RF-2410M

2.4G High-Performance Low-Power Wireless USB MCU Module

1、 Introduction

After RF-2400 cost-effective wireless modules, INHAOS launches the RF-2410 series modules. RF-2410 series modules is a SOB (System On Board) module based on RF-2400 modules adding MCU.RF-2410 series modules is a cost-effective module with more powerful and convenient RF solutions.

RF-2410M uses Silicon labs C8051F330 MCU as the master IC unit, with the RF-2400-V03 module. The module is compact and powerful. C8051F330 MCU has 8K Flash program memory, 1T command rate, with 24.576MHz crystal oscillator, can achieve close to 25MIPS processing speed. RF-2400-V03 provides air transfer rate up to 2Mbps. Therefore, RF-2410M can be widely used in data transmission, audio, video transmission, wireless data collection and other short-range, high-rate areas.

2、 Feature

- Adopt RF-2400-V03 modules, with good RF performance, stable quality and a large number of application reference
- Adopt C8051F330 MCU，25MIPS，8KB Flash，768B RAM
- On-board with high precision and low noise 3.3V LDO, making the module can be work under 3.3 ~ 7V voltage
- On-board high precision 24.576MHz crystal oscillator on external MCU
- 6 Pin connector:
  - Provide TXD / RXD standard UART interface
  - It can be set to the lowest power mode (less than 5uA) in application, wake up by the RESET pin when needed
  - CONFIG pin is used for the user's system configuration
  - Users can write software to redefine the function of the pin configuration to achieve more application
- On-board C2 debug interface, very easy for simulation and burn
- Two LED (red and green), exact instructions for work status
- RF communication with any of RF-2400, RF-2410 series products
- Support 1x6Pin 2.54mm Connector and patch connecting
- Can both be used with the user system, and work alone
- Can be applied directly to the mass production, without any further changes to reduce the risk of technology transfer
- High cost-effective

3、 Physical picture of RF-2400 module
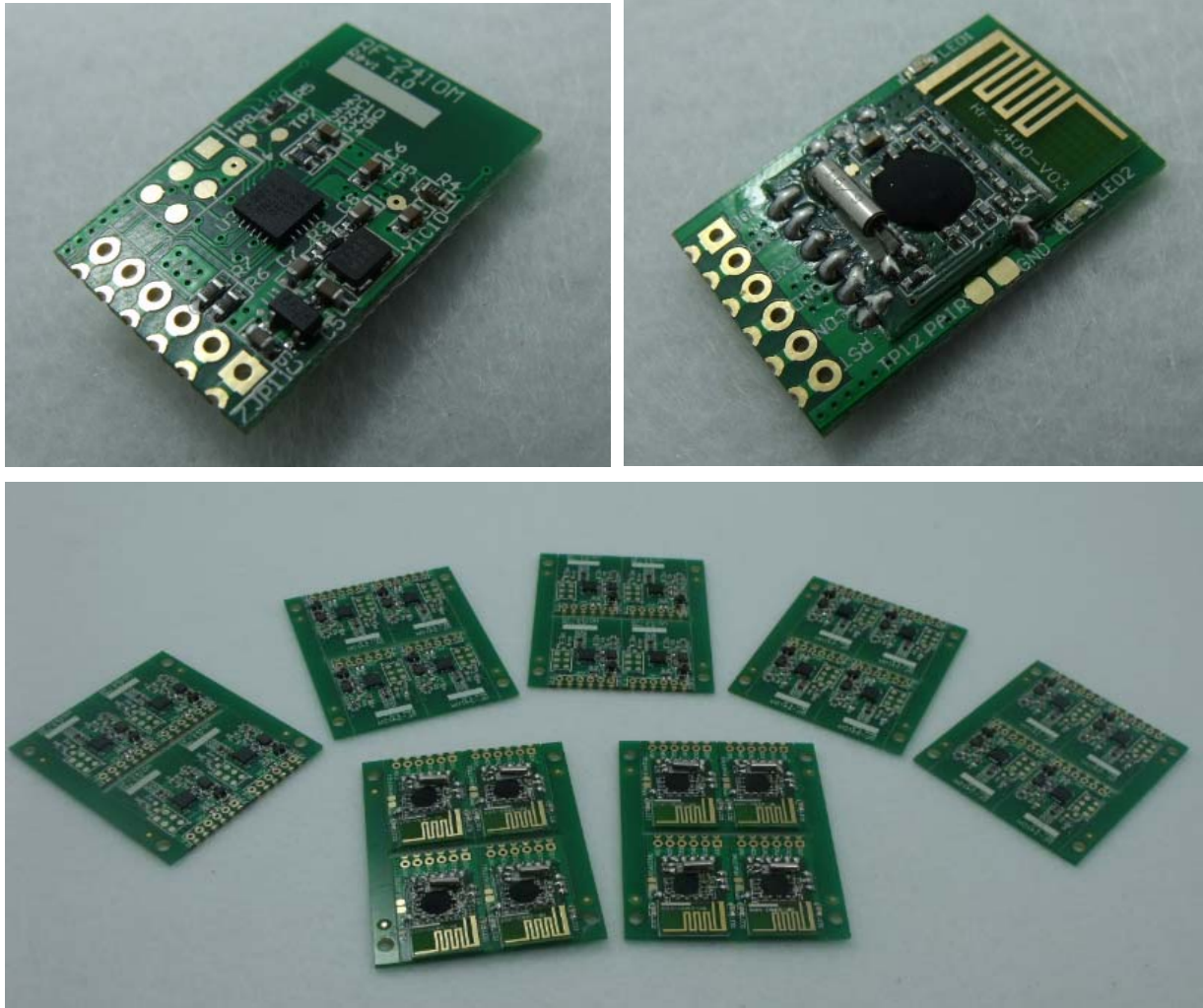
4、 Applications:

- ■ Wireless Serial port
- ■ Adding RF communication to existing system
- ■ wireless audio and video transmission
- ■ Wireless Data acquisition
- ■ Low-cost, low-power wireless networking
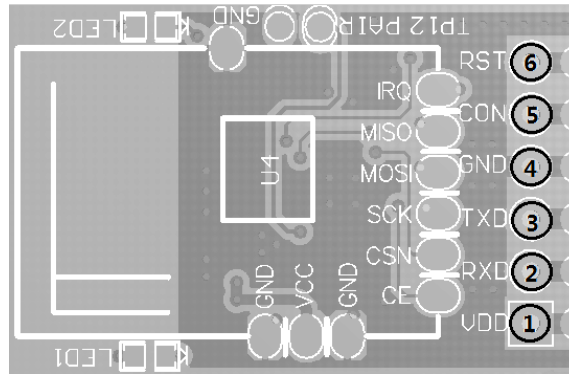- ■ Wireless sensor nodes (WSN)

5、RF-2410M Module Pin Information

Figure 5-1: RF-2410M pin outs

NO.	Name	MCU	I/O	Functional Description
1	VDD	---	P	Module power supply voltage range 3.3 ~ 7.0V
2	RXD	P0.5	IO	Connect to MCU P0.5, typical configuration is RXD function, TTL-3.3V level specifications, compatible with standard TTL-5V
3	TXD	P0.4	IO	Connect to MCU P0.4, typical configuration is TXD function, TTL-3.3V level specifications, compatible with standard TTL-5V
4	GND	---	P	Module place
5	CON	P0.1	IO	Connect to MCU P0.1, typical configuration is CONFIG function, TTL-3.3V level specifications, compatible with standard TTL-5V
6	RST	RST/C2CK	I	Connect to the MCU RESET pin for waking-up in POWER DOWN mode

