AN1310 Module Datasheet V1.3

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CONTENTS

Features

- Built in CC1310F128 Sub-1-GHz RF System-On-Chip (SOC)
- Size:15mm X 22mm
- Operating Voltage:1.8V to 3.8V
- Operating Temperature: -30℃~+85℃
- Storage Temperature: -40℃~+125℃
- Microcontroller
  - Powerful ARM Cortex –M3
  - Up to 48MHz Clock Speed
  - 128KB of In-System Programming Flash
  - 8KB of SRAM for Cache (or as General-Purpose RAM)
  - 20KB of Ultralow Leakage SRAM
  - 2-Pin cJTAG and JTAG Debugging
  - Supports Over-the-Air Upgrade (OTA)
- Ultralow Power Sensor Controller
  - Can Run Autonomous From the Rest of the System
  - 16-Bit Architecture
  - 2KB of Ultralow Leakage SRAM for Code and Data
- Efficient Code-Size Architecture, Placing TI-RTOS, Drivers and Bootloader in ROM
- Peripherals
  - All digital Peripheral Pins Can Be Routed to Any GPIO
  - Four General-Purpose Timer Modules (Eight 16-Bit or four 32-Bit Timers, PWM Each)
  - 12-Bit ADC, 200 ksamples/s, 8-Channel Analog MUX
  - Continuous Time Comparator
  - Ultralow Power Clocked Comparator
  - Programmable Current Source
  - UART
  - 2 x SSI (SPI, MICROWIRE, TI)
  - I2C
  - I2S
  - Real-Time Clock (RTC)
  - AES-128 Security Module
  - True Random Number Generator (TRNG
  - Support for Eight Capacitive Sensing Buttons
  - Integrated Temperature Sensor
- Low Power
  - Active-Mode RX: 5.4mA
  - Active-Mode TX at +10 dBm: 13.4mA
  - Active-Mode MCU: 48MHz Running Coremark: 2.5mA (51μA/MHz)
  - Active-Mode MCU: 48.5 CoreMark/mA
  - Active-Mode Sensor Controller at 24 MHz: 0.4mA +8.2μA/MHz
  - Sensor Controller, One Wake Up Every Second Performing One 12-Bit ADC Sampling: 0.95μA
  - Standby: 0.7μA (RTC Running and RAM and CPU Retention)
  - Shutdown: 185nA (Wakeup on External Events)
- RF Section
  - Excellent Receiver Sensitivity -124 dBm Using Long-Range Mode, -110dBm at 50kbps
  - Excellent Selectivity: 56dB
  - Excellent Blocking Performance: 90 dB
  - Programmable Output Power up to +14 dBm

Applications

- 433-, 868-, 915- ISM and SRD Systems
- Low-Power Wireless Systems With 50-kHz to 5-MHz Channel Spacing
- SmartGrid and Automatic Meter Reading
- Home and Building Automation
- Wireless Alarm and Security Systems
- Industrial Monitoring and Control
- Wireless Healthcare Applications
- Wireless Sensor Networks
- Active RFID
- IEEE 802.15.4g, IP-Enabled Smart Objects (6LoWPAN), Wireless M-Bus, KNX Systems, Wi-SUN, ZigBee and Proprietary Systems
- Energy Harvesting Applications
- ESL (Electronic Shelf Label)
- Long-Range Sensor Applications
- Heat Cost Allocator

Description

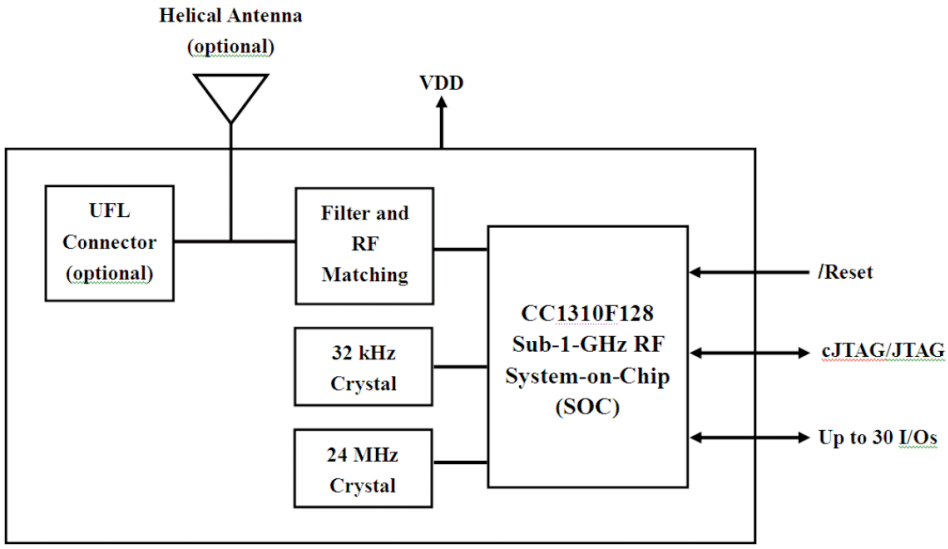
The AN1310 module is designed based on CC1310F128. The CC1310 device is the first part in a Sub-1-GHz family of cost-effective, ultralow power wireless MCUs. The CC1310 device combines a flexible, very low power RF transceiver with a powerful 48-MHz Cortex-M3 microcontroller in a platform supporting multiple physical layers and RF standards. A dedicated Radio Controller (Cortex-M0) handles low-level RF protocol commands that are stored in ROM or RAM, thus ensuring ultralow power and flexibility. The low-power consumption of the CC1310 device does not come at the expense of RF performance; the CC1310 device has excellent sensitivity and robustness (selectivity and blocking) performance.

