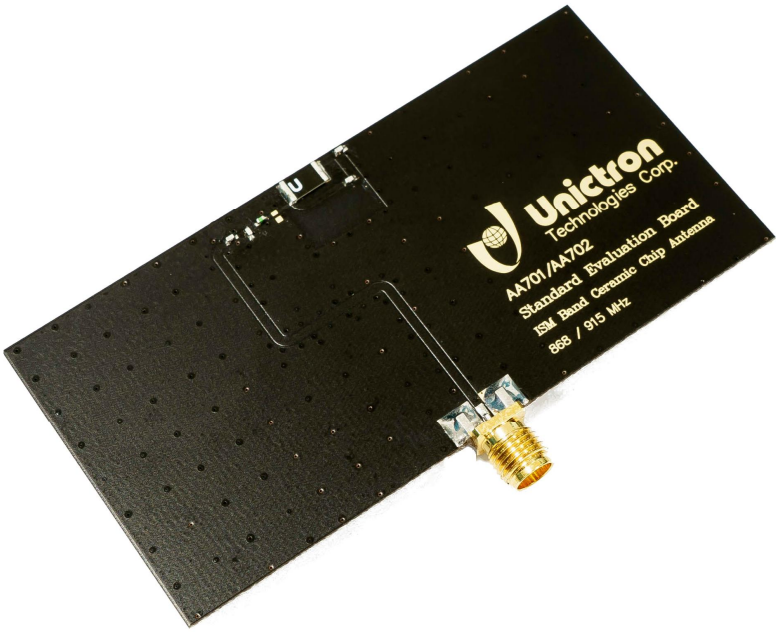
# ISM 868 MHz Ceramic Chip Antenna (AA701) with Evaluation Board

# Engineering Specification

## 1. Product Number

| H | 2 | B | 1 | S | G | 1 | A | 1 | S | 0 | 3 | 0 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|




## 2. Features

*Stable and reliable in performances
*Low profile, compact size
*RoHS compliance
*SMT processes compatible

## 3. Applications

*Short Range Devices (SRD)
*IoT applications
*Alarm system

## 4. Description

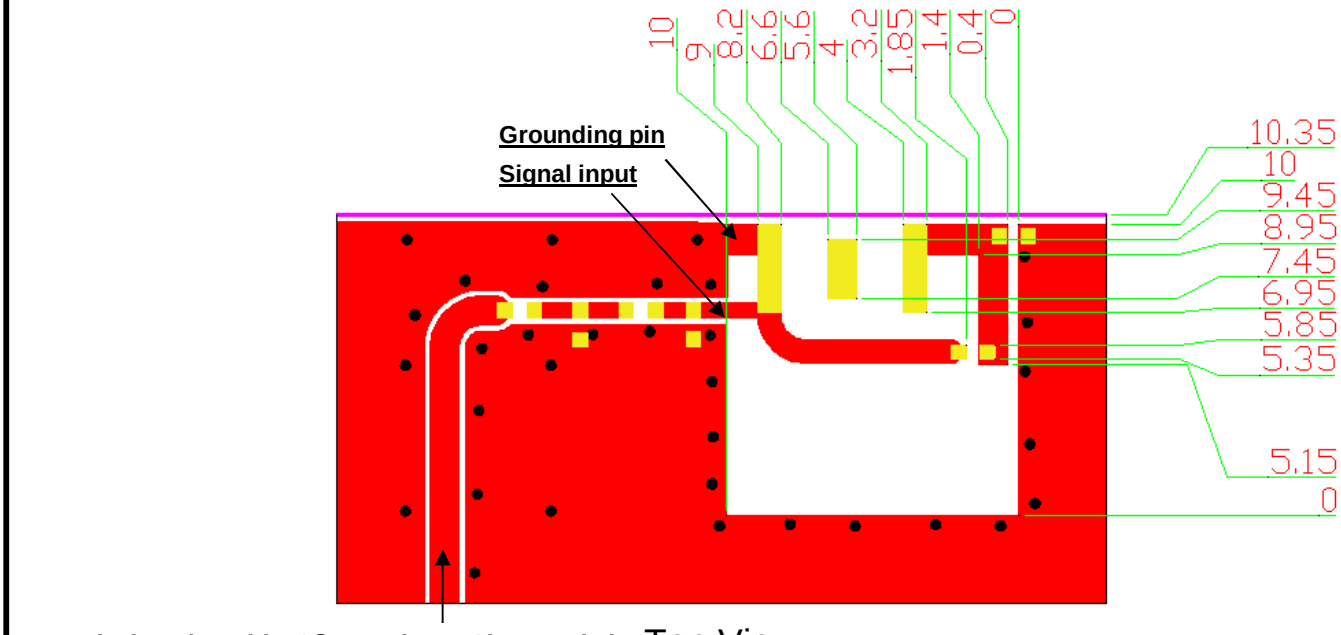
Unictron's AA701 ceramic chip antenna is designed for ISM 868MHz band applications, covering frequencies 863~870 MHz. Fabricated with proprietary design and processes, AA701 shows excellent performance and is fully compatible with SMT processes which can decrease the assembly cost and improve device's quality and consistency.

