

CELLPHONE DETECTOR **WOLFHOUND-LITE**

Manual version 1.5



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INTRODUCTION

The Wolfhound Lite cell phone detector unit is a multi-band receiver controlled by an on-board processor which continuously scans up-link channels for multiple air interface technologies and frequency bands, in North America, the European Union, Asia and Australia.

The Wolfhound Lite comes in two versions. One of them is for North American and the other for European/Asian/Australian frequency bands as summarized in Table 1:

Table 1. Frequency Bands for the two versions of Wolfhound Lite

Air Interface	Frequency Band (MHz)
North America	
GSM-850, GSM-900, CDMA, Cellular	824-849
	890-915
GSM-1900 / PCS-1900	1850-1910
E.U./Asia/Australia	
E-GSM-900	880-915
GSM 1800 (DCS-1800)	1710.2-1784.8
WCDMA/UMTS	1920-1980

The Wolfhound Lite receiver uses a square-law detector. It can detect RF power in multiple cell phone channels simultaneously. The receiver output is proportional to the output of the detector, which is used to drive one or more of the following indicators:

1. Instantaneous Signal Level bar chart
2. Maximum Hold value bar chart
3. Integral Vibrator Alert

The Wolfhound Light unit may be used either single-handed or belt-mounted by its integral clip. The unit has an antenna input port (SMA jack) for receiving RF signals from one of the two types of multi-band external antennae discussed later in this manual (see antenna 1 and antenna 2 below). The unit is controlled via its keyboard which has three buttons (B1, B2, B3) as indicated by labeled arrows in the left half of Figure 1. The bottom surfaces of the unit appear on the right half of Figure 1

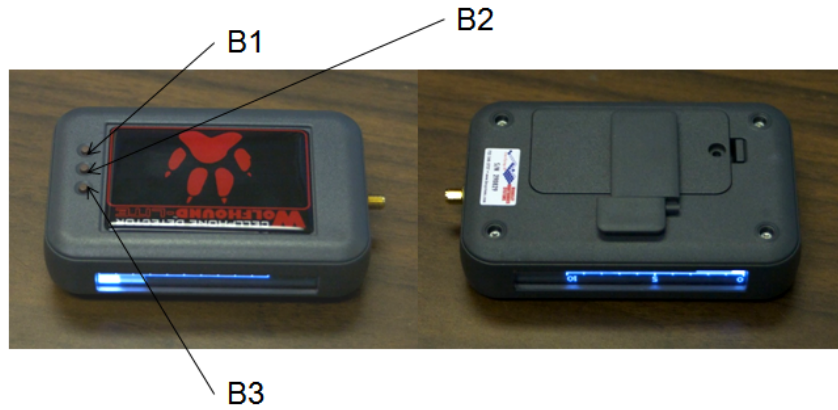


Figure 1. Wolfhound Light Unit (Top and Bottom)

Items Supplied

Figure 2 shows a photograph of the Wolfhound Lite unit and accessories as shipped:



Figure 2. Wolfhound unit and accessories

The Wolfhound Lite package ships with the following items:

- Wolfhound Lite unit
- Omnidirectional Antenna
- Optional Covert Antenna
- AC Charger for Lithium Ion 9 Volt Rechargeable Batteries
- Two (2) 9 Volt Lithium Ion Rechargeable Batteries
- Pelican® briefcase (with secure lock and keys)

WOLFHOUND Lite UNIT DESCRIPTION

A photograph of the Wolfhound Lite unit appears in Figure 1. The unit has a monochrome Organic LED (OLED) display panel and a 3-button keypad.

OLED Display Panel

The Wolfhound Lite unit is powered by pressing the “B1” button on the unit keypad (see Figure 1). When the unit is powered-up, the OLED display will momentarily show the starting screen starting the BVS logo (see Figure 3).



