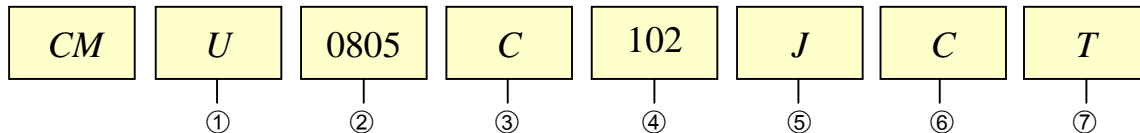


1. SCOPE

This specification is applicable to Jackcon multilayer ceramic capacitors.

2.CODE CONSTRUCTION :



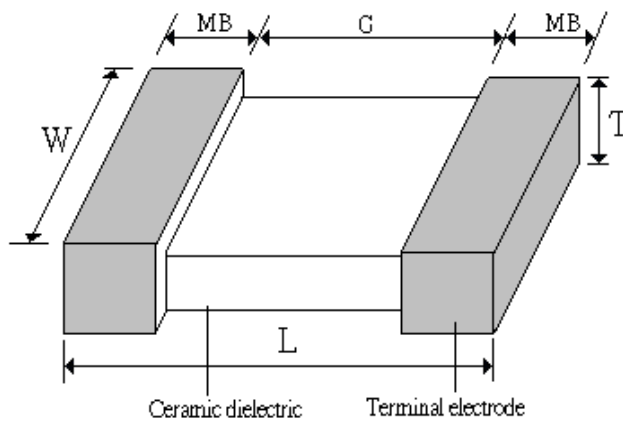
① Rated Voltage:

Code	Rated voltage	Code	Rated voltage	Code	Rated voltage	Code	Rated voltage	Code	Rated voltage
K	6.3V	T	25V	G	200V	D	630V	P	3000V
N	10V	U	50V	H	250V	M	1000V	Q	4000V
B	16V	A	100V	C	500V	O	2000V	R	5000V

② Part Dimension :

Unit: mm

Size Code	Dimension					Voltage Ranges
	Length (L)	Width (W)	Thickness (T)	MB(Min)	G(Min)	
0402	1.0±0.05	0.5±0.05	0.5±0.05	0.10	0.30	6.3 50V
0603	1.6±0.1	0.8±0.07	0.8±0.07	0.20	0.40	6.3 250V
0805	2.0±0.2	1.25±0.1	1.40 max.	0.25	0.70	6.3 500V
1206	3.2±0.2	1.60±0.2	1.8 max.	0.25	1.40	6.3 2KV
1210	3.2±0.3	2.5±0.3	2.8 max.	0.25	1.40	6.3 1KV
1808	4.5±0.35	2.0±0.3	2.3 max.	0.25	2.15	630 3KV
1812	4.5±0.35	3.2±0.3	3.5 max.	0.25	2.15	6.3 3KV
2220	5.7±0.4	5.0±0.4	5.4 max.	0.25	3.30	100 3KV
2225	5.7±0.4	6.3±0.4	6.7 max.	0.25	3.30	100 3KV



③ Temperature Characteristics Code:

Code	Temp. Coefficient	Operation Temp.		Capacitance Change
C	NP0 (Class I)	-55	+125	0 ± 30 ppm/
R	X7R (Class II)	-55	+125	± 15%
X	X5R (Class II)	-55	+85	± 15%
F	Y5V (Class II)	-30	+85	+22% -82%

④ Capacitance Code :

Code	Capacitance(pF)	Code	Capacitance(pF)
1R0	1 *	102	1000 *
1R5	1.5	222	2200 *
100	10 *	472	4700 *
101	100 *	103	10000 *

⑤ Tolerance Code :

Code	Tolerance	Code	Tolerance
B	± 0.1pF	J	±5%
C	±0.25pF	K	±10%
D	±0.50pF	M	±20%
F	± 1%	Z	+80% / -20%
G	± 2%		

- PS: 1. * -- Two significant digits followed by no. of zeros
 2. Temperature coefficient (T.C.) vs. Proper tolerance applied:
 NPO: For all tolerance
 X7R, X5R: K, M Tolerance
 Y5V : M, Z Tolerance

⑥ Termination Code :

Code	C
Termination Type	Nickel Barrier (pB free)

⑦ Packaging Code :

