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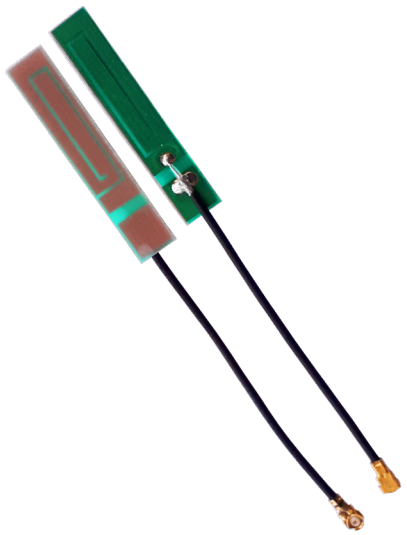
Enabling Industrial IoT

Echo 35

5G/4G Small PCB Embedded Antenna



Key Features

- Supports 5G NR / 4G LTE / 3G UMTS
- Supports Wi-Fi 5G
- Designed for embedded applications

General Description

The Echo 35 is an embedded PCB antenna with a good peak gain performance.

The wideband allows for a migration plan from one technology to another; 3G to 4G to 5G, or simply the choice to select a technology depending on usage.

Typically supplied with a uFL/I-PEX connector and a short tail of cable. Alternative cable lengths and connectors can be supplied for small volume requirements.

Additional Considerations

- Small format design for applications with limited space
- Ground Plane Independent

E Embedded	5G New Radio	4G LTE	3G UMTS	ISM 5.8G
WiFi 5G	WiFi 4 802.11n	WiFi 5 802.11ac	WiFi 6 802.11ax	WLAN 5800

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Electrical Specifications

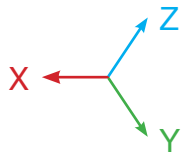
Impedance:	50 Ohm
Polarization:	Linear
Max Input Power:	10 W
Ground plane independent:	Yes

Environmental Specifications

Operating Temperature range:	-30 to +75 °C
Storage Temperature range:	-30 to +75 °C

Mechanical Specifications

Dimensions:	35.8 x 7 x 0.5 mm (without cable and connector)
Weight:	3 g
Connector:	UFL/I-PEX
Antenna Cable:	1.13mm Low Loss
Antenna Materials:	PCB



orientation

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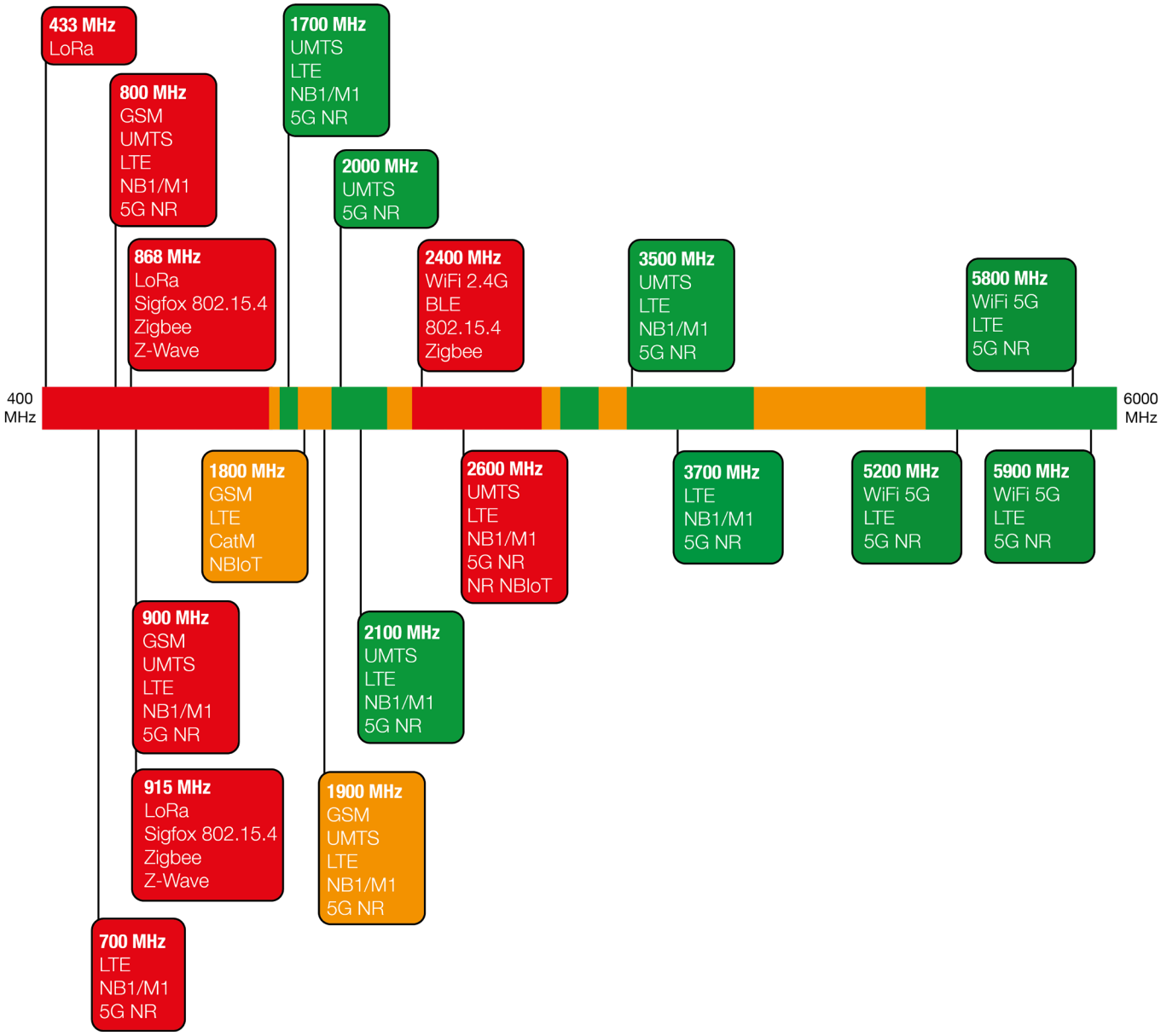
Spectrum Coverage



