Pulse®
A TECHNITROL COMPANY

RoHS COMPLIANT

Wireless Antennas

WC713.D (12/05)

WIRELESS ANTENNAS

Pulse® A TECHNITROL COMPANY

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WIRELESS ANTENNAS

Product Line Overview

These antennas offer superior transmission and reception between wireless access points and devices on a WLAN (wireless local area network). Wireless networks, especially those that are indoors, often have physical barriers that inhibit communication between wireless devices. These barriers cause blind spots, intermittent signal quality and interference. Selecting the correct external antenna can improve range and the reliability of wireless networks.

Pulse's new line of wireless antennas offers flexible and economical solutions for OEMs of wireless devices. The antennas are compatible with IEEE 802.11a/b/g/n, Bluetooth® and ZigBee™ applications, as well as with other devices that utilize ISM frequency bands.

Single-band antennas are available in 900MHz and 2.4GHz nominal frequencies. The dual-band antennas cover the 2.4GHz and 5.0GHz frequencies plus 5.15GHz and 5.85GHz. The 900MHz antenna is a 1/8 wavelength dipole, while all other models are 1/4 wavelength dipole.

Pulse's wireless antennas offer these standard features:

- WiFi, Bluetooth, ZigBee and other ISM band applications
- Omni-directional
- 50Ω impedence
- Vertical polarization
- Uniform 360-degree radiation patterns
- RoHS compatible

Antennas can be ordered with a variety of connector and cabling options. The industry-standard SMA connector has an articulated swivel-mount (including a reverse polarity version for FCC Part 15 compliance). Connector options include panel mount, TNC, I-PEX, MMCX, or configurations with cabling. The desktop antenna #W1045 has a magnetic base and 1500mm cable so that users can easily move the antenna for best reception/transmission.

RoHS Compliance
All Pulse wireless products, including these wireless antennas, are lead-free and RoHS compliant. The antenna part numbers shown in this catalog designate the lead-free RoHS compliant models, and no additional suffix or identifier is required. Please contact Pulse for further details.

Custom Solutions
In addition to the antennas shown in this catalog, Pulse can customize antenna designs for high-volume wireless OEMs. This includes alternative frequencies and a variety of cables/connectors for antenna assemblies. Pulse also manufactures build-to-print embedded antennas featuring:

- Stamped metal (variety of platings available)
- Stamped metal on plastic carriers
- PCB assemblies with cabling
- High-frequency production testing, up to 8GHz

WIRELESS ANTENNAS

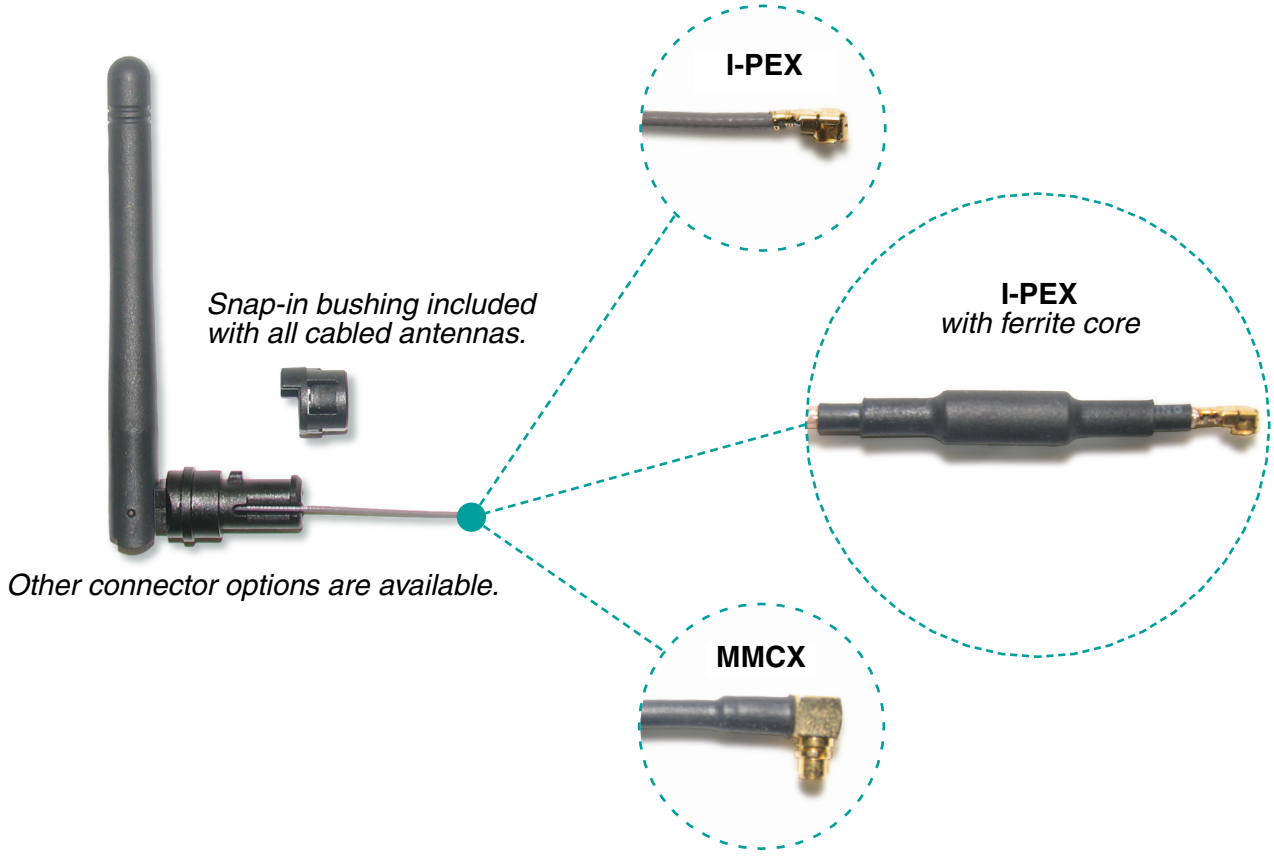
Selection Guide

Model [1]	Frequency	Gain (dBi)	Mechanical [2] Length	Application/Standard	Catalog Page No.
SINGLE-BAND ANTENNAS					
W1047	900MHz	1.0	6.65" (169mm)	ISM 900MHz	1
W1030	2.4GHz	2.0	3.25" (82.5mm)	802.11b/g, Bluetooth, ZigBee	3
W1031	2.4GHz	2.0	3.25" (82.5mm)	802.11b/g, Bluetooth, ZigBee	3
W1034	2.4GHz	2.0	4.21" (107mm)	802.11b/g, Bluetooth, ZigBee	5
W1037	2.4GHz	3.2	6.65" (169mm)	802.11b/g, Bluetooth, ZigBee	7
W1027	2.4GHz	3.2	4.88" (124mm)	802.11b/g, Bluetooth, ZigBee	9
DUAL-BAND ANTENNAS					
W1043	2.4 & 5.0GHz	2.0	4.59" (117mm)	802.11a/b/g, Bluetooth, ZigBee	11
W1045	2.4 & 5.0GHz	2.0	4.134" (105mm)	802.11a/b/g, Bluetooth, ZigBee	13
W1028	5.15 & 5.85GHz	2.0	4.88" (124mm)	802.11a, ISM 5.8GHz	15

NOTES: 1. Antennas come standard with R-SMA connectors.
2. Mechanical length from connector pivot to tip of antenna. See dimension details on following pages.

Connector Options

The standard connector is an R-SMA connector, but antennas can be ordered with a variety of cabling and connector options. Ask your representative for details.



NOTE: Connector photos are enlarged to show details and are not to scale.

WIRELESS ANTENNAS
900MHz Applications

Pulse® A TECHNITROL COMPANY

- Ideal for lower frequency wireless applications in the ISM 900MHz band
- Omni-directional radiation pattern provides broad 360° coverage
- One-eighth wavelength dipole configuration
- Connection and color options easily integrate with OEM designs

RoHS COMPLIANT

Electrical Specifications @ 25°C

Antenna Part No.	Frequency (MHz)	Gain (dBi)	Impedance (Nom)	VSWR	Polarization	Electrical Length	Radiation	Color
W1047	860 - 928	1.0	50Ω	≤ 2.0	Vertical	1/8, dipole	Omni	Black

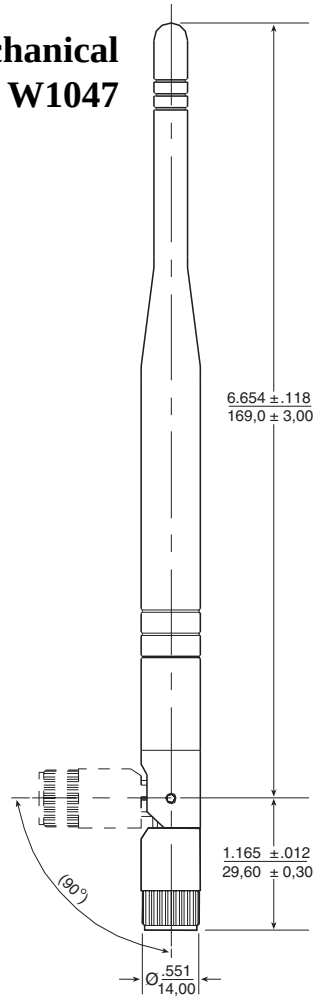
NOTE: This part number is lead-free and RoHS compliant. No additional suffix or identifier is required.

