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Material or Methods Specification

Number: PMAN5101A
Issue: A
Date: October 2, 2018

TITLE: APX8500-HP 2.4/5 GHz Covert Glass-Mount BT/WIFI ANTENNA Page 1 **of** 26

ISSUE	ORIGINATOR	DETAIL SPEC CHANGES	DATE
A	HAMMEL, BRANDON; MEHDI MEHRSA; GRADA, SAMUEL; KUPPUSAMY, ANBUSELVAN	PRODUCTION RELEASE	October 2, 2018

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1. SCOPE

This document contains specifications pertinent to the AXP8500-HP 2.4/5 GHz Covert Glass-Mount BT/WIFI antenna for use in mobile radios. It includes General, Mechanical and Electrical Requirements, VQA/Final tests, and Qualification tests.

2. APPLICABLE DOCUMENTS

12M02897W18	Controlled and Reportable Materials Disclosure
12M05022A87	Motorola Quality Procedure Outsourced Assembled Kits
12M05041A30	Motorola Barcode and Label Applications Standard
12M80967A78	Motorola Vendor Material Quality Control
12S10601A	Motorola Packaging Rules for Vendors
12S10616A	Motorola Marking and Containers for Consumer Products Division
12G13933A01	Motorola Receiving Bar Code Specification for Vendors

3. REQUIREMENTS

3.1 General

Manufacturer needs to report any change in process/ material that would affect the electrical/ mechanical performance of the antenna.

2.4 GHz Covert Glass-Mount BT/WIFI ANTENNA DEFINED IN THIS DOCUMENT	
Part Number	**Description**
PMAN5101A	2.4/5 GHz Covert Glass-Mount BT/WIFI Antenna with 17ft Cable and QMA Connector

3.1.1 Application: This antenna is used with vehicle mount mobile radios.

3.1.2 Mechanical Requirements: Table 1. See Antenna diagram on page 6.

Part Number	Description	WIFI Antenna Cable	Install Manual
PMAN5101A	2.4/5 GHz BT/WIFI Glass Mount for vehicle installations	PVC Free RG316 FEP 1ft and PFP-195 16ft with QMA Plug (QMA Plug: Amphenol 134104 or Motorola Approved Equivalent)	Install Manual for Wi-Fi Glass Mount PMLN7726B

Table 1: Mechanical Requirements

3.1.2 Mechanical:

Random Vibration Test: Per MIL-STD-810E, Method 514.4, Procedure I-3.3

Temperature Cycle Test: In temperature/humidity chamber and perform 5 contiguous cycles of the following temperature cycle:

a. Begin test at room temperature (+23°C).
b. Ramp up to 70°C in 94 + 15/-0 minutes (0.5°C/min).
c. Soak at 70°C for 60 +30/-0 minutes.
d. Ramp down to -40°C in 220 + 15 minutes/-0 (0.5°C/min).
e. Soak at -40°C for 60 +30/-0 minutes.
f. Ramp back to room temperature in 126 + 15 minutes/-0 (0.5°C/min).

Humidity Cycle Test: In temperature/humidity chamber and perform the following 24-hour temperature/humidity profile:

a. Begin test at 25°C/50% relative humidity.
b. Ramp temperature to 40°C + 5°C and relative humidity to 95% + 5% in 3 hours + 30 minutes/-0.

c. Hold at 40°C + 5°C and 95% + 5% relative humidity for 6 hours + 30 minutes/-0.
d. Ramp temperature to 25°C + 5°C and relative humidity to 80% + 5% in 3 hours + 30 minutes/-0.
e. Ramp relative humidity to 95% + 5% while maintaining temperature at 25°C + 5°C in 3 hours + 30 minutes/-0.
f. Soak at 25°C + 5°C and 95% + 5% relative humidity for 6 hours.
g. Ramp temperature to 40°C + 5°C while maintaining relative humidity at 95% + 5% in 3 hours + 30 minutes/-0.
h. Repeat steps c through g for a total of 6 cycles.

Salt Spray (Fog) Test: Per MIL-STD-810E, Procedure I, Method 509.3

3.1.3 Electrical Requirements:

Table 2: BT/WLAN Specifications

Motorola P/N	Freq Range (GHz)	Nominal Impedance (Ohms)	Max. Power (Watts)	Nominal Peak Gain (dBi)	Nominal VSWR (over 90 %BW)	MAX. VSWR	Minimum Efficiency (%)
PMAN5101A	2.30- 2.50 4.90– 5.90	50 50	1 1	1.7 – 2.7 [1] -3.6 – 0.2[1]	< 1.65:1 [1] < 1.35:1 [1]	< 2:1 [1] < 2:1 [1]	30 [1] 15 [1]

[1] Note: Measured in an anechoic setup/ open space with no interference. The antenna cable was cut to 1-foot length and terminated with SMA Male connector. A 16-foot PFP-195 cable assembly was attached to the antenna pigtail and terminated with Male QMA. The antenna was mounted on a 12 W x 5 H x .25 T - inch glass pane bordered with a metal rim (right side border of the pane).

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4. EXCEPTIONS AND WAIVERS

No change shall be allowed on production material, regardless of whether such change affects requirements specified, without prior explicit written permission of Motorola Development Engineering and Purchasing departments.

