

# Chip Multilayer Ceramic Capacitors for Automotive



2017

# Explanation of Symbols in This Catalog



Links are provided to the latest information from the PDF version of the catalog, which is available on the web.

<b>General</b>	For applications that do not require the particular reliability such as the general equipment
<b>Info-tainment</b>	Infotainment for Automotive The product for entertainment equipment like car navigations, car audios, and body control equipment like wipers, power windows.
<b>Power-train</b>	Powertrain/Safety for Automotive Product used for applications (running, turning, stopping and safety devices) which particularly concern human life, such as in devices for automobiles.
<b>Medical Device</b>	Medical-grade products for Implanted Medical Devices These products are intended for use in implanted medical devices such as cardiac pacemakers, cochlear implants, insulin pumps and gastric electrostimulators. They are suitable for use in non-critical circuits. *1 *1 Non-critical circuits This term refers to circuits in implanted medical devices that are not directly linked to life support, i.e. circuits that will not directly endanger the life of the patient should the functionality of the device be reduced or halted by failure of the circuit.
<b>AEC-Q200</b>	AEC-Q200 compliant product
<b>Safety standard</b>	Safety Standard Certified Product Products that acquired safety standard certification IEC60384-14 and products based on the Electrical Appliance and Material Safety Law of Japan.
<b>High Q</b>	Low dissipation for high frequency By devising ceramic materials and electrode materials, low dissipation is achieved in frequency bands of VHF, UHF and microwave or beyond.
<b>Low ESL</b>	Low inductance This capacitor is designed so that the parasitic inductance component (ESL) that the capacitor has on the high frequency side becomes lower.
<b>Fail safe</b>	Fail safe product This capacitor is designed to prevent failures as much as possible by short mode.
<b>Deflecting crack</b>	Product resistant to deflection cracking This capacitor is designed to prevent failures as much as possible by short mode caused by cracking when there is board deflection.
<b>Soldering crack</b>	Product with solder cracking suppression This capacitor is configured with metal terminals and leads connected to the chip. The metal terminals and leads relieve the stress from expansion and contraction of the solder, to suppress solder cracking.
<b>Anti-noise</b>	Product suitable for acoustic noise reduction and low distortion This product suppresses acoustic noise, which occurs when a ceramic capacitor is used, by devising the materials and configuration.
<b>Effective Cap</b>	No DC bias characteristics Polymer capacitor is no capacitance change with DC bias due to aluminum oxidized film for dielectric.
<b>EMI FIL®</b>	Low-inductance product suitable for noise suppression. This product has extremely low ESL and is suitable for suppression of noise, including high frequencies. This product can also be used as a low-ESL, high-performance bypass capacitor.
<b>Limited to conductive glue mounting</b>	Limited to Conductive Glue Mounting Since silver palladium is used for the external electrodes, the capacitor can be mounted by conductive adhesive.

**Derating 1**  
 This product is suitable when a voltage continuously applied to a capacitor in an operating circuit, is used below (derated) the rated voltage of the capacitor. This model guarantees the test conditions in the endurance test, at a rated voltage x 100% at the maximum operating temperature. A reliability assurance level equivalent to a common product can be secured, by using this product within the voltage and temperature derated conditions recommended in the figure below.

**D1 Derating 1**

Recommended Conditions of the Derating Operating Voltage and Temperature

Product Temperature (°C)	125°C Type (%)	105°C Type (%)	85°C Type (%)
25	100	100	100
50	100	100	100
75	100	100	~85
100	100	~85	~70
125	~70	~70	~70

**Derating 2**  
 When the product temperature exceeds 105°C, please use this product within the voltage and temperature derated conditions in the figure below.

**D2 Derating 2**

Product Temperature (°C)	Rated Voltage 630V (V)	Rated Voltage 450V (V)
0	630	450
25	630	450
50	630	450
75	630	450
100	630	450
125	~450	~350

**Derating 3**  
 Please apply the derating curve according to the operating temperature. Please refer to detailed specifications sheet for details.

**D3 Derating 3**

**Derating 4**  
 When the product temperature exceeds 125°C, please use this product within the voltage and temperature derated conditions in the figure below.

**D4 Derating 4**

Product Temperature (°C)	125°C Type (%)	105°C Type (%)
-75	100	~50
-50	100	~50
-25	100	~50
0	100	~50
25	100	~50
50	100	~50
75	100	~50
100	100	~50
125	100	~50
150	~50	~50

**Derating 5**  
 Please apply the rated voltage derating over 150°C. Please refer to detailed specifications sheet for details.

**D5 Derating 5**

# Selection Guide for Capacitors

**Infotainment for automotive**

SMD

Solder mounting

Chip type

	<b>GRT</b>		P23
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**Powertrain/Safety for automotive**

SMD

Solder mounting

Chip type

	<b>GCM</b>		P29
	<b>GC3</b>	Anti-noise	High effective capacitance & high ripple current P37
	<b>GCJ</b>	Fail safe	Soft termination P39
	<b>GGM</b>	Water Resistant	WEB
	<b>GCQ</b>	High Q	WEB
	<b>GCD</b>	Fail safe	MLSC design P45
	<b>GCE</b>	Fail safe	Soft termination MLSC design P47
	<b>GGD</b>	Fail safe	MLSC design WEB
	<b>NFM</b>	Low ESL	3 terminals P49

Metal terminal type

	<b>KCM</b>	Anti-noise	Deflecting crack	Soldering crack	P51	
	<b>KC3</b>	Anti-noise	Deflecting crack	Soldering crack	High effective capacitance & high ripple current P54	
	<b>KCA</b>	Safety standard	Anti-noise	Deflecting crack	Soldering crack	P57

Limited to Conductive Glue Mounting

Chip type

	<b>GCB</b>	Deflecting crack	Soldering crack	Ni plating + Pd plating termination conductive glue mounting	WEB
	<b>GCG</b>	Deflecting crack	Soldering crack	AgPd termination conductive glue mounting	P60

