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|---|--|-------------------------|
|  | DATASHEET | Part No. |
| | Components Directional Couplers | CXH 02 F 1822 AG |


CUSTOMER : _____

DATA SHEET

Product Name : Components Directional Couplers - 10dB to 30dB

Part No : CXH 02 F 1822 AG

Customer Code :

| | | | | |
|---|--------------------------------------|---|--|---|
|  | MAKER | Location | TEL. | ADDRESS |
| | Office(Korea) Manufacture | Incheon | TEL) 82-32-821-0363 FAX) 82-32-811-0283 | (21629) 5BL-1Lot, Namdongsearo 380, Namdong-Gu, Incheon, KOREA |
| | Homepage(URL) | http://www.amotech.co.kr | | |

1. Parts description

1.1. Overview

The CXH Series is a low cost, low profile sub-miniature high performance 2 dB coupler in an easy to use surface mount package. LTCC (Low Temperature Co-fired Ceramic), high conductivity metal conductor (Ag), and gold (Au) plating enable the CXH Series to minimize insertion loss and improve durability for thermal stabilization and electricity. The CXH Series is offered in a variety of frequency bands compatible with various types of high frequency wireless systems.

1.2. Features

- 1800 ~ 2200MHz
- Mean Coupling 2dB
- Low Insertion Loss
- Surface mount type
- LTCC base (Er=4.6)
- RoHS Compliance (Pb Free)

1.3. Applications

- Balanced Amplifiers and Signal Distribution in Wireless Communications
- LTE, WiMax and WiBro
- Base station and Repeater



DATASHEET

Part No.

Components Directional Couplers

CXH 02 F 1822 AG

2. Model and Lot Number description

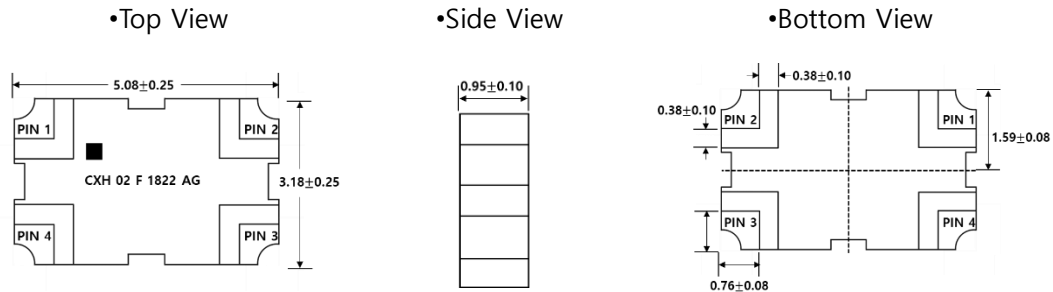
2.1. Model

| <u>CXH</u> | <u>02</u> | <u>F</u> | <u>1822</u> | <u>AG</u> |
|------------|-----------|----------|-------------|-----------|
| (1) | (2) | (3) | (4) | (5) |

- (1) Series name
- (2) Coupling (dB) : Mean Coupling 2dB
- (3) Chip Size : "F" – 2013inch (5.08 x 3.18 mm)
- (4) Frequency Bandwidth: 1800MHz ~ 2200MHz
- (5) Design Code

3. Style and Dimension

3.1. Appearance and dimension



- **Unit : mm**
- **Tolerances are Non-Cumulative**

3.2. Pin Description

| Configuration | Pin 1 | Pin 2 | Pin 3 | Pin 4 |
|---------------|--|--|--|--|
| Case 1 | Input | Isolated | Output $-5\text{dB} \angle \theta - 90^\circ$ | Coupling $-2\text{dB} \angle \theta$ |
| Case 2 | Isolated | Input | Coupling $-2\text{dB} \angle \theta$ | Output $-5\text{dB} \angle \theta - 90^\circ$ |
| Case 3 | Output $-5\text{dB} \angle \theta - 90^\circ$ | Coupling $-2\text{dB} \angle \theta$ | Input | Isolated |
| Case 4 | Coupling $-2\text{dB} \angle \theta$ | Output $-5\text{dB} \angle \theta - 90^\circ$ | Isolated | Input |

