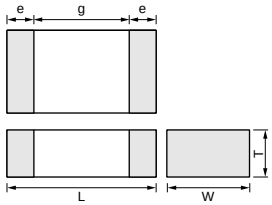
Chip Monolithic Ceramic Capacitors

High Frequency for Flow/Reflow Soldering

■ Features

1. HiQ and low ESR at VHF, UHF, Microwave.
2. Feature improvement, low power consumption for mobile telecommunication. (Base station, terminal, etc.)



■ Applications

High-frequency circuit (Mobile telecommunication, etc.)

Part Number	Dimensions (mm)				
	L	W	T	e	g min.
GQM188	1.6 ±0.1	0.8 ±0.1	0.8 ±0.1	0.2 to 0.5	0.5
GQM219	2.0 ±0.1	1.25 ±0.1	0.85 ±0.1	0.2 to 0.7	0.7

Part Number	**GQM18**		**GQM21**	
L x W	1.60x0.80		2.00x1.25	
TC	C0G (**5C**)		C0G (**5C**)	
Rated Volt.	100 (**2A**)	50 (**1H**)	100 (**2A**)	50 (**1H**)
Capacitance (Capacitance part numbering code) and T (mm) Dimension (T Dimension part numbering code)				
0.50pF(**R50**)	0.80(**8**)		0.85(**9**)	
0.75pF(**R75**)	0.80(**8**)		0.85(**9**)	
1.0pF(**1R0**)	0.80(**8**)		0.85(**9**)	
1.1pF(**1R1**)	0.80(**8**)		0.85(**9**)	
1.2pF(**1R2**)	0.80(**8**)		0.85(**9**)	
1.3pF(**1R3**)	0.80(**8**)		0.85(**9**)	
1.5pF(**1R5**)	0.80(**8**)		0.85(**9**)	
1.6pF(**1R6**)	0.80(**8**)		0.85(**9**)	
1.8pF(**1R8**)	0.80(**8**)		0.85(**9**)	
2.0pF(**2R0**)	0.80(**8**)		0.85(**9**)	
2.2pF(**2R2**)	0.80(**8**)		0.85(**9**)	
2.4pF(**2R4**)	0.80(**8**)		0.85(**9**)	
2.7pF(**2R7**)	0.80(**8**)		0.85(**9**)	
3.0pF(**3R0**)	0.80(**8**)		0.85(**9**)	
3.3pF(**3R3**)	0.80(**8**)		0.85(**9**)	
3.6pF(**3R6**)	0.80(**8**)		0.85(**9**)	
3.9pF(**3R9**)	0.80(**8**)		0.85(**9**)	
4.0pF(**4R0**)	0.80(**8**)		0.85(**9**)	
4.3pF(**4R3**)	0.80(**8**)		0.85(**9**)	
4.7pF(**4R7**)	0.80(**8**)		0.85(**9**)	
5.0pF(**5R0**)	0.80(**8**)		0.85(**9**)	
5.1pF(**5R1**)	0.80(**8**)		0.85(**9**)	
5.6pF(**5R6**)	0.80(**8**)		0.85(**9**)	
6.0pF(**6R0**)	0.80(**8**)		0.85(**9**)	
6.2pF(**6R2**)	0.80(**8**)		0.85(**9**)	
6.8pF(**6R8**)	0.80(**8**)		0.85(**9**)	
7.0pF(**7R0**)		0.80(**8**)	0.85(**9**)	
7.5pF(**7R5**)		0.80(**8**)	0.85(**9**)	
8.0pF(**8R0**)		0.80(**8**)	0.85(**9**)	
8.2pF(**8R2**)		0.80(**8**)	0.85(**9**)	
9.0pF(**9R0**)		0.80(**8**)	0.85(**9**)	
9.1pF(**9R1**)		0.80(**8**)	0.85(**9**)	
10pF(**100**)		0.80(**8**)	0.85(**9**)	

