RFW322-M Transceiver Module

FEATURES

- Designed for short range wireless communication in the 2.4 GHz - world wide license free band
- Data rate - up to 3 mbit/s
- Simple 3 line digital interface
- Low power consumption - ideal for battery operated devices
- + 6 dBm typical peak output transmission power
- - 73 dBm typical sensitivity
- Complies with FCC regulations
- Wide range operating voltage (2.6 - 3.5 V)
- Unique Direct Sequence Spread Spectrum Code
- Short signal acquisition time (1.2 µs)

The company's products are covered by one or more of the following:
Taiwan Patent No. 155994, Taiwan Patent No. 176767, USA Patent No. 6,535,545. Other patents pending

DESCRIPTION

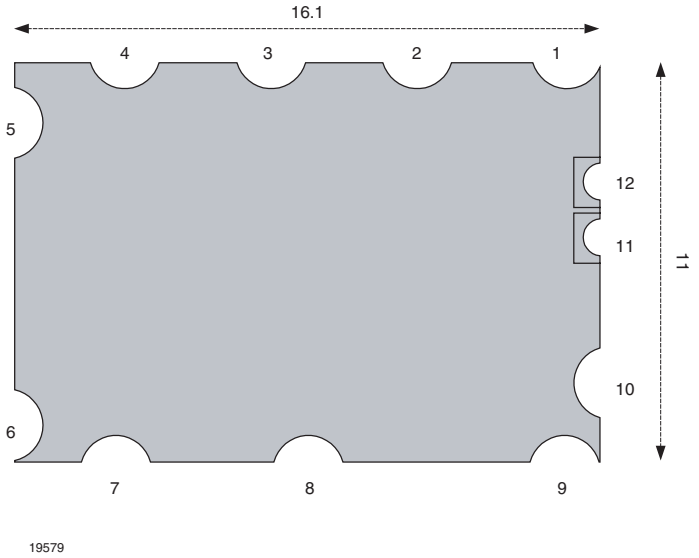
The RFW322-M ISM Transceiver Module is a short-range wireless radio transceiver, designed by Vishay RFWaves*. The transceiver is intended for use in the world wide unlicensed Industrial, Scientific and Medical (ISM) band of 2400 - 2483.5 MHz, complying with worldwide regulations and standards.
The module core consists of 2 chips, offering small size, low power consumption and simple integration with applications.
The module antenna interface reflects a 200 Ω differential impedance.
Module has 3 digital control lines. The data I/O line is a serial interface. RFW322-M the transceiver was designed for low power consumption. During standby, the transceiver almost does not consume any power (0.1 µA at Vcc = 3 V). It features a very short wakeup time of 20 µs, and the signal acquisition time is only 1.2 µs. Thus, by using the standby mode in a frequent manner, an efficient power consumption management method can be applied.

The communication link between the transceivers is based on a unique Direct Sequence Spread Spectrum (DSSS) pulse pipe. The modulation scheme is 100 % Amplitude Shift Keying (ASK).

The module interface has 12 pads and is soldered on a motherboard PCB like a regular SMT component.

* Vishay Advanced Technologies ltd. - RFWaves division

PIN OUT AND MECHANICAL DIMENSIONS in millimeters



Top View

PINOUT			
1	VCC RF	7	TX/RX
2	ACT	8	TXD/RXD
3	VCC PD	9	VCC GD
4	GND	10	VCC OSC
5	GND	11	RF1
6	RSSI	12	RF2

MECHANICAL DIMENSIONS (mm)	
Overall length	16.1
Overall width	11
PCB thickness	0.6
Max overall thickness	2.5

ABSOLUTE MAXIMUM RATING			
PARAMETER	MIN	MAX	UNIT
Supply voltage	- 0.3	6.0	V
All input or output voltages with respect to ground	- 0.3	V_{cc} + 0.3	V
Temperature under bias	- 10	70	°C
Storage temperature	- 60	100	°C
Digital output short-circuit duration (to GND)	continues		

Stresses exceeding those listed under "Absolute Maximum Rating" may cause permanent damage to the devices. These are stress ratings only, and functional operation of the devices at these or any other conditions, beyond those indicated in the operational sections of the datasheet, is not implied. Exposure to absolute maximum rating conditions for extended periods may affect devices reliability.

