

Approval Sheet

Customer :

Model Name : NTN-X-ANT

Customer P/N :

Anjie P/N :

Product Description : RF Antenna
Skylo / GPS / LoRa Band / WiFi_BT
NTN (Monopole) & LoRa (Dipole)
Antenna

Issue Date : 2025 / 04 / 24

Reversion : A

Customer Approved	Anjie Approved

Taiwan Anjie Electronics Co.,Ltd
Address : 1F, No.236,Sec 3, Huan-Bei Rd., Ju-Bei City
Hsin-Chu Country, 30265, Taiwan
Tel : +886-3-5543399 Fax : +886-3-5533062

台灣安潔電子股份有限公司
地址：新竹縣竹北市環北路三段236號1樓
電話：+886-3-5543399 傳真：+886-3-5543062
Website: www.anjietw.com

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2. Specification

WiFi_BT Antenna :

- . Frequency : 2400-2500 & 5150-7125 MHz
- . SWR : < 3.0
- . Gain : 2.5 dBi @ 2400-2500 MHz
3.0 dBi @ 5150-7125 MHz
- . Efficiency : 55% @ 2400-2500 MHz
45% @ 5150-7125 MHz
- . Isolation : 20 dB @ GPS Ant
15 dB @ Skylo Ant
18 dB @ LoRa Ant
- . Polarization : Linearly / Dipole Type . Impedance : 50 ohm

LoRa Antenna :

- . Frequency Range : 860-930 MHz
- . S.W.R. : < 2.0 . Peak Gain : 0.7 dBi
- . Efficiency : 45 %
- . Isolation : 22 dB @ 1525-1661 MHz (Skylo Ant)
18 dB @ 1980-2200 MHz (Skylo Ant)
13 dB @ 1560-1602 MHz (GPS Ant)
- . Polarization : Linearly / Dipole Type . Impedance : 50 ohm

GPS / GNSS Passive Antenna :

- . Frequency Range : 1560-1602 MHz
- . S.W.R. : < 2.0 . Peak Gain : 3 dBi
- . Polarization : Linearly
- . Radiation Pattern Type : Directional Dipole Type
- . Impedance : 50 ohm

Skylo Antenna :

- . Frequency (MHz) : 1525-2200 MHz
- . S.W.R. : < 3.0 . Peak Gain : 5.7 dBi
- . Efficiency : 50 %
- . Isolation : 5.5 dB @ 1525-1661 MHz
15 dB @ 1980-2200 MHz
- . Radiation Pattern Type : Directional Dipole Type
- . Impedance : 50 ohm

2. Specification

Mechanical Characteristics

- . Radiator Material : PCB FR4
- . Connector : IPEX MHF
- . Material : RoHS Compatible

Environmental Condition

- . Operation Temperature : -40 ~ +85 °C
- . Storage Temperature : -40 ~ +85 °C
- . Moisture Sensitivity Levels (MSL) : N/A
- . ESD Limit : N/A
- . Vibration Limit : N/A

3. Reliability Characteristics

R1. Soldering Ability

Condition: the dipped surface of the terminal should be over 95% covered with solder after dipped in soldering material of $260 \pm 5^{\circ}\text{C}$ for 3 ± 1 seconds.

Requirement: no apparent damage

R2. Soldering Heat

Condition: .solder bath temperature : $260 \pm 5^{\circ}\text{C}$

.bathing time : 10 ± 1 seconds

Requirement: no apparent damage

R3. Thermal Shock

Condition: 30 minutes @ $-40 \pm 5^{\circ}\text{C}$ and 5 minutes to 90°C ;

30 minutes @ $90 \pm 5^{\circ}\text{C}$ and 5 minutes to -40°C ;

