



HR-2003 ZigBee Module User Manual

Function

• **RF/layout**

- Adapt to the 2.4-GHz IEEE 802.15.4 RF transceiver
- High receiver sensitivity and robustness
- Programmable output power up to 21 dBm
- Only power Can communicate
- 16-mm × 28-mm Stamps package
- Suitable for system configuration in line with the worldwide radio frequency

Rate regulations: ETSI EN 300 328 and EN 300440 (Europe), FCC CFR47 Part 15 (U.S.)

And ARIB STD-T-66 (Japan)

• **Low power consumption**

- Active Mode RX (CPU Idle): 27 mA
- Active Mode TX 20dBm (CPU Idle): 166mA
- Power mode 1 (4 μs wake-up): 0.2 mA
- Power mode 2(Sleep timer running): 1 μA
- Power mode 3 (external interrupt): 0.4 μA
- Wide supply voltage range (2 V-3.6 V)

• **Microcontrollers**

- Excellent performance and low power code prefetch function consumption of 8051 microcontroller core
- 32,64 -,128,256-KB system programmable flash
- 8-KB RAM, has number holding capacity under variety of power supply
- Support for hardware debugging

• **Default firmware**

- Provide transparent serial, frame format , Various operating parameters can be configured using the configuration tool, the user can apply do not program

• **Peripherals**

- Powerful 5-channel DMA
- IEEE 802.5.4 MAC timer, general-purpose timer (A 16-bit timer, an 8-bit timer)
- IR generation circuit
- 32-kHz sleep timer with capture functionality
- Hardware support CSMA/CA
- Support accurate digitization RSSI/LQI
- Battery monitor and temperature sensor
- 7 inputs and configurable resolution 12-bit ADC
- AES Security coprocessor
- 2 Powerful USART supports a variety of serial communications protocol
- 18 general I / O pins (17 × 4 mA, 20 mA)
- Watchdog Timer

• **Development Tool**

- CC2530 development kit
- CC2530ZigBee®development kit
- For the RF4CE CC2530 RemoTI™ Development Kit
- SmartRF™ software
- Packet sniffer
- Available IAR Embedded Workbench

Application

- 2.4-GHz IEEE 802.15.4 system
- RF4CE Remote control systems (greater than 64-KB Flash)
- ZigBee system (256-KB flash)
- Home / building automation
- lighting system
 - Industrial control and monitoring
 - Low-power wireless sensor networks
 - Consumer electronics
 - Healthcare

RemoTI, SmartRF, Z-Stack Is trademark of Texas Instruments.

IAR Embedded Workbench is trademark IAR Systems.

ZigBee Is a registered trademark ZigBee Alliance. All other trademarks are property their owners.

Remarks : The follow records of TT2530 and TT2530 is based on the T=25°C and VDD = 3 V,

unless other explanations

Performance	TT2530	TT2530
Use Chip	CC2530	CC2530+CC2591
Interface	SMT	SMT
Serial Interface Options	3V TTL	3V TTL
Serial Data Rate	Up to 115.2 Kbps	Up to 115.2 Kbps
RF Baud Rate	250 Kbps	250 Kbps
Receive Current (Typical) (Active Mode RX, CPU idle)	24 mA	27 mA
Transmit Current (Typical) (Active Mode TX at 1 dBm, CPU idle)	29mA	166 mA
Channels	16	16
Security	128 bit AES & SSP	128 bit AES & SSP
Radio Frequency	TT2530	TT2530
Frequency Band (software-selectable)	2400-2483.5 MHz	2400-2483.5 MHz
Modulation	DSSS QPSK	DSSS QPSK
Output Power	-28 dBm -- 4.5 dBm variable	-10 dBm -- 22.5 dBm variable
Voltage	2.0V - 3.6V	2.0V - 3.6V
Sensitivity (Typical) (@ full RF data rate)	-97 dBm typical	-98.8 dBm (High Gain Mode) -90.4 dBm (Low Gain Mode)
Range (typical, depends on antenna/environment)	Up to 150 m	800~1600m
Environmental	TT2530	TT2530
Temperature	-40°C -- +125°C	-40°C -- +85°C
Physical	TT2530	TT2530
Dimensions	(16 x 28 x 3 mm)	(16 x 28 x 3 mm)
Weight	< 0.7 oz (< 20 g)	< 0.7 oz (< 20 g)
Antenna Connector	U.FL Connector or pcb antenna	U.FL Connector or pcb antenna
Certification	TT2530	TT2530
Approvals	CE	CE