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:										●		

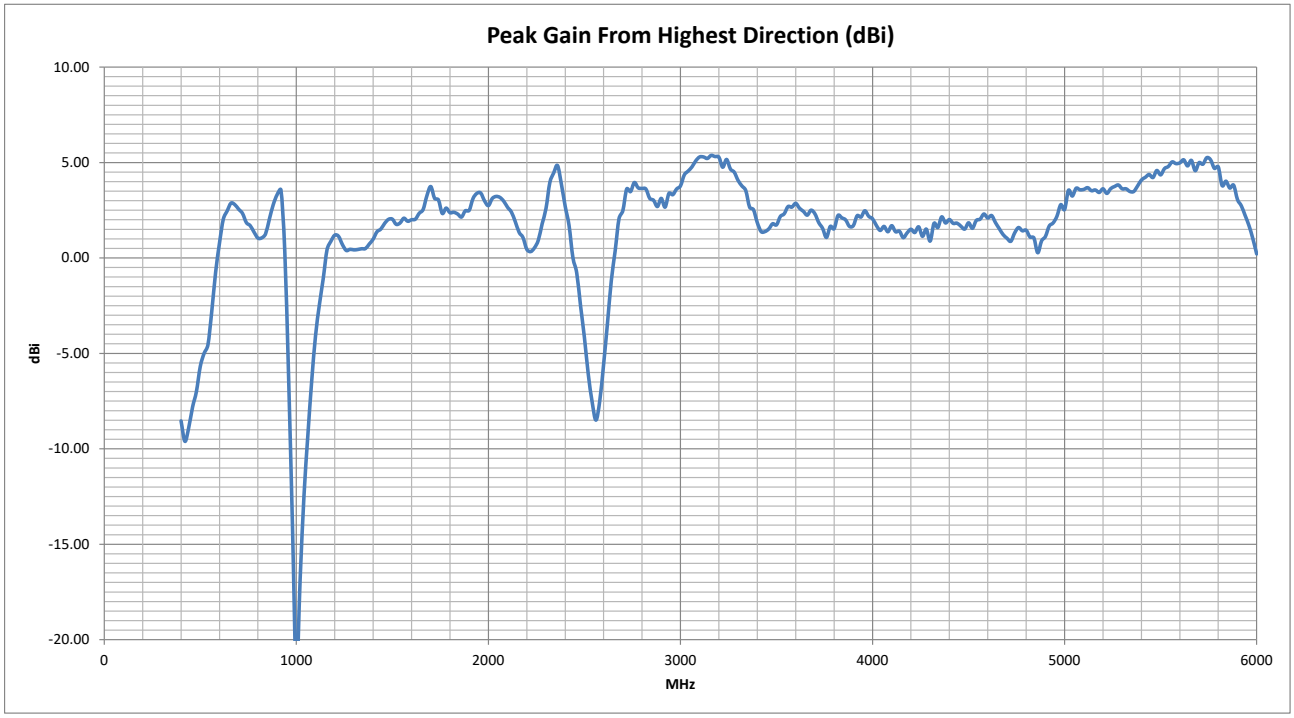
Usable Cellular Frequency Support (2000 MHz – 5900 MHz)

	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:		●										

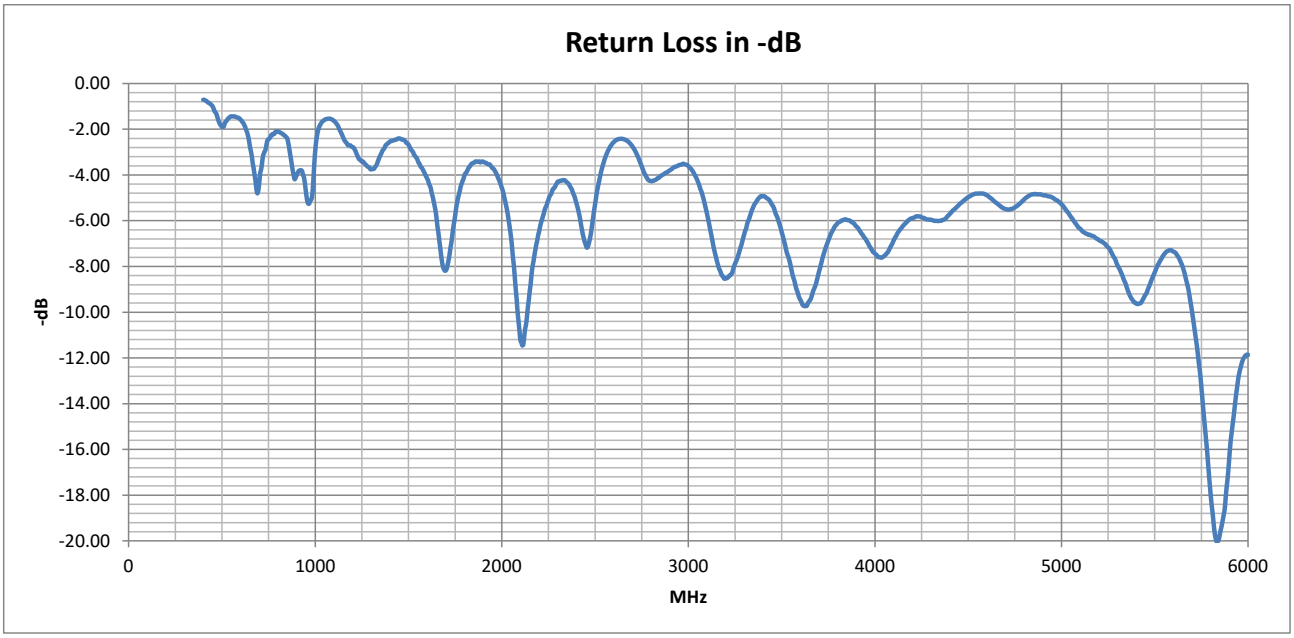
Usable ISM Frequency Support (433 MHz - 5800 MHz)

