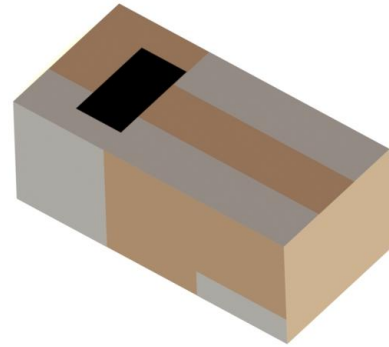


Document	Datasheet
Type	Dielectric Chip Antenna
Application	2.4GHz
Part No.	AMAN301512ST01
Revision	3.6

# DATASHEET



## Application

Bluetooth(LE)  
Zigbee  
WLAN (IEEE 802.11 b/g)  
ISM 2.4GHz Wireless Devices

## Features

PIFA Structure  
Small Size (3.0\*1.5\*1.2mm<sup>3</sup>)  
Easy Optimizing  
with external lumped matching components  
SMT Available under Pb-free Condition  
RoHS Compliant

**Automotive applications qualified (AEC-Q200)**

# AMOTECH

### Notes

*The contents of this datasheet are subject to change without notice. Please confirm the specifications and delivery conditions when placing your order.*

## Revision History

Rev. No	Date	Title	Contents	Page
0	08. 09. 30		New published	
1	09. 03. 24	Data	Added Efficiency data	8
			Changed carrier tape width (W16mm → W12mm)	12
1.1	09. 04. 07	Format	Changed document format	
1.2	14. 08. 06		Corrected the miswritten values	3
2	14. 09. 26	Data	Changed Antenna Specification & Parameter	3, 5, 6
2.1	15. 08. 01	Data	Added Peak gain	3, 6
2.2	15. 12. 23	Data	Added Cautions (Recommendations)	7
3.0	17. 03. 03	Data	Changed Antenna Specification & Parameter, PCB Design Guide	3, 4, 5, 6
3.1	18. 06. 01	Data	Changed Mechanical Specification (Operating Temperature)	3
3.2	18. 09. 03	Data	Reliability Test Condition for AEC-Q200	7
3.3	21. 01. 05	Data	Changed Design guide and EVB Measurement data	7
3.4	23. 08. 18	Add	PCB Design Guide	5
3.5	24. 01. 04		Marking shape is changed (▶ → ■)	3
3.6	24. 02. 19	Add	PCB Design Guide	6

## Table of Content

1. Specifications	3
1.1 Electrical Specifications	
1.2 Mechanical Specifications	
1.3 Appearance and Material	
2. PCB Design for Test	4
2.1 Evaluation Board Dimension	
2.2 PCB Design Guide	
3. Measurement Result	8
3.1 Typical Measurement Result (VSWR/Return-loss)	
3.2 Typical Measurement Result (Gain, Radiation Pattern)	
4. Reliability	14
5. Cautions (Recommendations)	14
6. Soldering Reflow Profile	14
7. Packaging	15
7.1 Carrier Tape Dimension	
7.2 Packaging Quantity	
7.3 Packaging Label	

## 1. Specifications

### 1.1 Electrical Specifications

No	Item	Spec.	Remark
1	Frequency Range [MHz]	2400 ~ 2485	
2	VSWR	Max 2.0:1	
3	Avg. Gain [dBi]	Typical -2.2	
4	Peak Gain [dBi]	Typical 3.0	
5	Efficiency [%]	Typical 70	
6	Polarization	Linear	
7	Impedance [ $\Omega$ ]	Nominal 50	

✓ The results are measured on the 50 x 50 mm<sup>2</sup> evaluation board(EVB).

✓ See Page 6. for more detail gain parameter

### 1.2 Mechanical Specifications

No	Item	Spec.	Remark
1	Dimensions (L*W*H)	3.0 * 1.5 * 1.2 mm <sup>3</sup>	
2	Unit Weight	Typical 20 mg	
3	Operating Temperature	-40 ~ +105 °C	

### 1.3 Appearance & Material

No	Item	Function	Material
①	Marking	Feeding Index	Ink
②	Electrode	Radiation Element	Ag
③	Ceramic Body	-	Ceramic

