Data Sheet

Customer:

Product: Multilayer Chip Bead – FBM Series

Size : 0201/0402/0603/0805/1204/1808

Issued Date: 29-Mar.-2024

Edition: Ver. 4

Record of change

Date	Ver.	Description	Page
30-Sep.-2014	1		
22-Nov.-2022	2	Revised Size 0402 Standard &High Speed Type	3,14
16-Oct.-2023	3	Add size 0201 & revise electrical specification	1~14
29-Mar.-2024	4	Delete size 0805 Medium Current Type (for Power Line)330Ω R.C. 1500mA	6

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29-Mar.-2024	29-Mar.-2024	29-Mar.-2024	
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MULTILAYER CHIP BEAD FBM SERIES

1. Introductions

The FBM series chip ferrite devices are categorized as noise limiting for EMI/RFI issue and products. These ferrite devices are typically useful when there is poor or no ground or capacitance cannot be tolerated by some high speed data line.

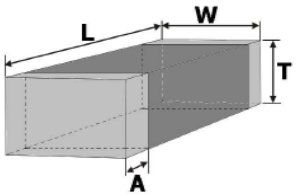
2. Features

Excellent solderability and high heat resistance for either flow or reflow soldering.

A closed circuit formed by internal silver printed layer, acting like a magnetic shield, minimizes heat generation and cross-talk.

Easy to use, serial connection to Signal/Power lines for noise limiting purpose.

3. Chip Dimension



Size	L	W	T	A
0201	0.6±0.03	0.30±0.03	0.3±0.03	0.1~0.2
0402	1.0±0.05	0.50±0.05	0.5±0.05	0.1~0.3
0603	1.6±0.15	0.80±0.15	0.8±0.15	0.2~0.6
0805	2.0±0.20	1.25±0.20	0.9+0.15/–0.2	0.2~0.8
1204	3.2±0.20	1.60±0.20	1.1±0.20	0.4~1.0
1808	4.5±0.25	1.60±0.20	1.6±0.20	0.2~1.0

4. Part Numbering

FBM	0603	S	T	600	S	□□□
TYPE	SIZE	TYPE	PACKAGE	IMPEDANCE (Ω)	TOLERANCE	INTERNAL CODE
Multilayer Bead	0201 0402 0603 0805 1204 1808	S= Standard Type (For Signal Line) P= Medium Current (For Power Line) B= High Current (For Power Line)	T= Tape&Reel	060 = 6 Ω 150 = 15 Ω 601 = 600 Ω 102 = 1000 Ω	S= ±25%	

5. Electrical Specification

Size 0201 Standard Type (for Signal Line)

Impedance (Ω)	Tolerance	Test Frequency (MHz)	Test Voltage (mV)	DC Resistance (Ω) Max.	Rated Current (mA) Max.
10	±25%	100	500	0.10	500
11	±25%	100	500	0.10	500
22	±25%	100	500	0.30	300
25	±25%	100	500	0.30	300
30	±25%	100	500	0.30	300
33	±25%	100	500	0.30	300
40	±25%	100	500	0.30	300
50	±25%	100	500	0.30	300
60	±25%	100	500	0.35	300
70	±25%	100	500	0.35	300
80	±25%	100	500	0.35	300
120	±25%	100	500	0.45	200
150	±25%	100	500	0.50	200
220	±25%	100	500	0.75	200
240	±25%	100	500	0.80	200
300	±25%	100	500	0.90	150
330	±25%	100	500	0.90	150
470	±25%	100	500	1.50	100
600	±25%	100	500	1.50	100
1000	±25%	100	500	2.50	100

Size 0402 Standard Type (for Signal Line)