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

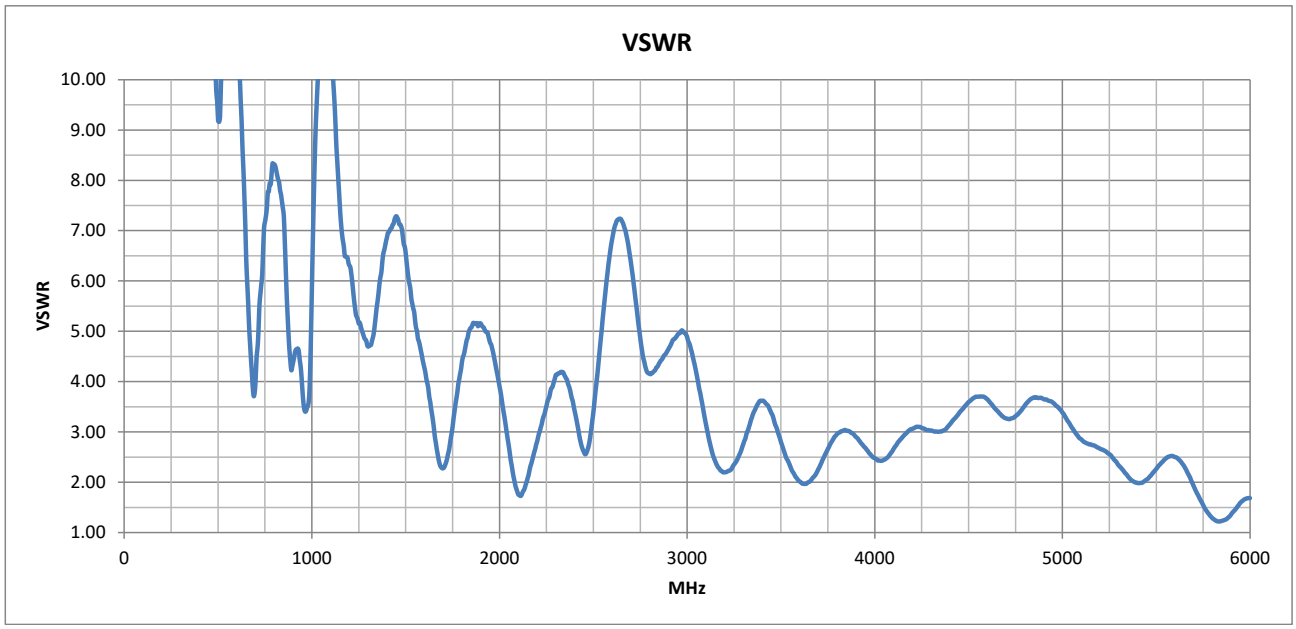
Peak Gain vs. Frequency



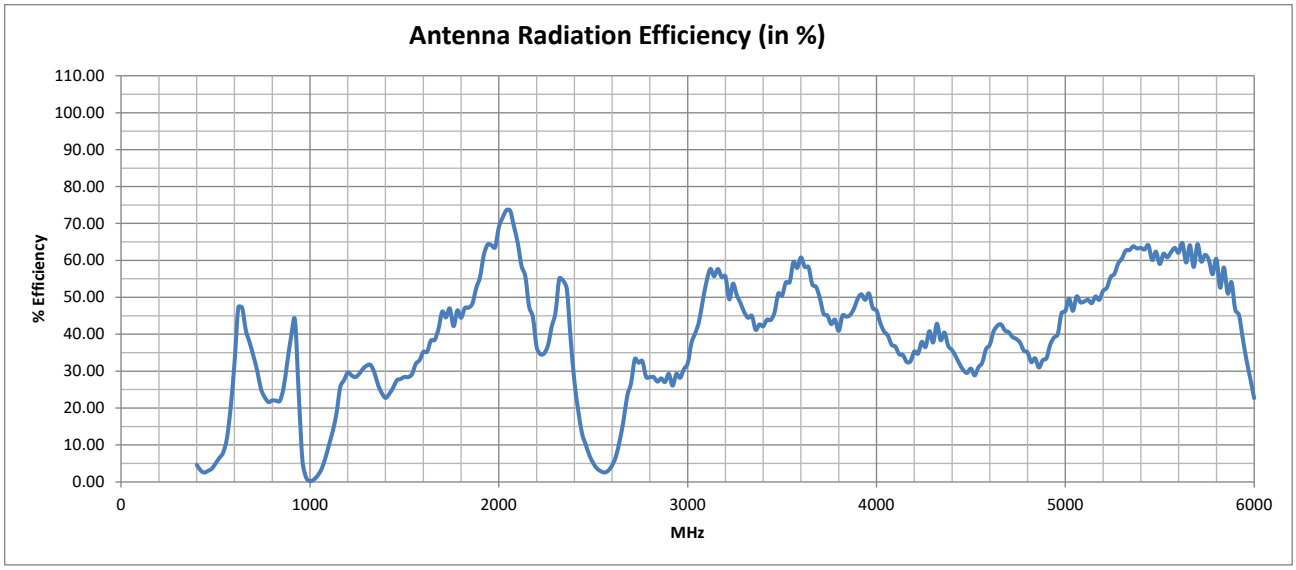
Return Loss



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	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	63.61	54.05	5.04	2.38	●
PCS-1900	2	2	2	2	n2	n2	1850 - 1910 MHz	1930 - 1990 MHz	52.28	64.08	5.17	4.99	●
DCS-1800	3	3	3	3	n3	n3	1710 - 1785 MHz	1805 - 1880 MHz	44.99	47.97	4.05	5.17	●
	4	4	4	4			1710 - 1755 MHz	2110 - 2155 MHz	45.39	56.27	3.27	2.15	●
GSM-850	5	5	5	5	n5	n5	824 - 849 MHz	869 - 894 MHz	22.23	33.07	7.97	5.42	●
	6						830 - 840 MHz	875 - 885 MHz	21.94	32.57	7.80	4.95	●
	7	7	7	7	n7	n7	2500 - 2570 MHz	2620 - 2690 MHz	3.32	15.69	5.99	7.24	●
E-GSM-900	8	8	8	8	n8	n8	880 - 915 MHz	925 - 960 MHz	38.19	21.87	4.64	4.66	●
	9	9					1749.9 - 1784.9 MHz	1844.9 - 1879.9 MHz	44.31	49.31	4.05	5.17	●
	10	10					1710 - 1770 MHz	2110 - 2170 MHz	44.82	54.05	3.67	2.38	●
	11	11	11	11			1427.9 - 1447.9 MHz	1475.9 - 1495.9 MHz	25.38	28.04	7.28	7.08	●
	12	12	12	12	n12	n12	699 - 716 MHz	729 - 746 MHz	32.62	25.94	5.11	7.09	●
	13	13	13	13	n13	n13	777 - 787 MHz	746 - 756 MHz	21.71	23.93	8.21	7.33	●
	14	14	14	14	n14		788 - 798 MHz	758 - 768 MHz	21.92	22.73	8.34	7.77	●
		17		17			704 - 716 MHz	734 - 746 MHz	32.12	25.38	5.11	7.09	●
		18	18	18	n18	n18	815 - 830 MHz	860 - 875 MHz	21.97	28.17	8.10	6.29	●
	19	19	19	19			830 - 845 MHz	875 - 890 MHz	22.09	33.43	7.80	4.95	●
	20	20	20	20	n20	n20	832 - 862 MHz	791 - 821 MHz	23.40	22.01	7.77	8.33	●
	21	21	21	21			1447.9 - 1462.9 MHz	1495.9 - 1510.9 MHz	27.05	28.41	7.29	6.65	●
	22	22					3410 - 3490 MHz	3510 - 3590 MHz	46.12	56.39	3.61	2.69	●
		24	24	24	n24		1626.5 - 1660.5 MHz	1525 - 1559 MHz	37.93	29.79	3.68	5.84	●
	25	25	25	25	n25	n25	1850 - 1915 MHz	1930 - 1995 MHz	52.81	64.31	5.17	4.99	●
	26	26	26	26	n26		814 - 849 MHz	859 - 894 MHz	22.16	31.32	8.11	6.40	●
		27	27				807 - 824 MHz	852 - 869 MHz	22.00	26.03	8.24	7.11	●
		28	28	28	n28	n28	703 - 748 MHz	758 - 803 MHz	28.71	22.11	7.14	8.34	●

