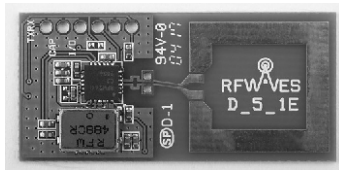


RFW122-L ISM Transceiver Module



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 RFW122-L ISM transceiver module is a short-range wireless radio transceiver. The transceiver is intended for use in the world wide unlicensed Industrial, Scientific and Medical (ISM) band of 2400-2483.5 MHz, complying with world wide regulations and standards. The module core consists of 2 chips, offering small size, low power consumption and simple intergration with applications. The module includes a printed antenna which is matched to 200 Ω differential input impedance. The module has a simple six pin interface, which includes 3 digital control lines. The

FEATURES

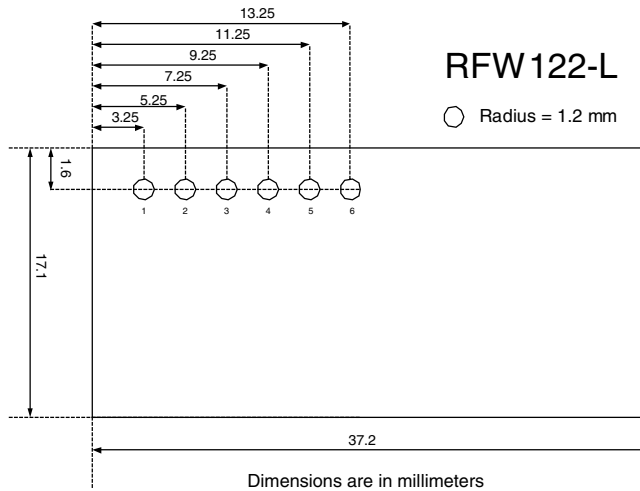
- Designed for short range wireless communication in the 2.4 GHz - world wide license free band
- Data rate - up to 1 Mb per second
- Simple 3 line digital interface
- Low power consumption - ideal for battery operated devices
- + 7 dBm typical peak output transmission power
- - 75 dBm typical sensitivity
- 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 μ s)

APPLICATIONS

- Home automation and security
- Industrial automation
- Peripherals: keyboards, mice, gamepads
- Remote control devices
- Toys and games

data I/O line is a simple serial interface. During standby, the transceiver consumes almost no power (0.1 μ A at $V_{CC} = 3$ V). It features a very short wakeup time of 20 μ s. The signal acquisition time is only 1.2 μ s. This results in an efficient power consumption management method, by using the standby mode in a frequent manner. The communication link between the transceivers is a Unique Direct Sequence Spread Spectrum (DSSS) pulse pipe. The modulation scheme is 100 % Amplitude Shift Keying (ASK).

PINOUT AND MECHANICAL DIMENSIONS (MM)



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Pinout	
1	TxRx
2	RSSI
3	Txd/Rxd
4	ACT
5	GND
6	V _{CC}

Mechanical dimensions (mm)	
Overall length	37.2
Overall width	17.1
PCB thickness	0.6
Max overall thickness	2.5
Connection pin diameter	1.2
Connection pin pitch	2

ABSOLUTE MAXIMUM RATINGS			
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	- 40	85	°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 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 effect devices reliability.

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

Use in Life Support and Safety Critical Applications

Vishay RFWaves products are not approved for use in life support or safety critical applications.



TRANSCEIVER INTERFACE The RFW122-L transceiver includes the following interface ports.	
Name	Characteristic
V _{CC}	Power supply regulated voltage of 2.6 - 3.5 Volts
GND	Apply the supply ground to this pin
Tx/Rx	transmit/receive 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} for turning the module on. It typically takes 20 μs for the module to wake up to a fully operational state. CMOS-level pin.
TxD/RxD	In Tx mode this is an input pin with positive edge trigger. In Tx mode, upon transition from GND to V _{CC} , a spread bit (logical 1) 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 to any equivalent interface.

