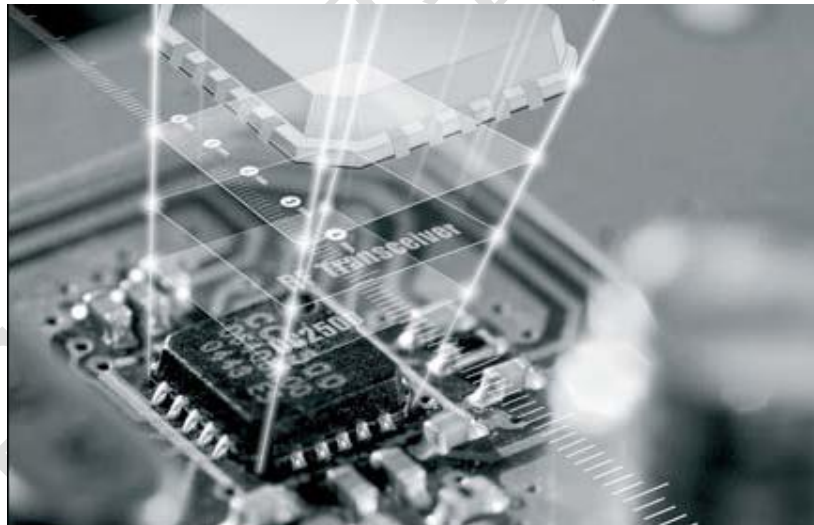




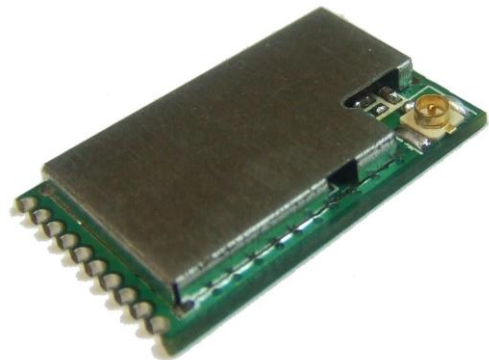
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# SPECIFICATION

Single Chip Low Cost / High Power  
RF Transceiver



Model : **2.4GHz RF Module**  
Part No : TC2500-PAT1  
Version : V3.0  
Date : 2015.4.9



## Absolute Maximum Ratings

Under no circumstances must the absolute maximum ratings given in Table 1 be violated. Stress exceeding one or more of the limiting values may cause permanent damage to the device.



**Caution!** ESD sensitive device.  
Precaution should be used when handling the device in order to prevent permanent damage.

Parameter	Min	Max	Units	Condition
Supply voltage	-0.3	3.6	V	All supply pins must have the same voltage
Voltage on any digital pin	-0.3	VDD+0.3, max 3.6	V	
Voltage on the pins	-0.3	2.0	V	
Voltage ramp-up rate		120	kV/ $\mu$ s	
Input RF level		+5	dBm	
Storage temperature range	-50	150	$^{\circ}$ C	
Solder reflow temperature		260	$^{\circ}$ C	According to IPC/JEDEC J-STD-020C
ESD		<500	V	According to JEDEC STD 22, method A114, Human Body Model

## Operating Conditions

Parameter	Min	Max	Units	Condition
Operating temperature	-40	80	$^{\circ}$ C	
Operating supply voltage	2.0	3.6	V	All supply pins must have the same voltage

## General Characteristics

Parameter	Min	Typ	Max	Units	Condition/Note
Frequency range	2400		2483.5	MHz	
Data rate	1.2		500	kbps	FSK
	1.2		250	kbps	GFSK and OOK
	26		500	kbps	(Shaped) MSK (also known as differential offset QPSK) Optional Manchester encoding (halves the data rate).

