RTK-ANT-0022 PIFA measurement report

Jeany Ling

Jan. 27, 2022

RTK-ANT-0022 PIFA measurement report

- **Report History**

Test Items	Test Date	Test Engineer
S-Parameter measurement	2021.12.20	Jeany
Radiation patterns measurement	2022.01.27	Jeany

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- **Antenna Specifications**

Category	Specifications	
Frequency	2400-2480MHz	5150-7125MHz
Peak gain	3.4dBi	5.0dBi
Antenna brand	REALTEK	
Part number	RTK-ANT-0022	
Antenna type	PIFA	
Polarization	Linear	
Impedance	50Ω	
Dimensions	35 x 7 x 6 mm^3	
Connector	IPEX MHF4	
Cable	Φ1.13 L: 300mm	

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- **Equipment List**

Equipment Description	Manufacturer	Identification no.	Current calibration date	Next calibration date
EMC Analyzer	Agilent	E7405A	2021/12/21	2023/12/20
Signal generator	Agilent	E8257D	2021/01/21	2023/01/20
Microwave system amplifier	Keysight	83017A	2022/03/17	2023/03/16
Power supply	Keysight	87421A	N/A	N/A
Position controller	Chance Most	CM100	N/A	N/A
Horn antenna	ETS-Lindgren	3117	N/A	N/A

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- **Test Software**

Description	Manufacturer	Identification no.
Measurement software	REALTEK	Radiation plotter v3.0

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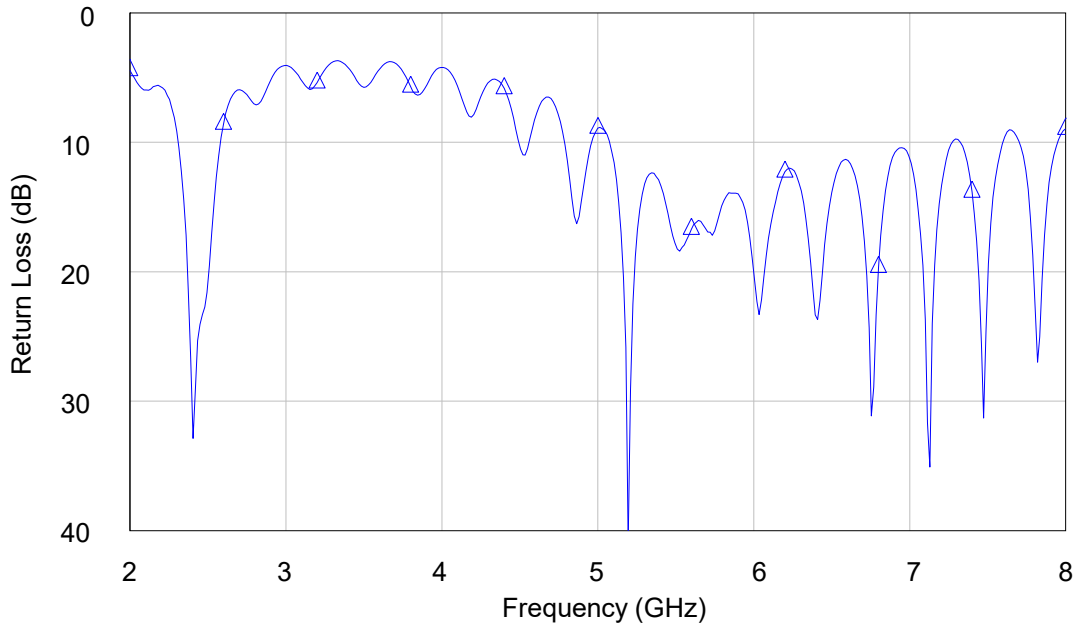
- **Return Loss**

10-dB BW	2.31 ~ 2.58 GHz	5.07 ~ 7.27 GHz



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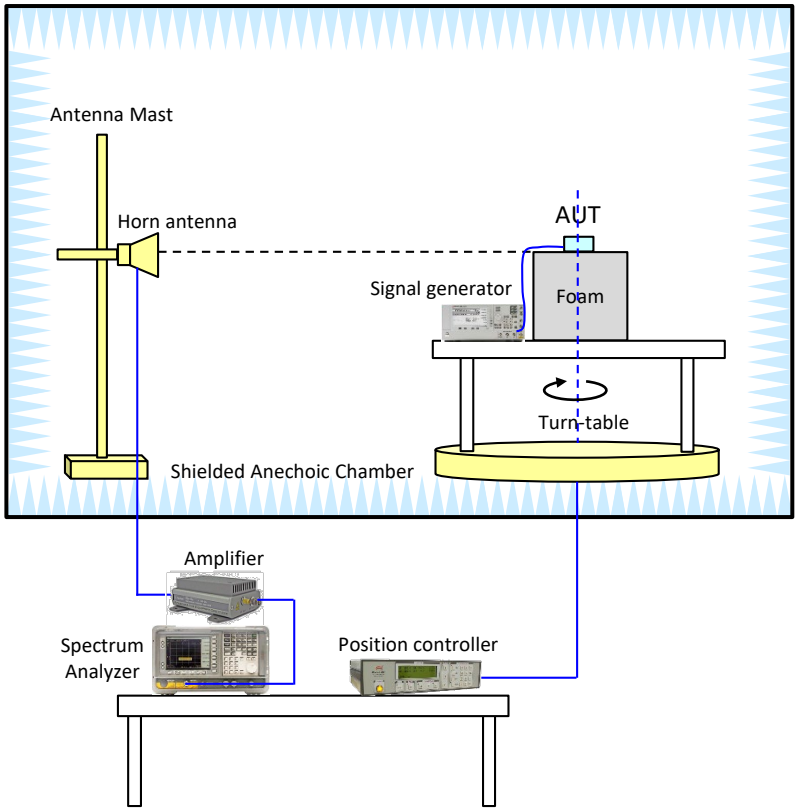
- **Test procedure**
  - The AUT was placed upon a turn-table above a foam.
  - At each frequency, the AUT was rotated 360°.
  - Rotated AUT to each test plane (xy-plane, yz-plane and xz-plane).
  - Measurements were performed for both horizontal and vertical polarization.



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- **Applicable test method**
  - The individual antenna gain was measured as indicated in this report.
  - Here is a 2D radiation pattern measurement method.
  - The Horn antenna is first fixed for horizontal polarization.
  - The AUT will then be rotated 360 degree of phi rotation.
  - Capture measured data with 4-degree step angle from the Horn antenna.
  - The Horn antenna will then be changed for vertical polarization measurement, and the process repeated.
  - Change the AUT position to XY-plane, YZ-plane and XZ-plane placement.

