User Manual

Version V1.0-2019704

User Manual
For Tersus RS460 Radio
2W Wireless Data Transceiver

Sales & Technical Support:

sales@tersus-gnss.com & support@tersus-gnss.com

More details, please visit www.tersus-gnss.com

Table of Content

List of Figures

List of Tables

Revision History

Version	Revision Date	Change summary
1.0	20190704	Initial Release

1. Introduction

This chapter mainly introduces the overview and specification of the Tersus 2W Radio RS460.

1.1 Overview

The Tersus 2W radio RS460 is a radio solution for both the base and the rover. It provides reliable data communications for mission-critical applications where a combination of stability, superior performance and long distance are required.

The RS460 is a lightweight, ruggedized UHF receiver designed for digital radio communications between 457 MHz and 467 MHz in 25 kHz channels, which can be used widely in GNSS/RTK surveying and precise positioning system applications. The RS460 is equipped with a LED display and a keypad which is used for checking the operating status, changing the operating channel, and transmitting power level. It is easy to operate.

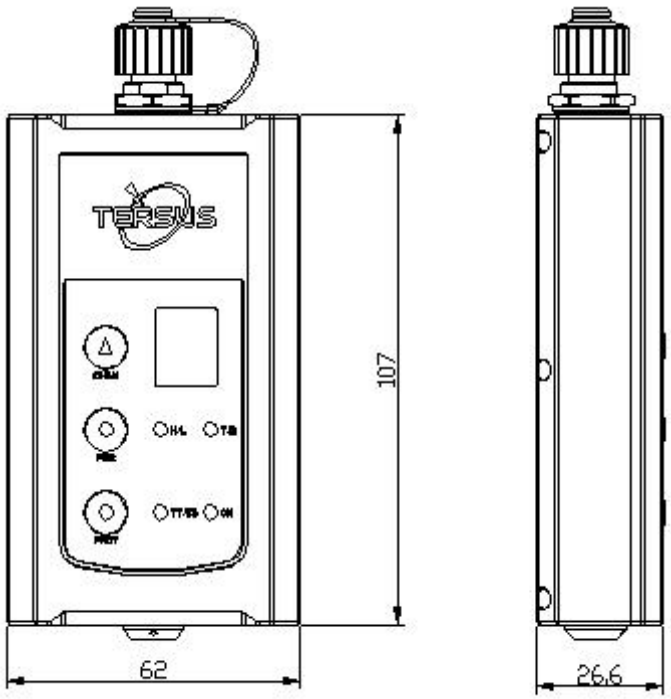
Figure 1.1 2W Radio RS460

1.2 Specification

Table 1 Specifications of 2W Radio RS460

Communication Interface		
Interface	9.6kbps in the air	
	RS-232, baud rate 38400	
Voltage and Power		
Input voltage	DC 5 – 12V	
Power consumption in transmitting	6.5W (DC 12V, transmitting power 2W) 4W (DC 12V, transmitting power 1W)	
Power consumption in receiving	<400mW (DC 5V)	
External Antenna		
Impedance	50 ohm	
VSMR	≤ 1.5	
Interface	TNC female	
Modulation & Demodulation		
Modulation	GMSK	
Data rate in air	9600bps @ 25KHz	
RF sensitivity	Better than 13dB @ -119dBm	
Decode sensitivity	-116 dBm BER 10E-5@9600bps	
Protocol	Transparent EOT, TT450S and Tersus	
RF Specification		
Frequency range	10MHz (457MHz – 467MHz)	
Channel width	25KHz	
Frequency stability	±1.5 ppm(25C)	
Channel number	10 configurable channels	
Adjacent channel selectivity	≥ 60dB	
Transmission power	High power (2W)	33.5 ± 0.5dBm @ DC5.5V
	Low power (1W)	30.0 ± 0.5dBm @ DC5.5V

Environment	
Temperature	-30°C - +60°C (operating)
	-40°C - +85°C (storage)
Mechanical	
Dimension	107 * 62 * 26.6mm
Weight	213g



The serial interface provides power and data communication function for radio equipment.

