Rayson

Bluetooth® Module

Class2 BC04-ext Module with Antenna BTM-180

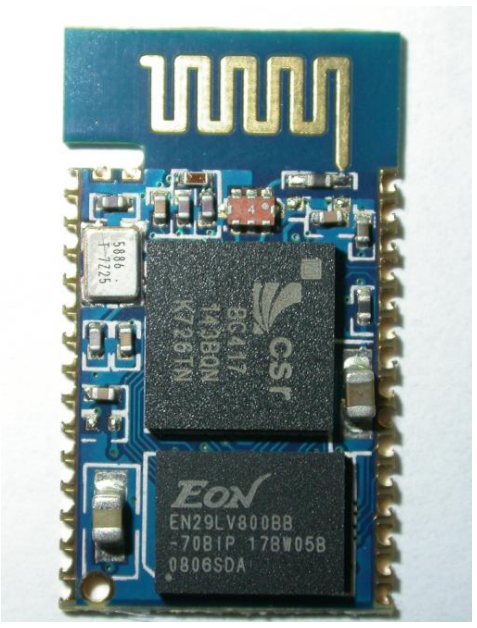
Features

- The module is a Max.4dBm(Class2) module with antenna
- *Bluetooth* standard Ver. 2.0 + EDR compliant.
- Low current consumption :
  Hold,Sniff,Park,Deep sleep Mode
- 3.0V or 1.8V operation
- Support for up to seven slaves :
  SCO links<3>,ACL links,Piconet<7>
- Interface: USB,UART&PCM(for voice CODEC)
- HCI or SPP,HSP/HFP,HID,DUN firmware is available
- Support for 802.11 Co-Exsitence
- RoHS compliant
- Small outline. 25.0 x 14.5 x 2.2 mm

Applications

- PDA,NB, Car Kit
- Presenter, Mouse, Keyboard
- for Cordless headset
- Digital camera & printer
- Access Points
- GPS,POS, Barcode Reader
- Data collector
- Domestic and industrial applications

