

## Regulatory MIMO Antenna Information

<b>Platform</b>	
Platform Owner	Lenovo Cooperation
Brand Name	Lenovo
Model Name	20004
ODM	Compal
Target Launch Date	(2008/ 04/ 22)
<b>Antenna</b>	
Brand Name	Smart Approach
Part Number	■ Tx1 Antenna:CPL07-230010
	■ Tx2 Antenna:CPL07-230010
	■ Tx3 Antenna:CPL07-230010
<b>Module</b>	
With WLAN Module	<input type="checkbox"/> WM3B2200BG
(Check Box)	<input type="checkbox"/> WM3B2915ABG
	<input type="checkbox"/> WM3945ABG
	<input type="checkbox"/> 4965AGN
	<input type="checkbox"/> 4965AG_
	■ 533ANX Family
	■ 512ANX Family
	■ 533AN Family
	■ 512AN Family

## 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 only	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	Part number of Antenna Assembly / cable impedance, length & diameter.	Required	Desired	Desired	Desired	Desired
1E	Tx1, Tx2 & Tx3 antenna (Peak Gain W/ cable loss) *	Required	Required	Required	Required	Required
	1E OR 1F, 1G, 1H					
1F	Tx1, Tx2 & Tx3 antenna (Peak Gain only) *	Required	Required	Required	Required	Required
1G	VSWR of cable including connector	Required	Required	Required	Required	Required
1H	Tx1, Tx2 & Tx3 antenna (Cable loss W/ connector) *	Required	Required	Required	Required	Required
2	Dimensioned Photographs <u>and</u> Drawings of Tx1, Tx2, and Tx3 (or Rx3) antennas	Required	Required	Required	Required	Required
3	Radiation patterns of antennas loaded in the host platform.	Required	Desired	Required	N/A	Required
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. <u>(S. Korea requires photographs of antennas for approval submission). Taiwan requires pictures of each antenna type shown in the system.</u>	Required	Required	Desired	<u>Required (Photos)</u>	<u>Required (Photos)</u>
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

NOTE:

(\*) if Rx3 only (3<sup>rd</sup> antenna receive only, e.g. for 4965AGN) then the information marked with \* Is not required

# Antenna Information

## Section 1. Antenna Assembly Specifications

### Antenna Assembly Summary:

1A Antenna Part Number	1B Manufacture	1C Antenna Type	1D Cable Assembly Part Number and Information	1E *Peak Gain W/ Cable loss (dBi)	1F Peak Gain w/o Cable Loss (dBi)	1G VSWR	1H Cable Loss (dBi)
(P/N:CPL07-23 0010) Main antenna	SmartApproach Corporation	PIFA	50 ohm Coaxial. length: 99.3.0cm diameter: 1.37mm Connector: IPX (RHoS:Yes)	2400-2500MHz 3.46 dBi (peak)	2400-2500MHz 5.96 dBi (peak)	2400-2500MHz 1.42 max	2400-2500MHz 2.50 dBi (peak)
				2496-2690MHz -2.38 dBi (peak)	2496-2690MHz 0.42 dBi (peak)	2496-2690MHz 2.32 max	2496-2690MHz 2.80 dBi (peak)
				5150-5350MHz 3.30 dBi (peak)	5150-5350MHz 7.18 dBi (peak)	5150-5350MHz 1.42 max	5150-5350MHz 3.88 dBi (peak)
				5470-5725MHz 2.75 dBi (peak)	5470-5725MHz 6.66 dBi (peak)	5470-5725MHz 1.48 max	5470-5725MHz 3.91 dBi (peak)
				5725-5850MHz 2.31 dBi (peak)	5725-5850MHz 6.31 dBi (peak)	5725-5850MHz 1.67 max	5725-5850MHz 4.00 dBi (peak)
(P/N:CPL07-23 0010) AUX antenna	SmartApproach Corporation	PIFA	50 ohm Coaxial. length: 75.6cm diameter: 1.37mm Connector: IPX (RHoS:Yes)	2400-2500MHz 2.73 dBi (peak)	2400-2500MHz 4.60 dBi (peak)	2400-2500MHz 1.35 max	2400-2500MHz 1.87 dBi (peak)
				2496-2690MHz 2.13 dBi (peak)	2496-2690MHz 4.23 dBi (peak)	2496-2690MHz 2.12 max	2496-2690MHz 2.10 dBi (peak)
				5150-5350MHz 2.77dBi (peak)	5150-5350MHz 5.75 dBi (peak)	5150-5350MHz 1.63 max	5150-5350MHz 2.98 dBi (peak)
				5470-5725MHz 1.34 dBi (peak)	5470-5725MHz 4.46 dBi (peak)	5470-5725MHz 1.57 max	5470-5725MHz 3.12 dBi (peak)
				5725-5850MHz 0.29 dBi (peak)	5725-5850MHz 3.51 dBi (peak)	5725-5850MHz 1.71 max	5725-5850MHz 3.22 dBi (peak)
(P/N:CPL07-23 0010) MIMO antenna	SmartApproach Corporation	PIFA	50 ohm Coaxial. length: 48.3cm diameter: 1.37mm Connector: IPX (RHoS:Yes)	2400-2500MHz -1.61 dBi (peak)	2400-2500MHz -0.36 dBi (peak)	2400-2500MHz 1.46 max	2400-2500MHz 1.25 dBi (peak)
				2496-2690MHz -1.74 dBi (peak)	2496-2690MHz -0.34 dBi (peak)	2496-2690MHz 2.56 max	2496-2690MHz 1.40 dBi (peak)
				5150-5350MHz 0.69 dBi (peak)	5150-5350MHz 2.63 dBi (peak)	5150-5350MHz 1.51 max	5150-5350MHz 1.94 dBi (peak)
				5470-5725MHz -0.59 dBi (peak)	5470-5725MHz 1.38 dBi (peak)	5470-5725MHz 1.35 max	5470-5725MHz 1.97 dBi (peak)
				5725-5850MHz -1.08 dBi (peak)	5725-5850MHz 0.92 dBi (peak)	5725-5850MHz 1.74max	5725-5850MHz 2.00dBi (peak)

### NOTE:

(\*) If Rx3 only (3<sup>rd</sup> antenna receives only, e.g. 4965AGN) then the information marked with \* is not required

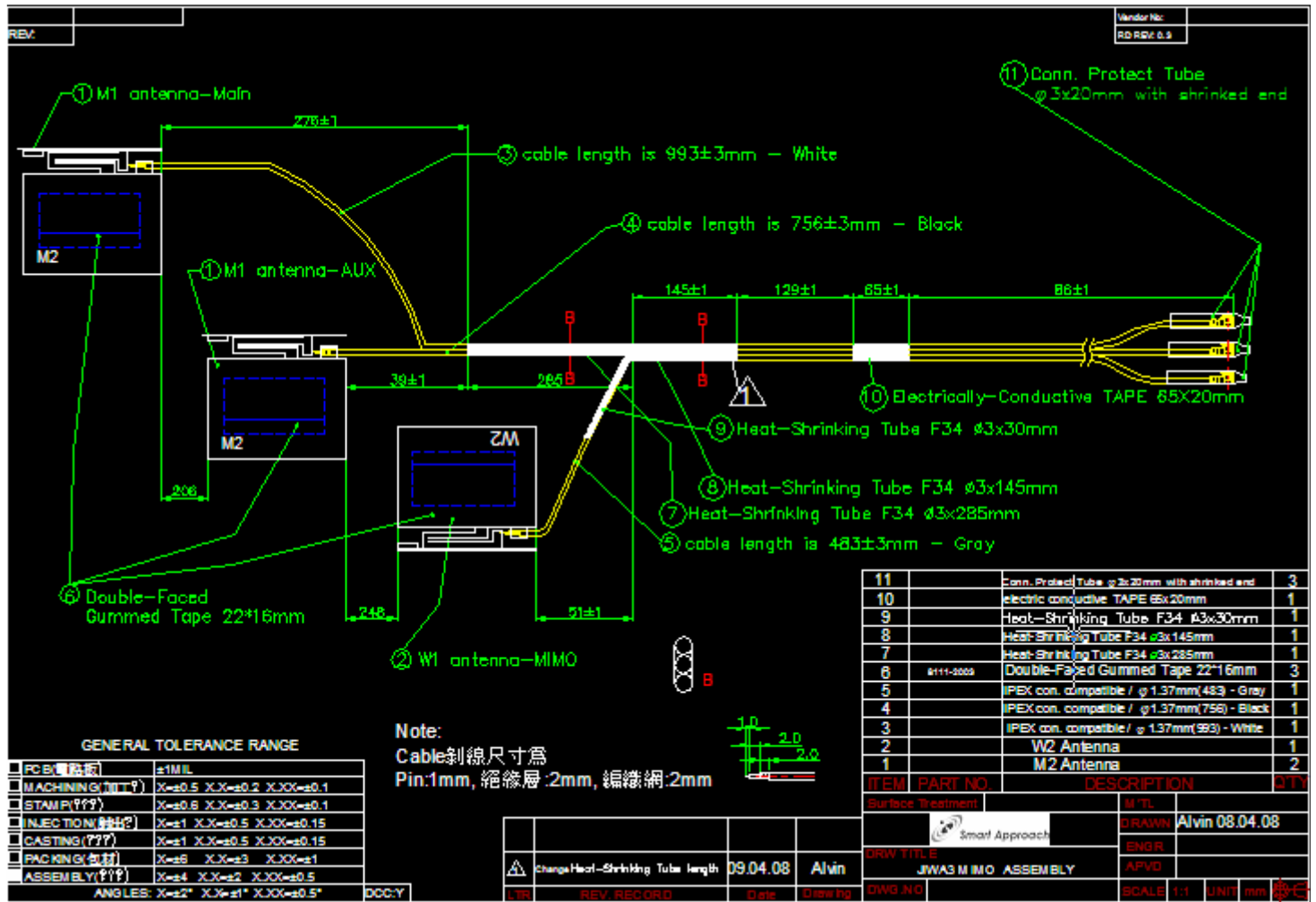
**Antenna Peak Gain Table:**

Frequency (MHz)	Main antenna		Aux Antenna		Mimo Antenna	
	Horizontal (dBi)	Vertical (dBi)	Horizontal (dBi)	Vertical (dBi)	Horizontal (dBi)	Vertical (dBi)
2400	-1.52	-4.51	-1.93	-2.06	-3.35	-4.13
2450	-1.57	-3.77	-2.19	-1.57	-3.18	-2.57
2500	-2.75	-3.80	-2.07	-1.48	-3.12	-2.58
2501	-3.19	-4.25	-2.96	-2.30	-0.47	-0.14
2593	-3.22	-4.10	-2.72	-2.06	-1.41	0.72
2685	-4.55	-3.94	-2.49	-3.14	-2.66	0.12
5150	-1.92	-3.17	-1.42	-1.05	-3.59	-6.15
5250	0.50	-2.67	-1.69	-3.26	-3.36	-5.72
5350	-0.37	-3.81	-2.25	-4.48	-3.33	-5.39
5470	-0.60	-3.82	-1.28	-2.54	-3.86	-6.01
5600	-0.11	-1.92	-1.65	-2.64	-2.78	-7.14
5725	0.42	-1.71	-2.40	-2.91	-3.24	-5.80
5785	0.19	-0.45	-1.48	-2.47	-3.65	-4.47
5850	-0.31	-0.39	-1.97	-3.41	-4.08	-4.47

- Antenna Peak Gain required being test in system basis.
- 1E frame contend absolutely peak antenna gain include H/V
- If Rx2 only (2<sup>nd</sup> antenna receives only, e.g. for 512 family) then the information is not required for Rx2.
- If Rx3 only (3<sup>rd</sup> antenna receives only, e.g. for 4965AGN) then the information is not required for Rx3.

## Section 2. Dimensioned Photos or Drawings of Antennas

### 2-1 dimensioned drawing of assembly.



Include a dimensioned photo or dimensioned drawing of Main and AUX antenna here.

Part Number						Vendor/No	
REV: 1						RD REV: 1	

檢驗圖

註: □ 為建議檢驗尺寸:例 □33.330

NOTE:

1. T=0.3mm
2. 銅片未標示之圓角皆為 R=0.5mm
3. 字高為 2.5mm
4. 銅片不可有油污、刮傷

GENERAL TOLERANCE RANGE	
□ PCB(電路板)	±1MIL
□ MACHINING(加工件)	X,XX=±0.5 X,X=±0.2 X,XX=±0.1
□ STAMP(沖製件)	X,XX=±0.6 X,X=±0.3 X,XX=±0.1
□ INJECTION(射出件)	X,XX=±1 X,X=±0.5 X,XX=±0.15
□ CASTING(鑄造件)	X,XX=±1 X,X=±0.5 X,XX=±0.15
□ PACKING(包材)	X,XX=±1 X,X=±0.3 X,XX=±1
□ ASSEMBLY(組合作)	X,XX=±1 X,X=±2 X,XX=±0.5

ANGLES: X,XX=±2° X,X=±1° X,XX=±0.5°	DCC:Y
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LTR	REV. RECORD	DR	APVD
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ITEM	PART NO.	DESCRIPTION	QTY
1			1
Surface Treatment		MTL	
SMART APPROACH CO., LTD.		DRAWN	A/vn 03.12.08 iv
DRW TITLE		ENGR	
DWG. NO		APVD	
SCALE		2:1	UNIT mm

Include a dimensioned photo or dimensioned drawing of MIMO antenna here.

Part Number		Vendor No.	
REV: 1		RD REV: <del>REV</del>	

檢驗圖

註:  為建議檢驗尺寸(例 0.25, 0.5)

NOTE:

1. T=0.3mm
2. 銅片未標示之圓角皆為 R=0.5mm
3. 字高為 2.5mm
4. 銅片不可有油污、刮傷

GENERAL TOLERANCE RANGE	
<input type="checkbox"/> PCB(單路板)	±1MIL
<input type="checkbox"/> MACHINING(加工件)	X=±0.5 X,X=±0.2 X,XX=±0.1
<input type="checkbox"/> STAMP(沖製件)	X=±0.8 X,X=±0.3 X,XX=±0.1
<input type="checkbox"/> INJECTION(射出件)	X=±1 X,X=±0.5 X,XX=±0.15
<input type="checkbox"/> CASTING(鑄造件)	X=±1 X,X=±0.5 X,XX=±0.15
<input type="checkbox"/> PACKING(包材)	X=±0.8 X,X=±0.3 X,XX=±0.1
<input type="checkbox"/> ASSEMBLY(組零件)	X=±1 X,X=±0.5 X,XX=±0.15

ANGLES: X=±2° X,X=±1° X,XX=±0.5°		DCC: Y	LTR	REV. RECORD	DR	APVD
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1			1
ITEM	PART NO.	DESCRIPTION	QTY
Surface Treatment		MTL	
SMART APPROACH CO., LTD.		DRAWN	Alvin 03.12.08
DRW TITLE		ENGR	
DWG. NO		APVD	
	SCALE	2:1	UNIT mm

**2-2** Resize the photograph file into 640x480 pix(JPG)  
The Photograph of main antenna.



The Photograph of aux. antenna.





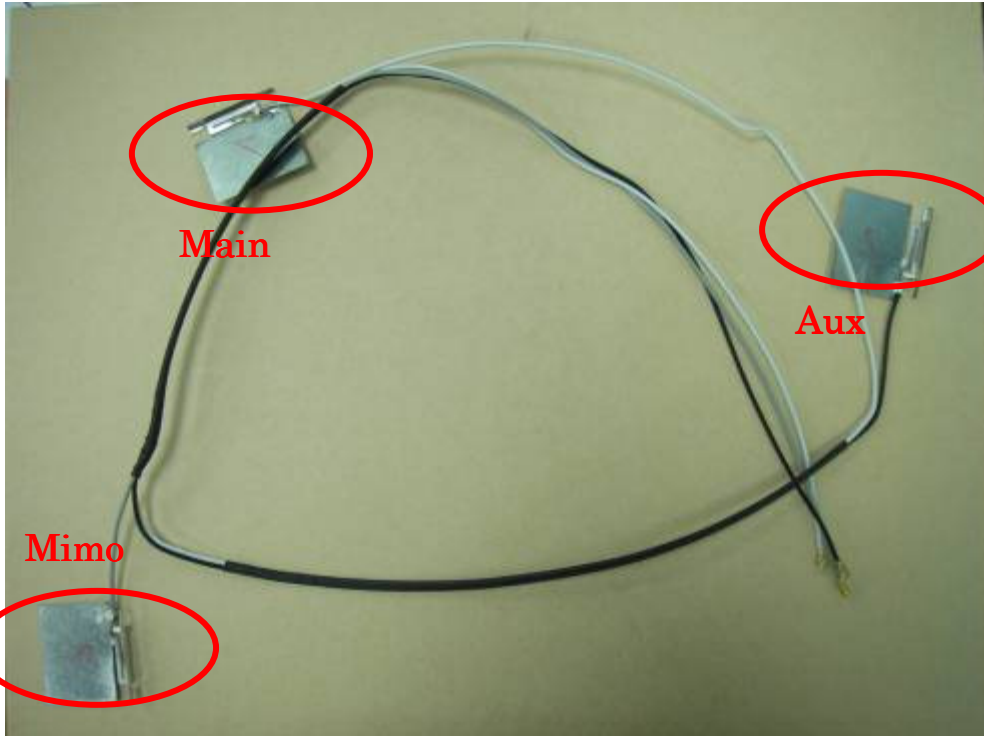
### The Photograph of MIMO antenna.



Include front view photo of all 3 antennas here.

Antenna Manufacturer: Smart Approach

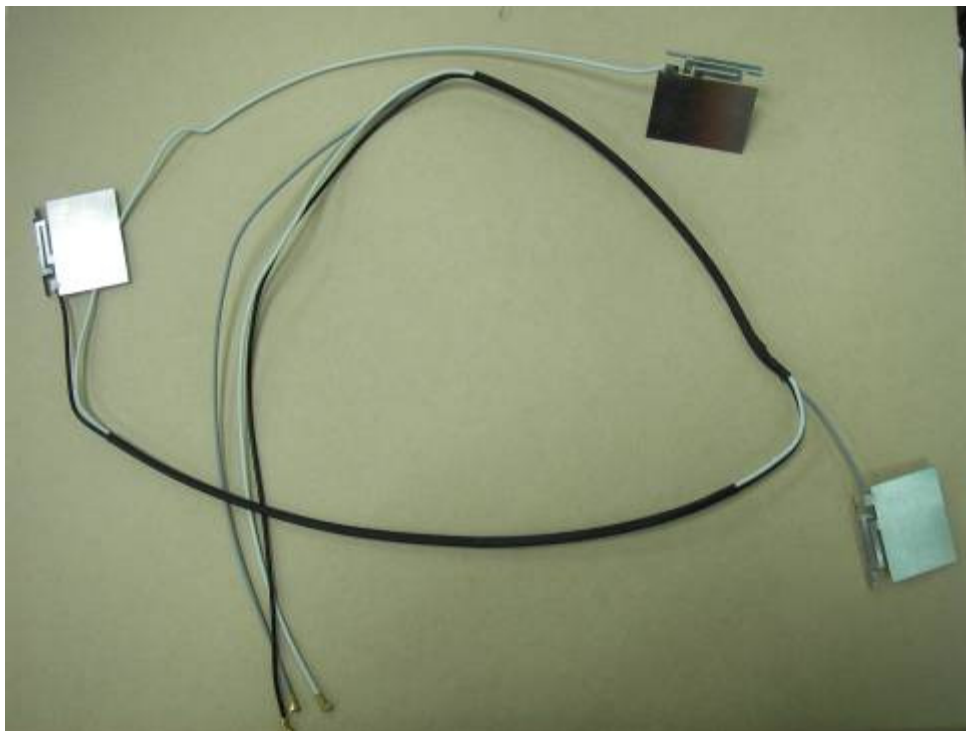
Antenna Part Number: P/N:CPL07-230010 (Tx1), P/N:CPL07-230010 (Tx2), P/N:CPL07-230010 (Tx3 or Rx3)



Include back view photo of all 3 antennas here.

