

GeoHelix®-P2

Embeddable Passive GPS Antenna

Product Specification



Product Description

Built on patented PowerHelix® filtering antenna technology, the GeoHelix-P2 embedded GPS antenna is the smallest quadrifilar helix antenna available, providing high performance in difficult GPS applications. The GeoHelix-P2 antenna is ideal in applications where:

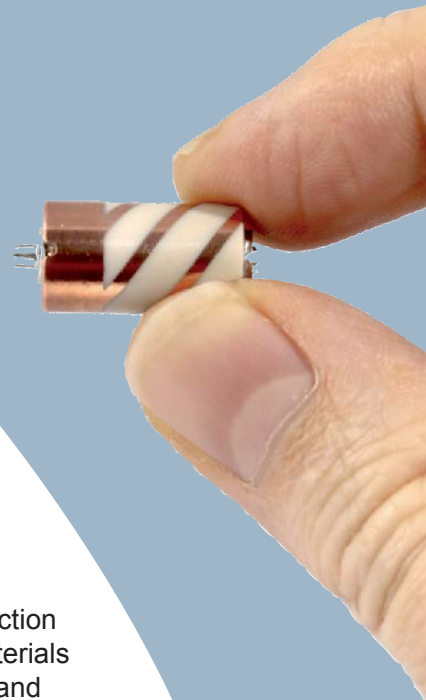
- the device is handheld, body-worn, or otherwise surrounded by high-dielectric materials that would de-tune conventional antennas;
- the antenna is tightly integrated with other antennas, e.g., Bluetooth®/GPS receivers or GPS/GSM mobile phones;
- there are tight constraints on the size of the device or the amount of space allocated to ground planes;
- the orientation of the device is random; or
- the antenna will be embedded in the device.

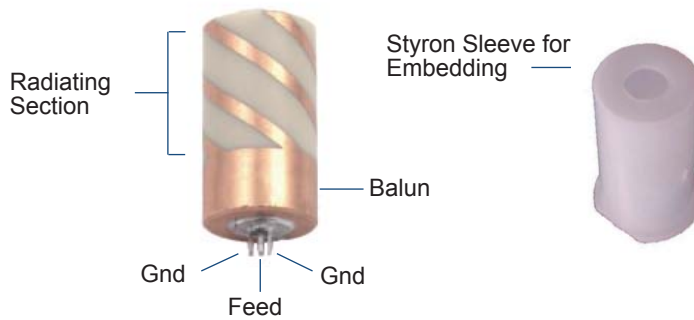
The GeoHelix-P2 antenna is balanced, which isolates it from the device and enables the antenna to reject common mode noise resident on the device ground plane. The construction and materials of the antenna constrain its near-field to a very small volume, therefore materials near the antenna have negligible de-tuning effects and the antenna maintains its pattern and efficiency in the presence of dielectric loading. As a dielectrically-loaded antenna, the GeoHelix-P2 acts as its own filter, attenuating signals from common GSM and ISM frequencies by as much as 30dB without external filtering.

The GeoHelix-P2 embedded antenna builds on the industry-leading performance of the GeoHelix-SMP external GPS antenna, reducing its size by 30%, making it even simpler to embed in a product. The antenna is deployed with a plastic tuning sleeve to ensure on-frequency performance.

