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Enabling Industrial IoT

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

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 Wi-Fi, 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.

Additional Considerations

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



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Electrical Specifications

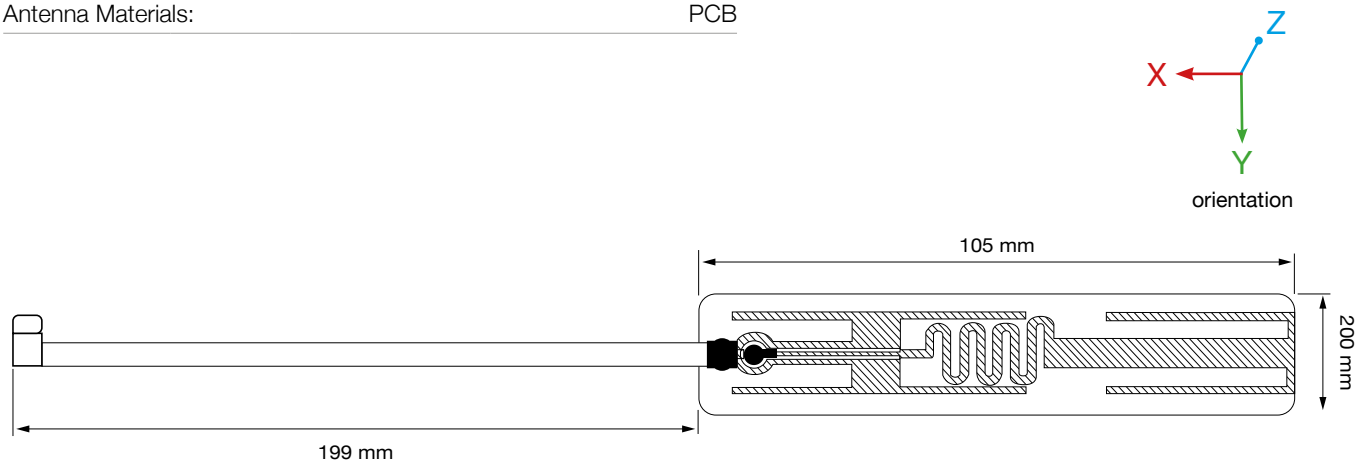
Impedance:	50 Ohm
Polarization:	Vertical
Max Input Power:	5 W
Ground plane independent:	Yes

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
Cable Type:	1.13mm Low Loss
Antenna Materials:	PCB



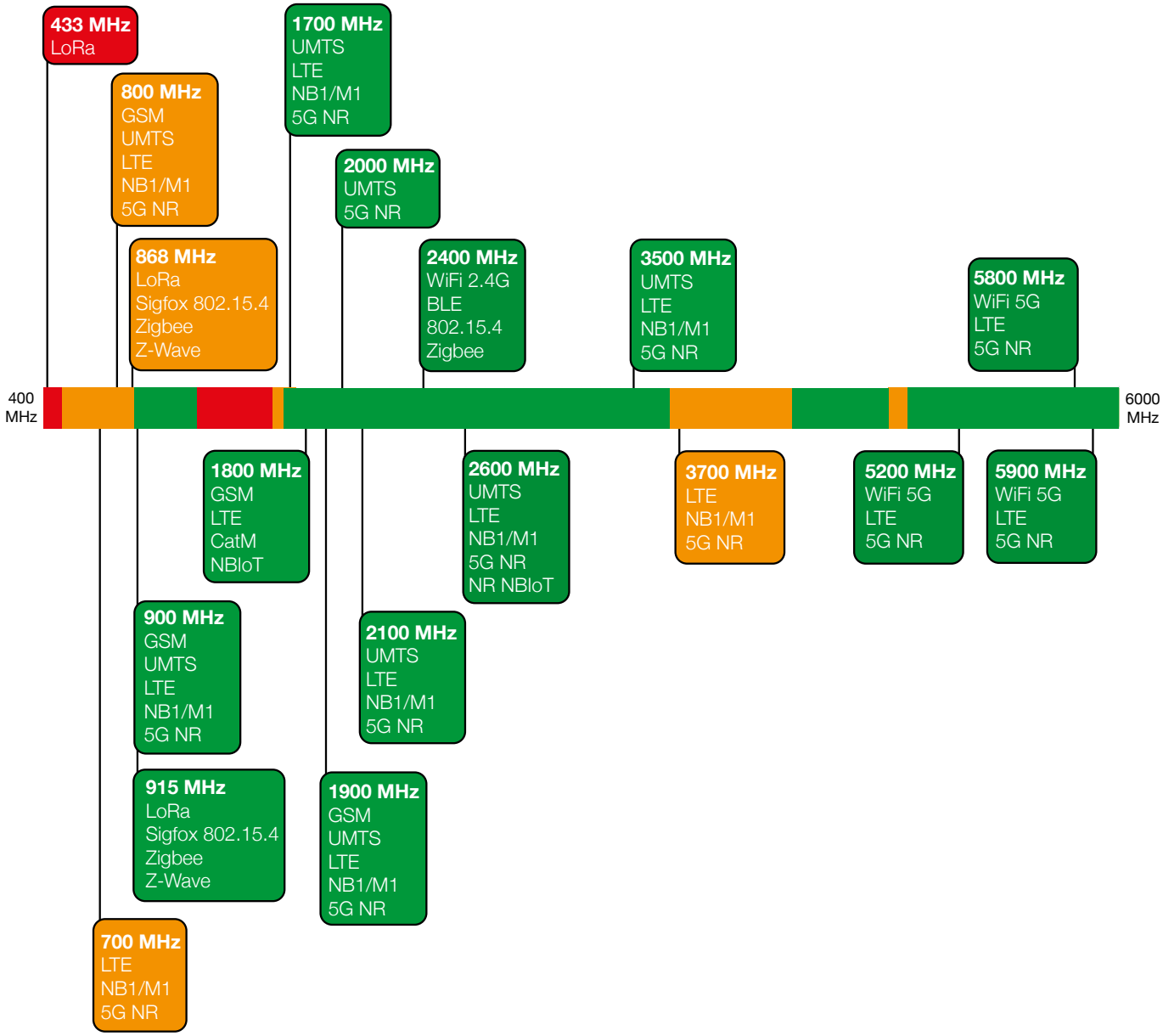
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Spectrum Coverage



● 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:						●	●		●		●	●
NTN Bands:									●			

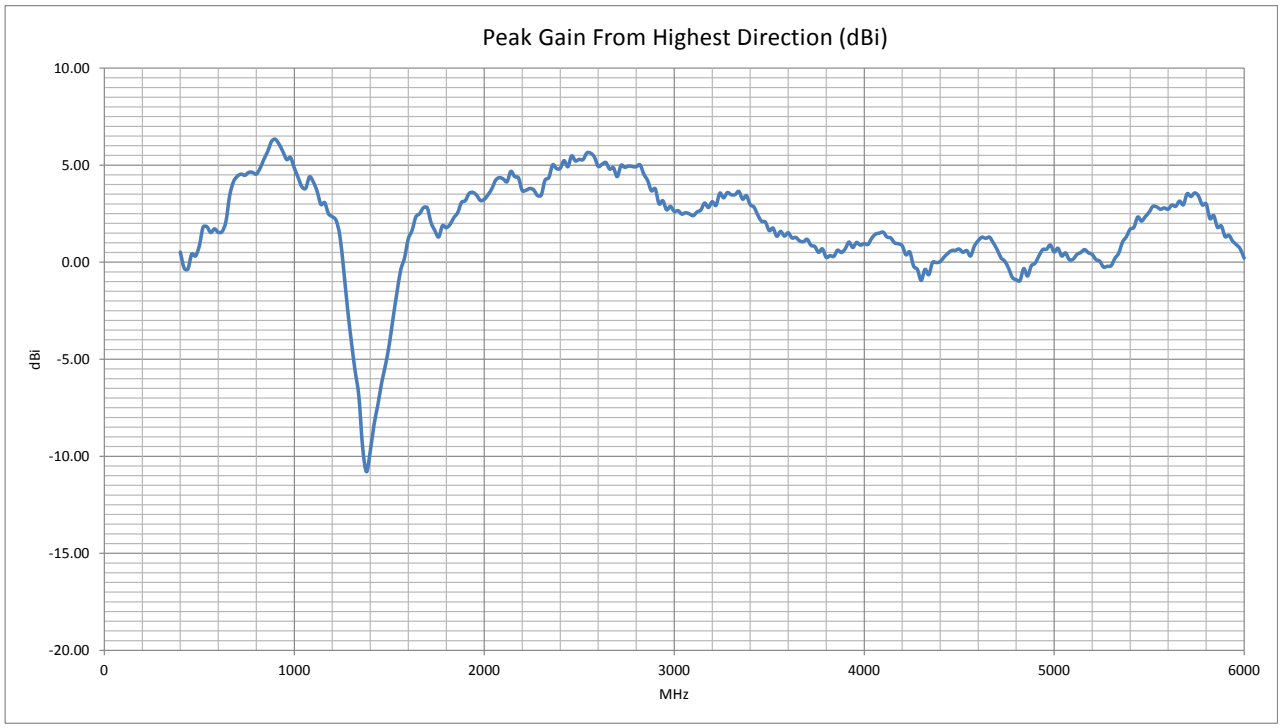
Usable Cellular Frequency Support (2000 MHz – 5900 MHz)

