

Regulatory WLAN Antenna Information

Platform information											
Brand		ODM		****End product model name		Intel platform (ex: Yes, No or NA)		Platform type (ex: regular NB, convertible PC, AIO...etc)		*SAR minimum separation (mm)	
HP Inc.		Inventec		Warpath 14W (HSN-I45C-4)		Yes		Notebook PC		229.5 mm	
*****Please fill in exact product model name and make sure the model name is visible on product cover or any parts for end users recognize for authority inspection.											
Antenna information											
Vendor			Type			Antenna Part number (Main)			Antenna Part number (Aux)		
WNC			PIFA			6036B0307301 (81EABL15.G10)			6036B0307101 (81EABL15.G11)		
Peak gain w/ cable loss (dBi)*											
	2.4GHz 2400-2483.5 MHz	5.2GHz 5150-5250MHz	5.3GHz 5250-5350MHz	5.6GHz 5470-5725MHz	5.8GHz 5725-5850MHz	5.9GHz 5850-5895MHz	6.2GHz 5925-6425MHz	6.5GHz 6425-6525MHz	6.7GHz 6525-6875MHz	7.0 GHz 6875-7125MHz	
Main	-3.34	1.15	1.15	0.98	0.43	-1.24	1.1	1.1	1.93	2.32	
Aux	-3.78	0.86	2.54	2.17	1.28	0.25	0.35	0.35	1.31	1.05	
Intel Reference Gain/Type/ Separation distance											
Antenna Type	Antenna Peak gain (In dBi)*										Distance to the end user (mm)
	2.4GHz 2400-2483.5 MHz	5.2GHz 5150-5250MHz	5.3GHz 5250-5350MHz	5.6GHz 5470-5725MHz	5.8GHz 5725-5850MHz	5.9GHz 5850-5895MHz	6.2GHz 5925-6425MHz	6.5GHz 6425-6525MHz	6.7GHz 6525-6875MHz	7.0GHz 6875-7125MHz	Generic: refer to modular FCC SAR report Mid-power: ≥ 8 mm Low power: ≥ 5 mm
Design	3.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	
PIFA	3.24	3.64	3.73	4.77	4.97	4.97	4.83	4.30	5.37	5.59	
Dipole	2.89	2.92	3.19	4.41	4.22	TBD	4.83	4.30	4.49	5.34	
Notes (marked with *) * SAR minimum separation (mm) - Regular NB: Minimum antenna-to-body (from antenna bottom to the bottom of the device) - Tablet / Convertible PC: Minimum antenna-to-edge (5 sides of the device) - Mini-tablet: Minimum antenna-to-edge (6 sides of the device) * 3D Peak Antenna gain should be equal or greater than -2 dBi - If a host integrator plans to use a lower gain antenna of the same type, additional CBP(FCC)/EDT(EU) testing need to be performed while the module is installed in the host.											

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1. Applicable test methods

ETS-Lindgren AMS-8500 system is 3D fully anechoic chamber, it is applied to the “Conical Cut test method”, the detail description is described as below.

The Conical Cut method requires the ability of the Measurement Antenna to be physically rotated in the theta plane (overhead) of the EUT for implementations using a single Measurement Antenna, Eleven conical cuts are required to capture data at every 15 degrees from the EUT, with the top (0 degrees) and bottom (180 degrees) cuts not being measured. Typically, the EUT will remain affixed to a turntable during the entire measurement process. The Measurement Antenna will be positioned at a starting theta angle. The EUT will then be rotated around the full 360 degrees of phi rotation. The Measurement Antenna will then be positioned at the next theta angle, and the process repeated.

2. Test & System Description

a. Test setup

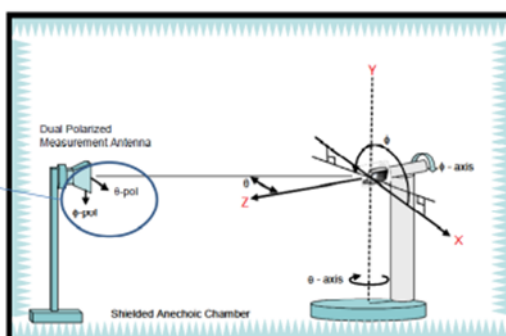
Chamber Coordinate

Both Theta- and Phi-axis rotate clockwise.

From center of Quiet Zone

- To 90-degree Phi → X axis
- To ceiling → Y axis
- To 3164 measurement antenna → Z axis

Theta Polarization → Horizontal
Phi Polarization → Vertical



b. Equipment list

Equipment Description	Manufacturer	Identification no.	Current calibration date	Next calibration date
Network analyzer	Agilent	E5071C		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	2022/03/09	2023/03/08

3. Setup photo

Antenna Information

Section 1. Antenna Assembly Specifications

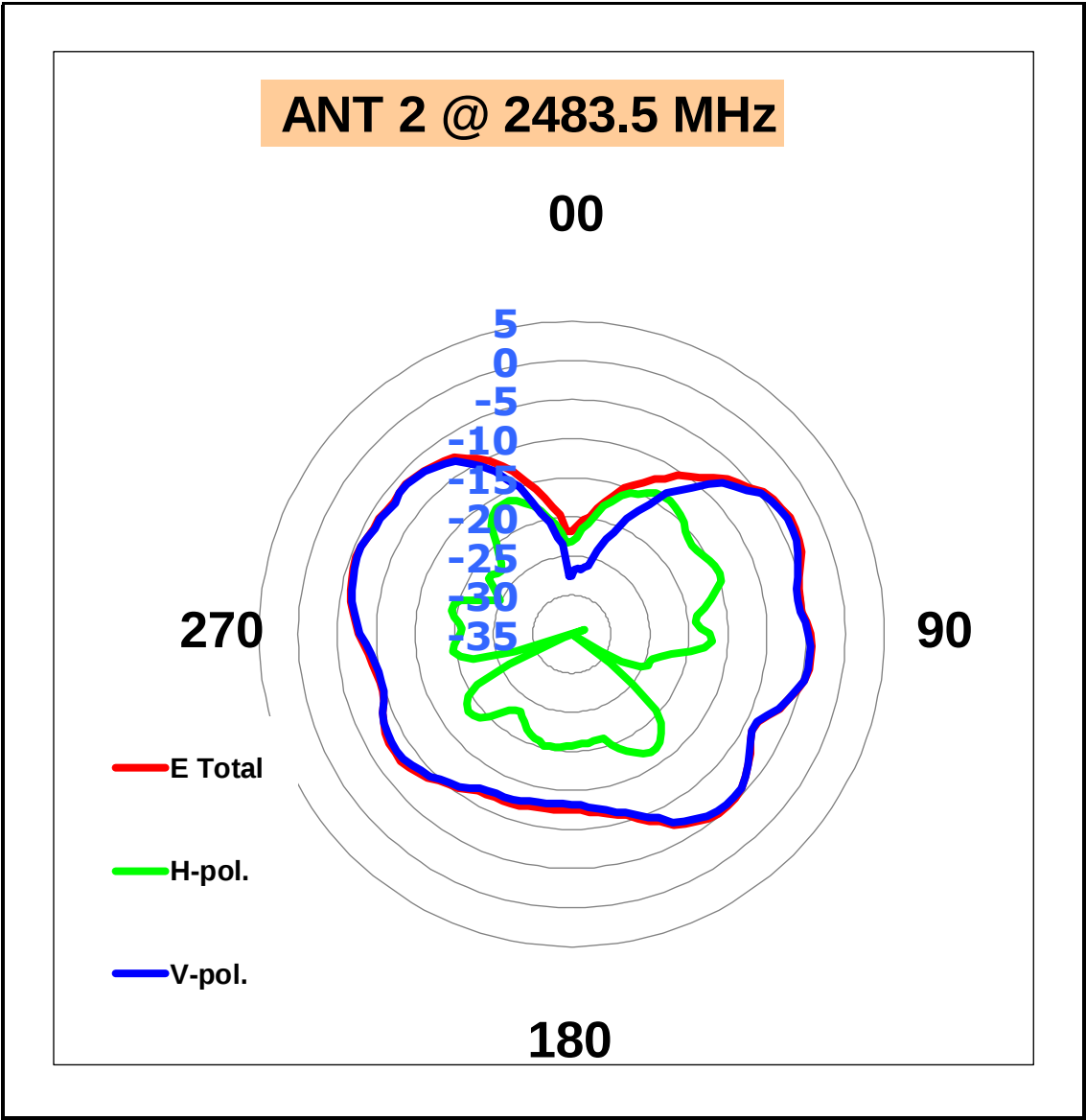
1A	1B	1C	1D		1E	1F	1G	1H
Antenna Part Number	Manufacturer	Antenna Type	Cable Assembly Part Number and Information	Freq Range MHz	* Peak Gain W/ Cable loss (dBi)	Peak Gain w/o Cable Loss (dBi)	Max VSWR	Cable Loss (dB)
(P/N: 81EABL15.G10) Main Antenna (TX2)	WNC	PIFA	Cable P/N: SY113L/50-065,SHENYU 50 ohm Coaxial length: 393mm diameter: 1.13mm Connector: I-PEX P/N: 20565-001R-13	2400-2483.5	-3.34	-2.25	3.0	1.09
				5150-5250	1.15	2.77	3.0	1.62
				5250-5350	1.15	2.77	3.0	1.62
				5470-5725	0.98	2.65	3.0	1.67
				5725-5850	0.43	2.12	3.0	1.69
				5850-5895	-1.24	0.48	3.0	1.72
				5925-6425	1.1	2.85	3.0	1.75
				6425-6525	1.1	2.91	3.0	1.81
				6525-6875	1.93	3.78	3.0	1.85
				6875-7125	2.32	4.23	3.0	1.91
(P/N: 81EABL15.G11) Aux Antenna (TX1)	Example: Intel Corporation	Example: Folded Dipole or PIFA	Cable P/N: SY137/50-077,SHENYU 50 ohm Coaxial length: 540mm diameter: 1.37mm Connector: I-PEX P/N: 20632-001R-37	2400-2483.5	-3.78	-2.54	3.0	1.24
				5150-5250	0.86	2.72	3.0	1.86
				5250-5350	2.54	4.40	3.0	1.86
				5470-5725	2.17	4.08	3.0	1.91
				5725-5850	1.28	3.22	3.0	1.94
				5850-5895	0.25	2.22	3.0	1.97
				5925-6425	0.35	2.36	3.0	2.01
				6425-6525	0.35	2.43	3.0	2.08
				6525-6875	1.31	3.44	3.0	2.13
				6875-7125	1.05	3.24	3.0	2.19

- 3D Antenna Peak Gain required being test in system basis.

