

HT-6766BEM Antenna Report

V1.0

Report Change List



Version	Change description	Author	date
V1.0	First version	Wen	2024.08.04

CONTENTS

- ◆ **Purpose & Environment**
- ◆ **DUT Antenna**
- ◆ **Return Loss and Isolation**
- ◆ **2D&3D Radiation Pattern**
- ◆ **Peak Gain and Efficiency**
- ◆ **Summary**

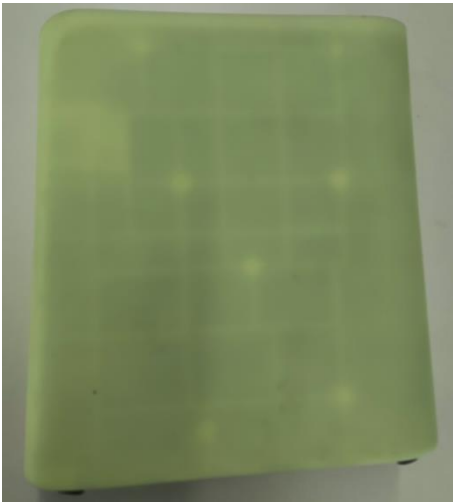
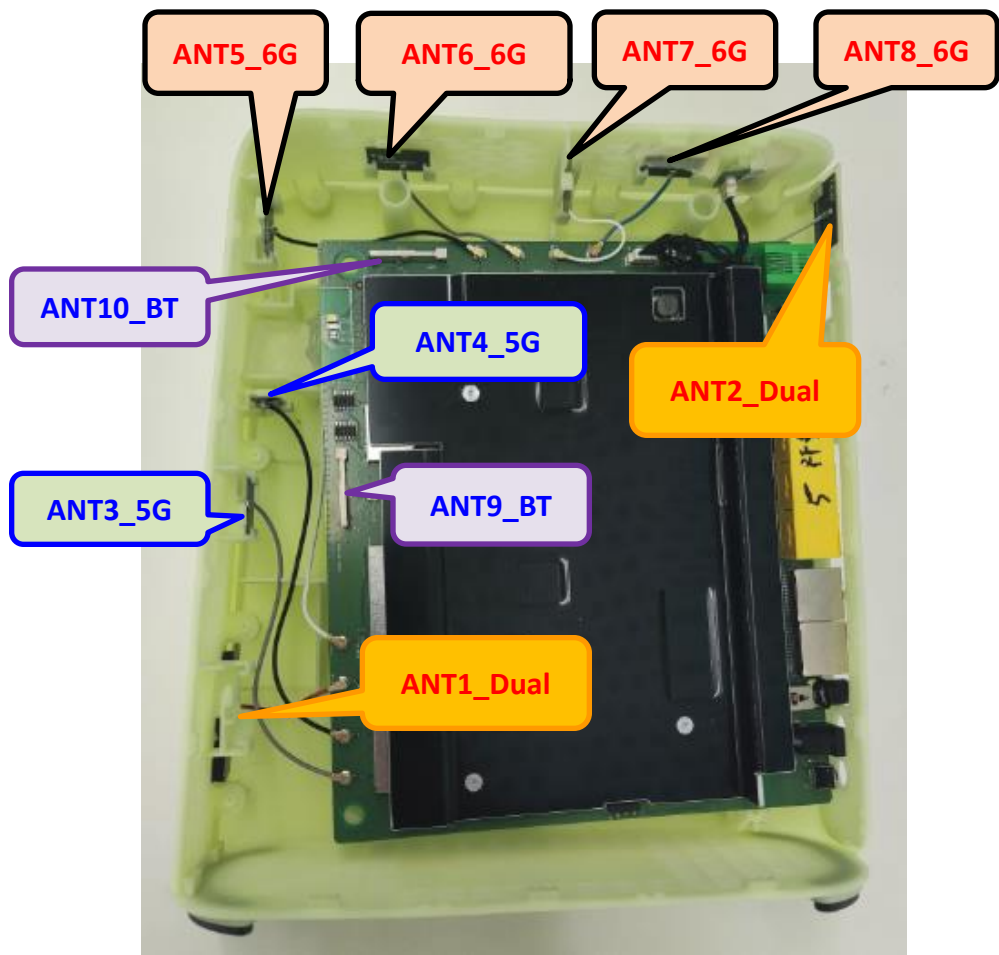
Purpose

- Meet the electrical performance index ;
- Confirm the antenna scheme to meet the design requirements;

Environment

- Test Condition: the network analyzer(E5071C) and SATIMO microwave anechoic chamber
- Passive measurement results are presented mock up

Antenna Model



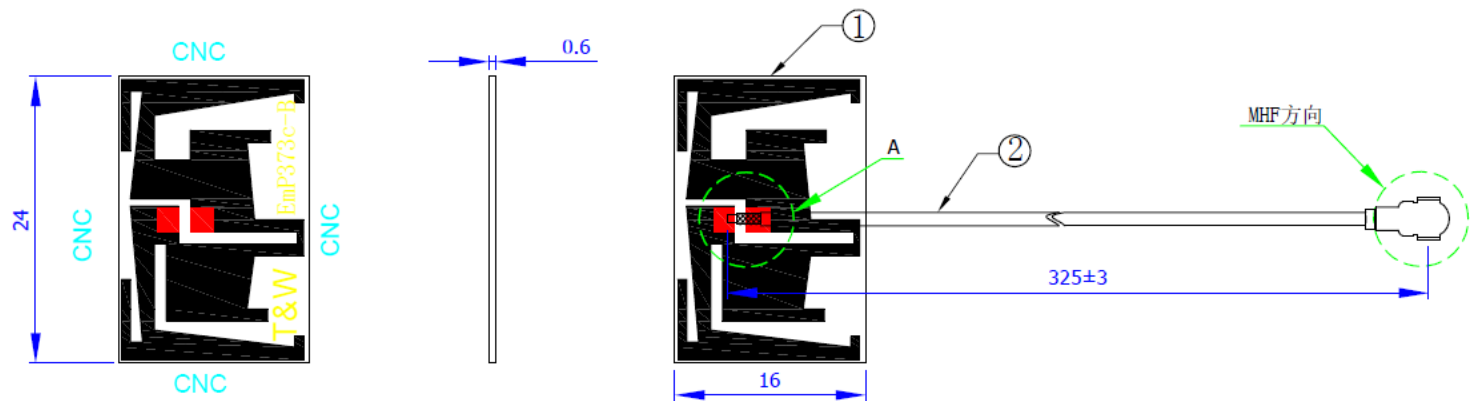
ANT NO.	Frequency (GHz)
ANT1-Dual	2.4-2.5&5.15-5.85
ANT2-Dual	2.4-2.5&5.15-5.85
ANT3	5.15-5.85
ANT4	5.15-5.85
ANT5	5.91-7.125
ANT6	5.91-7.125
ANT7	5.91-7.125
ANT8	5.91-7.125
ANT9-BT	2.4-2.5
ANT10-BT	2.4-2.5

Antenna manufacturer :
ShangHai Signal Plus Technology Co.,Ltd.

Antenna manufacturer's address:
Room 603, Building 30, No. 69, Guqing Road, Xuhui District,
Shanghai.

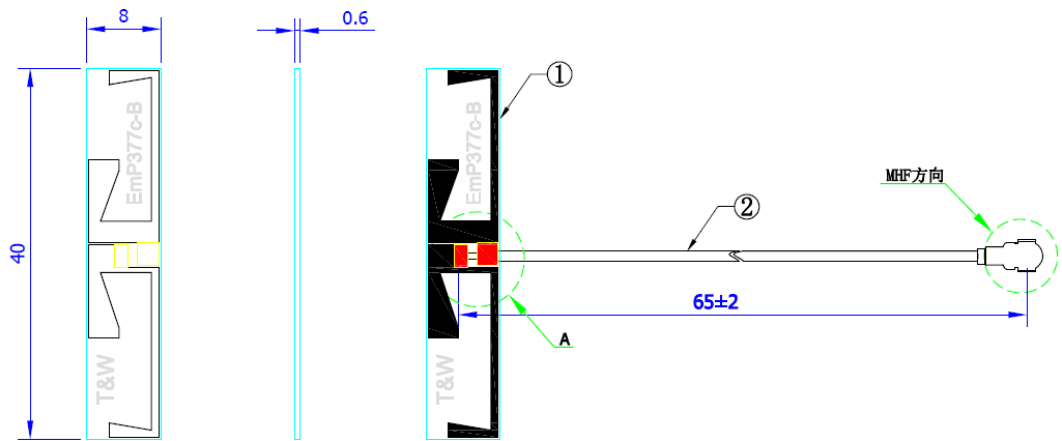
DUT Antenna

ANT1-Dual



Antenna dimension:EmP373c-B-I325(W)
(Remark: for White, the RF cable is 325mm)

ANT2-Dual

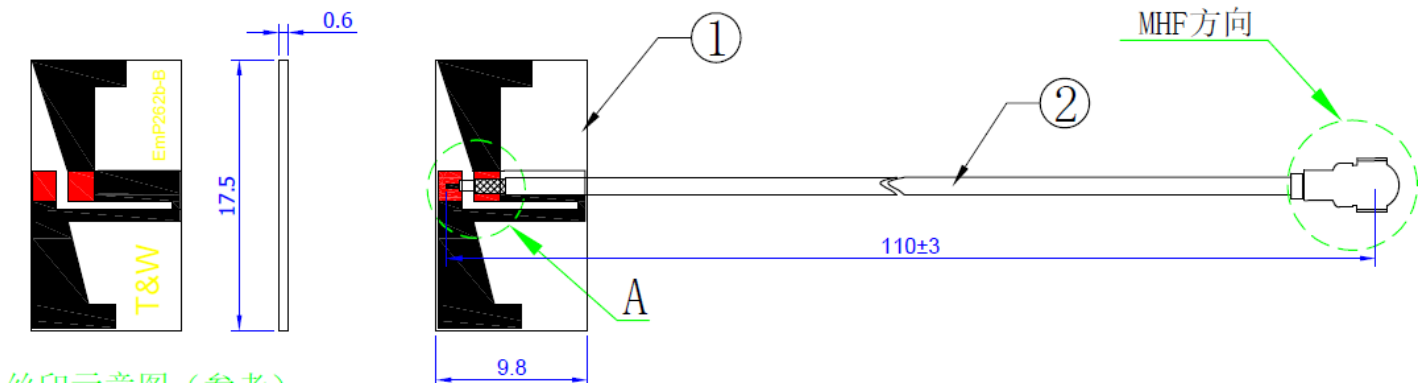


Antenna dimension:EmP377c-B-I65(R)
(Remark: for Red, the RF cable is 65mm)

DUT Antenna

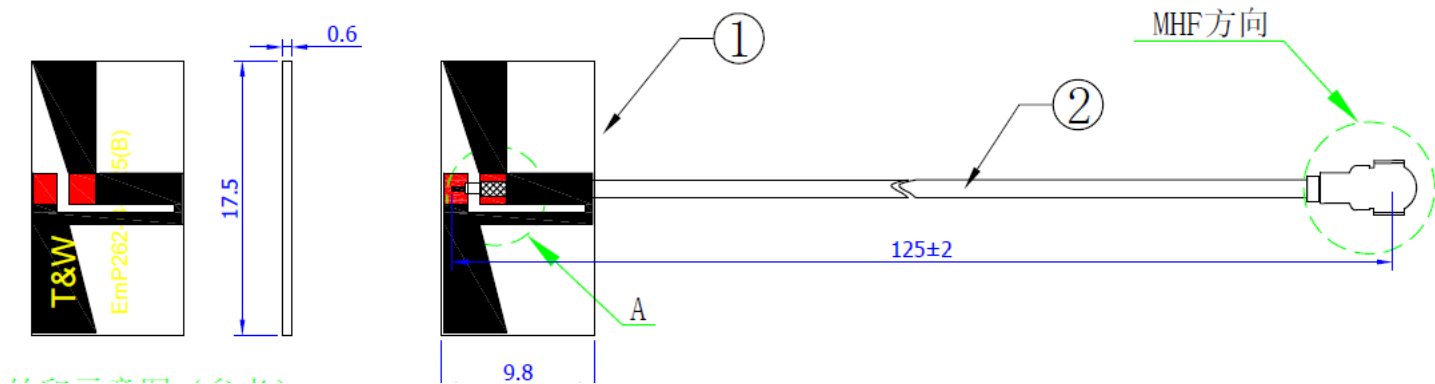


ANT3-5G



Antenna dimension:EmP262b-B-I110(G)
(Remark: for Gray, the RF cable is 110mm)

ANT4-5G

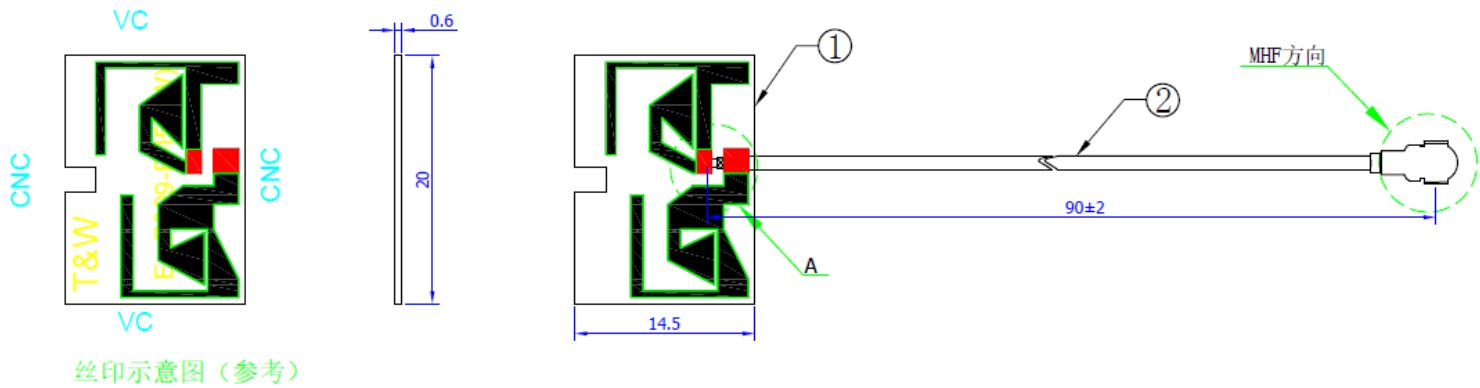


Antenna dimension:EmP262-B-I125(B)
(Remark: for Black, the RF cable is 125mm)

DUT Antenna

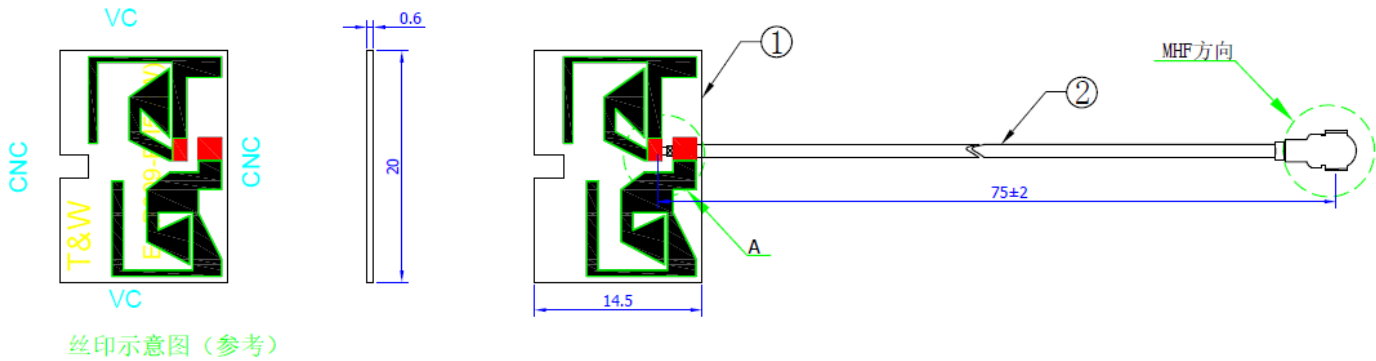


ANT5-6G



Antenna dimension:EmP609-B-I90(B)
(Remark: for Black, the RF cable is 90mm)

ANT6-6G

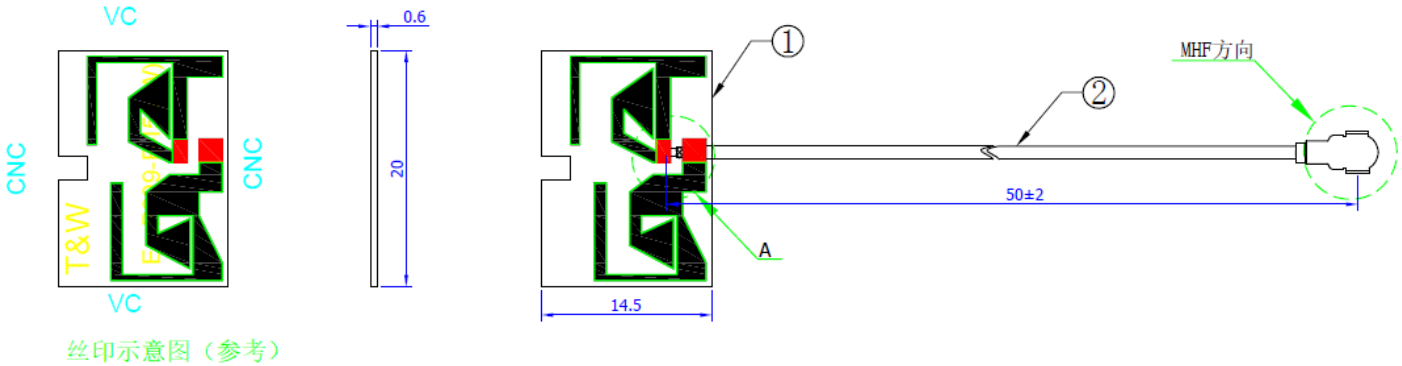


Antenna dimension:EmP609-B-I75(G)
(Remark: for Gray, the RF cable is 75mm)

DUT Antenna

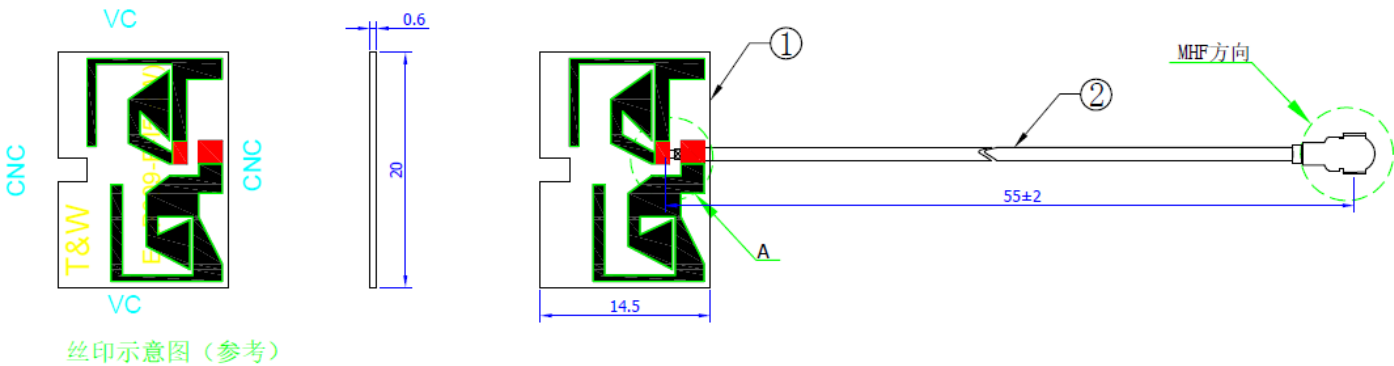


ANT7-6G



Antenna dimension:EmP609-B-I50(W)
(Remark: for White, the RF cable is 50mm)

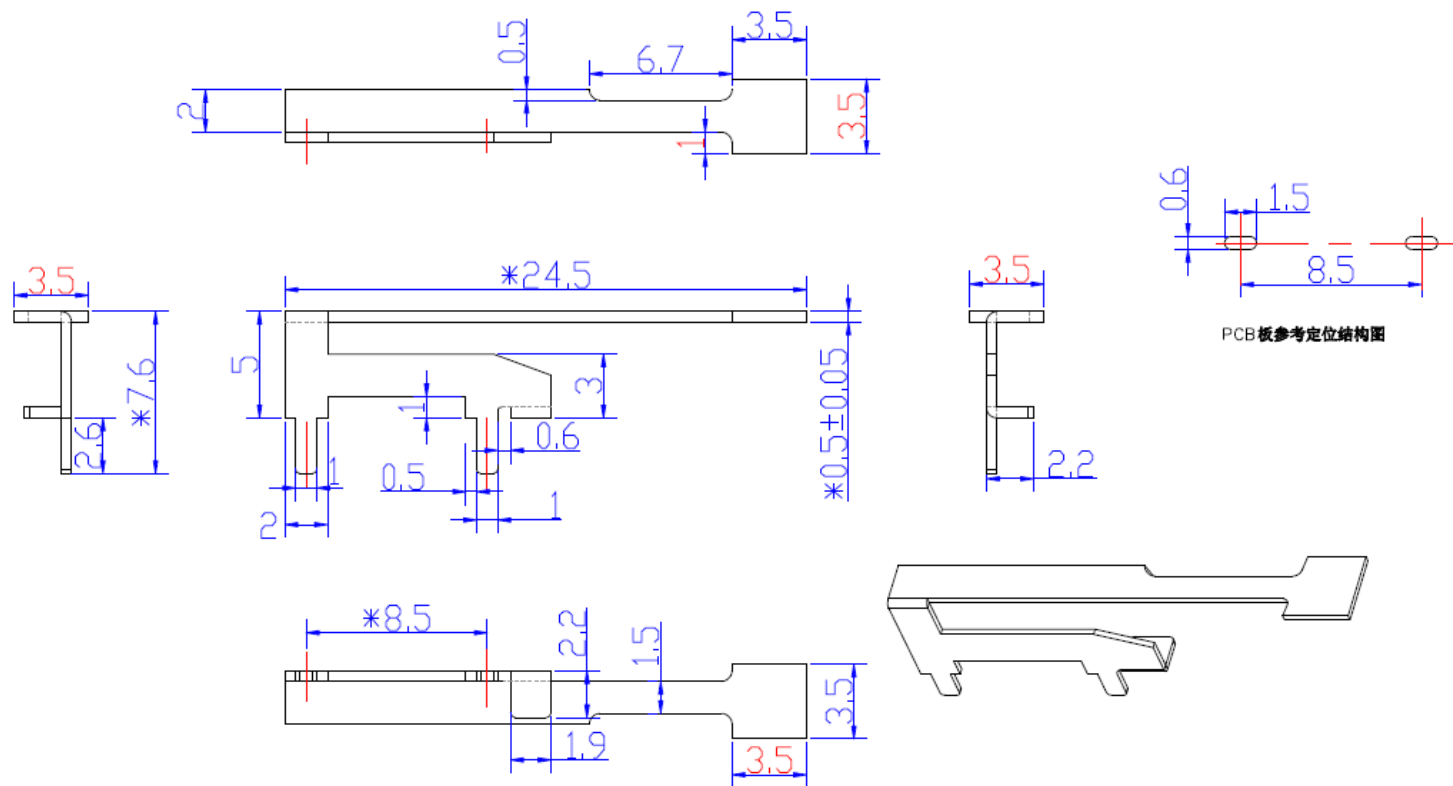
ANT8-6G



Antenna dimension:EmP609-B-I55(Blue)
(Remark: for Blue, the RF cable is 55mm)

