

# SPECIFICATION FOR APPROVAL

CUSTOMER	_____
CUST. PART NO.	_____
CUST. DOC. REV.	_____
DESCRIPTION	POWER CHOKE(RoHS+H.F.)
SAMPLE LOT NO.	_____
PART NO.	CSMS0412D-XXXX-LRH
DOC. REV.	_____
DATE	_____

Once you approve this part, please sign and return this page to the following marked location.

Customer Signature: \_\_\_\_\_ Date: \_\_\_\_\_

This part currently development section.  Production line can produce this series of products.

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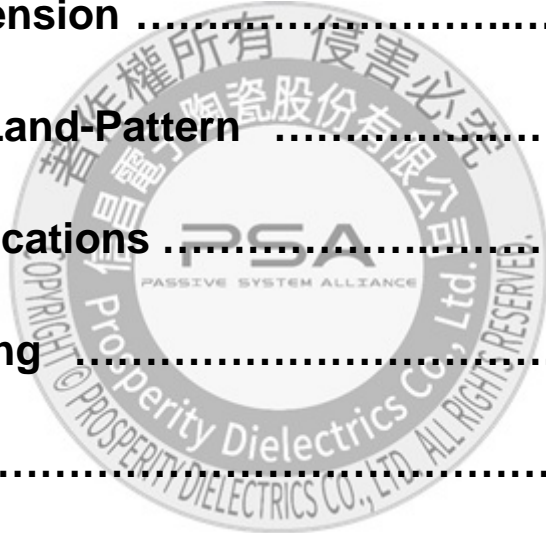
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TESTED BY	CHECKED BY	APPROVED BY

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# SPECIFICATION FOR APPROVAL

<b>CUSTOMER</b>	<b>CUSTOMER P/N</b>	<b>REV.</b> -	<b>SPL. LOT NO.</b>	
<b>PART NAME</b> <b>POWER CHOKE</b> <b>(RoHS+H.F.)</b>	<b>PART NO.</b> <b>CSMS0412D-XXXX-LRH</b>	<b>REV.</b>	<b>DATE OF ISSUE</b>	<b>Q'TY</b> <b>0 PCS</b>

## ENGINEERING CHANGE NOTICE - RECORD

<b>REVISION NO.</b>	<b>REVISION DESCRIPTION</b>	<b>AUTHOR</b>	<b>DATE</b>	<b>REMARK</b>
				

# SPECIFICATION FOR APPROVAL

※This is a RoHS and REACH compliant product whose related documents are available on request.  
 ※Graphic is only for dimensionally application.

## 1. Range of application:

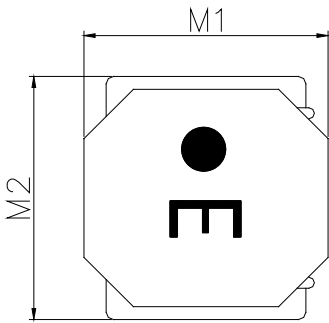
This specifications are applied to SMD Power Inductor, CSMS0412D.

## 2. Ordering code:

Example: **CSMS** **0412** **D - 2R2** **M** - □ □ □ □  
 (1) (2) (3) (4) (5) (6) (7)

- (1) Product Type
- (2) External dimensions
- (3) Solder Type
- (4) Inductance
- (5) Inductance tolerance
- (6) Green product code
- (7) Internal Code

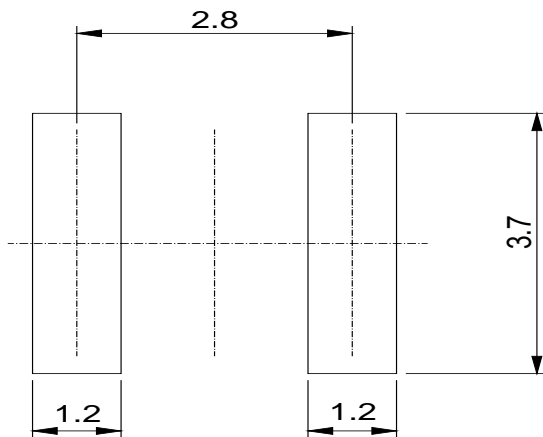
## 3. Mechanical Dimension:



UNIT: mm

	DIM.	TOL.
M1	4.0	±0.2
M2	4.0	±0.2
M3	1.2	MAX.
M4	1.1	±0.2
M5	2.5	±0.2

## 4. Recommended Land-Pattern:



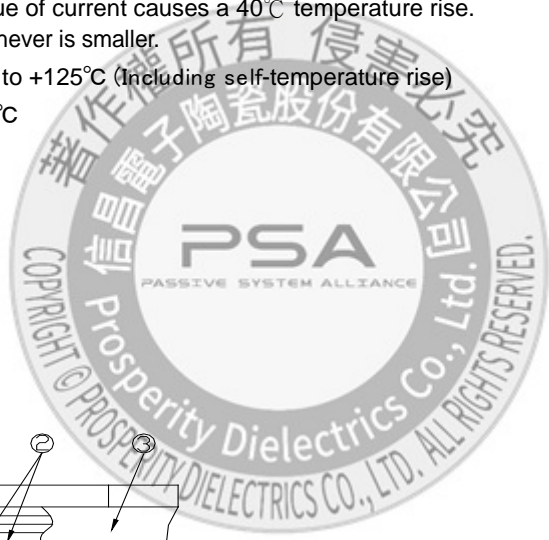
(Unit: mm)

# SPECIFICATION FOR APPROVAL

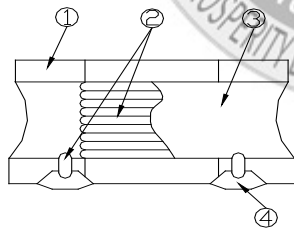
## 5. Electrical Characteristics:

Part number	Inductance Symbol	Nominal Inductance (uH)	Inductance Tolerance	DC Resistance (Ω) ±20%	Rated Current (mA)		
					Saturation Current Idc1	Temperature Rise Current Idc2	Self-resonant Frequency Min (MHz)
CSMS0412D-1R0N-LRH	A	1.0	±30%	0.042	2800	2200	100
CSMS0412D-2R2M-LRH	C	2.2	±20%	0.060	1650	1900	70
CSMS0412D-3R3M-LRH	E	3.3	±20%	0.070	1400	1700	60
CSMS0412D-4R7M-LRH	H	4.7	±20%	0.095	1200	1500	45
CSMS0412D-6R8M-LRH	I	6.8	±20%	0.125	900	1300	35
CSMS0412D-100M-LRH	K	10	±20%	0.170	800	1100	30
CSMS0412D-150M-LRH	M	15	±20%	0.260	650	750	24
CSMS0412D-220M-LRH	N	22	±20%	0.400	500	620	18

1. Test Frequency: 100KHz
2. Test Equipment:
  - Inductance: Chroma3302+1320+16502. or equivalent.
  - DCR: Chroma16502 or equivalent.
  - SRF: HP4291B or equivalent.
3. Saturation Current Idc1: The value of current causes a 30% inductance reduction from initial value.
4. Temperature rise current Idc2: The value of current causes a 40°C temperature rise.
5. Rated Current: Either Idc1 or Idc2 whichever is smaller.
6. Operating Temperature Range: -25°C to +125°C (Including self-temperature rise)
7. Storage Temp. Range : -40°C to +85°C
8. MSL : Level 1



