



ACCELERATING  
INNOVATION

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## **Job#1475 Carrier IBOX Supra Lock**

**Updated Rev J RF Report, added antenna test equipment with Calibration tags, antenna assembly part number with revision and antenna picture for FCC certification**



# Revision History

Antenna P/N	1005268-01	
Revision	Date	Description of changes
Rev. A	Nov 08, 2019	BASELINE THE BT OEM ANTENNA INSIDE THE SAMPLE UNIT FROM CARRIER IBOX SUPRA LOCK
Rev. A.1	Nov 08, 2019	BASELINE THE BT OEM ANTENNA and AVX ETHERTRONICS BT FPC ANTENNA DESIGN INSIDE THE SAMPLE UNIT FROM CARRIER IBOX SUPRA LOCK
Rev. B	Nov 15, 2019	BLE TESTING FOR AVX ETHERTRONICS BT FPC ANTENNA DESIGN INSIDE THE SAMPLE UNIT FROM CARRIER IBOX SUPRA LOCK
Rev. C	Jan 28, 2020	BASELINE and TUNING AVX ETHERTRONICS BT LDS ANTENNA DESIGN INSIDE THE SAMPLE UNIT FROM CARRIER IBOX SUPRA LOCK
Rev. D.1	Sept 28, 2020	BASELINE AND FINE TUNING 1005268-A_AVX ETHERTRONICS BT ANTENNA INSIDE THE SAMPLE UNIT FROM CARRIER IBOX SUPRA LOCK
Rev. D.3	Oct 13, 2020	BEFORE AND AFTER POTTING OF BASELINE AND FINE TUNING 1005268-A_AVX ETHERTRONICS BT ANTENNA INSIDE THE SAMPLE UNIT FROM CARRIER IBOX SUPRA LOCK
Rev. E	Oct 28, 2020	MATCHING COMPARISON of BEFORE AND AFTER POTTING OF 1005268-A_AVX ETHERTRONICS BT ANTENNA INSIDE THE SAMPLE UNIT FROM CARRIER IBOX SUPRA LOCK
Rev. G	July 30, 2021	EVALUATION BEFORE AND AFTER POTTING OF 1005268-01_AVX ETHERTRONICS BT ANTENNA INSIDE THE SAMPLE UNIT FROM CARRIER IBOX SUPRA LOCK
Rev. H.1	Oct 28, 2021	Baseline BLE Testing of Kyocera-AVX Part#1005268-01 Antenna Inside New Carrier IBOX Supra Lock
Rev. I.1	Nov 11, 2021	Debugging Carrier IBOX Sample Units

# Revision History

Antenna P/N	1005268-01; 1005415-01 Rev F	
Revision	Date	Description of changes
Rev. J	Nov 12, 2021	Passive Evaluation of Kyocera-AVX Part#1005268-01 Antenna Inside New Carrier IBOX Supra Lock with Potting
Rev. J.1	April 16, 2024	Updated Rev J RF Report, added antenna test equipment with Calibration tags, antenna assembly part number with revision and antenna picture for FCC certification. Tested by : Rey Eguilos

