

# AP734 Test Report v7



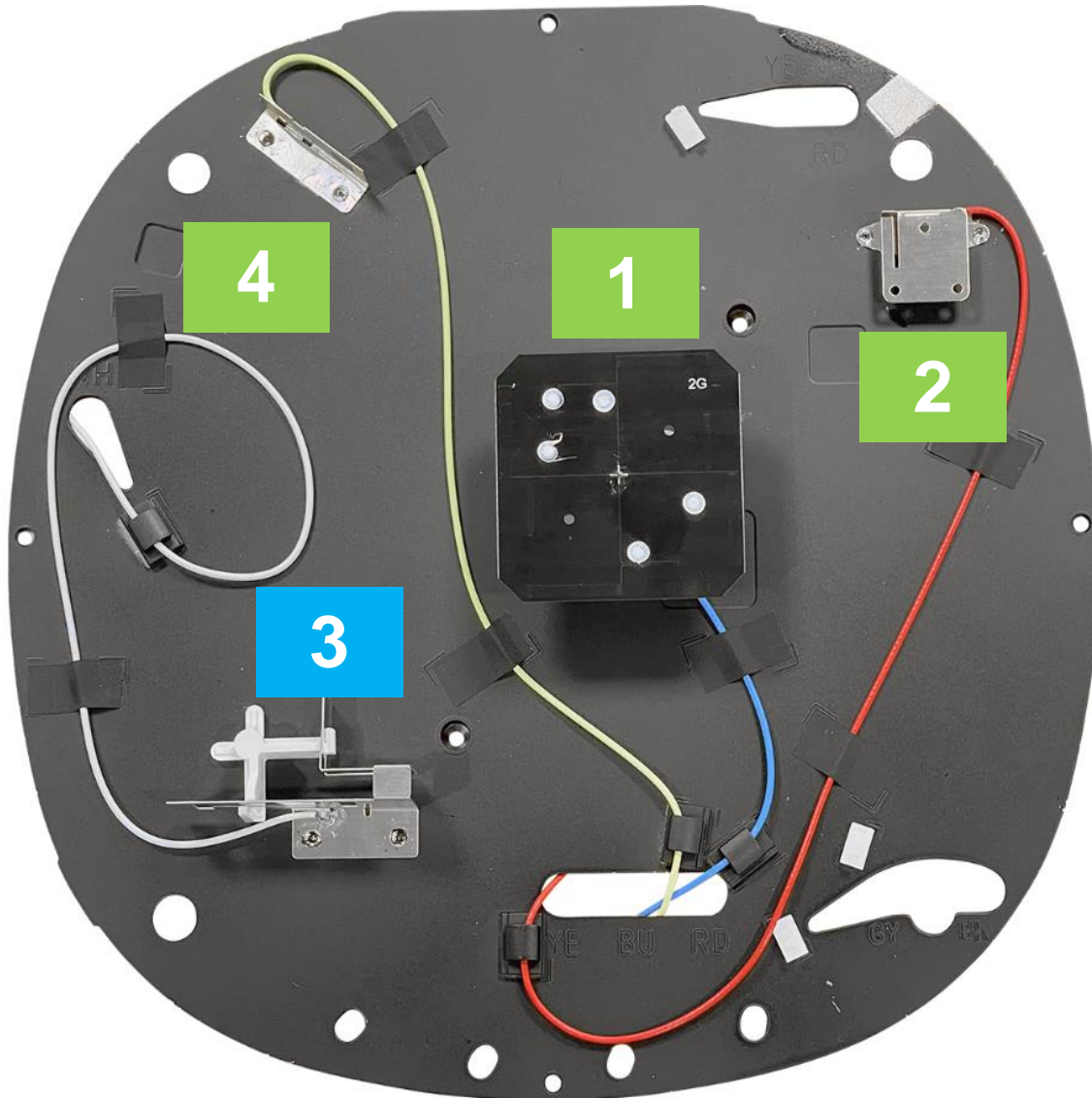
## Project Name: AP734

- |                                      |           |
|--------------------------------------|-----------|
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# Conformity to Specification-1

	ANT Item	1: BLE-1	2: BLE-2	3: GPS(cross-pole) L1+L5	4: BLE-3	Conformity Check
Basic Electrical Requirements	Frequency Range	2.4GHz~2.5GHz	2.4GHz~2.5GHz	1.1GHz~1.6GHz	2.4GHz~2.5GHz	Yes
	Impedance	50 ohm				Yes
	VSWR	< 2:1				Yes
	Efficiency	> 70%				<b>N</b> (exclude cable loss)
	Max Power	30 dBm				Yes
	Isolation	BLE↔BLE:20dB ; BLE↔GPS: 30dB				Yes
	Radiation Pattern	Polarization	H	V	Hybrid-Polarity	V
Max Gain L1/L5		-	-	1dBi< G< 3dBi	-	Yes
Max Gain 2.4GHz		3dBi< G< 5dBi	3dBi< G< 5dBi	-	3dBi< G< 5dBi	Yes
Vertical plane 3dB bandwidth		>35°				Some points slightly larger
Horizontal plane cut		Omnidirectional				Yes
Horizontal cut Gain Flatness		<10dB (@down tilt 60° , 70°)				Yes
Down tilt angle		65° (+/-5°)				<b>N</b>

# Antenna Definition



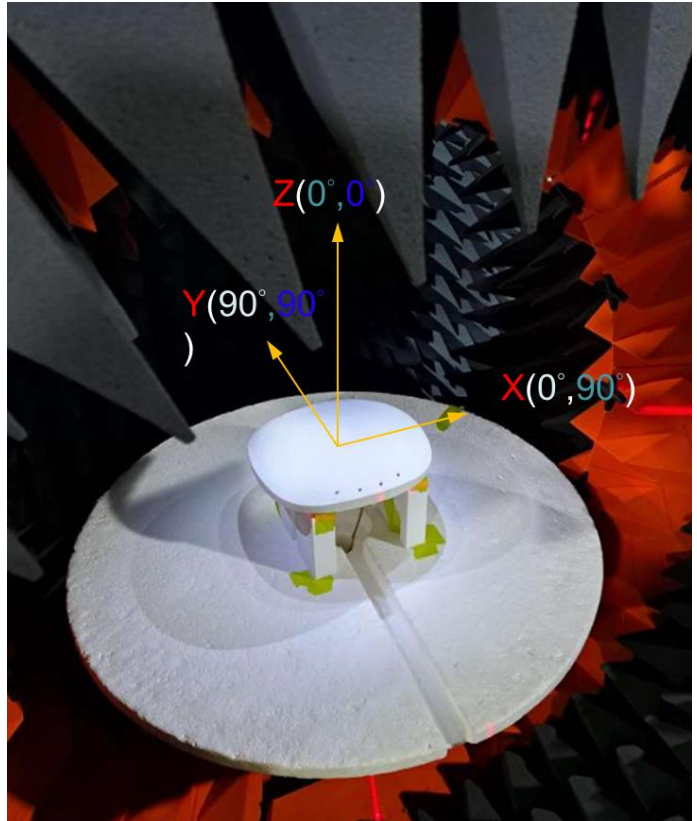
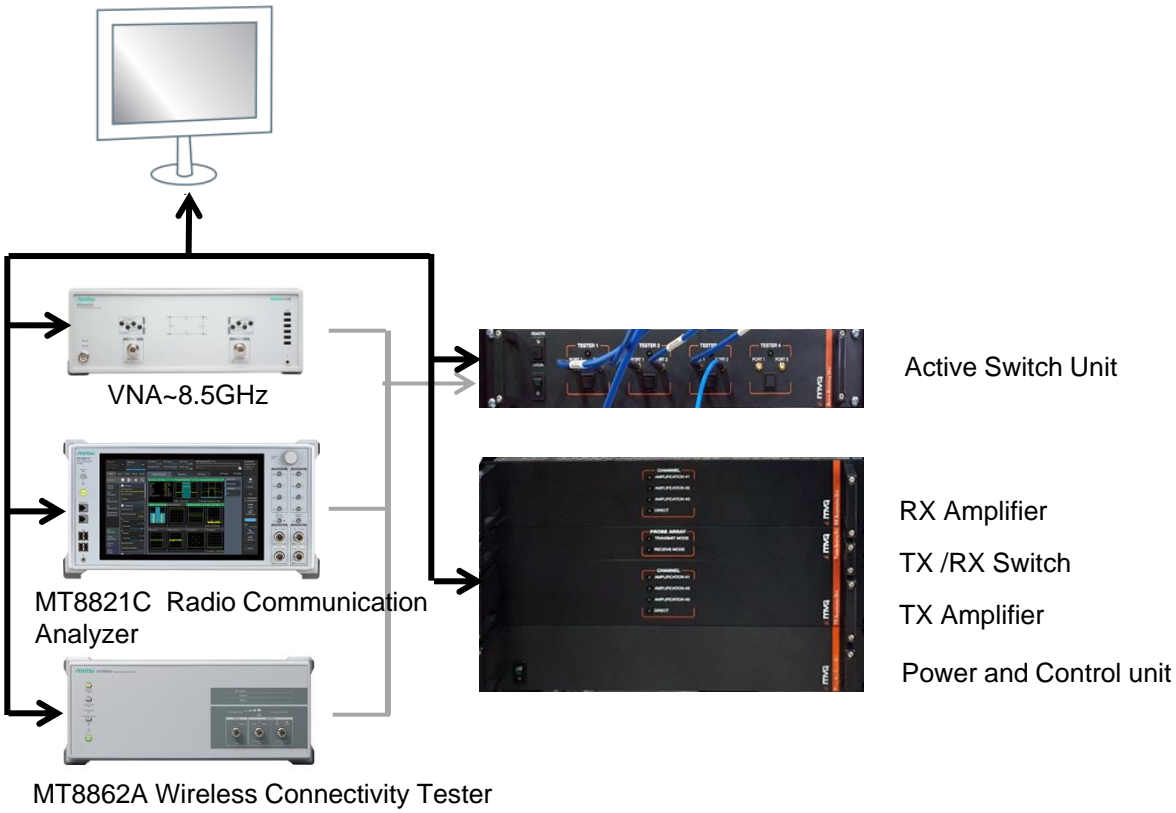
ANT 1 - BLE(H)

ANT 2 - BLE(V)

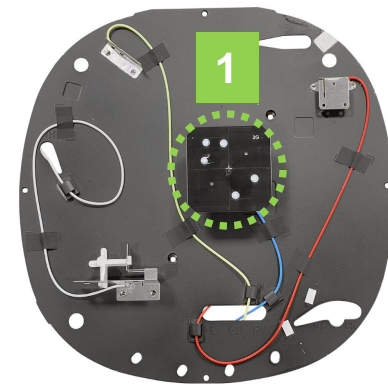
ANT 3 - GPS L1+L5

ANT 4 - BLE(V)