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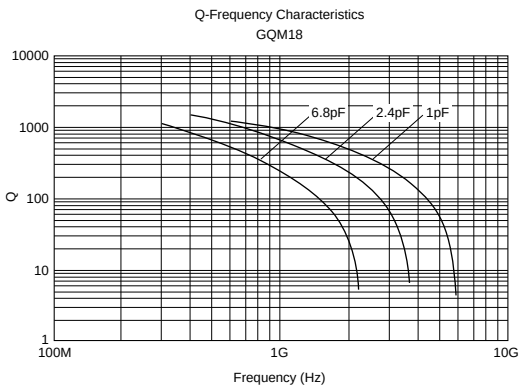
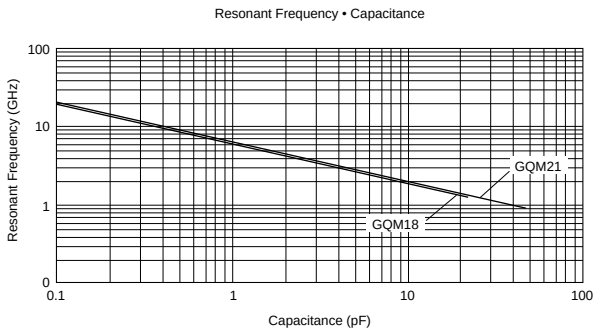
Part Number	GQM18		GQM21	
L x W	1.60x0.80		2.00x1.25	
TC	C0G (**5C**)		C0G (**5C**)	
Rated Volt.	100 (**2A**)	50 (**1H**)	100 (**2A**)	50 (**1H**)
Capacitance (Capacitance part numbering code) and T (mm) Dimension (T Dimension part numbering code)				
11pF(**110**)		0.80(**8**)	0.85(**9**)	
12pF(**120**)		0.80(**8**)	0.85(**9**)	
13pF(**130**)		0.80(**8**)	0.85(**9**)	
15pF(**150**)		0.80(**8**)	0.85(**9**)	
16pF(**160**)		0.80(**8**)	0.85(**9**)	
18pF(**180**)		0.80(**8**)	0.85(**9**)	
20pF(**200**)		0.80(**8**)		0.85(**9**)
22pF(**220**)		0.80(**8**)		0.85(**9**)
24pF(**240**)		0.80(**8**)		0.85(**9**)
27pF(**270**)				0.85(**9**)
30pF(**300**)				0.85(**9**)
33pF(**330**)				0.85(**9**)
36pF(**360**)				0.85(**9**)
39pF(**390**)				0.85(**9**)
43pF(**430**)				0.85(**9**)
47pF(**470**)				0.85(**9**)

The part numbering code is shown in ( ).
Dimensions are shown in mm and Rated Voltage in Vdc.

■ Q-Frequency Characteristics



■ Resonant Frequency-Capacitance



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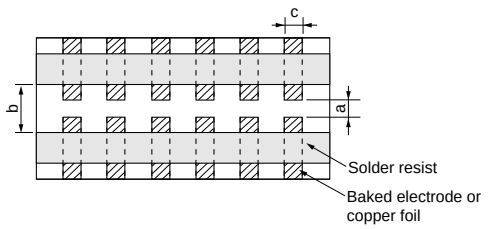
Specifications and Test Methods

No.	Item		Specifications	Test Method
1	Operating Temperature		5C : −55℃ to 125℃	
2	Rated Voltage		See the previous page.	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	Dimension		Within the specified dimensions	Using calipers
5	Dielectric Strength		No defects or abnormalities	No failure should be observed when 300% 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 10,000MΩ or 500Ω • F (whichever is smaller)	The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at 25℃ and 75%RH max. and within 2 minutes of charging.
7	Capacitance		Within the specified tolerance	The capacitance/Q should be measured at 25℃ at the frequency and voltage shown in the table.
8	Q		30pF min. : Q≧1000 30pF max. : Q≧400+20C C : NominalCapacitance (pF)	
9	Capacitance Temperature Characteristics	Capactance Change	Within the specified tolerance (Table A)	The temperature coefficient is determind using the capacitance measured in step 3 as a reference. When cycling the temperature sequentially from step 1 through 5 the capacitance should be within the specified tolerance for the temperature coefficient and capacitance change as in Table A. The capacitance drift is caluculated by dividing the differences between the maximum and minimum measured values in the steps 1, 3 and 5 by the capacitance. value in step 3.
		Temperature Coefficent	Within the specified tolerance (Table A)	
		Capacitance Drift	Within ±0.2% or ±0.05pF (Whichever is larger.)	
10	Adhesive Strength of Termination		No removal of the terminations or other defect should occur.	Solder the capacitor to the test jig (glass epoxy board) shown in Fig. 1 using a eutectic solder. Then apply 10N* force in parallel with the test jig for 10±1sec. 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. *5N (GQM188)
11	Vibration Resistance	Appearance	No defects or abnormalities	Solder the capacitor to the test jig (glass epoxy board) in the same manner and under the same conditions as (10). 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 of 3 mutually perpendicular directions (total of 6 hours).
		Capacitance	Within the specified tolerance	
		Q	30pF min. : Q≧1000 30pF max. : Q≧400+20C C : NominalCapacitance (pF)	

Item \ Char.	5C (1000pF and below)
Frequency	1±0.1MHz
Voltage	0.5 to 5Vrms

Step	Temperature (℃)
1	25±2
2	−55±3
3	25±2
4	125±3
5	25±2



Type	a	b	c
GQM18	1.0	3.0	1.2
GQM21	1.2	4.0	1.65
GQM32	2.2	5.0	2.9

(in mm)

Fig .1

Continued on the following page.