# 5. Layout Guide & Electrical Specifications

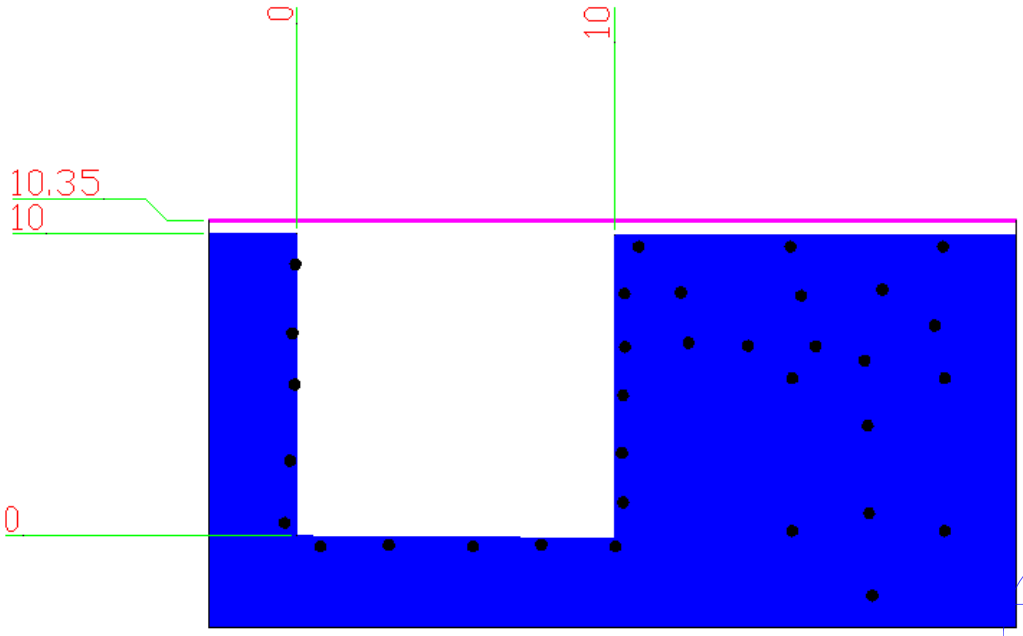
## 5-1. Layout Guide (unit：mm)

Solder Land Pattern:

The solder land pattern (gold marking areas) is shown below. Recommendation on matching circuit will be provided according to customer's installation conditions.




