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Product Specification for Reference Only

Issue Date : 7/19/2005

Date Format: 5/5/2001

Part Description : Chip Monolithic Ceramic Capacitor

Murata Part Number

Murata Global Part Number: GRM216R71H103KA01D

Murata Previous Part Number: GRM40X7R103K050AD

*Attention: Murata will change to Global Part Numbers in June 2001. Global Part numbers are shown on this sheet with the previous part numbers.

The product specification in this sheet is for reference only.

There will be a chance to change contents of this document in part number on specifications or discontinue it's production.

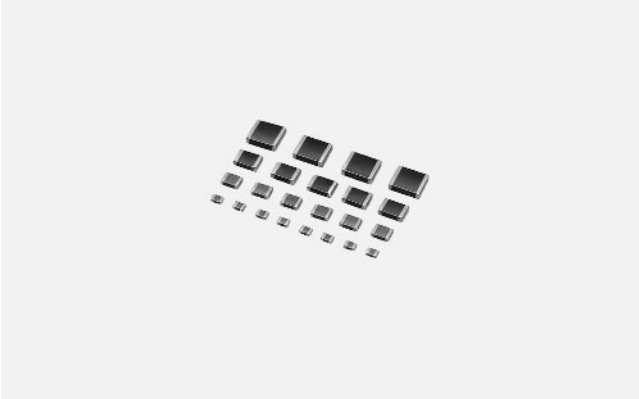
You are requested to receive formal specification to confirm latest specification before going into mass production.

Murata Electronics N.A., Inc.
2200 Lake Park Dr.
Smyrna, Ga. 30080
Tel: (770) 436-1300
Fax: (770) 436-3030

MONOLITHIC CERAMIC CAPACITORS
CERAMIC CHIP CAPACITORS
HIGH DIELECTRIC CONSTANT TYPE

muRata
Innovator in Electronics

GRM Series



FEATURES

- Miniature size
- No Polarity
- Nickel Barrier Termination Standard – highly resistant to metal migration
- Uniform dimensions and configuration
- Suitable for reflow soldering
- GRM39, 40 and 42-6 suitable for wave soldering
- Minimum series inductance
- Tape and Reel Packaging
- Bulk Case Packaging available for GRM40 and smaller
- Wide selection of capacitance values and voltages
- Largest production capacity and volume in the world

PART NUMBERING SYSTEM

GRM40 – – – X7R 103 K 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
X5R
X7R
Y5V

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.

CAPACITANCE TOLERANCE
X7R/X5R:
K = ±10%
M = ±20%
Y5V: Z = $^{+80\%}_{-20\%}$

VOLTAGE
Identified by a three-digit number.

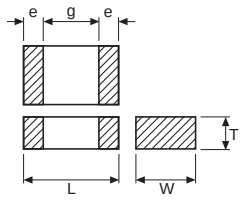
MARKING
A = Unmarked

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 32-35 for labeling and packaging information

CHIP DIMENSIONS

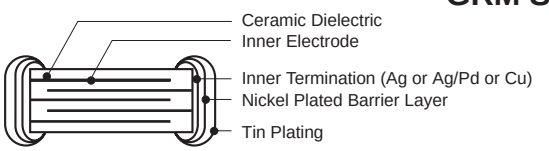
Dimensions: mm	Size	EIA Code	L Length	W Width	T Thickness	e (min.) Termination	g (min.) Insulation
	GRM36	0402	1.0 ± 0.05	0.5 ± 0.05	0.5 ± 0.05	0.15 ~ 0.3	0.4
	GRM39*	0603	1.6 ± 0.1	0.8 ± 0.1	0.8 ± 0.1	0.2 ~ 0.5	0.5
	GRM40	0805	2.0 ± 0.1	1.25 ± 0.1	0.6 ± 0.1	0.2 ~ 0.7	0.7
					0.85 ± 0.1		
					1.25 ± 0.1		
	GRM42-6	1206	3.2 ± 0.15	1.6 ± 0.15	0.85 ± 0.1	0.3 ~ 0.8	1.5
					1.15 ± 0.1		
			3.2 ± 0.2	1.6 ± 0.2	1.6 ± 0.2		
	GRM42-2	1210	3.2 ± 0.3	2.5 ± 0.2	1.15 ± 0.1	0.3 min.	1.0
					1.35 ± 0.15		
					1.8 ± 0.2		
					2.5 ± 0.2		
	GRM43-2	1812	4.5 ± 0.4	3.2 ± 0.3	2.0 max.	0.3 min.	2.0
	GRM44-1	2220	5.7 ± 0.4	5.0 ± 0.4	2.0 max.	0.3 min.	2.0

