AN1312 Module Datasheet V2.1

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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
2025-7-15	V2.1	Update Contact Details	Keystone	Jessy

Module Name Information

AN - 1312 - UA - A - 434

Module Type:	Chip Type:	Antenna Type:	PCB Version	Frequency:
Air Nerve	CC1312	HA: Helical wire antenna UA: UFL Connector NA: NO Antenna		434: 434MHz 470: 470MHz 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: -20℃~+70℃
- 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

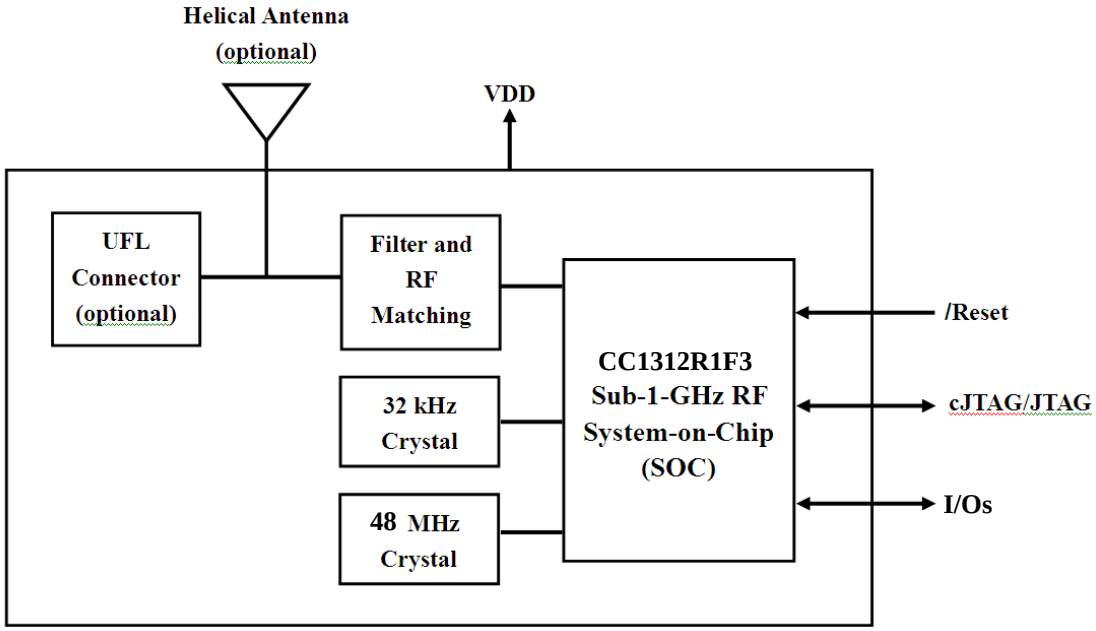
The AN1312 module is designed based on CC1312R. The CC1312R device is a Sub-1GHz wireless MCU targeting Wireless M-Bus, IEEE 802.15.4g, IPv6-enabled smart objects (6LoWPAN), KNX RF, Wi-SUN®, and proprietary systems, including theTI15.4-Stack.

