



## Echo 14

5G/4G/Dual Band Wi-Fi Compact PCB Embedded Antenna



### Key Features

- Supports 5G NR / 4G LTE / 3G UMTS / 2G Quad-band GSM
- Supports LTE Cat M, LTE Cat NB and NR Cat NB Bands
- Supports Dual-band Wi-Fi 2.4 GHz/5 GHz
- Supports Bluetooth/Zigbee/IEEE 802.15.4/ISM 2.4 GHz/ ISM 5.8 GHz
- Supports LoRa/Sigfox/ISM 868 MHz/ISM 915 MHz
- Compact size

### Additional Considerations

- Can be mounted on any surface
- Ground plane independent
- Excellent gain within upper frequency band

### General Description

The ECHO14 is an embedded PCB antenna that is designed to support a wide range of communication standards, including 5G NR, 4G LTE, 3G UMTS, and 2G Quad-band GSM.

This versatile antenna is capable of supporting LTE Cat M, LTE Cat NB, and NR Cat NB bands, as well as Dual-band WiFi, Bluetooth, Zigbee, and other wireless protocols in the 2.4 GHz and 5.8 GHz bands.

In addition, the ECHO14 is capable of supporting LoRa, Sigfox, IMT 868 MHz, and ISM 915 MHz communication standards, making it a flexible solution for a wide range of applications.

The Echo14 is supplied with different length cables and an I-PEX MHF1 / uFLconnector as standard, alternative cable lengths and connectors can be specified for volume orders.

E Embedded	5G New Radio	4G LTE	3G UMTS	2G GSM
LTE Cat M	LTE NB IoT	NR NB IoT	ISM 868	ISM 915
ISM 2.4G	ISM 5.8G	IEEE 802.15.4	LoRa Wireless	SF Sigfox
HNT Helium	W Weightless	Z Wave	BLE Bluetooth	AoA Bluetooth
AoD Bluetooth	WiFi 2.4G & 5G	WiFi 4 802.11n	WiFi 5 802.11ac	WiFi 6 802.11ax
WLAN 2400	WLAN 5800	ZB Zigbee		



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### Electrical Specifications

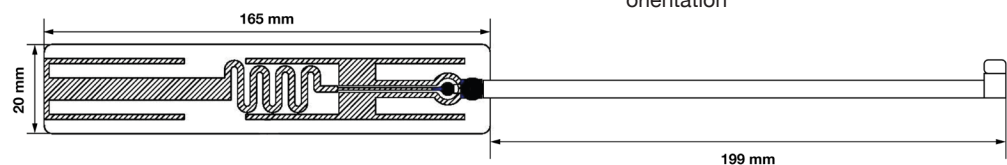
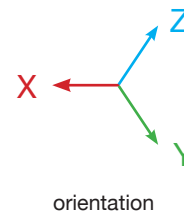
Impedance:	50 Ohm
Polarization:	Vertical
Max Input Power:	5 W
Ground plane independent:	Yes

### Environmental Specifications

Operating Temperature range:	-35 to +75 °C
Storage Temperature range:	-40 to +80 °C

### Mechanical Specifications

Dimensions:	105 x 20 x 0.8 mm (without cable)
Weight:	3.5 g
Connector:	UFL/IPEX
Mounting method:	1.13mm Low Loss
Antenna materials:	PCB

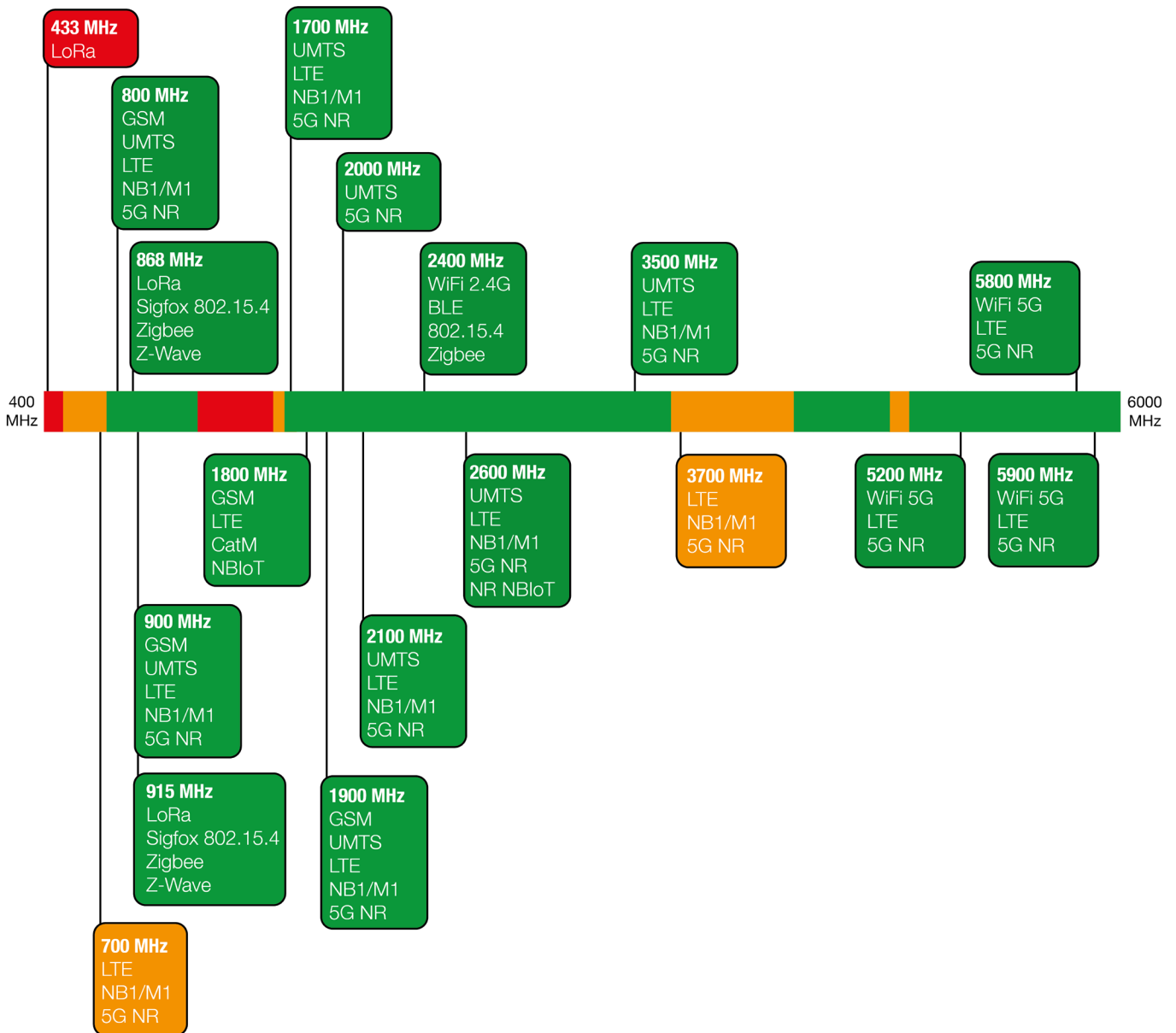




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### Spectrum Coverage



● Suitable band

● Adequate band in good signal conditions

● Likely to be unsuitable



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### Usable Cellular Frequency Support (410 MHz – 1900 MHz)

	410	450	600	700	800	850	900	1500	1600	1700	1800	1900
GSM Bands:						●	●				●	●
UMTS Bands:					●	●	●			●	●	●
LTE Bands:					●	●	●			●	●	●
LTE Cat M Bands:					●	●	●			●	●	●
LTE Cat NB Bands:					●	●	●			●	●	●
5G NR Bands:						●	●			●	●	●
NR Cat NB Bands:						●	●			●	●	●

### Usable Cellular Frequency Support (2000 MHz – 5900 MHz)

	2000	2100	2300	2400	2500	2600	3300	3500	3700	4700	5200	5900
GSM Bands:												
UMTS Bands:		●				●		●				
LTE Bands:	●	●	●	●	●	●	●	●			●	●
LTE Cat M Bands:		●	●		●	●						
LTE Cat NB Bands:		●			●	●						
5G NR Bands:	●	●	●	●	●	●		●		●	●	●
NR Cat NB Bands:		●			●	●						

