

HHQ Series RF High Q Multilayer Chip Ceramic Capacitor

1. Capacitor characteristics and applications

1.1 Characteristics

- Size specifications are standardized and suitable for surface mount components in hybrid integrated circuits or printed circuits
- High Q value, low ESR, high reliability
- Low loss, high capacitance stability, high operating frequency
- Suitable for high-frequency circuits, VHF-microwave bands, RF and amplification circuits in various equipment

1.2 Main performance indicators

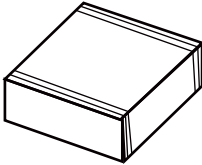
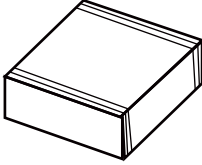
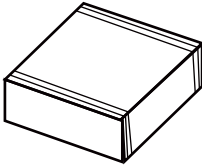
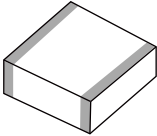
- Temperature coefficient: C0G: $0 \pm 30 \text{ ppm/}^\circ\text{C}$
- Capacitance drift: no more than $\pm 0.2\%$ or $\pm 0.05 \text{ pF}$, whichever is larger.
- Quality factor (Q value): greater than 2,000 at a frequency of 1MHz/1kHz
- Insulation resistance: $\geq 100000 \text{ m}\Omega$ at 20°C
- Operating temperature: $-55 \sim 125^\circ\text{C}$

2. Product model naming

How to order

<u>HHQ</u> 	<u>1111</u> 	<u>C0G</u> 	<u>1R0</u> 	<u>B</u> 	<u>501</u> 	<u>N</u> 	<u>T</u>
Type	Size	Dielectric	Capacitance unit: (pF)	Tolerance	Rated voltage	Termination	Packaging style
HHQ series RF high Q capacitor	0402 2525 0603 3838 0805 6243 0505 7676 1111	C0G: $+30 \text{ ppm/}^\circ\text{C}$	The first two digits are significant figures, and the last digit is the power of 10	A: $\pm 0.05 \text{ pF}$ B: $\pm 0.10 \text{ pF}$ C: $\pm 0.25 \text{ pF}$ D: $\pm 0.50 \text{ pF}$ F: $\pm 1.0\%$ G: $\pm 2.0\%$ J: $\pm 5.0\%$ K: $\pm 10.0\%$	The first two digits are significant figures, and the last digit is the power of 10	N: Leading-out Terminal: Ag/Ni/Sn Terminal: Z: Leading-out Ag/Ni/Sn/Pb E: Non-magnetic Terminal M: Microstrip, A: Axial tape RW: Radial wire, RN: Non-magnetic radial wire	T: Tape & reel C: Cut Tray B: Bulk