	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:	●	●			●	●						
NTN Bands:	●											

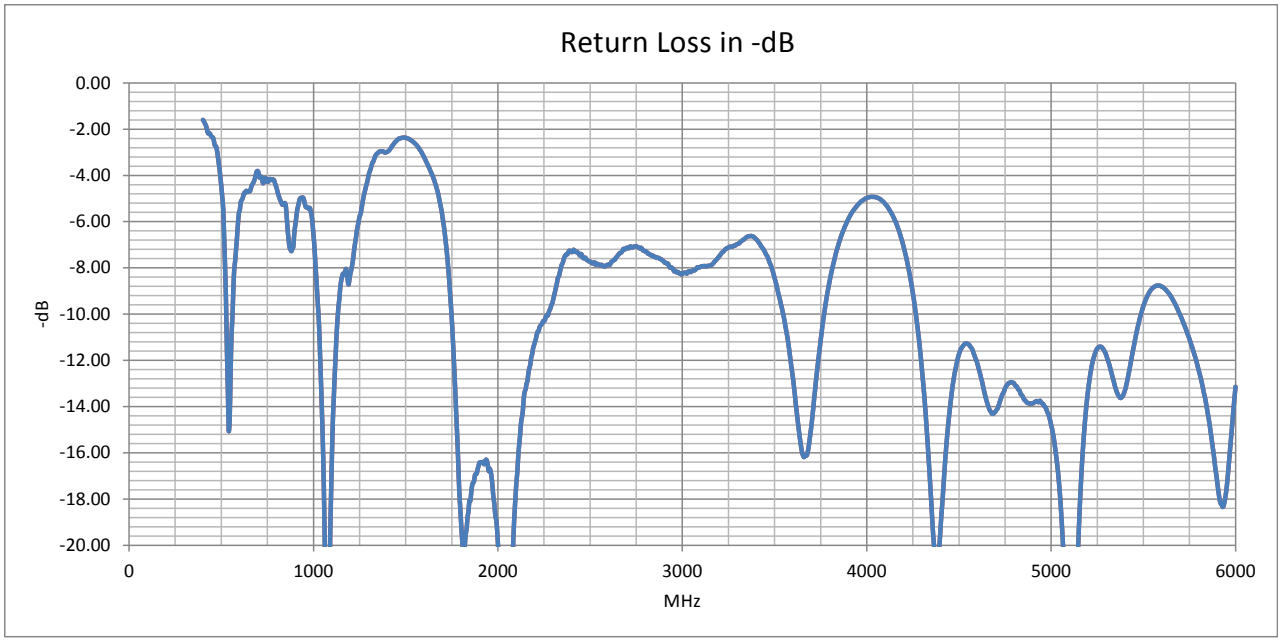
Usable ISM Frequency Support (433 MHz - 6525 MHz)

	433	868	915	2450	5800	6525
Bluetooth				●		
Helium		●	●			
IEEE 802.15.4		●	●	●		
ISM 433						
ISM 868		●				
ISM 915			●			
ISM 2.4G				●		
ISM 5.8G					●	
LoRa						
SigFox		●	●			
Weightless		●	●			
WiFi 2.4G		●	●			
WiFi 5G				●		
WiFi 6E					●	
Zigbee		●	●	●		
Z-Wave		●	●			

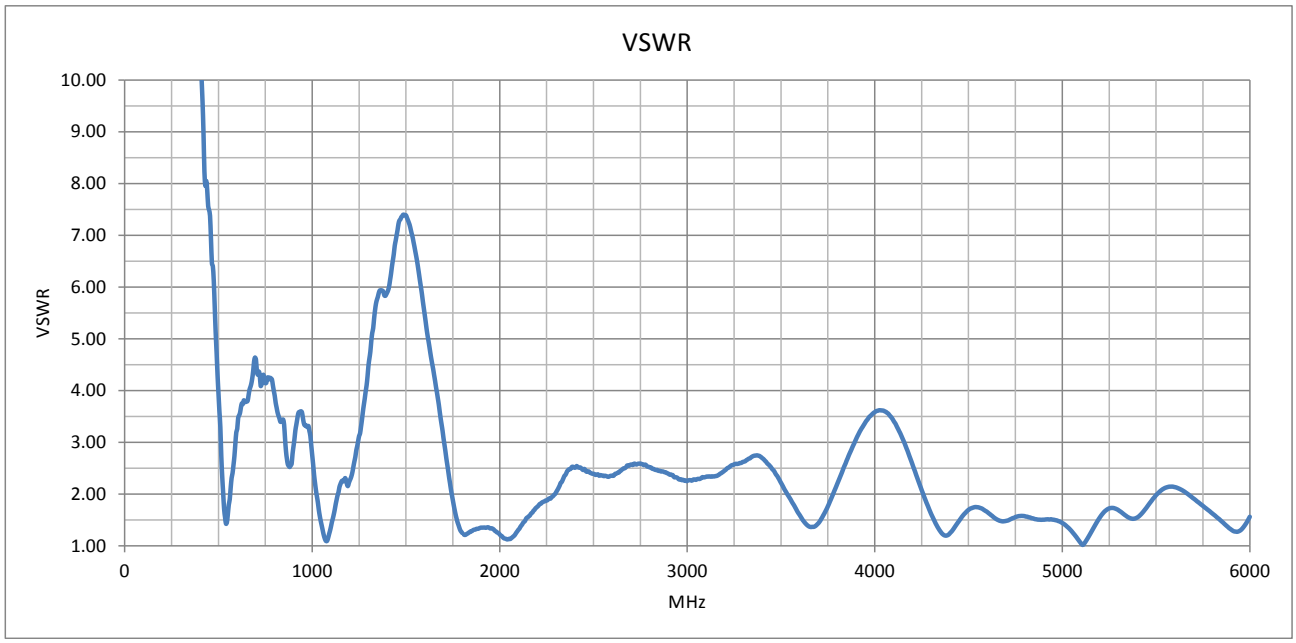
Peak Gain vs. Frequency



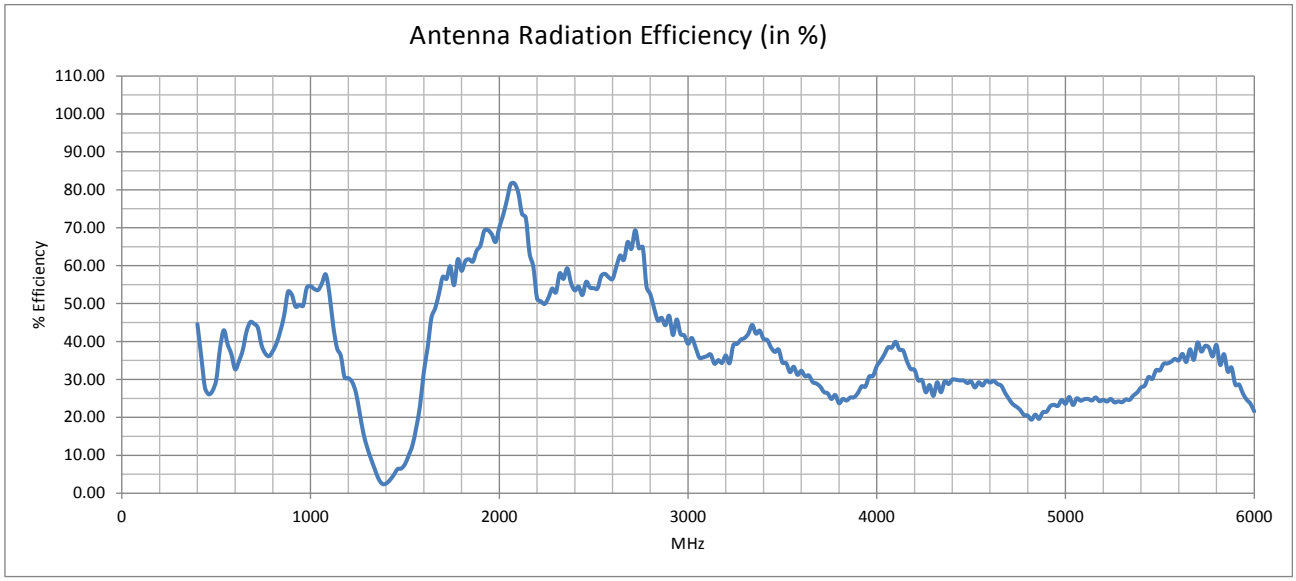
Return Loss



VSWR



Radiation Efficiency



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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	NTN 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			777 - 787 MHz	746 - 756 MHz	36.32	37.79	4.24	4.20	●
	14	14	14	14	n14	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	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	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

