

# Low Profile SMD LTE Chip Antenna



**AANI-CH-0202**

Request Samples



Check Inventory



40 x 7 x 3 mm

RoHS/RoHS II Compliant

MSL Level = 1

## Features

- Frequency Range: 698-960 / 1710-2690 MHz
- Compact & Low-Profile
- Peak Gain: 1.0 / 5.9 dBi
- Efficiency: 66 % / 80 %
- Surface Mount (SMD)

## Applications

- Internet of Things (IoT) Devices
- LTE-M, Cat M, Cat M1, NB-IoT
- LTE CAT 1 up to CAT 20 Supported
- Smart Home Networking
- Networking & Telecommunication

## Product Image



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## Electrical Specification

| Parameter                   | Specification    |           | Unit     |
|-----------------------------|------------------|-----------|----------|
| Operating Frequency         | 698-960          | 1710-2690 | MHz      |
| Return Loss                 | < -7.0           | < -9.5    | dB       |
| VSWR (Typ.)                 | < 2.6            | < 2.0     | :1       |
| Peak Gain                   | 1.0              | 5.9       | dBi      |
| Average Gain                | 0.25             | 3.75      |          |
| Minimum Total Efficiency    | -2.9 (51)        | -2.8 (53) | dB (%)   |
| Average Total Efficiency    | -2.3 (59)        | -2.2 (60) |          |
| Maximum Total Efficiency    | -1.8 (66)        | -1.0 (80) |          |
| Impedance                   | 50               |           | $\Omega$ |
| Polarization                | Linear           |           | -        |
| Radiation Pattern (Azimuth) | Omni-directional |           | -        |
| Input Power                 | < 5              |           | W        |

Note : All test measurements were conducted on 135 x 40 mm. Performance of the chip antenna will vary relative to the ground plane size in use.

## Mechanical Specification

| Parameter               | Specification                       |
|-------------------------|-------------------------------------|
| Dimensions              | 40 x 7 x 3 mm                       |
| Mounting Type           | Surface Mount                       |
| Antenna Clearance Space | 40 x 14.7 mm                        |
| Evaluation Board size   | 135 x 40 mm                         |
| Solder Termination      | Ag (Environmental-Friendly Pb-Free) |

## Environmental Specification

| Parameter             | Specification  |
|-----------------------|----------------|
| Operating Temperature | -40°C to +85°C |
| Storage Temperature   | -40°C to +85°C |
| Relative Humidity     | 90% to 95%     |
| MSL Level             | 1              |
| RoHS Complaint        | Yes            |



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## Ordering Information

| Part Number      | Description                                       |
|------------------|---------------------------------------------------|
| AANI-CH-0202     | Low Profile SMD LTE Chip Antenna on Cut Tape      |
| AANI-CH-0202-T   | Low Profile SMD LTE Chip Antenna on Tape & Reel   |
| AANI-CH-0202-EVB | Low Profile SMD LTE Chip Antenna Evaluation Board |



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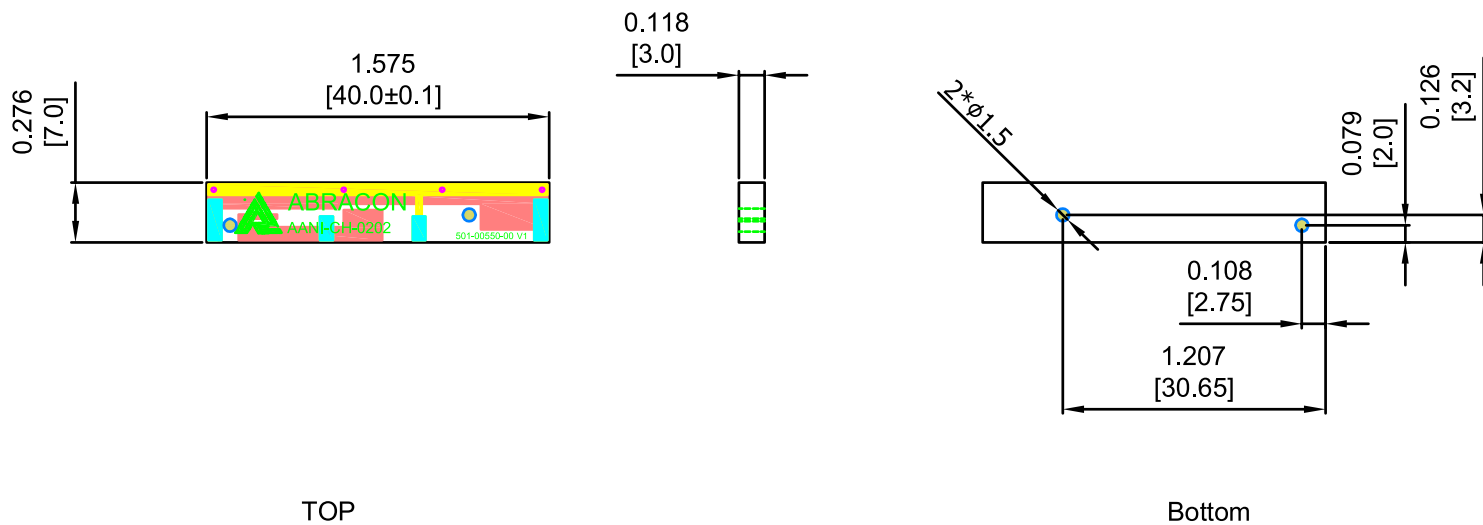


**40 x 7 x 3 mm**

**RoHS/RoHS II Compliant**

**MSL Level = 1**

## Product Dimensions



Unit: Inches[mm]

