Linx TECHNOLOGIES

AntennaFactor by Linx

Antenna Overview Guide

Linx strives to *make every engineer a hero in record time*™ by minimizing the risk, delays and technical challenges for design engineers to implement wireless functionality and connectivity to the Internet. Linx's Antenna Factor division has the industry's broadest selection of antennas for a wide variety of applications. For customers with specialized needs, custom antennas and design services are available along with simulations of antenna performance to speed development.

Wireless made simple®

Revised 6/15/2015

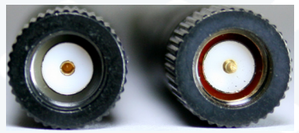
Antenna Factor Antennas

Antenna Factor antennas are divided into several categories based on their construction and application. The categories are described below and specifications are given in tables on the following pages.

Connectorized Whip and Rubber Duck Antennas

Whip and rubber duck antennas are small antennas that are typically mounted outside a product's enclosure. These antennas are small and suitable for portable and mobile products. They consist of a straight shaft for the antenna element and some families offer a tilt and swivel joint for optimizing the antenna orientation. Since these antennas are outside the product they offer the best performance.

The connectorized antennas use a standard 50-ohm RF connector that attaches to a mating connector on the product. Most have either SMA or Reverse Polarity SMA connectors. These differ simply by which side has a center pin and which has a center socket. **Standard SMA connectors are restricted by the FCC for use on antennas in the United States while Reverse Polarity antennas are acceptable.**



RP-SMA SMA

Permanent Mount Whip and Rubber Duck Antennas

Like the connectorized whip antennas, these have a straight shaft for the antenna and some include tilt and swivel joints. Rather than using an RF connector to attach to the product, these antennas attach directly to the product's enclosure or PCB. They have threaded bases and nuts or screw tabs. Antennas that connect to the enclosure typically have an RF cable that either solders onto the PCB or uses an RF connector. These antennas are permanently attached to a product and are not serviceable by the end customer. However, this means they meet the FCC requirements without added cost or work.

Antennas that have a cable and connector can be customized for length of cable and type of connector. SMA, Reverse-Polarity SMA and UFL are standard, but MCX and MMCX can be offered. The main constraint to the type of connector is making sure that it can physically fit through the antenna's mounting hole.

Embedded and Internal Antennas

Embedded antennas attach directly to a product's PCB inside the product's enclosure. Because of their small size these antennas are typically less efficient than larger external whip or rubber duck antennas, so the overall system range is less than what it would be. They are a good fit for applications where concerns about size, appearance, security or environmental issues make an external antenna impractical.

GPS Antennas

A GPS antenna's design is particularly critical due to the extremely low signal levels and multiple sources of signal origin. Each GPS antenna is designed to meet these technical challenges in a unique way while delivering maximum value and performance.

Specialty Antennas

The size, cosmetic or physical requirements of many RF products calls for innovative and unusual antenna styles designed to address such specialized requirements. Specialty antennas are designed to meet specific needs in gain, mounting, construction or frequency.

Color Codes

Linx antennas are color coded by frequency. Since many antenna families offer multiple frequencies in the same package, this enables easy identification to prevent confusion in testing or shipping.

Microstrip and Coplanar Waveguide Feed Lines

If part of the feed line between the radio and the antenna is run on a PCB, then consideration must be given to the design of this line. If the PCB trace is not designed correctly then it can become a source of loss in the system and reduce the overall range of the system. There are two typical methods of designing a PCB trace to carry RF: a microstrip line and a coplanar waveguide (CPWG). A microstrip line is a trace that runs on a layer above a ground plane. A CPWG adds ground plane on both sides of the trace. Please see Application Note number AN-00502 for more information on these methods.