5. ANTENNA DIAGRAM

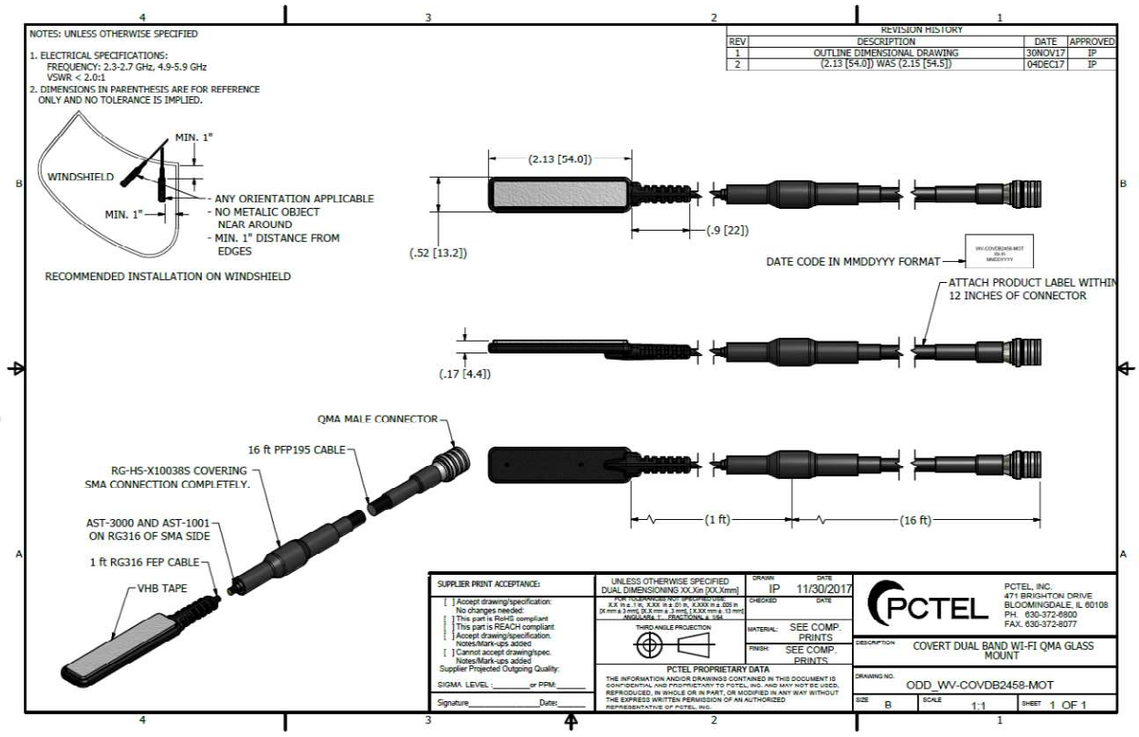

Figure 1A - Spec

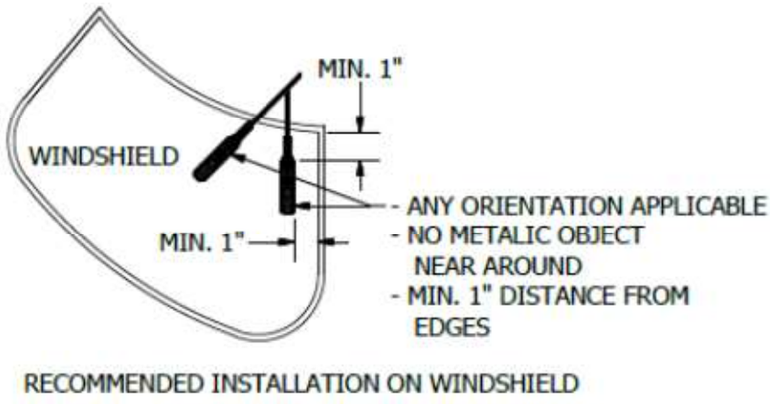

Figure 1B – Windshield Installation Diagram

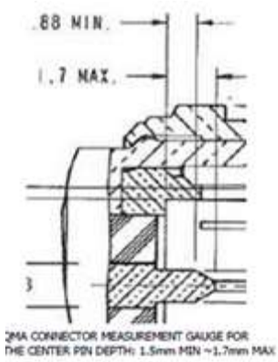

Figure 1C – Tolerance of QMA center pin

PMAN5101A
Note: Dimensions in Millimeters

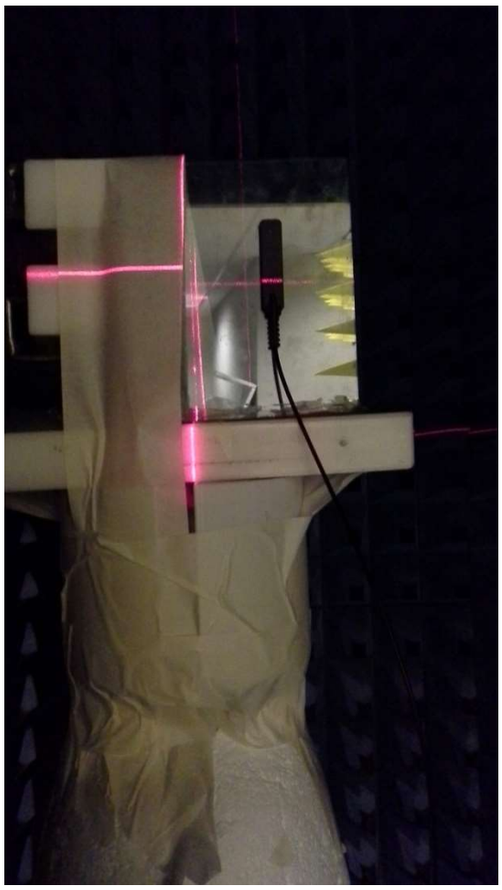

Figure 1D – Antenna picture in the test chamber

6. TYPICAL VSWR FOR REFERENCE

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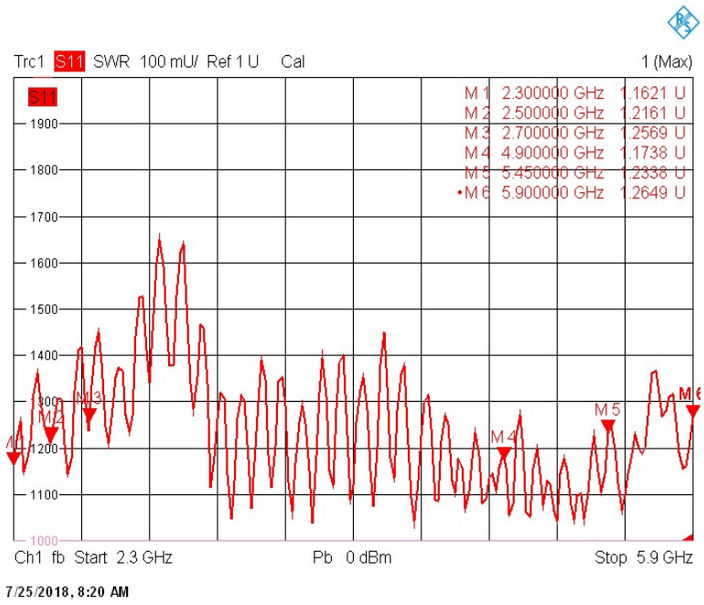
Measured in an anechoic setup/ open space with no interference. The antenna cable was cut to 1-foot length and terminated with SMA Male connector. A 16-foot PFP-195 cable assembly was attached to the antenna pigtail and terminated with Male QMA. The antenna was mounted on a 12 W x 5 H x .25- inch glass pane bordered with a metal rim (right side border of the pane).

(Mounted as shown in Fig 1B, With RG316 FEP 1ft and PFP-195 16ft cable)



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freq[Hz]	VSWR	freq[Hz]	VSWR	freq[Hz]	VSWR	freq[Hz]	VSWR
2.30E+09	1.16	3.20E+09	1.64	4.10E+09	1.12	5.00E+09	1.19
2.32E+09	1.22	3.22E+09	1.51	4.12E+09	1.26	5.02E+09	1.06
2.34E+09	1.26	3.24E+09	1.34	4.14E+09	1.33	5.04E+09	1.05
2.35E+09	1.15	3.25E+09	1.28	4.15E+09	1.35	5.05E+09	1.16
2.37E+09	1.18	3.27E+09	1.35	4.17E+09	1.28	5.07E+09	1.20
2.39E+09	1.21	3.29E+09	1.47	4.19E+09	1.15	5.09E+09	1.14
2.41E+09	1.32	3.31E+09	1.46	4.21E+09	1.07	5.11E+09	1.08
2.43E+09	1.36	3.33E+09	1.34	4.23E+09	1.20	5.13E+09	1.13
2.44E+09	1.30	3.34E+09	1.11	4.24E+09	1.38	5.14E+09	1.12
2.46E+09	1.25	3.36E+09	1.18	4.26E+09	1.45	5.16E+09	1.06
2.48E+09	1.23	3.38E+09	1.26	4.28E+09	1.33	5.18E+09	1.04
2.50E+09	1.21	3.40E+09	1.32	4.30E+09	1.18	5.20E+09	1.14
2.52E+09	1.26	3.42E+09	1.31	4.32E+09	1.14	5.22E+09	1.18
2.53E+09	1.31	3.43E+09	1.14	4.33E+09	1.28	5.23E+09	1.15
2.55E+09	1.31	3.45E+09	1.05	4.35E+09	1.36	5.25E+09	1.08
2.57E+09	1.21	3.47E+09	1.13	4.37E+09	1.38	5.27E+09	1.04
2.59E+09	1.14	3.49E+09	1.27	4.39E+09	1.24	5.29E+09	1.10
2.61E+09	1.18	3.51E+09	1.31	4.41E+09	1.09	5.31E+09	1.10
2.62E+09	1.32	3.52E+09	1.30	4.42E+09	1.04	5.32E+09	1.05
2.64E+09	1.41	3.54E+09	1.18	4.44E+09	1.13	5.34E+09	1.11
2.66E+09	1.42	3.56E+09	1.07	4.46E+09	1.23	5.36E+09	1.18
2.68E+09	1.32	3.58E+09	1.17	4.48E+09	1.30	5.38E+09	1.23
2.70E+09	1.23	3.60E+09	1.30	4.50E+09	1.31	5.40E+09	1.15
2.71E+09	1.33	3.61E+09	1.39	4.51E+09	1.24	5.41E+09	1.11
2.73E+09	1.42	3.63E+09	1.35	4.53E+09	1.09	5.43E+09	1.14
2.75E+09	1.45	3.65E+09	1.19	4.55E+09	1.09	5.45E+09	1.23
2.77E+09	1.39	3.67E+09	1.11	4.57E+09	1.21	5.47E+09	1.25
2.79E+09	1.25	3.69E+09	1.20	4.59E+09	1.27	5.49E+09	1.20

