

Bluetooth Module Datasheet

Model:AR-6203

Version: V1.0

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Release Record

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List of Contents

1	INTRODUCTION.....	4
1.1	FEATURES.....	4
1.2	APPLICATION.....	5
2	PIN DEFINITION.....	6
2.1	PIN CONFIGURATION.....	6
2.2	PIN DEFINITION.....	6
3	CHARACTERISTICS.....	7
3.1	PMU PARAMETERS.....	7
3.2	IO PARAMETERS.....	8
3.3	AUDIO DAC PARAMETERS.....	8
3.4	AUDIO ADC PARAMETERS.....	8
3.5	BT PARAMETERS.....	9
3.6	CURRENT PARAMETERS.....	9
4	REFERENCE DESIGN.....	10
5	MECHANICAL CHARACTERISTIC.....	11
6	RECOMMENDED REFLOW PROFILE.....	11
7	ORDERING INFORMATION.....	13
7.1	Module function.....	13
7.2	The chip manufacturer.....	14
7.3	Module mounting mode.....	14
	IMPORTANT NOTICE.....	15

1 Introduction

AR-6203T is a low-power and economical Bluetooth 5.0 dual-mode module, which integrates sub-systems such as ultra-low power DSP, application processor, embedded flash memory, high-performance stereo codec, LED driver and ADC I/O . The dual-core architecture with flash memory allows manufacturers to easily use new features to differentiate their products without extending the development cycle.

Therefore, AR-6203T provides an ideal solution for developers who want to integrate Bluetooth wireless technology into their designs.

1.1 Features

CPU and Flexible IO

- 32-bit high-performance CPU with DSP
- Program memory: internal 4M bit flash
- Flexible GPIO pins with Programmable pull-up and pull-down resistors
- Support GPIO wakeup or interrupt

Bluetooth Radio

- Compliant to Bluetooth 5.0
- TX output power +2dBm in typical
- RX Sensitivity with -90.5dBm @Basic Rate

FM Tuner

- Support frequency band 76~108MHz
- Auto search tuning
- Programable de-emphasis(50/75uS)
- Receive signal strength indicator (RSSI)

Audio Interface

- Audio codec with 16bit DAC and 16bit ADC
- Support flexible audio EQ adjust
- Support Sample rate 8, 11.025, 12, 16, 22.05,32, 44.1 and 48KHz
- 2 channel Analog MUX

- One channel MIC amplifier input
- High performance audio ADC with 90dB SNR
- High performance audio DAC with 96dB SNR, with headphone amplifier output

Peripheral and Interfaces

- Three 32-bit timers
- Three multi-function 32-bit timers, support Capture and PWM mode
- WatchDog
- Three full-duplex UART
- SPI
- IR controller
- SD Card Host controller
- Full speed USB 2.0 HOST/DEVICE controller
- Sixteen Channels 10-bit SARADC
- Build in PMU, such as LDO

Package

- SSOP24L

Temperature

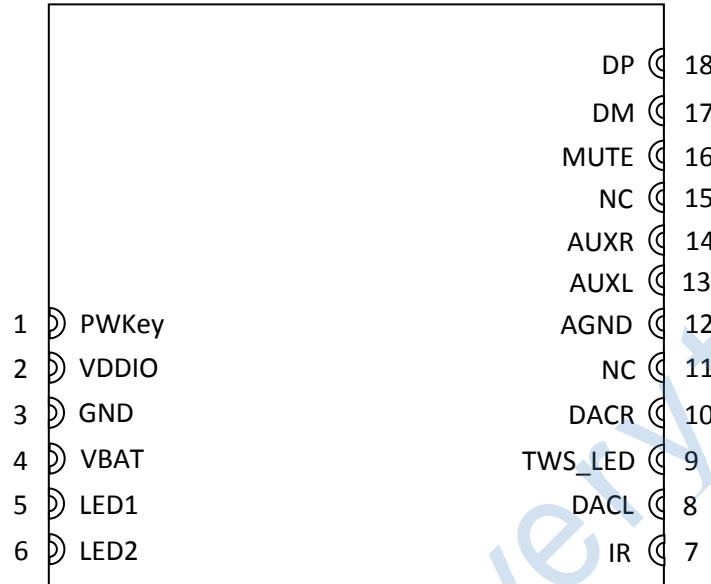
- Operating temperature: -40°C to +85°C
- Storage temperature: -65°C to +150°C