Matching Networks

Antenna factor antennas are matched to 50-ohms, but there are cases where something in the product construction causes the antenna's center frequency to shift. Having a ground plane that is not the correct size is the most common cause of such a shift. In these cases a PI network can be installed between the radio and antenna. A PI network consists of two capacitors to ground on either side of a series inductor. The values can be selected to electrically tune the antenna. It does take test equipment such as a network analyzer to get this right. The PI network is good for shifting an antenna a few MHz. Anything larger will make it difficult to pull the antenna in-band while still having good efficiency. Linx may be able to assist with tuning, so contact us for more details.

Antenna Gain

Antenna gain is one of the most requested but least understood aspects of antenna specifications. It is a value that is important for the overall system performance, but is critically dependent on the integration into the system, the product's design and its construction.

Gain when applied to antennas is a measure of how the antenna radiates and focuses the energy received into free space. Much like a flashlight focuses light from a bulb into a specific direction, antennas can focus RF energy into specific directions. Gain in this sense refers to an increase in energy in one direction over others.

Gain is not "free;" gain above 0dBi in one direction means that there must be less gain in another direction. Gain is related to the overall physical size of the antenna, as well as surrounding materials. As the geometry of the antenna is reduced below the effective wavelength (considered an electrically small antenna) the gain will decrease. As well, the relative distance between an electrically small antenna and its associated ground will impact antenna gain.

Gain is determined by measuring the antenna's radiation pattern. This is done by sending an RF signal through the antenna and measuring the received power with a very well characterized antenna. The antenna under test is then rotated in 3 dimensions relative to the receiving antenna and the patterns are produced.

Antenna radiation patterns are available either in their data sheets or upon request. It is important to understand that the patterns we provide were made on the antenna's test fixture. The antenna's performance in the end product may be completely different due to differences in design (like ground plane size) and product construction. Please see Application Notes AN-00500 and AN-00501 for more details.

IP Rating

An IP rating specifies how well an enclosure resists intrusion by solids and liquids. None of the antennas have an IP rating because the final enclosure rating depends on how the antenna is installed. Customers have been able to achieve ratings as high as IP67 with certain antennas when they are installed correctly. However, since the implementation is outside of our control we cannot guarantee this with designs in general.

Connectorized Whip / Rubber Duck Antennas

Series	CW Series					HW Series							HWR Series							HD Series						RAF Series
Picture																										
Frequency	418MHz	433MHz	868MHz	916MHz	2.4GHz	315MHz	418MHz	433MHz	868MHz	916MHz	1.4GHz	2.4GHz	315MHz	418MHz	433MHz	868MHz	916MHz	1.4GHz	2.4GHz	315MHz	418MHz	433MHz	868MHz	916MHz	2.4GHz 5.8GHz
Frequency Range	380 – 450MHz	400 – 470MHz	750 – 950MHz	865 – 965MHz	2.35 – 2.60GHz	304 – 325MHz	403 – 433MHz	418 – 448MHz	855 – 880MHz	900 – 930MHz	1.36 – 1.44GHz	2.3 – 2.6GHz	305 – 325MHz	398 – 438MHz	418 – 448MHz	853 – 883MHz	900 – 930MHz	1.35 – 1.45GHz	2.3 – 2.6GHz	310 – 320MHz	410 – 425MHz	420 – 445MHz	820 – 900MHz	873 – 958MHz	2.40 – 2.48GHz 5.15 – 5.83GHz
Wavelength	1/4	1/4	1/4	1/4	1/2	1/4	1/4	1/4	1/2	1/2	1/2	1/2	1/4	1/4	1/4	1/2	1/2	1/2	1/2	1/4	1/4	1/4	1/4	1/4	1/2
Peak Gain	2.9dBi	3.3dBi	1.6dBi	1.8dBi	1.1dBi	0.0dBi	0.0dBi	0.0dBi	0.0dBi	1.2dBi	0.7dBi	3.2dBi	N/A	0.7dBi	1.1dBi	–2.3dBi	1.9dBi	2.4dBi	3.2dBi	N/A	–1.8dBi	0.7dBi	–0.3dBi	–0.3dBi	2.5dBi 4.6dBi
VSWR	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<1.9 typ.
Height	178mm 7.01 inches	173mm 6.81 inches	84mm 3.31 inches	80mm 3.15 inches	105mm 4.13 inches	120mm 4.72 inches	120mm 4.72 inches	120mm 4.72 inches	135.5mm 5.33 inches	120mm 4.72 inches	120mm 4.72 inches	120mm 4.72 inches	142mm 5.59 inches	142mm 5.59 inches	142mm 5.59 inches	142mm 5.59 inches	142mm 5.59 inches	142mm 5.59 inches	142mm 5.59 inches	117mm 4.61 inches	90mm 3.54 inches	88mm 3.46 inches	75mm 2.95 inches	65mm 2.56 inches	104.9mm 4.13 inches
Connector	RP-SMA or SMA	RP-SMA or SMA	SMA	RP-SMA or SMA	RP-SMA or SMA	RP-SMA or SMA	RP-SMA or SMA	RP-SMA or SMA	RP-SMA or SMA	RP-SMA or SMA	RP-SMA or SMA	RP-SMA or SMA	RP-SMA or SMA	RP-SMA or SMA	RP-SMA or SMA	RP-SMA or SMA	RP-SMA or SMA	RP-SMA or SMA	RP-SMA or SMA	RP-SMA	RP-SMA	RP-SMA or SMA	SMA	RP-SMA	RP-SMA or SMA