Antenna Manufacturer: Smart Approach

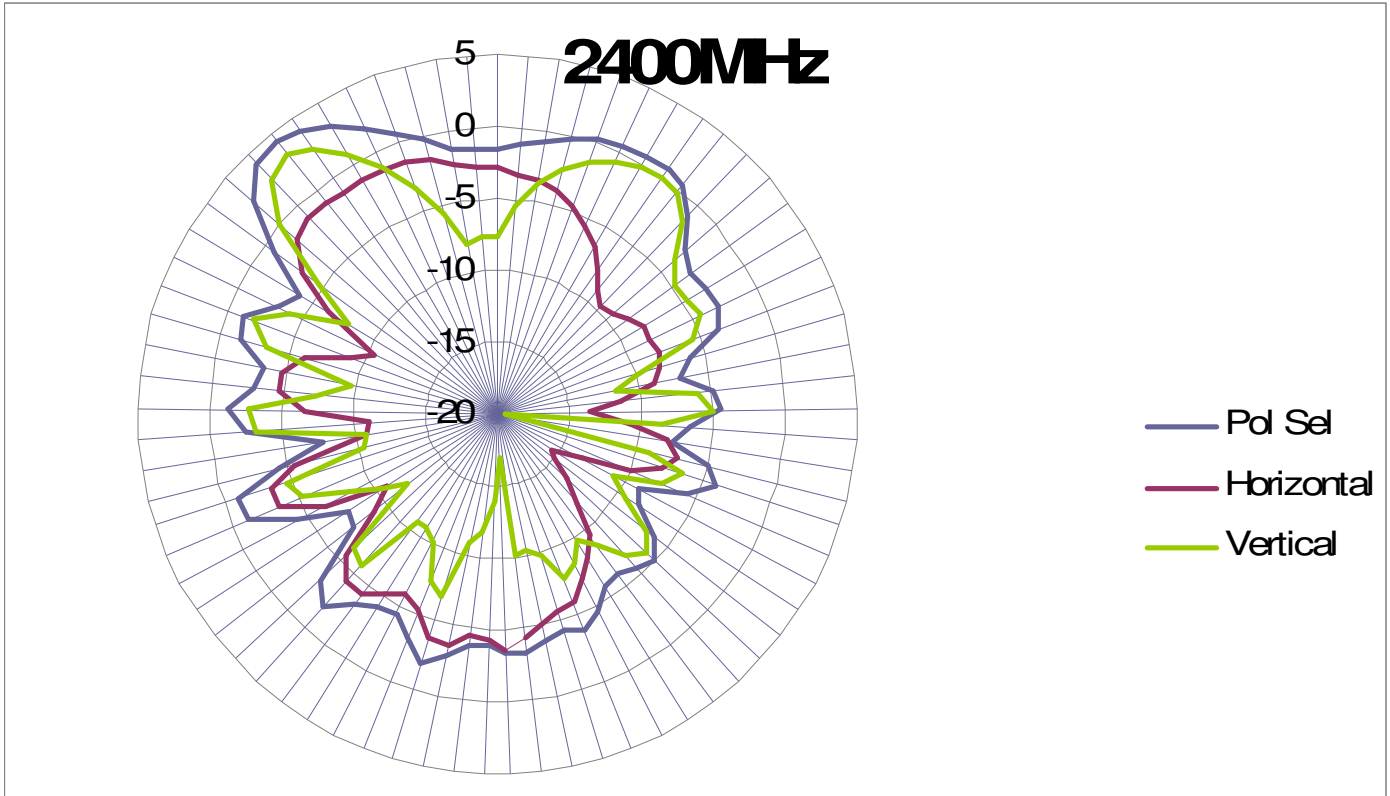
Antenna Part Number: P/N:CPL07-230010(Main),P/N:CPL07-230010(AUX),P/N:CPL07-230010 (MIMO)



## Section 3. Radiation characteristics of antennas Loaded in Host Platform

### 2400-2500MHz radiation characteristic

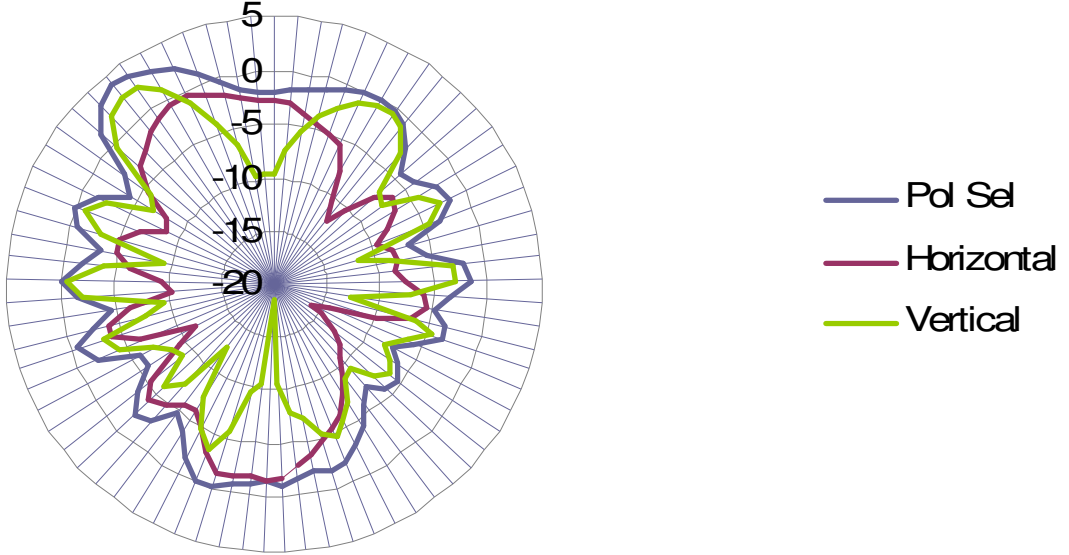
Main antenna: 2400 MHz



frequency	2400
Horizontal	3.16
Vertical	-1.01
E total	4.53

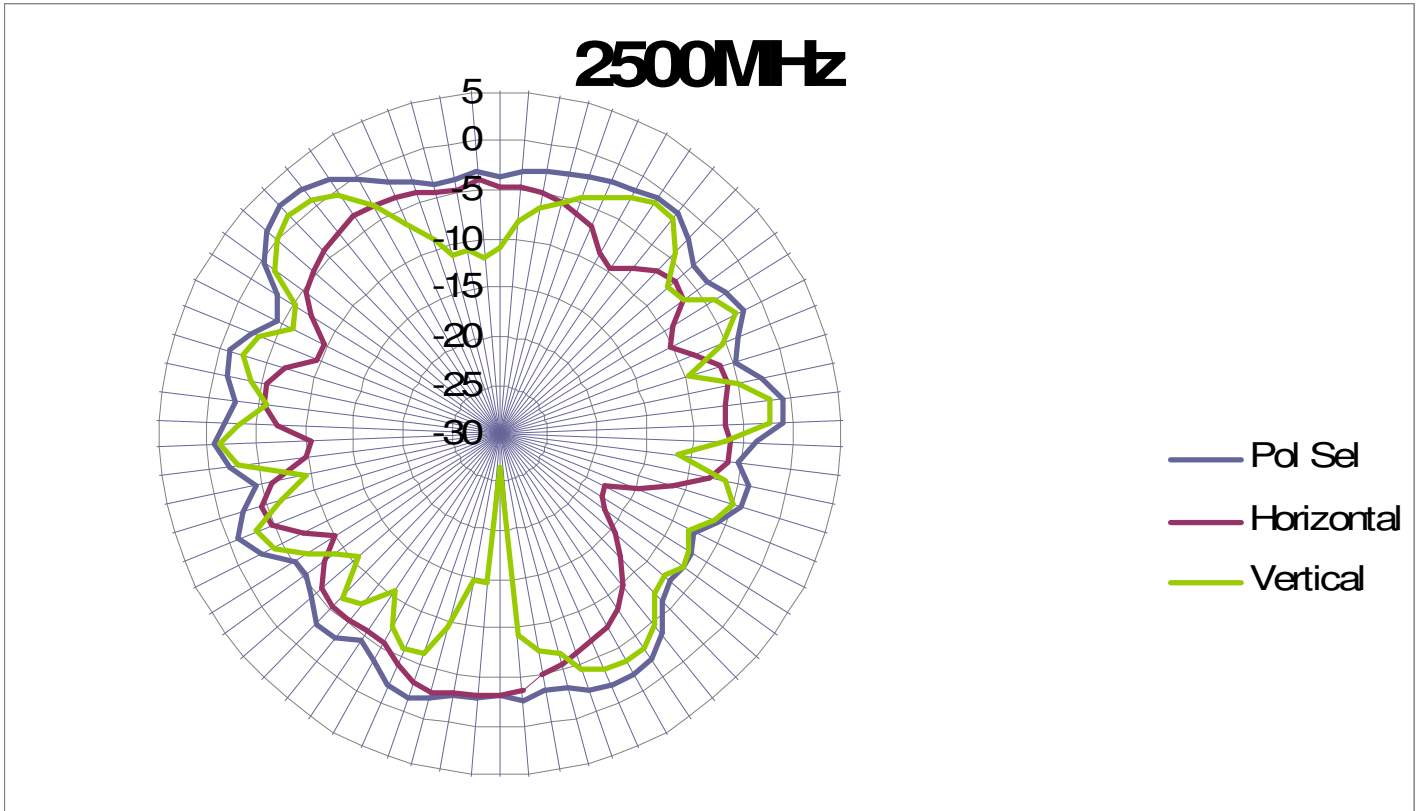
Main antenna: 2450 MHz

# 2450MHz



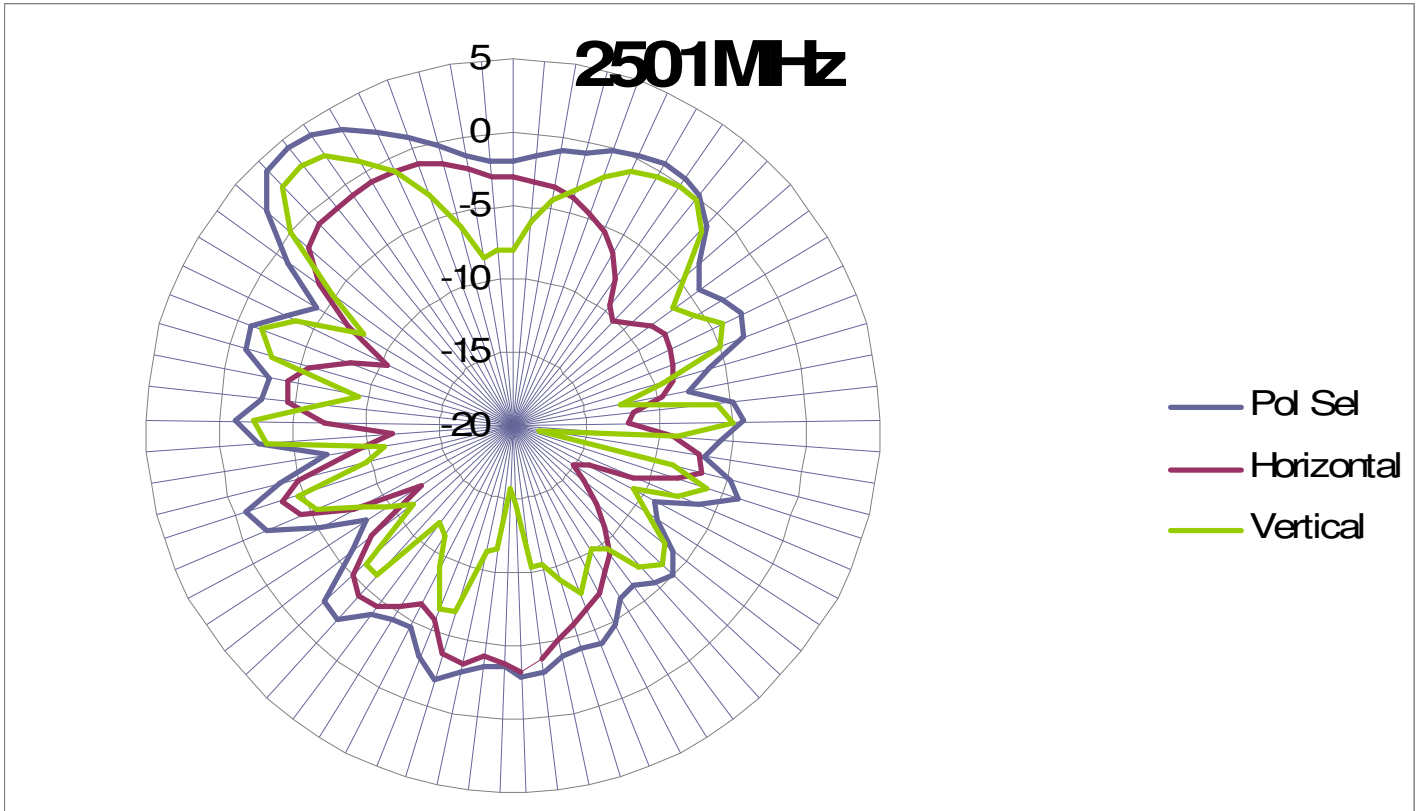
frequency	2450
Horizontal	2.59
Vertical	-0.67
E total	3.95

Main antenna: 2500 MHz



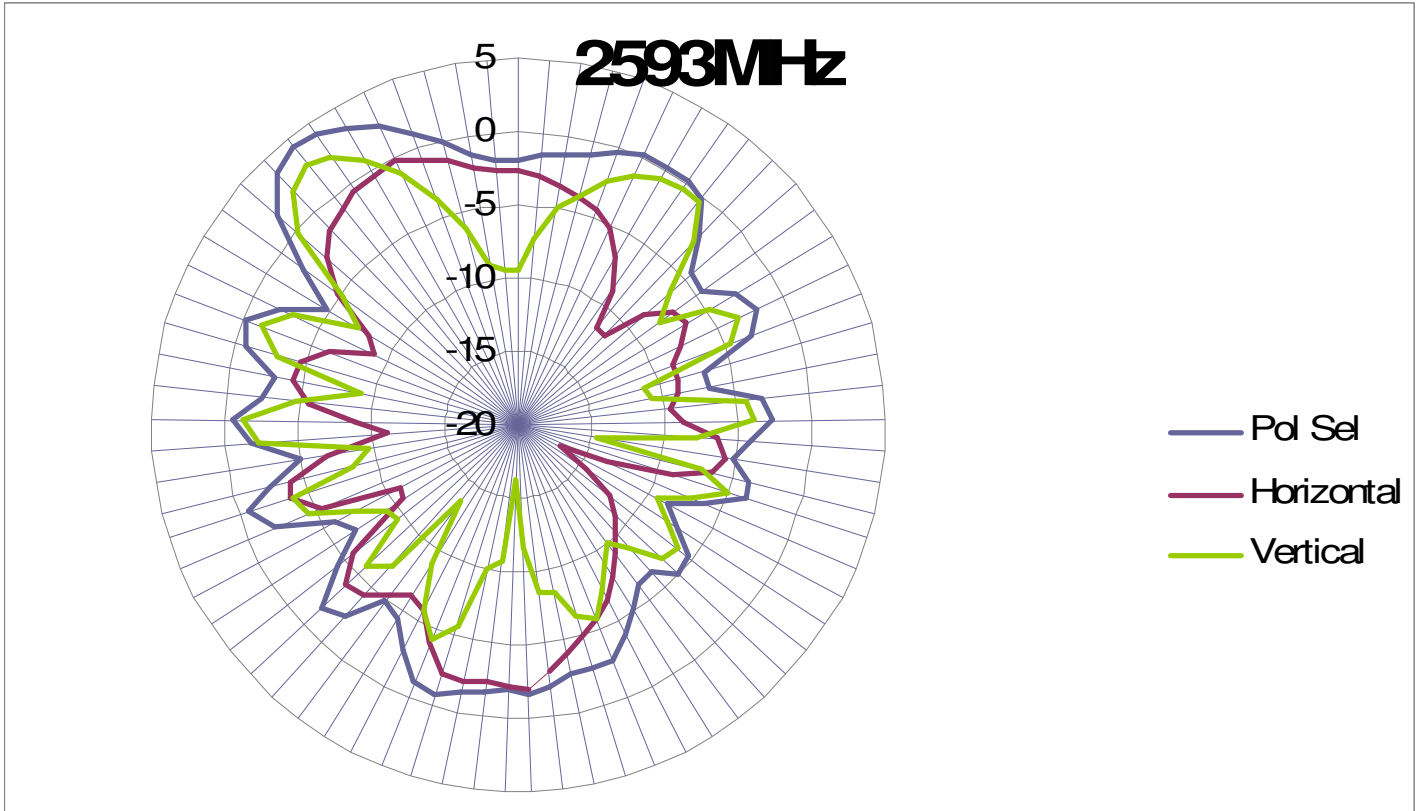
frequency	2500
Horizontal	1.11
Vertical	-2.76
E total	2.24

