



**Photograph 1: EUT Antennas.**



TECHNICAL DATA SHEET

Description: 2.4-2.5 / 5.15-5.925 GHz Stick Antenna

Series: External Antenna

PART NUMBER: W5029X



Features:

- WiFi Dual-Band
- DSRC
- Multi band 2.4-2.5/5.15-5.925GHz
- IP65
- P/N: W5029  
R/A RP SMA Male, length 78mm
- P/N: W5029RPG/W5029RPGT  
RP SMA Male. length 76mm
- P/N: W5029RASM  
R/A SMA Male, length 76.5mm

Applications:

- Zigbee, BLE/BT, WLAN (2.4GHz, 5GHz)
- DSRC V2x communication
- Rugged Outdoor Systems
- Marine, Mining, Utility, Oil/Gas Environments
- Industrial Applications
- Metering, Security, IoT Applications
- Outdoor Networking
- Data Transmission, Access Points

Issue: 2039

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**TECHNICAL DATA SHEET**
**Description: 2.4-2.5 / 5.15-5.925 GHz Stick Antenna**
**Series: External Antenna**
**PART NUMBER: W5029X**

This document covers all product variants of the following product family

Antennas	Length	Connector
W5029	78mm	Right Angle RP SMA male (Au plating)
W5029RASM	76.5mm	Right Angle SMA male (Au plating)
W5029RPG	76mm	Straight RP SMA Male (Au plating)
W5029RPGT	76mm	Straight RP SMA Male (Ni plating)

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TECHNICAL DATA SHEET

Description: 2.4-2.5 / 5.15-5.925 GHz Stick Antenna

Series: External Antenna

PART NUMBER: W5029X

ELECTRICAL SPECIFICATIONS

Frequency	2.4-2.5GHz/5.15-5.925GHz
Nominal Impedance	50Ω
Return Loss	2.4-2.5GHz <-10dB 5.15-5.85GHz <-4dB 5.55GHz <-10dB
Peak Gain	2.4-2.5GHz 2.3dBi +/-1 dB 5.15-5.85GHz 5dBi +/-1dB 5.925GHz 3dBi +/-1dB
Radiation Pattern	Omni in Horizontal plane
Polarization:	Vertical
Power withstanding	1W

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**TECHNICAL DATA SHEET**
**Description: 2.4-2.5 / 5.15-5.925 GHz Stick Antenna**
**Series: External Antenna**
**PART NUMBER: W5029X**
**MECHANICAL SPECIFICATIONS**

Plastic radome		TPEE
Color		Black
Weight		
	W5029	11.36 g
	W5029RASM	11.36 g
	W5029RPG	7.82 g
	W5029RPGT	7.82 g
Overall Length		
	W5029	78 mm
	W5029RASM	76.5mm
	W5029RPG	76 mm
	W5029RPGT	76 mm
IP Rate		IP65