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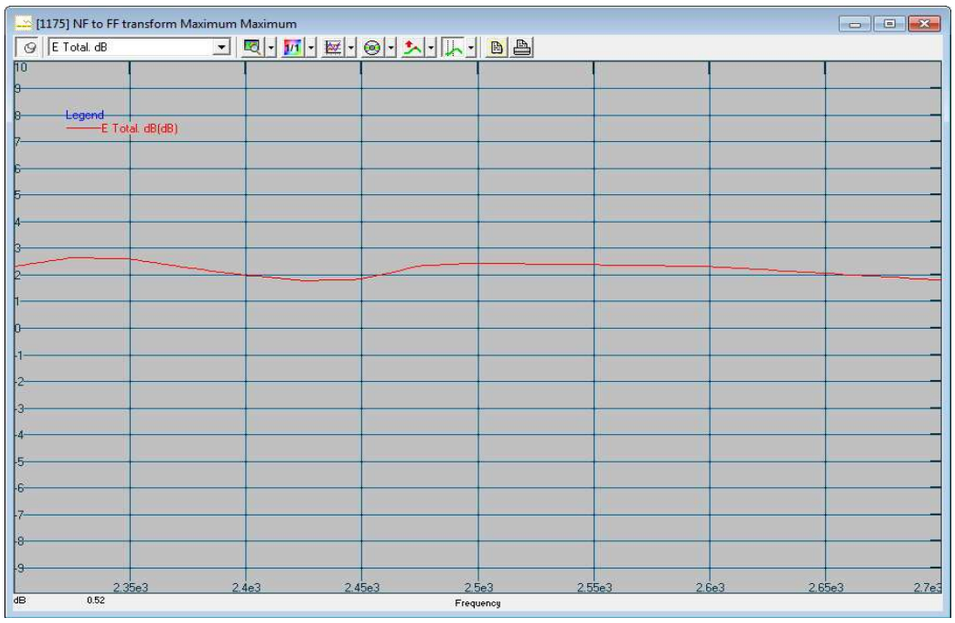
2.80E+09	1.21	3.70E+09	1.34	4.60E+09	1.25	5.50E+09	1.12
2.82E+09	1.29	3.72E+09	1.35	4.62E+09	1.13	5.52E+09	1.06
2.84E+09	1.35	3.74E+09	1.29	4.64E+09	1.10	5.54E+09	1.10
2.86E+09	1.37	3.76E+09	1.13	4.66E+09	1.18	5.56E+09	1.15
2.88E+09	1.37	3.78E+09	1.06	4.68E+09	1.16	5.58E+09	1.19
2.89E+09	1.27	3.79E+09	1.17	4.69E+09	1.07	5.59E+09	1.23
2.91E+09	1.24	3.81E+09	1.26	4.71E+09	1.11	5.61E+09	1.20
2.93E+09	1.27	3.83E+09	1.29	4.73E+09	1.18	5.63E+09	1.19
2.95E+09	1.44	3.85E+09	1.25	4.75E+09	1.23	5.65E+09	1.20
2.97E+09	1.52	3.87E+09	1.15	4.77E+09	1.18	5.67E+09	1.29
2.98E+09	1.53	3.88E+09	1.04	4.78E+09	1.08	5.68E+09	1.36
3.00E+09	1.41	3.90E+09	1.18	4.80E+09	1.09	5.70E+09	1.37
3.02E+09	1.34	3.92E+09	1.32	4.82E+09	1.13	5.72E+09	1.32
3.04E+09	1.45	3.94E+09	1.39	4.84E+09	1.15	5.74E+09	1.27
3.06E+09	1.60	3.96E+09	1.31	4.86E+09	1.11	5.76E+09	1.28
3.07E+09	1.65	3.97E+09	1.15	4.87E+09	1.16	5.77E+09	1.31
3.09E+09	1.59	3.99E+09	1.12	4.89E+09	1.19	5.79E+09	1.32
3.11E+09	1.47	4.01E+09	1.28	4.91E+09	1.16	5.81E+09	1.26
3.13E+09	1.38	4.03E+09	1.38	4.93E+09	1.06	5.83E+09	1.19
3.15E+09	1.38	4.05E+09	1.40	4.95E+09	1.08	5.85E+09	1.16
3.16E+09	1.53	4.06E+09	1.27	4.96E+09	1.23	5.86E+09	1.16
3.18E+09	1.62	4.08E+09	1.09	4.98E+09	1.27	5.88E+09	1.22

7. TYPICAL PEAK GAIN FOR REFERENCE

(Mounted as shown in Fig 1B, With RG316 FEP 1ft and PFP-195 16ft cable)

Measured in an anechoic setup/ open space with no interference. The antenna cable was cut to 1-foot length and terminated with SMA Male connector. A 16-foot PFP-195 cable assembly was attached to the antenna pigtail and terminated with Male QMA. The antenna was mounted on a 12 W x 5 H x .25- inch glass pane bordered with a metal rim (right side border of the pane).

Peak Gain (dBi), WIFI 2.4 GHz



Frequency	E.Total. dB (dB)
2300MHz	2.30958
2325MHz	2.64247
2350MHz	2.60669
2375MHz	2.27192
2400MHz	1.98413
2425MHz	1.77924
2450MHz	1.8418
2475MHz	2.34788
2500MHz	2.43798
2600MHz	2.31923
2700MHz	1.80242

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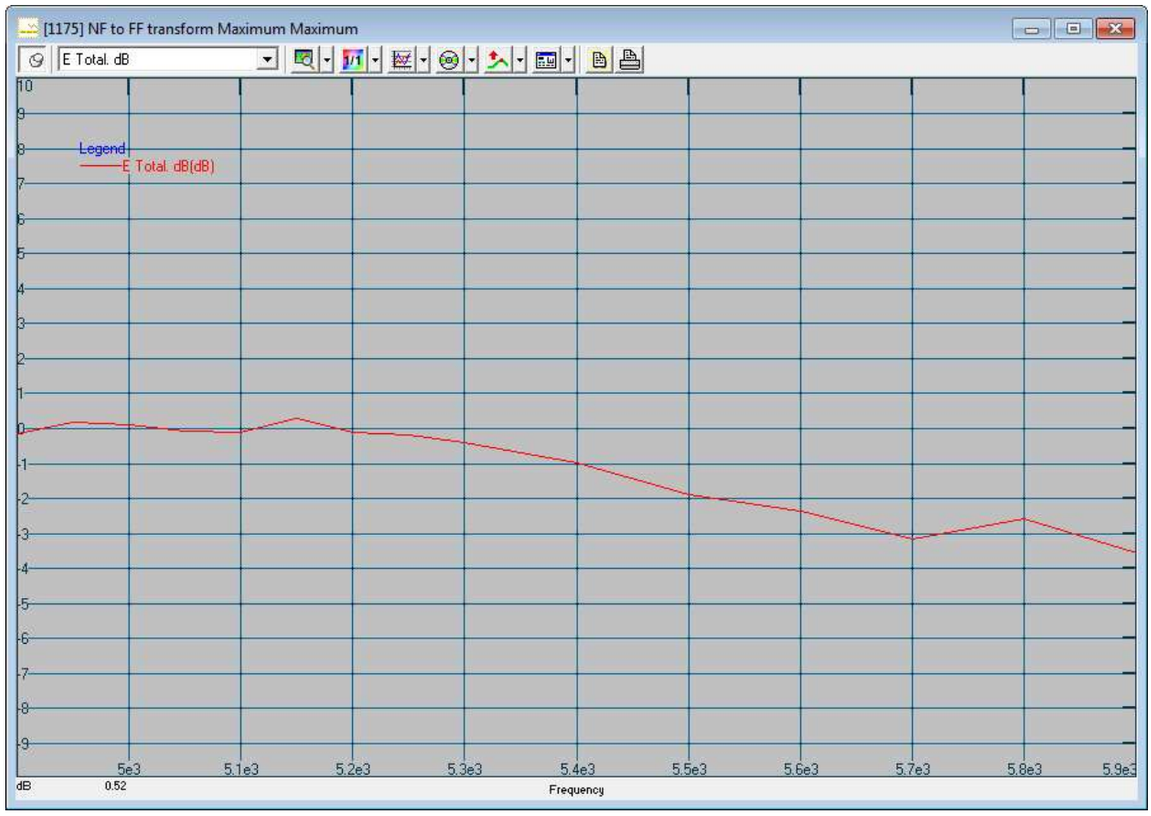
Peak Gain (dBi), WIFI 5 GHz