The CC1310 device is a highly integrated, true single-chip solution incorporating a complete RF system and an on-chip DC-DC converter.

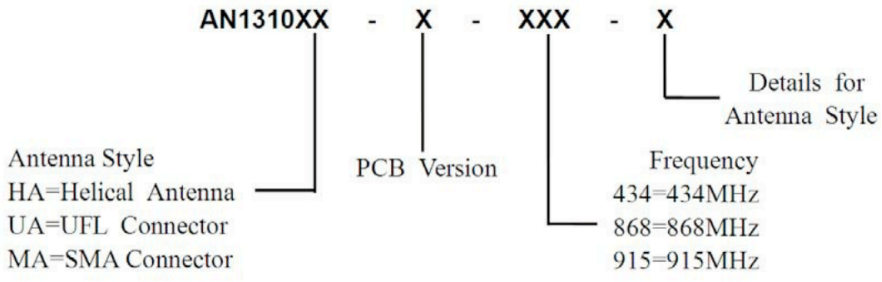
Sensors can be handled in a very low-power manner by a dedicated autonomous ultralow power MCU that can be configured to handle analog and digital sensors; thus the main MCU (Cortex-M3) is able to maximize sleep time.

The CC1310 power and clock management and radio systems require specific configuration and handling by software to operate correctly. This has been implemented in the TI RTOS, and it is therefore recommended that this software framework is used for all application development on the device. The complete TI-RTOS and device drivers are offered in source code free of charge.

Block Diagram

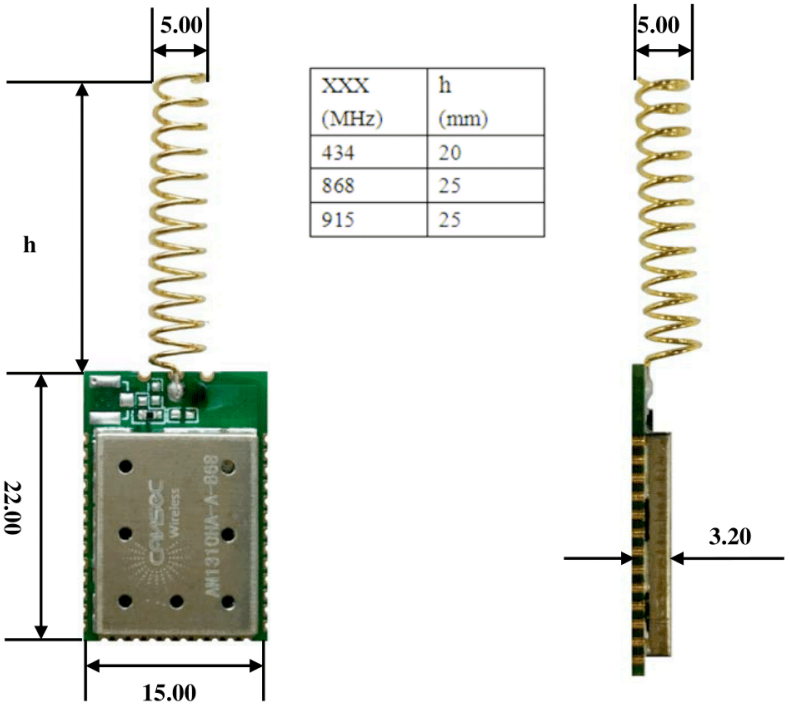


Module Information and Mechanical Drawing



AN1310HA-A-XXX:

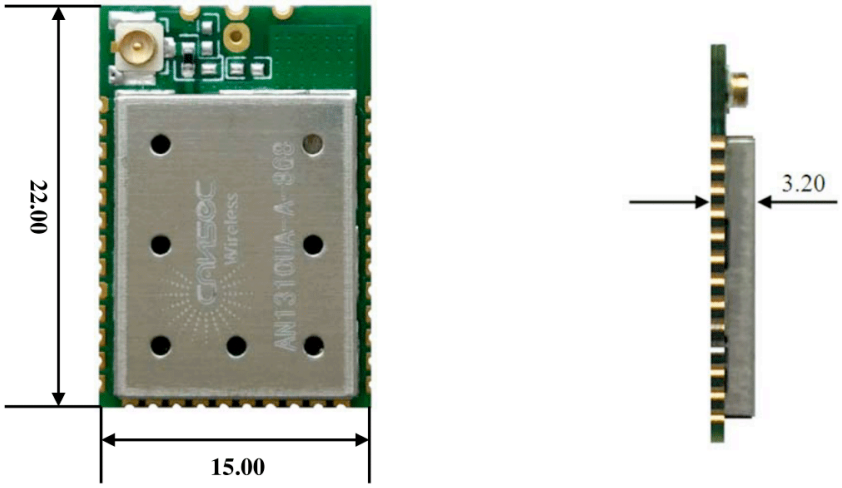
Unit: mm
Tolerance:±0.2



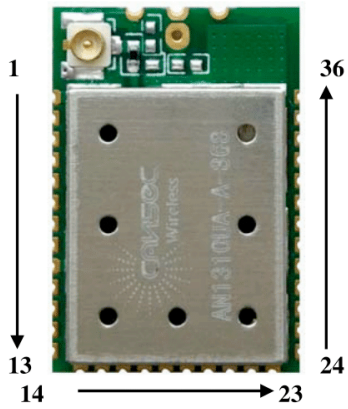
XXX (MHz)	h (mm)
434	20
868	25
915	25

AN1310UA-A-XXX:

Unit: mm
Tolerance:±0.2



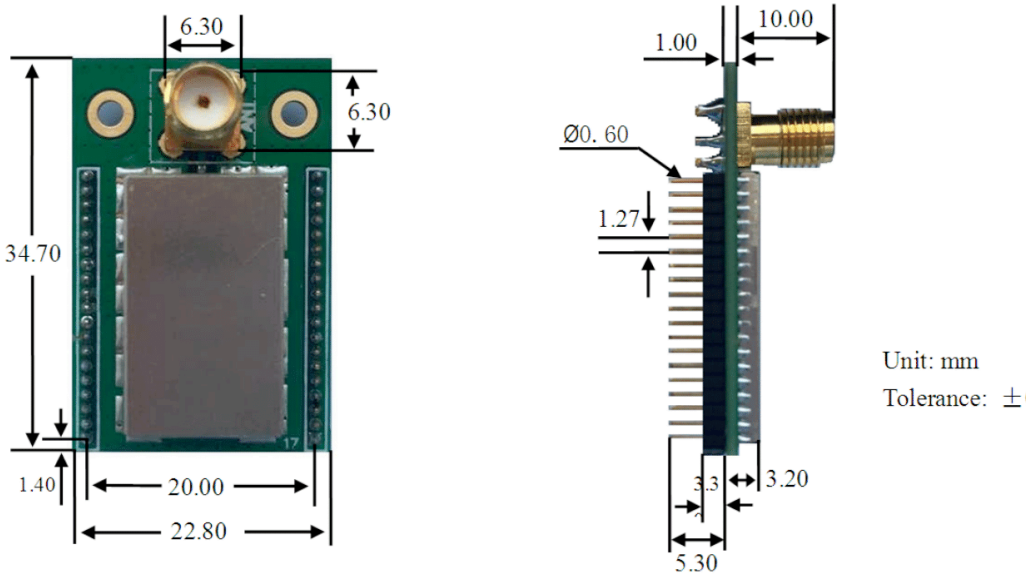
Terminal Description



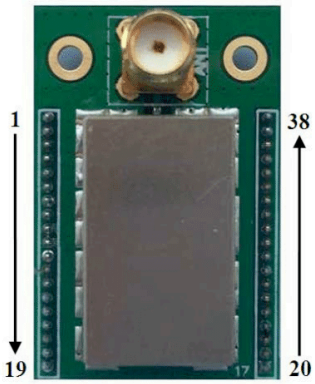
Pad Number	Name	Pin Type	Description
1	GND	Ground Pin	Connect to GND
2	DIO_1	Digital I/O	GPIO, Sensor Controller
3	DIO_2	Digital I/O	GPIO, Sensor Controller
4	DIO_3	Digital I/O	GPIO, Sensor Controller
5	DIO_4	Digital I/O	GPIO, Sensor Controller
6	DIO_5	Digital I/O	GPIO, Sensor Controller, High drive capability
7	DIO_6	Digital I/O	GPIO, Sensor Controller, High drive capability
8	DIO_7	Digital I/O	GPIO, Sensor Controller, High drive capability
9	GND	Ground Pin	Connect to GND
10	VDD	Power	1.8V to 3.8V main chip supply
11	DIO_8	Digital I/O	GPIO
12	DIO_9	Digital I/O	GPIO
13	DIO_10	Digital I/O	GPIO
14	DIO_11	Digital I/O	GPIO
15	DIO_12	Digital I/O	GPIO
16	DIO_13	Digital I/O	GPIO
17	DIO_14	Digital I/O	GPIO
18	DIO_15	Digital I/O	GPIO
19	JTAG_TMSC	Digital I/O	JTAG TMSC, High drive capability
20	JTAG_TCKC	Digital I/O	JTAG TCKC
21	DIO_16	Digital I/O	GPIO, JTAG_TDO, High drive capability
22	DIO_17	Digital I/O	GPIO, JTAG_TDI, High drive capability
23	DIO_18	Digital I/O	GPIO
24	DIO_19	Digital I/O	GPIO
25	DIO_20	Digital I/O	GPIO