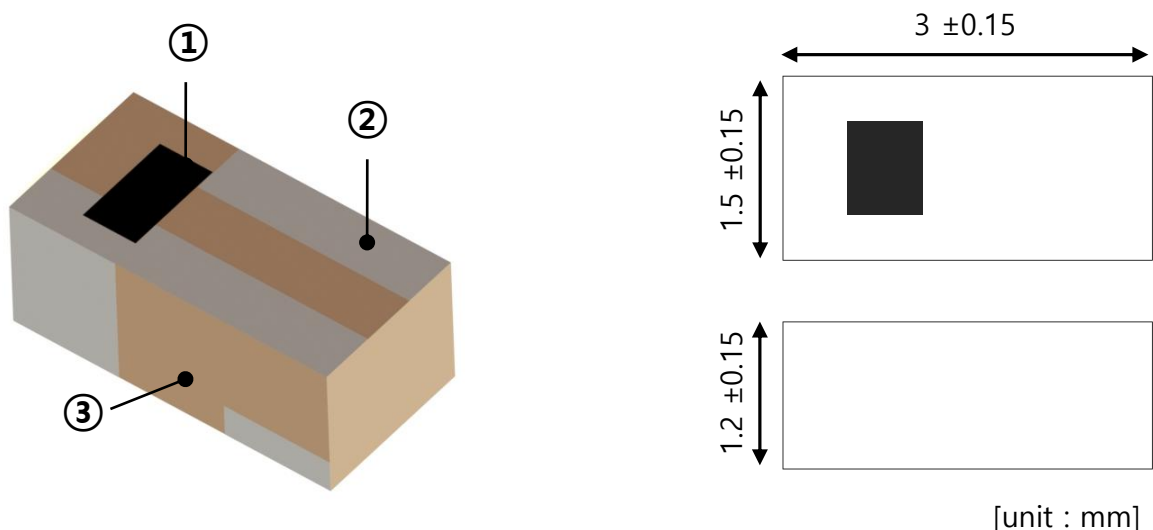


Figure 1. AMAN3015ST01 appearance and dimension

## 2. PCB Design for Test

### 2.1 Evaluation Board Dimension

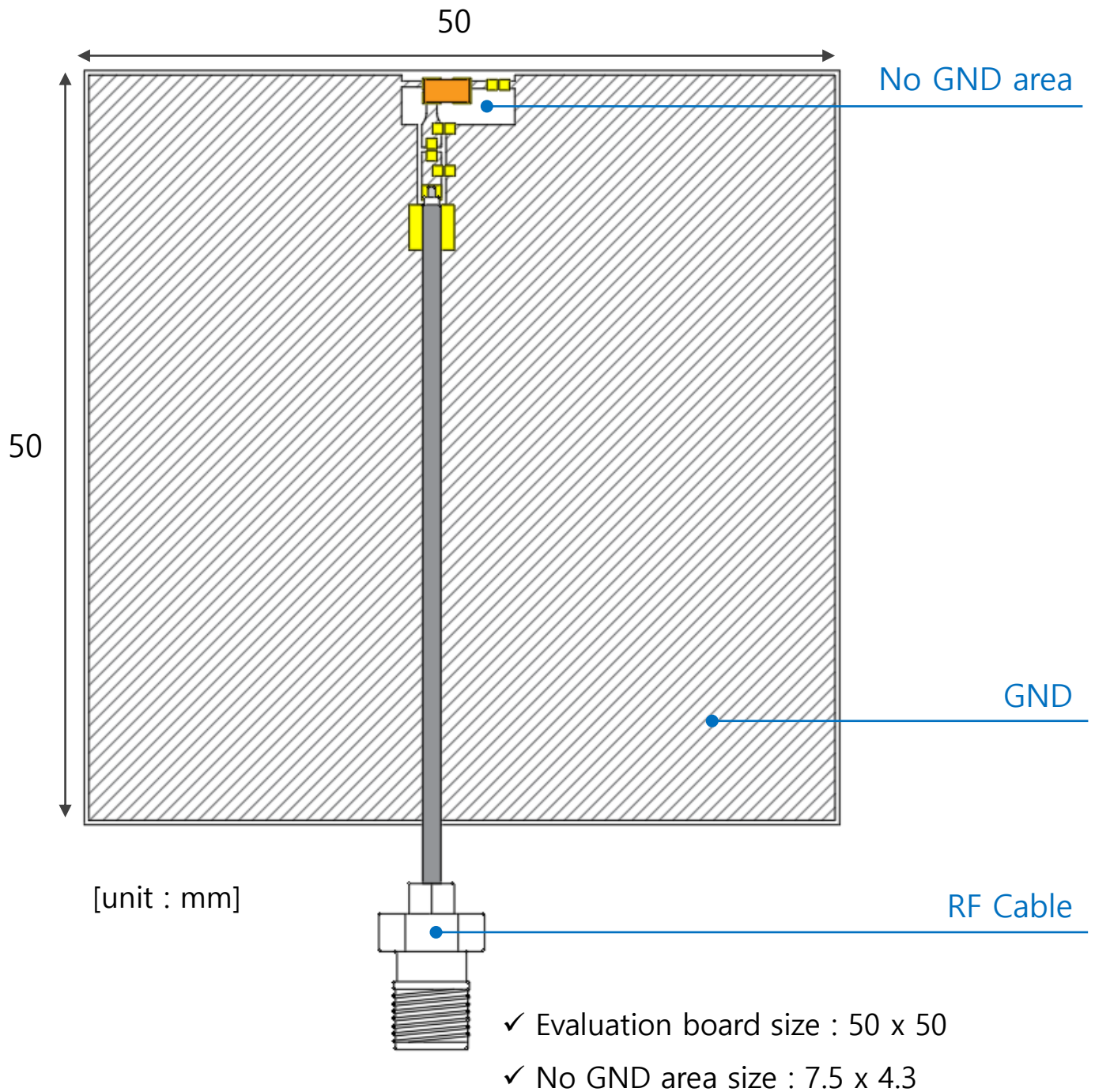
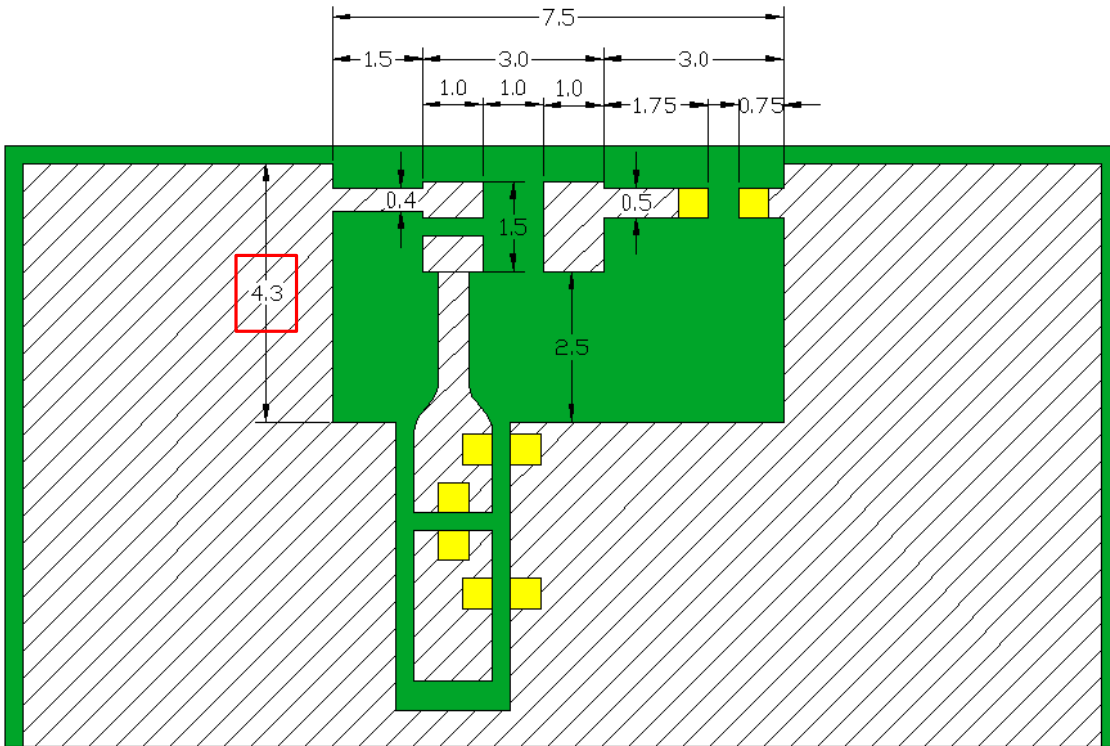


