General military (General Army) RF high-Q multilayer chip ceramic capacitor

Features

Serialization of size specifications, suitable for surface mount components of hybrid integrated circuits or printed circuits;

It has the characteristics of high Q value, low ESR, and high reliability;

Low loss, high capacitance stability, and operating frequency up to 3GHz;

National military standard production line production;

Ground electronic equipment and high-end civilian equipment for military communications, radar, artillery fuzes, ships, aviation, aerospace, and weapon systems.

Suitable for high-frequency circuits, VHF-microwave segments, radio frequency and amplifier circuits in various equipment;

Main performance indicators

Temperature coefficient: C0G: 0±30ppm/℃;

Capacitance drift: no more than ±0.2% or ±0.05pF, whichever is greater.

Quality factor: greater than 2000 at frequency 1MHz/1KHz.

Aging characteristics: none;

Insulation resistance: at 20℃: ≥100000MΩ

Working temperature: -55～125℃

Product Naming Rules

FHQ-	101	COG	0805	J	251	N	T
|	|	|	|	|	|	|	|
Series	Capacitance Code	TCC	Size code	Accuracy code	Rated Voltage	Type of coating	Packaging
FHQ: High Q RF capacitor	101=10X101=100pF 1R0=1.0pF	COG: 0±30ppm/℃ -55℃～125℃	0505 0603 0805 1111 2525 3838	A:±0.05pF B:±0.10pF C:±0.25pF D:±0.50pF F:±1.0% G:±2.0% J:±5.0%	2500V Code:2 52 Or 3600V Code:362	N: Silver - Nickel - Tin;	T: Tape; B: Bulk

Farohm product series can replace the correspondence between the ATC product series

Farohm series	ATC Series	Dalicap Series
FHQ-0505	ATC100A / ATC700A	DLC10A/DLC70A
FHQ-1111	ATC100B	DLC10B
FHQ-2525	ATC100C	DLC10C
FHQ-3838	ATC100E	DLC10E

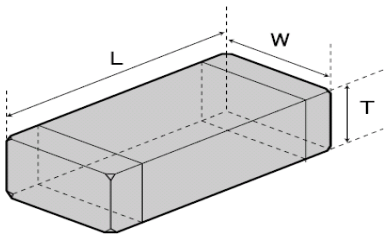
Product meets specifications:
GJB 192B-2011 "General Specification for Multilayer Chip Ceramic Fixed Capacitors with Low Loss Level"
GJB 1940-94 "General Specification for High-voltage hifh-Reliable Multilayer Ceramic Fixed Capacitors"
Q/CT 05B-2016 "Detailed Specification of J Series Ordinary Military Multilayer Ceramic Capacitors"

Screening process：
The sustained voltage is monitored for 48 hours at room temperature. During this time, the following voltage is applied to the capacitor：

Rated voltage	Applied voltage
$U_R \leq 200V$	$2*U_R$
$200V < U_R < 500V$	$1.5*U_R$
$500V \leq U_R \leq 1000V$	$1.3*U_R$
$1000V < U_R \leq 2000V$	$1.1*U_R$
$U_R > 2000V$	$1.0*U_R$

Temperature shock: 100% inspection (at -55℃～+125℃, 5 cycles)
Ultrasonic nondestructive testing: 100% inspection
Visual inspection: batch by batch inspection
Weldability: batch by batch inspection
Eligibility criteria: The rejection rate is ≤8%, which is used as the criterion for the approval of the batch
Shelf life: 10 years

1. Dimensions



Size code	Size (mm)		
	L	W	Tmax
0505	1.40 + 0.38 - 0.25	1.40±0.38	1.45
0603	1.52±0.25	0.76±0.25	1.01
0805	2.00±0.25	1.25±0.25	1.45
1111	2.79 + 0.51 - 0.25	2.79±0.38	2.59
2525	5.84 + 0.51 - 0.25	6.35±0.38	3.68
3838	9.65 + 0.38 - 0.25	8.89±0.25	4.50