Code	B	T
Packaging Type	Bulk	Tape & Reel

3. STANDARD TEST CONDITIONS :

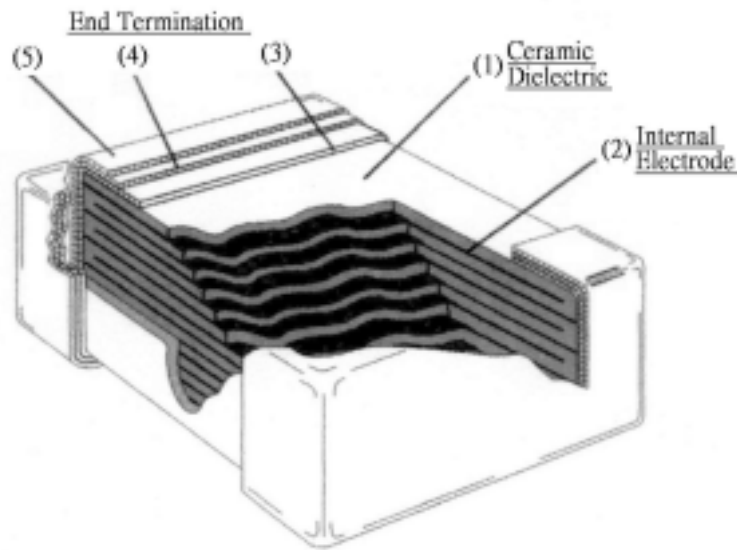
Tests shall, unless otherwise specified, be carried out at 15 to 35 and RH 45 to 75%.

If any doubt and argument has been encounter in judgement, the final test shall be done at 25±2 ,RH45 to 55% and 860 1060mbar. (Based on JIS standard)

4. DISPOSITION

If question to the measuring result in judgement, take the capacitor under a specified temperature for 30 minutes at least before measurement.

5. STRUCTURE:



Ag / Pd SERIES .

NO	Specifications	Material	Termination
1	Ceramic dielectric	Ceramic	Plating thickness
2	Internal Electrode	Ag-Pd	
3	End Terminal	Ag layer	40 μ m min
4		Ni layer	1-4 μ m
5		Sn-Pb layer or Sn layer	4-12 μ m min

BME SERIES :

NO	Specifications	Material	Termination
1	Ceramic dielectric	Ceramic	Plating thickness
2	Internal Electrode	Ni	
3	End Termination	Cu layer	40 μ m min
4		Ni layer	1-4 μ m
5		Sn-Pb layer or Sn layer	4-12 μ m min

6. STORING CONDITION AND TERM

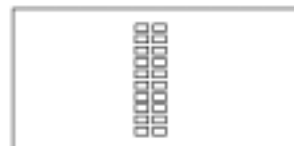
Recommends the storing of products within 6 months at temperature 15 35 and humidity 70%RH max. If the product stored over 6 months, please reconfirm its solderability before use.

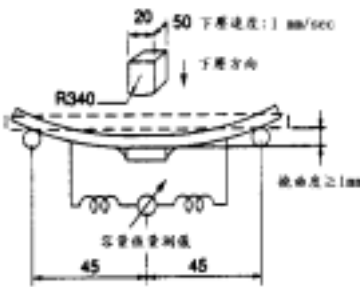
7. PERFORMANCE:

NO.	Item	Performance	Test or Inspection method			
(1)	External Appearance	No defects which may affect performance.	Visual inspection & Dimension measurement			
(2)	Voltage Proof	Withstand test voltage without Insulation breakdown or other damage.	DC Tested voltage shall be applied for 1 5sec. Charge/discharge current shall not exceed 50 mA . (PS: Ra – Rated Voltage)			
			Rated voltage	DC Tested voltage		
			<100V	2.5Ra		
			100V	3.0Ra		
			200~300V	2.0Ra		
			500~999V	1.5Ra		
			1000~3000V	1.2Ra		
4000V	1.1Ra					
(3)	Insulation Resistance	NPO: 100,000M Min. or X7R、X5R、Y5V: 10,000M Min or R C 1,000 . F (Whichever is smaller)	Apply DC tested voltage for 60± 5 minute. (PS: Ra – Rated Voltage)			
			Rated voltage	DC Tested voltage		
			< 500V	1.0 Ra		
500V	500V					
(4)	Capacitance (Cap.)	Within the specified tolerance that refers on page 2	Measuring frequency & voltage: NPO : > 1000pF : 1KHz± 10% 1.0± 0.2 Vrms 1000pF : 1MHz± 10% 1.0± 0.2 Vrms X7R、Y5V : C 10uF 1.0± 0.2 Vrms 1KHz± 10% C > 10 uF 0.5± 0.2 Vrms 120Hz± 20%			
(5)	Dissipation Factor (D. F.)	NPO		More than 30pF Q 1000 Less than 30pF Q 400+20C		
		X7R		2.5%	50V (Except 0603 0.047uF 0805 0.18 uF , 1206 0.47uF , DF 3.0%)	
				3.5%	25V (Except 0805 1 uF , DF 5.0%) (Except 0402 0.033 uF , 0603 0.15uF , 0805 0.68 uF , 1206 2.2uF , DF 5.0%)	
					5.0%	10V
					7.5%	6.3V
				Y5V	5%	50V 25V (Except 0603 0.1uF; 0805 0.33uF; 1206 1.0uF)
			7%		16V (Cap < 1uF) (Except 0402 0.068 uF , DF 9%)	
		9%			16V (Cap 1uF)	
		12.5%	10V			

