

# 3.2X1.6X0.5 (mm) WiFi/Bluetooth Ceramic Chip Antenna

## Engineering Specification

### 1. Product Number

|    |      |    |   |      |
|----|------|----|---|------|
| FH | 3216 | Q2 | 3 | 2P52 |
| 1  | 2    | 3  | 4 | 5    |



|                 |                   |
|-----------------|-------------------|
| (1)Product Type | Chip Antenna      |
| (2)Size Code    | 3.6x1.2x0.5mm     |
| (3)Type Code    | H2                |
| (4)Packing      | Plastic Packaging |
| (5)Frequency    | 2.45GHz           |



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Designed by : **Jason**

Checked by : **Jason**

Approved by : **MR.FANG**

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## 2. Features

- \*Stable and reliable in performances
- \*Low temperature coefficient of frequency
- \*Low profile, compact size
- \*RoHS compliance
- \*SMT processes compatible

## 3. Applications

- \*Bluetooth earphone systems
- \*Hand-held devices when WiFi /Bluetooth functions are needed, e.g., Smart phone.
- \*IEEE802.11 b/g/n
- \*ZigBee
- \*Wireless PCMCIA cards or USB dongle

## 4. Description

Yingfeng chip antenna series are specially designed for WiFi/Bluetooth applications. Based on yingfeng proprietary design and processes, this chip antenna has excellent stability and sensitivity to consistently provide high signal reception efficiency.

## 5. Electrical Specifications (80 x 40 mm<sup>2</sup> ground plane)

5-1. Electrical Table

| Characteristics    |            | Specifications      | Unit |
|--------------------|------------|---------------------|------|
| Outline Dimensions |            | 3.2x1.6x0.5         | mm   |
| Working Frequency  |            | 2400~2500           | MHz  |
| VSWR               |            | 2 Max.              |      |
| Impedance          |            | 50                  | Ω    |
| Polarization       |            | Linear Polarization |      |
| Gain               | Peak       | 3.5 (typical)       | dBi  |
|                    | Efficiency | 78 (typical)        | %    |



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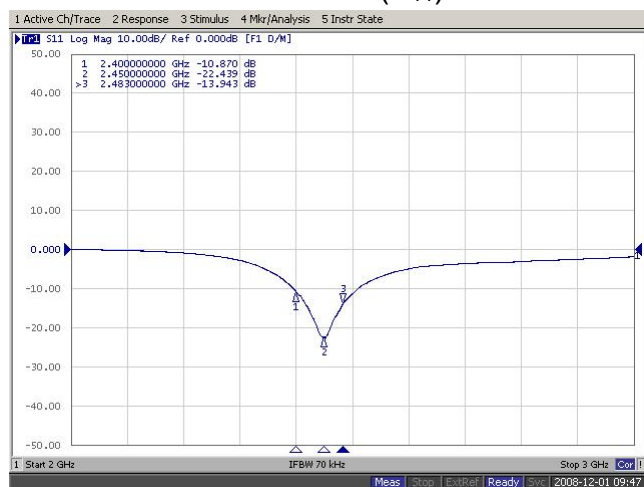
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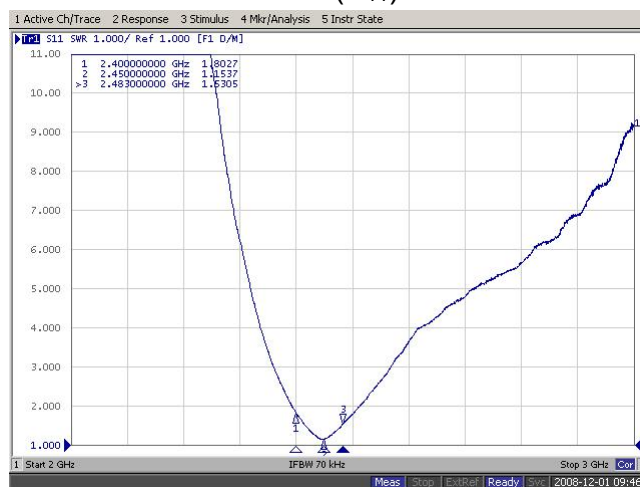
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## 5-2. Return Loss & VSWR

