

Antenna Specifications

Frequency range of operation:

1- WiFi L Antenna: 2.4 to 2.48GHz and 5.15GHz to 5.850GHz

Antenna type: IFA

2- WiFi R Antenna: 2.4 to 2.48GHz and 5.15GHz to 5.850GHz

Antenna type: IFA

3- Bluetooth Antenna: 2.4 to 2.48GHz

Antenna type: IFA

4- LoRa Antenna: 860MHz to 930MHz

Antenna type: IFA

Antenna gain:

Antenna	Frequency (MHz)	Antenna gain (dBi)
LoRa	863-870	-0.5
	902-928	0.5
BLE	2400-2483	3
WIFI_L	2400-2483	0.5
	5150-5250	3.1
	5250-5350	4.5
	5470-5725	3
	5725-5850	2.7
WIFI_R	2400-2483	0.5
	5150-5250	3
	5250-5350	4.7
	5470-5725	3.5
	5725-5850	1

Lab name: Amazon antenna lab

Lab address: 1100 Enterprise Way, Sunnyvale, CA 94089

Measurement test method:

Solder pigtails on feeding point of antenna and measure passive antenna performance by VNA and OTA chamber system.

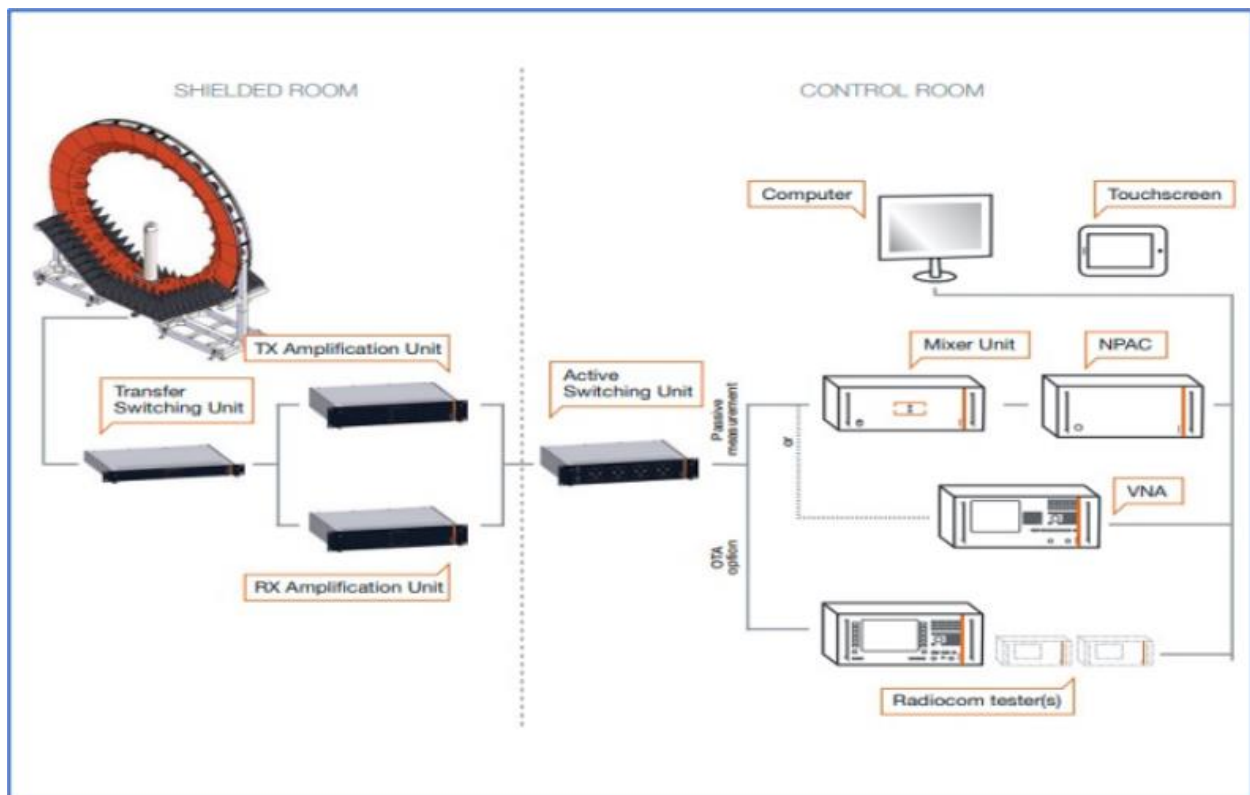
Test equipment:

VNA: Agilent E5071C

Calibration due: August 2024

OTA chamber: MVG/Satimo SG24

Test engineer: Mehdi Sadatgol

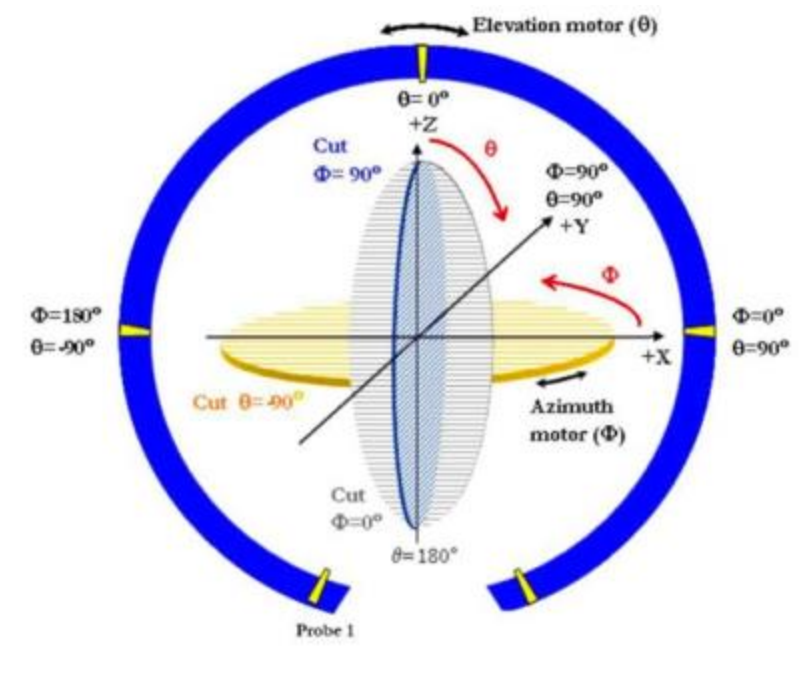
Equipment setup:

Software used: MVG Wave studio

Test set-up:

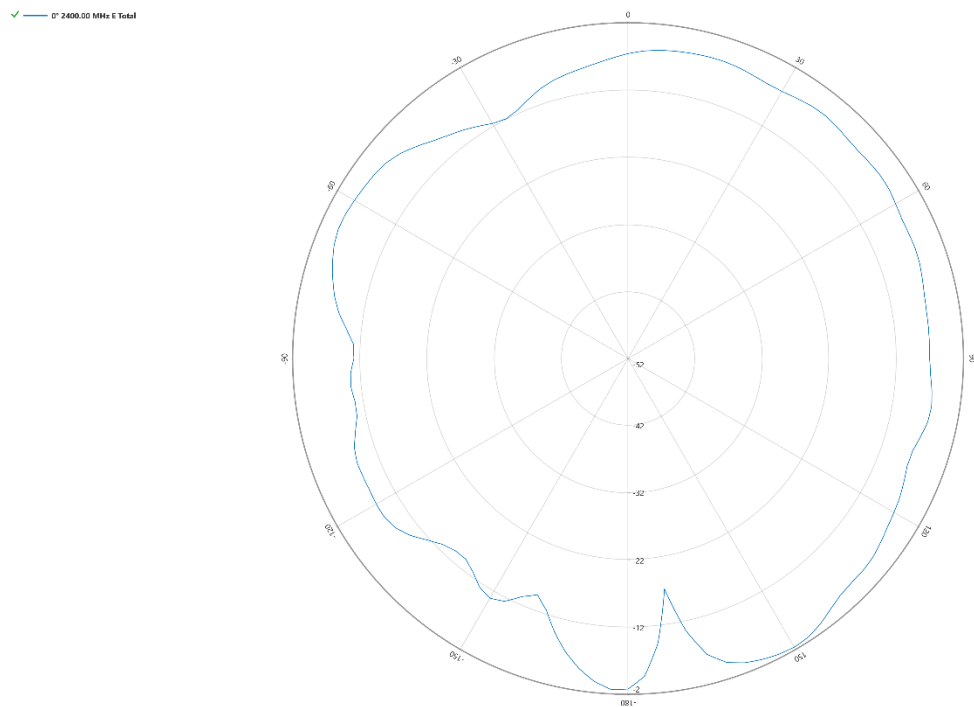
- Set up the device on the turn table and connect the pigtails to the RF cable.
- Measure the 3D passive performance according to the following coordinate axis.
- Turntable – Phi: 0-165°, step size: 15°, clockwise rotation

Antenna radiated pattern orientation:

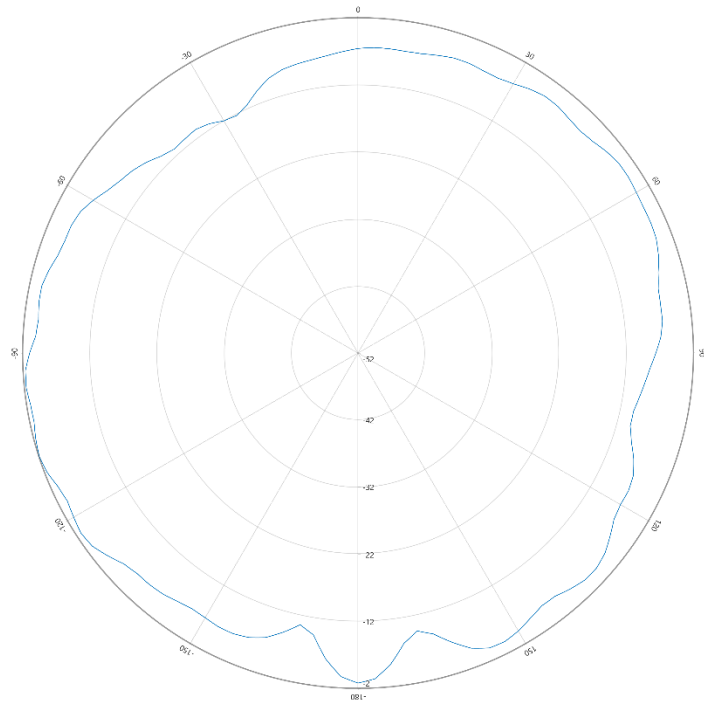


Radiation patterns

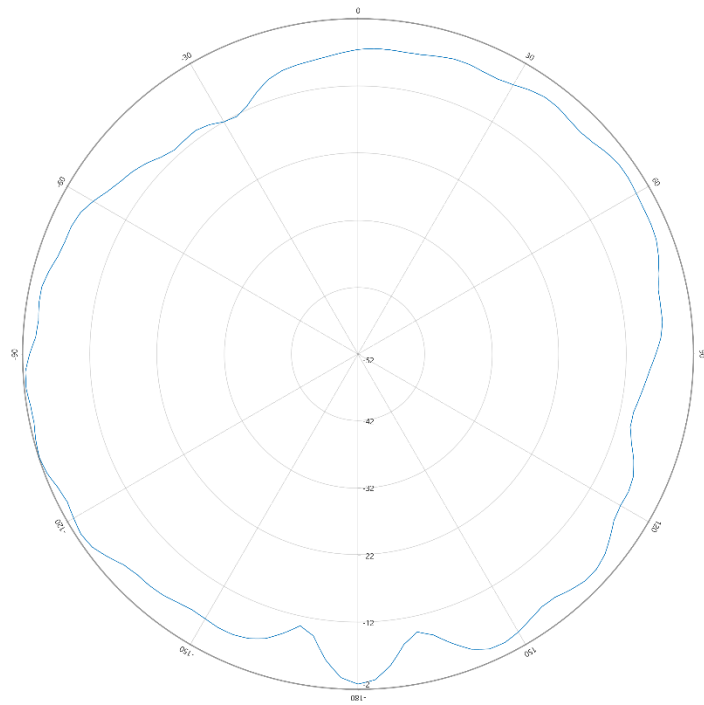
WiFi R Antenna 2400MHZ



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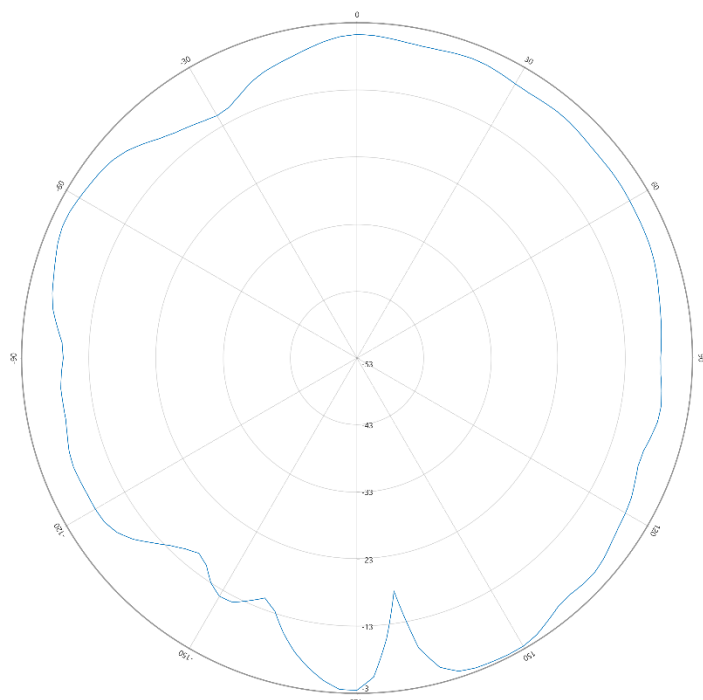


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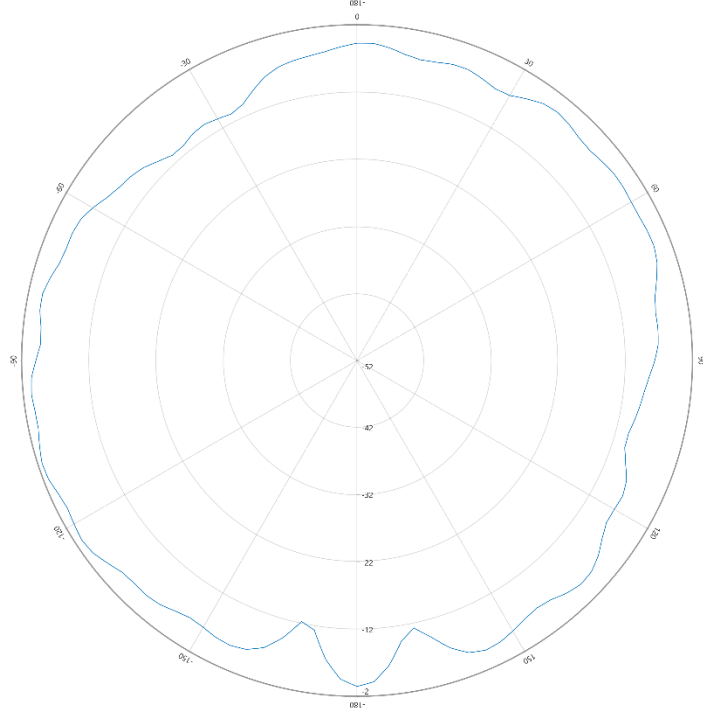


2440MHz

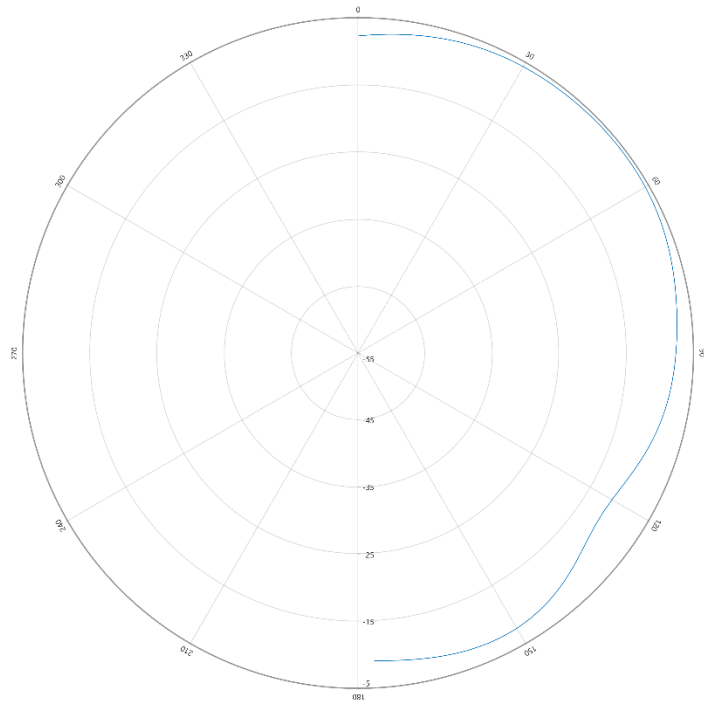
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✓ 90° 2440.00 MHz E Total

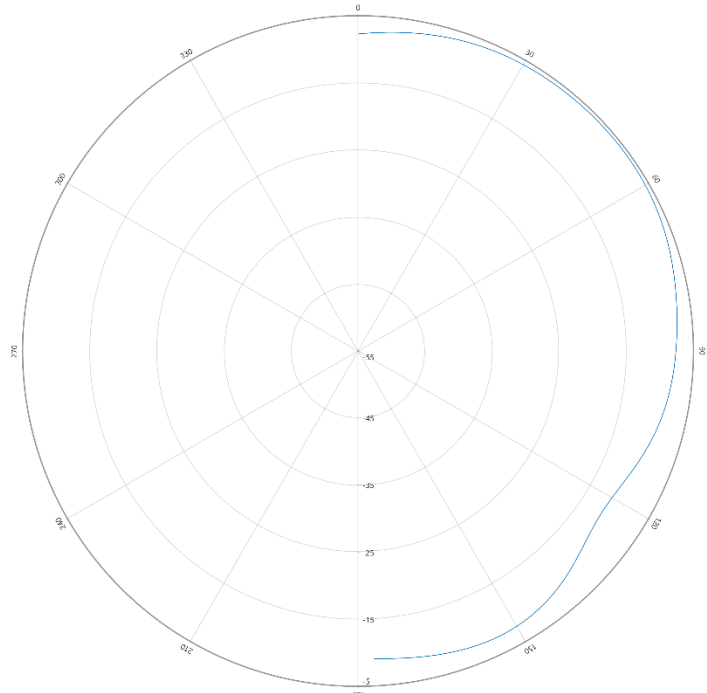


✓ 60° 2448.00 MHz E Total

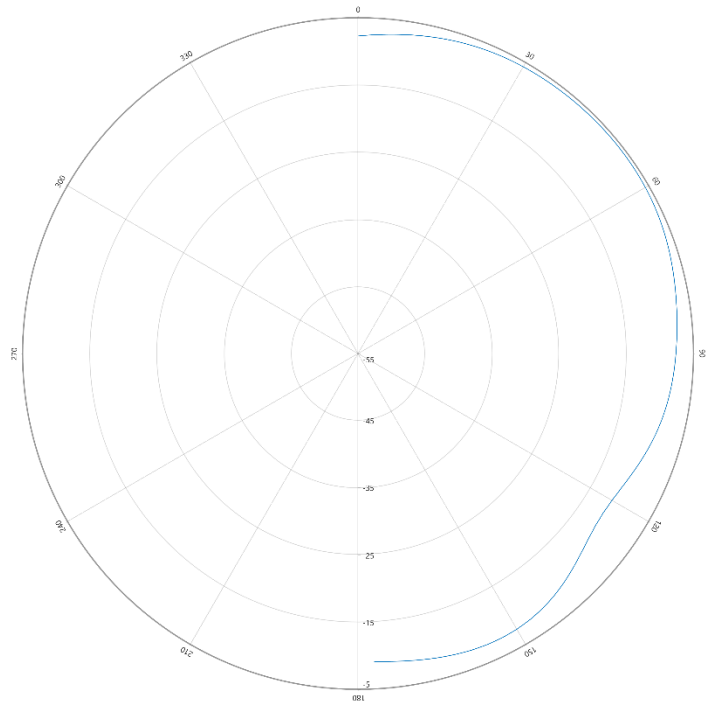


2480MHz

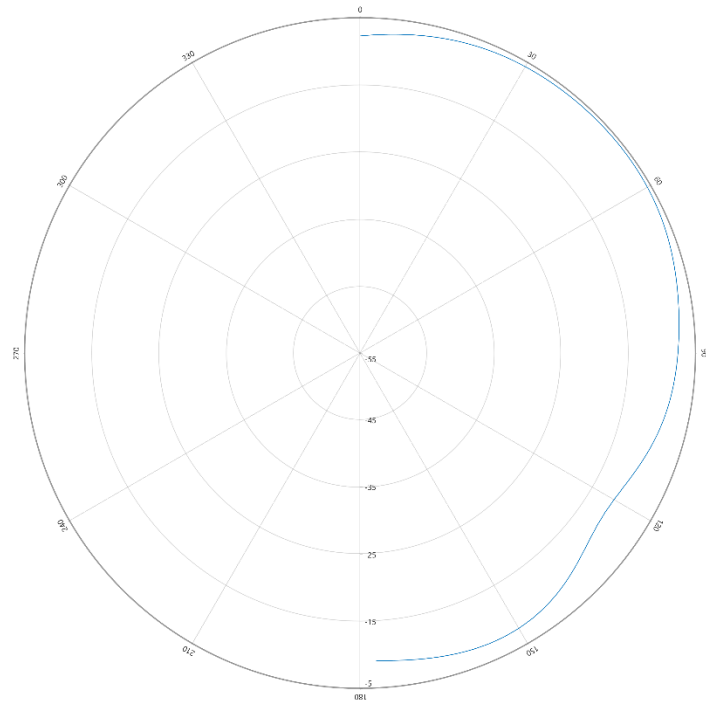
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✓ 60° 2440.00 MHz E Total

