

WWAN Antenna Information

ThinkPad X13 Gen 6 Series

[SPEED Taiwan Corporation]

Platform	
Platform owner	Lenovo Japan LLC
Platform name	ThinkPad P16 Gen 3
Regulatory Model name (Compliance ID)	TP00167A
ODM	LCFC
Target Launch Date	
Tx Antenna	
Brand name	Speedwire
Parts Number	Main Antenna: DC330027Q10
	Auxiliary Antenna: DC330027Q10 (RX only)
	MIMO1 Antenna DC330027Q10 (RX only)
	MIMO2 Antenna DC330027Q10
Transmitter Module	
WWAN Module	Model A: Rolling RW350R-GL FCC ID:2AX2URW350RGL IC: 26644-RW350RGL
	Model B: NetPrisma LCUK54-WRD FCC ID:2BEY3LCUK54WWDA IC:32052-LCUK54WWDA
	Model C: NetPrisma LCUR57-WWD FCC ID:2BEY3LCUR57WWDC IC:32052-LCUR57WWDA
	Model D: Quectel EM05-CN FCC ID: N/A IC:N/A
	Model E: Lenovo Connect LCM720-NCN FCC ID: N/A IC:N/A

Revision history

Revision number	Date	Description
1	2025/03/25	Initial release

Section 1. Antenna Assembly Specifications

Main Antenna

Module A = FCUN69-WWD
Module B = LCUK54-WRD
Module C = LCUR57-WWD
Module D = EM05-CN
Module E = LCM720-NCN

Antenna Part Number	Manufacturer	Antenna Type	Cable Assembly Part Number and Information	Frequency (MHz)		Cable Loss (dB)	Peak Gain (including cable loss)	
							Horizontal (dBi)	Vertical (dBi)
DC330027Q10	SPEED	PIFA	1. Cable P/N:1.13LL 2. Diameter: 1.13mm 50 ohm coaxial cable 3.Cable length: 96 mm 4. Connector P/N: C87P115 or equivalent	UMTS/HSPA (UMTS 2100, Band 1) (UE-UTRA, Band 1, n1) Module:A,B,C,D,E	1920.00	0.24	-13.32	0.32
					1950.00	0.25	-10.52	-1.11
					1980.00	0.25	-8.69	-1.9
				UMTS/HSPA/EVDO (UMTS1900, Band 2) (UE-UTRA, Band 2, n2) Module:A,B,C,	1850.00	0.24	-13.66	1.57
					1880.00	0.24	-12.96	0.87
					1910.00	0.24	-12.02	0.6
				GSM/GPRS/EDGE (GSM 1800, Band 3) (UE-UTRA, Band 3, n3) Module:A,B,C,D,E	1710.00	0.23	-12.62	1.79
					1747.50	0.23	-15.29	1.45
					1785.00	0.24	-14.38	1.26
				UMTS(AWS) / HSPA (UMTS, Band 4) (UE-UTRA , Band 4) Module:A,B,C	1710.00	0.23	-12.62	1.79
					1732.50	0.23	-13.23	1.39
					1755.00	0.23	-15.88	1.45
				GSM/GPRS/EDGE (GSM 850) (UMTS850, Band 5) (UE-UTRA, Band 5, n5) Module:A,B,C,D,E	824.00	0.16	-5.67	1.28
					836.50	0.16	-4.75	1.84
					849.00	0.16	-3.41	1.48
				(UMTS, Band 6) Module:B,C	830.00	0.16	-5.23	1.52
					835.00	0.16	-4.97	1.72
					840.00	0.16	-4.33	1.96
				FCC Part 27 (UE-UTRA, Band 7, n7) Module:A,B,C	2500.00	0.28	-9.58	1.47
					2535.00	0.28	-9.7	0.93
					2570.00	0.29	-7.63	0.06
				UMTS/HSPA (UMTS 900, Band 8) (UE-UTRA, Band 8, n8) Module:A,B,C,D,E	880.00	0.16	-2.01	1.36
					897.50	0.16	-2.33	1.22
					915.00	0.17	-3.67	3
				(WCDMA, Band 9)	1844.9			
					1862.5			
					1879.9			
				(UE-UTRA , Band 12, n12) Module:A,B,C	699.00	0.15	-3.69	-0.8
					707.50	0.15	-3.37	-0.08
					716.00	0.15	-3.17	0.52
				(UE-UTRA, Band 13) Module:A,B,C	777.00	0.15	-2.28	1.23
					782.00	0.15	-2.59	1.11
					787.00	0.15	-3.44	1.77
				(UE-UTRA, Band 14) Module:A,B,C	788.00	0.15	-3.58	1.69
					793.00	0.15	-4.38	1.27
					798.00	0.16	-5.33	1.67
				(UE-UTRA, Band 17) Module :A,B,C	704.00	0.15	-3.76	-0.34
					710.00	0.15	-3.39	0.08
					716.00	0.15	-3.17	0.52
				(UE-UTRA, Band 18) Module :A,B,C	815.00	0.16	-6.33	1.21
					822.50	0.16	-5.55	1.28
					830.00	0.16	-5.23	1.52
				(UMTS, Band 19) (UE-UTRA, Band 19) Module :A,B,C	830.00	0.16	-5.23	1.52
					837.50	0.16	-4.54	1.8
					845.00	0.16	-3.75	1.26

Antenna Part Number	Manufacturer	Antenna Type	Cable Assembly Part Number and Information	Frequency (MHz)		Cable Loss (dB)	Peak Gain (including cable loss)	
							Horizontal (dBi)	Vertical (dBi)
				(UE-UTRA, Band 20, n20) Module :A,B,C	832.00	0.16	-4.99	1.58
					847.00	0.16	-3.64	1.39
					862.00	0.16	-2.45	1.05
				(UE-UTRA, Band 25, n25) Module:A,B,C	1850.00	0.24	-13.66	1.57
					1882.50	0.24	-12.65	0.86
					1915.00	0.24	-13.31	0.46
				(UE-UTRA, Band 26) Module:A,B,C (CDMA2000 BC0) Module:D	814.00	0.16	-6.17	1.22
					831.50	0.16	-5.18	1.52
					849.00	0.16	-3.41	1.48
				(UE-UTRA, Band 28, n28) Module:A,B,C	703.00	0.15	-3.68	-0.44
					725.50	0.15	-2.94	1.18
					748.00	0.15	-1.92	1.06
				(UE-UTRA, Band 29) * Down link only Module:A,B,C	717.00	0.15	-3.19	0.6
					722.50	0.15	-3.04	0.97
					728.00	0.15	-2.62	1.38
				(UE-UTRA, Band 30, n30) Module:A,B,C	2305.00	0.27	-9.23	0.22
					2310.00	0.27	-7.78	0.19
					2315.00	0.27	-8.63	0.12
				(LTE, Band 32) * Down link only Module:A,B,C	1452.00	0.21	-11.74	0.84
					1474.00	0.21	-10.93	0.25
					1496.00	0.22	-10.81	-0.24
				(LTE Band 34) Module:A,B,D,E	2010.00	0.25	-8.1	-2.31
					2017.50	0.25	-8.84	-2.01
					2025.00	0.25	-7.99	-1.52
				(UE-UTRA, Band 38, n38) Module:A,B,C,D,E	2570.00	0.29	-7.63	0.06
					2595.00	0.29	-8.84	-0.44
					2620.00	0.29	-7.36	-1.29
				(TD-SCDMA, Band 39) Module:A,B,C,D,E	1880.00	0.24	-12.96	0.87
					1900.00	0.24	-12.84	0.75
					1920.00	0.24	-13.32	0.32
				(UE-UTRA, Band 40, n40) Module:A,B,C,D,E	2300.00	0.27	-8.21	1.24
					2350.00	0.27	-11.36	1.51
					2400.00	0.28	-11.98	1.84
				(UE-UTRA, Band 41, n41) Module:A,B,C,D,E	2496.00	0.28	-8.28	1.54
					2593.00	0.29	-8.06	-0.49
					2690.00	0.3	-6.68	-2.66
				(LTE Band 42) Module:A,C	3400.00	0.33	-5.62	0.56
					3500.00	0.34	-4.72	0.13
					3600.00	0.34	-4.86	0.02
				(LTE Band 43) Module:A,C	3600.00	0.34	-4.86	0.02
					3700.00	0.34	-4.41	-0.73
					3800.00	0.35	-5.88	-2.51
				(LTE Band 46) TD Unlicensed, LAA RCV only Module:A,C	5150.00	0.41	-5.98	-2.49
					5537.00	0.43	-5.37	-5.35
					5925.00	0.45	-5.22	-5.66
				(LTE Band 48, n48) Module:A,C	3550.00	0.34	-4.81	-0.95
					3625.00	0.34	-3.94	0.31
					3700.00	0.34	-4.41	-0.73
				(LTE, Band 66, n66) Module:A,B,C	1710.00	0.23	-12.62	1.79
					1745.00	0.23	-14.69	1.5
					1780.00	0.23	-14.73	1.15
				(LTE Band 71, n71) Module:A,B	663.00	0.14	-7.41	-3.42
					680.50	0.14	-5.49	-2.3
					698.00	0.15	-3.93	-0.99
				(5G NR Band 75)	1432.0	0.21	-10.43	1

Antenna Part Number	Manufacturer	Antenna Type	Cable Assembly Part Number and Information	Frequency (MHz)		Cable Loss (dB)	Peak Gain (including cable loss)	
							Horizontal (dBi)	Vertical (dBi)
				RCV only Module:A	1474.5	0.21	-11.16	0.21
					1517.0	0.22	-11.24	-0.03
				(5G NR Band 76) RCV only Module:A	1427	0.21	-10.47	0.96
					1429.5	0.21	-10.14	0.99
					1432	0.21	-10.43	1
				(5G NR Band 77) Module:A	3300.00	0.33	-7.26	0.75
					3750.00	0.35	-6.3	-1.63
					4200.00	0.36	-3.34	-4.55
				(5G NR Band 78) Module:A	3300.00	0.33	-7.26	0.75
					3550.00	0.34	-4.81	-0.95
					3800.00	0.35	-5.88	-2.51
				(5G NR Band 79) Module:A	4400.00	0.37	-5.37	-1.83
					4700.00	0.39	-5.43	-0.18
					5000.00	0.4	-4.99	-4
				5G NR mmWave n257	26500			
					28000			
					29500			
				5G NR mmWave n258	24250			
					25875			
					27500			
				5G NR mmWave n260	37000			
					38500			
					40000			
				5G NR mmWave n261	27500			
					27925			
					28350			
				Japan (UE-UTRA, Band 21)	1477.90			
					1455.40			
					1462.90			
				Japan J-CDMA	815.00			
					824.70			
					836.52			
					848.31			
					870.00			
					880.20			
					897.60			
					914.80			
					925.00			
				Japan J-CDMA	940.00			
					1922.40			
					1950.00			
					1977.60			

Auxiliary Antenna

Antenna Part Number	Manufacturer	Antenna Type	Cable Assembly Part Number and Information	Frequency (MHz)		Cable Loss (dB)	Peak Gain (including cable loss)	
							Horizontal (dBi)	Vertical (dBi)
DC330027Q10	SPEED	PIFA	1. Cable P/N: 1.13LL 2. Diameter: 1.13mm 50 ohm coaxial cable 3. Cable length: 98.5 mm 4. Connector P/N: C87P115 or equivalent	LTE Band 20, 5G n20 Module:A	832	0.15	-8.19	0.41
					847	0.15	-7.74	0.73
					862	0.16	-6.94	0.93
DC330027Q10	SPEED	PIFA	1. Cable P/N: 1.13LL 2. Diameter: 1.13mm 50 ohm coaxial cable 3. Cable length: 98.5 mm 4. Connector P/N: C87P115 or					

Antenna Part Number	Manufacturer	Antenna Type	Cable Assembly Part Number and Information	Frequency (MHz)	Cable Loss (dB)	Peak Gain (including cable loss)	
						Horizontal (dBi)	Vertical (dBi)
			equivalent				

MIMO Antenna

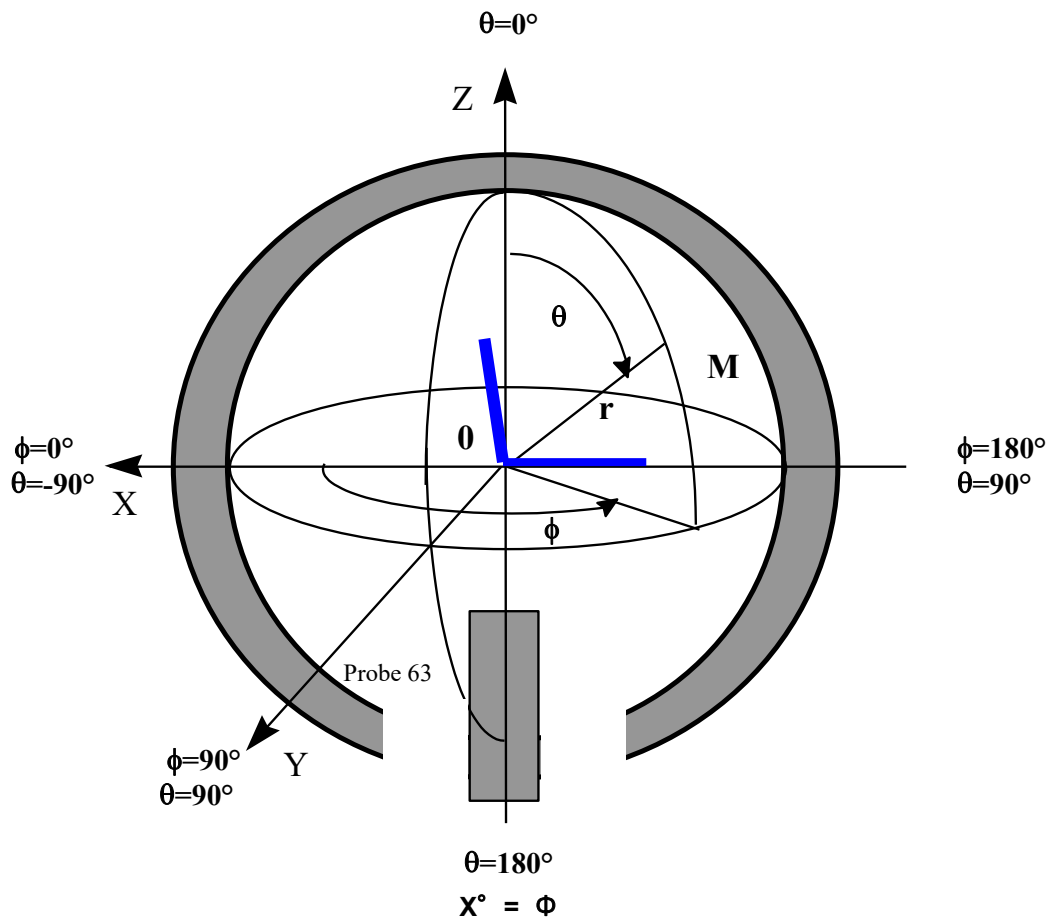
Antenna Part Number	Manufacturer	Antenna Type	Cable Assembly Part Number and Information	Frequency (MHz)		Cable Loss (dB)	Peak Gain (including cable loss)	
							Horizontal (dBi)	Vertical (dBi)
DC330027Q10	SPEED	PIFA	1. Cable P/N:1.13LL 2. Diameter: 1.13mm 50 ohm coaxial cable 3. Cable length: 97.5 mm 4. Connector P/N: C87P115 or equivalent	UMTS/HSPA (UMTS 2100, Band 1) (UE-UTRA, Band 1, n1) Module:A,B,C	1920.00	0.25	-12.11	0.92
					1950.00	0.25	-13.67	0.99
					1980.00	0.25	-12.27	1
				GSM/GPRS/EDGE (GSM 1900) UMTS/HSPA/EVDO (UMTS1900, Band 2) (UE-UTRA, Band 2, n2) Module:A,B,C	1850.00	0.24	-15.09	0.93
					1880.00	0.25	-14.52	0.96
					1910.00	0.25	-11.78	0.74
				GSM/GPRS/EDGE (GSM 1800, Band 3) (UE-UTRA, Band 3, n3) Module:A,B,C	1710.00	0.23	-11.44	0.77
					1747.50	0.24	-7.73	0.86
					1785.00	0.24	-9.63	0.71
				UMTS(AWS) / HSPA (UMTS, Band 4) (UE-UTRA, Band 4) Module:A,B,C	1710.00	0.23	-11.44	0.77
					1732.50	0.24	-9.21	0.8
					1755.00	0.24	-7.94	0.9
				GSM/GPRS/EDGE (GSM 850) (UMTS850, Band 5) (UE-UTRA, Band 5, n5) Module:A,B,C,D	824.00			
					836.50			
					849.00			
				(UMTS, Band 6) Module:B,C	830.00			
					835.00			
					840.00			
				(UE-UTRA, Band 7, n7) Module:A,B,C	2500.00	0.29	-10.11	0.91
					2535.00	0.29	-8.39	0.86
					2570.00	0.29	-9.26	0.96
				UMTS/HSPA (UMTS 900, Band 8) (UE-UTRA, Band 8, n8) Module:A,B,C,D	880.00			
					897.50			
					915.00			
				(WCDMA, Band 9)	1844.9			
					1862.5			
					1879.9			
				(UE-UTRA, Band 12, n12) Module:A,B,C	699.00			
					707.50			
					716.00			
				(UE-UTRA, Band 13) Module:A,B,C	777.00			
					782.00			
					787.00			
				(UE-UTRA, Band 14) Module:A,B,C	788.00			
					793.00			
					798.00			
				(UE-UTRA, Band 17) Module:A,B,C	704.00			
					710.00			
					716.00			
				(UE-UTRA, Band 18) Module:A,B,C	815.00			
					822.50			
					830.00			
				(UMTS, Band 19) (UE-UTRA, Band 19) Module:A,B,C	830.00			
					837.50			
					845.00			
				(UE-UTRA, Band 20, n20)	832.00			
					847.00			

Antenna Part Number	Manufacturer	Antenna Type	Cable Assembly Part Number and Information	Frequency (MHz)	Cable Loss (dB)	Peak Gain (including cable loss)	
						Horizontal (dBi)	Vertical (dBi)
				Module:A,B,C	862.00		
				(UE-UTRA, Band 25, n25) Module:A,B,C	1850.00	0.24	-15.09
					1882.50	0.25	-13.43
					1915.00	0.25	-12.01
				(UE-UTRA, Band 26) Module:A,B,C	814.00		
					831.50		
					849.00		
				(UE-UTRA, Band 28, n28) Module:A,B,C	763.00		
					725.50		
					748.00		
				(UE-UTRA, Band 29) * Down link only Module:A,B,C	717.00		
					722.50		
					728.00		
				(UE-UTRA, Band 30, n30) Module:A,B,C	2305.00	0.27	-8.05
					2310.00	0.27	-8.43
					2315.00	0.27	-9.76
				(LTE, Band 32) * Down link only Module:A,B,C	1452.00	0.22	-10.59
					1474.00	0.22	-11.32
					1496.00	0.22	-12.69
				(LTE Band 34) Module:A,B	2010.00	0.25	-10.24
					2017.50	0.25	-9.46
					2025.00	0.26	-9.02
				(UE-UTRA, Band 38, n38) Module:A,B,C	2570.00	0.29	-9.26
					2595.00	0.29	-8.48
					2620.00	0.29	-8.33
				(TD-SCDMA, Band 39) Module:A,B,C	1880.00	0.25	-14.52
					1900.00	0.25	-12.61
					1920.00	0.25	-12.11
				(UE-UTRA, Band 40, n40) Module:A,B,C	2300.00	0.27	-7.43
					2350.00	0.28	-10.75
					2400.00	0.28	-10.87
				(UE-UTRA, Band 41, n41) Module:A,B,C	2496.00	0.29	-9.91
					2593.00	0.29	-9.52
					2690.00	0.3	-7.75
				(LTE Band 42) Module:A,C	3400.00	0.34	-5.77
					3500.00	0.34	-4.14
					3600.00	0.35	-8.49
				(LTE Band 43) Module:A,C	3600.00	0.35	-8.49
					3700.00	0.35	-6.38
					3800.00	0.35	-7.26
				(LTE Band 46) TD Unlicensed, LAA RCV only Module:A,C	5150.00	0.42	-8.39
					5537.00	0.44	-7.65
					5925.00	0.45	-3.41
				(LTE Band 48, n48) Module:A,C	3550.00	0.34	-7.14
					3625.00	0.35	-7.54
					3700.00	0.35	-6.38
				(LTE, Band 66, n66) Module:A,B,C	1710.00	0.23	-11.44
					1745.00	0.24	-7.83
					1780.00	0.24	-8.54
				(LTE Band 71, n71) Module:A,B	663.00		
					680.50		
					698.00		
				(5G NR Band 77) Module:A	3300.00	0.33	-4.94
					3750.00	0.35	-6.22
					4200.00	0.37	-2.61

Antenna Part Number	Manufacturer	Antenna Type	Cable Assembly Part Number and Information	Frequency (MHz)		Cable Loss (dB)	Peak Gain (including cable loss)	
							Horizontal (dBi)	Vertical (dBi)
				(5G NR Band 78) Module:A	3300.00	0.33	-4.94	0.99
					3550.00	0.34	-7.14	-1.66
					3800.00	0.35	-7.26	-1.83
				(5G NR Band 79) Module:A	4400.00	0.38	-3.32	-1.19
					4700.00	0.39	-3.11	-1.81
					5000.00	0.41	-4.65	-5.17
				Japan (UE-UTRA, Band 21)	1477.90			
					1455.40			
					1462.90			
				Japan J-CDMA	815.00			
					824.70			
					836.52			
					848.31			
					870.00			
					880.20			
					897.60			
					914.80			
					925.00			
					940.00			
				Japan J-CDMA	1922.40			
					1950.00			
					1977.60			

Section 3. Radiation characteristics of antenna

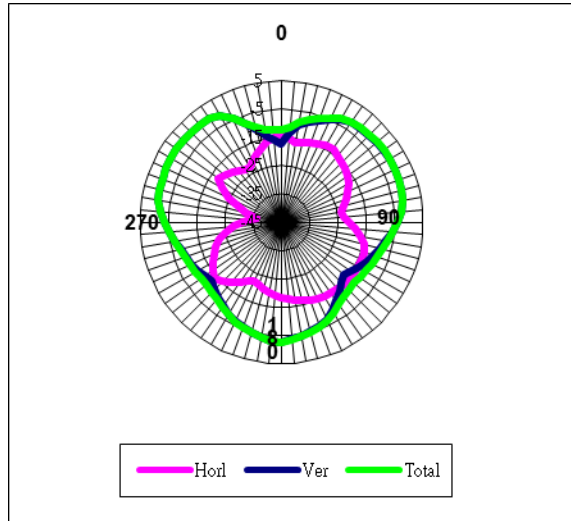
Antenna Gain and Radiation Pattern Measuring Structure Diagram



Radiation characteristic in 1920MHz ~ 1980MHz (UMTS/HSDPA, Band 1, n1)

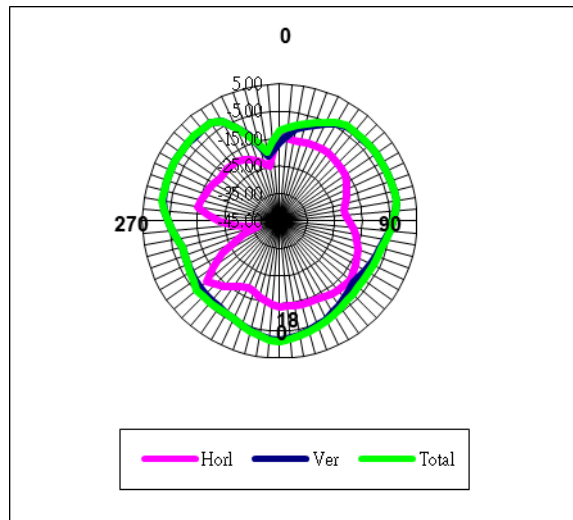
Main antenna: 1920.00 MHz

1920.00 MHz		
Horizontal Peak (dBi)	-13.32	35deg
Vertical Peak(dBi)	0.32	305deg



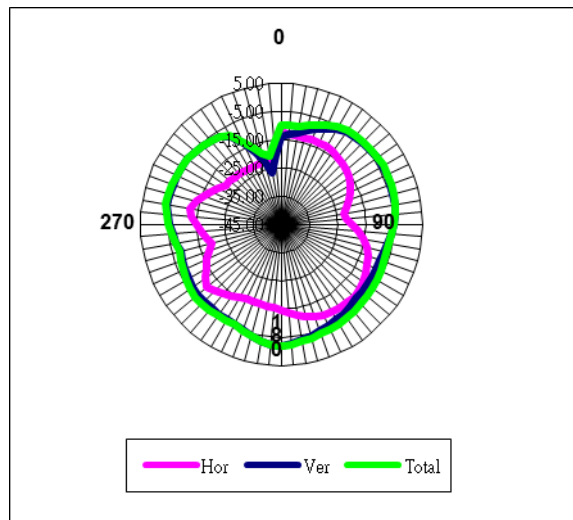
Main antenna: 1950.00 MHz

1950.00 MHz		
Horizontal Peak (dBi)	-10.52	230deg
Vertical Peak(dBi)	-1.11	305deg



Main antenna: 1980.00 MHz

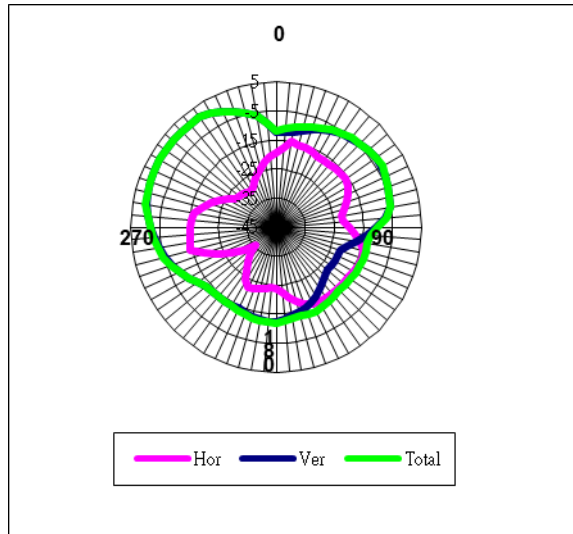
1980.00 MHz		
Horizontal Peak (dBi)	-8.69	135deg
Vertical Peak(dBi)	-1.9	180deg



Radiation characteristic in 1850MHz ~ 1910MHz (PCS, Band 2, n2)

