Regulatory WWAN Antenna Information (NB mode)

Platform information				
Brand	**ODM**	**Platform model name**	**Platform type (ex: regular NB, convertible PC, AIO…etc)**	**˙SAR minimum separation (mm)**
HP Inc.	Inventec	HSN-I46C	Convertible PC	204.95

Antenna information						Maximum Peak gain
Vendor	**Type**	**Antenna Part number (Ant5 TX/RX)**	**Antenna Part number (Ant6 RX)**	**Antenna Part number (Ant7 RX)**	**Antenna Part number (Ant8 TX/RX)**	**2300MHz~2400MHz**
WNC	PIFA	6036B0312701 (81ELA215.G10)	6036B0312601 (81ELA215.G09)	6036B0312801 (81EABL15.G24)	6036B0312701 (81ELA215.G10)	2.83dBi

Module information	
Model	**Form factor and suffixes (NGW/ HMW AND AN/ NB/ BN….)**
Kavalan 4	Fibocom FM350-GL WWAN 4x4 5G NR radio module

Antenna vendor connect person	
Antenna Vendor	WNC
contact person	Annie Lo
E-mail	annie.lo@wnc.com.tw
Tel/Mobile	886-3-666-7799 ext: 3415
Web address	https://www.wnc.com.tw
Address	20 Park Avenue II, Hsinchu Science Park Hsinchu 300, Taiwan

Antenna Sample / Antenna Data
Requirements for worldwide regulatory approval

Section	Description of Required OEM / ODM Antenna Information	US / IC	EU	Japan	Taiwan	S.Korea
1A	Part Number for Antenna Assembly	Required	Required	Required	Required	Required
1B	Antenna Manufacturer Name	Required	Required	Required	Required	Required
1C	Description of Antenna Type	Required	N/A	N/A	N/A	N/A
1D	Tx antenna Gain (Peak Gain W/ cable loss) *	Required	Required	Required	Required	Required
2	Dimensioned Photographs and Drawings of Tx and Rx antennas	Required	Required	Required	Required	Required
3	Radiation patterns of antennas loaded in the host platform.	N/A	Required	Required	Required	N/A
4	Platform model name / number - correlated to antenna manufacturer and antenna part number	Required	Required	Desired	Required	Desired
5	Photograph(s) or Drawings showing location of antennas in platform. (S. Korea requires photographs of antennas for approval submission). Taiwan requires pictures of each antenna type shown in the system.	Required	Required	Desired	Required (Photos)	Required (Photos)
6	Mech. drawings / photos with dimensions of antenna locations and distance from end-user (For evaluation of SAR testing requirement).	Required	N/A	N/A	N/A	N/A
7	Photograph(s) or Drawings showing the location of all antennas (WLAN, other) and distance between those transmitting antennas. Information will be used to evaluate whether co-location testing is required.	Required	N/A	N/A	N/A	N/A
8	Local representative contact information for LMA/ PARS process.	Required	N/A	N/A	N/A	N/A

Test location: _____SGS_____

Testing date:_____2022/12/8_____

Equipment list

Equipment Description	Manufacturer	Identification no.	Current calibration date	Next calibration date
Network analyzer	Agilent	E5071C	2022/01/07	2023/01/06
Measurement software	ETS-Lindgren	EMQuest	N/A	N/A
Multi axis positioning system(MAPSTM)	ETS-Lindgren	EMCO 2115	N/A	N/A
Multi axis positioning system(MAPSTM)	ETS-Lindgren	EMCO 2110	N/A	N/A
MAPSTM controller	ETS-Lindgren	EMCO 2090	N/A	N/A
Horn antenna	ETS-Lindgren	3164-10	2022/03/03	2023/03/03
ETS OTA Chamber	ETS-Lindgren	AMS-8500	2022/03/03	2023/03/03
Cable	ETS-Lindgren	RFC SMS-100-NMR Series	N/A	N/A

Note: Chamber calibration included full set of implement

Antenna Information
Section 1. Antenna Assembly Specifications

Communication System	Band	Frequency(MHz) from low to high spectrum		1A Part Number for Antenna Assembly	1B Antenna Manufacturer Name	1C Description of Antenna Type	1D Tx Antenna Gain (dBi) Ant5
WCDMA/ LTE/5G NR FR1	1	1920	1980	Ant5 : 81ELA215.G10	WNC	PIFA	2.13
WCDMA/ LTE/5G NR FR1	2	1850	1910				0.63
LTE/5G NR FR1	3	1710	1785				1.73
WCDMA/ LTE	4	1710	1755				1.73
WCDMA/ LTE/5G NR FR1	5	824	849				-1.24
LTE/5G NR FR1	7	2500	2570				1.92
WCDMA/ LTE/5G NR FR1	8	880	915				-0.35
LTE	12	699	716				-0.31
LTE	13	777	787				1.98
LTE	14	788	798				1.49
LTE	17	704	716				-0.31
LTE	18	815	830				-1.24
LTE	19	830	845				-1.27
LTE/5G NR FR1	20	832	862				-1.07
LTE/5G NR FR1	25	1850	1915				0.63
LTE	26	814	849				-1.07
LTE/5G NR FR1	28	703	748				-0.01
LTE/5G NR FR1	30	2305	2315				0.98
LTE	34	2010	2025				2.01
LTE/5G NR FR1	38	2570	2620				1.95
LTE	39	1880	1920				0.83
LTE/5G NR FR1	40	2300	2400				2.83
LTE/5G NR FR1	41	2496	2690				1.95
LTE	42	3400	3600				0.64
LTE	43	3600	3800				1.23
LTE/5G NR FR1	66	1710	1780				1.73
LTE/5G NR FR1	71	663	698				-2.72
5G NR FR1	77	3300	4200				1.23
5G NR FR1	78	3300	3800				1.23
5G NR FR1	79	4400	5000				2.11

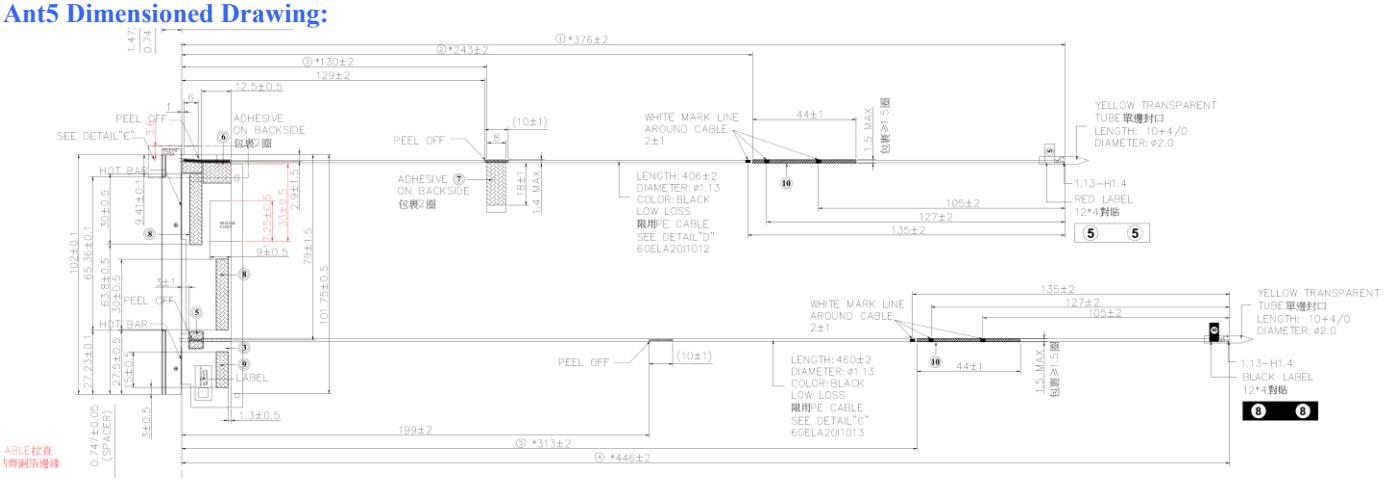
Communication System	Band	Frequency(MHz) from low to high spectrum		1A Part Number for Antenna Assembly	1B Antenna Manufacturer Name	1C Description of Antenna Type	1D Tx Antenna Gain (dBi) Ant8
5G NR FR1	1	1920	1980	Ant8 : 81ELA215.G10	WNC	PIFA	1.83
LTE/5G NR FR1	2	1850	1910				1.80
5G NR FR1	3	1710	1785				1.17
LTE	4	1710	1755				0.61
5G NR FR1	5	824	849				-24.00
LTE/5G NR FR1	7	2500	2570				0.84
LTE/5G NR FR1	25	1850	1915				1.80
LTE/5G NR FR1	30	2305	2315				0.65
5G NR FR1	38	2570	2620				0.13
5G NR FR1	40	2300	2400				0.82
LTE/5G NR FR1	41	2496	2690				0.28
5G NR FR1	48	3550	3700				0.84
LTE/5G NR FR1	66	1710	1780				0.95
5G NR FR1	77	3300	4200				0.92
5G NR FR1	78	3300	3800				0.92
5G NR FR1	79	4400	5000				2.59

Antenna Peak Gain required being test in system basis.

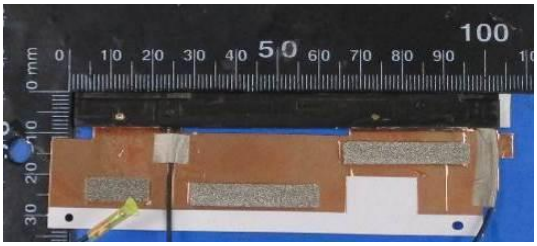
Section 2. Dimensioned Photos or Drawings of Antennas

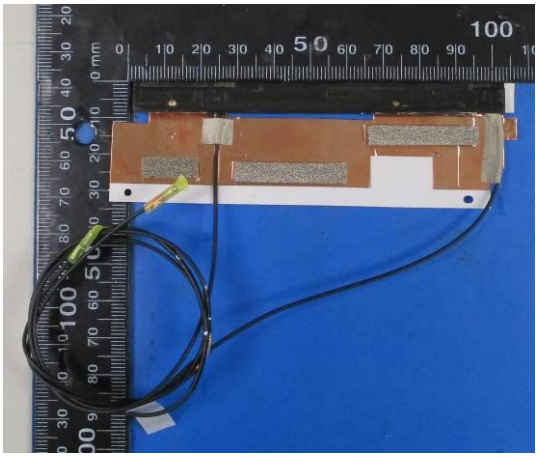
	Ant supplier	Part number	Drawing	Photo
Ant5	WNC	6036B0312701	V	V
Ant6	WNC	6036B0312601	V	V
Ant7	WNC	6036B0312801	V	V
Ant8	WNC	6036B0312701	V	V

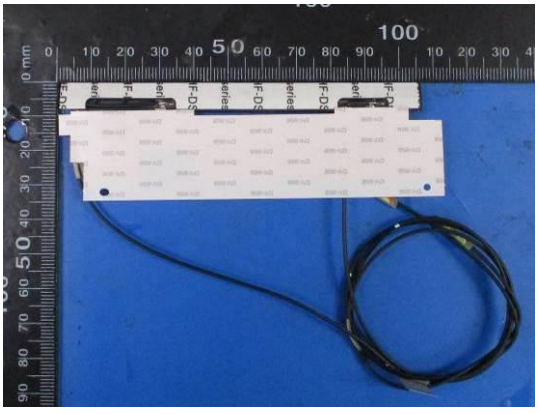
Ant5 Dimensioned Drawing:



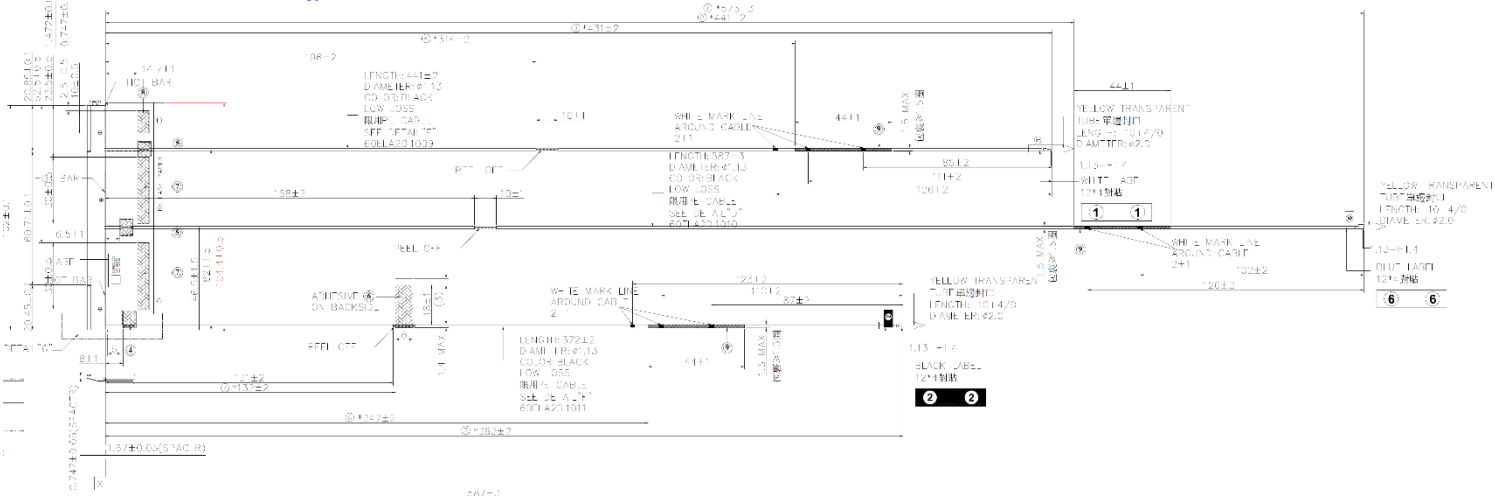
Ant5 Photo:



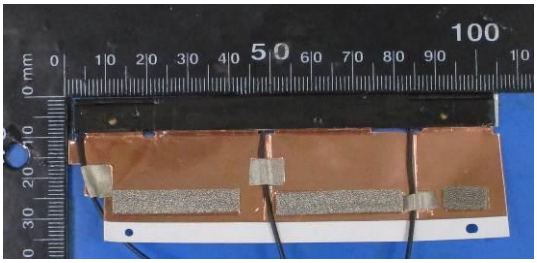


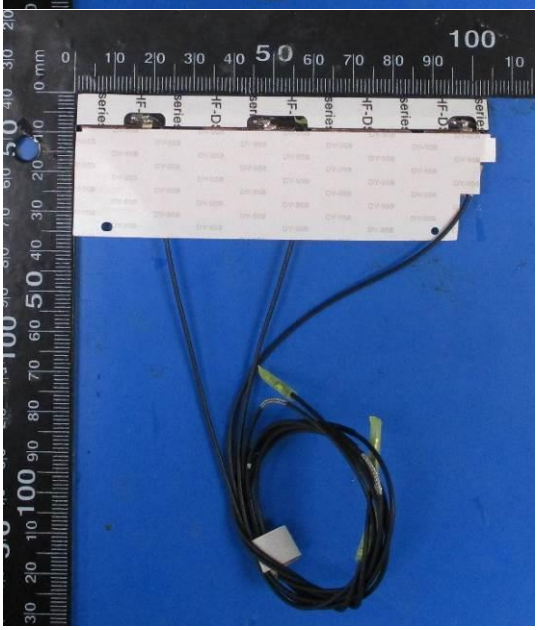


Ant6 Dimensioned Drawing:

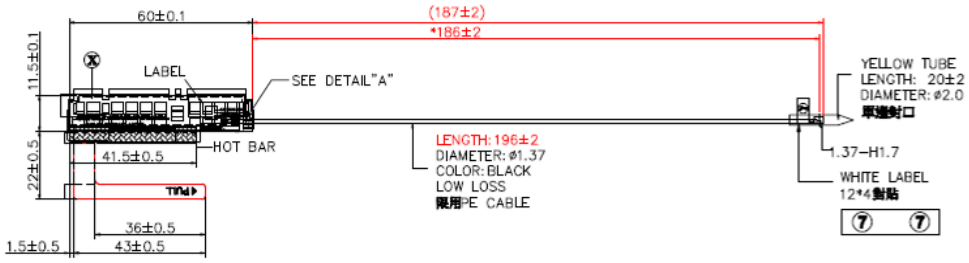


Ant6 Photo:

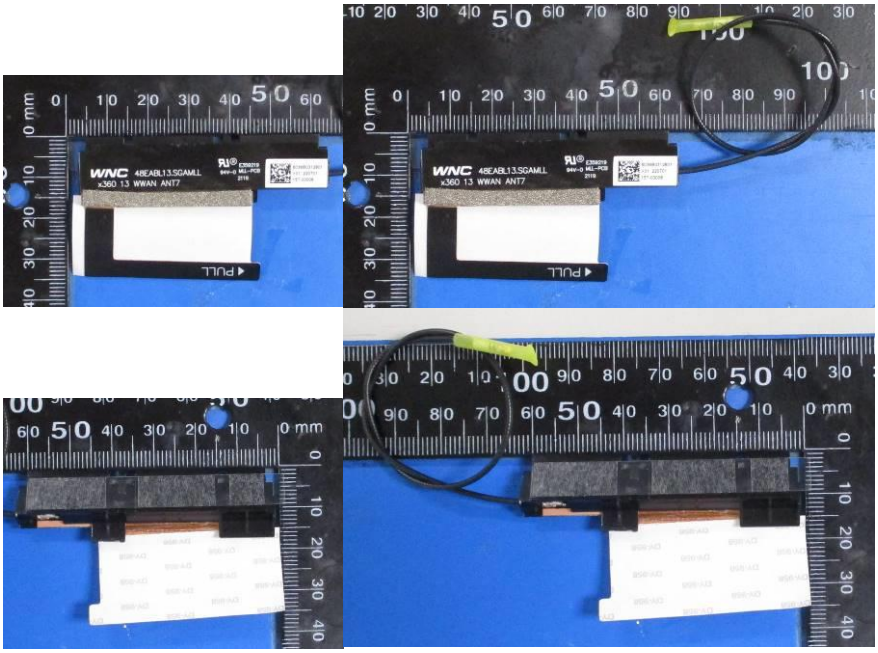




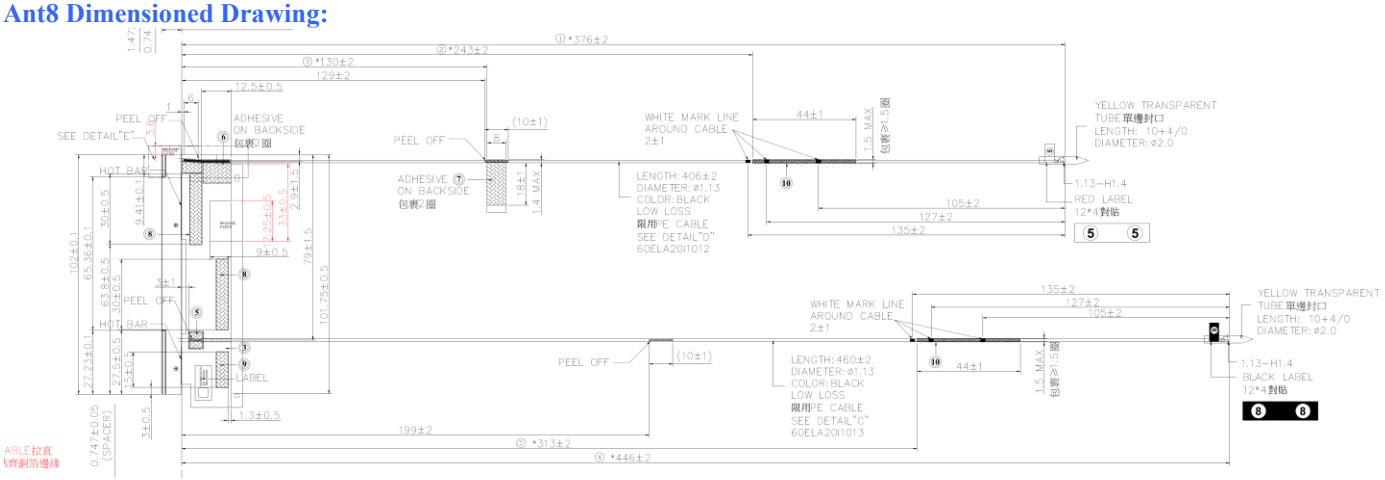
Ant7 Dimensioned Drawing:



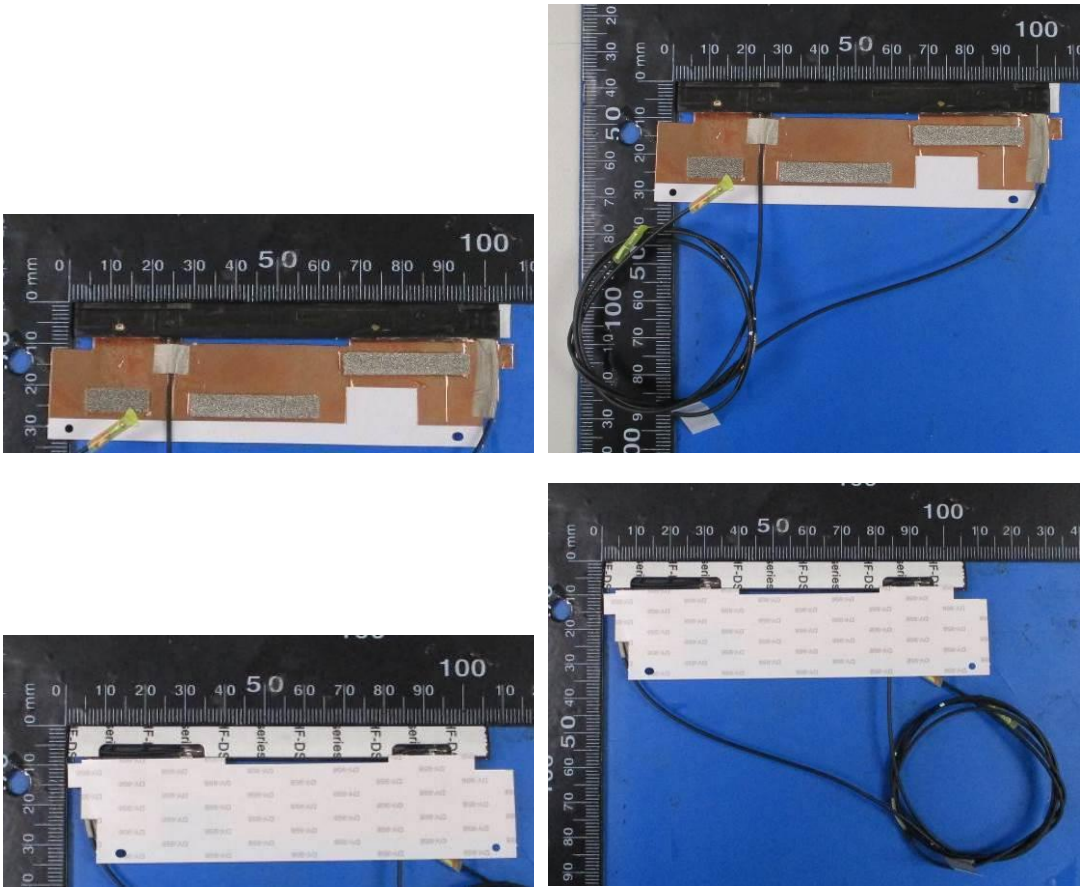
Ant7 Photo:



Ant8 Dimensioned Drawing:



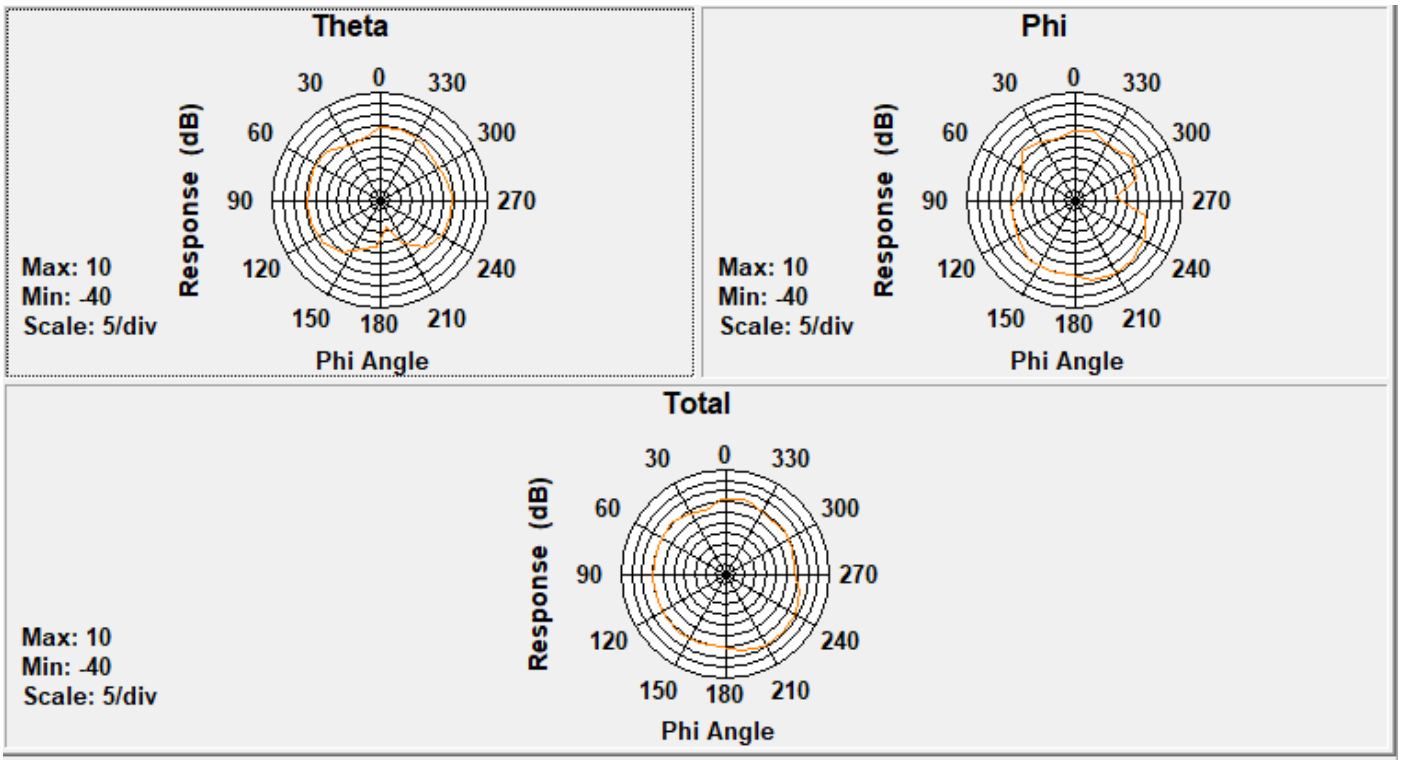
Ant8 Photo:



- **The listed frequency 2D radiation pattern is required**
- **Ant5:**

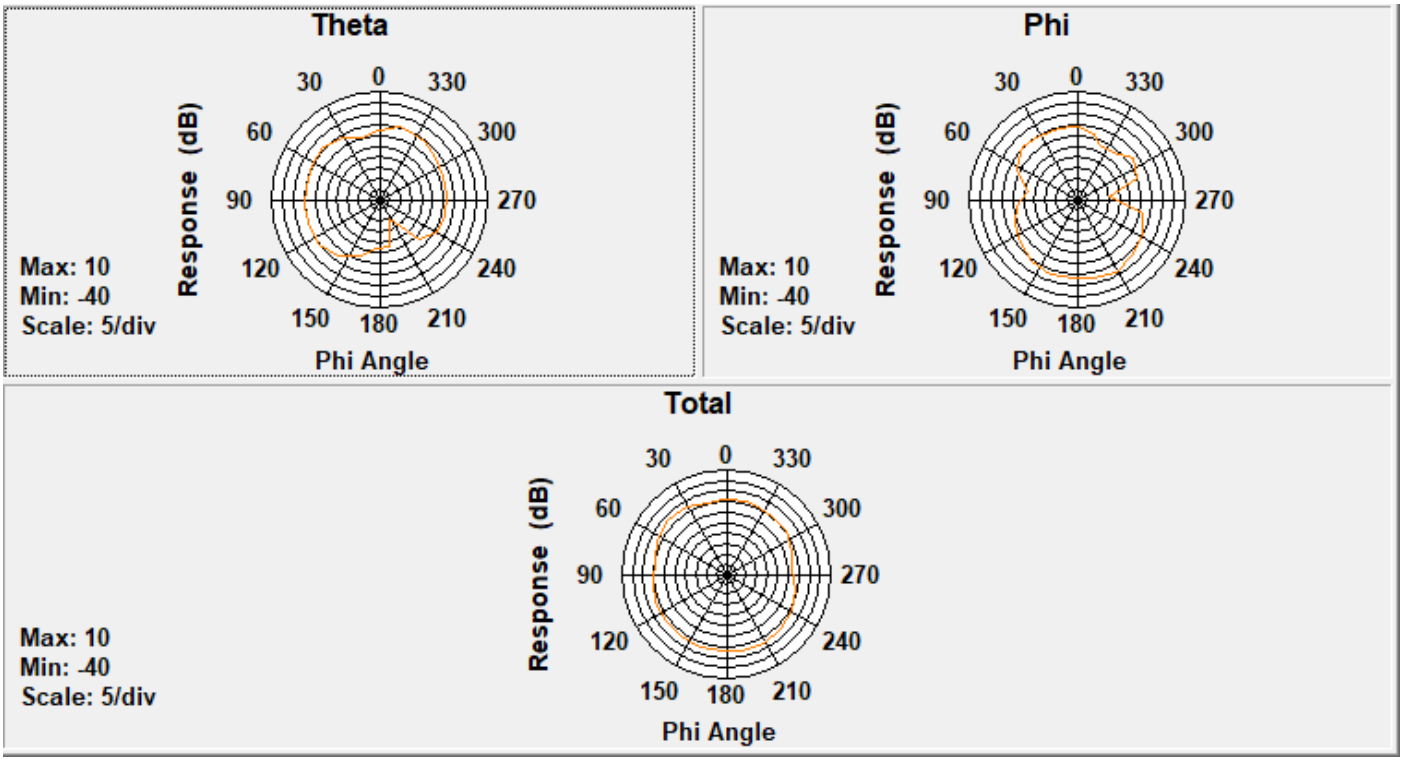
Example

814MHz



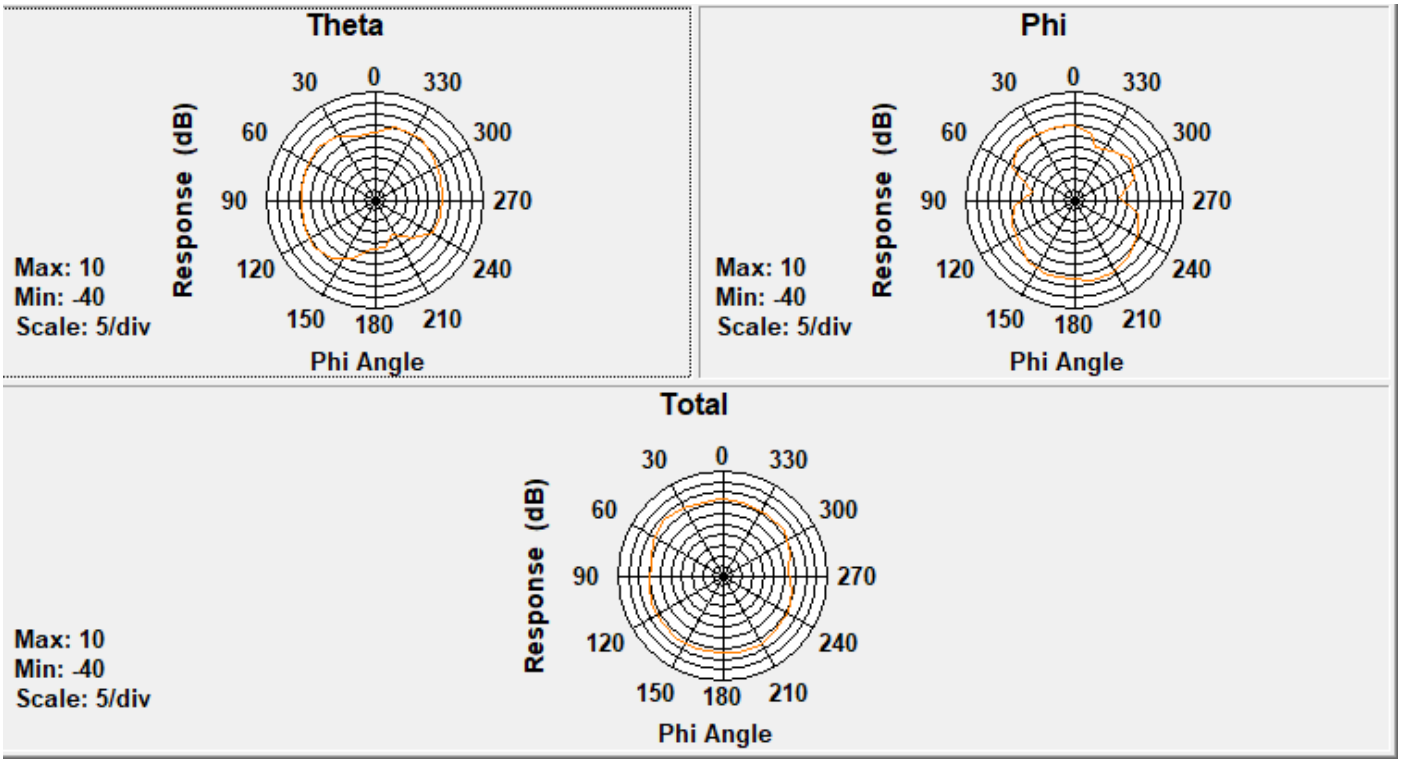
Center Frequency	**814MHz**
Horizontal (dBi) peak	-1.93
Vertical (dBi) peak	-1.24

832MHz



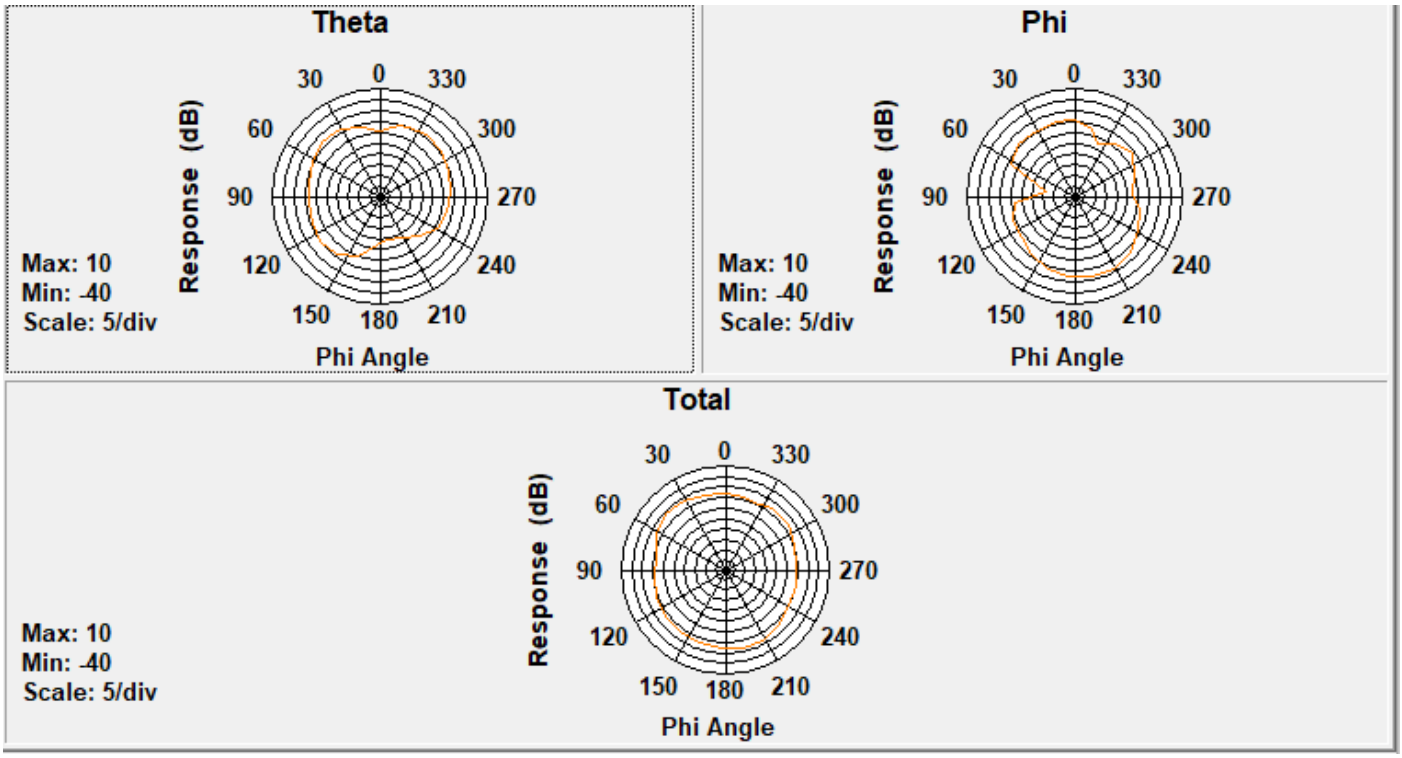
Center Frequency	**832MHz**
Horizontal (dBi) peak	-1.72
Vertical (dBi) peak	-2.30

837MHz



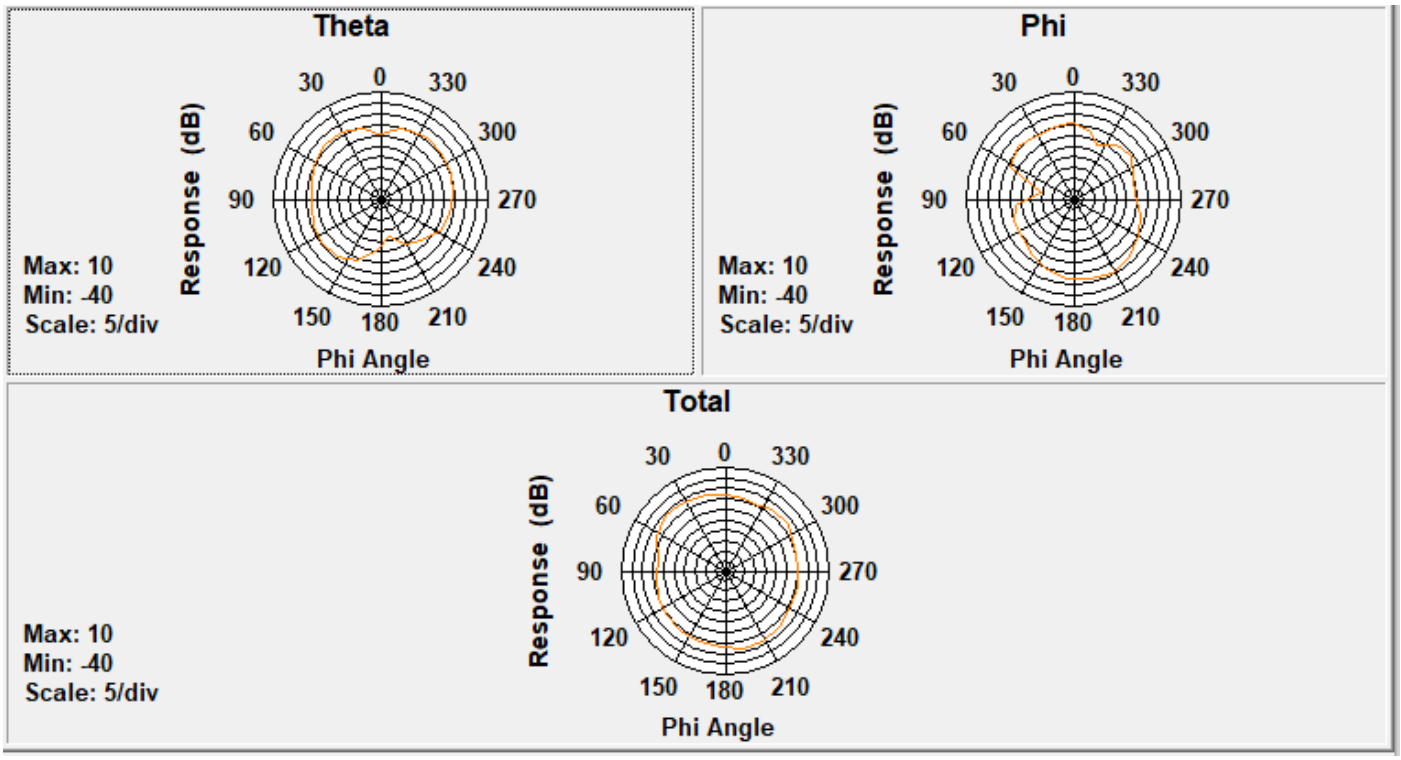
Center Frequency	**837MHz**
Horizontal (dBi) peak	-1.66
Vertical (dBi) peak	-2.03

845MHz



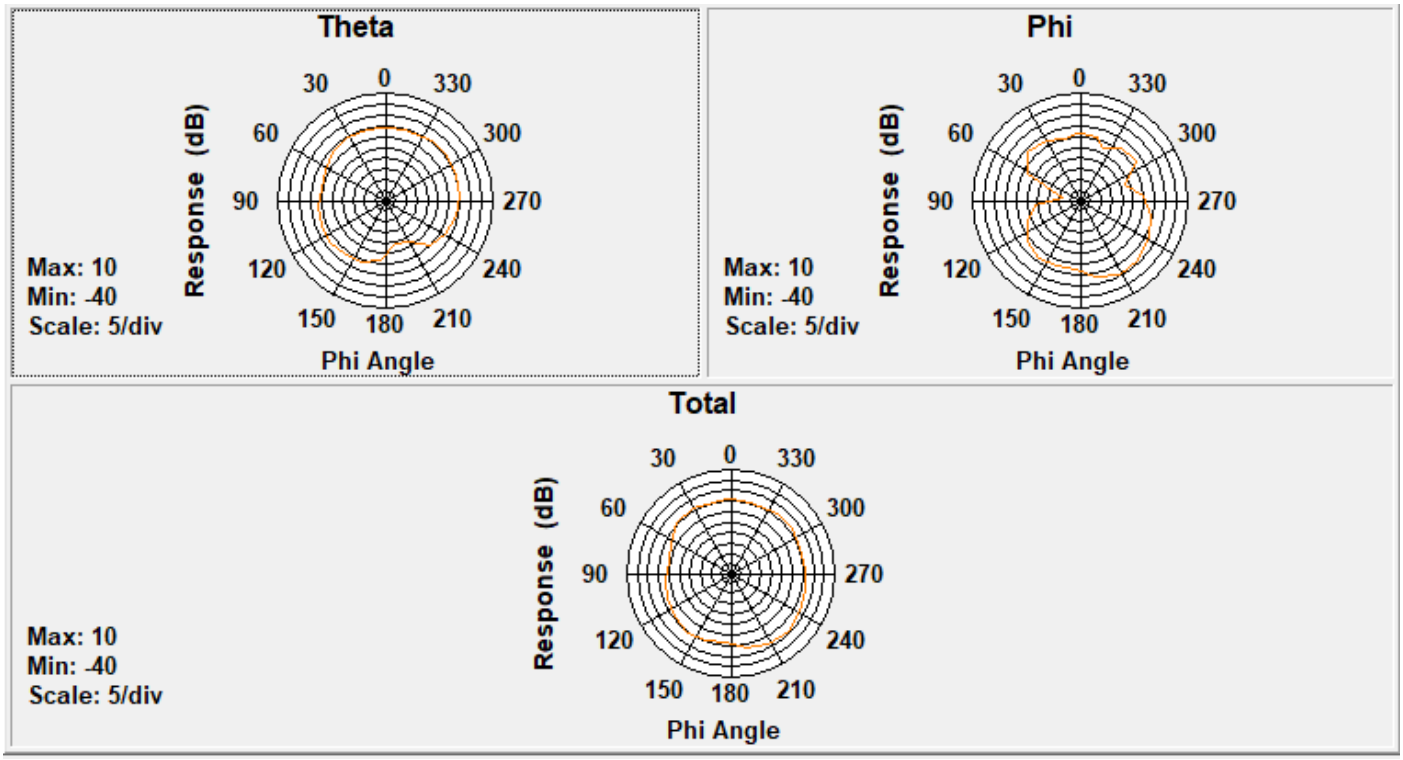
Center Frequency	**845MHz**
Horizontal (dBi) peak	-2.03
Vertical (dBi) peak	-1.27

849MHz



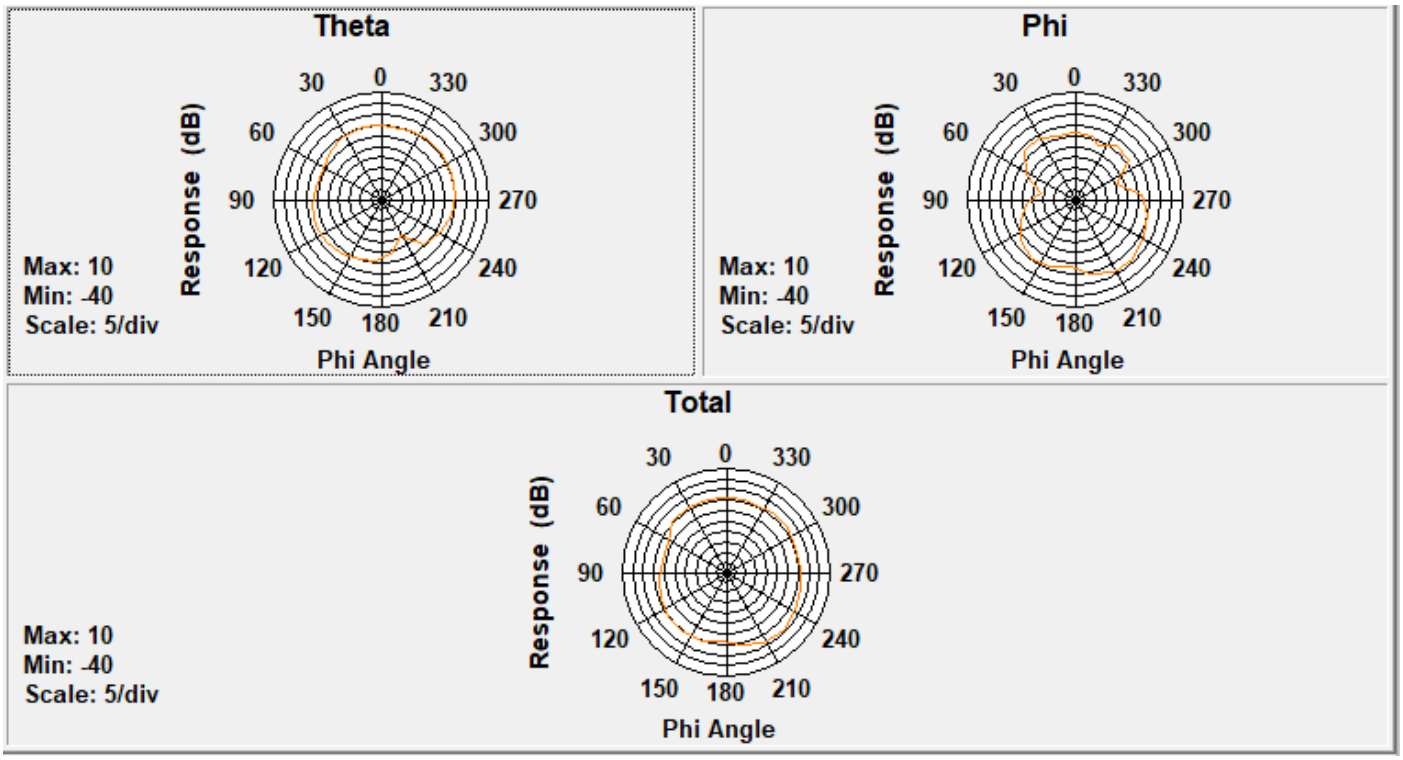
Center Frequency	**849MHz**
Horizontal (dBi) peak	-2.32
Vertical (dBi) peak	-1.07

880MHz



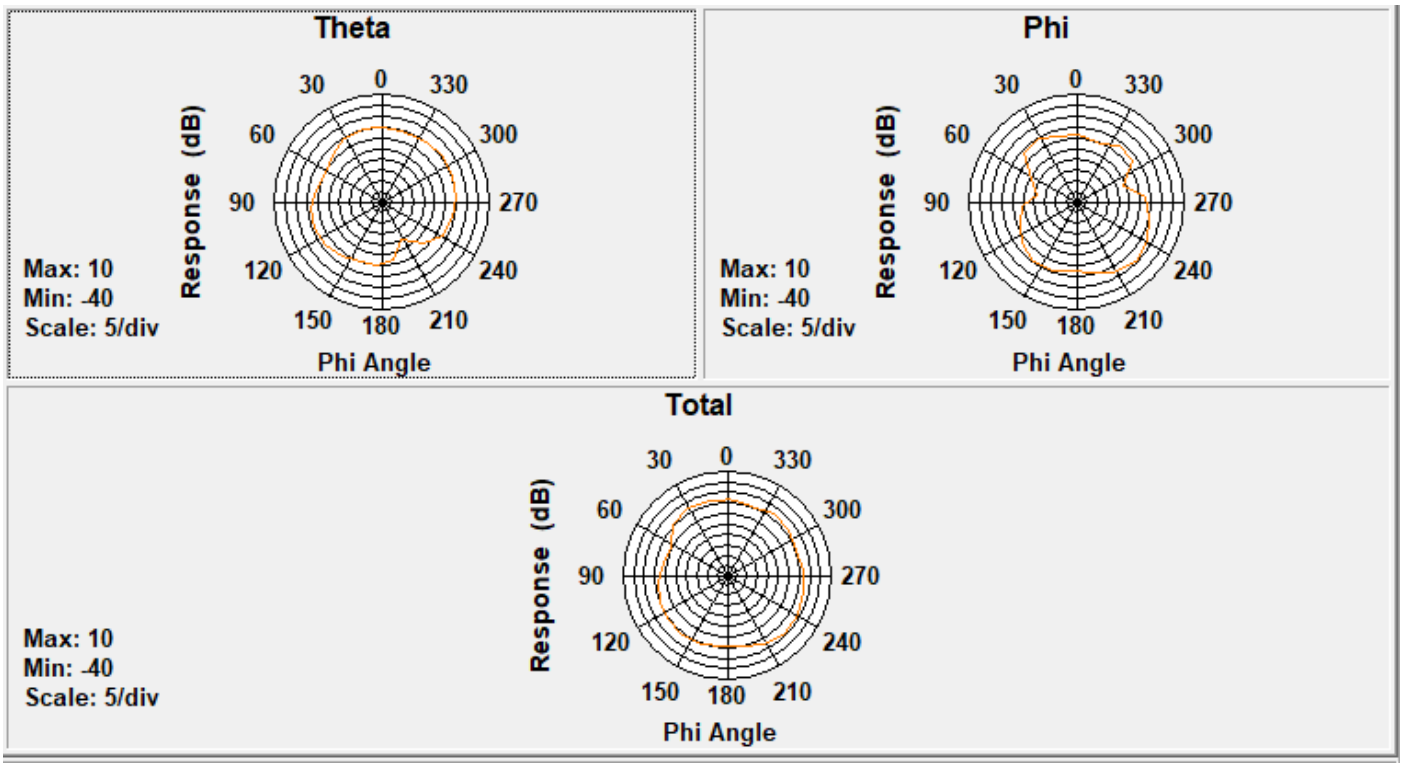
Center Frequency	**880MHz**
Horizontal (dBi) peak	-2.16
Vertical (dBi) peak	-0.61

894MHz



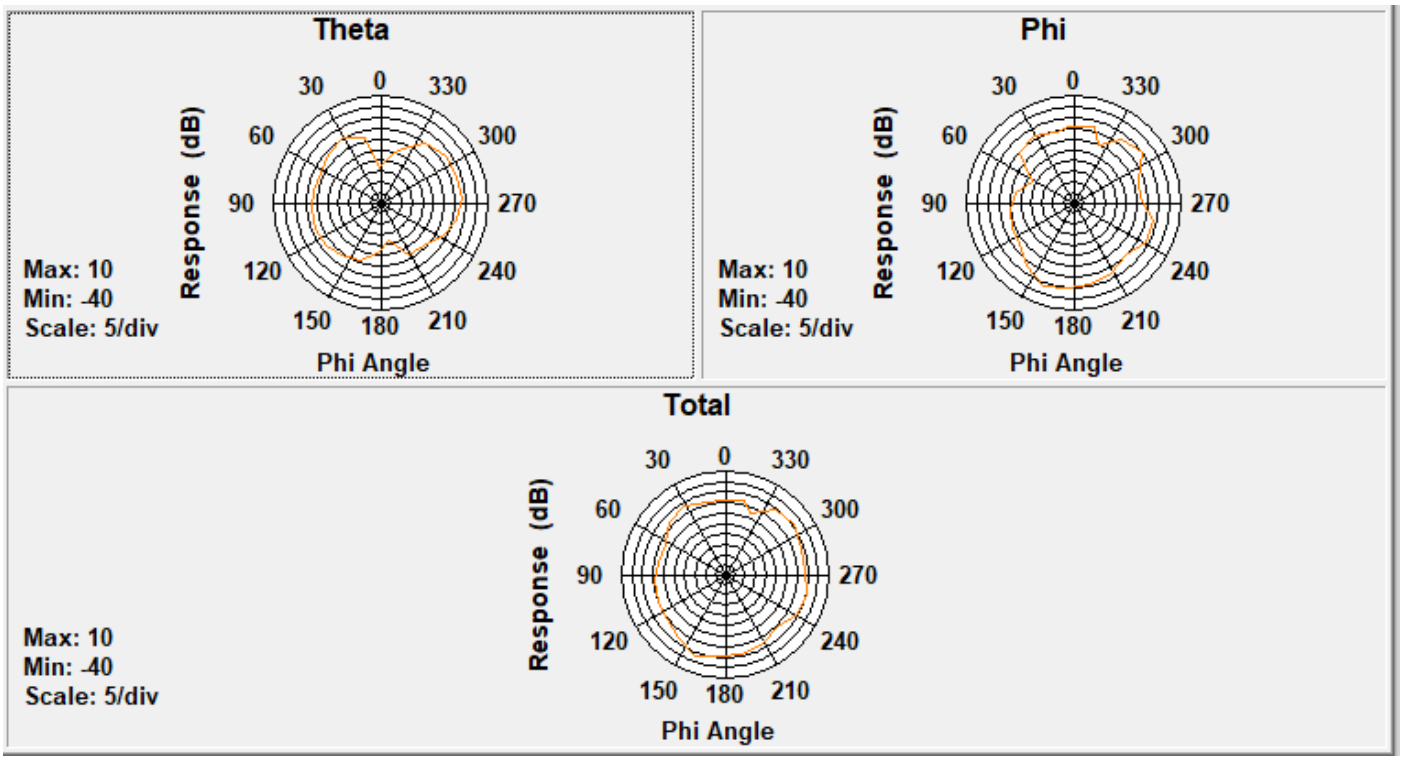
Center Frequency	**894MHz**
Horizontal (dBi) peak	-2.57
Vertical (dBi) peak	-0.43