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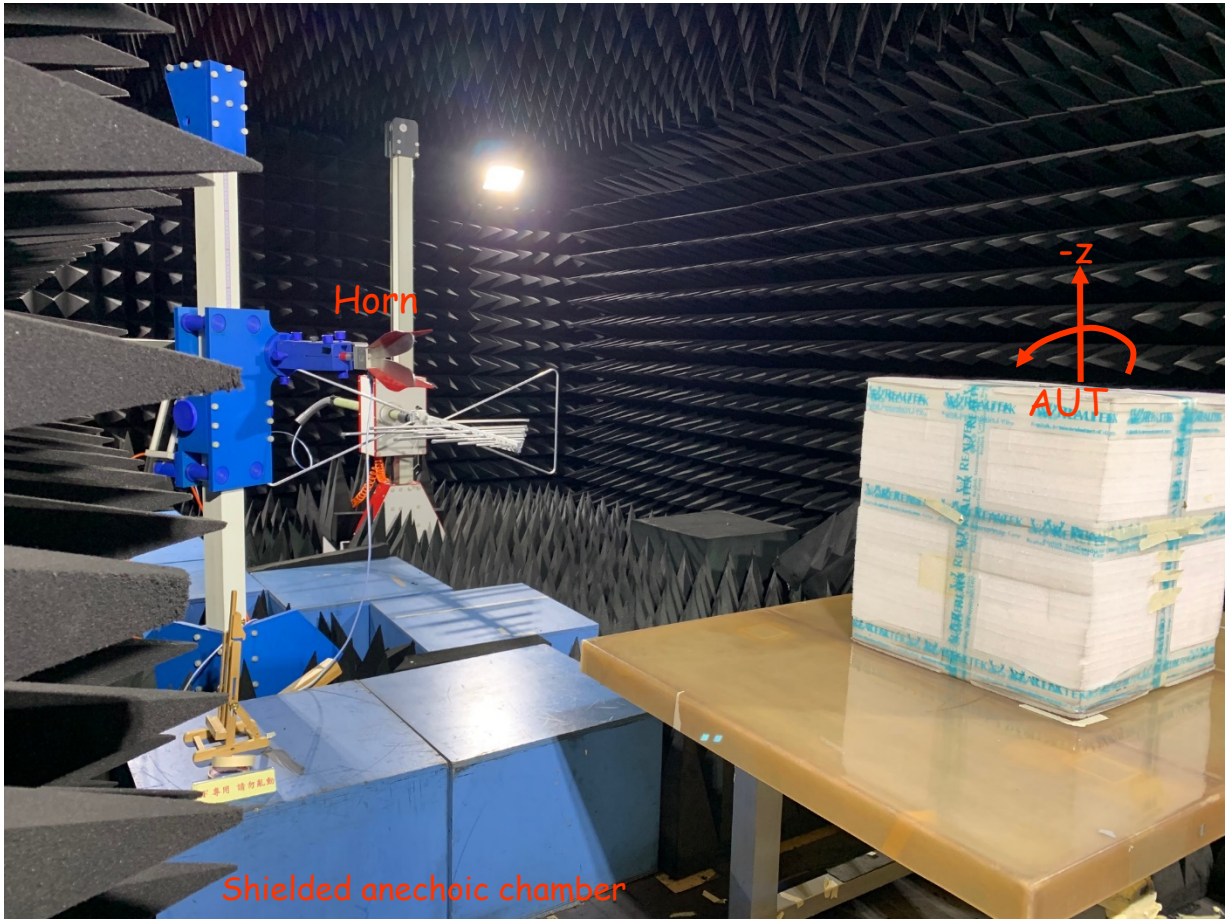
- **Test Setup Photo**



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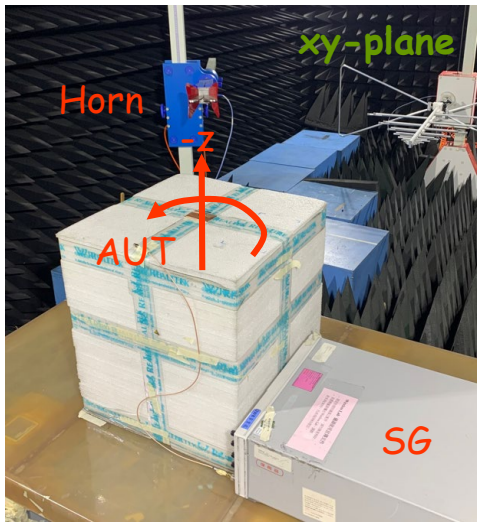
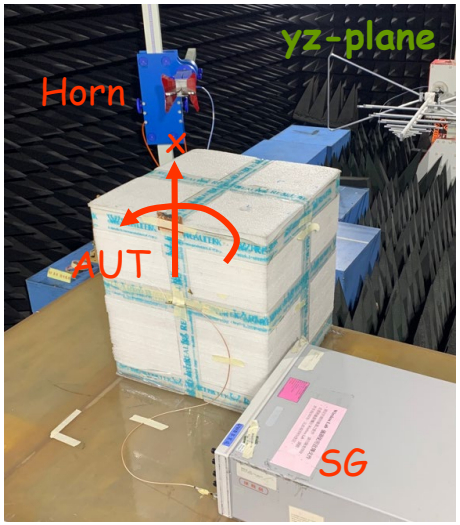
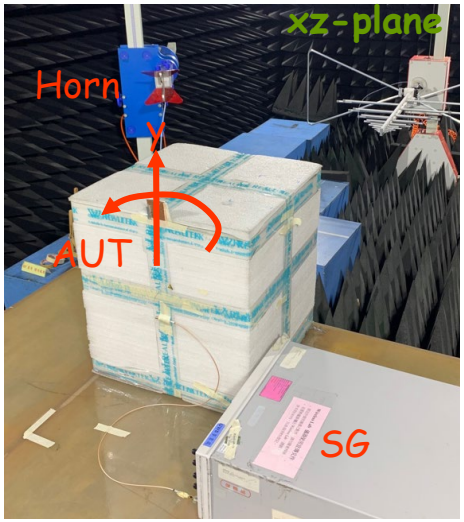
- **Radiation Patterns**
  - Frequency : 2400MHz, 2450MHz, 2480MHz,
    5150MHz, 5250MHz, 5350MHz, 5470MHz, 5725MHz, 5850MHz, 5895MHz,
    5925MHz, 6425MHz, 6525MHz, 6875MHz and 7125MHz
  - Test plane : xy-plane, xz-plane and yz-plane
  - Input power : SG 0dBm
  - Place: RTK 4F chamber
  - Horn h: horizontal polarization
  - Horn v: vertical polarization