## 6. Structural Drawing:



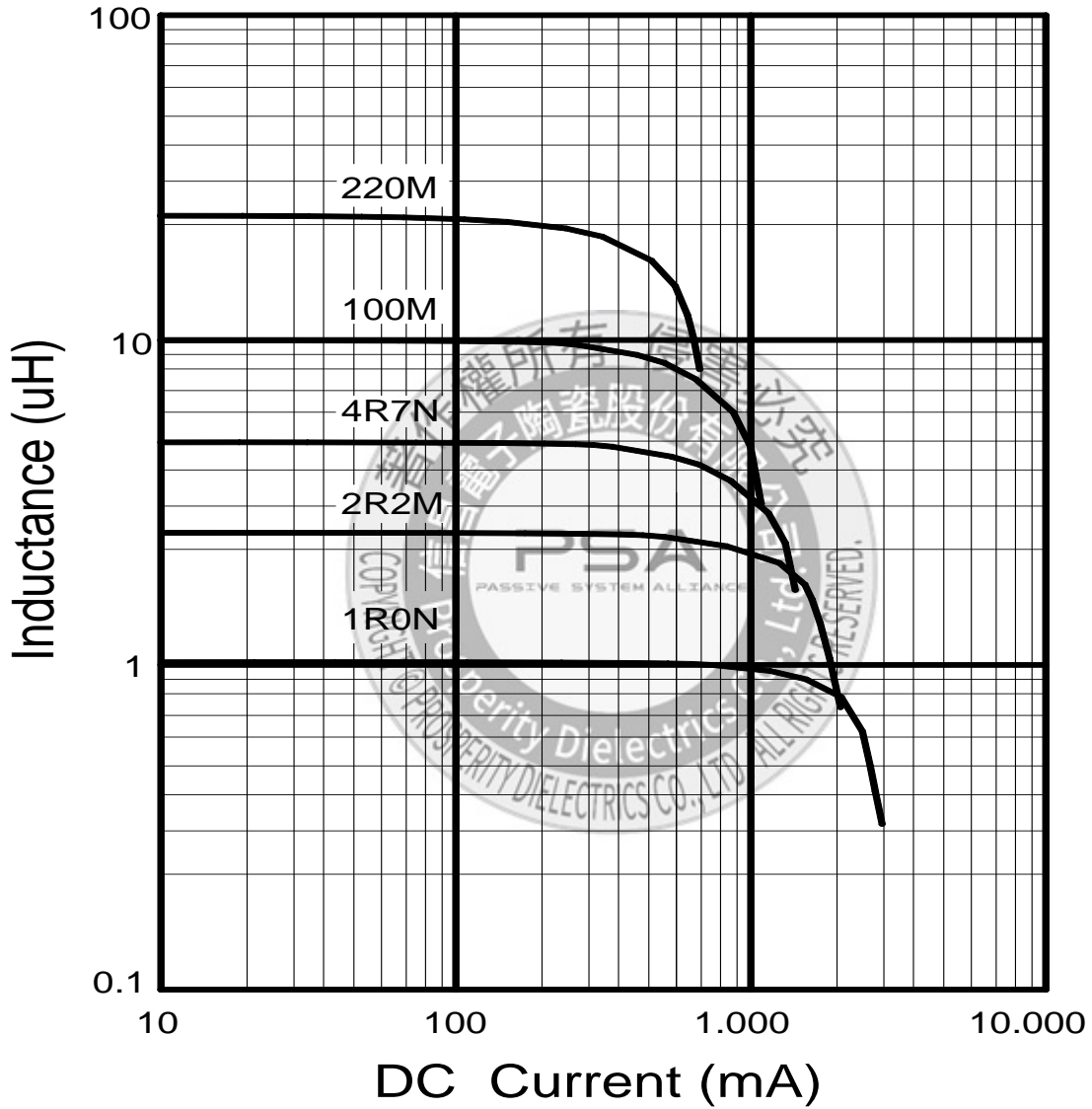
(Magnetic Shielded Type)

- |                       |                                                 |          |
|-----------------------|-------------------------------------------------|----------|
| ① Ferrite core.       | Ni-Zn ferrite                                   |          |
| ② Winding wire        | Polyurethane-copper wire                        |          |
| ③ Over-coating resin. | Epoxy resin, containing ferrite powder          |          |
| ④ Electrode           | External electrode (substrate)                  | Ag       |
|                       | External electrode (base plating)               | Ni-Sn    |
|                       | External electrode (top surface solder coating) | Sn-Ag-Cu |

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## 7. Electrical Curve :

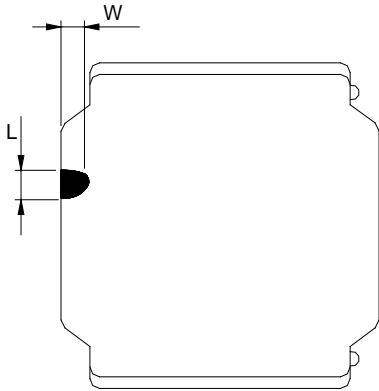
### Inductance vs. DC Current



# SPECIFICATION FOR APPROVAL

## 8. Core Chipping:

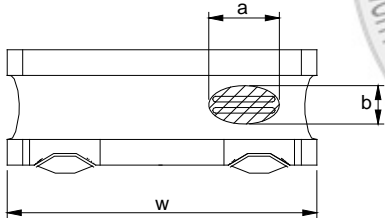
The appearance standard of the chipping size in top side, of bottom side ferrite Core is following dimension



L	W
1.0mmMax.	1.0mmMax.