DUT Antenna

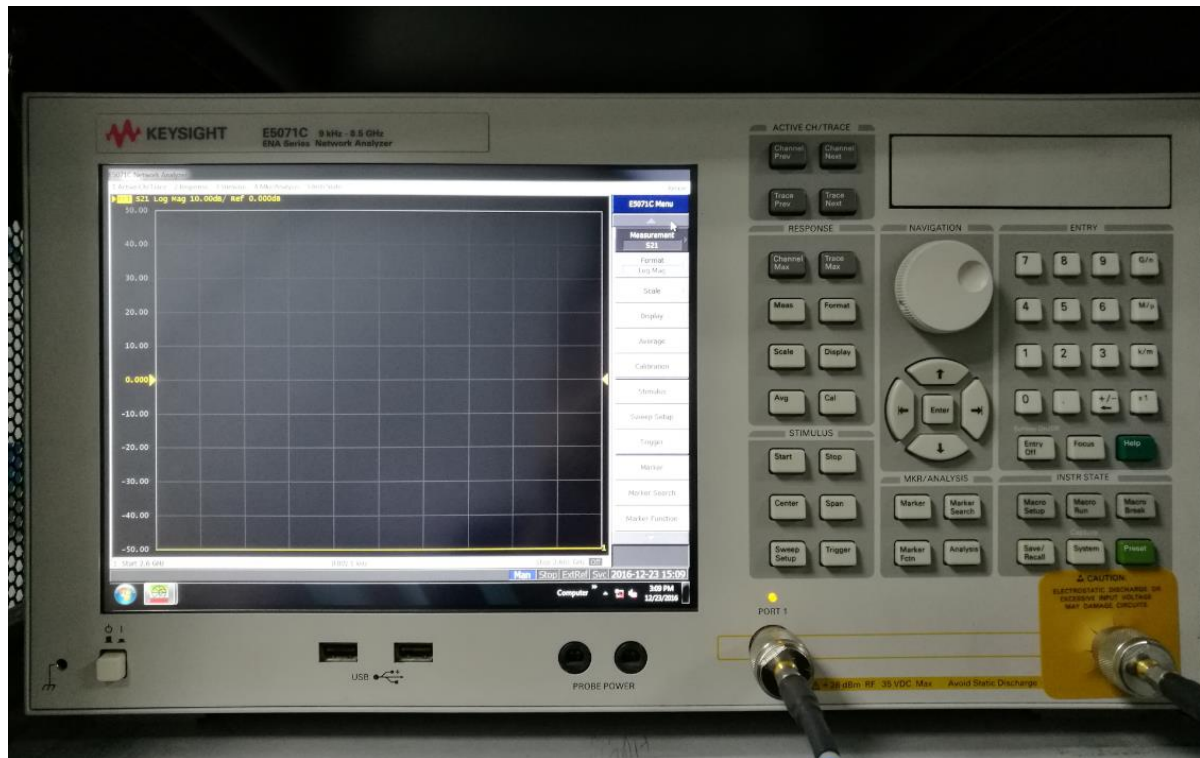
ANT9-BT
ANT10-BT



Antenna dimension:EmW101-N

Return Loss and Isolation

Measurement Condition

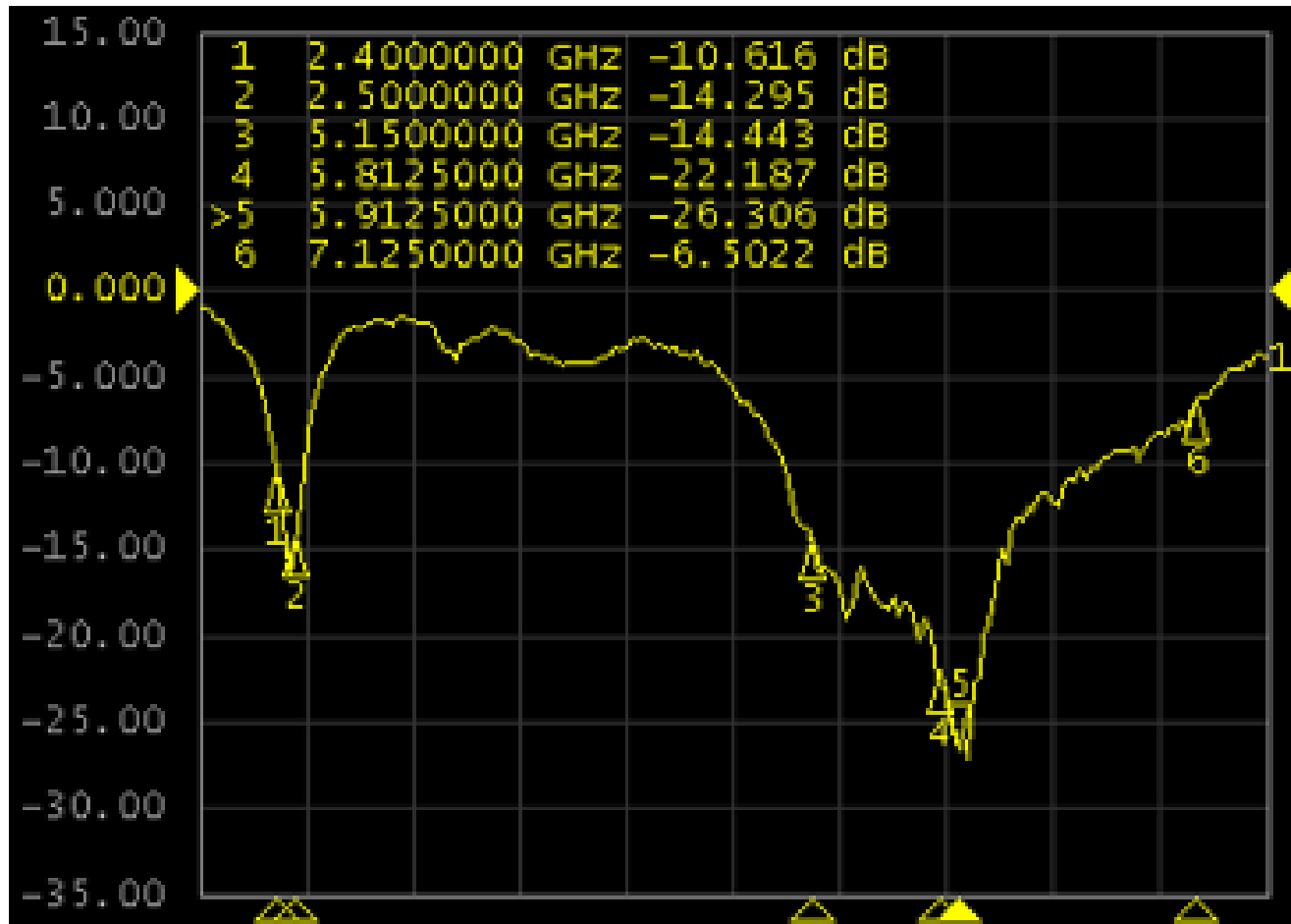


The network Analyzer

Return loss

ANT1-2G (2.4-2.5GHz&5.125-5.8125GHz)

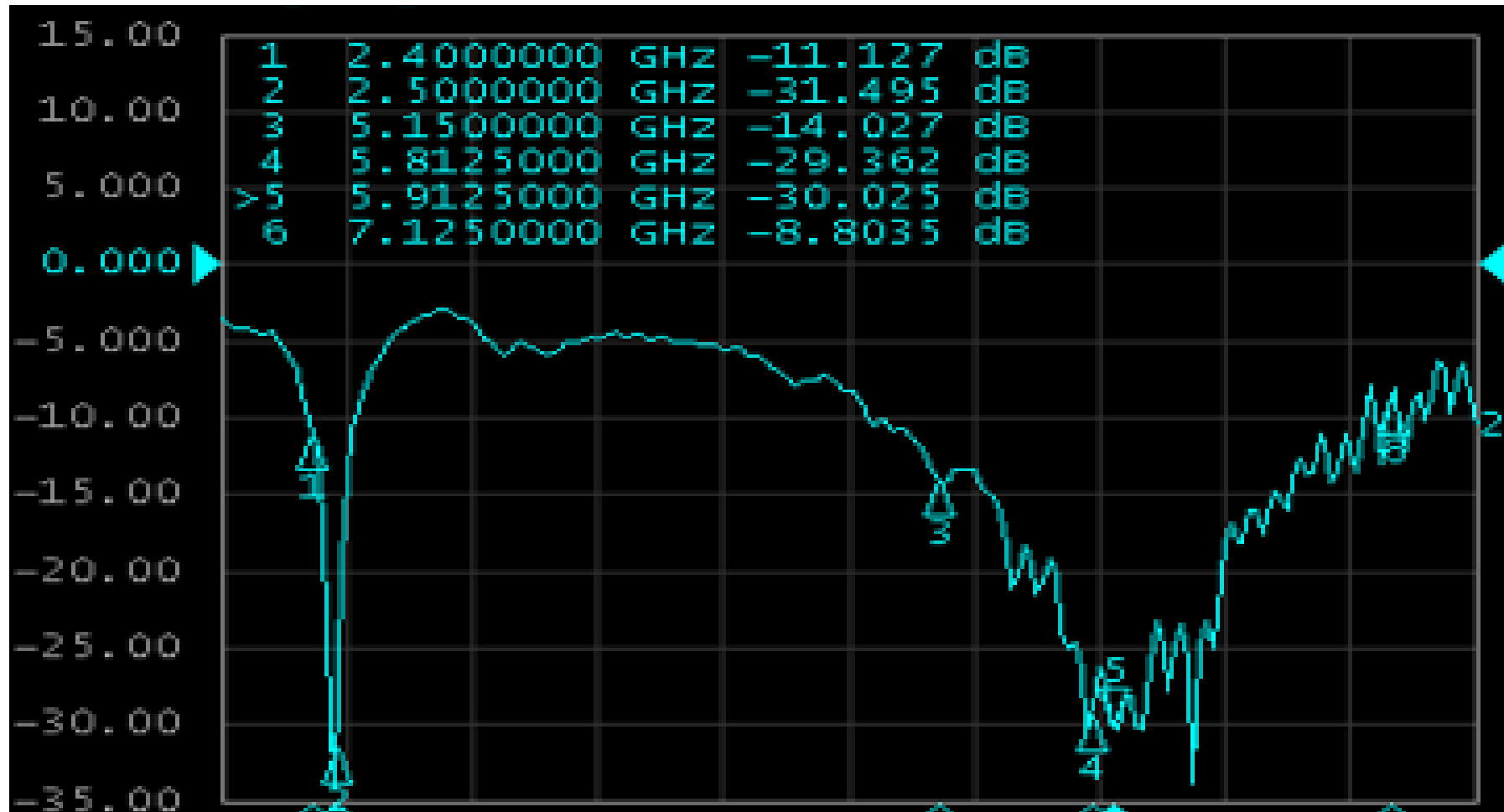
S11 Return loss 2.4G < -10dB, 5G < -22dB



Return loss

ANT2-5G (2.4-2.5GHz&5.15-5.8125GHz)

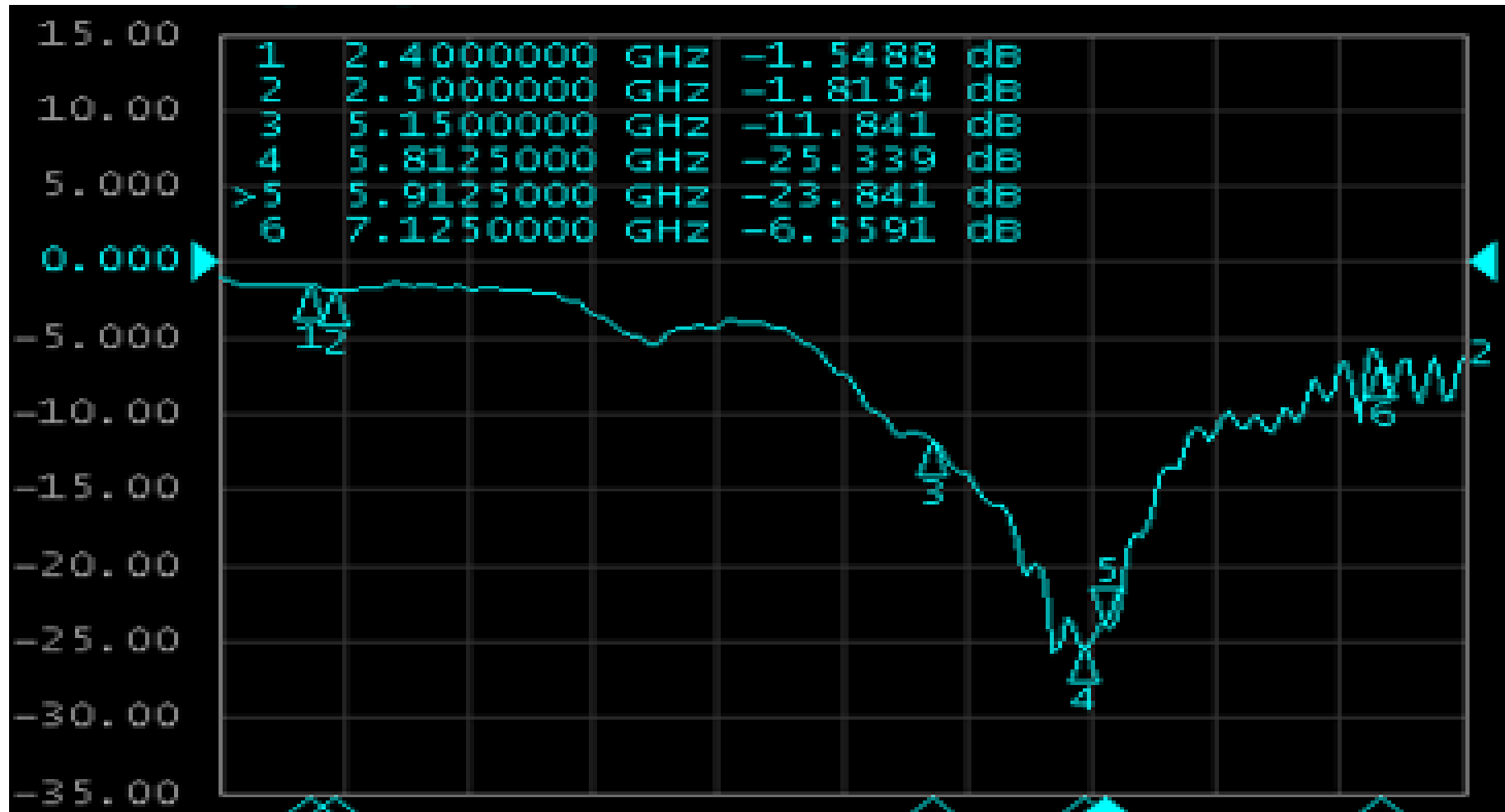
S22 Return loss 2.4G<-11dB, 5G<-29dB



Return loss

ANT3-5G (5.15-5.8125GHz)

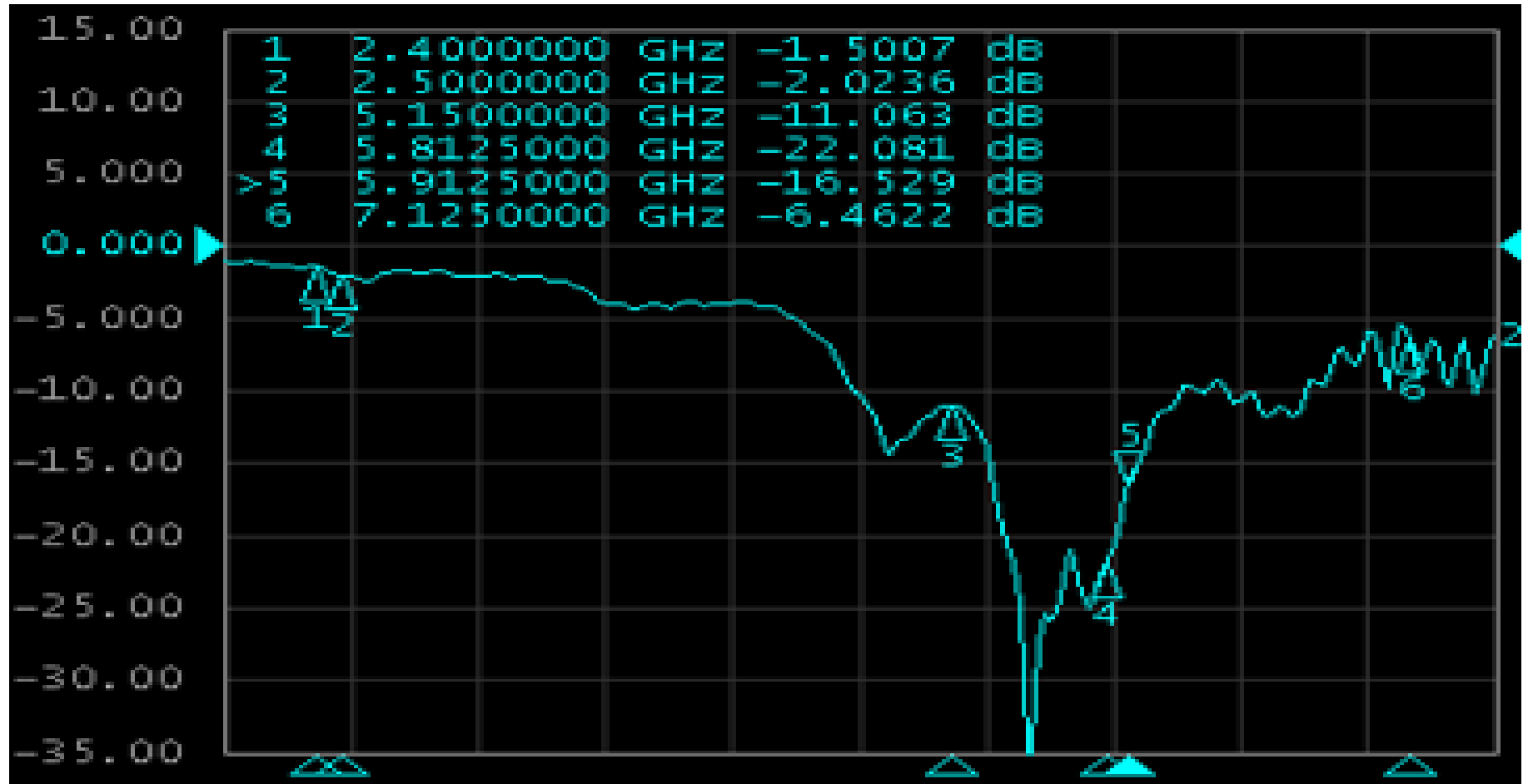
S33 Return loss <-11dB@5G



Return loss

ANT4-2G (5.15-5.8125GHz)

S44 Return loss <-15dB@5GHz

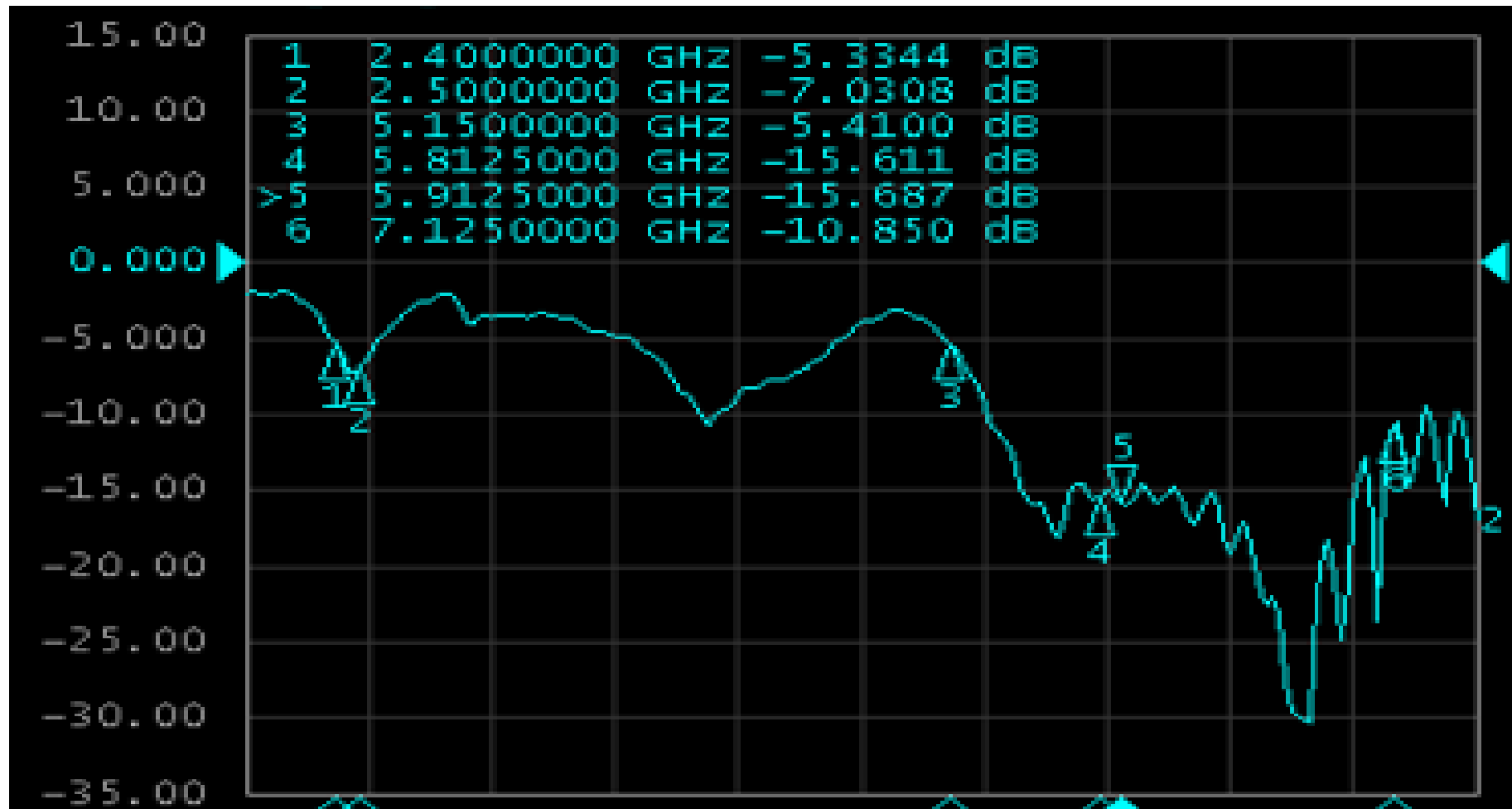


Return loss

ANT5-6G (5.9125-7.125GHz)