Top View




Bottom View

## 5-2. Electrical Specifications (Evaluation Board Dimensions: 80 x 40 $mm^2$)

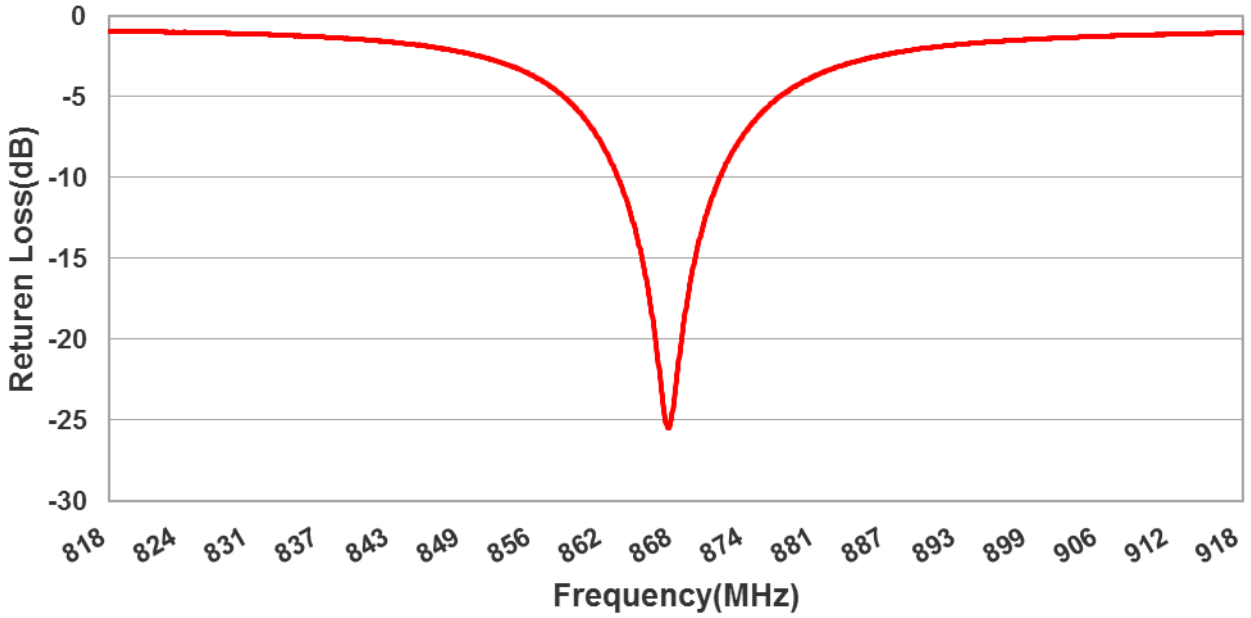
### 5-2-1. Electrical Table

| Characteristics | | Specifications | Unit |
|---|---|---|---|
| Outline Dimensions | | 5.0 x 3.0 x 0.5 | mm |
| Ground Plane Dimensions | | 80 x 40 | mm |
| Working Frequency | | 863~870 | MHz |
| VSWR (@ center frequency)* | | 2 Max. | |
| Characteristic Impedance | | 50 | Ω |
| Polarization | | Linear Polarization | |
| Peak Gain | (@868 MHz) | -0.9 (typical) | dBi |
| Efficiency | | 52 (typical) | % |

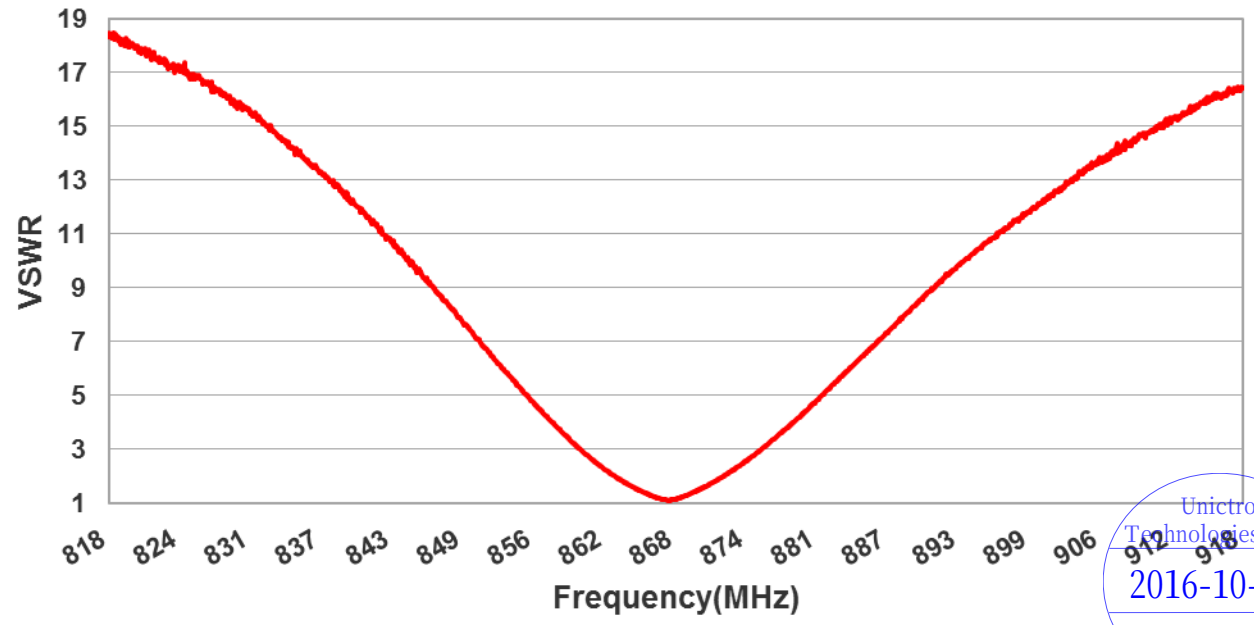
*Center frequency means the frequency with the lowest value in return loss of the chip antenna on the evaluation board.