3. Product dimension

Product type	Size specifications Inch	Capacitor size(mm)			Terminal size(mm)			
		Lc	Wc	Tc max	MB	LL min	WL	TL
Terminal code:N \ Z \ E 	0402	1.00±0.20	0.50±0.20	0.55	0.25±0.10	—		
	0603	1.52±0.25	0.76±0.25	1.01	0.30±0.15			
	0805	2.00±0.25	1.25±0.25	1.45	0.50±0.20			
	0505	1.40 -0.25~+0.38	1.40±0.38	1.45	0.40±0.15			
	1111	2.79 -0.25~+0.51	2.79±0.38	2.59	0.60±0.20			
	2525	5.84 -0.25~+0.51	6.35±0.38	3.68	0.80±0.30			
	3838(L)	9.90 -0.25~+0.38	8.89±0.25	4.0	1.00±0.50			
	3838(M)	9.65 -0.25~+0.38	9.65±0.25	4.5	1.00±0.50			
	6243	15.60 -0.25~+0.51	10.92±0.38	5.0	1.20±0.50			
	7676	19.30 -0.25~+0.51	19.30±0.38	5.0	1.50±0.50			
Terminal code:M 	1111	3.50±0.38	2.79±0.25	2.54	—	6.35	2.36±0.13	0.20±0.05
	2525	6.35±0.38	6.35±0.38	3.68		12.70	6.10±0.13	0.20±0.05
	3838(M)	9.65 -0.25~+0.89	9.65±0.25	4.50		19.05	8.64±0.25	0.25±0.10
	6243	15.60 -0.25~+0.89	10.92±0.38	5.0		19.05	8.64±0.25	0.25±0.10
	7676	19.30 -0.25~+0.89	19.30±0.38	5.0		19.05	15.00±0.25	0.25±0.10
Terminal code:A 	2525	6.35±0.38	6.35±0.38	3.68		12.70	6.10±0.13	0.20±0.05
	3838(M)	9.65 -0.25~+0.89	9.65±0.25	4.50		19.05	8.64±0.25	0.25±0.10
	6243	15.60 -0.25~+0.89	10.92±0.38	5.0		19.05	8.64±0.25	0.25±0.10
	7676	19.30 -0.25~+0.89	19.30±0.38	5.0		19.05	15.00±0.25	0.25±0.10
Terminal code: RW \ RN 	1111	3.90±0.51	2.79±0.38	2.59		12.70	Lead diameter 0.40±0.05	
	2525	5.84 -0.25~+1.91	6.35±0.38	3.68		25.40	Lead diameter 0.80±0.05	
	3838(L)	9.90 -0.25~+2.16	8.89±0.25	4.0				
	3838(M)	9.65 -0.25~+2.16	9.65±0.25	4.50				

4. Capacity range

4.1 0402 specification capacitance table

Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)	Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)	Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)
0R1	0.1	A, B, C.	250	2R1	2.1	B, C, D.	250	130	13	F, G, J.	200
0R2	0.2			2R2	2.2			150	15		50
0R3	0.3			2R4	2.4			160	16		
0R4	0.4			2R7	2.7			180	18		
0R5	0.5	3R0		3	200		20				
0R6	0.6	3R3		3.3	220		22				
0R7	0.7	3R6		3.6	240		24				
0R8	0.8	3R9		3.9	270		27				
0R9	0.9	4R3		4.3	300		30				
1R0	1	4R7		4.7	330		33				
1R1	1.1	5R1		5.1	360		36				
1R2	1.2	5R6		5.6	390		39				
1R3	1.3	6R2		6.2	430		43				
1R4	1.4	6R8		6.8	470		47				
1R5	1.5	7R5		7.5							
1R6	1.6	8R2		8.2							
1R7	1.7	9R1		9.1							
1R8	1.8	100		10							
1R9	1.9	110		11							
2R0	2	120		12							

4.2 0603 specification capacitance table

Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)	Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)	Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)
0R1	0.1	A, B, C.	250	3R3	3.3	B, C, D.	250	360	36	F, G, J, K, M.	250
0R2	0.2			3R6	3.6			390	39		
0R3	0.3			3R9	3.9			430	43		
0R4	0.4			4R3	4.3			470	47		
0R5	0.5	A, B, C, D.		4R7	4.7			510	51		
0R6	0.6			5R1	5.1			560	56		
0R7	0.7			5R6	5.6			620	62		
0R8	0.8			6R2	6.2			680	68		
0R9	0.9			6R8	6.8			750	75		
1R0	1			7R5	7.5			820	82		
1R1	1.1			8R2	8.2	910		91			
1R2	1.2			9R1	9.1	101		100			
1R3	1.3			100	10	F, G, J, K, M.		150			
1R4	1.4			110	11						
1R5	1.5			120	12						
1R6	1.6			130	13						
1R7	1.7			150	15						
1R8	1.8			160	16						
1R9	1.9			180	18						
2R0	2			200	20						
2R1	2.1			220	22						
2R2	2.2			240	24						
2R4	2.4			270	27						
2R7	2.7			300	30						
3R0	3			330	33						