Lead type

Solder mounting

	<b>RCE</b>	Anti-noise	Deflecting crack	Soldering crack	WEB
	<b>RHE</b>	Anti-noise	Deflecting crack	Soldering crack	150°C operation leaded WEB
	<b>RHS</b>	Anti-noise	Deflecting crack	Soldering crack	200°C operation leaded WEB
	<b>DE6</b>	Safety standard			WEB

**Medical-grade products for implanted medical devices**

SMD

Solder mounting

Chip type

	<b>GCH</b>		WEB
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**For general**

General SMD

Solder mounting

Chip type

	<b>GRM</b>		WEB
	<b>GRM</b>		For LCD backlight inverter circuit only WEB
	<b>GR3</b>	Anti-noise	High effective capacitance & high ripple current WEB
	<b>GRJ</b>	Deflecting crack	Soft termination WEB
	<b>GXM</b>	Water Resistant	WEB
	<b>GR4</b>		For information devices only WEB
	<b>GR7</b>		For camera flash circuit only WEB
	<b>GJM</b>	High Q	WEB
	<b>GQM</b>	High Q	High power WEB
	<b>GA2</b>		Based on the Electrical Appliance and Material Safety Law of Japan WEB
	<b>GA3</b>	Safety standard	WEB
	<b>LLL</b>	Low ESL	LW reversed WEB
	<b>LLA</b>	Low ESL	8 terminals WEB
	<b>LLM</b>	Low ESL	10 terminals WEB
	<b>LLR</b>	Low ESL	LW reversed controlled ESR WEB
	<b>NFM</b>	Low ESL	3 terminals WEB
	<b>GJ4</b>	Anti-noise	Low distortion WEB
	<b>GJ8</b>	Anti-noise	Low acoustic noise WEB

On interposer board

	<b>ZRA</b>	Anti-noise	WEB
	<b>ZRB</b>	Anti-noise	WEB

Metal terminal type

	<b>KRM</b>	Anti-noise	Deflecting crack	Soldering crack	WEB
	<b>KR3</b>	Anti-noise	Deflecting crack	Soldering crack	High effective capacitance & high ripple current WEB

Resin molding SMD type

	<b>DK1</b>	Safety standard	WEB
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Wire bonding mounting

Bonding

Chip type

	<b>GMA</b>		Microchip WEB
	<b>GMD</b>		WEB

Lead type

Solder mounting

	<b>RDE</b>	Anti-noise	Deflecting crack	Soldering crack	WEB
	<b>DEH</b>				High temperature low loss WEB
	<b>DEA</b>				High temperature Class 1 WEB
	<b>DEB</b>				Class 2 WEB
	<b>DEC</b>				WEB
	<b>DEF</b>				For LCD backlight inverter circuit only WEB
	<b>DHR</b>	Ultra-high-voltage	Deflecting crack	Soldering crack	WEB
	<b>DEJ</b>				Based on the Electrical Appliance and Material Safety Law of Japan WEB
	<b>DE1</b>	Safety standard			X1/Y1 Class certified product WEB
	<b>DE2</b>	Safety standard			X1/Y2 Class certified product WEB

Screw termination mounting

	<b>DHS</b>	Ultra-high-voltage			WEB
	<b>DHK</b>	Ultra-high-voltage			High voltage AC rated WEB

● Part Numbering

Chip Multilayer Ceramic Capacitors for Automotive



(Part Number)



① Product ID

② Series

Product ID	Code	Series
GC	3	High effective capacitance & High allowable ripple current
	D	Specially designed product to reduce shorts
	E	Specially designed product to reduce shorts & resin electrode product
	G	Limited to conductive glue mounting
	J	Soft termination type
	M	For automotive
GR	T	Meet AEC-Q200 for infotainment
KC	3	Metal terminal type/High effective capacitance & High allowable ripple current
	A	Metal terminal type/ Safety standard certified product
	M	Metal terminal type

③ Chip Dimension (L x W)

Code	Dimension (L x W)	EIA
03	0.6 x 0.3mm	0201
15	1.0 x 0.5mm	0402
18	1.6 x 0.8mm	0603
21	2.0 x 1.25mm	0805
31	3.2 x 1.6mm	1206
32	3.2 x 2.5mm	1210
43	4.5 x 3.2mm	1812
55	5.7 x 5.0mm	2220

⑤ Temperature Characteristics

Temperature Characteristic Codes			Temperature Characteristics			Operating Temperature Range	Capacitance Change Each Temperature (%)					
Code	Public STD Code	Reference Temperature	Temperature Range	Capacitance Change or Temperature Coefficient	-55°C		*4		-10°C			
					Max.		Min.	Max.	Min.	Max.	Min.	
5C	C0G	EIA	25°C	25 to 125°C	0±30ppm/°C	-55 to 125°C	0.58	-0.24	0.4	-0.17	0.25	-0.11
5G	X8G	*2	25°C	25 to 150°C	0±30ppm/°C	-55 to 150°C	0.58	-0.24	0.4	-0.17	0.25	-0.11
7U	U2J	EIA	25°C	25 to 125°C *3	-750±120ppm/°C	-55 to 125°C	8.78	5.04	6.04	3.47	3.84	2.21
9E	ZLM	*2	20°C	-55 to -40°C	-4700+1000/-2500ppm/°C	-55 to 125°C	-	-	-	-	-	-
				-40 to 20°C	-5350±750ppm/°C		-	-	-	-	-	
				20 to 85°C	-4700±500ppm/°C		-	-	-	-	-	
				85 to 125°C	-4700+2000/-1000ppm/°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	-	-	-	-	-	-
D7	X7T	EIA	25°C	-55 to 125°C	+22%, -33%	-55 to 125°C	-	-	-	-	-	-
L8	X8L	*2	25°C	-55 to 150°C	+15%, -40%	-55 to 150°C	-	-	-	-	-	-
M8	X8M	*2	25°C	-55 to 150°C	+15%, -50%	-55 to 150°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	-	-	-	-	-	-

\*1 Capacitance change is specified with 50% rated voltage applied.

\*2 Murata Temperature Characteristic Code.

