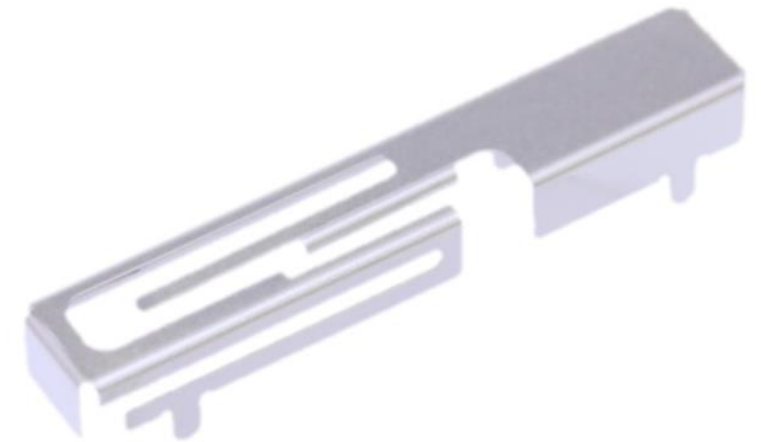


This embedded antenna designed for IoT/M2M applications, includes high performance characteristics such as a wide frequency range and advanced embedded antenna design technology. This was originally developed for mobile phone applications, making it compact, low cost and compatible with various devices. Yokowo's diverse terminal design and support expertise facilitates easy antenna integration to enable easy installation and effective wireless communication.

- **Frequency Range:** 814 ~ 960 [MHz], 1575.42 ~ 2170 [MHz]
- **Dimensions :** L45 x W8 x t5 mm



Typical Applications:

Smart meters, Construction ICT terminals, GPS trackers/Logistics management, Agricultural and Dairy terminals, etc.

1. Specifications
2. Antenna Characteristics
3. Radiation Patterns
4. Mechanical Drawing
5. Recommended PCB
6. Recommended Mounting Land
7. Recommended Matching Component
8. Examples of Matching Component Values When the Ground Plane Size Differs from the Recommended Board
9. Relationship Between Antenna Radiation Efficiency and GND Plane
10. Packaging

1. Specifications

Electrical

Frequency [MHz]	Peak Gain [dBi]	VSWR	Impedance	Polarization	Radiation Pattern
814-960	-0 ~ 3.0	3.5 or less	50 ohm	Linear	Omni-Directional
1575.42-2170	-0 ~ 3.0	3.0 or less			

General Specification

Frequency	815~960[MHz]/1428~2170[MHz]
Antenna Type	$\lambda/4$ monopole antenna
Maximum Absolute Gain	815~960[MHz]/1428~2170[MHz] 3[dBi] or less
Impedance	50 Ω

Mechanical

Dimensions	Please see page.7
Weight	1.55g

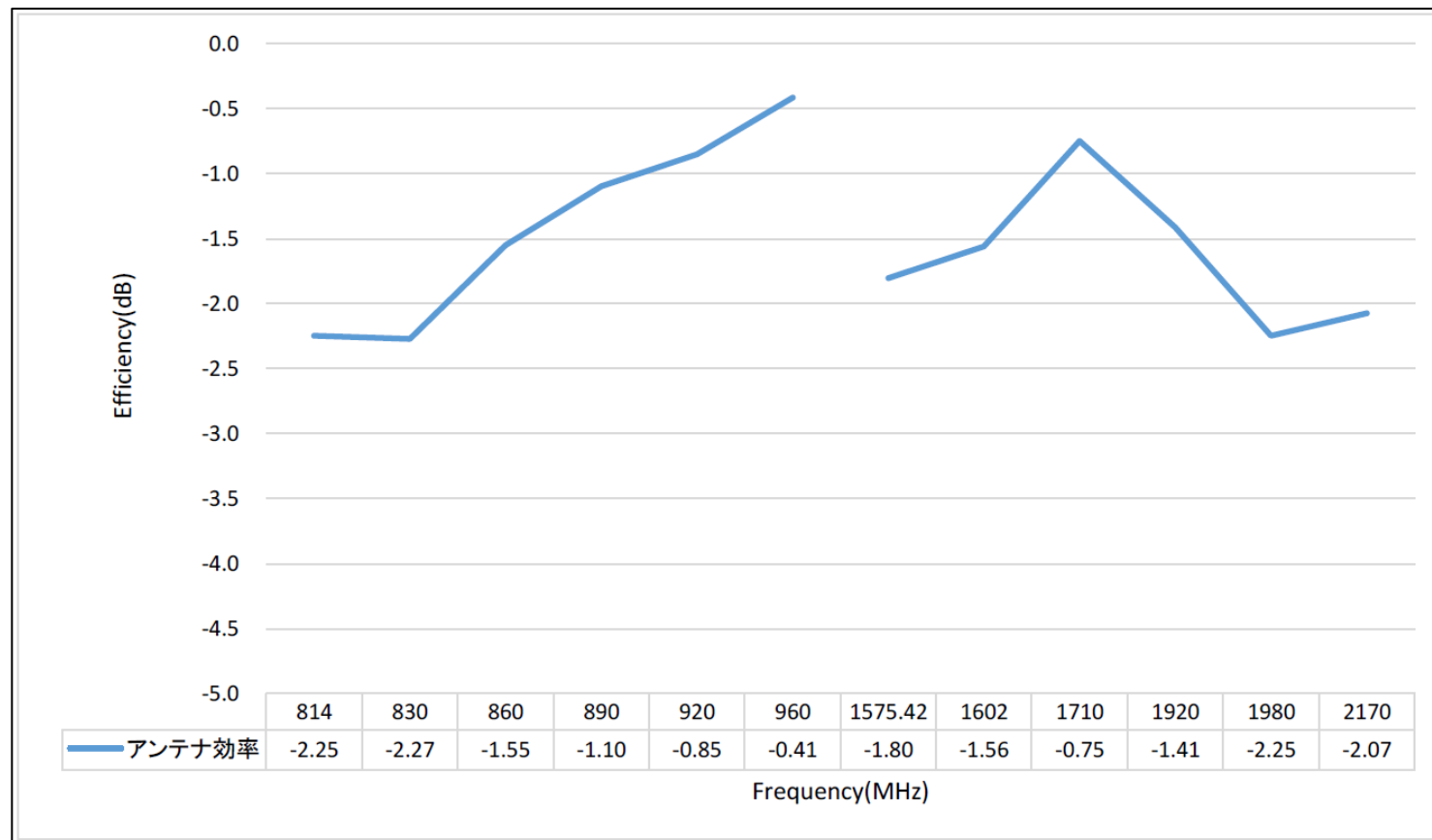
Environmental

Operational Temperature Range	-40°C~+120°C
Storage Temperature Range	-40°C~+120°C (Antenna Alone Condition)