Impedance (Ω)	Tolerance	Test Frequency (MHz)	Test Voltage (mV)	DC Resistance (Ω) Max.	Rated Current (mA) Max.
10	±25%	100	500	0.05	500
30	±25%	100	500	0.20	300
60	±25%	100	500	0.40	200
80	±25%	100	500	0.40	200
100	±25%	100	500	0.45	200
120	±25%	100	500	0.50	200
150	±25%	100	500	0.60	200
220	±25%	100	500	0.70	100
300	±25%	100	500	0.75	100
600	±25%	100	500	1.10	50
600	±25%	100	500	0.23	900
1000	±25%	100	500	1.50	50

MULTILAYER CHIP BEAD FBM SERIES

Size 0603 Standard Type (for Signal Line)

Impedance (Ω)	Tolerance	Test Frequency (MHz)	Test Voltage (mV)	DC Resistance (Ω) Max.	Rated Current (mA) Max.
31	±25%	100	500	0.10	400
47	±25%	100	500	0.15	400
52	±25%	100	500	0.15	400
60	±25%	100	500	0.15	400
80	±25%	100	500	0.15	400
100	±25%	100	500	0.15	400
120	±25%	100	500	0.15	400
300	±25%	100	500	0.30	400
600	±25%	100	500	0.35	400
600	±25%	100	500	0.35	500
1000	±25%	100	500	0.55	300
1000	±25%	100	500	0.45	500
1000	±25%	100	500	0.25	800
1500	±25%	100	500	0.60	200

Size 0805 Standard Type (for Signal Line)

Impedance (Ω)	Tolerance	Test Frequency (MHz)	Test Voltage (mV)	DC Resistance (Ω) Max.	Rated Current (mA) Max.
30	±25%	100	500	0.10	300
32	±25%	100	500	0.10	300
60	±25%	100	500	0.15	300
80	±25%	100	500	0.15	300
100	±25%	100	500	0.20	300
120	±25%	100	500	0.20	300
150	±25%	100	500	0.20	300
300	±25%	100	500	0.25	300
470	±25%	100	500	0.35	300
600	±25%	100	500	0.35	300
1000	±25%	100	500	0.45	300
1000	±25%	100	500	0.27	600
1500	±25%	100	500	0.70	300

MULTILAYER CHIP BEAD FBM SERIES

Size 1204 Standard Type (for Signal Line)

Impedance (Ω)	Tolerance	Test Frequency (MHz)	Test Voltage (mV)	DC Resistance (Ω) Max.	Rated Current (mA) Max.
19	±25%	100	500	0.10	800
26	±25%	100	500	0.10	800
31	±25%	100	500	0.10	800
52	±25%	100	500	0.15	800
60	±25%	100	500	0.15	500
70	±25%	100	500	0.15	500
100	±25%	100	500	0.20	450
120	±25%	100	500	0.20	450
150	±25%	100	500	0.20	450
220	±25%	100	500	0.20	350
300	±25%	100	500	0.20	350
400	±25%	100	500	0.25	350
600	±25%	100	500	0.25	350
750	±25%	100	500	0.30	350
1000	±25%	100	500	0.35	350
1500	±25%	50	500	0.30	500

MULTILAYER CHIP BEAD FBM SERIES

Size 0402 Medium Current Type (for Power Line)

Impedance (Ω)	Tolerance	Test Frequency (MHz)	Test Voltage (mV)	DC Resistance (Ω) Max.	Rated Current (mA) Max.
10	±25%	100	500	0.05	1000
10	±25%	100	500	0.03	2000
30	±25%	100	500	0.05	1700
30	±25%	100	500	0.035	2200
60	±25%	100	500	0.15	1000
60	±25%	100	500	0.075	1500
70	±25%	100	500	0.09	1200
80	±25%	100	500	0.10	1000
100	±25%	100	500	0.09	1200
120	±25%	100	500	0.09	1200
120	±25%	100	500	0.09	1500
180	±25%	100	500	0.14	1000

Size 0603 Medium Current Type (for Power Line)

