# MODULAR TRANSCEIVER

## Contents:



## 1. Introduction

This is a Modular RF Transceiver designed to be used in transmitting/receiving the UART data between Remote units over the air. It uses the 915MHz carrier frequency.

## 2. Specifications:

| *Specification of Modular transceiver* | | |
|---|---|---|
| **Communication parameter** | | |
| **Parameter** | **Rate** | **units** |
| RF (over the air) Data Rate | 19200 | bps |
| Power (Selectable) | 0, 5,10 | dbm |
| Frequency Deviation | 55 or 235 | KHz |
| **Interface data rate[UART]** | 19200 | bps |
| **Power supply** | | |
| Supply Voltage | 3.3 to 9 | V dc |
| Peak Transmitter current | 70 | mA |
| Receiver current | 18 | mA |
| Power down current | <60 | uA |

## 3. Pin Details:

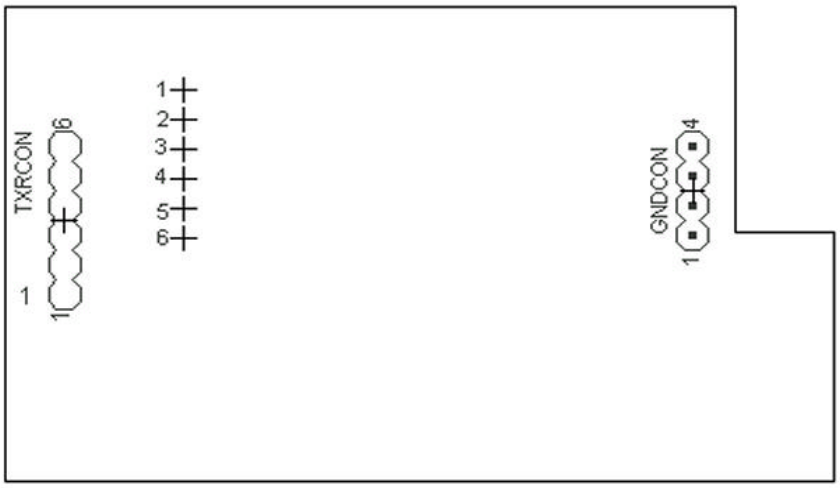


**FIG1.1**

| MODULE PIN (TXRCON) | SIGNAL NAME | I/O | DESCRIPTION |
|---|---|---|---|
| 1 | VCC | I | 3.3V to 9V DC |
| 2 | GND | I | Ground |
| 3 | CMD/DATA | I | When this pin is low the transceiver will be in Data mode.<br>When this pin is high the transceiver will be in Command mode<br>For details refer Operations |
| 4 | CTS | O | CTS (clear-to-send) flow control – When pin is driven low,UART host is permitted to send serial data to the module. |
| 5 | RXD | I | Serial data entering the module (from UART host). |
| 6 | TXD | O | Serial data exiting the module (to the UART host). |

TXRCON Pin Signal Description Table 1.1

**Note** : All the I/O pins are bufferd

| MODULE PIN (GNDCON) | SIGNAL |
|---|---|
| 1 | Ground |
| 2 | Ground |
| 3 | Ground |
| 4 | Ground |

GNDCON Pin Signal Description Table 1.2

## 4. Serial communication

The RF Transceiver Module interfaces to a host device through an asynchronous serial port at 19200, 8, N, 1 with CTS control.

**UART-Interfaced Data Flow**
Devices that have a UART interface can connect directly through the pins of the Transceiver Module as is shown in the fig1.2 below.

