacitance, Capacitance Tolerance and T Dimension						
390pF(391)	J	0.8(8)	0.8(8)			
470pF(471)	J	0.8(8)	0.8(8)			
560pF(561)	J	0.8(8)	0.8(8)			
680pF(681)	J	0.8(8)	0.8(8)			
820pF(821)	J	0.8(8)	0.8(8)			
1000pF(102)	J	0.8(8)	0.8(8)			
1200pF(122)	J	0.8(8)	0.8(8)			
1500pF(152)	J	0.8(8)	0.8(8)			
1800pF(182)	J		0.8(8)	0.6(6)		
2200pF(222)	J		0.8(8)	0.6(6)		
2700pF(272)	J		0.8(8)	0.6(6)		
3300pF(332)	J		0.8(8)	0.6(6)		
3900pF(392)	J		0.8(8)		0.85(9)	
4700pF(472)	J			0.6(6)	0.85(9)	
5600pF(562)	J			0.85(9)	0.85(9)	
6800pF(682)	J			0.85(9)	0.85(9)	
8200pF(822)	J			0.85(9)	0.85(9)	
10000pF(103)	J			0.85(9)	0.85(9)	
12000pF(123)	J			0.85(9)		
15000pF(153)	J			0.85(9)		
18000pF(183)	J			1.25(B)		
22000pF(223)	J			1.25(B)		
27000pF(273)	J					0.85(9)
33000pF(333)	J					0.85(9)
39000pF(393)	J					0.85(9)
47000pF(473)	J					1.15(M)
56000pF(563)	J					1.15(M)
68000pF(683)	J					1.6(C)
82000pF(823)	J					1.6(C)
0.10μF(104)	J					1.6(C)

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 (1H)	
TC	C0G (5C)	
Capacitance, Capacitance Tolerance and T Dimension		
120pF(121)	J	0.3(3)
150pF(151)	J	0.3(3)
180pF(181)	J	0.3(3)
220pF(221)	J	0.3(3)
270pF(271)	J	0.3(3)
330pF(331)	J	0.3(3)
390pF(391)	J	0.3(3)

The part numbering code is shown in ().
 Dimensions are shown in mm and Rated Voltage in Vdc.

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Part Number	GRM15	
L x W [EIA]	1.0x0.5 [0402]	
Rated Volt.	50 (1H)	
TC	C0G (5C)	
Capacitance, Capacitance Tolerance and T Dimension		
470pF(471)	J	0.3(3)

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	GRM03		GRM15		GRM18		GRM21		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 (1H)	25 (1E)	50 (1H)	10 (1A)	50 (1H)	10 (1A)	50 (1H)	10 (1A)	50 (1H)
TC	U2J (7U)	U2J (7U)	U2J (7U)	U2J (7U)	U2J (7U)	U2J (7U)	U2J (7U)	U2J (7U)	U2J (7U)
Capacitance, Capacitance Tolerance and T Dimension									
1.0pF(1R0)	C	0.3(3)		0.5(5)	0.8(8)				
2.0pF(2R0)	C	0.3(3)		0.5(5)	0.8(8)				
3.0pF(3R0)	C	0.3(3)		0.5(5)	0.8(8)				
4.0pF(4R0)	C	0.3(3)		0.5(5)	0.8(8)				
5.0pF(5R0)	C	0.3(3)		0.5(5)	0.8(8)				
6.0pF(6R0)	D	0.3(3)		0.5(5)	0.8(8)				
7.0pF(7R0)	D	0.3(3)		0.5(5)	0.8(8)				
8.0pF(8R0)	D	0.3(3)		0.5(5)	0.8(8)				
9.0pF(9R0)	D	0.3(3)		0.5(5)	0.8(8)				
10pF(100)	J	0.3(3)		0.5(5)	0.8(8)				
12pF(120)	J	0.3(3)		0.5(5)	0.8(8)				
15pF(150)	J	0.3(3)		0.5(5)	0.8(8)				
18pF(180)	J		0.3(3)	0.5(5)	0.8(8)				
22pF(220)	J		0.3(3)	0.5(5)	0.8(8)				
27pF(270)	J		0.3(3)	0.5(5)	0.8(8)				
33pF(330)	J		0.3(3)	0.5(5)	0.8(8)				
39pF(390)	J		0.3(3)	0.5(5)	0.8(8)				
47pF(470)	J		0.3(3)	0.5(5)	0.8(8)				
56pF(560)	J		0.3(3)	0.5(5)	0.8(8)				
68pF(680)	J		0.3(3)	0.5(5)	0.8(8)				
82pF(820)	J		0.3(3)	0.5(5)	0.8(8)				
100pF(101)	J		0.3(3)	0.5(5)	0.8(8)				
120pF(121)	J			0.5(5)	0.8(8)				
150pF(151)	J			0.5(5)	0.8(8)				
180pF(181)	J			0.5(5)	0.8(8)				
220pF(221)	J				0.8(8)				
270pF(271)	J				0.8(8)				
330pF(331)	J				0.8(8)				
390pF(391)	J				0.8(8)				
470pF(471)	J				0.8(8)				
560pF(561)	J				0.8(8)				
680pF(681)	J				0.8(8)				
1000pF(102)	J				0.8(8)				
1200pF(122)	J			0.5(5)	0.8(8)				
1500pF(152)	J			0.5(5)	0.8(8)				
1800pF(182)	J			0.5(5)	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		GRM21		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 (1H)	25 (1E)	50 (1H)	10 (1A)	50 (1H)	10 (1A)	50 (1H)	10 (1A)	50 (1H)
TC	U2J (7U)	U2J (7U)	U2J (7U)	U2J (7U)	U2J (7U)	U2J (7U)	U2J (7U)	U2J (7U)	U2J (7U)
Capacitance, Capacitance Tolerance and T Dimension									
2200pF(222)	J			0.5(5)	0.8(8)				
2700pF(272)	J			0.5(5)	0.8(8)				
3300pF(332)	J			0.5(5)	0.8(8)				
3900pF(392)	J			0.5(5)	0.8(8)				
4700pF(472)	J			0.5(5)	0.8(8)				
5600pF(562)	J				0.8(8)				
6800pF(682)	J				0.8(8)				
8200pF(822)	J				0.8(8)				
10000pF(103)	J				0.8(8)				
12000pF(123)	J					0.8(8)	0.6(6)		
15000pF(153)	J					0.8(8)	0.6(6)		
18000pF(183)	J					0.8(8)	0.6(6)		
22000pF(223)	J					0.8(8)	0.85(9)		
27000pF(273)	J						0.85(9)		
33000pF(333)	J						1.0(A)		
39000pF(393)	J						1.25(B)		
47000pF(473)	J						1.25(B)		
56000pF(563)	J							0.85(9)	0.85(9)
68000pF(683)	J							1.25(B)	1.15(M)
82000pF(823)	J							1.25(B)	1.15(M)
0.10μF(104)	J							1.25(B)	1.15(M)

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]	1.0x0.5 [0402]		1.6x0.8 [0603]	
Rated Volt.	50 (1H)		50 (1H)	
TC	P2H (6P)		P2H (6P)	
Capacitance, Capacitance Tolerance and T Dimension				
1.0pF(1R0)	C	0.5(5)		0.8(8)
2.0pF(2R0)	C	0.5(5)		0.8(8)
3.0pF(3R0)	C	0.5(5)		0.8(8)
4.0pF(4R0)	C	0.5(5)		0.8(8)
5.0pF(5R0)	C	0.5(5)		0.8(8)
6.0pF(6R0)	D	0.5(5)		0.8(8)
7.0pF(7R0)	D	0.5(5)		0.8(8)
8.0pF(8R0)	D	0.5(5)		0.8(8)
9.0pF(9R0)	D	0.5(5)		0.8(8)
10pF(100)	J	0.5(5)		0.8(8)
12pF(120)	J	0.5(5)		0.8(8)
15pF(150)	J	0.5(5)		0.8(8)
18pF(180)	J	0.5(5)		0.8(8)
22pF(220)	J	0.5(5)		0.8(8)
27pF(270)	J	0.5(5)		0.8(8)
33pF(330)	J			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	GRM15		GRM18	
L x W [EIA]	1.0x0.5 [0402]		1.6x0.8 [0603]	
Rated Volt.	50 (1H)		50 (1H)	
TC	P2H (6P)		P2H (6P)	
Capacitance, Capacitance Tolerance and T Dimension				
39pF(390)	J		0.8(8)	
47pF(470)	J		0.8(8)	
56pF(560)	J		0.8(8)	
68pF(680)	J		0.8(8)	
82pF(820)	J		0.8(8)	
100pF(101)	J		0.8(8)	
120pF(121)	J		0.8(8)	
150pF(151)	J		0.8(8)	

