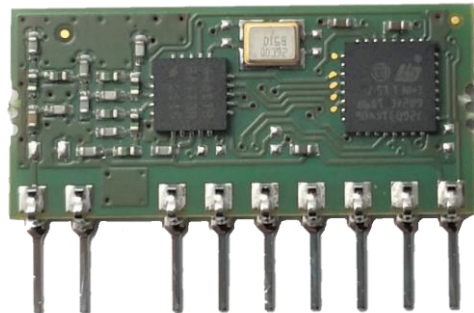


# Wireless Transparent Modules Datasheet

## 32001537

449 MHz TRANSCEIVER

## Datasheet



### Overview

Transceiver operating in the 449 MHz SRD band with extremely compact dimensions.

The module operates as an independent device that can be controlled through external control lines.

## Contents

1. Product Features.....	<b>3</b>
2. Mechanical Dimensions .....	<b>4</b>
3. Pin Definition .....	<b>4</b>
4. Electrical Characteristics.....	<b>5</b>
4.1 Absolute Maximum Ratings .....	<b>5</b>
4.2 Operating Condition.....	<b>5</b>
5. I/O Pins Status and Control in Standard Mode .....	<b>Errore. Il segnalibro non è definito.</b>
5.1 Control in UART mode.....	<b>8</b>
5.2 Control in GPIO mode.....	<b>9</b>
6. Temperature Range Curves .....	<b>10</b>
6.1 Receiver.....	<b>10</b>
6.2 Transmitter .....	<b>11</b>
7. Application Notes .....	<b>12</b>
8. Regulatory Approvals.....	<b>12</b>
9. Revision History .....	<b>12</b>

## I. Product Features

### Mechanical highlights:

- ✓ Compact dimensions

### RF performances:

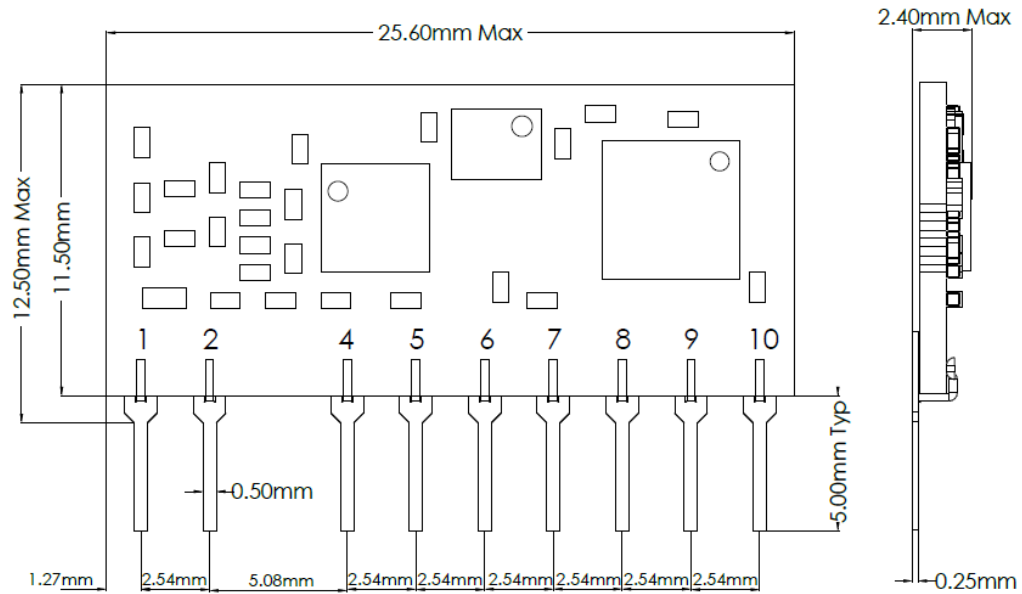
- ✓ -115 dBm Sensitivity
- ✓ +10 dBm Output power

### Low power characteristics:

- ✓ Sleep current 3  $\mu$ A

- The TRX module operates as a single channel (449.850 MHz) 2-FSK transceiver. Through the external pins, the user can control the operation mode (Tx, Rx, Sleep Mode). Supports data rates of 2400 bit/s.
- Standard supply voltage range from 2.3 to 3.6 V. The module meets all the requirements in the industrial temperature range -40 / +85 °C.
- Compliant with RoHS directives.

