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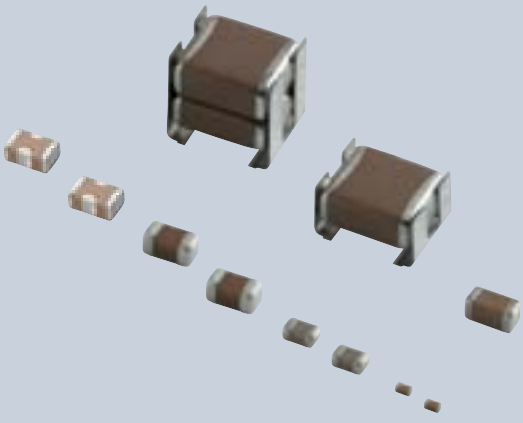
Chip Multilayer Ceramic Capacitors for Automotive

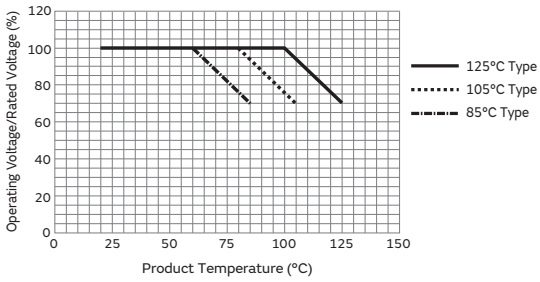
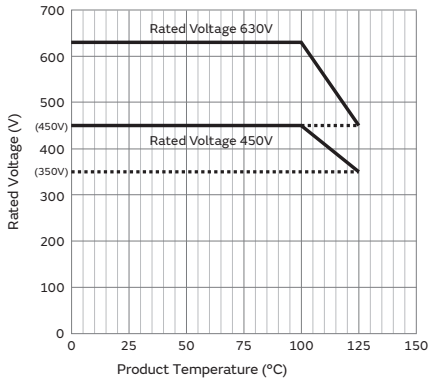
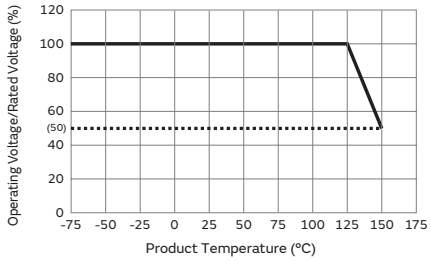


2017

Explanation of Symbols in This Catalog

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

General	For applications that do not require the particular reliability such as the general equipment
Info-tainment	Infotainment for Automotive The product for entertainment equipment like car navigations, car audios, and body control equipment like wipers, power windows.
Power-train	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.
Medical Device	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.
AEC-Q200	AEC-Q200 compliant product
Safety standard	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.
High Q	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.
Low ESL	Low inductance This capacitor is designed so that the parasitic inductance component (ESL) that the capacitor has on the high frequency side becomes lower.
Fail safe	Fail safe product This capacitor is designed to prevent failures as much as possible by short mode.
Deflecting crack	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.
Soldering crack	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.
Anti-noise	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.
Effective Cap	No DC bias characteristics Polymer capacitor is no capacitance change with DC bias due to aluminum oxidized film for dielectric.
EMI FIL®	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.
Limited to conductive glue mounting	Limited to Conductive Glue Mounting Since silver palladium is used for the external electrodes,the capacitor can be mounted by conductive adhesive.

D1 Derating 1	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. Recommended Conditions of the Derating Operating Voltage and Temperature 
D2 Derating 2	Derating 2 When the product temperature exceeds 105°C, please use this product within the voltage and temperature derated conditions in the figure below. 
D3 Derating 3	Derating 3 Please apply the derating curve according to the operating temperature. Please refer to detailed specifications sheet for details.
D4 Derating 4	Derating 4 When the product temperature exceeds 125°C, please use this product within the voltage and temperature derated conditions in the figure below. 
D5 Derating 5	Derating 5 Please apply the rated voltage derating over 150°C. Please refer to detailed specifications sheet for details.