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Frequency	E.Total. dB (dB)
4900MHz	-1.43E-01
4950MHz	1.71E-01
5000MHz	1.05E-01
5050MHz	-7.24E-02
5100MHz	-1.08E-01
5150MHz	2.76E-01
5200MHz	-9.37E-02
5250MHz	-1.64E-01
5300MHz	-4.06E-01
5400MHz	-9.92E-01
5500MHz	-1.87295
5600MHz	-2.35549
5700MHz	-3.15544
5800MHz	-2.5779
5900MHz	-3.57516

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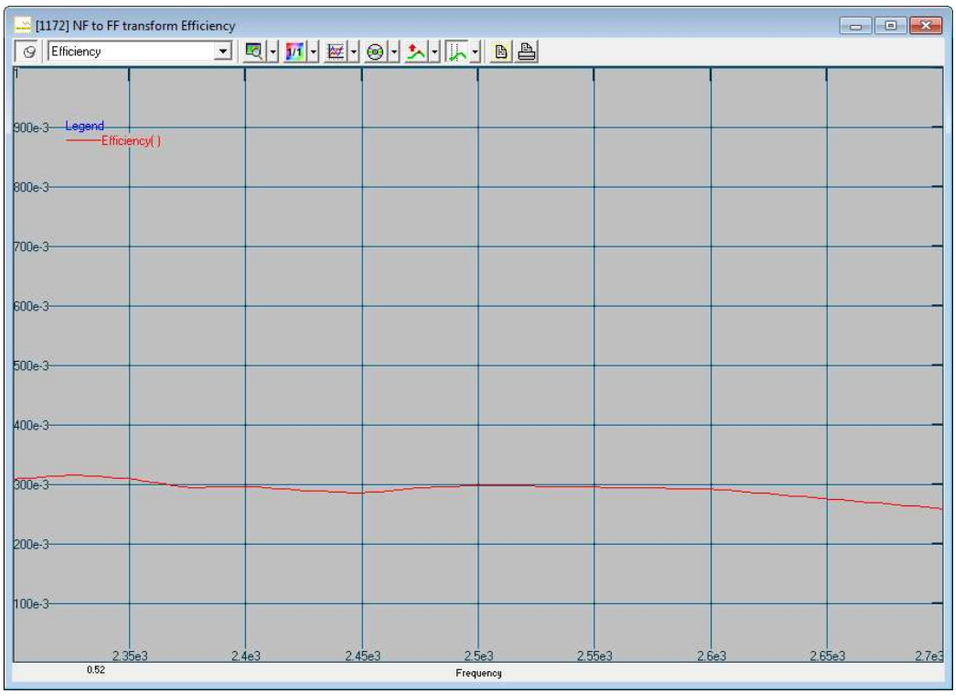
8. TYPICAL EFFICIENCY FOR REFERENCE

(Mounted as shown in Fig 1B, With RG316 FEP 1ft and PFP-195 16ft cable)

Measured in an anechoic setup/ open space with no interference. The antenna cable was cut to 1-foot length and terminated with SMA Male connector. A 16-foot PFP-195 cable assembly was attached to the antenna pigtail and terminated with Male QMA. The antenna was mounted on a 12 W x 5 H x .25- inch glass pane bordered with a metal rim (right side border of the pane).

Efficiency, WIFI 2.4 GHz



Frequency	Efficiency
2300MHz	3.09E-01
2325MHz	3.17E-01
2350MHz	3.10E-01
2375MHz	2.95E-01
2400MHz	2.98E-01
2425MHz	2.90E-01
2450MHz	2.86E-01
2475MHz	2.95E-01
2500MHz	2.99E-01
2600MHz	2.93E-01
2700MHz	2.60E-01

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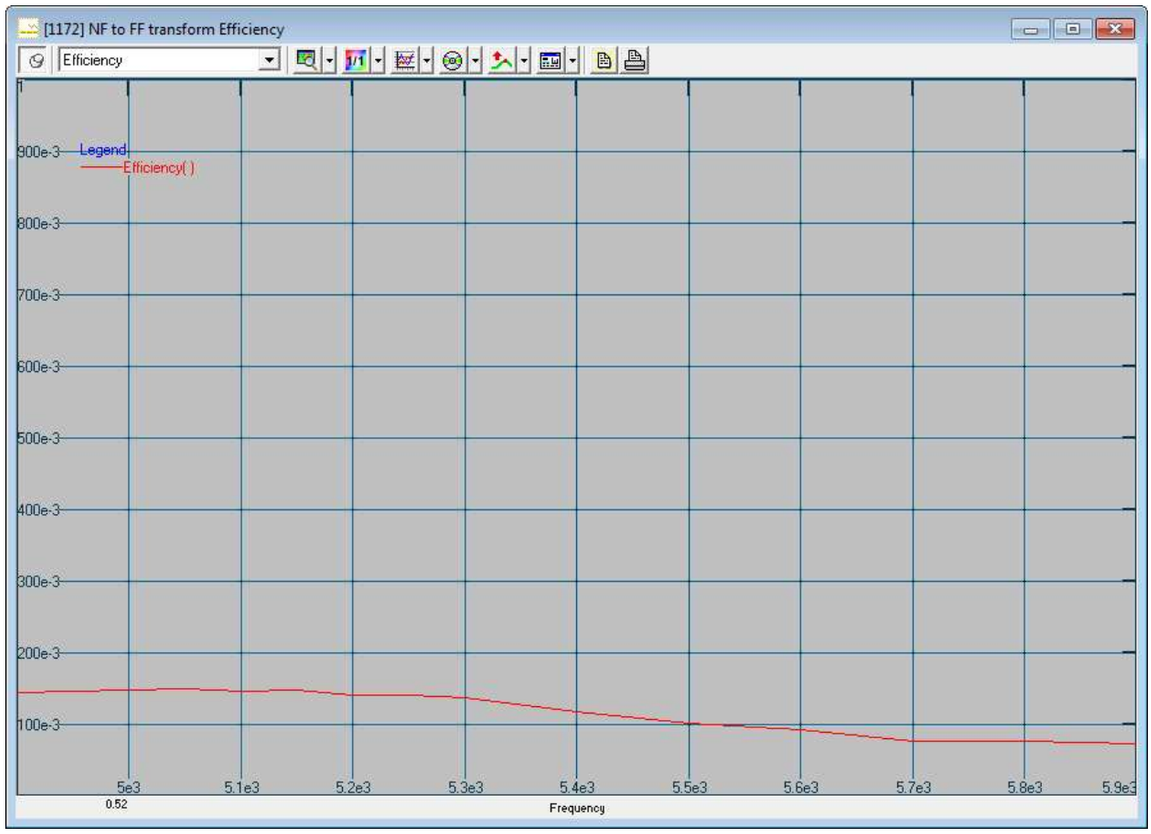
Efficiency, WIFI 5 GHz



