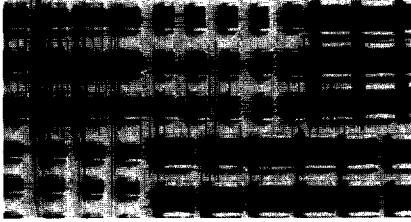


CHIPS, MONOLITHIC CERAMIC CAPACITORS



FEATURES

- Miniature size
- Wide capacitance, T.C., voltage and tolerance range
- Industry standard sizes
- 8 mm and 12 mm tape & reel for auto-placement
- Nickel barrier termination standard – highly resistant to metal migration.
- Largest production volume and capacity in the industry

PART NUMBERING SYSTEM

CAPACITOR TYPE AND SIZE	3-digit code appears as necessary to indicate special thickness requirements. Please consult your local sales office for details.	TEMPERATURE CHARACTERISTICS	CAPACITANCE VALUE	CAPACITANCE TOLERANCE	VOLTAGE	MARKING	PACKAGING												
		Standard TC's (described herein) COG=0, ±30ppm (Notes 1 & 2) X7R=±15% Z5U=+22, -56% Y5V=+22, -82% (See Note 2 below) P2H=N150±60ppm R2H=N220±60ppm S2H=N330±60ppm T2H=N470±60ppm U2J=N750±120ppm	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 values below 10pF, the letter "R" is used as the decimal point and the last digit becomes significant.	(Note 2) COG: (10pF or less) B=±.1pF ★C=±.25pF ★D=±.5pF F=±1pF for 10pF only (over 10pF) F=±1% G=±2% ★J=±5% ★K=±10% ★X7R:K=±10% ★M=±20% J=±5% on special request ★Z5U:M=±20% ★Z=+80, -20% ★Y5V:Z=+80, -20%	Identified by a three-digit number. 500V available upon request.	★A=Unmarked ★B=EIA Marking ★C=Non-standard	<table border="1" style="font-size: small;"> <tr><td>Reel Diameter</td><td>EIA-481-A</td></tr> <tr><td>★7" Paper</td><td>D</td></tr> <tr><td>★7" Plastic</td><td>L</td></tr> <tr><td>13" Paper</td><td>J</td></tr> <tr><td>13" Plastic</td><td>K</td></tr> <tr><td>Bulk</td><td>B</td></tr> </table> <p>T/R per EIA-481-1</p>	Reel Diameter	EIA-481-A	★7" Paper	D	★7" Plastic	L	13" Paper	J	13" Plastic	K	Bulk	B
Reel Diameter	EIA-481-A																		
★7" Paper	D																		
★7" Plastic	L																		
13" Paper	J																		
13" Plastic	K																		
Bulk	B																		
NOTE 1: T.C. Tolerance (COG)																			
		<table border="1" style="font-size: small;"> <tr><th>Capacitance (pF)</th><th>T.C. Tolerance (ppm)</th></tr> <tr><td>10 or over</td><td>± 30 (G)</td></tr> <tr><td>4.0-9.9</td><td>± 60 (H)</td></tr> <tr><td>2.1-3.9</td><td>± 120 (J)</td></tr> <tr><td>.4-2.0</td><td>± 250 (K)</td></tr> </table>	Capacitance (pF)	T.C. Tolerance (ppm)	10 or over	± 30 (G)	4.0-9.9	± 60 (H)	2.1-3.9	± 120 (J)	.4-2.0	± 250 (K)							
Capacitance (pF)	T.C. Tolerance (ppm)																		
10 or over	± 30 (G)																		
4.0-9.9	± 60 (H)																		
2.1-3.9	± 120 (J)																		
.4-2.0	± 250 (K)																		
NOTE 2: Refer to EIA-RS198 for limitations																			

★ Available as standard through authorized Murata Erie Distributors.