Selection Guide for Capacitors

Infotainment for automotive

Infotainment / AEC-Q200 / SMD / Solder mounting / Chip type

GRT			P23

Powertrain/Safety for automotive

Powertrain / AEC-Q200 / SMD / Solder mounting

Chip type

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

Metal terminal type

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

Limited to Conductive Glue Mounting

Chip type

GCB	Deflecting crack, Soldering crack	Ni plating + Pd plating termination conductive glue mounting	WEB
GCG	Deflecting crack, Soldering crack	AgPd termination conductive glue mounting	P60

Lead type

Solder mounting

RCE	Anti-noise, Deflecting crack, Soldering crack		WEB
RHE	Anti-noise, Deflecting crack, Soldering crack	150°C operation leaded	WEB
RHS	Anti-noise, Deflecting crack, Soldering crack	200°C operation leaded	WEB
DE6	Safety standard		WEB

Medical-grade products for implanted medical devices

Medical Device / SMD / Solder mounting / Chip type

GCH			WEB

For general

General / SMD / Solder mounting

Chip type

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

On interposer board

ZRA	Anti-noise		WEB
ZRB	Anti-noise		WEB

Metal terminal type

KRM	Anti-noise, Deflecting crack, Soldering crack		WEB
KR3	Anti-noise, Deflecting crack, Soldering crack	High effective capacitance & high ripple current	WEB

Resin molding SMD type

DK1	Safety standard		WEB

Wire bonding mounting

Bonding / Chip type

GMA		Microchip	WEB
GMD			WEB

Lead type

Solder mounting

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

Screw termination mounting

DHS	Ultrahigh-voltage		WEB
DHK	Ultrahigh-voltage	High voltage AC rated	WEB

Part Numbering

Chip Multilayer Ceramic Capacitors for Automotive

WEB

(Part Number)

GC	M	18	8	R7	1H	102	K	A37	D
❶	❷	❸	❹	❺	❻	❼	❽	❾	❿

❶Product ID

❷Series

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	Metel terminal type/ Safety standard certified product
	M	Metal terminal type

❸Chip 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

❹Height 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.

❹Height Dimension (T) (**KC**□ Only)

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

❺Temperature Characteristics

Temperature Characteristic Codes			Temperature Characteristics			Operating Temperature Range	Capacitance Change Each Temperature (%)					
							−55°C		*4		−10°C	
Code	Public STD Code		Reference Temperature	Temperature Range	Capacitance Change or Temperature Coefficient		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)

Continued on the following page.↗

(Part Number)

GC	M	18	8	R7	1H	102	K	A37	D
❶	❷	❸	❹	❺	❻	❼	❽	❾	❿

Continued from the preceding page. ↘

❻Rated 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)

❼Capacitance

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

❽Capacitance Tolerance

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

❾Individual Specification Code

Expressed by three figures.

❿Package

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

WEB

(Part Number)

NF	M	3D	CC	102	R	1H	3	L
❶	❷	❸	❹	❺	❻	❼	❽	❾

❶Product ID ❷Series

Product ID	Series
NFM	3 Terminal Low ESL Type

❸Dimensions (LxW)

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

❹Features

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

❺Capacitance

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.

❻Characteristics

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

❼Rated Voltage

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

❽Electrode

Code	Electrode
3	Sn Plating

❾Packaging

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

Info-tainment AEC-Q200 WEB

Capacitor meet AEC-Q200 (Grade2 or Grade3).

Features

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

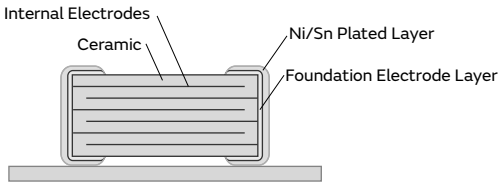
This series is designed for use in Car Multimedia, Car Interior, Car Comfort application and General Electronic equipment. It is not appropriate for use in applications critical to passenger safety and car driving function (e.g. ABS, AIRBAG, etc.). Please use the GCM series is in critical applications.

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

2 Meet AEC-Q200 (Grade2 or Grade3).

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

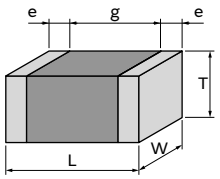
3 Sn plating is applied to the external electrodes; excellent solderability.



