



SPECIFICATION

Multi-Protocol 2.4-GHz Wireless Module
with Crystal-less BAW resonator



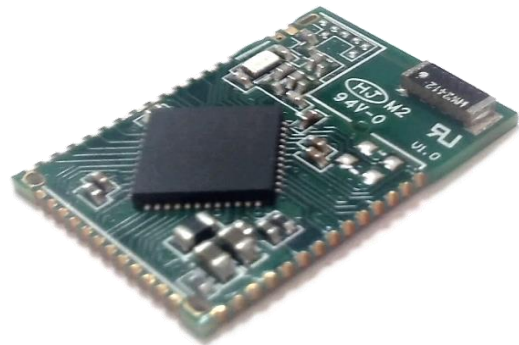
Model : **2.4-GHz RF Module**

IC Part No. : CC2652RB

Module Part No. : TC2652RB-xx

Version : v10

Date : 2022/8/25



1 Features

- Microcontroller
 - Powerful 48-MHz Arm® Cortex®-M4F processor
 - EEMBC CoreMark® score: 148
 - 352KB of in-system programmable flash
 - 256KB of ROM for protocols and library functions
 - 8KB of cache SRAM (alternatively available as general-purpose RAM)
 - 80KB of ultra-low leakage SRAM. The SRAM is protected by parity to ensure high reliability of operation.
 - 2-pin cJTAG and JTAG debugging
 - Supports over-the-air (OTA) update
- Ultra-low power sensor controller with 4KB of SRAM
 - Sample, store, and process sensor data
 - Operation independent from system CPU
 - Fast wake-up for low-power operation
- TI-RTOS, drivers, bootloader, *Bluetooth*® 5.2 low energy controller, and IEEE 802.15.4 MAC in ROM for optimized application size
- RoHS-compliant package
 - 7-mm × 7-mm RGZ VQFN48 (31 GPIOs)
- Peripherals
 - Digital peripherals can be routed to any GPIO
 - 4× 32-bit or 8× 16-bit general-purpose timers
 - 12-bit ADC, 200 kSamples/s, 8 channels
 - 2× comparators with internal reference DAC (1× continuous time, 1× ultra-low power)
 - Programmable current source
 - 2× UART
 - 2× SSI (SPI, MICROWIRE, TI)
 - I²C and I²S
 - Real-time clock (RTC)
 - AES 128- and 256-bit cryptographic accelerator
 - ECC and RSA public key hardware accelerator
 - SHA2 accelerator (full suite up to SHA-512)
 - True random number generator (TRNG)
 - Capacitive sensing, up to 8 channels
 - Integrated temperature and battery monitor
- External system
 - Integrated bulk acoustic wave (BAW) resonator generating accurate clock with fast startup time of 80 μs for system and RF
 - On-chip buck DC/DC converter
- Low power
 - Wide supply voltage range
 - Normal operation: 1.8 to 3.8 V
 - External regulator mode: 1.7 to 1.95 V
 - Active mode RX: 7.3 mA
 - Active mode TX 0 dBm: 7.9 mA
 - Active mode TX 5 dBm: 10.2 mA
 - Active mode MCU 48 MHz (CoreMark): 3.4 mA (71 μA/MHz)
 - Sensor controller, low power-mode, 2 MHz, running infinite loop: 30.8 μA
 - Sensor controller, active mode, 24 MHz, running infinite loop: 808 μA
 - Standby: 0.94 μA (RTC on, 80KB RAM and CPU retention)
- Radio section
 - 2.4 GHz RF transceiver compatible with Bluetooth 5.2 Low Energy and earlier LE specifications and IEEE 802.15.4 PHY and MAC
 - 3-wire, 2-wire, 1-wire PTA coexistence mechanisms
 - Excellent receiver sensitivity:
 - 100 dBm for 802.15.4 (2.4 GHz),
 - 102 dBm for Bluetooth 5 Low Energy Coded
 - Programmable output power up to +5 dBm
 - Suitable for systems targeting compliance with worldwide radio frequency regulations
 - EN 300 328, (Europe)
 - EN 300 440 Category 2
 - FCC CFR47 Part 15
 - ARIB STD-T66 (Japan)
- Wireless protocols
 - [Thread](#), [Zigbee](#)®, [Bluetooth](#)® 5.2 Low Energy, IEEE 802.15.4, IPv6-enabled smart objects (6LoWPAN), proprietary systems, SimpleLink™ TI 15.4 stack (2.4 GHz), and dynamic multiprotocol manager (DMM) driver.
- Development *Tools and Software*
 - [CC2652RB LaunchPad™ Development Kit](#)
 - [SimpleLink™ CC13x2 and CC26x2 Software Development Kit](#)
 - [SmartRF™ Studio](#) for simple radio configuration
 - [Sensor Controller Studio](#) for building low-power sensing applications