4.3 0505 specification capacitance table

Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)	Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)	Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)
0R2	0.2	B, C.	250	3R6	3.6	B, C, D.	250	390	39	F, G, J, K, M.	250
0R3	0.3			3R9	3.9			430	43		
0R4	0.4			4R3	4.3			470	47		
0R5	0.5	4R7		4.7	510			51			
0R6	0.6	5R1		5.1	560			56			
0R7	0.7	5R6		5.6	620			62			
0R8	0.8	6R2		6.2	680			68			
0R9	0.9	6R8		6.8	750			75			
1R0	1	7R5		7.5	820			82			
1R1	1.1	8R2		8.2	910			91			
1R2	1.2	9R1		9.1	101			100			
1R3	1.3	100		10	111	110					
1R4	1.4	110		11	121	120					
1R5	1.5	120		12	131	130					
1R6	1.6	130		13	151	150					
1R7	1.7	150		15	161	160					
1R8	1.8	160		16	181	180					
1R9	1.9	180		18	201	200					
2R0	2	200		20	221	220					
2R1	2.1	220		22							
2R2	2.2	240		24							
2R4	2.4	270		27							
2R7	2.7	300		30							
3R0	3	330		33							
3R3	3.3	360		36							

**4.4 0805 specification capacitance table**

Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)	Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)	Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)
0R2	0.2	B, C.	250	3R6	3.6	B, C, D.	250	390	39	F, G, J, K.	250
0R3	0.3			3R9	3.9			430	43		
0R4	0.4			4R3	4.3			470	47		
0R5	0.5	4R7		4.7	510			51			
0R6	0.6	5R1		5.1	560			56			
0R7	0.7	5R6		5.6	620			62			
0R8	0.8	6R2		6.2	680			68			
0R9	0.9	6R8		6.8	750			75			
1R0	1	7R5		7.5	820			82			
1R1	1.1	8R2		8.2	910			91			
1R2	1.2	9R1		9.1	101			100			
1R3	1.3	100		10	111	110					
1R4	1.4	110		11	121	120					
1R5	1.5	120		12	131	130					
1R6	1.6	130		13	151	150					
1R7	1.7	150		15	161	160					
1R8	1.8	160		16	181	180					
1R9	1.9	180		18	201	200					
2R0	2	200		20	221	220					
2R1	2.1	220		22	241	240					
2R2	2.2	240		24							
2R4	2.4	270		27							
2R7	2.7	300		30							
3R0	3	330		33							
3R3	3.3	360		36							

4.5 1111 specification capacitance table

Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)	Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)	Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)	Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)
0R1	0.1	A, B, C.	1500	3R3	3.3		1500	360	36	F, G, J, K.	1000	391	390		500
0R2	0.2			3R6	3.6			390	39			431	430		250
0R3	0.3			3R9	3.9			430	43			471	470		
0R4	0.4			4R3	4.3			470	47			511	510		
0R5	0.5	4R7		4.7	510	51		561	560			F, G, J, K.			
0R6	0.6	5R1		5.1	560	56		621	620						
0R7	0.7	5R6		5.6	620	62		681	680						
0R8	0.8	6R2		6.2	680	68		751	750						
0R9	0.9	6R8		6.8	750	75		821	820						
1R0	1	7R5		7.5	820	82		911	910						
1R1	1.1	8R2		8.2	910	91		102	1000						
1R2	1.2	9R1		9.1	101	100									
1R3	1.3	100		10	111	110									
1R4	1.4	110		11	121	120									
1R5	1.5	120		12	131	130									
1R6	1.6	130		13	151	150									
1R7	1.7	150		15	161	160									
1R8	1.8	160		16	181	180									
1R9	1.9	180		18	201	200									
2R0	2	200		20	221	220									
2R1	2.1	220	22	241	240										
2R2	2.2	240	24	271	270										
2R4	2.4	270	27	301	300										
2R7	2.7			300	30										
3R0	3			330	33										
							1000	331	330		500				
								361	360						

