TB-04 Specification

Version V1.1

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Document development/revision/revocation resume

Version	Date	Revised content	Maker	Approve
V1.0	2020.04.10	First developed	Yiji Xie	Hong xu
V1.1	2021.01.04	Update database	Hong xu	Hong xu

CONTENT

1.INTRODUCTION

The TB-04 intelligent lighting module is a Bluetooth module based on the TLSR8250F512ES16 chip and compatible with BT 5.0 low-power Tmall Genie Mesh. This module supports the Bluetooth module directly controlled by Tmall Genie and has a Bluetooth mesh networking function. Peer-to-peer network communication, using Bluetooth broadcast for communication, can ensure timely response in the case of multiple devices. It is mainly used in intelligent light control, which can meet the requirements of low power consumption, low latency, and short-range wireless data communication.

Features

- 1.1mm spacing SMD-20 package
- 6 PWM output
- antenna patch pad, reserved antenna hole can be directly inserted spring antenna
- brightness (duty cycle) adjustment range 5-100%
- factory default warm and cool color duty cycle 50% each
- PMW output frequency 1 KHz
- with small night light function
- with wall switch switching color temperature functionion

LIST 1 Main Parameters

Model Name	TB-04
Size	12.2*13.0*2.3(±0.2)MM
Package	SMD-20
Wireless Standard	Bluetooth V5.0
Frequency Range	2400 ~ 2483.5MHz
Output Power	10dBm
Max Sensitivity	-93dBm±2
Interface	GPIO/PWM/SPI/ADC
Operating Temperature	-20℃ ~ 70 ℃
Store Temperature	-40 ℃ ~ 125 ℃ , ＜ 90%RH
Voltage	Voltage:2.7V ~ 3.6V,Current≥50mA
Power consumption	Deep sleep Mode：0.8uA
	Sleep Mode：1.8uA
	TX（10dBm）：20.69mA

2.SPECIFICATION

Electrical characteristics

Absolute Maximum Rating

Any exceeding the following absolute maximum ratings may cause damage to TLSR8253

Item	Min	Typical	Max	Unit
Voltage	2.7	3.3	3.6	V
I/O Voltage(VCCIO)	−0.3	−	3.6	V
Operating Temperature	−20	−	+70	℃
Store Temperature	−40	−	+125	℃

Consumption

Name	Typical	Unit
Transmitting consumption （10dBm）	20.69	mA
Receiving Power	6.26	mA
Standby power consumption	3.06	mA
Light Sleep	1.8	uA
Deep Sleep	0.8	uA