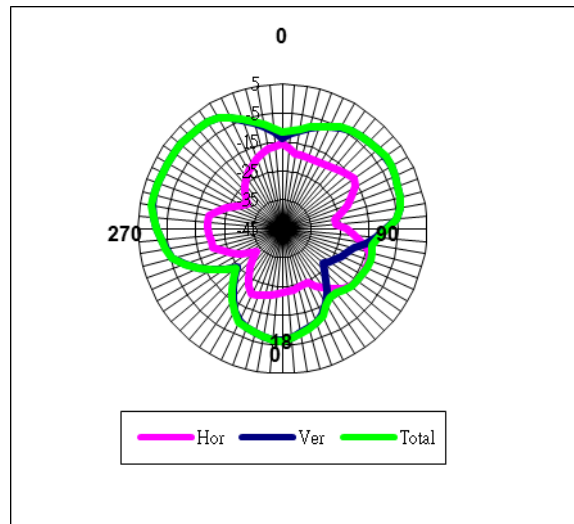
Main antenna: 1850.00 MHz

1850.00 MHz		
Horizontal Peak (dBi)	-13.66	110deg
Vertical Peak(dBi)	1.57	305deg



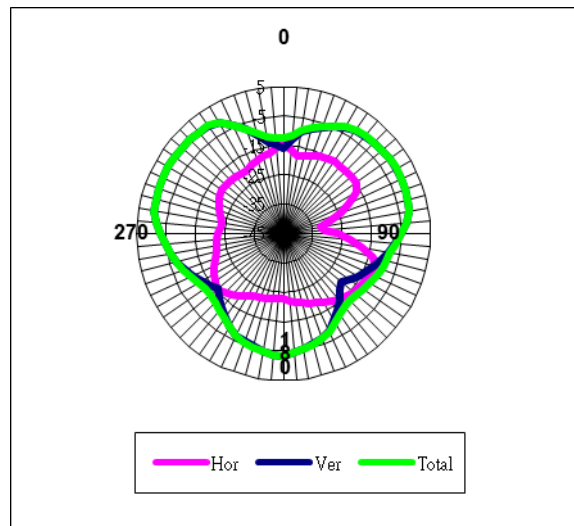
Main antenna: 1880.00 MHz

1880.00 MHz		
Horizontal Peak (dBi)	-12.96	110deg
Vertical Peak(dBi)	0.87	300deg



Main antenna: 1910.00 MHz

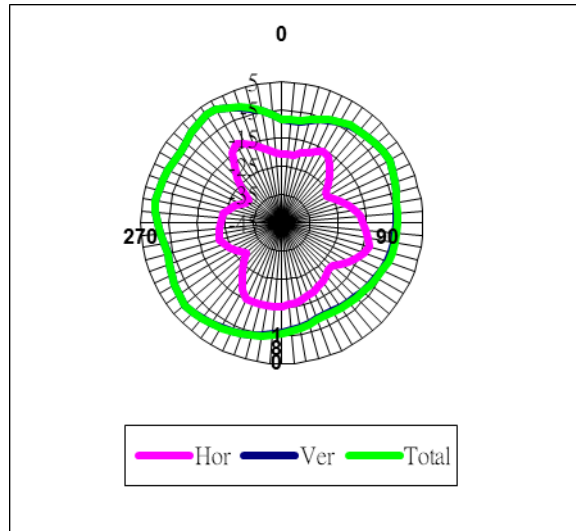
1910.00 MHz		
Horizontal Peak (dBi)	-12.02	110deg
Vertical Peak(dBi)	0.6	305deg



Radiation characteristic in 1710MHz ~ 1785MHz (UE-UTRA, Band 3, n3)

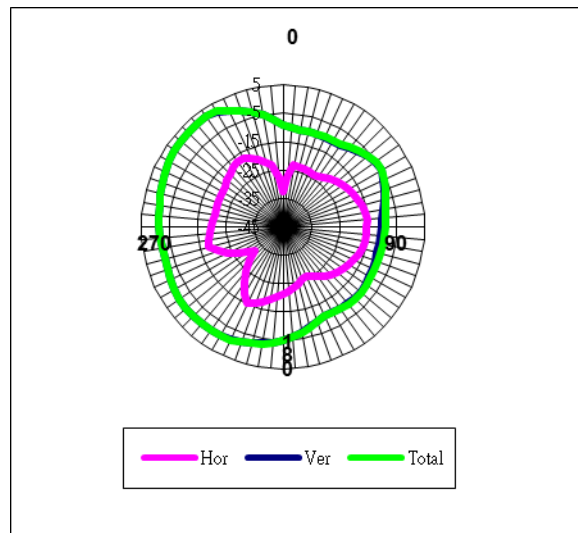
Main antenna: 1710.00 MHz

1710.00 MHz		
Horizontal Peak (dBi)	-12.62	330deg
Vertical Peak(dBi)	1.79	325deg



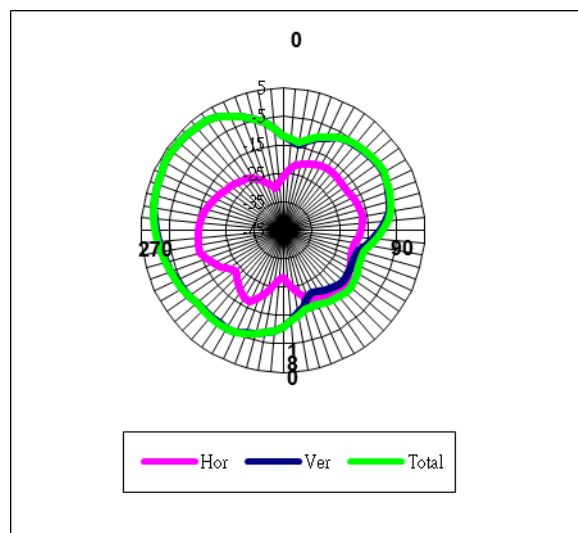
Main antenna: 1747.50 MHz

1747.50 MHz		
Horizontal Peak (dBi)	-15.29	85deg
Vertical Peak(dBi)	1.45	325deg



Main antenna: 1785.00 MHz

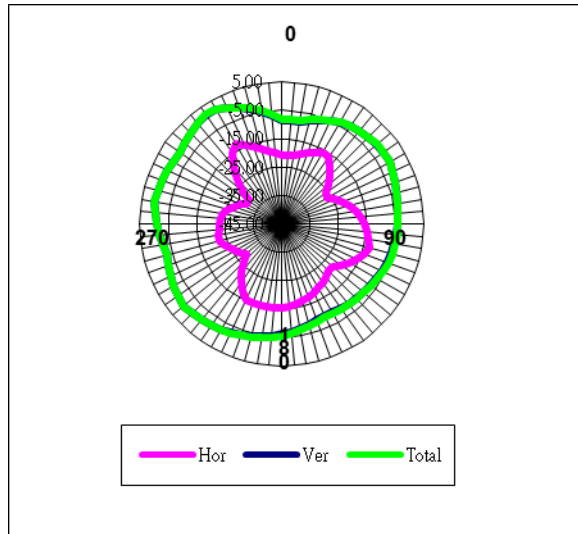
1785.00 MHz		
Horizontal Peak (dBi)	-14.38	255deg
Vertical Peak(dBi)	1.26	305deg



Radiation characteristic in 1710MHz ~ 1755MHz (UMTS(AWS), Band 4)

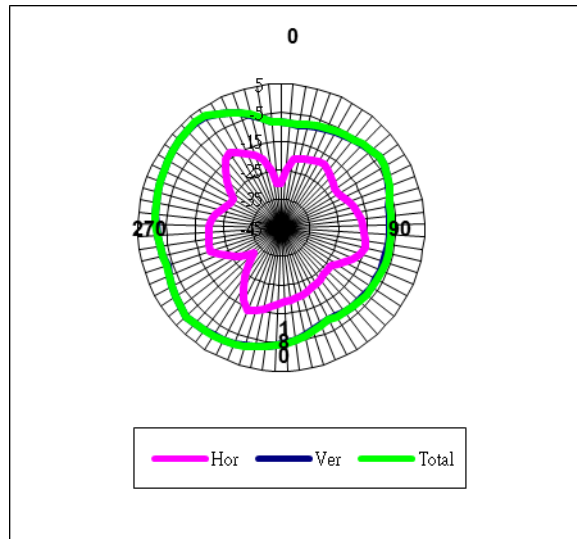
Main antenna: 1710.00 MHz

1710.00 MHz		
Horizontal Peak (dBi)	-12.62	330deg
Vertical Peak(dBi)	1.79	325deg



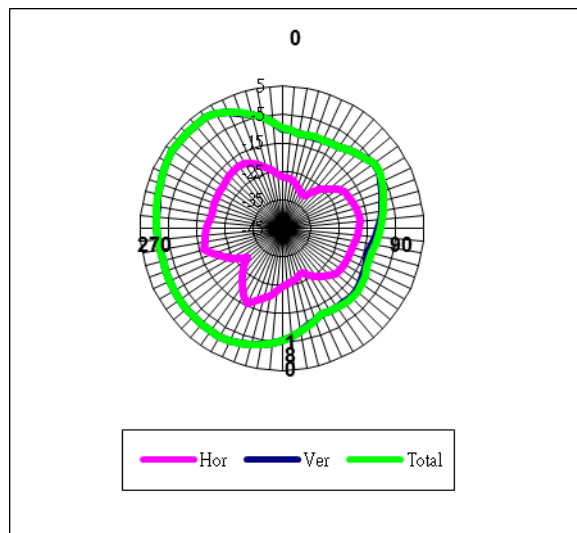
Main antenna: 1732.50 MHz

1732.50 MHz		
Horizontal Peak (dBi)	-13.23	330deg
Vertical Peak(dBi)	1.39	325deg



Main antenna: 1755.00 MHz

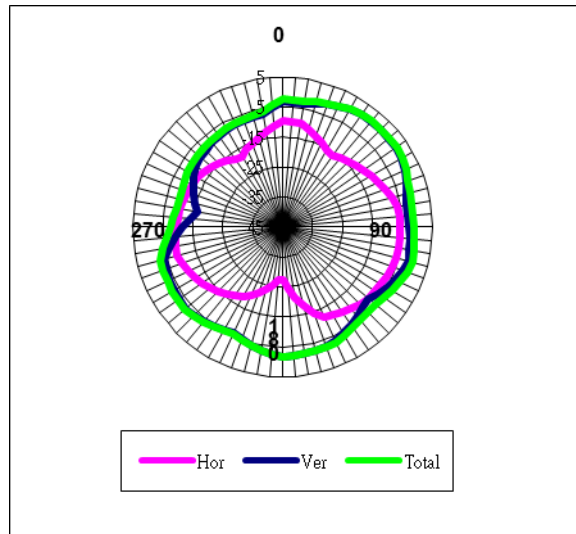
1755.00 MHz		
Horizontal Peak (dBi)	-15.88	205deg
Vertical Peak(dBi)	1.45	325deg



Radiation characteristic in 824MHz ~ 849MHz (Cellular, Band 5, n5)

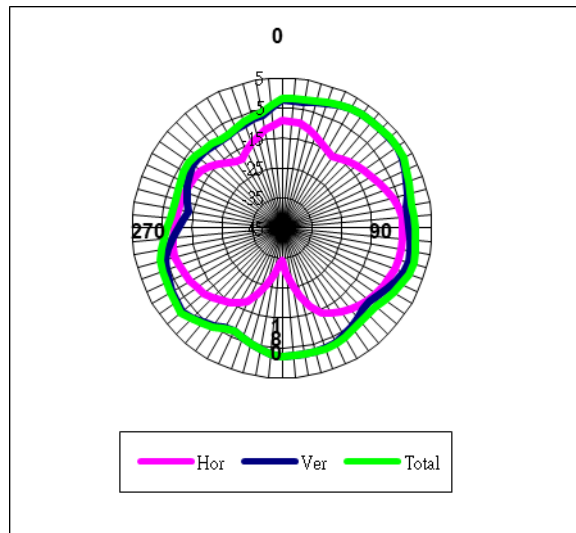
Main antenna: 824.00 MHz

824.00 MHz		
Horizontal Peak (dBi)	-5.67	85deg
Vertical Peak(dBi)	1.28	55deg



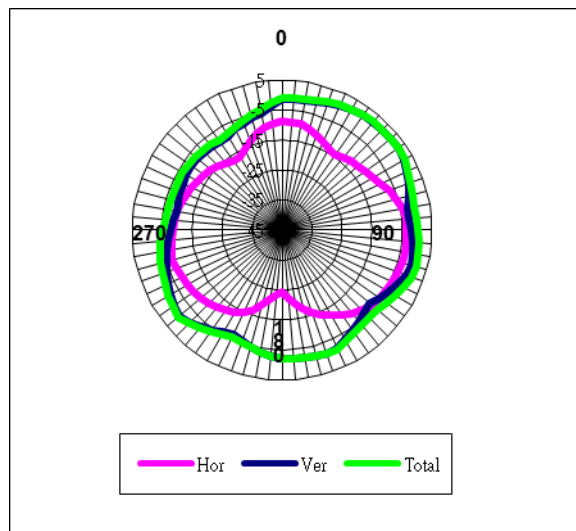
Main antenna: 836.50 MHz

836.50 MHz		
Horizontal Peak (dBi)	-4.75	105deg
Vertical Peak(dBi)	1.84	55deg



Main antenna: 849.0 MHz

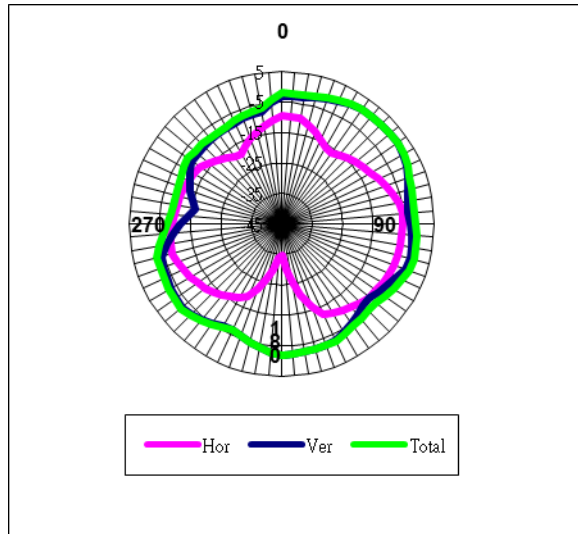
849.0 MHz		
Horizontal Peak (dBi)	-3.41	85deg
Vertical Peak(dBi)	1.48	55deg



Radiation characteristic in 830MHz ~ 840MHz (Band 6)

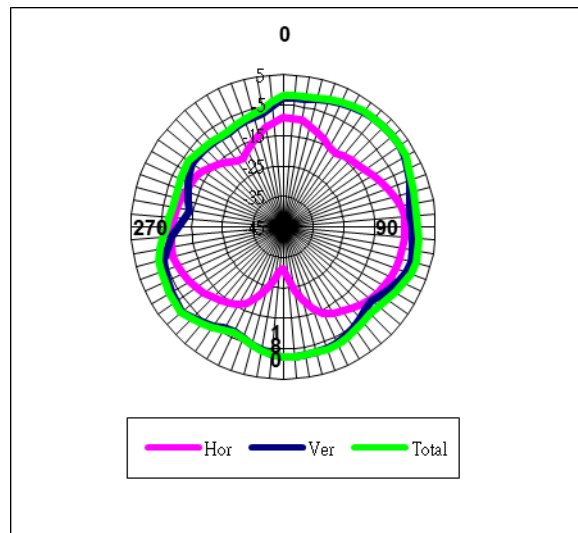
Main antenna: 830.00 MHz

830.00 MHz		
Horizontal Peak (dBi)	-5.23	85deg
Vertical Peak(dBi)	1.52	55deg



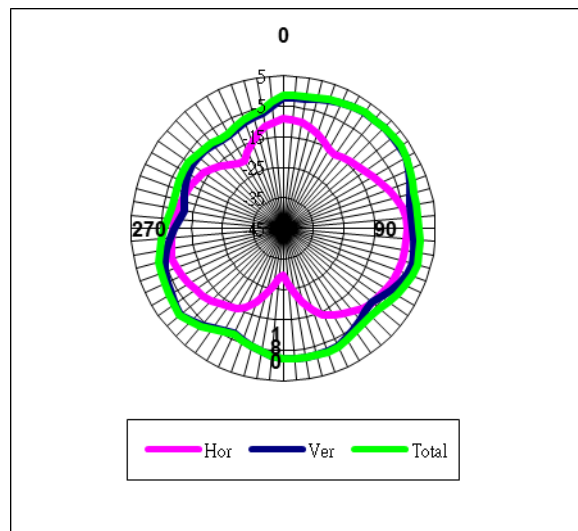
Main antenna: 835.00 MHz

835.00 MHz		
Horizontal Peak (dBi)	-4.97	85deg
Vertical Peak(dBi)	1.72	55deg



Main antenna: 840.00 MHz

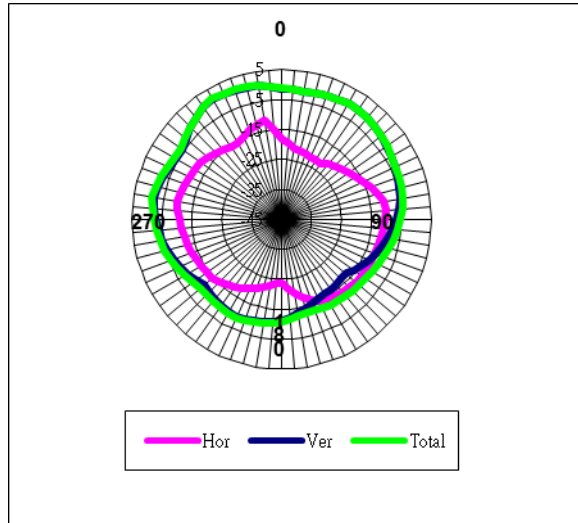
840.00 MHz		
Horizontal Peak (dBi)	-4.33	105deg
Vertical Peak(dBi)	1.96	55deg



Radiation characteristic in 2500MHz ~ 2570MHz (UE-UTRA, Band 7, n7)

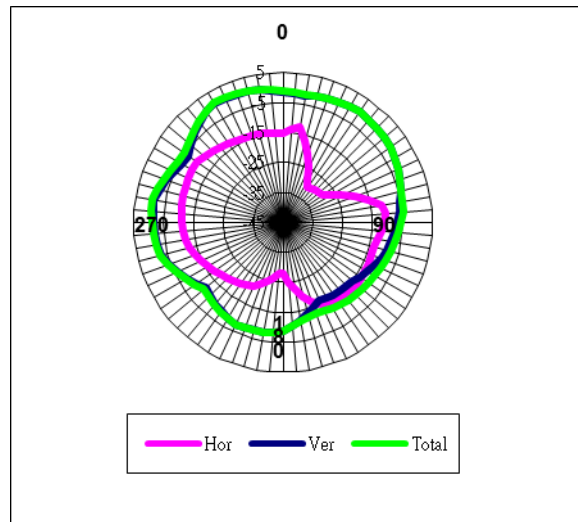
Main antenna: 2500.00 MHz

2500.00 MHz		
Horizontal Peak (dBi)	-9.58	280deg
Vertical Peak(dBi)	1.47	330deg



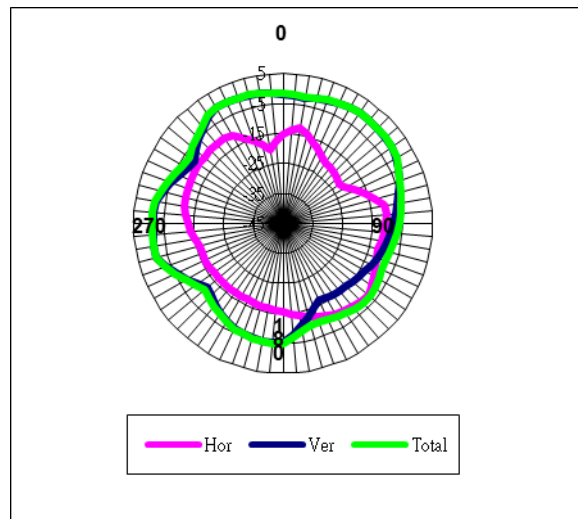
Main antenna: 2535.00 MHz

2535.00 MHz		
Horizontal Peak (dBi)	-9.7	300deg
Vertical Peak(dBi)	0.93	330deg



Main antenna: 2570.00 MHz

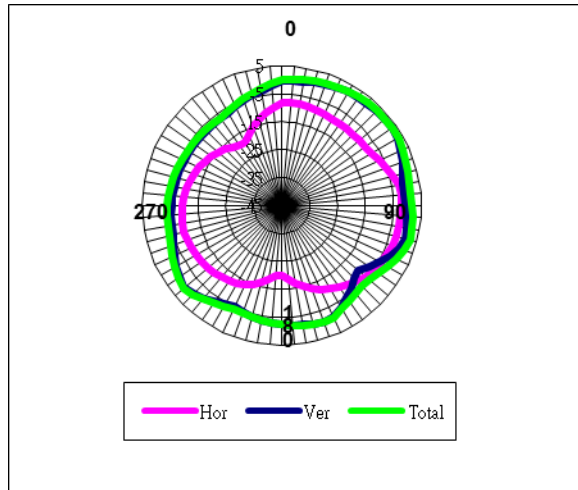
2570.00 MHz		
Horizontal Peak (dBi)	-7.63	130deg
Vertical Peak(dBi)	0.06	330deg



Radiation characteristic in 880MHz ~ 915MHz (Band 8, n8)

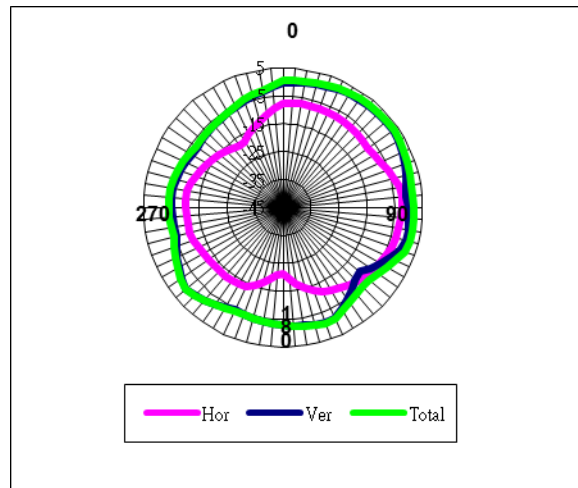
Main antenna: 880.00 MHz

880.00 MHz		
Horizontal Peak (dBi)	-2.01	85deg
Vertical Peak(dBi)	1.36	55deg



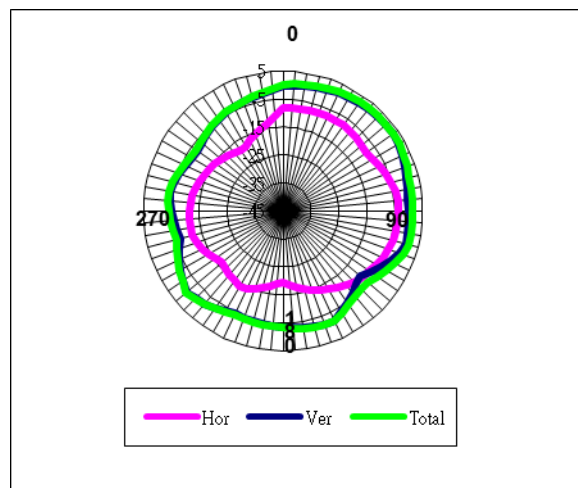
Main antenna: 897.50 MHz

897.50 MHz		
Horizontal Peak (dBi)	-2.33	85deg
Vertical Peak(dBi)	1.22	55deg



Main antenna: 915.00 MHz

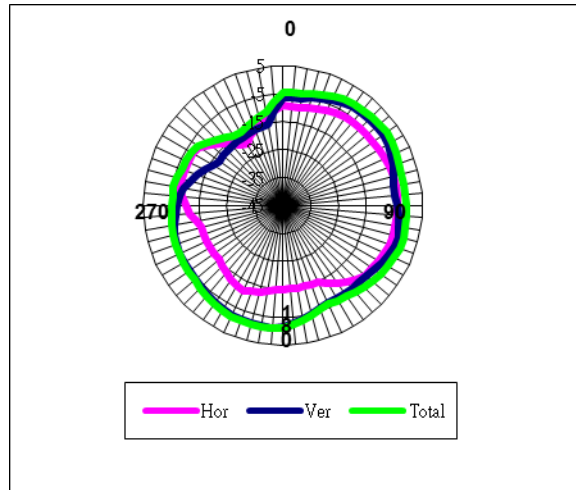
915.00 MHz		
Horizontal Peak (dBi)	-3.67	85deg
Vertical Peak(dBi)	1	55deg



Radiation characteristic in 699MHz ~ 716MHz (UE-UTRA, Band 12, n12)

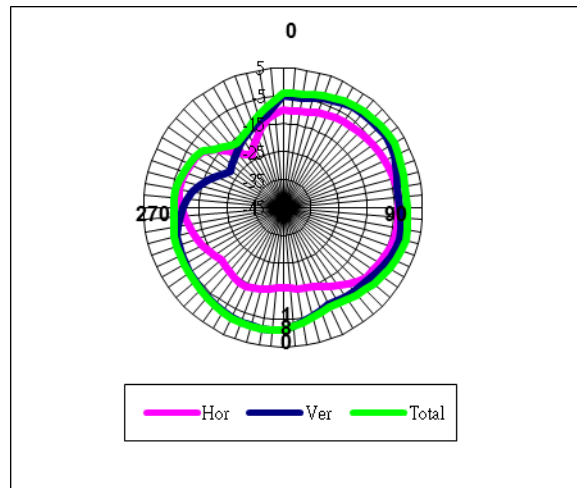
Main antenna: 699.00 MHz

699.00 MHz		
Horizontal Peak (dBi)	-3.69	85deg
Vertical Peak(dBi)	-0.8	55deg



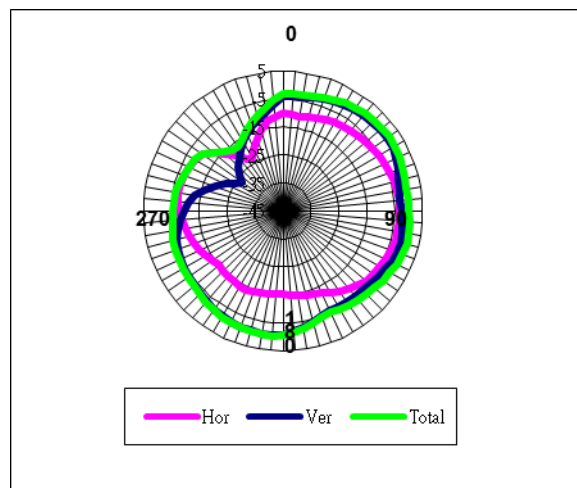
Main antenna: 707.50 MHz

707.50 MHz		
Horizontal Peak (dBi)	-3.37	85deg
Vertical Peak(dBi)	-0.08	55deg



Main antenna: 716.00 MHz

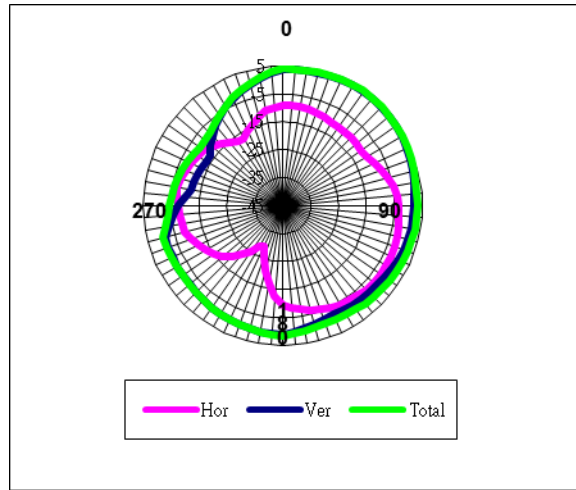
716.00 MHz		
Horizontal Peak (dBi)	-3.17	85deg
Vertical Peak(dBi)	0.52	55deg



Radiation characteristic in 776MHz ~ 787MHz (UE-UTRA, Band 13)

