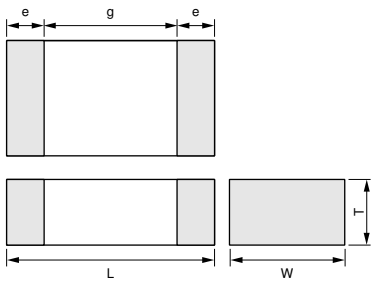
Data Sheet

Monolithic Ceramic Capacitors

GRM31MR71C225KA35□ (1206, X7R, 2.2µF, 16Vdc)

□: packaging code



(in mm)

■ Dimensions

Length L	3.20mm±0.20mm
Width W	1.60mm±0.20mm
Thickness T	1.15mm±0.15mm
Electrode e	0.30 to 0.80mm
Electrode Gap g (min.)	1.50mm

■ Rated Value

TC Code	**R7**
TC Code (Standard)	X7R (EIA)
Capacitance Change	±15%
Capacitance	2.2µF±10%
Rated Voltage	16Vdc

■ Packaging

Code	Packaging	Minimum Quantity
L	180mm Plastic Tape	3000
K	330mm Plastic Tape	10000
B	Bulk(Bag)	1000

■ Specifications

Please refer to 'Specification' PDF file.

● This data sheet is applied for CHIP MONOLITHIC CERAMIC CAPACITOR used for General Electronics equipment for your design.

<Notice>

● Solderability of Tin plating termination chip might be deteriorated when low temperature soldering profile where peak solder temperature is below the Tin melting point is used. Please confirm the solderability of Tin plating termination chip before use.

⚠Note:

1. Export Control
   〈For customers outside Japan〉
   Murata products should not be used or sold for use in the development, production, stockpiling or utilization of any conventional weapons or mass-destructive weapons (nuclear weapons, chemical or biological weapons, or missiles), or any other weapons.
   〈For customers in Japan〉
   For products which are controlled items subject to the “Foreign Exchange and Foreign Trade Law” of Japan, the export license specified by the law is required for export.
2. Please contact our sales representatives or product engineers before using the products in this data sheet for the applications listed below, which require especially high reliability for the prevention of defects which might directly damage to a third party's life, body or property, or when one of our products is intended for use in applications other than those specified in this data sheet.
   ① Aircraft equipment ② Aerospace equipment
   ③ Undersea equipment ④ Power plant equipment
   ⑤ Medical equipment ⑥ Transportation equipment (vehicles, trains, ships, etc.)
   ⑦ Traffic signal equipment ⑧ Disaster prevention / crime prevention equipment
   ⑨ Data-processing equipment ⑩ Application of similar complexity and/or reliability requirements to the applications listed in the above
3. They are subject to change or our products in it may be discontinued without advance notice. Please check with our sales representatives or product engineers before ordering. If there are any questions, please contact our sales representatives or product engineers.
4. This data sheet has only typical specifications because there is no space for detailed specifications. Therefore, please approve our product specifications or transact the approval sheet for product specifications before ordering. Especially, please read rating and ⚠CAUTION (for storage, operating, rating, soldering, mounting and handling) in them to prevent smoking and/or burning, etc.
5. You are able to read a detailed specification in the website of Search Engine (http://search.murata.co.jp/) or catalog library (http://www.murata.com/catalog/) before to require our product specification or to transact the approval sheet for product specification.
6. Please note that unless otherwise specified, we shall assume no responsibility whatsoever for any conflict or dispute that may occur in connection with the effect of our and/or a third party's intellectual property rights and other related rights in consideration of your use of our products and/or information described or contained in our data sheets. In this connection, no representation shall be made to the effect that any third parties are authorized to use the right mentioned above under licenses without our consent.
7. No ozone depleting substances (ODS) under the Montreal Protocol are used in our manufacturing process.