NO.	Item	Performance	Test or Inspection method		
(6)	Temperature Characteristic of Capacitance	Temperatures Coefficient		The temperature coefficient is determined using the capacitance measured at base temperature as a reference. Test the specimen in a range of maximum and minimum operation temperature that shown as left table. * Base Temp.: 25 ± 2	
		T.C.	Operating Temperature		Capacitance Change(C)
		NPO	-55~+125		0±30(ppm/)
		X7R	-55~+125		± 15%
		X5R	-55~+85		± 15%
Y5V	-30~+85	+ 22%~ - 82%			
(7)	Soldering to Heat	External appearance	No mechanical damage.	Completely immerse both terminations in solder at 270±5 for 10±3 sec. Leave the capacitors in ambient condition for 24 ± 2 hours before measurement. *Preconditioning : (only for Class 2): Perform a heat treatment at 150 ±5 for one hour and then let sit for 24 ± 2 hours at room temperature. Perform the initial measurement.	
		Cap. change (C/C)	NPO X7R/X5R Y5V		±2.5% or ± 0.25 pF max. (Whichever is larger) ±7.5% ±20%
		D.F./Q & IR	To meet initial standard value		
(8)	Leaching	New solder to over 95% of termination	Completely soak both terminal electrodes in solder at 270±5 for 40±5 sec.		
(9)	Solderability	New solder to over 95% of termination	Completely soak both terminal electrodes in solder at specified temperature for 3±0.5 sec.: a. For Tin-Lead (Sn/Pb) Termination product: 235±5 Soldering bath: Sn63/Pb37 b. For Lead-free Termination product: 245±5 Soldering bath: Sn96.5/Ag3.0/Cu0.5		

NO.	Item		Performance	Test or Inspection method
(10)	Humidity (Steady state) & Humidity load	External appearance	No mechanical damage.	<p>A. Humidity load: (Not apply for the product with rated voltage 250V): Apply the rated voltage at temperature 40±2 and humidity 90 to 95%RH for 1000 + 48/ - 0 hours. Leave the capacitors in ambient condition for the following time before measurement. Class 1 : 1~2 hours. Class 2 : 24± 2 hours.</p> <p>* Charge / discharge current shall. not exceed 50 mA.</p> <p>* Preconditioning : (only for Class 2): Apply the rated DC voltage for 1hour at 150 ±5 . Remove and let sit for 24±2 hours at room temperature. Perform initial measurement.</p> <p>B. Humidity (Steady state): The test procedure is same as that in Humidity load but only without rated voltage applied.</p>
		Cap. change (C/C)	NPO: ± 5% or ±0.5 pFmax. (Whichever is larger) X7R/X5R: ±12.5 % Y5V: ±30%	
		D.F.	NPO: C 30pF: D.F. $\frac{1}{350}$ 10pF C < 30pF: D.F. $\frac{1}{275 + 2.5 * C}$ C < 10pF: D.F. $\frac{1}{200 + 10 * C}$ PS: C: Nominal Capacitance (pF) X7R/ X5R: Less than 2 times of initial value Y5V : Less than 1.5 times of initial value	
		I.R.	500M min. or 25 *F (Whichever is smaller)	
(11)	Vibration	External appearance	Without distinct damage	(Not apply for 0402 product) Solder the capacitors to the test jig as shown in figure below with IR-Reflow method. The capacitor shall be subjected to a simple harmonic motion with the entire frequency range, from 10 to 55 Hz and return to 10 Hz ,shall be transverse in 1 min. Amplitude(total excursion):1.5mm Amplitude tolerance:± 15% This motion shall be applied for a period of 2 hours in each of 3 mutually perpendicular directions (a total of 6 hours)
		Cap. change (C/C)	NPO: ±2.5% or ±0.25pF max. (Whichever is larger) X7R/ X5R: ± 7.5 % Y5V: ±20%	
		D.F. or Q	To meet initial standard value	

