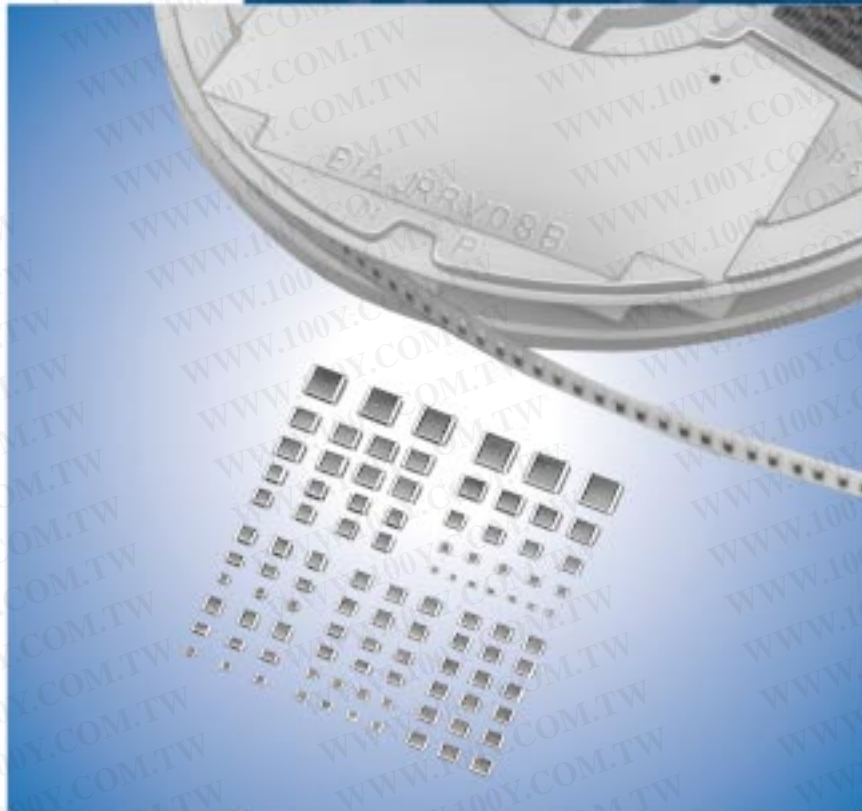


Chip Monolithic Ceramic Capacitors



勝特力材料 886-3-5753170
勝特力电子(上海) 86-21-54151736
勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

● Part Numbering

Chip Monolithic Ceramic Capacitors

(Part Number)

GR	M	18	8	B1	1H	102	K	A01	K
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩

① Product ID

② Series

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
	L	Low ESL Wide Width Type
	A	Eight-termination Low ESL Type
LL	M	Ten-termination Low ESL Type
	M	High Frequency Low Loss Type Tin Plated Type
GJ	M	High Frequency Low Loss Type Tin Plated Type
	M	High Frequency Low Loss Type Tin Plated Type
GA	2	for AC250V (r.m.s.)
	3	Safety Standard Recognized Type

③ Dimension (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

勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

④ Dimension (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.

Continued on the following page. 

Continued from the preceding page.

⑤ Temperature Characteristics

Temperature Characteristic Codes			Temperature Characteristics			Operating Temperature Range
Code	Public STD Code		Reference 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	*3	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% *4	-55 to 125°C
					+22, -33% *5	

*1 Please refer to table for Capacitance Change under reference temperature.

*2 Capacitance change is specified with 50% rated voltage applied.

*3 Murata Temperature Characteristic Code.

*4 Apply DC350V bias.

*5 No DC bias.

勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
 Http://www.100y.com.tw

Continued on the following page. 

Continued from the preceding page.

●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

⑥Rated 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)


⑦Capacitance

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

勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

Continued on the following page. 

Continued from the preceding page.

⑧ Capacitance Tolerance

Code	Capacitance Tolerance	TC	Series	Capacitance Step	
B	±0.1pF	CA	GRM/GJM	≤5pF	E24 Series,1pF
C	±0.25pF	CA-SL	GRM/ERB/GQM	≤5pF	* 1pF
		CA	GJM	<10pF	E24 Series,1pF
D	±0.5pF	CA-SL	GRM	6.0 to 9.0pF	* 1pF
		CA	ERB/GQM/GJM	5.1 to 9.1pF	E24 Series
F	±1%	CA	GRM03/15, GJM03/15	5.0 to 9.9pF	0.1pF
G	±2%	CA	GJM	≥10pF	E12 Series
		CA	GQM	≥10pF	E24 Series
		CA	GRM03/15, GJM03/15	2.0 to 9.9pF	0.1pF
J	±5%	CA-SL	GRM/GA3	≥10pF	E12 Series
		CA	ERB/GQM/GJM	≥10pF	E24 Series
		CA	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	
		CA	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	
		CA	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.

