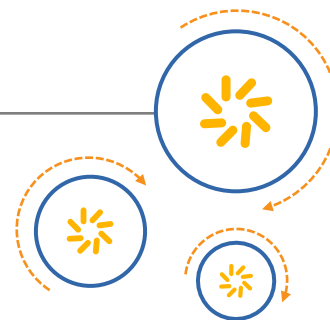




Qualcomm Technologies, Inc.



RB04

Product Specification

80-YA116-24 Rev. A

October 31, 2017

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Qualcomm Technologies, Inc.
5775 Morehouse Drive
San Diego, CA 92121
U.S.A.

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Revision history

Revision	Date	Description
A	October 2017	Initial release

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1 Introduction

The RB04 Wi-Fi/BT module provides a highly-integrated and flexible platform for developing and evaluating products and applications based on the QCA4010 SoC. The RB04 module can be either used with RB01 development kit for software development or incorporated into OEM products to enable rapid deployment of Wi-Fi connected systems.

The RB04 module includes the following components:

- QCA4010 chip
- CSR8811 chip
- An integrated balun to save cost and size, minimize tuning and tolerance
- A printed antenna
- Apple MFI co-processor
- 2MB SPI Flash memory

The QCA4010 is a single band 1x1 802.11 b/g/n device optimized for low-power embedded applications with single-stream capability for both Tx and Rx. It has an integrated network processor with a large set of TCP/IP with IPv4/IPv6-based services. These services can be accessed via a serial SPI link or by a UART link connected to an external host CPU.

