SURFACE MOUNT MONOLITHIC CHIP CAPACITORS
COG AND TEMPERATURE COMPENSATING TYPES
GRM36/39/40/42-6/42-2/43-2/44-1 Series

muRata
Innovator in Electronics

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 – – – 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
COH
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
*= Standard
≤ 5pf:
B = ±.1pf
*C = ±.25pf
>5pf to ≤10pf:
B = ±.1pf
C = ±.25pf
*D = ±.5pf
>10pf:
K = ±10%
*J = ±5%
G = ±2%
F = ±1%

VOLTAGE
Identified by a three-digit number.

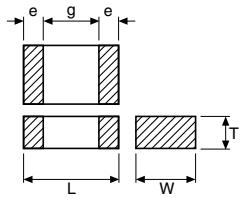
MARKING
A = Unmarked

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 115 -118 for labeling and packaging information.

CHIP DIMENSIONS



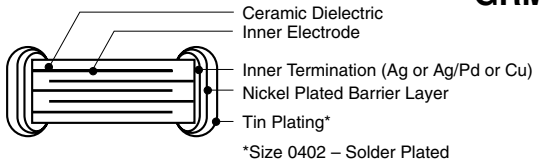
Dimensions: mm	Size	EIA Code	L Length	W Width	T Thickness	e (min.) Termination	g (min.) Insulation
	GRM36	0402	1.0 ± 0.05	0.5 ± 0.05	0.5 ± 0.05	0.15 ~ 0.3	0.4
	GRM39*	0603	1.6 ± 0.1	0.8 ± 0.1	0.8 ± 0.1	0.2 ~ 0.5	0.5
	GRM40	0805	2.0 ± 0.1	1.25 ± 0.1	0.6 ± 0.1	0.2 ~ 0.7	0.7
					0.85 ± 0.1		
					1.25 ± 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



*Size 0402 – Solder Plated

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

SURFACE MOUNT MONOLITHIC CHIP CAPACITORS
COG AND TEMPERATURE COMPENSATING TYPES – SPECIFICATION
GRM36/39/40/42-6/42-2/43-2/44-1 Series

GENERAL

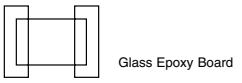
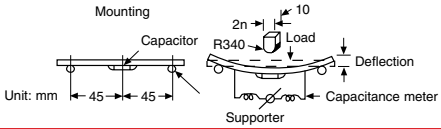
Temperature Coefficient	Temperature Range
C0G = 0 ± 30 ppm*	–55° to +125°C
C0H = 0 ± 60 ppm	–55° to +125°C
P2H = N150 ± 60 ppm	–55° to +85°C
R2H = N220 ± 60 ppm	–55° to +85°C
S2H = N330 ± 60 ppm	–55° to +85°C
T2H = N470 ± 60 ppm	–55° to +85°C
U2J = N750 ± 120 ppm	–55° to +85°C
SL = N1000 to P350	–55° to +85°C

***TC Tolerance for COG**
Refer to EIA-RS198E 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.; 200% for 500V
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		1mm 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, Steady State	Maintain 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 defects Capacitance: Within ±5% or ±.0.5pF (whichever is greater) Q/D.F.: 30pF and over: Q≥350; 10pf to 30pf: Q≥275+5/2C 10pf and below: Q≥200±10C I.R.: 1,000MΩ or 50MΩ F (whichever is less) C: Nominal Capacitance (pF)
Humidity Load	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 defects Capacitance: Within ±7.5% or ±.0.75pF (whichever is greater) Q/D.F.: 30pF and over: Q≥200; 30pf and below: Q≥100±10/3C I.R.: 500MΩ or 25MΩ F (whichever is less) C: Nominal Capacitance (pF)
Life Test	Apply 200% of rated voltage for 1000 ± 12 hours at maximum operating temperature; 150% for 500V. Upon completion of above test wait 24 hours prior to performing post testing.	Appearance: No defects Capacitance: ±3% or ±.3pF (whichever is greater) Q: >30pF = 500 min., ≤30pF = 200 + [10 x C(pF)] I.R.: 1,000MΩ or 50MΩ F (whichever is less) Flash: 250% rated voltage

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 between 5°C and 40°C and where the humidity is 20% to 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.