● 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	Uplink	Downlink	Average Upload Efficiency (%)	Average Download Efficiency (%)	Maximum Upload VSWR	Maximum Download VSWR	Use Indicator
		28A					703 - 733 MHz	758 - 788 MHz	30.39	22.17	6.05	8.25	●
		29			n29		N/A	717 - 728 MHz	N/A	29.49	N/A	5.85	●
		30			n30		2305 - 2315 MHz	2350 - 2360 MHz	50.50	52.82	4.17	4.10	●
		31	31	31			452.5 - 457.5 MHz	462.5 - 467.5 MHz	2.88	3.15	16.83	14.21	●
	32	32					N/A	1452 - 1496 MHz	N/A	27.74	N/A	7.28	●
		33					1900 - 1920 MHz	1900 - 1920 MHz	58.42	58.42	5.15	5.15	●
		34			n34		2010 - 2025 MHz	2010 - 2025 MHz	71.27	71.27	3.69	3.69	●
		35					1850 - 1910 MHz	1850 - 1910 MHz	52.28	52.28	5.17	5.17	●
		36					1930 - 1990 MHz	1930 - 1990 MHz	64.08	64.08	4.99	4.99	●
		37					1910 - 1930 MHz	1910 - 1930 MHz	61.00	61.00	5.09	5.09	●
		38			n38		2570 - 2620 MHz	2570 - 2620 MHz	4.38	4.38	7.14	7.14	●
		39	39		n39		1880 - 1920 MHz	1880 - 1920 MHz	56.20	56.20	5.16	5.16	●
		40	40		n40		2300 - 2400 MHz	2300 - 2400 MHz	47.45	47.45	4.19	4.19	●
		41	41	41	n41	n41	2496 - 2690 MHz	2496 - 2690 MHz	8.10	8.10	7.24	7.24	●
		42	42	42			3400 - 3600 MHz	3400 - 3600 MHz	51.24	51.24	3.62	3.62	●
		43	43	43			3600 - 3800 MHz	3600 - 3800 MHz	50.07	50.07	2.96	2.96	●
		44					703 - 803 MHz	703 - 803 MHz	25.24	25.24	8.34	8.34	●
		45					1447 - 1467 MHz	1447 - 1467 MHz	27.14	27.14	7.29	7.29	●
		46			n46		5150 - 5925 MHz	5150 - 5925 MHz	58.71	58.71	2.75	2.75	●
		47			n47		5855 - 5925 MHz	5855 - 5925 MHz	49.41	49.41	1.47	1.47	●
		48			n48		3550 - 3700 MHz	3550 - 3700 MHz	56.70	56.70	2.31	2.31	●
		49					3550 - 3700 MHz	3550 - 3700 MHz	56.70	56.70	2.31	2.31	●
		50			n50		1432 - 1517 MHz	1432 - 1517 MHz	27.44	27.44	7.29	7.29	●
		51			n51		1427 - 1432 MHz	1427 - 1432 MHz	24.66	24.66	7.13	7.13	●
		52					3300 - 3400 MHz	3300 - 3400 MHz	43.47	43.47	3.62	3.62	●

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		53			n53		2483.5 - 2495 MHz	2483.5 - 2495 MHz	6.17	6.17	3.24	3.24	🔴
		65		65	n65	n65	1920 - 2010 MHz	2110 - 2200 MHz	64.88	50.09	5.04	2.81	🟢
		66	66	66	n66	n66	1710 - 1780 MHz	2110 - 2200 MHz	44.90	50.09	3.95	2.81	🟢
		67			n67		N/A	738 - 758 MHz	N/A	24.28	N/A	7.40	🔴
		68					698 - 728 MHz	753 - 783 MHz	31.47	22.45	5.85	8.04	🔴
		69					N/A	2570 - 2620 MHz	N/A	4.38	N/A	7.14	🔴
		70		70	n70	n70	1695 - 1710 MHz	1995 - 2020 MHz	45.67	69.92	2.34	4.01	🟢
		71	71	71	n71		663 - 698 MHz	617 - 652 MHz	37.59	46.51	5.29	9.90	🔴
		72	72	72			451 - 456 MHz	461 - 466 MHz	2.84	3.10	17.24	14.42	🔴
		73	73	73			450 - 455 MHz	460 - 465 MHz	2.82	3.07	17.52	14.56	🔴
		74	74	74	n74		1427 - 1470 MHz	1475 - 1518 MHz	26.32	28.22	7.29	7.09	🔴
		75			n75		N/A	1432 - 1517 MHz	N/A	27.44	N/A	7.29	🔴
		76			n76		N/A	1427 - 1432 MHz	N/A	24.66	N/A	7.13	🔴
					n77		3300 - 4200 MHz	3300 - 4200 MHz	46.13	46.13	3.62	3.62	🟠
					n78		3300 - 3800 MHz	3300 - 3800 MHz	49.22	49.22	3.62	3.62	🟢
					n79		4400 - 5000 MHz	4400 - 5000 MHz	36.05	36.05	3.71	3.71	🟠
					n80		1710 - 1785 MHz	N/A	44.99	N/A	4.05	N/A	🟠
					n81		880 - 915 MHz	N/A	38.19	N/A	4.64	N/A	🟠
					n82		832 - 862 MHz	N/A	23.40	N/A	7.77	N/A	🔴
					n83		703 - 748 MHz	N/A	28.71	N/A	7.14	N/A	🔴
					n84		1920 - 1980 MHz	N/A	63.61	N/A	5.04	N/A	🟠
		85	85	85	n85		698 - 716 MHz	728 - 746 MHz	32.72	26.06	5.11	7.09	🔴
					n86		1710 - 1780 MHz	N/A	44.90	N/A	3.95	N/A	🟠
		87	87	87			410 - 415 MHz	420 - 425 MHz	3.68	3.04	23.47	22.12	🔴
		88	88	88			412 - 417 MHz	422 - 427 MHz	3.53	2.98	23.34	21.75	🔴