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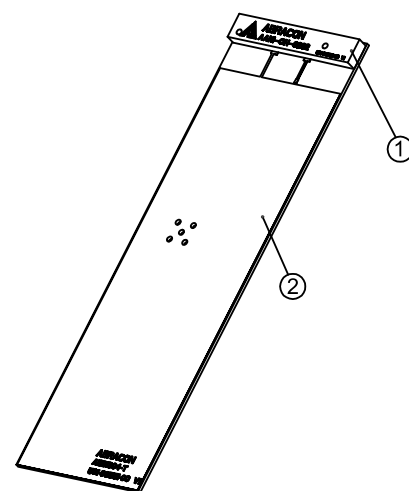
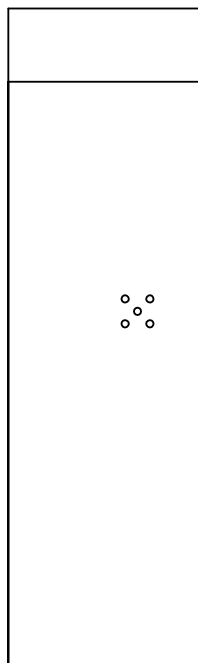
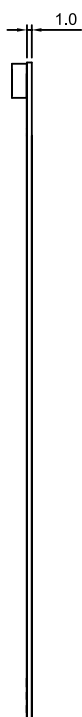
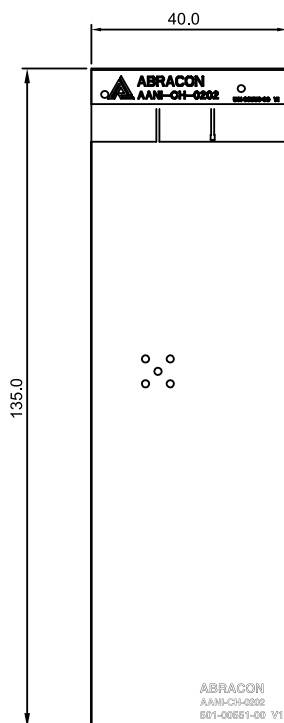


**40 x 7 x 3 mm**

**RoHS/RoHS II Compliant**

**MSL Level = 1**

## Evaluation Board Dimensions



Unit: mm

| No. | Description           |
|-----|-----------------------|
| 1   | Antenna 40 x 7 x 3 mm |
| 2   | PCB 135 x 40 x 1 mm   |

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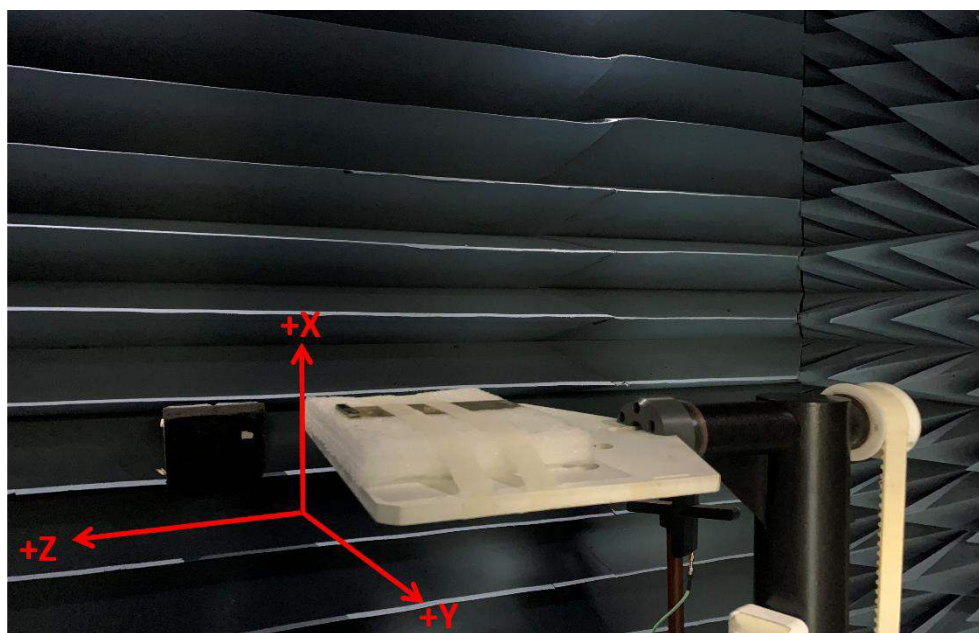


40 x 7 x 3 mm

RoHS/RoHS II Compliant

MSL Level = 1

## Measurement Setup photo



# Low Profile SMD LTE Chip Antenna



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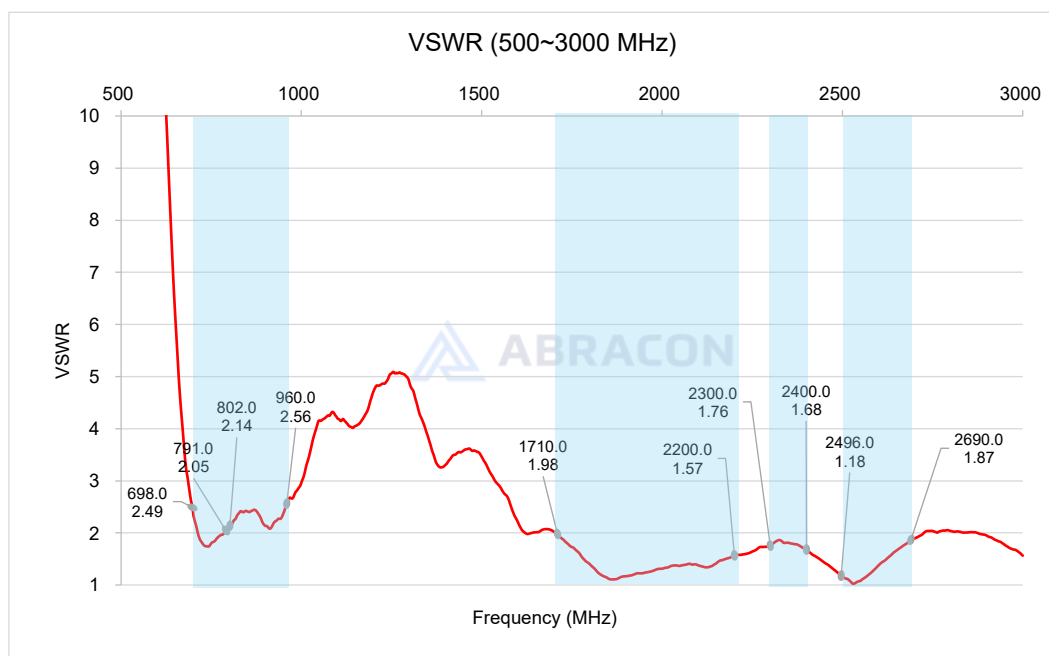
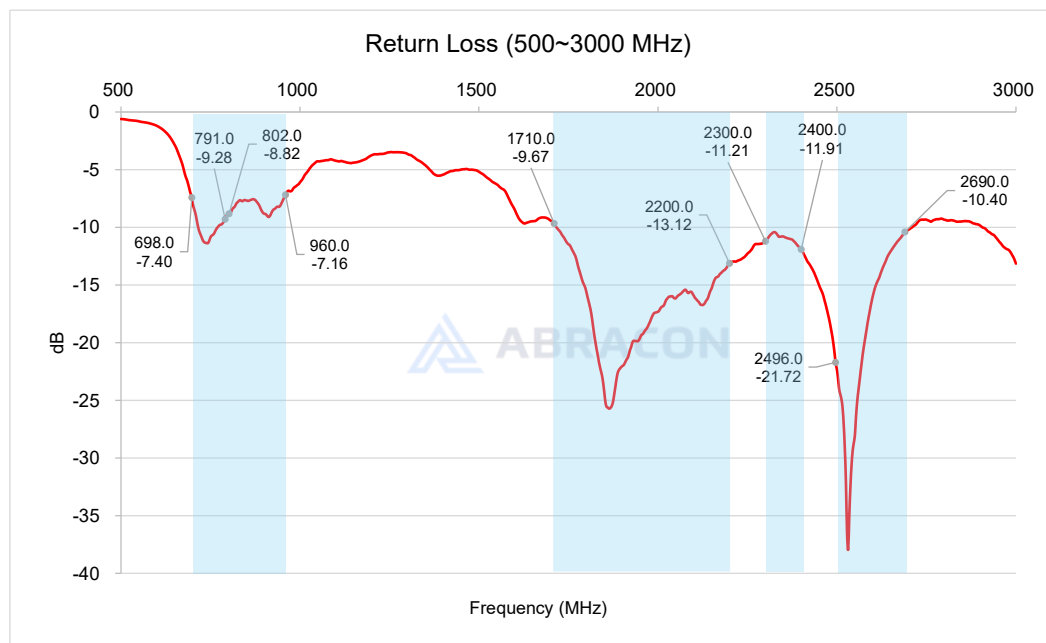