Figure 3. Wolfhound Lite Booting Screen

Following the momentary display of the starting screen, the unit will settle to its monitoring mode of operation and will display the detected signal bar-chart and other graphic objects, as seen in Figure 4:

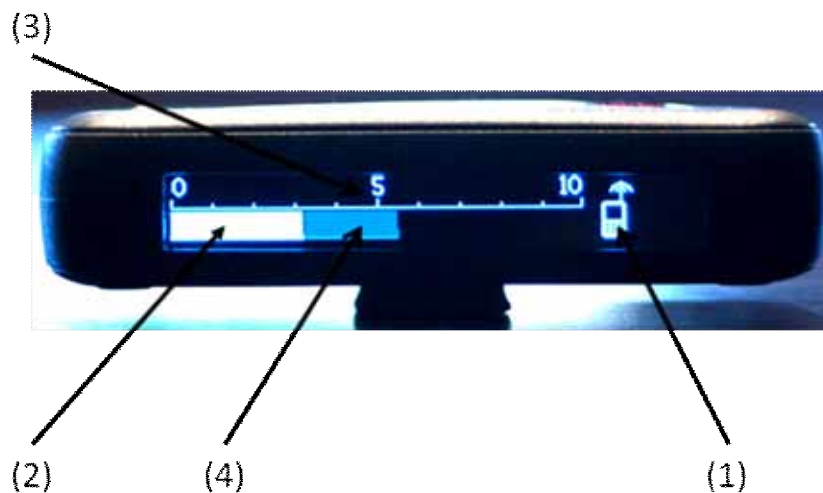


Figure 4. Wolfhound LCD Monitoring Screen (all fields displayed)

The complete list of graphic objects that may be displayed on the unit OLCD display is (see the arrows numbered respectively in Figure 4):

1. Wolfhound Lite unit icon (will be displayed as long as the detected signal level exceeds the pre-set value of the Threshold Level, which can be set to any integer 1 through 9)
2. Instantaneous Signal Level Bar-Chart (White)
3. Scale (White, Ranging 0-10)
4. Maximum Hold Value Bar Chart (Gray)

Lithium-Ion Rechargeable 9 Volt Battery

The Wolfhound Lite unit is powered by a single 9 Volt Rechargeable Lithium-Ion Battery which will last for at least 8 hours of continuous use. The unit is shipped with two such batteries and an AC Charger capable of charging two depleted batteries simultaneously, in about 3.5 hours.

Caution:

The Wolfhound Lite unit is designed to operate with Lithium-Ion rechargeable batteries only. Other types of batteries should not be used.

SETUP

Powering Up

To power the unit , follow steps 1 through 4 below:

1. Remove the belt clip by sliding it off as seen in Figure 5 below.
2. Remove the battery cover (see Figure 6 below).
3. Engage the 9 Volt battery to the battery connector and push the battery into the battery compartment. Make sure the “+” terminal of the battery mates with the terminal of the unit marked “+”. Close the battery compartment cover and re-insert the belt clip.
4. Turn unit on by pressing the “B1” button (see Figure 1) on the keyboard to obtain the Monitoring Screen.



Figure 5. Removing Belt Clip



Figure 6. Removing Battery Cover

While the unit is in the Monitoring Screen state, pressing the “B2” button repeatedly will cycle the OLED Display screens through the following states:

Press “B2” once: to get “**Vibrator**” screen

Press “B2” twice: to get “**Threshold Level**” screen

Press “B2” three times: to get “**Stealth Mode**” screen

Press “B2” four times: “**Product Information**” screen

While the unit is in any one of the above four states, pausing for 5 seconds will automatically return the OLED to the Monitoring Screen (see Figure 4.).

Vibrator Activation:

1. Starting in the Monitoring Screen (see Figure 4) proceed as follows:

2. Enter “**Vibrator**” screen by pressing “B2” once
3. press “B3” once then “B2” once to get “**Vibrator On**” indication on the OLED
4. pause for 5 seconds to allow the unit to return to the Monitoring Screen

To deactivate the Vibrator, simply repeat steps 1 through 3, to obtain “**Vibrator Off**” indication on the OLED.

Threshold Level Setting:

1. Starting in the Monitoring Screen (see Figure 4) proceed as follows:
2. press “B2” twice to enter the “**Threshold Level**” screen
3. press “B3” once then press “B2” as many times as needed to set the Threshold Level to the desired value in the 1-9 range
4. pause for 5 seconds to allow the unit to return to the Monitoring Screen

The Vibrator will activate when the detected signal level exceeds the pre-set Threshold Level

Stealth Mode Activation

1. Starting in the Monitoring Screen (see Figure 4) proceed as follows:
2. press “B2” three times to enter the “**Stealth Mode**” screen
3. press “B3” once then press “B2” once to obtain “**Stealth Mode On**” indication on the OLED
4. pause for 5 seconds to allow the unit to return to the Stealth Mode Screen. In the Stealth Mode, the OLED will be displaying a small gray square moving back and forth along the length of the display panel – see Figure 7)



Figure 7. OLED Screen in Stealth Mode

To deactivate Stealth Mode, simply repeat steps 1 through 3, to obtain “**Stealth Mode Off**” indication on the OLED.