4. Specifications

4.1. Electrical characteristics

| Frequency (MHz) | Coupling (dB) | Return Loss Min.(dB) | Insertion Loss Max.(dB) | Directivity Min.(dB) | Phase Balance (Degree) | Group Delay (ns) | Power Avg.(W) Watts at 95°C | Operating Temperature(°C) |
|-----------------|---------------|----------------------|-------------------------|----------------------|------------------------|------------------|-----------------------------|---------------------------|
| 1800 ~ 2200 | 1.9 ± 0.2 | 23 | 0.20 | 21 | 90±4.0 | 0.11±0.011 | 24 | -55 ~ 140 |

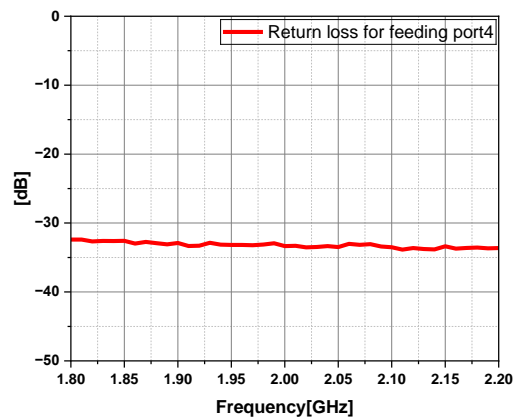
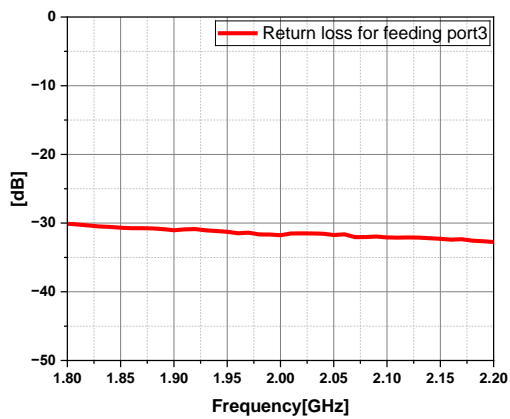
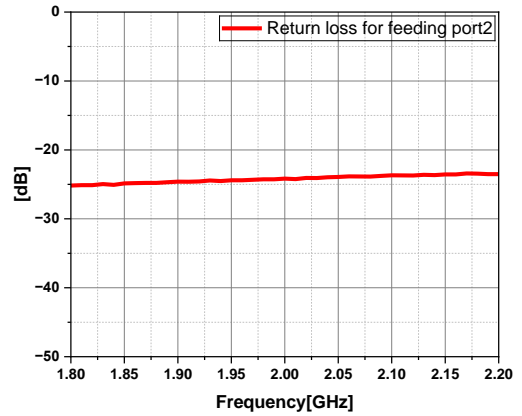
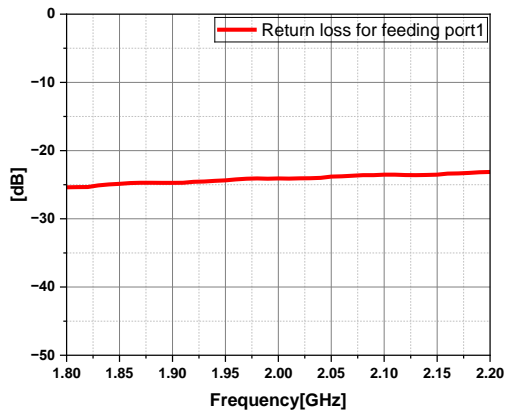
4.2. Definition of Measured Specifications

| Parameter | Definition | Mathematical Representation |
|----------------|--|--|
| Coupling | At a given frequency coupling is the input power divided by the power at the coupled port. Coupling is the average values in the band. | $10\log (P_{cou} / P_{in})$ |
| Return Loss | The impedance match of the coupler to a 50Ω System. Return Loss is an alternate mean to express VSWR. | $10\log (P_{in} / P_{back})$ |
| Directivity | The power at the isolated port divided by the power at the coupled port | $10\log (P_{iso} / P_{cou})$ |
| Insertion Loss | The input power divided by the sum of the power at the two output port. | $10\log (P_{in} / (P_{cou} + P_{out}))$ |
| Phase Balance | The difference in phase angle between the two output ports. | Phase at coupled port – Phase at transmission port |
| Group Delay | Group delay is average of group delay's from input port to the coupled port | Average (GD-C) |