**ENVIRONMENTAL SPECIFICATIONS**

Operating temperature	-35/+65° C
Storage Temperature	-30/+75° C

Issue: 2039

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**4**



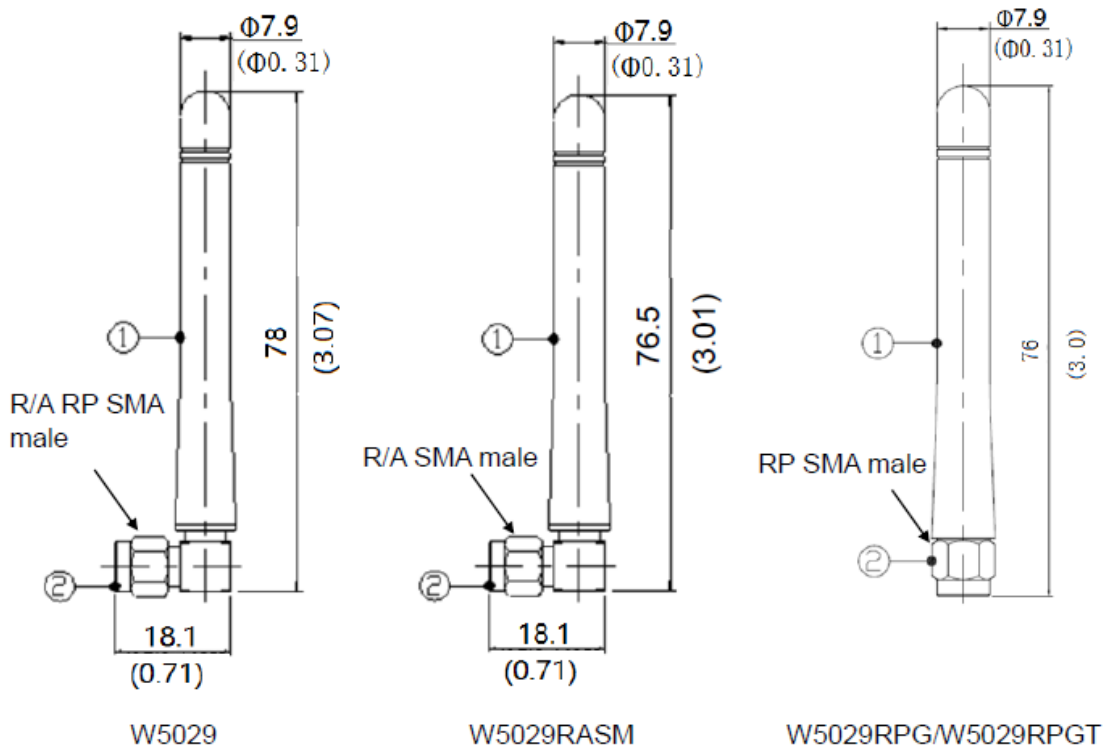
TECHNICAL DATA SHEET

Description: 2.4-2.5 / 5.15-5.925 GHz Stick Antenna

Series: External Antenna

PART NUMBER: W5029X

MECHANICAL DRAWING



- 1, Dimension show as mm (inch)
- 2, Item 1 is tube, and item 2 is connector

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TECHNICAL DATA SHEET

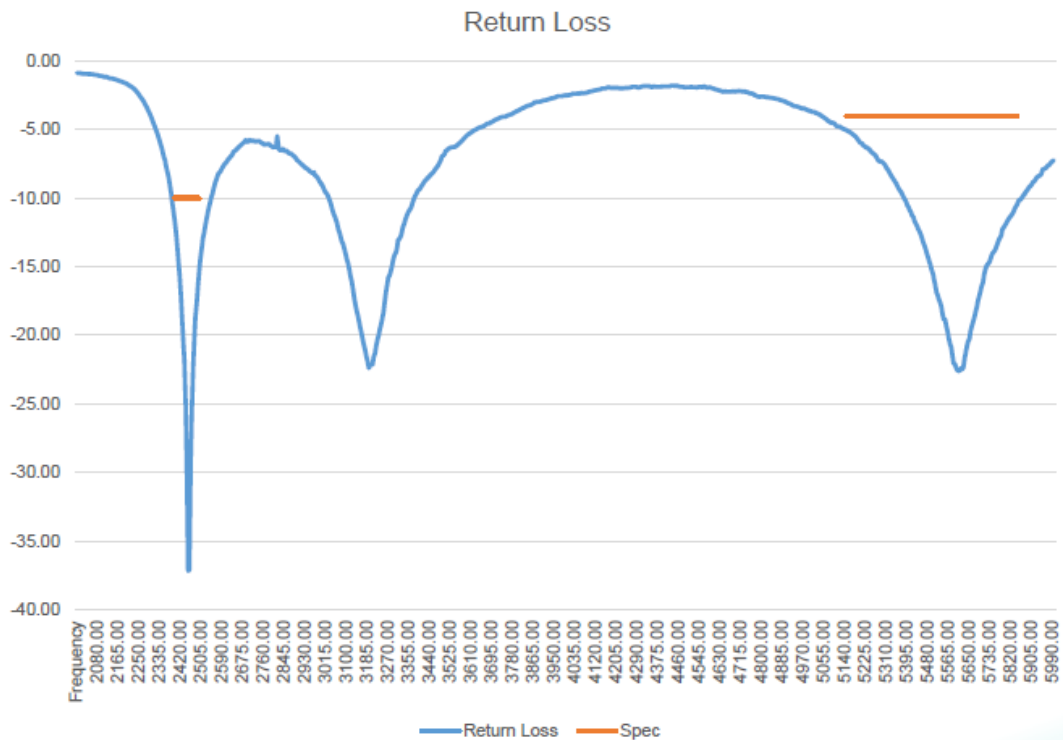
Description: 2.4-2.5 / 5.15-5.925 GHz Stick Antenna

