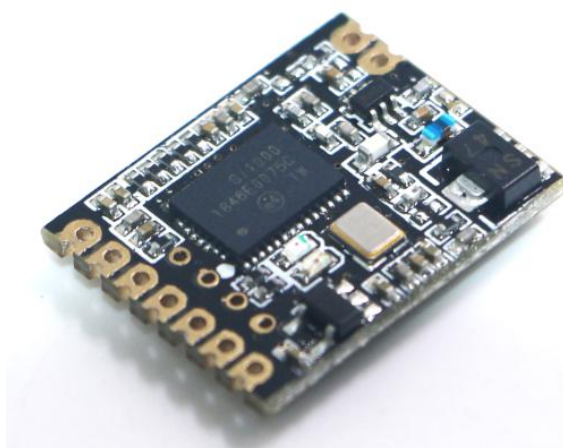DL-TRP A Series SOC Wireless Transparent Transmission Module

with UART Protocol & 500mW Low-power

SPECIFICATION

Model No.: DL-TRP-A 433/868/915

Version: V1.0

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Brief Introduction

DL-TRP A Series RF Modules are medium power, high performance FSK wireless transparent data transceiver modules. They can work in 433/470/868/915MHz ISM band, compact in size, but large power, high sensitivity, long transmission distance, and high communication rate; they can automatically complete communication protocol conversion and data receive control within the module. The module provides UART serial data interface, which enables wireless data transmission by providing only serial data. Users can also flexibly configure the serial rate, operating frequency, transmission power, communication rate, modulation frequency offset, receiving bandwidth and other parameters of the module according to their own needs. DL-TRP series modules can be widely used in all kinds of wireless data transmission fields, and are ideal for designing wireless data transmission products.

Application

- ISM band data communication
- Smart Home Security System
- Architectural Automation
- Energy Control and Management
- The development of AMR system-level networking
- Automatic (Water, Electricity, Gas) Meter Reading system

- Intelligent Building
- Heat energy collection
- Wireless Sensor Network
- RKE (Remote Keyless Entry)

Features

- High power output, high performance RF parameters and high reliability;
- FSK modulation, half duplex communication, strong anti-interference ability
- A series 433 / 470 / 868 / 915MHz ISM frequency band, no need to apply for frequency point
- The maximum output power is 500MW (27dBm), and the output power can be adjusted nonlinearly in the range of 20-27dbm;
- The module adopts single power input, low noise DC chip supplies power to RF and PA respectively, and the receiving sensitivity is - 117dbm;
- Transmit transient working current: 450mA@27dBm
- Receiving working current: 25mA
- Power consumption in standby mode: 5mA (not applicable to products with ultra-low power consumption and battery system power supply)
- Standard TTL level UART serial interface, can be extended to RS232 interface or other interfaces
- The working frequency can be set, frequency division multiplexing for multiple modules available, without mutual interference

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- The modulation frequency offset and receiving bandwidth are optional, which can be configured by yourself through software
- Communication protocol conversion and RF transceiver switching are completed automatically, and users do not need to intervene, which is simple and easy to use
- The communication rate is 1.2kbps-115.2kbps, which can be configured by software
- Provide enable control signal, and the duty cycle is controlled by yourself to meet different requirements
- RSSI function, LED indication function
- Long transmission distance: more than 3km in open area (without interference)
- Compact size: 16*20*2mm, SMD package, easy to install
- No debugging needed when production
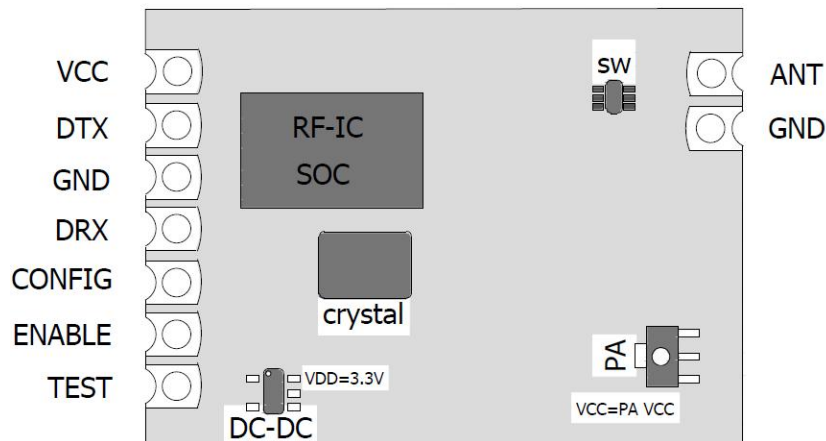
Technical Parameters