## 9. Exposed wire tolerance limit of coating resin part on product side

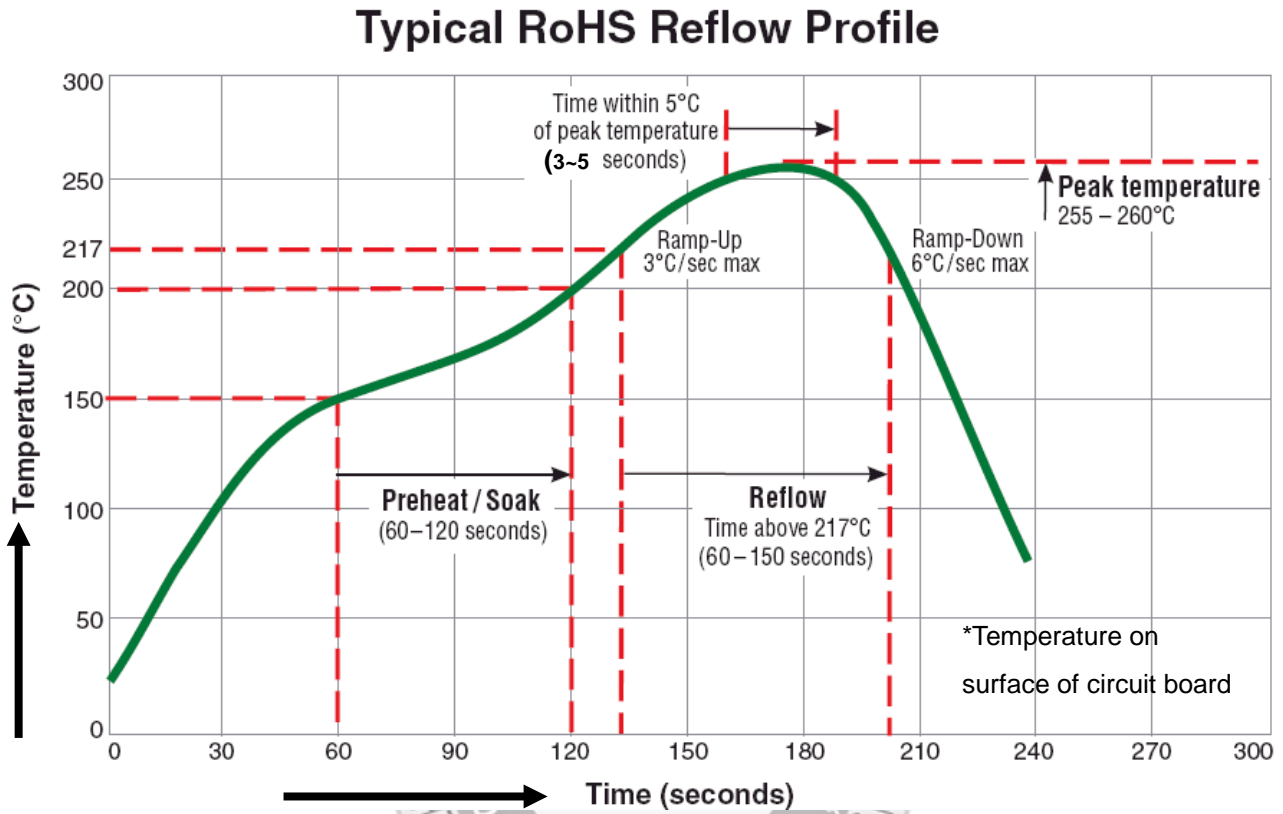
Size of exposed wire occurring to coating resin is specified below.



- ① Width direction (dimension a): Acceptable when  $a \leq w/2$   
Nonconforming when  $a > w/2$
- ② Length direction (dimension b): Dimension b is not specified.
- ③ When total area of exposed wire occurring to each sides is not greater than 50% of coating resin area, that is acceptable.

# SPECIFICATION FOR APPROVAL

## 10. Reflow Profile Chart (Reference):



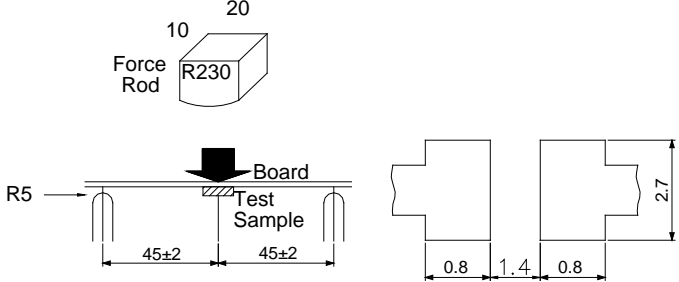
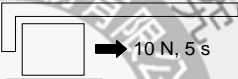
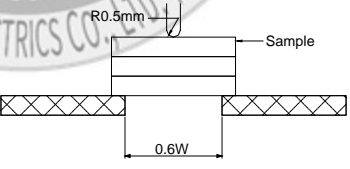
(Table 1)

The products may be exposed to reflow soldering process of above profile up to two times.



