TRU35 Wireless Data Transceiver

User Manual_V1.2



e-survey

Contents

1.	Intro	duction3
2.	Key f	features4
3.	Tech	nical Specifications5
4.	Prod	uct Interface6
Z	1.1	LED Display6
Z	1.2	Buttons7
Z	1.3	Channel Display7
5.	Conr	nection Port8
[5.1	Definition of 5-Pin8
6.	Conf	iguration9
6	5.1	Connect TRU359
6	5.2	Parameter Setting10
6	5.3	Channel Detect10
(5.4	Equipment Information11
(ó.5	Temperature Control
(5.6	Radio Control12
(5.7	Firmware Update12
7.	Worl	king Mode12
7	7.1	Serial Mode12
5	7.2	Bluetooth Mode

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1. Introduction

TRU35 is a high-power, small-size, half-duplex digital radio model which is designed using advanced 32-bit cortex M4 microcontroller technology, wireless transceiver RF technology, and digital communication technology. It uses high-quality RF components, excellent EMC and EMI processing. The utility model has the advantages:

- High transmission power
- Long transmission distance
- Integrated transmission and reception
- Convenient installation
- Easy to use
- Stable and reliable



Figure 1.1

2. Key features

All in one

Integrated with transmitting and receiving functions.

Radio Relay

Increase the transmitting distance by receiving data and transmitting out using different frequency.

• Power Protection

Two-stage surge protection is used to protect the radio from damage when the input voltage or current exceeds the normal range or positive and negative stages are reversed.

• Standing Wave Detection Protection

Prevent damage caused by long-time open circuit or short circuit.

• Good Heat Dissipation

One-piece molded case makes it easy to perform good heat dissipation.

Thermal Protection

TRU35 can adjust the transmit power adaptively, automatically reduce the power when temperature is too high, and increase the power when temperature decreases. Ensure radio equipment is always in a stable power range and will not be damaged by overheating.

IP67 Protection

Bluetooth Function

Bluetooth can be used to configurate operating mode, protocol, frequency, power level as well as receiving data and transmitting out using radio.

• 16 Channels

User can switch frequency quickly with 16 radio channels.

• Long Transmission Distance

Transmission distance can reach 14Km with high power level (Optimal conditions)

3. Technical Specifications

Gene	eral Specifications						
Frequency Range 410~470MHz							
Operating Mode	Half-duplex						
Channel Spacing		12.5KHz/ 25KHz					
	Channels 16						
Modulation	GMSK/ 4FSK						
Operating Voltage	Nominal voltage 12.5V (10.8~15V)					
Power Consumption	Transmit (High Power)	91W					
(Typical)	Receive	6.5W					
RF Power Stability	≤±1.0ppm						
Dimension	165×125×81mr	n					
Weight	1680g						
Operating Temperature	-40~+85°C						
Storage Temperature	-45~+90°C						
IP Rate IP67							
Antenna Interface TNC, female							
Antenna Interface Impedance	Antenna Interface Impedance 50ohm						
Data Interface LEMO 5pin							
Transm	nitter Specifications						
RF Output Power	10W/ 30W (12.5V I	nput)					
RF Power Stability	±1.5dB						
Adjacent Channel Inhibition	>50dB						
Recei	iver Specifications						
Sensitivity	Better than -116dBm@BER	10⁻⁵, 9600bps					
Co-channel Inhibition	>-12dB						
Block	>70dB						
Adjacent Channel Selectivity	>52dB@25KHz						
Perturbation Resistance Stray	>55dB						
	Modulator						
Air Rate	9600bps, 19200b	ps					
Modulation	GMSK/ 4FSK						

4. Product Interface



Figure 4.1

4.1 LED Display

There are 5 LED indicators showing current working status.

Indicator	Color	Description			
Valtaga		Solid green	Power on		
Voltage	Green	Flash 1Hz	Low voltage (flash when lower than 11.3V, stop		
₿	Ureen		transmitting when lower than 10.5V)		
		Flash	Stop working when temperature is higher than 90°C		
High Power	Groot	On	Transmitting with high power (30w)		
н	Green	Off	Transmitting with low power (5W)		
Transmitting	Grant	Off	Default		
ТХ	Green	Flash	With transmitting data frequency		

Receiving	Green	Off	Default
RX	Green	Flash	With receiving data frequency
Bluetooth		Solid blue	With connection
((r-	Blue	Flash	Transmitting data
•		Off	No connection

4.2 Buttons

User can switch power, channel number and power on/off device with buttons.