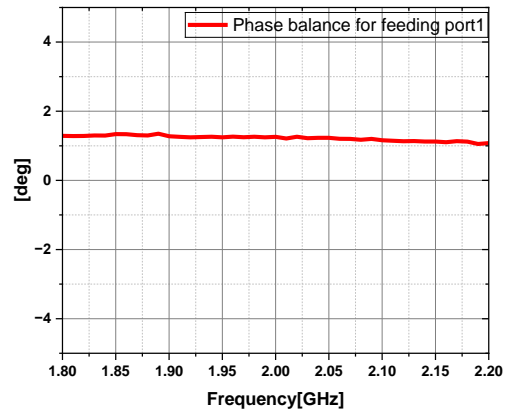
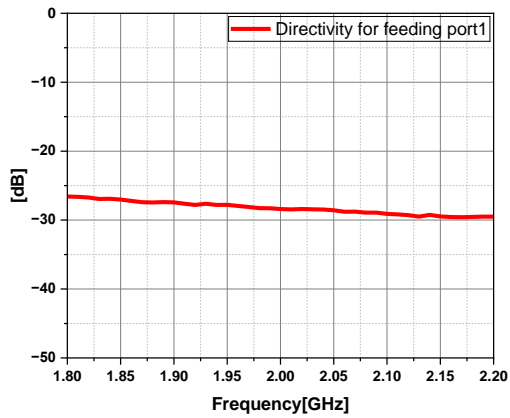
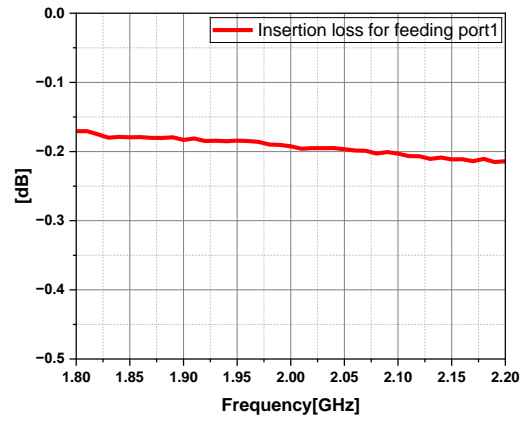
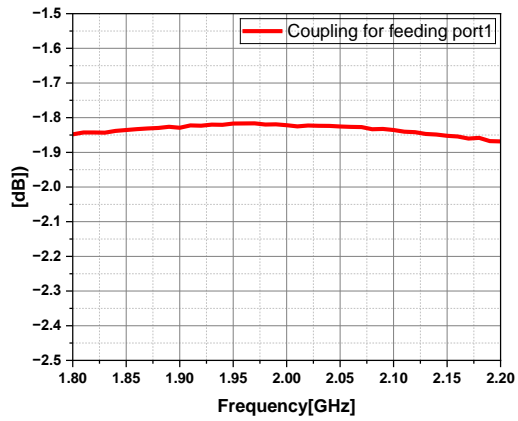
* P_{in} : power of input port , P_{out} : power of output port , P_{cou} : power of output port ,
 P_{iso} : power of isolated port , P_{back} : Return power of input port