\*3 Rated Voltage 100Vdc max: 25 to 85°C

\*4 -25°C (Reference Temperature 20°C) / -30°C (Reference Temperature 25°C)

④ Height Dimension (T) (Except KC□)

Code	Dimension (T)
3	0.3mm
5	0.5mm
6	0.6mm
8	0.8mm
9	0.85mm
A	1.0mm
B	1.25mm
C	1.6mm
D	2.0mm
E	2.5mm
M	1.15mm
Q	1.5mm
X	Depends on individual standards.

④ Height Dimension (T) (KC□ Only)

Code	Dimension (T)
L	2.8mm
Q	3.7mm
T	4.8mm
W	6.4mm

Continued on the following page. ↗

(Part Number)

GC	M	18	8	R7	1H	102	K	A37	D
1	2	3	4	5	6	7	8	9	10

Continued from the preceding page. ↘

⑥ Rated Voltage

Code		Rated Voltage
Standard Product	Voltage Derated Product	
0E	-	DC2.5V
0G	-	DC4V
0J	EC	DC6.3V
1A	ED	DC10V
1C	EE	DC16V
1E	EF	DC25V
YA	EG	DC35V
1H	EH	DC50V
1J	-	DC63V
1K	-	DC80V
2A	EL	DC100V
2E	-	DC250V
2W	LP	DC450V
2J	LQ	DC630V
3A	-	DC1kV
MF	-	X1/Y2: AC250V (Safety Standard Certified Type MF)

⑦ Capacitance

Expressed by three-digit alphanumerics. The unit is pico-farad (pF). The first and second figures are significant digits, and the third figure expresses the number of zeros that 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.

If any letter, other than "R" is included, this indicates the specific part number is a non-standard part.

Ex.)

Code	Capacitance
R50	0.50pF
1R0	1.0pF
100	10pF
103	10000pF

⑧ Capacitance Tolerance

Code	Capacitance Tolerance
C	±0.25pF
D	±0.5pF (Less than 10pF)
	±0.5% (10pF and over)
J	±5%
K	±10%
M	±20%

⑨ Individual Specification Code

Expressed by three figures.

⑩ Package

Code	Package
L	ø180mm Embossed Taping
D/W	ø180mm Paper Taping
K	ø330mm Embossed Taping
J	ø330mm Paper Taping

Please contact us if you find any part number not provided in this table.

### 3 Terminal Low ESL Multilayer Ceramic Capacitors



(Part Number)

NF	M	3D	CC	102	R	1H	3	L
1	2	3	4	5	6	7	8	9

#### 1 Product ID 2 Series

Product ID	Series
NFM	3 Terminal Low ESL Type

#### 3 Dimensions (LxW)

Code	Dimensions (LxW)	EIA
21	2.0x1.25mm	0805
31	3.2x1.6mm	1206

#### 4 Features

Code	Features	
HC	Powertrain/Safety for Automotive	For Signal Lines / For Large Current
HK		For Very Large Current

#### 5 Capacitance

Expressed by three figures. The unit is in pico-farad (pF). The first and second figures are significant digits, and the third figure expresses the number of zeros that follow the two figures.

#### 6 Characteristics

Code	Capacitance Temperature Characteristics
R	±15%, +15/-18%

#### 7 Rated Voltage

Code	Rated Voltage
1A	10V
1C	16V
1H	50V
2A	100V

#### 8 Electrode

Code	Electrode
3	Sn Plating

#### 9 Packaging

Code	Packaging
L	Embossed Taping (ø180mm Reel)
D	Paper Taping (ø180mm Reel)

Please contact us if you find any part number not provided in this table.

AEC-Q200 Compliant Chip Multilayer Ceramic Capacitors for Infotainment

**GRT Series**    

Capacitor meet AEC-Q200 (Grade2 or Grade3).

Features

① This product has cleared test conditions meet AEC-Q200.

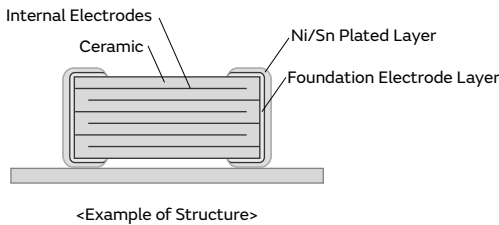
This series is designed for use in Car Multimedia, Car Interior, Car Comfort application and General Electronic equipment. It is not appropriate for use in applications critical to passenger safety and car driving function (e.g. ABS, AIRBAG, etc.). Please use the GCM series is in critical applications.

	General Purpose GRM Series Maximum operating temperature: <b>125°C</b>	AEC-Q200 meteed GRT Series Maximum operating temperature: <b>125°C</b>
Items	Test Method	Test Method
Temperature Cycle	Temperature Cycle: <b>5 cycles</b>	Temperature Cycle: <b>1,000 cycles</b>
Humidity Loading	Test temperature: <b>40±2°C</b> Test humidity: <b>90 to 95%RH</b> Test time: 500 hours	Test temperature: <b>85±2°C</b> Test humidity: <b>80 to 85%RH</b> Test time: 1,000 hours

② Meet AEC-Q200 (Grade2 or Grade3).

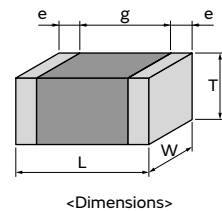
105°C product: Grade2.  
 85°C product: Grade3.

③ Sn plating is applied to the external electrodes; excellent solderability.