96 continuous cycles

Requirement: no apparent damage / electrical test pass

R4. Humidity

Condition: R.H. 85% ; $85 \pm 5^{\circ}\text{C}$; 96 Hours

Requirement: no apparent damage / electrical test pass

R5. High Temperature

Condition: $90 \pm 5^{\circ}\text{C}$; 96 Hours

Requirement: no apparent damage / electrical test pass

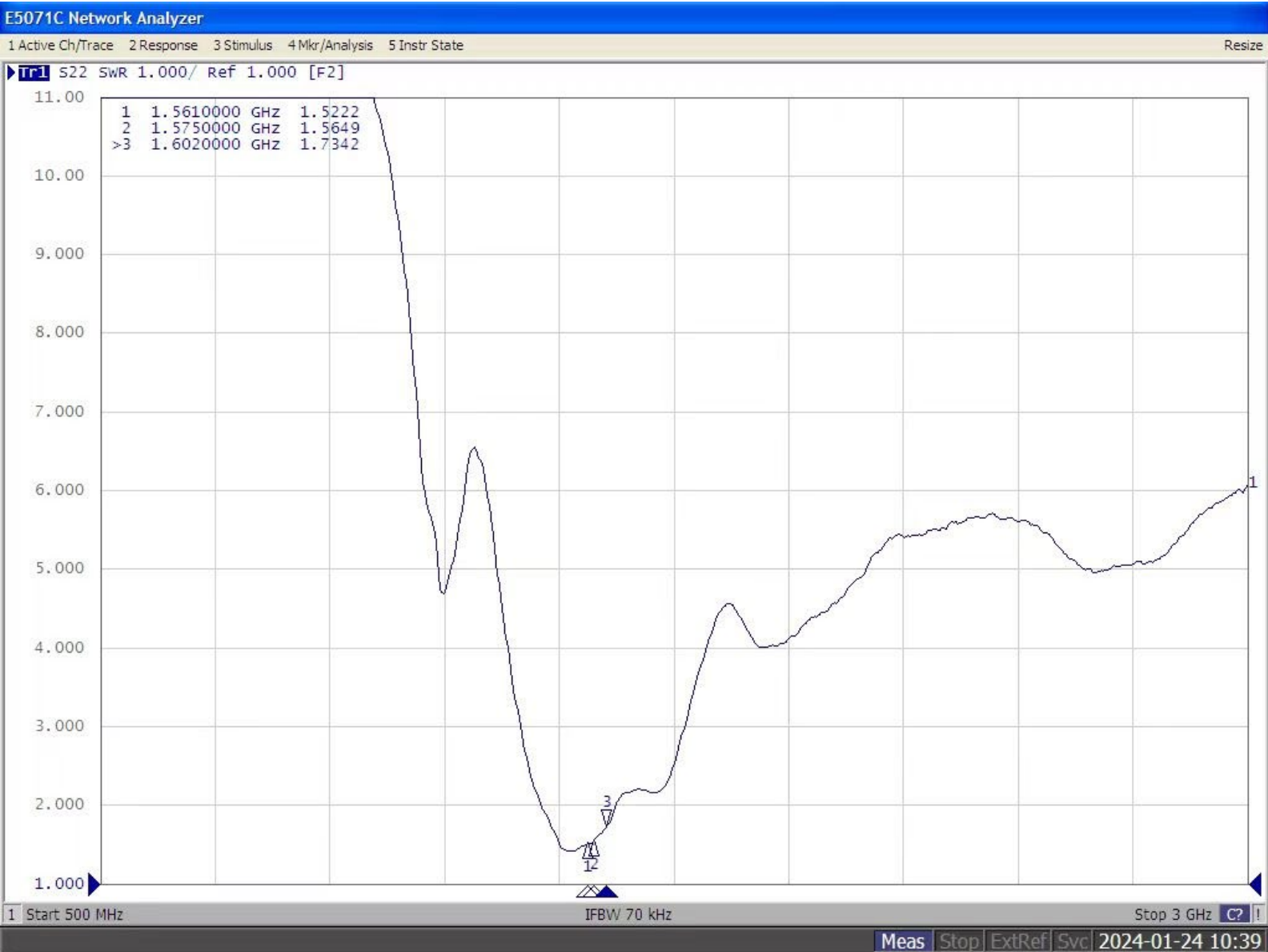
R6. Low Temperature