## Electrical Specifications

### Current Consumption

T<sub>c</sub> = 25°C, VDD = 3.3 V if nothing else stated. All measurement results obtained using the TC2500-PATI module design

Parameter	Min	Typ	Max	Unit	Condition
Current consumption in power down modes		400		nA	Voltage regulator to digital part off, register values retained(SLEEP state), TX&RX = low
Current consumption		1.7		mA	Only voltage regulator to digital part and crystal oscillator running (IDLE state), TX&RX = low
		34.8		mA	Only voltage regulator to digital part and crystal oscillator running (IDLE state), TX = high /RX = low
		9.17		mA	Only voltage regulator to digital part and crystal oscillator running (IDLE state), TX= low /RX = high
Current consumption, RX states		25.9		mA	Receive mode, 2.4 kbps, input at sensitivity limit, MDMCFG2.DEM_DCFILT_OFF = 1 ,TX= low /RX = high
		25.9		mA	Receive mode, 10 kbps, input at sensitivity limit,MDMCFG2.DEM_DCFILT_OFF = 1 ,TX= low /RX = high
		27.1		mA	Receive mode, 250 kbps, input at sensitivity limit,MDMCFG2.DEM_DCFILT_OFF = 0 ,TX= low /RX = high
		27.8		mA	Receive mode, 500 kbps, input at sensitivity limit,MDMCFG2.DEM_DCFILT_OFF = 0 ,TX= low /RX = high
Current consumption, TX states		54.6		mA	Transmit mode, +6 dBm output power ,TX = high /RX = low
		61.4		mA	Transmit mode, +10 dBm output power ,TX = high /RX = low
		112		mA	Transmit mode, +20 dBm output power ,TX = high /RX = low

### RF Receive Section

T<sub>c</sub> = 25°C, VDD = 3.3 V if nothing else stated. All measurement results obtained using the TC2500-PATI module design.

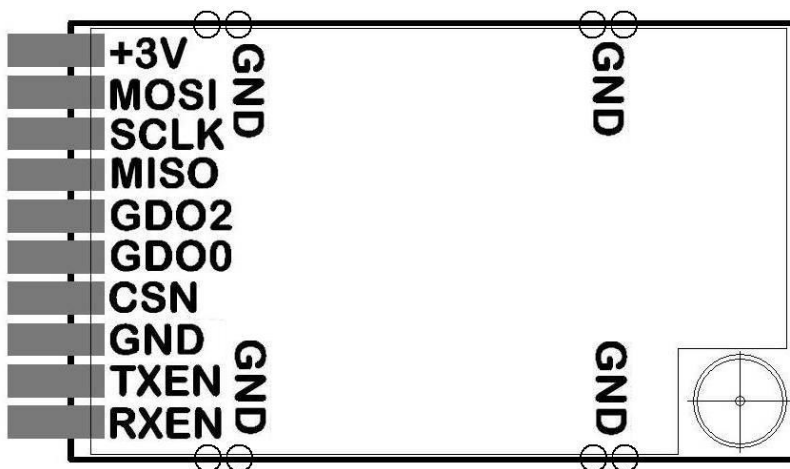
Parameter	Min	Typ	Max	Units	Condition/Note
Receiver sensitivity		-112		dBm	2.4 kbps data rate, current optimized, MDMCFG2.DEM_DCFILT_OFF = 1
		-107		dBm	10 kbps data rate, current optimized, MDMCFG2.DEM_DCFILT_OFF = 1
		-97		dBm	250 kbps data rate, current optimized, MDMCFG2.DEM_DCFILT_OFF = 0
		-86		dBm	500 kbps data rate, MDMCFG2.DEM_DCFILT_OFF = 0

### RF Transmit Section

T<sub>c</sub> = 25°C, VDD = 3.3 V if nothing else stated. All measurement results obtained using the TC2500-PATI module design.