# Content

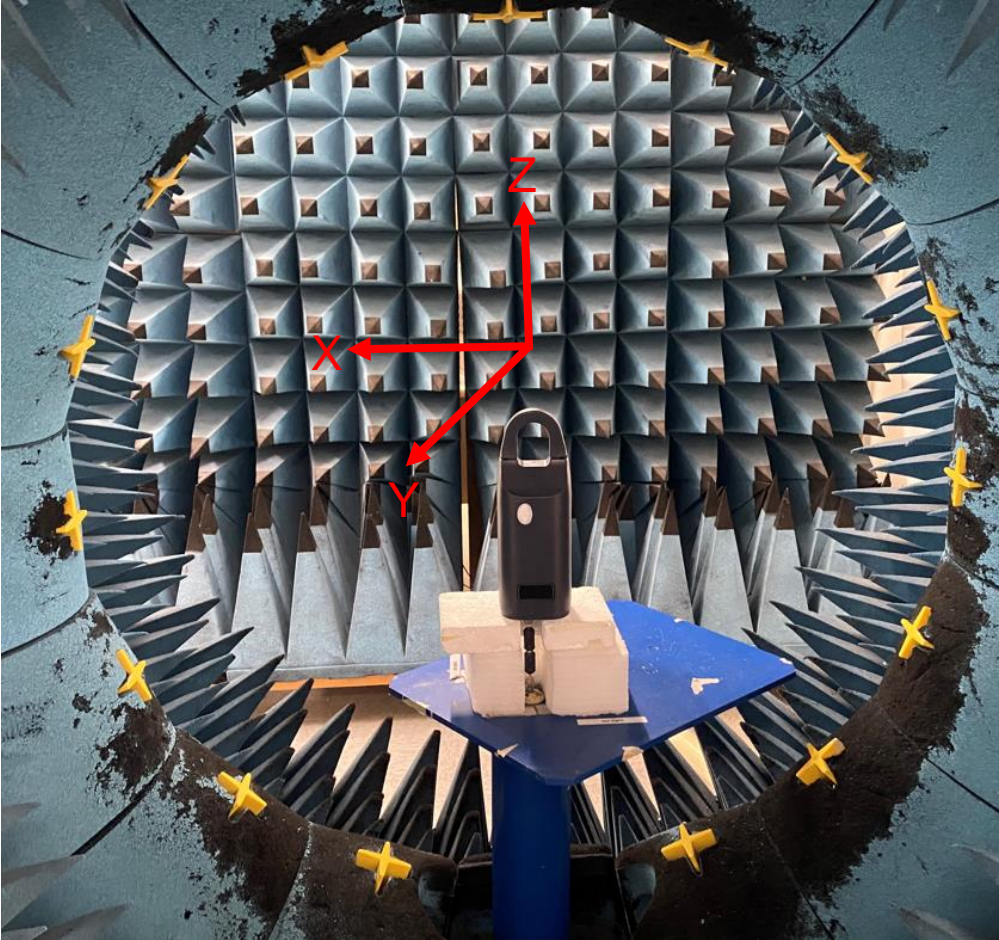
- Introduction
- Measurement Test Set Up and Test Equipment
- Antenna Matching Network
  - BT ANTENNA NEW MATCHING & VENDOR PART#
- Antenna performances
  - Return Loss
  - VSWR
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- Conclusions

# Introduction

- The purpose of this report is to baseline and fine tune sample unit of Kyocera-AVX Part#1005415-01 Rev F Antenna inside New Carrier IBOX with potting
- Measured return loss, efficiency, peak gain and 2d radiation pattern

# Measurement Test Setup

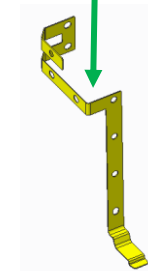
## Radiation Patterns and Total Efficiency



Satimo Chamber



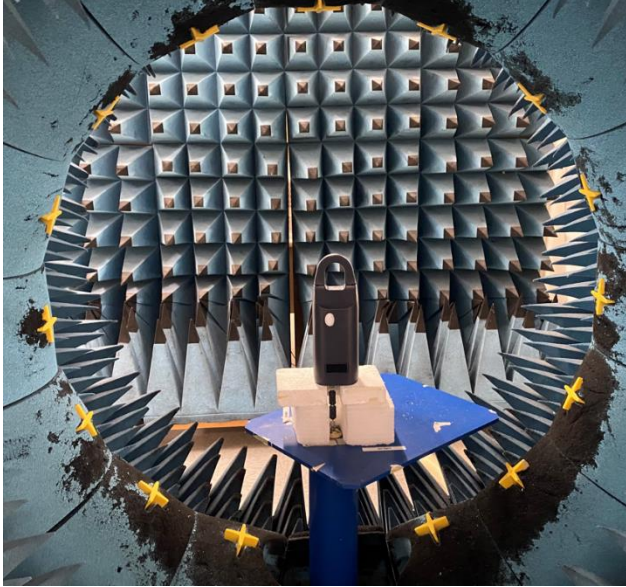
1005415-01 Rev. F  
Antenna Assembly



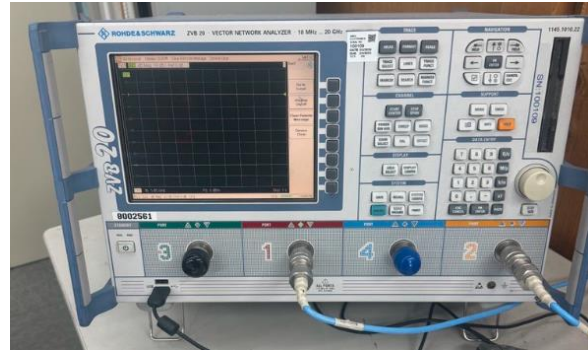
1005271 BT Antenna

# Test Equipment

## Passive Measurements : Satimo Starlab 15



Satimo Chamber



ROHDE&SCHWARZ\_Model\_ZVB 20\_  
Vector Network Analyzer



Calibration Date Tags

Passive Measurements are measured in Satimo Starlab 15 with ROHDE&SCHWARZ\_Model\_ZVB 20\_Vector Network Analyzer