S55

Return loss <-15dB

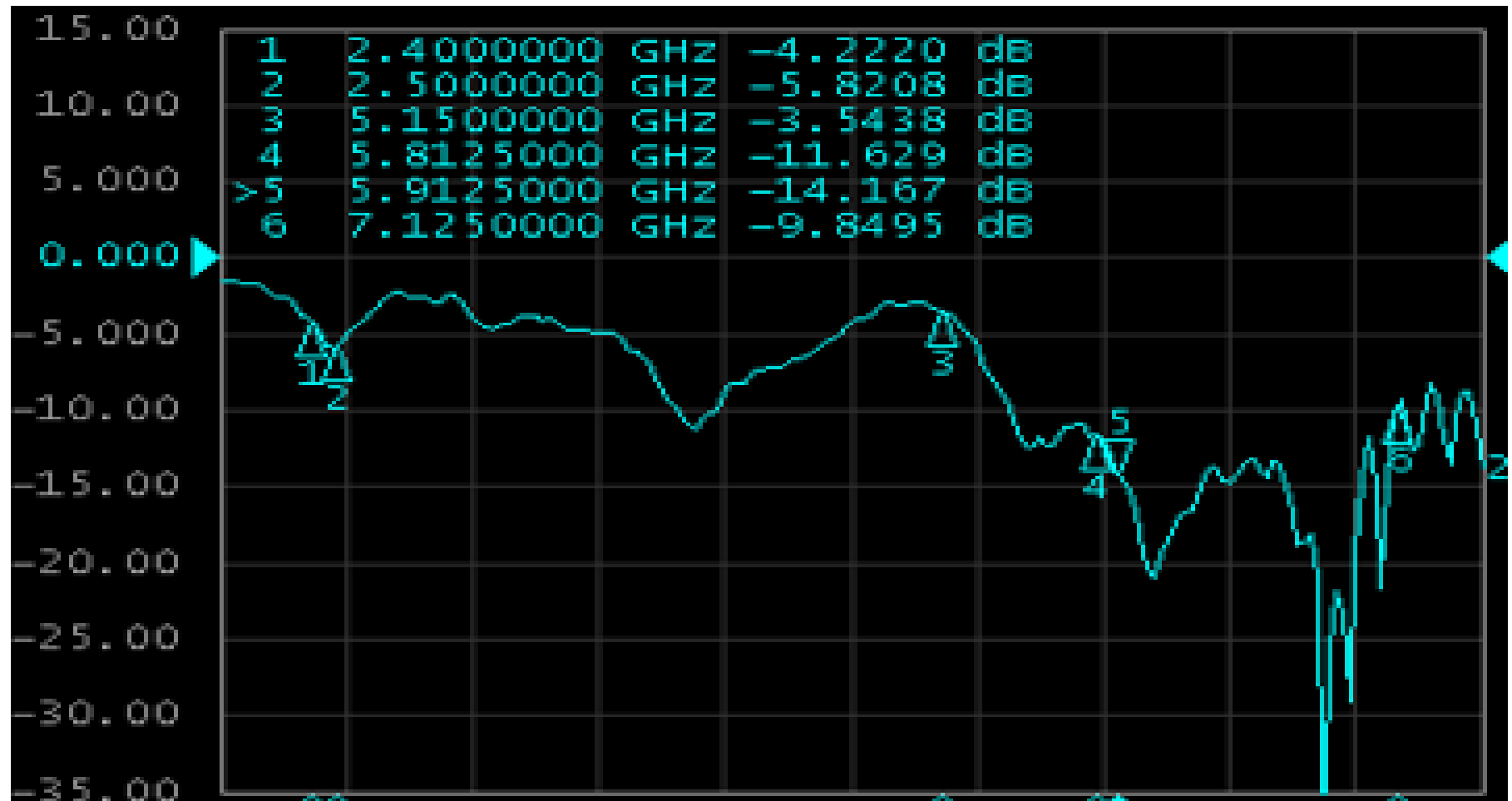


Return loss

ANT6-6G (5.9125-7.125GHz)

S66

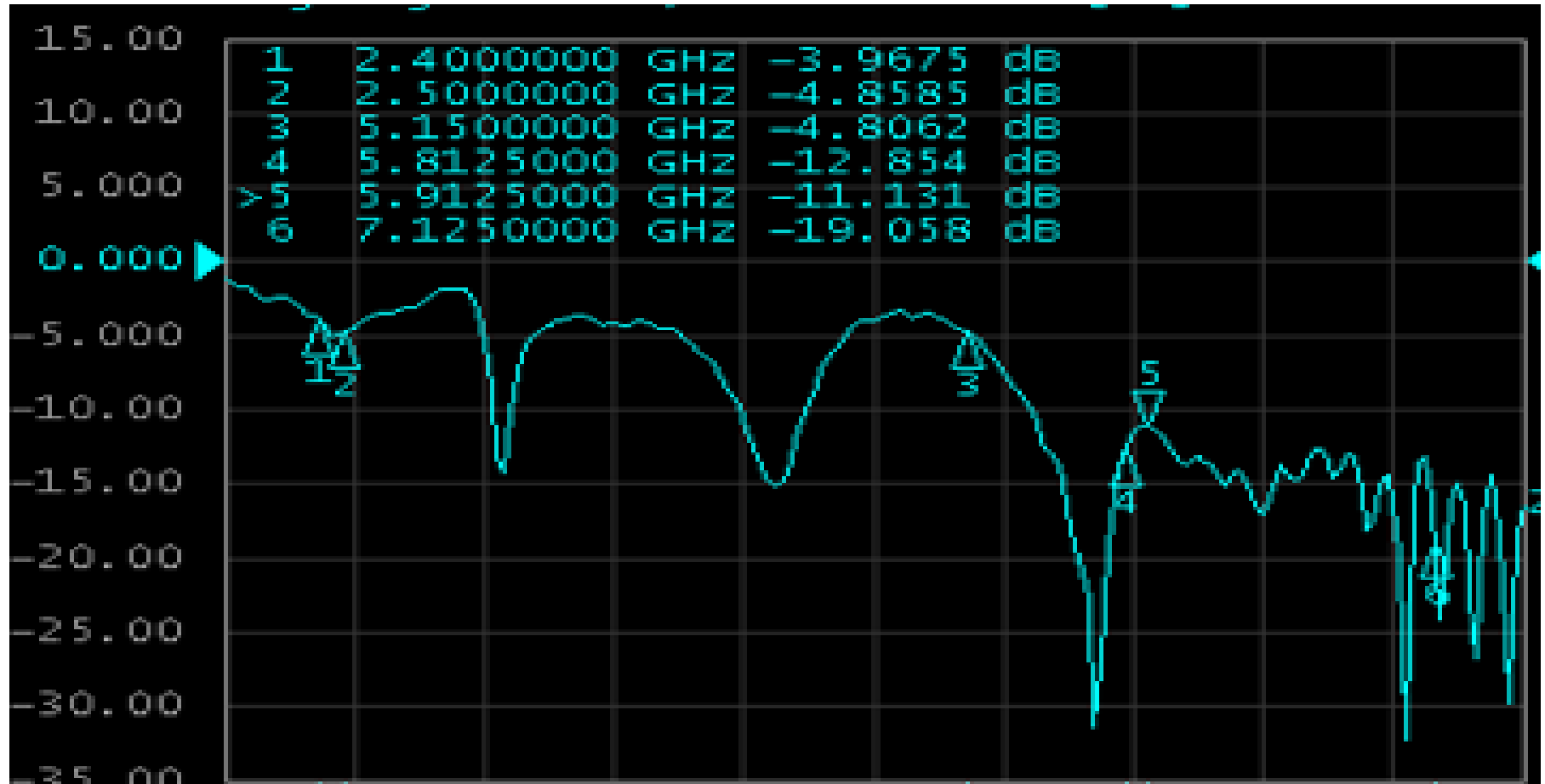
Return loss <-11dB



Return loss

ANT7-6G (5.9125-7.125GHz)

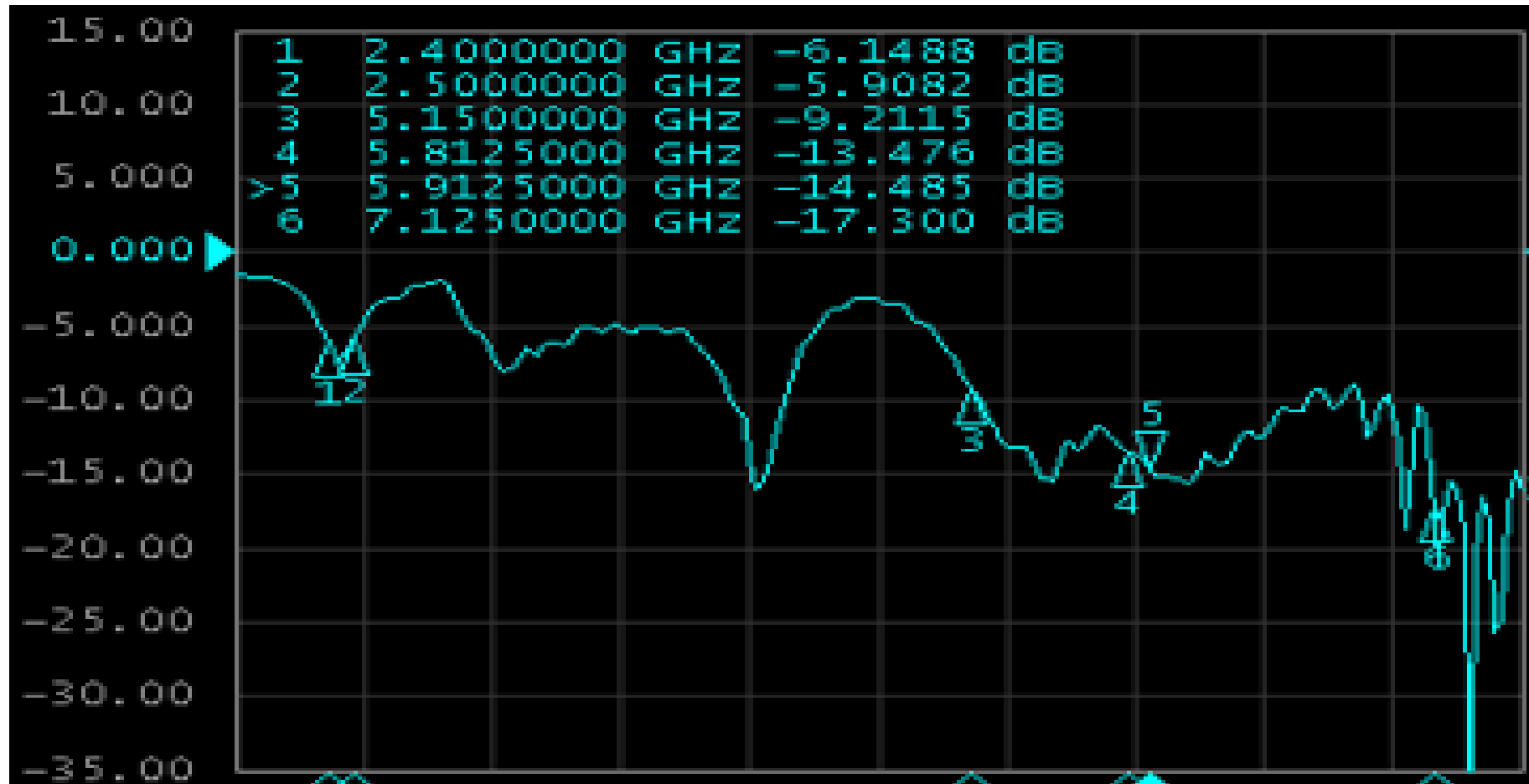
S77 Return loss <-11dB



Return loss

ANT8-6G (5.9125-7.125GHz)

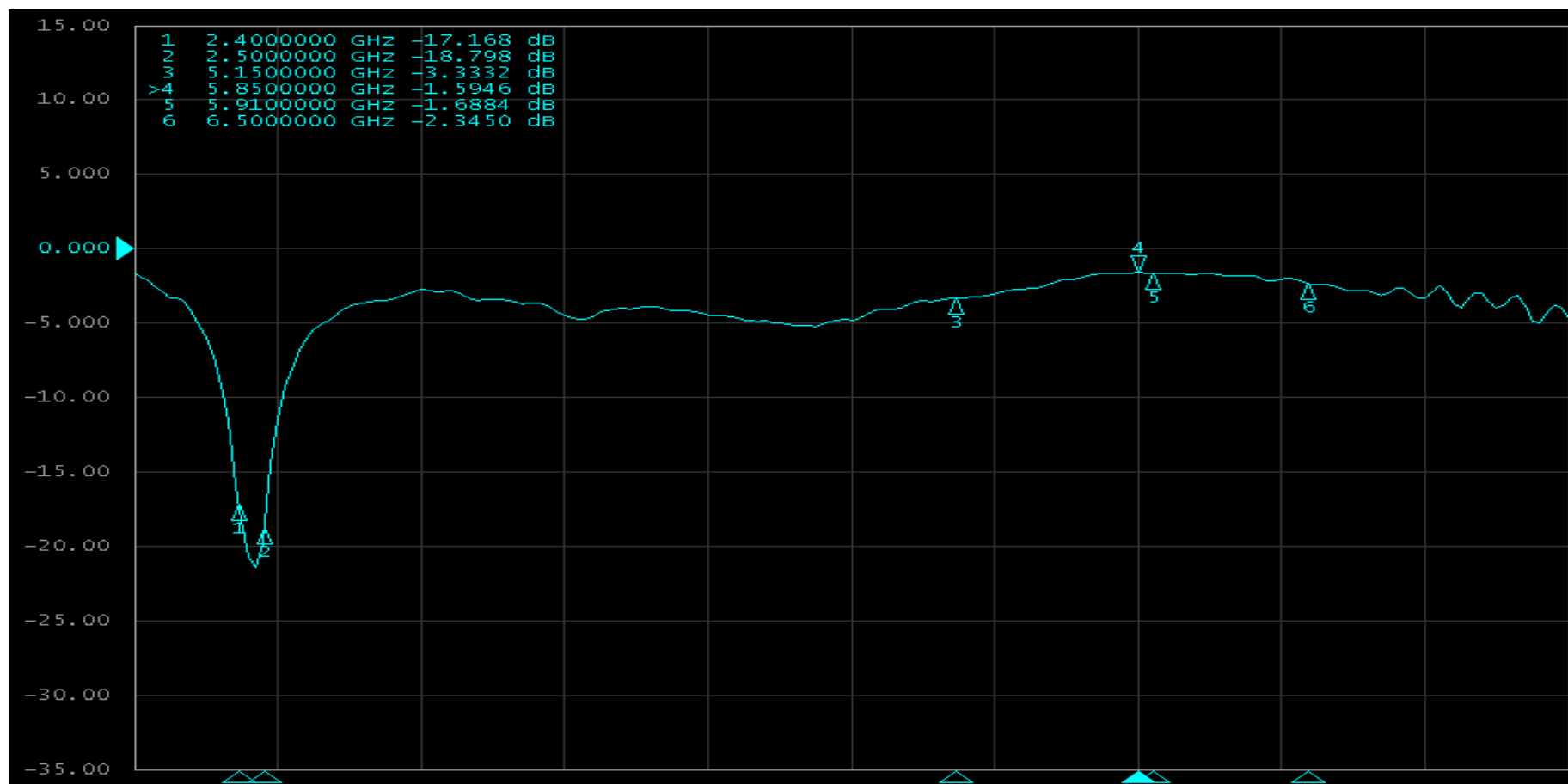
S88 Return loss <-14dB



Return loss

ANT9-2G (2.4-2.5GHz)

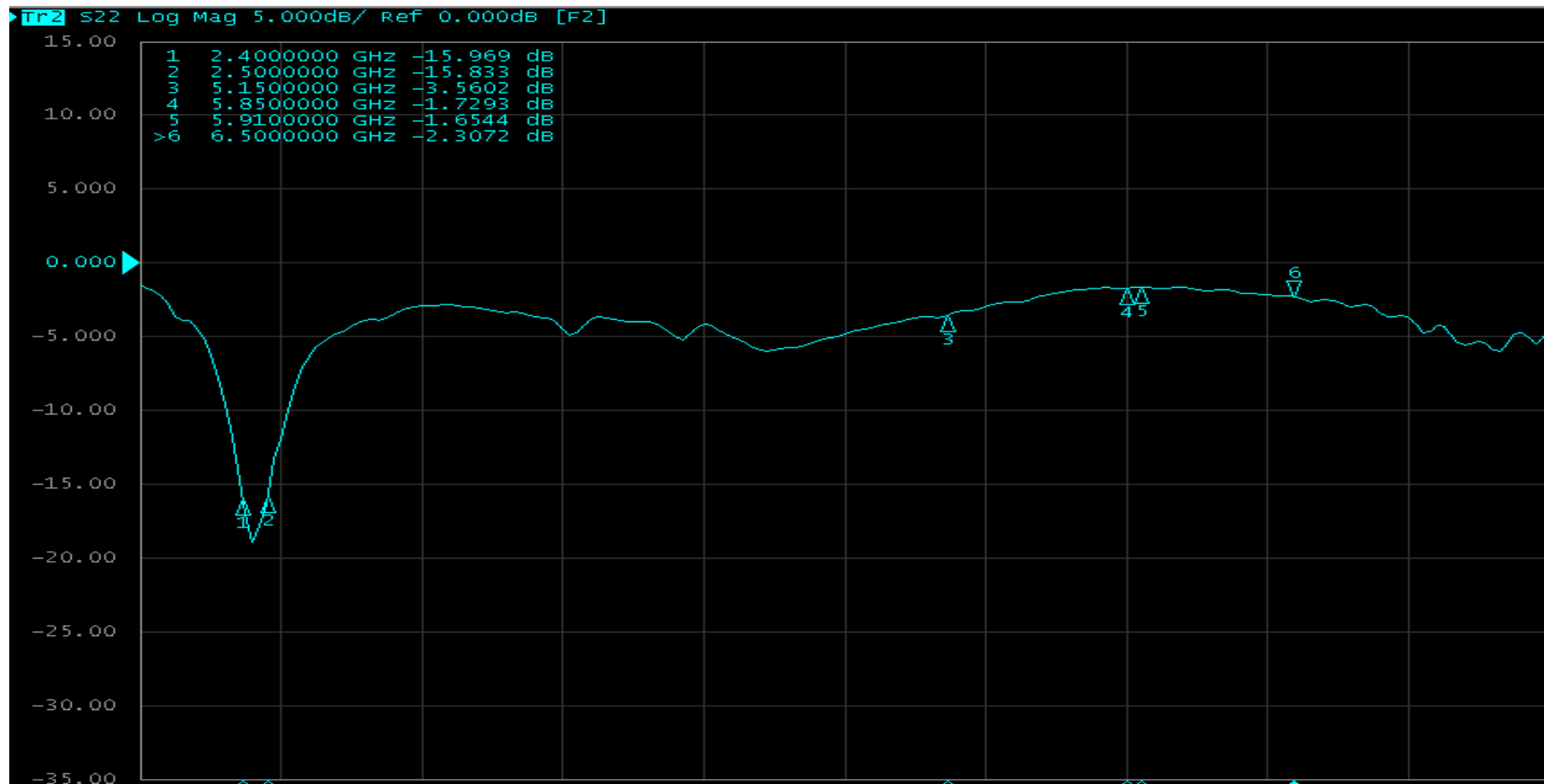
S99 Return loss <-15dB



Return loss

ANT10-2G (2.4-2.5GHz)

S10 10 Return loss < -15dB



Return loss

	Return loss		
Frequency (GHz)	2.4-2.5GHz	5.15-5.85GHz	5.91-7.125GHz
ANT1-Dual	<-10dB		-
ANT2-Dual			-
ANT3-5G	-	<-10dB	-
ANT4-5G	-		-
ANT5-6G	-	-	<-10dB
ANT6-6G	-	-	
ANT7-6G	-	-	
ANT8-6G	-	-	
ANT9-BT	<-10dB	-	-
ANT10-BT		-	-

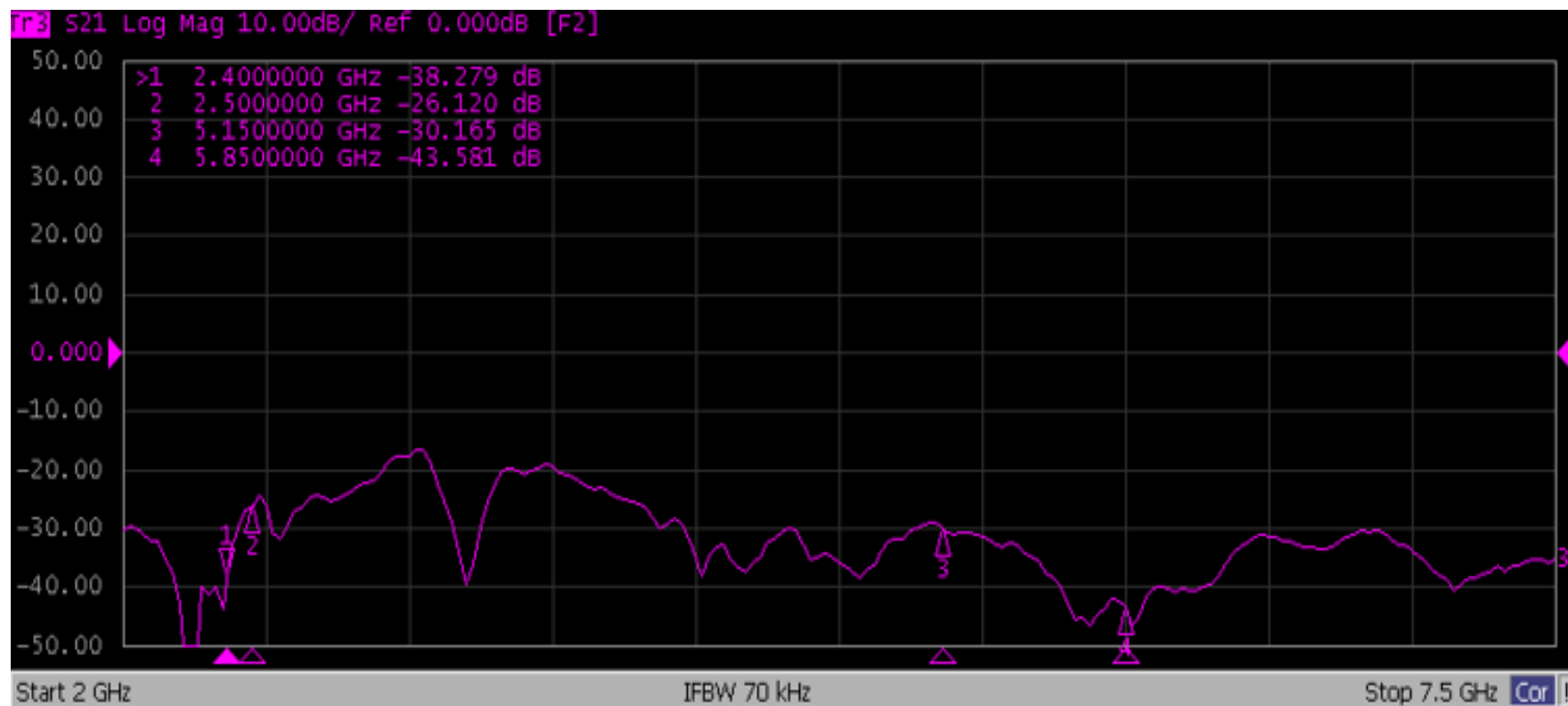
- The WIFI 2.4G antenna's Return loss < -10dB;
- The WIFI 5G antenna's Return loss < -10dB;
- The WIFI 6G antenna's Return loss < -10dB;
- The WIFI BT antenna's Return loss < -10dB.