### Usable ISM Frequency Support (433 MHz - 5800 MHz)

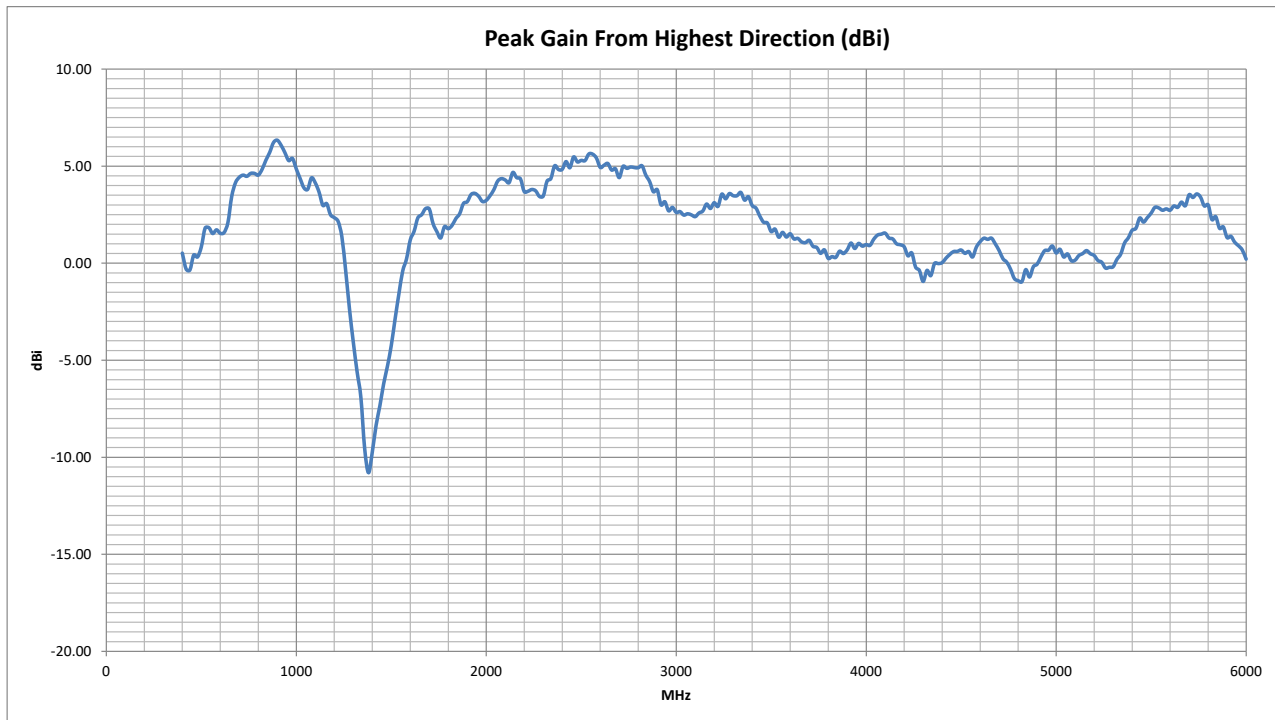
	433	868	915	2450	5800
Bluetooth				●	
IEEE 802.15.4		●	●	●	
LoRa		●	●		
Sigfox		●	●		
WiFi 2.4G				●	
WiFi 5G					●
Zigbee		●	●	●	
Z-Wave		●	●		



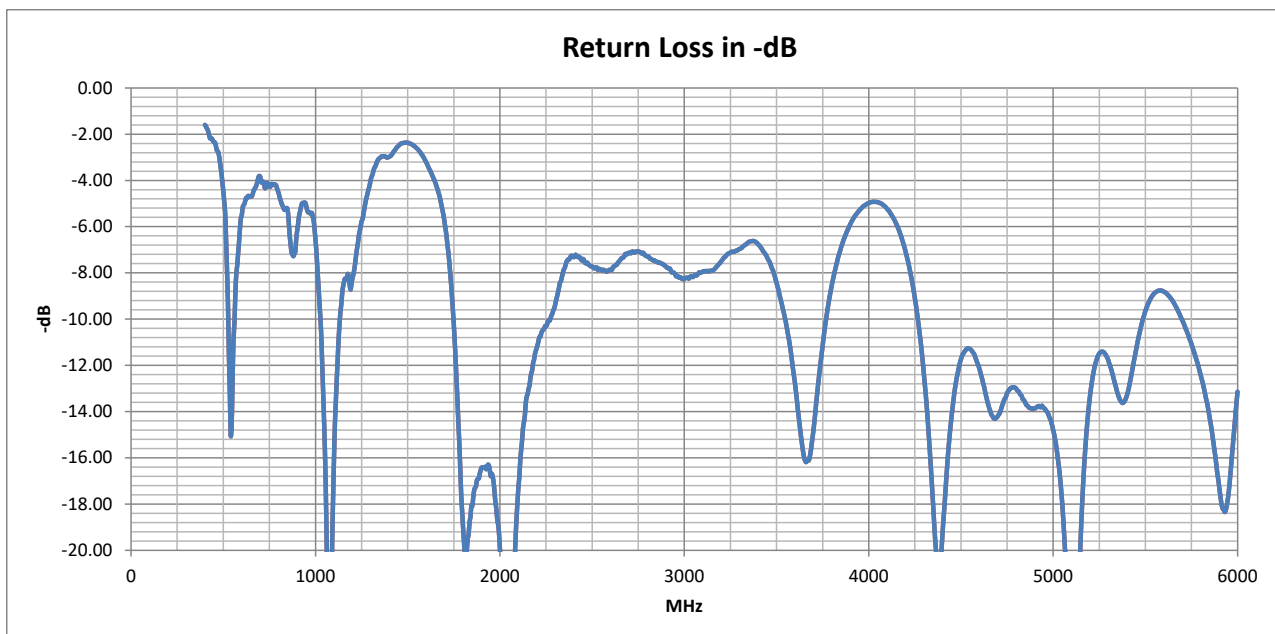
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### Peak Gain vs. Frequency



### Return Loss

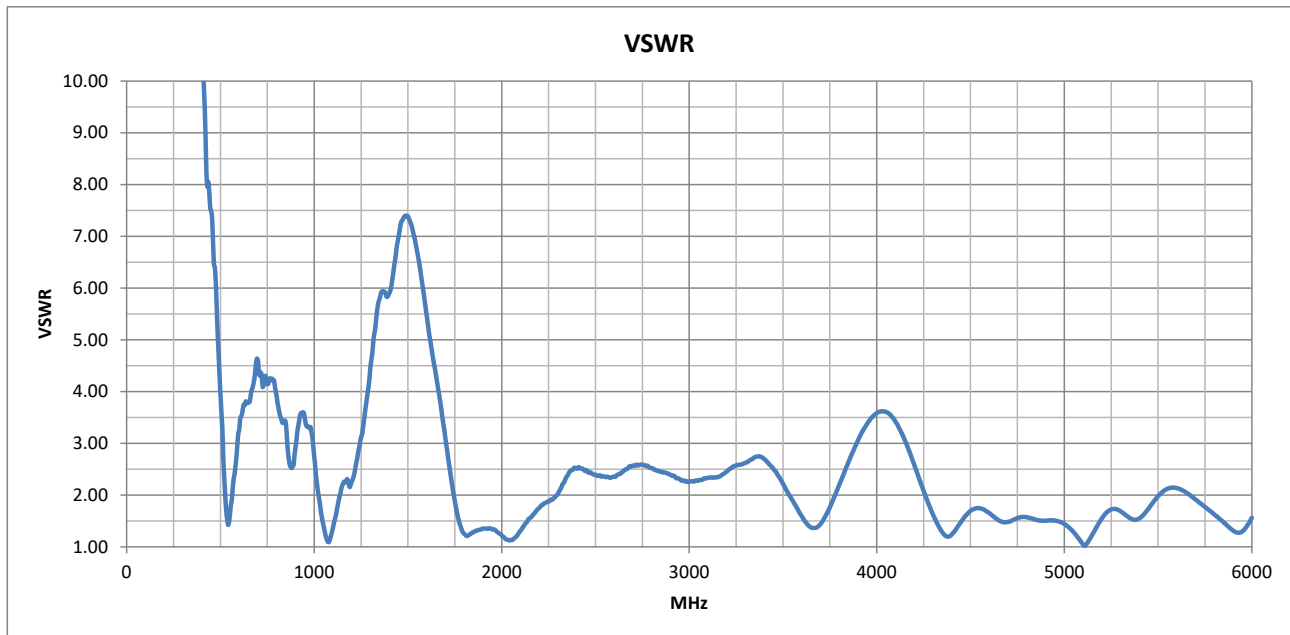




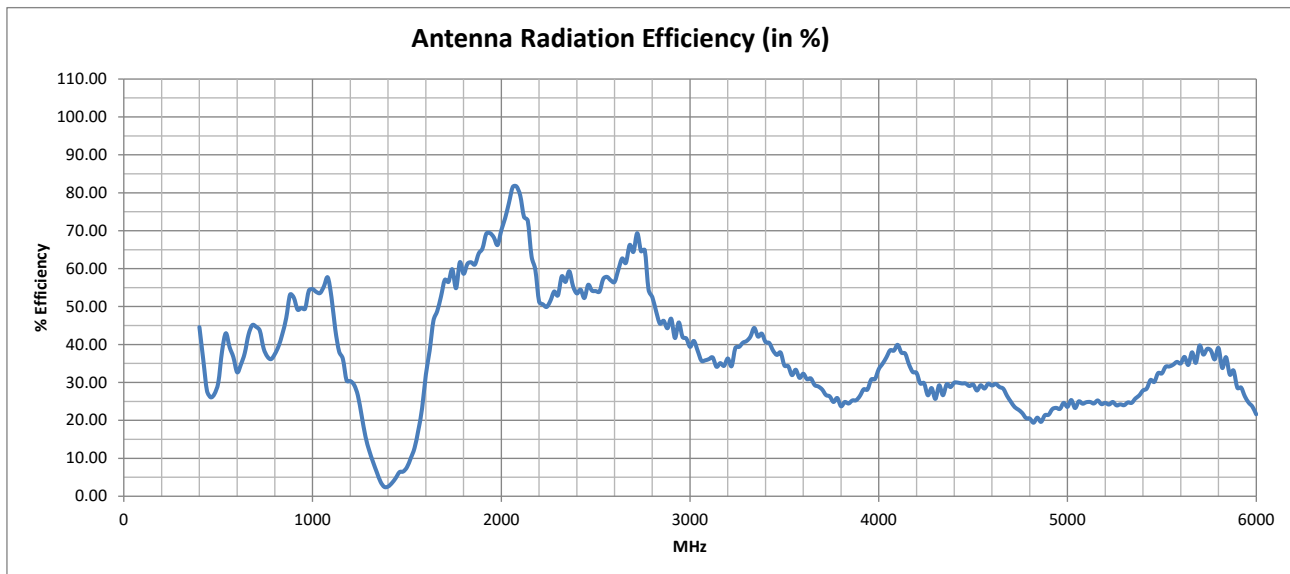
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### VSWR