**40 x 7 x 3 mm**

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**MSL Level = 1**

## Reflection Characteristics –Return Loss & VSWR



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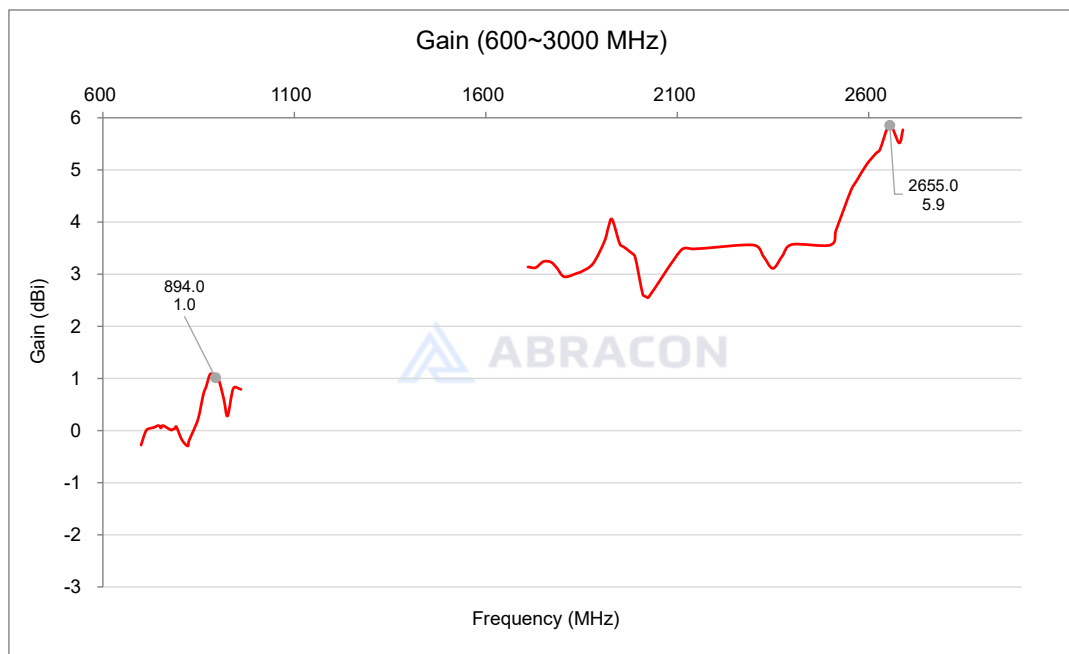


**40 x 7 x 3 mm**

**RoHS/RoHS II Compliant**

**MSL Level = 1**

## Radiation Characteristics – Peak Gain



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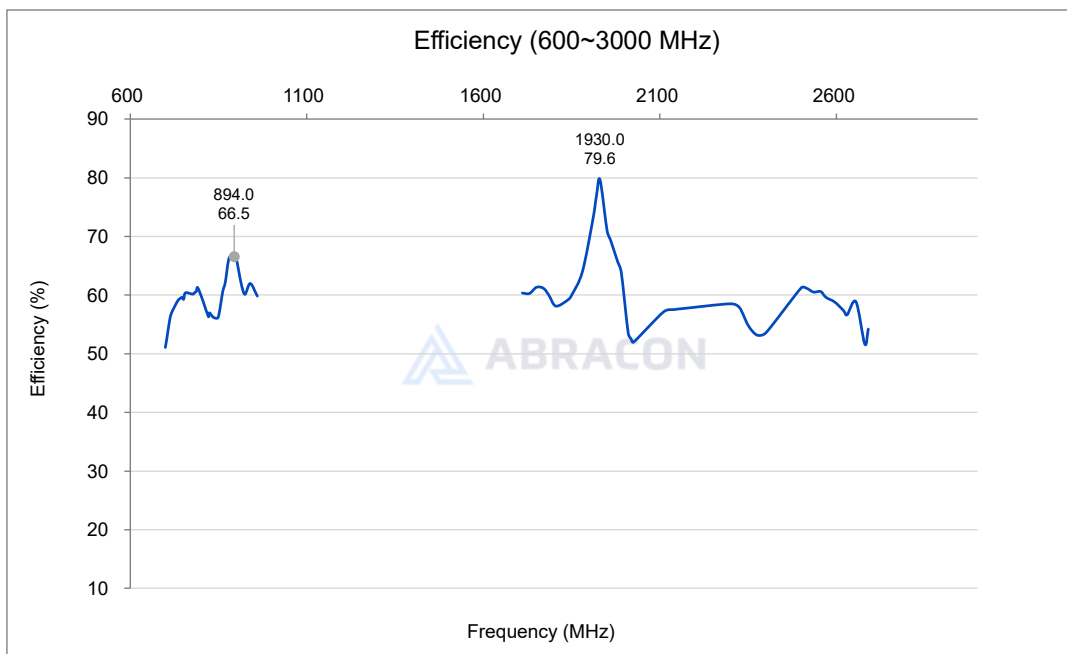