Color Options
- Black*
- Gray (Pantone cool gray 8C)
- Gray (Pantone 429C)
- Gray (Pantone cool gray 7C)

Connector Options
- Reverse SMA (Female)*
- SMA (Male)

*****Default Configuration - Please contact Pulse Applications Engineering for assistance in ordering colors and connectors.*

Mechanical
W1047



Weight.....25.6 grams
Carton 20/bag; 500/carton

Dimensions: Inches / mm

Unless otherwise specified, all tolerances are ± .010 / 0,25

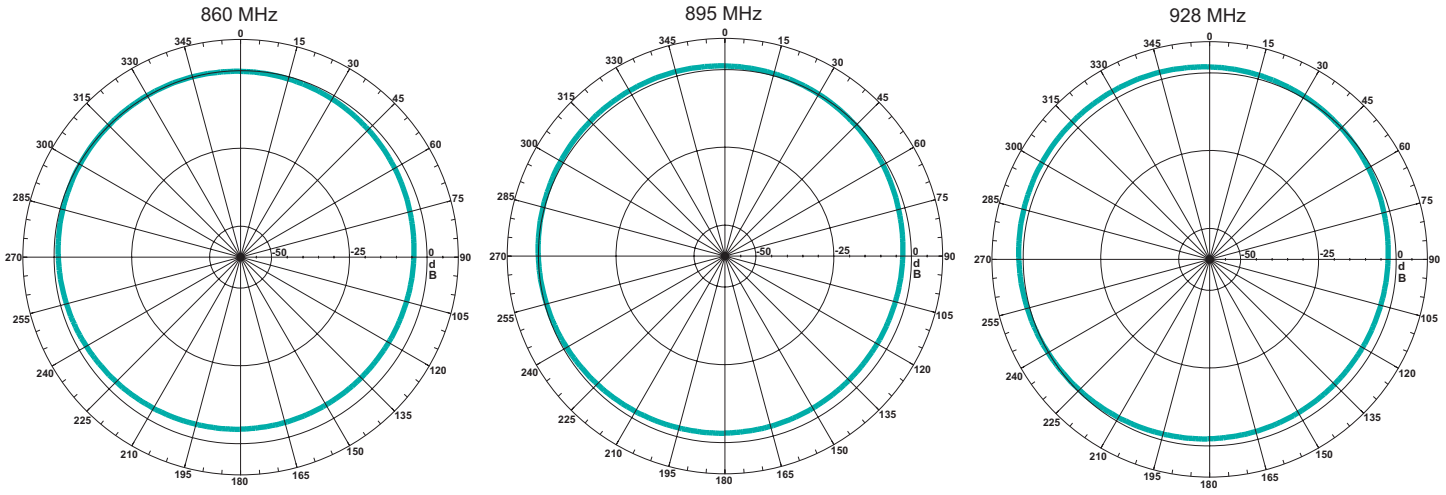
WIRELESS ANTENNAS
900MHz Applications

Application Notes

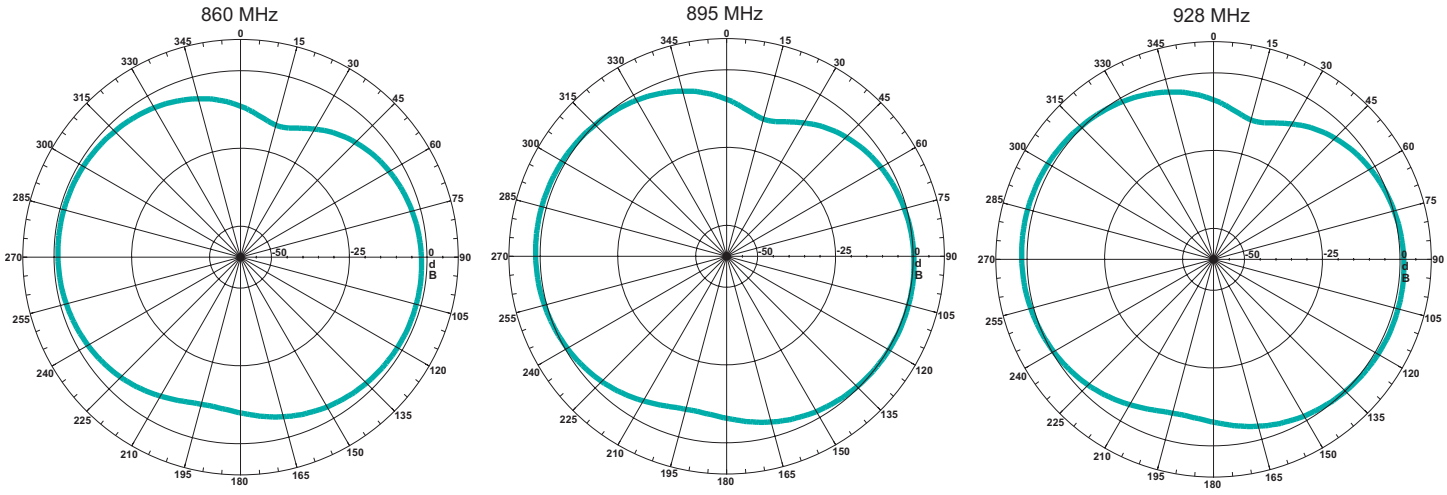
Omni-directional antennas provide a uniform, donut-shaped, 360° radiation pattern. The omni-directional pattern is suitable for point-to-multipoint broadcasting in all directions. This antenna is primarily used for WLAN applications. However, it can also be used for a variety of other applications within the specified frequency range. When used as an access point, the antenna is ideally located at the center of the coverage area.

Gain Performance - W1047

Horizontal Position



Vertical Position



WIRELESS ANTENNAS
2.4GHz Applications

- Shortest antennas in product line
- For WLAN devices using WiFi (802.11b/g), Bluetooth® and ZigBee™
- Omni-directional radiation pattern provides broad 360° coverage
- One-quarter wavelength dipole configuration
- Connection and color options easily integrate with OEM designs

Electrical Specifications @ 25°C

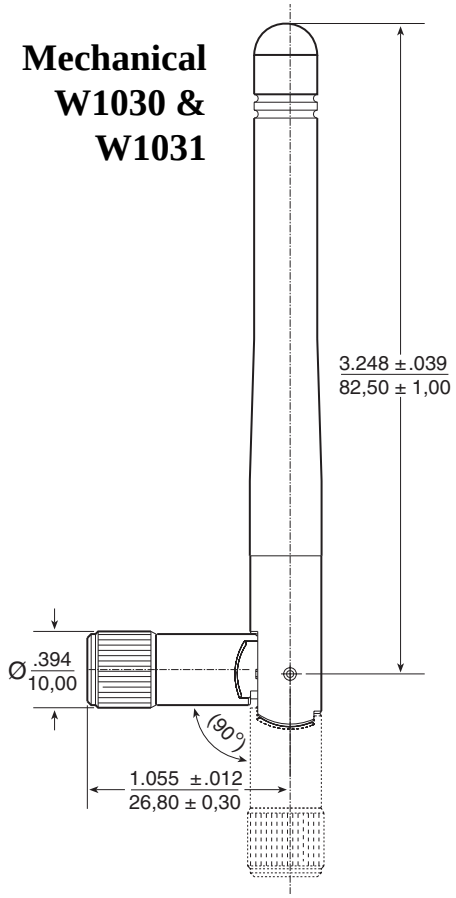
Antenna Part No.	Frequency (GHz)	Gain (dBi)	Impedance (Nom)	VSWR	Polarization	Electrical Length	Radiation	Color
W1030	2.4 - 2.5	2.0	50Ω	≤ 2.0	Vertical	1/4, dipole	Omni	Black
W1031	2.4 - 2.5	2.0	50Ω	≤ 2.0	Vertical	1/4, dipole	Omni	Gray

NOTE: These part numbers are lead-free and RoHS compliant. No additional suffix or identifier is required.

