



# TNP-UG63 Antenna Test Report

(Model: Milesight LORA ANT)

Version: 1.0

Released Date: 2022/07/01

Prepared By: James

Reviewed By: Daniel

**Confidential**

- Revised History
- Specification
- Antenna Placement & Condition
- Test Setup for Return Loss, S-parameters Measurement
- Return Loss, S-parameters Test
- Isolation Test
- Test Setup for OTA Measurement
- 2D Radiation Patterns
- 3D Radiation Patterns
- Results Summary (Return Loss, S-parameters, Peak Gain, Efficiency)
- Conclusion & Comments

# Revision History

| Released Date | Version | Revised Records                                                             |
|---------------|---------|-----------------------------------------------------------------------------|
| 2022/07/01    | V1.0    | <ul style="list-style-type: none"><li>• Antenna evaluation report</li></ul> |
|               |         |                                                                             |
|               |         |                                                                             |

## Requirements of Antenna Design

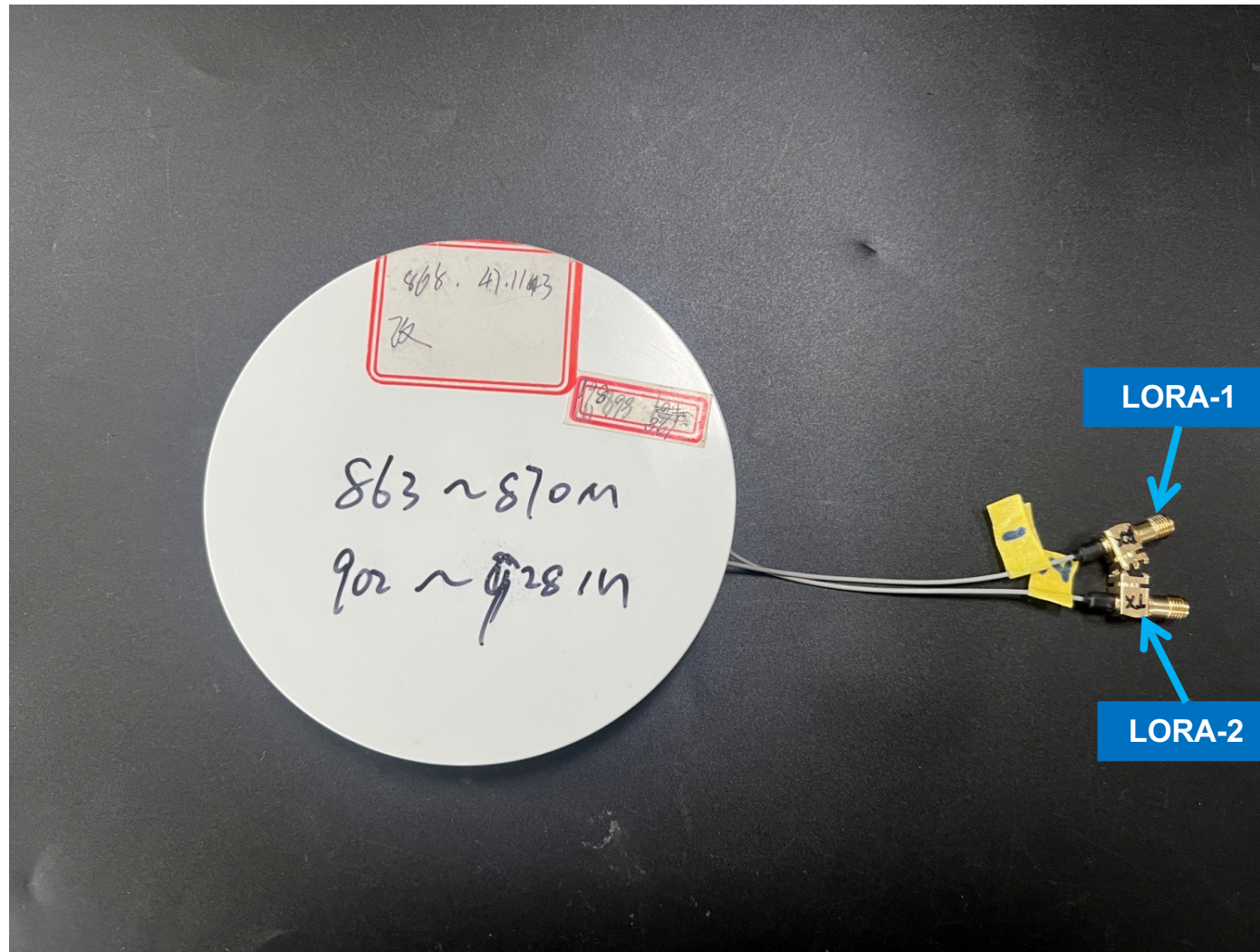
| RF Function | Number of ANT | Frequency Band        | Remark  |
|-------------|---------------|-----------------------|---------|
| LORA        | 2             | 863-870 / 902-928 MHz | ANT1, 2 |

LORA-1 : RX  
LORA-2 : TX

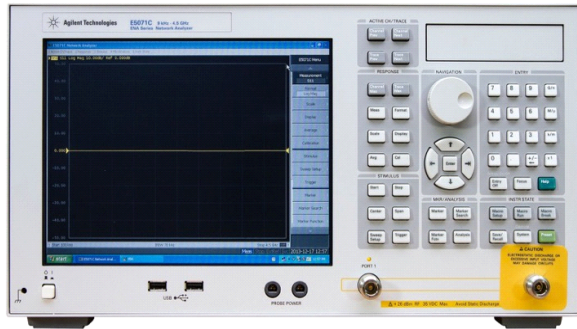
## Requirements of Measurement

| Test Item         | Specification                                  | Remark |
|-------------------|------------------------------------------------|--------|
| Return Loss       | 6.0 dB Max                                     |        |
| VSWR              | 3.0:1 Max                                      |        |
| Peak Gain         | --                                             |        |
| Efficiency        | --                                             |        |
| Radiation Pattern | Scale: +5 - -45 dBi, Angle step size: 5 degree |        |