Section 3. Radiation characteristics of antenna loaded in Host Platform

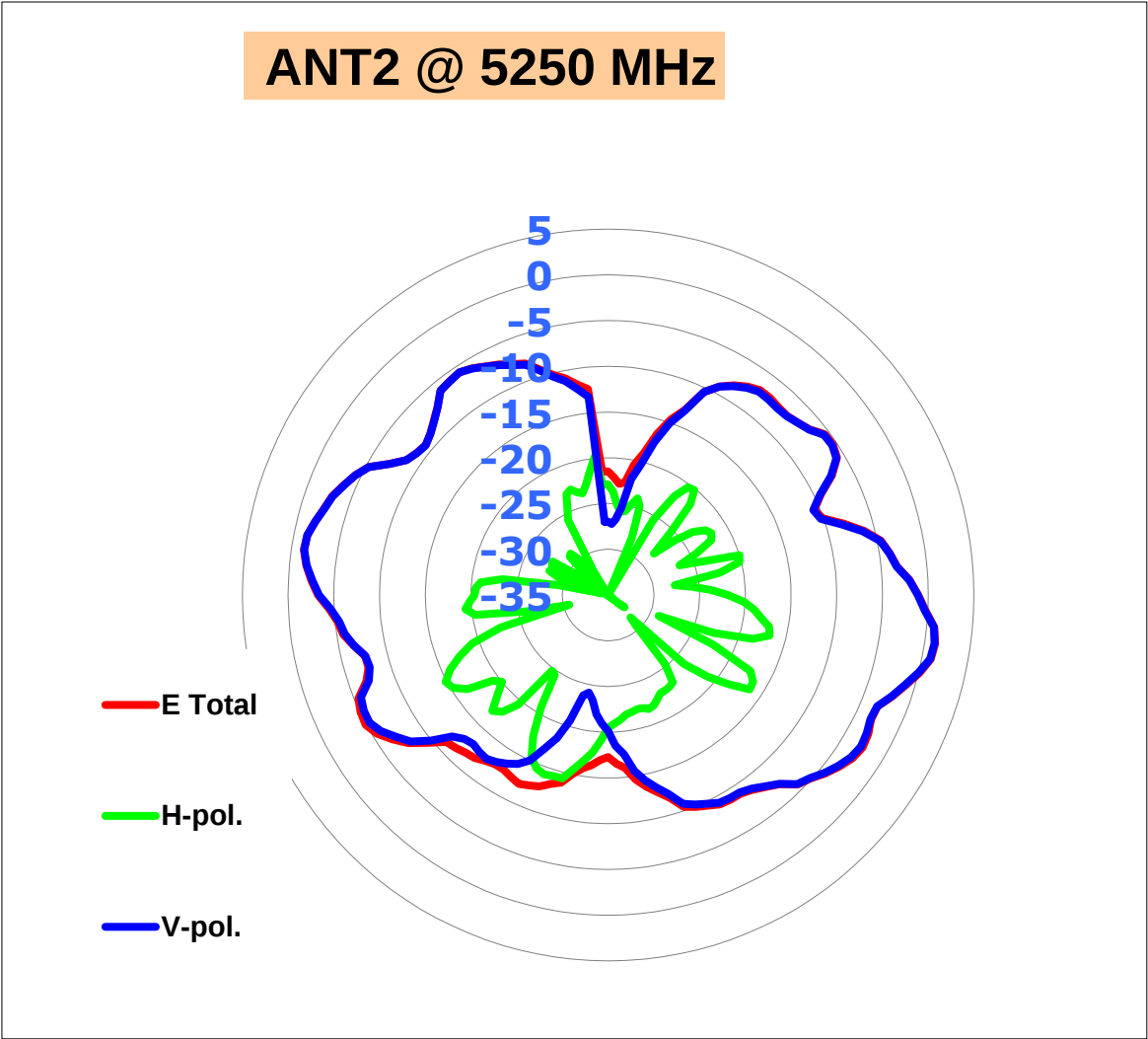
Main Antenna

Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz



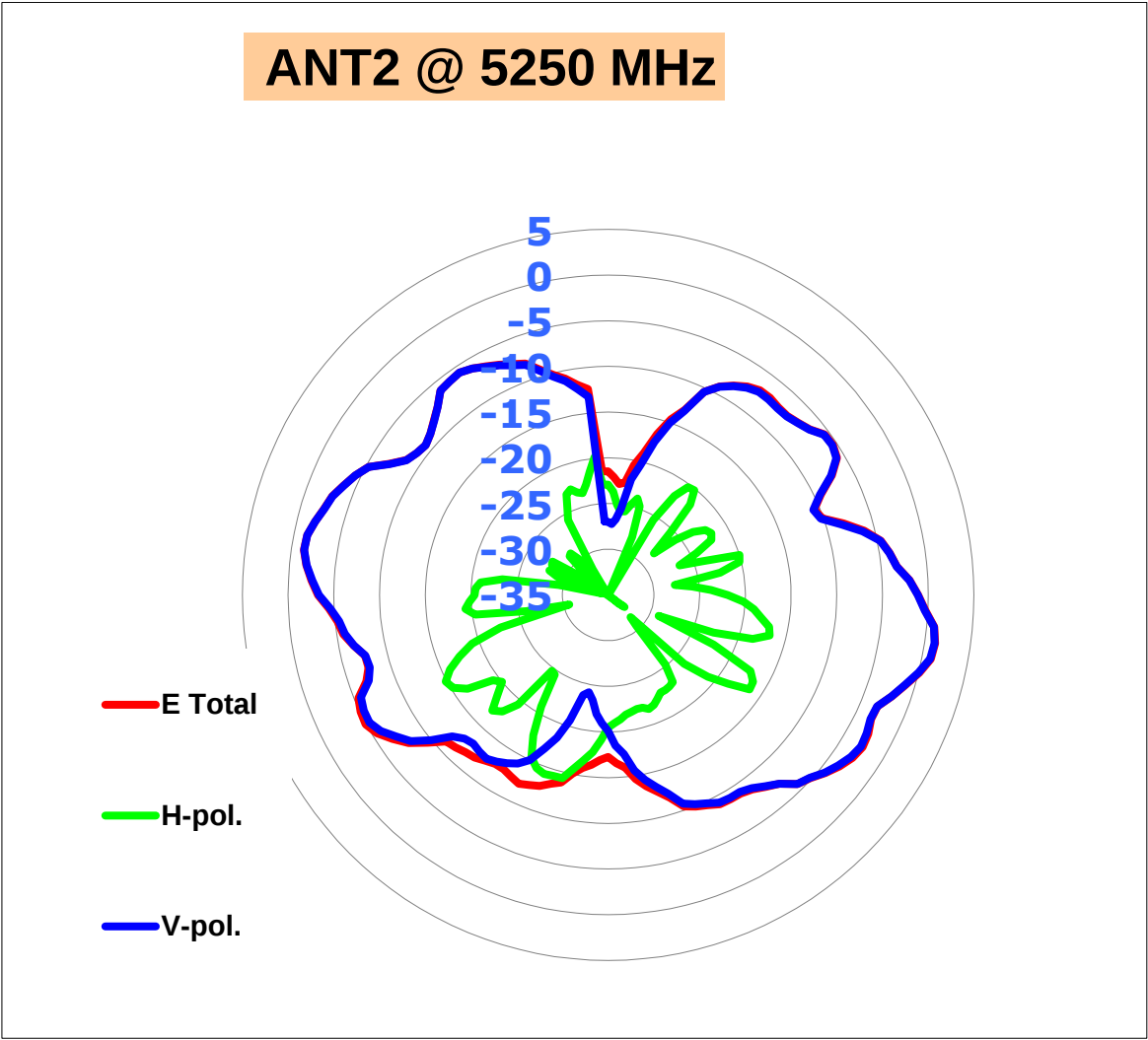
Center Frequency	2483.5 MHz
Horizontal+ Vertical (dBi) peak	-3.34

Max Antenna 3D Radiation Pattern 5150-5250 MHz



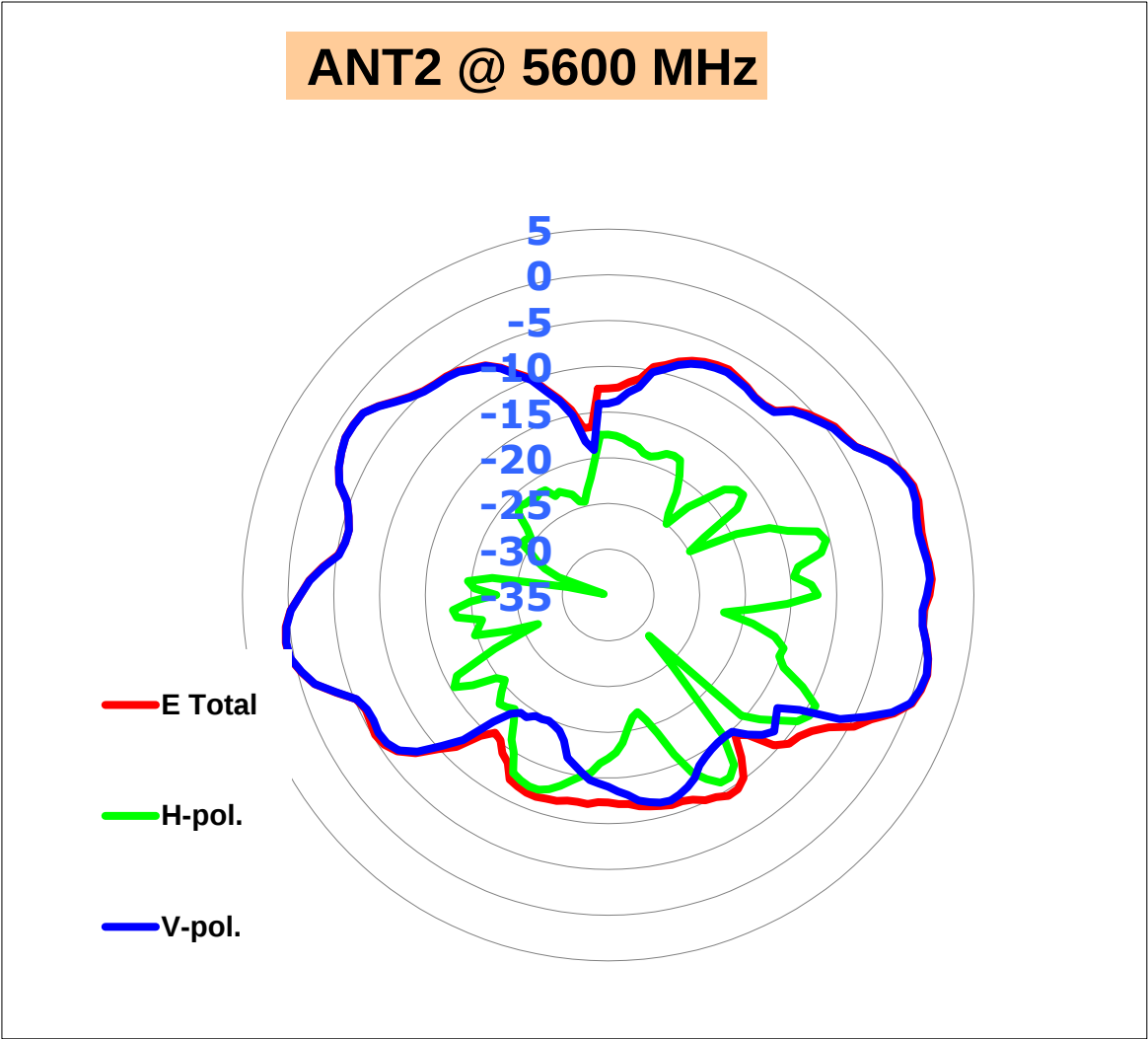
Center Frequency	5250 MHz
Horizontal+ Vertical (dBi) peak	1.15

Max Antenna 3D Radiation Pattern 5250-5350 MHz



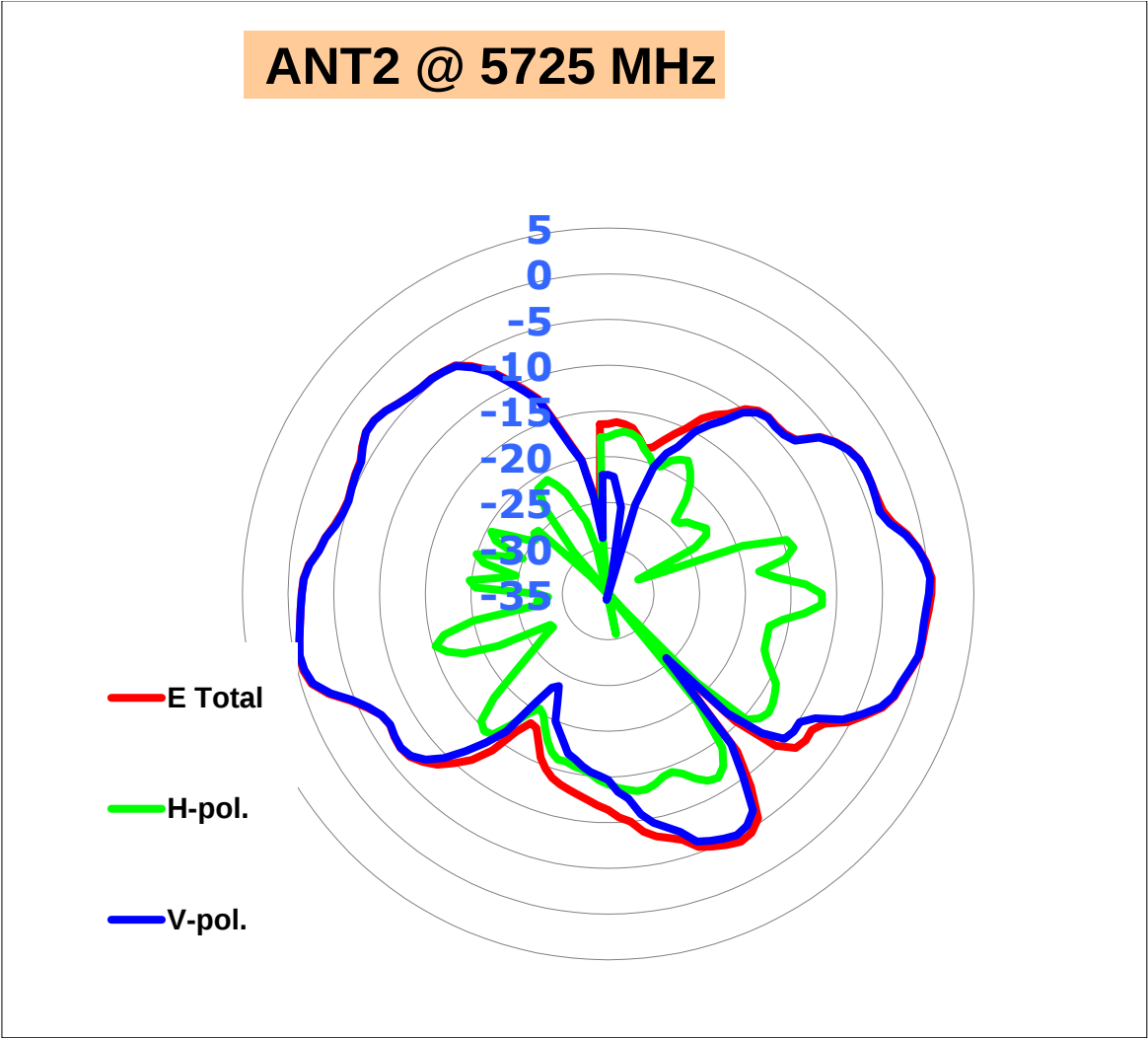
Center Frequency	5250 MHz
Horizontal+ Vertical (dBi) peak	1.15

