

■ High Q MLCC (HQ SERIES)



◆ Feature

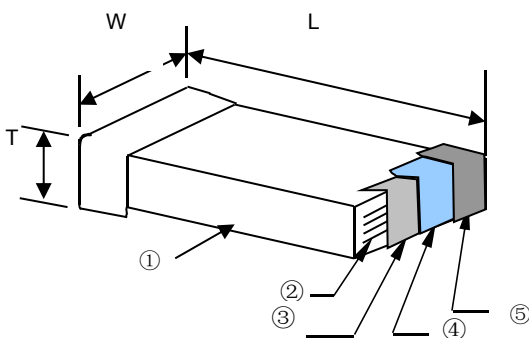
- * There is high reliability on monolithic structure of laminated layers.
- * And its character of excellent soldering ability and soldering resistance ability is suitable for reflow soldering and peak soldering.
- * It includes high and stable capacitance.
- * Internal electrodes use copper metal paste
- * High Q
- * Low equivalent series resistance
- * Executive Standard: GB/T 21041-2007

◆ Application

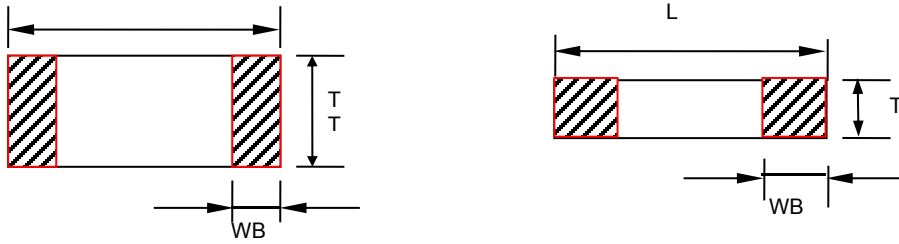
- * Communication devices
- * RF power amplifier
- * Filter network

◆ How To Order

0402			HQ		1R0		A		500		N		T		
Size Code			Nominal Capacitance		Rated Voltage (unit): V		Package Styles		Dielectric Code		Capacitance Tolerance		Terminal Material Styles		
Size Code	(L×W) inch	(L×W) mm	Express Method	Actual Value	Express Method	Actual Value	Express Method	Package Styles	Dielectric Code	Dielectric	Code	Tolerance	Note	Termination Styles	Express Method
0201	0.02×0.01	0.60×0.30	0R5	0.5	6R3	6.3	B	Bulk Bag	HQ	COG	A	±0.05pF	These Capacitance tolerance A, B, C, D are just applicable the capacitance that equals to or less than 10pF.	Nickel Barrier Termination	N
0402	0.04×0.02	1.00×0.50	1R0	1.0	500	50×10 ⁰	T	Taping Package			B	±0.10pF			
0603	0.06×0.03	1.60×0.80	102	10×10 ²	201	20×10 ¹					C	±0.25pF			
0805	0.08×0.05	2.00×1.25	Note: the first two digits are significant; third digit denotes number of zeros; R=decimal point.		Note: the first two digits are significant; third digit denotes number of zeros; R=decimal point.						D	±0.50pF			
											F	±1%			
											G	±2%			
											J	±5%			

◆ Product Structure


NO	Name
①	Ceramic dielectric
②	Inner electrode (Cu)
③	Substrate electrode
④	Nickel Layer
⑤	Tin Layer

◆ Product Dimensions


Type		Dimensions (mm)			
British expression	Metric expression	L	W	T	WB
0201	0603	0.60±0.03	0.30±0.03	0.30±0.03	0.15±0.05
0402	1005	1.00±0.05	0.50±0.05	0.50±0.05	0.25±0.05
0603	1608	1.60±0.10	0.80±0.10	0.80±0.10	0.35±0.20
0805	2012	2.00±0.20	1.25±0.20	0.80±0.20	0.50±0.20


Note: We can design according to customer special requirements

◆ Temperature Coefficient /Characteristics


Dielectric	Reference Temperature Point	Temperature Coefficient	Operation Temperature Range
C0G	20°C	0±30ppm/°C	-55°C ~ 125°C

