



Antenna Debugging Report

Customer: Duoke

Project: DK096 US version

Structure: Xiaoxiang-13316888409

RF: Long Yaobin -15874137313

Date: April 17, 2025



Antenna Debugging Report

Report type:

Version number: V2.0

Machine status: Trial production machine

Antenna frequency band:

GSM:B2/B3/B5/B8

WCDMA:W1/W2/W4/W5/W8

FDD-LTE: B1/B2/B3/B4/B5/B7/B8/B12/B13/B17/B19/B20/B26/B28B/B28A/B66

TDD-LTE: B40/B41

GPS and other satellite positioning antennas

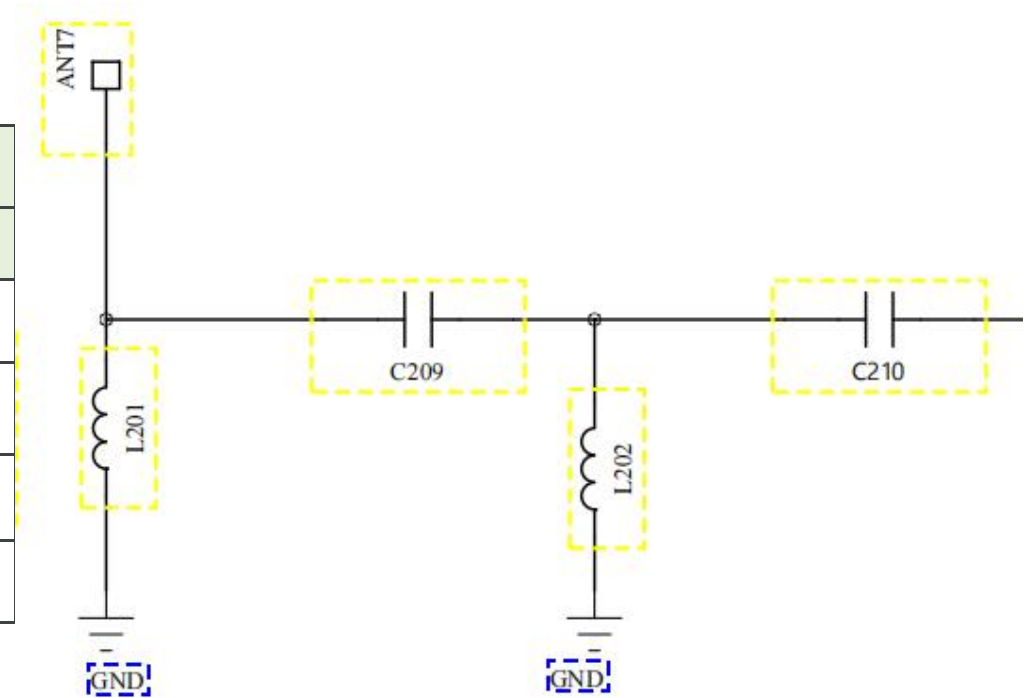
2.4G/5G WIFI

Bluetooth

PCB small board (ANT0)

0201 specification

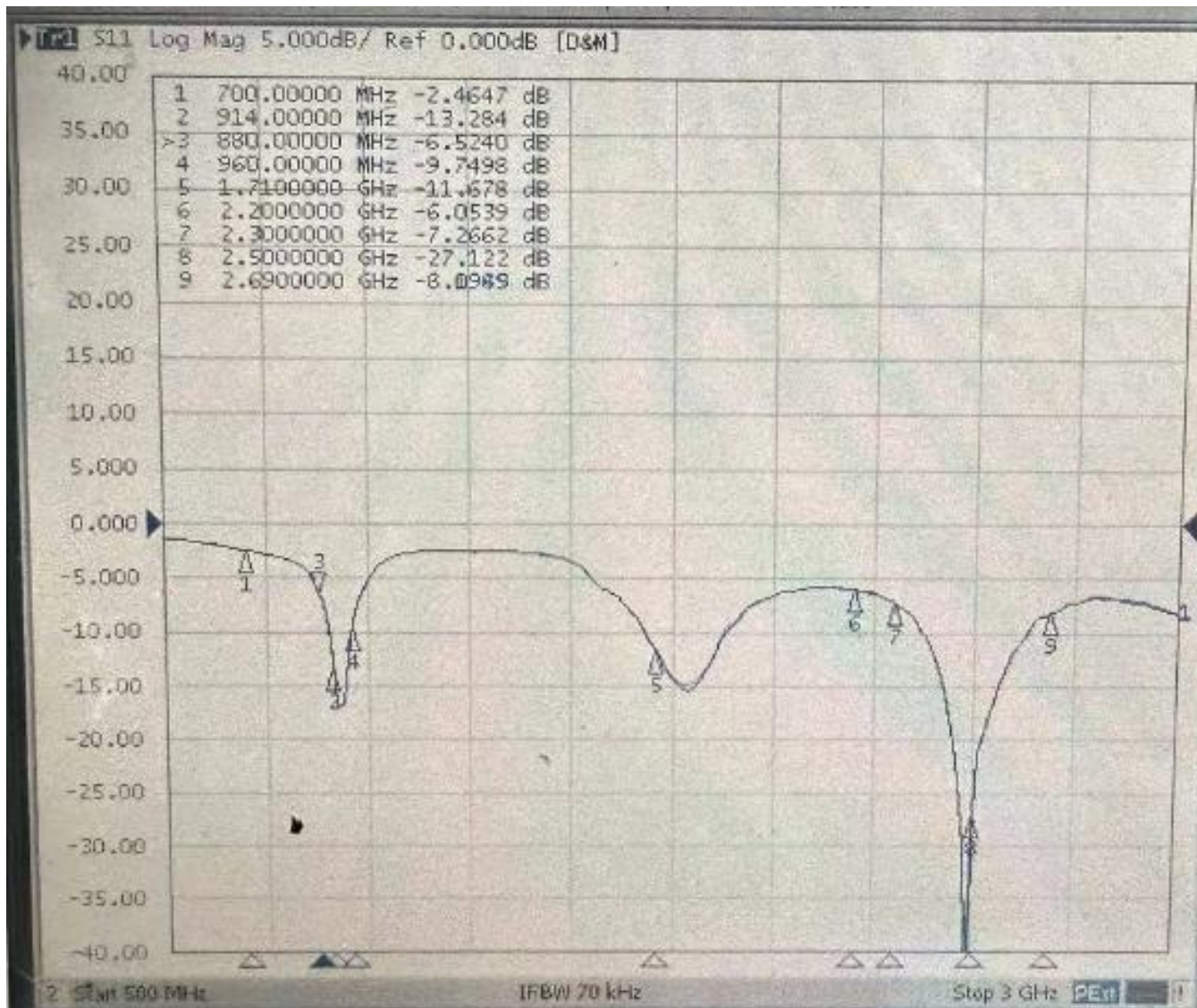
Element	Value	PCB Tag Number
E1 (0201)	10nH	L201
E2 (0201)	4.7pF	C209
E3 (0201)	0.5pF	L202
E4 (0201)	3.9nH	C210

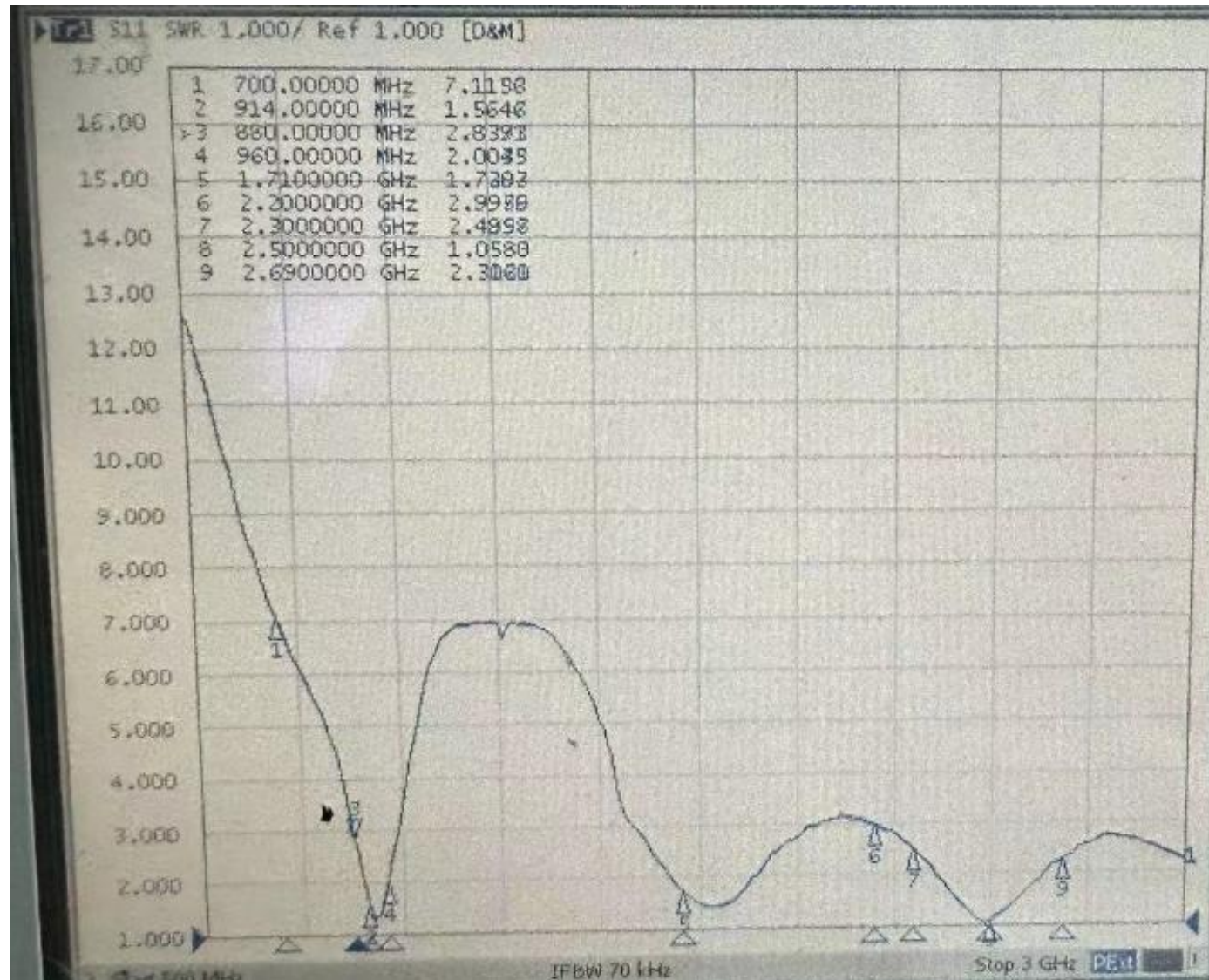




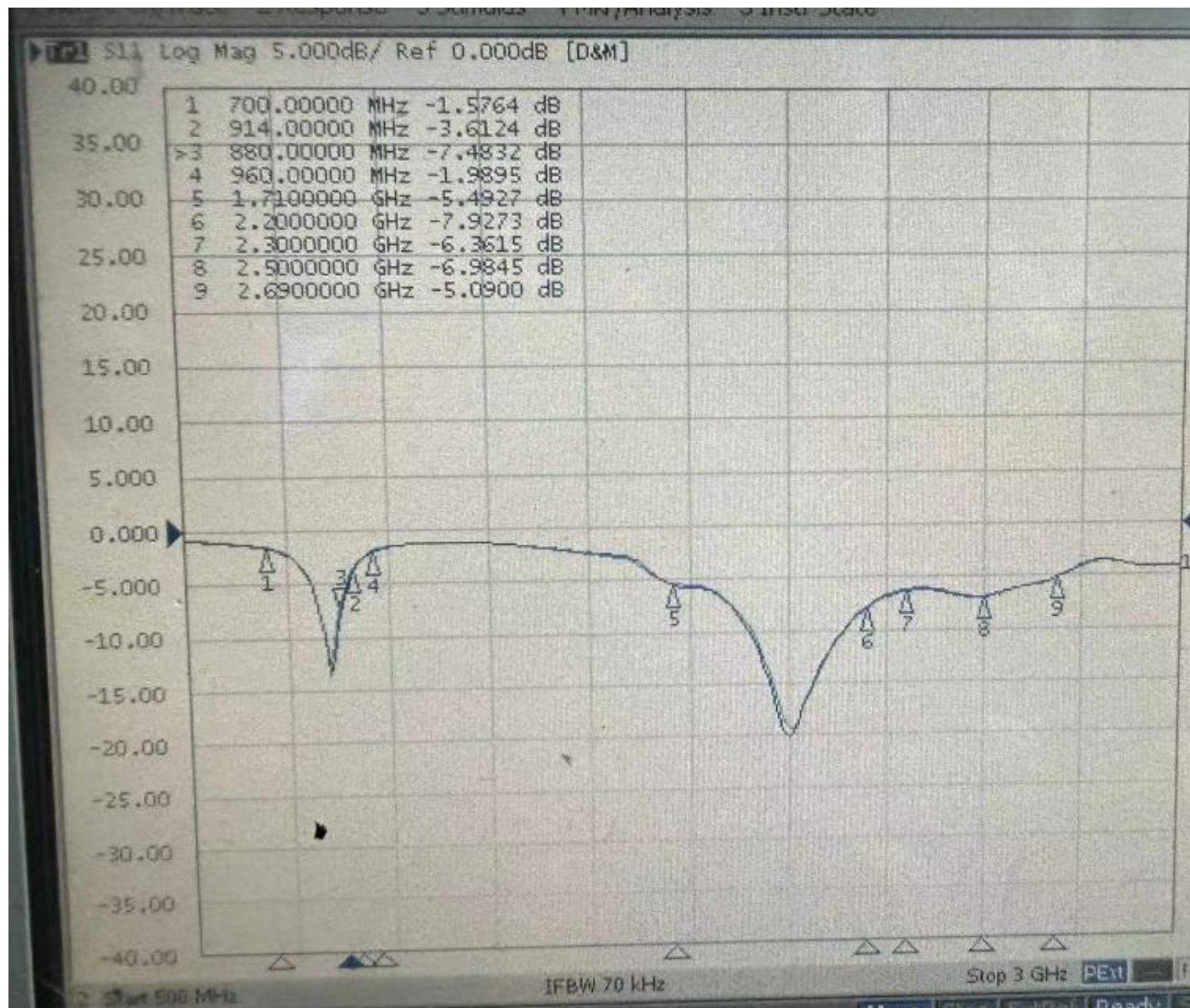
PCB small board (ANT0)

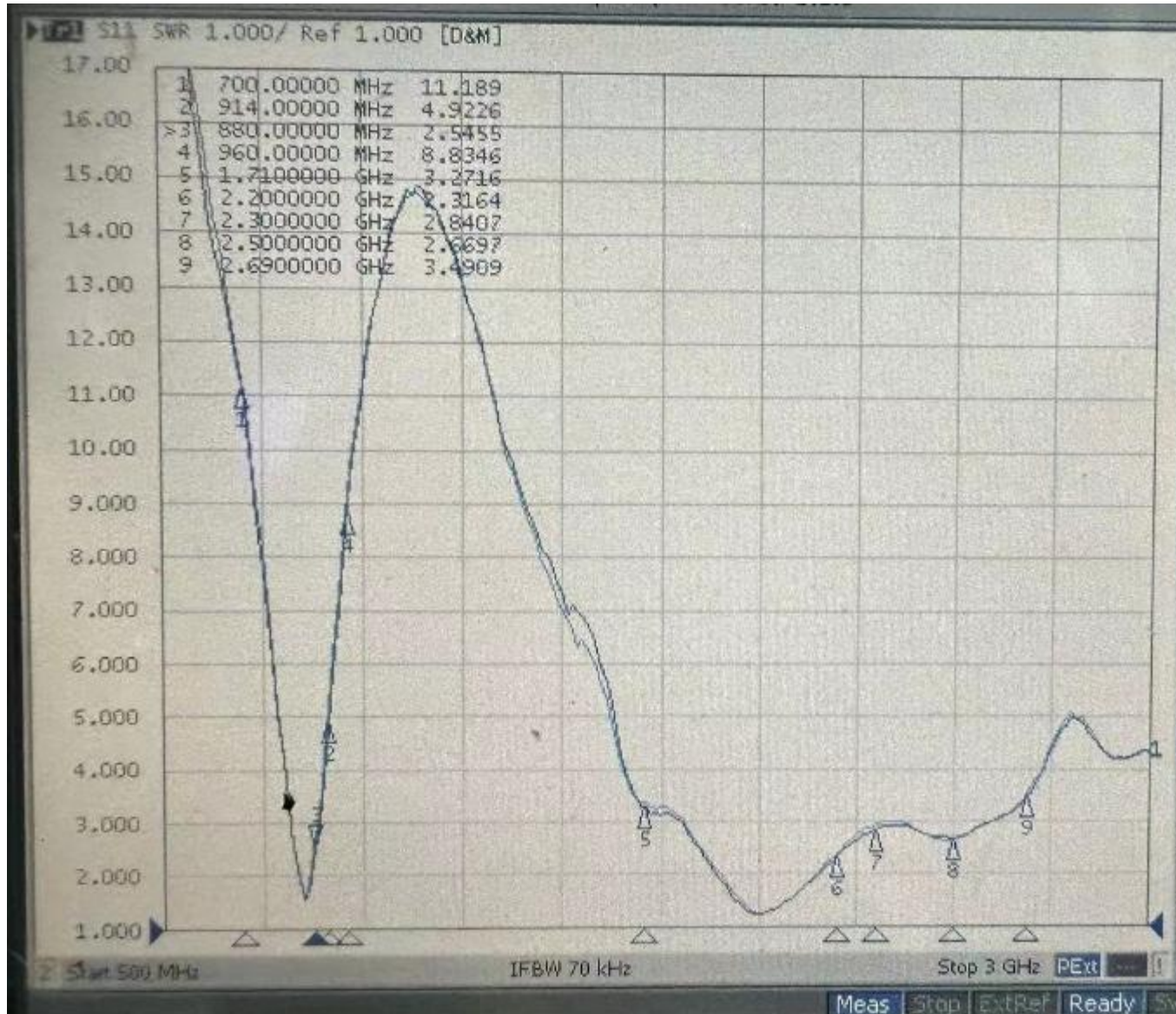
DK096 small board main antenna switch logic		
RF1	0 Ω (位号C205)	GSM:900RX /1800/1900 LTE-FDD:B1/B2/B7 LTE_TDD:B40/41 WCDMA:B1/B2
RF2	15nH (位号C206)	FDD-LTE:B12/B13/B17/B28A/28B
RF3	6.2nH (位号C201)	GSM:850TX LTE-FDD:B5/B19/B20/B26 WCDMA:B5
RF4	2.7nH (位号C202)	GSM850RX/900TX WCDMA:B4/B8 LTE-FDD:B3/B4/B8/B66