Condition: $-40 \pm 5^{\circ}\text{C}$; 96 Hours

Requirement: no apparent damage / electrical test pass

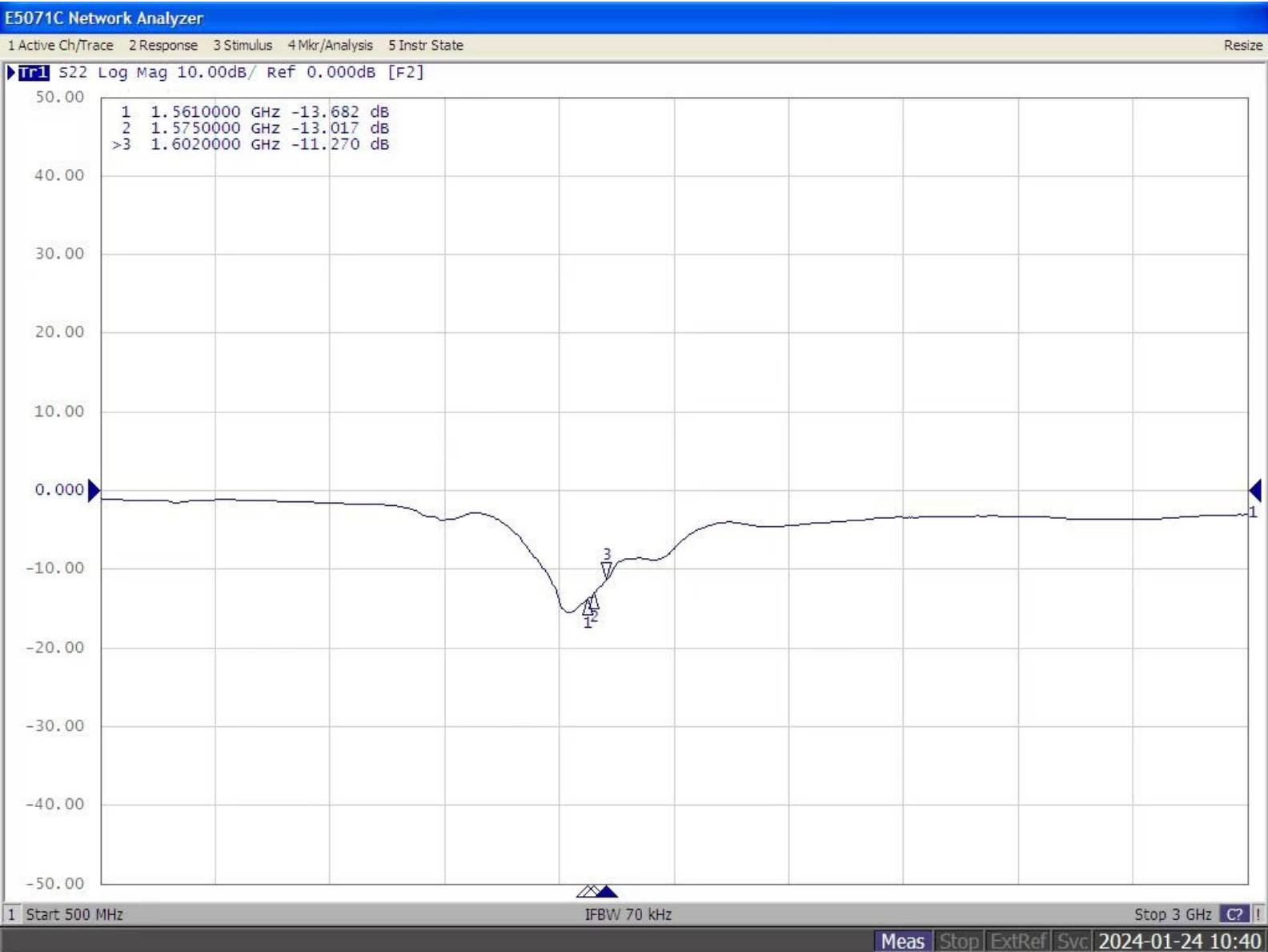
4.2 S Parameter Test

S.W.R. Test Data / GPS Antenna



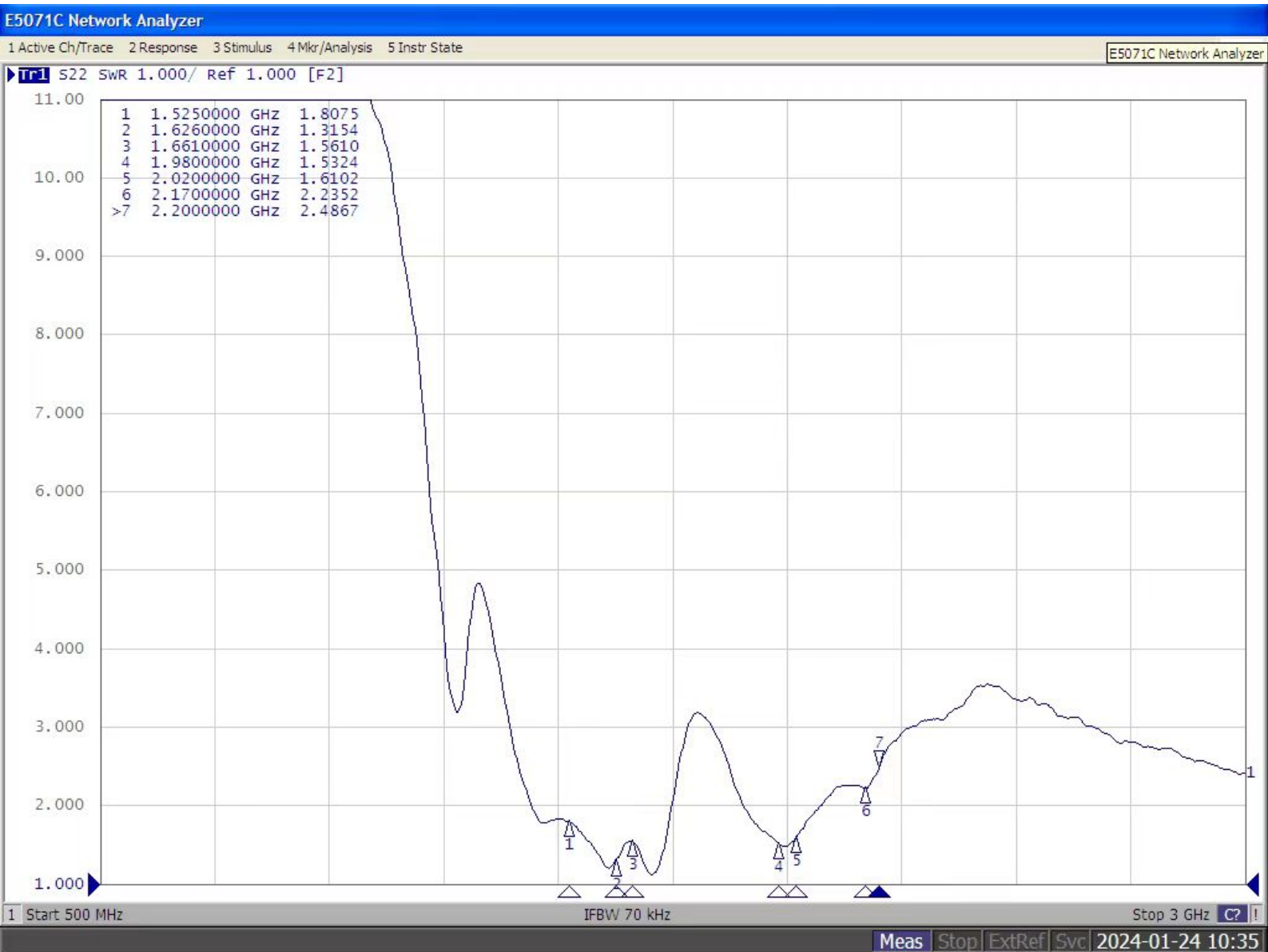
4.3 S Parameter Test

Return Loss Test Data / GPS Antenna



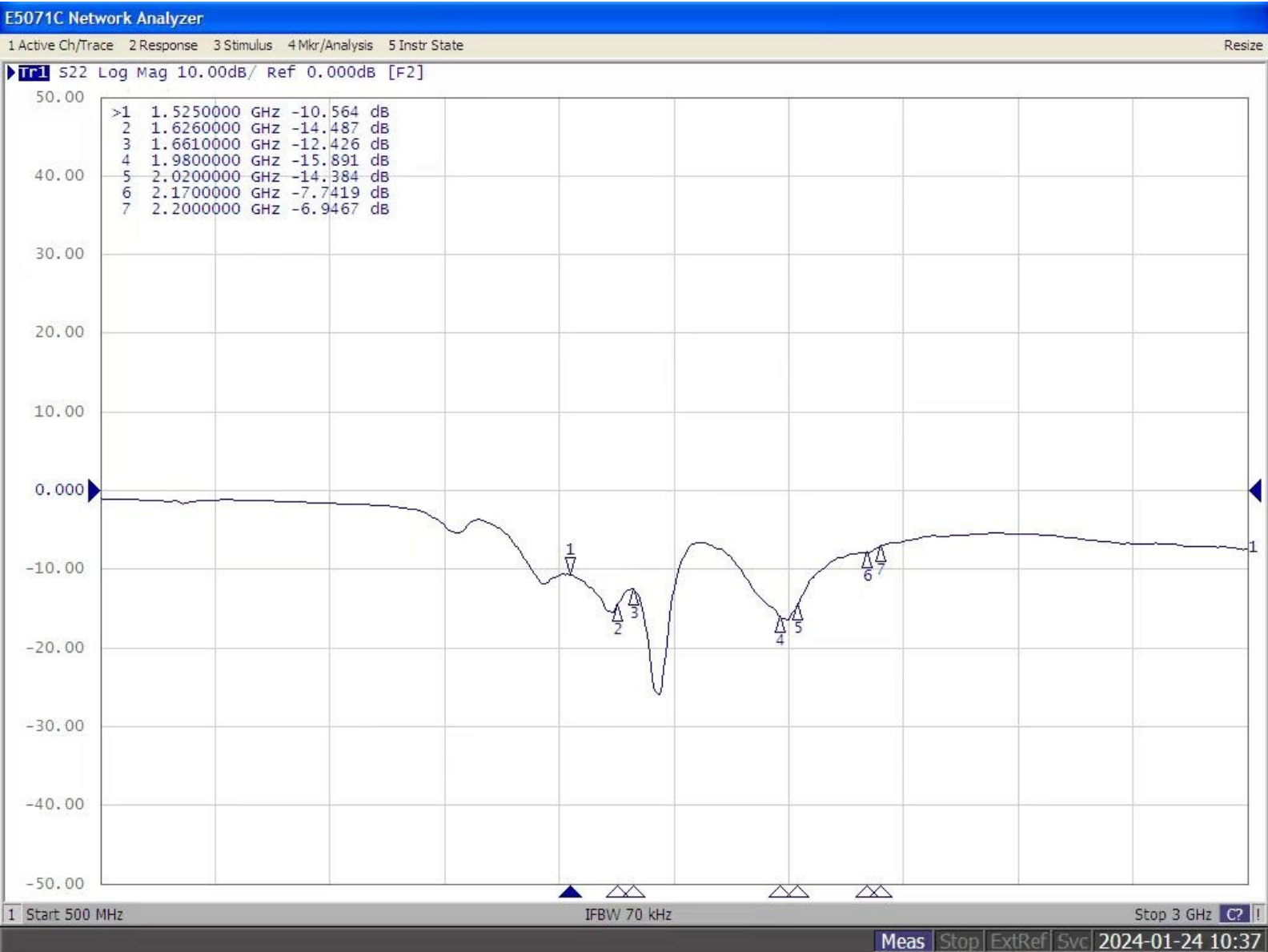
4.4 S Parameter Test

S.W.R. Test Data / Skylo Antenna



4.5 S Parameter Test