Main antenna: 2501 MHz



frequency	2501
Horizontal	2.94
Vertical	-0.82
E total	4.46

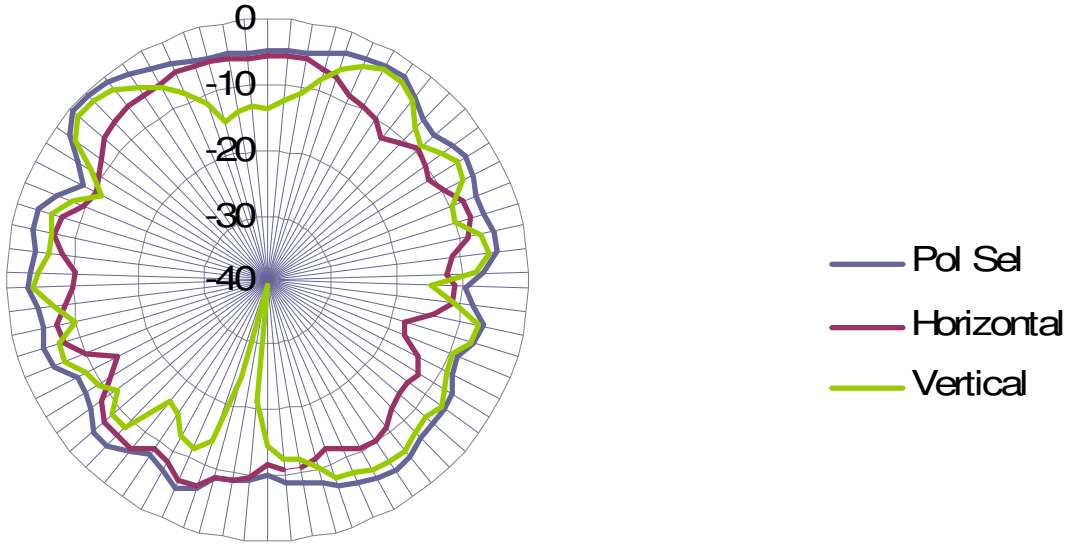
Main antenna: 2593 MHz



frequency	2593
Horizontal	2.84
Vertical	-0.23
E total	4.34

Main antenna: 2685 MHz

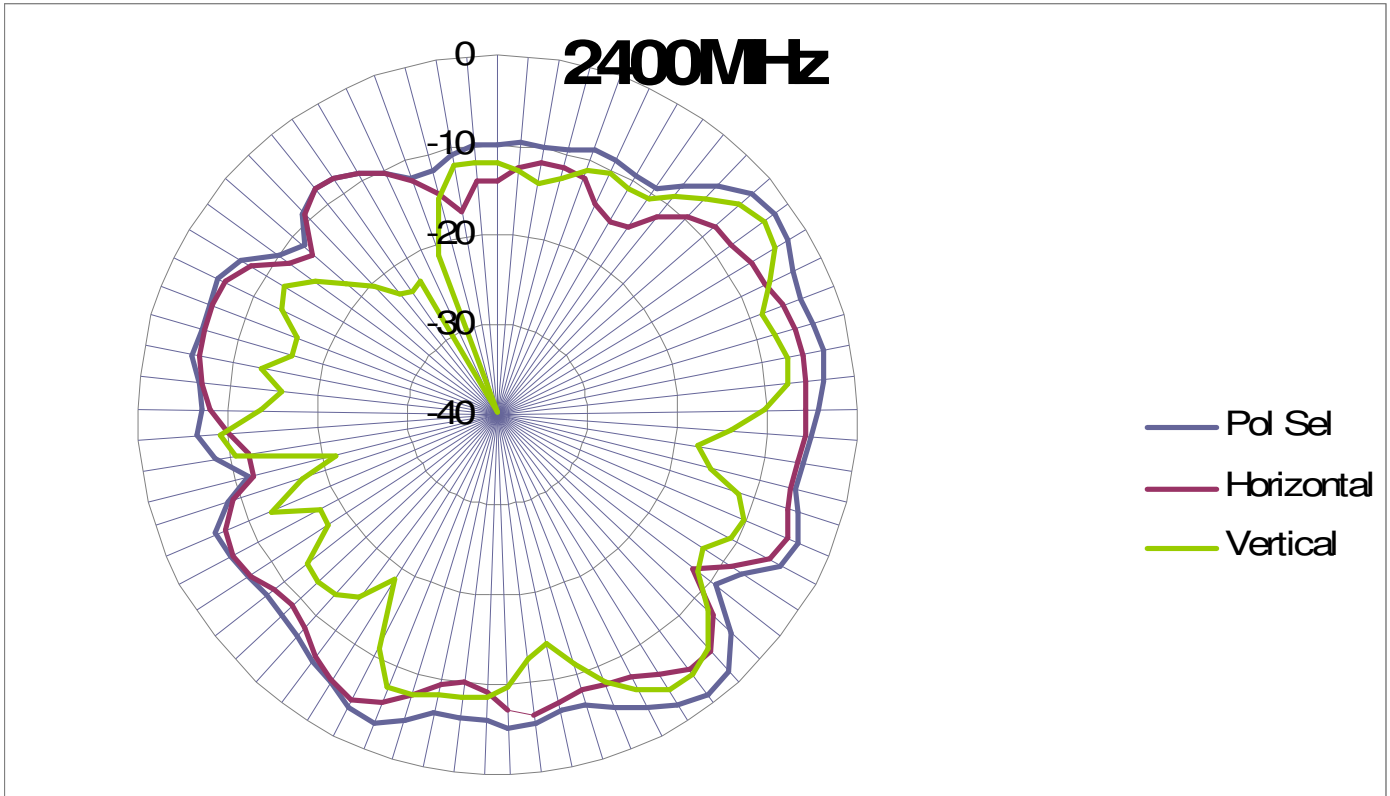
**2685MHz**



frequency	2685
Horizontal	-1.59
Vertical	-5.18
E total	-0.27

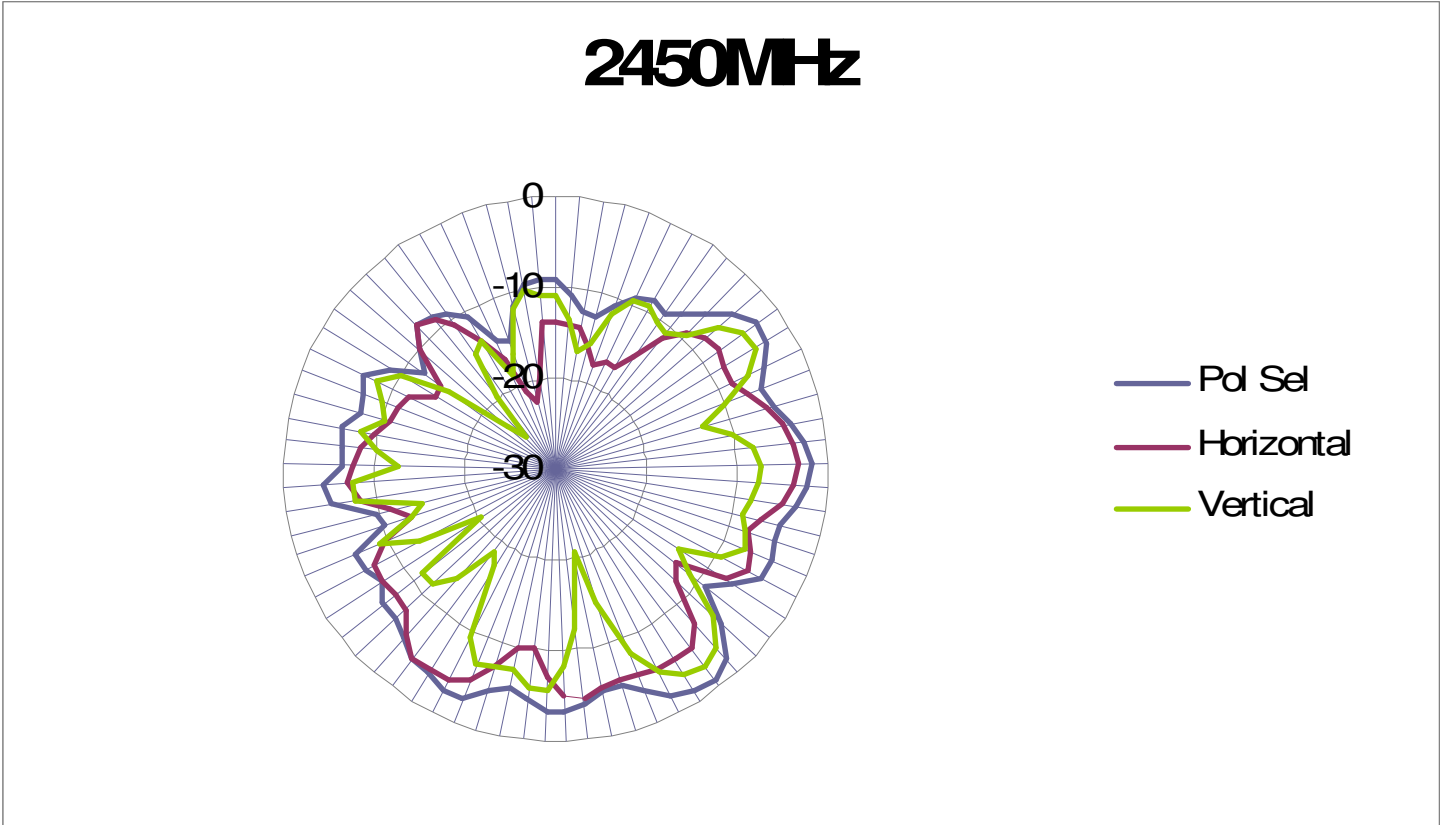


### MIMO antenna: 2400 MHz



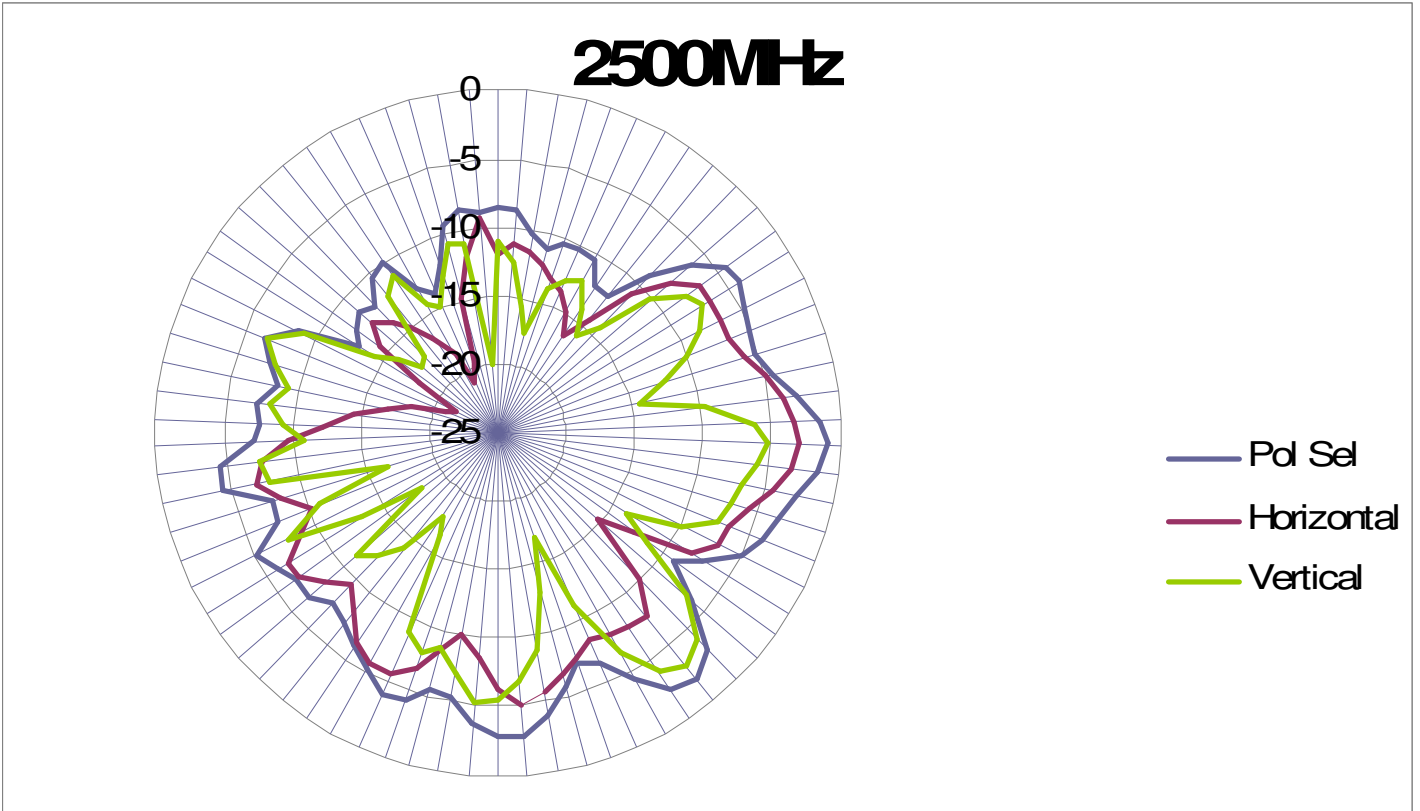
frequency	2400
Horizontal	-3.31
Vertical	-4.41
E total	-1.25

MIMO antenna: 2450 MHz



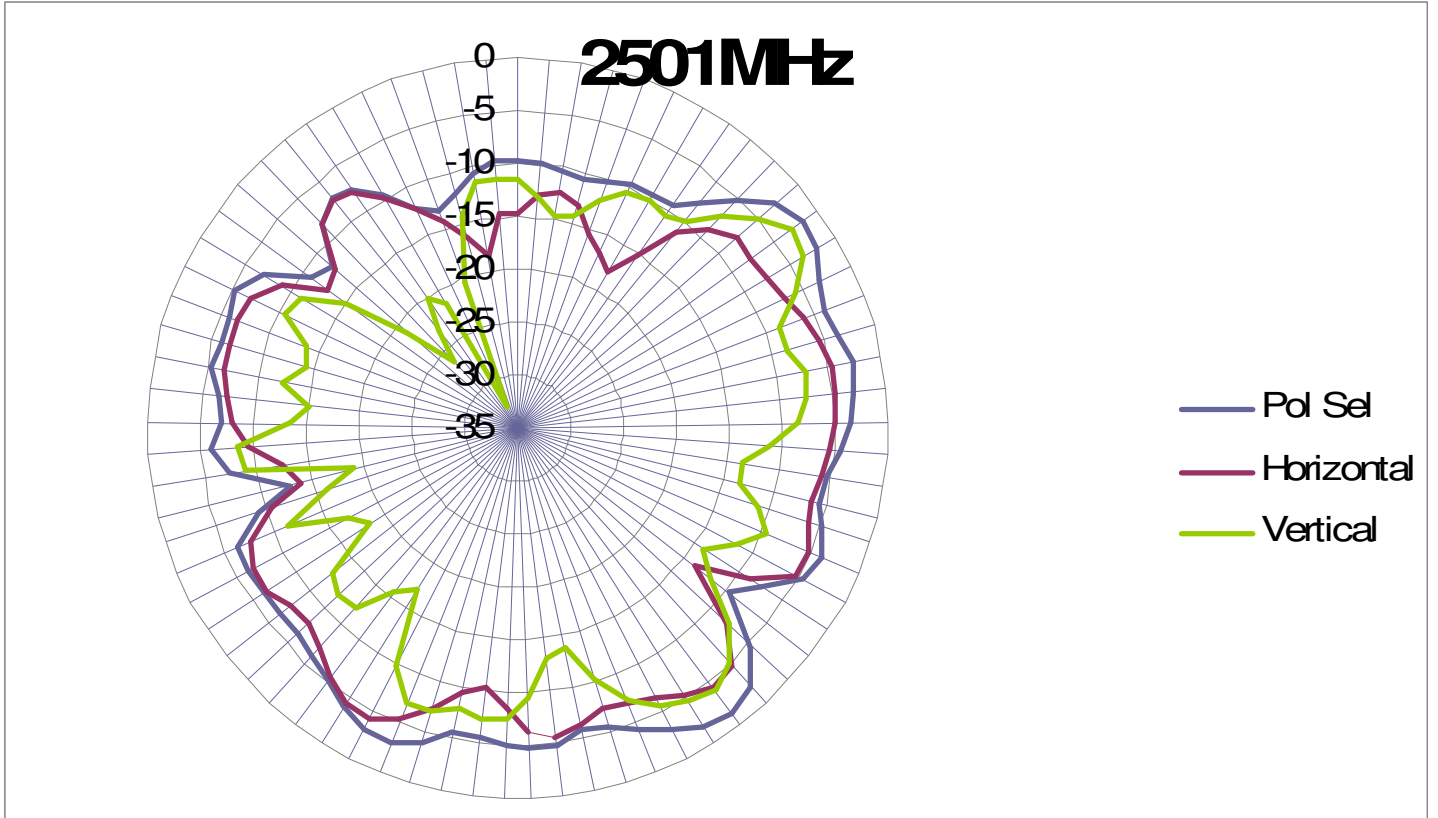
frequency	2450
Horizontal	-2.77
Vertical	-3.37
E total	-0.83

**MIMO antenna: 2500 MHz**



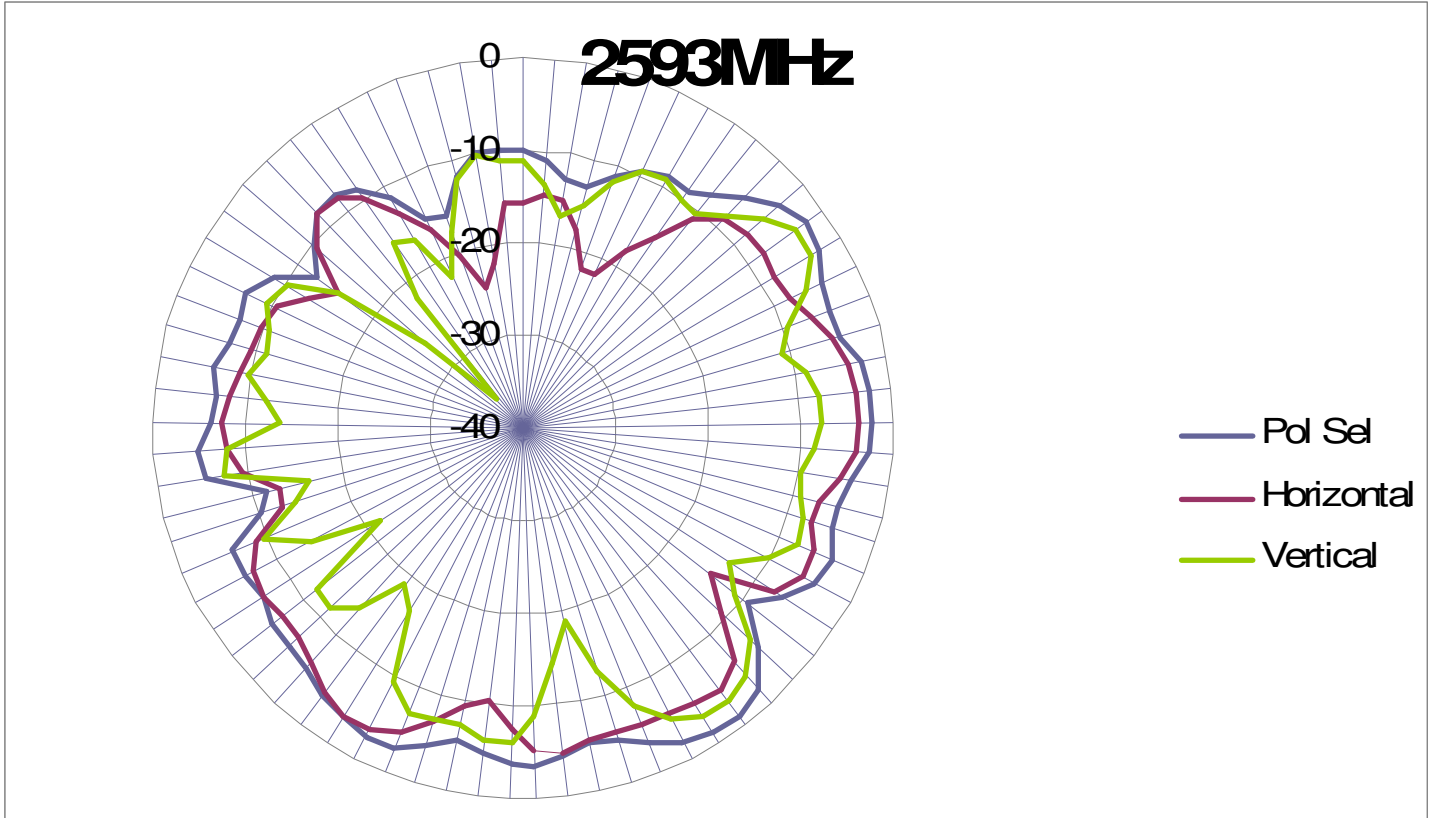
frequency	2500
Horizontal	-3.18
Vertical	-3.03
E total	-1.00