915MHz



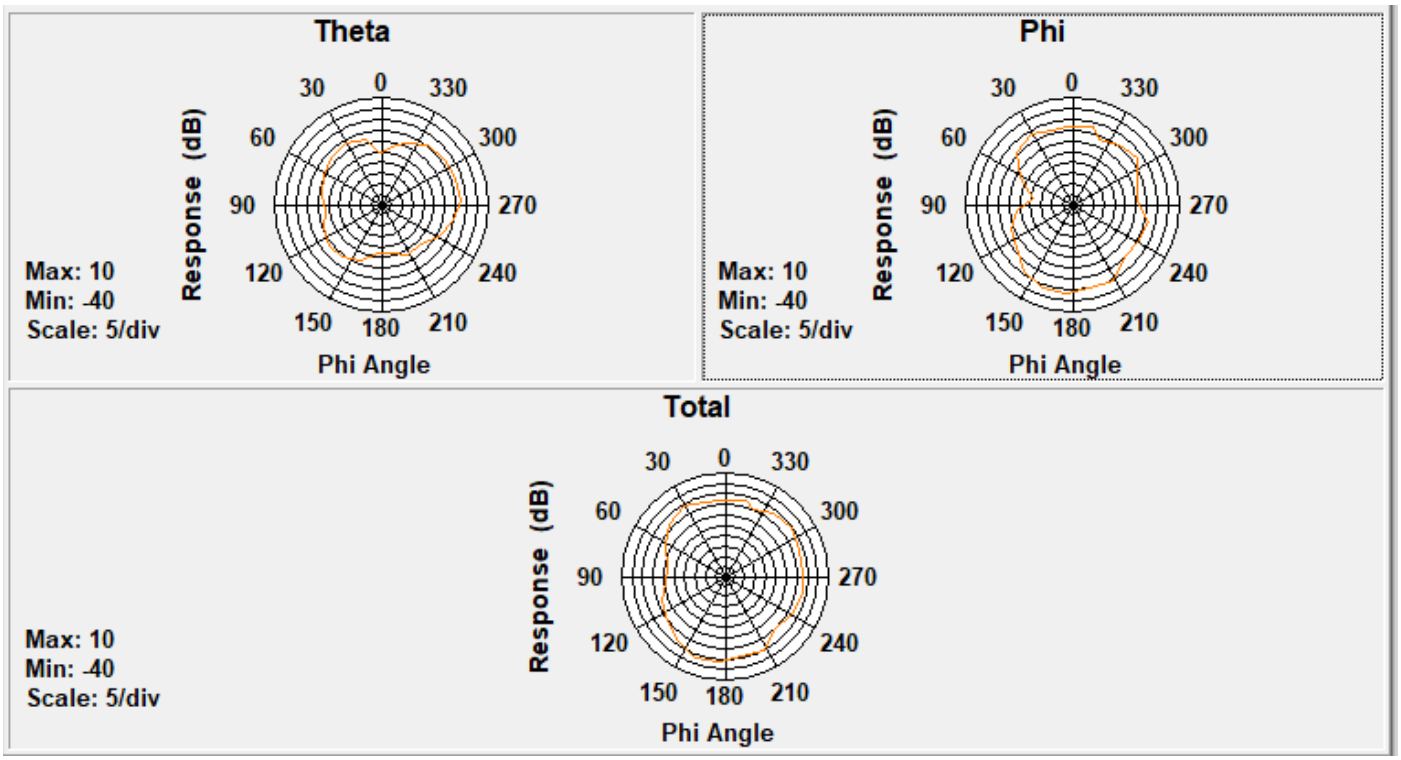
Center Frequency	**915MHz**
Horizontal (dBi) peak	-2.89
Vertical (dBi) peak	-0.35

1710MHz



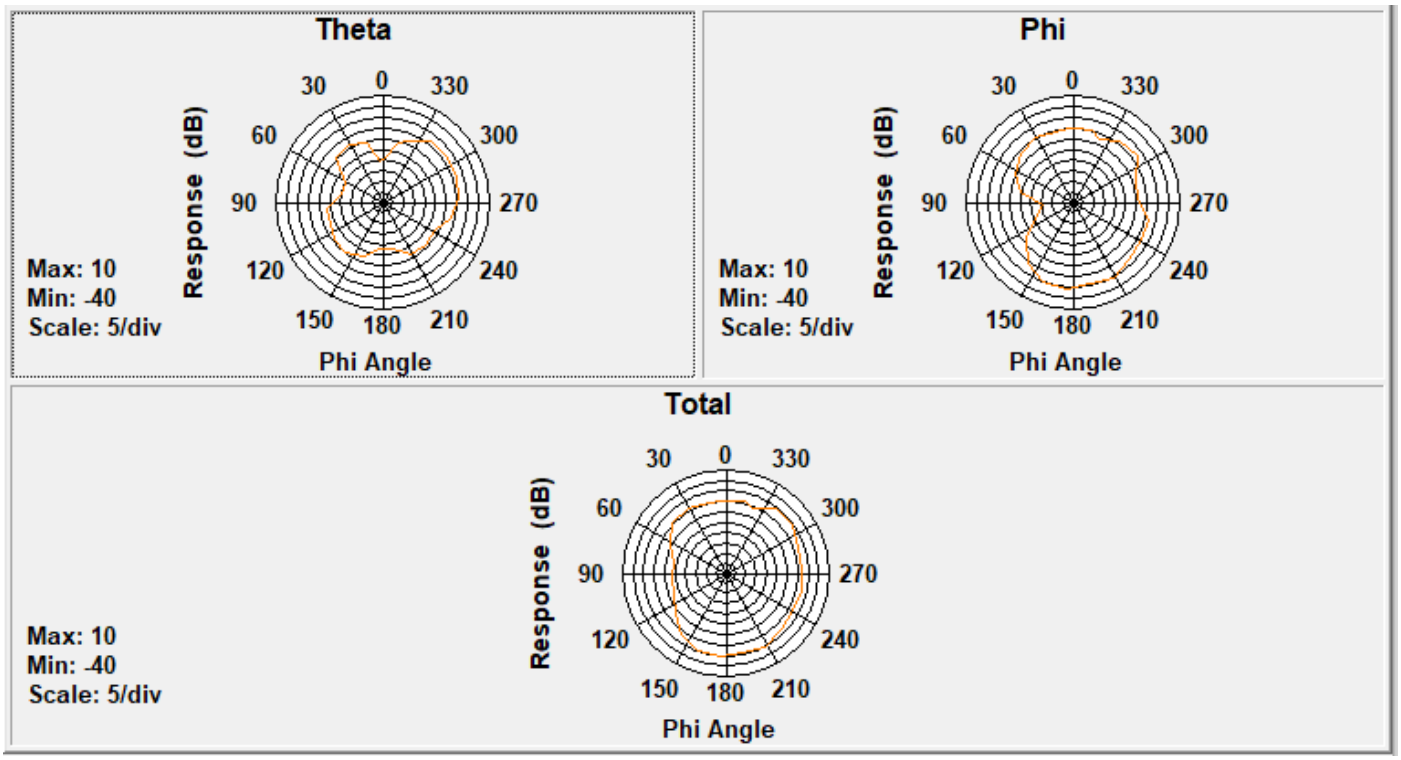
Center Frequency	**1710MHz**
Horizontal (dBi) peak	0.25
Vertical (dBi) peak	0.44

1750MHz



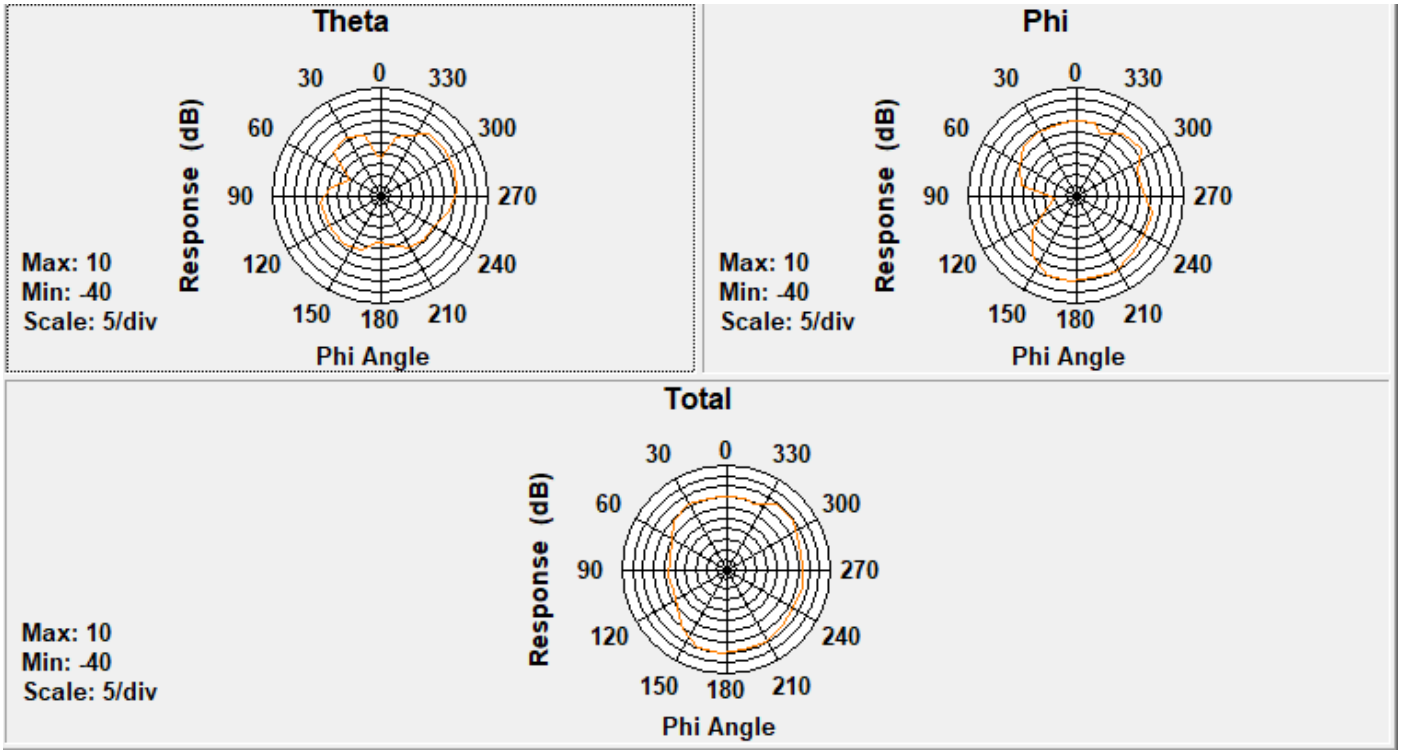
Center Frequency	**1750MHz**
Horizontal (dBi) peak	1.73
Vertical (dBi) peak	1.46

1780MHz



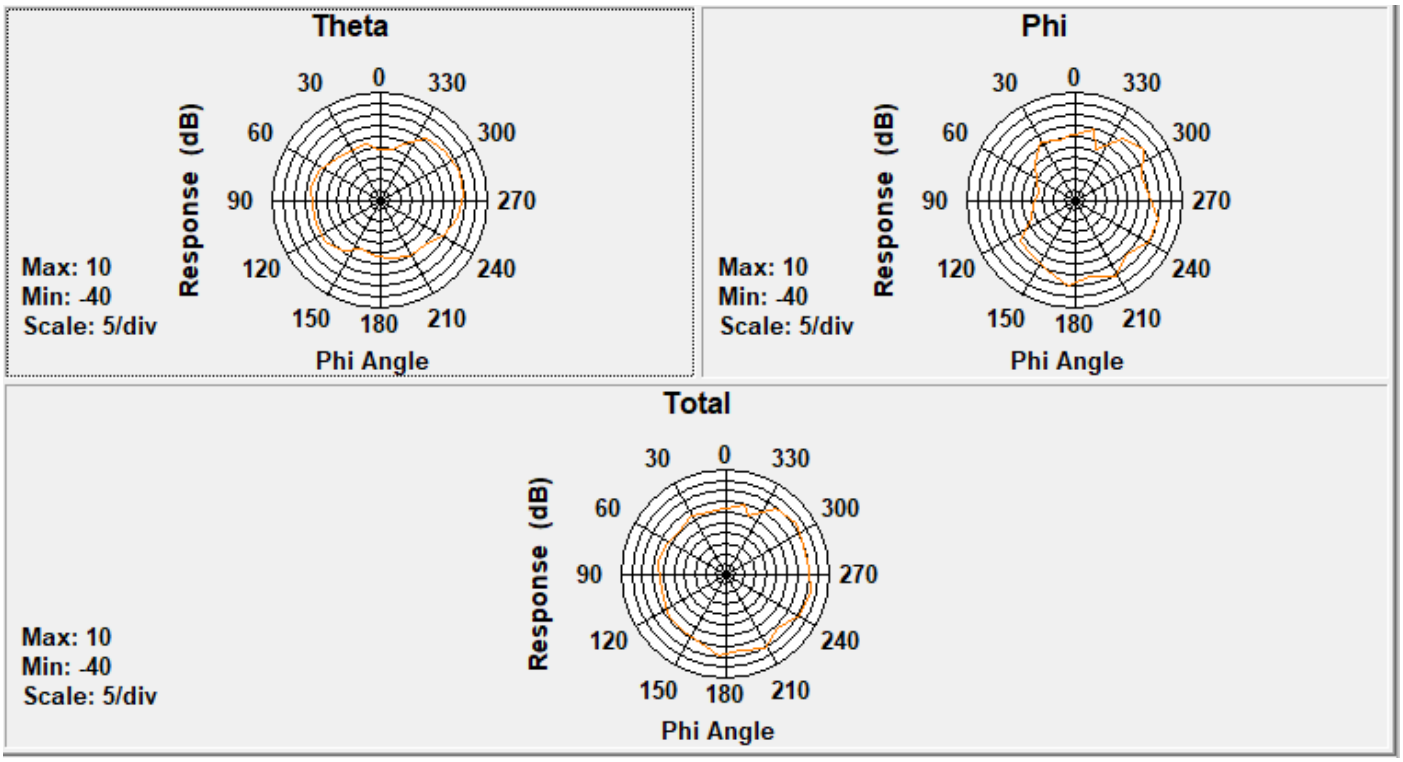
Center Frequency	**1780MHz**
Horizontal (dBi) peak	1.48
Vertical (dBi) peak	1.33

1785MHz



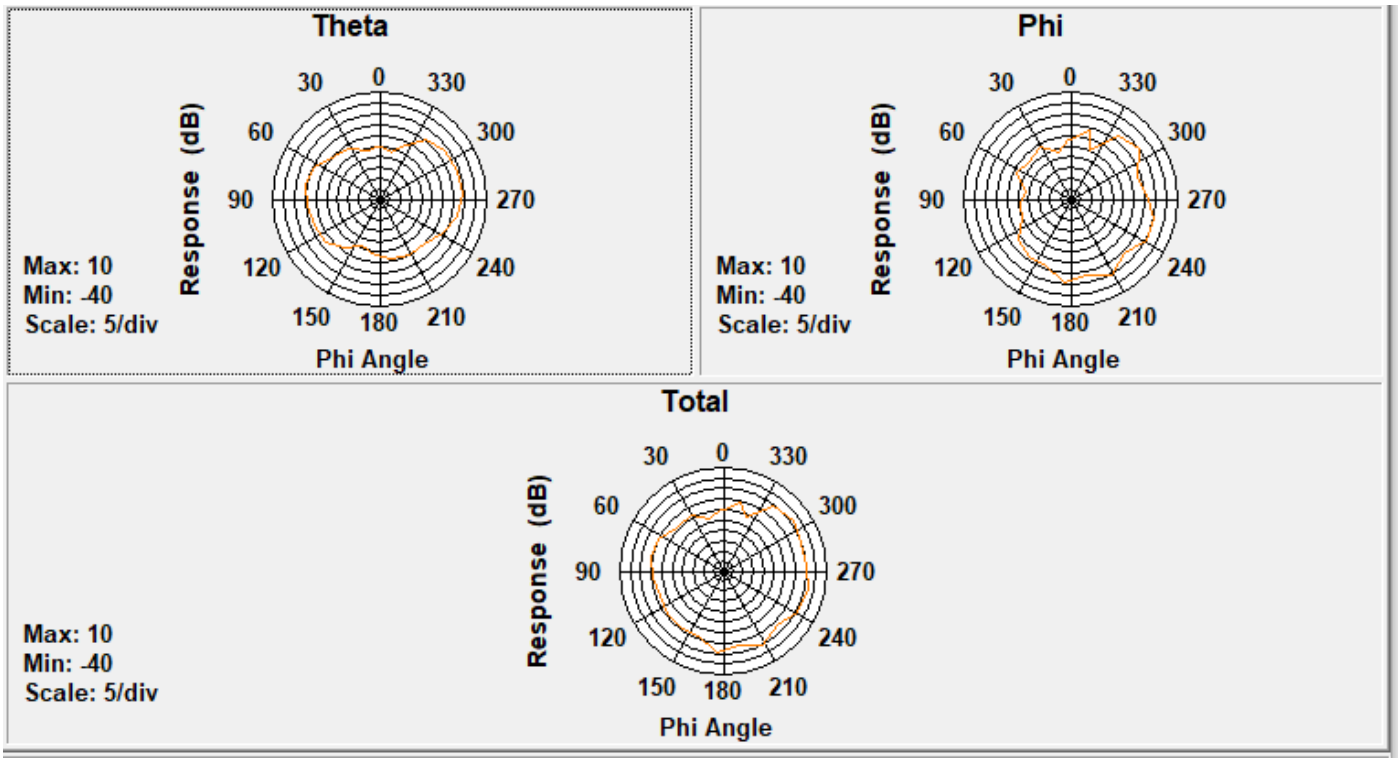
Center Frequency	**1785MHz**
Horizontal (dBi) peak	1.38
Vertical (dBi) peak	1.25

1880MHz



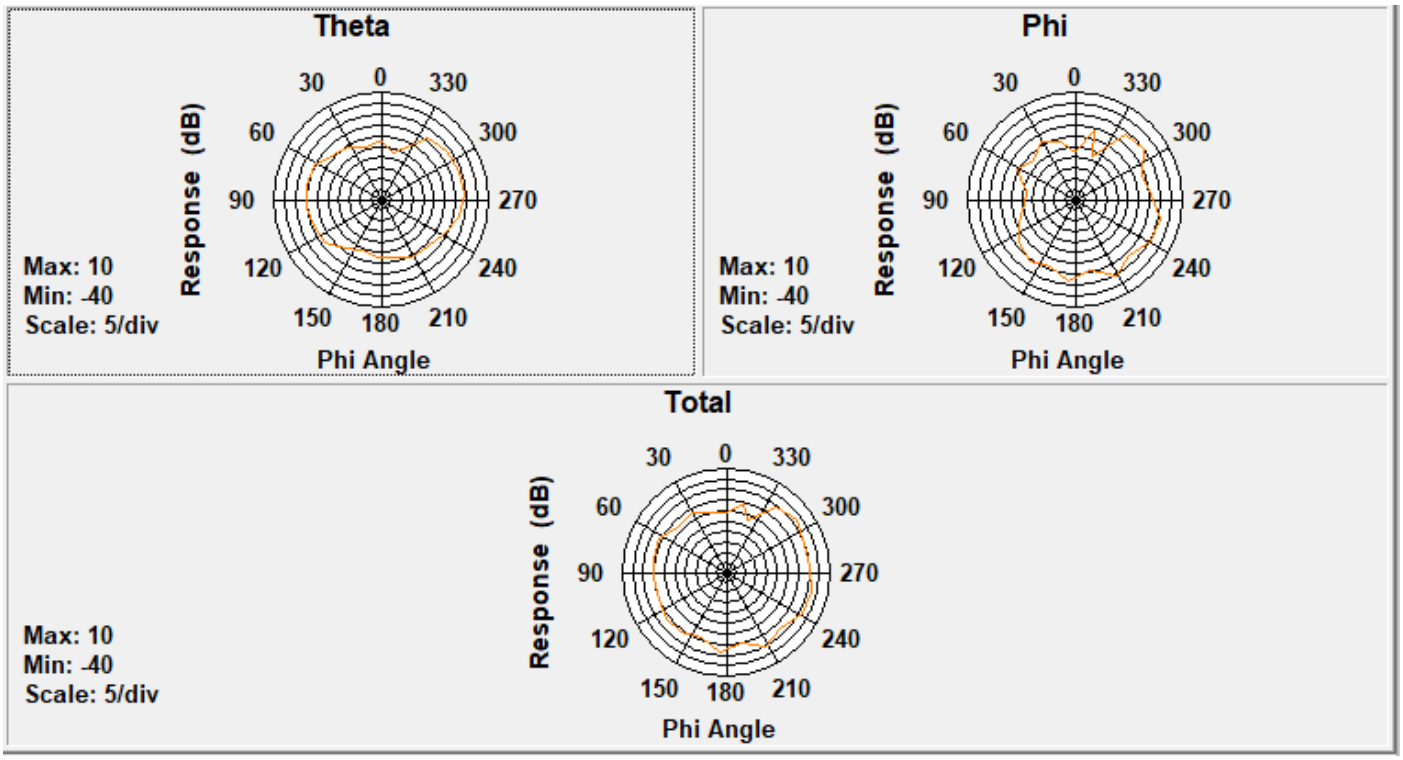
Center Frequency	**1880MHz**
Horizontal (dBi) peak	0.07
Vertical (dBi) peak	0.33

1900MHz



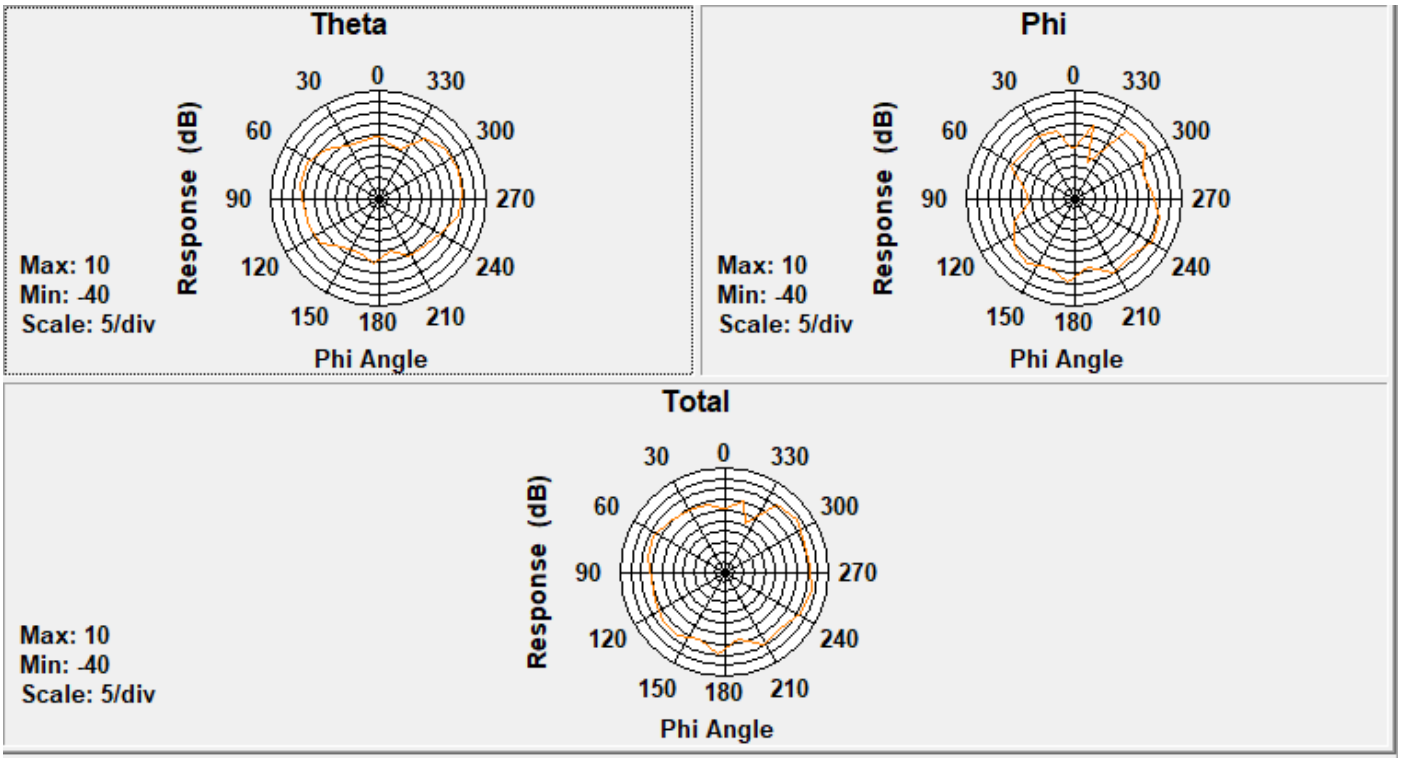
Center Frequency	**1900MHz**
Horizontal (dBi) peak	0.28
Vertical (dBi) peak	0.29

1920MHz



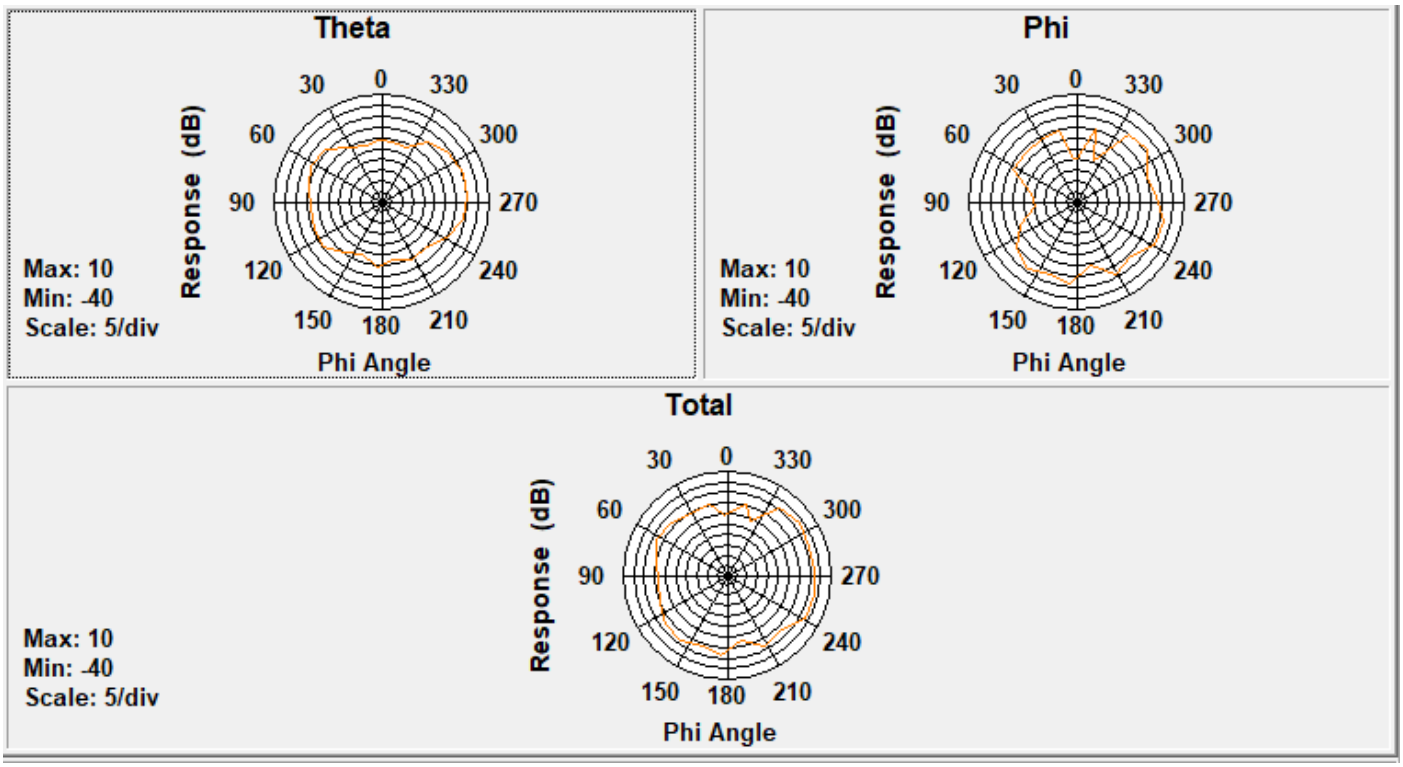
Center Frequency	**1920MHz**
Horizontal (dBi) peak	0.54
Vertical (dBi) peak	0.83

