TransitHound

Cellphone Detector

User Manual Version 1.3

RF3

RF2

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INTRODUCTION

The purpose of this document is to help the user set up the TransitHound Cellphone Detector (THCD) unit and associated graphic user interface software (TransitHound Controller-Serial) To set up the system, the user needs the following components:

1. PC/Laptop/Notebook host running Windows (7) (provided by customer)
2. THCD unit
3. Serial Interface cable (Hirose 6 pin (round) to open leads) (provided by BVS)
4. TransitHound Controller-Serial software package (provided by BVS)

Components 1 through 4 are further discussed below:

PC/Laptop/Notebook running Windows (7)

The PC/Laptop/Notebook hardware platform needs to meet the following ***minimal*** requirements:

Windows OS (7)

512 MB RAM

20GB storage space

800 MHz processor speed

Unit Description

The THCD unit comes with a monopole omni-directional antenna covering the above frequency bands. This compact antenna is well-suited for deployment in cramped spaces with multiple reflecting boundaries and/or metal surfaces.

Electrical Interfaces

The THCD unit has the following electrical interfaces:

1. Ground (un-insulated terminal)
2. RS232 Serial port (6-pin Hirose round connector)

Ground and Hirose connector side of Transithound

3. RF input port with SMA connector used for omni-directional antenna or connect to a cable delivering RF signal from a non co-located antenna.

RF Input port on Transithound

The THCD unit is enclosed in a specially designed metal box consisting of a tubular body, two end covers and two conducting gaskets constituting an external EMI shield. The unit also has an inner secondary shield enclosing the RF receiver stages for extra attenuation of disproportionately strong ambient electromagnetic fields.

Transithound Interface Cable

This cable can be used to interface between the Transithound and your computer. Additional modification to the cable is required by the customer. See page 10 for drawing.

USB to Serial Interface Cable (Optional)

The THCD unit is controlled by the PC over a Serial port, via the USB to Serial Interface Cable provided by BVS. This cable is terminated by USB, Hirose 6-pin round type connector, dry contacts and input for a power supply at its ends. The Hirose 6-pin round end of the cable connects to the RS232 serial port of the THCD unit. The USB end of the cable fits on the corresponding USB port of the PC. *See page 10 for drawing.*

Typical lab set up of the Transithound connected to a computer via the USB to Serial Interface Cable Note: External power supply is needed to power the unit via the interface cable.

TransitHound Controller-Serial User Interface Software Installation

The driver for the THCD unit and the graphic user interface program for using the system are installed by initiating the TransitHound Controller-Serial program on the BVS-supplied USB Stick. The installation is relatively straightforward; it starts by running setup and following menu instructions.

Installing the Software

Run the TransitHound Controller-Serial program, the following user graphic interface screen will appear (Figure 3):