⑨ Individual Specification Code

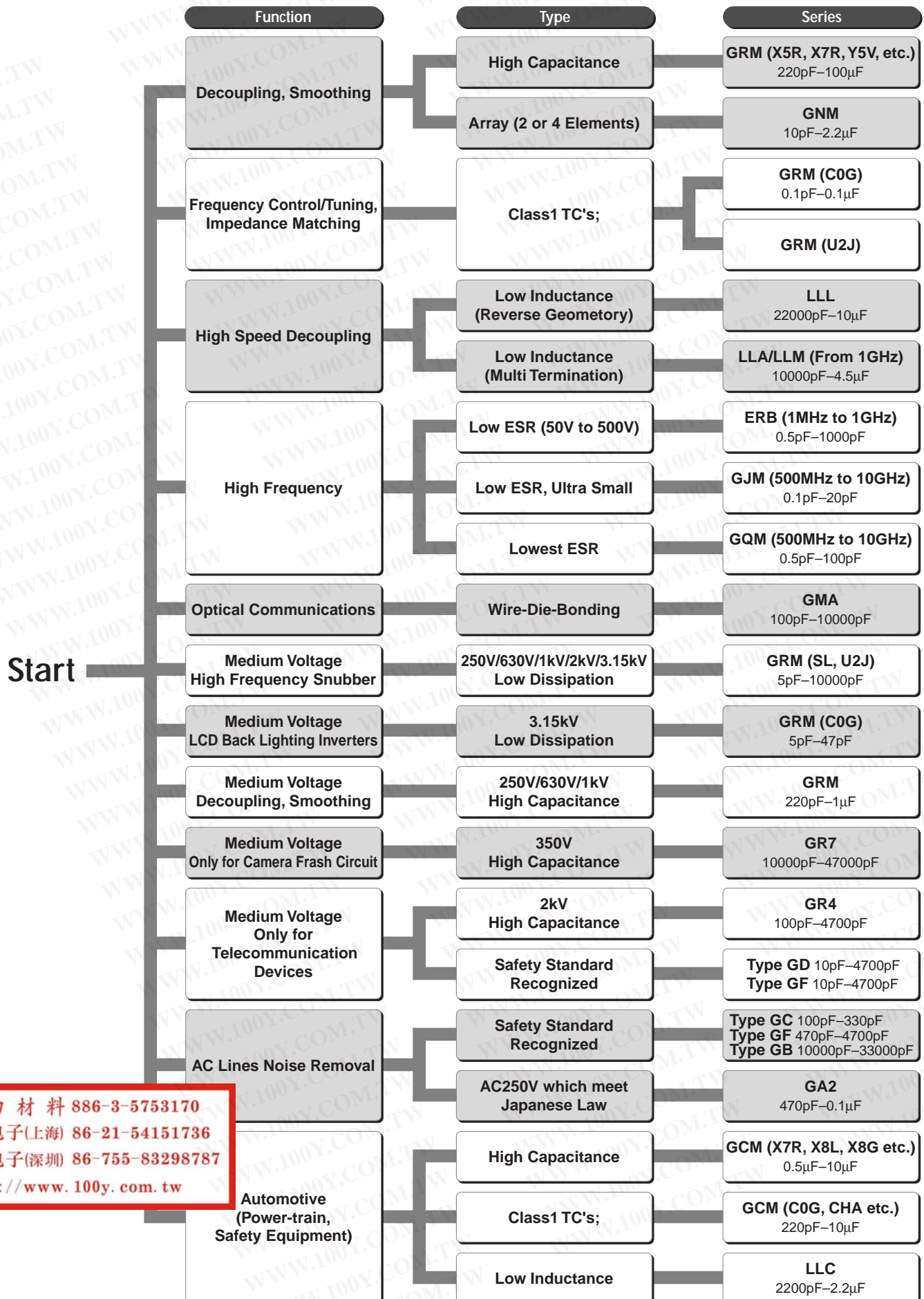
Expressed by three figures.

⑩ Packaging

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

勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

Selection Guide of Chip Monolithic Ceramic Capacitors



勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

Chip Monolithic Ceramic Capacitors



Large Capacitance Type

■ Features

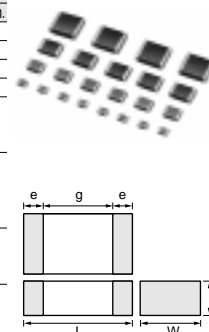
1. Smaller size and higher capacitance value
2. High reliability and no polarity
3. Excellent pulse responsibility and noise reduction due to the low impedance at high frequency
4. Ta replacement

■ Applications

General electronic equipment

勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

Part Number	Dimensions (mm)				
	L	W	T	e min.	g min.
GRM033	0.6 ±0.03	0.3 ±0.03	0.3 ±0.03	0.1 to 0.2	0.2
GRM155	1.0 ±0.05	0.5 ±0.05	0.5 ±0.05	0.15 to 0.35	0.3
GRM185	1.6 ±0.1	0.8 ±0.1	0.5 ±0.05	0.2 to 0.5	0.5
GRM188	1.6 ±0.1	0.8 ±0.1	0.8 ±0.1	0.2 to 0.5	0.5
GRM216			0.6 ±0.1		
GRM219	2.0 ±0.1	1.25 ±0.1	0.85 ±0.1	0.2 to 0.7	0.7
GRM21B			1.25 ±0.1		
GRM316			0.6 ±0.1		
GRM319	3.2 ±0.15	1.6 ±0.15	0.85 ±0.1	0.3 to 0.8	1.5
GRM31M			1.15 ±0.1		
GRM31C	3.2 ±0.2	1.6 ±0.2	1.6 ±0.2		
GRM32C			1.6 ±0.2		
GRM32D	3.2 ±0.3	2.5 ±0.2	2.0 ±0.2	0.3	1.0
GRM32E			2.5 ±0.2		
GRM43D			2.0 ±0.2		
GRM43E	4.5 ±0.4	3.2 ±0.3	2.5 ±0.2	0.3	2.0
GRM43S			2.8 ±0.2		
GRM55F	5.7 ±0.4	5.0 ±0.4	3.2 ±0.2	0.3	2.0