## 2. Mechanical Dimensions



## 3. Pin Definition

Pin	Name	Type
1	RF I/O	RF
2	GND	S
4	DATA OUT	O
5	EN	I
6	TX/RX	I/O
7	GND	S
8	NC	NC
9	DATA IN	I
10	VDD	S

**LEGEND:** S = Power supply, O = Output, I = Input, RF = Antenna port, NC = Do Not Connect

## 4. Electrical Characteristics

### 4.1 Absolute Maximum Ratings

Parameter	Max.	Unit
Supply Voltage (VDD)	3.9	V
Max voltage on pins 4, 5, 6, 8, 9	VDD + 0.3	V
Storage Temperature	-40 to +100	°C
Operating Temperature	-40 to +85	°C
Radio Frequency Input, pin 2	+10	dBm

### 4.2 Operating Condition

**Note:** All RF parameters measured with input (pin 1) connected to a 50  $\Omega$  impedance signal source or load.

GENERAL ELECTRICAL CHARACTERISTICS @ 25 °C
--

Parameter	Min.	Typ.	Max.	Unit	Notes
Supply Voltage (VDD)	2.3	3.0	3.6	V	
Tx Current consumption	-	22	25	mA	1
Rx Current consumption	-	16	18	mA	2
Sleep Mode Current consumption	-	3	-	$\mu$ A	
Operating Band	449.8375	-	449.8875	MHz	
Operating frequency	-	449.8500	-	MHz	
Operating Channel Width	-	8.5	-	kHz	
2-FSK deviation	-	$\pm$ 2.4	-	kHz	
Data Rate	-	2400	-	bit/s	
V <sub>low</sub> on I/O pins	0	-	0.3xVDD	V	
V <sub>high</sub> on I/O pins	0.7xVDD	-	VDD	V	
Output load on pin 4	2	-	-	k $\Omega$	

RECEIVER ELECTRICAL CHARACTERISTICS @ 25 °C

Parameter	Min.	Typ.	Max.	Unit	Notes
Sensitivity	-	-115	-	dBm	3
-3 dB RF Bandwidth	-	2	-	kHz	3

TRANSMITTER ELECTRICAL CHARACTERISTICS @ 25 °C

Parameter	Min.	Typ.	Max.	Unit	Notes
Output Power	-	9.5	10	dBm	
2-FSK Occupied Bandwidth	-	6.2	6.4	kHz	
Unwanted spurious emission	-	-	-48	dBm	
Out-of-band emissions	-	-	-36	dBm	
Frequency accuracy	-	±0.3	-	ppm	

TIMINGS @ 25 °C / VDD = 3.0 V

Parameter	Min.	Typ.	Max.	Unit	Notes
Time between power on and valid data reception	-	40	-	ms	
Time between power on and valid data transmission	-	40	-	ms	
Time by Sleep Mode to RX	-	17	-	ms	
Time by Sleep Mode to TX	-	17	-	ms	
Time by TX to RX	-	15	-	ms	
Time by RX to TX	-	15	-	ms	

**Notes:**

**Note 1:** TX Current consumption measured with unmodulated TX carrier.

**Note 2:** RX Current consumption measured with 2400 bit/s NRZ pseudo-random bit sequence code demodulated, BER ≤ 10<sup>-3</sup>.