CHIP DIMENSIONS

DIMENSIONS: in. (mm)	Size	EIA Code	L Length	W Width	T Thickness	g Insulation	e Termination
	★GRM 39	0603	.060±.006 (1.6±0.15)	.030±.006 (0.8±0.15)	Note 1: Thickness varies with capacitance value. See capacitance charts on following pages for thickness.	.020 (0.5)	.014±.006 (0.35±0.15)
	★GRM40	0805	.080±.006 (2.0±0.15)	.050±.006 (1.25±0.15)		.030 (0.75)	.020±.010 (0.5±0.25)
	★GRM42-6	1206	.125±.006 (3.2±0.15)	.063±.006 (1.6±0.15)		.040 (1.0)	.020±.010 (0.5±0.25)
	★GRM42-2	1210	.125±.006 (3.2±0.15)	.100±.006 (2.5±0.15)		.040 (1.0)	.020±.010 (0.5±0.25)
	★★GRM43-2	1812	.180±.012 (4.6±0.3)	.125±.008 (3.2±0.2)		.080 (2.0)	.025±.015 (0.63±0.38)
	★★GRM43-4	1825	.180±.012 (4.6±0.3)	.250±.016 (6.35±0.4)		.080 (2.0)	.025±.015 (0.63±0.38)
	★★GRM44-1	2220*	.220±.012 (5.6±0.3)	.200±.010-.025 (5.1±0.25-0.5)		.080 (2.0)	.025±.015 (0.63±0.38)
	★★GRM44	2225*	.220±.012 (5.6±0.3)	.250±.016 (6.35±0.4)		.080 (2.0)	.025±.015 (0.63±0.38)

*Non EIA-Standard Size

CHIP TERMINATION DIAGRAMS

Nickel Barrier Layer (Standard)	Palladium Silver
<p>GRM Series</p> <p>Ceramic Dielectric Inner Electrode Inner Termination (Ag) Nickel Plated Barrier Layer Tin Plating</p>	<p>GR Series</p> <p>Ceramic Dielectric Inner Electrode Outer Electrode End Termination (PdAg)</p>

★ Available as standard through authorized Murata Electronics Distributors.

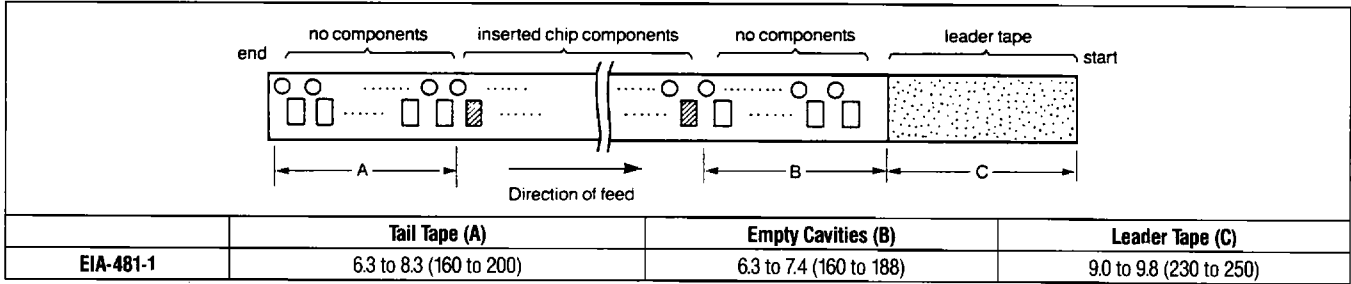
★★ Contact your local Murata Electronics Sales Office for standard values in these series.

Note: Other Terminations Available Upon Request. Please Contact Local Sales Office.

TAPE & REEL FOR AUTOMATIC INSERTION



DIMENSIONS: in. (mm) TAIL AND LEADER TAPE



*20 to 30mm must be unsealed with remaining portion of empty cavities sealed.

