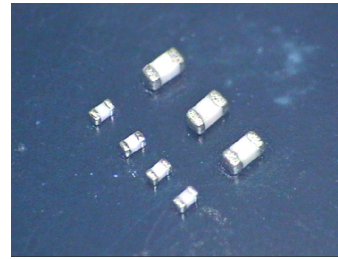


Multilayer Ceramic Chip Capacitors [Radio Frequency Capacitors]

RFC Series



◆ Features

- High Q value & Low ESL at high frequency
- Ultra stable C0G performance
- Ultra miniature size 0201 to 1111
- Low capacitance with tight tolerance
- RoHS compliant

◆ Application

- Radio Frequency
 - Impedance Matching Circuit
 - Resonant Circuit
 - Coupling Circuit
 - ◆ RF Modules, VCO, BPF, DUP, PA, etc.
 - ◆ Cellular Phone, Bluetooth, Wireless LAN etc.

◆ Summary of Specification

Operation Temperature	-55 to +125°C
Rated Voltage	25Vdc to 500Vdc
Size	0201, 0402,0603,0505,0805 and 1111
Temperature Coefficient	C0G $\pm 30\text{ppm}/^\circ\text{C}$, -55~+125 °C (EIA Class I)
Capacitance Range	0.1pF ~ 1000pF
Q Value :	Q ≥ 1000 at 1MHz & ≥ 500 . at 1GHz / 1pF
Insulation Resistance	10G Ω
Dielectric Strength	V ≤ 50 V : 300% Rated Voltage for 5 second @ 50mA max. current
	100 $\leq V < 500$ V : 200% rated voltage for 5 second @ 50mA max. current
	V ≥ 500 V : 150% rated voltage for 5 second @ 50mA max. current
Tolerance	$\pm 0.05\text{pF}$ to $\pm 0.1\text{pF}$, C , J
Aging	0 % per decade of time , Typical

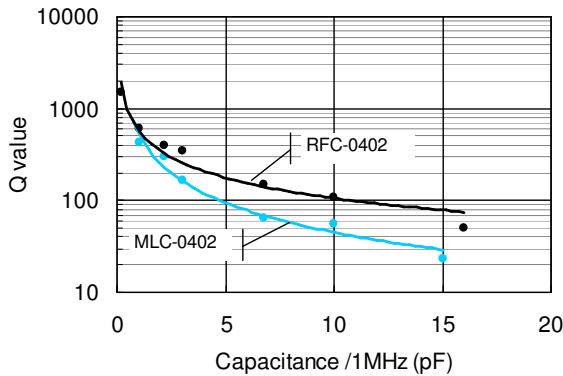
◆ How To Order

RFC
0402
G
R30
B
025
T

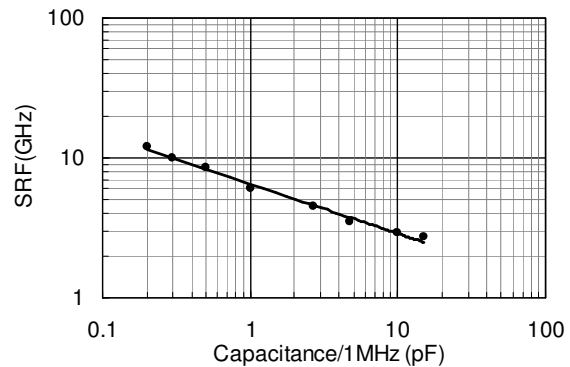
Product Code	Chip Size	Dielectric	Capacitance Unit : pF	Tolerance	Rated Voltage	Packaging
RFC: Radio Frequency of MLCC	Ex.: 0201 : 0.60×0.30 mm 0402 : 1.00×0.50 mm 0603 : 1.60×0.80 mm 0505 : 1.40×1.40 mm 0805 : 2.00×1.25 mm 1111 : 2.80×2.80 mm	Ex.: G : C0G	Ex.: R10: 0.1pF 5R0: 5.0pF 120: 12×10 ⁰ 102: 10×10 ²	Ex.: L : $\pm 0.050\text{pF}$ A: $\pm 0.075\text{pF}$ B: $\pm 0.10\text{pF}$ C: $\pm 0.25\text{pF}$ J : $\pm 5.0\%$	Ex.: 025:25Vdc 050:50Vdc 101:100Vdc 151:150Vdc 201:200Vdc 251:250Vdc 501:500Vdc	T: Taping & Reel B: Bulk