Color Options
- Black*
- Gray (Pantone cool gray 8C)*
- Gray (Pantone 429C)
- Gray (Pantone cool gray 7C)

Connector Options
- Reverse SMA (Female)*
- SMA (Male)

**Mechanical W1030 & W1031*



*****Default Configuration - Please contact Pulse Applications Engineering for assistance in ordering colors and connectors.*

Weight .....6.3 grams
Carton 20/bag; 500/carton

Dimensions: Inches / mm

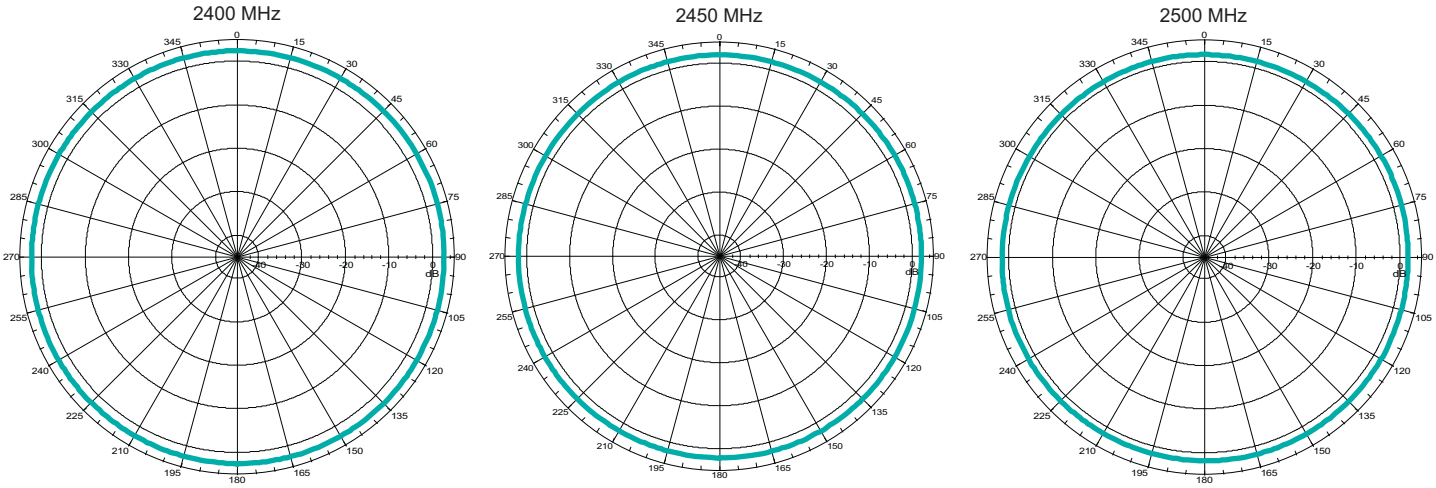
Unless otherwise specified, all tolerances are ± .010 / 0,25

Application Notes

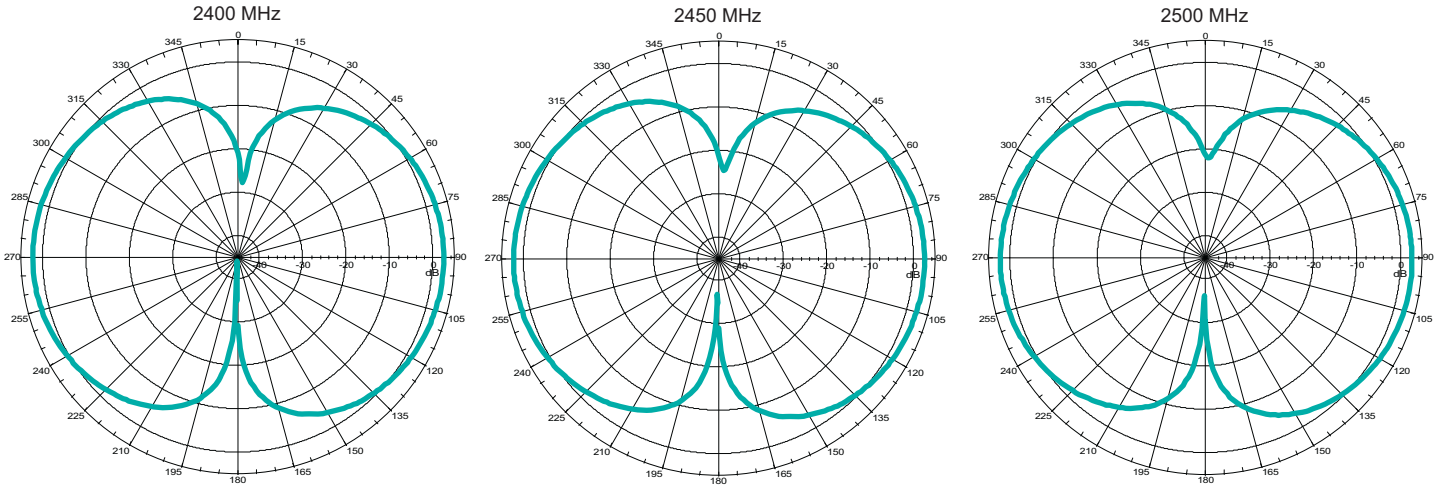
Omni-directional antennas provide a uniform, donut-shaped, 360° radiation pattern. The omni-directional pattern is suitable for point-to-multipoint broadcasting in all directions. This antenna is primarily used for WLAN applications. However, it can also be used for a variety of other applications within the specified frequency range. When used as an access point, the antenna is ideally located at the center of the coverage area.

Gain Performance - W1030 & W1031

Horizontal Position



Vertical Position



WIRELESS ANTENNAS
2.4GHz Applications

Pulse® A TECHNITROL COMPANY

- Attractive, tapered design
- For WLAN devices using WiFi (802.11b/g), Bluetooth® and ZigBee™
- Omni-directional radiation pattern provides broad 360° coverage
- One-quarter wavelength dipole configuration
- Connection and color options easily integrate with OEM designs

RoHS COMPLIANT

Electrical Specifications @ 25°C

Antenna Part No.	Frequency (GHz)	Gain (dBi)	Impedance (NOM)	VSWR	Polarization	Electrical Length	Radiation	Color
W1034	2.4 - 2.5	2.0	50Ω	≤ 2.0	Vertical	1/4, dipole	Omni	Black

NOTE: This part number is lead-free and RoHS compliant. No additional suffix or identifier is required.

Color Options
- Black*
- Gray (Pantone cool gray 8C)
- Gray (Pantone 429C)
- Gray (Pantone cool gray 7C)

Connector Options
- Reverse SMA (Female)*
- SMA (Male)

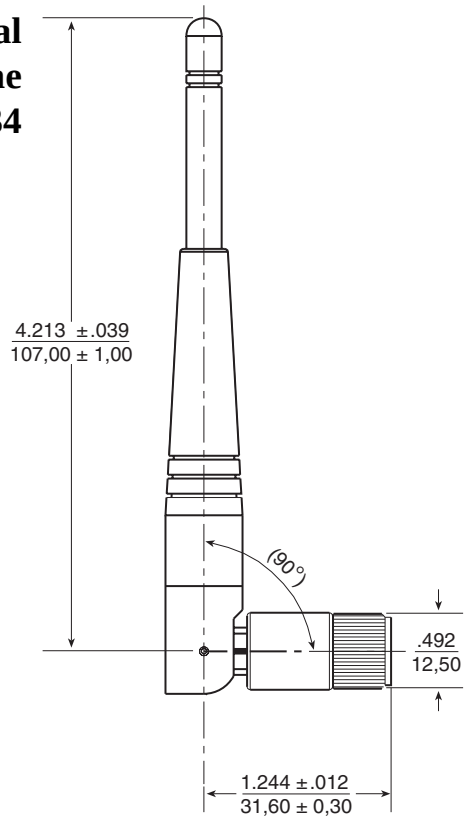
**Default Configuration - Please contact Pulse Applications Engineering for assistance in ordering colors and connectors.*

