

Wireless Transparent Modules Datasheet

32001270

DUAL MODE 868 MHz TRANSCEIVER

Data Sheet



Overview

Dual-mode transceiver operating in the 868 MHz SRD band with extremely compact dimensions.

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

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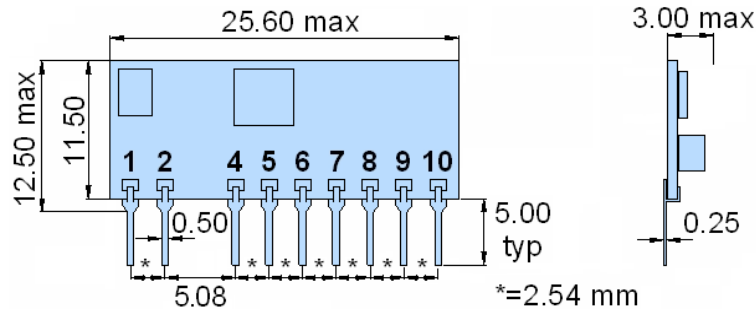
I. Description

The peculiarity is the possibility of using two possible operating modes of the device:

Normal mode (default): The TRX module operates as a dual channel (868.15- 868.45 MHz) transceiver in OOK. Through the external pins, the user can control the operation mode (Tx, Rx, stand-by) and the channel frequency. Supports data rates up to 4800 baud.

Extended Mode (User-programmable): through a predefined sequence of serial commands sent on input pins, the user can enter configuration mode and then customize the module. It is possible to set the output power, the frequency of the channel (selectable for each channel between 868.1, 868.15, 868.2, 868.3, 868.4, 868.45, 868.5, 868.825, 868.95, 869.075, 869.85 MHz), the modulation (OOK, FSK), the baud rate up to 38400 baud, etc.

2. Mechanical Dimensions



3. Pin Definition

Pin Number	Name	Description
1	RF I/O	Tx: RF Output - Rx: RF Input
2	GND	Ground
4	Data Out	Data Output in reception mode
5	EN	0 = Power down 1 = Active; ready to TX or RX
6	Tx/Rx	0 = Reception 1 = Transmission
7	GND	Ground
8	CH Sel/Serial Input	Normal Mode: 0 = 868.15 MHz 1 = 868.45 MHz Extended Mode: Sequence of commands
9	Data In	Ground Data Input in transmission mode
10	Vcc	Voltage Supply

4. Electrical characteristics

4.1 Absolute Maximum Ratings

Parameter	Max.	Unit
Supply voltage, +Vcc, pin 15:	3.6	V
Radio Frequency Input, pin 3:	10	dBm
Max pins voltage with respect to GND	+Vcc+0.3	V
Storage Temperature:	-40 ÷ 100	°C
Operating Temperature:	-20 ÷ 70	°C

4.2 Operating Condition

GENERAL ELECTRICAL CHARACTERISTICS @ 25 °C

Parameter	Min.	Typ.	Max.	Unit	Notes
Supply Voltage (Vcc)	2.1	3.0	3.6	V	
Current drain Power Down	-	0.5	-	μA	See note 1
Current drain Tx mode	-	25	-	mA	See note 1
Current drain Rx mode	-	15	-	mA	See note 1
V _{low} on I/O pins	0	-	0.2*Vcc	V	
V _{high} on I/O pins	0.8*Vcc	-	Vcc	V	
Output load on pin 4	2000	-	-	Ω	

RECEIVER CHARACTERISTICS @ 25 °C

Parameter	Min.	Typ.	Max.	Unit	Notes
OOK Sensitivity (Extended Mode)	-	-110	-	dBm	See note 2
FSK Sensitivity	-	-104	-	dBm	See note 2
Operating Frequency CH1	-	868.15	-	MHz	See note 4
Operating Frequency CH2	-	868.45	-	MHz	See note 4
-3dB Bandwidth OOK	-	200	-	kHz	See note 4
-3dB Bandwidth FSK (Extended Mode)	-	100	-	kHz	See note 4
FSK Deviation (Extended Mode)	-	±25	-	kHz	
Baud Rate	1200	-	4800	Baud	

