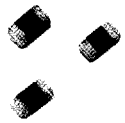
A 05-05-07

MONOLITHIC CERAMIC CAPACITORS
CERAMIC CHIP CAPACITORS
COG AND TEMPERATURE COMPENSATING TYPES

murata

GRM Series



FEATURES

- Miniature size
- No Polarity
- Nickel Barrier Termination Standard – highly resistant to metal migration
- Uniform dimensions and configuration
- Flow for GRM39, 40, 42-6 and Reflow Solderable
- Minimum series inductance
- Tape and Reel Packaging
- Wide selection of capacitance values and voltages
- Largest production capacity and volume in the world

PART NUMBERING SYSTEM

GRM 40 --- COG 101 J 050 A D

CAPACITOR TYPE AND SIZE
See below and following pages.

3-digit code appears as necessary to indicate special thickness requirements. Please consult your local sales office for details.

TEMPERATURE CHARACTERISTICS
COG
P2H
R2H
S2H
T2H
U2J
SL

CAPACITANCE VALUE
Expressed in picofarads and identified by a three-digit number. First two digits represent significant figures. Last digit specifies the number of zeros to follow. For fractional values below 10pF, the letter "R" is used as the decimal point and the last digit becomes significant.

CAPACITANCE TOLERANCE
5pF or less
C = ±.25pF
>5pF ≤ 10pF
D = ±.5pF
>10pF
J = ±5%

VOLTAGE
Identified by a three-digit number.

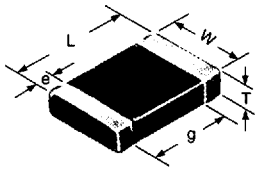
MARKING
A = Unmarked

PACKAGING

Reel Diameter/ Tape Material	Code
★7" Paper Tape	D
★7" Plastic Tape	L
★13" Paper Tape	J
★13" Plastic Tape	K
★Bulk	B
Bulk Cassette	C
7" Paper 2mm pitch	Q

See pages 24-27 for labeling and packaging information.

CHIP DIMENSIONS

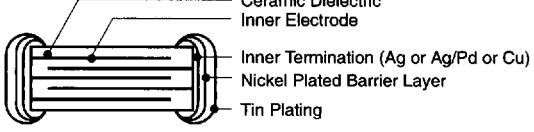


Dimensions: mm	Size	EIA Code	L Length	W Width	T Thickness	g (min.) Insulation	e (min.) Termination
	GRM 36	0402	1.0 ± 0.05	0.5 ± 0.05	0.5 ± 0.05	0.3	0.1
	GRM 39	0603	1.6 ± 0.1	0.80 ± 0.1	0.8 ± 0.1	0.5	0.35 ± 0.15
	GRM 40	0805	2.0 ± 0.15	1.25 ± 0.15	1.25 max.	0.75	0.5 ± 0.25
	GRM 42-6	1206	3.2 ± 0.15	1.6 ± 0.15	1.25 max.	1.0	0.55 ± 0.25
	GRM 42-2	1210	3.2 ± 0.15	2.5 ± 0.15	1.5 max.	1.0	0.5 ± 0.25
	GRM 43-2	1812	4.6 ± 0.3	3.2 ± 0.2	2.75 max.	2.0	0.63 ± 0.38
	GRM 44-1	2220	5.6 ± 0.3	5.1 + 0.25 – 0.5	2.75 max.	2.0	0.63 ± 0.38

CHIP TERMINATION DIAGRAMS

Nickel Barrier Layer (Standard)

GRM Series



ALL PRODUCTS ON THIS PAGE ARE AVAILABLE AS STANDARD THROUGH AUTHORIZED MURATA ELECTRONICS DISTRIBUTORS.