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					n89		824 - 849 MHz	N/A	22.23	N/A	7.97	N/A	🔴
					n90	n90	2496 - 2690 MHz	2496 - 2690 MHz	8.10	8.10	7.24	7.24	🔴
					n91		832 - 862 MHz	1427 - 1432 MHz	23.40	24.66	7.77	7.13	🔴
					n92		832 - 862 MHz	1432 - 1517 MHz	23.40	27.44	7.77	7.29	🔴
					n93		880 - 915 MHz	1427 - 1432 MHz	38.19	24.66	4.64	7.13	🔴
					n94		880 - 915 MHz	1432 - 1517 MHz	38.19	27.44	4.64	7.29	🔴
					n95		2010 - 2025 MHz	N/A	71.27	N/A	3.69	N/A	🟢
					n97		2300 - 2400 MHz	N/A	47.45	N/A	4.19	N/A	🟠
					n98		1880 - 1920 MHz	N/A	56.20	N/A	5.16	N/A	🟠
					n99		1626.5 - 1660.5 MHz	N/A	37.93	N/A	3.68	N/A	🟠
					n101		1900 - 1910 MHz	1900 - 1910 MHz	56.94	56.94	5.15	5.15	🟠
				103			787 - 788 MHz	757 - 758 MHz	21.80	23.19	8.25	7.40	🔴

🟢 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	2.71	20.19	-9.0772	🔴
ISM 868 MHz	863 - 870 MHz	27.82	5.98	2.415	🔴
ISM 915 MHz	902 - 928 MHz	41.24	4.66	3.56	🟠
ISM 2.4 GHz	2400 - 2500 MHz	13.21	3.42	2.7	🔴
Wi-Fi 2.4G	2401 - 2483 MHz	14.55	3.40	2.65	🔴
Wi-Fi 2.4G (USA)	2401 - 2473 MHz	15.54	3.40	2.65	🔴
Wi-Fi 2.4G (Japan)	2401 - 2495 MHz	13.49	3.40	2.65	🔴
Wi-Fi 5G (all channels)	5150 - 5990 MHz	56.80	2.75	5.25	🟢
Wi-Fi 5G (Ch 32-48)	5150 - 5250 MHz	51.85	2.75	3.685	🟢
Wi-Fi 5G (Ch 32-64)	5150 - 5330 MHz	55.32	2.75	3.82	🟢
Wi-Fi 5G (Ch 32-161)	5150 - 5815 MHz	59.90	2.75	5.25	🟢
Wi-Fi 5G (Ch 32-173)	5150 - 5875 MHz	59.43	2.75	5.25	🟢
ISM 5.8 GHz	5725 - 5875 MHz	57.13	1.73	5.25	🟢

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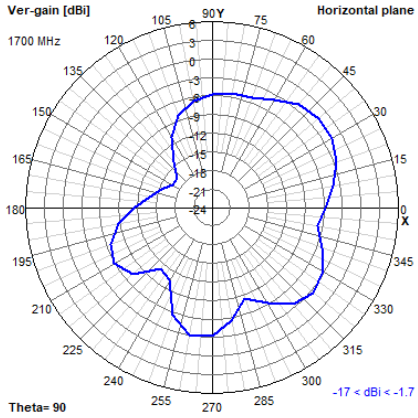
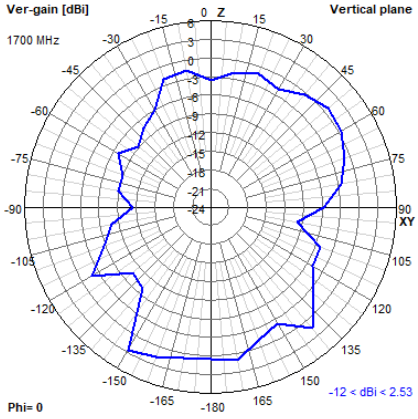
2D Radiation Plots