MIMO antenna: 2501 MHz



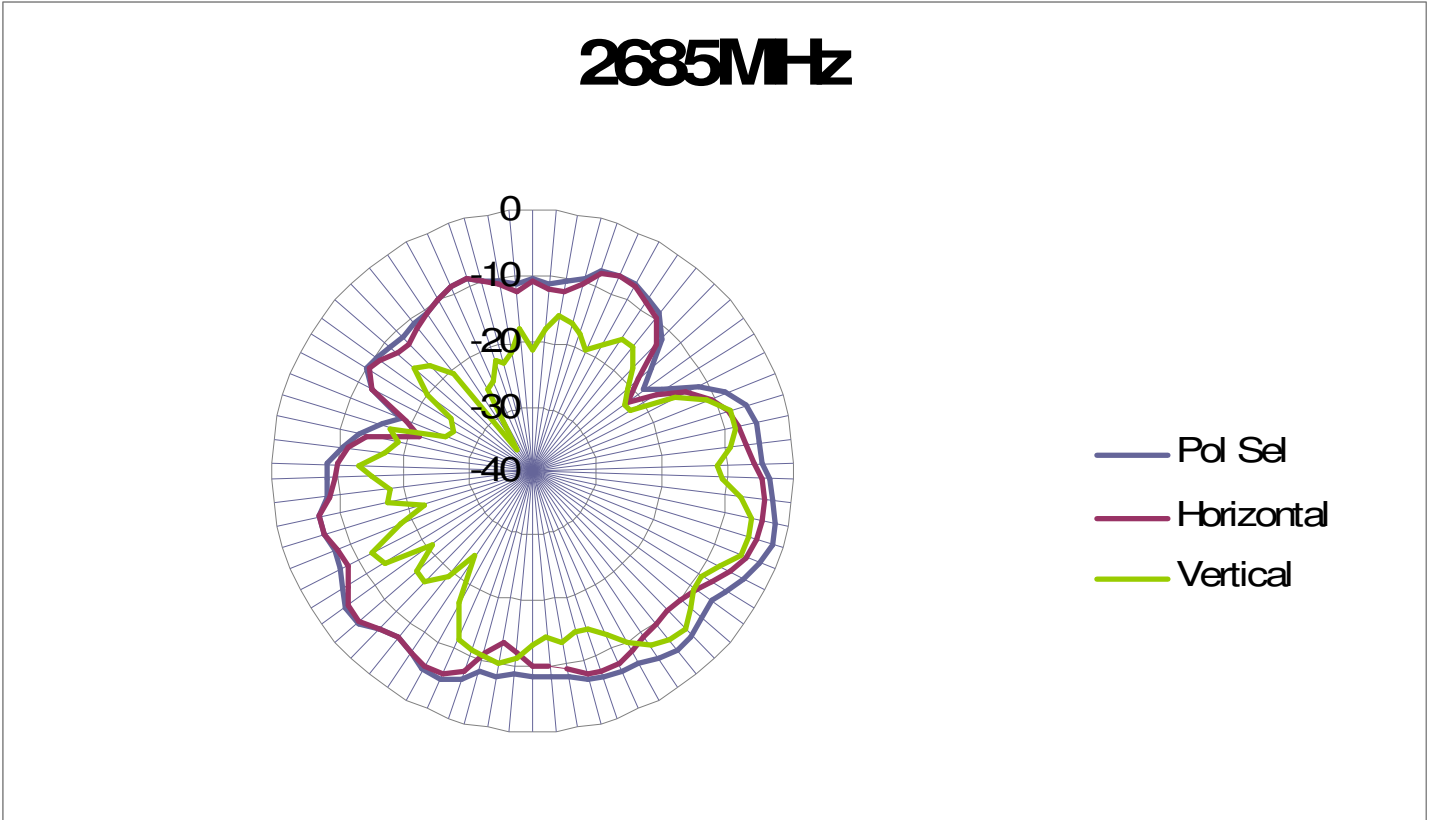
frequency	2501
Horizontal	-3.01
Vertical	-4.20
E total	-1.21

MIMO antenna: 2593 MHz



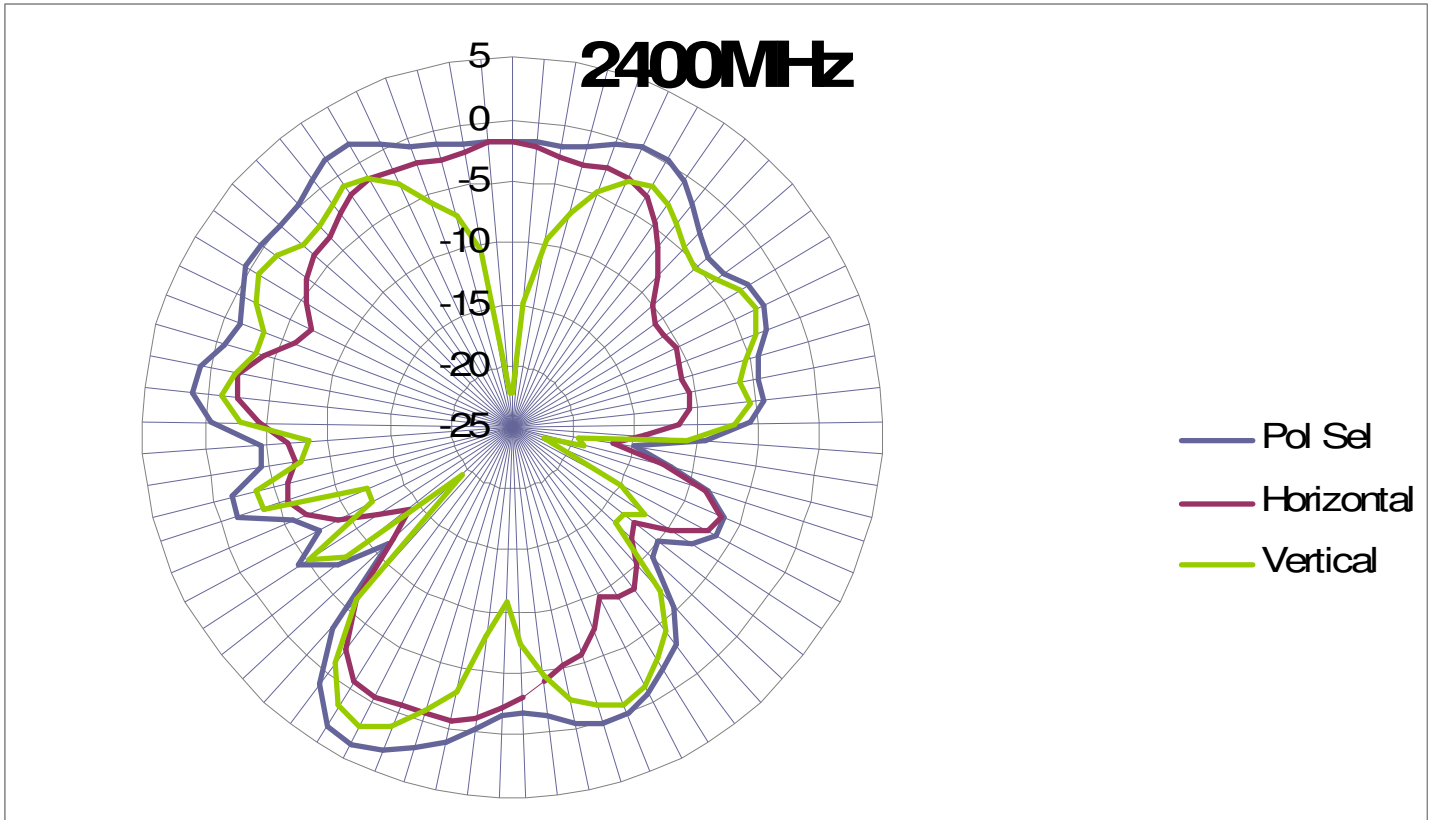
frequency	2593
Horizontal	-3.19
Vertical	-3.42
E total	-0.79

MIMO antenna: 2685 MHz



frequency	2685
Horizontal	-5.11
Vertical	-4.17
E total	-1.61

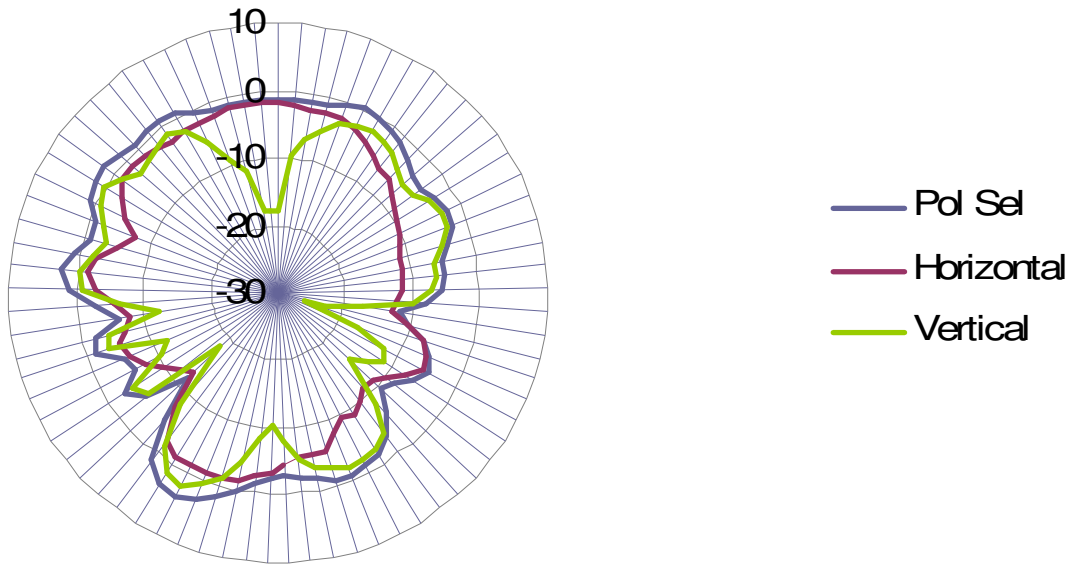
**AUX antenna: 2400 MHz**



frequency	2400
Horizontal	2.19
Vertical	-0.60
E total	4.02

**AUX antenna: 2450 MHz**

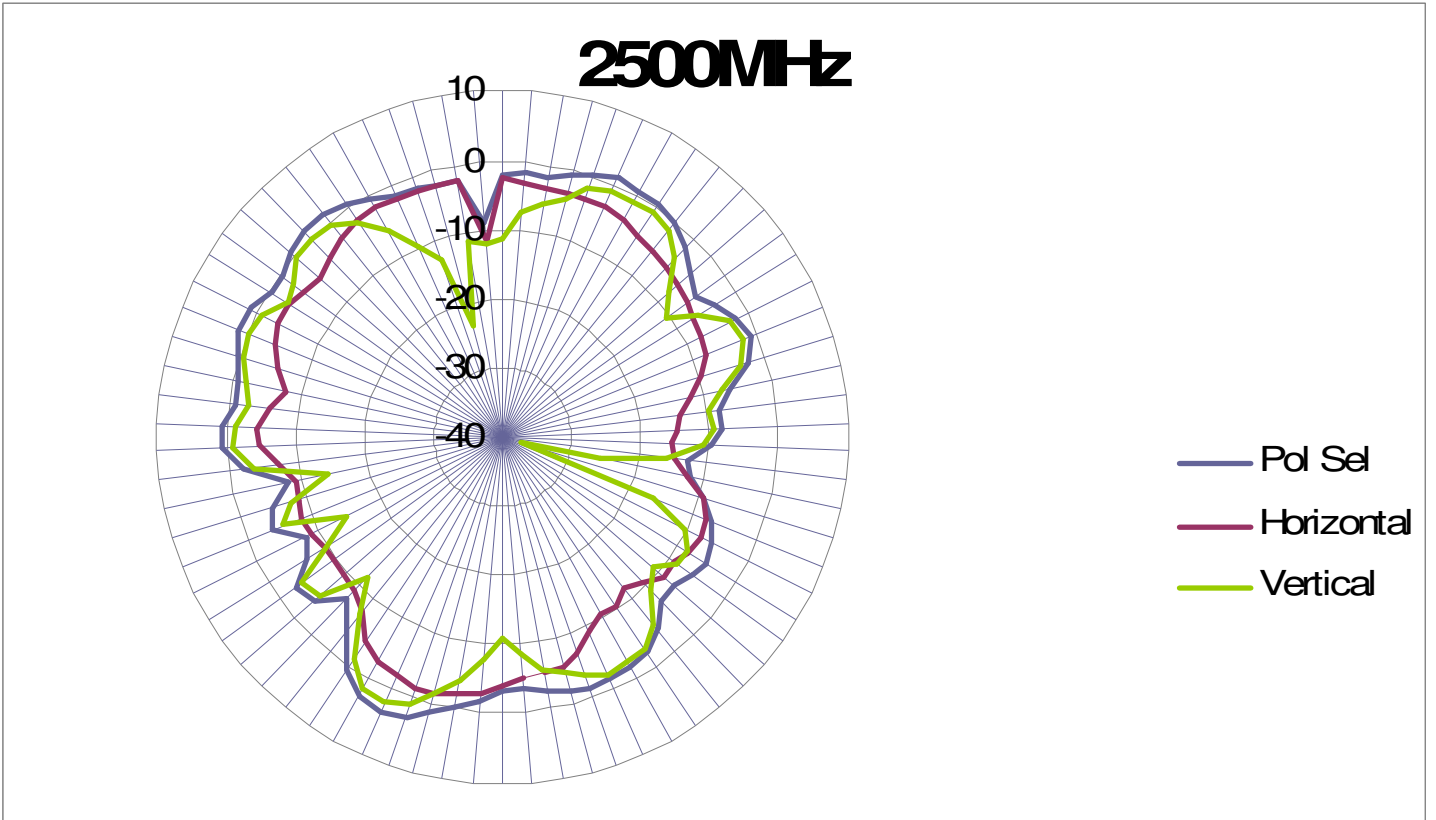
**2450MHz**



<b>frequency</b>	<b>2450</b>
<b>Horizontal</b>	<b>2.07</b>
<b>Vertical</b>	<b>-1.20</b>
<b>E total</b>	<b>3.74</b>