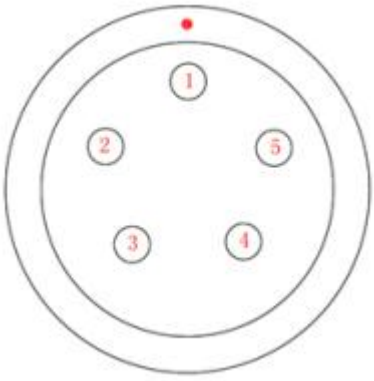


Figure 1.2 Serial Interface RS232

Interface Type: RS232

Each PIN is defined as follows:

Pin 1: Ground

Pin 2: Ground

Pin 3: Power

Pin 4: RXD

Pin 5: TXD

1.3 Accessories

The accessories of 2W Radio RS460 are listed below.

The 2W/460MHz radio antenna is to be installed on 2W/460MHz radio to transmit and receive radio signal.

Figure 1.3 2W/460MHz radio antenna

Figure 1.4 Serial-5pin to DC JACK and DB9 male cable

Figure 1.5 DC JACK male with two wires

Figure 1.6 DB9 Female to USB Type A Male converter cable

Note: The Serial-5pin to DC JACK and DB9 male cable, DC JACK male with two wires and DB9 Female to USB Type A Male converter cable are optional to purchase, they are not included in the package if there is no requirement from customer.

2. General Operation

⚠	Install the radio antenna before switching the radio transceiver to transmit mode, or the radio transceiver will be damaged.

2.1 Basic Operation

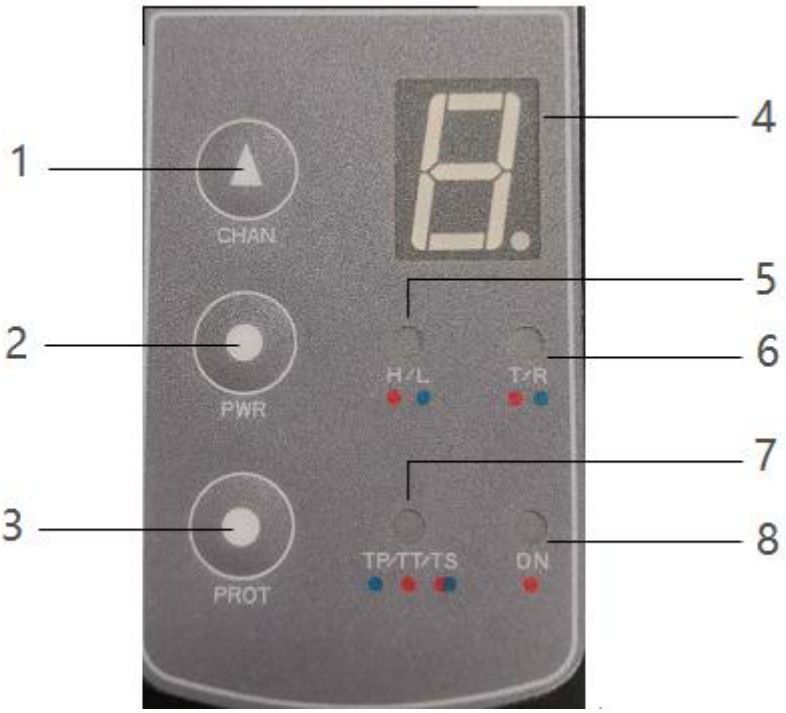


Figure 2.1 Front Panel of the Radio

Table 2 Definition for each button

Serial No.	Definition
1	Channel switching button
2	Power switching button
3	Protocol switching button
4	Current channel display
5	Power indicator (H/L)
6	Transceiver mode indicator

7	Protocol indicator
8	Power Supply Indicator

The basic operations include:

1) Boot up

The radio module is boot up directly when powered on.

2) Channel switching

Press the channel switching button once, the channel is increased by one; the LED displays the current channel value; the channel display is 0 to 9, and the default is 0.

3) Power switching

Press the power switching button once, the power is switched once; the power indicator is steady red to indicate high power 2W, and indicator is steady green to indicate low power 1W, and the default is high power.

4) Protocol switching

Press the protocol switching button once, the protocol is switched once; TP represents Transparent, TT represents TT450S, TS represents the custom protocol TERSUS; the default is TP.

5) Transceiver mode switching

Simultaneously press and hold the channel switching button and power

switching button for 1 second to switch the transceiver mode; T is steady red for transmit mode, and red light is flashing for transmitting data; R is steady green for receive mode, and green light is flashing for receiving data; the default is the receive mode.