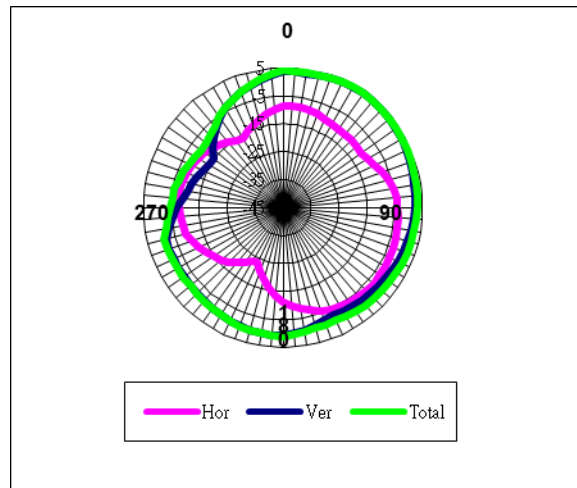
Main antenna: 777.00 MHz

777.00 MHz		
Horizontal Peak (dBi)	-2.28	110deg
Vertical Peak(dBi)	1.23	35deg



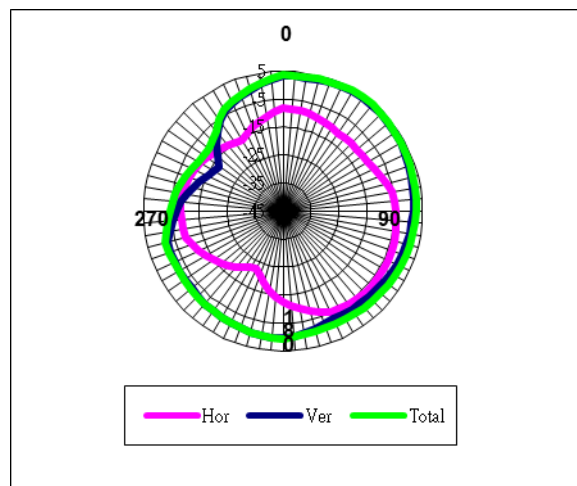
Main antenna: 782.00 MHz

782.00 MHz		
Horizontal Peak (dBi)	-2.59	130deg
Vertical Peak(dBi)	1.11	35deg



Main antenna: 787.00 MHz

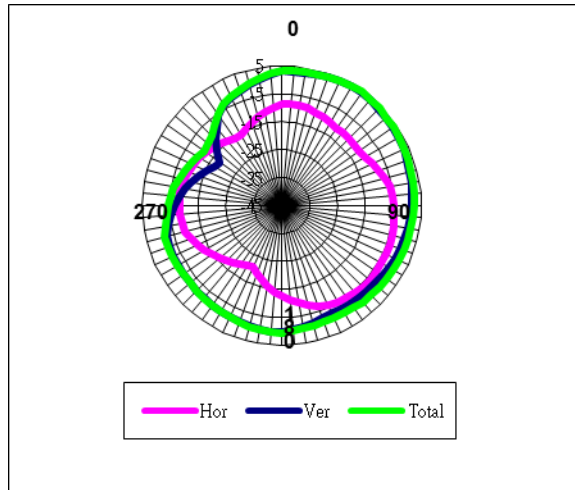
787.00 MHz		
Horizontal Peak (dBi)	-3.44	130deg
Vertical Peak(dBi)	1.77	35deg



Radiation characteristic in 788MHz ~ 798MHz (UE-UTRA, Band 14)

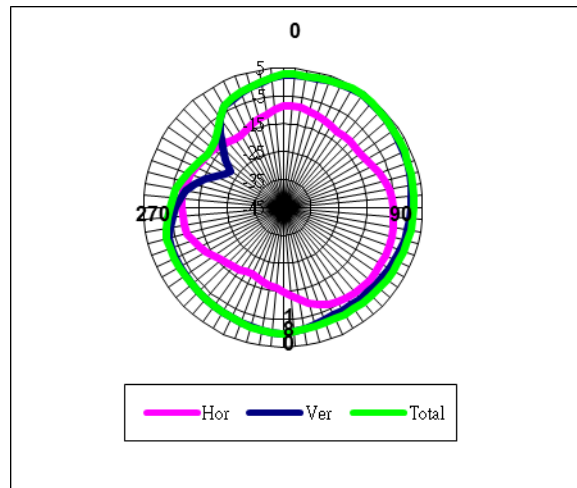
Main antenna: 788.00 MHz

788.00 MHz		
Horizontal Peak (dBi)	-3.58	130deg
Vertical Peak(dBi)	1.69	35deg



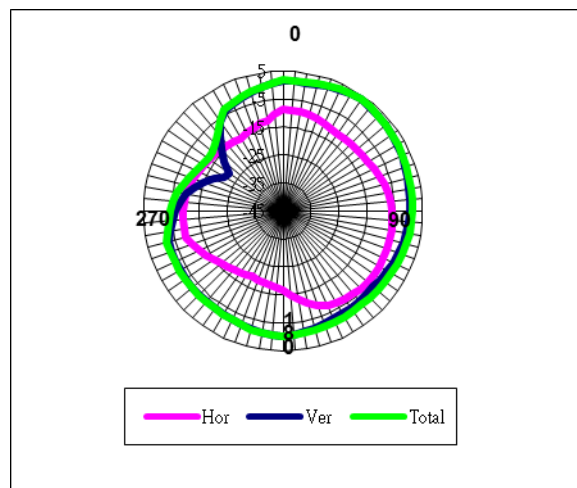
Main antenna: 793.00 MHz

793.00 MHz		
Horizontal Peak (dBi)	-4.38	130deg
Vertical Peak(dBi)	1.27	35deg



Main antenna: 798.00 MHz

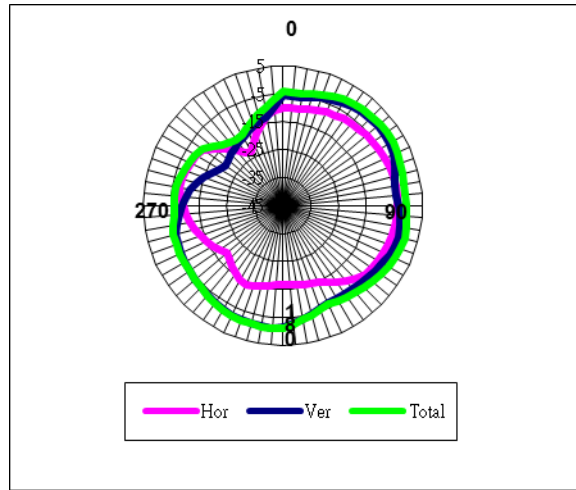
798.00 MHz		
Horizontal Peak (dBi)	-5.33	110deg
Vertical Peak(dBi)	1.67	35deg



Radiation characteristic in 704MHz ~ 716MHz (UE-UTRA, Band 17)

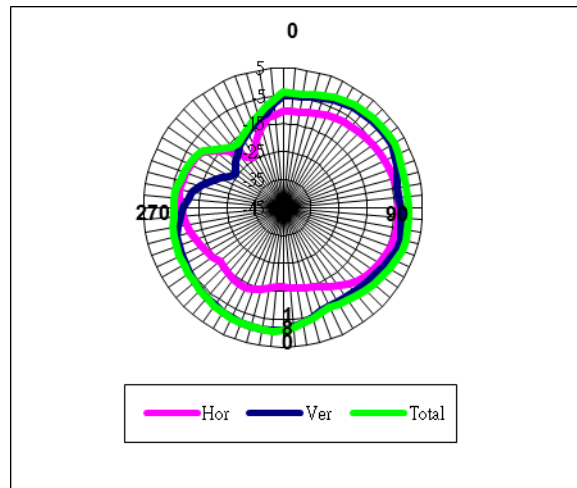
Main antenna: 704.00 MHz

704.00 MHz		
Horizontal Peak (dBi)	-3.76	85deg
Vertical Peak(dBi)	-0.34	55deg



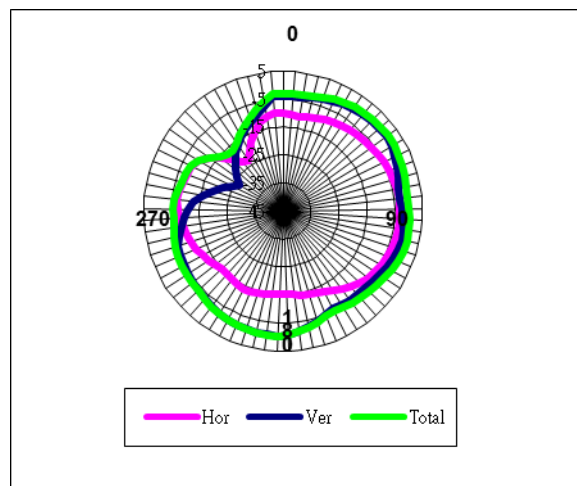
Main antenna: 710.00 MHz

710.00 MHz		
Horizontal Peak (dBi)	-3.39	85deg
Vertical Peak(dBi)	0.08	55deg



Main antenna: 716.00 MHz

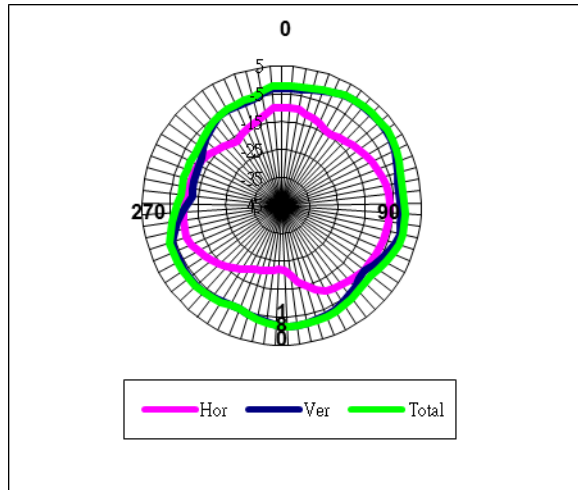
716.00 MHz		
Horizontal Peak (dBi)	-3.17	85deg
Vertical Peak(dBi)	0.52	55deg



Radiation characteristic in 815MHz ~ 830MHz (Band 18)

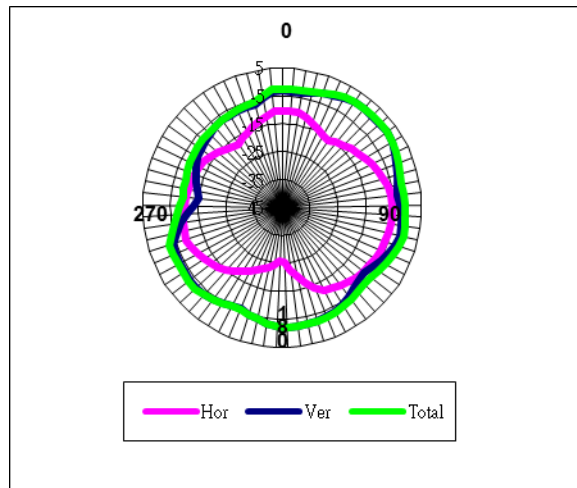
Main antenna: 815.00 MHz

815.00 MHz		
Horizontal Peak (dBi)	-6.33	85deg
Vertical Peak(dBi)	1.21	55deg



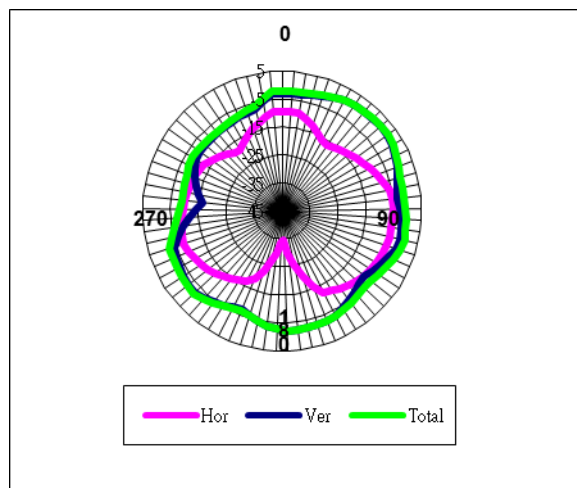
Main antenna: 822.50 MHz

822.50 MHz		
Horizontal Peak (dBi)	-5.55	85deg
Vertical Peak(dBi)	1.28	55deg



Main antenna: 830.00 MHz

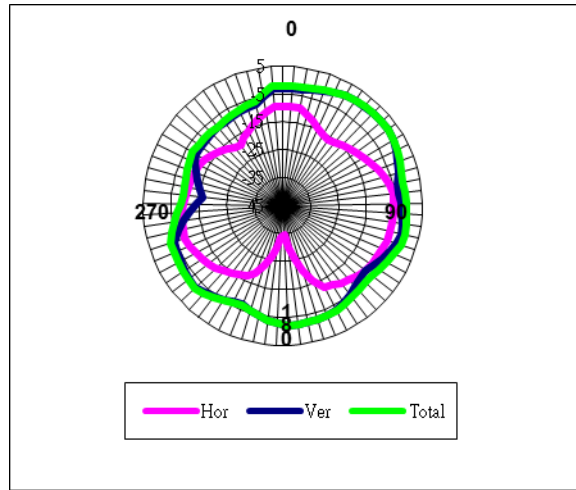
830.00 MHz		
Horizontal Peak (dBi)	-5.23	85deg
Vertical Peak(dBi)	1.52	55deg



Radiation characteristic in 830MHz ~ 845MHz (Band 19)

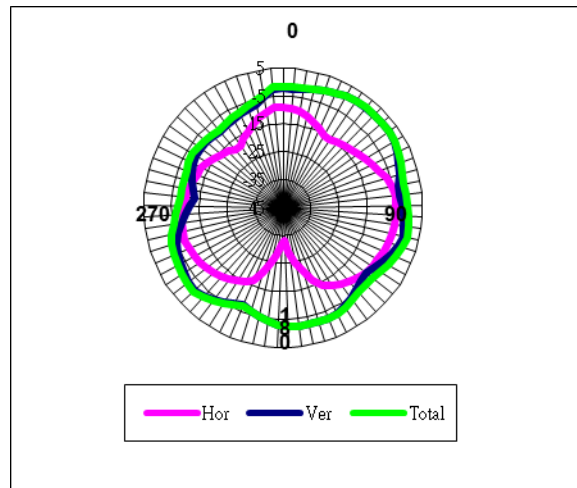
Main antenna: 830.00 MHz

830.00 MHz		
Horizontal Peak (dBi)	-5.23	85deg
Vertical Peak(dBi)	1.52	55deg



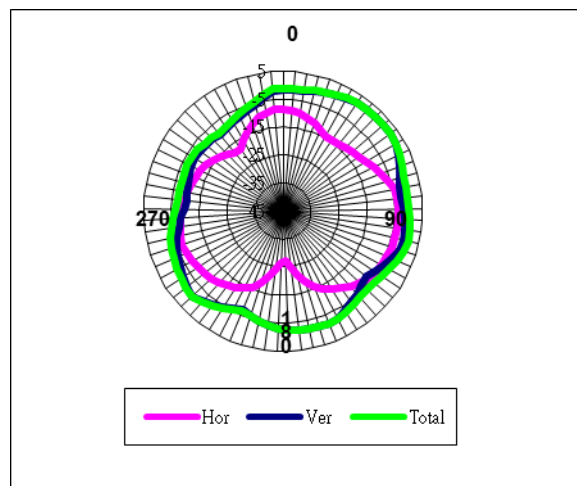
Main antenna: 837.50 MHz

837.50 MHz		
Horizontal Peak (dBi)	-4.54	85deg
Vertical Peak(dBi)	1.8	55deg



Main antenna: 845.00 MHz

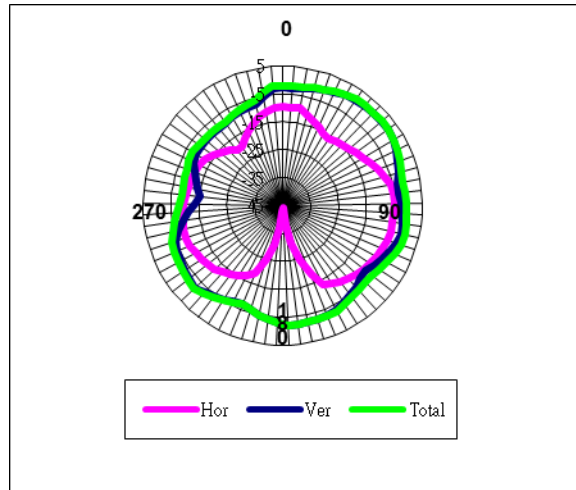
845.00 MHz		
Horizontal Peak (dBi)	-3.75	85deg
Vertical Peak(dBi)	1.26	55deg



Radiation characteristic in 832MHz ~ 862MHz (UE-UTRA,Band 20, n20)

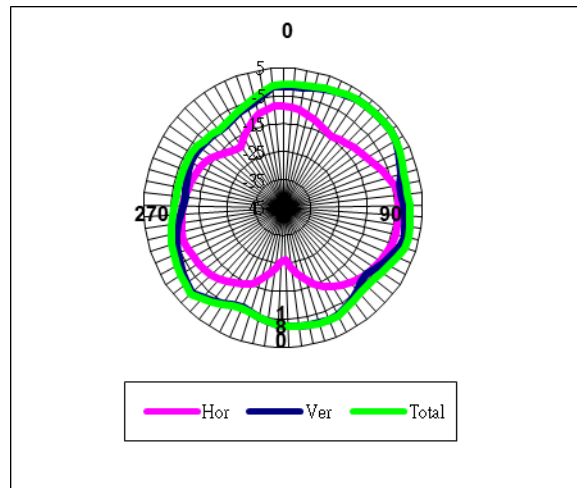
Main antenna: 832.00 MHz

832.00 MHz		
Horizontal Peak (dBi)	-4.99	85deg
Vertical Peak(dBi)	1.58	55deg



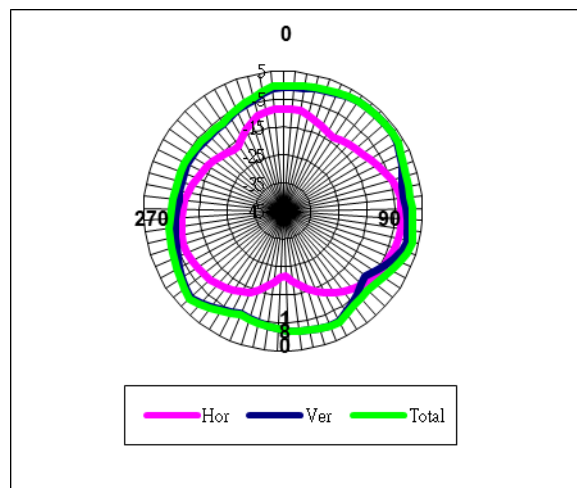
Main antenna: 847.00 MHz

847.00 MHz		
Horizontal Peak (dBi)	-3.64	105deg
Vertical Peak(dBi)	1.39	55deg



Main antenna: 862.00 MHz

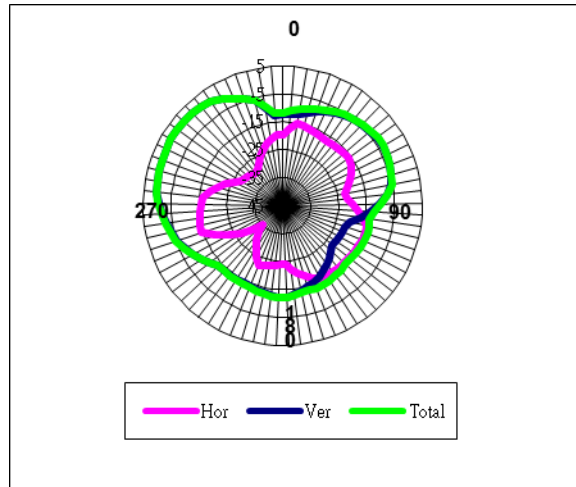
862.00 MHz		
Horizontal Peak (dBi)	-2.45	105deg
Vertical Peak(dBi)	1.05	55deg



Radiation characteristic in 1850MHz ~ 1915MHz (UE-UTRA, Band 25)

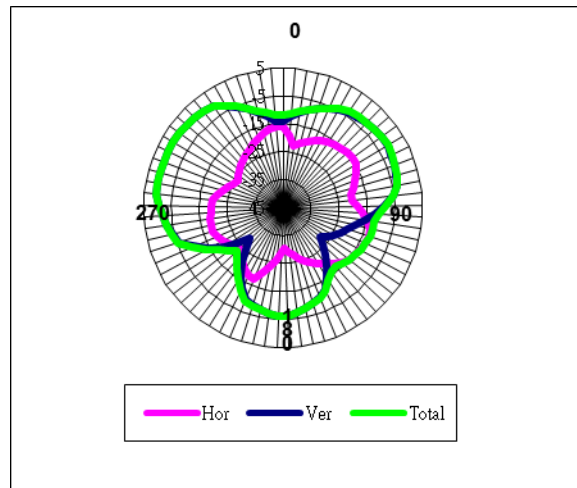
Main antenna: 1850.00 MHz

1850.00 MHz		
Horizontal Peak (dBi)	-13.66	110deg
Vertical Peak(dBi)	1.57	305deg



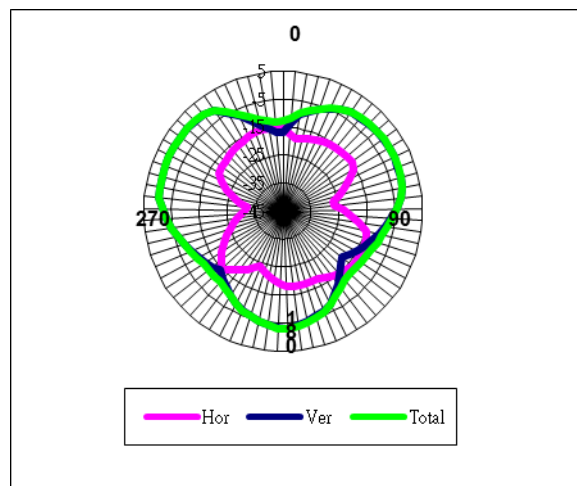
Main antenna: 1882.50 MHz

1882.50 MHz		
Horizontal Peak (dBi)	-12.65	110deg
Vertical Peak(dBi)	0.86	300deg



Main antenna: 1915.00 MHz

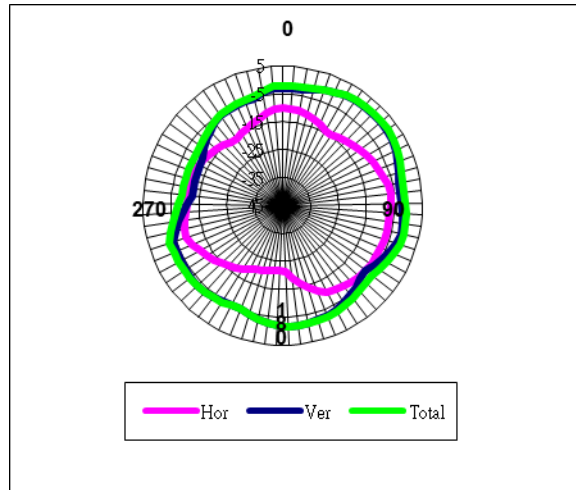
1915.00 MHz		
Horizontal Peak (dBi)	-13.31	110deg
Vertical Peak(dBi)	0.46	305deg



Radiation characteristic in 814MHz ~ 849MHz (UE-UTRA, Band 26)

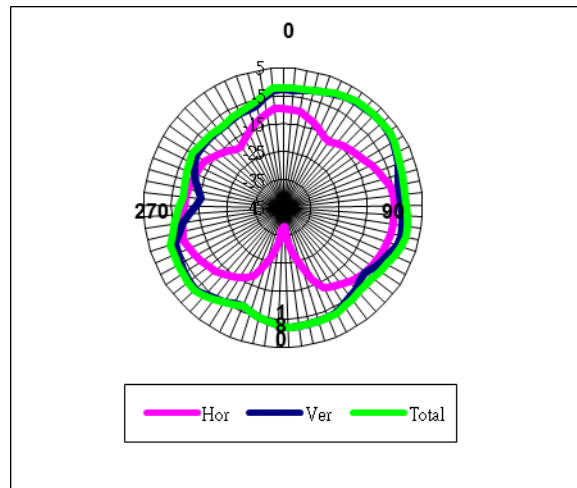
Main antenna: 814.00 MHz

814.00 MHz		
Horizontal Peak (dBi)	-6.17	85deg
Vertical Peak(dBi)	1.22	55deg



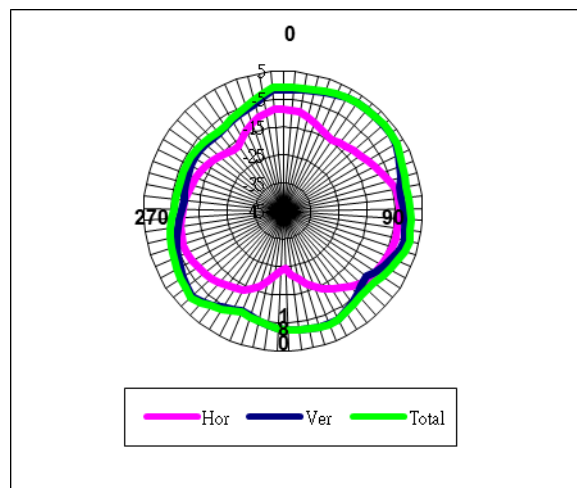
Main antenna: 831.50 MHz

831.50 MHz		
Horizontal Peak (dBi)	-5.18	85deg
Vertical Peak(dBi)	1.52	55deg



Main antenna: 849.00 MHz

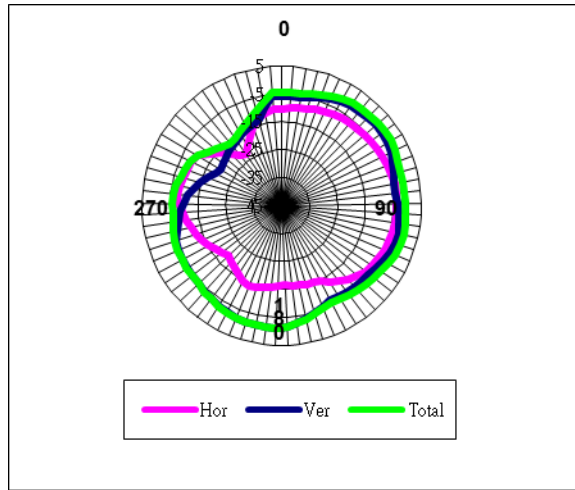
849.00 MHz		
Horizontal Peak (dBi)	-3.41	85deg
Vertical Peak(dBi)	1.48	55deg



Radiation characteristic in 703MHz ~ 748MHz (UE-UTRA, Band 28, 28)

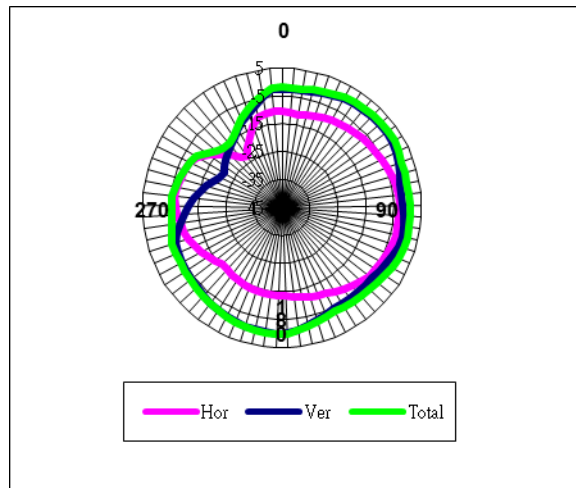
Main antenna: 703.00 MHz

703.00 MHz		
Horizontal Peak (dBi)	-3.68	85deg
Vertical Peak(dBi)	-0.44	55deg



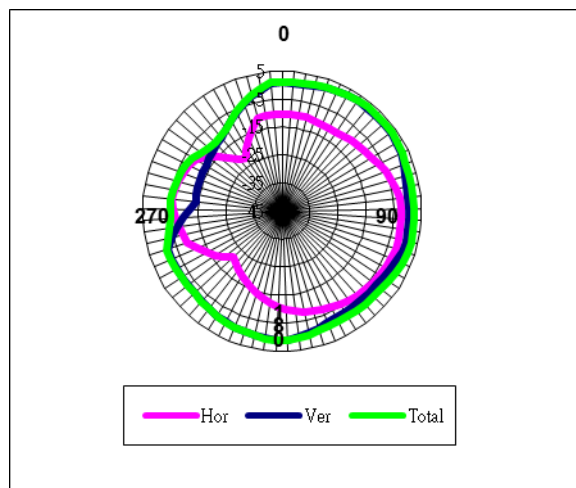
Main antenna: 725.50 MHz

725.50 MHz		
Horizontal Peak (dBi)	-2.94	85deg
Vertical Peak(dBi)	1.18	55deg



Main antenna: 748.00 MHz

748.00 MHz		
Horizontal Peak (dBi)	-1.92	105deg
Vertical Peak(dBi)	1.06	55deg

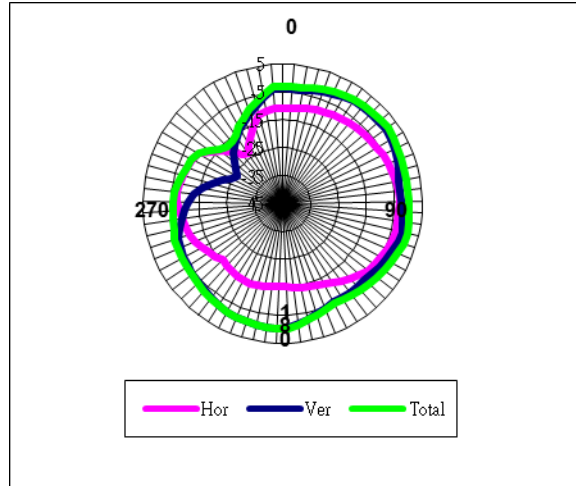


Radiation characteristic in 717MHz ~ 728MHz (UE-UTRA, Band 29)

