2.4 GHz IEEE 802.15.4 / RF4CE / ZigBee SoC Module

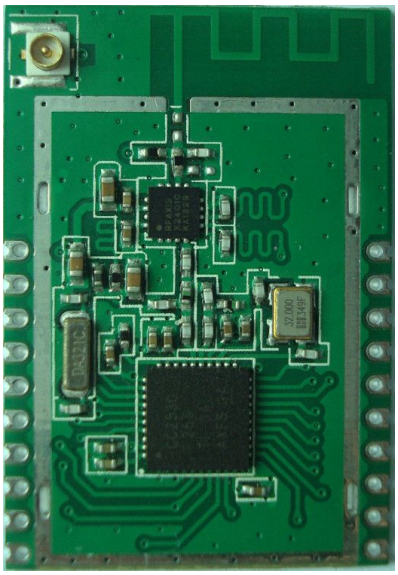
RL-CC2530-PA1

Overview

RL_CC2530_PA1 Zigbee Module is a low-power, highly integrated 2.4-GHz transceiver that suitable for systems targeting compliance with worldwide radio-frequency. It's a true system-on-chip solution for 2.4-GHz IEEE802.15.4, ZigBee and RF4CE applications.This solution use ZigBee CC2530 wireless MCU with the RFX2401 range extender to improve the receiver sensitivity and increase the total link budget, enabling up to four times the range of each node in the ZigBee network. The combination of these devices creates a system solution that is ideal for applications such as home and industrial automation,lighting, metering, and sensor networks.

Feature

- 2.4-GHz IEEE802.15.4 compliant RF transceiver
- Programmable output power up to 23dBm
- Accurate digital RSSI/LQI support
- Suitable for systems targeting compliance with worldwide radio-frequency
- Data rate: 250kbps
- 128KB in-system programmable flash, customization 32,64,256KB
- Two 64 bytes FIFO for TX & RX buffer
- CSMA/CA hardware support
- Battery monitor and temperature sensor
- AES security coprocessor
- 8KB RAM with retention in all power mode
- 32-kHz sleep timer with capture
- Wide Supply-Voltage Range (2 V~3.6 V)



Applications

- 2.4-GHz IEEE 802.15.4 systems
- RF4CE remote control systems (64-KB flash and higher)
- AMR – Automatic Meter Reading
- Two-way RKE – Remote Keyless Entry
- Home and building automation
- Wireless alarm and security systems
- Industrial monitoring and control
- Wireless Light Dimming
- Wireless sensor networks

Electrical Characteristics

ITEM	TEST REQUIREMENT	REMARKS
Voltage supply	2.0~3.6V	DC
Center frequency	2400~2483.5MHz	Programmable
Frequency error	±50KHz	
Modulation	O-QPSK	
Output power	15~23 dBm	Programmable
Receiving sensitivity	-116dBm	@250Kbps data rate
Receiving current	<32mA	
Transmitting current	160mA	Tx Power @20dBm
Sleep consumption	0.4mA	Power Mode 1
Data rate	250kBand	typical
Transmit distance	1000M	At open area
Antenna	50ohm	
Store temperature	-40~125°C	
Operation temperature	-20~85°C	Base on crystal performance
Package size	22mm*34mm	