6) Restore default configuration

Simultaneously press and hold the power switching button and protocol switching button for 1 second to recover to the default configuration.

The LED definition is shown in the table below.

Table 3 LED Definition

LED	Description
H/L	RED: 2W output is selected, GREEN: 1W output is selected.
T/R	Blink RED: data is transmitting. Blink GREEN: data is receiving.
TP/TT/TS	GREEN: Transparent protocol is selected. RED: TT450S protocol is selected. GREEN&RED: Tersus protocol is selected.
ON	It is solid on after the power is on.

2.2 Software Configuration

The detailed steps of software configuration are as follows:

1) Hardware connection

Use the accessary cables listed in section 1.3 to connect the radio to the computer following the connection in the figure below. Power on the radio using 5V or 12V external power supply.

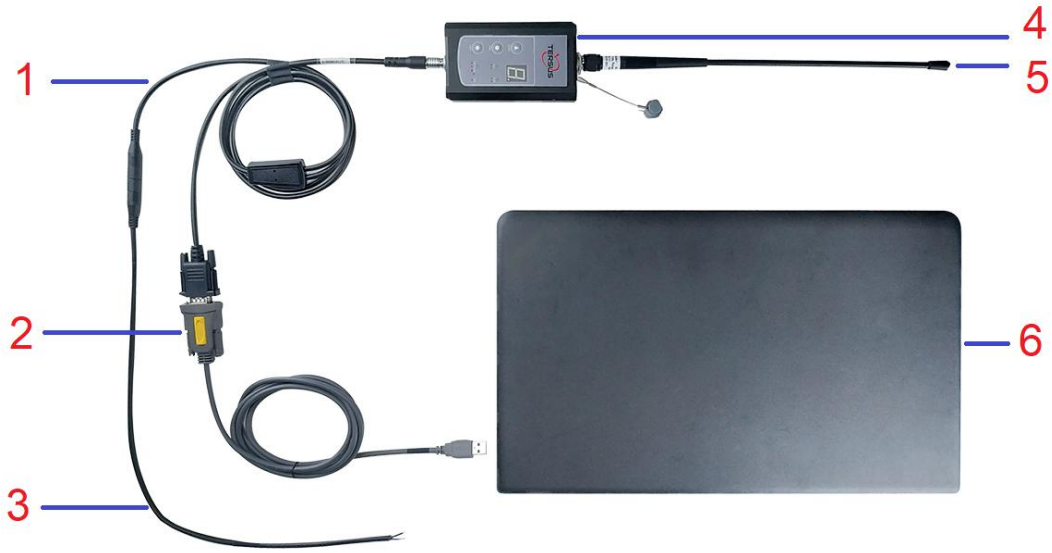


Figure 2.2 Hardware connection for software configuration

Table 4 Devices in Figure 2.2

No.	Device Name
1	Serial-5pin to DC JACK and DB9 male cable
2	DB9 Female to USB Type A Male converter cable
3	DC JACK male with two wires
4	2W Radio RS460
5	2W/460MHz radio antenna
6	Computer(Desktop/Laptop)

2) Radio Config Tool

Open the radio configuration software 'TersusRadio Config Tool' obtained from Tersus support. Ensure the port is selected correctly, then click [Connect].