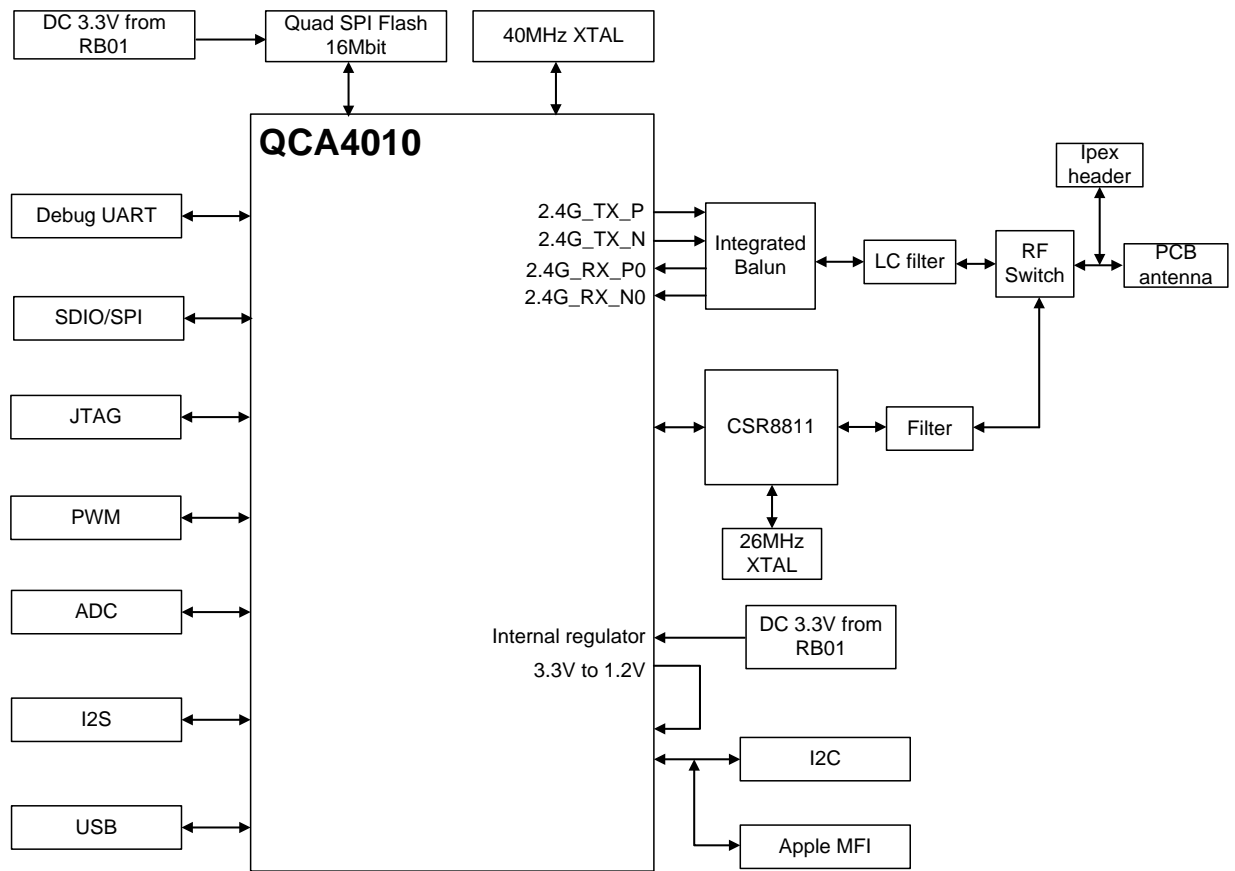


Figure 1-1 RB04 block diagram

RB04 Wi-Fi link features

- IEEE 802.11 b/g/n, single stream 1x1
- Single-band 2.4 GHz
- Integrated PA and LNA; support for external PA and external LNA
- Green Tx power saving mode
- Low power listen mode
- Four-layer PCB design
- Pre-certified FCC
- Data rates up to 150 Mbps
- Full security support: WPS, WEP, TKIP, WPA (personal), WPA2 (personal)

RB04 manufacturing interface

- USB 2.0 interface with integrated controller and PHY for manufacturing test and configuration