Return Loss ( $S_{11}$ )



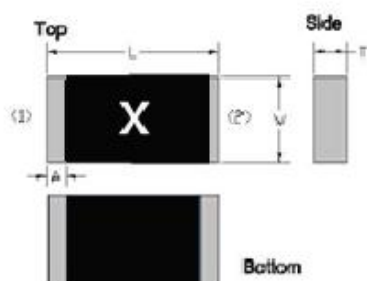
VSWR( $S_{11}$ )



## 6. Antenna Dimensions & Test Board (unit: mm)

### a. Antenna Dimensions

#### Dimension and Terminal Configuration



| Dimension (mm) |           |
|----------------|-----------|
| L              | 3.15±0.15 |
| W              | 1.55±0.15 |
| T              | 0.50±0.10 |
| A              | 0.35±0.10 |

| No. | Terminal Name |
|-----|---------------|
| 1   | Feeding point |
| 2   | GND           |



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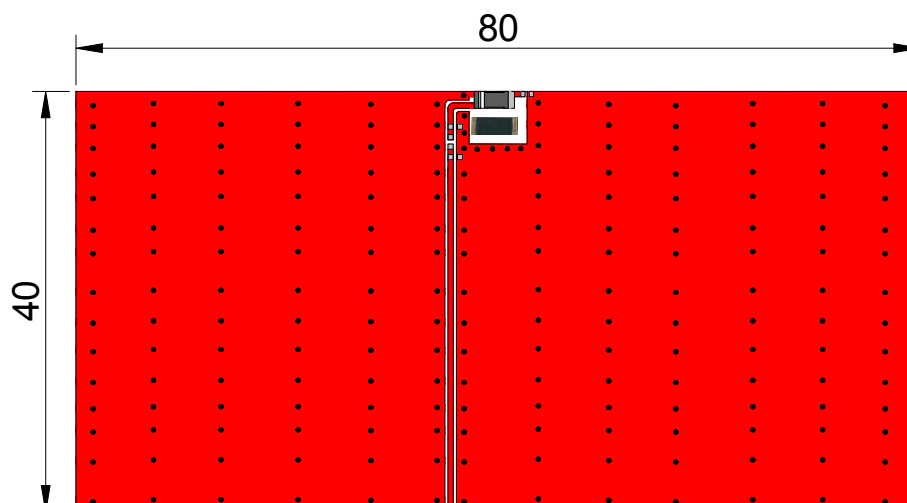
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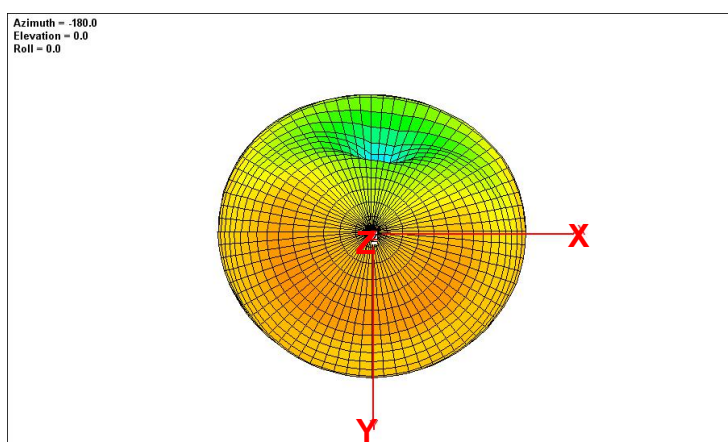
## b. Test Board with Antenna