# SPECIFICATION FOR APPROVAL

## 11. Mechanical Performance / Environmental Test Performance Specifications:

	Test Item	Standard	Test method
MECHANICAL CHARACTERISTICS	Resistance to Deflection	No damage.	<p>The test samples shall be soldered to the test board by the reflow soldering conditions show in Table 1. As illustrated below, apply force in the direction of the Arrow indicating until deflection of the test board Reaches to 2 mm.</p>  <p style="text-align: right;">Land dimensions</p> <p>Test board size :100×40×10            Test board material I: glass epoxy-resin            Solder cream thickness:0.1</p> <p style="text-align: right;">Unit: mm</p>
	Adhesion of Terminal Electrode	Shall not come off PC board	<p>The test samples shall be soldered to the test board By the reflow soldering conditions shown in Table 1.</p>  <p>Applied force:10 N to X and Y directions            Duration:5 s.            Solder cream thickness:0.1 mm            (Refer to recommended Land Pattern Dimensions Defined in "Precaution")</p>
	Body strength	No damage	<p>Applied force :20 N            Duration :10 s</p> 

# SPECIFICATION FOR APPROVAL

Test Item	Standard	Test method															
Resistance to Vibration	$\Delta$ L/L:within $\pm$ 10% No abnormality observed In appearance	The test samples shall be soldered to the test board by The reflow soldering conditions shown in Table 1.Then It shall be submitted to below test conditions <table border="1" style="margin-left: 20px;"> <tr> <td>Frequency range</td> <td>10Hz~55Hz</td> </tr> <tr> <td>Total Amplitude</td> <td>1.5mm(May not exceed acceleration 196 m/S<sup>2</sup>)</td> </tr> <tr> <td>Sweeping Method</td> <td>10Hz to 55Hz to 10 Hz for 1 min.</td> </tr> <tr> <td>Time</td> <td>For 2 hours on each X,Y, and Z axis.</td> </tr> </table>	Frequency range	10Hz~55Hz	Total Amplitude	1.5mm(May not exceed acceleration 196 m/S <sup>2</sup> )	Sweeping Method	10Hz to 55Hz to 10 Hz for 1 min.	Time	For 2 hours on each X,Y, and Z axis.							
Frequency range	10Hz~55Hz																
Total Amplitude	1.5mm(May not exceed acceleration 196 m/S <sup>2</sup> )																
Sweeping Method	10Hz to 55Hz to 10 Hz for 1 min.																
Time	For 2 hours on each X,Y, and Z axis.																
Resistance to Soldering heat (Reflow)	$\Delta$ L/L:within $\pm$ 10% No abnormality observed In appearance	The test sample shall be exposed to reflow oven at 230 $\pm$ 5 deg C for 40 seconds, with peak temperature at 260 $\pm$ 5 deg C for 5 seconds, 2 times.  Test board thickness:1.0 mm Test board material :glass epoxy-resin															
Solder ability	At least 90% of surface of terminal electrode is covered by new solder.	The test samples shall be dipped in flux, and then Immersed in molten solder as shown in below table. Flux: Methanol solution containing rosin 25% <table border="1" style="margin-left: 20px;"> <tr> <td>Solder Temperature</td> <td>245<math>\pm</math>deg C</td> </tr> <tr> <td>Time</td> <td>5<math>\pm</math>1.0 S.</td> </tr> <tr> <td>Immersing Speed</td> <td>25 mm/s</td> </tr> </table>	Solder Temperature	245 $\pm$ deg C	Time	5 $\pm$ 1.0 S.	Immersing Speed	25 mm/s									
Solder Temperature	245 $\pm$ deg C																
Time	5 $\pm$ 1.0 S.																
Immersing Speed	25 mm/s																
Temperature Characteristics	$\Delta$ L/L:within $\pm$ 20% No abnormality observed In appearance	Measurement of inductance shall be taken at temperature Range within -25 deg C to +85 deg C. With reference to inductance value at +20 deg C, change Rate shall be calculated.															
Thermal shock	$\Delta$ L/L:within $\pm$ 10% No abnormality observed In appearance	The test samples shall be soldered to test board By the reflow soldering conditions shown in Table 1. The test samples shall be placed at specified Shown in below table in sequence. The temperature cycle shall be repeated 100 cycles.  Conditions of steps for 1 cycle <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Time(min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-40<math>\pm</math>3 deg C</td> <td>30<math>\pm</math>3</td> </tr> <tr> <td>2</td> <td>Room Temp</td> <td>3 maximum</td> </tr> <tr> <td>3</td> <td>85<math>\pm</math>2 deg C</td> <td>30<math>\pm</math>3</td> </tr> <tr> <td>4</td> <td>Room Temp</td> <td>3 maximum</td> </tr> </tbody> </table>	Step	Temperature	Time(min)	1	-40 $\pm$ 3 deg C	30 $\pm$ 3	2	Room Temp	3 maximum	3	85 $\pm$ 2 deg C	30 $\pm$ 3	4	Room Temp	3 maximum
Step	Temperature	Time(min)															
1	-40 $\pm$ 3 deg C	30 $\pm$ 3															
2	Room Temp	3 maximum															
3	85 $\pm$ 2 deg C	30 $\pm$ 3															
4	Room Temp	3 maximum															
Low Temperature life Test	$\Delta$ L/L:within $\pm$ 10% No abnormality observed In appearance	The test samples shall be soldered to the test board by The reflow soldering conditions shown in Table 1. After that, the test samples shall be placed at test Conditions as shown in below table. <table border="1" style="margin-left: 20px;"> <tr> <td>Temperature</td> <td>-40<math>\pm</math>2 deg C</td> </tr> <tr> <td>Time</td> <td>500 +24/-0 h</td> </tr> </table>	Temperature	-40 $\pm$ 2 deg C	Time	500 +24/-0 h											
Temperature	-40 $\pm$ 2 deg C																
Time	500 +24/-0 h																

