

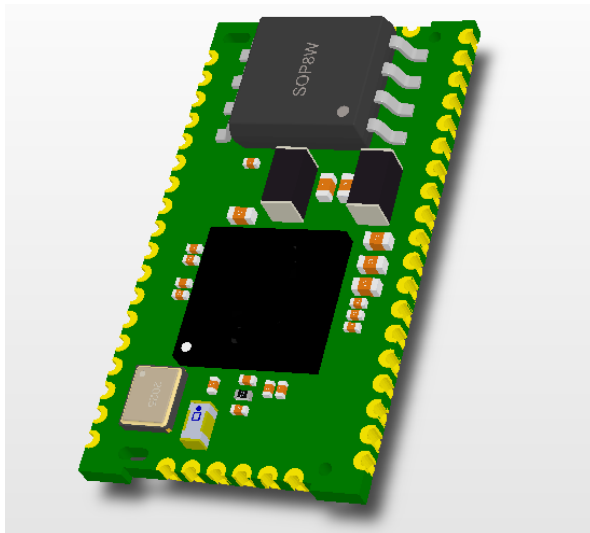
Datasheet

Product model: F-3024

Document Version:

ZX_RD_SP_F3024_V1.0

Availability date: 2020-05-19



File include (BLM World Limited) confidential documents, without permission, can not be disclosed

Change History:

Revision History					
Version	Chang Information	Page	Date	Editor	Reviewer



Content

1. Product Overview 4

2. Features 4

4. Application Area 5

5. Module Block Diagram 5

6. Performance Parameter 6

7. The Size Of The Module Graph 10

9. Recommended Reflow Temperature 17

10. Application circuit diagram 18

1. Product Overview

F-3024 (QCC3024/QCC3034) Bluetooth module is an intelligent wireless audio data dual-mode transmission product independently developed by the company. It is a high-end and high-efficiency stereo wireless transmission solution. The module uses the QCC3024/QCC3034 chip to provide the module with high-quality Sound quality and compatibility, overall performance is more optimized. The F-3024 (QCC3024/QCC3034) Bluetooth module adopts a driver-free mode. Customers only need to connect the module to the application product to quickly realize the wireless transmission of music and enjoy the fun of wireless music.