Unit: mm

## 7. Radiation Pattern (80 x 40 mm<sup>2</sup> ground plane)

### 7-1. 3D Gain Pattern @ 2442 MHz



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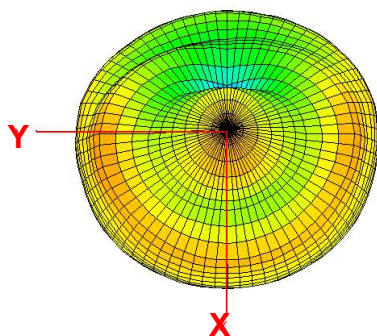
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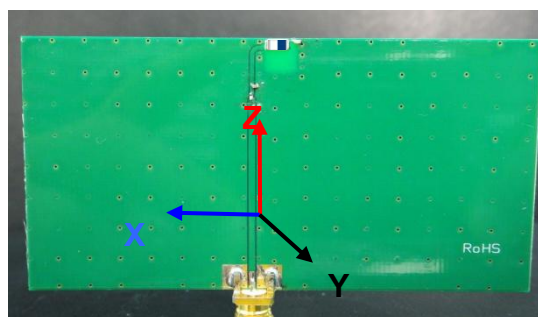
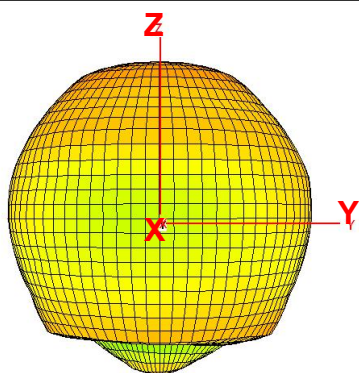
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Azimuth = -180.0  
 Elevation = -5.1  
 Roll = 180.0



Azimuth = 0.0  
 Elevation = -90.0  
 Roll = 180.0



## 7-2. 3D Efficiency Table

| Frequency( MHz) | 2400 | 2410 | 2420 | 2430 | 2442 | 2450 | 2460 | 2470 | 2480 | 2490 | 2500 |
|-----------------|------|------|------|------|------|------|------|------|------|------|------|
| Efficiency (dB) | -1.4 | -1.0 | -0.9 | -0.7 | -0.7 | -0.8 | -0.9 | -1.1 | -1.2 | -1.3 | -1.4 |
| Efficiency (%)  | 72.8 | 73.7 | 74.3 | 74.4 | 75.5 | 75.0 | 74.0 | 73.6 | 73.1 | 72.6 | 71.5 |
| Gain (dBi)      | 2.1  | 2.2  | 2.3  | 2.4  | 3.5  | 2.5  | 2.4  | 1.8  | 1.7  | 1.6  | 1.4  |