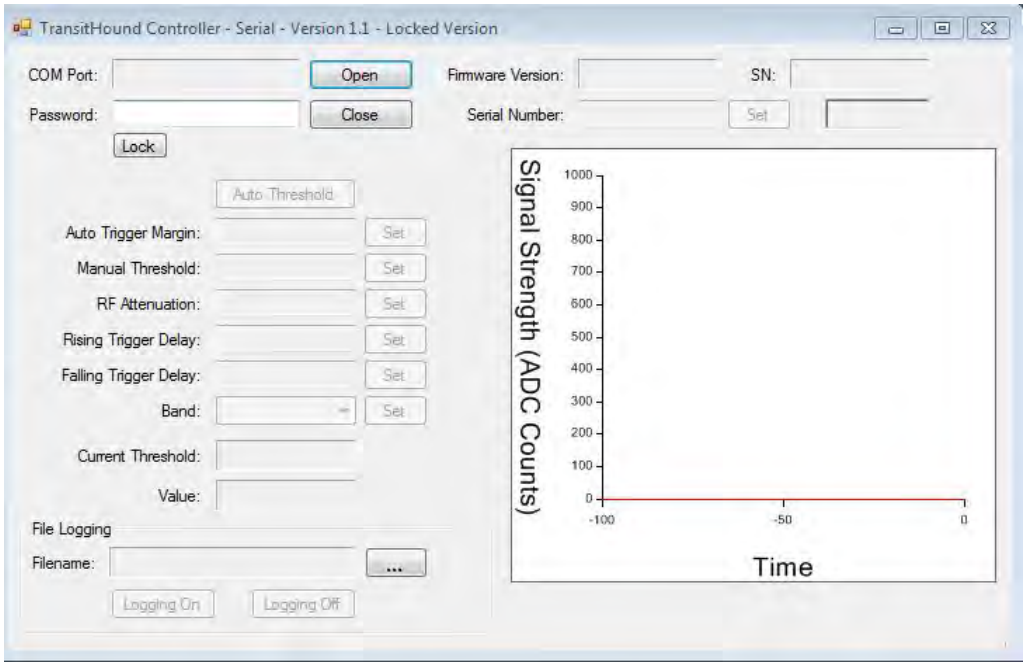


Figure 3. Graphic User Interface screen

Click "Open" from Figure 3; then select a listed port in Figure 4, then click "OK":

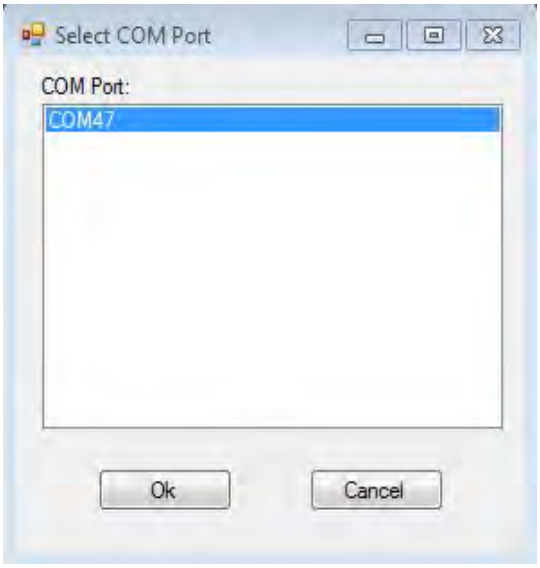


Figure 4. Selecting the Com Port

Following the COM port selection, the monitoring screen will display the detected signal in real-time on the graph at right hand side, as seen in Figure 5:

The firmware and serial number fields also fill in automatically when the COM Port is selected. (Note the firmware version of your Tranisthound may not match the firmware version from the screen shot below.)