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

Block Diagram



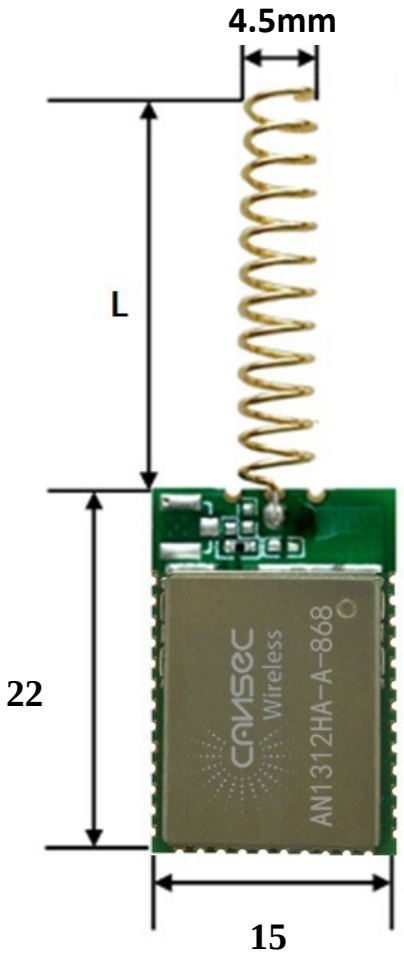
Specifications

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		-	-	-121	dBm
Distance		434 / 470MHz:400-500 868 / 915MHz:600-800			m

Mechanical Drawing

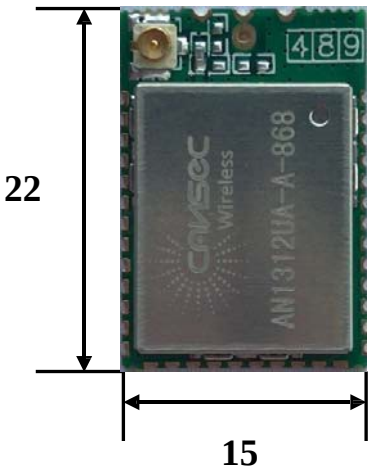
AN1312HA-A-XXX:

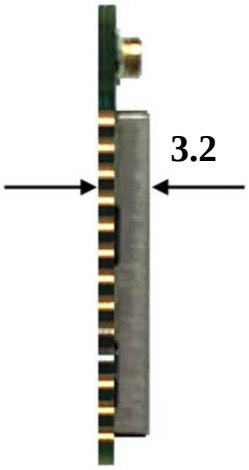
Unit: mm



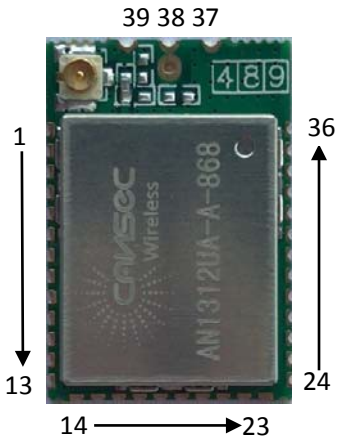
XXX (MHz)	L (mm)
434	19.5
868	25
915	24

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

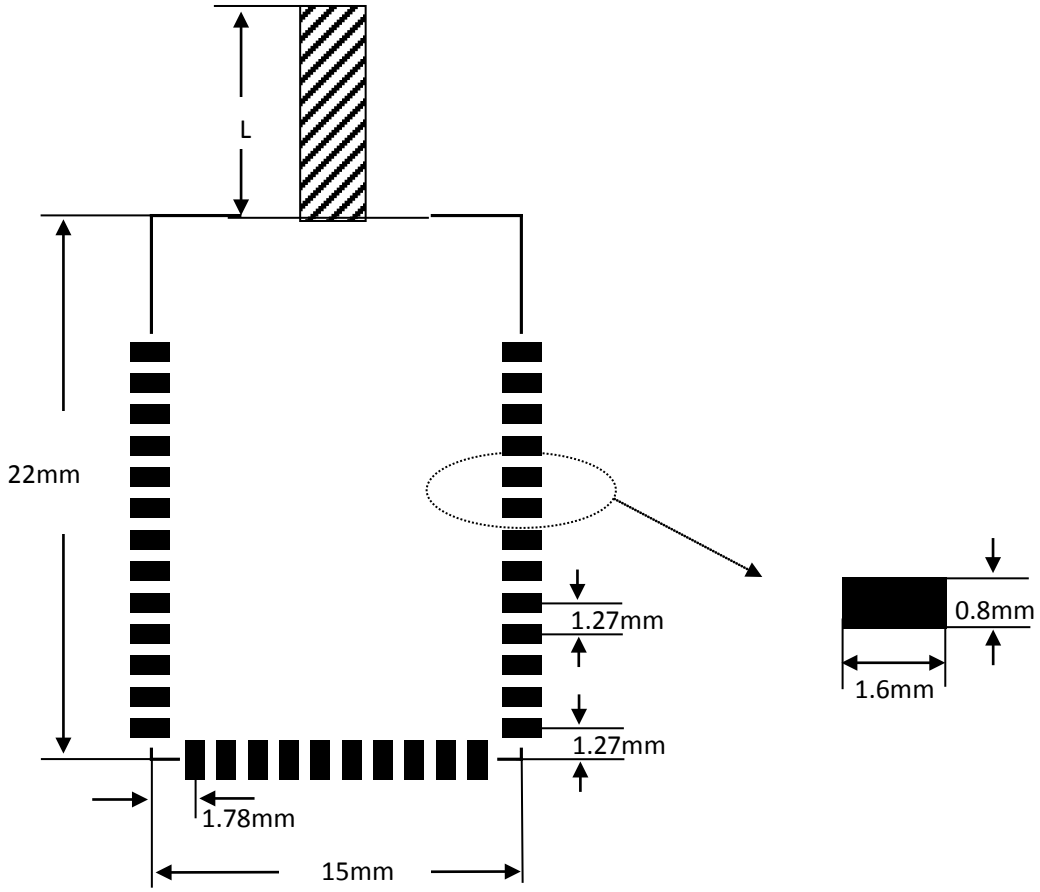
23	DIO_18	Digital I/O	GPIO
24	DIO_19	Digital I/O	GPIO
25	DIO_20	Digital I/O	GPIO
26	DIO_21	Digital I/O	GPIO
27	DIO_22	Digital I/O	GPIO
28	RESET_N	Digital input	Reset, active low. Internal pullup resistor
29	DIO_23	Digital/Analog I/O	GPIO, analog capability
30	DIO_24	Digital/Analog I/O	GPIO, analog capability
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****.*

