File information：

File type	UHF	
Model	TRM501	
Product code		
Product name	Wireless Data Transceiver Module	

TRM501 Wireless Data Transceiver Module

User Manual

（Version：V1.0）

Author：	**Fengting Han**	**Date：**	**20210908**
reviewer：		**Date：**	
signer：		**Date：**	
approved：		**Date：**	

Guangzhou Geoelectron Science & Technology Company Limited

Catalog

1、Technical specifications

Technical specifications		
Specification name	specification requirements	
Frequency rage	410~470MHz	
Working type	half-duplex	
Channel spacing	12.5KHz / 25KHz	
Modulation type	GMSK	
Operating voltage	7.5V	
Average power consumption (typical)	Transmission (high	7.5W@DC 7.5V
	Transmission (low	4.7W@DC 7.5V
	Receive power	1W
Frequency stability	≤±1.0ppm	
Size	69×43×11mm	
Weight	168g	
Operating temperature	-40~+85℃	
Storage temperature	-45~+90℃	
Antenna interface	MMCX	
Antenna impedance	50ohm	
Data interface	20pin	
Transmitter specification		
Specification name	specification requirements	
RF output power	High power（5.0W）	37dBm@DC 7.5V
	Low power (2.0W)	33dBm@DC 7.5V
RF power stability	±0.6dB	
Adjacent channel inhibition	>50dB	
Receiver specification		
Specification name	specification requirements	
Sensitivity	Better than -118dBm@BER 10^{-5} · 9600bps	
Co-channel inhibition	>-12dB	
Block	>70dB	
Adjacent channel selectivity	>52dB@25KHz	

perturbation resistance stray	>55dB
Modulator	
Specification name	Specification requirements
Air rate	9600bps,19200 bps
Modulation method	GMSK

2、Definition of interface connector pin

Pin No.	Input/output	definition
1	Input	VCC
2	Input	VCC
3	Input/output	GND
4	Input/output	GND
5	NC	No use
6	Input	Enable(ENABLE UHF radio module, active at high level)
7	Output	TXD(UHF data output)
8	NC	No use
9	Input	RXD(UHF data input)
10	NC	No use
11	NC	No use
12	NC	No use
13	NC	No use
14	NC	No use
15	NC	No use
16	NC	No use
17	Input	Config(default is high station data mode, need to configure low to enter command mode)
18	NC	No use
19	NC	No use
20	NC	No use

3、Transceiver command instructions

3.1 Serial port configuration in the factory state.

serial port baud rate setting	38400
Data bits	8
Stop bit	1
Check bit	none

3.2Basic command

3.3.1 TX 【parameter】
Function：set the transmission frequency（MHz）
Parameter choice：410.000 – 470.000
Example：TX 466.125 show:"PROGRAMMED OK"

3.3.2 TX
Function：Check the transmission frequency
Example：TX show:"TX 466.12500 MHz"

3.3.3 RX 【parameter】
Function：set receive frequency（MHz）
Parameter choice：410.000 – 470.000
Example：RX 466.125 show:"PROGRAMMED OK"

3.3.4 RX
Function: Check the receive frequency
Example：RX show:"RX 466.12500 MHz"

3.3.5 BAUD 【parameter】
Function：set air baud rate（bps）
Parameter choice：9600、19200
Example：BAUD 9600 show:"PROGRAMMED OK"

3.3.6 BAUD
Function：check the air baud rate（bps）
Example：BAUD show:"BAUD 9600"

3.3.7 PWR 【parameter】
Function: set the transmission power
Parameter choice：H、L
Example：PWR L show"PROGRAMMED OK"

3.3.8 PWR
Function: check the transmission power
Example：PWR show"PWR L"

3.3.9 CHANNEL 【parameter】
Function：Set the current channel
Parameter choice：0、1、2、3、4、5、6、7
Example：CHANNEL 0 show"PROGRAMMED OK"