ELECTRICAL CHARACTERISTICS T _{amb} = 25 °C, V _{CC} = 2.7 V to 3.3 V unless otherwise noted						
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
Sink current	ACT = GND	I _{si shdn}			1	μA
Source current		I _{src tr}			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					1	Mb/s

Note: Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.



RECEIVER CHARACTERISTICS $T_{amb} = 25\text{ }^{\circ}\text{C}$, $V_{CC} = 2.7\text{ V to }3.3\text{ V}$ unless otherwise noted						
Parameter	Test Conditions	Symbol	Min	Typ.	Max	Unit
Signal acquisition time		T_{acq}		1.2	1.5	μs
Sensitivity	at BER = 10^{-3}	Sens		- 75	- 72	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}		560		ns
Current consumption RF power @ antenna port < - 40 dBm peak	Bit rate = 1 Mb/s	I_s		33		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

Note: Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.

TRANSMITTER CHARACTERISTICS $T_{amb} = 25\text{ }^{\circ}\text{C}$, $V_{CC} = 2.7\text{ V to }3.3\text{ V}$ unless otherwise noted						
Parameter	Test Conditions	Symbol	Min	Typ.	Max	Unit
Transmit power peak		$P_{out\ max}$	4	7		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 = 1 Mb/s ⁽¹⁾	I_s		22		mA
Current consumption - No data transmitted	TxD/RxD = 0	I_{snd}		7		mA
Bandwidth	at - 10 dBc	BW		20		MHz
Out of band spurious (> 1 GHz) ⁽²⁾	at RBW = 1 MHz; at VBW = 1 MHz	Spur			- 20	dBm
Central frequency		Cf	2.439	2.440	2.441	GHz

Note: Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.

⁽¹⁾ When transmitting a uniform distribution of '1' and '0' bits.

⁽²⁾ Depends on test platform.

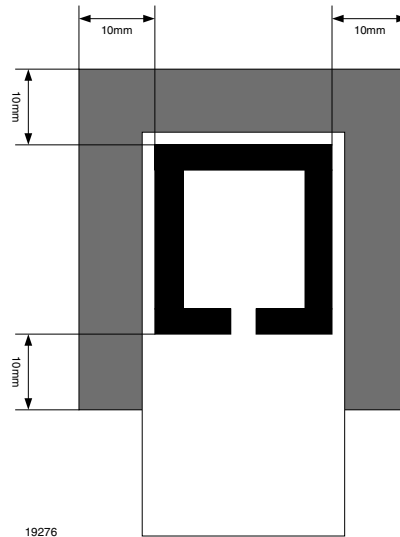
ANTENNA CHARACTERISTICS		
Parameter	Typ.	Unit
Central frequency	2.44	Ghz
Bandwidth	100	MHz
Maximum gain	1	dBi
Input impedance	200	Ohm

Placement and Layout Considerations

The following diagram shows the 'keep away areas'. These areas must be clear of any metal parts, large components, ground planes or pcb material in order to ensure optimized performance of the antenna.

Notes:

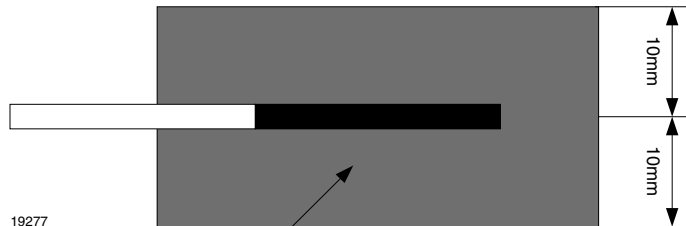
With any doubt on placement or layout, please contact Vishay RFWaves technical support. Regarding antenna orientation and orientation relative to other side of RF link, please see antenna datasheet.



Keep away areas - top view

Keep away areas

Keep away areas - side view



Antenna

Keep away areas

For more information about antenna characteristics, such as radiation patterns and scattering coefficient, please contact Vishay-RFWaves technical support.

*** Note: The antenna part is ESD sensitive.**



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