4.3. Frequency characteristics

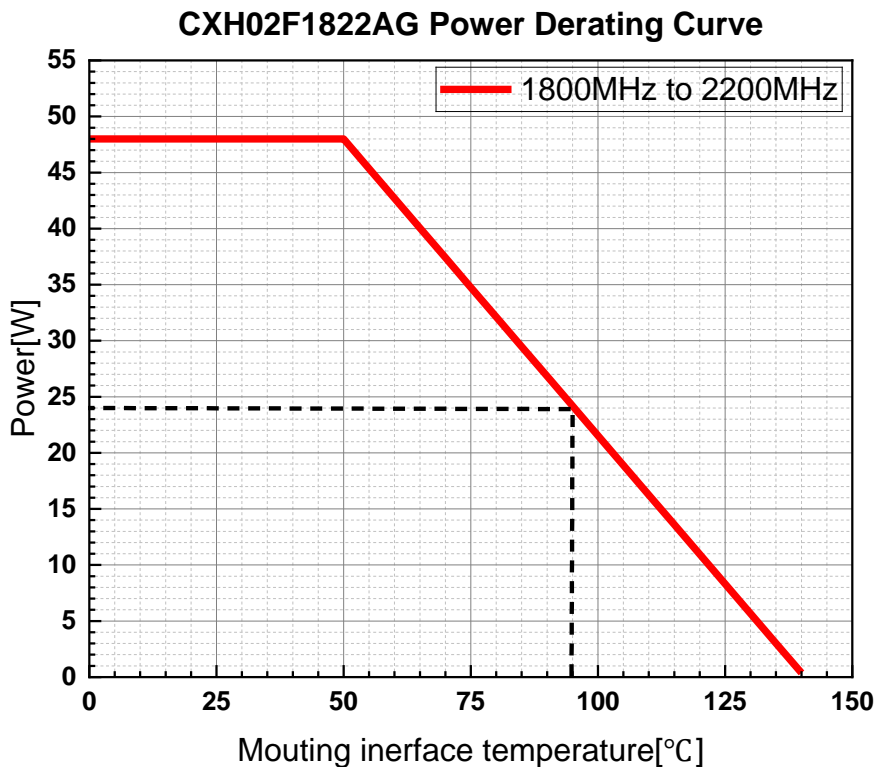
Typical Performance : 1800MHz to 2200MHz



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4.4 Power Derating Curve



CXH02F1822AG power derating curve is shows the maximum allowable average power of the depending on base PCB temperature changes.

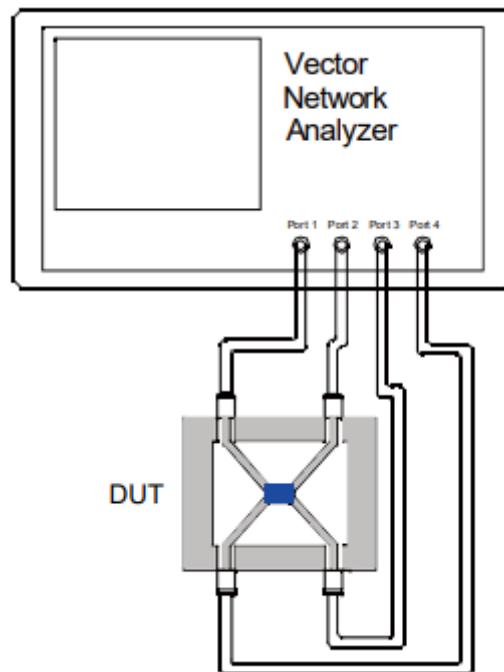
Following factors are determining the power derating curve.

- Internal Circuit Temperature
- Insertion Loss
- Material properties
- Operating temperature
- Mounting interface temperature

As the mounting interface temperature approaches the maximum continuous operating temperature, the power handling decreases to zero.