4.6 2525 specification capacitance table

Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)	Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)	Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)	Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)
1R0	1.0	B, C.	3600	7R5	7.5	B, C, D.	3600	820	82	F, G, J, K, M.	3600	911	910	F, G, J, K, M.	1000
1R1	1.1			8R2	8.2	910		91	102			1000			
1R2	1.2			9R1	9.1	101		100	112			1100			
1R3	1.3					111		110	122			1200			
1R4	1.4	B, C, D.		110	11	121		120	152		1500	2500	272	2700	250
1R5	1.5			120	12	131		130	182		1800				
1R6	1.6			130	13	151		150	202		2000				
1R7	1.7			150	15	161		160	222		2200				
1R8	1.8			160	16	181		180							
1R9	1.9			180	18	201		200							
2R0	2.0			200	20	221		220							
2R1	2.1			220	22	241		240							
2R2	2.2			240	24	271		270							
2R4	2.4			270	27	301		300	2000						
2R7	2.7			300	30	331		330							
3R0	3			330	33	361		360	1500						
3R3	3.3			360	36	391		390							
3R6	3.6			390	39	431		430							
3R9	3.9			430	43	471		470							
4R3	4.3				470	47		511	510		1000				
4R7	4.7		510	51	561	560									
5R1	5.1		560	56	621	620									
5R6	5.6		620	62	681	680									
6R2	6.2		680	68	751	750									
6R8	6.8		750	75	821	820									

4.7 3838 specification capacitance table

Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)	Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)	Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)	Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)	
1R0	1.0	B, C.	7200	7R5	7.5	B, C, D.	7200	820	82	F, G, J, K, M.	7200	911	910		1500	
1R1	1.1			8R2	8.2	910		91	102			1000	1000			
1R2	1.2			9R1	9.1	101		100	112			1100				
1R3	1.3			100	10	111		110	122			1200			1000	
1R4	1.4	B, C, D.		110	11	121		120	5000		152	1500	F, G, J, K, M.	500		
1R5	1.5			120	12	131		130			182	1800				
1R6	1.6			130	13	151		150			202	2000				
1R7	1.7			150	15	161		160			222	2200				
1R8	1.8			160	16	181		180			242	2400				
1R9	1.9			180	18	201		200			272	2700				
2R0	2.0			200	20	221		220	3600		302	3000		250		
2R1	2.1			220	22	241		240			332	3300				
2R2	2.2			240	24	271		270			362	3600				
2R4	2.4			270	27	301		300			392	3900				
2R7	2.7			300	30	331		330			432	4300				
3R0	3			330	33	361		360			472	4700				
3R3	3.3			360	36	391		390	512		5100	2500				
3R6	3.6			390	39	431		430	562		5600					
3R9	3.9			430	43	471		470	622		6200					
4R3	4.3			470	47	511		510	682		6800					
4R7	4.7	510		51	561	560										
5R1	5.1	560	56	621	620											
5R6	5.6	620	62	681	680			1500								
6R2	6.2	680	68	751	750											
6R8	6.8	750	75	821	820											

