

BW2570-PCIE

802.11ac 2T2R Wi-Fi+BT 4.2 Transceiver PCIe
Module



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1 Device Overview

1.1 Features

BW2570-PCIE module is built around Broadcom BCM43570 single-chip Wi-Fi transceiver. It supports the 2-stream 802.11ac specification to enable speeds up to 867 Mbps in high-quality video and media applications in the home and enterprise. The features supported include:

- 2.4 and 5 GHz dual-band operation
- 20, 40, or 80 MHz channel bandwidth
- Highest modulation scheme of 256-QAM
- 2 x 2 MIMO operation with PHY rate up to 867 Mbps
- PCI Express 2.0 host interface
- 2 U.FL RF connectors
- 29.80 mm x 26.8 mm module size;
- Operation temperature: 0 °C ~ 60 °C

1.2 Applications

1.2.1 Typical Applications

This module is best suitable for applications which require reliable high throughput to make out the value of its 2x2 MIMO 802.11ac feature. One important category is consumer, surveillance, medical, and industrial video transmission applications. The typical applications include the following:

- Projector
- Point of sale (POS)
- Set-top Box
- Smart display
- Industrial automation
- Industrial IoT gateway
- IP camera
- T-Box
- Medical device

1.2.2 Application Diagram

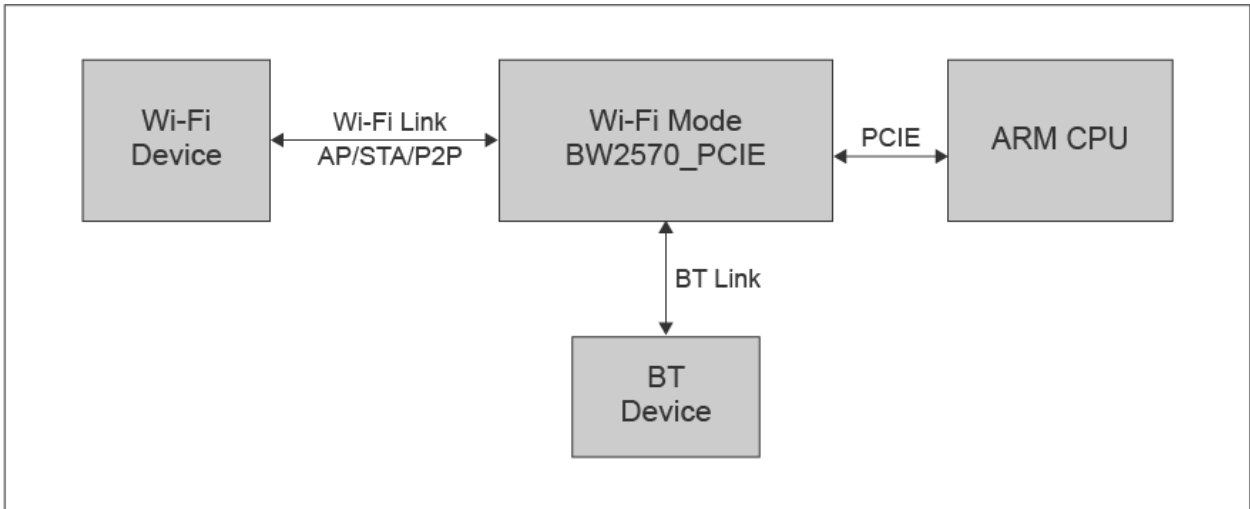


Figure 1. Application Diagram of BW2570-PCIE

1.3 Description

The BW2570-PCIE module was built around Broadcom BCM43570, which provides the highest level of integration for wireless systems, with integrated IEEE 802.11 a/b/g/n/ac WLAN MAC/baseband/radio and Bluetooth 4.2 + EDR.

BCM43570 uses advanced design techniques and process technology to reduce active and idle power. It includes an embedded power management unit that simplifies the system power topology. It has implemented highly sophisticated enhanced collaborative coexistence hardware mechanisms and algorithms that ensure that WLAN and Bluetooth collaboration is optimized for maximum performance.

This module provides a small form-factor solution with minimal external components to be cost effective and allows for design flexibility.