1950MHz



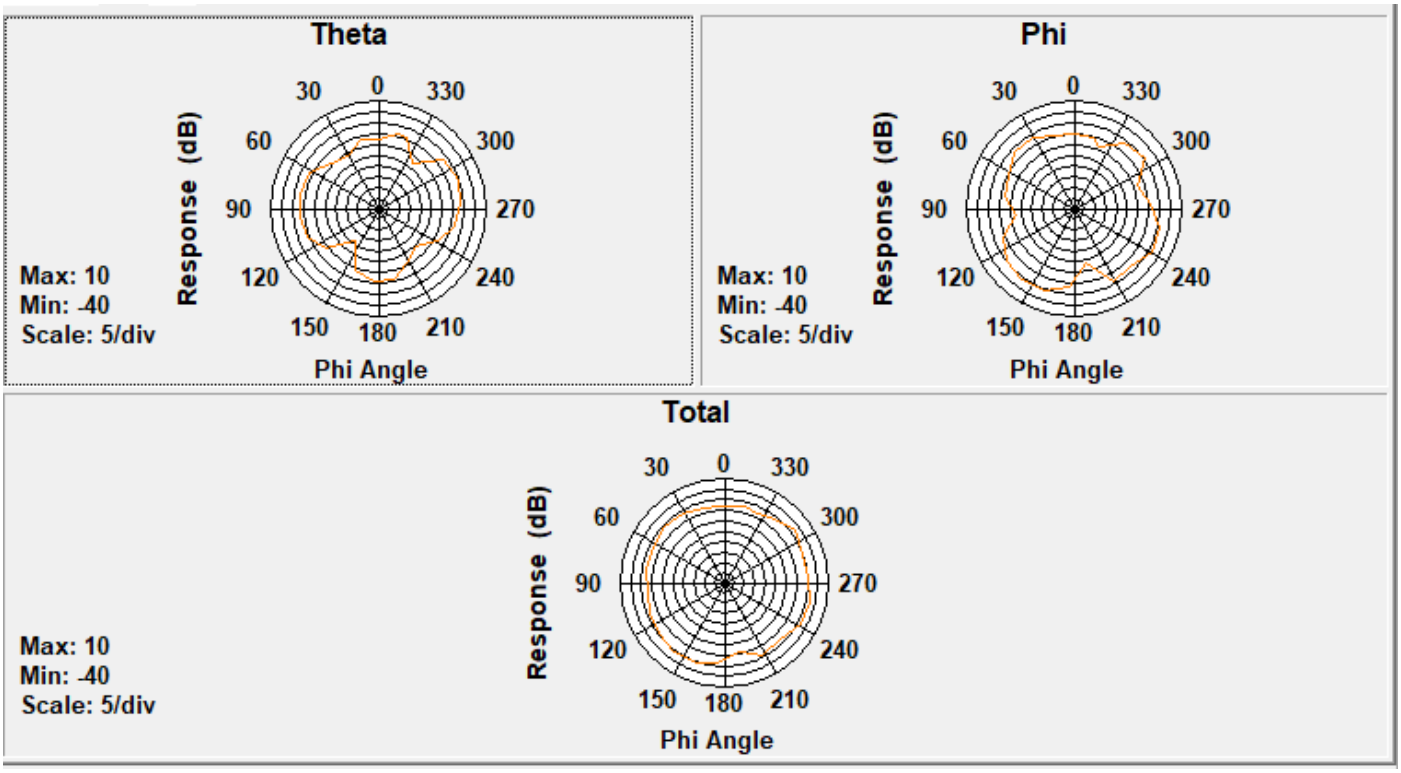
Center Frequency	**1950MHz**
Horizontal (dBi) peak	0.96
Vertical (dBi) peak	1.79

1980MHz



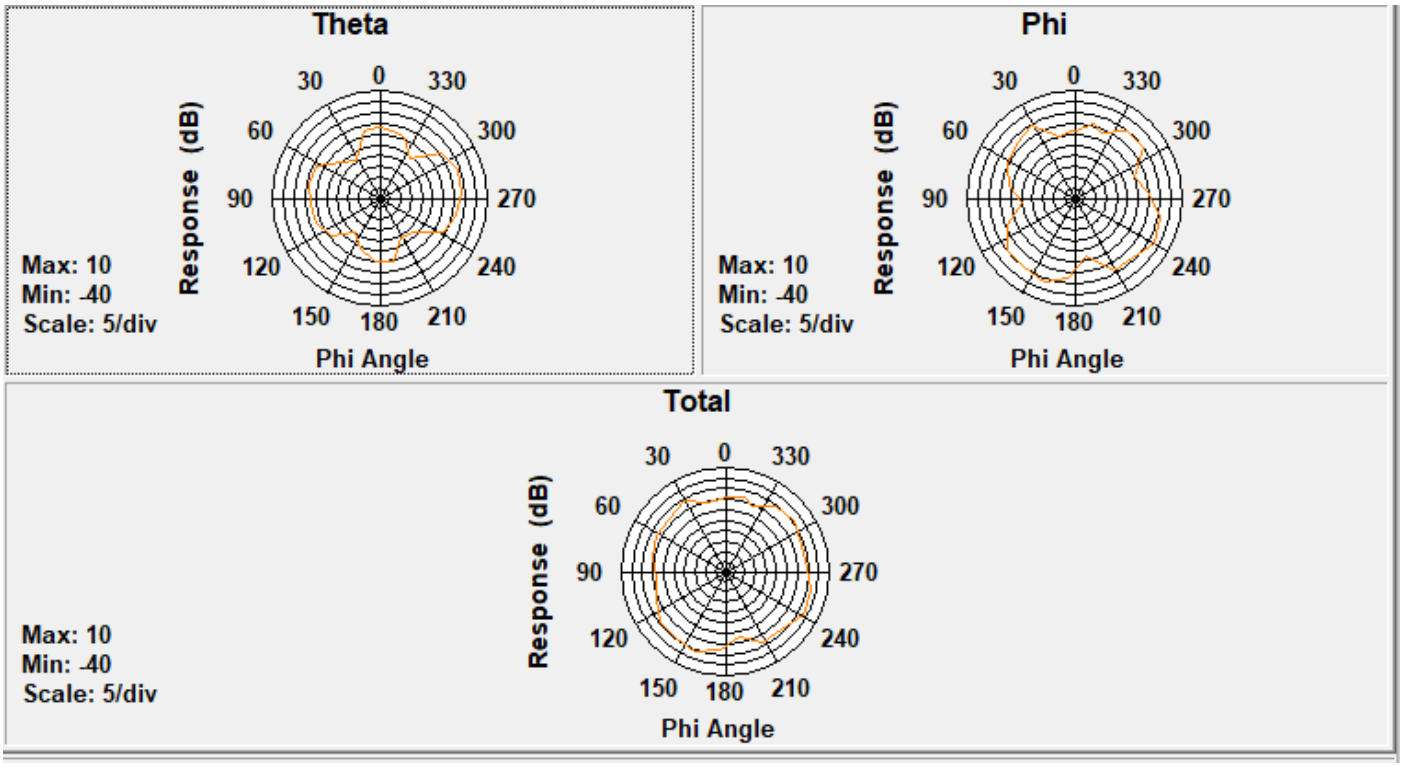
Center Frequency	**1980MHz**
Horizontal (dBi) peak	1.29
Vertical (dBi) peak	2.13

2496MHz



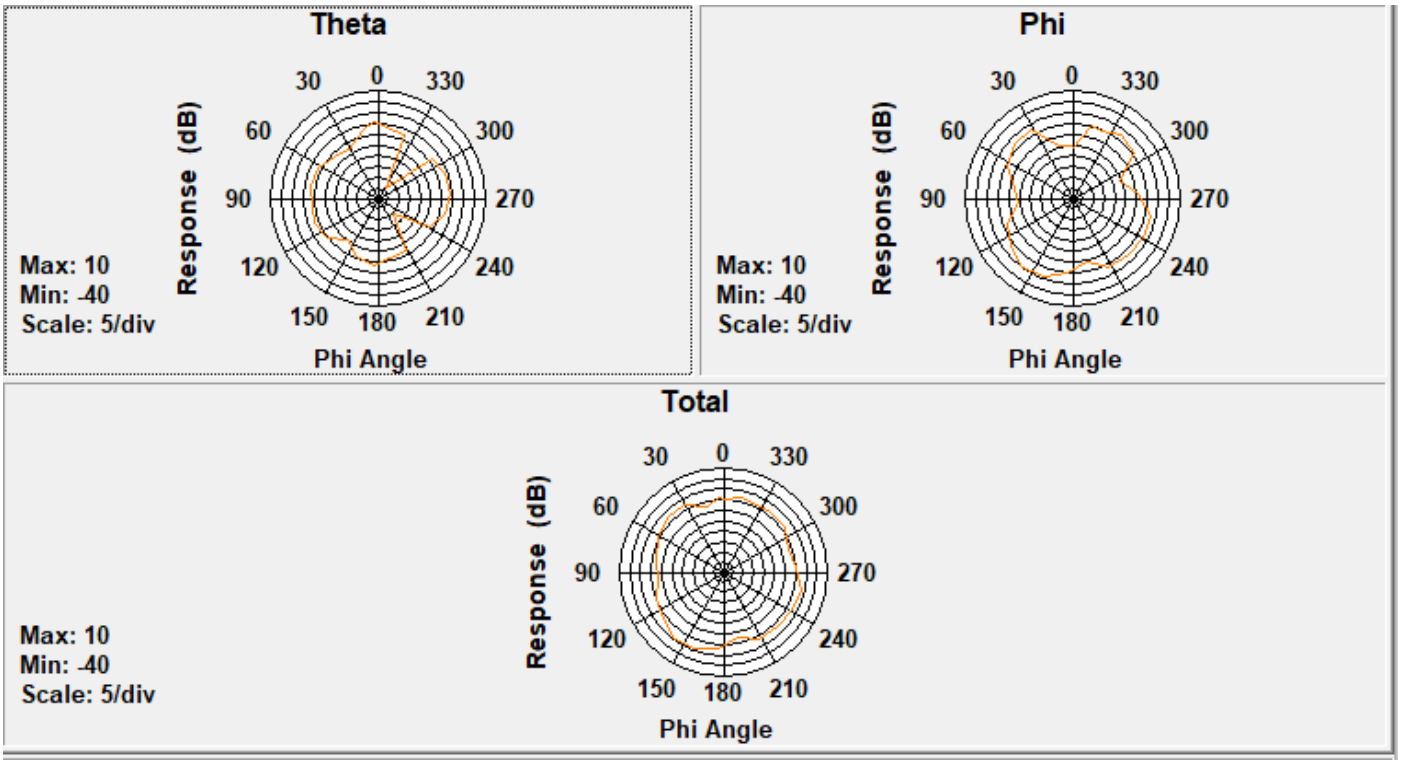
Center Frequency	**2496MHz**
Horizontal (dBi) peak	0.88
Vertical (dBi) peak	0.62

2595MHz



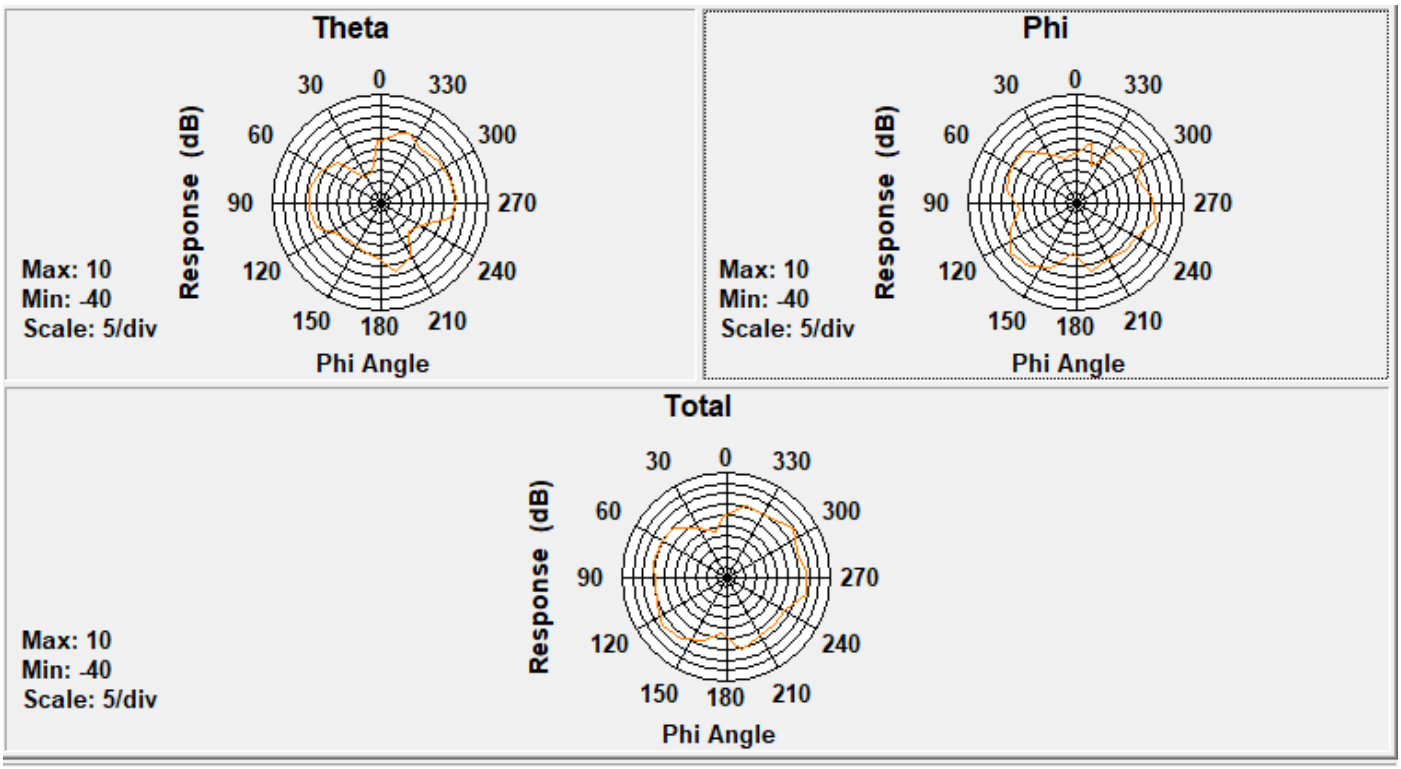
Center Frequency	**2595MHz**
Horizontal (dBi) peak	1.75
Vertical (dBi) peak	1.95

2690MHz



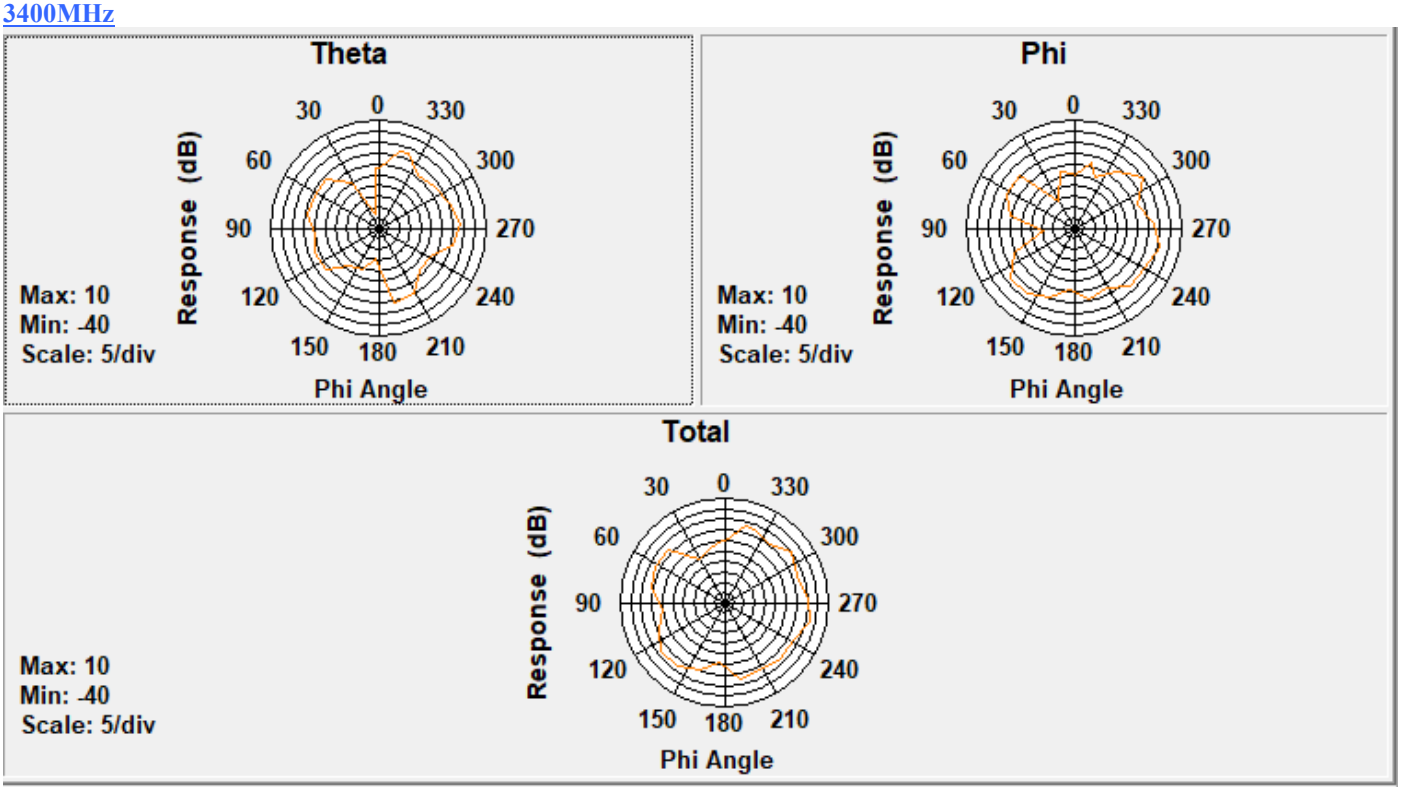
Center Frequency	**2690MHz**
Horizontal (dBi) peak	-0.88
Vertical (dBi) peak	-0.86

3300MHz



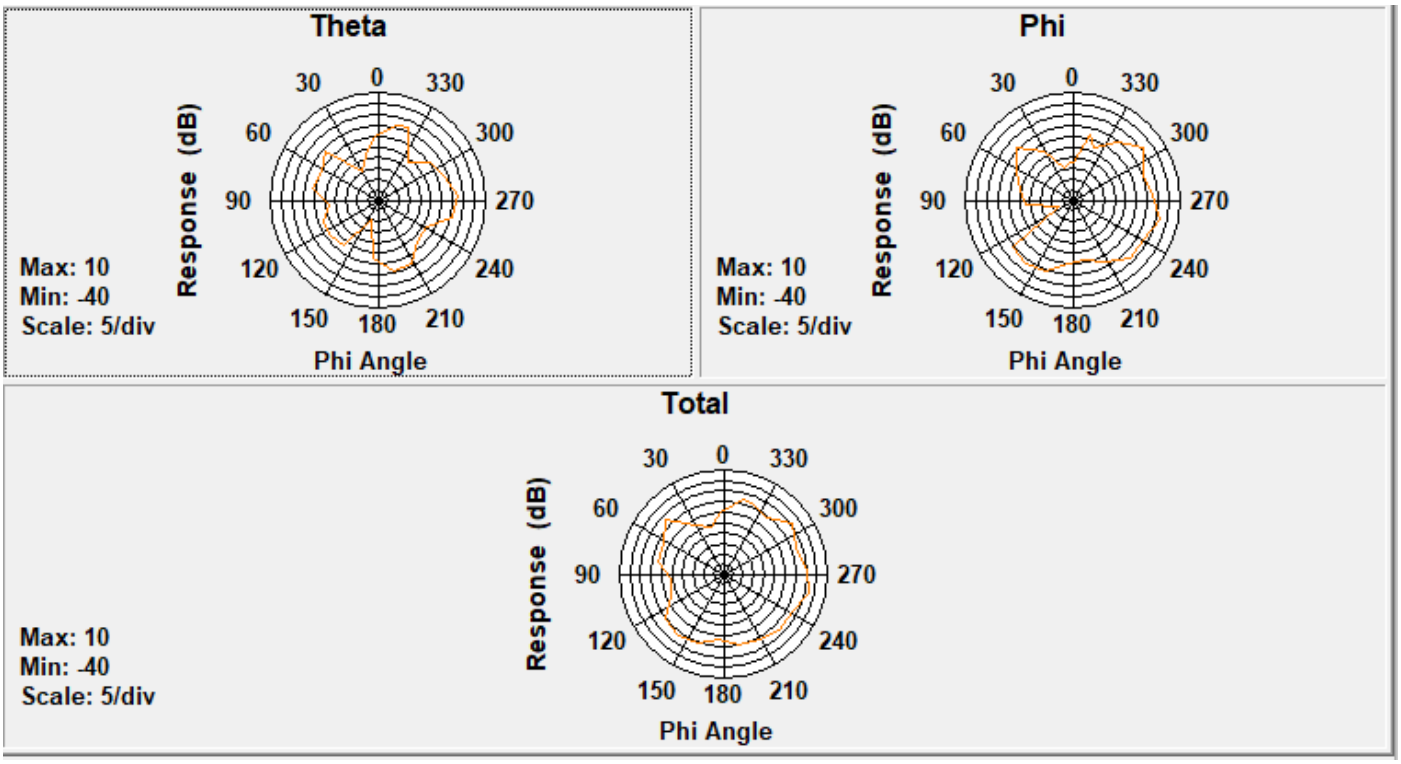
Center Frequency	**3300MHz**
Horizontal (dBi) peak	-1.60
Vertical (dBi) peak	-1.66

3400MHz



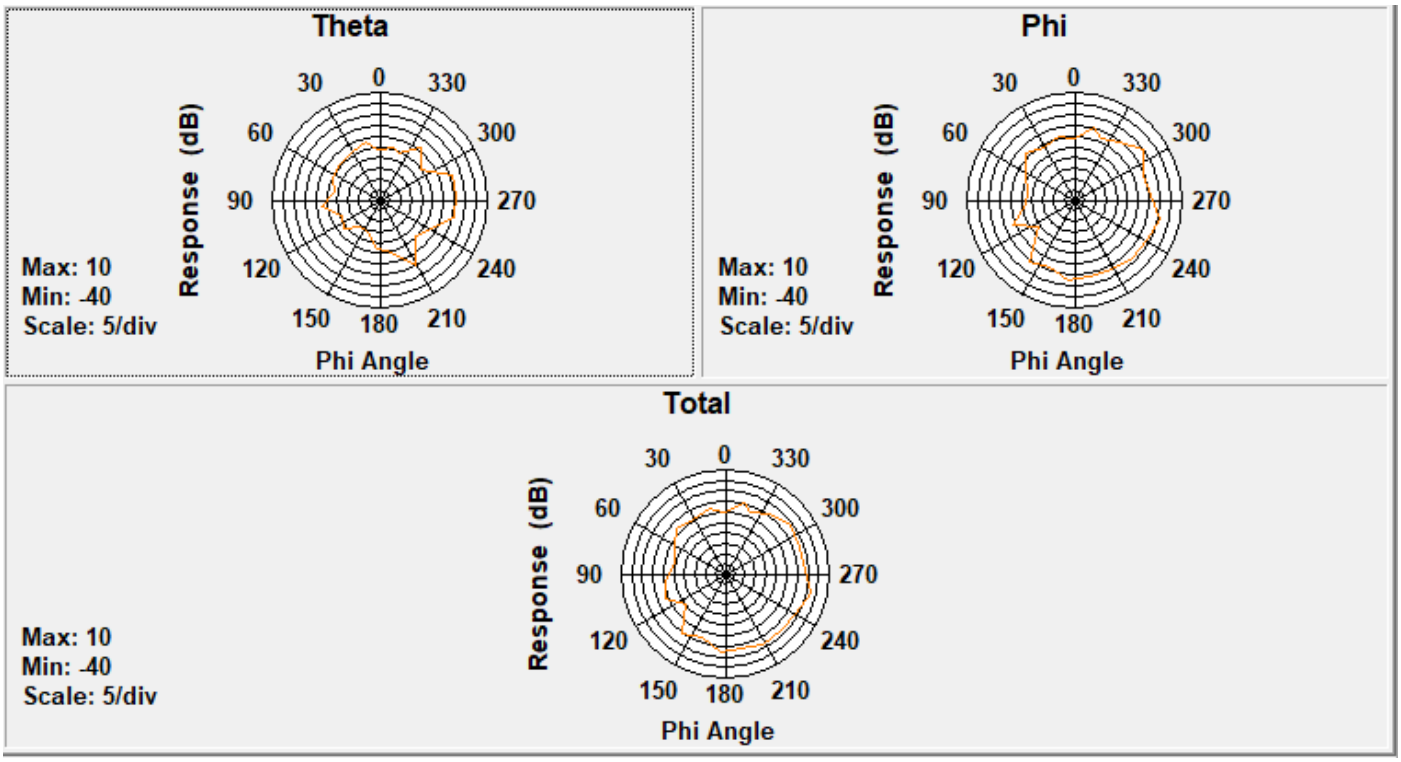
Center Frequency	**3400MHz**
Horizontal (dBi) peak	0.48
Vertical (dBi) peak	0.17

3500MHz



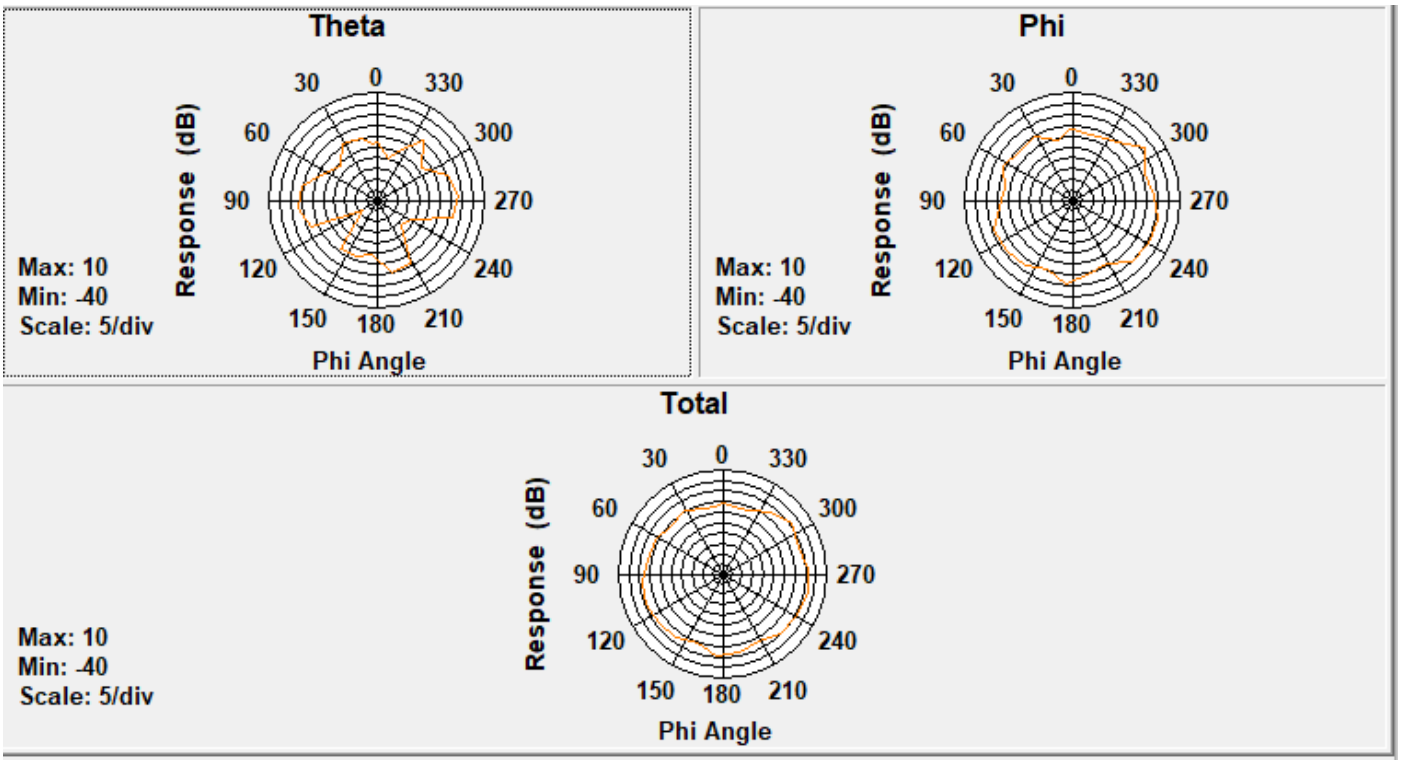
Center Frequency	**3500MHz**
Horizontal (dBi) peak	-1.22
Vertical (dBi) peak	0.64