The antenna characteristics above are based on our recommended substrate. (Please see page. 8)

2. Antenna Characteristics

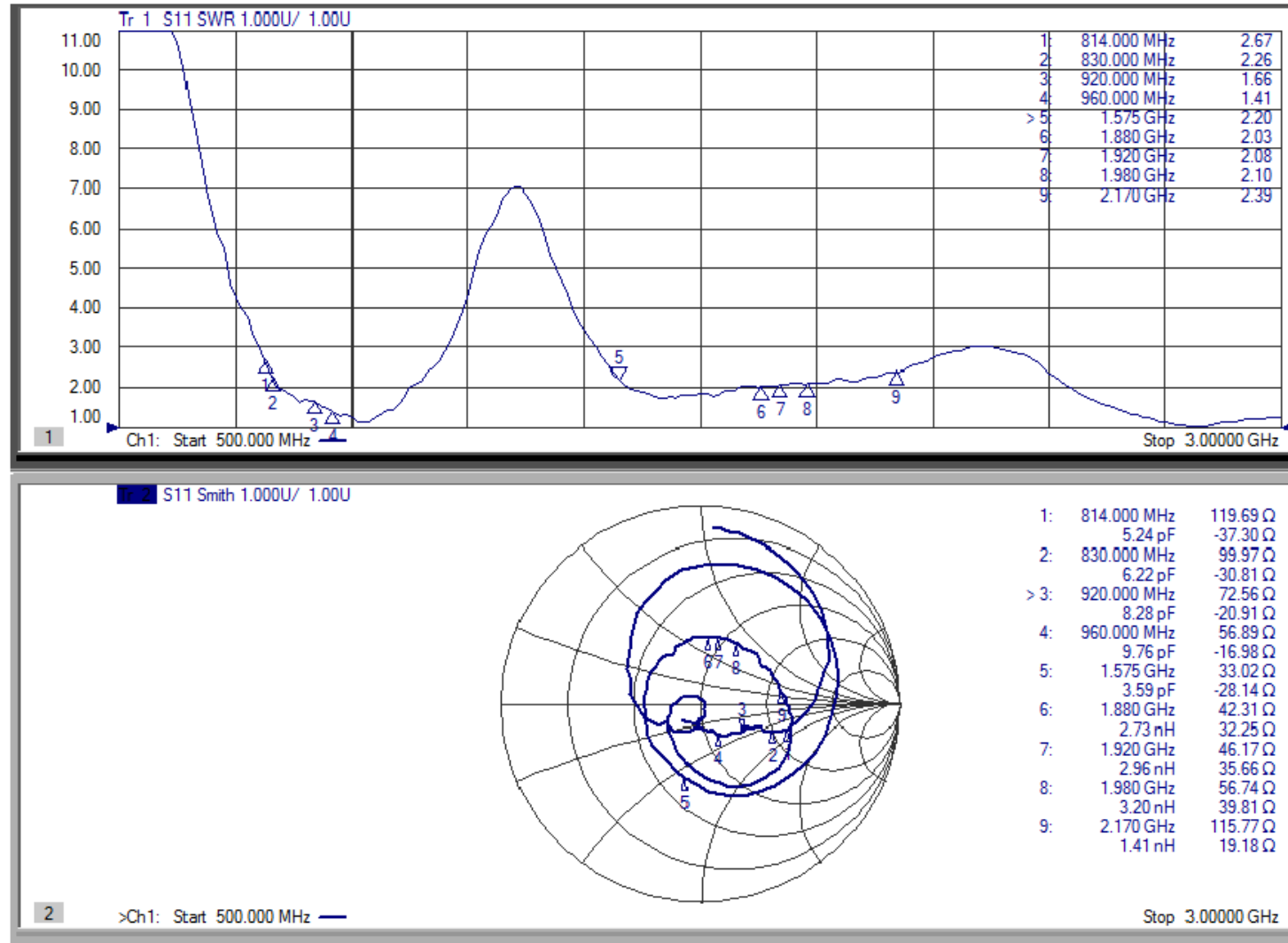
Radiation Efficiency



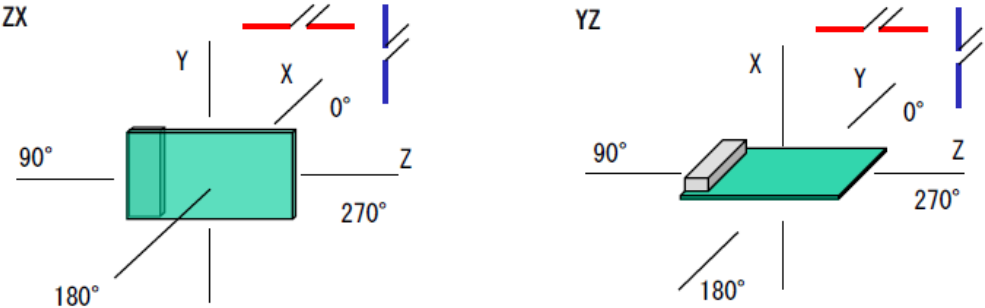
NOTE: Typical performance on 110 x 60 mm PCB

