

WRAP THOR

BLUETOOTH MODULE

DATA SHEET (VERSION 1.0)

Product Name: WRAP THOR™ Module
Product ID: WRAP THOR-2022-1 (Bluetooth module)
WRAP THOR-2022-1-CR (Bluetooth module with Casira carrier board)
Hardware Version: REV 1.0
Software Version: 16.4

FEATURES

- Wireless communication module corresponding to Bluetooth Specification V1.1
- High sensitivity, supports connections from up to 100 m, Bluetooth class 1
- Support for up to 7 ACL connections and up to 3 SCO connections
- 13-bit PCM interface, PIO control
- UART interface with programmable baud rate
- Compact package size (25.6 * 14 * 2.5 mm)
- Built-in link controller and Link Manager Protocol
- Interface options
 - WRAP THOR ASCII Interface™ using UART
 - HCI using UART/USB
 - PIO and SPI
- Built-in flash memory and system clock
- Support for Virtual Machine applications inside the module
- Metal shielding

TARGET APPLICATIONS

Telemetry, telematics, M2M applications, industrial instruments, sensors, and devices, hand-held devices, network appliances, embedded Linux systems, Professional transportation systems, lifestyle electronics, cable replacement, Symbian phone accessories.

BLOCK DIAGRAM

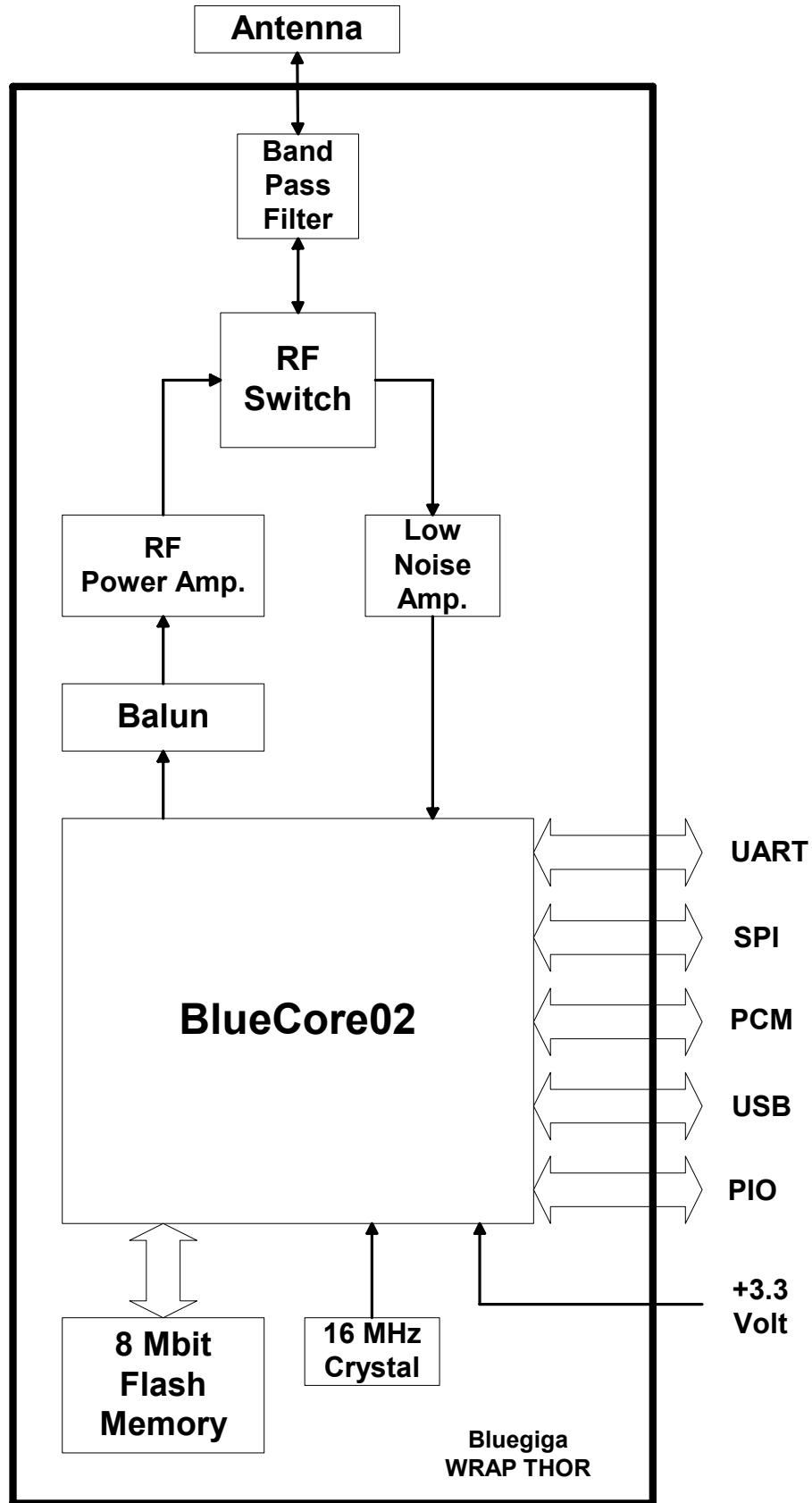


Figure 1: Block diagram

COMMON PHYSICAL LAYER SPECIFICATIONS

Operating Frequency	2402 MHz to 2480 MHz
Carrier Spacing	1.0 MHz
Channel	79
Duplexing	TDD
Symbol Rate	1 Mbps
TX Modulation Polarity	Binary one: Positive Frequency
	Binary zero: Negative Frequency
RX Data Out Polarity	Fc +dF: "H"
	FC -dF: "L"

Table 1: Common physical layer specifications

GENERAL SPECIFICATIONS

	Item	Specification
1	Supply voltage	VDD: 3.3 V +/- 0.1 V regulated voltage.
2	Carrier frequency	2400 MHz to 2483.5 MHz
3	Modulation method	GFSK, 1 Mbps, 0.5 BT Gaussian.
4	Maximum data rate	Asynchronous: 723.2 kbps / 57.6 kbps.
5	Transmission power	(Max +18) +16 to -12 dBm (Power control 6 stage).
6	Hopping	1600 hops/s, 1 MHz channel space.
7	Receiving signal range	-82 to -20 dBm.
8	Receiver IF frequency	1.5 MHz center frequency.
9	RF input impedance	50 Ohms.
10	Baseband crystal OSC	16 MHz.