5-2-2. Return Loss & VSWR

Return Loss ($S_{11}$)




VSWR

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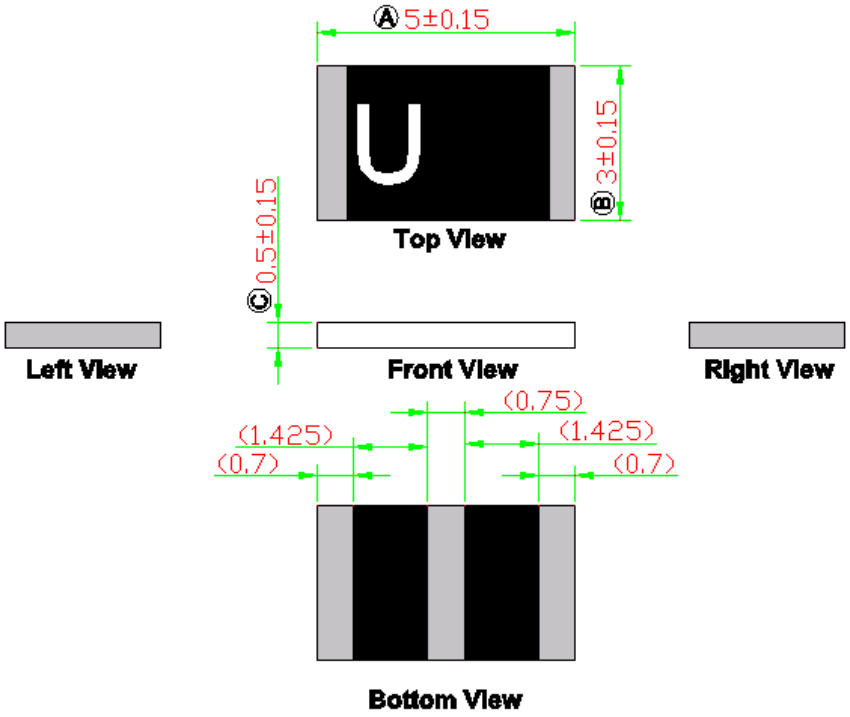
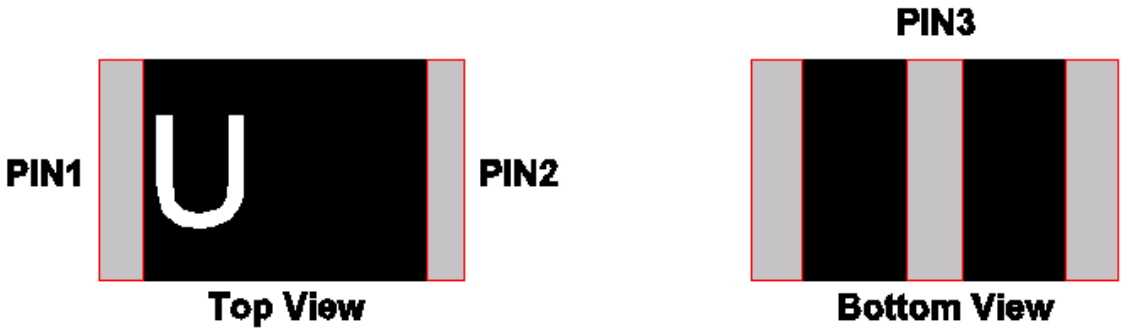
## 6. Outline Dimensions of Antenna & Evaluation Board (unit: mm)