Limit value

Parameters	Min.	Max.	Unit
Working Voltage (VCC)	-0.3	+5.5	V
storage temperature	-40	+150	℃
Working temperature	-40	+85	℃
Reflow temperature		+260	℃

Specification

Parameters	Condition	Min.	Typi.	Max.	Unit
Power Supply		2.4	5.0	5.5V	V
Working temperature		-40	25	85	℃
Working frequency	DL-TRP-433	414	434	454	MHz
	DL-TRP-470	450	470	490	
	DL-TRP-868	849	869	889	
	DL-TRP-915	895	915	935	
Max. output power		18	26.5	27	dBm

Output power range		1		27	dBm
Receiving sensitivity	FSK,Fdev=35K, DR=1.2Kbps,		-117	-115	dBm
	FSK,Fdev=35K, DR=9.6Kbps,		-114	-112	
	FSK,Fdev=35K, DR=40Kbps		-111	-109	
	FSK,Fdev=35K, DR=100Kbps		-104	-102	
Transmitting Current	30dBm（1w）	Reference measurement	——	450	mA
	24dBm（250mw）	Reference measurement	——	180	
Receiving current			25	30	mA
Standby current	PA-VCC disabled			5	mA
Modulation rate		1.2		115.2	Kbps
Modulation frequency offset		10		160	kHz
Receiving bandwidth		30		620	kHz
UART rate		1.2		115.2	Kbps
UART Data bit			8		bit
UART Stop bit			1		bit

Pins Definition

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Name	Definition
VCC	Positive power supply, DC 2.4-5.5V, DC 5.0V is recommended
DTX	Data Output
GND	Negative pole of power supply, Grounding
DRX	Data Input
CONFIG	Low level enters the configuration state, and exits the configuration state at high level
ENABLE	Low level enters into the working state, data transmission and configuration; high level into sleep state
TEST	Not connected
ANT	RF signal input / output port; connected to 50 ODL antenna

Table 1:   Pins Definition of DL-TRP A Series

Configuration Instructions

1. LED light function

In order to facilitate module debugging and function demonstration, DL-TRP adds LED indicator function to facilitate users to quickly understand whether the module is working properly and in what state.

1). When the module is powered on, the red and green LED lights on the module will be on at the same time, indicating that the module is working properly.

2). When the ENABLE foot is low and the CONFIG foot is low, it enters the configuration mode. The red and green LEDs on the module are always bright, indicating that it enters the configuration mode successfully. When exiting configuration mode, the red and green LEDs on the module crush out.

3). When the module transmits RF signal, the red LED on the module is illuminated, indicating that the transmission is successful. When the transmission state ends, the red LED is off.

4). When the module enters the receiving state, the green LED light on the module is off. When the module receives a useful RF signal, the green LED light flashes once to indicate that the reception is successful.

2. Configuration Instructions

Due to different requirements, the DL-TRP module needs parameter configuration and query to achieve the functionality. The working frequency, RF transmission rate, receiving bandwidth, modulation frequency offset, transmission power, UART interface transmission rate, RSSI signal reading can be configured and queried

Configuration and query methods:

When ENABLE foot is low level and CONFIG foot is low level, the red and green LEDs on the module are always bright, and the module enters the configuration mode, then the parameters of the module can be set and queried.

Configuration instructions are formatted as AA FA+[Instruction]+[Parameter]. Instructions are 1 byte, parameters are 0-4 bytes of HEX data, high bytes first.