■ Selection Guide

Part No. : TC2652RB-xx



S : Shielding Case / O : Without Shielding Case
A : Internal Antenna / E : External Antenna

■ Operating range

Parameter	Min	Typ	Max	Units	Condition/Note
Operating battery supply voltage	1.8	3	3.8	V	
Operating ambient temperature range	-40	+25	+85	°C	

■ Electrical Specifications

● Current Consumption

Parameter	Min	Typ	Max	Units	Condition/Note
Current consumption in power down modes		150		nA	Reset and Shutdown, Reset. RESET_N pin asserted or VDDS below power-on-reset threshold
		150			Shutdown. No clocks running, no retention
		0.94			Standby without cache retention. RCOSC_LF
		1.09		μA	Standby without cache retention. XOSC_LF
		3.3			Standby with cache retention
Current consumption		3.4		mA	Idle mode, Supply Systems and RAM powered RCOSC_HF
		7.9		mA	Active mode, MCU running CoreMark at 48 MHz RCOSC_HF
		7.9		mA	0 dBm output power setting 2440 MHz
		10.2		mA	+5 dBm output power setting 2440MHz

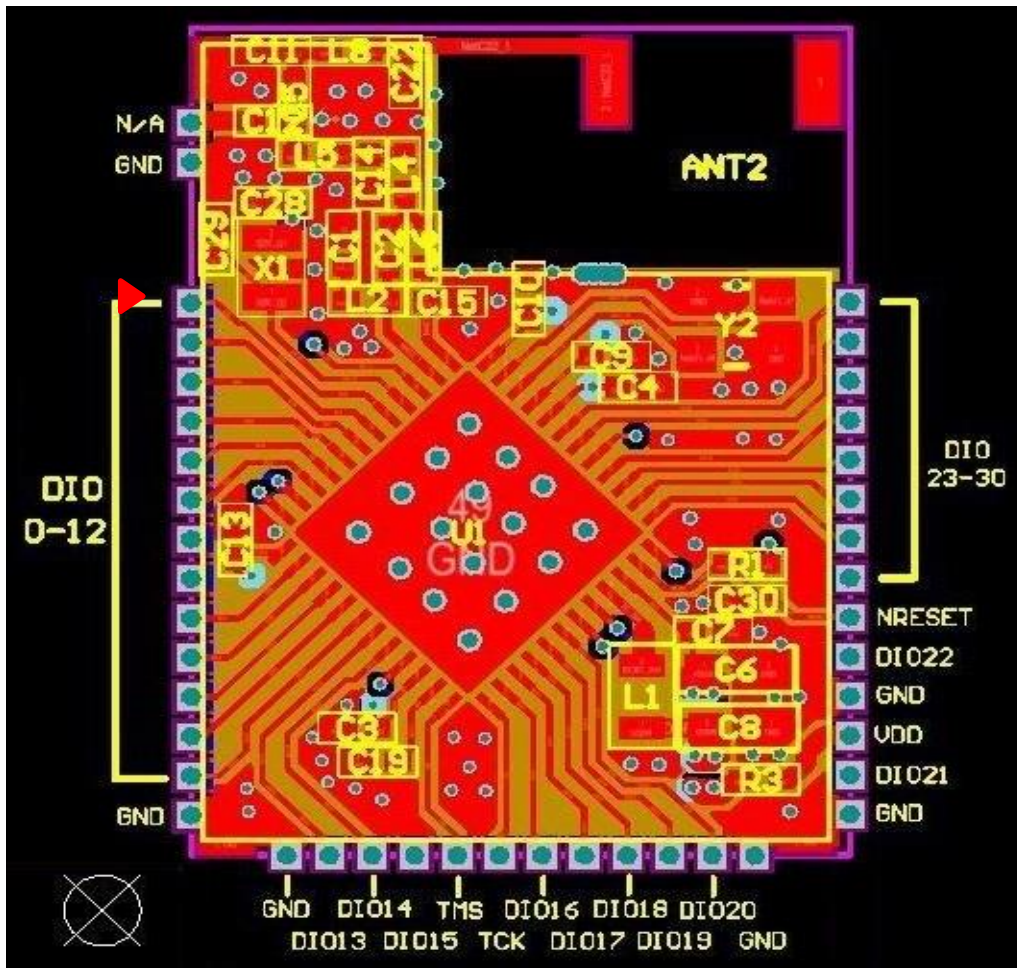
● RF Receive Section

