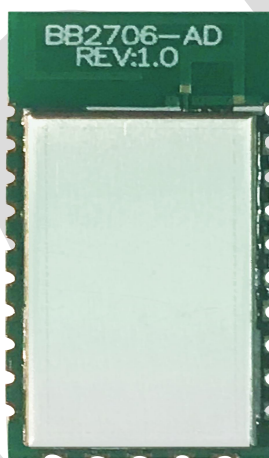


BB2706-AD

Bluetooth Module



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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 PCB antenna and external antenna interface, which can be selected flexibly

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 -96 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. This module has a fine tuned inverted-F PCB antenna. 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

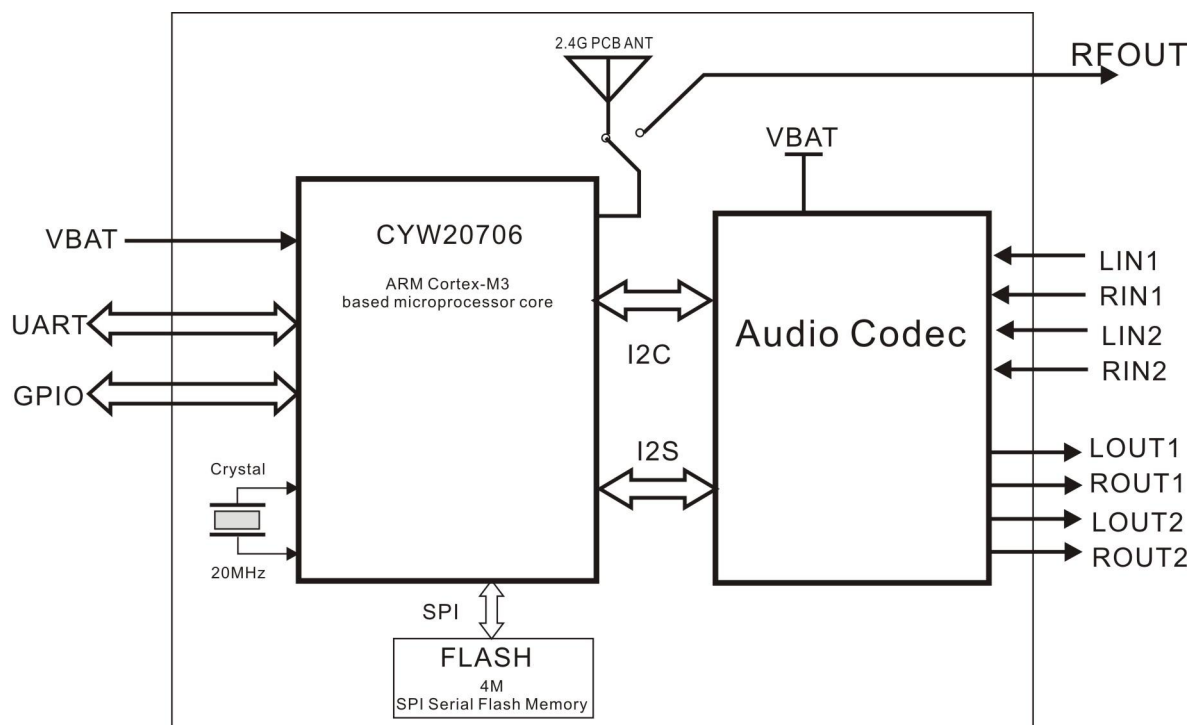


Figure 1. Block Diagram of BB2706-AD

2. Pin Configuration and Functions

2.1 Module Pin Diagram

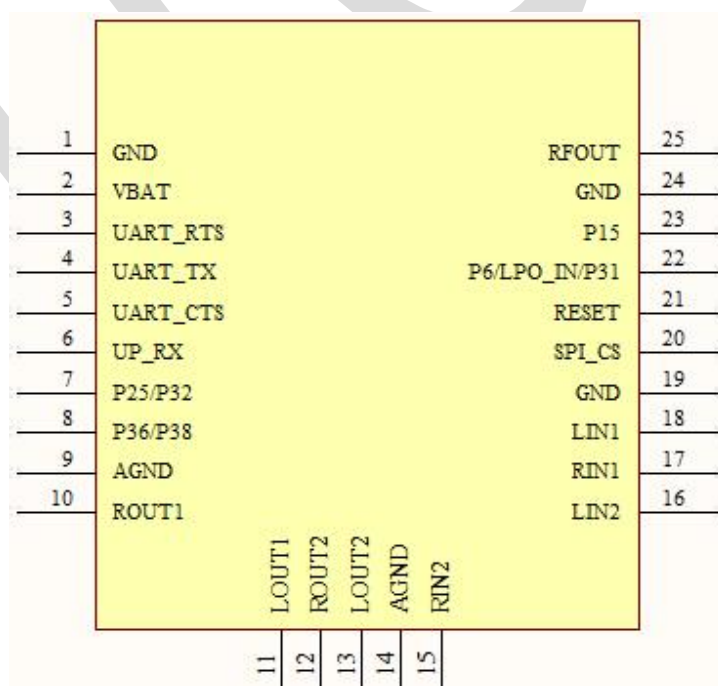


Figure 2. Pin Diagram of BB2706-AD

2.2 Pin Functions

Pin	Name	Type	Description
1	GND	Ground	Ground
2	VBAT	Input	Power supply, range: 2.7V~3.6V
3	UART_RTS	Output	UART request to send output
4	UART_TX	Output	UART transmit data
5	UART_CTS	Input	UART clear to send input
6	UART_RX	Input	UART receive data
7	P25	I/O	GPIO: P25 SPI_1: MISO (master and slave) Peripheral UART: uart_rx