Isolation

S21

Isolation < -26dB @ 2G

Isolation < -30dB @ 5G

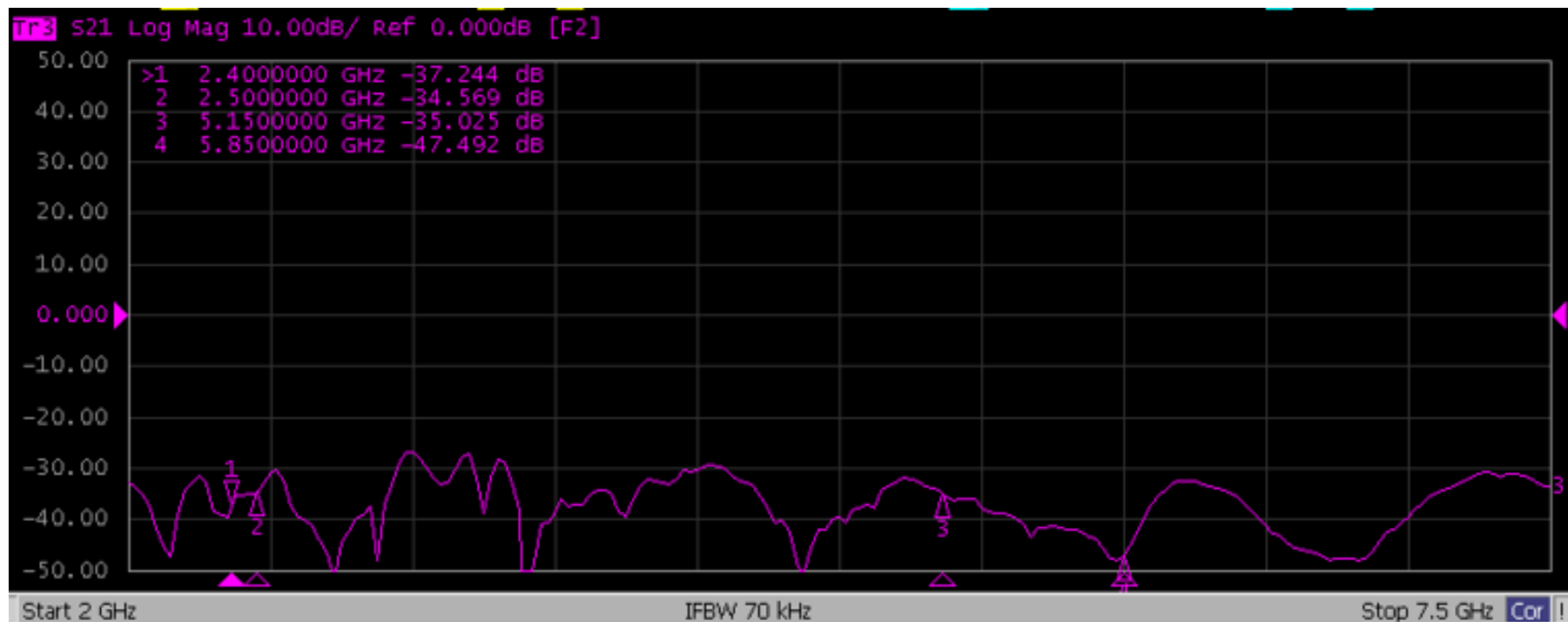


Isolation

S31

Isolation < -26dB@2G

Isolation < -30dB@5G



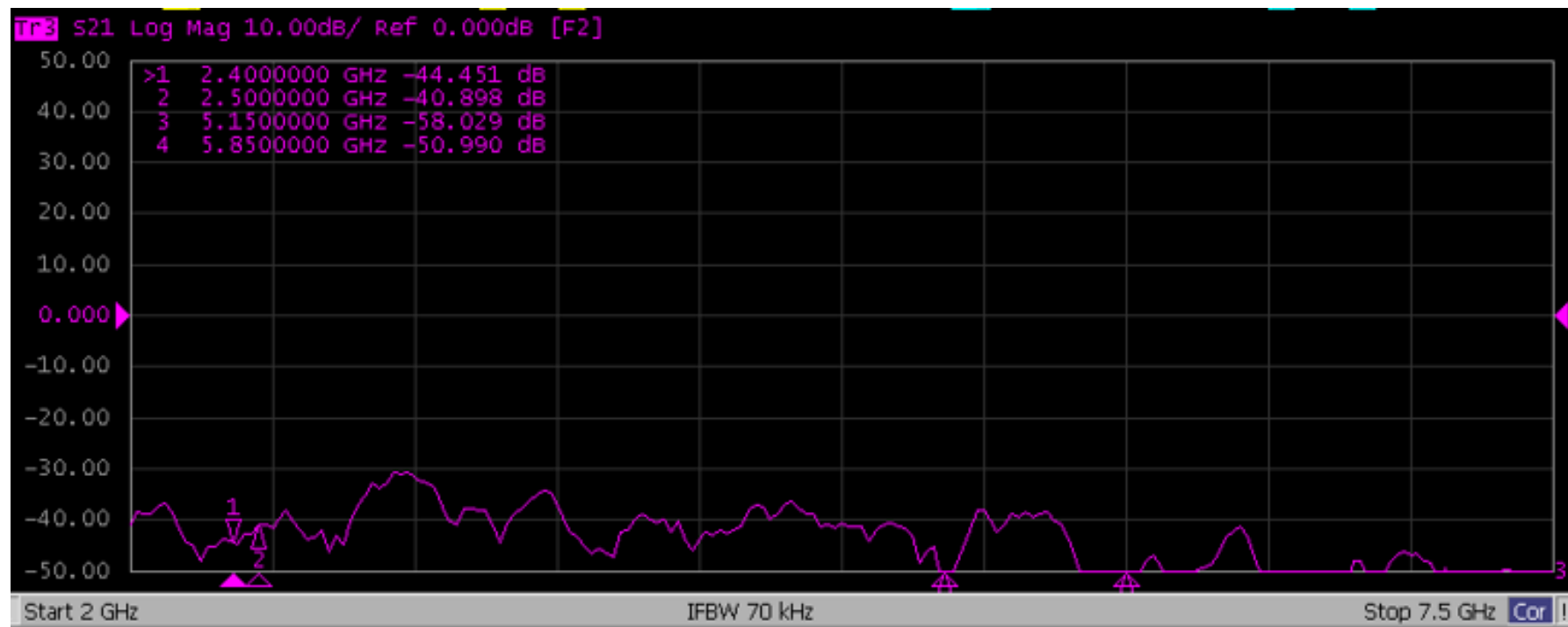
Isolation

S41

Isolation < -40 dB @ 2G

Isolation < -50 dB @ 5G

Isolation < -50 dB @ 6G



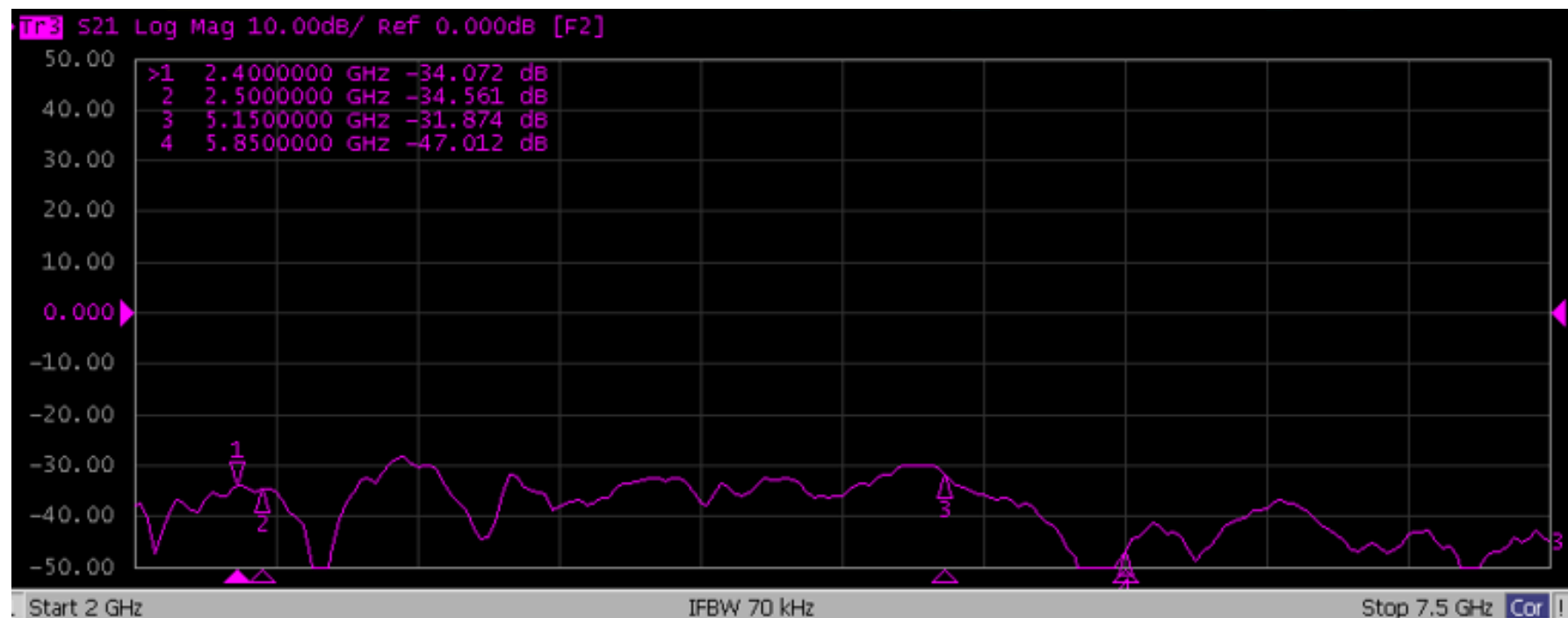
Isolation

S51

Isolation < -40dB @ 2G

Isolation < -50dB @ 5G

Isolation < -50dB @ 6G

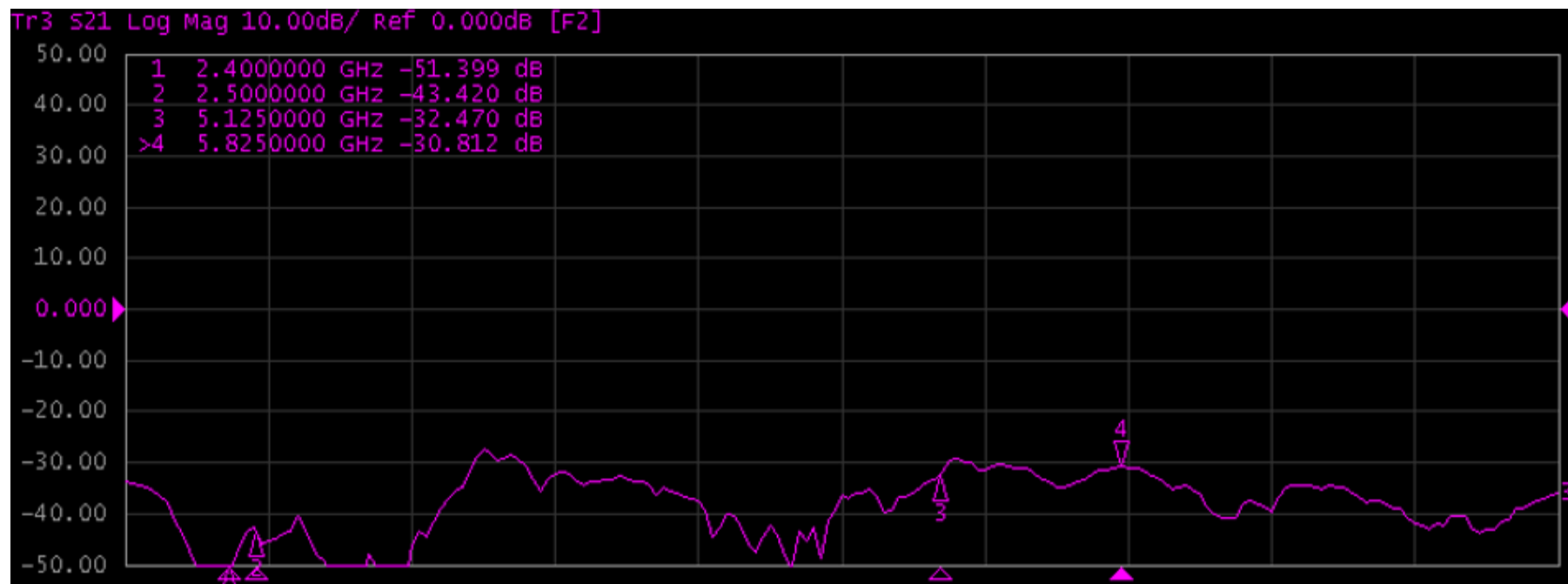


S61

Isolation<-40dB@2G

Isolation<-50dB@5G

Isolation<-50dB@6G



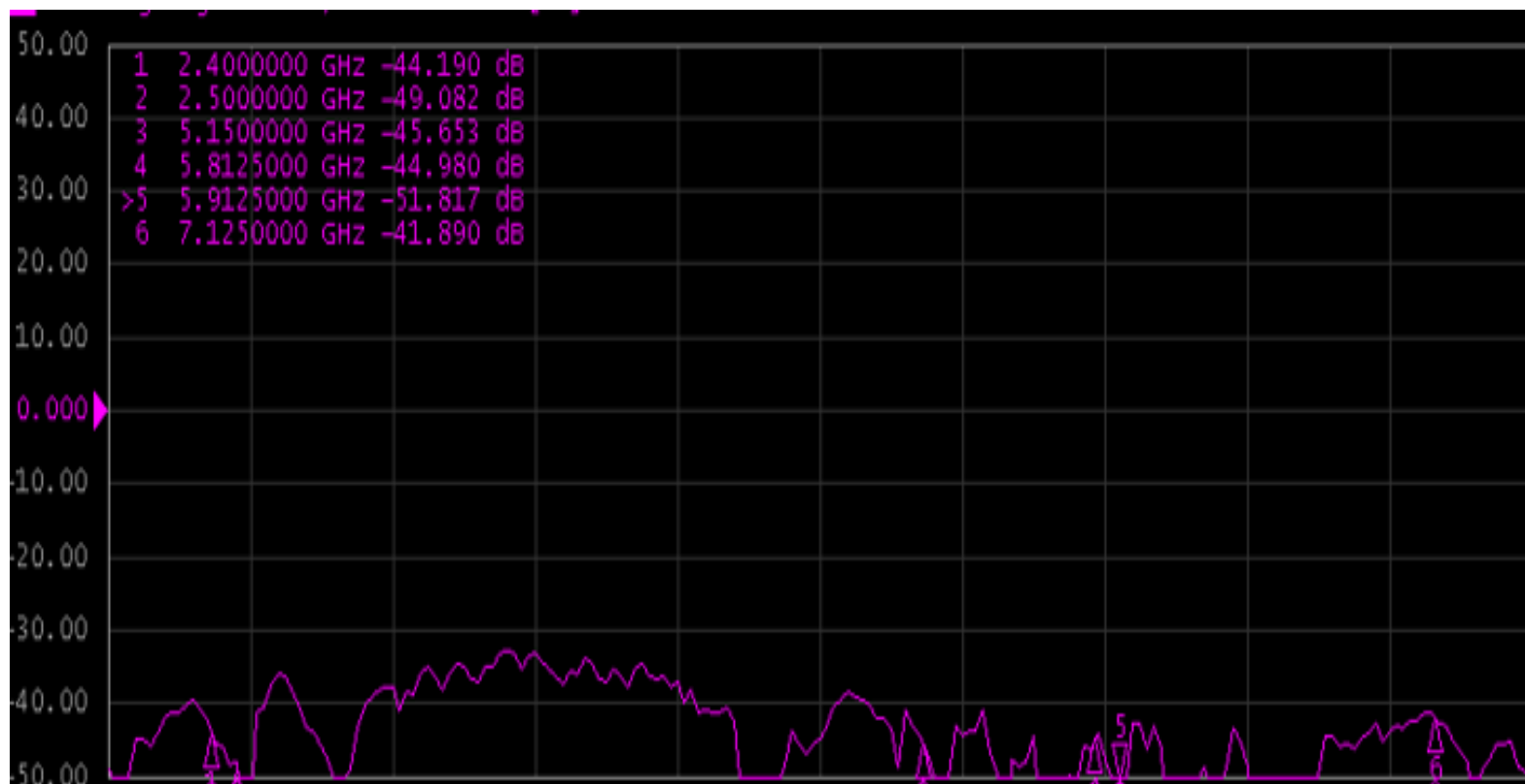
Isolation

S71

Isolation<-44dB@2G

Isolation<-44dB@5G

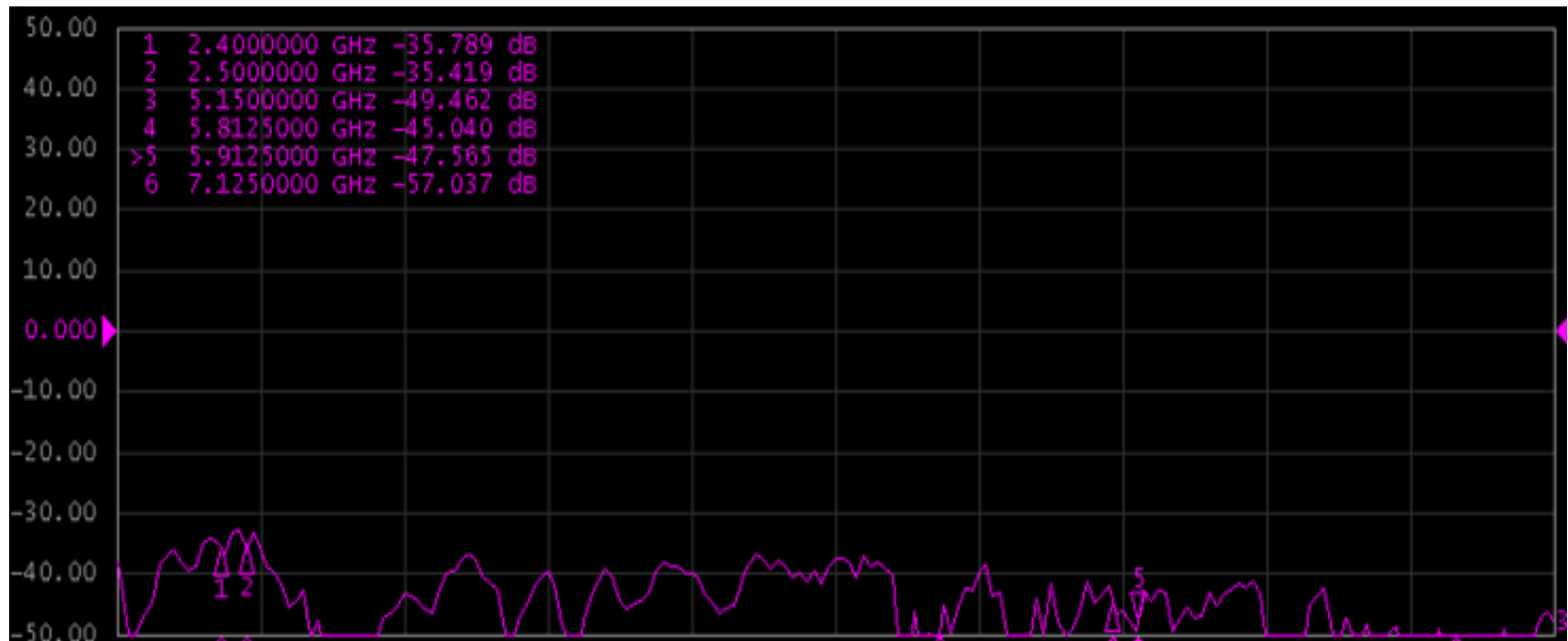
Isolation<-41dB@6G



S81

Isolation<-35dB@2G

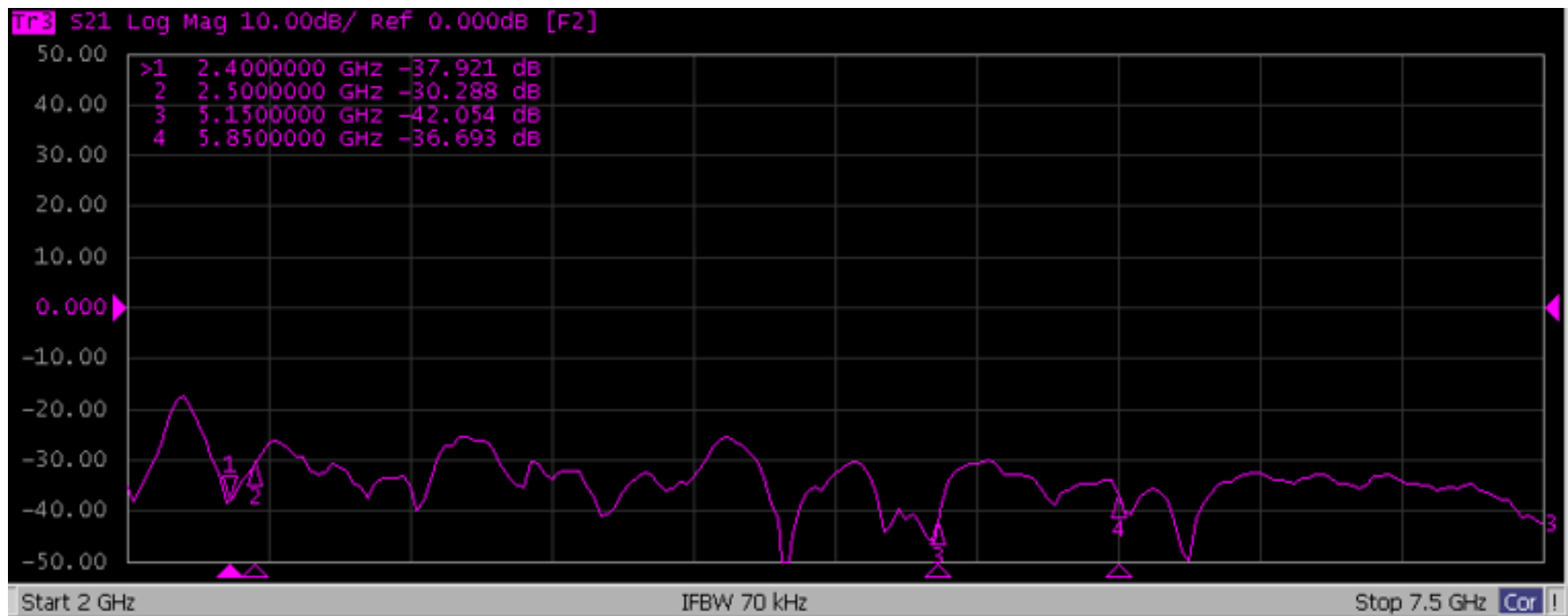
Isolation<-45dB@5G



Isolation

S32

Isolation < -36dB @ 5G

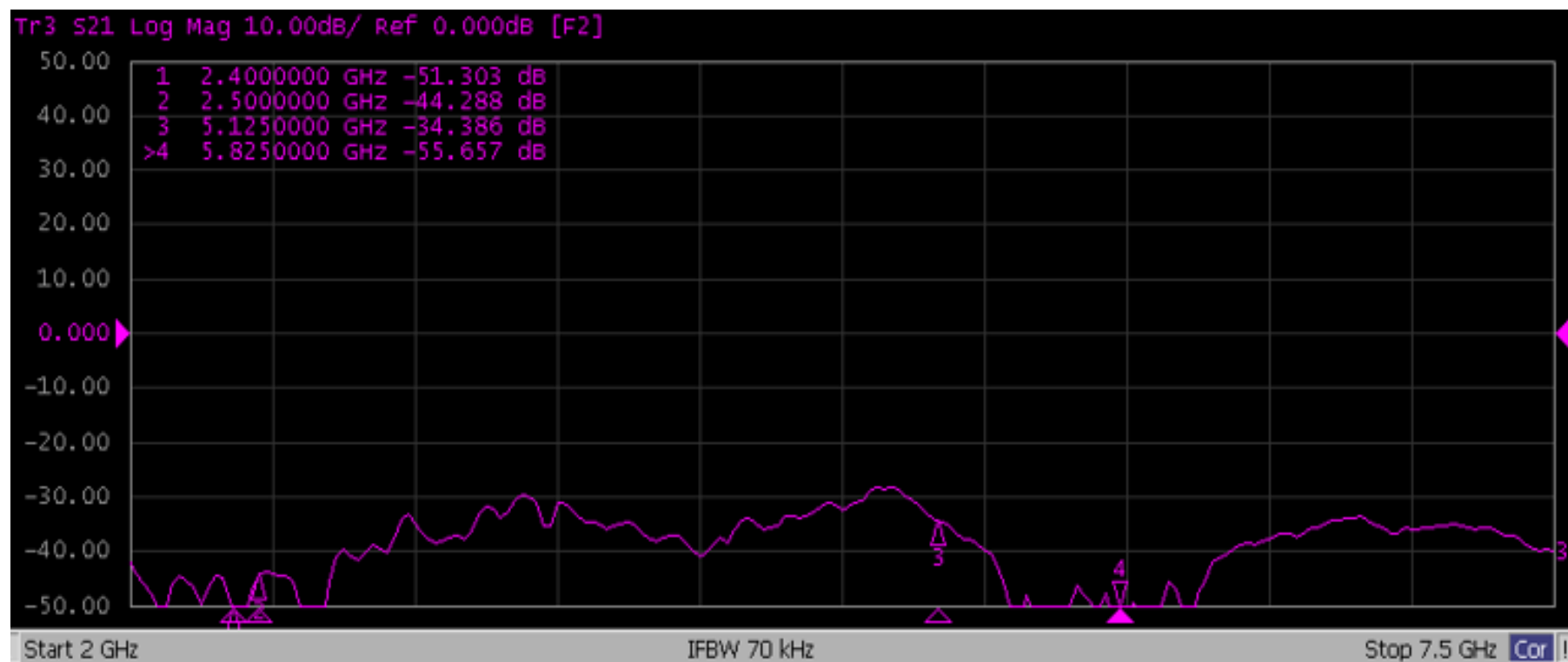


Isolation

S42

Isolation < -44dB @ 5G

Isolation < -34dB @ 6G

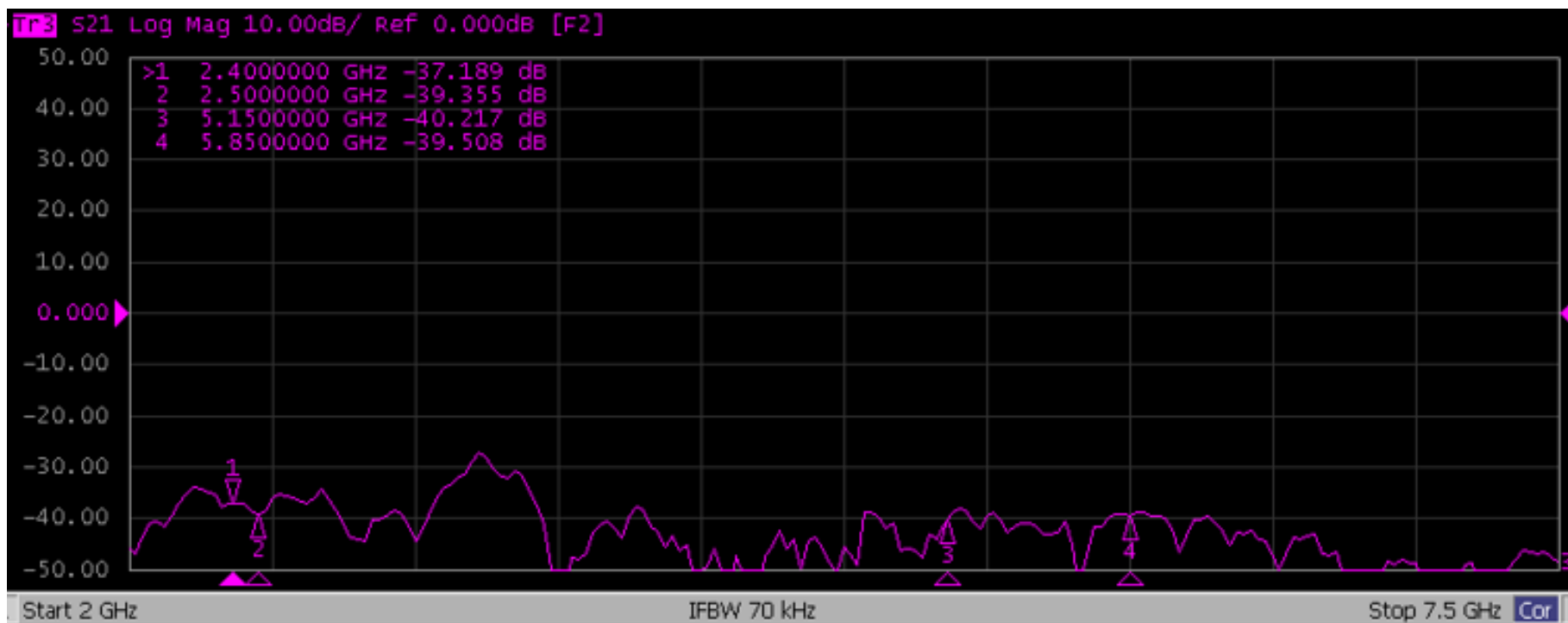


Isolation

S52

Isolation < -37dB@5G

Isolation < -39dB@6G

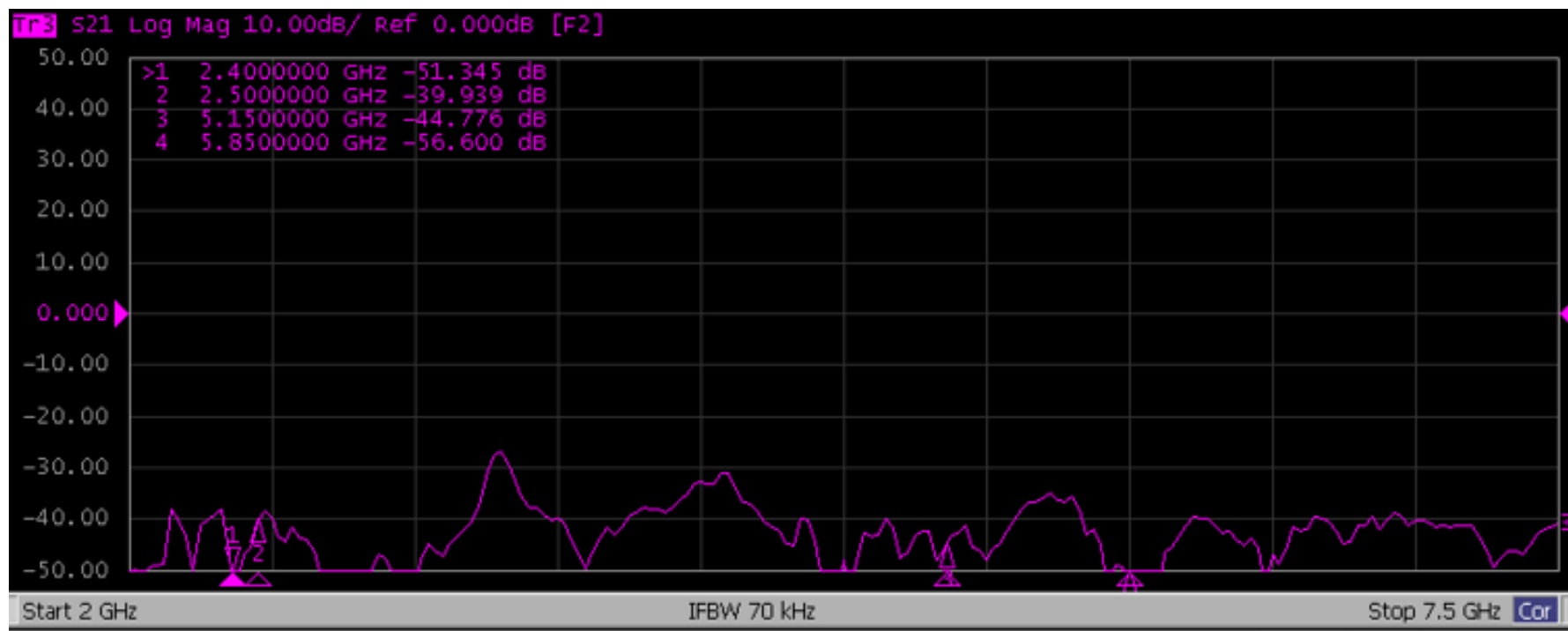


Isolation

S62

Isolation<-39dB@5G

Isolation<-44dB@6G

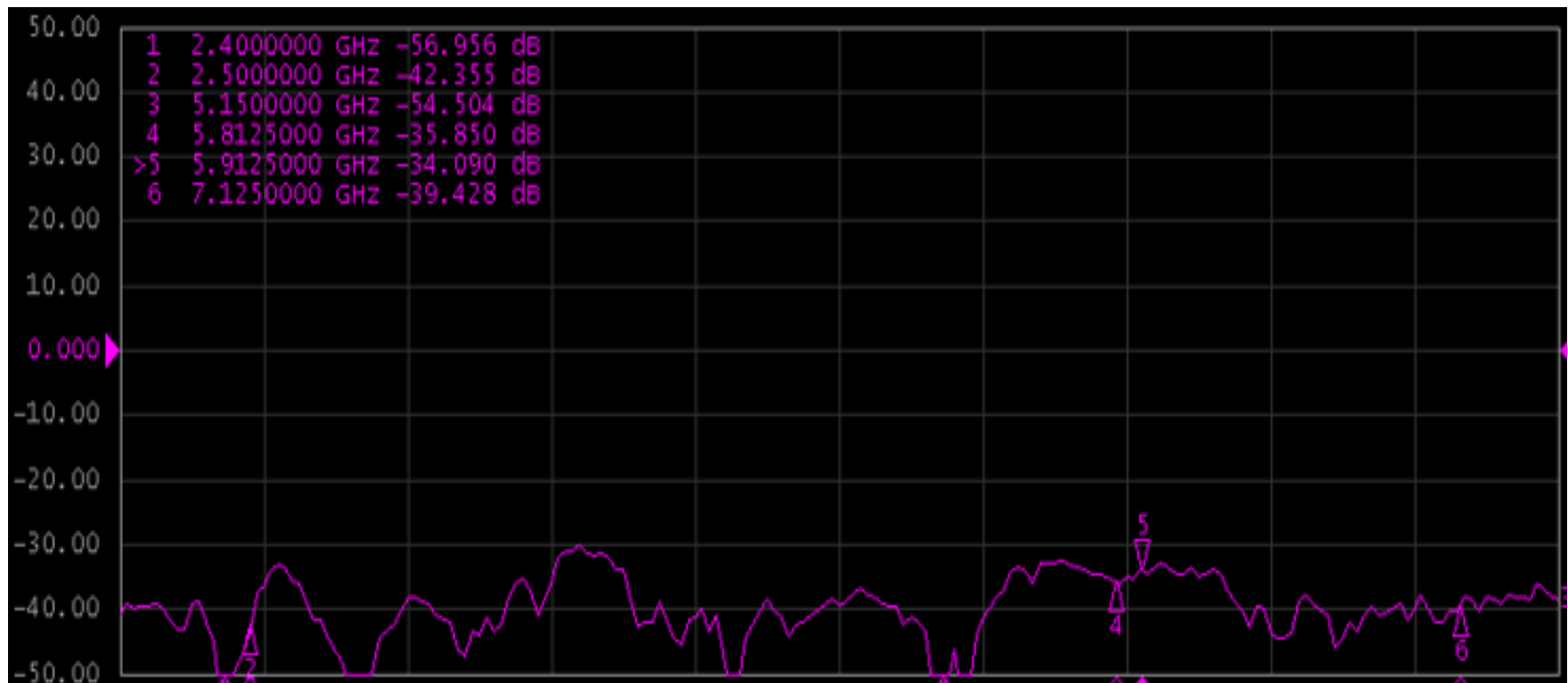


Isolation

S72

Isolation<-35dB@5G

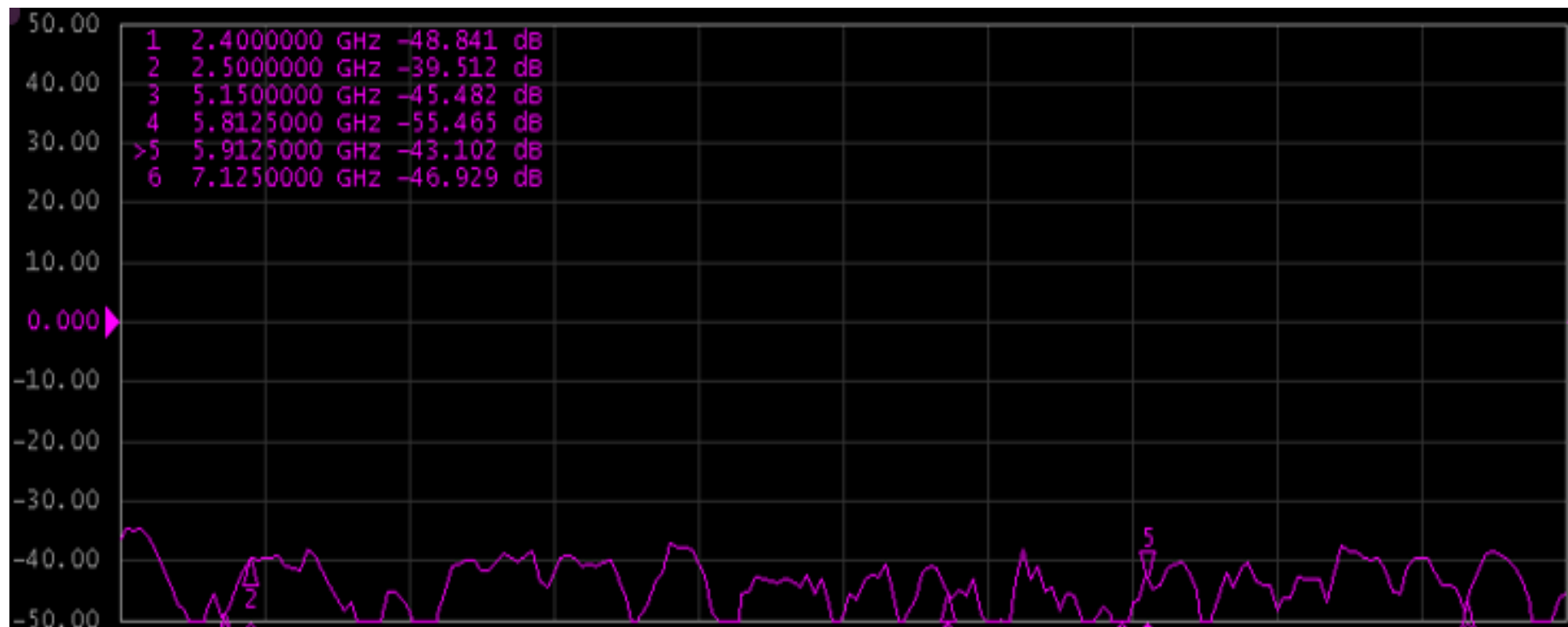
Isolation<-34dB@6G



S82

Isolation<-39dB@2G

Isolation<-45dB@5G