High Dielectric Constant Type X5R (R6) Characteristics

Part Number	TC Code (Standard)	Rated Voltage (Vdc)	Capacitance	Length L (mm)	Width W (mm)	Thickness T (mm)
GRM188R61E474KA12	X5R (EIA)	25	0.47μF ±10%	1.60	0.80	0.80
GRM188R61E105KA12	X5R (EIA)	25	1.0μF ±10%	1.60	0.80	0.80
GRM21BR61E105KA99	X5R (EIA)	25	1.0μF ±10%	2.00	1.25	1.25
GRM219R61E225KA12	X5R (EIA)	25	2.2μF ±10%	2.00	1.25	0.85
GRM21BR61E225KA12	X5R (EIA)	25	2.2μF ±10%	2.00	1.25	1.25
GRM21BR61E335KA12	X5R (EIA)	25	3.3μF ±10%	2.00	1.25	1.25
GRM21BR61E475KA12	X5R (EIA)	25	4.7μF ±10%	2.00	1.25	1.25
GRM319R61E475KA12	X5R (EIA)	25	4.7μF ±10%	3.20	1.60	0.85
GRM31CR61E106KA12	X5R (EIA)	25	10μF ±10%	3.20	1.60	1.60
GRM32ER61E226KE15	X5R (EIA)	25	22μF ±10%	3.20	2.50	2.50
GRM188R61C474KA93	X5R (EIA)	16	0.47μF ±10%	1.60	0.80	0.80
GRM185R61C105KE44	X5R (EIA)	16	1.0μF ±10%	1.60	0.80	0.50
GRM188R61C105KA93	X5R (EIA)	16	1.0μF ±10%	1.60	0.80	0.80
GRM216R61C105KA88	X5R (EIA)	16	1.0μF ±10%	2.00	1.25	0.60
GRM188R61C225KE15	X5R (EIA)	16	2.2μF ±10%	1.60	0.80	0.80
GRM219R61C225KA88	X5R (EIA)	16	2.2μF ±10%	2.00	1.25	0.85
GRM21BR61C225KA88	X5R (EIA)	16	2.2μF ±10%	2.00	1.25	1.25
GRM316R61C225KA88	X5R (EIA)	16	2.2μF ±10%	3.20	1.60	0.60
GRM21BR61C335KA88	X5R (EIA)	16	3.3μF ±10%	2.00	1.25	1.25
GRM21BR61C475KA88	X5R (EIA)	16	4.7μF ±10%	2.00	1.25	1.25
GRM319R61C475KA88	X5R (EIA)	16	4.7μF ±10%	3.20	1.60	0.85
GRM32ER61C226KE20	X5R (EIA)	16	22μF ±10%	3.20	2.50	2.50
GRM43ER61C226KE01	X5R (EIA)	16	22μF ±10%	4.50	3.20	2.50
GRM32ER61C476KE15	X5R (EIA)	16	47μF ±10%	3.20	2.50	2.50
GRM155R61A154KE19	X5R (EIA)	10	0.15μF ±10%	1.00	0.50	0.50
GRM155R61A224KE19	X5R (EIA)	10	0.22μF ±10%	1.00	0.50	0.50
GRM185R61A105KE36	X5R (EIA)	10	1.0μF ±10%	1.60	0.80	0.50
GRM188R61A225KE34	X5R (EIA)	10	2.2μF ±10%	1.60	0.80	0.80
GRM188R61A225ME34	X5R (EIA)	10	2.2μF ±10%	1.60	0.80	0.80
GRM216R61A225KE24	X5R (EIA)	10	2.2μF ±10%	2.00	1.25	0.60
GRM219R61A225KA01	X5R (EIA)	10	2.2μF ±10%	2.00	1.25	0.85
GRM316R61A225KA01	X5R (EIA)	10	2.2μF ±10%	3.20	1.60	0.60
GRM219R61A335KE19	X5R (EIA)	10	3.3μF ±10%	2.00	1.25	0.85
GRM21BR61A335KA73	X5R (EIA)	10	3.3μF ±10%	2.00	1.25	1.25
GRM316R61A335KE19	X5R (EIA)	10	3.3μF ±10%	3.20	1.60	0.60
GRM219R61A475KE34	X5R (EIA)	10	4.7μF ±10%	2.00	1.25	0.85

Continued on the following page. ➤

Continued from the preceding page.