Weight.....19.5 grams
Carton 20/bag; 500/carton

Dimensions: Inches / mm

Unless otherwise specified, all tolerances are ± .010 / 0,25

Mechanical Outline W1034

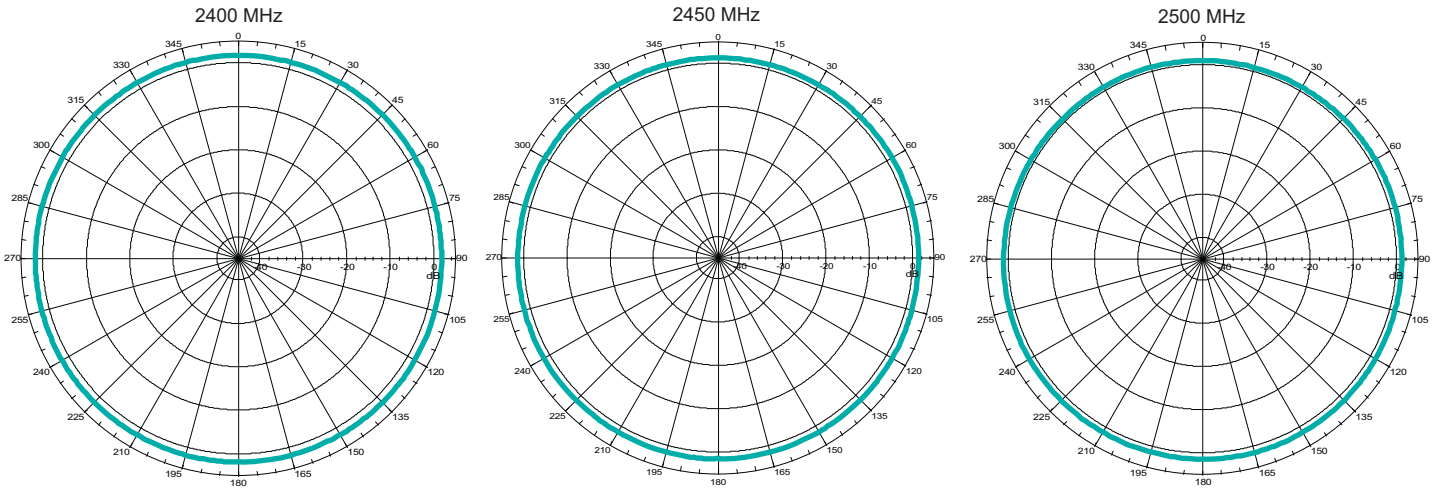


Application Notes

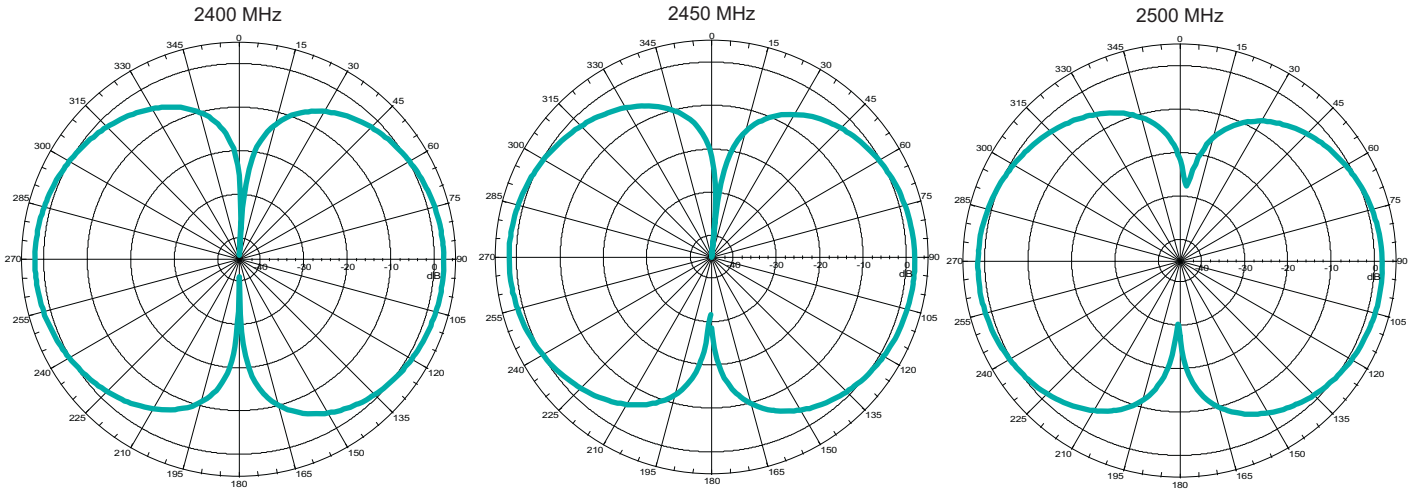
Omni-directional antennas provide a uniform, donut-shaped, 360° radiation pattern. The omni-directional pattern is suitable for point-to-multipoint broadcasting in all directions. This antenna is primarily used for WLAN applications. However, it can also be used for a variety of other applications within the specified frequency range. When used as an access point, the antenna is ideally located at the center of the coverage area.

Gain Performance - W1034

Horizontal Position



Vertical Position



WIRELESS ANTENNAS
2.4GHz Applications

- High gain performance
- For WLAN devices using WiFi (802.11b/g), Bluetooth® and ZigBee™
- Omni-directional radiation pattern provides broad 360° coverage
- One-quarter wavelength dipole configuration
- Connection and color options easily integrate with OEM designs

RoHS COMPLIANT

Electrical Specifications @ 25°C

Antenna Part No.	Frequency (GHz)	Gain (dBi)	Impedance (Nom)	VSWR	Polarization	Electrical Length	Radiation	Color
W1037	2.4 - 2.5	3.2	50Ω	≤ 2.0	Vertical	1/4, dipole	Omni	Black

NOTE: This part number is lead-free and RoHS compliant. No additional suffix or identifier is required.

Color Options
- Black*
- Gray (Pantone cool gray 8C)
- Gray (Pantone 429C)
- Gray (Pantone cool gray 7C)

Connector Options
- Reverse SMA (Female)*
- SMA (Male)

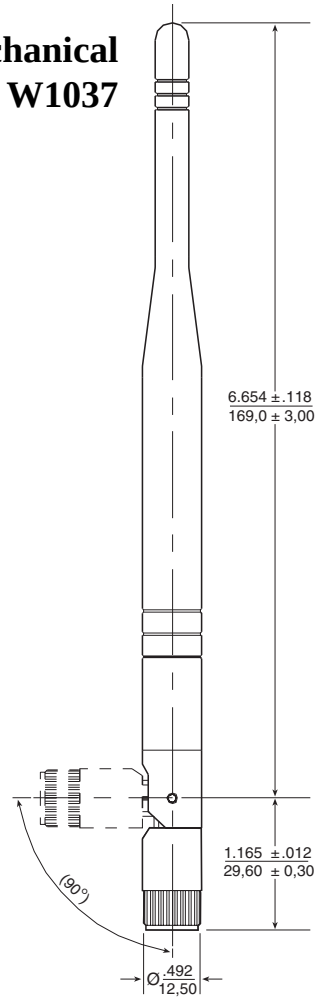
**Default Configuration - Please contact Pulse Applications Engineering for assistance in ordering colors and connectors.*

Weight.....25.1 grams
Carton 20/bag; 500/carton

Dimensions: Inches / mm

Unless otherwise specified, all tolerances are ± .010 / 0,25

Mechanical
W1037



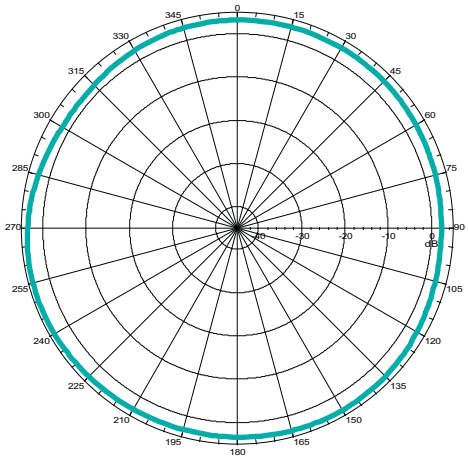
Application Notes

Omni-directional antennas provide a uniform, donut-shaped, 360° radiation pattern. The omni-directional pattern is suitable for point-to-multipoint broadcasting in all directions. This antenna is primarily used for WLAN applications. However, it can also be used for a variety of other applications within the specified frequency range. When used as an access point, the antenna is ideally located at the center of the coverage area.

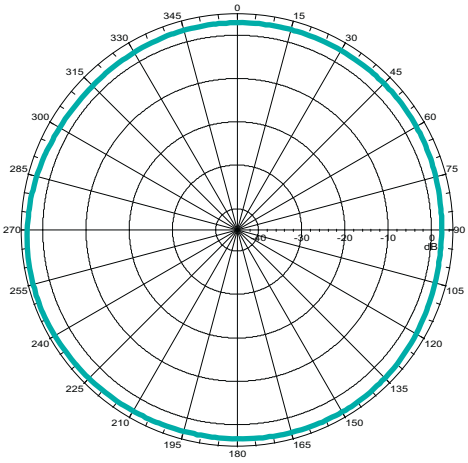
Gain Performance - W1037

Horizontal Position

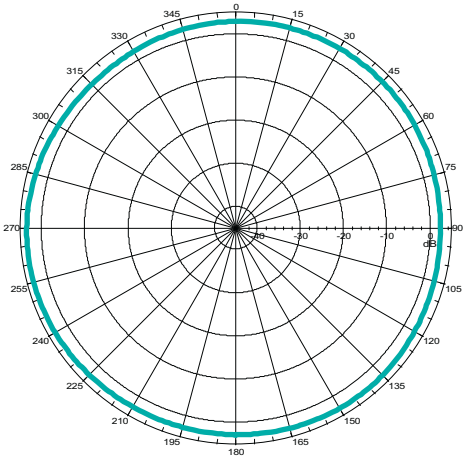
2400 MHz



2450 MHz

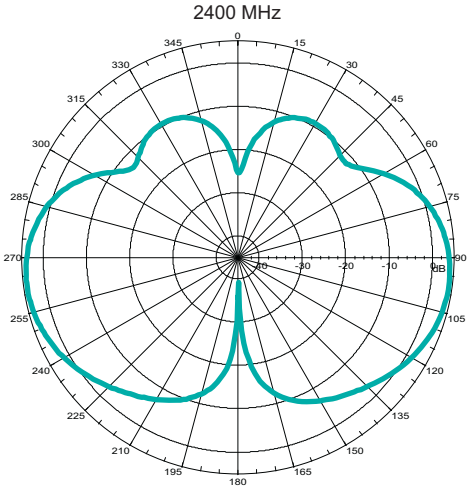


2500 MHz

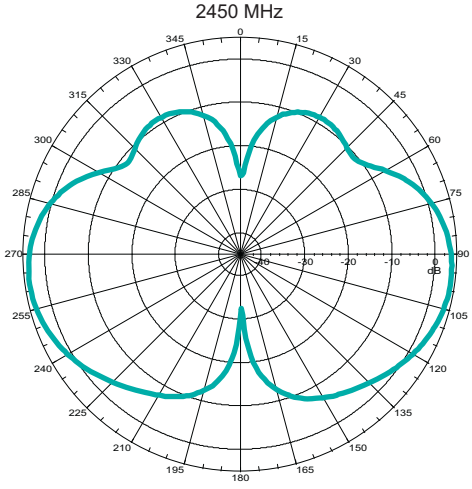


Vertical Position

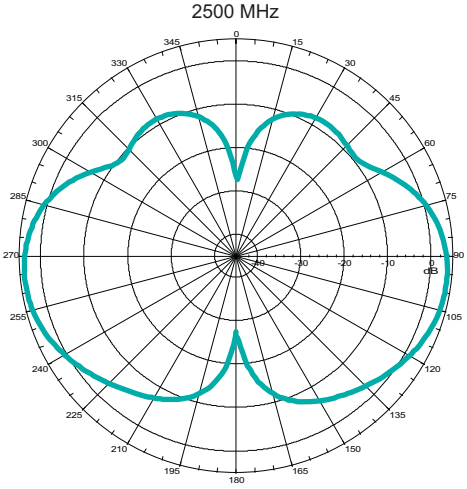
2400 MHz



2450 MHz



2500 MHz



WIRELESS ANTENNAS
2.4GHz Applications

Pulse® A TECHNITROL COMPANY

- High gain antenna
- For WLAN devices using WiFi (802.11b/g), Bluetooth® and ZigBee™
- Omni-directional radiation pattern provides broad 360° coverage
- One-quarter wavelength dipole configuration
- Connection and color options easily integrate with OEM designs