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]		1.0x0.5 [0402]		1.6x0.8 [0603]	
Rated Volt.	25 (1E)		50 (1H)		50 (1H)	
TC	R2H (6R)		R2H (6R)		R2H (6R)	
Capacitance, Capacitance Tolerance and T Dimension						
1.0pF(1R0)	C	0.3(3)	0.5(5)		0.8(8)	
2.0pF(2R0)	C	0.3(3)	0.5(5)		0.8(8)	
3.0pF(3R0)	C	0.3(3)	0.5(5)		0.8(8)	
4.0pF(4R0)	C	0.3(3)	0.5(5)		0.8(8)	
5.0pF(5R0)	C	0.3(3)	0.5(5)		0.8(8)	
6.0pF(6R0)	D	0.3(3)	0.5(5)		0.8(8)	
7.0pF(7R0)	D	0.3(3)	0.5(5)		0.8(8)	
8.0pF(8R0)	D	0.3(3)	0.5(5)		0.8(8)	
9.0pF(9R0)	D	0.3(3)	0.5(5)		0.8(8)	
10pF(100)	J	0.3(3)	0.5(5)		0.8(8)	
12pF(120)	J	0.3(3)	0.5(5)		0.8(8)	
15pF(150)	J	0.3(3)	0.5(5)		0.8(8)	
18pF(180)	J	0.3(3)	0.5(5)		0.8(8)	
22pF(220)	J	0.3(3)	0.5(5)		0.8(8)	
27pF(270)	J	0.3(3)	0.5(5)		0.8(8)	
33pF(330)	J	0.3(3)	0.5(5)		0.8(8)	
39pF(390)	J	0.3(3)			0.8(8)	
47pF(470)	J	0.3(3)			0.8(8)	
56pF(560)	J	0.3(3)			0.8(8)	
68pF(680)	J	0.3(3)			0.8(8)	
82pF(820)	J	0.3(3)			0.8(8)	
100pF(101)	J	0.3(3)			0.8(8)	
120pF(121)	J				0.8(8)	
150pF(151)	J				0.8(8)	
180pF(181)	J				0.8(8)	

The part numbering code is shown in ().
 Dimensions are shown in mm and Rated Voltage in Vdc.

Temperature Compensating Type S2H(6S) 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 (1E)	50 (1H)	50 (1H)
TC		S2H (6S)	S2H (6S)	S2H (6S)
Capacitance, Capacitance Tolerance and T Dimension				
1.0pF(1R0)	C	0.3(3)	0.5(5)	0.8(8)
2.0pF(2R0)	C	0.3(3)	0.5(5)	0.8(8)
3.0pF(3R0)	C	0.3(3)	0.5(5)	0.8(8)
4.0pF(4R0)	C	0.3(3)	0.5(5)	0.8(8)
5.0pF(5R0)	C	0.3(3)	0.5(5)	0.8(8)
6.0pF(6R0)	D	0.3(3)	0.5(5)	0.8(8)
7.0pF(7R0)	D	0.3(3)	0.5(5)	0.8(8)
8.0pF(8R0)	D	0.3(3)	0.5(5)	0.8(8)
9.0pF(9R0)	D	0.3(3)	0.5(5)	0.8(8)
10pF(100)	J	0.3(3)	0.5(5)	0.8(8)
12pF(120)	J	0.3(3)	0.5(5)	0.8(8)
15pF(150)	J	0.3(3)	0.5(5)	0.8(8)
18pF(180)	J	0.3(3)	0.5(5)	0.8(8)
22pF(220)	J	0.3(3)	0.5(5)	0.8(8)
27pF(270)	J	0.3(3)	0.5(5)	0.8(8)
33pF(330)	J	0.3(3)	0.5(5)	0.8(8)
39pF(390)	J	0.3(3)	0.5(5)	0.8(8)
47pF(470)	J	0.3(3)		0.8(8)
56pF(560)	J	0.3(3)		0.8(8)
68pF(680)	J	0.3(3)		0.8(8)
82pF(820)	J	0.3(3)		0.8(8)
100pF(101)	J	0.3(3)		0.8(8)
120pF(121)	J			0.8(8)
150pF(151)	J			0.8(8)
180pF(181)	J			0.8(8)
220pF(221)	J			0.8(8)

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 (1E)	50 (1H)	50 (1H)
TC		T2H (6T)	T2H (6T)	T2H (6T)
Capacitance, Capacitance Tolerance and T Dimension				
1.0pF(1R0)	C	0.3(3)	0.5(5)	0.8(8)
2.0pF(2R0)	C	0.3(3)	0.5(5)	0.8(8)
3.0pF(3R0)	C	0.3(3)	0.5(5)	0.8(8)
4.0pF(4R0)	C	0.3(3)	0.5(5)	0.8(8)
5.0pF(5R0)	C	0.3(3)	0.5(5)	0.8(8)
6.0pF(6R0)	D	0.3(3)	0.5(5)	0.8(8)
7.0pF(7R0)	D	0.3(3)	0.5(5)	0.8(8)
8.0pF(8R0)	D	0.3(3)	0.5(5)	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]	1.0x0.5 [0402]	1.6x0.8 [0603]
Rated Volt.		25 (1E)	50 (1H)	50 (1H)
TC		T2H (6T)	T2H (6T)	T2H (6T)
Capacitance, Capacitance Tolerance and T Dimension				
9.0pF(9R0)	D	0.3(3)	0.5(5)	0.8(8)
10pF(100)	J	0.3(3)	0.5(5)	0.8(8)
12pF(120)	J	0.3(3)	0.5(5)	0.8(8)
15pF(150)	J	0.3(3)	0.5(5)	0.8(8)
18pF(180)	J	0.3(3)	0.5(5)	0.8(8)
22pF(220)	J	0.3(3)	0.5(5)	0.8(8)
27pF(270)	J	0.3(3)	0.5(5)	0.8(8)
33pF(330)	J	0.3(3)	0.5(5)	0.8(8)
39pF(390)	J	0.3(3)	0.5(5)	0.8(8)
47pF(470)	J	0.3(3)	0.5(5)	0.8(8)
56pF(560)	J	0.3(3)	0.5(5)	0.8(8)
68pF(680)	J	0.3(3)	0.5(5)	0.8(8)
82pF(820)	J	0.3(3)	0.5(5)	0.8(8)
100pF(101)	J	0.3(3)	0.5(5)	0.8(8)
120pF(121)	J			0.8(8)
150pF(151)	J			0.8(8)
180pF(181)	J			0.8(8)
220pF(221)	J			0.8(8)
270pF(271)	J			0.8(8)
330pF(331)	J			0.8(8)
390pF(391)	J			0.8(8)
470pF(471)	J			0.8(8)

The part numbering code is shown in ().
 Dimensions are shown in mm and Rated Voltage in Vdc.

Chip Monolithic Ceramic Capacitors

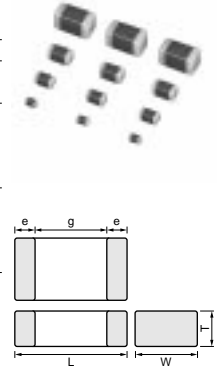


for General Purpose GRM Series (High Dielectric Constant Type)

■ Features

1. Higher 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.
6. 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.

Part Number	Dimensions (mm)				
	L	W	T	e	g min.
GRM022	0.4±0.02	0.2±0.02	0.2±0.02	0.07 to 0.14	0.13
GRM033	0.6±0.03	0.3±0.03	0.3±0.03	0.1 to 0.2	0.2
GRM15X	1.0±0.05	0.5±0.05	0.25±0.05	0.1 to 0.3	0.4
GRM153			0.3±0.03		
GRM155	1.6±0.1	0.8±0.1	0.5±0.05	0.15 to 0.35	0.3
GRM185			0.5+0/-0.1		
GRM188*	2.0±0.1	1.25±0.1	0.8±0.1	0.2 to 0.7	0.7
GRM216			0.6±0.1		
GRM219	3.2±0.15	1.6±0.15	0.85±0.1	0.3 to 0.8	1.5
GRM21A			1.0+0/-0.2		
GRM21B	3.2±0.2	1.6±0.2	1.25±0.1	0.3 min.	1.0
GRM316			0.6±0.1		
GRM319	3.2±0.3	2.5±0.2	0.85±0.1	0.3 min.	1.0
GRM31M			1.15±0.1		
GRM31C	3.2±0.3	2.5±0.2	1.6±0.2	0.3 min.	1.0
GRM329			0.85±0.1		
GRM32A	3.2±0.3	2.5±0.2	1.0+0/-0.2	0.3 min.	1.0
GRM32M			1.15±0.1		
GRM32C	3.2±0.3	2.5±0.2	1.35±0.15	0.3 min.	1.0
GRM32N			1.6±0.2		
GRM32R	3.2±0.3	2.5±0.2	1.8±0.2	0.3 min.	1.0
GRM32D			2.0±0.2		
GRM32E	3.2±0.3	2.5±0.2	2.5±0.2	0.3 min.	1.0
GRM32E			2.5±0.2		



