

BB2706-HF

Bluetooth Module

DISCLAIMER AND COPYRIGHT NOTICE

Information in this document, including URL references, is subject to change without notice.

This document is provided "As is" with no whatsoever, including any warranty of merchantability, noninfringement, fitness for any purpose, or any warranty otherwise arising out of any proposal, specification or samples.

All liability, including liability for infringement of any proprietary rights, relating to use of information in this document is disclaimed. No licenses express or implied, by estoppel or otherwise, to any intellectual property rights are granted herein.

The Bluetooth logo and symbol belong to the Bluetooth SIG Inc.

The Wi-Fi Alliance Member Logo is a trademark of the Wi-Fi Alliance.

All trade names, trademarks and registered trademarks mentioned in this document are property of their respective owners, and are hereby acknowledged.

Copyright ITON Technology Corp. All rights reserved.

Table of Contents

Table of Contents.....	2
1. Device Overview.....	3
1.1 Features.....	3
1.2 Applications.....	3
1.3 Descriptions.....	3
1.4 Functional Block Diagram.....	4
2. Pin Configuration and Functions.....	4
2.1 Module Pin Diagram.....	4
2.2 Pin Functions.....	5
3. Specifications.....	6
3.1 Absolute Maximum Rating.....	6
3.2 RF Characteristics.....	6
3.2.1 Transmitter RF Parameters.....	6
3.2.2 Receiver RF Parameters.....	8
3.2.3 Antenna.....	10
4. Application, Implementation, and Layout.....	10
4.1 Application Diagram.....	10
4.2 Typical Application Circuit.....	11
4.3 Layout Guideline.....	12
5. Mechanical and Package.....	12
5.1 Module Size.....	12
5.2 Recommended PCB Footprint.....	13
5.3 Package Information.....	13
6. Thermal Reflow.....	14
7. Ordering Information.....	14
8. Revision History.....	14

1. Device Overview

1.1 Features

- Bluetooth specification V5.0 compliant
- Supports high speed UART interface (up to 4Mbps) and PCM audio data transmission
- Supports DPLE and LE Security connecting
- Supports SPP
- Supports HID Profile
- Supports HOGP
- Supports HFP
- Supports GATT
- Designed with shielding cover
- The module is designed with the external antenna interface

1.2 Applications

- Bluetooth SPP or BLE to RS232 serial data conversion
- Bluetooth wireless data transmission
- Custom Bluetooth audio devices
- Audio transmission

1.3 Descriptions

This module is designed with Cypress® CYW20706 dual mode Bluetooth 5.0 SoC. The CYW20706 features 96 MHz Cortex M3 core, excellent receiving sensitivity down to -93 dBm (BLE GFSK), integrated PA to support Class 1 Tx power up to 12 dBm. The module design includes the peripheral circuit of Bluetooth chip CYW20706, 4Mbit flash memory chip, audio codec and its peripheral circuit. It provides excellent efficiency while keeps small size. This module can be easily integrated in a product board. It is the best solution for audio transmission, data transmission, home automation and other Bluetooth devices.