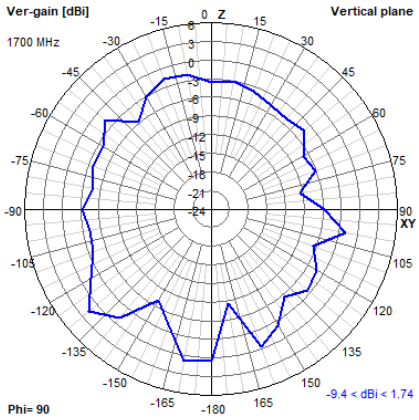
1700 MHz XY



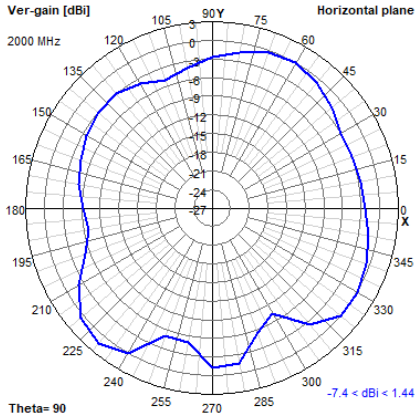
XZ



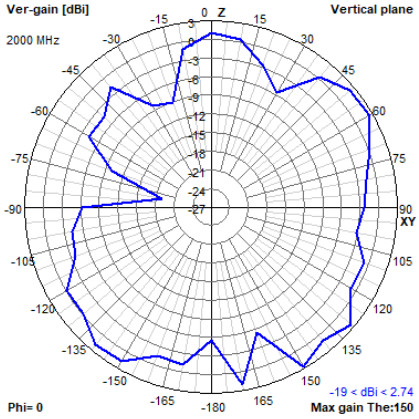
YZ



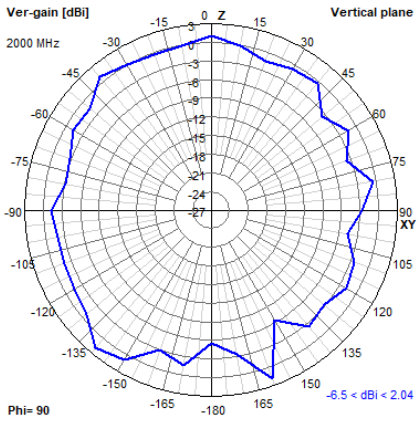
2000 MHz XY



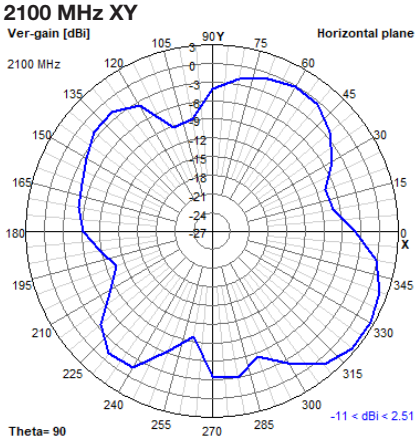
XZ



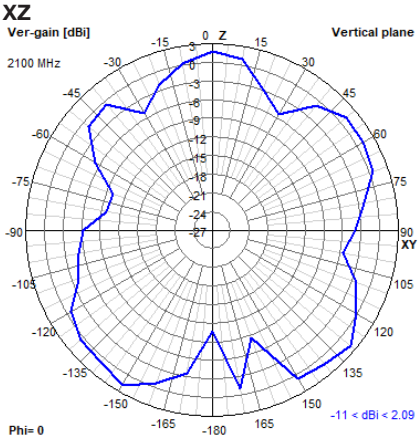
YZ



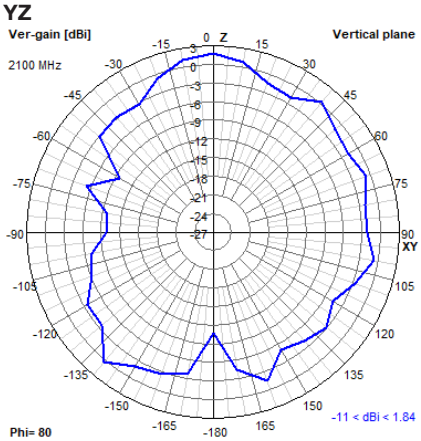
2100 MHz XY



XZ



YZ



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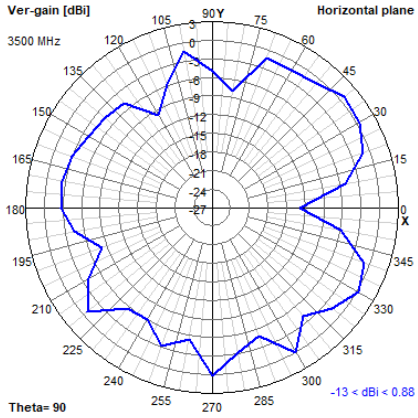
Echo 35

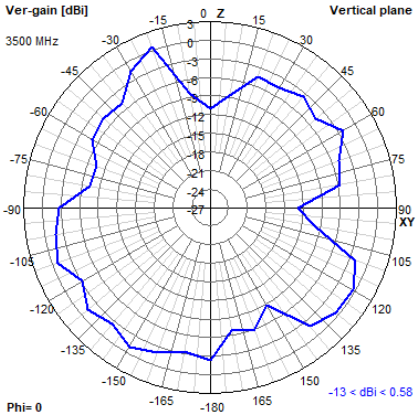
5G/4G Small PCB Embedded Antenna

2D Radiation Plots

3500 MHz XY



XZ



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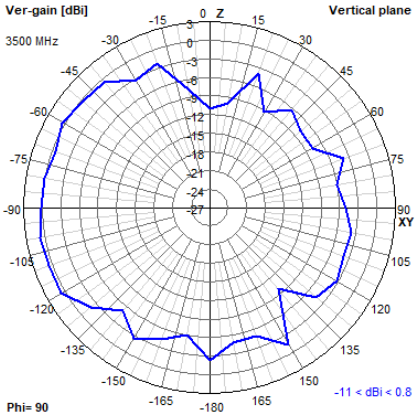
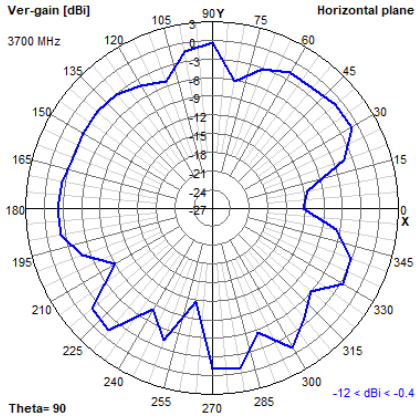


3700 MHz XY



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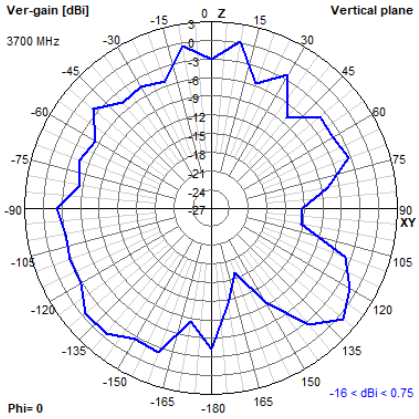
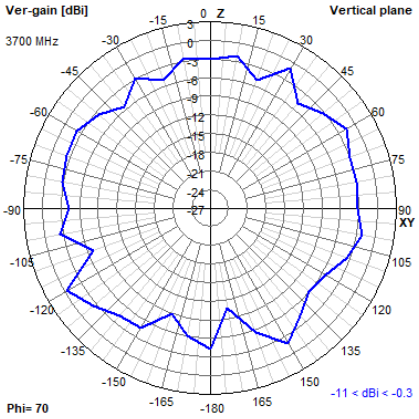
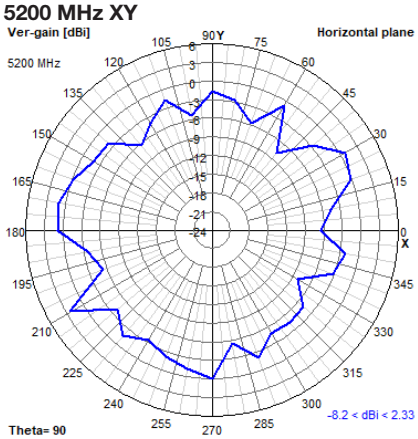


