Revised Date: Jan. 16, 2007

QRZ-3000 ZigBee Transceiver

Description

The QRZ-3000 is a miniature 2.4 GHz Direct Sequence Spread Spectrum ZigBee transceiver. It includes all RF hardware and a micro-controller to manage the communications link. The micro-controller manages all communications task including configuration, data packaging, and clear channel selection. The result is a complete wireless data communications solution.

The QRZ-3000 package is unique because of its small form factor (45 x 28 mm^2), It has an on-board chip antenna and the availability of external dipole antenna SMA connector. No competitive products can offer a solution as flexible, convenient, and easy to integrate,

There are four QRZ-3000 models; the QRZ-3000 with the on-board chip antenna and dipole antenna SMA connector, the QRZ-3000-PA with power amplifier, low noise amplifier, on-board chip antenna and dipole antenna SMA connector. The power amplifier enhances the transmission power and low noise amplifier increase receiving signal sensitivity. The power amplifier, low noise amplifier and dipole antenna improve range while the QRZ-3000 lowers system cost and simplifies integration. Development Kits are available for each version. Two pin-compatible variants are also available, the QRZ-3000A and QRZ-3000A-PA, for applications with pre-loaded transceiver program requirements. The QRZ-3000A is same hardware as QRZ-3000 with pre-loaded transceiver program. The QRZ-3000A-PA is same hardware as QRZ-3000-PA with pre-loaded transceiver program.

Models

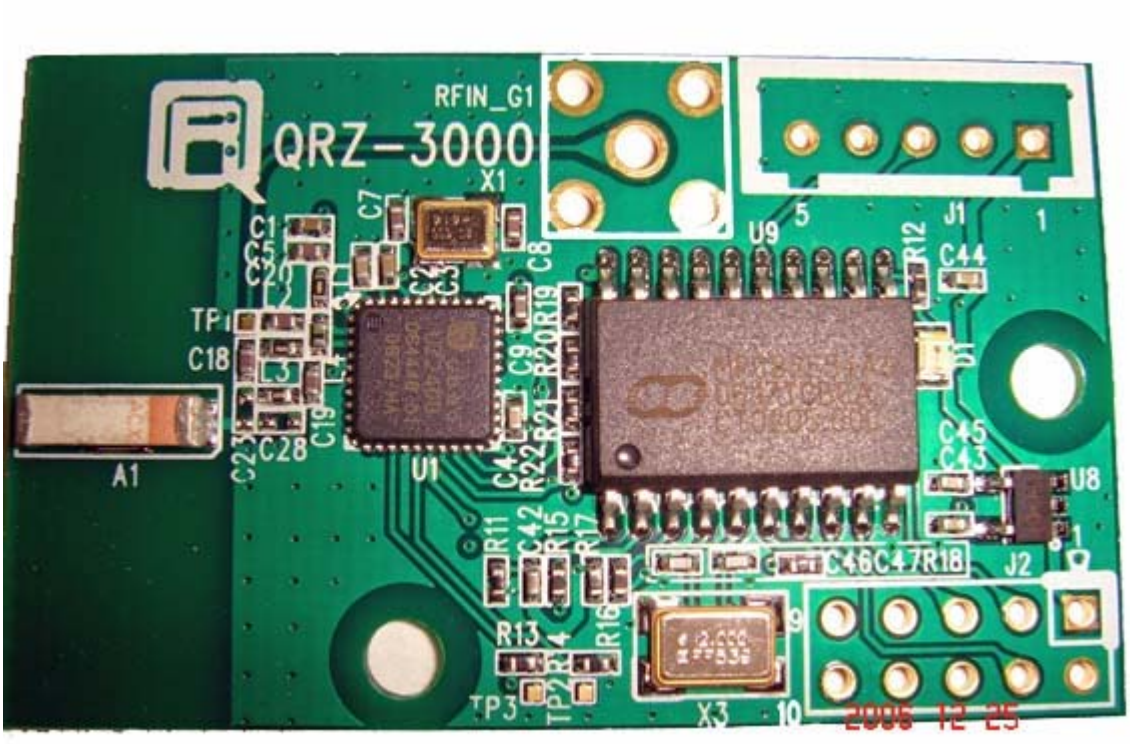
- QRZ-3000: Includes on-board chip antenna and Dipole Antenna Connector
- QRZ-3000-PA: Includes Power Amplifier, Low Noise Amplifier and Dipole Antenna Connector
- QRZ-3000A: Transceiver program pre-loaded QRZ-3000
- QRZ-3000A-PA: Transceiver program pre-loaded QRZ-3000A
- QRZ-2200K: 2 nodes Development Kit
- QRZ-2400K: 4 nodes Development Kit