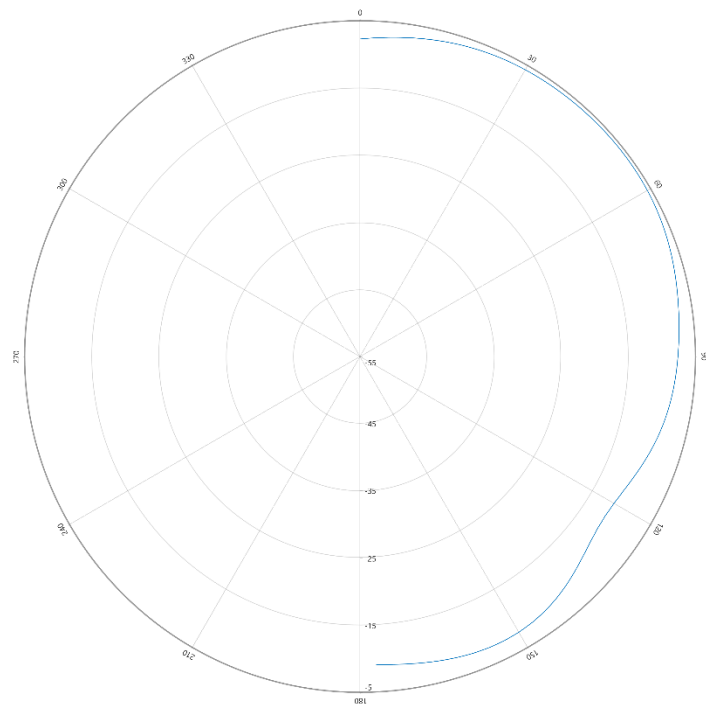


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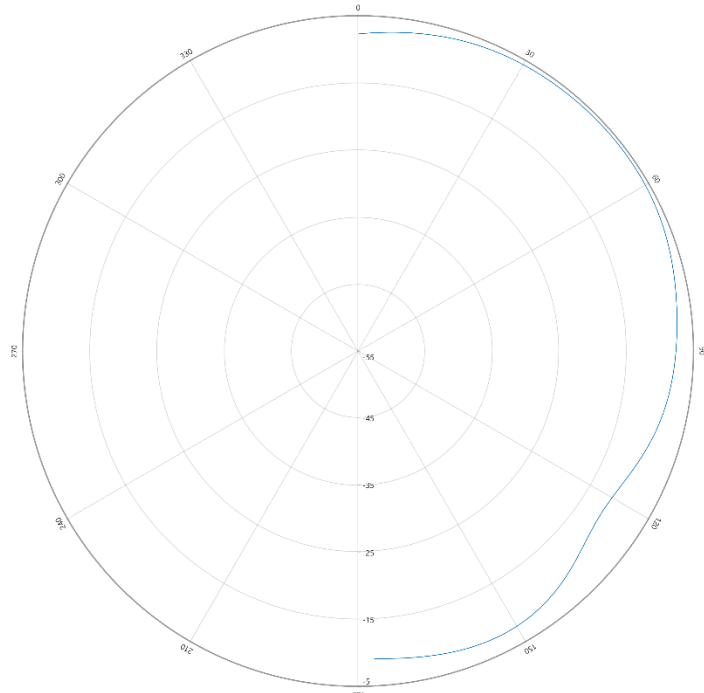


5150MHz

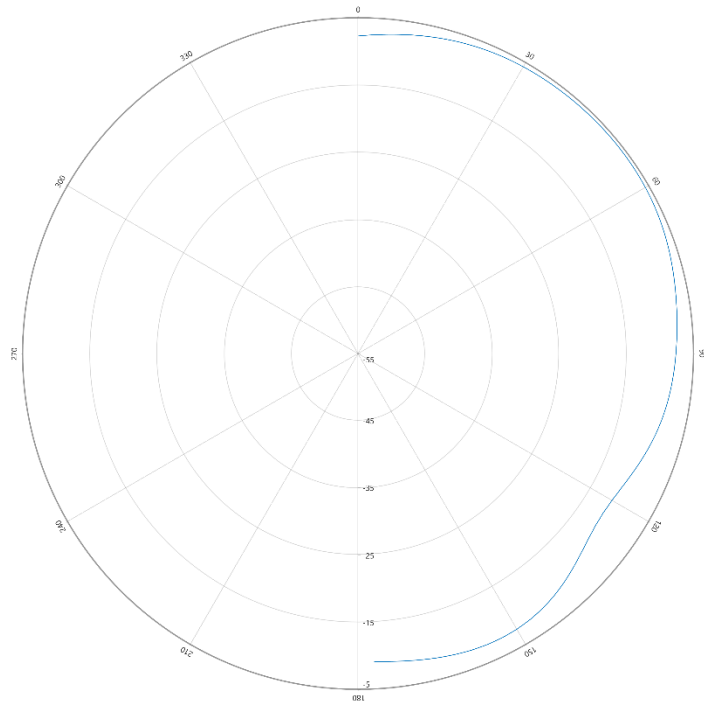
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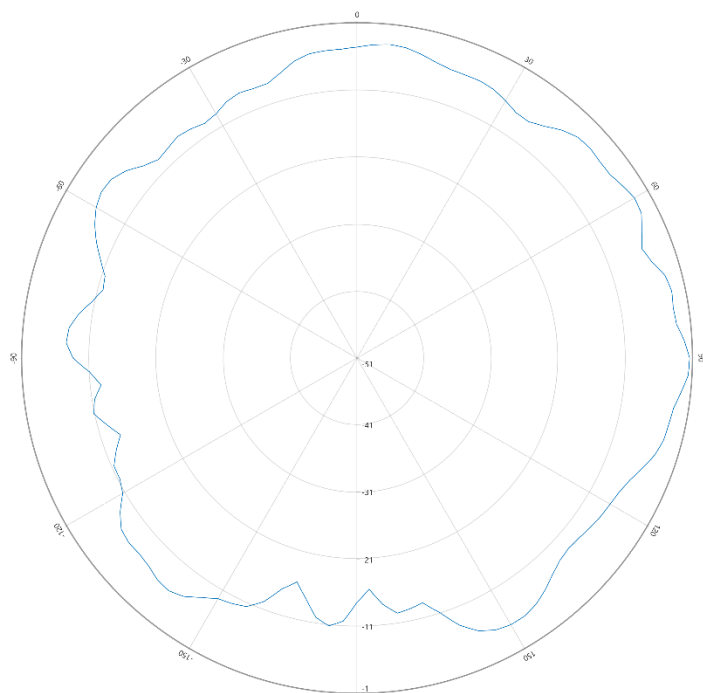


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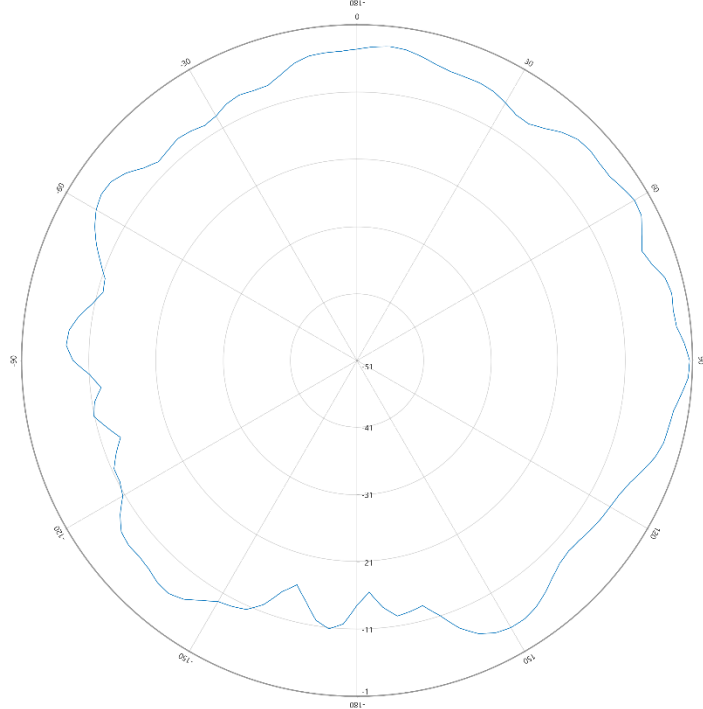


5500MHz

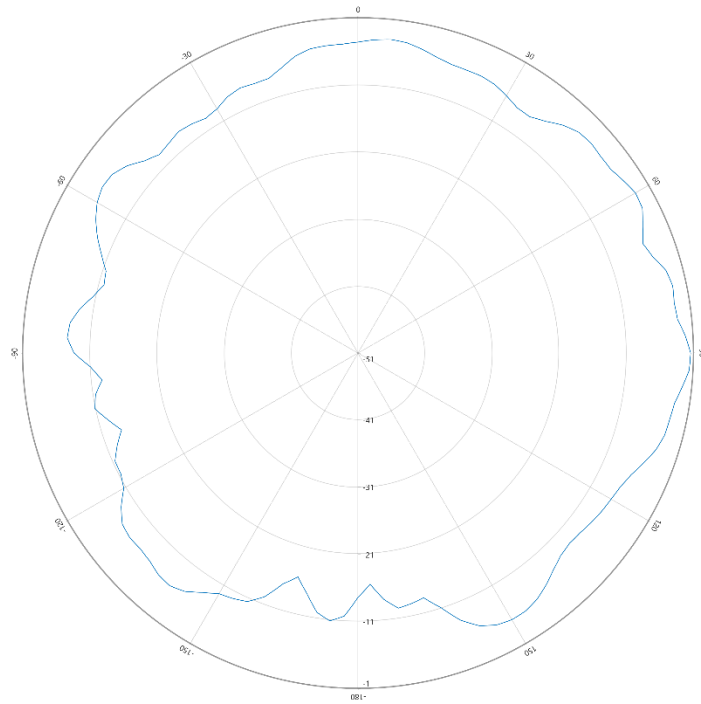
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✓ 0° 5500.00 MHz E Total

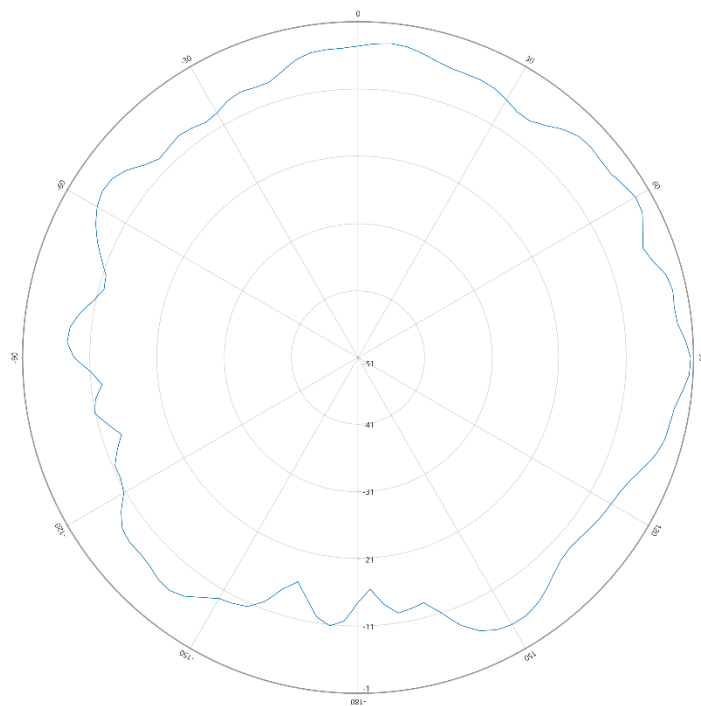


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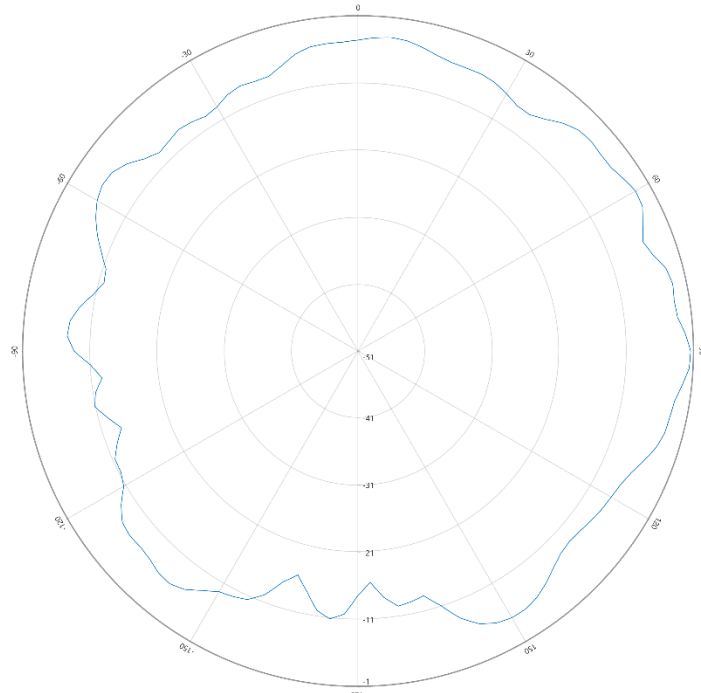


