

# Rayson

## Bluetooth® Module

### Class2 BC04-ext Module

### BTM-110

#### Features

- The module is a Max.4dBm( Class2 ) module.
- Bluetooth standard Ver. 2.0 conformity.
- Internal 1.8V regulator
- Low current consumption :  
**Hold,Sniff,Park,Deep sleep Mode**
- 3.0v to 3.6v operation
- Support for up to seven slaves :  
**SCO links,ACL links,Piconet<7>**
- Interface: USB,UART&PCM(for voice CODEC)
- HCI or SPP firmware is available
- Small outline. 25 x 14.5 x 2.2 mm

#### Applications

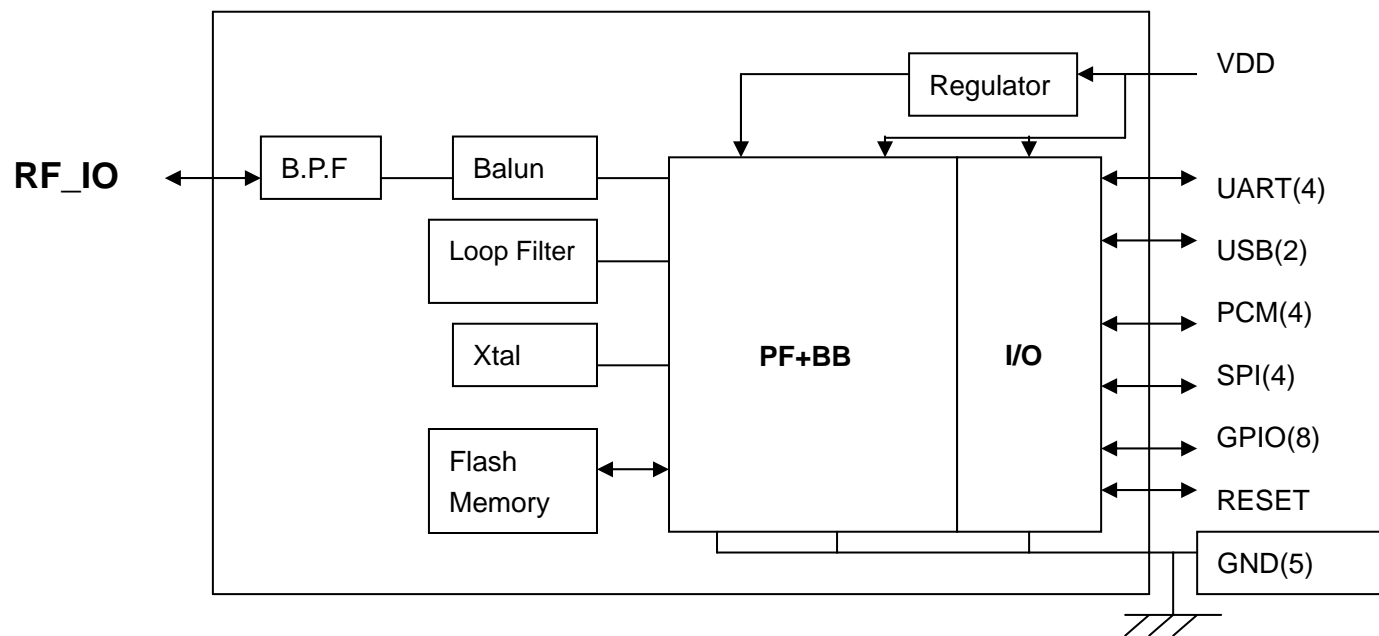
- Notebook PC
- PDA
- Cordless headset
- Digital camera & printer
- GPS,POS, Barcode Reader
- Domestic and industrial applications

#### Outline



Parameter	Description	Min.	Typ.	Max.	Units
Carrier Frequency		2.402		2.480	GHz
Operating Voltage (VDD)		3.00	3.30	3.60	V
RF Output Power	Measured in 50 ohm	-6	0	4	dBm
RX Sensitivity			-83	-70	dBm
Load Impedance	No abnormal Oscillation			5:1	-
Input Low Voltage	RESET,UART,GPIO,PCM	-0.30	-	0.80	V
Input High Voltage	RESET,UART,GPIO,PCM	0.70VDD	-	VDD+0.30	V
Output Low Voltage	UART,GPIO,PCM	-	-	0.40	V
Output High Voltage	UART,GPIO,PCM	VDD-0.40	-	-	V
Average Current Consumption	SCO connection HV1		46	-	mA
Peak Current	Tx burst +4dBm		-	80	mA

