433 MHz RF Transceiver (#27982)

The Parallax 433 MHz RF Transmitter allows users to easily send serial data, robot control data or other information wirelessly. Reliable wireless communication is as effortless as sending serial data. The power-down (PDN) pin may be used to place the module into a low power state (active low), or left floating (it is pulled high on the module).

Features

- High-speed data transfer rates (1200 ~ 9600 baud)
- SIP header allows for ease of use with breadboards
- Compatible with most microcontrollers including the Propeller chip and all BASIC Stamp models
- As easy to use as simple SEROUT/SERIN PBASIC instructions
- Power-down mode for conservative energy usage (longer battery life)
- Line-of-sight range up to 250 feet (depending on conditions)

Key Specifications

- Power requirements: 3.3 – 5 VDC @ ~10 mA
  (~4 mA in power-down mode)
- Communication: asynchronous serial @ 1200 – 9600 bps
- Operating temperature: 32 to 158 °F (0 to 70 °C)
- Dimensions: 3.82″ H x 0.94″ W x 0.41″ D
  (97.0 mm H x 24.0 mm W x 10.5 mm D)

Application Ideas

- Remote controlled Boe-Bot® robot
- Wireless data acquisition
- Remote signal beacon for adventure seekers
- Remote industrial monitoring
- Lighting control
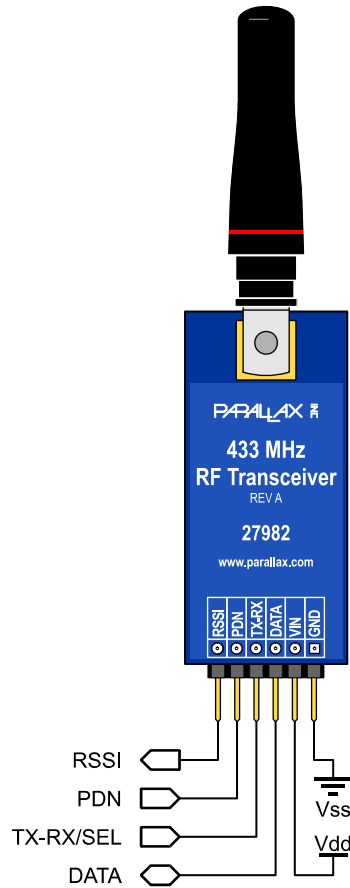- Keyless entry

Quick Start Circuit

Figure 1: Pin Connections

Connecting and Testing

Connect the I/O pins above to your microcontroller as needed. To use the BASIC Stamp example code you will use P0 for DATA and P1 for TX-RX. PDN and RSSI are optional and described in more detail on the following page.

Resources and Downloads

You may download free example programs and articles from the product page on our website by searching for 27982.

Theory of Operation

Short for Radio Frequency, RF refers to the frequencies that fall within the electromagnetic spectrum associated with radio wave propagation. When applied to an antenna, RF current creates electromagnetic fields that propagate the applied signal through space. Any RF field has a wavelength that is inversely proportional to the frequency. This means that the frequency of an RF signal is inversely proportional to the wavelength of the field. The Parallax 433 MHz RF Transceiver utilizes a frequency of 433 MHz, this works out to be a wavelength of approximately 0.69 meters.

Precautions

- The DATA and TX-RX pins are connected on the module to MOSFETs, which are highly sensitive to static electricity. It is advised not to touch these pins unless necessary.

Pin Definitions and Ratings

Pin	Name	Function
1	GND	Ground: 0V (VSS)
2	VIN	Power: 3.3 to 5 VDC
3	Serial Data	Serial Data Input/Output; direction depends on T/R line
4	T/R	Transmit/Receive Select: LOW/Floating = Receive; HIGH = Transmit
5	PDN	Power Down: LOW = Power Down Mode; HIGH/Floating = Normal
6	RSSI	Received Signal Strength Indicator

PDN

Pulling the PDN pin low puts the transceiver into low-power mode where it uses < 4 mA current. Leaving it floating places the transceiver into normal mode where it will draw ~10 mA.

RSSI

The RSSI pin provides an analog voltage relative to what the transceiver is picking up (receiving). Note that this signal is modulated and the voltage will vary with the rising and falling of the DATA line.

Synchronization

When initiating communication between two RF Transceiver modules, a sync pulse should be sent to re-establish the radio connection between the modules. Sending several characters can accomplish this, however sending a pulse (which maintains a high state during the synchronization) is more efficient:

√ For BS1s the following code line sends an appropriate sync pulse:

```
PULSOUT 0, 300
```

√ For BS2s the following code line sends an appropriate sync pulse:

```
PULSOUT 0, 1200
```

Communication Protocol

The 433 MHz RF Transceivers do not have a built-in protocol and therefore are not immune to noise and errors in the signal. To account for this it is recommended that you initiate error checking on your microcontroller to be sure the packets are valid. You could even create a simple protocol that could be used to verify each transmission arrives at its destination intact. For error checking examples please see the code example downloads on the product page of our website, www.parallax.com. You can find this by typing 27982 into the search box and clicking Go.