Features

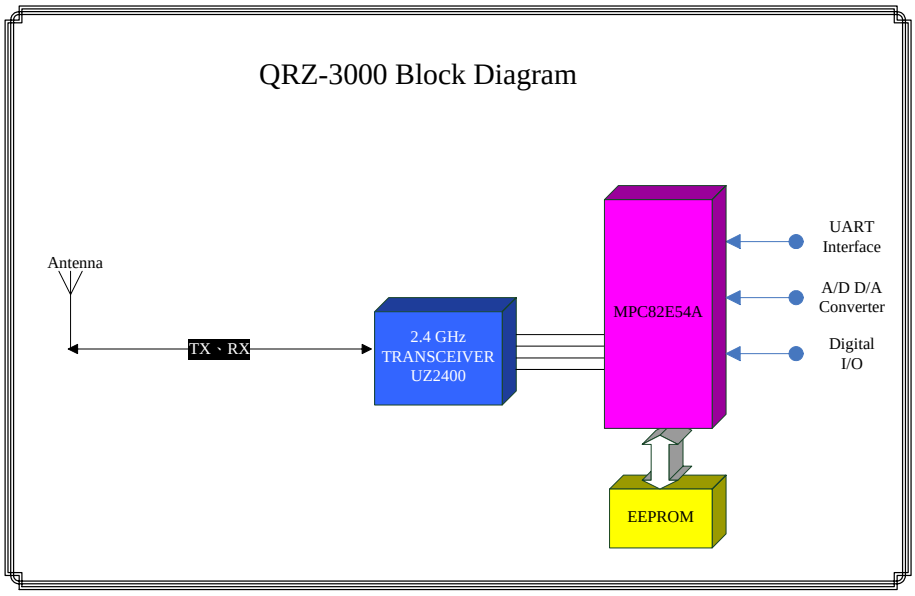
- 45 x 28 mm^2 PCBA package with 2 connectors
- Utilizes globally available 2.4 GHz ISM band
- 65535 unique node addresses, IDs allow multiple large networks to coexist.
- Programmable Transmit Power Output, max. 1 mW
- Complete IEEE 802.15.4 spec compliant

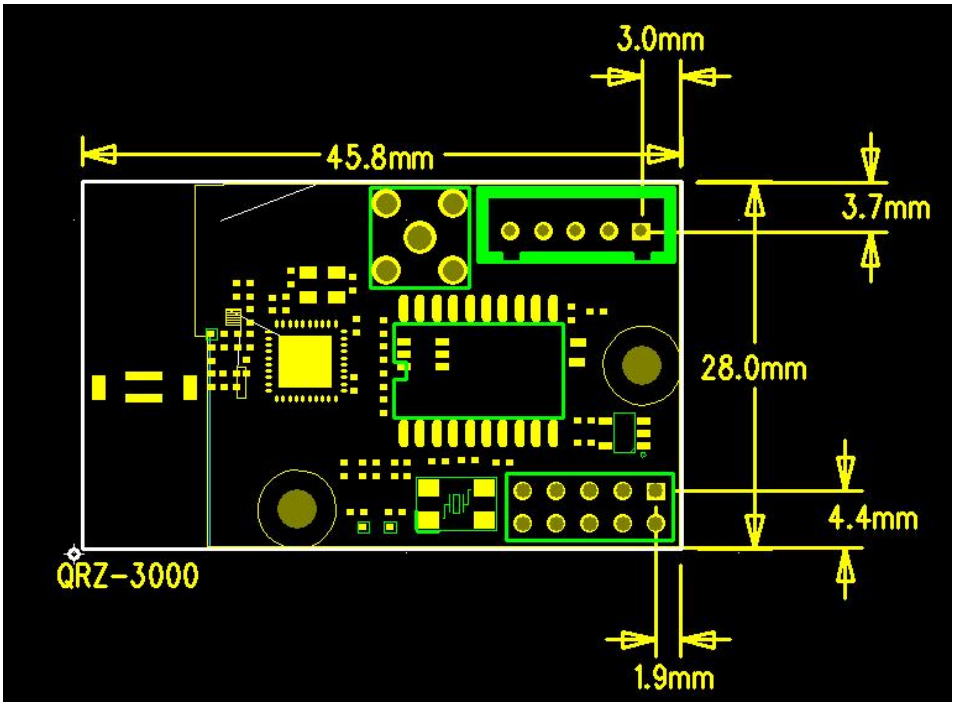
- Typical Receiver Sensitivity –95 dBm
- Typical Throughput rate 250,000 bps
- Non-obstructed signal range to 100 meters
- Multiple Low Power Operating modes