1.2 Application

- Bluetooth Speaker
- Bluetooth music box
- Car audio application
- USB audio
- TWS

2 Pin Definition

2.1 Pin Configuration



2.2 Pin Definition

Table 2: Pin Definition

Pin	Symbol	I/O Type	Description
1	Pwkey	A	Power key input
2	VDDIO	PWR	VDDIO power output
3	DGND	GND	Digital Ground
4	VBAT	PWR	VBAT power input
5	LED1	Output	LED Driver
6	LED2	Output	LED Driver
7	IR	I/O	Infrared
8	DACL	A	DACL
9	TWS_LED	Output	TWS_LED Driver
10	DACR	A	DACR
11	NC	NC	NC
12	AGND	GND	DAC Grund
13	AUXL	I/O	Audio input left interface
14	AUXR	I/O	Audio input right interface
15	NC	NC	NC
16	MUTE	O	SPI0DI-G3 TX0-G5(RX) PWM0-T3-G4 TMR3CAP_G5/IR_G5 IISDO/DAT-G2
17	DM	USB	USB data negative
18	DP	USB	USB data positive

3 Characteristics

3.1 PMU Parameters

Table 3-1 PMU voltage input Parameters

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
VUSB	VUSB Voltage input	3.0	5.0	5.5	V	
VBAT	Voltage input	3.0	3.7	5.0	V	

Table 3-2 3.3V LDO Parameters

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
VDDIO	3.3V LDO voltage output	—	3.3	—	V	Light Loading condition
Δ VDDIO	Output Mismatch 1-sigma	—	56	—	mV	VDDIO=3.3V
ILOAD	Maximum output current	—	—	150	mA	@VBAT=3.6V
ISC	Short Circuit Current Limit	—	—	300	mA	@VBAT=3.8V

Table 3-3 1.6V LDO Parameters

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
VDDBT	1.6V LDO voltage output	—	1.6	—	V	Light Loading condition
Δ VDDBT	Output Mismatch 1-sigma	—	27	—	mV	VDDBT=1.6V
ILOAD	Maximum output current	—	—	100	mA	@VBAT=3.0V
ISC	Short Circuit Current Limit	—	—	200	mA	@VBAT=3.8V

Table 3-4 1.2V LDO Parameters

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
VDDCORE	1.2V LDO voltage output	—	1.2	—	V	Light Loading condition
Δ V VDDCORE	Output Mismatch 1-sigma	—	20	—	mV	VDDCORE=1.2v
ILOAD	Maximum output current	—	—	80	mA	@VBAT=3.6v
ISC	Short Circuit Current Limit	—	—	120	mA	@VBAT=3.8v

3.2 IO Parameters

Table 3-5 I/O Parameters

GPIO—Electrical Characteristics							
Sym	Description	Related GPIO	Min	Typ	Max	Unit	Conditions
V _{IL}	Low-level input voltage		-0.3		1.27	V	VDDIO=3.3V
V _{IH}	High-level input voltage		2.03		3.6	V	VDDIO=3.3V
Driver Ability 1	Output Driver Ability 1			32		mA	VDDIO=3.3V
Driver Ability 0	Output Driver Ability 0			8		mA	VDDIO=3.3V
R _{PUP0}	Internal pull-up resister 0		8	10	12	KΩ	
R _{PUP1}	Internal pull-up resister 1		0.24	0.3	0.36	KΩ	
R _{PUP2}	Internal pull-up resister 2		160	200	240	KΩ	
R _{PUN0}	Internal pull-down resister 0		8	10	12	KΩ	
R _{PUN1}	Internal pull-down resister 1		0.24	0.3	0.36	KΩ	
R _{PUN2}	Internal pull-down resister 2		160	200	240	KΩ	

3.3 Audio DAC Parameters

Table 3-6 Audio DAC Parameters

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
SNR		—	96	—	dB	VCM cap=1uF VDDDAC cap=1uF with A-wt filter Output -3dBV Fin=1KHz
THD+N		—	-86	—	dB	VCM cap=1uF VDDDAC cap=1uF with A-wt filter Output -3dBV with 10K loading Fin=1KHz
Output Range	Maximum output voltage	—	2.6		V _{peak-peak}	32ohm Loading