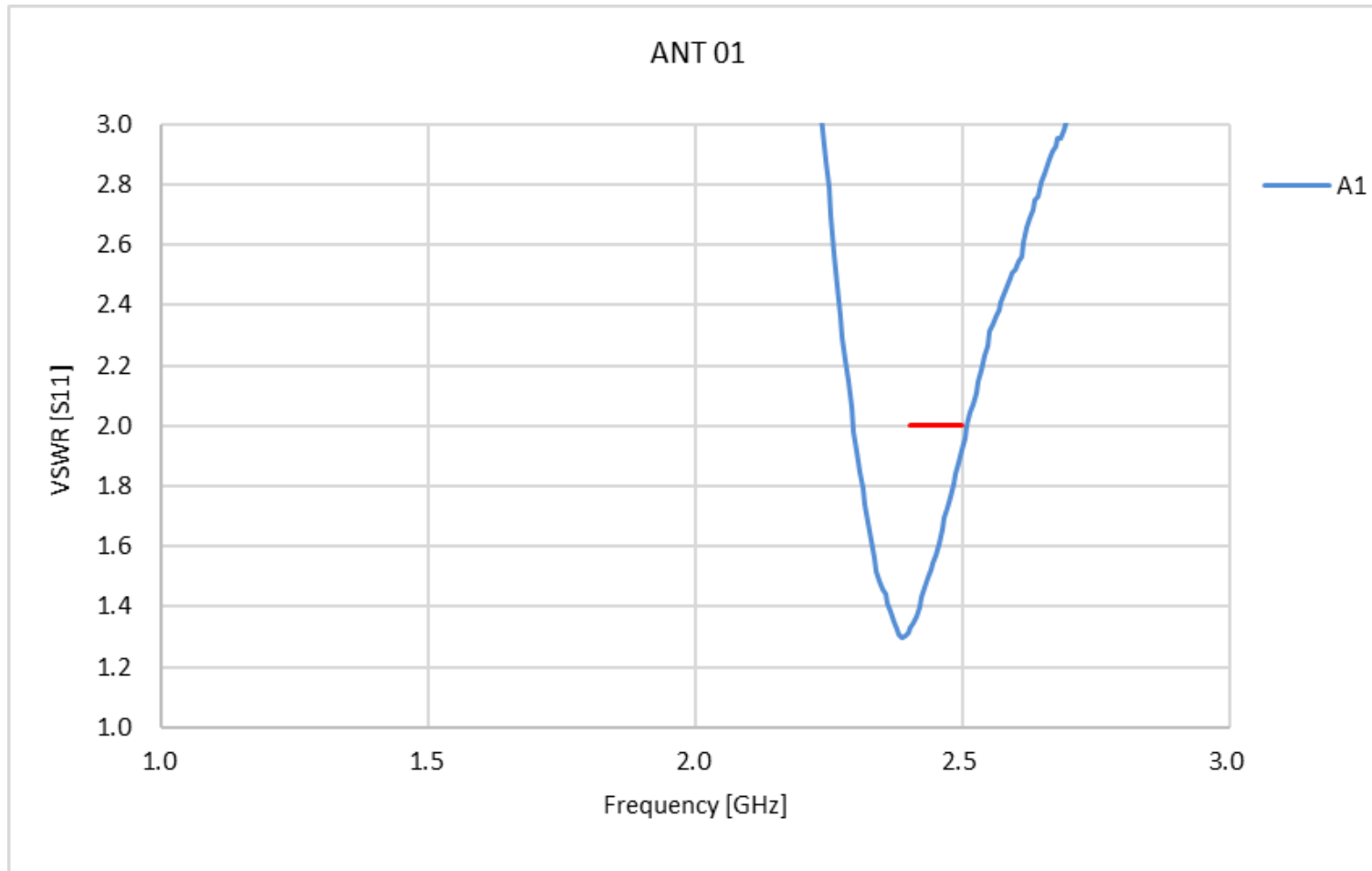
# Chamber and Scanning Orientation



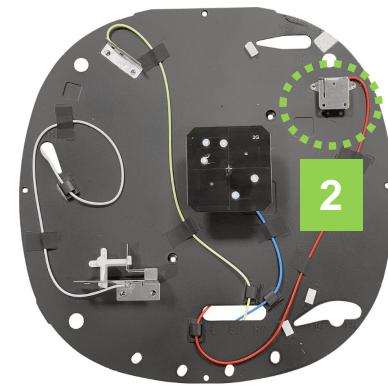
# S-parameter: VSWR- ANT 1 – 2G PCB(H)-BLE 1



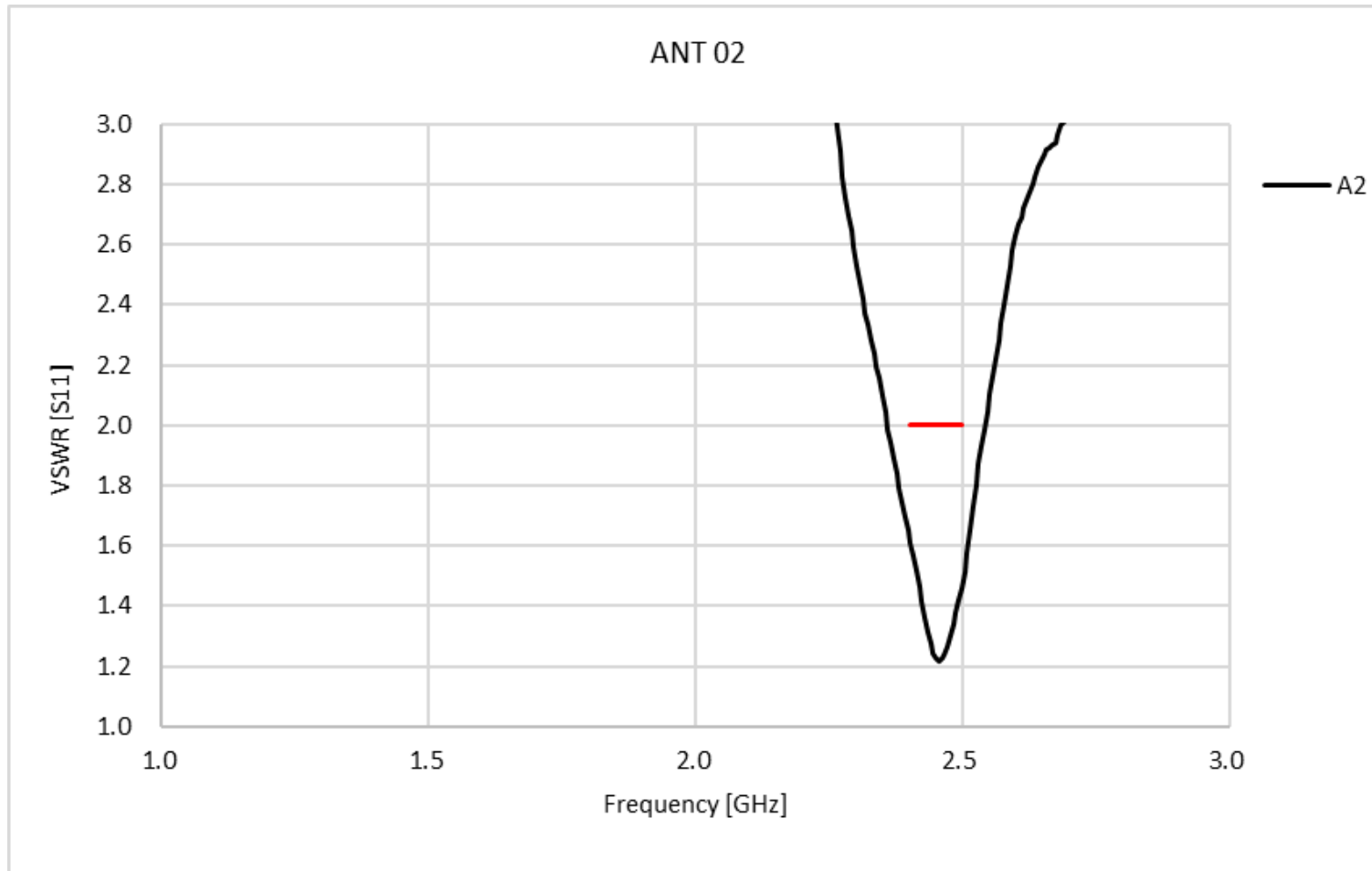
Frequency (MHz)	2G	Spec.	Result	Test Value (MAX)
VSWR	2400~2500	2.0 MAX	Pass	1.92



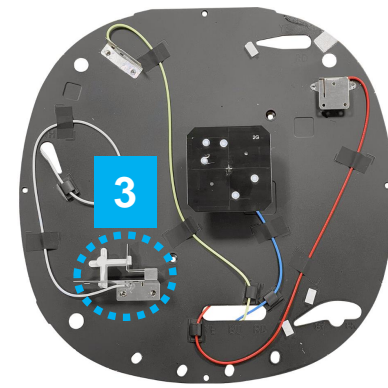
# S-parameter: VSWR- ANT 2 – 2G PIFA(V)-BLE 2