QRZ-3000 ZigBee Transceiver Module



QRZ-3000 MECHANICAL SPECIFICATIONS





Note : The thickness of PCB board (including PCB and components) is 3.632 mm

Using the QRZ-3000 Power Saving Modes

The QRZ-3000 includes several low power operating modes to permit the most efficient use of the available power. Below are descriptions of the available selections.

ACTIVE: In Active Mode, all QRZ-3000 circuits are powered and available for immediate action. This includes the RF receiver which actively monitors the air for an incoming communications request. Two sub-modes are classified as TX-ACTIVE and RX-ACTIVE. The current consumption of TX-ACTIVE is 22 mA while RX-ACTIVE is 18 mA.

IDLE: In Idle mode, all QRZ-3000 RF circuits are shut down but the communications controller remains active to accept AT commands. The QRZ-3000 cannot respond to incoming RF communications requests in Power-Down mode. If a transmit RF or receive RF command is received, The QRZ-3000 can activate the RF section in under 200 microseconds. Current draw in Idle Mode is less than 7.5 milliamps.

STANDBY: In Standby mode, all QRZ-3000 RF, MAC and Base Band circuits are powered-down with sleep clock remains active to minimize power consumption. The QRZ-3000 cannot accept commands or respond to incoming RF communications requests from Standby mode. Any input on TXD awakens the transceiver. Current draw in Standby Mode is less than 3.5 uA.

DEEP SLEEP: In Deep Sleep Mode, all QRZ-3000 circuits are shutdown except digital-side power. Current draw in Deep Sleep Mode is only 2 uA.

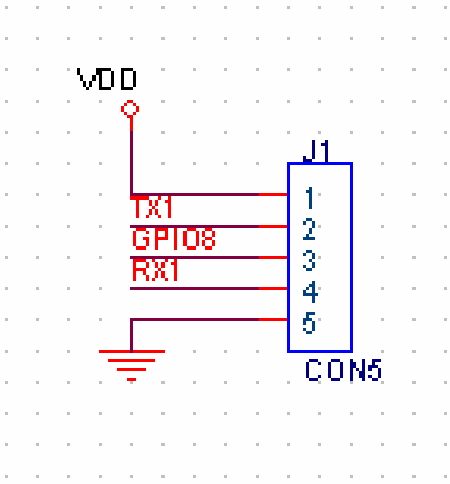
WAKE-UP: QRZ-3000 has two wake-up modes: timed wake-up and immediate wake-up. Timed wake-up has two sub-modes: beacon and non-beacon modes. However, if programmer sets both "main counter" and "remain counter" zero, QRZ-3000 will not wake up without immediate wake-up. QRZ-3000 can be wakened up externally. It can also be wakened up by setting internal register.

QRZ-3000 CONNECTORS PIN CONFIGURATION

QRZ-3000 uses Megawin MPC82E54A as MCU. It is an 8051 base MCU and reserves 10 GPIO pins for external controlling by application. Each pin can be a general I/O pin and programmed it by user directly. Furthermore, most of these pins can be used as special purpose function. Thereof TX, RX pins can be programmed as UART for data communication. For example, user is easy to connect these pins with RS485 transceivers such as 75176, MAX485, or programs to a 10-bit ADC, or PCA.

