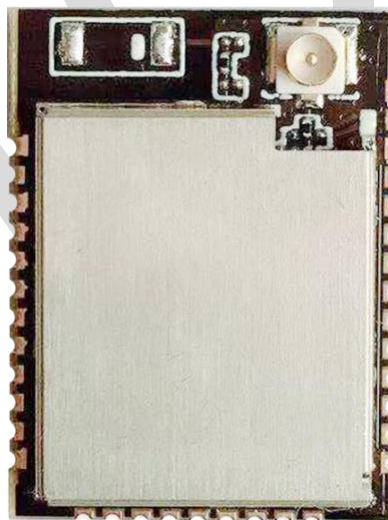


RW1711-37P

IEEE802.11b/g/n 1T1R Module



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1 Device Overview

1.1 Features

1.1.1 General

- CMOS MAC, Baseband PHY, and RF in a single chip for 802.11b/g/n compatible WLAN
- Complete 802.11n solution for 2.4 GHz band
- 72.2 Mbps receive PHY rate and 72.2 Mbps transmit PHY rate using 20 MHz bandwidth
- 150 Mbps receive PHY rate and 150 Mbps transmit PHY rate using 40 MHz bandwidth
- Compatible with 802.11n specification
- Backward compatible with 802.11b/g devices while operating in 802.11n mode

1.1.2 Standards Supported

- 802.11b/g/n compatible WLAN
- 802.11e QoS Enhancement (WMM)
- 802.11i (WPA, WPA2). Open, shared key, and pair-wise key authentication services
- Wi-Fi WPS support
- Wi-Fi Direct support
- Light Weight TCP/IP protocol
- Fast receiver Automatic Gain Control (AGC)
- On-chip ADC and DAC

1.1.3 Peripheral Interfaces

- 2 high speed UART interface with baud rate up to 4MHz, and only one of them has flow control
- 1 log UART with standard baud rate support
- 2 I2C interface

1.1.4 WLAN MAC Features

- Frame aggregation for increased MAC efficiency (A-MSDU, A-MPDU)
- Low latency immediate High-Throughput Block Acknowledgement (HT-BA)
- Long NAV for media reservation with CF-End for NAV release
- PHY-level spoofing to enhance legacy compatibility
- Power saving mechanism

1.1.5 WLAN PHY Features

- 802.11n OFDM
- One Transmit and one Receive path (1T1R)
- 20MHz bandwidth transmission

- Short Guard Interval (400ns)
- DSSS with DBPSK and DQPSK, CCK modulation with long and short preamble
- OFDM with BPSK, QPSK, 16QAM, and 64QAM modulation. Convolutional Coding Rate: 1/2, 2/3, 3/4, and 5/6
- Maximum data rate 54 Mbps in 802.11g and 72.2 Mbps in 802.11n
- 1 SPI supported with baud rate up to 10.4MHz (master).
- Support 4 PWM with configurable duration and duty cycle from 0 ~ 100%
- Maximum 18 GPIO pins

1.2 Applications

- Low-power IoT sensor hub
- Wi-Fi voice recognition device
- Smart outlet
- Home automation
- Mesh network
- Industrial control
- General low-power IoT recorder
- Video transmission
- OTT box/set-top box device

1.3 Description

ITON RW1711-37P was built around Realtek 802.11n RTL8711AF Wi-Fi SoC, which combines an ARM-CM3 core, wireless LAN (WLAN) MAC, a 1T1R capable WLAN baseband, and the 2.4 GHz radio into a single chip. It also provides a bunch of configurable GPIOs which are configured as digital peripherals for different applications and control usage. ITON RW1711-37P has integrated internal SRAM and flash for complete Wi-Fi protocol functions.