### Radiation Efficiency





### Cellular Standards Band Support

GSM (2G) Band	UMTS (3G) Band	E-UTRA (4G) Band	Cat M E-UTRA Band	Cat NB E-UTRA Band	NR (5G) Band	Cat NB NR (5G) Band	Uplink	Downlink	Average Upload Efficiency (%)	Average Download Efficiency (%)	Maximum Upload VSWR	Maximum Download VSWR	Use Indicator
	1	1	1	1	n1	n1	1920 - 1980 MHz	2110 - 2170 MHz	68.43	69.91	1.36	1.64	●
PCS-1900	2	2	2	2	n2	n2	1850 - 1910 MHz	1930 - 1990 MHz	63.65	68.09	1.36	1.36	●
DCS-1800	3	3	3	3	n3	n3	1710 - 1785 MHz	1805 - 1880 MHz	57.97	61.48	2.84	1.33	●
	4	4	4	4			1710 - 1755 MHz	2110 - 2155 MHz	57.75	72.20	2.84	1.58	●
GSM-850	5	5	5	5	n5	n5	824 - 849 MHz	869 - 894 MHz	42.36	52.20	3.48	2.74	●
	6						830 - 840 MHz	875 - 885 MHz	42.05	52.66	3.43	2.56	●
	7	7	7	7	n7	n7	2500 - 2570 MHz	2620 - 2690 MHz	55.99	62.86	2.40	2.56	●
E-GSM-900	8	8	8	8	n8	n8	880 - 915 MHz	925 - 960 MHz	52.06	49.52	3.34	3.60	●
	9	9					1749.9 - 1784.9 MHz	1844.9 - 1879.9 MHz	58.05	62.00	1.88	1.33	●
	10	10					1710 - 1770 MHz	2110 - 2170 MHz	57.36	69.91	2.84	1.64	●
	11	11	11	11			1427.9 - 1447.9 MHz	1475.9 - 1495.9 MHz	4.65	6.86	6.96	7.40	●
	12	12	12	12	n12	n12	699 - 716 MHz	729 - 746 MHz	44.29	39.71	4.61	4.31	●
	13	13	13	13	n13	n13	777 - 787 MHz	746 - 756 MHz	36.32	37.79	4.24	4.20	●
	14	14	14	14	n14		788 - 798 MHz	758 - 768 MHz	37.02	36.73	4.15	4.26	●
		17		17			704 - 716 MHz	734 - 746 MHz	44.16	39.18	4.42	4.31	●
		18	18	18	n18	n18	815 - 830 MHz	860 - 875 MHz	40.08	49.28	3.58	2.83	●
	19	19	19	19			830 - 845 MHz	875 - 890 MHz	42.49	52.71	3.44	2.58	●
	20	20	20	20	n20	n20	832 - 862 MHz	791 - 821 MHz	44.36	38.19	3.44	4.09	●
	21	21	21	21			1447.9 - 1462.9 MHz	1495.9 - 1510.9 MHz	5.95	8.09	7.26	7.39	●
	22	22					3410 - 3490 MHz	3510 - 3590 MHz	38.36	32.72	2.67	2.15	●
		24	24	24	n24		1626.5 - 1660.5 MHz	1525 - 1559 MHz	45.96	13.50	4.81	7.12	●
	25	25	25	25	n25	n25	1850 - 1915 MHz	1930 - 1995 MHz	63.96	68.14	1.36	1.36	●
	26	26	26	26	n26		814 - 849 MHz	859 - 894 MHz	41.56	51.06	3.60	2.88	●
		27	27				807 - 824 MHz	852 - 869 MHz	39.17	47.33	3.73	3.24	●
		28	28	28	n28	n28	703 - 748 MHz	758 - 803 MHz	41.87	36.73	4.46	4.26	●

● Suitable band

● Adequate band in good signal conditions

● Likely to be unsuitable



### Cellular Standards Band Support

GSM (2G) Band	UMTS (3G) Band	E-UTRA (4G) Band	Cat M E-UTRA Band	Cat NB E-UTRA Band	NR (5G) Band	Cat NB NR (5G) Band	Uplink	Downlink	Average Upload Efficiency (%)	Average Download Efficiency (%)	Maximum Upload VSWR	Maximum Download VSWR	Use Indicator
		28A					703 - 733 MHz	758 - 788 MHz	43.24	36.49	4.46	4.26	●
		29			n29		N/A	717 - 728 MHz	N/A	42.99	N/A	4.35	●
		30			n30		2305 - 2315 MHz	2350 - 2360 MHz	55.45	58.59	2.13	2.45	●
		31	31	31			452.5 - 457.5 MHz	462.5 - 467.5 MHz	26.50	26.29	7.43	6.69	●
	32	32					N/A	1452 - 1496 MHz	N/A	6.54	N/A	7.40	●
		33					1900 - 1920 MHz	1900 - 1920 MHz	67.25	67.25	1.36	1.36	●
		34			n34		2010 - 2025 MHz	2010 - 2025 MHz	72.93	72.93	1.19	1.19	●
		35					1850 - 1910 MHz	1850 - 1910 MHz	63.65	63.65	1.36	1.36	●
		36					1930 - 1990 MHz	1930 - 1990 MHz	68.09	68.09	1.36	1.36	●
		37					1910 - 1930 MHz	1910 - 1930 MHz	68.72	68.72	1.36	1.36	●
		38			n38		2570 - 2620 MHz	2570 - 2620 MHz	57.34	57.34	2.40	2.40	●
		39	39		n39		1880 - 1920 MHz	1880 - 1920 MHz	65.95	65.95	1.36	1.36	●
		40	40		n40		2300 - 2400 MHz	2300 - 2400 MHz	56.45	56.45	2.53	2.53	●
		41	41	41	n41	n41	2496 - 2690 MHz	2496 - 2690 MHz	58.78	58.78	2.56	2.56	●
		42	42	42			3400 - 3600 MHz	3400 - 3600 MHz	35.54	35.54	2.70	2.70	●
		43	43	43			3600 - 3800 MHz	3600 - 3800 MHz	27.99	27.99	2.20	2.20	●
		44					703 - 803 MHz	703 - 803 MHz	39.13	39.13	4.46	4.46	●
		45					1447 - 1467 MHz	1447 - 1467 MHz	6.00	6.00	7.30	7.30	●
		46			n46		5150 - 5925 MHz	5150 - 5925 MHz	31.26	31.26	2.15	2.15	●
		47			n47		5855 - 5925 MHz	5855 - 5925 MHz	30.65	30.65	1.46	1.46	●
		48			n48		3550 - 3700 MHz	3550 - 3700 MHz	30.77	30.77	1.91	1.91	●
		49					3550 - 3700 MHz	3550 - 3700 MHz	30.77	30.77	1.91	1.91	●
		50			n50		1432 - 1517 MHz	1432 - 1517 MHz	6.64	6.64	7.40	7.40	●
		51			n51		1427 - 1432 MHz	1427 - 1432 MHz	4.08	4.08	6.57	6.57	●
		52					3300 - 3400 MHz	3300 - 3400 MHz	42.43	42.43	2.75	2.75	●

● Suitable band

● Adequate band in good signal conditions

● Likely to be unsuitable





### Cellular Standards Band Support

GSM (2G) Band	UMTS (3G) Band	E-UTRA (4G) Band	Cat M E-UTRA Band	Cat NB E-UTRA Band	NR (5G) Band	Cat NB NR (5G) Band	Uplink	Downlink	Average Upload Efficiency (%)	Average Download Efficiency (%)	Maximum Upload VSWR	Maximum Download VSWR	Use Indicator
		53			n53		2483.5 - 2495 MHz	2483.5 - 2495 MHz	54.14	54.14	2.41	2.41	●
		65		65	n65	n65	1920 - 2010 MHz	2110 - 2200 MHz	68.65	65.67	1.36	1.76	●
		66	66	66	n66	n66	1710 - 1780 MHz	2110 - 2200 MHz	57.73	65.67	2.84	1.76	●
		67			n67		N/A	738 - 758 MHz	N/A	38.13	N/A	4.31	●
		68					698 - 728 MHz	753 - 783 MHz	43.81	36.62	4.62	4.26	●
		69					N/A	2570 - 2620 MHz	N/A	57.34	N/A	2.40	●
		70		70	n70	n70	1695 - 1710 MHz	1995 - 2020 MHz	56.74	71.30	3.23	1.24	●
		71	71	71	n71		663 - 698 MHz	617 - 652 MHz	44.46	37.08	4.64	3.81	●
		72	72	72			451 - 456 MHz	461 - 466 MHz	26.63	26.22	7.47	6.83	●
		73	73	73			450 - 455 MHz	460 - 465 MHz	26.71	26.18	7.49	6.93	●
		74	74	74	n74		1427 - 1470 MHz	1475 - 1518 MHz	5.37	7.70	7.31	7.40	●
		75			n75		N/A	1432 - 1517 MHz	N/A	6.64	N/A	7.40	●
		76			n76		N/A	1427 - 1432 MHz	N/A	4.08	N/A	6.57	●
					n77		3300 - 4200 MHz	3300 - 4200 MHz	32.99	32.99	3.62	3.62	●
					n78		3300 - 3800 MHz	3300 - 3800 MHz	33.90	33.90	2.75	2.75	●
					n79		4400 - 5000 MHz	4400 - 5000 MHz	25.42	25.42	1.75	1.75	●
					n80		1710 - 1785 MHz	N/A	57.97	N/A	2.84	N/A	●
					n81		880 - 915 MHz	N/A	52.06	N/A	3.34	N/A	●
					n82		832 - 862 MHz	N/A	44.36	N/A	3.44	N/A	●
					n83		703 - 748 MHz	N/A	41.87	N/A	4.46	N/A	●
					n84		1920 - 1980 MHz	N/A	68.43	N/A	1.36	N/A	●
		85	85	85	n85		698 - 716 MHz	728 - 746 MHz	44.31	39.82	4.62	4.31	●
					n86		1710 - 1780 MHz	N/A	57.73	N/A	2.84	N/A	●
		87	87	87			410 - 415 MHz	420 - 425 MHz	39.30	35.10	10.02	9.00	●
		88	88	88			412 - 417 MHz	422 - 427 MHz	38.46	34.26	9.84	8.69	●