Remarks: RXD / TXD / CON pin function can be re-defined by writing firmware.
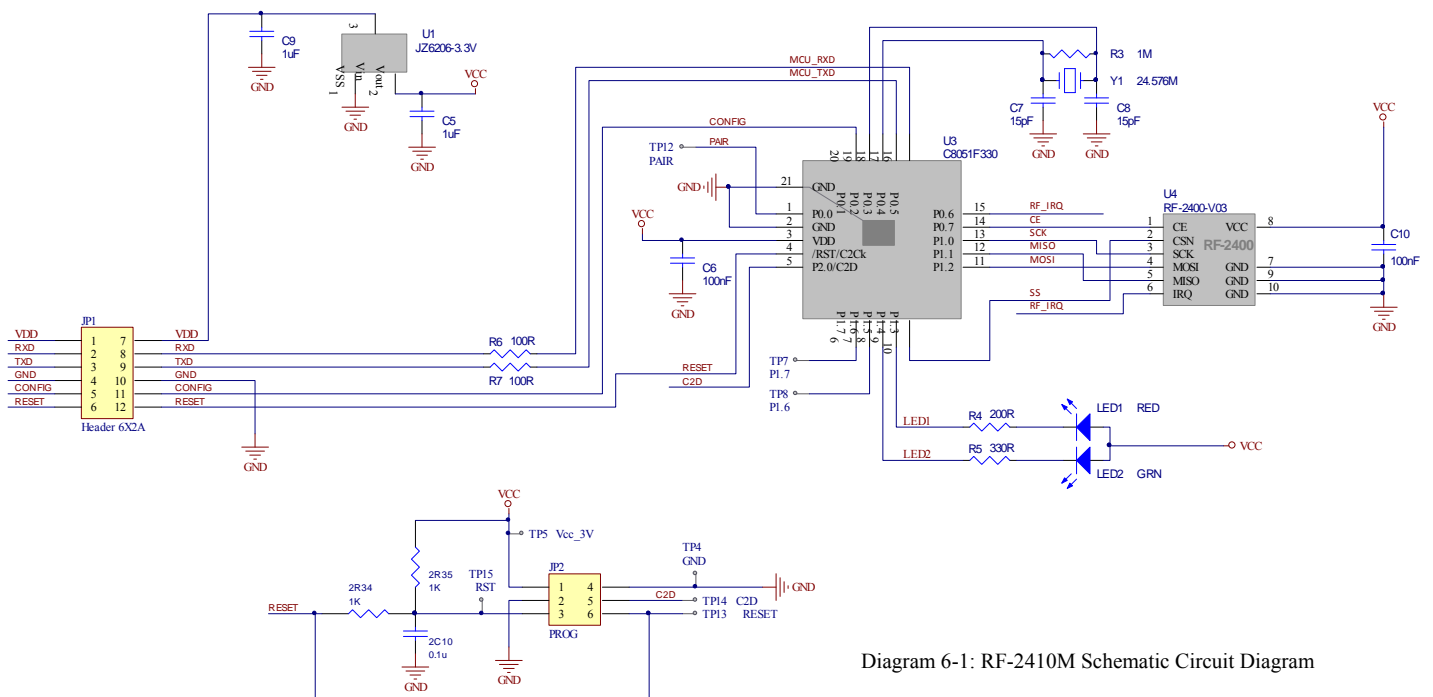
6、Schematic Circuit Diagram

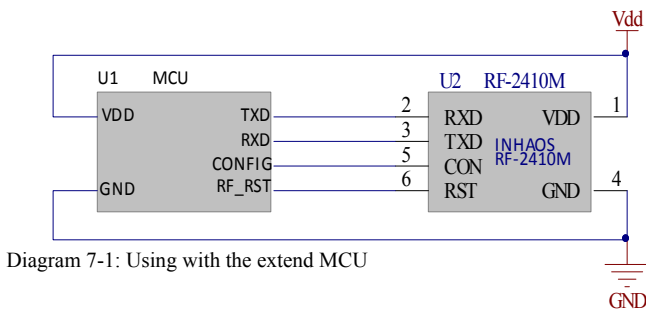Diagram 6-1: RF-2410M Schematic Circuit Diagram
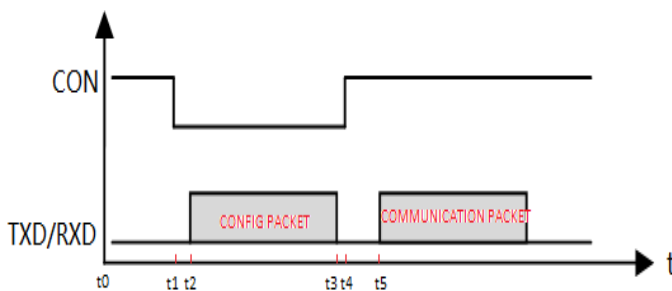
7、Application

