File information：

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| Model | TRM230 | |
| Product code | | |
| Product name | Wireless Data Transceiver Module | |

# TRM230 Wireless Data Transceiver Module

## User Manual

（Version：V1.0）

**Author：** _____ **Date：** **20240708**

**reviewer：** _____ **Date：** _____

**signer：** _____ **Date：** _____

**approved：** _____ **Date：** _____

# Catalog

# 1、Technical specifications

| Technical specifications | | |
|---|---|---|
| Specification name | specification requirements | |
| Frequency rage | 410~470MHz | |
| Working type | half-duplex | |
| Channel spacing | 12.5KHz / 25KHz/ 6.25KHz | |
| Modulation type | GMSK /4FSK | |
| Operating voltage | 3.6V ±10%( TX state, not more than 4.2V) | |
| Power consumption | Transmitted power | 5W |
| | Receive power | 0.5W |
| Frequency stability | ≤±1.0ppm | |
| Size | 57×36×7mm | |
| Weight | 66g | |
| Operating temperature | -40~+85℃ | |
| Storage temperature | -45~+90℃ | |
| Antenna interface | IPX or MMCX | |
| Antenna impedance | 50ohm | |
| Data interface | 20pin | |
| Transmitter specification | | |
| Specification name | specification requirements | |
| RF output power | High power（2.0W） | 33±1dBm@DC 3.6V |
| RF power stability | ±0.3dB | |
| Adjacent channel inhibition | >50dB | |
| Receiver specification | | |
| Specification name | specification requirements | |
| Sensitivity | (GMSK/4FSK)Better than -115dBm@BER10$^{-5}$，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 / 4FSK |

## 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 |
| 7 | Output | RXD |
| 8 | NC | No use |
| 9 | Input | TXD |
| 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 |
| 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

Firmly fitted the radio modem onto the mounting surface of user system by holes on radio modem 4 corners。

## 5 Main Power Supply

TRM230 can operate with any 3.6V power supply, which comes from data interface connector with good filtered. The power must supply 1.6A current at least and featured with current-limiting, even if you make radio modem operating on low power mode (0.5W).

## 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、FCC radiation exposure statement

This equipment complies with FCC radiation exposure limits set forth for a uncontrolled environment.
This equipment should be installed and operated with minimum distance 60cm between the radiator & your body.
Only service personnel have access to the programming capabilities.
The end users in all these cases must not be able to program the radios.

This Licensed transmitter is approved as a module for installation into the final devices providing the FCC criteria is met:
1. The final device is designed for mobile or fixed operation.
2. The maximum antenna gain to allow compliance with RF exposure requirement that is listed on the Grant of Certification must be followed.
3. If the label of the module is not visible on the final device, the final device should contain the following text: "Contains FCC ID: 2ABNA-TRM230”

**Integration instructions for host product manufacturers according to KDB 996369 D03 OEMManual v01**

Conditions on using Guangzhou Geoelectron Science & Technology Company Ltd. regulatory approvals:
A. Customer must ensure that its product (The ” Wireless Data Transceiver Module”) is electrically identical to Guangzhou Geoelectron Science & Technology Company Ltd. reference designs. Customer acknowledges that any modifications to Guangzhou Geoelectron Science & Technology Company Ltd. reference designs may invalidate regulatory approvals in relation to the CUSTOMER Product, or may necessitate notifications to the relevant regulatory authorities.
B. Customer is responsible for ensuring that antennas used with the product are of the same type, with same or lower gains as approved and providing antenna reports to Guangzhou Geoelectron Science & Technology Company Ltd.
C. Customer is responsible for regression testing to accommodate changes to Guangzhou Geoelectron Science & Technology Company Ltd. reference designs, new antennas, and portable RF exposure safety testing/approvals.
D. Appropriate labels must be affixed to the CUSTOMER Product that comply with applicable regulations in all respects.
E. A user’s manual or instruction manual must be included with the customer product that contains the text as required by applicable law. Without limitation of the foregoing, an example (for illustration purposes only) of possible text to include is set forth below:

**2.2 List of applicable FCC rules**
FCC CFR Title 47 Part 90, FCC CFR Title 47 Part 2

**2.3 Specific operational use conditions**
Radio Technology: UHF
Operation frequency: 410MHz-470MHz
Conducted Power: 2W (33.01±1dBm)
Channel spacing: GMSK: 12.5 KHz, 25 KHz
4FSK: 6.25 KHz, 12.5 KHz, 25 KHz
Modulation type: GMSK, 4FSK
Antenna Type: Rod Antenna, Maximum Gain is 4dBi. (Antenna information is provided by applicant.)

The module can be used for mobile applications with a maximum 4dBi antenna. The host manufacturer installing this module into their product must ensure that the final composit product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation. The host manufacturer has to be aware not to provide informationto the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

**2.4 Limited module procedures**
Not applicable. The module is a Single module and complies with the requirement of FCC Part 15.212.

**2.5 Trace antenna designs**
The antenna used is the Rod antenna on the module.

**2.6 RF exposure considerations**
The antennas used for this transmitter must be installed to provide a separation distance of at least 60cm from all persons and must not be located or operating in conjunction with any other antenna or transmitter.

**2.7 FCC statements**
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. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**2.8 Antennas**
Antenna Specification are as follows:
Antenna Type: Rod antenna
Antenna Gain (Peak): UHF: 4dBi

This device is intended only for host manufacturers under the following conditions: The transmitter module may not be co-located with any other transmitter or antenna;

As long as the conditions above are met, further transmitter test will not be required. However, the host manufacturer is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheralrequirements, etc.).

**2.9 Label and compliance information**
Host product manufacturers need to provide a physical or e-label stating "Contains FCC ID: 2ABNA-TRM230" With their finished product.

**2.10 Information on test modes and additional testing requirements**

Radio Technology: UHF
Operation frequency: 410MHz-470MHz
Conducted Power: 2W (33.01±1dBm)
Channel spacing: GMSK: 12.5 KHz, 25 KHz
4FSK: 6.25 KHz, 12.5 KHz, 25 KHz
Modulation type: GMSK, 4FSK
Antenna Type: Rod Antenna, Maximum Gain is 4dBi. (Antenna information is provided by applicant.)

Host manufacturer must perfom test of radiated & conducted emission and spurious emission, etcaccording to the actual test modes for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.
Only when all the test results of test modes comply with FCC requirements, then the end product canbe sold legally.

**2.11 Additional testing, Part 15 Subpart B disclaimer**

The modular transmitter is only FCC authorized for FCC CFR Title 47 Part 90 that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuity), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.