8mm PUNCHED (PAPER)		GR(M)39 0603	GR(M)40 0805	GR(M)42-6 1206	GR(M)42-2 1210	
	Tape	.047 (1.2)	.065 (1.65)	.087 (2.2)	.116 (2.95)	
	Tape A max.					
	Tape B max.	.079 (2.0)	.095 (2.4)	.150 (3.8)	.144 (3.65)	
	Chip T max.	.035 (0.9)	.040 (1.0)	.040 (1.0)	.040 (1.0)	
	Tape Pitch: P	.157±.004 (4.0±0.1)	.157±.004 (4.0±0.1)	.157±.004 (4.0±0.1)	.157±.004 (4.0±0.1)	
8mm EMBOSED (PLASTIC)			GR(M)40 0805	GR(M)42-6 1206	GR(M)42-2 1210	
	Tape	N/A	.061 (1.55)	.079 (2.0)	.114 (2.9)	
	Tape A max.					
	Tape B max.			.093 (2.35)	.142 (3.6)	.142 (3.6)
	Chip T max.			.053 (1.35)	.060 (1.5)	.060 (1.5)
	Tape Pitch: P			.157±.004 (4.0±0.1)	.157±.004 (4.0±0.1)	.157±.004 (4.0±0.1)
12mm EMBOSED (PLASTIC)		GR(M)43-2 1812	GR(M)43-4 1825	GR(M)44-1 2220	GR(M)44 2225	
	Tape	.146 (3.7)	.197 (5.0)	.209 (5.3)	.264 (6.7)	
	Tape A max.					
	Tape B max.	.197 (5.0)	.268 (6.8)	.244 (6.2)	.248 (6.3)	
	Chip T max.	.080 (2.0)	.080 (2.0)	.080 (2.0)	.080 (2.0)	
	Tape Pitch: P	.320±.004 (8±0.1)	.320±.004 (8±0.1)	.320±.004 (8±0.1)	.320±.004 (8±0.1)	

CHIP MARKING

- The capacitance value is expressed in pF.
- A two character marking system will be used. The first character will be an alphabetic symbol and it will designate the 1st and 2nd figures of capacitance. The second character will be a numerical digit and it will designate the decimal multiplier of capacitance.
Examples: A1 = $1 \times 10^1 = 10\text{pF}$
J5 = $2.2 \times 10^5 = 0.22\mu\text{F}$
- The marking shall appear in black or legible contrast. The orientation of the marking shall be as illustrated.
- Marking resistance to solvents per EIA-RS 198 method 210

GR39
No Marking

GR40

GR42-6, 42-2, 43-2, 44-1, 44

GR43-4

TC BAR CODE
Where chip marking is required, bar code designations for temperature coefficients (T.C.s) will be provided as listed below.
NPO = □□, N150 = □□, N220 = □□,
N330 = □□, N470 = □□, N750 = □□,
Y5V = □□, Z5U = □□, X7R = □□

Other T.C. Designators are available. Contact your local Murata Electronics Sales Office.

T.C. Bar

Base Cap. Code

Multiplier

CHIP MARKING SPECIFICATIONS

Alphabetic Character	Significant Figures	Alphabetic Character	Significant Figures	Alphabetic Character	Significant Figures	Numeric Character	Decimal Multiplier
A	1.0	L	2.7	W	6.8	0	10 ⁰
B	1.1	M	3.0	X	7.5	1	10 ¹
C	1.2	N	3.3	Y	8.2	2	10 ²
D	1.3	P	3.6	Z	9.1	3	10 ³
E	1.5	Q	3.9	a	2.5	4	10 ⁴
F	1.6	R	4.3	b	3.5	5	10 ⁵
G	1.8	S	4.7	d	4.0	6	10 ⁶
H	2.0	T	5.1	e	4.5	7	10 ⁷
J	2.2	U	5.6	f	5.0	8	10 ⁸
K	2.4	V	6.2	m	6.0	9	10 ⁹
				n	7.0		
				t	8.0		
				y	9.0		

MURATA DESIGNATION	GRM 39			GRM 40			GRM 42-6			GRM 42-2		
EIA TYPE DESIGNATION	0603			0805			1206			1210		
WVDC	50	100	200	50	100	200	50	100	200	50	100	200
CAPACITANCE (pF) (NOTE)	1.0											
	10		10									
	100					15						
	1000	560	160	330		75	750		160			200
	10000											
(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.