Return Loss Test Data / Skylo Antenna

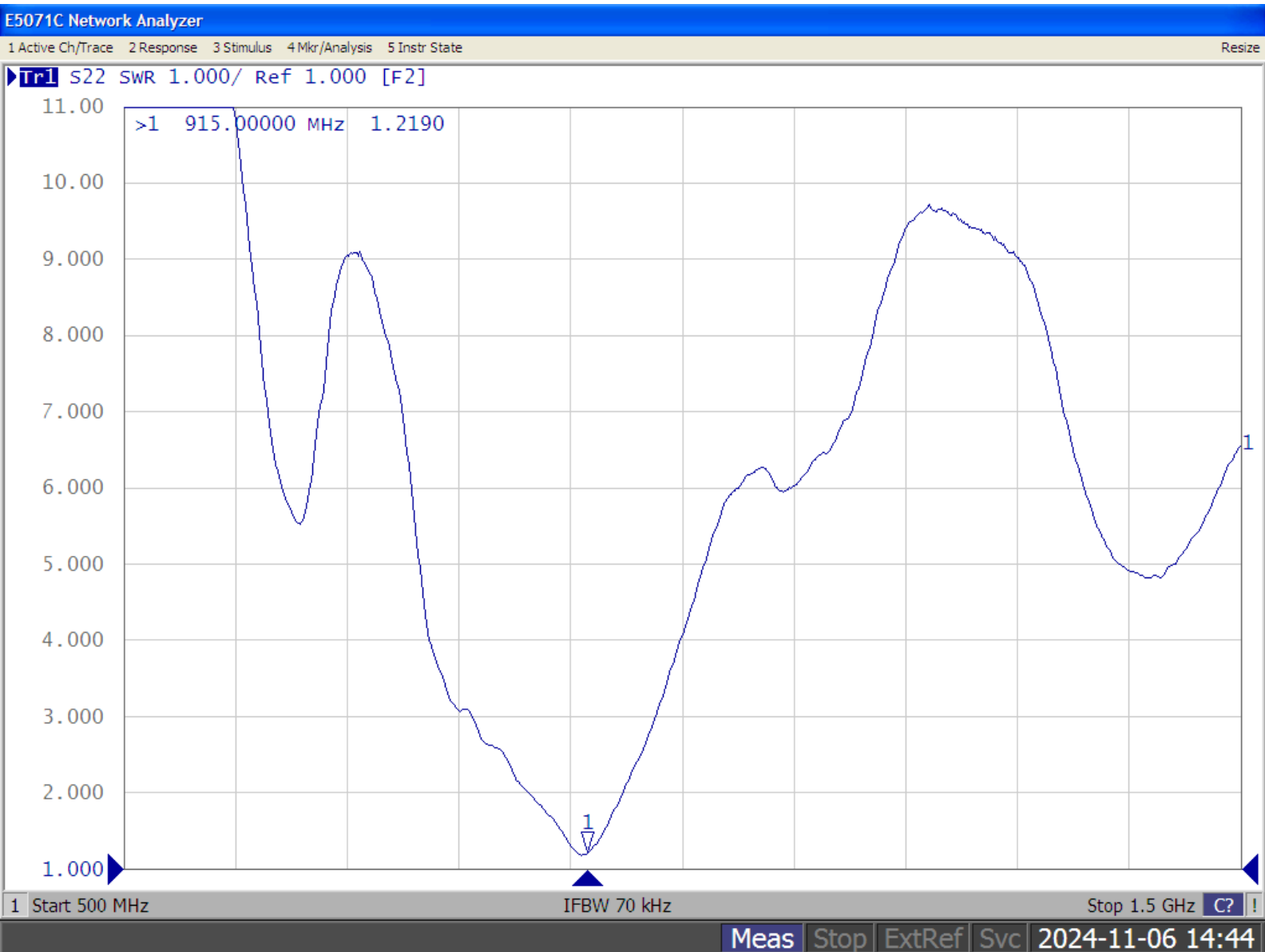


4.6 S Parameter Test Isolation Test Data



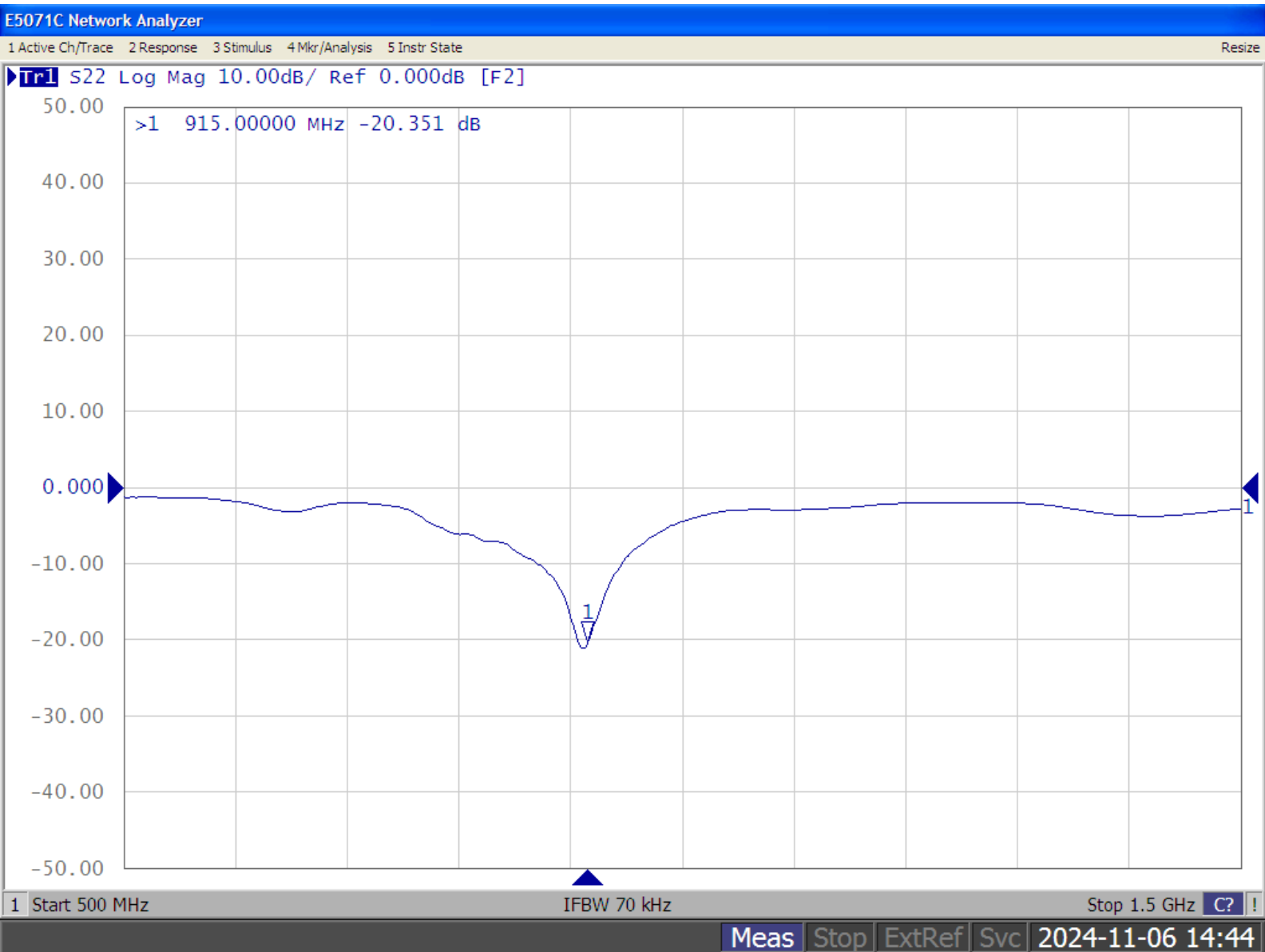
4.7 S Parameter Test

S.W.R. Test Data / LoRa Antenna



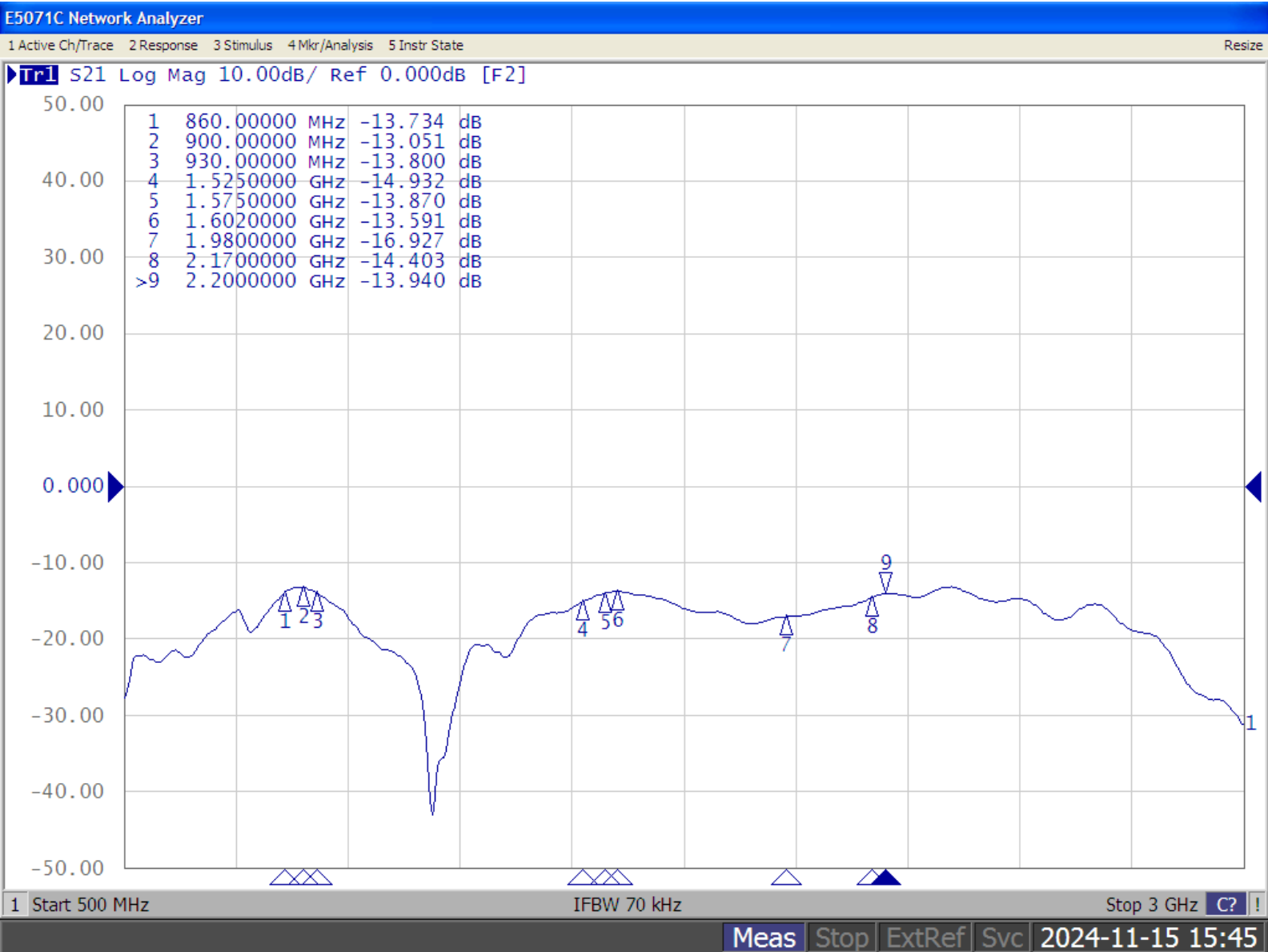
4.8 S Parameter Test

Return Loss Test Data / LoRa Antenna



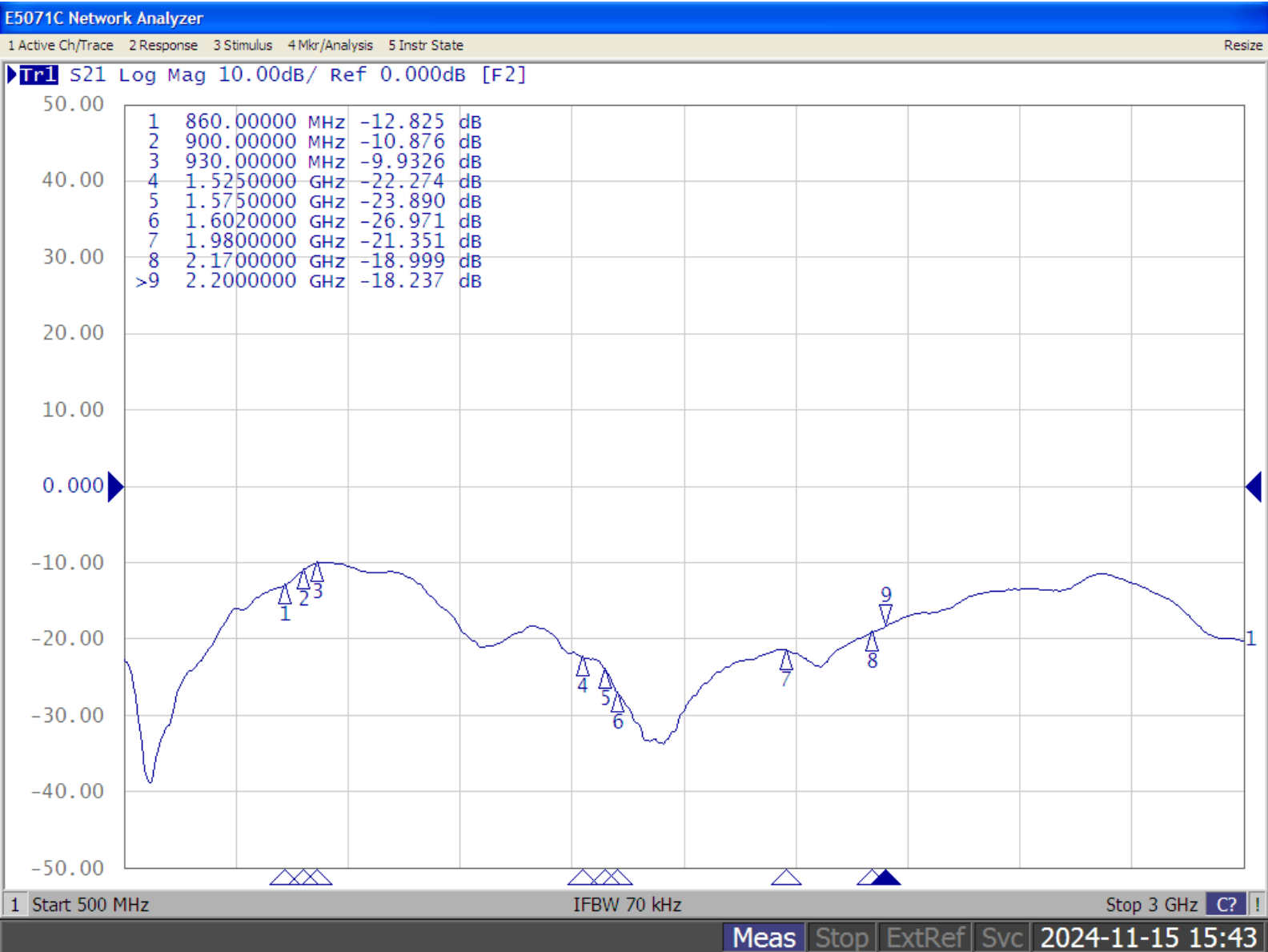
4.9 S Parameter Test