5850MHz

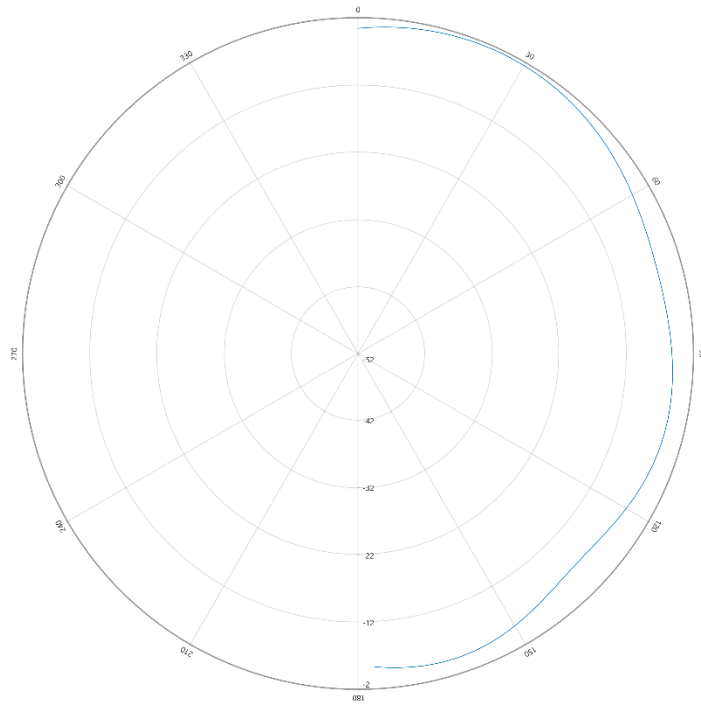
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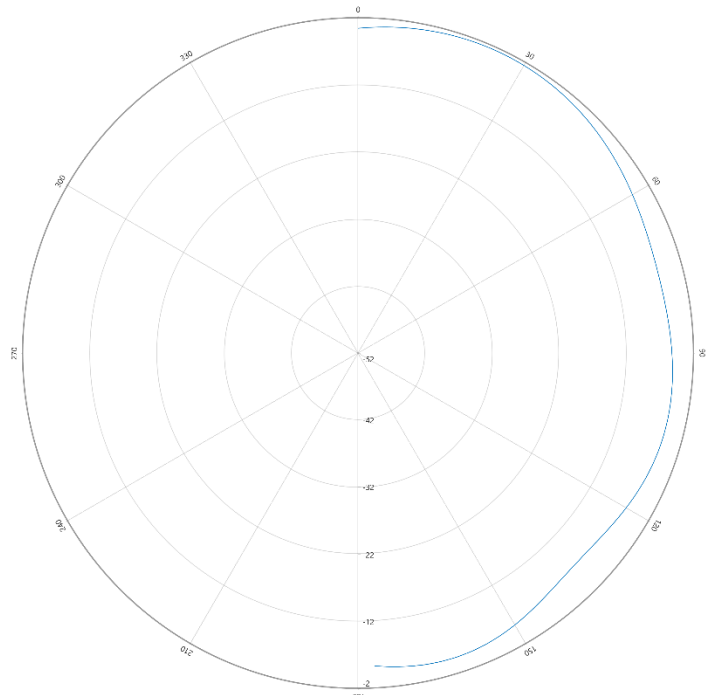


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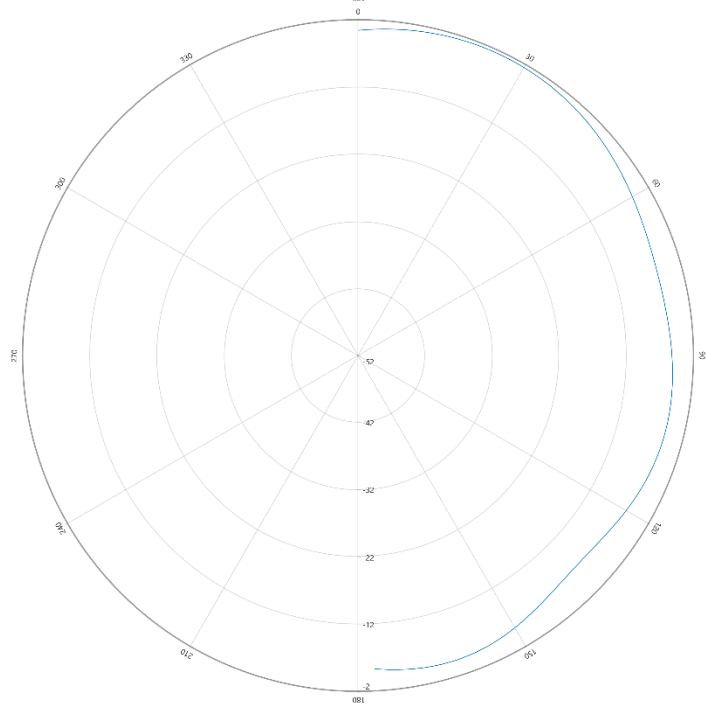


WiFi L Antenna
2400MHz

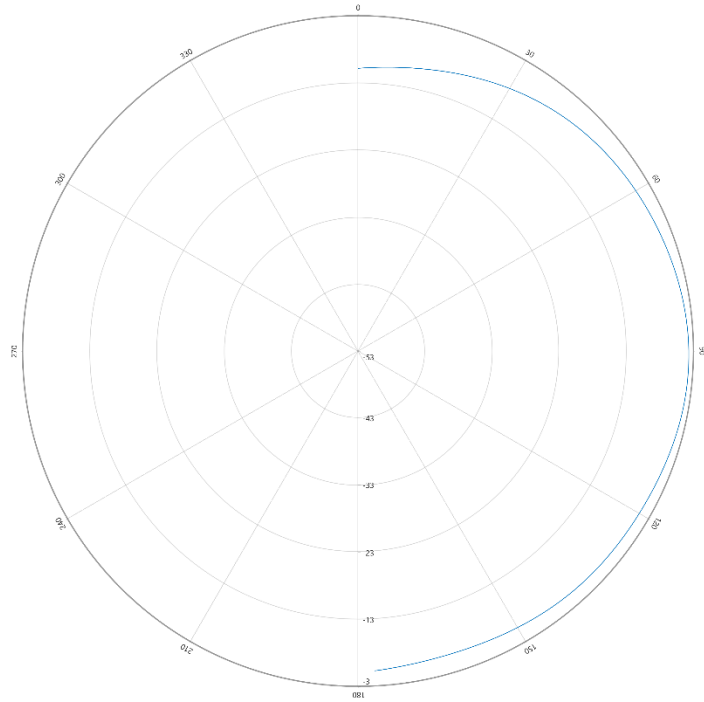
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✓ 90° 5850.00 MHz E Total

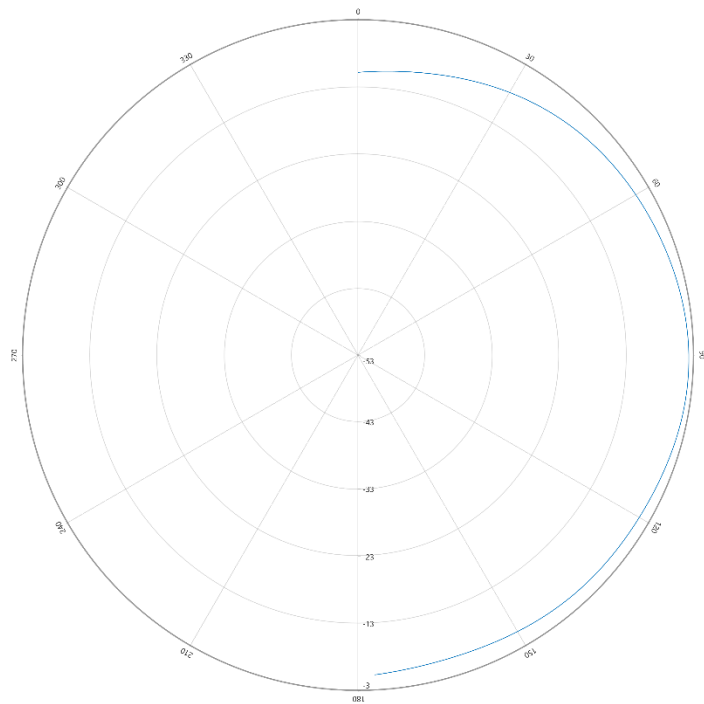


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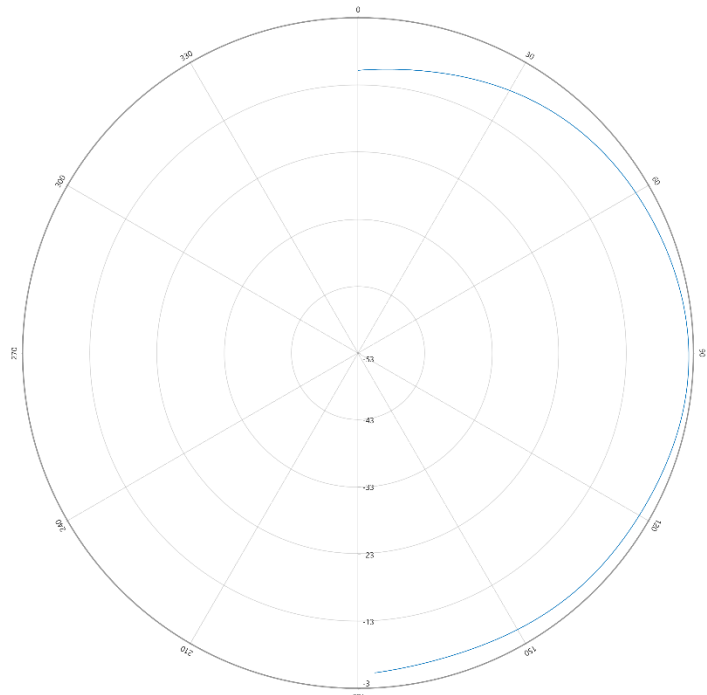


2440MHz

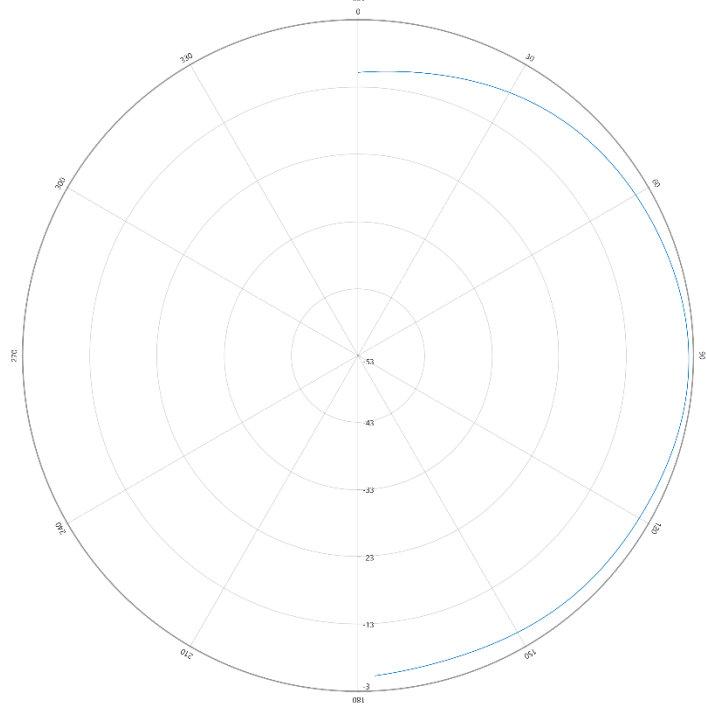
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✓ 60° 2400.00 MHz E Total