Part Number	TC Code (Standard)	Rated Voltage (Vdc)	Capacitance	Length L (mm)	Width W (mm)	Thickness T (mm)
GRM21BR61A475KA73	X5R (EIA)	10	4.7μF ±10%	2.00	1.25	1.25
GRM316R61A475KE19	X5R (EIA)	10	4.7μF ±10%	3.20	1.60	0.60
GRM319R61A475KA01	X5R (EIA)	10	4.7μF ±10%	3.20	1.60	0.85
GRM21BR61A106KE19	X5R (EIA)	10	10μF ±10%	2.00	1.25	1.25
GRM21BR61A106ME19	X5R (EIA)	10	10μF ±20%	2.00	1.25	1.25
GRM319R61A106KA19	X5R (EIA)	10	10μF ±10%	3.20	1.60	0.85
GRM31MR61A106KE19	X5R (EIA)	10	10μF ±10%	3.20	1.60	1.15
GRM32NR61A226KE19	X5R (EIA)	10	22μF ±10%	3.20	2.50	1.35
GRM32ER61A476KE20	X5R (EIA)	10	47μF ±10%	3.20	2.50	2.50
GRM43ER61A476KE19	X5R (EIA)	10	47μF ±10%	4.50	3.20	2.50
GRM033R60J153KE01	X5R (EIA)	6.3	15000pF ±10%	0.60	0.30	0.30
GRM033R60J223KE01	X5R (EIA)	6.3	22000pF ±10%	0.60	0.30	0.30
GRM033R60J333KE01	X5R (EIA)	6.3	33000pF ±10%	0.60	0.30	0.30
GRM033R60J393KE19	X5R (EIA)	6.3	39000pF ±10%	0.60	0.30	0.30
GRM033R60J473KE19	X5R (EIA)	6.3	47000pF ±10%	0.60	0.30	0.30
GRM033R60J683KE19	X5R (EIA)	6.3	68000pF ±10%	0.60	0.30	0.30
GRM033R60J104KE19	X5R (EIA)	6.3	0.10μF ±10%	0.60	0.30	0.30
GRM155R60J154KE01	X5R (EIA)	6.3	0.15μF ±10%	1.00	0.50	0.50
GRM155R60J224KE01	X5R (EIA)	6.3	0.22μF ±10%	1.00	0.50	0.50
GRM155R60J334KE01	X5R (EIA)	6.3	0.33μF ±10%	1.00	0.50	0.50
GRM155R60J474KE19	X5R (EIA)	6.3	0.47μF ±10%	1.00	0.50	0.50
GRM155R60J105KE19	X5R (EIA)	6.3	1.0μF ±10%	1.00	0.50	0.50
GRM185R60J105KE21	X5R (EIA)	6.3	1.0μF ±10%	1.60	0.80	0.50
GRM185R60J105KE26	X5R (EIA)	6.3	1.0μF ±10%	1.60	0.80	0.50
GRM185R60J225KE26	X5R (EIA)	6.3	2.2μF ±10%	1.60	0.80	0.50
GRM188R60J225KE01	X5R (EIA)	6.3	2.2μF ±10%	1.60	0.80	0.80
GRM188R60J225KE19	X5R (EIA)	6.3	2.2μF ±10%	1.60	0.80	0.80
GRM188R60J475KE19	X5R (EIA)	6.3	4.7μF ±10%	1.60	0.80	0.80
GRM219R60J475KE01	X5R (EIA)	6.3	4.7μF ±10%	2.00	1.25	0.85
GRM219R60J475KE19	X5R (EIA)	6.3	4.7μF ±10%	2.00	1.25	0.85
GRM219R60J475KE32	X5R (EIA)	6.3	4.7μF ±10%	2.00	1.25	0.85
GRM219R60J106KE19	X5R (EIA)	6.3	10μF ±10%	2.00	1.25	0.85
GRM219R60J106ME19	X5R (EIA)	6.3	10μF ±20%	2.00	1.25	0.85
GRM21BR60J106KE01	X5R (EIA)	6.3	10μF ±10%	2.00	1.25	1.25
GRM21BR60J106KE19	X5R (EIA)	6.3	10μF ±10%	2.00	1.25	1.25
GRM21BR60J106ME01	X5R (EIA)	6.3	10μF ±20%	2.00	1.25	1.25
GRM21BR60J106ME19	X5R (EIA)	6.3	10μF ±20%	2.00	1.25	1.25
GRM319R60J106KE01	X5R (EIA)	6.3	10μF ±10%	3.20	1.60	0.85
GRM319R60J106KE19	X5R (EIA)	6.3	10μF ±10%	3.20	1.60	0.85
GRM31MR60J106KE19	X5R (EIA)	6.3	10μF ±10%	3.20	1.60	1.15
GRM31CR60J156KE19	X5R (EIA)	6.3	15μF ±10%	3.20	1.60	1.60
GRM21BR60J226ME39	X5R (EIA)	6.3	22μF ±20%	2.00	1.25	1.25
GRM31CR60J226KE19	X5R (EIA)	6.3	22μF ±10%	3.20	1.60	1.60
GRM31CR60J226ME19	X5R (EIA)	6.3	22μF ±20%	3.20	1.60	1.60
GRM32DR60J226KA01	X5R (EIA)	6.3	22μF ±10%	3.20	2.50	2.00
GRM32DR60J336ME19	X5R (EIA)	6.3	33μF ±10%	3.20	2.50	2.00
GRM43DR60J336KE01	X5R (EIA)	6.3	33μF ±10%	4.50	3.20	2.00
GRM31CR60J476ME19	X5R (EIA)	6.3	47μF ±20%	3.20	1.60	1.60
GRM32ER60J476ME20	X5R (EIA)	6.3	47μF ±20%	3.20	2.50	2.50
GRM43ER60J476KE01	X5R (EIA)	6.3	47μF ±10%	4.50	3.20	2.50
GRM32ER60J107ME20	X5R (EIA)	6.3	100μF ±20%	3.20	2.50	2.50
GRM43SR60J107ME20	X5R (EIA)	6.3	100μF ±20%	4.50	3.20	2.80
GRM188R60G106ME47	X5R (EIA)	4	10μF ±20%	1.60	0.80	0.80

勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
 Http://www.100y.com.tw

High Dielectric Constant Type X6S/X7R/X7S (C8/R7/C7) Characteristics

Part Number	TC Code (Standard)	Rated Voltage (Vdc)	Capacitance (μF)	Length L (mm)	Width W (mm)	Thickness T (mm)
GRM188C80G475KE19	X6S(EIA)	4	4.7 ±10%	1.60	0.80	0.80
GRM21BR71E225KA73	X7R (EIA)	25	2.2 ±10%	2.00	1.25	1.25
GRM55ER71E156KA01	X7R (EIA)	25	15 ±10%	5.70	5.00	2.50
GRM31CR71C106KAC7	X7R (EIA)	16	10 ±10%	3.20	1.60	1.60
GRM32ER71A226KE20	X7R (EIA)	10	22 ±10%	3.20	2.50	2.50
GRM32ER71A226ME20	X7R (EIA)	10	22 ±20%	3.20	2.50	2.50
GRM43ER71A226KE01	X7R (EIA)	10	22 ±10%	4.50	3.20	2.50
GRM21BC71A335KA73	X7S(EIA)	10	3.3 ±10%	2.00	1.25	1.25
GRM21BC71A475KA73	X7S(EIA)	10	4.7 ±10%	2.00	1.25	1.25

High Dielectric Constant Type Y5V (F5) Characteristics

Part Number	TC Code (Standard)	Rated Voltage (Vdc)	Capacitance (μF)	Length L (mm)	Width W (mm)	Thickness T (mm)
GRM188F51A225ZE01	Y5V (EIA)	10	2.2 +80/-20%	1.60	0.80	0.80
GRM188F51A475ZE20	Y5V (EIA)	10	4.7 +80/-20%	1.60	0.80	0.80
GRM31CF51A226ZE01	Y5V (EIA)	10	22 +80/-20%	3.20	1.60	1.60
GRM32CF51A226ZA01	Y5V (EIA)	10	22 +80/-20%	3.20	2.50	1.60
GRM155F50J105ZE01	Y5V (EIA)	6.3	1.0 +80/-20%	1.00	0.50	0.50
GRM188F50J225ZE01	Y5V (EIA)	6.3	2.2 +80/-20%	1.60	0.80	0.80
GRM188F50J475ZE20	Y5V (EIA)	6.3	4.7 +80/-20%	1.60	0.80	0.80
GRM21BF50J106ZE01	Y5V (EIA)	6.3	10 +80/-20%	2.00	1.25	1.25
GRM31CF50J226ZE01	Y5V (EIA)	6.3	22 +80/-20%	3.20	1.60	1.60
GRM32EF50J107ZE20	Y5V (EIA)	6.3	100 +80/-20%	3.20	2.50	2.50

勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

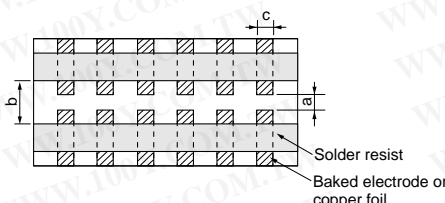
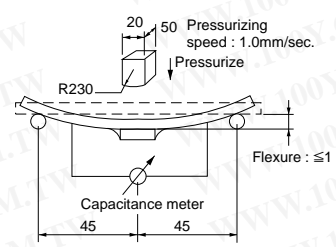
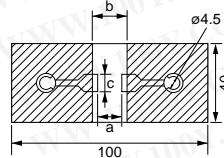
Specifications and Test Methods