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

■ Applications

General electronic equipment

High Dielectric Constant Type X5R(R6) Characteristics

Part Number	GRM02		GRM03		GRM15			GRM18					GRM21			GRM31				GRM32	
L x W [EIA]	0.4x0.2 [01005]		0.6x0.3 [0201]		1.0x0.5 [0402]			1.6x0.8 [0603]					2x1.25 [805]			3.2x1.6 [1206]				3.2x2.5 [1210]	
Rated Volt.	10 (1A)	6.3 (0J)	10 (1A)	6.3 (0J)	50 (1H)	16 (1C)	10 (1A)	50 (1H)	25 (1E)	16 (1C)	10 (1A)	6.3 (0J)	25 (1E)	16 (1C)	6.3 (0J)	50 (1H)	25 (1E)	16 (1C)	6.3 (0J)	25 (1E)	16 (1C)
TC	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)
Capacitance, Capacitance Tolerance and T Dimension																					
68pF (680)	K	0.2 (2)																			
100pF (101)	K	0.2 (2)																			
150pF (151)	K	0.2 (2)																			
220pF (221)	K	0.2 (2)																			
330pF (331)	K	0.2 (2)																			
470pF (471)	K	0.2 (2)																			
680pF (681)	K	0.2* (2)																			
1000pF (102)	K	0.2* (2)			0.5 (5)			0.8 (8)													
1500pF (152)	K	0.2* (2)	0.3 (3)																		

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±0.15, W: 1.25±0.15, T: 1.25±0.15mm)

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

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Part Number	GRM02		GRM03		GRM15			GRM18				GRM21			GRM31				GRM32			
L x W [EIA]	0.4x0.2 [01005]		0.6x0.3 [0201]		1.0x0.5 [0402]			1.6x0.8 [0603]				2x1.25 [805]			3.2x1.6 [1206]				3.2x2.5 [1210]			
Rated Volt.	10 (1A)	6.3 (0J)	10 (1A)	6.3 (0J)	50 (1H)	16 (1C)	10 (1A)	50 (1H)	25 (1E)	16 (1C)	10 (1A)	6.3 (0J)	25 (1E)	16 (1C)	6.3 (0J)	50 (1H)	25 (1E)	16 (1C)	6.3 (0J)	25 (1E)	16 (1C)	
TC	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	X5R (R6)	
Capacitance, Capacitance Tolerance and T Dimension																						
2200pF (222)	K		0.2* (2)	0.3 (3)					0.8 (8)													
3300pF (332)	K		0.2* (2)	0.3 (3)																		
4700pF (472)	K		0.2* (2)	0.3 (3)		0.5 (5)			0.8 (8)													
6800pF (682)	K		0.2* (2)	0.3 (3)																		
10000pF (103)	K		0.2* (2)	0.3 (3)		0.5 (5)			0.8 (8)													
15000pF (153)	K				0.3* (3)																	
22000pF (223)	K				0.3* (3)	0.5 (5)			0.8 (8)													
33000pF (333)	K				0.3* (3)	0.5 (5)																
47000pF (473)	K				0.3* (3)	0.5 (5)																
68000pF (683)	K				0.3* (3)	0.5 (5)																
0.10μF (104)	K				0.3* (3)	0.5 (5)			0.8 (8)													
0.15μF (154)	K							0.5* (5)				0.8 (8)										
0.22μF (224)	K							0.5* (5)	0.8 (8)													
0.33μF (334)	K							0.5* (5)														
0.47μF (474)	K							0.5* (5)	0.8* (8)													
0.68μF (684)	K							0.5* (5)														
1μF (105)	K							0.5* (5)	0.8* (8)													
2.2μF (225)	K								0.8* (8)				1.25* (B)			1.6 (C)						
4.7μF (475)	K											0.8* (8)	1.25* (B)									
10μF (106)	K, M**											0.8* (8)		1.25* (B)			1.6* (C)					
22μF (226)	M													1.25* (B)			1.6* (C)			2.5* (E)		
47μF (476)	M																	1.6* (C)			2.5* (E)	
100μF (107)	M																		1.6* (C)			

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±0.15, W: 1.25±0.15, T: 1.25±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	GRM03		GRM15		GRM18		GRM21			GRM31			GRM32	
L x W [EIA]	0.6x0.3 [0201]		1.0x0.5 [0402]		1.6x0.8 [0603]		2.0x1.25 [0805]			3.2x1.6 [1206]			3.2x2.5 [1210]	
Rated Volt.	6.3 (0J)	4 (0G)	6.3 (0J)	4 (0G)	10 (1A)	4 (0G)	25 (1E)	10 (1A)	4 (0G)	10 (1A)	4 (0G)	10 (1A)	6.3 (0J)	
TC	X6S (C8)	X6S (C8)	X6S (C8)	X6S (C8)	X6S (C8)	X6S (C8)	X6S (C8)	X6S (C8)	X6S (C8)	X6S (C8)	X6S (C8)	X6T (D8)	X6S (C8)	X6S (C8)
Capacitance, Capacitance Tolerance and T Dimension														
15000pF(153)	K	0.3*(3)												
22000pF(223)	K	0.3*(3)												
33000pF(333)	K	0.3*(3)												
47000pF(473)	K	0.3*(3)												
0.10μF(104)	K		0.3*(3)											
0.15μF(154)	K			0.5*(5)										
0.22μF(224)	K			0.5*(5)										
0.33μF(334)	K			0.5*(5)										
0.47μF(474)	K			0.5*(5)										
0.68μF(684)	K				0.5*(5)									
1.0μF(105)	K				0.5*(5)									
2.2μF(225)	K					0.8*(8)								
4.7μF(475)	K						0.8*(8)	1.25*(B)						
10μF(106)	K								1.25*(B)					
22μF(226)	M									1.25*(B)	1.6*(C)			
47μF(476)	M											1.6*(C)		2.5*(E)
100μF(107)	M												1.6*(C)	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	GRM02	GRM03		GRM15		GRM18		GRM21				GRM31				GRM32								
L x W [EIA]	0.4x0.2 (01005)	0.6x0.3 [0201]		1.0x0.5 [0402]		1.6x0.8 [0603]		2.0x1.25 [0805]				3.2x1.6 [1206]				3.2x2.5 [1210]								
Rated Volt.	10 (1A)	25 (1E)	16 (1C)	10 (1A)	100 (2A)	50 (1H)	25 (1E)	16 (1C)	100 (2A)	50 (1H)	25 (1E)	16 (1C)	10 (1A)	4 (0G)	100 (2A)	50 (1H)	25 (1E)	10 (1A)	4 (0G)	100 (2A)	50 (1H)	10 (1A)	6.3 (0J)	4 (0G)
TC	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7U (E7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7U (E7)	X7R (R7)	X7R (R7)	X7R (R7)	X7T (D7)	X7U (E7)
Capacitance, Capacitance Tolerance and T Dimension																								
68pF (680)	K	0.2 (2)																						
100pF (101)	K	0.2 (2)	0.3 (3)																					
150pF (151)	K	0.2 (2)	0.3 (3)																					
220pF (221)	K	0.2 (2)	0.3 (3)		0.5 (5)	0.5 (5)		0.8 (8)	0.8 (8)															
330pF (331)	K	0.2 (2)	0.3 (3)		0.5 (5)	0.5 (5)		0.8 (8)	0.8 (8)															
470pF (471)	K	0.2 (2)	0.3 (3)		0.5 (5)	0.5 (5)		0.8 (8)	0.8 (8)															

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/0.47μF, 25V/2.2μF, 16V/4.7μF, 10V/10μF, 4V/22μF (L: 2.0±0.15, W: 1.25±0.15, T: 1.25±0.15mm)
 GRM31M Series 100V/0.68μF, 25V/2.2μF (L: 3.2±0.2, W: 1.6±0.2, T: 1.15±0.15mm)