3.4 Audio ADC Parameters

Table 3-7 Audio ADC Parameters

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
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SNR		—	90	—	dB	VCM cap=1uF VDDDAC cap=1uF with A-wt filter Input sine amplitude, 850mV RMS Fin=1KHz
THD+N		—	-87	—	dB	VCM cap=1uF VDDDAC cap=1uF with A-wt filter Input sine amplitude, 850mV RMS Fin=1KHz.
Input Range	Input sine wave peak amplitude	0		VCM	V	From aux input, aux 0db gain, VCM represent VCM voltage.

3.5 BT Parameters

Table 3-8 BT Parameters

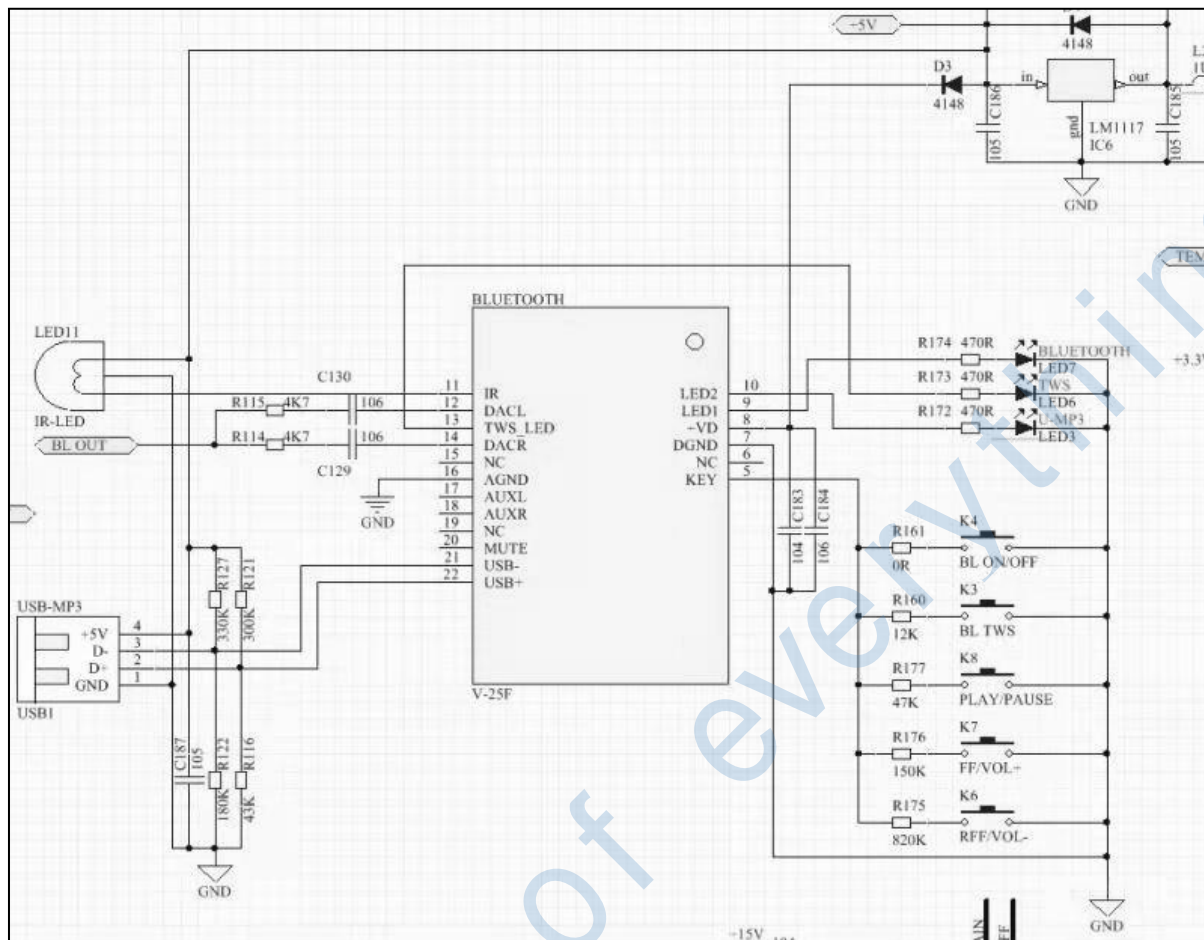
Characteristics	Min	Typical	Max	Unit	Conditions
Maximum Transmit Power	—	—	7	dBm	
RMS DEVM	—	5.5	—	%	Maximum TX power 2-DH5 packet
Peak DEVM	—	12.5	—	%	
EDR Relative Transmit Power		-0.2		dB	
Sensitivity @ Basic Rate		-90.5		dBm	BER=0.1%, using DH5 packet
Sensitivity @ EDR		-89.5		dBm	BER=0.01%, using 2-DH5 packet

