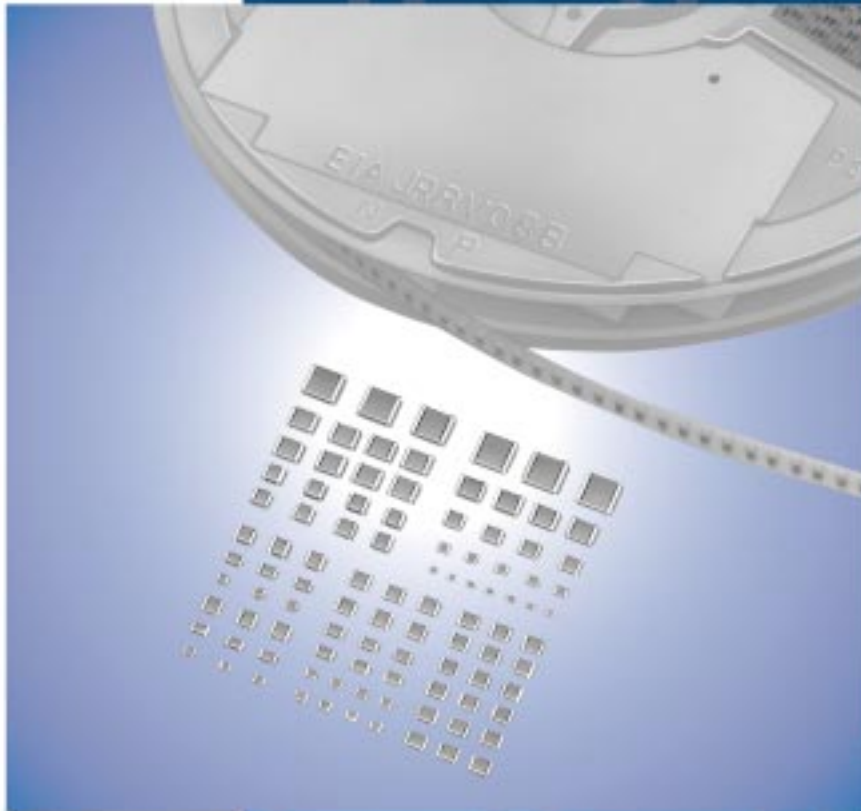


Chip Monolithic Ceramic Capacitors



● Part Numbering

Chip Monolithic Ceramic Capacitors

(Part Number)

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

① Product ID

② Series

Product ID	Code	Series
GR	J	Soft Termination Type
	M	Tin Plated Layer
	4	Only for Information Devices / Tip & Ring
	7	Only for Camera Flash Circuit
GQ	M	High Frequency for Flow/Reflow Soldering
GM	A	Monolithic Microchip
	D	For Bonding
GN	M	Capacitor Array
LL	L	Low ESL Type
	R	Controlled ESR Low ESL Type
	A	8-termination Low ESL Type
	M	10-termination Low ESL Type
GJ	M	High Frequency Low Loss Type
GA	2	For AC250V (r.m.s.)
	3	Safety Standard Certified Type

③ Dimensions (L×W)


Code	Dimensions (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
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) (Except GNM)

Code	Dimension (T)
2	0.2mm
3	0.3mm
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.

④ Elements (GNM Only)

Code	Elements
2	2-elements
4	4-elements

Continued on the following page. 

Continued from the preceding page.

5 Temperature Characteristics

Temperature Characteristic Codes			Temperature Characteristics			Operating Temperature Range
Code	Public STD Code	Reference 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	COG *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	COH *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 *6	-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	*3	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
W0	-	-	25°C	-55 to 125°C	±10% *4	-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 Murata Temperature Characteristic Code.

*4 Apply DC350V bias.

*5 No DC bias.

*6 Rated Voltage 100Vdc max : 25 to 85°C

Continued on the following page. 

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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


⑥ Rated Voltage

Code	Rated Voltage
0E	DC2.5V
0G	DC4V
0J	DC6.3V
1A	DC10V
1C	DC16V
1E	DC25V
YA	DC35V
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
GC	X1/Y2; AC250V (Safety Standard Certified Type GC)
GF	Y2, X1/Y2; AC250V (Safety Standard Certified Type GF)
GD	Y3; AC250V (Safety Standard Certified Type GD)
GB	X2; AC250V (Safety Standard Certified Type GB)

⑦ Capacitance

Expressed by three-digit alphanumerics. The unit is picofarad (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

Continued on the following page. 

Please check the MURATA home page (<http://www.murata.com/>) if you cannot find the part number in the catalog.

Continued from the preceding page.

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
C	±0.25pF	CΔ	GRM/GJM	≤9.9pF	0.1pF
		except CΔ	GRM	≤5pF	* 1pF
		CΔ	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	GQM	5.1 to 9.9pF	1pF Step and E24 Series
G	±2%	CΔ	GJM	≥10pF	E12 Series
		CΔ	GQM	≥10pF	E24 Series
J	±5%	CΔ, SL, U2J	GRM/GA3	≥10pF	E12 Series
		CΔ	GQM/GJM	≥10pF	E24 Series
K	±10%	B, R, X7R, X5R, ZLM	GRJ/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/LLR/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 (Except LLR)

Expressed by three figures.

⑨ ESR (LLR Only)

Code	ESR
E01	100mΩ
E03	220mΩ
E05	470mΩ
E07	1000mΩ

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 the MURATA home page (<http://www.murata.com/>) if you cannot find the part number in the catalog.

Chip Monolithic Ceramic Capacitors



Capacitor Array GNM Series

■ Features

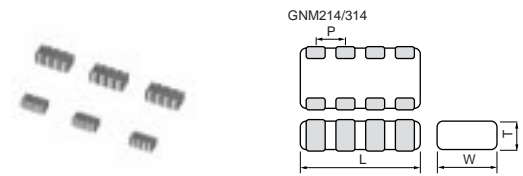
1. High density mounting due to mounting space saving
2. Mounting cost saving

■ Applications

General electronic equipment



Part Number	Dimensions (mm)			
	L	W	T	P
GNM0M2	0.9 ±0.05	0.6 ±0.05	0.45 ±0.05	0.45 ±0.05
GNM1M2	1.37 ±0.15	1.0 ±0.15	0.5 +0.05/-0.10	0.64 ±0.05
			0.6 ±0.1	
			0.8 +0/-0.15	
GNM212	2.0 ±0.15	1.25 ±0.15	0.6 ±0.1	1.0 ±0.1
			0.85 ±0.1	
			0.85 ±0.1	