Series: External Antenna

PART NUMBER: W5029X

CHARTS

Return Loss



(\* All RF parameters measured with free space

Issue: 2039

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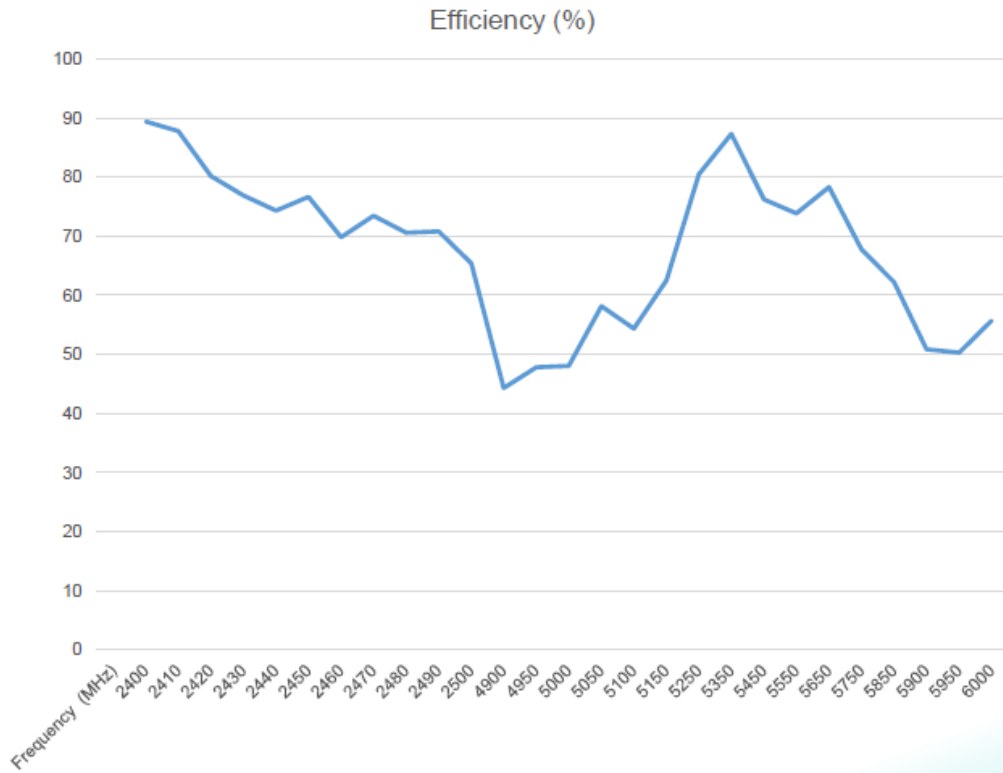
Description: 2.4-2.5 / 5.15-5.925 GHz Stick Antenna

Series: External Antenna

PART NUMBER: W5029X

CHARTS

Efficiency(%)



**(\*) All RF parameters measured with free space**

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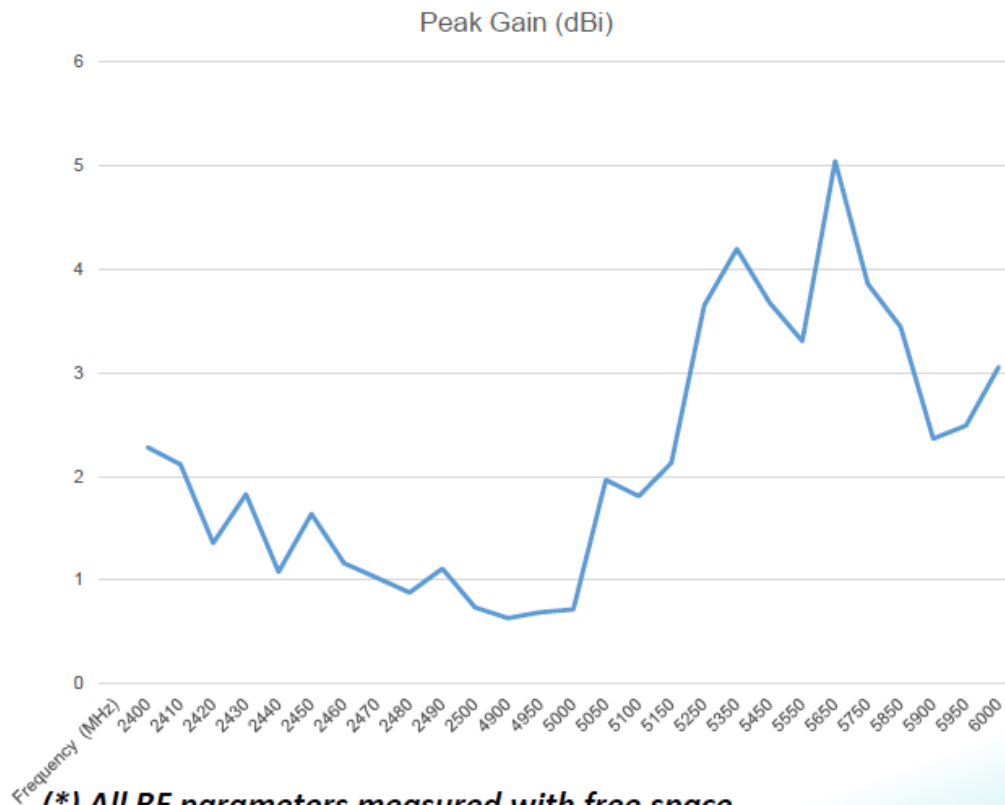
Description: 2.4-2.5 / 5.15-5.925 GHz Stick Antenna

Series: External Antenna

PART NUMBER: W5029X

CHARTS

Peak Gain (dBi)