3600MHz



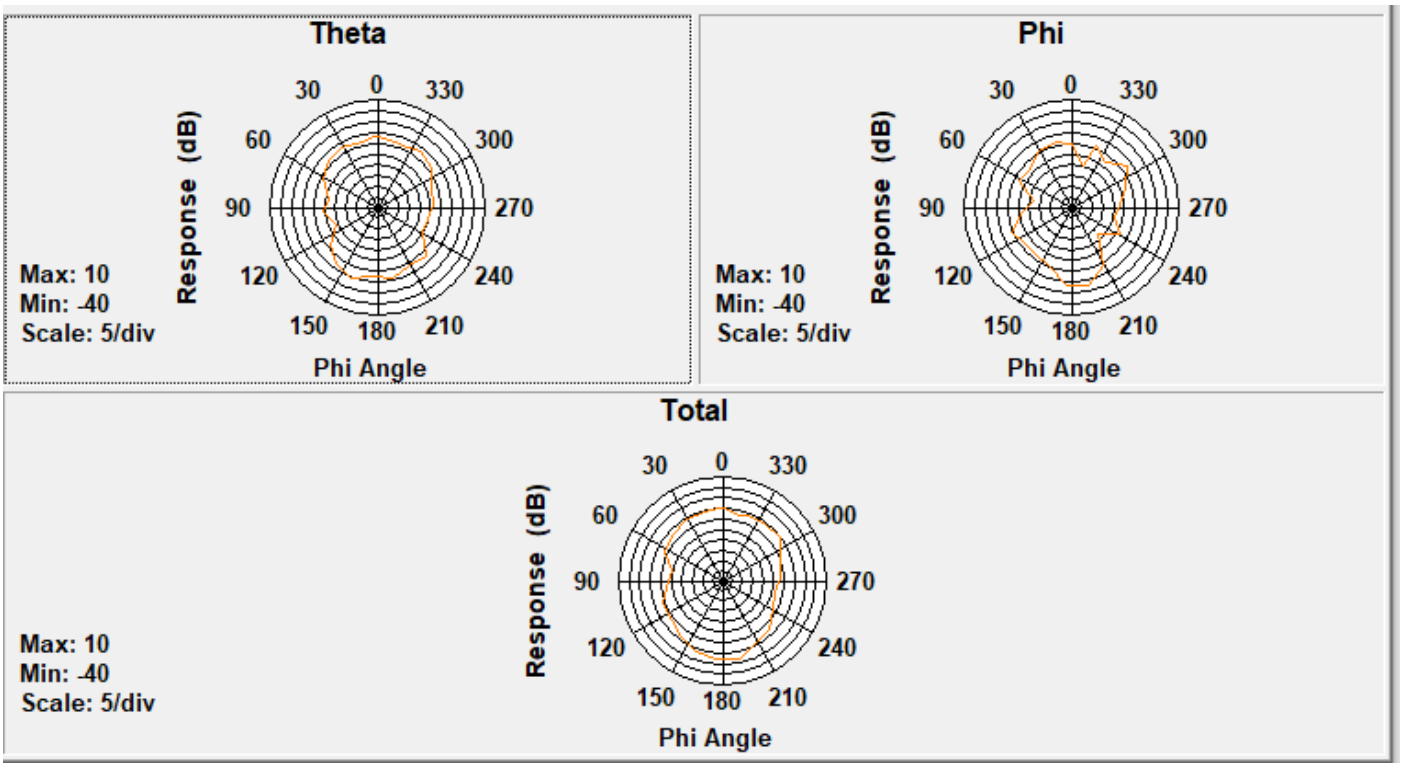
Center Frequency	**3600MHz**
Horizontal (dBi) peak	-0.99
Vertical (dBi) peak	-0.08

3750MHz



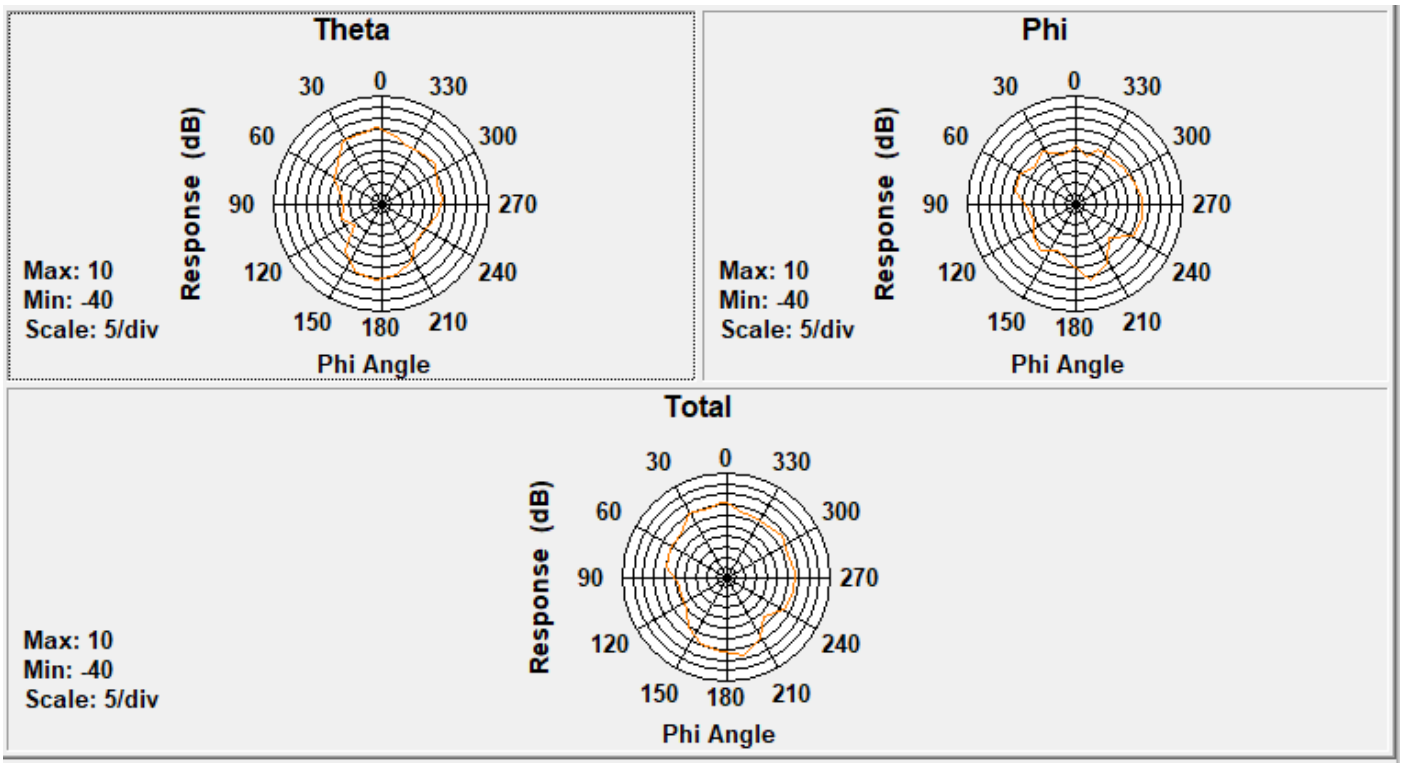
Center Frequency	**3750MHz**
Horizontal (dBi) peak	0.63
Vertical (dBi) peak	1.23

4200MHz



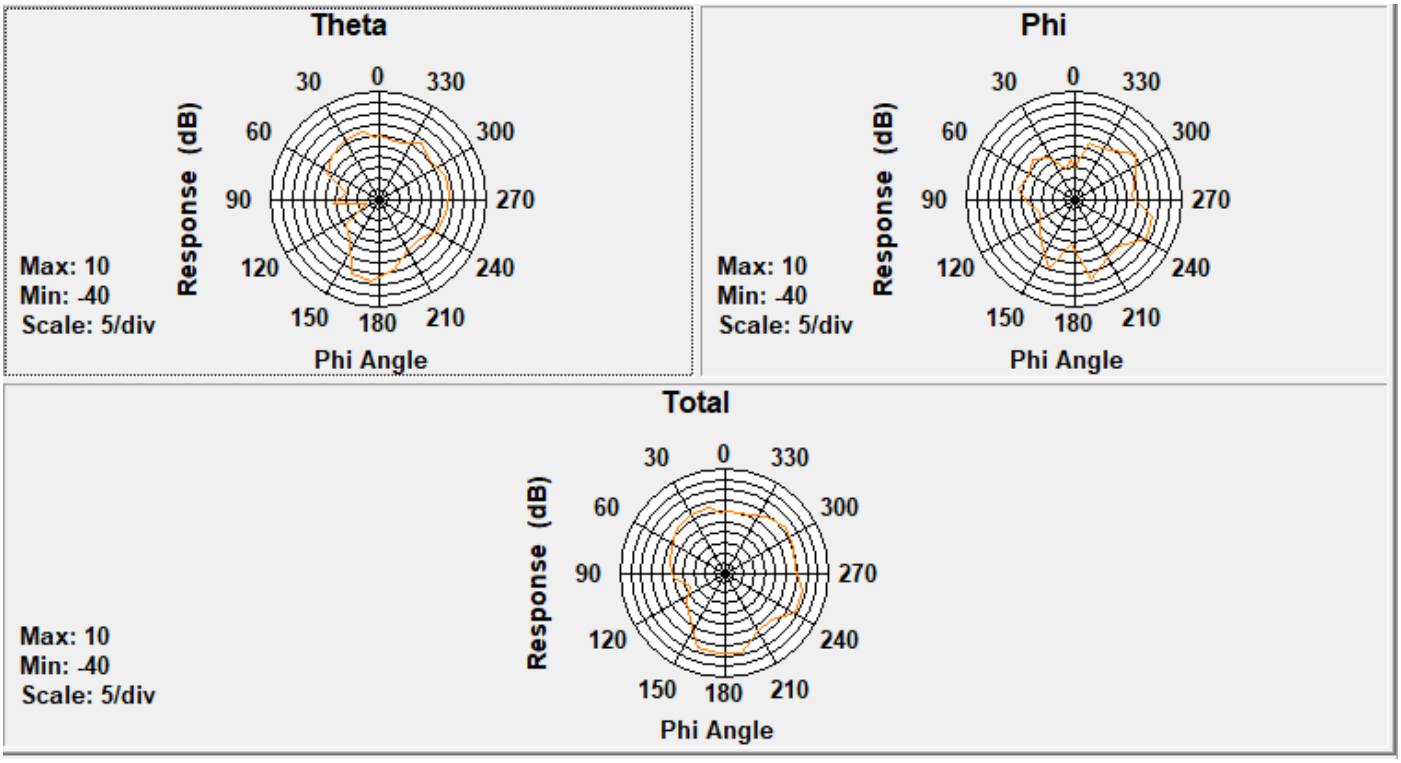
Center Frequency	**4200MHz**
Horizontal (dBi) peak	-3.64
Vertical (dBi) peak	-2.15

4400MHz



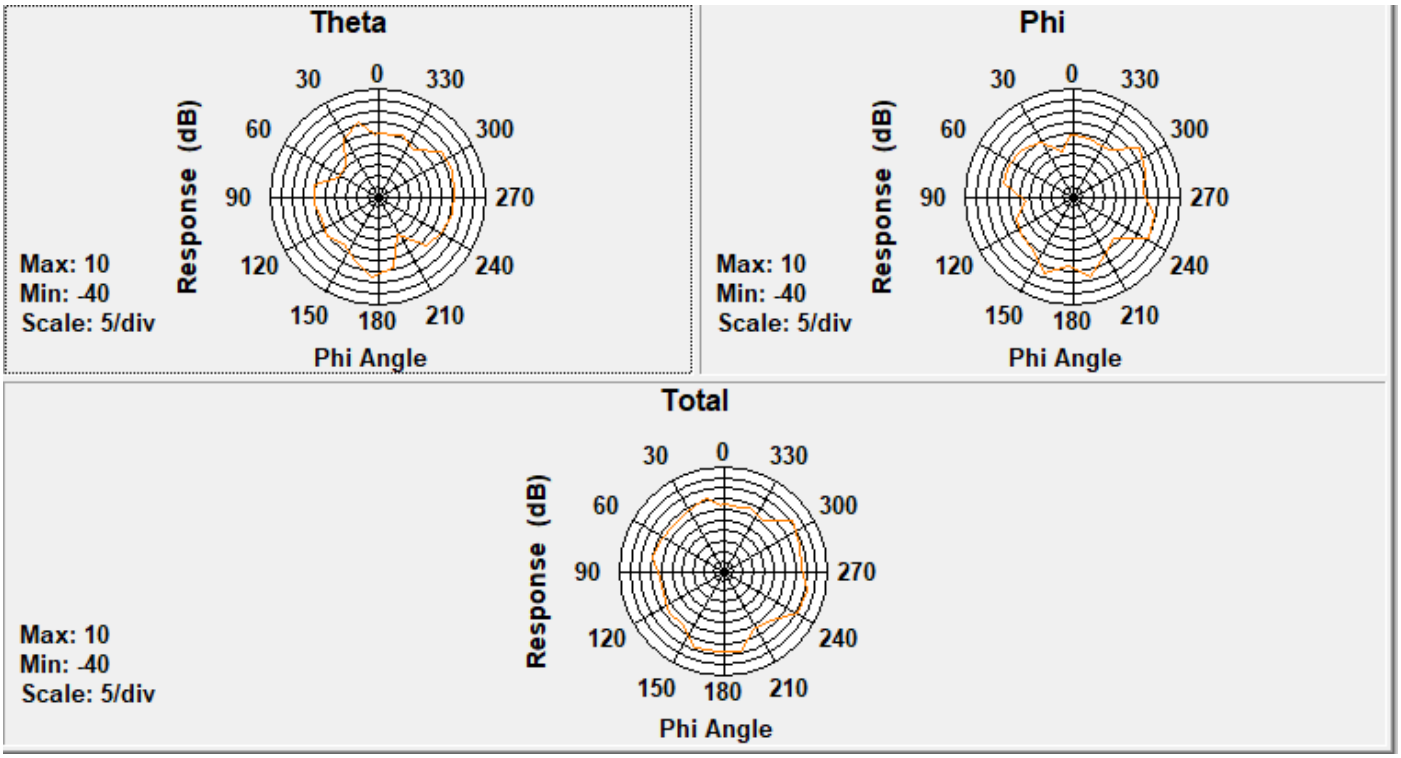
Center Frequency	**4400MHz**
Horizontal (dBi) peak	-3.13
Vertical (dBi) peak	-3.67

4800MHz



Center Frequency	**4800MHz**
Horizontal (dBi) peak	-0.84
Vertical (dBi) peak	-1.96

5000MHz

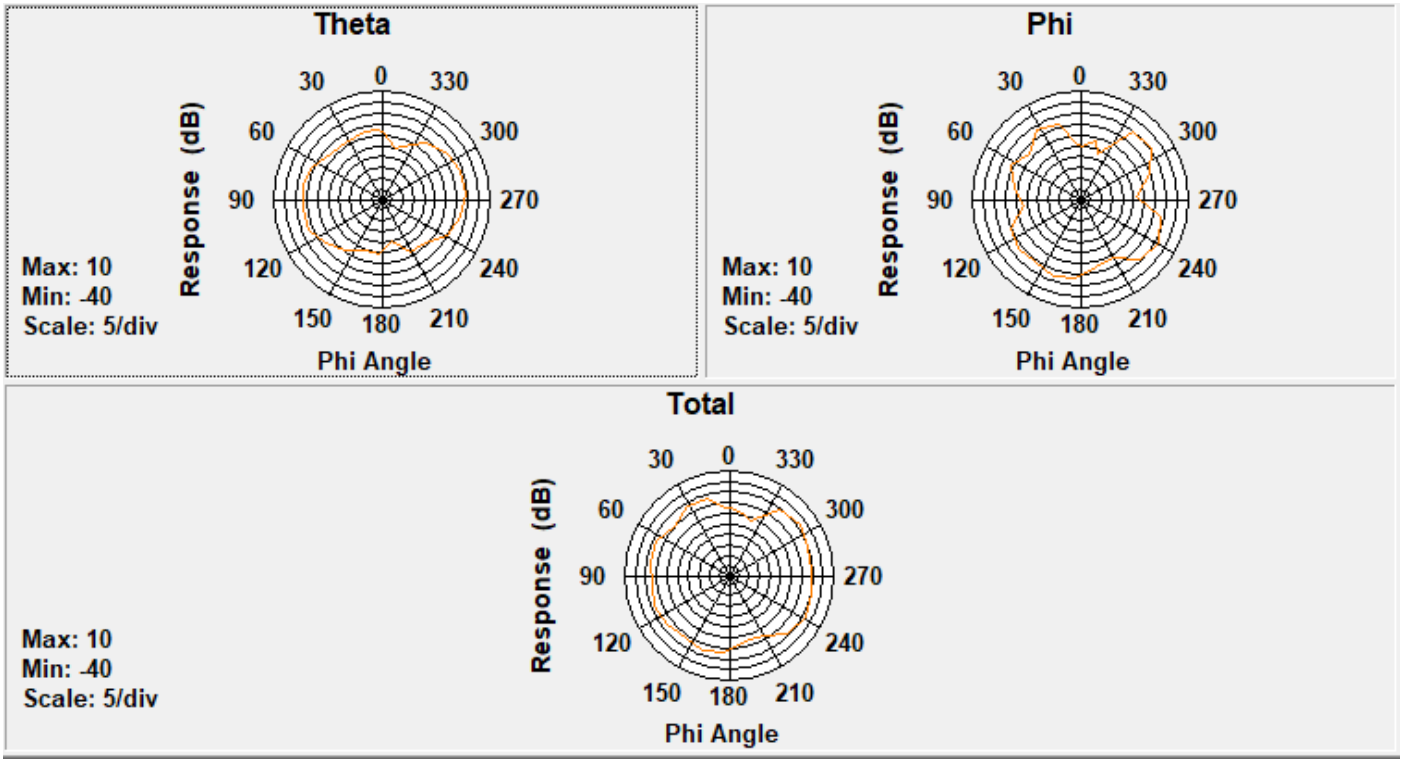


Center Frequency	**5000MHz**
Horizontal (dBi) peak	1.05
Vertical (dBi) peak	2.11

- **Ant8:**

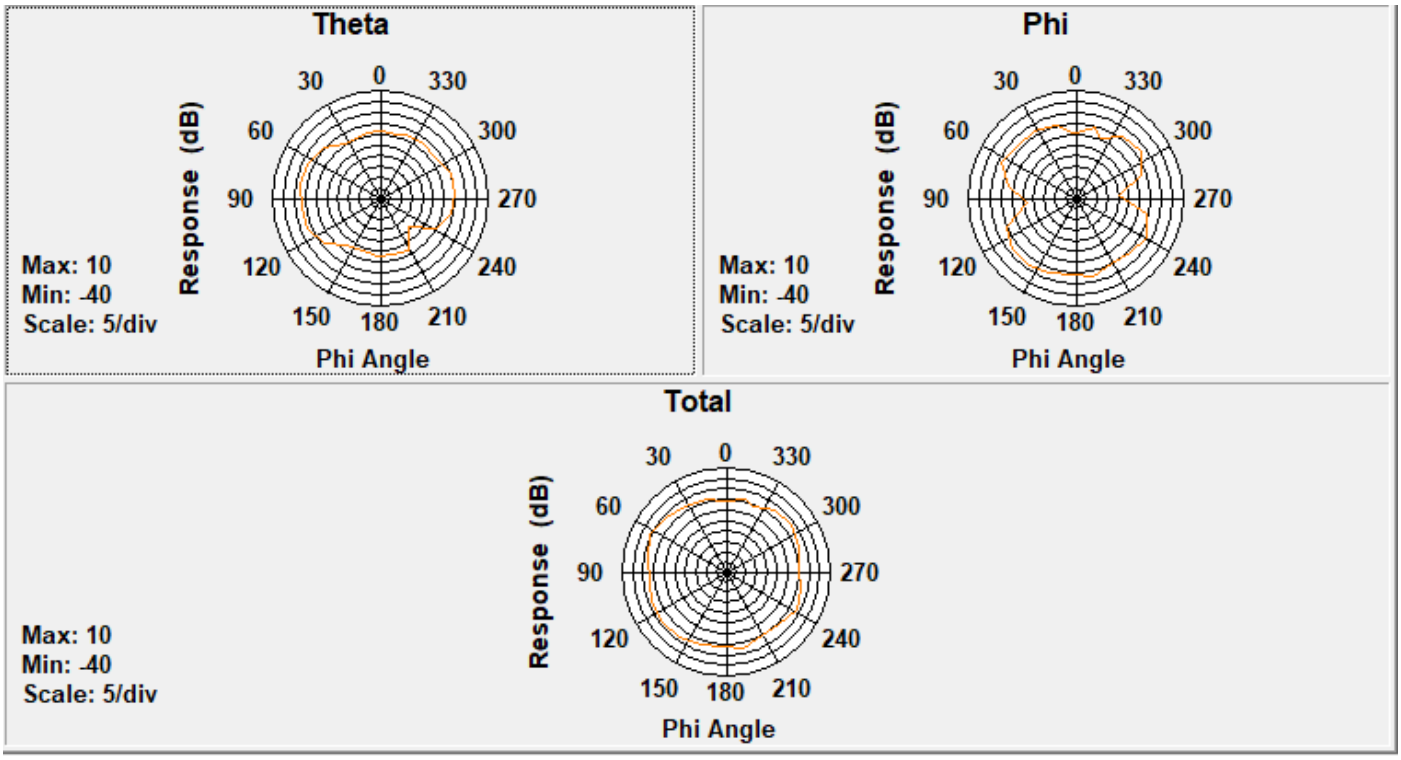
Example

1710 MHz



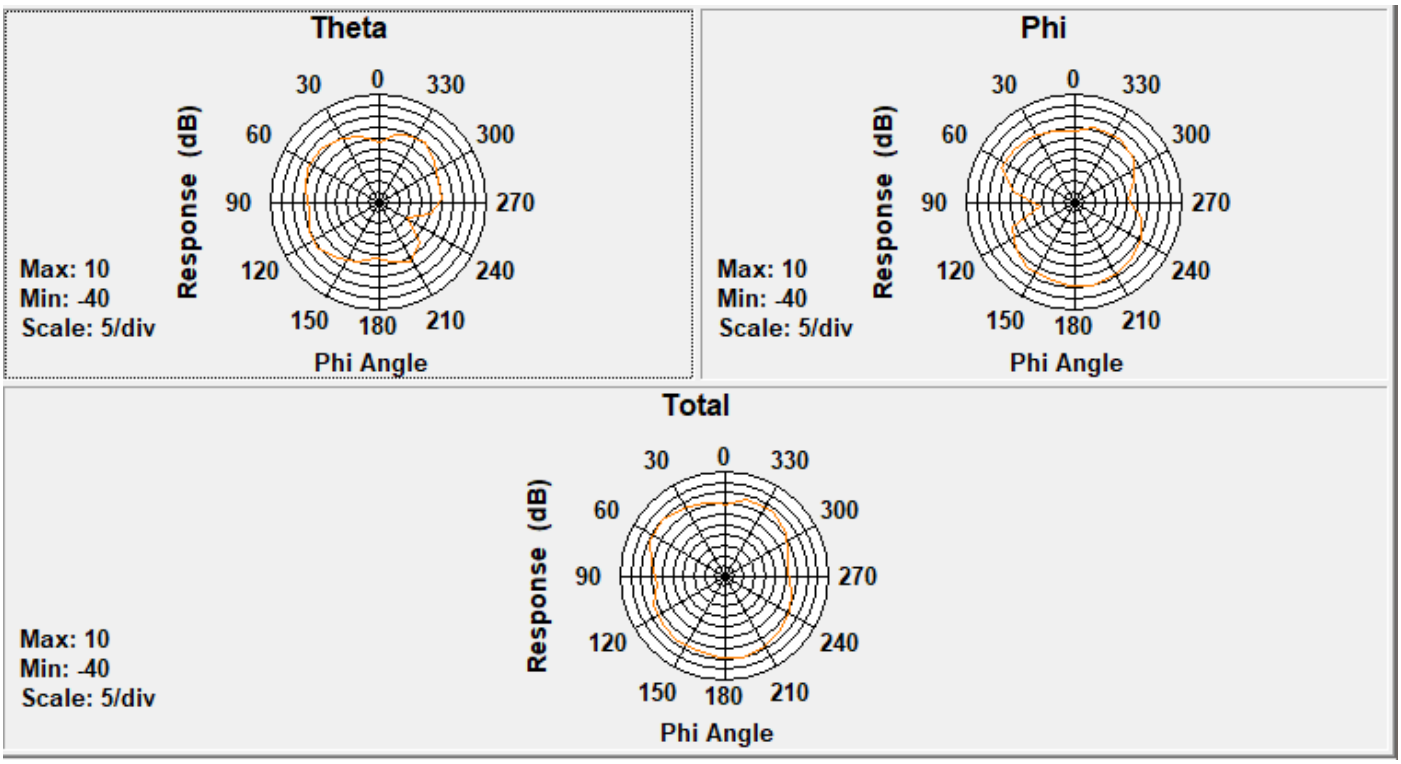
Center Frequency	**1710MHz**
Horizontal (dBi) peak	-0.35
Vertical (dBi) peak	0.61