11	Output interface	USB, PCM, SPI, UART.
12	Operation temperature	-20 to +70 °C.
13	Compliance	Bluetooth Specification Ver1.1.
15	Storage temperature	-40 to +80 °C.
16	USB specification	Ver 1.1.

Table 2: General specifications

ELECTRICAL CHARACTERISTICS

	Items	Min	Typ	Max	Unit	Condition	
1	Transmission power ETC1	-12	TBD	+18	dBm	Longest supported packet.	
2	Initial frequency accuracy	-75		75	kHz	Hopping ON/Off. Continuous TX.	
3	In-band spurious ETC1 M +/- 500 kHz M-N =2 M-N ≥3 Exception NOTE5			-20 -20 -40 -20	dBc dBm dBm dBm	Max hold and 100 kHz.	
4	Out-of-band spurious ETC1 (Operation mode) 30 MHz to 1 GHz 1 GHz to 12.75 GHz 1.8 GHz to 1.9 GHz 5.1 GHz to 5.3 GHz (Idle mode) 30 MHz to 1 GHz 1 GHz to 12.75 GHz 1.8 GHz to 1.9 GHz 5.15 GHz to 5.3 GHz			-36 -30 -47 -47 -57 -47 -47 -47	dBm dBm dBm dBm dBm dBm dBm dBm	100 kHz RBW.	
5	Modulation characteristics NTC	F1AVG	140		175	kHz	00001111, Hopping off. DH1.
		F2MIN	115			kHz	01010101, Hopping off. DH1.
		F2AVG/F1AVG	0.8				
6	Frequency drift			±25 ±40 ±40	kHz kHz kHz	DH1. DH3. DH5. Max Drift rate: 400 Hz/10 us.	
7	Operation current ETC1			200	mA	TX ON.	

Table 3: Transmitter characteristics

	Items	Min	Typ	Max	Unit	Condition
1	Sensitivity					BER 10E-3, hopping off, 1600 k returned payload bit. Multi-slot packets use DH5.
	Single-slot packet	-87	-82	-75	dBm	
	Multi-slot packet	-87	-82	-75	dBm	
2	Maximum received signal NTC	-20			dBm	BER 10E-3, hopping off, 1600 k returned payload bit, multi-slot packet, DH1.
3	Out-of-band blocking NTC					Hopping off, BER 10E-3.
	30 MHz to 2000 MHz	-10			dBm	
	2000 MHz to 2399 MHz	-27			dBm	
	2498 MHz to 3000 MHz	-27			dBm	
	3000 MHz to 12.75 Ghz	-10			dBm	
4	Operation current ETC1			200	mA	TX ON.
5	Intermodulation NTC	-39			dBm	Hopping off, BER 10E-3
6	Interference performance					NTC, BER 10E-3 Measured with hopping off, DH1, UD signal: BT modulated signal without hopping.
	Co-channel			14	dB	
	+1 MHz			4	dB	
	+2 MHz			-30	dB	
	>+3 MHz			-40	dB	
	Image frequency			-6	dB	
Adjacent (1 MHz) to in-band image			-16	dB		

Table 4: Receiver characteristics

PIN DESCRIPTION (BOARD TO BOARD CONNECTOR)