RB04 host interfaces

- UART host interface to a remote microcontroller with an AT style command set

2 Hardware specification

2.1 RB04 module pinout

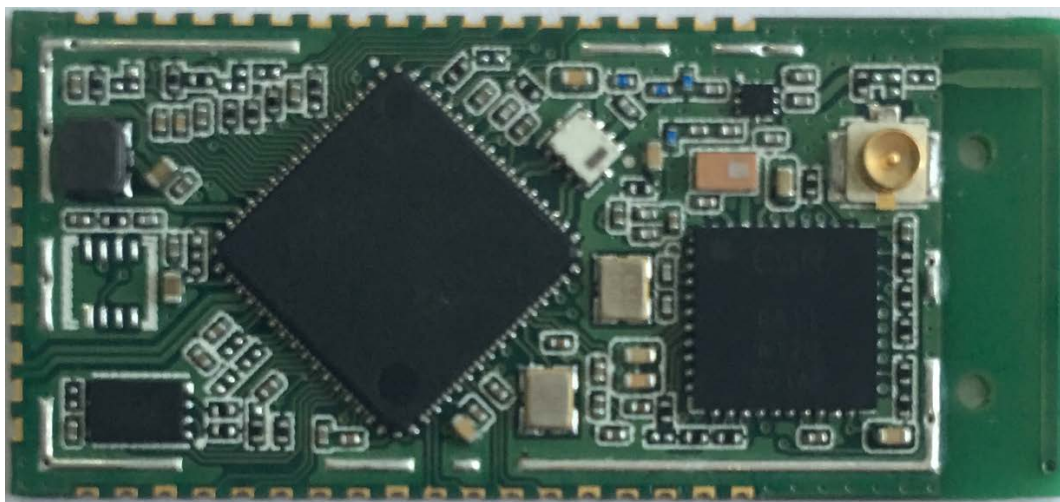


Figure 2-1 RB04 top view

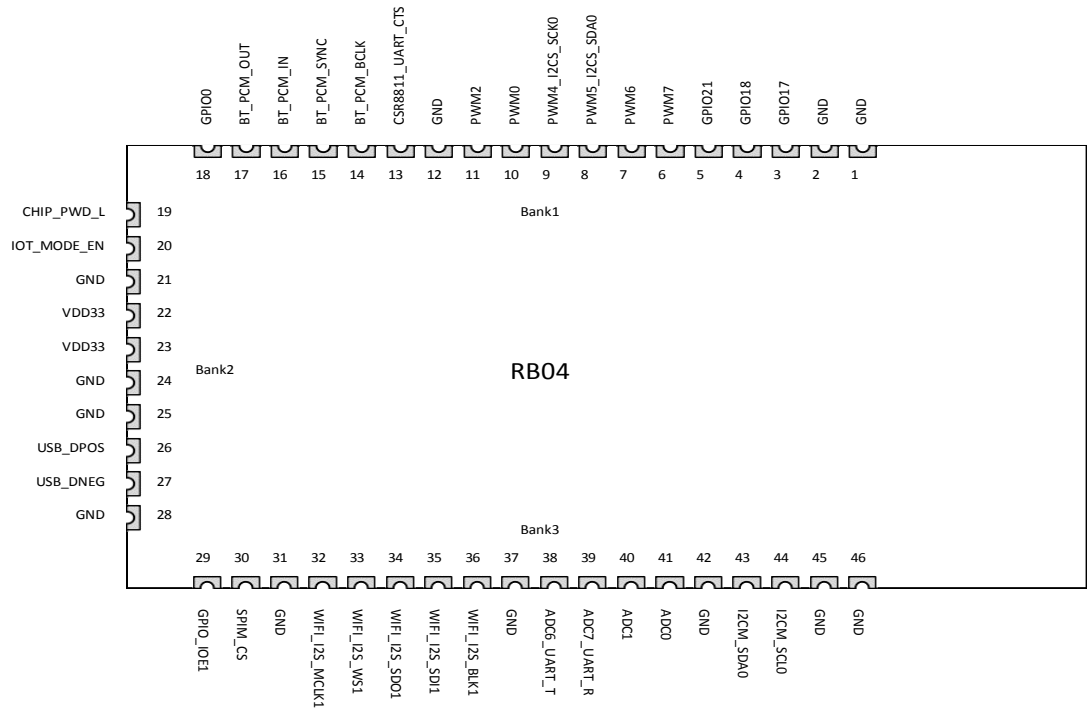


Figure 2-2 RB04 pinout definition

Table 2-1 RB04 module pinout definition and QCA4010 GPIO assignment

Pin	Signal/interface	ALT1	ALT2	GPIO No.
1	GND	Ground		
2	GND	Ground		
3	GPIO17			
4	GPIO18			
5	GPIO21			
6	PWM7	PWM7		GPIO[13]
7	PWM6	PWM6		GPIO[12]
8	PWM5_I2CS_SDA0	PWM5	I2C Slave SDA0	GPIO[11]
9	PWM4_I2CS_SCK0	PWM4	I2C Slave SCK0	GPIO[10]
10	PWM0	PWM0		GPIO[6]
11	PWM2	PWM2		GPIO[8]
12	GND	Ground		
13	CSR8811_UART_CTS			GPIO[4]
14	BT_PCM_BCLK			
15	BT_PCM_SYNC			
16	BT_PCM_IN			
17	BT_PCM_OUT			
18	GPIO0			GPIO[0]
19	CHIP_PWD_L	Module reset, active low		
20	IOT_MODE_EN	Wakeup manager enable		
21	GND	Ground		
22	VDD33	3.3V power supply		
23	VDD33	3.3V power supply		
24	GND	Ground		
25	GND	Ground		
26	USB_DPOS	USB Data+		
27	USB_DNEG	USB Data-		
28	GND	Ground		
29	GPIO_IOE1	external wakeup		
30	SPIM_CS	Flash memory /CS pin		GPIO[35]
31	GND	Ground		
32	WIFI_I2S_MCLK1	I2S MCLK1		GPIO[33]
33	WIFI_I2S_WS1	I2S WS1		GPIO[32]
34	WIFI_I2S_SDO1	I2S SDO1		GPIO[31]
35	WIFI_I2S_SDI1	I2S SDI1		GPIO[30]
36	WIFI_I2S_BLK1	I2S BLK1		GPIO[27]
37	GND	Ground		
38	ADC6_UART_T	ADC6	Debug UART TXD (Output)	GPIO[29]
39	ADC7_UART_R	ADC7	Debug UART RXD (Input)	GPIO[28]

Pin	Signal/interface	ALT1	ALT2	GPIO No.
40	ADC1	ADC1		
41	ADC0	ADC0		
42	GND	Ground		
43	I2CM_SDA0	I2C Master SDA0		GPIO[25]
44	I2CM_SCL0	I2C Master SCL0		GPIO[26]
45	GND	Ground		
46	GND	Ground		

2.2 RB04 interface summary

- Host interface: SPI master x 1, debug UART x 1
- I2C master x 1, I2C slave x 1
 - Standard-mode and fast-mode
- I2S x 1
- PWM x 6
 - 18-bit resolution with 8-bit clock prescaler
- ADC x 4
 - 12-bit resolution, 400 Ksps for multiple channels and 1 Msps for single channel.
- All signal pins can be multiplexed as GPIO
- USB2.0 x 1, for ART tool