Continued on the following page. ↗

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2

Part Number	GRM02		GRM03				GRM15				GRM18				GRM21				GRM31				GRM32								
L x W [EIA]	0.4x0.2 [01005]		0.6x0.3 [0201]				1.0x0.5 [0402]				1.6x0.8 [0603]				2.0x1.25 [0805]				3.2x1.6 [1206]				3.2x2.5 [1210]								
Rated Volt.	10 (1A)	25 (1E)	16 (1C)	10 (1A)	100 (2A)	50 (1H)	25 (1E)	16 (1C)	100 (2A)	50 (1H)	25 (1E)	16 (1C)	10 (1A)	100 (2A)	50 (1H)	25 (1E)	16 (1C)	10 (1A)	4 (0G)	100 (2A)	50 (1H)	25 (1E)	10 (1A)	4 (0G)	100 (2A)	50 (1H)	10 (1A)	6.3 (0J)	4 (0G)		
TC	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7R (R7)	X7U (E7)	X7R (R7)	X7R (R7)	X7R (R7)	X7U (E7)	X7R (R7)	X7R (R7)	X7U (E7)	X7R (R7)	X7R (R7)	X7U (E7)		
Capacitance, Capacitance Tolerance and T Dimension																															
680pF (681)	K		0.3 (3)		0.5 (5)	0.5 (5)			0.8 (8)	0.8 (8)																					
1000pF (102)	K		0.3 (3)		0.5 (5)	0.5 (5)			0.8 (8)	0.8 (8)																					
1500pF (152)	K		0.3 (3)		0.5 (5)	0.5 (5)			0.8 (8)	0.8 (8)																					
2200pF (222)	K		0.3 (3)		0.5 (5)	0.5 (5)			0.8 (8)	0.8 (8)																					
3300pF (332)	K		0.3 (3)		0.5 (5)	0.5 (5)			0.8 (8)	0.8 (8)																					
4700pF (472)	K			0.3 (3)	0.5 (5)	0.5 (5)			0.8 (8)	0.8 (8)																					
6800pF (682)	K			0.3 (3)	0.5 (5)				0.8 (8)	0.8 (8)																					
10000pF (103)	K			0.3 (3)	0.5 (5)				0.8 (8)	0.8 (8)																					
15000pF (153)	K				0.5 (5)				0.8 (8)				1.25 (B)																		
22000pF (223)	K				0.5 (5)				0.8 (8)				1.25 (B)																		
33000pF (333)	K					0.5 (5)			0.8 (8)				1.25 (B)																		
47000pF (473)	K					0.5 (5)			0.8 (8)				1.25 (B)																		
68000pF (683)	K						0.5 (5)		0.8 (8)											1.15 (M)											
0.10μF (104)	K						0.5 (5)	0.8 (8)	0.8 (8)																						
0.15μF (154)	K								0.8 (8)				1.25 (B)							1.15 (M)											
0.22μF (224)	K								0.8 (8)				1.0 (A)	1.25 (B)																	
0.33μF (334)	K								0.8 (8)				1.0 (A)	0.85 (9)																	
0.47μF (474)	K								0.8* (8)				1.25 (B)	1.25 (B)																	
0.68μF (684)	K								0.8 (8)				0.85 (9)							1.15 (M)	1.15 (M)										
1.0μF (105)	K								0.8* (8)				1.25 (B)							1.6 (C)											
2.2μF (225)	K								0.8* (8)				1.25* (B)							1.15 (M)					2.5 (E)						
4.7μF (475)	K												1.25* (B)							1.6 (C)					2.5 (E)						
10μF (106)	K												1.25* (B)							1.6* (C)											
22μF (226)	M													1.25* (B)						1.6* (C)									1.35* (N)		

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/0.47μF, 25V/2.2μF, 16V/4.7μF, 10V/10μF, 4V/22μF (L: 2.0±0.15, W: 1.25±0.15, T: 1.25±0.15mm)

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

Continued on the following page. ↗

2

High Dielectric Constant Type X6S(C8) Characteristics Low Profile

Part Number	GRM18		GRM21			GRM31
L x W [EIA]	1.6x0.8 [0603]		2.0x1.25 [0805]			3.2x1.6 [1206]
Rated Volt.	10 (1A)	4 (0G)	16 (1C)	10 (1A)	6.3 (0J)	16 (1C)
TC	X6S (C8)	X6S (C8)	X6S (C8)	X6S (C8)	X6S (C8)	X6S (C8)
Capacitance, Capacitance Tolerance and T Dimension						
1.0μF(105)	K	0.5*(5)		0.6*(6)		
2.2μF(225)	K		0.5*(5)	0.85*(9)		0.6*(6)
4.7μF(475)	K				0.85*(9)	0.85*(9)
10μF(106)	K				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/10μF (L: 2.0±0.2, W: 1.25±0.2, T: 0.85±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 (1H)	25 (1E)	16 (1C)	10 (1A)	25 (1E)
TC	X7R (R7)	X7R (R7)	X7R (R7)	X7T (D7)	X7R (R7)
Capacitance, Capacitance Tolerance and T Dimension					
220pF(221)	K	0.25(X)			
330pF(331)	K	0.25(X)			
470pF(471)	K	0.25(X)			
680pF(681)	K	0.25(X)			
1000pF(102)	K	0.25(X)			
1500pF(152)	K	0.25(X)			
2200pF(222)	K		0.25(X)		
3300pF(332)	K			0.25(X)	
4700pF(472)	K			0.25(X)	
6800pF(682)	K			0.25(X)	
10000pF(103)	K			0.25(X)	
1.0μF(105)	K				0.5*(5) 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).

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).**

No.	Item	Specifications		Test Method
		Temperature Compensating Type	High Dielectric Type	
1	Operating Temperature Range	-55 to +125°C	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°C (2Δ, 3Δ, 4Δ, B1, B3, F1, R1: 20°C)
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 ^{P-P} or V ^{G-P} , whichever is larger, should be maintained within the rated voltage range.
3	Appearance	No defects or abnormalities		Visual inspection
4	Dimensions	Within the specified dimensions		Using calipers (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 10,000MΩ C _{>} 0.047μF: More than 500Ω · F	C: Nominal Capacitance	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		The capacitance/Q/D.F. should be measured at 20/25°C at the frequency and voltage shown in the table.
8	Q/ Dissipation Factor (D.F.)	30pF and over: Q _≥ 1000 30pF and below: Q _≥ 400+20C C: Nominal Capacitance (pF)	[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) [E4] W.V.: 25Vmin: 0.025 max. [F1, F5] W.V.: 25V min. : 0.05 max. (C<0.1μF) : 0.09 max. (C _≥ 0.1μF) W.V.: 16/10V: 0.125 max. W.V.: 6.3V: 0.15 max.	

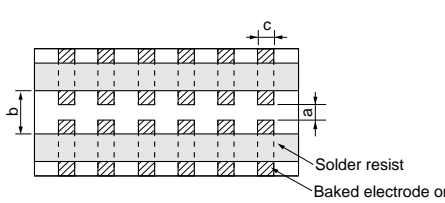
Char. Item	ΔC to 7U, 1X (1000pF and below)	ΔC to 7U, 1X (more than 1000pF) R6, R7, C8, F5, B1, B3, F1	R6, R7, F5 (C>10μF)	E4
Frequency	1±0.1MHz	1±0.1kHz	120±24kHz	1±0.1kHz
Voltage	0.5 to 5Vrms	1±0.2Vrms	0.5± 0.1Vrms	0.5± 0.05Vrms

Continued on the following page.

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).

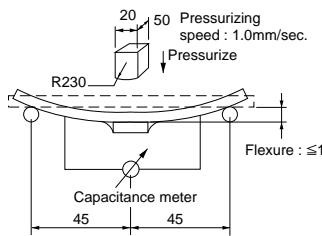
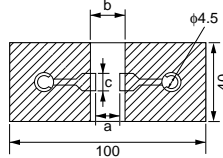
No.	Item	Specifications		Test Method																																						
		Temperature Compensating Type	High Dielectric Type																																							
9	Capacitance Temperature Characteristics	No bias	B1, B3: Within $\pm 10\%$ (−25 to +85°C) R1, R7: Within $\pm 15\%$ (−55 to +125°C) R6: Within $\pm 15\%$ (−55 to +85°C) E4: Within +22/−56% (+10 to +85°C) F1: Within +30/−80% (−25 to +85°C) F5: Within +22/−82% (−30 to +85°C) C8: Within $\pm 22\%$ (−55 to +105°C)	The capacitance change should be measured after 5 min. at each specified temp. stage. (1) Temperature Compensating Type The temperature coefficient is determined using the capacitance measured in step 3 as a reference. When cycling the temperature sequentially from step 1 through 5 (5C: +25 to +125°C/ Δ C: +20 to +125°C: other temp. coeffs.: +25 to +85°C/+20 to +85°C) the capacitance should be within the specified tolerance for the temperature coefficient and capacitance change as Table A-1. The capacitance drift is calculated by dividing the differences between the maximum and minimum measured values in the step 1, 3 and 5 by the cap. value in step 3.																																						
		50% of the Rated Voltage	B1: Within +10/−30% R1: Within +15/−40% F1: Within +30/−95%																																							
		Capacitance Drift	*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. Within $\pm 0.2\%$ or $\pm 0.05\text{pF}$ (Whichever is larger.) *Do not apply to 1X/25V		(2) High Dielectric Constant Type The ranges of capacitance change compared with the 20°C 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.																																					
10	Adhesive Strength of Termination	No removal of the terminations or other defect should occur.		Solder the capacitor to the test jig (glass epoxy board) shown in Fig. 1a using an eutectic solder. Then apply 10N* force in parallel with the test jig for 10±1 sec. 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)																																						
		 <p>Fig. 1a</p>			<table border="1"> <thead> <tr> <th>Type</th> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>GRM02</td> <td>0.2</td> <td>0.56</td> <td>0.23</td> </tr> <tr> <td>GRM03</td> <td>0.3</td> <td>0.9</td> <td>0.3</td> </tr> <tr> <td>GRM15</td> <td>0.4</td> <td>1.5</td> <td>0.5</td> </tr> <tr> <td>GRM18</td> <td>1.0</td> <td>3.0</td> <td>1.2</td> </tr> <tr> <td>GRM21</td> <td>1.2</td> <td>4.0</td> <td>1.65</td> </tr> <tr> <td>GRM31</td> <td>2.2</td> <td>5.0</td> <td>2.0</td> </tr> <tr> <td>GRM32</td> <td>2.2</td> <td>5.0</td> <td>2.9</td> </tr> <tr> <td>GRM43</td> <td>3.5</td> <td>7.0</td> <td>3.7</td> </tr> <tr> <td>GRM55</td> <td>4.5</td> <td>8.0</td> <td>5.6</td> </tr> </tbody> </table> <p>(in mm)</p>	Type	a	b	c	GRM02	0.2	0.56	0.23	GRM03	0.3	0.9	0.3	GRM15	0.4	1.5	0.5	GRM18	1.0	3.0	1.2	GRM21	1.2	4.0	1.65	GRM31	2.2	5.0	2.0	GRM32	2.2	5.0	2.9	GRM43	3.5	7.0	3.7	GRM55
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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).**