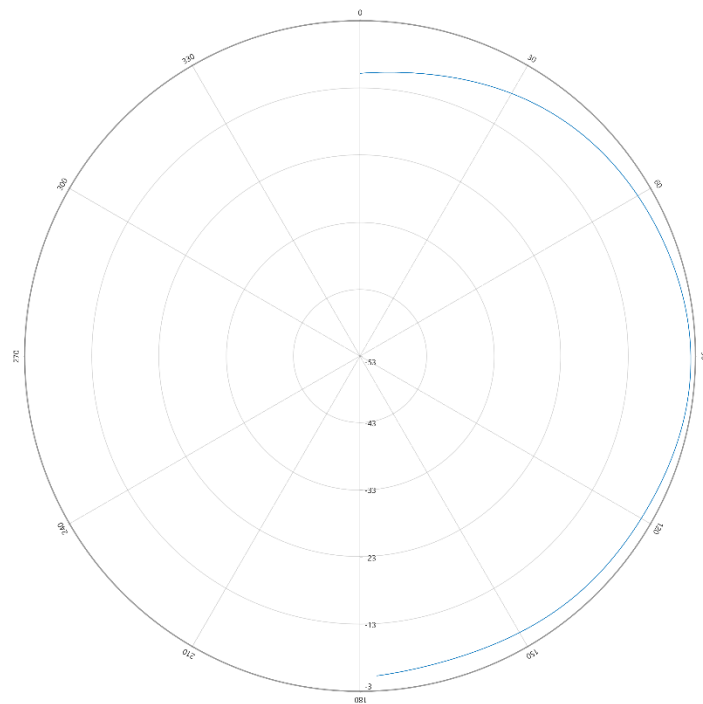


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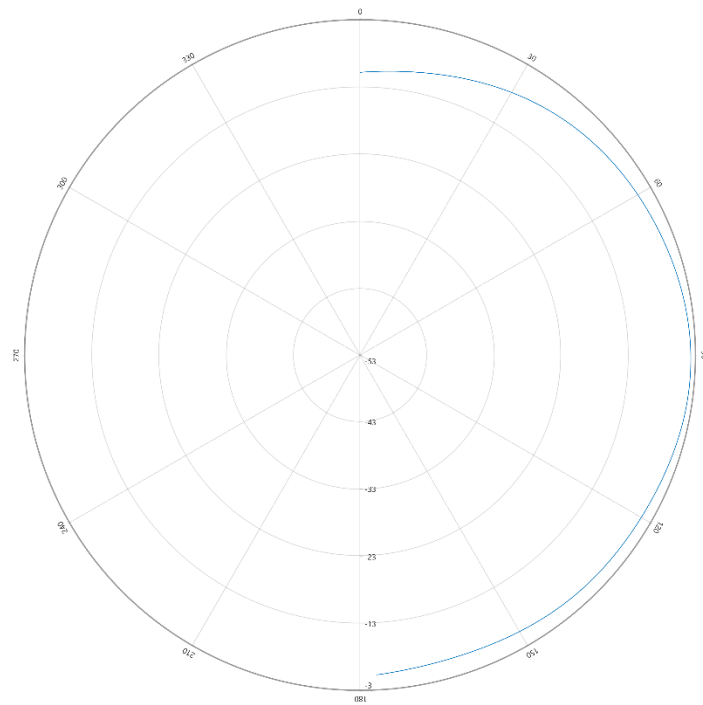


2480MHz

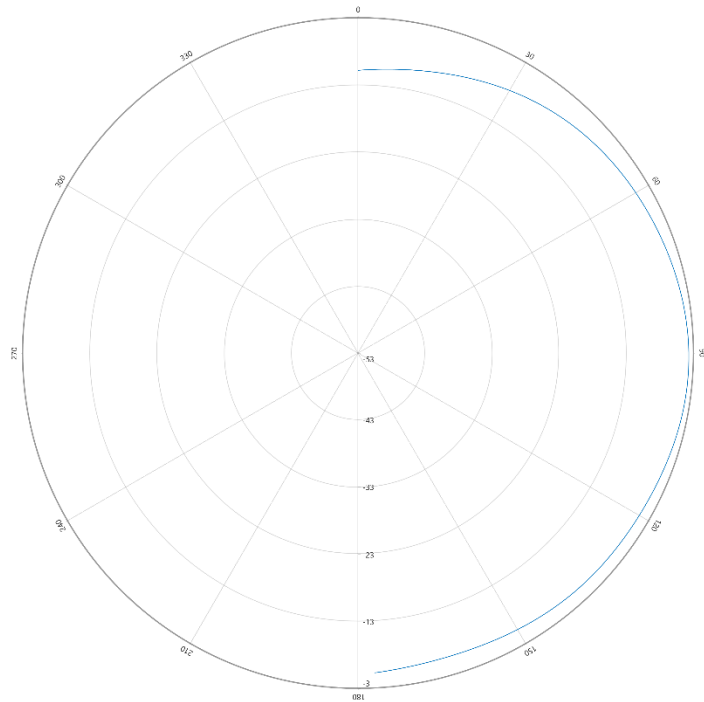
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✓ — 90° 2400.00 MHz E Total

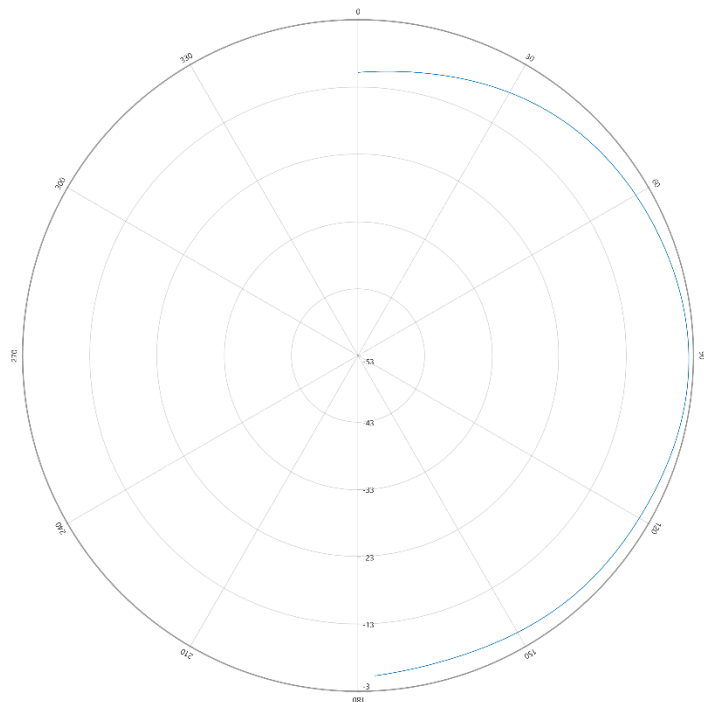


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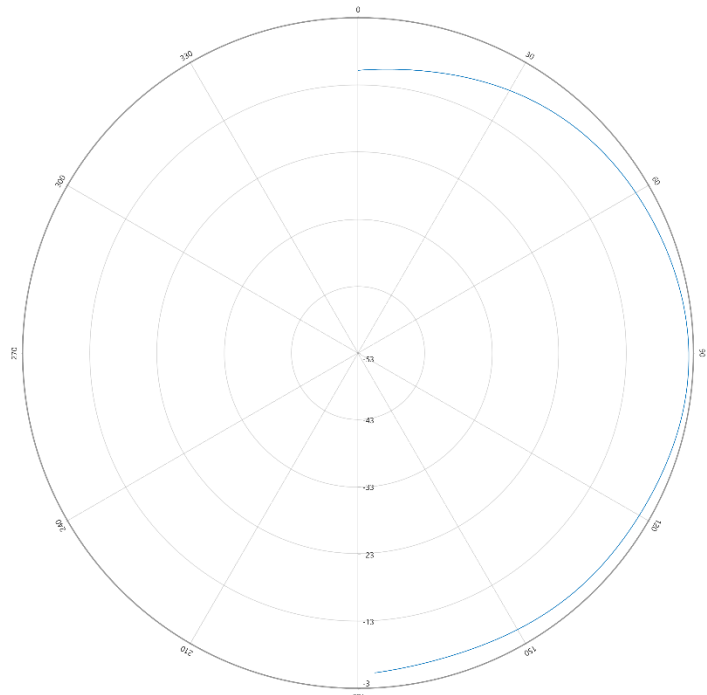


5150MHz

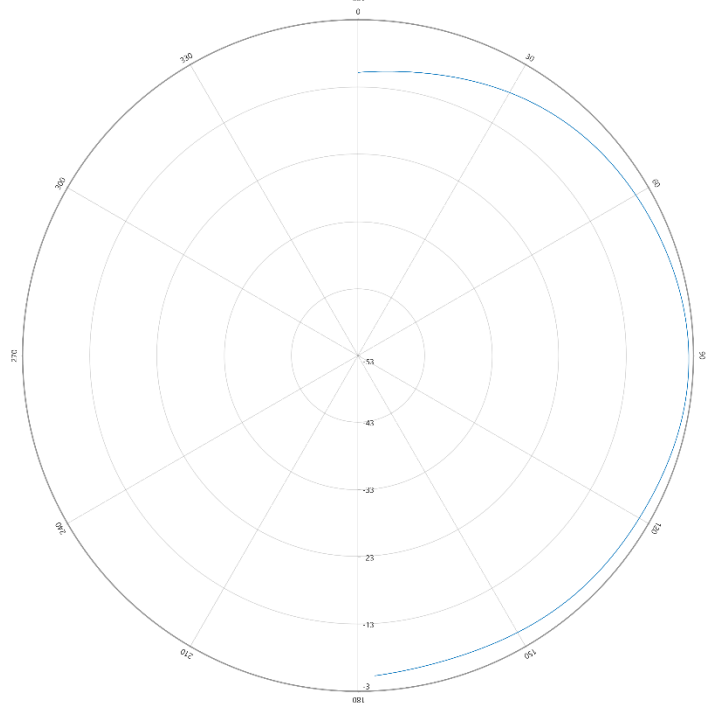
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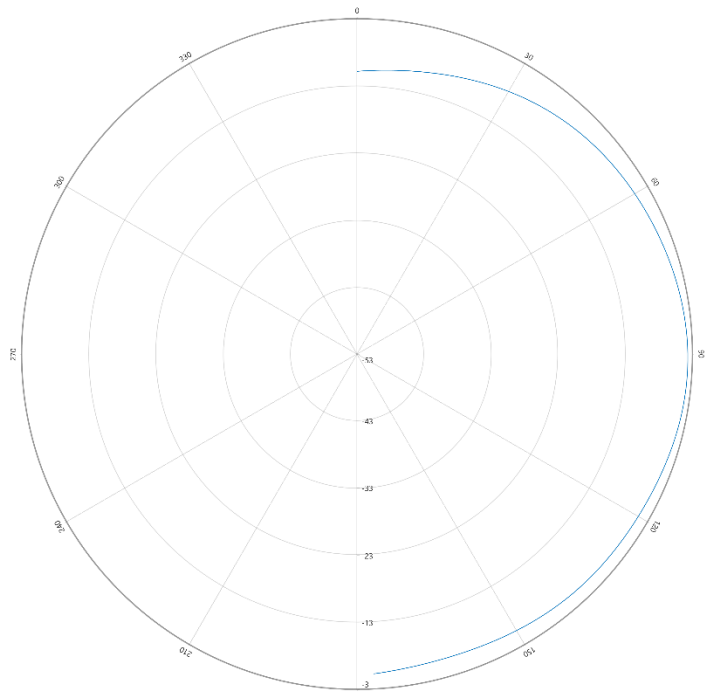