Part Number	Dimensions (mm)			
	L	W	T	P
GNM214	2.0 ±0.15	1.25 ±0.15	0.5 +0.05/-0.1	0.5 ±0.05
			0.6 ±0.1	
			0.85 ±0.1	
GNM314	3.2 ±0.15	1.6 ±0.15	0.8 ±0.1	0.8 ±0.1
			0.85 ±0.1	
			1.0 ±0.1	
			1.15 ±0.1	

For General
GRM Series

Array
GNM Series

Low ESL
LL□ Series

High-Q
GJM Series

High Frequency
GQM Series

Monolithic Microchip
GMA Series

For Bonding
GMD Series

Product Information

Capacitance Table

Temperature Compensating Type C0G(5C) Characteristics

0.6		ex.0.6: T Dimension [mm]			
Capacitance	LxW [mm]	1.37x1.0 (1M) <0504>	2.0x1.25 (21) <0805>	3.2x1.6 (31) <1206>	
	Number of Elements	2(2)		4(4)	
	Rated Voltage [Vdc]	50 (1H)	50 (1H)	100 (2A)	50 (1H)
	10pF(100)	0.6	0.6	0.8	0.8
	15pF(150)	0.6	0.6	0.8	0.8
	22pF(220)	0.6	0.6	0.8	0.8
	33pF(330)	0.6	0.6	0.8	0.8
	47pF(470)	0.6	0.6	0.8	0.8
	68pF(680)	0.6	0.6	0.8	0.8
	100pF(101)	0.6	0.6	0.8	0.8
	150pF(151)	0.6	0.6	0.8	0.8
	220pF(221)	0.6	0.6		0.8
	330pF(331)				0.8

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

High Dielectric Constant Type X7R(R7)/X7S(C7) Characteristics

0.6		ex.0.6: T Dimension [mm]											
Capacitance	LxW [mm]	1.37x1.0 (1M) <0504>				2.0x1.25 (21) <0805>				3.2x1.6 (31) <1206>			
	Number of Elements	2(2)				4(4)							
	Rated Voltage [Vdc]	50 (1H)	25 (1E)	16 (1C)	10 (1A)	50 (1H)	25 (1E)	16 (1C)	50 (1H)	25 (1E)	16 (1C)	6.3 (0J)	
	470pF(471)					0.6							
	1000pF(102)	0.6				0.6							
	2200pF(222)		0.6				0.6						
	4700pF(472)		0.6				0.6						
	10000pF(103)		0.6				0.6						
	22000pF(223)			0.6	0.6			0.85					
	47000pF(473)			0.6	0.6			0.85	0.85		1.0		
	0.10μF(104)			0.6	0.6			0.85	0.85	0.85	1.0		
	1.0μF(105)											1.15	

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

High Dielectric Constant Type X7R(R7) Characteristics-Low Profile

0.5		ex.0.5: T Dimension [mm]	
Capacitance	LxW [mm]	1.37x1.0 (1M) <0504>	2.0x1.25 (21) <0805>
	Number of Elements	2(2)	4(4)
	Rated Voltage [Vdc]	16 (1C)	16 (1C)
	0.10μF(104)	0.5	0.5

The part number code is shown in () and Unit is shown in [].
< >: EIA [inch] Code

For General GRM Series

Array GNM Series

Low ESL LL□ Series

High-Q GJM Series

High Frequency GOM Series

Monolithic Microchip GMA Series

For Bonding GMD Series

Product Information

Capacitance Table

High Dielectric Constant Type X5R(R6) Characteristics

0.6 ex.0.6: T Dimension [mm]		0.9x0.6 (0M) <0302>				1.37x1.0 (1M) <0504>				2.0x1.25 (21) <0805>			2.0x1.25 (21) <0805>		3.2x1.6 (31) <1206>					
LxW [mm]																				
Number of Elements		2(2)										4(4)								
Rated Voltage [Vdc]		16 (1C)	10 (1A)	6.3 (0J)	4 (0G)	50 (1H)	25 (1E)	16 (1C)	10 (1A)	6.3 (0J)	16 (1C)	10 (1A)	6.3 (0J)	10 (1A)	6.3 (0J)	16 (1C)	10 (1A)			
Capacitance																				
1000pF(102)						0.6														
2200pF(222)						0.6														
4700pF(472)						0.6														
10000pF(103)		0.45							0.6											
22000pF(223)		0.45							0.6		0.6									
47000pF(473)		0.45							0.6		0.6									
0.10μF(104)		0.45									0.6									
0.22μF(224)										0.8										
0.47μF(474)										0.85										
1.0μF(105)					0.45						0.8		0.8		0.8		0.85		0.85	
2.2μF(225)										0.8		0.8				0.85				

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

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

0.5 ex.0.5: T Dimension [mm]		1.37x1.0 (1M) <0504>		2.0x1.25 (21) <0805>
LxW [mm]				
Number of Elements		2(2)		4(4)
Rated Voltage [Vdc]		16 (1C)	10 (1A)	10 (1A)
Capacitance				
1.0μF(105)		0.5	0.5	0.5

The part number code is shown in () and Unit is shown in [].
< >: EIA [inch] Code

For General
GRM Series

Array
GNM Series

Low ESL
LL□ Series

High-Q
GJM Series

High Frequency
GQM Series

Monolithic Microchip
GMA Series

For Bonding
GMD Series

Product Information

Temperature Compensating Type C0G(5C) Characteristics

LxW [mm]		1.37x1.0(1M)<0504>		2.0x1.25(21)<0805>		3.2x1.6(31)<1206>			
Number of Elements		2(2)		4(4)					
Rated Volt. [Vdc]		50(1H)		50(1H)		100(2A)		50(1H)	
Capacitance	Tolerance	Part Number							
10pF(100)	±10%(K)	GNM1M25C1H100KD01D	GNM2145C1H100KD01D	GNM3145C2A100KD01D	GNM3145C1H100KD01D				
15pF(150)	±10%(K)	GNM1M25C1H150KD01D	GNM2145C1H150KD01D	GNM3145C2A150KD01D	GNM3145C1H150KD01D				
22pF(220)	±10%(K)	GNM1M25C1H220KD01D	GNM2145C1H220KD01D	GNM3145C2A220KD01D	GNM3145C1H220KD01D				
33pF(330)	±10%(K)	GNM1M25C1H330KD01D	GNM2145C1H330KD01D	GNM3145C2A330KD01D	GNM3145C1H330KD01D				
47pF(470)	±10%(K)	GNM1M25C1H470KD01D	GNM2145C1H470KD01D	GNM3145C2A470KD01D	GNM3145C1H470KD01D				
68pF(680)	±10%(K)	GNM1M25C1H680KD01D	GNM2145C1H680KD01D	GNM3145C2A680KD01D	GNM3145C1H680KD01D				
100pF(101)	±10%(K)	GNM1M25C1H101KD01D	GNM2145C1H101KD01D	GNM3145C2A101KD01D	GNM3145C1H101KD01D				
150pF(151)	±10%(K)	GNM1M25C1H151KD01D	GNM2145C1H151KD01D	GNM3145C2A151KD01D	GNM3145C1H151KD01D				
220pF(221)	±10%(K)	GNM1M25C1H221KD01D	GNM2145C1H221KD01D		GNM3145C1H221KD01D				
330pF(331)	±10%(K)				GNM3145C1H331KD01D				

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

High Dielectric Constant Type X7R(R7)/X7S(C7) Characteristics

LxW [mm]		1.37x1.0(1M)<0504>							
Number of Elements		2(2)							
Rated Volt. [Vdc]		50(1H)		25(1E)		16(1C)		10(1A)	
Capacitance	Tolerance	Part Number							
1000pF(102)	±20%(M)	GNM1M2R71H102MA01D							
2200pF(222)	±20%(M)			GNM1M2R71E222MA01D					
4700pF(472)	±20%(M)			GNM1M2R71E472MA01D					
10000pF(103)	±20%(M)			GNM1M2R71E103MA01D					
22000pF(223)	±20%(M)					GNM1M2R71C223MA01D		GNM1M2R71A223MA01D	
47000pF(473)	±20%(M)					GNM1M2R71C473MA01D		GNM1M2R71A473MA01D	
0.10μF(104)	±20%(M)					GNM1M2R71C104MA01D		GNM1M2C71A104MA01D	

LxW [mm]		2.0x1.25(21)<0805>							
Number of Elements		4(4)							
Rated Volt. [Vdc]		50(1H)		25(1E)		16(1C)			
Capacitance	Tolerance	Part Number							
470pF(471)	±20%(M)	GNM214R71H471MA01D							
1000pF(102)	±20%(M)	GNM214R71H102MA01D							
2200pF(222)	±20%(M)			GNM214R71E222MA01D					
4700pF(472)	±20%(M)			GNM214R71E472MA01D					
10000pF(103)	±20%(M)			GNM214R71E103MA01D					
22000pF(223)	±20%(M)					GNM214R71C223MA01D			
47000pF(473)	±20%(M)					GNM214R71C473MA01D			
0.10μF(104)	±20%(M)					GNM214R71C104MA01D			

LxW [mm]		3.2x1.6(31)<1206>							
Number of Elements		4(4)							
Rated Volt. [Vdc]		50(1H)		25(1E)		16(1C)		6.3(0J)	
Capacitance	Tolerance	Part Number							
47000pF(473)	±20%(M)	GNM314R71H473MA11D				GNM314R71C473MA01L			
0.10μF(104)	±20%(M)	GNM314R71H104MA11D		GNM314R71E104MA11D		GNM314R71C104MA01L			
1.0μF(105)	±20%(M)							GNM314R70J105MA01L	

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

* Please refer to GNM series Specifications and Test Method (2).

(Part Number) **GN** **M** **1M** **2** **5C** **1H** **100** **K** **D01** **D** ①Product ID ②Series ③Dimensions (LxW) ④Number of Elements
 ⑤Temperature Characteristics ⑥Rated Voltage ⑦Capacitance
 ⑧Capacitance Tolerance ⑨Individual Specification Code ⑩Packaging

Packaging Code in Part Number shows STD 180mm Reel Taping.

For General GRM Series

High Dielectric Constant Type X7R(R7) Characteristics-Low Profile

LxW [mm]	1.37x1.0(1M)<0504>		2.0x1.25(21)<0805>	
Number of Elements	2(2)		4(4)	
Rated Volt. [Vdc]	16(1C)		16(1C)	
Capacitance	Tolerance	Part Number		
0.10μF(104)	±20%(M)	GNM1M2R71C104MAA1D	GNM214R71C104MAA1D	

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

Array GNM Series

High Dielectric Constant Type X5R(R6) Characteristics

LxW [mm]	0.9x0.6(0M)<0302>			
Number of Elements	2(2)			
Rated Volt. [Vdc]	16(1C)	10(1A)	6.3(0J)	4(0G)
Capacitance	Tolerance	Part Number		
10000pF(103)	±20%(M)	GNM0M2R61C103ME18D*	GNM0M2R61A103ME17D*	GNM0M2R60J103ME17D*
22000pF(223)	±20%(M)	GNM0M2R61C223ME18D*	GNM0M2R61A223ME17D*	GNM0M2R60J223ME17D*
47000pF(473)	±20%(M)	GNM0M2R61C473ME18D*	GNM0M2R61A473ME17D*	GNM0M2R60J473ME17D*
0.10μF(104)	±20%(M)	GNM0M2R61C104ME18D*	GNM0M2R61A104ME17D*	GNM0M2R60J104ME17D*
1.0μF(105)	±20%(M)			GNM0M2R60G105ME17D*

Low ESL LL□ Series

High-Q GJM Series

LxW [mm]	1.37x1.0(1M)<0504>		
Number of Elements	2(2)		
Rated Volt. [Vdc]	50(1H)	25(1E)	16(1C)
Capacitance	Tolerance	Part Number	
1000pF(102)	±20%(M)	GNM1M2R61H102MA01D	
2200pF(222)	±20%(M)		GNM1M2R61E222MA01D
4700pF(472)	±20%(M)		GNM1M2R61E472MA01D
10000pF(103)	±20%(M)		GNM1M2R61E103MA01D
22000pF(223)	±20%(M)		GNM1M2R61C223MA01D
47000pF(473)	±20%(M)		GNM1M2R61C473MA01D
0.22μF(224)	±20%(M)		GNM1M2R61C224ME18D*
1.0μF(105)	±20%(M)		GNM1M2R61C105ME18D*

High Frequency GQM Series

Monolithic Microchip GMA Series

LxW [mm]	1.37x1.0(1M)<0504>	
Number of Elements	2(2)	
Rated Volt. [Vdc]	10(1A)	6.3(0J)
Capacitance	Tolerance	Part Number
22000pF(223)	±20%(M)	GNM1M2R61A223MA01D
47000pF(473)	±20%(M)	GNM1M2R61A473MA01D
0.10μF(104)	±20%(M)	GNM1M2R61A104MA01D
1.0μF(105)	±20%(M)	GNM1M2R61A105ME17D* GNM1M2R60J105ME12D*
2.2μF(225)	±20%(M)	GNM1M2R61A225ME18D* GNM1M2R60J225ME18D*

For Bonding GMD Series

LxW [mm]	2.0x1.25(21)<0805>		
Number of Elements	2(2)		
Rated Volt. [Vdc]	16(1C)	10(1A)	6.3(0J)
Capacitance	Tolerance	Part Number	
0.47μF(474)	±20%(M)	GNM212R61C474MA16D	
1.0μF(105)	±20%(M)	GNM212R61C105MA16D	GNM212R61A105MA13D
2.2μF(225)	±20%(M)		GNM212R61A225ME16D* GNM212R60J225ME16D*

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

* Please refer to GNM series Specifications and Test Method (2).