Impedance (Ω)	Tolerance	Test Frequency (MHz)	Test Voltage (mV)	DC Resistance (Ω) Max.	Rated Current (mA) Max.
60	±25%	100	500	0.04	3000
60	±25%	100	500	0.10	1000
100	±25%	100	500	0.04	3000
120	±25%	100	500	0.04	3000
120	±25%	100	500	0.05	2000
220	±25%	100	500	0.08	2000
220	±25%	100	500	0.05	3000
600	±25%	100	500	0.20	1000
600	±25%	100	500	0.10	2000

MULTILAYER CHIP BEAD FBM SERIES

Size 0805 Medium Current Type (for Power Line)

Impedance (Ω)	Tolerance	Test Frequency (MHz)	Test Voltage (mV)	DC Resistance (Ω) Max.	Rated Current (mA) Max.
30	±25%	100	500	0.03	3000
60	±25%	100	500	0.04	3000
80	±25%	100	500	0.04	3000
80	±25%	100	500	0.10	1000
100	±25%	100	500	0.04	3000
120	±25%	100	500	0.05	3000
220	±25%	100	500	0.05	3000
300	±25%	100	500	0.05	3000
330	±25%	100	500	0.05	3000
600	±25%	100	500	0.10	2000
600	±25%	100	500	0.11	2000
1000	±25%	100	500	0.30	1000
1000	±25%	100	500	0.12	1500
1500	±25%	100	500	0.30	1000

Size 1204 Medium Current Type (for Power Line)

Impedance (Ω)	Tolerance	Test Frequency (MHz)	Test Voltage (mV)	DC Resistance (Ω) Max.	Rated Current (mA) Max.
19	±25%	100	500	0.03	3000
31	±25%	100	500	0.03	3000
52	±25%	100	500	0.03	3000
60	±25%	100	500	0.03	3000
70	±25%	100	500	0.04	3000
80	±25%	100	500	0.04	3000
90	±25%	100	500	0.04	3000
100	±25%	100	500	0.04	3000
120	±25%	100	500	0.05	3000
150	±25%	100	500	0.05	3000
180	±25%	100	500	0.05	3000
200	±25%	100	500	0.05	3000
220	±25%	100	500	0.05	3000
300	±25%	100	500	0.06	3000
500	±25%	100	500	0.06	3000
500	±25%	100	500	0.07	2500
600	±25%	100	500	0.06	3000
1000	±25%	100	500	0.30	1000

MULTILAYER CHIP BEAD FBM SERIES

Size 1808 Medium Current Type (for Power Line)

Impedance (Ω)	Tolerance	Test Frequency (MHz)	Test Voltage (mV)	DC Resistance (Ω) Max.	Rated Current (mA) Max.
60	±25%	100	500	0.04	3000
75	±25%	100	500	0.04	3000
80	±25%	100	500	0.04	3000
100	±25%	100	500	0.04	3000
150	±25%	100	500	0.04	3000
180	±25%	100	500	0.04	3000
600	±25%	100	500	0.09	2000
1000	±25%	100	500	0.09	1500

MULTILAYER CHIP BEAD FBM SERIES

Size 0603 High Current Type (for Power Line)

Impedance (Ω)	Tolerance	Test Frequency (MHz)	Test Voltage (mV)	DC Resistance (Ω) Max.	Rated Current (mA) Max.
7	±25%	100	500	0.025	4000
10	±25%	100	500	0.010	6000
22	±25%	100	500	0.008	6000
26	±25%	100	500	0.008	6000
26	±25%	100	500	0.007	6000
30	±25%	100	500	0.020	4000
30	±25%	100	500	0.010	5000
30	±25%	100	500	0.008	6000
33	±25%	100	500	0.008	6000
60	±25%	100	500	0.020	3500
70	±25%	100	500	0.020	4000

Size 0805 High Current Type (for Power Line)

Impedance (Ω)	Tolerance	Test Frequency (MHz)	Test Voltage (mV)	DC Resistance (Ω) Max.	Rated Current (mA) Max.
7	±25%	100	500	0.008	6000
11	±25%	100	500	0.008	6000
17	±25%	100	500	0.008	6000
19	±25%	100	500	0.008	6000
22	±25%	100	500	0.008	6000
26	±25%	100	500	0.008	6000
30	±25%	100	500	0.008	6000
39	±25%	100	500	0.008	6000
60	±25%	100	500	0.010	5000
80	±25%	100	500	0.010	5000
120	±25%	100	500	0.020	4000
120	±25%	100	500	0.015	5000