No.	Item	Specifications		Test Method																																							
		Temperature Compensating Type	High Dielectric Type																																								
11	Appearance	No defects or abnormalities																																									
	Capacitance	Within the specified tolerance																																									
11	Vibration Resistance	Q/D.F.	30pF and over: $Q \geq 1000$ 30pF and below: $Q \geq 400 + 20C$ C: Nominal Capacitance (pF)	[B1, B3, R6, R7, C8] W.V.: 100V : 0.025 max. ($C < 0.068\mu\text{F}$) : 0.05 max. ($C \geq 0.068\mu\text{F}$) W.V.: 50/25V: : 0.025 max. ($C < 10\mu\text{F}$) : 0.035 max. ($C \geq 10\mu\text{F}$) W.V.: 16/10V: 0.035 max. W.V.: 6.3/4V : 0.05 max. ($C < 3.3\mu\text{F}$) : 0.1 max. ($C \geq 3.3\mu\text{F}$) [E4] W.V.: 25Vmin: 0.025 max. [F1, F5] W.V.: 25V min. : 0.05 max. ($C < 0.1\mu\text{F}$) : 0.09 max. ($C \geq 0.1\mu\text{F}$) W.V.: 16/10V: 0.125 max. W.V.: 6.3V: 0.15 max.	Solder the capacitor on the test jig (glass epoxy board) in the same manner and under the same conditions as (10). The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should be applied for a period of 2 hours in each of 3 mutually perpendicular directions (total of 6 hours).																																						
			12	Deflection		No crack or marked defect should occur.  <p style="text-align: center;">Fig. 3a</p>	Solder the capacitor on the test jig (glass epoxy board) shown in Fig. 2a using an eutectic solder. Then apply a force in the direction shown in Fig. 3a 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.  <p style="text-align: center;">Fig. 2a t: 1.6mm (GRM02/03/15: t: 0.8mm)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Type</th> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>GRM02</td> <td>0.2</td> <td>0.56</td> <td>0.23</td> </tr> <tr> <td>GRM03</td> <td>0.3</td> <td>0.9</td> <td>0.3</td> </tr> <tr> <td>GRM15</td> <td>0.4</td> <td>1.5</td> <td>0.5</td> </tr> <tr> <td>GRM18</td> <td>1.0</td> <td>3.0</td> <td>1.2</td> </tr> <tr> <td>GRM21</td> <td>1.2</td> <td>4.0</td> <td>1.65</td> </tr> <tr> <td>GRM31</td> <td>2.2</td> <td>5.0</td> <td>2.0</td> </tr> <tr> <td>GRM32</td> <td>2.2</td> <td>5.0</td> <td>2.9</td> </tr> <tr> <td>GRM43</td> <td>3.5</td> <td>7.0</td> <td>3.7</td> </tr> <tr> <td>GRM55</td> <td>4.5</td> <td>8.0</td> <td>5.6</td> </tr> </tbody> </table> <p style="text-align: right;">(in mm)</p>	Type	a	b	c	GRM02	0.2	0.56	0.23	GRM03	0.3	0.9	0.3	GRM15	0.4	1.5	0.5	GRM18	1.0	3.0	1.2	GRM21	1.2	4.0	1.65	GRM31	2.2	5.0	2.0	GRM32	2.2	5.0	2.9	GRM43	3.5	7.0	3.7
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13	Solderability of Termination	75% of the terminations are to be soldered evenly and continuously.		Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Preheat at 80 to 120°C for 10 to 30 seconds. After preheating, immerse in an eutectic solder solution for 2 ± 0.5 seconds at $230 \pm 5^\circ\text{C}$ or Sn-3.0Ag-0.5Cu solder solution for 2 ± 0.5 seconds at $245 \pm 5^\circ\text{C}$.																																							

Continued on the following page.

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).

No.	Item	Specifications		Test Method	
		Temperature Compensating Type	High Dielectric Type		
14	Resistance to Soldering Heat	The measured and observed characteristics should satisfy the specifications in the following table.		Preheat the capacitor at 120 to 150°C for 1 minute. Immerse the capacitor in an eutectic solder or Sn-3.0Ag-0.5Cu solder solution at 270±5°C for 10±0.5 seconds. Set at room temperature for 24±2 hours, then measure. •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. •Preheating for GRM32/43/55	
		Appearance	No defects or abnormalities		
		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%
		Q/D.F.	30pF and over: $Q \geq 1000$ 30pF and below: $Q \geq 400+20C$ C: Nominal Capacitance (pF)		[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) [E4] W.V.: 25Vmin: 0.025 max. [F1, F5] W.V.: 25V min. : 0.05 max. (C<0.1μF) : 0.09 max. (C≥0.1μF) W.V.: 16/10V: 0.125 max. W.V.: 6.3V: 0.15 max.
		I.R.	More than 10,000MΩ or 500Ω · F (Whichever is smaller)		
		Dielectric Strength	No defects		
15	Temperature Cycle	The measured and observed characteristics should satisfy the specifications in the following table.		Fix the capacitor to the supporting jig in the same manner and under the same conditions as (10). Perform the five cycles according to the four heat treatments shown in the following table. Set for 24±2 hours at room temperature, then measure.	
		Appearance	No defects or abnormalities		
		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%
		Q/D.F.	30pF and over: $Q \geq 1000$ 30pF and below: $Q \geq 400+20C$ C: Nominal Capacitance (pF)		[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) [E4] W.V.: 25Vmin: 0.05 max. [F1, F5] W.V.: 25V min. : 0.05 max. (C<0.1μF) : 0.09 max. (C≥0.1μF) W.V.: 16/10V: 0.125 max. W.V.: 6.3V: 0.15 max.
		I.R.	More than 10,000MΩ or 500Ω · F (Whichever is smaller)		
		Dielectric Strength	No defects		

Step	Temperature	Time
1	100 to 120°C	1 min.
2	170 to 200°C	1 min.

Step	1	2	3	4
Temp. (°C)	Min. Operating Temp. +0/-3	Room Temp.	Max. Operating Temp. +3/-0	Room Temp.
Time (min.)	30±3	2 to 3	30±3	2 to 3

Continued on the following page. ↗

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).**

No.	Item	Specifications		Test Method	
		Temperature Compensating Type	High Dielectric Type		
16	Humidity (Steady State)	The measured and observed characteristics should satisfy the specifications in the following table.		Set the capacitor at 40±2°C and in 90 to 95% humidity for 500±12 hours. Remove and set for 24±2 hours at room temperature, then measure.	
		Appearance	No defects or abnormalities		
		Capacitance Change	Within ±5% or ±0.5pF (Whichever is larger)		B1, B3, R1, R6, R7, C8 : Within ±12.5% F1, F5, E4: Within ±30%
		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)		[R6, R7, C8] W.V.: 100V : 0.05 max. (C<0.068μF) : 0.075 max. (C≥0.068μF) W.V.: 50/25/16/10V : 0.05 max. W.V.: 6.3/4V : 0.075 max. (C<3.3μF) : 0.125 max. (C≥3.3μF) [E4] W.V.: 25Vmin: 0.05 max. [F1, F5] W.V.: 25V min. : 0.075 max. (C<0.1μF) : 0.125 max. (C≥0.1μF) W.V.: 16/10V: 0.15 max. W.V.: 6.3V: 0.2 max.
		I.R.	More than 1,000MΩ or 50Ω · F (Whichever is smaller)		
17	Humidity Load	The measured and observed characteristics should satisfy the specifications in the following table.		Apply the rated voltage at 40±2°C and 90 to 95% humidity for 500±12 hours. Remove and 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.	
		Appearance	No defects or abnormalities		
		Capacitance Change	Within ±7.5% or ±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%
		Q/D.F.	30pF and over: Q≥200 30pF and below: Q≥100+10C/3 C: Nominal Capacitance (pF)		[B1, B3, R6, R7, C8] W.V.: 100V : 0.05 max. (C<0.068μF) : 0.075 max. (C≥0.068μF) W.V.: 50/25/16/10V : 0.05 max. W.V.: 6.3/4V : 0.075 max. (C<3.3μF) : 0.125 max. (C≥3.3μF) [E4] W.V.: 25Vmin: 0.05 max. [F1, F5] W.V.: 25V min. : 0.075 max. (C<0.1μF) : 0.125 max. (C≥0.1μF) W.V.: 16/10V: 0.15 max. W.V.: 6.3V: 0.2 max.
		I.R.	More than 500MΩ or 25Ω · F (Whichever is smaller)		

Continued on the following page.