# Test Equipment

## S-Parameters

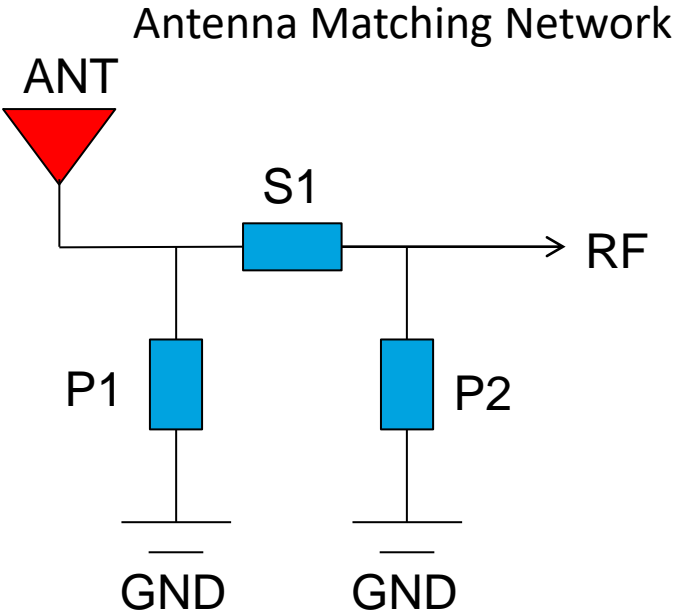


Calibration Date Tags



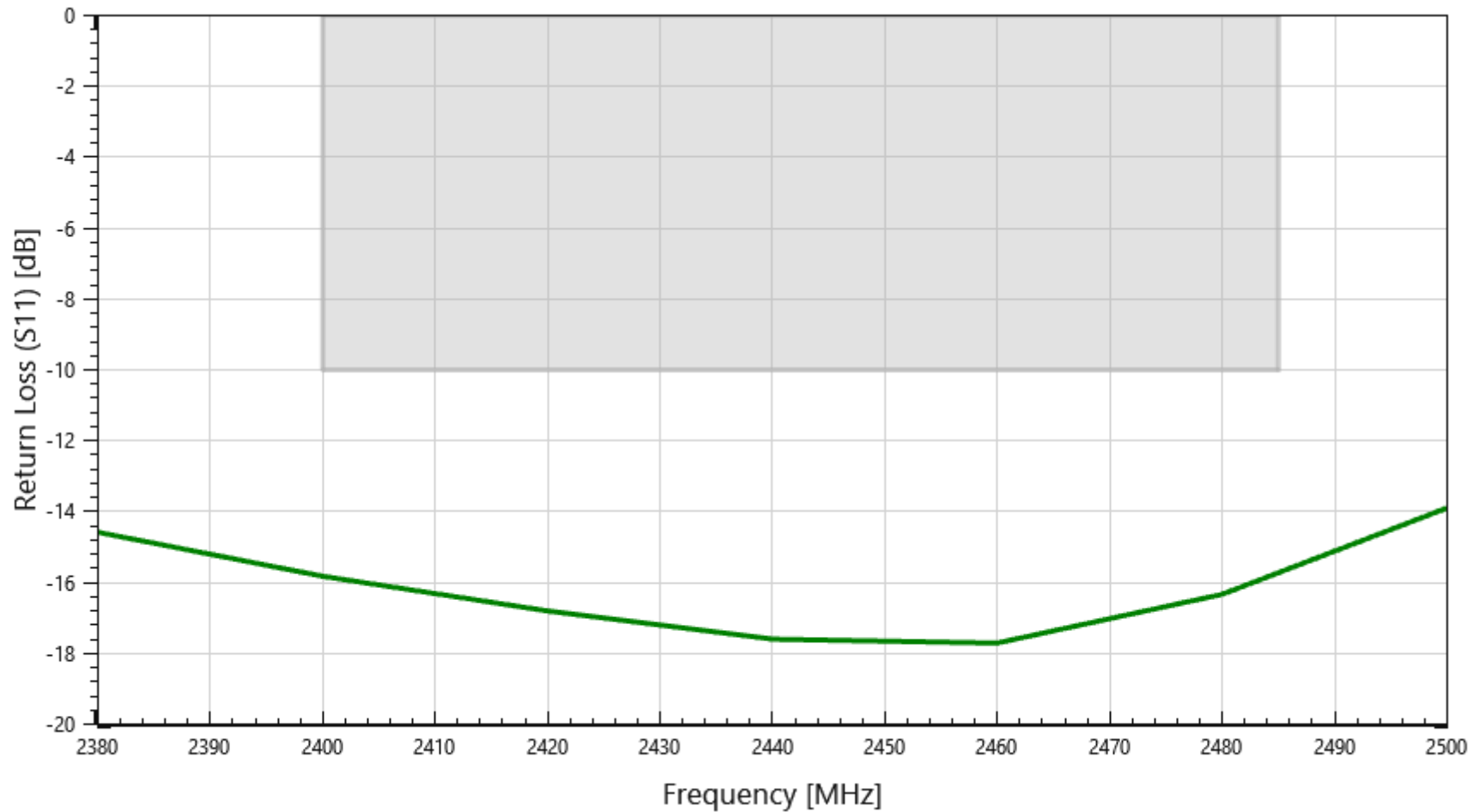
All S-parameters, Return Loss values and Isolations are measured with a Vector Network Analyzer covering 30 kHz to 6 GHz (M5090 Copper Mountain)