◆ Capacitance Range and Operating Voltage

Dielectric	C0G											
	0201		0402		0603				0805			
Dimension	25V	50V	25V	50V	25V	50V	100V	200/ 250V	25V	50V	100V	200/250V
Capacitance												
0.1pF												
0.2pF												
0.3pF												
0.4pF												
0.5pF												
0.6 pF												
0.7pF												
1.0pF												
1.2pF												
1.5pF												
1.8pF												
2.0pF												
2.2pF												
3.3pF												
3.9pF												
4.7pF												
5.6pF												

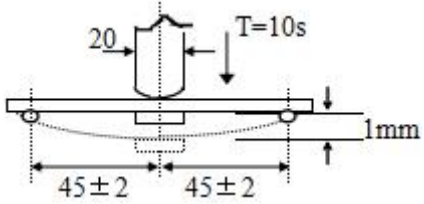
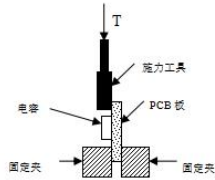
Note: 1、  Normal production 2、 We can design according to the customer requirements.

Dielectric	COG											
Dimension	0201		0402		0603				0805			
Voltage	25V	50V	25V	50V	25V	50V	100V	200/ 250V	25V	50V	100V	200/250V
Capacitance												
6.8pF												
8.2pF												
10pF												
12pF												
15pF												
18pF												
22pF												
27pF												
33pF												
39pF												
47pF												
56pF												
68pF												
82pF												
100pF												
120pF												
150pF												
180pF												
220pF												
270pF												
330pF												
390pF												
470pF												
560pF												
680pF												
820pF												
1000pF												
1200pF												
1500pF												

Note: 1、  Normal production 2、 We can design according to the customer requirements.

◆Reliability Test

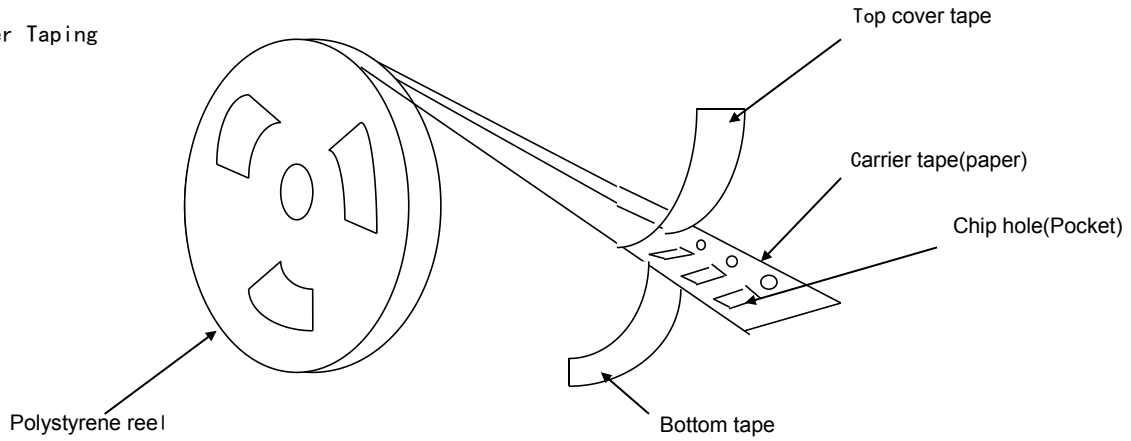
Item	Technical Specification	Test Method and Remarks		
Capacitance	Should be within the specified tolerance.	Capacitance	Measuring Frequency	Measuring Voltage
		≤1000pF	1MHz±10%	1.0±0.2Vrms
		> 1000 pF	1KHz±10%	
Q	C≥30pF, Q≥1000 C<30pF, Q≥400+20C	Test Frequency: 1MHz±10% Test Voltage: 1.0±0.2Vrms		