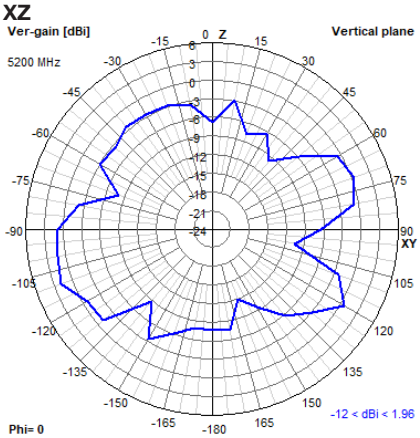
YZ



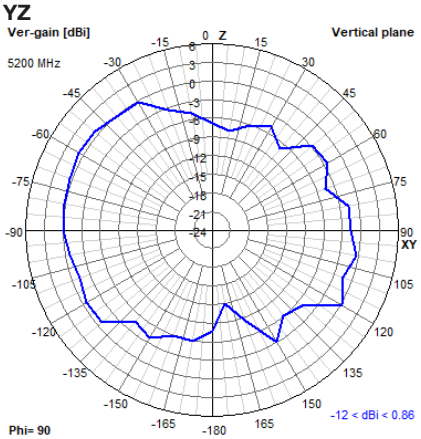
5200 MHz XY



XZ



YZ



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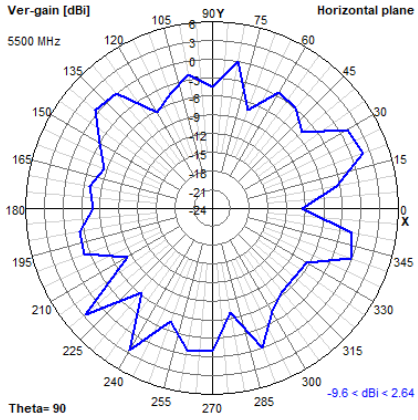
Echo 35

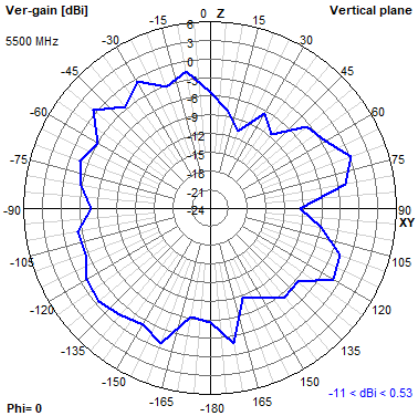
5G/4G Small PCB Embedded Antenna

2D Radiation Plots

5500 MHz XY



XZ



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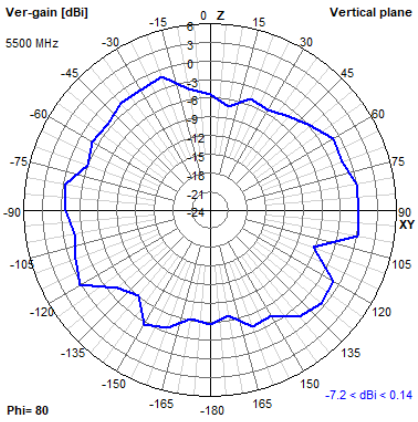
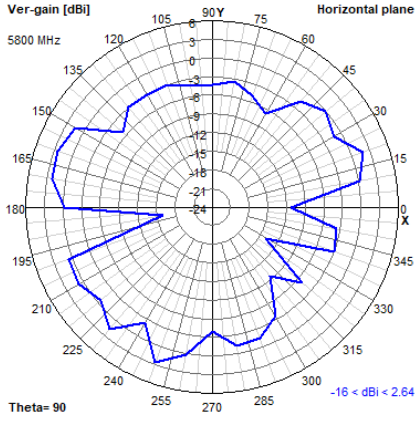
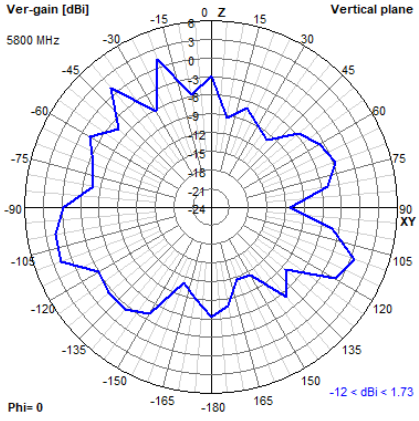


5800 MHz XY



XZ



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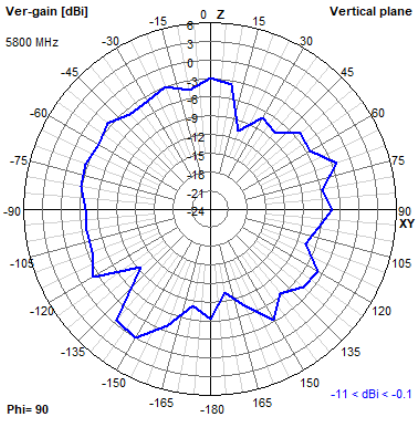
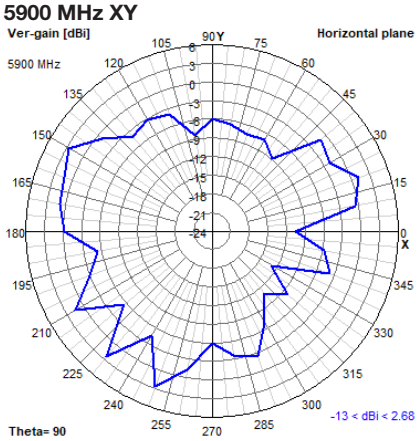
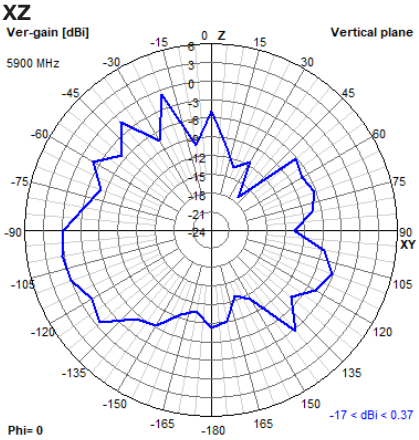