4.8 6243 specification capacitance table

Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)	Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)	Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)	Capac- itance code	Capac- itance (pF)	Tolerance	Max DC working voltage (V)
1R0	1.0	B, C.		7R5	7.5	B,		820	82			10000	911	910	
1R1	1.1			8R2	8.2	C,		910	91				102	1000	
1R2	1.2			9R1	9.1	D.		101	100				122	1200	
1R3	1.3			100	10			111	110				152	1500	
1R4	1.4	B, C, D.	10000	110	11	F, G, J, K, M.	10000	121	120	F, G, J, K, M.		7200	182	1800	F, G, J, K, M.
1R5	1.5			120	12			131	130				202	2000	
1R6	1.6			130	13			151	150				222	2200	
1R7	1.7			150	15			161	160				242	2400	
1R8	1.8			160	16			181	180				272	2700	1000
1R9	1.9			180	18			201	200				302	3000	
2R0	2.0			200	20			221	220				332	3300	
2R1	2.1			220	22			241	240				392	3900	500
2R2	2.2			240	24			271	270				472	4700	
2R4	2.4			270	27			301	300			3600			
2R7	2.7			300	30			331	330						
3R0	3			330	33			361	360						
3R3	3.3			360	36			391	390						
3R6	3.6			390	39			431	430						
3R9	3.9			430	43			471	470						
4R3	4.3			470	47			511	510						
4R7	4.7			510	51			561	560						
5R1	5.1			560	56			621	620						
5R6	5.6			620	62			681	680						
6R2	6.2			680	68			751	750			3000			
6R8	6.8			750	75			821	820						

**4.9 7676 specification capacitance table**

Capacitance code	Capacitance (pF)	Tolerance	Max DC working voltage (V)	Capacitance code	Capacitance (pF)	Tolerance	Max DC working voltage (V)	Capacitance code	Capacitance (pF)	Tolerance	Max DC working voltage (V)	Capacitance code	Capacitance (pF)	Tolerance	Max DC working voltage (V)
1R0	1.0	B, C.		7R5	7.5	B, C, D.		820	82			911	910		
1R1	1.1			8R2	8.2			910	91			102	1000		
1R2	1.2			9R1	9.1			101	100			122	1200		
1R3	1.3											152	1500		
1R4	1.4	B, C, D.	10000	100	10		10000	111	110	F, G, J, K, M.		182	1800	F, G, J, K, M.	
1R5	1.5			110	11			121	120			202	2000		
1R6	1.6			120	12			131	130			222	2200		
1R7	1.7			130	13			151	150			272	2700		
1R8	1.8			150	15			161	160			332	3300		2000
1R9	1.9			160	16			181	180			392	3900		
2R0	2.0			180	18			201	200			472	4700		1000
2R1	2.1			200	20			221	220			562	5600		
2R2	2.2			220	22			241	240			682	6800		
2R4	2.4			240	24			271	270			752	7500		
2R7	2.7			270	27			301	300			822	8200		
3R0	3			300	30			331	330						
3R3	3.3			330	33			361	360						
3R6	3.6			360	36			391	390						
3R9	3.9			390	39			431	430						
4R3	4.3			430	43			471	470						
4R7	4.7			470	47			511	510						
5R1	5.1			510	51			561	560						
5R6	5.6			560	56			621	620						
6R2	6.2			620	62			681	680						
6R8	6.8			680	68			751	750						
				750	75			821	820						

5. Technical requirements and test condition

5.1 General specifications

General specification GB/T 21041-2007 《Fixed capacitors for use in electronic equipment Part 21: Sectional specification:Fixed surface mount multilayer capacitors of ceramic dielectric, class 1》

5.2 Conventional technical indicators and test met

Program	Technical specifications		Test method			
Operating temperature	(-55 ~ +125)℃					
Appearance	No obvious defects		Visual inspection			
Capacitance	Within the specification error range		Nominal capacitance	Test frequency	Test voltage	Environment
			≤1000pF	1MHz(±10%)	(1.0±0.2)Vrms	Temperature(25±2)℃ Humidity<75%
			> 1000pF	1KHz(±10%)	(1.0±0.2)Vrms	
Quality factor(Q value)	Greater than 2000 when the frequency is 1MHz	Test method: Same as 'Capacitance'				
Loss angle tangent	Less than 0.0005 when the frequency is 1MHz					
Insulation Resistance	≥100000MΩ		Test voltage	Test time	Charge and discharge current	Environment
			Ur or 1000V , take the smaller or the two	≤60 sec	≤50mA	Temperature(25±2)℃ Humidity<75%
Dielectric Withstanding Voltage	There should be no dielectric breakdown or damage		Rated voltage	Test voltage	Time	Charge and discharge current
			Ur<200V	2.5Ur	(1~5)sec	≤50mA
			200V≤Ur≤1000V	1.5Ur		
			Ur> 1000V	1.2Ur		
Capacitance temperature coefficient or temperature characteristics	C0G: (0±30) ppm/℃		Measured after the temperature is stable for 30 minutes in the following temperature order (△C is based on T3)			
			Step	Temperature (℃)		
			T1	20±2		
			T2	-55±3		
			T3	20±2		
			T4	125±2		
Solderability	Appearance	No visible damage,inning rate≥95%	Immerse the capacitor in a solution of ethanol and rosin (25% by weight), take it out and preheat it at a temperature of (80~120)℃ for (10~30)sec,then immerse it in a solder solution. Soldering temperature:(235±5)℃;			