RoHS COMPLIANT

Electrical Specifications @ 25°C

Antenna Part No.	Frequency (GHz)	Gain (dBi)	Impedance (NOM)	VSWR	Polarization	Electrical Length	Radiation	Color
W1027	2.4 - 2.5	3.2	50Ω	≤ 1.9	Vertical	1/4, dipole	Omni	Black

NOTE: This part number is lead-free and RoHS compliant. No additional suffix or identifier is required.

Color Options

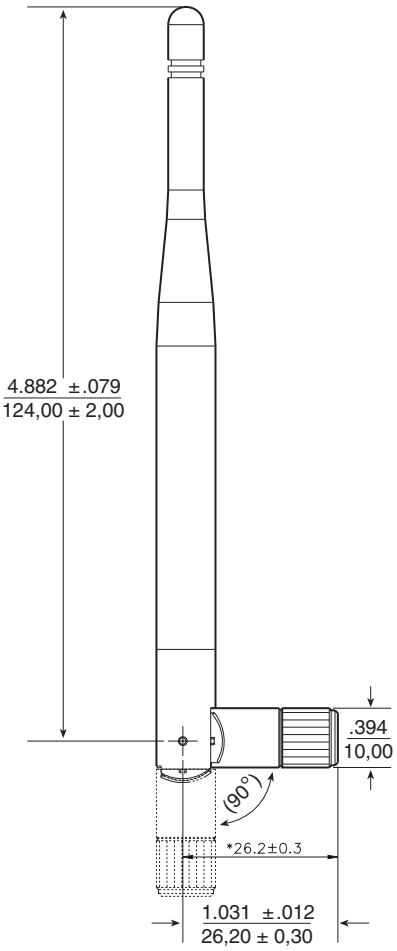
- Black*
- Gray (Pantone cool gray 8C)

Connector Options

- Reverse SMA (Female)*
- SMA (Male)

*****_Default Configuration - Please contact Pulse Applications Engineering for assistance in ordering colors and connectors._

Mechanical Outline W1027



Weight.....13.9 grams
Carton 20/bag; 500/carton

Dimensions: Inches / mm

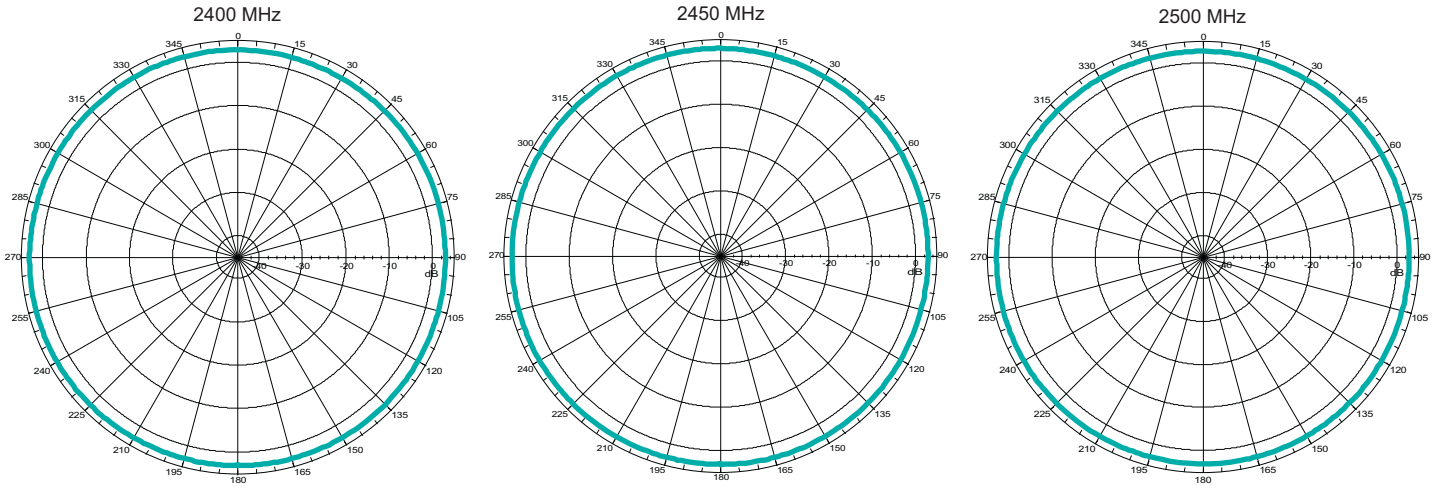
Unless otherwise specified, all tolerances are ± .010 / 0,25

Application Notes

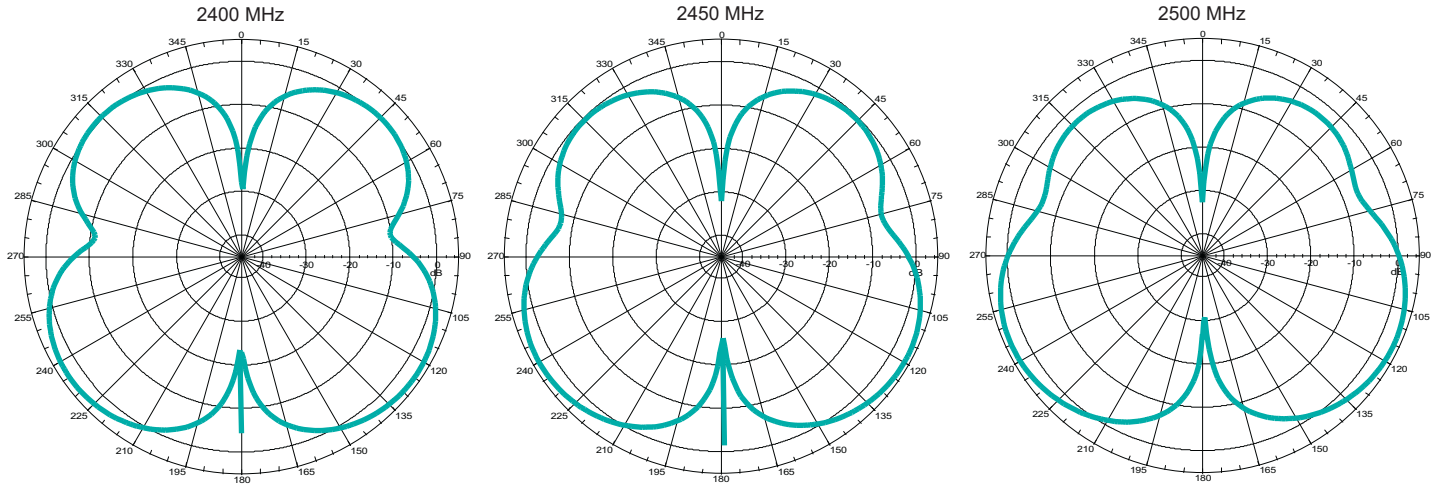
Omni-directional antennas provide a uniform, donut-shaped, 360° radiation pattern. The omni-directional pattern is suitable for point-to-multipoint broadcasting in all directions. This antenna is primarily used for WLAN applications. However, it can also be used for a variety of other applications within the specified frequency range. When used as an access point, the antenna is ideally located at the center of the coverage area.