# 1005415-01 Rev F\_BT Antenna Matching Components and Vendor Part #



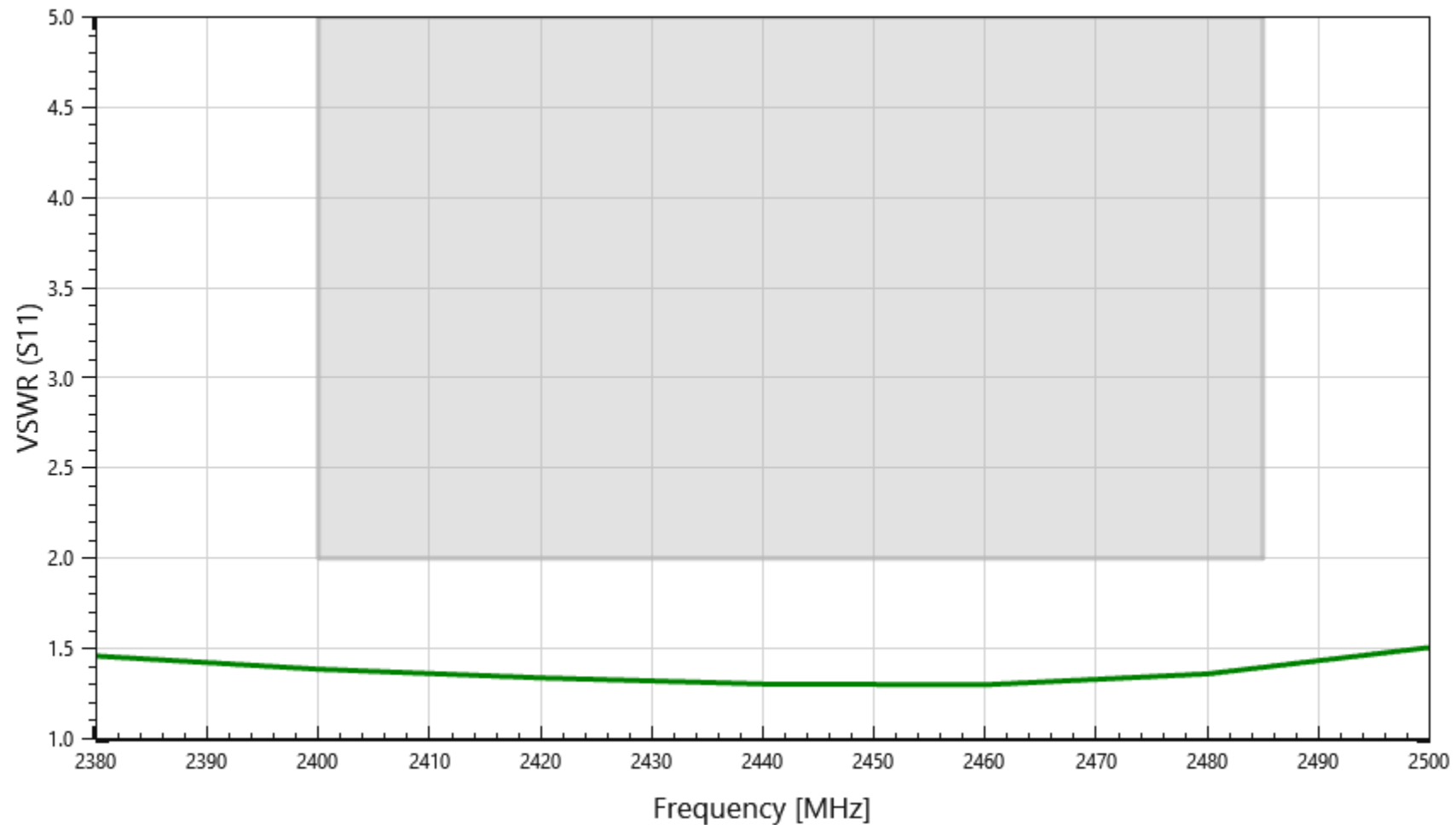
	P1	S1	P2
Matching Components	NA	1nH	1.8 pF
Digi-Key Part #	NA	478-6906-2-ND	478-4408-2-ND
Tolerance	NA	±0.1nH	±0.05pF
MANUFACTURER	NA	Kyocera-AVX	Kyocera-AVX
Manufacturer Part#	NA	HL021R0BTTR	04023J1R8ABSTR