No.	Item	Specifications	Test Method																				
1	Operating Temperature Range	B1, B3, F1 : -25 to +85℃ R6 : -55 to +85℃ F5 : -30 to +85℃ C8 : -55 to +105℃, C7 : -55 to +125℃	Reference temperature : 25℃ (B1, B3, F1 : 20℃)																				
2	Rated Voltage	See the previous pages.	The rated voltage is defined as the maximum voltage which may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, V ^{P-P} or V ^{O-P} , whichever is larger, should be maintained within the rated voltage range.																				
3	Appearance	No defects or abnormalities	Visual inspection																				
4	Dimensions	Within the specified dimensions	Using calipers																				
5	Dielectric Strength	No defects or abnormalities	No failure should be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA.																				
6	Insulation Resistance	More than 50Ω · F	The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at reference temperature and 75%RH max. and within 1 minutes of charging, provided the charge/discharge current is less than 50mA.																				
7	Capacitance	Within the specified tolerance *Table 1 <table><tr><td>GRM155 B3/R6 1A 124 to 224</td></tr><tr><td>GRM185 B3/R6 1A 105</td></tr><tr><td>GRM188 B3/R6 1C/1A 225</td></tr><tr><td>GRM219 B3/R6 1A 475</td></tr><tr><td>GRM21B B3/R6 1C/1A 106</td></tr></table>	GRM155 B3/R6 1A 124 to 224	GRM185 B3/R6 1A 105	GRM188 B3/R6 1C/1A 225	GRM219 B3/R6 1A 475	GRM21B B3/R6 1C/1A 106	The capacitance should be measured at reference temperature at the frequency and voltage shown in the table. <table><tr><th>Capacitance</th><th>Frequency</th><th>Voltage</th></tr><tr><td>C≤10μF (10V min.)*1</td><td>1±0.1kHz</td><td>1.0±0.2Vrms</td></tr><tr><td>C≤10μF (6.3V max.)</td><td>1±0.1kHz</td><td>0.5±0.1Vrms</td></tr><tr><td>C>10μF</td><td>120±24Hz</td><td>0.5±0.1Vrms</td></tr></table> *1 However the voltage is 0.5±0.1Vrms about Table 1 items on the left side.	Capacitance	Frequency	Voltage	C≤10μF (10V min.)*1	1±0.1kHz	1.0±0.2Vrms	C≤10μF (6.3V max.)	1±0.1kHz	0.5±0.1Vrms	C>10μF	120±24Hz	0.5±0.1Vrms			
GRM155 B3/R6 1A 124 to 224																							
GRM185 B3/R6 1A 105																							
GRM188 B3/R6 1C/1A 225																							
GRM219 B3/R6 1A 475																							
GRM21B B3/R6 1C/1A 106																							
Capacitance	Frequency	Voltage																					
C≤10μF (10V min.)*1	1±0.1kHz	1.0±0.2Vrms																					
C≤10μF (6.3V max.)	1±0.1kHz	0.5±0.1Vrms																					
C>10μF	120±24Hz	0.5±0.1Vrms																					
8	Dissipation Factor (D.F.)	B1, B3, R6, C7, C8 : 0.1 max. F1, F5 : 0.2 max. *Table 1 <table><tr><td>GRM155 B3/R6 1A 124 to 224</td></tr><tr><td>GRM185 B3/R6 1A 105</td></tr><tr><td>GRM188 B3/R6 1C/1A 225</td></tr><tr><td>GRM219 B3/R6 1A 475</td></tr><tr><td>GRM21B B3/R6 1C/1A 106</td></tr></table>	GRM155 B3/R6 1A 124 to 224	GRM185 B3/R6 1A 105	GRM188 B3/R6 1C/1A 225	GRM219 B3/R6 1A 475	GRM21B B3/R6 1C/1A 106	The D.F. should be measured at reference temperature at the frequency and voltage shown in the table. <table><tr><th>Capacitance</th><th>Frequency</th><th>Voltage</th></tr><tr><td>C≤10μF (10V min.)*1</td><td>1±0.1kHz</td><td>1.0±0.2Vrms</td></tr><tr><td>C≤10μF (6.3V max.)</td><td>1±0.1kHz</td><td>0.5±0.1Vrms</td></tr><tr><td>C>10μF</td><td>120±24Hz</td><td>0.5±0.1Vrms</td></tr></table> *1 However the voltage is 0.5±0.1Vrms about Table 1 items on the left side.	Capacitance	Frequency	Voltage	C≤10μF (10V min.)*1	1±0.1kHz	1.0±0.2Vrms	C≤10μF (6.3V max.)	1±0.1kHz	0.5±0.1Vrms	C>10μF	120±24Hz	0.5±0.1Vrms			
GRM155 B3/R6 1A 124 to 224																							
GRM185 B3/R6 1A 105																							
GRM188 B3/R6 1C/1A 225																							
GRM219 B3/R6 1A 475																							
GRM21B B3/R6 1C/1A 106																							
Capacitance	Frequency	Voltage																					
C≤10μF (10V min.)*1	1±0.1kHz	1.0±0.2Vrms																					
C≤10μF (6.3V max.)	1±0.1kHz	0.5±0.1Vrms																					
C>10μF	120±24Hz	0.5±0.1Vrms																					
9	No bias	B1, B3 : Within ±10% (-25 to +85℃) F1 : Within +30/-80% (-25 to +85℃) R6 : Within ±15% (-55 to +85℃) F5 : Within +22/-82% (-30 to +85℃) C7 : Within ±22% (-55 to +125℃) C8 : Within ±22% (-55 to +105℃)	The capacitance change should be measured after 5 min. at each specified temp. stage. The ranges of capacitance change compared with the reference temperature value over the temperature ranges shown in the table should be within the specified ranges.* In case of applying voltage, the capacitance change should be measured after 1 more min. with applying voltage in equilibration of each temp. stage. *GRM43 B1/R6 0J/1A 336/476 only : 1.0±0.2Vrms																				
	Capacitance Temperature Characteristics 50% of the Rated Voltage	<div>勝特力材料 886-3-5753170 勝特力电子(上海) 86-21-54151736 勝特力电子(深圳) 86-755-83298787 Http://www.100y.com.tw</div> B1: Within +10/-30% F1: Within +30/-95%	<table><tr><th>Step</th><th>Temperature (°C)</th><th>Applying Voltage (V)</th></tr><tr><td>1</td><td>Reference temperature ±2</td><td rowspan="3">No bias</td></tr><tr><td>2</td><td>-55±3 (for R6, C7, C8)/ -25±3 (for B1, B3, F1) -30±3 (for F5)</td></tr><tr><td>3</td><td>Reference temperature ±2</td></tr><tr><td>4</td><td>85±3 (for B1, B3, F1, R6, F5) 125±3 (for C7)/ 105±3 (for C8)</td><td rowspan="5">50% of the rated voltage</td></tr><tr><td>5</td><td>20±2</td></tr><tr><td>6</td><td>-25±3 (for B1, F1)</td></tr><tr><td>7</td><td>20±2</td></tr><tr><td>8</td><td>85±3 (for B1, F1)</td></tr></table> •Initial measurement for high dielectric constant type Perform a heat treatment at 150 +0/-10℃ for one hour and then set for 24±2 hours at room temperature. Perform the initial measurement.	Step	Temperature (°C)	Applying Voltage (V)	1	Reference temperature ±2	No bias	2	-55±3 (for R6, C7, C8)/ -25±3 (for B1, B3, F1) -30±3 (for F5)	3	Reference temperature ±2	4	85±3 (for B1, B3, F1, R6, F5) 125±3 (for C7)/ 105±3 (for C8)	50% of the rated voltage	5	20±2	6	-25±3 (for B1, F1)	7	20±2	8
Step	Temperature (°C)	Applying Voltage (V)																					
1	Reference temperature ±2	No bias																					
2	-55±3 (for R6, C7, C8)/ -25±3 (for B1, B3, F1) -30±3 (for F5)																						
3	Reference temperature ±2																						
4	85±3 (for B1, B3, F1, R6, F5) 125±3 (for C7)/ 105±3 (for C8)	50% of the rated voltage																					
5	20±2																						
6	-25±3 (for B1, F1)																						
7	20±2																						
8	85±3 (for B1, F1)																						

Continued on the following page.

