AN1312 Module Datasheet V2.0

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Contents

History

Date	Version	Description	Draft	Approval
2019-8-13	V1	Release		
2020-3-6	V2.0	Change of format	X	Amy

Module Name Information

AN - 1312 - UA - A - 434

↓   ↓   ↓   ↓   ↓

Module Type:	Chip Type:	Antenna Type:	PCB Version	Frequency:
Air Nerve	CC1312	HA: Helical wire antenna		434: 434MHz
		UA: UFL Connector		470: 470MHz
		NA: NO Antenna		868: 868MHz
				915: 915MHz

Features

- Built in CC1312F Sub-1-GHz RF System-On-Chip (SOC)
- Size:15mm X 22mm X 3.2mm
- Operating Voltage:1.8V to 3.8V
- Operating Temperature: -40℃~+85℃
- Storage Temperature: -40℃~+150℃
- Microcontroller
  - Powerful 48-MHz Arm® Cortex®-M4F
- Processor
  - 352KB of in-system Programmable Flash
  - 256KB of ROM for protocols and library Functions
  - 8KB of Cache SRAM (Alternatively available as general-purpose RAM)
  - 80KB of Ultralow Leakage SRAM
  - 2-Pin cJTAG and JTAG Debugging
  - Supports Over-the-Air Upgrade (OTA)
- Ultralow Power Sensor Controller with 4KB of SRAM
  - Sample, store, and process sensor data
  - Operation independent from system CPU
  - Fast wake-up for low-power operation
- TI-RTOS, drivers, Bootloader, and IEEE 802.15.4 MAC in ROM for optimized application size
- Peripherals
  - Digital peripherals can be routed to any GPIO
  - 4× 32-bit or 8× 16-bit general-purpose Timers

- 12-Bit ADC, 200 ksamples/s, 8-Channel
- 2× comparators with internal reference DAC (1× continuous time, 1× ultra-low power)
- Programmable Current Source
- 2 x UART
- 2 x SSI (SPI, MICROWIRE, TI)
- I2C
- I2S
- Real-Time Clock (RTC)
- AES-128 - and 256-bit Crypto Accelerator
- True Random Number Generator (TRNG)
- Capacitive sensing, up to 8 channels
- Integrated Temperature and battery monitor
- Low Power
  - Active-Mode RX: 8mA
  - Active-Mode TX: 27mA
  - Standby: 1 µA (RTC on, 80KB RAM and CPU retention)
- Radio Section
  - Flexible high-performance sub-1 GHz RF transceiver
  - Excellent receiver sensitivity: -121 dBm for SimpleLink long-range mode at 5 kbps; -110 dBm at 50 kbps
  - Output power up to +14 dBm with temperature compensation

Applications

- 433-, 470- to 510-, 868-, and 902 to 928 MHz ISM and SRD Systems with down to 4 kHz of receive bandwidth
- Home and building automation
  - Building security systems – motion detector, electronic door lock, door and window sensor, gateway
  - HVAC – thermostat, wireless environmental sensor, HVAC system controller
  - Fire safety systems – smoke detector, fire alarm control panel
  - Video surveillance – IP camera
    - Garage door openers
    - Elevator and escalator control
- Smart grid and automatic meter reading
  - Water, gas, and electricity meters
  - Heat cost allocators
  - Gateways
- Wireless sensor networks
  - Long-range sensor applications
- Asset tracking and management
- Factory automation
- Wireless healthcare applications
- Energy harvesting applications
- Electronic Shelf Label (ESL)

Description

The AN1312 module is designed based on CC1312R. The CC1312R device is a Sub-1GHz wireless MCU targeting Wireless M-Bus, IEEE 802.15.4g, IPv6-enabled smart objects (6LoWPAN), KNX RF, Wi-SUN®, and proprietary systems, including theTI15.4-Stack.

The CC1312R device is a member of the SimpleLink™ MCU platform of cost-effective, ultra-low power,2.4-GHz and Sub-1 GHz RF devices. Very low active RF and microcontroller (MCU) currents, in addition to sub-µA sleep current with up to 80KB of parity protected RAM retention, provide excellent battery lifetime and allow operation on small coin-cell batteries and in energy-harvesting applications.