Isolation Test Data / LoRa v.s. GPS Band



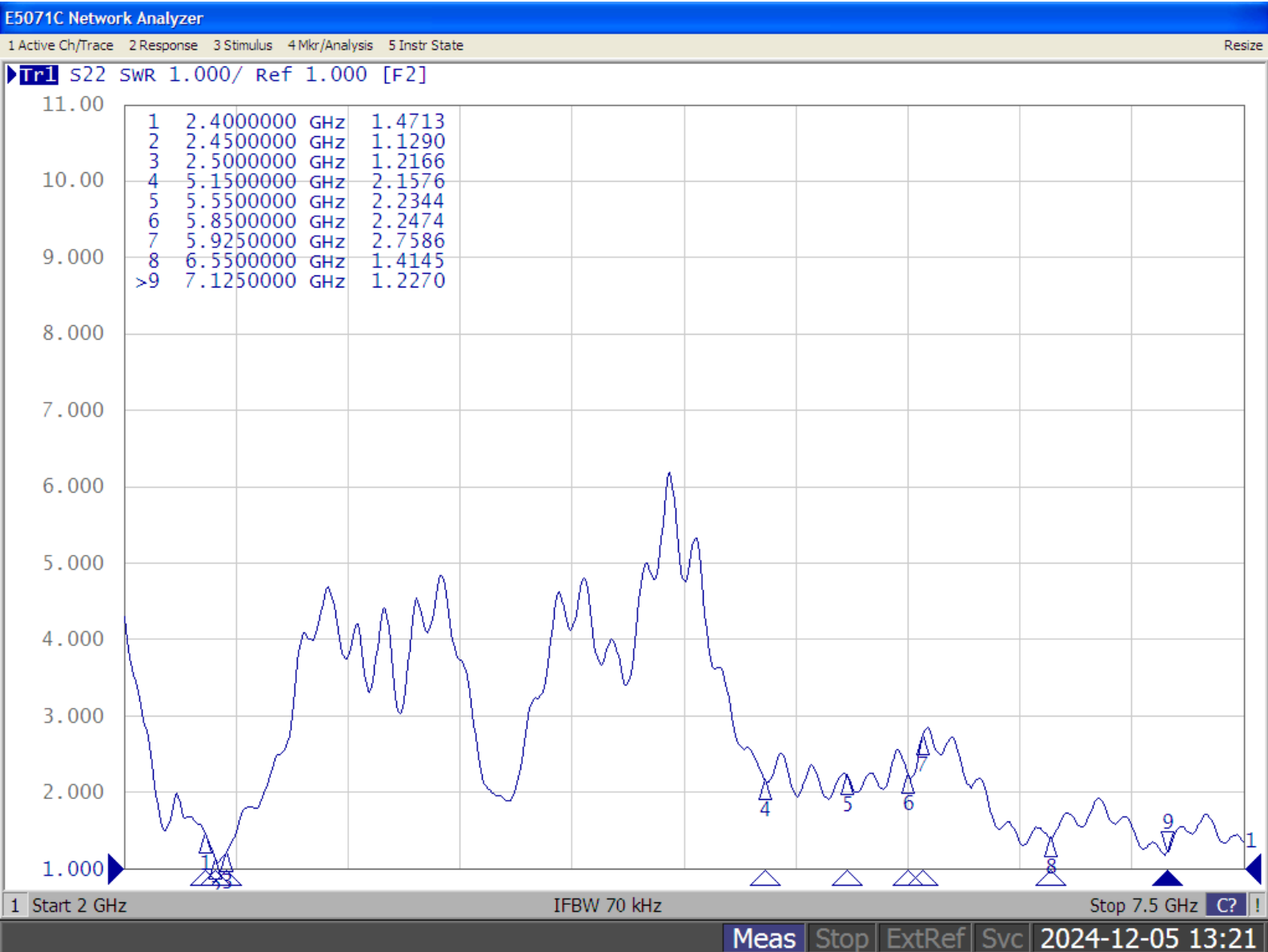
4.9 S Parameter Test

Isolation Test Data / LoRa v.s. Skylo Band



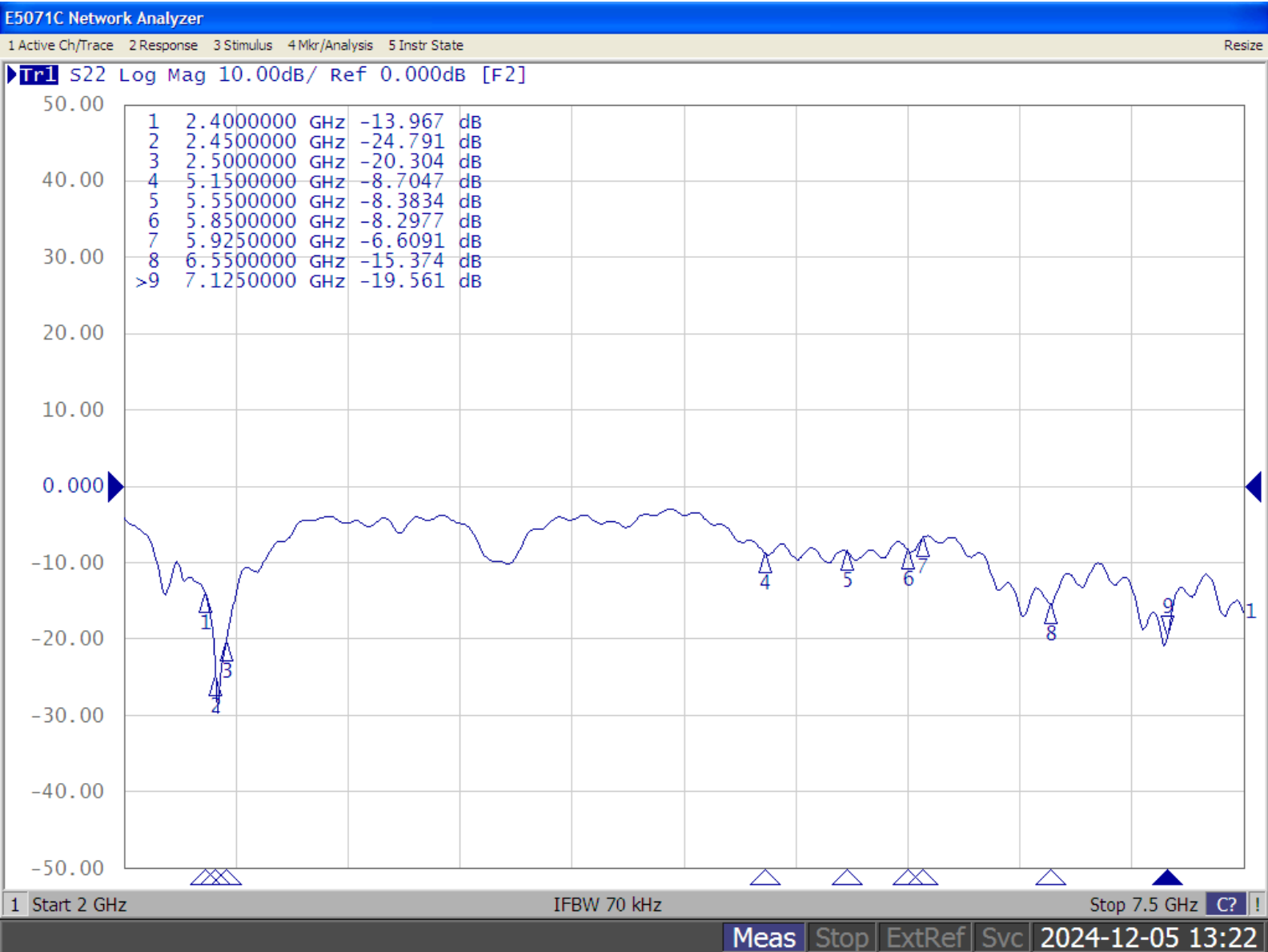
4.10 S Parameter Test

S.W.R. Test Data / WiFi_BT Antenna



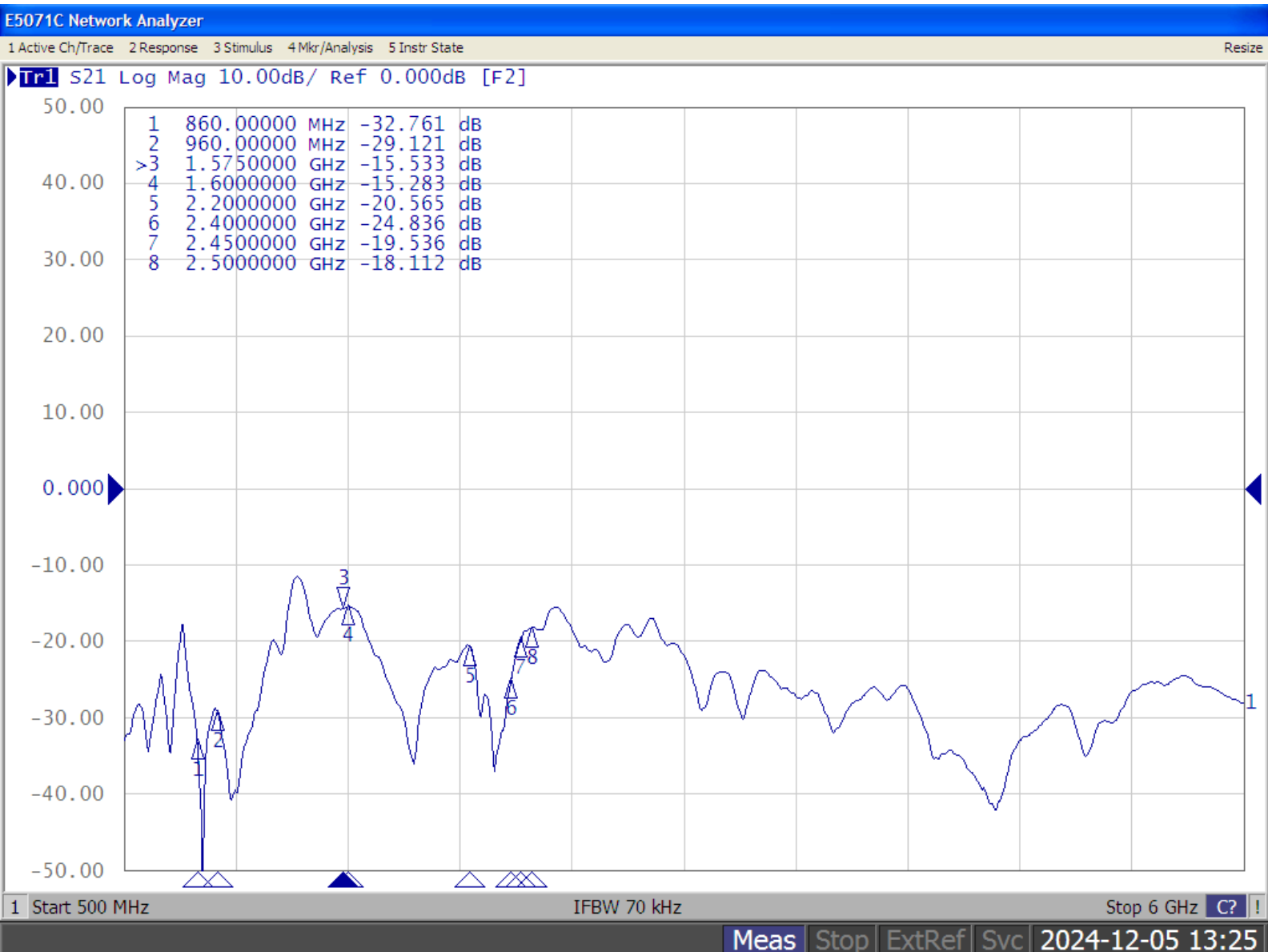
4.11 S Parameter Test

Return Loss Test Data / WiFi_BT Antenna



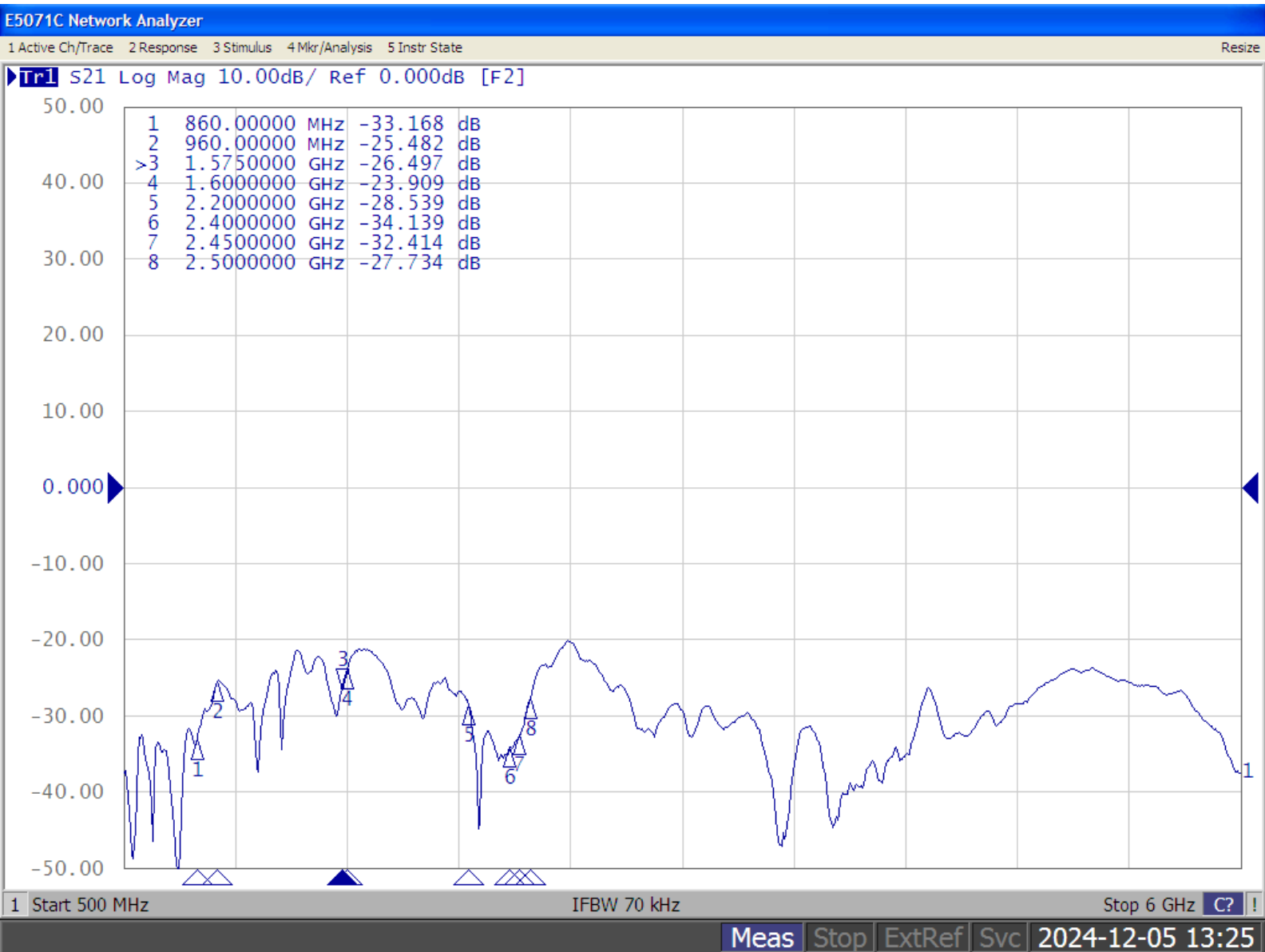
4.12 S Parameter Test