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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	NTN 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	n31	n31		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	48	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

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		53			n53			2483.5 - 2495 MHz	2483.5 - 2495 MHz	54.14	54.14	2.41	2.41	●
		54	54	54	n54	n54		1670 - 1675 MHz	1670 - 1675 MHz	51.16	51.16	3.85	3.85	●
		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	n71		663 - 698 MHz	617 - 652 MHz	44.46	37.08	4.64	3.81	●
		72	72	72	n72	n72		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	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	●

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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	NTN Band	Uplink	Downlink	Average Upload Efficiency (%)	Average Download Efficiency (%)	Maximum Upload VSWR	Maximum Download VSWR	Use Indicator
		88	88	88				412 - 417 MHz	422 - 427 MHz	38.46	34.26	9.84	8.69	●
					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	●
1900					n101			1900 - 1910 MHz	1900 - 1910 MHz	66.28	66.28	1.36	1.36	●
		103		103				787 - 788 MHz	757 - 758 MHz	36.65	37.09	4.17	4.21	●
					n105			663 - 703 MHz	612 - 652 MHz	44.48	36.72	4.64	3.81	●
							n254	1610 - 1625.5 MHz	2483.5 - 2500 MHz	37.74	54.13	5.19	2.41	●
							n255	1626.5 - 1660.5 MHz	1525 - 1559 MHz	45.96	13.50	4.81	7.12	●
							n256	1980 - 2010 MHz	2170 - 2200 MHz	69.10	57.19	1.28	1.76	●

● 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.

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ISM Standards Frequency Support

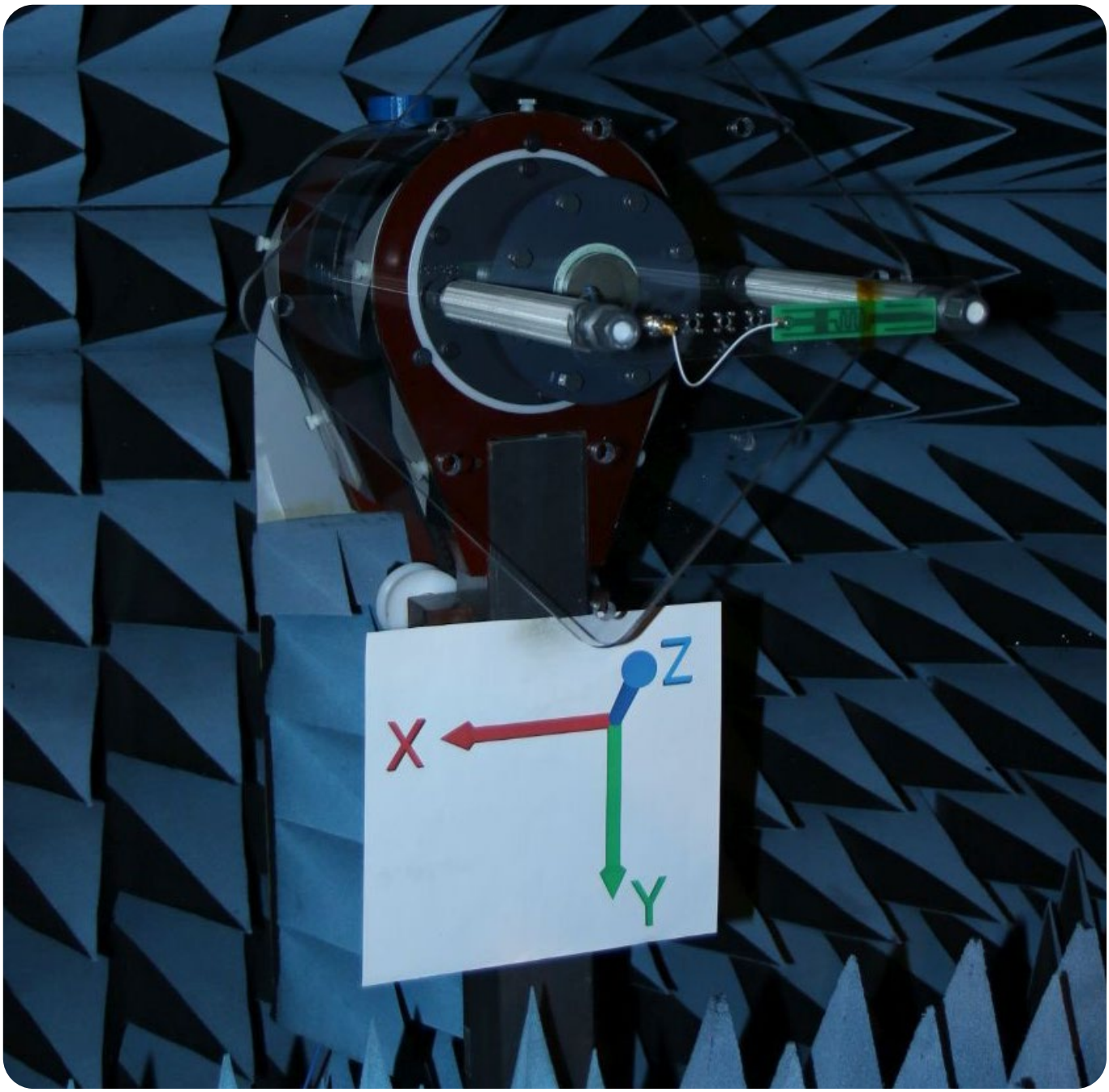
Application	Frequency Range	Efficiency (%)	Maximum VSWR	Peak Gain from highest direction (dBi)	Use Indicator
ISM 433 MHz	433.05 - 434.79 MHz	30.34	8.05	-0.33	🔴
ISM 868 MHz	863 - 870 MHz	48.97	2.74	5.97	🟢
ISM 915 MHz	902 - 928 MHz	50.22	3.58	6.31	🟢
ISM 2.4 GHz	2400 - 2500 MHz	54.07	2.55	5.48	🟢
Wi-Fi 2.4G	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	🟢
UWB band 1	3168 - 3696 MHz	36.37	2.75	3.65	🟢
UWB band 2	3696 - 4224 MHz	30.65	3.62	1.55	🟠
UWB band 3	4224 - 4752 MHz	28.11	2.34	1.29	🟠
UWB band 4	4752 - 5280 MHz	23.18	1.74	0.89	🟢
UWB band 5	5280 - 5808 MHz	32.66	2.15	3.57	🟢

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Test Setup (in Free Space)



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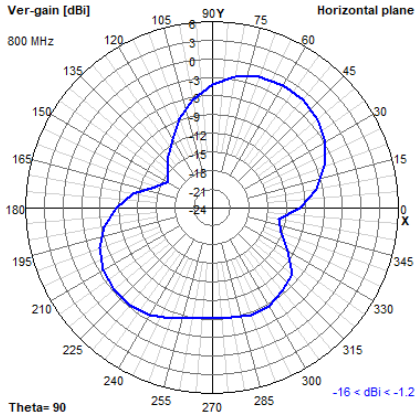
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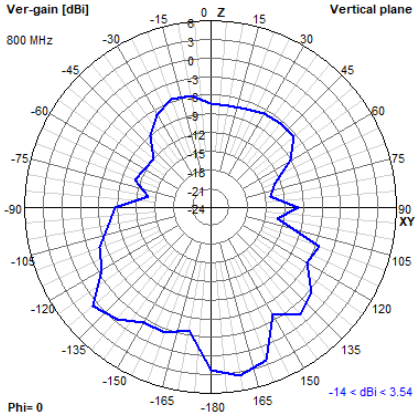
5G/4G/Dual Band Wi-Fi Compact PCB Embedded Antenna