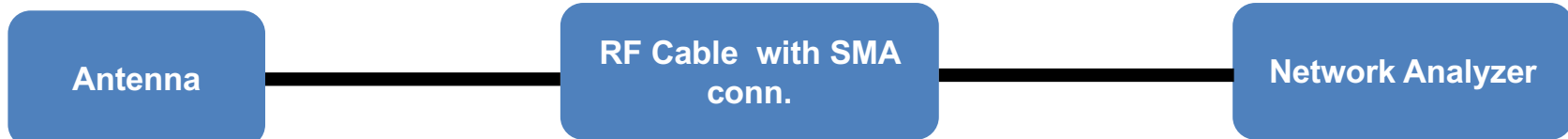
# Antenna Placement & Solution



# Test Setup for Return Loss Test



| Equipment        | Brand    | Model  |
|------------------|----------|--------|
| Network Analyzer | Keysight | E5071C |



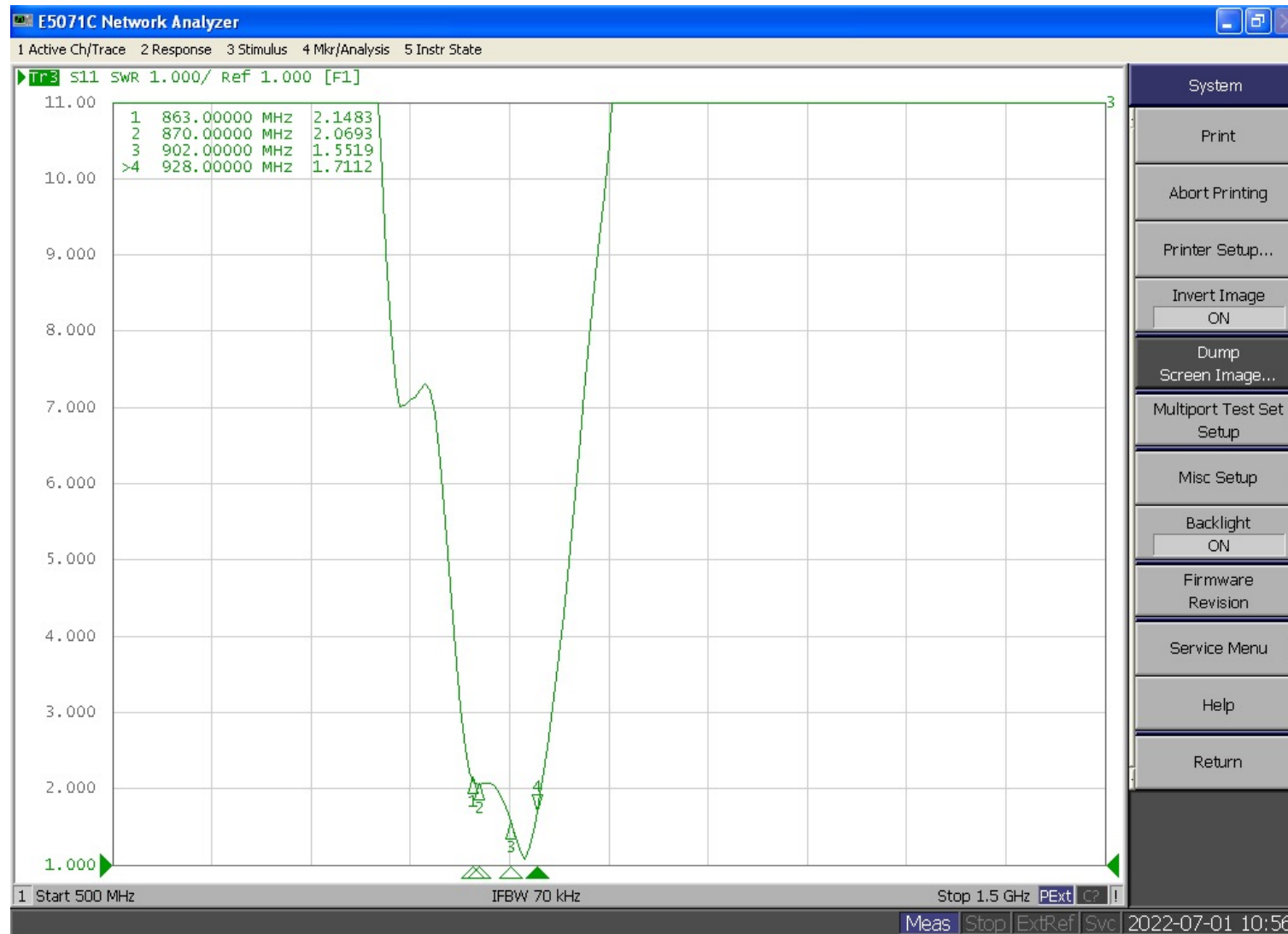
# V.S.W.R Test

LORA-1 (863-870 / 902-928 MHz)