Product Information Screen

1. Starting in the Monitoring Screen (see Figure 4) proceed as follows:

2. press “B2” four times to obtain “**Product Information Version 1.03**” displayed on the OLED.
3. press “B3” once then “B2” once to obtain the regional indication: “**USA**” or “**EU**”.
4. pause for 5 seconds to allow the unit to return to the Monitoring Screen

Monitoring Cell Phone Use in Real-Time

For monitoring or sensing cell phone use, observe the signal level bar chart (White) in the Monitoring Screen.

Monitoring Maximum Hold Value

The unit monitors RF signal levels in real time and displays observed levels using a White Bar Chart in the Monitoring Screen (see Figure 4). The unit also continuously updates and displays the last Maximum Hold value as a Gray Bar Chart (see Figure 4) for as long as the current signal level falls below the recorded Maximum Hold value. If a signal level (White) is seen but no maximum level bar chart (Gray) is displayed, the current signal level has exceeded the Maximum Hold value and it will be registered in memory as the new Maximum Hold value.

Maintenance and Troubleshooting

The unit batteries are charged by attaching them (one or two at a time) to the AC Charger output(s) and plugging the AC Charger to a power outlet. The AC Charger is capable of charging one or two fully depleted batteries in about 3.5 hours. If the unit will not turn on after “B1” is pressed, the lithium-ion batteries have to be re-charged.

Guidelines for Optimal Signal Reception Using External Antennas

Wolfhound Lite unit's External Antenna Port (see Figure 8) offers the flexibility to use two different antennas, depending on user needs. The two antennas are:

- a multi-band omnidirectional antenna which is directly connected to and mechanically supported by the unit external port (Antenna 1 - see Figure 10 below).
- a multi-band Covert Antenna which may be worn as a pen, and connected to the unit external port via several feet of coaxial cable comprising the antenna assembly (Antenna 2 - see Figure 13 below).

The unit's signal sensitivity is determined by the performance of these external antenna(s) which convert the incident RF power into electrical signals. Toward this end, the user needs to be conscious of requirements for good signal reception. The unit's external antenna port (SMA female connector) is located at the end of the unit away from the keypad as seen in Figure 8:



Figure 8. Wolfhound Lite unit with External Antenna Port

The Wolfhound Lite receiver unit alerts the user of the existence of detected RF energy by either the OLED or by the Vibrator alone for stealth. The user can make performance tradeoffs by managing the opposing requirements of stealth and good signal reception, which are listed in Table 2:

Table 2. Requirements for Stealth and Good Signal Reception

Stealth	Good Signal Reception
wear the unit next to one's clothing (hence body)	Keep unit away from large conducting surfaces which tend to short out tangential component of electric fields (this includes the human body).
Keep unit out of sight	The unit should have 360 degree un-obstructed view in the region of space being monitored.
	Avoid enclosing unit in other objects, in particular objects with conducting or energy dissipating surfaces

From the stealth perspective, the user would prefer to wear the unit next to one's clothing (hence body) and the unit would be kept out of sight or perhaps covered. Placement of the unit should be chosen to help achieve not only stealth but also to maintain optimum sensitivity to the unit's Vibrator Alert. From the optimum signal detection perspective, Antenna 1 (and the unit) or Antenna 2 (by itself)¹ should maintain maximum height from floor in order to have direct line-of-sight view to most objects above the floor space, be oriented vertical to the floor, be away from any conducting objects and if possible, be at arm's length from the user's body as well.