Table 1. Specifications of RW1711-37P

Item	Parameter
Dimension (L x W x H)	19.8 mm (± 0.15 mm) x 14.7 mm (± 0.15 mm) x 2.3 mm (± 0.15 mm)
Chip-set	RTL8711AF
Standard	IEEE802.11 n/g/b
Modulation Type	CCK, BPSK, QPSK, 16-QAM, 64-QAM
Frequency Band	2.412 GHz ~ 2.484 GHz
Interface	UART, I2C, PWM
Spread Spectrum	DSSS
Transmission Distance	Indoor ~ 100 m, outdoor ~ 300 m (depending on radio environment)
Data Security	64/128bit WEP, WPA/WPA2, WPA-PSK/WPA2-PSK (TKIP/AES)
Transmit Power	2.4 G:

	11b:18 ± 2 dBm, 11g:15 ± 2 dBm, 11n HT20 :15 ± 2 dBm; 11n HT40 :15 ± 2 dBm;
Rx Sensitivity	11n HT40 MCS7: -69 dBm@10% PER 11g 54M: -75 dBm@10% PER 11b 11M: -88 dBm@8% PER
Data Rate	802.11b [11, 5.5, 2 and 1 Mbps] 802.11g [54, 48, 36, 24, 18, 12, 9 & 6 Mbps] 802.11n (20 MHz): up to 72 Mbps 802.11n (40 MHz): up to 150 Mbps
Clock	2.4 GHz: ±20 ppm
Ambient Temperature	-20 °C ~ 85 °C
Storage Temperature	-55 °C ~ 125°C
Antenna	Internal PF or external PF
Operation System	Windows, OS, Linux
Operation Voltage	3.3 V DC (±0.3 V)