Max Antenna 3D Radiation Pattern 5470-5725 MHz



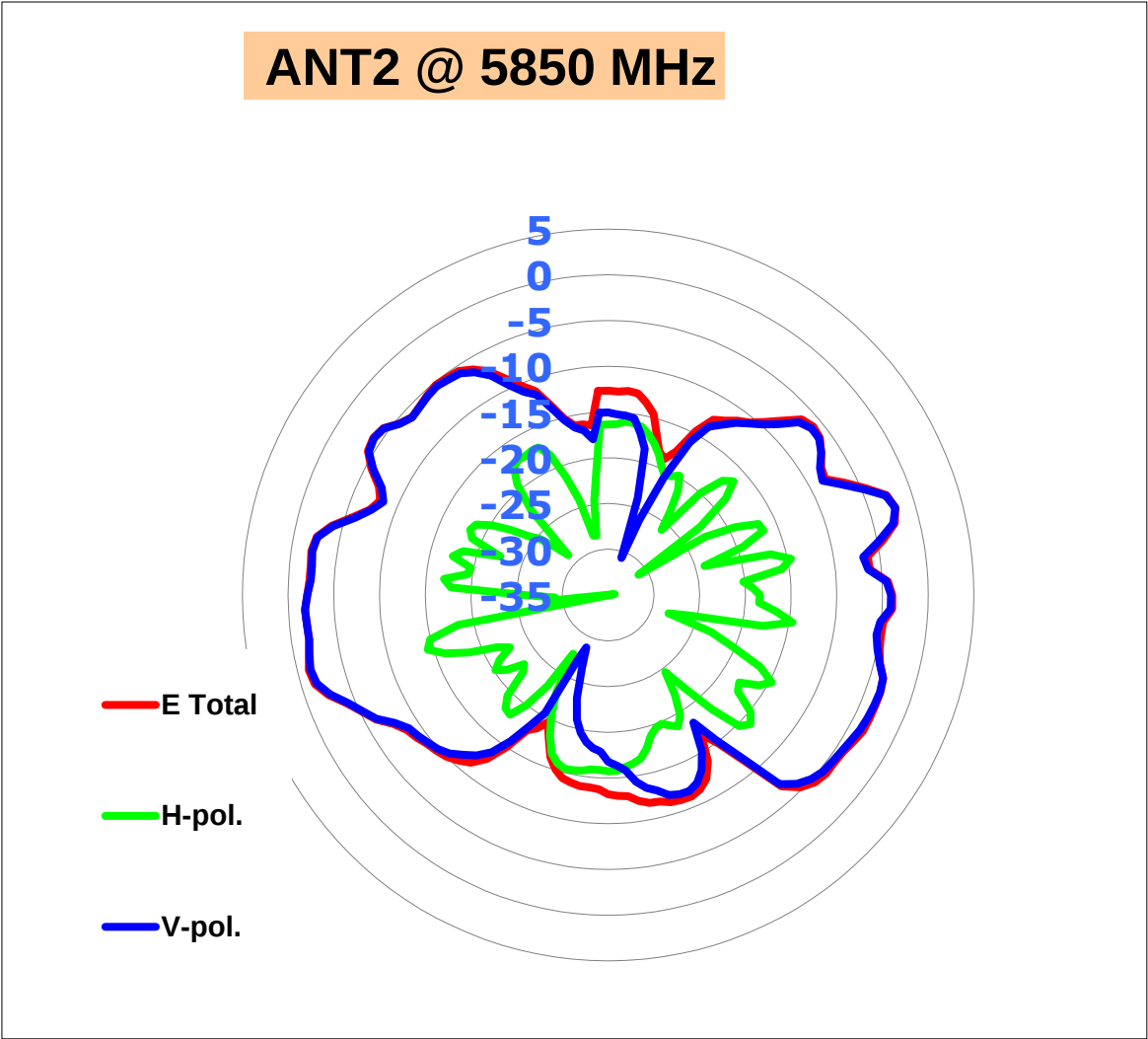
Center Frequency	5600 MHz
Horizontal+ Vertical (dBi) peak	0.98

Max Antenna 3D Radiation Pattern 5725-5850 MHz



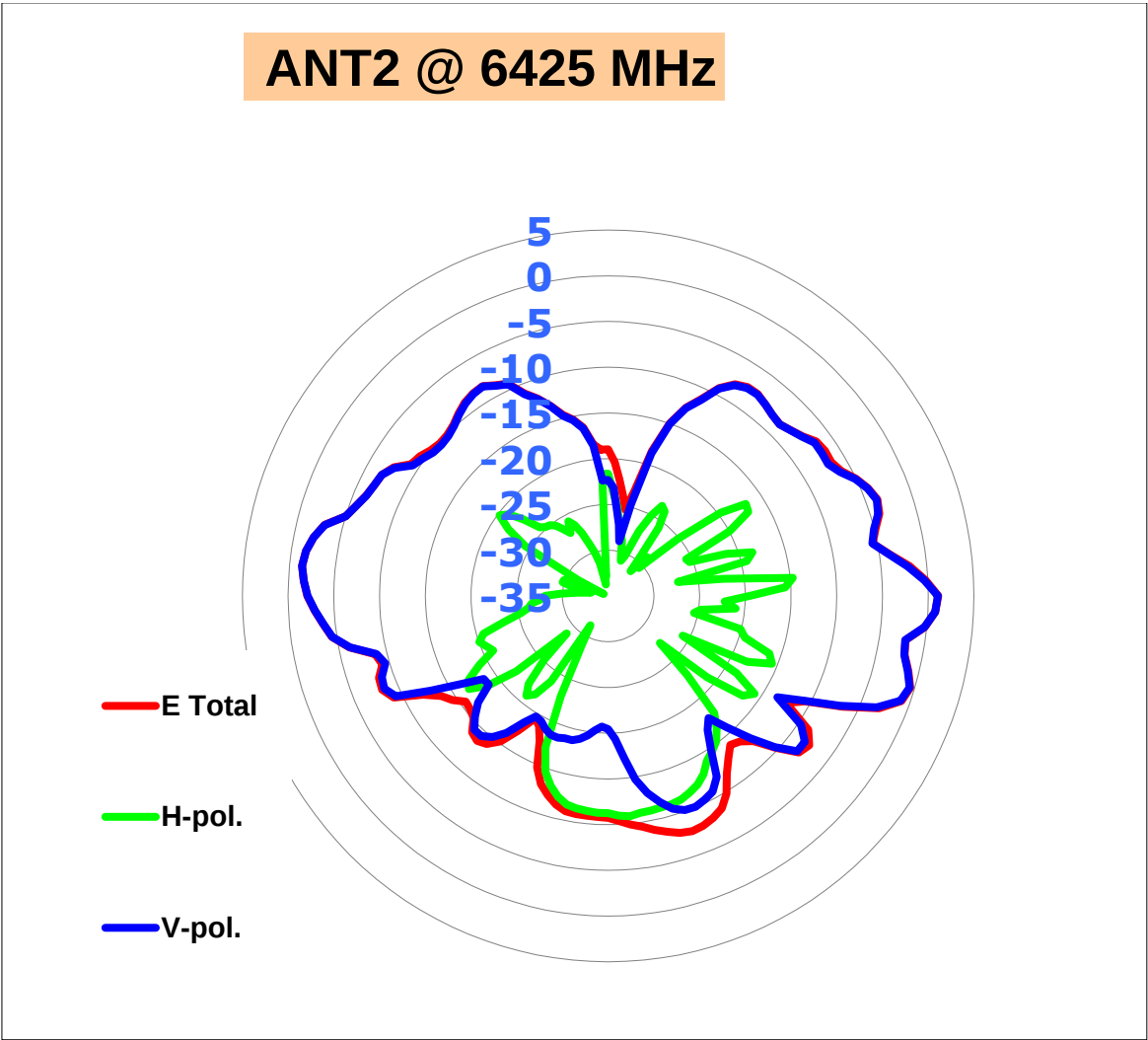
Center Frequency	5725 MHz
Horizontal+ Vertical (dBi) peak	0.43

Max Antenna 3D Radiation Pattern 5850-5895 MHz



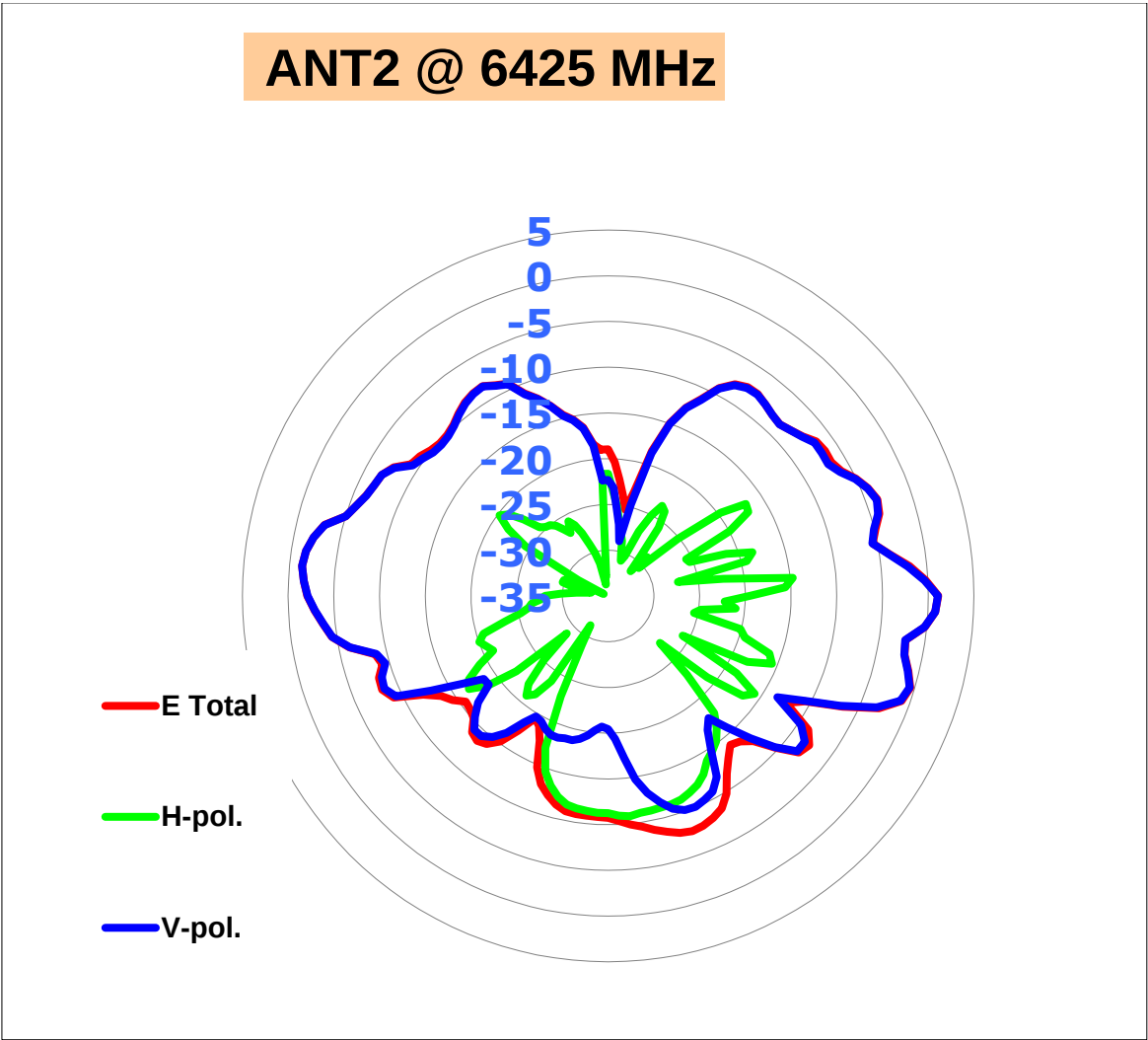
Center Frequency	5850 MHz
Horizontal+ Vertical (dBi) peak	-1.24