26	**DIO_21**	**Digital I/O**	**GPIO**
27	**DIO_22**	**Digital I/O**	**GPIO**
28	**RESET_N**	**Digital input**	**Reset, active-low, No internal pullup**
29	**DIO_23**	**Digital/Analog I/O**	**GPIO, Sensor Controller, Analog**
30	**DIO_24**	**Digital/Analog I/O**	**GPIO, Sensor Controller, Analog**
31	**DIO_25**	**Digital/Analog I/O**	**GPIO, Sensor Controller, Analog**
32	**DIO_26**	**Digital/Analog I/O**	**GPIO, Sensor Controller, Analog**
33	**DIO_27**	**Digital/Analog I/O**	**GPIO, Sensor Controller, Analog**
34	**DIO_28**	**Digital/Analog I/O**	**GPIO, Sensor Controller, Analog**
35	**DIO_29**	**Digital/Analog I/O**	**GPIO, Sensor Controller, Analog**
36	**DIO_30**	**Digital/Analog I/O**	**GPIO, Sensor Controller, Analog**

AN1310MA-A-XXX-2:



Terminal Description



Pad Number	Name	Pin Type	Description
1	GND	Ground Pin	Connect to GND
2	DIO_1	Digital I/O	GPIO, Sensor Controller
3	DIO_2	Digital I/O	GPIO, Sensor Controller
4	DIO_3	Digital I/O	GPIO, Sensor Controller
5	DIO_4	Digital I/O	GPIO, Sensor Controller
6	DIO_5	Digital I/O	GPIO, Sensor Controller, High drive capability
7	DIO_6	Digital I/O	GPIO, Sensor Controller, High drive capability
8	DIO_7	Digital I/O	GPIO, Sensor Controller, High drive capability
9	GND	Ground Pin	Connect to GND
10	GND	Ground Pin	Connect to GND
11	VDD	Power	1.8V to 3.8V main chip supply
12	DIO_8	Digital I/O	GPIO
13	DIO_9	Digital I/O	GPIO
14	DIO_10	Digital I/O	GPIO
15	DIO_11	Digital I/O	GPIO
16	DIO_12	Digital I/O	GPIO
17	DIO_13	Digital I/O	GPIO
18	DIO_14	Digital I/O	GPIO
19	DIO_15	Digital I/O	GPIO
20	JTAG_TMSC	Digital I/O	JTAG TMSC, High drive capability
21	JTAG_TCKC	Digital I/O	JTAG TCKC
22	DIO_16	Digital I/O	GPIO, JTAG_TDO, High drive capability
23	DIO_17	Digital I/O	GPIO, JTAG_TDI, High drive capability
24	DIO_18	Digital I/O	GPIO

25	**DIO_19**	**Digital I/O**	**GPIO**
26	**DIO_20**	**Digital I/O**	**GPIO**
27	**DIO_21**	**Digital I/O**	**GPIO**
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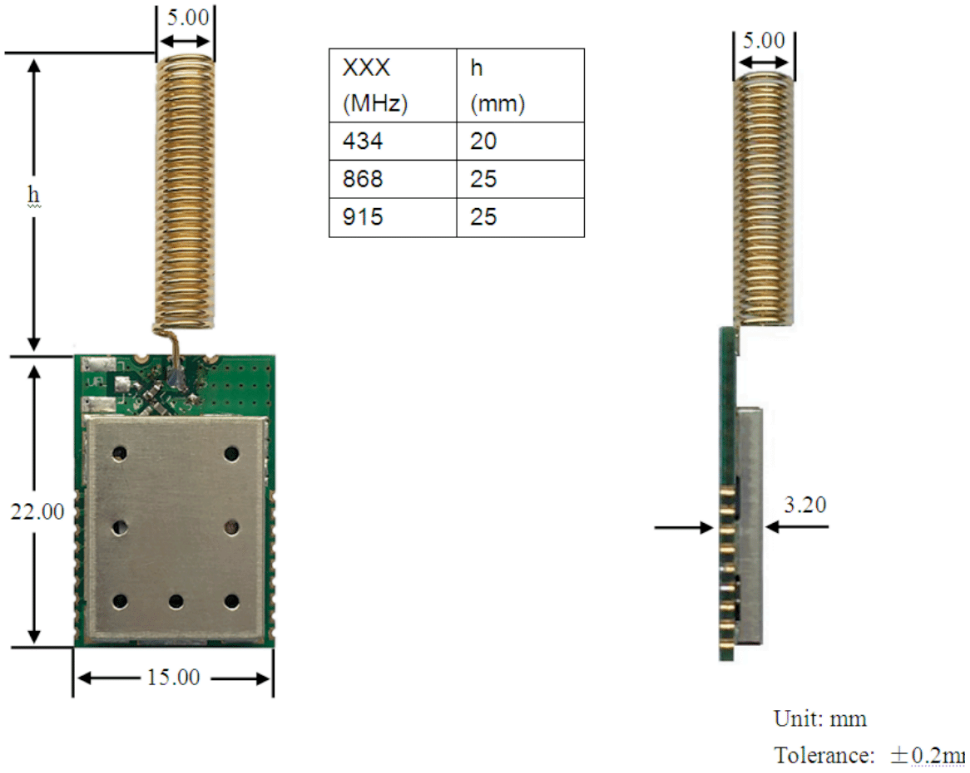
35	**DIO_28**	**Digital/Analog I/O**	**GPIO, Sensor Controller, Analog**
36	**DIO_29**	**Digital/Analog I/O**	**GPIO, Sensor Controller, Analog**
37	**DIO_30**	**Digital/Analog I/O**	**GPIO, Sensor Controller, Analog**
38	**GND**	**Ground Pin**	**Connect to GND**