Outline

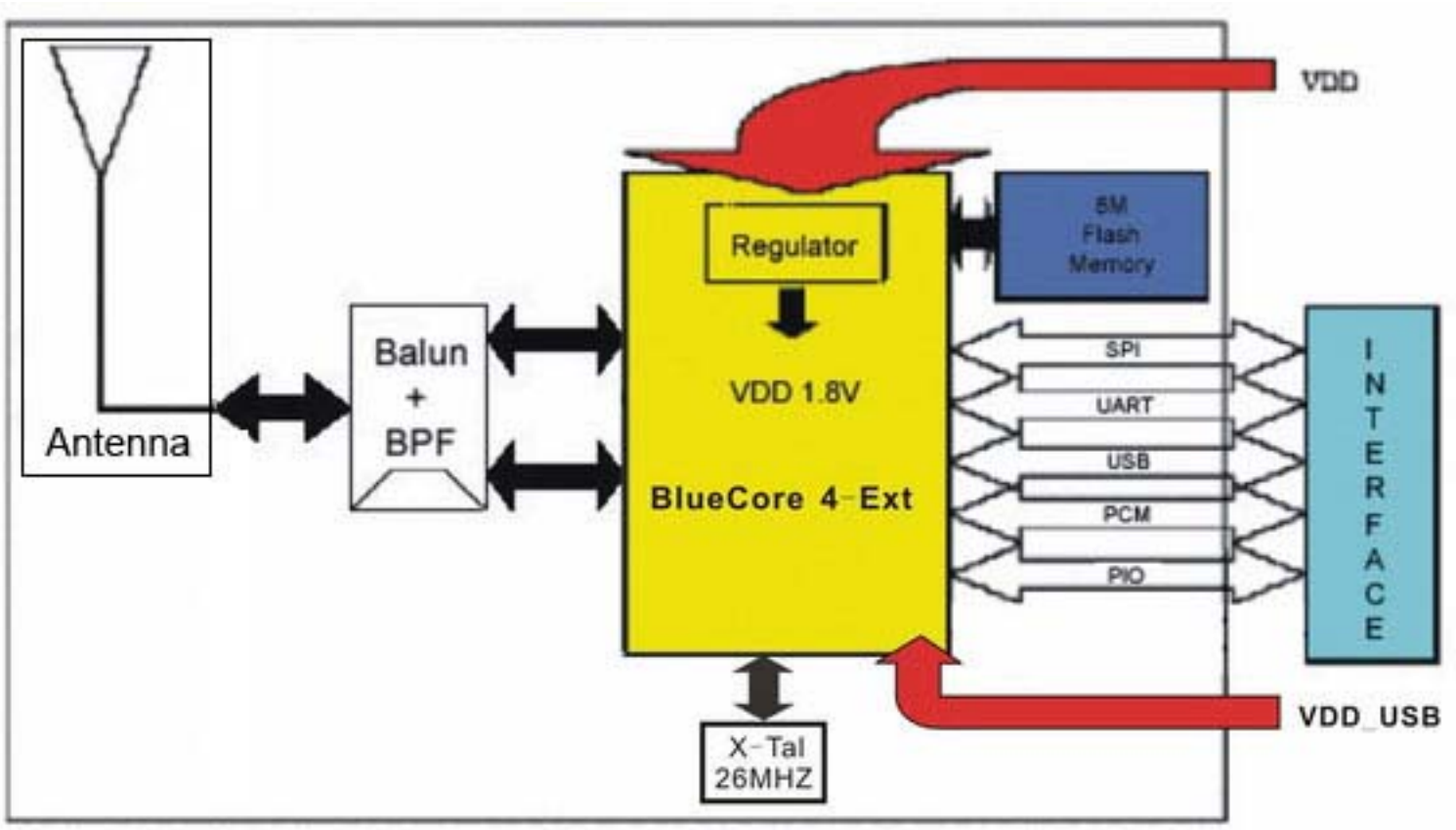


General Electrical Specification

Absolute Maximum Ratings		
Ratings	**Min.**	**Max.**
Storage Temperature	**-40 ℃**	**+150 ℃**
Supply Voltage VDD (3.3V version, BTM-160)	**-0.4 V**	**3.7 V**
Supply Voltage VDD (1.8V version, BTM-170)	**-0.4 V**	**2.2 V**
Recommended Operating Condition		
Operating Condition	**Min.**	**Max.**
Operating Temperature range	**-20 ℃**	**+75 ℃**
Supply Voltage VDD (3.3V version, BTM-160)	**3.0 V**	**3.6 V**
Supply Voltage VDD (1.8V version, BTM-170)	**1.7 V**	**1.9 V**

Parameter	Description	Min.	Typ.	Max.	Units
RF Output Power	**Measured in 50 ohm**	**0**	**2**	**4**	**dBm**
RX Sensitivity			**-83**	**-80**	**dBm**
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	**Deep sleep**		**40**		**uA**
	ACL 40ms sniff		**2.4**		**mA**
	SCO connection HV1		**39**	**-**	**mA**
Peak Current	**Tx burst +4dBm**		**-**	**58**	**mA**

Block Diagram



Radio Characteristics – Basic Data Rate

Radio Characteristics, VDD = 3.3V Temperature =+20°C						
	Freauency (GHz)	**Min**	**Typ**	**Max**	**Bluetooth Specification**	**Unit**
Sensitivity at 0.1% BER	2.402	-	-83	-82	≤ - 70	dBm
	2.441	-	-83	-82		dBm
	2.480	-	-83	-82		dBm
Maximum received signal at 0.1% BER	2.402	-	-6	0	≥ - 20	dBm
	2.441	-	-6	0		dBm
	2.480	-	-6	0		dBm
RF transmit power[1]	2.402	-	+2	-	-6 to +4[2]	dBm
	2.441	-	+2	-		dBm
	2.480	-	+2	-		dBm
Initial carrier frequency tolerance	2.402	-	12	20	±75	kHz
	2.441	-	10	20		kHz
	2.480	-	9	20		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	-	-	20	≤25	kHz
	2.441	-	-	20		kHz
	2.480	-	-	20		kHz
Drift (five slot packet)	2.402	-	-	20	≤40	kHz
	2.441	-	-	20		kHz
	2.480	-	-	20		kHz
Drift Rate	2.402	-	-	15	20	kHz/50µs
	2.441	-	-	15		kHz/50µs
	2.480	-	-	15		kHz/50µs