Max Antenna 3D Radiation Pattern 5925-6425 MHz



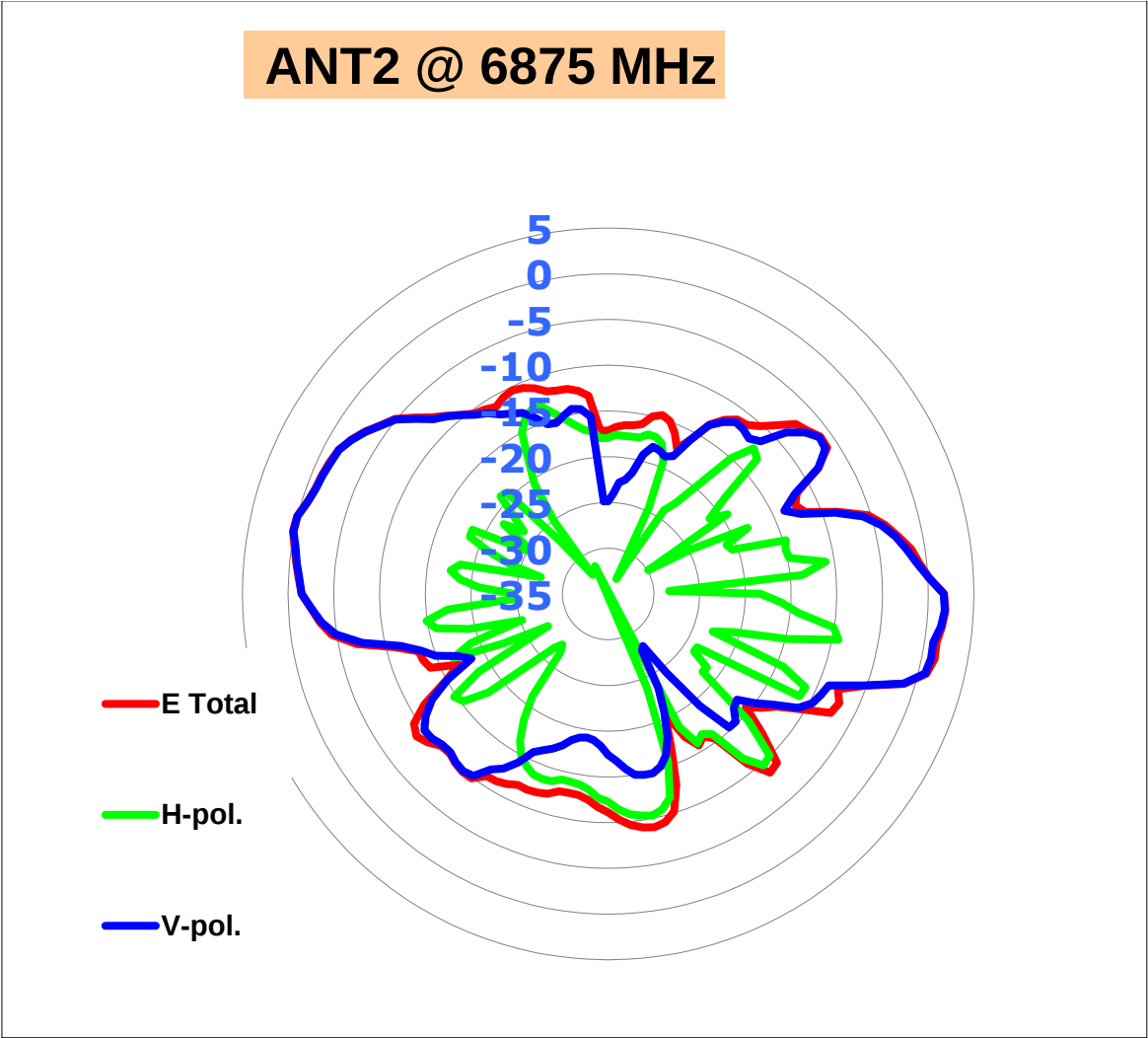
Center Frequency	6425 MHz
Horizontal+ Vertical (dBi) peak	1.10

Max Antenna 3D Radiation Pattern 6425-6525 MHz



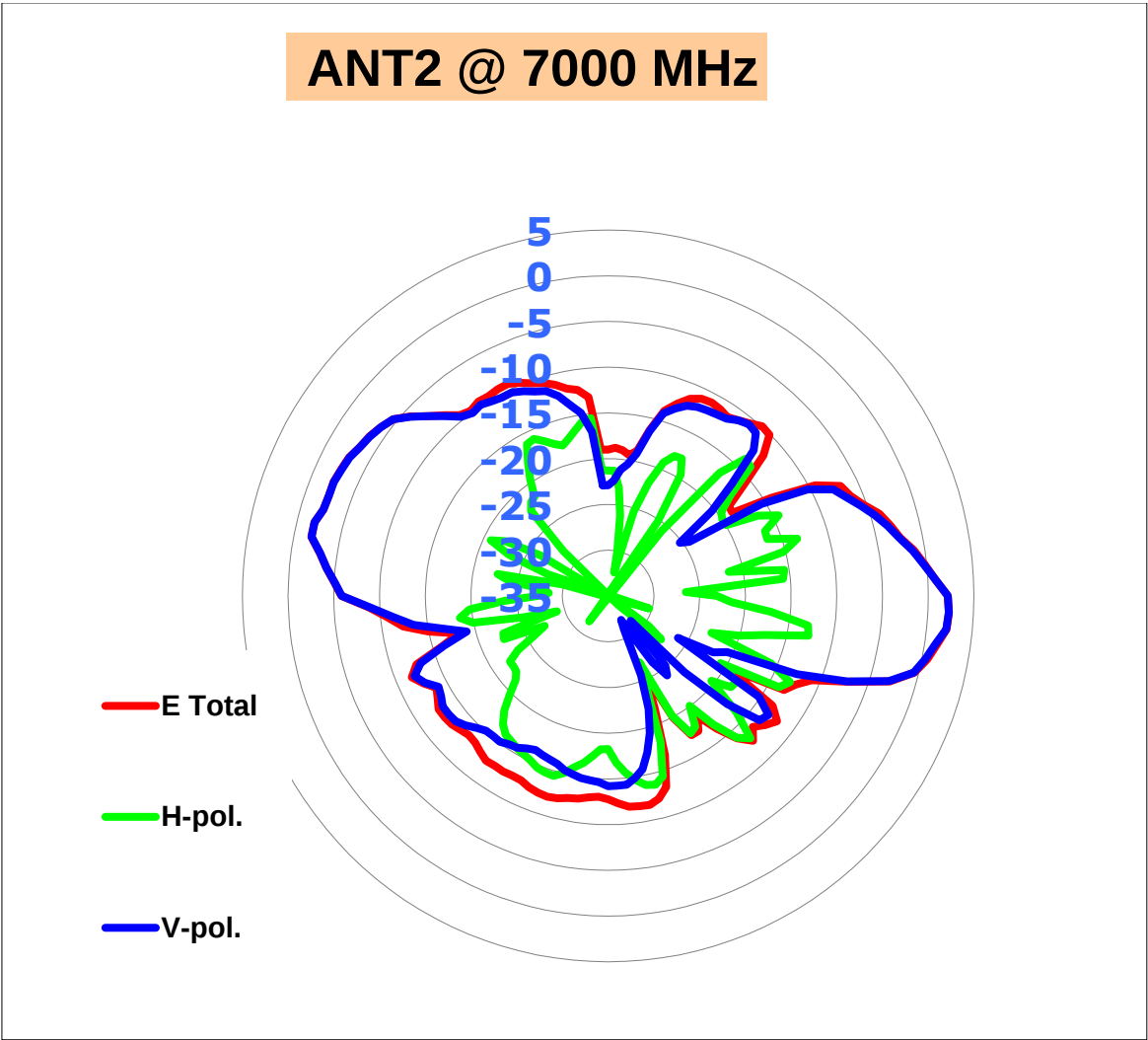
Center Frequency	6425 MHz
Horizontal+ Vertical (dBi) peak	1.10

Max Antenna 3D Radiation Pattern 6525-6875 MHz



Center Frequency	6875 MHz
Horizontal+ Vertical (dBi) peak	1.93

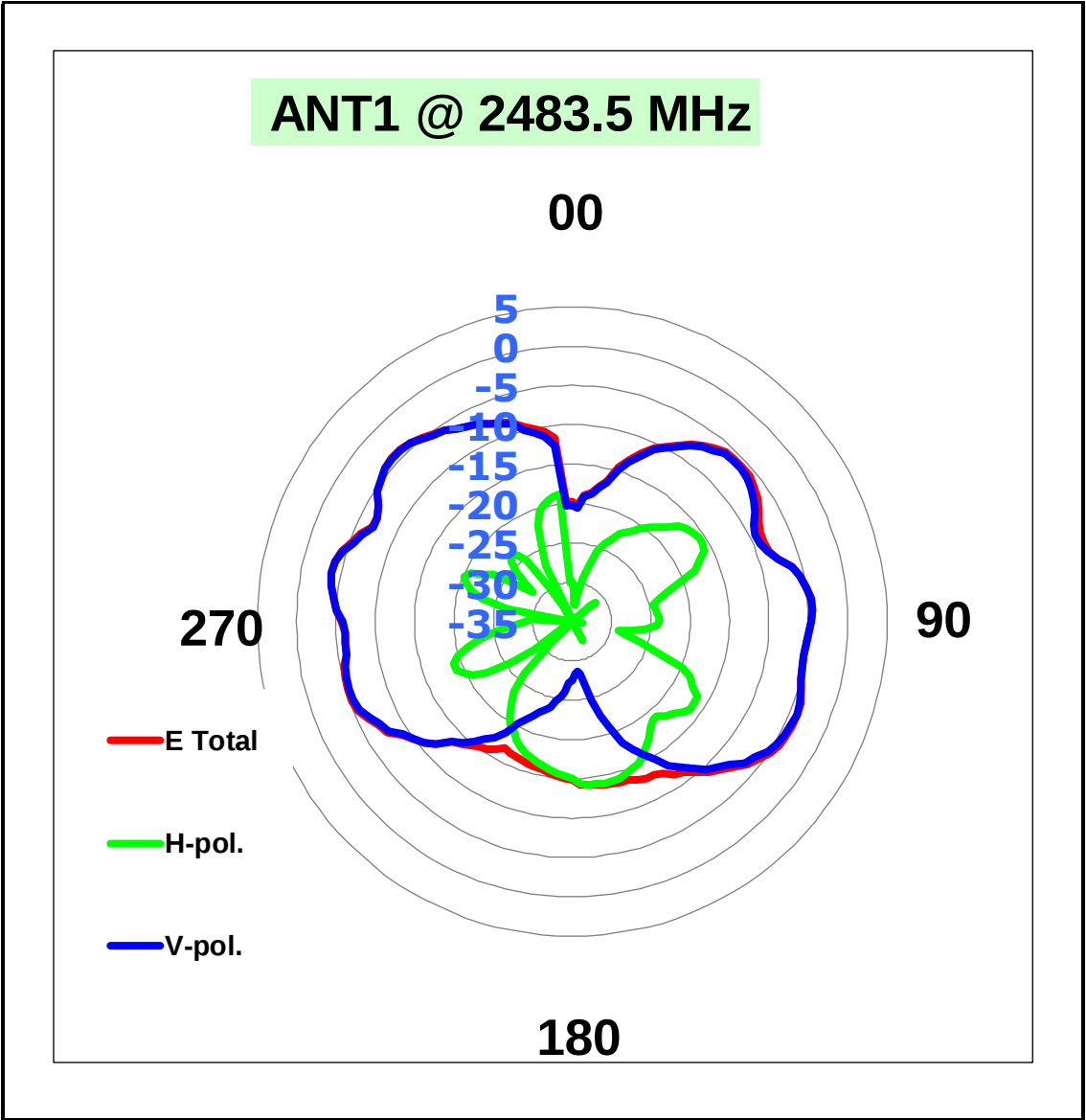
Max Antenna 3D Radiation Pattern 6875-7125 MHz