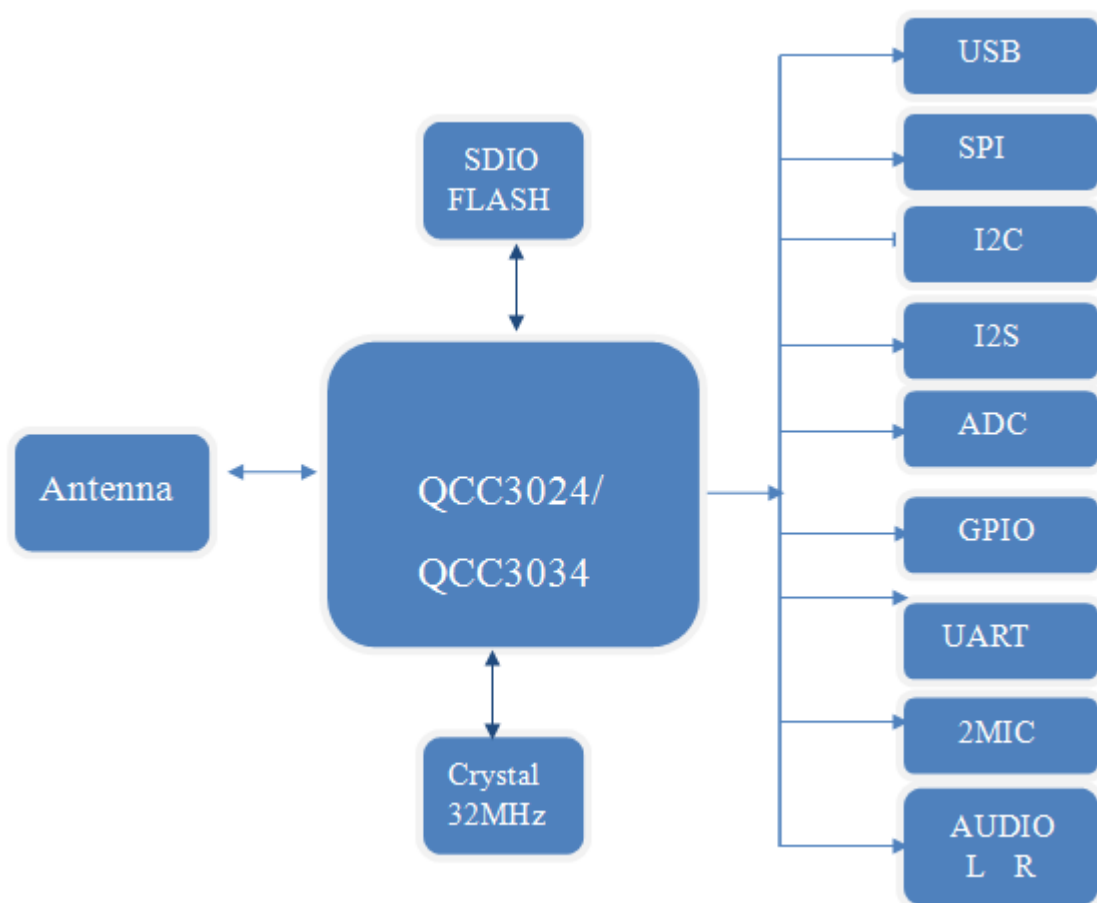
2. Features

- Qualified to Bluetooth v5.1 specification 120 MHz Qualcomm audio DSP
- 32 MHz development application processor
- Flexible QSPI flash memory
- Programmable platform
- Advanced audio algorithm
- High-performance 24-bit stereo audio interface
- Digital and analog microphone interface
- Flexible PIO controller and LED pins with PWM support
- 1 or 2 microphone headset noise reduction and echo cancellation technology
- SBC, AAC, APTX(QCC3034) Audio codec
- Support serial interface: UART (I2C / SPI) USB 2.0
- Integrated lithium ion charger

4. Application Area

- Bluetooth speaker
- Bluetooth headphone
- Hands-free phone
- Bluetooth wireless audio transmission
- Bluetooth data transmission application
- Support mobile internet peripheral devices
- Bluetooth smart speaker

5. Module Block Diagram



6. Performance Parameter

Module Parameter

Module Parameter	
Bluetooth version	Bluetooth V5.1
Antenna	External antenna
Frequency Range	2.402GHz-2.480GHz
TX power	CLASS1
Receiving sensitivity	-95dB
Extension port	PIO, SPI, AIO, UART, USB, I2S, I2C, PWM, MIC, LIN, SPK(L/R)
Support system	Support Android) ,IOS,Windows
Audio decoding output	SBC,AAC 和 APTX(QCC3034)audio codec
Dimension	11.01*20.04*2.7mm (FLASH is changed to a small package height of 2.0mm) (LxWxH) SMD
Certification	-

Recommended working conditions

Operating range	Min	Typical	Max	Unit
Working temperature range	-40	-	+85	°C
Battery	3.0	3.7	4.6	V
5 V (USB VBUS)	4.75	5.0	6.5	V
Digital I/O	1.7	1.8	3.6	V
AIO/LED	0	-	6.5	V
AUDIO-IN/OUT	0	-	1.95	V

Audio input/output characteristics

Class-D DAC audio output

Parameter	Conditions	Min	Typ	Max	Unit
Input Sample Width	-	-	-	24	Bits
Input Sample Rate, Fsample	-	8	-	192	kHz
Max Power	0 dBFS, 32 Ω, and 16 Ω load	-	-	30	mW
Load	-	16	32	30K	Ω
SNR	f _{in} = 1 kHz 48 kHz F _{sample} B/W = 20 Hz → 20 kHz A-Weighted -1 dBFS 32 Ω load	-	98.3	-	dB
THD+N	f _{in} = 1 kHz 48 kHz B/W = 20 Hz → 20 kHz 0 dBFS 30 mW 32 Ω load	-	-87.5	-	dB
Digital gain	Digital gain resolution = 1/32	-24	-	21.5	dB
Stereo separation (crosstalk)	-	80	-	-	dB