**40 x 7 x 3 mm**

**RoHS/RoHS II Compliant**

**MSL Level = 1**

## Radiation Characteristics – Total Efficiency (%)



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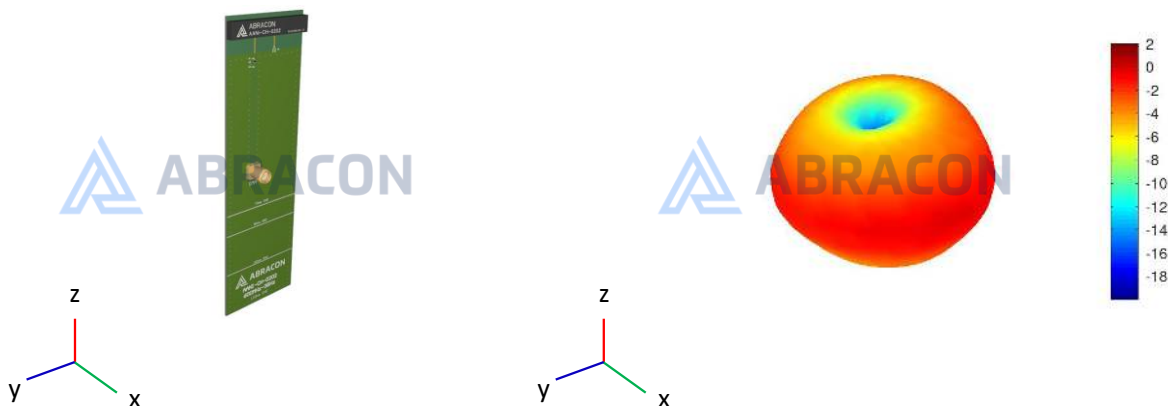
**40 x 7 x 3 mm**

**RoHS/RoHS II Compliant**

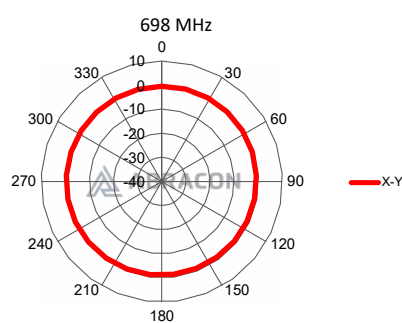
**MSL Level = 1**

## Radiation Characteristics – 3D & 2D Pattern

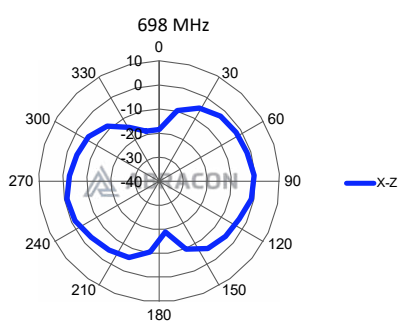
698MHz



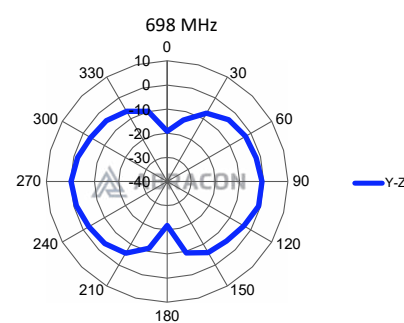
XY plane



XZ plane



YZ plane



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Request Samples



Check Inventory

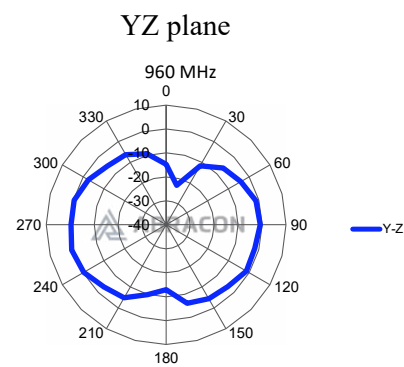
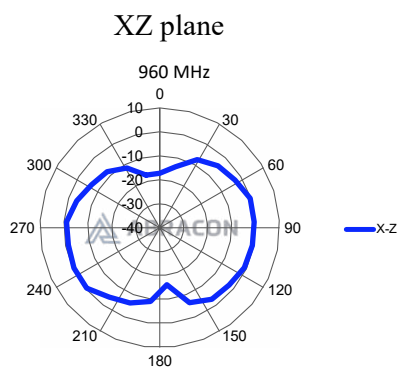
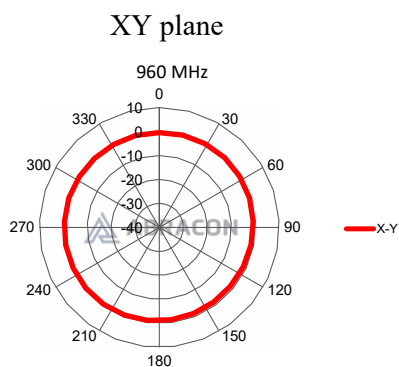
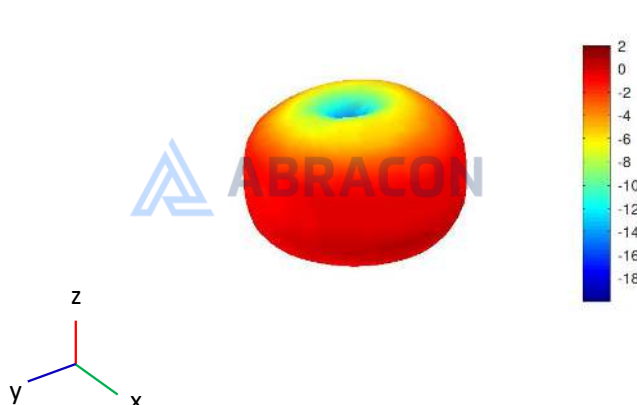