Center Frequency	7000 MHz
Horizontal+ Vertical (dBi) peak	2.32

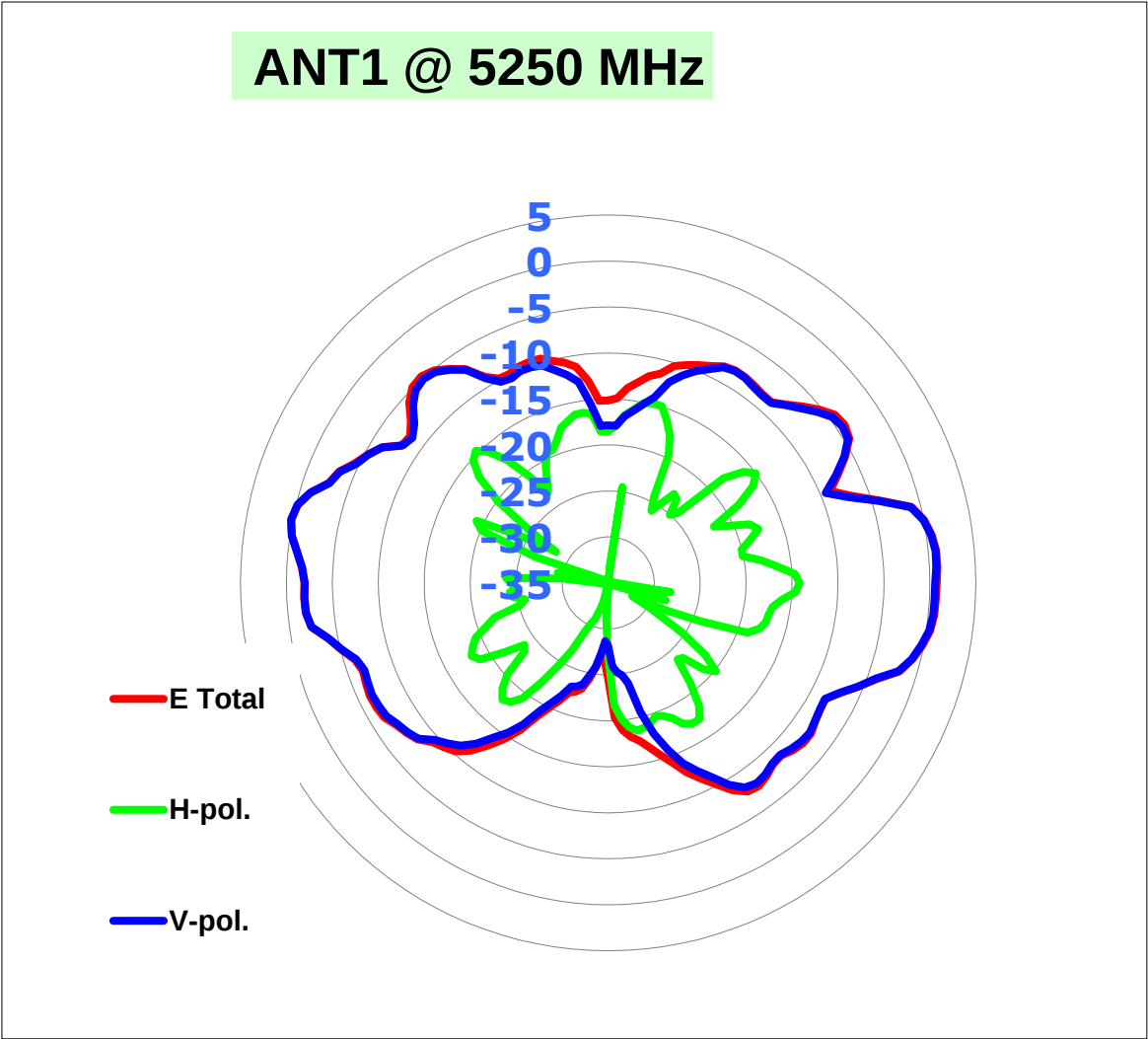
Auxiliary Antenna

Max Antenna 3D Radiation Pattern 2400 – 2483.5 MHz



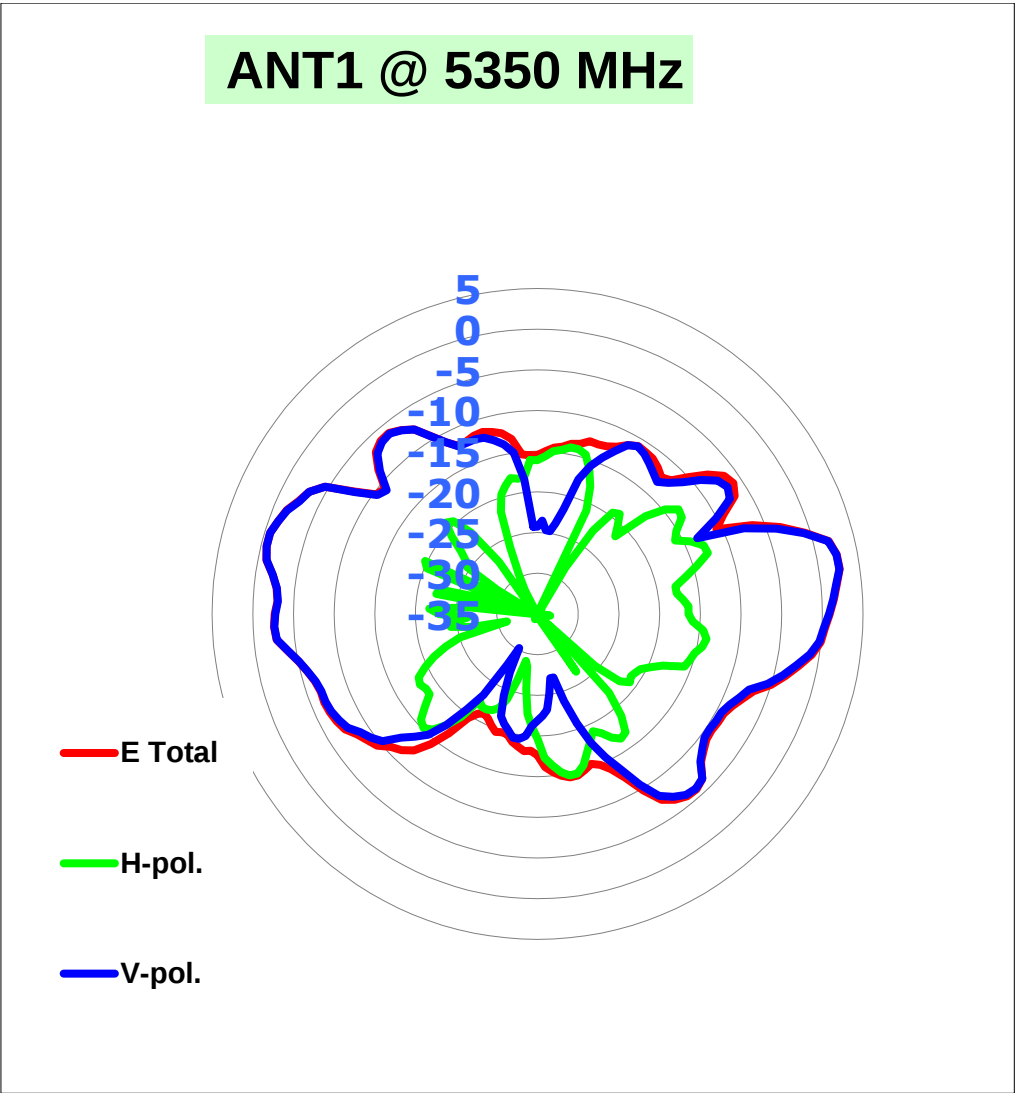
Center Frequency	2483.5 MHz
Horizontal+ Vertical (dBi) peak	-3.78

Max Antenna 3D Radiation Pattern 5150-5250 MHz



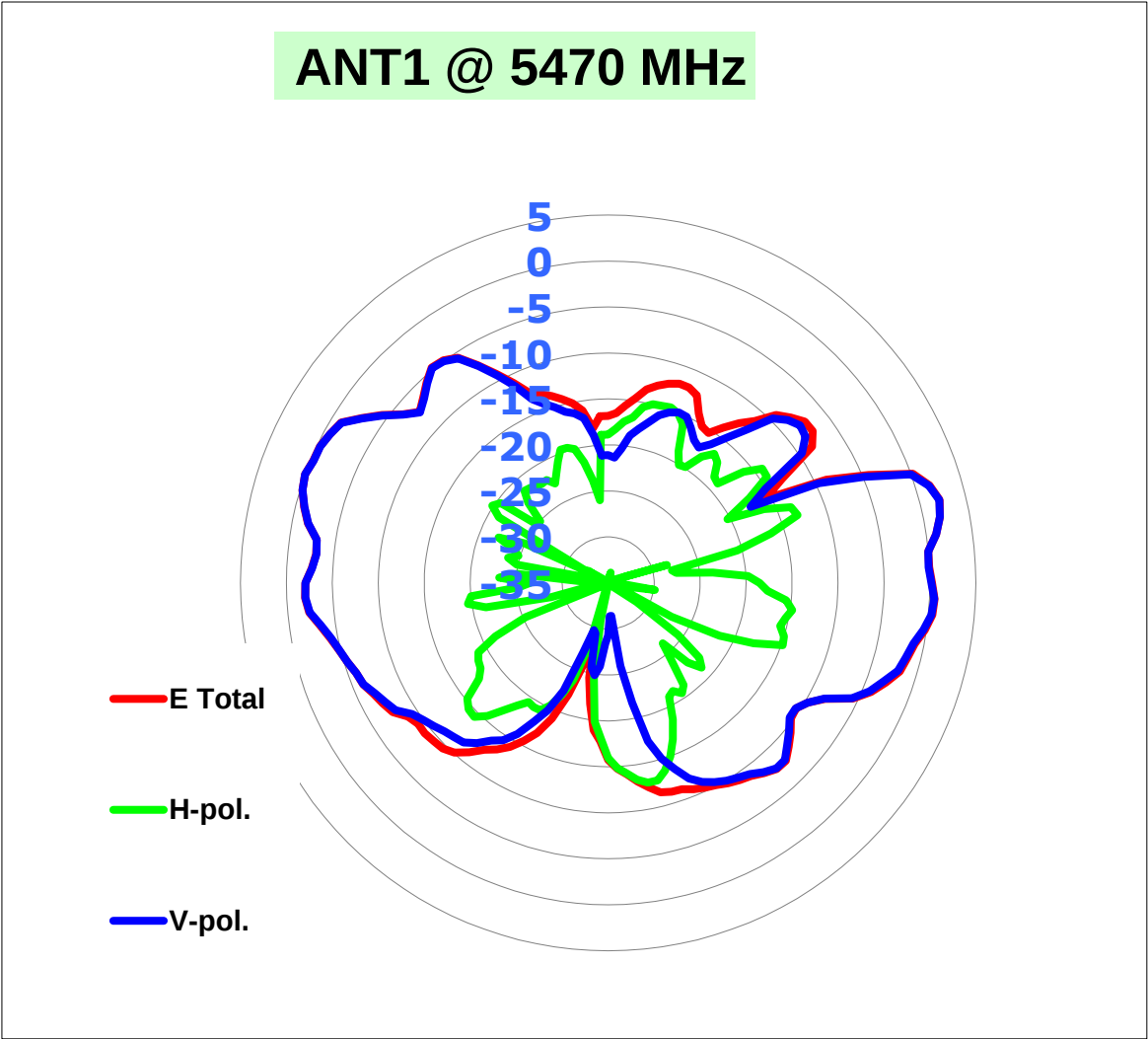
Center Frequency	5250 MHz
Horizontal+ Vertical (dBi) peak	0.86