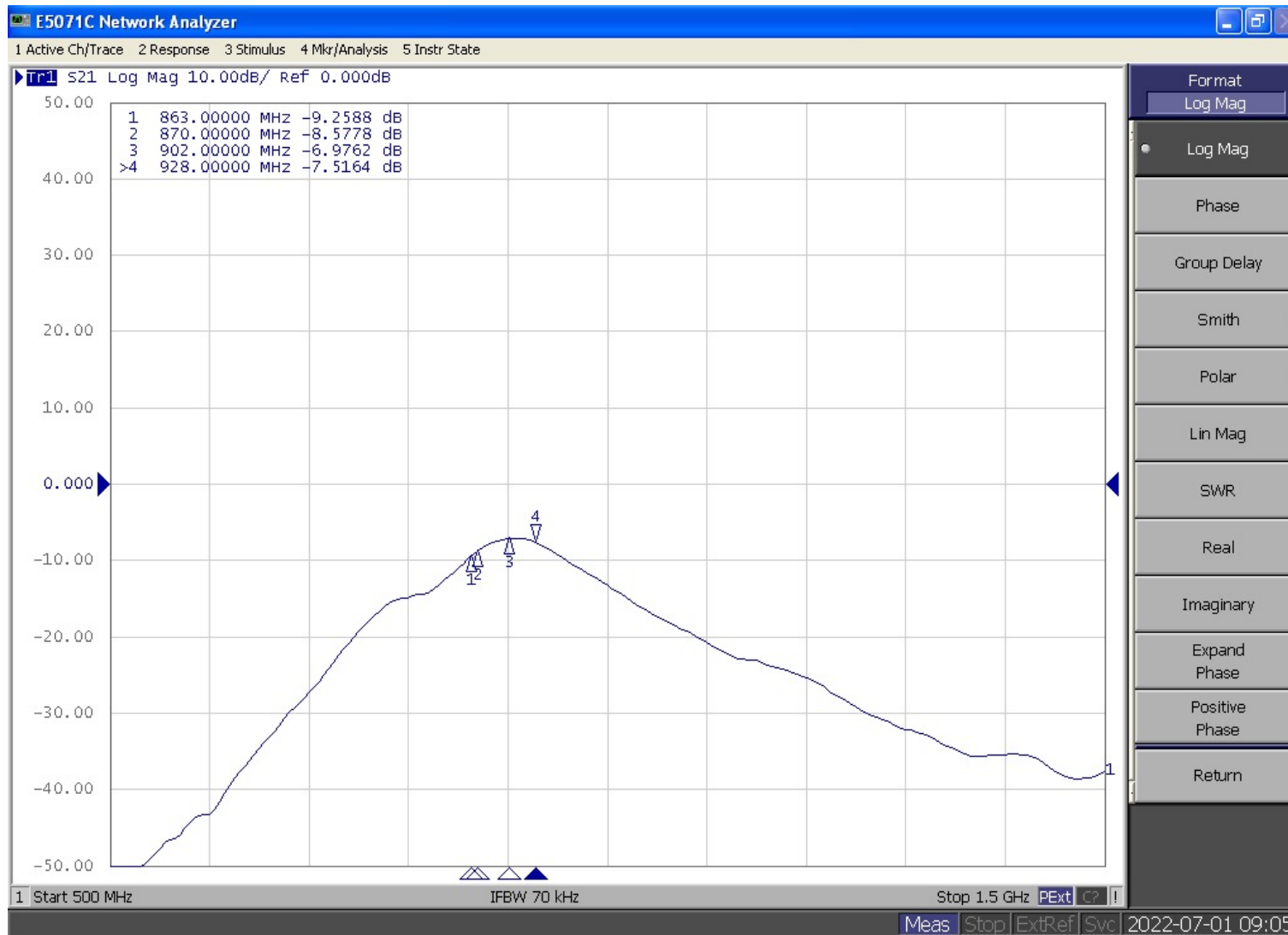
# V.S.W.R Test

LORA-2 (863-870 / 902-928 MHz)