PIN name	No	I/O	Description
+3V3	1	VDD	Positive supply connection.
NC	2	-	
GND	3	VSS	Ground.
NC	4	-	
GND	5	VSS	Ground.
PIO (2)	6	I/O	Programmable I/O lines.
UART_RST	7	O	Asynchronous serial data RTS (pull-up).
UART_CTS	8	I	Asynchronous serial data CTS (pull-up).
PIO (6)	9	I/O	Programmable I/O lines.
PCM_OUT	10	O	Synchronous 8 kbps data out (pull-down).
PIO (7)	11	I/O	Programmable I/O lines.
PIO (5)	12	I/O	Programmable I/O lines.
USB_D+	13	I/O	USB Data+.
GND	14	VSS	Ground.
+3V3	15	VDD	Positive supply connection.
UART_RX	16	I	Asynchronous serial data.
PCM_IN	17	I	Synchronous 8 kbps data in (pull-down).
USB_D-	18	I/O	USB Data-.
PCM_SYNC	19	I/O	Synchronous data strobe (pull-down).
SPI_CSB	20	I	Chip select for synchronous serial interface (pull-up).
SPI_MOSI	21	I	Synchronous Serial Interface data input (pull down).
PCM_CLK	22	I/O	Synchronous data clock (pull-down).
UART_TX	23	O	Asynchronous serial data out.
SPI_MISO	24	O	Synchronous Serial Interface data output (pull-down).
PIO (4)	25	I/O	Programmable I/O lines.
SPI_CLK	26	I	Synchronous Serial Interface Clock (pull down).
RESET_IN	27	I	Reset if high (pull-down).
PIO (3)	28	I/O	Programmable I/O lines.
GND	29	VSS	Ground.
RF	30	RF	RF-transceiver antenna.

Table 5: Pin configuration

PHYSICAL OUTLOOK



Figure 2: Physical outlook

PHYSICAL DIMENSIONS

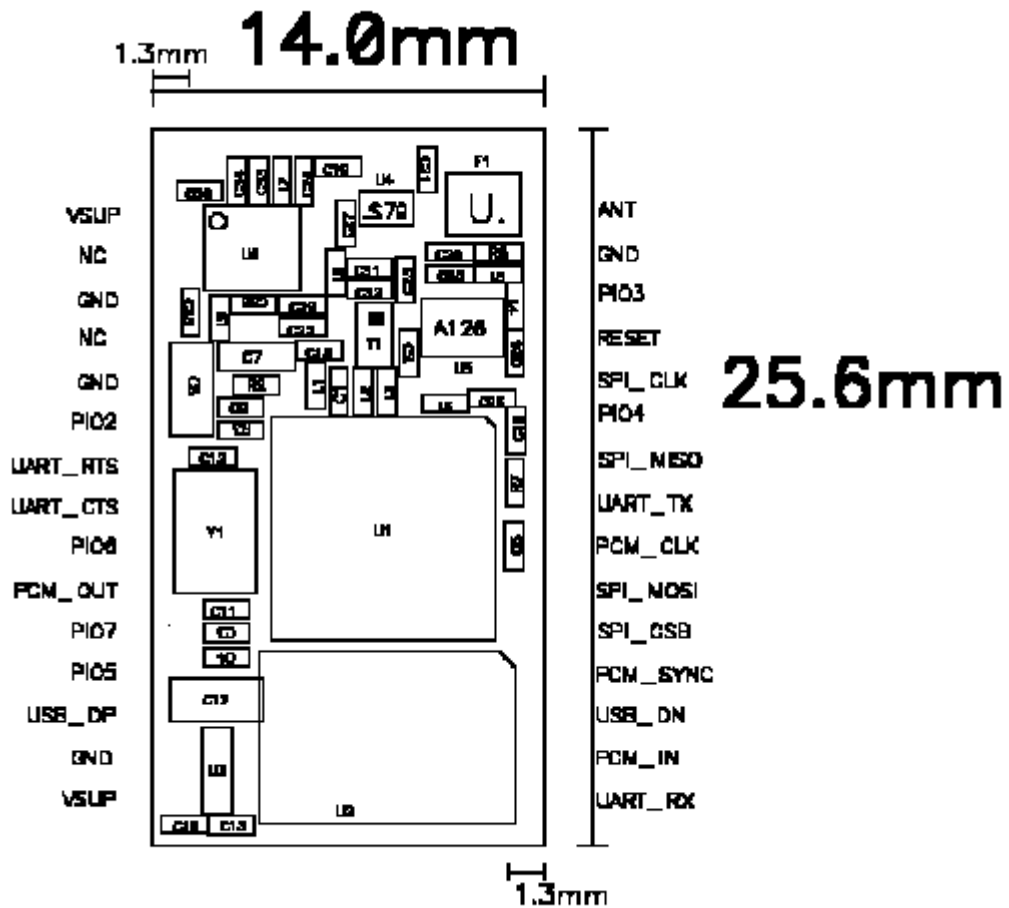


Figure 3: Physical dimensions

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