Product Information

- (Part Number) **GN** **M** **1M** **2** **R7** **1C** **104** **M** **AA1** **D**
- ① Product ID
 - ② Series
 - ③ Dimensions (LxW)
 - ④ Number of Elements
 - ⑤ Temperature Characteristics
 - ⑥ Rated Voltage
 - ⑦ Capacitance
 - ⑧ Capacitance Tolerance
 - ⑨ Individual Specification Code
 - ⑩ Packaging

Packaging Code in Part Number shows STD 180mm Reel Taping.



High Dielectric Constant Type X5R(R6) Characteristics

LxW [mm]		2.0x1.25(21)<0805>	
Number of Elements		4(4)	
Rated Volt. [Vdc]		10(1A)	6.3(0J)
Capacitance	Tolerance	Part Number	
1.0μF(105)	±20%(M)	GNM214R61A105ME17D*	GNM214R60J105ME17D*
2.2μF(225)	±20%(M)		GNM214R60J225ME18D*

LxW [mm]		3.2x1.6(31)<1206>	
Number of Elements		4(4)	
Rated Volt. [Vdc]		16(1C)	10(1A)
Capacitance	Tolerance	Part Number	
1.0μF(105)	±20%(M)	GNM314R61C105MA15D	GNM314R61A105MA13D

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

* Please refer to GNM series Specifications and Test Method (2).

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

LxW [mm]		1.37x1.0(1M)<0504>	2.0x1.25(21)<0805>
Number of Elements		2(2)	4(4)
Rated Volt. [Vdc]		16(1C)	10(1A)
Capacitance	Tolerance	Part Number	
1.0μF(105)	±20%(M)	GNM1M2R61C105MEA2D*	GNM1M2R61A105MEA4D* GNM214R61A105MEA2D*

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

* Please refer to GNM series Specifications and Test Method (2).

For General
GRM Series

Array
GNM Series

Low ESL
LL□ Series

High-Q
GJM Series

High Frequency
GOM Series

Monolithic Microchip
GMA Series

For Bonding
GMD Series

Product Information

GNM Series Specifications and Test Methods (1)

When no "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (1).
 When "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (2).

No.	Item	Specifications		Test Method																									
		Temperature Compensating Type	High Dielectric Type																										
1	Operating Temperature Range	5C: -55 to +125°C	R7, C7: -55 to +125°C R6: -55 to +85°C																										
2	Rated Voltage	See the previous pages.		The rated voltage is defined as the maximum voltage that 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 300% of the rated voltage (5C) or 250% of the rated voltage (R7) is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA.																									
6	Insulation Resistance	More than 10,000MΩ or 500Ω · F (whichever is smaller)		The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at 25°C and 75%RH max. and within 2 minutes of charging.																									
7	Capacitance	Within the specified tolerance		The capacitance/Q/D.F. should be measured at 25°C at the frequency and voltage shown in the table.																									
8	Q/ Dissipation Factor (D.F.)	30pF min.: $Q \geq 1000$ 30pF max.: $Q \geq 400+20C$ C: Nominal Capacitance (pF)	<table border="1"> <thead> <tr> <th>Char.</th> <th>25V min.</th> <th>16V</th> <th>10V</th> <th>6.3V</th> </tr> </thead> <tbody> <tr> <td>R7, R6, C7</td> <td>0.025 max.</td> <td>0.035 max.</td> <td>0.035 max.</td> <td>0.05 max.</td> </tr> </tbody> </table>	Char.	25V min.	16V	10V	6.3V	R7, R6, C7	0.025 max.	0.035 max.	0.035 max.	0.05 max.	<table border="1"> <thead> <tr> <th>Char.</th> <th>5C</th> <th>R7</th> </tr> </thead> <tbody> <tr> <td>Item</td> <td></td> <td></td> </tr> <tr> <td>Frequency</td> <td>1±0.1MHz</td> <td>1±0.1kHz</td> </tr> <tr> <td>Voltage</td> <td>0.5 to 5Vrms</td> <td>1.0±0.2Vrms</td> </tr> </tbody> </table>	Char.	5C	R7	Item			Frequency	1±0.1MHz	1±0.1kHz	Voltage	0.5 to 5Vrms	1.0±0.2Vrms			
			Char.	25V min.	16V	10V	6.3V																						
R7, R6, C7	0.025 max.	0.035 max.	0.035 max.	0.05 max.																									
Char.	5C	R7																											
Item																													
Frequency	1±0.1MHz	1±0.1kHz																											
Voltage	0.5 to 5Vrms	1.0±0.2Vrms																											
9	Capacitance Temperature Characteristics	Within the specified tolerance (Table A)	<table border="1"> <thead> <tr> <th>Char.</th> <th>Temp. Range</th> <th>Reference Temp.</th> <th>Cap. Change</th> </tr> </thead> <tbody> <tr> <td>R7</td> <td>-55°C to +125°C</td> <td rowspan="3">25°C</td> <td rowspan="2">Within ±15%</td> </tr> <tr> <td>R6</td> <td>-55°C to +85°C</td> </tr> <tr> <td>C7</td> <td>-55°C to +125°C</td> <td>Within ±22%</td> </tr> </tbody> </table>	Char.	Temp. Range	Reference Temp.	Cap. Change	R7	-55°C to +125°C	25°C	Within ±15%	R6	-55°C to +85°C	C7	-55°C to +125°C	Within ±22%	<p>The capacitance change should be measured after 5 min. at each specified temperature stage.</p> <p>(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 steps 1 through 5, the capacitance should be within the specified tolerance for the temperature coefficient and capacitance change as in Table A. The capacitance drift is calculated by dividing the differences between the maximum and minimum measured values in the steps 1, 3 and 5 by the cap. value in step 3.</p> <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>25±2</td> </tr> <tr> <td>2</td> <td>-55±3 (for 5C/R7/C7), -30±3 (for F5)</td> </tr> <tr> <td>3</td> <td>25±2</td> </tr> <tr> <td>4</td> <td>125±3 (for 5C/R7/C7), 85±3 (for F5)</td> </tr> <tr> <td>5</td> <td>25±2</td> </tr> </tbody> </table> <p>(2) High Dielectric Constant Type The ranges of capacitance change compared with the above 25°C value over the temperature ranges shown in the table should be within the specified ranges.</p> <ul style="list-style-type: none"> 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. 	Step	Temperature (°C)	1	25±2	2	-55±3 (for 5C/R7/C7), -30±3 (for F5)	3	25±2	4	125±3 (for 5C/R7/C7), 85±3 (for F5)	5	25±2
			Char.	Temp. Range	Reference Temp.	Cap. Change																							
			R7	-55°C to +125°C	25°C	Within ±15%																							
R6	-55°C to +85°C																												
C7	-55°C to +125°C	Within ±22%																											
Step	Temperature (°C)																												
1	25±2																												
2	-55±3 (for 5C/R7/C7), -30±3 (for F5)																												
3	25±2																												
4	125±3 (for 5C/R7/C7), 85±3 (for F5)																												
5	25±2																												
Capacitance Change	Within the specified tolerance (Table A)																												
Temperature Coefficient	Within the specified tolerance (Table A)																												
Capacitance Drift	Within ±0.2% or ±0.05pF (whichever is larger.)																												
10	Adhesive Strength of Termination	No removal of the terminations or other defect should occur.		<p>Solder the capacitor to the test jig (glass epoxy board) shown in Fig.1 using a eutectic solder. Then apply 5N force in parallel with the test jig for 10±1 sec.</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> <table border="1"> <thead> <tr> <th>Type</th> <th>a</th> <th>b</th> <th>c</th> <th>d</th> </tr> </thead> <tbody> <tr> <td>GNM1M2</td> <td>0.5</td> <td>1.6</td> <td>0.32</td> <td>0.32</td> </tr> <tr> <td>GNM212</td> <td>0.6</td> <td>1.8</td> <td>0.5</td> <td>0.5</td> </tr> <tr> <td>GNM214</td> <td>0.6</td> <td>2.0</td> <td>0.25</td> <td>0.25</td> </tr> <tr> <td>GNM314</td> <td>0.8</td> <td>2.5</td> <td>0.4</td> <td>0.4</td> </tr> </tbody> </table> <p>(in mm)</p>	Type	a	b	c	d	GNM1M2	0.5	1.6	0.32	0.32	GNM212	0.6	1.8	0.5	0.5	GNM214	0.6	2.0	0.25	0.25	GNM314	0.8	2.5	0.4	0.4
Type	a	b	c	d																									
GNM1M2	0.5	1.6	0.32	0.32																									
GNM212	0.6	1.8	0.5	0.5																									
GNM214	0.6	2.0	0.25	0.25																									
GNM314	0.8	2.5	0.4	0.4																									