(\* All RF parameters measured with free space

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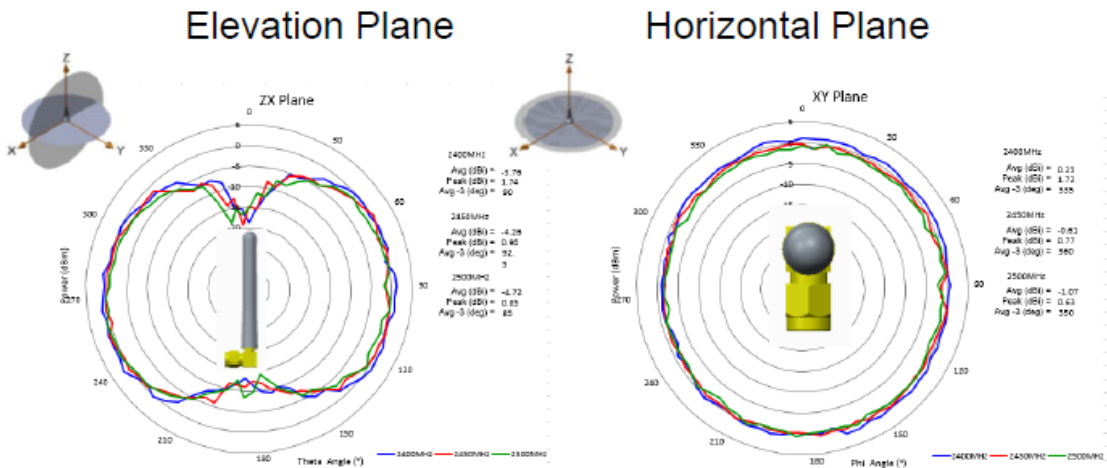
Description: 2.4-2.5 / 5.15-5.925 GHz Stick Antenna

Series: External Antenna

PART NUMBER: W5029X

CHARTS

Free Space Radiation Pattern



**(\*) All RF parameters measured with free space**

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TECHNICAL DATA SHEET

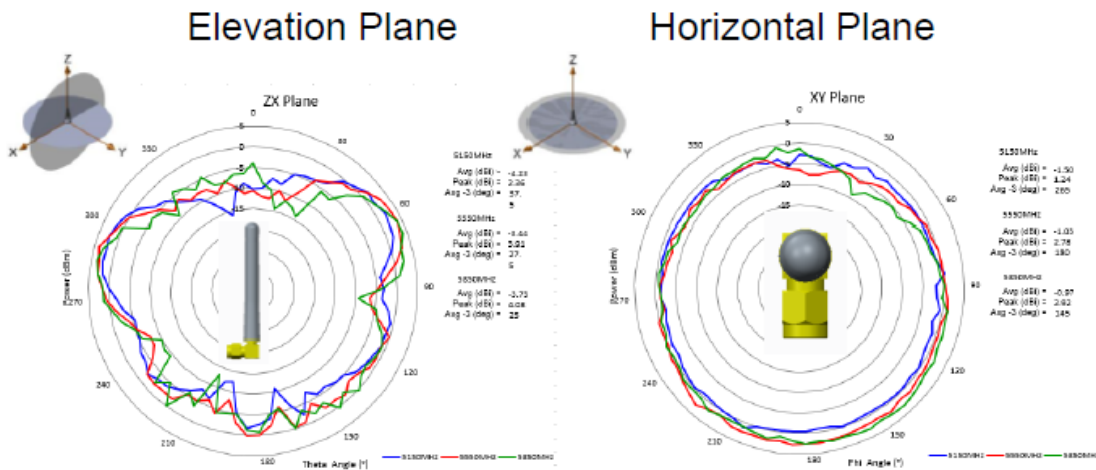
Description: 2.4-2.5 / 5.15-5.925 GHz Stick Antenna

Series: External Antenna

PART NUMBER: W5029X

CHARTS

Free Space Radiation Pattern



(\* All RF parameters measured with free space

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## TECHNICAL DATA SHEET

Description: 2.4-2.5 / 5.15-5.925 GHz Stick Antenna

Series: External Antenna

PART NUMBER: W5029X

## PACKAGING

20PCS/Bullet PE bag  
30 Bullet PE bag/ Carton box  
Total 600PCS antenna/ Carton box

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**ANT-LTE-VDP-2000-SMA**

## Data Sheet



### Product Description

The Linx VDP Series antenna is a highly versatile antenna, offering high performance in a wide range of applications as well as an industrial ruggedness at a commercial price point. These durable, low profile, IP67, UV, and extended temperature rated robust antennas mount to non-conductive surfaces with an integrated PSA adhesive patch and have a vertical cable egress. With two meters of low loss cable, the VDP Series antenna can be located remotely from the radio and positioned for optimal performance. The VDP Series offers a very rugged solution at a fraction of the cost of competitive options.

The VDP Series LTE antenna supports all common LTE frequency bands making it ideal for LTE, CAT-M1 and NB-IOT applications as well as 2G and 3G systems. It is easily customized with different cable lengths and connectors for volume orders. Contact Linx for details.



