

ICradio Module 2.4G

I. FEATURES

The *ICradio Module 2.4G* is a compact and flexible to use radio, specified for *ZigBee / IEEE 802.15.4* network applications. The *ICradio Module 2.4G* is based on the powerful *ATmega1281* controller and the new *AT86RF230* 2.4GHz radio chip of Atmel. The module is fully compatible to Atmel's free *IEEE802.15.4 Software MAC*.

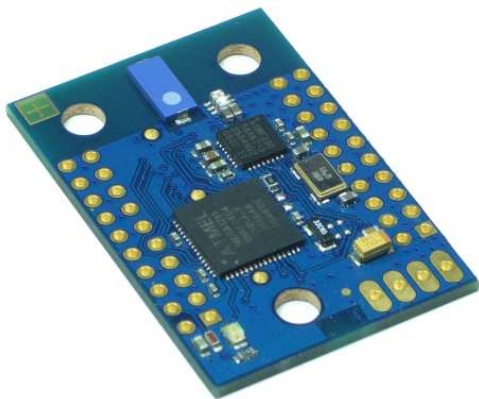


Figure 1. *ICradio Module 2.4G*

Thanks to the high adaptability of the *AT86RF230*, the module can be used for proprietary protocols as well. The *ATmega1281* serves the purpose of a free programmable protocol controller. To realize self-made applications easily, most of the I/O pins as well as ADC inputs, interrupt inputs and PWM outputs are accessible on two rowed pinheads with a 0.1" pitch.

In addition to the free development software like GCC and AVR Studio, low-cost programmers are available on the market.

On the bottom side there are highly integrated SMD pads to provide connection to the *ICradio Application Development Board*. The *ICradio Module 2.4G* snaps into the *ICradio ADB* to connect the JTAG pins, ISP pins and IO pins. All pin connections of the 0.1" pitch are also connected to the SMD connector on the bottom side.

The LED located on the *ICradio Module 2.4G* is connected to the port *PG5* of *ATmega1281*. The LED lights up when the pin is driven low.

Summary:

- built-in antenna
- small physical dimensions: 40 x 27 x 3 mm
- low current consumption vs. high transmission power
- *AT86RF230* provides link budget of up to 103dBm
- HF- data rate up to 250 kbps
- range >50m
- on board microcontroller *ATmega1281* for protocol and control tasks
- free development tool chain
- temperature range -40°C to +85°C
- word-wide registration free usage in the 2.4 GHz ISM band
- evaluation kits available
- fully compatible to Atmel's *IEEE802.15.4 Software MAC*

II. BOOTLOADER

The *ICradio Module 2.4G* is equipped with a bootloader. This enables the user to do firmware updates or load In-Circuit's demo applications over the COM port. To use the bootloader, two PC tools are provided under <http://www.ic-board.de>. To load own applications the tool *ICload* is appropriated or to load In-Circuit's demo applications use the *ICappLoader*.

When delivered the *ICradio Module 2.4G* already holds an RS232-radio application. To transmit and receive data between to devices the following settings are required:

- Baud rate: 19200
- Data bits: 8
- Parity: none
- Stopp bits: 1
- Flow control: Xon/Xoff

After transmitting a character to the *ICradio Stick 2.4G* the demo application starts.

III. PINOUT

Table 1 and 2 show the pinout of the module's 0.1" pitch connectors. Figure 2 depicts the position of the pinheads.

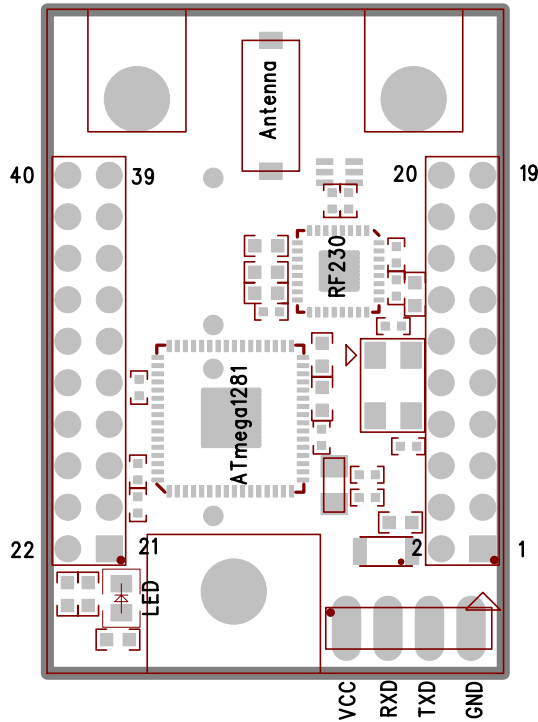


Figure 2. Pinout, top view

Pin#	Name	Pin#	Name
1	VCC	2	VCC
3	GND	4	GND
5	MISO	6	MOSI
7	SEL	8	SLP_TR
9	/RF_RST	10	IRQ
11	PD0	12	PD1
13	GND	14	PE6
15	PE5	16	PD4
17	PD5	18	PD6
19	PD7	20	GND

table 1. pinout 1st pinhead

Pin#	Name	Pin#	Name
21	SCK)	22	PE1
23	PE0	24	/RESET
25	TCK	26	TMS
27	TDO	28	TDI
29	GND	30	PA7
31	PA6	32	PA5
33	PA4	34	PA3
35	PF2	36	PF1
37	PF0	38	PD2/RXD
39	PD3/TXD	40	GND

table 2. pinout 2nd pinhead

For an easy integration of the module into existing applications, the module provides a 4 pole pinhead for the UART interface.

Pin#	Name	Description
21	VCC	within 1,8V - max. 3,6V
23	RXD	tied to RXD-Pin(PD2) of <i>ATmega1281</i>
25	TXD	tied to TXD(PD3) of <i>ATmega1281</i>
27	GND	Ground

table 3. pinout of 4 pole header

IV. PINOUT OF THE ATMEGA1281

The connections between the *ATmega1281* and the AT86RF230 are listed in table 4. The Pins TOSC1 and TOSC2 are tied to a 32.768kHz crystal. The clock output of the AT86RF230 is connected to the timer input T1, to ensure a proper synchronisation.

Pos	AVR Port	AT86RF230
1	PB0(/SS)	SEL
2	PB1(SCK)	SCK
3	PB2(MOSI)	MOSI
4	PB3(MISO)	MISO
5	PB4	SLP_TR
6	PB5	/RF_Reset
7	PD4	IRQ
8	PD6	CLKM

table 4. Pinout of the ATmega1281