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).

No.	Item	Specifications		Test Method	
		Temperature Compensating Type	High Dielectric Type		
18	High Temperature Load	The measured and observed characteristics should satisfy the specifications in the following table.			Apply 200% (GRM21BR71H105, GRM21BR72A474, GRM31CR71H475: 150% of the rated voltage) of the rated voltage at the maximum operating temperature $\pm 3^{\circ}\text{C}$ for 1000 \pm 12 hours. Set for 24 \pm 2 hours at room temperature, then measure. The charge/discharge current is less than 50mA. •Initial measurement for high dielectric constant type. Apply 200% of the rated DC voltage at the maximum operating temperature $\pm 3^{\circ}\text{C}$ for one hour. Remove and set for 24 \pm 2 hours at room temperature. Perform initial measurement.
		Appearance	No defects or abnormalities		
		Capacitance Change	Within $\pm 3\%$ or $\pm 0.3\text{pF}$ (Whichever is larger)	B1, B3, R1, R6, R7, C8 : Within $\pm 12.5\%$ F1, F5, E4: Within $\pm 30\%$ [Except 10V max. and $C \geq 1.0\mu\text{F}$] F1, F5: Within $+30/-40\%$ [10V max. and $C \geq 1.0\mu\text{F}$]	
		Q/D.F.	30pF and over: $Q \geq 350$ 10pF and over 30pF and below: $Q \geq 275 + 2.5C$ 10pF and below: $Q \geq 200 + 10C$ C: Nominal Capacitance (pF)	[B1, B3, R6, R7, C8] W.V.: 100V : 0.05 max. ($C < 0.068\mu\text{F}$) : 0.075 max. ($C \geq 0.068\mu\text{F}$) W.V.: 50/25/16/10V : 0.05 max. W.V.: 6.3/4V : 0.075 max. ($C < 3.3\mu\text{F}$) : 0.125 max. ($C \geq 3.3\mu\text{F}$) [E4] W.V.: 25Vmin: 0.05 max. [F1, F5] W.V.: 25V min. : 0.075 max. ($C < 0.1\mu\text{F}$) : 0.125 max. ($C \geq 0.1\mu\text{F}$) W.V.: 16/10V: 0.15 max. W.V.: 6.3V: 0.2 max.	
I.R.	More than 1,000M Ω or 50 $\Omega \cdot \text{F}$ (Whichever is smaller)				

Table A-1
(1)

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

*1: Nominal values denote the temperature coefficient within a range of 25 $^{\circ}\text{C}$ to 125 $^{\circ}\text{C}$ (for ΔC)/85 $^{\circ}\text{C}$ (for other TC).

(2)

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

*2: Nominal values denote the temperature coefficient within a range of 20 $^{\circ}\text{C}$ to 125 $^{\circ}\text{C}$ (for ΔC)/85 $^{\circ}\text{C}$ (for other TC).

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).

No.	Item	Specifications	Test Method																																																								
1	Operating Temperature 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°C (B1, B3, R1, F1: 20°C)																																																								
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^{P-P} or V^{O-P} , whichever is larger, should be maintained within the rated voltage range.																																																								
3	Appearance	No defects or abnormalities	Visual inspection																																																								
4	Dimensions	Within the specified dimensions	Using calipers																																																								
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 50Ω · 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	Capacitance	Within the specified tolerance *Table 1 <table border="1"> <tr><td>GRM155</td><td>B3/R6</td><td>1A</td><td>124 to 105</td></tr> <tr><td>GRM185</td><td>B3/R6</td><td>1C/1A</td><td>105</td></tr> <tr><td>GRM185</td><td>C8/D7</td><td>1A</td><td>105</td></tr> <tr><td>GRM188</td><td>B3/R6</td><td>1C/1A</td><td>225</td></tr> <tr><td>GRM188</td><td>R7/C8</td><td>1A</td><td>225</td></tr> <tr><td>GRM188</td><td>B3/R6</td><td>1A</td><td>335</td></tr> <tr><td>GRM219</td><td>B3/R6</td><td>1C/1A</td><td>475, 106</td></tr> <tr><td>GRM219</td><td>C8</td><td>1A</td><td>475</td></tr> <tr><td>GRM21B</td><td>B3/R6</td><td>1C/1A</td><td>106</td></tr> <tr><td>GRM21B</td><td>R7/C8</td><td>1A</td><td>106</td></tr> <tr><td>GRM319</td><td>B3/R6</td><td>1C/1A</td><td>106</td></tr> </table>	GRM155	B3/R6	1A	124 to 105	GRM185	B3/R6	1C/1A	105	GRM185	C8/D7	1A	105	GRM188	B3/R6	1C/1A	225	GRM188	R7/C8	1A	225	GRM188	B3/R6	1A	335	GRM219	B3/R6	1C/1A	475, 106	GRM219	C8	1A	475	GRM21B	B3/R6	1C/1A	106	GRM21B	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. <table border="1"> <thead> <tr> <th>Capacitance</th> <th>Frequency</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>$C \leq 10\mu\text{F}$ (10V min.)*1</td> <td>1±0.1kHz</td> <td>1.0±0.2Vrms</td> </tr> <tr> <td>$C \leq 10\mu\text{F}$ (6.3V max.)</td> <td>1±0.1kHz</td> <td>0.5±0.1Vrms</td> </tr> <tr> <td>$C > 10\mu\text{F}$</td> <td>120±24Hz</td> <td>0.5±0.1Vrms</td> </tr> </tbody> </table> <p>*1 However the voltage is 0.5±0.1Vrms about Table 1 items on the left side.</p>	Capacitance	Frequency	Voltage	$C \leq 10\mu\text{F}$ (10V min.)*1	1±0.1kHz	1.0±0.2Vrms	$C \leq 10\mu\text{F}$ (6.3V max.)	1±0.1kHz	0.5±0.1Vrms	$C > 10\mu\text{F}$	120±24Hz	0.5±0.1Vrms
GRM155	B3/R6	1A	124 to 105																																																								
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GRM188	B3/R6	1A	335																																																								
GRM219	B3/R6	1C/1A	475, 106																																																								
GRM219	C8	1A	475																																																								
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$C \leq 10\mu\text{F}$ (10V min.)*1	1±0.1kHz	1.0±0.2Vrms																																																									
$C \leq 10\mu\text{F}$ (6.3V max.)	1±0.1kHz	0.5±0.1Vrms																																																									
$C > 10\mu\text{F}$	120±24Hz	0.5±0.1Vrms																																																									
8	Dissipation Factor (D.F.)	B1, B3, R6*2, R7*3, C7, C8, D8*2: 0.1 max. F1, F5: 0.2 max.																																																									
9	Capacitance Temperature Characteristics	<p>No bias</p> <p>B1, B3 : Within ±10% (-25 to +85°C) F1 : Within +30/-80% (-25 to +85°C) R6 : Within ±15% (-55 to +85°C) R1, R7: Within ±15% (-55 to +125°C) F5 : Within +22/-82% (-30 to +85°C) C6 : Within ±22% (-55 to +85°C) C7 : Within ±22% (-55 to +125°C) C8 : Within ±22% (-55 to +105°C) D7 : Within +22/-33% (-55 to +125°C) E7 : Within +22/-56% (-55 to +125°C) D8 : Within +22/-33% (-55 to +105°C)</p> <p>50% of the Rated Voltage</p> <p>B1: Within +10/-30% R1: Within +15/-40% F1: Within +30/-95%</p>	<p>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.</p> <p>*GRM43 B1/R6 0J/1A 336/476 only: 1.0±0.2Vrms</p> <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Applying Voltage (V)</th> </tr> </thead> <tbody> <tr> <td rowspan="2">1</td> <td>25±2 (for R6, R7, C6, C7, C8, D7, D8, E7, F5)</td> <td rowspan="8">No bias</td> </tr> <tr> <td>20±2 (for B1, B3, F1, R1)</td> </tr> <tr> <td rowspan="2">2</td> <td>-55±3 (for R1, R6, R7, C6, C7, C8, D7, D8, E7)</td> </tr> <tr> <td>-30±3 (for F5) -25±3 (for B1, B3, F1)</td> </tr> <tr> <td rowspan="2">3</td> <td>25±2 (for R6, R7, C6, C7, C8, D7, D8, E7, F5)</td> <td rowspan="8">50% of the rated voltage</td> </tr> <tr> <td>20±2 (for B1, B3, F1, R1)</td> </tr> <tr> <td rowspan="2">4</td> <td>125±3 (for R1, R7, C7, D7, E7)</td> </tr> <tr> <td>105±3 (for C8, D8) 85±3 (for B1, B3, F1, F5, R6, C6)</td> </tr> <tr> <td>5</td> <td>20±2 (for B1, F1, R1)</td> </tr> <tr> <td rowspan="2">6</td> <td>-55±3 (for R1)</td> </tr> <tr> <td>-25±3 (for B1, F1)</td> </tr> <tr> <td>7</td> <td>20±2 (for B1, F1, R1)</td> </tr> <tr> <td>8</td> <td>125±3 (for R1) 85±3 (for B1, F1)</td> </tr> </tbody> </table> <p>•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.</p>	Step	Temperature (°C)	Applying Voltage (V)	1	25±2 (for R6, R7, C6, C7, C8, D7, D8, E7, F5)	No bias	20±2 (for B1, B3, F1, R1)	2	-55±3 (for R1, R6, R7, C6, C7, C8, D7, D8, E7)	-30±3 (for F5) -25±3 (for B1, B3, F1)	3	25±2 (for R6, R7, C6, C7, C8, D7, D8, E7, F5)	50% of the rated voltage	20±2 (for B1, B3, F1, R1)	4	125±3 (for R1, R7, C7, D7, E7)	105±3 (for C8, D8) 85±3 (for B1, B3, F1, F5, R6, C6)	5	20±2 (for B1, F1, R1)	6	-55±3 (for R1)	-25±3 (for B1, F1)	7	20±2 (for B1, F1, R1)	8	125±3 (for R1) 85±3 (for B1, F1)																														
Step	Temperature (°C)	Applying Voltage (V)																																																									
1	25±2 (for R6, R7, C6, C7, C8, D7, D8, E7, F5)	No bias																																																									
	20±2 (for B1, B3, F1, R1)																																																										
2	-55±3 (for R1, R6, R7, C6, C7, C8, D7, D8, E7)																																																										
	-30±3 (for F5) -25±3 (for B1, B3, F1)																																																										
3	25±2 (for R6, R7, C6, C7, C8, D7, D8, E7, F5)		50% of the rated voltage																																																								
	20±2 (for B1, B3, F1, R1)																																																										
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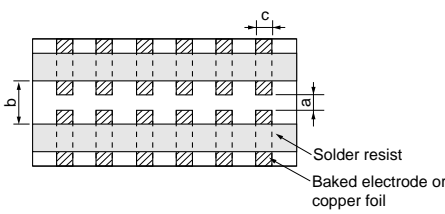
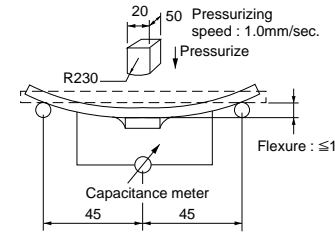
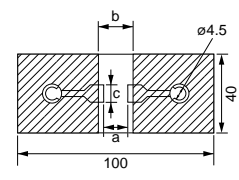
*2: GRM31CR60J107, GRM31CD80G107: 0.15 max.

