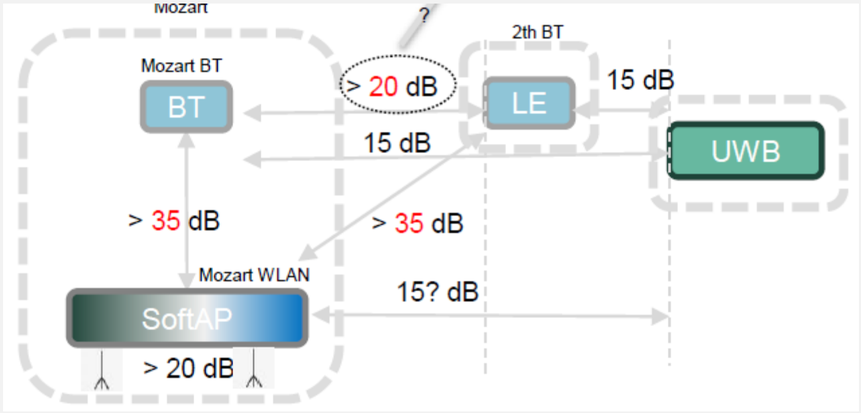
April 2023/Roustem:
Verification test on EZ4 Antenna PCB v2 sample
Deliverables: test reports.

Antenna PCB v2 build antenna evaluation Conclusions.

1. Overall performance is close to the optimal
2. Antennas "as is" have somewhat higher tuning in 2.4 GHz bands.
3. Antennas ISOLATION parameter is COMPLIANT with the requirements (below).



Overview of the Antenna PCB evaluation - preliminary

	Function	Alternative name on PCB	Compliance with ISOLATION requirements	EFFICIENCY, dB. Worst case. Free space. No power and Ethernet cables inserted.	BOM changes	LAYOUT changes	Notes
ANT1	UWB	ANT12-UWB	Yes	-3.2			xxxx
ANT2	WiFi 2.4 GHz	ANT1-WIFI-2.4G	Yes	-6.5			xxxx
ANT3	WiFi 2.4 GHz	ANT3-WIFI-2.4G	Yes	-5.8			xxxx
ANT4	Bluetooth	ANT2-BLUETOOTH	Yes	-5.9			xxxx
ANT5	BLE	ANT4-BLE	Yes	-6			xxxx
ANT6	WiFi 5 GHz	ANT7-5G-WIFI of ANT1	Yes	-4.9			xxxx
ANT7	WiFi 5 GHz	ANT6-5G-WIFI of ANT3	Yes	-5.6			xxxx