● Suitable band

● Adequate band in good signal conditions

● Likely to be unsuitable



### Cellular Standards Band Support

GSM (2G) Band	UMTS (3G) Band	E-UTRA (4G) Band	Cat M E-UTRA Band	Cat NB E-UTRA Band	NR (5G) Band	Cat NB NR (5G) Band	Uplink	Downlink	Average Upload Efficiency (%)	Average Download Efficiency (%)	Maximum Upload VSWR	Maximum Download VSWR	Use Indicator
					n89		824 - 849 MHz	N/A	42.36	N/A	3.48	N/A	●
					n90	n90	2496 - 2690 MHz	2496 - 2690 MHz	58.78	58.78	2.56	2.56	●
					n91		832 - 862 MHz	1427 - 1432 MHz	44.36	4.08	3.44	6.57	●
					n92		832 - 862 MHz	1432 - 1517 MHz	44.36	6.64	3.44	7.40	●
					n93		880 - 915 MHz	1427 - 1432 MHz	52.06	4.08	3.34	6.57	●
					n94		880 - 915 MHz	1432 - 1517 MHz	52.06	6.64	3.34	7.40	●
					n95		2010 - 2025 MHz	N/A	72.93	N/A	1.19	N/A	●
					n97		2300 - 2400 MHz	N/A	56.45	N/A	2.53	N/A	●
					n98		1880 - 1920 MHz	N/A	65.95	N/A	1.36	N/A	●
					n99		1626.5 - 1660.5 MHz	N/A	45.96	N/A	4.81	N/A	●
					n101		1900 - 1910 MHz	1900 - 1910 MHz	66.28	66.28	1.36	1.36	●
				103			787 - 788 MHz	757 - 758 MHz	36.65	37.09	4.17	4.21	●

● Suitable band

● Adequate band in good signal conditions

● Likely to be unsuitable

**NOTE:** For each frequency band, Siretta provides a traffic light indication to show the suitability of the antenna for use at that frequency band. Determination of exactly what makes an antenna good or bad at any frequency is subjective.

The view presented is that of Siretta's engineering team having taken into account the efficiency and VSWR measurements. The end user is advised to use their own criteria and/or testing to confirm suitability.



### ISM Standards Frequency Support

Application	Frequency Range	Efficiency (%)	Maximum VSWR	Peak Gain from highest direction (dBi)	Use Indicator
ISM 433 MHz	433.05 - 434.79 MHz	30.34	8.05	-0.3325	●
ISM 868 MHz	863 - 870 MHz	48.97	2.74	5.965	●
ISM 915 MHz	902 - 928 MHz	50.22	3.58	6.314	●
ISM 2.4 GHz	2400 - 2500 MHz	54.07	2.55	5.48	●
Wi-Fi 2.4G	2401 - 2483 MHz	54.07	2.55	5.48	●
Wi-Fi 2.4G (USA)	2401 - 2473 MHz	54.03	2.55	5.48	●
Wi-Fi 2.4G (Japan)	2401 - 2495 MHz	54.08	2.55	5.48	●
Wi-Fi 5G (all channels)	5150 - 5990 MHz	30.78	2.15	3.57	●
Wi-Fi 5G (Ch 32-48)	5150 - 5250 MHz	24.58	1.73	0.65	●
Wi-Fi 5G (Ch 32-64)	5150 - 5330 MHz	24.43	1.74	0.65	●
Wi-Fi 5G (Ch 32-161)	5150 - 5815 MHz	31.10	2.15	3.57	●
Wi-Fi 5G (Ch 32-173)	5150 - 5875 MHz	31.35	2.15	3.57	●
ISM 5.8 GHz	5725 - 5875 MHz	36.32	1.85	3.57	●

● Suitable band

● Adequate band in good signal conditions

● Likely to be unsuitable

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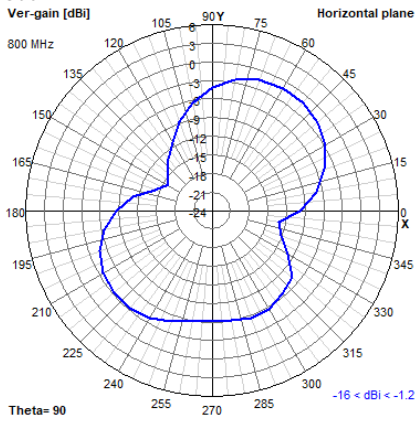


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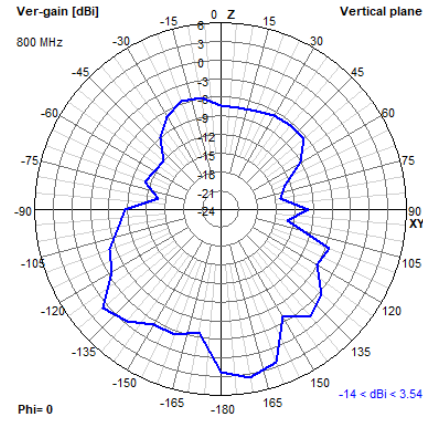
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### 2D Radiation Plots

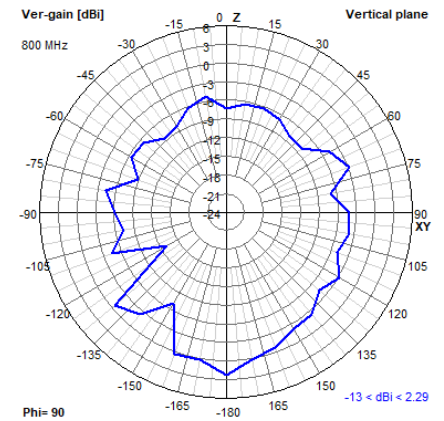
#### 800 MHz XY



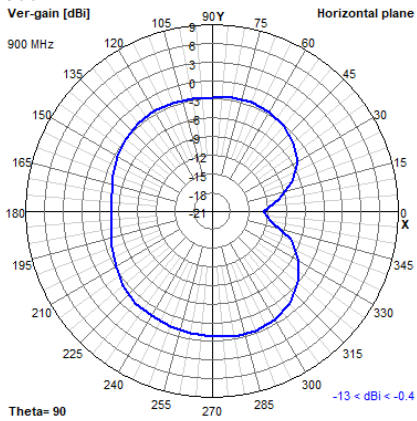
#### XZ



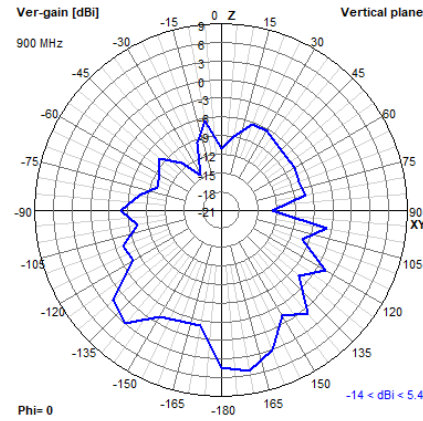
#### YZ



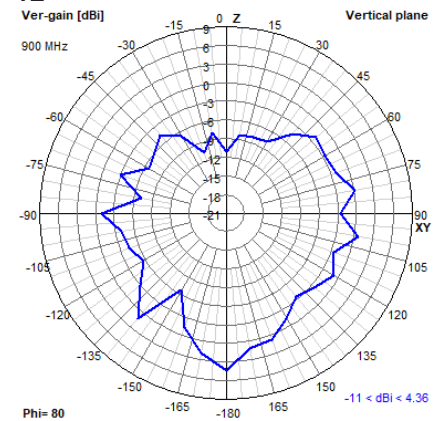
#### 900 MHz XY



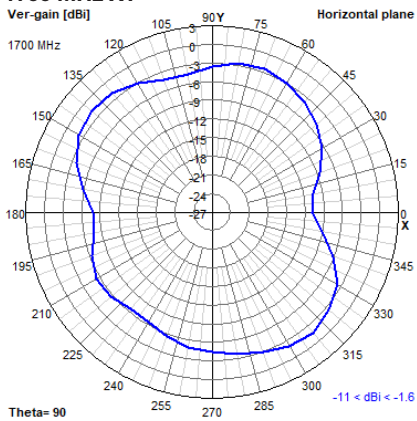
#### XZ



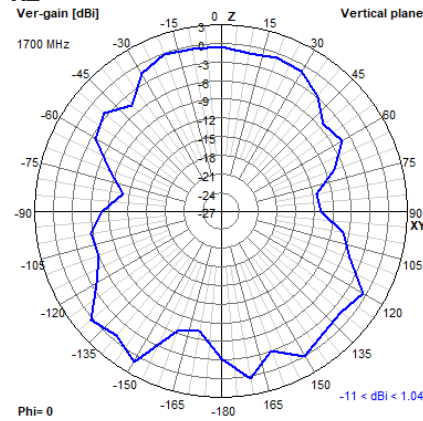
#### YZ



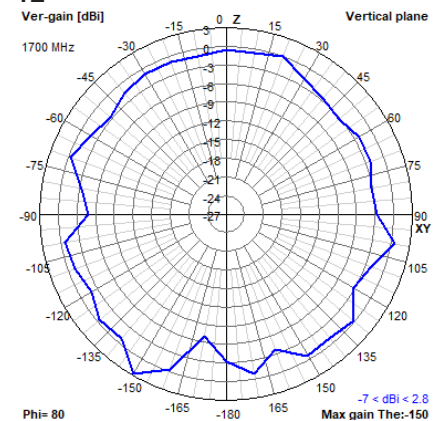
#### 1700 MHz XY



#### XZ



#### YZ



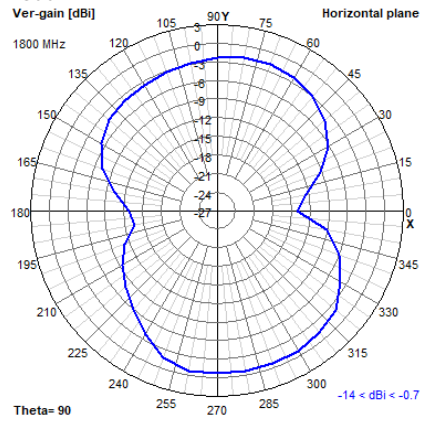


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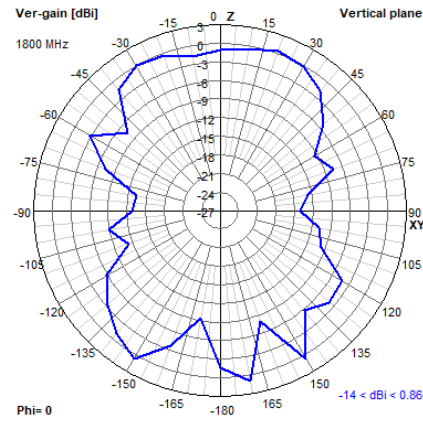
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### 2D Radiation Plots