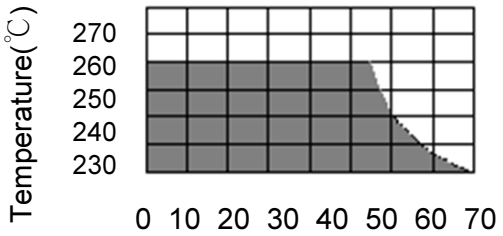
MULTILAYER CHIP BEAD FBM SERIES

Size 1204 High Current Type (for Power Line)

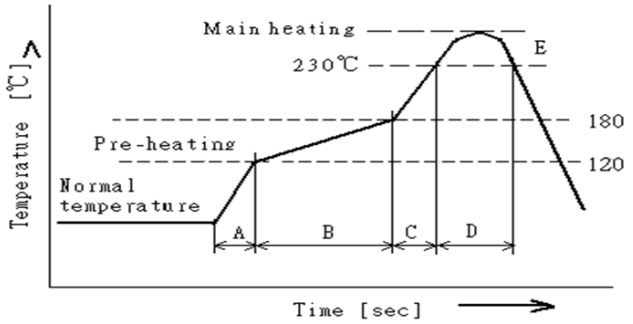
Impedance (Ω)	Tolerance	Test Frequency (MHz)	Test Voltage (mV)	DC Resistance (Ω) Max.	Rated Current (mA) Max.
19	±25%	100	500	0.006	6000
26	±25%	100	500	0.006	6000
30	±25%	100	500	0.006	6000
31	±25%	100	500	0.006	6000
33	±25%	100	500	0.006	6000
52	±25%	100	500	0.008	6000
60	±25%	100	500	0.010	6000
80	±25%	100	500	0.020	4000
120	±25%	100	500	0.025	5000
120	±25%	100	500	0.120	6000

6. Reflow soldering conditions

- Pre－heating should be in such a way that the temperature difference between solder and ferrite surface is limited to 150℃ max. Also cooling into solvent after soldering should be in such a way that the temperature difference is limited to 100℃ max.
  Insufficient pre－heating may cause cracks on the ferrite, resulting in the deterioration of product quality.
- Products should be soldered within the following allowable range indicated by the slanted line. The excessive soldering conditions may cause the corrosion of the electrode, when soldering is repeated, allowable time is the accumulated time.



Temperature Profile



(Melting area of solder)

A	Slope of temp. rise	1 to 5	℃/sec
B	Heat time	50 to 150	sec
	Heat temperature	120 to 180	℃
C	Slope of temp. rise	1 to 5	℃/sec
D	Time over 230℃	90~120	sec
E	Peak temperature	255~260	℃
	Peak hold time	10 max.	sec
No. of mounting		3	times

6-1 Reworking with soldering iron：

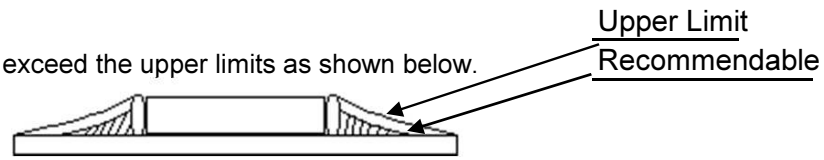
Preheating	150℃, 1 minute
Tip temperature	280℃ max.
Soldering time	3 seconds max.
Soldering iron output	30w max.
End of soldering iron	ϕ3mm max.

- Reworking should be limited to only one time.

Note：Do not directly touch the products with the tip of the soldering iron in order to prevent the crack on the ferrite material due to the thermal shock.

6-2 Solder Volume：

Solder shall be used not to be exceed the upper limits as shown below.