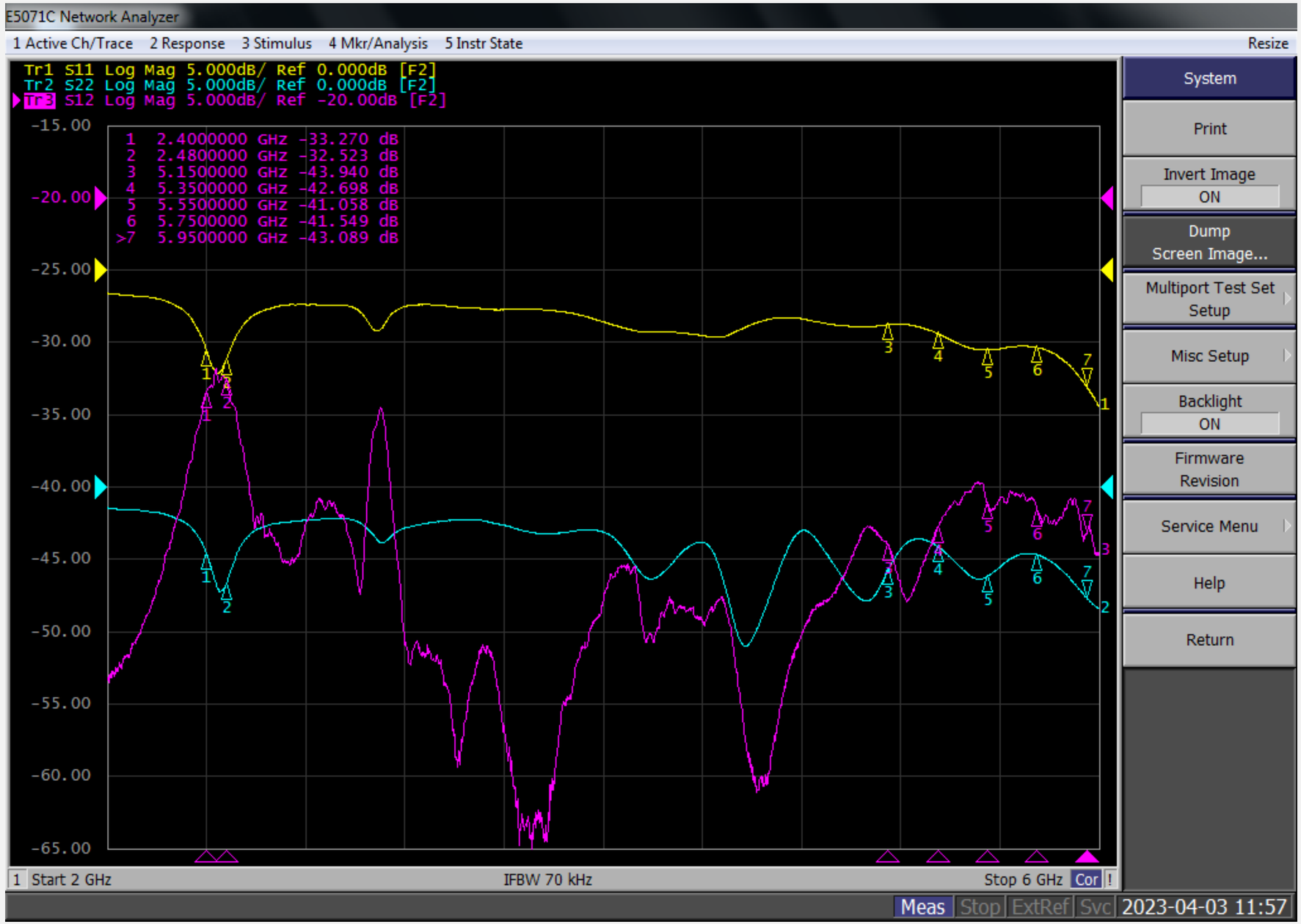
SIGMA Connectivity

Impedance and Isolation

Bluetooth, BLE, WIFI Antennas

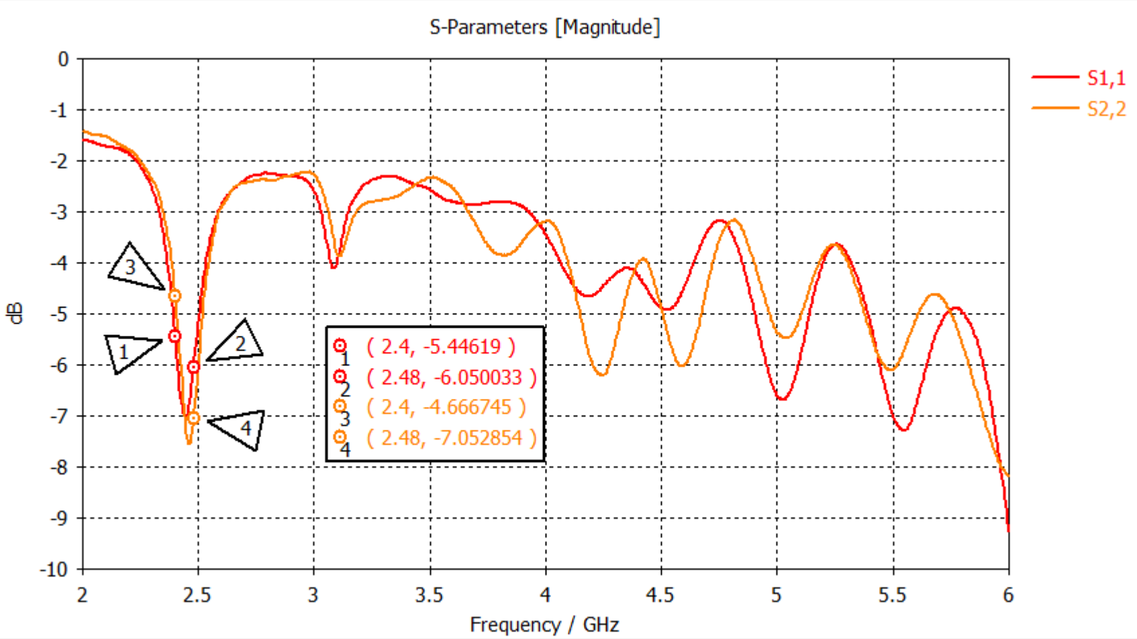
SIGMA Connectivity

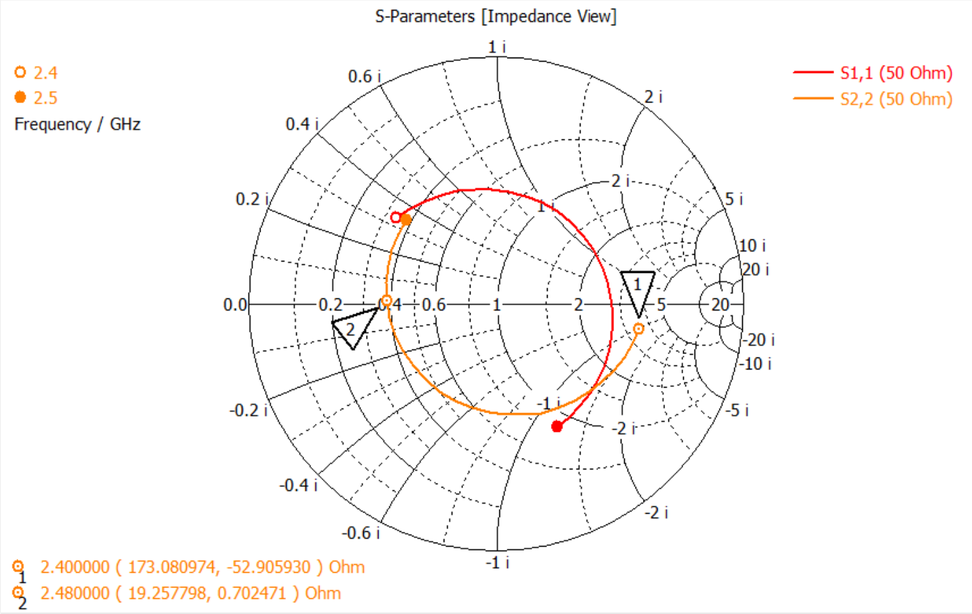