	P32	I/O	GPIO: P32 A/D converter input 7 SPI_1: SPI_CS (slave only) Peripheral UART: uart_tx
8	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
9	AGND	Analog Ground	Analog Ground
10	ROUT1	Analog Output	Audio Right Output1
11	LOUT1	Analog Output	Audio Left Output1
12	ROUT2	Analog Output	Audio Right Output2
13	LOUT2	Analog Output	Audio Left Output2
14	AGND	Analog Ground	Analog Ground
15	RIN2	Analog Input	Right Line Input2
16	LIN2	Analog Input	Left Line Input2
17	RIN1	Analog Input	Right Line Input1
18	LIN1	Analog Input	Left Line Input1
19	GND	Ground	Ground
20	SPI_CS	I/O	Serial flash active-low chip select
21	RESET	Input	Active-low reset input
22	P6 PWM2	I/O	GPIO: P6 Quadrature: QDZ0 Peripheral UART: uart_rts SPI_1: SPI_CS (slave only)
	LPO_IN	Input	External LPO input
	P31	I/O	GPIO: P31 A/D converter input 8 Peripheral UART: uart_tx

23	P15	I/O	GPIO: P15 A/D converter input 20 IR_RX
24	GND	Ground	Ground
25	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

The module has alternative internal PCB antenna (antenna gain: -1.3 dBi) and external antenna.