When solder volume is increased, the mechanical stress to product is also increased. Exceeding solder volume may cause the failure of mechanical or electrical performance.

7. Equipment

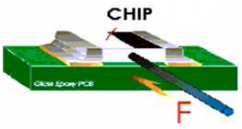
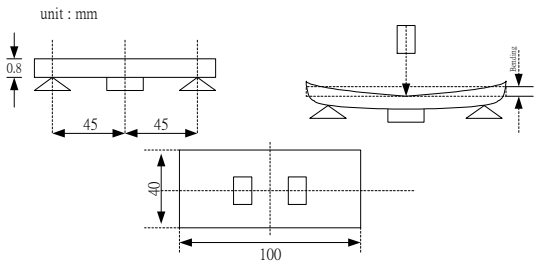
7-1 IMPEDANCE

Impedance shall be measured with HP－4286A impedance analyzer or equivalent system

7-2 DC RESISTANCE

DC resistance shall be measured using HP 4338 digital mili－ohm meter with 4 terminal method.

8. Mechanical Characteristics

ITEM	Specification	Test Conditions
Terminal Strength	Terminal strength does not distort the case shall meet SPEC DC resistance specifications.	<table><tr><th>SMD-Size</th><th>Force g(N)</th><th>Time Sec.</th></tr><tr><td>1005</td><td>300g(3N)</td><td>60+1sec.</td></tr><tr><td>1608</td><td>500g(5N)</td><td>60+1sec.</td></tr><tr><td>2012</td><td>600g(6N)</td><td>60+1sec.</td></tr><tr><td>3216</td><td>1000g(10N)</td><td>60+1sec.</td></tr><tr><td>3225</td><td>1000g(10N)</td><td>60+1sec.</td></tr><tr><td>4516</td><td>1000g(10N)</td><td>60+1sec.</td></tr><tr><td>4532</td><td>1500g(15N)</td><td>60+1sec.</td></tr><tr><td>5650</td><td>2000g(20N)</td><td>60+1sec.</td></tr></table> 
Substrate Bending Test	SPEC substrate bending test DC resistance shall meet specifications.	After soldering a chip to a test substrate, bend the substrate by 3mm hold for 10s and then return. Soldering shall be done in accordance with the recommended PC board pattern and reflow soldering. 
Resistance to Solder Heat	No visible damage Electrical characteristics and mechanical characteristics shall be satisfied. **Consult standard MIL-STD-202 METHOD 210**	Solder Temp. : 265±3℃ Immersion time : 6±1 sec Preheating : 100℃ to 150℃, 1 minute. Measurement to be made after keeping at room temp for 24±2 hrs. Solder : Sn-3Ag-0.5Cu
Solderability	95% min. coverage of all metabolised area **Consult standard J-STD-002**	Solder temp. : 240±5℃ Immersion time : 3±1 sec Solder : Sn-3Ag-0.5Cu

9. RELIABILITY AND TEST CONDITIONS

9-1 HIGH TEMPERATURE RESISTANCE

a. Performance specification

1.Appearance：no mechanical damage

2. Impedance shall be with ±30% of the initial value

b.Test condition

1.Temperature: 125℃ ±2℃

2.Testing time：1000±12hrs

3.Measurement：After placing at room ambient temperature for 24 hours minimum

9-2 Biased Humidity RESISTANCE

a.Performance specification

1.Appearance：no mechanical damage

2. Impedance shall be with ±30% of the initial value

b.Test condition

1.Humidity: 85 ± 5%RH

2. Temperature: 85℃ ±2℃

3.Testing time: 1000 ± 12 hours

4.Measurement：After placing at room ambient temperature for 24 hours minimum

9-3 TEMPERATURE CYCLE

a.Performance specification

1.Appearance：no mechanical damage

2. Impedance shall be with ±30% of the initial value

b.Test condition

1. Low Temperature: - 55℃ ±5℃ kept stabilized for 30 minutes each

2. High Temperature: 125℃ ±5℃kept stabilized for 30 minutes each

2.Cycle：1000 cycles

3.Measurement：After placing for 24hours minimum at room ambient temperature

4. step1. -55℃ temp±5℃ 30±3 minutes

step2. Room temperature 2to5 minutes

step3. +125℃ temp±5℃ 30±3 minutes

step4. room temperature 2to5 minutes

9-4 VIBRATION TEST

a.Performance specification

1.Appearance：no mechanical damage

2. Impedance shall be with ±30% of the initial value

b.Test condition

1.Frequency and Amplitude:10-2000-10Hz

2.Direction:X,Y,Z.

3.Test duration:4 hours for each direction,12hours in total.

9-5 Mechanical Shock TEST

a.Performance specification

1.Appearance：no mechanical damage

2. Impedance shall be with ±30% of the initial value

b.Test condition

1.peak acceleration ：100 g's

2.Duration of pulse：6 ms

3.Waveform ：Half-sine

4.Velocity change ：12.3 ft/sec

5. Direction：X，Y，Z（3axes/3 times）

9-6 Operational Life

a. Performance specification

1.Appearance：no mechanical damage

2. Impedance shall be with ±30% of the initial value

b.Test condition

1.Temperature: 125℃ ±2℃

2.Testing time：1000±12hrs

3.Measurement：After placing at room ambient temperature for 24 hours minimum

9-7 Electrostatic discharge test

a. Performance specification

1.Appearance：no mechanical damage

2. Impedance shall be with ±30% of the initial value

b.Test condition

1.ESD voltage: 15k volts

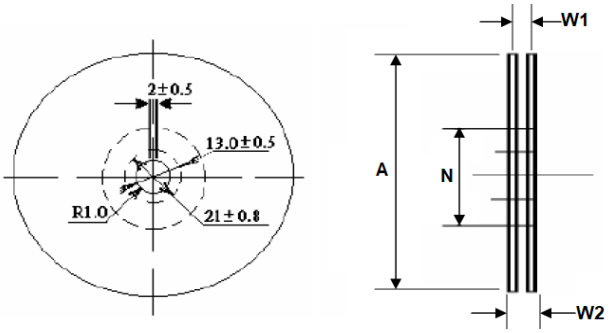
2.Mode 1:150 pF/330 Ohm

3.Mode 2:150 pF/2000 Ohm

9.1 REMARK

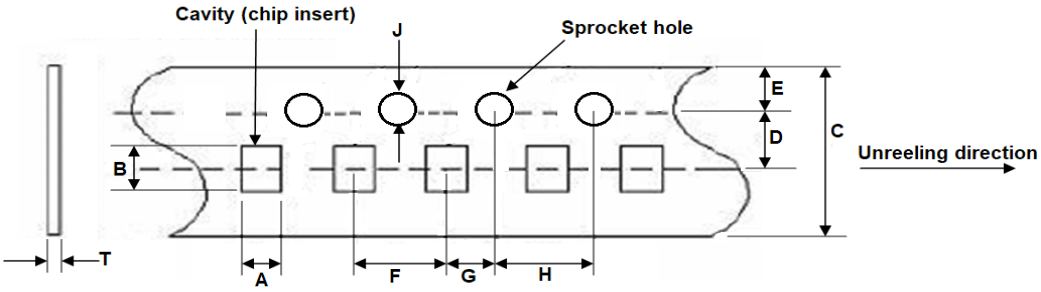
Reliability tests can be adjusted according to customers' special requirements.

PAPER CARRIER TAPE PACKING



A	178±2.0
N	50 Min.
W1	10±1.5
W2	20 Max.

