UHF Transceiver Module TRX916

User Manual

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1   Key Features

- Supply voltage   1.8 V – 3.6 V

- Frequency   916.500 MHz

- Data rate   10 kbit/s

- High sensitivity   -104 dBm

- Output power (EIRP)   94 dBuV/m @ 3 m or –1 dBm (EIRP)

- FSK modulation

- Integral λ/4 monopole

- Separate 64-byte RX and TX data FIFOs

- Efficient SPI interface: All register can be programmed with one "burst" transfer

2   Applications For The Module

- Consumer Electronics

- RKE Two-way Remote Keyless Entry

- Low power telemetry

- Home and building automation

- Wireless alarm and security systems

- Wireless sensor networks

3   Description Of The Module

The transceiver module eQ-3 TRX916 contains a true single chip UHF transceiver designed for very low power wireless applications.

The transceiver module operates within the frequency band 902 MHz to 928 MHz according to FCC Part 15, Section 15.249. The transmission and receive frequency is set to 916.5 MHz. FSK modulation is done with 19 kHz deviation.

The transceiver module TRX916 provides extensive hardware support for packet handling, data buffering, burst transmission link quality and wake on radio.

The main operation parameters and the 64-byte transmit/receive FIFOs of the transceiver module can be controlled via an SPI interface. A system consists of two transceiver modules integrated in an appropriate terminal equipment, which can be used in each case as transmitters and/or receivers.

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4 History For The Document

Revision	Date	Modification / Remarks
V 1.0	October 6, 2006	

5 Terminal Layout
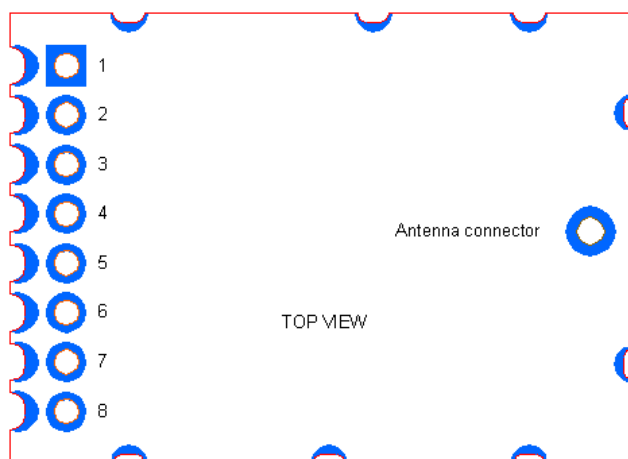
5.1 Pin Assignment

Pin#	Pin name	Pin type	Description
1	SI	Digital Input	Serial configuration interface, data input
2	SCLK	Digital Input	Serial configuration interface, clock input
3	SO / GDO1	Digital Output	Serial configuration interface, data output. Optional general output pin when CSn is high
4	GDO2	Digital Output	Digital output pin for general use: • Test signals • FIFO status signals
5	GDO0	Digital Output	Digital output pin for general use: • Test signals • FIFO status signals
6	CSn	Digital Input	Serial configuration interface, chip select
7	GND	Ground	Ground connection
8	VCC	Power	1.8 V to 3.6 V power supply connection