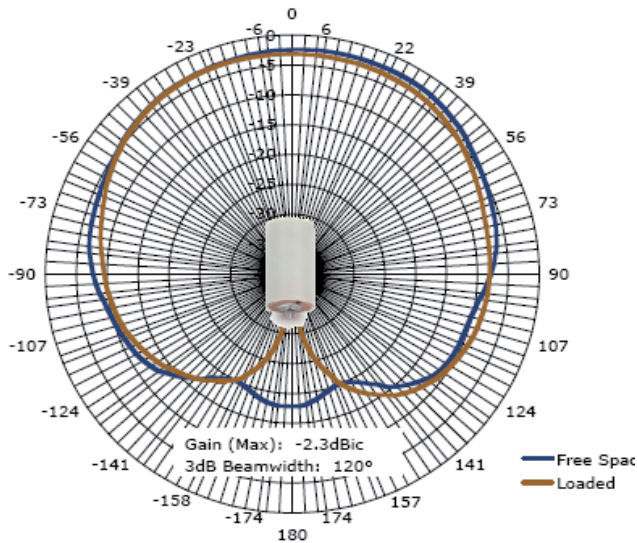
Specifications

	Minimum	Typical	Maximum	Unit
Part Number	1010046			Each
Type	Quadrifilar Helix			
Embedded Frequency	1573.42	1575.42	1577.42	MHz
Polarization	Right-hand circular polarized			
Gain		-2.8		dBic @ zenith
Efficiency		27%		Total spherical
Efficiency		50%		Upper hemishpere
Beamwidth		>120		Degrees
Bandwidth (3dB)		20		MHz
Axial Ratio		<1.5		@Zenith
VSWR		<2.0:1	2.3:1	
Impedance		50		
Operating Temperature	-40	+20	+85	°C
Element Dimensions	10 (diameter) x 17.75 (length)			mm
Overall Dimensions (w/sleeve)	12 (dia) x 14 (width) x 18.5 (length)			mm
Weight (excl sleeve)	7			grams





Radiation Pattern (dBic)

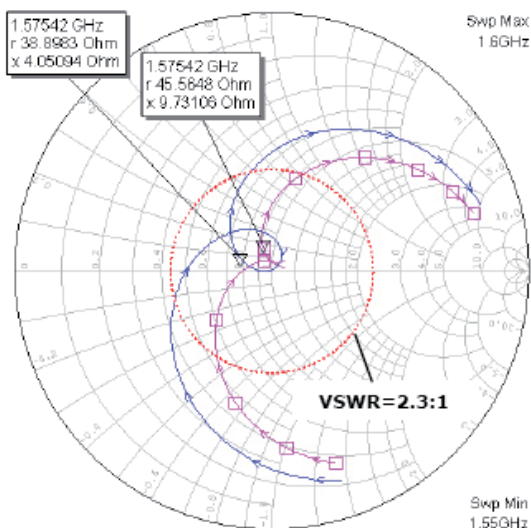


The embedded GeoHelix-P2 GPS antenna provides similar performance to the external GeoHelix-SMP antenna, with typical peak gain of ≈ -2.8 dBic, excellent beamwidth and strong circular polarization.

The strength of the PowerHelix antenna technology is its immunity to de-tuning in the presence of dielectric loading, like human tissues. GeoHelix antennas retain efficiency and polarization near the human body. Conventional antennas lose 5-10 dB of gain in similar circumstances.

Though it will not electrically couple with a ground plane, the GeoHelix-P2 antenna can be expected to increase efficiency by up to 100% when mounted over a ground plane due to near-field signal reflections. Configuration and orientation of the ground plane will vary results, but efficiency will not decrease.

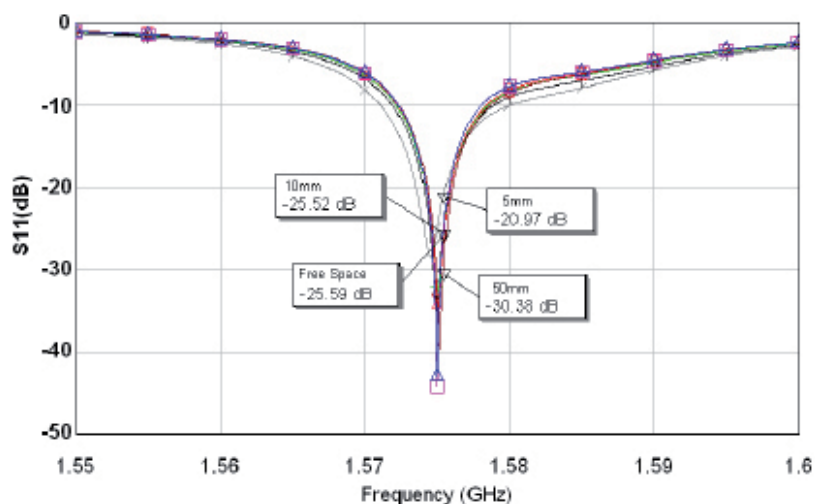
Typical Impedance



The GeoHelix-P2 antenna is optimized for 50 Ω impedance to simplify the matching process. The Smith chart showing a typical impedance plot of the antenna has been normalized to 1. The resonant frequency of the antenna is shown at the marker, and the bandwidth of the antenna is shown by the dimensions of the loop. The red circle shows the VSWR $\leq 2.3:1$ impedance mask.