AN1310HA-B-XXX:

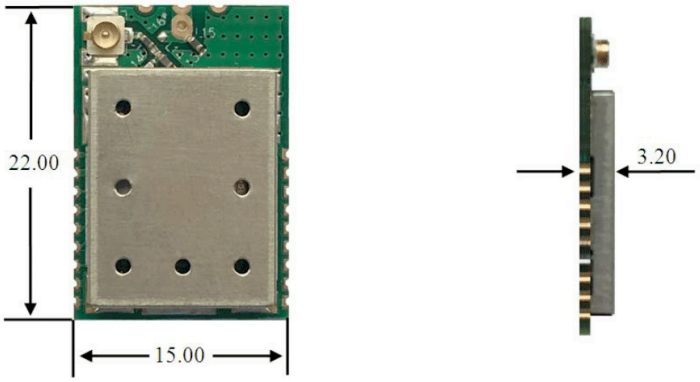


XXX (MHz)	h (mm)
434	20
868	25
915	25

Unit: mm

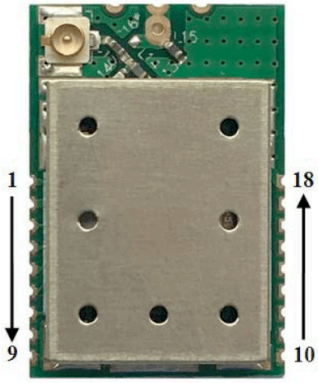
Tolerance: ±0.2mm

AN1310UA-B-XXX:



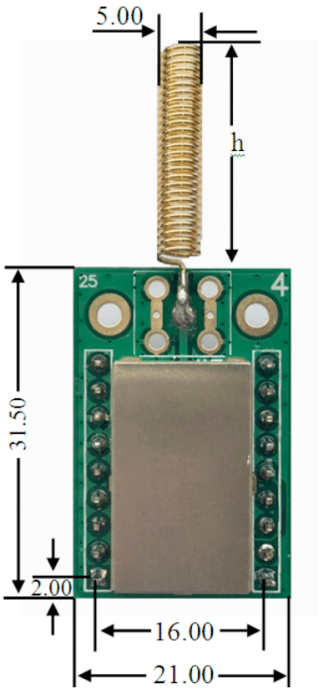
Unit: mm
Tolerance: ±0.2mm

Terminal Description

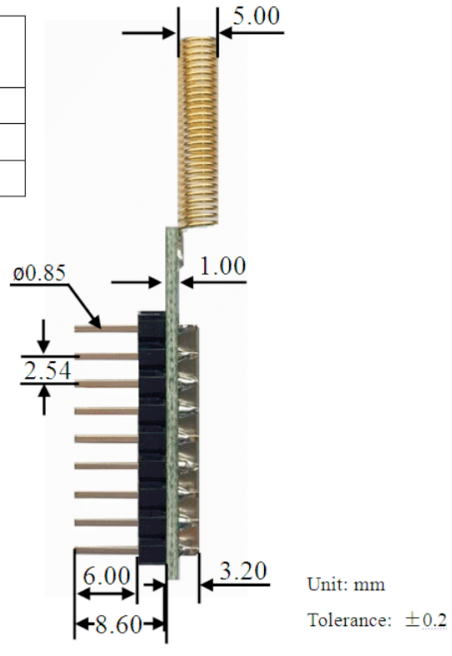


Pad Number	Name	Pin Type	Description
1	DIO_0	Digital I/O	GPIO, Sensor Controller, high-drive capability
2	DIO_1	Digital I/O	GPIO, Sensor Controller, high-drive capability
3	DIO_2	Digital I/O	GPIO, Sensor Controller, high-drive capability
4	JTAG_TMSC	Digital I/O	JTAG TMSC
5	JTAG_TCKC	Digital I/O	JTAG TCKC
6	DIO_3	Digital I/O	GPIO, high-drive capability, JTAG_TDO
7	DIO_4	Digital I/O	GPIO, high-drive capability, JTAG_TDI
8	GND	Ground Pin	Connect to GND
9	GND	Ground Pin	Connect to GND
10	GND	Ground Pin	Connect to GND
11	VDD	Power	1.8V to 3.8V main chip supply
12	RESET_N	Digital input	Reset, active-low, No internal pullup
13	DIO_5	Digital or analog I/O	GPIO, Sensor Controller, analog
14	DIO_6	Digital or analog I/O	GPIO, Sensor Controller, analog
15	DIO_7	Digital or analog I/O	GPIO, Sensor Controller, analog
16	DIO_8	Digital or analog I/O	GPIO, Sensor Controller, analog
17	DIO_9	Digital or analog I/O	GPIO, Sensor Controller, analog
18	GND	Ground Pin	Connect to GND

AN1310HA-C-XXX:



XXX (MHz)	h (mm)
434	20
868	25
915	25



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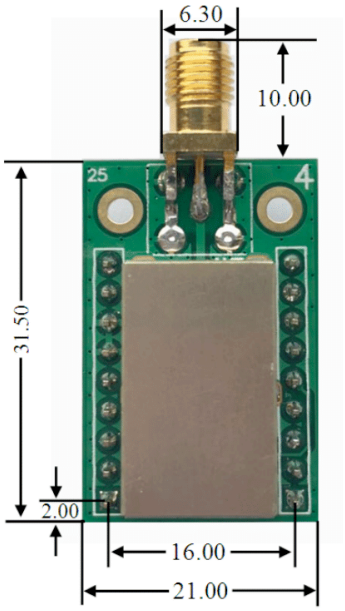
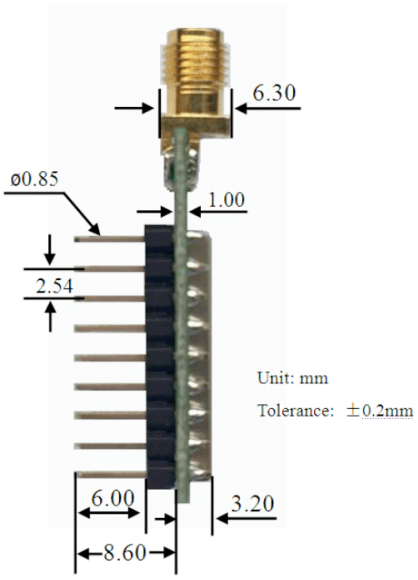
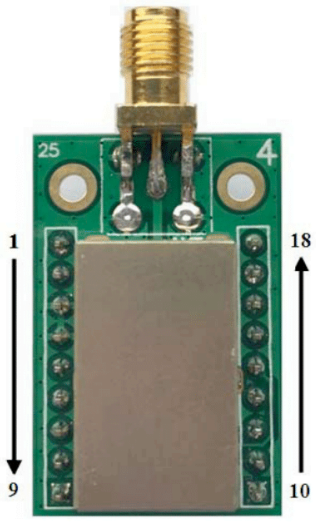
1310MA-C-XXX-1:





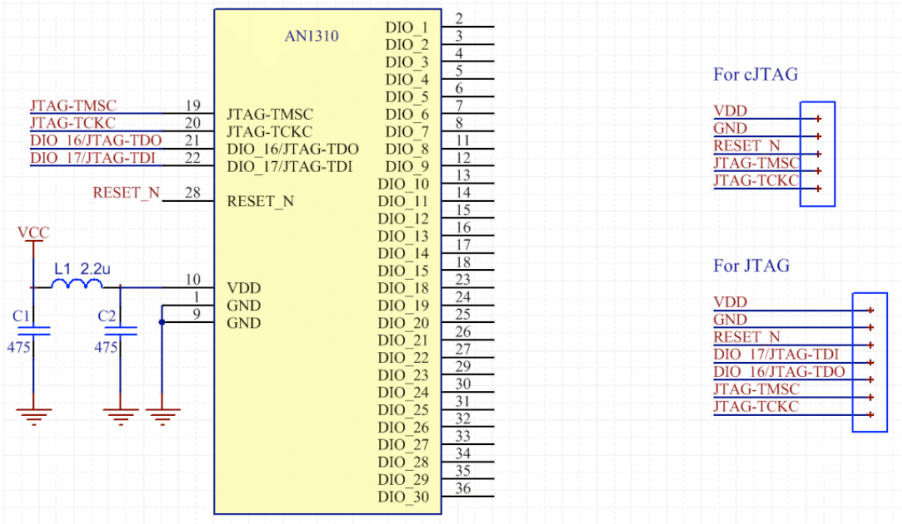
Terminal Description



Pad Number	Name	Pin Type	Description
1	DIO_0	Digital I/O	GPIO, Sensor Controller, high-drive capability
2	DIO_1	Digital I/O	GPIO, Sensor Controller, high-drive capability
3	DIO_2	Digital I/O	GPIO, Sensor Controller, high-drive capability
4	JTAG_TMSC	Digital I/O	JTAG TMSC
5	JTAG_TCKC	Digital I/O	JTAG TCKC
6	DIO_3	Digital I/O	GPIO, high-drive capability, JTAG_TDO
7	DIO_4	Digital I/O	GPIO, high-drive capability, JTAG_TDI
8	GND	Ground Pin	Connect to GND
9	GND	Ground Pin	Connect to GND
10	GND	Ground Pin	Connect to GND
11	VDD	Power	1.8V to 3.8V main chip supply
12	RESET_N	Digital input	Reset, active-low, No internal pullup
13	DIO_5	Digital or analog I/O	GPIO, Sensor Controller, analog
14	DIO_6	Digital or analog I/O	GPIO, Sensor Controller, analog
15	DIO_7	Digital or analog I/O	GPIO, Sensor Controller, analog
16	DIO_8	Digital or analog I/O	GPIO, Sensor Controller, analog
17	DIO_9	Digital or analog I/O	GPIO, Sensor Controller, analog
18	GND	Ground Pin	Connect to GND