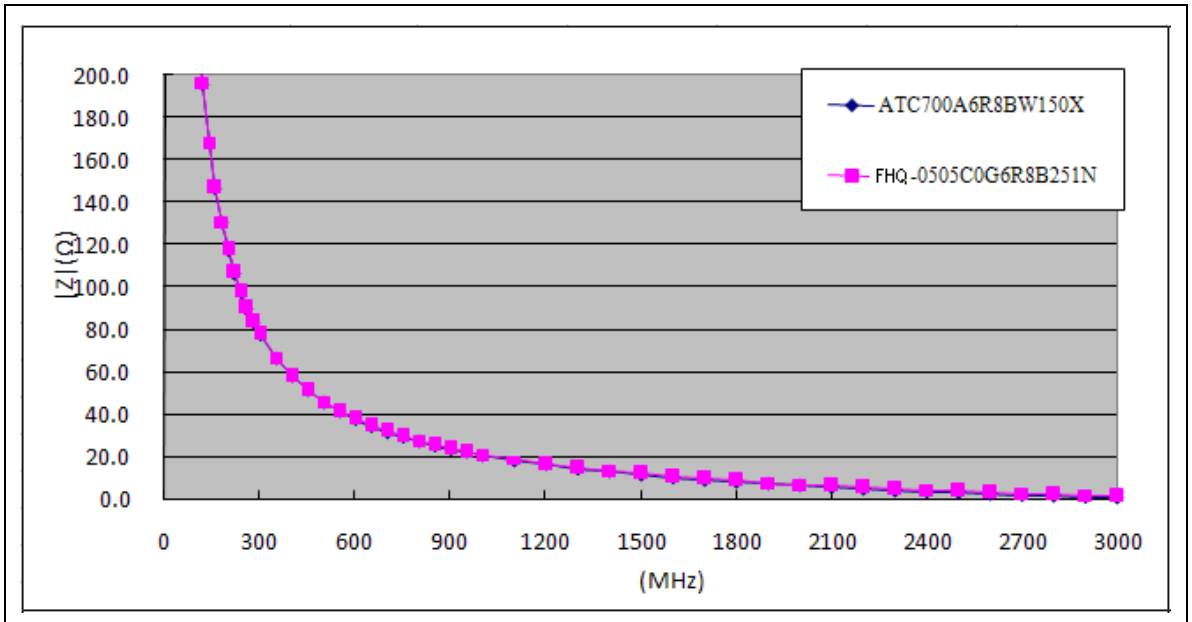
2. Temperature coefficient of capacity：

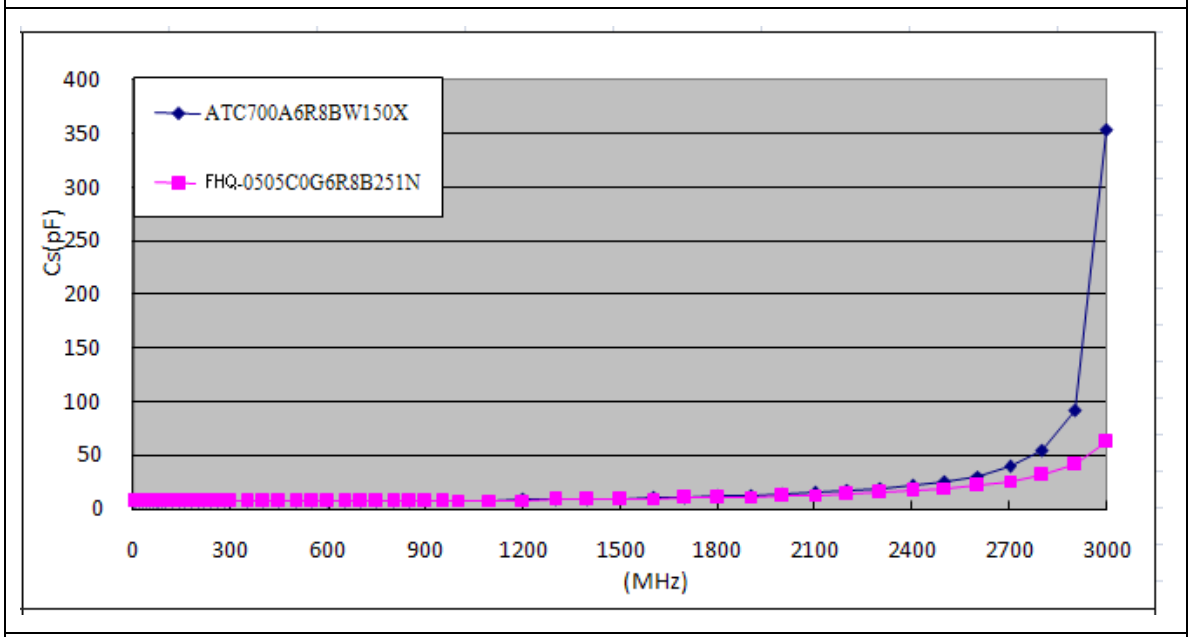
TCC	Allowable deviation	Category temperature range
C0G	0±30ppm/℃	-55～+125℃

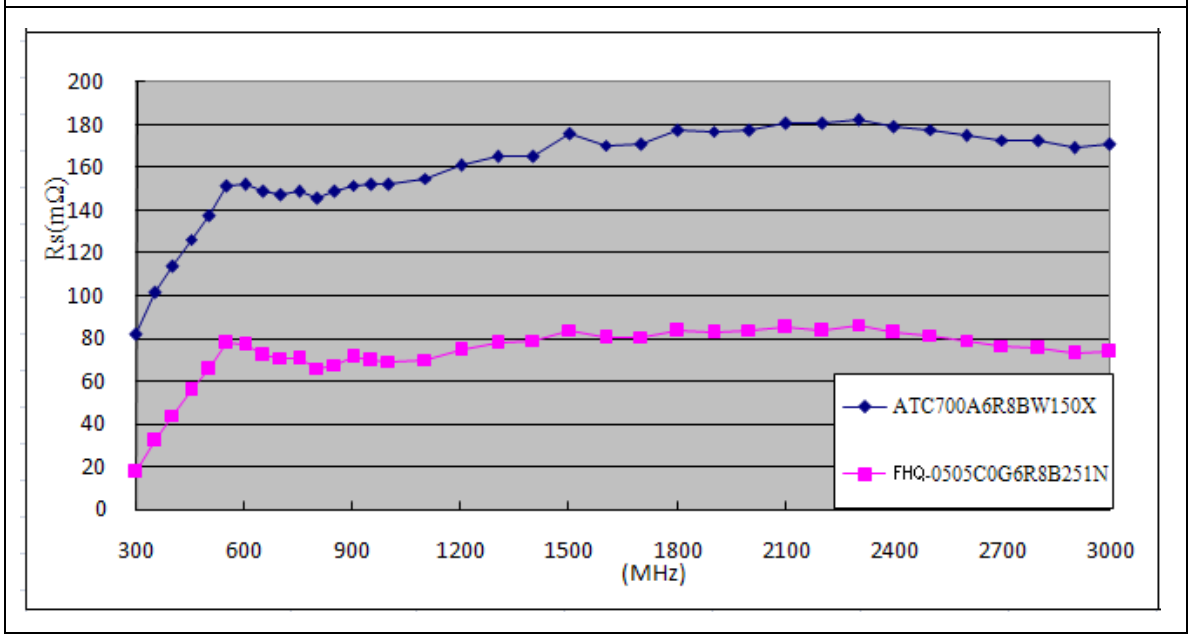
3. Electrical parameters：

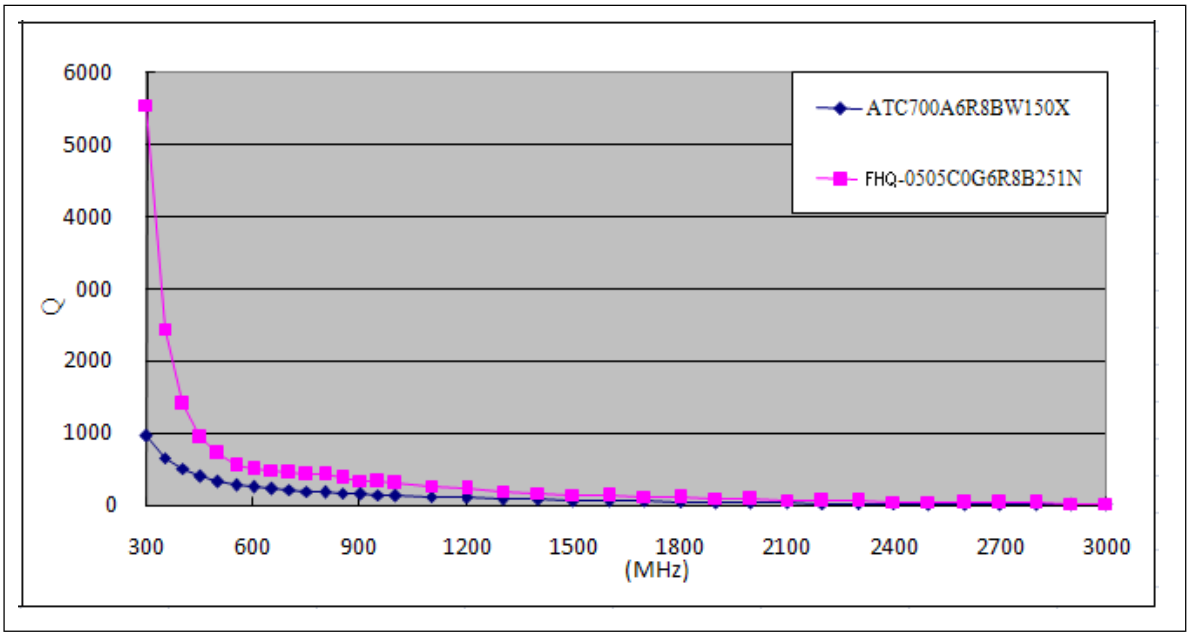
TCC	Quality factor	Dielectric withstand voltage	Insulation resistance
C0G	Q≥2000 Test frequency: f=1MHz/1kHz	UR ≤100V，2.5UR； 100V<UR ≤1250V， 1.5UR+100V UR＞ 1250V, 1.2UR	Ri≥105MΩ