As with the pattern chart, it is important to note the immunity of the antenna to loading factors in close proximity. It can be seen that the impedance of the antenna changes very little until a phantom hand is placed inside a radius of 10 mm from the antenna.

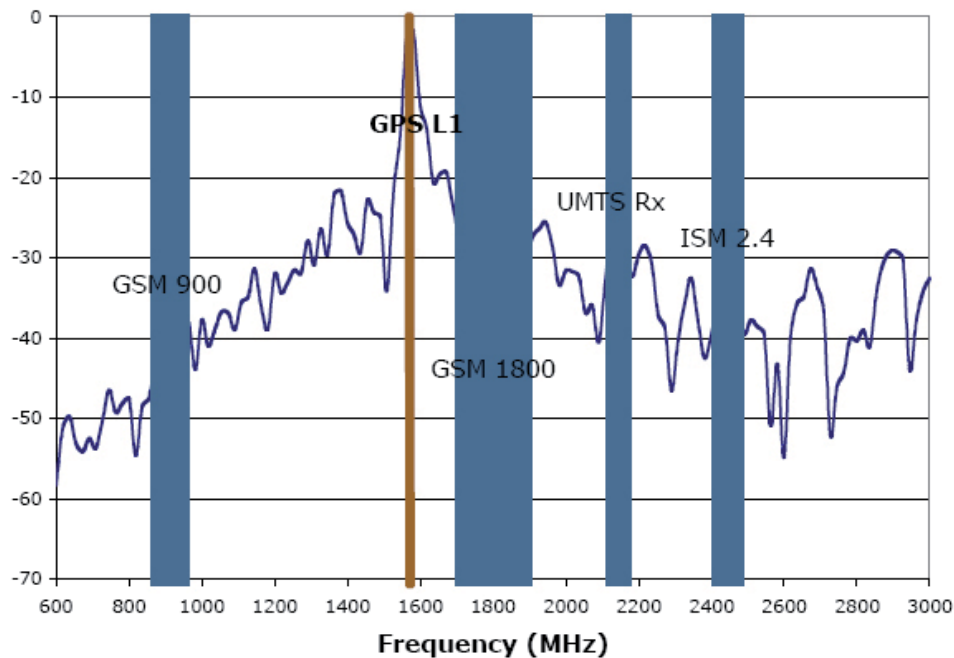
Return Loss



Immunity from bio-loading effects can be demonstrated effectively through the S11 plot. While some change in match is observed as a phantom hand is moved closer to the radiating section of the antenna, minimal de-tuning occurs.

The GeoHelix-P2 antenna also demonstrates a sharp filtering response in bands near the desired resonant frequency.

Filtering Response



Frequency (MHz)		S ₁₂ (dB)
860	GSM	-46
970	900	-40
1575	GPS L1	-2
1700	GSM	-26
1800		-36
1900	1800	-29
2110	3G Rx	-32
2170		-30
2400	ISM 2.4	-40
2480		-38

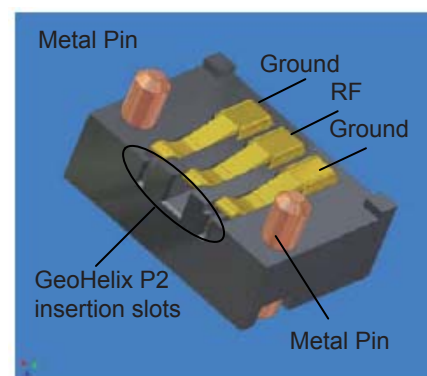
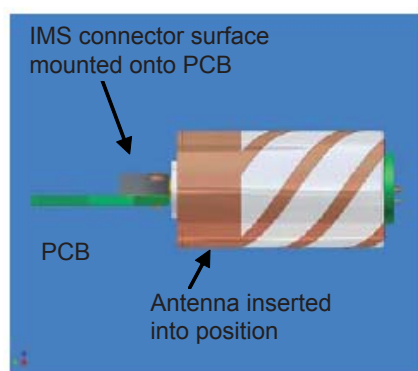
Embedding Information