**40 x 7 x 3 mm**

**RoHS/RoHS II Compliant**

**MSL Level = 1**

960MHz



# Low Profile SMD LTE Chip Antenna



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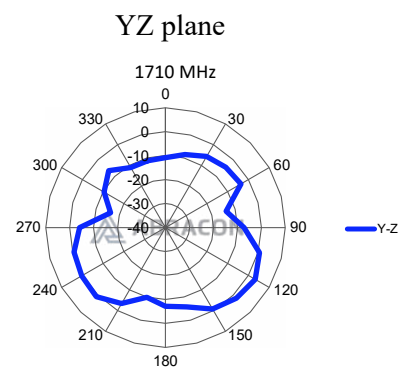
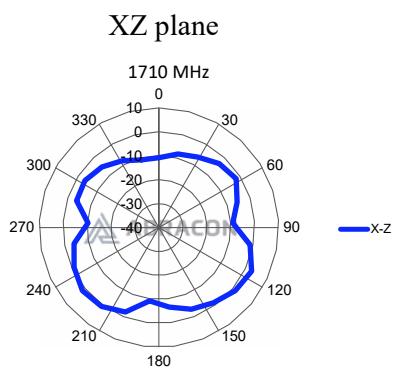
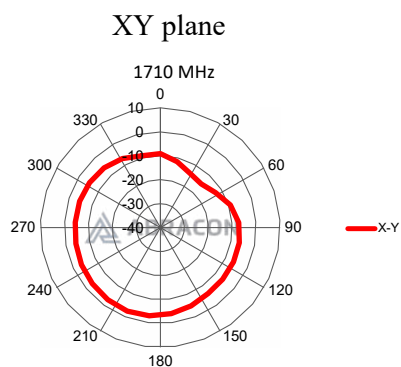
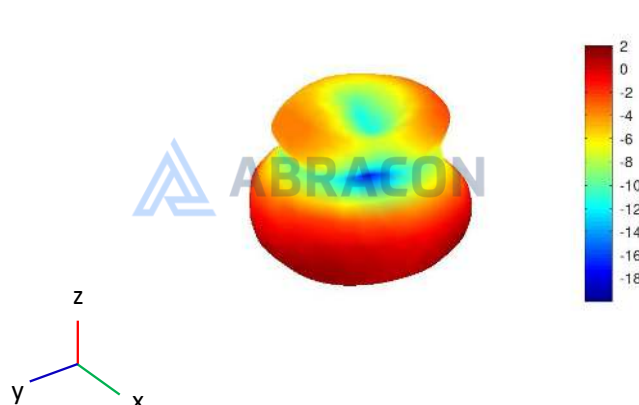


40 x 7 x 3 mm

RoHS/RoHS II Compliant

MSL Level = 1

1710MHz



# Low Profile SMD LTE Chip Antenna



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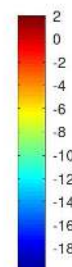
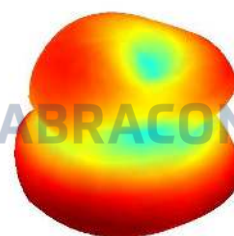
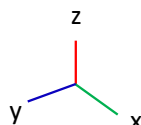


40 x 7 x 3 mm

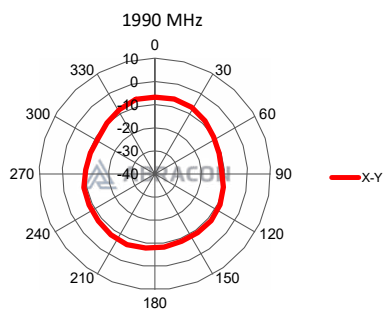
RoHS/RoHS II Compliant

MSL Level = 1

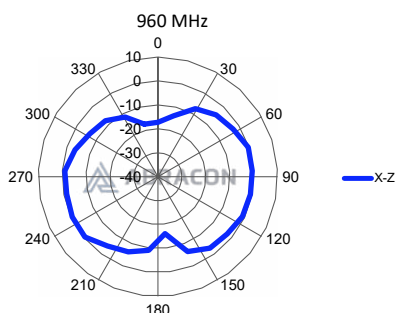
1990MHz



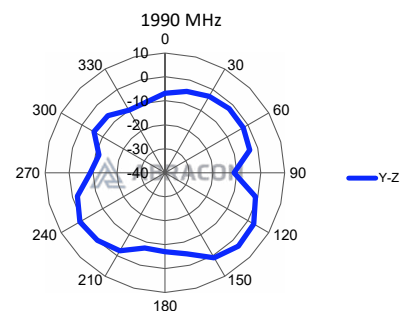
XY plane



XZ plane



YZ plane



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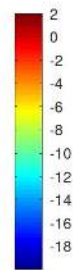
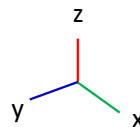


40 x 7 x 3 mm

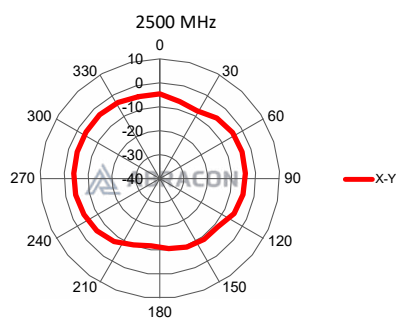
RoHS/RoHS II Compliant

MSL Level = 1

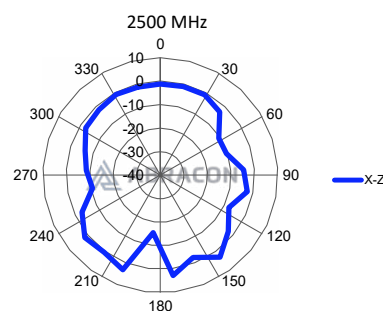
2500MHz



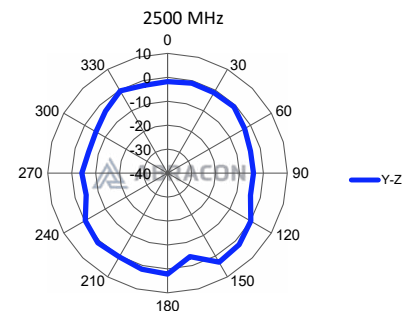
XY plane



XZ plane



YZ plane



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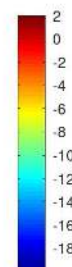
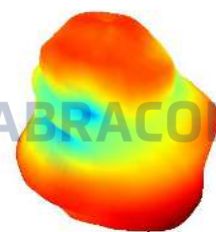
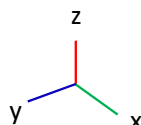