Note: When testing the dielectric strength of capacitors, in order to eliminate the influence of the external environment, when the test voltage exceeds 1000Vdc, the capacitor should be immersed in insulating oil for testing.

5.3 Reliability indicators and perio

Program	Technical specifications		Test method			
Resistance to soldering heat	Appearance	No visible damage,inning rate ≥95%	The capacitor is immersed in a solution of ethanol and rosin (25% by weight), taken out and preheated at a temperature of 100-200℃ for 10±2min, then immersed in a soldering solution. Soldering temperature:260±5℃; Soldering speed:25±0.25mm/s Soldering time:10±1sec After being taken out, it is cleaned with a solvent and observed under a microscope with a magnification of at least 10x. The test is performed again after the capacitor has been placed in a room for 24±2hrs			
	△C/C	±0.5% or ±0.5pF,take the larger				
	D.F.	Same as the initial standard				
	I.R.	Same as the initial standard				
Terminal electrode adhesion strength	The end electrode does not peel off Appearance: no visible damage		Apply thrust: 5N Time: 10±1sec Speed: 1±0.5mm/sec			
Bending strength	Appearance	No visible damage	Test substrate: PCB board Bending depth: 1mm Application speed: 1±0.5mm/sec. Measurement should be performed in a bent state.			
	△C/C	≤±5%				
Temperature cycling	Appearance	No visible damage	Number of cycles: 5 times, one cycle is divided into the following 4 steps:			
	△C/C	≤±1% or ±1pF Take the larger of the two	Step	Temperature(℃)	Time(min)	
			Step 1	-55±3	30	
	D.F.	Same as the initial standard	Step 2	20±3	3	
			Step 3	125±3	30	
	I.R.	Same as the initial standard	Step 4	20±3	3	
			After the test, place it at room temperature for 24±2 hrs before measuring again.			
Resistance to soldering heat	Appearance	No visible damage	Temperature: 40±2℃ Humidity: 90~95%RH Time: 500+24/-0hrs After the test, place it at room temperature for 24±2 hrs before measuring again.			
	△C/C	≤±2% or ±1pF Take the larger of the two				
	D.F.	Same as the initial standard				
	I.R.	Ri≥2500MΩ or Ri*CR>25S Take the smaller of the two				
Life test	Appearance	No visible damage	Rated voltage		Applied voltage	Time
			Ur ≤200V		2Ur	1000h
	△C/C	≤±2% or ±1pF Take the larger of the two	200V<Ur ≤500V		1.5Ur	1500h
			500V<Ur ≤1000V		1.2Ur	2000h
	D.F.	Twice the initial standard	Ur > 1000V		Ur	2000h
	I.R.	Ri≥4000MΩ or Ri*CR>40S Take the smaller of the two	Charging and discharging current: ≤ 50mA Temperature: (125±3)℃ After the test, place it at room temperature for 24±2 hrs before measuring again.			