Item	Technical Specification		Test Method and Remarks					
(IR) Insulation Resistance	$\geq 10,000\text{M}\Omega$		Measuring Voltage: Rated Voltage (Max 500V) Duration: 60±5s Test Humidity: $\leq 75\%$ Test Temperature: $25^\circ\text{C} \pm 3^\circ\text{C}$ Test Current: $\leq 50\text{mA}$					
Dielectric Withstanding Voltage	No breakdown or damage.		Measuring Voltage: Class I :300% Rated voltage Duration: 1~5s Charge/ Discharge Current: 50mA max.					
Solderability	At least 95% of the terminal electrode is covered by new solder. Visual Appearance: No visible damage.		Preheating conditions:80 to 120°C; 10~30s.					
			Pb-Sn soldering Solder Temperature: $235 \pm 5^\circ\text{C}$ Duration: $2 \pm 0.5\text{s}$	Lead-free soldering Solder Temperature: $245 \pm 5^\circ\text{C}$ Duration: $2 \pm 0.5\text{s}$				
Resistance to Soldering Heat	ΔCC	$\leq \pm 2.5\%$ or $\pm 0.25\text{PF}$, whichever is larger	Preheating conditions: 100 to 200°C; 60~120s. Solder Temperature: $265 \pm 5^\circ\text{C}$ Duration: $10 \pm 1\text{s}$ Clean the capacitor with solvent and examine it with a 10X(min.) microscope. Recovery Time: $24 \pm 2\text{h}$ Recovery condition: Room temperature					
	Q	Same to initial value.						
	IR	Same to initial value.						
	Appearance: No visible damage. At least 95% of the terminal electrode is covered by new solder.							
Resistance to Flexure of Substrate (Bending Strength)	Appearance: No visible damage.		Test Board: PCB Warp: 1mm Speed: 1mm/sec. Unit: mm The measurement should be made with the board in the bending position. 					
	$\Delta\text{C/C}$	Within $\pm 5\%$ or $\pm 0.5\text{pF}$, whichever is larger						
Termination Adhesion	No visible damage.	As shown in the picture, Slowly apply a T force to the porcelain body on the side of the capacitor and hold for 60+1 seconds. <table border="1" data-bbox="670 1724 909 1881"> <thead> <tr> <th>Size</th> <th>Apply Force T</th> </tr> </thead> <tbody> <tr> <td>≤ 0402</td> <td>2N</td> </tr> <tr> <td>≥ 0603</td> <td>5N</td> </tr> </tbody> </table> 	Size	Apply Force T	≤ 0402	2N	≥ 0603	5N
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≤ 0402	2N							
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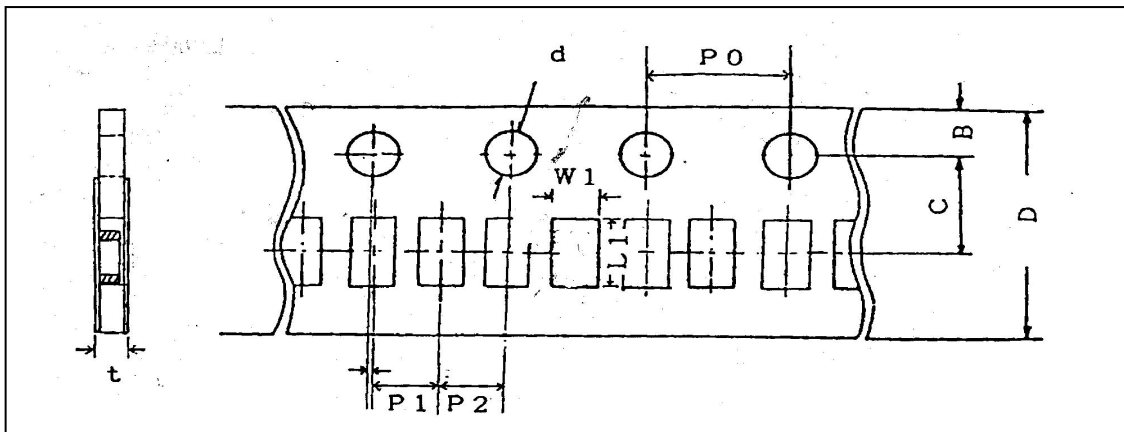
Item	Technical Specification	Test Method and Remarks																			
Temperature Cycle	<table border="1"> <tr> <td data-bbox="335 353 422 398">Item</td> <td data-bbox="422 353 893 398">COG</td> </tr> <tr> <td data-bbox="335 398 422 443">$\Delta C/C$</td> <td data-bbox="422 398 893 443">$\leq \pm 1\%$ or $\pm 1\text{pF}$, whichever is larger</td> </tr> </table>	Item	COG	$\Delta C/C$	$\leq \pm 1\%$ or $\pm 1\text{pF}$, whichever is larger	<p>Initial Measurement Cycling Times: 5 times, 1 cycle, 4 steps:</p> <table border="1"> <thead> <tr> <th data-bbox="909 362 989 407">Step</th> <th data-bbox="989 362 1324 407">(Temperature) (°C)</th> <th data-bbox="1324 362 1447 407">(Time)</th> </tr> </thead> <tbody> <tr> <td data-bbox="909 407 989 463">1</td> <td data-bbox="989 407 1324 463">(Low- category temp.): (COG:-55)</td> <td data-bbox="1324 407 1447 463">30min</td> </tr> <tr> <td data-bbox="909 463 989 508">2</td> <td data-bbox="989 463 1324 508">(Normal temp.) : +20°C</td> <td data-bbox="1324 463 1447 