Figure 2. AMAN3015ST01 EVB dimension

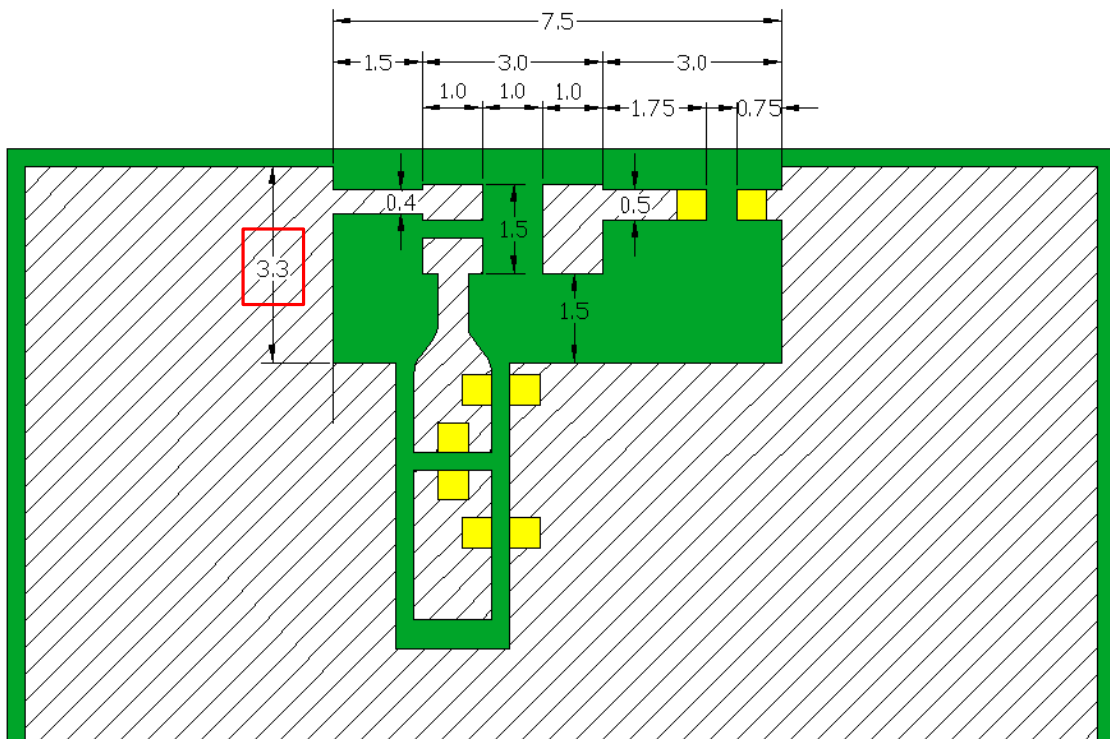
## 2.2 PCB Design Guide

### Option 1.



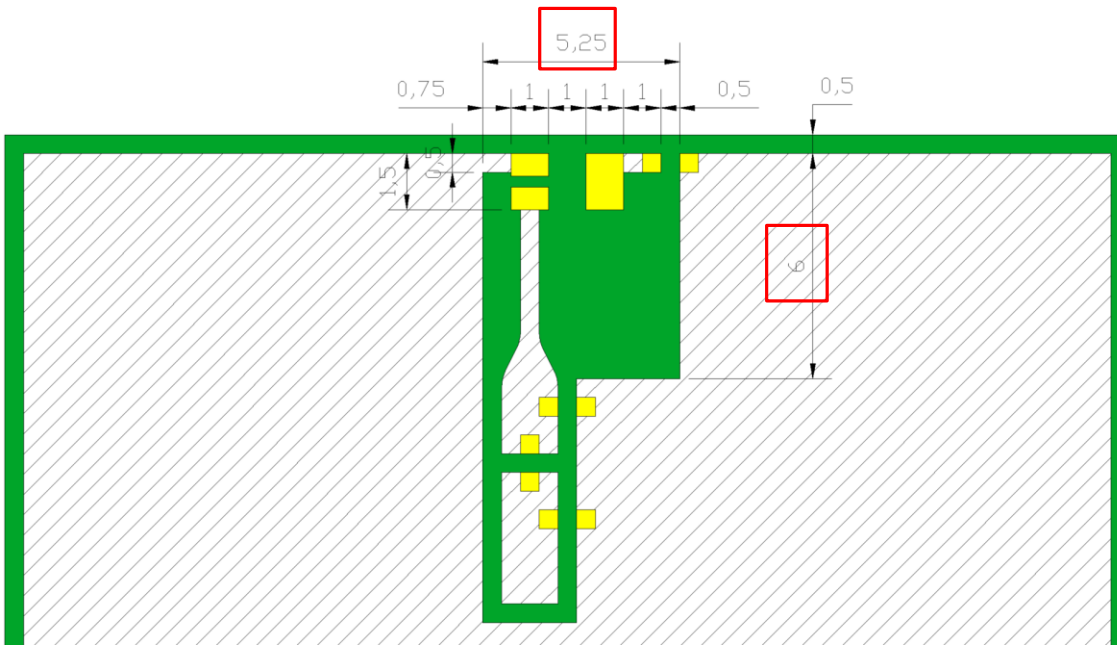
- ※ Total GND fill cut area : 7.5 x 4.3 mm
- ※ Total GND fill cut area should be applied in all layer.

### Option 2.



- ※ Total GND fill cut area : 7.5 x 3.3 mm
- ※ Total GND fill cut area should be applied in all layer.

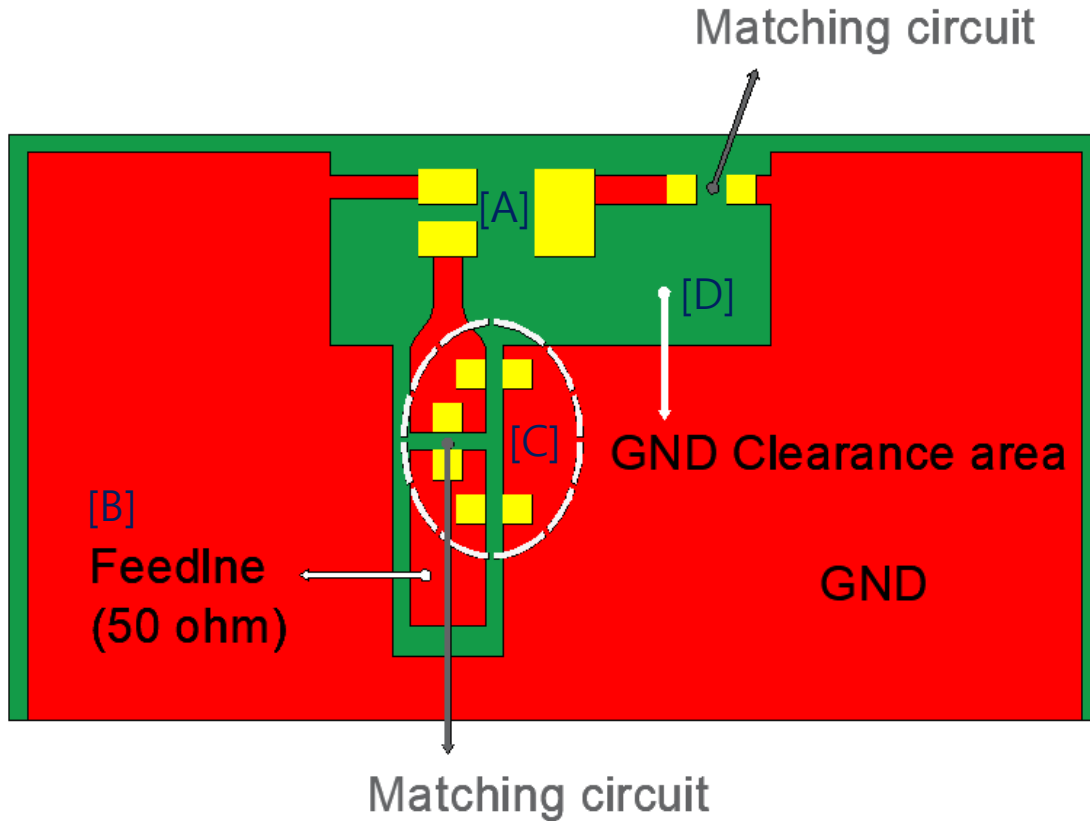
Option 3.



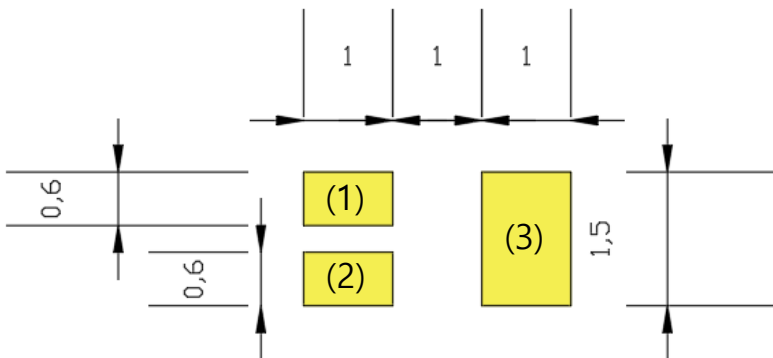
- ※ Total GND fill cut area : 5.25 x 6 mm
- ※ Total GND fill cut area should be applied in all layer.

※ We can suggest a suitable layout based on your PCB environment.  
We can also optimize it differently from the existing layout.

※ Note



[A] : PCB solder land



No	Pin Assignment
(1)	GND
(2)	Feeding
(3)	GND

[B] : Transmission line should be design by 50 ohm.

[C] : Transmission line should contain "Phi-shape" matching circuit [C] and another [D] of GND short line.  
The matching value could be changed depending on the customer's SET environment.