4. Application, Implementation, and Layout

4.1 Application Diagram

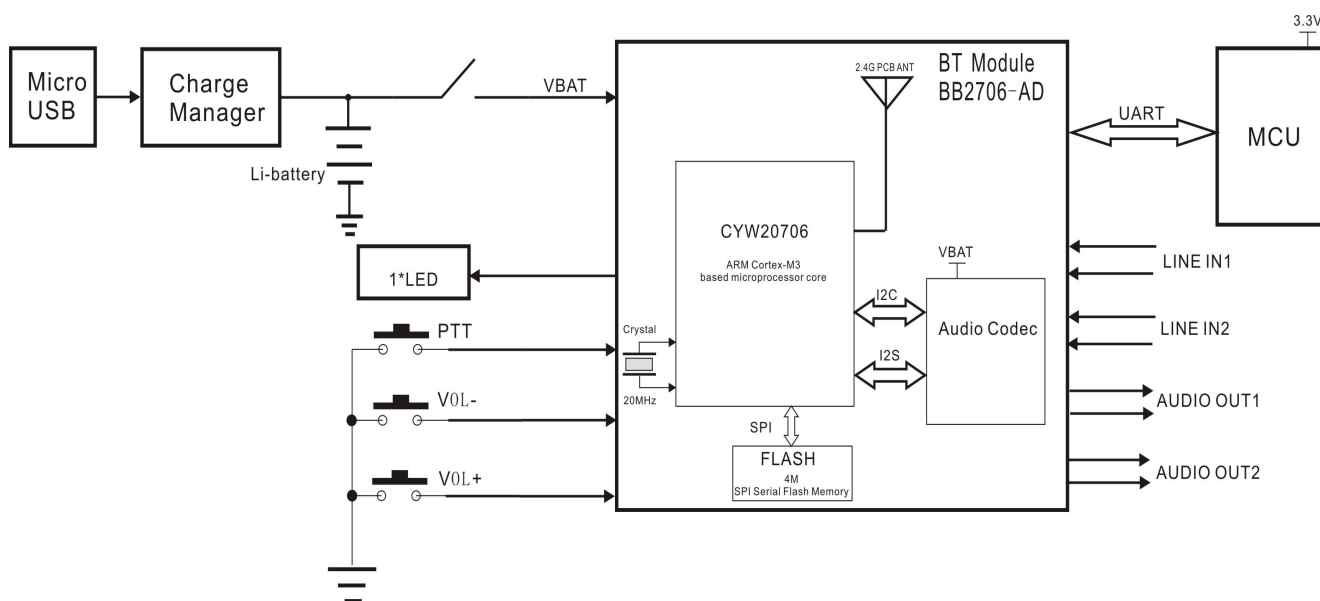


Figure 3.Application Diagram of BB2706-AD

4.2 Typical Application Circuit

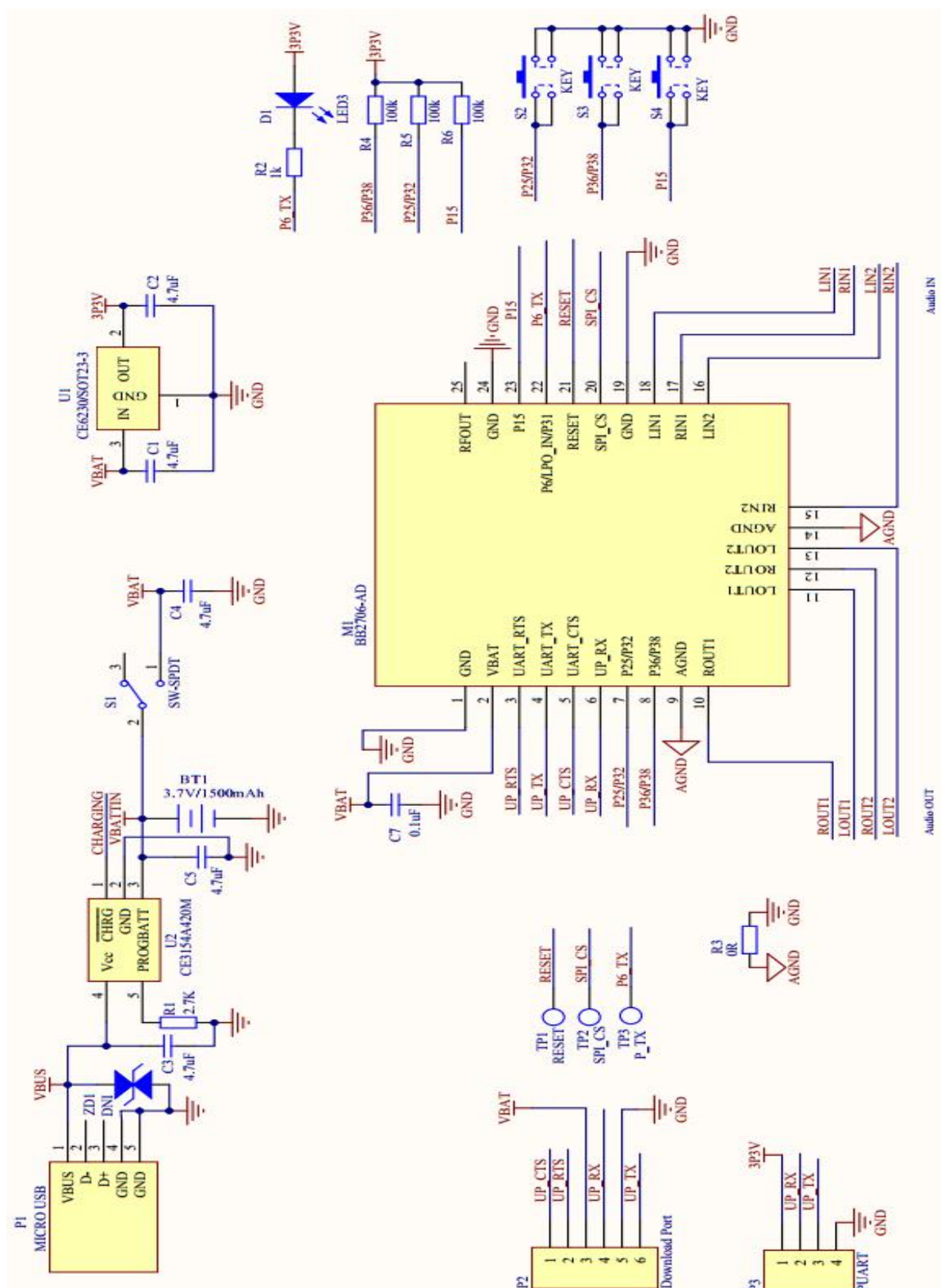