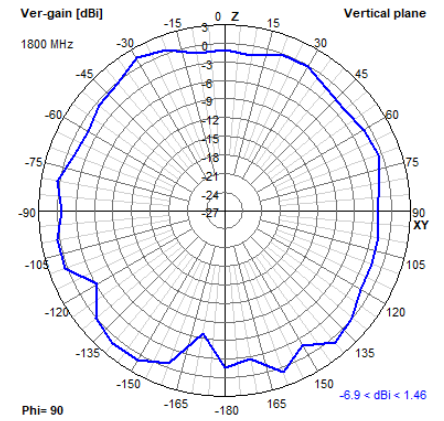
#### 1800 MHz XY



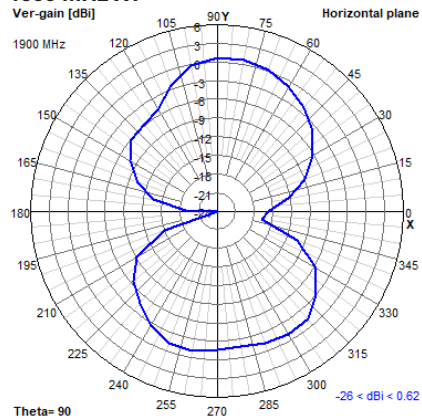
#### XZ



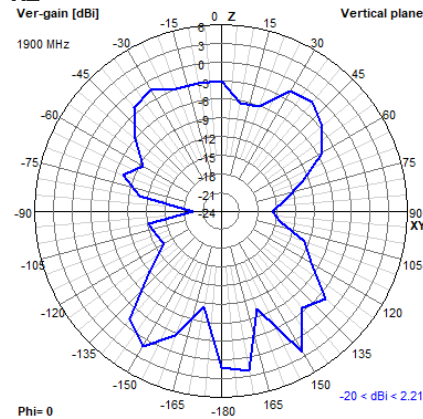
#### YZ



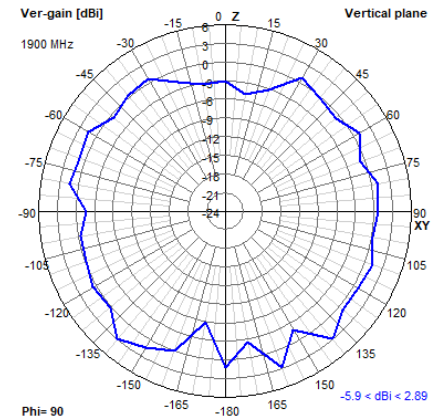
#### 1900 MHz XY



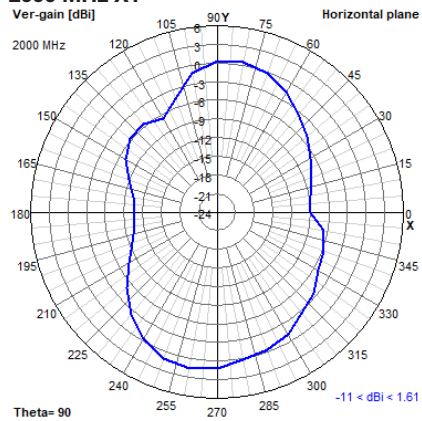
#### XZ



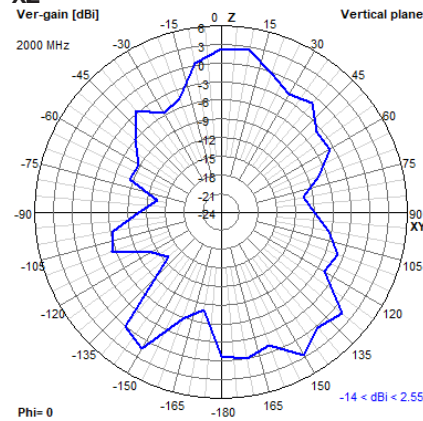
#### YZ



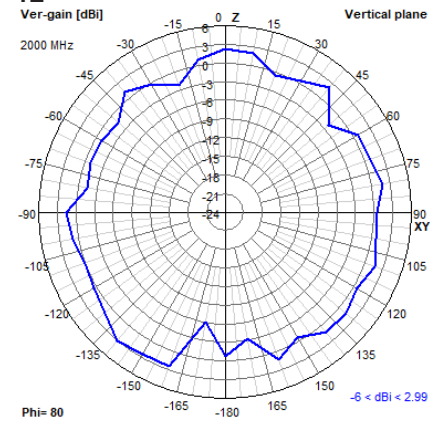
#### 2000 MHz XY



#### XZ



#### YZ



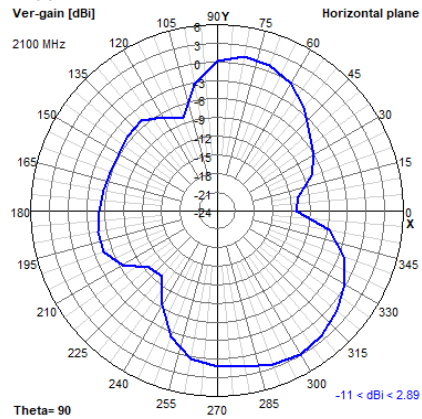


## Echo 14

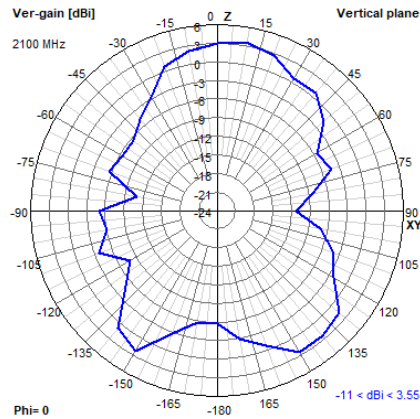
5G/4G/Dual Band Wi-Fi Compact PCB Embedded Antenna