Isolation Test Data / WiFi_BT v.s. Skylo Band



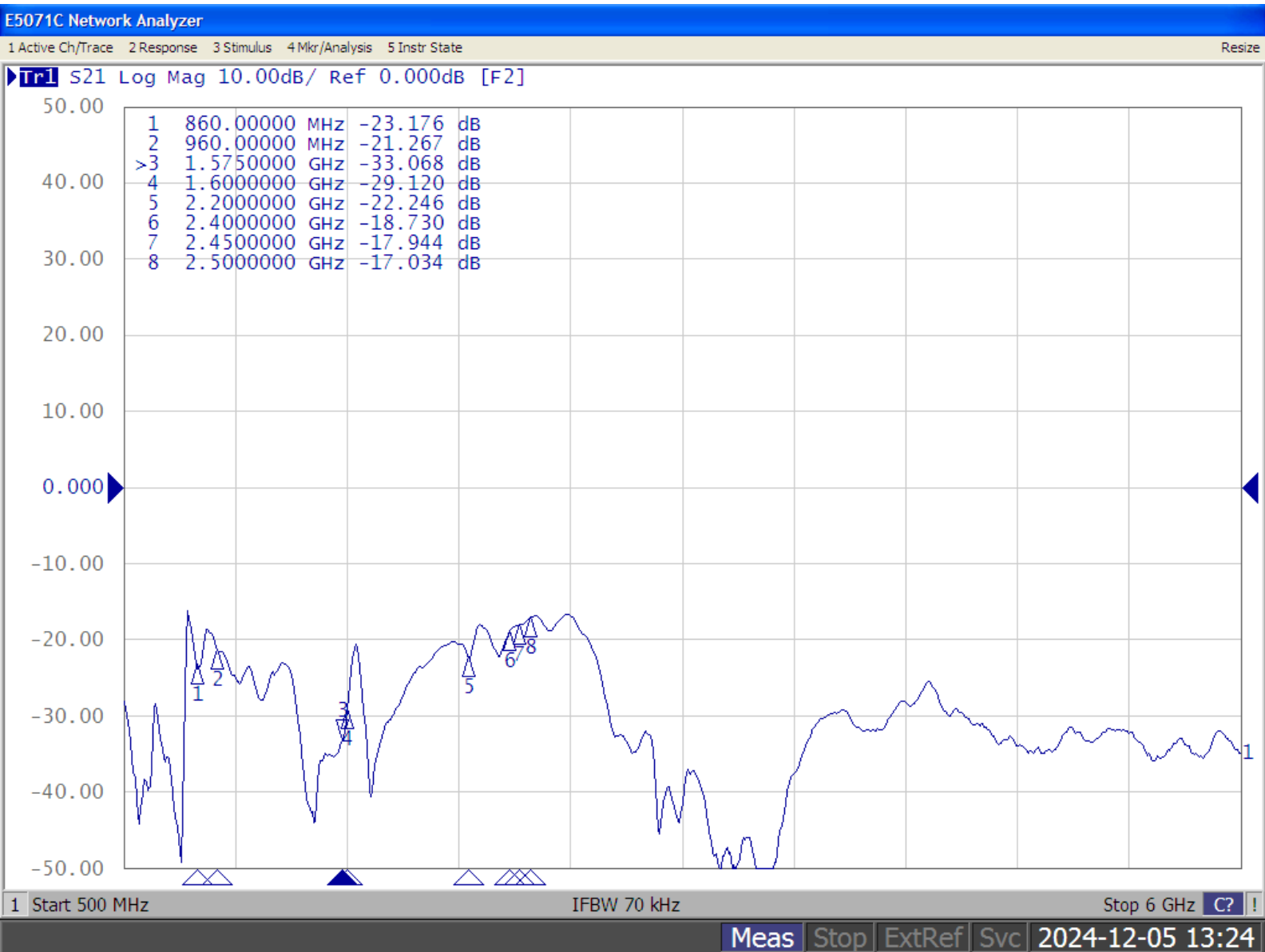
4.12 S Parameter Test

Isolation Test Data / WiFi_BT v.s. GPS Band



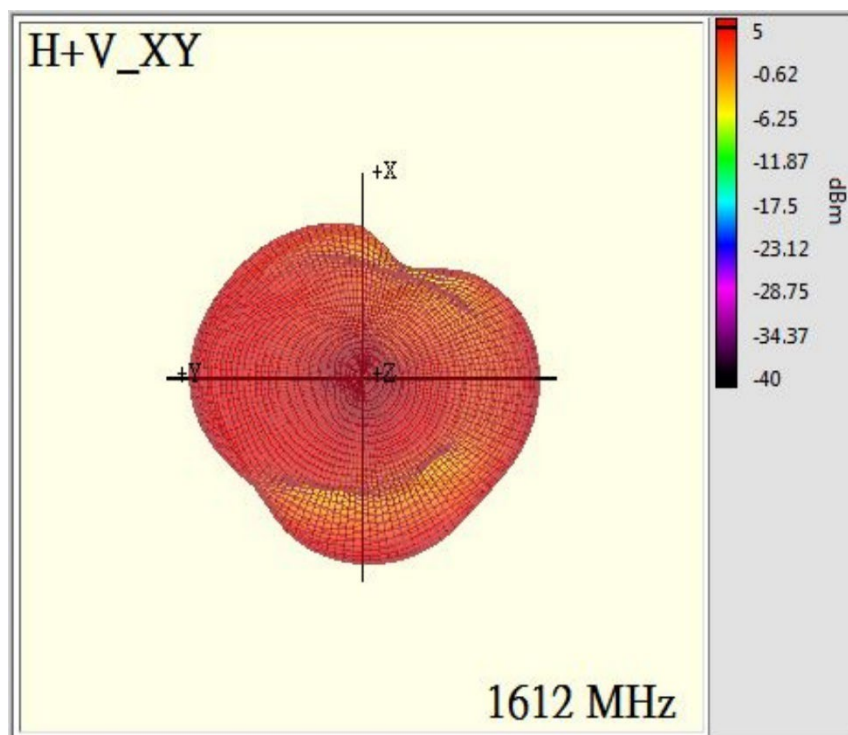
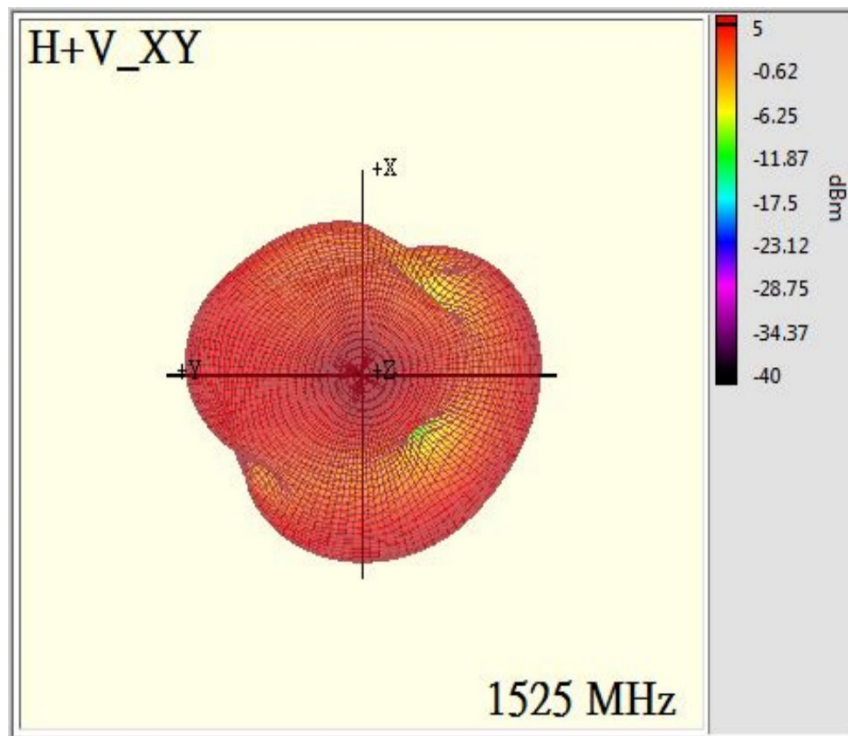
4.12 S Parameter Test

Isolation Test Data / WiFi_BT v.s. LoRa Band



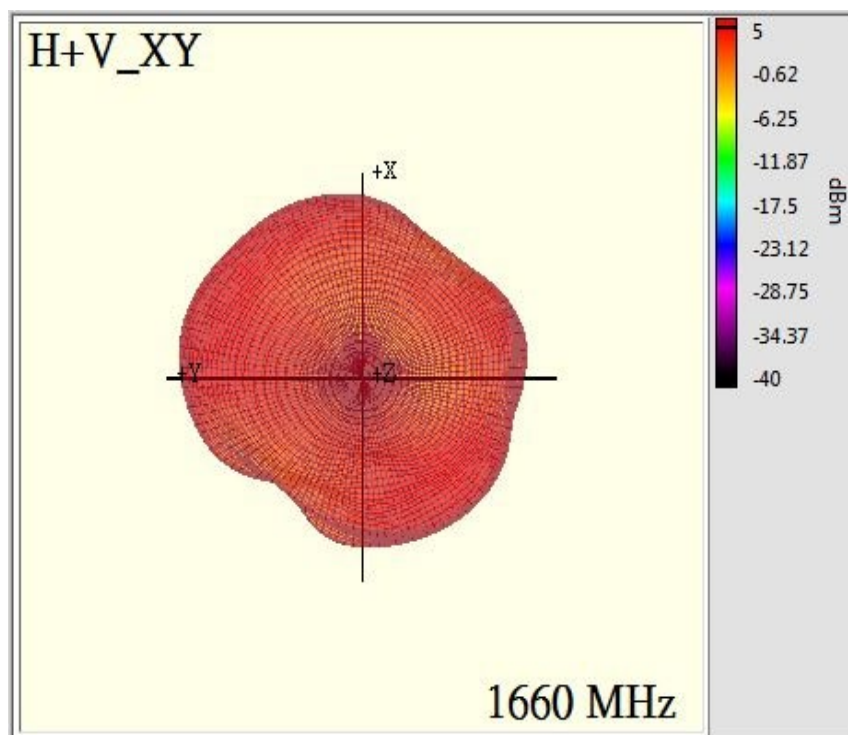
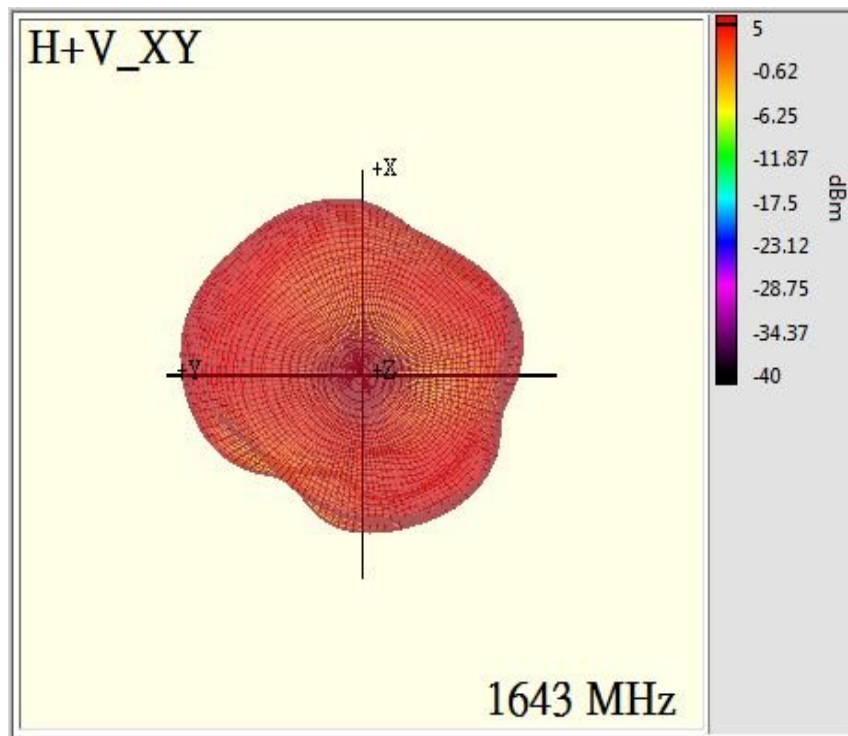
5. Antenna Gain Test