<Example of Structure>

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



<Dimensions>

GRT Series Temperature Compensating Type Infotainment AEC-Q200 Part Number List

1.0×0.5mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
0.55mm	100Vdc	C0G	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	C0G	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#	
0.55mm	50Vdc	C0G	560pF	±5%	GRT1555C1H561JA02#	
			680pF	±5%	GRT1555C1H681JA02#	
			820pF	±5%	GRT1555C1H821JA02#	
			1000pF	±5%	GRT1555C1H102JA02#	
	25Vdc	C0G	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	C0G	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 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	C0G	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	C0G	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#**	
0.9mm	50Vdc	C0G	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	C0G	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	C0G	18000pF	±5%	**GRT21B5C1H183JA02#**	
			22000pF	±5%	**GRT21B5C1H223JA02#**	

3.2×1.6mm

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.8mm	50Vdc	C0G	56000pF	±5%	**GRT31C5C1H563JA02#**	
			68000pF	±5%	**GRT31C5C1H683JA02#**	
			82000pF	±5%	**GRT31C5C1H823JA02#**	
			0.10μF	±5%	**GRT31C5C1H104JA02#**	
	25Vdc	C0G	0.10μF	±5%	**GRT31C5C1E104JA02#**	
			0.12μF	±5%	**GRT31C5C1E124JA02#**	
	16Vdc	C0G	0.12μF	±5%	**GRT31C5C1C124JA02#**	

Part number # indicates the package specification code.

GRT Series High Dielectric Constant Type Info-tainment AEC-Q200 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#	D1
	25Vdc	X7R	470pF	±10%	GRT033R71E471KE01#	
			1000pF	±10%	GRT033R71E102KE01#	
		X6S	470pF	±10%	GRT033C81E471KE01#	
			1000pF	±10%	GRT033C81E102KE01#	
			0.10μF	±10%	GRT033C81E104KE01#	D1
		X5R	100pF	±10%	GRT033R61E101KE01#	
			220pF	±10%	GRT033R61E221KE01#	
			470pF	±10%	GRT033R61E471KE01#	
			1000pF	±10%	GRT033R61E102KE01#	
			4700pF	±10%	GRT033R61E472KE01#	D1
			10000pF	±10%	GRT033R61E103KE01#	D1
			0.10μF	±10%	GRT033R61E104KE01#	
	16Vdc	X6S	0.10μF	±10%	GRT033C81C104KE01#	
		X5R	10000pF	±10%	GRT033R61C103KE01#	
			22000pF	±10%	GRT033R61C223KE01#	D1
			47000pF	±10%	GRT033R61C473KE01#	D1
			0.10μF	±10%	GRT033R61C104KE01#	D1
	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#	D1
	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#	D1
			0.10μF	±10%	GRT033C80J104KE01#	D1
			0.22μF	±10%	GRT033C80J224KE01#	D1
		X5R	10000pF	±10%	GRT033R60J103KE01#	
			22000pF	±10%	GRT033R60J223KE01#	
			47000pF	±10%	GRT033R60J473KE01#	
			68000pF	±10%	GRT033R60J683KE01#	
			0.10μF	±10%	GRT033R60J104KE01#	
			0.22μF	±10%	GRT033R60J224KE01#	D1
			0.47μF	±10%	GRT033R60J474KE01#	
	4Vdc	X6S	68000pF	±10%	GRT033C80G683KE01#	
			0.10μF	±10%	GRT033C80G104KE01#	
			0.22μF	±20%	GRT033C80G224ME01#	D1
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#	D1
		X5R	0.22μF	±10%	GRT155R6YA224KE01#	D1
			0.47μF	±10%	GRT155R6YA474KE01#	D1
	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#	D1
	16Vdc	X7R	10000pF	±10%	GRT155R71C103KE01#	
			22000pF	±10%	GRT155R71C223KE01#	
			47000pF	±10%	GRT155R71C473KE01#	
			0.10μF	±10%	GRT155R71C104KE01#	
			0.22μF	±10%	GRT155R71C224KE01#	
		X6S	0.47μF	±10%	GRT155C81C474KE01#	
		X5R	0.22μF	±10%	GRT155R61C224KE01#	
			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#	D1
	6.3Vdc	X7R	22000pF	±10%	GRT155R70J223KE01#	
			1.0μF	±10%	GRT155R70J105KE01#	D1
		X6S	0.22μF	±10%	GRT155C80J224KE01#	
			0.47μF	±10%	GRT155C80J474KE01#	
			1.0μF	±10%	GRT155C80J105KE01#	D1
			2.2μF	±10%	GRT155C80J225KE01#	D1
		X5R	0.22μF	±10%	GRT155R60J224KE01#	
			0.47μF	±10%	GRT155R60J474KE01#	
			1.0μF	±10%	GRT155R60J105KE01#	
			2.2μF	±10%	GRT155R60J225KE01#	
	4Vdc	X7R	1.0μF	±10%	GRT155R70G105KE01#	
0.6mm	35Vdc	X5R	1.0μF	±10%	GRT155R6YA105KE13#	D1
	25Vdc	X6S	1.0μF	±10%	GRT155C81E105KE13#	D1
	16Vdc	X6S	1.0μF	±10%	GRT155C81C105KE13#	
	10Vdc	X7S	1.0μF	±10%	GRT155C71A105KE13#	
	6.3Vdc	X5R	4.7μF	±20%	GRT155R60J475ME13#	D1

Part number # indicates the package specification code.