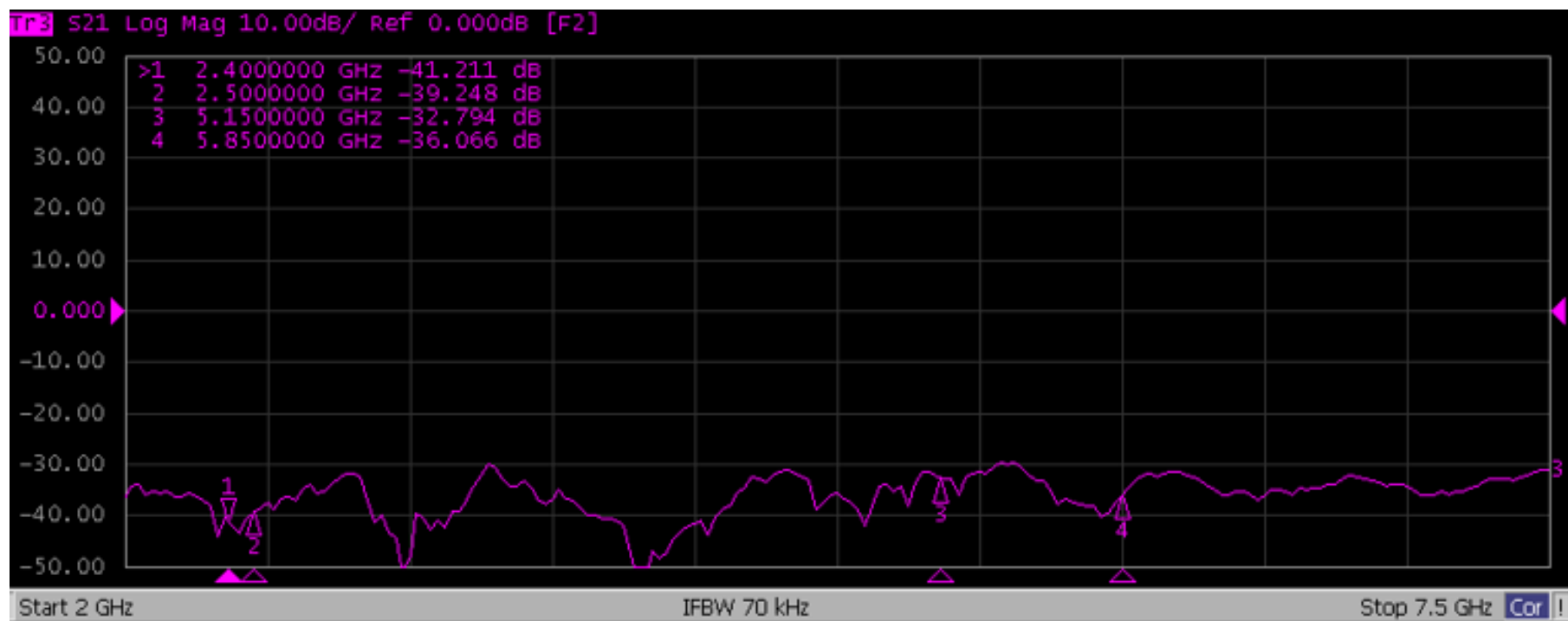


Isolation

S43

Isolation < -39dB @ 5G

Isolation < -32dB @ 6G

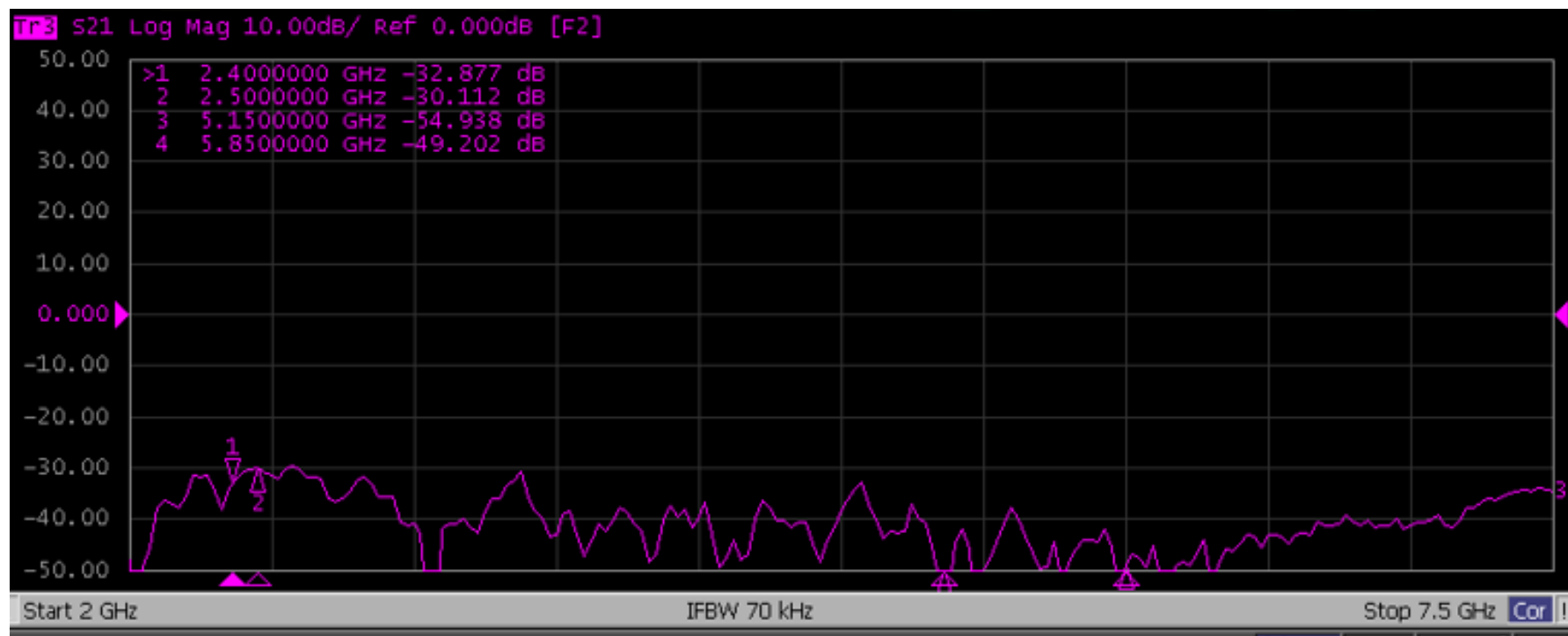


Isolation

S53

Isolation < -30dB @ 5G

Isolation < -49dB @ 6G

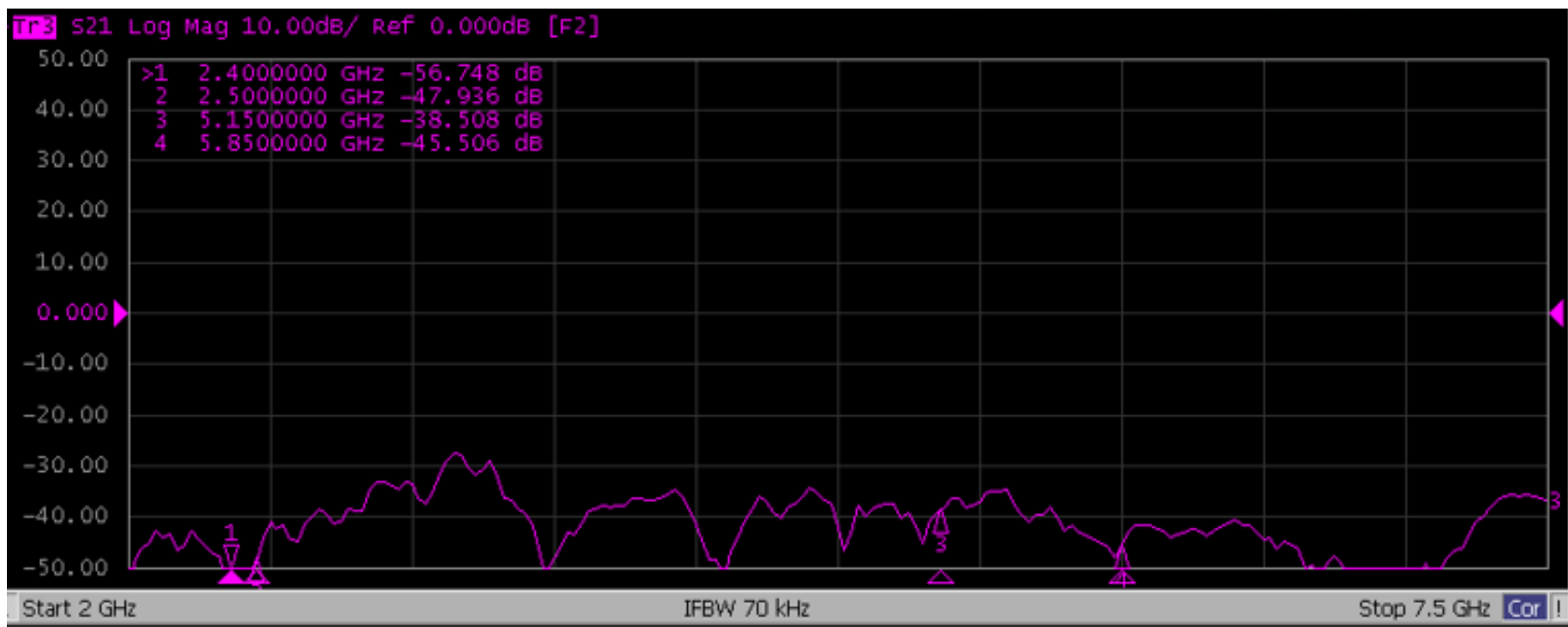


Isolation

S63

Isolation < -47dB@5G

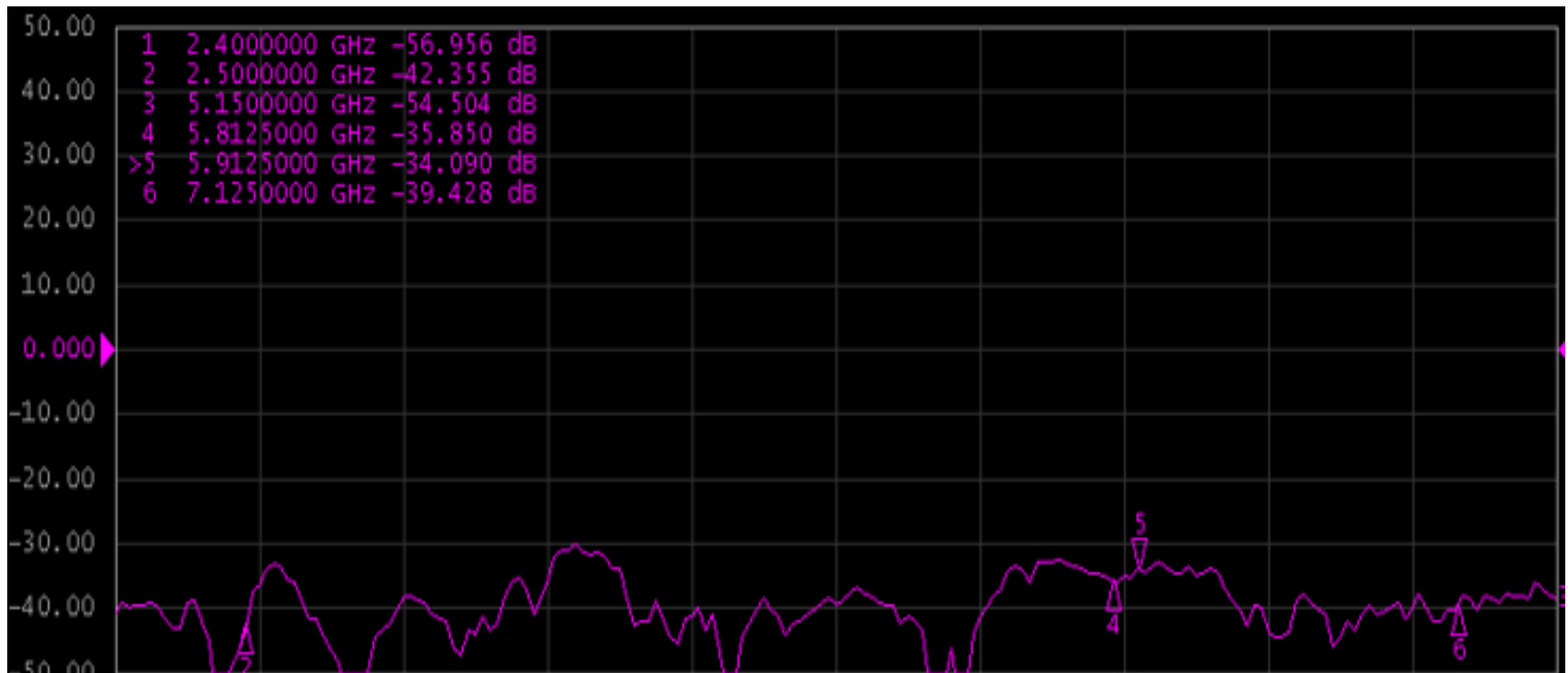
Isolation < -38dB@6G



S73

Isolation<-35dB@5G

Isolation<-34dB@6G

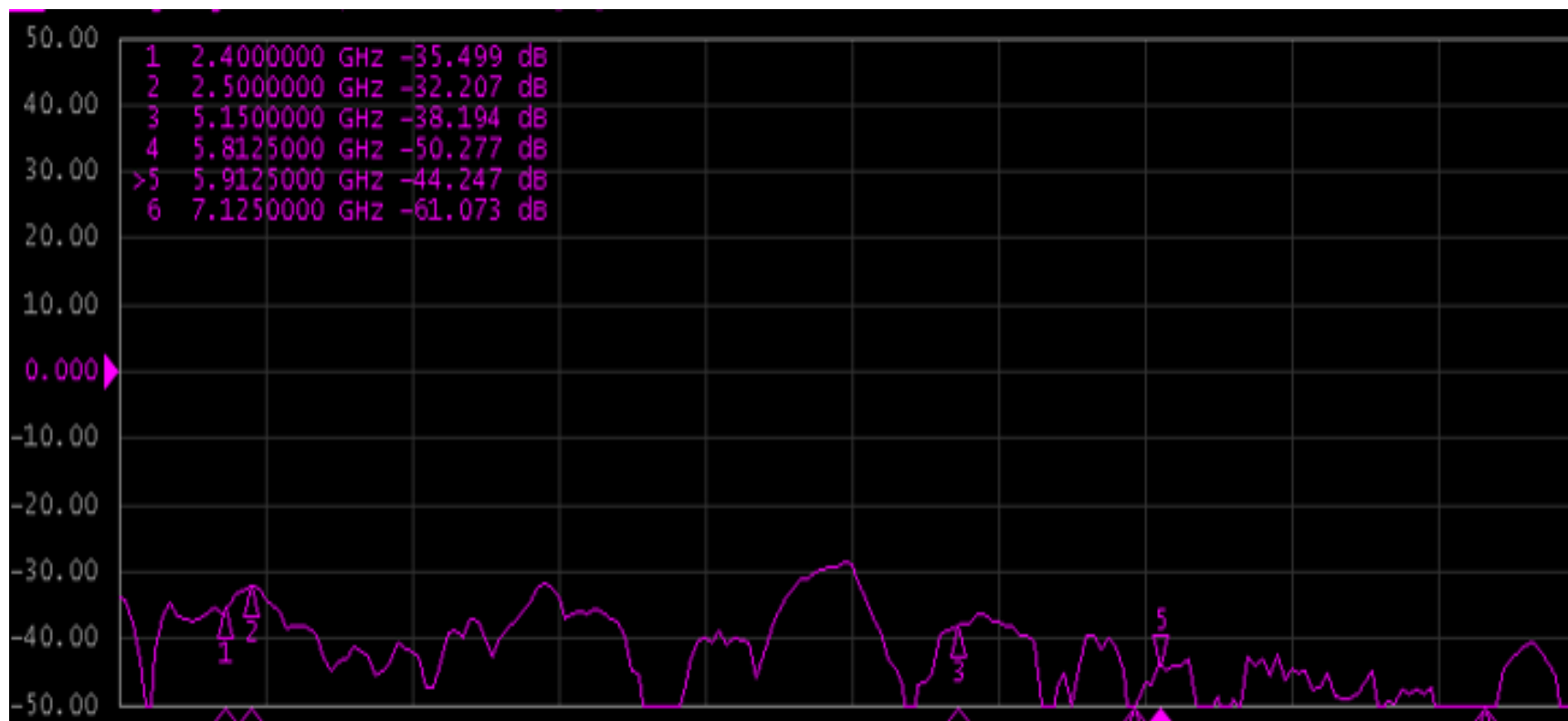


Isolation

S83

Isolation<-32dB@2G

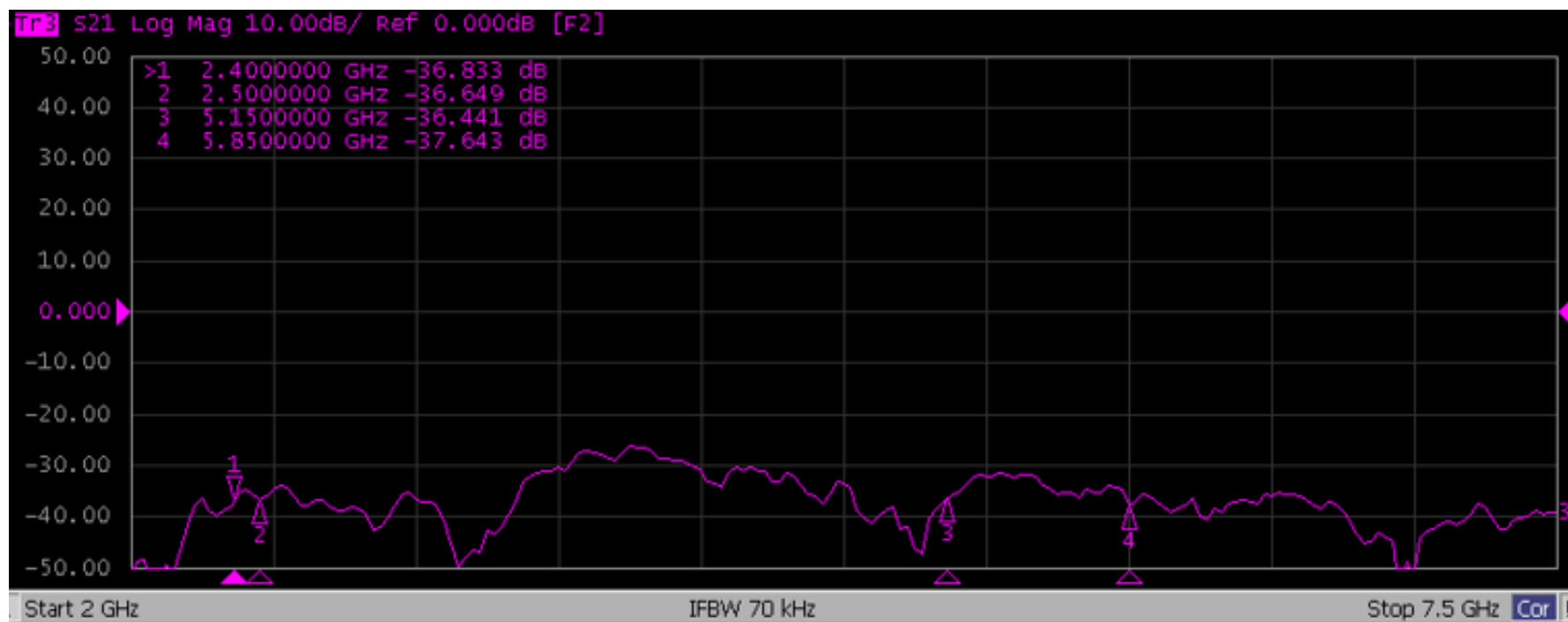
Isolation<-38dB@5G



Isolation

S54

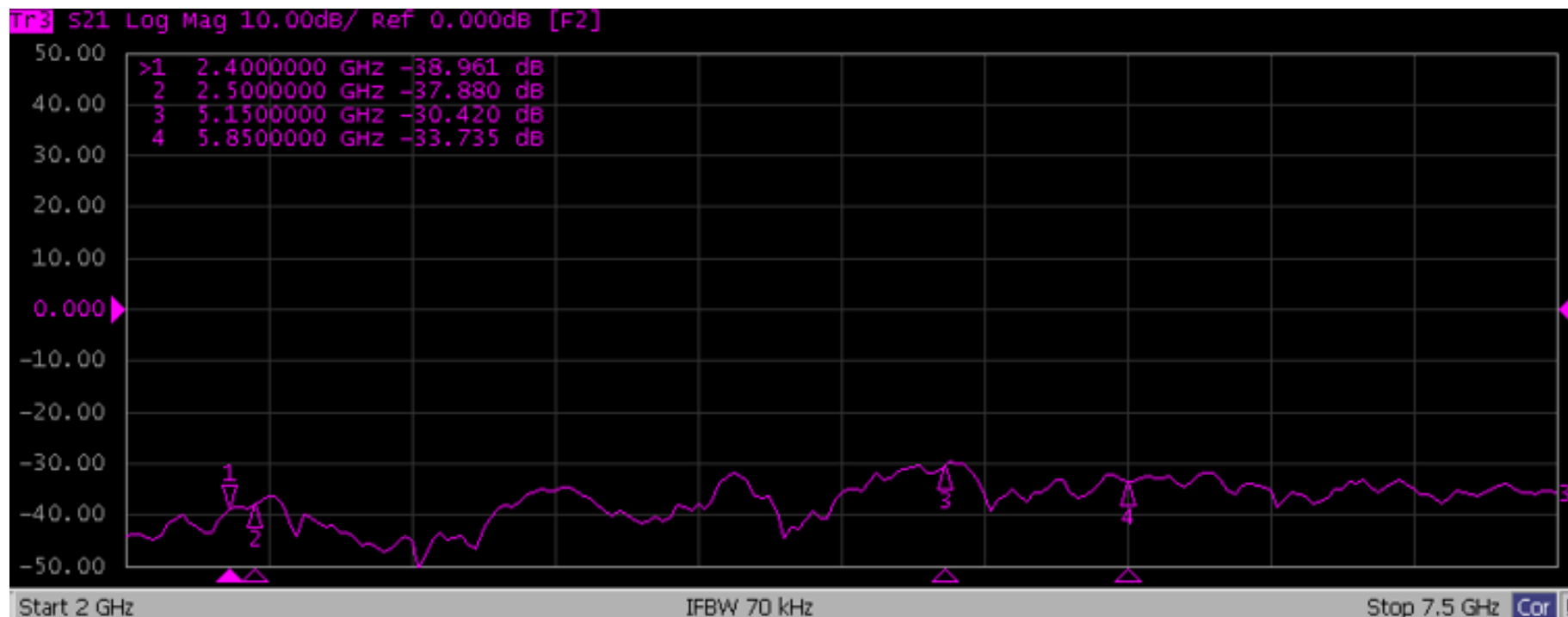
Isolation < -36dB @ 6G



Isolation

S64

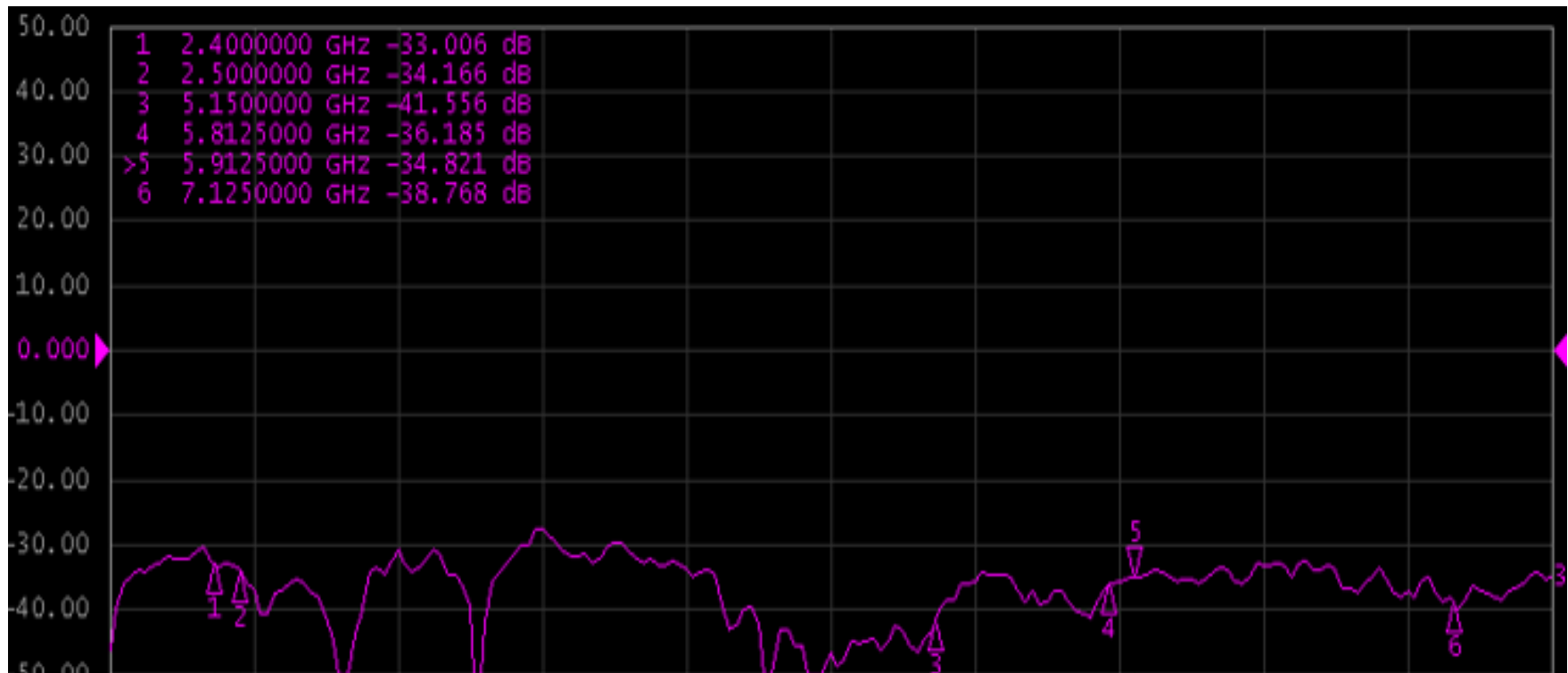
Isolation < -30dB @ 6G



Isolation

S74

Isolation<-34dB@6G

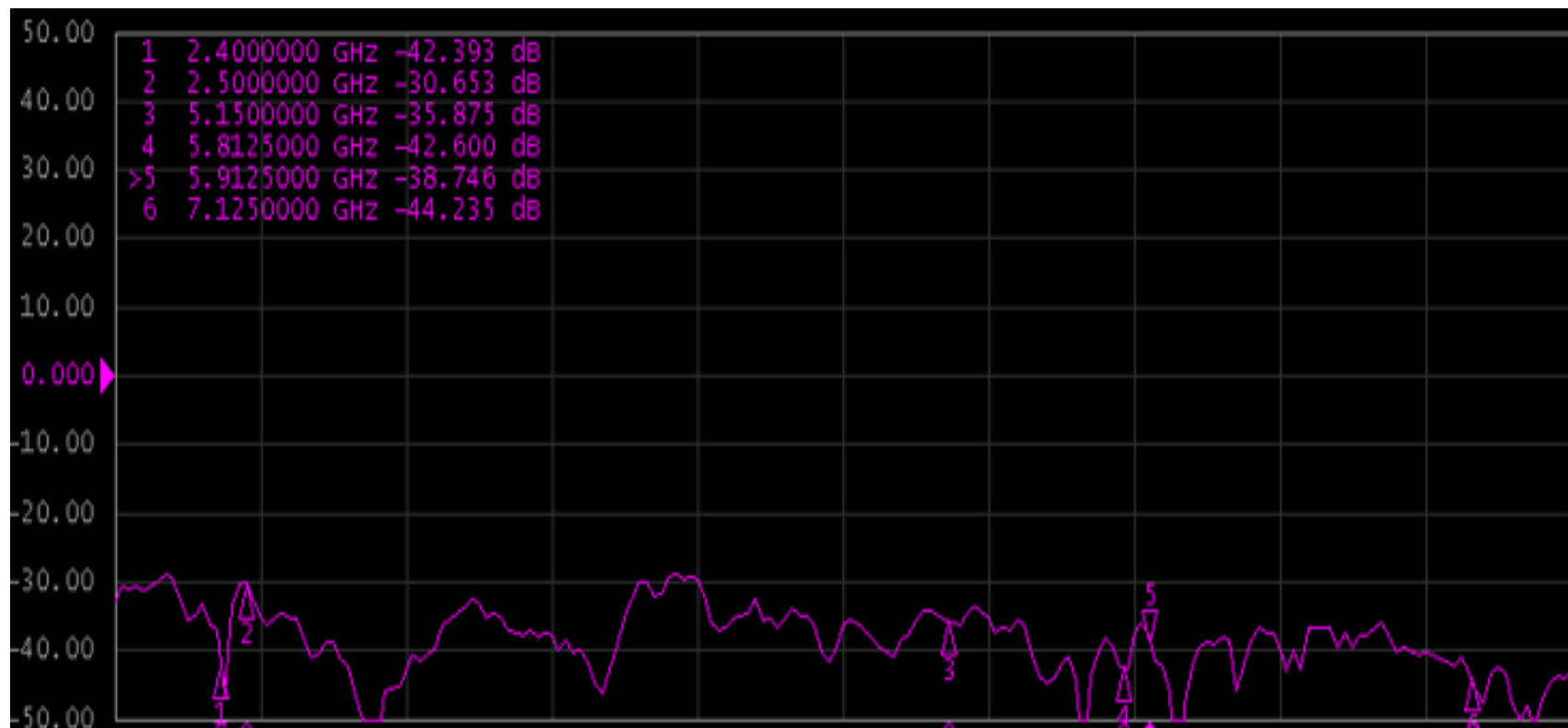


Isolation

S84

Isolation<-30dB@2G

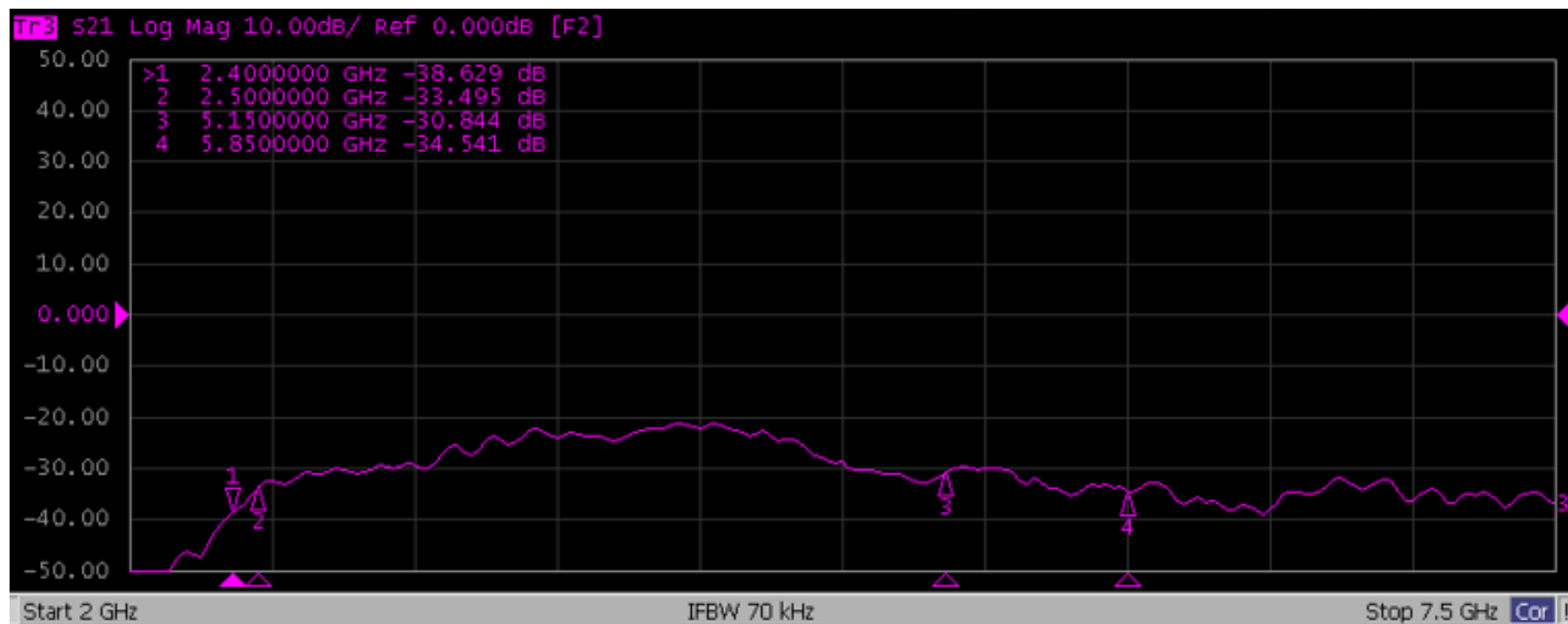
Isolation<-38dB@6G



Isolation

S65

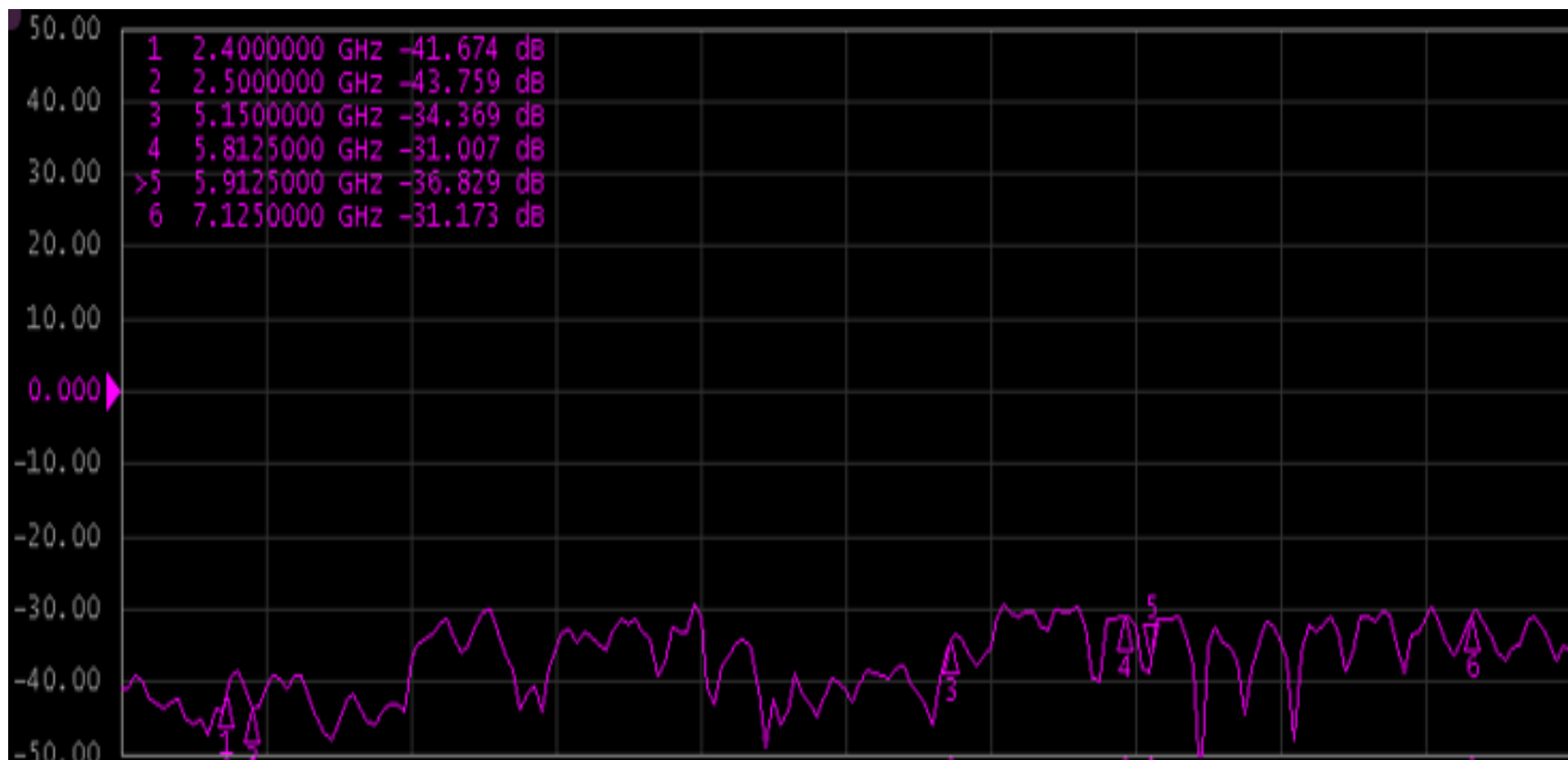
Isolation < -30dB @ 6G



Isolation

S75

Isolation<-31dB@6G

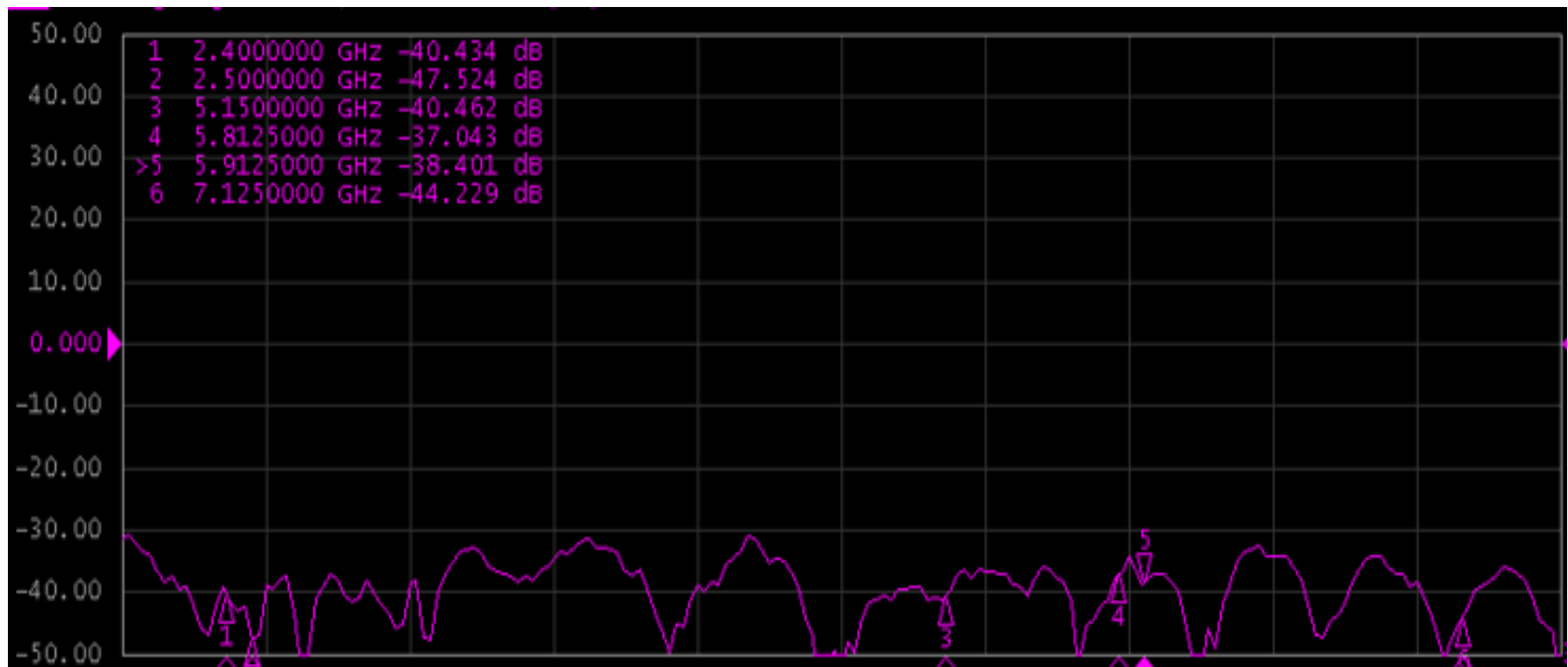


Isolation

S85

Isolation<-40dB@2G

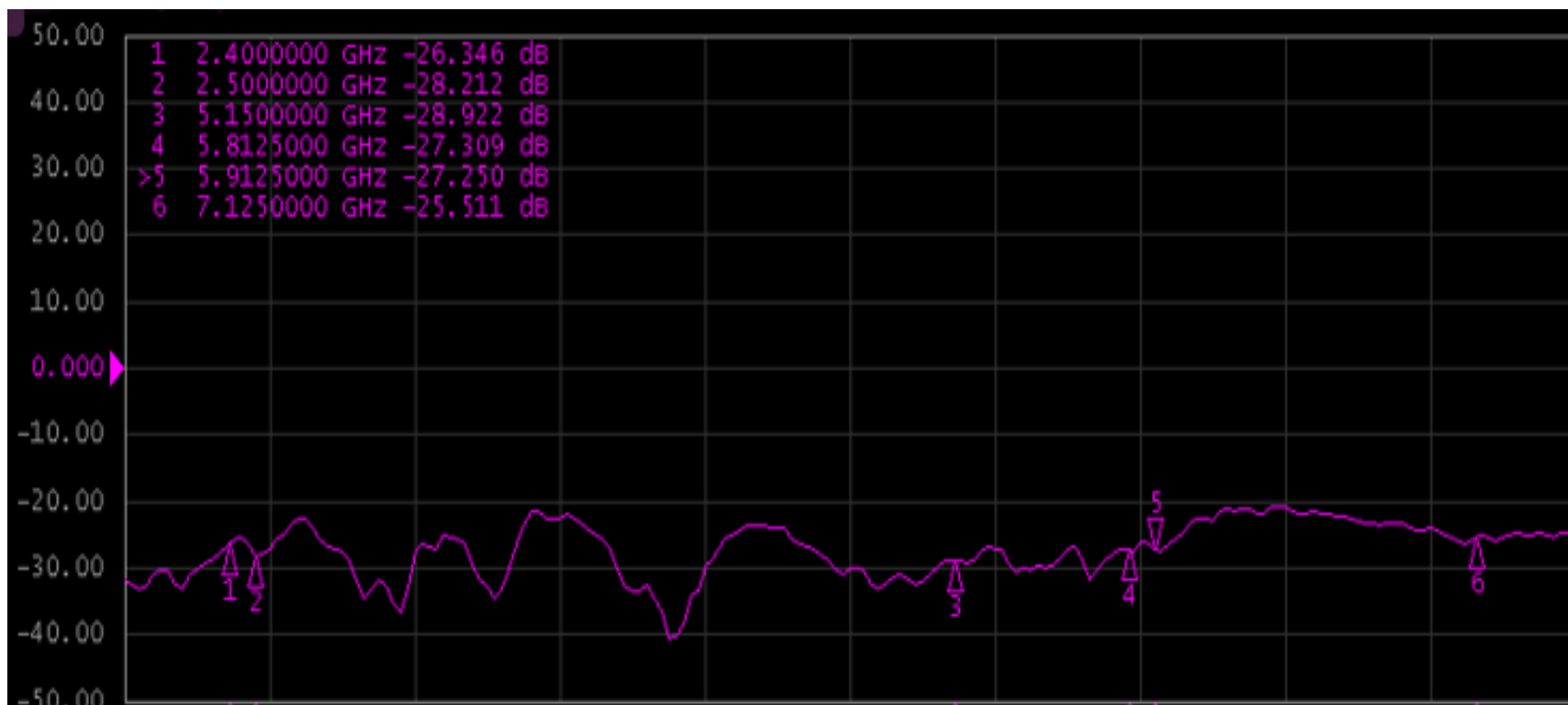
Isolation<-38dB@6G



Isolation

S76

Isolation < -27dB@6G

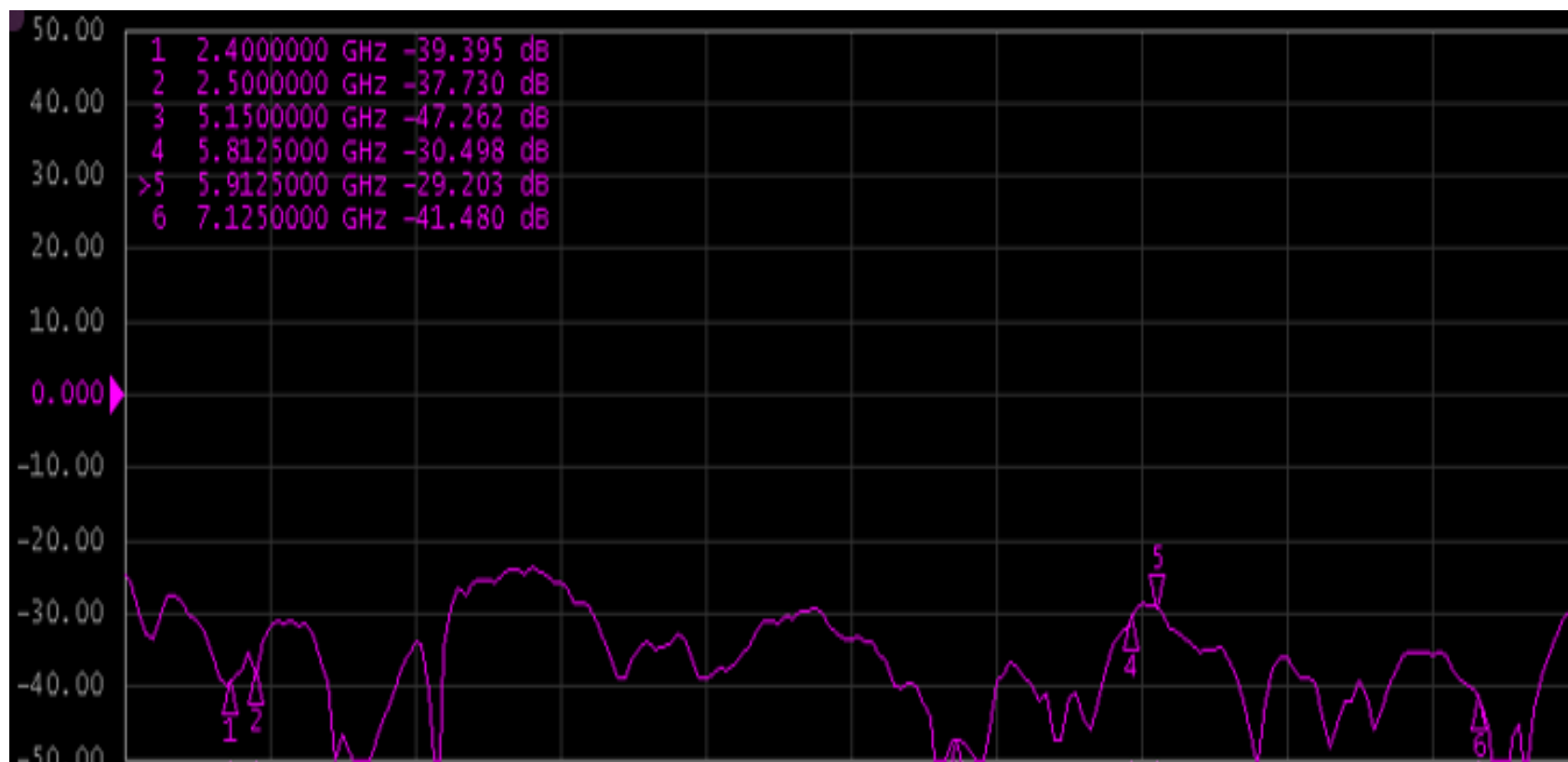


Isolation

S86

Isolation<-37dB@2G

Isolation<-29dB@6G

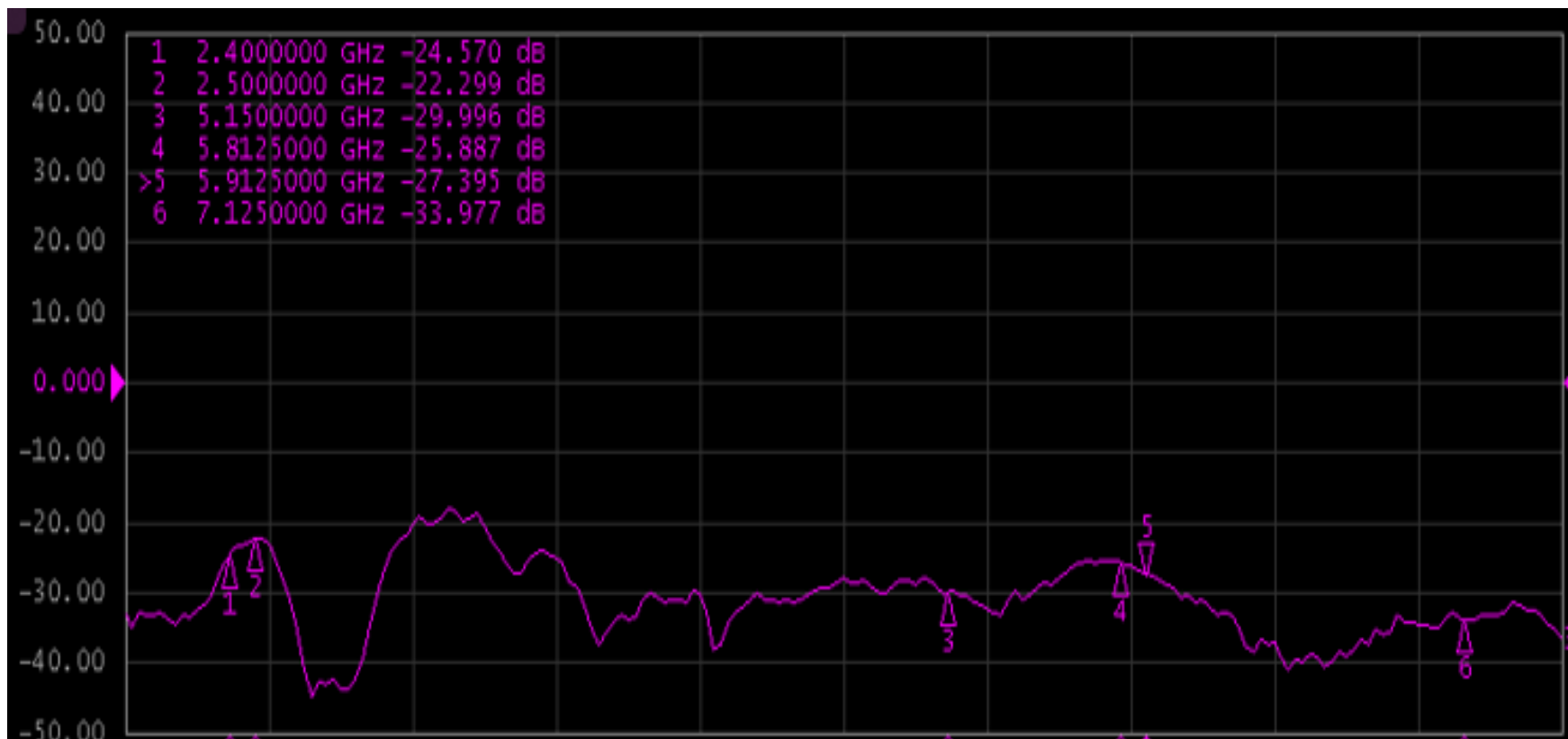


Isolation

S87