These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the I/O buffers.

Life Support Policy and Use in Safety-Critical Applications
Vishay RFWaves' products are not authorized for use in life-support or saftey-critical applications.

TRANSCEIVER INTERFACE The RFW322-M transceiver includes the following 12 pads interface.	
NAME	**CHARACTERISTIC**
V_{CC} GD	Transmitter pulse generator power supply input. A regulated voltage of 2.6 - 3.5 Volts.
V_{CC} RF	RF amplifier power supply input. A regulated voltage of 2.6 - 3.5 Volts.
V_{CC} OSC	Oscillator power supply input. A regulated voltage of 2.6 - 3.5 Volts.
V_{CC} PD	Receiver peak detector power supply input. A regulated voltage of 2.6 - 3.5 Volts.
GND	Apply the supply ground to this pin.
GND	Apply the supply ground to this pin.
Tx/Rx*	Mode selection input. Apply V_{cc} for transmit mode. Apply 0 V (GND) for receive mode.
ACT*	Apply 0 V (GND) for standby mode. Apply V_{cc} to this pin to turn the module on. It typically takes the module 20 µs to wake up into a fully operational mode. CMOS-level pin.
TxD/RxD*	In Tx mode this is an input pin, positive edge trigger. Every time TxD goes from GND to V_{cc}, a spread bit is transmitted. In Rx mode this is an output pin. CMOS-level pin.
RSSI	When used, reflects the average RF power detected by the receiver. Connect to the RSSI port in the RFW-D100 or any equivalent interface.
RF1 / RF2	Connect a 200 ohm differential impedance antenna to this port, or a proper matching circuit to any other antenna.

* ESD protected pin.

ELECTRICAL CHARACTERISTICS T_A = 25 °C, V_{CC} = 2.7 V to 3.3 V, unless otherwise specified.						
PARAMETER	**TEST CONDITIONS**	**SYMBOL**	**MIN**	**TYP.**	**MAX**	**UNIT**
Supply voltage (All 3 ports)		V_{CC}	2.6	3.3	3.5	V
Operating ambient temperature		T_a	0	+ 25	+ 50	°C
Current consumption in standby mode	ACT = GND I/O = High Z at V_{cc} = 3 V	I_{shdn}		0.1		µA
Wakeup time		T_{wa}		20		µs
All input pins (TxD/RxD, ACT, Tx/Rx)						
Rise time		T_r	8		1000	ns
Fall time		T_f	8		1000	ns
Input capacitance		C_{in}			10	PF
ACT						
Logic high input		$V_{ih\ act}$	V_{cc} - 0.8		V_{cc}	V
Logic low input		$V_{il\ act}$	GND		0.8	V
Sink current	ACT = V_{cc}	I_{si_act}		24	50	µA
Source current	ACT = GND	I_{src_act}			1	µA
Tx/Rx						
Logic high input		$V_{ih\ tr}$	V_{cc} - 0.8		V_{cc}	V
Logic low input		$V_{il\ tr}$	GND		0.8	V
Source current		I_{src_tr}			1	µA
Sink current	ACT = GND	I_{si_shdn}			1	µA
TxD/RxD						
Source current in standby and transmit mode	ACT = GND	I_{src_shdn}			1	µA
Sink current in standby and transmit mode	ACT = GND	I_{si_shdn}			1	µA
Transmit to receive transition time		$T_{t\_to\_r}$	2.5			µs
Receive to transmit transition time		$T_{r\_to\_t}$	2.5			µs
Bit rate					3	Mb/s