#### Block Diagram



## BTM-110 Specification

### Radio Characteristics – Basic Data Rate

Radio Characteristics, VDD = 3.3V Temperature =+20°C						
	Frequency (GHz)	Min	Typ	Max	Bluetooth Specification	Unit
Sensitivity at 0.1% BER	2.402	-	-85	-83	≤ - 70	dBm
	2.441	-	-85	-83		dBm
	2.480	-	-85	-83		dBm
Maximum received signal at 0.1% BER	2.402	0	-	-	≥ - 20	dBm
	2.441	0	-	-		dBm
	2.480	0	-	-		dBm
RF transmit power <sup>(1)</sup>	2.402	-2	2	-	-6 to +4 <sup>(2)</sup>	dBm
	2.441	-2	2	-		dBm
	2.480	-2	2	-		dBm
Initial carrier frequency tolerance	2.402	-	12	75	±75	kHz
	2.441	-	10	75		kHz
	2.480	-	9	75		kHz
20dBm bandwidth for modulated carrier	2.402	-	879	1000	≤ 1000	kHz
	2.441	-	816	1000		kHz
	2.480	-	819	1000		kHz
Drift (single slot packet)	2.402	-	-	25	≤25	kHz
	2.441	-	-	25		kHz
	2.480	-	-	25		kHz
Drift (five slot packet)	2.402	-	-	40	≤40	kHz
	2.441	-	-	40		kHz
	2.480	-	-	40		kHz
Drift Rate	2.402	-	-	20	20	kHz/50µs
	2.441	-	-	20		kHz/50µs
	2.480	-	-	20		kHz/50µs
RF power control range		16	35	-	≥16	dB
RF power range control resolution		-	1.8	-	-	dB
Δf1 <sup>avg</sup> "Maximum Modulation"	2.402	140	165	175	140<Δf1 <sup>avg</sup> <175	kHz
	2.441	140	165	175		kHz
	2.480	140	165	175		kHz
Δf2 <sup>maz</sup> "Minimum Modulation"	2.402	115	150	-	115	kHz
	2.441	115	150	-		kHz
	2.480	115	150	-		kHz
C/I co-channel		-	10	11	≤= 11	dB
Adjacent channel selectivity C/I F=F <sub>0</sub> +1 MHz <sup>(3)(5)</sup>		-	-4	0	≤= 0	dB
Adjacent channel selectivity C/I F=F <sub>0</sub> - 1MHz <sup>(3)(5)</sup>		-	-4	0	≤= 0	dB
Adjacent channel selectivity C/I F=F <sub>0</sub> +2 MHz <sup>(3)(5)</sup>		-	-35	-30	≤= - 30	dB
Adjacent channel selectivity C/I F=F <sub>0</sub> - 2MHz <sup>(3)(5)</sup>		-	-21	-20	≤= - 20	dB
Adjacent channel selectivity C/I F>=F <sub>0</sub> +3 MHz <sup>(3)(5)</sup>		-	-45	-	≤= - 40	dB
Adjacent channel selectivity C/I F<=F <sub>0</sub> -5 MHz <sup>(3)(5)</sup>		-	-45	-	≤= - 40	dB
Adjacent channel selectivity C/I F=F <sub>image</sub> <sup>(3)(5)</sup>		-	-18	-9	≤= - 9	dB
Adjacent channel transmit power F=F <sub>0</sub> ±2MHz <sup>(4)(5)</sup>		-	-35	-20	≤= - 20	dBc
Adjacent channel transmit power F=F <sub>0</sub> ±3MHz <sup>(4)(5)</sup>		-	-55	-40	≤= - 40	dBc

#### Notes:

- (1) BlueCore-External firmware maintains the transmit power to be within the Bluetooth specification v2.0 limits.
- (2) Class 2 RF transmit power range, Bluetooth specification v2.0
- (3) Up to five exceptions are allowed in v2.0 of the Bluetooth specification