Connectorized Whip / Rubber Duck Antennas

Series	RH Series						RAH Series						RCS Series						CT Series	RCT Series	RCL Series		OC Series	
Picture																								
Frequency	315MHz	418MHz	433MHz	868MHz	916MHz	2.4GHz	315MHz	418MHz	433MHz	868MHz	916MHz	2.4GHz	315MHz	418MHz	433MHz	868MHz	916MHz	2.4GHz	2.4GHz	2.4GHz	916MHz	2.4GHz	916MHz	2.4GHz
Frequency Range	310 – 320MHz	413 – 423MHz	425 – 440MHz	855 – 880MHz	900 – 935MHz	2.39 – 2.49GHz	311 – 319MHz	410 – 426MHz	425 – 440MHz	833 – 903MHz	850 – 970MHz	2.35 - 2.60GHz	310 – 320MHz	411 – 426MHz	425 – 440MHz	850 – 880MHz	886 – 946MHz	2.35 – 2.50GHz	2.37 - 2.53GHz	2.40 – 2.50GHz	840 – 990MHz	2.40 – 2.50GHz	895 – 935MHz	2.39 – 2.55GHz
Wavelength	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/2	1/2	1/4	1/2	1/2	1/2
Peak Gain	N/A	–6.7dBi	–5.6dBi	–1.5dBi	–1.3dBi	–0.9dBi	N/A	–6.1dBi	–5.0dBi	0.6dBi	2.2dBi	1.6dBi	N/A	N/A	–2.9dBi	3.6dBi	3.3dBi	–0.2dBi	2.8dBi	2.2dBi	–2dBi	1.1dBi	2.2dBi	4dBi
VSWR	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<2.0 typ.	<2.0 typ.
Height	51mm 2.00 inches	51mm 2.00 inches	51mm 2.00 inches	51mm 2.00 inches	51mm 2.00 inches	27mm 1.06 inches	47mm 1.85 inches	47mm 1.85 inches	47mm 1.85 inches	47mm 1.85 inches	47mm 1.85 inches	25.6mm 1.00 inch	53.5mm 2.11 inches	53.5mm 2.11 inches	53.5mm 2.11 inches	53.5mm 2.11 inches	53.5mm 2.11 inches	53.5mm 2.11 inches	113mm 4.44 inches	113mm 4.44 inches	88mm 3.46 inches	88mm 3.46 inches	193.5mm 7.62 inches	193.5mm 7.62 inches
Connector	RP-SMA or SMA	RP-SMA or SMA	RP-SMA or SMA	RP-SMA or SMA	RP-SMA or SMA	RP-SMA or SMA	RP-SMA	RP-SMA	RP-SMA	RP-SMA	RP-SMA	RP-SMA or SMA	RP-SMA	RP-SMA	RP-SMA or SMA	RP-SMA or SMA	RP-SMA	RP-SMA or SMA	RP-SMA or SMA	RP-SMA	RP-SMA	RP-SMA or SMA	RP-SMA or SMA	RP-SMA or SMA