4. Comparison curve of the characteristics of our products and ATC products



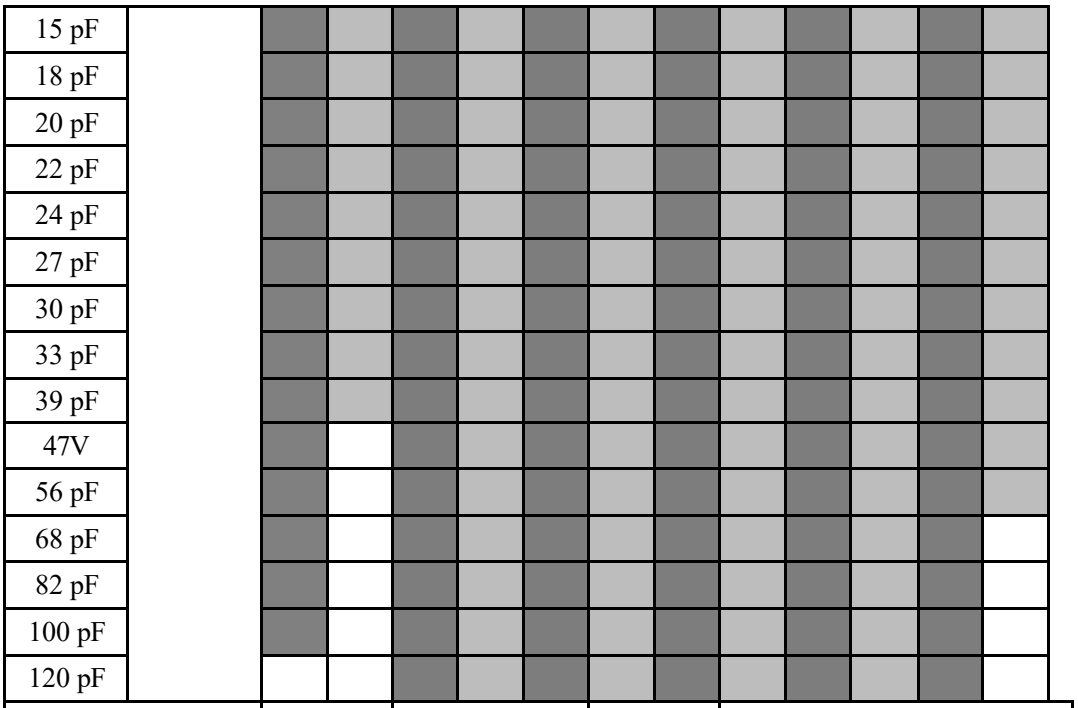






5. Capacity range

Size		0603		0505			0805		1111				
Rated voltage		100	250	100	150	250	100	250	100	250	500	1000	1500
Capacitance	Error level												
0.1pF	B, C												
0.2 pF													
0.4 pF													
0.6 pF													
0.8 pF													
1.0 pF	B, C, D												
1.2 pF													
1.5 pF													
1.8 pF													
2.0 pF													
2.2 pF													
2.4 pF													
2.7 pF													
3.0 pF													
3.3 pF													
3.9 pF													
4.7 pF													
5.6 pF													
6.8 pF													
8.2 pF													
10 pF	F, G, J												
12 pF													



Size		0603		0505			0805		1111				
Rated voltage		100	250	100	150	250	100	250	100	250	500	1000	1500
Capacitance	Error level												
150 pF	F ,G, J												
180 pF													
200 pF													
220 pF													
240 pF													
270 pF													
300 pF													
330 pF													
390 pF													
470 pF													
560 pF													
680 pF													
820 pF													
1000 pF													
1200 pF													
1500 pF													
1800 pF													
2200 pF													
2700 pF													
3000 pF													
3300 pF													
3900 pF													
4700 pF													

Size		2525							3838					
Rated voltage		250	500	1000	1500	2000	2500	3600	500	1000	2500	3600	5000	7200
Capacitance	Error level													
0.1pF	B, C													
0.2 pF														
0.4 pF														
0.6 pF														
0.8 pF														
1.0 pF	B, C, D													
1.2 pF														
1.5 pF														
1.8 pF														
2.0 pF														
2.2 pF														
2.4 pF														
2.7 pF														
3.0 pF														
3.3 pF														
3.9 pF														
4.7 pF														
5.6 pF														
6.8 pF														
8.2 pF														
10 pF	F, G, J													
12 pF														
15 pF														
18 pF														
20 pF														
22 pF														
24 pF														
27 pF														
30 pF														
33 pF														
39 pF														
47 pF														
56 pF														
68 pF														
82 pF														
100 pF														
120 pF														

Size		2525							3838					
Rated voltage		250	500	1000	1500	2000	2500	3600	500	1000	2500	3600	5000	7200
Capacitance	Error level													
150 pF	F, G,J													
180 pF														
200 pF														
220 pF														
240 pF														
270 pF														
300 pF														
330 pF														
390 pF														
470 pF														
560 pF														
680 pF														
820 pF														
1000 pF														
1200 pF														
1500 pF														
1800 pF														
2200 pF														
2700 pF														
3000 pF														
3300 pF														
3900 pF														
4700 pF														

Note: If you have special capacitance and accuracy requirements, please contact IS Company.

1. Capacitor characteristics and applications

1.1 Features

- The standardized size specifications are applicable to surface mount components for mixed integrated circuits or printed circuit boards.
- It has the characteristics of high Q value, low ESR, and high reliability;
- Low loss, high capacity stability, and operating frequency up to 3GHz;
- Suitable for high-frequency circuits, VHF-microwave segments, radio frequency and amplifier circuits in various equipment;

1.2 Main performance indicators

- Temperature coefficient: C0G: 0±30ppm/℃
- Capacitance drift: no more than ±0.2% or ±0.05pF, whichever is greater.
- Quality factor: greater than 2000 at frequency 1MHz/1KHz
- Insulation resistance: at 20℃: ≥100000MΩ
- Operating temperature: -55～125℃