1.4 Functional Block Diagram

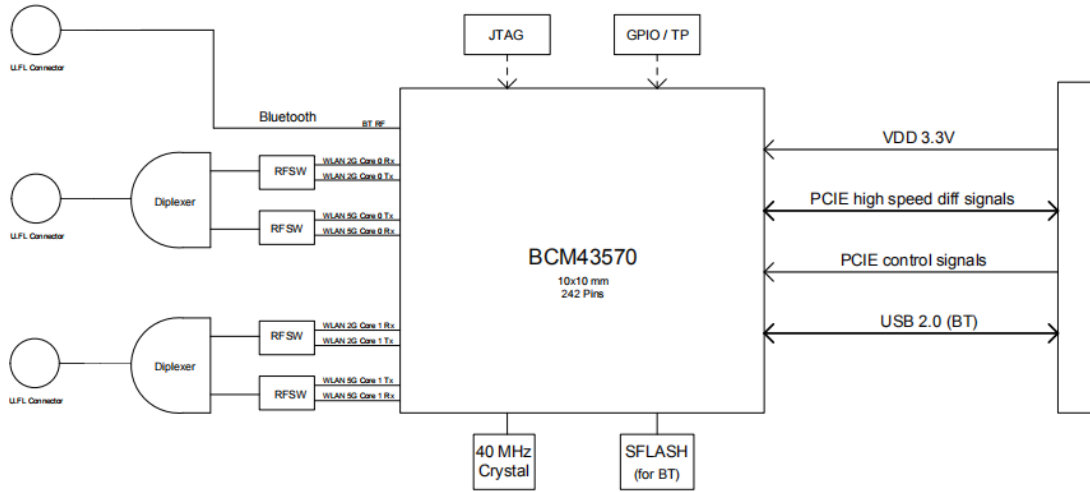


Figure 2. Functional Block Diagram of BW2570-PCIE

1.5 WLAN Features

This module supports operation modes of both Station and AP. It is typically used under Station mode. Both Linux and Android host operation systems (OS) are supported. The host processor and specific OS support need to be carefully checked and confirmed. Some custom support is normally required for driver porting, optimization, and feature customization.