1750 MHz



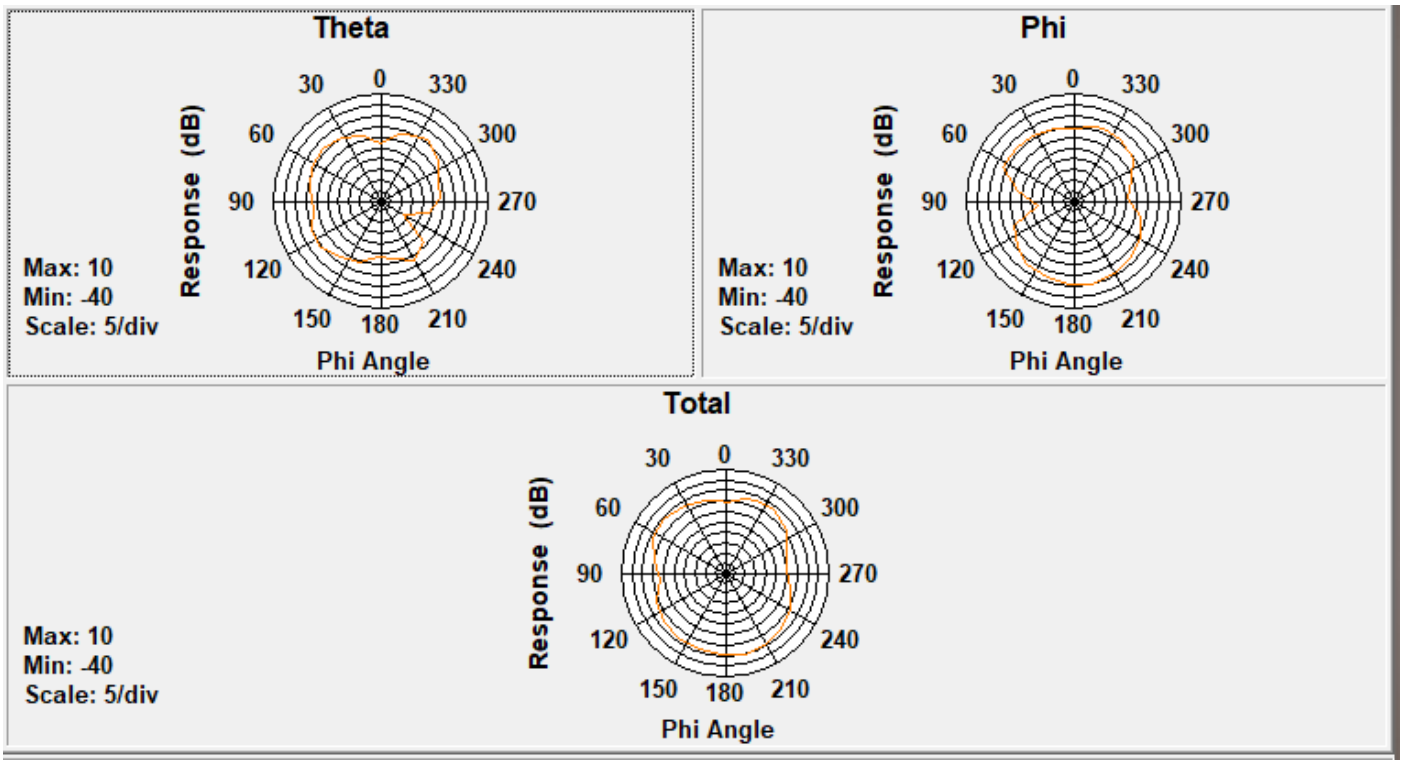
Center Frequency	**1750MHz**
Horizontal (dBi) peak	-0.77
Vertical (dBi) peak	-0.62

1780 MHz



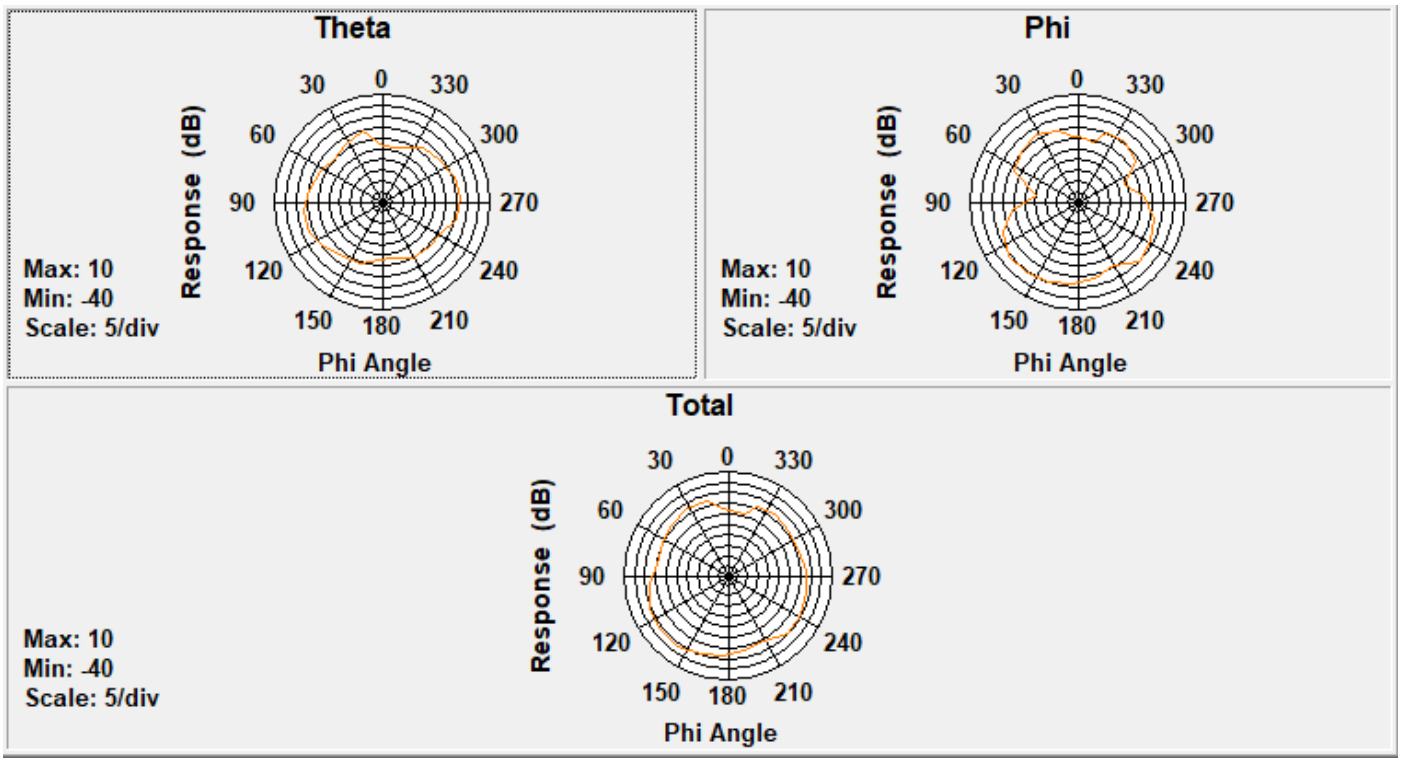
Center Frequency	**1780MHz**
Horizontal (dBi) peak	0.95
Vertical (dBi) peak	0.86

1785 MHz



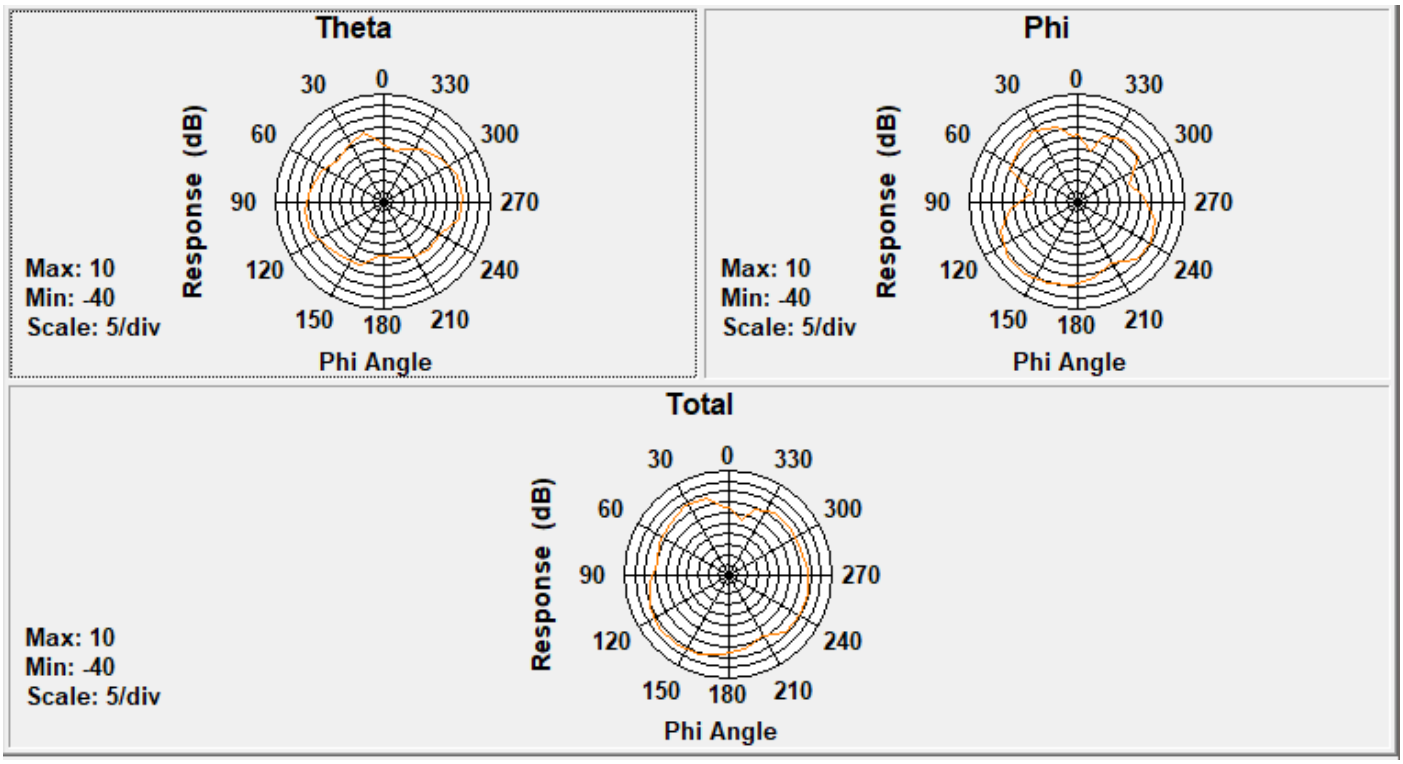
Center Frequency	**1785MHz**
Horizontal (dBi) peak	1.17
Vertical (dBi) peak	1.01

1880 MHz



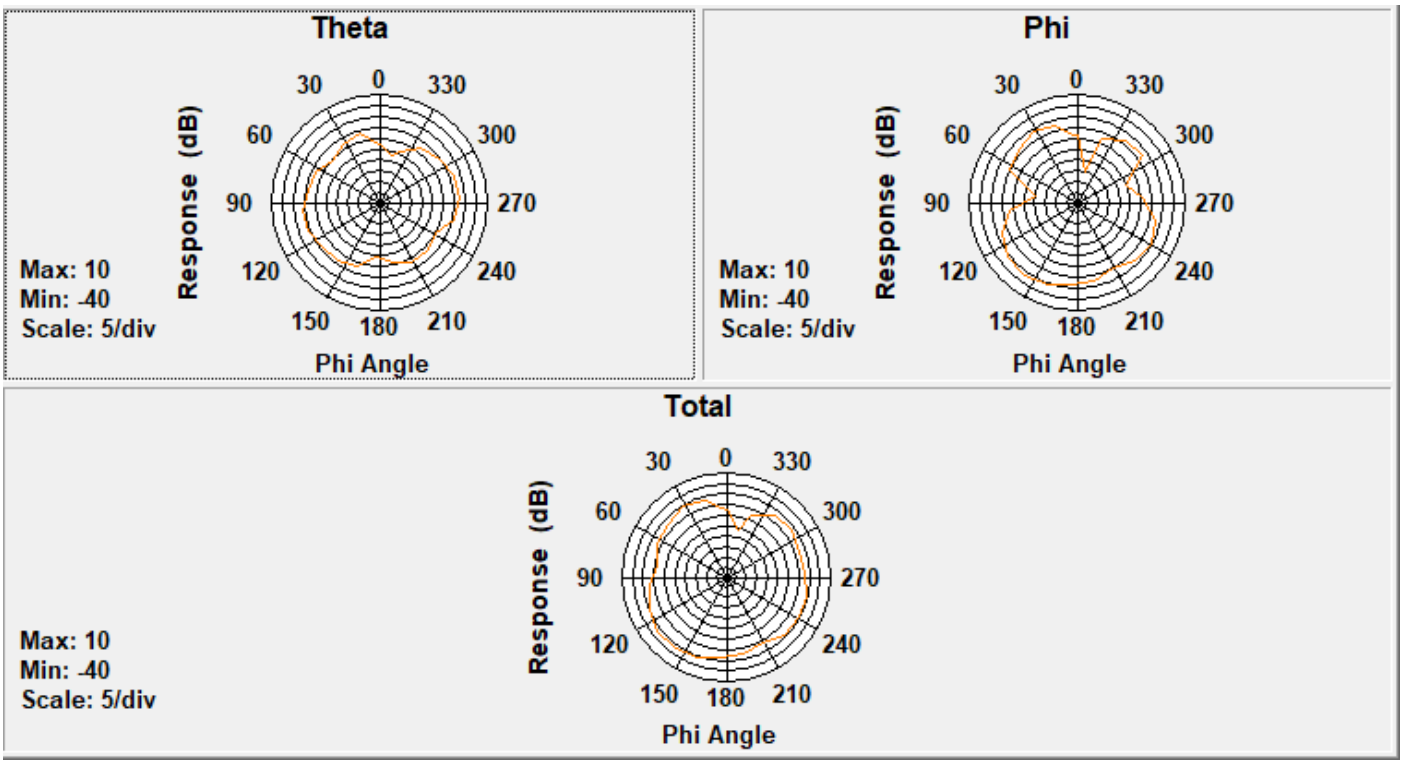
Center Frequency	**1880MHz**
Horizontal (dBi) peak	0.42
Vertical (dBi) peak	1.42

1900 MHz



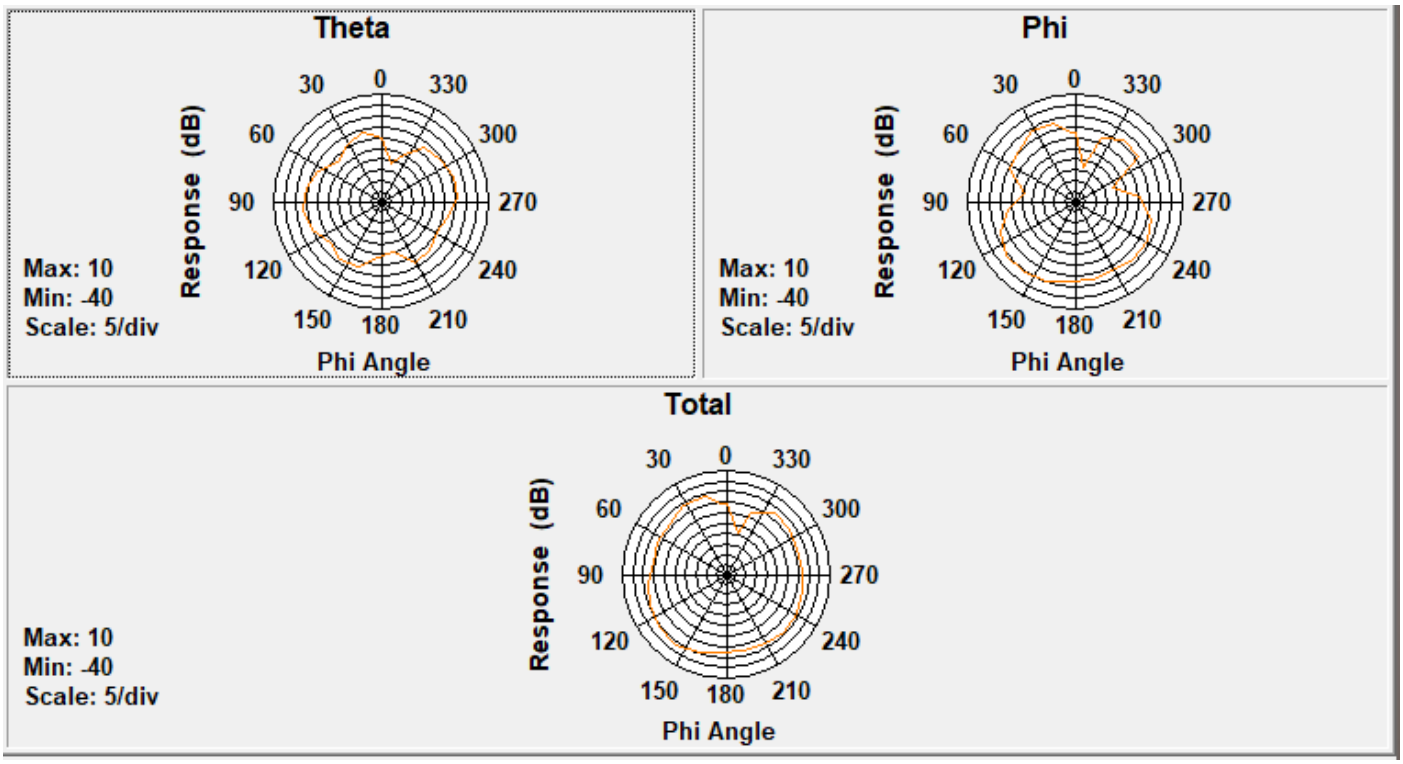
Center Frequency	**1900MHz**
Horizontal (dBi) peak	1.15
Vertical (dBi) peak	1.80

1920 MHz



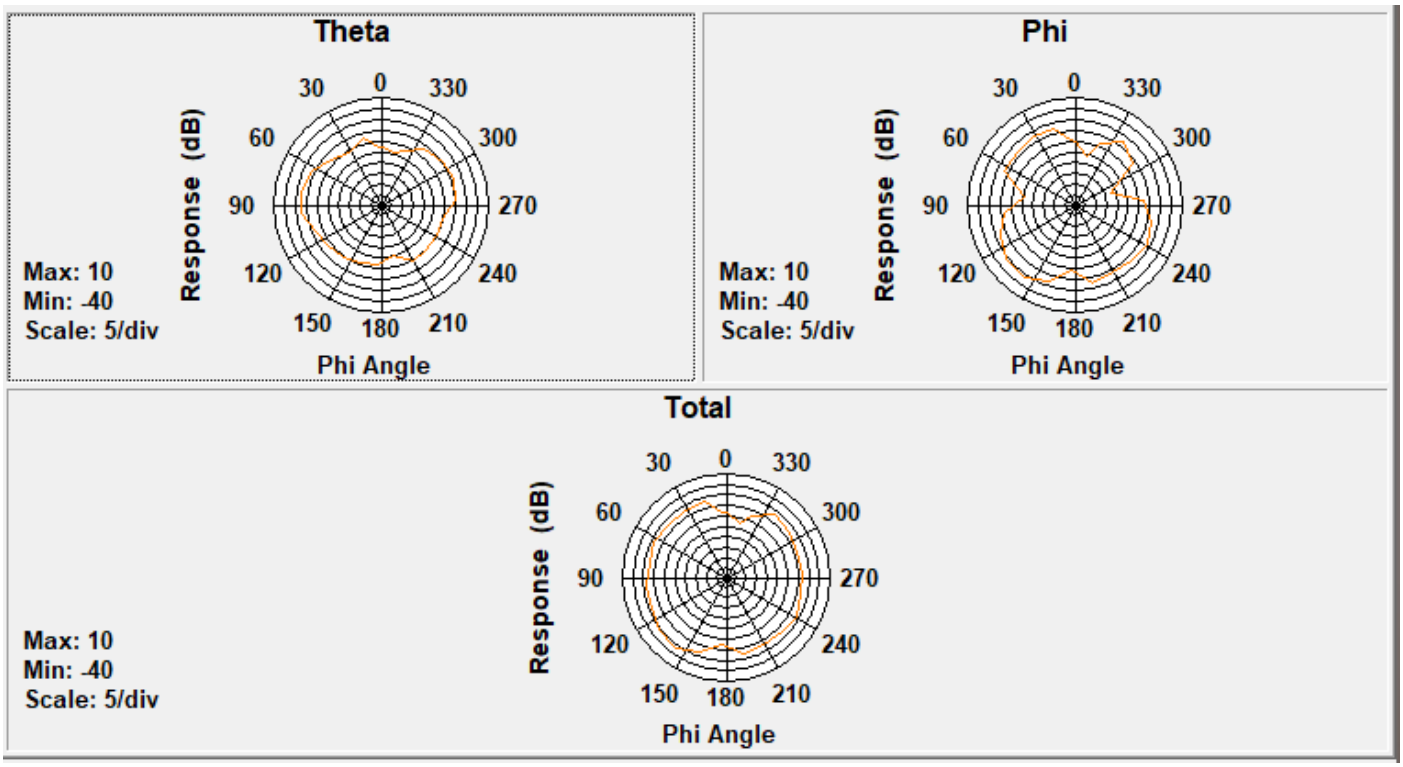
Center Frequency	**1920MHz**
Horizontal (dBi) peak	0.62
Vertical (dBi) peak	1.83

1950 MHz



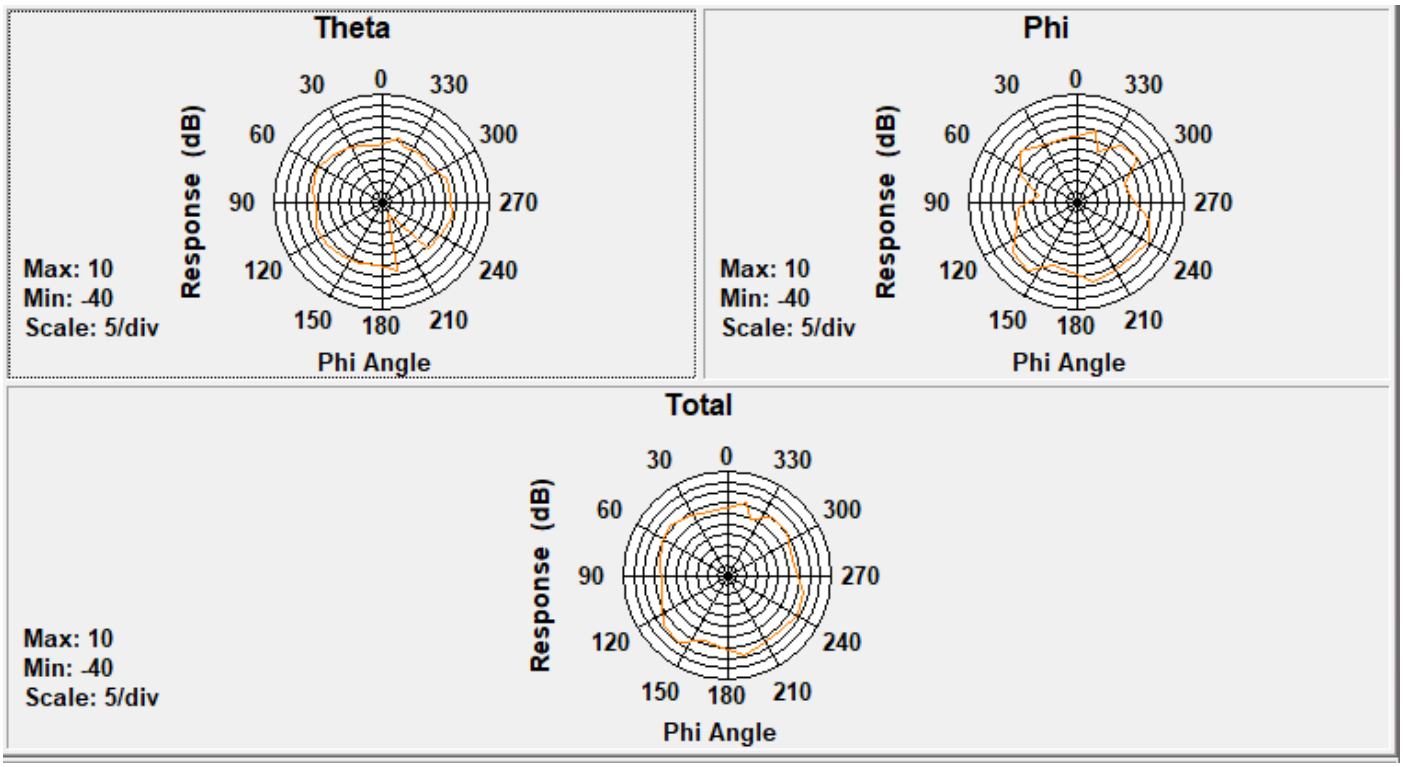
Center Frequency	**1950MHz**
Horizontal (dBi) peak	0.32
Vertical (dBi) peak	1.40

1980 MHz



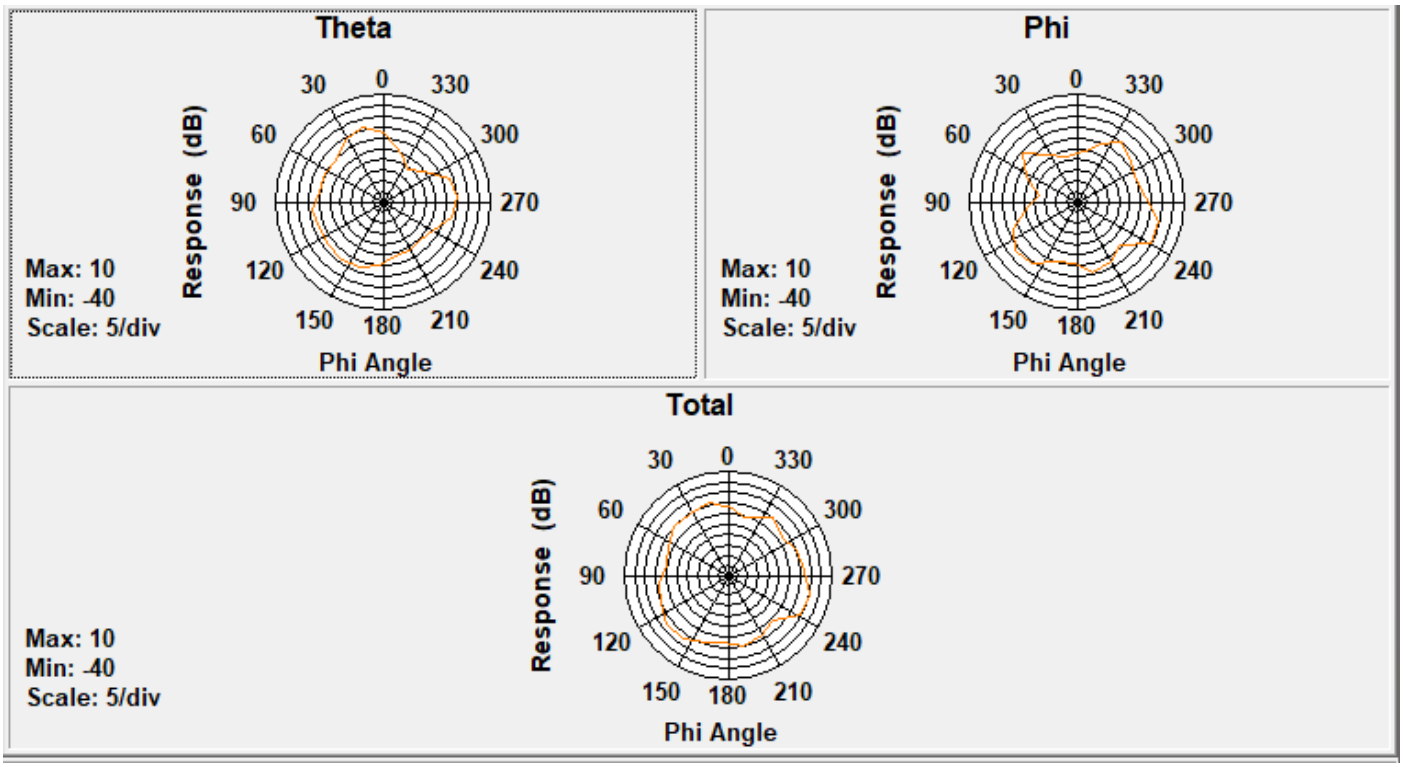
Center Frequency	**1980MHz**
Horizontal (dBi) peak	-0.21
Vertical (dBi) peak	0.93