(4) Up to three exceptions are allowed in v2.0 of the Bluetooth specification

(5) Measured at  $F_0 = 2441\text{MHz}$

## Radio Characteristics – Enhanced Data Rate

<b>Transmitter , VDD = 3.3V Temperature =+20°C</b>						
	<b>Frequency (GHz)</b>	<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Bluetooth Specification</b>	<b>Unit</b>
Maximum RF transmit power	2.402	-6	0	+2	-6 to +20	dBm
	2.441	-6	0	+2		dBm
	2.480	-6	0	+2		dBm
Relative transmit power		-	-1.2	-	-4 to +1	dB
$\pi/4$ DQPSK Maximum carrier frequency stability $w_0$		-	2	-	$\leq \pm 10$ for all blocks	kHz
$\pi/4$ DQPSK Maximum carrier frequency stability $w_i$		-	6	-	$\leq \pm 75$ for all packets	kHz
$\pi/4$ DQPSK Maximum carrier frequency stability $ w_0 + w_i $		-	8	-	$\leq \pm 75$ for all blocks	kHz
8 DPSK Maximum carrier frequency stability $w_0$		-	2	-	$\leq \pm 10$ for all blocks	kHz
8 DPSK Maximum carrier frequency stability $w_i$		-	6	-	$\leq \pm 75$ for all packets	kHz
8 DPSK Maximum carrier frequency stability $ w_0 + w_i $		-	8	-	$\leq \pm 75$ for all blocks	kHz
$\pi/4$ DQPSK Modulation Accuracy	RMS DVEM	-	7	-	$\leq 20$	%
	99% DEVM	-	13	-	$\leq 30$	%
	Peak DEVM	-	19	-	$\leq 35$	%
8 DPSK Modulation Accuracy	RMS DVEM	-	7	-	$\leq 13$	%
	99% DEVM	-	13	-	$\leq 20$	%
	Peak DEVM	-	17	-	$\leq 25$	%
In-band spurious emissions	$F > F_0 + 3\text{ MHz}$	-	<-50	-	$\leq -40$	dBm
	$F < F_0 - 3\text{ MHz}$	-	<-50	-	$\leq -40$	dBm
	$F = F_0 - 3\text{ MHz}$	-	-46	-	$\leq -40$	dBm
	$F = F_0 - 2\text{ MHz}$	-	-34	-	$\leq -20$	dBm
	$F = F_0 - 1\text{ MHz}$	-	-35	-	$\leq -26$	dBm
	$F = F_0 + 1\text{ MHz}$	-	-35	-	$\leq -26$	dBm
	$F = F_0 + 2\text{ MHz}$	-	-31	-	$\leq -20$	dBm
$F = F_0 + 3\text{ MHz}$	-	-33	-	$\leq -40$	dBm	
EDR Differential Phase Encoding			No Errors		$\geq 99$	%
<b>Receiver , VDD = 3.3V Temperature =+20°C</b>						
	<b>Modulation</b>	<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Bluetooth Specification</b>	<b>Unit</b>
Sensitivity at 0.1% BER	$\pi/4$ DQPSK	-	-87	-	$\leq -70$	dBm
	8 DPSK	-	-78	-	$\leq -70$	dBm
Maximum received signal level at 0.1% BER	$\pi/4$ DQPSK	-	-8	-	$\geq -20$	dBm
	8 DPSK	-	-10	-	$\geq -20$	dBm
C/I co-channel at 0.1% BER	$\pi/4$ DQPSK	-	10	-	$\leq +13$	dB
	8 DPSK	-	19	-	$\leq +21$	dB
Adjacent channel selectivity C/I $F = F_0 + 1\text{ MHz}$	$\pi/4$ DQPSK	-	-10	-	$\leq 0$	dB
	8 DPSK	-	-5	-	$\leq +5$	dB
Adjacent channel selectivity C/I $F = F_0 - 1\text{ MHz}$	$\pi/4$ DQPSK	-	-11	-	$\leq 0$	dB
	8 DPSK	-	-5	-	$\leq +5$	dB