Return Loss_and Isolation. S11- GRAY cable (Bluetooth), S22 – BLACK cable (BLE)

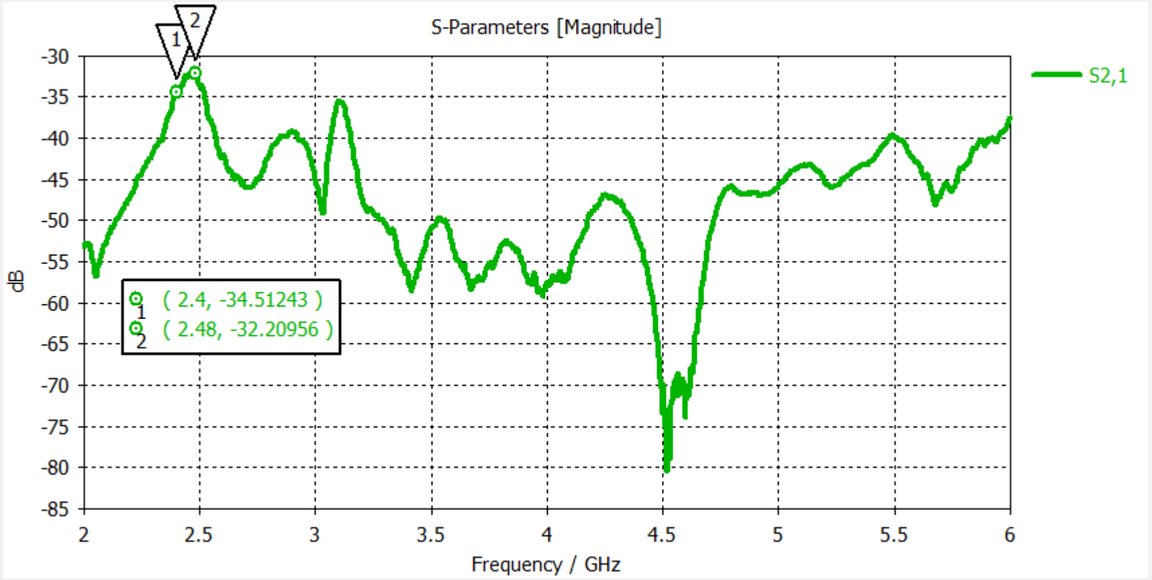


	dB	
S11	-5.5	-6,1
S22	-4.7	-7.1
S21	-31	

Impedance_and Isolation. S11- (Bluetooth), S22 – BLE)