2D Radiation Plots

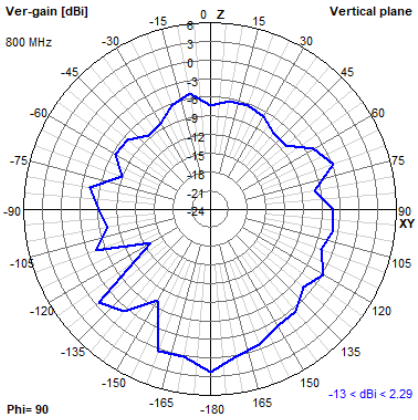
800 MHz XY



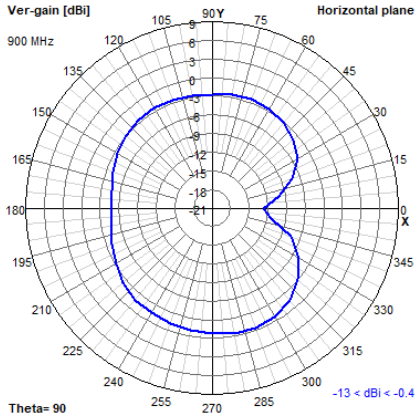
XZ



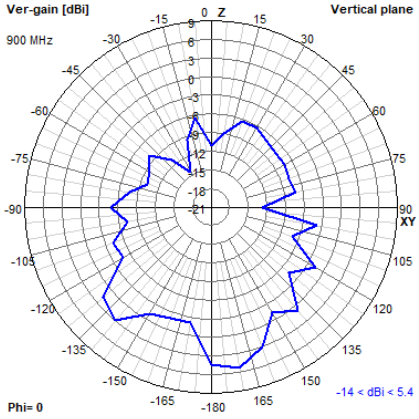
YZ



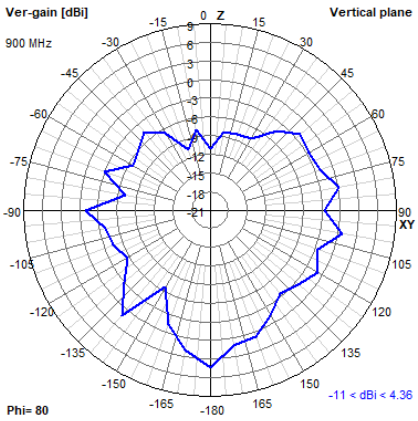
900 MHz XY



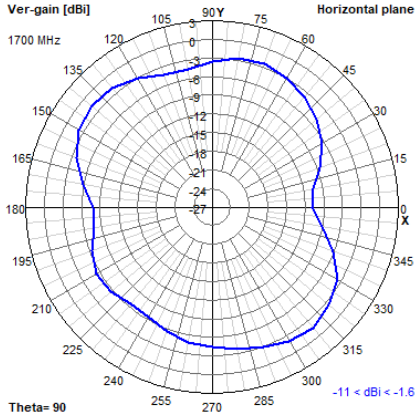
XZ



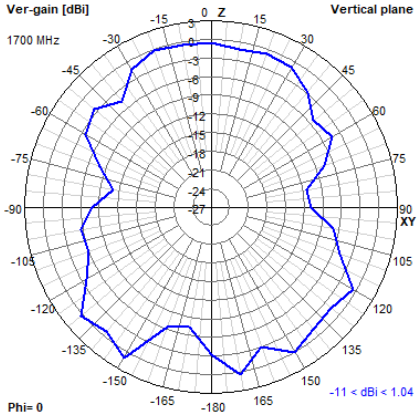
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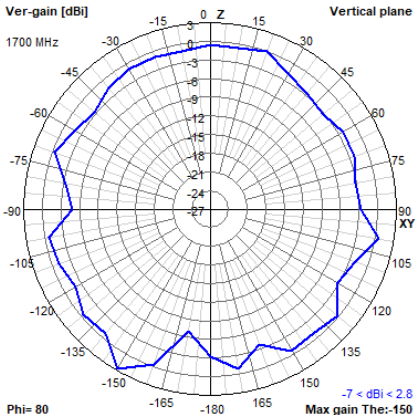
1700 MHz XY



XZ



YZ



Siretta

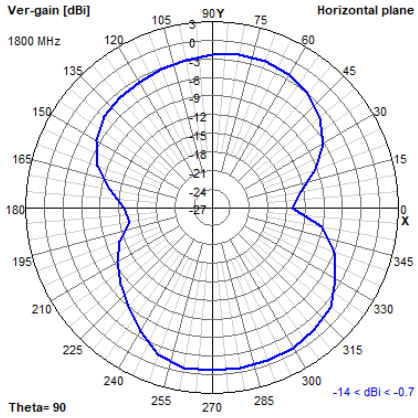
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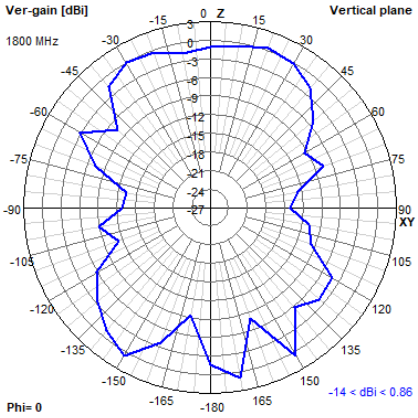
5G/4G/Dual Band Wi-Fi Compact PCB Embedded Antenna

2D Radiation Plots

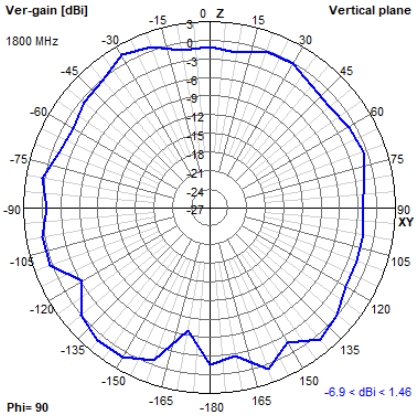
1800 MHz XY



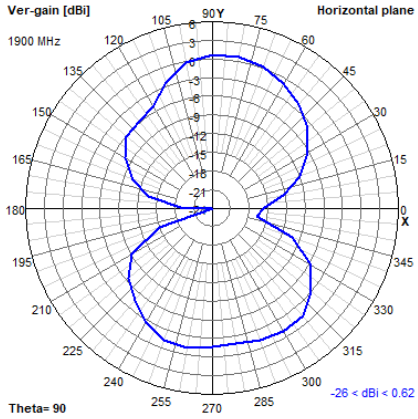
XZ



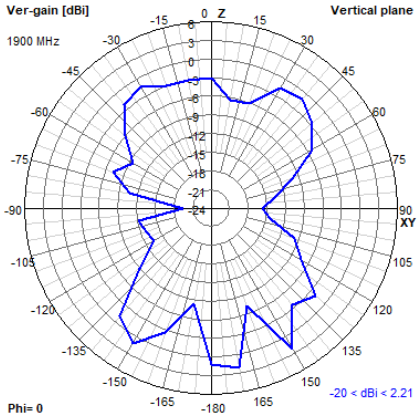
YZ



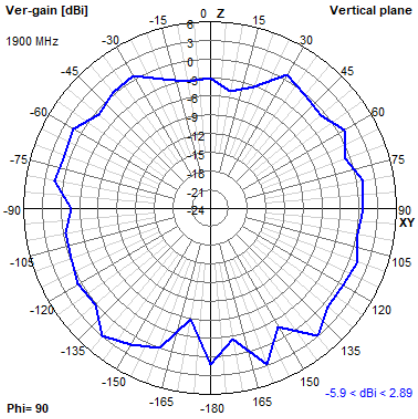
1900 MHz XY



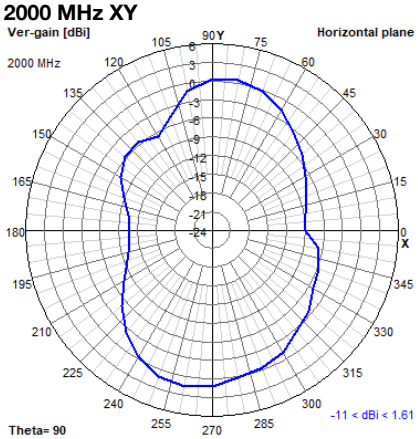
XZ



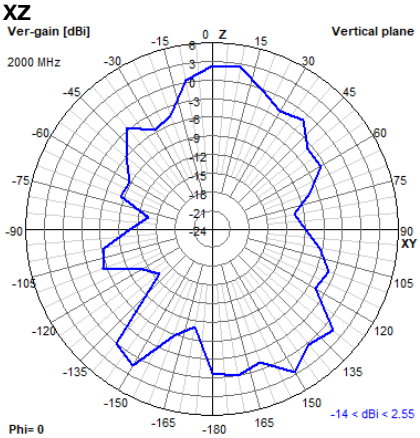
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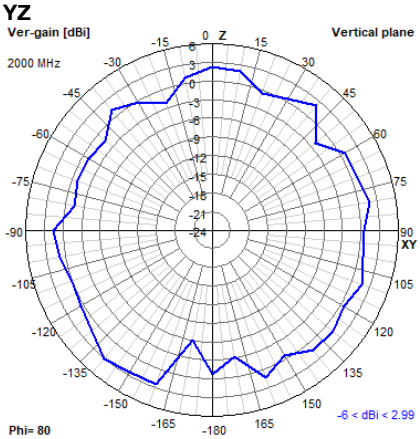
2000 MHz XY