MONOLITHIC CERAMIC CAPACITORS SPECIFICATIONS–COG AND TEMPERATURE COMPENSATING TYPES

muRata

GRM Series

GENERAL

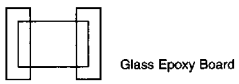
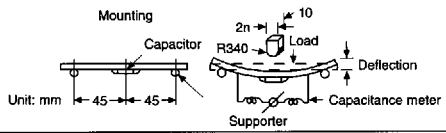
Temperature Coefficient	Temperature Range
C0G = 0 ± 30 ppm*	–55° to +125°C
P2H = N150 ± 60 ppm	–55° to +85°C
R2H = N220 ± 60 ppm	–55° to +85°C
S2H = N330 ± 60 ppm	–55° to +85°C
T2H = N470 ± 60 ppm	–55° to +85°C
U2J = N750 ± 120 ppm	–55° to +85°C
SL = N1000 to P350	–55° to +85°C

***TC Tolerance for COG**
Refer to EIA-RS198D for other limitations

ELECTRICAL

TEST	
Capacitance & Q (Frequency & Voltage):	≤1000pF 1MHz ± 100Hz @ 1.0 ± .2 Vrms >1000pF 1KHz ± 100Hz @ 1.0 ± .2 Vrms
Q Limits	≤30pF: 400 + (20xC (pF)) >30pF: 1000 minimum
Insulation Resistance (I.R.)	100,000 megohms or 1000 megohms – mfd (whichever is less) with rated voltage applied for 2 minutes max with 50mA limiting current
Dielectric Strength (Flash)	250% of rated voltage for 5 seconds with series resistor limiting charging current to 50mA max.
Aging	Negligible

MECHANICAL

TEST	TEST METHOD	POST TEST LIMITS
Terminal Adhesion		≤0603 1.0 lbs. ≥0805 2.2 lbs. No evidence of termination peeling
Deflection		2 mm deflection (paper phenol board) 1 mm deflection (Glass epoxy board) No mechanical damage Cap., DF, IR meet initial limits
Solderability	MIL-STD-202 Method 208F	Contact factory for test limits

ENVIRONMENTAL

TEST	TEST METHOD		POST TEST LIMITS
Thermal Shock (Air to Air)	MIL-STD-202, Method 107, Condition A Post thermal Shock measurement shall be taken after 24 hours stabilization.		Appearance: No visual damage ΔC: = ±2.0% or ±0.5pF (whichever is greater) Q: >30pF = 1,000 min., ≤ 30pF = 400 + [20 x C(pF)] I.R.: = 100,000MΩ min. or 1,000MΩ•μF (whichever is less)
Humidity	**RATED VOLTAGE** Apply rated voltage for 500 ± 12 hours at 85°C and 85% relative humidity **See Note 1**	**LOW VOLTAGE** Apply .5 Vrms for 250 ± 12 hours at 85°C and 85% relative humidity **See Note 1**	Appearance: No defects Capacitance: ±3% or ±.3pF (whichever is less) Q: >30pF = 500 min., ≤30pF = 200 + [10 x C(pF)] I.R.: 10,000MΩ or 100MΩ-mfd. (whichever is less) Flash: 250% rated voltage
Life Test	Apply 200% of rated voltage for 1000 ± 12 hours at maximum operating temperature **See Note 2**		Appearance: No defects Capacitance: ±3% or ±.3pF (whichever is greater) Q: >30pF = 500 min., ≤30pF = 200 + [10 x C(pF)] I.R.: 10,000MΩ or 100MΩ-mfd. (whichever is less) Flash: 250% rated voltage

Note 1: Upon completion of either above test wait 24 hours prior to performing post testing.
Note 2: Upon completion of above test wait 24 hours prior to performing post testing.

STORAGE LIFE

Chip component terminations should generally be protected from moisture. In addition, they should also be protected from materials containing chlorine, sulfur compounds or any harmful gases that could cause degradation of the solder.