* Down link only

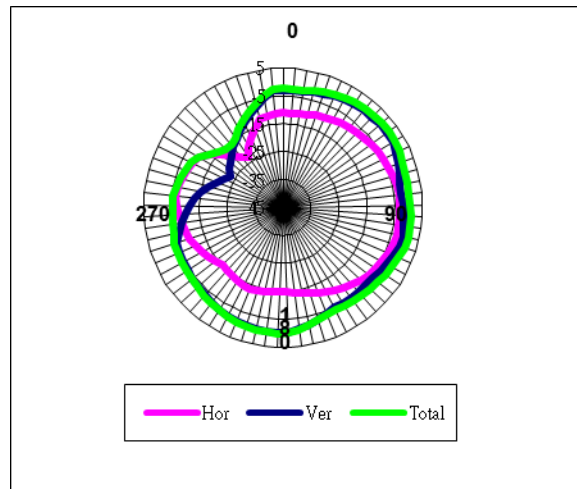
Main antenna: 717.00 MHz

717.00 MHz		
Horizontal Peak (dBi)	-3.19	85deg
Vertical Peak(dBi)	0.6	55deg



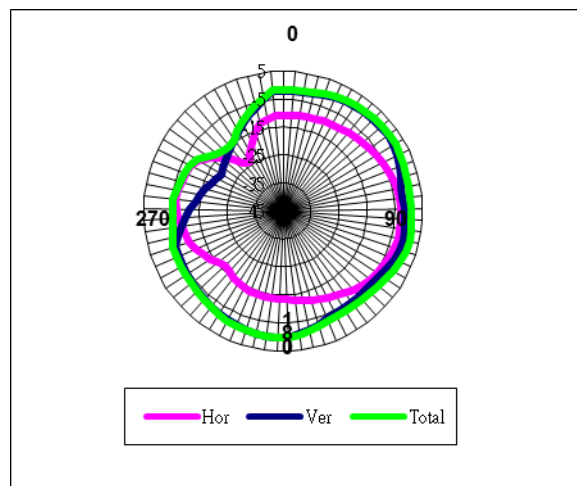
Main antenna: 722.50 MHz

722.50 MHz		
Horizontal Peak (dBi)	-3.04	85deg
Vertical Peak(dBi)	0.97	55deg



Main antenna: 728.00 MHz

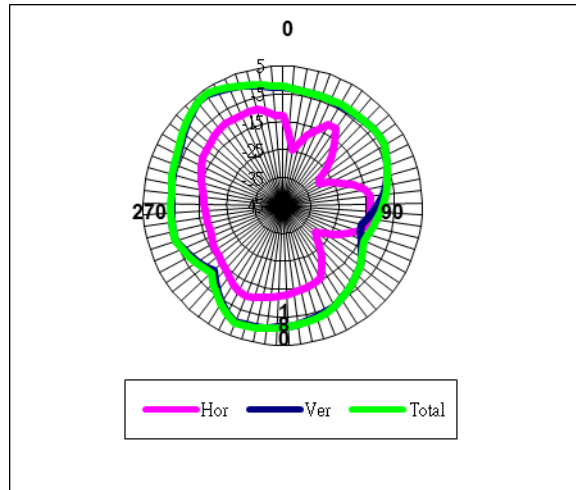
728.00 MHz		
Horizontal Peak (dBi)	-2.62	105deg
Vertical Peak(dBi)	1.38	55deg



Radiation characteristic in 2305MHz ~ 2315MHz (UE-UTRA, Band 30)

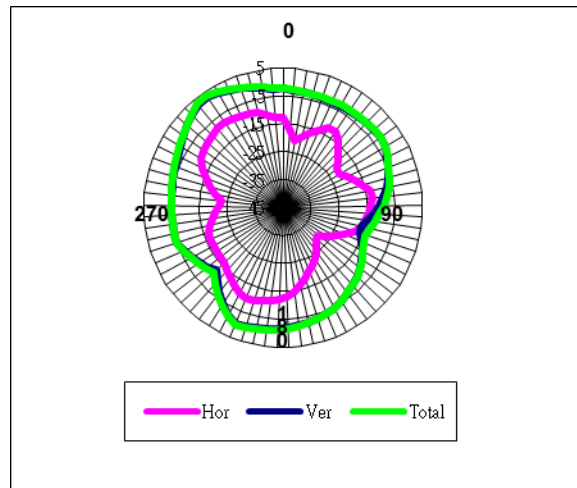
Main antenna: 2305.00 MHz

2305.00 MHz		
Horizontal Peak (dBi)	-9.23	330deg
Vertical Peak(dBi)	0.22	330deg



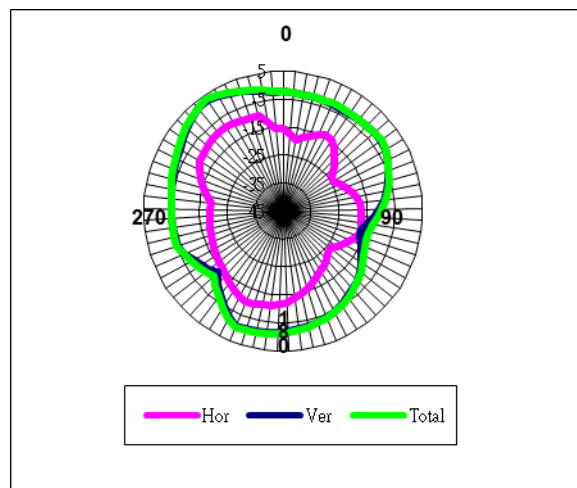
Main antenna: 2310.00 MHz

2310.00 MHz		
Horizontal Peak (dBi)	-7.78	330deg
Vertical Peak(dBi)	0.19	330deg



Main antenna: 2315.00 MHz

2315.00 MHz		
Horizontal Peak (dBi)	-8.63	330deg
Vertical Peak(dBi)	0.12	330deg

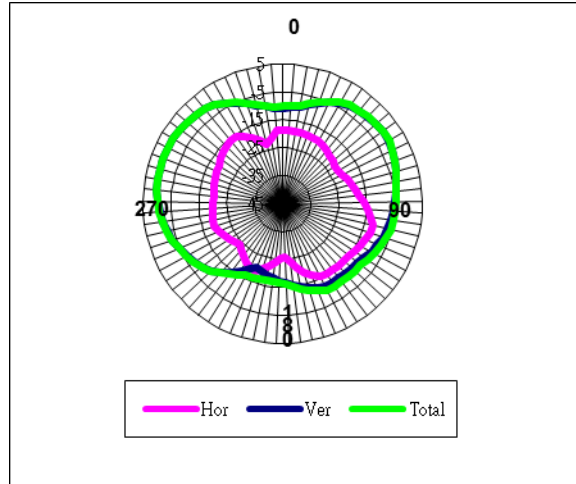


Radiation characteristic in 1452MHz ~ 1496MHz (LTE, Band 32)

* Down link only

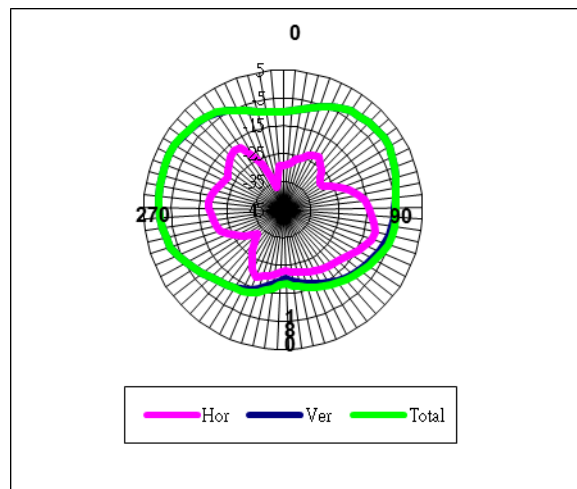
Main antenna: 1452.00 MHz

1452.00 MHz		
Horizontal Peak (dBi)	-11.74	110deg
Vertical Peak(dBi)	0.84	300deg



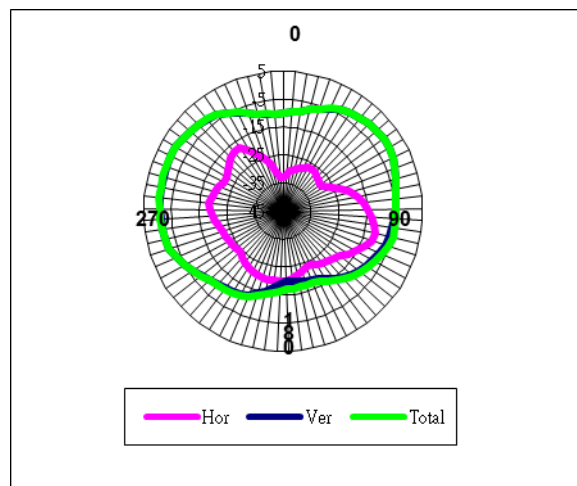
Main antenna: 1474.00 MHz

1474.00 MHz		
Horizontal Peak (dBi)	-10.93	105deg
Vertical Peak(dBi)	0.25	300deg



Main antenna: 1496.00 MHz

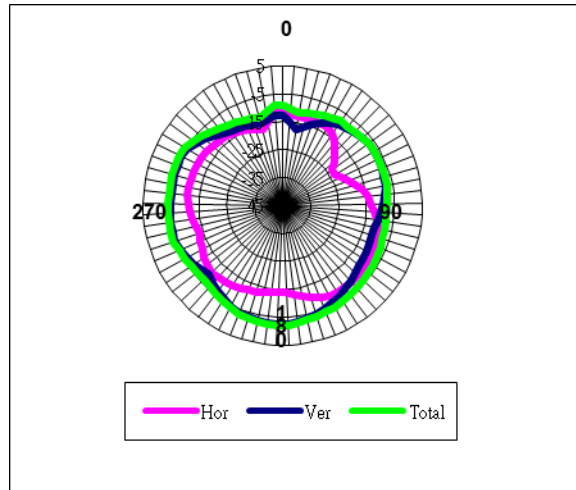
1496.00 MHz		
Horizontal Peak (dBi)	-10.81	105deg
Vertical Peak(dBi)	-0.24	300deg



Radiation characteristic in 2010MHz ~ 2025MHz (LTE, Band 34)

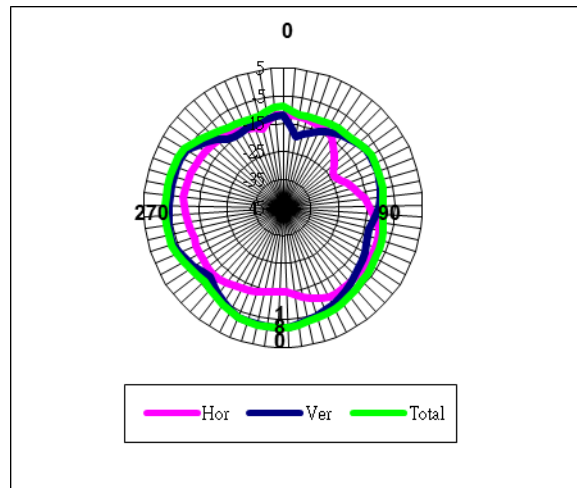
Main antenna: 2010.00 MHz

2010.00 MHz		
Horizontal Peak (dBi)	-8.1	130deg
Vertical Peak(dBi)	-2.31	185deg



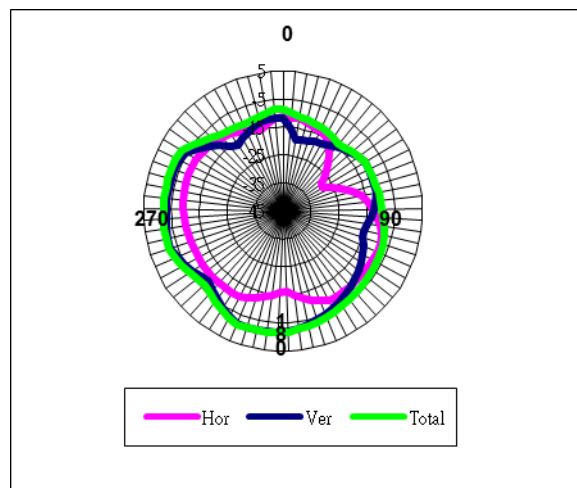
Main antenna: 2017.50 MHz

2017.50 MHz		
Horizontal Peak (dBi)	-8.84	155deg
Vertical Peak(dBi)	-2.01	185deg



Main antenna: 2025.00 MHz

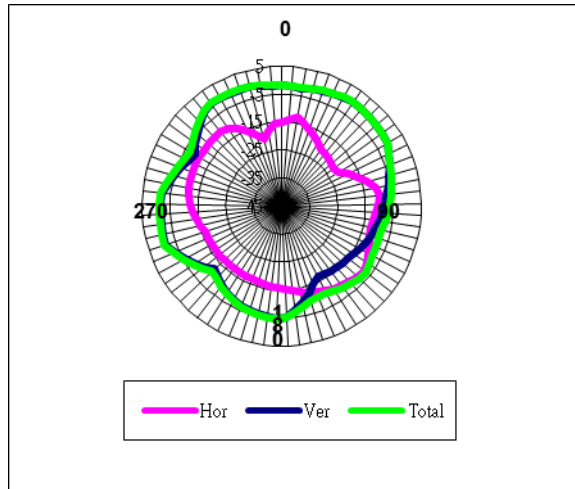
2025.00 MHz		
Horizontal Peak (dBi)	-7.99	110deg
Vertical Peak(dBi)	-1.52	185deg



Radiation characteristic in 2570MHz ~ 2620MHz (UE-UTRA, Band 38, n38)

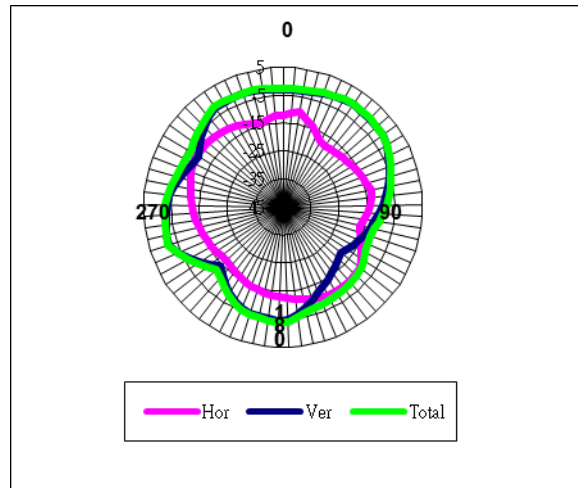
Main antenna: 2570.00 MHz

2570.00 MHz		
Horizontal Peak (dBi)	-7.63	130deg
Vertical Peak(dBi)	0.06	35deg



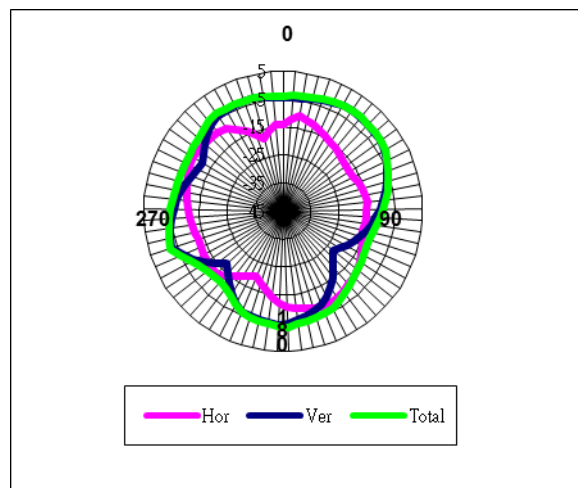
Main antenna: 2595.00 MHz

2595.00 MHz		
Horizontal Peak (dBi)	-8.84	305deg
Vertical Peak(dBi)	-0.44	35deg



Main antenna: 2620.00 MHz

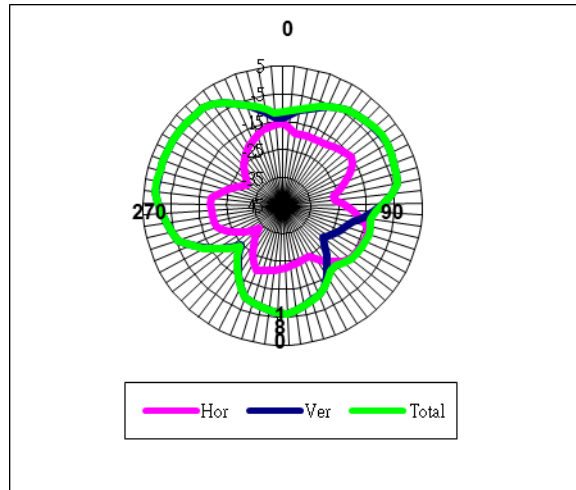
2620.00 MHz		
Horizontal Peak (dBi)	-7.36	305deg
Vertical Peak(dBi)	-1.29	35deg



Radiation characteristic in 1880MHz ~ 1920MHz (TD-SCDMA, Band 39)

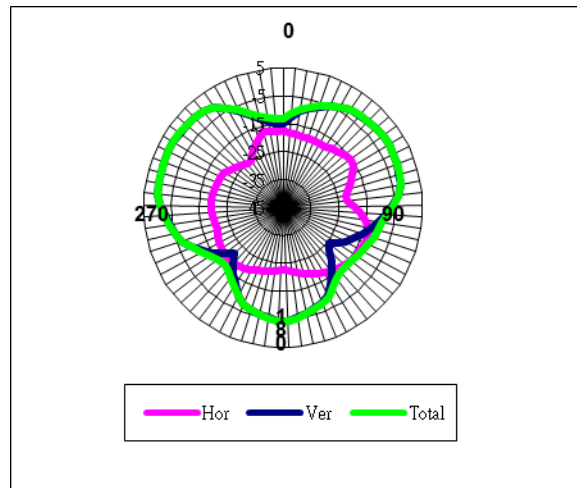
Main antenna: 1880.00 MHz

1880.00 MHz		
Horizontal Peak (dBi)	-12.96	110deg
Vertical Peak(dBi)	0.87	300deg



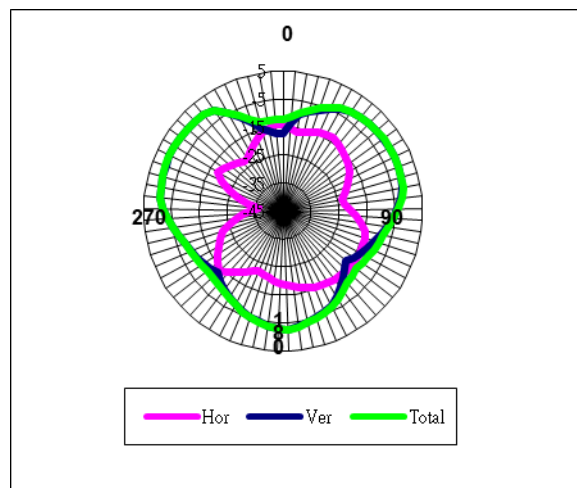
Main antenna: 1900.00 MHz

1900.00 MHz		
Horizontal Peak (dBi)	-12.84	110deg
Vertical Peak(dBi)	0.75	305deg



Main antenna: 1920.00 MHz

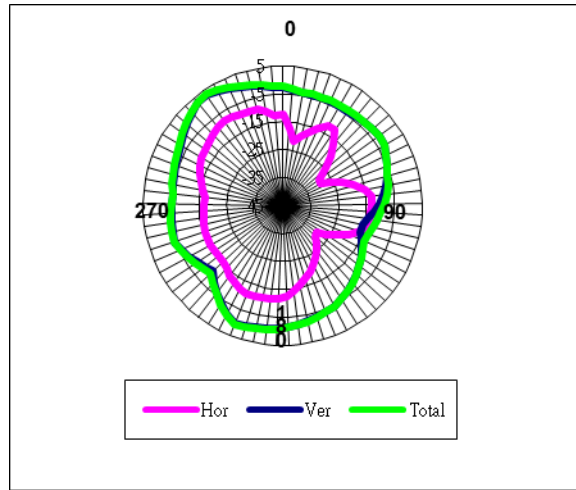
1920.00 MHz		
Horizontal Peak (dBi)	-13.32	35deg
Vertical Peak(dBi)	0.32	305deg



Radiation characteristic in 2300MHz ~ 2400MHz (UE-UTRA, Band 40)

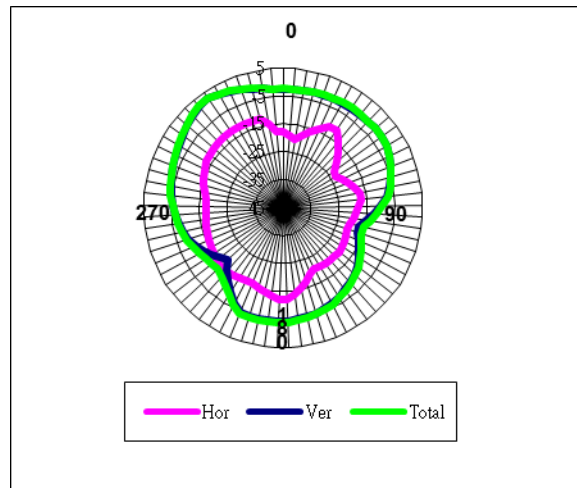
Main antenna: 2300.00 MHz

2300.00 MHz		
Horizontal Peak (dBi)	-8.21	330deg
Vertical Peak(dBi)	1.24	330deg



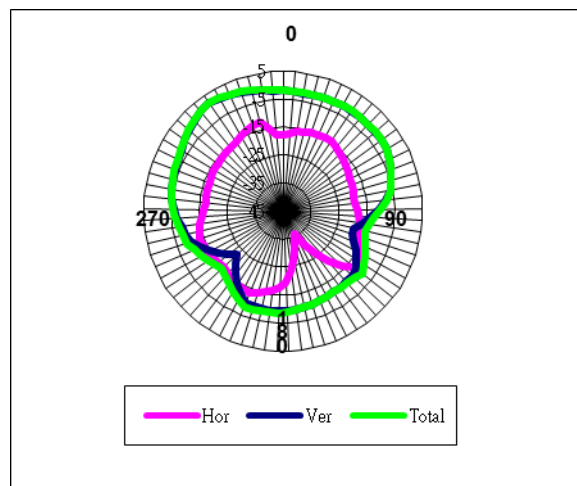
Main antenna: 2350.00 MHz

2350.00 MHz		
Horizontal Peak (dBi)	-11.36	35deg
Vertical Peak(dBi)	1.51	330deg



Main antenna: 2400.00 MHz

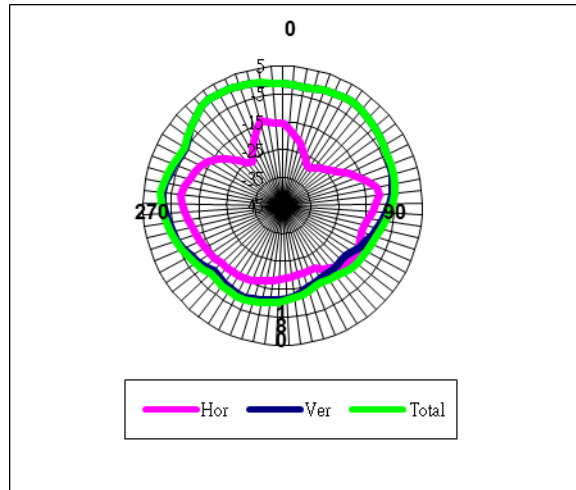
2400.00 MHz		
Horizontal Peak (dBi)	-11.98	350deg
Vertical Peak(dBi)	1.84	330deg



Radiation characteristic in 2496MHz ~ 2690MHz (UE-UTRA, Band 41, n41)

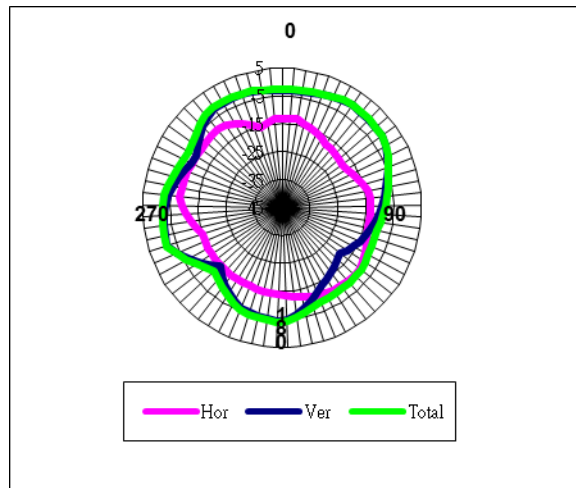
Main antenna: 2496.00 MHz

2496.00 MHz		
Horizontal Peak (dBi)	-8.28	280deg
Vertical Peak(dBi)	1.54	330deg



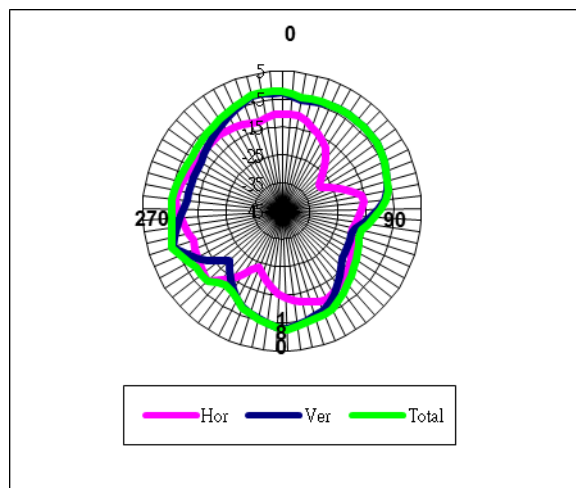
Main antenna: 2593.00 MHz

2593.00 MHz		
Horizontal Peak (dBi)	-8.06	280deg
Vertical Peak(dBi)	-0.49	35deg



Main antenna: 2690.00 MHz

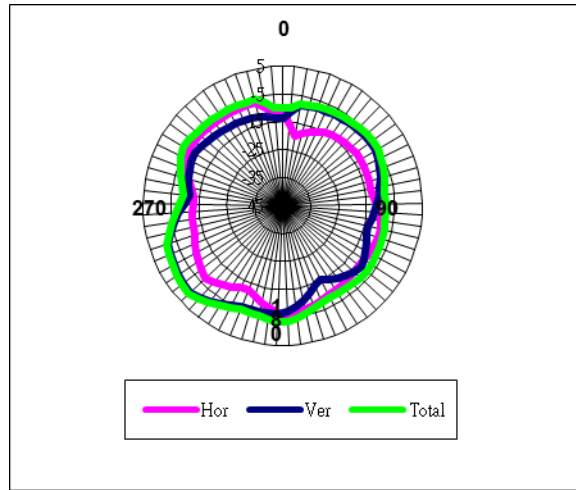
2690.00 MHz		
Horizontal Peak (dBi)	-6.68	280deg
Vertical Peak(dBi)	-2.66	355deg



Radiation characteristic in 3400MHz ~ 3600MHz (LTE Band 42)