# Return Loss



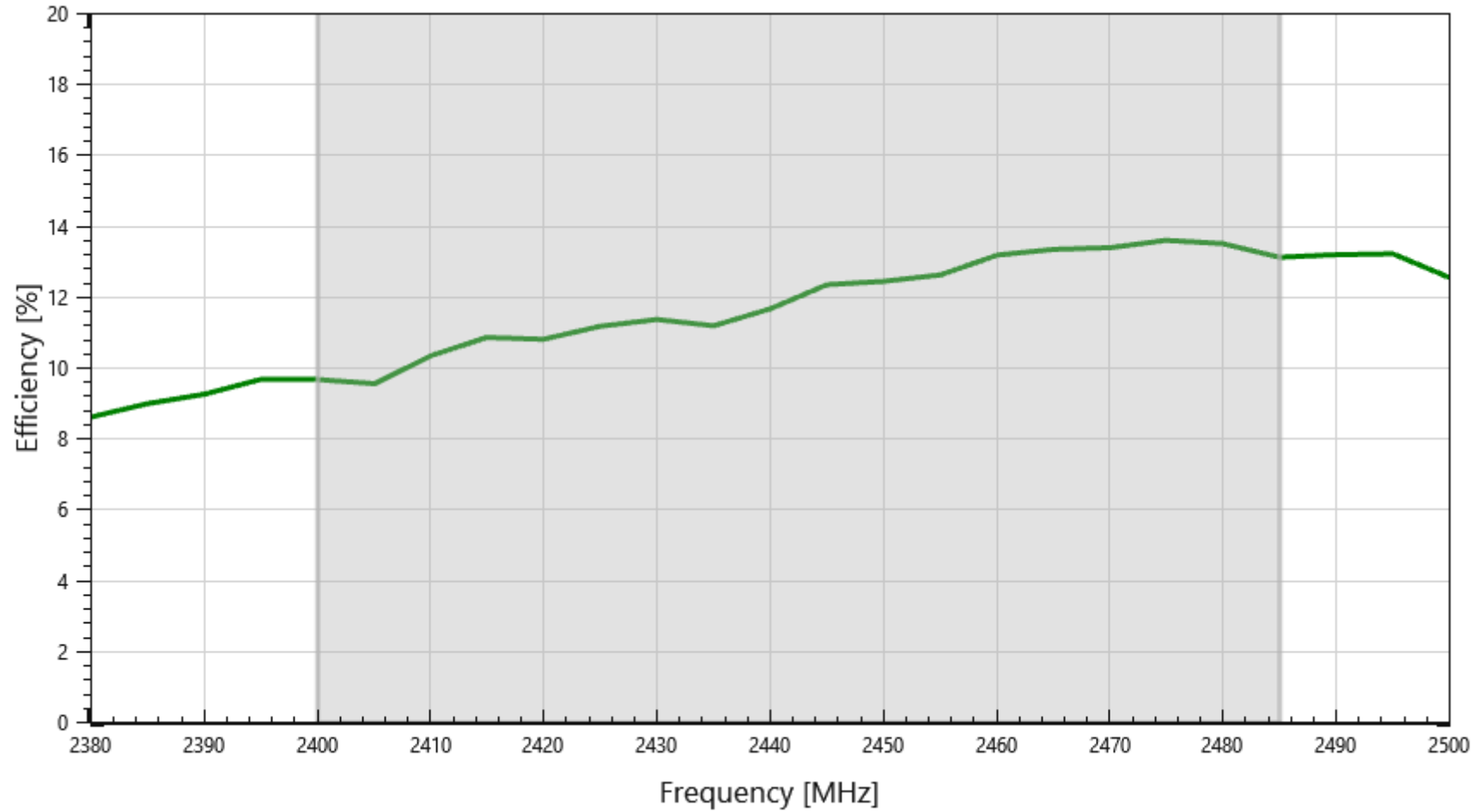
1005415-01 Rev F\_BT Ant inside Sample Unit Full Assy with Potting