*Bulk case packaging is L = 1.6 ± 0.07, W, T = 0.8 ± 0.07.

CHIP TERMINATION DIAGRAMS

Nickel Barrier Layer (Standard)

GRM Series



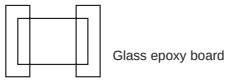
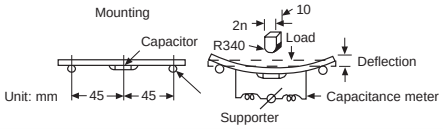
All products on this page are available as standard through authorized Murata Electronics Distributors.

GENERAL/ELECTRICAL

Capacitance Change with Temperature:	X5R: ±15% ΔCX –55°C to +85°C X7R: ±15% ΔCX –55°C to +125°C Y5V: $^{+22}_{-82}$% ΔCX –30°C to +85°C
Capacitance & D.F. (Frequency & Voltage)	X5R, X7R: 1kHz ±100Hz @ 1.0 ±.2Vrms Y5V: 1kHz ±100Hz @ 1.0 ±.2Vrms
Dissipation Factor (D.F.)	25 to 100V: X5R 2.5%, X7R 2.5%, Y5V 5.0% 16V: X5R 3.5%, X7R 3.5%, Y5V 9.0% 10V: X5R 3.5%, X7R 3.5%, Y5V 12.5% 6.3V: X5R 5%, X7R 5%, Y5V 12.5%