◆ Characteristic

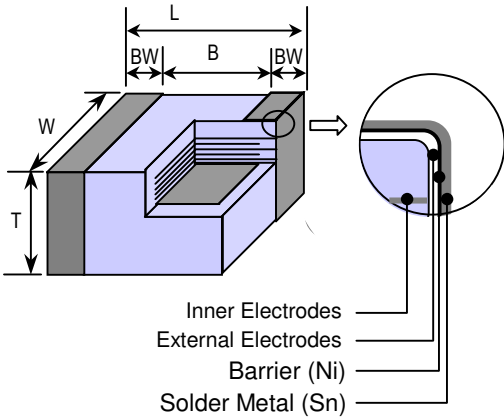
Q v.s. Capacitance at 1GHz



Self Resonant Frequency



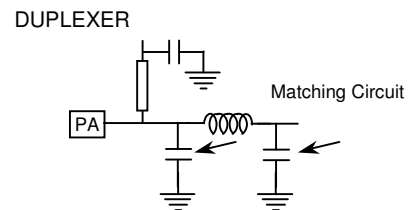
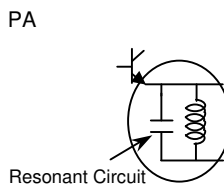
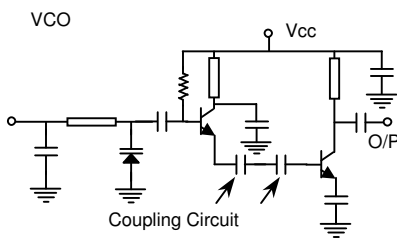
◆ Structure & Dimension



Unit : mm [inches]

TYPE	L	W	T (max)	B (min)	BW (min)
0201	0.60±0.03 [.024±0.01]	0.30±0.03 [.011±0.01]	0.33 [.013]	0.20 [.008]	0.10 [.004]
0402	1.00±0.05 [.039±0.02]	0.50±0.05 [.020±0.02]	0.55 [.022]	0.30 [.012]	0.15 [.006]
0603	1.60±0.1 [.063±.004]	0.80±0.1 [.031±.004]	0.90 [.035]	0.40 [.016]	0.15 [.006]
0505	1.40±0.25 [.055±.010]	1.40±0.25 [.055±.010]	1.40 [.055]	0.35 [.014]	0.20 [.008]
0805	2.00±0.2 [.079±.012]	1.25±0.2 [.049±.008]	1.45 [.057]	0.70 [.028]	0.20 [.008]
1111	2.80±0.4 [.110±.016]	2.80±0.4 [.110±.016]	2.60 [.102]	1.40 [.055]	0.30 [.012]

◆ Application Example Circuit

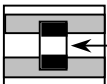
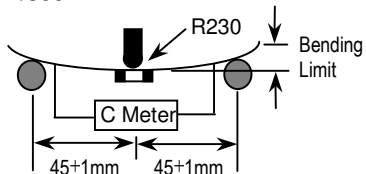
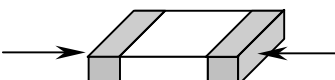


◆ Capacitance Range

T.C.	Size	Voltage	Capacitance Range																																																
			R10	R20	R30	R40	R50	R60	R70	R80	R90	1R0	1R1	1R2	1R3	1R5	1R6	1R8	2R0	2R2	2R4	2R7	3R0	3R3	3R9	4R7	5R6	6R8	8R2	100	120	150	180	220	270	330	390	470	560	680	820	101	121	151	181	221	271	331	391	471	561
COG	0201	25V	[Blue bars indicating range]																																																
	0402	25V	[Blue bars indicating range]																																																
	0603	250V	[Blue bars indicating range]																																																
	0505	150V	[Blue bars indicating range]																																																
	0805	250V	[Blue bars indicating range]																																																
1111	50V	[Blue bars indicating range]																																																	
	100V	[Blue bars indicating range]																																																	
	200V	[Blue bars indicating range]																																																	
	300V	[Blue bars indicating range]																																																	
	500V	[Blue bars indicating range]																																																	
Tolerance			± 0.05pF								±0.075pF								±0.1pF								± 0.25pF								±5%																

■ Other dimensions, capacitance values and voltages rating are available. Please contact HEC.