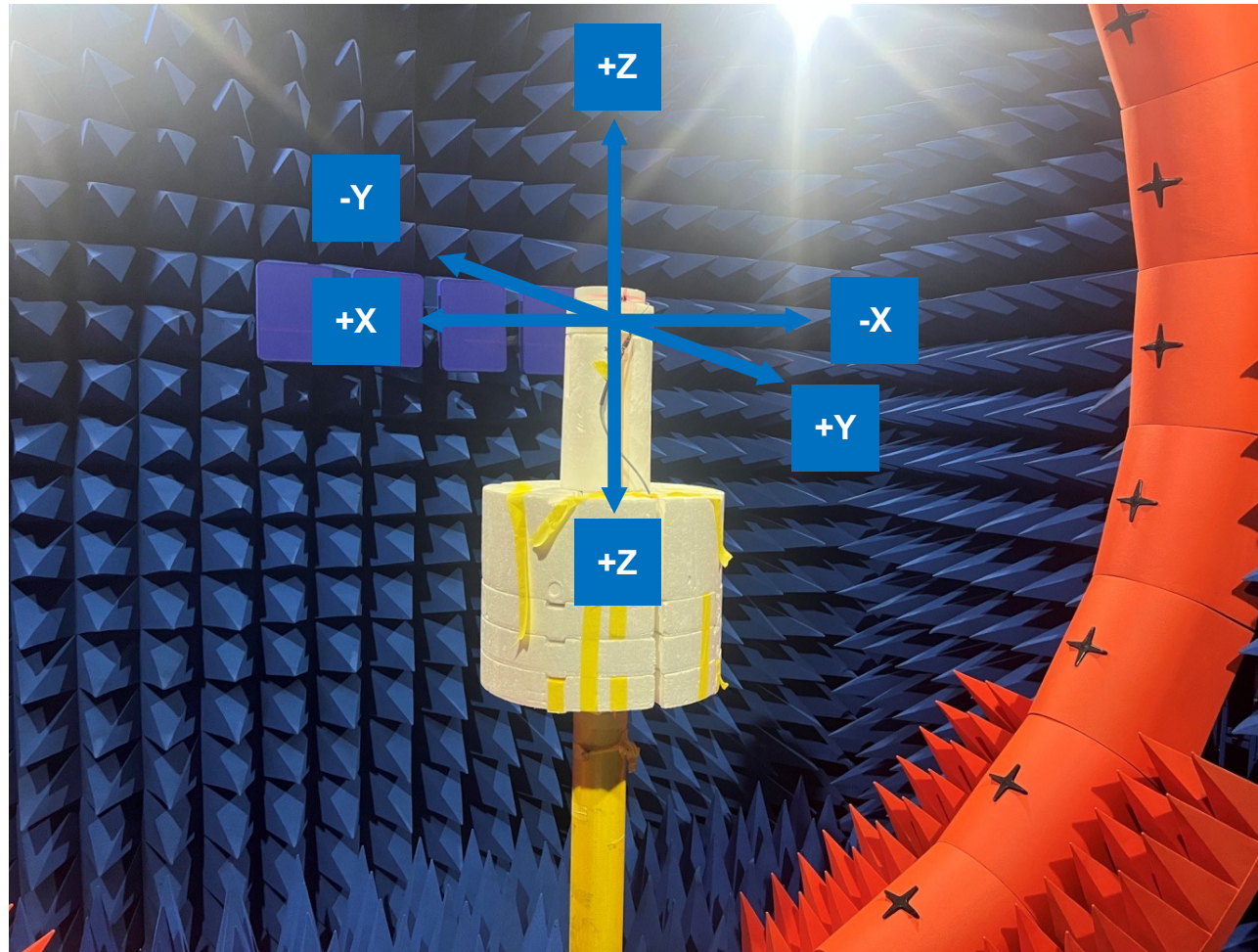


# Isolation Test

## LORA-1 & LORA-2



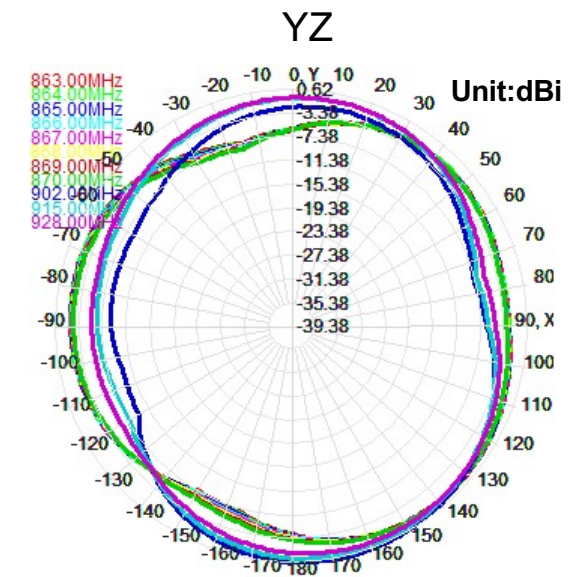
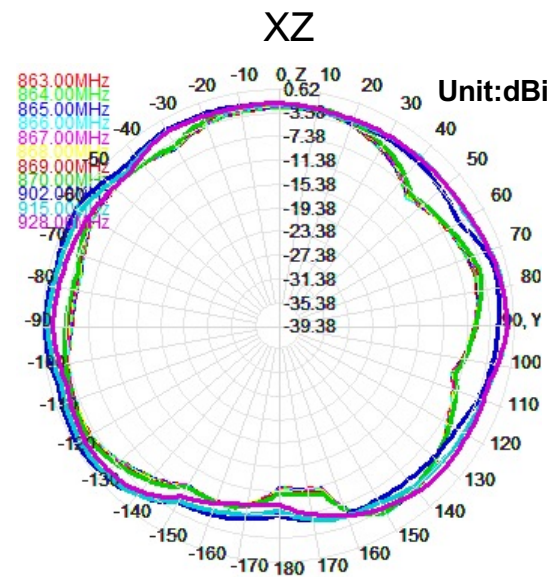
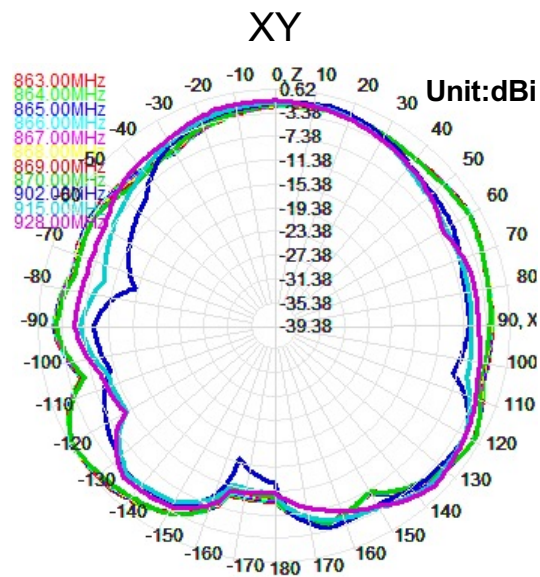
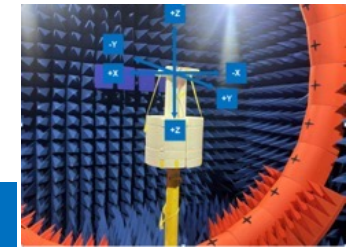
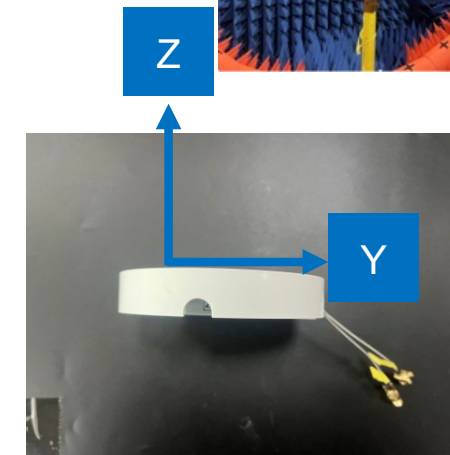
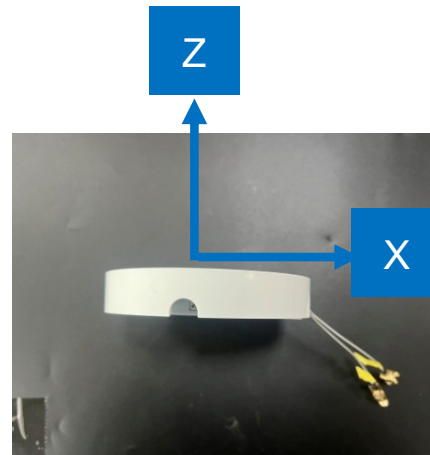
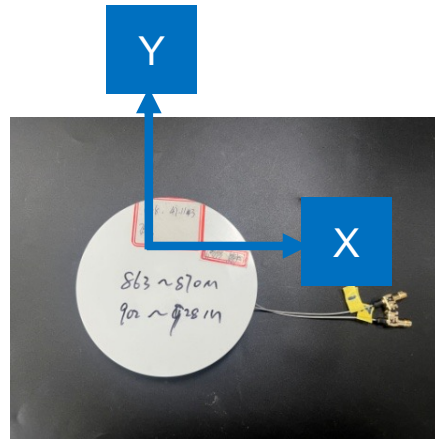
# Test Setup for OTA Measurement



| Chamber  | Brand  | Model    | Location        |
|----------|--------|----------|-----------------|
| 24 probe | Fei-Tu | FT-OTA24 | China, Dongguan |