XZ



YZ



Siretta

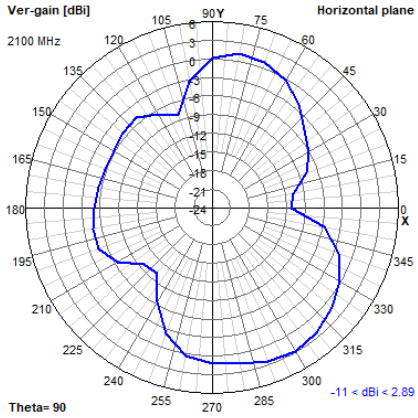
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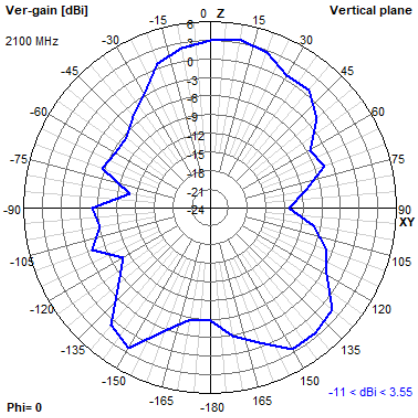
5G/4G/Dual Band Wi-Fi Compact PCB Embedded Antenna

2D Radiation Plots

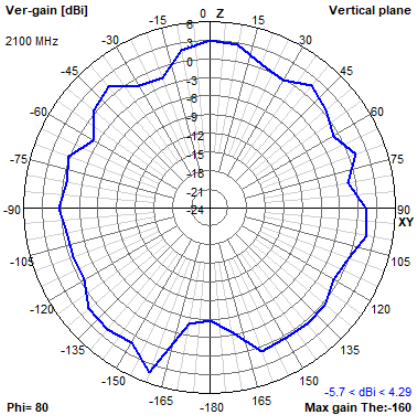
2100 MHz XY



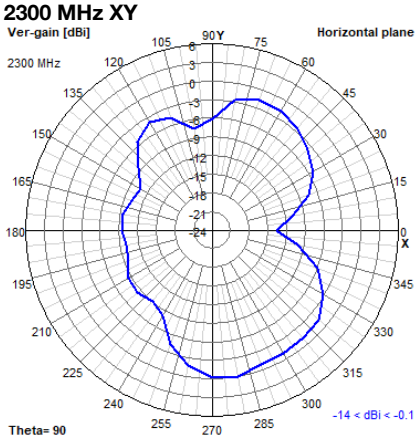
XZ



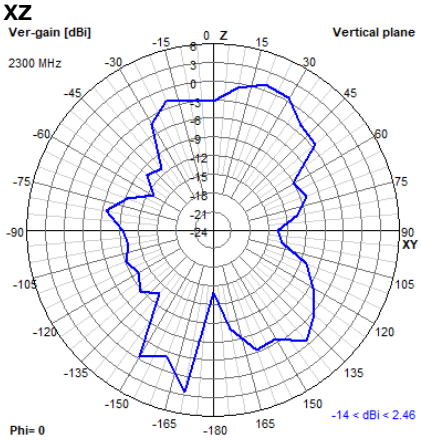
YZ



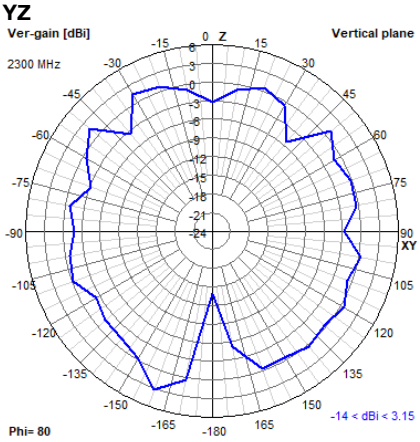
2300 MHz XY



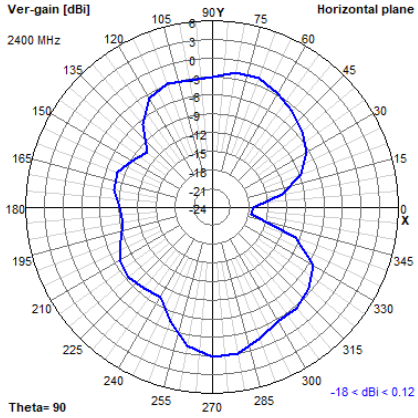
XZ



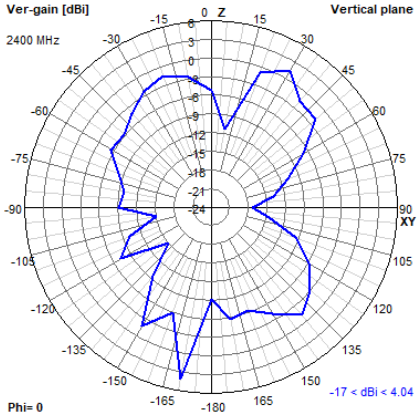
YZ



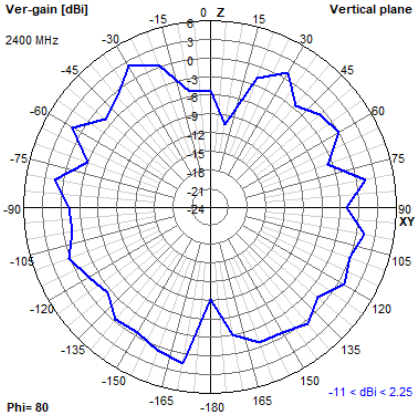
2400 MHz XY



XZ



YZ



Siretta

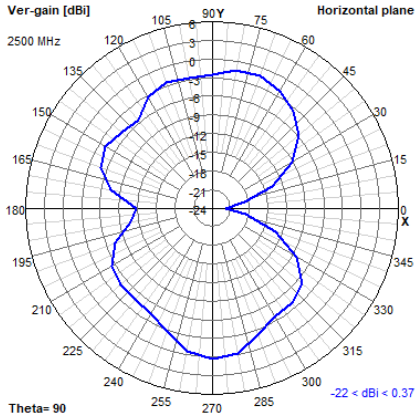
Enabling Industrial IoT

Echo 14

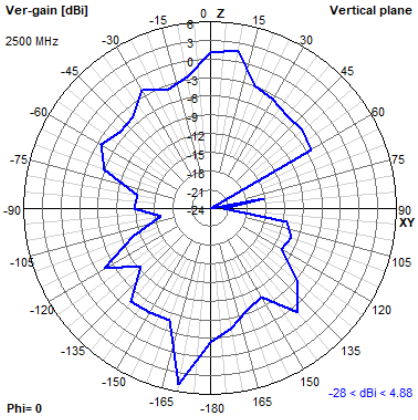
5G/4G/Dual Band Wi-Fi Compact PCB Embedded Antenna

2D Radiation Plots

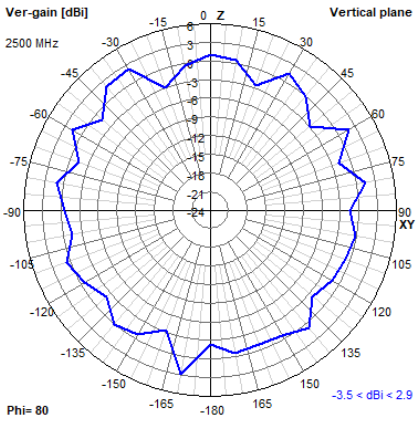
2500 MHz XY



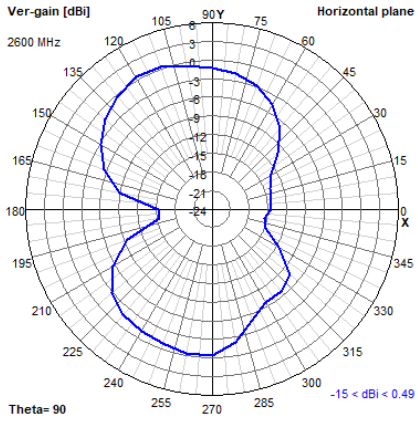
XZ



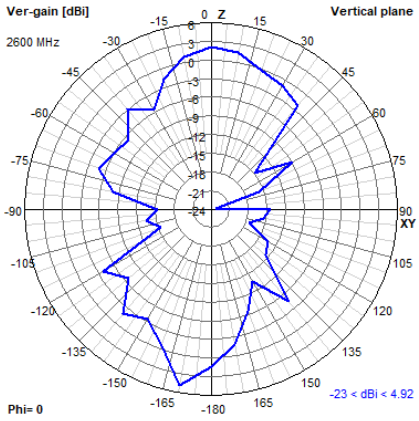
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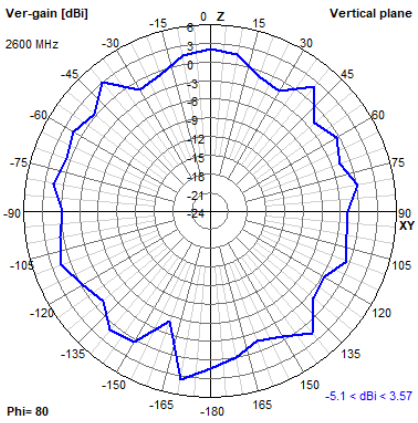
2600 MHz XY