RECEIVER CHARACTERISTICS T_A = 25 °C, V_{CC} = 2.7 V to 3.3 V, unless otherwise specified.						
PARAMETER	**TEST CONDITIONS**	**SYMBOL**	**MIN**	**TYP.**	**MAX**	**UNIT**
Signal acquisition time		T_{acq}		1.2	1.5	µs
Sensitivity	at BER = 10^{-3}	Sens		- 73	- 70	dBm peak
RxD						
Output voltage high	1 mA load sync current	RxDVH	V_{cc} - 0.8		V_{cc}	V
Output voltage low	1 mA load source current	RxDVL	0		0.8	V
Output capacitance		C_{out}			10	pF
Pulse length		T_{pw}				ns
Current consumption RF power at antenna port < - 40 dBm peak	Bit rate = 3 Mb/s	Is		34		mA
Emission level between 30 MHz and 1 GHz					- 57	dBm
Emission level between 1 GHz and 12.75 GHz					- 47	dBm
RSSI						
Allowed source current		$I_{src\ RS}$			50	nA
Allowed sink current		I_{si_RS}			50	nA
Allowed load capacitance		$C_{lo\ RS}$			20	pf
Output voltage		V_SAT	0.4		1.2	V
Voltage to received power slope		V to P		6		mV / dB

TRANSMITTER CHARACTERISTICS T = 25 °C, V_{CC} = 2.7 V to 3.3 V, unless otherwise specified.						
PARAMETER	**TEST CONDITIONS**	**SYMBOL**	**MIN**	**TYP.**	**MAX**	**UNIT**
Transmit power peak		$Pout_{max}$	2	6		dBm
TxD						
Logic high input		$V_{ih\ d}$	V_{cc} - 0.8		V_{cc}	V
Logic low input		$V_{il\ d}$	GND		0.8	V
Source current		I_{src_di}			1	µA
Sink current		I_{si_di}			1	µA
Pulse length		T_{dil}	20		Not limited	ns
Current consumption	Bit rate = 3 Mb/s[1]	Is		34		mA
Current consumption - No data transmitted	TxD/RxD = 0	Isnd		7		mA
Bandwidth	at - 10 dBc	BW		30		MHz
Out of band spurious (> 1 GHz)[2]	at RBW = 1 MHz; at VBW = 1 MHz	Spur			- 20	dBm
Time from data into output power		T_d	400	450	500	ns
Central frequency		Cf	2.439	2.440	2.441	GHz

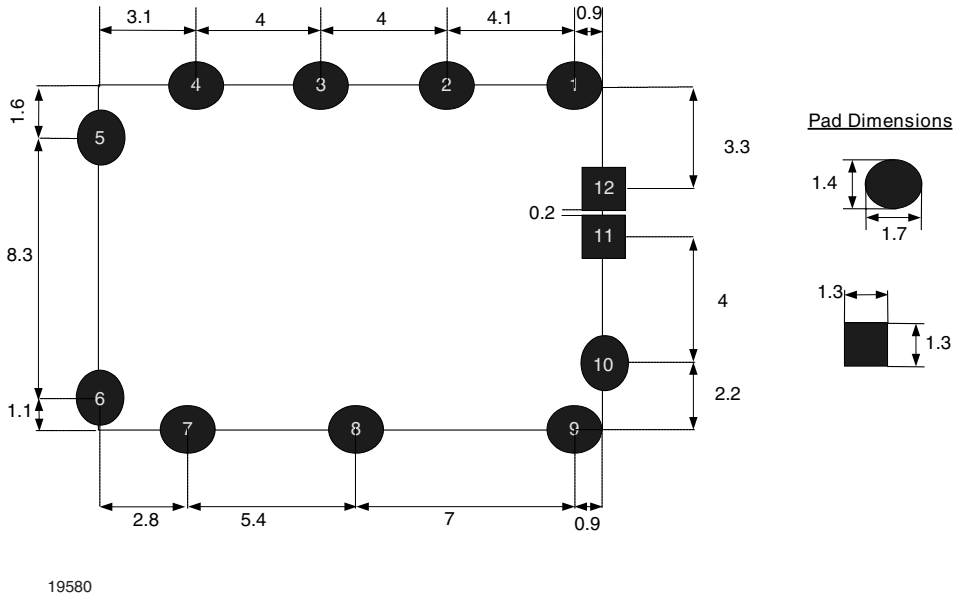
[1] When transmitting a uniform distribution of '1' and '0' bits. This assupmtion is not relevant in 3 Mbps!

[2] Depends on test platform.

FOOTPRINT

The following diagram shows the physical footprint of the RFW322-M module, which should be implemented.

***Note**: The pcb area under the module (CS layer only) must be considered as void and not include any conducting metal.



Footprint

**All figures are in mm units. Measurements are taken from the middle of the solder pads.

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