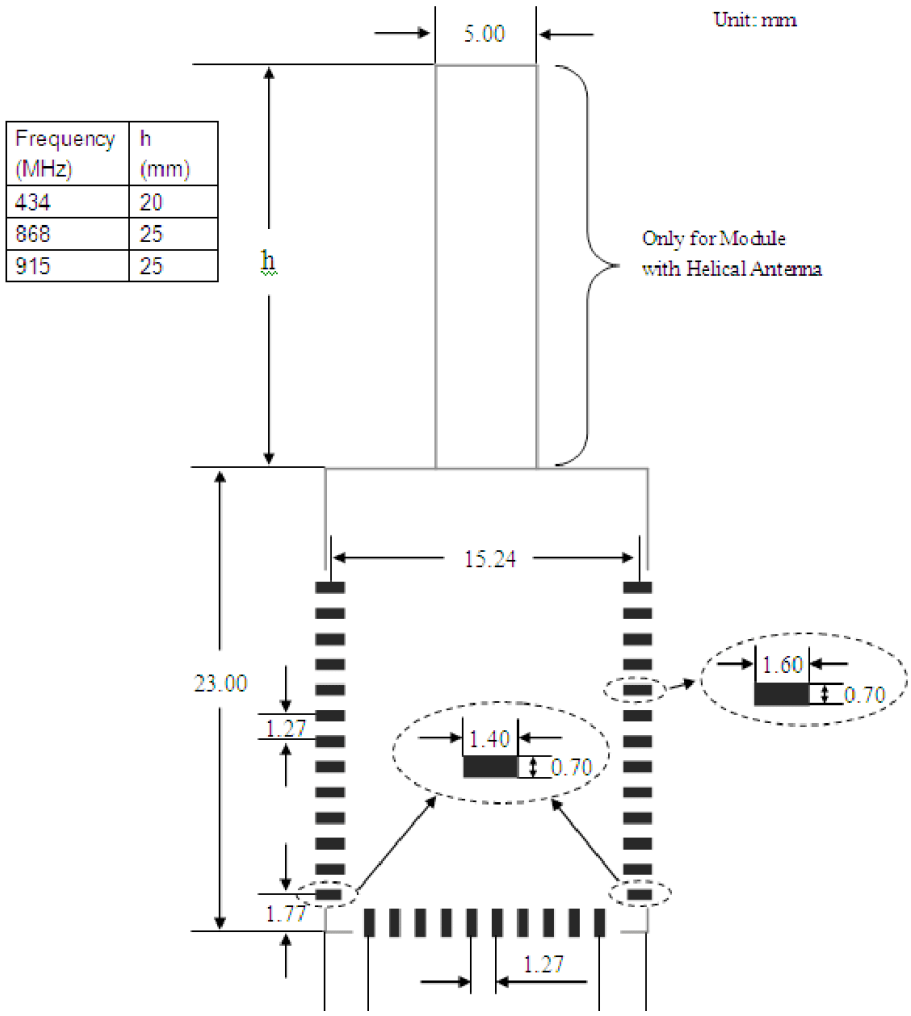
Reference Schematics

VCC Wide Supply Voltage Range:1.8 to 3.8V



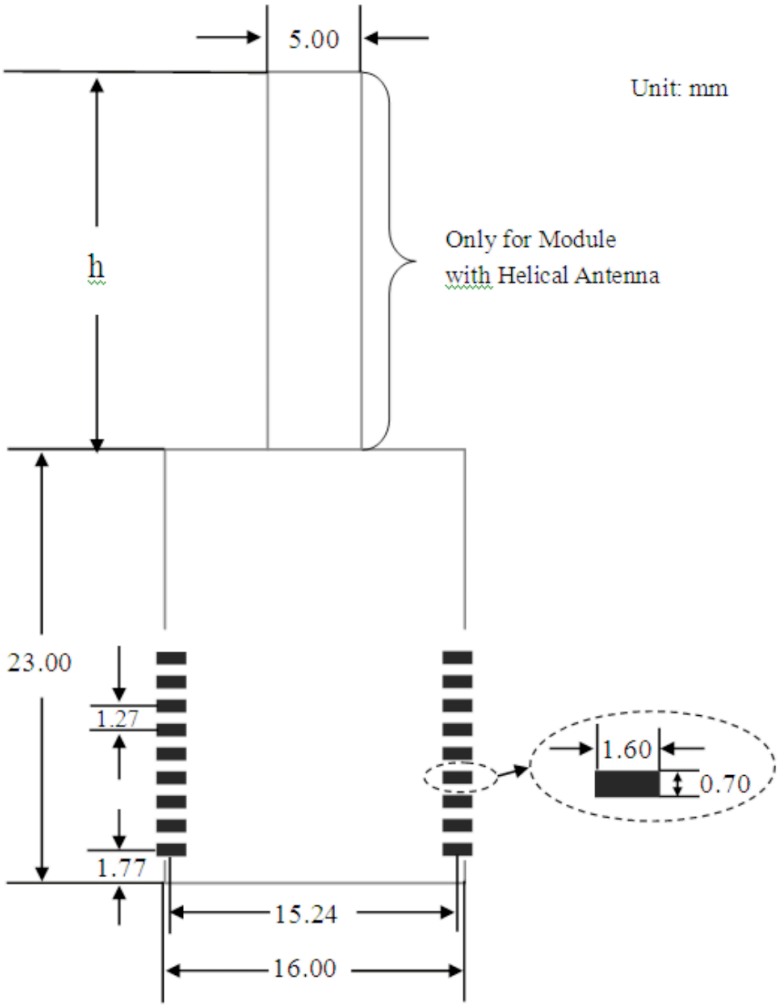
Recommended PCB Layout for Package

AN1310HA-A-XXX/AN1310UA-A-XXX:

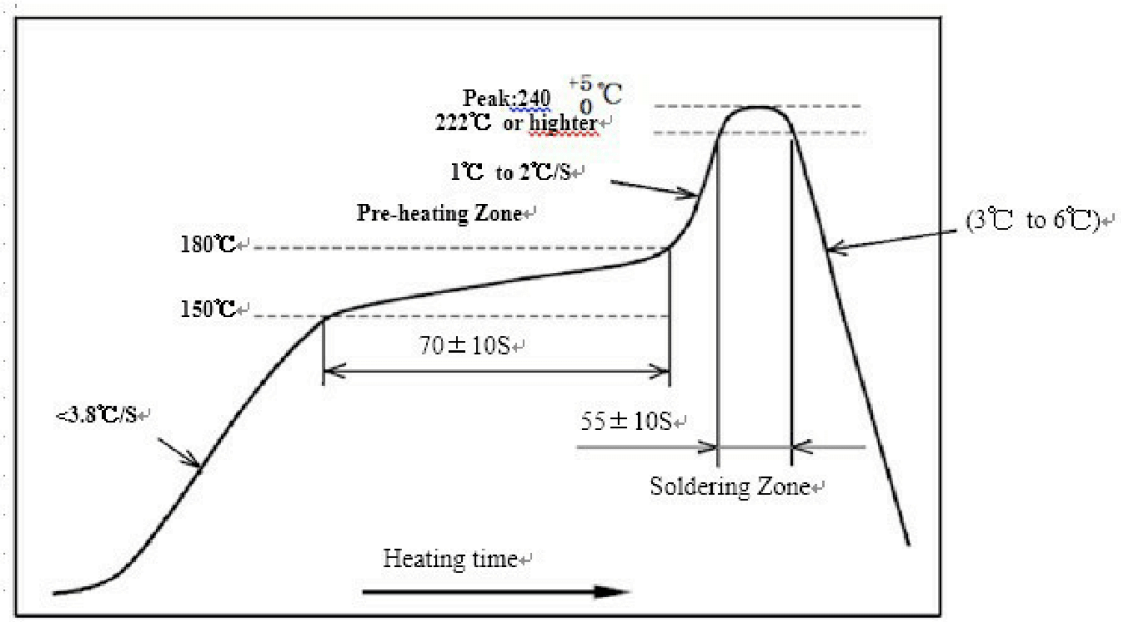


AN1310HA-B-XXX/AN1310UA-B-XXX

Frequency (MHz)	h (mm)
434	20
868	25
915	25



Recommended Reflow Profile for Lead Free Solder



Contact details

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