40 x 7 x 3 mm

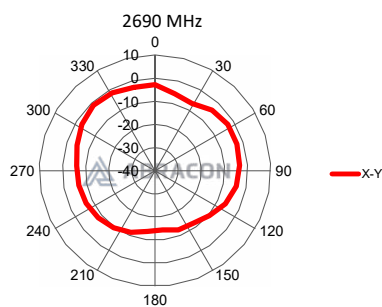
RoHS/RoHS II Compliant

MSL Level = 1

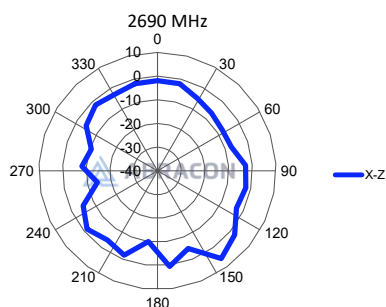
2690MHz



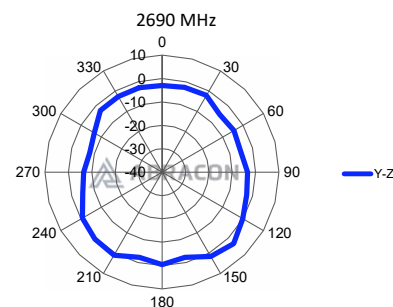
XY plane



XZ plane



YZ plane



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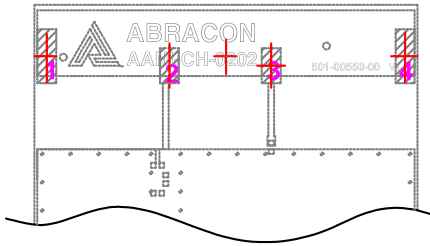
**40 x 7 x 3 mm**

**RoHS/RoHS II Compliant**

**MSL Level = 1**

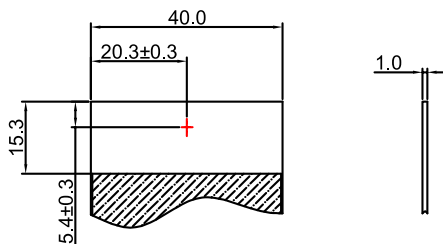
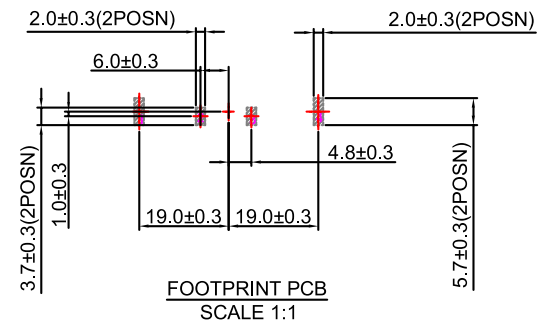
## Evaluation Board Outline & Matching Circuit

The evaluation board is developed to showcase the performance of this chip antenna on a typical PCB and to simplify antenna testing and evaluation. It has a size of 135 x 40 mm. The performance could vary with different PCB sizes and Abracon can offer support to optimize the antenna for your specific application.

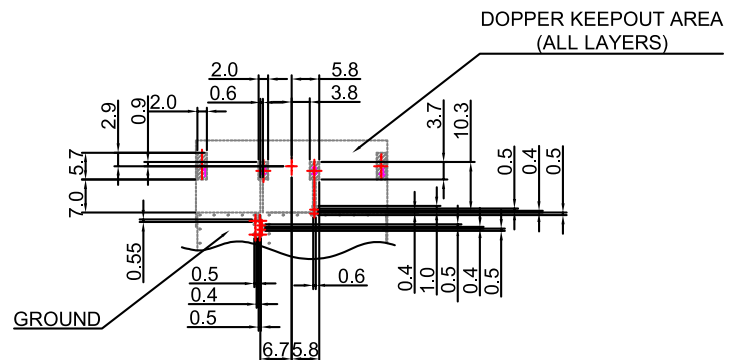


FOOTPRINT SOLDER PADS WITH PCB OUTLINE  
SCALE 2:1

| PIN | DESCRIPTION |
|-----|-------------|
| 1   | PAD         |
| 2   | Feed        |
| 3   | GND         |
| 4   | PAD         |



GROUND CLEARANCE BOTTOM VIEW  
(SILKSCREEN NOT SHOW)



GROUND CLEARANCE TOP VIEW  
(SILKSCREEN NOT SHOW)

The evaluation board has a matching circuit implemented next to the antenna. This is aimed to enable optimization possibilities for the user.

The standard tuning for the evaluation board is the following (can be replaced by equivalent):

However, it is common that the resonant frequency will shift during implementation in an arbitrary device. Therefore, this matching may be changed with other values/components/brands for compensation of such effects.



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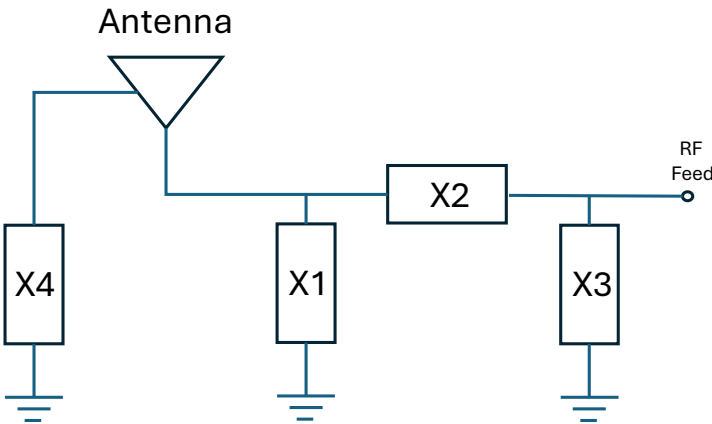
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40 x 7 x 3 mm  
RoHS/RoHS II Compliant  
MSL Level = 1



Matching circuit

| Location     | X1                | X2              | X3  | X4              |
|--------------|-------------------|-----------------|-----|-----------------|
| Description  | 0.5pF             | 3.3nH           | N/A | 6.8nH           |
| Part Number  | 0402N0R5A500CT    | AIMC-0402-3N3ST | N/A | AIMC-0402-6N8ST |
| Manufacturer | WALSIN TECHNOLOGY | ABRACON         | N/A | ABRACON         |