1.4 Block Diagram

1.4.1 Functional Block Diagram

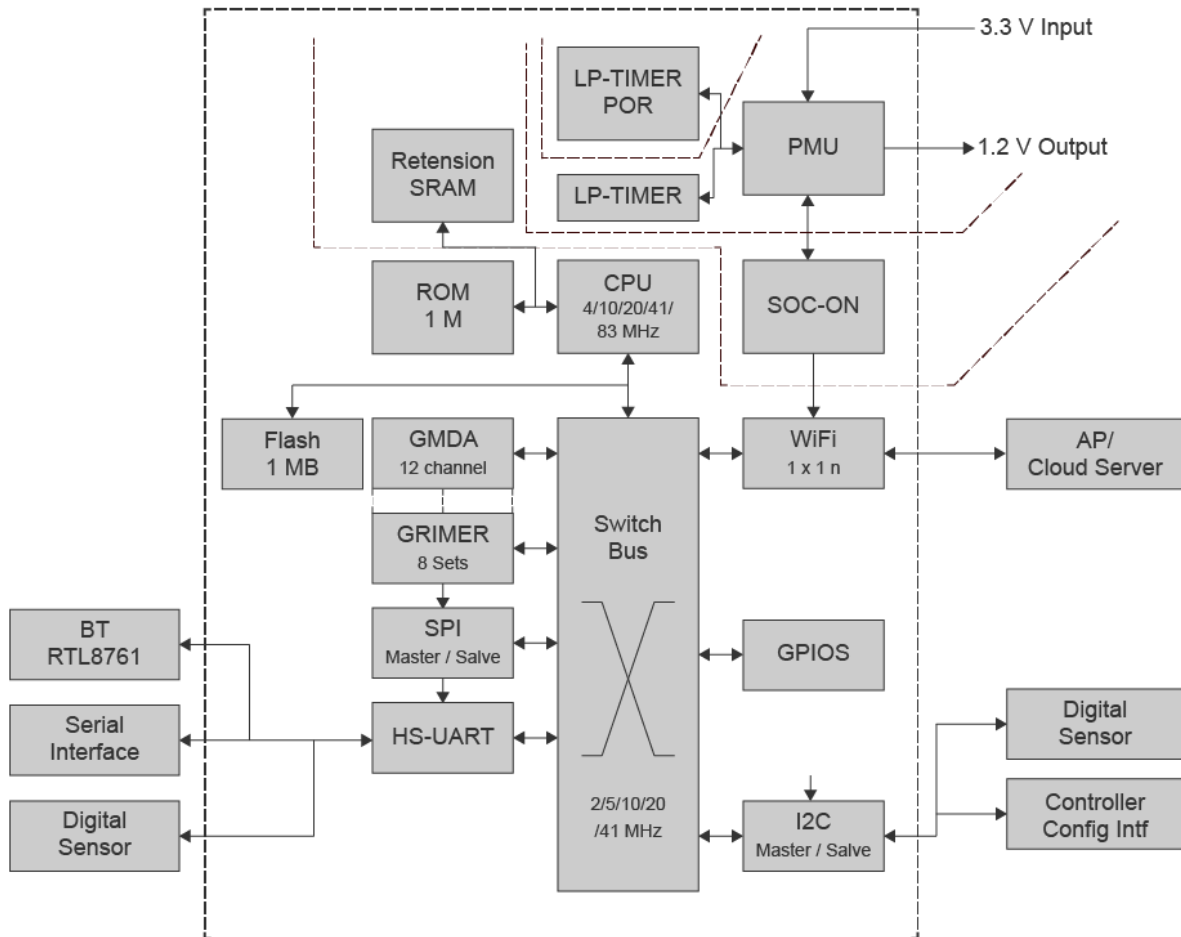


Figure 1. Functional Block Diagram of RW1711-37P

1.4.2 Wi-Fi Application Diagram

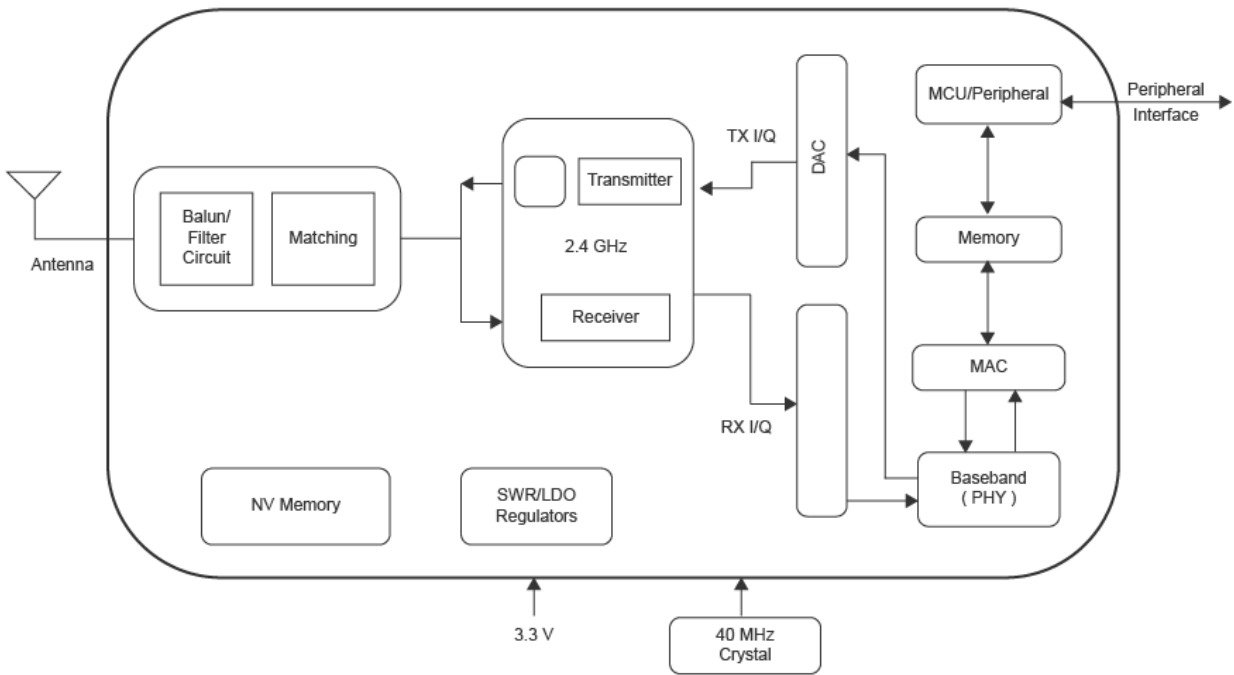


Figure 2. Single-Band 11n (1x1) Solution