### 2D Radiation Plots

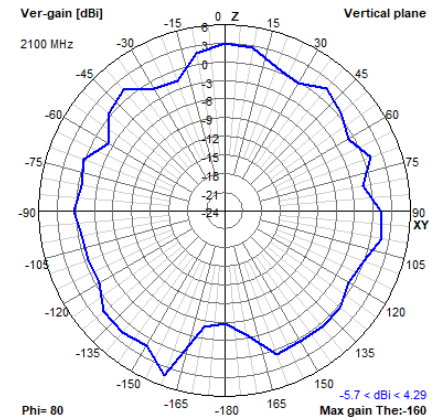
#### 2100 MHz XY



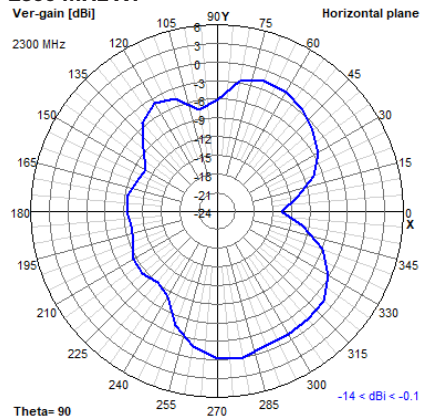
#### XZ



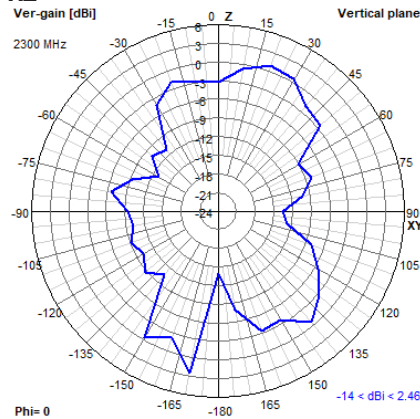
#### YZ



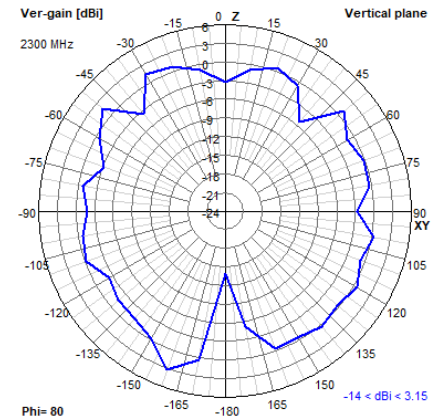
#### 2300 MHz XY



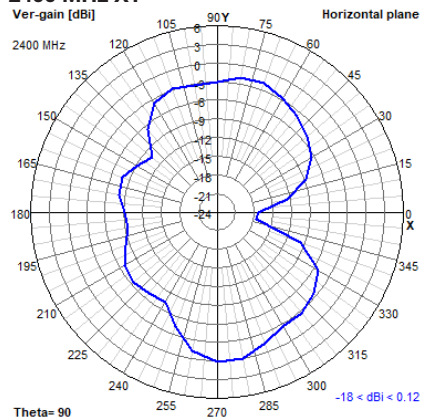
#### XZ



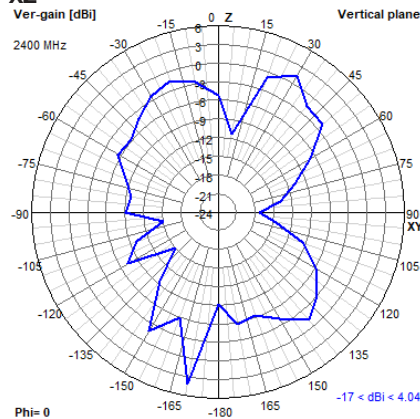
#### YZ



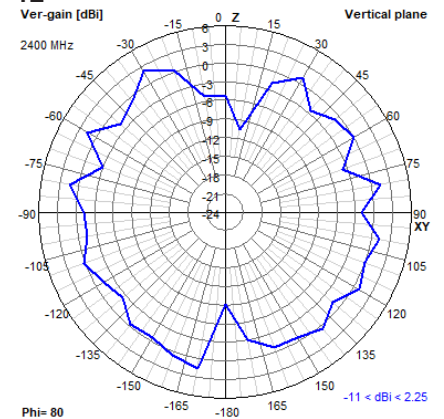
#### 2400 MHz XY



#### XZ



#### YZ



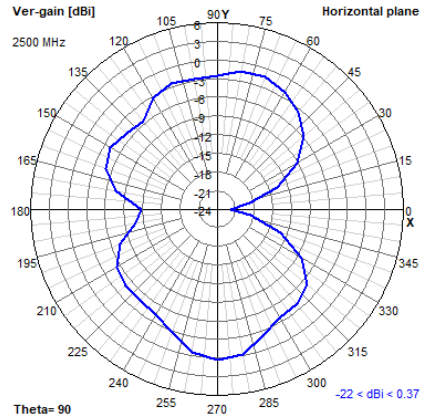


## Echo 14

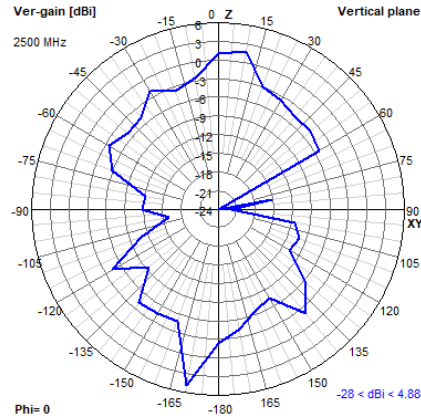
5G/4G/Dual Band Wi-Fi Compact PCB Embedded Antenna

### 2D Radiation Plots

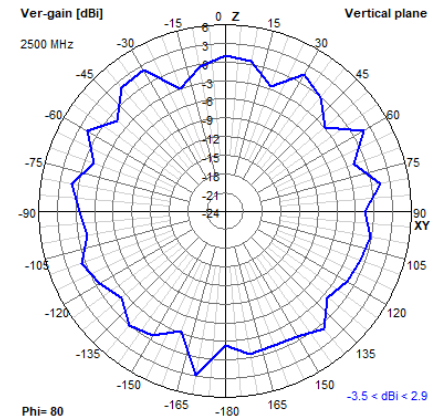
#### 2500 MHz XY



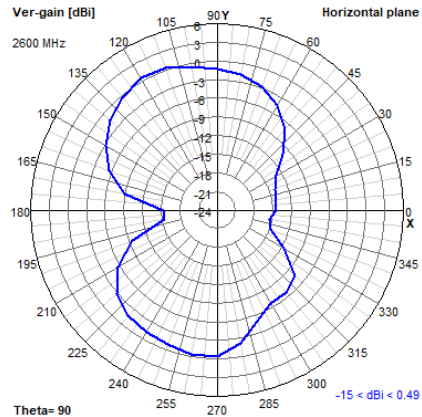
#### XZ



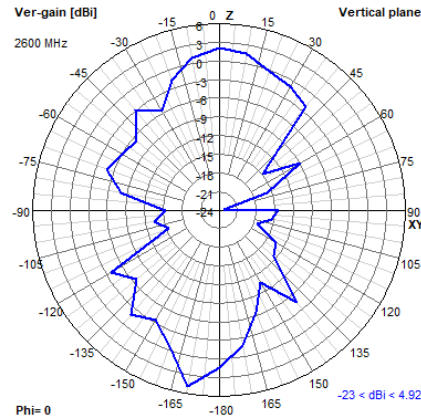
#### YZ



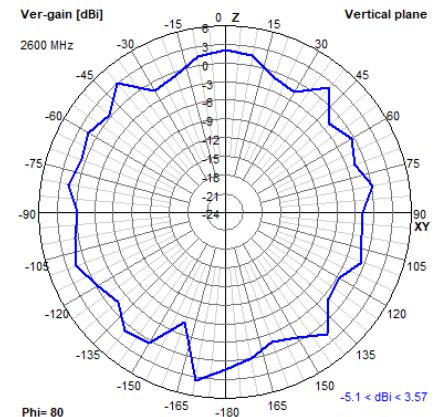
#### 2600 MHz XY



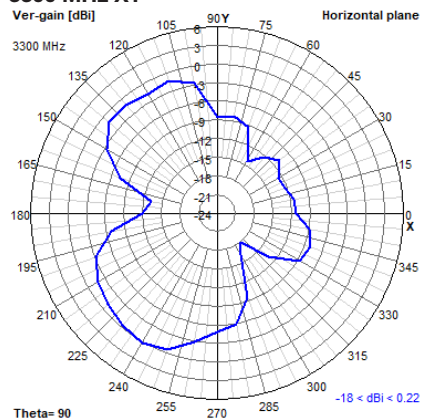
#### XZ



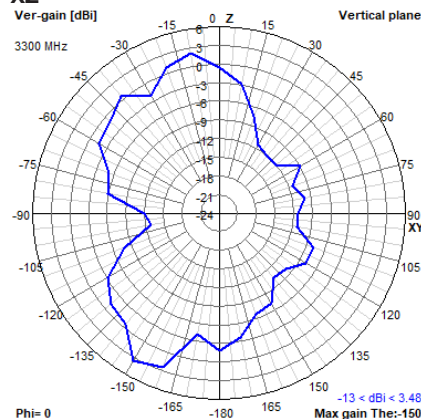
#### YZ



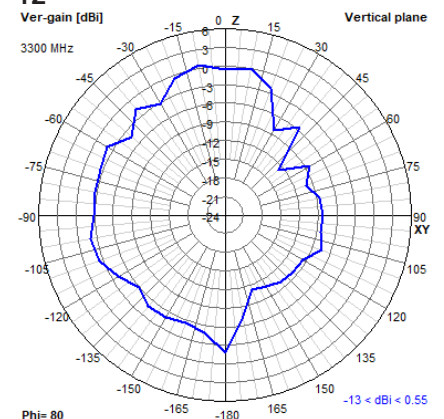
#### 3300 MHz XY



#### XZ



#### YZ



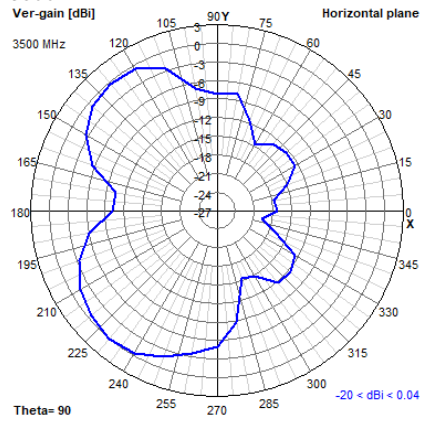


## Echo 14

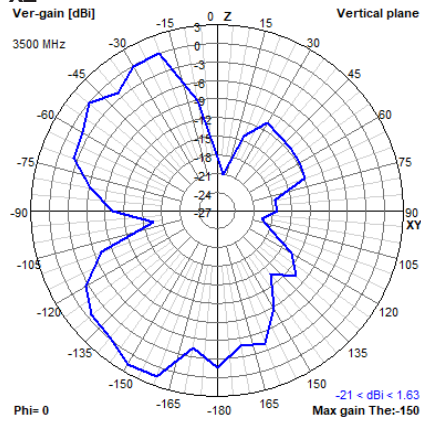
5G/4G/Dual Band Wi-Fi Compact PCB Embedded Antenna