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Permanent Mount Whip / Rubber Duck Antennas

Series	WRT Series					WRT-MON Series
Picture						
Frequency	418MHz	433MHz	868MHz	916MHz	2.4GHz 5.8GHz	2.4GHz
Frequency Range	409 – 426MHz	425 – 441MHz	855 – 880MHz	900 – 930MHz	2.4 – 2.5GHz 5.7 – 5.9GHz	2.4 – 2.5GHz
Wavelength	1/2	1/2	1/2	1/2	1/2	1/4
Peak Gain	–1.3dBi	–0.9dBi	1.5dBi	–0.1dBi	3.5dBi 2.9dBi	0.8dBi
VSWR	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.
Height	116.8mm 4.6 inches	116.8mm 4.6 inches	102mm 4.0 inches	99.5mm 3.92 inches	49.5mm 1.95 inches	35.5mm 1.4 inches
Cable Length	216mm 8.5 inches	216mm 8.5 inches	216mm 8.5 inches	216mm 8.5 inches	216mm 8.5 inches	216mm 8.5 inches
Termination	RP-SMA, SMA or U.FL	RP-SMA, SMA or U.FL	RP-SMA, SMA or U.FL	RP-SMA, SMA or U.FL	RP-SMA, SMA or U.FL	RP-SMA, SMA or U.FL

The WRT Series

The WRT Series antenna is ideal for applications that need a discreet and robust antenna solution. A small dome is all that protrudes from the enclosure, avoiding the obvious look of an antenna that could be subject to vandalism. Its low profile also helps prevent accidental breakage due to handling or physical shock.

Its materials and construction are designed for harsh, outdoor environments. An adhesive ring on the base seals the antenna to the enclosure, enabling IP67 ratings when it is installed correctly. Linx cannot guarantee any specific rating as it is dependent upon design and installation, but we do offer implementation reviews.

The integrated counterpoise makes the antenna less reliant on a ground plane on the product's circuit board. A monopole version is used for conductive enclosures and has a metal base that turns the enclosure into the counterpoise.

The cable length, type and connector type can be easily customized. Contact Linx for details.