Module Dimensions
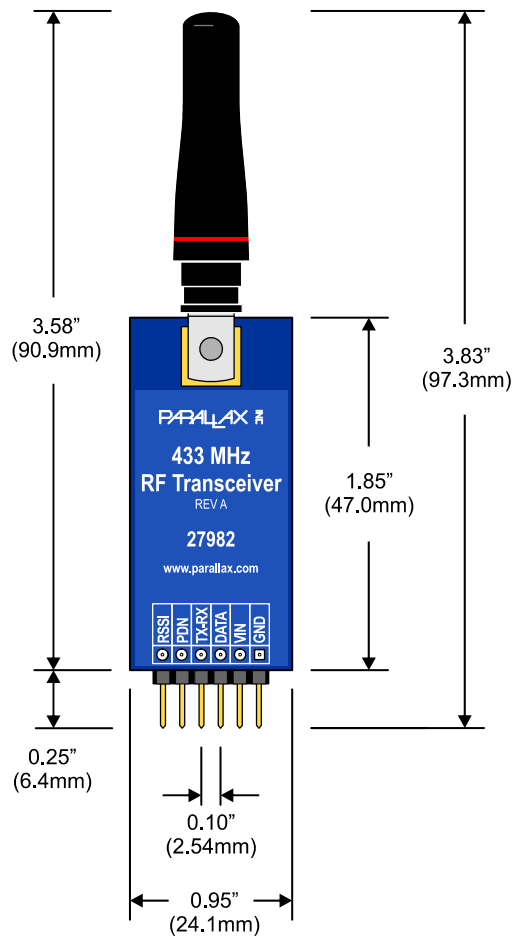
BASIC Stamp® 1 Program

To use this TX code on a BASIC Stamp 1 system, please connect the RF Transceiver DATA line to P0 and the T/R line to P1. This is a very basic communication example.

```
' TcvrCode_Tx_v1.1.bs1

' {$STAMP BS1}
' {$PBASIC 1.0}

SYMBOL x  =  W1
SYMBOL y  =  W2

HIGH 1                    'T/R line

Start:

  PULSOUT 0, 300          'Sync pulse for the Transceivers
  SEROUT 0, N2400, ("!", B3, B2, B5, B4)
  PAUSE 100
  x = x + 1
  y = y + 1
  PAUSE 150

GOTO Start
```

To use this RX code on a BASIC Stamp 1 system, please connect the RF Transceiver DATA line to P0 and the T/R line to P1. This is a very basic communication example.

```
' TcvrCode_Rx_v1.1.bs1

'{$STAMP BS1}
'{$PBASIC 1.0}

SYMBOL x  =  W1
SYMBOL y  =  W2

LOW 1

Start:

  SERIN 0, N2400, ("!"), B3, B2, B5, B4
  DEBUG x, y

GOTO Start
```

BASIC Stamp® 2 Program

To use this TX code on a BASIC Stamp 2 system, please connect the RF Transceiver DATA line to P0 and the T/R line to P1. This is a very basic communication example.

```
' Tcvr_TxCode_v1.1.bs2

'{$STAMP BS2}
'{$PBASIC 2.5}

x    VAR    Word
y    VAR    Word

HIGH 1                                  ' T/R Line

DO
  PULSOUT 0, 1200                       'Sync pulse for the receiver
  SEROUT  0, 16468, [ "!", x.HIGHBYTE, x.LOWBYTE, y.HIGHBYTE, y.LOWBYTE ]
  x = x + 1
  y = y + 1
  PAUSE 10
LOOP
```

To use this RX code on a BASIC Stamp 2 system, please connect the RF Transceiver DATA line to P0 and the T/R line to P1. This is a very basic communication example.

```
'Tcvr_RxCode_v1.1.bs2

'{$STAMP BS2}
'{$PBASIC 2.5}

x    VAR    Word
y    VAR    Word

LOW 1                                   ' T/R Line

DO
  LOW 0
  SERIN 0, 16468, [WAIT("!"), x.HIGHBYTE, x.LOWBYTE, y.HIGHBYTE, y.LOWBYTE]
  HIGH 0
DEBUG ? x
DEBUG ? y
LOOP
```

FCC Notice and Liability Disclaimer

These modules (boards) are not FCC approved. They are designed to comply with FCC Part 15 Rules and Regulations. They are not in a finished product form.   They are strictly intended for experimental purposes only. If you wish to use these modules in an actual product (a non-experimental capacity), the module must first be designed into the product then the whole product must be approved by the FCC.

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