3.3.10 CHANNEL
Function：Check the current channel
Example：CHANNEL show"CHANNEL 0"

3.3.11 PRT 【parameter】
Function：Set current protocol type
Parameter choice：TRIMTALK、TRIMMK3、SOUTH

Example：PRT TRIMTALK　　　show"PROGRAMMED OK"
3.3.12　　PRT
　　　　　　Function：Check current protocol type
　　　　　　Example：PRT　　　show"PRT TRIMTALK"
3.3.13　　SREV
　　　　　　Function：Check current software version
　　　　　　Example：SREV　　　show"GA0B11O12D15.09.12"
3.3.14　　SER 【parameter】
　　　　　　Function：Set the serial number
　　　　　　Parameter choice：Less than 16 numbers of ASCII
　　　　　　Example：SER TRU201-006　　show"PROGRAMMED OK"
　　　　　　note：Serial number is the only remark for the UHF, so it's forbidden to change the serial number by software.
3.3.15　　SER
　　　　　　Function：Check the serial number
　　　　　　Example：SER　　　show"SN:TRU201-006"
　　　　　　note：If UHF has never set the SN with no.14 command, so only show the "SN:"
3.3.16　　FLOW
　　　　　　Function：Check the lower limit of UHF frequency.
　　　　　　Example：FLOW　　　show"FLOW 410"
3.3.17　　FUPP
　　　　　　Function：Check the upper limit of UHF frequency.
　　　　　　Example：FUPP　　　show"FUPP 470"
3.3.18　　SBAUD 【parameter】
　　　　　　Function：Set baud rate of Communication interface.
　　　　　　Parameter choice：9600、19200、38400、57600、115200
　　　　　　Example：SBAUD 38400　　　show"PROGRAMMED OK"
3.3.19　　SBAUD
　　　　　　Function：Check baud rate of Communication interface.
　　　　　　Example：SBAUD　　　show"SBAUD 38400"

3.4 Special commands

3.4.1　　CCA 【parameter】
　　　　　　Function：Check the received signal strength value (dBm) of the specified channel (MHz).
　　　　　　Parameter choice：410.000 – 470.000
　　　　　　Example：CCA 466.125　show：
　　　1）CCA 【parameter 1】:【parameter 2】，Example "CCA 466.125:-106.125"，indicate the received signal strength value is 466.125MHz in the current channel.
　　　2）"CCA 466.125:ERROR"，indicate the test is failed. But it is not indicated that all the channels to be tested are applicable, but it is only the failure for the test operation without connecting the antenna, or too closer to the emission source, etc. may lead to the test failure.
3.4.2　　RSSI
　　　　　　Function：Check the received signal strength value.
　　　　　　Example：RSSI　　　show：
　　　1）RSSI indicates it doesn't receive any data in the protocol, so it can't show the received signal strength value.
　　　2）RSSI -52.478 -48.063，-52.478（dBm）

4、Installation of radio

Figure 1 shown the installation dimension of data transceiver module PCB, firmly fitted the radio modem onto the mounting surface of user system 。
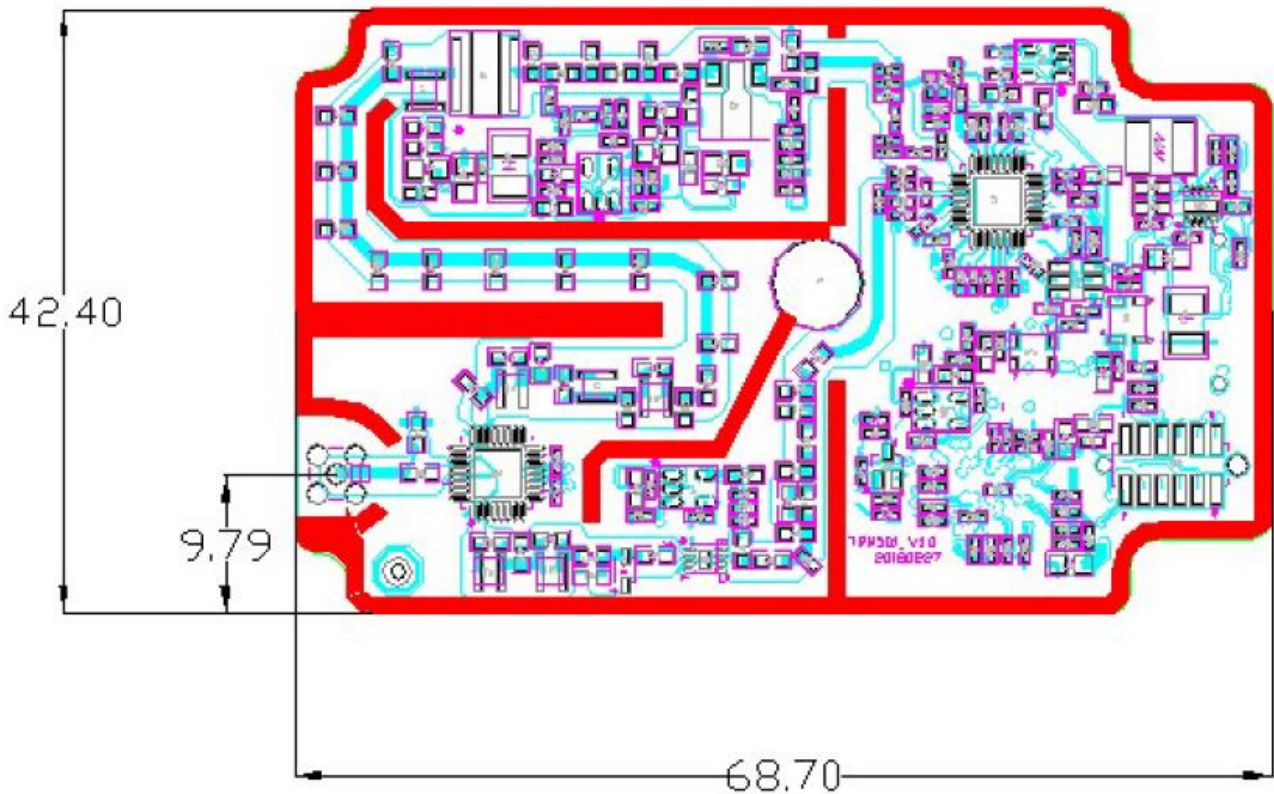
Figure 1 Radio Modem installation dimension

5 Main Power Supply

TRM501 can operate with any 7.5V power supply, which comes from data interface connector with good filtered. The power must supply 2A current at least and featured with current-limiting, even if you make radio modem operating on low power mode (2W).