2 PIN Configuration and Functions

2.1 Module PIN Diagram

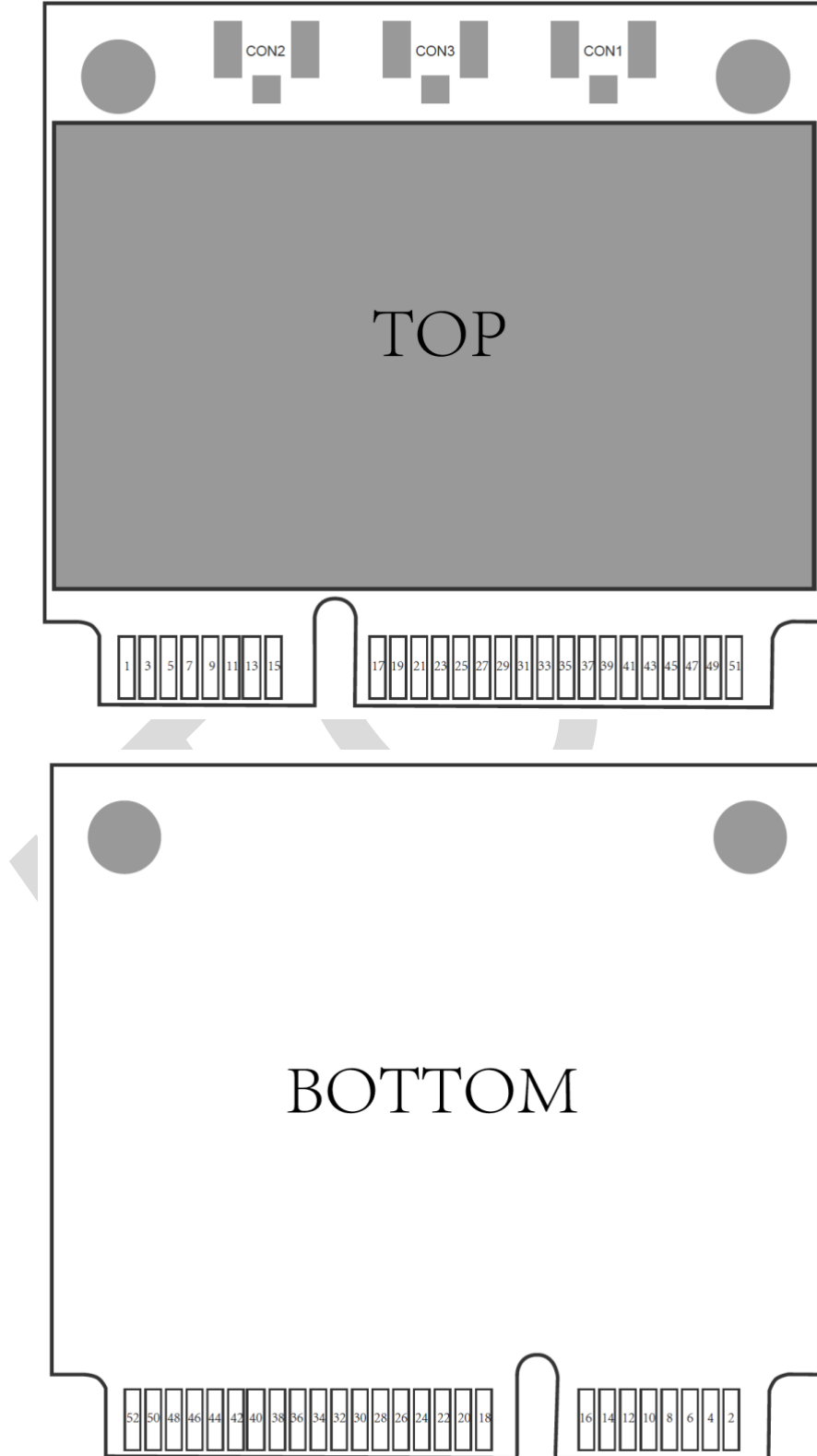


Figure 3. Pin Diagram of BW2570-PCIE

2.2 PIN Functions

Table1. Pin Attributes of BW2570-PCIE

Pin	Name	Description	Typical
1	PCIE_WAKE_N	PCI Power management event output	INPUT/OUTPUT
2	VDD3_3	Module +3.3 V power supply	VCC_3.3 V
3	NC	NC	
4	Ground	Ground	GND
5	NC	NC	
6	NC	NC	
7	PCIE_CLKREQ_N	PCIE clock request signal	OUTPUT
8	NC	NC	
9	Ground	Ground	GND
10	NC	NC	
11	PCIE_REFCLK_N	100 OHM differential pair clock signal Negative	INPUT
12	NC	NC	
13	PCIE_REFCLK_P	100 OHM differential pair clock signal positive	INPUT
14	NC	NC	
15	Ground	Ground	GND
16	NC	NC	
17	NC	NC	
18	Ground	Ground	GND
19	NC	NC	
20	W_DISABLE_N	WLAN & Bluetooth regulator power up	INPUT
21	Ground	Ground	GND
22	PCIE_PRST_N	PCIE preset signal	INPUT
23	PCIE_TDN	100 OHM differential pair TX data signal Negative	OUTPUT
24	VDD3_3	Module +3.3V power supply	VCC_3.3V
25	PCIE_TDP	100 OHM differential pair TX data signal Positive	OUTPUT

26	Ground	Ground	GND
27	Ground	Ground	GND
28	NC	NC	
29	Ground	Ground	GND
30	NC	NC	
31	PCIE_RDN	100 OHM differential pair RX data signal Negative	INPUT
32	NC	NC	
33	PCIE_RDP	100 OHM differential pair RX data signal Positive	INPUT
34	Ground	Ground	GND
35	Ground	Ground	GND
36	BT_USB_DN	Bluetooth USB 2.0	
37	Ground	Ground	GND
38	BT_USB_DP	Bluetooth USB 2.0	
39	VDD3_3	Module +3.3 V power supply	VCC_3.3V
40	Ground	Ground	GND
41	VDD3_3	Module +3.3 V power supply	VCC_3.3 V
42	NC	NC	
43	Ground	Ground	GND
44	WLAN_LED_N_GPIO_13	WLAN Activity LED	OUTPUT
45	WLAN_HOST_WAKE	WLAN wake up Host	
46	NC	NC	
47	BT_HOST_WAKE	Bluetooth wake up Host	I/O
48	NC	NC	
49	BT_DEV_WAKE	Host wake up Bluetooth device	
50	Ground	Ground	GND
51	NC	NC	
52	VDD3_3	Module +3.3 V power supply	VCC_3.3 V