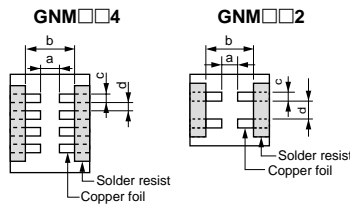


Fig. 1

Continued on the following page.

For General GRM Series

Array GNM Series

Low ESL LL□ Series

High-Q GJM Series

High Frequency GQM Series

Monolithic Microchip GMA Series

For Bonding GMD Series

Product Information

GNM Series Specifications and Test Methods (1)

Continued from the preceding page.

When no "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (1).
 When "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (2).

No.	Item	Specifications				Test Method																									
		Temperature Compensating Type	High Dielectric Type																												
11	Vibration Resistance	Appearance	No defects or abnormalities			Solder the capacitor to the test jig (glass epoxy board) in the same manner and under the same conditions as (10). The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should be applied for a period of 2 hours in each of 3 mutually perpendicular directions (total of 6 hours).																									
		Capacitance	Within the specified tolerance																												
Q/D.F.	30pF min.: $Q \geq 1000$ 30pF max.: $Q \geq 400+20C$ C: Nominal Capacitance (pF)	Char.	25V min.	16V	10V		6.3V																								
		R7, R6, C7	0.025 max.	0.035 max.	0.035 max.		0.05 max.																								
12	Deflection	Appearance	No marking defects			Solder the capacitor on the test jig (glass epoxy board) shown in Fig. 2 using a eutectic solder. Then apply a force in the direction shown in Fig. 3 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.																									
		Capacitance Change	Within $\pm 5\%$ or $\pm 0.5\text{pF}$ (whichever is larger)	Within $\pm 10\%$																											
		<table border="1" style="margin: 10px auto;"> <thead> <tr> <th>Type</th> <th>a</th> <th>b</th> <th>c</th> <th>d</th> </tr> </thead> <tbody> <tr> <td>GNM1M2</td> <td>2.0±0.05</td> <td>0.5±0.05</td> <td>0.32±0.05</td> <td>0.32±0.05</td> </tr> <tr> <td>GNM212</td> <td>2.0±0.05</td> <td>0.6±0.05</td> <td>0.5±0.05</td> <td>0.5±0.05</td> </tr> <tr> <td>GNM214</td> <td>2.0±0.05</td> <td>0.7±0.05</td> <td>0.3±0.05</td> <td>0.2±0.05</td> </tr> <tr> <td>GNM314</td> <td>2.5±0.05</td> <td>0.8±0.05</td> <td>0.4±0.05</td> <td>0.4±0.05</td> </tr> </tbody> </table> <p style="text-align: center;">(in mm)</p>					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
		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																											
<p style="text-align: center;">Fig. 3</p>																															
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 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 $245 \pm 5^\circ\text{C}$.																										
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 a eutectic solder or Sn-3.0Ag-0.5Cu solder solution at $270 \pm 5^\circ\text{C}$ for 10 ± 0.5 seconds. Let sit at room temperature for 24 ± 2 hours, then measure. • Initial measurement for high dielectric constant type Perform a heat treatment at $150+0/-10^\circ\text{C}$ for one hour and then let sit for 24 ± 2 hours at room temperature. Perform the initial measurement.																									
	Appearance	No marking defects																													
	Capacitance Change	Within $\pm 2.5\%$ or $\pm 0.25\text{pF}$ (whichever is larger)	R7, R6, C7: Within $\pm 7.5\%$																												
	Q/D.F.	30pF min.: $Q \geq 1000$ 30pF max.: $Q \geq 400+20C$ C: Nominal Capacitance (pF)	Char.	25V min.	16V		10V	6.3V																							
			R7, R6, C7	0.025 max.	0.035 max.		0.035 max.	0.05 max.																							
I.R.	More than $10,000\text{M}\Omega$ or $500\Omega \cdot \text{F}$ (whichever is smaller)																														
Dielectric Strength	No failure																														

Continued on the following page.