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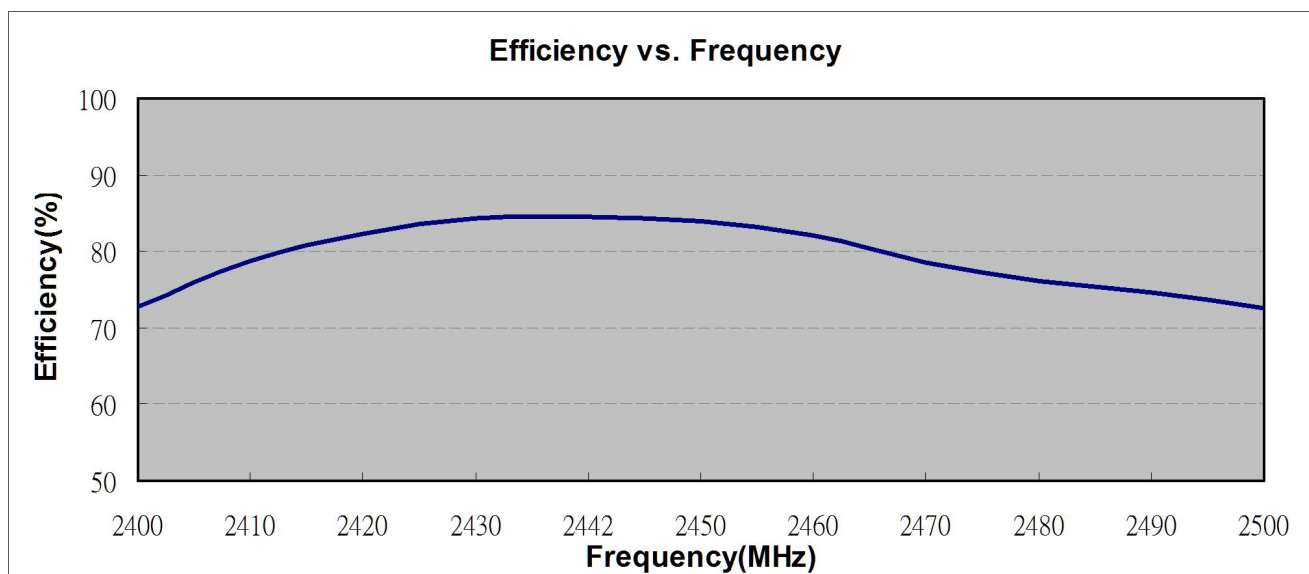
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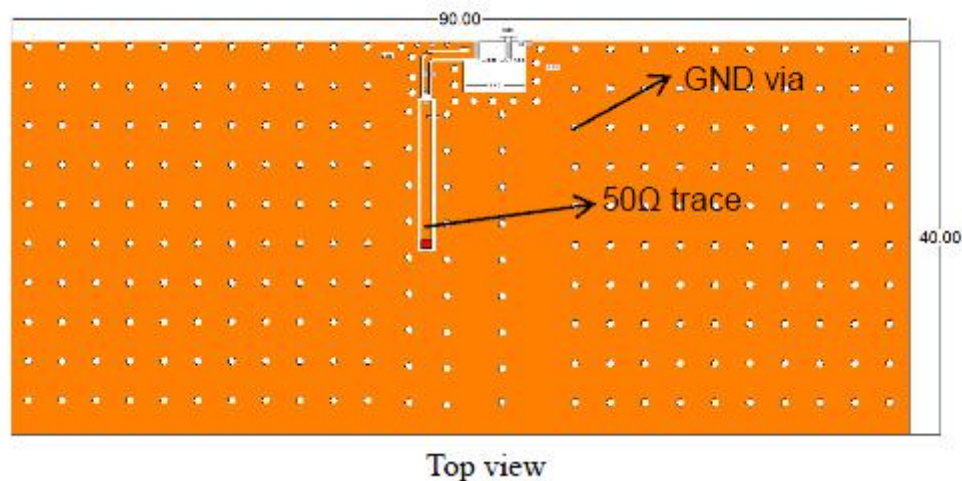
### 7-3. 3D Efficiency vs. Frequency



## 8. Layout Guide

### a. Solder Land Pattern:

Land pattern for soldering (gray marking areas) is as shown below. Depending on Customer's requirement, matching circuit as shown below is also recommended.