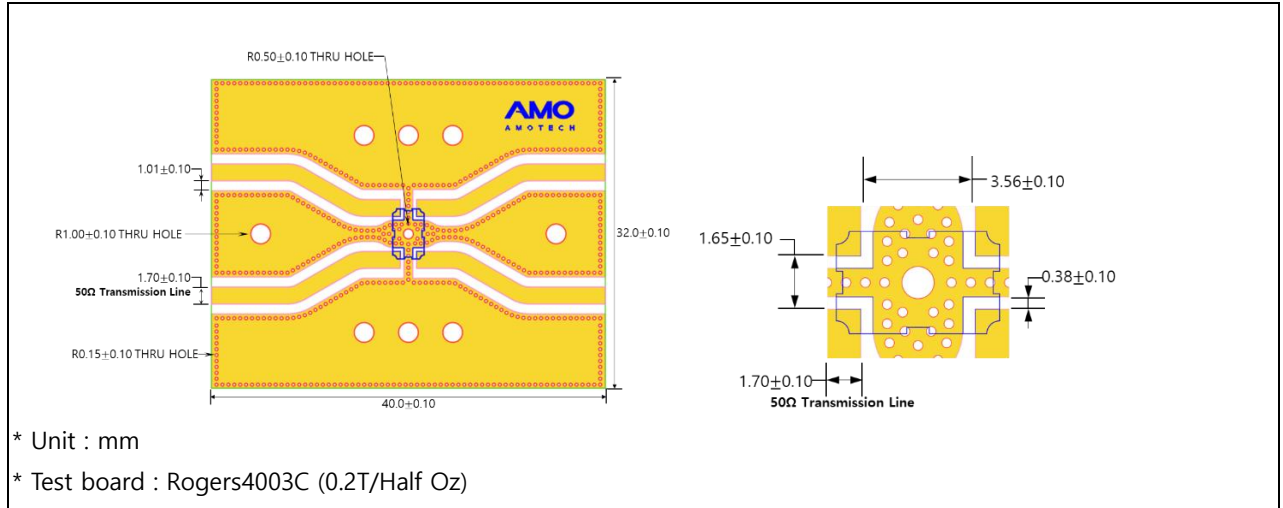
5. Test Method

1. Calibrating your vector network analyzer.
2. Connect the VNA 4 Port to DUT respectively
3. Measure the data of coupling through port 1 to port 4(S41).
4. Measure the data of transmission through port 1 to port 3(S31).
5. Measure the data of isolation through port 1 to port 2(S21).
6. Measure the data of phase port 4 & port 3(port 1 feeding).
7. Measure the data of return loss port 1, port 2, port 3 & port 4.
8. According to the above data to calculate insertion loss, amplitude balance & phase.

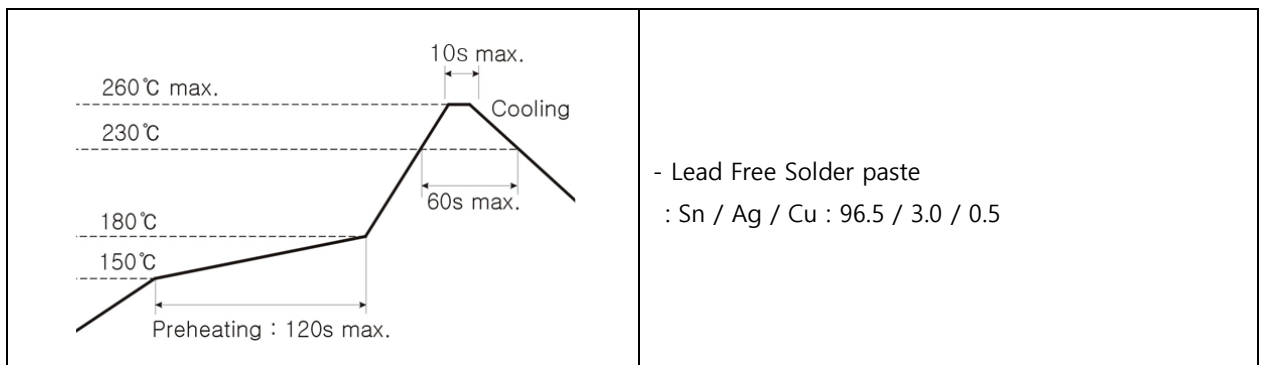


6. Soldering (Reflow soldering)

6.1. PCB pattern design condition (recommended)



6.2. Soldering condition



Follow the recommended soldering conditions to avoid degradation of performance .