RF power control range		16	35	-	≥16	dB
RF power range control resolution		-	1.8	-	-	dB
△f1^{avg} "Maximum Moudulation"	2.402	145	165	175	140<△f1^{avg}<175	kHz
	2.441	145	165	175		kHz
	2.480	145	165	175		kHz
△f2^{maz} "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$_0$ +1 MHz$^{(3)(5)}$		-	-4	0	<= 0	dB
Adjacent channel selectivity C/I F=F$_0$ - 1MHz$^{(3)(5)}$		-	-4	0	<= 0	dB
Adjacent channel selectivity C/I F=F$_0$ +2 MHz$^{(3)(5)}$		-	-35	-30	<= - 30	dB
Adjacent channel selectivity C/I F=F$_0$ - 2MHz$^{(3)(5)}$		-	-21	-20	<= - 20	dB
Adjacent channel selectivity C/I F>=F$_0$ +3 MHz$^{(3)(5)}$		-	-45	-	<= - 40	dB
Adjacent channel selectivity C/I F<=F$_0$ -5 MHz$^{(3)(5)}$		-	-45	-	<= - 40	dB
Adjacent channel selectivity C/I F=F$_{image}$$^{(3)(5)}$		-	-18	-9	<= - 9	dB
Adjacent channel transmit power F=F$_0$±2MHz$^{(4)(5)}$		-	-35	-20	<= - 20	dBc
Adjacent channel transmit power F=F$_0$±3MHz$^{(4)(5)}$		-	-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$_0$ = 2441MHz

Radio Characteristics – Enhanced Data Rate

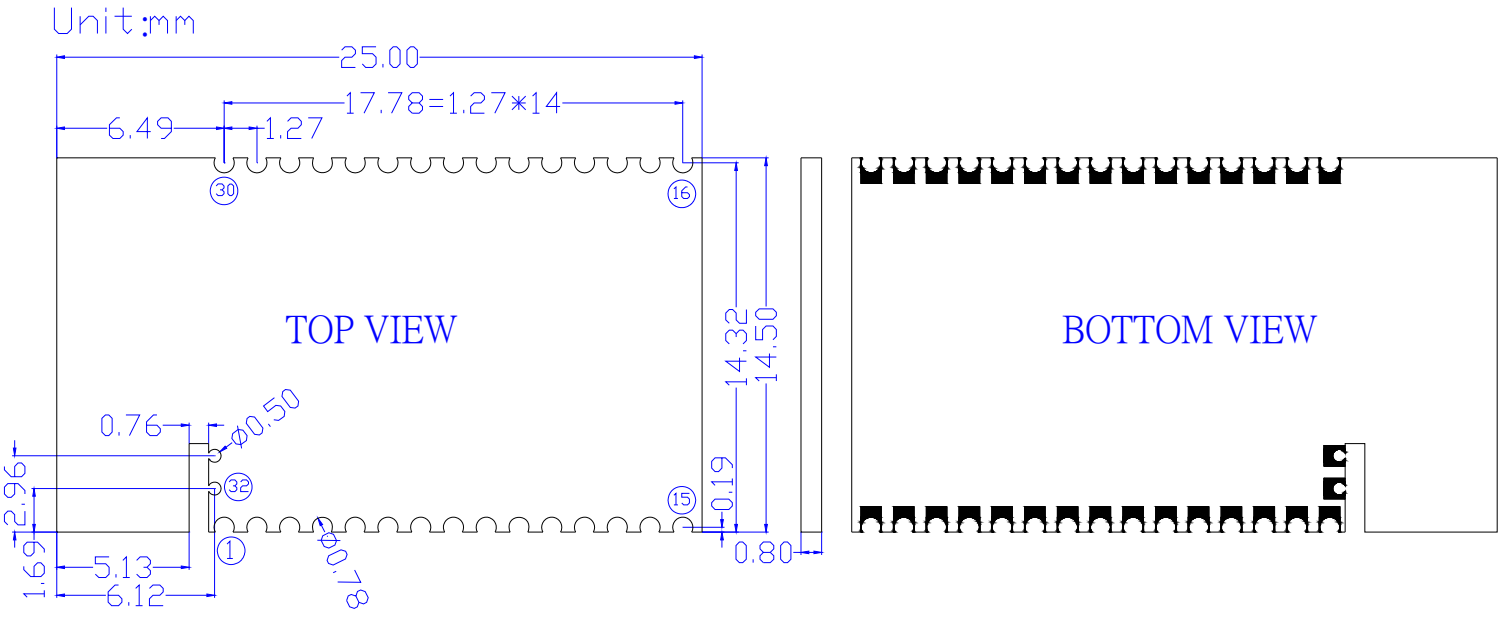
Transmitter , VDD = 3.3V Temperature =+20°C						
	Frequency (GHz)	**Min.**	**Typ.**	**Max.**	**Bluetooth Specification**	**Unit**
Maximum RF transmit power	2.402	-6	0	+2	-6 to +20	dBm
	2.441	-6	0	+2		dBm
	2.480	-6	0	+2		dBm
Relative transmit power		-	-1.5	-	-4 to +1	dB
π/4 DQPSK Maximum carrier frequency stability w$_0$		-	2	-	≤ ±10 for all blocks	kHz
π/4 DQPSK Maximum carrier frequency stability w$_i$		-	6	-	≤ ±75 for all packets	kHz
π/4 DQPSK Maximum carrier frequency stability | w$_0$ + w$_i$ |		-	8	-	≤ ±75 for all blocks	kHz
8 DPSK Maximum carrier frequency stability w$_0$		-	2	-	≤ ±10 for all blocks	kHz
8 DPSK Maximum carrier frequency stability w$_i$		-	6	-	≤ ±75 for all packets	kHz
8 DPSK Maximum carrier frequency stability | w$_0$ + w$_i$ |		-	8	-	≤ ±75 for all blocks	kHz
π/4 DQPSK Modulation Accuracy	RMS DVEM	-	7	-	≤ 20	%
	99% DEVM	-	13	-	≤ 30	%
	Peak DEVM	-	19	-	≤ 35	%
8 DPSK Modulation Accuracy	RMS DVEM	-	7	-	≤ 13	%
	99% DEVM	-	13	-	≤ 20	%
	Peak DEVM	-	17	-	≤ 25	%