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#	D1
	6.3Vdc	X6S	4.7µF	±20%	GRT155C80J475ME13#	D1
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#	
	35Vdc	X6S	1.0µF	±10%	GRT188C8YA105KE13#	
		X5R	1.0µF	±10%	GRT188R6YA105KE13#	
			2.2µF	±10%	GRT188R6YA225KE13#	D1
	25Vdc	X7R	1.0µF	±10%	GRT188R71E105KE13#	
		X6S	1.0µF	±10%	GRT188C81E105KE13#	
		X5R	1.0µF	±10%	GRT188R61E105KE13#	
			2.2µF	±10%	GRT188R61E225KE13#	
	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#	D1
		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#	D1
		X5R	10µF	±20%	GRT188R60G106ME13#	
0.95mm	25Vdc	X5R	4.7µF	±10%	GRT188R61E475KE13#	
	16Vdc	X6S	4.7µF	±10%	GRT188C81C475KE13#	
		X5R	4.7µF	±10%	GRT188R61C475KE13#	
			10µF	±10%	GRT188R61C106KE13#	
	10Vdc	X5R	10µF	±10%	GRT188R61A106KE13#	D1
	2.5Vdc	X5R	22µF	±20%	GRT188R60E226ME13#	
1.0mm	50Vdc	X5R	2.2µF	±10%	GRT188R61H225KE13#	
	35Vdc	X6S	2.2µF	±10%	GRT188C8YA225KE13#	
		X5R	4.7µF	±10%	GRT188R6YA475KE13#	
	25Vdc	X6S	2.2µF	±10%	GRT188C81E225KE13#	
			4.7µF	±10%	GRT188C81E475KE13#	
		X5R	10µF	±20%	GRT188R61E106ME13#	
	16Vdc	X6S	10µF	±20%	GRT188C81C106ME13#	
	10Vdc	X6S	10µF	±20%	GRT188C81A106ME13#	
	6.3Vdc	X5R	22µF	±20%	GRT188R60J226ME13#	D1
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#	
	25Vdc	X6S	2.2µF	±10%	GRT21BC81E225KA02#	
			4.7µF	±10%	GRT21BC81E475KA02#	
		X5R	2.2µF	±10%	GRT21BR61E225KA02#	
			4.7µF	±10%	GRT21BR61E475KA02#	
	16Vdc	X7R	2.2µF	±10%	GRT21BR71C225KE01#	
		X6S	2.2µF	±10%	GRT21BC81C225KA02#	
			4.7µF	±10%	GRT21BC81C475KA02#	
			10µF	±10%	GRT21BC81C106KE01#	D1
		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#	
	35Vdc	X6S	2.2µF	±10%	GRT21BC8YA225KE13#	
			4.7µF	±10%	GRT21BC8YA475KE13#	
	25Vdc	X7R	2.2µF	±10%	GRT21BR71E225KE13#	
		X5R	10µF	±10%	GRT21BR61E106KE13#	
	16Vdc	X7R	4.7µF	±10%	GRT21BR71C475KE13#	
	10Vdc	X7R	4.7µF	±10%	GRT21BR71A475KE13#	
			10µF	±10%	GRT21BR71A106KE13#	
		X5R	4.7µF	±10%	GRT21BR61A475KE13#	
			22µF	±20%	GRT21BR61A226ME13#	D1
	6.3Vdc	X7R	10µF	±10%	GRT21BR70J106KE13#	
		X5R	4.7µF	±10%	GRT21BR60J475KE13#	
			22µF	±20%	GRT21BR60J226ME13#	
1.45mm	25Vdc	X7S	10µF	±10%	GRT21BC71E106KE13#	D1
		X5R	22µF	±20%	GRT21BR61E226ME13#	
	16Vdc	X5R	22µF	±20%	GRT21BR61C226ME13#	
	10Vdc	X6S	22µF	±20%	GRT21BC81A226ME13#	
	6.3Vdc	X5R	47µF	±20%	GRT21BR60J476ME13#	D1
	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#	
	25Vdc	X7R	10µF	±10%	GRT31CR71E106KE13#	
		X6S	10µF	±10%	GRT31CC81E106KE01#	
		X5R	10µF	±10%	GRT31CR61E106KE01#	

Part number # indicates the package specification code.