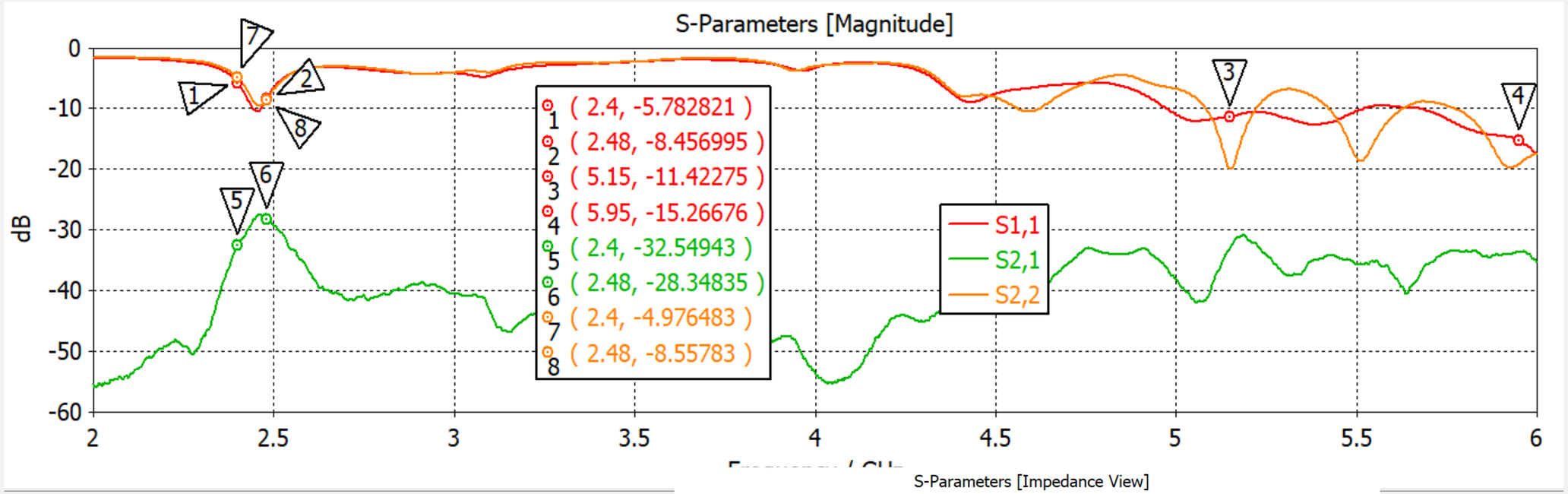


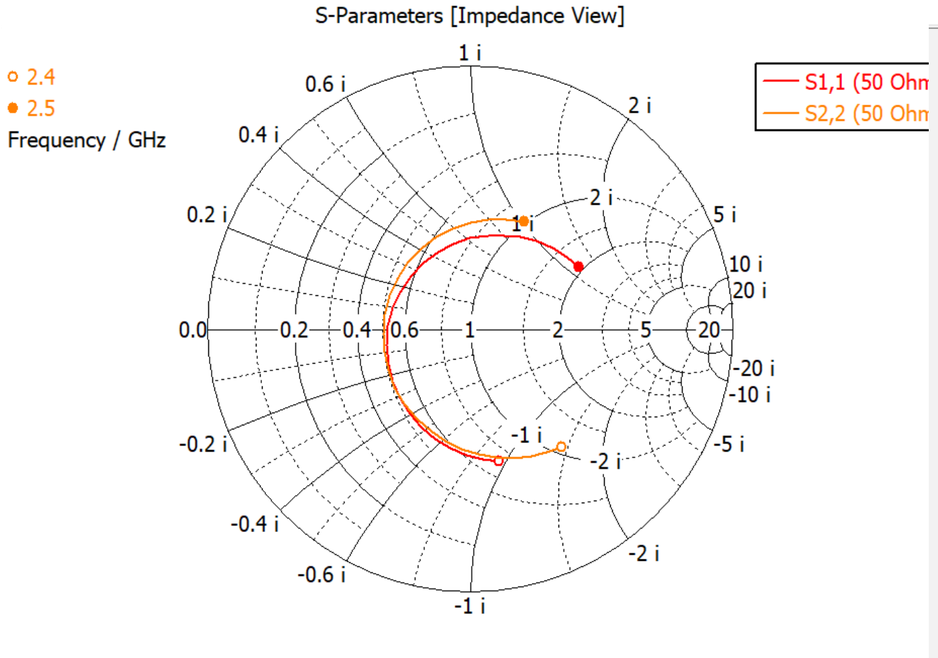


Return Loss_and Isolation. S11- WHITE cable (WIFI ANT3+6), S22 – WHITE CAPT cable (WIFI ANT1+7)