6 Warning

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

7、Photo

UHF Antenna specification

Technical parameters	
Frequency range (MHz)	410～470
Bandwidth (MHz)	20
Polarization mode	Vertical
Gain (dBi)	4
Input impedance （Ω）	50
Voltage standing wave ratio	≤2.0
Maximum power (W)	20
Joint type	TNC
Antenna length (mm)	293
Antenna weight (g)	50
Extreme wind speed (km/h)	90

Remark: Antenna structure for elastic whip, and resistance to bending.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna.
• Increase the separation between the equipment and receiver.
• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
• Consult the dealer or an experienced radio/TV technician for help.

Caution: Any changes or modifications to this device not explicitly approved by manufacturer could void your authority to operate this equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This equipment should be installed and operated with minimum distance 200cm between the radiator & your body.

IC WARNING

Cet appareil contient des émetteurs / récepteurs exemptés de licence conformes aux RSS (RSS) d'Innovation, Sciences et Développement économique Canada. Le fonctionnement est soumis aux deux conditions suivantes :

(1) Cet appareil ne doit pas causer d'interférences.

(2) Cet appareil doit accepter toutes les interférences, y compris celles susceptibles de provoquer un fonctionnement indésirable de l'appareil.

Cet équipement est conforme aux limites d'exposition au rayonnement ISED établies pour un environnement non contr?lé.

Cet équipement doit être installé et utilisé à une distance minimale de 200 cm entre le radiateur et votre corps.

2.2 List of applicable FCC rules
This module meets the requirements of FCC CFR Title 47 Part 90, FCC CFR Title 47 Part 2.

2.4 Limited module procedures
This module is an approval module.

2.6 RF exposure considerations
Integration is strictly limited to fixed categorized end-products where a separation distance of at least 200 cm between the radiating part and any human body can be assured during normal operating conditions.

2.7 Antennas
This module only allows connection antenna in the instruction manual. If other antennas are used, re-evaluation is required.

2.9 Information on test modes and additional testing requirements5
This module is test stand-alone, if more another modules work together with this module, please evaluation the multiple RF exposure.

2.10 Additional testing, Part 15 Subpart B disclaimer
The final end product must be labeled in a visible area with the following "Contains TX FCC ID: 2ABNA-TRM501" .If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users manual: This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

IMPORTANT NOTE:

Integration is strictly limited to mobile/fixed categorized end-products where a separation distance of at least 200 cm between the radiating part and any human body can be assured during normal operating conditions.

IMPORTANT NOTE:

In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter).then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

IMPORTANT NOTE:

This module is intended for OEM integrator only and the OEM integrators are instructed to ensure that the end user has no manual instructions to remove or install the device. The OEM integrator is still responsible for the FCC compliance requirement of the end product, which integrates this module.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following "Contains TX FCC ID: 2ABNA-TRM501" .If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users manual: This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

IMPORTANT NOTE:
Integration is strictly limited to mobile/fixed categorized end-products where a separation distance of at least 200 cm between the radiating part and any human body can be assured during normal operating conditions.

IMPORTANT NOTE:
In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter).then the IC authorization is no longer considered valid and the IC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate IC authorization.

IMPORTANT NOTE:
This module is intended for OEM integrator only and the OEM integrators are instructed to ensure that the end user has no manual instructions to remove or install the device. The OEM integrator is still responsible for the IC compliance requirement of the end product, which integrates this module.

LABEL OF THE END PRODUCT:
The final end product must be labeled in a visible area with the following "Contains TX IC: 11648A-TRM501" .If the size of the end product is smaller than 8x10cm, then additional IC statement is required to be available in the users manual:

Cet appareil contient des émetteurs / récepteurs exemptés de licence conformes aux RSS (RSS) d'Innovation, Sciences et Développement économique Canada. Le fonctionnement est soumis aux deux conditions suivantes :
(1) Cet appareil ne doit pas causer d'interférences.
(2) Cet appareil doit accepter toutes les interférences, y compris celles susceptibles de provoquer un fonctionnement indésirable de l'appareil.
Cet équipement est conforme aux limites d'exposition au rayonnement ISED établies pour un environnement non contr?lé.

Cet équipement doit être installé et utilisé à une distance minimale de 200 cm entre le radiateur et votre corps.