### Features

- Covers all common 4G/3G/2G LTE bands
- Fully weatherized - UV protected, IP67, wide temperature range
- Low Loss cable for better RF performance at higher frequency bands

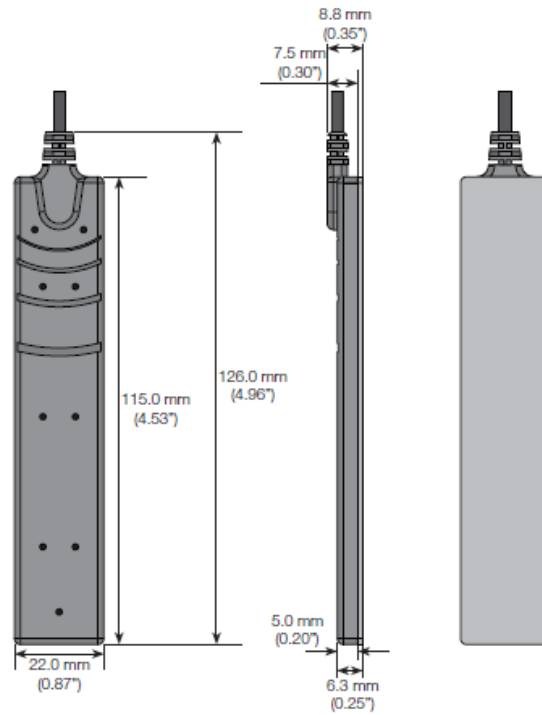
### Ordering Information

ANT-LTE-VDP-2000-SMA

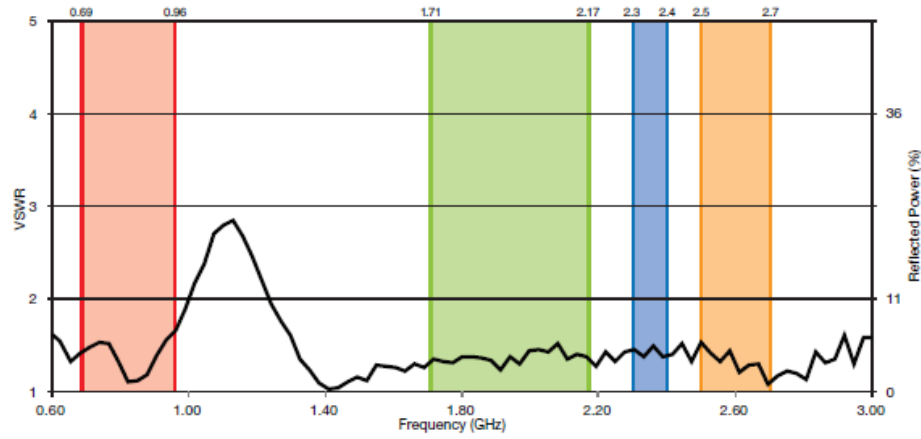
### Electrical Specifications

Electrical Specifications				
Parameter	LTE/ GSM850/ GSM900	DCS/ PCS/ UMTS1	LTE 2300	LTE 2600
Recommended Frequency Range	698 – 960	1710 – 2170	2300 – 2400	2500 – 2700
VSWR	<1.7:1	<1.3:1	<1.4:1	<1.25:1
Peak Gain	4.5dBi	3.5dBi	1.5dBi	4.0dBi
Average Gain	-2.5dBi	-4.0dBi	-5.5dBi	-5.0dBi
Efficiency	55%	40%	30%	30%
Polarization	Linear			
Radiation	Omni-Directional			
Max Power	10W			
Wavelength	½-wave			
Impedance	50-ohms			
Cable	2m of Low Loss RG-174/U			
Connection	SMA Plug (Male)			
Mounting Type	Adhesive			
Weight	49g (1.7oz.)			
Operating Temperature Range	-40°C to +85°C			