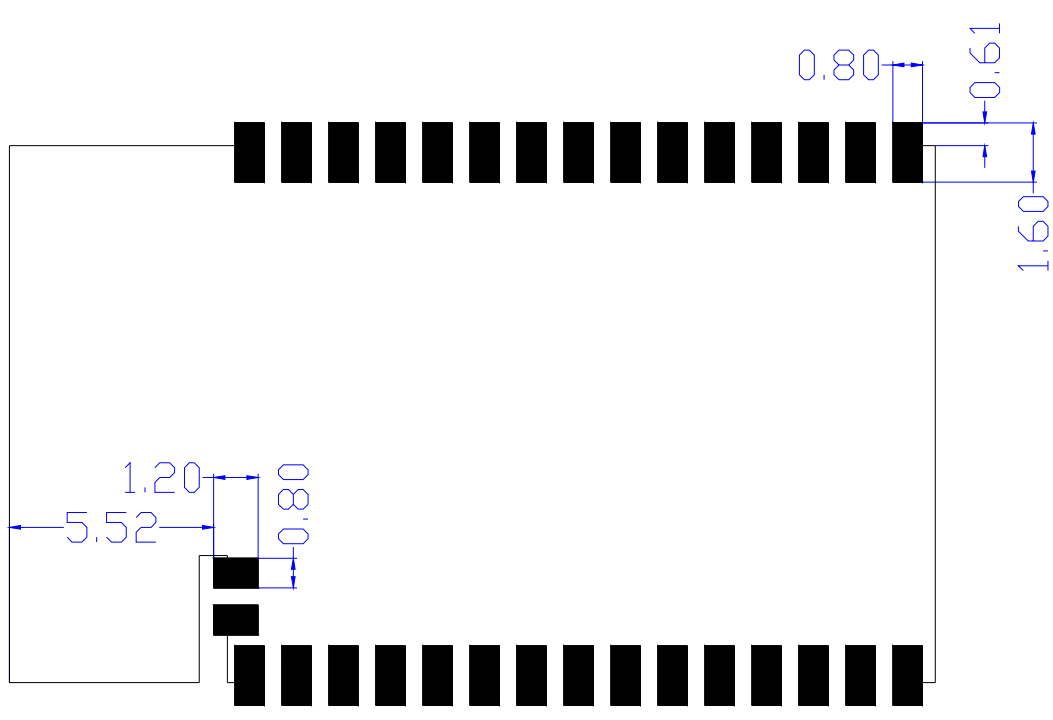
In-band spurious emissions	$F>F_0+3$ MHz	-	<-50	-	≤ -40	dBm
	$F<F_0-3$ MHz	-	<-50	-	≤ -40	dBm
	$F=F_0-3$ MHz	-	-46	-	≤ -40	dBm
	$F=F_0-2$ MHz	-	-34	-	≤ -20	dBm
	$F=F_0-1$ MHz	-	-35	-	≤ -26	dBm
	$F=F_0+1$ MHz	-	-35	-	≤ -26	dBm
	$F=F_0+2$ MHz	-	-31	-	≤ -20	dBm
	$F=F_0+3$ MHz	-	-33	-	≤ -40	dBm
EDR Differential Phase Encoding			No Errors		≥ 99	%
Receiver , VDD = 3.3V Temperature =+20°C						
	Modulation	**Min.**	**Typ.**	**Max.**	**Bluetooth Specification**	**Unit**
Sensitivity at 0.1% BER	$\pi/4$ DQPSK	-	-82	-	≤ -70	dBm
	8 DPSK	-	-76	-	≤ -70	dBm
Maximum received signal level at 0.1% BER	$\pi/4$ DQPSK	-	-8	-	≥ -20	dBm
	8 DPSK	-	-10	-	≥ -20	dBm
C/I co-channel at 0.1% BER	$\pi/4$ DQPSK	-	10	-	≤ +13	dB
	8 DPSK	-	19	-	≤ +21	dB
Adjacent channel selectivity C/I $F=F_0+1$ MHz	$\pi/4$ DQPSK	-	-10	-	≤ 0	dB
	8 DPSK	-	-5	-	≤ +5	dB
Adjacent channel selectivity C/I $F=F_0-1$ MHz	$\pi/4$ DQPSK	-	-11	-	≤ 0	dB
	8 DPSK	-	-5	-	≤ +5	dB
Adjacent channel selectivity C/I $F=F_0+2$ MHz	$\pi/4$ DQPSK	-	-40	-	≤ -30	dB
	8 DPSK	-	-40	-	≤ -25	dB
Adjacent channel selectivity C/I $F=F_0-2$ MHz	$\pi/4$ DQPSK	-	-23	-	≤ -20	dB
	8 DPSK	-	-20	-	≤ -13	dB
Adjacent channel selectivity C/I $F=F_0+3$ MHz	$\pi/4$ DQPSK	-	-45	-	≤ -40	dB
	8 DPSK	-	-45	-	≤ -33	dB
Adjacent channel selectivity C/I $F=F_0-5$ MHz	$\pi/4$ DQPSK	-	-45	-	≤ -40	dB
	8 DPSK	-	-45	-	≤ -33	dB
F_0 = 2405, 2441, 2477 MHz						
Adjacent channel selectivity C/I $F=F_{image}$	$\pi/4$ DQPSK		-20		≤ -7	dB
	8 DPSK		-15		≤ 0	dB