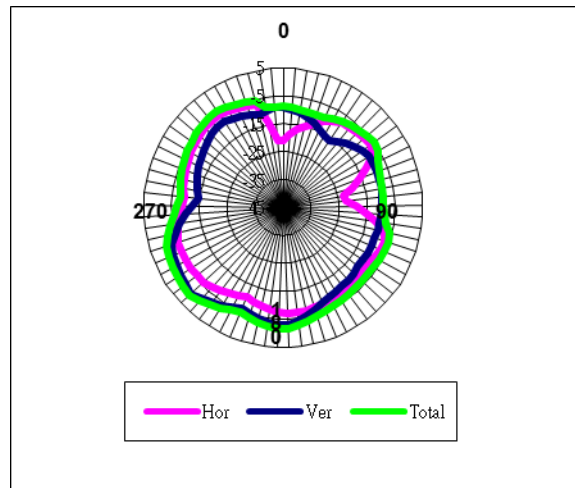
Main antenna: 3400.00 MHz

3400.00 MHz		
Horizontal Peak (dBi)	-5.62	305deg
Vertical Peak(dBi)	0.56	230deg



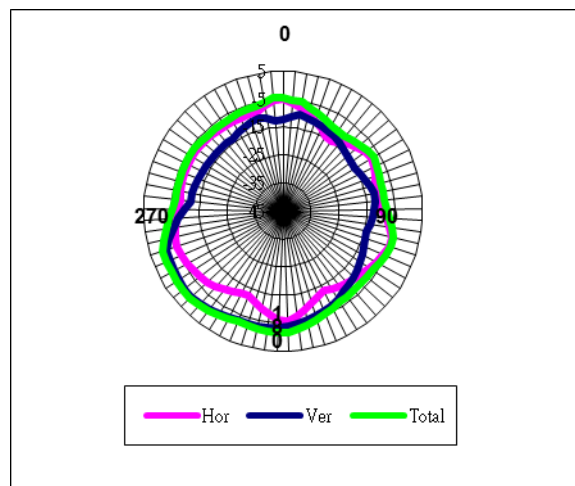
Main antenna: 3500.00 MHz

3500.00 MHz		
Horizontal Peak (dBi)	-4.72	330deg
Vertical Peak(dBi)	0.13	230deg



Main antenna: 3600.00 MHz

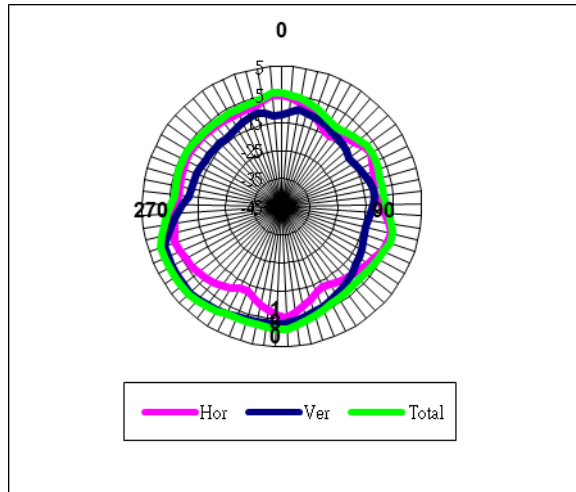
3600.00 MHz		
Horizontal Peak (dBi)	-4.86	255deg
Vertical Peak(dBi)	0.02	230deg



Radiation characteristic in 3600MHz ~ 3800MHz (LTE Band 43)

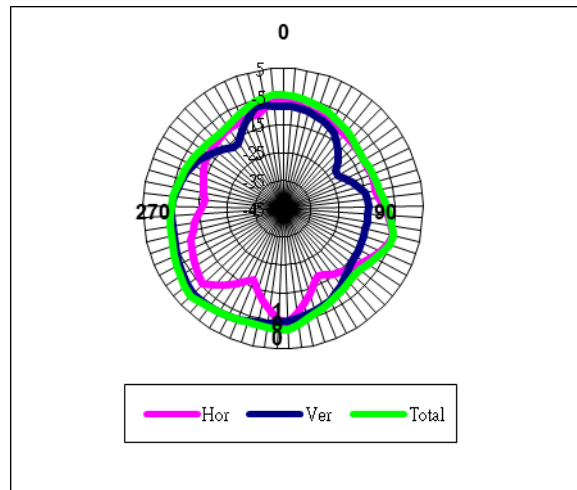
Main antenna: 3600.00 MHz

3600.00 MHz		
Horizontal Peak (dBi)	-4.86	255deg
Vertical Peak(dBi)	0.02	230deg



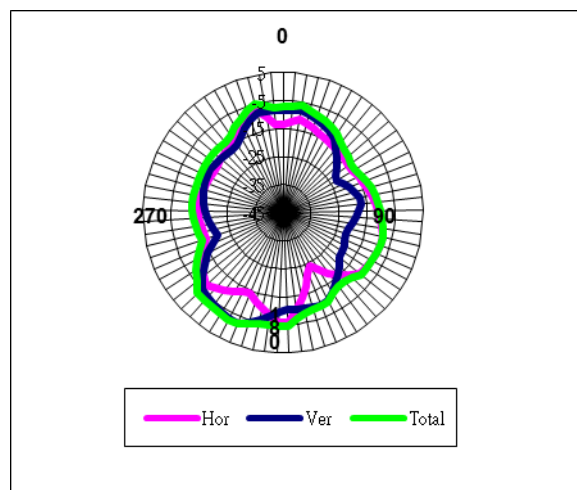
Main antenna: 3700.00 MHz

3700.00 MHz		
Horizontal Peak (dBi)	-4.41	180deg
Vertical Peak(dBi)	-0.73	230deg



Main antenna: 3800.00 MHz

3800.00 MHz		
Horizontal Peak (dBi)	-5.88	180deg
Vertical Peak(dBi)	-2.51	205deg

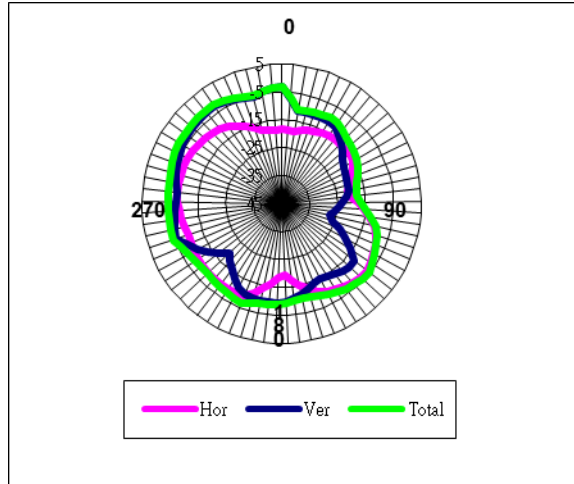


Radiation characteristic in 5150MHz ~ 5925MHz (LTE Band 46)

* TD Unlicensed, LAA RCV only

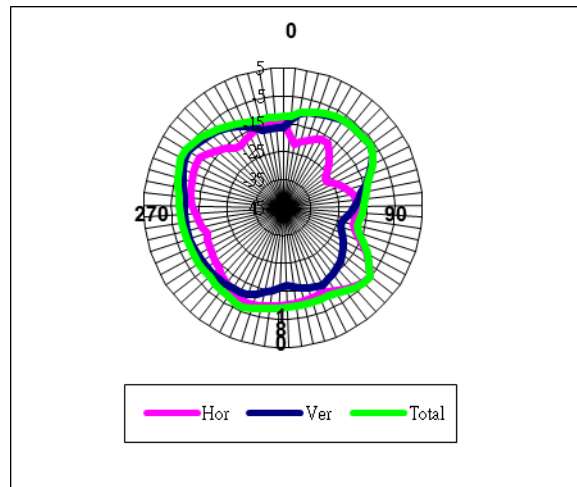
Main antenna: 5150.00 MHz

5150.00 MHz		
Horizontal Peak (dBi)	-5.98	130deg
Vertical Peak(dBi)	-2.49	325deg



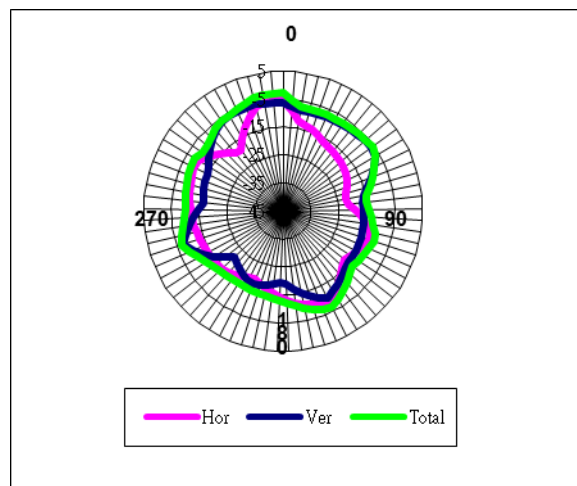
Main antenna: 5537.00 MHz

5537.00 MHz		
Horizontal Peak (dBi)	-5.37	130deg
Vertical Peak(dBi)	-5.35	305deg



Main antenna: 5925.00 MHz

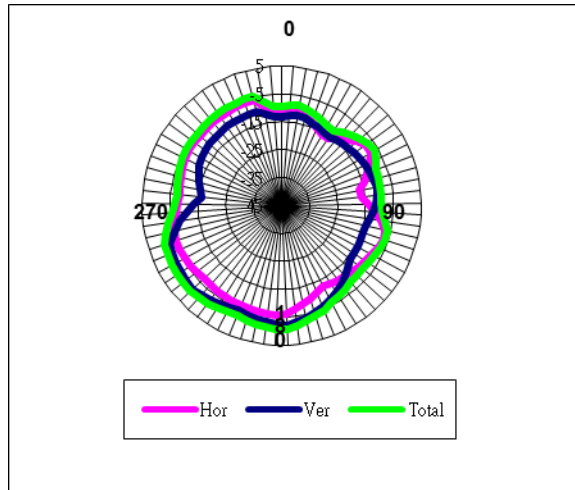
5925.00 MHz		
Horizontal Peak (dBi)	-5.22	0deg
Vertical Peak(dBi)	-5.66	350deg



Radiation characteristic in 3550MHz ~ 3700MHz (LTE Band 48)

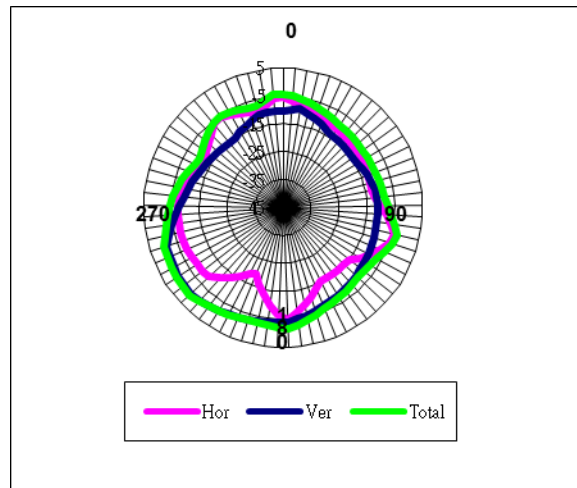
Main antenna: 3550.00 MHz

3550.00 MHz		
Horizontal Peak (dBi)	-4.81	255deg
Vertical Peak(dBi)	-0.95	230deg



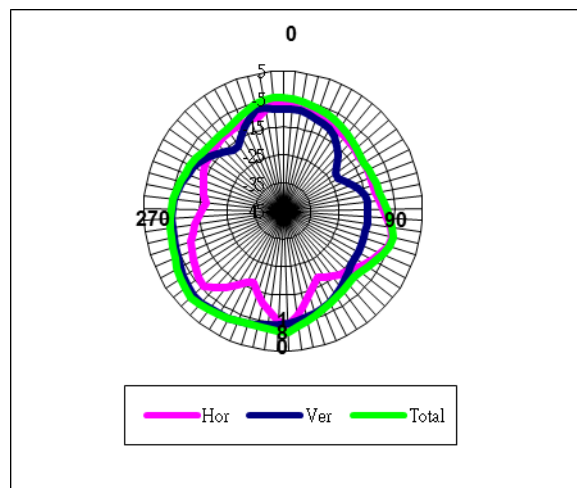
Main antenna: 3625.00 MHz

3625.00 MHz		
Horizontal Peak (dBi)	-3.94	105deg
Vertical Peak(dBi)	0.31	230deg



Main antenna: 3700.00 MHz

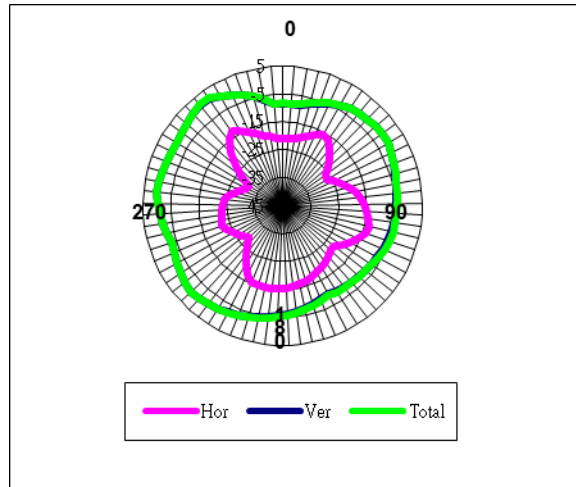
3700.00 MHz		
Horizontal Peak (dBi)	-4.41	180deg
Vertical Peak(dBi)	-0.73	230deg



Radiation characteristic in 1710MHz ~ 1780MHz (LTE, Band 66, n66)

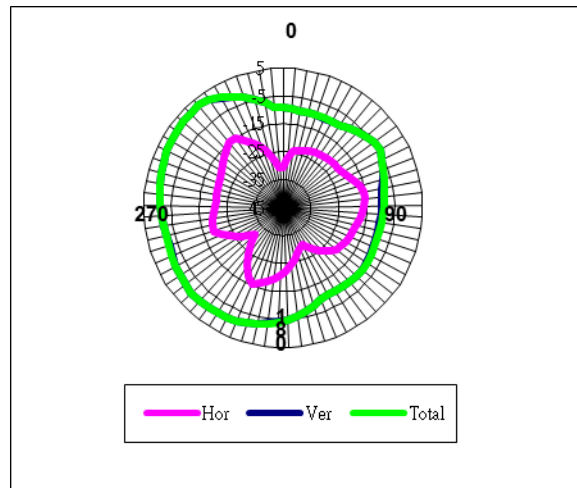
Main antenna: 1710.00 MHz

1710.00 MHz		
Horizontal Peak (dBi)	-12.62	330deg
Vertical Peak(dBi)	1.79	325deg



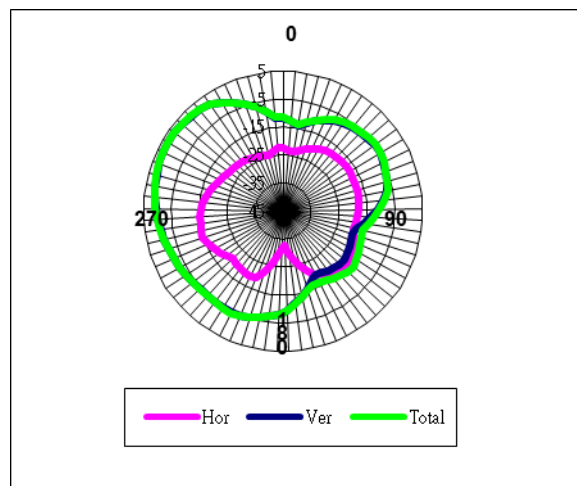
Main antenna: 1745.00 MHz

1745.00 MHz		
Horizontal Peak (dBi)	-14.69	325deg
Vertical Peak(dBi)	1.5	325deg



Main antenna: 1780.00 MHz

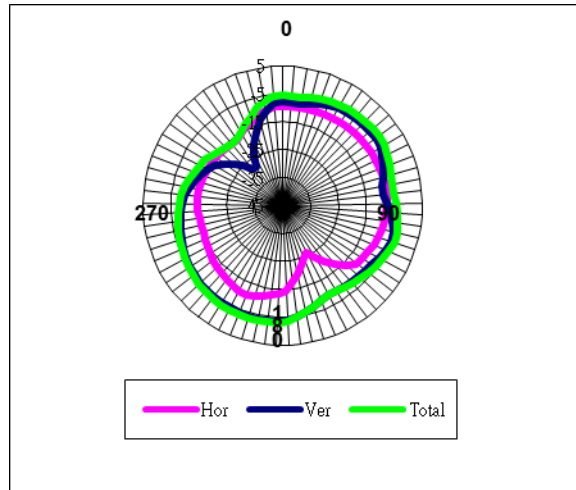
1780.00 MHz		
Horizontal Peak (dBi)	-14.73	255deg
Vertical Peak(dBi)	1.15	305deg



Radiation characteristic in 663MHz ~ 698MHz (LTE, Band 71, n71)

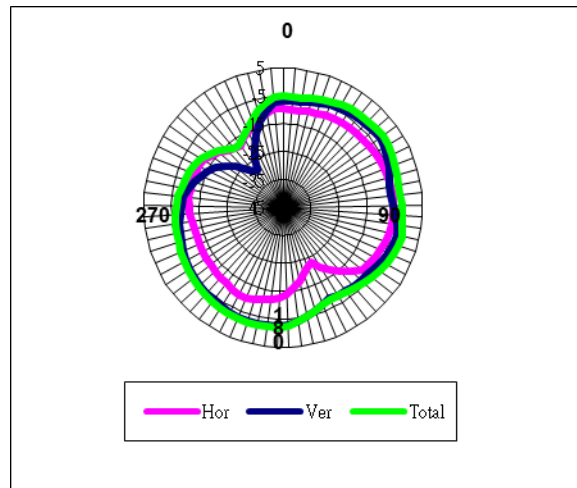
Main antenna: 663.00 MHz

663.00 MHz		
Horizontal Peak (dBi)	-7.41	80deg
Vertical Peak(dBi)	-3.42	185deg



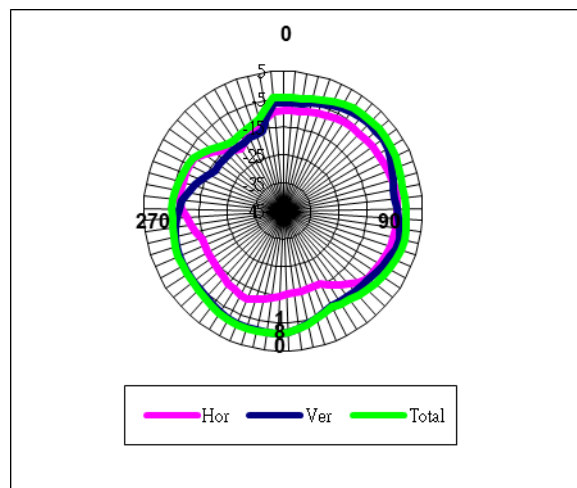
Main antenna: 680.50 MHz

680.50 MHz		
Horizontal Peak (dBi)	-5.49	85deg
Vertical Peak(dBi)	-2.3	55deg



Main antenna: 698.00 MHz

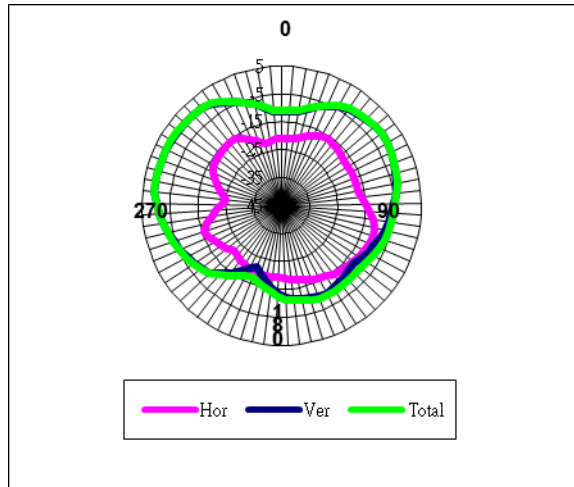
698.00 MHz		
Horizontal Peak (dBi)	-3.93	85deg
Vertical Peak(dBi)	-0.99	55deg



Radiation characteristic in 1432MHz ~ 1517MHz (LTE, Band 75, n75)

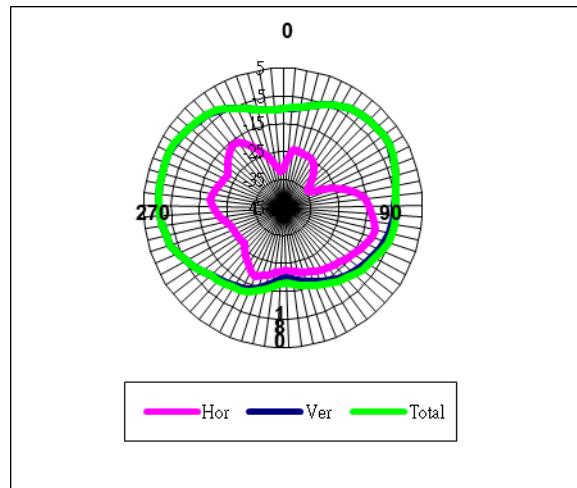
Main antenna: 1432.00 MHz

1432.00 MHz		
Horizontal Peak (dBi)	-10.43	110deg
Vertical Peak(dBi)	1	300deg



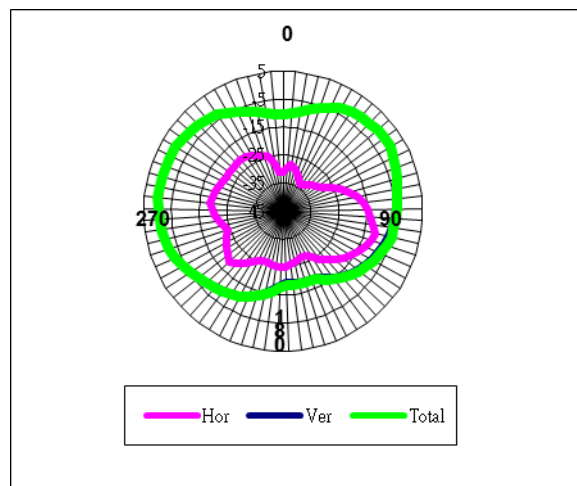
Main antenna: 1474.50 MHz

1474.50 MHz		
Horizontal Peak (dBi)	-11.16	105deg
Vertical Peak(dBi)	0.21	300deg



Main antenna: 1517.00 MHz

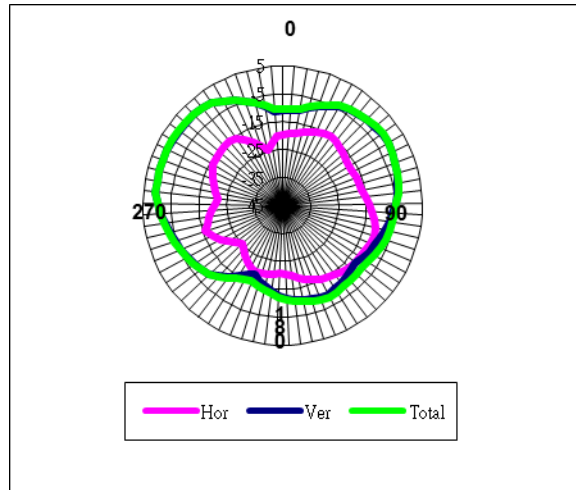
1517.00 MHz		
Horizontal Peak (dBi)	-11.24	105deg
Vertical Peak(dBi)	-0.03	280deg



Radiation characteristic in 1427MHz ~ 1432MHz (LTE, Band 76, n76)

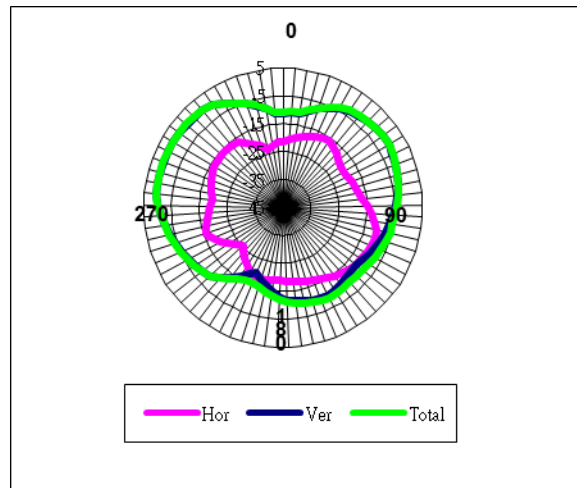
Main antenna: 1427.00 MHz

1427.00 MHz		
Horizontal Peak (dBi)	-10.47	110deg
Vertical Peak(dBi)	0.96	300deg



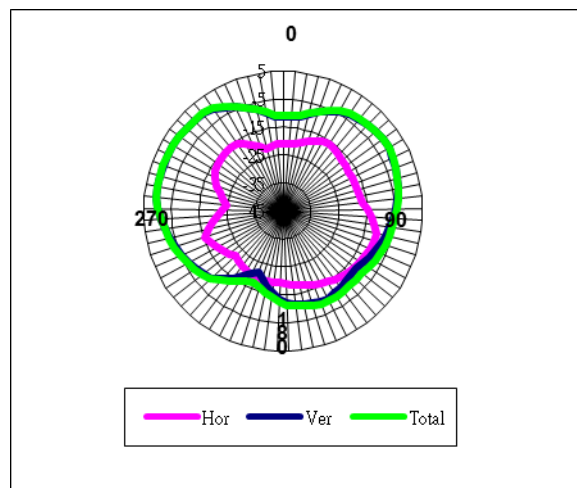
Main antenna: 1429.50 MHz

1429.50 MHz		
Horizontal Peak (dBi)	-10.14	110deg
Vertical Peak(dBi)	0.99	300deg



Main antenna: 1432.00 MHz

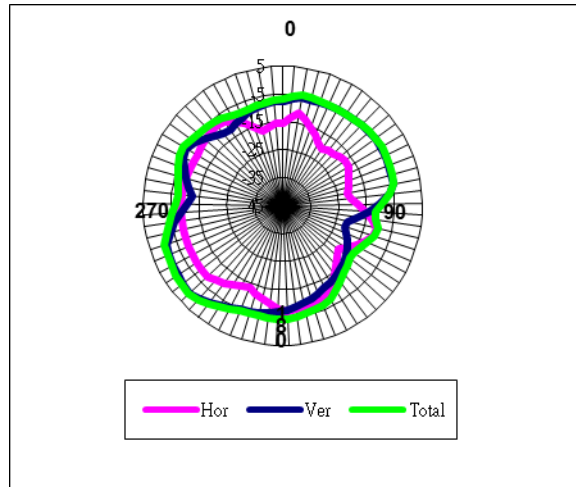
1432.00 MHz		
Horizontal Peak (dBi)	-10.43	110deg
Vertical Peak(dBi)	1	300deg



Radiation characteristic in 3300MHz ~ 4200MHz (5G NR Band 77)