Frequency	Efficiency
4900MHz	1.45E-01
4950MHz	1.47E-01
5000MHz	1.49E-01
5050MHz	1.50E-01
5100MHz	1.47E-01
5150MHz	1.49E-01
5200MHz	1.41E-01
5250MHz	1.42E-01
5300MHz	1.38E-01
5400MHz	1.18E-01
5500MHz	1.03E-01
5600MHz	9.34E-02
5700MHz	7.74E-02
5800MHz	7.82E-02
5900MHz	7.47E-02

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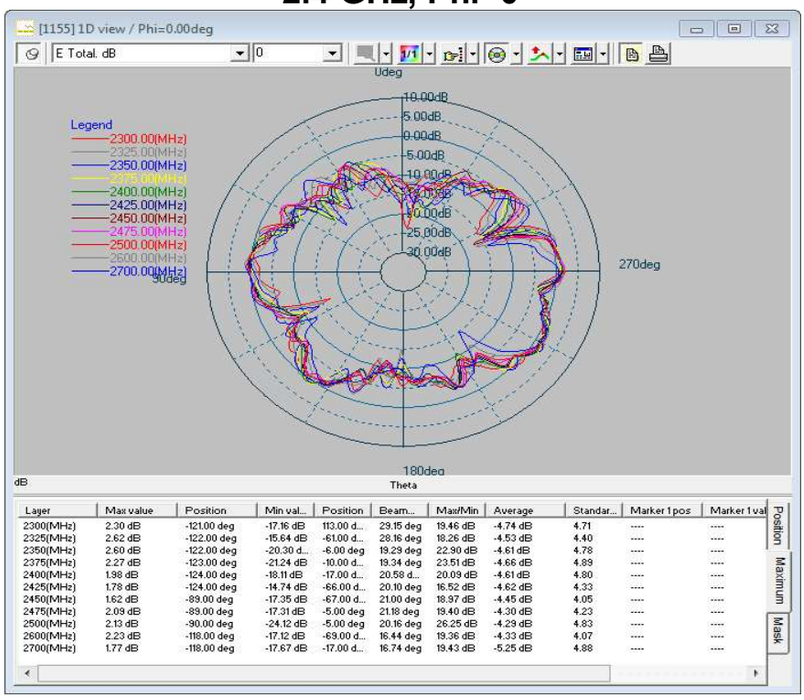
9. TYPICAL RADIATION PATTERNS

(Mounted as shown in Fig 1B, With RG316 FEP 1ft and PFP-195 16ft cable)

Measured in an anechoic setup/ open space with no interference. The antenna cable was cut to 1-foot length and terminated with SMA Male connector. A 16-foot PFP-195 cable assembly was attached to the antenna pigtail and terminated with Male QMA. The antenna was mounted on a 12 W x 5 H x .25- inch glass pane bordered with a metal rim (right side border of the pane).

2.4 GHz, Phi=0



Layer	Max value	Position	Min val...	Position	Beam...	Max/Min	Average	Standar...	Marker 1 pos	Marker 1 val
2300(MHz)	2.30 dB	-121.00 deg	-17.16 dB	113.00 d...	29.15 deg	19.46 dB	-4.74 dB	4.71	----	----
2325(MHz)	2.62 dB	-122.00 deg	-15.64 dB	-61.00 d...	28.16 deg	18.26 dB	-4.53 dB	4.40	----	----
2350(MHz)	2.60 dB	-122.00 deg	-20.30 d...	-6.00 deg	19.29 deg	22.90 dB	-4.61 dB	4.78	----	----
2375(MHz)	2.27 dB	-123.00 deg	-21.24 dB	-10.00 d...	19.34 deg	23.51 dB	-4.66 dB	4.89	----	----
2400(MHz)	1.98 dB	-124.00 deg	-18.11 dB	-17.00 d...	20.58 d...	20.09 dB	-4.61 dB	4.80	----	----
2425(MHz)	1.78 dB	-124.00 deg	-14.74 dB	-66.00 d...	20.10 deg	16.52 dB	-4.62 dB	4.33	----	----
2450(MHz)	1.62 dB	-89.00 deg	-17.35 dB	-67.00 d...	21.00 deg	18.97 dB	-4.45 dB	4.05	----	----
2475(MHz)	2.09 dB	-89.00 deg	-17.31 dB	-5.00 deg	21.18 deg	19.40 dB	-4.30 dB	4.23	----	----
2500(MHz)	2.13 dB	-90.00 deg	-24.12 dB	-5.00 deg	20.16 deg	26.25 dB	-4.29 dB	4.83	----	----
2600(MHz)	2.23 dB	-118.00 deg	-17.12 dB	-69.00 d...	16.44 deg	19.36 dB	-4.33 dB	4.07	----	----
2700(MHz)	1.77 dB	-118.00 deg	-17.67 dB	-17.00 d...	16.74 deg	19.43 dB	-5.25 dB	4.88	----	----

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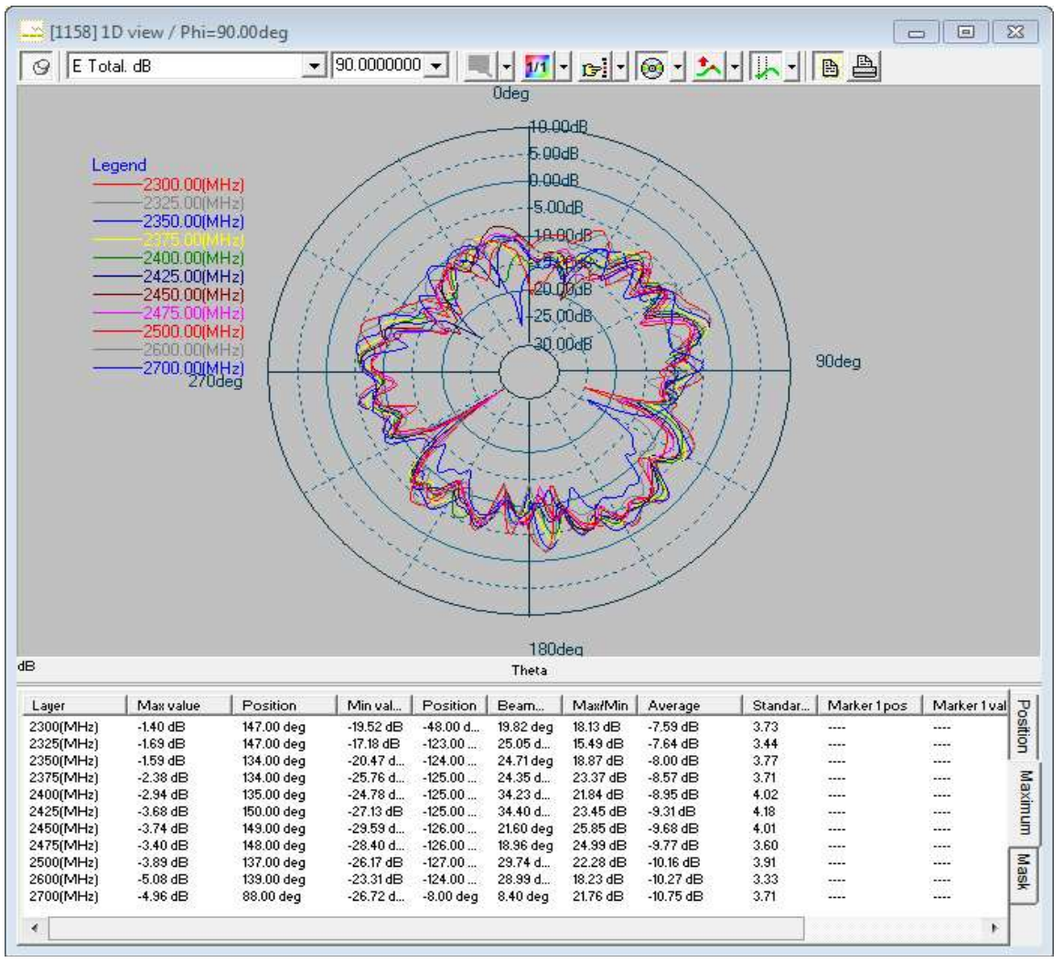
2.4 GHz, Phi=90