RF Specification

Transmitting power

Name	Min	Typical	Max	Unit
Average power	–	8.5	10	dBm

Sensitivity

Name	Min	Typical	Max	Unit
Sensitivity	−94	−93	–	dBm

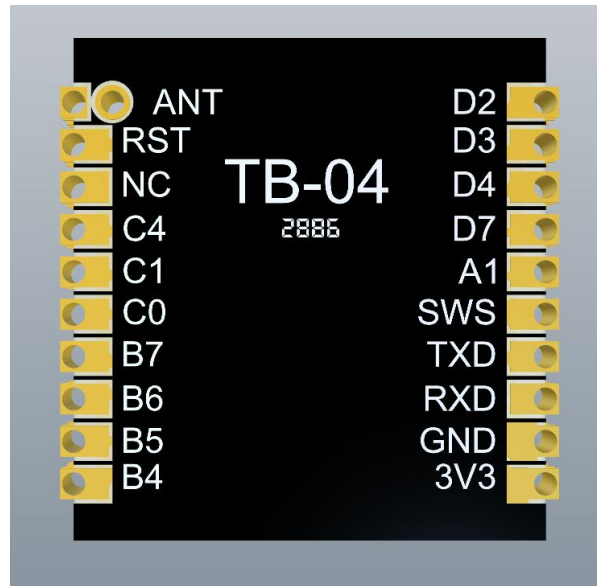## 3.DIMENSION
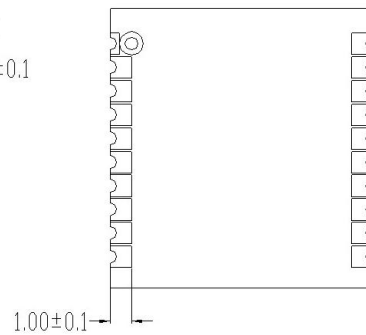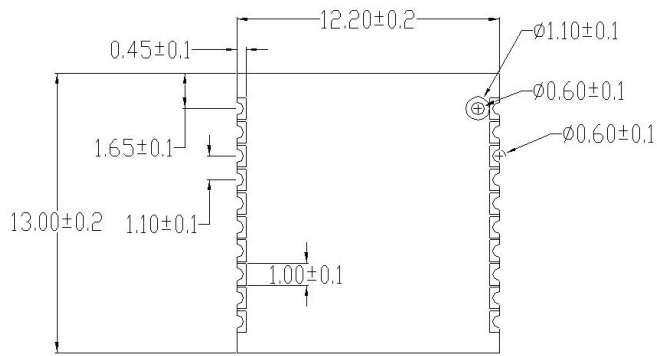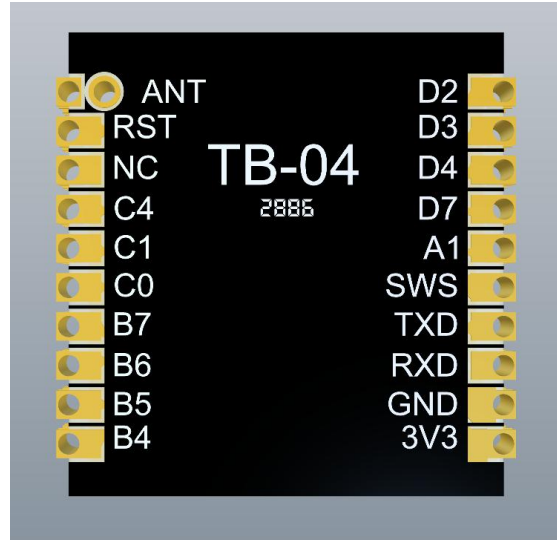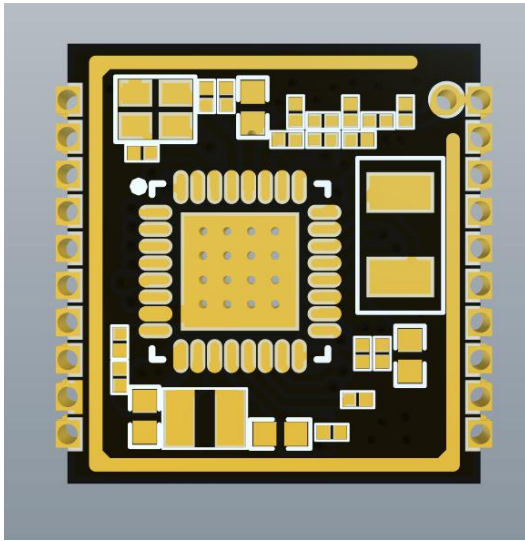
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4.PIN DEFINITION

The TB-04 module has a total of 20 interfaces. For example, the pin diagram, the pin function definition table is the interface definition.


TB-04 Pin diagram

PIN function definition sheet

| No.	Item.	Function Description
1	ANT	Antenna interface
2	RST	Reset pin
3	NC	NOT CONNECTED
4	C4	PWM2 output/UART_CTS/PWM0 opposite output/SAR ADC input /GPIO PC4
5	C1	I2C serial clock/ PWM1 opposite output/ pwm0 out put/GPIO PC1
6	C0	I2C serial data/ PWM4 opposite output/ UART_RTS / GPIO PC0
7	B7	SPI data output/UART_RX/SAR ADC input/GPIO PB7
8	B6	SPI data output（I2C_SDA）/UART_RTS/SAR ADC input/GPIO PB6
9	B5	PWM5 output/SAR ADC output/GPIO PB5