Specifications

Size	0.6×0.3mm to 3.2×2.5mm
Rated Voltage	2.5Vdc to 100Vdc
Capacitance	0.50pF to 100μF
Main Applications	Such as Information and Comfort equipment, car navigation, communication module and entertainment system



GRT Series  
 GCM Series  
 GC3 Series  
 GCJ Series  
 GCD Series  
 GCE Series  
 NMF Series  
 KCM Series  
 KC3 Series  
 KCA Series  
 GCG Series  
 △Caution / Notice

# GRT Series Temperature Compensating Type Part Number List

## 1.0×0.5mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.55mm	100Vdc	COG	1.0pF	±0.25pF	GRT1555C2A1R0CA02#
			2.0pF	±0.25pF	GRT1555C2A2R0CA02#
			3.0pF	±0.25pF	GRT1555C2A3R0CA02#
			4.0pF	±0.25pF	GRT1555C2A4R0CA02#
			5.0pF	±0.25pF	GRT1555C2A5R0CA02#
			6.0pF	±0.5pF	GRT1555C2A6R0DA02#
			7.0pF	±0.5pF	GRT1555C2A7R0DA02#
			8.0pF	±0.5pF	GRT1555C2A8R0DA02#
			9.0pF	±0.5pF	GRT1555C2A9R0DA02#
			10pF	±5%	GRT1555C2A100JA02#
			12pF	±5%	GRT1555C2A120JA02#
			15pF	±5%	GRT1555C2A150JA02#
			18pF	±5%	GRT1555C2A180JA02#
			22pF	±5%	GRT1555C2A220JA02#
			27pF	±5%	GRT1555C2A270JA02#
			33pF	±5%	GRT1555C2A330JA02#
			39pF	±5%	GRT1555C2A390JA02#
			47pF	±5%	GRT1555C2A470JA02#
			56pF	±5%	GRT1555C2A560JA02#
			68pF	±5%	GRT1555C2A680JA02#
			82pF	±5%	GRT1555C2A820JA02#
	100pF	±5%	GRT1555C2A101JA02#		
	50Vdc	COG	1.0pF	±0.25pF	GRT1555C1H1R0CA02#
			2.0pF	±0.25pF	GRT1555C1H2R0CA02#
			3.0pF	±0.25pF	GRT1555C1H3R0CA02#
			4.0pF	±0.25pF	GRT1555C1H4R0CA02#
			5.0pF	±0.25pF	GRT1555C1H5R0CA02#
			6.0pF	±0.5pF	GRT1555C1H6R0DA02#
			7.0pF	±0.5pF	GRT1555C1H7R0DA02#
			8.0pF	±0.5pF	GRT1555C1H8R0DA02#
			9.0pF	±0.5pF	GRT1555C1H9R0DA02#
			10pF	±5%	GRT1555C1H100JA02#
			12pF	±5%	GRT1555C1H120JA02#
			15pF	±5%	GRT1555C1H150JA02#
			18pF	±5%	GRT1555C1H180JA02#
			22pF	±5%	GRT1555C1H220JA02#
			27pF	±5%	GRT1555C1H270JA02#
			33pF	±5%	GRT1555C1H330JA02#
			39pF	±5%	GRT1555C1H390JA02#
			47pF	±5%	GRT1555C1H470JA02#
			56pF	±5%	GRT1555C1H560JA02#
			68pF	±5%	GRT1555C1H680JA02#
82pF			±5%	GRT1555C1H820JA02#	
100pF	±5%	GRT1555C1H101JA02#			
120pF	±5%	GRT1555C1H121JA02#			
150pF	±5%	GRT1555C1H151JA02#			
180pF	±5%	GRT1555C1H181JA02#			
220pF	±5%	GRT1555C1H221JA02#			
270pF	±5%	GRT1555C1H271JA02#			
330pF	±5%	GRT1555C1H331JA02#			
390pF	±5%	GRT1555C1H391JA02#			
470pF	±5%	GRT1555C1H471JA02#			

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.55mm	50Vdc	COG	560pF	±5%	GRT1555C1H561JA02#
			680pF	±5%	GRT1555C1H681JA02#
			820pF	±5%	GRT1555C1H821JA02#
			1000pF	±5%	GRT1555C1H102JA02#
	25Vdc	COG	10pF	±5%	GRT1555C1E100JA02#
			12pF	±5%	GRT1555C1E120JA02#
			15pF	±5%	GRT1555C1E150JA02#
			18pF	±5%	GRT1555C1E180JA02#
			22pF	±5%	GRT1555C1E220JA02#
			27pF	±5%	GRT1555C1E270JA02#
			33pF	±5%	GRT1555C1E330JA02#
			39pF	±5%	GRT1555C1E390JA02#
			47pF	±5%	GRT1555C1E470JA02#
			56pF	±5%	GRT1555C1E560JA02#
			68pF	±5%	GRT1555C1E680JA02#
			82pF	±5%	GRT1555C1E820JA02#
			100pF	±5%	GRT1555C1E101JA02#
			120pF	±5%	GRT1555C1E121JA02#
			150pF	±5%	GRT1555C1E151JA02#
			180pF	±5%	GRT1555C1E181JA02#
			220pF	±5%	GRT1555C1E221JA02#
270pF			±5%	GRT1555C1E271JA02#	
330pF			±5%	GRT1555C1E331JA02#	
390pF			±5%	GRT1555C1E391JA02#	
470pF			±5%	GRT1555C1E471JA02#	
560pF			±5%	GRT1555C1E561JA02#	
680pF			±5%	GRT1555C1E681JA02#	
820pF			±5%	GRT1555C1E821JA02#	
1000pF			±5%	GRT1555C1E102JA02#	

## 1.6×0.8mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
0.9mm	100Vdc	COG	1.0pF	±0.25pF	GRT1885C2A1R0CA02#
			2.0pF	±0.25pF	GRT1885C2A2R0CA02#
			3.0pF	±0.25pF	GRT1885C2A3R0CA02#
			4.0pF	±0.25pF	GRT1885C2A4R0CA02#
			5.0pF	±0.25pF	GRT1885C2A5R0CA02#
			6.0pF	±0.5pF	GRT1885C2A6R0DA02#
			7.0pF	±0.5pF	GRT1885C2A7R0DA02#
			8.0pF	±0.5pF	GRT1885C2A8R0DA02#
			9.0pF	±0.5pF	GRT1885C2A9R0DA02#
			10pF	±5%	GRT1885C2A100JA02#
			12pF	±5%	GRT1885C2A120JA02#
			15pF	±5%	GRT1885C2A150JA02#
			18pF	±5%	GRT1885C2A180JA02#
			22pF	±5%	GRT1885C2A220JA02#
			27pF	±5%	GRT1885C2A270JA02#
			33pF	±5%	GRT1885C2A330JA02#
			39pF	±5%	GRT1885C2A390JA02#
			47pF	±5%	GRT1885C2A470JA02#
			56pF	±5%	GRT1885C2A560JA02#
			68pF	±5%	GRT1885C2A680JA02#

Part number # indicates the package specification code.