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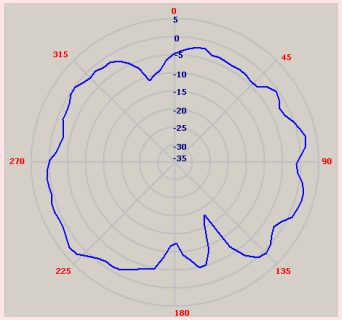
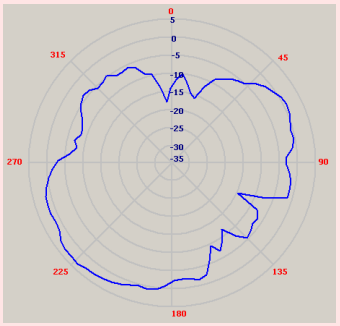
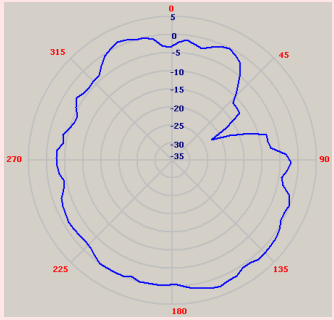
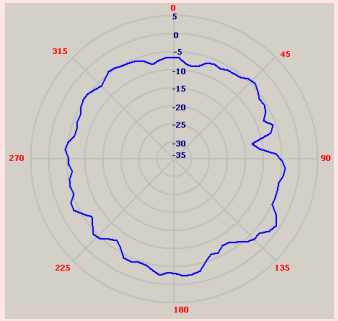
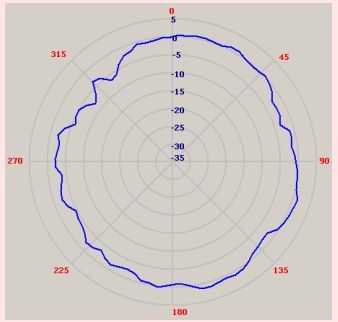
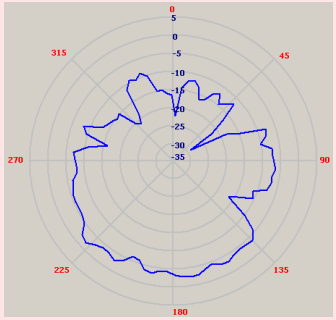
- **Radiation Patterns – 2400 MHz**

	xy-plane	yz-plane	xz-plane
horizontal			
	Pol. / Peak / avg. h / +2.5 / -1.6	Pol. / peak / avg. h / +3.4 / -2.2	Pol. / peak / avg. h / +2.2 / -1.7
vertical			
	Pol. / peak / avg. v / -1.2 / -5.3	Pol. / peak / avg. v / +1.9 / -1.4	Pol. / peak / avg. v / -2.0 / -7.2

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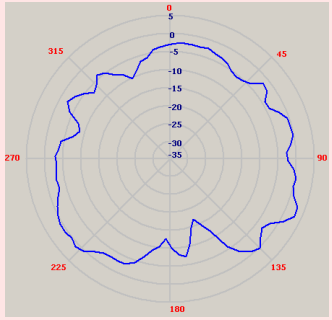
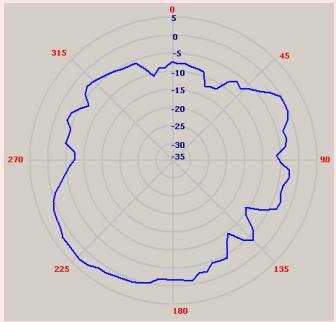
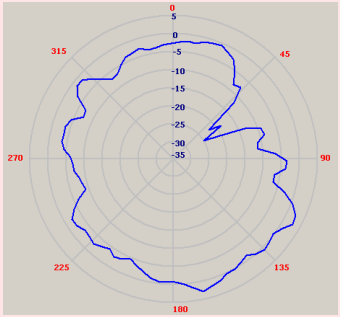
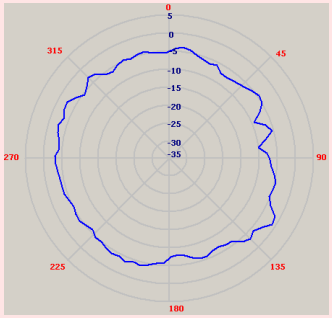
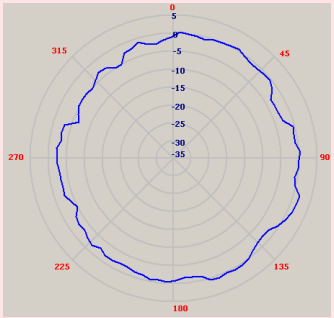
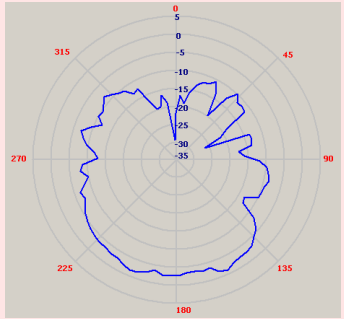
- **Radiation Patterns – 2450 MHz**

	xy-plane	yz-plane	xz-plane
horizontal			
	Pol. / Peak / avg. h / +3.0 / -2.9	Pol. / peak / avg. h / +2.8 / -2.7	Pol. / peak / avg. h / +2.7 / -2.7
vertical			
	Pol. / peak / avg. v / -1.1 / -5.0	Pol. / peak / avg. v / +1.5 / -1.6	Pol. / peak / avg. v / -1.3 / -7.0

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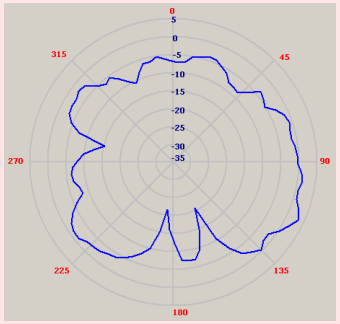
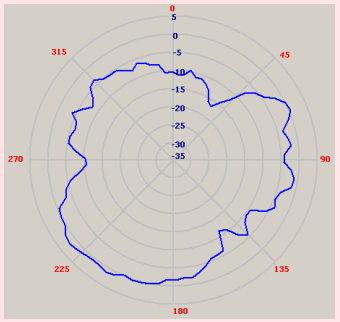
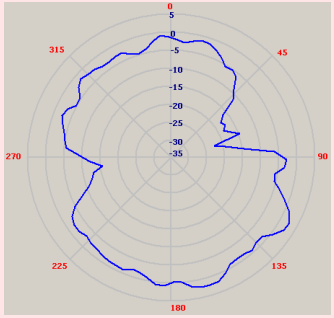
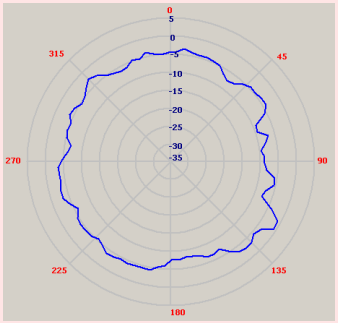
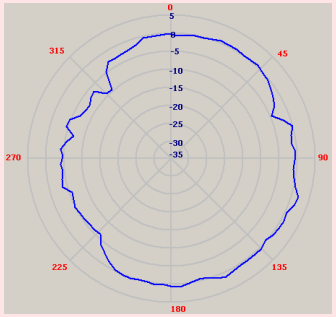
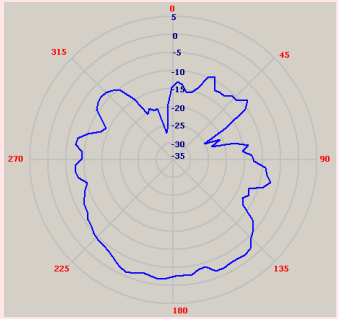
- **Radiation Patterns – 2480 MHz**

	xy-plane	yz-plane	xz-plane
horizontal			
	Pol. / Peak / avg. h / +3.1 / -3.7	Pol. / peak / avg. h / +1.9 / -3.6	Pol. / peak / avg. h / +2.5 / -2.6
vertical			
	Pol. / peak / avg. v / -1.0 / -5.0	Pol. / peak / avg. v / +1.1 / -1.4	Pol. / peak / avg. v / -1.3 / -6.9