10	B4	PWM4 output/SAR ADC input/GPIO PB4
11	3V3	3.3V power supply
12	GND	Ground
13	RXD	PWM0 opposite output/UART_RX/GPIO PA0
14	TXD	PWM4 output/UART_TX/SAR ADC output/GPIO PB1
15	SWS	Single wire slave
16	A1	GPIO PA1
17	D7	GPIO PD7/SPI clock（I2C_SCK）
18	D4	GPIO PD4/single line host machine/PWM2 opposite output
19	D3	PWM1 opposite output/GPIO PD3
20	D2	SPI chip select（Low Level Effective）/PWM3 output/GPIO PD2

5.SCHEMATIC
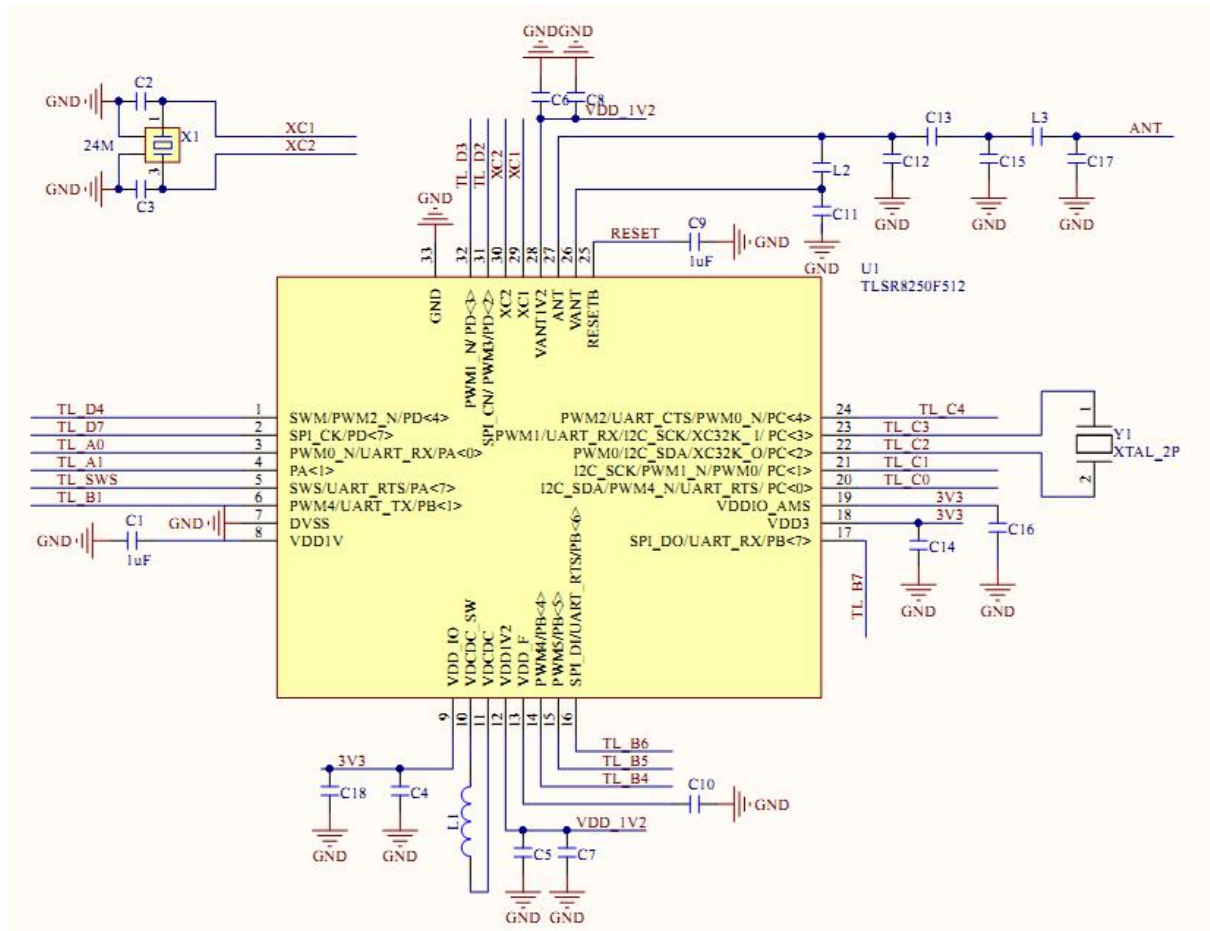

6.DESIGN GUIDE

1、Application circuit
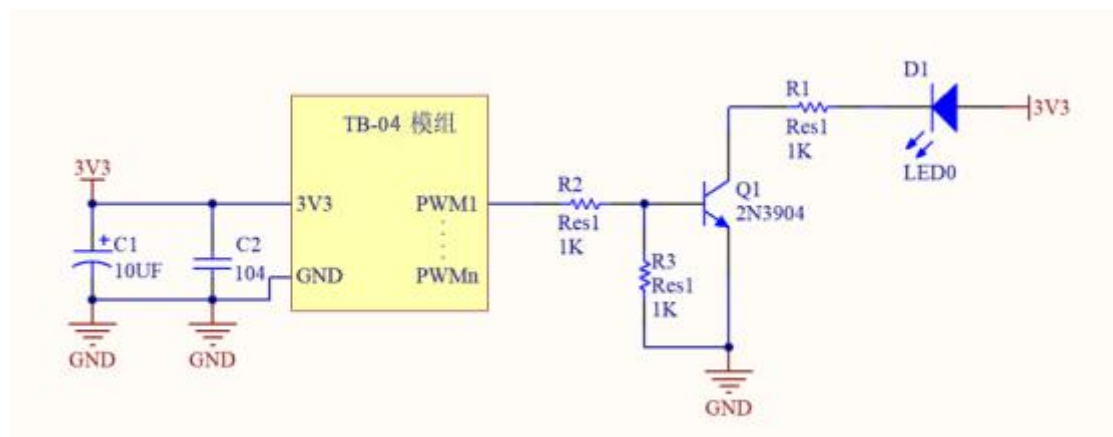
2、Antenna layout requirements

（1）、Place the module on the edge of the motherboard, and the antenna area extends beyond the edge of the motherboard.

Electricity Supply

(1) Recommended 3.3V voltage, peak current above 50mA