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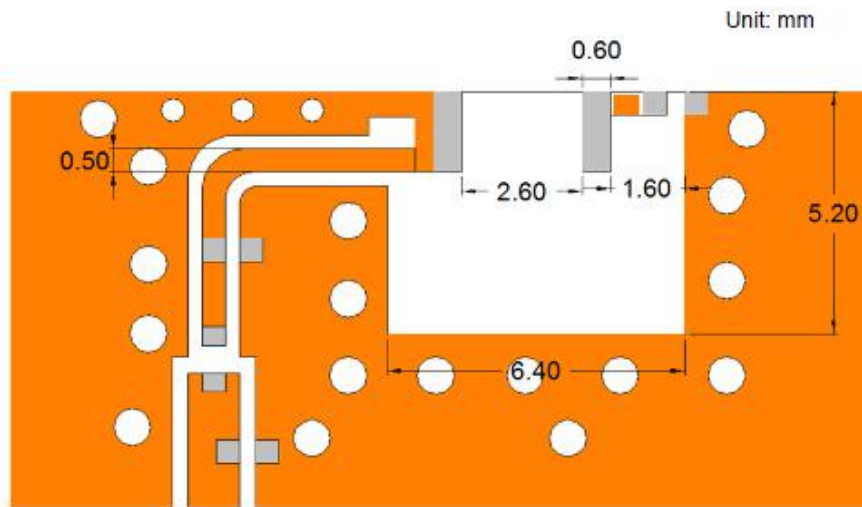
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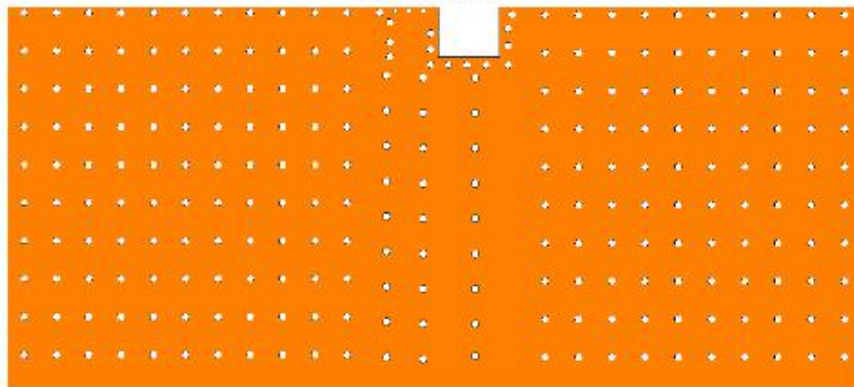
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Detail view



Bottom view



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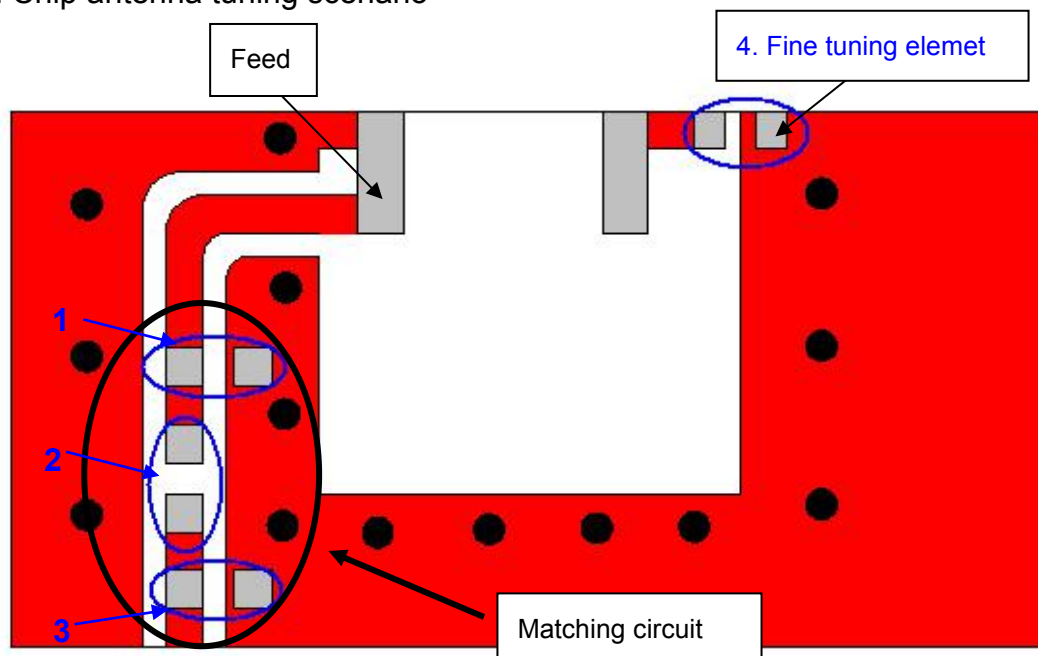
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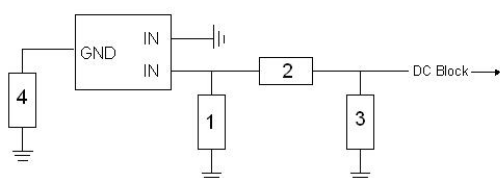
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## 9. Frequency tuning