Class-AB DAC audio output

Parameter	Conditions	Min	Typ	Max	Unit
Input Sample Width	-	-	-	24	Bits
Input Sample Rate, Fsample	-	8	-	192	kHz
Max Power	0 dBFS, 32 Ω, and 16 Ω load	-	-	30	mW
Load	-	16	32	30K	Ω
SNR	f _{in} = 1 kHz 48 kHz F _{sample} B/W = 20 Hz → 20 kHz A-Weighted -1 dBFS 32 Ω load	-	101	-	dB

THD+N	fin = 1 kHz 48 kHz Fsample B/W = 20 Hz → 20 kHz	-	-90.5	-	dB
	0 dBFS 30 mW 32 Ω load				
Digital gain	Digital gain resolution = 1/32	-24	-	21.5	dB
Stereo separation (crosstalk)	-	80	-	-	dB

High-quality (HQADC) single-ended audio input

Parameter	Conditions	Min	Typ	Max	Unit
Output Sample Width	-	-	-	24	Bits
Output Sample Rate, Fsample	-	8	-	96	kHz
Input level	-	-	-	2.4	V pk-pk
Input impedance	0 dB to 24 dB analog gain	-	20	-	kΩ
	27 dB to 39 dB analog gain	-	10	-	kΩ
SNR	fin = 1 kHz 48 kHz Fsample B/W = 20 Hz → 20 kHz kHz A-Weighted THD+N<0.1% 2.4 V pk-pk input (0 dB gain)	-	101	-	dB
THD+N	fin = 1 kHz 48 kHz Fsample B/W = 20 Hz → 20 kHz 2.4 V pk-pk input (0 dB gain)	-	-85	-	dB
Digital gain	Digital gain resolution = 1/32	-24	-	21.5	dB
Analog gain	3 dB steps	0	-	39	dB
Stereo separation (crosstalk)	-	80	-	-	dB

High-quality (HQADC) differential audio input

Parameter	Conditions	Min	Typ	Max	Unit
Output Sample Width	-	-	-	24	Bits
Output Sample Rate, Fsample	-	8	-	96	kHz
Input level	-	-	-	2.4	V pk-pk
Input impedance	0 dB to 24 dB analog gain	-	20	-	kΩ
	27 dB to 39 dB analog gain	-	10	-	kΩ
SNR	fin = 1 kHz 48 kHz Fsample B/W = 20 Hz → 20 kHz A-Weighted THD+N<0.1% 2.4 V pk-pk input (0 dB gain)	-	100	-	dB
THD+N	fin = 1 kHz 48 kHz Fsample B/W = 20 Hz → 20 kHz 2.4 V pk-pk input (0 dB gain)	-	-91	-	dB
Digital gain	Digital gain resolution = 1/32	-24	-	21.5	dB
Analog gain	3 dB steps	0	-	39	dB
Stereo separation (crosstalk)	-	80	-	-	dB

Microphone bias

Parameter	Conditions	Min	Typ	Max	Unit
Output voltage (Tunable, step = 0.1 V)	-	1.5	-	2.1	V
Output current capability	-	0.07	-	3.0	mA
Output noise	B/W = 20 Hz → 20 kHz Unweighted	4.5	5.1	7.3	μVrms
Crosstalk Between Microphones	Using recommended application circuit	-	80	-	dB