QRZ-3000 ZigBee transceiver provides J1, J2 two connectors for application usage. The J1 connector circuit and pin configuration show as below in which VDD and GND are used for power supply. The TX and RX are used for UART transmitting and receiving data. But TX and RX are used in pair. That means you can't use TX or RX only and use another pin as GPIO. The pin 3 is a MCU GPIO pin and defined as port 1.3. In programming stage, TX, VDD and GND of J1 are also defined as Megawin ISP programming interface for downloading the program

Connector J1 Pin Configuration

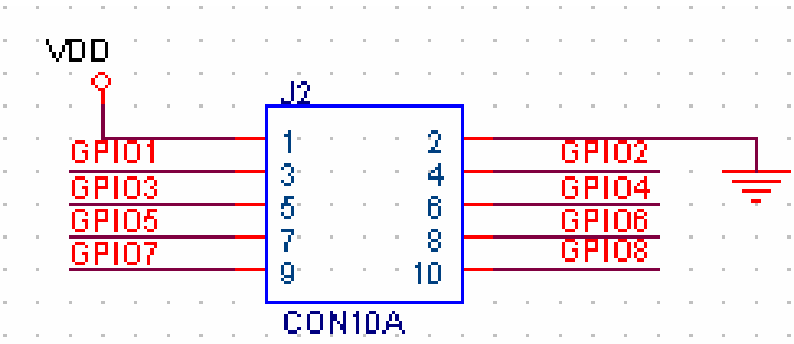


Connector J1 Pin Configuration

Signal	Pin	Description
VDD	1	3.3 Volt power for the QRZ-3000
TX	2	GPIO, also used as UART TX, transmit Data is the data input to the QRZ-3000
RX	3	GPIO, also used as UART RX, received Data is the data output from the QRZ-3000.
P1.3	4	GPIO8, also used as ADC3, this pin is same pin as J2 pin 10
GND	5	Common voltage reference for the QRZ-3000

The J2 connector circuit and the pin configuration show as below in which VDD and GND are used for power supply. The pin 3 to P10 are MCU GPIO pins and defined as port 1.0~port 1.3, port3.3~port3.5, port3.7 respectively. These GPIO pins can interface with other devices such as sensor, LED, host controller, push button, joystick or power relays through a 5x2 connector. All of these GPIO pins can be programmed as other functions such as external interrupt, 10-bit ADC (3 sets), timer (16-bit), PGA(Programmable Counter Array) etc. The detail function definitions have showed as below.

Connector J2 Pin Configuration



Connector J2 Pin Configuration

Signal	Pin	Description
VDD	1	3.3 Volt power for the QRZ-3000
GND	2	Common voltage reference for the QRZ-3000
GPIO1	3	GPIO port 3.3, may be programmed as either a digital input or digital output. It also can be programmed as external interrupt
GPIO2	4	GPIO port 3.4, may be programmed as either a digital input or digital output. It also can be programmed as external clock input to PCA as

		alternative clock input to timer-0
GPIO3	5	GPIO port 3.5, may be programmed as either a digital input or digital output. It also can be programmed as external clock input to PCA as alternative clock input to timer-1
GPIO4	6	GPIO port 3.7, may be programmed as either a digital input or digital output. It also can be programmed as external clock input to PCA
GPIO5	7	GPIO port 1.0, may be programmed as either a digital input or digital output. It also can be programmed as analog to digital converter (ADC0)
GPIO6	8	GPIO port 1.1, may be programmed as either a digital input or digital output. It also can be programmed as analog to digital converter (ADC1)
GPIO7	9	GPIO port 1.2, may be programmed as either a digital input or digital output. It also can be programmed as analog to digital converter (ADC2)
GPIO8	10	GPIO port 1.3, may be programmed as either a digital input or digital output. It also can be programmed as analog to digital converter (ADC3)

Absolute Maximum Rating	
VCC	3.6V
Storage temperature	-40°C to +120°C
Operating temperature Range	-30°C to +80°C