GRT Series  
 GCM Series  
 GC3 Series  
 GCJ Series  
 GCD Series  
 GCE Series  
 NMF Series  
 KCM Series  
 KC3 Series  
 KCA Series  
 GCG Series  
 Caution/Notice



# GRT Series Temperature Compensating Type Info-tainment AEC-Q200 Part Number List

(→ 1.6×0.8mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number		
0.9mm	100Vdc	COG	82pF	±5%	GRT1885C2A820JA02#		
			100pF	±5%	GRT1885C2A101JA02#		
			120pF	±5%	GRT1885C2A121JA02#		
			150pF	±5%	GRT1885C2A151JA02#		
			180pF	±5%	GRT1885C2A181JA02#		
			220pF	±5%	GRT1885C2A221JA02#		
			270pF	±5%	GRT1885C2A271JA02#		
			330pF	±5%	GRT1885C2A331JA02#		
			390pF	±5%	GRT1885C2A391JA02#		
			470pF	±5%	GRT1885C2A471JA02#		
			560pF	±5%	GRT1885C2A561JA02#		
			680pF	±5%	GRT1885C2A681JA02#		
			820pF	±5%	GRT1885C2A821JA02#		
			1000pF	±5%	GRT1885C2A102JA02#		
			1200pF	±5%	GRT1885C2A122JA02#		
			1500pF	±5%	GRT1885C2A152JA02#		
			50Vdc	COG	1.0pF	±0.25pF	GRT1885C1H1R0CA02#
					2.0pF	±0.25pF	GRT1885C1H2R0CA02#
	3.0pF	±0.25pF			GRT1885C1H3R0CA02#		
	4.0pF	±0.25pF			GRT1885C1H4R0CA02#		
	5.0pF	±0.25pF			GRT1885C1H5R0CA02#		
	6.0pF	±0.5pF			GRT1885C1H6R0DA02#		
	7.0pF	±0.5pF			GRT1885C1H7R0DA02#		
	8.0pF	±0.5pF			GRT1885C1H8R0DA02#		
	9.0pF	±0.5pF			GRT1885C1H9R0DA02#		
	10pF	±5%			GRT1885C1H100JA02#		
	12pF	±5%			GRT1885C1H120JA02#		
	15pF	±5%			GRT1885C1H150JA02#		
	18pF	±5%			GRT1885C1H180JA02#		
	22pF	±5%			GRT1885C1H220JA02#		
	27pF	±5%			GRT1885C1H270JA02#		
	33pF	±5%	GRT1885C1H330JA02#				
	39pF	±5%	GRT1885C1H390JA02#				
47pF	±5%	GRT1885C1H470JA02#					
56pF	±5%	GRT1885C1H560JA02#					
68pF	±5%	GRT1885C1H680JA02#					
82pF	±5%	GRT1885C1H820JA02#					
100pF	±5%	GRT1885C1H101JA02#					
120pF	±5%	GRT1885C1H121JA02#					
150pF	±5%	GRT1885C1H151JA02#					
180pF	±5%	GRT1885C1H181JA02#					
220pF	±5%	GRT1885C1H221JA02#					
270pF	±5%	GRT1885C1H271JA02#					
330pF	±5%	GRT1885C1H331JA02#					
390pF	±5%	GRT1885C1H391JA02#					
470pF	±5%	GRT1885C1H471JA02#					
560pF	±5%	GRT1885C1H561JA02#					
680pF	±5%	GRT1885C1H681JA02#					
820pF	±5%	GRT1885C1H821JA02#					
1000pF	±5%	GRT1885C1H102JA02#					
1200pF	±5%	GRT1885C1H122JA02#					
1500pF	±5%	GRT1885C1H152JA02#					
1800pF	±5%	GRT1885C1H182JA02#					
2200pF	±5%	GRT1885C1H222JA02#					

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number		
0.9mm	50Vdc	COG	2700pF	±5%	GRT1885C1H272JA02#		
			3300pF	±5%	GRT1885C1H332JA02#		
			3900pF	±5%	GRT1885C1H392JA02#		
			4700pF	±5%	GRT1885C1H472JA02#		
			5600pF	±5%	GRT1885C1H562JA02#		
			6800pF	±5%	GRT1885C1H682JA02#		
			8200pF	±5%	GRT1885C1H822JA02#		
			10000pF	±5%	GRT1885C1H103JA02#		
			25Vdc	COG	560pF	±5%	GRT1885C1E561JA02#
					680pF	±5%	GRT1885C1E681JA02#
	820pF	±5%			GRT1885C1E821JA02#		
	1000pF	±5%			GRT1885C1E102JA02#		
	1200pF	±5%			GRT1885C1E122JA02#		
	1500pF	±5%			GRT1885C1E152JA02#		
	4700pF	±5%			GRT1885C1E472JA02#		
	5600pF	±5%			GRT1885C1E562JA02#		
	6800pF	±5%	GRT1885C1E682JA02#				
	8200pF	±5%	GRT1885C1E822JA02#				
10000pF	±5%	GRT1885C1E103JA02#					

## 2.0×1.25mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
1.35mm	50Vdc	COG	18000pF	±5%	GRT21B5C1H183JA02#
			22000pF	±5%	GRT21B5C1H223JA02#

## 3.2×1.6mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number		
1.8mm	50Vdc	COG	56000pF	±5%	GRT31C5C1H563JA02#		
			68000pF	±5%	GRT31C5C1H683JA02#		
			82000pF	±5%	GRT31C5C1H823JA02#		
			0.10μF	±5%	GRT31C5C1H104JA02#		
			0.12μF	±5%	GRT31C5C1E124JA02#		
	25Vdc	COG	0.10μF	±5%	GRT31C5C1E104JA02#		
			0.12μF	±5%	GRT31C5C1E124JA02#		
			16Vdc	COG	0.12μF	±5%	GRT31C5C1C124JA02#

Part number # indicates the package specification code.