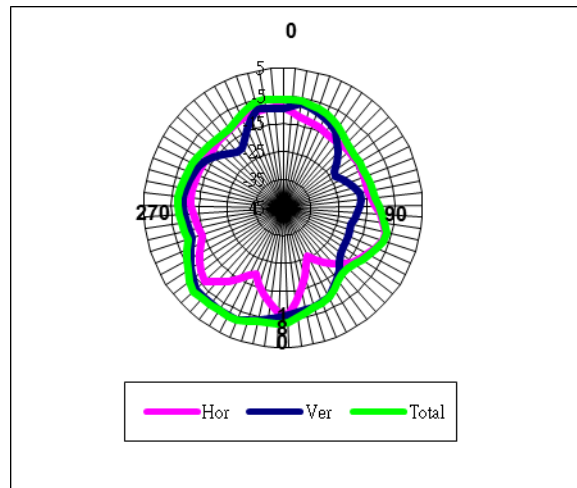
Main antenna: 3300.00 MHz

3300.00 MHz		
Horizontal Peak (dBi)	-7.26	180deg
Vertical Peak(dBi)	0.75	230deg



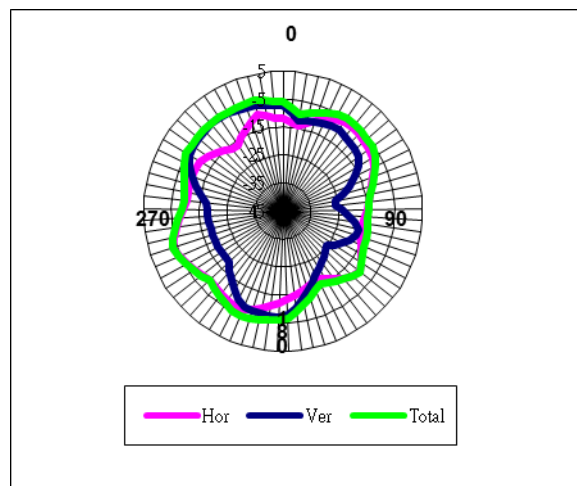
Main antenna: 3750.00 MHz

3750.00 MHz		
Horizontal Peak (dBi)	-6.3	230deg
Vertical Peak(dBi)	-1.63	210deg



Main antenna: 4200.00 MHz

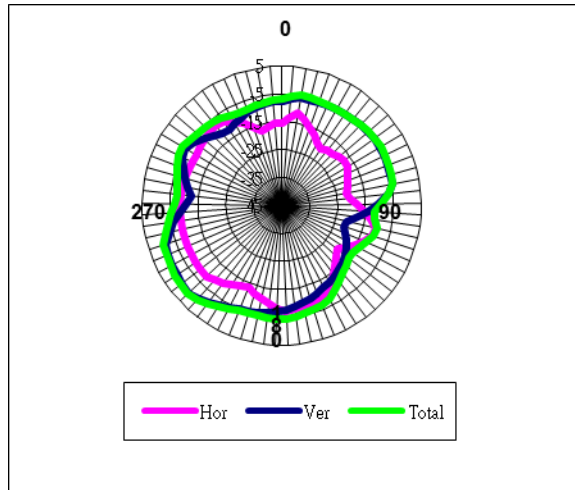
4200.00 MHz		
Horizontal Peak (dBi)	-3.34	255deg
Vertical Peak(dBi)	-4.55	330deg



Radiation characteristic in 3300MHz ~ 3800MHz (5G NR Band 78)

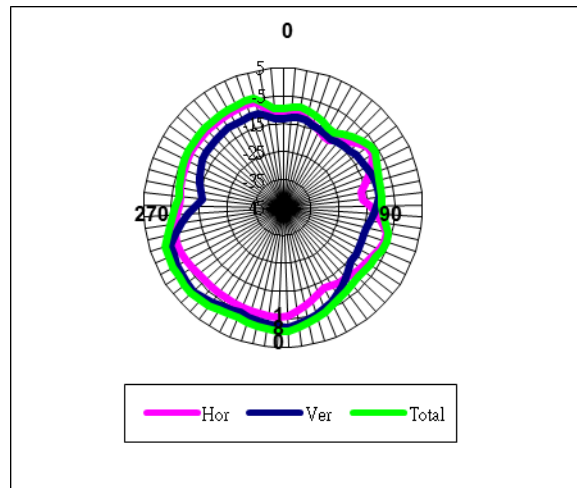
Main antenna: 3300.00 MHz

3300.00 MHz		
Horizontal Peak (dBi)	-7.26	180deg
Vertical Peak(dBi)	0.75	230deg



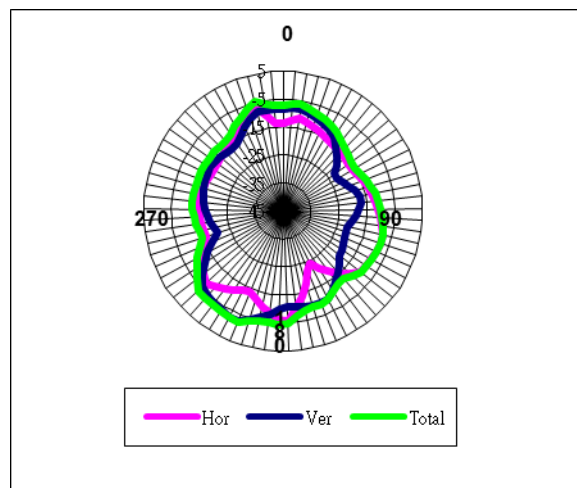
Main antenna: 3550.00 MHz

3550.00 MHz		
Horizontal Peak (dBi)	-4.81	255deg
Vertical Peak(dBi)	-0.95	230deg



Main antenna: 3800.00 MHz

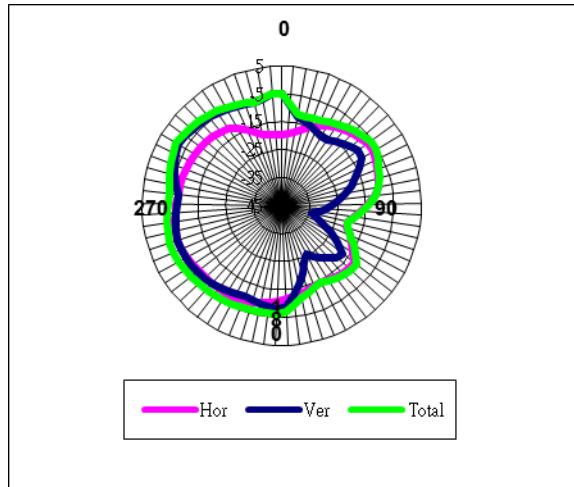
3800.00 MHz		
Horizontal Peak (dBi)	-5.88	180deg
Vertical Peak(dBi)	-2.51	205deg



Radiation characteristic in 4400MHz ~ 5000MHz (5G NR Band 79)

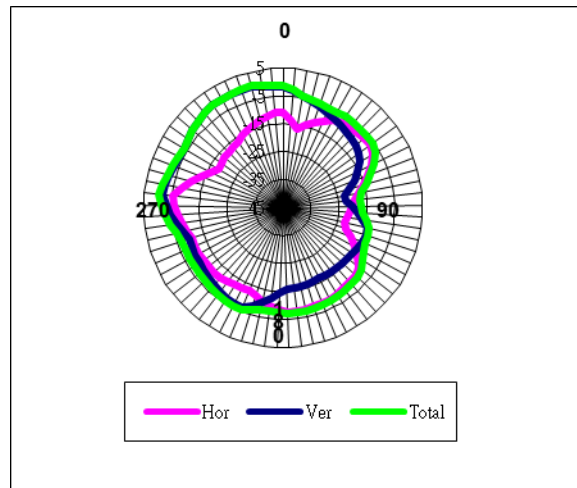
Main antenna: 4400.00 MHz

4400.00 MHz		
Horizontal Peak (dBi)	-5.37	255deg
Vertical Peak(dBi)	-1.83	305deg



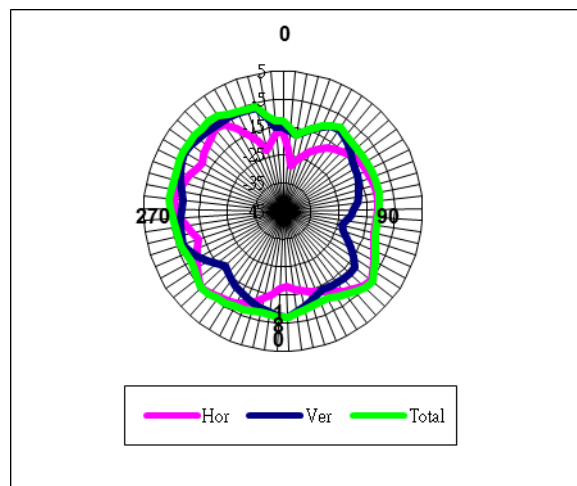
Main antenna: 4700.00 MHz

4700.00 MHz		
Horizontal Peak (dBi)	-5.43	280deg
Vertical Peak(dBi)	-0.18	350deg



Main antenna: 5000.00 MHz

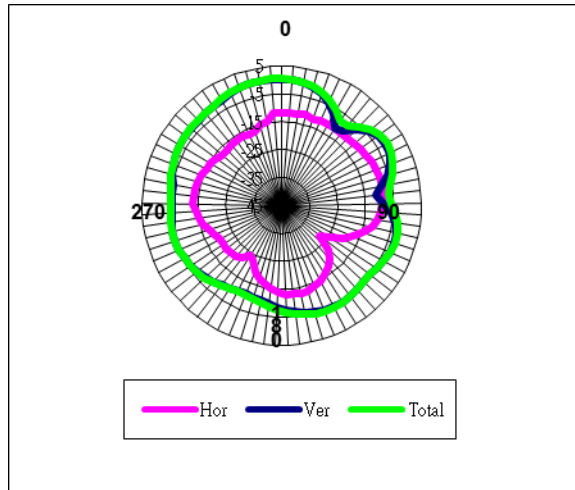
5000.00 MHz		
Horizontal Peak (dBi)	-4.99	130deg
Vertical Peak(dBi)	-4	305deg



Radiation characteristic in 832MHz ~ 862MHz (Band 20, n20)

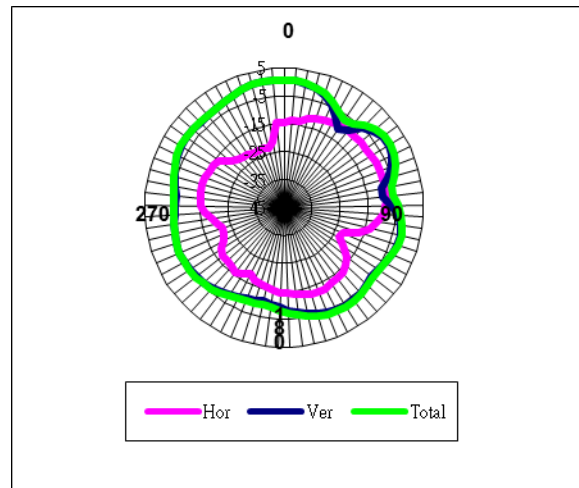
Auxiliary antenna: 832.00 MHz

832.00 MHz		
Horizontal Peak (dBi)	-8.19	80deg
Vertical Peak(dBi)	0.41	355deg



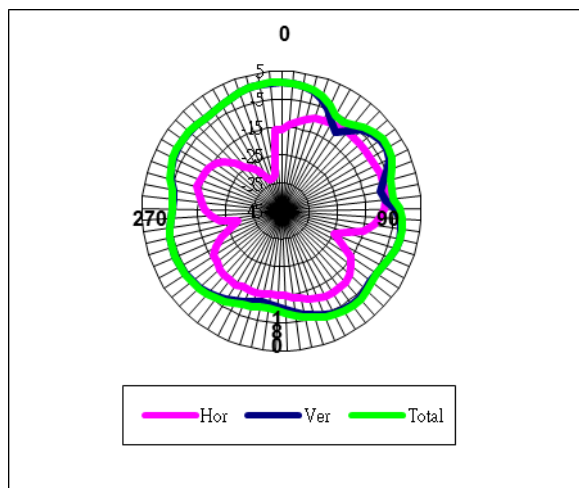
Auxiliary antenna: 847.00 MHz

847.00 MHz		
Horizontal Peak (dBi)	-7.74	85deg
Vertical Peak(dBi)	0.73	355deg



Auxiliary antenna: 862.00 MHz

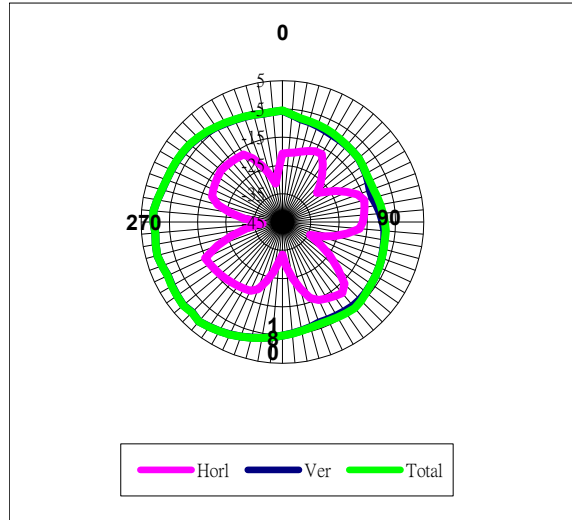
862.00 MHz		
Horizontal Peak (dBi)	-6.94	70deg
Vertical Peak(dBi)	0.93	0deg



Radiation characteristic in 1920MHz ~ 1980MHz (UMTS/HSDPA, Band 1, n1)

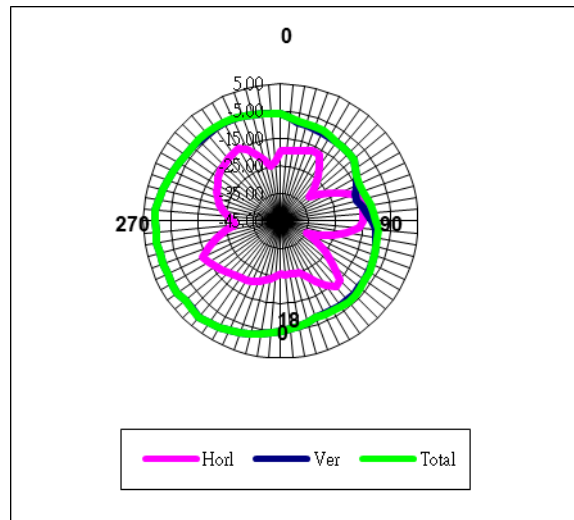
MIMO antenna: 1920.00 MHz

1920.00 MHz		
Horizontal Peak (dBi)	-12.11	140deg
Vertical Peak(dBi)	0.92	220deg



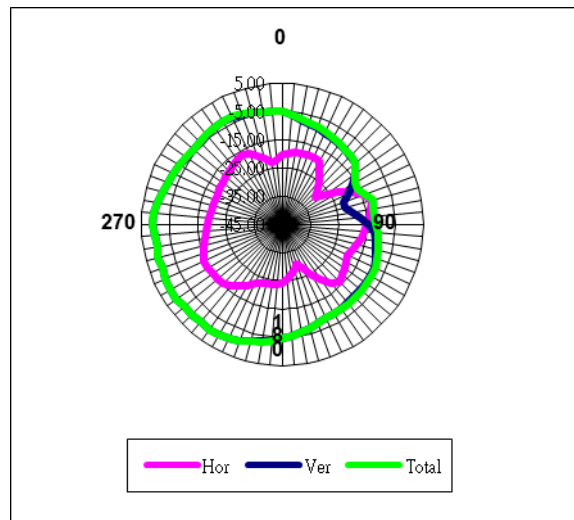
MIMO antenna: 1950.00 MHz

1950.00 MHz		
Horizontal Peak (dBi)	-13.67	140deg
Vertical Peak(dBi)	0.99	220deg



MIMO antenna: 1980.00 MHz

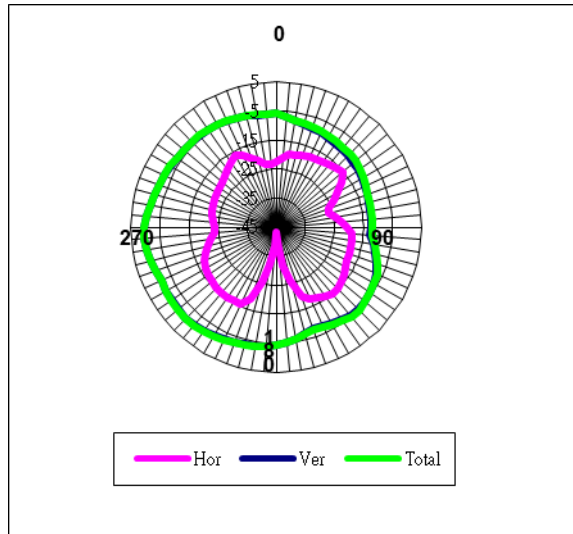
1980.00 MHz		
Horizontal Peak (dBi)	-12.27	75deg
Vertical Peak(dBi)	1	235deg



Radiation characteristic in 1850MHz ~ 1910MHz (PCS, Band 2, n2)

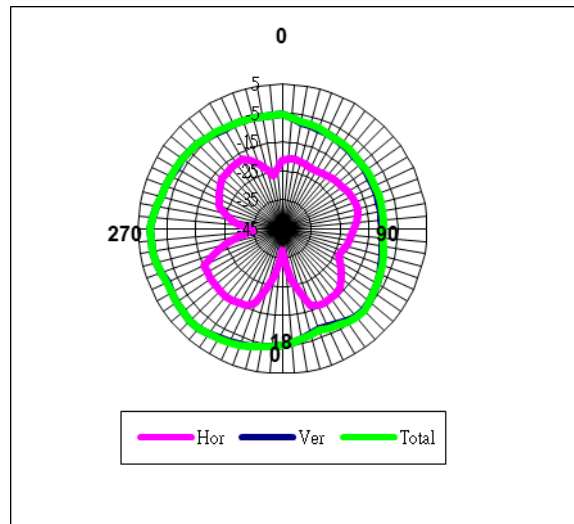
MIMO antenna: 1850.00 MHz

1850.00 MHz		
Horizontal Peak (dBi)	-15.09	135deg
Vertical Peak(dBi)	0.93	265deg



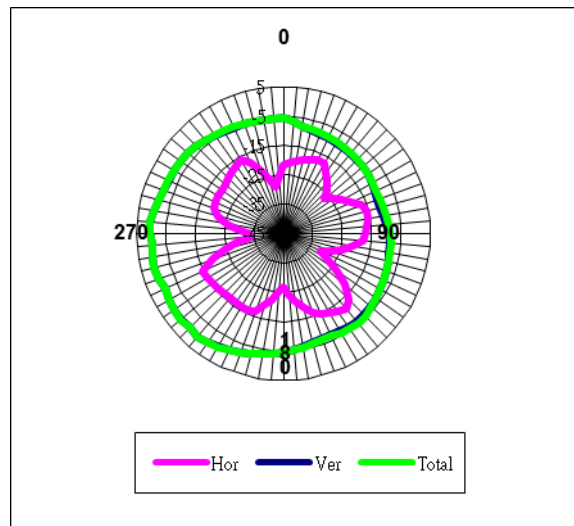
MIMO antenna: 1880.00 MHz

1880.00 MHz		
Horizontal Peak (dBi)	-14.52	225deg
Vertical Peak(dBi)	0.96	270deg



MIMO antenna: 1910.00 MHz

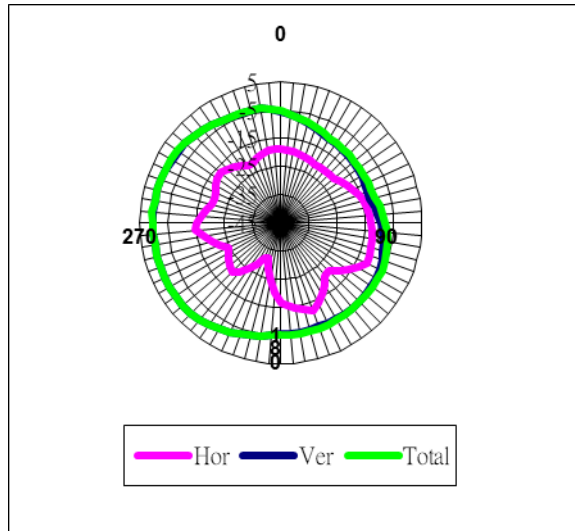
1910.00 MHz		
Horizontal Peak (dBi)	-11.78	140deg
Vertical Peak(dBi)	0.74	220deg



Radiation characteristic in 1710MHz ~ 1785MHz (UE-UTRA, Band 3, n3)

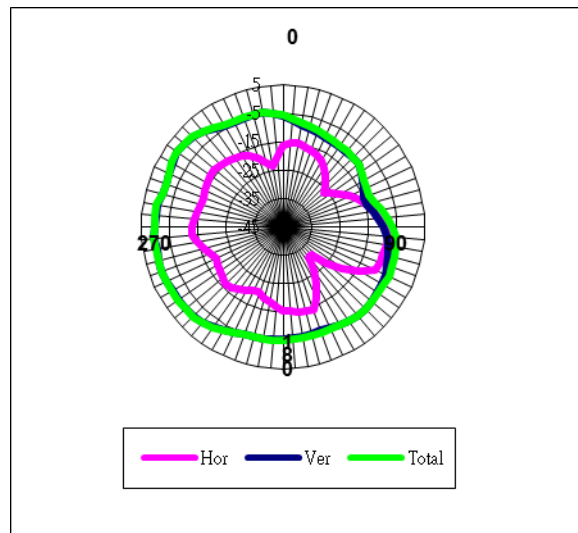
MIMO antenna: 1710.00 MHz

1710.00 MHz		
Horizontal Peak (dBi)	-11.44	115deg
Vertical Peak(dBi)	0.77	245deg



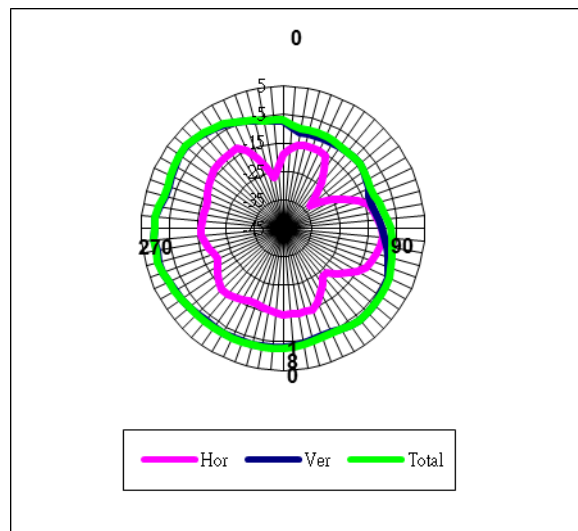
MIMO antenna: 1747.50 MHz

1747.50 MHz		
Horizontal Peak (dBi)	-7.73	95deg
Vertical Peak(dBi)	0.86	250deg



MIMO antenna: 1785.00 MHz

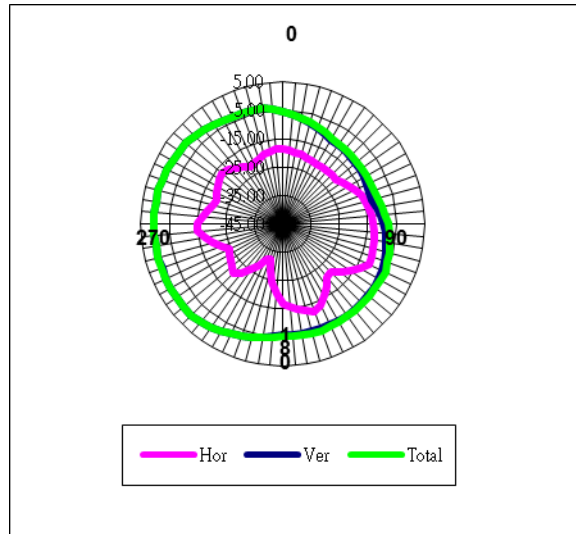
1785.00 MHz		
Horizontal Peak (dBi)	-9.63	95deg
Vertical Peak(dBi)	0.71	265deg



Radiation characteristic in 1710MHz ~ 1755MHz (UMTS(AWS), Band 4)

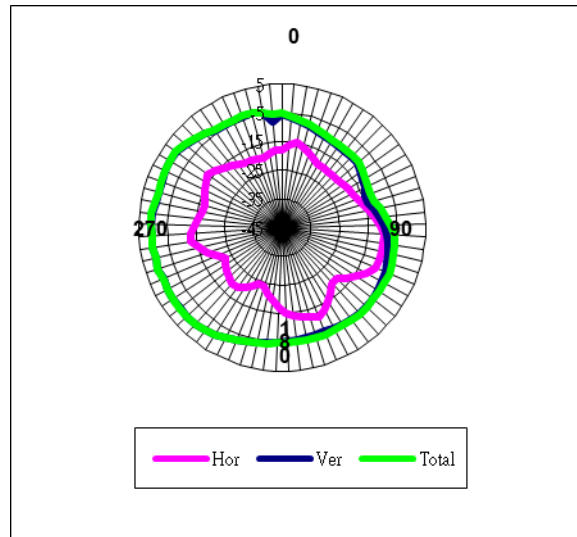
MIMO antenna: 1710.00 MHz

1710.00 MHz		
Horizontal Peak (dBi)	-11.44	115deg
Vertical Peak(dBi)	0.77	245deg



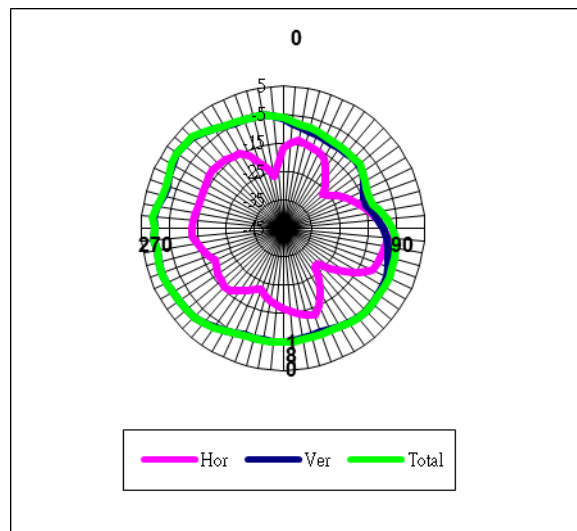
MIMO antenna: 1732.50 MHz

1732.50 MHz		
Horizontal Peak (dBi)	-9.21	95deg
Vertical Peak(dBi)	0.8	265deg



MIMO antenna: 1755.00 MHz

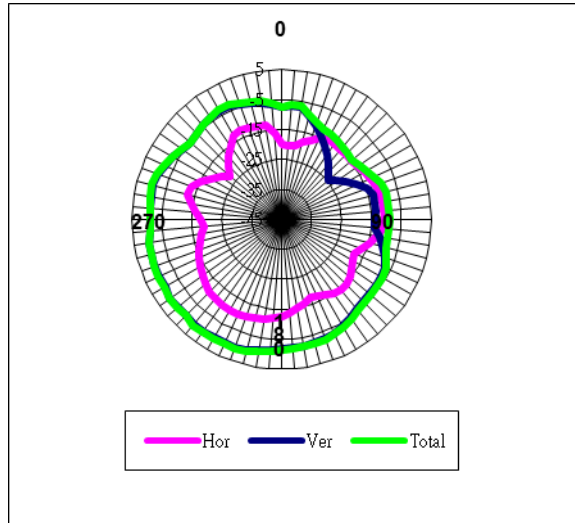
1755.00 MHz		
Horizontal Peak (dBi)	-7.94	95deg
Vertical Peak(dBi)	0.9	275deg



Radiation characteristic in 2500MHz ~ 2570MHz (UE-UTRA, Band 7, n7)