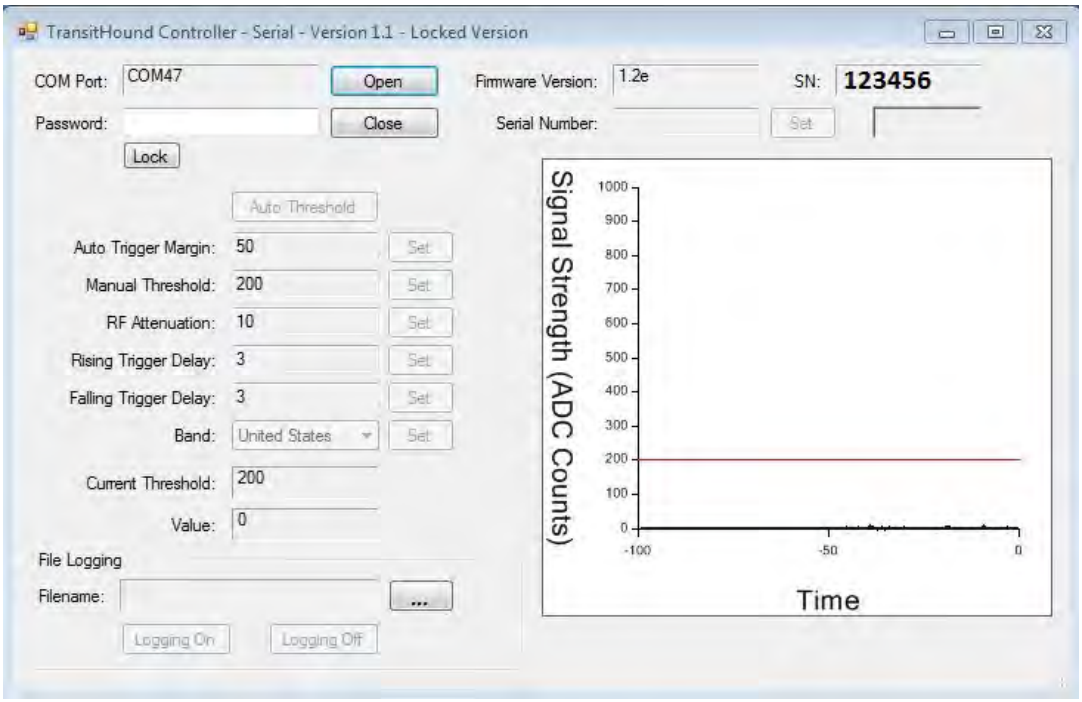


Figure 5. Monitoring Screen Displaying Real-Time Data

Transit Hound Functional parameters configurable by the user.
1. Threshold – Auto or Manual threshold set by the user determines the signal strength level used to trigger the internal solid-state relay (SSR). The dry contact of this relay is connected to the 6-pin Hirose connector and is being used to trigger an external Alarm in some applications. In the Manual threshold mode, SSR is triggered, when RF signal exceeds the set threshold. In the Auto threshold mode the user set "Auto Trigger Margin" determines by how much the current threshold must be exceeded in order to trigger the SSR.

Transit Hound Auto threshold algorithm:

All uplink cellular frequencies are scanned with a 4 MHz or 20MHz resolution. Signal strength is sorted along the scan. The maximum value is a "sample". This process is continuous and periodic; each period takes approximately 0.6 sec for the US set of frequencies.
As long as the "new sample" is lower than the current threshold, the latter is calculated as a moving average of 16 samples increased by the auto threshold margin. It takes up to 16 * 0.6 = 10 sec for the auto threshold to settle after the input signal change.
If the input signal exceeds the current threshold, the threshold stays unchanged for the next 20 sec. After delay the threshold and each of the 16 entries of the circular buffer are set to the maximum level of 1000, thus forcing the algorithm to perform step 2., starting with the next sample.

2. RF Attenuation – even values from 0 to 30 dB can be set to reduce the input level of RF as seen by the Transit Hound. This feature can be used to contain the detection radius, for instance, to limit detection around the operator's compartment in a moving vehicle. Another reason to use attenuation is in presence of a strong out of band RF interference that otherwise could saturate the receiver's front end and compromise the cell phone detection.
3. Rising Trigger Delay is essentially a filter that allows the customer to set how long the duration of a signal above the threshold has to be before SSR is triggered. Values are in scan cycle periods. For instance, the signal must exceed the threshold and stay above it for three complete cycles before triggering the SSR, if the rising trigger delay is set to 3. This parameter can be set, for instance, to ignore pings of an idling phone to the tower.
4. Falling Trigger Delay is a different filter – one that allows the customer to set how long the pause in the signal has to be before the SSR trigger is reset. Units are also in scan cycles. This parameter allows to greatly reduce the amount of entries in a log file – a long phone conversation will be logged as one event versus multiple entries every time the signal gets interrupted and then again re-assigned.
5. Band – list of implemented band selections is being read from the Transit Hound. When the user selects the country, the scan is limited to the appropriate custom set of uplink cellular frequencies.