BTM-180 Pins out Information

PIN	NAME	TYPE	FUNCTION
1	PIO(11)	Bi-directional	Programmable Input/Output line
2	AIO(0)	Bi-directional	Programmable Input/Output Line or 32KHz sleep clock input or or Analogue input
3	AIO(1)	Bi-directional	Programmable Input/Output Line or Analogue input
4	PCM_OUT	CMOS Output	Synchronous Data Output
5	PCM_CLK	Bi-directional	Synchronous Data Clock
6	PCM_SYNC	Bi-directional	Synchronous Data Sync
7	PCM_IN	CMOS Input	Synchronous Data Input
8	UART_CTS	CMOS Input	UART Clear To Send (Active Low)
9	UART_TX	CMOS Output	UART Data Output
10	UART_RX	CMOS Input	UART Data Input
11	UART_RTS	CMOS Output	UART Request To Send (Active Low)
12	USB_DP	Bi-directional	USB Data Plus
13	USB_DN	Bi-directional	USB Data Minus
14	VDD	Power	3.3V or 1.8V Power Supply Input, Positive supply for PIO[3:0] and PIO[11:8]
15	GND	GND	Ground
16	VDD_USB	Power	3.3V Power Supply Input for USB/SPI/PCM ports and PIO[7:4]
17	SPI_MOSI	CMOS Input	Serial Peripheral Interface Data Input
18	SPI_CSB	CMOS Input	Chip Select For Synchronous Serial Interface active low
19	SPI_MISO	CMOS Output	Serial Peripheral Interface Data Output
20	SPI_CLK	CMOS Input	Serial Peripheral Interface Clock
21	RESETB	CMOS input	Reset if low. Input debounced so must be low for >5ms to cause a reset
22	PIO(7)	Bi-directional	Programmable Input/Output line
23	PIO(6)	Bi-directional	Programmable Input/Output line , CLK_REQ , WLAN_Ative/Ch_Data input
24	PIO(5)	Bi-directional	Programmable Input/Output line , USB_DETACH, BT_Ative output
25	PIO(4)	Bi-directional	Programmable Input / Output Line , USB_ON, BT_Priority/Ch_Clk Output
26	PIO(3)	Bi-directional	Programmable Input/Output Line , USB_WAKE_UP, CLK_REQ_IN
27	PIO(2)	Bi-directional	Programmable Input/Output line
28	PIO(8)	Bi-directional	Programmable Input/Output line
29	PIO(9)	Bi-directional	Programmable Input/Output line
30	PIO(10)	Bi-directional	Programmable Input/Output line
31	PIO(0)	Bi-directional	Programmable Input / Output Line ,RF signal RX Enable
32	PIO(1)	Bi-directional	Programmable Input/Output Line ,RF signal TX Enable

BTM-180 Dimension





PCB LAYOUT(TOP VIEW)