508">2~3min</td> </tr> <tr> <td data-bbox="909 508 989 564">3</td> <td data-bbox="989 508 1324 564">(Up- category temp.) (COG: +125)</td> <td data-bbox="1324 508 1447 564">30min</td> </tr> <tr> <td data-bbox="909 564 989 609">4</td> <td data-bbox="989 564 1324 609">(Normal temp.) : +20°C</td> <td data-bbox="1324 564 1447 609">2~3min</td> </tr> </tbody> </table> <p>Recovery time after test: 24±2h</p>	Step	(Temperature) (°C)	(Time)	1	(Low- category temp.): (COG:-55)	30min	2	(Normal temp.) : +20°C	2~3min	3	(Up- category temp.) (COG: +125)	30min	4	(Normal temp.) : +20°C	2~3min
	Item	COG																			
$\Delta C/C$	$\leq \pm 1\%$ or $\pm 1\text{pF}$, whichever is larger																				
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3	(Up- category temp.) (COG: +125)	30min																			
4	(Normal temp.) : +20°C	2~3min																			
Humidity load	<table border="1"> <tr> <td data-bbox="335 779 422 884">$\Delta C/C$</td> <td data-bbox="422 779 893 884">Class I : $\pm 7.5\%$ or $\pm 0.75\text{pF}$, whichever is larger.</td> </tr> </table>	$\Delta C/C$	Class I : $\pm 7.5\%$ or $\pm 0.75\text{pF}$, whichever is larger.	<p>Temperature: 40±2°C Humidity: 90~95%RH Voltage: Rated Voltage Duration: 500h Recovery conditions: Room temperature Recovery Time: 24±2h</p>																	
	$\Delta C/C$	Class I : $\pm 7.5\%$ or $\pm 0.75\text{pF}$, whichever is larger.																			
	<table border="1"> <tr> <td data-bbox="335 891 422 952">Q</td> <td data-bbox="422 891 893 952">≤ 2 Not more than twice of initial value.</td> </tr> </table>	Q	≤ 2 Not more than twice of initial value.																		
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<table border="1"> <tr> <td data-bbox="335 958 422 1041">IR</td> <td data-bbox="422 958 893 1041">$R_i \geq 1000\text{M}\Omega$</td> </tr> </table>	IR	$R_i \geq 1000\text{M}\Omega$																			
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Appearance: No visible damage.																					
Life Test	<table border="1"> <tr> <td data-bbox="335 1227 422 1299">$\Delta C/C$</td> <td data-bbox="422 1227 893 1299">$\pm 2\%$ or $\pm 1\text{pF}$, whichever is larger.</td> </tr> </table>	$\Delta C/C$	$\pm 2\%$ or $\pm 1\text{pF}$, whichever is larger.	<p>Applied Voltage: Rated Voltage < 100V: 2Ur 100V ≤ Rated Voltage ≤ 200V: 1.5 Ur 200V < Rated Voltage ≤ 500V: 1.3 Ur Duration: 1000h Temperature: 125°C Charge/ Discharge Current: 50mA max. Recovery Conditions: Room Temperature Recovery Time: 24±2h</p>																	
	$\Delta C/C$	$\pm 2\%$ or $\pm 1\text{pF}$, whichever is larger.																			
	<table border="1"> <tr> <td data-bbox="335 1305 422 1355">Q</td> <td data-bbox="422 1305 893 1355">Not more than twice of initial value.</td> </tr> </table>	Q	Not more than twice of initial value.																		
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<table border="1"> <tr> <td data-bbox="335 1361 422 1489">IR</td> <td data-bbox="422 1361 893 1489">$R_i \geq 4000\text{M}\Omega$ 或 $R_i \cdot C_R \geq 40\text{S}$ whichever is smaller.</td> </tr> </table>	IR	$R_i \geq 4000\text{M}\Omega$ 或 $R_i \cdot C_R \geq 40\text{S}$ whichever is smaller.																			
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Appearance: No visible damage.																					