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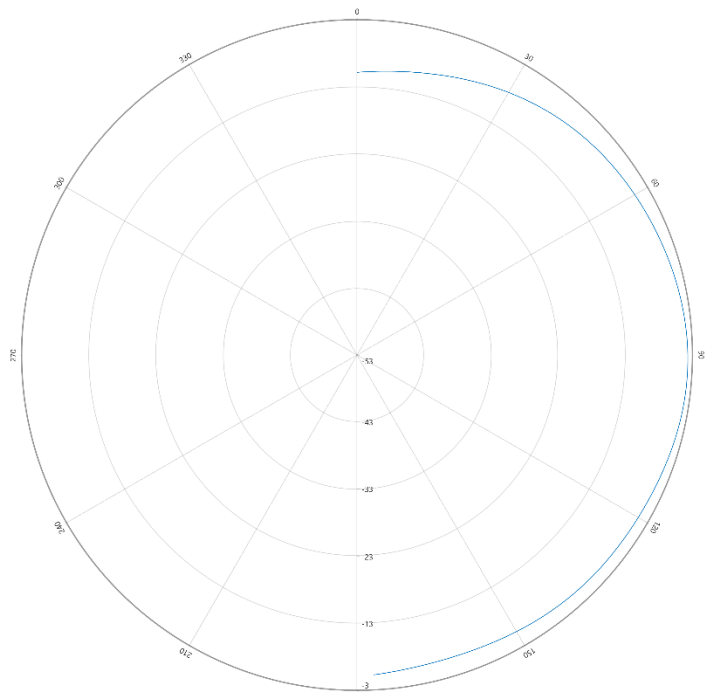


5500MHz

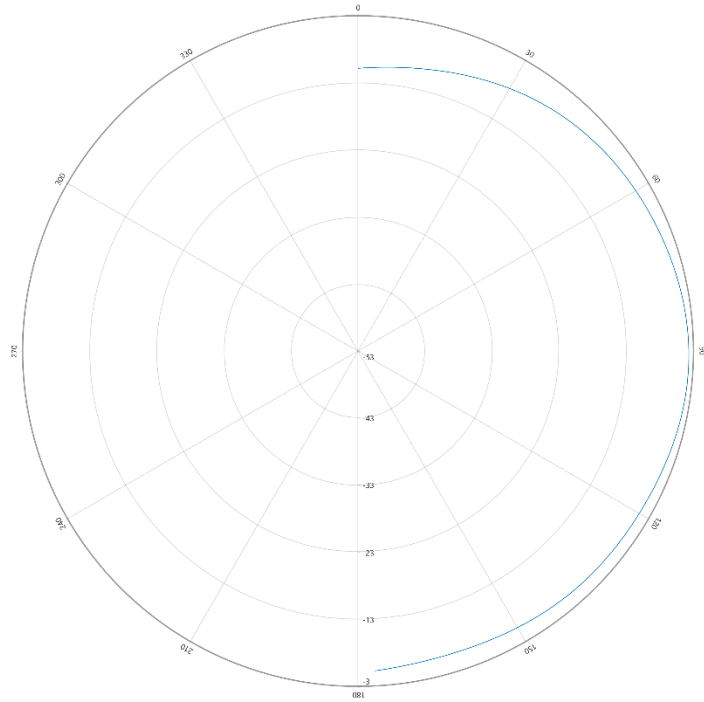
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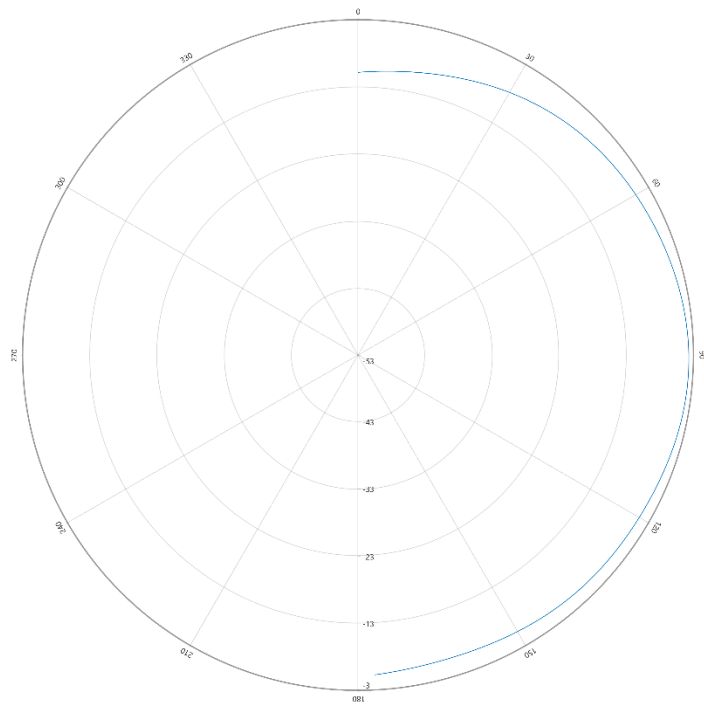


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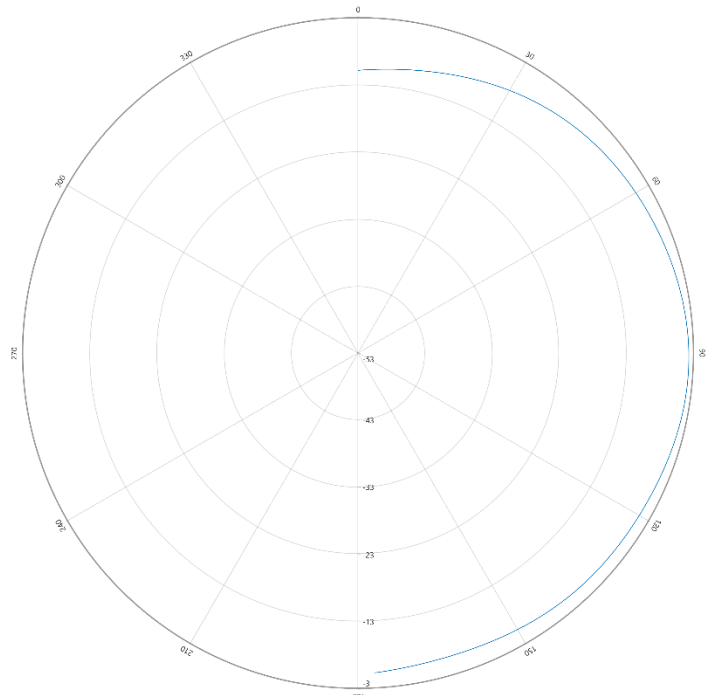


5850MHz

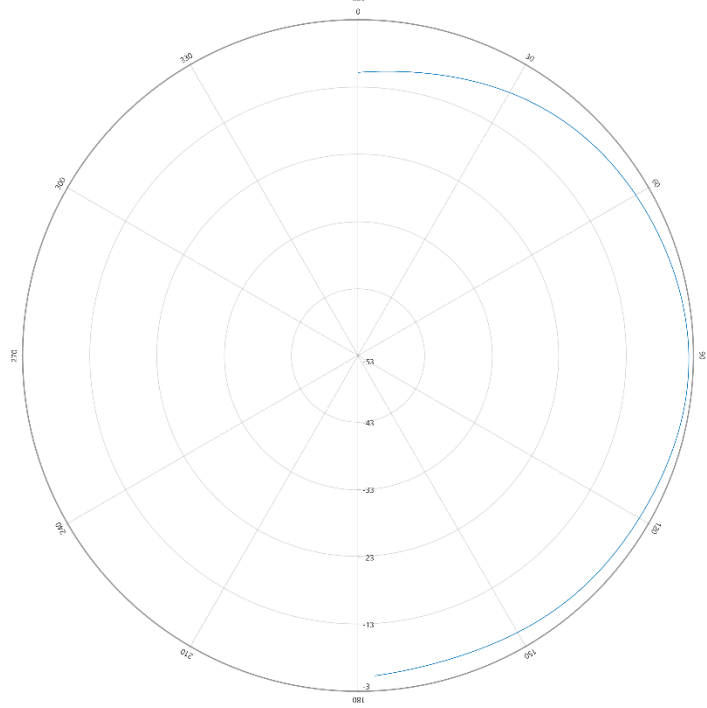
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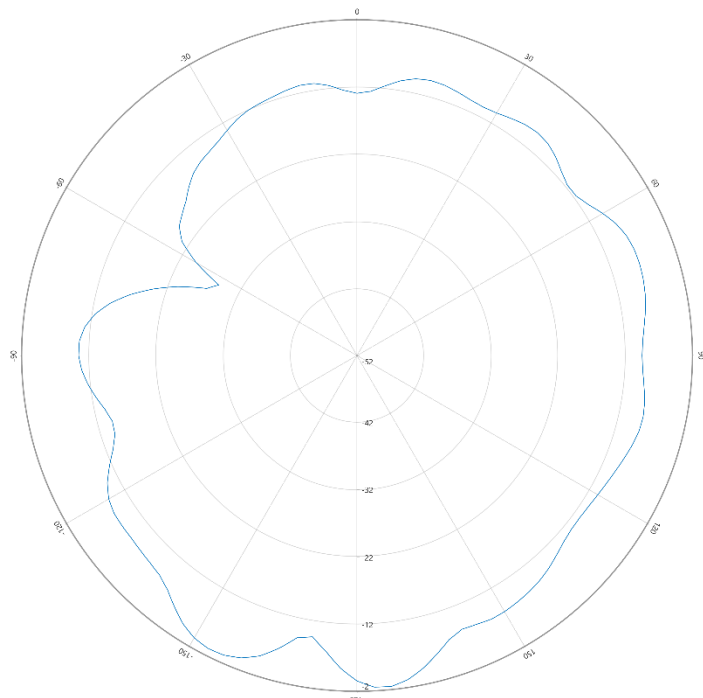


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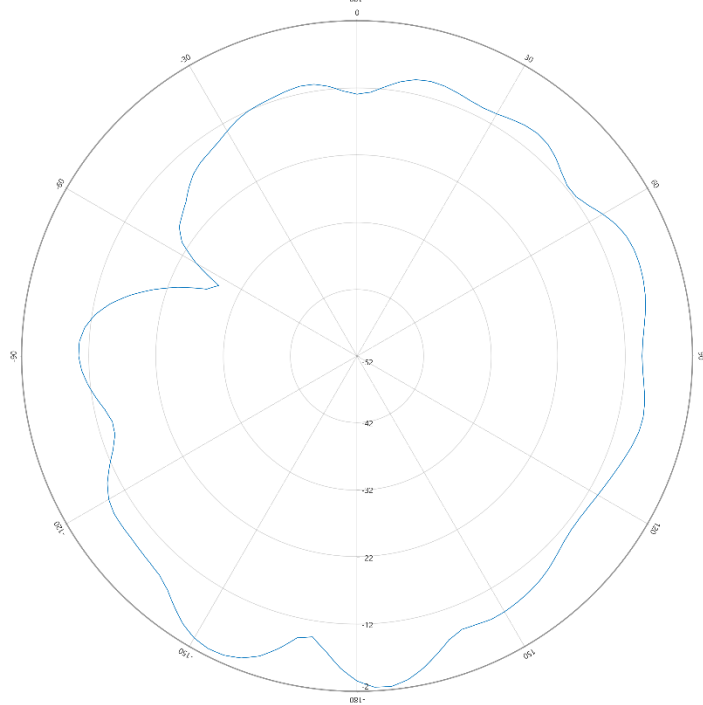