2. Product model naming

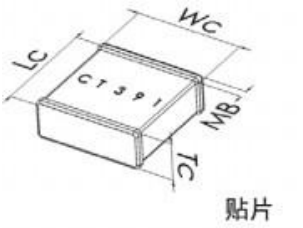
2.1 Specifications

J-	FSQ-	1R0	COG	1111	B	501	N	T
|	|	|	|	|	|	|	|	|
Grade	Series	Capacitance Code	TCC	Size code	Accuracy code	Rated Voltage	Type of coating	Packaging
Military	FSQ: FSQ Series RF high Q capacitor	101=10X101=100pF 1R0=1.0pF	COG: 0±30ppm/℃ -55℃～125℃	0402 0603 0805 0505 1111 0709	A:±0.05pF B:±0.10pF C:±0.25pF D:±0.50pF F:±1.0% G:±2.0% J:±5.0%	2500V Code:252 Or 3600V Code:362	N: Silver-Nickel- Tin;	T:Tape; B:Bulk

2.2 Product Series andATC product series correspondence

IS Series Specifications	ATC Series Specifications	Dalicap Series Specifications
FSQ-0402	ATC600L	DLC75H
FSQ-0603	ATC600S	DLC75P
FSQ-0805	ATC600F	DLC75D
FSQ-0505	ATC800A	DLC75A
FSQ-1111	ATC800B	DLC75B
FSQ-0709	ATC800R	DLC75R

3. Product size

Product Type	Dimensions (Imperia l)	Capacitor size (mm)			
		Lc	W	Tc max	MB
	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	0.35±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
	0709	1.78±0.25	2.29±0.25	2.92	0.50±0.20

4. Capacity range

4.1 0402 Specification Capacitance Table

Specifications and Capacitance Table

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

4.2 0603 Specification Capacitance Table

Specifications and Capacitance Table

Capacitance Code	Capacitance value (pF)	accuracy	Max DC Operationg voltage (V)	Capacitance Code	Capacitance value (pF)	accuracy	Max DC Operationg voltage (V)	Capacitance Code	Capacitance value (pF)	accuracy	Max DC Operationg voltage (V)
0R2	0.2	A,		3R3	3.3			360	36		
0R3	0.3	B,		3R6	3.6			390	39		
0R4	0.4	C		3R9	3.9			430	43		
0R5	0.5			4R3	4.3			470	47		
0R6	0.6			4R7	4.7			510	51		
0R7	0.7			5R1	5.1	C,		560	56		
0R8	0.8			5R6	5.6	D		620	62		250
0R9	0.9			6R2	6.2			680	68		
1R0	1			6R8	6.8			750	75		
1R1	1.1			7R5	7.5			820	82		
1R2	1.2			8R2	8.2			910	91	F,	
1R3	1.3			9R1	9.1			101	100	G,	
1R4	1.4	A,	250	100	10		250	111	111	J,	
1R5	1.5	B,		110	11			121	121	K,	
1R6	1.6	C,		120	12					M.	
1R7	1.7	D.		130	13						
1R8	1.8			150	15	F,					
1R9	1.9			160	16	G,					
2R0	2			180	18	J,		131	131		
2R1	2.1			200	20	K,		151	151		151
2R2	2.2			220	22	M		181	181		
2R3	2.3			240	24						
2R4	2.4			270	27						
2R7	2.7			300	30						
3R0	3			330	33						

4.3 0505 Specification capacitance table

Specifications and Capacitance Table

Capacitance Code	Capacitance value (pF)	accuracy	Max DC Operationg voltage (V)	Capacitance Code	Capacitance value (pF)	accuracy	Max DC Operationg voltage (V)	Capacitance Code	Capacitance value (pF)	accuracy	Max DC Operationg voltage (V)
0R3	0.3	A, B, C.	250	3R6	3.6	B, C, D.	250	390	39	F, G, J, K, M.	250
0R4	0.4			3R9	3.9			430	43		
0R5	0.5	B, C, D.		4R3	4.3			470	47		
0R6	0.6			4R7	4.7			510	51		
0R7	0.7			5R1	5.1			560	56		
0R8	0.8			5R6	5.6			620	62		
0R9	0.9			6R2	6.2			680	68		
1R0	1			6R8	6.8			750	75		
1R1	1.1			7R5	7.5			820	82		
1R2	1.2			8R2	8.2			910	91		
1R3	1.3			9R1	9.1			101	100		250
1R4	1.4			100	10	F, G, J, K, M.		111	110		
1R5	1.5			110	11			121	120		
1R6	1.6			120	12			131	130		
1R7	1.7			130	13			151	150		
1R8	1.8			150	15			161	160		
1R9	1.9			160	16			181	180		
2R0	2			180	18			201	200		
2R1	2.1			200	20			221	220		
2R2	2.2			220	22			241	240		
2R3	2.3			240	24			271	270		200
2R4	2.4			270	27			301	300		
2R7	2.7			300	30			331	330		150
3R0	3			330	33			361	360		
3R3	3.3			360	36						

4.4 0805 Specification Capacitance Table

Specifications and Capacitance Table

Capacitance Code	Capacitance value (pF)	accuracy	Max DC Operationg voltage (V)	Capacitance Code	Capacitance value (pF)	accuracy	Max DC Operationg voltage (V)	Capacitance Code	Capacitance value (pF)	accuracy	Max DC Operationg voltage (V)
0R3	0.3	A, B, C.	250	3R9	3.9	B, C, D.	250	430	43	F, G, J, K.	250
0R4	0.4			4R3	4.3			470	47		
0R5	0.5	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.		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			331	330		
3R0	3			330	33			361	360		150
3R3	3.3			360	36			391	390		
3R6	3.6			390	39			431	430		

4.5 1111 Specification Capacitance Table

Specifications and Capacitance Table

Capacitance Code	Capacitance value (pF)	accuracy	Max DC Operationg voltage (V)	Capacitance Code	Capacitance value (pF)	accuracy	Max DC Operationg voltage (V)	Capacitance Code	Capacitance value (pF)	accuracy	Max DC Operationg voltage (V)	Capacitance Code	Capacitance value (pF)	accuracy	Max DC Operationg voltage (V)
0R5	0.5			4R7	4.7			510	51			561	560		600
0R6	0.6	A,		5R1	5.1			560	56			621	620		
0R7	0.7	B,		5R6	5.6			620	62			681	680		
0R8	0.8	C,		6R2	6.2			680	68			751	750		
0R9	0.9	D.		6R8	6.8	B,		750	75			821	820		500
1R0	1			7R5	7.5	C,		820	82			911	910		
				8R2	8.2	D.		910	91			102	1000		
1R1	1.1			9R1	9.1			101	100		1500				
1R2	1.2							111	110						
1R3	1.3						1500	121	120	F,		112	1100		250
1R4	1.4			100	10			131	130	G,		122	1200		
1R5	1.5			110	11			151	150	J,		132	1300		
1R6	1.6			120	12			161	160	K.		152	1500		
1R7	1.7			130	13			181	180		1000	162	1600		150
1R8	1.8	B,		150	15			201	200			182	1800		
1R9	1.9	C,		160	16			221	220						
2R0	2	D.		180	18	F,		241	240						
2R1	2.1			200	20	G,		271	270						
2R2	2.2		1500	220	22	J,		301	300						
2R4	2.4			240	24	K.		331	330						
2R7	2.7			270	27			361	360						
3R0	3			300	30			391	390						
3R3	3.3			330	33										
3R6	3.6			360	36										
3R9	3.9			390	39										
4R3	4.3			430	43										
				470	47			431	430						
								471	470		600				
								511	510						