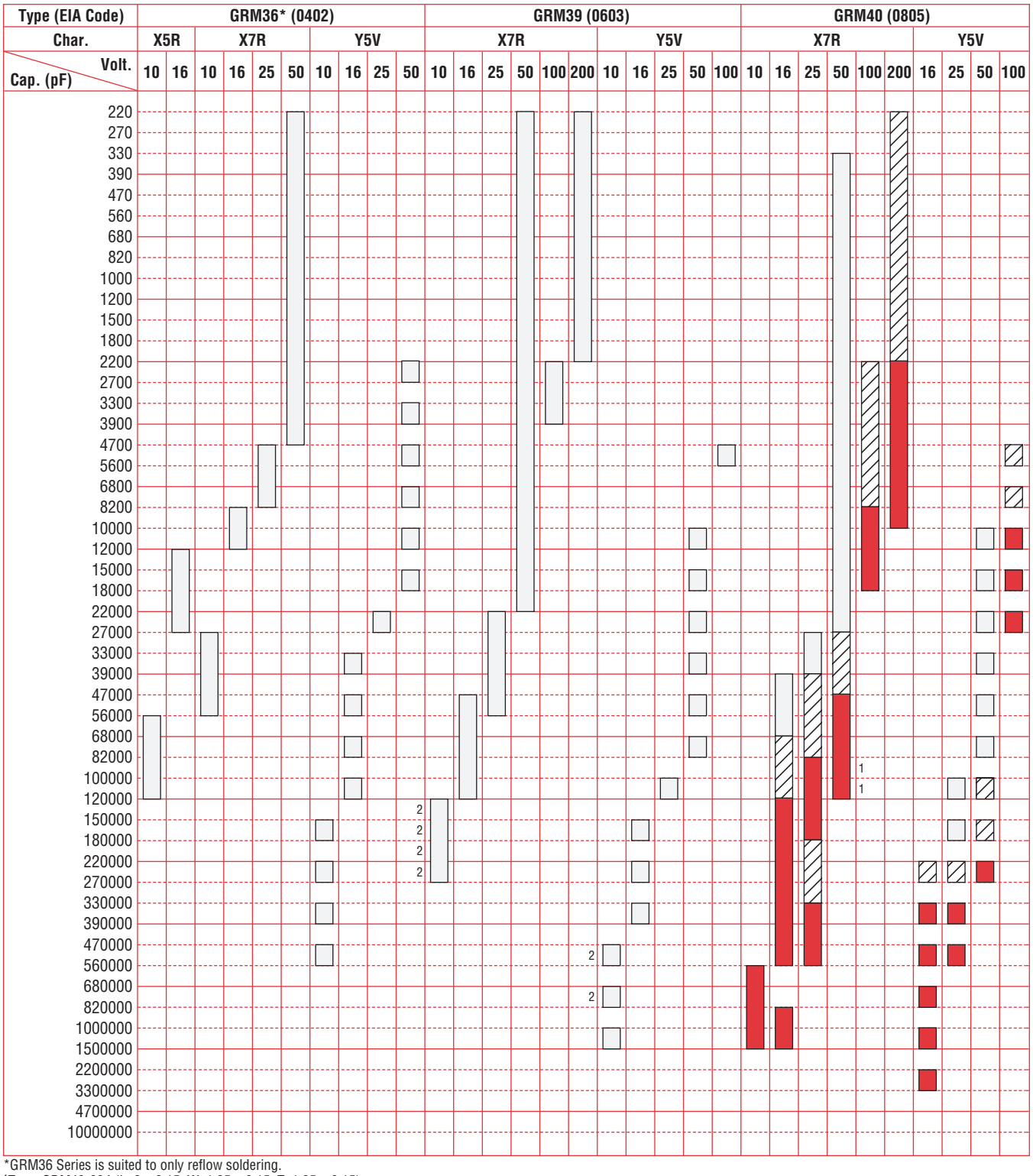
Insulation Resistance (I.R.)	X7R 100,000 megohms or 1000 megohms-mfd (whichever is less) Y5V 10,000 megohms or 500 megohms–mfd (whichever is less)
Dielectric Strength (Flash)	250% of rated voltage for 5 seconds with series resistor limiting charge current to 50mA max.
Typ. Aging (per Decade)	X7R 3% Y5V 7%

MECHANICAL

TEST	TEST METHOD	POST TEST LIMITS
Terminal Adhesion		<0603 1.0 lbs. ≥0805 2.2 lbs. No evidence of termination peeling
Deflection		1 mm deflection (Glass epoxy board) No mechanical damage Cap., DF, IR meet initial limits
Solderability	MIL-STD-202 Method 208F	Meets Requirement For specific details contact factory