*3: GRM31CR71E106: 0.125 max.

GRM Series Specifications and Test Methods (2)


Below GRM Series Specifications and Test Methods (2) are applied to "*" PN's in capacitance table.

Continued from the preceding page. In case "*" is not added in capacitance table, please refer to GRM Series Specifications and Test Methods (1) (P.23).

No.	Item	Specifications	Test Method																																								
10	Adhesive Strength of Termination	<p>No removal of the terminations or other defects should occur.</p>  <p>Fig. 1a</p>	<p>Solder the capacitor on the test jig (glass epoxy board) shown in Fig. 1a using an eutectic solder. Then apply 10N* force in parallel with the test jig for 10±1sec.</p> <p>The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.</p> <p>*1N: GRM02, 2N: GRM03, 5N: GRM15/GRM18</p> <table border="1"> <thead> <tr> <th>Type</th> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr><td>GRM02</td><td>0.2</td><td>0.56</td><td>0.23</td></tr> <tr><td>GRM03</td><td>0.3</td><td>0.9</td><td>0.3</td></tr> <tr><td>GRM15</td><td>0.4</td><td>1.5</td><td>0.5</td></tr> <tr><td>GRM18</td><td>1.0</td><td>3.0</td><td>1.2</td></tr> <tr><td>GRM21</td><td>1.2</td><td>4.0</td><td>1.65</td></tr> <tr><td>GRM31</td><td>2.2</td><td>5.0</td><td>2.0</td></tr> <tr><td>GRM32</td><td>2.2</td><td>5.0</td><td>2.9</td></tr> <tr><td>GRM43</td><td>3.5</td><td>7.0</td><td>3.7</td></tr> <tr><td>GRM55</td><td>4.5</td><td>8.0</td><td>5.6</td></tr> </tbody> </table>	Type	a	b	c	GRM02	0.2	0.56	0.23	GRM03	0.3	0.9	0.3	GRM15	0.4	1.5	0.5	GRM18	1.0	3.0	1.2	GRM21	1.2	4.0	1.65	GRM31	2.2	5.0	2.0	GRM32	2.2	5.0	2.9	GRM43	3.5	7.0	3.7	GRM55	4.5	8.0	5.6
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11	Vibration	<table border="1"> <tr> <td>Appearance</td> <td>No defects or abnormalities</td> </tr> <tr> <td>Capacitance</td> <td>Within the specified tolerance</td> </tr> <tr> <td>D.F.</td> <td>B1, B3, R1, R6*2, R7*3, C7, C8, E7, D7, D8*2: 0.1 max. C6: 0.125 max. F1, F5: 0.2 max.</td> </tr> </table>	Appearance	No defects or abnormalities	Capacitance	Within the specified tolerance	D.F.	B1, B3, R1, R6*2, R7*3, C7, C8, E7, D7, D8*2: 0.1 max. C6: 0.125 max. F1, F5: 0.2 max.	<p>Solder the capacitor on the test jig (glass epoxy board) in the same manner and under the same conditions as (10).</p> <p>The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should be applied for a period of 2 hours in each of 3 mutually perpendicular directions (total of 6 hours).</p>																																		
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12	Deflection	<p>No cracking or marking defects should occur.</p>  <p>Fig.3a</p>	<p>Solder the capacitor on the test jig (glass epoxy board) shown in Fig. 2a using an eutectic solder. Then apply a force in the direction shown in Fig. 3a 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.</p>  <p>Fig. 2a</p> <p>t: 1.6mm</p> <p>(GRM02/03/15: t: 0.8mm)</p> <table border="1"> <thead> <tr> <th>Type</th> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr><td>GRM02</td><td>0.2</td><td>0.56</td><td>0.23</td></tr> <tr><td>GRM03</td><td>0.3</td><td>0.9</td><td>0.3</td></tr> <tr><td>GRM15</td><td>0.4</td><td>1.5</td><td>0.5</td></tr> <tr><td>GRM18</td><td>1.0</td><td>3.0</td><td>1.2</td></tr> <tr><td>GRM21</td><td>1.2</td><td>4.0</td><td>1.65</td></tr> <tr><td>GRM31</td><td>2.2</td><td>5.0</td><td>2.0</td></tr> <tr><td>GRM32</td><td>2.2</td><td>5.0</td><td>2.9</td></tr> <tr><td>GRM43</td><td>3.5</td><td>7.0</td><td>3.7</td></tr> <tr><td>GRM55</td><td>4.5</td><td>8.0</td><td>5.6</td></tr> </tbody> </table> <p>(in mm)</p>	Type	a	b	c	GRM02	0.2	0.56	0.23	GRM03	0.3	0.9	0.3	GRM15	0.4	1.5	0.5	GRM18	1.0	3.0	1.2	GRM21	1.2	4.0	1.65	GRM31	2.2	5.0	2.0	GRM32	2.2	5.0	2.9	GRM43	3.5	7.0	3.7	GRM55	4.5	8.0	5.6
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13	Solderability of Termination	<p>75% of the terminations is to be soldered evenly and continuously.</p>	<p>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 an eutectic solder solution for 2±0.5 seconds at 230±5°C or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5°C.</p>																																								

*2: GRM31CR60J107, GRM31CD80G107: 0.15 max.

*3: GRM31CR71E106: 0.125 max.

Continued on the following page. 

GRM Series Specifications and Test Methods (2)

Below GRM Series Specifications and Test Methods (2) are applied to "*" PNs in capacitance table.