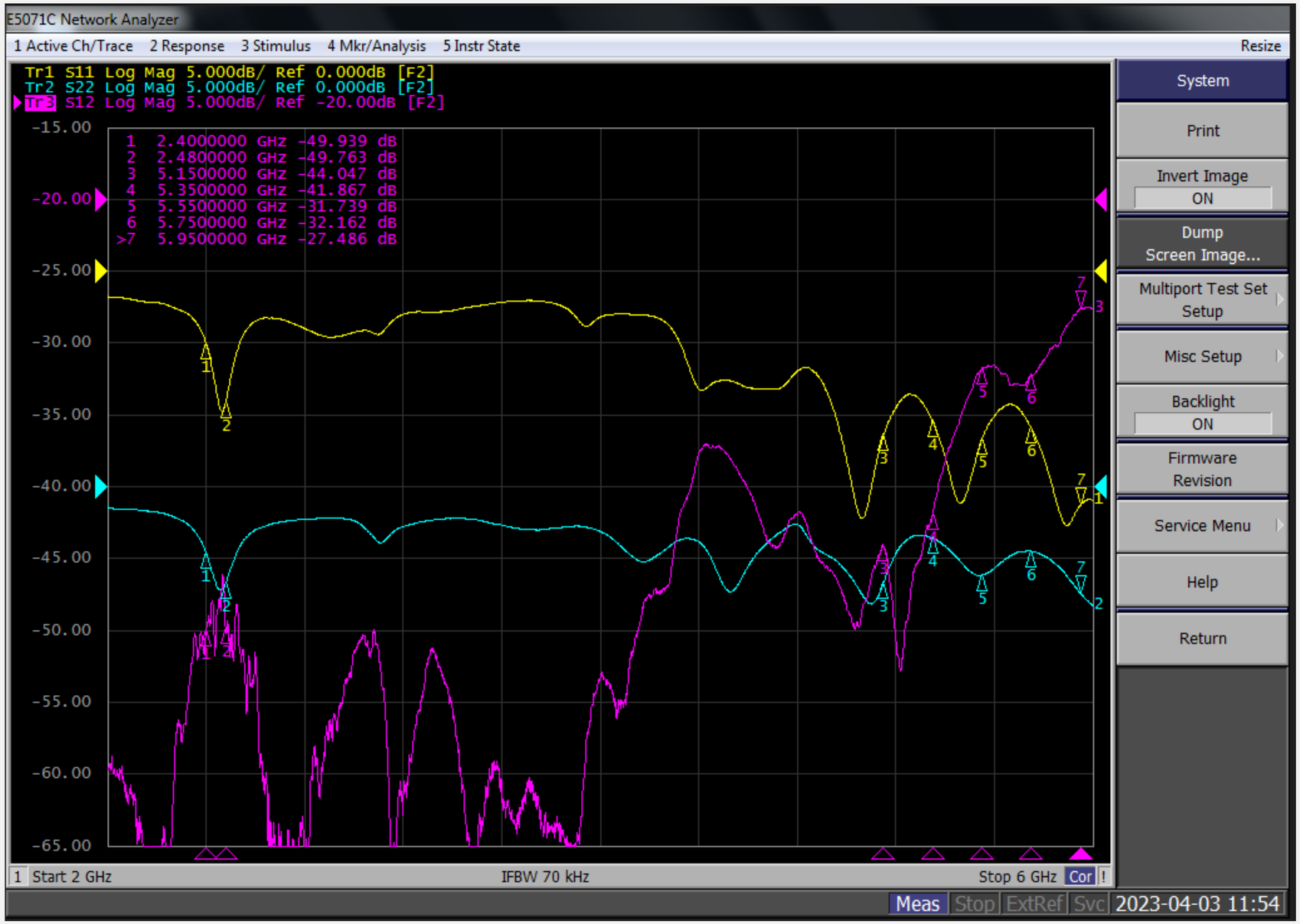
	dB	
S11	-5.8	-8.5
S22	-5	-8.6
S21	-27.5	

Impedance and Isolation. S11- WHITE cable (WIFI ANT3+6), S22 – WHITE CAPT cable (WIFI ANT1+7)