Specifications and Test Methods

Continued from the preceding page.

No.	Item	Specifications	Test Method																																				
10	Adhesive Strength of Termination	<p>No removal of the terminations or other defects should occur.</p> <div><p>Fig. 1a</p></div>	<p>Solder the capacitor on the test jig (glass epoxy board) shown in Fig. 1a using an eutectic solder. Then apply 10N* force in parallel with the test jig for 10±1sec.</p> <p>The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.</p> <p>*5N : GR□15/GRM18, 2N : GR□33</p> <table><tr><th>Type</th><th>a</th><th>b</th><th>c</th></tr><tr><td>GR□03</td><td>0.3</td><td>0.9</td><td>0.3</td></tr><tr><td>GR□15</td><td>0.4</td><td>1.5</td><td>0.5</td></tr><tr><td>GRM18</td><td>1.0</td><td>3.0</td><td>1.2</td></tr><tr><td>GRM21</td><td>1.2</td><td>4.0</td><td>1.65</td></tr><tr><td>GRM31</td><td>2.2</td><td>5.0</td><td>2.0</td></tr><tr><td>GRM32</td><td>2.2</td><td>5.0</td><td>2.9</td></tr><tr><td>GRM43</td><td>3.5</td><td>7.0</td><td>3.7</td></tr><tr><td>GRM55</td><td>4.5</td><td>8.0</td><td>5.6</td></tr></table>	Type	a	b	c	GR□03	0.3	0.9	0.3	GR□15	0.4	1.5	0.5	GRM18	1.0	3.0	1.2	GRM21	1.2	4.0	1.65	GRM31	2.2	5.0	2.0	GRM32	2.2	5.0	2.9	GRM43	3.5	7.0	3.7	GRM55	4.5	8.0	5.6
Type	a	b	c																																				
GR□03	0.3	0.9	0.3																																				
GR□15	0.4	1.5	0.5																																				
GRM18	1.0	3.0	1.2																																				
GRM21	1.2	4.0	1.65																																				
GRM31	2.2	5.0	2.0																																				
GRM32	2.2	5.0	2.9																																				
GRM43	3.5	7.0	3.7																																				
GRM55	4.5	8.0	5.6																																				
11	Vibration	<table><tr><td>Appearance</td><td>No defects or abnormalities</td></tr><tr><td>Capacitance</td><td>Within the specified tolerance</td></tr><tr><td>D.F.</td><td>B1, B3, R6, C7, C8 : 0.1 max. F1, F5 : 0.2 max.</td></tr></table>	Appearance	No defects or abnormalities	Capacitance	Within the specified tolerance	D.F.	B1, B3, R6, C7, C8 : 0.1 max. F1, F5 : 0.2 max.	<p>Solder the capacitor on the test jig (glass epoxy board) in the same manner and under the same conditions as (10).</p> <p>The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should be applied for a period of 2 hours in each 3 mutually perpendicular directions (total of 6 hours).</p>																														
Appearance	No defects or abnormalities																																						
Capacitance	Within the specified tolerance																																						
D.F.	B1, B3, R6, C7, C8 : 0.1 max. F1, F5 : 0.2 max.																																						
12	Deflection	<p>No cracking or marking defects should occur.</p> <div><p>Fig.3a</p><div><p>勝特力材料 886-3-5753170</p><p>勝特力电子(上海) 86-21-54151736</p><p>勝特力电子(深圳) 86-755-83298787</p><p>Http://www.100y.com.tw</p></div></div>	<p>Solder the capacitor on the test jig (glass epoxy board) shown in Fig. 2a using an eutectic solder. Then apply a force in the direction shown in Fig. 3a for 5±1 sec. The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.</p> <div><p>Fig. 2a</p><p>t : 1.6mm</p><p>(GR□03, GR□15 : t : 0.8mm)</p><table><tr><th>Type</th><th>a</th><th>b</th><th>c</th></tr><tr><td>GR□03</td><td>0.3</td><td>0.9</td><td>0.3</td></tr><tr><td>GR□15</td><td>0.4</td><td>1.5</td><td>0.5</td></tr><tr><td>GRM18</td><td>1.0</td><td>3.0</td><td>1.2</td></tr><tr><td>GRM21</td><td>1.2</td><td>4.0</td><td>1.65</td></tr><tr><td>GRM31</td><td>2.2</td><td>5.0</td><td>2.0</td></tr><tr><td>GRM32</td><td>2.2</td><td>5.0</td><td>2.9</td></tr><tr><td>GRM43</td><td>3.5</td><td>7.0</td><td>3.7</td></tr><tr><td>GRM55</td><td>4.5</td><td>8.0</td><td>5.6</td></tr></table><p>(in mm)</p></div>	Type	a	b	c	GR□03	0.3	0.9	0.3	GR□15	0.4	1.5	0.5	GRM18	1.0	3.0	1.2	GRM21	1.2	4.0	1.65	GRM31	2.2	5.0	2.0	GRM32	2.2	5.0	2.9	GRM43	3.5	7.0	3.7	GRM55	4.5	8.0	5.6
Type	a	b	c																																				
GR□03	0.3	0.9	0.3																																				
GR□15	0.4	1.5	0.5																																				
GRM18	1.0	3.0	1.2																																				
GRM21	1.2	4.0	1.65																																				
GRM31	2.2	5.0	2.0																																				
GRM32	2.2	5.0	2.9																																				
GRM43	3.5	7.0	3.7																																				
GRM55	4.5	8.0	5.6																																				
13	Solderability of Termination	<p>75% of the terminations is to be soldered evenly and continuously.</p>	<p>Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion) .</p> <p>Preheat at 80 to 120℃ for 10 to 30 seconds.</p> <p>After preheating, immerse in an eutectic solder solution for 2±0.5 seconds at 230±5℃ or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5℃.</p>																																				

Continued on the following page. 