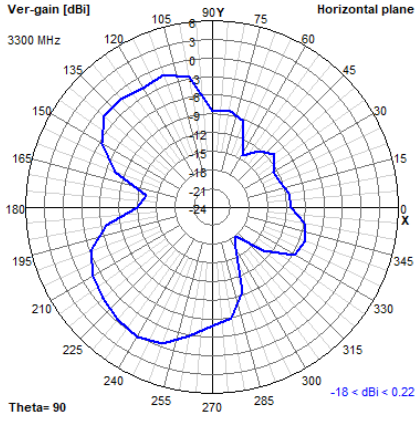
XZ



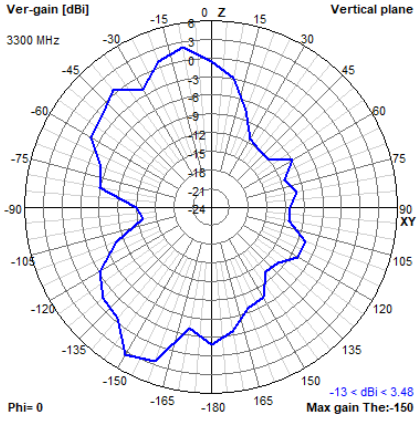
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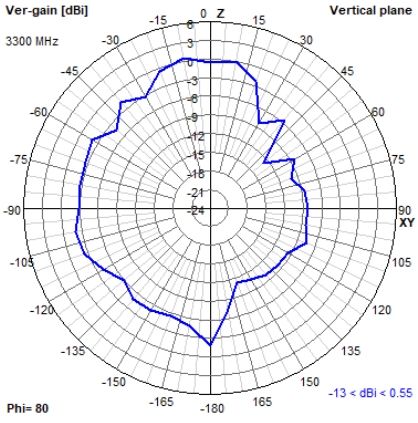
3300 MHz XY



XZ



YZ

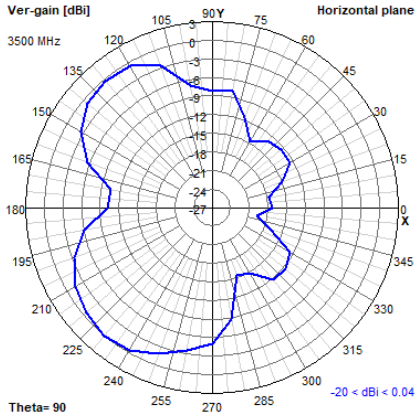


Echo 14

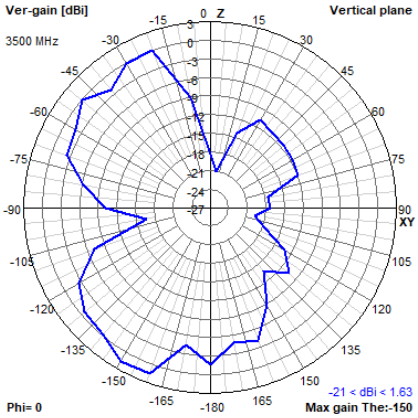
5G/4G/Dual Band Wi-Fi Compact PCB Embedded Antenna

2D Radiation Plots

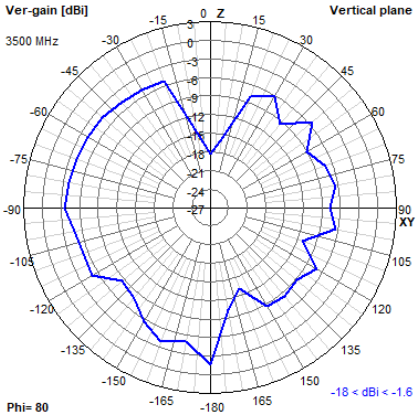
3500 MHz XY



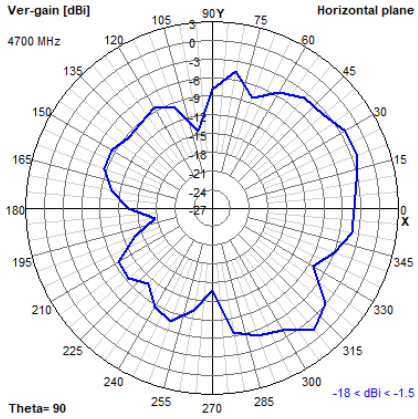
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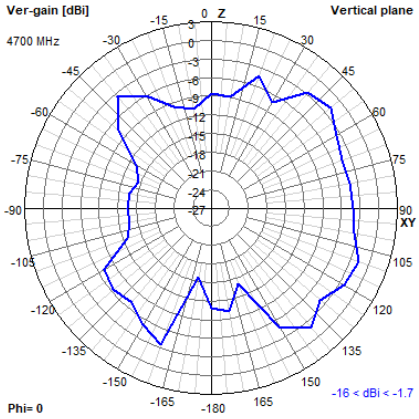
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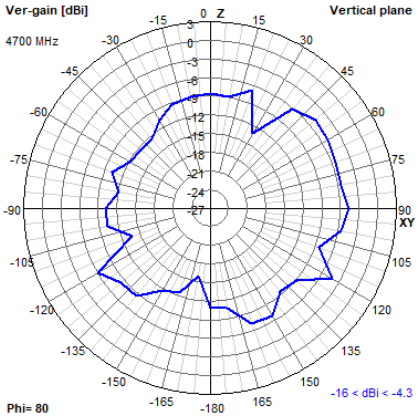
4700 MHz XY



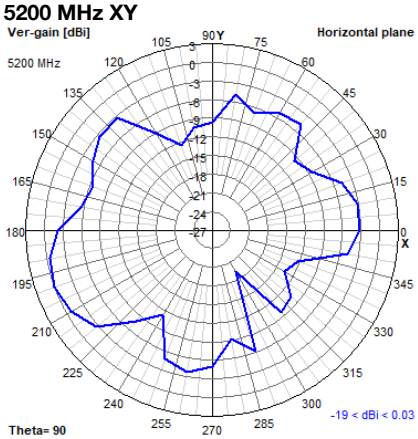
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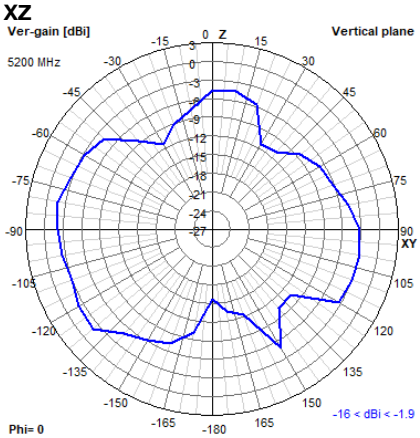
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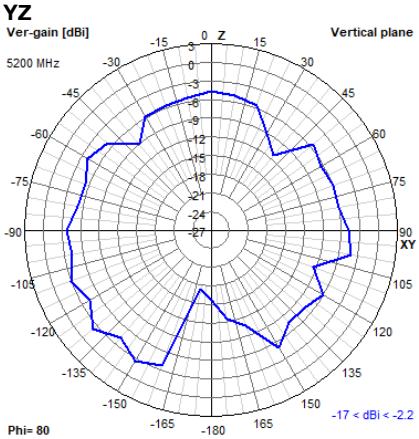
5200 MHz XY