a. Chip antenna tuning scenario :



b. Matching circuit : (Center frequency is about 2442 MHz @ 80 x 40 mm<sup>2</sup> ground plane)



| System Matching Circuit Component |             |               |           |
|-----------------------------------|-------------|---------------|-----------|
| Location                          | Description | Vendor        | Tolerance |
| 1                                 | 1.2 pF*     | Murata (0402) | ±0.1 pF   |
| 2                                 | 10PF*       | Murata(0402)  | ±0.5 PF   |
| 3                                 | N/A*        | -             | -         |
| Fine tuning element 4             | 1.5 pF*     | Murata (0402) | ±0.1 pF   |

\*Typical reference values which may need to be changed when circuit boards or part vendors are different.



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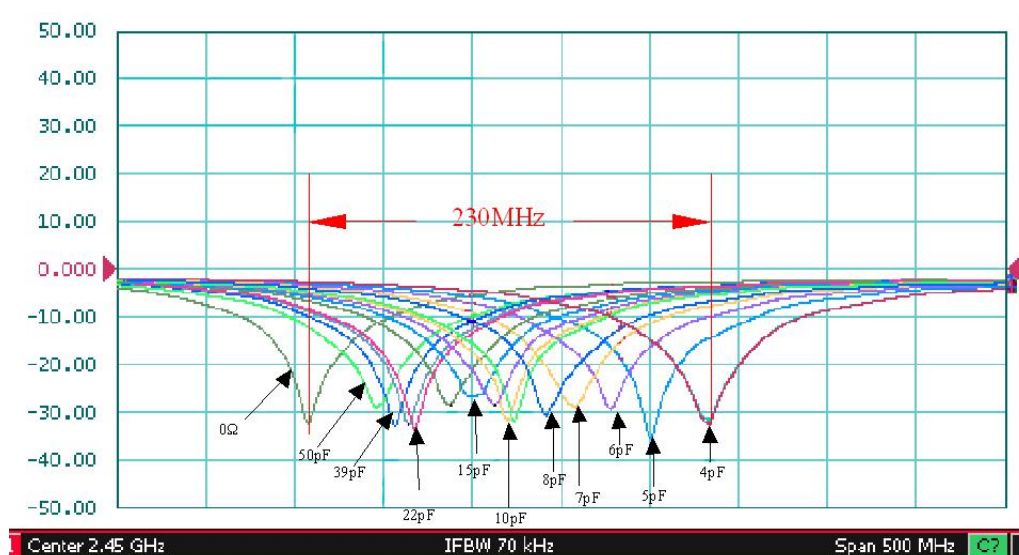
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c. Fine tuning element vs. Center frequency