1.4 Functional Block Diagram

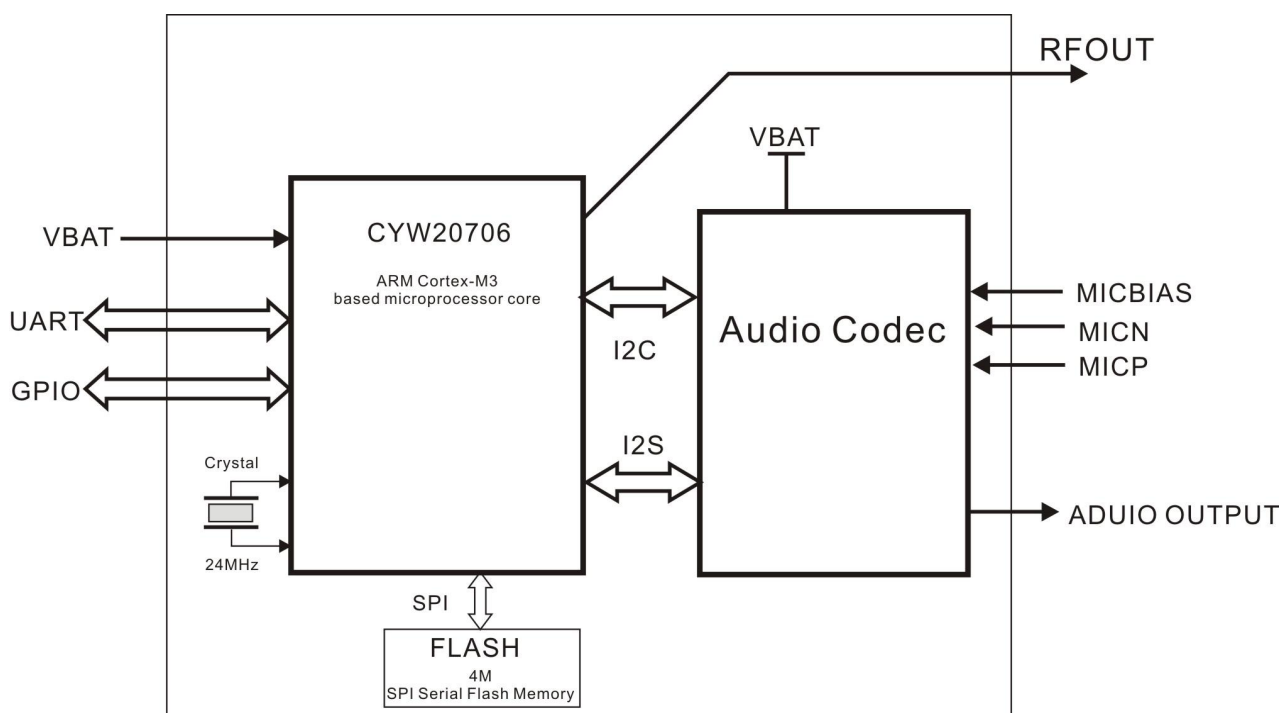


Figure 1. Block Diagram of BB2706-HF

2. Pin Configuration and Functions

2.1 Module Pin Diagram

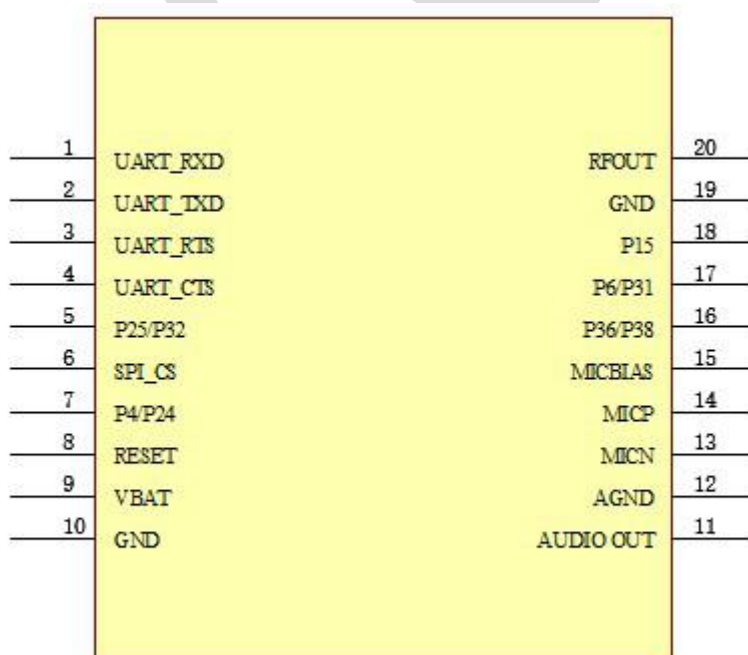


Figure 2. Pin Diagram of BB2706-HF

2.2 Pin Functions

Pin	Name	Type	Description
1	UART_RXD	Input	UART receive data
2	UART_TXD	Output	UART transmit data
3	UART_RTS	Output	UART request to send output
4	UART_CTS	Input	UART clear to send input
5	P25	I/O	GPIO: P25 SPI_1: MISO (master and slave) Peripheral UART: puart_rx
	P32	I/O	GPIO: P32 A/D converter input 7 SPI_1: SPI_CS (slave only) Peripheral UART: puart_tx
6	SPI_CS	I/O	Serial flash active-low chip select
7	P4	I/O	GPIO: P4 Quadrature: QDY0 Peripheral UART: puart_rx SPI_1: MOSI (master and slave) IR_TX
	P24	I/O	GPIO: P24 SPI_1: SPI_CLK (master and slave) Peripheral UART: puart_tx
8	RESET	Input	Active-low reset input
9	VBAT	Input	Power supply, range: 2.8V~3.6V
10	GND	Ground	Ground
11	AUDIO_OUT	Analog Output	Audio Output
12	AGND	Analog Ground	Analog Ground
13	MICN	Analog Input	MICN Input
14	MICP	Analog Input	MICP Input
15	MICBIAS	Analog Output	Microphone Bias
16	P36	I/O	GPIO: P36 A/D converter input 3 SPI_1: SPI_CLK (master and slave)
	P38	I/O	GPIO: P38 A/D converter input 1 SPI_1: MOSI (master and slave) IR_TX
17	P6 PWM2	I/O	GPIO: P6 Quadrature: QDZ0 Peripheral UART: puart_rts SPI_1: SPI_CS (slave only)
	P31	I/O	GPIO: P31 A/D converter input 8 Peripheral UART: puart_tx

18	P15	I/O	GPIO: P15 A/D converter input 20 IR_RX
19	GND	Ground	Ground
20	RFOUT	Output	RF I/O antenna port (Default NC)

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	Specifications			Unit
	Min.	Typ.	Max.	
VBAT	-0.5	3.3	3.6	V
Analog Input Voltage range	-0.3		VBAT	V