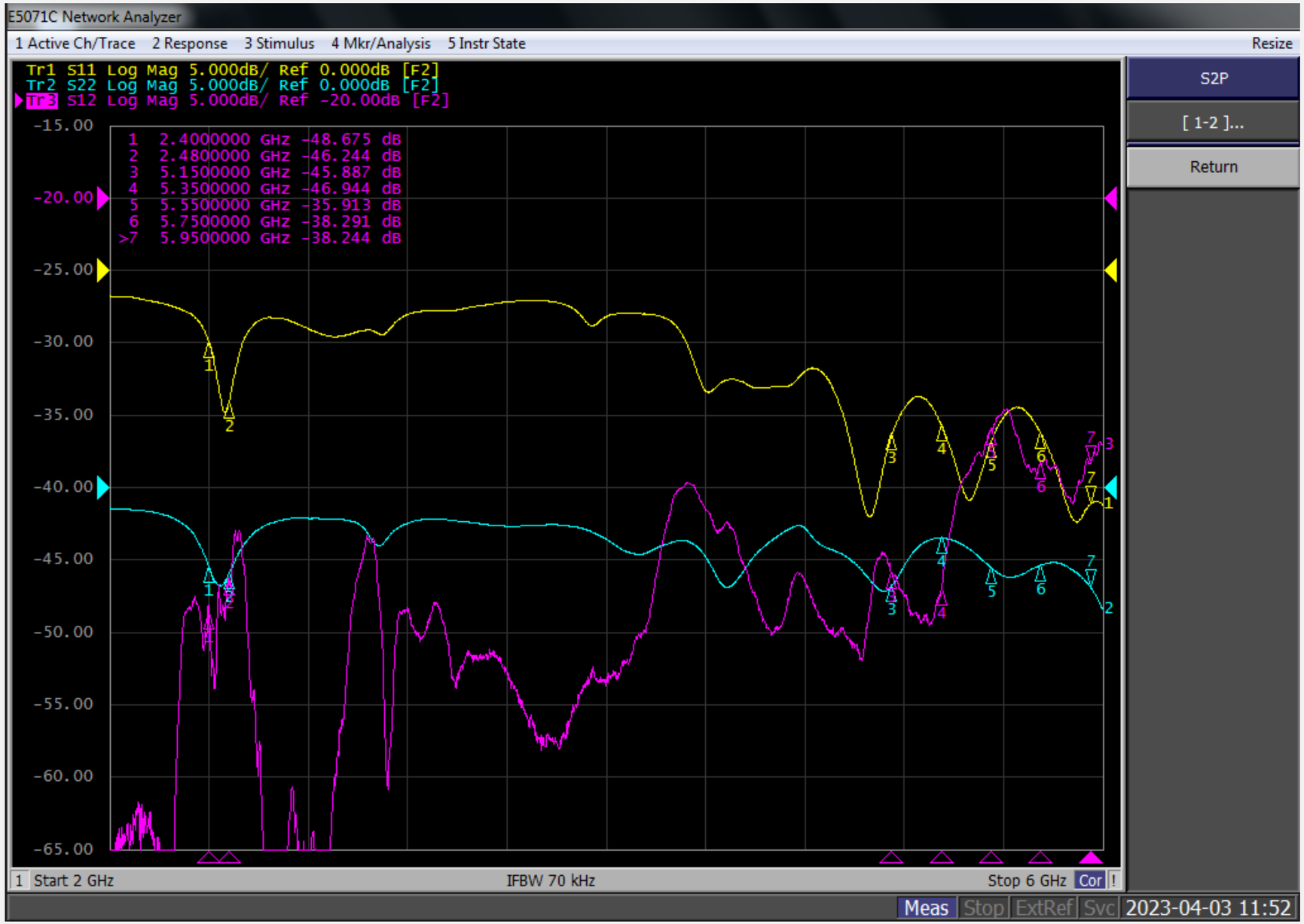


Isolation. S11- WHITE cable (WIFI ANT3+6), S22 – BLACK cable (BLE)