# VSWR



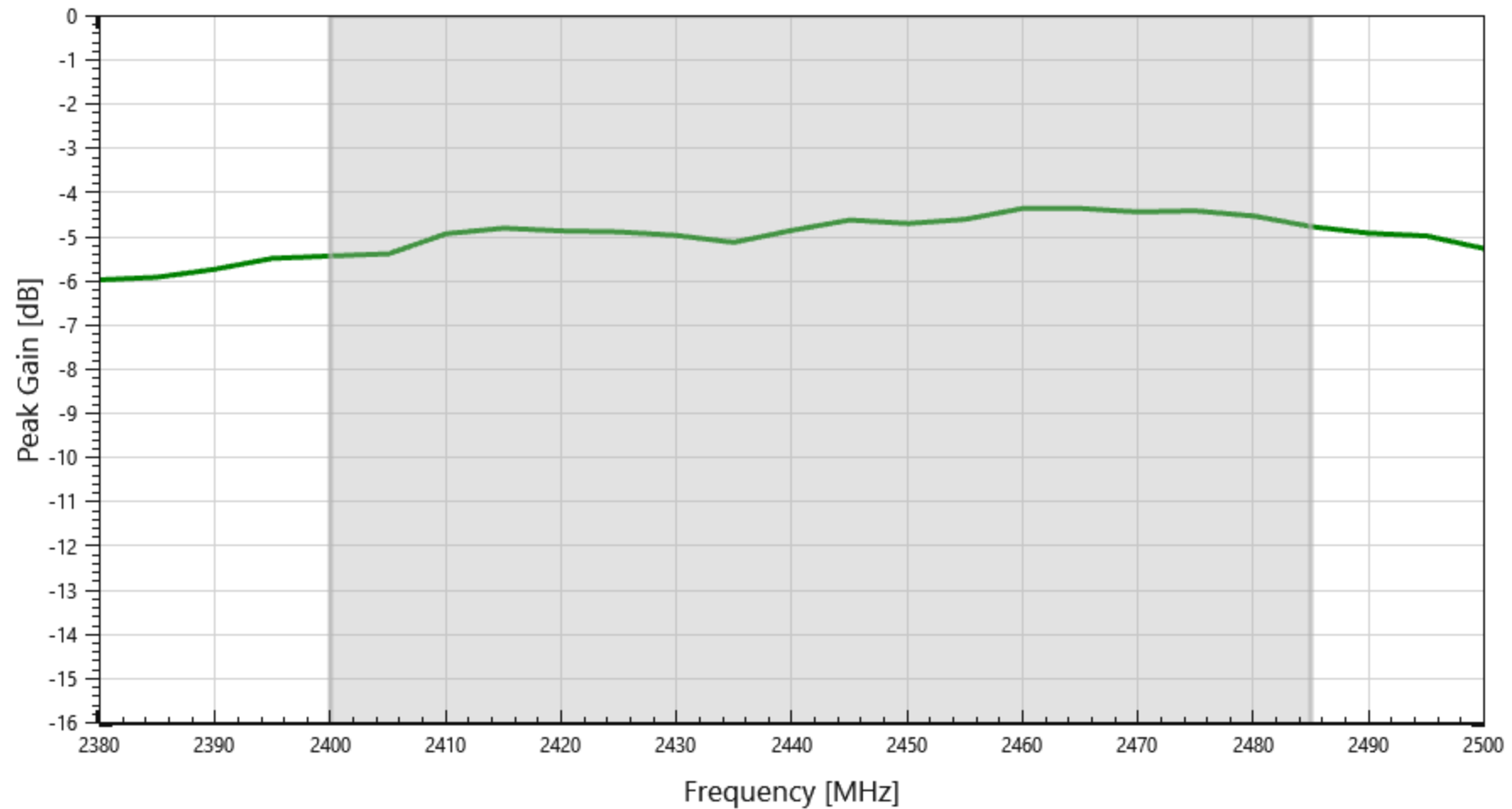
1005415-01 Rev F\_BT Ant inside Sample Unit Full Assy with Potting