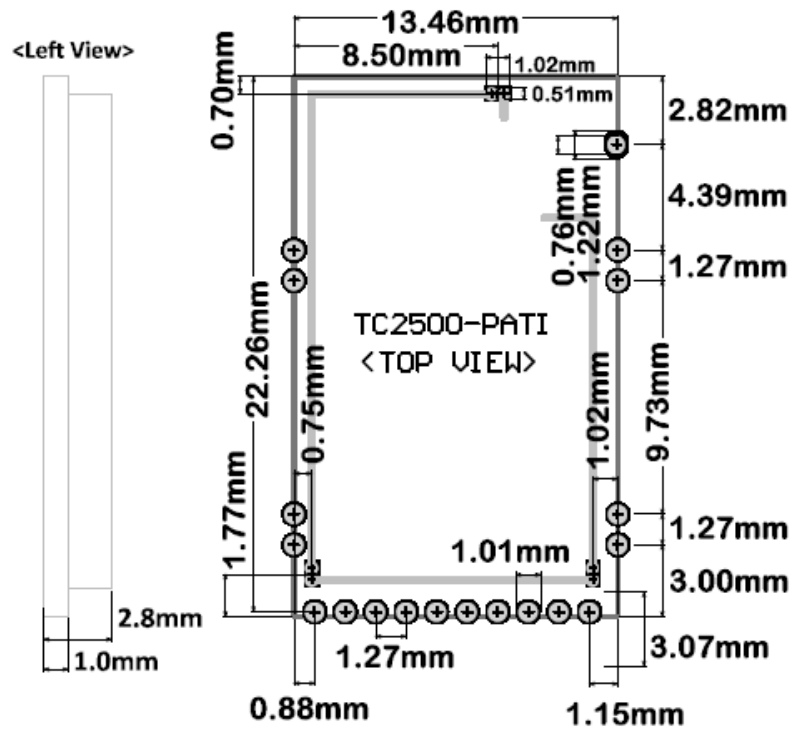
Parameter	Min	Typ	Max	Unit	Condition
Differential load impedance		80 + j74		Ω	Differential impedance as seen from the RF-port (RF_P and RF_N) towards the antenna.
Output power, highest setting		+20		dBm	Output power is programmable and is available across the entire frequency band.
Output power, lowest setting		-30		dBm	Output power is programmable and is available across the entire frequency band.

TC2500-PATI RF Module Pin Configuration

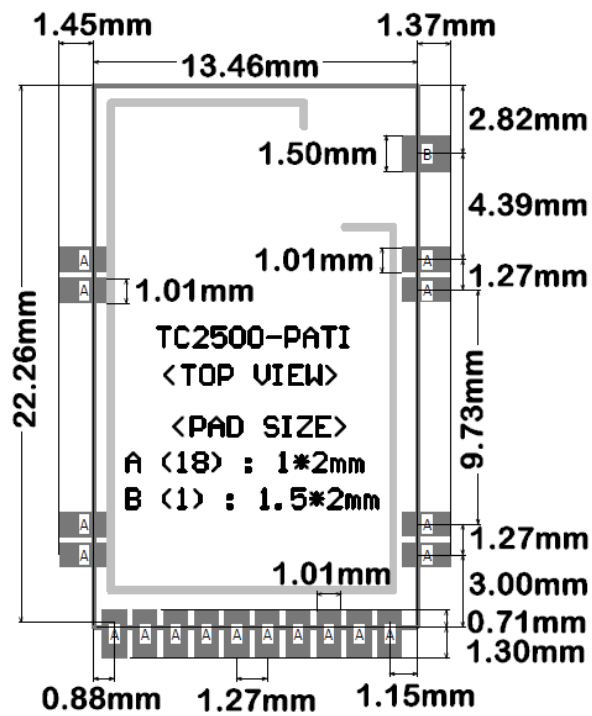


Pin #	Pin name	Pin type	Description
1	VCC	Power (Digital)	Power supply 3.3V
2	SI	Digital Input	Serial configuration interface, data input
3	SCLK	Digital Input	Serial configuration interface, clock input
4	SO	Digital Output	Serial configuration interface, data output. Optional general output pin when CSn is high
5	GDO2	Digital Output	Digital output pin for general use: <ul style="list-style-type: none"> <li>• Test signals</li> <li>• FIFO status signals</li> <li>• Clear Channel Indicator</li> <li>• Clock output, down-divided from XOSC</li> <li>• Serial output RX data</li> </ul>
6	GDO0	Digital I/O	Digital output pin for general use: <ul style="list-style-type: none"> <li>• Test signals</li> <li>• FIFO status signals</li> <li>• Clear Channel Indicator</li> <li>• Clock output, down-divided from XOSC</li> <li>• Serial output RX data</li> <li>• Serial input TX data</li> </ul> Also used as analog test I/O for prototype/production testing
7	CSN	Digital Input	Serial configuration interface, chip select
8	GND	Ground	Ground
9	TXEN	CMOS	Input to Control TX Enable
10	RXEN	CMOS	Input to Control RX Enable

TC2500-PATI RF Module Description



Recommended PCB layout for Module



## ■ Document History

Revision	Date	Description/Changes
1.0	2012.5.12	
2.0	2013.11.25	Modify Pin define

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