(1) Description

CC2530 is a true system-on-chip(SoC) solution for IEEE 802.15.4, ZigBee and RF4CE applications. It can be very low total cost of materials to create a strong network of nodes. The CC2530 combines the excellent performance of the leading RF transceiver, the industry-standard enhanced 8051 CPU, system programmable flash,8-KB RAM and many other powerful features.CC2530 have four different types of flash memory version : CC2530F32/64/128/256 , Each having 32/64/128/256 KB flash。 CC2530 has a different mode of operation, the system makes it especially adapted to the requirements of the ultra-low power。 The conversion between the run mode in a short time,to further ensure low energy consumption.CC2530F256 combined with the gold unit of Texas Instruments, the industry-leading ZigBee protocol stack (Z-Stack™), provides a powerful and complete ZigBee solution。 CC2530F64 combinaed of Texas Instruments the gold unit RemoTI, better to provide a powerful and complete ZigBee RF4CE remote control solutions。

GB2530 is the wireless module which using CC2530 and CC2591, has a small, peripheral simple, easy to use and excellent RF performance, leads to all external ports, and the convenience of the user, eliminating the need for debugging RF as well as other aspects of the complicated work more convenient embedded into the system and shorten the development cyclefaster to seize market opportunities and cost advantages.

(2) Limiting values

		Least	Maximum	Unit
Voltage	All power supply pins must have the same voltage	-0.3 3.9		V
Either a digital pin voltage		-0.3 +0.3 3.9	VDD ≤	V
Input RF level			10	dBm
Storage Temperature Range		-40 125		° C
ESD ⁽²⁾	All the liner are based on human model JEDECSTD22 methodA114		2	kV
	According to the charged device model JEDECSTD22 method C101		500	V

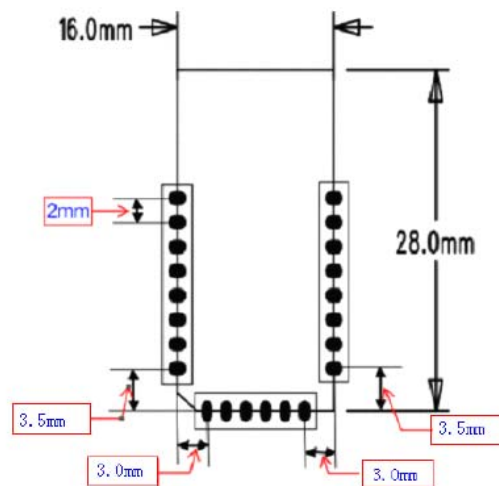
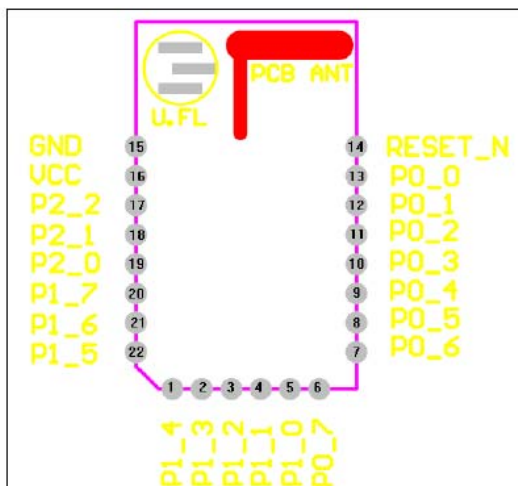
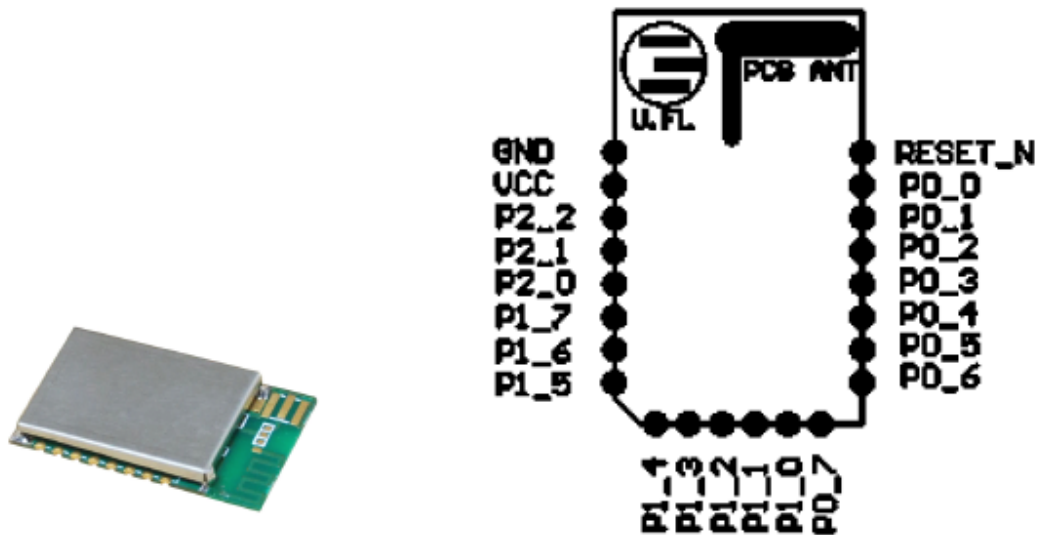
(1) Beyond the limits of the parameters listed range may cause permanent damage to the device. These are just the limit parameter