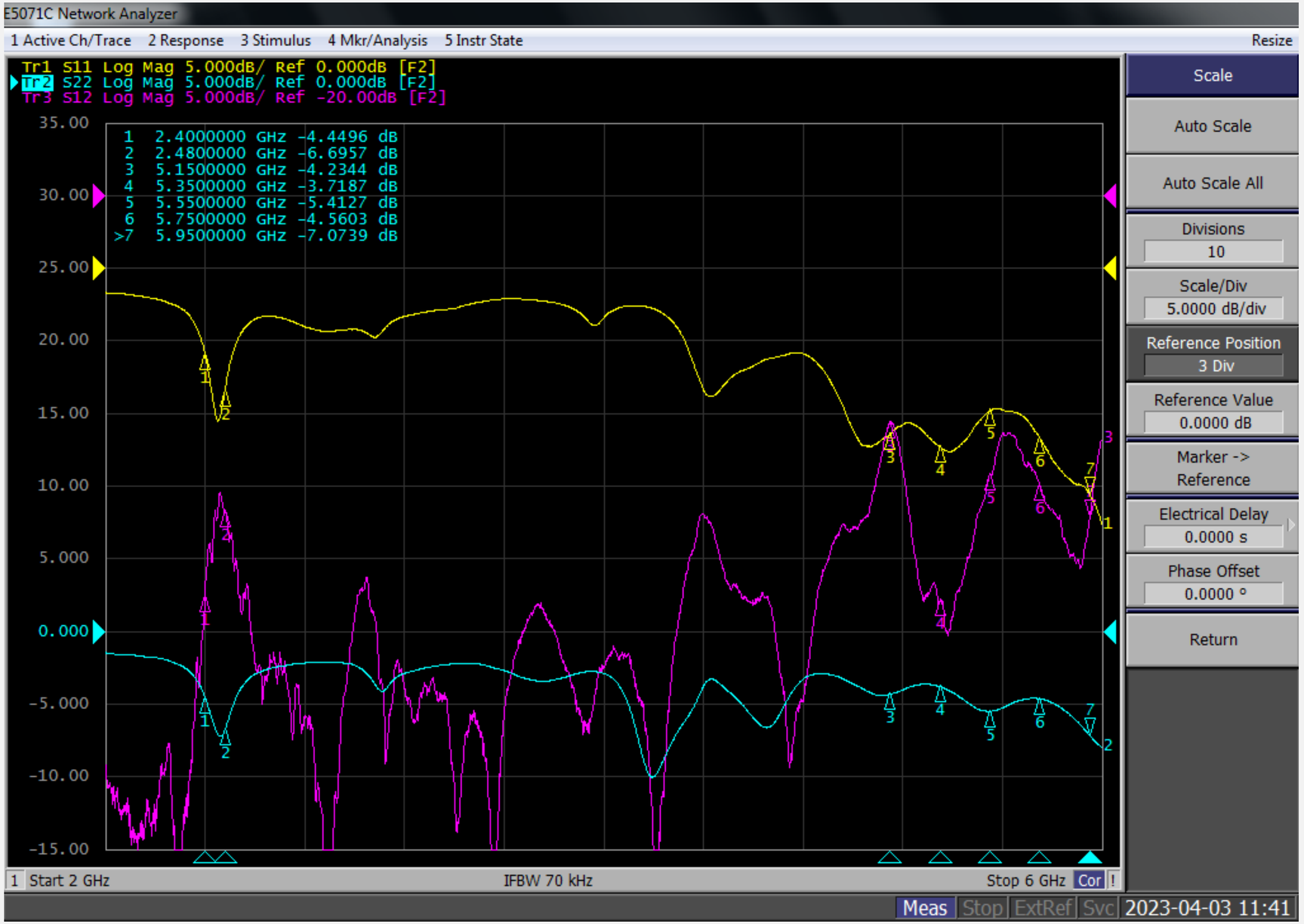
	dB	
S11		
S22		
S21	-46	In 2.4-2.5 GHz band

Isolation. S11- WHITE cable (WIFI ANT3+6), S22 – GRAY cable (Bluetooth)