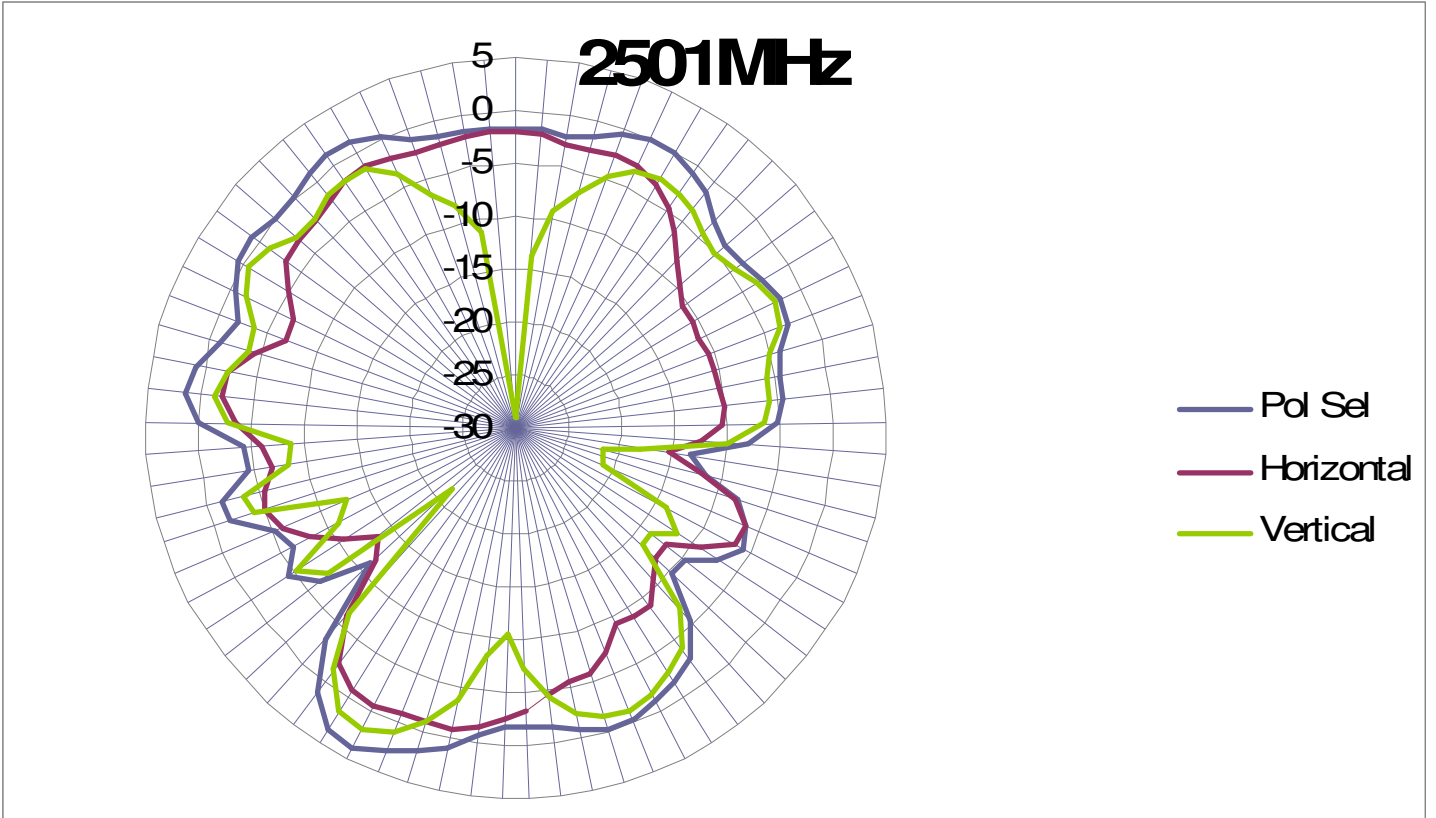


**AUX antenna: 2500 MHz**



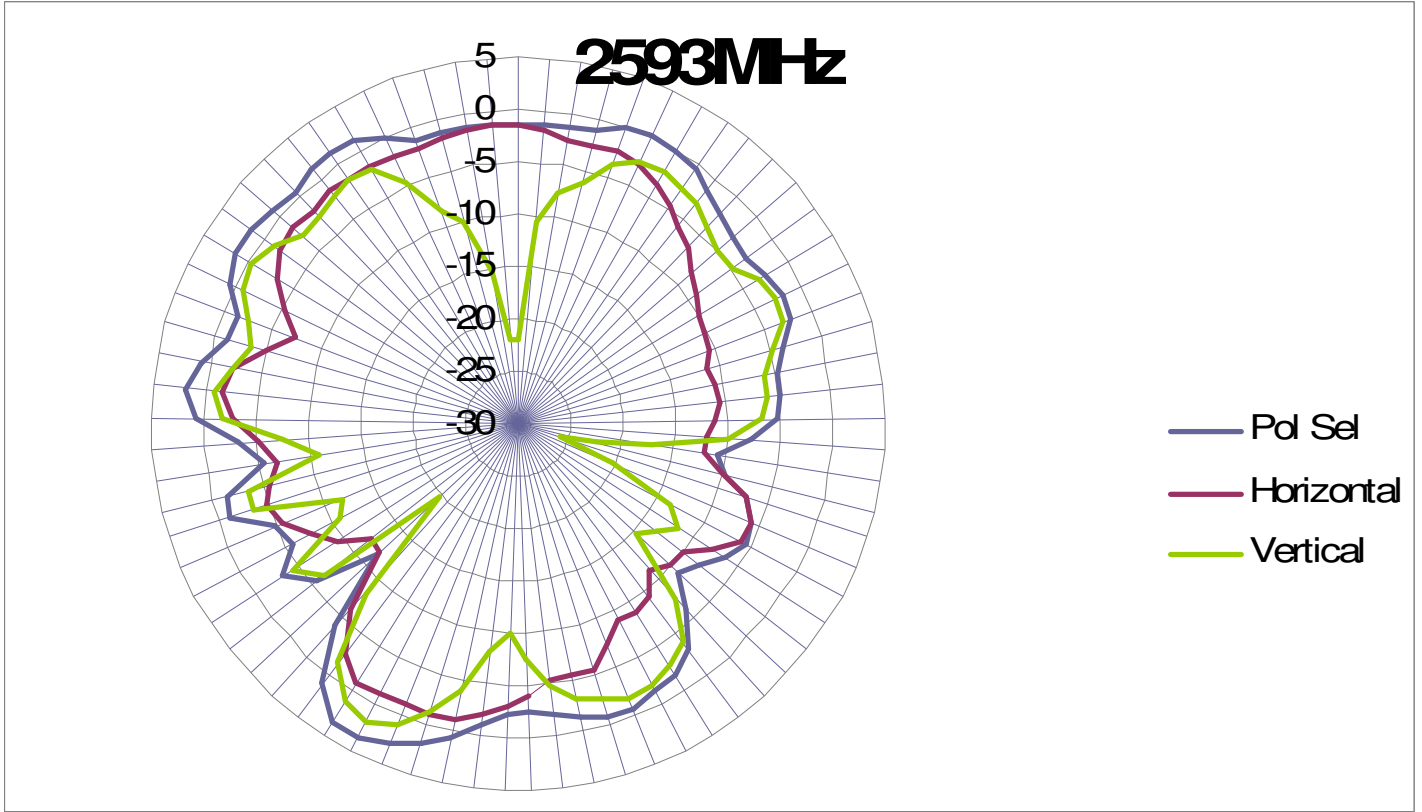
frequency	2500
Horizontal	1.95
Vertical	-1.74
E total	3.33

**AUX antenna: 2501 MHz**



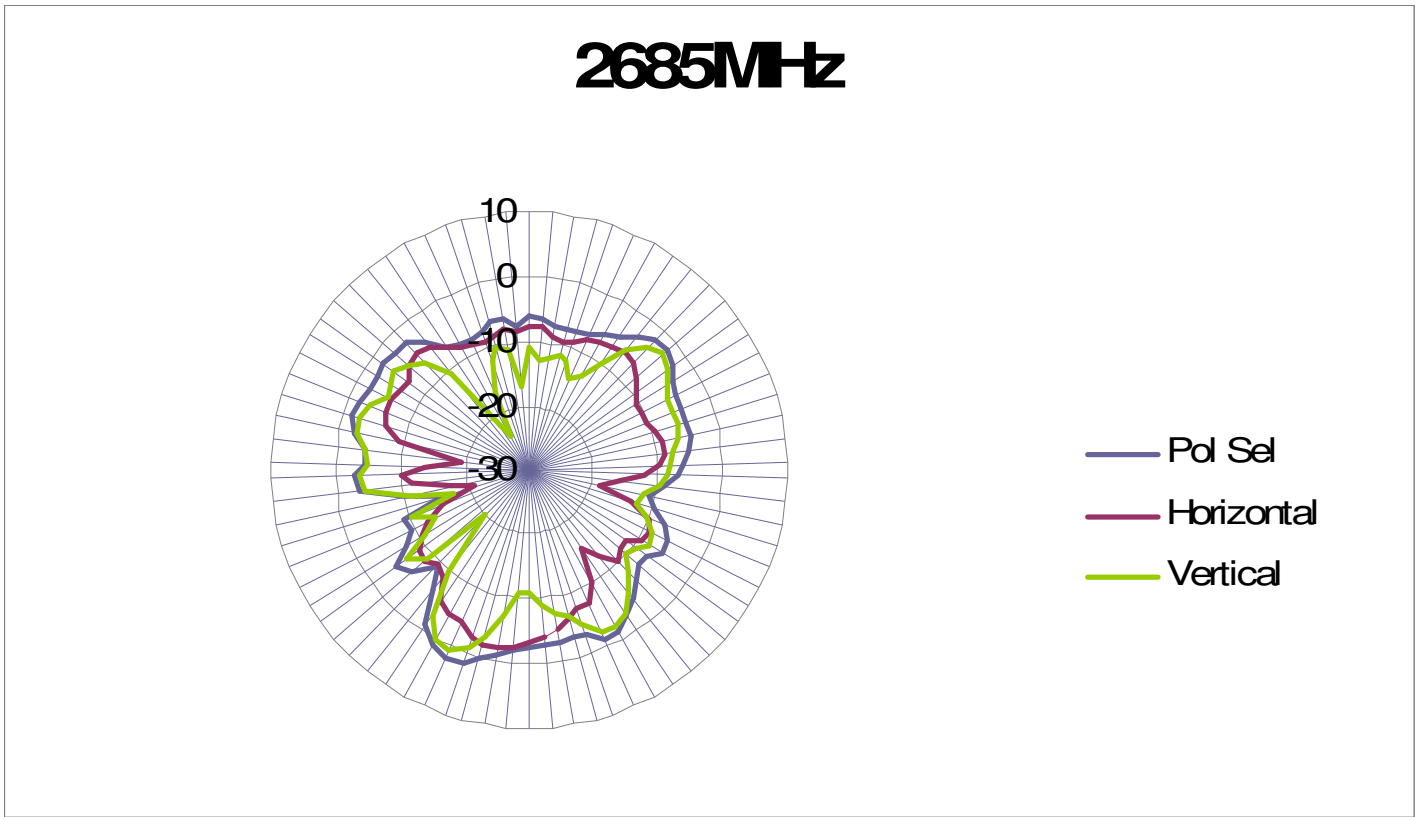
frequency	2501
Horizontal	-3.01
Vertical	-4.20
E total	-1.21

**AUX antenna: 2593 MHz**



frequency	2593
Horizontal	2.11
Vertical	-0.87
E total	3.86

**AUX antenna: 2685 MHz**

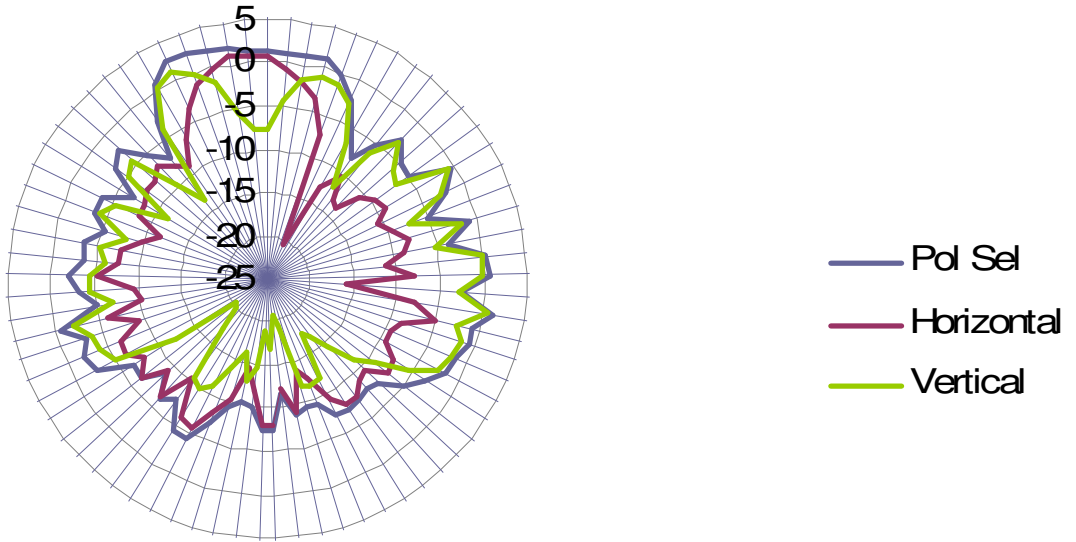


<b>frequency</b>	<b>2685</b>
<b>Horizontal</b>	<b>0.43</b>
<b>Vertical</b>	<b>-2.05</b>
<b>E total</b>	<b>1.78</b>