2004.9.6

● Part Numbering

Chip Monolithic Ceramic Capacitors

(Part Number)

GR	M	18	8	B1	1H	102	K	A01	K
❶	❷	❸	❹	❺	❻	❼	❽	❾	❿

❶Product ID

❷Series

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
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 Tin Plated Type
GA	2	for AC250V (r.m.s.)
	3	Safety Standard Recognized Type

❸Dimension (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
11	1.25×1.0mm	0504
15	1.0×0.5mm	0402
18	1.6×0.8mm	0603
1D	1.4×1.4mm	
1X	Depends on individual standards.	
21	2.0×1.25mm	0805
22	2.8×2.8mm	1111
31	3.2×1.6mm	1206
32	3.2×2.5mm	1210
3X	Depends on individual standards.	
42	4.5×2.0mm	1808
43	4.5×3.2mm	1812
52	5.7×2.8mm	2211
55	5.7×5.0mm	2220

❹Dimension (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
R	1.8mm
S	2.8mm
Q	1.5mm
X	Depends on individual standards.

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

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❺Temperature 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 85°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
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	*4	20°C	-25 to 20°C	-4700+100/-2500ppm/°C	-25 to 85°C
				20 to 85°C	-4700+500/-1000ppm/°C	
W0	-	-	25°C	-55 to 125°C	±10% *5	-55 to 125°C
					+22, -33% *6	

*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.
*5 Apply DC350V bias.
*6 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

ERB Series

Murata Code	Capacitance Change from 25°C (%)					
	−55°C		−30°C		−10°C	
	Max.	Min.	Max.	Min.	Max.	Min.
5C	0.43	−0.22	0.28	−0.16	0.17	−0.11

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❻Rated 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)

❼Capacitance

Expressed by three figures. 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

❽Capacitance Tolerance

Code	Capacitance Tolerance	TC	Series	Capacitance Step	
B	±0.1pF	CΔ	**GRM/GJM**	≦5pF	E24 Series, 1pF
C	±0.25pF	CΔ-SL	**GRM/ERB/GQM**	≦5pF	*1pF
		CΔ	**GJM**	<10pF	E24 Series, 1pF
D	±0.5pF	CΔ-SL	**GRM**	6.0 to 9.0pF	*1pF
		CΔ	**ERB/GQM/GJM**	5.1 to 9.1pF	E24 Series
F	±1%	CΔ	**GRM03/15/GJM03/15**	5.0 to 9.9pF	0.1pF
G	±2%	CΔ	**GJM**	≧10pF	E12 Series
		CΔ	**GQM**	≧10pF	E24 Series
		CΔ	**GRM03/15/GJM03/15**	2.0 to 9.9pF	0.1pF
J	±5%	CΔ-SL	**GRM/GA3**	≧10pF	E12 Series
		CΔ	**ERB/GQM/GJM**	≧10pF	E24 Series
		CΔ	**GRM03/15/GJM03/15**	1.0 to 4.9pF	0.1pF
K	±10%	B, R, X7R, X5R, ZLM	**GRM/GR7/GA3**	E6 Series	
			GR4	E12 Series	
		CΔ	**GRM03/15/GJM03/15**	0.2 to 1.9pF	0.1pF
M	±20%	Z5U	**GRM**	E3 Series	
		B, R, X7R, X7S	**GRM/GMA/LLL/LLA/LLM**	E6 Series	
		X7R	**GA2**	E3 Series	
		CΔ	**GRM03/15/GJM03/15**	0.1 to 0.9pF	0.1pF
Z	+80%, -20%	F, Y5V	**GRM**	E3 Series	
R	Depends on individual standards.				

* E24 series is also available.

❾Individual Specification Code

Expressed by three figures.

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⑩Packaging

Code	Packaging
L	ø178mm Plastic Taping
D	ø178mm Paper Taping
K	ø330mm Plastic Taping
J	ø330mm Paper Taping
E	ø178mm Special Packaging
F	ø330mm Special Packaging
B	Bulk
C	Bulk Case
T	Bulk Tray