2. Antenna Characteristics

VSWR/Impedance



3. Radiation Patterns
 (814~960MHz)

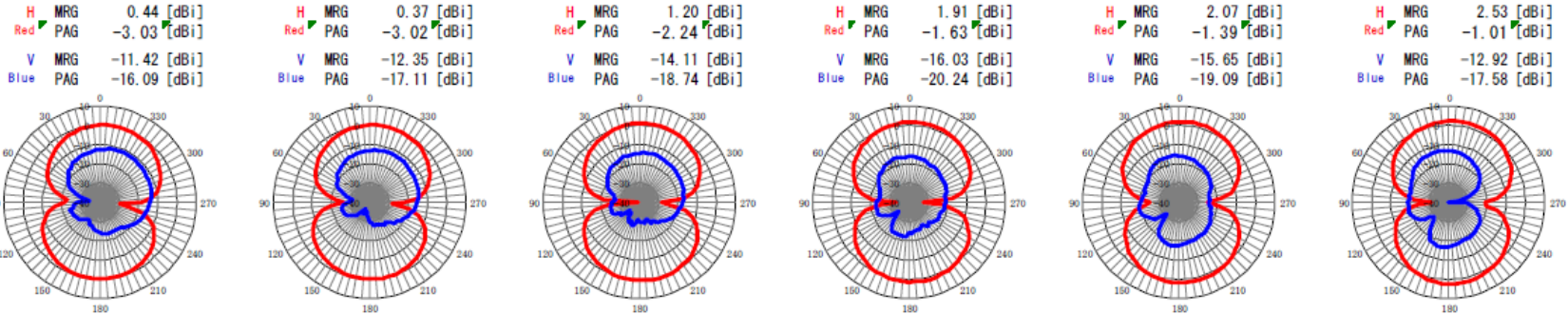


█ Horizontal polarized wave
█ Vertical polarized wave

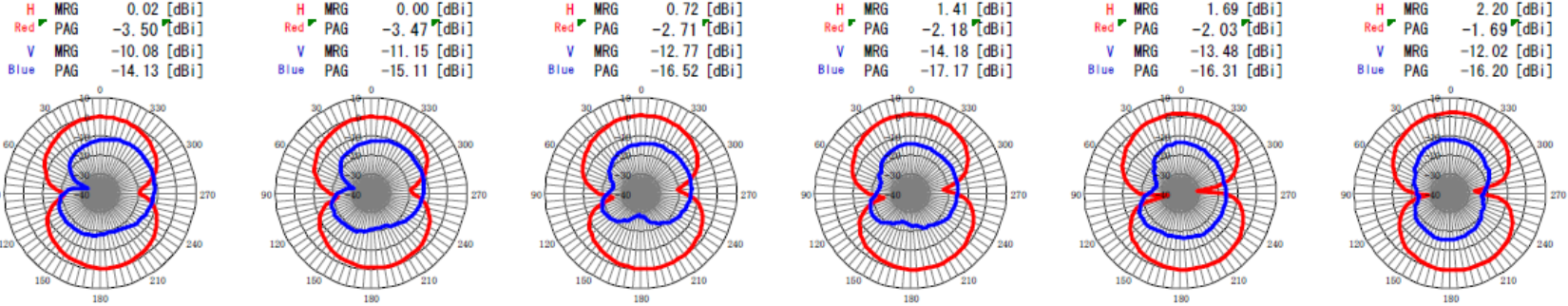
MRG=Maximum Radiation Gain
 PAG= Pattern Average Gain

814 [MHz]	830 [MHz]	860 [MHz]	890 [MHz]	920 [MHz]	960 [MHz]
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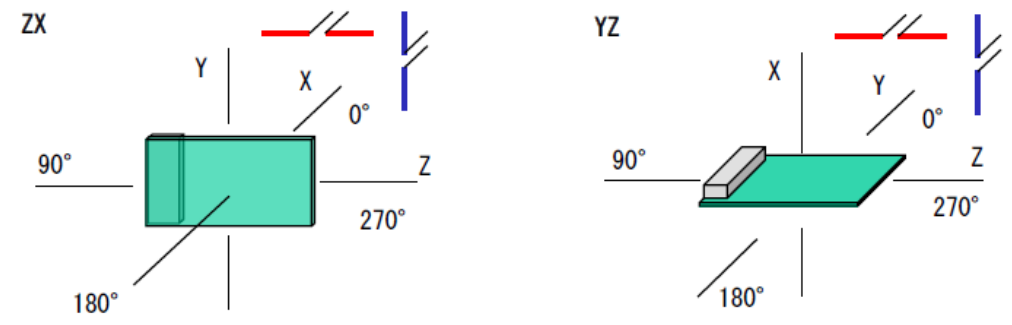
Z X Plane