The CC1312R device combines a flexible, very low-power RF transceiver with a powerful 48-MHz Arm® Cortex®-M4F CPU in a platform supporting multiple physical layers and RF standards. A dedicated Radio Controller (Arm® Cortex®-M0) handles low-level RF protocol commands that are stored in ROM or RAM, thus ensuring ultra-low power and great flexibility. The low power consumption of the CC1312R device does not come at the expense of RF performance; the CC1312R device has excellent sensitivity and robustness (selectivity and blocking) performance.

The CC1312R 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 programmable, autonomous ultra-low power Sensor Controller CPU with 4KB of SRAM for program and data. The Sensor Controller, with its fast wake-up and ultra-low-power 2 MHz mode is designed for sampling, buffering, and processing both analog and digital
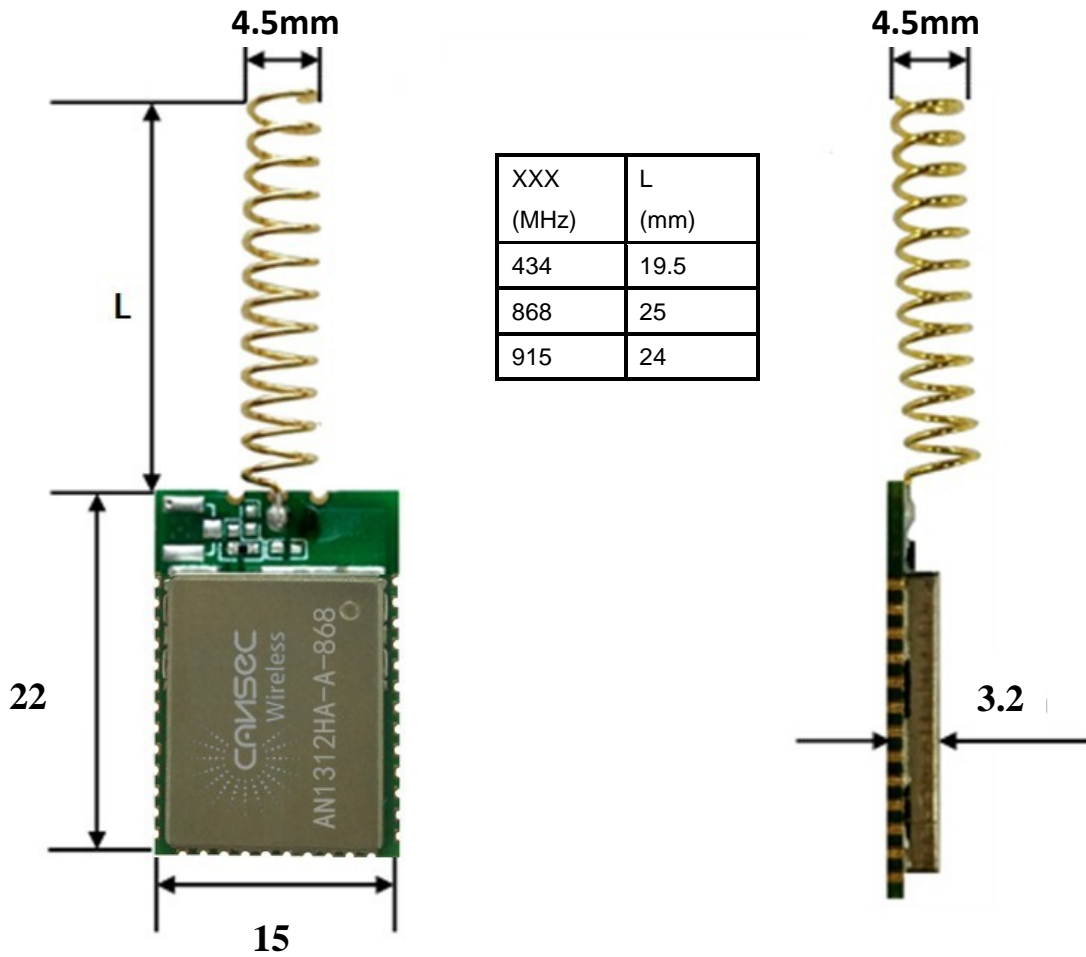
Specifications