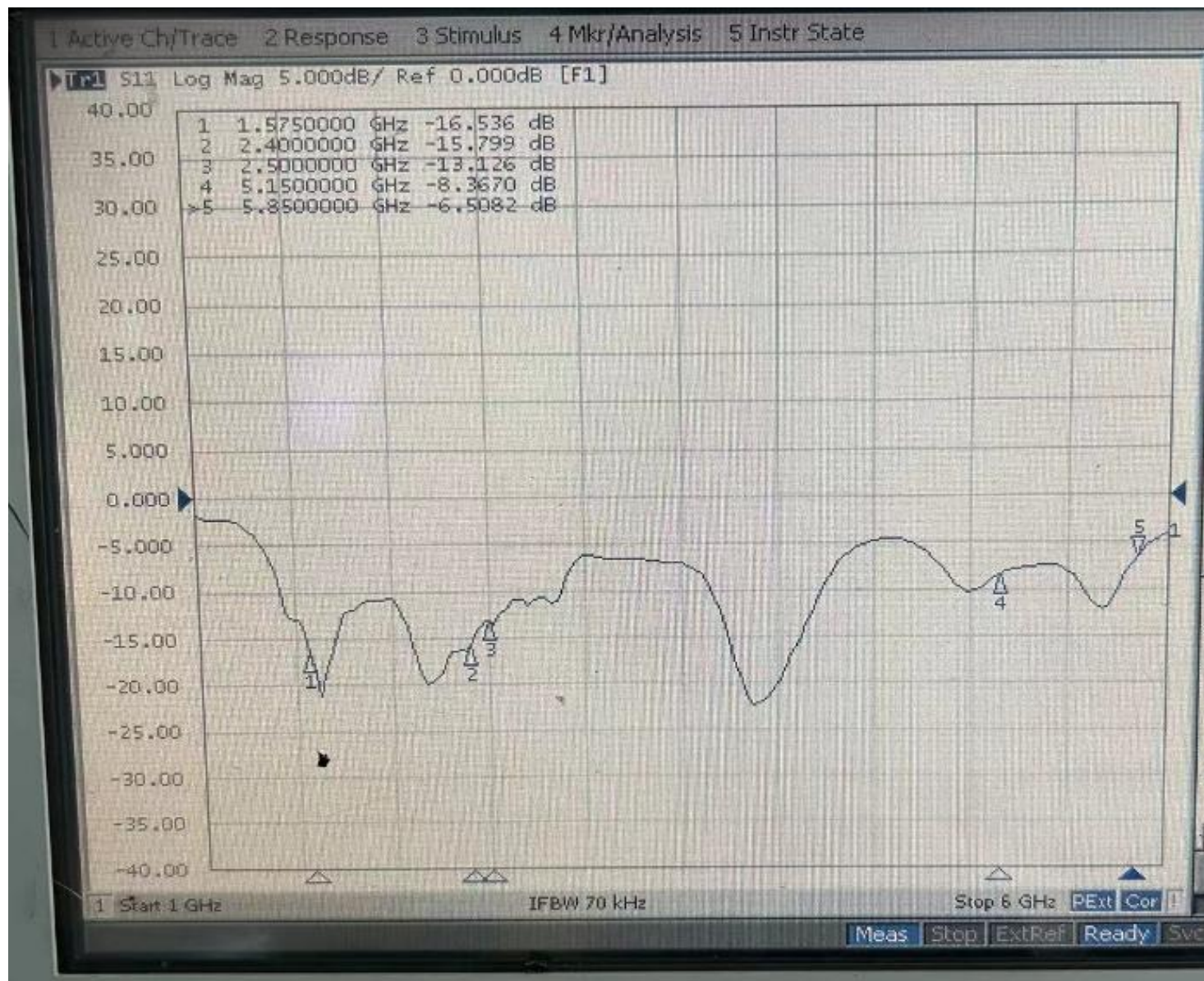


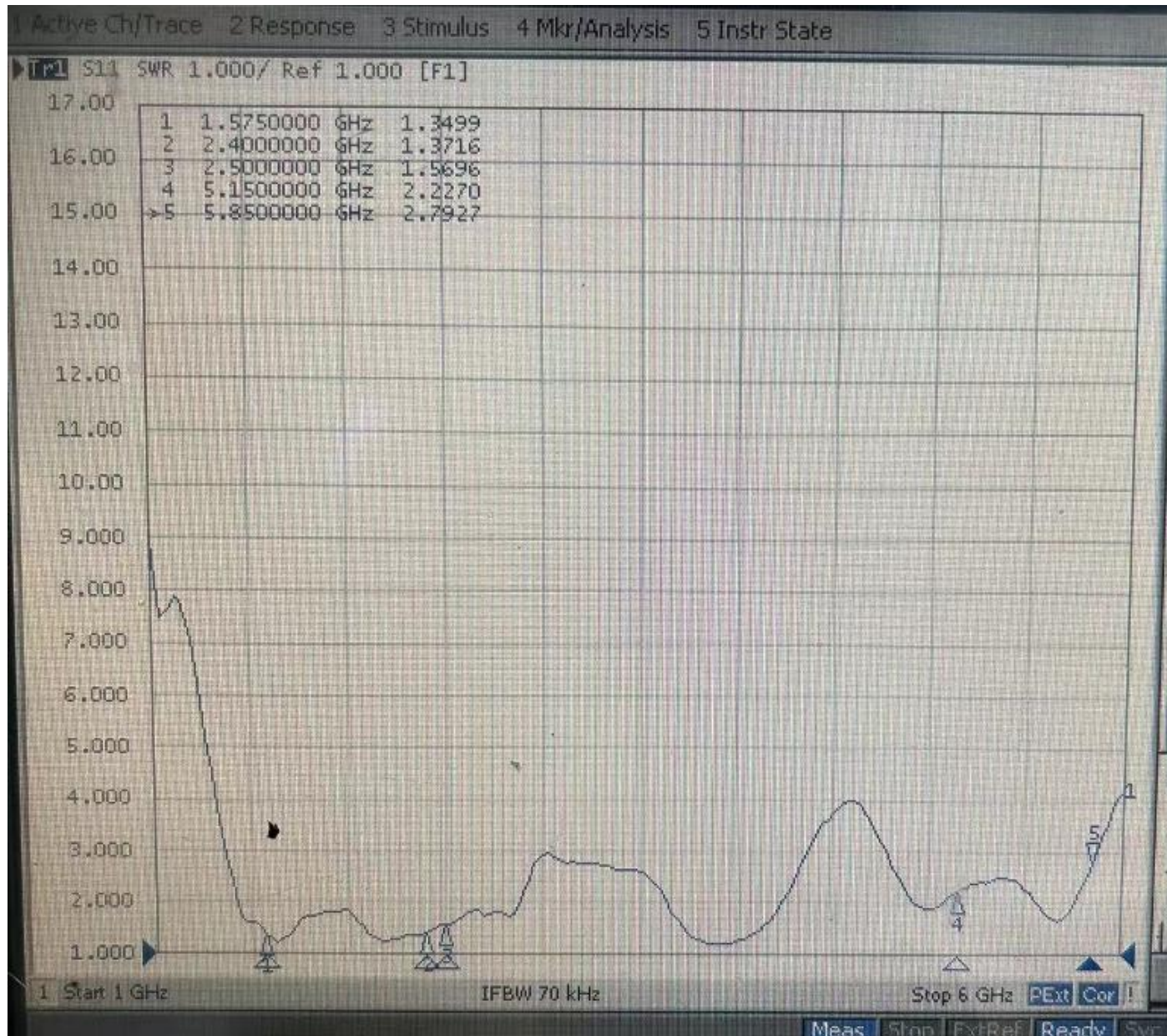


ANT1 LOG MAG











Antenna gain

Frequency (MHZ)	Average Gain(dBi)	Peak Gain(dBi)	Frequency (MHZ)	Average Gain(dBi)	Peak Gain(dBi)
GSM850	-6.8	-1.1	LTE B13	-7.1	-1.9
GSM900	-5.7	-0.2	LTE B17	-6.8	-1.5
DCS1800	-4.1	0.4	LTE B19	-6.3	-1.1
PCS1900	-4.8	0.2	LTE B20	-6.1	-0.9
WCDMA B1	-4.3	0.5	LTE B26	-6.4	-1.1
WCDMA B2	-4.8	0.2	LTE B28A	-6.8	-1.9
WCDMA B4	-4.4	0.3	LTE B28B	-6.9	-2.1
WCDMA B5	-6.8	-1.1	LTE B66	-4.5	0.7
WCDMA B8	-5.7	-0.2	LTE B40	-4.7	0.2
LTE B1	-4.3	0.5	LTE B41	-5.1	-0.3
LTE B2	-4.8	0.2	WIFI 2.4G/BT	-4.0	1.95
LTE B3	-4.1	0.4	WIFI 5.8G	-5.7	0.33
LTE B4	-4.4	0.3	GPS	-4.3	1.17
LTE B5	-6.8	-1.1			
LTE B7	-5.1	-0.3			
LTE B8	-5.6	-0.2			
LTE B12	-6.9	-1.8			

Free Space-3D - Machine Screen Off			
Band	Channal	ANT0 TRP	ANT0+ANT1 TIS
GSM850	128	24.2	
	190	23.2	
	251	22.4	-101.9
EGSM	1	23.9	
	62	23.9	
	124	24.2	-101.3
DCS	512	25.3	
	698	25.3	
	885	25.1	-103.1
PCS	512	24.9	
	661	24.8	
	810	24.8	-103.2

Free Space-3D - Machine Screen Off			
Band	Channal	ANT0 TRP	ANT0+ANT1 TIS
WCDMA-B1	10562	17.4	
	10700	16.3	
	10838	16.2	-105.8
WCDMA-B2	9662	17.3	
	9800	17.1	
	9938	16.8	-106.6
WCDMA-B4	1538	17.3	
	1675	17.8	
	1738	18.3	-105.7
WCDMA-B5	4357	14.7	
	4410	14.7	
	4458	15.1	-103.3

Free Space-3D - Machine Screen Off			
Band	Channal	ANT0 TRP	ANT0+ANT1 TIS
WCDMA-B8	2937	15.2	
	3013	15.9	
	3088	15.7	-102.4
FDD-B1-10M	50	18.5	
	300	18.8	
	550	18.1	-93.4
FDD-B2-10M	650	18.7	
	900	19.3	
	1150	18.5	-93.5
FDD-B3-10M	1250	18.5	
	1575	18.7	
	1900	18.9	-92.9

Free Space-3D - Machine Screen Off			
Band	Channal	ANT0 TRP	ANT0+ANT1 TIS
FDD-10M-B4	2000	18.7	
	2175	18.9	
	2350	19.1	-94.1
FDD-10M-B5	2450	15.8	
	2525	15.8	
	2600	15.8	-91.7
FDD-10M-B7	2800	18.6	
	3100	18.9	
	3400	18.6	-92.9
FDD-10M-B8	3500	16.4	
	3625	17.2	
	3750	17.9	-91.8

OTA test data

Free Space-3D - Machine Screen Off			
Band	Channel	ANT0 TRP	ANT0+ANT1 TIS
FDD-10M- B12	5060	15.5	
	5095	16.2	
	5130	16.1	-91.7
FDD-10M- B13			
	5230	15.4	-91.8
FDD-10M- B17	5780	15.7	
	5790	16.4	
	5800	16.5	-90.7
FDD-10M- B19	6050	15.1	
	6075	15.2	
	6100	15.4	-91.8

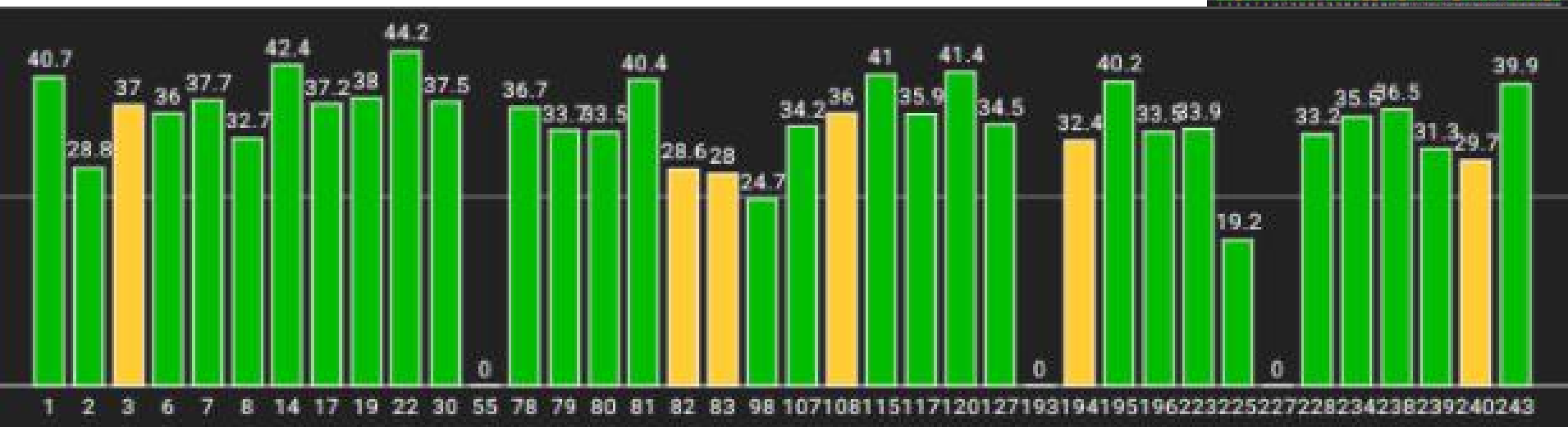
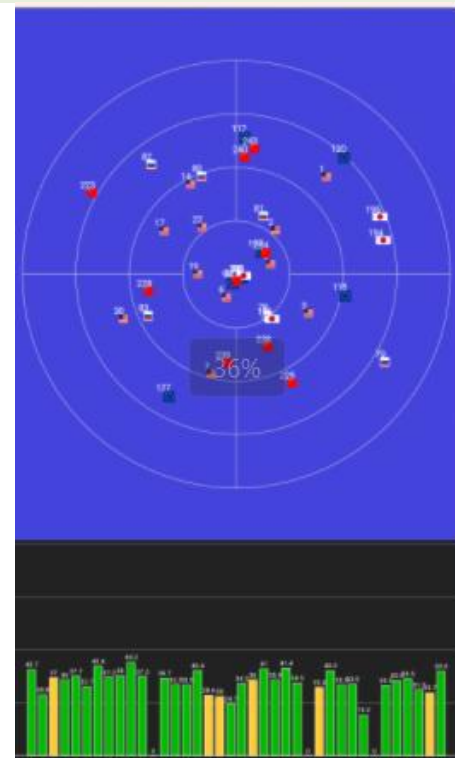
OTA test data

Free Space-3D - Machine Screen Off			
Band	Channal	ANT0 TRP	ANT0+ANT1 TIS
FDD-10M- B20	6200	15.8	
	6300	16.2	
	6400	15.5	-91.4
FDD-10M- B26	8740	16.6	
	8865	16.7	
	8990	16.9	-92.2
FDD-10M- B28a	9310	16.6	
	9360	15.9	
	9410	16.1	-91.1
FDD-10M- B28b	9460	15.6	
	9510	15.5	
	9560	16.2	-90.2
FDD-10M- B66	66536	18.3	
	66786	18.5	
	67036	18.3	-92.6

Free Space-3D - Machine Screen Off			
Band	Channal	ANT0 TRP	ANT0+ANT1 TIS
TDD-20M- B40	38750	18.8	
	39150	18.7	
	39550	18.5	-91.4
TDD-20M- B41			
	40620	18.6	-91.6