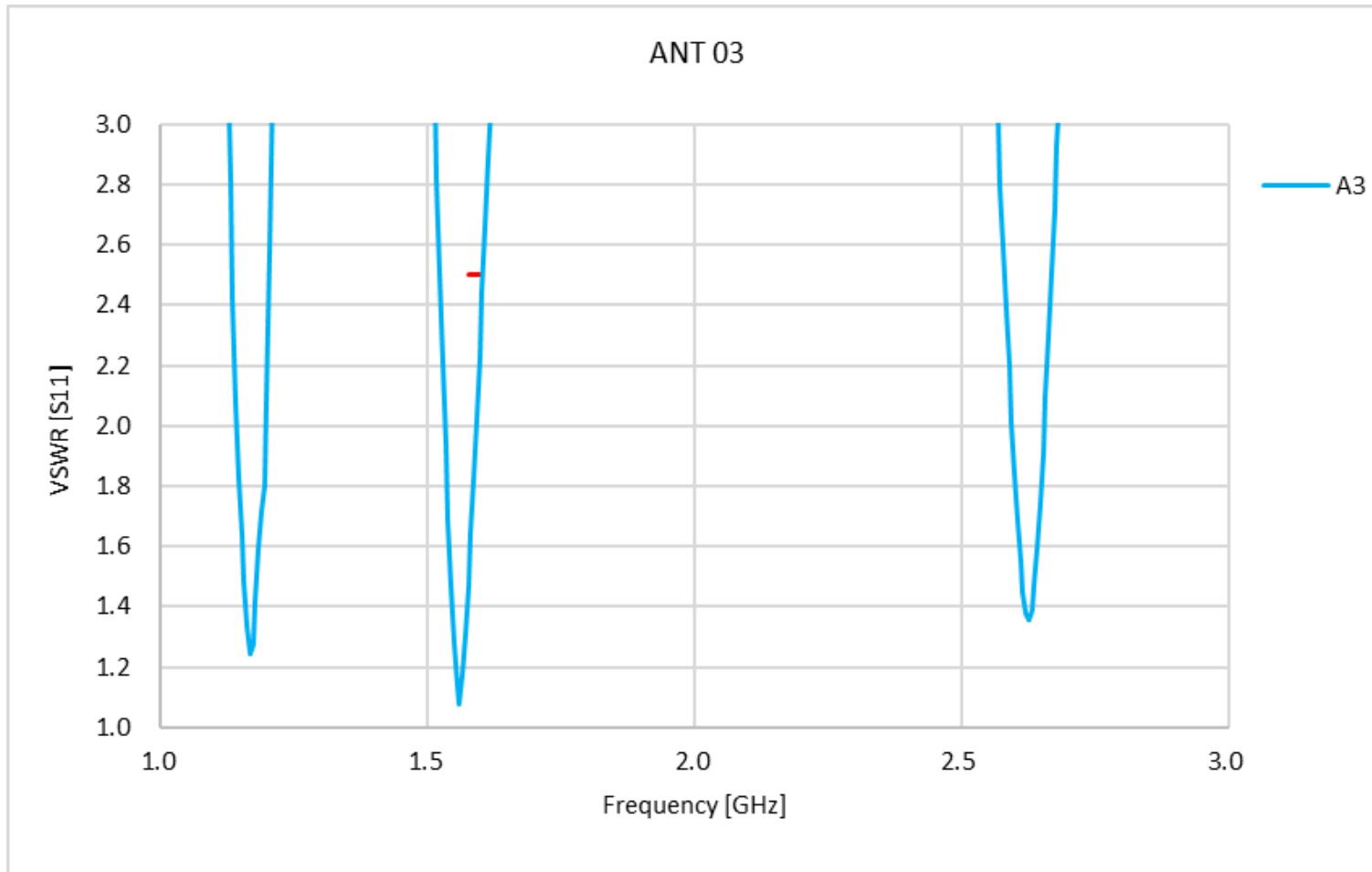
Frequency (MHz)	2G	Spec.	Result	Test Value (MAX)
VSWR	2400~2500	2.0 MAX	Pass	1.65



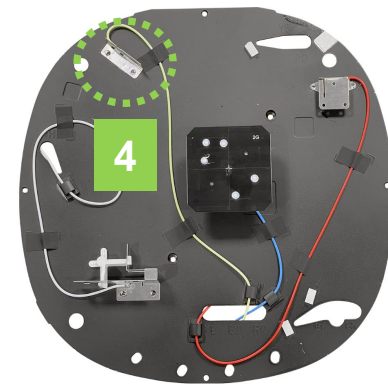
# S-parameter: VSWR- ANT 3 – GPS PIFA(V)-L1+L5



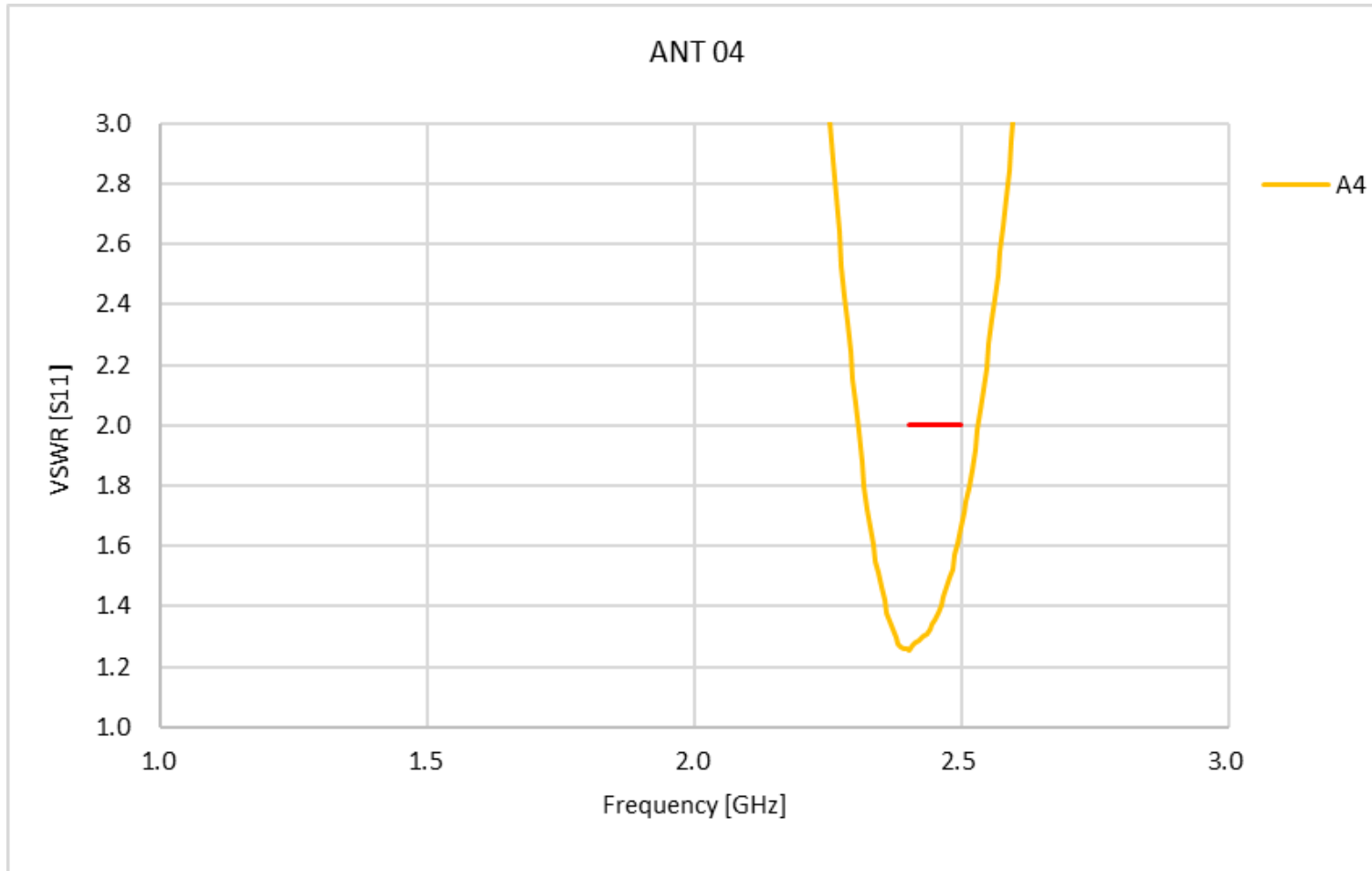
Frequency (MHz)	GPS	Spec.	Result	Test Value (MAX)
VSWR	1176	2.0 MAX	Pass	1.27
	1575~1602	2.5 MAX	Pass	2.44



# S-parameter: VSWR- ANT 4 – 2G PIFA(V)-BLE 3



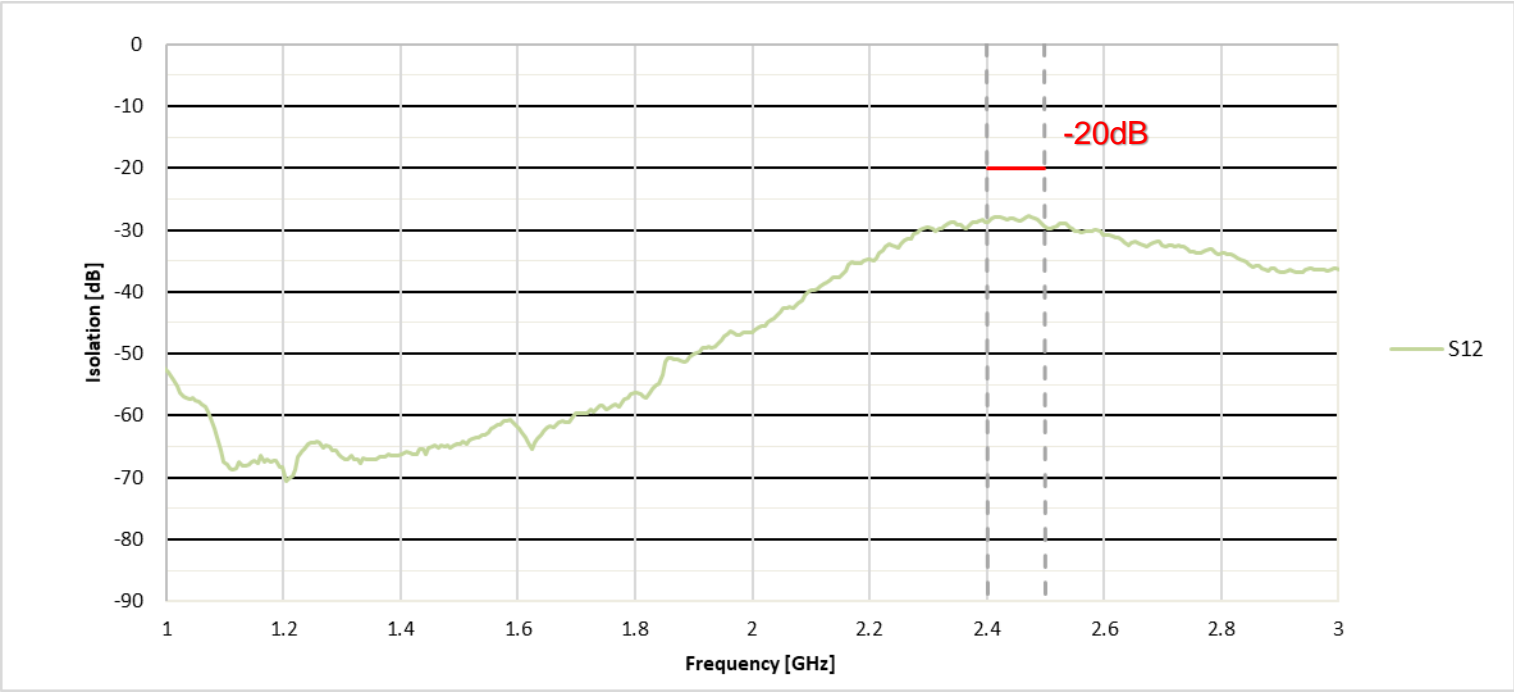
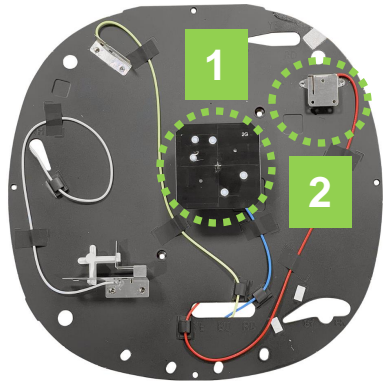
Frequency (MHz)	2G	Spec.	Result	Test Value (MAX)
VSWR	2400~2500	2.0 MAX	Pass	1.67