Isolation<-22dB@2G

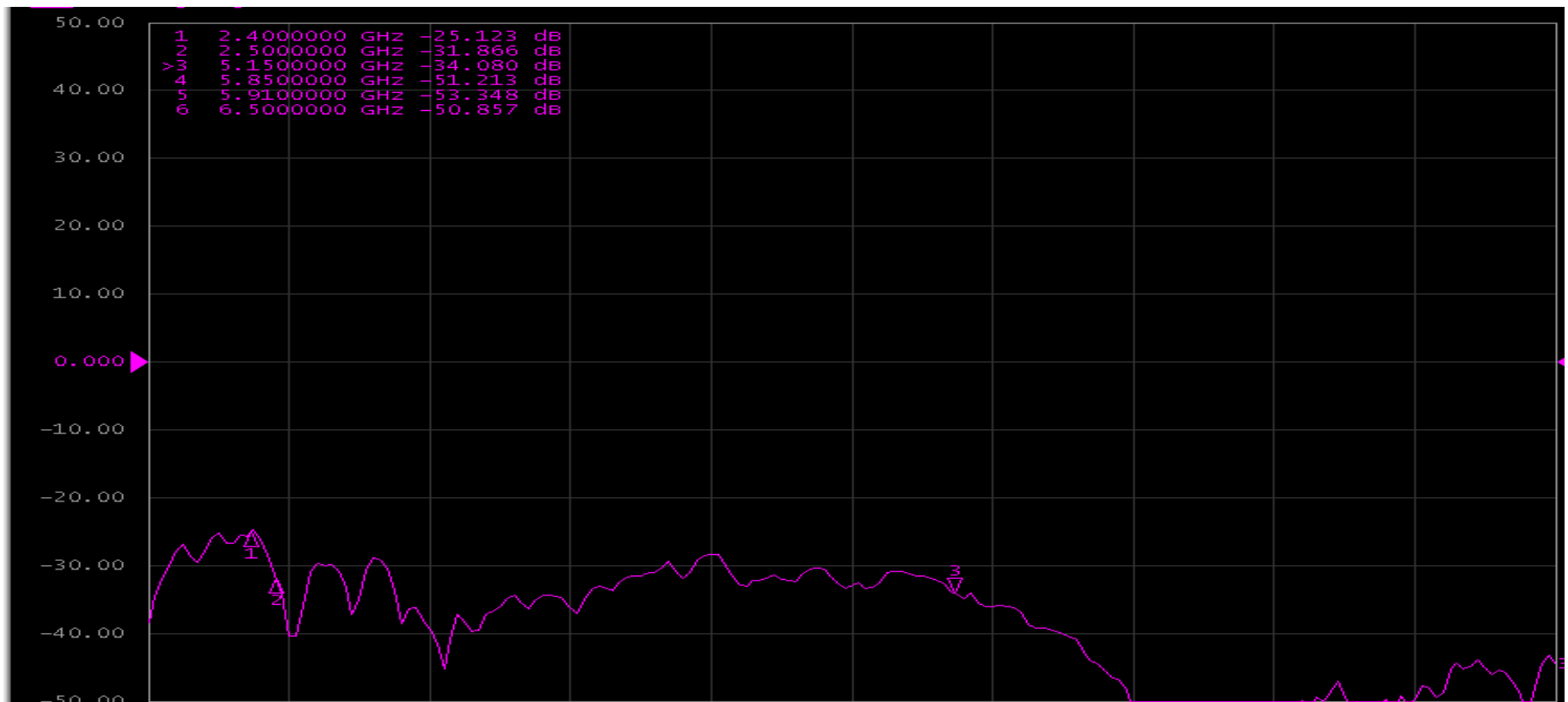
Isolation<-25dB@6G



Isolation

S9 10

Isolation < -25dB@2G

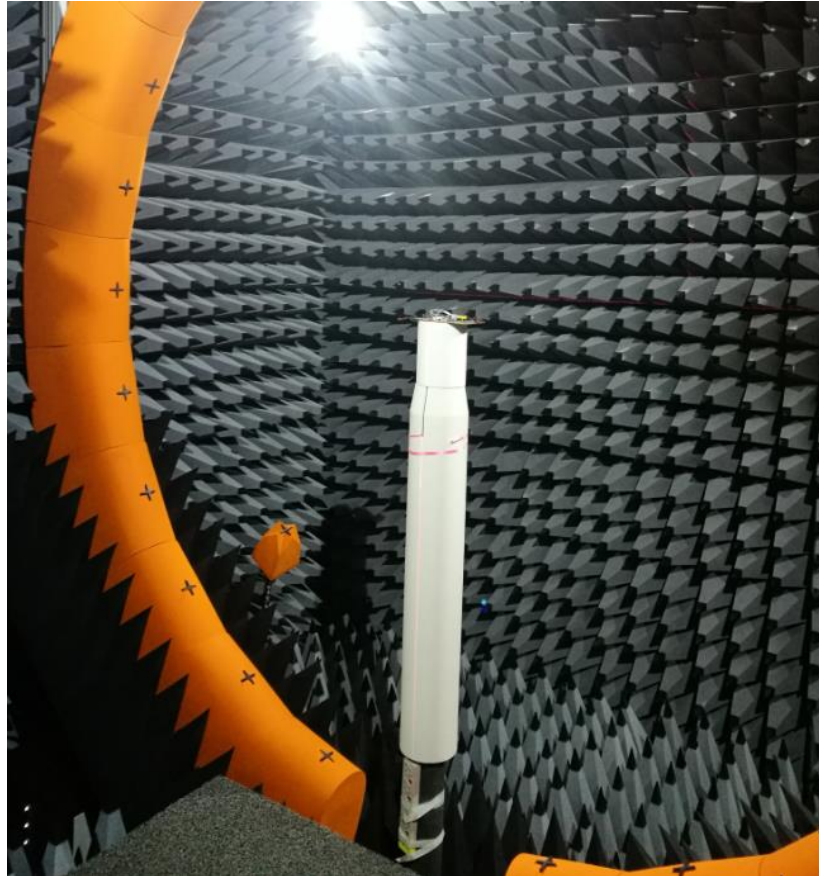


Isolation

Isolation				
ANT	Frequency/NO.	2.4-2.5GHz	5.15-5.85GHz	5.91-7.125GHz
Dual	ANT1-Dual	<-20dB		<-25dB
	ANT2-Dual			
5G	ANT3-5G	-	<-20dB	<-25dB
	ANT4-5G			
6G	ANT5-6G	-	<-25dB	<-20dB
	ANT6-6G	-		
	ANT7-6G	-		
	ANT8-6G	-		
BT	ANT9-BT	<-20dB	-	-
	ANT10-BT		-	-

- The Isolation between WIFI 2.4G antennas < - 20dB;
- The Isolation between WIFI 5G antennas < - 20dB;
- The Isolation between WIFI 6G antennas < - 20dB;
- The Isolation between WIFI 5G &6G antennas < - 25dB;
- The Isolation between WIFI 2G &BT antennas < - 20dB.

Measurement Condition

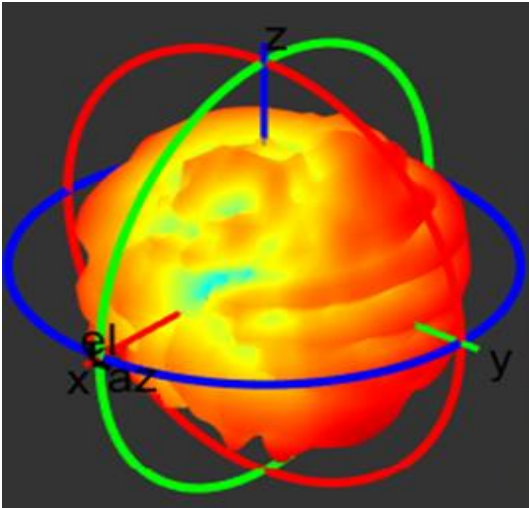


Microwave anechoic chamber

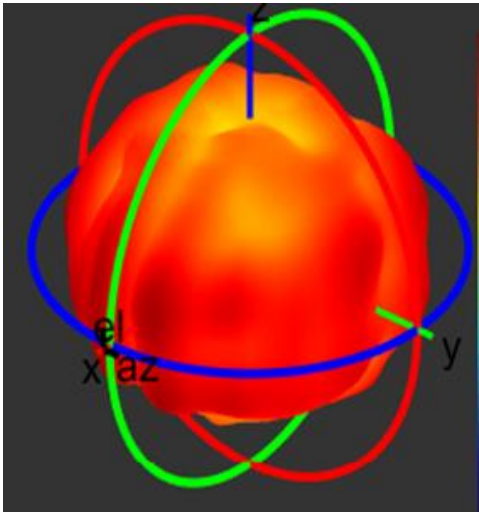
3D Radiation Pattern@2.45GHz



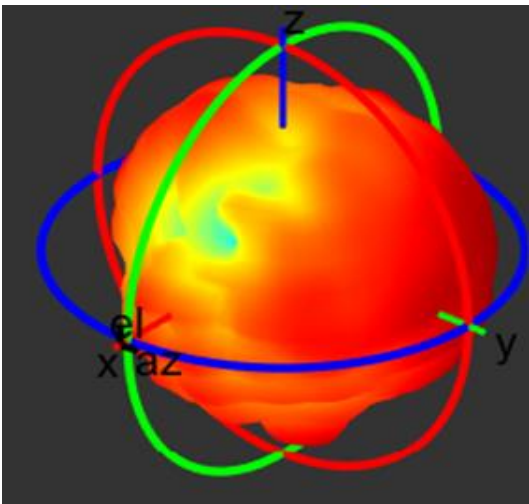
ANT1-2G



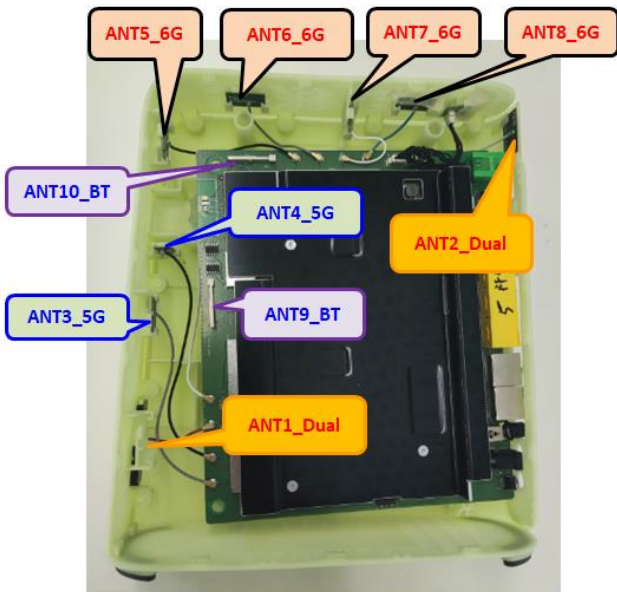
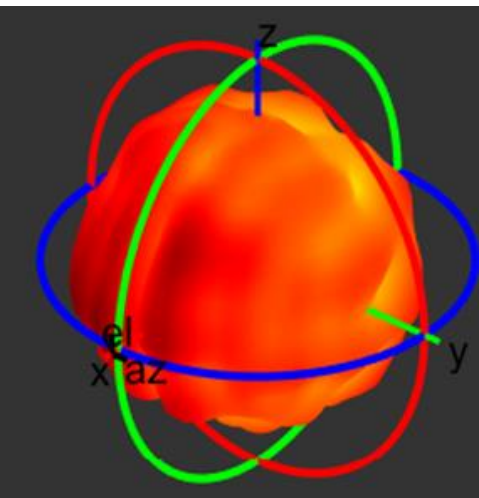
ANT2-2G



ANT9-2G (BT)

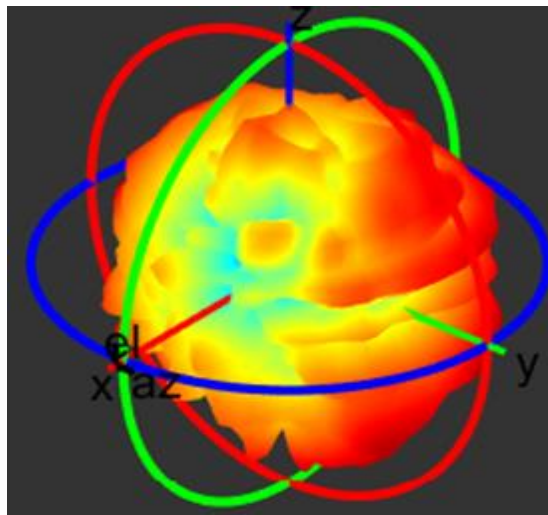


ANT10-2G (BT)

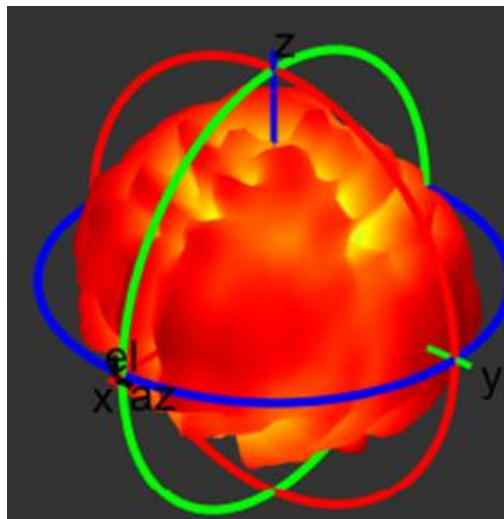


3D Radiation Pattern@5.5GHz

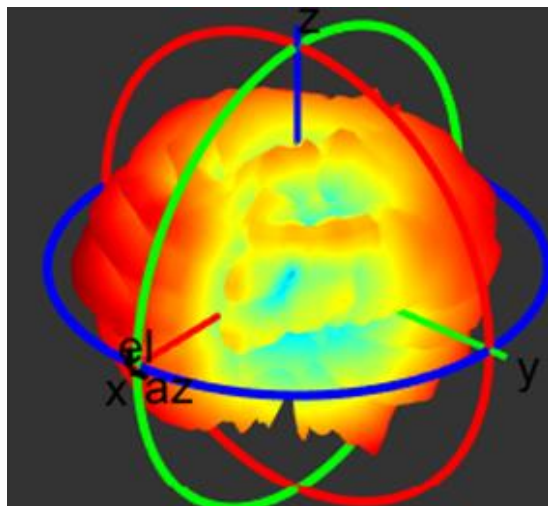
ANT1-5G



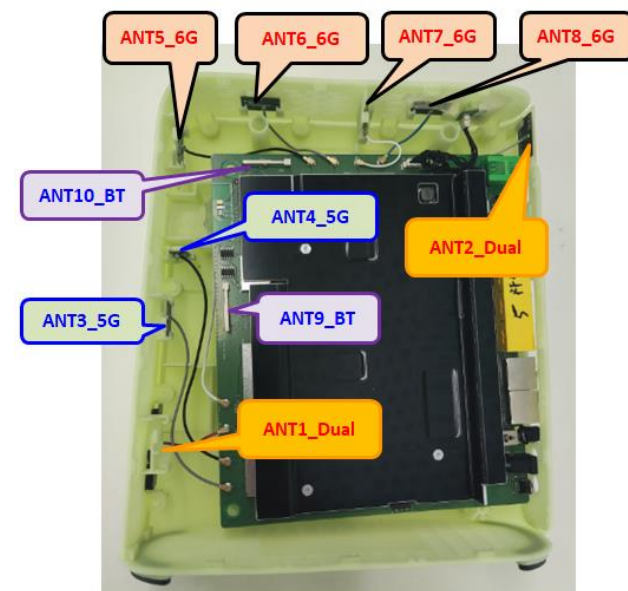
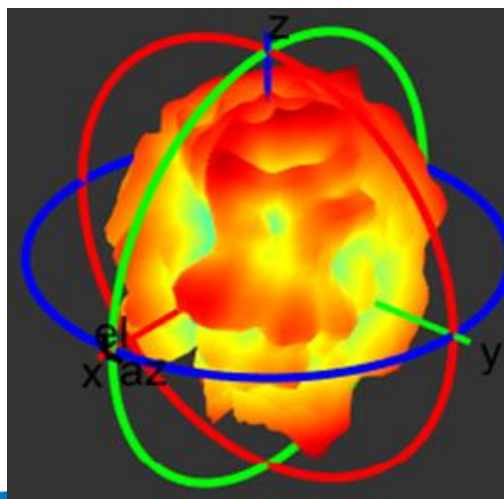
ANT2-5G



ANT3-5G

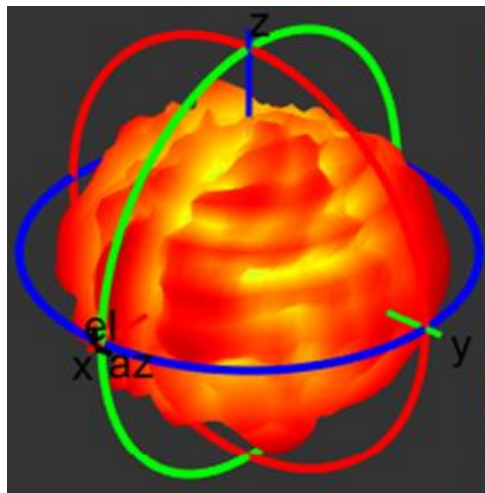