The transmission rate of instructions should be the same as that of the module UART interface. When the transmission rate of the module UART interface is changed, the transmission rate of instructions should also be changed accordingly. The transmission rate of instructions can range from 1.2 Kbps to 115.2 Kbps.

Configuration and Query Instruction Description:

1). Command [F0]:

Restore module factory default parameters, without [parameters]

Configuration instructions are: AA FA F0

2). Command [E1]:

Read the parameters currently set by the module, without [parameters]

Configuration instructions are: AA FA E1

3). Command [D2]:

Set working frequency, [parameter] is 4 bytes, [parameter] units: Hz

Setting range:

DL-TRP-433: 414000000-454000000Hz

DL-TRP-470: 450000000-490000000Hz

DL-TRP-868: 849000000-889000000Hz

DL-TRP-915: 895000000-935000000Hz

For example:

Configuration instructions: AA FA D2 36 89 CA C0, set frequency to 915000000Hz

Configuration instructions: AA FA D2 19 DE 50 80, set frequency to 434000000Hz

4). Command [C3]:

Set the wireless transmission rate, [parameter] is 4 bytes, [parameter] units: bps

Setting range: 1200-115200 BPS

For example:

Configuration instructions: AA FA C3 00 00 25 80, set rate to 9600bps

Configuration instructions: AA FA C3 00 00 96 00, set rate to 38400 BPS

5). Command [B4]:

Set the receive bandwidth, [parameter] is 2 bytes, [parameter] units: KHz

Setting range: 30-620KHz

For example:

Configuration instructions: AA FA B4 00 69, set bandwidth to 105KHz

Configuration instructions: AA FA B4 01 2C, set bandwidth to 300 KHz

6). Command [A5]:

Set the modulation frequency offset, [parameter] is 1 byte, [parameter] units: KHz

Setting range: 10-160KHz

For example:

Configuration instructions: AA FA A5 23, set frequency offset to 35 KHz

Configuration instructions: AA FA A5 32, set frequency offset to 50 KHz

7). Command [96]:

Set transmission power, [parameter] is 1 byte, level 0-7

Setting Range: Level 0-7 (1-20 dBm)

For example:

Configuration instructions: AA FA 96 07, set power to level 7 (+20 dBm)

Configuration instructions: AA FA 96 03, set power to level 3 (+8 dBm)

Level	Corresponding transmission power
7	+20dBm
6	+17dBm
5	+14dBm
4	+11dBm
3	+8dBm
2	+5dBm
1	+2dBm
0	+1dBm

Table 1: Transmission Power Levels (Non-PA output values)

8). Command [1E]:

Set UART interface transmission rate, [parameter] is 4 bytes, [parameter] units: bps

Setting range: 1200-115200 BPS

For example:

Configuration instructions: AA FA 1E 00 25 80, set rate to 9600bps

Configuration instructions: AA FA 1E 00 96 00, set rate to 38400BPS

9). Command [87]:

Read the wireless signal strength when useful data is received, without [parameters]

Configuration instructions are: AA FA 87

The RSSI value read is an 8-bit byte, ranging from 0-255,

The relationship between wireless signal strength and RSSI value is shown in Table 2.

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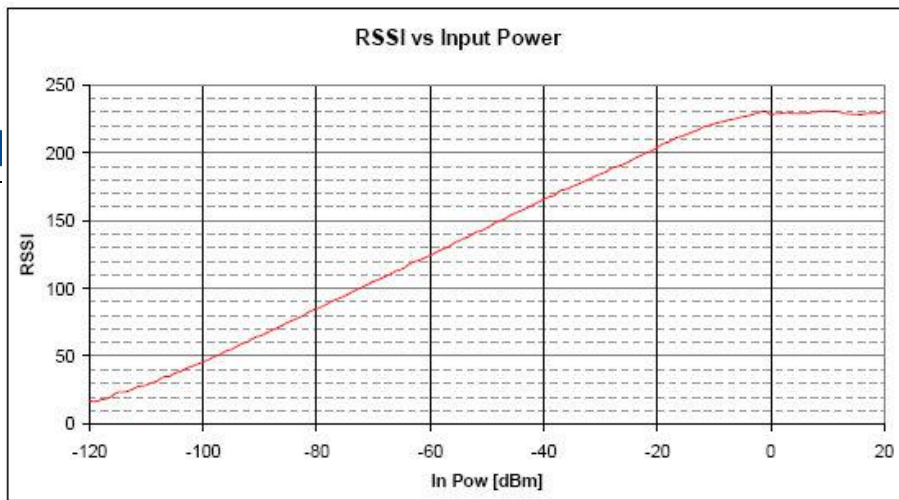
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Table 2:   The relationship between wireless signal strength and RSSI value