RFC Series Specification & Test Condition

Item	Specification	Test Condition						
Operation Temperature	-55°C ~ +125°C							
Visual	No abnormal exterior appearance	Visual Inspection						
Capacitance	Within the specified tolerance	Frequency Voltage						
Q Value	≥1000	1MHz±10% 1.0±0.2Vrms						
Insulation Resistance	More than 10,000MΩ	Applied Voltage : Rated Voltage Charge Time : 60±5 sec. Charge-Discharge current shall be less than 50mA current.						
Withstanding Voltage	No dielectric breakdown or mechanical breakdown	V≤50V : 300% Rated Voltage 100≤V<500V : 200% Rated Voltage V≥500V : 150% Rated Voltage for 1~5 sec. Current is limited to less than 50mA.						
Temperature Capacitance Coefficient	<table border="1"> <thead> <tr> <th>Char.</th> <th>Temp. Range</th> <th>Cap. Change</th> </tr> </thead> <tbody> <tr> <td>C0G(G)</td> <td>-55°C ~ +125°C</td> <td>± 30ppm/°C</td> </tr> </tbody> </table>	Char.	Temp. Range	Cap. Change	C0G(G)	-55°C ~ +125°C	± 30ppm/°C	$[C2-C1/C1(T2-T1)] \times 100\%$ T1:Standard Temperature(25°C) T2:Test Temperature C1:Capacitance at Standard Temperature C2:Capacitance at Test Temperature
Char.	Temp. Range	Cap. Change						
C0G(G)	-55°C ~ +125°C	± 30ppm/°C						
Adhesive Strength of Termination	No indication of peeling shall occur on the terminal electrode.	 A 5N·f (≈ 0.5Kg·f) pull force shall be applied for 10 ± 1 second.						
Resistance to Flexure of Substrate	No mechanical damage shall occur.	The board shall be bent 1.0mm with a rate of 1.0 mm/sec. 						
Solderability	More than 90% of the terminal surface is to be soldered newly, so metal part does not come out or dissolve . 	Solder Temperature : 245±5°C Dip Time : 2 ± 0.5 sec. Immersion Speed : 25±10% mm/s Solder : H63A Flux : Rosin Preheat : At 80~120 °C For 10~30sec.						
Resistance to Soldering Heat	<table border="1"> <tbody> <tr> <td>Appearance</td> <td>No mechanical damage shall occur</td> </tr> <tr> <td>Capacitance</td> <td>Cap. change within ±7.5% or ±0.02pF of initial value, whichever is large.</td> </tr> <tr> <td>Insulation Resistance</td> <td>≥1000MΩ</td> </tr> </tbody> </table>	Appearance	No mechanical damage shall occur	Capacitance	Cap. change within ±7.5% or ±0.02pF of initial value, whichever is large.	Insulation Resistance	≥1000MΩ	Preheat : at 150±10°C for 60~120sec. Dip : solder temperature of 260±5°C Dip Time : 10 ± 1 sec. Immersing Speed : 25±10% mm/s Solder : H63A Flux : Rosin
Appearance	No mechanical damage shall occur							
Capacitance	Cap. change within ±7.5% or ±0.02pF of initial value, whichever is large.							
Insulation Resistance	≥1000MΩ							

RFC Series Specification & Test Condition

Item	Specification	Test Condition														
Temperature Cycle	Appearance	No mechanical damage shall occur														
	Capacitance	Cap. change within $\pm 7.5\%$ or $\pm 0.02\text{pF}$ of initial value, whichever is larger.														
	Insulation Resistance	$\geq 1,000\text{M}\Omega$														
		Capacitor shall be subjected to five cycles of the temperature cycle as follow: <table border="1"> <thead> <tr> <th>Step</th> <th>Temp.(°C)</th> <th>Time(min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Min Rated Temp.(-55)+0/-3</td> <td>30</td> </tr> <tr> <td>2</td> <td>25</td> <td>3</td> </tr> <tr> <td>3</td> <td>Max Rated Temp.(+125)+3/-0</td> <td>30</td> </tr> <tr> <td>4</td> <td>25</td> <td>3</td> </tr> </tbody> </table>	Step	Temp.(°C)	Time(min)	1	Min Rated Temp.(-55)+0/-3	30	2	25	3	3	Max Rated Temp.(+125)+3/-0	30	4	25
Step	Temp.(°C)	Time(min)														
1	Min Rated Temp.(-55)+0/-3	30														
2	25	3														
3	Max Rated Temp.(+125)+3/-0	30														
4	25	3														
		Measure at room temperature after cooling for 24 ± 2 Hours														
Humidity	Appearance	No mechanical damage shall occur														
	Capacitance	Cap. change Within 7.5% or $\pm 0.02\text{pF}$ of initial value, Whichever is larger														
	Q	≥ 200														
	Insulation Resistance	$\geq 1,000\text{M}\Omega$														
		Temperature : 40 ± 2 °C Relative Humidity : 90 ~95%RH Test Time : 500 +12/-0 hr Measure at room temperature after cooling for 24 ± 2 Hours														
High Temperature Load (Life Test)	Appearance	No mechanical damage shall occur														
	Insulation Resistance	$\geq 1,000\text{M}\Omega$														
		Applied Voltage : $V \leq 50\text{V}$:200%Rated Voltage $50\text{V} < V \leq 250\text{V}$: 150%Rated Voltage $V > 250\text{V}$: 120%Rated Voltage Temperature : max. operating temperature Test Time : 1000 +48/-0Hr Current Applied : 50 mA Max. Measure at room temperature after cooling for 24 ± 2 Hours														