# Efficiency



1005415-01 Rev F\_BT Ant inside Sample Unit Full Assy with Potting

# Peak Gain

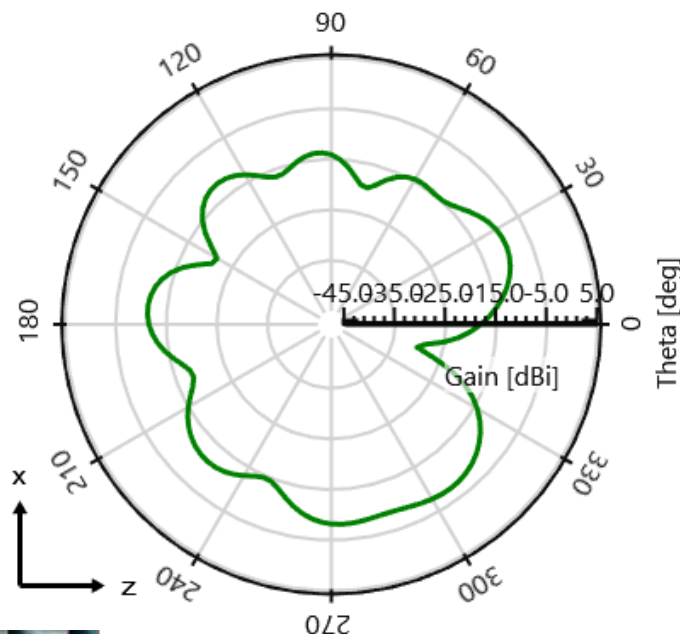


1005415-01 Rev F\_BT Ant inside Sample Unit Full Assy with Potting

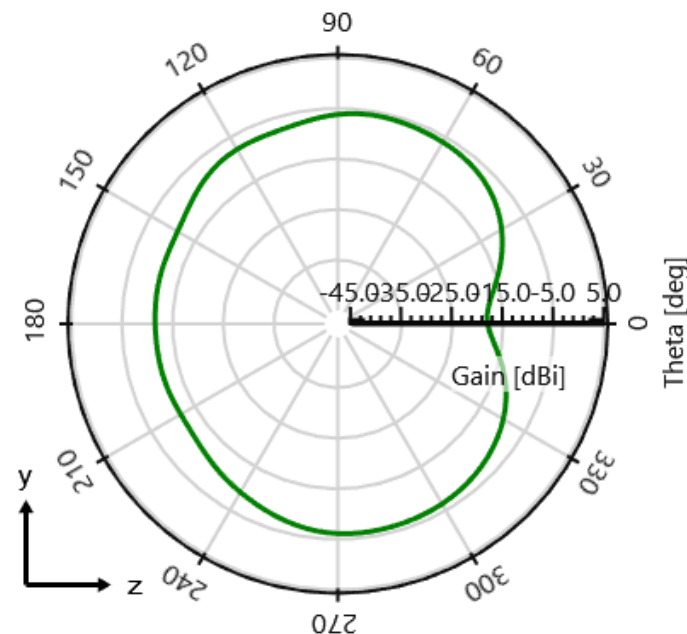
# Antenna performances

## Radiation pattern - 2.4GHz- 2D Cuts at 2440 MHz

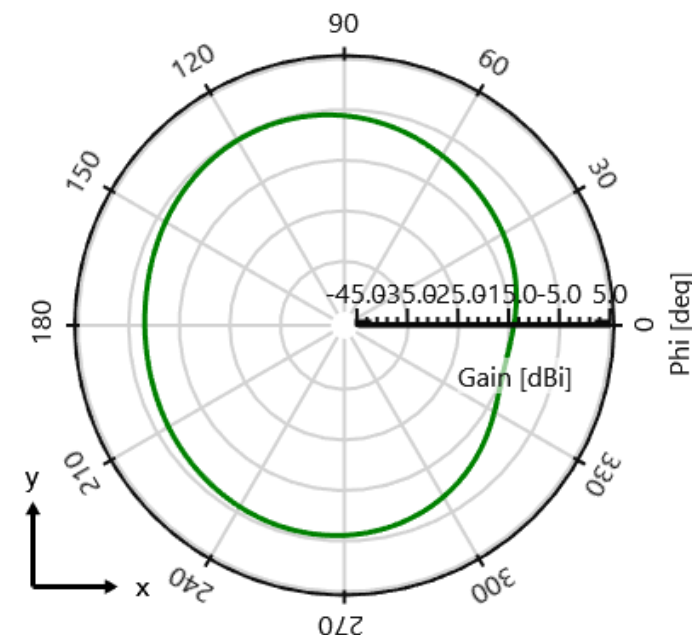
Gain (Total) -  $\phi = 0$  deg - 2440 MHz [Plane XZ]



Gain (Total) -  $\phi = 90$  deg - 2440 MHz [Plane YZ]



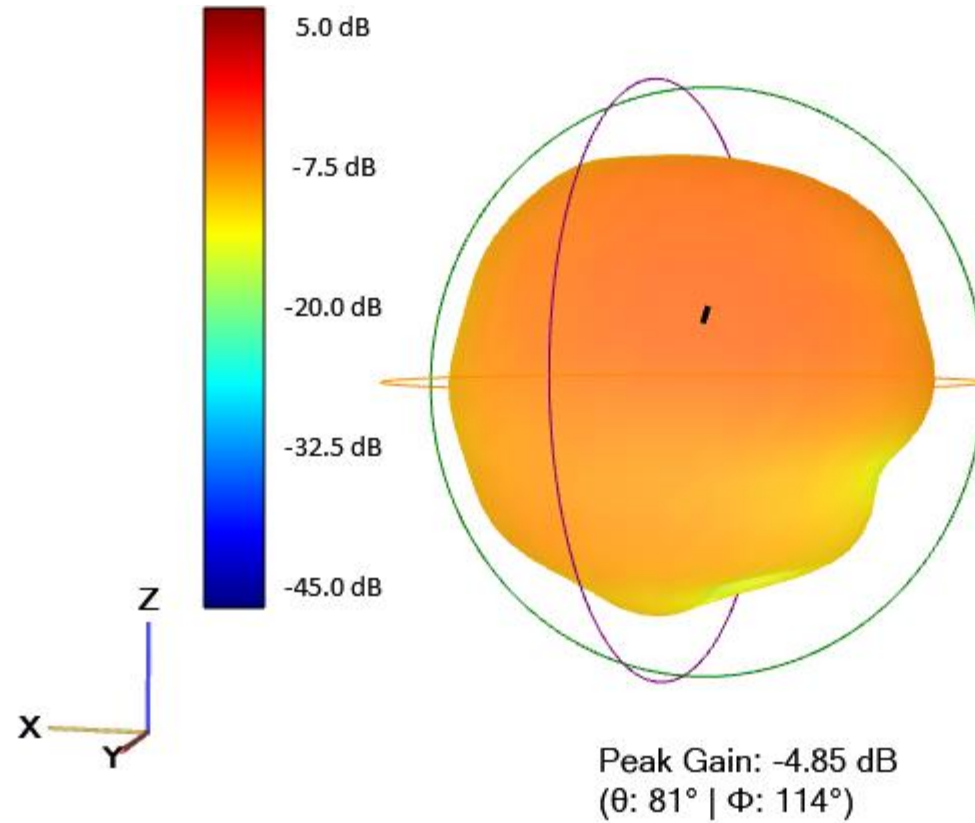
Gain (Total) -  $\theta = 90$  deg - 2440 MHz [Plane XY]



1005415-01 Rev F\_BT Ant inside Sample Unit Full Assy with Potting

# 3D Radiation Pattern

1005415-01 Rev F\_BT Ant inside Sample Unit Full Assy with Potting



# Conclusion

Average Efficiency & Maximum Peak Gain for New Sample Unit with Potting RF performances are summarized below :

Set Up Descriptions	Average Efficiency 2.4GHz	Maximum Peak Gain 2.4GHz
1005415-01 Rev F_BT Ant inside Sample Unit Full Assy with Potting	11.91 %	- 4.35 dBi

NOTE: Refer to Slide 9 for New Matching Components of New Sample Unit with potting

# THANK YOU.



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