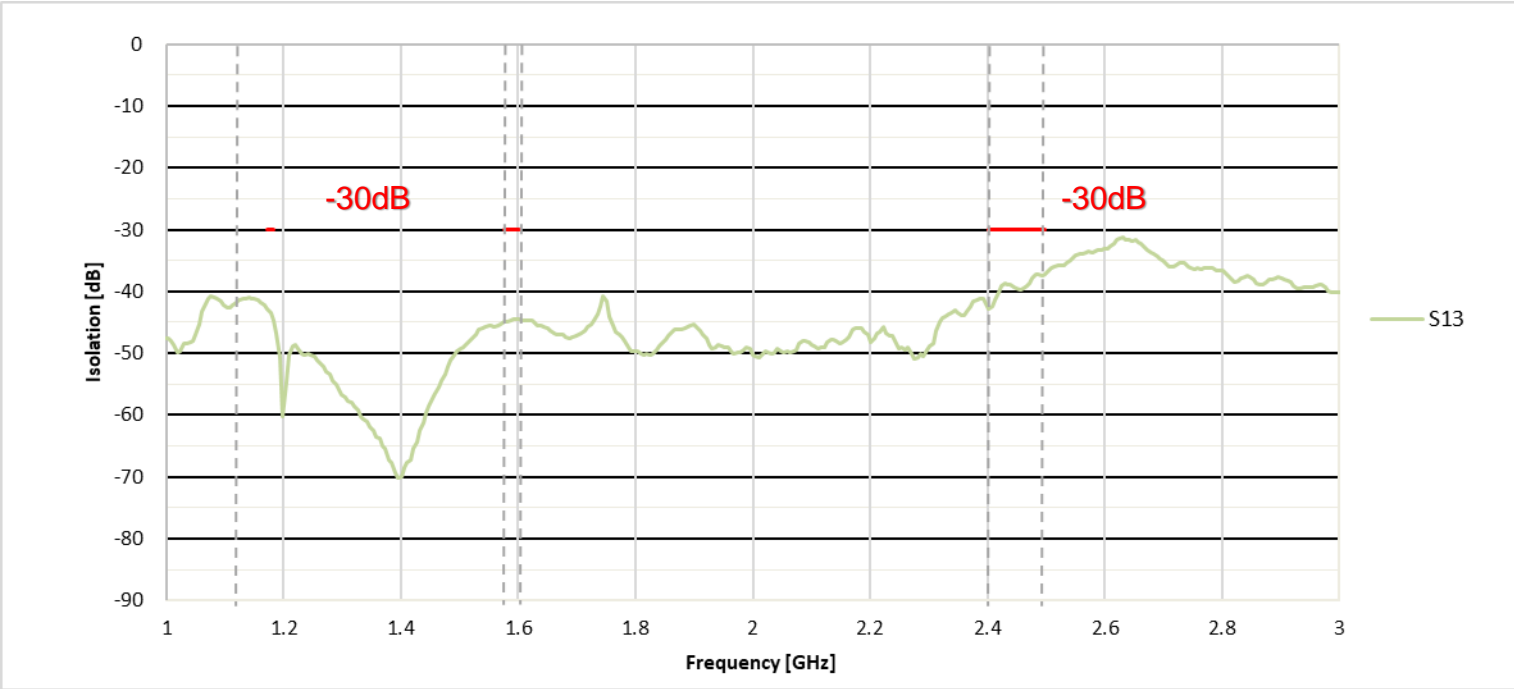
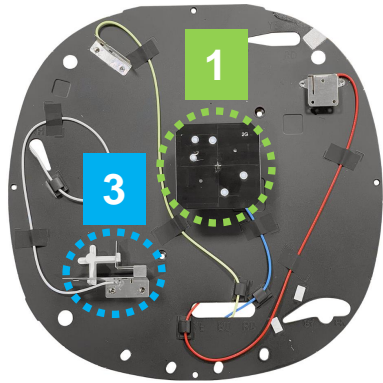
# Isolation - ANT 1 to ANT 2

Frequency (MHz)	2G	Spec.	Result	Test Value (MIN)
Isolation (dB)	2400~2500	-20	Pass	-27



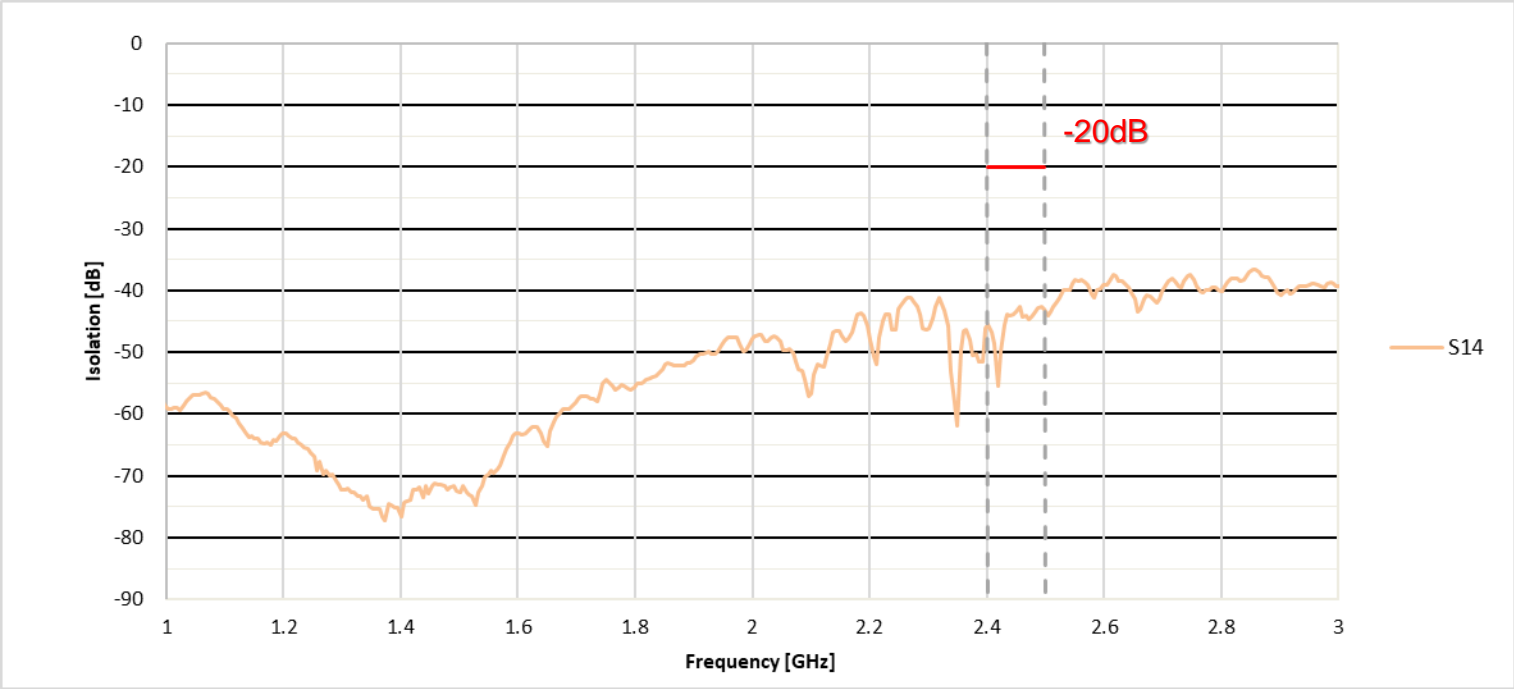
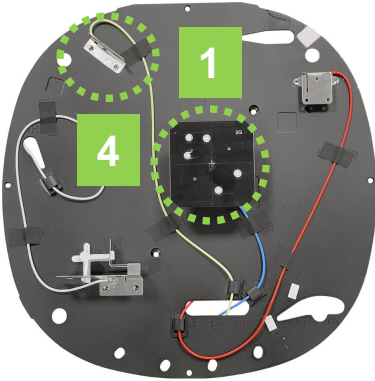
# Isolation - ANT 1 to ANT 3

Frequency (MHz)	2G	Spec.	Result	Test Value (MIN)
Isolation (dB)	1176	-30	Pass	-42.8
	1575~1602	-30	Pass	-44.5
	2400~2500	-30	Pass	-37.3



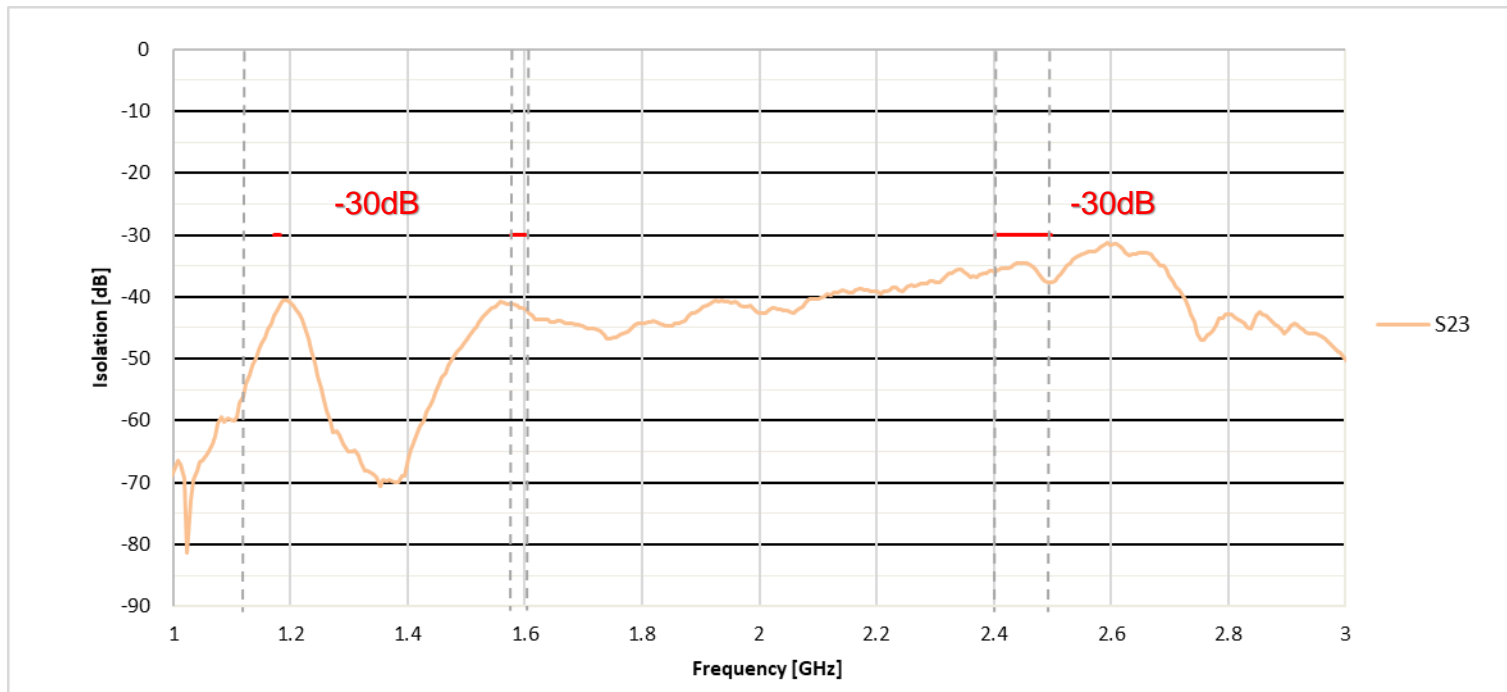
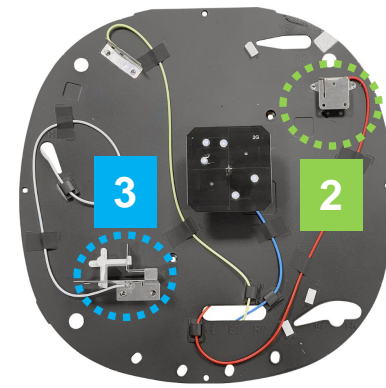
# Isolation - ANT 1 to ANT 4