Bluetooth Antenna
2400MHz

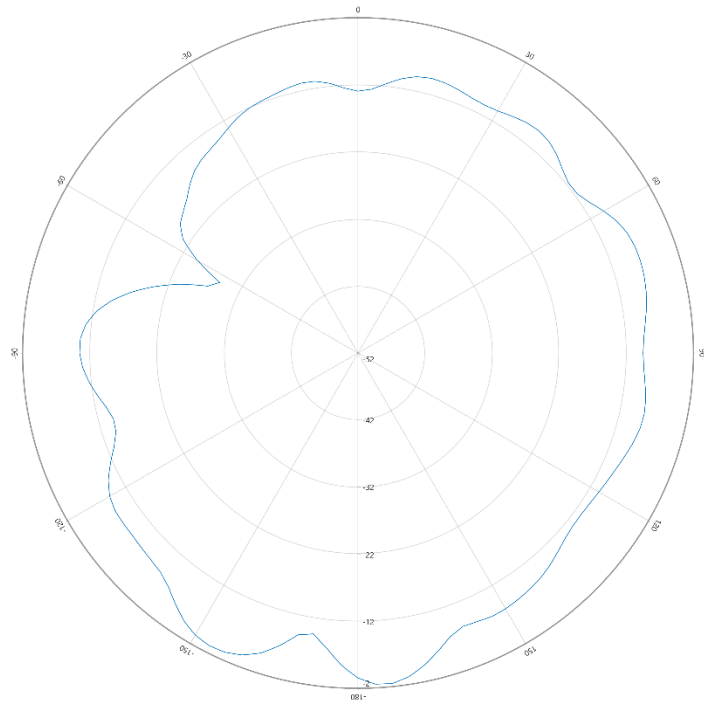
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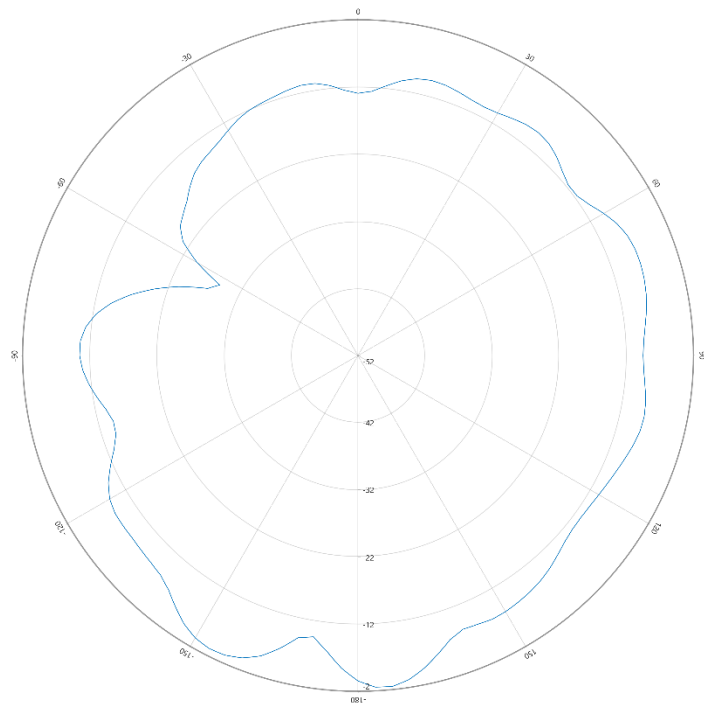


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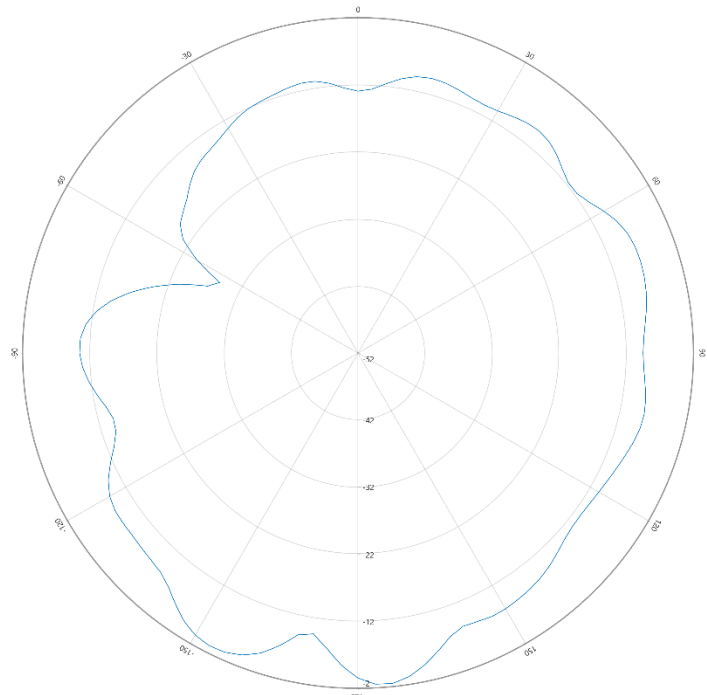


2440MHz

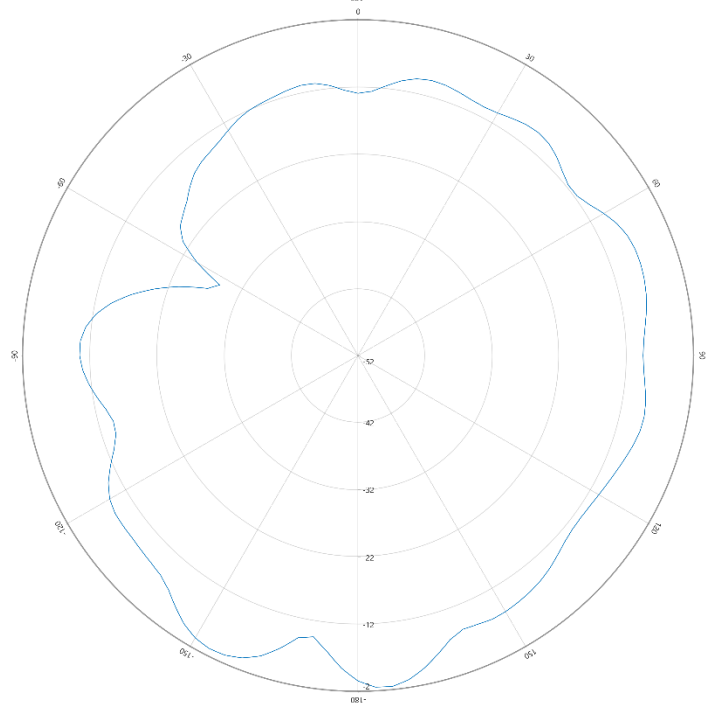
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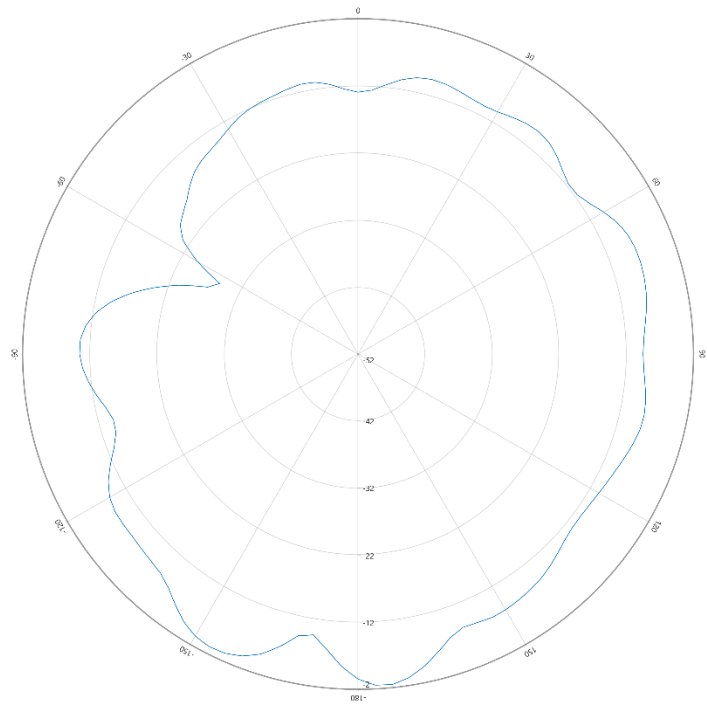


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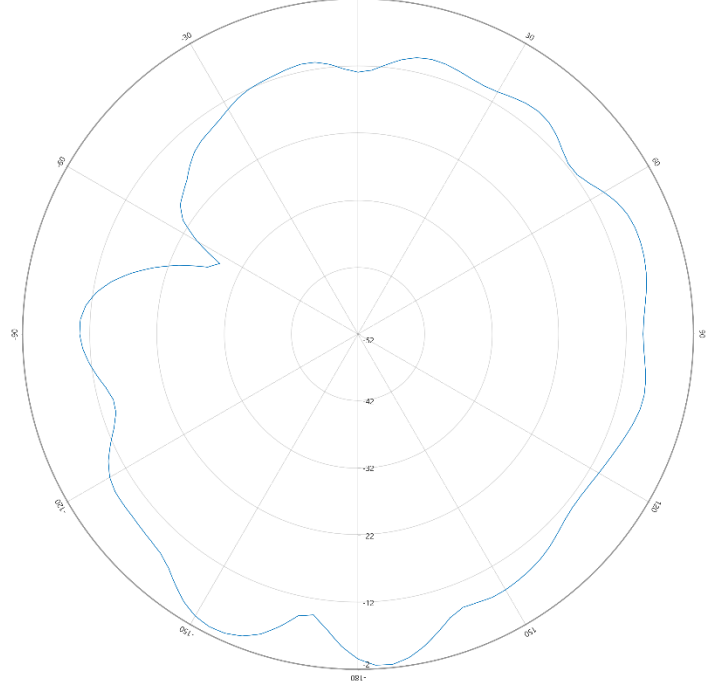


2480MHz

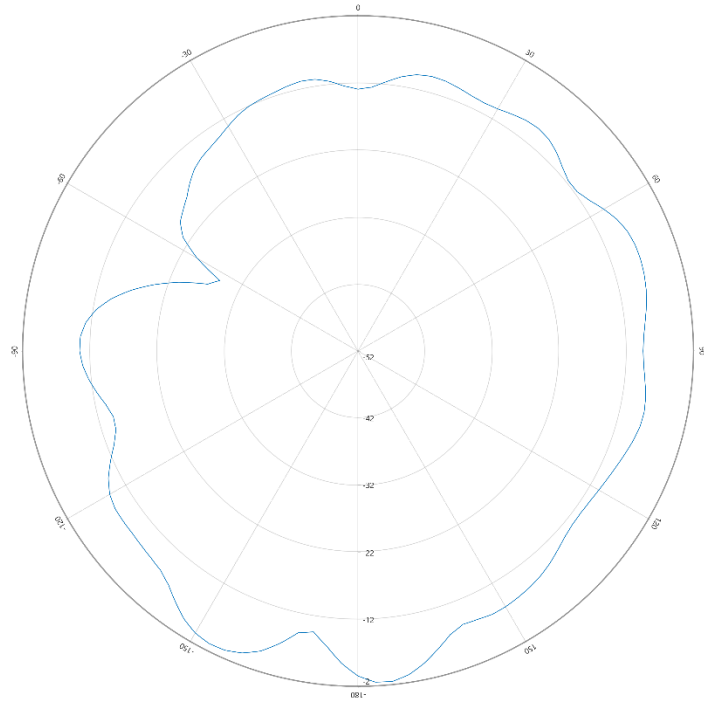
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✓ 0° 2400.00 MHz E Total