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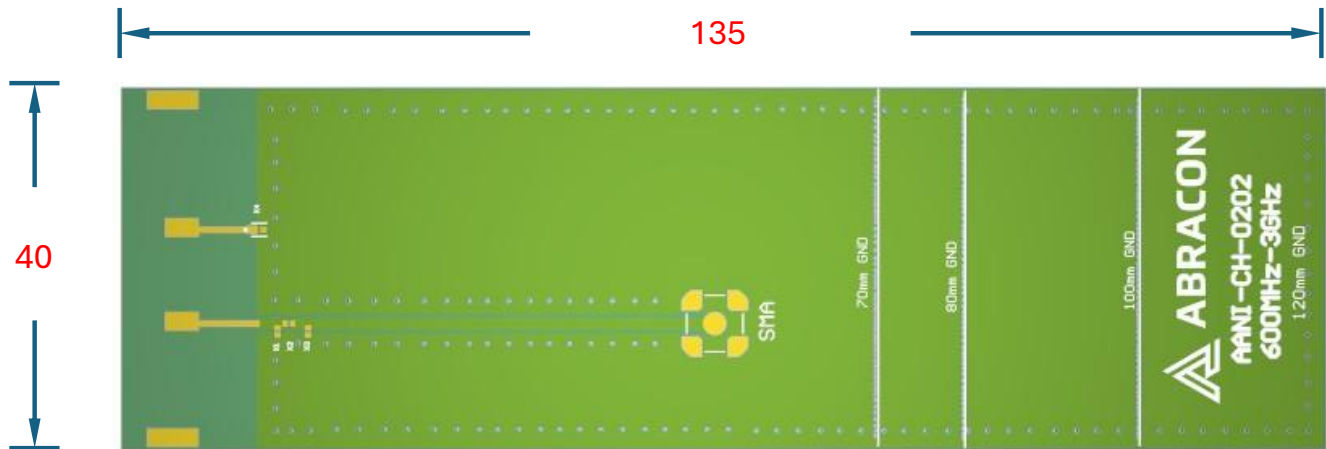
40 x 7 x 3 mm

RoHS/RoHS II Compliant

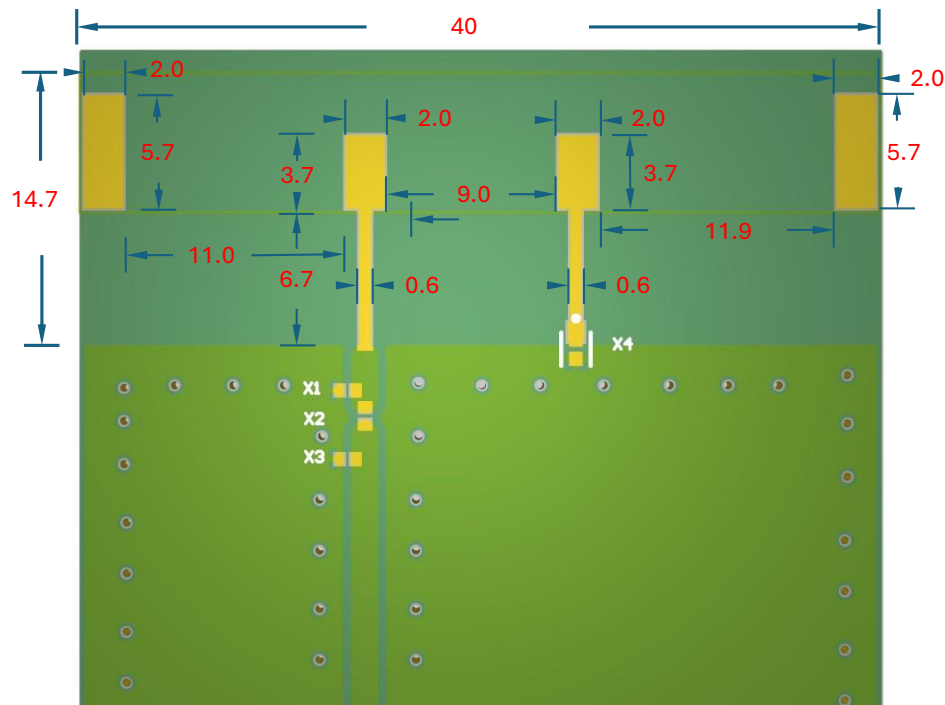
MSL Level = 1

## Recommended PCB layout

If there are several layers in the PCB, there is an advantage to add vias for smooth interconnection of the ground areas to avoid splits in the ground plane. It is also important that the ground clearance is respected through **all layers** of the PCB. It is recommended to implement a matching network to optimize the antenna impedance in your application.



Detailed view of antenna pads and antenna extension trace:



Unit: mm



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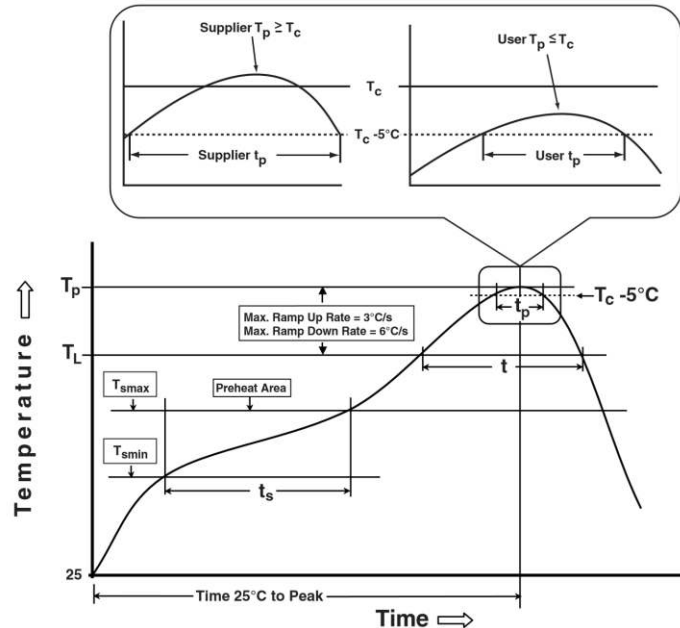
**40 x 7 x 3 mm**

**RoHS/RoHS II Compliant**

**MSL Level = 1**

## Reflow Profile [JEDEC J-STD-020]

Solder paste: Sn/3.0Ag/0.5Cu



**Table 1**

### SnPb Eutectic Process Classification Temperatures ( $T_c$ )

| Package Thickness | Volume mm <sup>3</sup> <350 | Volume mm <sup>3</sup> ≥350 |
|-------------------|-----------------------------|-----------------------------|
| <2.5mm            | 235°C                       | 220°C                       |
| ≥2.5mm            | 220°C                       | 220°C                       |