Digital terminal characteristics

	Min	Typ	Max	Unit
VDD_PADS supply	1.7	1.8	3.6	V
VIL input logic level low	-	-	0.22 x VDD_PADS	V
VIH input logic level high	0.7 x VDD_PADS	-	-	V
Drive current (configurable)	2, 4, 8, 12	4	-	mA
VOL output logic level low, at max rated drive	-	-	0.22 x VDD_PADS	V
VOH output logic level high, at max rated drive	0.75 x VDD_PADS	-	-	V
Strong pull (up & down)	15	65	150	kΩ
Weak pull (up & down)	500	2200	5000	kΩ

SYS_CTRL Enable

SYS_CTRL, switching threshold	Min	Typ	Max	Unit
Rising threshold	-	-	1.6	V
Falling threshold	0.4	-	-	V

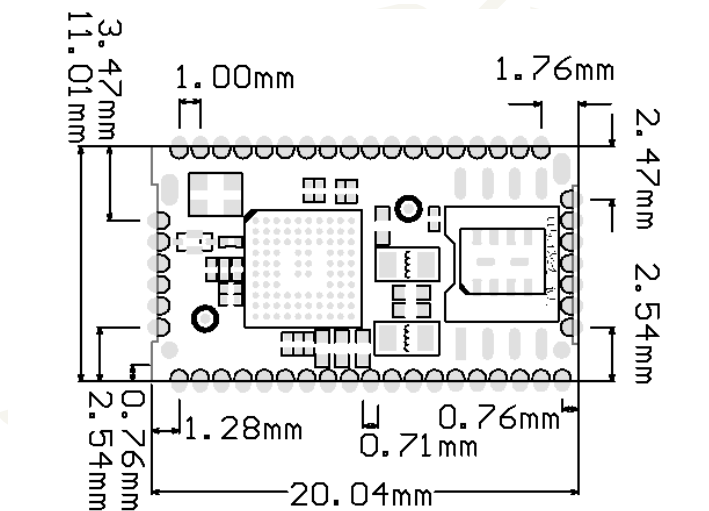
RF Parameter

Parameter	Test Conditions	Minimum	Typical	Maximum	Unit
FOP	Working frequency	2402		2480	MHz
FXTAL	Crystal frequency		32		MHz
Transmit					
RF TRP	Output Power		8		dBm
PBW	Modulation bandwidth			1	MHz
Dev	Frequency deviation		±10		kHz
Receive					
Max Input	0.01%BER Received power		-		dBm
RXSENS	0.01%BER sensitivity		-91		dBm
Note: The above test results are all at 25 degrees room temperature and 3.3V power supply mode					