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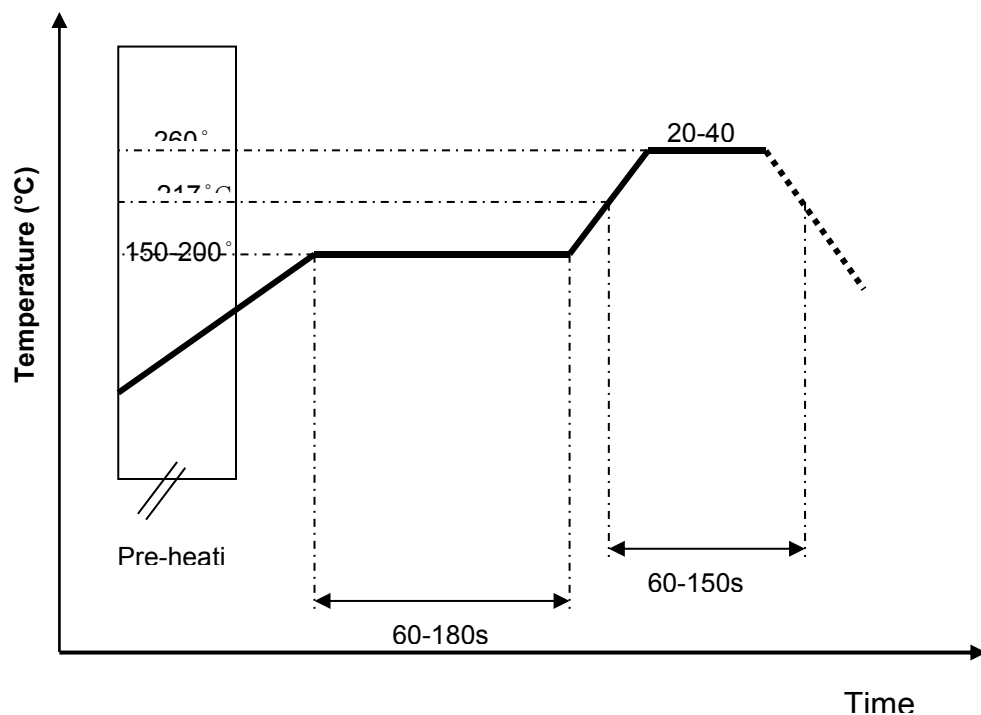
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## 10. Soldering Conditions

### a. Typical Soldering Profile for Lead-free Process



## 11. Packing

(1) Quantity/Reel: 6000 pcs/Reel:



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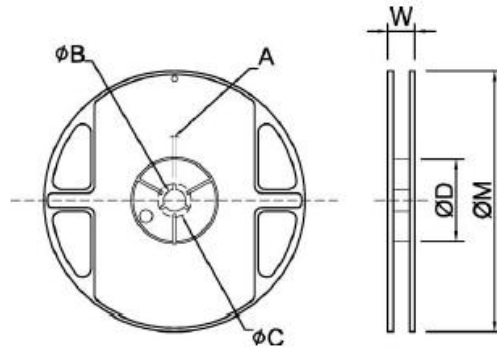
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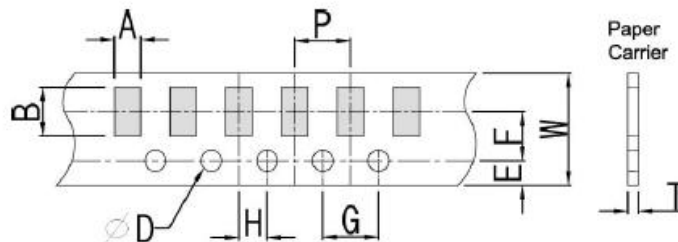
## Reel and Taping Specification

### Reel Specification



| TYPE | SIZE |         | A       | ϕ B      | ϕ C    | ϕ D    | W        | ϕ M     |
|------|------|---------|---------|----------|--------|--------|----------|---------|
| 3216 | 7"   | 5K/Reel | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 60±1.0 | 11.5±2.0 | 178±2.0 |

### Tapping Specification



| Packaging  | Type | A         | B         | W        | E         | F        | G        | H        | T         | $\phi D$            | P       |
|------------|------|-----------|-----------|----------|-----------|----------|----------|----------|-----------|---------------------|---------|
| Paper Type | 3216 | 1.90±0.20 | 3.50±0.20 | 8.0±0.20 | 1.75±0.10 | 3.5±0.05 | 4.0±0.10 | 2.0±0.05 | 0.75±0.10 | 1.50<br>+0.10<br>-0 | 4.0±0.1 |