Ambient Temperature	-30	25	+85	°C
Storage Temperature	-40	-	+105	°C

Digital I/O Characteristics					
Characteristics	Symbol	Min.	Typ.	Max.	Unit
Input Voltage					
Low	V _{IL}	-	-	0.8	V
High	V _{IH}	2.0	-	VBAT	V
Output Voltage					
Low	V _{OL}	-	-	0.4	V
High	V _{OH}	2.9	-	VBAT	V

3.2 RF Characteristics

3.2.1 Transmitter RF Parameters

Parameter	Conditions	Min.	Typ.	Max.	Unit
General					
Frequency Range	-	2402	-	2480	MHz
Class1: GFSK TX Power	-	-	12	-	dBm
Class1: EDR TX Power	-	-	9	-	dBm
Class2: GFSK TX Power	-	-	2	-	dBm
Power Control Step	-	2	4	8	dB

Modulation Accuracy					
$\pi/4$ -DQPSK Frequency Stability	-	-10	-	10	kHz
$\pi/4$ -DQPSK RMS DEVM	-	-	-	20	%
$\pi/4$ -QPSK Peak DEVM	-	-	-	35	%
$\pi/4$ -DQPSK 99% DEVM	-	-	-	30	%
8-DPSK Frequency Stability	-	-10	-	10	kHz
8-DPSK RMS DEVM	-	-	-	13	%
8-DPSK Peak DEVM	-	-	-	25	%
8-DPSK 99% DEVM	-	-	-	20	%
In-Band Spurious Emissions					
1.0 MHz < M-N < 1.5 MHz	-	-	-	-26	dBm
1.5 MHz < M-N < 2.5 MHz	-	-	-	-20	dBm
M-N $\geq$ 2.5 MHz	-	-	-	-40	dBm
Out-of-Band Spurious Emissions					
30 MHz ~ 1 GHz	-	-	-	-36	dBm
1 GHz ~ 12.75 GHz	-	-	-	-30	dBm
1.8 GHz ~ 1.9 GHz	-	-	-	-47	dBm
5.15 GHz ~ 5.3 GHz	-	-	-	-47	dBm
GPS Band Noise Emissions (Without a front-end band filter)					
1572.92 MHz ~ 1577.92 MHz	-	-	-150	-127	dBm/Hz
Out-of-Band Noise Emissions (Without a front-end band filter)					
65 MHz ~ 108 MHz	FM RX	-	-145	-	dBm/Hz
746 MHz ~ 764 MHz	CDMA	-	-145	-	dBm/Hz
869 MHz ~ 960 MHz	CDMA	-	-145	-	dBm/Hz
925 MHz ~ 960 MHz	EDGE/GSM	-	-145	-	dBm/Hz
1805 MHz ~ 1880 MHz	EDGE/GSM	-	-145	-	dBm/Hz
1930 MHz ~ 1990 MHz	PCS	-	-145	-	dBm/Hz
2110 MHz ~ 2170 MHz	WCDMA	-	-140	-	dBm/Hz

Note:

All specifications are for industrial temperature.