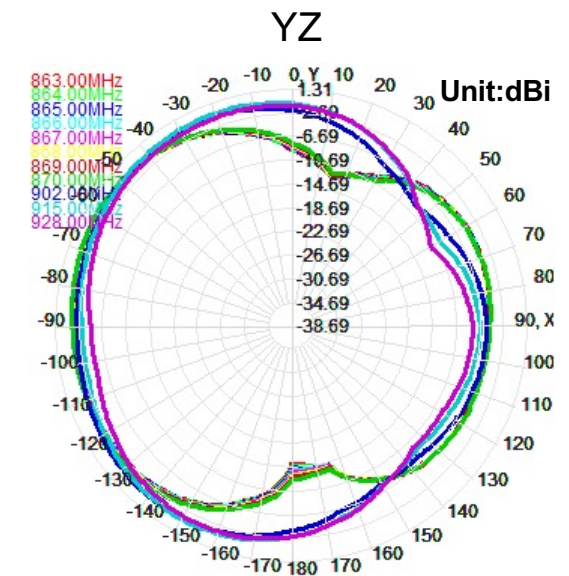
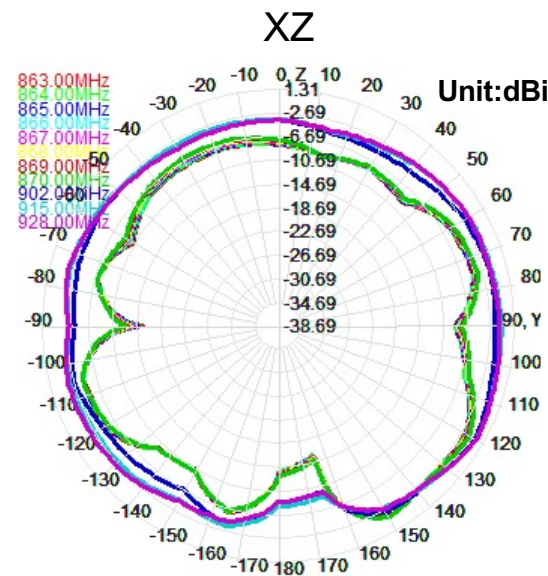
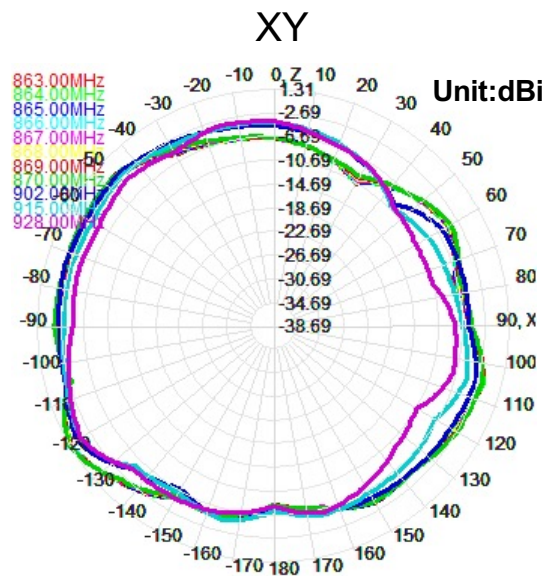
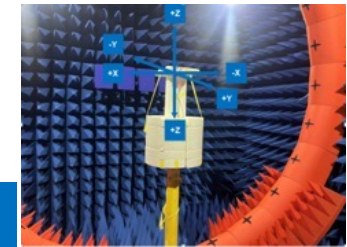
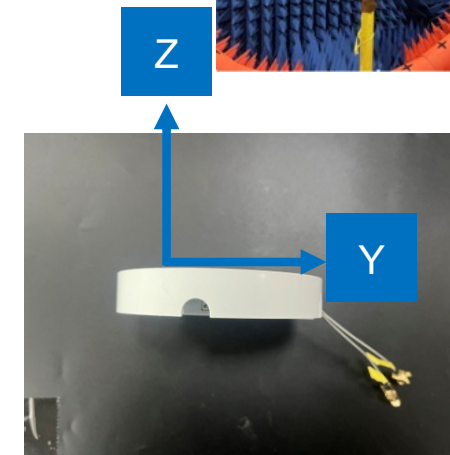
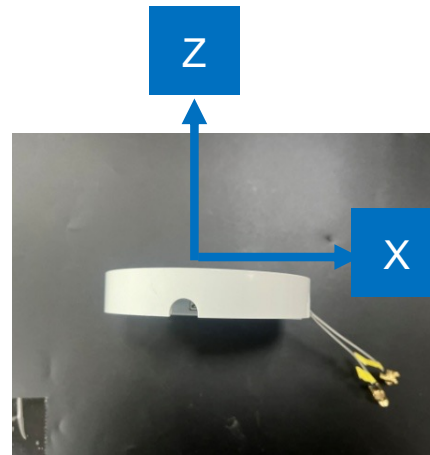
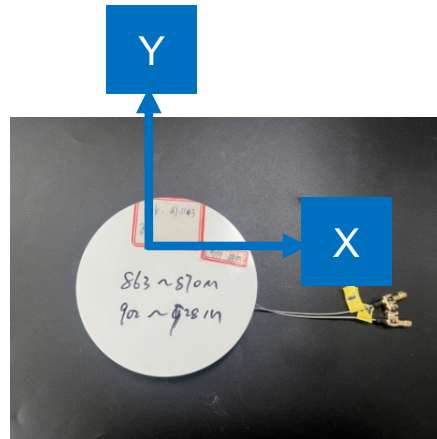
# 2D Radiation Pattern