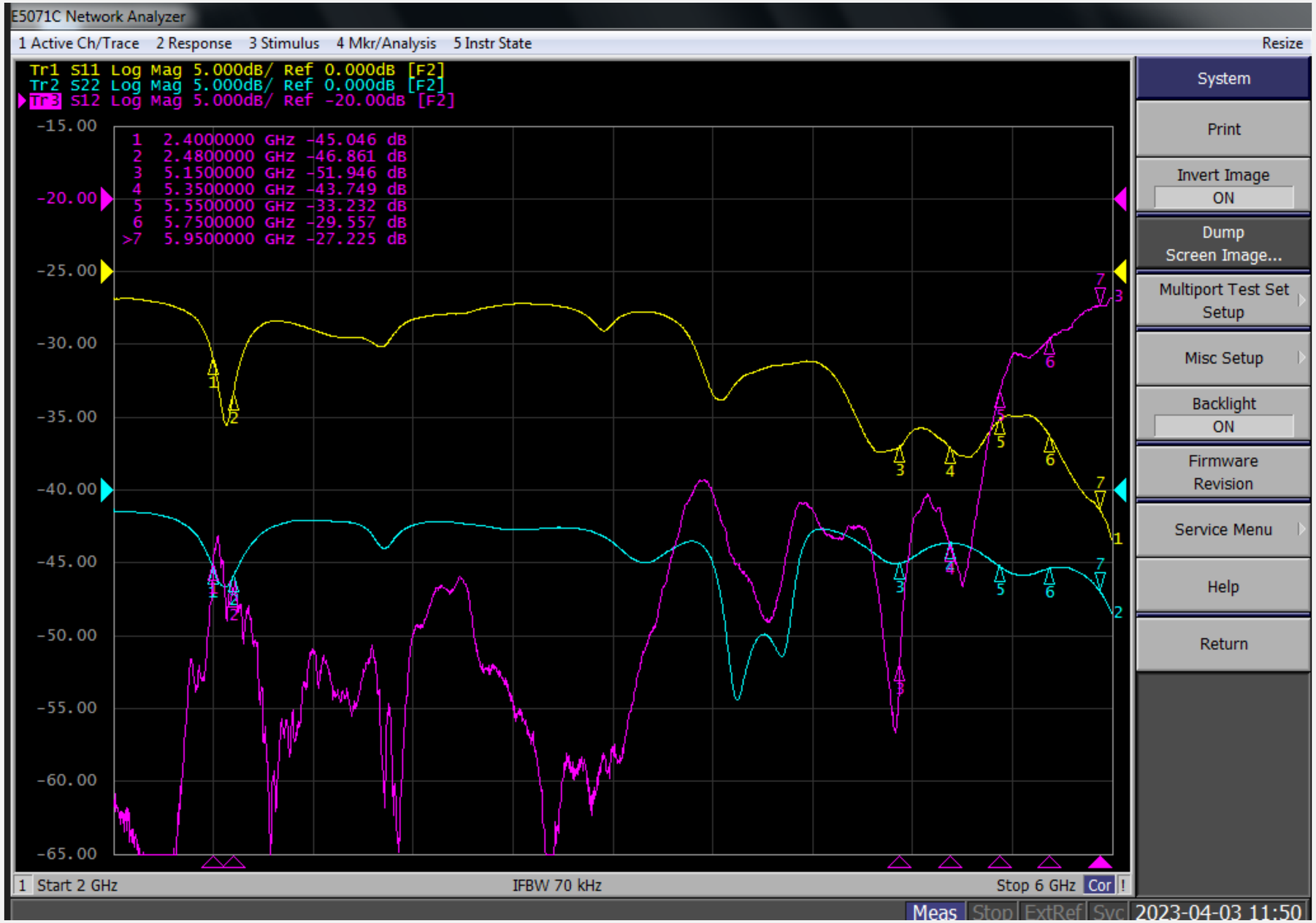
	dB	
S11		
S22		
S21	-46	

Isolation. S11- WHITE CAPT cable (WIFI ANT1+7), S22 – BLACK cable (BLE)



	dB	
S11		
S22		
S21	-40	In 2.4-2.5 GHz band

Isolation. S11- WHITE capt cable (WIFI ANT1+7), S22 – GRAY cable (Bluetooth)



	dB	
S11		
S22		
S21	-43	In 2.4-2.5 GHz band

	Total efficiency, dB			
	WIFI 2+6	WIFI 1+7	BLE	Bluetooth
2400	-5.8	-6.5	-6.0	-5.9
2420	-4.7	-5.4	-5.2	-5.1
2440	-4.0	-4.5	-4.5	-5.0
2460	-3.7	-3.9	-4.1	-4.8
2480	-4.0	-3.9	-4.2	-5.0
5150	-4.6	-5.4		
5250	-4.5	-5.2		
5350	-4.5	-5.2		
5450	-4.9	-5.6		
5550	-4.8	-5.2		
5650	-4.8	-5.1		
5750	-4.5	-5.3		
5850	-4.3	-5.6		
5950	-4.0	-4.9		

SIGMA Connectivity

Frequency	Peak Gain, dBi			
	WIFI 2+6	WIFI 1+7	BLE	Bluetooth
2400	0.8	-0.2	0.8	2.0
2420	1.9	1.0	1.8	2.9
2440	2.7	1.9	2.4	2.7
2460	3.1	2.6	2.9	3.2
2480	2.8	2.7	2.8	3.2
5150	1.6	0.7		
5250	1.9	1.2		
5350	2.1	1.0		
5450	1.8	0.2		
5550	2.4	1.2		
5650	2.7	1.4		
5750	2.7	0.9		
5850	2.4	1.2		
5950	2.9	1.8		

SIGMA Connectivity