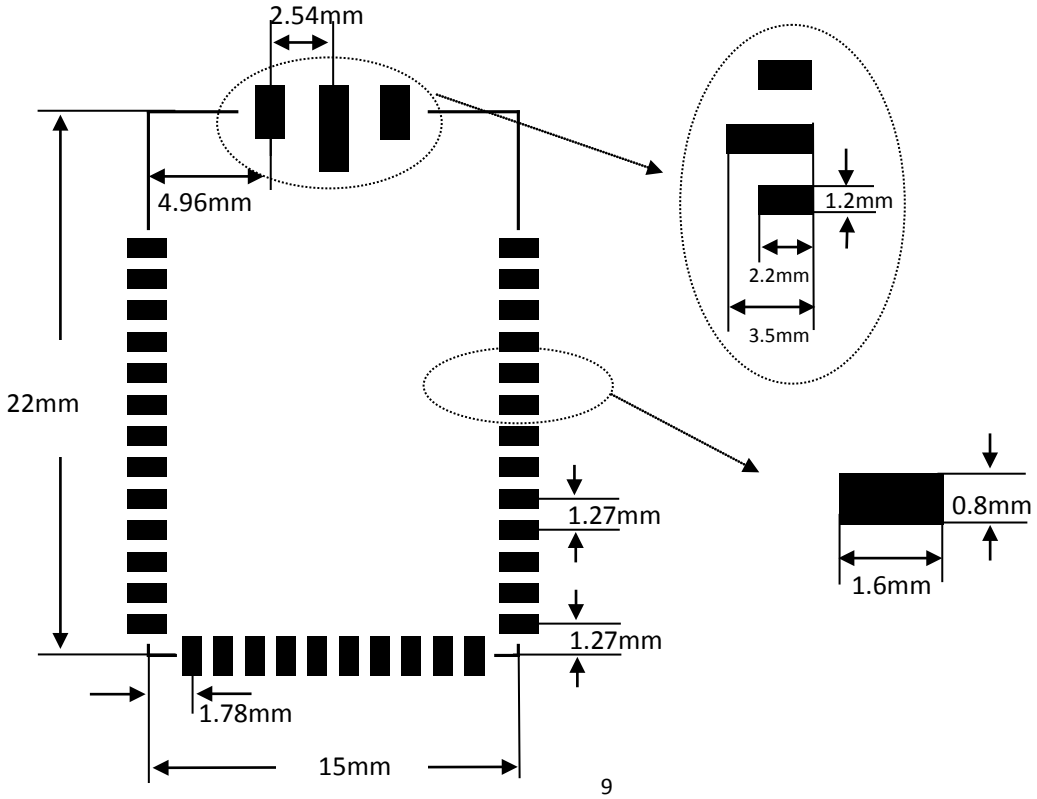
Recommended PCB Layout for Package

AN1312HA-A-XXX/AN1312UA-A-XXX:

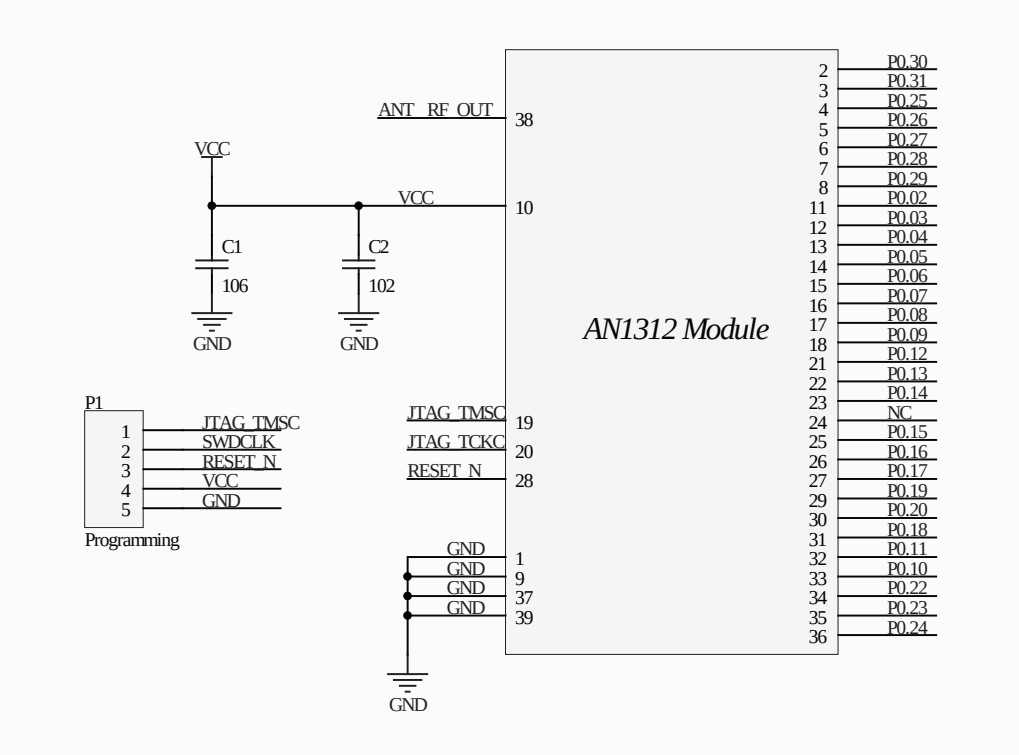
XXX (MHz)	L (mm)
434	19.5
868	25
915	21.5