SURFACE MOUNT MONOLITHIC CHIP CAPACITORS
COG/COH TYPE–25V/50V/100V/200V

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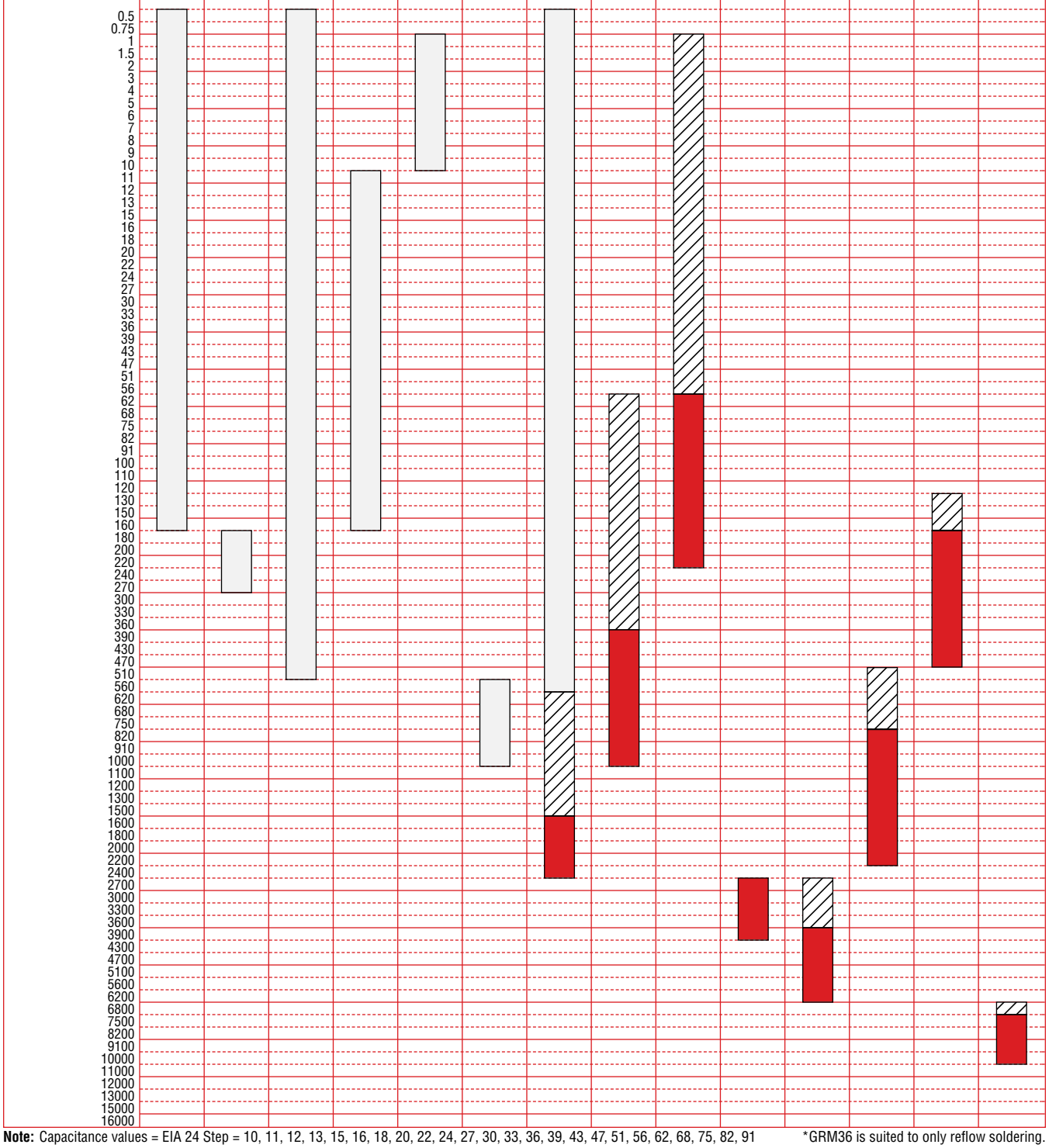
GRM36/39/40/42-6 Series