LORA-1



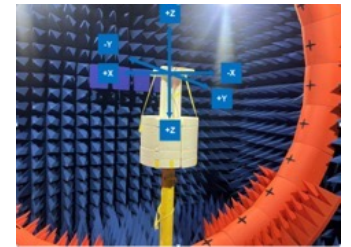
# 2D Radiation Pattern

LORA-2

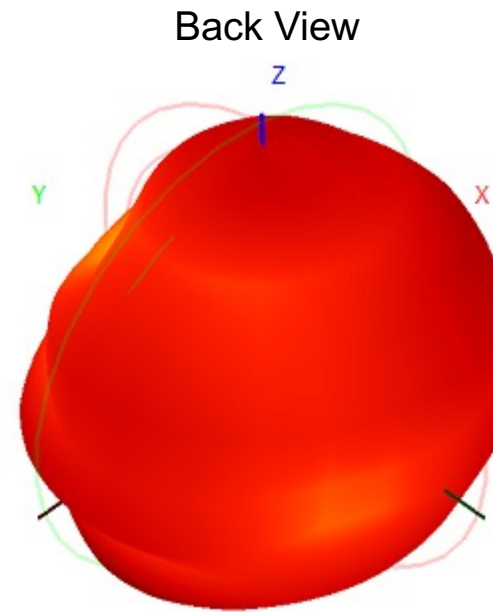
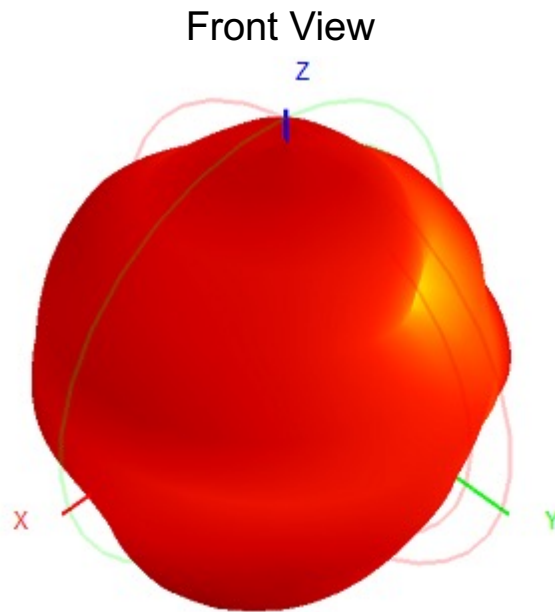


# 3D Radiation Pattern

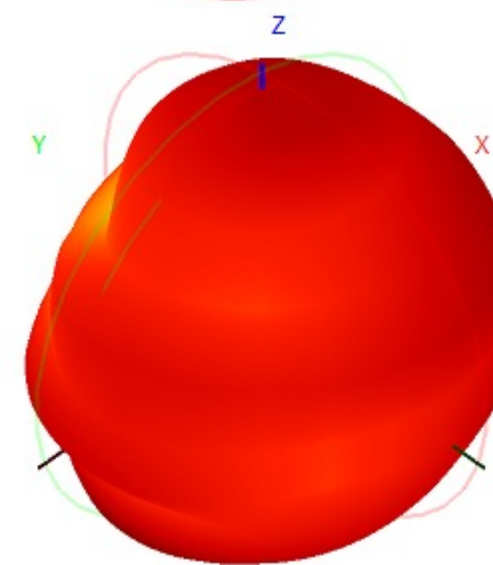
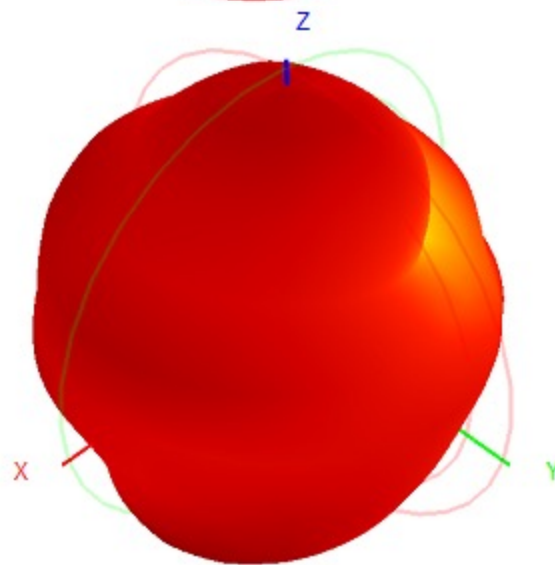
LORA-1