## 5150-5350 MHz radiation characteristic

Main antenna: 5150 MHz

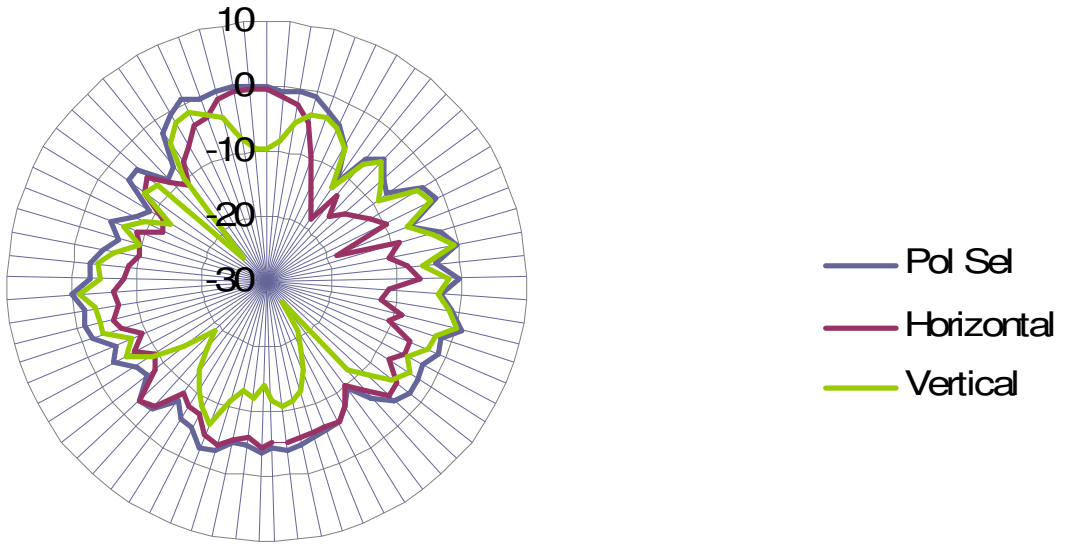
# 5150MHz



frequency	5150
Horizontal	1.13
Vertical	0.81
E total	2.47

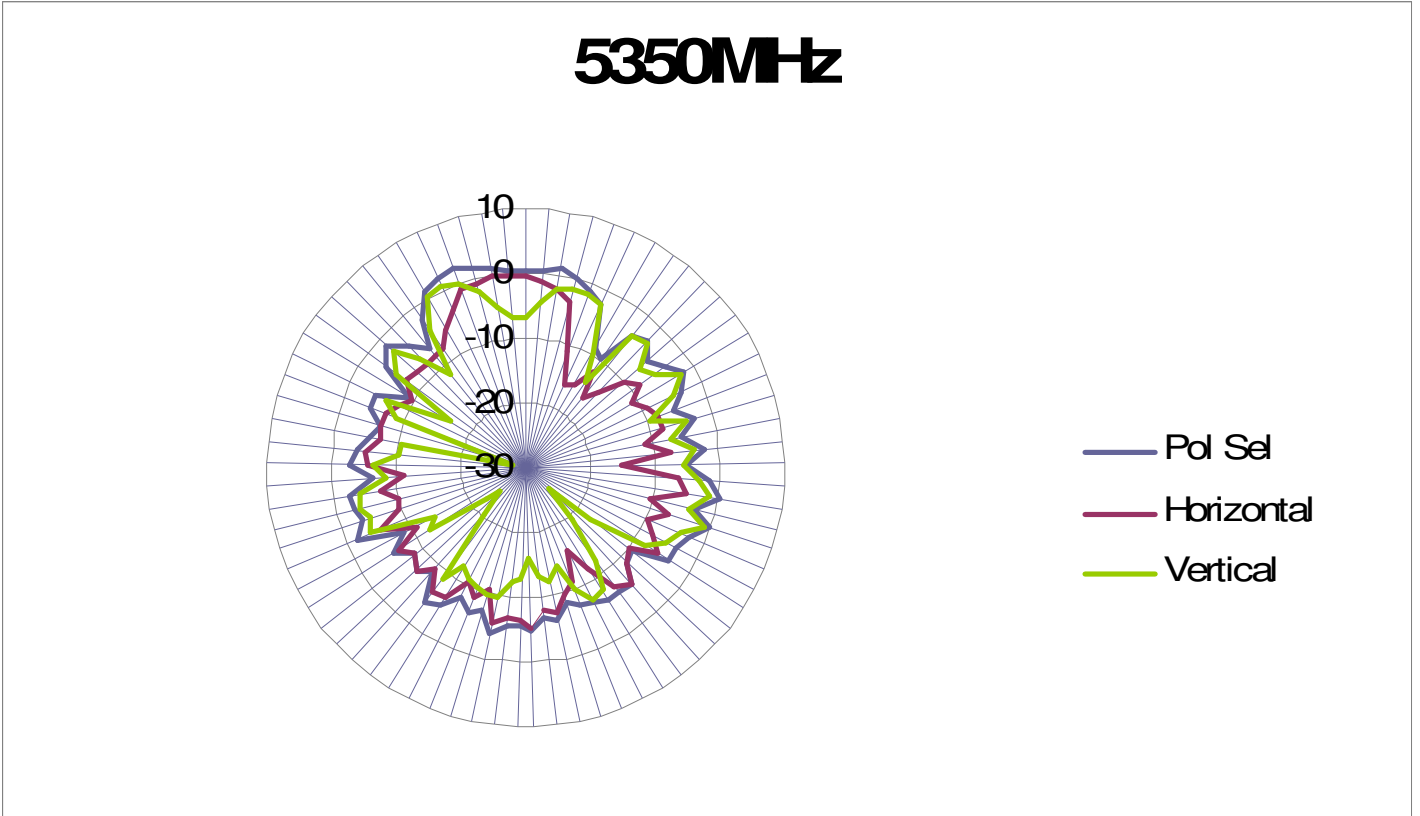
Main antenna: 5250 MHz

# 5250MHz



frequency	5250
Horizontal	0.04
Vertical	-0.50
E total	0.85

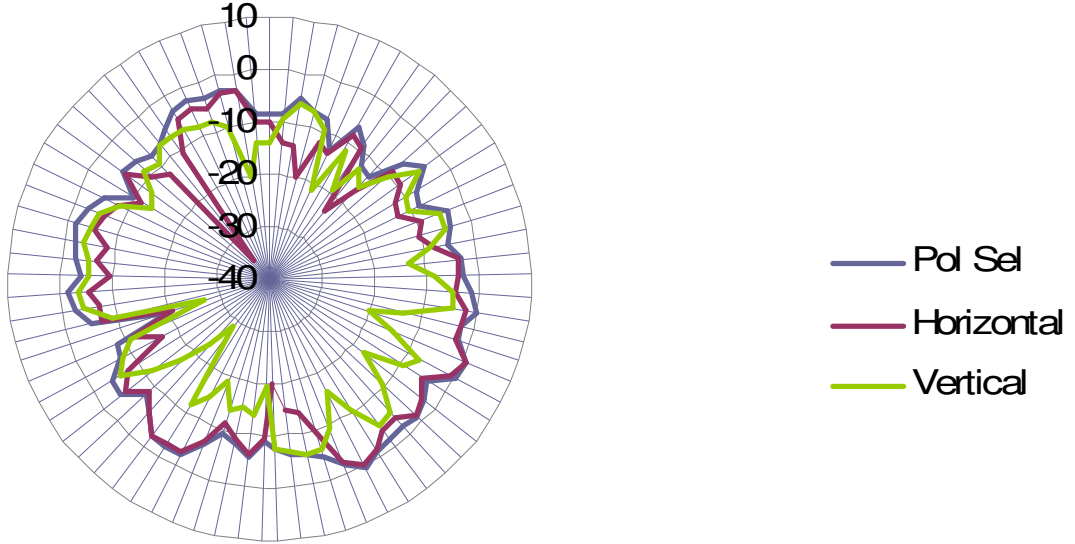
Main antenna: 5350 MHz



frequency	5350
Horizontal	0.93
Vertical	-0.17
E total	2.72

MIMO antenna: 5150 MHz

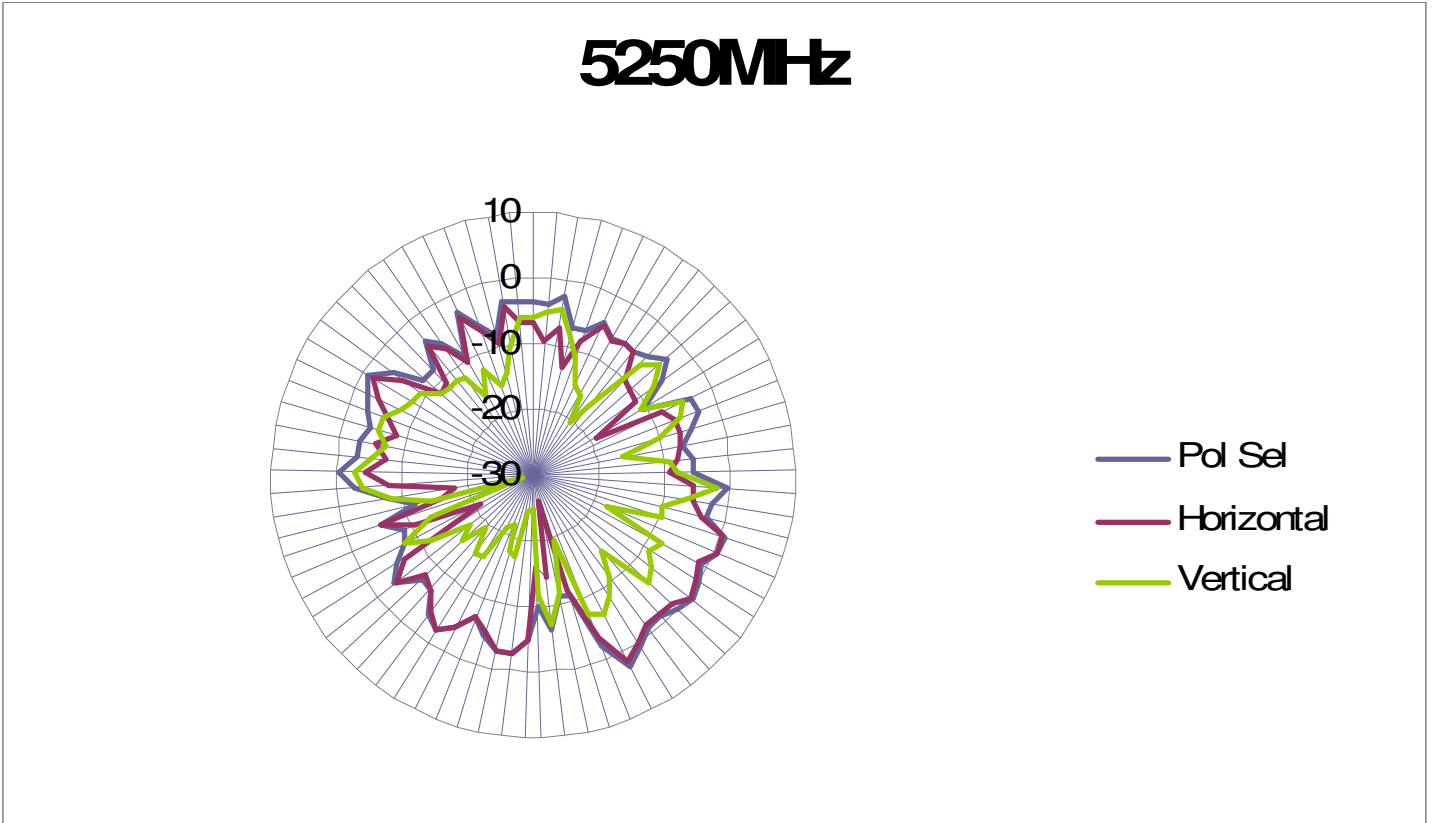
# 5150MHz



frequency	5150
Horizontal	-3.56
Vertical	0.99
E total	1.11

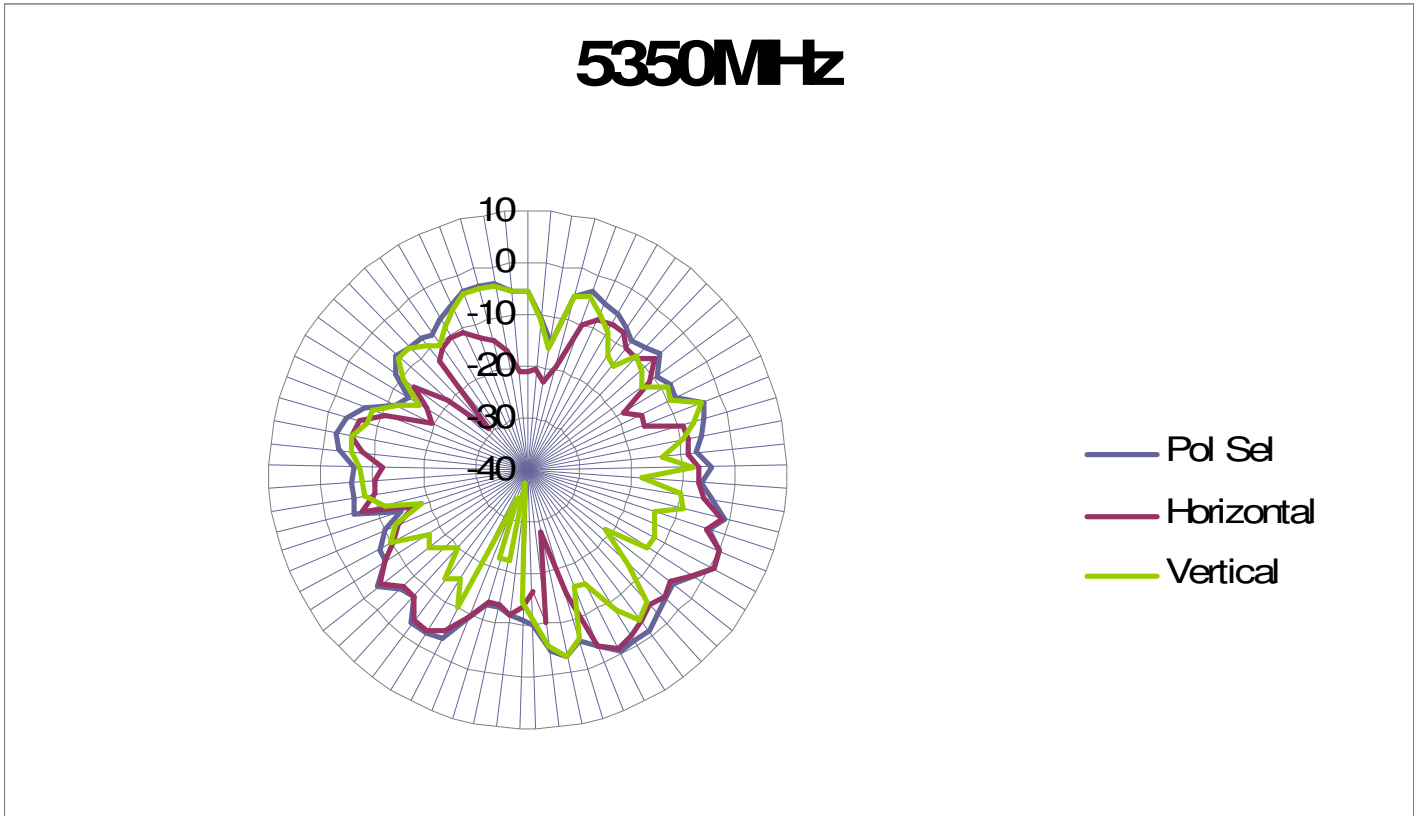


**MIMO antenna: 5250 MHz**



<b>frequency</b>	<b>5250</b>
<b>Horizontal</b>	<b>-2.16</b>
<b>Vertical</b>	<b>2.17</b>
<b>E total</b>	<b>2.74</b>

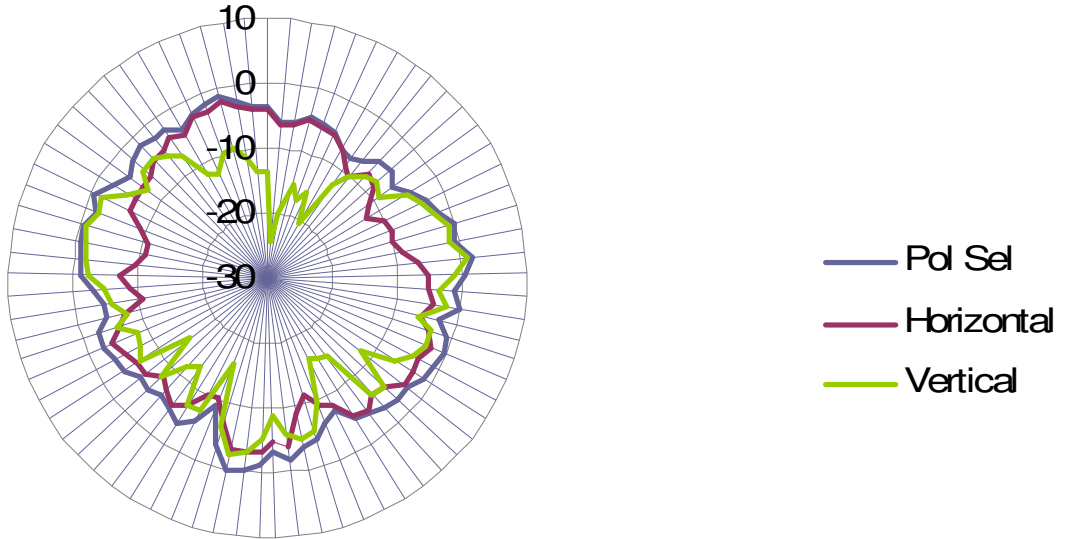
**MIMO antenna: 5350 MHz**



<b>frequency</b>	<b>5350</b>
<b>Horizontal</b>	<b>-2.94</b>
<b>Vertical</b>	<b>0.94</b>
<b>E total</b>	<b>1.15</b>