For General GRM Series

Array GNM Series

Low ESL LL□ Series

High-Q GJM Series

High Frequency GQM Series

Monolithic Microchip GMA Series

For Bonding GMD Series

Product Information

GNM Series Specifications and Test Methods (1)

Continued from the preceding page.

When no "***" is added in PNs table, please refer to GNM Series Specifications and Test Methods (1).
 When "***" is added in PNs table, please refer to GNM Series Specifications and Test Methods (2).

No.	Item	Specifications				Test Method															
		Temperature Compensating Type	High Dielectric Type																		
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 listed in the following table. Let sit for 24±2 hours (temperature compensating type) or 48±4 hours (high dielectric constant type) at room temperature, then measure. <table border="1" style="margin-top: 10px;"> <thead> <tr> <th>Step</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> </tr> </thead> <tbody> <tr> <td>Temp. (°C)</td> <td>Min. Operating Temp. +0/-3</td> <td>Room Temp.</td> <td>Max. Operating Temp. +3/-0</td> <td>Room Temp.</td> </tr> <tr> <td>Time (min.)</td> <td>30±3</td> <td>2 to 3</td> <td>30±3</td> <td>2 to 3</td> </tr> </tbody> </table> <ul style="list-style-type: none"> • 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. 	Step	1	2	3	4	Temp. (°C)	Min. Operating Temp. +0/-3	Room Temp.	Max. Operating Temp. +3/-0	Room Temp.	Time (min.)	30±3	2 to 3	30±3	2 to 3
	Step	1	2	3	4																
	Temp. (°C)	Min. Operating Temp. +0/-3	Room Temp.	Max. Operating Temp. +3/-0	Room Temp.																
	Time (min.)	30±3	2 to 3	30±3	2 to 3																
	Appearance	No marking defects																			
	Capacitance Change	Within ±2.5% or ±0.25pF (whichever is larger)	R7, R6, C7: Within ±7.5%																		
Q/D.F.	30pF min.: Q≥1000 30pF max.: Q≥400+20C C: Nominal Capacitance (pF)	<table border="1" style="font-size: small;"> <thead> <tr> <th>Char.</th> <th>25V min.</th> <th>16V</th> <th>10V</th> <th>6.3V</th> </tr> </thead> <tbody> <tr> <td>R7, R6, C7</td> <td>0.025 max.</td> <td>0.035 max.</td> <td>0.035 max.</td> <td>0.05 max.</td> </tr> </tbody> </table>	Char.	25V min.	16V	10V	6.3V	R7, R6, C7	0.025 max.	0.035 max.	0.035 max.	0.05 max.									
Char.	25V min.	16V	10V	6.3V																	
R7, R6, C7	0.025 max.	0.035 max.	0.035 max.	0.05 max.																	
I.R.	More than 10,000MΩ or 500Ω · F (whichever is smaller)																				
Dielectric Strength	No failure																				
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 90 to 95% humidity for 500±12 hours. Remove and let sit for 24±2 hours at room temperature, then measure.															
	Appearance	No marking defects																			
	Capacitance Change	Within ±5% or ±0.5pF (whichever is larger)	R7, R6, C7: Within ±12.5%																		
	Q/D.F.	30pF and over: Q≥350 10pF and over, 30pF and below: Q≥275+5C/2 10pF and below: Q≥200+10C C: Nominal Capacitance (pF)	<table border="1" style="font-size: small;"> <thead> <tr> <th>Char.</th> <th>25V min.</th> <th>16V</th> <th>10V/6.3V</th> </tr> </thead> <tbody> <tr> <td>R7, R6, C7</td> <td>0.05 max.</td> <td>0.05 max.</td> <td>0.05 max.</td> </tr> </tbody> </table>	Char.	25V min.		16V	10V/6.3V	R7, R6, C7	0.05 max.	0.05 max.	0.05 max.									
	Char.	25V min.	16V	10V/6.3V																	
R7, R6, C7	0.05 max.	0.05 max.	0.05 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 let sit for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA.															
	Appearance	No marking defects																			
	Capacitance Change	Within ±7.5% or ±0.75pF (whichever is larger)	R7, R6, C7: Within ±12.5%																		
	Q/D.F.	30pF and over: Q≥200 30pF and below: Q≥100+10C/3 C: Nominal Capacitance (pF)	<table border="1" style="font-size: small;"> <thead> <tr> <th>Char.</th> <th>25V min.</th> <th>16V</th> <th>10V/6.3V</th> </tr> </thead> <tbody> <tr> <td>R7, R6, C7</td> <td>0.05 max.</td> <td>0.05 max.</td> <td>0.05 max.</td> </tr> </tbody> </table>	Char.	25V min.		16V	10V/6.3V	R7, R6, C7	0.05 max.	0.05 max.	0.05 max.									
	Char.	25V min.	16V	10V/6.3V																	
R7, R6, C7	0.05 max.	0.05 max.	0.05 max.																		
I.R.	More than 500MΩ or 25Ω · F (whichever is smaller)																				

Continued on the following page.

For General GRM Series

Array GNM Series

Low ESL LL□ Series

High-Q GJM Series

High Frequency GQM Series

Monolithic Microchip GMA Series

For Bonding GMD Series

Product Information

GNM Series Specifications and Test Methods (1)

Continued from the preceding page.

**When no "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (1).
 When "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (2).**

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% 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 for high dielectric constant type. Apply 200% of the rated DC voltage for one hour at the maximum operating temperature ±3°C. Remove and let sit for 24±2 hours at room temperature. Perform initial measurement.								
	Appearance	No marking defects												
	Capacitance Change	Within ±3% or ±0.3pF (whichever is larger)	R7, R6, C7: Within ±12.5%											
	Q/D.F.	30pF and over: $Q \geq 350$ 10pF and over, 30pF and below: $Q \geq 275 + 5C/2$ 10pF and below: $Q \geq 200 + 10C$ C: Nominal Capacitance (pF)	<table border="1" style="font-size: small;"> <thead> <tr> <th>Char.</th> <th>25V min.</th> <th>16V</th> <th>10V/6.3V</th> </tr> </thead> <tbody> <tr> <td>R7, R6, C7</td> <td>0.04 max.</td> <td>0.05 max.</td> <td>0.05 max.</td> </tr> </tbody> </table>	Char.	25V min.		16V	10V/6.3V	R7, R6, C7	0.04 max.	0.05 max.	0.05 max.		
	Char.	25V min.	16V	10V/6.3V										
R7, R6, C7	0.04 max.	0.05 max.	0.05 max.											
I.R.	More than 1,000MΩ or 50Ω · F (whichever is smaller)													

Table A

Char.	Nominal Values (ppm/°C) *1	Capacitance Change from 25°C (%)					
		-55°C		-30°C		-10°C	
		Max.	Min.	Max.	Min.	Max.	Min.
5C	0±30	0.58	-0.24	0.40	-0.17	0.25	-0.11

*1: Nominal values denote the temperature coefficient within a range of 25 to 125°C.