2.3 Bootstrap signals

Table 2-2 Bootstrap signals

Pin No.	Bootstrap name	Description								
11	Test mode enable	Should be low while reset released, for normal function								
18 13	Host mode[1] Host mode[0]	Bootstrap for host interface selection. Default mode is 00. <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="width: 10%;">00</td> <td>USB/manufacturing test and configuration/hostless</td> </tr> <tr> <td>01</td> <td>Hostless (serial AT command) mode</td> </tr> <tr> <td>10</td> <td>SPI host mode</td> </tr> <tr> <td>11</td> <td>SDIO host mode</td> </tr> </tbody> </table>	00	USB/manufacturing test and configuration/hostless	01	Hostless (serial AT command) mode	10	SPI host mode	11	SDIO host mode
00	USB/manufacturing test and configuration/hostless									
01	Hostless (serial AT command) mode									
10	SPI host mode									
11	SDIO host mode									
20	IOT mode enable	Keep high always, for normal function								

2.4 Electrical characteristics

2.4.1 General DC electrical characteristics

These conditions apply to all DC characteristics unless otherwise specified: $T_{amb} = 25\text{ }^{\circ}\text{C}$,
 $V_{DD33} = 3.3\text{ V}$

Table 2-3 DC electrical characteristics for digital I/Os

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{IH}	High level I voltage	–	1.8	–	3.6	V
V_{IL}	Low level I voltage	–	-0.3	–	0.3	V
V_{OH}	High level O voltage	–	2.2	–	3.3	V
V_{OL}	Low level O voltage	–	0	–	0.4	V

2.4.2 RB04 radio Rx characteristics

Table 2-4 RB04 Main Rx characteristics for 2.4 GHz operation

Symbol	Parameter	Conditions ¹	Min	Typ	Max	Unit
F_{rx}	Rx input frequency range	–	2.412	–	2.472	GHz
S_{rf}	Sensitivity					
	CCK	1 Mbps	–	-91	–	dBm
		11 Mbps	–	-86	–	
	OFDM	6 Mbps	–	-88	–	
		54 Mbps	–	-72	–	
	HT20	MCS0	–	-88	–	
MCS7		–	-69	–		
R_{adj}	Adjacent channel rejection					
	CCK	2 Mbps	–	47	–	dB
		OFDM	6 Mbps	–	36	
	OFDM		54 Mbps	–	21	
		HT20	MCS0	–	34	
	MCS7		–	18	–	
1. In LPL mode, sensitivity will be degraded by 1 – 2 dB.						

2.4.3 RB04 radio Tx Characteristics

Table 2-5 RB04 Tx characteristics for 2.4 GHz operation

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
F_{tx}	Tx output frequency range	-	2.412	-	2.472	GHz
P_{out}	Output power¹					
	802.11b mask compliant	1 Mbps	-	18	-	dBm
	802.11g mask compliant	6 Mbps	-	18	-	
	802.11g EVM compliant	54 Mbps	-	15	-	
	802.11n HT20 mask compliant	MCS0	-	18	-	
802.11n HT20 EVM compliant	MCS7	-	14	-		
1. Refer to IEEE802.11 specification for Tx spectrum limits: <ul style="list-style-type: none"> ▫ 802.11b mask (18.4.7.3) ▫ 802.11g mask (19.5.4) ▫ 802.11g EVM (17.3.9.6.3) ▫ 802.11n HT20 mask (20.3.21.1) ▫ 802.11n HT20 EVM (20.3.21.7.3) 						