5.2 Antenna Radiation Pattern (1) / Skylo Ant



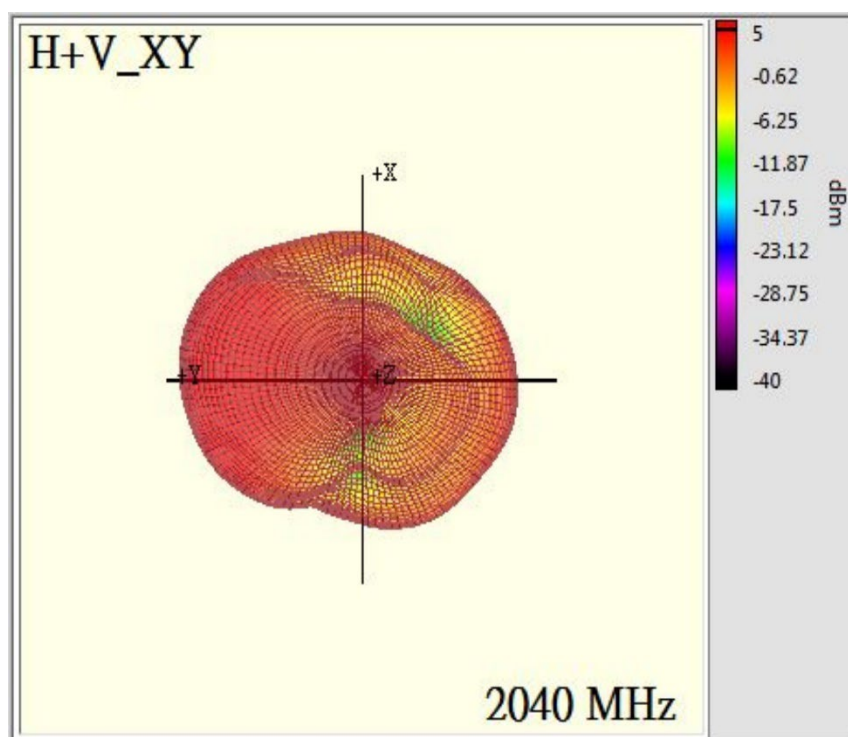
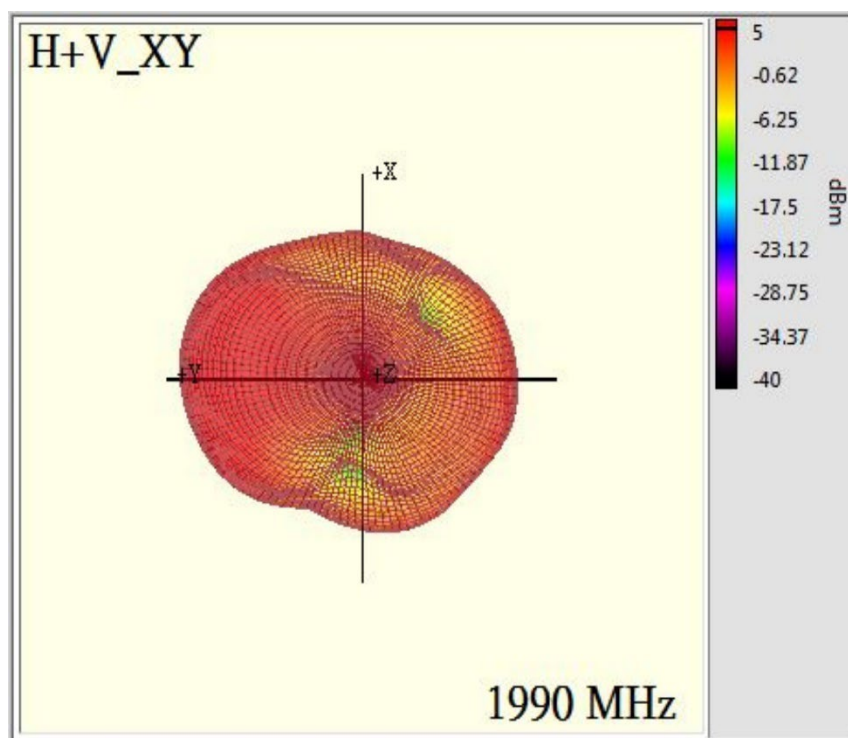
5. Antenna Gain Test

5.2 Antenna Radiation Pattern (2) / Skylo Ant



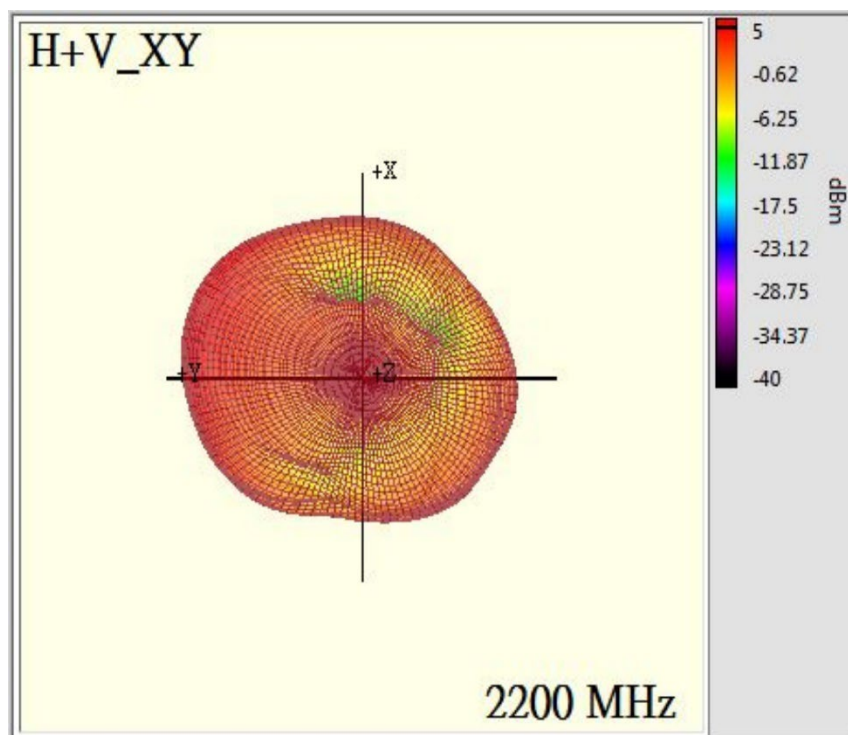
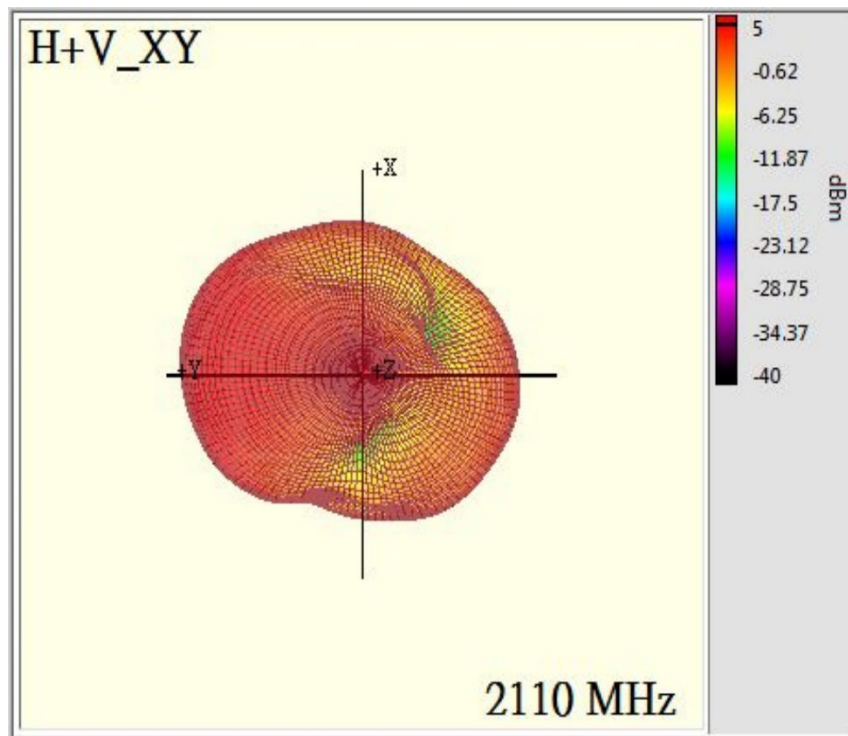
5. Antenna Gain Test

5.2 Antenna Radiation Pattern (3) / Skylo Ant



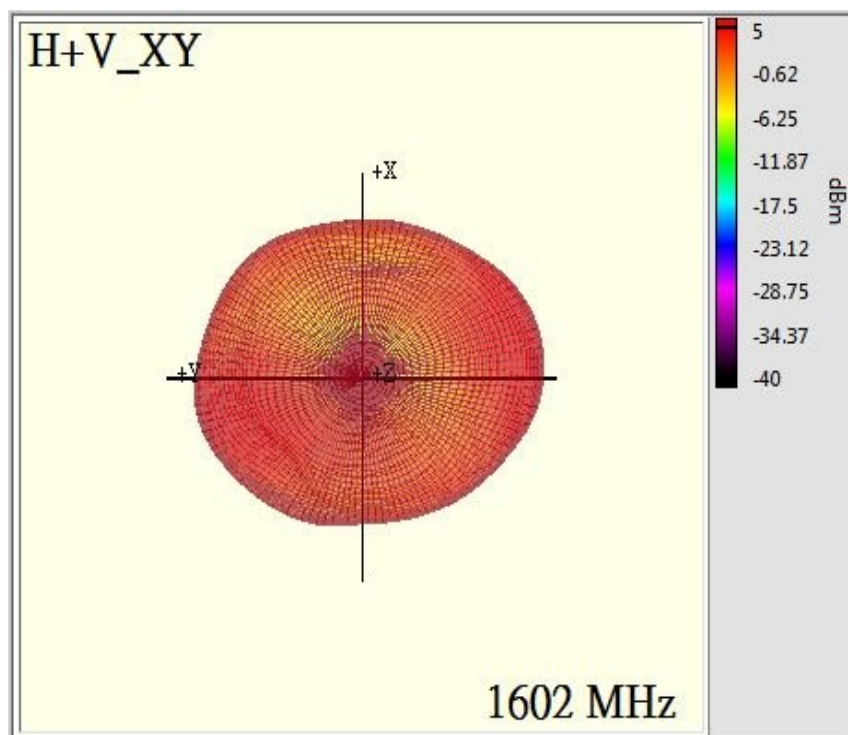
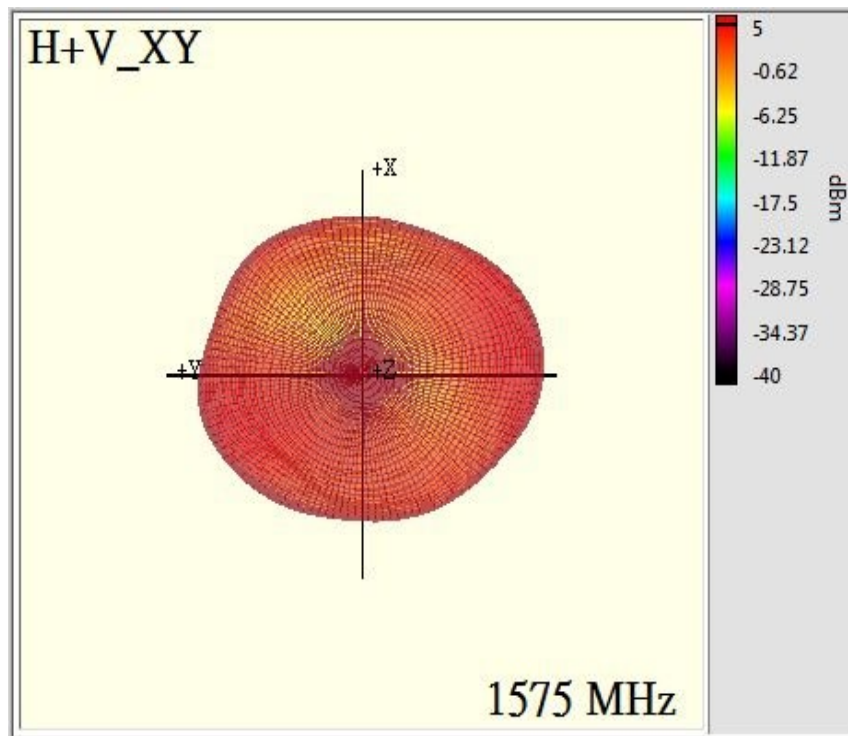
5. Antenna Gain Test