1. All chip components, including tape and reel, should be kept in an area where the temperature is less than 40°C and where the humidity is less than 70%.
2. The chip components should be used within six months.
3. The solderability of the chip components should be rechecked in the event that they are not used in six months.
4. Peel strength and shelf life of tape are guaranteed for 1 year when stored under afore said conditions.

MONOLITHIC CERAMIC CAPACITORS
CERAMIC CHIP CAPACITORS
COG TYPE

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GRM Series

MURATA DESIGNATION	GRM 36	GRM 39			GRM 40			GRM 42-6			GRM 42-2		
EIA TYPE DESIGNATION	0402	0603			0805			1206			1210		
WVDC	50	50	100	200	50	100	200	50	100	200	50	100	200
CAPACITANCE (pF) (NOTE) 1.0													
10				10									
100	220	560	160		2400	680	220	6200	1800	470	7500	4300	1000
1000													
(μF) .01													
.1													

Note: Capacitance values = EIA 24 Step = 10, 11, 12, 13, 15, 16, 18, 20, 22, 24, 27, 30, 33, 36, 39, 43, 47, 51, 56, 62, 68, 75, 82, 91
For values under 1.0pF and other values not listed, contact your local Murata Electronics Sales Office.

MONOLITHIC CERAMIC CAPACITORS
CERAMIC CHIP CAPACITORS
COG TYPE

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GRM Series

MURATA DESIGNATION	GRM 43-2			GRM 44-1		
EIA TYPE DESIGNATION	1812			2220		
WVDC	50	100	200	50	100	200
CAPACITANCE (NOTE) (pF) 1.0						
10						
100						
1000			2400			6200
(μF) .01	.011	.011		.036	.027	
.1						

Note: Capacitance values = EIA 24 Step = 10, 11, 12, 13, 15, 16, 18, 20, 22, 24, 27, 30, 33, 36, 39, 43, 47, 51, 56, 62, 68, 75, 82, 91
For values under 1.0pF and other values not listed, contact your local Murata Electronics Sales Office.

MONOLITHIC CERAMIC CAPACITORS
CERAMIC CHIP CAPACITORS
TEMPERATURE COMPENSATING TYPE

MURATA DESIGNATION	GRM 39												GRM 40											
EIA TYPE DESIGNATION	0603												0805											
CHARACTERISTIC	P2H		R2H		S2H		T2H		U2J		SL		P2H		R2H		S2H		T2H		U2J		SL	
WVDC	50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100
CAPACITANCE (pF) (NOTE)	160	120	160	150	220	120	390	39	750	430	750	430	620	470	750	560	820	620	1800	220	3300	2000	3300	2000

1.0 / 10 / 100 / 1000 / (μF) .01

Note: Capacitance values = EIA 24 Step = 10, 11, 12, 13, 15, 16, 18, 20, 22, 24, 27, 30, 33, 36, 39, 43, 47, 51, 56, 62, 68, 75, 82, 91
For values under 1.0pF and other values not listed, contact your local Murata Electronics Sales Office.