### 6-1. Antenna Dimensions



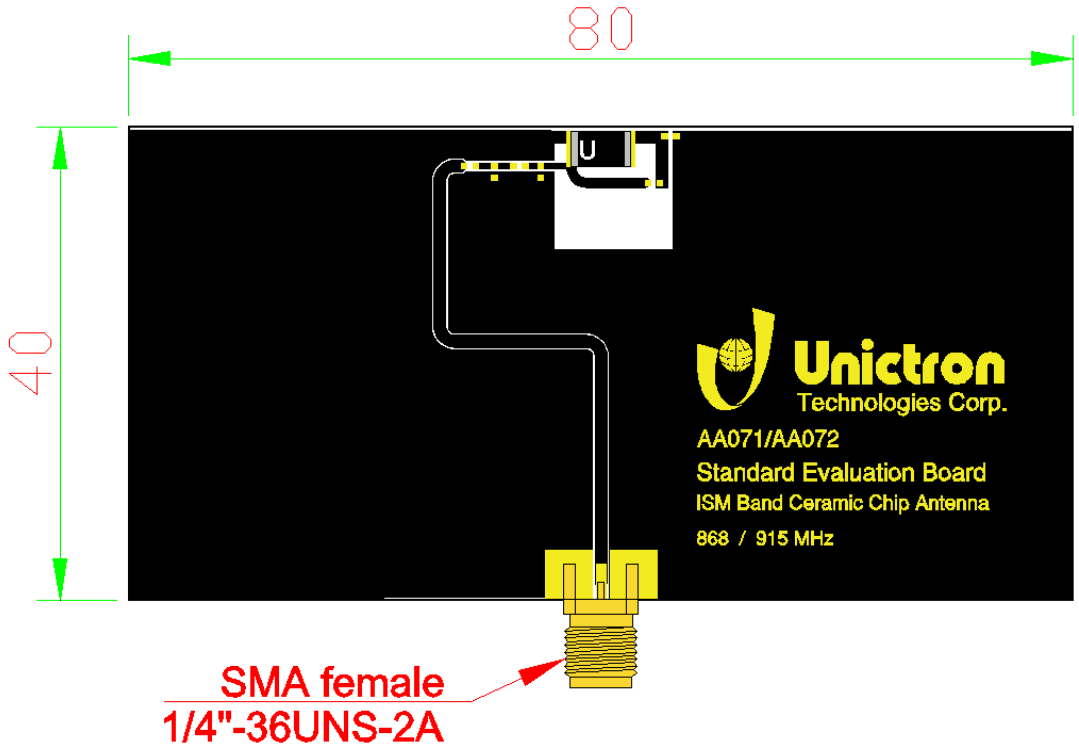

NOTE:
1.All materials are RoHS compliant.
2."Ⓐ~Ⓒ" Critical Dimensions.
3."( )" Reference Dimensions.

## PIN Definitions




| PIN | 1 | 2 | 3 |
|---|---|---|---|
| Soldering Pad | Signal | Tuning / Ground | N/C |

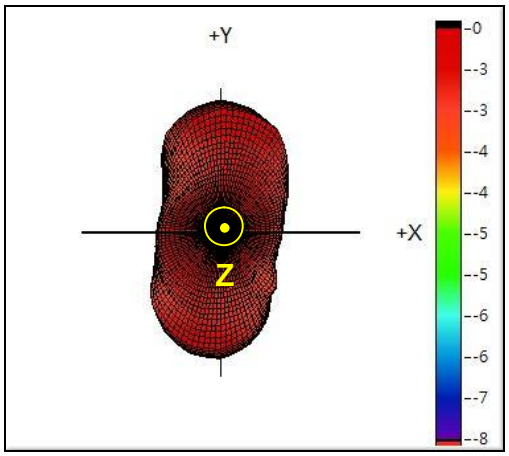
## 6-2. Evaluation Board with Antenna

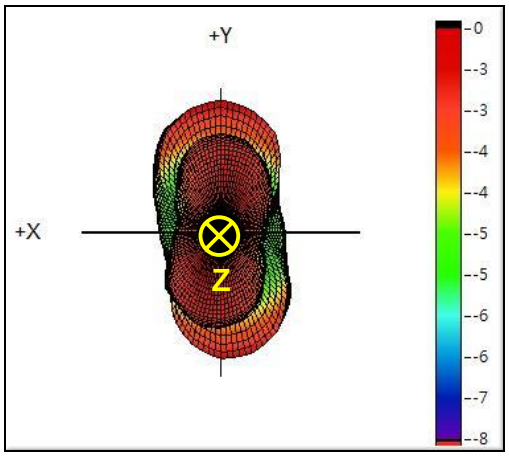


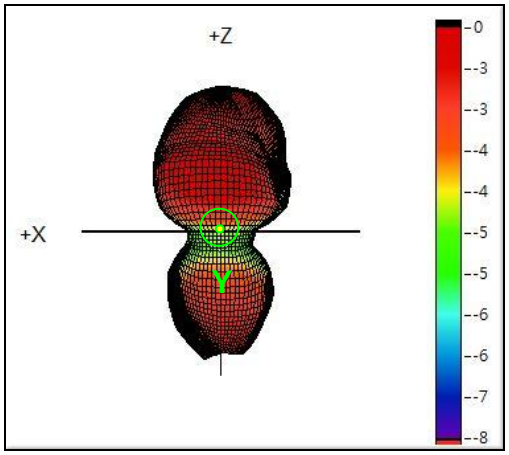

**unit: mm**

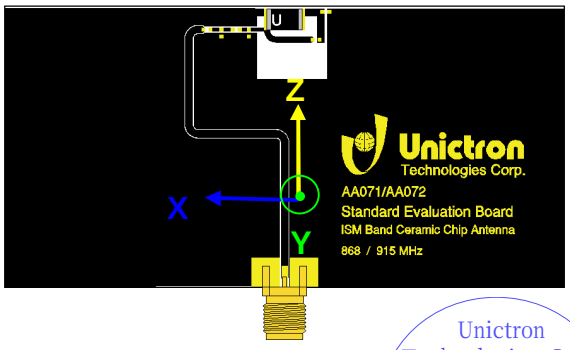
## 7. Radiation Pattern (with 80 x 40 mm$^2$ Evaluation Board)