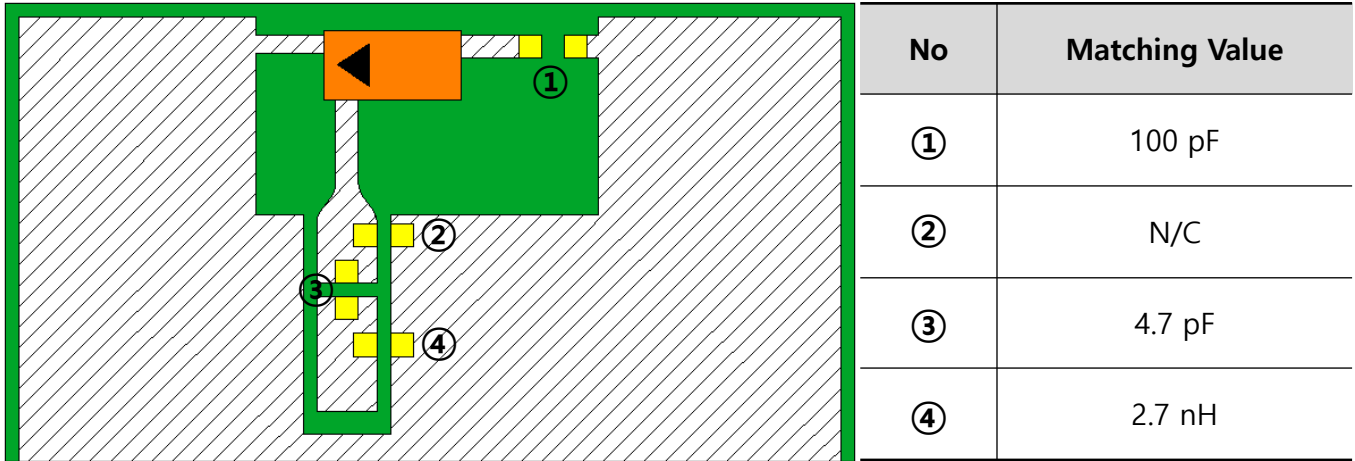
[D] : Default size of No GND area is 7.5 x 4.3 mm<sup>2</sup>.

However, the size of No GND area could be changed depending on the customer's SET.

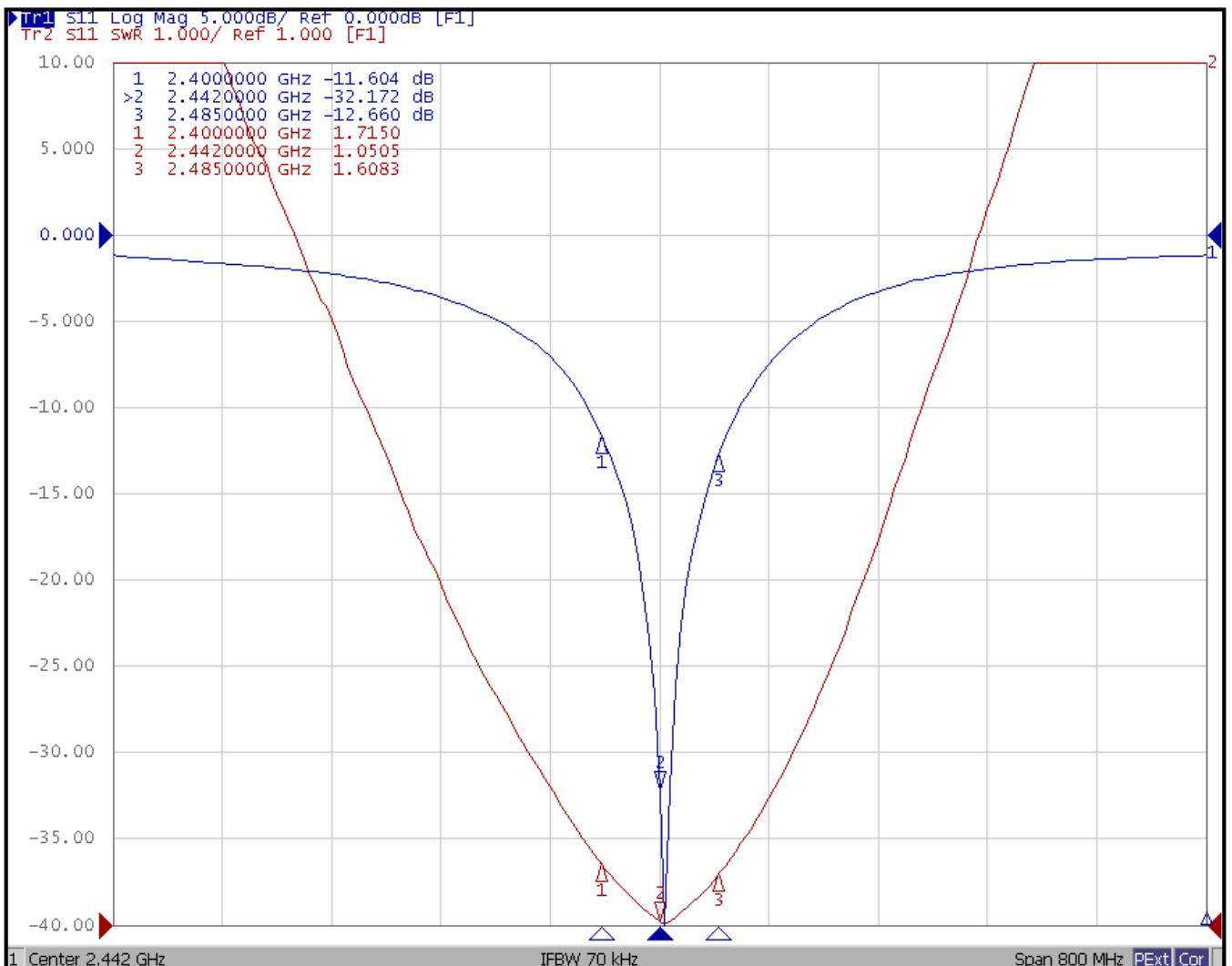
### 3. Measurement Result

#### 3.1 Typical Measurement Result (VSWR / Return-loss)

PCB design guide : Option 1



※ The matching value may change depending on the customer's SET environment.

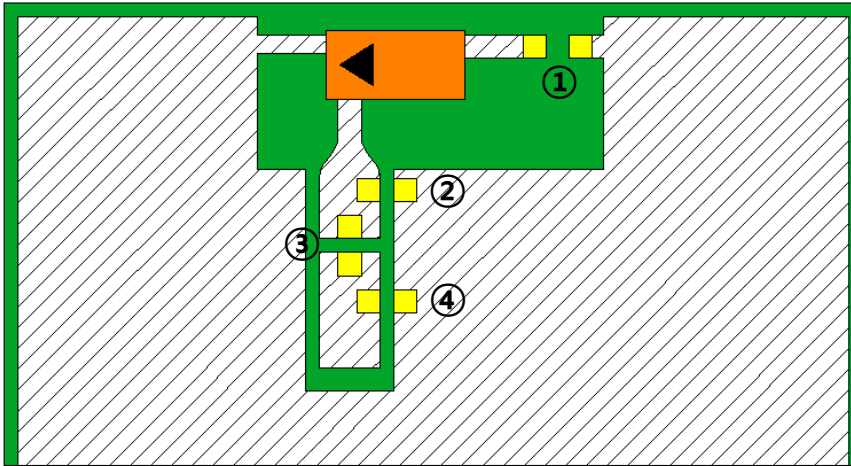


※ The results are measured on the 50 x 50mm<sup>2</sup> evaluation board(EVB).