Specifications and Test Methods

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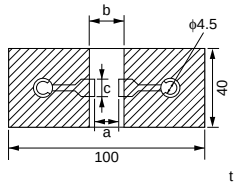
No.	Item		Specifications	Test Method
12	Deflection		No crack or marked defect should occur.	Solder the capacitor on the test jig (glass epoxy board) shown in Fig. 2 using a eutectic solder. Then apply a force in the direction shown in Fig. 3. The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.
13	Solderability of Termination		75% of the terminations are to be soldered evenly and continuously.	Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight propotion). Preheat at 80 to 120℃ for 10 to 30 seconds. After preheating, immerse in eutectic solder solution for 2±0.5 seconds at 230±5℃.
14	Resistance to Soldering Heat		The measured and observed characteristics should satisfy the specifications in the following table.	Preheat the capacitor at 120 to 150℃ for 1 minute. Immerse the capacitor in a eutectic solder solution at 270±5℃ for 10±0.5 seconds. Let sit at room temperature for 24±2 hours.
		Appearance	No marking defects	
		Capacitance Change	Within ±2.5% or ±0.25 pF (Whichever is larger)	
		Q	30pF min. : Q≧1000 30pF max. : Q≧400+20C C : NominalCapacitance (pF)	
		I.R.	More than 10,000MΩ or 500Ω • F (Whichever is smaller)	
		Dielectric Strength	No failure	
15	Temperature Cycle		The measured and observed characteristics should satisfy the specifications in the following table.	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 listed in the following table. Let sit for 24±2 hours at room temperature, then measure.
		Appearance	No marking defects	
		Capacitance Change	Within ±2.5% or ±0.25pF (Whichever is larger)	
		Q	30pF min. : Q≧1000 30pF max. : Q≧400+20C C : NominalCapacitance (pF)	
		I.R.	More than 10,000MΩ or 500Ω • F (Whichever is smaller)	
		Dielectric Strength	No failure	
16	Humidity Steady State		The measured and observed characteristics should satisfy the specifications in the following table.	Let the capacitor sit at 40±2℃ and 90 to 95% humiduty for 500±12 hours. Remove and let sit for 24±2 hours (temperature compensating type) at room temperature, then measure.
		Appearance	No marking defects	
		Capacitance Change	Within ±5% or ±0.5pF (Whichever is larger)	
		Q	30pF min. : Q≧350 10pF and over, 30pF and below : Q≧275+5C/2 10pF max. : Q≧200+10C C : Nominal Capacitance (pF)	
		I.R.	More than 1,000MΩ or 50Ω • F (Whichever is smaller)	
		Dielectric Strength	No failure	



Type	a	b	c
GQM18	1.0	3.0	1.2
GQM21	1.2	4.0	1.65
GQM32	2.2	5.0	2.9

(in mm)

Fig. 2

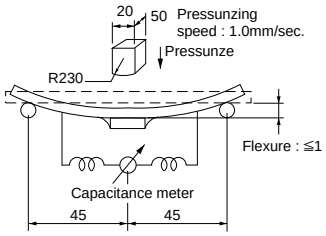


Fig. 3

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

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Specifications and Test Methods

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No.	Item		Specifications	Test Method
17	Humidity Load		The measured and observed characteristics should satisfy the specifications in the following table.	Apply the rated voltage at 40±2℃ and 90 to 95% humidity for 500±12 hours. Remove and let sit for 24±2 hours at room temprature then muasure. The charge/discharge current is less than 50mA.
		Appearance	No marking defects	
		Capacitance Change	Within ±7.5% or ±0.75pF (Whichever is larger)	
		Q	30pF min. : Q≧200 30pF max. : Q≧100+10C/3 C : Nominal Capacitance (pF)	
		I.R.	More than 500MΩ or 25Ω • F (Whichever is smaller)	
		Dielectric Strength	No failure	
18	High Temperature Load		The measured and observed characteristics should satisfy the specifications in the following table.	Apply 200% of the rated voltage for 1000±12 hours at the maximun operating temperature ±3℃. Let sit for 24±2 hours (temperature compensating type) at room temperature, then measure. The charge/discharge current is less than 50mA.
		Appearance	No marking defects	
		Capacitance Change	Within ±3% or ±0.3pF (Whichever is larger)	
		Q	30pF min. : Q≧350 10pF and over, 30pF and below : Q≧275+5C/2 10pF max. : Q≧200+10C C : Nominal Capacitance (pF)	
		I.R.	More than 1,000MΩ or 50Ω • F (Whichever is smaller)	
		Dielectric Strength	No failure	

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Table A

Char.	Nominal Values (ppm/℃) Note 1	Capacitance Change from 25℃ (%)					
		−55		−30		−10	
		Max.	Min.	Max.	Min.	Max.	Min.
5C	0±30	0.58	−0.24	0.40	−0.17	0.25	−0.11

Note1 : Nominal values denote the temperature coefficient within a range of 25℃ to 125℃ (for 5C)