4.1 0709 specification capacitance table

Specifications and Capacitance Table

Capacitance Code	Capacitance value (pF)	accuracy	Max DC Operationg voltage (V)	Capacitance Code	Capacitance value (pF)	accuracy	Max DC Operationg voltage (V)	Capacitance Code	Capacitance value (pF)	accuracy	Max DC Operationg voltage (V)
1R0	1	B, C, D.	500	6R2	6.2	B, C, D.	500	560	56	F, G, J.	500
1R1	1.1			6R8	6.8			620	62		
1R2	1.2			7R5	7.5			680	68		
1R3	1.3			8R2	8.2			750	75		
1R4	1.4			9R1	9.1			820	82		
1R5	1.5			100	10	F, G, J.		910	91		
1R6	1.6			110	11			101	100		
1R7	1.7			120	12			111	110		
1R8	1.8			130	13			121	120		
1R9	1.9			150	15			131	130		
2R0	2			160	16			151	150		
2R1	2.1			180	18			161	160		
2R2	2.2			200	20			181	180		
2R4	2.4			220	22			201	200		
2R7	2.7			240	24			221	220		
3R0	3			270	27			241	240		
3R3	3.3			300	30			271	270		
3R6	3.6			330	33			301	300		
3R9	3.9			360	36						
4R3	4.3			390	39						
4R7	4.7			430	43						
5R1	5.1			470	47						
5R6	5.6			510	51						

5. Technical requirements and test conditions

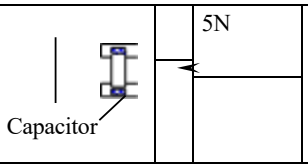
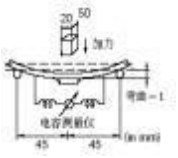
5.1 General Specifications

General Specifications: GB/T 21041-2007 "Fixed capacitors for electronic equipment - Part 21 Specification - Class 1 multilayer ceramic fixed capacitors for surface mounting"

5.2 General technical indicators and test methods

<table>
<tr><td>Project</td><td colspan="2">Technical specifications</td><td colspan="4">Test Method</td></tr>
<tr><td>Operating temperature range</td><td colspan="2">(-55 ~ +125)℃</td><td colspan="4"></td></tr>
<tr><td>Appearance</td><td colspan="2">No obvious defects</td><td colspan="4">Visual inspection</td></tr>
<tr><td rowspan="3">Electrostatic Capacitance</td><td colspan="2" rowspan="3">Within specification error</td><td>Nominal capacity</td><td>Test frequency</td><td>Test voltage</td><td>environment</td></tr>
<tr><td>≤1000pF</td><td>1MHz±10%</td><td>(1.0±0.2)Vrms</td><td rowspan="2">Temperature +25±2℃
Humidity <75%</td></tr>
<tr><td>>1000 pF</td><td>1KHz±10%</td><td>(1.0±0.2)Vrms</td></tr>
<tr><td>Quality Factor (Q value)</td><td colspan="2">Greater than 2000 at the frequency 1 MHz</td><td colspan="4">Test method: Same as "static capacity"</td></tr>
<tr><td rowspan="2">Insulation resistance (IR)
Insulation Resistance</td><td colspan="2" rowspan="2">≥100000MΩ</td><td>Test voltage</td><td>Testing time</td><td>Charge and discharge current</td><td>environment</td></tr>
<tr><td>Ur or 1000V, whichever is smaller</td><td>≤60sec</td><td>≤50mA</td><td>Temperature +25±2℃
Humidity <75%</td></tr>
<tr><td rowspan="4">Dielectric strength (DWV)
Dielectric Withstanding Voltage</td><td colspan="2" rowspan="4">No dielectric should be broken down or damaged.</td><td>Rated voltage</td><td>Test voltage</td><td>time</td><td>Charge and discharge current</td></tr>
<tr><td>Ur<200V</td><td>2.5Ur</td><td rowspan="3">1~5 sec</td><td rowspan="3">≤50mA</td></tr>
<tr><td>200V≤Ur≤ 1000V</td><td>1.5Ur</td></tr>
<tr><td>Ur > 1000V</td><td>1.2Ur</td></tr>
<tr><td rowspan="6">Capacitance temperature coefficient or temperature characteristics</td><td colspan="2" rowspan="6">C0G: (0±30)ppm/℃</td><td colspan="4">According to the following temperature sequence, the temperature is stable for 30Measure after min (△C is based on T3)</td></tr>
<tr><td>step</td><td colspan="3">Temperature (℃)</td></tr>
<tr><td>T1</td><td colspan="3">+20±2</td></tr>
<tr><td>T2</td><td colspan="3">-55±3</td></tr>
<tr><td>T3</td><td colspan="3">+20±2</td></tr>
<tr><td>T4</td><td colspan="3">+125±2</td></tr>
<tr><td>Solderability</td><td>Appear ance</td><td>No visible damage, tinning rate ≥95%</td><td colspan="4">Immerse the capacitor in a solution of ethanol and rosin (accounting for 25% by weight), take it out and preheat it at (80~120)℃ for (10~30)sec, then immerse in solder solution. Soldering temperature: (235±5)℃; Soldering speed: (25±0.25)mm/sec Soldering time: (2±0.5)sec</td></tr>
<tr><td colspan="6">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.</td></tr>
</table>