3 Specifications

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.	
V _{BAT}	-0.5		6	V
V _{DDIO}	-0.5		3.9	V
V _{DDIO_RF}	-0.5		3.9	V
V _{DDRF}	-0.5		1.32	V
V _{DDC}	-0.5		3.63	V
V _{undershoot}		-0.5		V
V _{overshoot}		V _{DDIO} + 0.5		V
T _j		125		°C
Storage Temperature	-40	25	125	°C
Operating Ambient Temperature	0	25	60	°C

3.2 RF Characteristics

The transmitting power are normally limited by the constellation error (EVM) requirement by IEEE 802.11 specification. When the transmitting power is set too high, the EVM would be deteriorated to be over the specification. Other specification requirements including spectrum mask margin and spurious emission also gate the transmitting power level.

Table 2. Typical Transmitting Power

Transmitting Mode	Tx Power (dBm)	Variation (dB)
2.4 GHz 11b 11 Mbps	17	±2
2.4 GHz 11g 54 Mbps	15	±2
2.4 GHz 11n MCS7 HT20	14	±2
2.4 GHz 11n MCS7 HT40	14	±2
5 GHz 11a 54 Mbps	12	±2
5 GHz 11n MCS7 HT20	12	±2
5 GHz 11n MCS7 HT40	12	±2

11ac MCS9 VHT80	11	±2
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Table 3. Typical Receiving Sensitivity

Receiving Mode	Sensitivity (dBm)
11ac MCS9 256-QAM VHT80 @1.3 Gbps	-57
11n MCS23 64-QAM HT40 @450 Mbps	-68
11n MCS16 BPSK HT20 @ 19.5 Mbps	TBD

3.3 Power Consumption Summary

Mode	I (mA)
Stand-By	9
TX, 2G, 20M, 11Mbps	337
TX, 2G, 20M, MCS0	308
TX, 2G, 20M, MCS16	649
TX, 5G, 40M, MCS0	439
TX, 5G, 40M, MCS16	877
TX, 5G, 80M, MCS9	502
TX, 5G, 80M, MCS9, NSS3	958
RX, 2G, 20M, MCS23	238
RX, 5G, 80M, MCS9, NSS3	458

4 Application, Implementation, and Layout

4.1 Antenna Placement Guideline

The three connected external antennas would need to be placed in the actual product with enough spatial diversity to avoid coupling. In general, the larger spatial distance and relative angle give better spatial diversity. Normally two antennas need to be separated in space by half the wavelength or larger, roughly 3 cm in 5 GHz, and 6 cm in 2.4 GHz frequency band.