For General GRM Series

Array GNM Series

Low ESL LL□ Series

High-Q GJM Series

High Frequency GOM Series

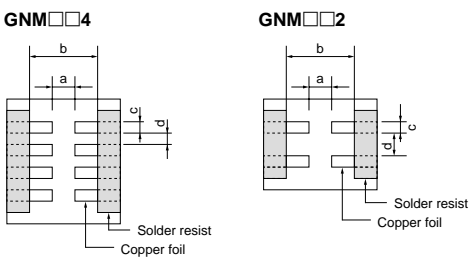
Monolithic Microchip GMA Series

For Bonding GMD Series

Product Information

GNM Series Specifications and Test Methods (2)

When no "***" is added in PNs table, please refer to GNM Series Specifications and Test Methods (1).
 When "***" is added in PNs table, please refer to GNM Series Specifications and Test Methods (2).

No.	Item	Specifications	Test Method																														
1	Operating Temperature Range	R6: -55°C to +85°C																															
2	Rated Voltage	See the previous pages.	The rated voltage is defined as the maximum voltage that 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 dimension	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	50Ω · F min.	The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at 25°C and 75%RH max. and within 1 minute of charging.																														
7	Capacitance	Within the specified tolerance	The capacitance/D.F. should be measured at 25°C at the frequency and voltage shown in the table. <table border="1"> <thead> <tr> <th>Nominal Capacitance</th> <th>Measuring Frequency</th> <th>Measuring Voltage</th> </tr> </thead> <tbody> <tr> <td>$C \leq 10\mu F$ *1 (10V min.)</td> <td>1±0.1kHz</td> <td>1.0±0.2Vrms</td> </tr> <tr> <td>$C \leq 10\mu F$ *2 (6.3V max.)</td> <td>1±0.1kHz</td> <td>0.5±0.1Vrms</td> </tr> <tr> <td>*1For items in Table1</td> <td>1±0.1kHz</td> <td>0.5±0.1Vrms</td> </tr> <tr> <td>*2For items in Table2</td> <td>1±0.1kHz</td> <td>1.0±0.1Vrms</td> </tr> </tbody> </table>	Nominal Capacitance	Measuring Frequency	Measuring Voltage	$C \leq 10\mu F$ *1 (10V min.)	1±0.1kHz	1.0±0.2Vrms	$C \leq 10\mu F$ *2 (6.3V max.)	1±0.1kHz	0.5±0.1Vrms	*1For items in Table1	1±0.1kHz	0.5±0.1Vrms	*2For items in Table2	1±0.1kHz	1.0±0.1Vrms															
Nominal Capacitance	Measuring Frequency	Measuring Voltage																															
$C \leq 10\mu F$ *1 (10V min.)	1±0.1kHz	1.0±0.2Vrms																															
$C \leq 10\mu F$ *2 (6.3V max.)	1±0.1kHz	0.5±0.1Vrms																															
*1For items in Table1	1±0.1kHz	0.5±0.1Vrms																															
*2For items in Table2	1±0.1kHz	1.0±0.1Vrms																															
8	Dissipation Factor (D.F.)	0.1 max.*3 <table border="1"> <caption>Table 3</caption> <thead> <tr> <th>GNM0M2 R6</th> <th>103/223/473/104</th> </tr> </thead> <tbody> <tr> <td>GNM1M2 R6</td> <td>0J 105/225</td> </tr> <tr> <td>GNM1M2 R6</td> <td>1A 105MEA4</td> </tr> <tr> <td>GNM1M2 R6</td> <td>1A 225</td> </tr> <tr> <td>GNM212 R6</td> <td>0J 225</td> </tr> <tr> <td>GNM212 R6</td> <td>1A 225</td> </tr> <tr> <td>GNM214 R6</td> <td>0J 225</td> </tr> </tbody> </table> *3 However 0.125 max. for Table 3 items.	GNM0M2 R6	103/223/473/104	GNM1M2 R6	0J 105/225	GNM1M2 R6	1A 105MEA4	GNM1M2 R6	1A 225	GNM212 R6	0J 225	GNM212 R6	1A 225	GNM214 R6	0J 225	<table border="1"> <caption>Table 1</caption> <thead> <tr> <th>GNM0M2 R6</th> <th>1A 104</th> </tr> </thead> <tbody> <tr> <td>GNM0M2 R6</td> <td>1C 104</td> </tr> <tr> <td>GNM1M2 R6</td> <td>1A 105/225</td> </tr> <tr> <td>GNM1M2 R6</td> <td>1C 224/105</td> </tr> </tbody> </table> <table border="1"> <caption>Table 2</caption> <thead> <tr> <th>GNM0M2 R6</th> <th>0J 103/223/473</th> </tr> </thead> <tbody> <tr> <td>GNM212 R6</td> <td>0J 225</td> </tr> <tr> <td>GNM214 R6</td> <td>0J 105</td> </tr> </tbody> </table>	GNM0M2 R6	1A 104	GNM0M2 R6	1C 104	GNM1M2 R6	1A 105/225	GNM1M2 R6	1C 224/105	GNM0M2 R6	0J 103/223/473	GNM212 R6	0J 225	GNM214 R6	0J 105		
GNM0M2 R6	103/223/473/104																																
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GNM212 R6	0J 225																																
GNM214 R6	0J 105																																
9	Capacitance Temperature Characteristics	<table border="1"> <thead> <tr> <th>Char.</th> <th>Temp. Range</th> <th>Reference Temp.</th> <th>Cap. Change</th> </tr> </thead> <tbody> <tr> <td>R6</td> <td>-55 to +85°C</td> <td>25°C</td> <td>Within ±15%</td> </tr> </tbody> </table>	Char.	Temp. Range	Reference Temp.	Cap. Change	R6	-55 to +85°C	25°C	Within ±15%	The capacitance change should be measured after 5 min. at each specified temperature stage. <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>25±2</td> </tr> <tr> <td>2</td> <td>-55±3</td> </tr> <tr> <td>3</td> <td>25±2</td> </tr> <tr> <td>4</td> <td>85±3</td> </tr> <tr> <td>5</td> <td>25±2</td> </tr> </tbody> </table> The ranges of capacitance change compared with the 25°C value over the temperature ranges shown in the table should be within the specified ranges. • 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.	Step	Temperature (°C)	1	25±2	2	-55±3	3	25±2	4	85±3	5	25±2										
Char.	Temp. Range	Reference Temp.	Cap. Change																														
R6	-55 to +85°C	25°C	Within ±15%																														
Step	Temperature (°C)																																
1	25±2																																
2	-55±3																																
3	25±2																																
4	85±3																																
5	25±2																																
10	Adhesive Strength of Termination	No removal of the terminations or other defects should occur. 	Solder the capacitor to the test jig (glass epoxy board) shown in Fig. 1 using a eutectic solder. Then apply 5N (GNM0M2: 2N) 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. <table border="1"> <thead> <tr> <th>Type</th> <th>a</th> <th>b</th> <th>c</th> <th>d</th> </tr> </thead> <tbody> <tr> <td>GNM0M2</td> <td>0.2</td> <td>0.96</td> <td>0.25</td> <td>0.2</td> </tr> <tr> <td>GNM1M2</td> <td>0.5</td> <td>1.6</td> <td>0.32</td> <td>0.32</td> </tr> <tr> <td>GNM212</td> <td>0.6</td> <td>1.8</td> <td>0.5</td> <td>0.5</td> </tr> <tr> <td>GNM214</td> <td>0.6</td> <td>2.0</td> <td>0.25</td> <td>0.25</td> </tr> <tr> <td>GNM314</td> <td>0.8</td> <td>2.5</td> <td>0.4</td> <td>0.4</td> </tr> </tbody> </table> (in mm)	Type	a	b	c	d	GNM0M2	0.2	0.96	0.25	0.2	GNM1M2	0.5	1.6	0.32	0.32	GNM212	0.6	1.8	0.5	0.5	GNM214	0.6	2.0	0.25	0.25	GNM314	0.8	2.5	0.4	0.4
Type	a	b	c	d																													
GNM0M2	0.2	0.96	0.25	0.2																													
GNM1M2	0.5	1.6	0.32	0.32																													
GNM212	0.6	1.8	0.5	0.5																													
GNM214	0.6	2.0	0.25	0.25																													
GNM314	0.8	2.5	0.4	0.4																													
11	Vibration	Appearance: No defects or abnormalities Capacitance: Within the specified tolerance D.F.: 0.1 max.*3 *3 However 0.125 max. for Table 3 items.	Solder the capacitor to the test jig (glass epoxy board) in the same manner and under the same conditions as (10). The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should be applied for a period of 2 hours in each of 3 mutually perpendicular directions (total of 6 hours).																														