ANT4-5G

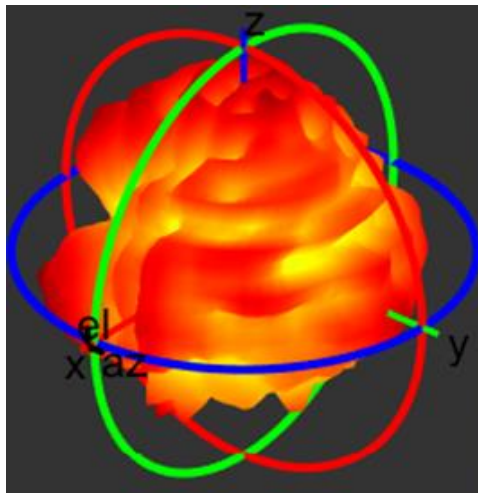


3D Radiation Pattern@6.5GHz

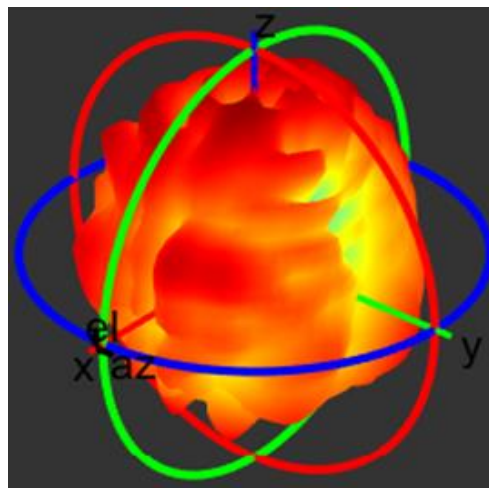
ANT5-6G



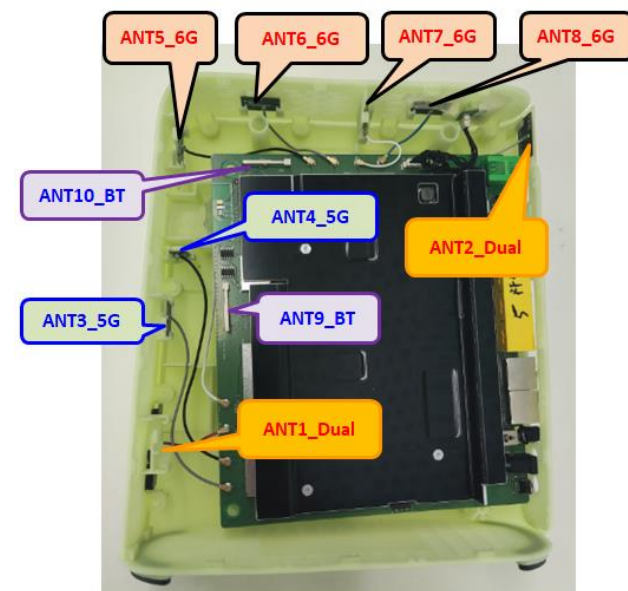
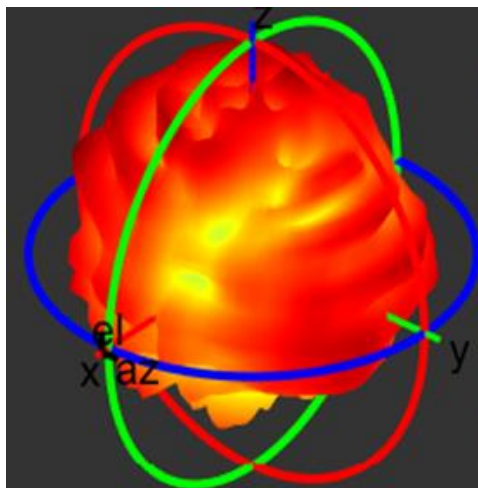
ANT6-6G



ANT7-6G



ANT8-6G



Gain & Efficiency

ANT	NO.	Frequency(GHz)	Gain(dBi)	Efficiency
2G	ANT1-Dual	2.45	3.67	70.38%
	ANT2-Dual	2.45	3.72	72.24%
5G	ANT1-Dual	5.5	4.42	68.78%
	ANT2-Dual	5.5	4.48	70.13%
	ANT3-5G	5.5	4.43	67.81%
	ANT4-5G	5.5	4.19	70.32%
6G	ANT5-6G	6.5	4.24	69.42%
	ANT6-6G	6.5	4.92	65.89%
	ANT7-6G	6.5	4.84	67.84%
	ANT8-6G	6.5	3.35	66.57%
BT	ANT9-BT	2.45	3.67	67.38%
	ANT10-BT	2.45	3.81	65.74%

- The WIFI 2.4G antenna's Gain < 4.0dBi, Efficiency> 70%;
- The WIFI 5G antenna's Gain < 4.5dBi, Efficiency> 65%;
- The WIFI 6G antenna's Gain < 5.0dBi, Efficiency> 60%;
- The WIFI BT antenna's Gain < 4.0dBi, Efficiency> 65%.

Directional Gain



Used for FCC and CE certification

ANT	NO.	Frequency(GHz)	Uncorrelated	Correlated
2G	ANT1-Dual	2.45	1.77	4.76
	ANT2-Dual	2.45		
5G	ANT1-Dual	5.5	1.05	6.62
	ANT2-Dual	5.5		
	ANT3-5G	5.5		
	ANT4-5G	5.5		
6G	ANT5-6G	6.5	1.12	6.6
	ANT6-6G	6.5		
	ANT7-6G	6.5		
	ANT8-6G	6.5		

1、Correlated Directional Gain

Directional gain = $10 \log[(10^{G1 \phi / 20} + 10^{G2 \phi / 20} + \dots + 10^{GN \phi / 20})^2 / N_{ANT} + (10^{G1 \theta / 20} + 10^{G2 \theta / 20} + \dots + 10^{GN \theta / 20})^2 / N_{ANT}]$ dBi