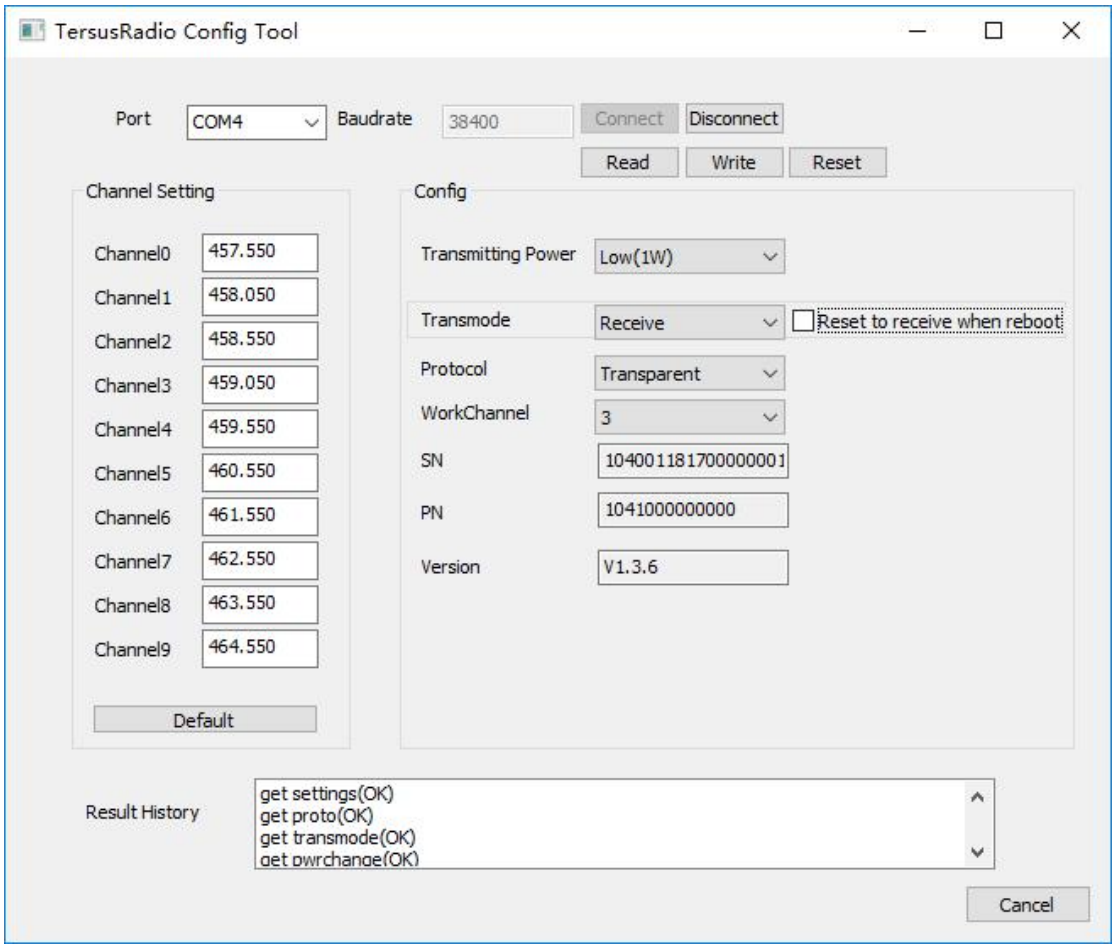


Figure 2.3 TersusRadio Config Tool

3) Read

After the connection is successful, click the [Read] button to read all the configuration information.

4) Write

After the connection is successful, click the [Write] button to write all the configuration information. (Note: SN, PN, and firmware versions are read-only and cannot be written. Other parameters can be configured according to customer needs).

5) Frequency Setting

The input frequency value should be between 457 MHz and 467 MHz with a step value of 25 KHz. Click the [Default] button to set all frequencies to the default values.

6) Transmode Setting

If the box before [Reset to receive when reboot] is checked, the radio will be in the receiving mode after it is rebooted. Uncheck it, the radio will be in the transmit mode after it is rebooted. Remember to click [Write] to make this configuration effective.