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

(→ 3.2×1.6mm)

T max.	Rated Voltage	TC Code	Cap.	Tol.	Part Number	
1.8mm	25Vdc	X5R	22μF	±10%	**GRT31CR61E226KE01#**	
	16Vdc	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%	**GRT31CR60J476KE13#**	
	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#**	D1
	10Vdc	X6S	47μF	±10%	**GRT32EC81A476KE13#**	
	6.3Vdc	X7R	47μF	±10%	**GRT32ER70J476KE13#**	
		X6S	47μF	±10%	**GRT32EC80J476KE13#**	
		X5R	100μF	±20%	**GRT32ER60J107ME13#**	

Part number # indicates the package specification code.

Mouser Electronics

Authorized Distributor

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Murata:

GRT32EC81A226KE13L GRT32ER61C226KE13L GRT188C81C106ME13D GRT31CR61A476KE13L GRT32ER60J107ME13L GRT21BR61C226ME13L GRT21BR61A226ME13L GRT21BC80G476ME13L GRT21BR60J476ME13L GRT32EC81H475KE01L GRT155C81C225KE13D GRT21BC81A226ME13L GRT188C8YA225KE13D GRT188C81C475KE13D GRT21BR61E475KA02L GRT31CR61E226KE01L GRT155R60G475ME13D GRT21BR61A475KE13L GRT21BR61C106KE01L GRT188R61C106KE13D GRT155C71A225KE13D GRT033R60J104KE01D GRT1555C1H102JA02D GRT033R60J105ME13D GRT188R6YA225ME13D GRT188C8YA105ME13D GRT32ER61E226ME13L GRT033R60J823KE01J GRT188R60J226ME13J GRT155C80E106ME13D GRT188C80G226ME13D GRT188R60E226ME13J GRT188R60E226ME13D GRT155C80E106ME13J GRT188C80G226ME13J GRT188R60J226ME13D GRT1555C1H750JA02D GRT033R61E103KE01D GRT1555C1H4R3CA02D GRT155C81E105ME13D GRT033R61C333ME01D GRT1885C1H561JA02D GRT033R61A472ME01D GRT1555C1H3R6CA02D GRT1885C2A6R0DA02D GRT1555C2A680JA02D GRT033R61C103ME01D GRT1885C2A4R7CA02D GRT033R60J333KE01D GRT1555C1E561JA02D GRT033R70J682KE01D GRT1555C1H510JA02D GRT1555C2A1R1CA02D GRT033R61C333KE01D GRT1555C1E101JA02D GRT1885C2A2R0CA02D GRT1555C1H620JA02D GRT21BR71H105KE01L GRT1885C2A681JA02D GRT1555C1E150JA02D GRT155R61A474KE01D GRT155R60J474ME01D GRT1555C1E681JA02D GRT1555C2A2R4CA02D GRT1885C1H103JA02D GRT1885C1H9R1DA02D GRT033R61C683KE01D GRT155R60J105ME01D GRT155R71H153KE01D GRT1885C2A1R6CA02D GRT1555C1H181JA02D GRT1555C1H6R0DA02D GRT32ER71H475KE01L GRT1885C1H181JA02D GRT1555C1H511JA02D GRT1885C1H471JA02D GRT1885C1H1R0CA02D GRT1555C2A8R0DA02D GRT033C80J104KE01D GRT1555C1H1R5CA02D GRT1885C1H562JA02D GRT1885C2A271JA02D GRT1555C2A150JA02D GRT1885C1H122JA02D GRT21B5C1H103JA02L GRT155R71H331KE01D GRT155R71C683KE01D GRT033R61A332KE01D GRT1885C1H4R0CA02D GRT1555C2A1R5CA02D GRT1885C2A152JA02D GRT1555C2A6R8DA02D GRT1885C1E102JA02D GRT155R70J105ME01D GRT1885C2A220JA02D GRT1555C1E121JA02D GRT1555C1E331JA02D GRT1555C1H430JA02D GRT033R61E104KE01D GRT1555C2A2R2CA02D