2.5 Timing specifications

2.5.1 SPI master interface timing

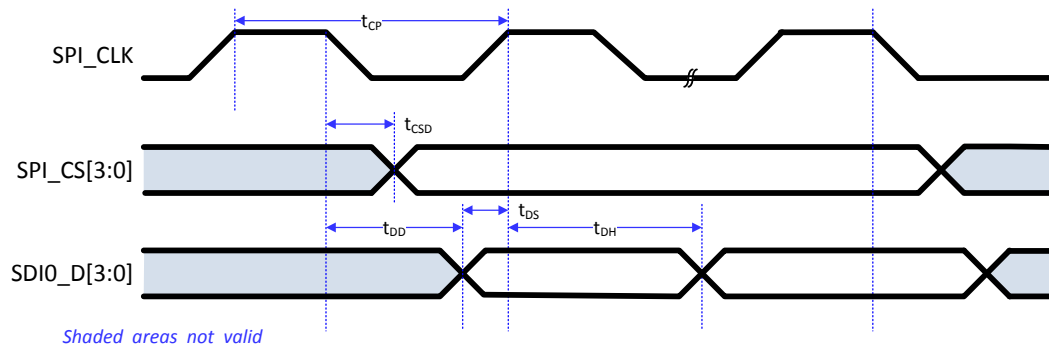


Figure 2-3 SPI master timing

Table 2-6 SPI master timing

Parameter	Description	Min	Max	Unit
t_{CP}	Clock period	30.7	1000	ns
t_{CSD}	Chip select valid delay	-5.5	5	ns
t_{DD}	Data valid delay	-5.5	5	ns
t_{DS}	Data setup	3	–	ns
t_{DH}	Data hold	0	–	ns

3 Mechanical interface specification

3.1 RB04 module dimensions

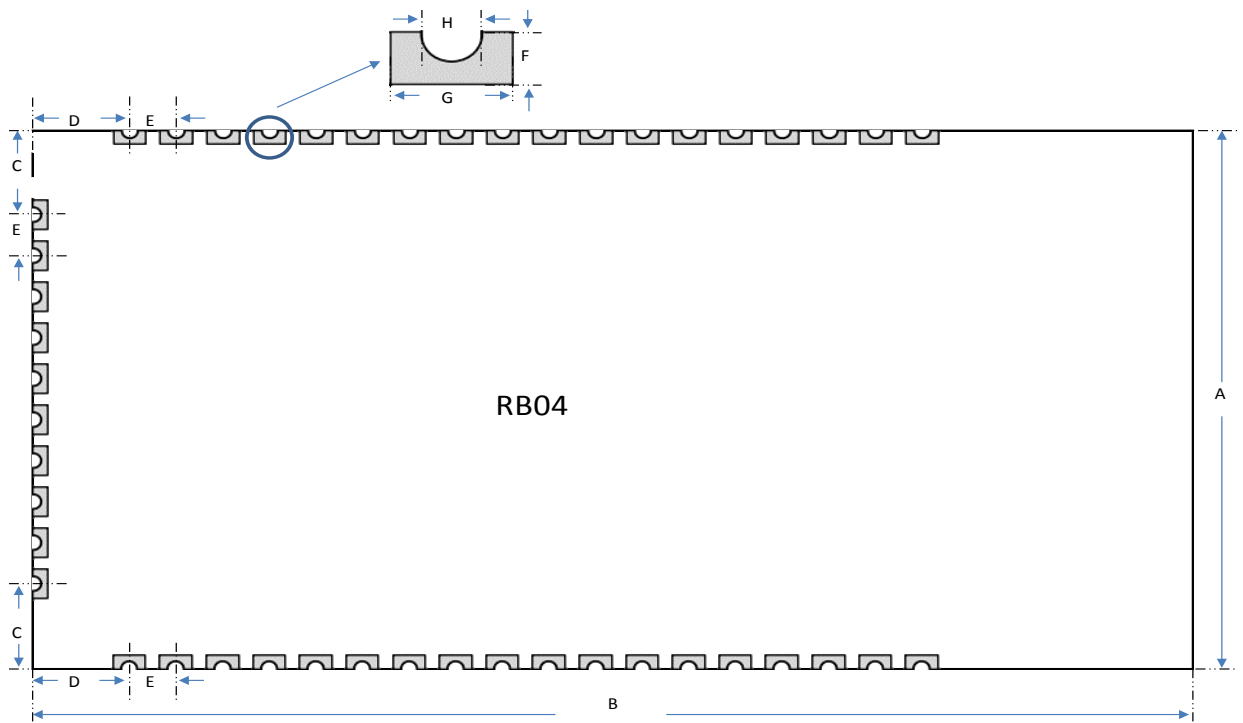


Figure 3-1 RB04 module dimensions

Table 3-1 RB04 module dimensions

Label	Dimension (mm)
A	16
B	35
C	2.285
D	2.54
E	1.27
F	0.4
G	0.7
H (diameter)	0.5
Module height (including the RF shield)	2.6
Total height (with a coax cable plugged into the U.FL connector)	3.6