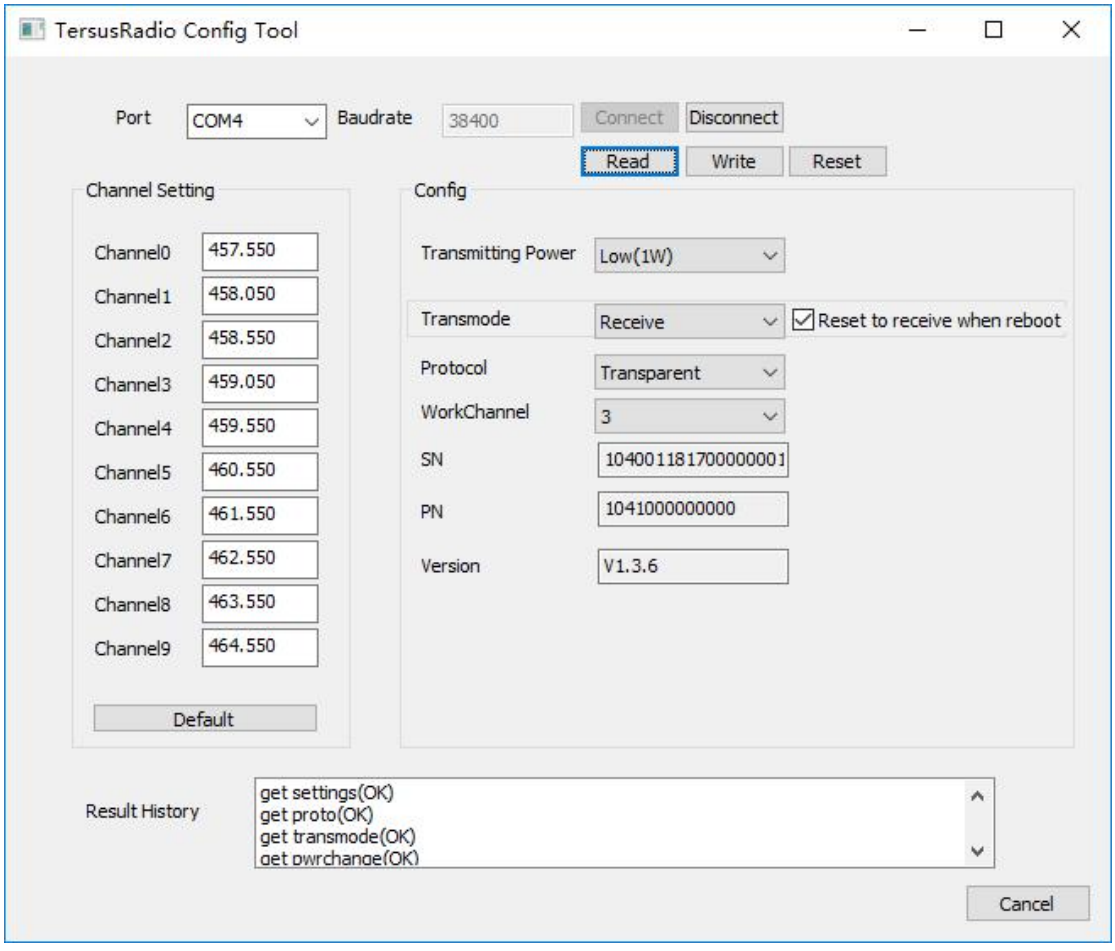


Figure 2.4 Setting Transmode

Note: Transmode Setting function is only available for the firmware

version V1.3.6 or later. Please upgrade radio firmware to use this function.

2.3 Firmware Upgrade

Use the accessary cables listed in section 1.3 to connect the radio to the computer following the connection in the figure below. Power on the radio using 5V or 12V external power supply.

Open the upgrade software 'TersusRadioUpdate' obtained from Tersus Support, select the corresponding port and firmware file, click [Next] and wait for the update to complete according to the progress bar.