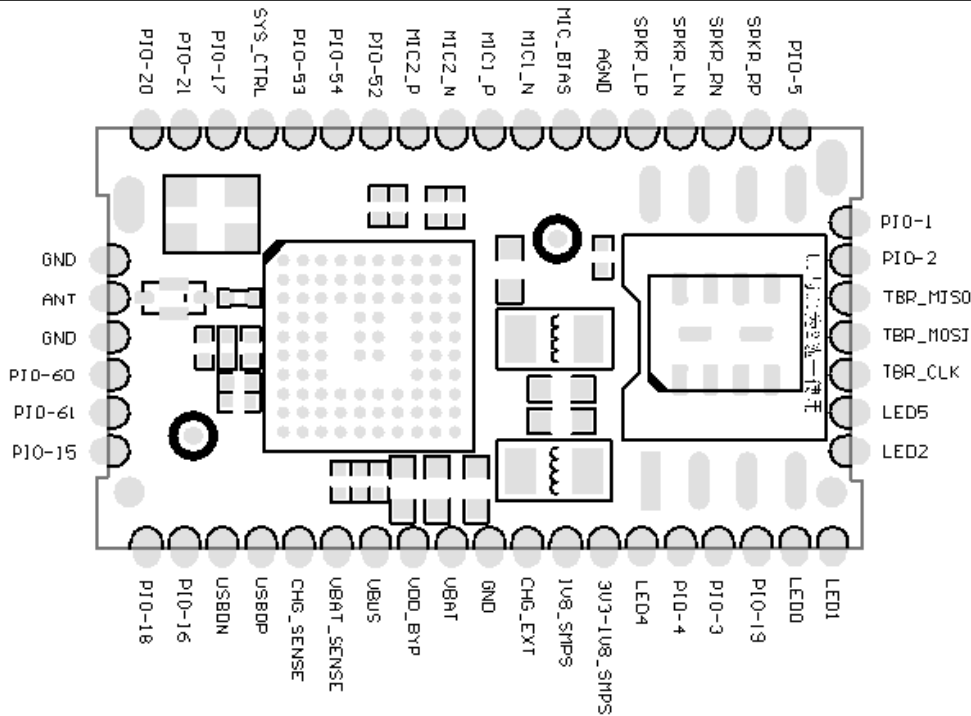
Static test

Test	Pins	Specification	Class
Human Body Model	AIO/LED[5:4, 2:0]	JS-001-2017	1C (1000 V)
	All other pins	JS-001-2017	2 (2000 V)
Charge Device model	All pins	JS-002-2014	C2a (500 V)

7. The Size Of The Module Graph



Module pin definition diagram



Pin definition

Pin	Symb	Pin type	Initial state	Status description
P1	PIO-18	Digital: Bidirectional with programmable strength internalpullup/pull-down	Weak pull-down	Programmable I/O line 18. Alternative function: ■ PCM_DOUT[0]
P2	PIO-16	Digital: Bidirectional with programmable strength internalpullup/pull-down	Weak pull-down	Programmable I/O line 17. Alternative function: ■ PCM_SYNC
P3	USB DN	Digital	-	USB Full Speed device D- I/O. IEC-61000-4-2 (device level) ESD Protection
P4	USB DP	Digital	-	USB Full Speed device D+ I/O. IEC-61000-4-2 (device level) ESD Protection
P5	CHG_SENSE	Analog	-	Charger input sense pin after external mode sense-resistor. High impedance. NOTE If using internal charger or no charger, connect VCHG_SENSE direct to VCHG.
P6	VBAT_SENSE	Analog	-	Battery voltage sense input.
P7	VBUS	Supply	-	Supply to SMPS power switch from charger input.

P8	VDD_BYP	Supply	-	Bypass regulator decoupling.
P9	VBAT	Analog	-	Battery voltage sense input.
P10	GND		-	Ground
P11	CHG_EXT	Analog	-	External charger transistor current control. Connect to base of external charger transistor as per application schematic.
P12	1V8_SMPS	-	-	1.8 V OUT
P13	3V3-1V8_SMPS	-	-	3V3-1V8 IN
P14	LED4	Analog or digital input/ open drain output.		General-purpose analog/digital input or open drain LED output.
P15	PIO-4	Digital: Bidirectional with programmable strength internalpullup/pull-down	Weak pull-down	Programmable I/O line 4. Alternative function: ■ TBR_MOSI[1]
P16	PIO-3	Digital: Bidirectional with programmable strength internalpullup/pull-down	Weak pull-down	Programmable I/O line 3. Alternative function: ■ TBR_MISO[2]
P17	PIO-19	Digital: Bidirectional with programmable strength internalpullup/pull-down	Weak pull-down	Programmable I/O line 19. Alternative function: ■ PCM_DIN[0]
P18	LED0	Analog or digital input/ open drain output.	-	General-purpose analog/digital input or open drain LED output.
P19	LED1	Analog or digital input/ open drain output.	-	General-purpose analog/digital input or open drain LED output.
P20	LED2	Analog or digital input/ open drain output.	-	General-purpose analog/digital input or open drain LED output.
P21	LED5	Analog or digital input/ open drain output.	-	General-purpose analog/digital input or open drain LED output.
P22	TBR_CLK	Digital: Bidirectional with programmable strength internalpullup/pull-down	Weak pull-down	Programmable I/O line 8. Alternative function: ■ TBR_CLK
P23	TBR_MOSI	Digital: Bidirectional with programmable strength internalpullup/pull-down	Strong pull-up	Programmable I/O line 6. Alternative function: ■ TBR_MOSI[0]
P24	TBR_MISO	Digital: Bidirectional with programmable strength internalpullup/pull-down	Strong pull-up	Programmable I/O line 7. Alternative function: ■ TBR_MISO[0]
P25	PIO-2	Digital: Bidirectional with programmable strength internalpullup/pull-down	Weak pull-down	Programmable I/O line 2. Alternative function: ■ TBR_MISO[3]