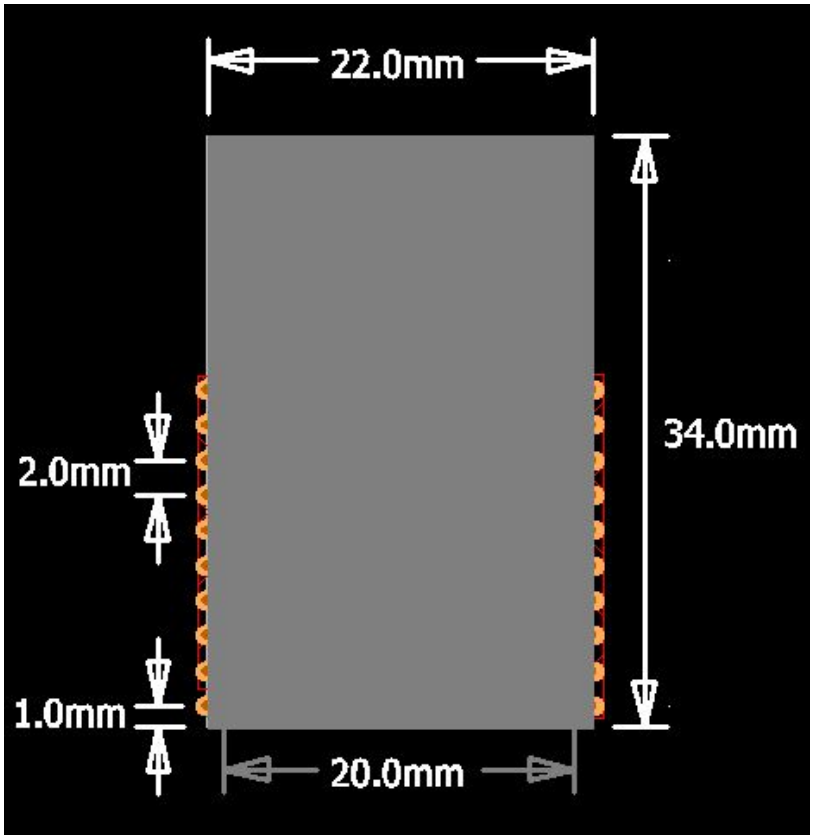
RECOMMENDED OPERATING CONDITIONS

	MIN	MAX	UNIT
Operating ambient temperature range, TA	-30	85	°C
Operating supply voltage	2	3.6	V

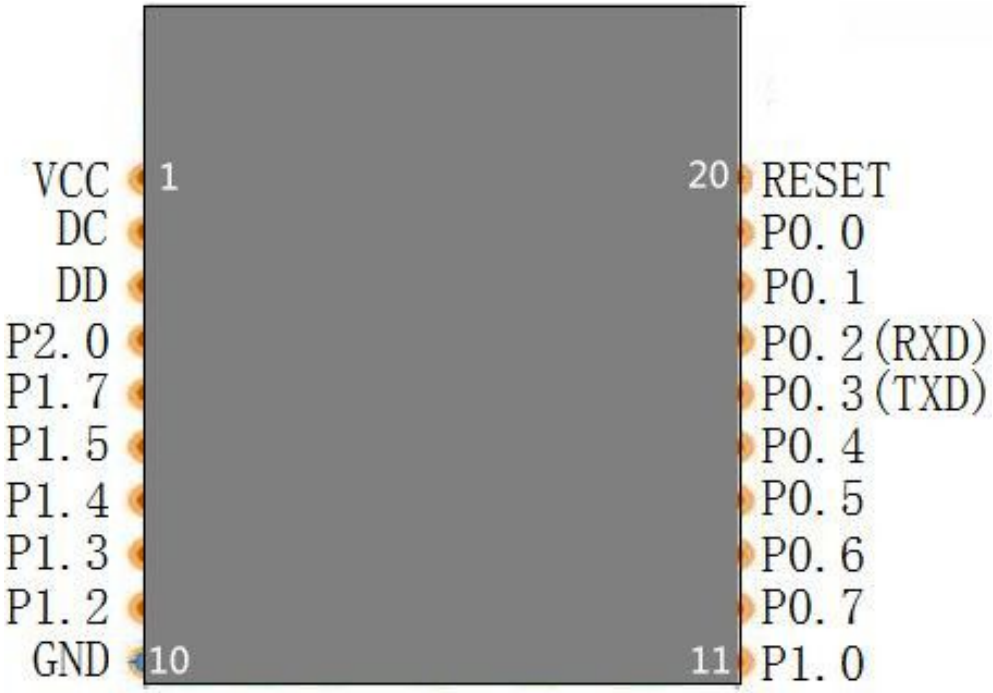
CAUTION: 

ESD sensitive device. Precautions should be used when handing the device in order to prevent permanent damage.

Dimensions

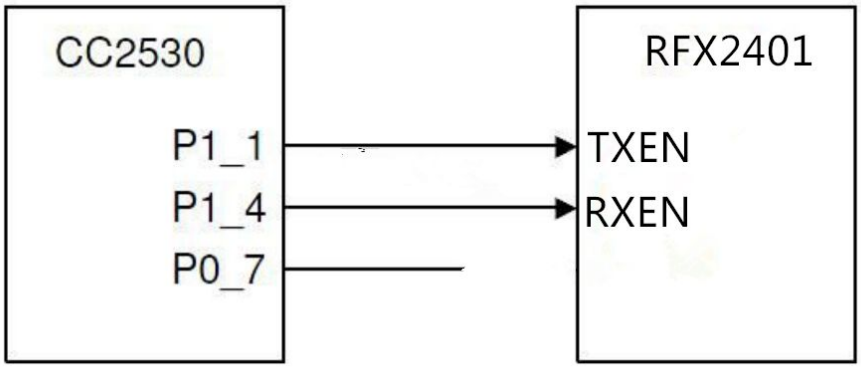


Pin Assignment



Pin Num.	Pin Name	Description
1	VCC	2V~3.6V power-supply
2	DC	Digital IO P2.2/Jtag DC
3	DD	Digital IO P2.1/Jtag DD
4	P2.0	Digital IO/TIMER4
5	P1.7	Digital IO/TIMER3
6	P1.5	Digital IO
7	P1.4	Digital IO/TIMER3
8	P1.3	Digital IO/TIMER3
9	P1.2	Digital IO/TIMER1
10	GND	Ground
11	P1.0	Digital IO/TIMER1/TIMER4
12	P0.7	Digital IO/AD/TIMER1
13	P0.6	Digital IO/AD/TIMER1
14	P0.5	Digital IO /RTS
15	P0.4	Digital IO /CTS
16	P0.3	Digital IO /TXD
17	P0.2	Digital IO /RXD
18	P0.1	Digital IO
19	P0.0	Digital IO
20	RESET_N	RESET active-low