### 2D Radiation Plots

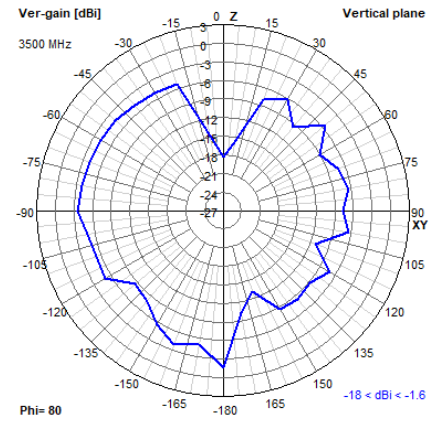
#### 3500 MHz XY



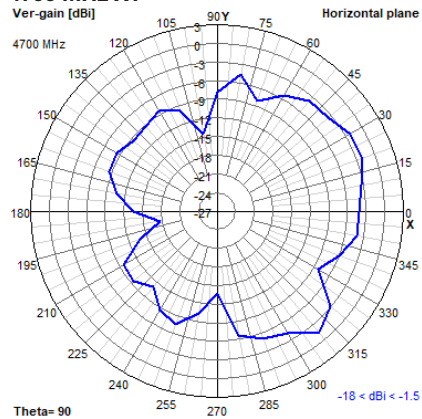
#### XZ



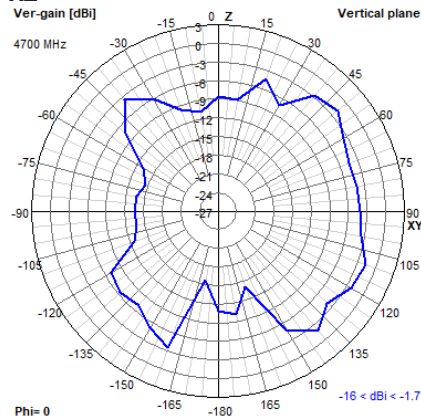
#### YZ



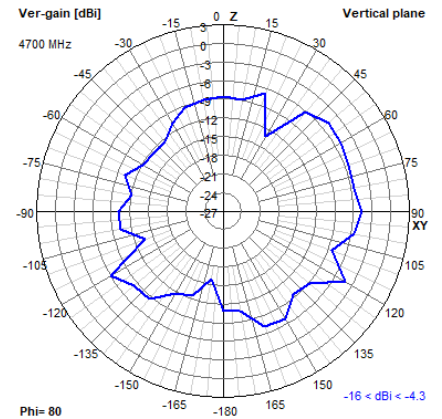
#### 4700 MHz XY



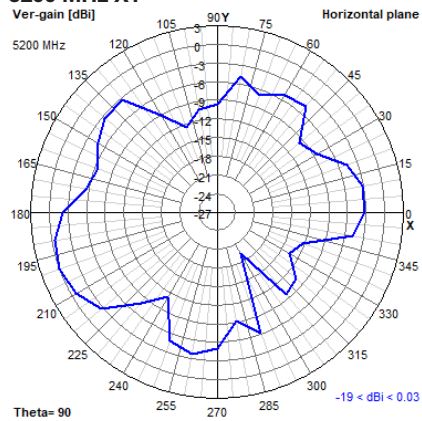
#### XZ



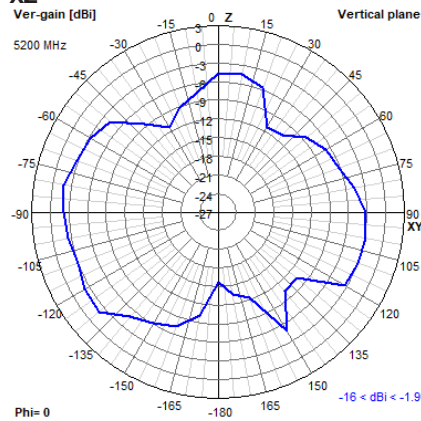
#### YZ



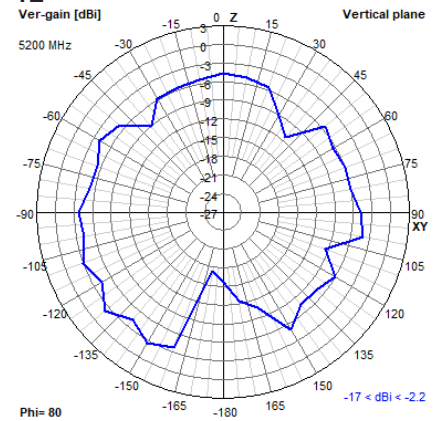
#### 5200 MHz XY



#### XZ



#### YZ





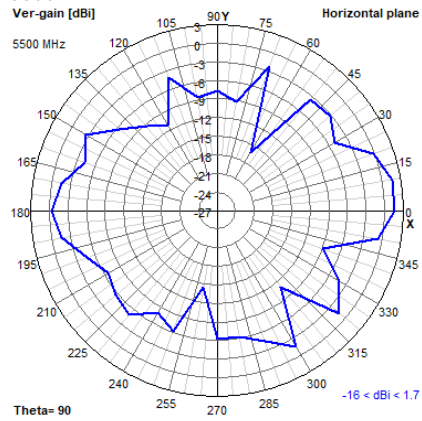


## Echo 14

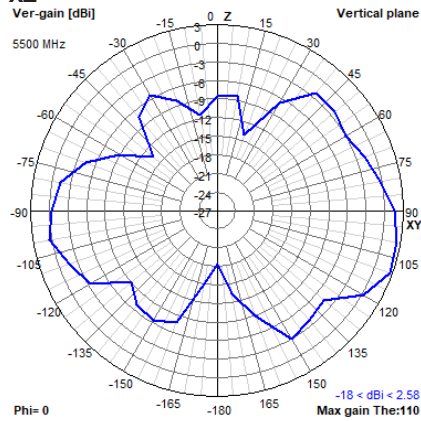
5G/4G/Dual Band Wi-Fi Compact PCB Embedded Antenna

### 2D Radiation Plots

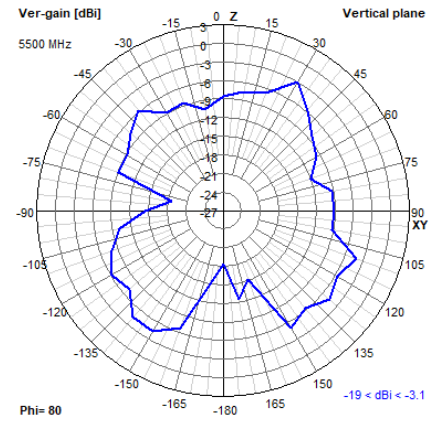
#### 5500 MHz XY



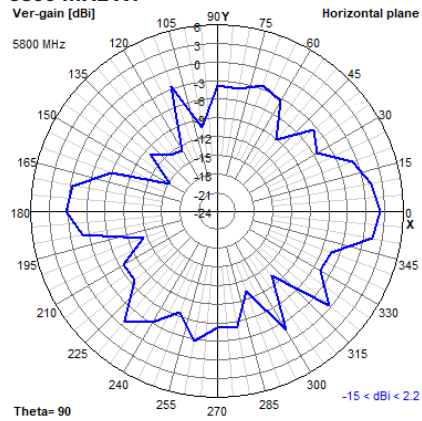
#### XZ



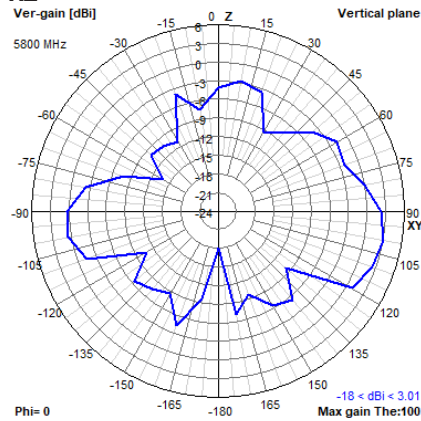
#### YZ



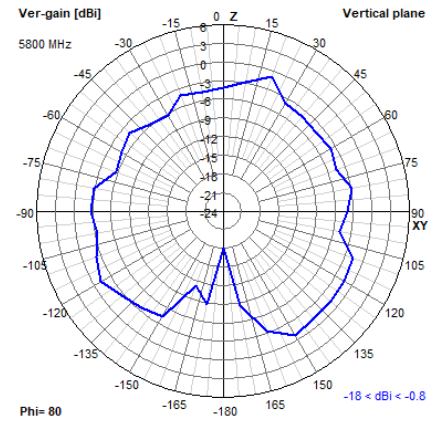
#### 5800 MHz XY



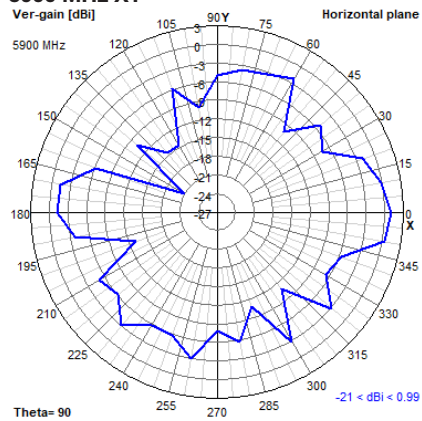
#### XZ



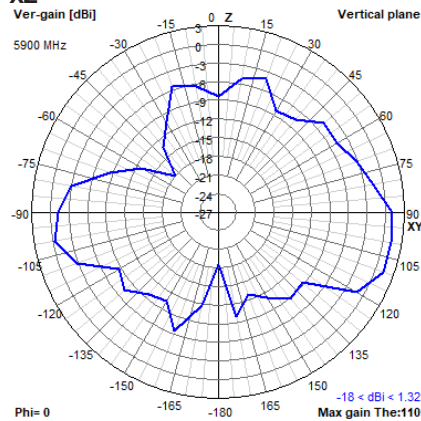
#### YZ



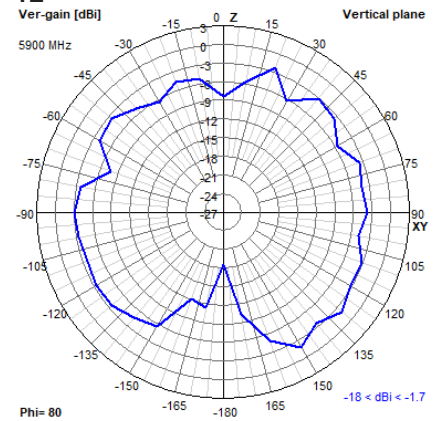
#### 5900 MHz XY



#### XZ



#### YZ



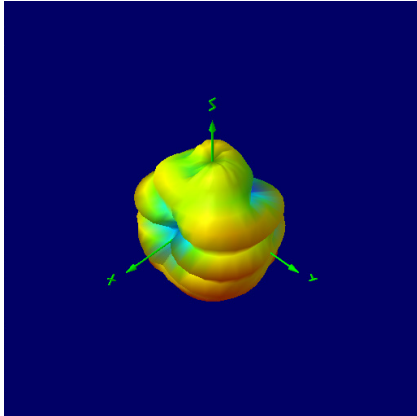


## Echo 14

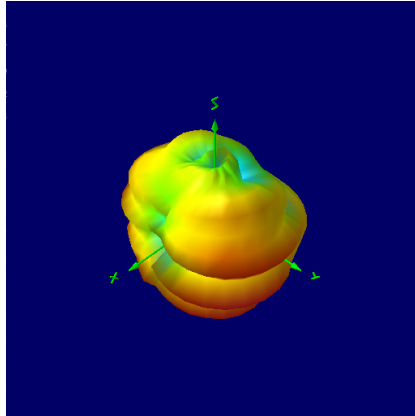
5G/4G/Dual Band Wi-Fi Compact PCB Embedded Antenna