- This product is designed for reflow soldering only. Do not use flow soldering.
- Use non-activated flux. (Max. Cl content less than 0.2%)
- Reflow cycle times should be done less than 3 times.

7. Caution

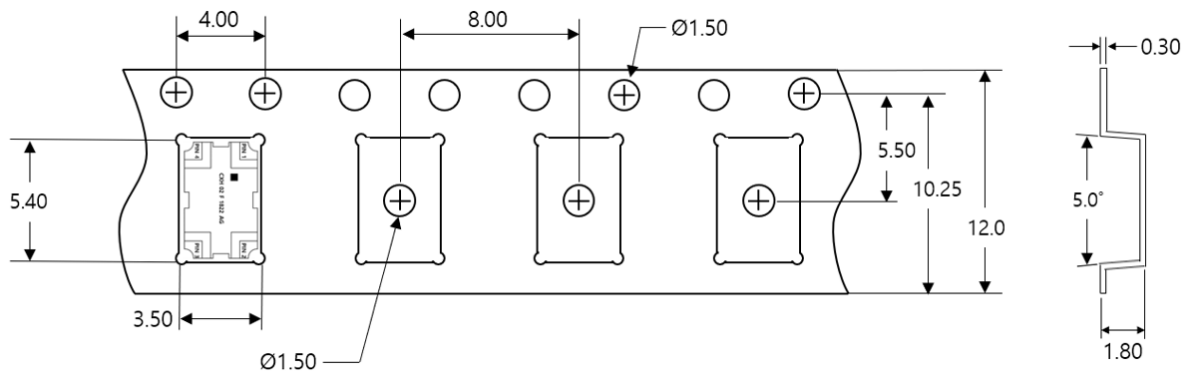
- 1) Storage environment : -5~40°C temperature, 20~70% humidity (MSL Level 1)
- 2) Do not use in high temperature/high humidity and a corrosive atmosphere like sulfide, chloride gas which could damage the solderability.
- 3) Do not expose to mechanical shock to avoid crack.
- 4) Use chips within 6 months. If over 6 months, check solderability before use.