5 Mechanical and Package

5.1 Recommended PCB Footprint

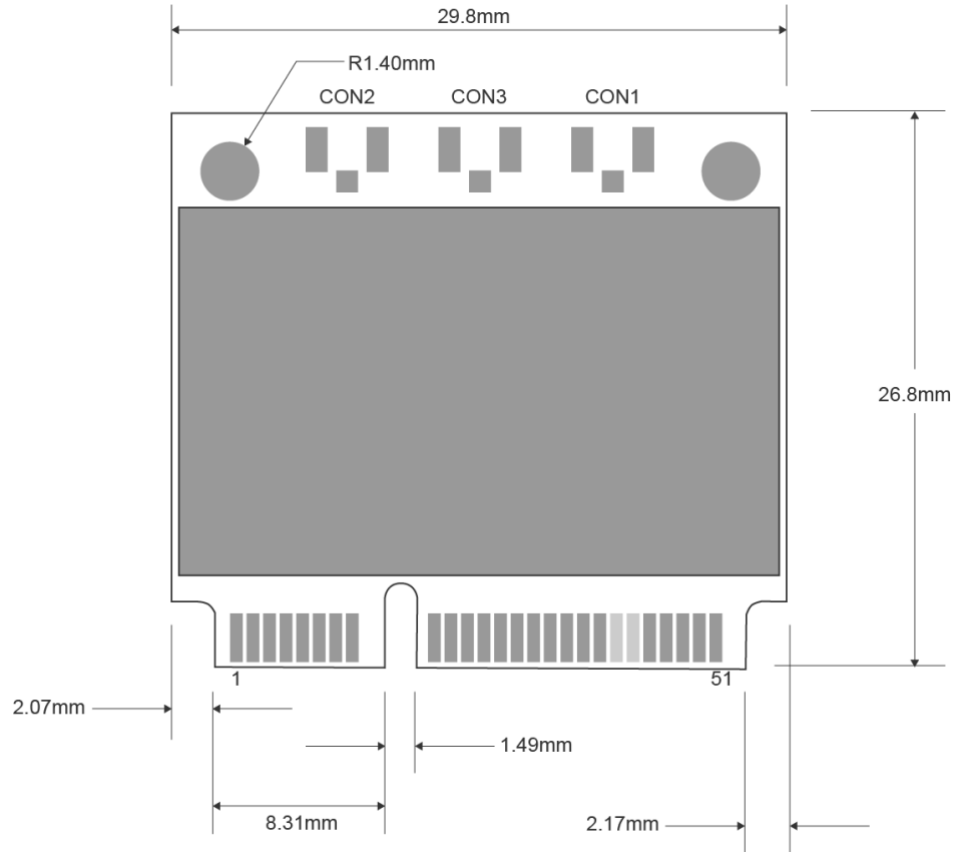


Figure 4. Recommended PCB Footprint of BW2570-PCIE

5.2 Packaging Information

The modules are packaged into blister trays, piled up, and tightened by rubber band before putting into carton boxes to ship.