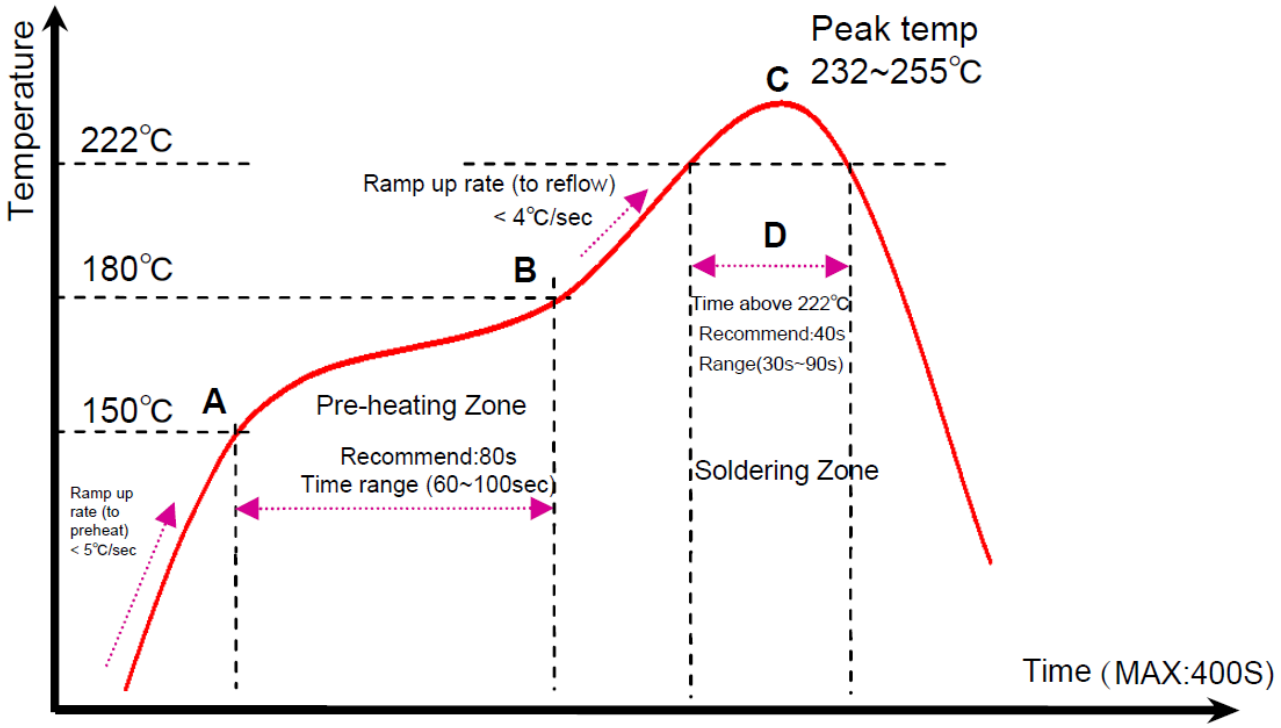
AN1312NA-A-XXX



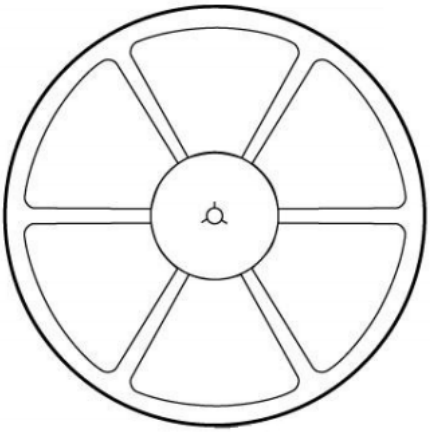
Reference Schematics

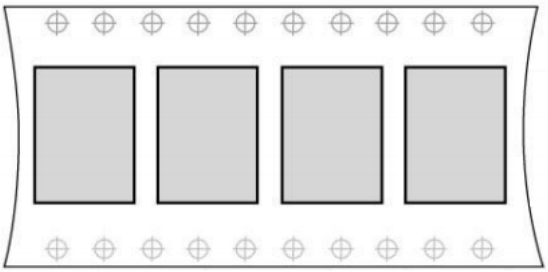


Recommended Reflow Profile for Lead Free Solder



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

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