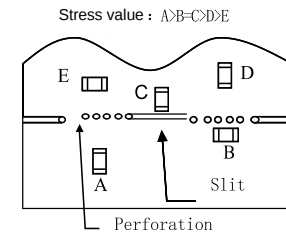
6. Precautions for use

1. Precautions before use:

In harsh working environments or under external mechanical overpressure that exceeds the use conditions described may be damaged, so when using it, first consider applying according to the relevant instructions in this approval book.

2. PCB board design

- 2.1 The amount of solder used will affect the chip's ability to resist mechanical stress, which may cause RF-MLCC to break or crack. Therefore, when designing the substrate, the size and configuration of the pads must be carefully considered, which has a decisive effect on the amount of solder that makes up the substrate.
- 2.2 When designing the pads and the position of the SMD MLCC, consider reducing the stress to the lowest point and install the MLCC in the least affected position on the PC board.



3. Issues to consider for automatic installation

If the suction pipe is lowered beyond the minimum limit, it will exert excessive pressure on the MLCC and cause it to rupture. When lowering the suction pipe, pay attention to the following points:

- 3.1 After correcting the deviation of the PC board, adjust the lower limit of the suction pipe to the surface level of the PC board.
- 3.2 The suction pressure should be adjusted between 1N and 3N. 3.3 In order to reduce the deformation of the PC board caused by the impact force of the suction pipe, support nails should be placed under the PC board.

4. Welding

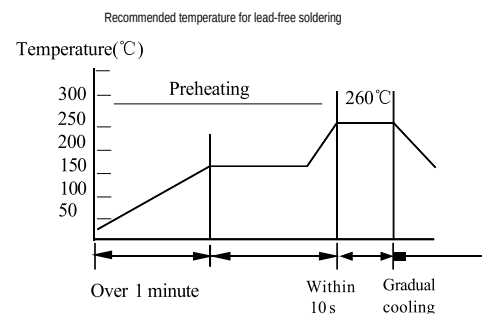
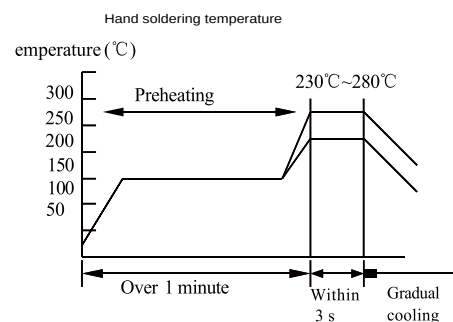
4.1 MLCC is a combination of ceramics and metal. As a ceramic body, especially a large-

sized ceramic body, its thermal plasticity is poor and its response to heat is slow. Under sudden cooling and sudden heating conditions, ceramic bodies are prone to cracking. It is recommended to preheat continuously for more than 1 minute before welding.

4.2 The interior of MLCC is a metal electrode with good thermal plasticity and fast response to heat. Therefore, under heating conditions, there must be a certain degree of inconsistency in expansion between metal parts and ceramic parts. This will cause internal stress and easily cause ceramic body cracking. It is recommended to preheat continuously for more than 1 minute before welding.

4.3 When manual welding, use a constant temperature soldering iron with a maximum diameter of 1.0mm at the tip of its tip and a maximum power of 25 watts; do not touch MLCC components directly with a soldering iron.

4.4 It is recommended to avoid using wave soldering for specifications above 1206. 4.5 The manual welding temperature for tape/lead products should be below 350°C.



5. Cleaning

5.1 The temperature difference between components and cleaning process cannot be greater than 100°C.

5.2 In case of ultrasonic cleaning, if the output power is too high, it will cause excessive vibration on the PC board. This will cause MLCC or solder joints to crack or reduce terminal electrode strength. Therefore pay special attention to the following points: Ultrasonic output: less than 20W/L; Ultrasonic frequency: less than 40KHz; Ultrasonic cleaning time: 5 minutes or less

6. Cutting PCB board

6.1 After installing MLCC and other components, when dividing PC boards, be careful not to apply any force on them. Do not let MLCC bear excessive mechanical impact.