Layer	Max value	Position	Min val...	Position	Beam...	Max/Min	Average	Standar...	Marker 1 pos	Marker 1 val
2300(MHz)	-1.40 dB	147.00 deg	-19.52 dB	-48.00 d...	19.82 deg	18.13 dB	-7.59 dB	3.73	----	----
2325(MHz)	-1.69 dB	147.00 deg	-17.18 dB	-123.00 ...	25.05 d...	15.49 dB	-7.64 dB	3.44	----	----
2350(MHz)	-1.59 dB	134.00 deg	-20.47 d...	-124.00 ...	24.71 deg	18.87 dB	-8.00 dB	3.77	----	----
2375(MHz)	-2.38 dB	134.00 deg	-25.76 d...	-125.00 ...	24.35 d...	23.37 dB	-8.57 dB	3.71	----	----
2400(MHz)	-2.94 dB	135.00 deg	-24.78 d...	-125.00 ...	34.23 d...	21.84 dB	-8.95 dB	4.02	----	----
2425(MHz)	-3.68 dB	150.00 deg	-27.13 dB	-125.00 ...	34.40 d...	23.45 dB	-9.31 dB	4.18	----	----
2450(MHz)	-3.74 dB	149.00 deg	-29.59 d...	-126.00 ...	21.60 deg	25.85 dB	-9.68 dB	4.01	----	----
2475(MHz)	-3.40 dB	148.00 deg	-28.40 d...	-126.00 ...	18.96 deg	24.99 dB	-9.77 dB	3.60	----	----
2500(MHz)	-3.89 dB	137.00 deg	-26.17 dB	-127.00 ...	29.74 d...	22.28 dB	-10.16 dB	3.91	----	----
2600(MHz)	-5.08 dB	139.00 deg	-23.31 dB	-124.00 ...	28.99 d...	18.23 dB	-10.27 dB	3.33	----	----
2700(MHz)	-4.96 dB	88.00 deg	-26.72 d...	-8.00 deg	8.40 deg	21.76 dB	-10.75 dB	3.71	----	----

Position | Maximum | Mask

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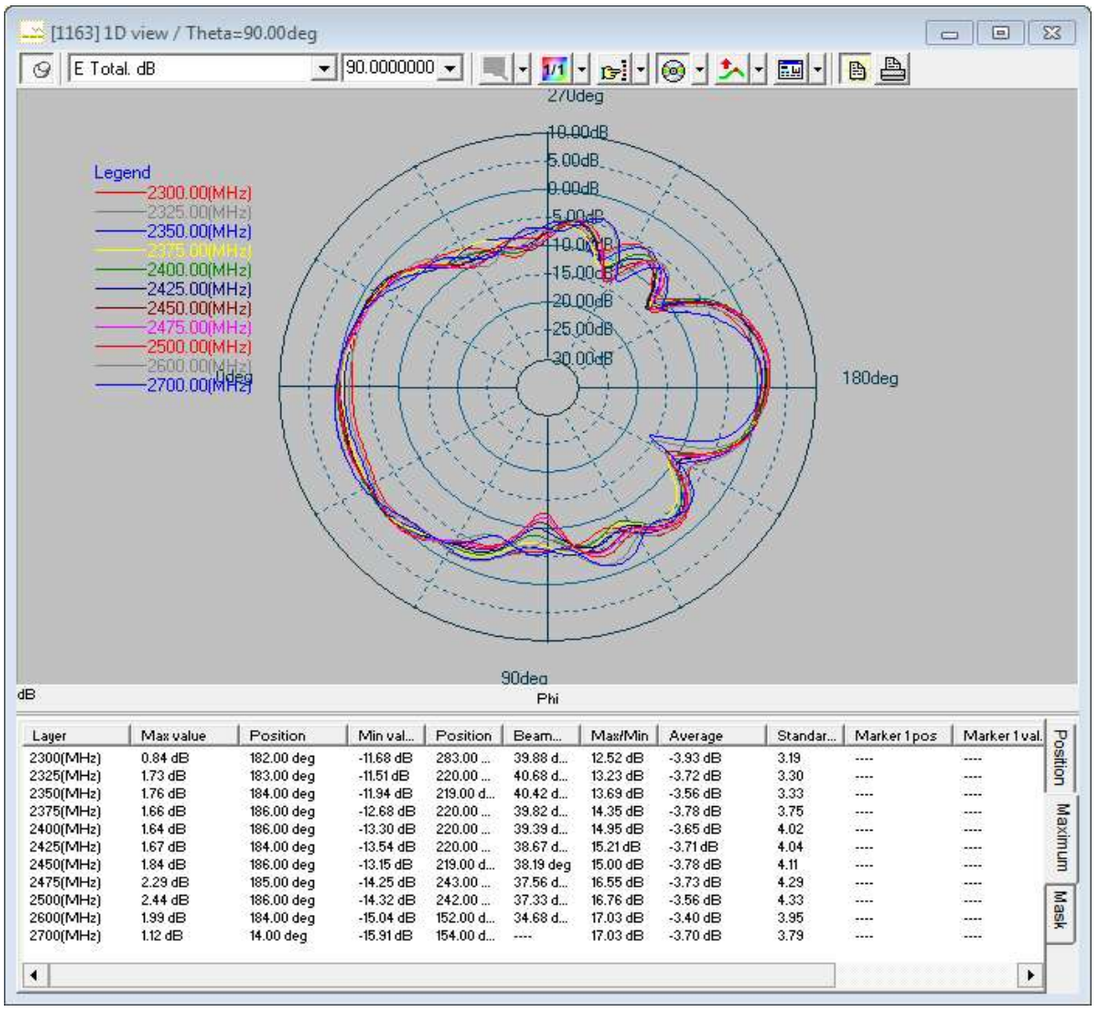
2.4 GHz, Theta=90



Layer	Max value	Position	Min val...	Position	Beam...	Max/Min	Average	Standar...	Marker 1 pos	Marker 1 val.
2300(MHz)	0.84 dB	182.00 deg	-11.68 dB	283.00 ...	39.88 d...	12.52 dB	-3.93 dB	3.19	----	----
2325(MHz)	1.73 dB	183.00 deg	-11.51 dB	220.00 ...	40.68 d...	13.23 dB	-3.72 dB	3.30	----	----
2350(MHz)	1.76 dB	184.00 deg	-11.94 dB	219.00 d...	40.42 d...	13.69 dB	-3.56 dB	3.33	----	----
2375(MHz)	1.66 dB	186.00 deg	-12.68 dB	220.00 ...	39.82 d...	14.35 dB	-3.78 dB	3.75	----	----
2400(MHz)	1.64 dB	186.00 deg	-13.30 dB	220.00 ...	39.39 d...	14.95 dB	-3.65 dB	4.02	----	----
2425(MHz)	1.67 dB	184.00 deg	-13.54 dB	220.00 ...	38.67 d...	15.21 dB	-3.71 dB	4.04	----	----
2450(MHz)	1.84 dB	186.00 deg	-13.15 dB	219.00 d...	38.19 deg	15.00 dB	-3.78 dB	4.11	----	----
2475(MHz)	2.29 dB	185.00 deg	-14.25 dB	243.00 ...	37.56 d...	16.55 dB	-3.73 dB	4.29	----	----
2500(MHz)	2.44 dB	186.00 deg	-14.32 dB	242.00 ...	37.33 d...	16.76 dB	-3.56 dB	4.33	----	----
2600(MHz)	1.99 dB	184.00 deg	-15.04 dB	152.00 d...	34.68 d...	17.03 dB	-3.40 dB	3.95	----	----
2700(MHz)	1.12 dB	14.00 deg	-15.91 dB	154.00 d...	----	17.03 dB	-3.70 dB	3.79	----	----