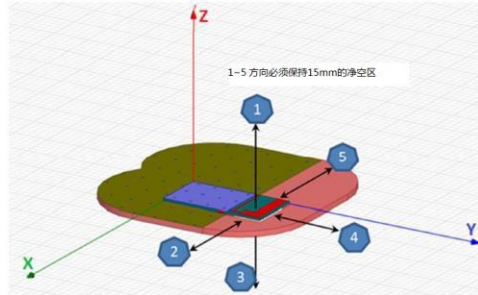
P26	PIO-1	Digital: Bidirectional with programmable strength internalpullup/pull-down	Strong pull-up b	Programmable I/O line 1
P27	PIO-5	Digital: Bidirectional with programmable strength internalpullup/pull-down	Weak pull-down	Programmable I/O line 5. Alternative function: ■ TBR_MISO[1]
P28	SPKR_RP	Analog	-	Headphone/speaker differential right output, positive. Alternative function: ■ Differential right line output, positive
P29	SPKR_RN	Analog	-	Headphone/speaker differential right output, negative. Alternative function: ■ Differential right line output, negative
P30	SPKR_LN	Analog	-	Headphone/speaker differential left output, negative. Alternative function: ■ Differential left lineoutput, negative
P31	SPKR_LP	Analog	-	Headphone/speaker differential left output, positive. Alternative function: ■ Differential left lineoutput, positive
P32	AGND		-	Ground
P33	MIC_BIAS	Analog	-	Mic bias output.
P34	MIC1_N	Analog	-	Microphone differential 1 input, negative. Alternative function: ■ Differential audio line input left, negative
P35	MIC1_P	Analog	-	Microphone differential 1 input, positive. Alternative function: ■ Differential audio line input left, positive
P36	MIC2_N	Analog	-	Microphone differential 2 input, negative. Alternative function: ■ Differential audio line input right, negative

P37	MIC2_P	Analog	-	Microphone differential 2 input, positive. Alternative function: ■ Differential audio line input right, positive
P38	PIO-52	Digital: Bidirectional with programmable	Weak pull-down	Programmable I/O line 52.

		strength internalpullup/ pull-down		
P39	PIO-54	Digital: Bidirectional with programmable strength internalpullup/ pull-down	Weak pull-down	Programmable I/O line 54.
P40	PIO-53	Digital: Bidirectional with programmable strength internalpullup/ pull-down	Weak pull-down	Programmable I/O line 53.
P41	SYS_CTRL	Digital input	-	Typically connected to an ON/OFF push button. Boots device in response to a button press when power is still present from battery and/or charger but software has placed the device in the OFF or DORMANT state. Additionally useable as a digital input in normal operation. No pull. Additional function: ■ PIO[0] input only
P42	PIO-17	Digital: Bidirectional with programmable strength internalpullup/ pull-down	Weak pull-down	Programmable I/O line 17. Alternative function: ■ PCM_SYNC
P43	PIO-21	Digital: Bidirectional with programmable strength internalpullup/ pull-down	Weak pull-down	Programmable I/O line 21.
P44	PIO-20	Digital: Bidirectional with programmable strength internalpullup/ pull-down	Weak pull-down	Programmable I/O line 20.
P45	GND	-	-	Ground
P46	ANT	RF	-	Bluetooth transmit/receive.
P47	GND	-	-	Ground
P48	PIO-60	Digital: Bidirectional with programmable strength internalpullup/ pull-down	Weak pull-down	Programmable I/O line 60.
P49	PIO-61	Digital: Bidirectional with programmable strength internalpullup/ pull-down	Weak pull-down	Programmable I/O line 61.
P50	PIO-15	Digital: Bidirectional with programmable strength internalpullup/ pull-down	Weak pull-down	Programmable I/O line 15. Alternative function: ■ MCLK_OUT