6.2 The division of boards cannot be divided manually and should use appropriate equipment.

7. Storage method

In order to maintain terminal electrode weldability and ensure that packaging materials are in good condition, recommended storage conditions are as follows: Storage temperature: 5-40°C; Storage relative humidity: 20-70%RH Even if stored under ideal storage conditions, MLCC terminal weldability will decrease over time, Therefore MLCC should be used within 6 months from date of shipment.

Soldering temperature: 260±5°C; Soldering speed: 25±0.25mm/s; Soldering time: 10±1 seconds. After being taken out, it is cleaned with a solvent and observed under a microscope with a magnification of at least 10x. The test is performed again after the capacitor has been placed in a room for 24±2 hours

Immerse the capacitor in a solution of ethanol and rosin (25% by weight), take it out and preheat it at a temperature of (80~120)°C for (10~30)sec, then immerse it in a solder solution. Soldering temperature: (235±5)°C; Soldering speed: (25±0.25)mm/sec; Soldering time: (2±0.5)sec

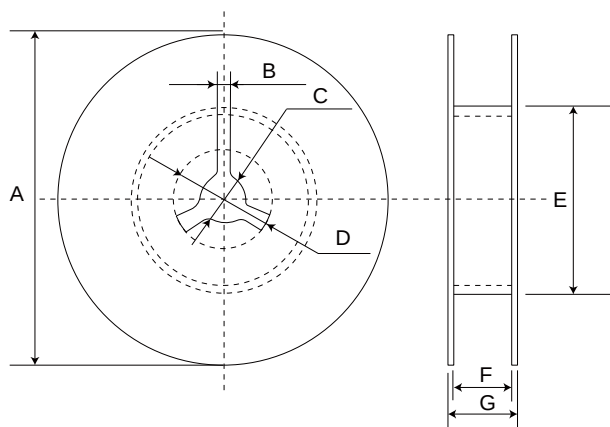
7. Product packaging

7.1 Packaging

Spec (Specification)	Qty (Quantity)	Comment
0402	10000	The packaging form and quantity can be customized
0603	5000	
0805	5000	
0505	5000	
1111	2000	

7.2 Reel dimension

Reel dimension (unit:mm)



A	B	C	D	E	F	G
$\Phi 178.00 \pm 2.00$	3.00	$\Phi 13.00 \pm 0.50$	$\Phi 21.00 \pm 0.80$	$\Phi 50.00$ or larger	10.00 ± 1.50	12Max
$\Phi 330.00 \pm 2.00$	3.00	$\Phi 13.00 \pm 0.50$	$\Phi 21.00 \pm 0.80$	$\Phi 50.00$ or larger	10.00 ± 1.50	12Max

7.3 Taping method

7.3.1 The tape for packaging capacitors is wound clockwise. When pulling out the tape from top to bottom, the feed hole is on the right side of the tape.

7.3.2 At the front end of the tape, at least 5 lead spacings should be left.

7.3.3 When taping, the lead part or blank part must be left as shown in the figure below.

7.3.4 The number of products installed incorrectly in the tape must be less than 0.1% or 1 per reel, and errors must not occur continuously.

7.3.5 The upper and lower adhesive tapes should not exceed the edge of the tape and should not block the feed hole.

7.3.6 The cumulative error of the feed hole is within ± 0.3 mm for 10 spacings.



8. Inspection results of prohibited substances in products About R

All products meet the requirements of the RoHS directive:

- Lead(pb) (<1000ppm)
- Mercury (Hg) (<1000ppm)
- Cadmium(cd) (<100ppm)
- Hexavalent Chromium Content(Cr6+) (<1000ppm)
- Polybrominated Biphenyls(PBBs) (<1000ppm)
- Polybrominated diphenyl ethers(PBDE) (<1000ppm)