(2) Other conditions beyond the recommended operating conditions here under the functional operation is not implied. Super time

(3) Conditions may affect the reliability of the equipment.

Warning: ESD sensitive devices. Handling such equipment must use precautions to prevent permanent damage.

Low Power Pin description



TT2530-L											
Pin	1	2	3	4	5	6	7	8	9	10	11
Function	P1_4	P1_3	P1_2	P1_1	P1_0	P0_7	P0_6	P0_5	P0_4	P0_3	P0_2
Pin	12	13	14	15	16	17	18	19	20	21	22
Function	P0_1	P0_0	RES_N	GND	VCC	P2_2	P2_1	P2_0	P1_7	P1_6	P1_5
TT2530-H											
Pin	1	2	3	4	5	6	7	8	9	10	11
Function	P1_4 EN	P1_3	P1_2	P1_1 PA_EN	P1_0	P0_7 HGM	P0_6	P0_5	P0_4	P0_3	P0_2
Pin	12	13	14	15	16	17	18	19	20	21	22
Function	P0_1	P0_0	RES_N	GND	VCC	P2_2	P2_1	P2_0	P1_7	P1_6	P1_5

Note: The PA_EN, EN, HGM in the above table are representing CC2591's pins.

Pin's Definition

ModulePin	Pin	Description
1	P1_4	General-purpose I/O, Timer function, have 4-mA output drive strength
2	P1_3	General-purpose I/O, Timer function, interrupt function, have 4-mA output drive strength
3	P1_2	General-purpose I/O, interrupt function, have 4-mA output drive strength
4	P1_1	General-purpose I/O, Timer function, interrupt function, have 20-mA output drive strength
5	P1_0	General-purpose I/O, Timer function, interrupt function, have 20-mA output drive strength
6	P0_7	General-purpose I/O, ADC function, have 4-mA output drive strength
7	P0_6	General-purpose I/O, Timer function, ADC function, have 4-mA output drive strength
8	P0_5	General-purpose I/O, ADC function, Time function, UART 0 (RT), UART 1 (RX), SPI0 (C), SPI1 (MI), have 4-mA output drive strength
9	P0_4	General-purpose I/O, ADC function, Timer function, UART 0 (CT), SPI0 (SS), SPI1 (M0), UART 1 TX function, have 4-mA output drive strength

10	P0_3 General-purpose I/O, ADC function, UART 0 (TX), UART 1 (RT), SPI0 (MO), SPI1 (C), Timer function, have 4-mA output drive strength
11	P0_2 General-purpose I/O, ADC function, UART 0 (RX), UART 1 (CT), SPI0 (MI), SPI1 (SS), Timer function, have 4-mA output drive strength
12	P0_1 General-purpose I/O, ADC function, have 4-mA output drive strength
13	P0_0 General-purpose I/O, ADC function, have 4-mA output drive strength
14	RES_N Reset, active-low
15	GND Ground
16	VCC Working voltage for the IC to provide 2.0 - 3.6V
17	P2_2 DEBUG function pin (DC)
18	P2_1 DEBUG function pin (DD)
19	P2_0 General-purpose I/O, Timer function, have 4-mA output drive strength
20	P1_7 General-purpose I/O, have 4-mA output drive strength
21	P1_6 General-purpose I/O, have 4-mA output drive strength
22	P1_5 General-purpose I/O, have 4-mA output drive strength

CC2591 and CC2530 's connection control logic

Pin's condition			Mode of operation
PA_EN	EN	HGM	
0	0	x	CC2591 Power Down
0	1	0	CC2591 RX Low Gain Mode (LGM)
0	1	1	CC2591 RX High Gain Mode (HGM)
1	0	x	CC2591 TX
1	1	x	Not allowed

TT2530-H Zigbee module , CC2591 and CC2530 connection,as follow picture:

