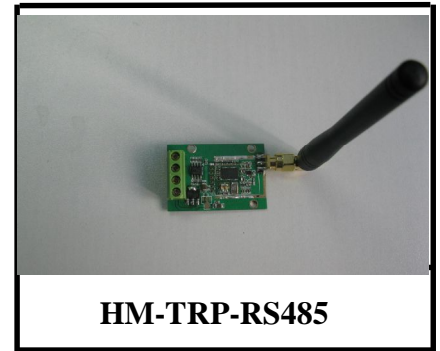


1. General

HM-TRP series is a low cost, high performance transparent FSK transceiver with operating at 433/470/868/915 MHz. It features small size, high output power, high sensitivity, long transmission distance and high communication data rate with auto set up for communication change and data receiving and transmission control. There is **RS-485** interface, it is easy to realize the wireless data transmission. It is flexible for the users to set the baud rate, frequency, output power, data rate, frequency deviation, receiving bandwidth etc parameters. The **RS-485** is your ideal choice for designing wireless data transmission products which can be widely used on wireless data transmission field.



2. Features

- Low cost, high performance , high reliability
- FSK modulation, 2-way half –duplex communication, strong anti-interfere
- 433/470/868/915MHz ISM band, globally license free.
- Maximal output power 100mW(20dBm), output power adjustable between 1-20dBm
- Sensitivity -117dBm
- Supply current for Tx 100mA@20dBm, 40mA@14dBm
- Supply current for Rx 25Ma
- Low current sleep mode 1uA
- Operation frequency can be configured, acceptable for several modules working in different frequency with no disturbance on each other.
- Optional for frequency deviation and receiving ISM bandwidth, users can be modulated by software.
- Easily use, auto exchange on communication & transceiver
- Communication speed 1.2kbps -115.2kbps, can be modulated through software
- Afford ENABLE control signal, user self control work duty cycle
- RSSI function
- With LED indication
- Longer transmission distance, over 1Km in open air
- Small size 44.1X 30 X 1.2mm .
- Tuning free
- Accord FCC,ETSI standard.

3. Application

Remote control, remote measurement system;	Wireless meter
Access control	Identification system
Data collection	IT household appliance
Intelligence household appliance	Baby monitoring system

4. Maximum specification

Parameter	Min	Max	Unit
Power supply(VCC)	-0.3	+3.6	V
Storage temperature	-40	+150	°C
Operate temperature	-40	+85	°C
Reflow temperature		+260	°C

5. Parameter

Parameter	Condition	Min	Typical	Max	Unit
Power supply (VCC)		2.4	3.3	3.6	V
Operate temperature		-40	25	85	°C
	HM-TRP-RS485-433	414	434	454	
	HM-TRP-RS485-470	450	470	490	
	HM-TRP-RS485-868	849	869	889	
	HM-TRP-RS485-915	895	915	935	
Max output power		18	20		dBm
Output range		1		20	dBm
	FSK,Fdev=35K, DR=1.2Kbps,		-117	-115	dBm
	FSK,Fdev=35K, DR=9.6Kbps,		-114	-112	dBm
	FSK,Fdev=35K, DR=40Kbps		-111	-109	dBm
	FSK,Fdev=35K, DR=100Kbps		-104	-102	dBm
Tx Current	20dBm output power		100	120	mA
Tx Current	14dBm output power		40	50	mA
Rx Current			25	30	mA
Sleep Current			1	2	uA
Modulate data rate		1.2		115.2	Kbps
Modulate deviation		10		160	KHz
Receive bandwidth		30		620	KHz
RS-485 Data Rate		1.2		115.2	Kbps
RS-485 data bit			8		bit
RS-485 stop bit			1		bit

6. LED function

The HM-TRP-RS485 add the LED function for easier debug & function demo, thus the users can easily understand whether the module is working or not or in any other status.

LED function:

1. The red and green LED will flash when there is power on if the module start working.
2. The module will be ready for Config status if ENABLE pin is low, CONFIG pin is low. It will be in Config if the red and green LED keep lighting. The green and red LED will not keep lighting if the module is not in Config mode.
3. The red LED flash when the module is in transmission , the red LED will be off if the transmission finished.
4. The green LED is off when the module is in receiving status, the green led will flash once if the module receive data.

7. Config Instruction

You need to Config the parameter and inquiry for different need to realize the function. The HM-TRP-RS485 can Config and inquiry for working frequency, wireless data rate , receiving ISM bandwidth, frequency deviation, transmission power, RS-485 transfer baud rate & RSSI signal reading etc.

Config and Inquiry methods:

The module will be ready for Config status if ENABLE pin is low, CONFIG pin is low. It will be in Config if the red and green LED keep lighting. Then you can Config & inquiry on the module.

The Config instruction format is as AA FA+[instruction]+[parameter].The instruction is 1 byte, the parameter is the HEX data of 0-4 byte which the high byte before the low byte.

The instruction's transfer speed should keeps the same as the transfer speed of RS-485. The instruction's transfer speed will change accordingly if changes the transfer speed of RS-485 .The range of transfer speed of the instruction is from 1.2Kbps -115.2K bps.

Config& Inquiry instruction description:

1. Instruction[F0]:
Reset to default parameter, no parameter follows
Config instruction: AA FA F0
2. Instruction[E1]:
Reading the current Config parameter, no parameter follows
Config instruction: AA FA E1
3. Instruction [D2]:
Set up working frequency, [parameter]4 byte, [parameter] Unit :Hz
Set up range:
HM-TRP-RS485-433: 414000000-454000000Hz
HM-TRP-RS485-470: 450000000-490000000Hz
HM-TRP-RS485-868: 849000000-889000000Hz

HM-TRP-RS485-915: 895000000-935000000Hz

Example:

Config instruction: AA FA D2 36 89 CA C0, set up frequency as 915000000Hz

Config instruction: AA FA D2 19 DE 50 80, set up frequency as 434000000Hz

4. Instruction [C3]:

Set up wireless data rate, [parameter]4 byte, [parameter] unit :bps

Set up range:1200-115200 bps

Example:

Config instruction: AA FA C3 00 00 25 80, set up transfer speed as 9600bps

Config instruction: AA FA C3 00 00 96 00, set up transfer speed as 38400bps

5. Instruction[B4]:

Set up receiving bandwidth, [parameter]2 byte, [parameter]Unit :KHz

Set up range:30-620KHz

Example:

Config instruction: AA FA B4 00 69, set up receiving band as 105KHz

Config instruction: AA FA B4 01 2C, set up receiving band as 300KHz

6. Instruction[A5]:

Set up frequency deviation, [parameter]1 byte, [parameter]Unit :KHz

Set up range:10-160KHz

Example:

Config instruction: AA FA A5 23, set up modulation frequency as 35KHz

Config instruction: AA FA A5 32, set up modulation frequency as 50KHz

7. Instruction[96]:

Set up transmission power, [parameter]1 byte, 0~7level

Set up range:0-7level(1-20 dBm)

Example:

Config instruction: AA FA 96 07, set up transmission power as level 7 (+20 dBm)

Config instruction: AA FA 96 03, set up transmission power as level 3 (+8 dBm)

Transmission power level	Transmission power
7	+20dBm
6	+17dBm
5	+14dBm
4	+11dBm
3	+8dBm
2	+5dBm
1	+2dBm
0	+1dBm

Table1: Transmission level

8. Instruction[1E]:

Set up RS485 transfer speed, [parameter]4 byte, [parameter] unit: bps

Set up range:1200-115200 bps

Example:

Config Instruction :AA FA 1E 00 00 25 80,set up speed as 9600bps

Config instruction :AA FA 1E 00 00 96 00, set up speed as 38400bps

9. Instruction [87]:

Wireless signal strength when receiving useful data, follows no [parameter]

Config Instruction: AA FA 87

RSSI value is 8 bit, range: 0-255,

Refer to Table 2 for wireless signal strength & RSSI

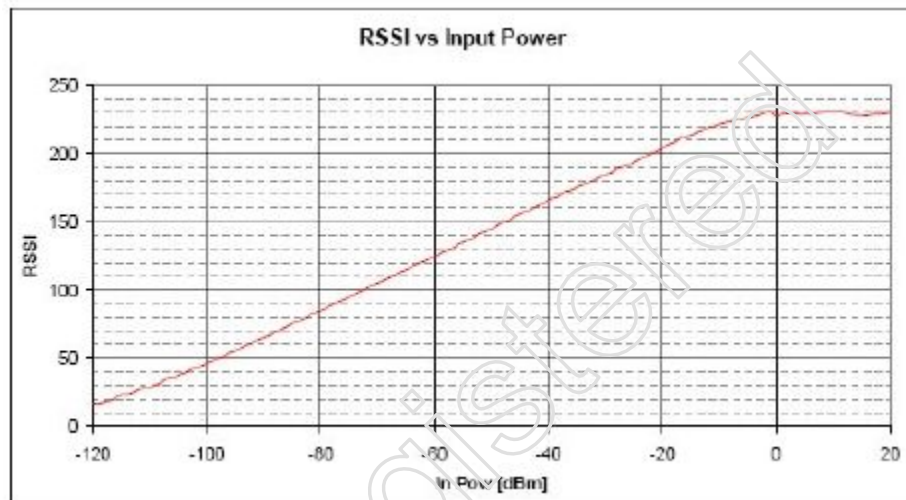


Table 2: wireless signal strength & RSSI

10. Instruction[78]:

Disturb wireless signal strength, follows no [parameter]

Config Instruction: AA FA 78

RSSI value is 8 bit, range: 0-255

Refer to Table 2 for wireless signal strength & RSSI

Note:

Modulation index: $h = Fd/Rb$, Range is 0.5 ~ 32.

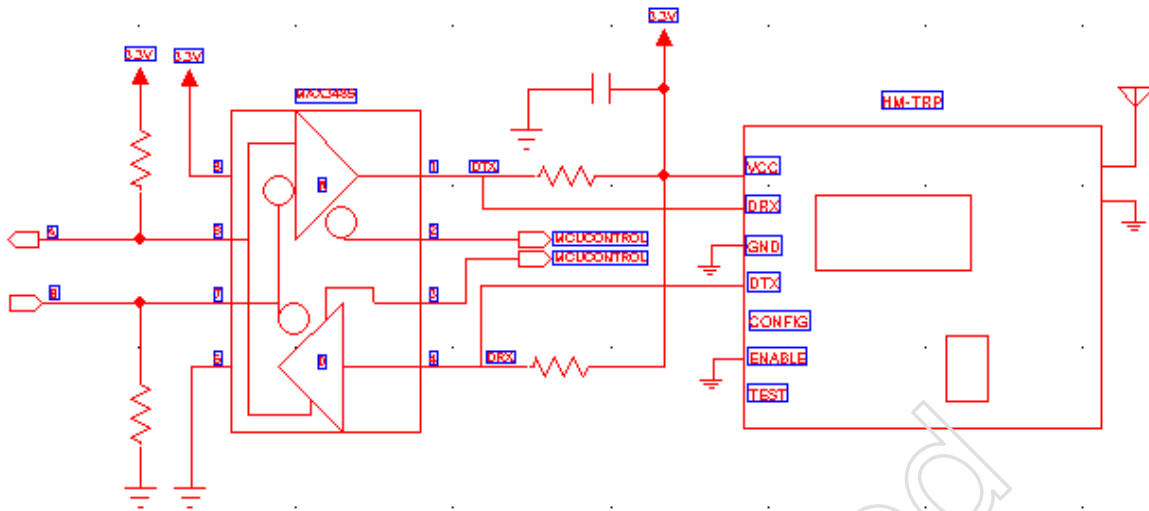
If $h > 1$, $BW = Rb + 2Fd$; If $h < 1$, $BW = 2Rb + Fd$.

8. Original default parameter

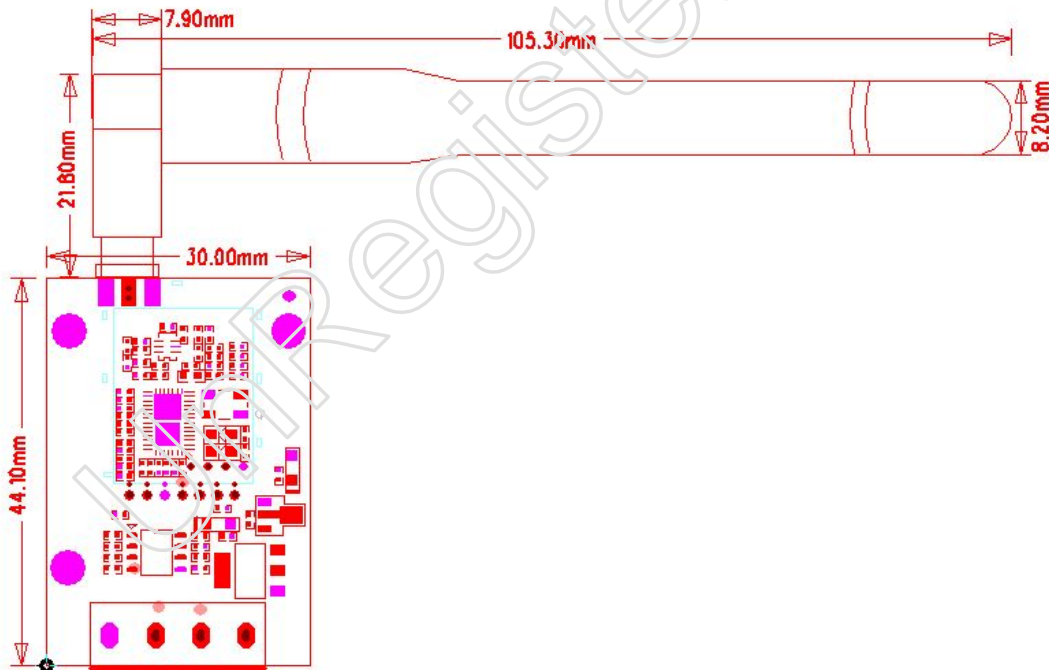
module	Operate frequency (MHz)	Modulate data rate (Kbps)	Receive bandwidth (KHz)	Modulate deviation (KHz)	output power (dBm)	UART data rate (Kbps)
HM-TRP-RS485-433	434.000	9.600	105	35	+20	9.600
HM-TRP-RS485-470	470.000	9.600	105	35	+20	9.600
HM-TRP-RS485-868	869.000	9.600	105	35	+20	9.600
HM-TRP-RS485-915	915.000	9.600	105	35	+20	9.600

Table 3: Original default parameter

9. HM-TRP-RS485 typical Application Notes.

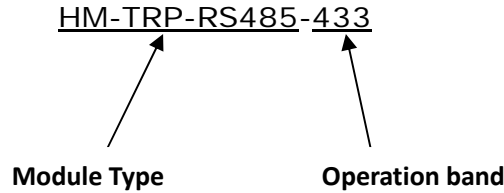


10. HM-TRP-RS485 dimension .



11. Order information

Part Number=Module type – Operation Band



Module type	Operation band
HM -TRP-433	433 MHZ
HM -TRP-470	470 MHZ
HM -TRP-868	868 MHZ
HM -TRP-915	915 MHZ

Table 4: Module list

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