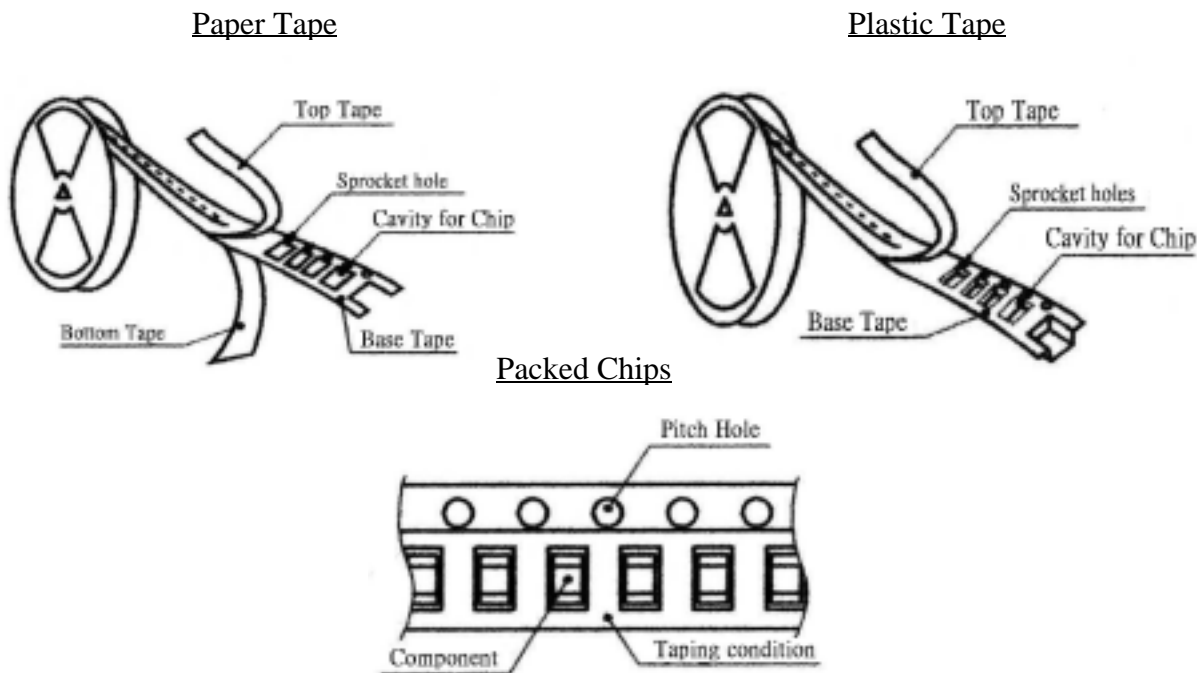


NO.	Item	Performance	Test or Inspection method												
(12)	Temperature cycle	External appearance	No mechanical damage.												
		Cap. change (C/C)	NPO: $\pm 2.5\%$ or $\pm 0.25\text{pFmax.}$ (Whichever is larger) X7R/ X5R: $\pm 7.5\%$ Y5V: $\pm 20\%$												
		D.F.	To meet initial standard value												
		I.R.	10000M min. or 500 *F (Whichever is smaller)												
		(Not apply for 0402 product) The capacitor shall be subject 5 cycles according to four heat treatments listed in the following table. Then Leave the capacitors in ambient condition for the following time before measurement. Class II: 2 ~ 24 hours <table border="1" data-bbox="951 583 1455 808"> <thead> <tr> <th>Step</th> <th>Temperature ()</th> <th>Duration (min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Min. Operation Temp.± 3</td> <td>30± 3</td> </tr> <tr> <td>2</td> <td>Room Temp. (25)</td> <td>2 ~ 5</td> </tr> <tr> <td>3</td> <td>Max. Operation Temp.± 3</td> <td>30± 3</td> </tr> <tr> <td>4</td> <td>Room Temp. (25)</td> <td>2 ~ 5</td> </tr> </tbody> </table> *Preconditioning : (only for Class 2): Perform a heat treatment at 150 ± 5 for one hour and then let sit for 24 ± 2 hours at room temperature. Perform the initial measurement.	Step	Temperature ()	Duration (min.)	1	Min. Operation Temp. ± 3	30 ± 3	2	Room Temp. (25)	2 ~ 5	3	Max. Operation Temp. ± 3	30 ± 3	4
Step	Temperature ()		Duration (min.)												
1	Min. Operation Temp. ± 3		30 ± 3												
2	Room Temp. (25)		2 ~ 5												
3	Max. Operation Temp. ± 3		30 ± 3												
4	Room Temp. (25)	2 ~ 5													
(13)	Deflection	External appearance	No cracking or marking defects shall occur												
		Bending strength	Flexure 1mm												
		Cap. change (C/C)	NPO: $\pm 5\%$ or $\pm 0.5\text{pFmax.}$ (Whichever is larger) X7R/ X5R: $\pm 12.5\%$ Y5V: $\pm 30\%$												
															