(2) It is recommended to use LDO power supply; if using DC-DC, it is recommended to control the ripple within 30mV.

(3) The DC-DC power supply circuit is recommended to reserve the position of the dynamic response capacitor, which can optimize the output ripple when the load changes greatly.

(4) 3.3V power interface is recommended to add ESD devices.
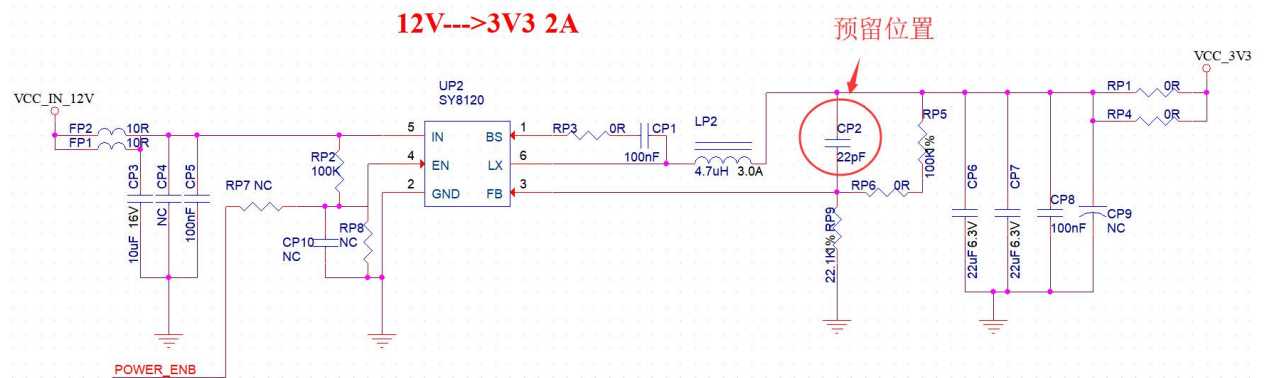
**4**、PWM Dimming Solution Design Instructions

For lamps that require dimming, you only need to connect the PWM pins of the corresponding color to the control end of the subsequent stage drive circuit; the PWM independently outputs a 100-level adjustable digital signal, and the subsequent stage circuit can be voltage The driving type may be a current driving type.