Frequency (MHz)	2G	Spec.	Result	Test Value (MIN)
Isolation (dB)	2400~2500	-20	Pass	-39.8



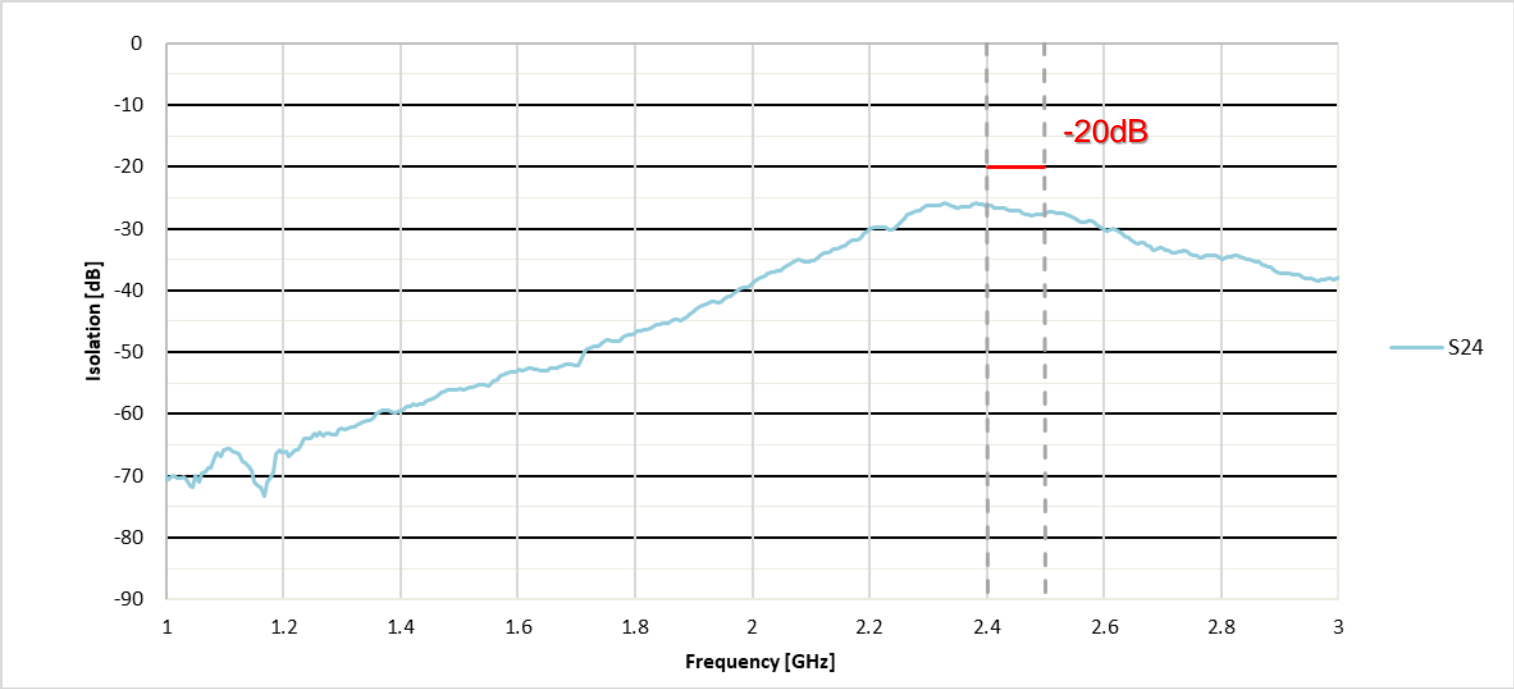
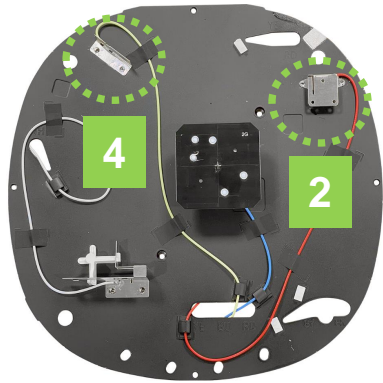
# Isolation - ANT 2 to ANT 3

Frequency (MHz)	2G	Spec.	Result	Test Value (MIN)
Isolation (dB)	1176	-30	Pass	-43.0
	1575~1602	-30	Pass	-41.1
	2400~2500	-30	Pass	-34.5



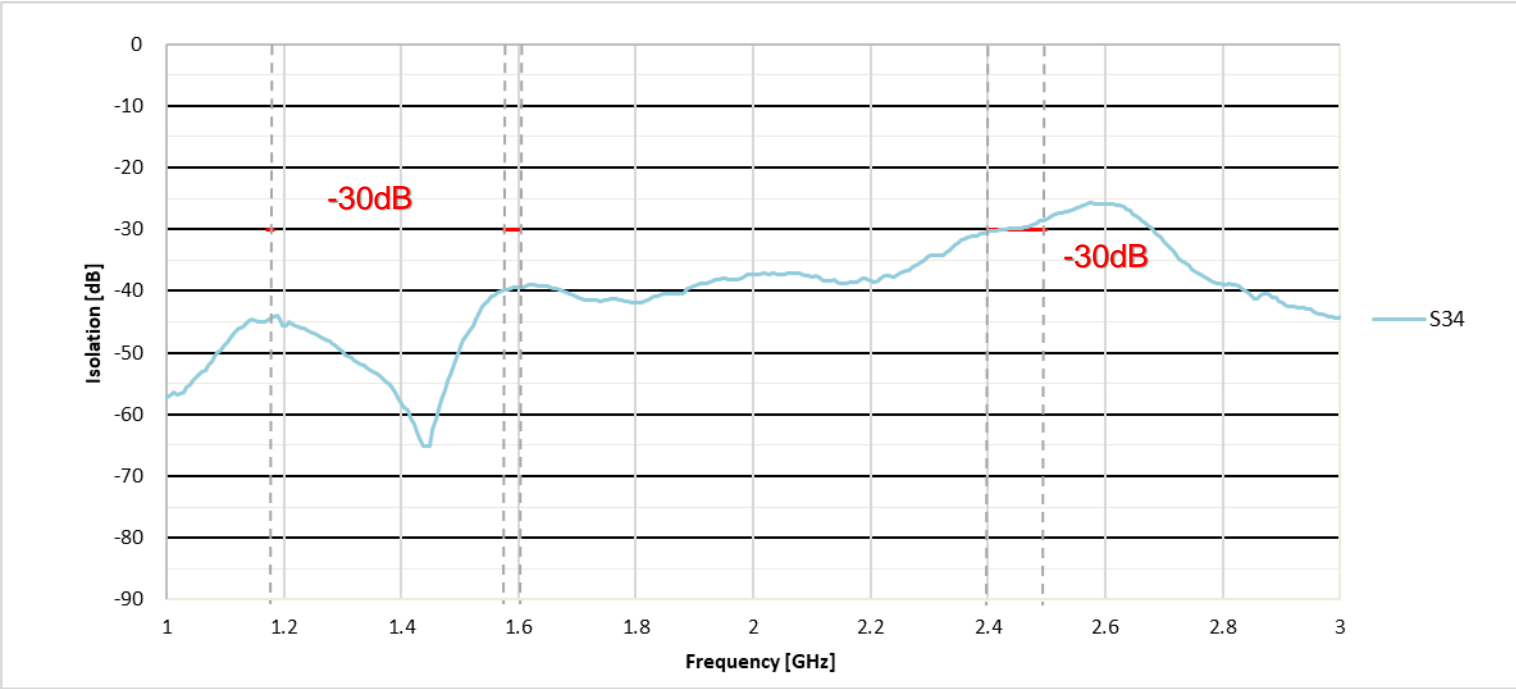
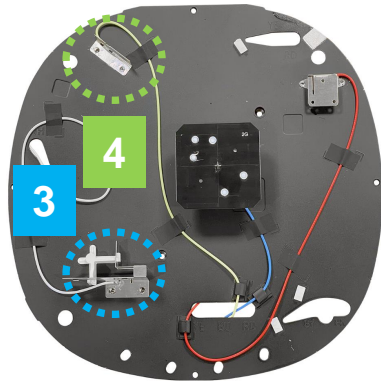
# Isolation - ANT 2 to ANT 4

Frequency (MHz)	2G	Spec.	Result	Test Value (MIN)
Isolation (dB)	2400~2500	-20	Pass	-25.2