Gain Performance - W1027

Horizontal Position



Vertical Position



WIRELESS ANTENNAS
2.4GHz and 5.0 GHz Applications

Pulse® A TECHNITROL COMPANY

- Dual-band, blade style antenna
- For WLAN devices using WiFi (802.11a/b/g), Bluetooth® and ZigBee™
- Omni-directional radiation pattern provides broad 360° coverage
- One-quarter wavelength dipole configuration
- Connection and color options easily integrate with OEM designs

RoHS COMPLIANT

Electrical Specifications @ 25°C

Antenna Part No.	Frequency (GHz)	Gain (dBi)	Impedance (NOM)	VSWR	Polarization	Electrical Length	Radiation	Color
W1043	2.4 & 5.0	2.0	50Ω	≤ 2.0	Vertical	1/4, dipole	Omni	Black

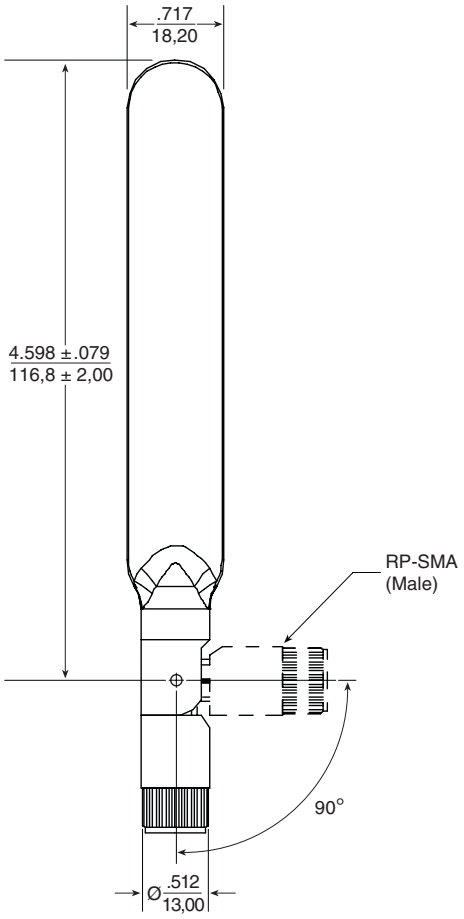
NOTE: This part number is lead-free and RoHS compliant. No additional suffix or identifier is required.

Color Options
- Black*
- Gray (Pantone cool gray 8C)

Connector Options
- Reverse SMA (Female)*
- SMA (Male)

*****_Default Configuration - Please contact Pulse Applications Engineering for assistance in ordering colors and connectors._

Mechanical Outline W1043



Weight.....18.0 grams
Carton 20/bag; 500/carton

Dimensions: Inches / mm

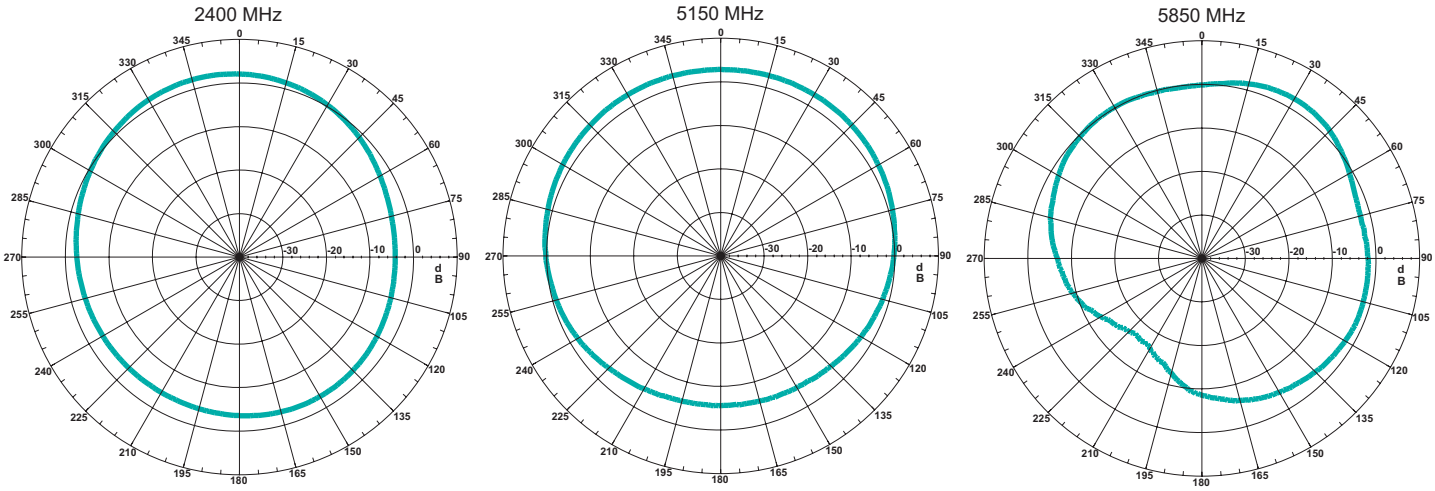
Unless otherwise specified, all tolerances are ± .010 / 0,25

Application Notes

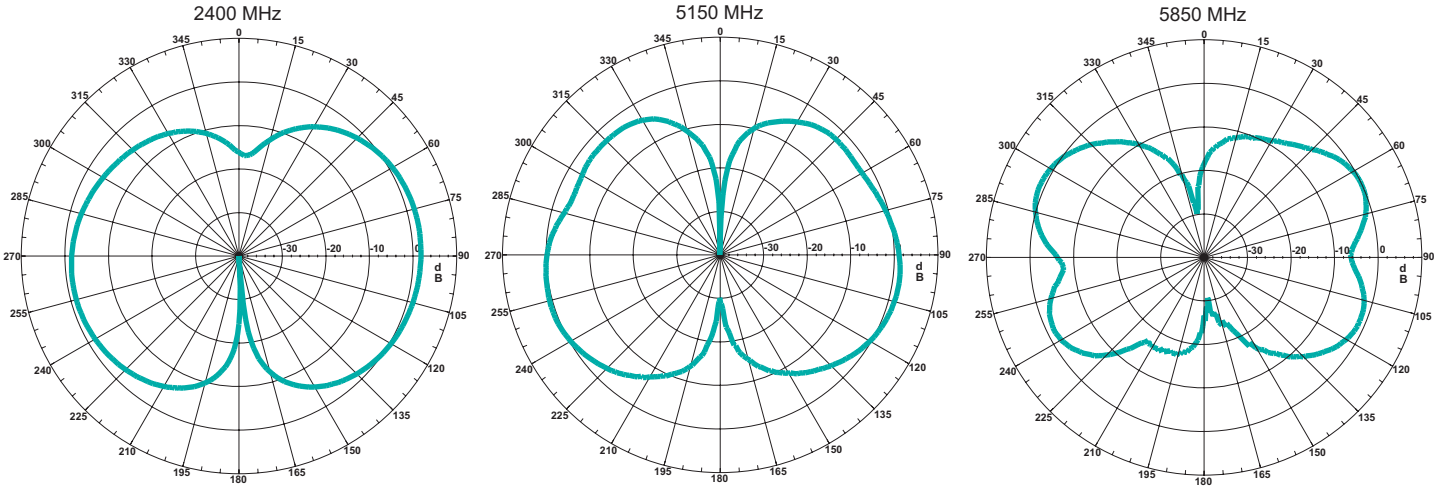
Omni-directional antennas provide a uniform, donut-shaped, 360° radiation pattern. The omni-directional pattern is suitable for point-to-multipoint broadcasting in all directions. This antenna is primarily used for WLAN applications. However, it can also be used for a variety of other applications within the specified frequency range. When used as an access point, the antenna is ideally located at the center of the coverage area.

Gain Performance - W1043

Horizontal Position



Vertical Position



WIRELESS ANTENNAS
2.4GHz and 5.0 GHz Applications

Pulse® A TECHNITROL COMPANY

- Dual-band antenna
- Magnetic, weighted base for use on desktop or metal surface
- 1500mm flexible cable for remote placement (alternate lengths and configurations available)
- For WLAN devices using WiFi (802.11a/b/g), Bluetooth® and ZigBee™
- Omni-directional radiation pattern provides broad 360° coverage
- One-quarter wavelength dipole configuration

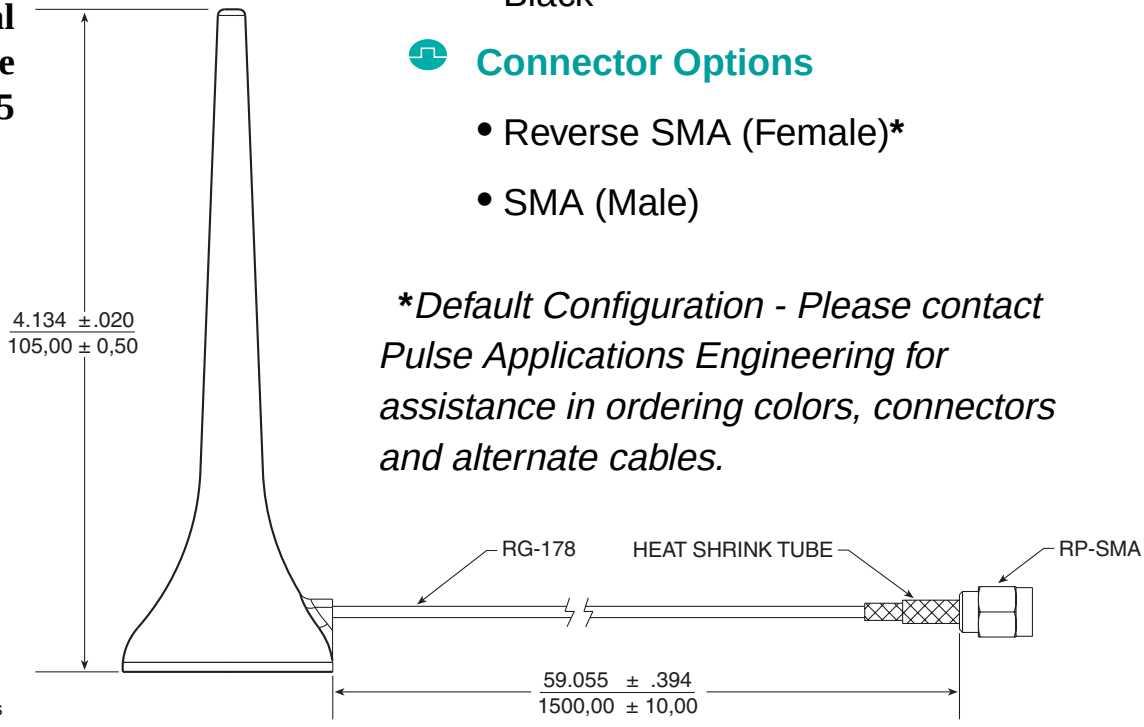
RoHS COMPLIANT

Electrical Specifications @ 25°C

Antenna Part No.	Frequency (GHz)	Gain (dBi)	Impedance (NOM)	VSWR	Polarization	Electrical Length	Radiation	Color
W1045	2.4 & 5.0	2.0	50Ω	≤ 2.0	Vertical	1/4, dipole	Omni	Black

NOTE: This part number is lead-free and RoHS compliant. No additional suffix or identifier is required.