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6   Block Diagram
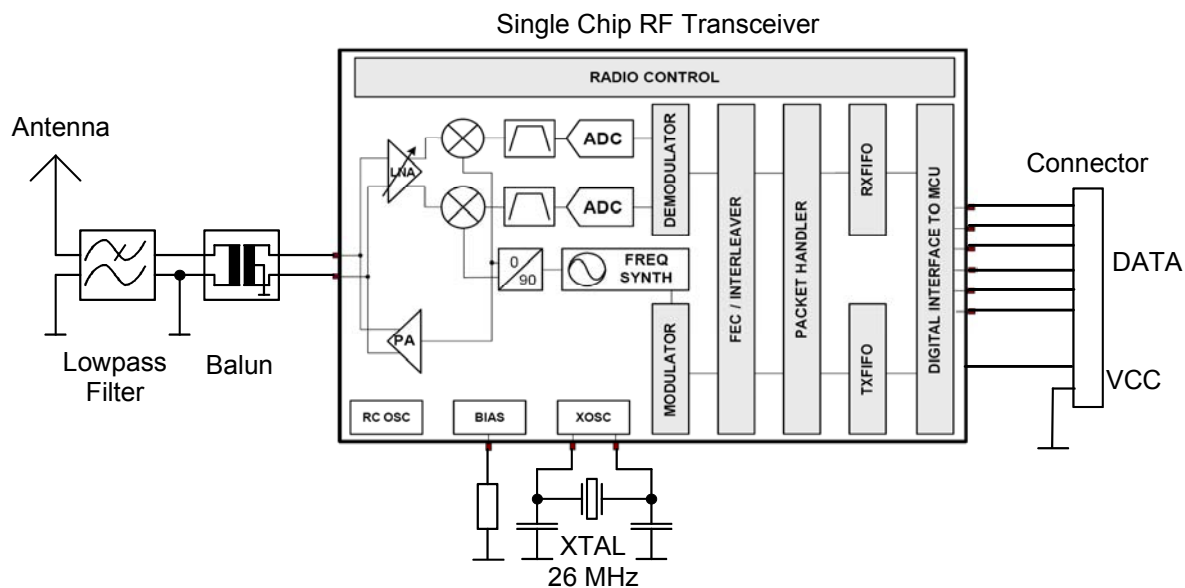
7   Absolute Maximum Ratings

Under no circumstances must the absolute maximum rating given in the following table be violated. Stress exceeding one or more of the limiting values may cause permanent damage to the module.

Parameter	Min	Max	Unit	Condition
Supply voltage	-0.3	3.6	V	
Voltage on any digital pin	-0.3	VCC+0.3 max. 3.6	V	
Input RF level		+10	dBm	
Storage temperature range	-50	150	°C	
Solder reflow temperature		265	°C	According to IPC/JEDEC J-STD-020C
ESD		<500	V	According to JEDEC STD 22, method A114, Human Body Model

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8　　Operating Conditions

The operating conditions of the TRX916 are listed in the table below.

Parameter	Min	Typ	Max	Unit	Condition
Operating temperature	-20		55	°C	
Supply voltage	1.8		3.6	V	All pins must have the same voltage
Frequency	916.47	916.50	916.53	MHz	
Data rate		10		kbit/s	
FSK deviation		±19		kHz	

9　　RF Receive Section

T_A = 25 °C, VCC = 3.0 V if nothing else stated.

Parameter	Min	Typ	Max	Unit	Condition
Receiver sensitivity		-104		dBm	
Saturation		-15		dBm	
Current consumption			16	mA	Receive mode
Current consumption			100	µA	Wake On Radio mode

10　　RF Transmit Section

T_A = 25 °C, VCC = 3.0 V, if nothing else stated.

Parameter	Min	Typ	Max	Unit	Condition
Output power / Field strength			93.9	dBµV/m @ 3 m	
Harmonics			53.9	dBµV/m @ 3m	
Current consumption			17	mA	

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11   DC Characteristics

The DC Characteristics of TRX 916 are listed in the table below.

$T_A = 25$ °C if nothing else stated.

Digital Inputs / Outputs	Min	Max	Unit	Condition
Logic "0" input voltage	0	0.7	V	
Logic "1" input voltage	VCC – 0.7	VCC	V	
Logic "0" output voltage	0	0.5	V	For up to 4 mA output current
Logic "1" output voltage	VCC – 0.3	VCC	V	For up to 4 mA output current
Logic "0" input current	N/A	-100	nA	Input equals 0 V
Logic "1" output current	N/A	100	nA	Input equals VCC

12   Module Dimension

Item	Dimension	Unit	Condition
Width	18.20	mm	
Length	25.20	mm	
Height	2.65	mm	

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13   Footprint
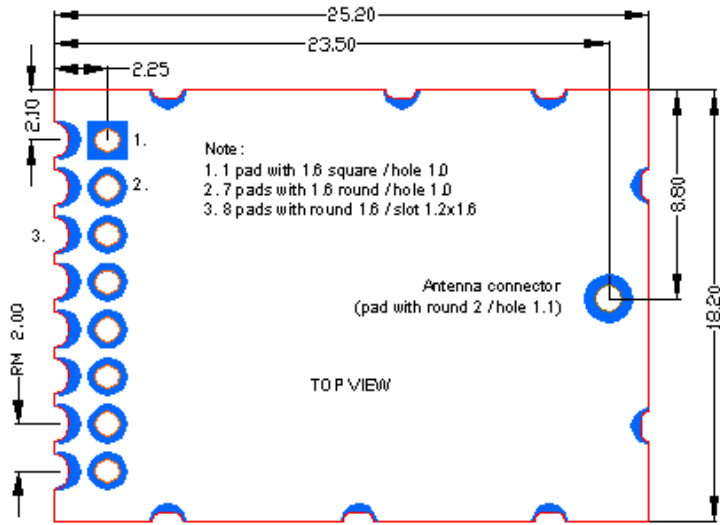
Dimensions in mm