Figure 4. Reference Circuit Design of BB2706-AD

4.3 Layout Guideline

1. The antenna requires enough clearance area.
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

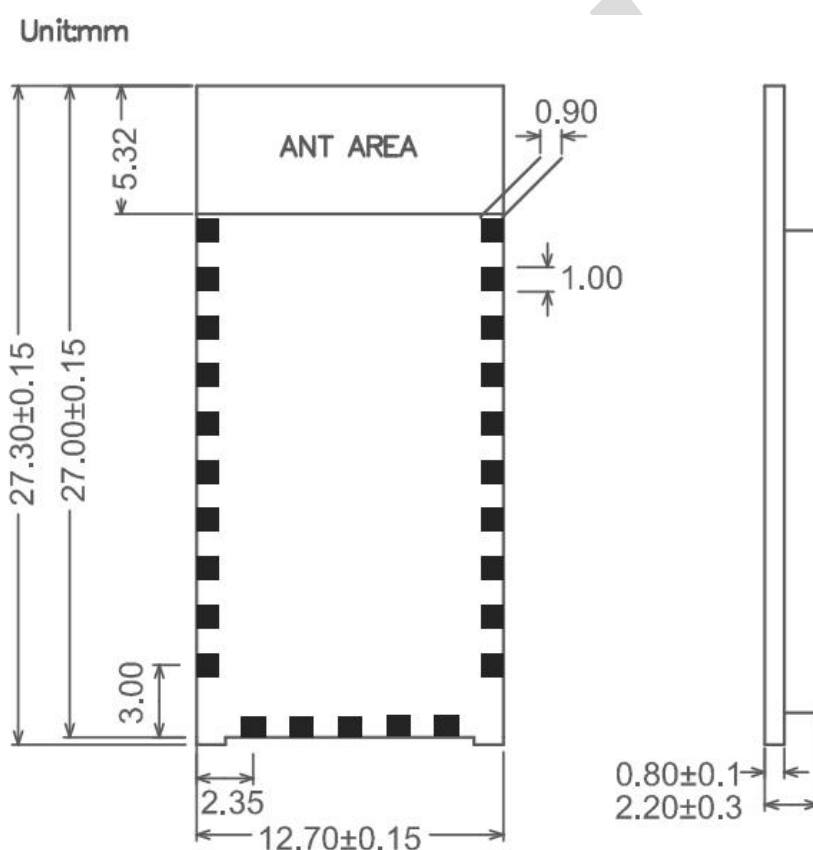


Figure 5. Module Size of BB2706-AD(TOP View)