◆ Package

* Paper Taping

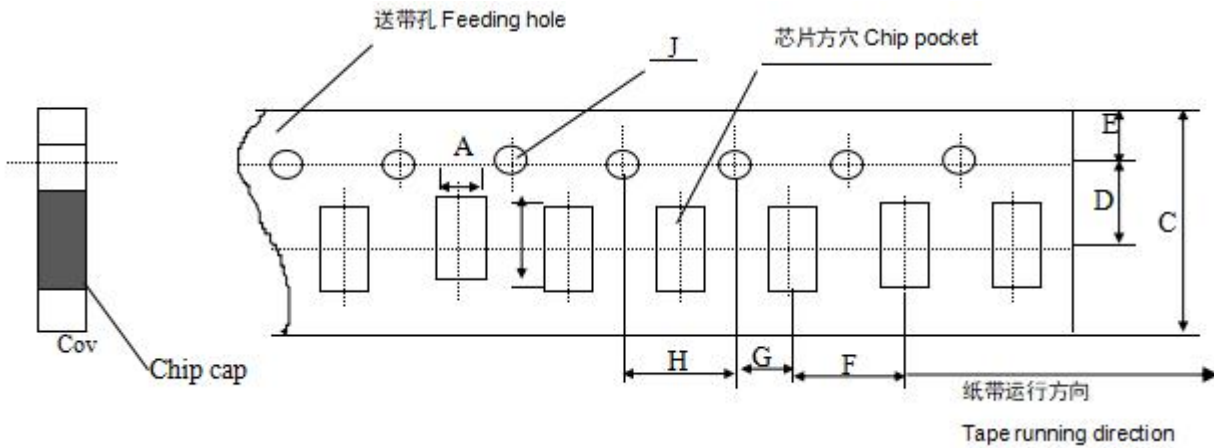


* Dimensions of paper taping for 0201、0402 type



Code	W1	L1	D	C	B	P1	P2	P0	d	t
0201	0.37± 0.10	0.67±0. 10	8.00± 0.10	3.50± 0.05	1.75± 0.10	2.00± 0.05	2.00± 0.05	4.00±0 .10	1.50 -0/+0.10	0.80 Below
0402	0.65± 0.10	1.15± 0.10	8.00± 0.10	3.50± 0.05	1.75± 0.10	2.00± 0.05	2.00± 0.05	4.00±0 .10	1.50 -0/+0.10	0.80 Below

* Dimensions of paper taping for 0603, 0805 types.