# GRT Series High Dielectric Constant Type Part Number List

## 0.6×0.3mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number		
0.33mm	35Vdc	X5R	0.10μF	±10%	GRT033R6YA104KE01#	<b>D1</b>	
		X7R	470pF	±10%	GRT033R71E471KE01#		
	1000pF		±10%	GRT033R71E102KE01#			
	X6S		470pF	±10%	GRT033C81E471KE01#		
		1000pF	±10%	GRT033C81E102KE01#			
		0.10μF	±10%	GRT033C81E104KE01#	<b>D1</b>		
	X5R	100pF	±10%	GRT033R61E101KE01#			
		220pF	±10%	GRT033R61E221KE01#			
		470pF	±10%	GRT033R61E471KE01#			
		1000pF	±10%	GRT033R61E102KE01#			
		4700pF	±10%	GRT033R61E472KE01#	<b>D1</b>		
		10000pF	±10%	GRT033R61E103KE01#	<b>D1</b>		
		0.10μF	±10%	GRT033R61E104KE01#			
		0.10μF	±10%	GRT033R61E104KE01#			
	16Vdc	X6S	0.10μF	±10%	GRT033C81C104KE01#		
			X5R	10000pF	±10%	GRT033R61C103KE01#	
		22000pF		±10%	GRT033R61C223KE01#	<b>D1</b>	
		47000pF		±10%	GRT033R61C473KE01#	<b>D1</b>	
		0.10μF	±10%	GRT033R61C104KE01#	<b>D1</b>		
	10Vdc	X7R	10000pF	±10%	GRT033R71A103KE01#		
			X6S	0.10μF	±10%	GRT033C81A104KE01#	
		X5R		2200pF	±10%	GRT033R61A222KE01#	
				4700pF	±10%	GRT033R61A472KE01#	
		10000pF		±10%	GRT033R61A103KE01#		
		22000pF		±10%	GRT033R61A223KE01#		
		47000pF		±10%	GRT033R61A473KE01#		
		0.10μF		±10%	GRT033R61A104KE01#		
		0.22μF		±10%	GRT033R61A224KE01#	<b>D1</b>	
		6.3Vdc	X7R	2200pF	±10%	GRT033R70J222KE01#	
	4700pF			±10%	GRT033R70J472KE01#		
	10000pF			±10%	GRT033R70J103KE01#		
	X6S		2200pF	±10%	GRT033C80J222KE01#		
			4700pF	±10%	GRT033C80J472KE01#		
			10000pF	±10%	GRT033C80J103KE01#		
			22000pF	±10%	GRT033C80J223KE01#		
			47000pF	±10%	GRT033C80J473KE01#		
			68000pF	±10%	GRT033C80J683KE01#	<b>D1</b>	
			0.10μF	±10%	GRT033C80J104KE01#	<b>D1</b>	
			0.22μF	±10%	GRT033C80J224KE01#	<b>D1</b>	
	X5R		10000pF	±10%	GRT033R60J103KE01#		
			22000pF	±10%	GRT033R60J223KE01#		
			47000pF	±10%	GRT033R60J473KE01#		
			68000pF	±10%	GRT033R60J683KE01#		
		0.10μF	±10%	GRT033R60J104KE01#			
		0.22μF	±10%	GRT033R60J224KE01#	<b>D1</b>		
0.47μF		±10%	GRT033R60J474KE01#				
0.47μF		±10%	GRT033R60J474KE01#				
4Vdc	X6S	68000pF	±10%	GRT033C80G683KE01#			
		0.10μF	±10%	GRT033C80G104KE01#			
		0.22μF	±20%	GRT033C80G224ME01#	<b>D1</b>		
0.35mm	6.3Vdc	X5R	1.0μF	±20%	GRT033R60J105ME13#		
	4Vdc	X5R	1.0μF	±20%	GRT033R60G105ME13#		