# Isolation - ANT 3 to ANT 4

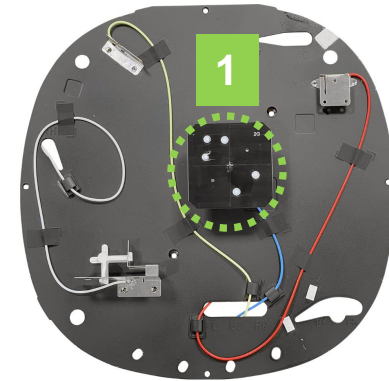
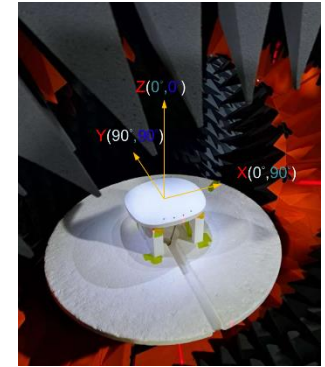
Frequency (MHz)	2G	Spec.	Result	Test Value (MIN)
Isolation (dB)	1176	-30	Pass	-44.1
	1575~1602	-30	Pass	-38.7
	2400~2500	-30	FAIL	-28.4



# Antenna Performance Summary-ANT01-BLE Horizontal Polarization Antenna

Cable: OD1.37 low loss, 140mm  
 Connector: I-PEX 1

Antenna-1	Detail			
Frequency		2400	2450	2500
Efficiency	<70%	75%	80%	74%
Peak Gain for 3D	5dBi>?>3dBi	4.4	4.7	4.2
Horizontal cut Gain Flatness	90°	1.5	1.4	1.7
	80°	1.2	1.2	1.1
	70°	1.3	1.1	1.1
	60°	1.3	1.1	1.1
Horizontal cut Average Gain	90°	-4.4	-4.2	-4.5
	80°	-1.9	-1.7	-1.9
	70°	0.3	0.6	0.4
	60°	2.2	2.5	2.2
V/H polarization ratio				



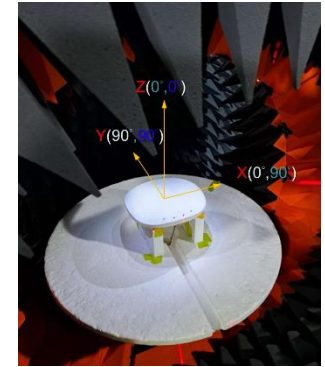
# Antenna Performance Summary-ANT01-BLE Horizontal Polarization Antenna

Cable: OD1.37 low loss, 140mm  
Connector: I-PEX 1

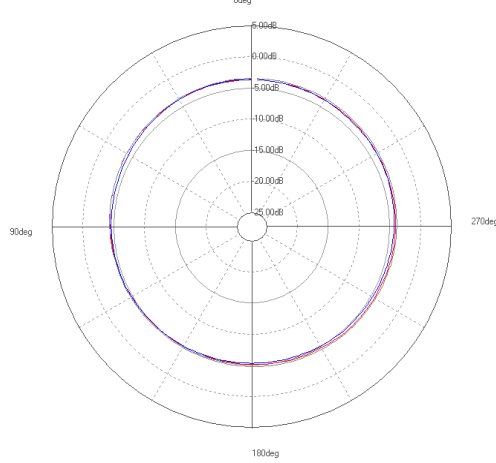
**2GHz**

Legend

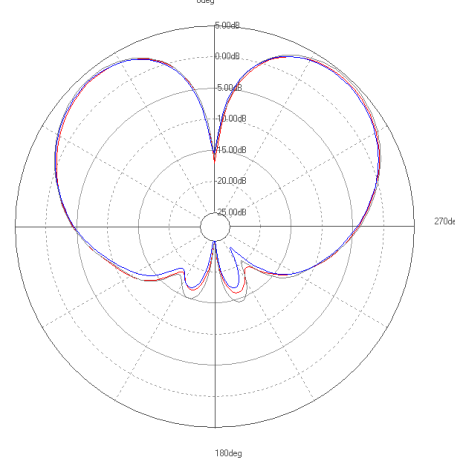
— 2400.00(MHz)  
— 2450.00(MHz)  
— 2500.00(MHz)



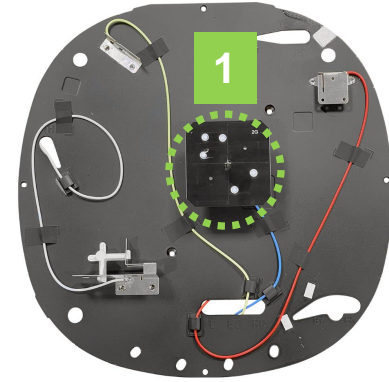
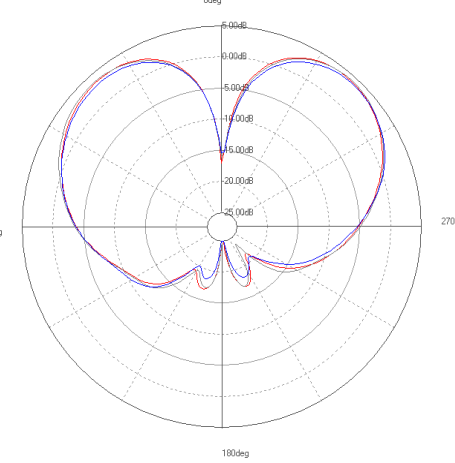
XY-plane(Down tilt 90°)



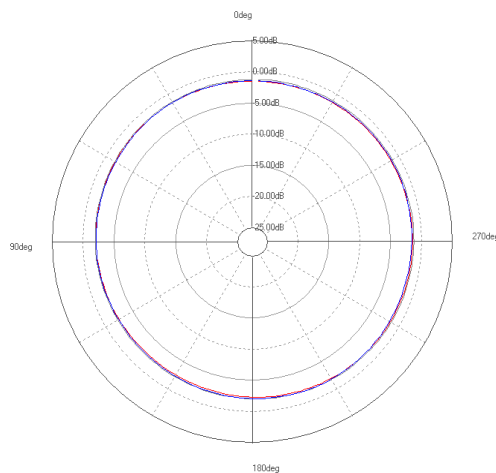
YZ-plane



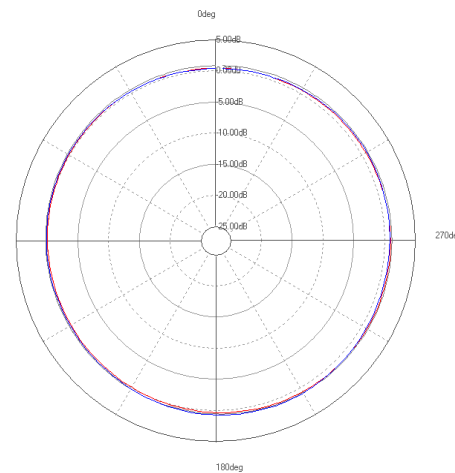
XZ-plane



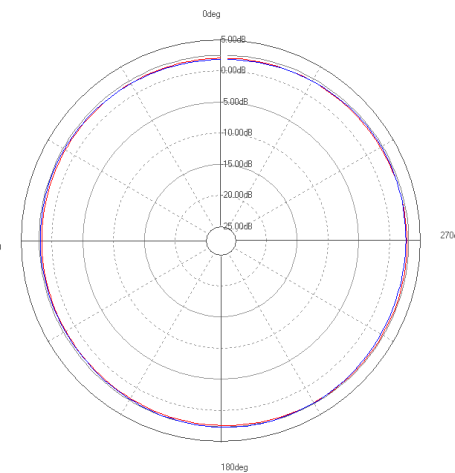
XY-plane(Down tilt 80°)



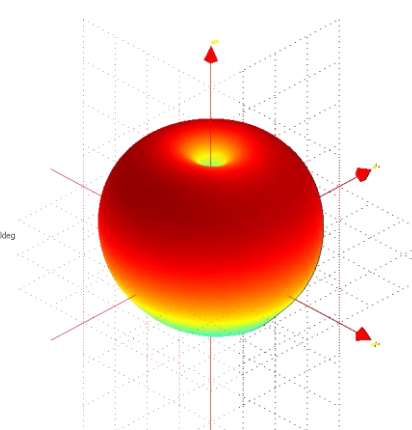
XY-plane(Down tilt 70°)



XY-plane(Down tilt 60°)



3D Pattern@2450MHz

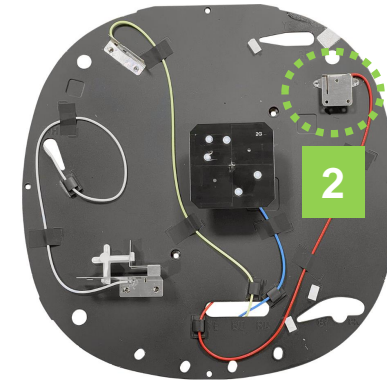
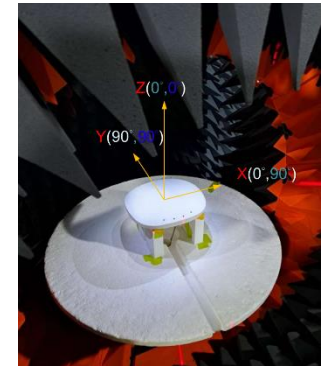




# Antenna Performance Summary-ANT02-BLE Vertical Polarization Antenna

Cable: OD1.37 low loss, 275mm  
 Connector: I-PEX 1

Antenna-1	Detail			
Frequency		2400	2450	2500
Efficiency	>70%	69%	71%	69%
Peak Gain for 3D	5dBi>?>3dBi	3.6	3.8	4.2
Horizontal cut Gain Flatness	90°	4.8	5.2	6.1
	80°	5.7	5.9	8.3
	70°	5.9	6.3	8.6
	60°	5.5	6.0	8.3
Horizontal cut Average Gain	90°	-2.2	-2.2	-2.2
	80°	-1.1	-1.0	-1.0
	70°	-0.1	0.2	0.1
	60°	0.7	0.8	0.8
V/H polarization ratio				



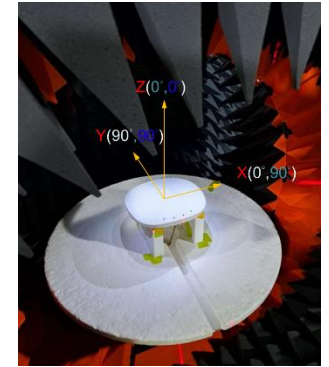
# Antenna Performance Summary-ANT02-BLE Vertical Polarization Antenna