1.4.3 Power Supply Application Diagram

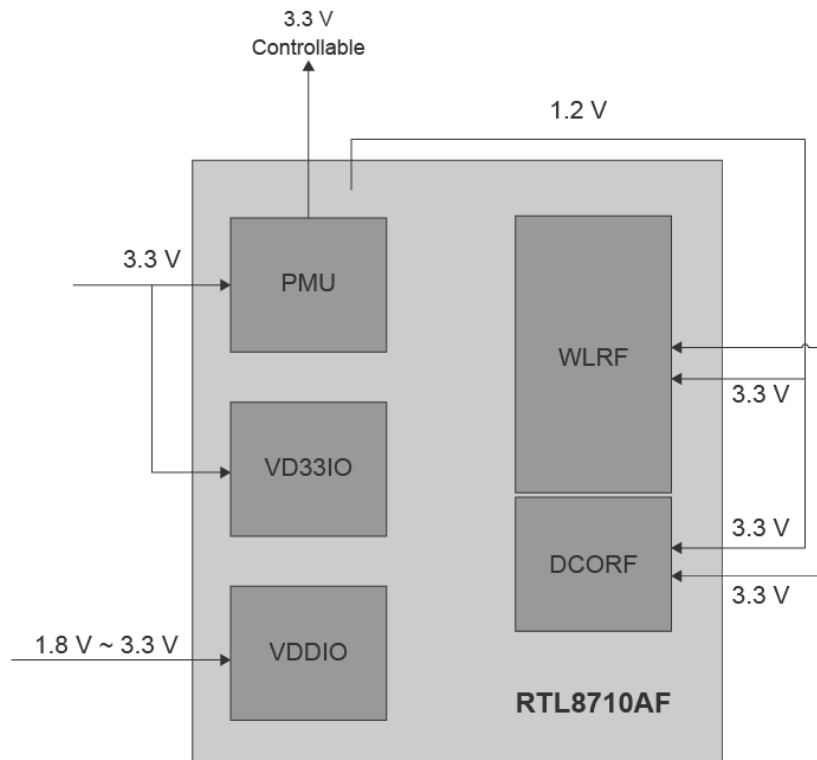


Figure 3. Power Supply Architecture

The integrated Power Management Unit (PMU) provides the following features:

- 1.2 V LDO/SWR (Switching Regulator).
- 3.3 V power source integrated power cut controlled by FW.