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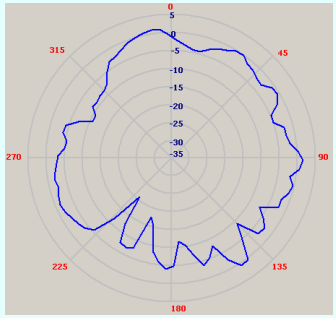
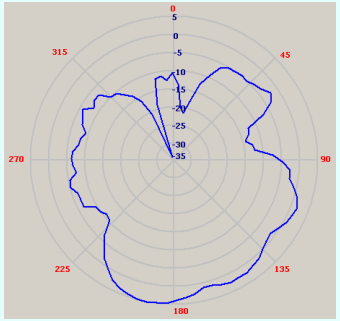
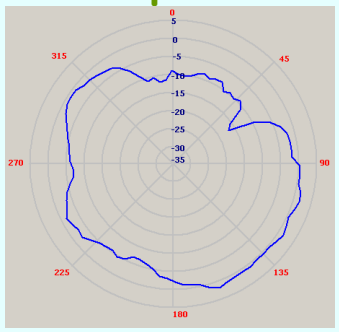
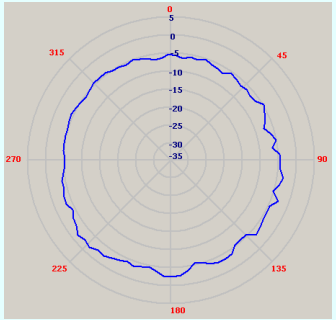
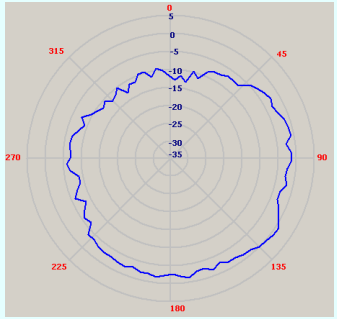
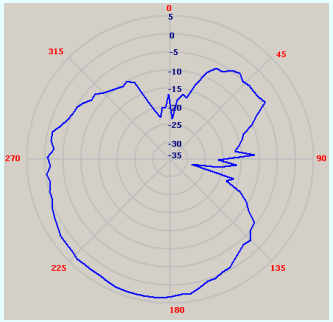
- **Radiation Patterns – 5150 MHz**

	xy-plane	yz-plane	xz-plane
horizontal			
	Pol. / Peak / avg. h / +1.5 / -3.2	Pol. / peak / avg. h / +4.9 / -1.9	Pol. / peak / avg. h / +1.7 / -2.8
vertical			
	Pol. / peak / avg. v / -1.8 / -4.7	Pol. / peak / avg. v / +0.7 / -4.2	Pol. / peak / avg. v / +3.5 / -1.9

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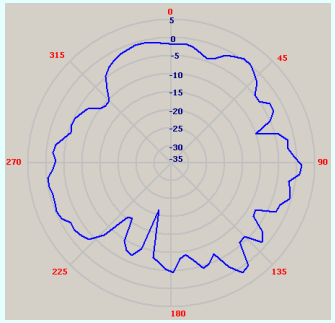
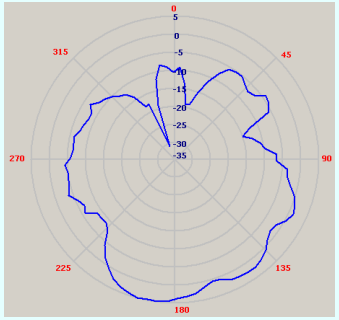
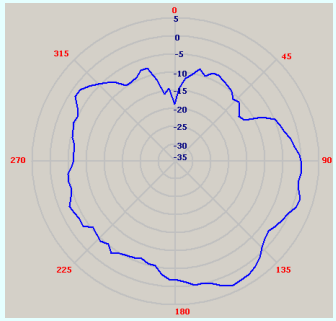
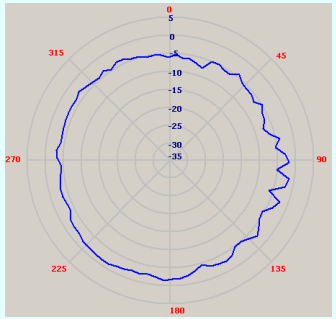
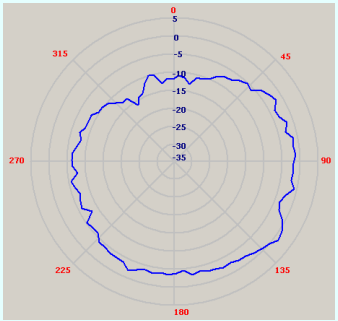
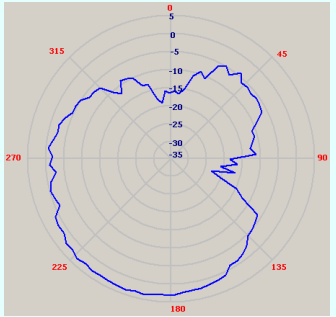
- **Radiation Patterns – 5250 MHz**

	xy-plane	yz-plane	xz-plane
horizontal			
	Pol. / Peak / avg. h / +1.2 / -3.1	Pol. / peak / avg. h / +4.8 / -2.0	Pol. / peak / avg. h / +3.0 / -3.2
vertical			
	Pol. / peak / avg. v / -1.5 / -3.9	Pol. / peak / avg. v / +1.1 / -4.5	Pol. / peak / avg. v / +3.5 / -1.9