3.6 Current Parameters

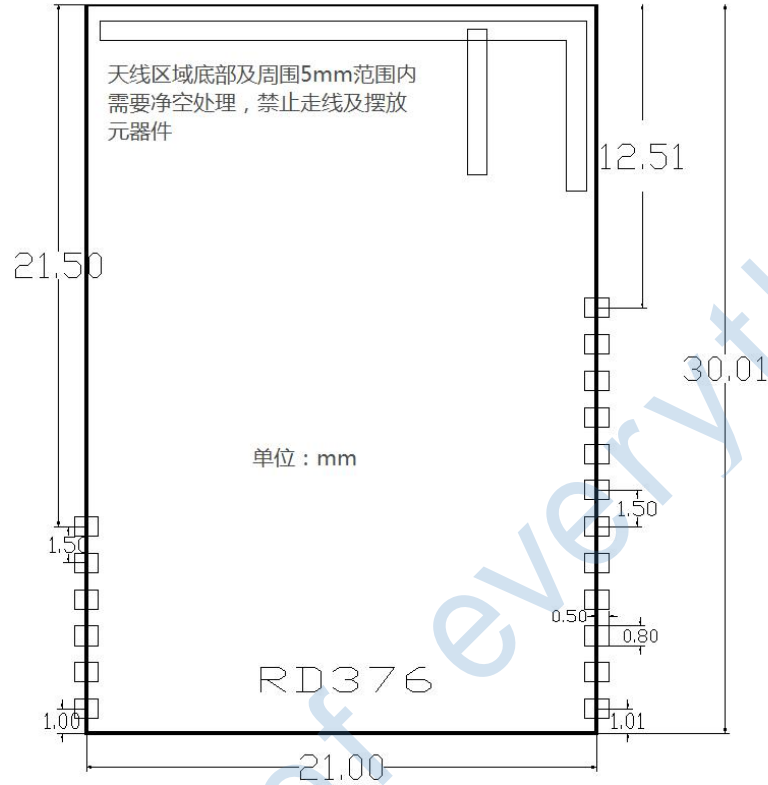
Table 3-9 Current Parameters

Sym	Characteristics	Min	Typ	Max	Unit	Conditions
IRTC	RTC mode current	—	4	—	uA	4.2V input, room temp.
Sleep	Sleep current	—	500	2000	uA	3.3V input, room temp

4 Reference Design



5 Mechanical Characteristic



6 Recommended Reflow Profile

The soldering profile depends on various parameters necessitating a set up for each application. The data here is given only for guidance on solder reflow.

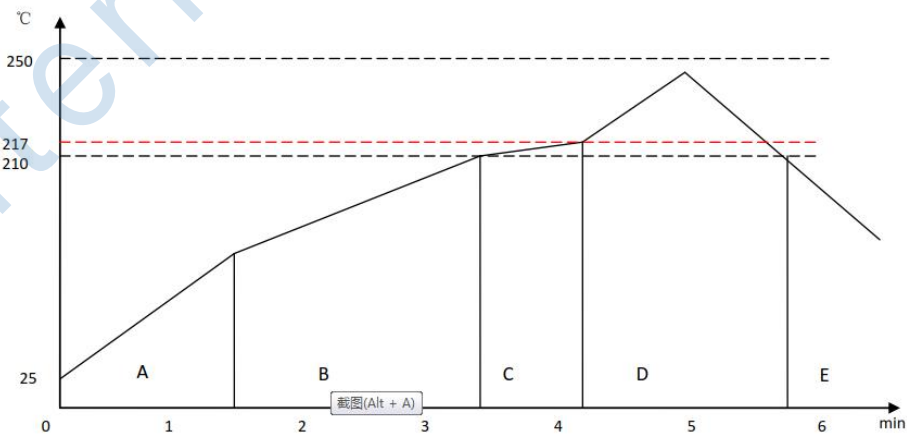


Figure 15: Recommended Reflow Profile

Pre-heat zone (A)