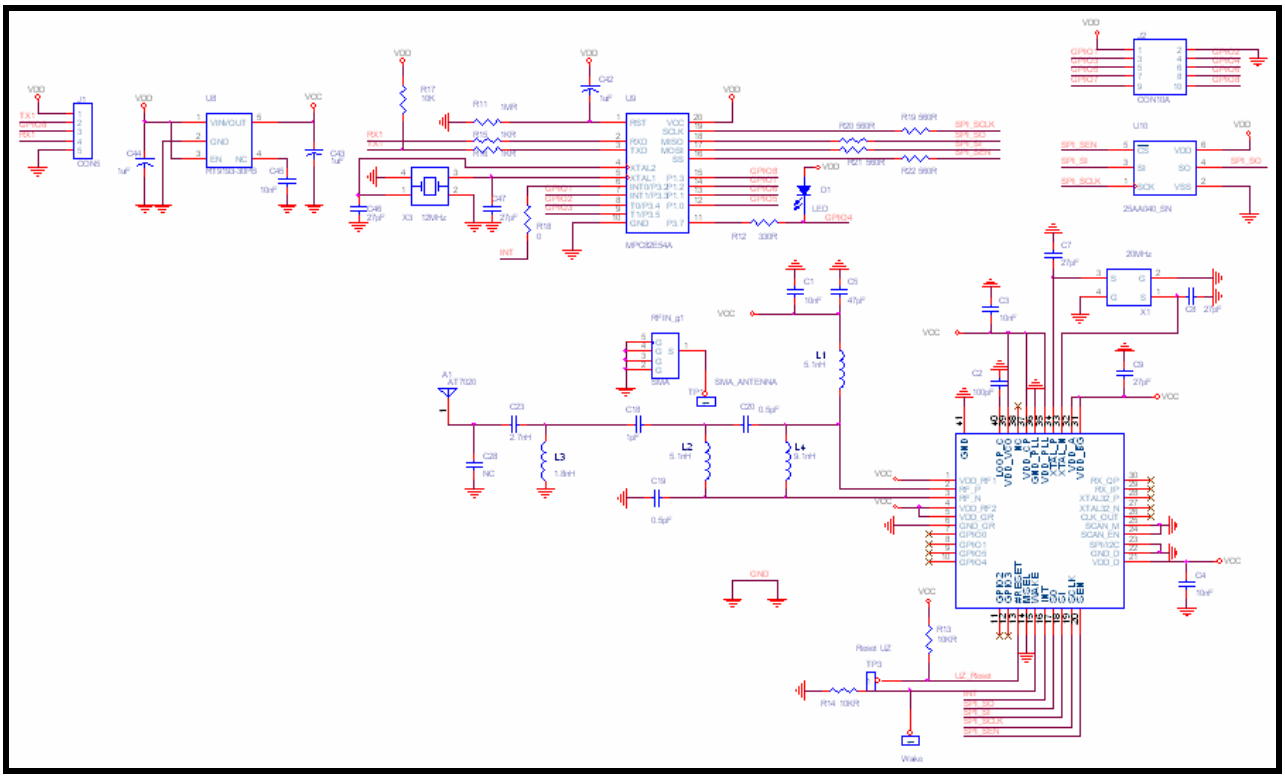
WARNING: Exceeding any of these ratings will void the warranty and may damage the device

QRZ-3000 ELECTRICAL SPECIFICATIONS

Parameters	Min	Typ	Max	Units
Supply Voltage for RF, analog and digital circuits	2.4		3.6	V
Supply Voltage for Digital I/O	2.4	3.3	3.6	V
Current Consumption				
ACTIVE TX Mode @ 0 dBm		22		mA
ACTIVE RX Mode		18		mA
IDLE Mode		7.5		mA
STANDBY Mode		3.5		uA
DEEP SLEEP Mode		2		uA
Output Power		1		mW
Wireless Receive Sensitivity		-95		dBm
Range thru no Physical Obstructions @ 0 dBm		100		meter
Selectable Channels		16		channel