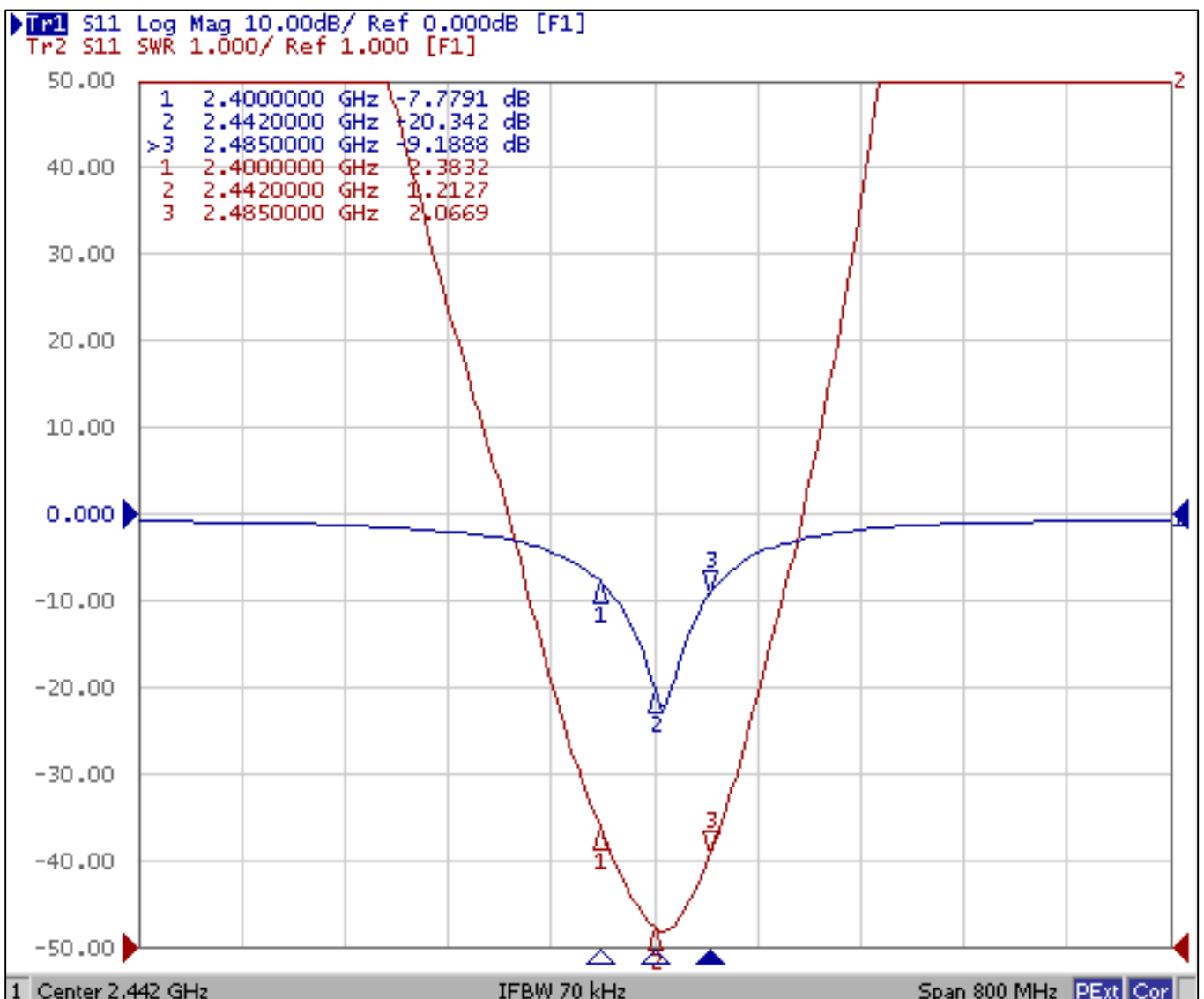
### 3.2 Typical Measurement Result (VSWR / Return-loss)

PCB design guide : Option 2



No	Matching Value
①	1.2 nH
②	N/C
③	2.7 nH
④	1.5 pF

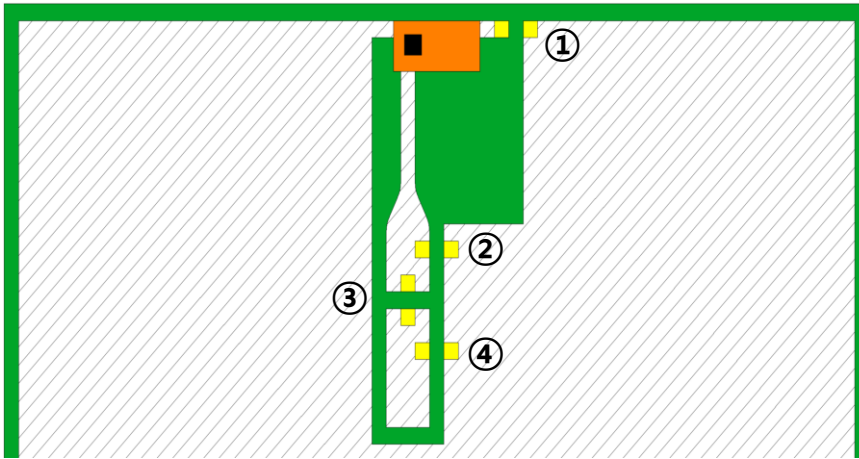
※ The matching value may change depending on the customer's SET environment.



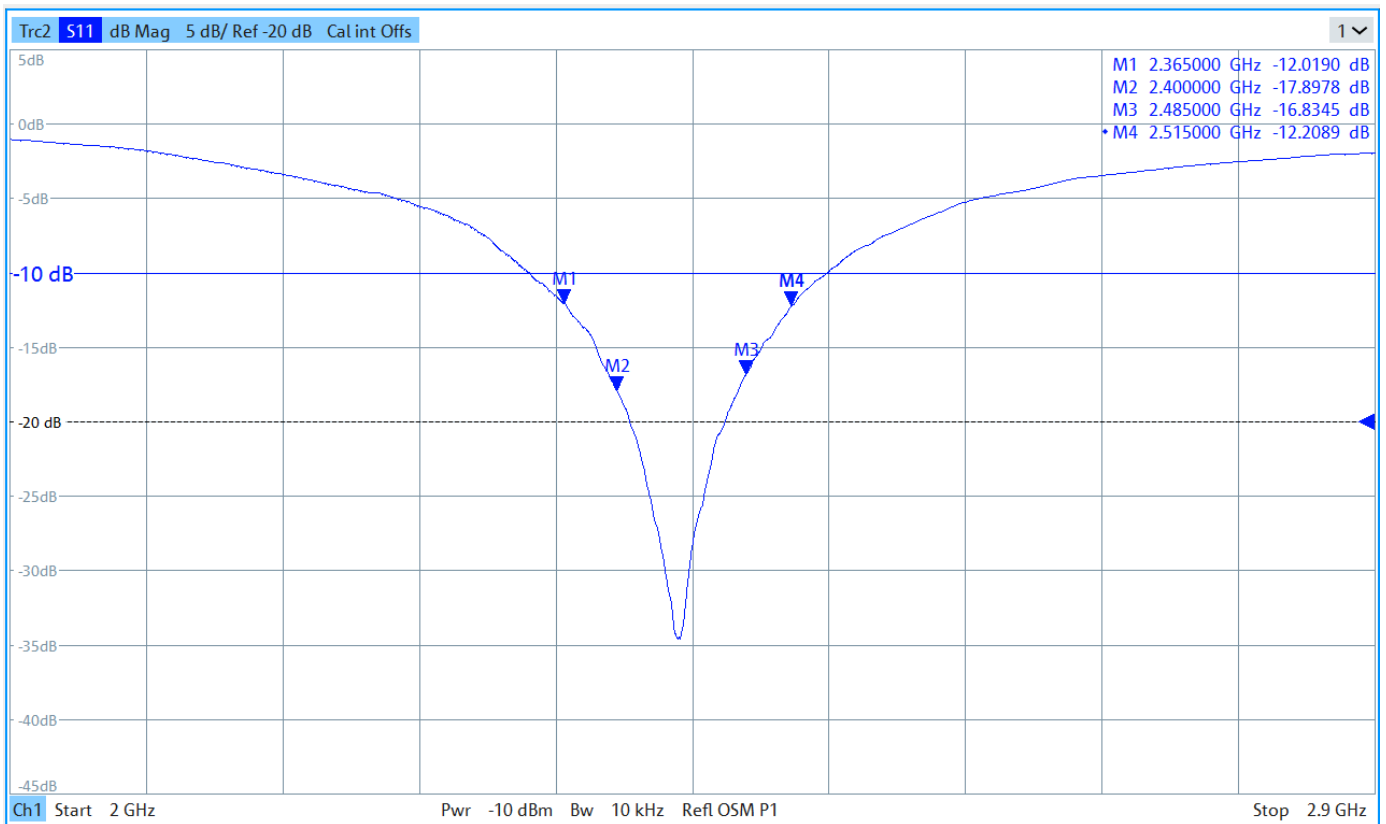
※ The results are measured on the 50 x 50mm<sup>2</sup> evaluation board(EVB).