2496 MHz



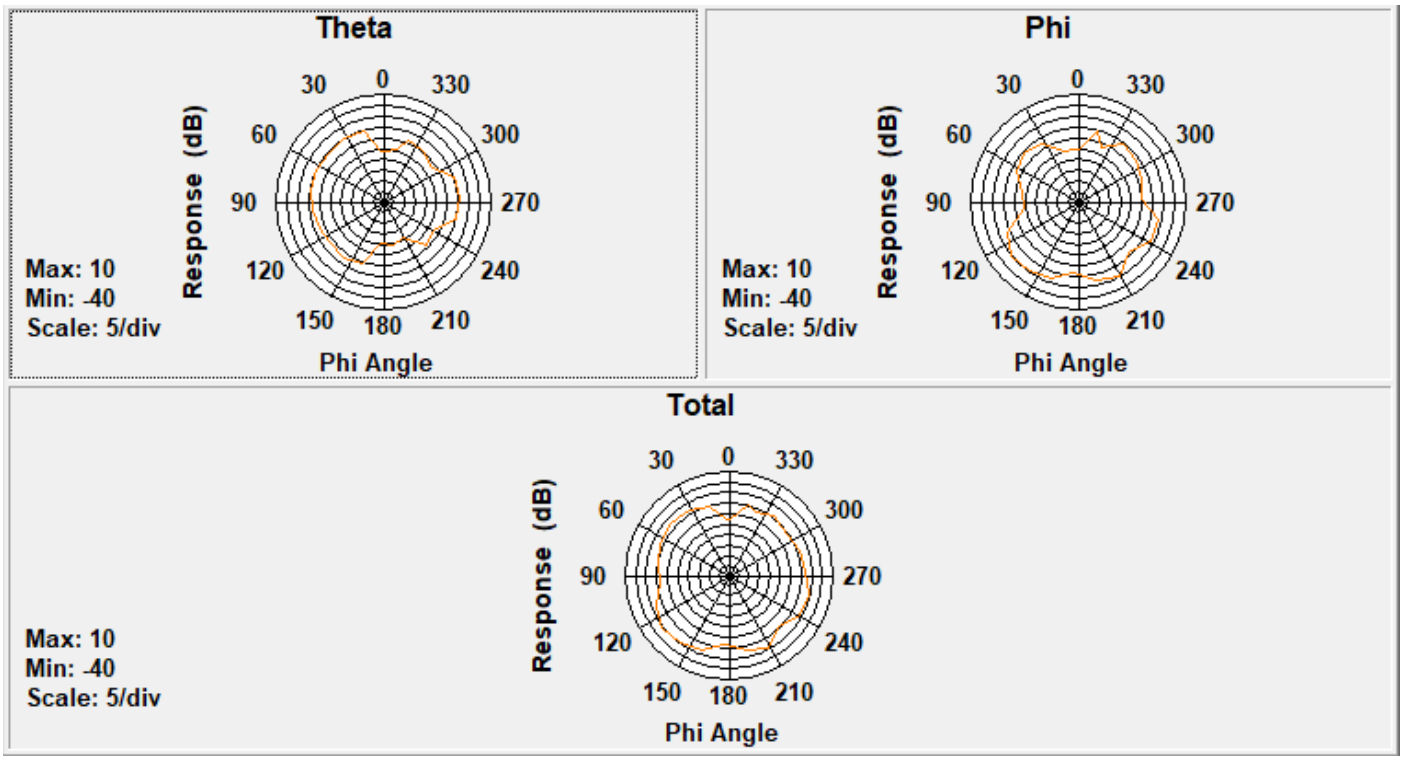
Center Frequency	**2496MHz**
Horizontal (dBi) peak	-0.18
Vertical (dBi) peak	-0.63

2595 MHz



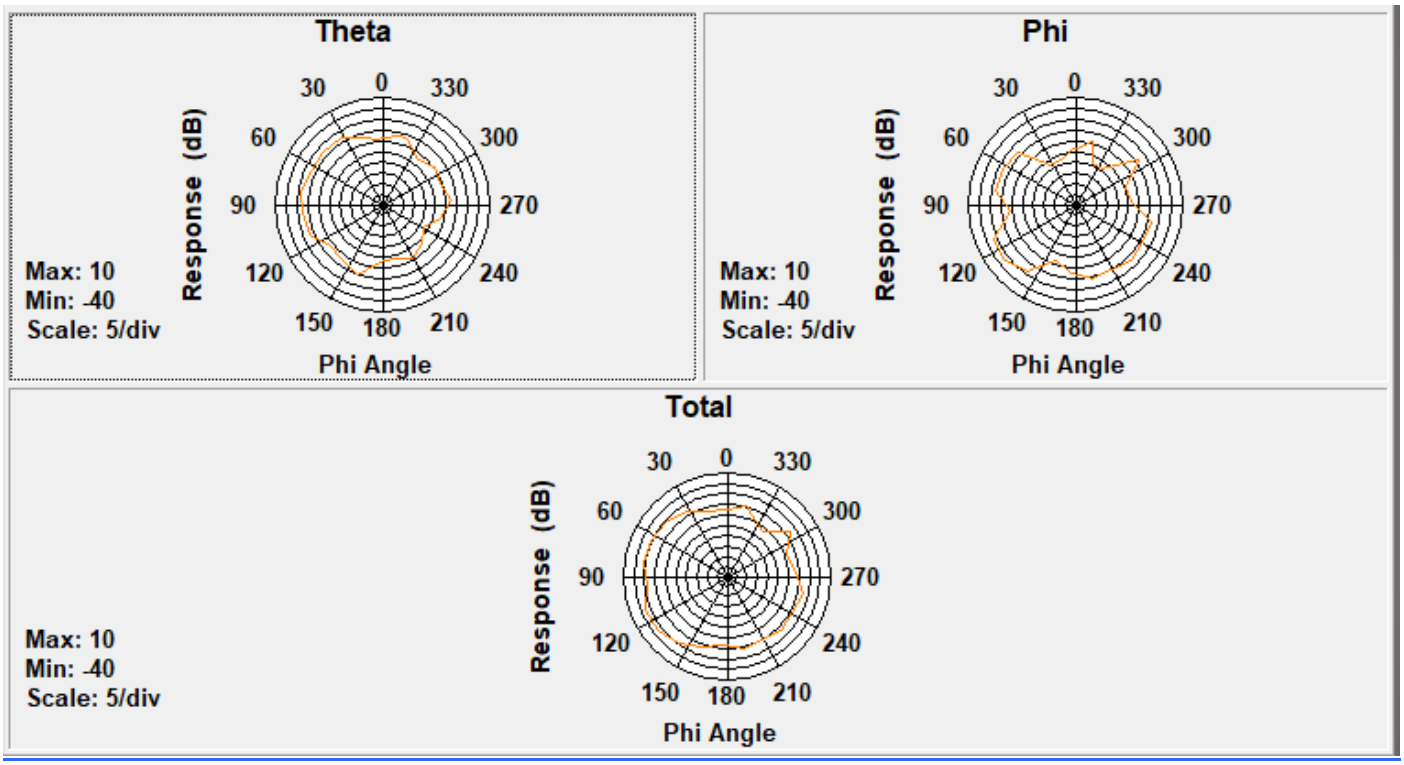
Center Frequency	**2595MHz**
Horizontal (dBi) peak	0.13
Vertical (dBi) peak	-0.10

2690 MHz



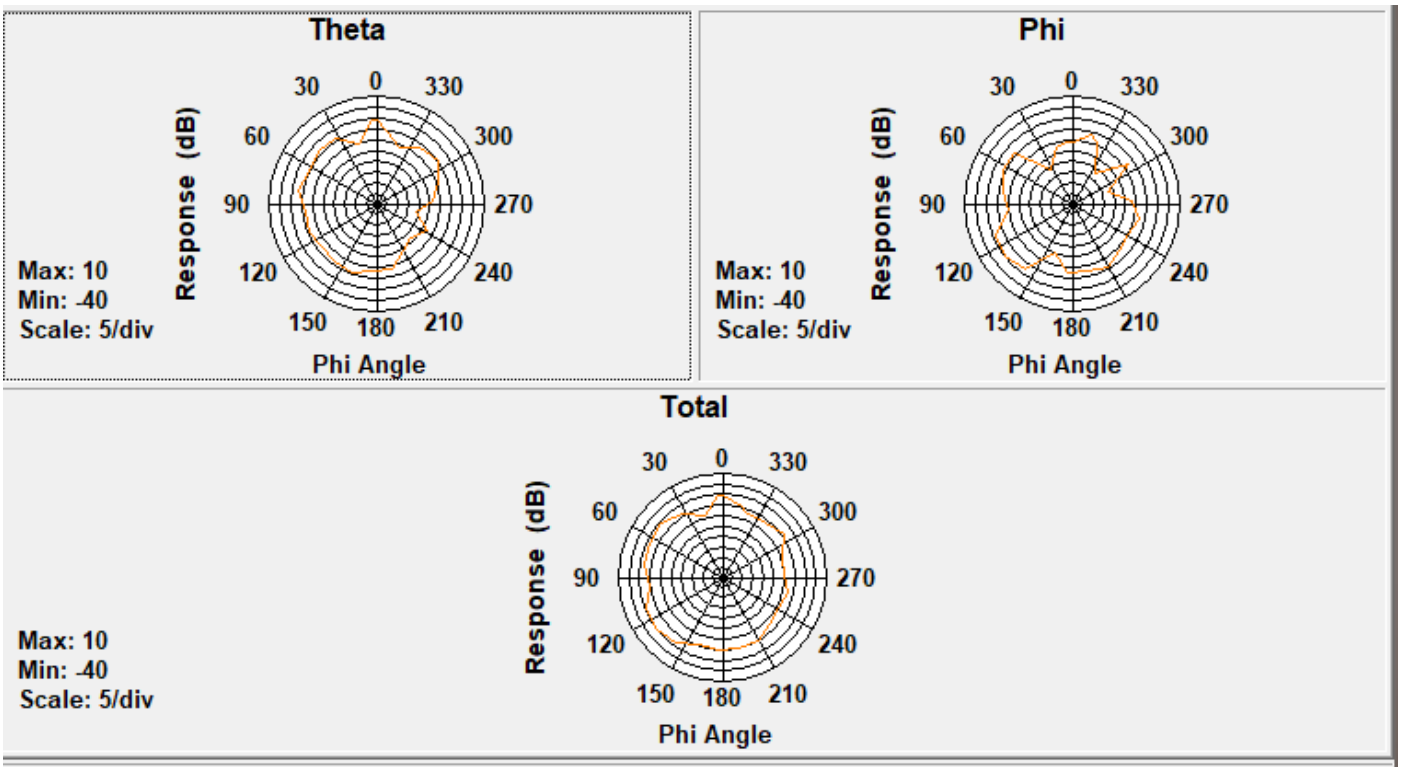
Center Frequency	**2690MHz**
Horizontal (dBi) peak	-0.61
Vertical (dBi) peak	0.28

3300 MHz



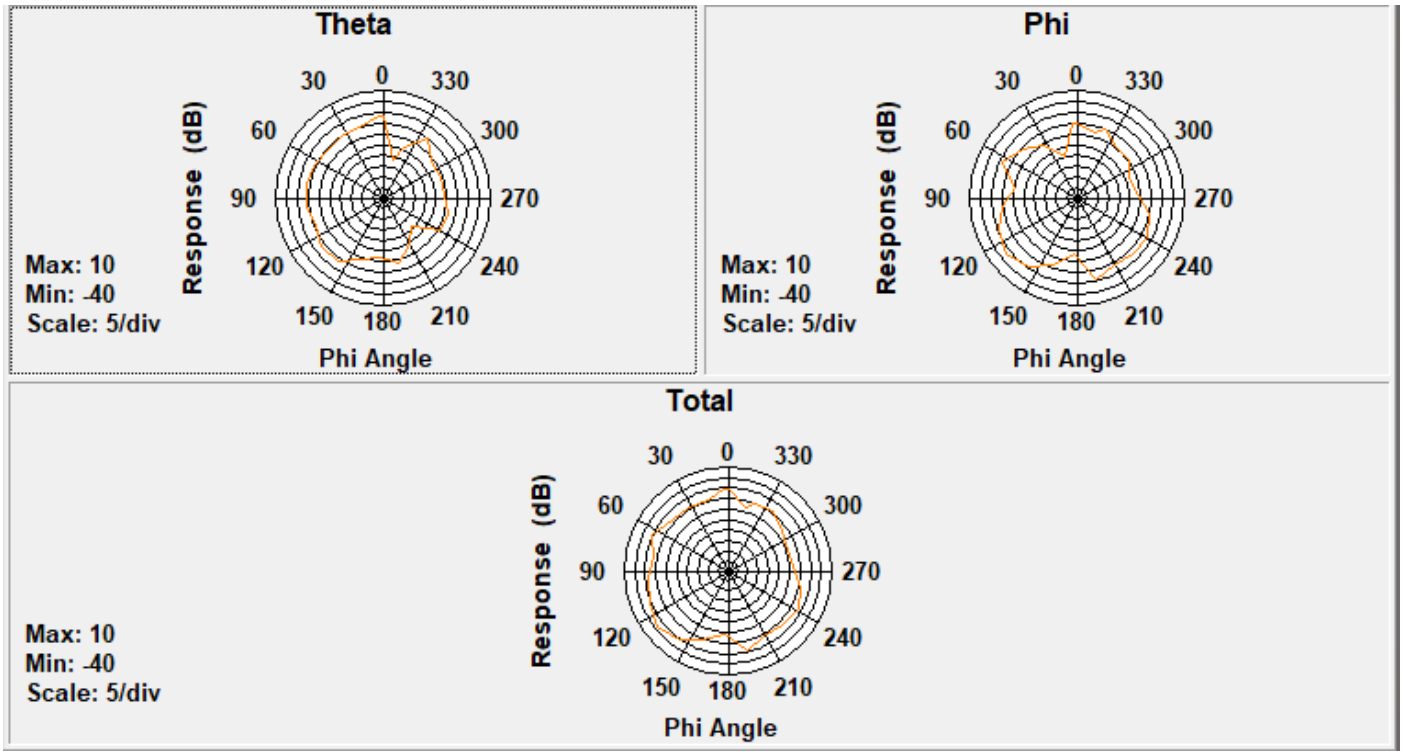
Center Frequency	**3300MHz**
Horizontal (dBi) peak	0.44
Vertical (dBi) peak	0.85

3400 MHz



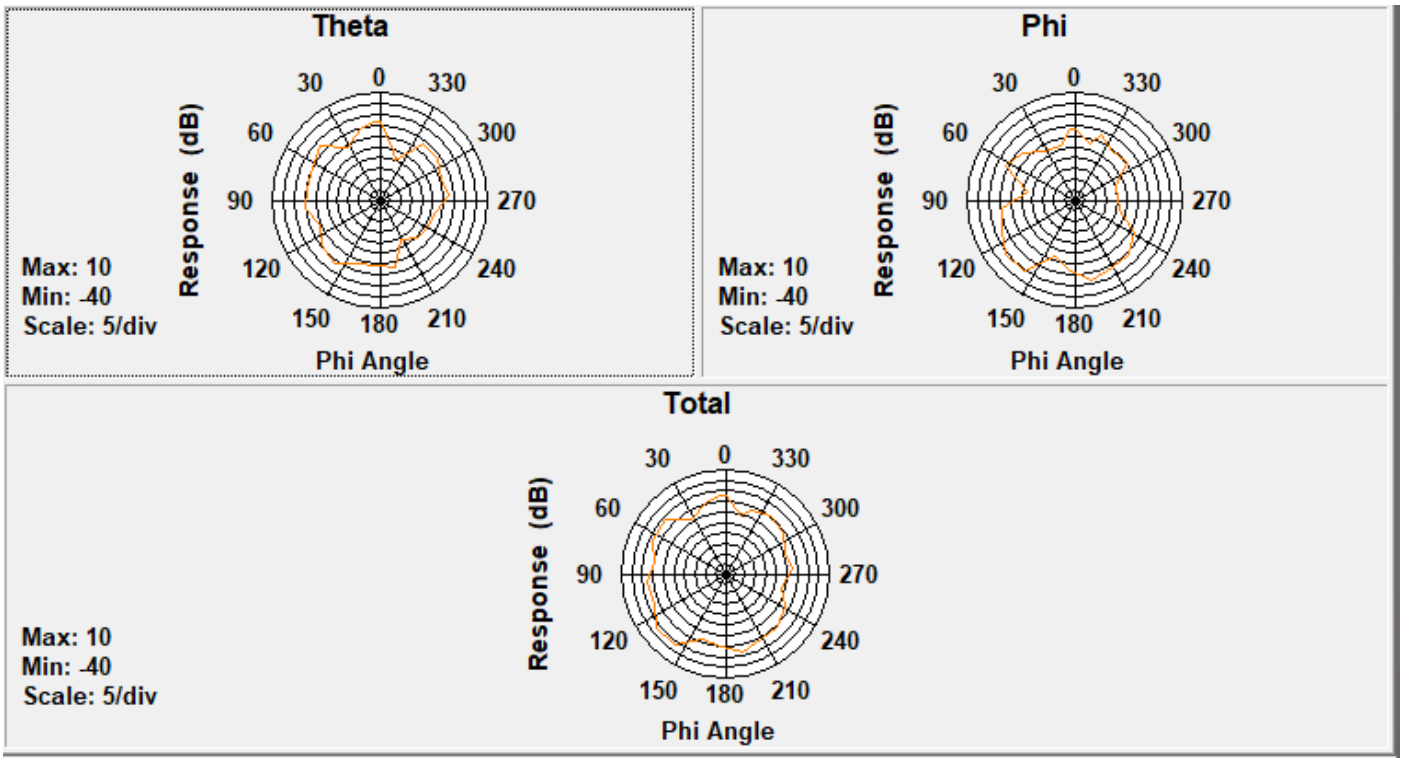
Center Frequency	**3400MHz**
Horizontal (dBi) peak	0.74
Vertical (dBi) peak	0.30

3500 MHz



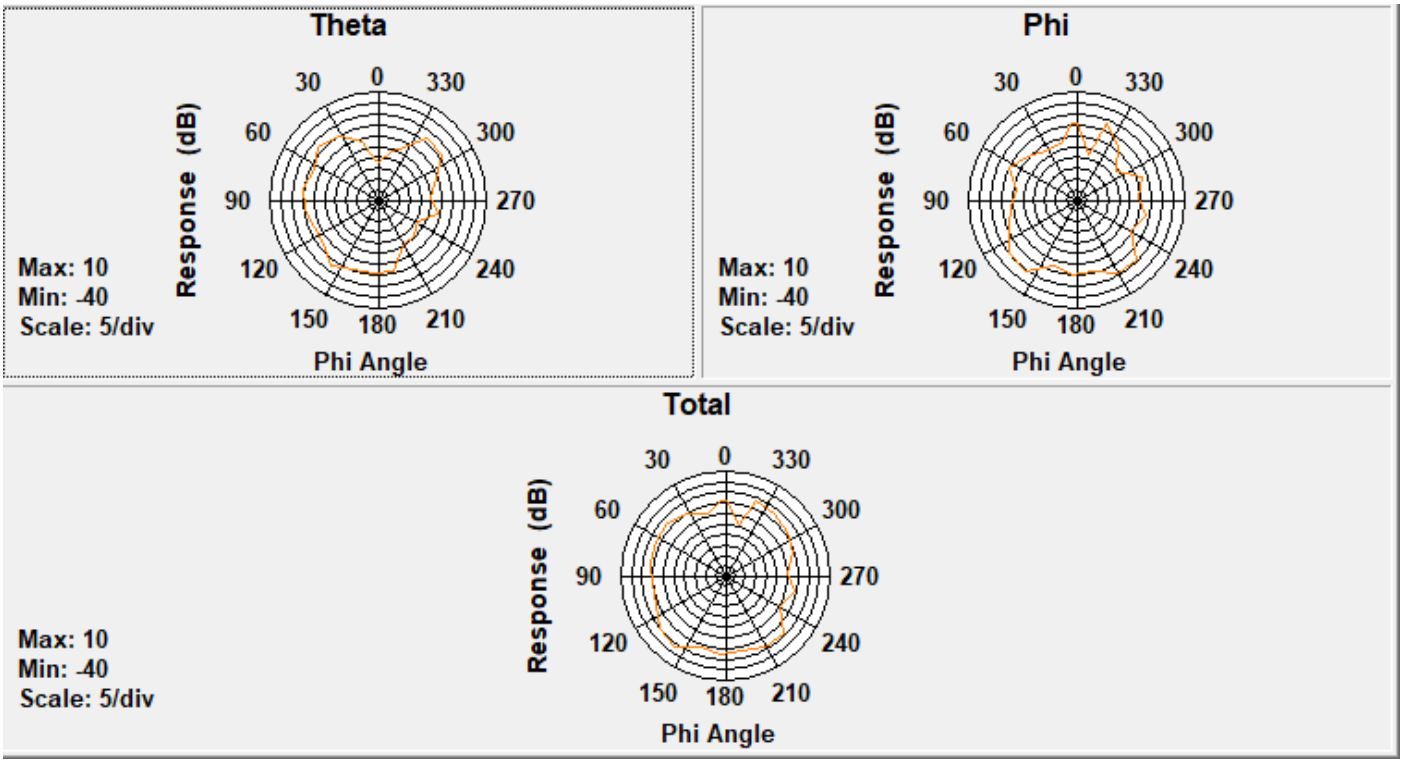
Center Frequency	**3500MHz**
Horizontal (dBi) peak	0.18
Vertical (dBi) peak	0.92

3600 MHz



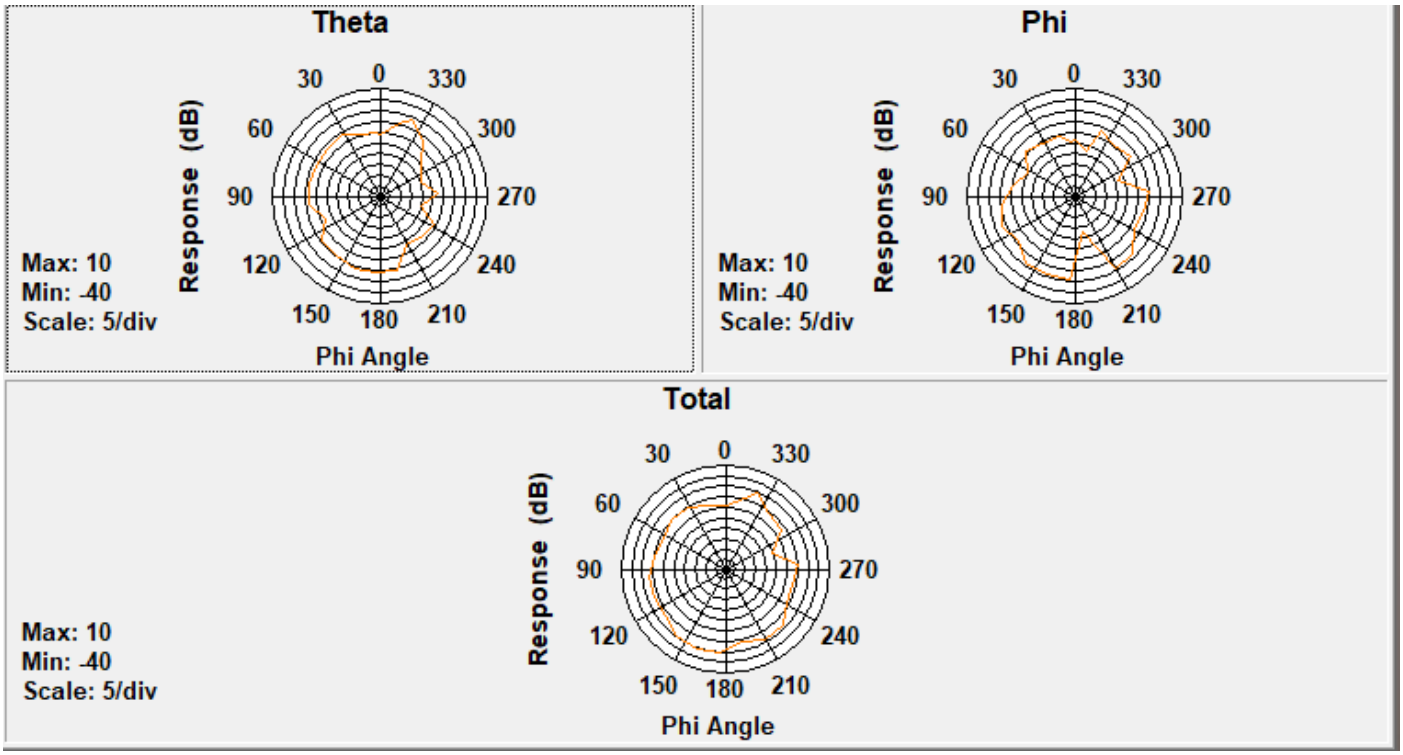
Center Frequency	**3600MHz**
Horizontal (dBi) peak	0.23
Vertical (dBi) peak	0.84

3750 MHz



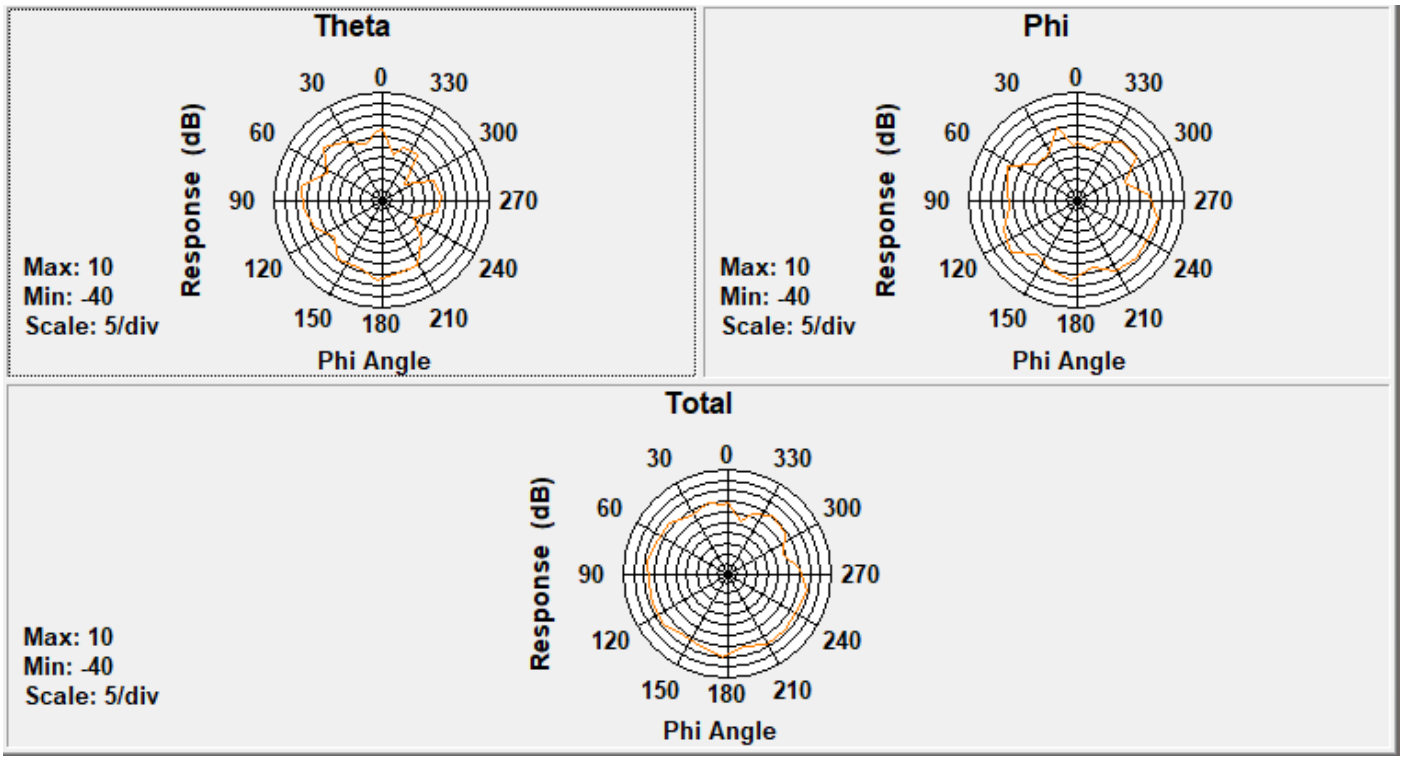
Center Frequency	**3750MHz**
Horizontal (dBi) peak	-0.79
Vertical (dBi) peak	0.82