STANDARD THICKNESS/PACKAGING SPECIFICATIONS

Dimensions (mm)		Bulk	Tape			
		Pcs/bag (typical)	Pcs/7 inch (178 mm) reel		Pcs/13 inch (330 mm) reel	
		Plastic	Paper	Embossed	Paper	Embossed
	T: 0.7 ⁺⁰ _{-0.2}	1000	4000	4000	10000	10000
	T: 0.8 ±0.1	1000	4000	N/A	10000	N/A
	T: 1.0 ⁺⁰ _{-0.2}	1000	4000	3000	10000	10000
	T: 1.25 ⁺⁰ _{-0.2} *	1000	N/A	3000	N/A	10000
	T: 1.5 ⁺⁰ _{-0.2}	1000	N/A	2000	N/A	8000

*GRM40T: 1.25 ± 0.1

MURATA DESIGNATION	GRM 43-2			GRM 43-4			GRM 44-1			GRM 44		
EIA TYPE DESIGNATION	1812			1825			2220			2225		
WVDC	50	100	200	50	100	200	50	100	200	50	100	200
CAPACITANCE (pF) (NOTE)	1.0											
	10											
	100											
	1000	1000	1000	330	1000	1000	560	1000	1000	820	1000	1300
(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.

STANDARD THICKNESS/PACKAGING SPECIFICATIONS

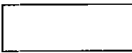




Dimensions (mm)		Bulk	Tape			
		Pcs/bag (typical)	Pcs/7 inch (178 mm) reel		Pcs/13 inch (330 mm) reel	
		Plastic	Paper	Embossed	Paper	Embossed
	T : 1.25 $\begin{matrix} +0 \\ -0.2 \end{matrix}$	1000	N/A	1000	N/A	5000
	T : 1.5 $\begin{matrix} +0 \\ -0.2 \end{matrix}$	1000	N/A	1000	N/A	5000
	T : 2.0 $\begin{matrix} +0 \\ -0.2 \end{matrix}$	1000	N/A	1000	N/A	4000

HIGH DIELECTRIC CONSTANT TYPE X7R

MURATA DESIGNATION	GRM 39					GRM 40					GRM 42-6					GRM 42-2				
EIA TYPE DESIGNATION	0603					0805					1206					1210				
WVDC	16	25	50	100	200	16	25	50	100	200	16	25	50	100	200	16	25	50	100	200
CAPACITANCE (pF) 100			220	220	220			220	220	220			220	220	220					
1000					1800					1800					2200					
(μF) .01																				
.1																				
1.0																				