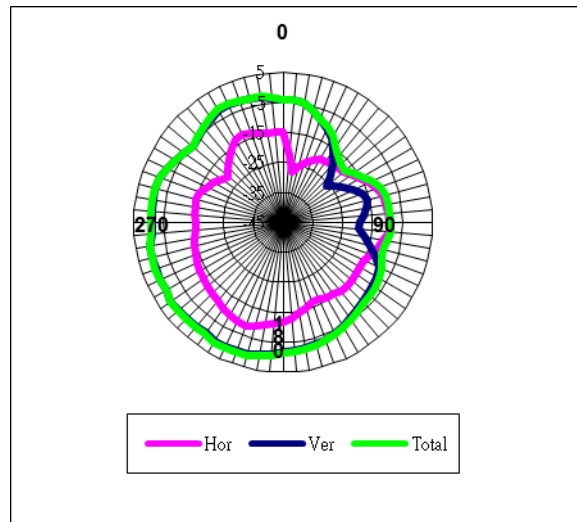
MIMO antenna: 2500.00 MHz

2500.00 MHz		
Horizontal Peak (dBi)	-10.11	205deg
Vertical Peak(dBi)	0.91	220deg



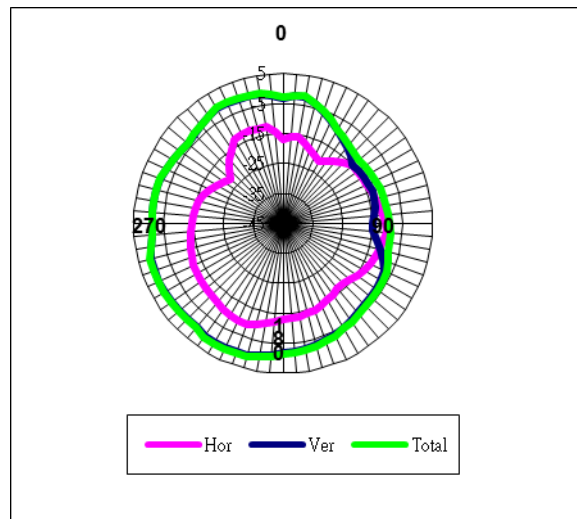
MIMO antenna: 2535.00 MHz

2535.00 MHz		
Horizontal Peak (dBi)	-8.39	200deg
Vertical Peak(dBi)	0.86	235deg



MIMO antenna: 2570.00 MHz

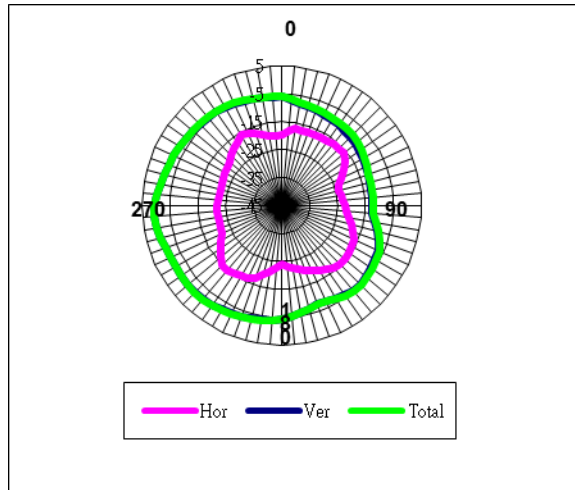
2570.00 MHz		
Horizontal Peak (dBi)	-9.26	205deg
Vertical Peak(dBi)	0.96	235deg



Radiation characteristic in 1850MHz ~ 1915MHz (UE-UTRA, Band 25)

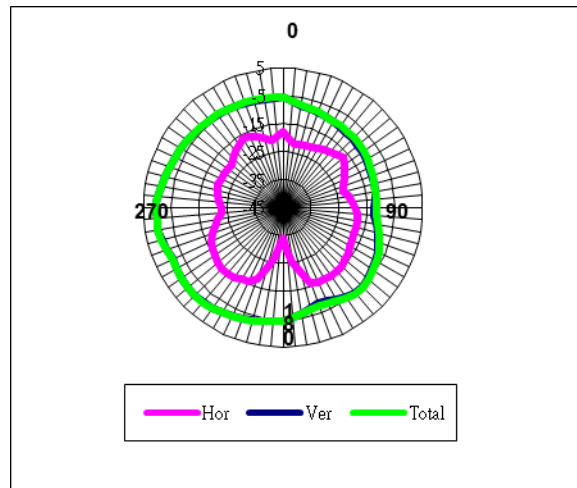
MIMO antenna: 1850.00 MHz

1850.00 MHz		
Horizontal Peak (dBi)	-14.62	220deg
Vertical Peak(dBi)	0.92	265deg



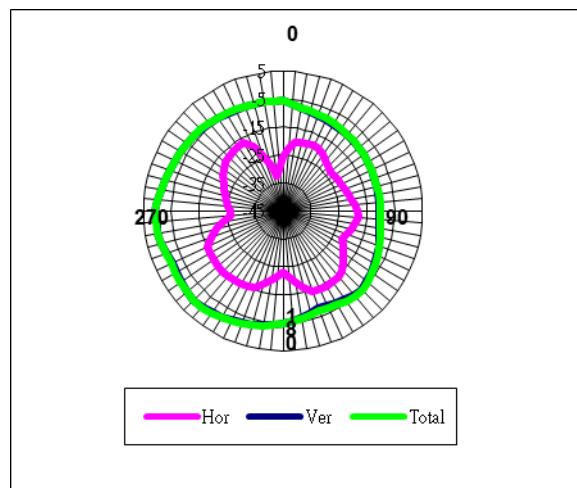
MIMO antenna: 1882.50 MHz

1882.50 MHz		
Horizontal Peak (dBi)	-13.8	225deg
Vertical Peak(dBi)	0.85	270deg



MIMO antenna: 1915.00 MHz

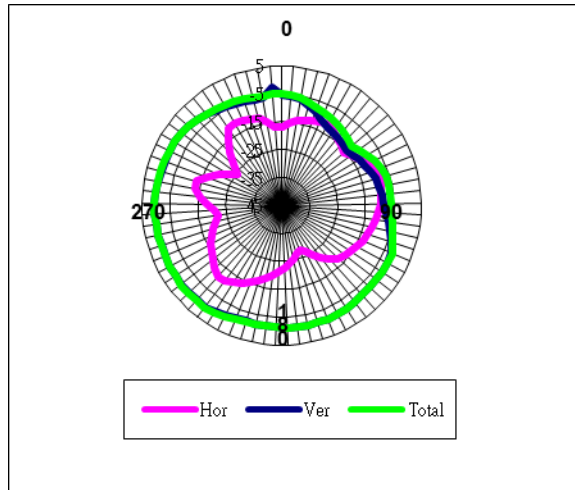
1915.00 MHz		
Horizontal Peak (dBi)	-14.05	155deg
Vertical Peak(dBi)	0.98	270deg



Radiation characteristic in 2305MHz ~ 2315MHz (UE-UTRA, Band 30)

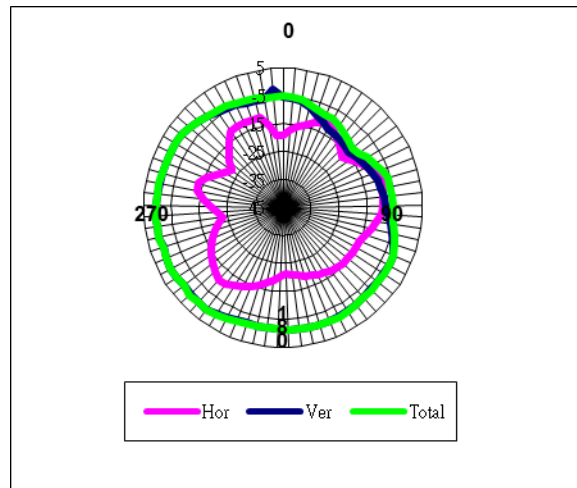
MIMO antenna: 2305.00 MHz

2305.00 MHz		
Horizontal Peak (dBi)	-8.05	75deg
Vertical Peak(dBi)	0.98	270deg



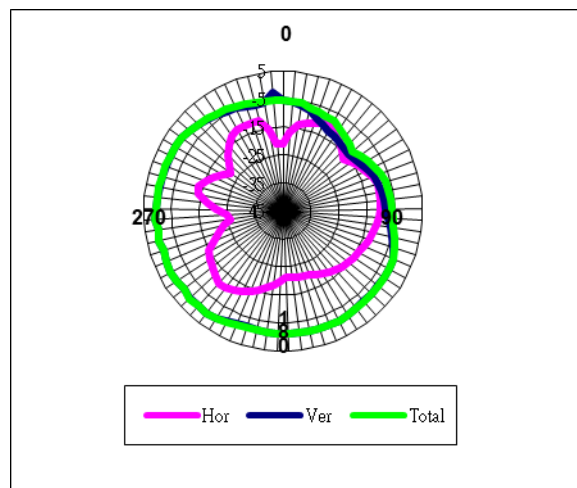
MIMO antenna: 2310.00 MHz

2310.00 MHz		
Horizontal Peak (dBi)	-8.43	75deg
Vertical Peak(dBi)	0.97	270deg



MIMO antenna: 2315.00 MHz

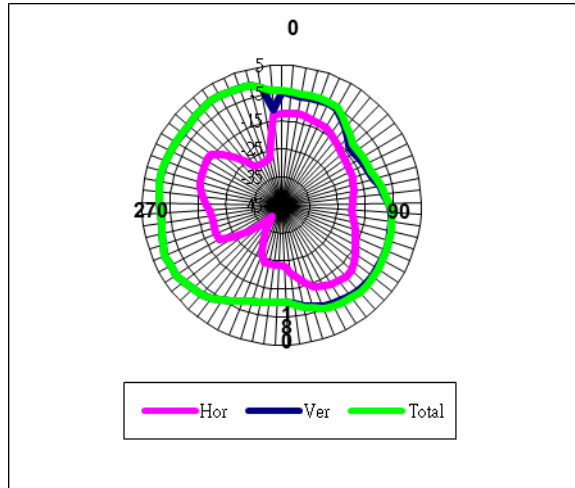
2315.00 MHz		
Horizontal Peak (dBi)	-9.76	75deg
Vertical Peak(dBi)	0.94	270deg



Radiation characteristic in 1452MHz ~ 1496MHz (UE-UTRA, Band 32)

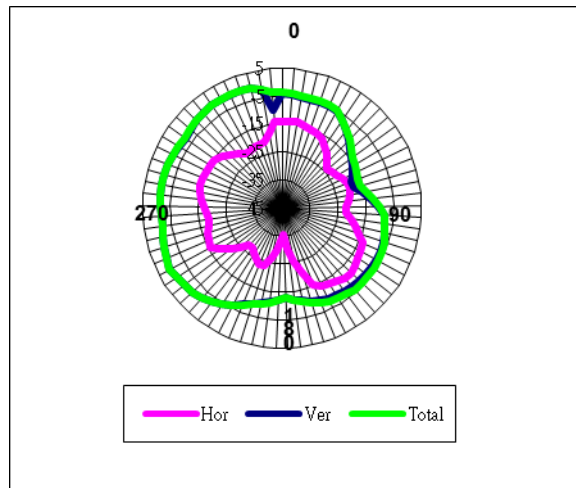
MIMO antenna: 1452.00 MHz

1452.00 MHz		
Horizontal Peak (dBi)	-10.59	140deg
Vertical Peak(dBi)	0.58	250deg



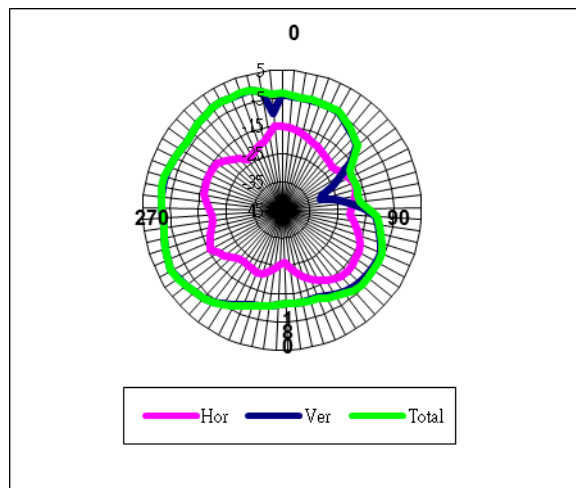
MIMO antenna: 1474.00 MHz

1474.00 MHz		
Horizontal Peak (dBi)	-11.32	135deg
Vertical Peak(dBi)	0.78	245deg



MIMO antenna: 1496.00 MHz

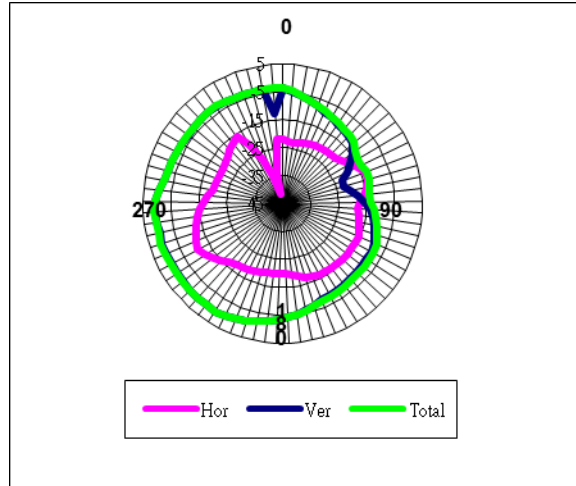
1496.00 MHz		
Horizontal Peak (dBi)	-12.69	135deg
Vertical Peak(dBi)	0.15	245deg



Radiation characteristic in 2010MHz ~ 2025MHz (UE-UTRA, Band 34)

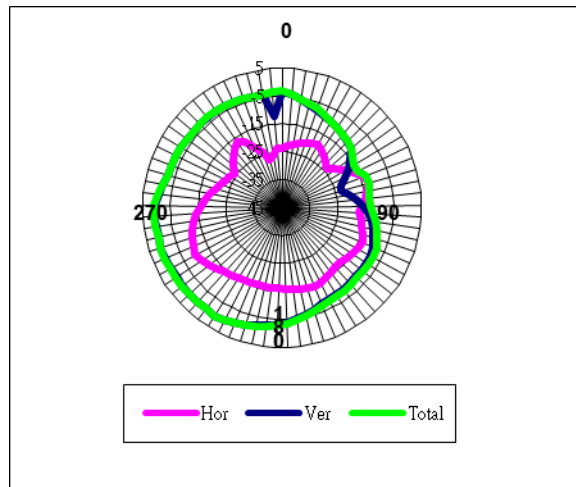
MIMO antenna: 2010.00 MHz

2010.00 MHz		
Horizontal Peak (dBi)	-10.24	245deg
Vertical Peak(dBi)	0.95	270deg



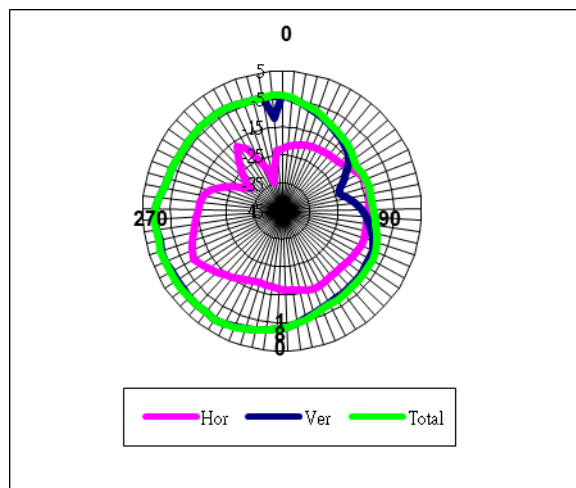
MIMO antenna: 2017.50 MHz

2017.50 MHz		
Horizontal Peak (dBi)	-9.46	245deg
Vertical Peak(dBi)	0.84	255deg



MIMO antenna: 2025.00 MHz

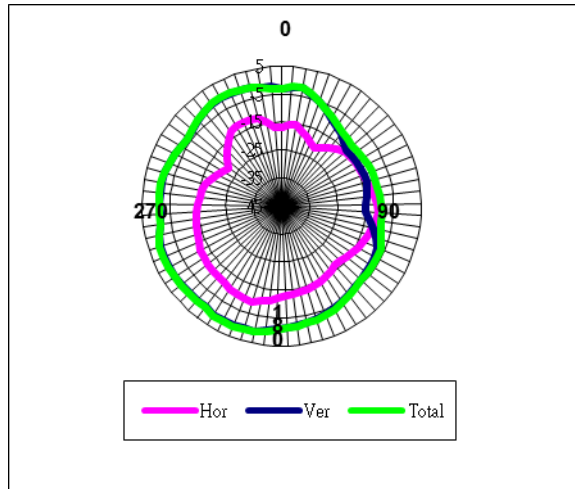
2025.00 MHz		
Horizontal Peak (dBi)	-9.02	245deg
Vertical Peak(dBi)	0.73	255deg



Radiation characteristic in 2570MHz ~ 2620MHz (UE-UTRA, Band 38, n38)

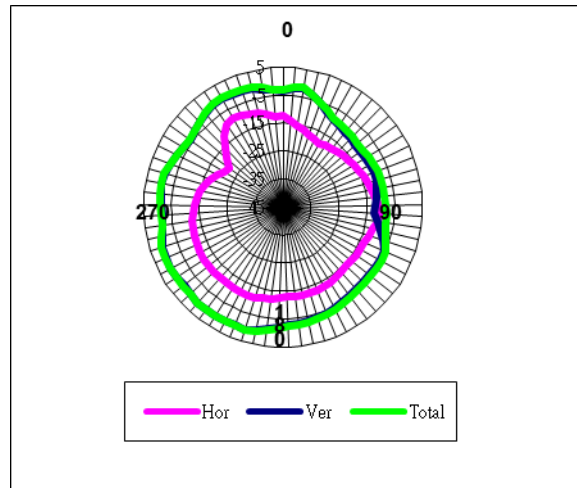
MIMO antenna: 2570.00 MHz

2570.00 MHz		
Horizontal Peak (dBi)	-9.26	205deg
Vertical Peak(dBi)	0.96	215deg



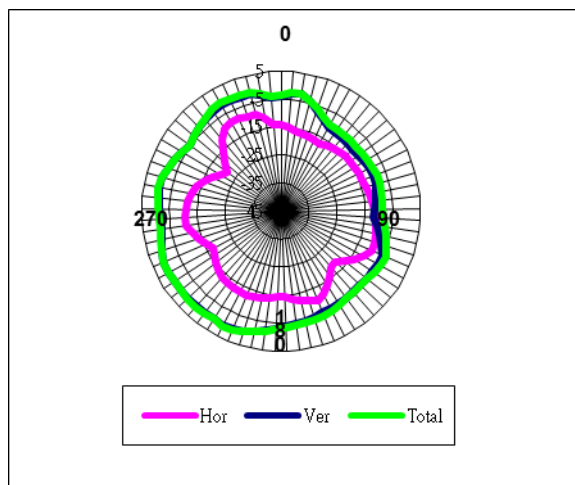
MIMO antenna: 2595.00 MHz

2595.00 MHz		
Horizontal Peak (dBi)	-8.48	335deg
Vertical Peak(dBi)	0.88	200deg



MIMO antenna: 2620.00 MHz

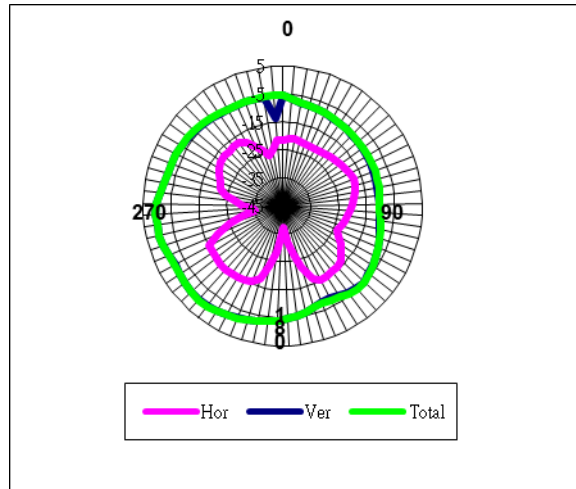
2620.00 MHz		
Horizontal Peak (dBi)	-8.33	335deg
Vertical Peak(dBi)	0.91	250deg



Radiation characteristic in 1880MHz ~ 1920MHz (UE-UTRA, Band 39, n39)

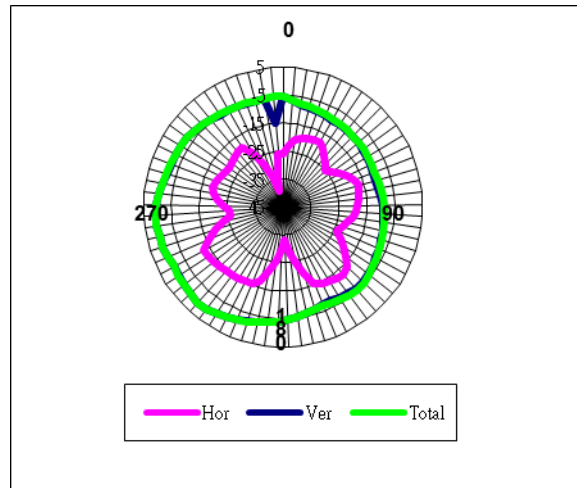
MIMO antenna: 1880.00 MHz

1880.00 MHz		
Horizontal Peak (dBi)	-14.52	225deg
Vertical Peak(dBi)	0.96	270deg



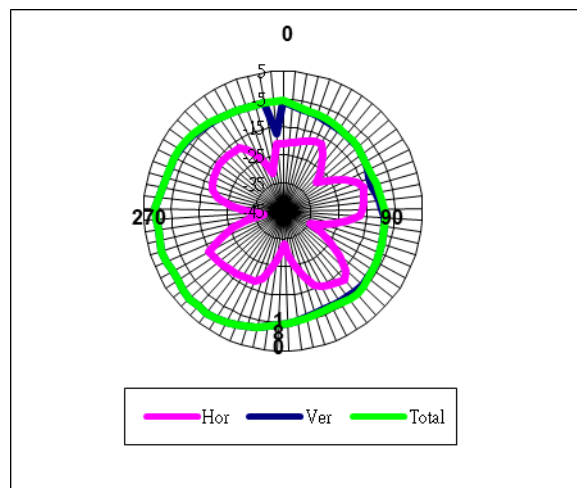
MIMO antenna: 1900.00 MHz

1900.00 MHz		
Horizontal Peak (dBi)	-12.61	245deg
Vertical Peak(dBi)	0.8	225deg



MIMO antenna: 1920.00 MHz

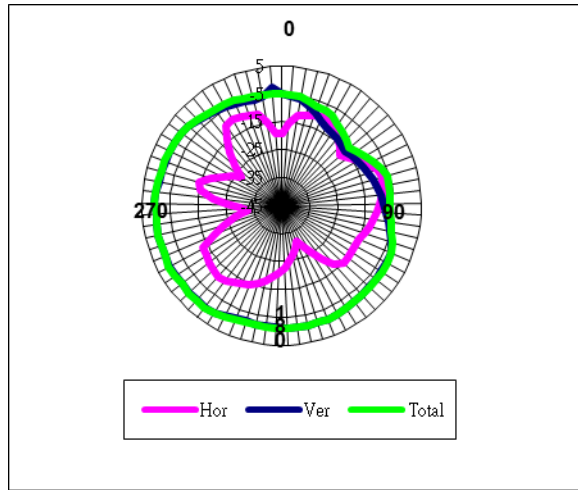
1920.00 MHz		
Horizontal Peak (dBi)	-12.11	140deg
Vertical Peak(dBi)	0.92	220deg



Radiation characteristic in 2300MHz ~ 2400MHz (UE-UTRA, Band 40)

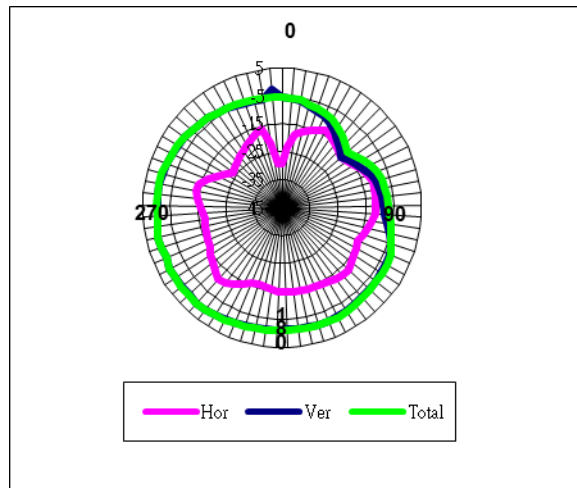
MIMO antenna: 2300.00 MHz

2300.00 MHz		
Horizontal Peak (dBi)	-7.43	75deg
Vertical Peak(dBi)	0.77	245deg



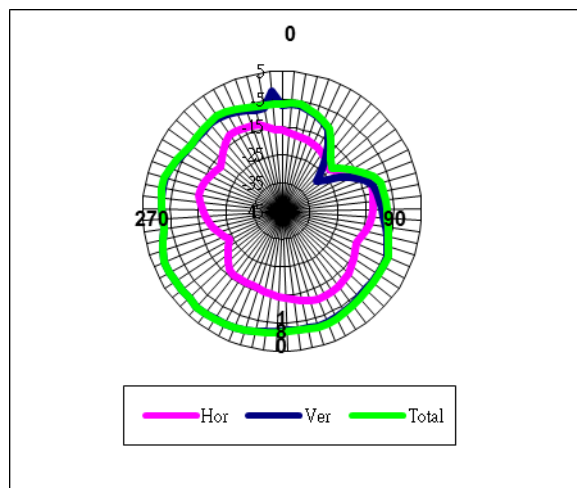
MIMO antenna: 2350.00 MHz

2350.00 MHz		
Horizontal Peak (dBi)	-10.75	225deg
Vertical Peak(dBi)	0.94	225deg



MIMO antenna: 2400.00 MHz

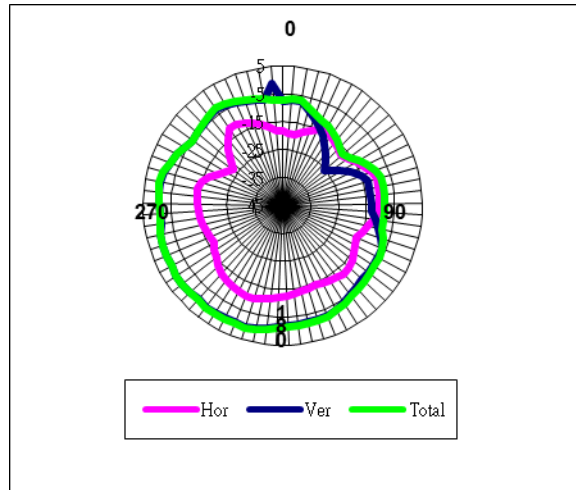
2400.00 MHz		
Horizontal Peak (dBi)	-10.87	160deg
Vertical Peak(dBi)	0.98	245deg



Radiation characteristic in 2496MHz ~ 2690MHz (UE-UTRA, Band 41, n41)

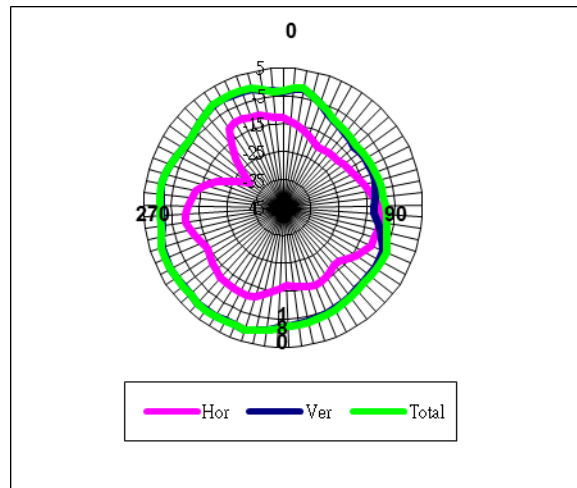
MIMO antenna: 2496.00 MHz

2496.00 MHz		
Horizontal Peak (dBi)	-9.91	75deg
Vertical Peak(dBi)	0.96	240deg



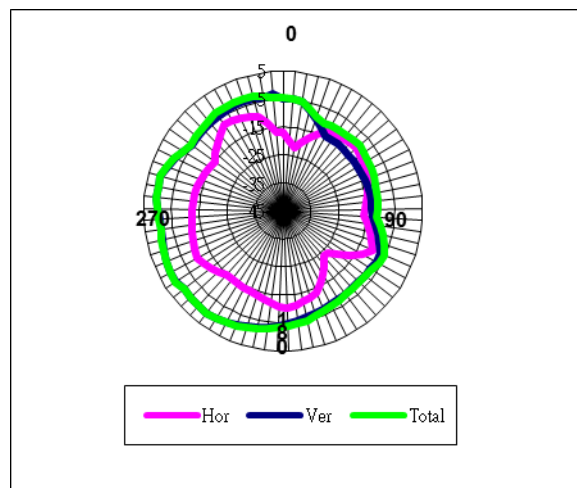
MIMO antenna: 2593.00 MHz

2593.00 MHz		
Horizontal Peak (dBi)	-9.52	95deg
Vertical Peak(dBi)	0.96	225deg



MIMO antenna: 2690.00 MHz

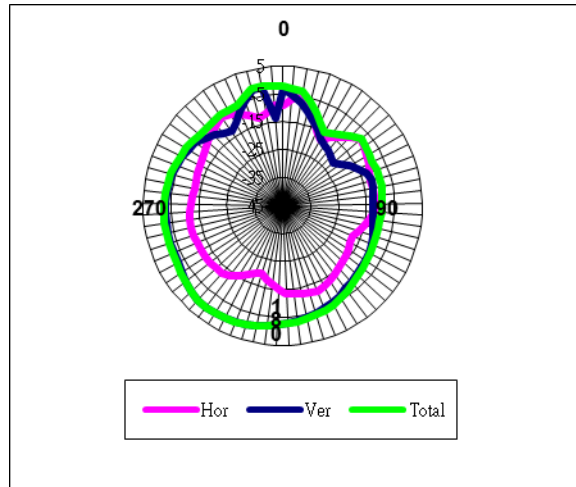
2690.00 MHz		
Horizontal Peak (dBi)	-7.75	330deg
Vertical Peak(dBi)	0.92	220deg