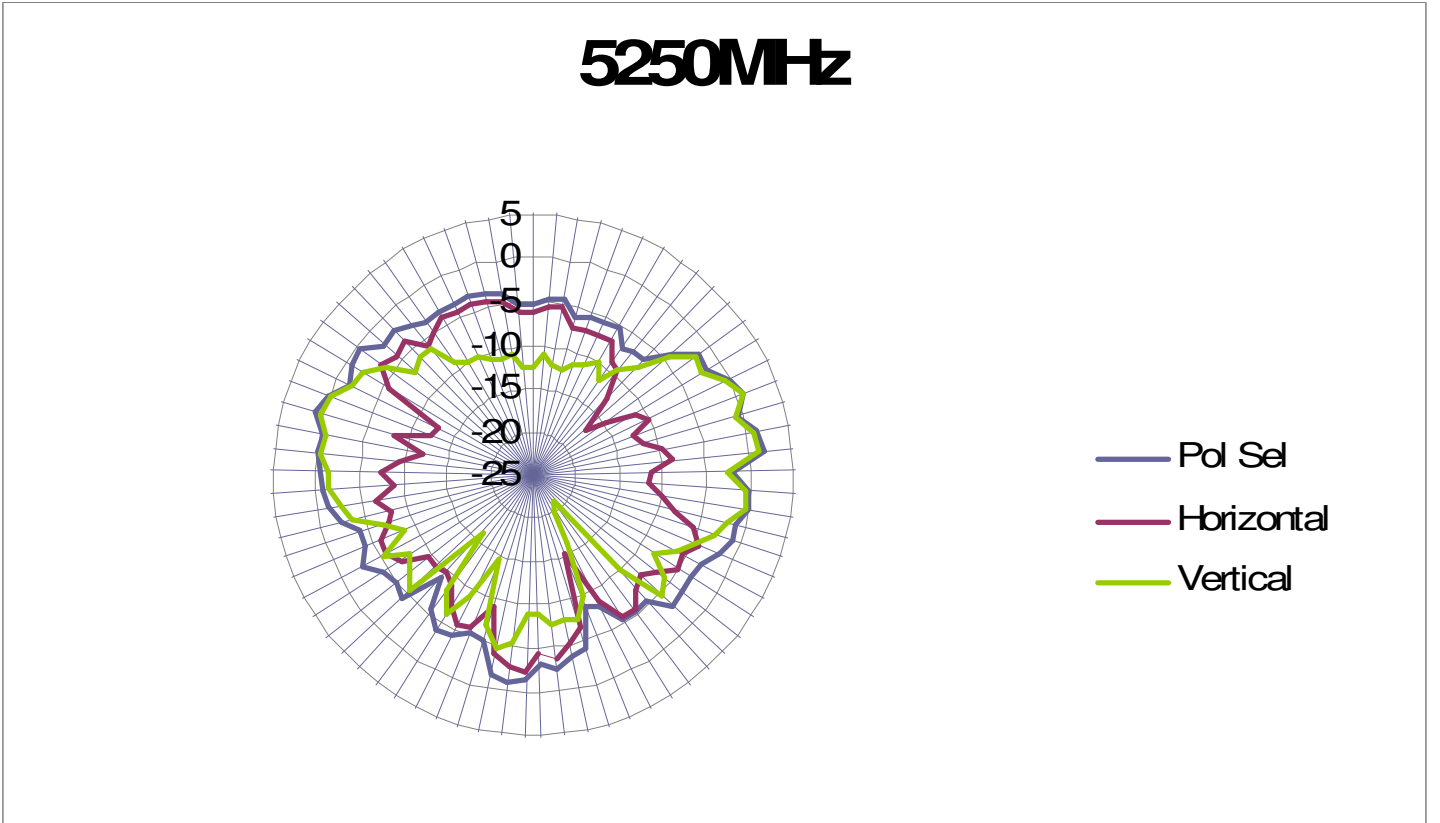
**AUX antenna: 5150 MHz**

# 5150MHz



frequency	5150
Horizontal	0.92
Vertical	-1.86
E total	1.62

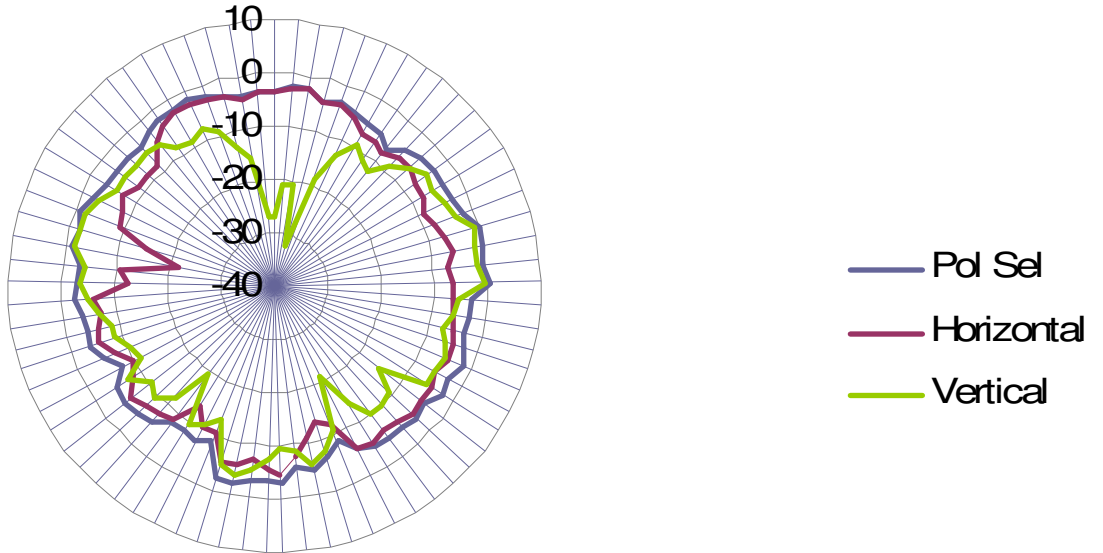
**AUX antenna: 5250 MHz**



frequency	5250
Horizontal	0.91
Vertical	-2.56
E total	1.32

**AUX antenna: 5350 MHz**

# 5350MHz

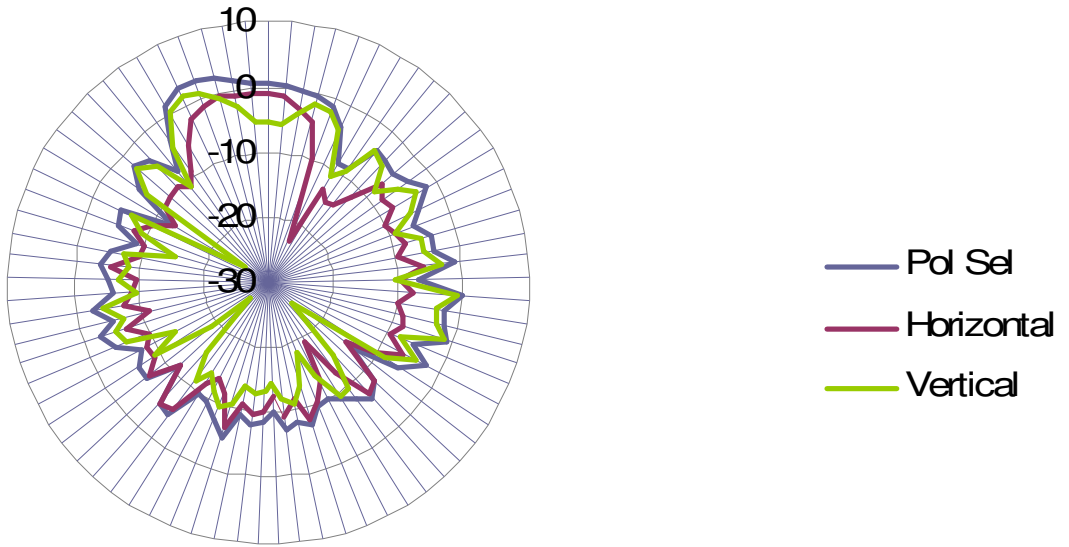


frequency	5350
Horizontal	-0.62
Vertical	-2.56
E total	0.34

**5470-5725MHz radiation characteristic**

**Main antenna: 5470MHz**

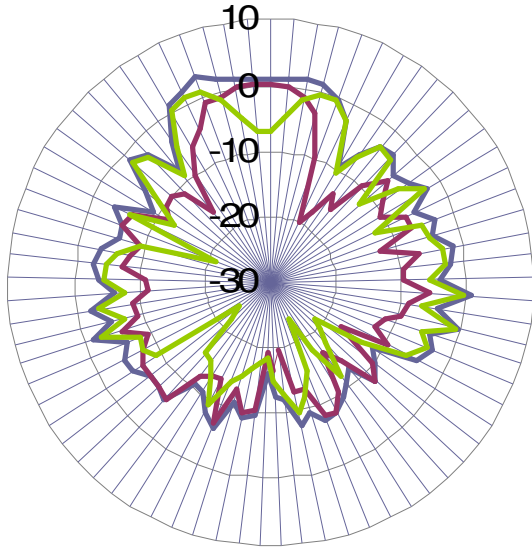
**5470MHz**



frequency	5470
Horizontal	1.30
Vertical	-0.39
E total	2.84

Main antenna: 5600 MHz

# 5600MHz

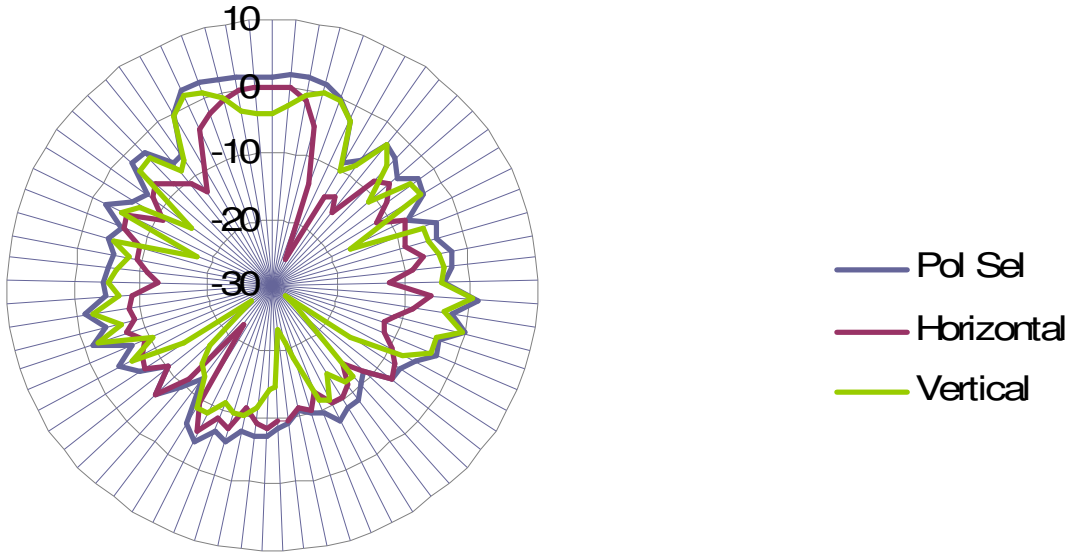


- Pd Sel
- Hbrizontal
- Vertical

frequency	5600
Horizontal	1.05
Vertical	0.20
E total	3.18

Main antenna: 5725 MHz

**5725MHz**

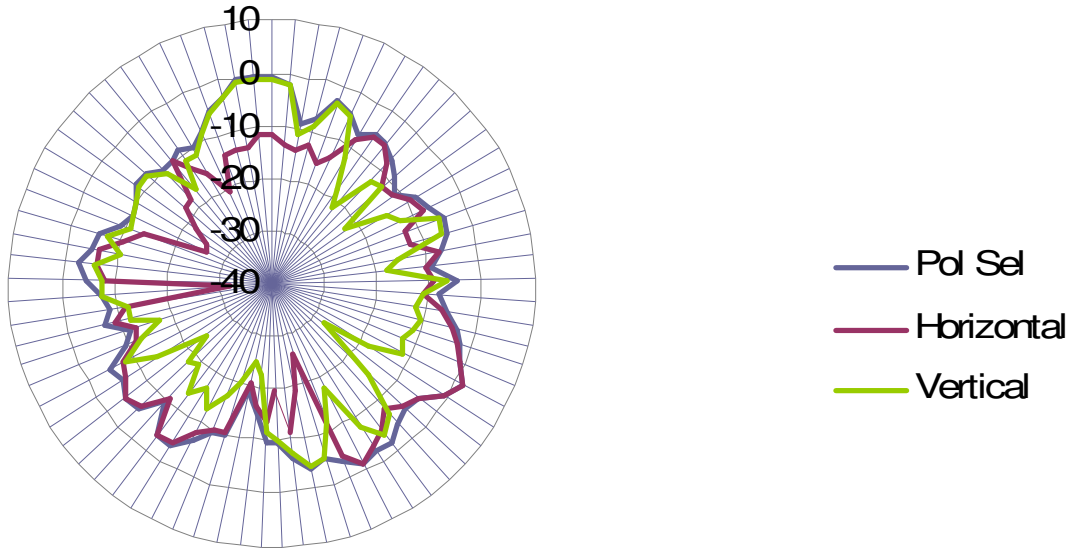


frequency	5725
Horizontal	1.49
Vertical	0.24
E total	2.62



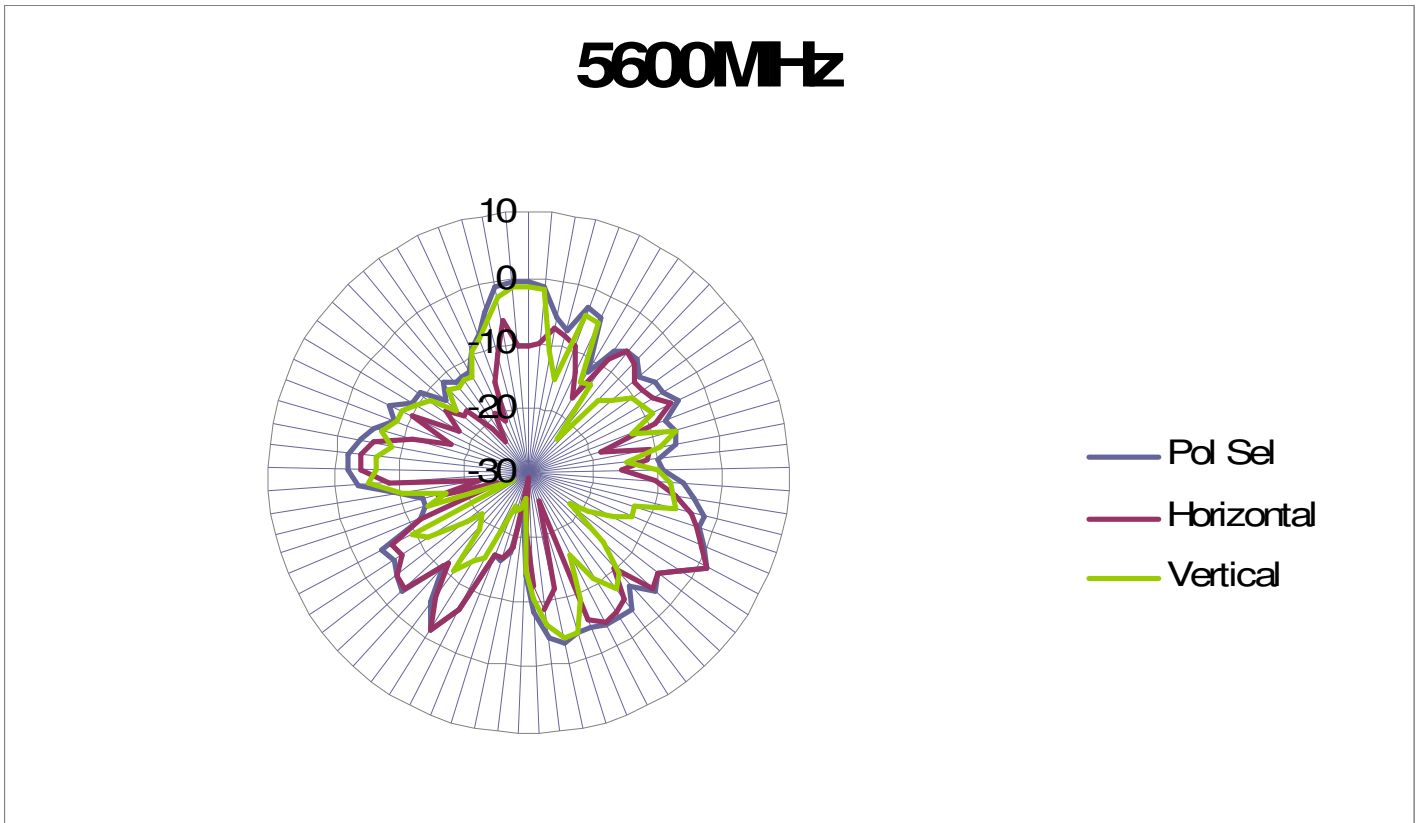
MIMO antenna: 5470MHz

# 5470MHz



frequency	5470
Horizontal	-1.26
Vertical	0.85
E total	1.07

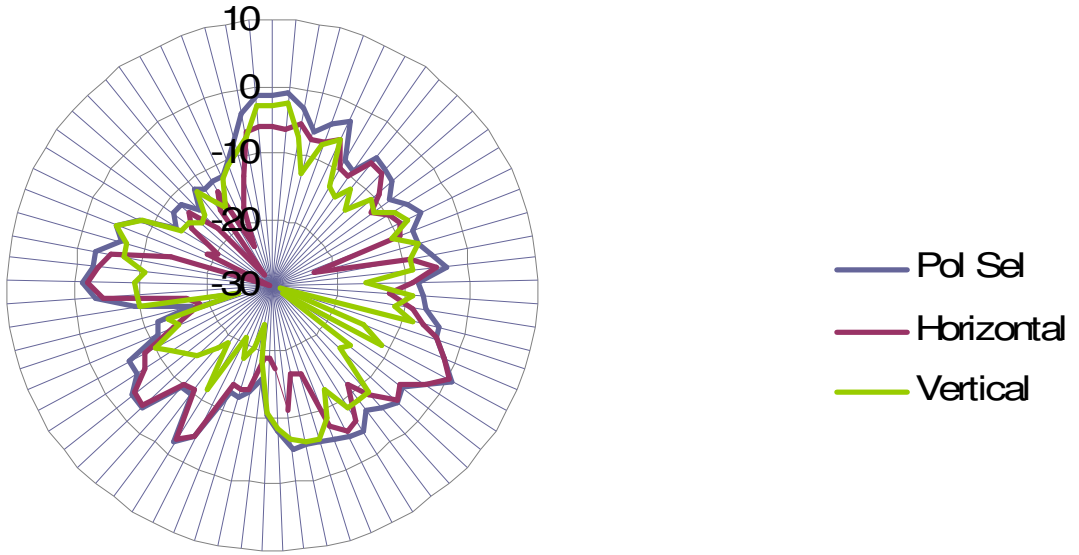
**MIMO antenna: 5600 MHz**



frequency	5600
Horizontal	-1.35
Vertical	0.72
E total	0.83

MIMO antenna: 5725 MHz

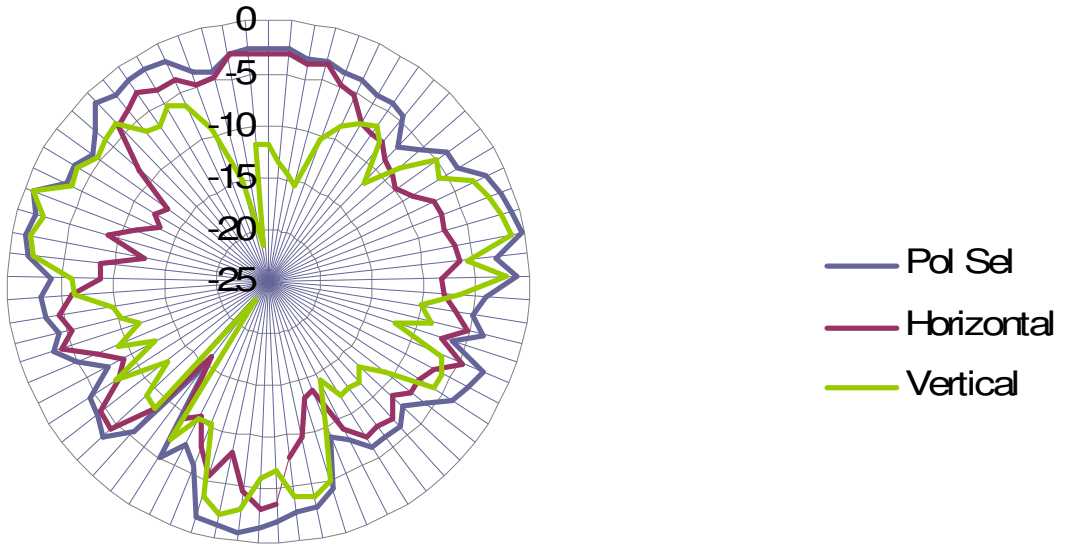
**5725MHz**



frequency	5725
Horizontal	-2.41
Vertical	0.25
E total	0.55

### Auxiliary antenna: 5470MHz

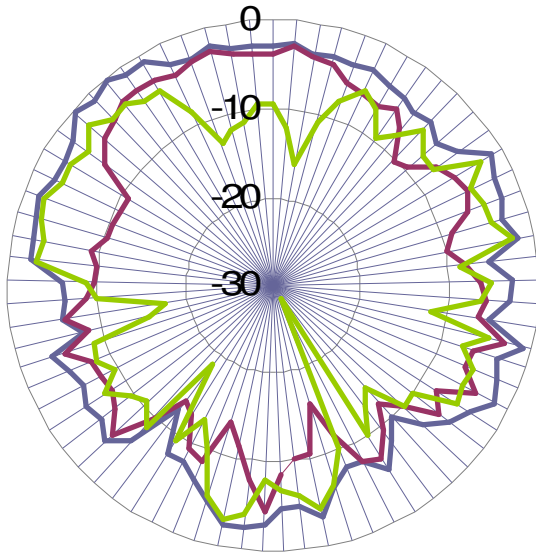
# 5470MHz



frequency	5470
Horizontal	-1.01
Vertical	-2.97
E total	-0.27

Auxiliary antenna: 5600 MHz

**5600MHz**

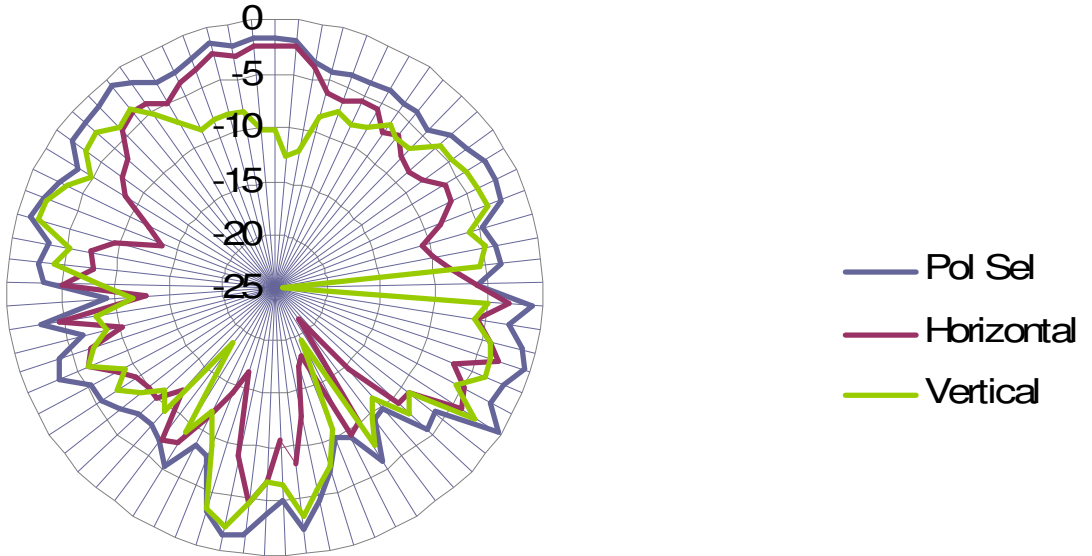


- Pol Sel
- Horizontal
- Vertical

frequency	5600
Horizontal	-2.24
Vertical	-2.57
E total	-0.34

Auxiliary antenna: 5725 MHz

**5725MHz**

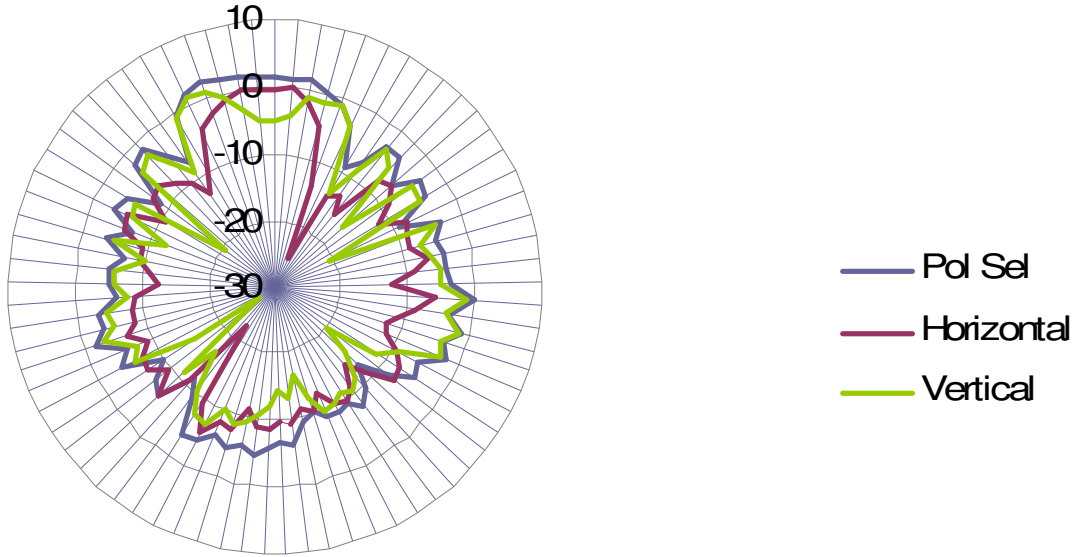


frequency	5725
Horizontal	-1.87
Vertical	-2.35
E total	-0.29

**5800-5875 MHz radiation characteristic**

**Main antenna: 5785MHz**

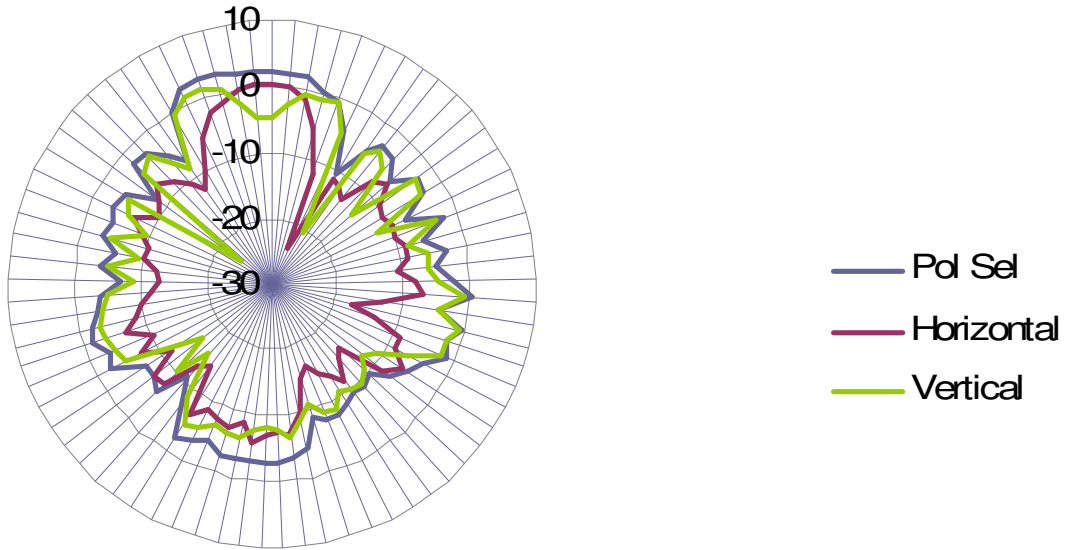