Free Space-3D - Machine Screen Off				
	Band	Channel	TRP/dBm	TIS/dBm
2.4G	b (11M)	1	12.3	
		6	12.1	
		13	14.2	-83.5
	g (54M)	1	11.6	
		6	10.9	
		13	12.1	-72.4
	n (MCS7)	1	11.9	
		6	11.3	
		13	12.5	-67.5
5.8G	a (54M)	36	12.6	
		149	12.7	
		165	12.8	-71.7
	n (MCS7)	36	11.8	
		149	11.9	
		165	11.8	-67.6
	ac (MCS8)	36	11.7	
		149	11.8	
		165	11.8	-65.9

GPS antenna measurement, location: Intersection of Ping'an Avenue
Weather: Cloudy

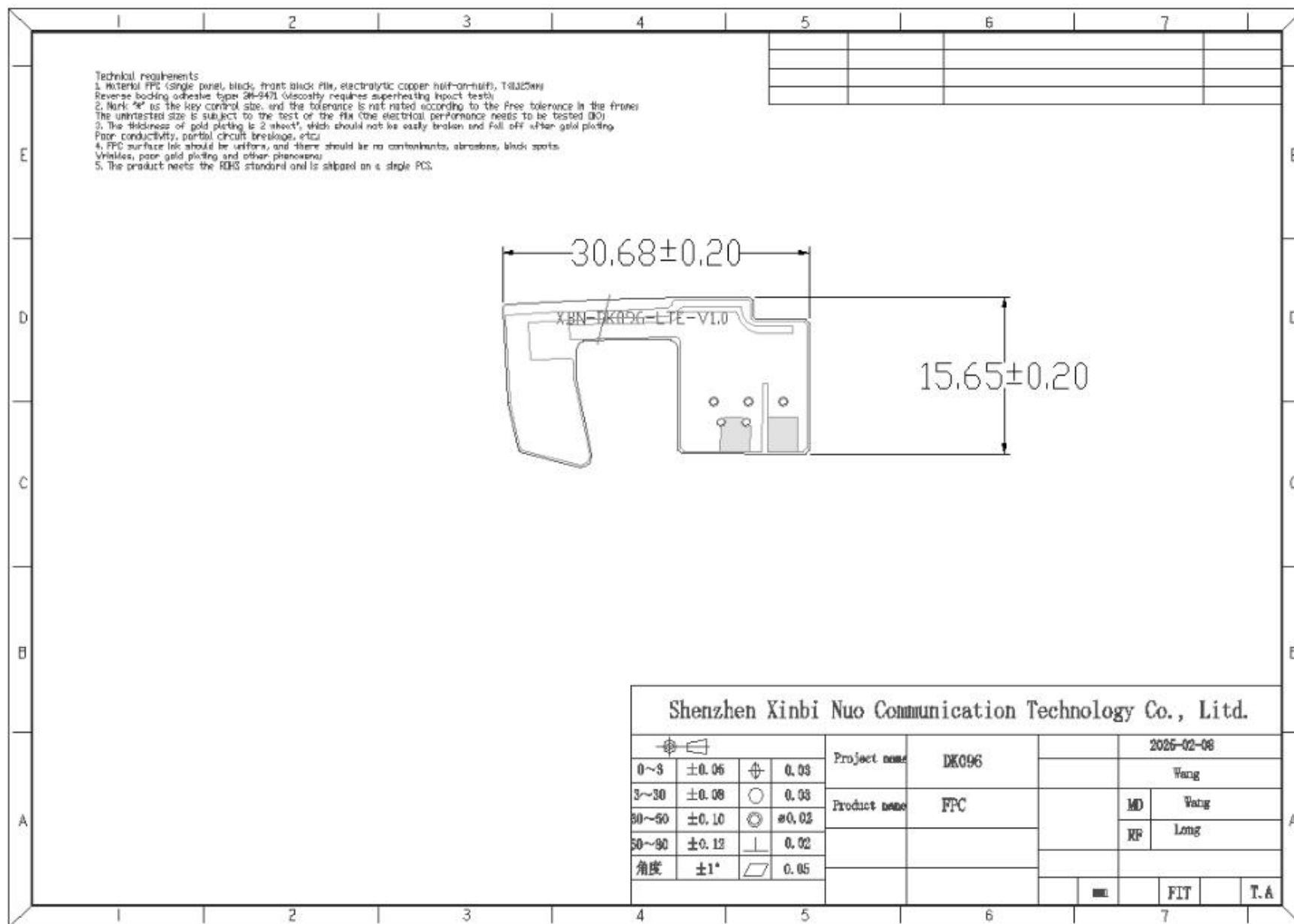


**NFC antenna (motherboard):**

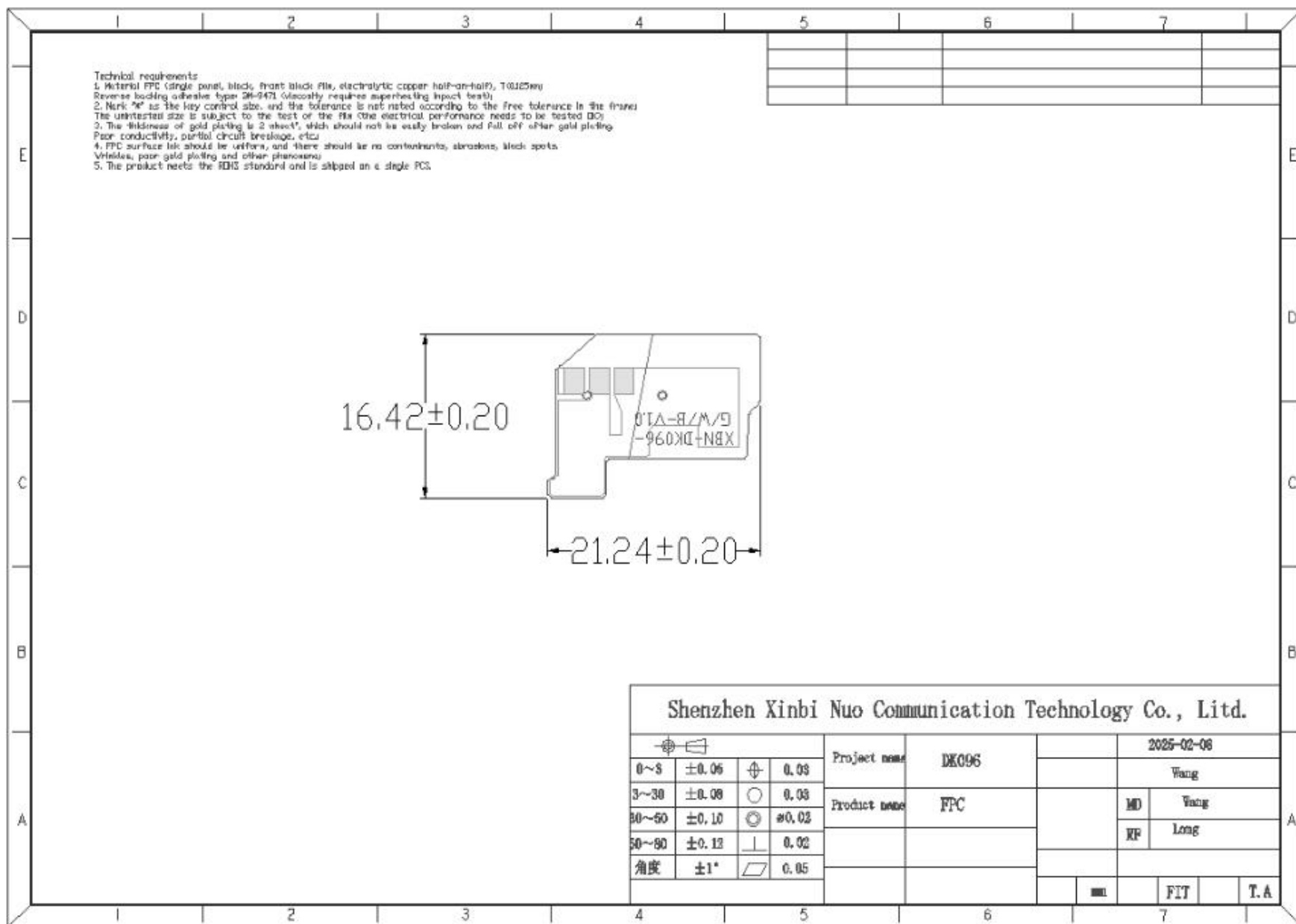
DK090	
label	Reading distance (mm)
Card 1	39
Card 2	40
Card 3	25
Card 4	15