Overall Specifications

Cell Phone Detector Unit

Sensitivity -80 dBm

Dynamic Range 60dB

Resolution Bandwidth 4MHz/RF2 ; 4 & 20 MHz/RF3

Selectivity 50dB at 1MHz from band edge

Electrical Interfaces

Hirose (Serial RS232 Port, dry contact)

Antenna Port (coaxial/SMA)

Ground

Receive Antenna

Omni-directional

PC/Laptop/Notebook Platform

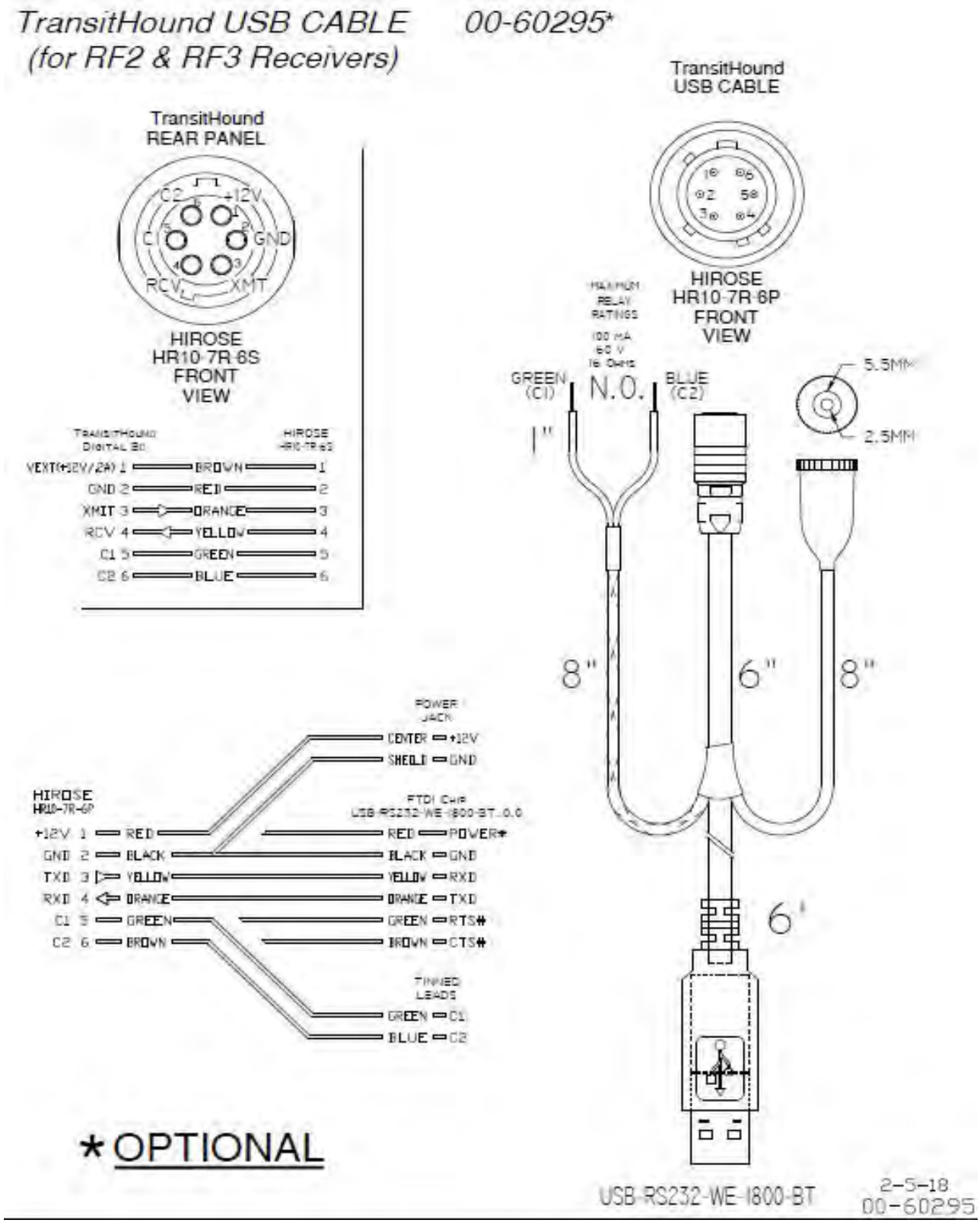
Windows 7

512MB RAM

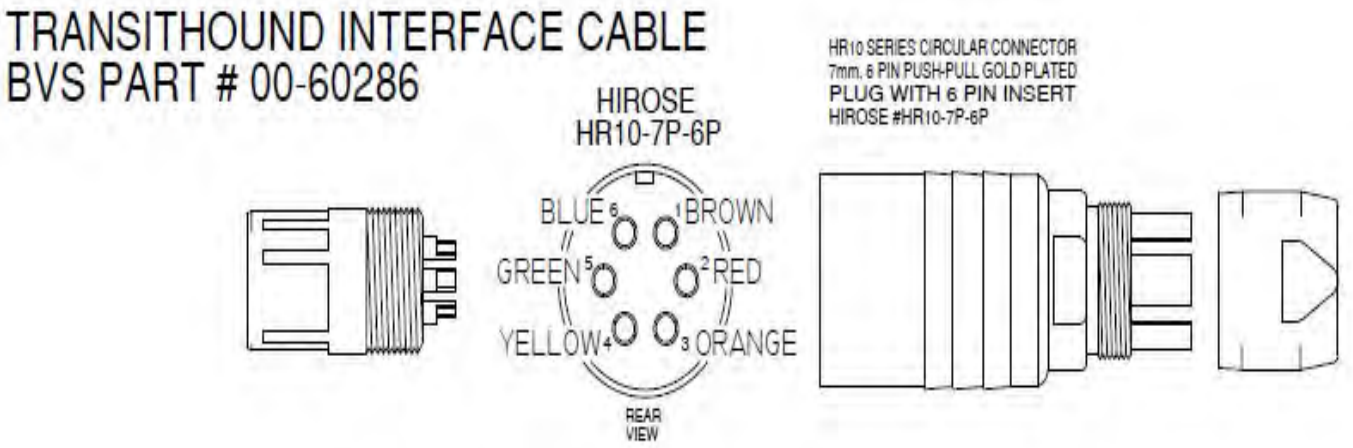
20GB storage space

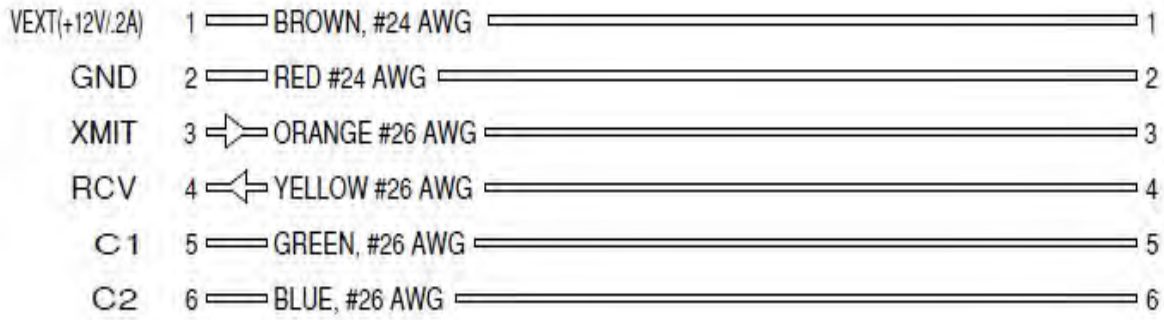
800 MHz processor speed

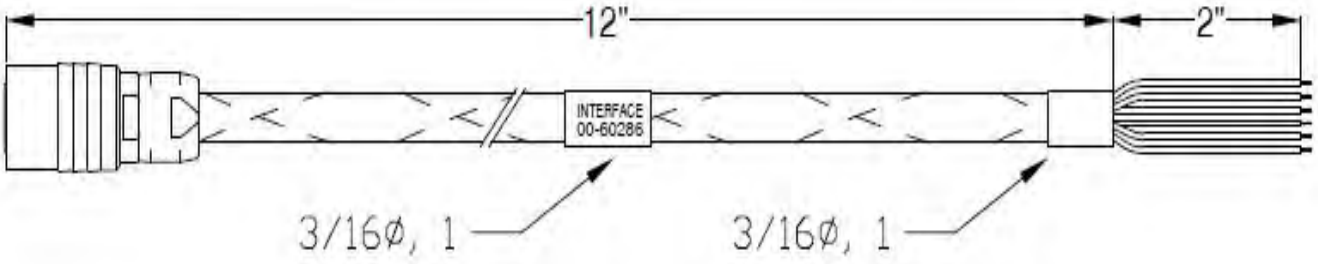
Cable Drawings



Cable Drawings



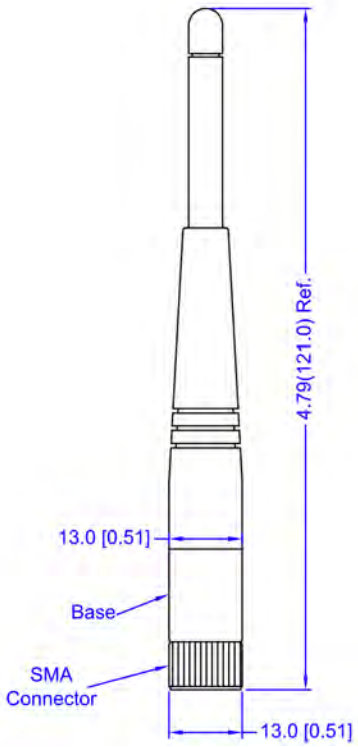




Transithound Antennas

Omni Directional Multi Band Antenna