Mechanical Outline W1045



Weight .....38.5 grams
Carton 500/carton
Dimensions: Inches / mm
Unless otherwise specified, all tolerances are ± .010 / 0,25

Color Options

- Black*

Connector Options

- Reverse SMA (Female)*
- SMA (Male)

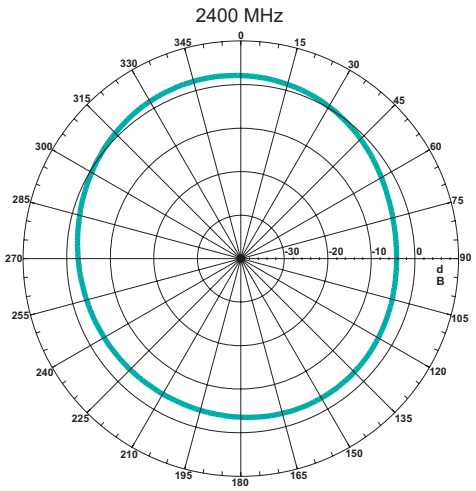
**Default Configuration - Please contact Pulse Applications Engineering for assistance in ordering colors, connectors and alternate cables.*

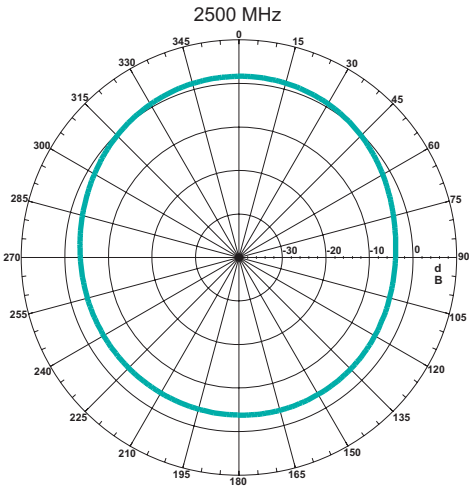
Application Notes

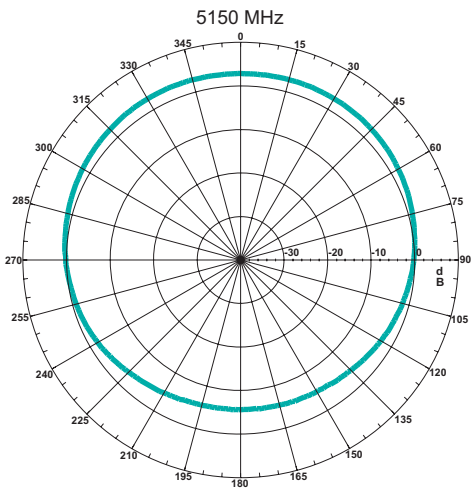
Omni-directional antennas provide a uniform, donut-shaped, 360° radiation pattern. The omni-directional pattern is suitable for point-to-multipoint broadcasting in all directions. This antenna is primarily used for WLAN applications. However, it can also be used for a variety of other applications within the specified frequency range. When used as an access point, the antenna is ideally located at the center of the coverage area.

Gain Performance - W1045

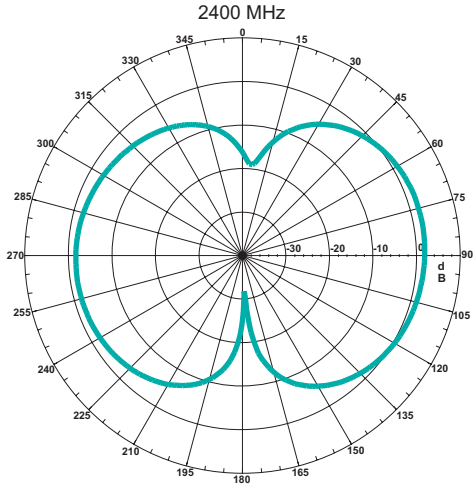
Horizontal Position

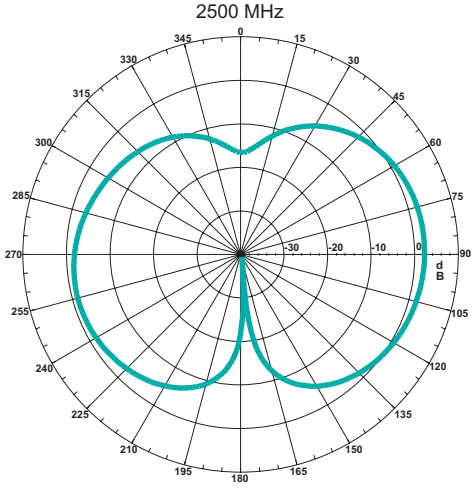


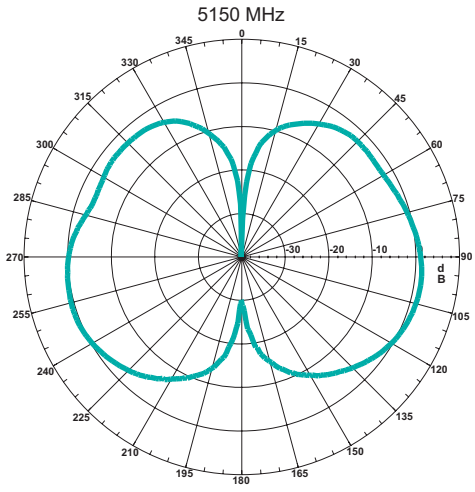




Vertical Position







WIRELESS ANTENNAS
5.15GHz and 5.85GHz Applications

Pulse® A TECHNITROL COMPANY

- High frequency and high gain antenna
- For WLAN devices using WiFi (802.11a) and ISM 5.8GHz band
- Omni-directional radiation pattern provides broad 360° coverage
- One-quarter wavelength dipole configuration
- Connection and color options easily integrate with OEM designs

RoHS COMPLIANT

Electrical Specifications @ 25°C

Antenna Part No.	Frequency (GHz)	Gain (dBi)	Impedance (NOM)	VSWR	Polarization	Electrical Length	Radiation	Color
W1028	5.15 - 5.85	2.0	50Ω	≤ 1.9	Vertical	1/4, dipole	Omni	Black

NOTE: This part number is lead-free and RoHS compliant. No additional suffix or identifier is required.

Color Options

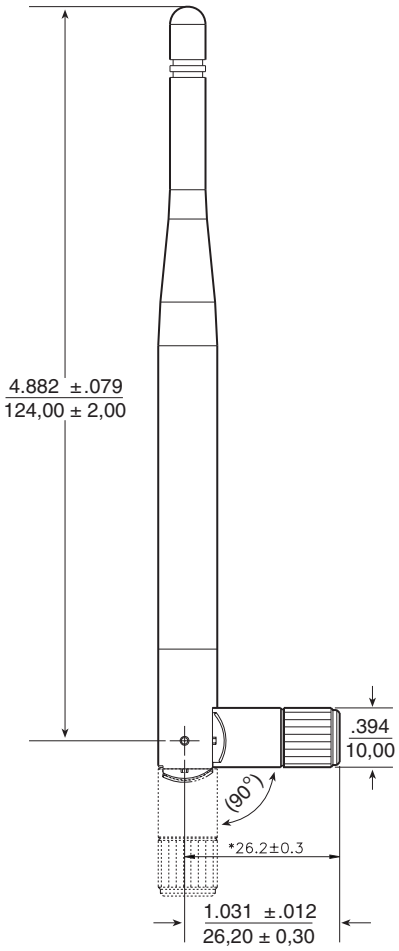
- Black*
- Gray (Pantone cool gray 8C)

Connector Options

- Reverse SMA (Female)*
- SMA (Male)

*****_Default Configuration - Please contact Pulse Applications Engineering for assistance in ordering colors and connectors._