**Table 2**

### Pb-Free Process Classification Temperatures ( $T_c$ )

| Package Thickness | Volume mm <sup>3</sup> <350 | Volume mm <sup>3</sup> 350-2000 | Volume mm <sup>3</sup> >2000 |
|-------------------|-----------------------------|---------------------------------|------------------------------|
| <1.6mm            | 260°C                       | 260°C                           | 260°C                        |
| 1.6mm - 2.5mm     | 260°C                       | 250°C                           | 245°C                        |
| >2.5mm            | 250°C                       | 245°C                           | 245°C                        |

| Profile Feature                                                                  | Sn-Pb Eutectic Assembly | Pb-Free Assembly |
|----------------------------------------------------------------------------------|-------------------------|------------------|
| Preheat / soak                                                                   |                         |                  |
| Temperature minimum ( $T_{smin}$ )                                               | 100°C                   | 150°C            |
| Temperature maximum ( $T_{smax}$ )                                               | 150°C                   | 200°C            |
| Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ )                                      | 60 – 120 sec.           | 60 – 90 sec.     |
| Average ramp-up rate ( $T_{smax}$ to $T_p$ )                                     | 3°C/sec. max            | 3°C/sec. max     |
| Liquidous temperature ( $T_L$ )                                                  | 183°C                   | 217°C            |
| Time at Liquidous ( $T_L$ )                                                      | 60 – 150 sec.           | 60 – 150 sec.    |
| Peak package body temperature ( $T_p$ )*                                         | See Table 1             | See Table 2      |
| Time ( $T_p$ )* within 5°C of the specified classification temperature ( $T_c$ ) | 20 sec.                 | 10 sec.          |
| Ramp-down rate ( $T_p$ to $T_{smax}$ )                                           | 6°C/sec. max            | 6°C/sec. max     |
| Time 25°C to peak temperature                                                    | 6 min. max              | 8 min. max       |
| Reflow cycles                                                                    | 2 max                   | 2 max            |

\*Tolerance for peak profile temperature ( $T_p$ ) is defined as a supplier minimum and a user maximum.

\*\*Tolerance for time at peak profile temperature ( $t_p$ ) is defined as a supplier minimum and a user maximum.

# Low Profile SMD LTE Chip Antenna



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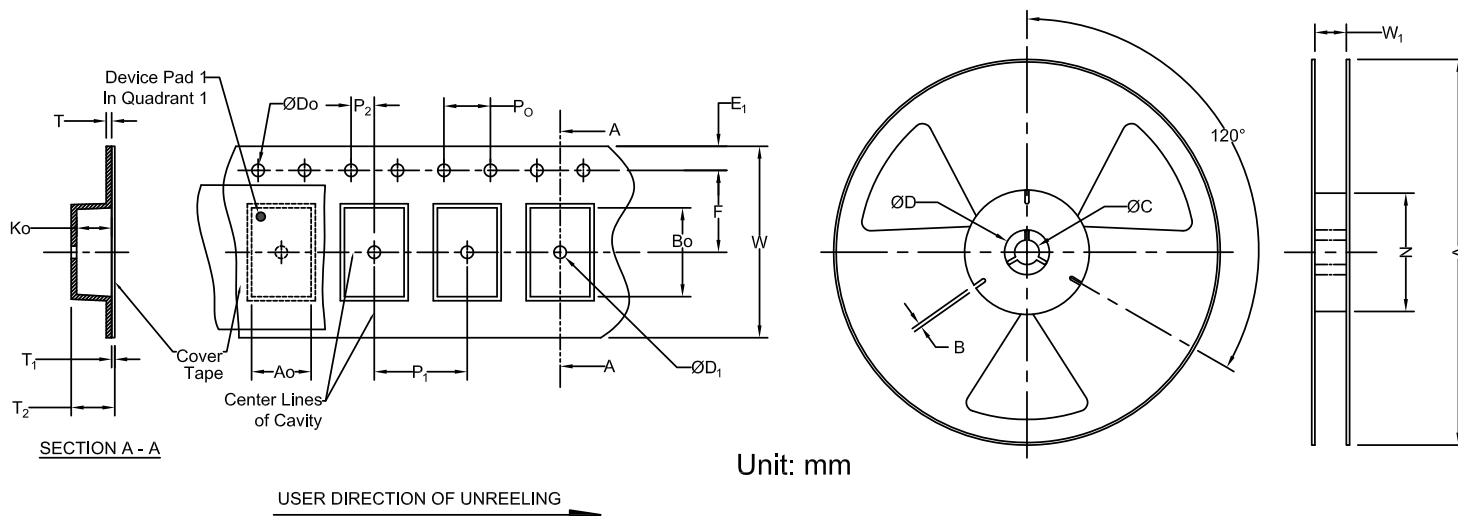
**40 x 7 x 3 mm**

**RoHS/RoHS II Compliant**

**MSL Level = 1**

## Packaging

### Tape & Reel Dimension



### Carrier Tape Specifications (mm)

| Do         | K <sub>0</sub> | E <sub>1</sub> | P <sub>0</sub> | P <sub>2</sub> | T          | F           | P <sub>1</sub> | W           | A <sub>0</sub> | B <sub>0</sub> | Reel Qty |
|------------|----------------|----------------|----------------|----------------|------------|-------------|----------------|-------------|----------------|----------------|----------|
| 1.50 ± 0.1 | 3.80 ± 0.1     | 1.75 ± 0.1     | 4.0 ± 0.1      | 2.0 ± 0.10     | 0.3 ± 0.05 | 26.2 ± 0.10 | 12.0 ± 0.1     | 56.0 ± 0.10 | 7.3 ± 0.1      | 41 ± 0.1       | 1,000    |

### Reel Specifications (mm)

| A         | W <sub>1</sub> | N         | B         | C        | D        |
|-----------|----------------|-----------|-----------|----------|----------|
| 330 ± 1.0 | 62 ± 1.0       | 100 ± 1.0 | 2.0 ± 0.5 | 13 ± 0.5 | 20.2 min |

**ATTENTION:** Abracon LLC's products are Commercial-Off-The-Shelf ('COTS'), which are designed, intended, and validated for use in commercial, industrial, and automotive applications. The customer is responsible for testing and verifying the performance of an Abracon solution to meet their system-level requirements.



5101 Hidden Creek Ln Spicewood TX 78669  
 Phone: 512-371-6159 | Fax: 512-351-8858  
 For terms and conditions of sales, please visit:  
[www.abracon.com](http://www.abracon.com)

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