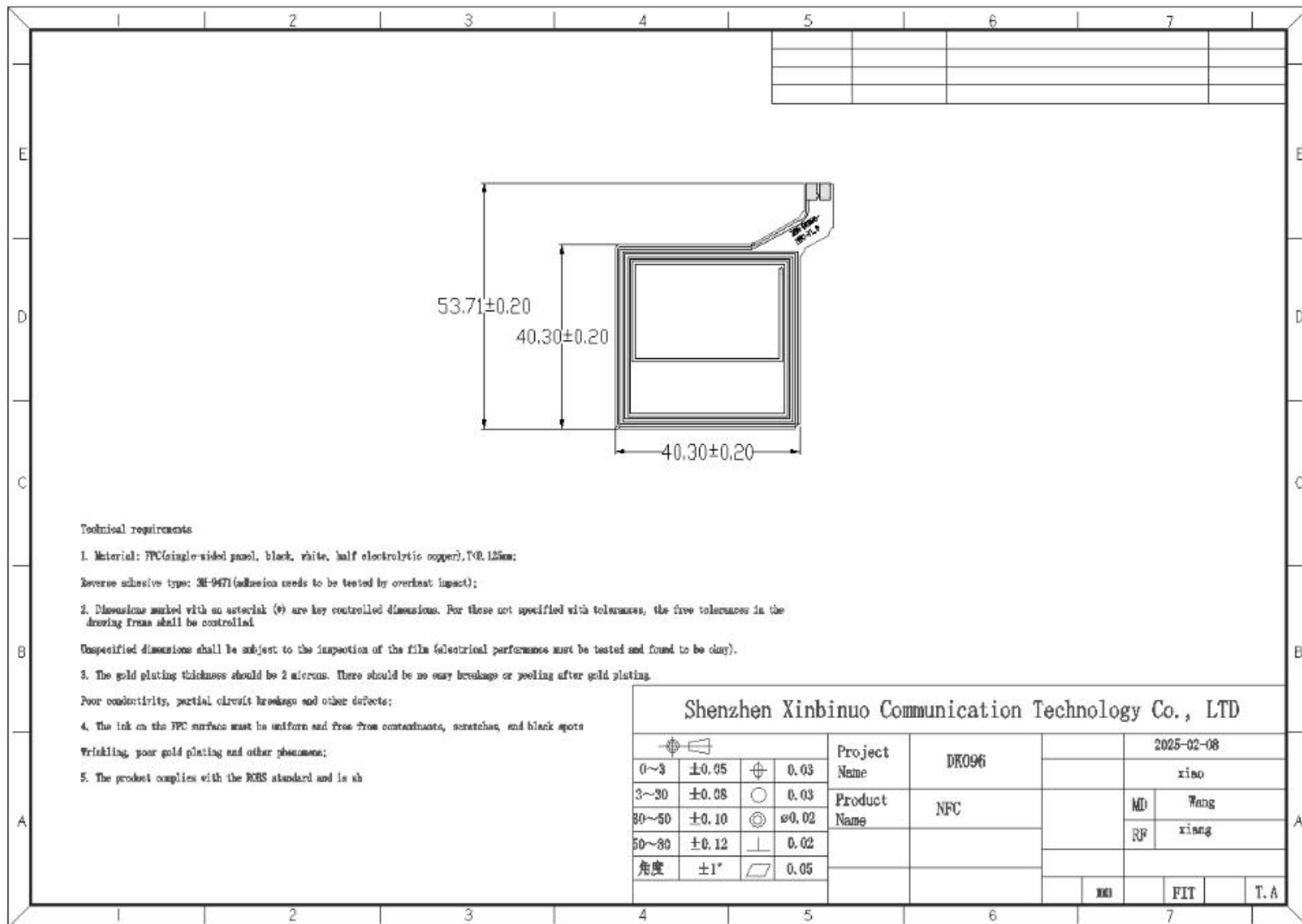
Antenna drawing



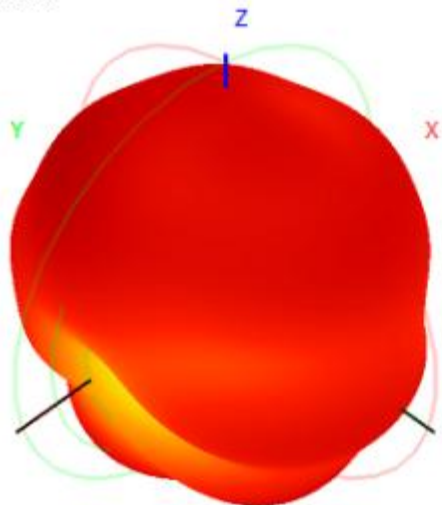
Antenna drawing



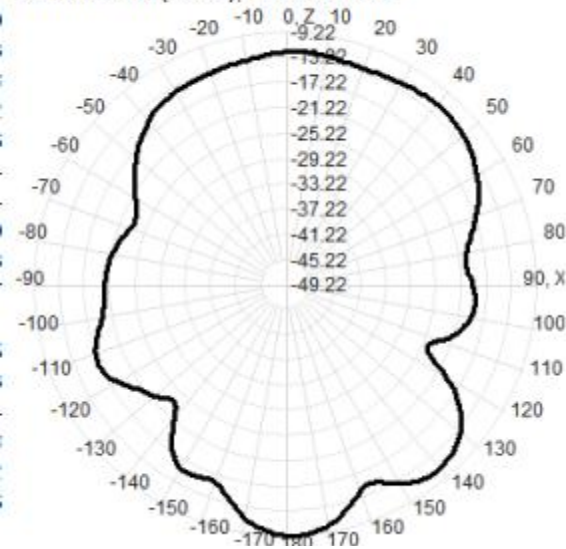
Antenna drawing



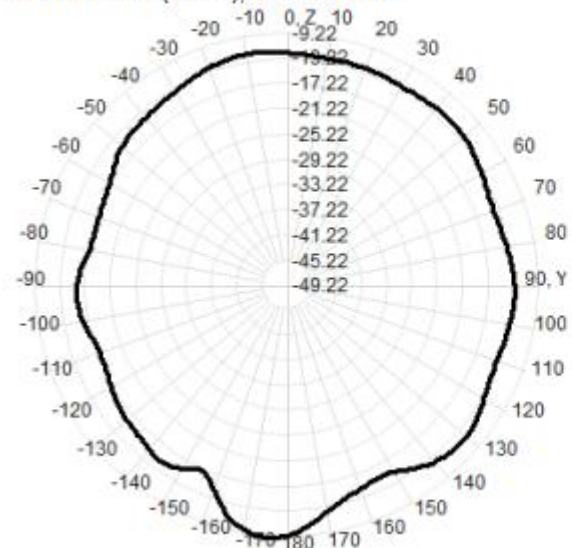
Back View



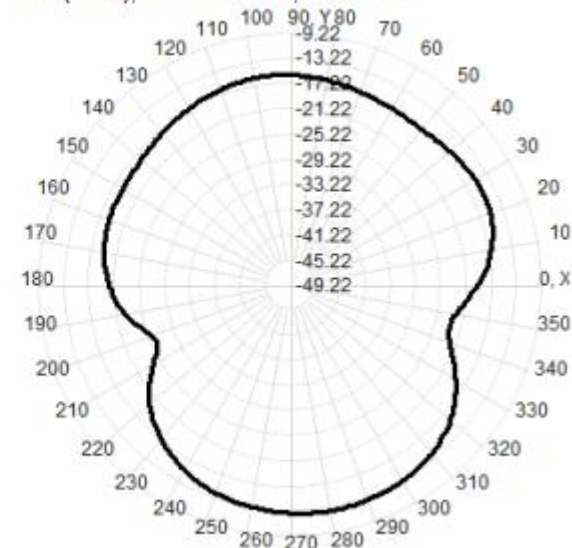
700.0MHz Total(E1-XZ), Max=-9.58dBi



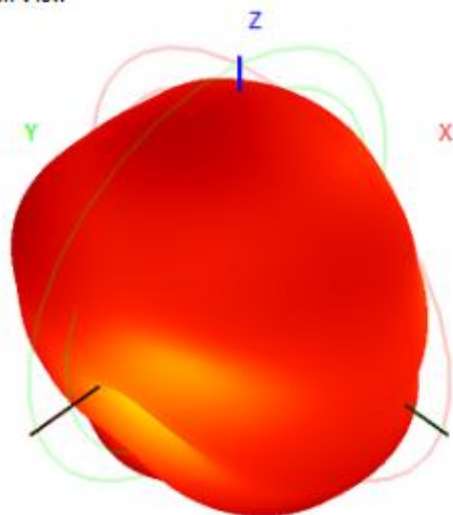
700.0MHz Total(E2-YZ), Max=-9.22dBi



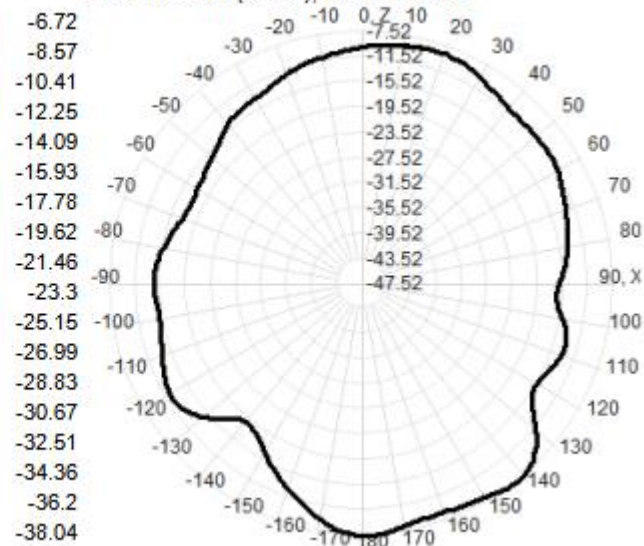
Total(H-XY), Max=-13.00dBi, CirD=13.22



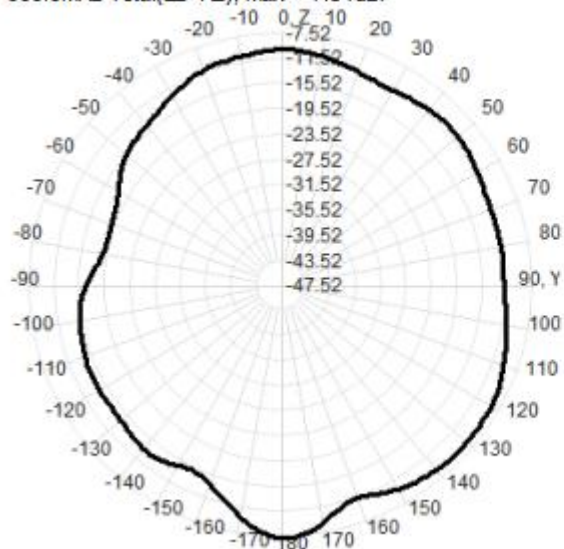
Back View



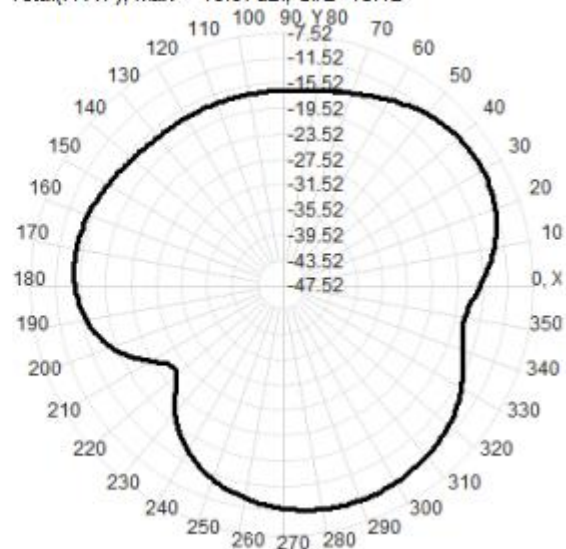
800.0MHz Total(E1-XZ), Max= -7.52dBi



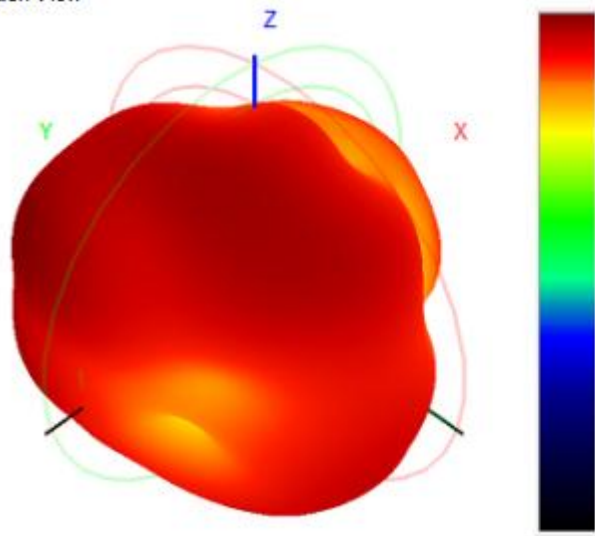
800.0MHz Total(E2-YZ), Max= -7.54dBi



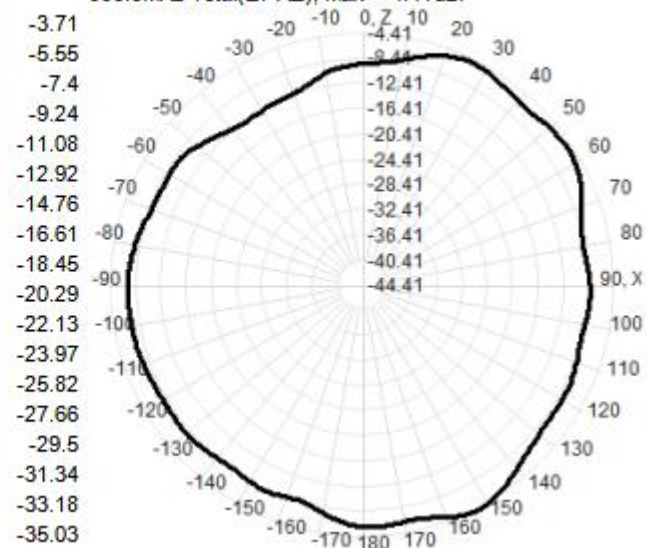
Total(H-XY), Max= -10.87dBi, CirD=15.12



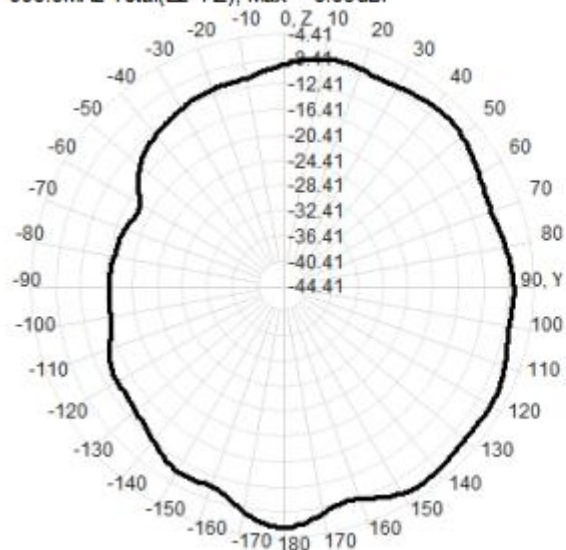
Back View



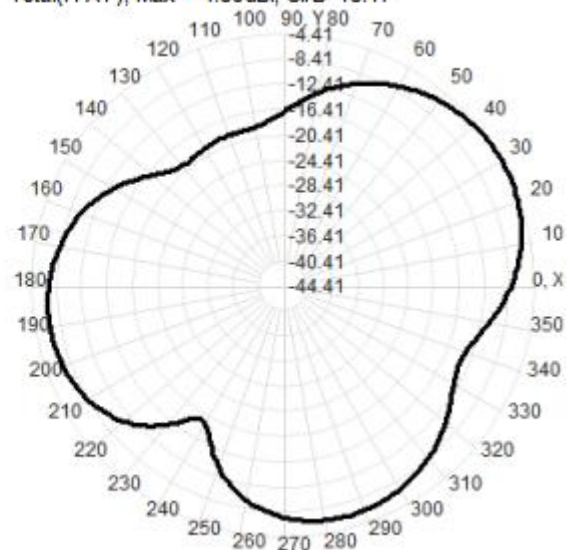
880.0MHz Total(E1-XZ), Max= -4.41dBi



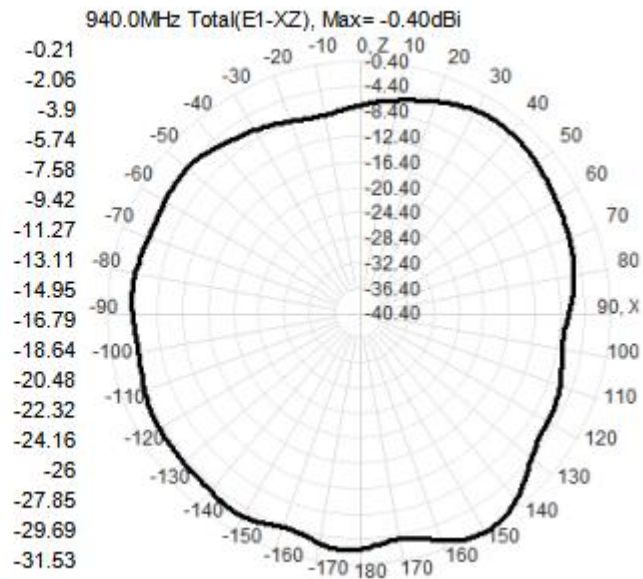
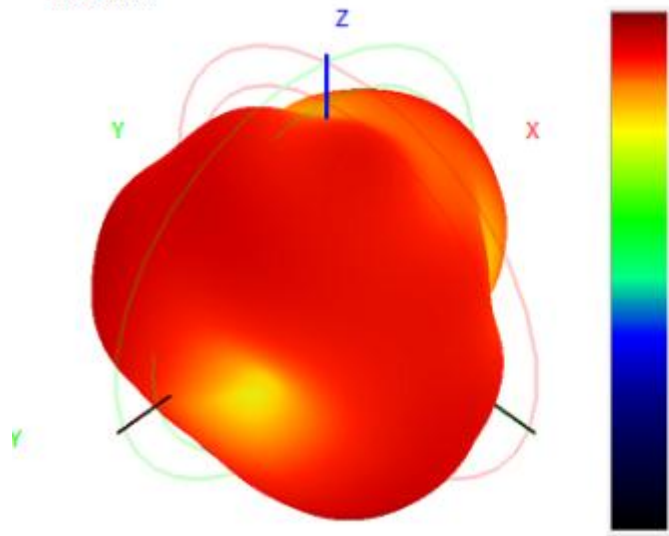
880.0MHz Total(E2-YZ), Max= -6.09dBi



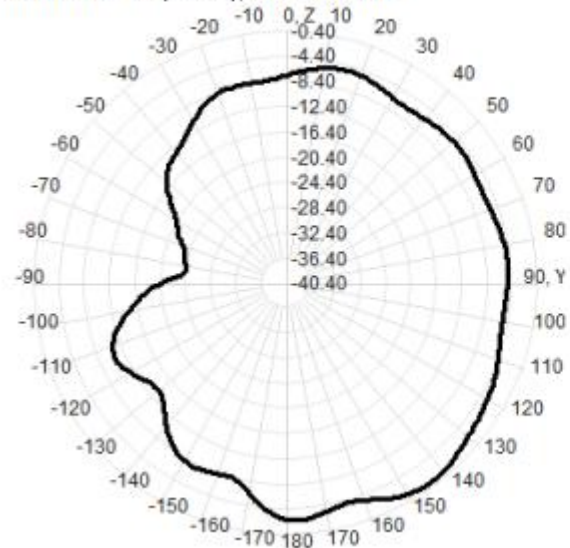
Total(H-XY), Max= -4.50dBi, CirD=15.17



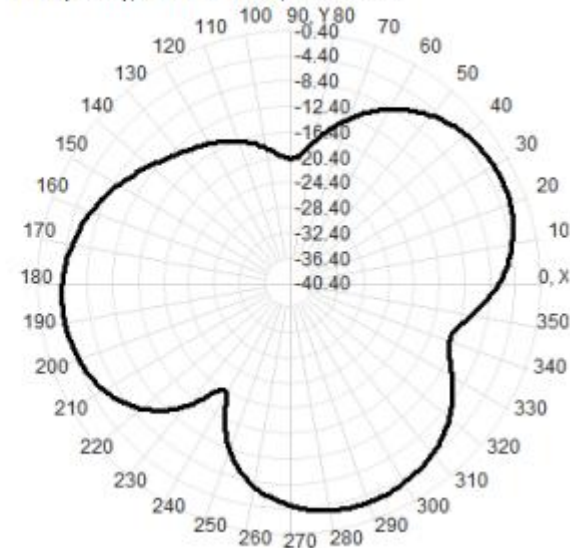
Back View



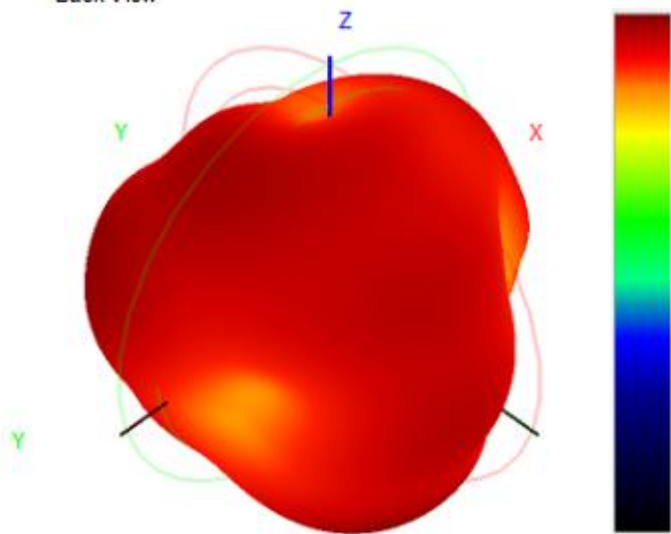
940.0MHz Total(E2-YZ), Max=-1.38dBi



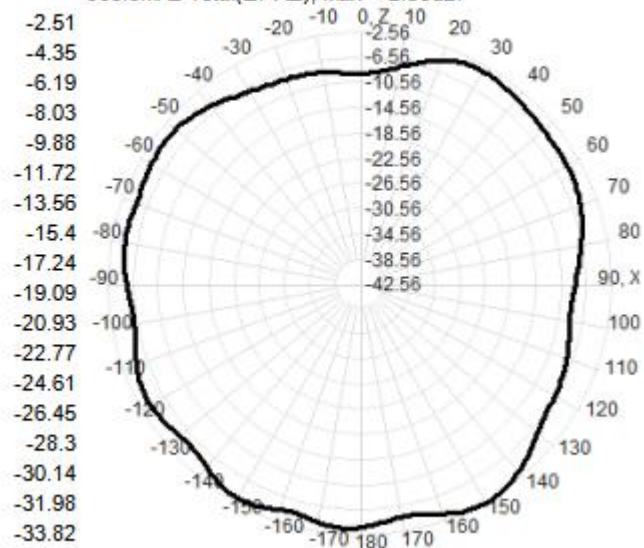
Total(H-XY), Max=-2.99dBi, CirD=17.67



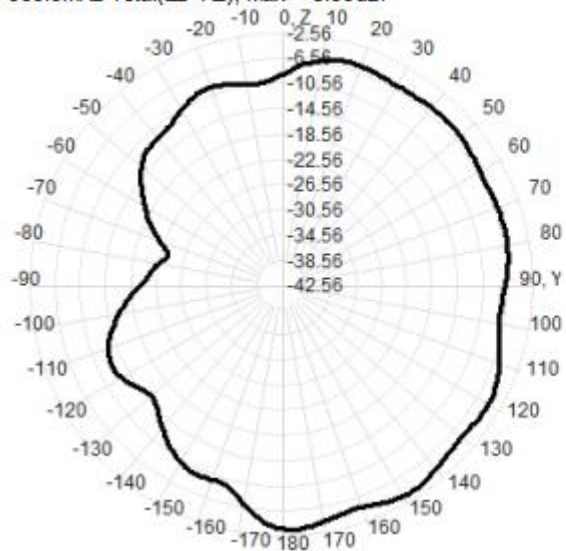
Back View



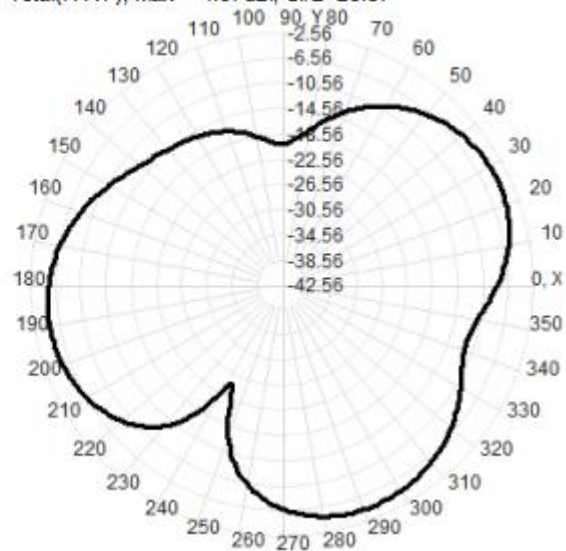
960.0MHz Total(E1-XZ), Max= -2.56dBi



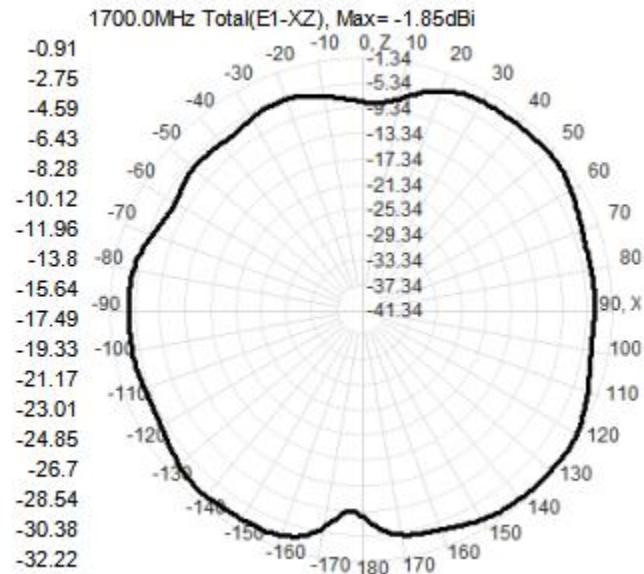
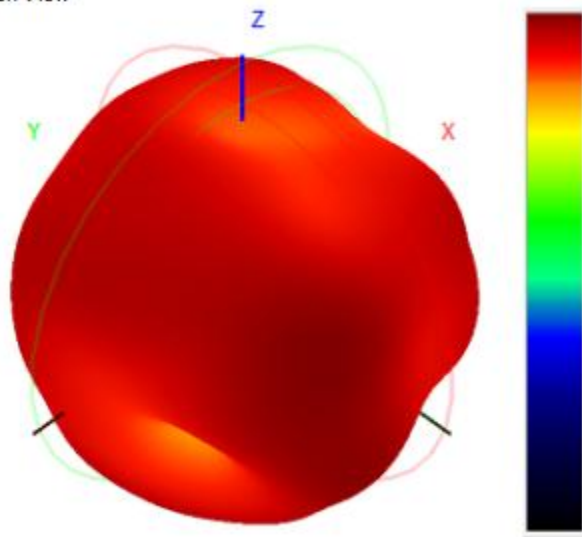
960.0MHz Total(E2-YZ), Max= -3.90dBi