### 3.3 Typical Measurement Result (VSWR / Return-loss)

PCB design guide : Option 3



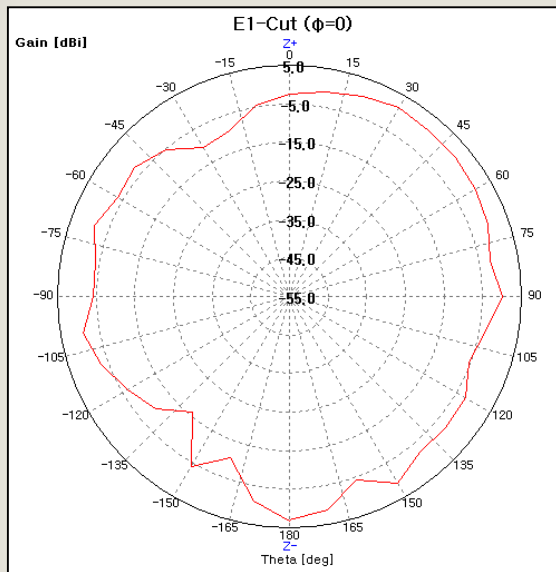
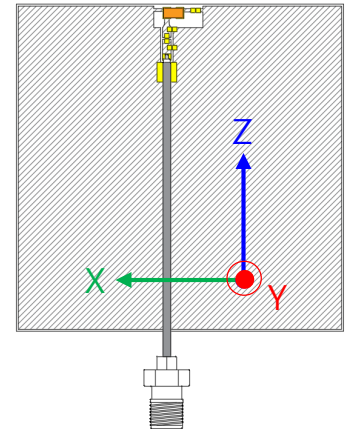
No	Matching Value
①	1 nH
②	N/C
③	100 pF
④	N/C



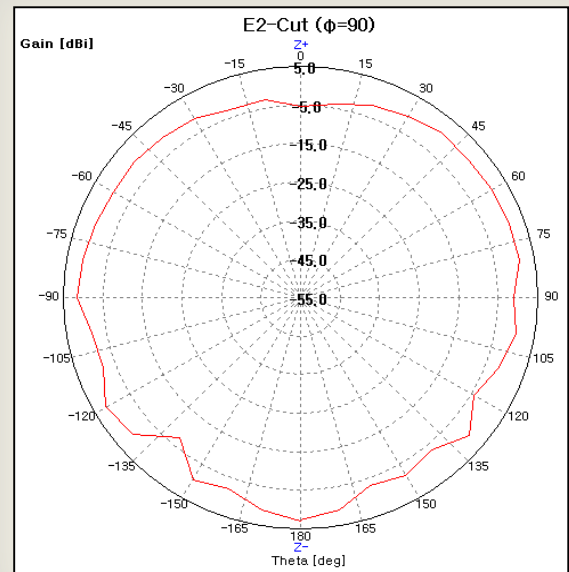
### 3.3 Typical Measurement Result (Gain, Radiation Pattern)

PCB design guide : **option 1**

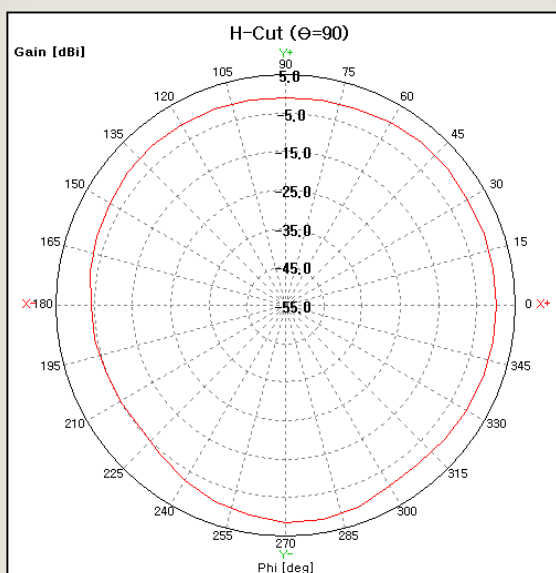
Freq. [MHz]	Efficiency [%]	Avg. Gain [dBi]	Peak Gain [dBi]
2400	77.8	-1.09	2.6
2442	86.9	-0.61	3.3
2485	79.6	-0.99	3.0



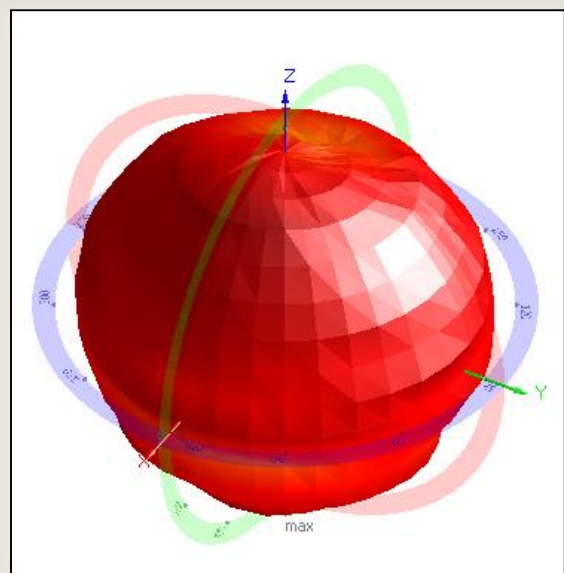
[ZX plane @2.442GHz ]



[YZ plane @2.442GHz ]



[XY plane @2.442GHz ]

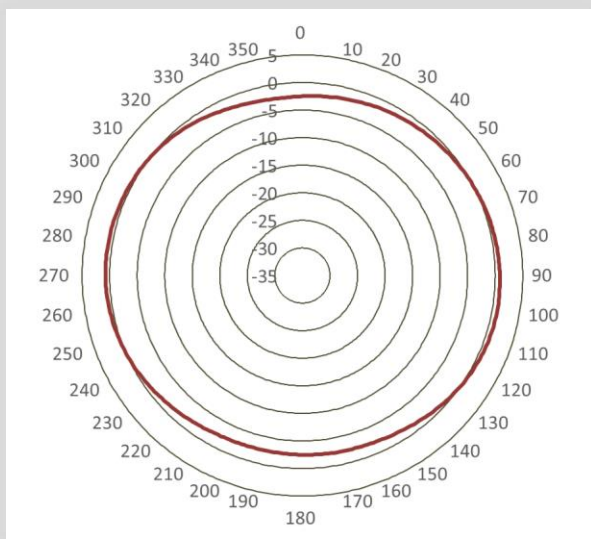
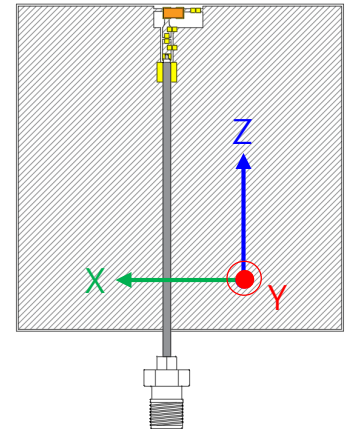


[3D Radiation Pattern]