Position | Maximum | Mask

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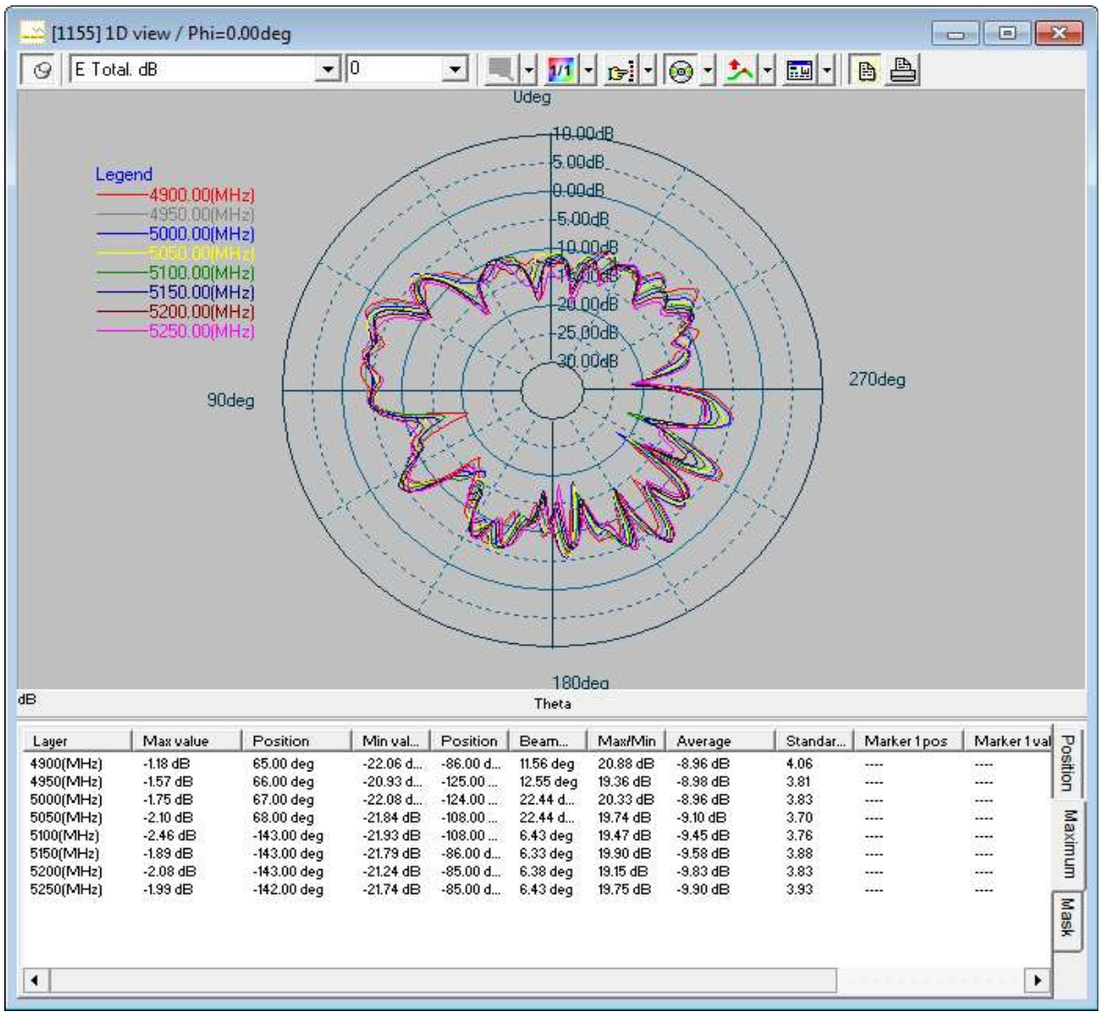
5 GHz, Phi=0



Layer	Max value	Position	Min val...	Position	Beam...	Max/Min	Average	Standar...	Marker 1 pos	Marker 1 val
4900(MHz)	-1.18 dB	65.00 deg	-22.06 d...	-86.00 d...	11.56 deg	20.88 dB	-8.96 dB	4.06	----	----
4950(MHz)	-1.57 dB	66.00 deg	-20.93 d...	-125.00 ...	12.55 deg	19.36 dB	-8.98 dB	3.81	----	----
5000(MHz)	-1.75 dB	67.00 deg	-22.08 d...	-124.00 ...	22.44 d...	20.33 dB	-8.96 dB	3.83	----	----
5050(MHz)	-2.10 dB	68.00 deg	-21.84 dB	-108.00 ...	22.44 d...	19.74 dB	-9.10 dB	3.70	----	----
5100(MHz)	-2.46 dB	-143.00 deg	-21.93 dB	-108.00 ...	6.43 deg	19.47 dB	-9.45 dB	3.76	----	----
5150(MHz)	-1.89 dB	-143.00 deg	-21.79 dB	-86.00 d...	6.33 deg	19.90 dB	-9.58 dB	3.88	----	----
5200(MHz)	-2.08 dB	-143.00 deg	-21.24 dB	-85.00 d...	6.38 deg	19.15 dB	-9.83 dB	3.83	----	----
5250(MHz)	-1.99 dB	-142.00 deg	-21.74 dB	-85.00 d...	6.43 deg	19.75 dB	-9.90 dB	3.93	----	----

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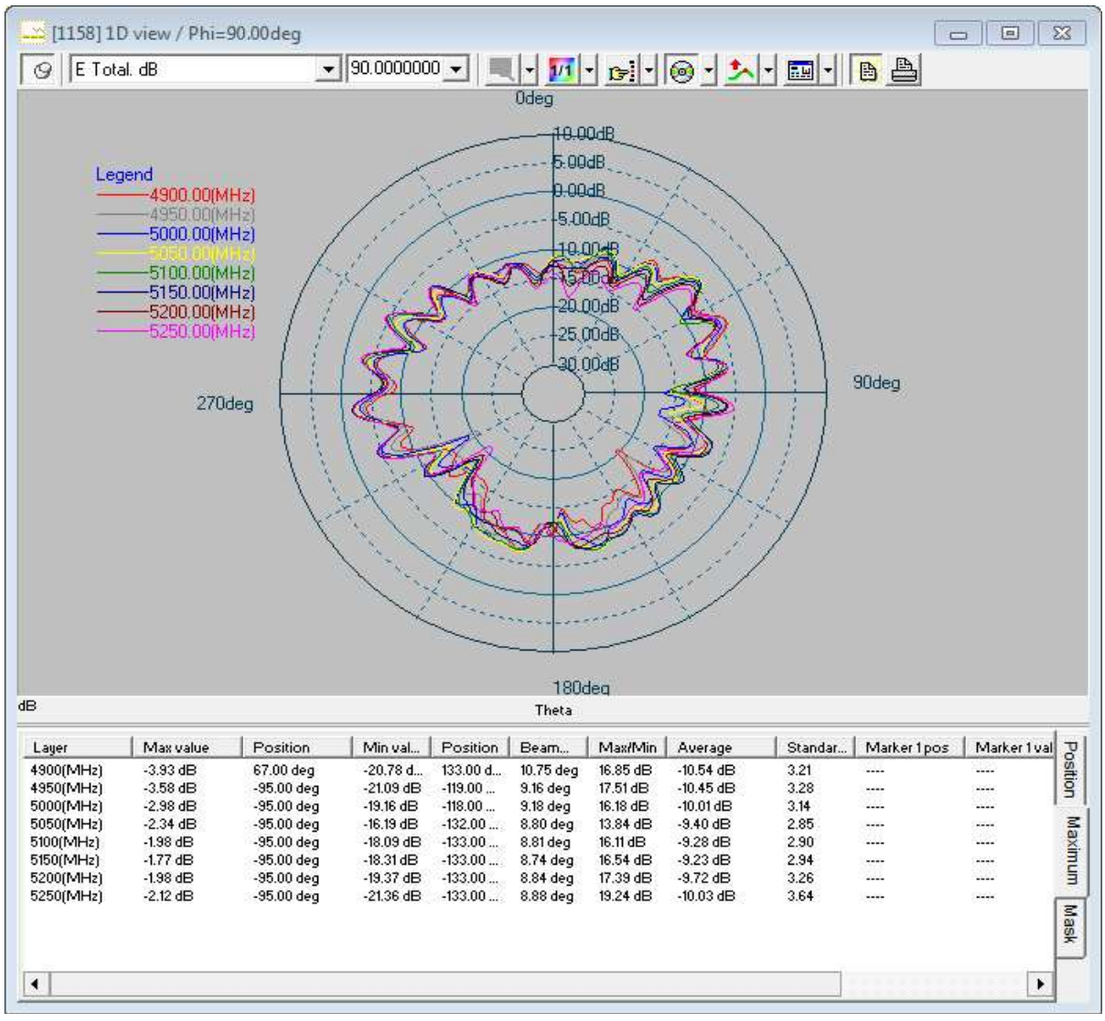
5 GHz, Phi=90