Frequency Band	2.400		2.4835	GHz
Antenna Output Impedance		50		Ohms

QRZ-3000 CIRCUIT DIAGRAM

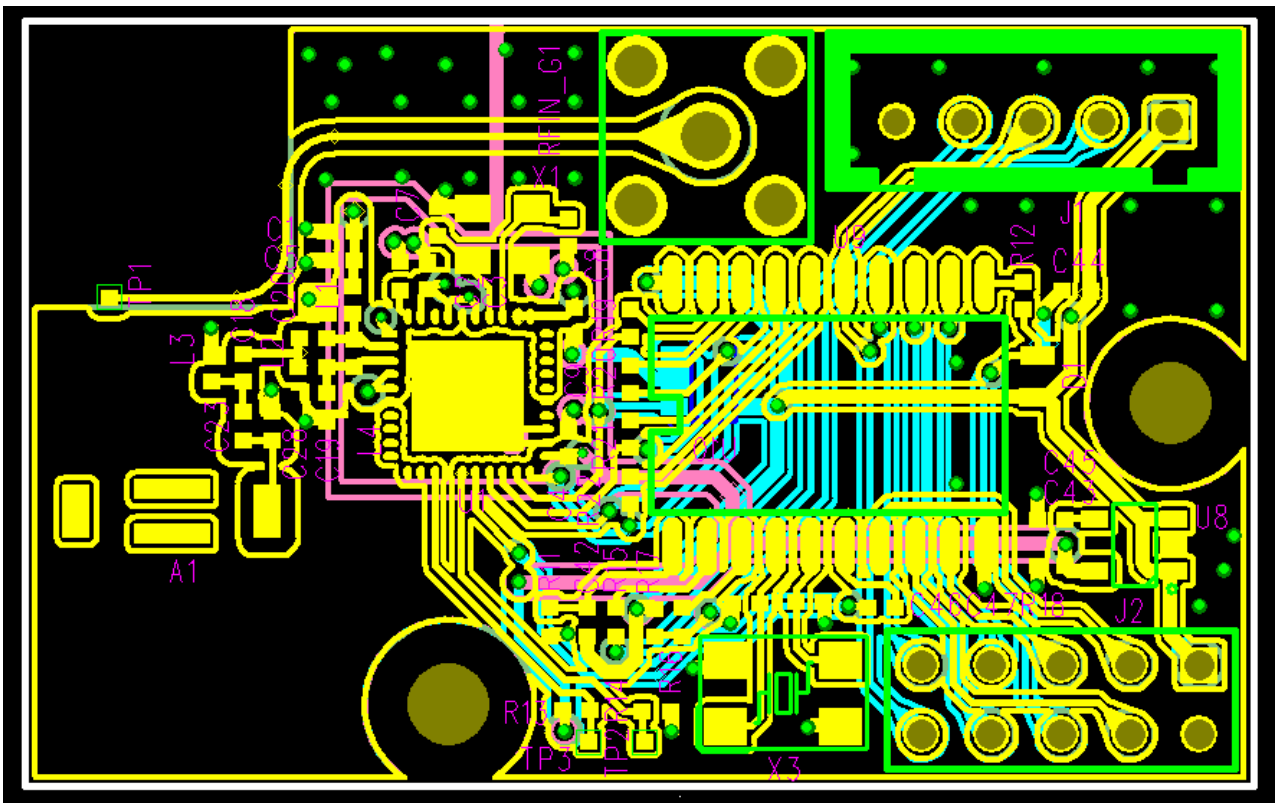


PART LIST OF QRZ-3000 CIRCUIT DIAGRAM

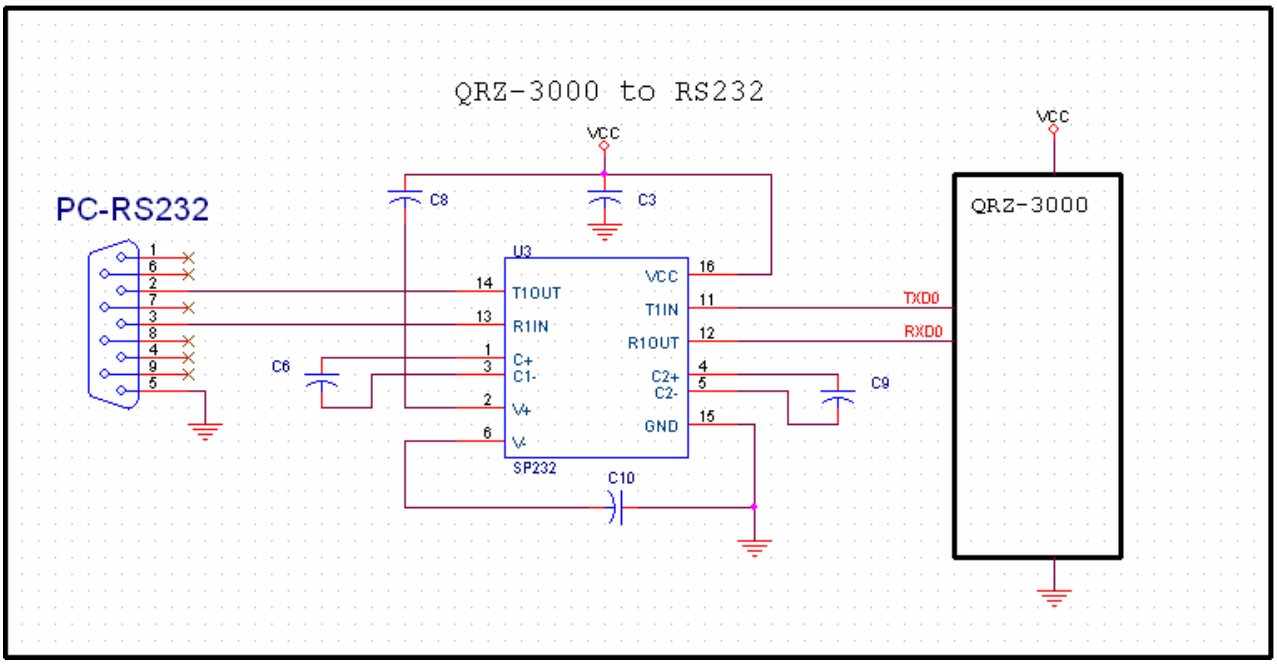
Item	Quantity	Reference	Part	Description
1	**1**	**A1**	**AT7020**	**AT7020**
2	**3**	**C1,C4,C45**	**10nF**	**0402**
3	**1**	**C2**	**100pF**	**0402**
4	**1**	**C3**	**10nF**	**0402**
5	**1**	**C5**	**47pF**	**0402**
6	**2**	**C7,C8**	**27pF**	**0402**
7	**3**	**C9,C46,C47**	**27pF**	**0402**
8	**1**	**C18**	**1pF**	**0402**
9	**2**	**C20,C19**	**0.5pF**	**0402**
10	**1**	**C23**	**2.7nH**	**0402**
11	**1**	**C28**	**NC**	**NC/2**
12	**3**	**C42,C43,C44**	**1uF**	**0402**
13	**1**	**D1**	**LED**	**0805**

14	1	J1	CON5	WAFER-A2501WV-5P
15	1	J2	CON10A	HD5X2_2.54
16	2	L2,L1	5.1nH	0402
17	1	L3	1.8nH	0402
18	1	L4	9.1nH	0402
19	1	RFIN_g1	SMA	SMA-1023-1-TGG
20	1	R11	1MR	0402
21	1	R12	330R	0402
22	2	R14,R13	10KR	0402
23	2	R15,R16	1KR	0402
24	1	R17	10K	0402
25	1	R18	0R	0402
26	4	R19,R20,R21,R22	560R	0402
27	1	TP1	SMA_ANTENNA	TP24S
28	1	TP2	Wake	TP24S
29	1	TP3	Reset UZ	TP24S
30	1	U1	UZ2400	UZ2400
31	1	U8	RT9193-30PB	SOT-23-5
32	1	U9	MPC82E54A	SOP20-7.5_1.27
33	1	U10	25AA040_SN	SOT-23-6
34	1	X1	20MHz	CX_101F
35	1	X3	12MHz	XTAL-5X3.2-4P_S