5.2 Recommended PCB Footprint

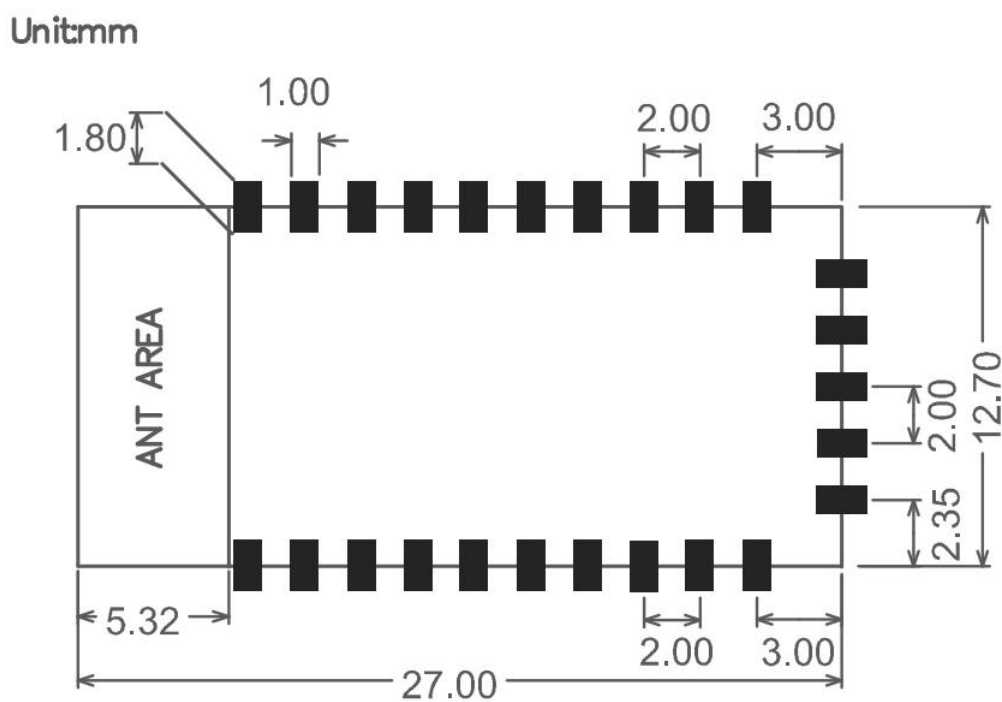


Figure 6. Recommended PCB Footprint of BB2706-AD(TOP View)

5.3 Package Information

TBD

6. Thermal Reflow

Referred to IPC/JEDEC standard.

Peak Temperature: <250°C

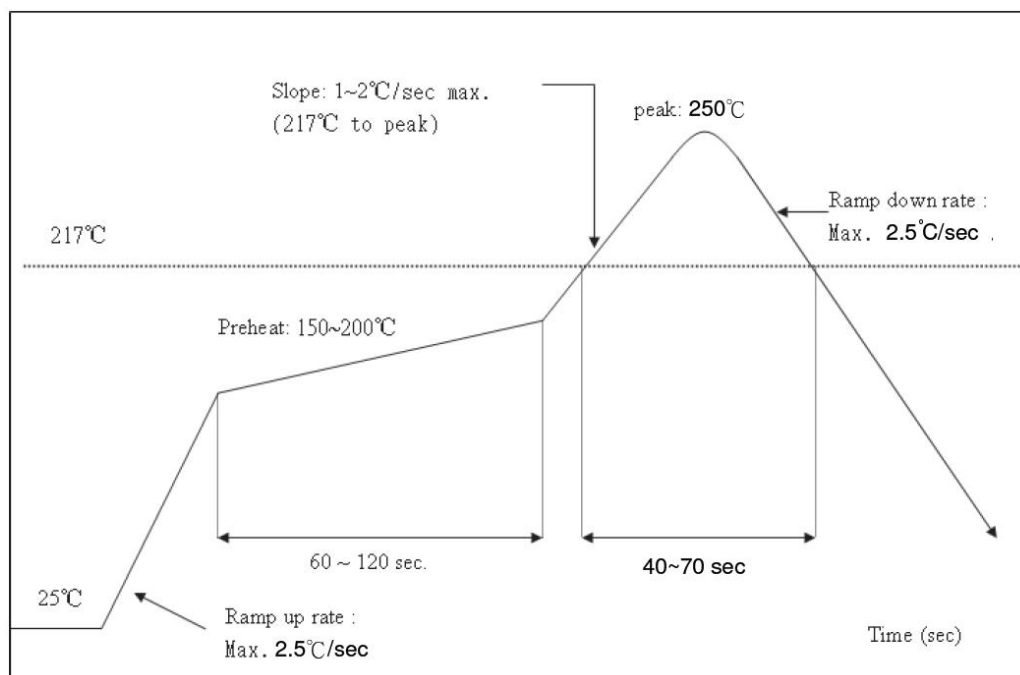


Figure 7. Recommended Reflow for Lead Free Solder

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

7. Ordering Information

Part NO.	Working Voltage	ANT	Shielding Cover	Remark
BB2706-AD	VBAT:2.7V~3.6V	PCB ANT	Included	
BB2706-AD1	VBAT:2.7V~3.6V	NC (RF pin external antenna)	Included	

8. Revision History

Version	Change Content	Reviser	Date
V1.0	Initial version	Renzhi Xing	2020.05.15
V1.1	Verified Storage Temperature	Renzhi Xing	2020.06.09