2 Pin Configuration and Functions

2.1 Module Pin Diagram

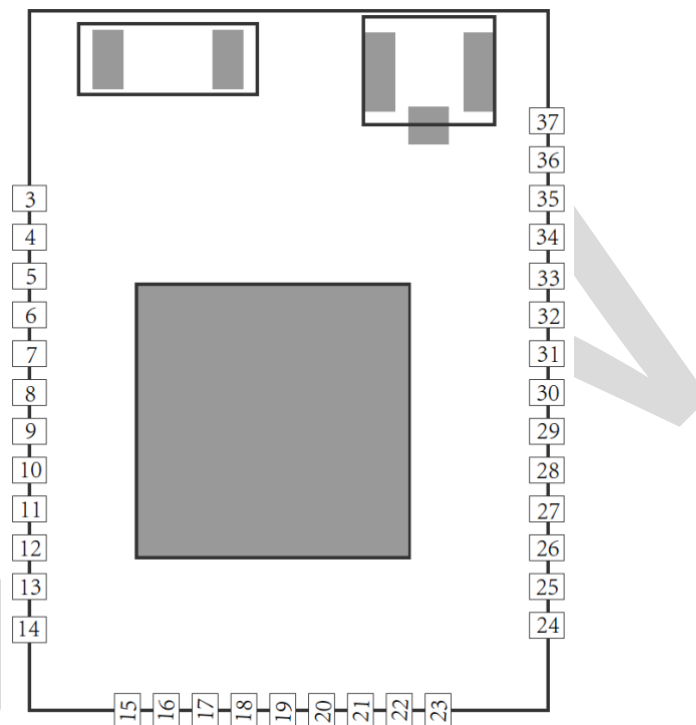


Figure 4. Pin Diagram of RW1711-37P

2.2 Pin Functions

Table 1. Pin Attributes of RW1711-37P

Pin	Name	Description
1		
2		
3	GND	Ground
4	VDDIO	VDDIO configuration; voltage: 1.8 V or 3.3 V
5	VDD33	3.3 V power supply
6	CHIP_PU	Whole chip enable control. When asserted, chip function is enabled; when de-asserted, whole chip is shutdown; 1: enable chip; 0: shutdown chip.
7	NC	NC

8	NC	NC
9	NC	NC
10	NC	NC
11	NC	NC
12	NC	NC
13	NC	NC
14	GND	Ground
15	NC	NC
16	NC	NC
17	NC	NC
18	NC	NC
19	NC	NC
20	NC	NC
21	NC	NC
22	GPIOA_4/U2TXD	GPIOA_4. Multiplexed with U2TXD (send data)
23	GPIOA_0/U2RXD	GPIOA_0. Multiplexed with U2RXD (Receive data)
24	GND	Ground
25	GPIOC_0/U0RXD	GPIOC_0. Multiplexed with U0RXD (Receive data)
26	GPIOC_3/U0TXD	GPIOC_3. Multiplexed with U0TXD (send data)
27	GPIOC_2/U0RTS	GPIOC_2. Multiplexed with U0RTS (Request To send)
28	GPIOC_1/U0CTS	GPIOC_1. Multiplexed with U0CTS (Clear TO send)
29	GPIOE_2/PWM2	GPIOE_2. Multiplexed with PWM2 (Pulse-Width Modulation)
30	GPIOE_1/PWM1	GPIOE_1. Multiplexed with PWM1 (Pulse-Width Modulation)
31	GPIOC_4/I2C1_SDA	GPIOC_4 pin. Multiplexed with I2C1_Data
32	GPIOC_5/I2C1_SCL	GPIOC_5 pin. Multiplexed with I2C1_Clock
33	GPIOE_4/JTAG_CLK	GPIOE_4. Multiplexed with JTAG_CLK
34	GPIOE_3/JTAG_TMS	GPIOE_3. Multiplexed with JTAG_TMS
35	GND	Ground
36	ANT	Wi-Fi Antenna
37	GND	Ground

3 RF Specifications

All measurements are made under nominal supply voltage, room temperature, and conducted conditions at each antenna port except antenna.

3.1 Absolute Maximum Rating

Caution! The absolute maximum ratings in the following table indicates voltages levels where permanent physical damage to the device can occur, even if these limits were exceeded for only a brief duration.

Parameter	Specification			Unit
	Min.	Typ.	Max.	
VA33, VD33IO, SW_HV3	3.0	3.3	3.6	V
VDD_IO	1.62	1.8 ~ 3.3	3.6	V
VA12_AFE, VA12_SYN, VA12_RF	1.08	1.2	1.32	V
IDD33	-	-	450	mA
IDD_IO	-	-	200	mA
IDD_IO_33	-	-	50	mA
Storage Temperature	-55	25	125	°C
Operating Ambient Temperature	-20	25	85	°C
Junction Temperature	0	-	125	°C

3.2 Receiver RF Characteristics

Table 2. Receiver RF Characteristics

Parameters	Condition	Min.	Typ.	Max.	Unit	
Receive Input Frequency						
2.4 GHz	802.11b/g/n mode	2401	-	2484	MHz	
Receiver Sensitivity						
802.11b	1 Mbps	-	-	-80	dBm	
	2 Mbps	FER < 8%, Packet size = 1,024 bytes	-	-	-80	dBm
	5.5 Mbps		-	-	-76	dBm
	11 Mbps		-	-	-76	dBm
802.11g	6 Mbps		PER < 10%, Packet size = 1,024 bytes	-	-	-82
	9 Mbps	-		-	-81	dBm
	12 Mbps	-		-	-79	dBm