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

*GRM36 is suited to only reflow soldering.

THICKNESS AND PACKAGING TYPES/QUANTITY

Type	Thickness: T (mm)	Bulk (pcs./bag)	Taping (pcs./ϕ178mm reel)[1]	Bulk Case (pcs./case)
GRM36	: 0.5 ± 0.05	1000	10000	50000
GRM39	: 0.8 ± 0.1[2]	1000	4000	15000
GRM40	: 0.6 ± 0.1	1000	4000	10000
	: 0.85 ± 0.1	1000	4000	—
	: 1.25 ± 0.1	1000	3000	5000

Type	Thickness: T (mm)	Bulk (pcs./bag)	Taping (pcs./ϕ178mm reel)[1]	Bulk Case (pcs./case)
GRM42-6	: 0.85 ± 0.1	1000	4000	—
	: 1.15 ± 0.1	1000	3000	—

[1]ϕ330mm reel is available on request. [2]Bulk case packaging is T = 0.8 ± 0.07.

Type (EIA Code)	GRM42-2 (1210)			GRM43-2 (1812)			GRM44-1 (2220)		
Char.	COG			COG			COG		
Cap. (pF) \ Volt.	50	100	200	50	100	200	50	100	200
130									
150									
160									
180									
200									
220									
240									
270									
300									
330									
360									
390									
430									
470									
510									
560									
620									
680									
750									
820									
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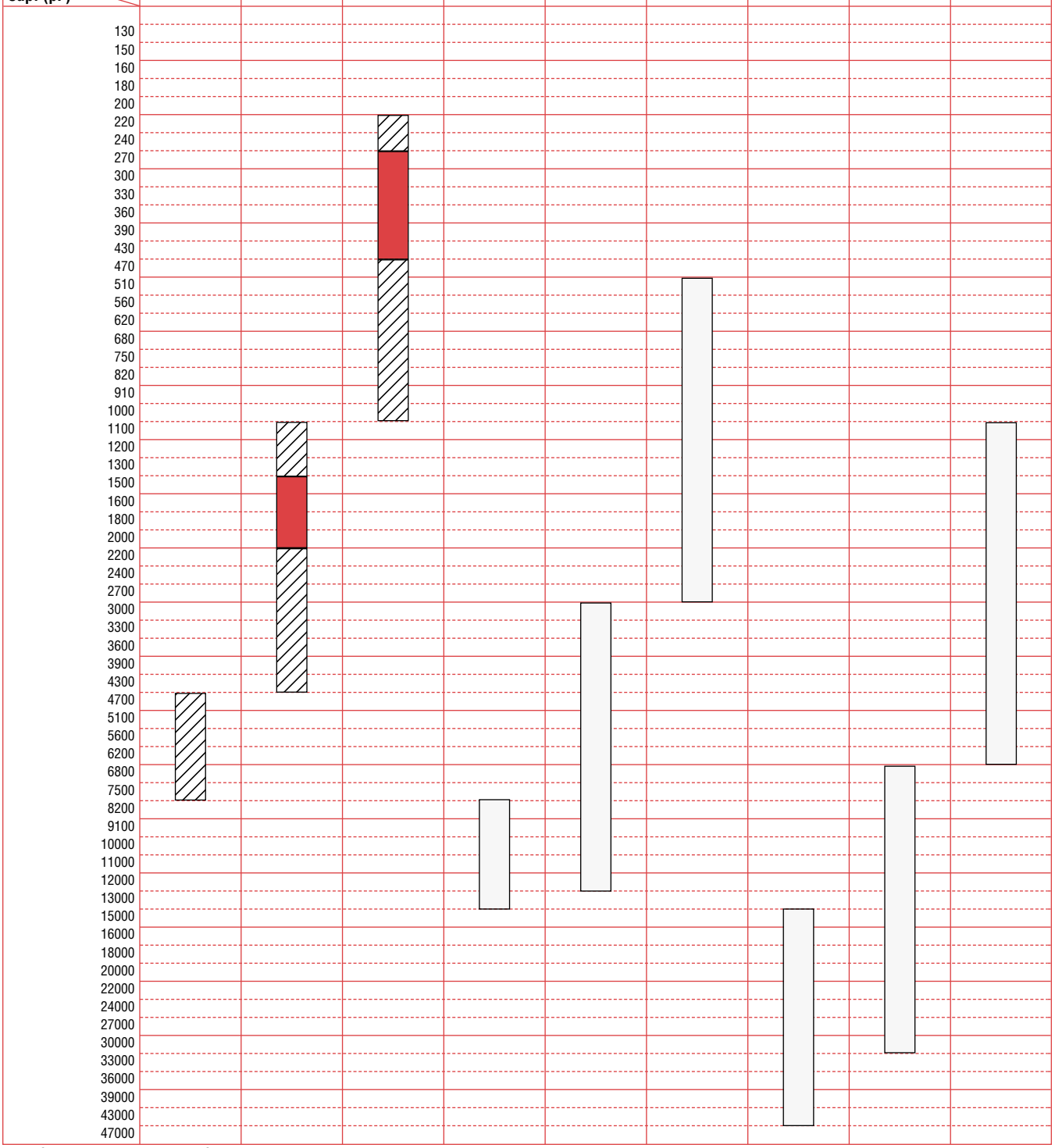
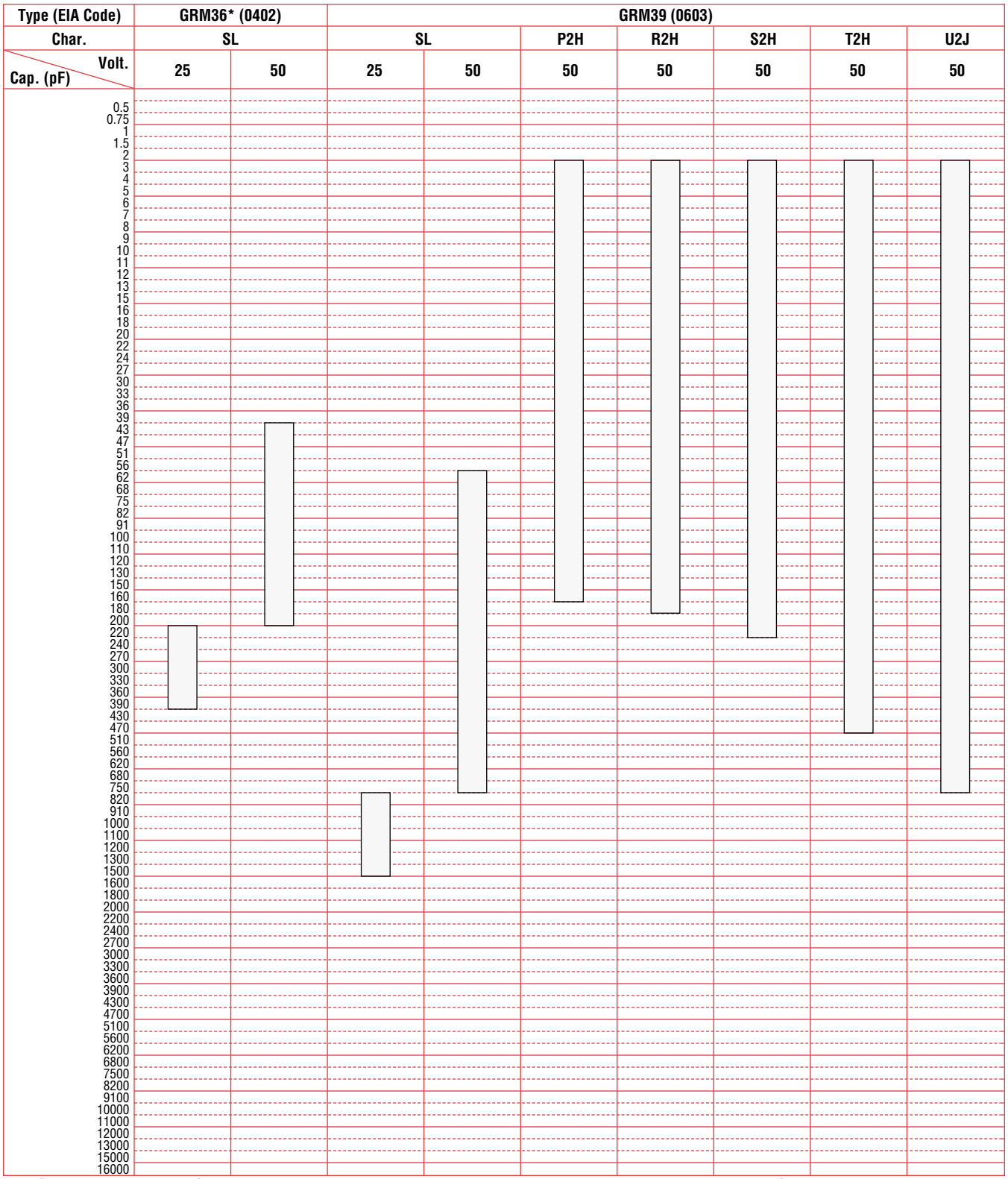