863 MHz

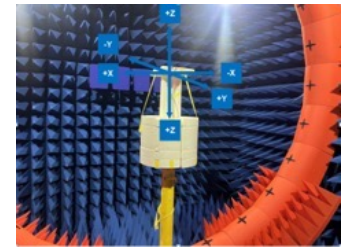


870 MHz



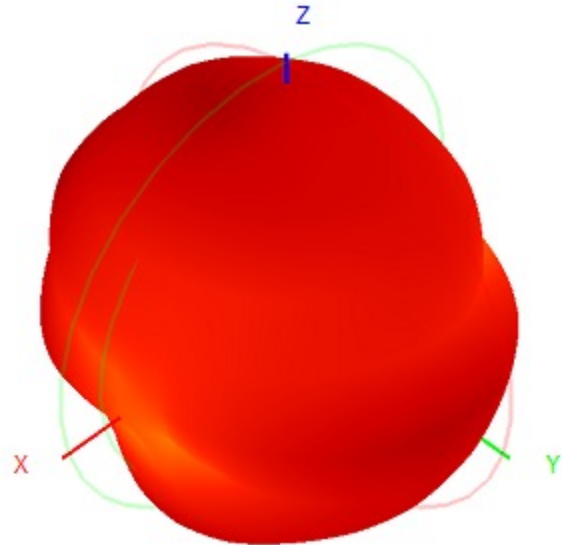
# 3D Radiation Pattern

LORA-1

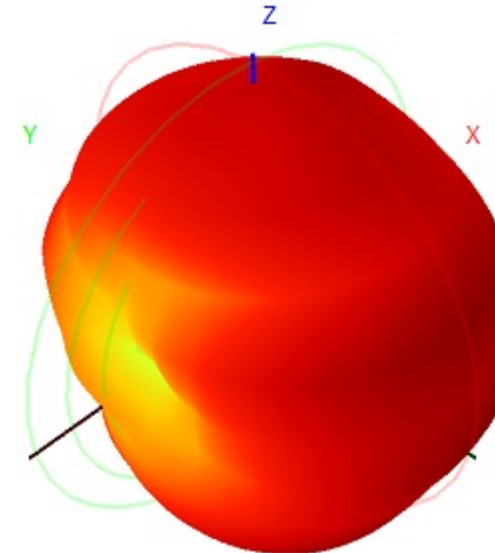


902 MHz

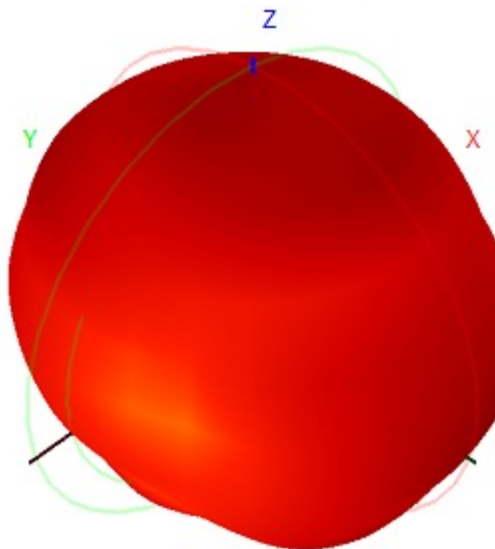
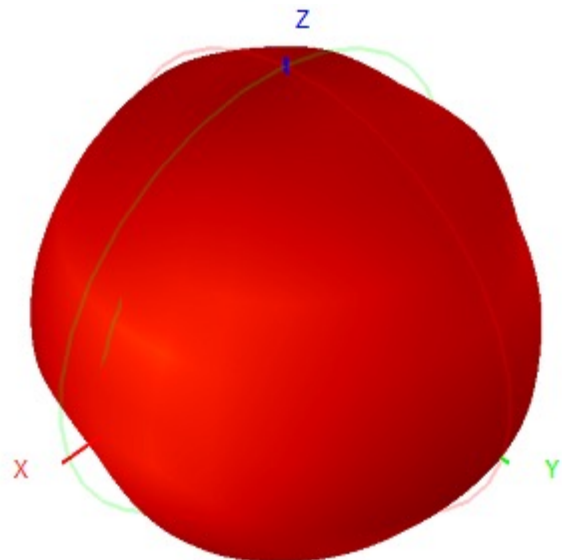
Front View



Back View

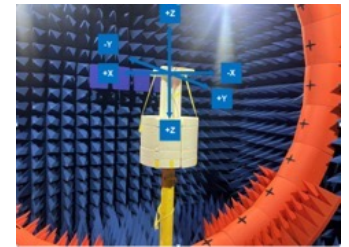


928 MHz

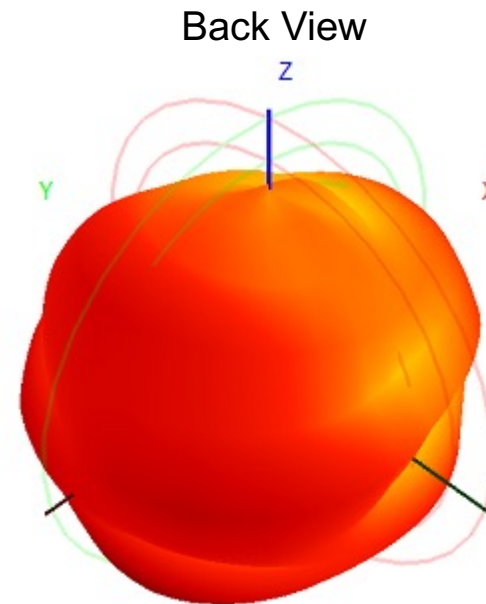
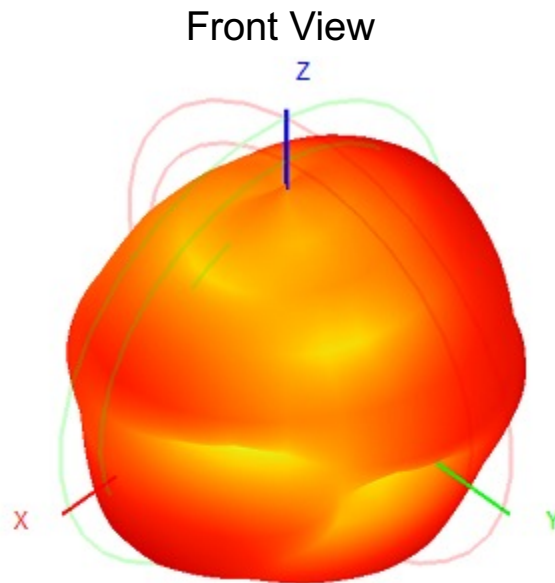


# 3D Radiation Pattern

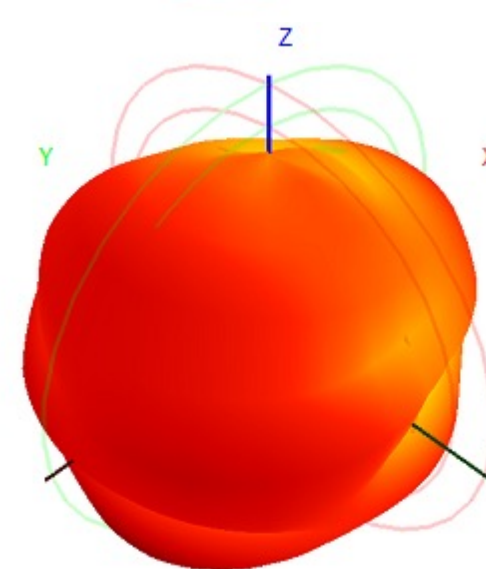
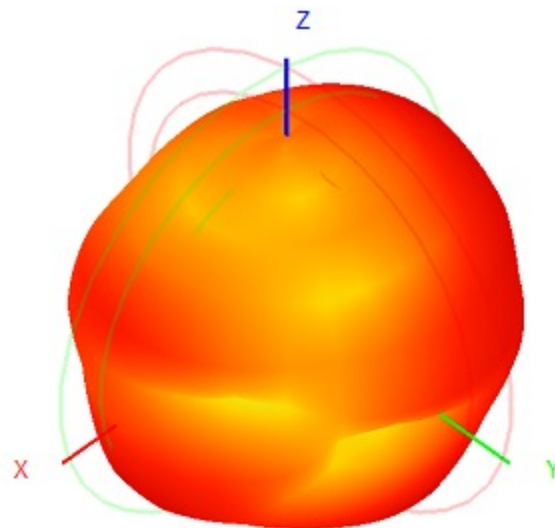
LORA-2