All specifications are single-ended. Unused inputs are left open,

+12 dBm output for GFSK measured with PA VDD = 2.5 V.

+9 dBm output for EDR measured with PA VDD = 2.5 V.

Maximum value is the value required for Bluetooth qualification.

Meets this spec using a front-end bandpass filter.

3.2.2 Receiver RF Parameters

Parameter	Conditions	Min.	Typ.	Max.	Unit
General					
Frequency Range	-	2402	-	2480	MHz
RX Sensitivity	GFSK, 0.1% BER, 1 Mbps	-	-93.5	-	dBm
	$\pi/4$ -DQPSK, 0.01% BER, 2 Mbps	-	-95.5	-	dBm
	8-DPSK, 0.01% BER, 3 Mbps	-	-89.5	-	dBm
Maximum Input	GFSK, 1 Mbps	-	-	-20	dBm
Maximum Input	$\pi/4$ -DQPSK, 8-DPSK, 2/3 Mbps	-	-	-20	dBm
Interference Performance					
GFSK Modulation					
C/I cochannel	GFSK, 0.1% BER	-	9.5	11	dB
C/I 1 MHz adjacent channel	GFSK, 0.1% BER	-	-5	0	dB
C/I 2 MHz adjacent channel	GFSK, 0.1% BER	-	-40	-30	dB
C/I ≥ 3 MHz adjacent channel	GFSK, 0.1% BER	-	-49	-40	dB
C/I image channel	GFSK, 0.1% BER	-	-27	-9	dB
C/I 1 MHz adjacent to image channel	GFSK, 0.1% BER	-	-37	-20	dB
QPSK Modulation					
C/I cochannel	$\pi/4$ -DQPSK, 0.01% BER	-	11	13	dB
C/I 1 MHz adjacent channel	$\pi/4$ -DQPSK, 0.01% BER	-	-8	0	dB
C/I 2 MHz adjacent channel	$\pi/4$ -DQPSK, 0.01% BER	-	-40	-30	dB
C/I ≥ 3 MHz adjacent channel	8-DPSK, 0.1% BER	-	-50	-40	dB
C/I image channel	$\pi/4$ -DQPSK, 0.01% BER	-	-27	-7	dB
C/I 1 MHz adjacent to image channel	$\pi/4$ -DQPSK, 0.01% BER	-	-40	-20	dB
8PSK Modulation					
C/I cochannel	$\pi/4$ -DQPSK, 0.01% BER	-	17	21	dB
C/I 1 MHz adjacent channel	8-DPSK, 0.1% BER	-	-5	5	dB
C/I 2 MHz adjacent channel	8-DPSK, 0.1% BER	-	-40	-25	dB
C/I ≥ 3 MHz adjacent channel	8-DPSK, 0.1% BER	-	-47	-33	dB
C/I image channel	8-DPSK, 0.1% BER	-	-20	0	dB
C/I 1 MHz adjacent to image channel	8-DPSK, 0.1% BER	-	-35	-13	dB
Out-of-Band Blocking Performance (CW)					
30 MHz ~ 2000 MHz	0.1% BER	-	-10	-	dBm
2000 MHz ~ 2399 MHz	0.1% BER	-	-27	-	dBm
2498 MHz ~ 3000 GHz	0.1% BER	-	-27	-	dBm