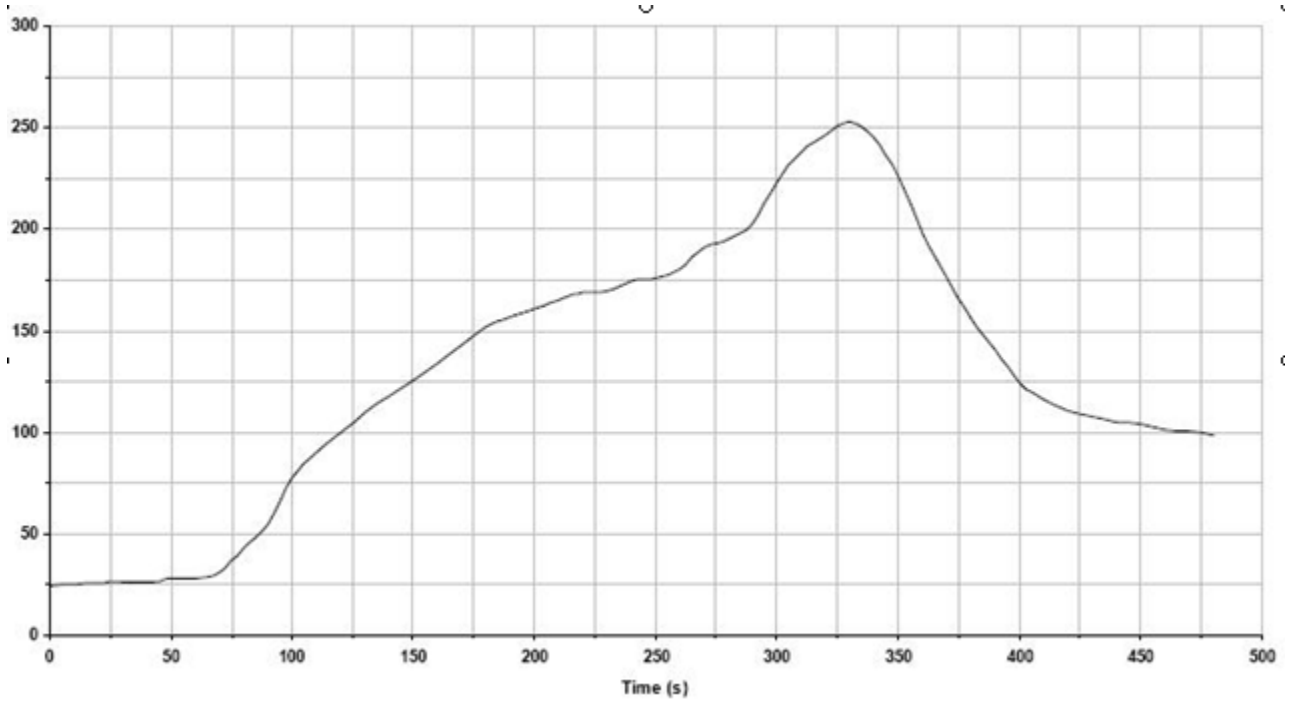
8. Note

- a. When using the module, please pay attention to avoid the influence of interference sources such as power amplifier, booster circuit, DC/DC circuit, etc. on the module, and avoid the power supply circuit of the module and the high-power circuit unit from forming a series loop to reduce interference
- b. If there are batteries, metal objects, LCD screens, horns, etc. next to the module antenna, the distance from the antenna should be at least 15mm (as shown in the figure)