5.3 Reliability indicators and periodic test methods

<table>
<tr><td>Project</td><td colspan="2">Technical specifications</td><td colspan="4">Test Method</td></tr>
<tr><td rowspan="3">Resistant to welding heat</td><td>△C/C</td><td>≤±0.5% or ±0.5pF, whichever is greater</td><td colspan="4" rowspan="3">Immerse the capacitor in a solution of ethanol and rosin (25% by weight) and take it out. Preheat at 100-200℃ for 10±2min, then immerse in solder solution. Tinning temperature: 260±5℃; Tinning speed: 25±0.25mm/s Tinning time: 10±1sec After taking it out, clean it with solvent and observe it under a microscope with a magnification of 10 or more. Measure again after hrs.</td></tr>
<tr><td>D.F.</td><td>Same as initial standard</td></tr>
<tr><td>I.R.</td><td>Same as initial standard</td></tr>
<tr><td>Terminal electrode adhesion strength</td><td colspan="2">The terminal electrode is not peeled off and there is no visible damage on the appearance</td><td colspan="4">Applied thrust: 5N
Time: 10±1sec
Speed: 1±0.5mm/sec
  </td></tr>
<tr><td rowspan="2">Bending strength</td><td>Appearance</td><td>No visible damage</td><td colspan="4" rowspan="2">Test substrate: PCB Bending depth: 1mm
Pressure speed: 1±0.5mm/sec. Should be measured in a bent state.
  </td></tr>
<tr><td>△C/C</td><td>≤±5%</td></tr>
<tr><td rowspan="5">Temperature Cycle</td><td>Appearance</td><td>No visible damage</td><td colspan="4">Number of cycles: 5 times, one cycle is divided into the following 4 steps:</td></tr>
<tr><td rowspan="2">△C/C</td><td rowspan="2">≤±1% or ±1pF
Take the larger of the two</td><td>stage</td><td>Temperature ℃</td><td colspan="2">Time (minutes)</td></tr>
<tr><td>Step 1</td><td>-55±3</td><td colspan="2">30</td></tr>
<tr><td rowspan="2">D.F.</td><td rowspan="2">Same as initial standard</td><td>Step 2</td><td>20±3</td><td colspan="2">3</td></tr>
<tr><td>Step 3</td><td>125±3</td><td colspan="2">30</td></tr>
<tr><td>I.R.</td><td>Same as initial standard</td><td>Step 4</td><td>20±3</td><td colspan="2">3</td></tr>
<tr><td colspan="4">After the test, place at room temperature for 24±2Measure again after hrs.</td></tr>
<tr><td rowspan="4">Steady-state humidity test</td><td>Appeaance</td><td>No visible damage</td><td colspan="4" rowspan="4">Temperature: 40±2℃ Humidity: 90-95%RH Time: 500+24/-0 hours
After the test, place at room temperature for 24±2Measure again after hrs.</td></tr>
<tr><td>△C/C</td><td>≤±2% or ±1pF
Take the larger of the two</td></tr>
<tr><td>D.F.</td><td>Same as initial standard</td></tr>
<tr><td>I.R.</td><td>Ri≥2500MΩ or Ri*CR＞25STake the smaller of the two</td></tr>
<tr><td></td><td>Appearance</td><td>No visible damage</td><td>Rated voltage</td><td>Applied</td><td colspan="2">time</td></tr>
<tr><td rowspan="6">Life test</td><td rowspan="3"></td><td rowspan="3"></td><td></td><td>voltage</td><td colspan="2"></td></tr>
<tr><td>Ur ≤200V</td><td>2Ur</td><td colspan="2">1000h</td></tr>
<tr><td rowspan="2">△C/C</td><td rowspan="2">≤±2% or ±1pF
Take the larger of the two</td><td>200V < Ur ≤500V</td><td>1.5Ur</td><td colspan="2">1500h</td></tr>
<tr><td>500V < Ur ≤1000V</td><td>1.2Ur</td><td colspan="2">2000h</td></tr>
<tr><td rowspan="2">D.F.</td><td rowspan="2">≤2 times the initial standard</td><td>Ur > 1000V</td><td>Ur</td><td colspan="2">2000h</td></tr>
<tr><td rowspan="2">I.R.</td><td rowspan="2">Ri≥4000MΩ or Ri*CR > 40S, whichever is smaller</td><td colspan="4" rowspan="2">Charge and discharge current: ≤50mA
Temperature: +125±3℃
After the test, place at room temperature and measure again after 24±2 hrs.</td></tr>
</table>

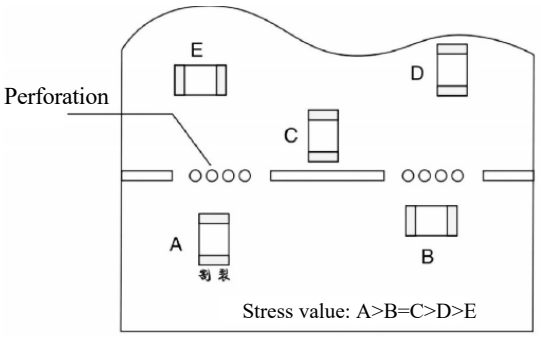
6. Precautions for use

1. Precautions before use:

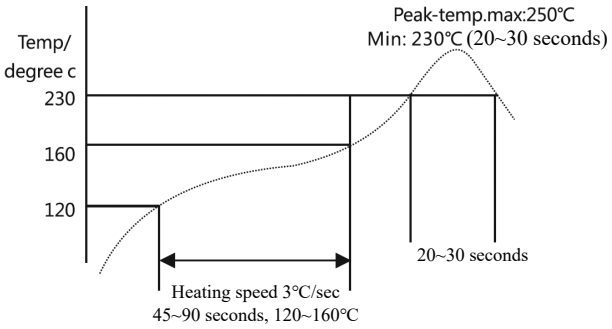
In the adverse working environment or external mechanical overpressure beyond the conditions of use described in the relevant instructions of this accreditation, MLCC chips are possible Therefore, when using it, please first consider applying it according to the relevant instructions in this acknowledgment.
PCB board design
The amount of solder used will affect the chip's ability to resist mechanical stress, thus Can cause RF-MLCC to break or crack. Therefore, when designing the substrate, care must be taken.
Reconsider the size and configuration of the pads, which play a decisive role in the amount of solder that makes up the substrate.
When designing pads and When positioning the SMD MLCC, consideration should be given to minimizing stress and the MLCC should be mounted on the PC board at the location that will be least affected.
Issues to consider when installing automatically
If the suction tube is lowered beyond the minimum limit, The MLCC generates excessive pressure, which causes the MLCC to break. When lowering the pickup tube, pay attention to the following points:
During calibration After the PC board is deviated, the lower limit of the suction tube should be adjusted to the surface level of the PC board. 3.2 The suction pressure should be adjusted to between 1 and 3N.
To reduce the impact of the suction tube Depending on the deformation degree of the PC board, the support nails should be placed under the PC board.

To reduce the impact of the suction tube Depending on the deformation degree of the PC board, the support nails should be placed under the PC board.

Recommended layout



Recomended reflow soldering curve

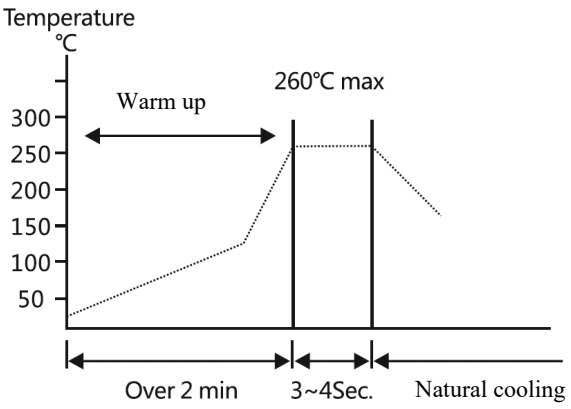


2. Welding

MLCC is a combination of ceramic and metal.
As a ceramic body, especially a large-scale ceramic body, The thermoplasticity is poor, and the response to heat is slow. The ceramic body is prone to cracking when subjected to rapid cooling and heating. It is recommended to preheat continuously for more than 1 minute before welding.