Generally, the unit will exhibit maximum sensitivity to sources oriented within direct line-of-sight of Antennas 1 or 2. For optimal antenna performance keep the antenna(s) at least one foot (but preferably more) away from large metal or conducting obstructions or surfaces (this includes human bodies, as well as reflecting metal walls, heavy steel structural elements, metal-wire screens, etc.). The reason for this is mainly the scattering of Electromagnetic waves by conducting objects between source and the receiver, the attenuation of incident Electromagnetic waves by the user's own body, and the human body's tendency to short out electric fields at the air-to-skin boundary. **Antennas 1 or 2 should NEVER be contained by bags or other kinds of enclosures made of metal, carbon or other RF energy absorbing or shielding materials;** doing so will seriously limit the unit's performance. When deployed with Antenna 2, the unit itself may be contained by an enclosure of any kind of material (including conductive) or shape as long as Antenna 2 is not. The use of the two alternative antennas is discussed in greater detail below:

Antenna 1 (Omnidirectional)

This antenna, seen in Figures 9, 10a, 10b, 10c below, is mounted directly on the external antenna port (SMA type connector) of the unit. The omnidirectional antenna should always be oriented vertical to the floor plane (or, horizon) for optimal reception.

¹ Antenna 2 assembly includes several feet of coaxial cable terminated by an SMA connector (see Figure 13).



Figure 9. Antenna 1: Omnidirectional

The Wolfhound Lite unit itself may be deployed in three different orientations, while having Antenna 1 oriented vertical, as follows:

1. Belt-Mounted : unit upright, OLED facing the ceiling plane (see Figure 10a)
2. Hand-Held: keypad end down, external port up (see Figure 10b)
3. Table-Top: unit flat on its side (see Figure 10c)

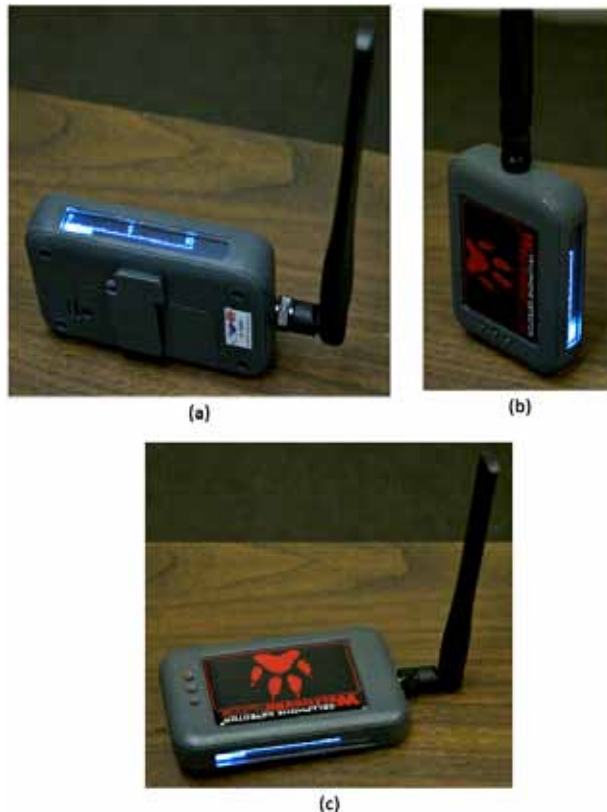


Figure10. Belt-Mounted (a), Hand-Held (b) and Table-Top (c) Orientations

Antenna1 Performance Considerations

When the unit is used with this antenna, the user needs to pay attention to the trade-off between the opposing requirements of stealth and good reception (see Table 2 above). When the unit is Belt-Mounted (see Figure 10a), it is worn on one's side using the belt-clip provided on the flat side of the unit opposite to the side carrying the BVS logo. Clipping the Wolfhound Lite unit on the user's Left side will leave the user an unobstructed view to the sources facing the user, while clipping the unit on the Right side will block signals from the same sources, as depicted in Figure 11:

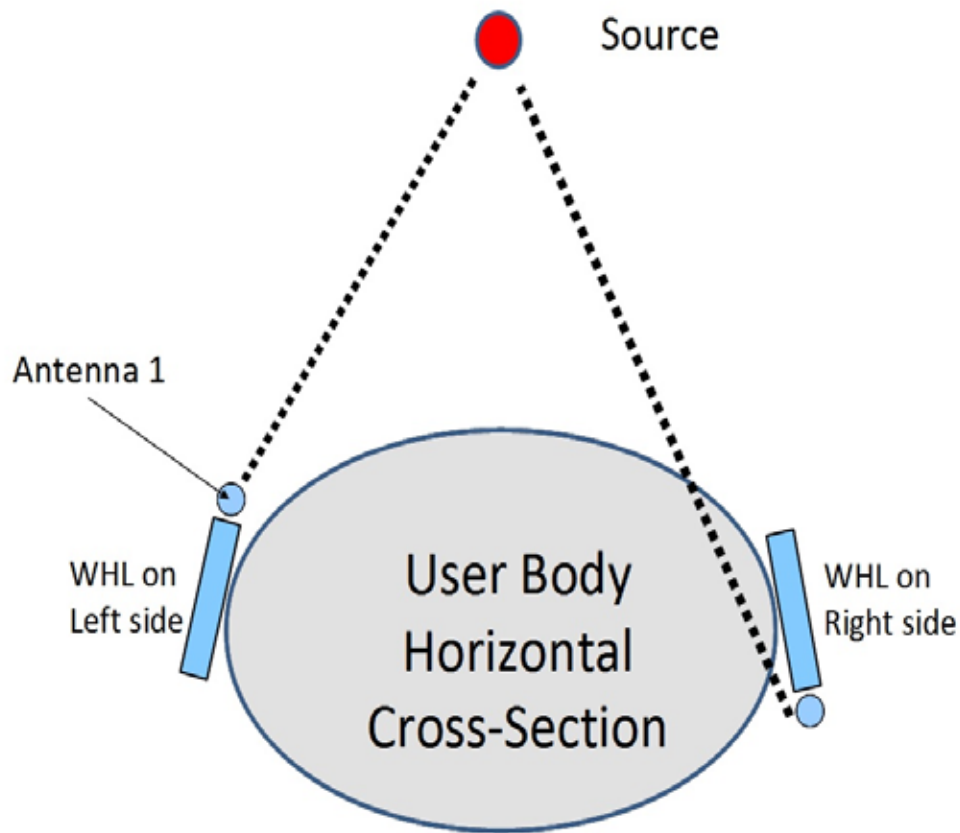


Figure 11. Considerations for Wearing Wolfhound Lite on a Belt with Antenna 1

Thus, when used with Antenna 1 the unit should be worn on the Left side, in order to avoid inadvertently placing Antenna 1 in the “shadow” of the user's own body and/or the unit itself (see Figure 11). Wearing the unit on the Right side, the user may still detect reflected or scattered signals from the same source but they will undoubtedly be lower in intensity. This means that the unit will exhibit considerably lower sensitivity to sources blocked by the wearer's body.

Antenna 2 (Optional)

The use of the optional Covert Antenna (see Figure 12) meets the stealth requirements while allowing the user virtually unlimited freedom in orienting and positioning the Wolfhound Lite unit. In doing so, this antenna effectively allows the user to meet both stealth and signal reception requirements (see Table 2 above) without having to compromise one for the other. Considerations of optimum signal reception discussed above apply to this antenna as well. Generally, this antenna will perform better than Antenna 1 as long as it is not obstructed and is placed higher than waist level from the floor plane.



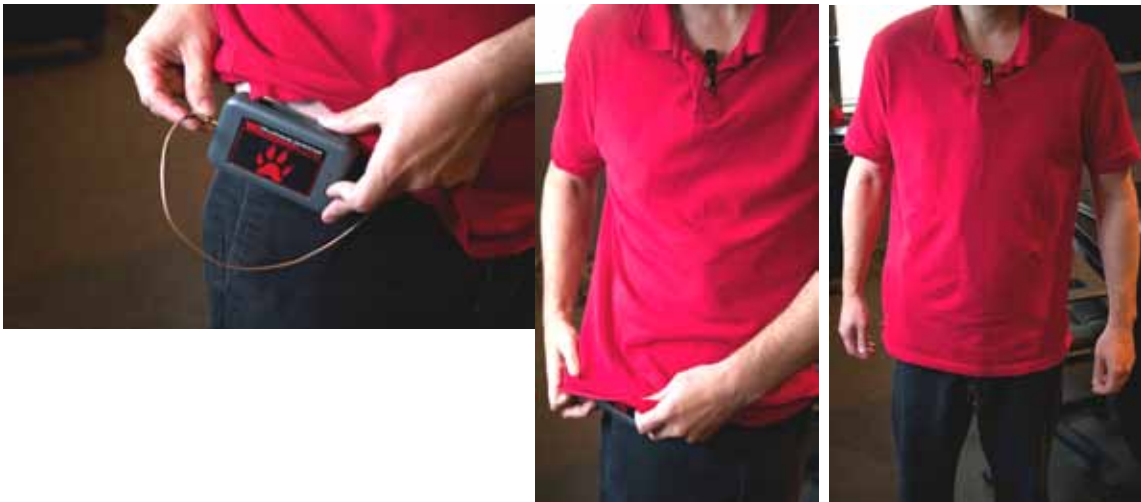
Figure 12. Optional Antenna 2: Covert (by itself and connected to unit)