XZ



YZ



Siretta

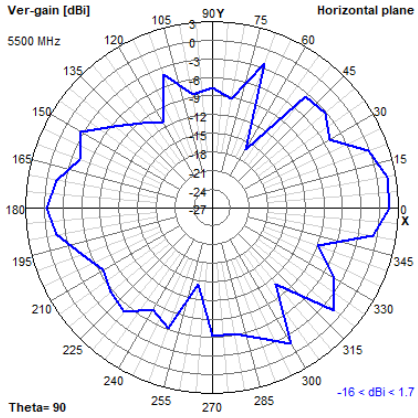
Enabling Industrial IoT

Echo 14

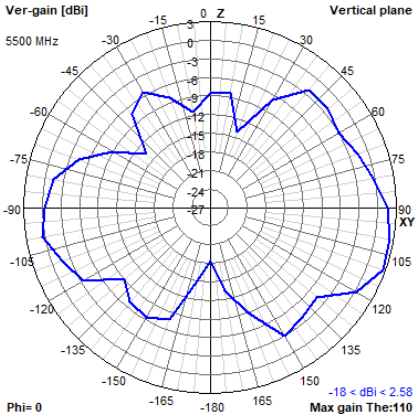
5G/4G/Dual Band Wi-Fi Compact PCB Embedded Antenna

2D Radiation Plots

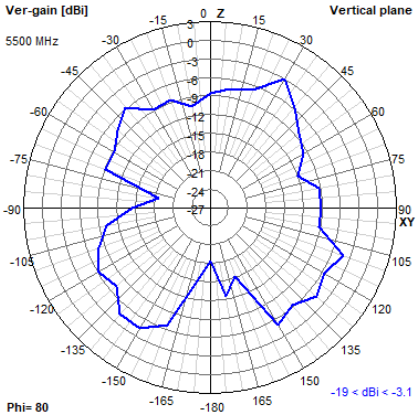
5500 MHz XY



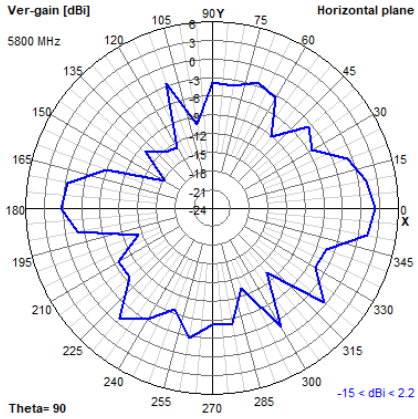
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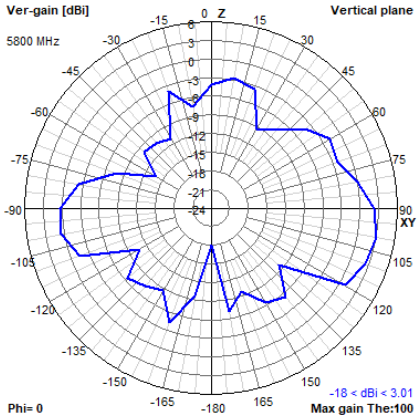
YZ



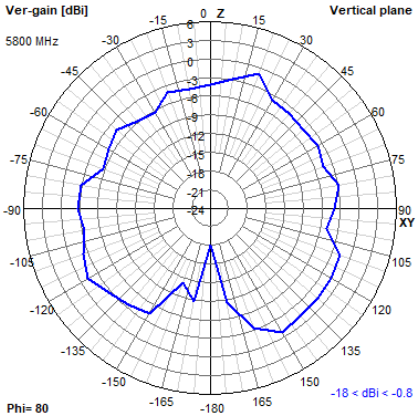
5800 MHz XY



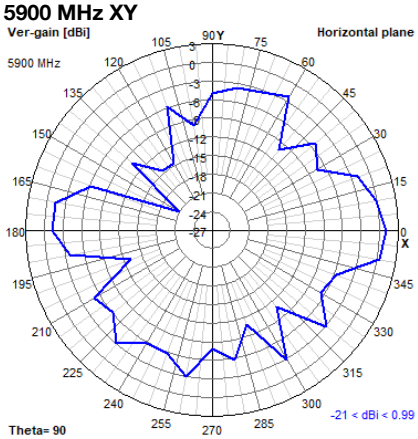
XZ



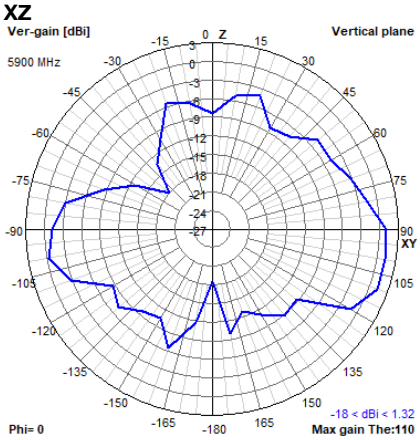
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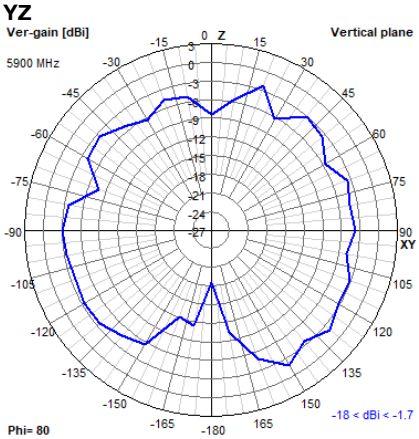
5900 MHz XY



XZ



YZ

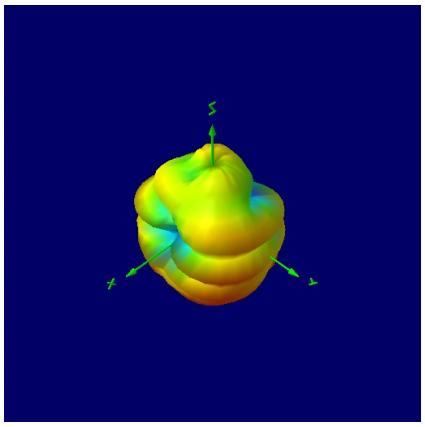


Echo 14

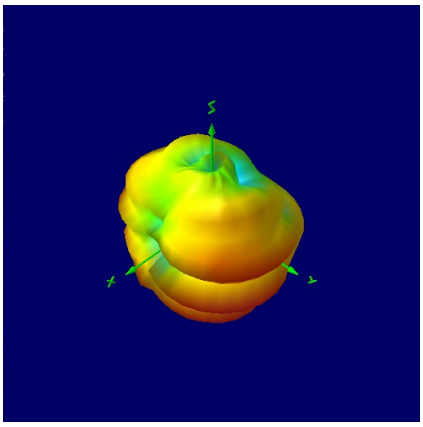
5G/4G/Dual Band Wi-Fi Compact PCB Embedded Antenna