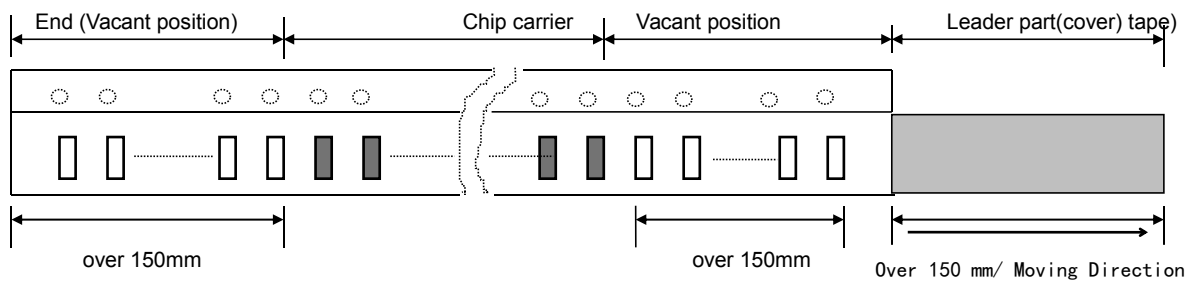


Unit: mm

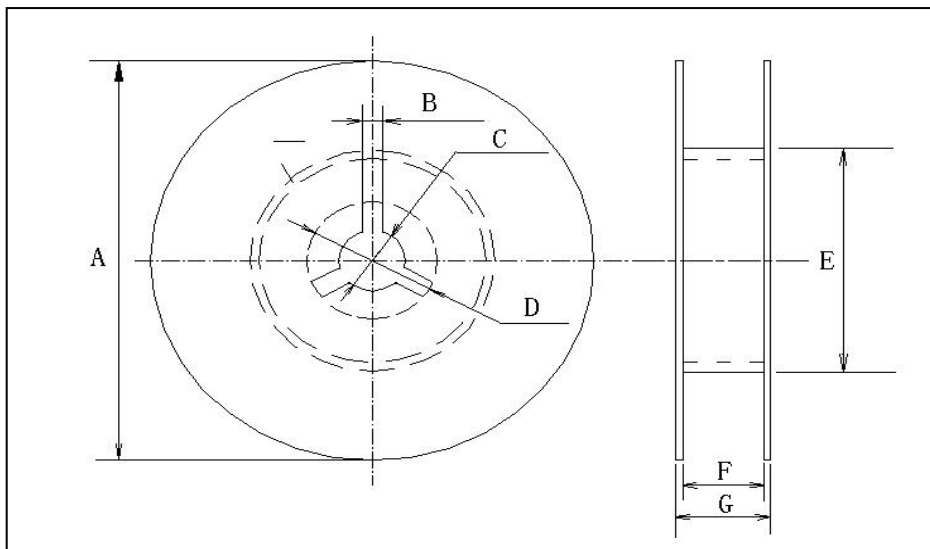
Code paper size	A	B	C	D*	E	F	G*	H	J	T
0603	1.10 ±0.10	1.90 ±0.10	8.00 ±0.10	3.50 ±0.05	1.75 ±0.10	4.00 ±0.10	2.00 ±0.10	4.00 ±0.10	1.50 -0/+0.10	1.10 Max
0805	1.45 ±0.15	2.30 ±0.15	8.0 ±0.15	3.50 ±0.05	1.75 ±0.10	4.00 ±0.10	2.00 ±0.10	4.00 ±0.10	1.50 -0/+0.10	1.10 Max

Note: The place with "*" means where needs exactly dimensions.

* Structure of leader part and end part of the carrier paper

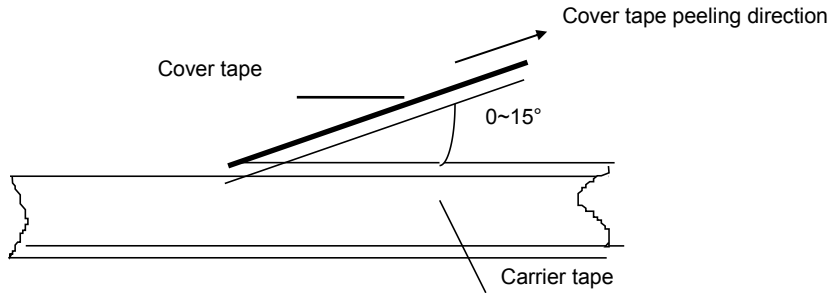


* Reel dimensions (unit: mm)



Reel type	A	B	C	D	E	F	G
7'REEL	$\phi 178 \pm 2.0$	3.0	$\phi 13 \pm 0.5$	$\phi 21 \pm 0.8$	$\phi 50$ or more	10.0 ± 1.5	12max

* Taping specification: top tape peeling strength
Paper Taping



Standard: $0.1N < \text{peeling strength} < 0.7N$

No paper dirty remains on the scotch when peeling, and sticks to top and bottom tape.