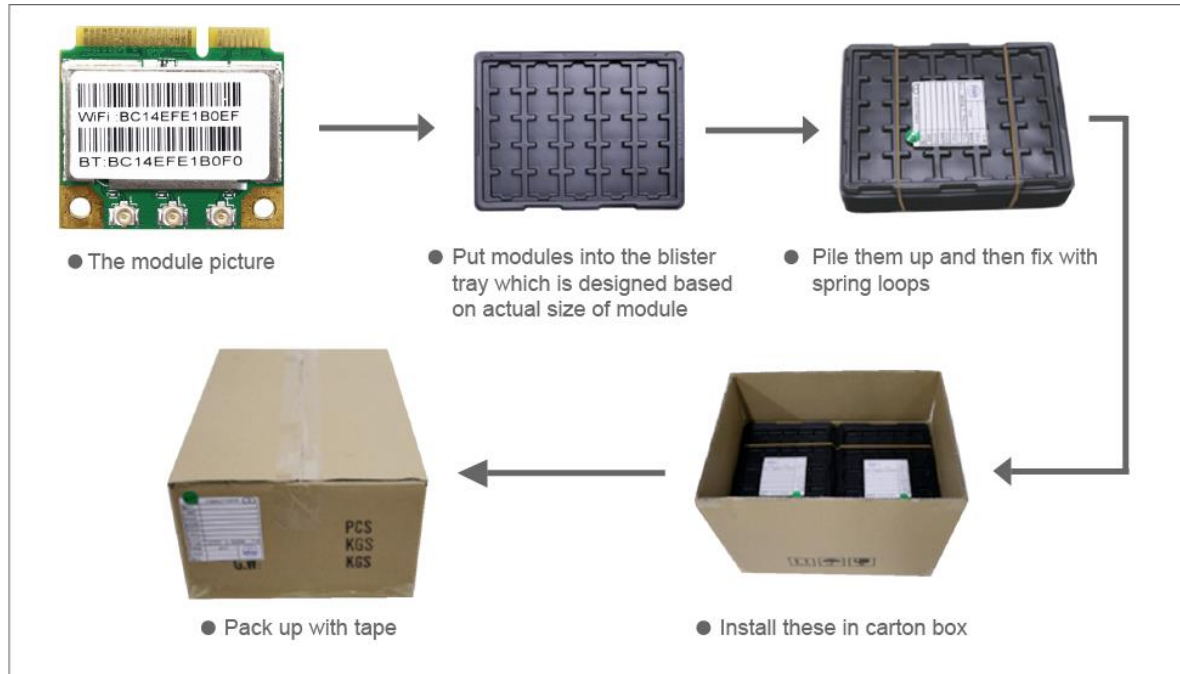


Figure 5. Packaging Information of BW2570-PCIE

6 Storage and Handling

The product shall be stored under the ambient temperature from 5 °C to 35 °C and the humidity from 20% to 60% RH. The packing materials can be deformed at the temperature over 40 °C. The product shall be stored in corrosive gas (Cl₂, NH₃, SO₂, Nox, etc.) free environment.

Any excess mechanical shock including, but not limited to, sticking the packing materials by sharp objects and dropping the product, shall be avoided.

ESD protection gloves or wristbands are recommended to wear when installing this module into the PCIe socket of a PCB board.

7 Thermal Reflow

Referred to IPC/JEDEC standard.

Peak temperature: <250°C

Number of times: ≤ 2

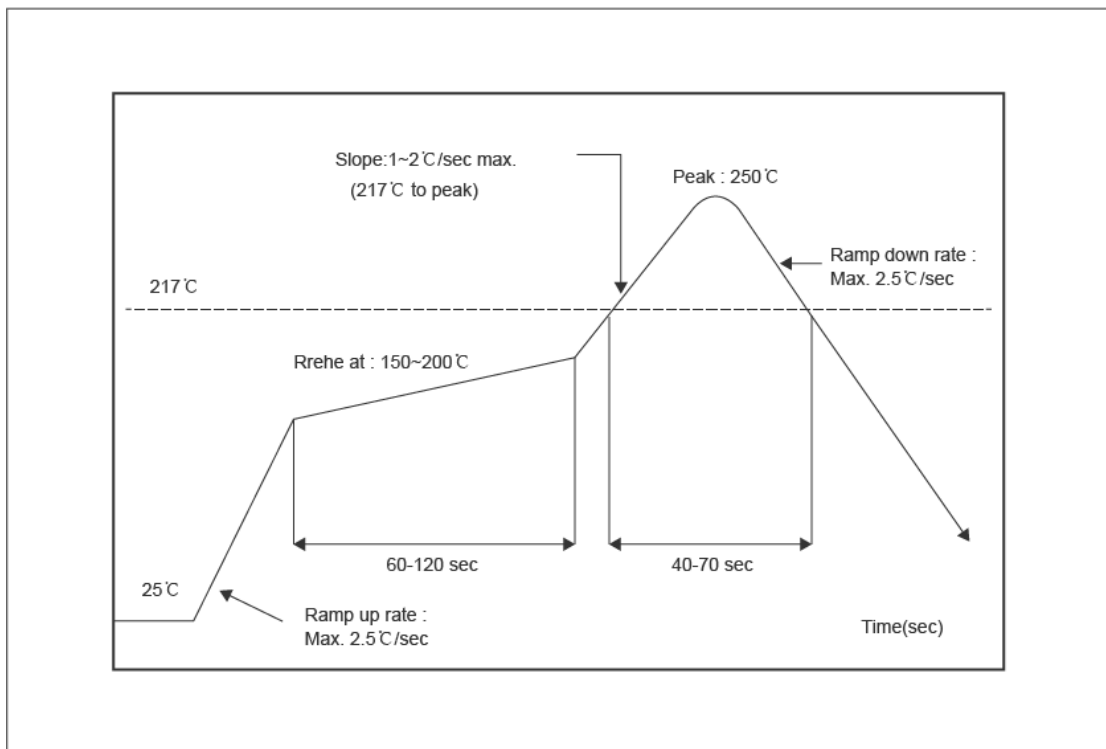


Figure 6. Recommended Reflow for Lead Free Solder

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

8 Revision History

Date	Version No.	Description	Author
2016.10.08	V 1.0	The draft version	Phil
2017.05.24	V 1.1	Modified the picture of module	Phil
2018.06.14	V 1.2	Remodified the picture of module	Phil
2018.09.18	V 1.3	Modified the PIN definition of module	Phil
2019.04.09	V 1.4	English version rewritten	