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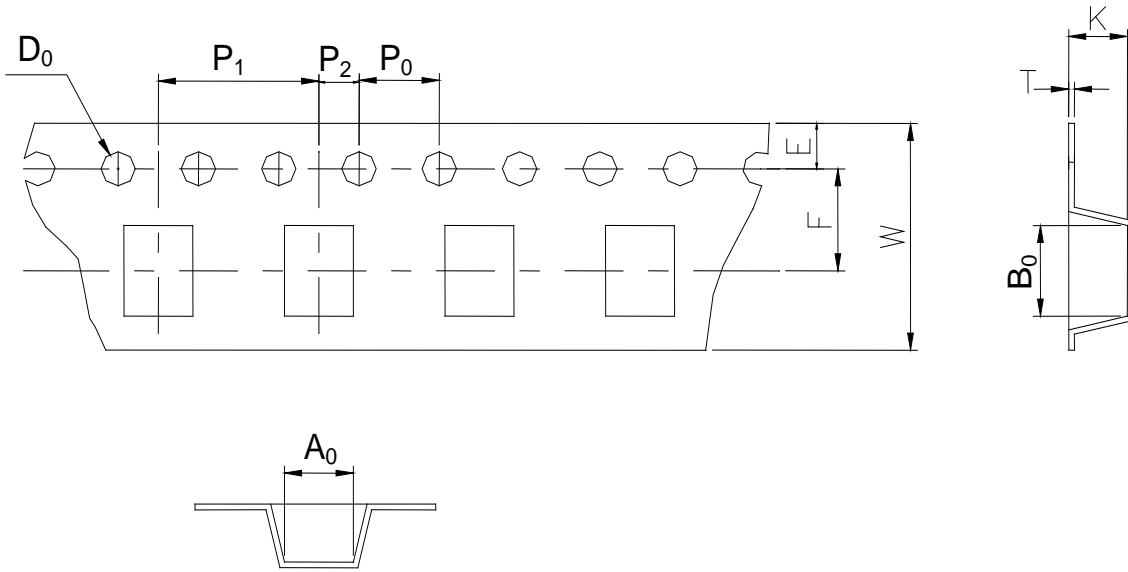
	Test Item	Standard	Test method							
ENVIRONMENT TESTS	Loading at high temperature life test	$\Delta L/L$ : within $\pm 10\%$ No abnormality observed in appearance.	The test samples shall be soldered to the test board by the reflow soldering conditions shown in Table 1. The test samples shall be placed in thermostatic oven set at specified temperature and applied the rated current continuously as shown in below table. <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <tr> <td style="text-align: center;">Temperature</td> <td style="text-align: center;">85<math>\pm</math>2 deg C</td> </tr> <tr> <td style="text-align: center;">Applied current</td> <td style="text-align: center;">Rated current (Refer to Page 2)</td> </tr> <tr> <td style="text-align: center;">Time</td> <td style="text-align: center;">500+24/-0 h</td> </tr> </table>	Temperature	85 $\pm$ 2 deg C	Applied current	Rated current (Refer to Page 2)	Time	500+24/-0 h	
	Temperature	85 $\pm$ 2 deg C								
	Applied current	Rated current (Refer to Page 2)								
Time	500+24/-0 h									
Damp heat life test	$\Delta L/L$ : within $\pm 10\%$ No abnormality observed in appearance.	The test samples shall be soldered to the test board by the reflow soldering conditions shown in Table 1. The test samples shall be placed in thermostatic oven set at specified temperature and humidity as shown in below table. <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <tr> <td style="text-align: center;">Temperature</td> <td style="text-align: center;">60<math>\pm</math>2 deg C</td> </tr> <tr> <td style="text-align: center;">Humidity</td> <td style="text-align: center;">90~95%RH</td> </tr> <tr> <td style="text-align: center;">Time</td> <td style="text-align: center;">500+24/-0 h</td> </tr> </table>	Temperature	60 $\pm$ 2 deg C	Humidity	90~95%RH	Time	500+24/-0 h		
Temperature	60 $\pm$ 2 deg C									
Humidity	90~95%RH									
Time	500+24/-0 h									
Loading under Damp heat life test	$\Delta L/L$ : within $\pm 10\%$ No abnormality observed in appearance.	The test samples shall be soldered to the test board by the reflow soldering conditions shown in Table 1. The test samples shall be placed in thermostatic oven set at specified temperature and humidity and applied the rated current continuously as shown in below table. <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <tr> <td style="text-align: center;">Temperature</td> <td style="text-align: center;">60<math>\pm</math>2 deg C</td> </tr> <tr> <td style="text-align: center;">Humidity</td> <td style="text-align: center;">90~95%RH</td> </tr> <tr> <td style="text-align: center;">Applied current</td> <td style="text-align: center;">Rated current (Refer to Page 2))</td> </tr> <tr> <td style="text-align: center;">Time</td> <td style="text-align: center;">500+24/-0 h</td> </tr> </table>	Temperature	60 $\pm$ 2 deg C	Humidity	90~95%RH	Applied current	Rated current (Refer to Page 2))	Time	500+24/-0 h
Temperature	60 $\pm$ 2 deg C									
Humidity	90~95%RH									
Applied current	Rated current (Refer to Page 2))									
Time	500+24/-0 h									