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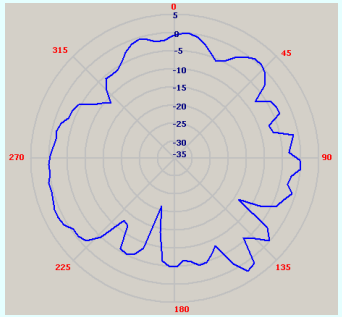
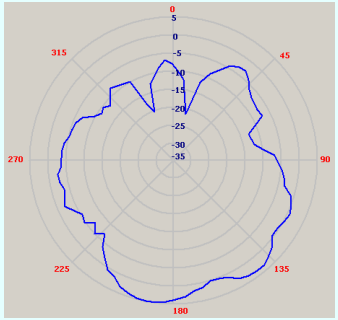
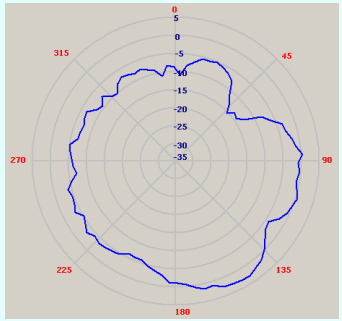
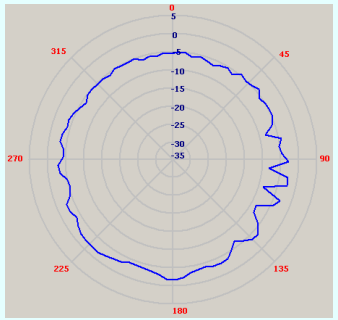
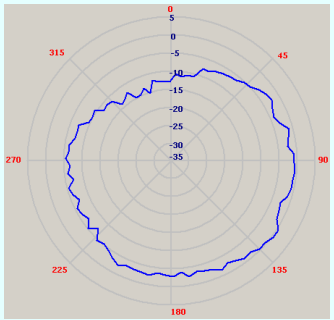
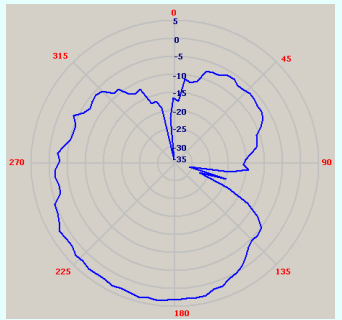
- **Radiation Patterns – 5350 MHz**

	xy-plane	yz-plane	xz-plane
horizontal			
	Pol. / Peak / avg. h / +2.1 / -2.6	Pol. / peak / avg. h / +4.7 / -1.8	Pol. / peak / avg. h / +2.9 / -3.3
vertical			
	Pol. / peak / avg. v / -1.8 / -4.4	Pol. / peak / avg. v / +0.4 / -4.4	Pol. / peak / avg. v / +3.5 / -2.0

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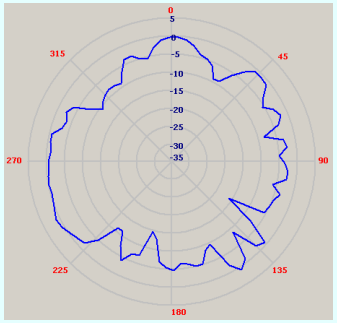
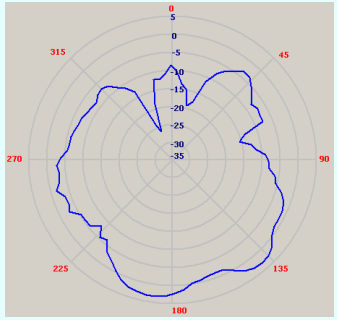
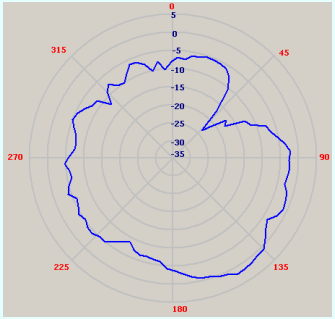
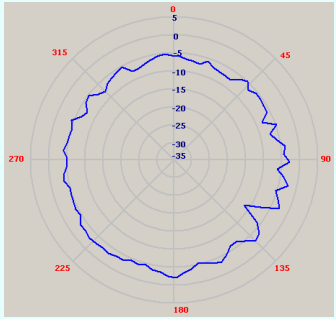
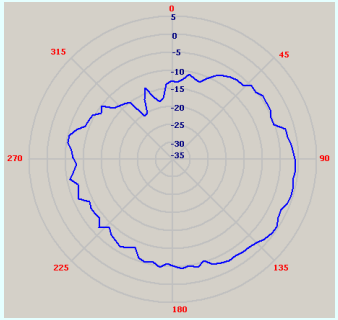
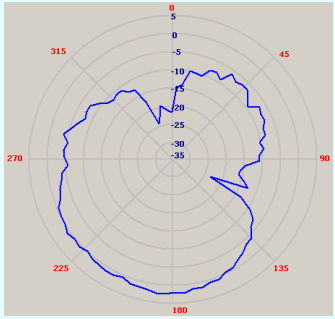
- **Radiation Patterns – 5470 MHz**

	xy-plane	yz-plane	xz-plane
horizontal			
	Pol. / Peak / avg. h / +0.9 / -3.5	Pol. / peak / avg. h / +3.2 / -3.0	Pol. / peak / avg. h / +1.8 / -4.5
vertical			
	Pol. / peak / avg. v / -2.2 / -5.1	Pol. / peak / avg. v / -0.6 / -5.4	Pol. / peak / avg. v / +2.3 / -3.4

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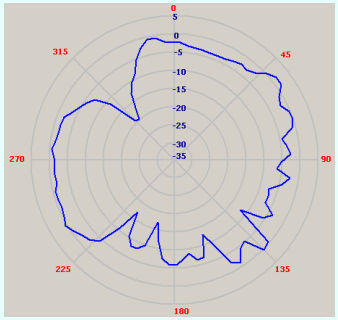
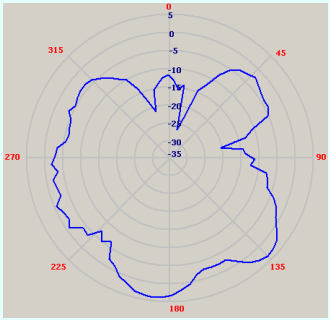
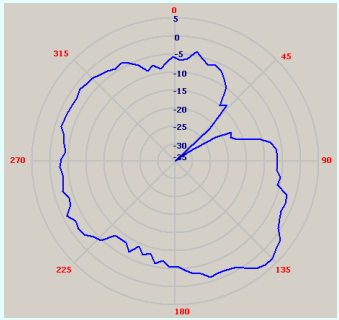
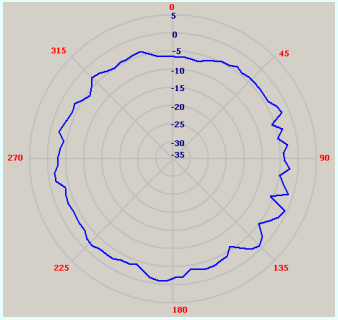
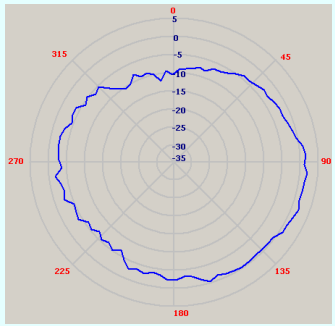
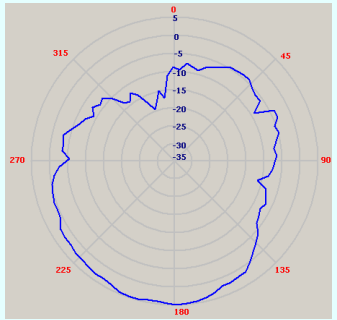
- **Radiation Patterns – 5725 MHz**

	xy-plane	yz-plane	xz-plane
horizontal			
	Pol. / Peak / avg. h / +1.2 / -3.4	Pol. / peak / avg. h / +3.9 / -2.5	Pol. / peak / avg. h / +3.2 / -3.7
vertical			
	Pol. / peak / avg. v / -0.9 / -3.7	Pol. / peak / avg. v / +1.9 / -2.8	Pol. / peak / avg. v / +4.8 / -1.0