863 MHz

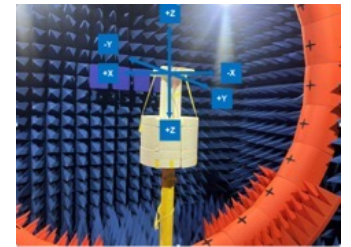


870 MHz

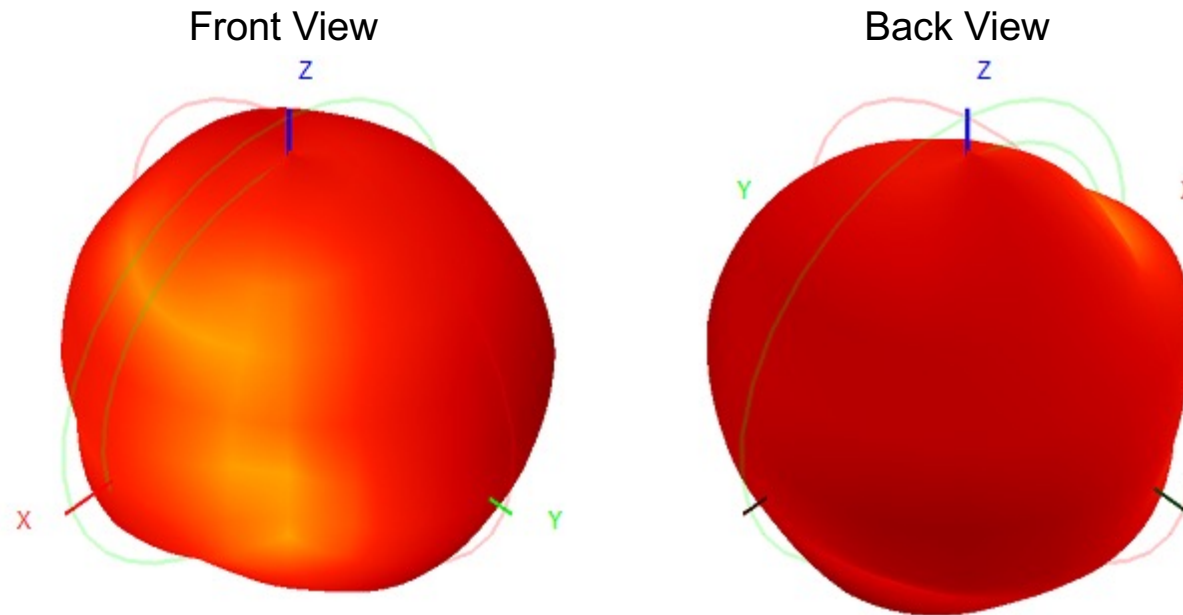


# 3D Radiation Pattern

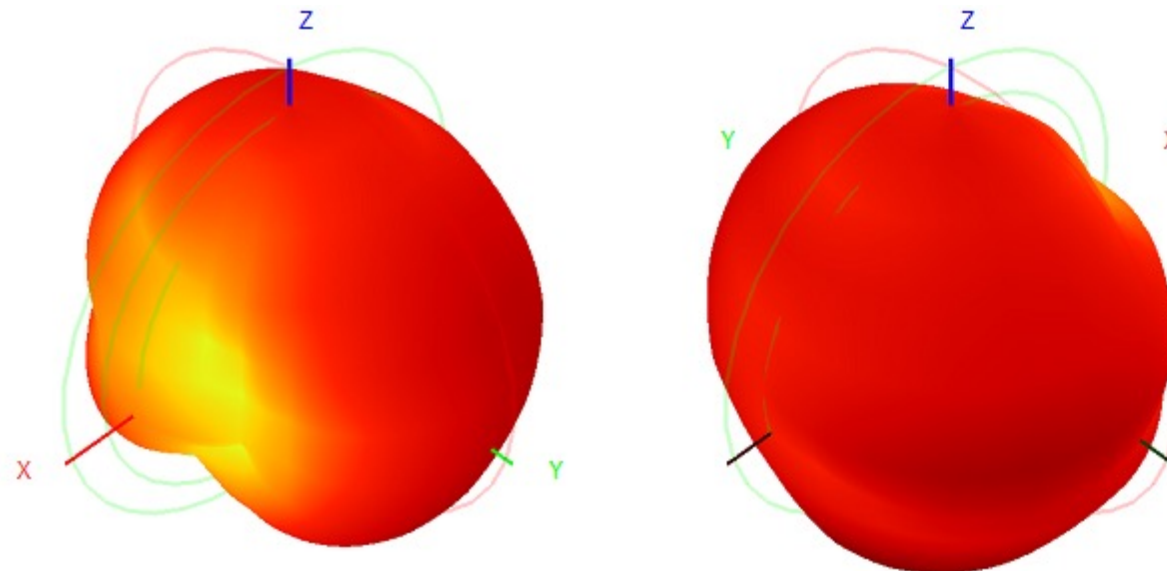
LORA-2



902 MHz



928 MHz



# Results Summary

V.S.W.R (863-870 / 902-928 MHz) (Criterion: <3.0)

| Frequency (MHz) | LORA-1 | LORA-2 |
|-----------------|--------|--------|
| 863             | 1.75   | 2.14   |
| 870             | 2.09   | 2.06   |
| 902             | 2.02   | 1.55   |
| 928             | 1.24   | 1.71   |

# Results Summary

## Isolation

| Frequency (MHz) | LORA-1 & LORA-2 (dB) |
|-----------------|----------------------|
| 863             | -9.2                 |
| 870             | -8.5                 |
| 902             | -6.9                 |
| 928             | -7.5                 |

# Results Summary

Peak Gain (Criterion: 863-870/902-928 MHz )

| Frequency (MHz) | LORA-1 (dBi) | LORA-2 (dBi) |
|-----------------|--------------|--------------|
| 863.0           | 0.24         | 0.92         |
| 864.0           | 0.22         | 0.97         |
| 865.0           | 0.21         | 1.04         |
| 866.0           | 0.15         | 1.07         |
| 867.0           | 0.12         | 1.12         |
| 868.0           | 0.09         | 1.17         |
| 869.0           | 0.07         | 1.24         |
| 870.0           | 0.06         | 1.31         |
| 902.0           | 0.62         | -0.13        |
| 915.0           | 0.02         | -0.12        |
| 928.0           | -0.64        | 0.49         |

# Results Summary

Efficiency (963-870 / 902-928MHz)

| Frequency (MHz) | LORA-1 (%) | LORA-2 (%) |
|-----------------|------------|------------|
| 863.0           | 43.20      | 34.51      |
| 864.0           | 43.08      | 34.70      |
| 865.0           | 43.12      | 35.05      |
| 866.0           | 42.95      | 35.26      |
| 867.0           | 42.94      | 35.62      |
| 868.0           | 43.00      | 36.02      |
| 869.0           | 43.14      | 36.50      |
| 870.0           | 43.27      | 36.96      |
| 902.0           | 43.93      | 43.57      |
| 915.0           | 45.79      | 43.55      |
| 928.0           | 46.29      | 40.43      |

TX

RX