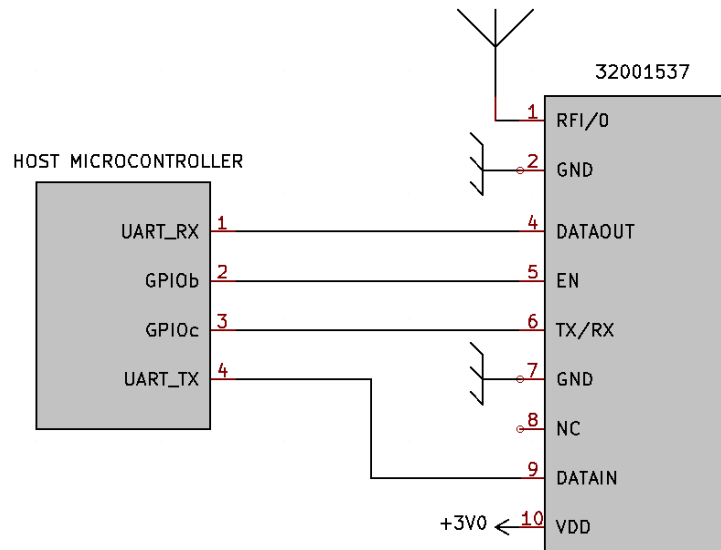
**Note 3:** Test signal 2-FSK 2400 bit/s NRZ pseudo-random bit sequence code (dev. ± 2.4 kHz). Results @ BER ≤ 10<sup>-3</sup>.

## 5 I/O Pins Status and Control in Standard Mode

The default mode behaves as a transparent device with respect to the data stream.

### 5.1 Control in UART Mode

DATA IN and DATA OUT pins of the transceiver are connected to the UART communication peripheral of the microcontroller.



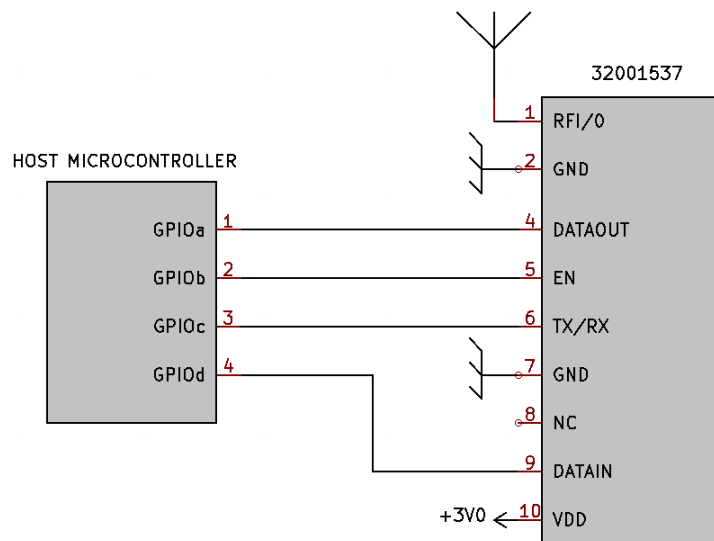
In this mode the control pins on the microcontroller side must be configured as follow:

Pin	Pin name	Configuration	Control
1	UART_RX	UART data RX	RX data stream to the host microcontroller.
2	GPIOb	DIGITAL OUTPUT	Enable pin. Allow to activate or set in Sleep Mode the module, according to the following logic:  0: power down (module in Sleep Mode) 1: enable (module operative)
3	GPIOc	DIGITAL OUTPUT	Operating mode selection pin.  0: module in reception (RX mode) 1: module in transmission (TX mode)
4	UART_TX	UART data TX	TX data stream to the radio module



## 5.2 Control in GPIO Mode

DATA IN and DATA OUT pins of the module are sampled with the host microcontroller general purpose input-output peripheral.