Y Z Plane



3. Radiation Patterns
(1575.42~2170MHz)

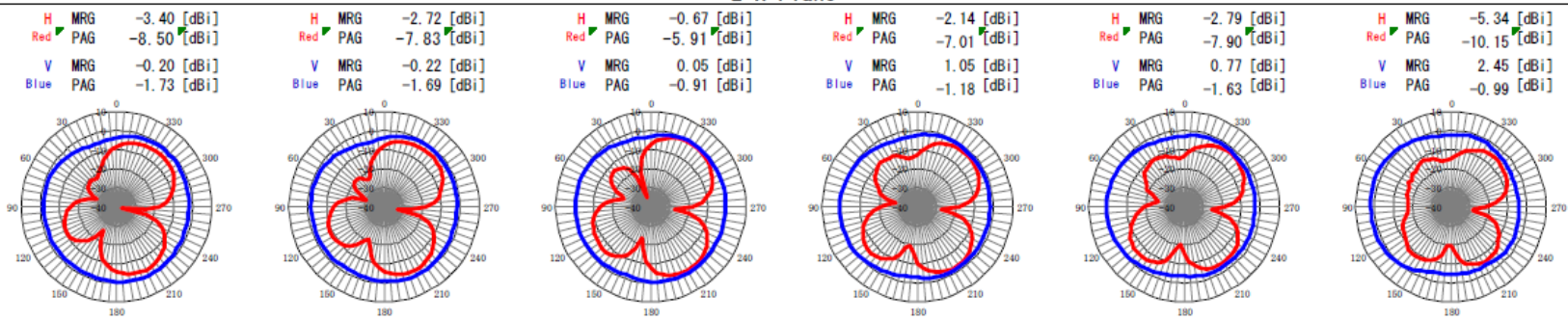


█ Horizontal polarized wave
█ Vertical polarized wave

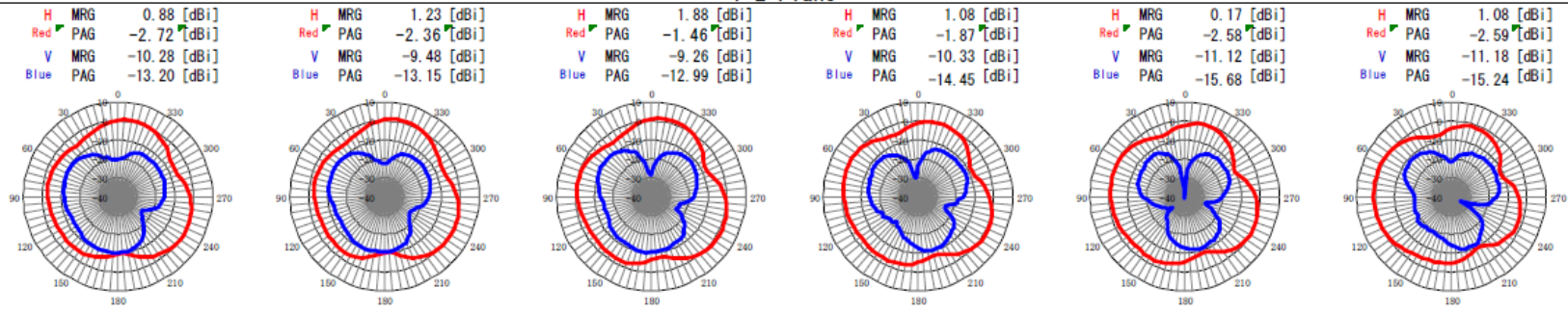
MRG=Maximum Radiation Gain
PAG= Pattern Average Gain

1575.42 [MHz] 1602 [MHz] 1710 [MHz] 1920 [MHz] 1980 [MHz] 2170 [MHz]