TRANSMITTER CHARACTERISTICS @ 25 °C

Parameter	Min.	Typ.	Max.	Unit	Notes
Output Power	-	10	-	dBm	See note 3
Operating Frequency CH1	-	868.15	-	MHz	
Operating Frequency CH2	-	868.45	-	MHz	
Frequency Accuracy	-	±10	-	kHz	
FSK Deviation (Extended Mode)	-	±25	-	kHz	
Occupied Band Width (OOK, 4800 Baud)	-	-	30	kHz	
Occupied Band Width (OOK, 4800 Baud)	-	-	65	kHz	
Operating Channel Width	-	-	600	kHz	
Baud Rate	1200	-	4800	Baud	

TIMINGS @25 °C

Parameter	Min.	Typ.	Max.	Unit	Notes
Time between power on and valid data reception in OOK	-	40	-	ms	
Time between power on and valid data reception in FSK	-	40	-	ms	
Time between power on and valid data transmission in OOK	-	40	-	ms	
Time between power on and valid data transmission in FSK	-	40	-	ms	
Time by power off to RX in OOK	-	1	-	ms	
Time by power off to RX in FSK	-	1	-	ms	
Time by power off to TX in OOK	-	1	-	ms	
Time by power off to TX in FSK	-	1	-	ms	
Time by TX to RX in OOK	-	600	-	µs	
Time by TX to RX in FSK	-	400	-	µs	
Time by RX to TX in OOK	-	400	-	µs	
Time by RX to TX in FSK	-	400	-	µs	
Time by Ch1 to Ch2 in RX in OOK	-	1	-	ms	
Time by Ch1 to Ch2 in RX in FSK	-	700	-	µs	
Time by Ch2 to Ch1 in RX in OOK	-	700	-	µs	
Time by Ch2 to Ch1 in RX in FSK	-	600	-	µs	
Time by Ch1 to Ch2 in TX in OOK	-	600	-	µs	

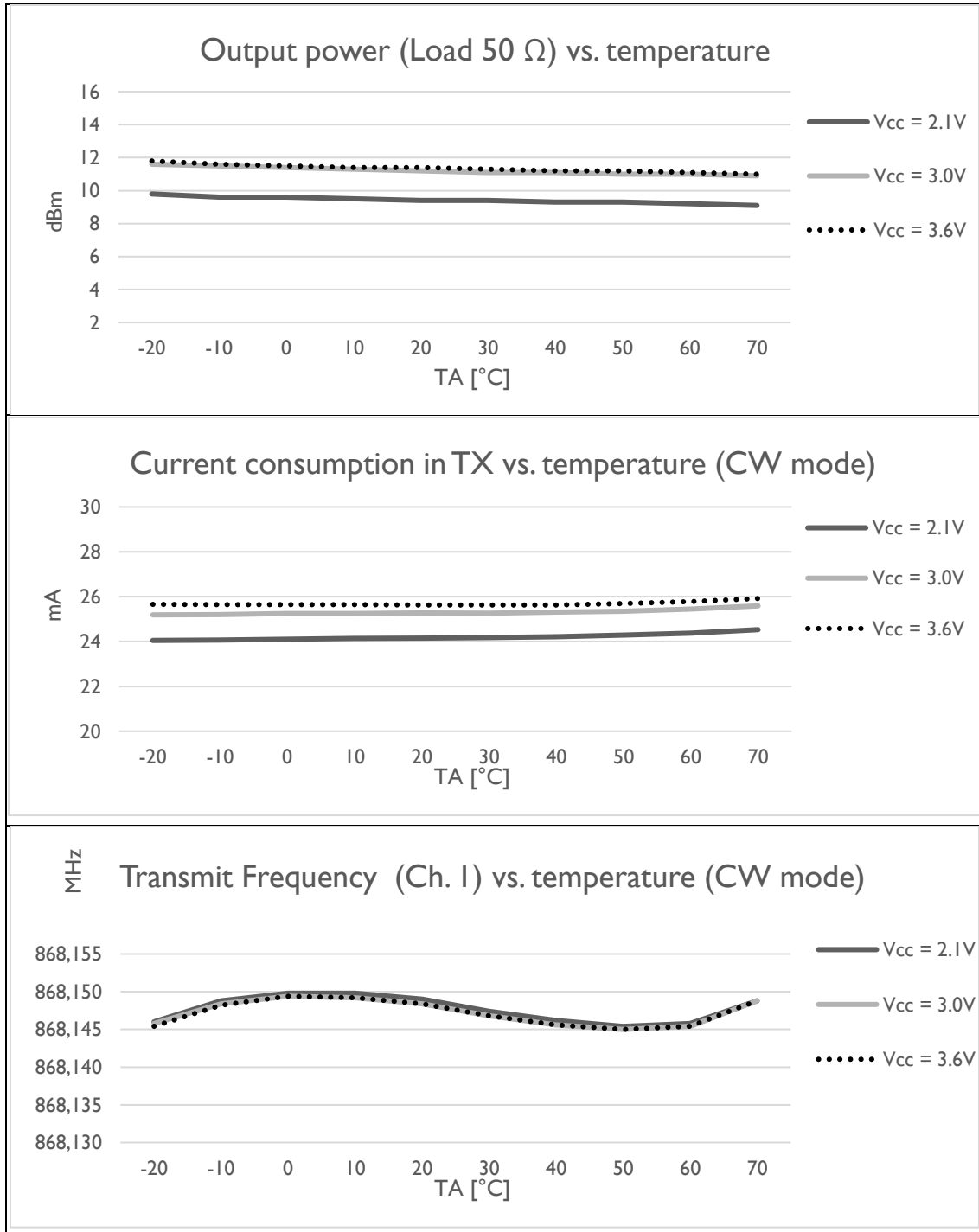
Time by Ch1 to Ch2 in TX in FSK	-	600	-	μs	
Time by Ch2 to Ch1 in TX in OOK	-	600	-	μs	
Time by Ch2 to Ch1 in TX in FSK	-	600	-	μs	
Time by no RF at input port to valid data reception (settling) in OOK	-	250		μs	
Time by no RF at input port to valid data reception (settling) in FSK	-	250		μs	