### 3D Radiation Plots

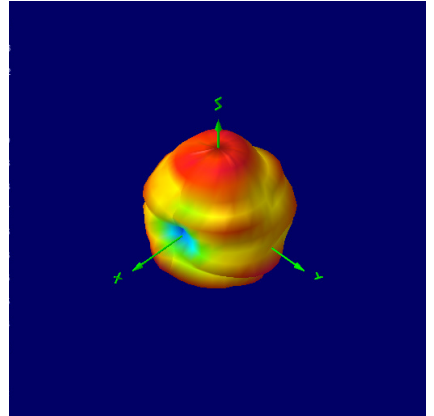
800 MHz



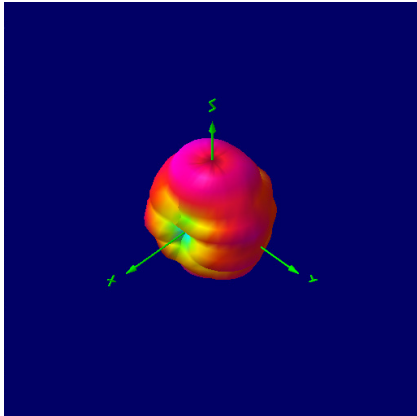
900 MHz



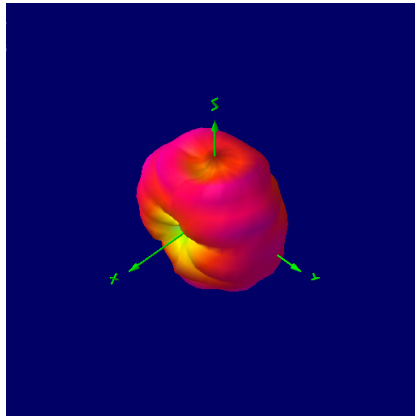
1700 MHz



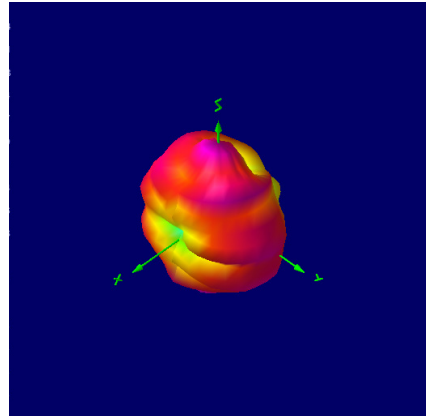
1800 MHz



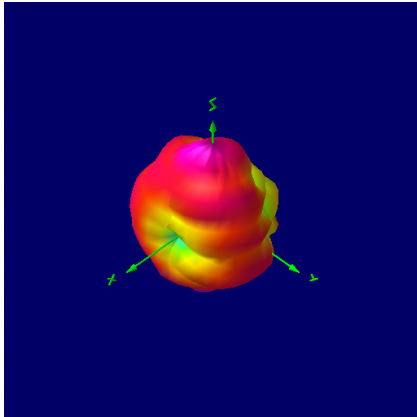
1900 MHz



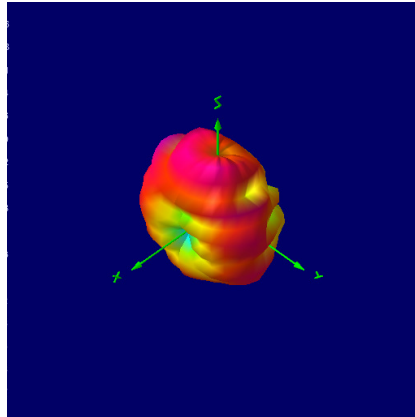
2000 MHz



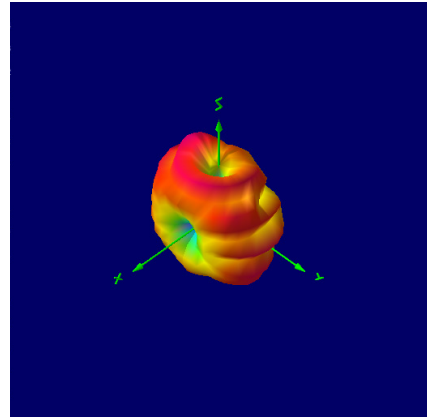
2100 MHz



2300 MHz



2400 MHz



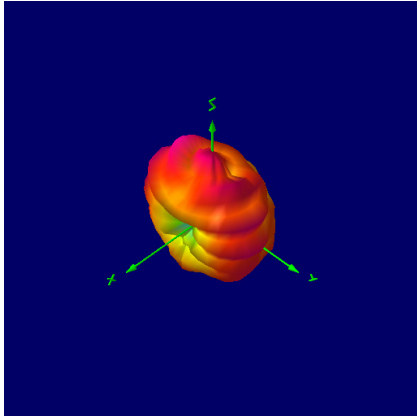


## Echo 14

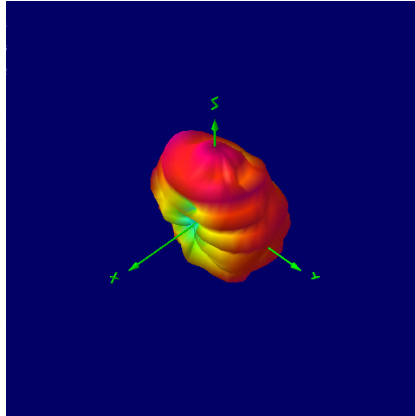
5G/4G/Dual Band Wi-Fi Compact PCB Embedded Antenna

### 3D Radiation Plots

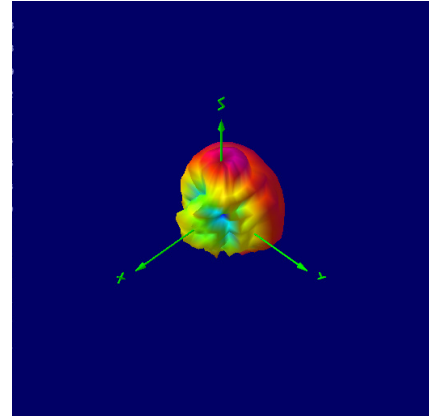
2500 MHz



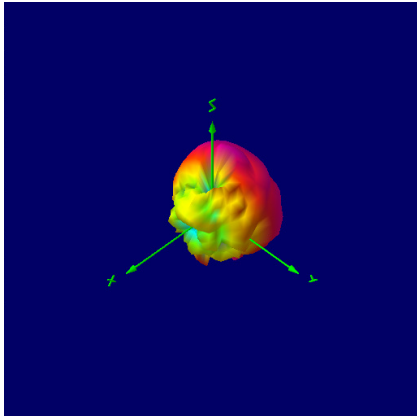
2600 MHz



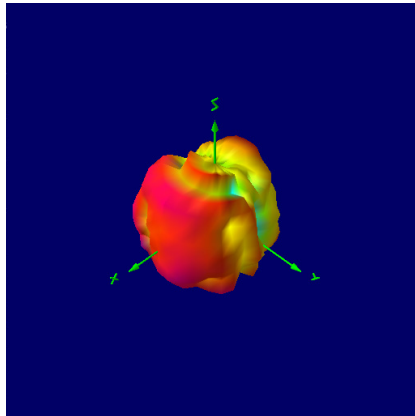
3300 MHz



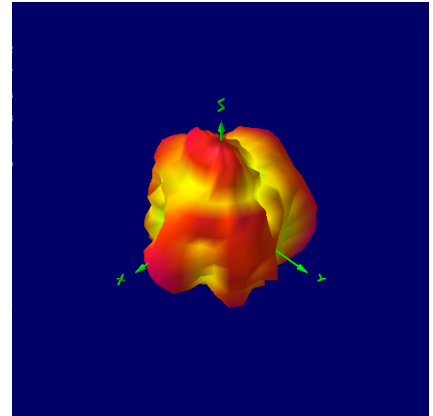
3500 MHz



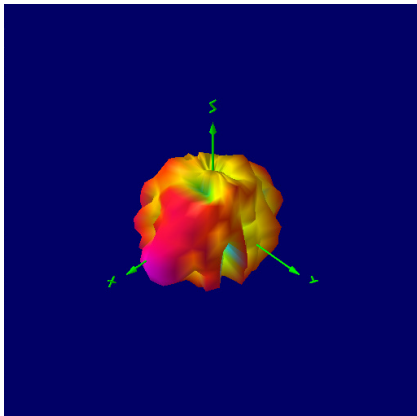
4700 MHz



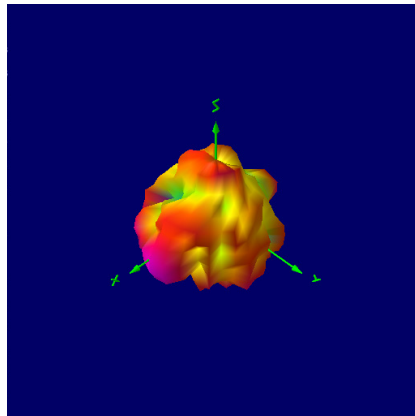
5200 MHz



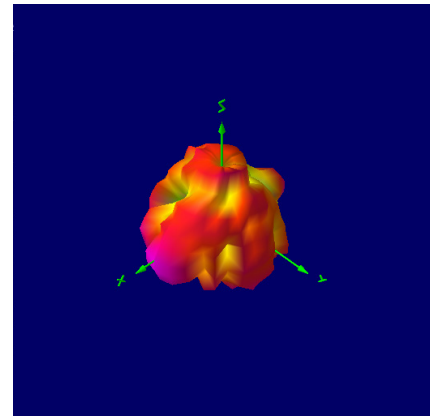
5500 MHz



5800 MHz



5900 MHz



**NOTE:** All 3D radiation plots are shown with Theta = 45 and Phi = 45.