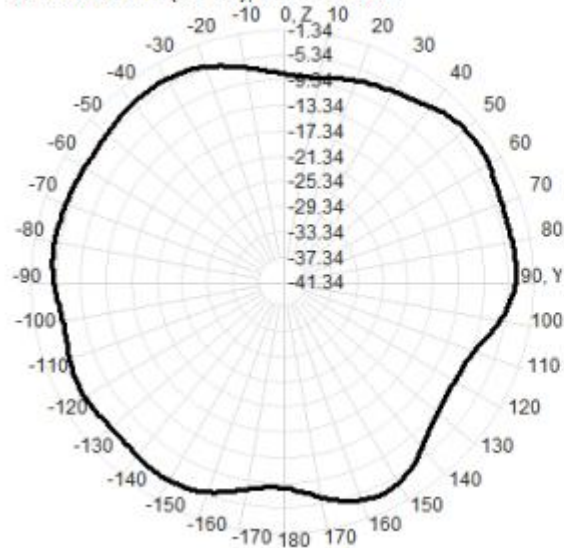
Total(H-XY), Max= -4.67dBi, CirD=20.37



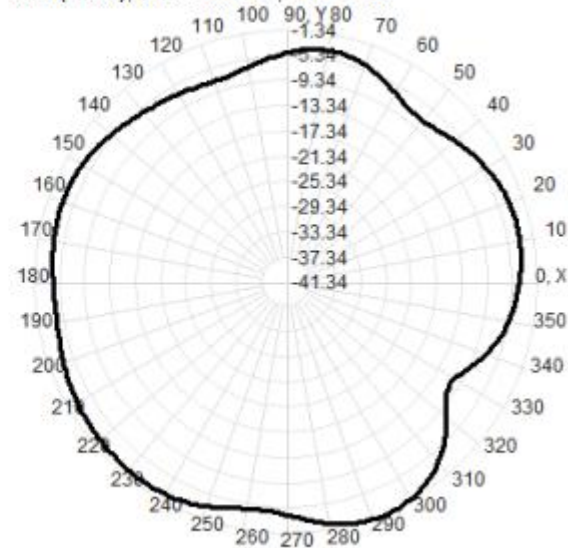
Back View



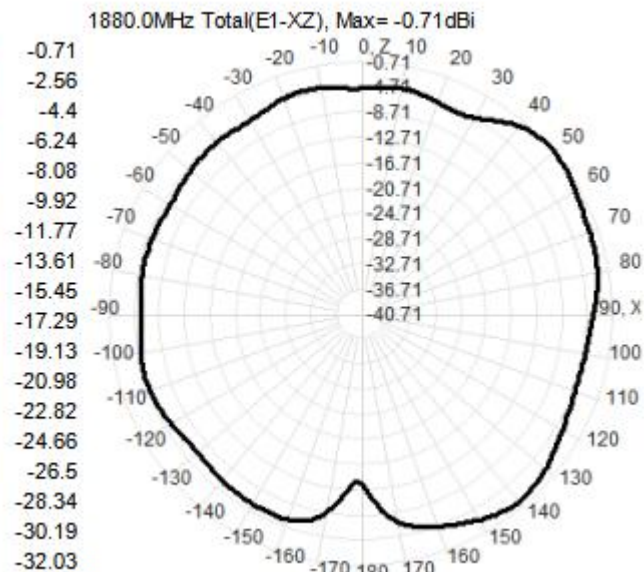
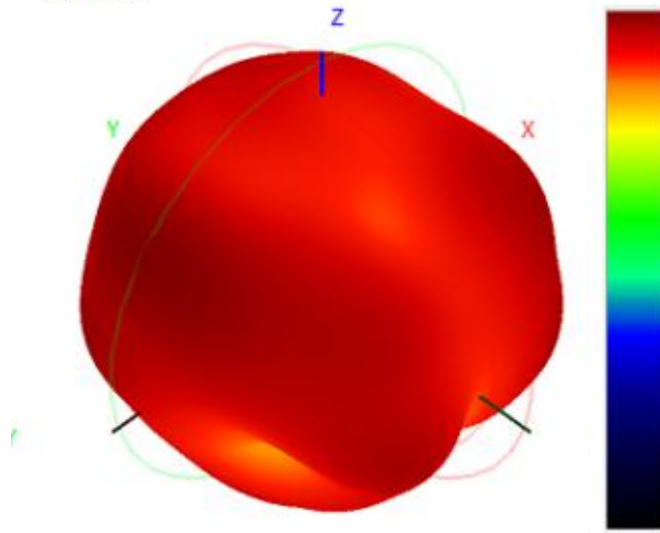
1700.0MHz Total(E2-YZ), Max= -3.50dBi



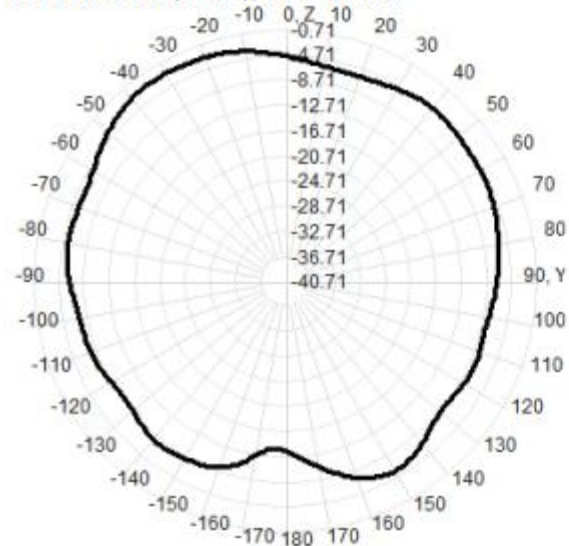
Total(H-XY), Max= -1.34dBi, CirD=9.53



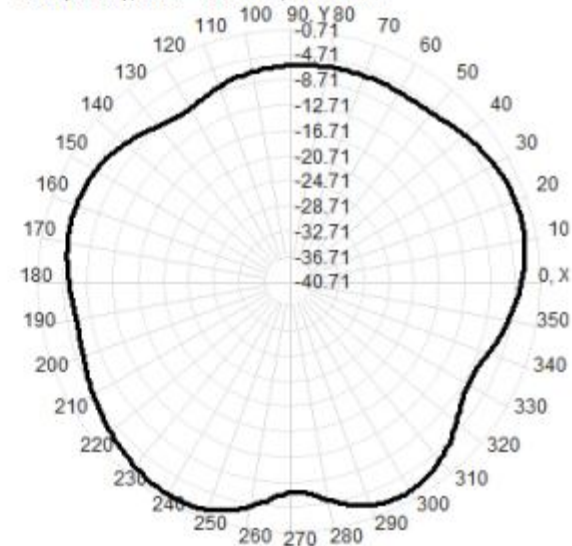
Back View



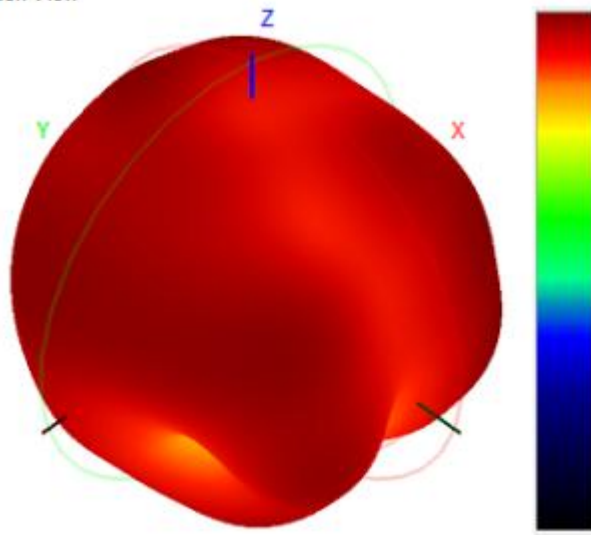
1880.0MHz Total(E2-YZ), Max=-2.61dBi



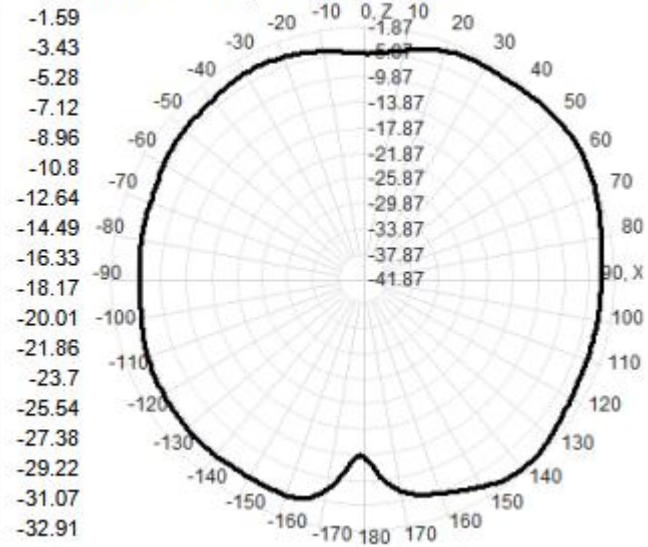
Total(H-XY), Max=-1.88dBi, CirD=7.32



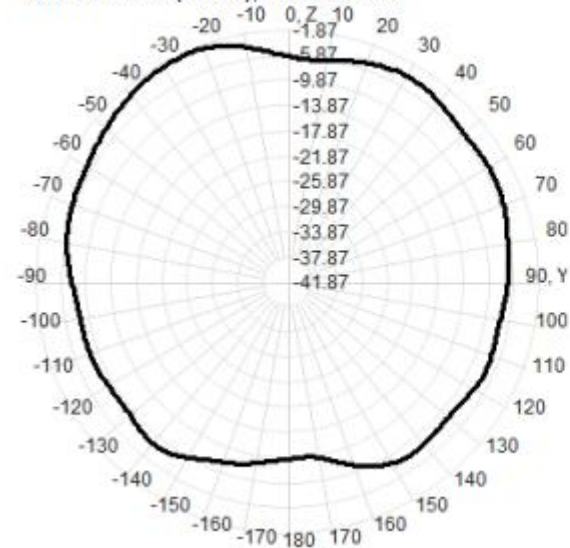
Back View



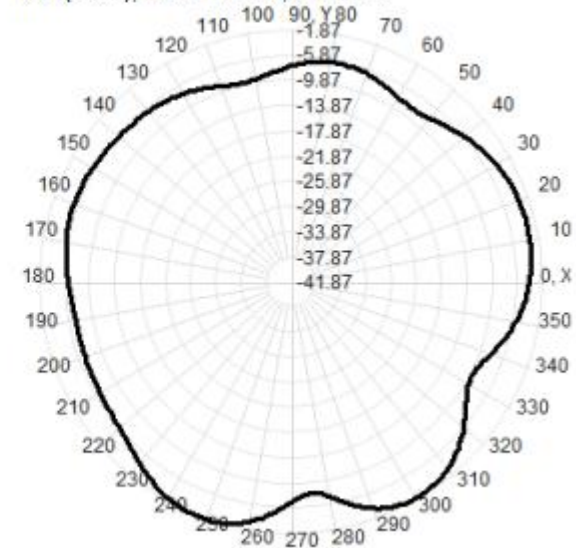
1920.0MHz Total(E1-XZ), Max= -1.87dBi



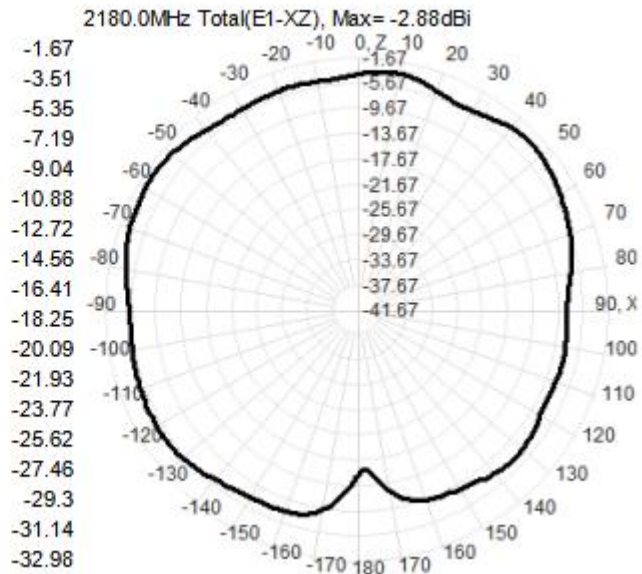
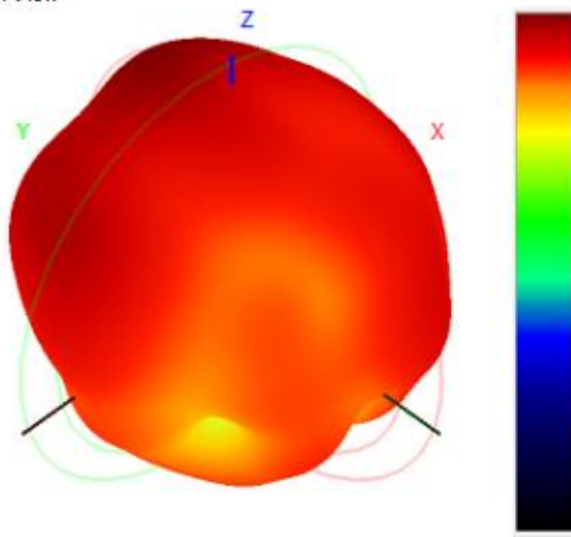
1920.0MHz Total(E2-YZ), Max= -2.37dBi