## 1.0×0.5mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number			
0.55mm	50Vdc	X7R	220pF	±10%	GRT155R71H221KE01#			
			470pF	±10%	GRT155R71H471KE01#			
			1000pF	±10%	GRT155R71H102KE01#			
			2200pF	±10%	GRT155R71H222KE01#			
			4700pF	±10%	GRT155R71H472KE01#			
			10000pF	±10%	GRT155R71H103KE01#			
			22000pF	±10%	GRT155R71H223KE01#			
			47000pF	±10%	GRT155R71H473KE01#			
			0.10μF	±10%	GRT155R71H104KE01#			
			35Vdc	X6S	0.22μF	±10%	GRT155C8YA224KE01#	<b>D1</b>
					X5R	0.22μF	±10%	GRT155R6YA224KE01#
				0.47μF		±10%	GRT155R6YA474KE01#	<b>D1</b>
			25Vdc	X7R	10000pF	±10%	GRT155R71E103KE01#	
					22000pF	±10%	GRT155R71E223KE01#	
	47000pF	±10%			GRT155R71E473KE01#			
	0.10μF	±10%			GRT155R71E104KE01#			
	X6S	0.22μF		±10%	GRT155C81E224KE01#			
		X5R		0.22μF	±10%	GRT155R61E224KE01#		
				0.47μF	±10%	GRT155R61E474KE01#		
		1.0μF		±10%	GRT155R61E105KE01#	<b>D1</b>		
	16Vdc	X7R	10000pF	±10%	GRT155R71C103KE01#			
			22000pF	±10%	GRT155R71C223KE01#			
			47000pF	±10%	GRT155R71C473KE01#			
			0.10μF	±10%	GRT155R71C104KE01#			
			0.22μF	±10%	GRT155R71C224KE01#			
			0.47μF	±10%	GRT155C81C474KE01#			
		X6S	0.47μF	±10%	GRT155R61C224KE01#			
			X5R	0.47μF	±10%	GRT155R61C474KE01#		
				1.0μF	±10%	GRT155R61C105KE01#		
			10Vdc	X7R	0.22μF	±10%	GRT155R71A224KE01#	
	0.47μF	±10%			GRT155R71A474KE01#			
	X6S	1.0μF		±10%	GRT155C81A105KE01#			
		X5R		0.22μF	±10%	GRT155R61A224KE01#		
	0.47μF			±10%	GRT155R61A474KE01#			
	1.0μF			±10%	GRT155R61A105KE01#			
	2.2μF			±10%	GRT155R61A225KE01#	<b>D1</b>		
	6.3Vdc	X7R		22000pF	±10%	GRT155R70J223KE01#		
			1.0μF	±10%	GRT155R70J105KE01#	<b>D1</b>		
		X6S	0.22μF	±10%	GRT155C80J224KE01#			
			0.47μF	±10%	GRT155C80J474KE01#			
			1.0μF	±10%	GRT155C80J105KE01#	<b>D1</b>		
		X5R	2.2μF	±10%	GRT155C80J225KE01#	<b>D1</b>		
			0.22μF	±10%	GRT155R60J224KE01#			
			0.47μF	±10%	GRT155R60J474KE01#			
	4Vdc	X7R	1.0μF	±10%	GRT155R60J105KE01#			
2.2μF			±10%	GRT155R60J225KE01#				
0.6mm	35Vdc	X5R	1.0μF	±10%	GRT155R6YA105KE13#	<b>D1</b>		
	25Vdc	X6S	1.0μF	±10%	GRT155C81E105KE13#	<b>D1</b>		
	16Vdc	X6S	1.0μF	±10%	GRT155C81C105KE13#			
	10Vdc	X7S	1.0μF	±10%	GRT155C71A105KE13#			
	6.3Vdc	X5R	4.7μF	±20%	GRT155R60J475ME13#	<b>D1</b>		

Part number # indicates the package specification code.

GRT Series  
 GCM Series  
 GC3 Series  
 GCJ Series  
 GCD Series  
 GCE Series  
 NMF Series  
 KCM Series  
 KC3 Series  
 KCA Series  
 GCG Series  
 Caution/Notice

## GRT Series High Dielectric Constant Type Info-tainment AEC-Q200 Part Number List

(→ 1.0×0.5mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.6mm	4Vdc	X5R	4.7μF	±20%	GRT155R60G475ME13#	
0.65mm	10Vdc	X5R	4.7μF	±20%	GRT155R61A475ME13#	<b>D1</b>
	6.3Vdc	X6S	4.7μF	±20%	GRT155C80J475ME13#	<b>D1</b>
0.7mm	25Vdc	X5R	2.2μF	±10%	GRT155R61E225KE13#	
	16Vdc	X6S	2.2μF	±10%	GRT155C81C225KE13#	
		X5R	2.2μF	±10%	GRT155R61C225KE13#	
	10Vdc	X7S	2.2μF	±10%	GRT155C71A225KE13#	
		X6S	2.2μF	±10%	GRT155C81A225KE13#	
2.5Vdc	X6S	10μF	±20%	GRT155C80E106ME13#		

1.6×0.8mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number		
0.9mm	50Vdc	X5R	1.0μF	±10%	GRT188R61H105KE13#		
		X6S	1.0μF	±10%	GRT188C8YA105KE13#		
			X5R	1.0μF	±10%	GRT188R6YA105KE13#	
	25Vdc	X7R	1.0μF	±10%	GRT188R71E105KE13#		
			X6S	1.0μF	±10%	GRT188C81E105KE13#	
		X5R	1.0μF	±10%	GRT188R61E105KE13#		
	16Vdc	X7R	1.0μF	±10%	GRT188R71C105KE13#		
			X6S	1.0μF	±10%	GRT188C81C105KE13#	
				2.2μF	±10%	GRT188C81C225KE13#	
		X5R	1.0μF	±10%	GRT188R61C105KE13#		
		10Vdc	X6S	1.0μF	±10%	GRT188C81A105KE13#	
	X5R		1.0μF	±10%	GRT188R61A105KE01#		
2.2μF			±10%	GRT188R61A225KE13#			
6.3Vdc	X7R	2.2μF	±10%	GRT188R70J225KE13#			
		X6S	4.7μF	±10%	GRT188C80J475KE01#	<b>D1</b>	
	X5R	1.0μF	±10%	GRT188R60J105KE01#			
		2.2μF	±10%	GRT188R60J225KE13#			
		4.7μF	±10%	GRT188R60J475KE01#			
		10μF	±20%	GRT188R60J106ME13#			
4Vdc	X6S	1.0μF	±20%	GRT188C80G105ME01#			
		4.7μF	±10%	GRT188C80G475KE01#			
		10μF	±20%	GRT188C80G106ME13#	<b>D1</b>		
	X5R	10μF	±20%	GRT188R60G106ME13#			
0.95mm	25Vdc	X5R	4.7μF	±10%	GRT188R61E475KE13#		
		X6S	4.7μF	±10%	GRT188C81C475KE13#		
			X5R	4.7μF	±10%	GRT188R61C475KE13#	
	10Vdc	X5R	10μF	±10%	GRT188R61A106KE13#	<b>D1</b>	
2.2μF			±20%	GRT188R60E226ME13#			
1.0mm	50Vdc	X5R	2.2μF	±10%	GRT188R61H225KE13#		
		X6S	2.2μF	±10%	GRT188C8YA225KE13#		
	35Vdc	X5R	4.7μF	±10%	GRT188R6YA475KE13#		
			X6S	2.2μF	±10%	GRT188C81E225KE13#	
		X5R	4.7μF	±10%	GRT188C81E475KE13#		
	25Vdc	X5R	10μF	±20%	GRT188R61E106ME13#		
			10μF	±20%	GRT188C81C106ME13#		
	10Vdc	X6S	10μF	±20%	GRT188C81A106ME13#		
	6.3Vdc	X5R	22μF	±20%	GRT188R60J226ME13#	<b>D1</b>	