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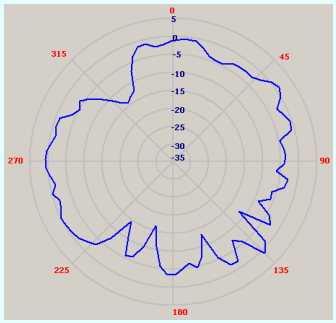
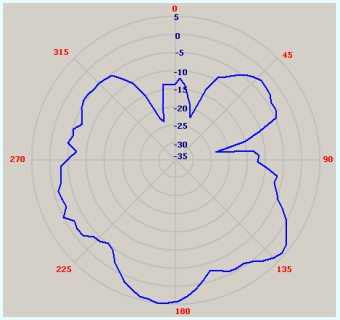
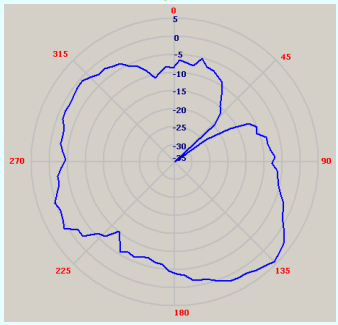
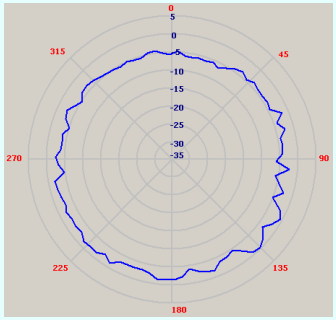
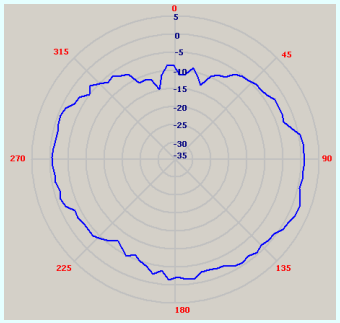
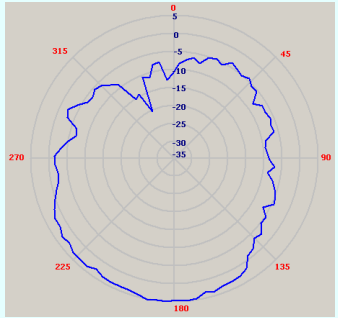
- **Radiation Patterns – 5850 MHz**

	xy-plane	yz-plane	xz-plane
horizontal			
	Pol. / Peak / avg. h / +0.9 / -3.1	Pol. / peak / avg. h / +4.8 / -2.1	Pol. / peak / avg. h / +3.9 / -2.9
vertical			
	Pol. / peak / avg. v / -0.5 / -3.5	Pol. / peak / avg. v / +1.8 / -2.7	Pol. / peak / avg. v / +5.0 / -0.7

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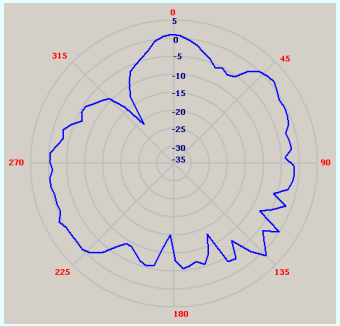
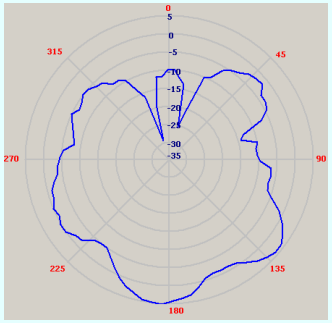
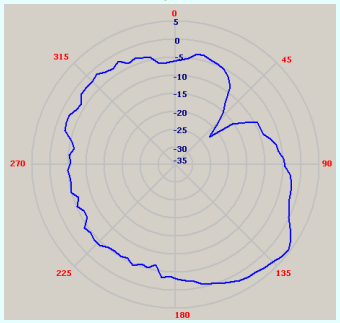
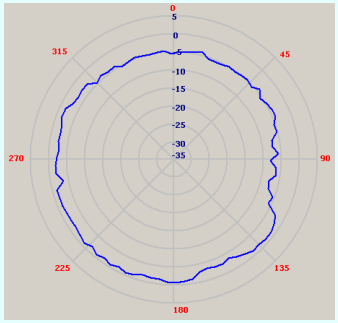
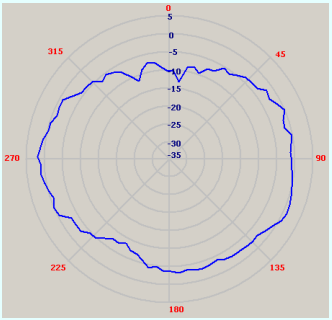
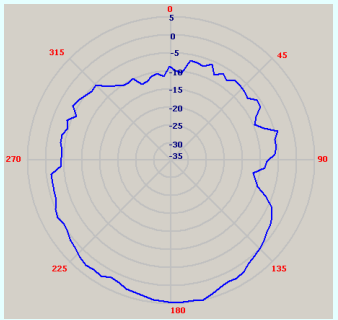
- **Radiation Patterns – 5895 MHz**

	xy-plane	yz-plane	xz-plane
horizontal			
	Pol. / Peak / avg. h / +1.3 / -2.8	Pol. / peak / avg. h / +5.0 / -1.8	Pol. / peak / avg. h / +4.2 / -2.7
vertical			
	Pol. / peak / avg. v / -0.8 / -3.2	Pol. / peak / avg. v / +1.6 / -2.7	Pol. / peak / avg. v / +4.9 / -1.2