Cable: OD1.37 low loss, 275mm  
Connector: I-PEX 1

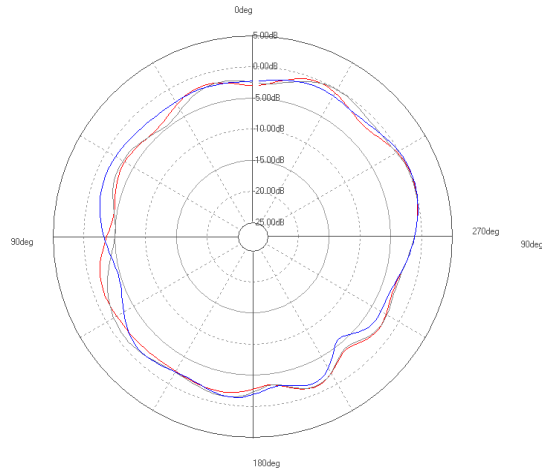
**2GHz**

Legend

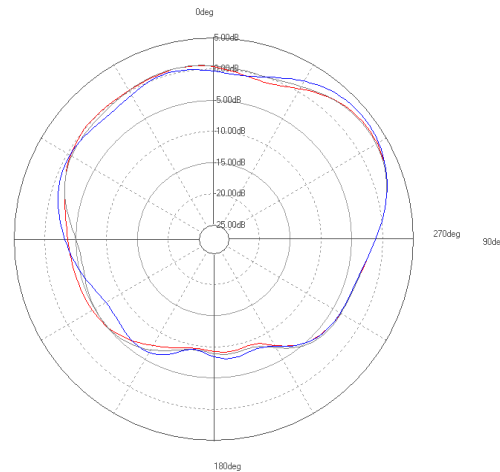
— 2400.00(MHz)  
— 2450.00(MHz)  
— 2500.00(MHz)



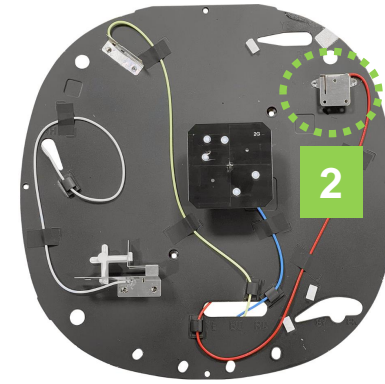
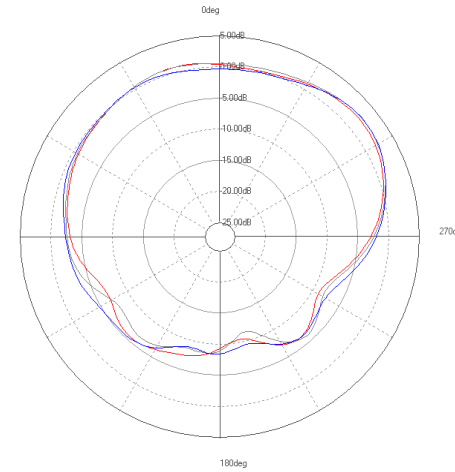
XY-plane(Down tilt 90°)



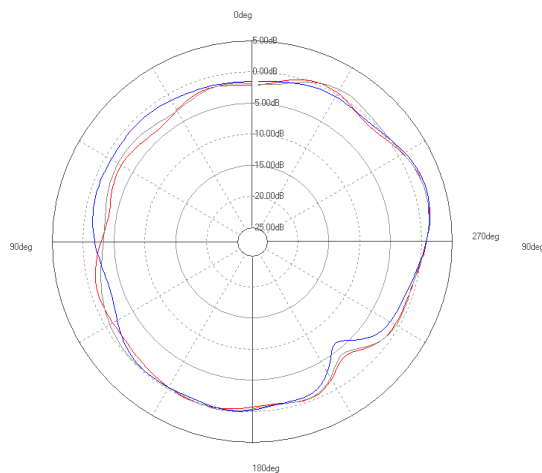
YZ-plane



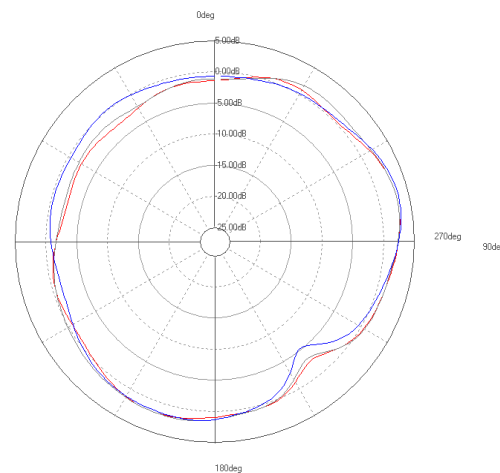
XZ-plane



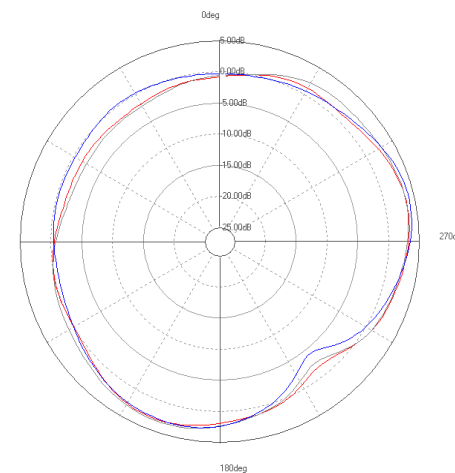
XY-plane(Down tilt 80°)



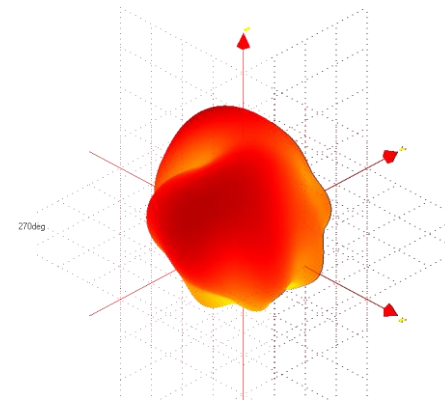
XY-plane(Down tilt 70°)



XY-plane(Down tilt 60°)



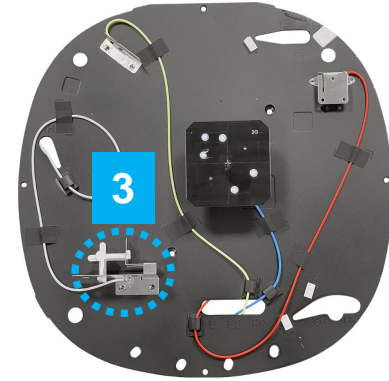
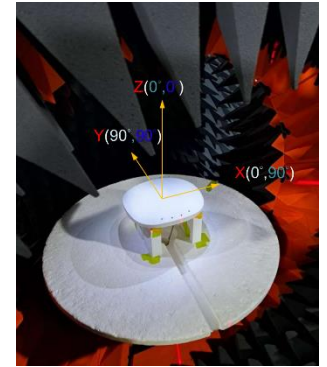
3D Pattern@2450MHz



# Antenna Performance Summary - ANT03-GPS L1 + L5 Antenna

Cable: OD1.37 low loss, 300mm  
Connector: I-PEX 1

Antenna-	Detail			
Frequency		1175.46	1575.42	1602
Efficiency	>70%	64%	66%	58%
Peak Gain for 3D	3dBi>Gain>1dBi	2.8	2.5	1.7
Horizontal cut Gain Flatness	90°	7.6	4.3	4.3
	80°	7.6	5.8	5.7
	70°	7.7	6.7	6.7
	60°	7.8	4.8	5.0
Horizontal cut Average Gain	90°	-2.5	-3.1	-3.7
	80°	-2.2	-2.8	-3.4
	70°	-1.9	-2.0	-2.6
	60°	-1.4	-0.9	-1.6
V/H polarization ratio				



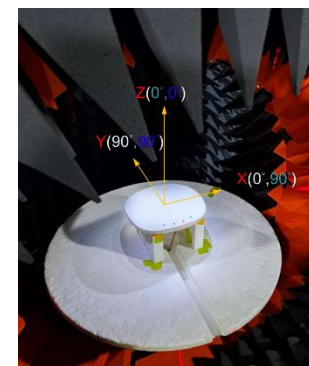
# Antenna Performance Summary-ANT03-GPS L1 + L5 Antenna

Cable: OD1.37 low loss, 300mm  
Connector: I-PEX 1

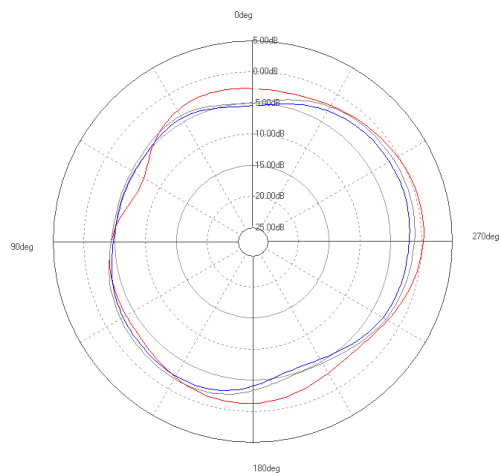
## L1 + L5

Legend

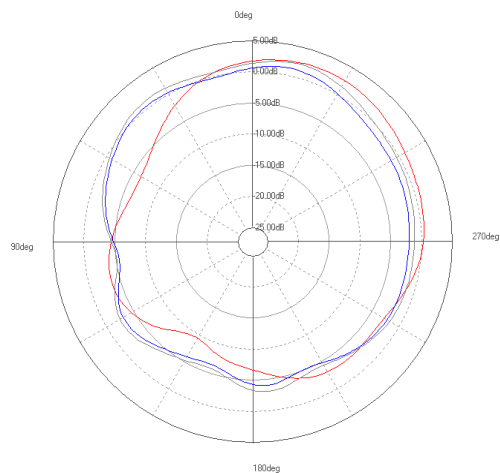
- farfield (f=1.176)
- farfield (f=1.575)
- farfield (f=1.602)



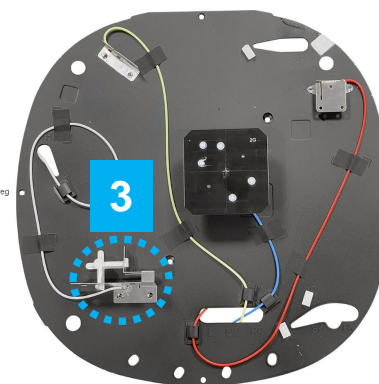
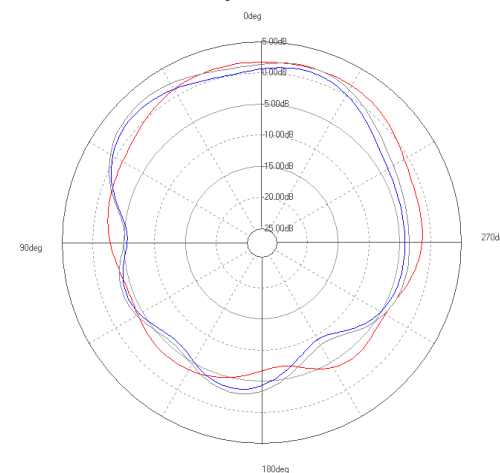
### XY-plane(Down tilt 90°)