Continued on the following page. 

GNM Series Specifications and Test Methods (2)

Continued from the preceding page.

When no "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (1).
 When "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (2).

No.	Item	Specifications	Test Method																														
12	Appearance	No marking defects	Solder the capacitor to the test jig (glass epoxy board) shown in Fig. 2 using a eutectic solder. Then apply a force in the direction shown in Fig. 3. The soldering should be done by the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.																														
	Capacitance Change	Within ±10%																															
	Deflection	<div style="text-align: center;"> <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <thead> <tr> <th>Type</th> <th>a</th> <th>b</th> <th>c</th> <th>d</th> </tr> </thead> <tbody> <tr> <td>GNM0M2</td> <td>2.0±0.05</td> <td>0.2±0.05</td> <td>0.2±0.05</td> <td>0.25±0.05</td> </tr> <tr> <td>GNM1M2</td> <td>2.0±0.05</td> <td>0.5±0.05</td> <td>0.32±0.05</td> <td>0.32±0.05</td> </tr> <tr> <td>GNM212</td> <td>2.0±0.05</td> <td>0.6±0.05</td> <td>0.5±0.05</td> <td>0.5±0.05</td> </tr> <tr> <td>GNM214</td> <td>2.0±0.05</td> <td>0.7±0.05</td> <td>0.3±0.05</td> <td>0.2±0.05</td> </tr> <tr> <td>GNM314</td> <td>2.5±0.05</td> <td>0.8±0.05</td> <td>0.4±0.05</td> <td>0.4±0.05</td> </tr> </tbody> </table> <p style="text-align: center;">(in mm)</p> </div>	Type	a	b	c	d	GNM0M2	2.0±0.05	0.2±0.05	0.2±0.05	0.25±0.05	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	<div style="text-align: center;"> </div> <p style="text-align: center;">Fig. 3</p>
Type	a	b	c	d																													
GNM0M2	2.0±0.05	0.2±0.05	0.2±0.05	0.25±0.05																													
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																													
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 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.																														
14	Appearance	No marking defects	Preheat the capacitor at 120 to 150°C for 1 minute. Immerse the capacitor in a eutectic solder or Sn-3.0Ag-0.5Cu solder solution at 270±5°C for 10±0.5 seconds. Let sit at room temperature for 24±2 hours, then measure. • 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.																														
	Capacitance Change	R6*: Within ±7.5% ** GNM0M2R60G105: Within +15/-7.5%																															
	D.F.	0.1 max. *3 *3 However 0.125 max. for Table 3 items.																															
	I.R.	50Ω · F min.																															
	Dielectric Strength	No failure																															
15	Appearance	No marking defects	Fix the capacitor to the supporting jig in the same manner and under the same conditions as (10). Perform the five cycles according to the four heat treatments listed in the following table. Let sit for 24±2 hours at room temperature, then measure.																														
	Capacitance Change	R6*: Within ±12.5% *5 GNM0M2R60G105, GNM0M2R60J103/223/473/104, GNM0M2R61A103/223/473/104, GNM0M2R61C103/223/473/104, GNM1M2R61A105: Within ±15%																															
	D.F.	0.1 max. *3 *3 However 0.125 max. for Table 3 items.																															
	I.R.	50Ω · F min.																															
	Dielectric Strength	No failure																															
16	Appearance	No marking defects	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	R6: Within ±12.5%																															
	D.F.	0.2 max.																															
	I.R.	12.5Ω · F min.																															
17	Appearance	No marking defects	Apply 150% (GNM1M2R61A225/1C105: 125% of the rated voltage) 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	R6: Within ±12.5%																															
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