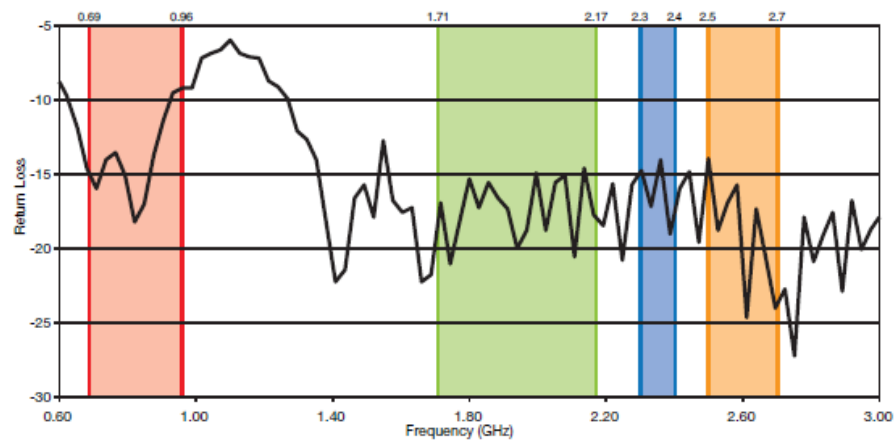
Dimensions



VSWR Graph



Return Loss



Gain Plots



XZ-Plane Gain

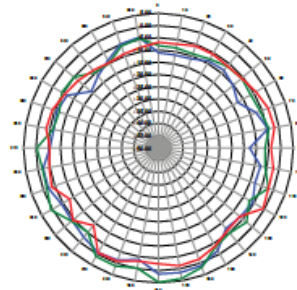


YZ-Plane Gain

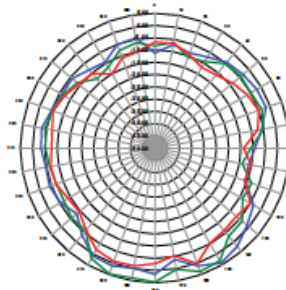


XY-Plane Gain

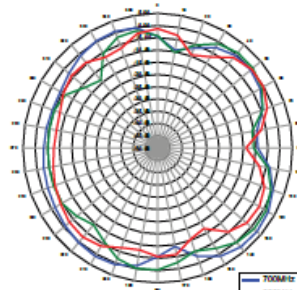
700 - 960MHz



XZ-Plane Gain



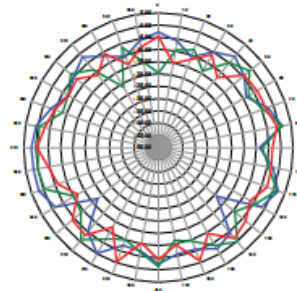
YZ-Plane Gain



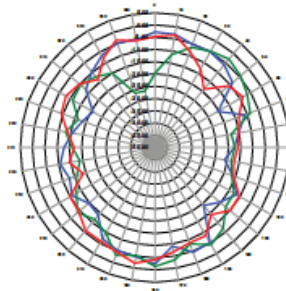
XY-Plane Gain



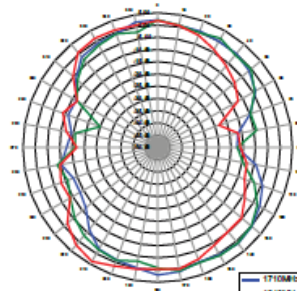
1710 - 2170MHz



XZ-Plane Gain



YZ-Plane Gain



XY-Plane Gain





Gain Plots



XZ-Plane Gain

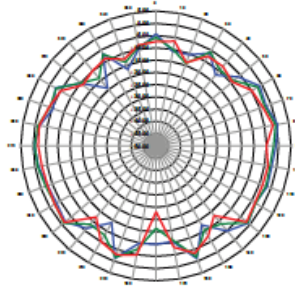


YZ-Plane Gain

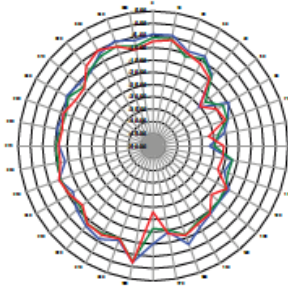


XY-Plane Gain

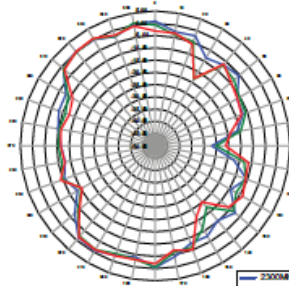
2300 - 2400MHz



XZ-Plane Gain



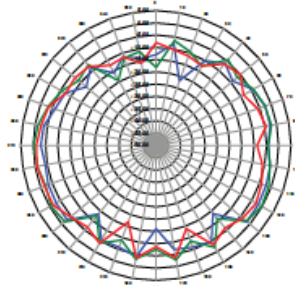
YZ-Plane Gain



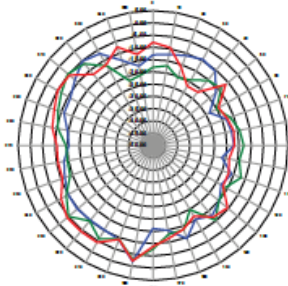
XY-Plane Gain



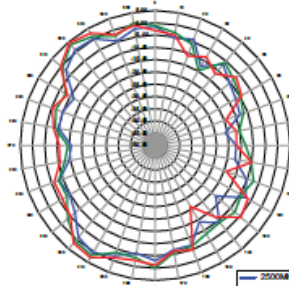
2500 - 2700MHz



XZ-Plane Gain



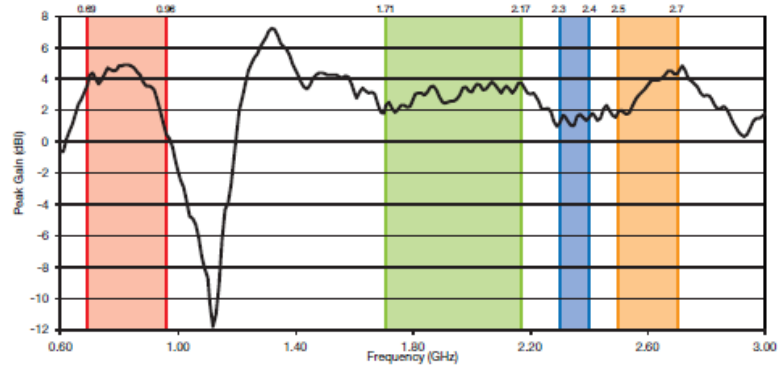
YZ-Plane Gain



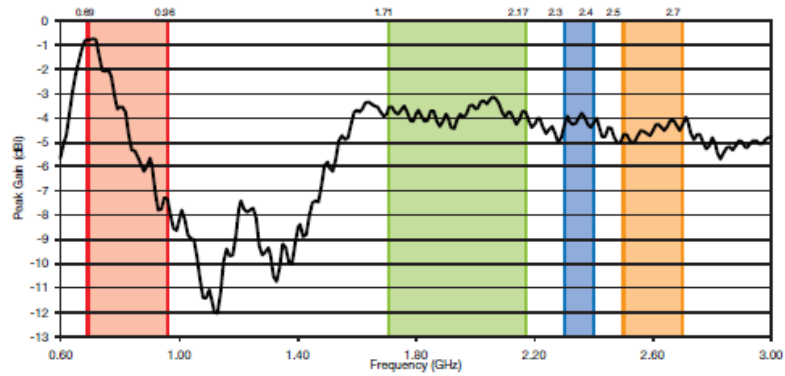
XY-Plane Gain



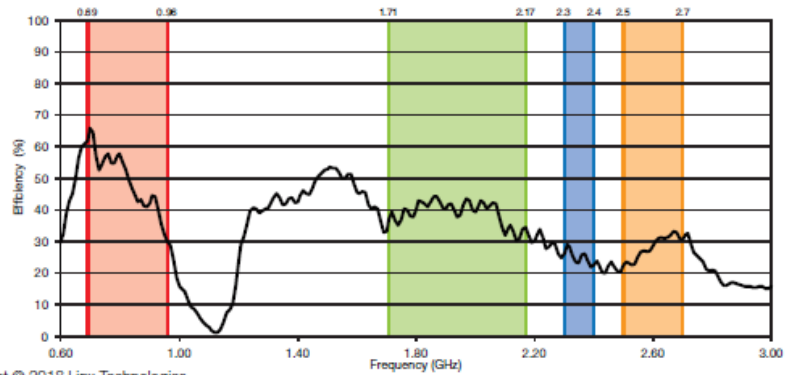
Peak Gain



Average Gain



Radiation Efficiency



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www.linxtechnologies.com

**ANT-GPS-SH2-ccc  
Data Sheet**

**Product Description**

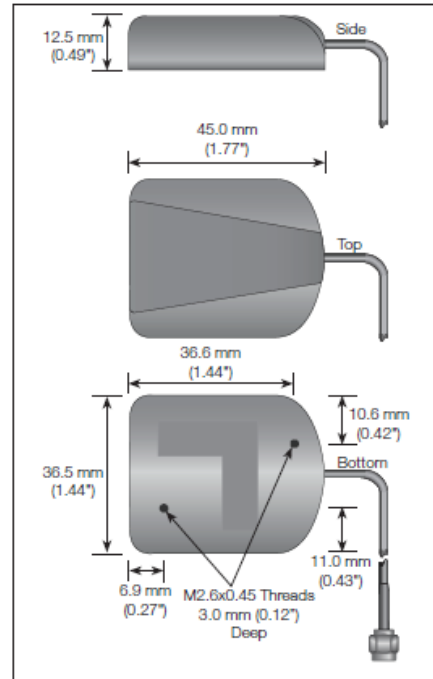