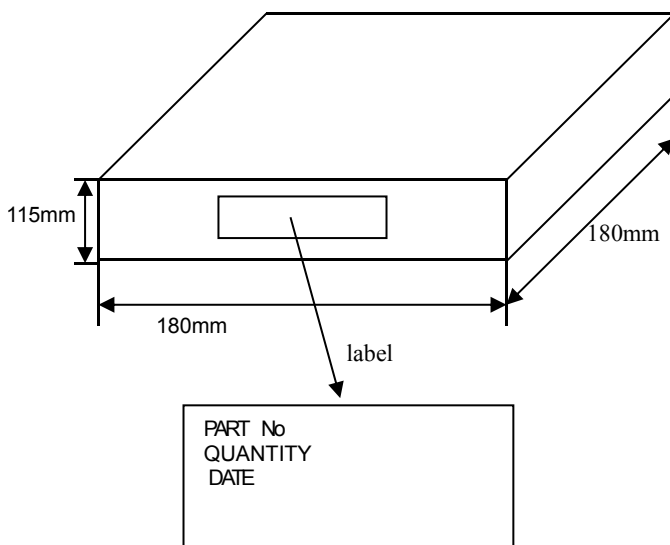
* Packing Quantity

尺寸 (SIZE)	(Package Style & Quantity) unit: pcs				
	(EPT)	(PT)	(ET)	(BC)	(BP)
0201	-----	15000	-----	20000	5000
0402	-----	10000	-----	20000	5000
0603	-----	4000	-----	15000	5000
0805	-----	4000	3000	10000	5000

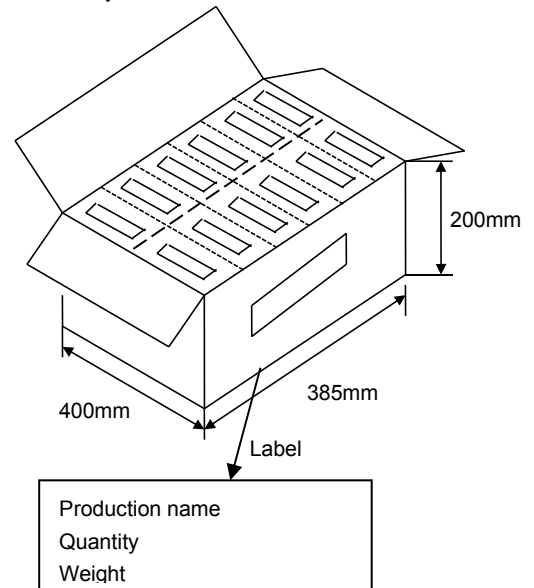
Note: We can choose packing style and quantity can be according to the customer's requirement.

* Outer packing

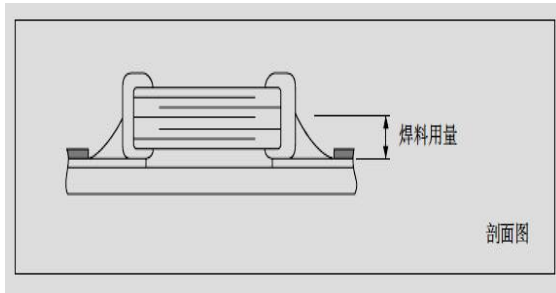
The first package
Quantity: 10 reels



The second package
Quantity: 6 cases



The optimal solder fillet amounts for reworking by using soldering iron



* Recommended Soldering Method

Size	Temperature Characteristics	Rated Voltage	Capacitance	Soldering Method
0201	C0G	/	/	R
0402	C0G	/	/	R
0603	C0G	/	/	R/W
0805	C0G	/	/	R/W