8. Packaging specification

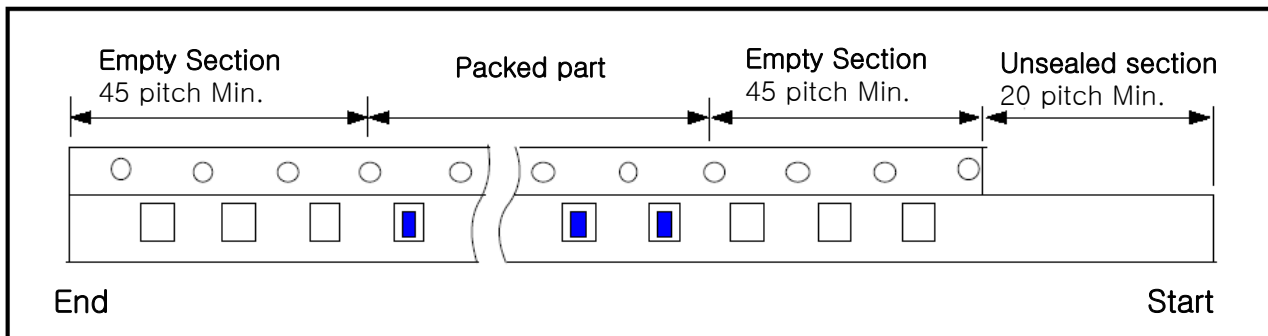
8.1 Carrier tape Specification

8.1.1. Size

Unit: mm



8.1.2. Chip Locations

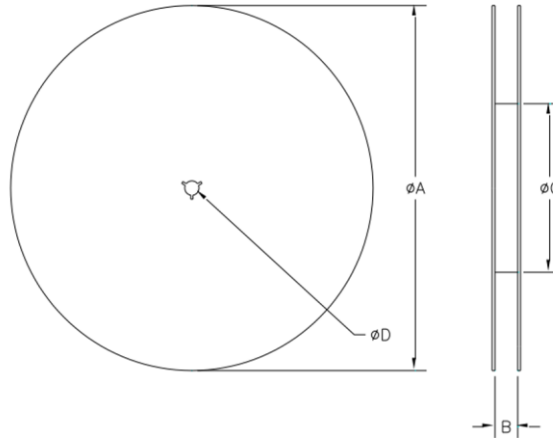


8.1.3. Material

- 1) Pater carrier tape : polycarbonate
- 2) Top tape : Polyester film

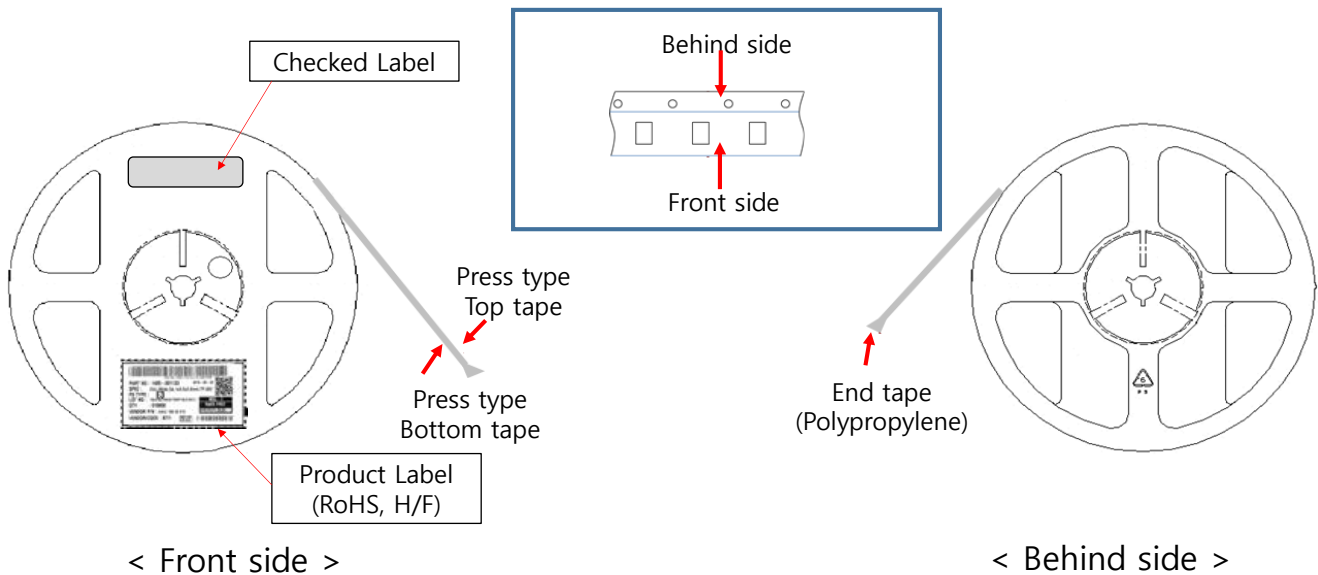
8.2. Reel Specification

8.2.1. Size




| Item | φA | B | φC | φD |
|----------|-------------|-------------|---------------|-------------|
| Inch(mm) | 13.3(333.0) | 0.472(12.0) | 4.017(102.03) | 0.512(13.0) |

8.2.2. Label adherence and winding direction



8.2.3. Material

- Plastic reel : GPS(General Purpose Styrene)

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8.3 Box packaging Specification

| Size (mm) | Thickness typ. (mm) | Quantity (EA) / Reel | Quantity |
|--------------------|------------------------|-------------------------|-----------|
| | | 13"/330mm (Material) | / Polybag |
| 5.08 x 3.18 | 0.95 | 4,000 (Embossed) | - |

a) Reel packing

- ① 3 Reels per Inner box (13" Reel)
- ② 3 Inner boxes per Out box

b) Box type



(Inner Box)



(Out box)