4200 MHz



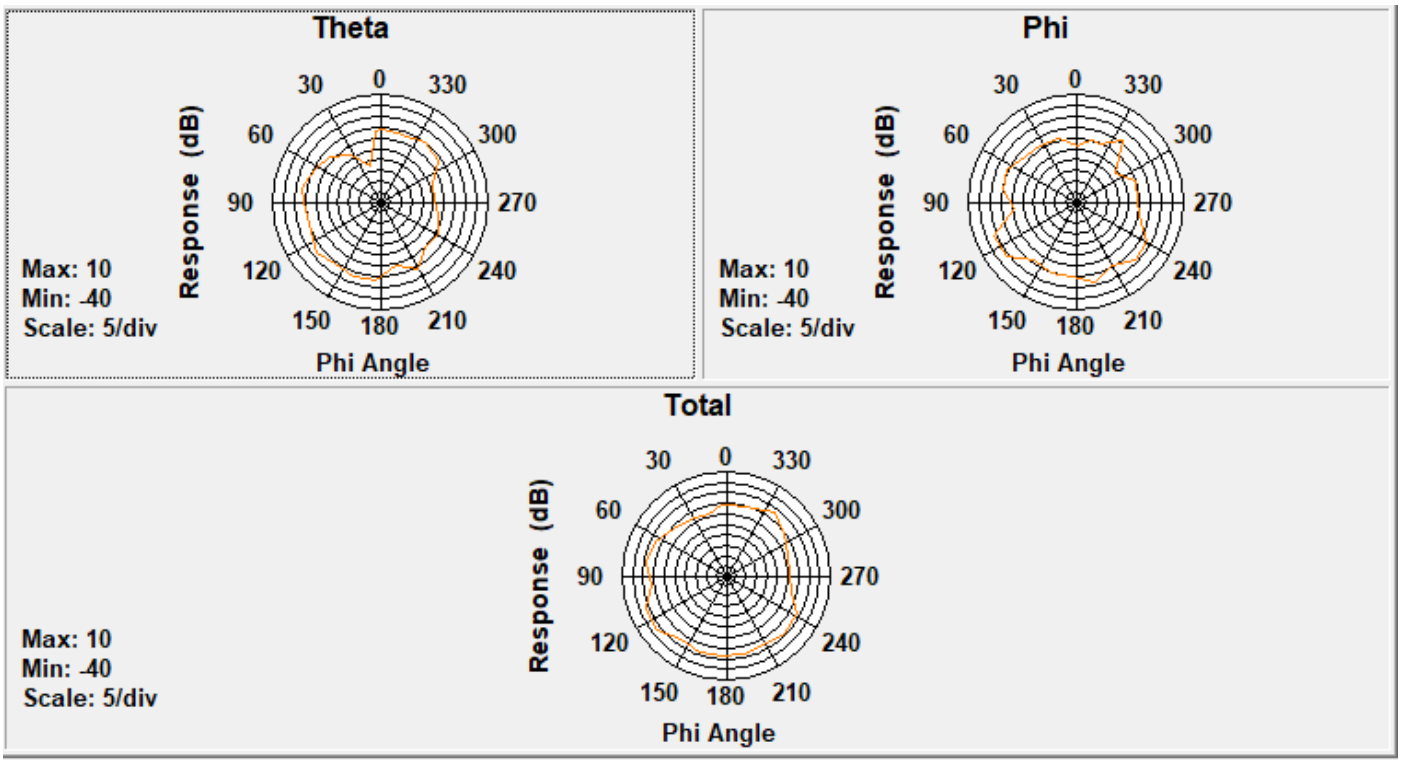
Center Frequency	**4200MHz**
Horizontal (dBi) peak	0.48
Vertical (dBi) peak	0.83

4400 MHz



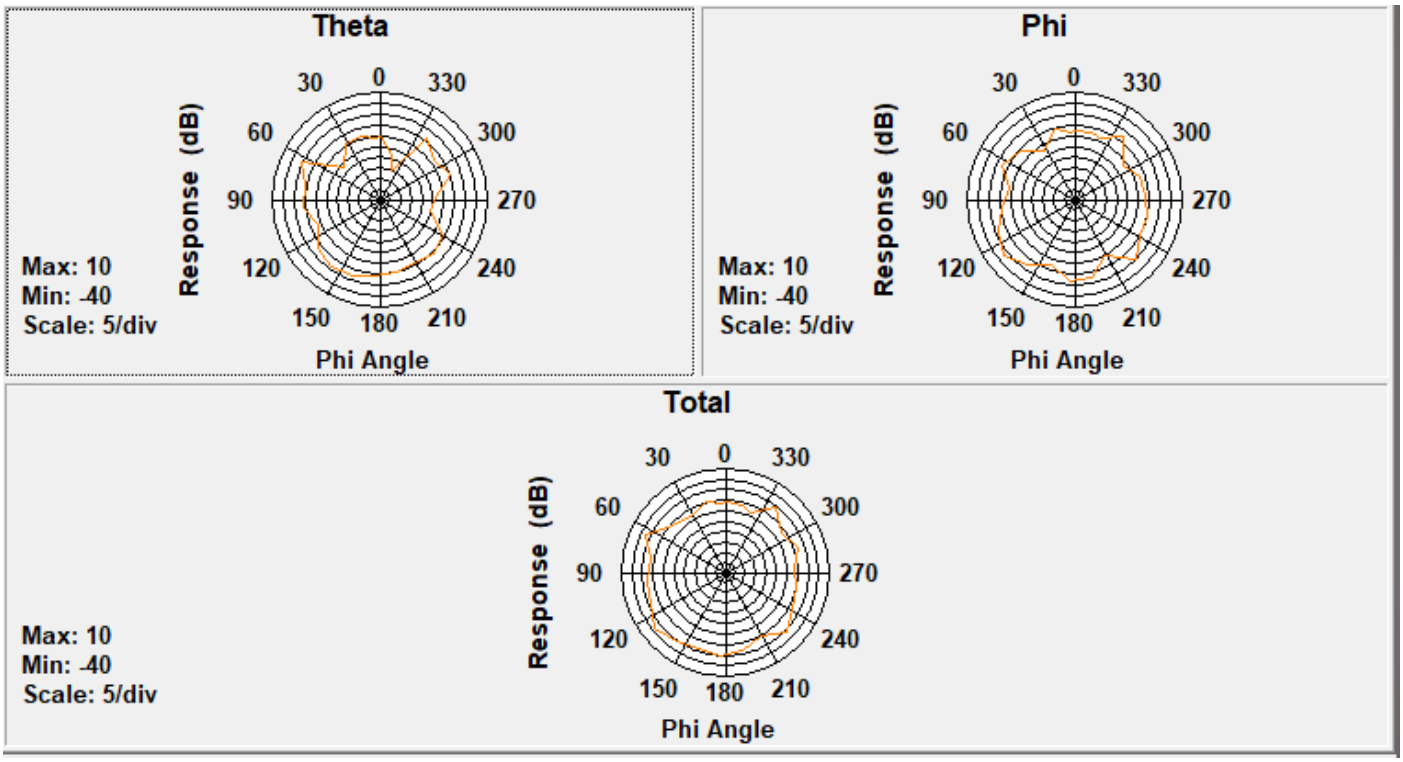
Center Frequency	**4400MHz**
Horizontal (dBi) peak	-0.22
Vertical (dBi) peak	0.43

4800 MHz



Center Frequency	**4800MHz**
Horizontal (dBi) peak	-0.21
Vertical (dBi) peak	1.02

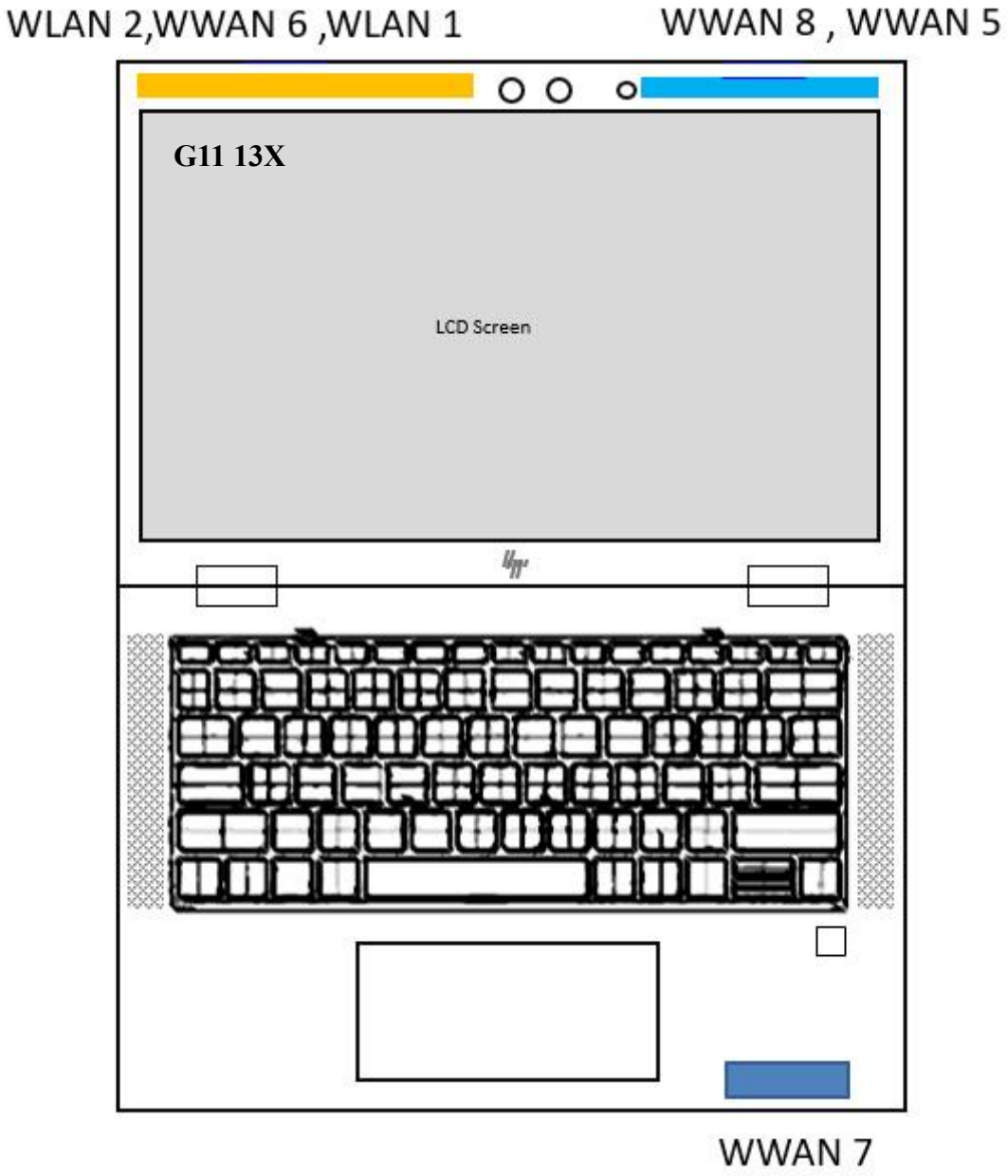
5000 MHz



Center Frequency	**5000MHz**
Horizontal (dBi) peak	0.15
Vertical (dBi) peak	2.59

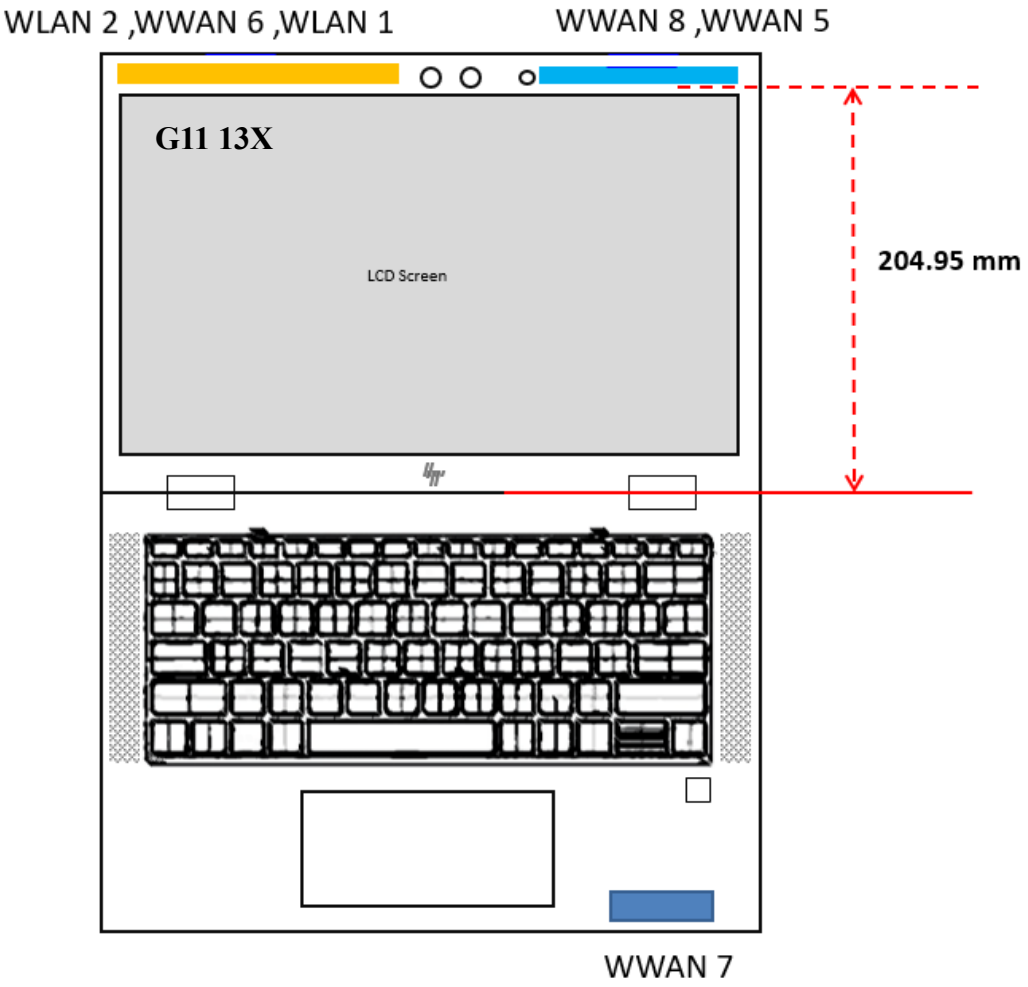
Section 4. Antenna Host Platform Location Information

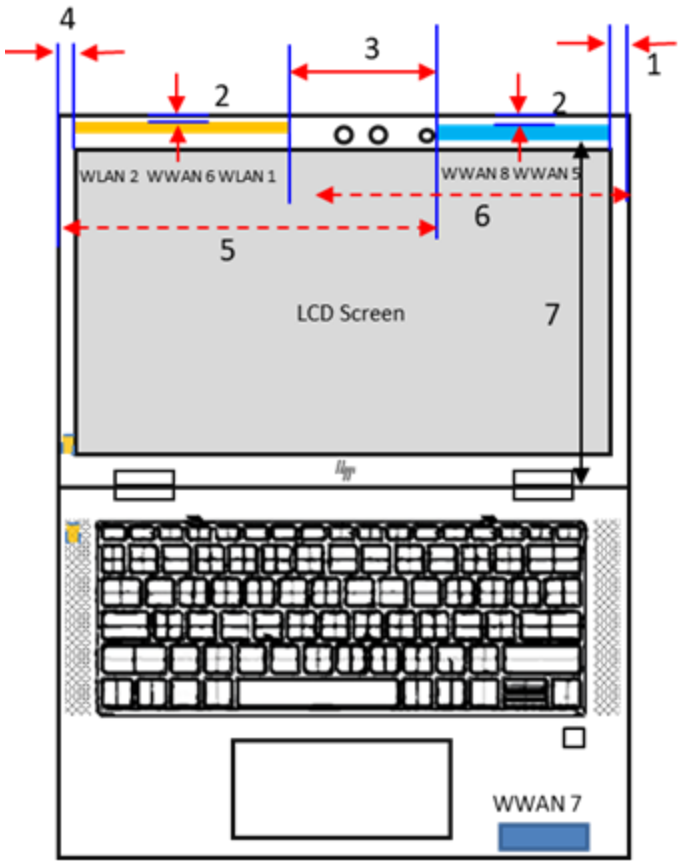
Include a **dimensioned photo(s) or dimensioned drawing(s)** of Main and Aux antenna placements (measurements are not required for receive-only antenna).
Any antenna that transmits must show dimensions to bottom of laptop. Provide a description of the materials that are used for supporting or surrounding transmit antennas; for example, non-conductive plastics vs. conductive coated plastic or metallic materials.



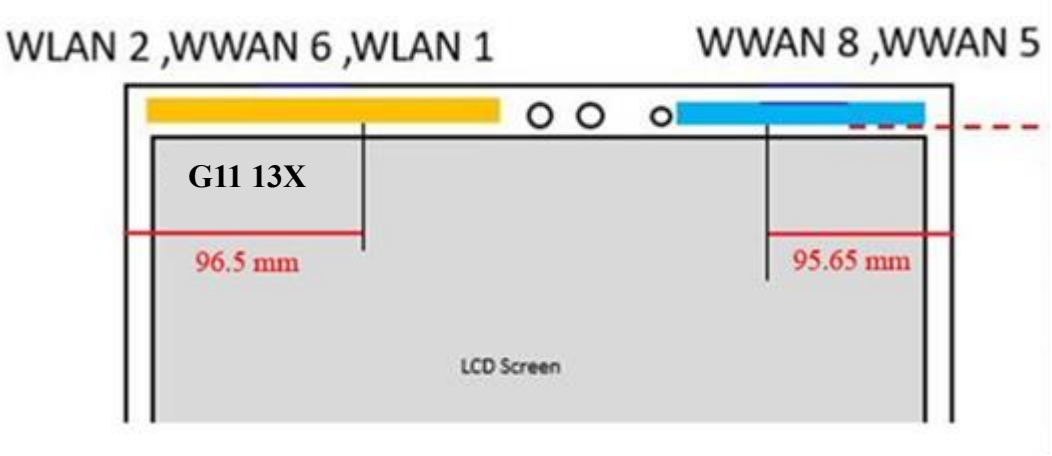
Section 5. Antenna Host Platform Location Information

Include a **dimensioned photo(s) or dimensioned drawing(s)** of Ant5,Ant6,Ant7,Ant8 placements (measurements are not required for receive-only antenna).
Any antenna that transmits must show dimensions to bottom of laptop. Provide a description of the materials that are used for supporting or surrounding transmit antennas; for example, non-conductive plastics vs. conductive coated plastic or metallic materials.



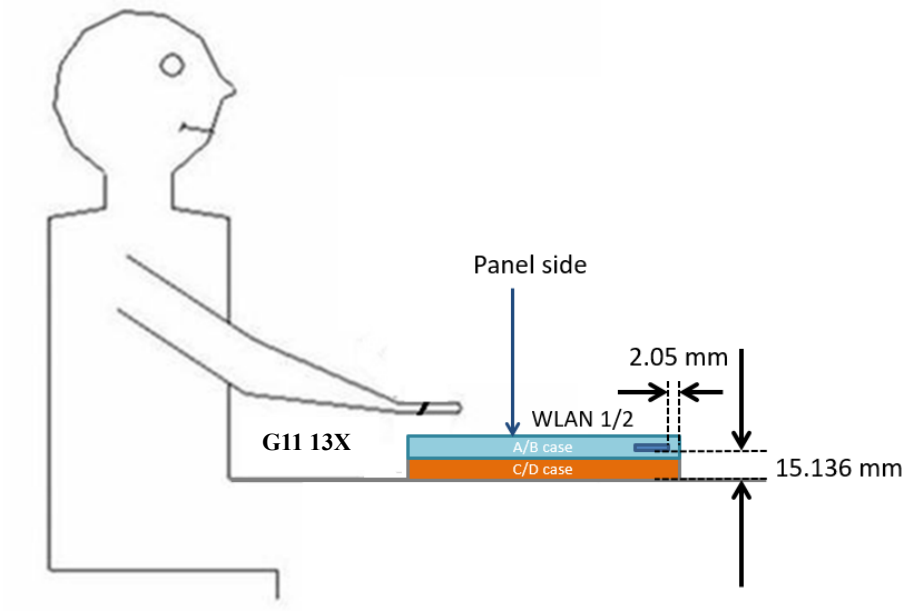


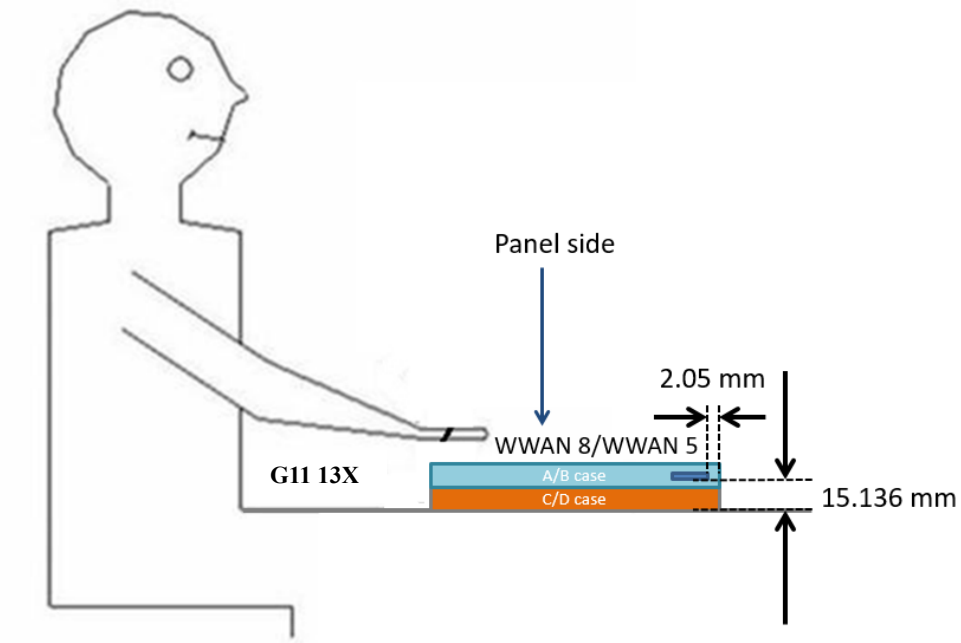
Plot	(mm)
1	14.146
2	2.05
3	75.825
4	11.796
5	184.05
6	186.375
7	204.95



Section 6. Antenna dimensional information for SAR evaluation

Include a **dimensioned photo(s) or dimensioned drawing(s)** showing the distance (mm) between the transmit antennas and the user. For notebook/laptop hosts show lapheld position (example below). For tablet hosts show all orientations including lapheld, primary & secondary portrait, primary & secondary landscape positions. Include a description of any proximity sensors or power throttling implementations that limit or exclude use of any host orientation.

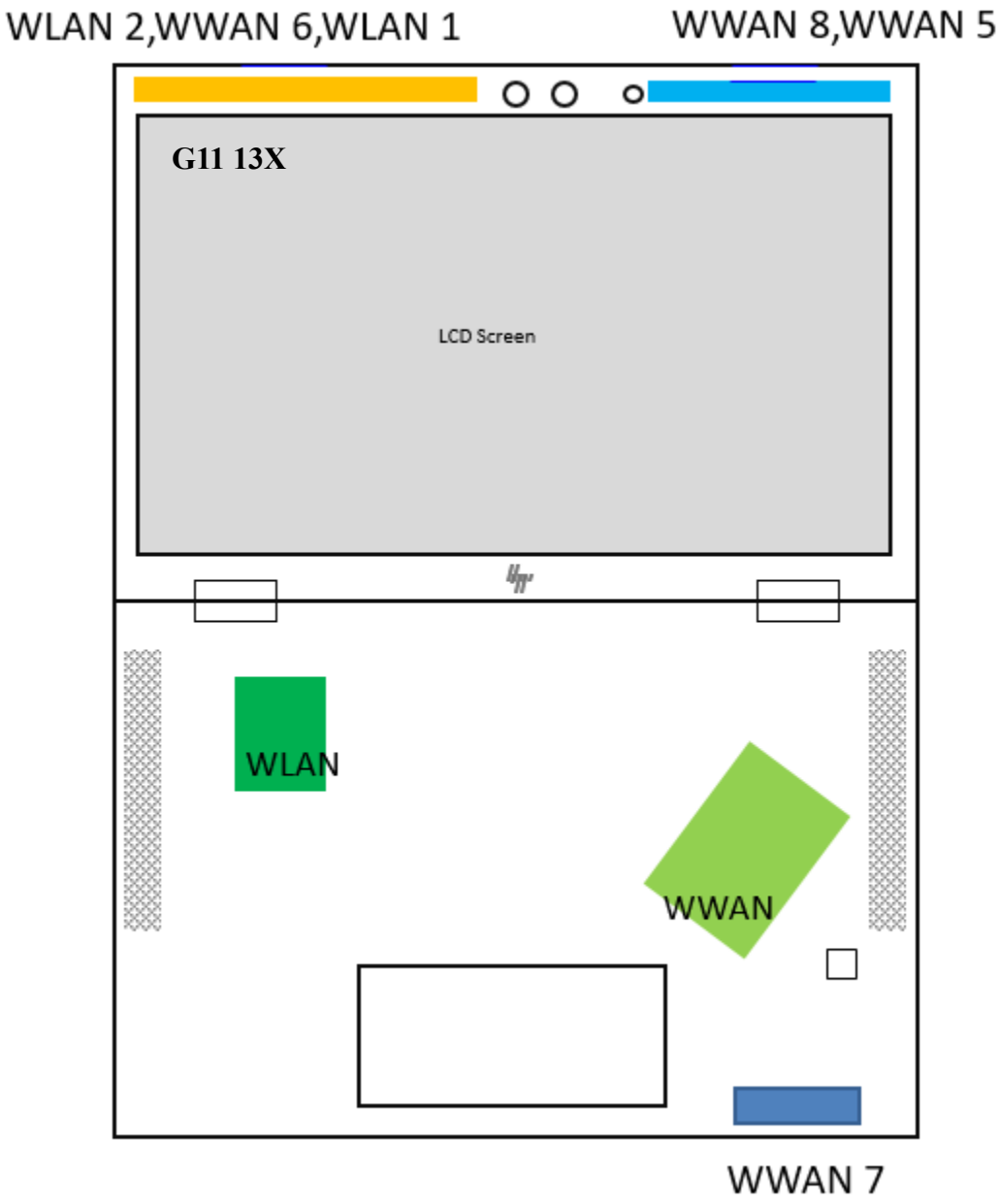




Section 7. Diagram Example of Co-Location Antenna Separation

Include a **dimensioned photo or dimensioned drawing** showing the distance (mm) between **all WLAN transmit antennas** and other co-located radiator transmit antenna such as Bluetooth, WWAN,..

(Note: Due to the evolving rules regarding co-location, each platform will need to be reviewed on a case by case basis)



Section 8. Local representative contact information

Local representative contact information is required for regulatory support for target countries below.

	Local company name	Contact name	Phone number	FAX Number	e-Mail Address	Notes
Argentina						
Azerbaijan						
Cambodia						
Indonesia						
Israel						
Malaysia						
Philippines						
Singapore						Telecommunication Equipment Dealer License Required
South Africa						
USA, Canada						
Vietnam						