NO.	Item	Performance	Test or Inspection method												
(14)	Load Life	External appearance	<table border="1" data-bbox="984 275 1430 405"> <thead> <tr> <th>Rated Voltage</th> <th>Tested Voltage</th> <th>Rated Voltage</th> <th>Tested Voltage</th> </tr> </thead> <tbody> <tr> <td><500V</td> <td>2.0Ra</td> <td>=630V</td> <td>1.2Ra</td> </tr> <tr> <td>=500V</td> <td>1.5Ra</td> <td>1KV</td> <td>1.0Ra</td> </tr> </tbody> </table> <p data-bbox="951 422 1455 495">at maximum operating temperature ± 2 for 1000 + 48/ - 0 hours.</p> <p data-bbox="951 506 1455 621">Leave the capacitors in ambient condition for the following time before measurement.</p> <p data-bbox="1000 632 1227 663">Class I: 1~2 hours</p> <p data-bbox="1000 674 1260 705">Class II: 24\pm 2 hours</p> <p data-bbox="951 758 1455 831">* Charge / discharge current shall. not exceed 50 mA.</p> <p data-bbox="951 842 1455 1125">* Preconditioning : (only for Class 2): Apply 200% of the rated DC voltage for 1 hour at the maximum operating temperature ± 3 . Remove and let sit for 24\pm2 hours at room temperature. Perform initial measurement.</p>	Rated Voltage	Tested Voltage	Rated Voltage	Tested Voltage	<500V	2.0Ra	=630V	1.2Ra	=500V	1.5Ra	1KV	1.0Ra
	Rated Voltage	Tested Voltage		Rated Voltage	Tested Voltage										
	<500V	2.0Ra		=630V	1.2Ra										
=500V	1.5Ra	1KV	1.0Ra												
Cap. change (C/C)	NPO: $\pm 3\%$ or $\pm 0.3pF_{max}$. (Whichever is larger) X7R/ X5R: $\pm 12.5\%$ Y5V: $\pm 30\%$														
D.F.	NPO: C $\leq 30pF$: D.F. $\frac{1}{350}$ $30pF < C \leq 10pF$: D.F. $\frac{1}{275 + 2.5 * C}$ C < 10pF : D.F. $\frac{1}{200 + 10 * C}$ PS: C: Nominal Capacitance (pF) X7R/ X5R: Less than 2 times of initial value Y5V : Less than 1.5 times of initial value														
I.R.	1000M min. or 50 *F (Whichever is smaller)														

9. Packaging :

(1) Reel specification: Standard reel diameter is 7" and 13"

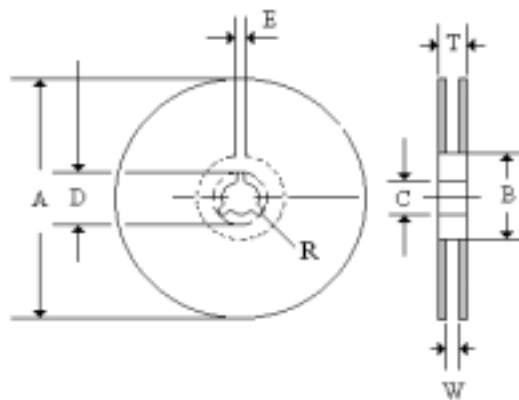


(2) Quantity for each reel

Chip Size		0402	0603	0805	1206	1210	1808	1812	2220	2225
Reel Size	7"	10000	3000/4000*	3000/4000*	3000	2000	2000	1000	1000	1000
	13"	50000	16000	12000	10000	8000	8000	4000	4000	4000
Tape wide(mm)		8	8	8	8/12	8/12	8/12	8/12	8/12	8/12