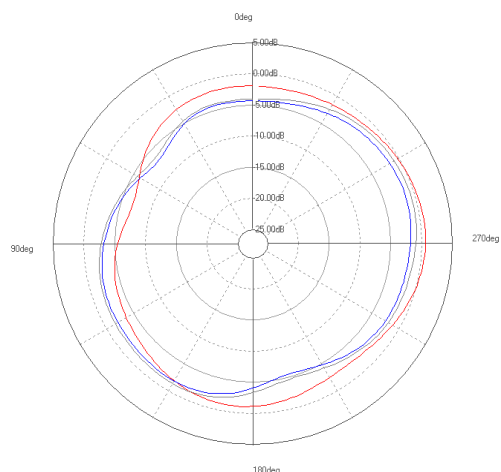
### YZ-plane



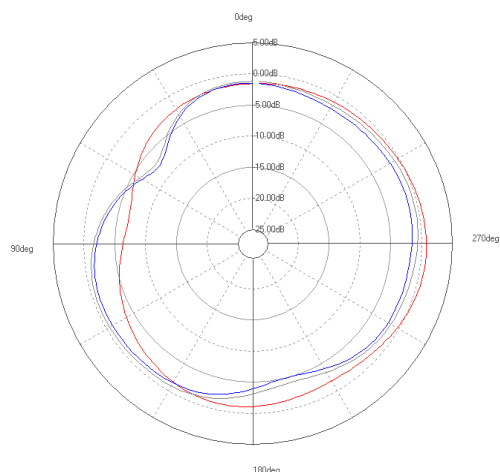
### XZ-plane



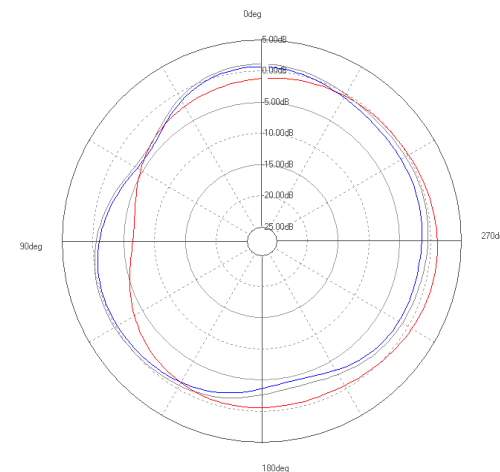
### XY-plane(Down tilt 80°)



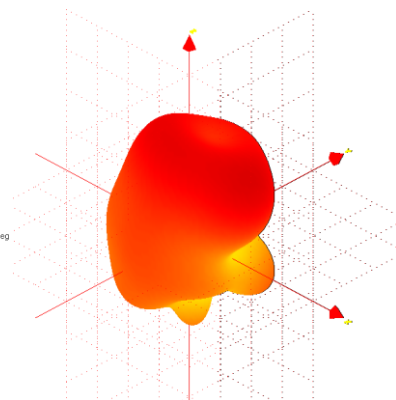
### XY-plane(Down tilt 70°)



### XY-plane(Down tilt 60°)



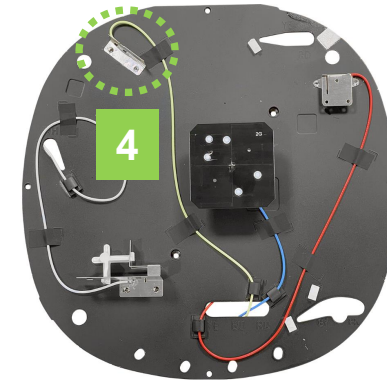
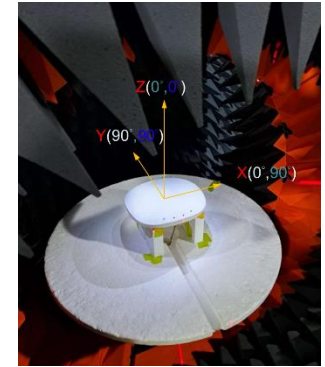
### 3D Pattern@1575MHz



# Antenna Performance Summary-ANT04-BLE Vertical Polarization Antenna

Cable: OD1.37 low loss, 265mm  
 Connector: I-PEX 1

Antenna-1	Detail			
Frequency		2400	2450	2500
Efficiency	>70%	75%	71%	66%
Peak Gain for 3D	5dBi>?>3dBi	4.1	3.8	3.5
Horizontal cut Gain Flatness	90°	4.6	5.0	5.1
	80°	5.5	6.4	6.0
	70°	6.0	7.1	6.7
	60°	5.4	5.9	6.1
Horizontal cut Average Gain	90°	-2.3	-2.5	-2.9
	80°	-0.9	-1.2	-1.5
	70°	0.4	0.1	-0.3
	60°	1.4	1.1	0.6
V/H polarization ratio				



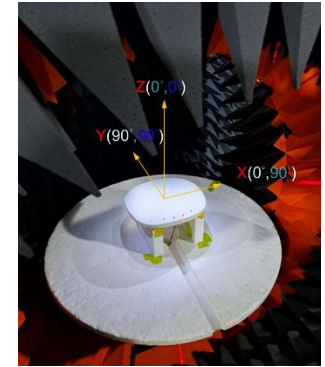
# Antenna Performance Summary-ANT04-BLE Vertical Polarization Antenna

Cable: OD1.37 low loss, 265mm  
Connector: I-PEX 1

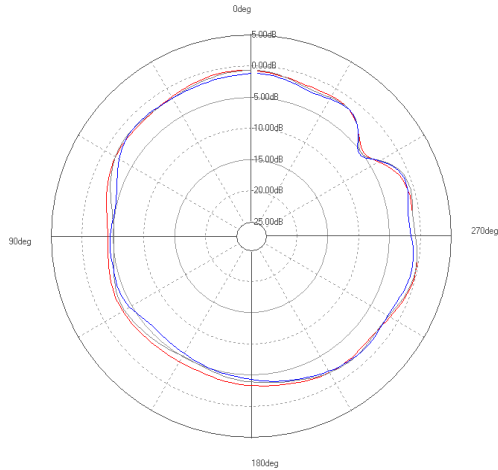
**2GHz**

Legend

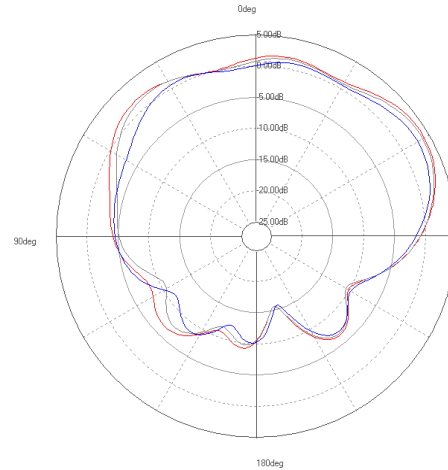
— 2400.00(MHz)  
— 2450.00(MHz)  
— 2500.00(MHz)



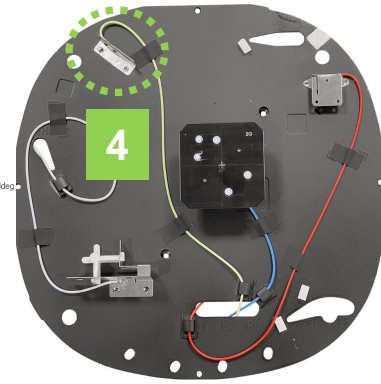
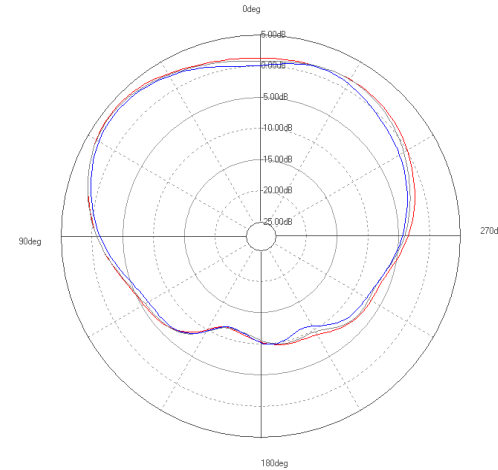
XY-plane(Down tilt 90°)



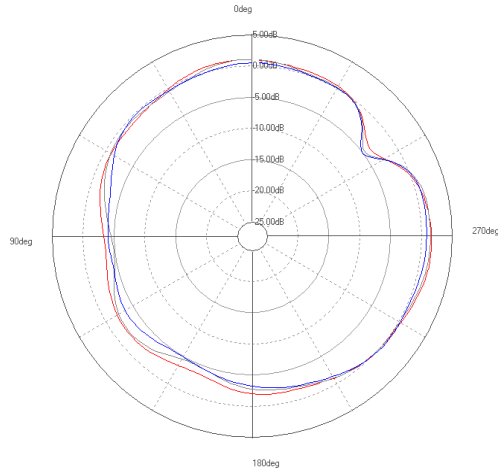
YZ-plane



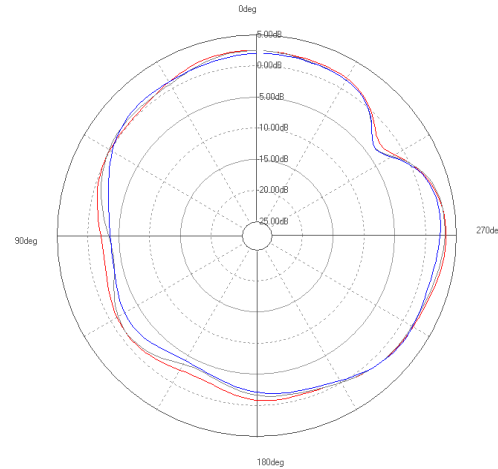
XZ-plane



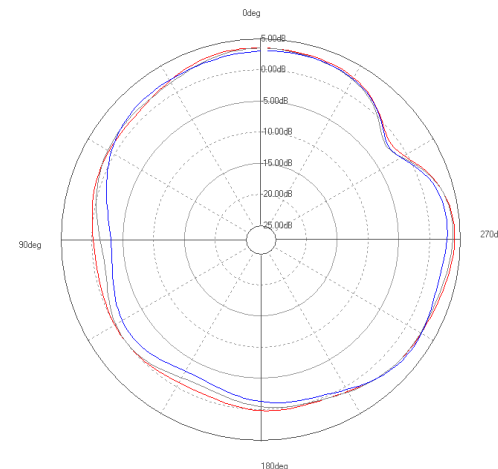
XY-plane(Down tilt 80°)



XY-plane(Down tilt 70°)



XY-plane(Down tilt 60°)



3D Pattern@2450MHz

