



## User Manual

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# User Manual For Tersus RS460H Radio 2W Wireless Data Transceiver

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## Revision History

<b>Version</b>	<b>Revision Date</b>	<b>Change summary</b>
1.0	20210720	Initial Release
1.0	20210903	Renew the figures
1.1	20220105	Upgrade the Figure1.1& Table 2 & Section 1.3

# 1. Introduction

This chapter mainly introduces the overview and specification of the Tersus 2W Radio RS460H.

## 1.1 Overview

The Tersus 2W radio RS460H 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 RS460H is a lightweight, ruggedized UHF receiver designed for digital radio communications between 410 MHz and 470 MHz in 12.5/25 kHz channels, which can be used widely in GNSS/RTK surveying and precise positioning system applications. The RS460H 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.



Figure 1.1 2W Radio RS460H

## 1.2 Specification

Table 1 Specifications of 2W Radio RS460H

Voltage and Power		
Input voltage	DC 5 ~ 12V	
Power consumption in transmitting	6W (DC 5V, transmitting power 2W) 5W (DC 5V, transmitting power 1W)	
Power consumption in receiving	0.5W (DC 5V)	
External Antenna		
Impedance	50 ohm	
VSMR	≤ 1.5	
Interface	TNC female	
Transmitter & Receiver		
Frequency range	410MHz – 470MHz	
Channel width	12.5KHz/25KHz	
Modulation type	GMSK, 4FSK	
Transmission power	High power (2W)	33.5 ± 0.5dBm @ DC5V
	Low power (1W)	30.5 ± 1.0dBm @ DC5V
Power stability	±1dB	
Sensitivity	115dBm@BER 10 <sup>-3</sup> , 9600bps	
Co-channel rejection	>-12dB	
Adjacent channel selectivity	>50dB@25KHz	
Distance(Typical)	5-7KM	
Modem		
Air baud rate	19200/9600/4800bps	
Serial baud rate	115200/38400 (default) /19200/9600bps	
Radio protocol	Transparent, TrimTalk450, TrimMark3, South, Satel	
Environment		
Temperature	-30°C - +60°C (operating)	
	-40°C - +85°C (storage)	

Mechanical	
Dimension	107 * 62 * 26.6mm
Weight	≈200g

The serial interface provides power and data communication function for radio equipment. Interface Type: RS232.

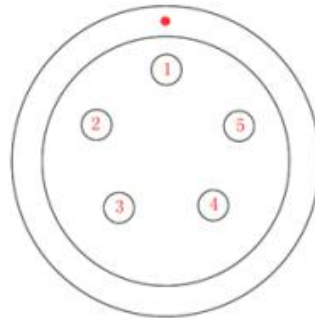


Figure 1.2 Serial Interface RS232

Table 2 Pin definition

Pin No.	Pin Definition
1	GND
2	GND
3	PWR
4	RXD
5	TXD

Table 3 Default factory configuration of RS460H

Channel	Frequency
00	457.550MHz
01	458.050MHz
02	458.550MHz
03	459.050MHz
04	459.550MHz
05	460.550MHz
06	461.550MHz
07	462.550MHz
08	463.550MHz
09	464.550MHz
Customized frequency	410~470MHz

Table 4 Detailed configuration information

Protocol	Modulation type	Channel band	Air baud rate(bps)
TrimTalk450	GMSK	12.5 kHz	4800
	GMSK	25 kHz	9600
TrimMark3	GMSK	50 kHz	19200
Transparent	GMSK	12.5 kHz	4800
	GMSK	25 kHz	9600
Satel	4FSK	12.5 kHz	9600
	4FSK	25 kHz	19200
South	GMSK	12.5 kHz	4800
	GMSK	25 kHz	9600
	GMSK	50 kHz	19200



### 1.3 Accessories

The accessories of 2W Radio RS460H are listed below.

The 410-470MHz radio whip antenna is to be installed on 2W radio RS460H to transmit and receive radio signal. This antenna is elastic whip structure, resistant to bending.



Figure 1.3 410-470MHz radio whip antenna

410-470MHz Radio Whip Antenna Technical Specification	
Frequency Range	410~470MHz
Bandwidth	60MHz
Polarization Mode	Vertical
Gain	2dBi
Input Impedance	50Ω
VSWR	≤2.5
Maximum Power	20W
Connector	TNC Male
Antenna Length	168mm
Antenna Weight	About 50g
Extreme Wind Speed	120 Km/h



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

	<p>Install the radio antenna before switching the radio transceiver to transmit mode, or the radio transceiver will be damaged.</p>
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### 2.1 Basic Operation