### 7-1. 3D Gain Pattern @ 868 MHz (unit: dBi)



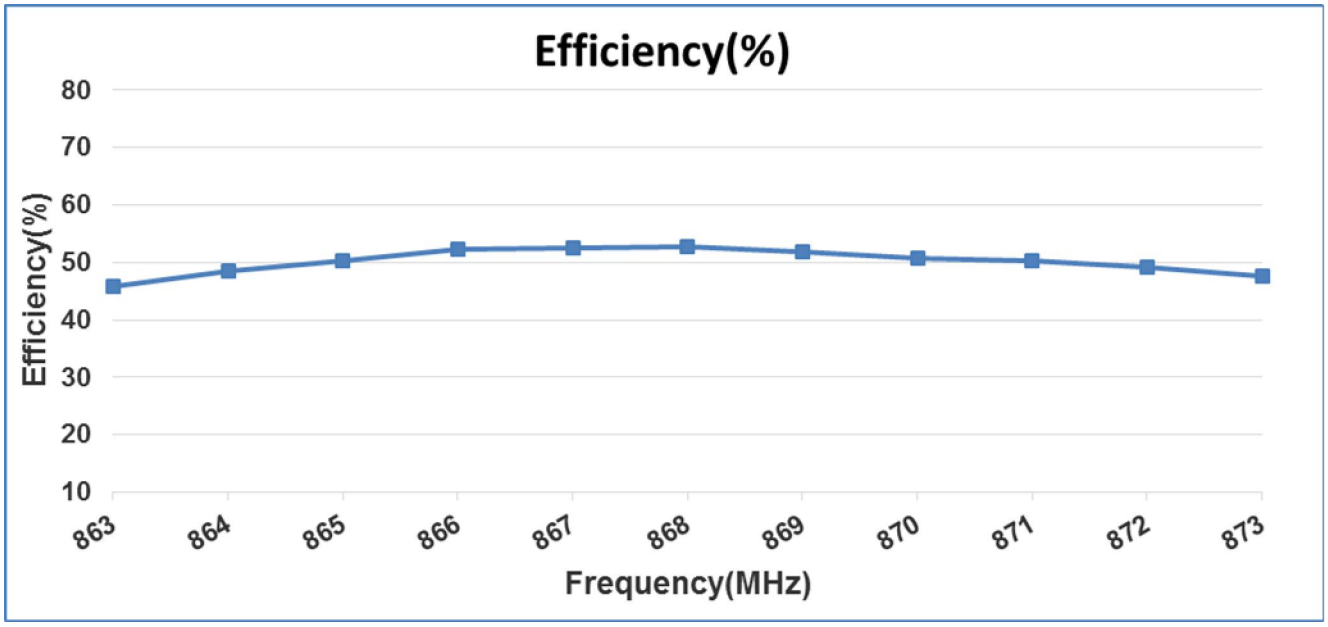



## 7-2. 3D Efficiency Table

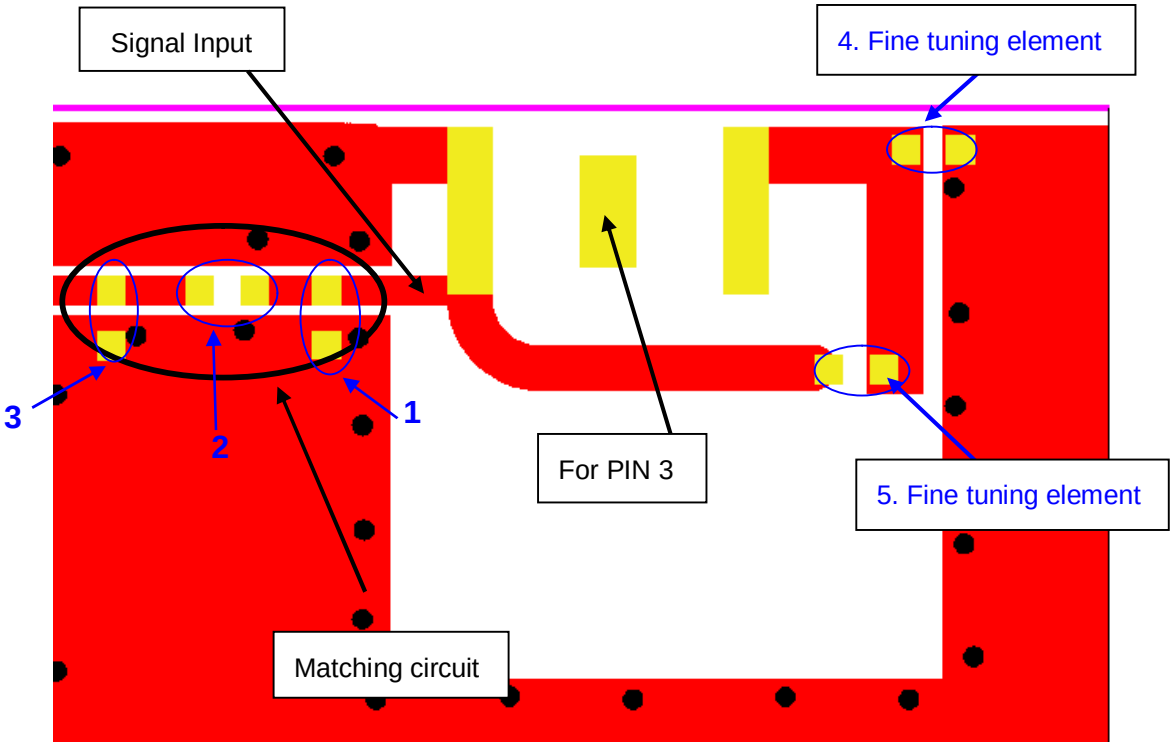
| Frequency (MHz) | 863 | 864 | 865 | 866 | 867 | 868 | 869 | 870 | 871 | 872 | 873 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Efficiency (dB) | -3.4 | -3.2 | -3.0 | -2.8 | -2.8 | -2.8 | -2.9 | -2.9 | -3.0 | -3.1 | -3.2 |
| Efficiency (%) | 45.9 | 48.4 | 50.3 | 52.2 | 52.5 | 52.8 | 51.8 | 50.8 | 50.3 | 49.2 | 47.7 |
| Peak Gain (dBi) | -1.5 | -1.3 | -1.1 | -0.9 | -0.9 | -0.9 | -1.0 | -1.0 | -1.1 | -1.2 | -1.3 |