Parameter	Min	Typ	Max	Units	Condition/Note
Current consumption, RX states		-98		dBm	125 kbps (LE Coded)
		-96		dBm	QPSK DSSS1,250 kbps,PER=1%
		-96		dBm	500 kbps(LE Coded),Differential mode,BER=10 ⁻³
		-91.4		dBm	2 Mbps(LE 2M),Differential mode,BER=10 ⁻³

● RF Output power

Parameter	Min	Typ	Max	Units	Condition/Note
Current consumption, TX states		+4.2		dBm	Differential mode
		+4.2		dBm	QPSK DSSS1,250 kbps,Differential mode
		+4.02		dBm	1 Mbps, 2.44GHz ,Supply voltage=+1.8V
		+4.5		dBm	1 Mbps, 2.48GHz ,Supply voltage=+3.8V

RF Module Pin Configuration

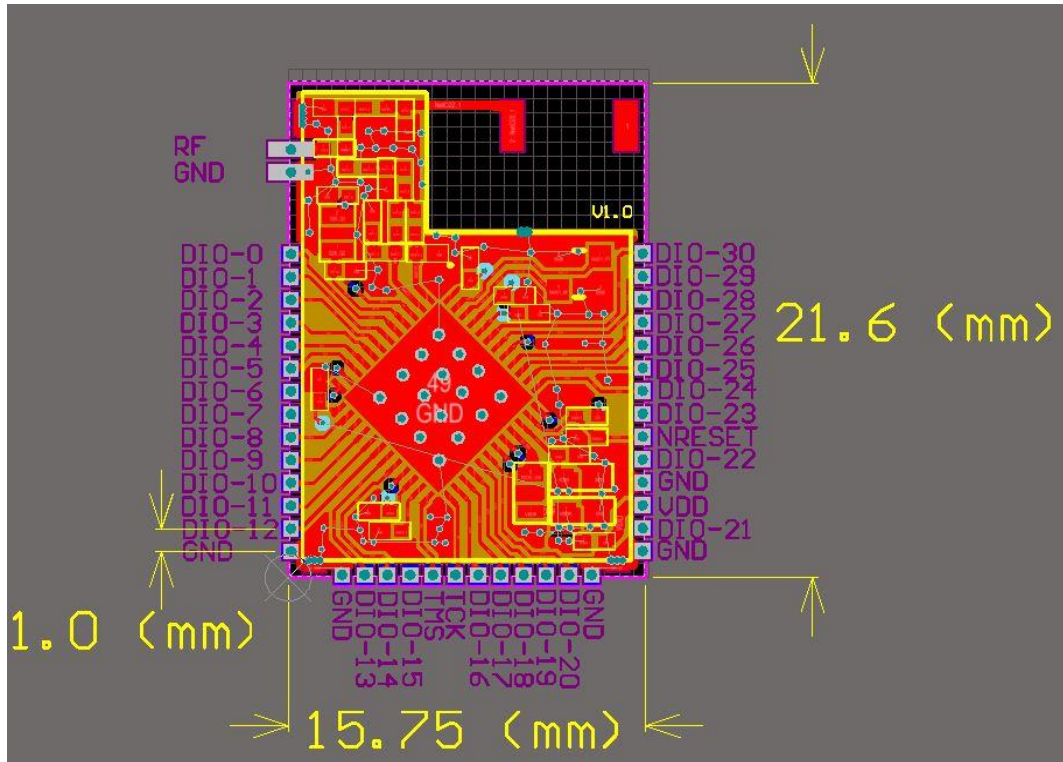


Pin #	Pin name	Pin type	Description
▲ 1-13	DIO0-12	Digital I/O	GPIO
14-15	GND	GND	Ground
16-18	DIO13-15	Digital I/O	GPIO
19	TMSC	Digital I/O	JTAG TMSC
20	TCK	Digital Input	JTAG TCK
21-25	DIO16-20	Digital I/O	GPIO
26-27	GND	GND	Ground
28	DIO21	Digital I/O	GPIO
29	VDD	Power (Digital)	Power supply 1.8 V to 3.8 V
30	GND	GND	Ground
31	DIO22	Digital I/O	GPIO
32	NRESET	Digital Input	Reset, active low. No internal pullup resistor
33-40	DIO23-30	Digital I/O	GPIO