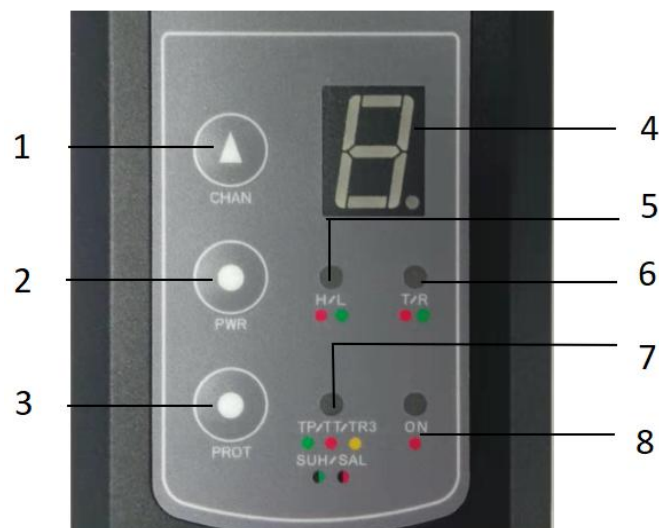


Figure 2.1 Front Panel of the Radio

Table 5 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 boots 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. The green light on represents Transparent, the red light on represents TT450, the green light flashing represents South, the red light flashing represents SATEL, the yellow light on represents TRIMMK3.

5) Transceiver mode switching

Simultaneously press and hold the channel switching button and power switching button for 1 second to switch the transceiver mode. It 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 6 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/TR3/ SUH/SAL	TP: Transparent protocol is selected. TT: TT450 protocol is selected. SUH: SOUTH protocol is selected. SAL: SATEL protocol is selected. TR3: TRIMMK3 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 accessory 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 7 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 RS460H
5	410-470MHz radio whip antenna
6	Computer(Desktop/Laptop)

## 2) Radio Config Tool

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

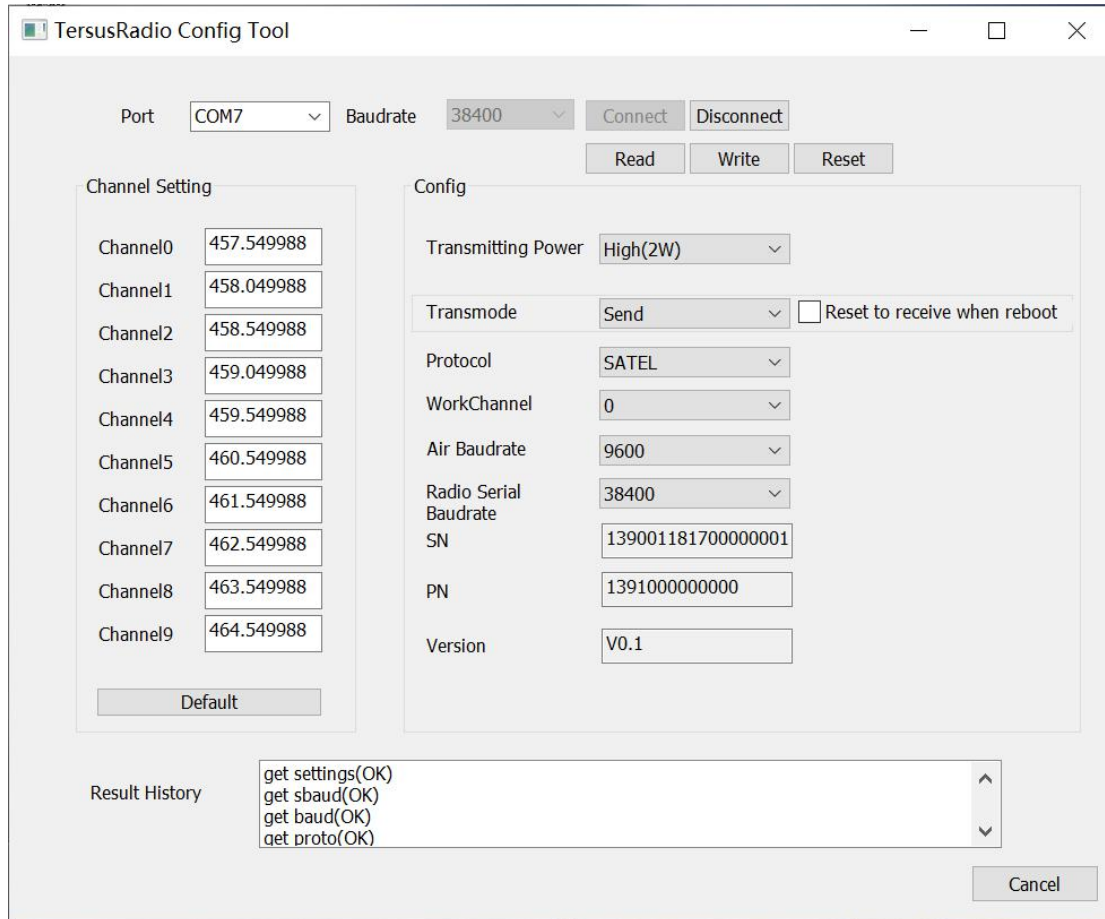


Figure 2.3 TersusRadio Config Tool

## 3) Read

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

## 2.3 Installation Tips

### 2.3.1 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.

### 2.3.2 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  $50\pm 2$  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

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