2、Uncorrelated Directional Gain

Directional gain = $10 \log[(10^{G1 \phi / 10} + 10^{G2 \phi / 10} + \dots + 10^{GN \phi / 10}) / N_{ANT} + (10^{G1 \theta / 10} + 10^{G2 \theta / 10} + \dots + 10^{GN \theta / 10}) / N_{ANT}]$ dBi

Summary

- **Return loss**

The data on page 17 shows:

- The WIFI 2.4G antenna's Return loss $< -10\text{dB}$;
- The WIFI 5G antenna's Return loss $< -10\text{dB}$;
- The WIFI 6G antenna's Return loss $< -10\text{dB}$;
- The WIFI BT antenna's Return loss $< -10\text{dB}$.

- **Isolation**

The data on page 47 shows:

- The Isolation between WIFI 2.4G antennas $< -20\text{dB}$;
- The Isolation between WIFI 5G antennas $< -20\text{dB}$;
- The Isolation between WIFI 6G antennas $< -20\text{dB}$;
- The Isolation between WIFI 5G & 6G antennas $< -25\text{dB}$;
- The Isolation between WIFI 2G & BT antennas $< -20\text{dB}$.

- **Gain & Efficiency**

The data on page 52 shows:

- The WIFI 2.4G antenna's Gain $< 4.0\text{dBi}$, Efficiency $> 70\%$;
- The WIFI 5G antenna's Gain $< 4.5\text{dBi}$, Efficiency $> 65\%$;
- The WIFI 6G antenna's Gain $< 5.0\text{dBi}$, Efficiency $> 60\%$;
- The WIFI BT antenna's Gain $< 4.0\text{dBi}$, Efficiency $> 65\%$.



Through the above data analysis, the single antenna can meet the performance requirements.

Thanks!