# SPECIFICATION FOR APPROVAL

## 12. Tape & Reel Packaging Dimensions:

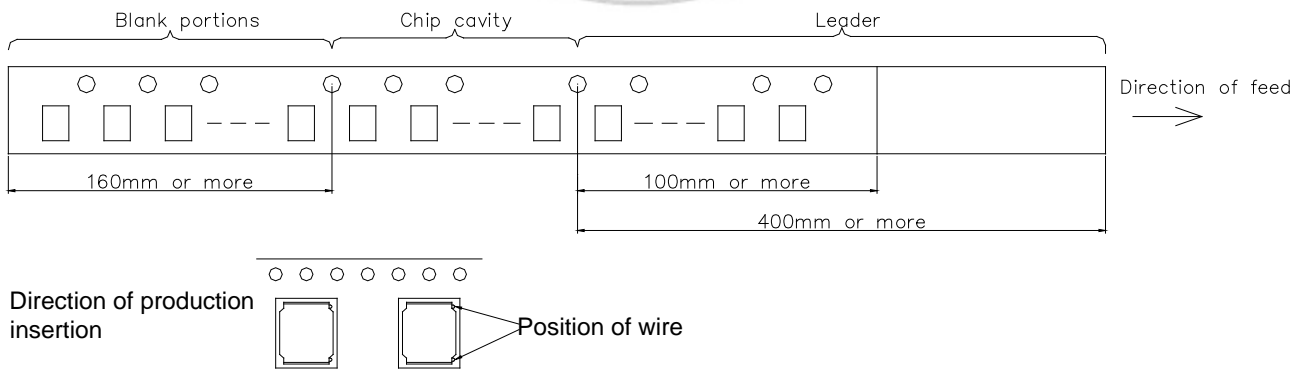
### 12-1 Dimensions

Unit: mm



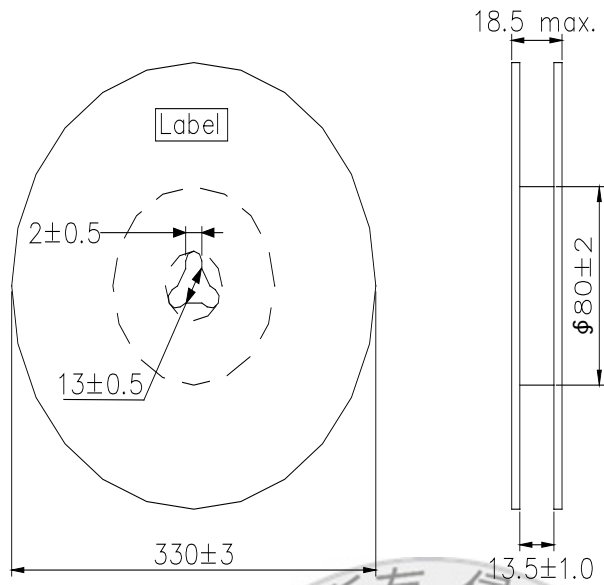
$A_0$	$B_0$	$W$	$F$	$E$	$P_1$	$P_2$	$P_0$	$D_0$	$T$	$K$
4.3 $\pm 0.1$	4.3 $\pm 0.1$	12.0 $\pm 0.3$	5.5 $\pm 0.1$	1.75 $\pm 0.1$	8.0 $\pm 0.1$	2.0 $\pm 0.1$	4.0 $\pm 0.1$	$\Phi 1.5$ $+0.1$ $-0$	0.3 $\pm 0.05$	1.6 $\pm 0.1$

### 12-2 Direction of rolling



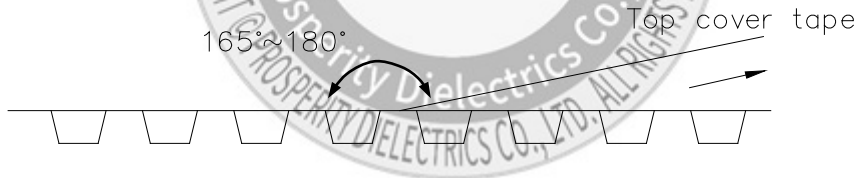