6

Continued from the preceding page.

No.	Item		Specifications	Test Method															
14	Resistance to Soldering Heat	Appearance	No defects or abnormalities	<p>Preheat the capacitor at 120 to 150℃ for 1 minute. Immerse the capacitor in an eutectic solder or Sn-3.0Ag-0.5Cu solder solution at 270±5℃ for 10±0.5 seconds. Set at room temperature for 24±2 hours, then measure.</p> <p>•Initial measurement for high dielectric constant type Perform a heat treatment at 150+0/−10℃ for one hour and then set at room temperature for 24±2 hours. Perform the initial measurement.</p> <p>*Preheating for GRM32/43/55</p> <table><tr><th>Step</th><th>Temperature</th><th>Time</th></tr><tr><td>1</td><td>100 to 120℃</td><td>1 min.</td></tr><tr><td>2</td><td>170 to 200℃</td><td>1 min.</td></tr></table>	Step	Temperature	Time	1	100 to 120℃	1 min.	2	170 to 200℃	1 min.						
		Step	Temperature		Time														
		1	100 to 120℃		1 min.														
		2	170 to 200℃		1 min.														
		Capacitance Change	B1, B3, R6, C7, C8 : Within ±7.5% F1, F5 : Within ±20%																
Q/D.F.	B1, B3, R6, C7, C8 : 0.1 max. F1, F5 : 0.2 max.																		
I.R.	More than 50Ω · F																		
	Dielectric Strength	No defects																	
15	Temperature Sudden Change	Appearance	No defects or abnormalities	<p>Fix the capacitor to the supporting jig in the same manner and under the same conditions as (10). Perform the five cycles according to the four heat treatments shown in the following table. Set for 24±2 hours at room temperature, then measure.</p> <table><tr><th>Step</th><th>1</th><th>2</th><th>3</th><th>4</th></tr><tr><td>Temp. (℃)</td><td>Min. Operating Temp. +0/−3</td><td>Room Temp.</td><td>Max. Operating Temp. +3/−0</td><td>Room Temp.</td></tr><tr><td>Time (min.)</td><td>30±3</td><td>2 to 3</td><td>30±3</td><td>2 to 3</td></tr></table> <p>•Initial measurement for high dielectric constant type Perform a heat treatment at 150+0/−10℃ for one hour and then set at room temperature for 24±2 hours. Perform the initial measurement.</p>	Step	1	2	3	4	Temp. (℃)	Min. Operating Temp. +0/−3	Room Temp.	Max. Operating Temp. +3/−0	Room Temp.	Time (min.)	30±3	2 to 3	30±3	2 to 3
		Step	1		2	3	4												
		Temp. (℃)	Min. Operating Temp. +0/−3		Room Temp.	Max. Operating Temp. +3/−0	Room Temp.												
		Time (min.)	30±3		2 to 3	30±3	2 to 3												
		Capacitance Change	B1, B3, R6, C7, C8 : Within ±7.5% F1, F5 : Within ±20%																
D.F.	B1, B3, R6, C7, C8 : 0.1 max. F1, F5 : 0.2 max.																		
I.R.	More than 50Ω · F																		
	Dielectric Strength	No defects																	
16	High Temperature High Humidity (Steady)	Appearance	No defects or abnormalities	<p>Apply the rated voltage at 40±2℃ and 90 to 95% humidity for 500±12 hours. The charge/discharge current is less than 50mA.</p> <p>•Initial measurement Perform a heat treatment at 150+0/−10℃ for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement.</p> <p>•Measurement after test Perform a heat treatment at 150+0/−10℃ for one hour and then let sit for 24±2 hours at room temperature, then measure.</p>															
		Capacitance Change	B1, B3, R6, C7, C8 : Within ±12.5% F1, F5 : Within ±30%																
		D.F.	B1, B3, R6, C7, C8 : 0.2 max. F1, F5 : 0.4 max.																
		I.R.	More than 12.5Ω · F																
17	Durability	Appearance	No defects or abnormalities	<p>Apply 150% of the rated voltage for 1000±12 hours at the maximum operating temperature ±3℃. Let sit for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA.</p> <p>•Initial measurement Perform a heat treatment at 150+0/−10℃ for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement.</p> <p>•Measurement after test Perform a heat treatment at 150+0/−10℃ for one hour and then let sit for 24±2 hours at room temperature, then measure.</p>															
		Capacitance Change	B1, B3, R6, C7, C8 : Within ±12.5% F1, F5 : Within ±30%																
		D.F.	B1, B3, R6, C7, C8 : 0.1 max. F1, F5 : 0.4 max.																
		I.R.	More than 25Ω · F																

勝特力材料 886-3-5753170
勝特力電子(上海) 86-21-54151736
勝特力電子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)