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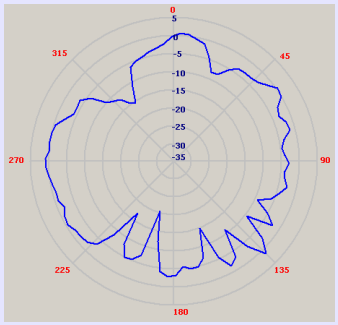
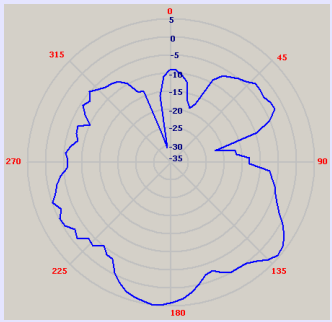
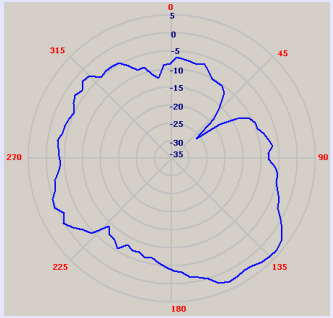
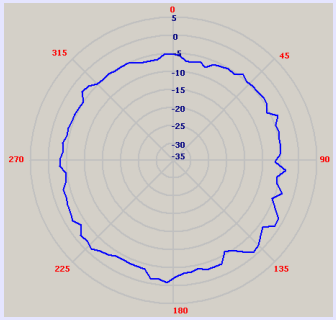
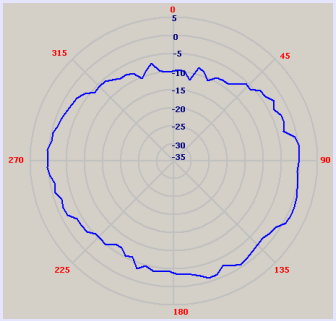
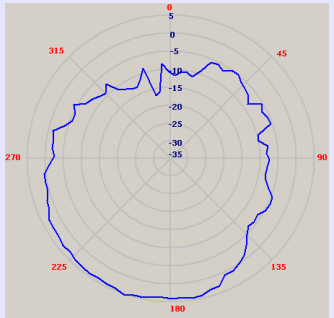
- **Radiation Patterns – 5925 MHz**

	xy-plane	yz-plane	xz-plane
horizontal			
vertical			

Pol.	Peak	avg.
h	+1.2	-3.2

Pol.	peak	avg.
h	+4.8	-2.0

Pol.	peak	avg.
h	+3.8	-3.0

Pol.	peak	avg.
v	-1.0	-4.1

Pol.	peak	avg.
v	+0.8	-3.0

Pol.	peak	avg.
v	+4.9	-0.8

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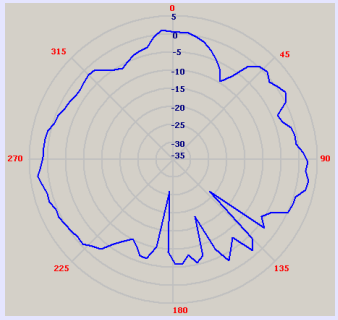
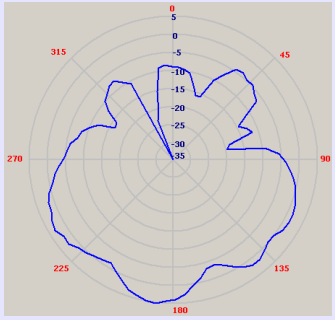
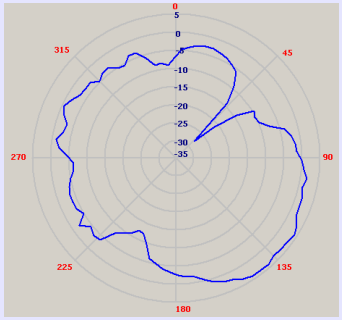
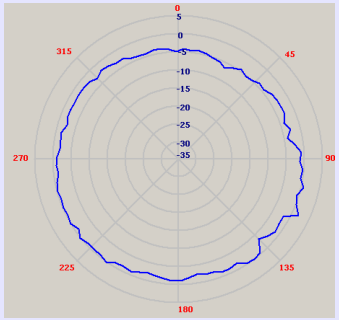
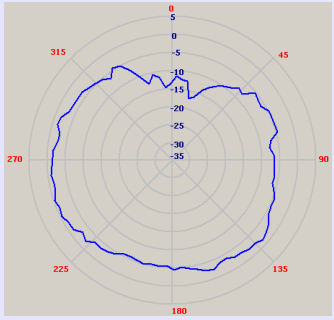
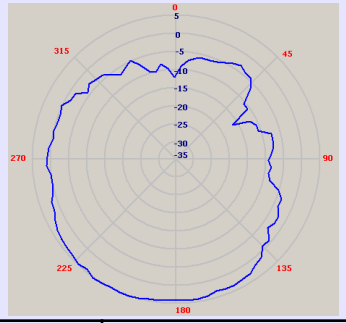
- **Radiation Patterns – 6425 MHz**

	xy-plane	yz-plane	xz-plane
horizontal			
	Pol. / Peak / avg. h / +2.9 / -1.6	Pol. / peak / avg. h / +4.9 / -1.6	Pol. / peak / avg. h / +4.0 / -1.8
vertical			
	Pol. / peak / avg. v / +1.7 / -2.1	Pol. / peak / avg. v / -0.6 / -4.5	Pol. / peak / avg. v / +5.0 / -0.2

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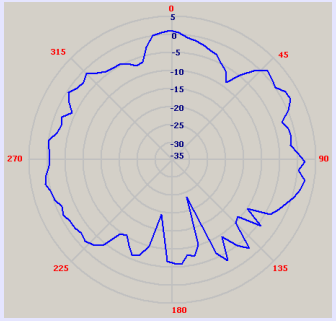
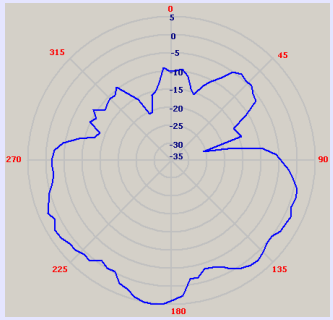
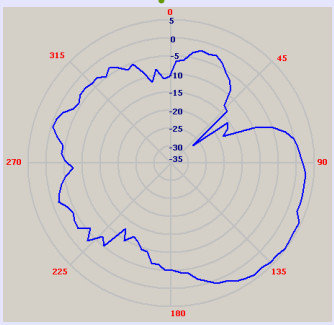
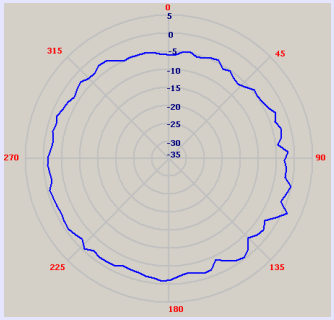
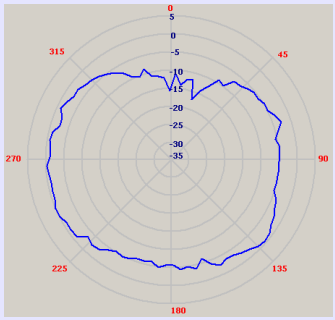
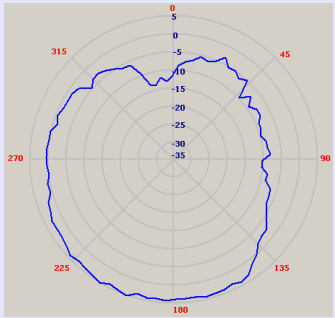
- **Radiation Patterns – 6525 MHz**

	xy-plane	yz-plane	xz-plane
horizontal			
	Pol. / Peak / avg. h / +2.2 / -2.2	Pol. / peak / avg. h / +4.9 / -1.5	Pol. / peak / avg. h / +4.5 / -1.6
vertical			
	Pol. / peak / avg. v / +1.1 / -2.7	Pol. / peak / avg. v / -0.2 / -4.0	Pol. / peak / avg. v / +5.0 / -0.1