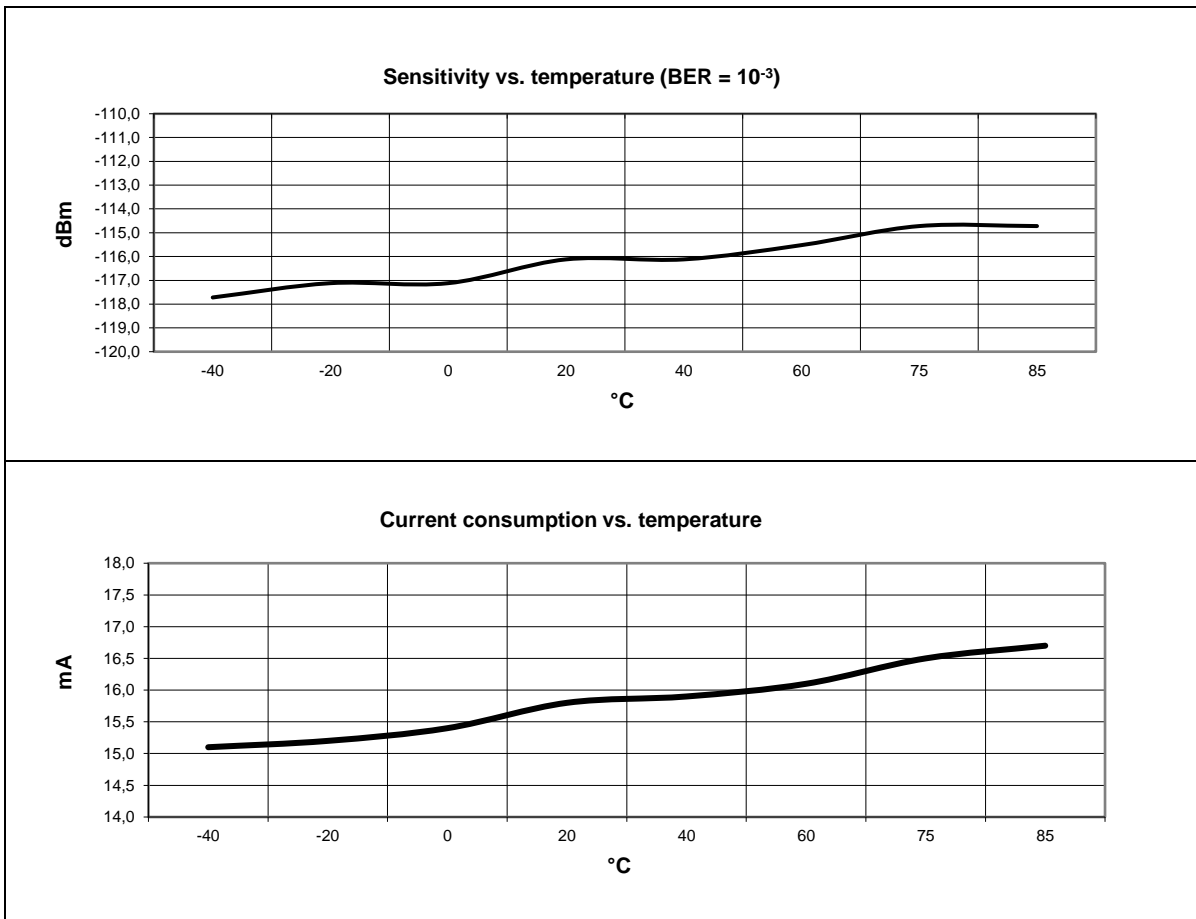
In this mode, control pins on microcontroller side, must be configured as follow:

Pin	Pin name	Configuration	Control
1	GPIOa	DIGITAL INPUT	RX data stream to the host microcontroller.
2	GPIOb	DIGITAL OUTPUT	Enable pin. Allow to activate or set in power down the module, according to the following logic:  0: power down (module in Sleep Mode) 1: enable (module operative)
3	GPIOc	DIGITAL OUTPUT	Operating mode selection pin.  0: module in reception (RX mode) 1: module in transmission (TX mode)
4	GPIOd	DIGITAL OUTPUT	Host microcontroller sends data in transmission mode.