The inside of MLCC is metal electrode.
Thermoplasticity is very good and it responds quickly to heat. When heated, the metal and ceramic parts will inevitably expand inconsistently to a certain extent, resulting in internal stress, which can easily cause the ceramic body to crack. It is recommended to preheat continuously for more than 1 minute before welding.
When soldering manually, use a constant temperature soldering iron with the tip of the soldering iron pointed straight
The maximum diameter is 1.0mm, maximum power 25 watts; the soldering iron cannot directly touch the MLCC components
It is recommended to avoid using wave soldering for specifications above 1206.

Recomended wave soldering curve



The temperature difference between the component and the cleaning process cannot be greater than 100°C.
In the case of ultrasonic cleaning, too much output power will cause The PC board is subjected to excessive vibration.
This will result in MLCC or solder joints crack, or reduce terminal electrode strength. Therefore, special attention should be paid to the following points:
Ultrasonic output: less than 20W/L; Ultrasonic frequency: less than 40 KHz; Ultrasonic cleaning time: 5 minutes or less

3. Cutting PCB board

3.1 After installation. When separating the PC board after MLCC and other components, be careful not to apply any force to the board. Do not subject the MLCC to excessive mechanical shock.

3.2 The boards should not be cut manually, but with appropriate equipment.

4. Storage Method
To maintain the solderability of the terminal electrodes and to ensure that the packaging materials are in good condition, the recommended storage conditions are as follows: Storage temperature: 5-40℃; Storage relative humidity: 20-70%RH
Even under ideal storage conditions, The solderability of MLCC terminals will also deteriorate over time, so MLCCs should be used within 6 months from the date of shipment.

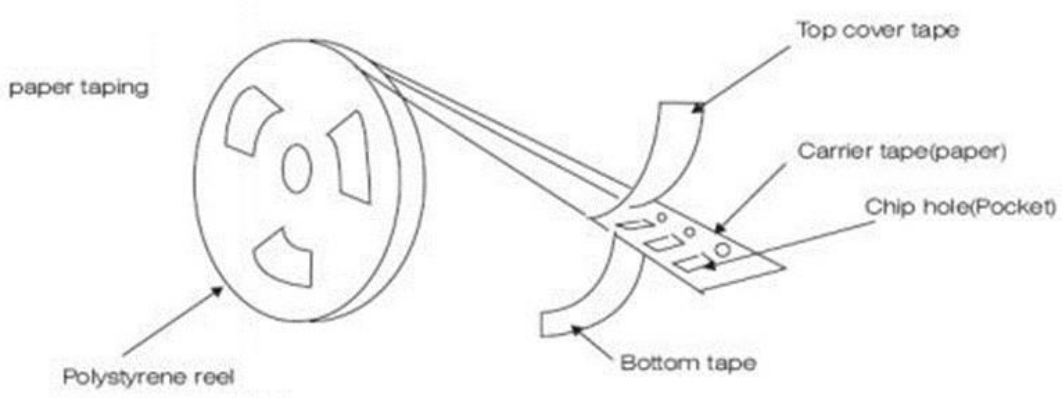
7. Product packaging

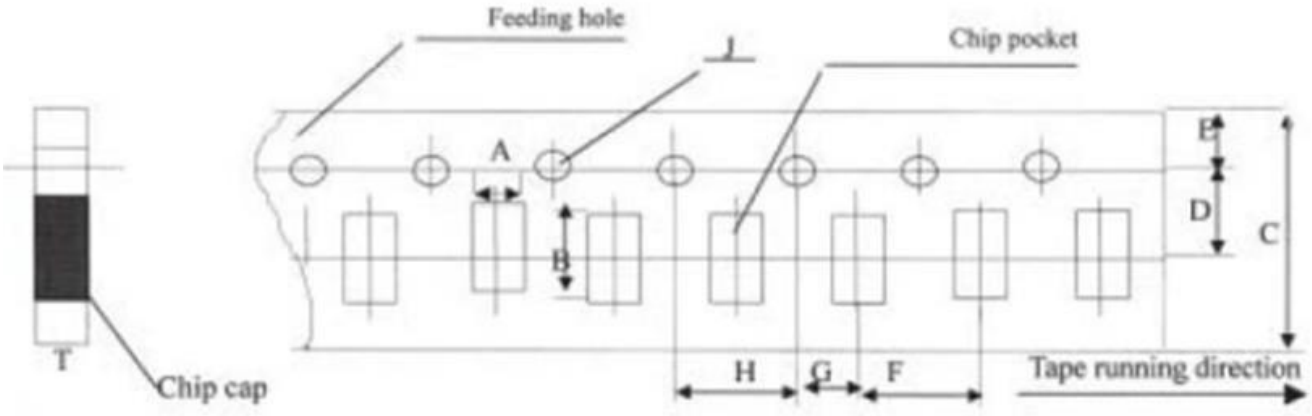
7.1 Bulk bag

Specification	quantity	Remark
0402	10000	Packaging form and quantity can be customized according to customer requirements
0603	5000	
0805	5000	
0505	5000	
1111	2000	