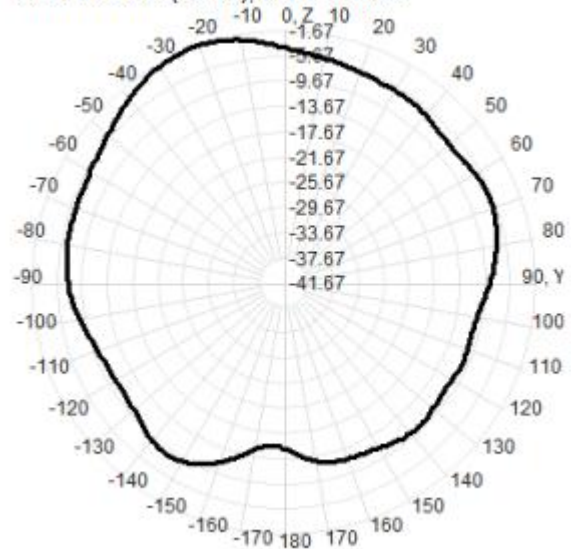
Total(H-XY), Max= -1.96dBi, CirD=7.75



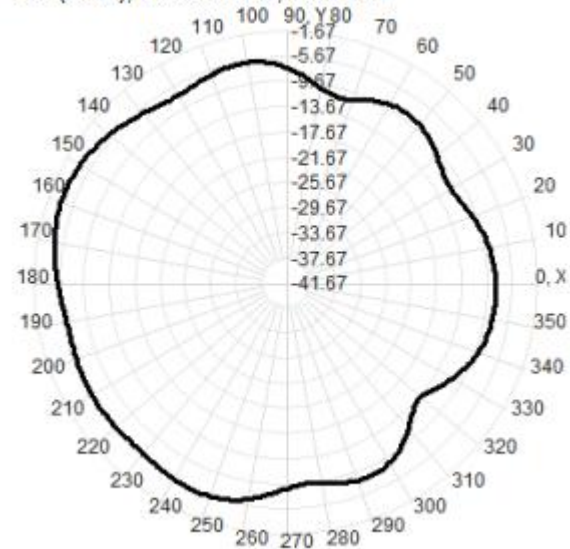
Back View



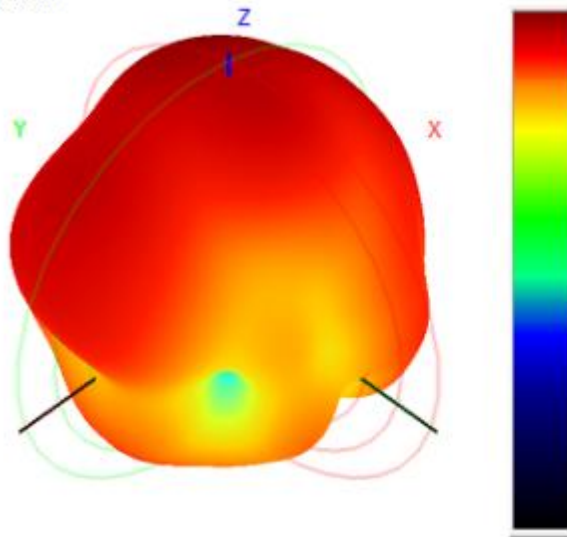
2180.0MHz Total(E2-YZ), Max= -1.67dBi



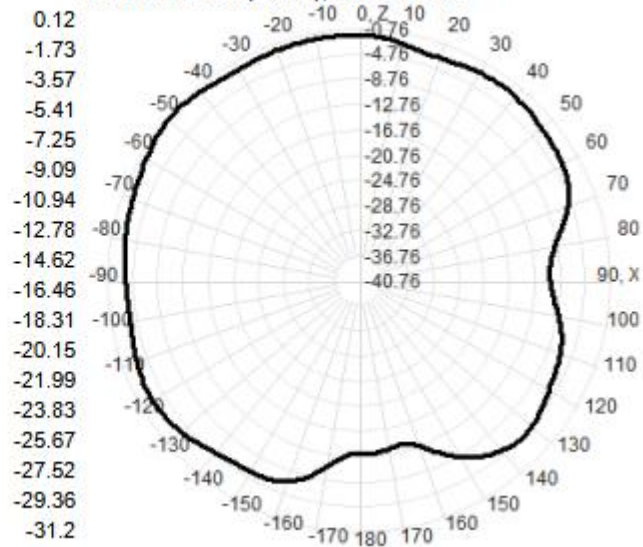
Total(H-XY), Max= -3.80dBi, CirD=9.99



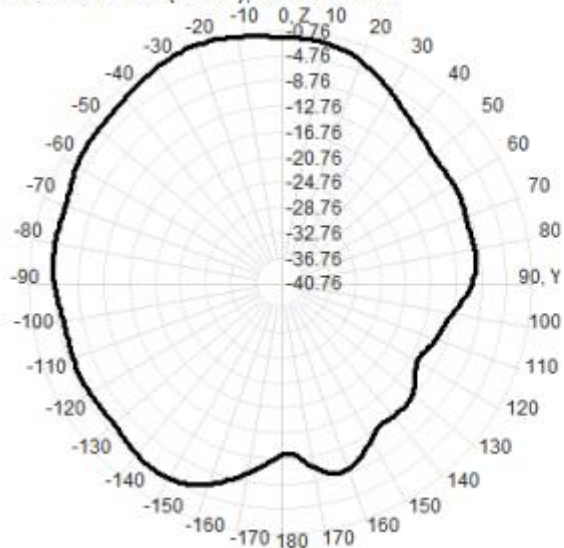
Back View



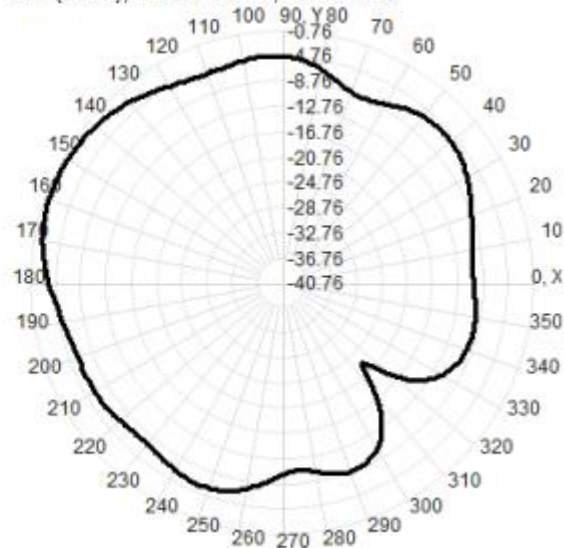
2320.0MHz Total(E1-XZ), Max=-1.19dBi



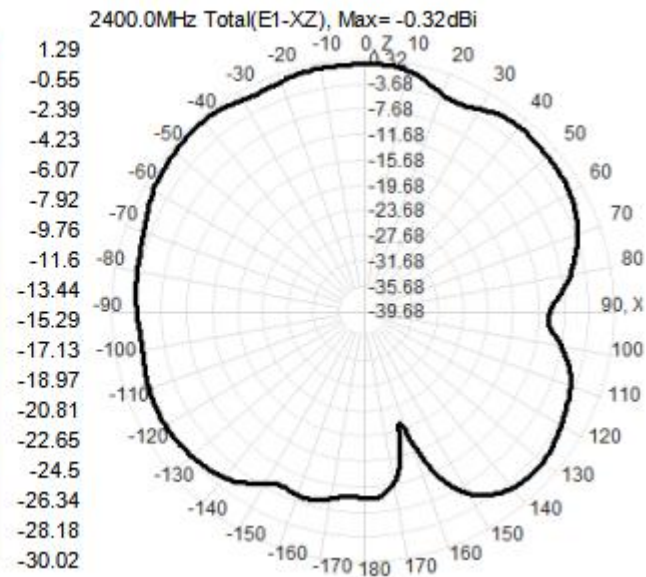
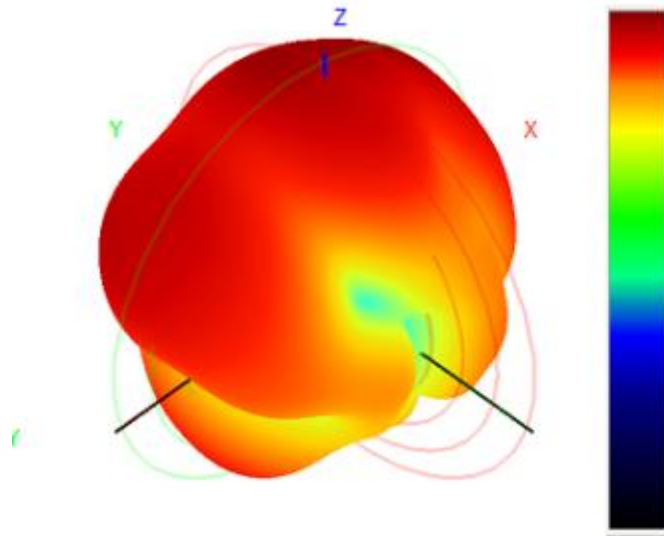
2320.0MHz Total(E2-YZ), Max=-0.76dBi