5.2 Antenna Radiation Pattern (4) / Skylo Ant



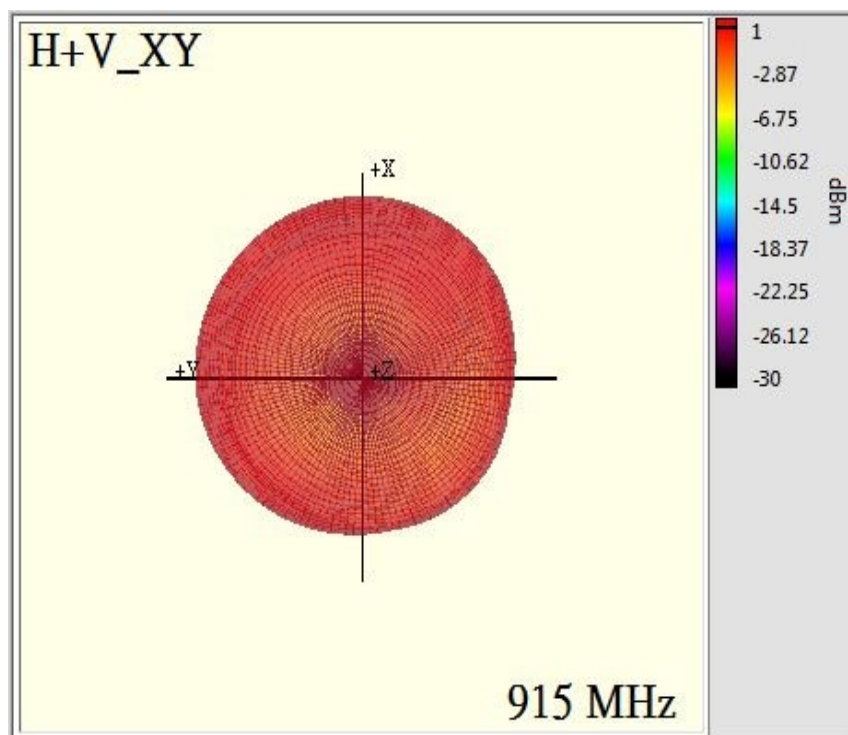
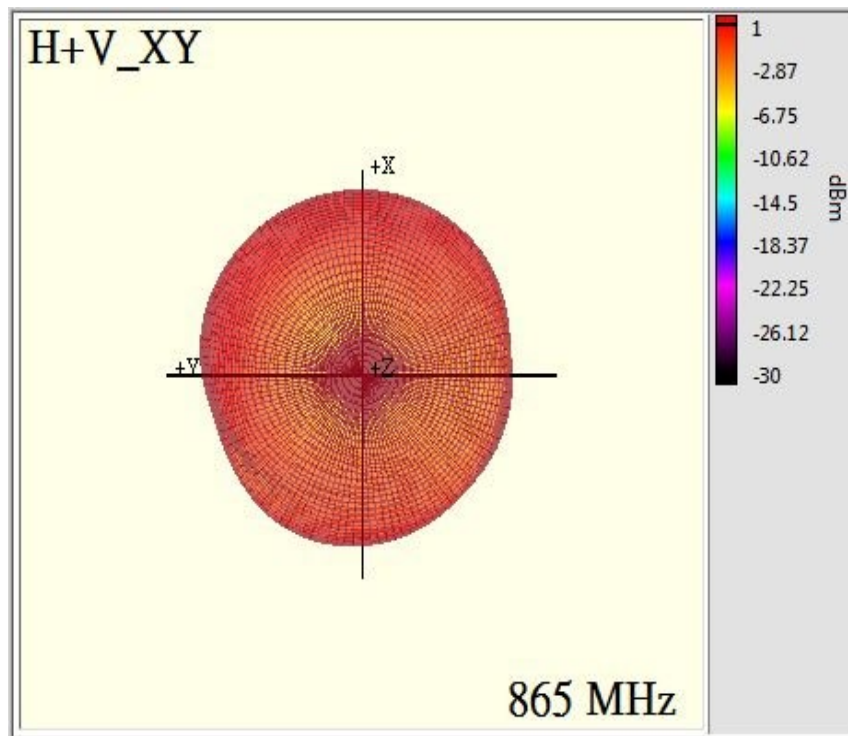
5. Antenna Gain Test

5.2 Antenna Radiation Pattern / GPS Ant



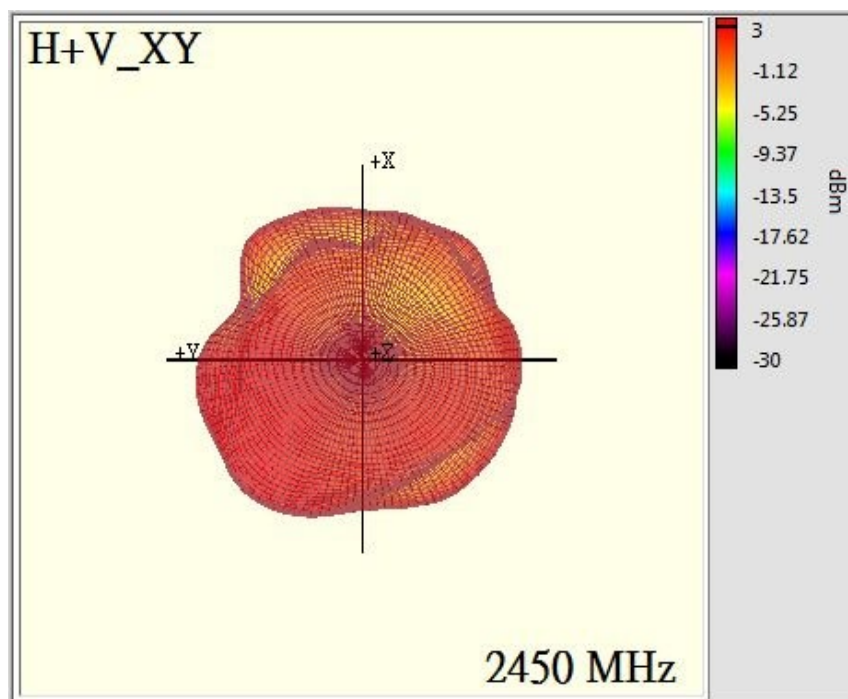
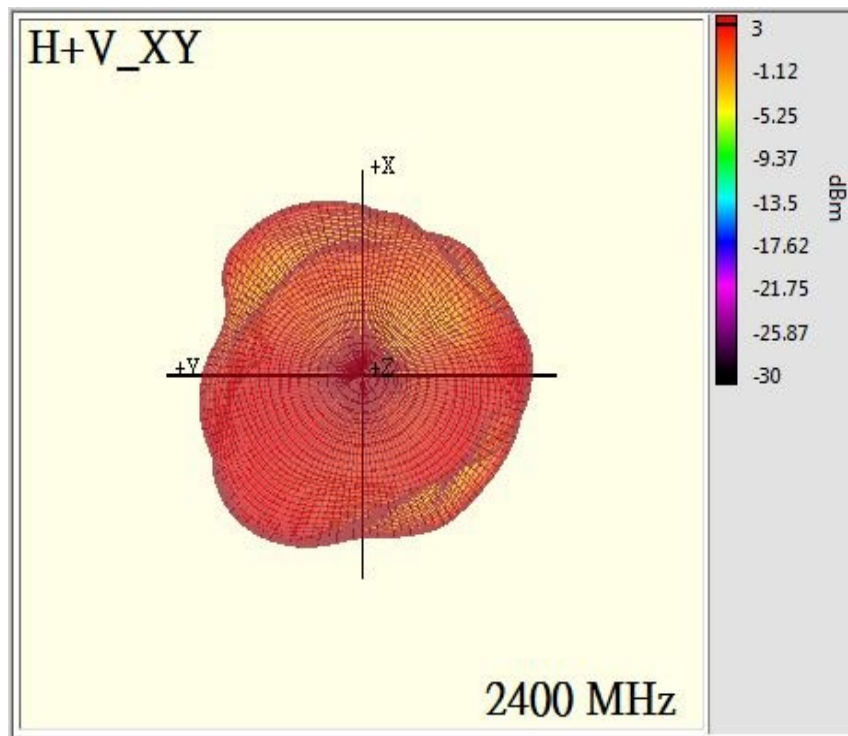
5. Antenna Gain Test

5.2 Antenna Radiation Pattern / LoRa Ant



5. Antenna Gain Test

5.2 Antenna Radiation Pattern / WiFi_BT Ant



5. Antenna Gain Test

5.3 Gain and Efficiency Test Data

Total Polarzation

Skylo

Frequency (MHz)	1525	1565	1575	1585	1602	1612
Efficiency (dB)	-2.093	-2.303	-2.437	-2.575	-2.419	-2.669
Efficiency (%)	61.763	58.845	57.05	55.276	57.294	54.085
Gain (dBi)	3.307	2.765	2.755	2.722	2.972	2.688
Frequency (MHz)	1626	1643	1660			
Efficiency (dB)	-2.73	-2.727	-2.57			
Efficiency (%)	53.334	53.367	55.333			
Gain (dBi)	2.858	2.998	2.564			
Frequency (MHz)	1980	2000	2010	2020	2050	2070
Efficiency (dB)	-1.83	-1.938	-2.499	-2.614	-2.831	-2.972
Efficiency (%)	65.613	64.002	56.241	54.777	52.112	50.439
Gain (dBi)	5.587	5.482	4.935	4.837	4.586	4.287
Frequency (MHz)	2100	2110	2140	2160	2190	2200
Efficiency (dB)	-3.25	-3.344	-3.564	-3.646	-4.079	-4.158
Efficiency (%)	47.319	46.305	44.011	43.193	39.095	38.392
Gain (dBi)	3.763	3.608	3.227	3.124	2.979	3.094

Total Polarzation

GPS

Frequency (MHz)	1565	1575	1585	1592	1602	1612
Efficiency (dB)	-3.085	-3.253	-3.382	-3.447	-3.084	-3.227
Efficiency (%)	49.144	47.277	45.896	45.22	49.16	47.565
Gain (dBi)	2.926	2.728	2.571	2.48	2.861	2.731

5. Antenna Gain Test

5.3 Gain and Efficiency Test Data

Total Polarization LoRa

Frequency (MHz)	860	865	870	875	900	905	915	925	930
Efficiency (dB)	-5.4	-5.0	-4.6	-4.1	-3.3	-3.4	-3.5	-3.5	-3.4
Efficiency (%)	28.8	31.9	34.7	39.0	46.4	46.1	44.6	44.3	45.8
Gain (dBi)	-1.6	-1.0	-0.6	0.0	0.7	0.6	0.1	-0.2	-0.1

Total Polarization WiFi_BT Antenna

Frequency (MHz)	2400	2420	2440	2450	2480	2500
Efficiency (dB)	-2.611	-2.382	-2.222	-2.106	-1.776	-1.685
Efficiency (%)	54.819	57.785	59.95	61.58	66.438	67.848
Gain (dBi)	1.963	2.168	2.31	2.49	2.805	2.707

Frequency (MHz)	5150	5350	5850	6325	6725	7125
Efficiency (dB)	-4.114	-3.187	-4.21	-3.142	-2.986	-3.07
Efficiency (%)	38.783	48.005	37.93	48.509	50.285	49.314
Gain (dBi)	1.976	2.619	1.333	4.052	2.564	3.8