Max Antenna 3D Radiation Pattern 5250-5350 MHz



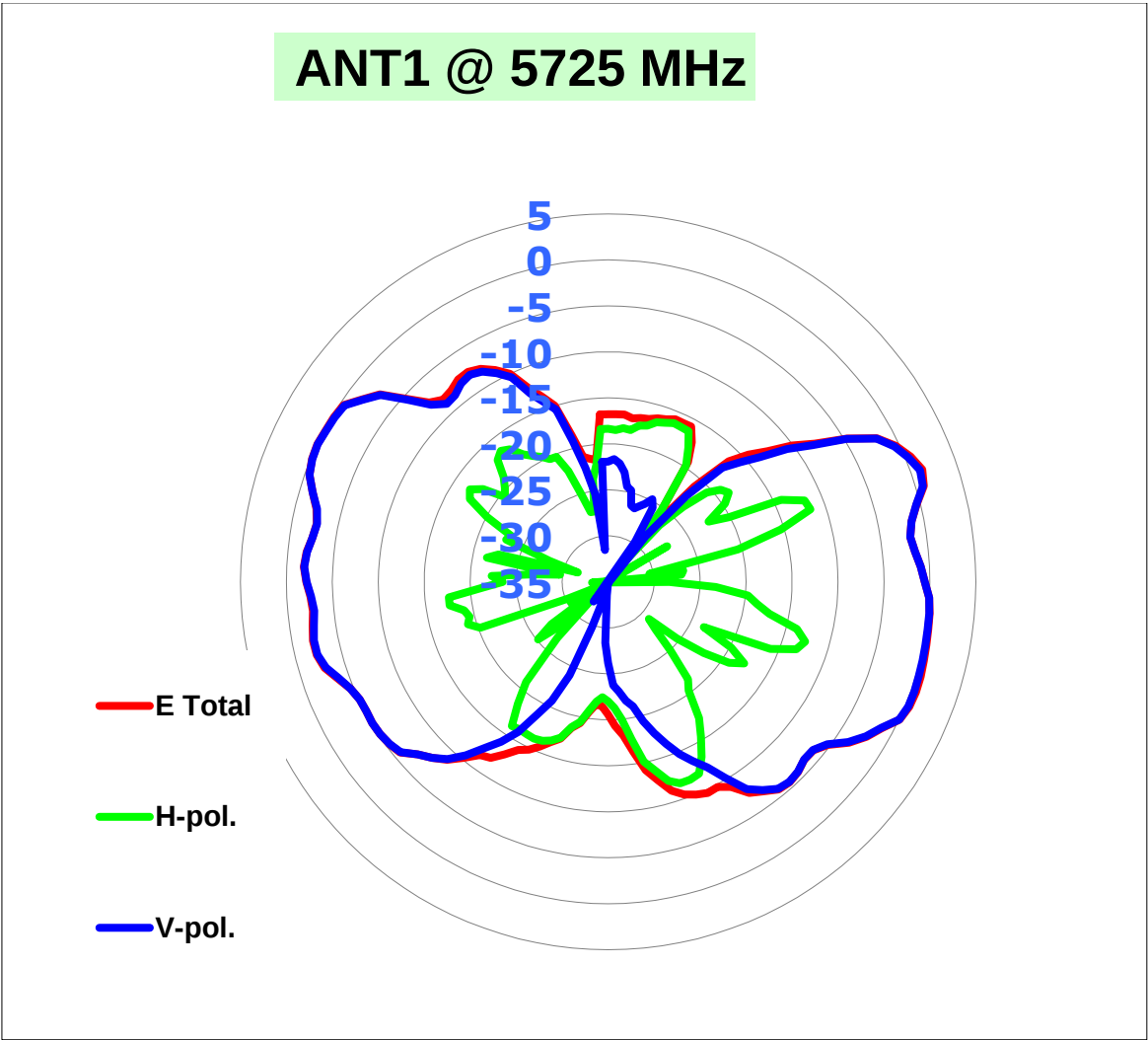
Center Frequency	5350 MHz
Horizontal+ Vertical (dBi) peak	2.54

Max Antenna 3D Radiation Pattern 5470-5725 MHz



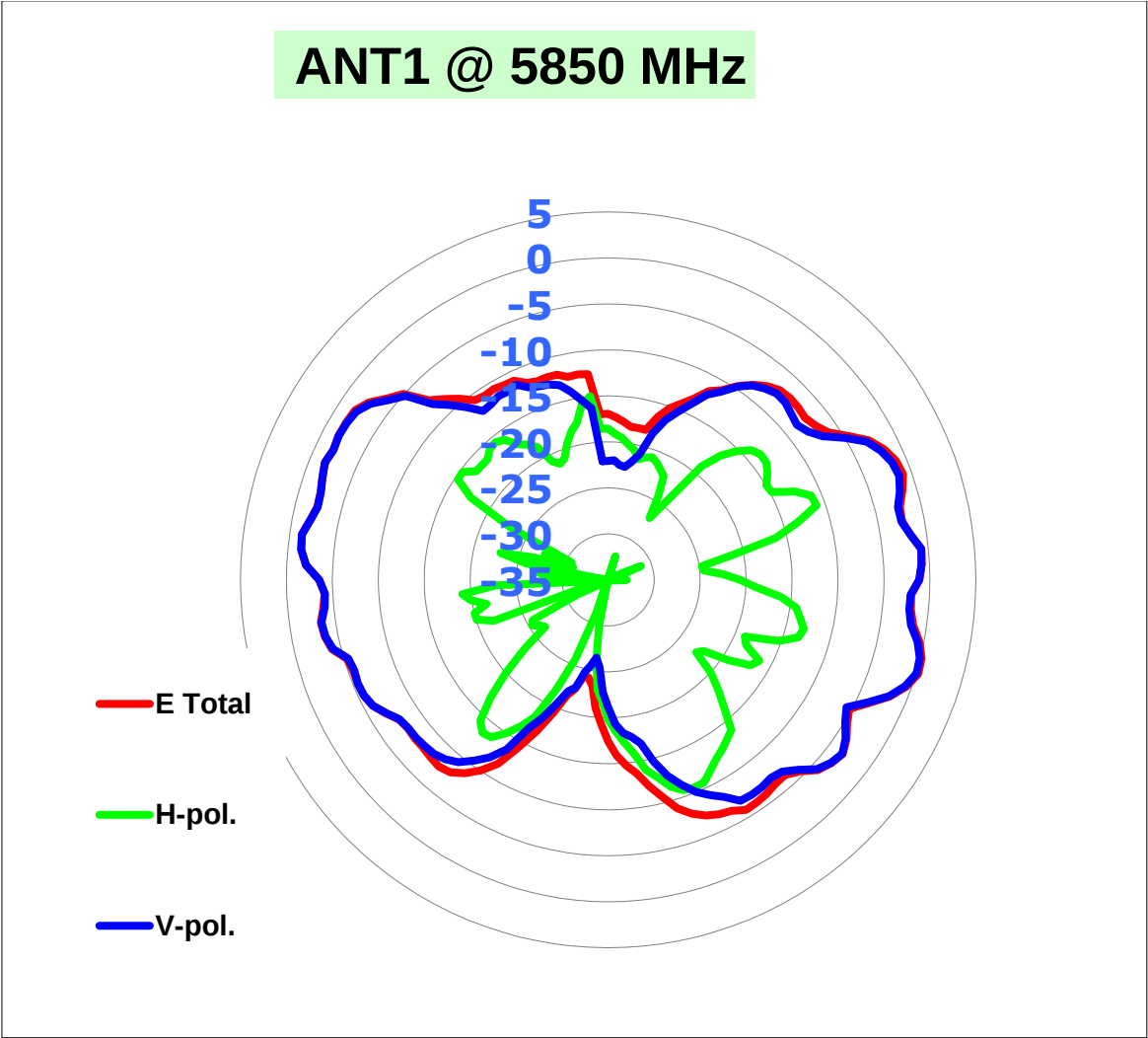
Center Frequency	5470 MHz
Horizontal+ Vertical (dBi) peak	2.17

Max Antenna 3D Radiation Pattern 5725-5850 MHz



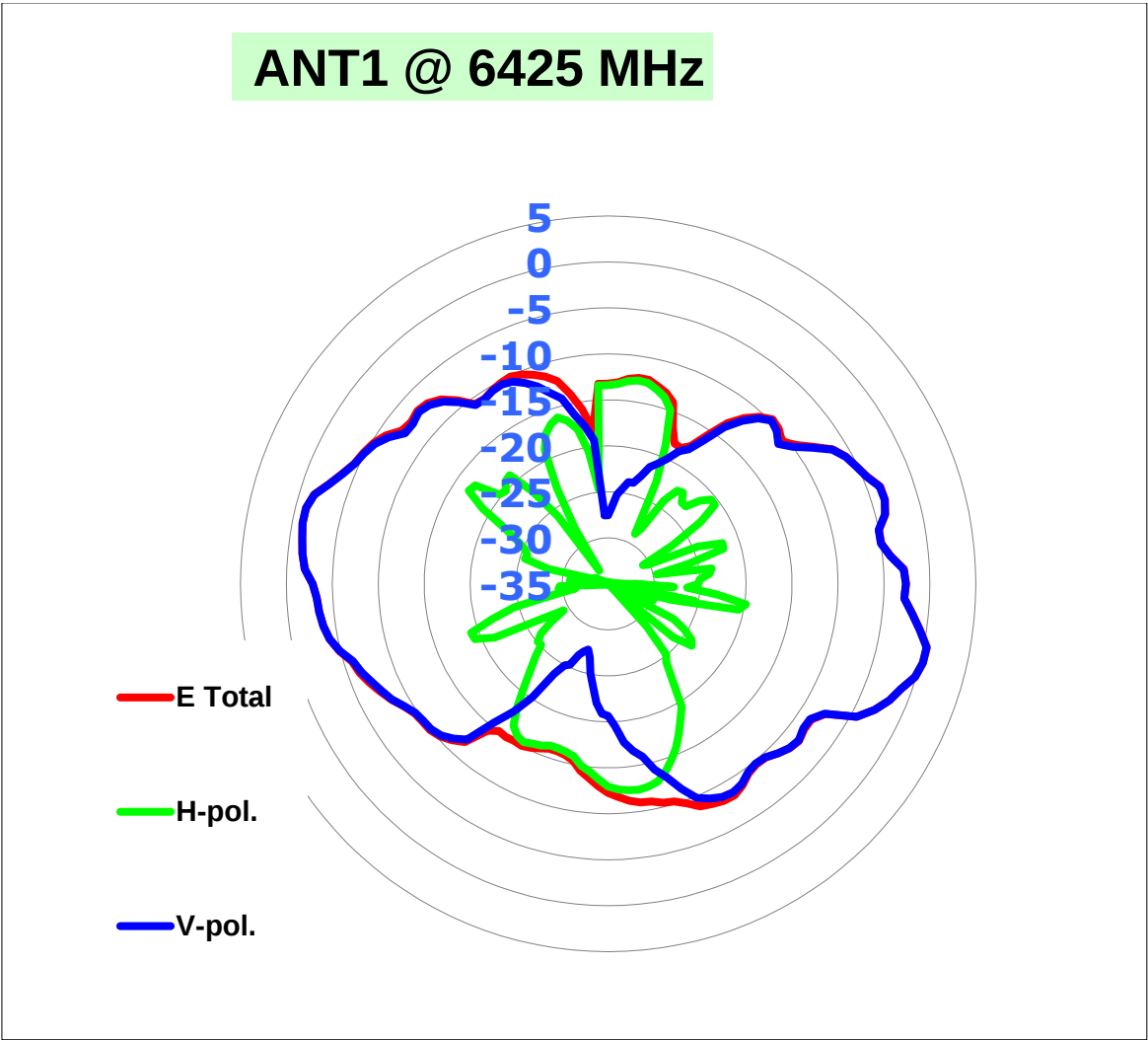
Center Frequency	5725 MHz
Horizontal+ Vertical (dBi) peak	1.28