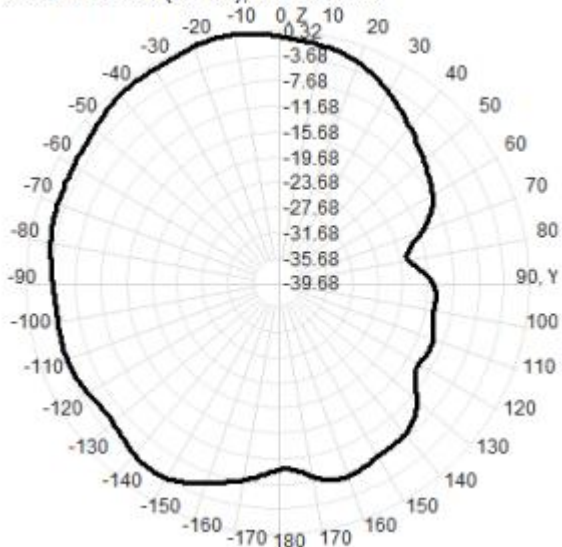
Total(H-XY), Max=-1.39dBi, CirD=21.64



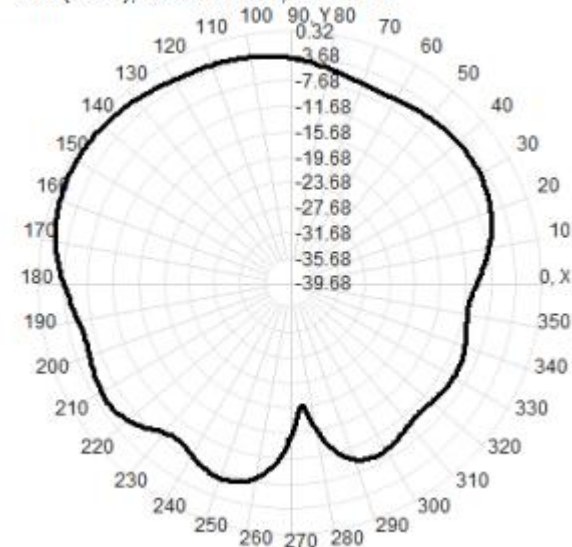
Back View



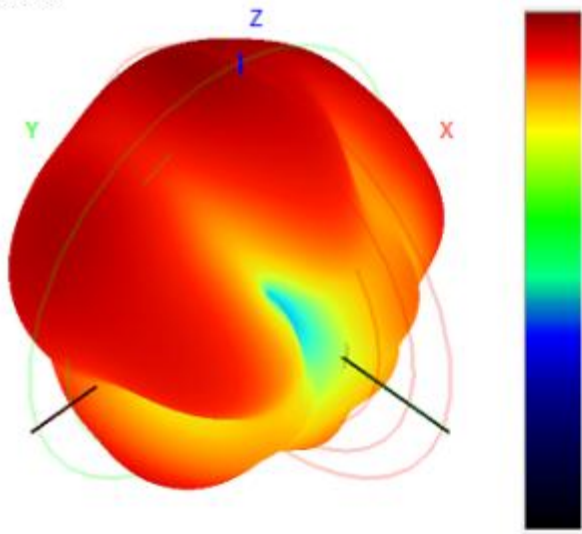
2400.0MHz Total(E2-YZ), Max= 0.32dBi



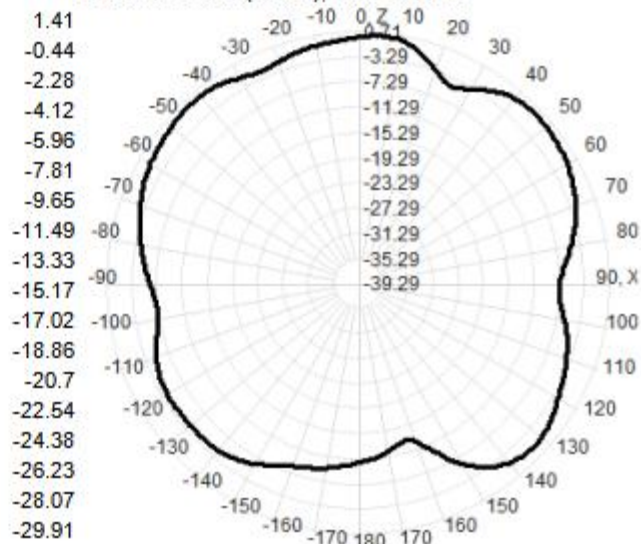
Total(H-XY), Max= -0.69dBi, CirD=19.45



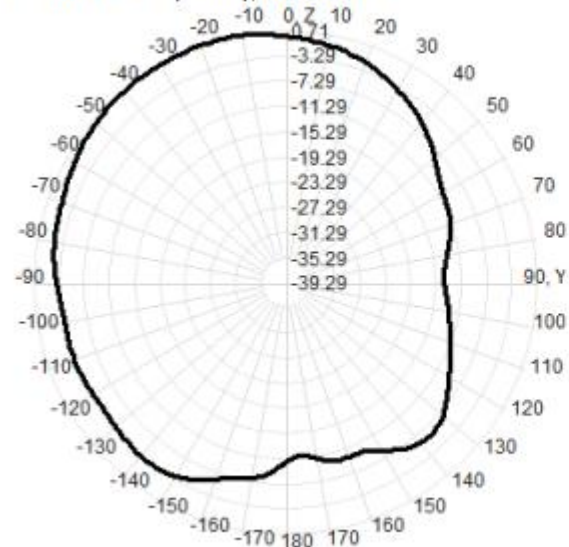
Back View



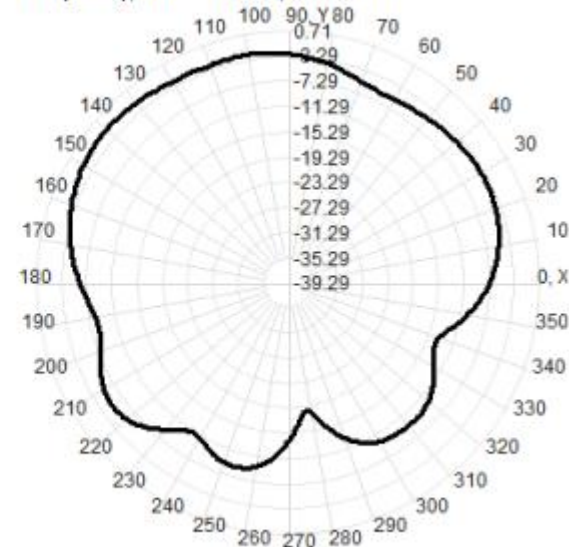
2460.0MHz Total(E1-XZ), Max= 0.20dBi



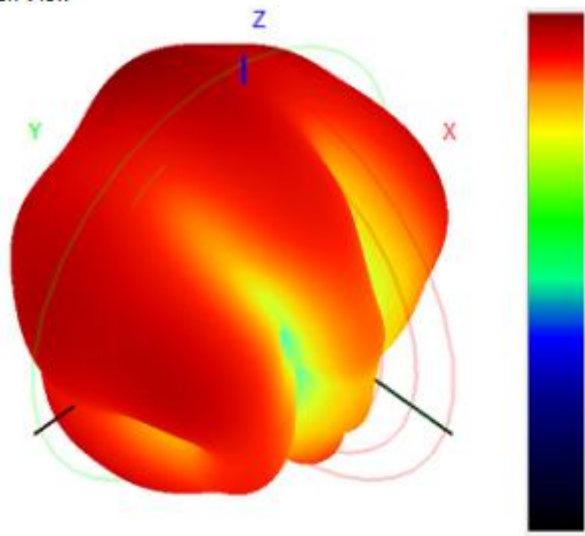
2460.0MHz Total(E2-YZ), Max= 0.71dBi



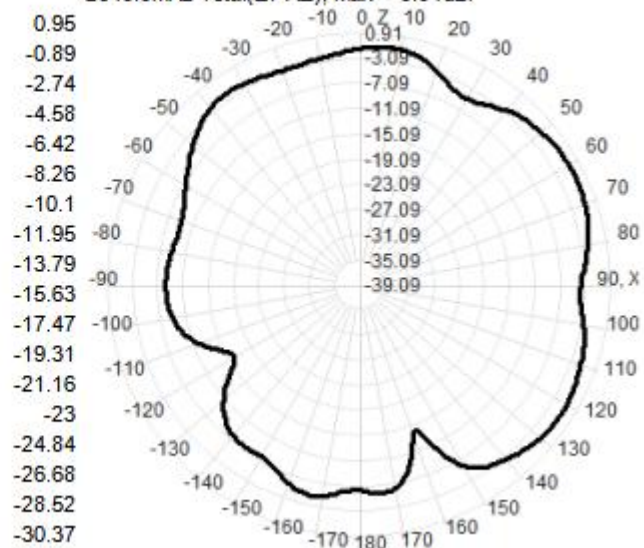
Total(H-XY), Max= -1.60dBi, CirD=17.30



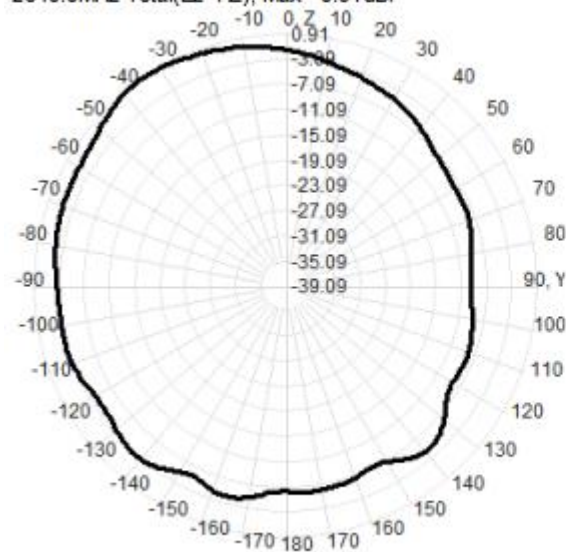
Back View



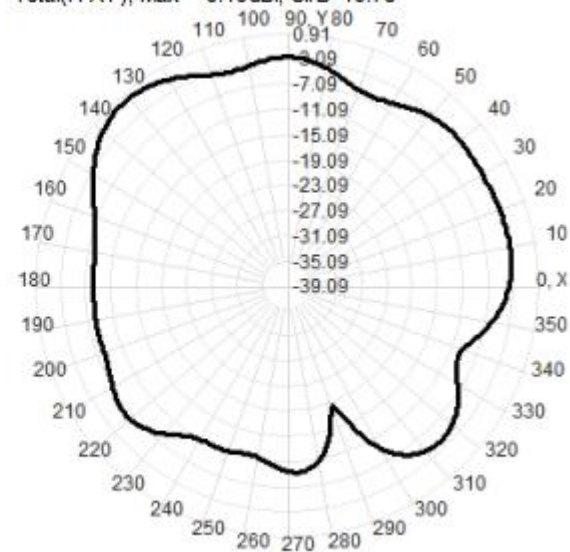
2640.0MHz Total(E1-XZ), Max=-0.84dBi



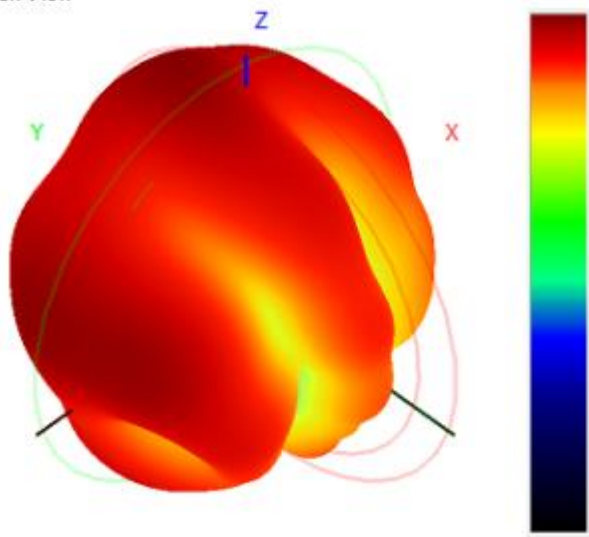
2640.0MHz Total(E2-YZ), Max= 0.91dBi



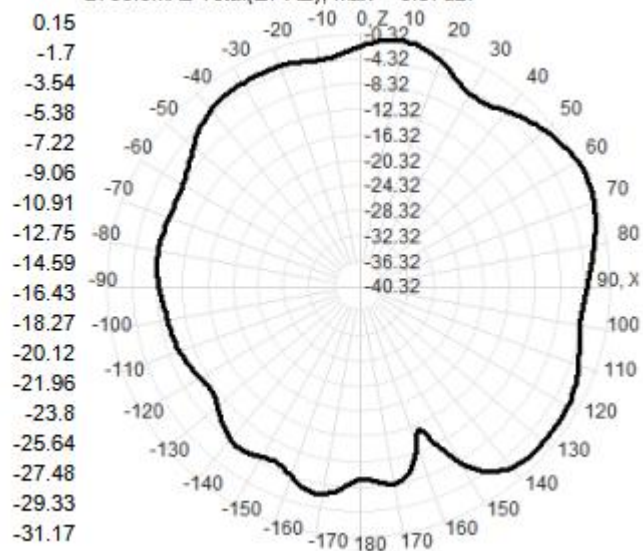
Total(H-XY), Max=-0.19dBi, CirD=18.73



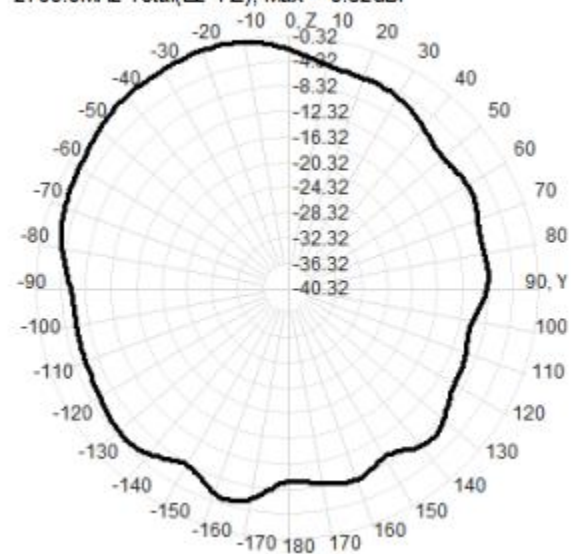
Back View



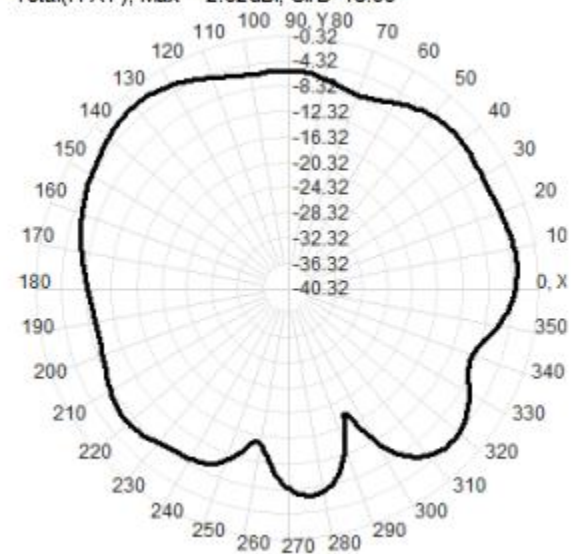
2700.0MHz Total(E1-XZ), Max=-0.37dBi



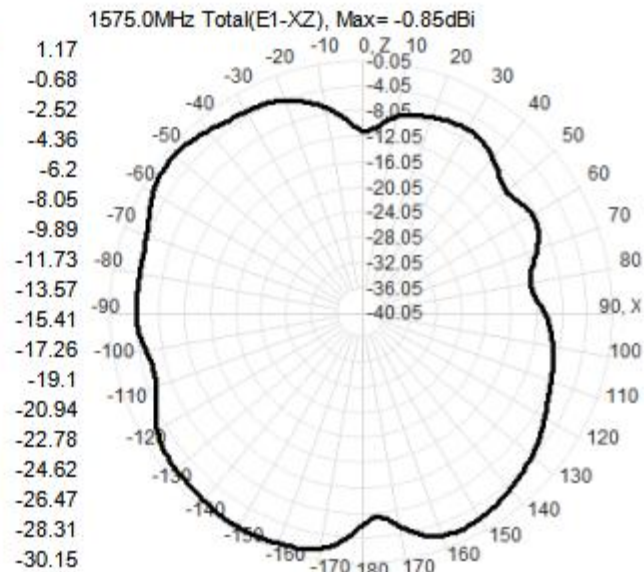
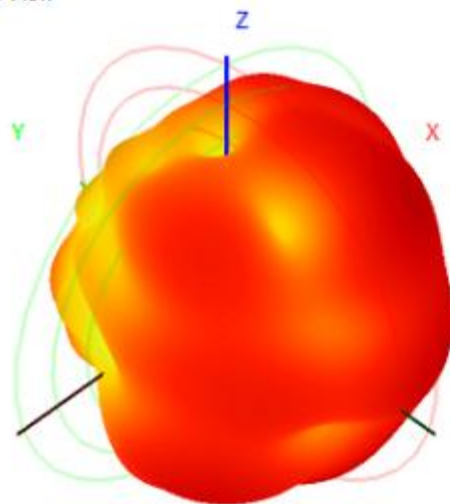
2700.0MHz Total(E2-YZ), Max=-0.32dBi



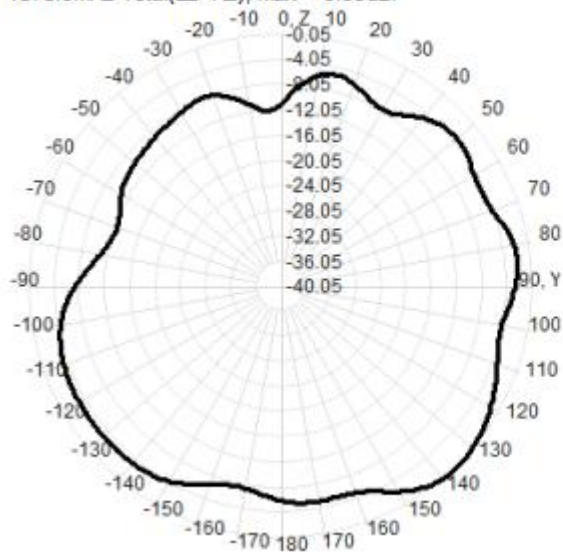
Total(H-XY), Max=-2.62dBi, CirD=15.89



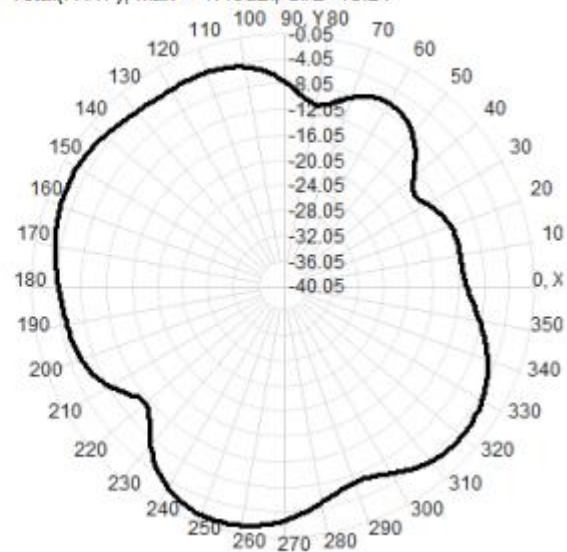
Back View



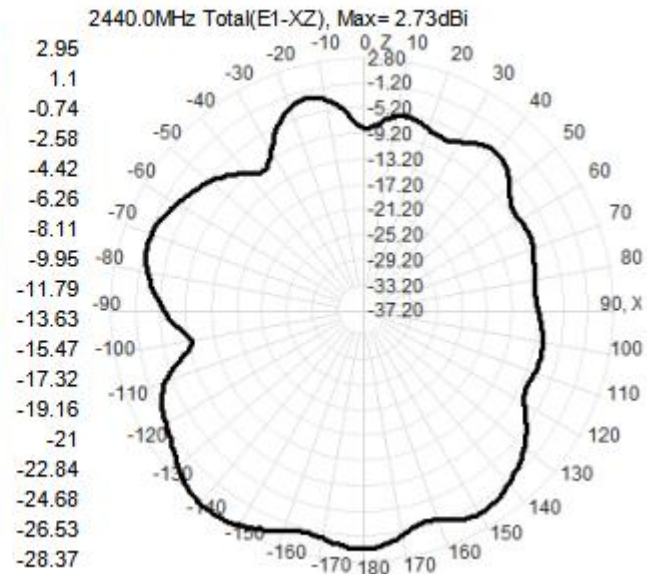
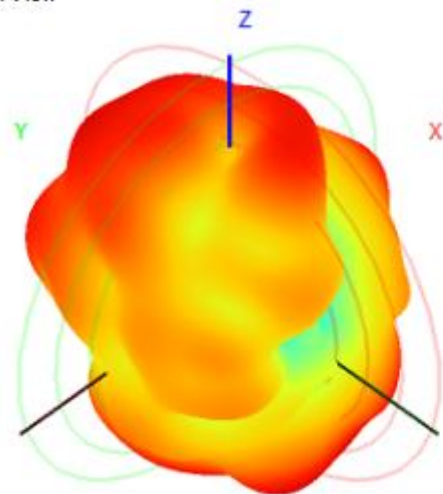
1575.0MHz Total(E2-YZ), Max=-0.05dBi



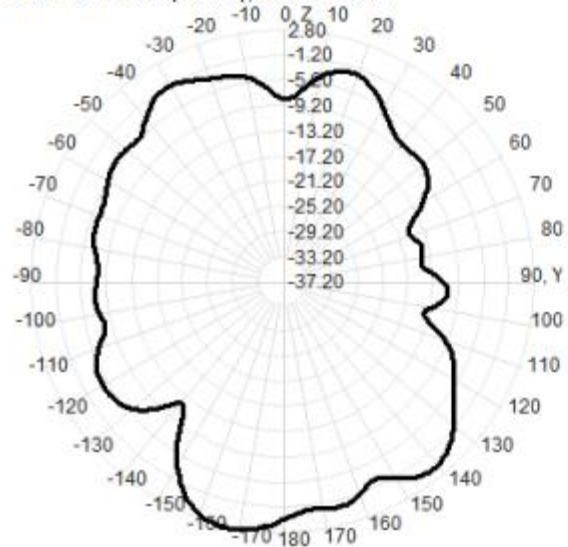
Total(H-XY), Max=-1.46dBi, CirD=13.21



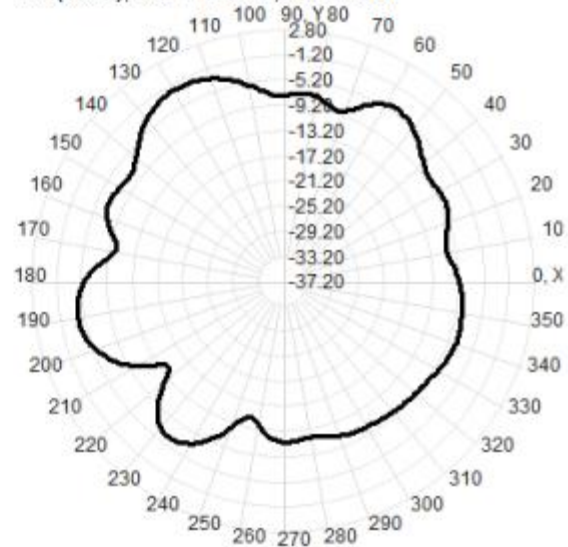
Back View



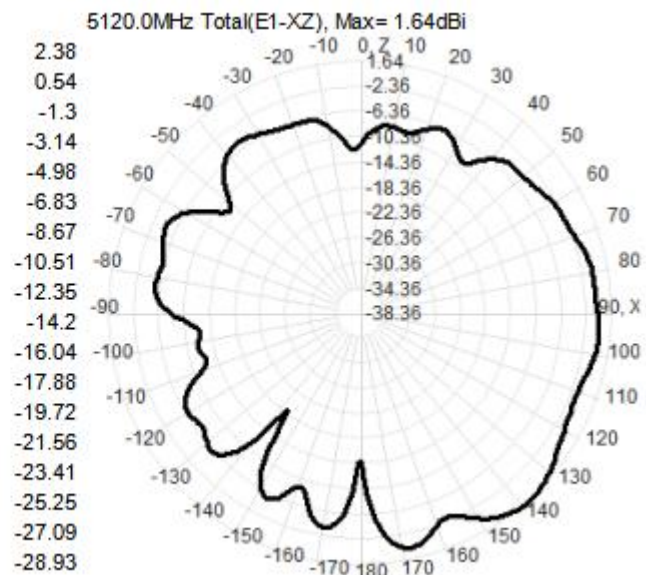
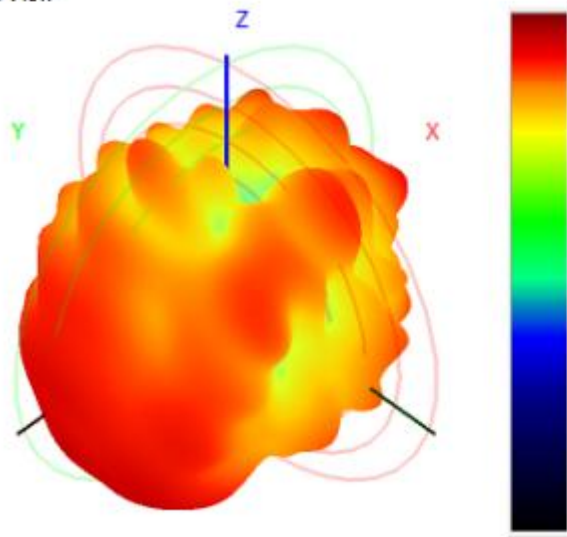
2440.0MHz Total(E2-YZ), Max= 2.80dBi