**5785MHz**



frequency	5785
Horizontal	1.20
Vertical	-0.10
E total	2.59

Main antenna: 5850MHz

# 5850MHz

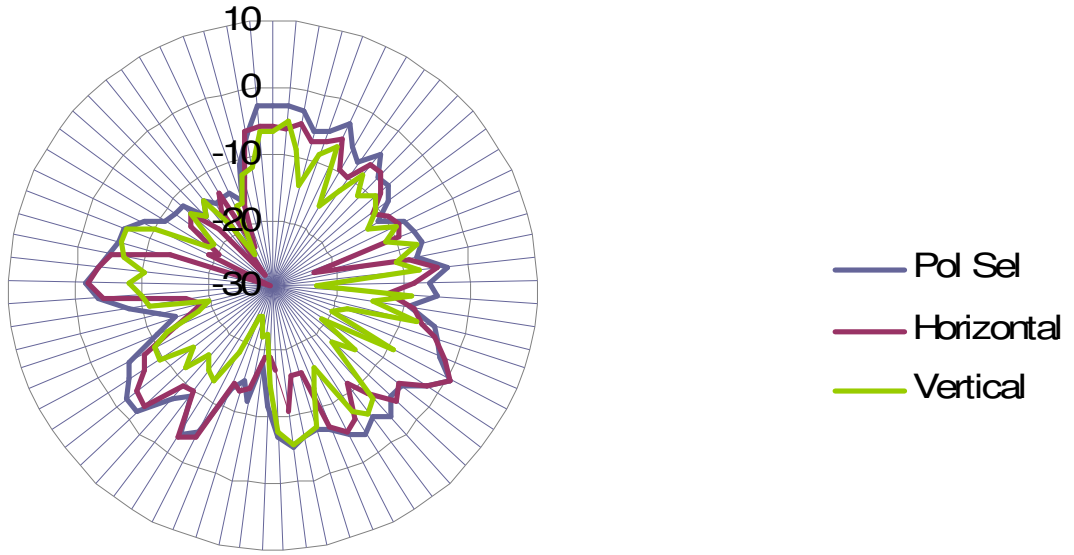


frequency	5850
Horizontal	1.57
Vertical	0.39
E total	3.05



**MIMO antenna: 5785z**

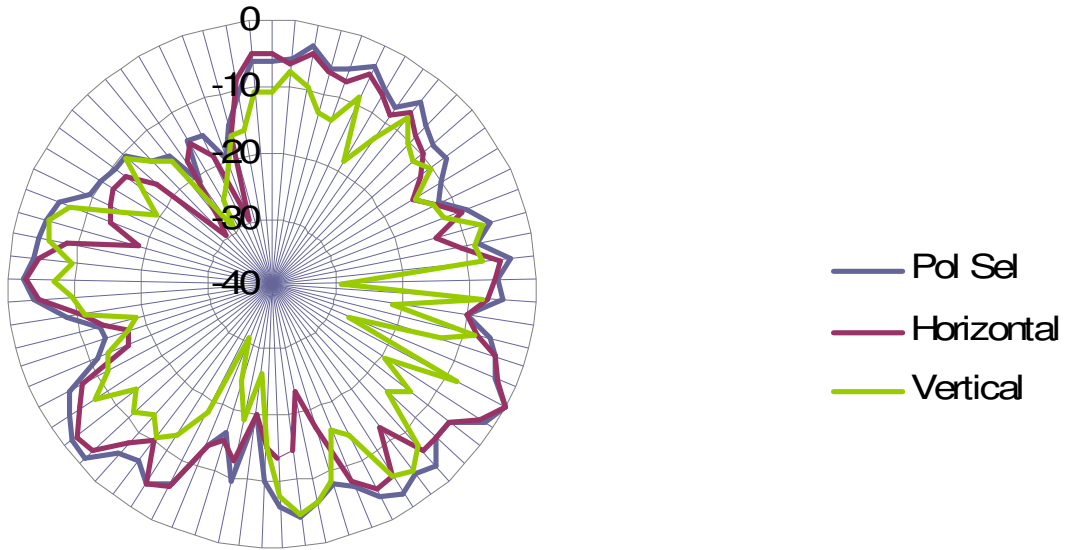
**5785MHz**



frequency	5785
Horizontal	1.57
Vertical	0.39
E total	3.05

MIMO antenna: 5850MHz

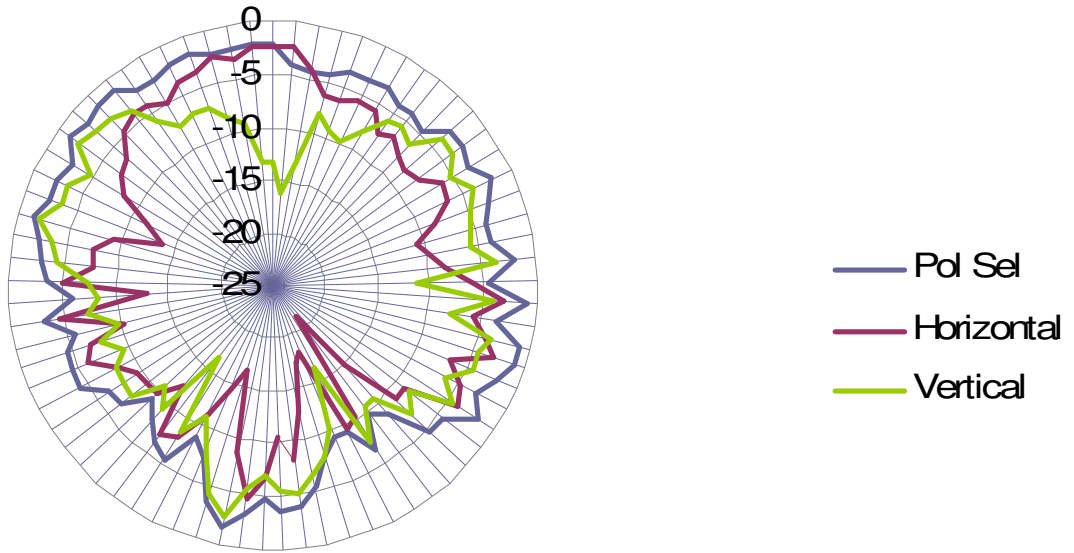
# 5850MHz



frequency	5850
Horizontal	-4.50
Vertical	-0.08
E total	-0.17

Auxiliary antenna: 5785 MHz

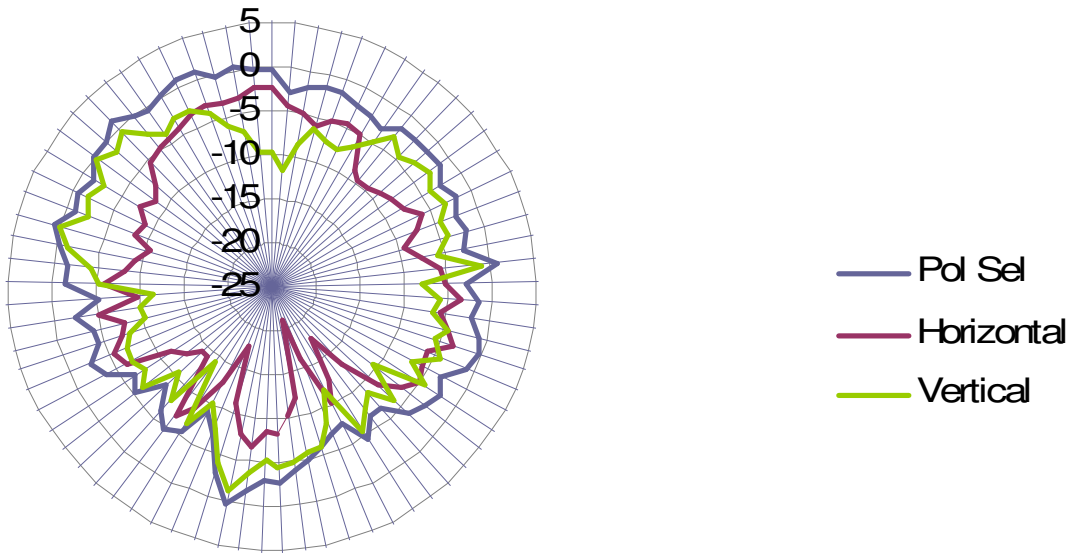
# 5785MHz



frequency	5785
Horizontal	-2.00
Vertical	-2.35
E total	-0.98

Auxiliary antenna: 5850MHz

# 5850MHz



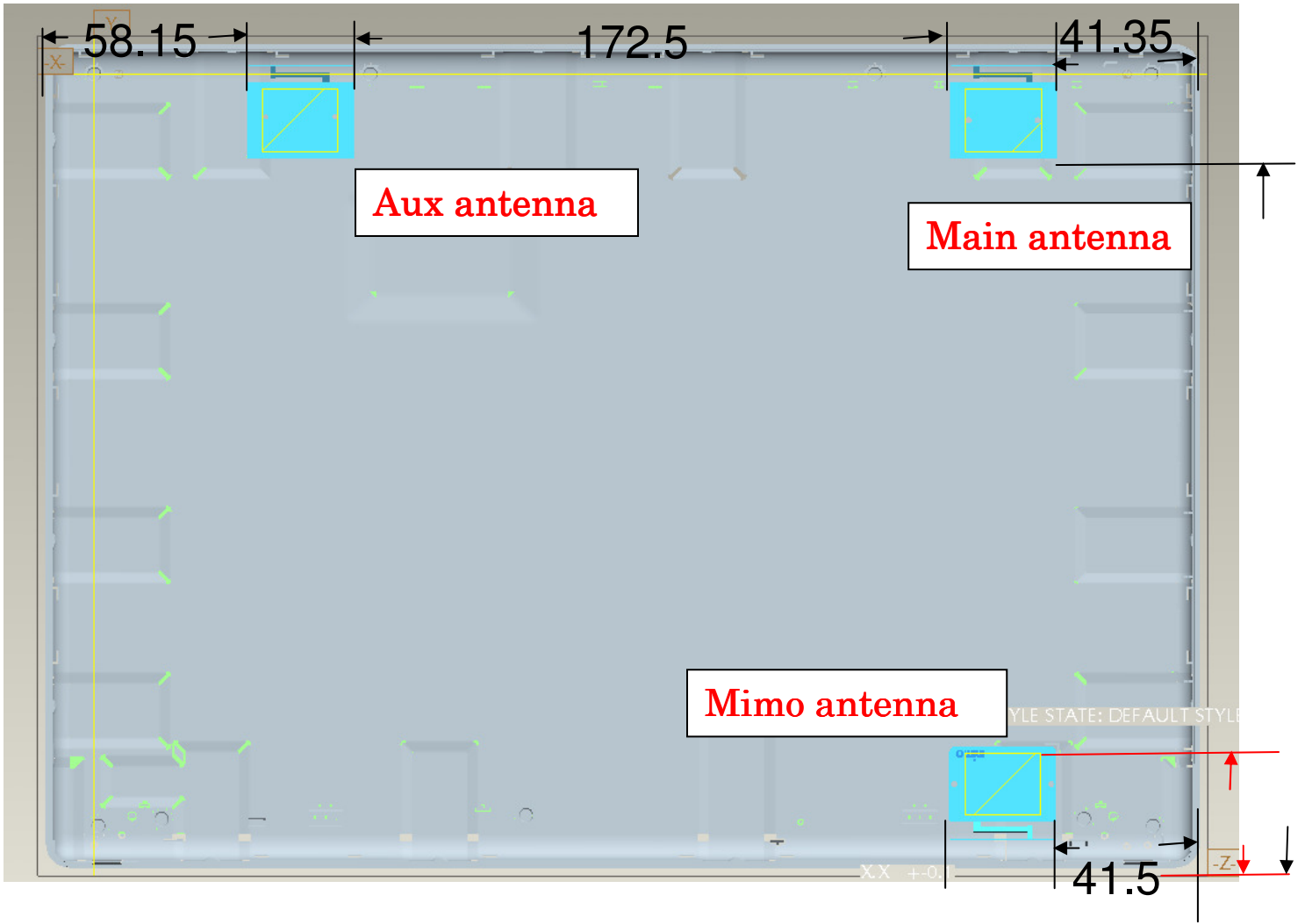
frequency	5850
Horizontal	-0.20
Vertical	-2.54
E total	1.01

## Section 4. Host Platform Information

OEM / ODM Host platform: (XXXXXXX) platform correlated to antenna data  
Rating Label Photo:

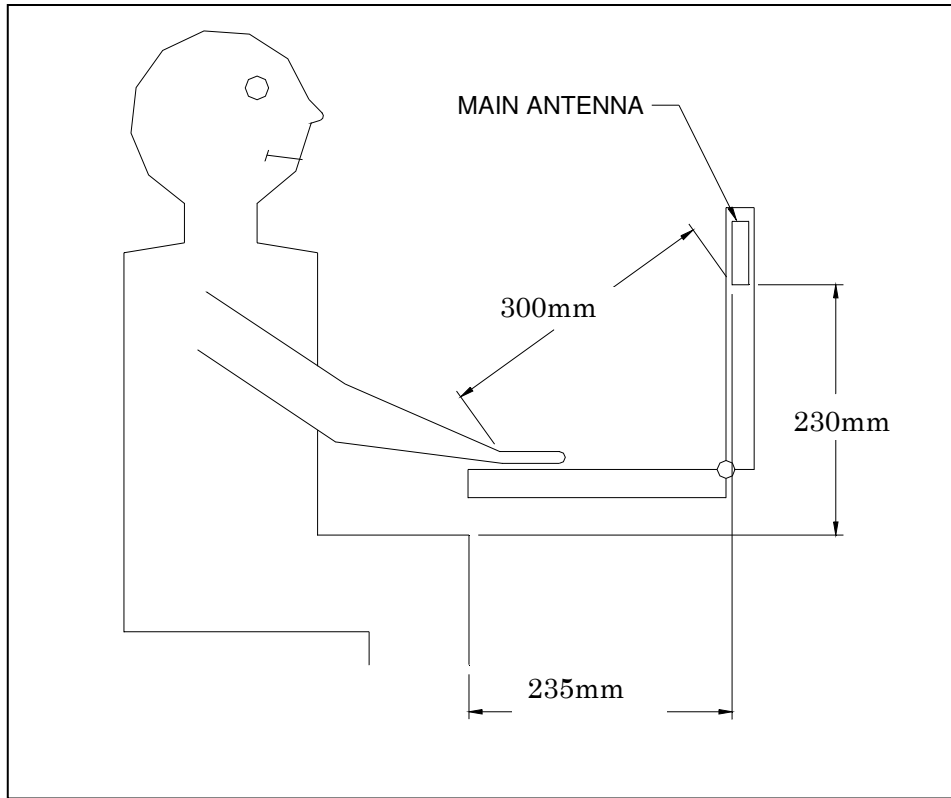
## Section 5. Antenna Host Platform Location Information

Include a dimensioned photos or dimensioned drawings of main and auxiliary antenna placements. (measurements are not required for receive-only antenna ). Any antenna that transmits must show dimensions to bottom of laptop.



## Section 6. Antenna dimensional information for SAR evaluation

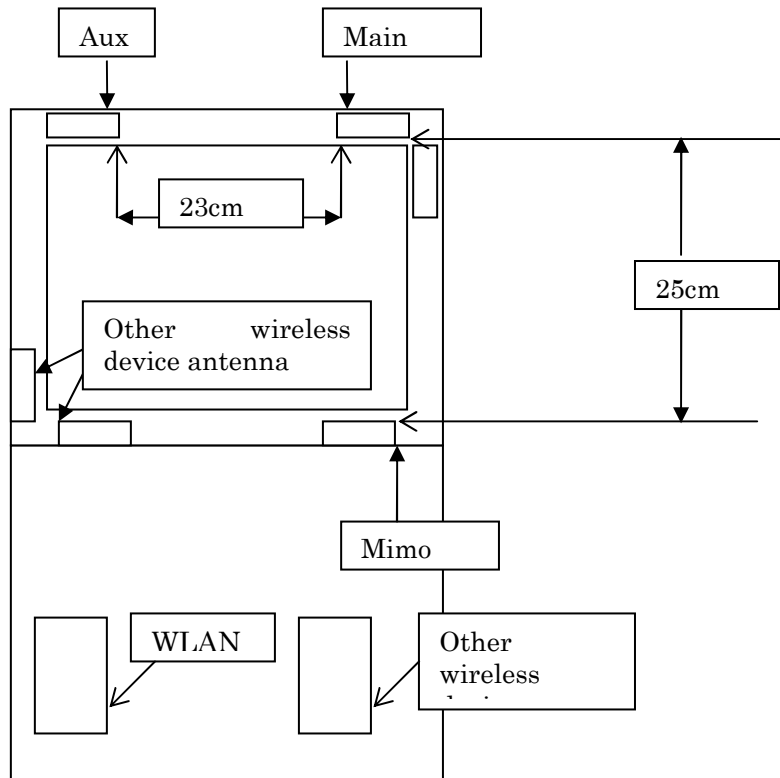
Include a dimensioned photos or dimensioned drawings showing the distance (mm) between the transmit antennas and the user (excluding hands, wrist, feet, lap/thigh, and ankle)



## 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
<b>Argentina</b>						
<b>Brazil</b>						
<b>Indonesia</b>						
<b>Israel</b>						
<b>Malaysia</b>						
<b>Mexico</b>						
<b>Singapore</b>						Telecommunication Equipment Dealer License Required
<b>South Africa</b>						
<b>USA, Canada</b>						