7.2 Paper tape packaging

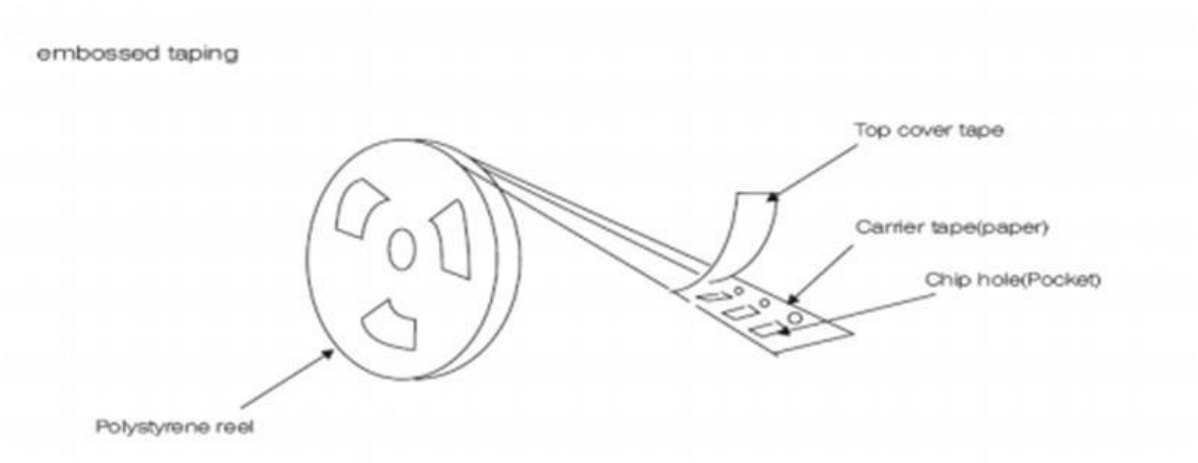
7.2.1 Paper tape reel structure

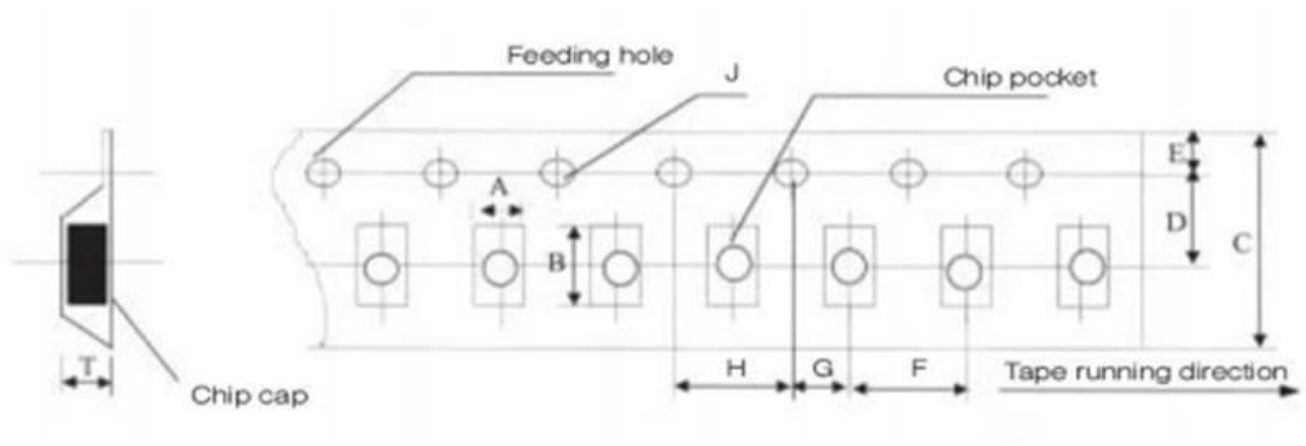




7.3 Plastic tape packaging

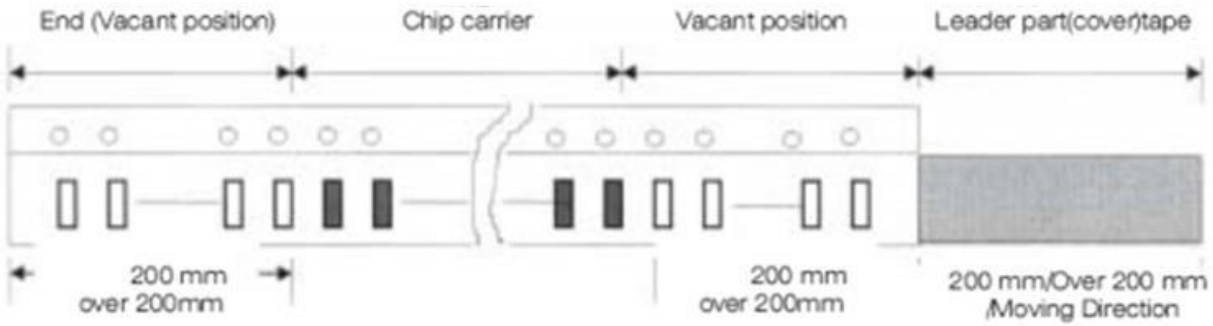
7.3.1 Plastic tape reel structure



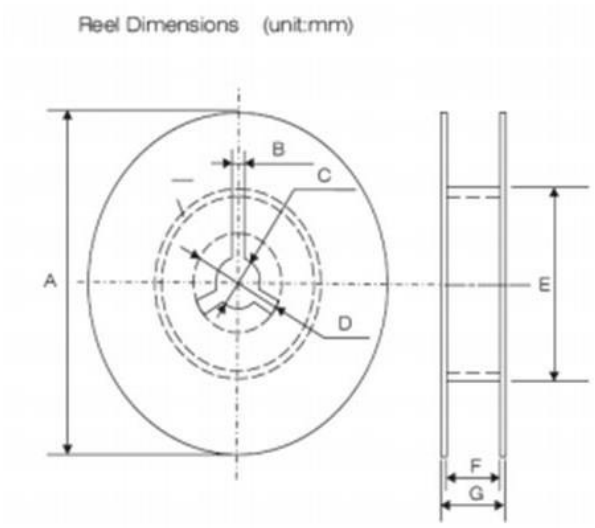


7.4 Conveyor belt front and rear structure

Structure of leader part and end part of the carrier paper



7.5 Reel size



A	B	C	D	E	F	G
Φ178.00±2.00	3.00	Φ13.00±0.50	Φ21.00±0.80	Φ50.00 or larger	10.00±1.50	12Max
Φ330.00±2.00	3.00	Φ13.00±0.50	Φ21.00±0.80	Φ50.00 or larger	10.00±1.50	12Max

7.6 Taping Method

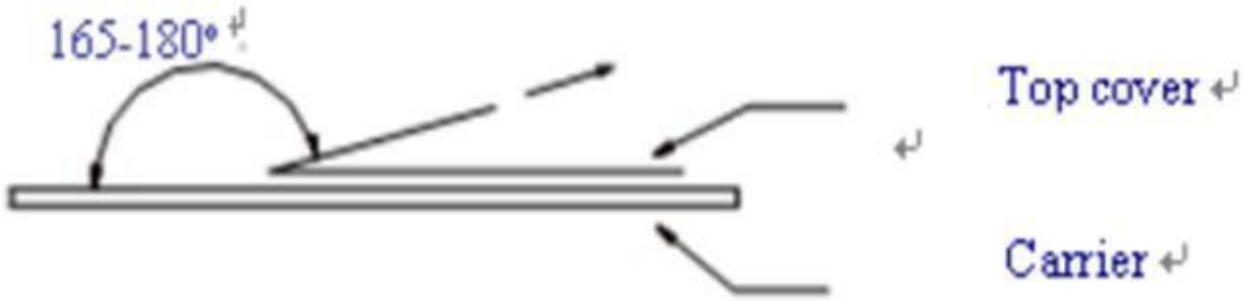
7.6.1 The tape used to package the capacitor is wound clockwise. When the tape is pulled out from top to bottom, the transfer hole is on the right side of the tape. 7.6.2 At the front end of the tape, leave at least 5 lead-out strips.

7.6.3 When weaving tape, a leader portion or blank portion must be left as shown below.

7.6.4 The number of products mis-installed during the installation of reels must be less than 0.1% of the indicated quantity or 1 per reel, and errors must not occur continuously. 7.6.5 The upper and lower tapes should not extend beyond the edge of the tape and should not block the transfer hole.

7.6.6 The cumulative error of the transmission hole is within ±0.3 mm for 10 spacings.

7.6.7 The peeling torque of the upper tape should be within 0.1 to 0.7 Newton and its direction is as shown in the figure below.



8. Product banned substance test resultsAbout RoHS

All products comply with RoHS Directive Requirements:

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

If necessary, the product label may indicate ″"RoHS" mark or "GP" mark