3000 MHz ~ 12.75 MHz	0.1% BER	-	-10	-	dBm
Out-of-Band Blocking Performance, Modulated Interferer					
776 MHz ~ 764 MHz	CDMA	-	-10	-	dBm
824 MHz ~ 849 MHz	CDMA	-	-10	-	dBm
1850 MHz ~ 1910 MHz	CDMA	-	-23	-	dBm
824 MHz ~ 849 MHz	EDGE/GSM	-	-10	-	dBm
880 MHz ~ 915 MHz	EDGE/GSM	-	-10	-	dBm
1710 MHz ~ 1785 MHz	EDGE/GSM	-	-23	-	dBm
1850 MHz ~ 1910 MHz	EDGE/GSM	-	-23	-	dBm
1850 MHz ~ 1910 MHz	WCDMA	-	-23	-	dBm
1920 MHz ~ 1980 MHz	WCDMA	-	-23	-	dBm
Intermodulation Performance					
BT, Df = 4MHz	-	-39	-	-	dBm
Spurious Emissions					
30 MHz ~ 1 GHz	-	-	-	-62	dBm
1 GHz ~ 12.75 GHz	-	-	-	-47	dBm
65 MHz ~ 108 MHz	FM RX	-	-147	-	dBm
746 MHz ~ 764 MHz	CDMA	-	-147	-	dBm/Hz
851 MHz ~ 894 MHz	CDMA	-	-147	-	dBm/Hz
925 MHz ~ 960 MHz	EDGE/GSM	-	-147	-	dBm/Hz
1805 MHz ~ 1880 MHz	EDGE/GSM	-	-147	-	dBm/Hz
1930 MHz ~ 1990 MHz	PCS	-	-147	-	dBm/Hz
2110 MHz ~ 2170 MHz	WCDMA	-	-147	-	dBm/Hz

Note:

All specifications are single ended. Unused inputs are left open.

All specifications, except typical, are for industrial temperature.

Typical operating conditions are 3.3 V VBAT and 25 °C ambient temperature.

The receiver sensitivity is measured at BER of 0.1% on the device interface.

Typical GFSK CI numbers at -7 MHz, -5 MHz and -3 MHz are -45 dB, -42 dB and -41 dB, respectively.

Typical QPSK CI numbers at -7 MHz, -5 MHz and -3 MHz are -46 dB, -43 dB and -42 dB, respectively.

Typical 8PSK CI numbers at -7 MHz, -5 MHz and -3 MHz are -50 dB, -45 dB and -45 dB, respectively.

Meets this specification using front-end band pass filter.

Numbers are referred to the pin output with an external BPF filter.

F0=-64 dBm Bluetooth-modulated signal, f1=-39 dBm sine wave, f2=-39 dBm Bluetooth-modulated signal, f0=2f1-f2, and |f2-f1|=n*1 MHz, where n is 3, 4 or 5. For the typical case, n=4.

Includes baseband radiated emissions.

3.2.3 Antenna

When using the module, an external 2.4G antenna is needed.