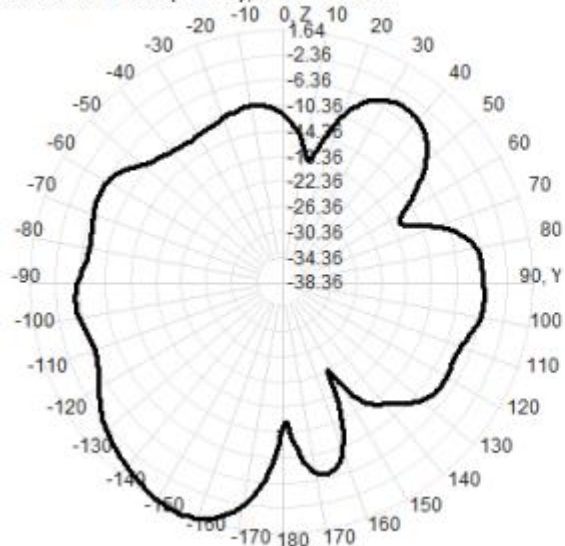
Total(H-XY), Max= -2.19dBi, CirD=13.05



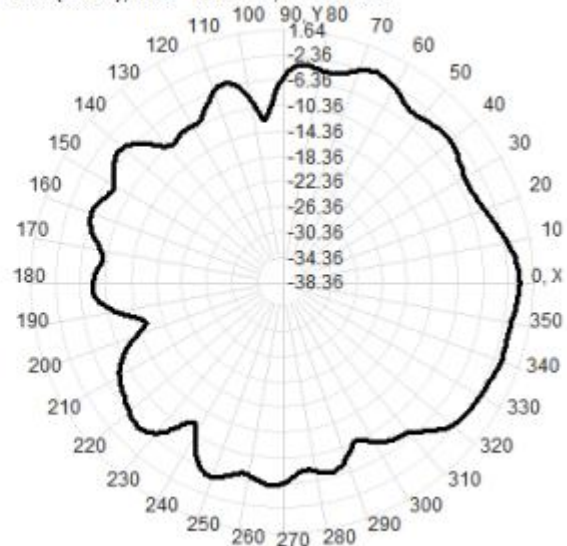
Back View



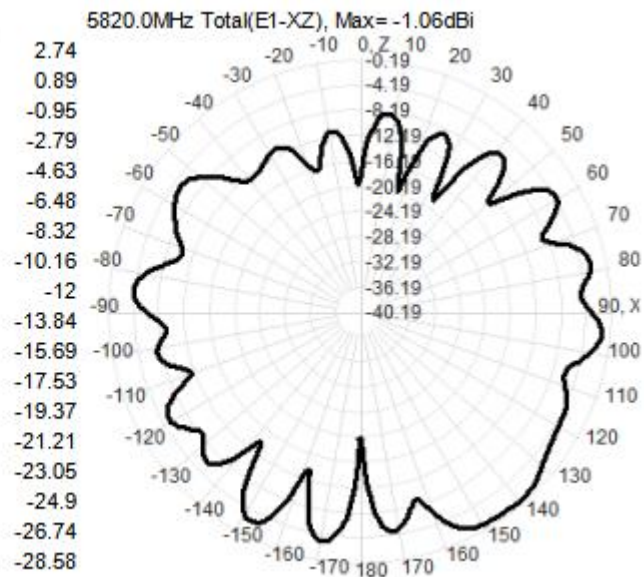
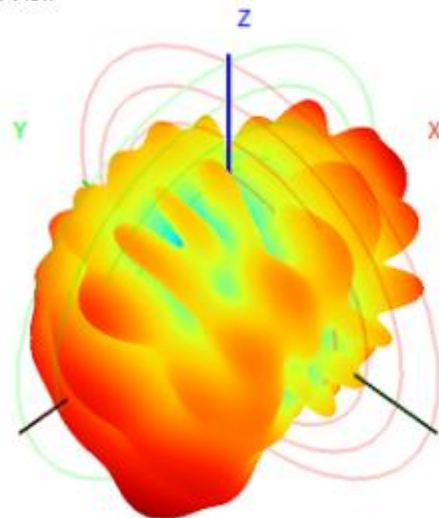
5120.0MHz Total(E2-YZ), Max= 1.64dBi



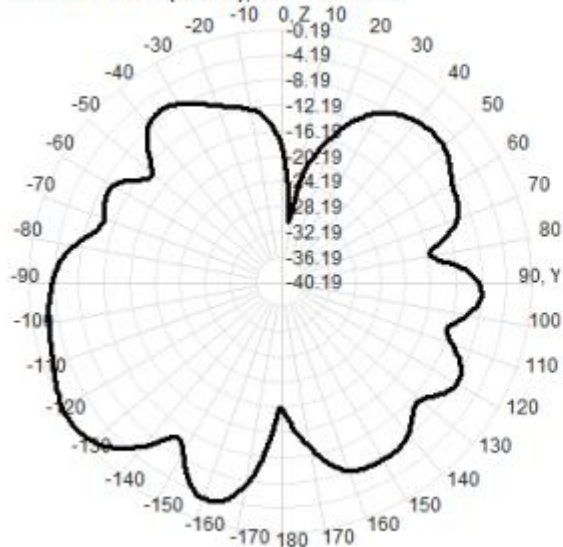
Total(H-XY), Max= -0.82dBi, CirD=15.04



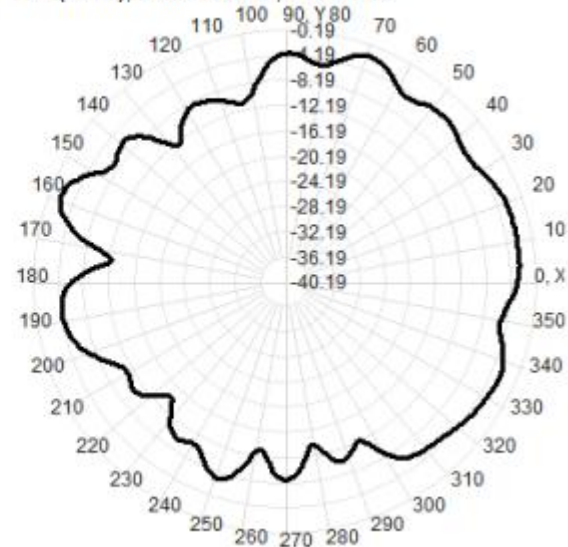
Back View



5820.0MHz Total(E2-YZ), Max=-0.19dBi

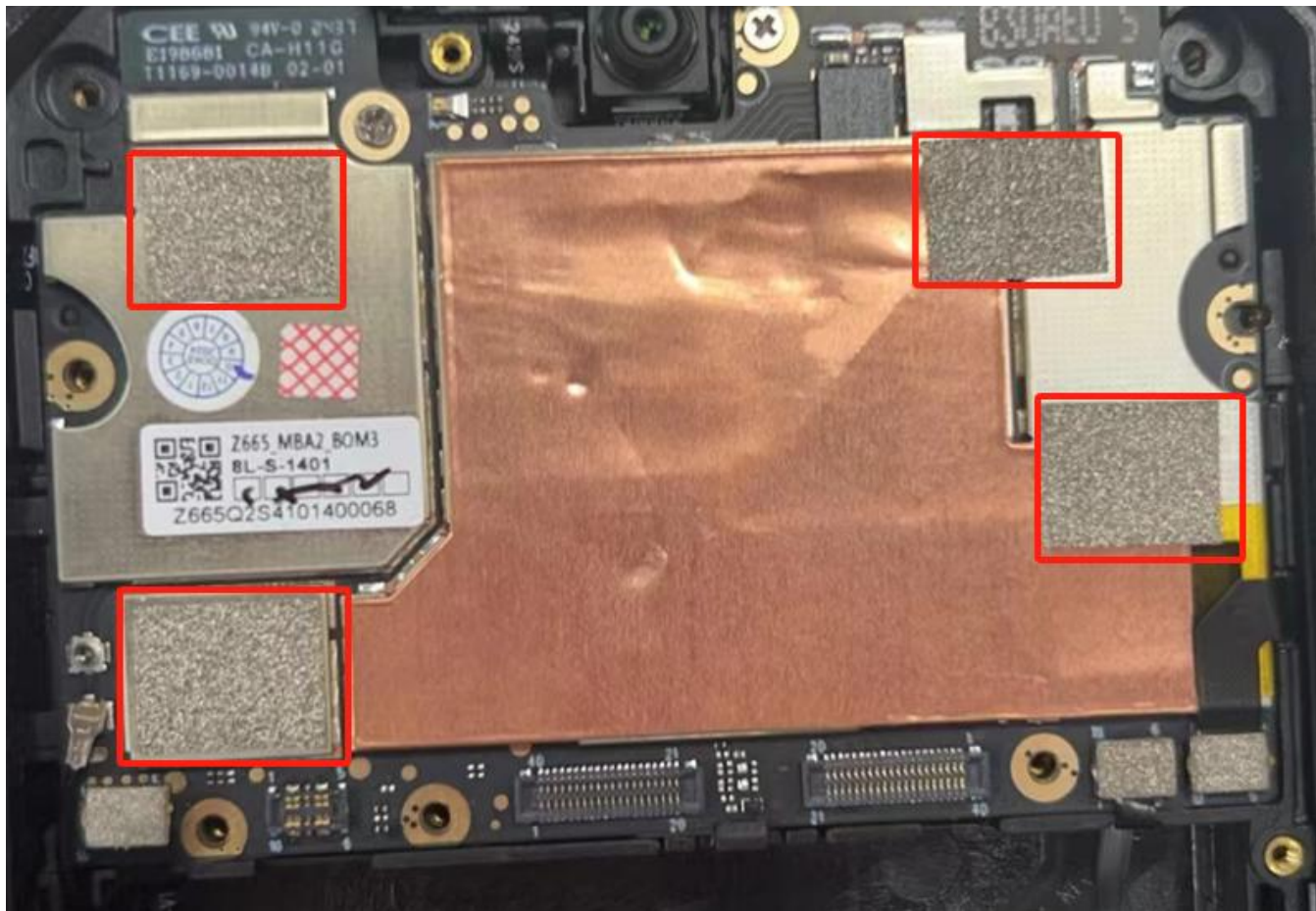


Total(H-XY), Max=-2.03dBi, CirD=12.63



environmental treatment

As shown in the red box in the figure, the back of the motherboard shielding cover is covered with a conductive sponge of sufficient height to fully ground the zinc alloy frame.

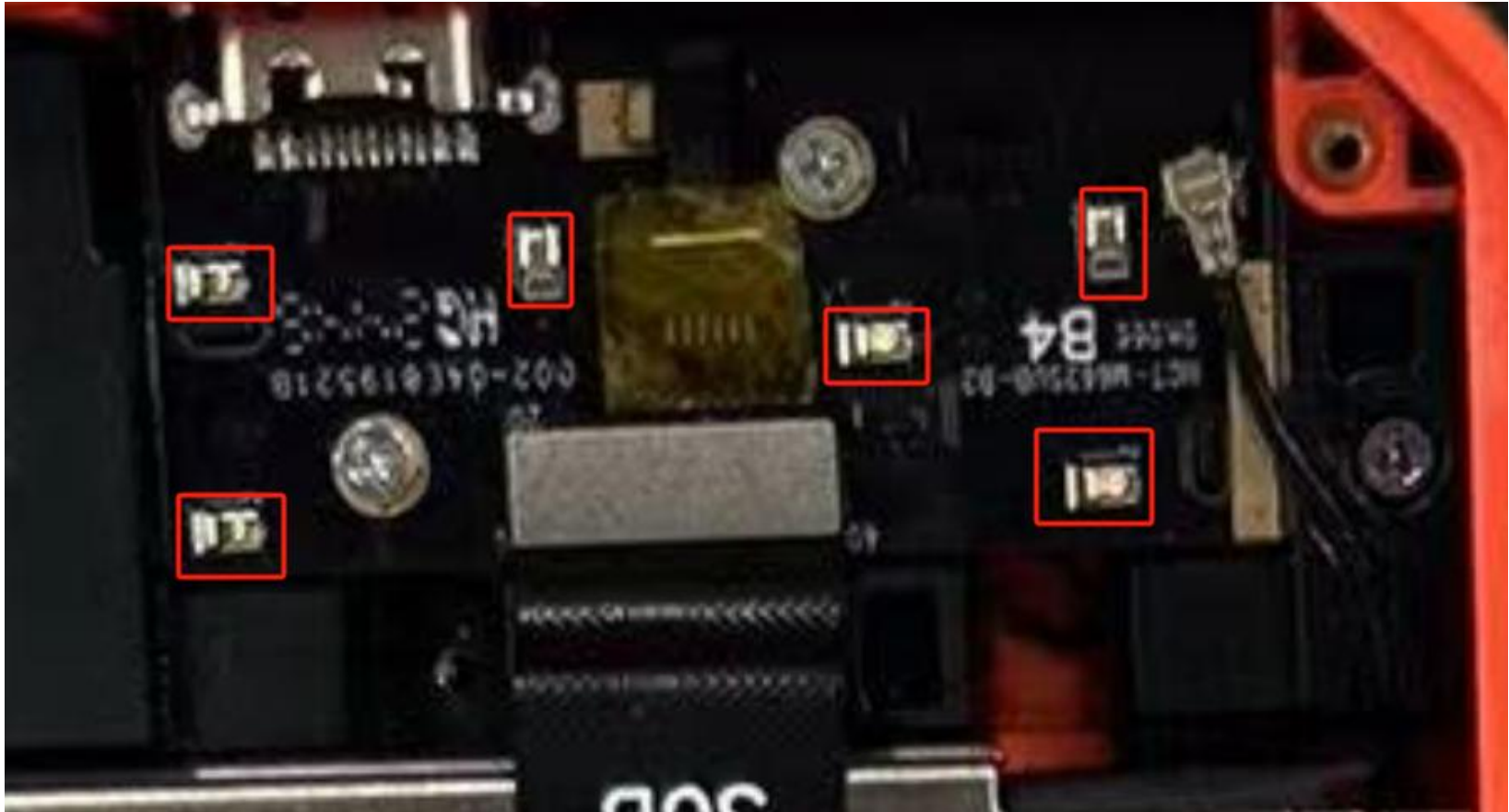


environmental treatment

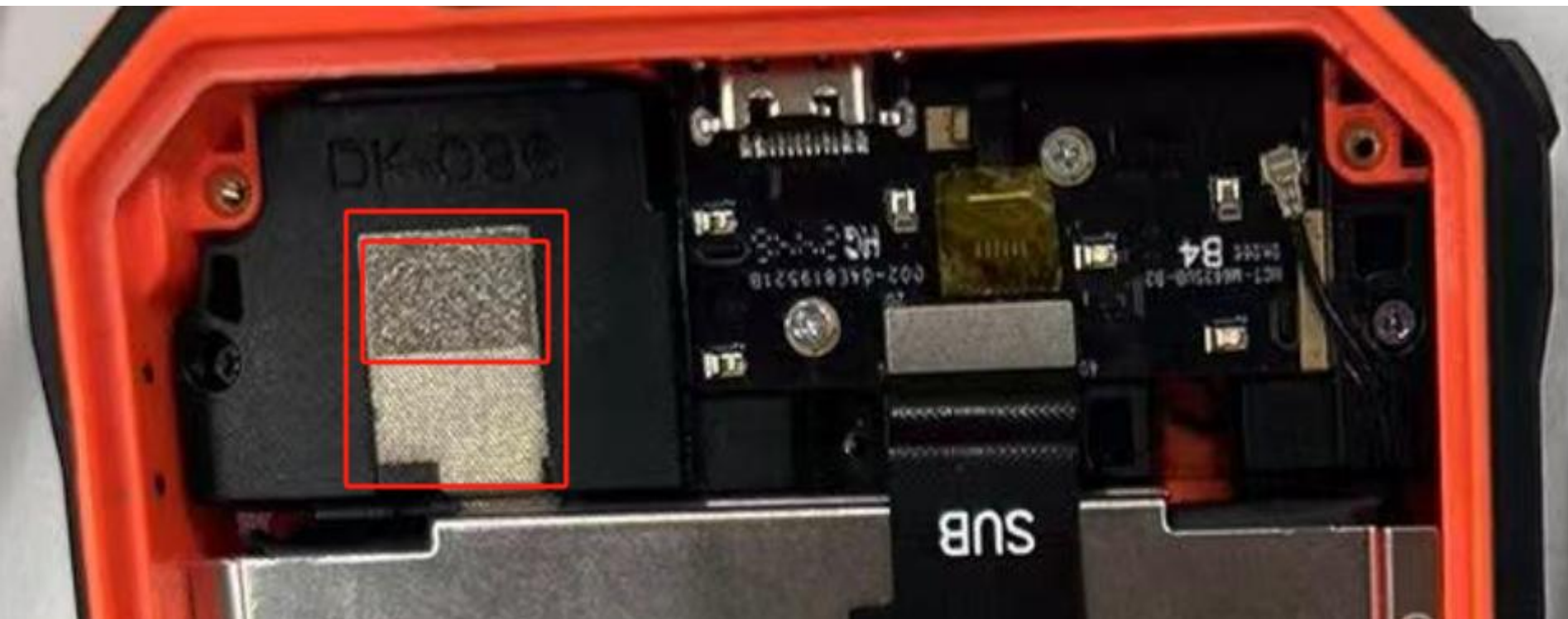
As shown in the red box in the figure: the bottom of the screen is grounded with a large conductive cloth to shield interference from screen cables, ICs, etc. Add large strip conductive sponge on both sides of the screen and fully ground it to the metal frame.



As shown in the red box in the figure, the small board is grounded to the metal frame through a spring clip. Add laser engraving at the corresponding position between the middle frame zinc alloy and the small plate spring to ensure that the small plate and the middle frame zinc alloy are fully grounded.



As shown in the figure: Pull out a long conductive cloth from the horn magnet in the red box and stick it back to the groove of the bracket. Then, place a 1.5mm high conductive sponge on top of the conductive cloth and ground it to the metal frame.



As shown in the figure, a conductive sponge is attached to the metal part on the back of the small board wiring corresponding to the zinc alloy of the middle frame, which is the grounding point between the zinc alloy of the middle frame and the wiring.