Connection diagram
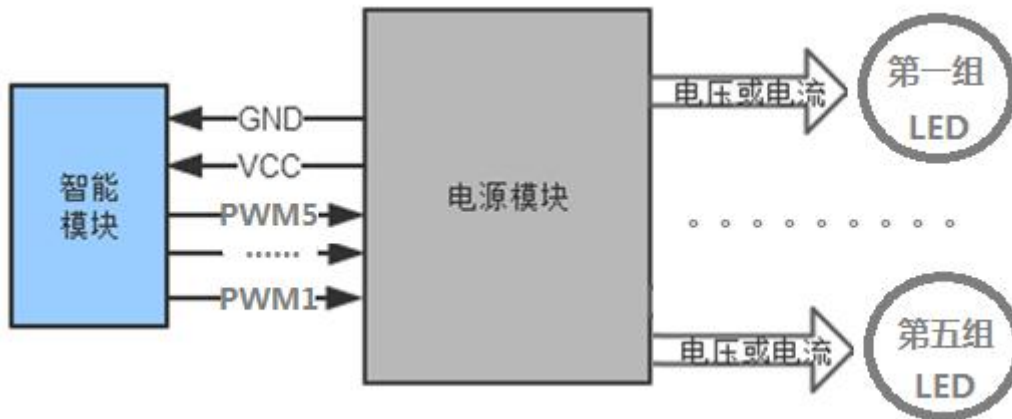
5、LED Drive Reference Design

TB-04 module application only needs 3.3V power supply and simple driving circuit to achieve intelligent light control. Take MOS tube to drive a channel of white light as an example, the design reference is as follows; CW_I is the module's positive white light PWM output , Q1 is MOS tube, WW is LED lamp beads, the other 4 road lamp driving circuit is the same as this road design method.
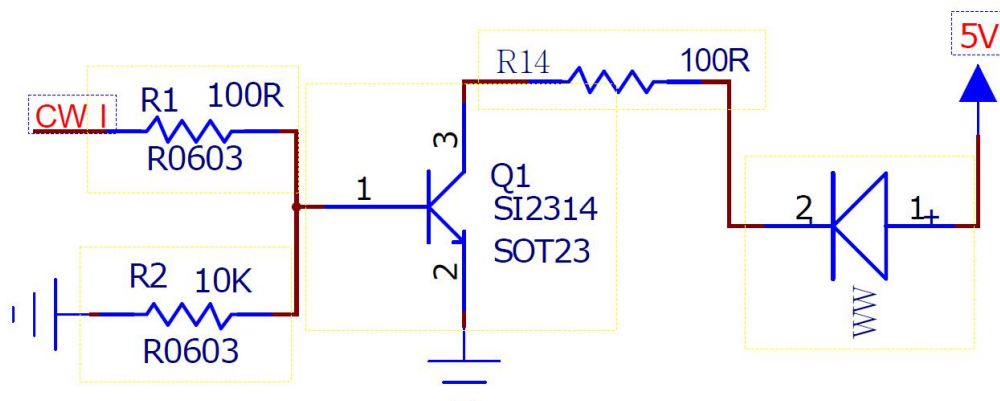
6、Secondary development