Note: Capacitance values = EIA 24 Step = 10, 11, 12, 13, 15, 16, 18, 20, 22, 24, 27, 30, 33, 36, 39, 43, 47, 51, 56, 62, 68, 75, 82, 91

THICKNESS AND PACKAGING TYPES/QUANTITY

Type	Thickness: T (mm)	Bulk (pcs./bag)	Taping (pcs./ϕ178mm reel)*
GRM42-2	▭: 1.35 ± 0.15	1000	2000
GRM43-2	▭: 2.0 max.	1000	1000
GRM44-1	▭: 2.0 max.	1000	1000

*ϕ330mm reel is available on request.



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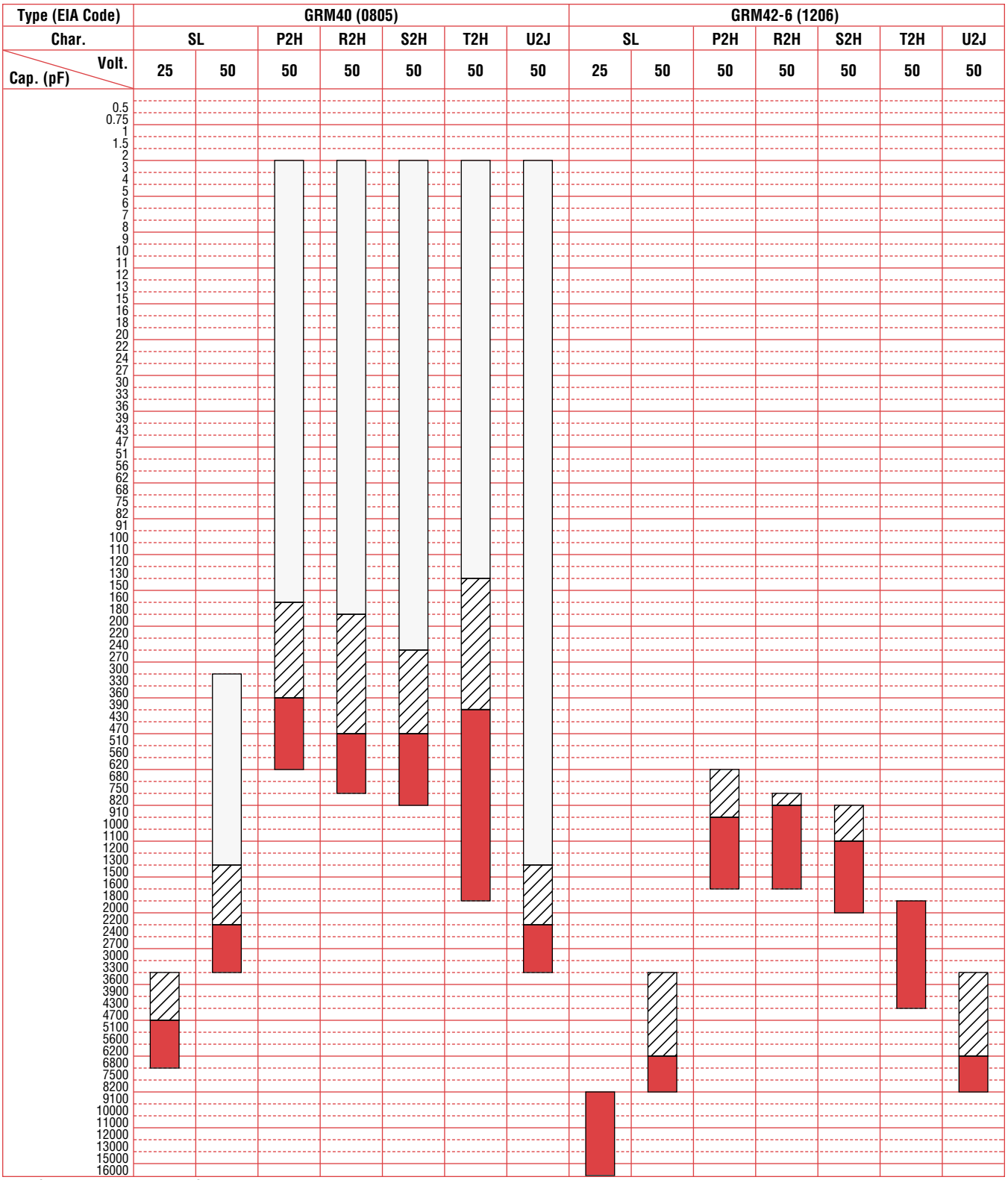
THICKNESS AND PACKAGING TYPES/QUANTITY

Type	Thickness: T (mm)	Bulk (pcs./bag)	Taping (pcs./ϕ178mm reel)[1]	Bulk Case (pcs./case)
GRM36	□: 0.5 ± 0.05	1000	10000	50000
GRM39	□: 0.8 ± 0.1[2]	1000	4000	15000

[1]ϕ330mm reel is available on request. [2]Bulk case packaging is T = 0.8 ± 0.07.



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THICKNESS AND PACKAGING TYPES/QUANTITY

Type	Thickness: T (mm)	Bulk (pcs./bag)	Taping (pcs./ϕ178mm reel)*	Bulk Case (pcs./case)	Type	Thickness: T (mm)	Bulk (pcs./bag)	Taping (pcs./ϕ178mm reel)*	Bulk Case (pcs./case)
GRM40	□: 0.6 ± 0.1	1000	4000	10000	GRM42-6	▨: 0.85 ± 0.1	1000	4000	—
	▨: 0.85 ± 0.1	1000	4000	—		■: 1.15 ± 0.1	1000	3000	—
	■: 1.25 ± 0.1	1000	3000	5000	*ϕ330mm reel is available on request.				