10) Command [78]:

Read the RF strength of the current external interference, without [parameters]

Configuration instructions are: AA FA 78

The RSSI value read is an 8-bit byte, ranging from 0-255

The relationship between RF signal strength and RSSI value is shown in Table 2.
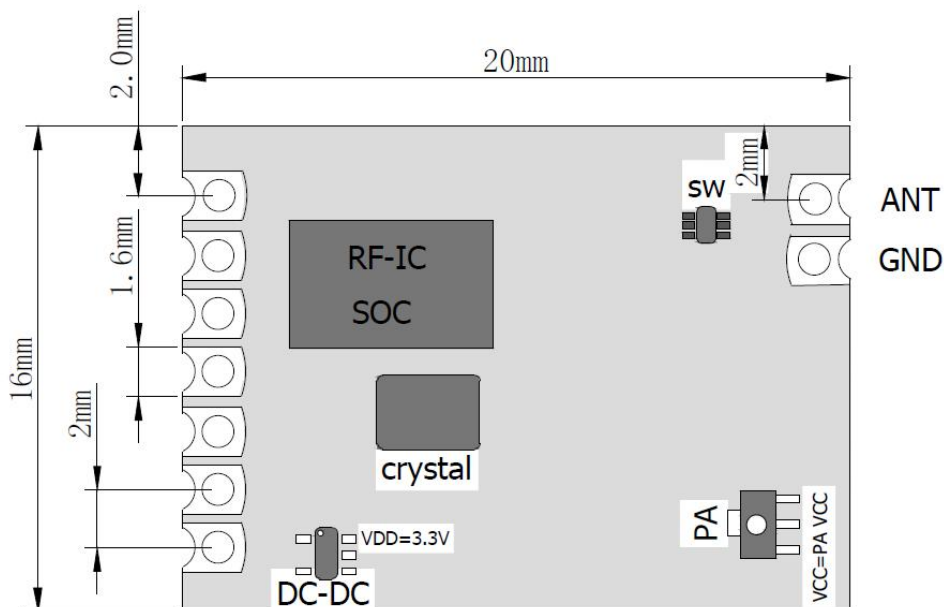
Remark: Configuration Notes

Modulation index: H = Fd/Rb, ranging from 0.5 to 32.