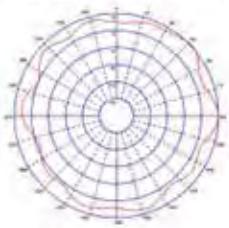
Connector Interface



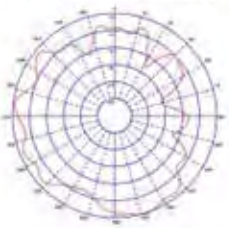
Electrical Properties:	
Frequency Range:	Dual Band 824~896MHz/1850~1990MHz
Impedance:	50Ω nominal
VSWR:	<2.0:1
Gain:	Unity Gain
Radiation:	Omni
Polarization:	Vertical
Mechanical Properties:	
Connector:	SMA Plug
Material:	
Whip:	Polyurethene(Black)
Elbow:	Polycarbonate(Black)
Connector:	Brass with black chrome plating
Operation Temp.:	-20°C to +65°C
Storage Temp.:	-30°C to +75°C

Pentaband Cellular PCB Antenna

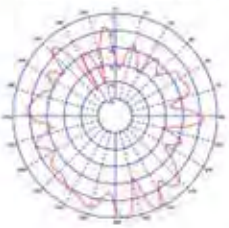
Typical H-Plane (900MHz)



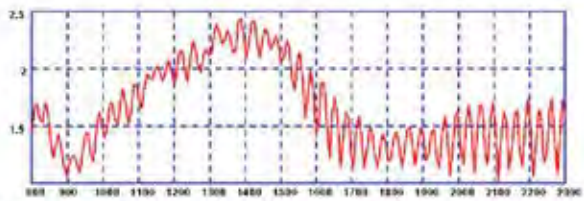
Typical H-Plane (1800MHz)



Typical H-Plane (2000MHz)



Typical VSWR*



* The VSWR of this antenna will vary depending on the mounting material and cable type and length

BVS patch antenna enclosure with 15' cable with M17/60-RG-142/U

Part No.		
		TCB-C3G-UF
Electrical Data		
Frequency Range (MHz)		805-894, 890-960, 1710-1880, 1900-2170
Operational Band		GSM850 / CDMA850, GSM900, GSM1800, PCS1900, 3G UMTS
Peak Gain: Isotropic		2dBi
Compared to ¼ wave		0dB
Pattern		Omni-directional
Impedance		50Ω
Max Input Power (W)		10
Mechanical Data		
Dimensions (mm)	Length	50 (1.97")
	Width	40 (1.57")
	Thickness	0.6 (0.02")
Operating Temp (°C)		-40° / +80°C (-40° / +176°C)
Colour		Black
Mounting Data		
Fixing Holes Diameter (mm)		Ø 3 (0.11")
Connector		
Type		U.FL socket
Height (mm)		1.25 (0.05")