Parameter		Min	Typ	Max	Unit
Operating Voltage		1.8	-	3.8	V
Operating Temperature		-20	-	+70	℃
Current Consumption	Sleep Mode	-	1	-	uA
	Receive mode	-	8	-	mA
	Transmit Mode	-	27	-	mA
TX Power (For Carrier)		-		12	dBm
RX Sensitivity (For Lora Modulation)		-	-	-121	dBm
Distance		434 / 470MHz:400-500 868 / 915MHz:600-800			m

Mechanical Drawing

AN1312HA-A-XXX:

Unit: mm

XXX (MHz)	L (mm)
434	19.5
868	25
915	24

AN1312UA-A-XXX：
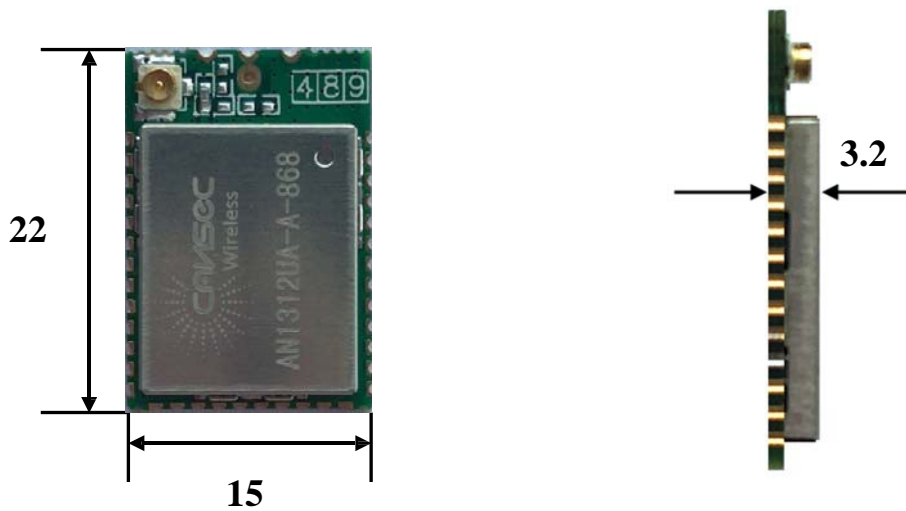
Terminal Description
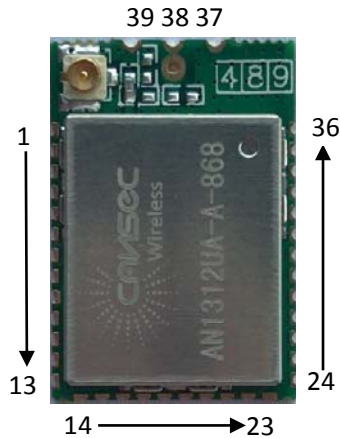
| Pad Number	Name	Pin Type	Description
1	GND	Ground Pin	Connect to GND
2	DIO_1	Digital I/O	GPIO,
3	DIO_2	Digital I/O	GPIO
4	DIO_3	Digital I/O	GPIO
5	DIO_4	Digital I/O	GPIO
6	DIO_5	Digital I/O	GPIO, High drive capability
7	DIO_6	Digital I/O	GPIO, High drive capability
8	DIO_7	Digital I/O	GPIO, High drive 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. Internal pullup resistor
29	DIO_23	Digital/Analog I/O	GPIO, analog capability
30	DIO_24	Digital/Analog I/O	GPIO, analog capability
31	DIO_25	Digital/Analog I/O	GPIO, analog capability
32	DIO_26	Digital/Analog I/O	GPIO, analog capability
33	DIO_27	Digital/Analog I/O	GPIO, analog capability
34	DIO_28	Digital/Analog I/O	GPIO, analog capability
35	DIO_29	Digital/Analog I/O	GPIO, analog capability
36	DIO_30	Digital/Analog I/O	GPIO, analog capability
37	GND	Ground Pin	Connect to GND
38	ANT	RF_OUT	Antenna Type: NA RF_OUT
39	GND	Ground Pin	Connect to GND