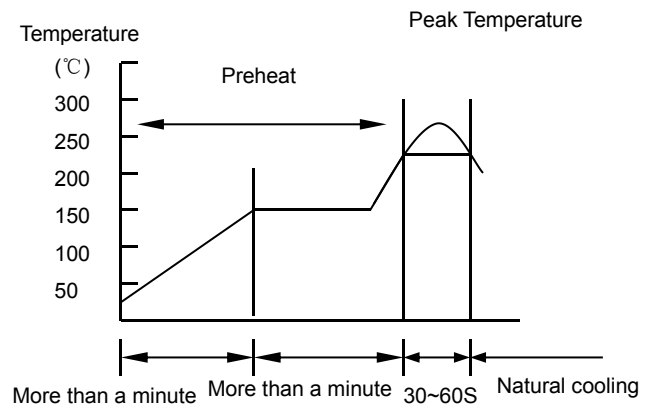
Soldering method:
Reflow Soldering
Wave Soldering

◆ The temperature profile for soldering

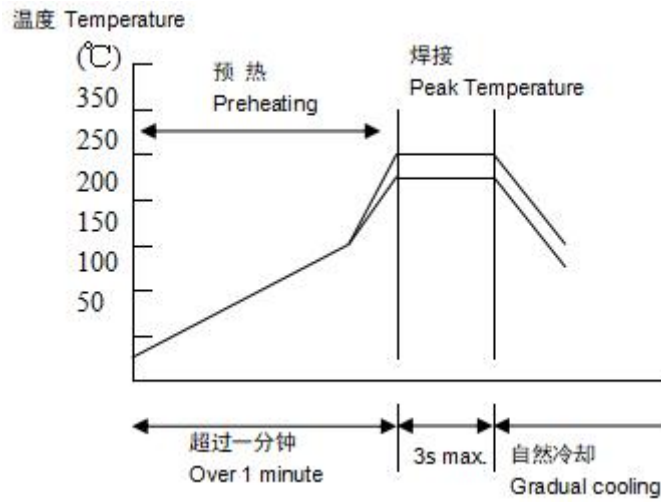
* (Re-flow soldering)

	Pb-Sn soldering	Lead-free soldering
Peak temperature	230℃~250℃	240℃~260℃

While in preheating, please keep the temperature difference between soldering temperature and surface temperature of chips as: $T \leq 150^\circ\text{C}$.



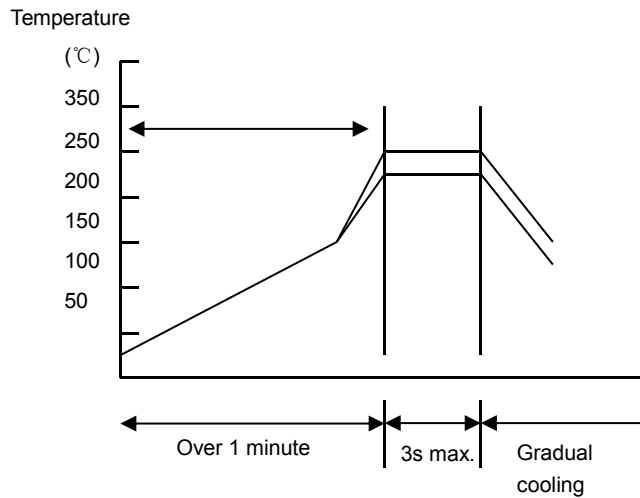
* (Wave soldering)



	Pb-Sn soldering	Lead-free soldering
Peak temperature	230°C~260°C	240°C~270°C

While in preheating, please keep the temperature difference between soldering temperature and surface temperature of chips as: $T \leq 150^\circ\text{C}$.

* Hand soldering



Conditions:

Preheating	Temperature of soldering iron head	Power of soldering iron	Diameter of soldering iron head	Soldering time	Solder paste amount	Restricted conditions
$\Delta \leq 130^\circ\text{C}$	Highest temperature: 350°C	20W at the highest	1mm recommended	3s at the longest	$\leq 1/2$ chip thickness	Please avoid the direct contact between soldering iron head and ceramic components

*The contents of the latest version shall prevail