5900 MHz XY



XZ



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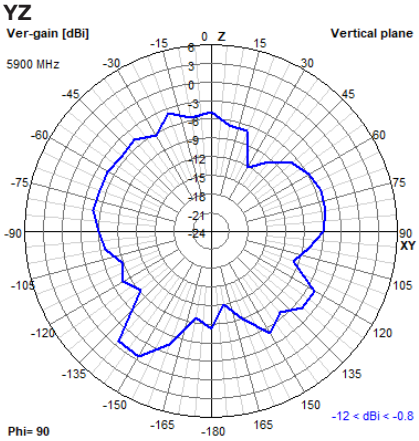
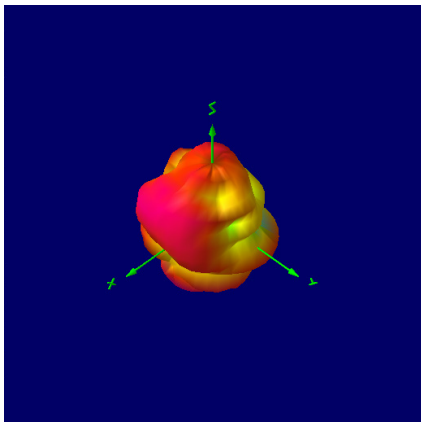


Echo 35

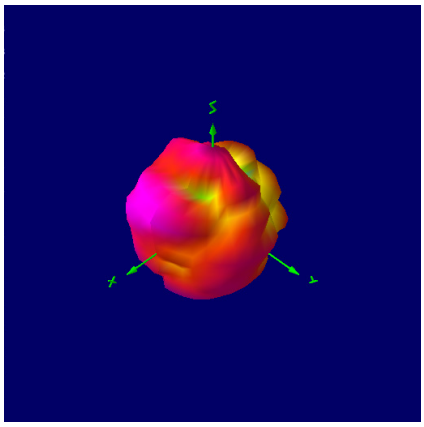
5G/4G Small PCB Embedded Antenna

3D Radiation Plots

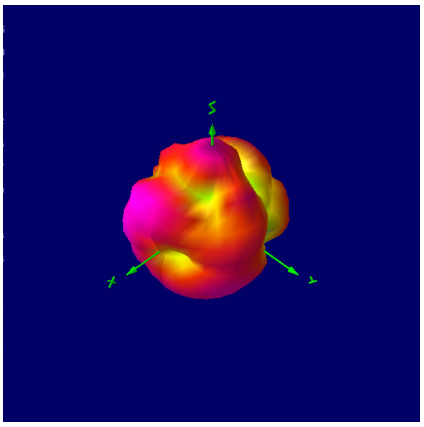
1700 MHz



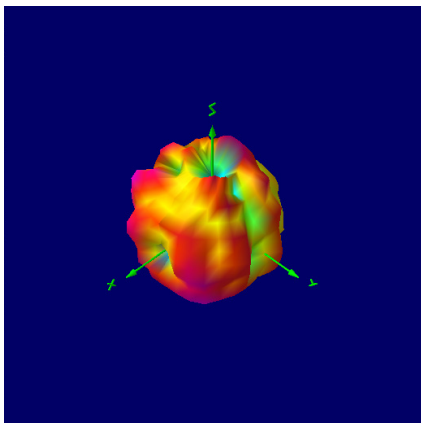
2000 MHz



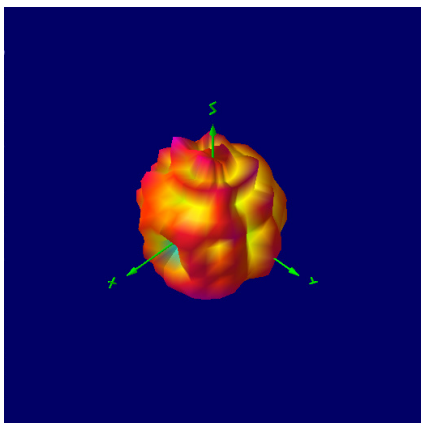
2100 MHz



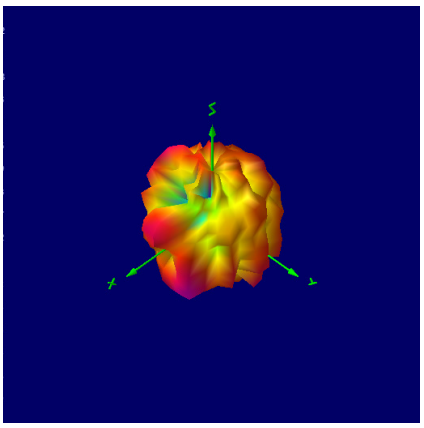
3500 MHz



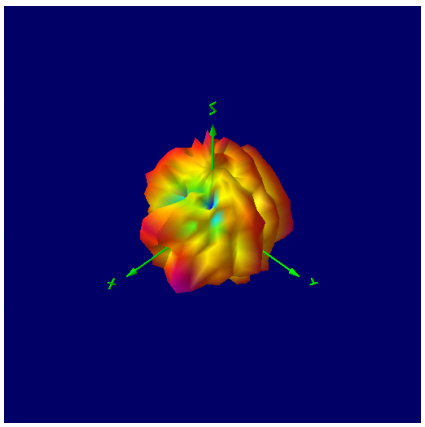
3700 MHz



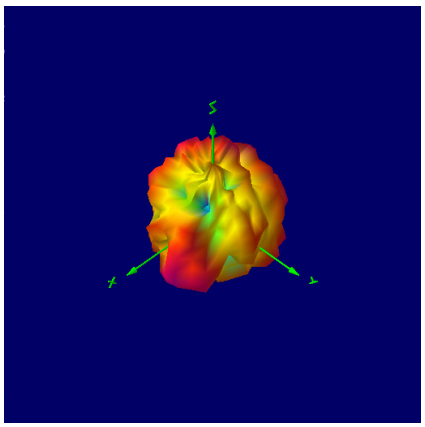
5200 MHz



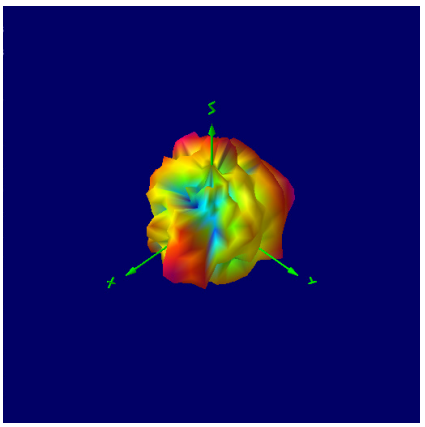
5500 MHz



5800 MHz



5900 MHz



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

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Echo 35

5G/4G Small PCB Embedded Antenna

Ordering Details:

Part Number	Description
ECHO35/0.1M/I-PEX/S/S/17	5G/4G Small PCB Embedded Antenna 100mm Cable and I-PEX MHF1 Connector