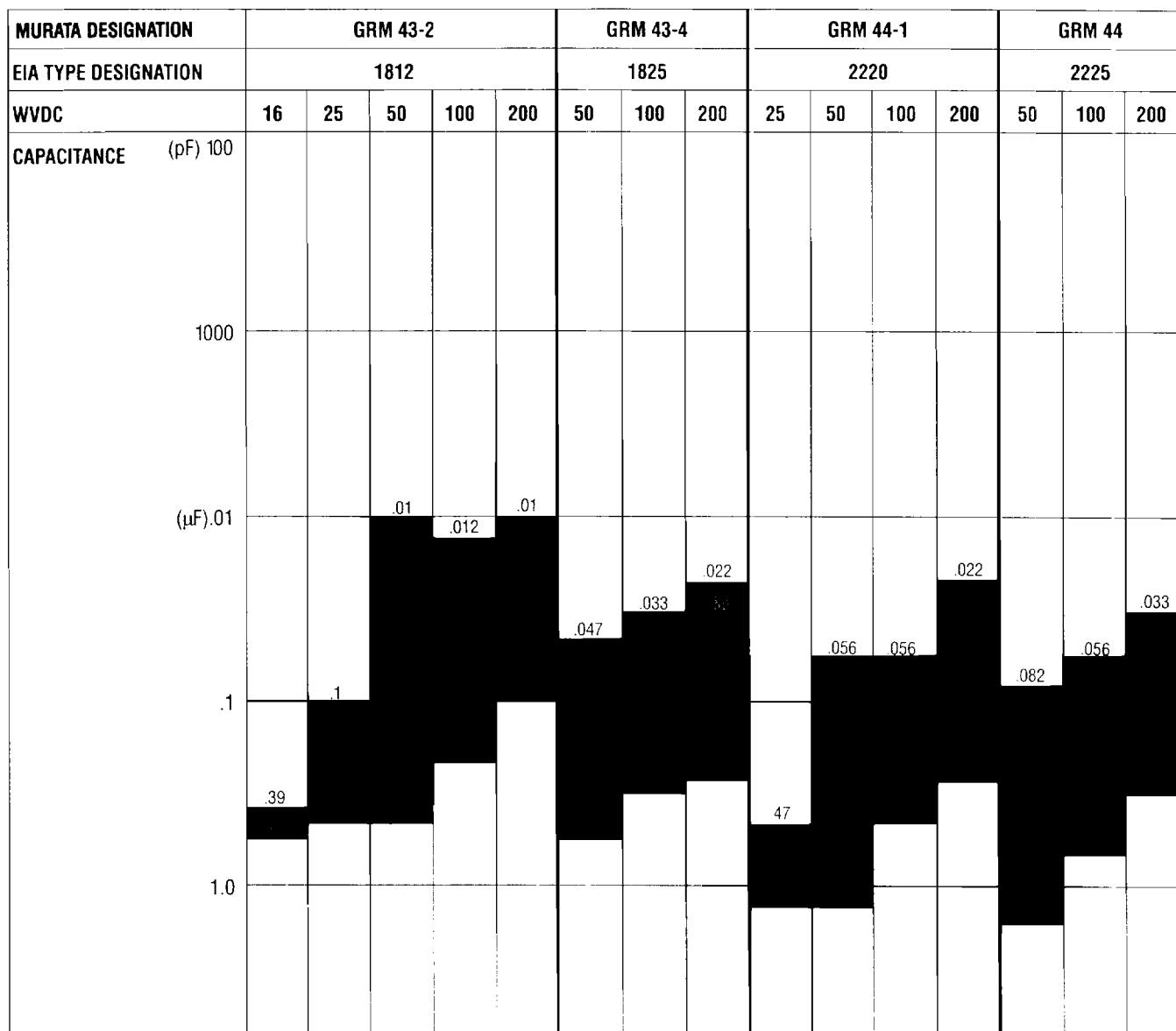
Note: Capacitance values = EIA 12 Step = 10, 12, 15, 18, 22, 27, 33, 39, 47, 56, 68, 82. For values not listed contact your local Murata Electronics Sales Office

STANDARD THICKNESS/PACKAGING SPECIFICATIONS

DIMENSIONS: mm		Bulk	Tape			
		Pcs/bag (typical)	Pcs/7 inch (178 mm) reel		Pcs/13 inch (330 mm) reel	
		Plastic	Paper	Embossed	Paper	Embossed
	T: 0.7 ⁺⁰ / _{-0.2}	1000	4000	4000	10000	10000
	T: 0.8 ± 0.1	1000	4000	N/A	10000	N/A
	T: 1.0 ⁺⁰ / _{-0.2}	1000	4000	3000	10000	10000
	T: 1.25 ⁺⁰ / _{-0.2}	1000	N/A	3000	N/A	10000
	T: 1.5 ⁺⁰ / _{-0.2}	1000	N/A	2000	N/A	8000

*GRM40 T: 1.25 ± .1

HIGH DIELECTRIC CONSTANT TYPE X7R



Note: Capacitance values = EIA 12 Step = 10, 12, 15, 18, 22, 27, 33, 39, 47, 56, 68, 82. For values not listed, contact your local Murata Electronics Sales Office.