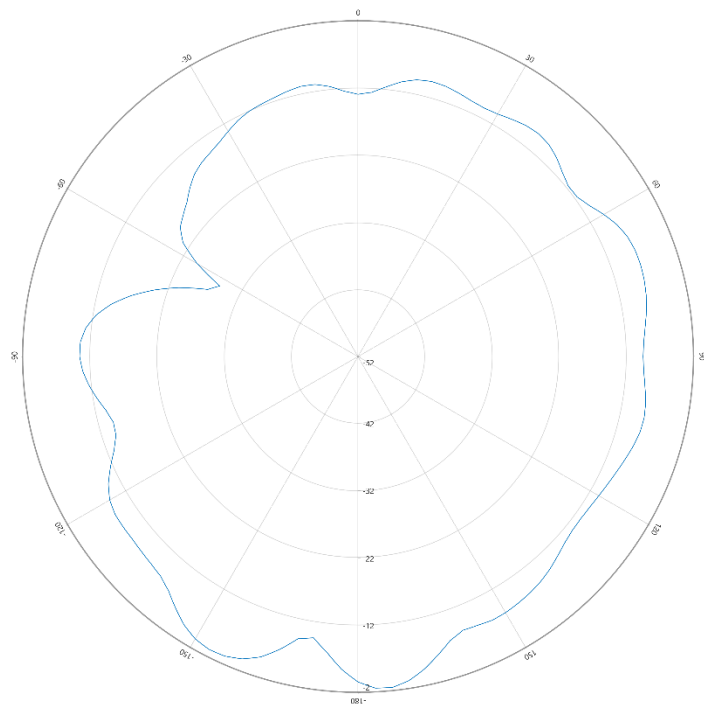


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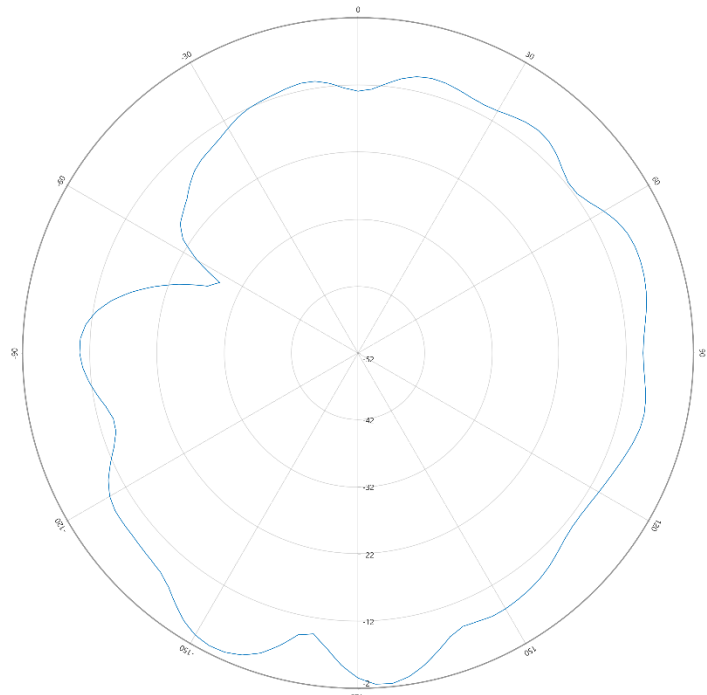


LoRa Antenna 870MHz

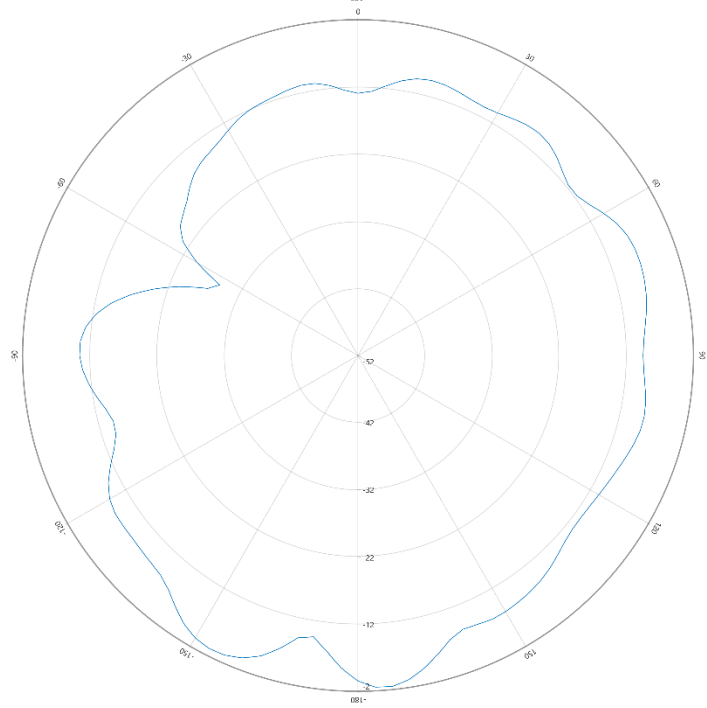
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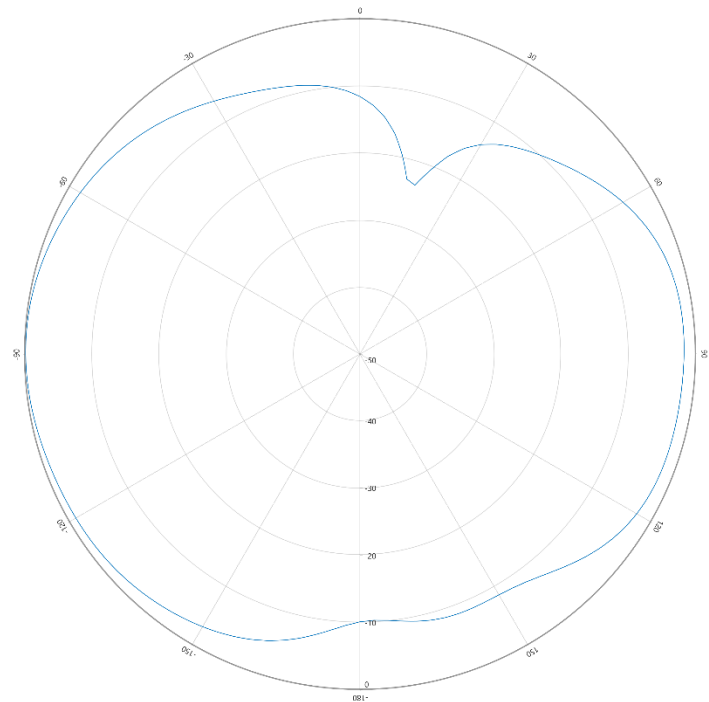


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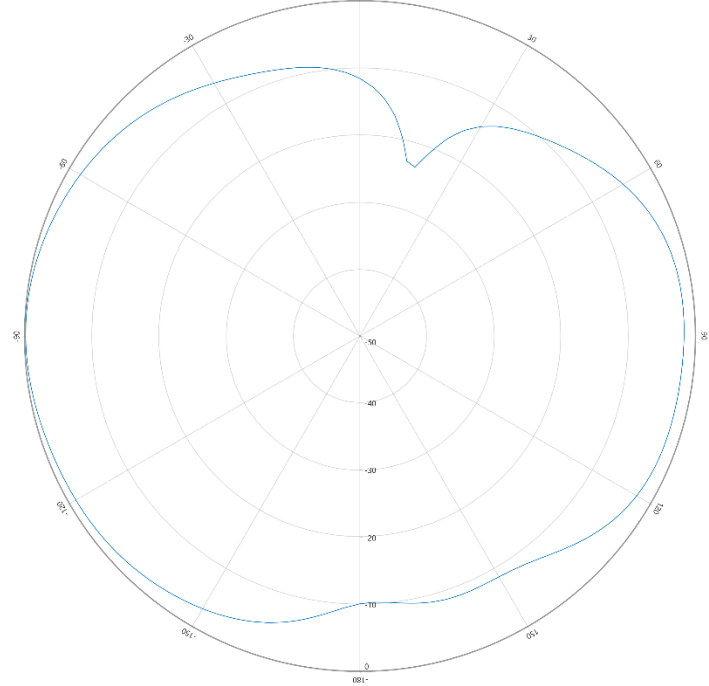


920MHz

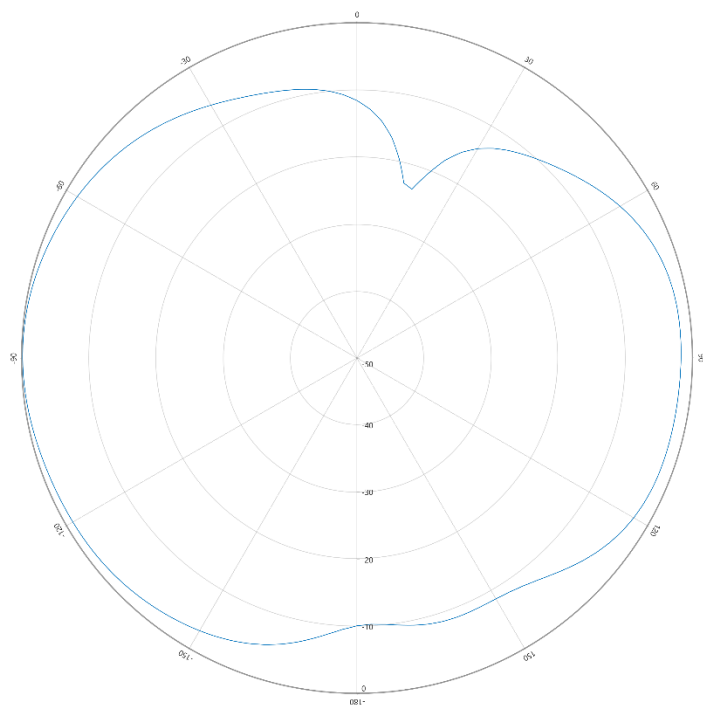
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✓ 0° 920.00 MHz E Total



✓ 0° 920.00 MHz E Total



24G Radio

1. Antenna manufacturer: Socionext
2. Antenna type: Patch antenna
3. Antenna gain: 2dbi

2.4. Antenna configuration

Figure 2-3 shows an antenna configuration. This product has two receiver antennas. The center-to-center distance of receiver antennas is 5.76 mm.

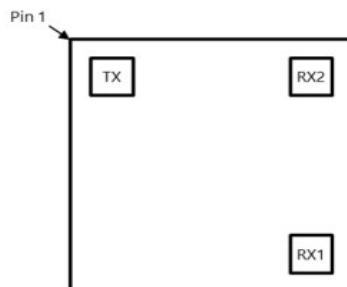


Figure 2-3 Top View Antenna configuration (Not to scale)

Table 3-11 Antenna Section

Parameter		Symbol	Conditions	Limits			Unit
				Min	Typ	Max	
E1	RX antenna Gain	Grxa	$f_{RF}=24.15\text{GHz}$		2		dBi
E2	TX antenna Gain	Gtxa	$f_{RF}=24.15\text{GHz}$		2		dBi

Table 3-15 Transmitter Section

Parameter		Symbol	Conditions	Limit			Unit
				Min	Typ	Max	
E21	RF transmit Frequency range	f_{TX}		24.06		24.24	GHz
E22	RF Transmit Power ^{Note 11)}	PAout	$f_{TX}=24.05\text{GHz to } 24.25\text{GHz}$, $T_{jopr}=25^{\circ}\text{C}$	-1	2	3.7	dBm
E23	Transmit Power Variation ^{Note 11)}	PAvar	$f_{TX}=24.05\text{GHz to } 24.25\text{ GHz}$		0.7		dB

Note 11) These limit values are based on the measurement conditions defined by Socionext; a receiving antenna is placed in the zenith direction of the DUT and the distance is 3m. Socionext's conditions may differ from the conditions defined in the radio regulations of each country.

Antenna pattern (Reference)