Covering both GPS and GLONASS frequencies, The high-performance SH2 Series GPS antennas combine superior performance and low power consumption. They are designed to survive the weather with an IP66 rating and UV stabilized plastic and cable. This makes them ideal for telematics, fleet management, navigation, tracking and other applications that require a compact, high-performance GPS antenna. For maximum compatibility with the host receiver, the SH2 accepts supply voltages from 2.5 to 5.5VDC and is protected against shorts, over current, or reverse polarity situations. The antennas attach via a SMA, MCX, MMCX or customer-specified connector.

**Features**

- Compact
- High-gain, low-noise design
- Low current consumption
- Protection circuit
- UV protection
- IP66 rating
- Rugged & damage-resistant
- Magnetic mount

**Electrical Specifications**

Center Frequency:	1575.42MHz, 1602MHz
Bandwidth:	10MHz @ -3dB point
VSWR:	1.5 typ.
Antenna Peak Gain:	5.0dB typ.
Impedance:	50-ohms
Axial Ratio:	1.0dB typ.
Elev. Angle Cov.:	5-90 degrees
Az. Bearing Cov.:	360 degrees
Polarization:	RHCP
System Gain:	28±1dB typ. (includes 3m cable & filter loss)
Noise Figure:	1.0dB typ.
Input Voltage:	+2.5 to +5.5VDC
Current:	5-8mA typ. @ 5V
Mounting:	Magnetic and/or screw