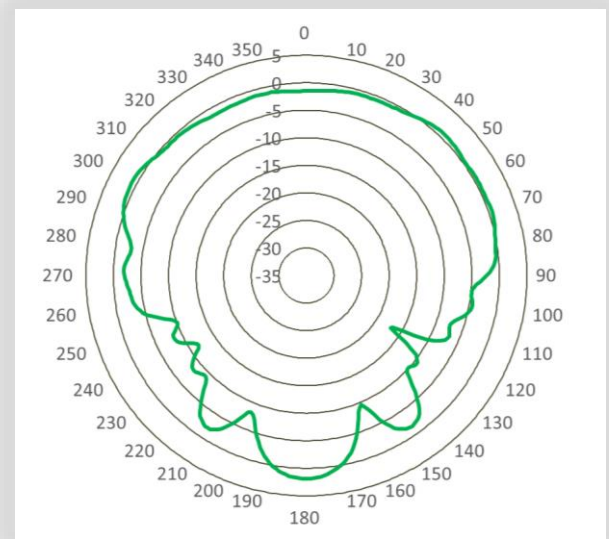
### 3.3 Typical Measurement Result (Gain, Radiation Pattern)

PCB design guide : **option 2**

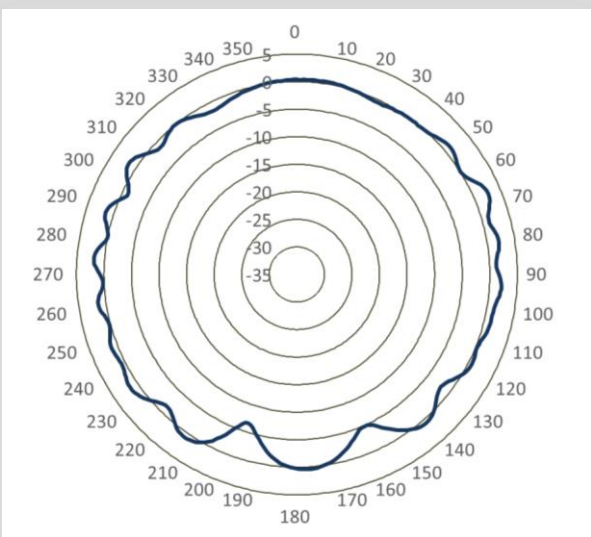
Freq. [MHz]	Efficiency [%]	Avg. Gain [dBi]	Peak Gain [dBi]
2400	74.1	-1.3	1.00
2442	75.8	-1.2	1.84
2485	63.1	-2.0	1.28



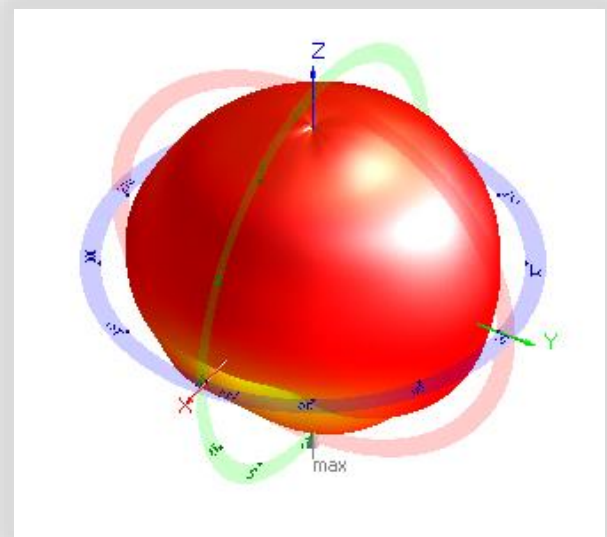
[XY plane @2.442GHz]



[YZ plane @2.442GHz]



[ZX plane @2.442GHz]



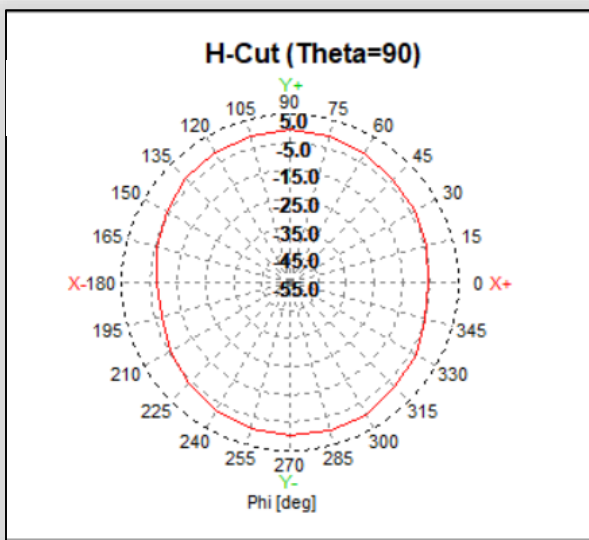
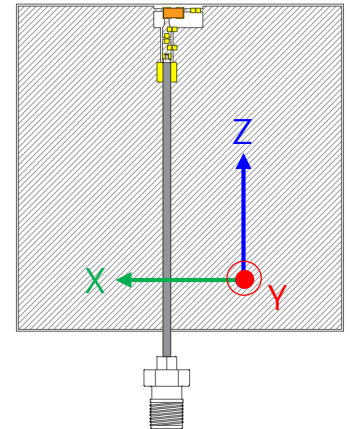
[3D Radiation Pattern]

Figure 5. Measured 2D and 3D radiation patterns

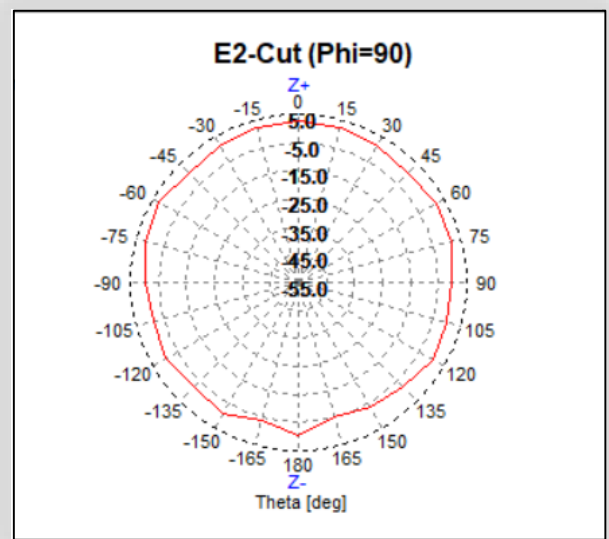
### 3.3 Typical Measurement Result (Gain, Radiation Pattern)

PCB design guide : **option 3**

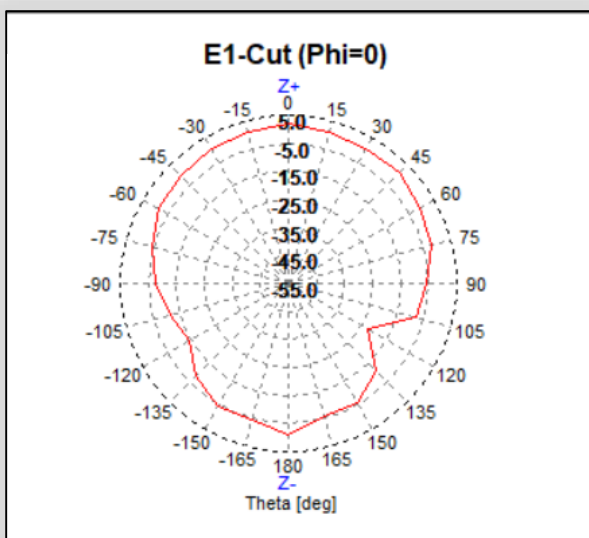
Freq. [MHz]	Efficiency [%]	Avg. Gain [dBi]	Peak Gain [dBi]
2400	72.54	-1.39	2.13
2442	78.13	-1.07	2.52
2485	74.67	-1.27	2.36