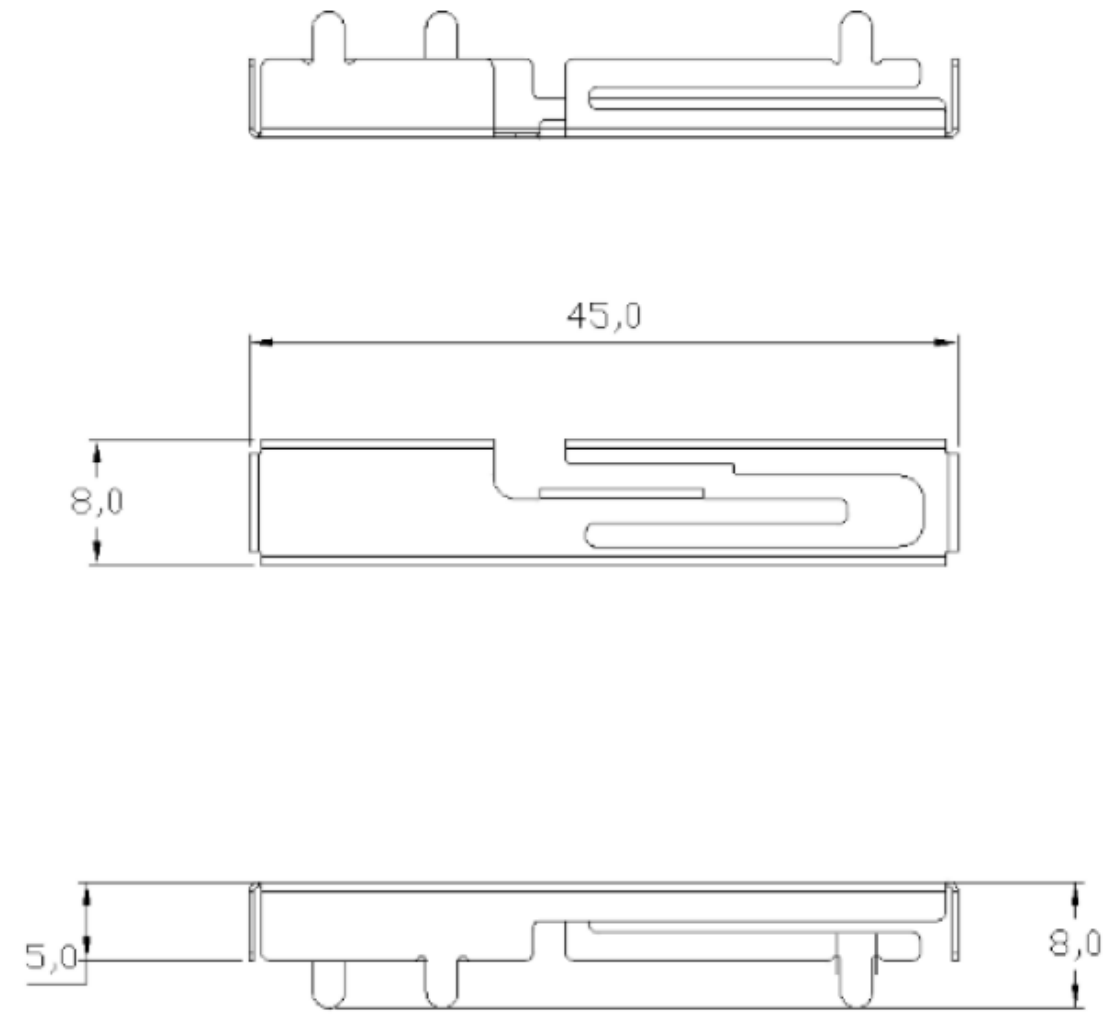
Z X Plane



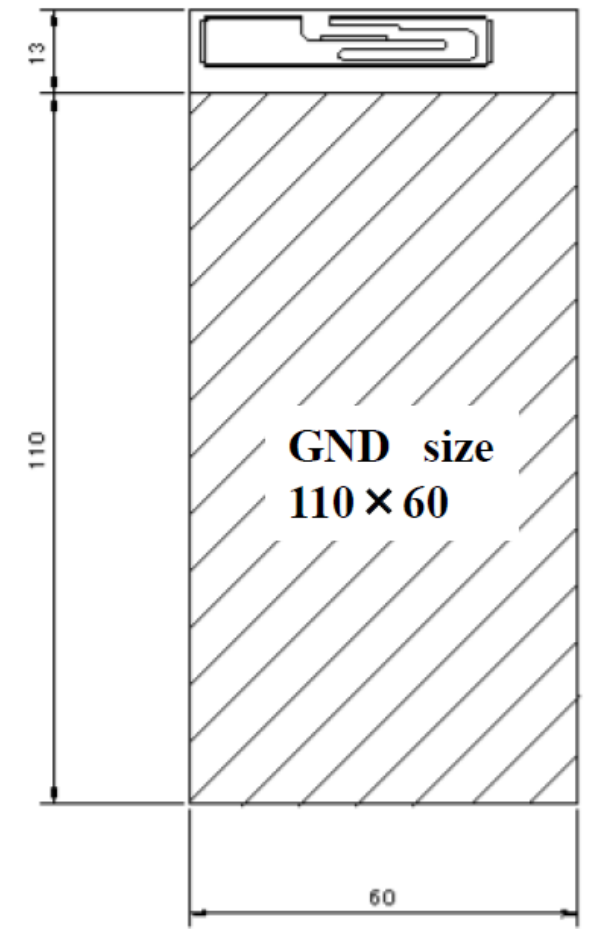
Y Z Plane



4. Mechanical Drawing



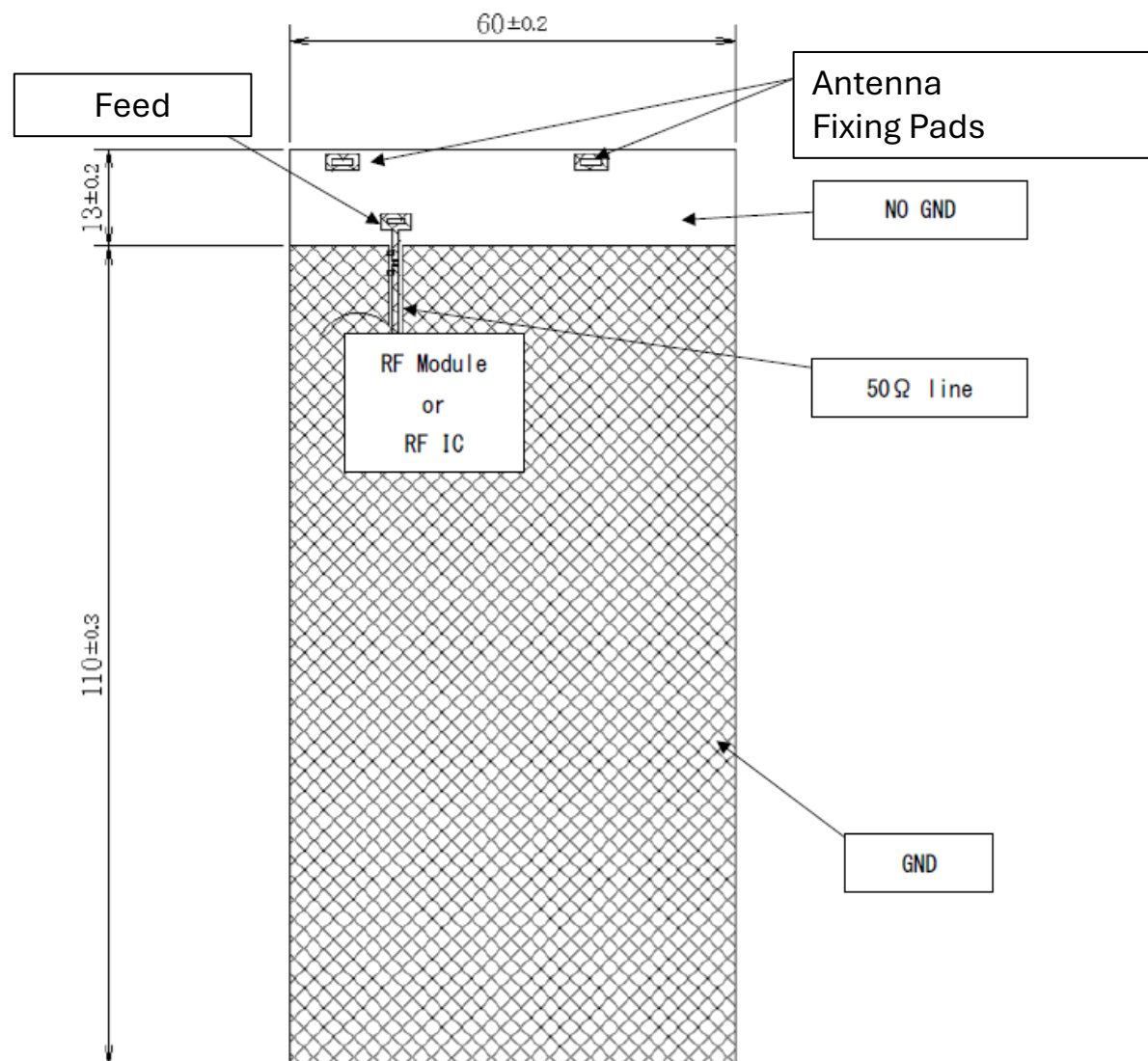
Thickness 0.3



Recommended Board

Unit : mm

5. Recommended PCB



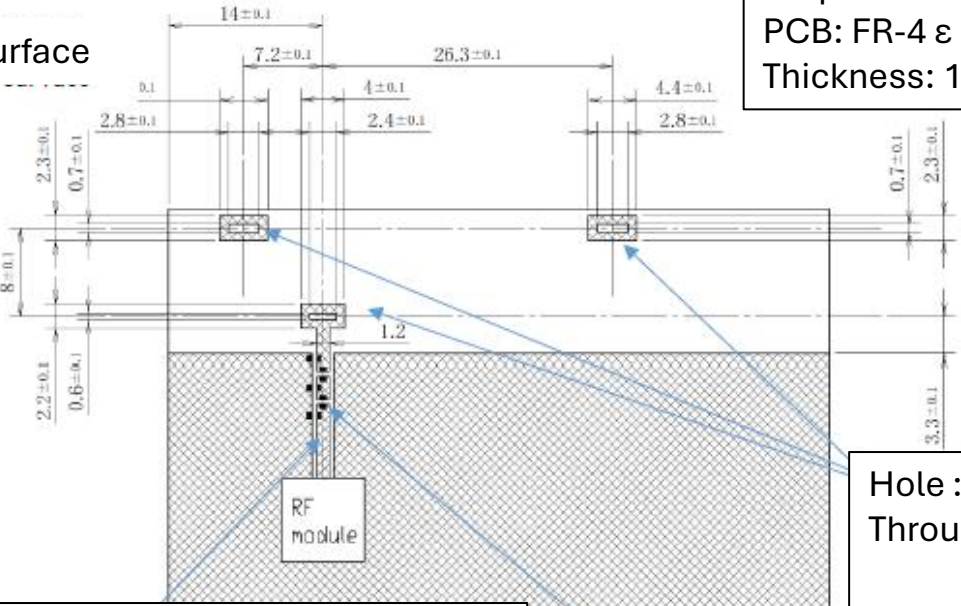
NOTE:

- The GND does not need to be all on the surface.
- It is desirable to secure the GND with through holes in the middle layer and the back side of the multilayer PCB.
- 110mm is the ideal GND size for the 800MHz band.
- It is recommended to connect the antenna to the RF Module with the shortest possible feed line. (50Ω impedance line)

6. Recommended Mounting Land

Recommended mounting land