Note: The MCU IOC can map a number of peripheral modules such as GPIO, SSI (SPI), UART, I2C,

and I2S to any of the available I/Os. The peripherals AUX and JTAG are limited to specific I/O pins.More information

*please reference **Ti.com**.*

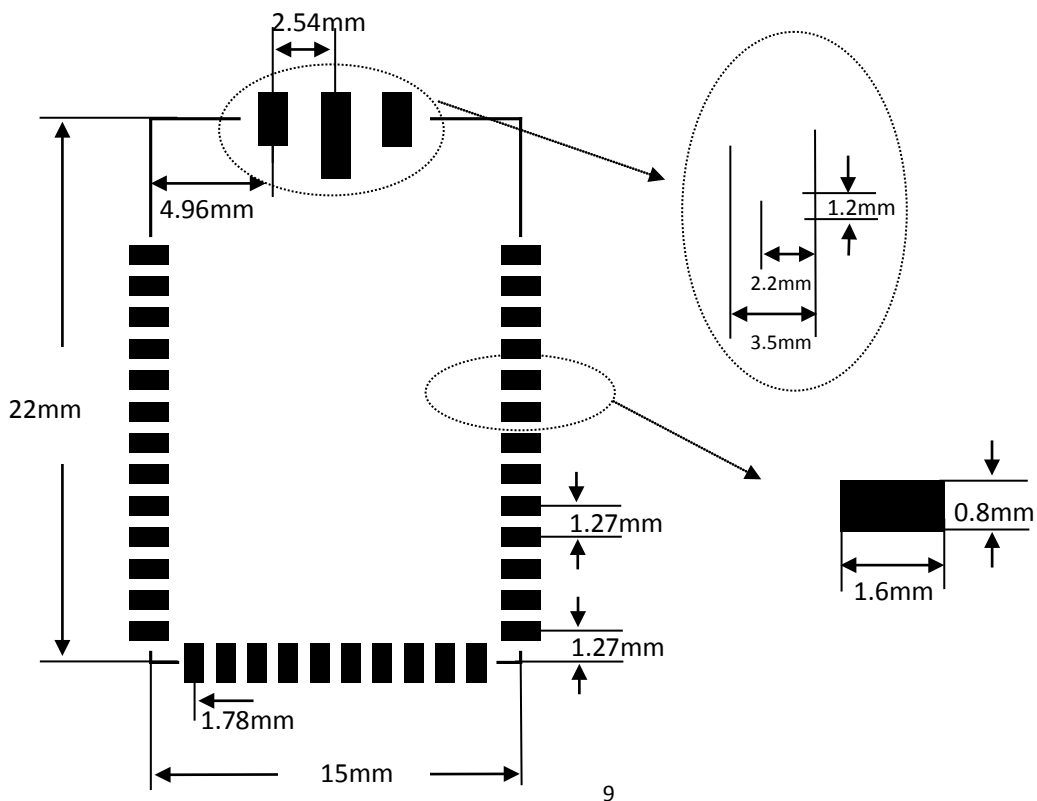# Recommended PCB Layout for Package
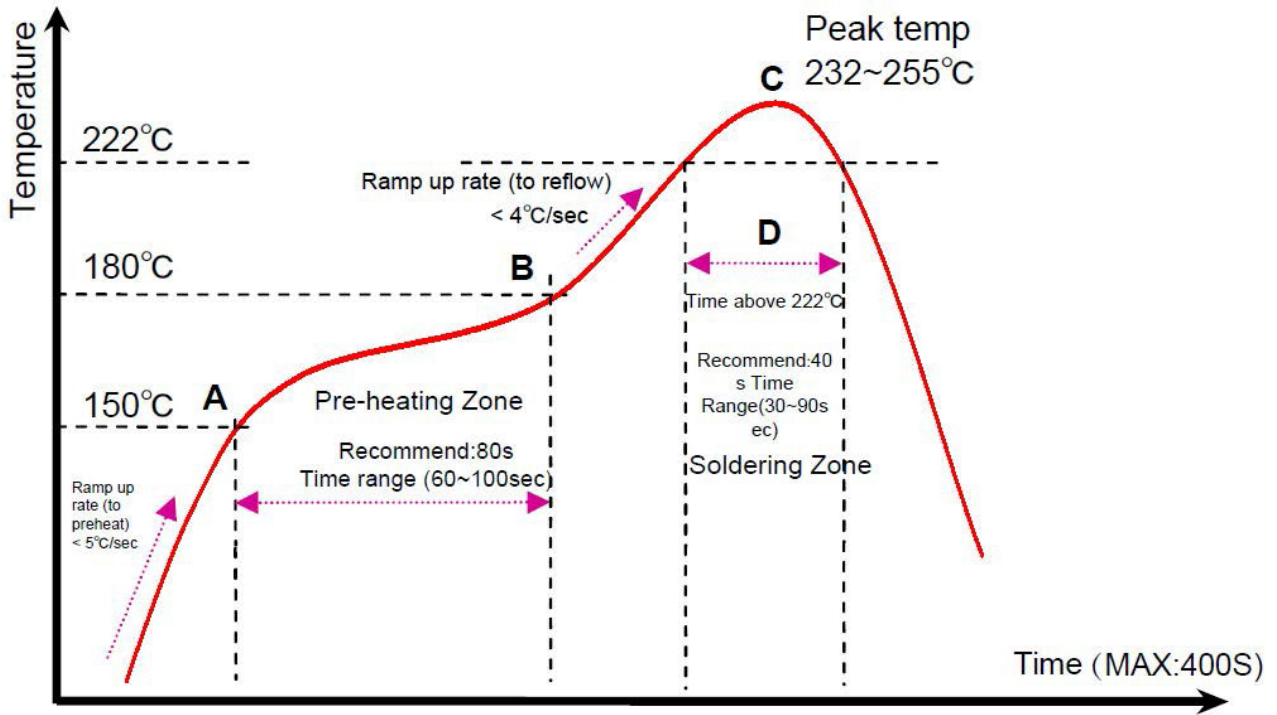
AN1312HA-A-XXX/AN1312UA-A-XXX:

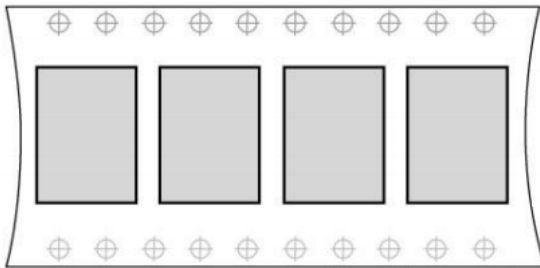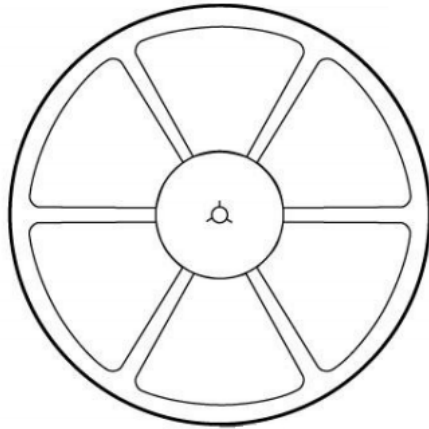| XXX (MHz)	L (mm)
434	19.5
868	25
915	21.5

AN1312NA-A-XXX

9
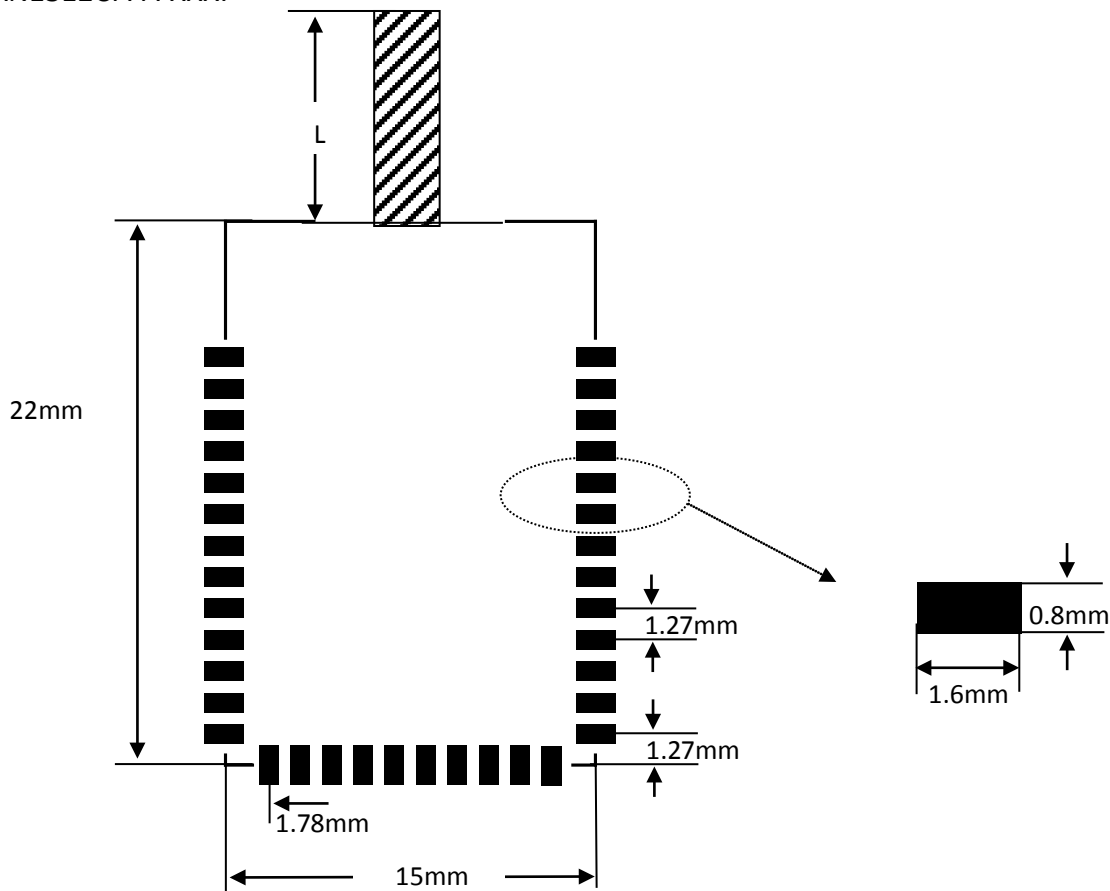
Recommended Reflow Profile for Lead Free Solder

Package

- ■ Tape and Reel

- ■ Helical antenna version Module exception

- ■ Note：For package, we have three package types: Reel, Tray, Simple way for choosing, depend on customer's request or quantity request

Contact Details

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FCC Statement (915MHz version) :

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1) Reorient or relocate the receiving antenna.

2) Increase the separation between the equipment and receiver.

3) Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

4) Consult the dealer or an experienced radio/TV technician for help.

Caution: Any changes or modifications to this device not explicitly approved by manufacturer could void your authority to operate this equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

2.2 FCC rules

CFR 47 FCC PART 15 SUBPART C has been investigated. It is applicable to the modular transmitter.

2.3 operational use conditions

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.

2.4 Limited module procedures

Not applicable

2.5 Trace antenna designs

Not applicable

2.6 RF exposure considerations

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

2.7 Antennas

This radio transmitter FCCID: VVJAN1312UA-A-915 has been approved by Federal Communications Commission to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

2.8 Label and compliance information

The final end product must be labeled in a visible area with the following "Contains FCC ID:VVJAN1312UA-A-915".

2.9 Information on test modes and additional testing requirements

Host manufacturer is strongly recommended to confirm compliance with FCC requirements for the transmitter when the module is installed in the host.

2.10 Additional testing, Part 15 Subpart B disclaimer

Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B.

FCC ID : VVJAN1312UA-A-915