STANDARD THICKNESS/PACKAGING SPECIFICATIONS



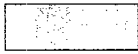

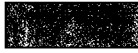
DIMENSIONS: mm		Bulk	Tape			
		Pcs/bag (typical)	Pcs/7 inch (178 mm) reel		Pcs/13 inch (330 mm) reel	
		Plastic	Paper	Embossed	Paper	Embossed
	T: 1.25 ⁺⁰ / _{-0.2}	1000	N/A	1000	N/A	5000
	T: 1.5 ⁺⁰ / _{-0.2}	1000	N/A	1000	N/A	5000
	T: 2.0 ⁺⁰ / _{-0.2}	1000	N/A	1000	N/A	4000

HIGH DIELECTRIC CONSTANT TYPE Z5U

MURATA DESIGNATION	GRM 39			GRM 40			GRM 42-6			GRM 42-2		
EIA TYPE DESIGNATION	0603			0805			1206			1210		
WVDC	50	100	200	50	100	200	50	100	200	50	100	200
CAPACITANCE (pF) 1000		3300			6800	1500		3300				
(μF).01	.01		N/A									
				.022				.022				
				.033			.047					
.1							.1					
										.15		
1.0												
												6800

Note: Capacitance values = EIA 6 Step = 10, 15, 22, 33, 47, 68. For values not listed, contact your local Murata Electronics Sales Office.

STANDARD THICKNESS/PACKAGING SPECIFICATIONS

DIMENSIONS: mm		Bulk	Tape			
		Pcs/bag (typical)	Pcs/7 inch (178 mm) reel		Pcs/13 inch (330 mm) reel	
		Plastic	Paper	Embossed	Paper	Embossed
	T: 0.7 ⁺⁰ / _{-0.2}	1000	4000	4000	10000	10000
	T: 0.8 ± 0.1	1000	4000	N/A	10000	N/A
	T: 1.0 ⁺⁰ / _{-0.2}	1000	4000	3000	10000	10000
	T: 1.25 ⁺⁰ / _{-0.2} *	1000	N/A	3000	N/A	10000
	T: 1.5 ⁺⁰ / _{-0.2}	1000	N/A	2000	N/A	8000

*GRM40T= 1.25 ± .1

HIGH DIELECTRIC CONSTANT TYPE Z5U

MURATA DESIGNATION	GRM 43-2			GRM 43-4			GRM 44-1			GRM 44														
EIA TYPE DESIGNATION	1812			1825			2220			2225														
WVDC	50	100	200	50	100	200	50	100	200	50	100	200												
CAPACITANCE (pF)1000																								
(μF) .01																								
1.0																								

Note: Capacitance values = EIA 6 Step = 10, 15, 22, 33, 47, 68. For values not listed, contact your local Murata Electronics Sales Office

STANDARD THICKNESS/PACKAGING SPECIFICATIONS

DIMENSIONS: mm		Bulk	Tape			
		Pcs/bag (typical)	Pcs/7 inch (178 mm) reel		Pcs/13 inch (330 mm) reel	
		Plastic	Paper	Embossed	Paper	Embossed
	T: 1.25 \pm 0.2	1000	N/A	1000	N/A	5000
	T: 1.5 \pm 0.2	1000	N/A	1000	N/A	5000
	T: 2.0 \pm 0.2	1000	N/A	1000	N/A	4000

MURATA DESIGNATION	GRM 39				GRM 40				GRM 42-6				GRM 42-2			
EIA TYPE DESIGNATION	0603				0805				1206				1210			
WVDC	16	25	50	100	16	25	50	100	16	25	50	100	16	25	50	100
CAPACITANCE (pF) 1000				1200												
(μF) .01				4700				6800								
.033								.022								
.1			.047				.047					.047				.047
.1					.068	.1					.068	.1				
.1	.22	.15			.22				.15	.15	.22					
1.0									.47					.68	1.0	1.0

Note: Capacitance values = EIA 6 Step = 10, 15, 22, 33, 47, 68. For values not listed, contact your local Murata Electronics Sales Office.