This zone raises the temperature at a controlled rate, **typically 0.5 – 2 C/s**. The purpose of this zone is to preheat the PCB board and components to 120 ~ 150°C. This stage is required to distribute the heat uniformly to the PCB board and completely remove solvent to reduce the heat shock to components.

Equilibrium Zone 1 (B)

In this stage the flux becomes soft and uniformly encapsulates solder particles and spread over PCB board, preventing them from being re-oxidized. Also with elevation of temperature and liquefaction of flux, each activator and rosin get activated and start eliminating oxide film formed on the surface of each solder particle and PCB board. **The temperature is recommended to be 150° to 210 ° for 60 to 120 second for this zone.**

Equilibrium Zone 2 (C) (optional)

In order to resolve the upright component issue, it is recommended to keep the temperature in 210 – 217 ° for about 20 to 30 second.

Reflow Zone (D)

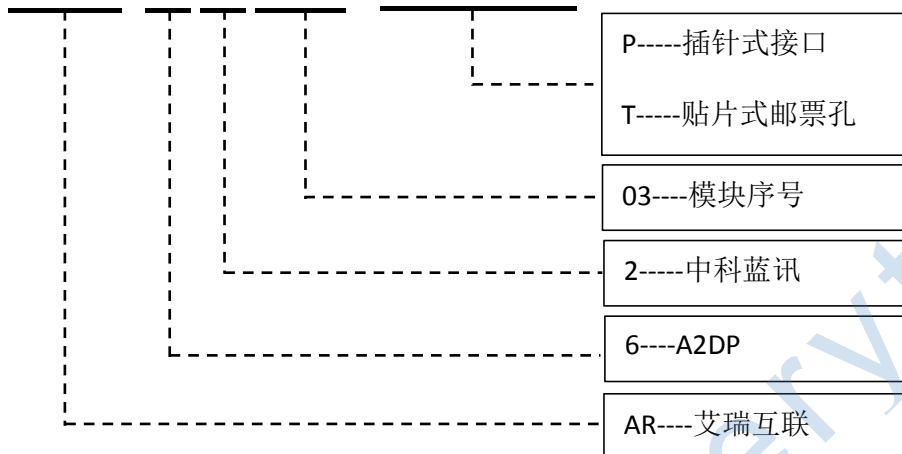
The profile in the figure is designed for Sn/Ag3.0/Cu0.5. It can be a reference for other lead-free solder. The peak temperature should be high enough to achieve good wetting but not so high as to cause component discoloration or damage. Excessive soldering time can lead to intermetallic growth which can result in a brittle joint. The recommended peak temperature (Tp) is 230 ~ 250°C. The soldering time should be 30 to 90 second when the temperature is above 217°C.

Cooling Zone (E)

The cooling ate should be fast, to keep the solder grains small which will give a longer lasting joint. **Typical cooling rate should be 4°C.**

7 Ordering Information

AR-6203-P/T/D



7.1 Module function

功能序号	产品主要功能	说明	备注
2	HID		
3	SPP 数传		
4	BLE 数传		
5	SPP+BLE 数传		
6	A2DP	仅音频	
7	HFP/HSP+A2DP+BLE	电话+音频+数传	全功能
8	WiFi		
9	Bluetooth+WiFi		

7.2 The chip manufacturer

厂家序号	芯片厂家	说明
1	高通 QCC	
2	中科蓝讯 AB	
3	杰理 JL	
4	锐迪科 RDA	
5	中芯微 WS	
6	TI	
7	NORDIC	
8	瑞昱 REALTEK	
9	南方硅谷	

7.3 Module mounting mode

序号	贴装方式	说明
1	P	插针式
2	T	邮票孔贴装
3	D	邮票孔+插针

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