MONOLITHIC CERAMIC CAPACITORS
CERAMIC CHIP CAPACITORS
TEMPERATURE COMPENSATING TYPE

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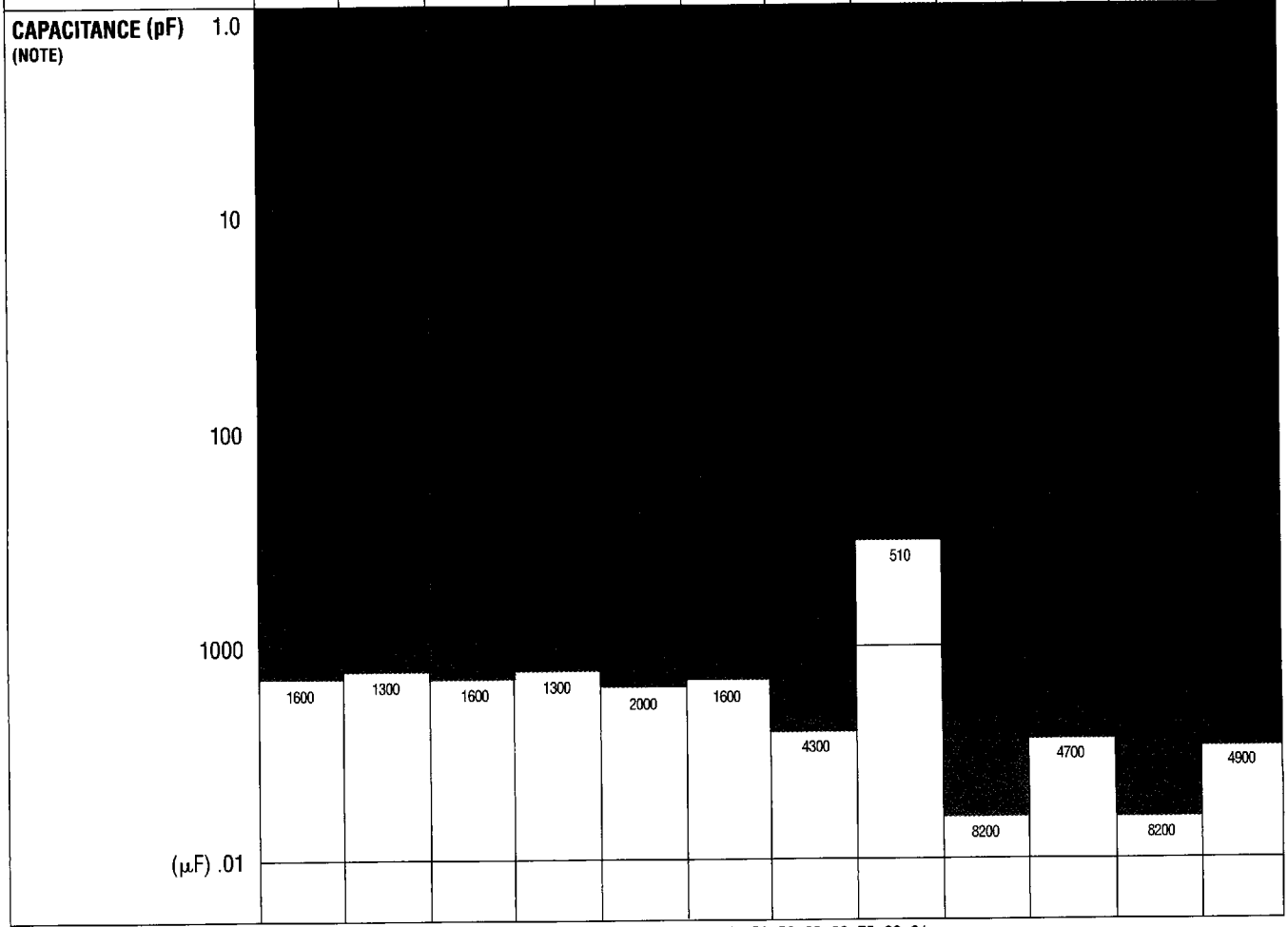
GRM Series

MURATA DESIGNATION	GRM 42-6											
EIA TYPE DESIGNATION	1206											
CHARACTERISTIC	P2H		R2H		S2H		T2H		U2J		SL	
WVDC	50	100	50	100	50	100	50	100	50	100	50	100
CAPACITANCE (pF) (NOTE)	1600	1300	1600	1300	2000	1600	4300	510	8200	4700	8200	4900



Note: Capacitance values = EIA 24 Step = 10, 11, 12, 13, 15, 16, 18, 20, 22, 24, 27, 30, 33, 36, 39, 43, 47, 51, 56, 62, 68, 75, 82, 91
For values under 1.0pF and other values not listed, contact your local Murata Electronics Sales Office.