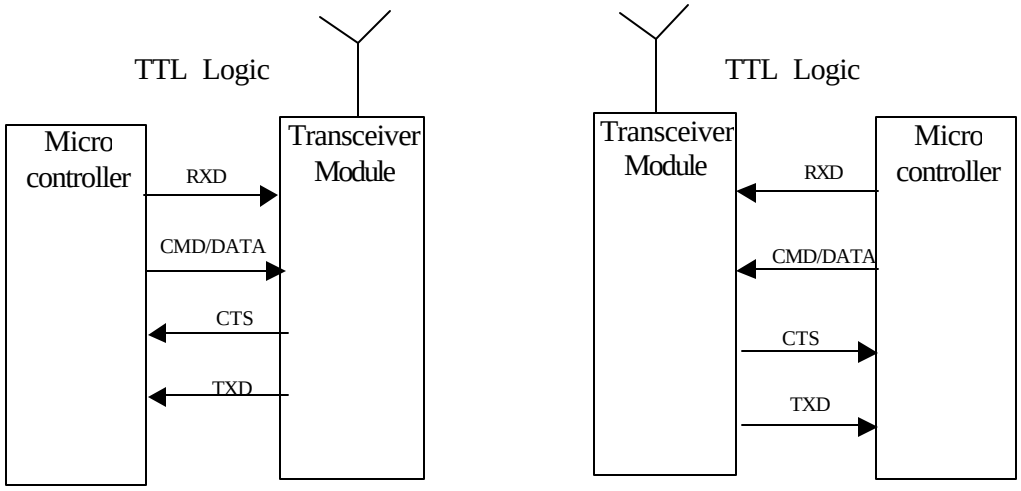


**Fig 1.2. System Data Flow Diagram in a UART-interfaced environment**

**Serial Data:**

Data enters the Transceiver Module through the RXD pin (pin 5) as an UART signal with baud rate of 19200bps, 8 data bits, 1 stop bit & no parity. CTS flow control should be observed by the host to prevent data loss. The host must also be ready at all times to receive data from the modular transceiver (no RTS flow control).

**CMD/DATA:**

This line should be held low during the normal operation. In special mode of operations like setting the communication parameters,sending the Transceiver to the Power down mode it has to be held high.

**5.RF Operation :**

Modular transceiver operates in three mode
1. Receive mode
2. Transmitter mode
3. Sleep mode.

**Receiver :**
Transceiver by default will be in Receive mode. As soon as the module detects RF data it will start receiving the RF packet.

While receiving the data as a packet it checks for the destination address, if the destination address matches with its source address then only it will continue the reception else it will stop the reception.

After the complete packet is received , the module checks the CRC (cyclic redundancy check) to ensure that the data was transmitted without error. If the CRC does not match the incoming packet is invalid and the packet is discarded. If the received packet is valid, module will change to the Transmitter mode and acknowledgment packet will be sent.

After sending the acknowledgement, it also checks if the same packet has been received by comparing it with the previously received packet. If it is different packet then put the received data to the UART (To the host controller).

The module returns to receive mode and waits for arrival of RF data .

**Transmitter**:

Modular transceiver will go to the transmitter mode in two cases
1.If the data is received from the host and no more data is received within next 50 ms after the last byte received.
2.If the received data length is of 25 characters or more.

After going to transmitter mode , it will construct the packet by calculating the CRC(cyclic redundancy check) calculation includes the source address ,destination address,data length and data type.

This packet will be sent to the the destination address which is stored previously in the eeprom of the transceiver module {refer parameter changing in section ).

After sending the RF data, module will switch to receiver mode and waits for the

acknowledg for 50ms.
If acknowledgment is not received within the specified time then wait for random delay time, switch to transmitter mode and retransmit the same packet again and wait for acknowledgment. This is repeated till the acknowledgment is received or for 10 retries. Then switch back to receiver mode and wait for RF data.

**Power down mode :**

This is special mode of the transceiver in this mode data is neither transmitted or received.
Transceiver can be sent to this mode by sending the special command when the CMD/DATA pin is high.
Importance of this mode is for saving the power. In this mode current to the whole module will be around 55uA.

## 6.Commands :

As soon as the CMD/DATA pin is made high, transceiver will go to command mode.
In command mode fallowing parameters can be changed.

### 1.Communication Parameters

a).Power : Can be set to 0db,5db or 10db.

Command to be sent is as shown below ,

PW [Power] '\n'

It includes the 4 characters 'P' ,' W' fallowed by power (in hex)to be changed and a escape sequence.

| POWER | COMMAND |
|---|---|
| 0db | PW0x0\n |
| 5db | PW0x05\n |
| 10db | PW0x0A \n |

b)Frequency Deviation : Can be changed to 55Khz or 235Khz

| Frequency Deviation | Command |
|---|---|
| 55Khz | FD0x37\n |
| 235Khz | FD0xEB\n |

2. Source Address :

It is two byte address can be changed to any value from 0 to 65534.
command is S byte1 byte2 \n
e.g:
To set the source address to 0x2000
S 0x20 0x00 \n

3 .Destination address
It is two Byte address can be changed to any value from 0 to 65534
command is
D byte1 byte2 \n

4.Send the transceiver to the power down mode.
Command is PD pad byte \n
e.g
PD 0x00\n will send the transceiver to the power down mode.
Transceiver will wake up whenever the CMD/DATA pin is pulled to low

## 7.Mechanical Drawings;