1) Surface



Reference information
 Chip size : 1005
 PCB: FR-4 ε r=4.8
 Thickness: 1.0mm

Hole :
 Through hole

Please design considering the thickness and dielectric constant of the PCB

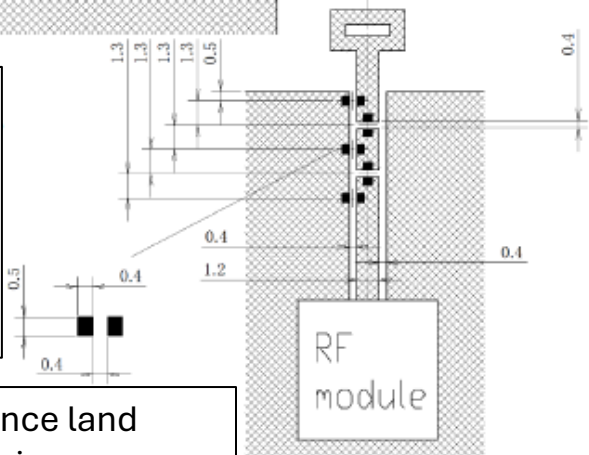
Matching circuit
 Please design according to the chip manufacture and size to be used
 • Prepare an antenna matching circuit directly under the antenna

2) Back

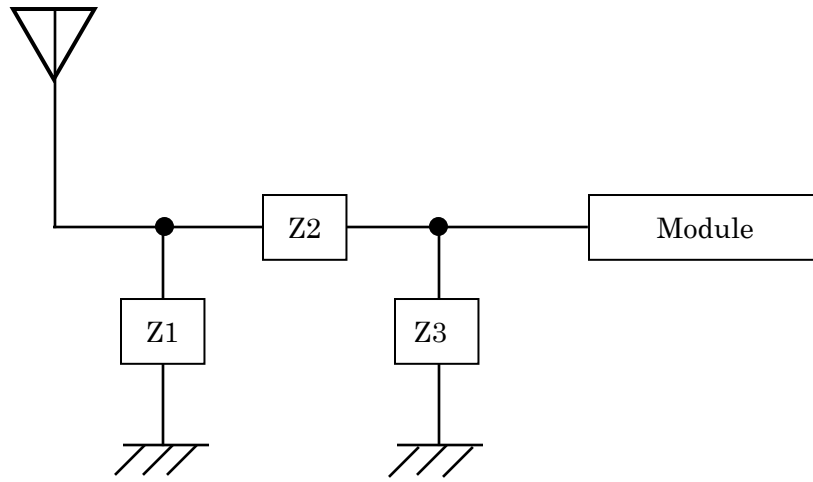


• Copper foil part on the back of the antenna matching circuit not required

Reference land dimensions



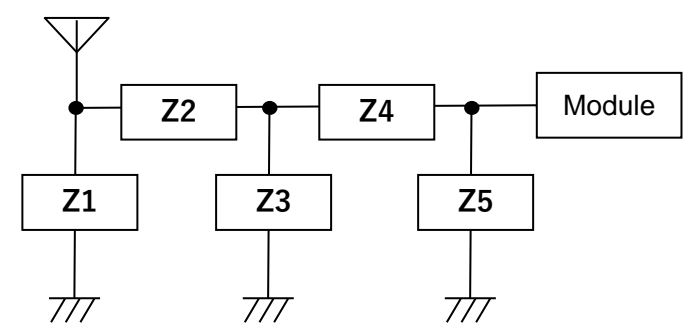
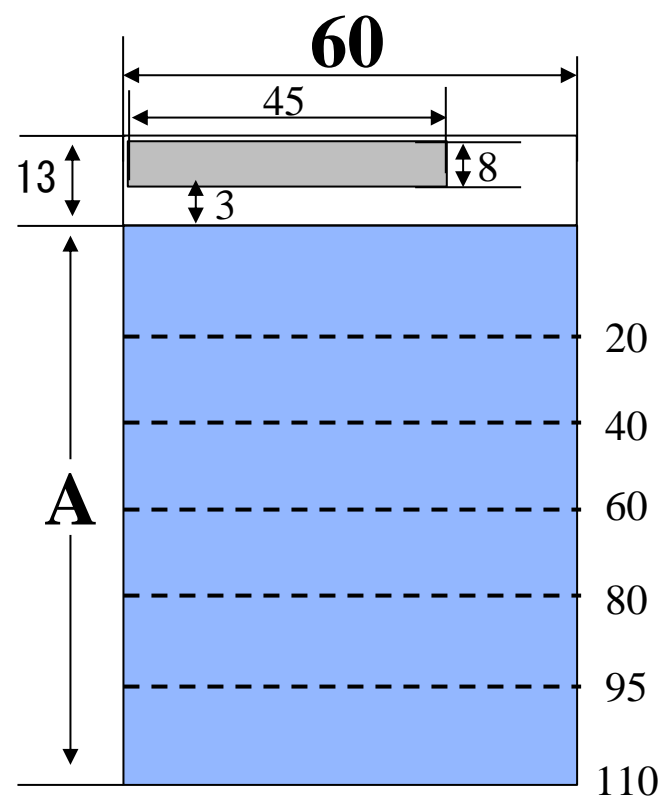
7. Recommended Matching Component