14   Labeling Drawing

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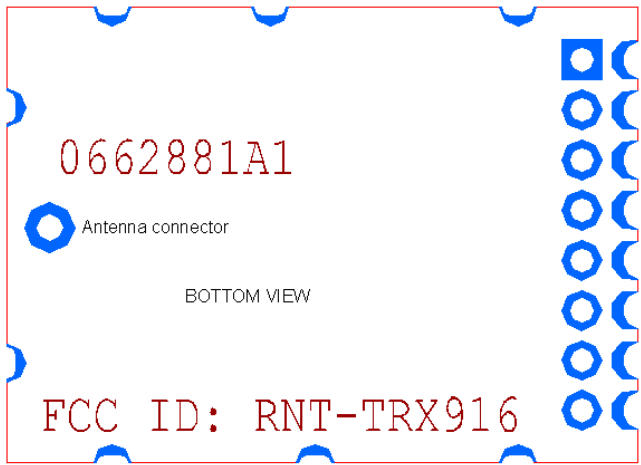
15   Software / Register Settings

After start up (connection to power supply) the transceiver module must be programmed with the necessary main operating parameters. Configuration is done using the SPI interface. To achieve the technical data and to ensure the FCC requirements according FCC Part 15, section 15.249 the register settings must be done after start up.

The necessary software parameter (register settings) are available on request from eQ-3 Limited after conclusion of a non-disclosure agreement.

16   Notes Of Design

- Please follow the condition written in this specification.
- This product should not be stressed when installed.
- Please keep this module away from heat.
- The supply voltage should not be exceeding or reverse and should not carry noise and spikes.
- Please keep this product away from other high frequency circuits.
- Please follow the condition written in this specification about the control signals of the module.

17   FCC Information

The **RF Transceiver Module eQ-3 TRX916** meets the requirements for modular transmitter approval as described in FCC Public Notice DA00-1407. To fulfill the requirements of the FCC rules, the OEM (Original Equipment Manufactor) must pay attention to the following items.

17.1   FCC ID

The FCC Equipment Authorization for this RF Transceiver Module is identified by

FCC ID: RNT-TRX916

and issued to the grantee

eQ-3 Limited, Hong Kong.

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17.2　FCC Notice

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

17.3　Information to the User

WARNING: Changes or modifications not expressly approved in writing by eQ-3 Limited, Hong Kong may void the user's authority to operate the equipment.

NOTE:　　　This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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17.4　Labeling Requirements

The Original Equipment Manufacturer (OEM) must ensure that FCC labeling requirements are met. The transceiver module is labeled with FCC ID: RNT-TRX916. This label is permanently fixed to the module.

If the module is mounted inside a terminal equipment, the label will not be visible. In this case the OEM must ensure that the terminal equipment is labeled with an exterior label containing the expression "Contains Transceiver Module FCC ID: RNT-TRX916" or "Contains FCC ID: RNT-TRX916".

See FCC Part 15, Section 2.925 (d) to (f) for detailed information according size, printing etc..

17.5　RF Exposure

The transceiver module meets all applicable RF exposure requirements. The EUT operates under the provisions of FCC Part 15, section 15.249 with a maximum allowed field strength of 50 mV/m, equivalent to 0.8 mW EIRP.

The Original Equipment Manufacturer (OEM) must ensure that the antenna used for this portable transmitter provides a separation distance of 2.5cm or more from all persons to satisfy RF Exposure compliance.

17.6　Performance Information

This transceiver module is not designed for use in highly reliable communication systems; e.g. serving human life inherent systems (systems where failure may result in a physical risk to a person).

18　Ordering Information

Ordering part number	Description	MOQ
73927	TRX916	1000

19　Disclaimer

eQ-3 Limited believes the information contained herein is correct and accurate at the time of this printing. However eQ-3 Limited does not assume any responsibility for the use of the described product.

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