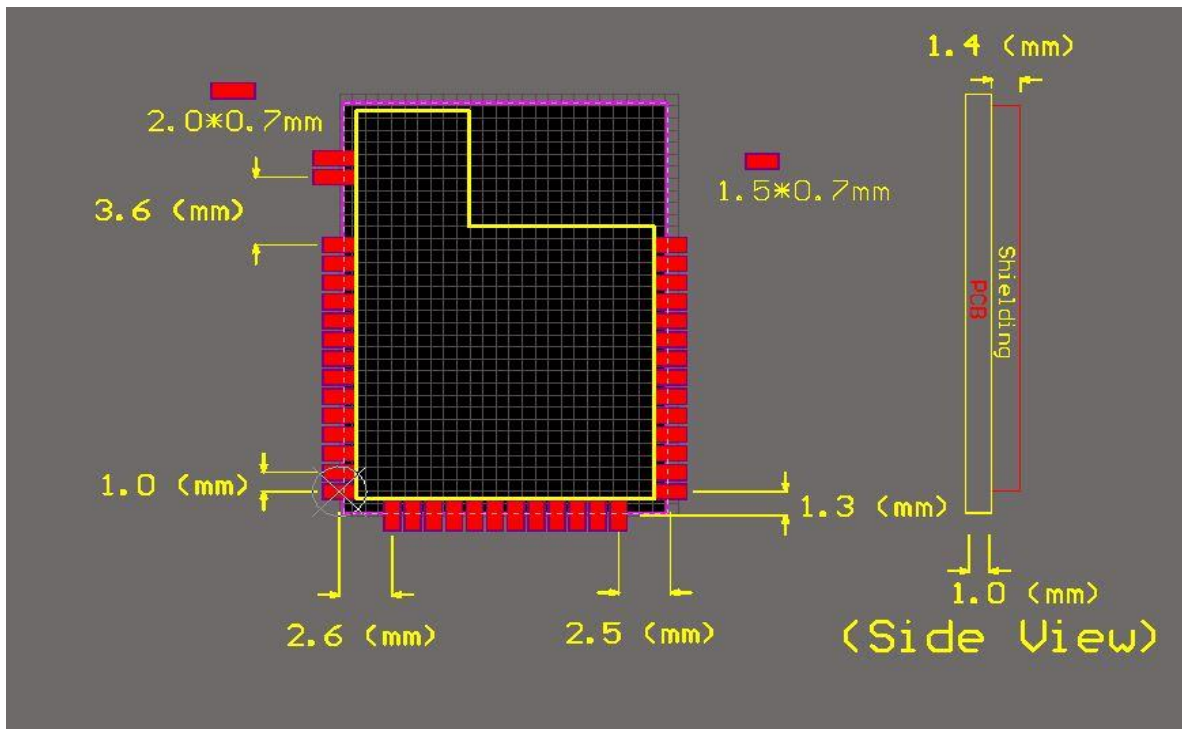
◆ Reference Datasheet signal descriptions

■ RF Module Dimension

- Module dimension information -



- Example board layout -



■ Document History

Revision	Date	Description/Changes
v10	2022.01.11	First release
v10	2022.08.25	modify dimension

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■ RIFO'S PRODUCTS

Standard RF Module

- RF Transmitters
- RF Transceivers
- 2.4GHz - IEEE802.15.4
- SimpleLink™ Wi-Fi® Streaming
- NFC
- RF Receivers
- 2.4GHz RF Modules
- Bluetooth RF Module
- Digital Audio
- Antenna

Market Solutions

- Optical Sensor Module
- Motion Module
- Programmable Control Board
- iBeacon Module
- G-Bike Sensor Module

Tools & Demo kit

- Wearable devices Solution
- BLE Demo kit1
- BLE Demo kit2
- iBeacon Module

Finished products

- Bluetooth headset
- Bluetooth speaker
- Wireless IP Camera