ENVIRONMENTAL

TEST	TEST METHOD	POST TEST LIMITS
Thermal Shock (Air to Air)	MIL-STD-202, Method 107, Condition A Prior to starting Thermal Shock test, capacitors shall be heat treated (deaged) for one (1) hour at 150°C. Allow capacitors to stabilize at room temperature for 48 hours prior to taking initial measurements. Post thermal Shock measurement shall be taken after 48 hours stabilization.	Appearance: No visual damage ΔC: X5R/X7R = ±12.5% Y5V = ±30.0% D.F.: X5R/X7R = 2.5% max. @ 25°C, (3.5% max. @ 25°C for 16V & 10V Series) (7.5% max. @ 25°C for 6.3V Series) Y5V = 5.0% max. @ 25°C, (9.0% max. @ 25°C for 16V Series) (15% max. @ 25°C for 10V & 6.3V Series) I.R.: X5R/X7R = 100,000MΩ min. of 1,000MΩ•μF (whichever is less) Y5V = 10,000Ω or 500MΩ•μF min. (whichever is less)
Humidity	**RATED VOLTAGE**: Apply rated voltage for 500 ± 12 hours at 85°C and 85% relative humidity **LOW VOLTAGE**: Apply .5Vrms for 250 ± 12 hours at 85°C and 85% relative humidity Upon completion of either above test wait 48 hours prior to performing post testing.	Appearance: No defects Capacitance: X5R/X7R ± 12.5% ΔCX, Z5U/Y5V ±30% ΔCX D.F.: X5R/X7R = 3.0% max. @ 25°C, (5% max. @ 25°C for 16V & 10V Series) (7.5% max. @ 25°C for 6.3V Series) Y5V = 7.5% max. @ 25°C, (10% max. @ 25°C for 16V Series) (15% max. @ 25°C for 10V & 6.3V Series) I.R.: X5R/X7R 10,000MΩ or 100MΩ-mfd. (whichever is less) Y5V 1,000MΩ or 50MΩ-mfd. (whichever is less) Flash: 250% rated voltage
Life Test	Apply 200% of rated voltage for 1000 ± 12 hours at maximum operating temperature Upon completion of above test wait 48 hours prior to performing post testing.	Appearance: No defects Capacitance: X5R/X7R ± 12.5% ΔCX, Z5U/Y5V ±30% ΔCX D.F.: X5R/X7R = 3.0% max. @ 25°C, (5% max. @ 25°C for 16V & 10V Series) (7.5% max. @ 25°C for 6.3V Series) Y5V = 7.5% max. @ 25°C, (10% max. @ 25°C for 16V Series) (15% max. @ 25°C for 10V & 6.3V Series) I.R.: X5R/X7R 1,000MΩ or 50MΩ-mfd. (whichever is less) Y5V 1,000MΩ or 50MΩ-mfd. (whichever is less) Flash: 250% rated voltage



*GRM36 Series is suited to only reflow soldering.
[1]Type: GRM40-034 (L: 2 ± 0.15, W: 1.25 ± 0.15, T: 1.25 ± 0.15)
[2]Only for taping

THICKNESS AND PACKAGING TYPES/QUANTITY

Type	Thickness: T (mm)	Bulk (pcs./bag)	Taping (pcs./ϕ178mm reel)[3]	Bulk Case (pcs./case)	Type	Thickness: T (mm)	Bulk (pcs./bag)	Taping (pcs./ϕ178mm reel)[3]	Bulk Case (pcs./case)
GRM36	: 0.5 ± 0.05	1000	10000	50000	GRM40	: 0.85 ± 0.1	1000	4000	—
GRM39	: 0.8 ± 0.1[4]	1000	4000	15000		: 1.25 ± 0.1	1000	3000	5000
GRM40	: 0.6 ± 0.1	1000	4000	10000	[3]ϕ330mm reel is available on request. [4]Bulk case packaging is T = 0.8 ± 0.07.				

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HIGH DIELECTRIC CONSTANT X5R/X7R/Y5V TYPES