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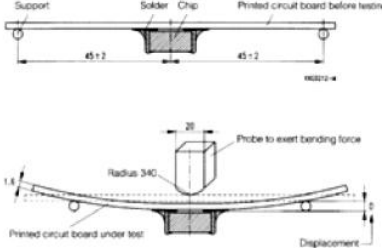
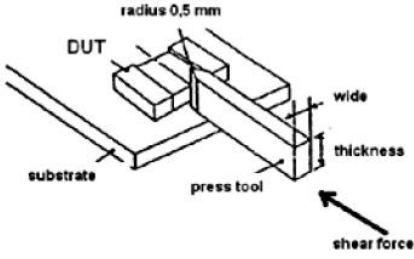
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|                    |                                                                                                                                                                                                                                              |                                                                                                                                                                          |              |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Board Flex (SMD)   | <p>1. Mounting method:<br/>IR-Reflow. PCB Size (L:100 × W:40 × T:1.6mm)</p> <p>2. Apply the load in direction of the arrow until bending reaches 2 mm.</p>  | No Visible Damage.                                                                                                                                                       | AEC-Q200 005 |
| Adhesion           | <p>Force of 1.8Kg for 60 seconds.</p>                                                                                                                       | No Visible Damage<br>Magnification of 20X or greater may be employed for inspection of the mechanical integrity of the device body terminals and body/terminal junction. | AEC-Q200 006 |
| Physical Dimension | Any applicable method using x10 magnification, micrometers, calipers, gauges, contour projectors, or other measuring equipment, capable of determining the actual specimen dimensions.                                                       | In accordance with specification.                                                                                                                                        | JESD22 JB100 |



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## Reliability Table

| Test Item                             | Procedure                                                                                                                                                                                                                                                                                          | Requirements<br>Ceramic Type                                                | Remark<br>(Reference)   |
|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------|
| Electrical<br>Characterization        |                                                                                                                                                                                                                                                                                                    | Fulfill the electrical<br>specification                                     | User Spec.              |
| Thermal<br>Shock                      | 1. Preconditioning:<br>50 ± 10°C / 1 hr , then keep for 24 ± 1 hrs at room temp.<br>2. Initial measure: Spec: refer Initial spec.<br>3. Rapid change of temperature test:<br>-30°C to +85°C; 100 cycles;<br>15 minutes at Lower category temperature;<br>15 minutes at Upper category temperature. | No Visible Damage.<br>Fulfill the electrical<br>specification.              | MIL-STD-202<br>107      |
| Temperature<br>Cycling                | 1. Initial measure: Spec: refer Initial spec.<br>2. 100 Cycles (-30°C to +85°C), Soak Mode=1 (2 Cycle/hours).<br>3. Measurement at 24 ± 2Hours after test condition.                                                                                                                               | No Visible Damage.<br>Fulfill the electrical<br>specification.              | JESD22<br>JA104         |
| High Temperature<br>Exposure          | 1. Initial measure: Spec: refer Initial spec.<br>2. Unpowered; 500hours @ T=+85°C.<br>3. Measurement at 24 ± 2 hours after test.                                                                                                                                                                   | No Visible Damage.<br>Fulfill the electrical<br>specification.              | MIL-STD-202<br>108      |
| Low Temperature<br>Storage            | 1. Initial measure: Spec: refer Initial spec.<br>2. Unpowered; 500hours @ T= -30°C.<br>3. Measurement at 24 ± 2 hours after test.                                                                                                                                                                  | No Visible Damage.<br>Fulfill the electrical<br>specification.              | MIL-STD-202<br>108      |
| Solderability<br>(SMD Bottom Side)    | Dipping method:<br>a. Temperature: 235 ± 5°C<br>b. Dipping time: 3 ± 0.5s                                                                                                                                                                                                                          | The solder should cover<br>over 95% of the critical<br>area of bottom side. | IEC 60384-21/22<br>4.10 |
| Soldering Heat<br>Resistance<br>(RSH) | Preheating temperature: 150 ± 10°C.<br>Preheating time: 1~2 min.<br>Solder temperature: 260 ± 5°C.<br>Dipping time: 5 ± 0.5s                                                                                                                                                                       | No Visible Damage.                                                          | IEC 60384-21/22<br>4.10 |



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