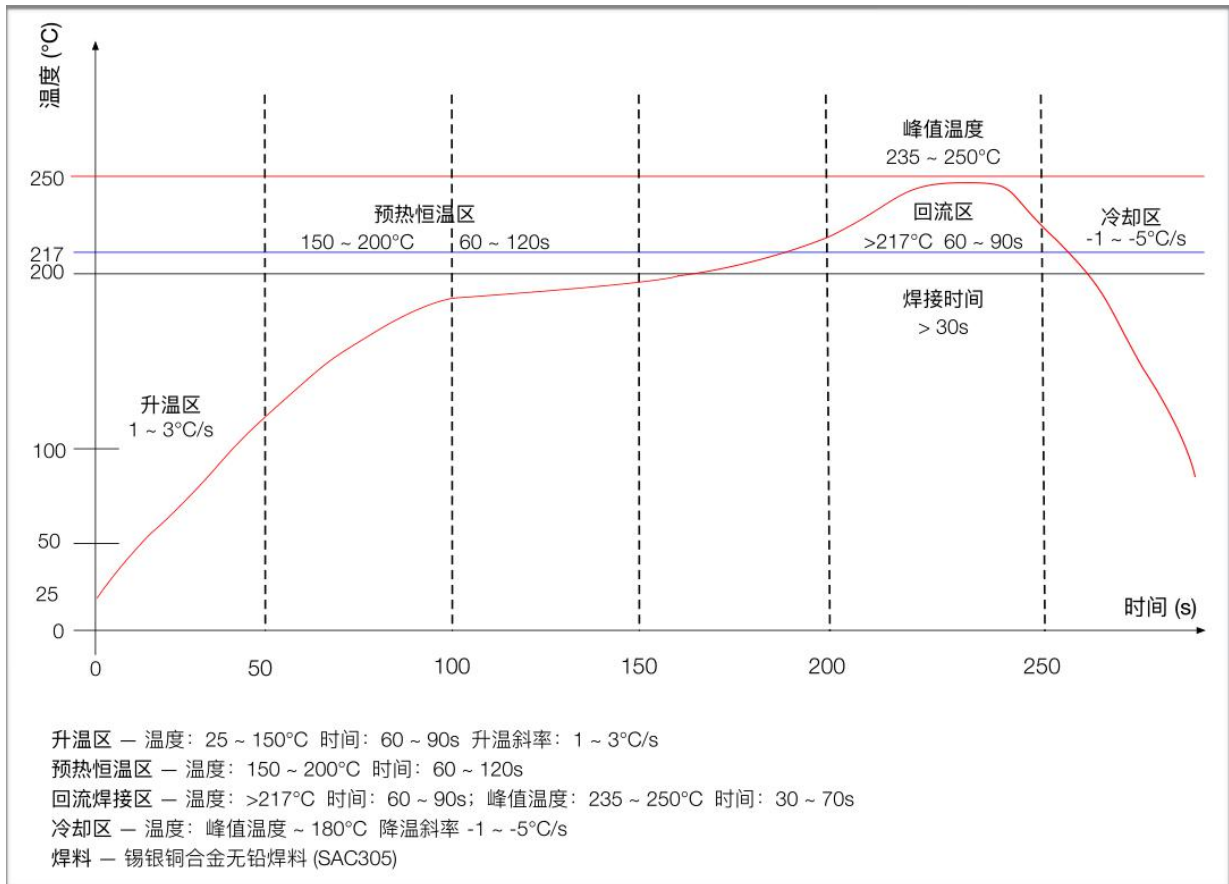The TB-04 module supports users to write their own firmware programs to achieve customized functions.

If you use a Linux machine to develop the firmware, you can refer to the SDK, documentation and source address of Anxin's collation:

https://github.com/Ai-Thinker-Open/Telink_825X_SDK.

If you use Windows development, you can refer to the original SDK provided by the chip manufacturer. Download address:

http://wiki.telink-semi.cn

7. REFLOW PROFILE

升温区 — 温度：25～150°C 时间：60～90s 升温斜率：1～3°C/s
预热恒温区 — 温度：150～200°C 时间：60～120s
回流焊接区 — 温度：>217°C 时间：60～90s；峰值温度：235～250°C 时间：30～70s
冷却区 — 温度：峰值温度～180°C 降温斜率 -1～-5°C/s
焊料 — 锡银铜合金无铅焊料 (SAC305)

8.PACKAGING

As shown below, the packaging of TB-04 is taping packaging.

9、CONTACT US

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