Controlling the RF PA



CC2530-RFX2401 Interconnect

Table 5.Control Logic for Connecting the CC2592 to a CC2530 Device

TXEN	RXEN	Operating Conditions
1	X	TX Active
0	1	RX Active
0	0	Chip is Shut-down

Note: "1" denotes high voltage state (> 1.2V)
"0" denotes low voltage stage (<0.3V) at Control Pins
"X" denotes do not care: either "1" or "0" can be applied

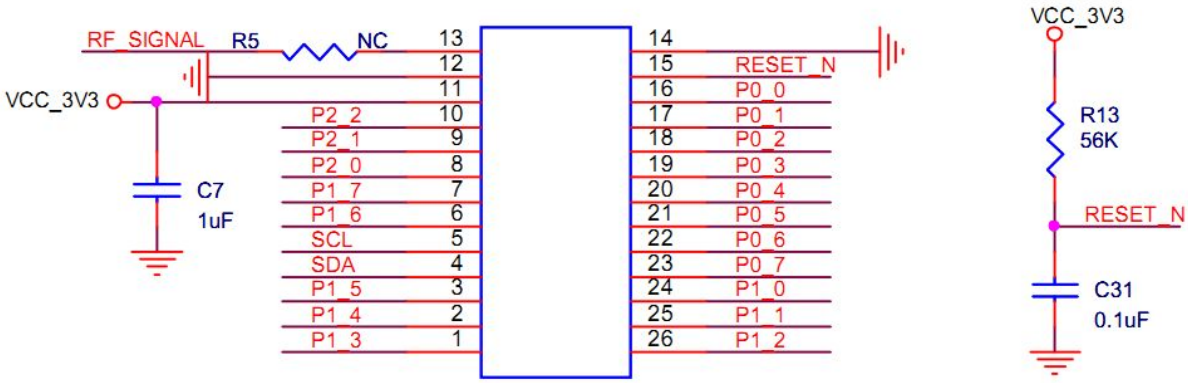
RFX2401C only need two IO control, used here P1.1 and P1.4, timing reference above the logic in the table. Can be seen from the above, as long as RXEN maintain a high level, TXEN decided to send or receive.To enable the pa in the stack,just need set P1.4 to high level.And the set of P1.1 remains the same.P0.7 can be used as the freedom of the IO.

Protocol stack code reference

530.h | mac_radio_defs.c * | hal_board_cfg.h | hal_mac_cfg.h | mac_radio.c | mac_radio_defs.s51 | mac_rffrontend.s51 | SampleApp.c | hal_u

```
268   if (macRadioDefsRefTableId & 0xf0)
269 #endif /* defined MAC_RUNTIME_CC2591 || defined MAC_RUNTIME_CC2590
270
271 #if defined MAC_RUNTIME_CC2591 || defined MAC_RUNTIME_CC2590 || \
272   defined HAL_PA_LNA || defined HAL_PA_LNA_CC2590
273   { /* either if compound statement or non-conditional compound st
274
275     /* (Re-)Configure PA and LNA control signals to RF frontend ch
276     * Note that The register values are not retained during sleep.
277     */
278
279     /* P1_1 -> PAEN */
280     RFC_OBS_CTRL0 = RFC_OBS_CTRL_PA_PD_INV;
281     OBSSEL1       = OBSSEL_OBS_CTRL0;
282
283     /* P1_4 -> EN (LNA control) */
284    /* RFC_OBS_CTRL1 = RFC_OBS_CTRL_LNAMIX_PD_INV;
285     OBSSEL4       = OBSSEL_OBS_CTRL1;*/
286     P1SEL &= ~0x10;
287     P1DIR |= 0x10;
288     P1_4=1;
289
```

Peripheral Circuit



Layout Suggestion

- **R**L-CC2530-PA1 zigbee module serial level should be 3.3 V, if the connection and 5V level system need to increase the level conversion chip.
- **B**luetooth signal is highly affected by the surrounding,such as trees, metal, wall can have certain absorption on the bluetooth signal or block, so the installation is not recommended in the metal case.
- **D**ue to metal will weaken the function of antenna, it is suggested that Lay in the module board,don't lay GND and a line under the antenna module, it is best to hollow out.

NOTE:

Additional information on the Texas Instruments CC2530
device can be found in the company's latest datasheet release at
http:// www.ti.com/product/CC2530