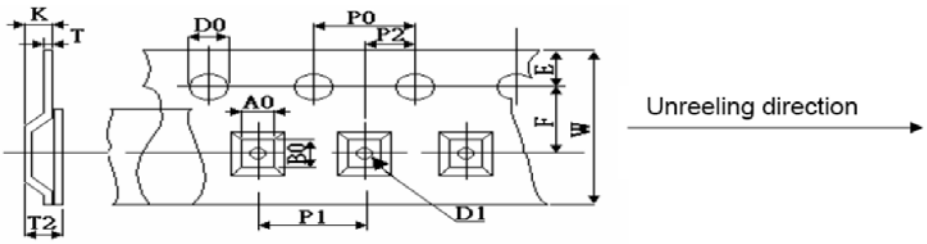
Unit : mm



Unit : mm

TYPE	A	B	C	D	E	F	G	H	J	T	Q'TY
0201	0.38±0.04	0.68±0.04	8.00±0.20	3.50±0.05	1.75±0.10	2.00±0.05	2.00±0.05	4.0±0.10	1.50+0.1/-0	1.10 Max.	15kpcs/reel
0402	0.62±0.05	1.12±0.05	8.00±0.10	3.50±0.05	1.75±0.10	2.00±0.05	2.00±0.05	4.0±0.10	1.55±0.05	0.60±0.05	10kpcs/reel
0603	1.03±0.05	1.85±0.05	8.00±0.10	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.0±0.10	1.55±0.05	0.95±0.05	4kpcs/reel
0805	1.45±0.05	2.25±0.05	8.00±0.10	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.0±0.10	1.55±0.05	0.95±0.05	4kpcs/reel

EMBOSSED CARRIER TAPE PACKING

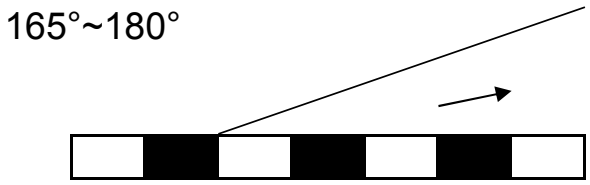


Unit : mm

TYPE	A0	B0	W	F	E	P1	P2	P0	D0	D1	K	T	T2	Q'TY
1204	1.88 ±0.10	3.50 ±0.10	8.00 ±0.20	3.50 ±0.05	1.75 ±0.10	4.00 ±0.10	2.00 ±0.05	4.00 ±0.10	1.55 ±0.05	1.00 ±0.10	1.49 ±0.15	0.22 ±0.05	1.49 ±0.25	3kpcs/reel
1808	1.93 ±0.10	4.95 ±0.10	12.0 ±0.20	5.50 ±0.05	1.75 ±0.10	4.00 ±0.10	2.00 ±0.05	4.00 ±0.10	1.55 ±0.05	1.50 ±0.10	2.17 ±0.15	0.24 ±0.05	2.17 ±0.25	2kpcs/reel

10. PEELING STRENGTH OF COVER TAPE

Cover tape	(10g~100g)



Test condition

1. peel angle：165°~180° vs carrier tape
2. peel speed：300mm/min

11. Packaging

1. Tape & Reel packaging in component specification 6/8
2) Reel and a bag of desiccant shall be packed in Nylon or plastic bag
3) Maximum of 5 reels shall be packaged in a inner box
4) Maximum of 6 inner box shall be packaged in a outer box

12. Reel Label

Producing the goods label needs to indicate (1) Pb Free (2) RoHS Compliant

13. Storage

13-1The solderability of the external electrode may be deteriorated if packages are stored where they are exposed to high humidity. Packages must be stored at 40℃ or less and 70% RH or less.

13-2 The solderability of the external electrode may be deteriorated if packages are stored where they are exposed to dust or harmful gas (hydrogen chloride, sulfurous acid gas or hydrogen sulfide).

13-3 Packaging material may be deformed if packages are stored where they are exposed to heat or direct sun－light.

13-4 Minimum packages, such as polyvinyl heat－seal packages shall not be opened until just before they are used. If opened, use the reels as soon as possible.

13-5 Solderability specified in component specification 4/8 shall be for 12 months from the date of delivery on condition that they are stored at the environment specified clause 13-1 & 13-2.
For those parts which passed more than 12 months shall be checked solderability before it is used.