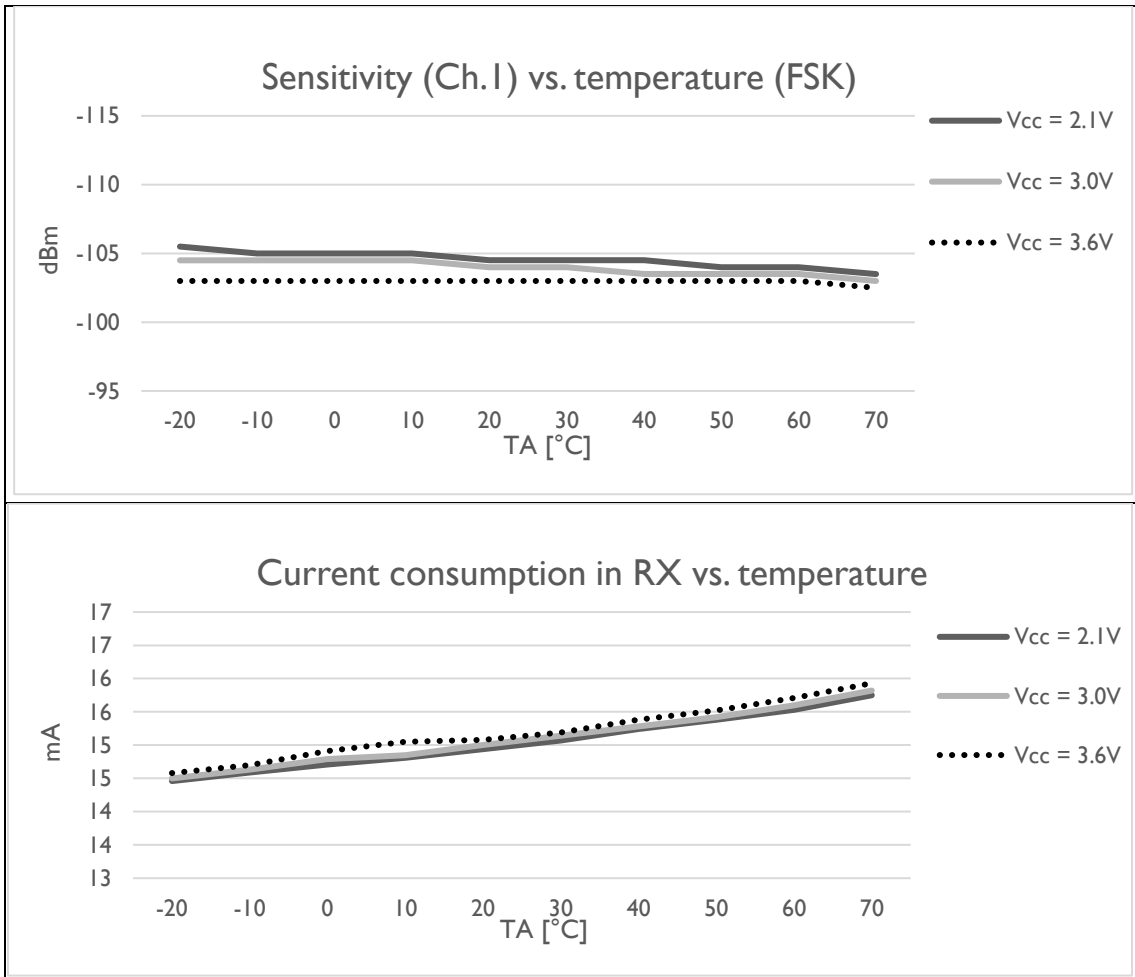
4.2.1 Notes:

- Note 1:** Current consumption measured at power supply level of +3 V. Current consumption in TX measured in CW.
- Note 2:** Sensitivity measured with OOK modulated signal, PRBS code, 4800 baud, result at BER equal or less than 10^{-2} .
- Note 3:** Transmitter is compliant with ETSI 300 220.
- Note 4:** All RF parameters measured with input (pin 3) connected to 50-Ω impedance signal source or load

4.3 Temperature Range Curves

Note: All RF parameters measured with input (pin 3) connected to a 50-Ω impedance signal source or load.





5. I/O Pins Status and Control

Data Out (pin 4):

Normal mode operation: ACTIVE (High or Low)
Power Down: ACTIVE LOW – MUST NOT be driven externally

EN (pin 5):

Normal mode operation: HIGH IMPEDANCE – MUST be driven externally (High or Low)
Power Down: HIGH IMPEDANCE – MUST be driven externally (High or Low)

Tx/Rx (pin 6):

Normal mode operation: HIGH IMPEDANCE – MUST be driven externally (High or Low)
Power Down: HIGH IMPEDANCE – MUST be driven externally (High or Low)

CH_SEL/Serial input (pin 8):

Normal mode operation: HIGH IMPEDANCE – MUST be driven externally (High or Low)
Power Down: HIGH IMPEDANCE – MUST be driven externally (High or Low)

Data In (pin 9):

Normal mode operation: HIGH IMPEDANCE – MUST be driven externally (High or Low)
Power Down: HIGH IMPEDANCE – MUST be driven externally (High or Low)

NORMAL MODE OPERATION:

It is the standard use. The module behaves as a transparent device with respect to the data stream, and can be controlled via external control lines.

The data flow is carried out along the following lines:

Data out (pin 4): data output in reception mode.
Data in (pin 9): data input in transmission mode.

The maximum data rate is 4800 baud.

Control lines are:

EN (pin 5): enable pin. Allows to activate or set in stand-by the module, according to the following logic:

- 0: power down (module in stand-by)
- 1: enable (module operative)

TX/RX (pin 6): operating mode selection pin.

- 0: module in reception
- 1: module in transmission

CH_SEL (pin 8): channel selection pin.

- 0: module operating on channel 1 (868.15 MHz)
- 1: module operating on channel 2 (868.45 MHz)

Important: These command pins are high impedance inputs; therefore, they must NOT be left floating (ie: if the "Power-Down" function is not used, connect the EN pin to +Vcc; if it is used only the channel 1, then connect CH_SEL to GND, etc).

EXTENDED MODE OPERATION

User programmable, for a detailed description how to implement it see the application note: DualMode_TRX_Command_Reference_rev1.6.pdf

OPERATION BELOW MINIMUM OPERATING VOLTAGE

In order to ensure compliance with the EMC and radio spectrum regulations, set the module in Power-Down mode before the power supply falls below the minimum operating voltage (2.1 V).

6. Application Notes

Title	Description	Doc
Dual Mode TRX Command Reference	User manual for extended mode operation related to the dual mode transceiver family	DualMode_TRX_Command_Reference_rev1.6.pdf

7. Regulatory Approvals

Doc	Title	Description
32001269_DoC.pdf	Declaration of Conformity	Declaration of the conformity with the essential requirements of the European Directive 2014/53/EU

8. Revision History

Revision	Date	Description
1.5	18.09.2020	Final Release