Radiation characteristic in 3400MHz ~ 3600MHz (LTE Band 42)

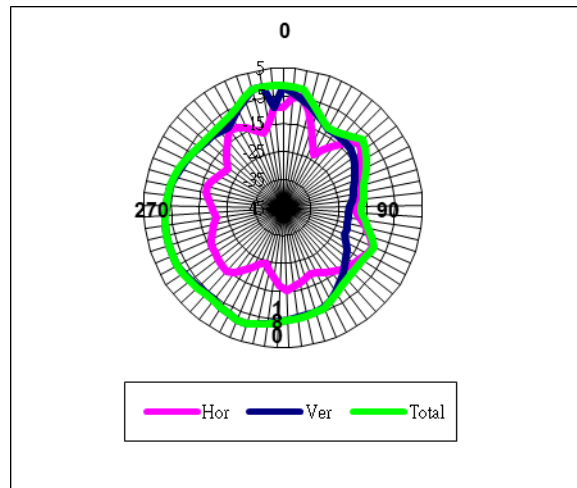
MIMO antenna: 3400.00 MHz

3400.00 MHz		
Horizontal Peak (dBi)	-5.77	10deg
Vertical Peak(dBi)	0.59	220deg



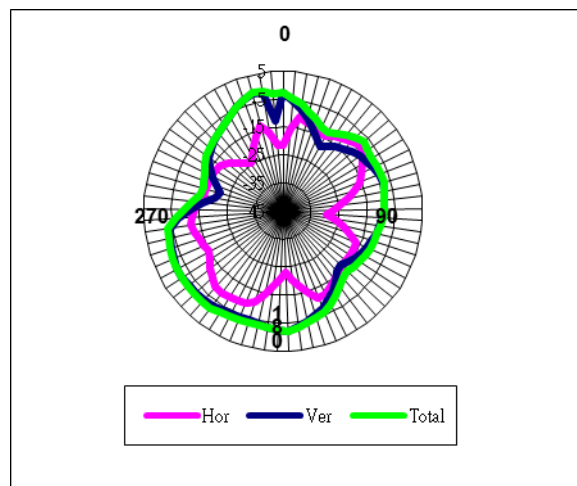
MIMO antenna: 3500.00 MHz

3500.00 MHz		
Horizontal Peak (dBi)	-4.14	10deg
Vertical Peak(dBi)	-1.17	355deg



MIMO antenna: 3600.00 MHz

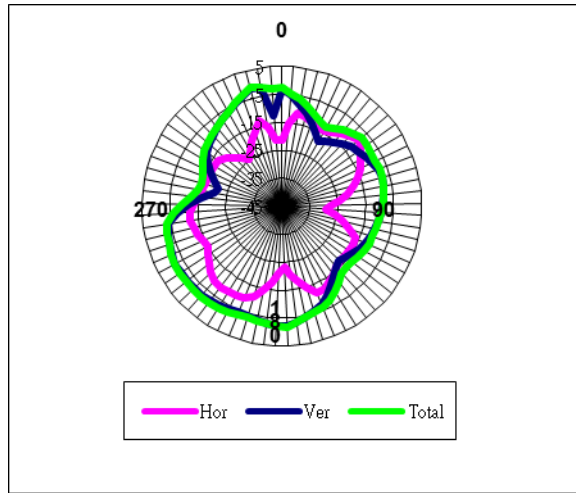
3600.00 MHz		
Horizontal Peak (dBi)	-8.49	220deg
Vertical Peak(dBi)	-1.56	350deg



Radiation characteristic in 3600MHz ~ 3800MHz (LTE Band 43)

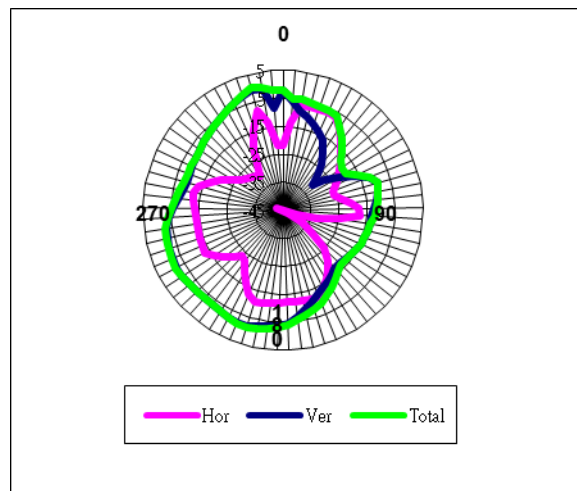
MIMO antenna: 3600.00 MHz

3600.00 MHz		
Horizontal Peak (dBi)	-8.49	220deg
Vertical Peak(dBi)	-1.56	350deg



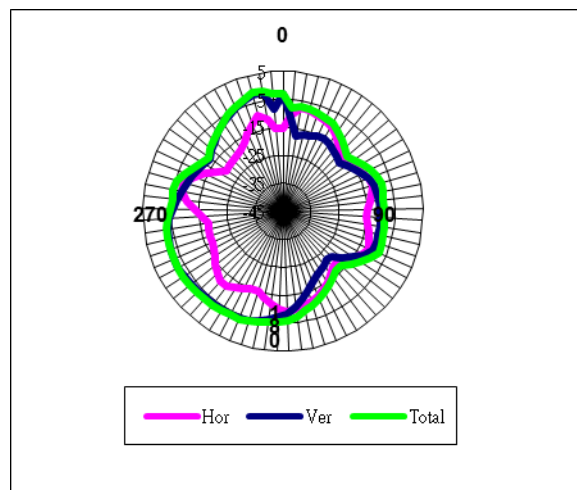
MIMO antenna: 3700.00 MHz

3700.00 MHz		
Horizontal Peak (dBi)	-6.38	25deg
Vertical Peak(dBi)	-0.5	350deg



MIMO antenna: 3800.00 MHz

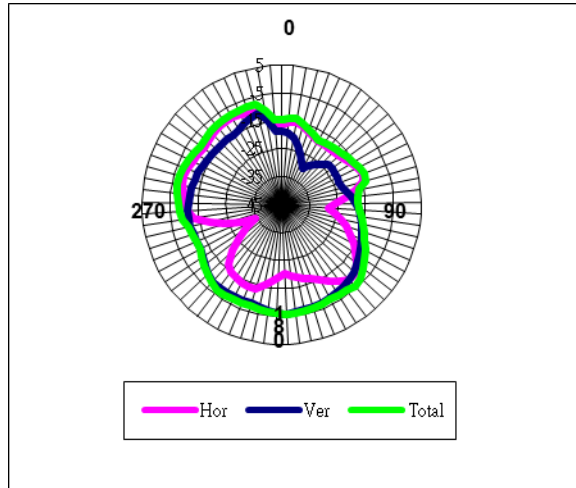
3800.00 MHz		
Horizontal Peak (dBi)	-7.26	10deg
Vertical Peak(dBi)	-1.83	350deg



Radiation characteristic in 5150MHz ~ 5925MHz (LTE Band 46)

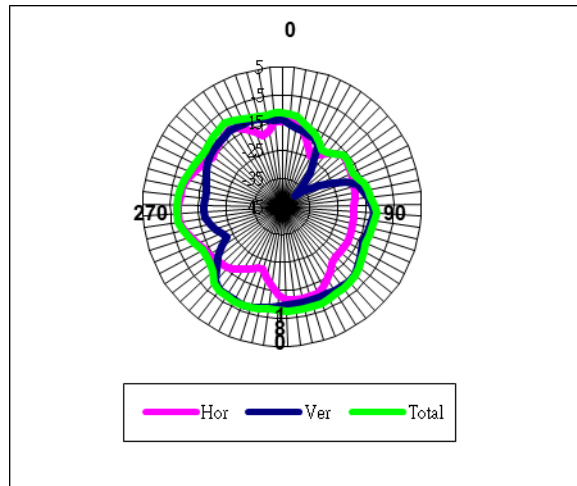
MIMO antenna: 5150.00 MHz

5150.00 MHz		
Horizontal Peak (dBi)	-8.39	290deg
Vertical Peak(dBi)	-5.83	180deg



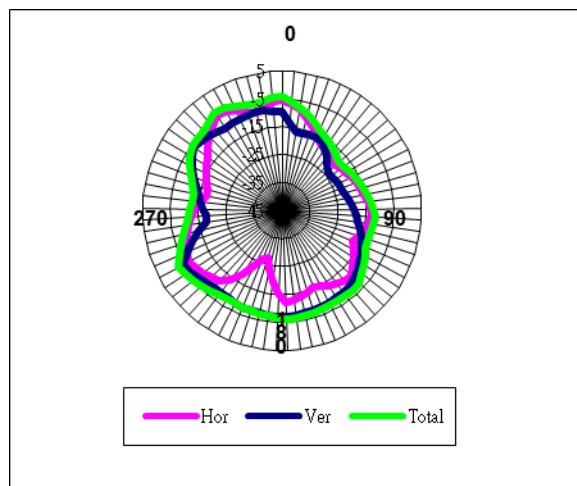
MIMO antenna: 5537.00 MHz

5537.00 MHz		
Horizontal Peak (dBi)	-7.65	270deg
Vertical Peak(dBi)	-7.19	205deg



MIMO antenna: 5925.00 MHz

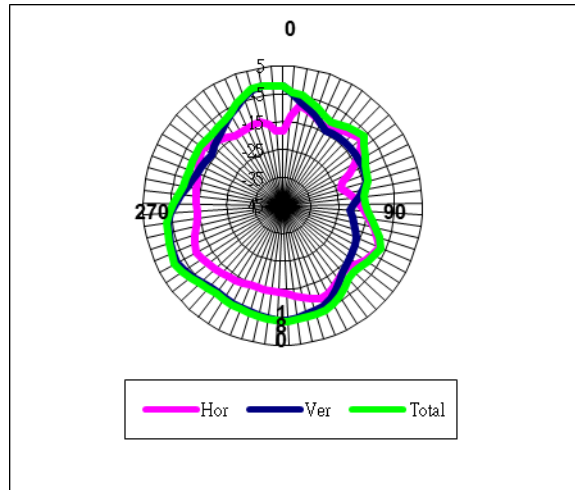
5925.00 MHz		
Horizontal Peak (dBi)	-3.41	330deg
Vertical Peak(dBi)	-4.59	245deg



Radiation characteristic in 3550MHz ~ 3700MHz (LTE Band 48)

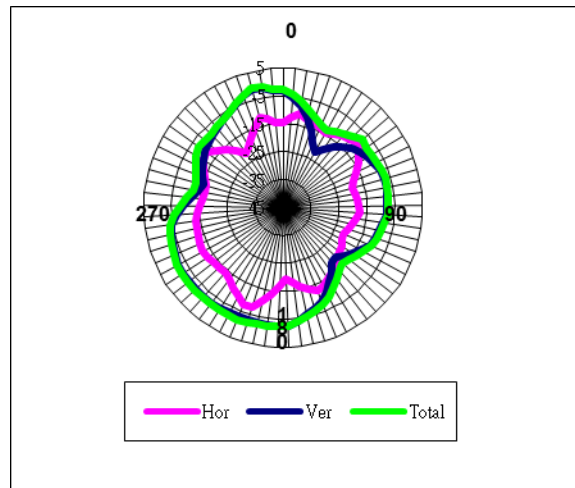
MIMO antenna: 3550.00 MHz

3550.00 MHz		
Horizontal Peak (dBi)	-7.14	115deg
Vertical Peak(dBi)	-1.66	355deg



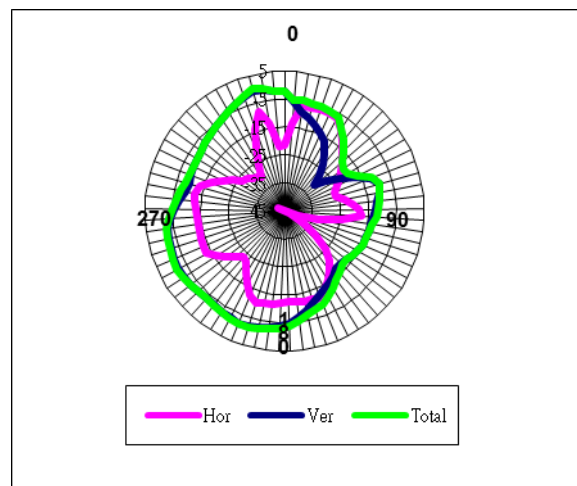
MIMO antenna: 3625.00 MHz

3625.00 MHz		
Horizontal Peak (dBi)	-7.54	205deg
Vertical Peak(dBi)	-1.1	350deg



MIMO antenna: 3700.00 MHz

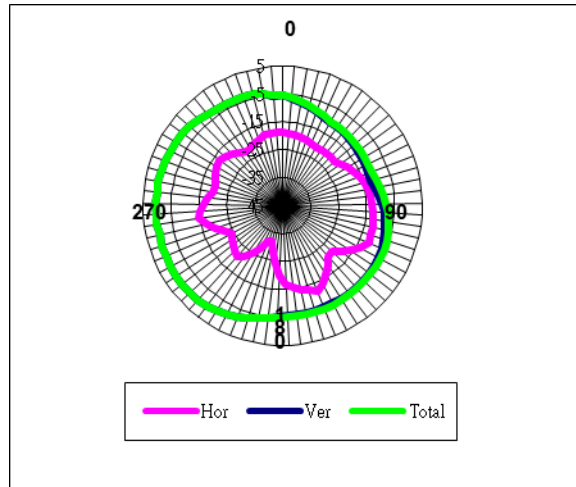
3700.00 MHz		
Horizontal Peak (dBi)	-6.38	25deg
Vertical Peak(dBi)	-0.5	350deg



Radiation characteristic in 1710MHz ~ 1780MHz (Band 66, n66)

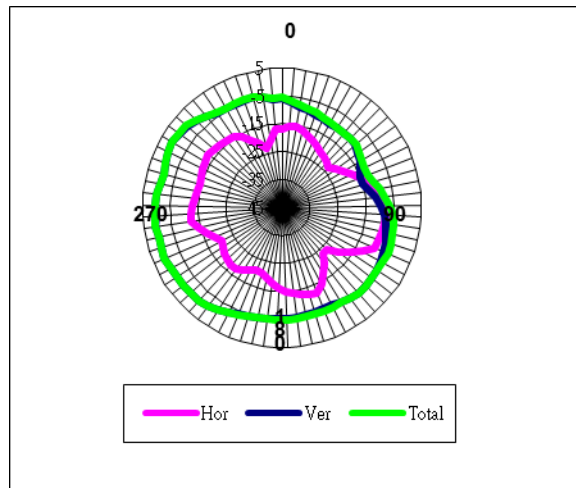
MIMO antenna: 1710.00 MHz

1710.00 MHz		
Horizontal Peak (dBi)	-11.44	115deg
Vertical Peak(dBi)	0.77	245deg



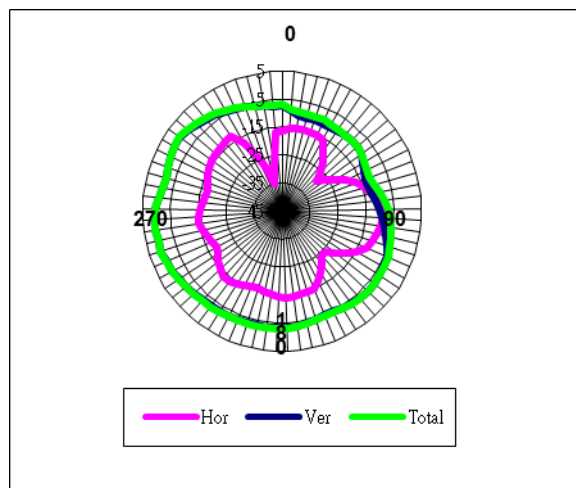
MIMO antenna: 1745.00 MHz

1745.00 MHz		
Horizontal Peak (dBi)	-7.83	95deg
Vertical Peak(dBi)	0.86	250deg



MIMO antenna: 1780.00 MHz

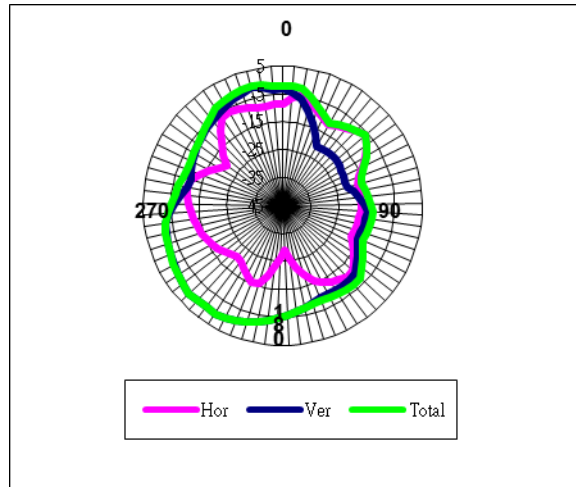
1780.00 MHz		
Horizontal Peak (dBi)	-8.54	95deg
Vertical Peak(dBi)	0.88	265deg



Radiation characteristic in 3300MHz ~ 4200MHz (5G NR Band 77)

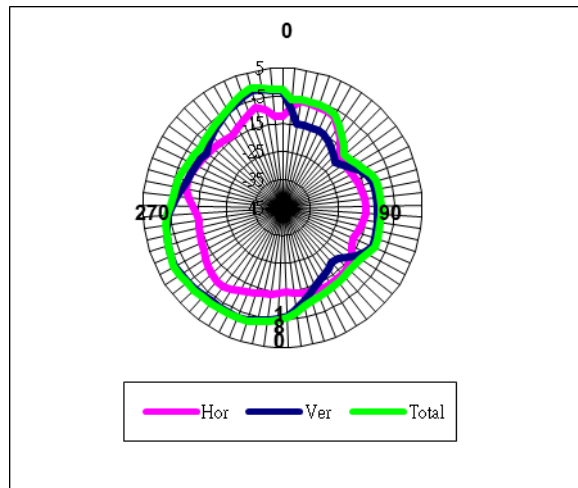
MIMO antenna: 3300.00 MHz

3300.00 MHz		
Horizontal Peak (dBi)	-4.94	10deg
Vertical Peak(dBi)	0.99	230deg



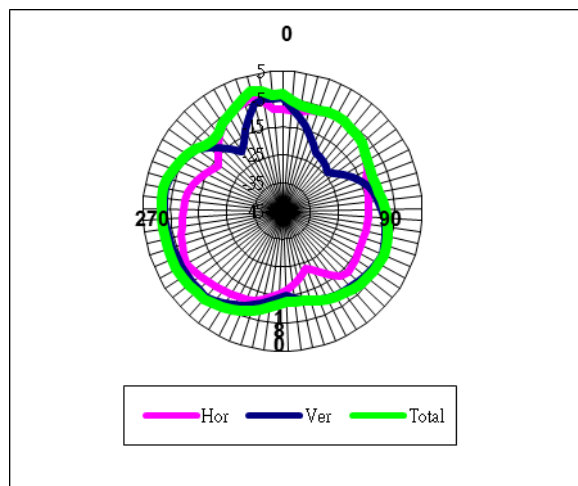
MIMO antenna: 3750.00 MHz

3750.00 MHz		
Horizontal Peak (dBi)	-6.22	10deg
Vertical Peak(dBi)	-1.11	245deg



MIMO antenna: 4200.00 MHz

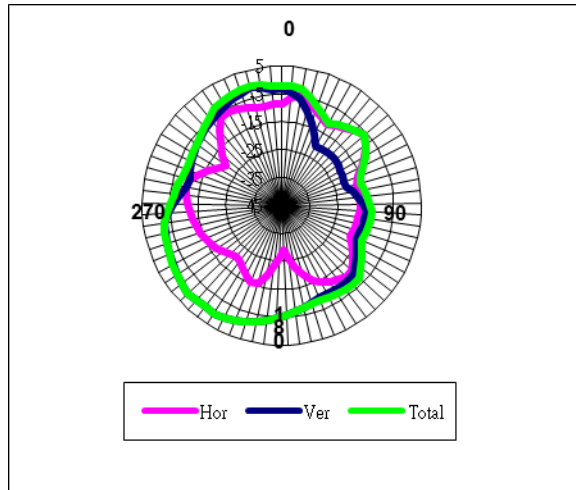
4200.00 MHz		
Horizontal Peak (dBi)	-2.61	350deg
Vertical Peak(dBi)	-2.33	285deg



Radiation characteristic in 3300MHz ~ 3800MHz (5G NR Band 78)

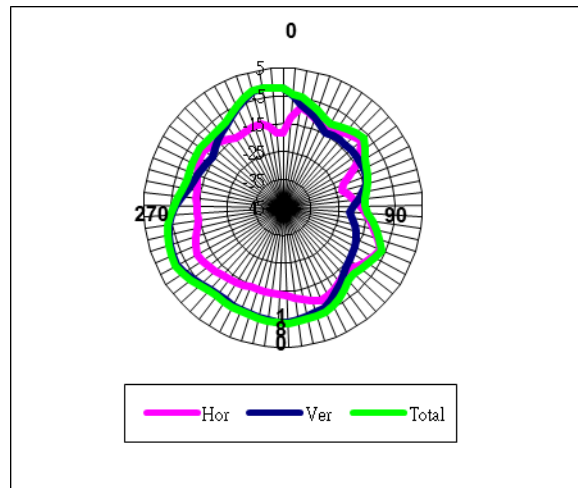
MIMO antenna: 3300.00 MHz

3300.00 MHz		
Horizontal Peak (dBi)	-4.94	10deg
Vertical Peak(dBi)	0.99	230deg



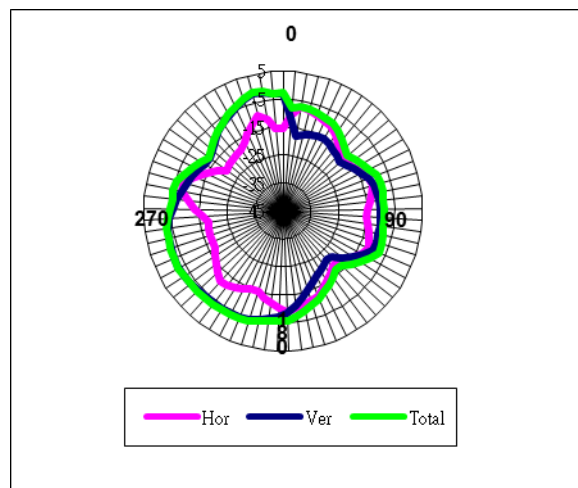
MIMO antenna: 3550.00 MHz

3550.00 MHz		
Horizontal Peak (dBi)	-7.14	115deg
Vertical Peak(dBi)	-1.66	355deg



MIMO antenna: 3800.00 MHz

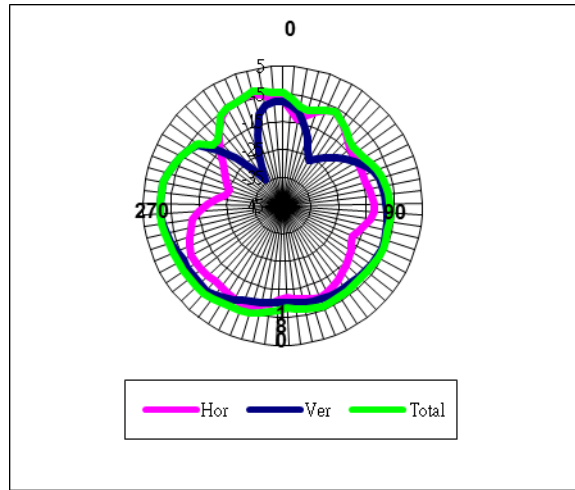
3800.00 MHz		
Horizontal Peak (dBi)	-7.26	10deg
Vertical Peak(dBi)	-1.83	350deg



Radiation characteristic in 4400MHz ~ 5000MHz (5G NR Band 79)

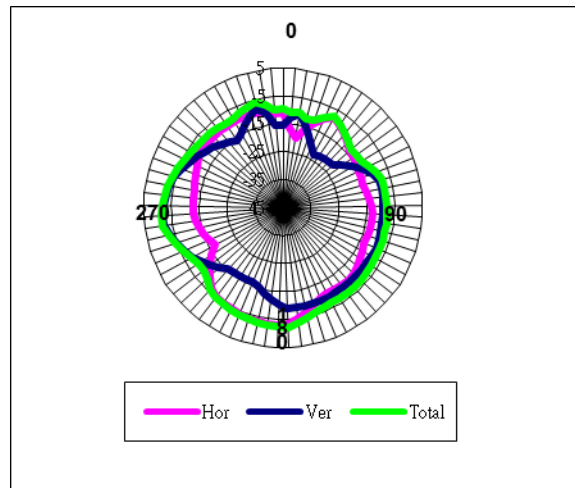
MIMO antenna: 4400.00 MHz

4400.00 MHz		
Horizontal Peak (dBi)	-3.32	350deg
Vertical Peak(dBi)	-1.19	270deg



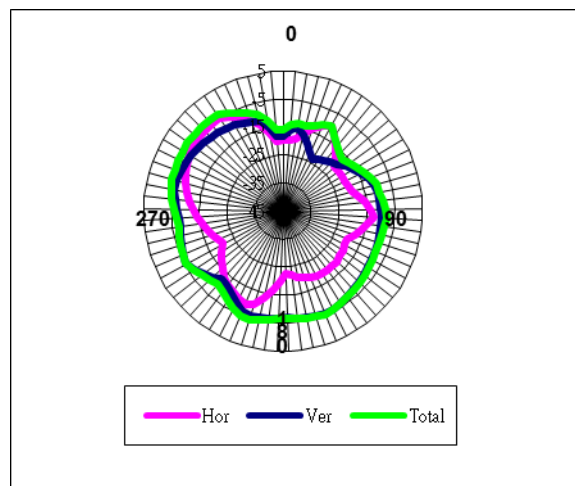
MIMO antenna: 4700.00 MHz

4700.00 MHz		
Horizontal Peak (dBi)	-3.11	185deg
Vertical Peak(dBi)	-1.81	270deg



MIMO antenna: 5000.00 MHz

5000.00 MHz		
Horizontal Peak (dBi)	-4.65	330deg
Vertical Peak(dBi)	-5.17	290deg



Section 7. Co-Location Antenna Separation

WWAN - Bluetooth:

The output power of Bluetooth device is 3.06mW ($\leq 60/f(\text{GHz})$) and the antenna-to-antenna distance is ≥ 5 cm, so the Bluetooth device is not required SAR evaluation in accordance with Table-2 of KDB616217.

WWAN - USB:

The USB ports are located with more than 5cm of separation distance from the all WLAN/WiMAX and WWAN Tx antennas. Therefore these are compliant with the section 2) of "Supplement to FCC KDB 616217".

WWAN - WLAN:

The WWAN main (Tx) antenna and WLAN (or WiMAX) antennas co-locate with at least 5.0 mm of separation distance, and both devices transmit RF simultaneously.

Any WWAN features (antenna and transmitter module) won't be incorporated in the host PC system nor shipped associated with the applying WLAN transmitter device, unless the relevant certification process completes for the simultaneous transmission.

Section 8. Host PC labeling