Mechanical Outline W1028



Weight.....12.9 grams
Carton 20/bag; 500/carton

Dimensions: Inches / mm

Unless otherwise specified, all tolerances are ± .010 / 0,25

WIRELESS ANTENNAS
5.15GHz and 5.85GHz Applications

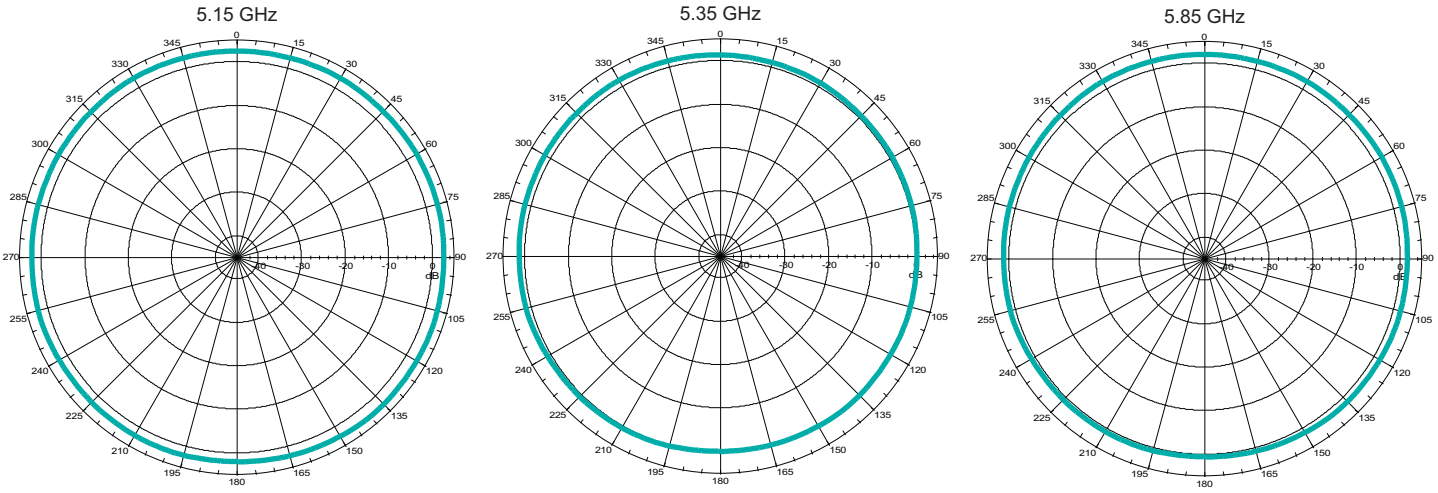
Pulse® A TECHNITROL COMPANY

Application Notes

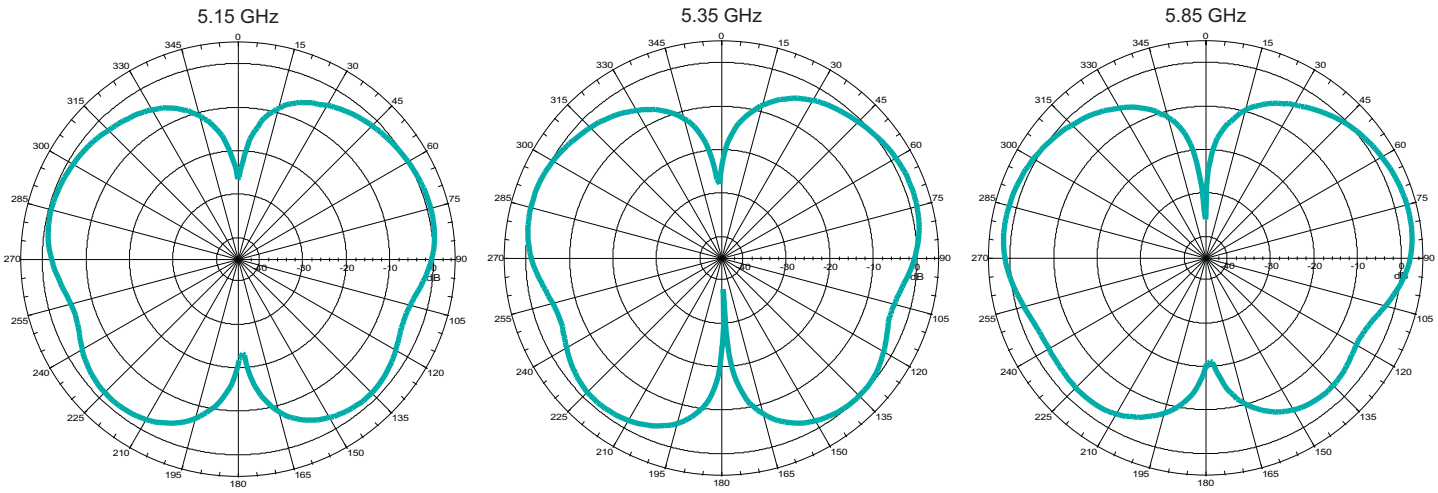
Omni-directional antennas provide a uniform, donut-shaped, 360° radiation pattern. The omni-directional pattern is suitable for point-to-multipoint broadcasting in all directions. This antenna is primarily used for WLAN applications. However, it can also be used for a variety of other applications within the specified frequency range. When used as an access point, the antenna is ideally located at the center of the coverage area.

Gain Performance - W1028

Horizontal Position



Vertical Position



WIRELESS ANTENNAS
Antenna Terminology

802.11
802.11 is a group of technology specifications for wireless local area networks (WLANs) developed by the Institute of Electrical and Electronics Engineers (IEEE). 802.11a provides 54MBps using OFDM encoding scheme in the 5GHz frequency range. 802.11b provides 11MBps using DSSS encoding in the 2.4GHz frequency range. 802.11g provides 54MBps using OFDM encoding in the 2.4GHz frequency band. 802.11n is a new technology promising over 100MBps using MIMO technology (see below).

Access Point
A wireless transceiver that acts as the hub of a local area network. Users with wireless antennas/receivers must be in physical proximity to the transmitter in order to access the network. An access point connects users within the network and can serve as the point of interconnection between the WLAN and a fixed wire network.

Bandwidth
Frequency over which an antenna can be used. For example, between 2.4-2.5GHz.

Bluetooth®
A short-range (approx. 10 meters) wireless protocol used for interconnectivity between mobile phones, computers, PDA's and other devices. Operates within the ISM Band of 2.4GHz.

dBi
Stands for "decibel relative to isotropic" which defines the gain of a real-life antenna relative to an isotropic radiator. An isotropic radiator is a theoretical ideal device that transmits energy in a spherical shape equally in all directions in 3-dimensional space.

Dipole
A balanced radio antenna consisting of two parts. The parts are symmetrical (equal length) and extend in opposite directions from the feed line at the center point. The lowest frequency at which a dipole is resonant is known as its fundamental resonance, and is measured in wavelengths (one-quarter, one-half, etc). A dipole works best at and above its fundamental resonance.

Directivity
Directivity is the ability of an antenna to receive energy better from a particular direction when receiving, or the ability of an antenna to focus energy in a particular direction when transmitting.

FCC Standards (for emitted power)
The Federal Communications Commission (FCC) has issued a series of guidelines related to human exposure to radiofrequency electromagnetic fields (OET Bulletin 65). The guidelines incorporate limits for transmitters operating at 30kHz to 100GHz.

Gain
A measure of the efficiency of an antenna as well as its ability to focus energy in a particular direction relative to a standard antenna. Expressed as a decibel (dB) or a decibel relative to isotropic (dBi). Gain is proportional; an increase in one direction is a decrease in the other (i.e. squeezing a ball in the middle increases its width). Typically higher gain is desirable however FCC safety regulations for emitted power often limit the antenna gain required for a given application. See FCC standards above.

Gain Performance
A graphical representation of the electromagnetic radiation of a given antenna. A "top-down" 360° view is often used (sometimes called a "polar" representation).

ISM Band
Industrial, Scientific and Medical wavebands that can be used without license.

MIMO
Multiple input, multiple output technology. Uses special algorithms and multiple antennas at both the receiving and transmitting devices to increase data throughput.

Omni-Directional
A type of antenna radiation pattern that extends equally in all *horizontal* directions. It provides point-to-multipoint transmission/reception. In WLAN applications, an omni-directional antenna is ideally placed at the center of the coverage area.

Polarization
The orientation of lines of electric flux of an electromagnetic wave. Can be horizontal, vertical or circular. Unmatched polarizations can lead to signal loss.

VSWR
Stands for Voltage Standing Wave Ratio and defines impedance match of an antenna to the RF circuit within the bandwidth of operation. Poor VSWR results in power loss. A ratio 2:1 is typical for most wireless applications. Lower is considered better.

ZigBee™
A wireless network used for control and automation in residential and commercial applications. It conforms to the IEEE 802.15.4 wireless standard for low data rate networks. ZigBee is slower than WiFi and Bluetooth, with a maximum speed of 250Kbps at 2.4 GHz. It is designed for low power, so batteries can last for months and even years. The typical transmission range is approximately 50 meters.

ANTENNA ANECHOIC CHAMBER

Successful antenna design requires an understanding of performance and system effects in a controlled environment. Our anechoic chamber, located in Taiwan, allows our engineering team to quickly verify and optimize antenna designs, saving development time and costs.

Far Field Antenna Measurement System

Inner Space Dimensions (excludes absorbers)

- Width: 2.33m
- Height: 2.33m
- Length: 5.90m

Quiet Zone Size

- 78cm @ 0.9GHz
- 55cm @ 1.8GHz
- 48cm @ 2.4GHz
- 31cm @ 5.8GHz
- 17cm @18GHz

Amplitude Ripple

(in testing quiet zone region)

- 0.9-1.2GHz: <±0.75dB
- 1.5-2.2GHz: <±0.5dB
- 2.4-18GHz: <±0.25dB

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