4. Application, Implementation, and Layout

4.1 Application Diagram

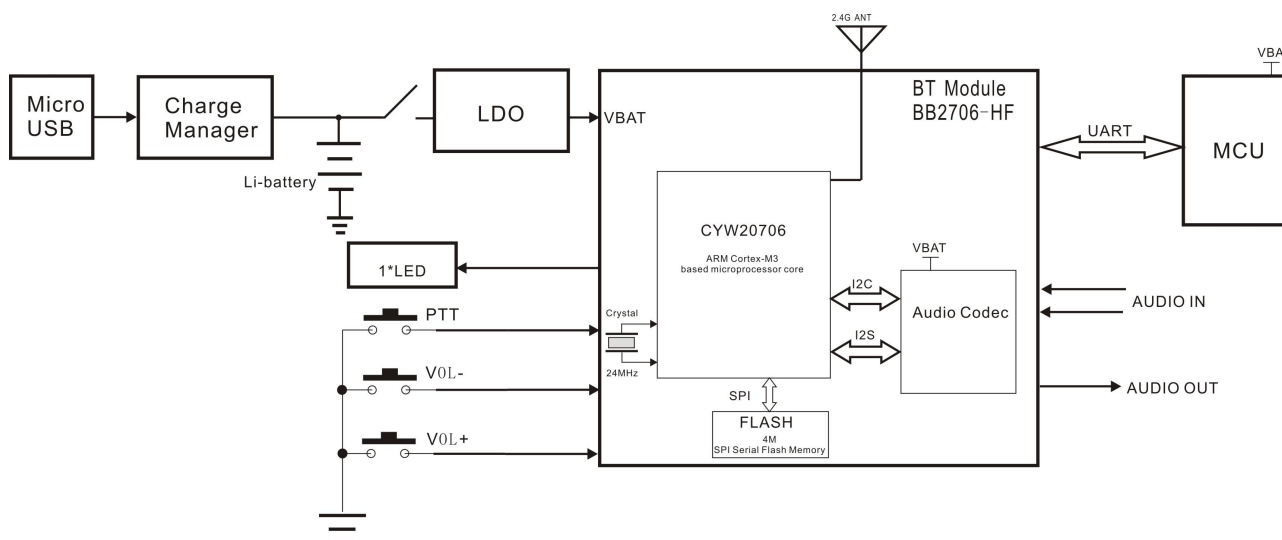


Figure 3.Application Diagram of BB2706-HF

4.2 Typical Application Circuit

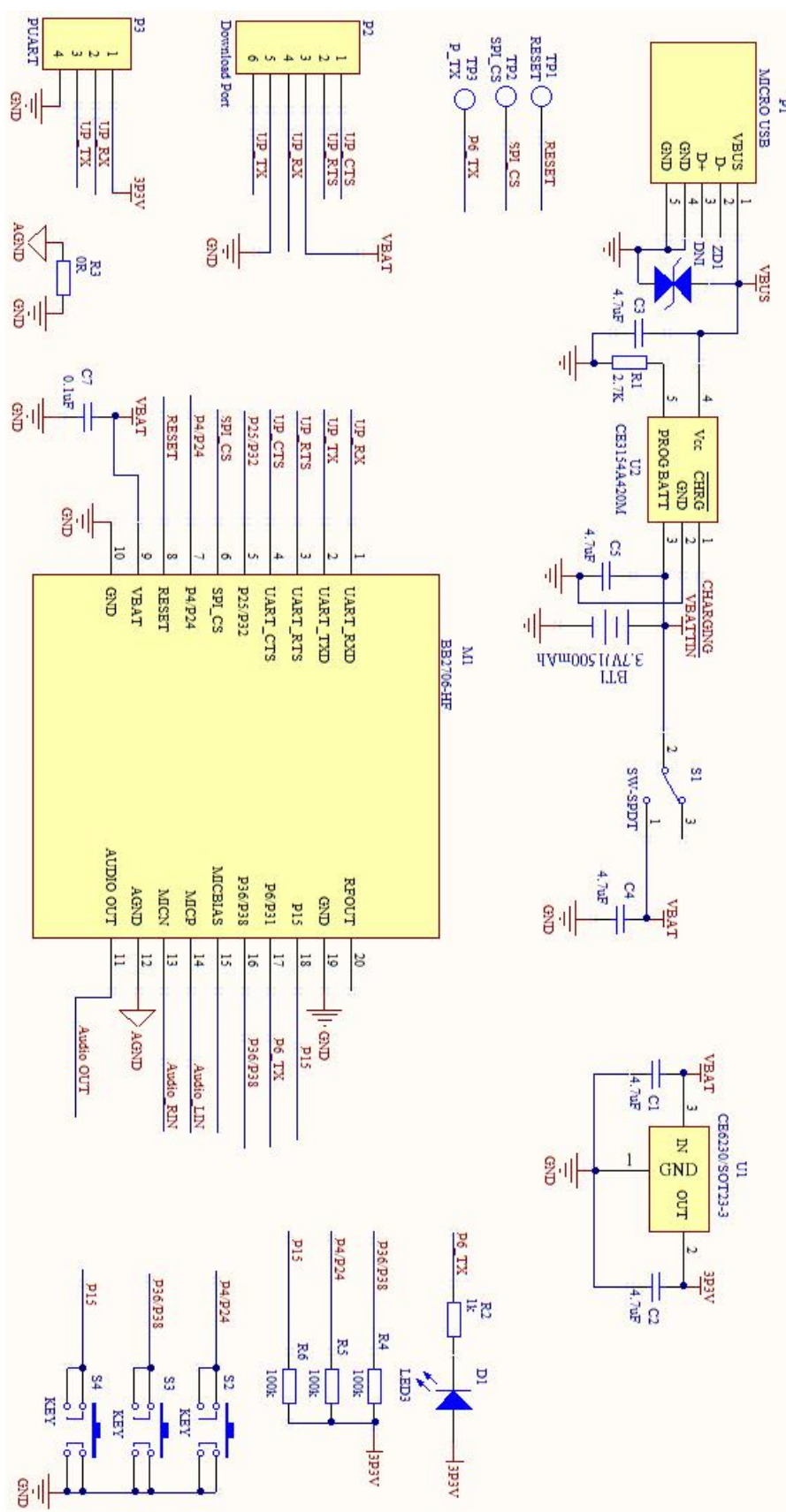


Figure 4.Reference Circuit Design of BB2706-HF

4.3 Layout Guideline