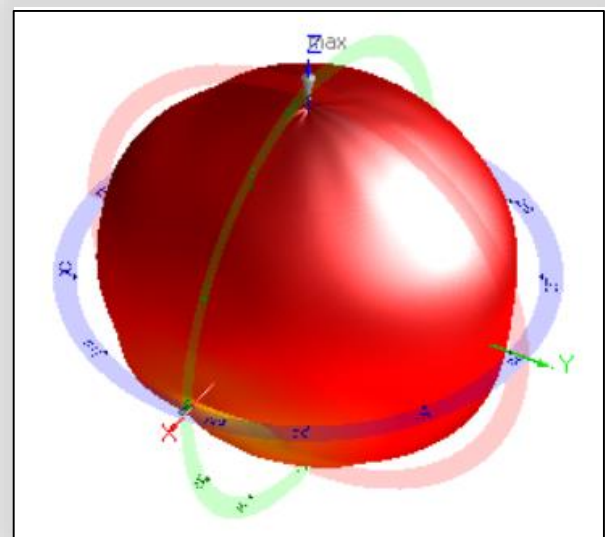
[XY plane @2.442GHz]



[YZ plane @2.442GHz]



[ZX plane @2.442GHz]

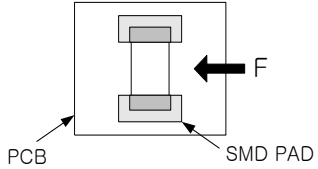


[3D Radiation Pattern]

Figure 5. Measured 2D and 3D radiation patterns

#### 4. Reliability Condition

✓ Automotive (AEC-Q200)

No	Item	Test Condition	Test Requirements
1	Adhesive Strength of Termination	1. Applied force on SMT chip till detached point from PCB. 	1. No mechanical damage by applied force 2. Strength (F) > 3 kgf
2	Thermal Shock (Cycle)	1. Step 1 : $-40 \pm 3^{\circ}\text{C}$ , 30 min Step 2 : $+85 \pm 3^{\circ}\text{C}$ , 30 min 2. Number of cycle : 30	1. No visual damage 2. Within electric spec (VSWR)
3	High Temperature Resistance	1. Temperature : $+85 \pm 5^{\circ}\text{C}$ 2. Time : $1000 \pm 24$ hrs	1. No visual damage 2. Within electric spec (VSWR)
4	Low Temperature Resistance	1. Temperature : $-40 \pm 5^{\circ}\text{C}$ 2. Time : $1000 \pm 24$ hrs	1. No visual damage 2. Within electric spec (VSWR)
5	Humidity	1. Humidity : 85 % RH Temperature : $+85 \pm 3^{\circ}\text{C}$ 2. Time : $1000 \pm 24$ hrs	1. No visual damage 2. Within electric spec (VSWR)

✓ Detail of AEC-Q200 measurement data would be available for request.

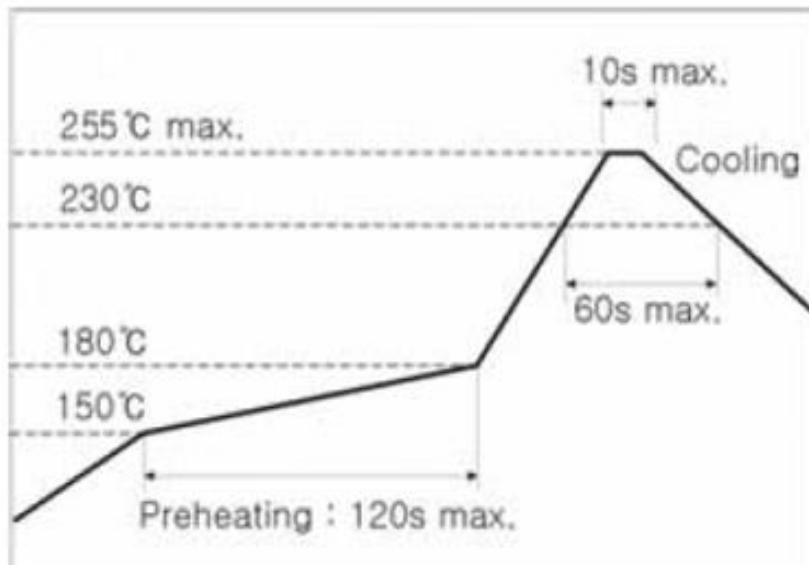
✓ Reliability test condition for normal application could be changed.

#### 5. Cautions (Recommendations )

✓ Storage environment of parts must be at ambient temperatures of 5 to  $40^{\circ}\text{C}$  and maximum 60%RH humidity

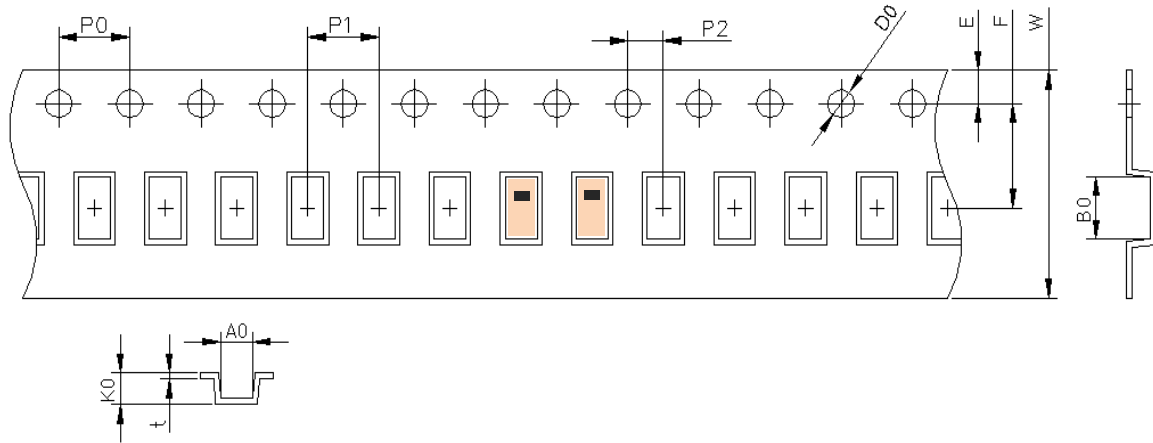
✓ The parts should be used within 6 months from the time of delivery. If stored for over 6 months, check for solder ability before use.

#### 6. Soldering Reflow Profile



## 7. Packaging

### 7.1 Carrier Tape Dimension



Item	Spec.	Item	Spec.	Item	Spec.
A0	1.80 ±0.10	P0	4.00 ±0.10	E	1.75 ±0.10
B0	3.30 ±0.10	P1	4.00 ±0.10	F	5.50 ±0.10
K0	1.35 ±0.10	P2	2.00 ±0.10	W	12.00 ±0.30
D0	1.55 ±0.05	-	-	t	0.30 ±0.05

### 7.2 Packaging Quantity

Item	Quantity	Dimension
Reel	2,500ea	Φ7" * 12mm
Inner Box	7,500 ea (3 reel)	185 * 185 * 68 (mm <sup>3</sup> )
Outer Box1	37,500 ea (5 Inner Box)	365 * 200 * 200 (mm <sup>3</sup> )
Outer Box2	105,000 ea (14 Inner Box)	390 * 390 * 280 (mm <sup>3</sup> )

### 7.3 Packaging Label

**AMOTECH Co., Ltd.**

5BL-1Lot, 617, Namchon-Dong, Namdong-Gu, Incheon, Korea

**Dielectric Chip Antenna**

P/N : AMAN301512ST01

Lot No :

Quantity : 2,500 pcs    Date : 2009/04/09