3D Radiation Plots

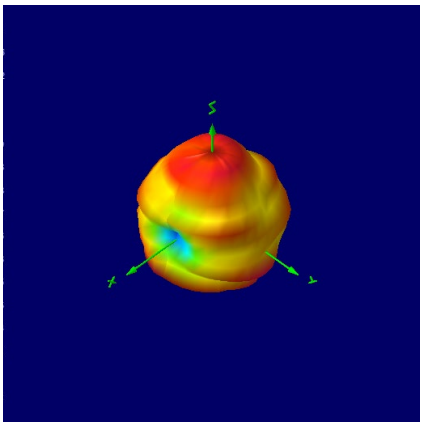
800 MHz



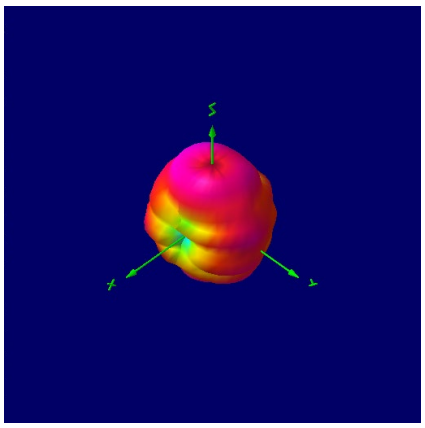
900 MHz



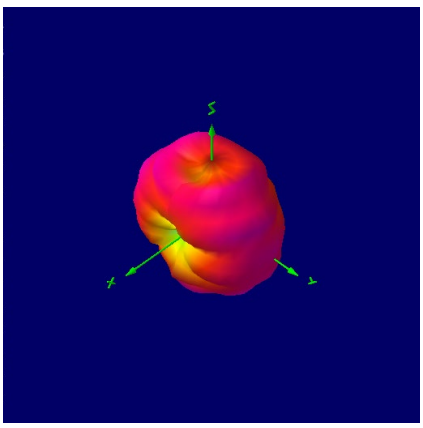
1700 MHz



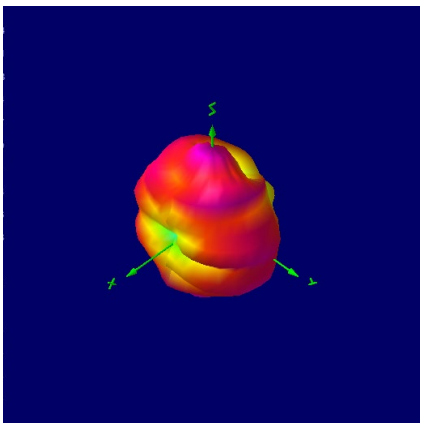
1800 MHz



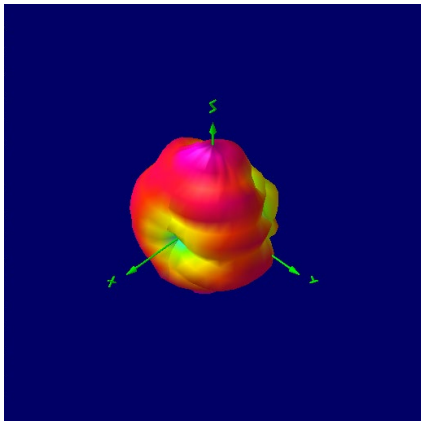
1900 MHz



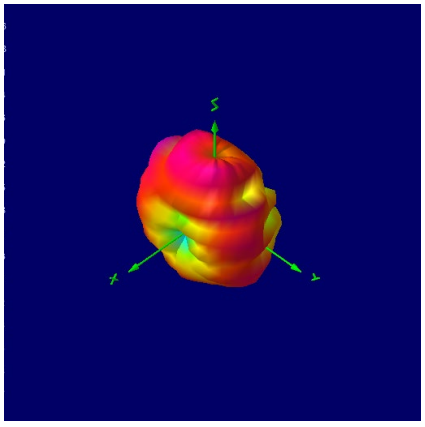
2000 MHz



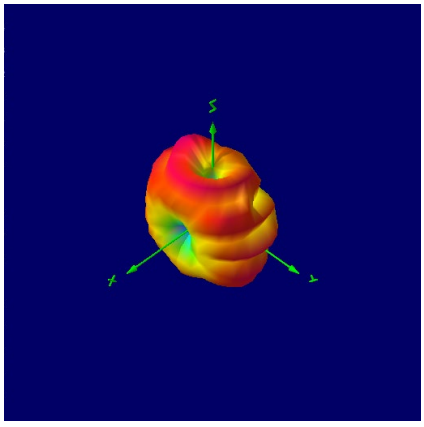
2100 MHz



2300 MHz



2400 MHz

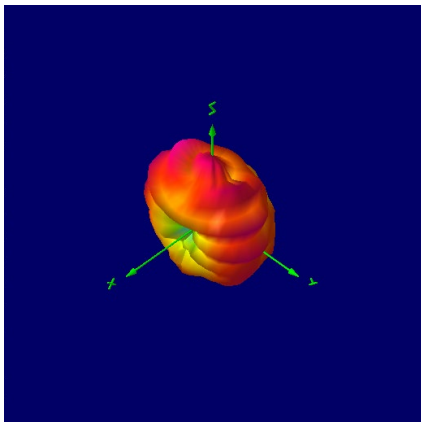


Echo 14

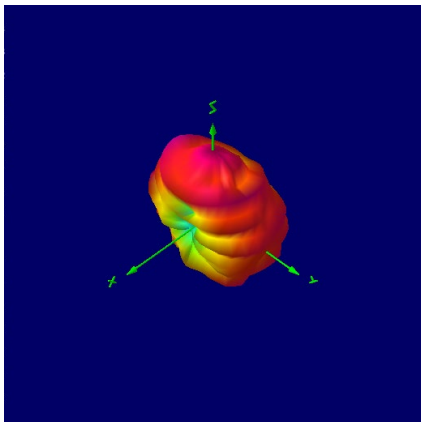
5G/4G/Dual Band Wi-Fi Compact PCB Embedded Antenna

3D Radiation Plots

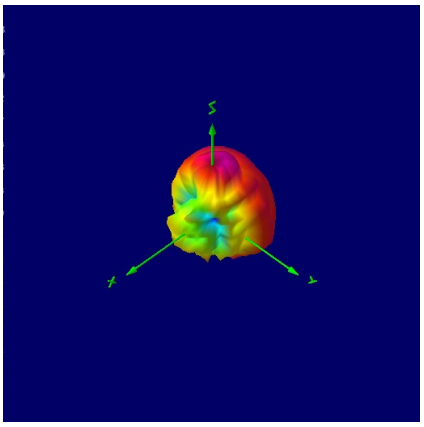
2500 MHz



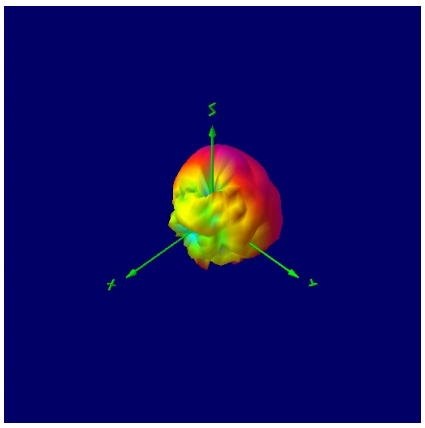
2600 MHz



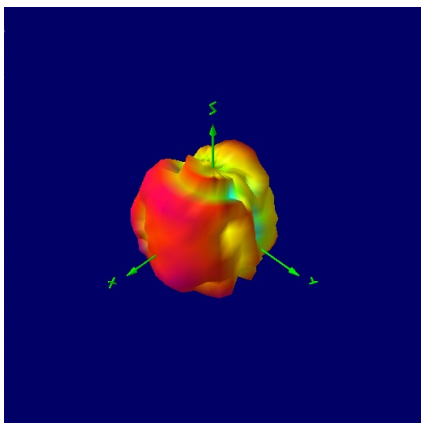
3300 MHz



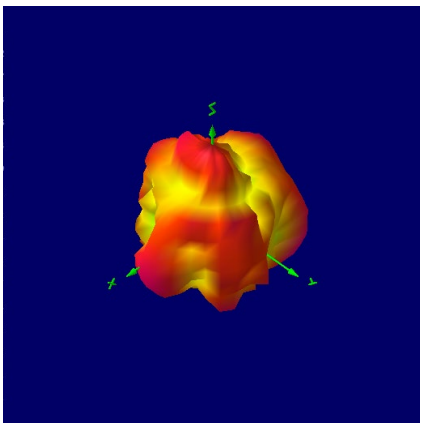
3500 MHz



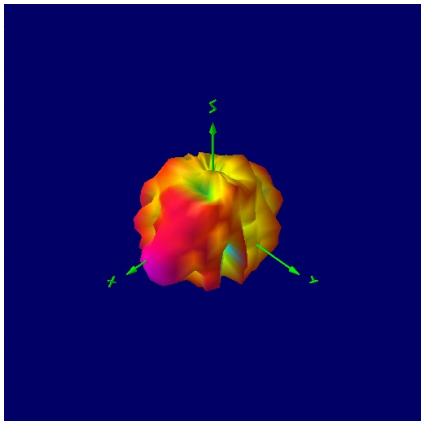
4700 MHz



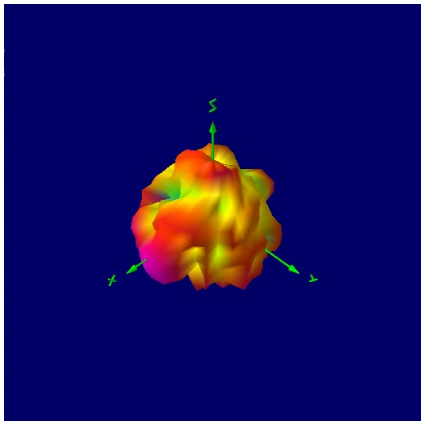
5200 MHz



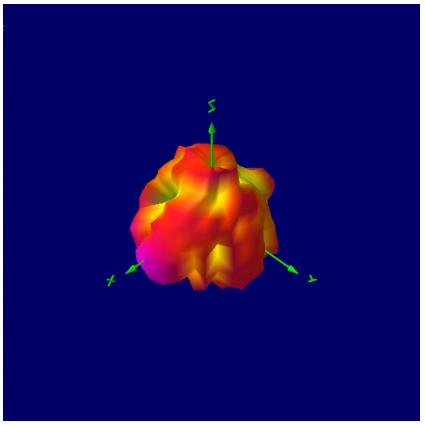
5500 MHz



5800 MHz



5900 MHz



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

Siretta

Enabling Industrial IoT

Echo 14

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

Ordering Details:

Part Number	Description
ECHO14/0.1M/UFL/S/S/15	5G/4G/Dual Band Wi-Fi Compact PCB Embedded Antenna 100mm Cable
ECHO14/0.2M/UFL/S/S/15	5G/4G/Dual Band Wi-Fi Compact PCB Embedded Antenna 200mm Cable

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