Cable:	117" +/-6" (3m) RG-174U (Low-loss, 0.7dB/m)
Connection:	SMA, MCX, MMCX <sup>1</sup>
Weight:	2.79oz (79g)
Plastic UV Resistance:	UL-746C f1
Cable UV Resistance:	UL-758
Ingress Protection:	IP66
Oper. Temp. Range:	-40°C to +85°C <sup>2</sup>

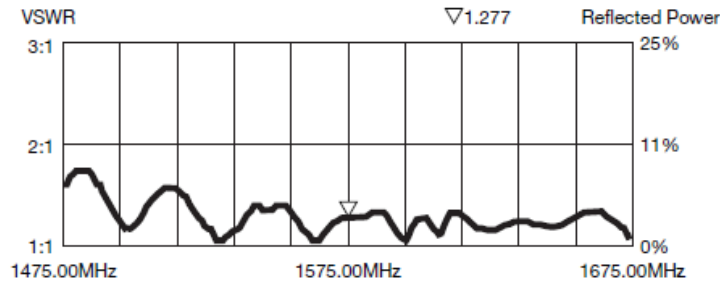
**Ordering Information**

ANT-GPS-SH2-SMA (with SMA connector)  
ANT-GPS-SH2-MCX (with MCX connector)  
ANT-GPS-SH2-MMX (with MMCX connector)

<sup>1</sup> Contact LinX for custom cable lengths and connectors.

<sup>2</sup> Operation below -30°C may result in a slightly longer time to first fix.

VSWR Graph



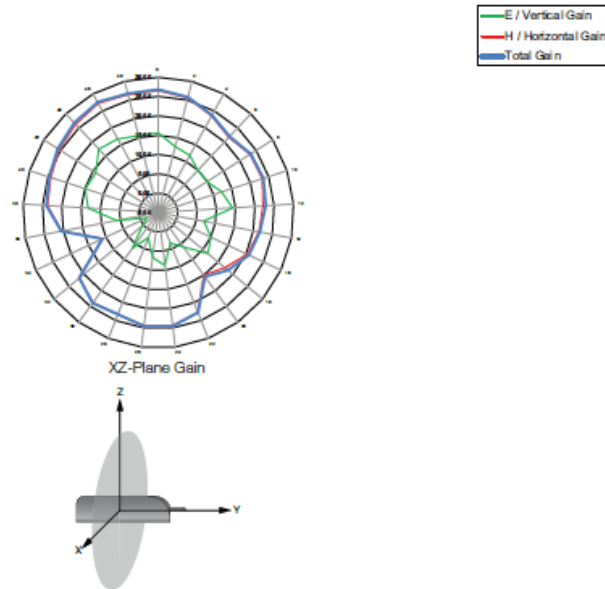
What is VSWR?

The Voltage Standing Wave Ratio (VSWR) is a measurement of how well an antenna is matched to a source impedance, typically 50-ohms. It is calculated by measuring the voltage wave that is headed toward the load versus the voltage wave that is reflected back from the load. A perfect match has a VSWR of 1:1. The higher the first number, the worse the match, and the more inefficient the system. Since a perfect match cannot ever be obtained, some benchmark for performance needs to be set. In the case of antenna VSWR, this is usually 2:1. At this point, 88.9% of the energy sent to the antenna by the transmitter is radiated into free space and 11.1% is either reflected back into the source or lost as heat on the structure of the antenna. In the other direction, 88.9% of the energy recovered by the antenna is transferred into the receiver. As a side note, since the ":1" is always implied, many data sheets will remove it and just display the first number.

How to Read a VSWR Graph

VSWR is usually displayed graphically versus frequency. The lowest point on the graph is the antenna's operational center frequency. In most cases, this is different than the designed center frequency due to fabrication tolerances. The VSWR at that point denotes how close to 50-ohms the antenna gets. Linx specifies the recommended bandwidth as the range where the typical antenna VSWR is less than 2:1.

Gain Plots

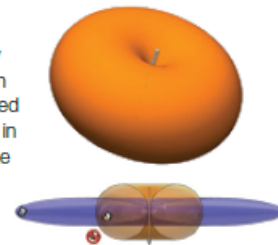


About Gain Plots

The true measure of the effectiveness of an antenna in any given application is determined by the gain and radiation pattern measurement. For antennas gain is typically measured relative to a perfect (isotropic) radiator having the same source power as the antenna under test, the units of gain in this case will be decibels isotropic (dBi). The radiation pattern is a graphical representation of signal strength measured at fixed distance from the antenna.

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

It should also be understood that gain is not "free", gain above 0dBi in one direction means that there must be less gain in another direction. Pictorially this can be pictured as shown in the figures to the right. The orange pattern represents the radiation pattern for a perfect dipole antenna, which is shaped like a donut. The pattern for an omnidirectional antenna with gain is shown in blue. The gain antenna is able to work with a device located further from the center along the axis of the pattern, but not with devices closer to the center when they are off the axis – the donut has been squished.



Gain is also 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 decreases. Also, the relative distance between an electrically small antenna and its associated ground impacts antenna gain.

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