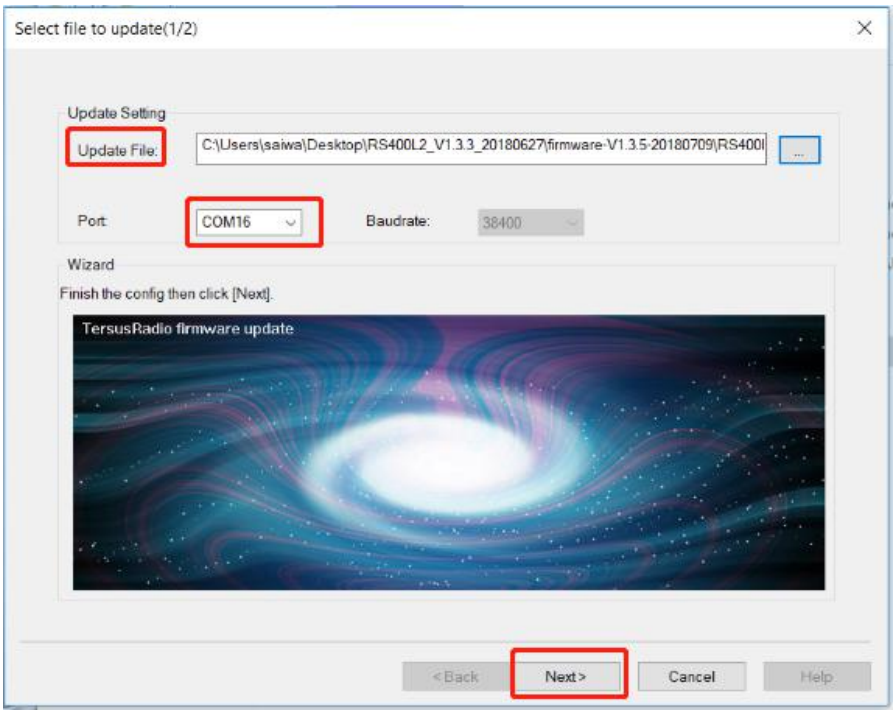


Figure 2.5 Firmware upgrade interface

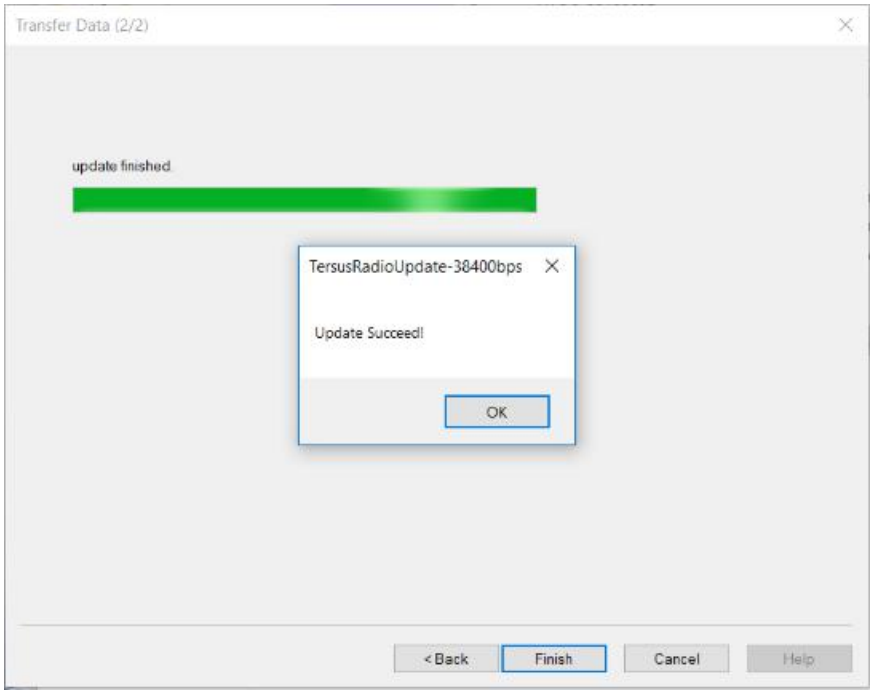


Figure 2.6 Update successful interface

2.4 Installation Tips

2.4.1 Radio installation

As a transmission, the radio is hooked on a tripod; as a rover station, the radio is installed in the rover station bracket.

(1) Large amount of heat would be generated when the radio is in transmission. When the radio is working, please do not place the radio in poor ventilated box, wrap or cover any item on the surface of the radio.

(2) In an environment with a high temperature of more than 40 °C or intense sunlight, the surface of the radio would be hot when it is transmitting at high power. It may cause scald if the surface of the machine is touched directly. Please pay special attention.

2.4.2 Antenna installation

Whether the antenna is properly installed and erected would seriously affect the transmission distance of the radio, hence the correct connection and installation of the antenna is of high importance.

(1) It is strictly forbidden to use a damaged antenna. The output impedance of the antenna interface of this radio is 50 ohms. Please use antennas and feeders with input impedance of 50±2 ohms and VSWR less than 1.5. Using an antenna that is not strictly matched with this radio would result in a shortened transmission distance for the radio, and it is possible to damage the radio if the mismatch is particularly serious.

(2) The original antenna of this radio is strictly matched with this radio, and the performance meets the requirements of this radio. The original antenna of this radio would better play the performance of this radio.

(3) Under normal circumstances, the height of the antenna installed from the ground would significantly increase the transmission distance and improve the transmission effect.

(4) Carefully check the connection of the antenna, feeder, connector and the components of the radio to ensure well contact and reliable connection between the antenna and the connector of the radio.

3. Terminology

DC	Direct Current
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
LED	Light Emitting Diode
SIM	Subscriber Identification Module
USB	Universal Serial BUS
VSWR	Voltage Standing Wave Ratio

Proprietary Notice