Buttons	Function
Switch low/high power	Switch transmitting power to low/high level
Power on/off	Power on/off
Switch channel	Switch channel (Can only switch TX channel. Need to use software to switch RX channel)

4.3 Channel Display

The panel show current transmitting channel.

Display	Function
	Show current channel number:
	1~9~0: Channel 1~10
	a~f: Channel 11~16

5. Connection Port

There are two ports on TRU35 for external antenna and power/serial.



Figure 5.1 Radio Antenna Port



Port	Function
Radio antenna	TNC, connect to external radio antenna
Power/Serial	Provide power and connect to 5pin/DB9 serial port

5.1 Definition of 5-Pin



Figure 5.3

5-pin Definition						
Pin No.	Definition					
1	VCC, 5.5-16V					
2	GND					
3	RXD					
4	GND					
5	TXD					

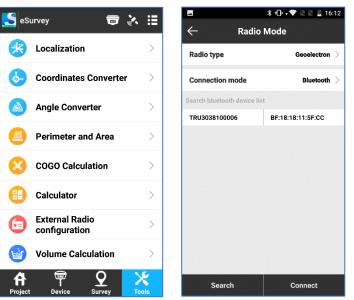
Serial port baud rate setting	9600~25600
Data bits	8
Stop bit	1
Check bit	None

6. Configuration

The configuration software has been integrated into SurPad4.0 data collection software.

6.1 Connect TRU35

Start SurPad4.0 software, then find Tools -> External Radio Configuration



- "Radio type" choose "Geoelectron", "Connection mode" choose "Bluetooth"
- > Then click "Search" to search device. You will see radio serial number in the list
- Select the device and click [Connect], the Bluetooth indicator will turn blue
- Click "Settings" to show setting page

	՝ ≰ 🕼 ₊ 💎 🖹 🖹 🛔 16:15	× ••• • ▼ × × = 10	6:15
\leftarrow Radio	Mode	← Functional selection	
Radio type	Geoelectron $>$	Parameter setting	>
Connection mode	Bluetooth $>$	Channel detection	>
Search bluetooth device lis		Equipment information	>
TRU3038100006	BF:18:18:11:5F:CC	Temperature control	>
Connection	Successful !	Radio control	>
		Firmware update	>
Settings	Disconnect		

Note:

- 1. Disconnect GPS receiver before you connect external radio
- 2. The first time to connect, it will ask to input pair code: 1234

6.2 Parameter Setting

In this page, you can set channels frequency, radio protocol, baud rate, relay function and alert for low power level/high temperature.

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\leftarrow	Paramet	er sett	ting	\leftarrow	Paramete	er sett	ing	\leftarrow	Paramete	r setting
aram	eter setting			5:	445.000000	6:	446.000000	3:	Radio Protocol	poo
	eiving channel Jency		Custom $>$	7:	447.000000	8:	448.000000	5:	TrimTalk 450S	000
1:	441.000000	2:	442.000000	Now	v channel		2 >	7:	TrimMark III	
3:	443.000000	4:	444.000000	Radi	io Protocol		TrimTalk 450S >	Now		2
5:	445.000000	6:	446.000000	Tran rate	nsmission baud		4800 >	Radi	South	ios
7:	447.000000	8:	448.000000	Emi	ssive power		LOW >	Tran	PCC-GMSK	300
	smission Inel frequency		Custom $>$	Rela	ay		off >	Emis	GEOTALK	Ow
1:	441.000000	2:	442.000000	Rela char	ay receiving nnel		1 >	Rela	GEOMARK	⊖)FF
3:	443.000000	4:	444.000000		y transmission		1 >	Rela		0
5:	445.000000	6:	446.000000	char			ka ao (0	chan Rela	HiTorgot	0
7:	447.000000	8:	448.000000	Low	pressure warning		10.00 😒	chan		1
Now	channel		2 >	High	h temperature warr	ning	90.00	Low		,)0
	Get		Settings		Get		Settings		Get	Settings

Note:

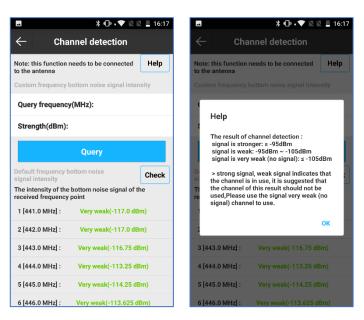
- 1. The frequency must be supported by external radio antenna.
- 2. When relay function is enabled, receiving channel should be same with Base, transmitting channel should be same with Rover.
- 3. When relay function is enabled, the radio protocol should be the same.
- 4. When relay function is enabled, receiving and transmitting frequency can't be the same.
- 5. Low pressure alert is set to 10.5v by default. When lower than 11.3v, the power indicator will flash but still can transmit data. When lower than 10.5v, the power indicator keep flash and stop transmitting data.
- High temperature warning is set to 90°C by default. The power indicator will flash and stop transmitting data when higher than 90°C.

6.3 Channel Detect

In this page, you can detect the strength of predefined/customized frequency.

Note:

- 1. The external radio antenna is required for this function.
- 2. If the detected frequency strength is strong, that means some other people may be using this frequency.



6.4 Equipment Information

In this page, you can view device information like current temperature and power level.

	\$ • □ • • ▼ 🖹 🖹 🔒 16:18	ਁ	🛡 🛛 🗶 🚨 16:18
← Equipment in	formation	← Equipment informa	ition
Equipment information		Radio module information	
Device serial number	TRU3038100006	Module name	
BOOT version	v1.13	Module serial number	TRU35 Radio
APP firmware version	1.1.0	Module BOOT version	v1.04
Board	TRU35_MB	APP firmware version	1.1.8
Board version	V1.1	Hardware version	
Radio module	TRM100	Radio module temperature(°C)	29.421
Bluetooth	B102	Low power(W)	
Temperature(°C)	30.9	High power(W)	
Voltage(V)	11.30	Lower frequency(MHz)	410
Date of manufacture	2018-09-05	Upper frequency(MHz)	470
Get		Get	

6.5 Temperature Control

In this page, you can set temperature threshold and power gain. For example, in below picture the first level threshold is set to 60°C, second level threshold is set to 85°C. When the temperature achieves the threshold, it will reduce the transmitting power automatically. The level to reduce power is depending on the gain value. The absolute value of gain is higher, the more power level will be reduced.

Note:

- 1. Temperature range: -100~1000 $^\circ\!\mathrm{C}$
- 2. Gain range: -60~60 °C

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3. The first level temperature must be lower than second level.

6.6 Radio Control

In this page, you can set radio baud rate, restart or power off device and restore factory setting.

6.7 Firmware Update

In this page, you can update radio firmware. In the process of updating, the power indicator will flash with 5Hz frequency. After finished, device will restart automatically.

	▶ ● • • ▶ ▶ ■ 16:18			🖹 📕 16:18		≱ 🕕 🗸 🗮 💄 16:19	
\leftarrow Temperature control		÷	Radio control		\leftarrow	Firmware update	
First order temperature con	trol	Serial port baud rate:	38400	~	Modify	Upgrade fi	ile:
Temperature threshold	60.000						
Power gain(dB)	-6 😒		Restart			File inform	nation:
Two stage temperature com Temperature threshold		95.000 Power off				Note: 1, in the process of upgrading, do not leave the current page; 2, after the success of the upgrade, the radio	
Power gain(dB)	-6						t will restart, please re use this software and pment to connect.
Note: 1, temperature thresh degrees Celsius; 2, power gain range [-60~6]		Recovery frequency table					
3, the first class temperature less than the two level temp	Restore factory settings						
Get	Settings						

7. Working Mode

TRU35 have two kinds of working mode: Working with base station and been used as external radio to transmit correction data; or used as relayed radio to receive correction data, then transmit the data with another frequency.

7.1 Serial Mode

To connect GPS receiver with serial cable, then set receiver as external radio mode. After finished, The TX indicator will flash.

Note:

- 1. The baud rate should be same with TRU35 when configurate GPS receiver
- 2. The default baud rate is 38400

7.2 Bluetooth Mode

TRU35 support to transmit data without serial cable. Firstly, log into GPS receiver WebUI. Then set working mode as Bluetooth, search the radio serial number and save the setting.

After finished, the Bluetooth indicator and TX indicator will flash which means the radio is receiving data through Bluetooth and transmit out with radio frequency.