QRZ-3000 PCB LAYOUT

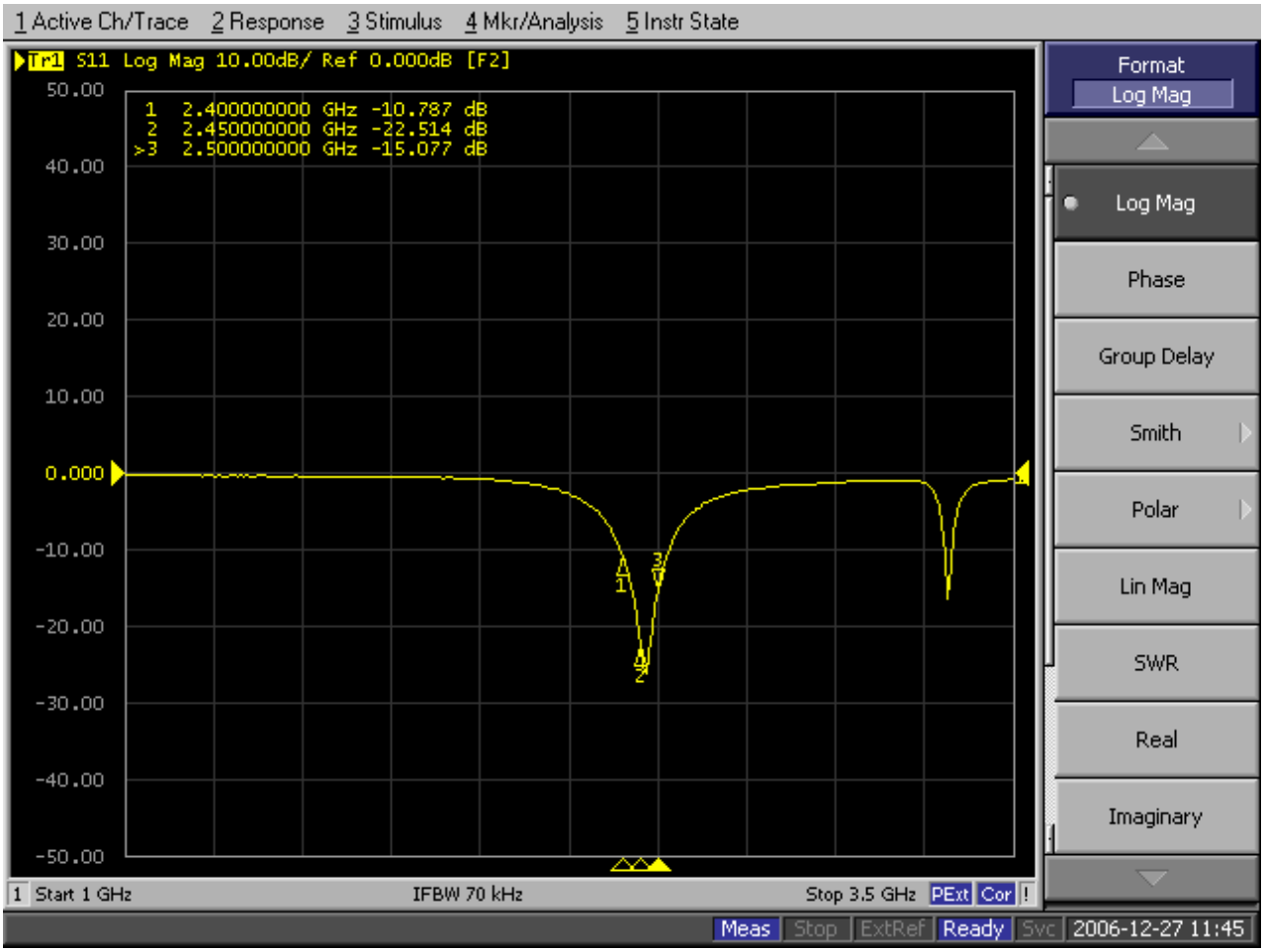


QRZ-3000 APPLICATION CIRCUIT DIAGRAM



RF PERFORMANCE TEST DATA

Return Loss: -22.5dB



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