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.0mm	4Vdc	X6S	22μF	±20%	GRT188C80G226ME13#	

2.0×1.25mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number		
1.35mm	50Vdc	X7R	1.0μF	±10%	GRT21BR71H105KE01#		
			X6S	2.2μF	±10%	GRT21BC81E225KA02#	
				4.7μF	±10%	GRT21BC81E475KA02#	
		X5R	2.2μF	±10%	GRT21BR61E225KA02#		
			4.7μF	±10%	GRT21BR61E475KA02#		
			10μF	±10%	GRT21BC81C106KE01#	<b>D1</b>	
	16Vdc	X7R	2.2μF	±10%	GRT21BR71C225KE01#		
			X6S	2.2μF	±10%	GRT21BC81C225KA02#	
				4.7μF	±10%	GRT21BC81C475KA02#	
		X5R	2.2μF	±10%	GRT21BR61C225KA02#		
			4.7μF	±10%	GRT21BR61C475KA02#		
			10μF	±10%	GRT21BR61C106KE01#		
10Vdc	X6S	10μF	±10%	GRT21BC81A106KE01#			
	X5R	10μF	±10%	GRT21BR61A106KE01#			
6.3Vdc	X5R	10μF	±10%	GRT21BR60J106KE01#			
1.4mm	50Vdc	X5R	2.2μF	±10%	GRT21BR61H225KE13#		
			4.7μF	±10%	GRT21BR61H475KE13#		
		X6S	2.2μF	±10%	GRT21BC8YA225KE13#		
	35Vdc	X6S	4.7μF	±10%	GRT21BC8YA475KE13#		
			X7R	2.2μF	±10%	GRT21BR71E225KE13#	
		X5R	10μF	±10%	GRT21BR61E106KE13#		
	25Vdc	X7R	4.7μF	±10%	GRT21BR71C475KE13#		
			X5R	10μF	±10%	GRT21BR61E106KE13#	
	16Vdc	X7R	4.7μF	±10%	GRT21BR71A475KE13#		
			X5R	4.7μF	±10%	GRT21BR61A475KE13#	
		X5R	22μF	±20%	GRT21BR61A226ME13#	<b>D1</b>	
	6.3Vdc	X7R	10μF	±10%	GRT21BR70J106KE13#		
X5R			4.7μF	±10%	GRT21BR60J475KE13#		
X5R		22μF	±20%	GRT21BR60J226ME13#			
1.45mm	25Vdc	X7S	10μF	±10%	GRT21BC71E106KE13#	<b>D1</b>	
		X5R	22μF	±20%	GRT21BR61E226ME13#		
	16Vdc	X5R	22μF	±20%	GRT21BR61C226ME13#		
		X6S	22μF	±20%	GRT21BC81A226ME13#		
	10Vdc	X6S	22μF	±20%	GRT21BC81A226ME13#		
		X5R	47μF	±20%	GRT21BR60J476ME13#	<b>D1</b>	
4Vdc	X5R	47μF	±20%	GRT21BR60G476ME13#			

3.2×1.6mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number		
1.8mm	50Vdc	X7R	2.2μF	±10%	GRT31CR71H225KE13#		
			X6S	2.2μF	±10%	GRT31CC81H225KE01#	
				X5R	10μF	±10%	GRT31CR61H106KE01#
		35Vdc	X6S	10μF	±10%	GRT31CC8YA106KE01#	
				X5R	10μF	±10%	GRT31CR6YA106KE01#
			X7R	10μF	±10%	GRT31CR71E106KE13#	
	25Vdc	X6S	10μF	±10%	GRT31CC81E106KE01#		
			X5R	10μF	±10%	GRT31CR61E106KE01#	
		X7R	10μF	±10%	GRT31CR71E106KE13#		
			X5R	10μF	±10%	GRT31CR61E106KE01#	

Part number # indicates the package specification code.

GRT Series

GCM Series

GC3 Series

G CJ Series

GCD Series

GCE Series

NMF Series

KCM Series

KC3 Series

KCA Series

GCG Series

⚠Caution/  
 Notice

# GRT Series High Dielectric Constant Type Part Number List

(→ 3.2×1.6mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.8mm	25Vdc	X5R	22μF	±10%	GRT31CR61E226KE01#	
		X6S	22μF	±10%	GRT31CC81C226KE01#	
			X5R	22μF	±10%	GRT31CR61C226KE01#
	10Vdc	X6S	22μF	±10%	GRT31CC81A226KE01#	
			X5R	22μF	±10%	GRT31CR61A226KE01#
				47μF	±10%	GRT31CR61A476KE13#
	6.3Vdc	X7R	22μF	±10%	GRT31CR70J226KE13#	
			X6S	22μF	±10%	GRT31CC80J226KE01#
				47μF	±10%	GRT31CC80J476KE13#
		X5R	22μF	±10%	GRT31CR60J226KE01#	
					47μF	±10%
	4Vdc	X6S	22μF	±10%	GRT31CC80G226KE01#	
				47μF	±20%	GRT31CC80G476ME01#

## 3.2×2.5mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number
2.2mm	25Vdc	X6S	10μF	±10%	GRT32DC81E106KE01#
		X5R	10μF	±10%	GRT32DR61E106KE01#
	6.3Vdc	X5R	33μF	±20%	GRT32DR60J336ME01#
2.7mm	50Vdc	X7R	4.7μF	±10%	GRT32ER71H475KE01#
		X6S	4.7μF	±10%	GRT32EC81H475KE01#
	16Vdc	X6S	47μF	±10%	GRT32EC81C476KE13# <b>D1</b>
	10Vdc	X6S	47μF	±10%	GRT32EC81A476KE13#
	6.3Vdc	X7R	47μF	±10%	GRT32ER70J476KE13#
			X6S	47μF	±10%
	X5R	100μF	±20%	GRT32ER60J107ME13#	