Adjacent channel selectivity C/I F=F <sub>0</sub> +2 MHz	$\pi/4$ DQPSK	-	-40	-	$\leq -30$	dB
	8 DPSK	-	-40	-	$\leq -25$	dB
Adjacent channel selectivity C/I F=F <sub>0</sub> -2 MHz	$\pi/4$ DQPSK	-	-23	-	$\leq -20$	dB
	8 DPSK	-	-20	-	$\leq -13$	dB
Adjacent channel selectivity C/I F=F <sub>0</sub> +3 MHz	$\pi/4$ DQPSK	-	-45	-	$\leq -40$	dB
	8 DPSK	-	-45	-	$\leq -33$	dB
Adjacent channel selectivity C/I F=F <sub>0</sub> -5 MHz	$\pi/4$ DQPSK	-	-45	-	$\leq -40$	dB
	8 DPSK	-	-45	-	$\leq -33$	dB
F <sub>0</sub> = 2405, 2441, 2477 MHz						
Adjacent channel selectivity C/I F=F <sub>image</sub>	$\pi/4$ DQPSK		-20		$\leq -7$	dB
	8 DPSK		-15		$\leq 0$	dB

## BTM-110 Pin Functions

PIN	NAME	TYPE	FUNCTION	REMARK
1	PIO(8)	Bi-directional	Programmable Input/Output line	
2	PIO(9)	Bi-directional	Programmable Input/Output line	
3	PIO(10)	Bi-directional	Programmable Input/Output line	
4	AIO0	Bi-directional	Programmable Input/Output Line	
5	AIO1	Bi-directional	Programmable Input/Output Line	
6	RESET	CMOS input	Reset if high. Input debounced so must be high for >5ms to cause a reset	
7	SPI_MISO	CMOS Output	Serial Peripheral Interface Data Output	
8	SPI_CSB	CMOS Input	Chip Select For Synchronous Serial Interface active low	
9	SPI_CLK	CMOS Input	Serial Peripheral Interface Clock	
10	SPI_MOSI	CMOS Input	Serial Peripheral Interface Data Input	
11	UART_CTS	CMOS Input	UART Clear To Send (Active Low)	
12	UART_TX	CMOS Output	UART Data Output	
13	UART_RTS	CMOS Output	UART Request To Send (Active Low)	
14	UART_RX	CMOS Input	UART Data Input	
15	PIO(11)	Bi-directional	Programmable Input/Output line	
16	3V3	Power	3.3V Power Supply Input	
17	GND	GND	Ground	
18	PCM_OUT	CMOS Output	Synchronous Data Output	
19	PCM_SYNC	Bi-directional	Synchronous Data Sync	
20	PCM_IN	CMOS Input	Synchronous Data Input	
21	PCM_CLK	Bi-directional	Synchronous Data Clock	
22	USB_DP	Bi-directional	USB Data Plus	
23	USB_DN	Bi-directional	USB Data Minus	
24	PIO(7)	Bi-directional	Programmable Input/Output line	
25	PIO(6)	Bi-directional	Programmable Input/Output line	
26	PIO(5)	Bi-directional	Programmable Input/Output line	
27	PIO(4)	Bi-directional	Programmable Input / Output Line	
28	PIO(3)	Bi-directional	Programmable Input/Output Line	
29	PIO(2)	Bi-directional	Programmable Input / Output Line	
30	PIO(1)	Bi-directional	Programmable Input/Output Line	
31	PIO(0)	Bi-directional	Programmable Input / Output Line	
32	GND	GND	Ground	
33	RF_IO	Analogue	Antenna Interface	
34	GND	GND	Ground	

# BTM-110 Pin out Information

## PIN DETAILS VIEWED FROM TOP SIDE

1	34
PIO(8)	GND
PIO(9)	RF_IO
PIO(10)	GND
AIO(0)	PIO(0)
AIO(1)	PIO(1)
RESET	PIO(2)
SPI_MISO	PIO(3)
SPI_CSB	PIO(4)
SPI_CLK	PIO(5)
SPI_MOSI	PIO(6)
UART_CTS	PIO(7)
UART_TX	USB_DN
UART_RTS	USB_DP
UART_RX	PCM_CLK
PIO(11)	PCM_IN
3V3	PCM_SYNC
GND	PCM_OUT
17	18

## MODULE PAD AND SOLDER MASK DETAILS

SOLDER MASK WINDOW 1.0mm MAX

SOLDER PAD 0.8mm

## MECHANICAL DETAILS VIEWED FROM TOP/BOTTOM SIDE