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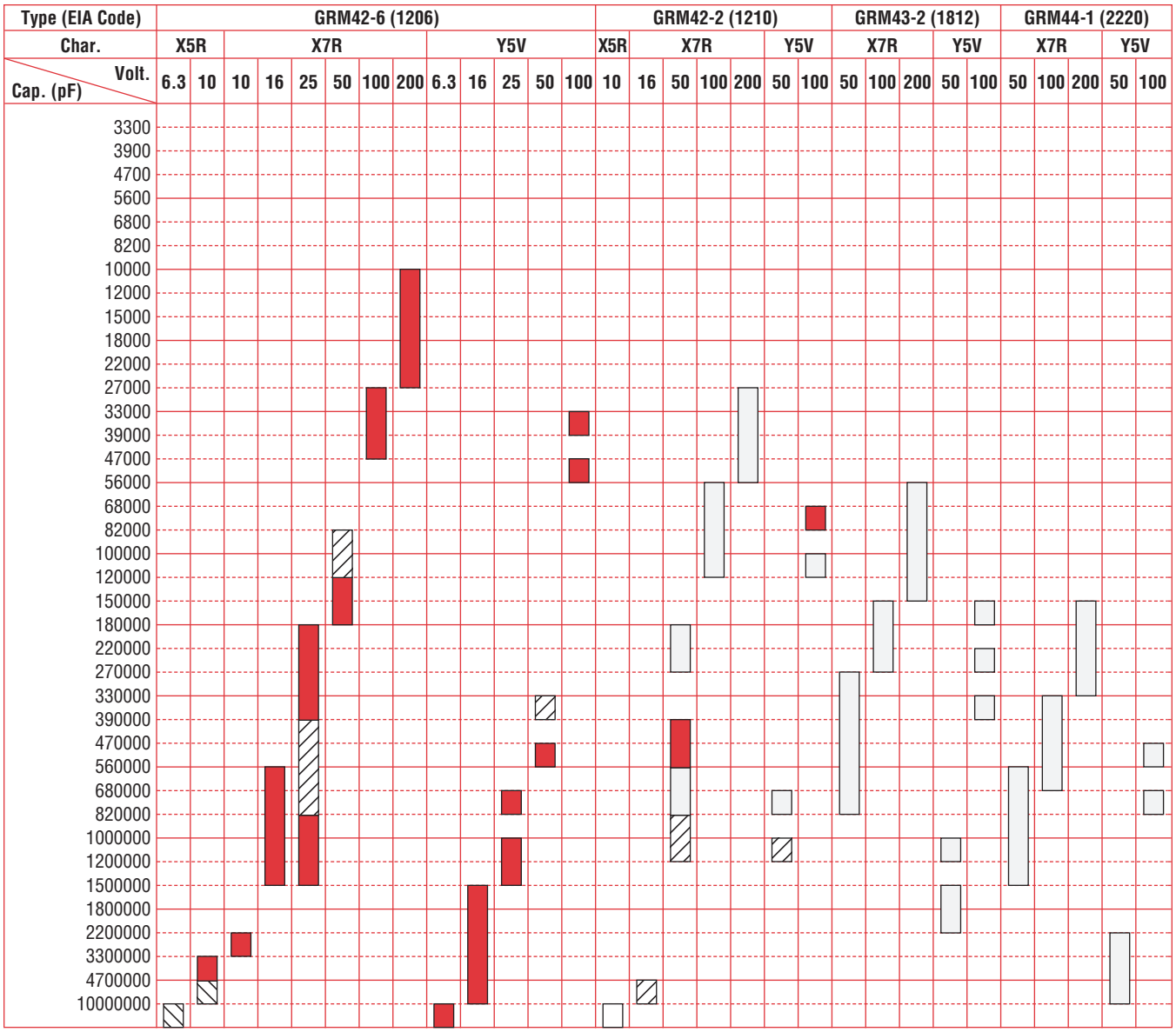
GRM Series



*Type: GRM42-631 (L: 3.2 ± 0.2, W: 1.6 ± 0.2, T: 1.3 $^{+0}_{-0.2}$)

THICKNESS AND PACKAGING TYPES/QUANTITY

Type	Thickness: T (mm)	Bulk (pcs./bag)	Taping (pcs./ϕ178mm reel)[1]
GRM42-6	: 0.85 ± 0.1	1000	4000
	: 1.15 ± 0.1	1000	3000
	: 1.6 ± 0.2	1000	2000
GRM42-2	: 1.15 ± 0.1	1000	3000
	: 1.35 ± 0.15	1000	2000
GRM42-2	: 1.8 ± 0.2	1000	1000
	: 2.5 ± 0.2	1000	1000
GRM43-2	: 2.0 max.	1000	1000
GRM44-1	: 2.0 max.	1000	1000

[1]ϕ330mm reel is available on request.