Max Antenna 3D Radiation Pattern 5850-5895 MHz



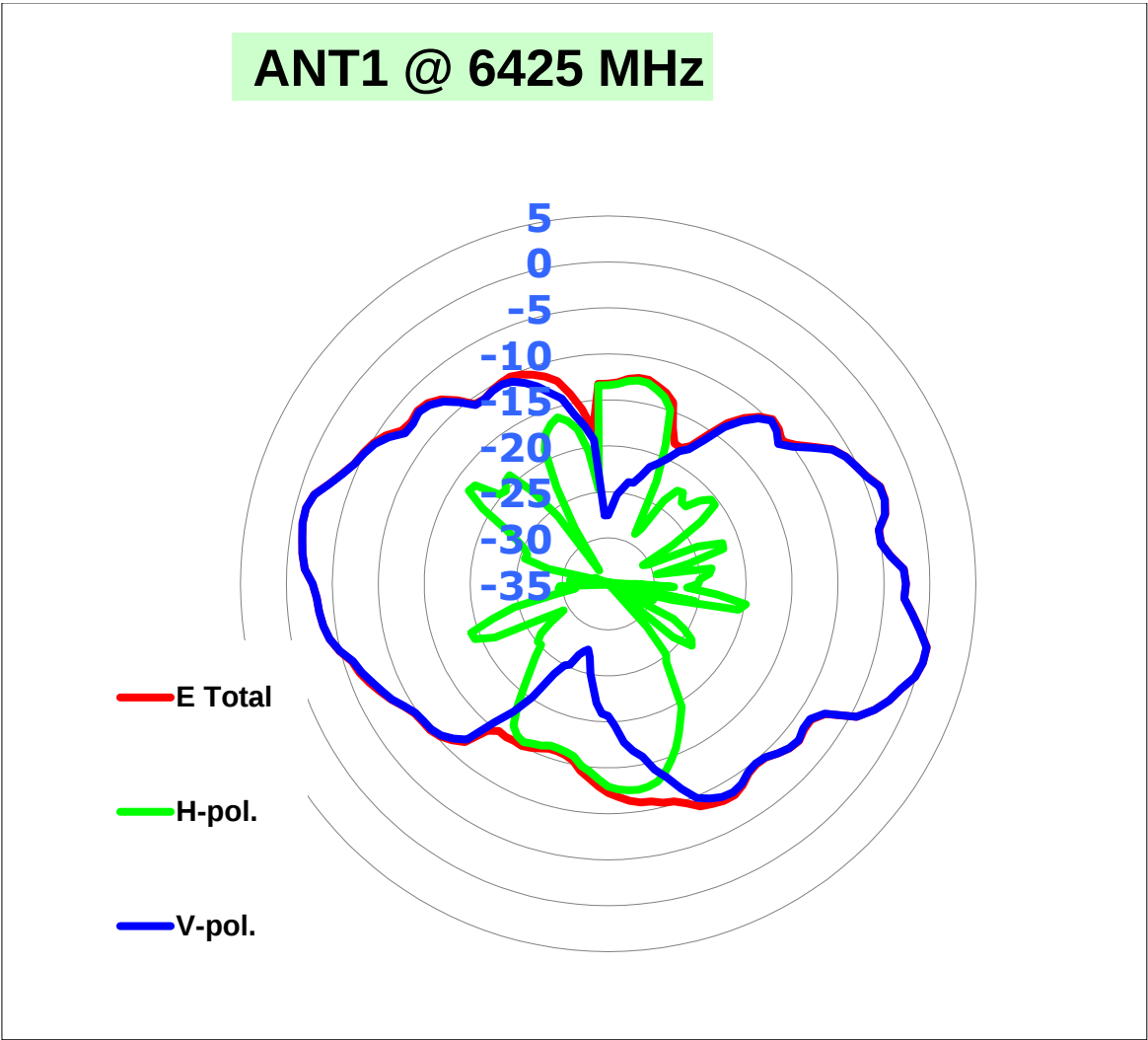
Center Frequency	5850 MHz
Horizontal+ Vertical (dBi) peak	0.25

Max Antenna 3D Radiation Pattern 5925-6425 MHz



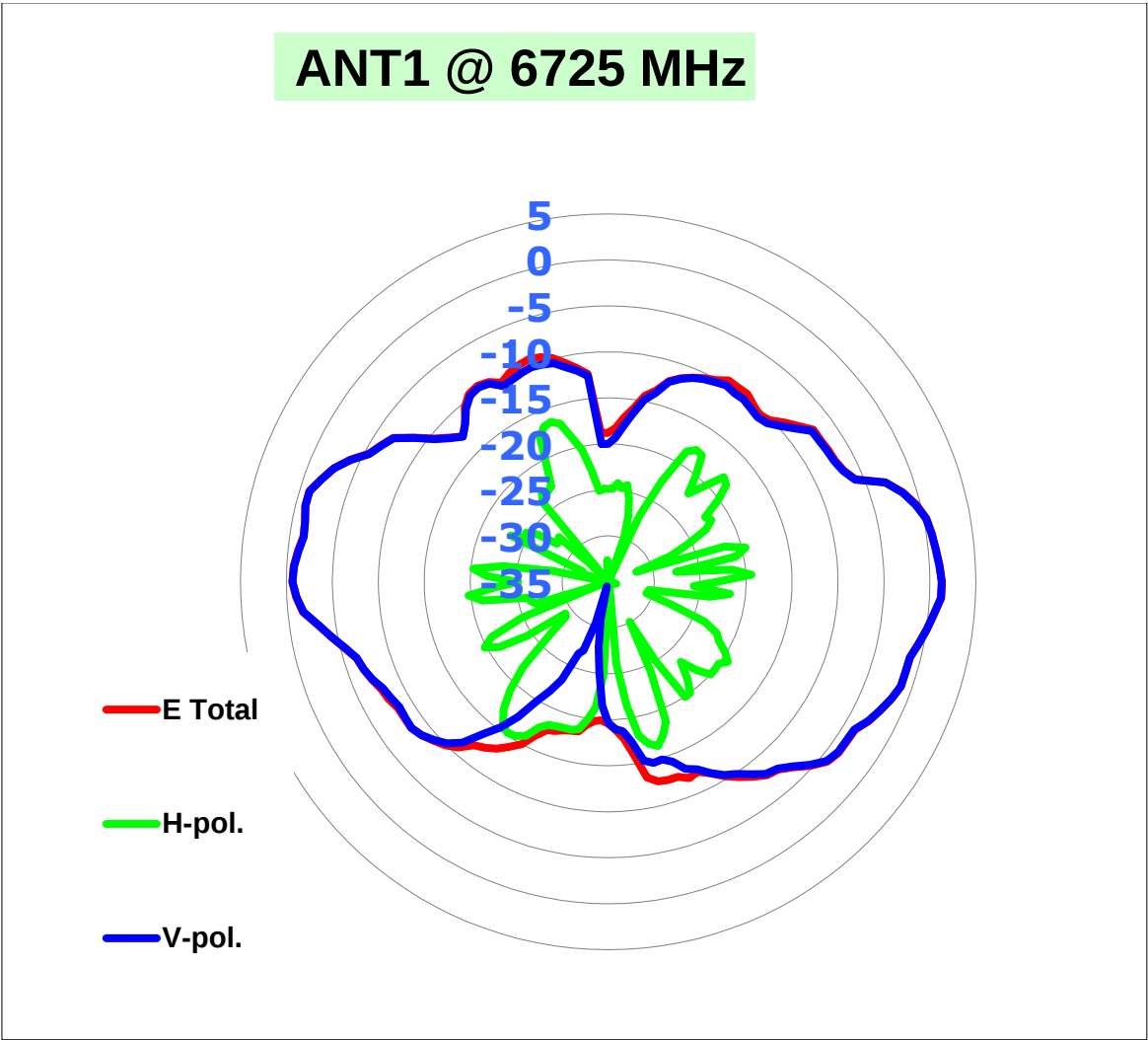
Center Frequency	6425 MHz
Horizontal+ Vertical (dBi) peak	0.35

Max Antenna 3D Radiation Pattern 6425-6525 MHz



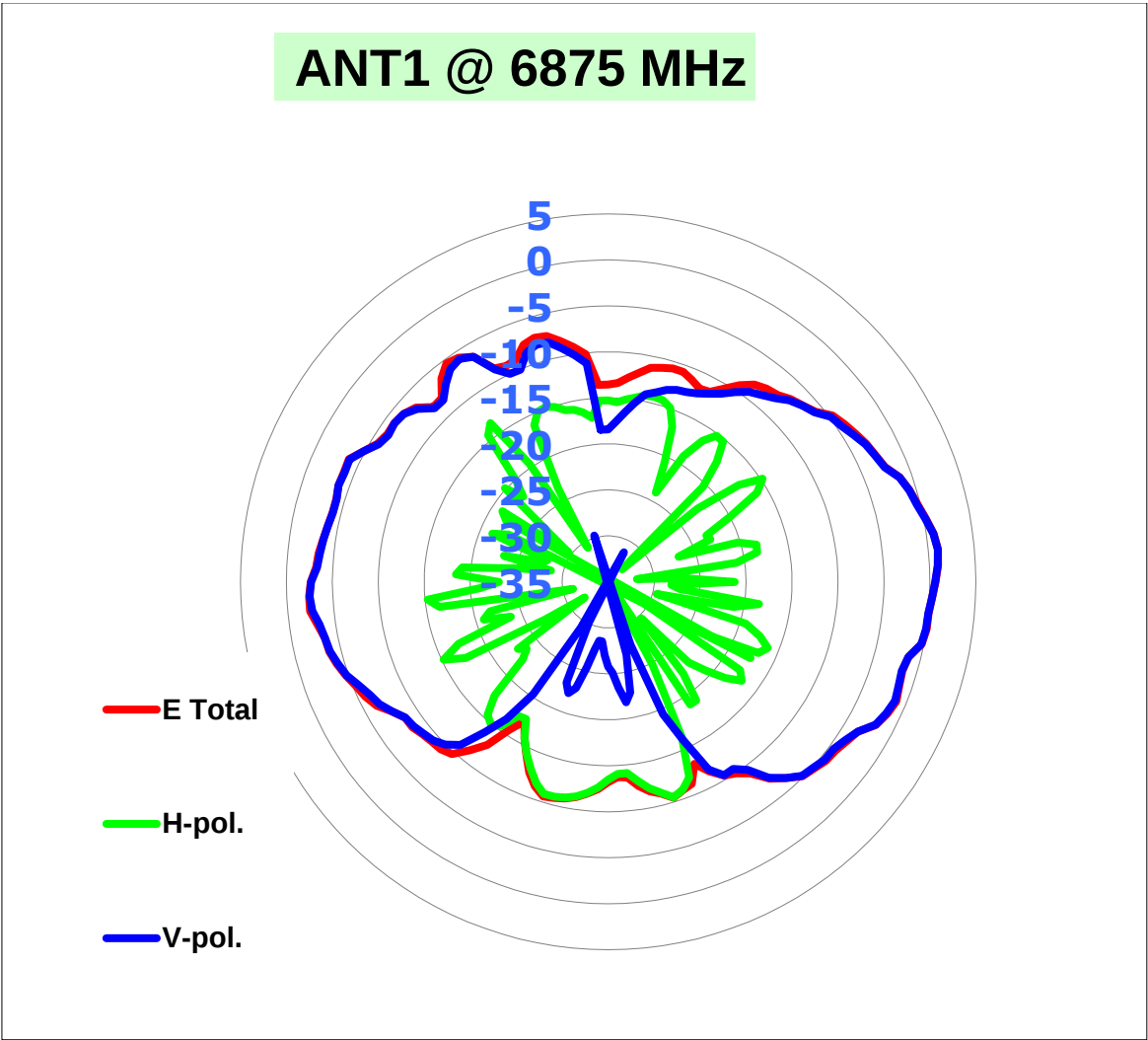
Center Frequency	6425 MHz
Horizontal+ Vertical (dBi) peak	0.35