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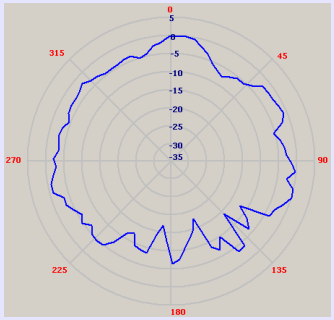
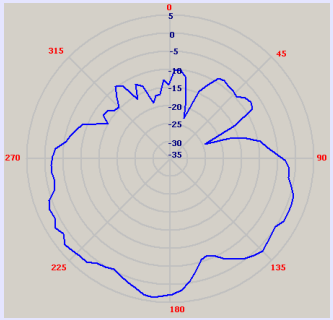
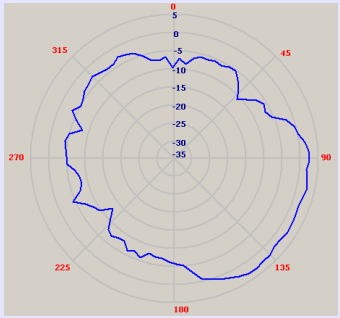
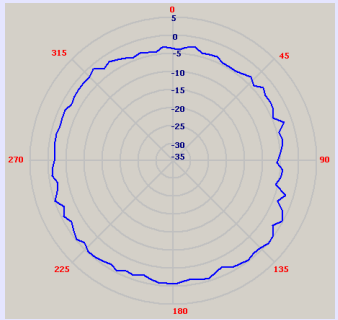
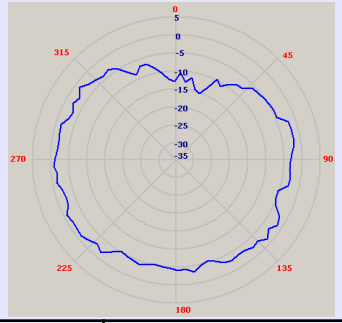
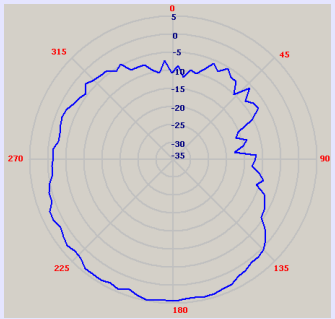
- **Radiation Patterns – 6875 MHz**

	xy-plane	yz-plane	xz-plane
horizontal			
	Pol. / Peak / avg. h / +0.1 / -4.0	Pol. / peak / avg. h / +3.6 / -2.2	Pol. / peak / avg. h / +3.0 / -2.3
vertical			
	Pol. / peak / avg. v / +0.1 / -2.3	Pol. / peak / avg. v / -1.1 / -3.9	Pol. / peak / avg. v / +4.6 / -0.6

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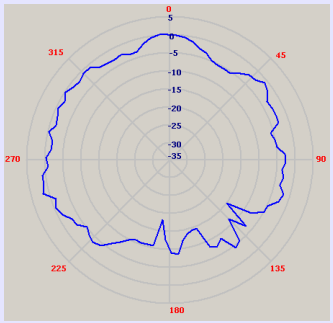
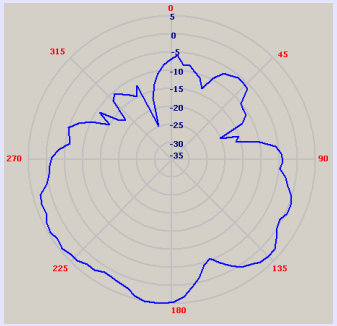
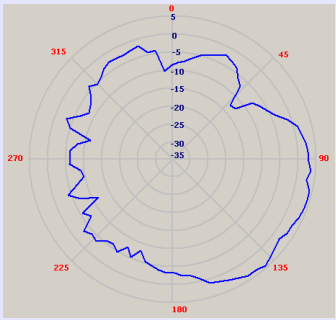
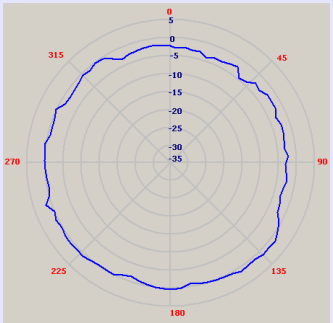
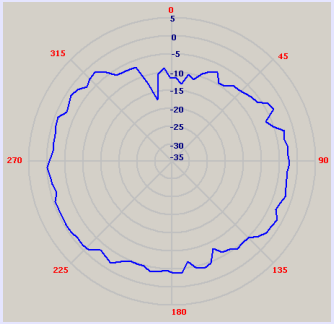
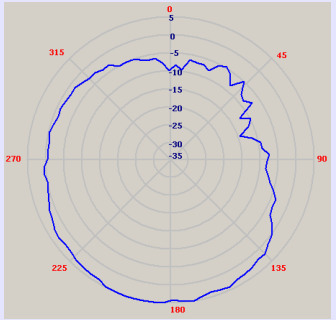
- **Radiation Patterns – 7125 MHz**

	xy-plane	yz-plane	xz-plane
horizontal			
vertical			

Pol.	Peak	avg.
h	+1.5	-3.3

Pol.	peak	avg.
h	+4.9	-0.8

Pol.	peak	avg.
h	+4.2	-1.4

Pol.	peak	avg.
v	+1.4	-1.1

Pol.	peak	avg.
v	-0.3	-3.7

Pol.	peak	avg.
v	+5.0	-0.2

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- **Antenna gain table**

Frequency (MHz)	Peak gain (dBi)	(θ, ϕ)
2400	+3.4	(253°, 90°)
2450	+3.0	(90°, 145°)
2480	+3.1	(90°, 145°)

Frequency (MHz)	Peak gain (dBi)	(θ, ϕ)
5150	+4.9	(221°, 0°)
5250	+4.8	(225°, 0°)
5350	+4.7	(221°, 0°)
5470	+3.2	(221°, 0°)
5725	+4.8	(209°, 90°)
5850	+5.0	(221°, 90°)
5895	+5.0	(225°, 90°)
5925	+4.9	(229°, 90°)
6425	+5.0	(241°, 0°)
6525	+5.0	(229°, 0°)
6875	+4.6	(221°, 0°)
7125	+5.0	(225°, 0°)

* XY-plane：Theta = 90°
  XZ-plane： Phi=0°
  YZ-plane：Phi = 90°

* The antenna gain values are used in EMC measurement, the EIRP and/or Conducted power are compliance all FCC requirements and not exceed the limit.