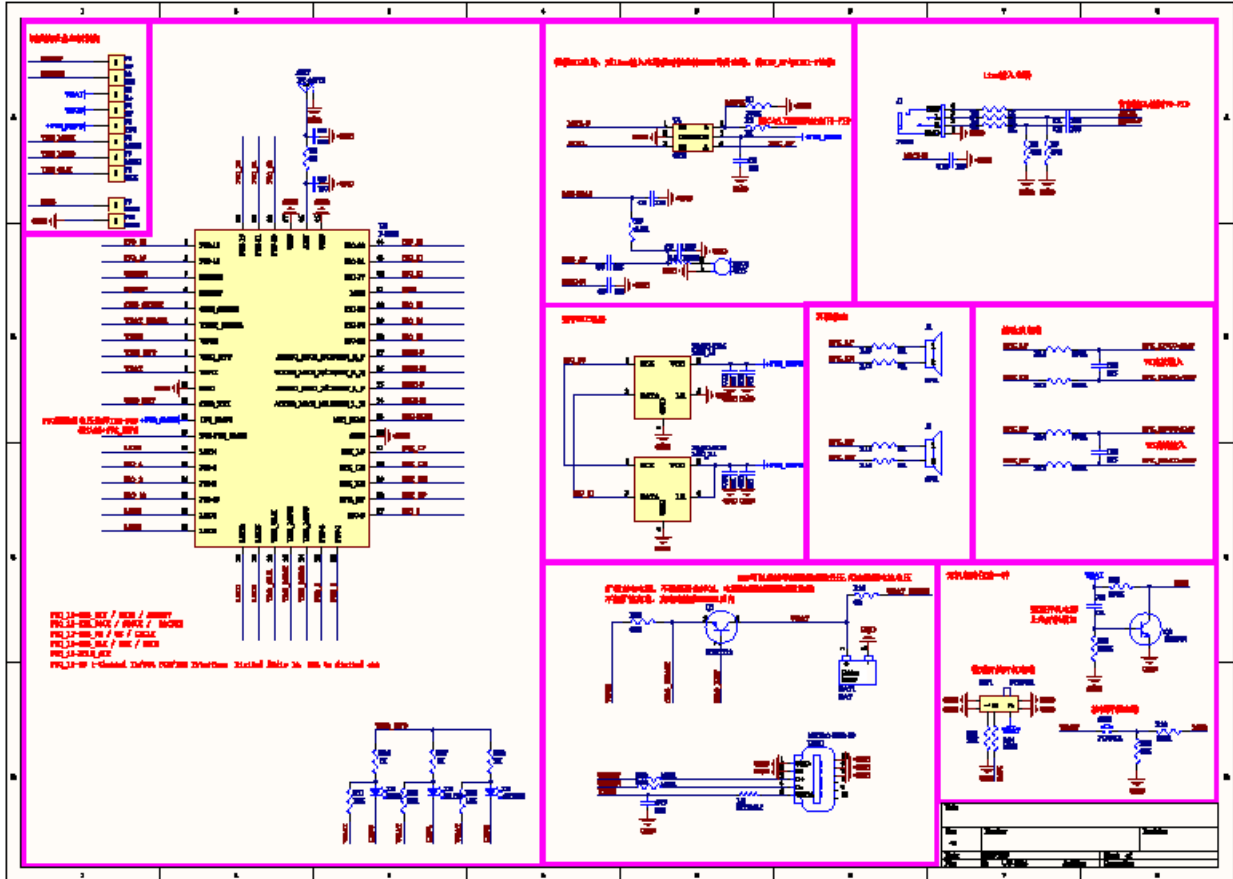
- c. PCB layout: As metal will weaken the function of the antenna, it is strictly forbidden to lay the ground and wire under the module antenna when laying out the module. It would be better if it can be hollowed out.
- d. Since the metal shell has a shielding effect on radio frequency signals, it is recommended not to install in a metal shell
- e. Regarding the use environment, wireless signals are easily affected by the surrounding environment. Obstacles such as trees and metals will absorb the wireless signals to a certain extent, so in practical applications, the distance of data transmission is affected to a certain extent.

9. Recommended Reflow Temperature



Key features of the profile:

10.Application circuit diagram



THE END!