Max Antenna 3D Radiation Pattern 6525-6875 MHz



Center Frequency	6725 MHz
Horizontal+ Vertical (dBi) peak	1.31

Max Antenna 3D Radiation Pattern 6875-7125 MHz

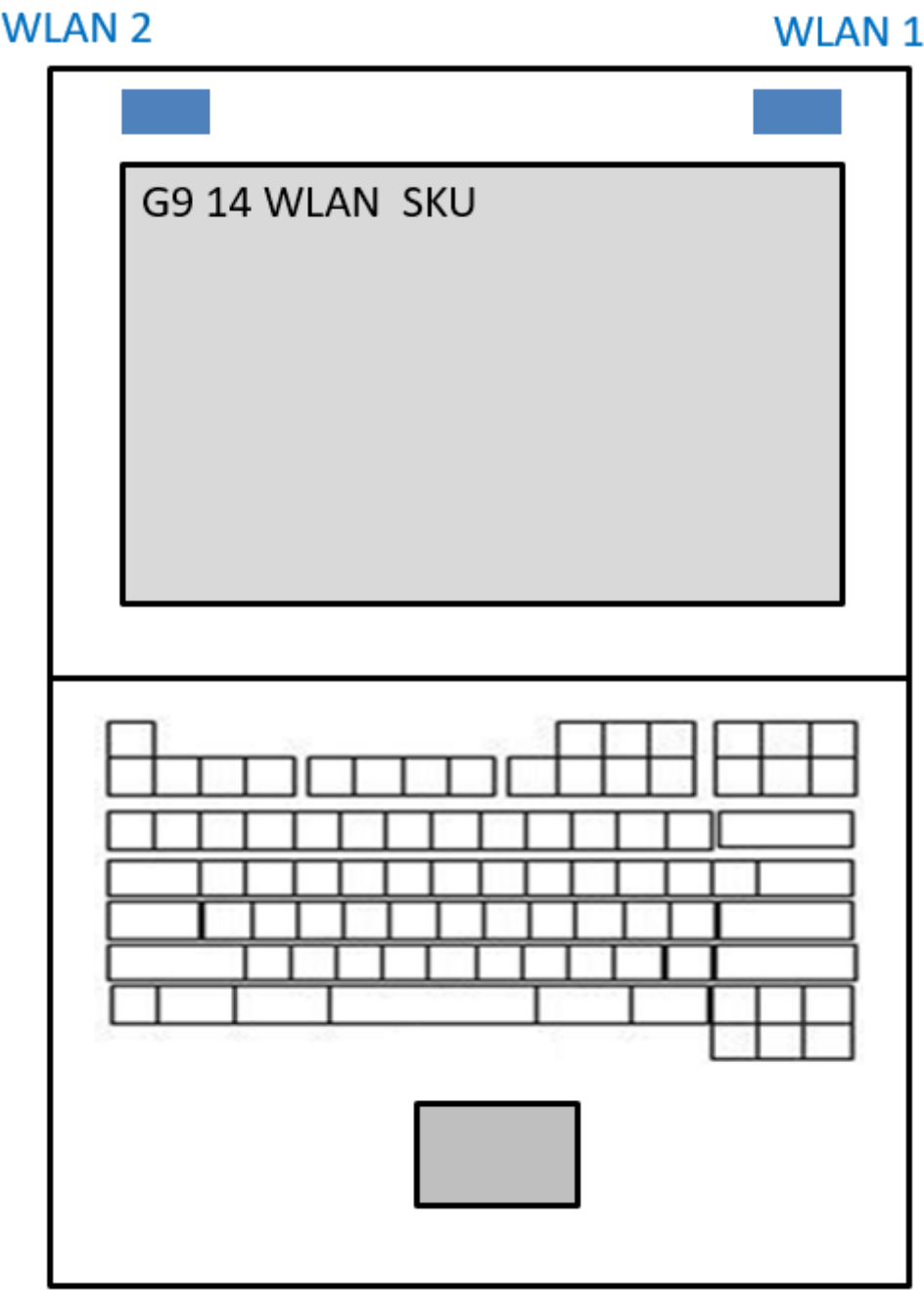


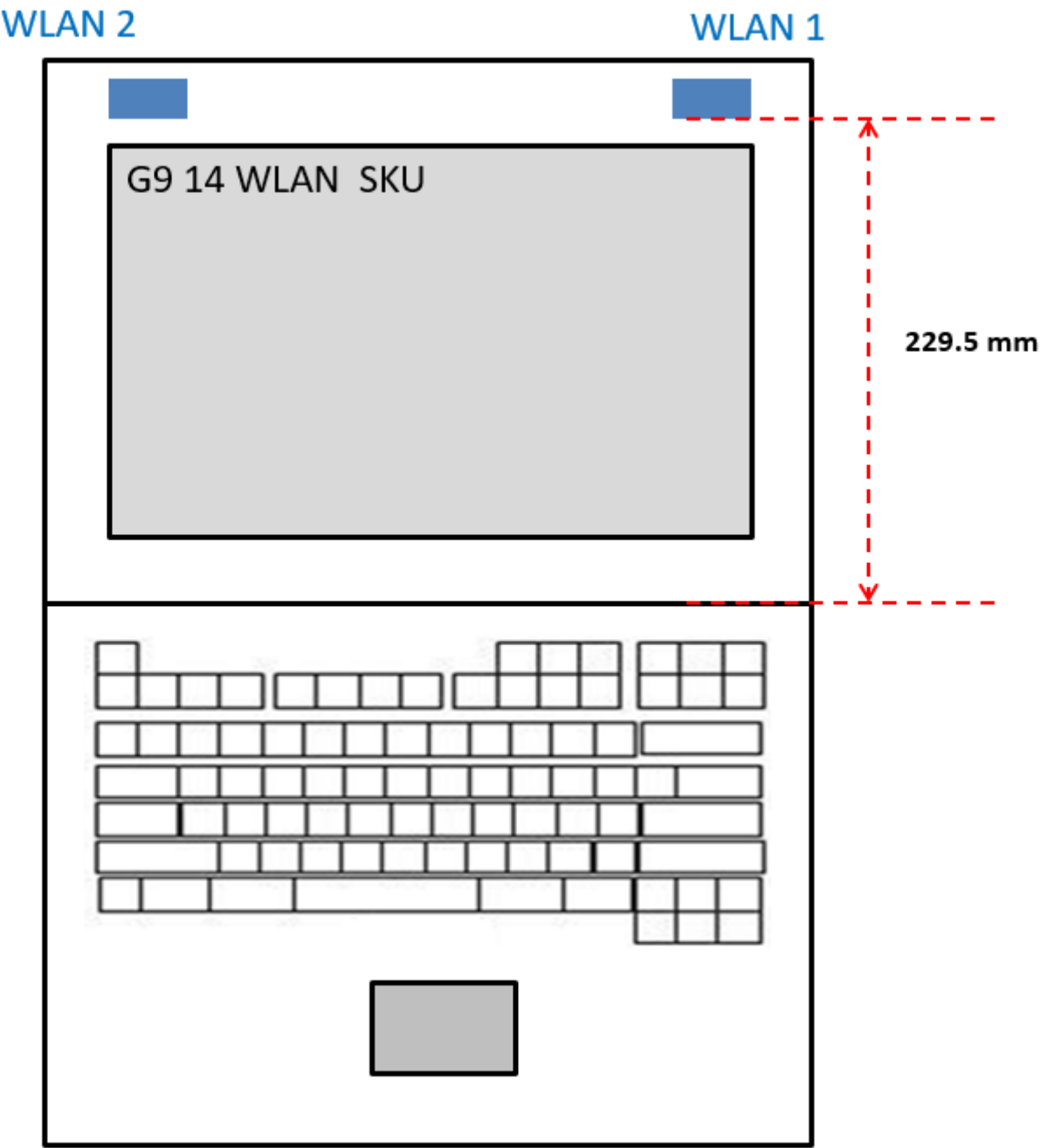
Center Frequency	6875 MHz
Horizontal+ Vertical (dBi) peak	1.05

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).

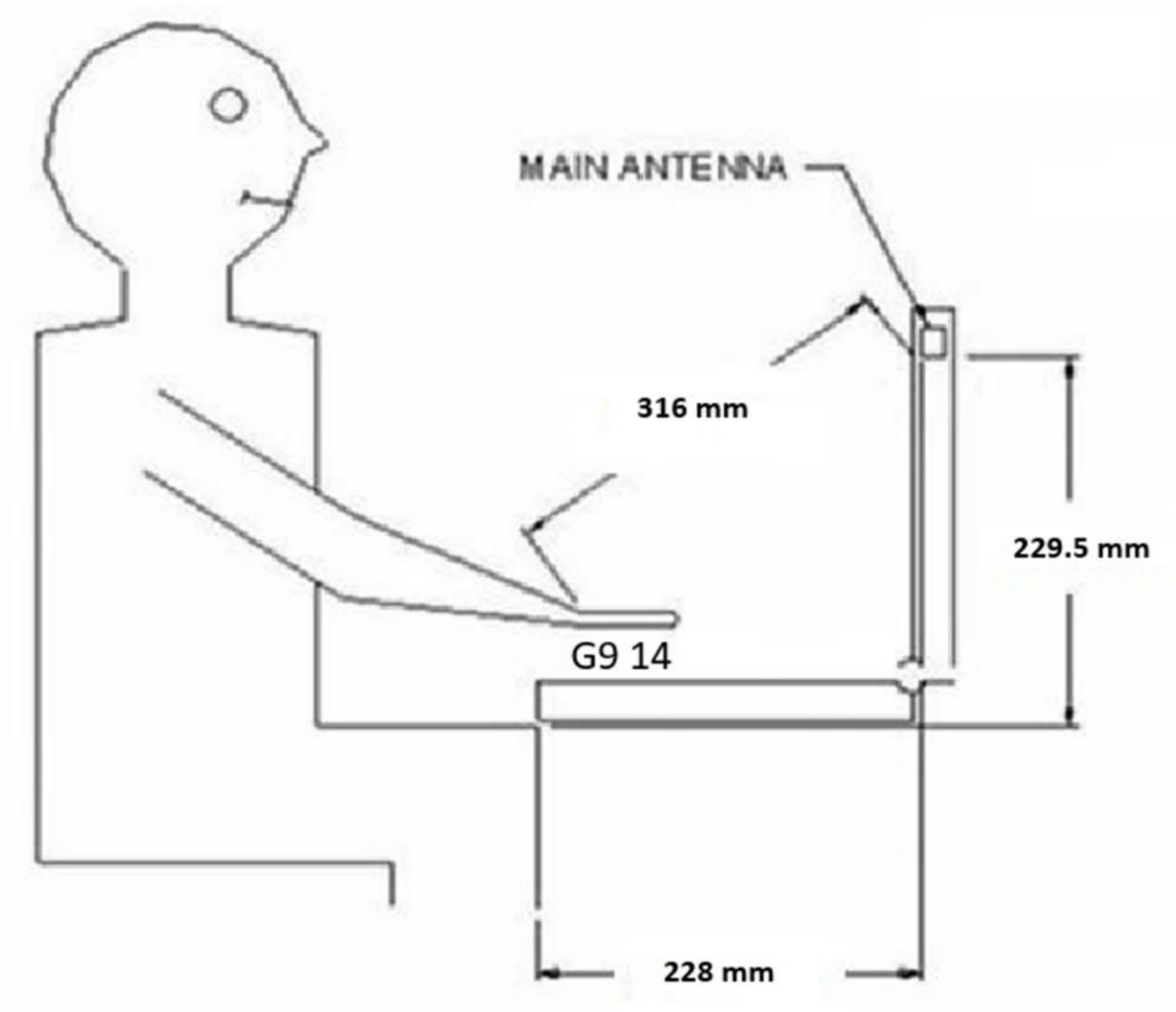
Any antenna that transmits must show dimensions to bottom of laptop. Provide a description of the materials that are used for supporting or surrounding transmit antennas; for example, non-conductive plastics vs. conductive coated plastic or metallic materials.





Section 5. Antenna 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 6. 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)