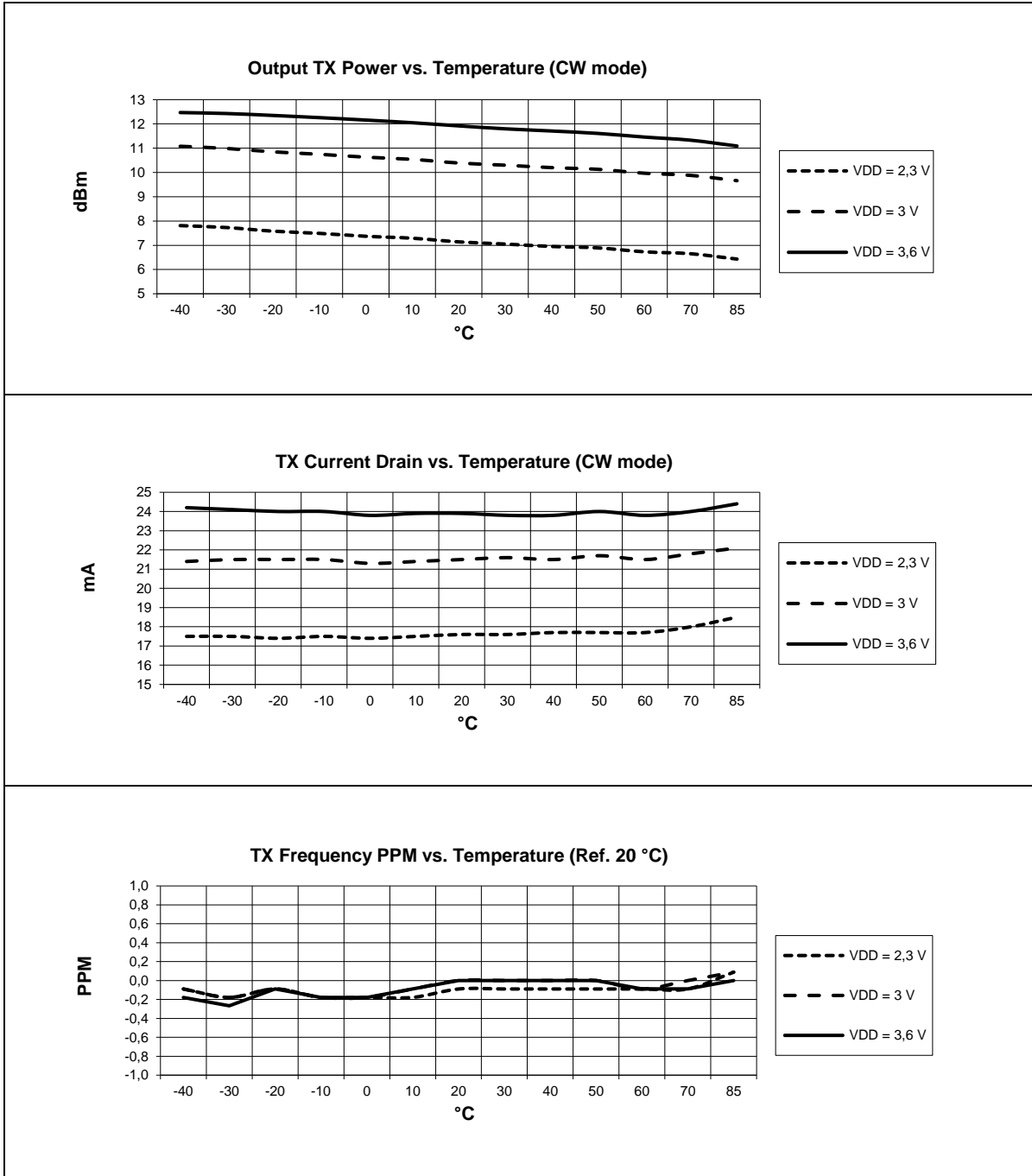
## 6. Temperature Range Curves

**Note:** All RF parameters measured with input (pin 1) connected to a 50 Ω impedance signal source or load.

### 6.1 Receiver



## 6.2 Transmitter



## 7. Application Notes

Title	Description	Doc
PCB Layout Guidelines	Hints how to make for a good RF design	AN_RF_001.pdf

## 8. Regulatory Approvals

Doc	Title	Description
-	-	-

## 9. Revision History

Revision	Date	Description
0.0	13.04.2022	Draft