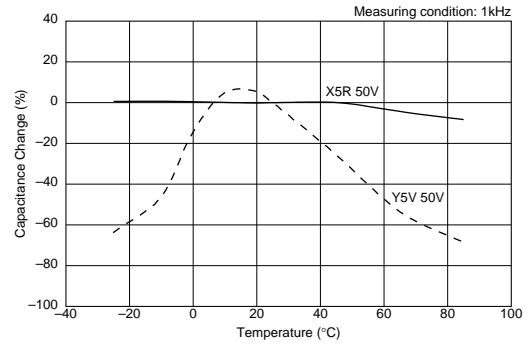
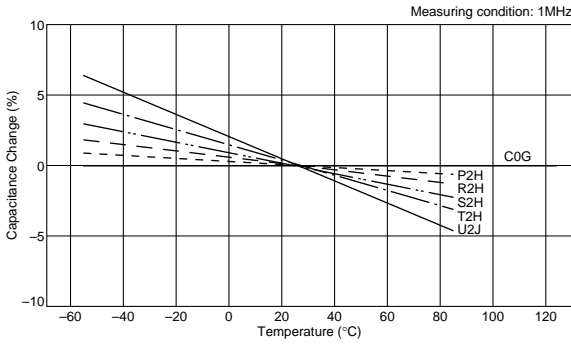
Continued from the preceding page. **In case "*" is not added in capacitance table, please refer to GRM Series Specifications and Test Methods (1) (P.23).**

No.	Item	Specifications	Test Method															
14	Appearance	No defects or abnormalities	Preheat the capacitor at 120 to 150°C for 1 minute. Immerse the capacitor in an eutectic solder or Sn-3.0Ag-0.5Cu solder solution at 270±5°C for 10±0.5 seconds. Set at room temperature for 24±2 hours, then measure. *Do not apply to GRM02. •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. *Preheating for GRM32/43/55															
	Capacitance Change	B1, B3, R1, R6*4, R7, C6, C7, C8, E7, D7, D8: Within ±7.5% F1, F5: Within ±20%																
	D.F.	B1, B3, R1, R6*2, R7*3, C7, C8, E7, D7, D8*2: 0.1 max. C6: 0.125 max. F1, F5: 0.2 max.																
	I.R.	More than 50Ω · F																
	Dielectric Strength	No defects																
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1	100 to 120°C	1 min.																
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15	Appearance	No defects or abnormalities	Fix the capacitor to the supporting jig in the same manner and under the same conditions as (10). Perform the five cycles according to the four heat treatments shown in the following table. Set for 24±2 hours at room temperature, then measure.															
	Capacitance Change	B1, B3, R1, R6, R7, C6, C7, C8, D7, D8: Within ±7.5% E7: Within ±30% F1, F5: Within ±20%																
	D.F.	B1, B3, R1, R6*2, R7*3, C7, C8, E7, D7, D8*2: 0.1 max. C6: 0.125 max. F1, F5: 0.2 max.																
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Step	1	2	3	4														
Temp. (°C)	Min. Operating Temp. +0/−3	Room Temp.	Max. Operating Temp. +3/−0	Room Temp.														
Time (min.)	30±3	2 to 3	30±3	2 to 3														
16	Appearance	No defects or abnormalities	Apply the rated voltage at 40±2°C and 90 to 95% humidity for 500±12 hours. The charge/discharge current is less than 50mA. •Initial measurement 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. •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.															
	Capacitance Change	B1, B3, R1, R6, R7, C6, C7, C8, E7, D7, D8: Within ±12.5% F1, F5: Within ±30%																
	D.F.	B1, B3, R1, R6, R7, C6, C7, C8, E7, D7, D8: 0.2 max. F1, F5: 0.4 max.																
	I.R.	More than 12.5Ω · F																
17	Appearance	No defects or abnormalities	Apply 150% of the rated voltage for 1000±12 hours at the maximum operating temperature ±3°C. Let sit for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA. •Initial measurement 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. •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.															
	Capacitance Change	B1, B3, R1, R6, R7, C6, C7, C8, E7, D7, D8: Within ±12.5% F1, F5: Within ±30%																
	D.F.	B1, B3, R1, R6, R7, C6, C7, C8, E7, D7, D8: 0.2 max. F1, F5: 0.4 max.																
	I.R.	More than 25Ω · F																

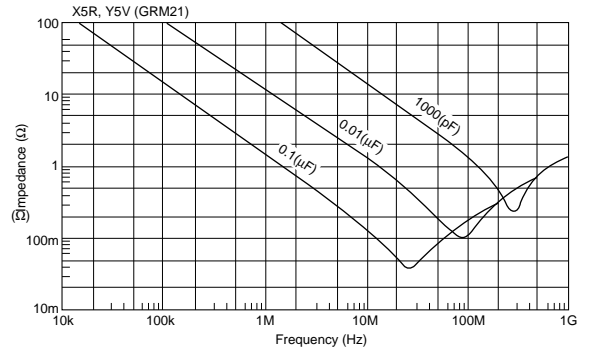
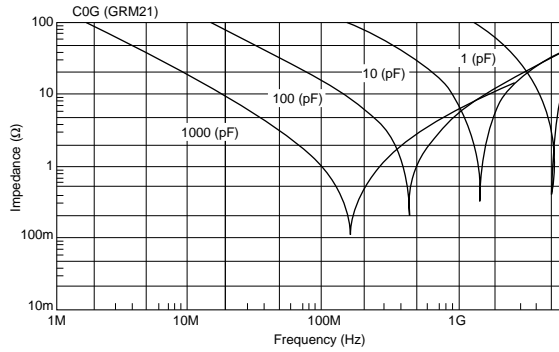
*2: GRM31CR60J107, GRM31CD80G107: 0.15 max.
 *3: GRM31CR71E106: 0.125 max.
 *4: GRM153R60G105, GRM188R60J106: Within ±12.5%

GRM Series Data

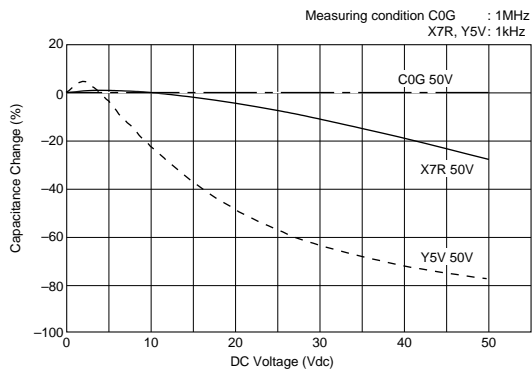
■ Capacitance - Temperature Characteristics



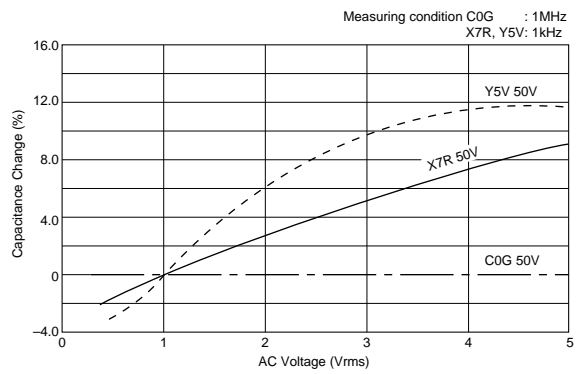
■ Impedance - Frequency Characteristics



■ Capacitance - DC Voltage Characteristics



■ Capacitance - AC Voltage Characteristics

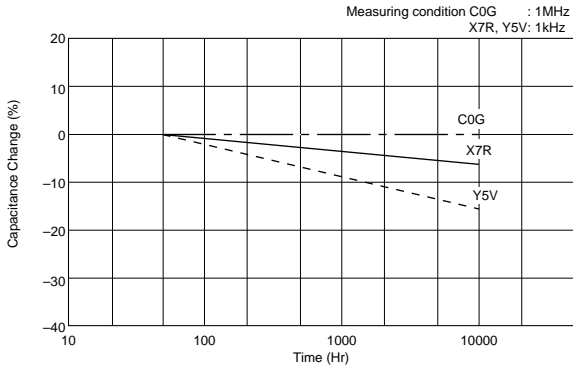


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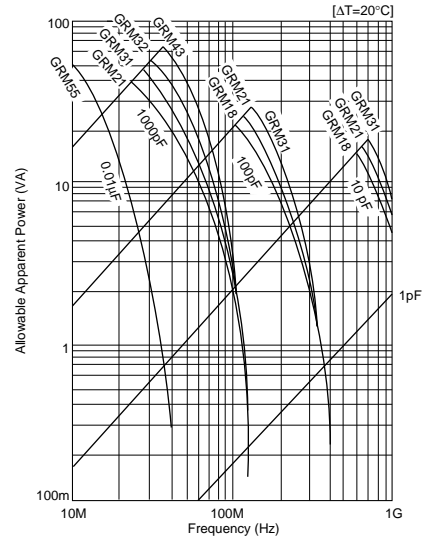
GRM Series Data

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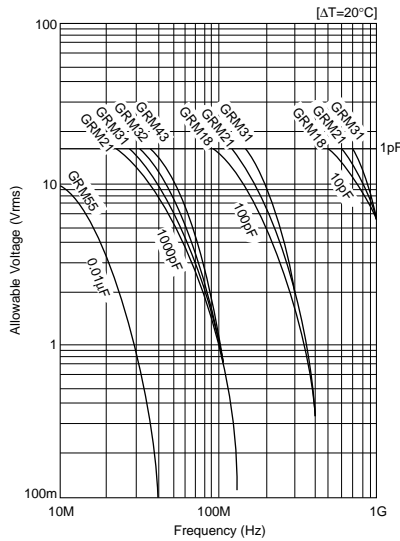
Capacitance Change - Aging



Allowable Apparent Power - Frequency



Allowable Voltage - Frequency



Allowable Current - Frequency