# SPECIFICATION FOR APPROVAL

## 12-3 Reel



**Label position: on the opposite side of sprocket holes side of reel**

## 12-4 Top tape strength



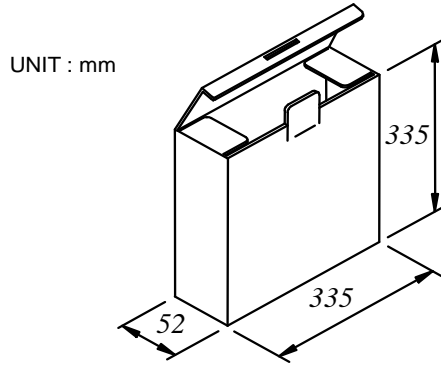
Peel-off strength: 0.1N~1.3N

Peel-off angle:  $165^\circ \sim 180^\circ$

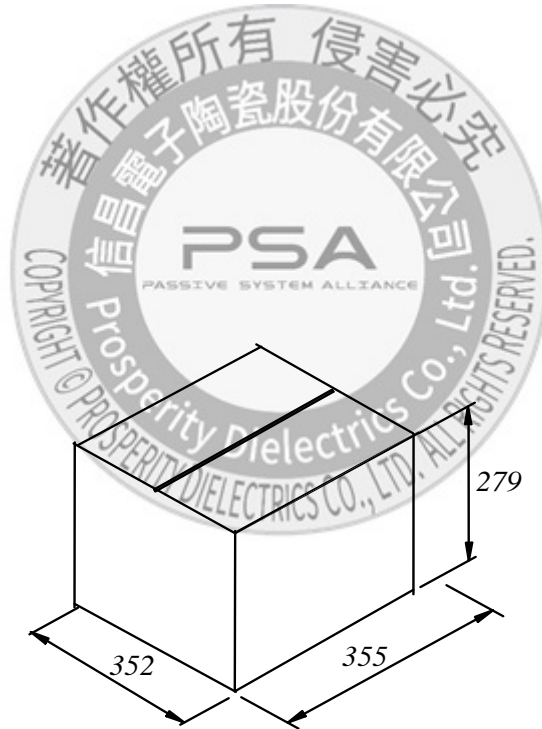
Peel-off speed: 300mm/mm

# SPECIFICATION FOR APPROVAL

## 12-5 Dimensions of packing box (for Tape & Reel package)



CONSTRUCTION:  
THE CASE CONTAINS 2-12mm WIDE CARRIER TAPES.  
Q'TY : 4,500/ REEL



TOTAL Q'TY : 36,000 PCS