1. The antenna microstrip line needs 50Ω impedance matching.
2. The filter capacitor should be as close as possible to the module.
3. Do not place strong interference lines under the module.

5. Mechanical and Package

5.1 Module Size

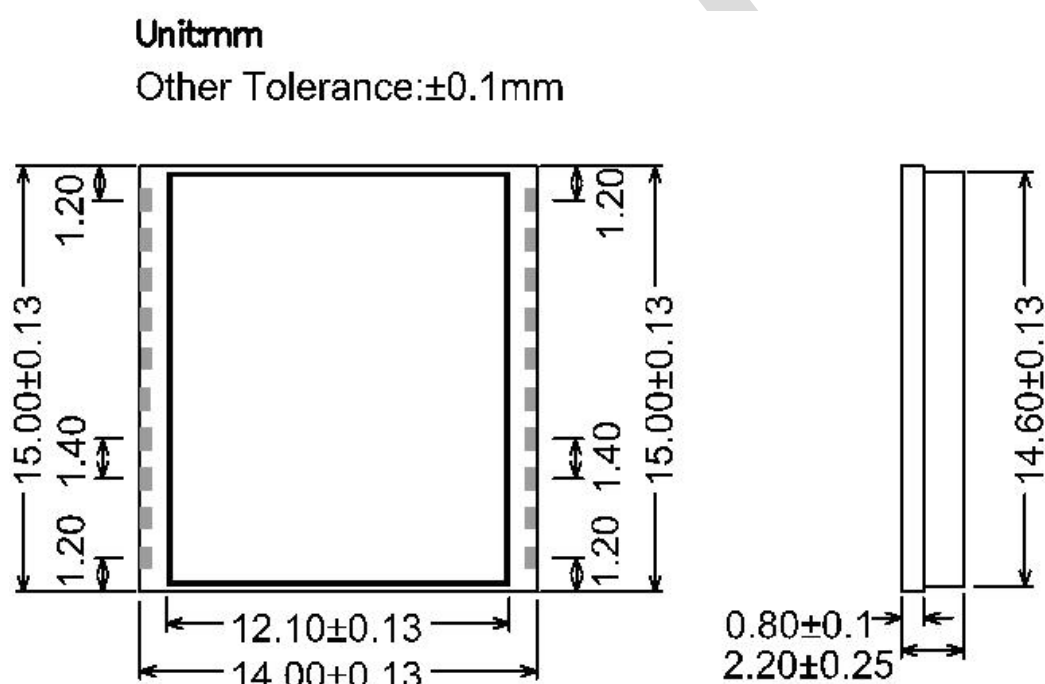


Figure 5. Module Size of BB2706-HF (TOP View)