Layer	Max value	Position	Min val...	Position	Beam...	Max/Min	Average	Standar...	Marker 1 pos	Marker 1 val
4900(MHz)	-3.93 dB	67.00 deg	-20.78 d...	133.00 d...	10.75 deg	16.85 dB	-10.54 dB	3.21	----	----
4950(MHz)	-3.58 dB	-95.00 deg	-21.09 dB	-119.00 ...	9.16 deg	17.51 dB	-10.45 dB	3.28	----	----
5000(MHz)	-2.98 dB	-95.00 deg	-19.16 dB	-118.00 ...	9.18 deg	16.18 dB	-10.01 dB	3.14	----	----
5050(MHz)	-2.34 dB	-95.00 deg	-16.19 dB	-132.00 ...	8.80 deg	13.84 dB	-9.40 dB	2.85	----	----
5100(MHz)	-1.98 dB	-95.00 deg	-18.09 dB	-133.00 ...	8.81 deg	16.11 dB	-9.28 dB	2.90	----	----
5150(MHz)	-1.77 dB	-95.00 deg	-18.31 dB	-133.00 ...	8.74 deg	16.54 dB	-9.23 dB	2.94	----	----
5200(MHz)	-1.98 dB	-95.00 deg	-19.37 dB	-133.00 ...	8.84 deg	17.39 dB	-9.72 dB	3.26	----	----
5250(MHz)	-2.12 dB	-95.00 deg	-21.36 dB	-133.00 ...	8.88 deg	19.24 dB	-10.03 dB	3.64	----	----

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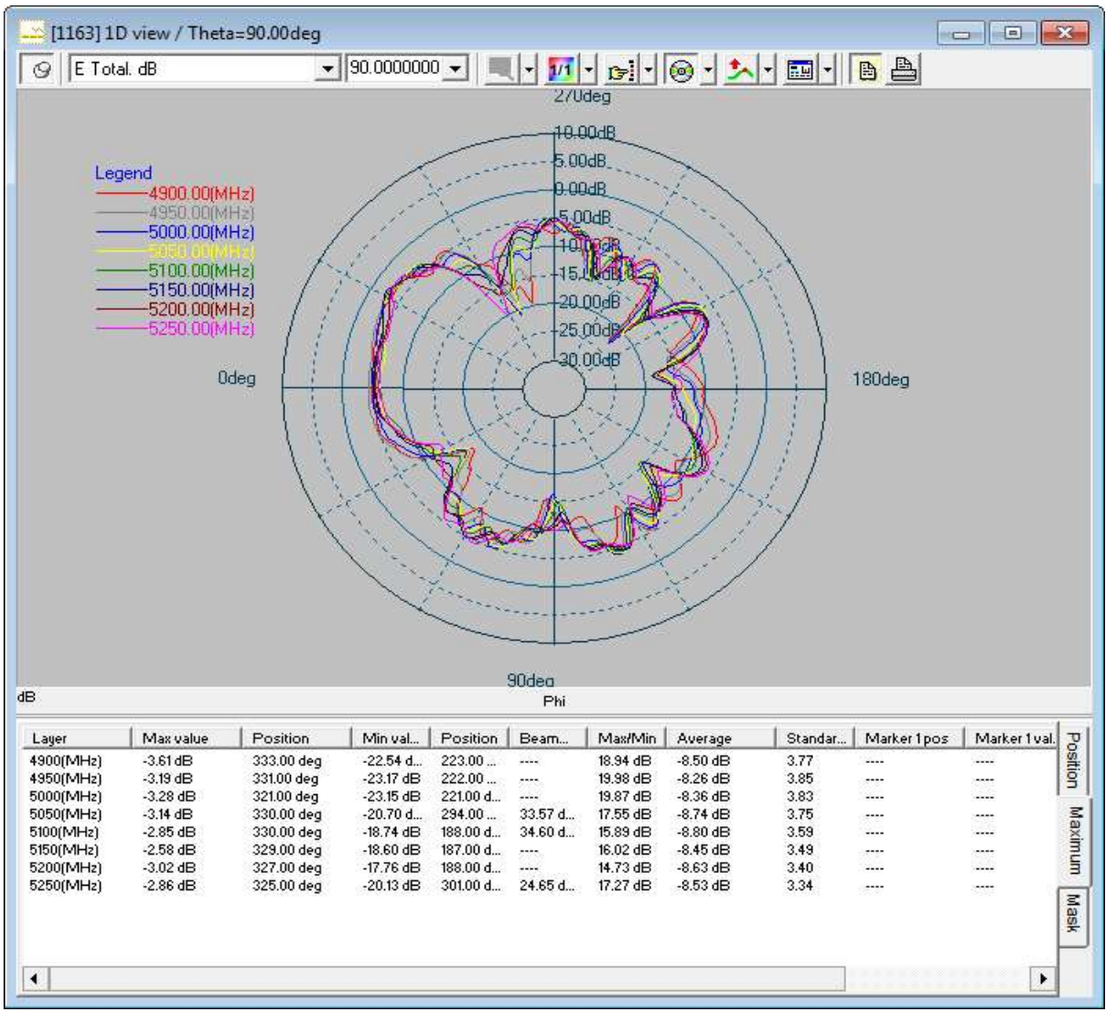
5 GHz, Theta=90



Layer	Max value	Position	Min val...	Position	Beam...	Max/Min	Average	Standar...	Marker 1 pos	Marker 1 val.
4900(MHz)	-3.61 dB	333.00 deg	-22.54 d...	223.00 ...	----	18.94 dB	-8.50 dB	3.77	----	----
4950(MHz)	-3.19 dB	331.00 deg	-23.17 dB	222.00 ...	----	19.98 dB	-8.26 dB	3.85	----	----
5000(MHz)	-3.28 dB	321.00 deg	-23.15 dB	221.00 d...	----	19.87 dB	-8.36 dB	3.83	----	----
5050(MHz)	-3.14 dB	330.00 deg	-20.70 d...	294.00 ...	33.57 d...	17.55 dB	-8.74 dB	3.75	----	----
5100(MHz)	-2.85 dB	330.00 deg	-18.74 dB	188.00 d...	34.60 d...	15.89 dB	-8.80 dB	3.59	----	----
5150(MHz)	-2.58 dB	329.00 deg	-18.60 dB	187.00 d...	----	16.02 dB	-8.45 dB	3.49	----	----
5200(MHz)	-3.02 dB	327.00 deg	-17.76 dB	188.00 d...	----	14.73 dB	-8.63 dB	3.40	----	----
5250(MHz)	-2.86 dB	325.00 deg	-20.13 dB	301.00 d...	24.65 d...	17.27 dB	-8.53 dB	3.34	----	----

Position | Maximum | Mask

10. OTHER ANTENNA PARAMETERS mounted as shown in Fig 1B

Band	Frequency (GHz)	3 dB Vertical Bandwidth (degrees)	Peak Gain Angle from horizon (degrees)
2.4 GHz	2.45	25	12
5GHz	5.3	22	15
	5.6	22	15