	18 Mbps		-	-	-77	dBm
	24 Mbps		-	-	-74	dBm
	36 Mbps		-	-	-70	dBm
	48 Mbps		-	-	-66	dBm
	54 Mbps		-	-	-65	dBm
802.11g (HT20)	MCS0	PER < 10%, Packet size = 1,024 bytes	-	-	-82	dBm
	MCS1		-	-	-79	dBm
	MCS2		-	-	-77	dBm
	MCS3		-	-	-74	dBm
	MCS4		-	-	-70	dBm
	MCS5		-	-	-66	dBm
	MCS6		-	-	-65	dBm
802.11g (HT40)	MCS0	PER < 10%, Packet size = 1,024 bytes	-	-	-79	dBm
	MCS1		-	-	-76	dBm
	MCS2		-	-	-74	dBm
	MCS3		-	-	-71	dBm
	MCS4		-	-	-67	dBm
	MCS5		-	-	-63	dBm
	MCS6		-	-	-62	dBm
	MCS7		-	-	-61	dBm
Maximum Input Level						
802.11b	FER < 8%		-10	-	-	dBm
802.11g/n (2.4 GHZ)	FER < 10%		-20	-	-	dBm

3.3 Transmitter RF Characteristics

Table 3. Transmitter RF Characteristics

Parameter	Conditions	Min.	Typ.	Max.	Unit
Transmitter Input Frequency					
802.11b/g/n	2.4 GHz	2401	-	2483	MHz
Transmitter Channel Power					
802.11b	11 Mbps	16	18	20	dBm

802.11g	54 Mbps	13	15	17	dBm
802.11n	2.4 GHz, HT20, MCS0~15	13	15	17	dBm
	2.4 GHz, HT40, MCS0~15	13	15	17	dBm
Spectrum Mask					
802.11b	Fc \pm 11 MHz to \pm 22 MHz	-	-	-30	dBm
	Fc \pm 22 MHz and more	-	-	-50	dBm
802.11g	Fc \pm 11 MHz	-	-	-20	dBm
	Fc \pm 20 MHz	-	-	-28	dBm
	Fc \pm 30 MHz	-	-	-40	dBm
802.11n	Fc \pm 11 MHz (\pm 21 MHz @ HT20)	-	-	-20	dBm
	Fc \pm 20 MHz (\pm 40 MHz @ HT20)	-	-	-28	dBm
	Fc \pm 30 MHz (\pm 60 MHz @ HT20)	-	-	-45	dBm
Center Frequency Tolerance					
802.11b		-20	-	+20	ppm
		-20	-	+20	ppm
EVM (Error Vector Magnitude)					
802.11b	1 Mbps	-	-	35	%
	2 Mbps	-	-	35	%
	5.5 Mbps	-	-	35	%
	11 Mbps	-	-	35	%
802.11g	6 Mbps	-	-	-5	dB
	9 Mbps	-	-	-8	dB
	12 Mbps	-	-	-10	dB
	18 Mbps	-	-	-13	dB
	24 Mbps	-	-	-16	dB
	36 Mbps	-	-	-19	dB
	48 Mbps	-	-	-22	dB
	54 Mbps	-	-	-25	dB
802.11g (HT20)	MCS0	-	-	-5	dB
	MCS1	-	-	-10	dB
	MCS2	-	-	-13	dB
	MCS3	-	-	-16	dB

MCS4	-	-	-19	dB
MCS5	-	-	-22	dB
MCS6	-	-	-25	dB
MCS7	-	-	-28	dB

EVM:
 <Test condition>
 Method: composite EVM method.
 Phase correction: Symbol-by-symbol correction.
 Channel estimation: Raw channel estimate full packet.
 Symbol timing correction: on.
 Frequency Sync: Long training symbol.