Permanent Mount Whip / Rubber Duck Antennas

Series	PW Series					RA Series					LP Series						PML Series		
Picture																			
Frequency	418MHz	433MHz	868MHz	916MHz	2.4GHz	315MHz	418MHz	433MHz	868MHz	916MHz	315MHz	418MHz	433MHz	868MHz	916MHz	2.4GHz	868MHz	916MHz	2.4GHz
Frequency Range	380 – 450MHz	400 – 470MHz	750 – 950MHz	865 – 965MHz	2.35 – 2.60GHz	311 – 319MHz	409 – 427MHz	413 – 443MHz	780 – 960MHz	816 – 1095MHz	312 – 318MHz	411 – 425MHz	427 – 439MHz	832 – 904MHz	881 – 951MHz	2.35 – 2.55GHz	853 – 883MHz	876 – 956MHz	2.35 – 2.6GHz
Wavelength	1/4	1/4	1/4	1/4	1/2	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/2	1/2	1/2
Peak Gain	2.9dBi	3.3dBi	1.6dBi	1.8dBi	1.6dBi	N/A	2.0dBi	–0.7dBi	4.0dBi	0.0dBi	–4.0dBi	–1.0dBi	–1.9dBi	2.1dBi	2.4dBi	–1.9dBi	–2.0dBi	–0.4dBi	2.4dBi
VSWR	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.
Height	178mm 7.01 inches	173mm 6.81 inches	84mm 3.31 inches	80mm 3.15 inches	105mm 4.13 inches	131.5mm 5.18 inches	131.5mm 5.18 inches	131.5mm 5.18 inches	99mm 3.90 inches	99mm 3.90 inches	50.5mm 1.99 inches	50.5mm 1.99 inches	50.5mm 1.99 inches	50.5mm 1.99 inches	50.5mm 1.99 inches	50.5mm 1.99 inches	150.3mm 5.92 inches	150.3mm 5.92 inches	150.3mm 5.92 inches
Cable Length	216mm 8.5 inches	216mm 8.5 inches	216mm 8.5 inches	216mm 8.5 inches	216mm 8.5 inches	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	304.8mm 12 inches	304.8mm 12 inches	304.8mm 12 inches
Termination	Straight cut cable or U.FL	Straight cut cable or U.FL	Straight cut cable or U.FL	Straight cut cable or U.FL	Straight cut cable or U.FL	Screw Tab	Screw Tab	Screw Tab	Screw Tab	Screw Tab	Screw Tab	Screw Tab	Screw Tab	Screw Tab	Screw Tab	Screw Tab	Straight cut cable or U.FL	Straight cut cable or U.FL	Straight cut cable or U.FL

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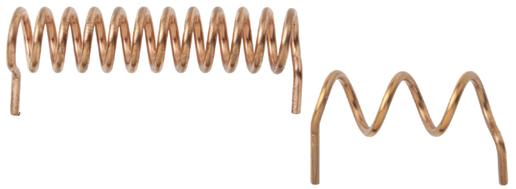
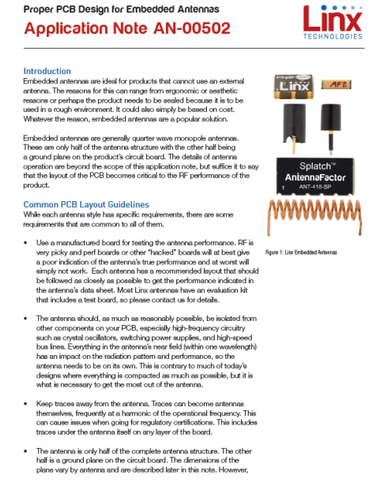
PCB Layout

Linx Application note AN-00502 describes the PCB layout requirements for each of the embedded antenna series. It shows the standard test fixtures used for each antenna and provides tips and recommendations for their implementation in an end product. This note can be downloaded from the Linx website. Once the PCB design is complete, Linx offers a free review service. We will review the layout and antenna implementation and make recommendations to optimize its performance.

Embedded / Internal Antennas

Series	CHP Series			HE Series				JJB Series					
Picture													
Frequency	868MHz	916MHz	2.4GHz	315MHz	418MHz	433MHz	916MHz	868MHz: RA	868MHz: ST	916MHz: RA	916MHz: ST	2.4GHz: RA	2.4GHz: ST
Frequency Range	863 – 873MHz	911 – 921MHz	2.38 – 2.54GHz	305 – 325MHz	393 – 443MHz	418 – 458MHz	865 – 965MHz	855 – 880MHz	855 – 880MHz	901 – 931MHz	901 – 931MHz	2.39 – 2.48GHz	2.39 – 2.48GHz
Wavelength	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
Peak Gain	0.5dBi	0.5dBi	0.5dBi	N/A	1.7dBi	1.9dBi	2.4dBi	–1.0dBi	–8.9dBi	–0.5dBi	–10.2dBi	3.3dBi	–1.5dBi
VSWR	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.
Size	3 x 16mm 0.12 x 0.63 inches	3 x 16mm 0.12 x 0.63 inches	2.2 x 6.5mm 0.09 x 0.26 inches	6.4 x 38.1mm 0.25 x 1.5 inches	6.4 x 38.1mm 0.25 x 1.5 inches	6.4 x 38.1mm 0.25 x 1.5 inches	6.4 x 25.4mm 0.25 x 1.0 inches	7.0 x 14.5mm 0.28 x 0.57 inches	7.0 x 17.6mm 0.28 x 0.69 inches	7.0 x 14.5mm 0.28 x 0.57 inches	7.0 x 17.6mm 0.28 x 0.69 inches	7.0 x 14.5mm 0.28 x 0.57 inches	7.0 x 17.6mm 0.28 x 0.69 inches