STANDARD THICKNESS/PACKAGING SPECIFICATIONS

DIMENSIONS: mm	Tolerance	Bulk	Tape			
		Pcs/bag (typical)	Pcs/7 inch (178 mm) reel		Pcs/13 inch (330 mm) reel	
		Plastic	Paper	Embossed	Paper	Embossed
	T: 0.7 ⁺⁰ / _{-0.2}	1000	4000	4000	10000	10000
	T: 0.8 ± 0.1	1000	4000	N/A	10000	N/A
	T: 1.0 ⁺⁰ / _{-0.2}	1000	4000	3000	10000	10000
	T: 1.25 ⁺⁰ / _{-0.2}	1000	N/A	3000	N/A	10000
	T: 1.5 ⁺⁰ / _{-0.2}	1000	N/A	2000	N/A	8000

HIGH DIELECTRIC CONSTANT TYPE Y5V

MURATA DESIGNATION	GRM 43-2				GRM 43-4		GRM 44-1			GRM 44		
EIA TYPE DESIGNATION	1812				1825		2220			2225		
WVDC	16	25	50	100	50	100	25	50	100	25	50	100
CAPACITANCE (pF) 1000												
(μF).01												
.1						.1						
1.0					.22							
							1.0				1.0	

Note: Capacitance values = EIA 6 Step = 10, 15, 22, 33, 47, 68. For values not listed, contact your local Murata Electronics Sales Office.

STANDARD THICKNESS/PACKAGING SPECIFICATIONS

DIMENSIONS: mm	Tolerance	Bulk	Tape			
		Pcs/bag (typical)	Pcs/7 inch (178 mm) reel		Pcs/13 inch (330 mm) reel	
		Plastic	Paper	Embossed	Paper	Embossed
	T: 1.25 ⁺⁰ / _{-0.2}	1000	N/A	1000	N/A	5000
	T: 1.5 ⁺⁰ / _{-0.2}	1000	N/A	1000	N/A	5000
	T: 2.0 ⁺⁰ / _{-0.2}	1000	N/A	1000	N/A	4000

CHIPS-GRM Series FOR LOW PROFILE AND SUB-PLCC HIGH DIELECTRIC CONSTANT TYPE X7R, Y5V

MURATA DESIGNATION	GRM 40-024						GRM 40-037						GRM 40-026					
EIA TYPE DESIGNATION	0805						0805						0805					
MAX THICKNESS	.020						.026						.028					
WVDC	16		25		50		16		25		50		16		25		50	
TEMPERATURE CHARACTERISTIC	X7R	Y5V	X7R	Y5V	X7R	Y5V	X7R	Y5V	X7R	Y5V	X7R	Y5V	X7R	Y5V	X7R	Y5V	X7R	Y5V
CAPACITANCE (pF) 100					220													
						1000												
			2200	2200														
					6800													
CAPACITANCE (pF) 10																		
CAPACITANCE (pF) 1																		
CAPACITANCE (pF) 0.1																		
CAPACITANCE (pF) 0.01																		
CAPACITANCE (pF) 0.001																		

PACKAGING = Bulk: 1,000 pcs/bag **TAPE AND REEL**: 4,000 pcs/7" (178mm) Reel, 10,000 pcs/13" (330mm) Reel **Paper tape only.**

Note: For X7R, Capacitance values = E1A 12 Step = 10, 12, 15, 18, 22, 27, 33, 39, 47, 56, 68, 82.

For Z5U and Y5V, Capacitance values = E1A 6 Step = 10, 15, 22, 33, 47, 68.

For values not listed, please contact your local Murata Electronics Sales Office.