4 Mechanical and Package

4.1 Recommended PCB Footprint

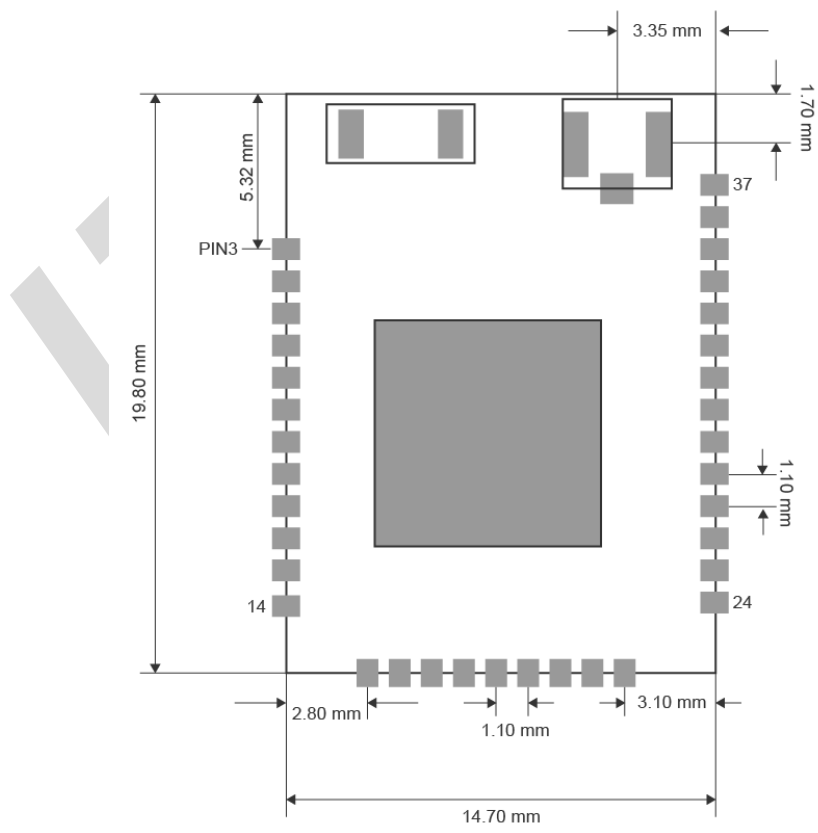


Figure 5. Recommended PCB Footprint of RW1711-37P

4.2 Package Information

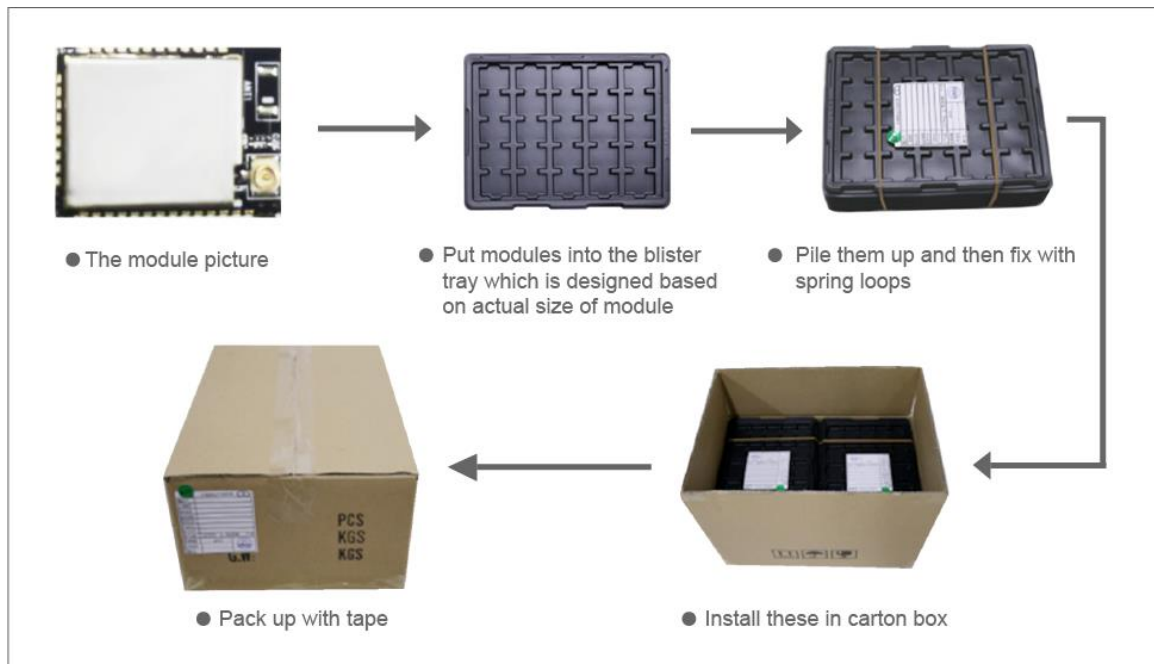


Figure 6. Packaging Information of RW1711-37P

5 Thermal Reflow

Referred to IPC/JEDEC standard.

Peak temperature: <250°C

Number of times: ≤2

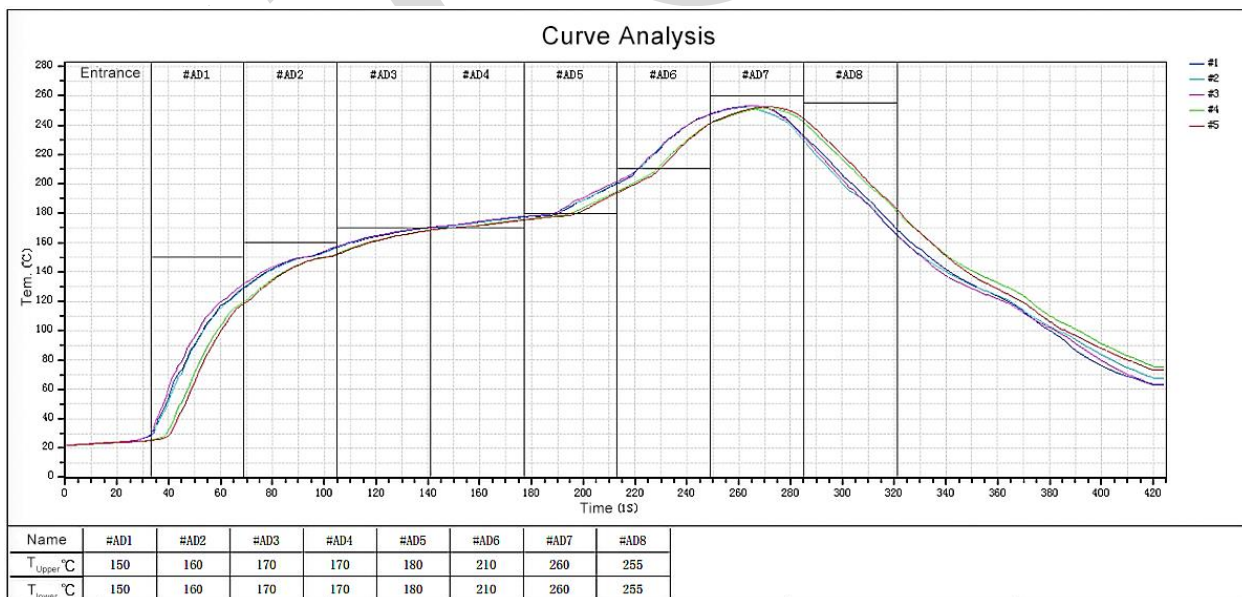


Figure 7. Recommended Reflow for Lead Free Solder

Note: Suggest the module can't be go through the reflow furnace again.

6 Order Information

Part No.	Description
RW1711-37PA	IPEX generation antenna
RW1711-37PB	Ceramic antenna
RW1711-37PC	PIN37/Stamp hole pad

7 Revision History

Date	Version No.	Description	Author
2017.10.10	V1.0	Initial version	Liaojl
2017.11.09	V1.1	Modify PCB size	Liaojl
2017.11.27	V1.2	Increase the module	Liaojl
2019.07.09	V1.3	English version rewritten	