Proper PCB Design for Embedded Antennas

Application Note AN-00502

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Introduction

Embedded antennas are ideal for products that cannot use an external antenna. The reasons for this can range from ergonomic or aesthetic reasons or perhaps the product needs to be sealed because it is to be used in a rough environment. It could also simply be based on cost. Whatever the reason, embedded antennas are a popular solution.

Embedded antennas are generally quarter wave monopole antennas. These are only half of the antenna structure with the other half being a ground plane on the product's circuit board. The details of antenna operation are beyond the scope of this application note, but suffice it to say that the layout of the PCB becomes critical to the RF performance of the product.

Common PCB Layout Guidelines

While each antenna style has specific requirements, there are some requirements that are common to all of them.

- Use a manufactured board for testing the antenna performance. RF is very picky and perf boards or other "hacked" boards will at best give a poor indication of the antenna's true performance and at worst will simply not work. Each antenna has a recommended layout that should be followed as closely as possible to get the performance indicated in the antenna's data sheet. Most Linx antennas have an evaluation kit that includes a test board, so please contact us for details.
- The antenna should, as much as reasonably possible, be isolated from other components on your PCB, especially high-frequency circuitry such as crystal oscillators, switching power supplies, and high-speed bus lines. Everything in the antenna's near field (within one wavelength) has an impact on the radiation pattern and performance, so the antenna needs to be on its own. This is contrary to much of today's designs where everything is compacted as much as possible, but it is what is necessary to get the most out of the antenna.
- Keep traces away from the antenna. Traces can become antennas themselves, frequently at a harmonic of the operational frequency. This can cause issues when going for regulatory certifications. This includes traces under the antenna itself on any layer of the board.
- The antenna is only half of the complete antenna structure. The other half is a ground plane on the circuit board. The dimensions of the plane vary by antenna and are described later in this note. However,

Splatch™ AntennaFactor ANT-418-SP

Figure 1: Linx Embedded Antennas

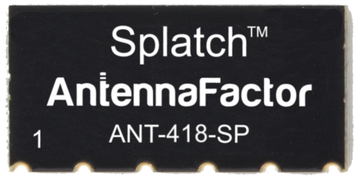
Revised 8/30/14

The SP and USP Series

The Splatch (SP) and Micro-Splatch (USP) antennas are ideal for low-cost embedded applications.

- Cost is better than ceramic chip antennas and they are more robust.
- They have a common footprint across all frequencies. This allows one PCB to be populated for different frequencies rather than have multiple PCBs.
- Based on PCB manufacturing processes, their production is more reliable, repeatable and faster than LTCC.
- The USP is available in 2.4GHz for use with Bluetooth, Wi-Fi, 802.15.4 and all other common 2.4GHz standards.
- The 2.4GHz USP is also suitable for use at 5.8GHz.