Z1 : 10nH
Z2 : 0Ω
Z3 : 0.5pF

8. Examples of Matching Component Values When the Ground Plane Size Differs from the Recommended Board

The substrate size to which this antenna is applied depends on the application. Therefore, it may not always be possible to match the size of the ground plane to our recommended board. Below is an example of matching at the 800MHz and 2GHz bands. However, please determine the optimal matching values while checking the VSWR and gain for your desired frequency / ground plane size. We offer matching services, so please feel free to contact us.

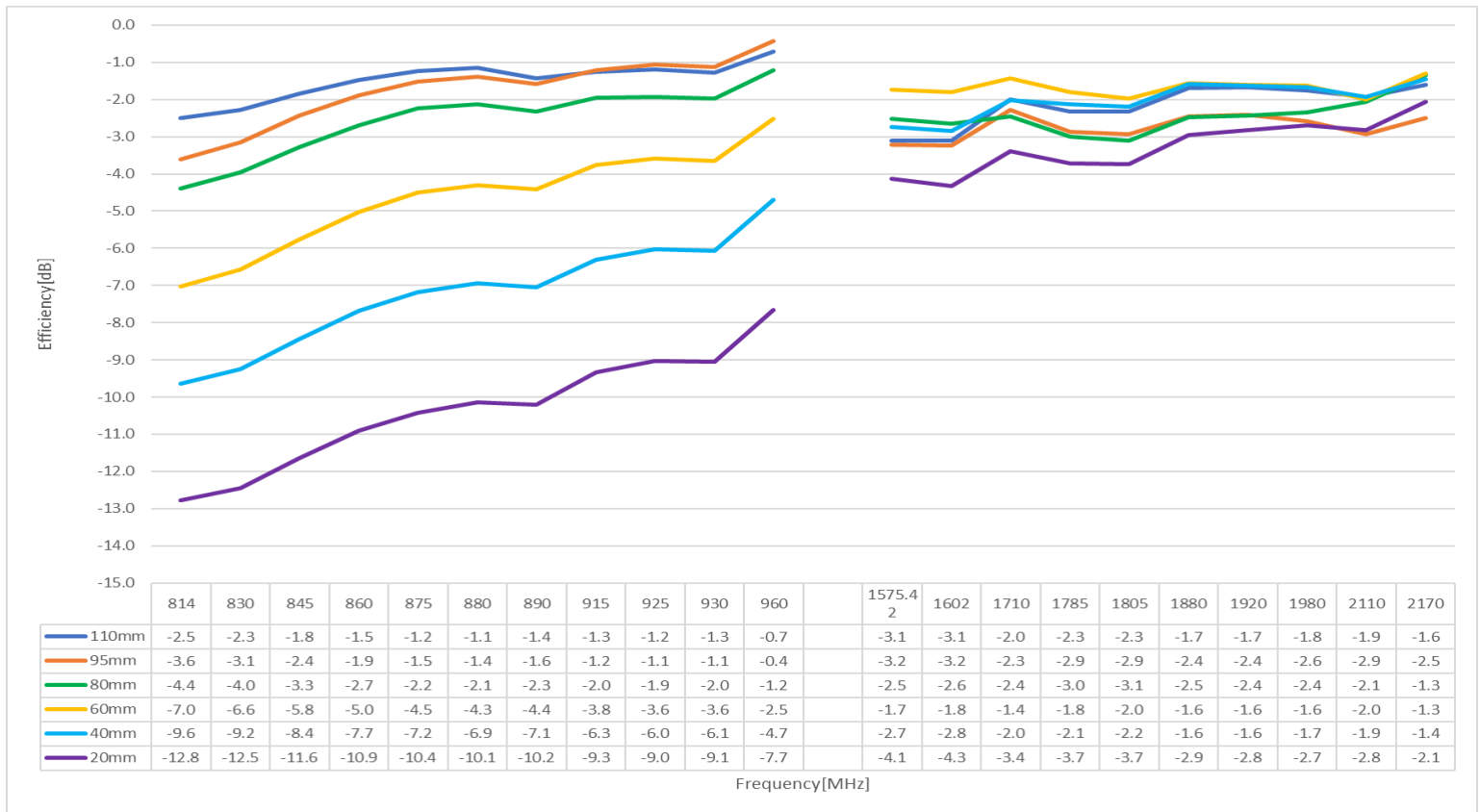
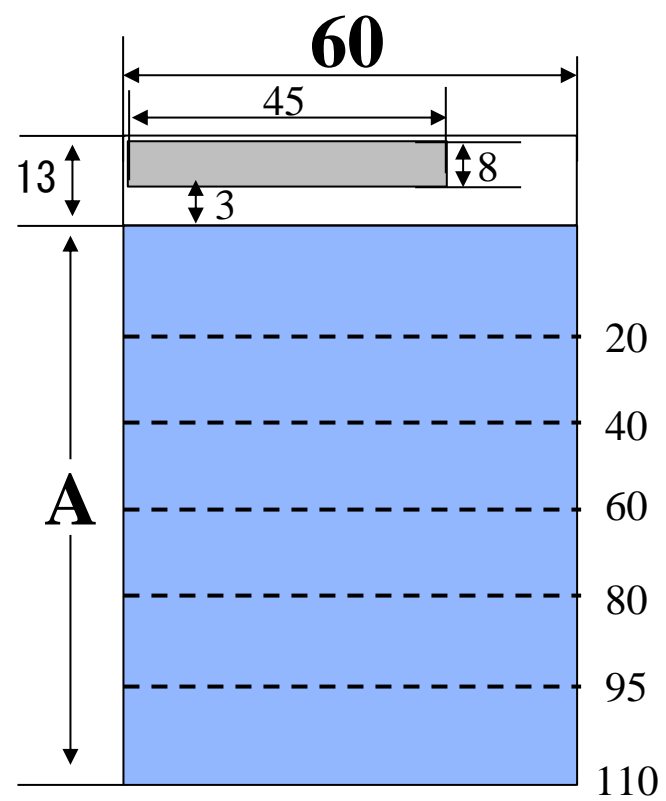