Diagram 7-1: Using with the extend MCU

Picture 7-2: Configuration module parameters can be achieved by pulling the con pin pulling the pin configuration module
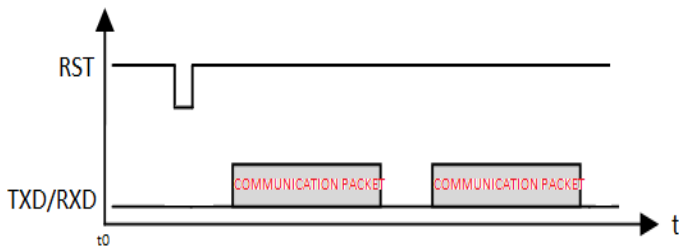

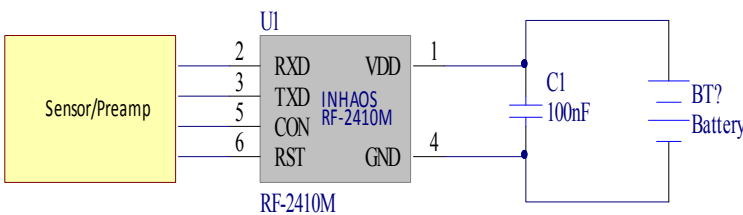Diagram 7-3: Pulling the RST pin in order to wake-up reset module

Diagram7-4：RF-2410M application2：Use independency as a system

Application1: Connect to the master MCU to achieve RF data transmission

In this mode, 2.4G wireless communication process can be implemented by RF-2410M. The master MCU U1 only needs to focus on the overall function of the system, and then serial communicates with RF2410 to achieve wireless data transceiving.

When the target system adopts fixed parameters and needn't the low-power mode, there is no need to connect CON and RST pins. In this case, RF-2410M's CON and RST pin should be left unconnected.

This application can achieve the following advanced function by CON and RST pins.

When the pin is pulled down, RF-2410M is the Set Mode. Then you can configure the UART baud rate, RF frequency band, RF status code via communication between TXD / RXD and RF-2410M .When the CON pin is pulled up again, RF-2410M is open, and then all data sent to RF-2410M will be transmitted through the RF.

When the master IC does not require RF communication, RF-2410M can enter the POWER DOWN Mode. In this mode, the MCU of RF-2410M and RF's chips will also enter into the Power down Mode for the lowest power consumption. When requiring RF communication, pull down the RST pin for a certain time, and then pull up to reset the MCU of RF-2410M module. Low level time is rely on MCU's operating basic frequency.Please refer to C8051F330's Datasheet.

Please note that after reset on RF-2410M, you need to postpone some time. If time permitting, can delay 500 ~ 1000uS.

Application 2: Module can be directly connected to the sensor, as an independent system

RF-2410M provides a 3.3V LDO, which can directly connect lithium battery or other battery above 3.3V. And then configure the module interface as ADC input to direct input sensor or pre-amplifier's signal.
In this mode, please note:
○ Module TXD / RXD connected to the MCU's P0.4/P0.5 through 100 Ohm resistor.
○ Module supply voltage range is 3.3 ~ 7V, over this voltage may damage the equipment.

Please note the input voltage range of the IO interface when using. High voltage may damage the IO port. When connecting the unknown margin of the signal, you need to limit the extent of IO ports input signal.

There are two ports named P1.5/P1.6 in the module. They are designed on PCB in the form of Test Point, connect to the TP7/TP8 separately. You also can connect the two ports when actual using.

RF-2400M has an open architecture, integral hardware configuration and mature development environment. Users can develop a distinctive range of products based on this module.