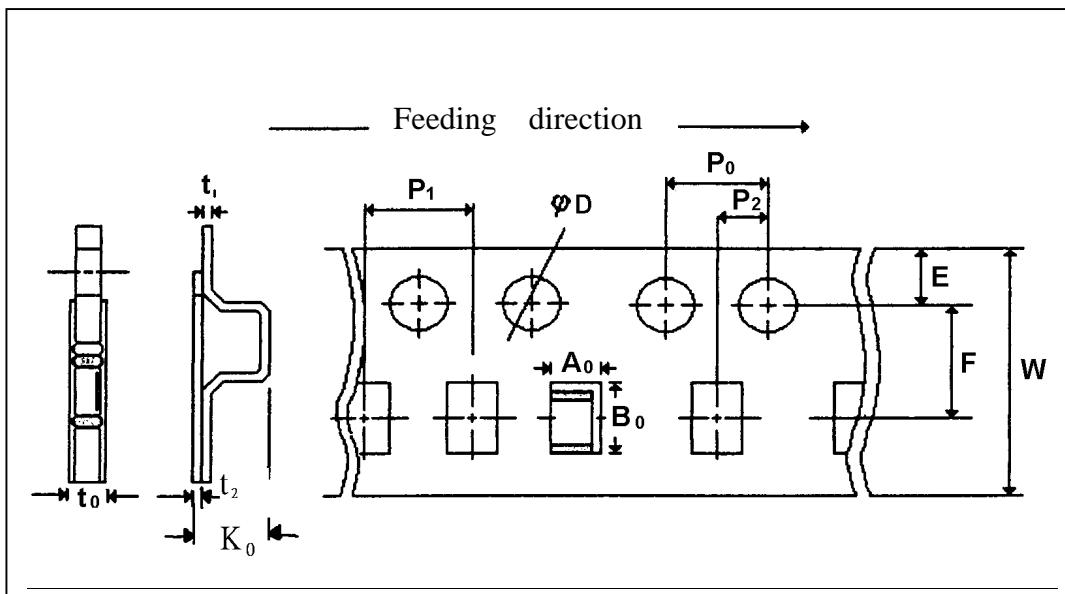
* Different size of reel base on different thickness of chips

(3) Dimension of Reel:



Dimension		A	B	C	D	E	T	W
Reel Size	7"	178±2	50 min.	13±0.5	21±0.8	2.0±0.5	12±2.0	10±1.5
	13"	330 max					18.4max.	12.4 +1.5/-0

(4) Tape Dimension :



Unit: inch (mm)

Symbol	Description	8 mm tape	12 mm tape
W	Wide of Tape	8(0.135) \pm 0.2(0.008)	12(0.472) \pm 0.2(0.008)
F	Distance between drive hole center and cavity center	3.5(0.138) \pm 0.05(0.002)	5.5(0.213) \pm 0.05(0.002)
E	Distance between drive hole center and tape edge	1.75(0.069) \pm 0.1(0.004)	
P_1	Distance between cavity center	4(0.156) \pm 0.1(0.004)	8(0.135) \pm 0.1(0.004)
P_2	Axial distance between drive hole center and cavity center	2(0.079) \pm 0.05(0.002)	
P_0	Axial distance between drive hole	4(0.156) \pm 0.1(0.004) [2(0.079) \pm 0.05(0.002) only for 0402 chip]	
D_0	Drive hole diameter	1.5(0.059) \pm 0.1(0.004)-0	
t_1	Base tape thickness	0.3(0.012) \pm 0.1(0.004)	0.4(0.016) \pm 0.1(0.004)
t_2	Total tape thickness	0.1(0.004) max.	
t_0	Total height of paper tape	1.1 max.	
K_0	Total height of plastic tape	2.5 max.	

	0402	0603	0805	1206	1210 and above
A_0 (Wide of Cavity)	0.65 \pm 0.1	1.05 \pm 0.1	1.55 \pm 0.15	2.0 \pm 0.2	Dependent on chip size to minimize rotation
B_0 (Length of Cavity)	1.15 \pm 0.1	1.85 \pm 0.1	2.3 \pm 0.15	3.6 \pm 0.2	

PS: Axial – Refer direction that parallel to feeding direction.

Unit: mm (inch)