Examples of Matching Component Values for the 800MHz and 2GHz Bands

A/mm	Z1	Z2	Z3	Z4	Z5
110	10nH	0Ω	0.5pF	0Ω	-
95	9.1nH	//	//	//	-
80	0.6pF	//	8.2nH	//	-
60	//	//	//	//	-
40	//	//	//	//	-
20	0.4pF	//	//	//	-

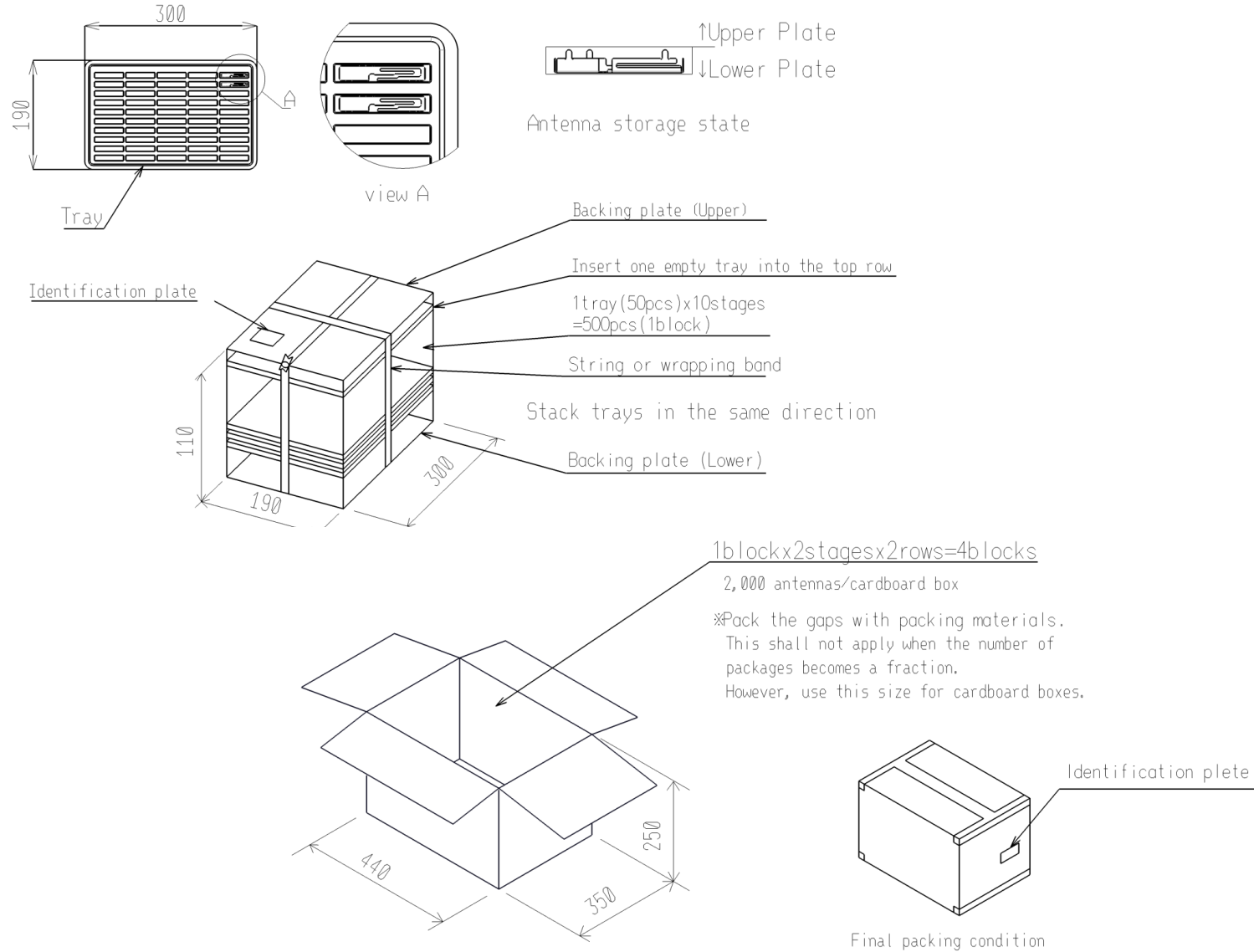
9. Relationship Between Antenna Radiation Efficiency and GND Plane

The following graph shows the radiation efficiency of the antenna at each frequency. These results are based on the matching values of the previous slide. The antenna's radiation efficiency depends on the length of the GND plane (A), and the 1018-456A shows the highest efficiency when A=110mm (width 60mm). Please note that as the length of the GND plane decreases, performance, particularly in the lower frequency bands, tends to degrade. For advice on optimal antenna placement and configuration, please feel free to contact us.



Relationship Between Antenna Radiation Efficiency and Frequency for Each GND plane size (A)

10. Packaging



Please all the products facing the same direction with the power feed part facing the tray opening side, and stack the trays so that they face the same direction.