8、C8051F330 Development Environment

C8051F is standard 51 core with the common development environment as follow

○ Software compilation environment: KeilC51

○ Emulator: U-EC6 (sold at INHAOS eBay store)
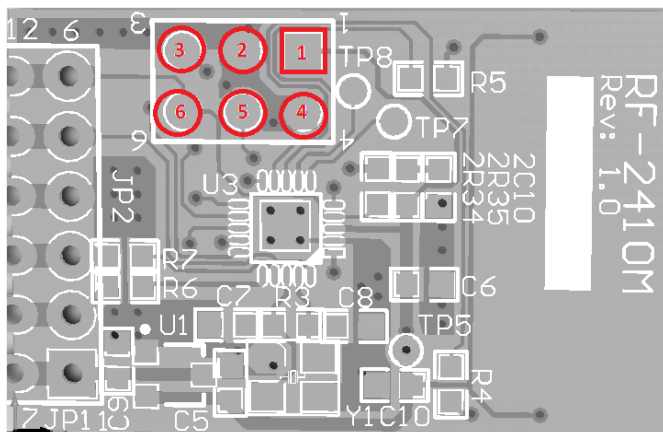
The picture above shows the programming interface of C8051F330.

U-EC6 connects with the target board by a 10Pin (2x5Pin) connector, which is defined as follows:

Pin #	Description
1,8	Not Connected
2,3,9	GND (Ground)
4	TCK (C2D)
5	TMS
6	TDO
7	TDI (C2CK)
10	USB Power
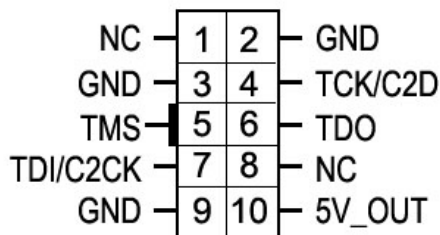
When using, you can debug and program software by C2 interface (C2D, C2CK, GND). The connection relationship between the target board and debugger is as follow:
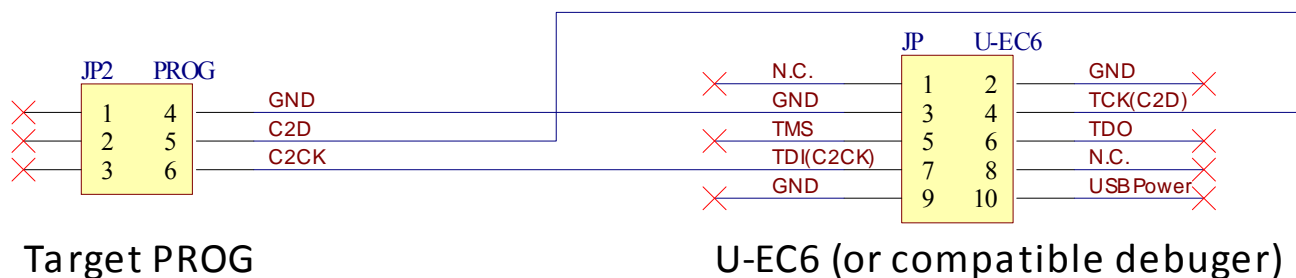

Target PROG   U-EC6 (or compatible debuger)

9、 Parameter

| No.	Parameter	Symbol	Unit	Term	Min	Typical	Max	Remark
1	Voltage range	VDD	V		3.3	3.6	7.0	
2	Current	IDD	mA	RF 0dBm continuous emission carrier	TBD	35	TBD	Rely on task mode
3	IO port output high	VIO_H	V	Load current 20mA	2.7	3.0	3.3	
4	IO port output low	VIO_L	V	Absorb current 20mA	0.1	0.3	0.6	
5	RF output frequency	FOP	MHz		2400	---	2527	
6	Air Data rate	RFSK	Mbps		1	---	2	
7	RF Output power	PRF	dBm		-40		5	
8	RF receiver sensitivity	RXSENS	dBm	1E-3 BER sensitivity (1Mbps)	---	-88	---	
	RF receiver sensitivity	RXSENS	dBm	1E-3 BER sensitivity (2Mbps)	---	-85	---	
9	Storage temperature	STEMP	°C		-20		+80	
10	Temperature	TEMP	°C		+5		+45	