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



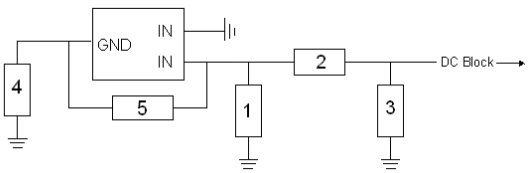
## 8. Frequency tuning and Matching circuit

### 8-1. Chip antenna tuning scenario：



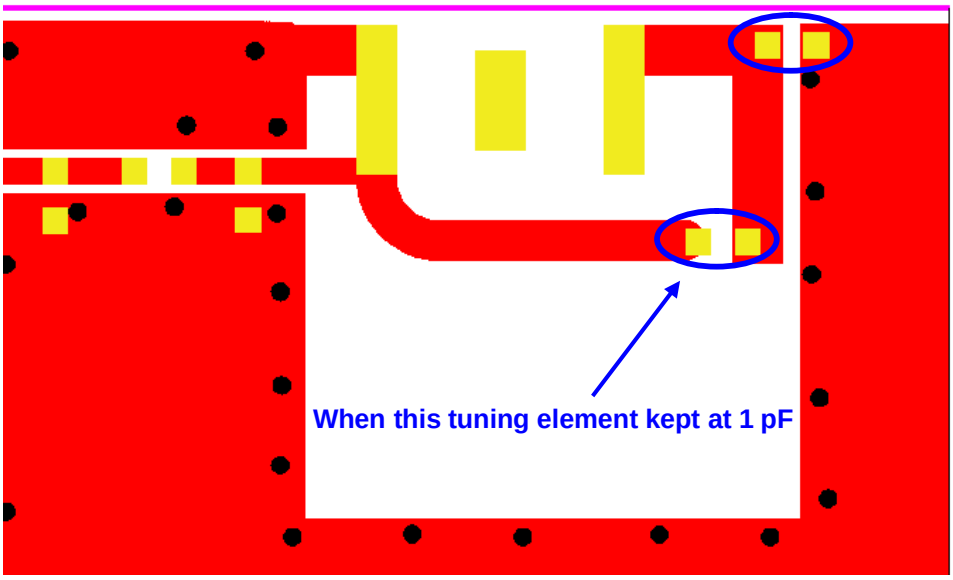

### 8-2. Matching circuit：

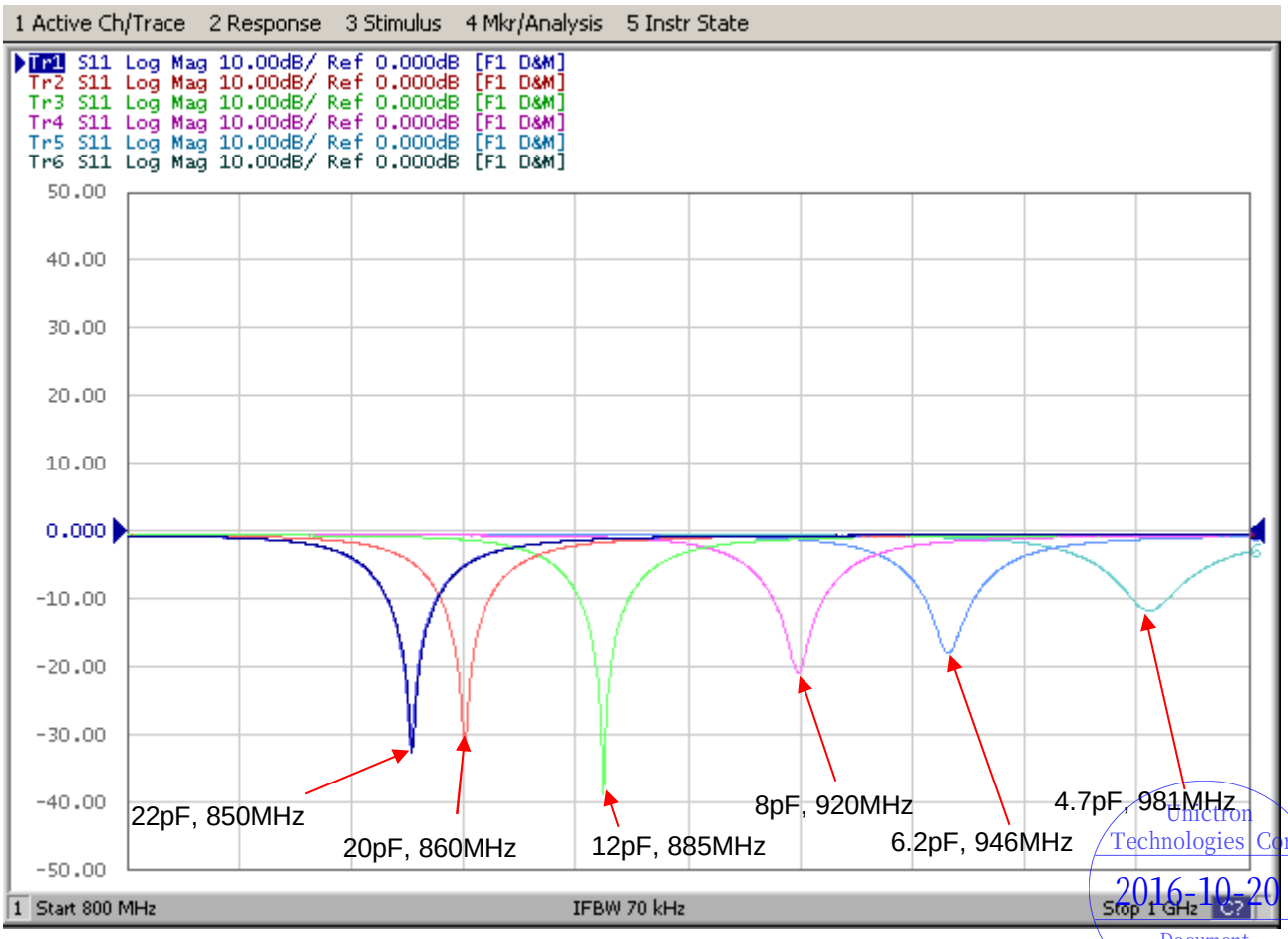
With the following recommended values of matching and tuning components, the center frequencies will be about 868 MHz at our standard 80x40 mm$^2$ evaluation board. However, these are typical reference values which may need to be changed when circuit boards or part vendors are different.




| System Matching Circuit Component | | | |
|---|---|---|---|
| Location | Description | Vendor | Tolerance |
| 1 | N/A* | - | - |
| 2 | 3.3nH, (0402) | MURATA | ±0.1nH |
| 3 | 0.2 pF, (0402) | MURATA | ±0.05pF |
| 4 Fine tuning element | 18 pF, (0402) | MURATA | ±2% |
| 5 Fine tuning element | 1 pF, (0402) | MURATA | ±0.05 pF |

## 8-3. Reference for frequency tuning element





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## 9. Reminders for users of Unictron's AA701 ceramic chip antennas

9-1. This chip antenna is made of ceramic materials which are relatively more rigid and brittle compared to printed circuit board materials. Bending of circuit board at the locations where chip antenna is mounted may cause the cracking of solder joints or antenna itself.

9-2. Punching/cutting of the break-off tab of PCB panel may cause severe bending of the circuit board which may result in cracking of solder joints or chip antenna itself. Therefore break-off tab shall be located away from the installation site of chip antenna.

9-3. Be cautious when ultrasonic welding process needs to be used near the locations where chip antennas are installed. Strong ultrasonic vibration may cause the cracking of chip antenna solder joints.

## 10. Operating & Storage Conditions

### 10-1. Operating

(1) Maximum Input Power: 2 W

(2) Operating Temperature: -40℃ to 85℃

### 10-2. Storage

(1) Storage Temperature: -5℃ to 40℃

(2) Relative Humidity: 20% to 70%

(3) Shelf Life: 1 year

## 11. Notice

All specifications are subject to change without notice.