Embedded / Internal Antennas

Series	USP "Micro Splatch" Series						SP "Splatch" Series						
Picture													
							Now available in tape and reel packaging!						
Frequency	403MHz	418MHz	433MHz	868MHz	916MHz	2.4GHz	315MHz	403MHz	418MHz	433MHz	458MHz	868MHz	916MHz
Frequency Range	400 – 406MHz	414 – 422MHz	429.5 – 436.5MHz	858 – 878MHz	903.5 – 928.5MHz	2.38 – 2.53GHz	312 – 317MHz	400 – 405MHz	415 – 423MHz	429 – 437MHz	454 – 462MHz	850 – 885MHz	900 – 930MHz
Wavelength	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
Peak Gain	–8.7dBi	–8.9dBi	–9.8dBi	0.2dBi	0.3dBi	3.8dBi	N/A	N/A	–8dBi	–6.4dBi	–5.4dBi	1.1dBi	1.4dBi
VSWR	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<2.0 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.9 typ.
Size	9.4 x 12.7mm 0.36 x 0.5 inches	9.4 x 12.7mm 0.36 x 0.5 inches	9.4 x 12.7mm 0.36 x 0.5 inches	9.4 x 12.7mm 0.36 x 0.5 inches	9.4 x 12.7mm 0.36 x 0.5 inches	9.4 x 12.7mm 0.36 x 0.5 inches	13.7 x 27.94mm 0.54 x 1.10 inches	13.7 x 27.94mm 0.54 x 1.10 inches	13.7 x 27.94mm 0.54 x 1.10 inches	13.7 x 27.94mm 0.54 x 1.10 inches	13.7 x 27.94mm 0.54 x 1.10 inches	13.7 x 27.94mm 0.54 x 1.10 inches	13.7 x 27.94mm 0.54 x 1.10 inches

Specialty Antennas

Series	MHW Series			VDP Series	HDP Series	OM Series	RMS Series	RMT Series	DB1-LP Series
Picture									
Frequency	418MHz	433MHz	916MHz	Tri-band	Tri-band	2.4GHz	Dual Band	Dual Band	Tri-band
Frequency Range	408 – 428MHz	413 – 453MHz	816 – 1016MHz	824 – 960MHz 1.71 – 1.99GHz 2.40 – 2.48GHz	824 – 960MHz 1.71 – 1.99GHz 2.40 – 2.48GHz	2.40 – 2.48GHz	824 – 960MHz 1.71 – 1.99GHz	860 – 960MHz 1.71 – 1.88GHz	824 – 960MHz 1.71 – 2.17GHz 2.40 – 2.48GHz
Wavelength	1/2	1/2	1/2	1/2	1/2	1/2	1/4	1/4	1/2
Peak Gain	2.1dBi	1.2dBi	5.4dBi	–1.8dBi –3.3dBi –1.3dBi	0.2dBi –3.3dBi 0.0dBi	7dBi	–0.6dBi 5.3dBi	N/A	8.5dBi 9.0dBi 9.0dBi
VSWR	<1.9 typ.	<1.9 typ.	<1.9 typ.	<1.5 typ. <1.9 typ. <1.9 typ.	<1.5 typ. <1.9 typ. <1.9 typ.	<1.5 typ.	<1.5 typ. <2.0 typ.	<1.5 typ. <2.7 typ.	<1.5 typ.
Size	15.5 x 150mm 0.61 x 5.91 inches	15.5 x 145mm 0.61 x 5.70 inches	15.5 x 138mm 0.61 x 5.43 inches	115 x 22mm 4.53 x 0.87 inches	132.3 x 20mm 5.23 x 0.79 inches	637mm 25.1 inches	77.8mm 3.06 inches	93.7mm 3.69 inches	210 x 395mm 8.27 x 15.55 inches
Cable Length	2 or 4.5m 79 or 180 inches	2 or 4.5m 79 or 180 inches	2 or 4.5m 79 or 180 inches	3m 9.8 feet	3m 9.8 feet	N/A	4.3m 14.1 feet	4.3m 14.1 feet	165.1mm 6.5 inches
Termination	RP-SMA or SMA	RP-SMA or SMA	RP-SMA or SMA	RP-SMA, SMA or TNC	RP-SMA, SMA or TNC	N Connector	RP-SMA, SMA or TNC	RP-SMA, SMA or TNC	N Connector

Antenna Factor specialty antennas have found use in a wide array of applications. From cellular, Wi-Fi, Bluetooth and 802.15.4 to traditional ISM band applications, Antenna Factor antennas offer high performance at a great price.

Integrated cables make it easy to remote locate the antenna to get around obstructions and provide better line-of-sight. The cable lengths and connectors can be customized to suit the application. Contact Linx for details.

Magnetic Mount Antennas

Series	ELE Series					
Picture						
Part Number	005	006	008	010	011	012
Frequency Range	824 – 960MHz	824 – 960MHz 1710 – 1880MHz	824 – 960MHz 1710 – 1990MHz	824 – 960MHz 1710 – 1990MHz	2.40 – 2.50GHz	824 – 960MHz 1710 – 1990MHz
Peak Gain	3.8dBi	0.5dBi 3.7dBi	N/A	–3.9dBi –1.5dBi	N/A	3.2dBi 4.4dBi
VSWR	<1.5 typ.	<1.5 typ.	<2.0 typ.	<1.5 typ.	<2.0 typ.	<2.0 typ.
Size	295.4mm 11.63 inches	233.17mm 9.18 inches	323.85mm 12.75 inches	60.5mm 2.38 inches	25.91mm 1.02 inches	260.74mm 10.27 inches

Series	MAG Series		
Picture			
Part Number	B50	B66	B85
Cable Length	4m 13.1 feet	4m 13.1 feet	4m 13.1 feet
Termination	RP-SMA, SMA or TNC	RP-SMA, SMA or TNC	RP-SMA, SMA or TNC
Size	50mm 1.97 inches	66mm 2.60 inches	85mm 3.35 inches

GPS Antennas

Series	SH Series
Picture	
Frequency	1575.42MHz
VSWR	<1.5 typ.
Antenna Gain	5.0dB min.
System Gain	28dB typ.
Input Voltage	2.5 – 12VDC
Current	5 – 10mA typ. @ 5V
Size	36.5 x 36.6mm 1.44 x 1.44 inches
Cable Length	3m 117 inches
Termination	SMA, MCX or MMCX

Custom Antennas

Linx also offers custom antennas. This includes customizations of existing antennas, such as color, connectors, cable length and frequency. It also includes new antenna types designed from the start using custom requirements. Contact Linx for more details.

Evaluation Kits

Antenna evaluation kits are available that allow the desired antennas to be tested with the product so that a final selection can be made. Different kits are available for the different types of antennas.

Connectorized Antennas

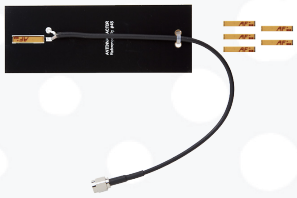
The connectorized antenna evaluation kit lets you compare the performance of many different antenna styles and element designs in your application environment. It includes a collection of antennas for evaluation during your development process. The kit is available at 315MHz, 418MHz, 433MHz, 868MHz, 916MHz and 2.4GHz with SMA or FCC Part 15 compliant RP-SMA connectors.

Permanent Mount Antennas

The permanent mount antenna evaluation kit includes a collection of our permanent mount antennas for evaluation during your development process. The kit is available at 418MHz, 433MHz, 868MHz, 916MHz and 2.45GHz.

Embedded Antennas

Many of our embedded antennas have their own kits. These include a test board with an antenna mounted that allows the performance of the antenna to be evaluated with a known design. The kit also includes five spare antennas for use in your first prototype designs.

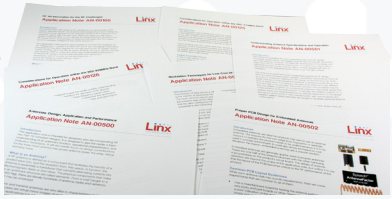


Application Notes

Linx Technologies offers many application notes to aid in the design of RF solutions. These can be easily located at

www.linxtechnologies.com/en/support/papers

or contact our awesome tech support for more information.



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