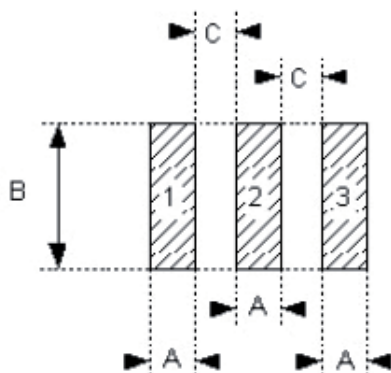
The GeoHelix-P2 antenna is designed to be embedded within a device and is supplied with a plastic tuning sleeve to ensure on-frequency performance. Ground planes within 5mm of the antenna radiating section can affect the performance of the antenna. Additional mechanical supports should be provided to hold the antenna in place. For further information on embedding the antenna, see the mechanical integration guideline documents. For information on externally mounting the GeoHelix-P2 antenna, contact Sarantel.

P2 Connector

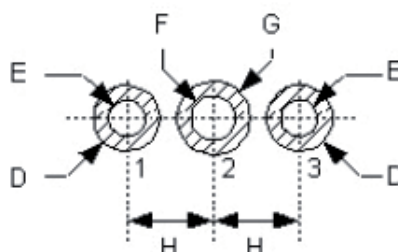
Sarantel has developed a custom connector that can be surface mounted and reflowed using a conventional lead free manufacturing process. For full details contact Sarantel Ltd.



Pad Layout & Pin-out Designations



Option 1 : Surface Mount



Option 2 : Through Hole

Dimensions	mm \pm 0.05
A	0.60
B	2.00
C	0.57
D	0.70
E	0.50
F	0.60
G	0.90
H	0.95

Pin Number	Function
1	Ground
2	Signal
3	Ground







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RoHS/Lead-Free Compliance

Dear Sir / Madam:

This letter is intended to answer questions from our customers, partners and suppliers regarding the compliance of Sarantel Ltd products with the following EU directives:

- 2006/96: Waste Electrical and Electronic Equipment (WEEE)
- 2000/53: End of Life Vehicle (ELV)
- 2002/95: Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS); (**effective 1st July 2006**)

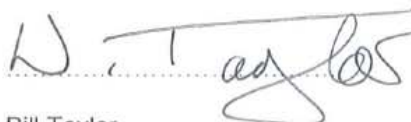
The directives aim is to avoid or limit the use of hazardous materials such as lead, mercury, cadmium and hexavalent chromium, as well as brominated substances - PBDE (polybrominated diphenyl ethers) and PBB (polybrominated biphenyls).

Sarantel has shipped compliant product since **1st January 2006** and incorporated the requirements of 2002/95 into the product/technology development roadmaps. We are committed to the supply of lead-free/RoHS compliant devices in current and future product introductions.

Please contact your local sales representative should further information be required.



David Wither
Chief Executive Officer (CEO)



Bill Taylor
Chief Operating Officer (COO)



Andrew Christie
VP of Engineering



Ian Gerry
Director of Quality

About Sarantel

Sarantel designs and manufactures dielectrically loaded antennas based on patented PowerHelix® filtering antenna technology. Sarantel's antennas are ideal for applications in which the radio device is small, handheld, or body-worn, or in devices with multiple transceivers and high levels of common mode noise. Sarantel antennas can be mounted externally or easily embedded within a device.

Sarantel antennas are protected by US patents 5854608, 5181297, 6424316, 5859621, 6369776; UK Patents 2297638, 2326532, 2326533, 2310543; and other granted or pending international patents.

GeoHelix®, PowerHelix®, and the Sarantel logo are registered trademarks of Sarantel Ltd.

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Application Support

Sarantel are committed to our customers' success, and so offer a variety of support options for customers designing RF products.

Check the Sarantel web site at sarantel.com/technology for the latest production specifications, technical notes, and application guides for solutions to the most common antenna integration issues.

Contact our applications support group by email at info@sarantel.com, info-asia@sarantel.com, or info-usa@sarantel.com for detailed product specifications, including mechanical drawings, surface mount pad layout, embedding recommendations, and other application questions not answered in the technical literature.

For further support options, please contact your local sales representative at www.sarantel.com/wheretobuy.

Ordering Information

The GeoHelix P2 antenna is supplied with a plastic sleeve for embedding. Part number (inclusive of the sleeve): 1010046