10、 Dimension （mm)
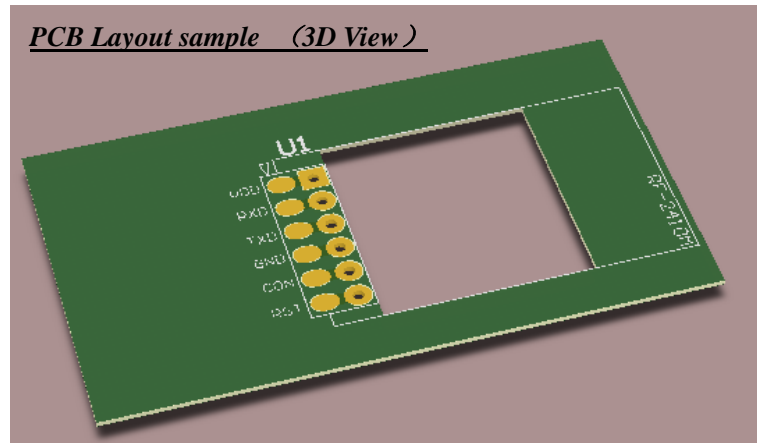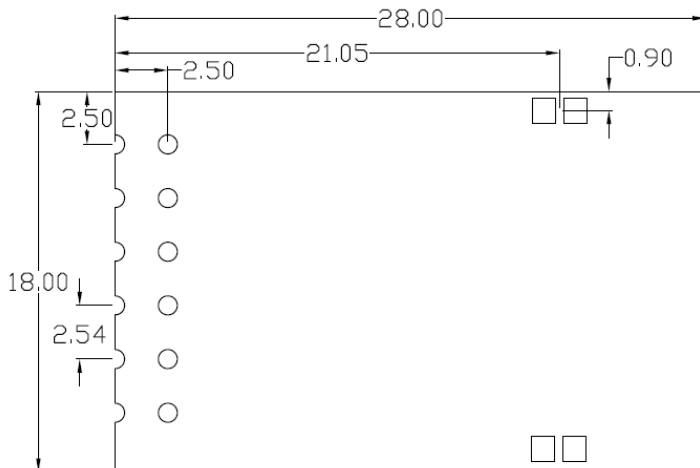
PCB Layout sample （3D View ）

PCB Layout warning ：

○ Clear the bottom of RF antenna without no lines and parts

○ Close the antenna as much as possible to the PCB without no metal parts around

○ Place a square slot on the bottom to escaped the parts(see 3D diagram above)
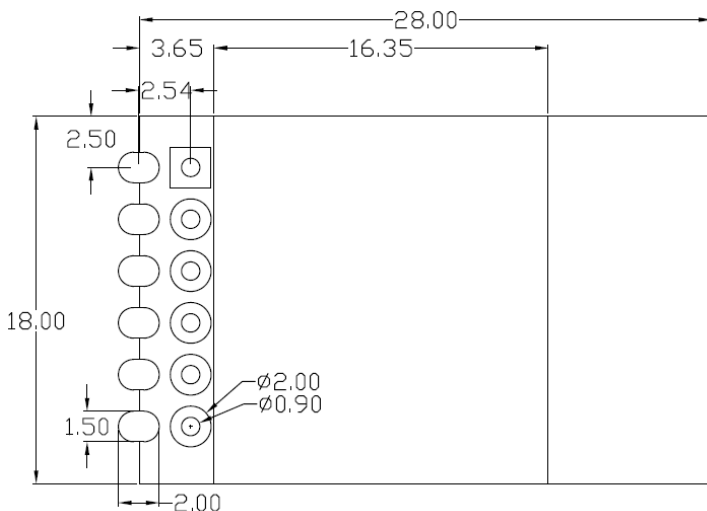
11、 Revision History

Version	Date	Page	Description
V10	2011-6-24		First release

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