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

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

Produce size & Application diagram

Product size of DL-TRP A Series Module

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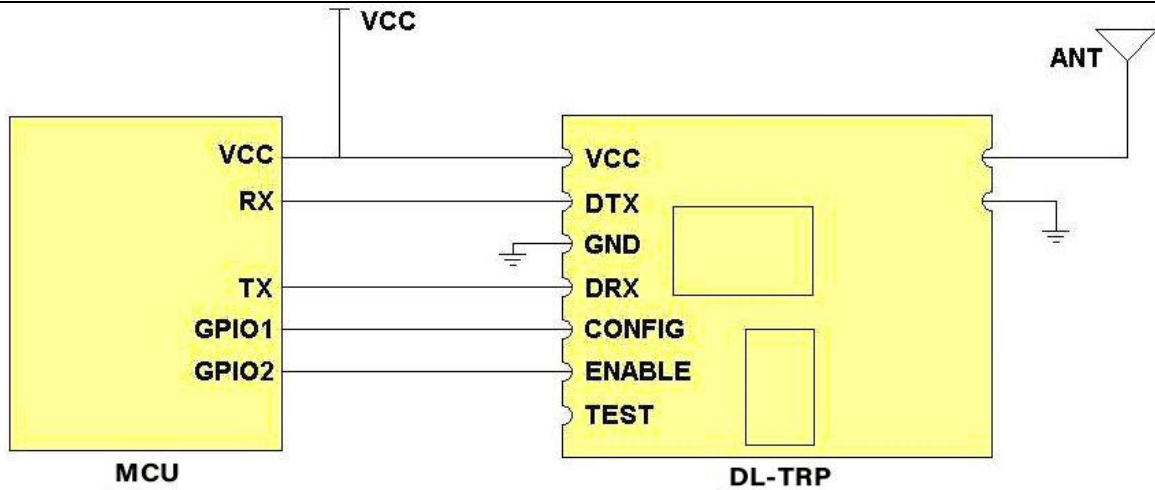
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Figure 3: DL-TRP TTL Level UART Serial Interface Application

As shown in Figure 3, connecting the DTX foot of the DL-TRP module to the UART RX foot of the MCU, the DRX foot of the DL-TRP module to the UART TX foot of the MCU, the CONFIG and ENABLE foot of the DL-TRP module to the GPIO foot of the MCU, to constitute a minimum application of TTL level.
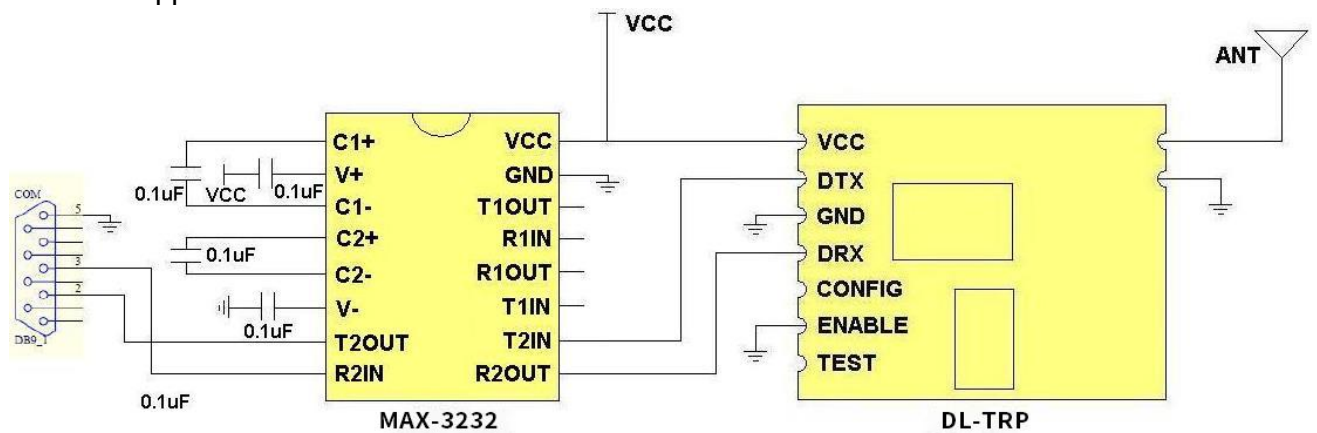

Figure 4: Application of DL-TRP Extended RS232 Interface

As shown in Figure 4, adding MAX3232 chip can expand DL-TRP to RS232 interface, which can connect directly to COM port of PC.

Factory Parameter Configuration

Product Model	Operating frequency (MHz)	RF Transmission Rate (Kbps)	Receive bandwidth (KHz)	Modulated Frequency Offset (KHz)	Transmission power (dBm)	UART Transmission Rate (Kbps)
DL-TRP-A433M	434.000	9.600	105	35	+20	9.600
DL-TRP-A868M	869.000	9.600	105	35	+20	9.600
DL-TRP-A915M	915.000	9.600	105	35	+20	9.600

Contact us

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