Typically, Antenna 2 should be worn at chest level (see photos under “Two-Step Deployment of Antenna 2” below), or as high as possible, oriented vertically (or nearly so) in order to maximize performance of the antenna. Independent of the location of Antenna 2, the Wolfhound Lite unit can be placed anywhere, as long as it can be connected to the SMA male 90 degree connector terminating the Antenna 2 assembly cable. If desired, the unit can be enclosed in any kind of enclosure(s) as long as Antenna2 itself is not. Generally, the user should be aware of the signal attenuation caused by the blockage or “shadow” of the user’s own body and other obstructions, as depicted in Figure 11 (above) for the case of Antenna 1.

Two-Step Deployment of Optional Antenna 2

Antenna 2 is deployed as follows:

Step 1: Unwind & route Antenna 2 cable via collar or clothing:



Step 2: Clip unit to belt, connect antenna connector to unit and cover unit for stealth:

Caution:

The external antenna connector should be **hand-tightened only** to the unit SMA port. Use of a wrench for this purpose can result in damage to the unit housing and/or the external port, hence null the product warranty.

1/2 wave Device Antennas Dual Band for CDMA/GSM (EV-DO)



PSKN series in Straight Position



PSKN series in Right Angle Position

- Sleek profile with adjustable elbow for straight or angled operation
- Compact design, groundplane independent with high performance
- Models for all wireless modems including GSM/GPRS/EVDO/1xRTT
- Reverse polarity connectors available for ISM 915 operation

The PSKN Dual band antennas offer excellent performance for broadband wireless data applications. The halfwave design means they can be used on plastic or metal without concern for proper ground size.

Two different series are available; a model for US GSM/CDMA, and a model for EU GSM. The EU GSM 900 MHz lower band also operates with the ISM 915 band, without any sacrifice in performance. Additionally, a model is available with reverse polarity SMA connector, for use in ISM 915.

The PSKN Dual band series for CDMA/GSM (EV-DO) have a "blade" type style and an adjustable right angle elbow. Overall length is 7.75" (20 cm) in a straight position, and 6.75" (172 mm) in a right angle position. Peak gain on all bands is 3 dBi.

The radome material is a semi-flex polyurethane, providing some give when stressed but maintaining long term durability. The antennas are available in SMA, TNC and reverse Polarity SMA for 902-928 ISM applications.

Model Numbers for US CDMA/GSM/Data

Model	Frequency MHz	Connector
PSKN3-900/1900T	824-894 & 1850-1990	TNC
PSKN3-900/1900S	824-894 & 1850-1990	SMA

Model Numbers for EU GSM & ISM 915

Model	Frequency MHz	Connector
PSKN3-925/1800S	870-960 & 1710-1880	SMA
PSKN3-925/1800T	870-960 & 1710-1880	TNC

Model Numbers for ISM 915 with Rev Pol SMA

Model	Frequency MHz	Connector
PSKN3-925/1800RS	870-960 & 1710-1880	Rev SMA

Model Applications/Notes:

- ◆ US GSM/CDMA, Edge/EV-DO, 1xRTT use models with nomenclature 900/1900.
- ◆ EU GSM/Data, or ISM 902-928, Mobitex, Skytel use only models with nomenclature "925/1800".