5.2 Recommended PCB Footprint

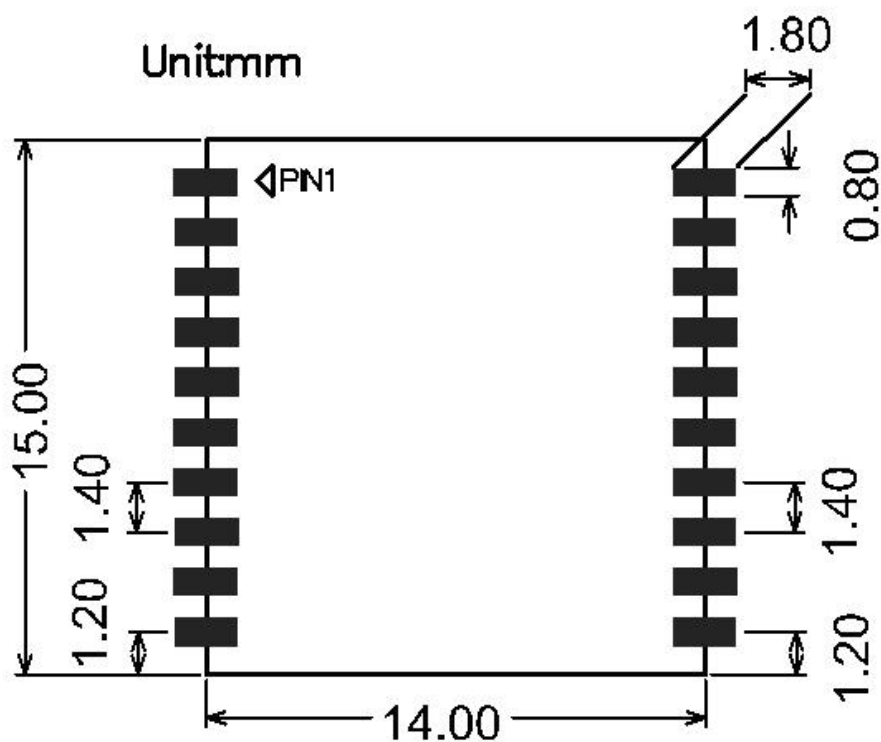


Figure 6. Recommended PCB Footprint of BB2706-HF (TOP View)

5.3 Package Information

TBD

6. Thermal Reflow

Referred to IPC/JEDEC standard.

Peak Temperature: <250°C

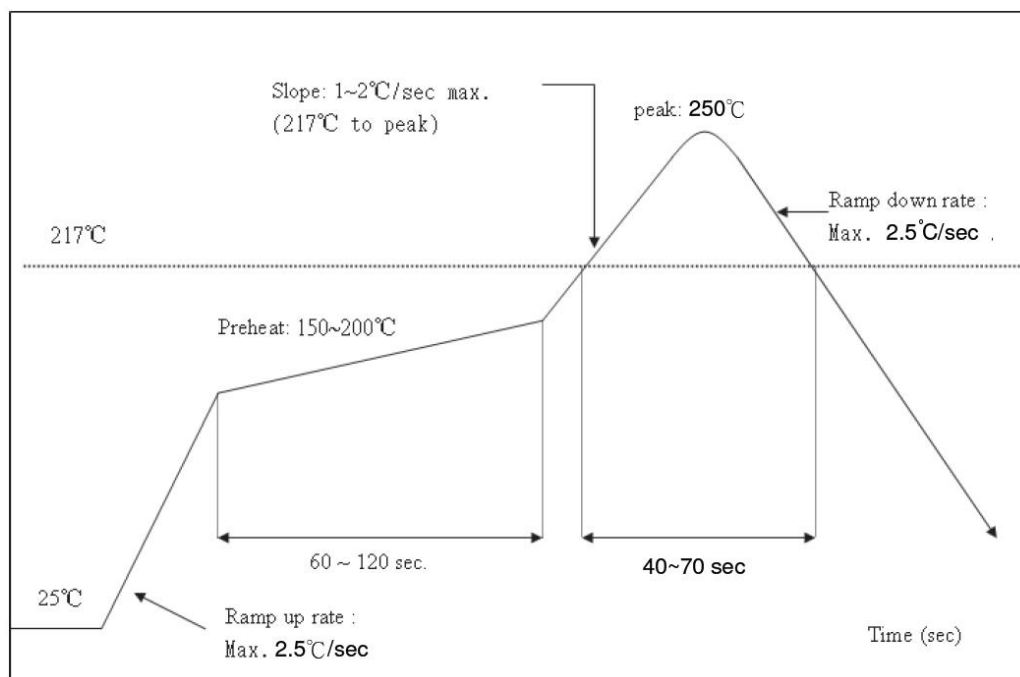


Figure 7. Recommended Reflow for Lead Free Solder

Note: The module is recommended not to go through reflow oven twice;

7. Ordering Information

Part NO.	Working Voltage	ANT	Shielding Cover	Remark
BB2706-HF	VBAT:2.8V~3.6V	RF pin external antenna	Included	

8. Revision History

Version	Change Content	Reviser	Date
V0.1	Initial Version	Renzhi Xing	2020.06.05