Note: WiFi, 802.11a/b/g models also available, consult separate spec sheet

Specifications

Frequency:

US GSM/CDMA	824-894/1850-1990 MHz
EU GSM	870-960/1710-1880 MHz
ISM 915	870 - 960 MHz

Gain: 3 dBi peak

Bandwidth@2:1SWR: See freq range above

Impedance: 50 Ohm nominal

Maximum Power: 5 Watt

Operating Temp: -30°C to +60°C

Connector: SMA, TNC, or Reverse Pol SMA
see models indicated above

Whip Length: 6.75" (172 mm) at 90° angle,
7.75" (197 mm) when straight

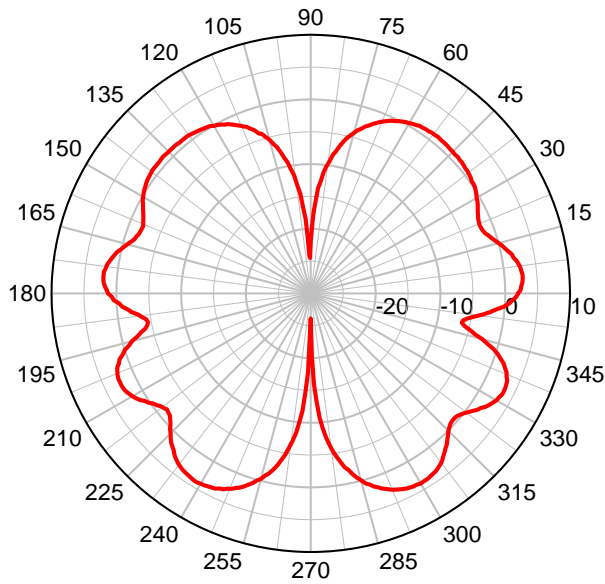
Radome Material: Polyurethane, with black matt finish, and knurled connector

PSKN3-900/1900S Antenna

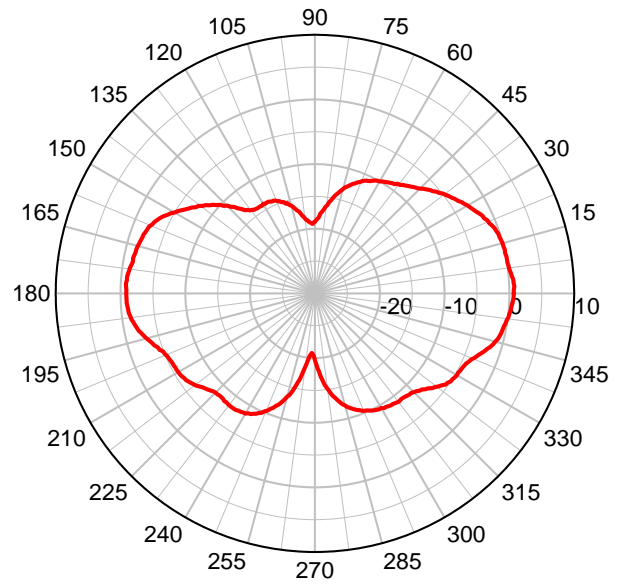
Dual Band 90degree Adj Knuckle Swivel w/SMA

3 dBi, Pattern for Cellular (824-894 MHz) & PCS (1850-1990 MHz)

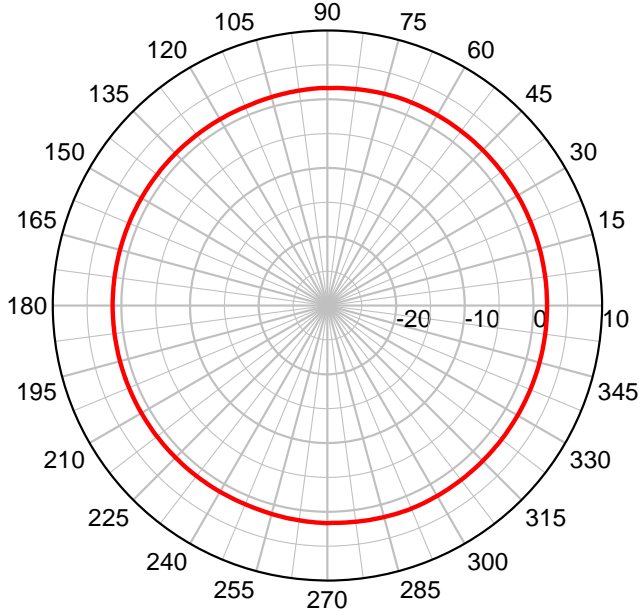
PSKN3-900/1900S-Elevation Plot at 850 MHz



PSKN3-900/1900S-Elevation Plot at 1850 MHz



PSKN3-900/1900S-Azimuth Plot at 850 MHz



PSKN3-900/1900S-Azimuth Plot at 1850 MHz

