# TB-03F-KIT Specification

Version V1.0

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# Revision History

| Version | Date | Development/revision | Development | Approval |
|---------|------|----------------------|-------------|----------|
| V1.0 | 2020.12.03 | Official release | ChengC | XuH |
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# 1.Product Overview

TB-03F-Kit development board is an intelligent lighting development board designed for TB-03F modules. There are five PWM, that can be adjusted by themselves RGB colorful lights and two cold and warm lamp beads. All the modules can be used to lead out the module with the pin header, which is convenient for developers to develop and debug themselves;

The integration of rich information, including AT instructions, SDK secondary development, support Bluetooth mesh networking, as well as Android / IOS APP control and WeChat Mini Program control, but also support Tmall genie voice direct connection control; multiple development boards interconnected, can be used to Mesh networking debugging ,2.54 mm pin header lead out all GPIO/PWM/I2C/ADC interfaces, free to match peripherals.

UART interface support firmware burning, simple and fast! At the same time pin SWS pin with Telink official burning tools can also achieve firmware burning.

## Characteristics

Module : TB-03F-Kit (TB-03F module development board)

Two options for firmware: Ali Tmall genie version; common AT version

BLE5.0，support Mesh

Interface Type: Standard　micro USB + 2.54mm spacing pin header

PWM/I2C/GPIO/ADC interface

With R/G/B colorful lights and　cold and warm lamp beads

With reset and user-defined button

Support Tmall Genie Voice Direct Control

Support Android/ IOS APP control and WeChat Mini Program control

# Main parameters

## Table 1 Main parameters description

| Model | TB-03F-KIT Development Board |
|---|---|
| **Package** | **DIP-30（2.54 mm spacing pin header）** |
| **Dimension** | **24.0\*16.0\*3.0(±0.2)MM** |
| **Wireless standard** | **Bluetooth 5.0，support Mesh** |
| **Frequency range** | **2400~2483.5MHz** |
| **Transmit power** | **Maximum 10dBm** |
| **Receiving sensitivity** | **Minimum-93dBm±2** |
| **Interface** | **PWM/I2C/GPIO/ADC** |
| **Operating temperature** | **-20℃~70℃** |
| **Storage temperature** | **-40℃~125℃，<90%RH** |
| **Power supply range** | **Micro USB supply voltage 4.75V~5.25V, recommend 5.0V** |
| **Power consumption** | **Deep sleep mode：0.4uA（only module）** |
| | **Standby mode：2.51mA（only module）** |
| | **Full-load mode（TX：10dBm）：:20.54mA（only module）** |
| | **Development　Board PCB：4mA** |

## 2. Electrical parameters

### Electrical characteristics

### Absolute maximum rating
**Any excess of the following absolute maximum can cause chip damage**

| Name | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|
| Micro USB supply voltage | 4.75 | 5.0 | 5.25 | V |
| Operating temperature | -20 | 4.75 | +70 | ℃ |
| Storage temperature | -40 | 5.0 | +125 | ℃ |

### Power consumption

| Parameter Name | Typ. | Unit |
|---|---|---|
| Emission power（10dBm） | 20.54 | mA |
| Standby power cunsumption | 2.51 | mA |
| Sleep mode | 0.8 | uA |

Note：The consumption is for module consumption only.

### RF parameters

### RF transmit power

| Name | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|
| Average power | - | 9.5 | 10 | dBm |

### Receiving sensitivity

| Name | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|
| Receiving sensitivity | -94 | -93 | - | dBm |

# 3.Appearance dimensions
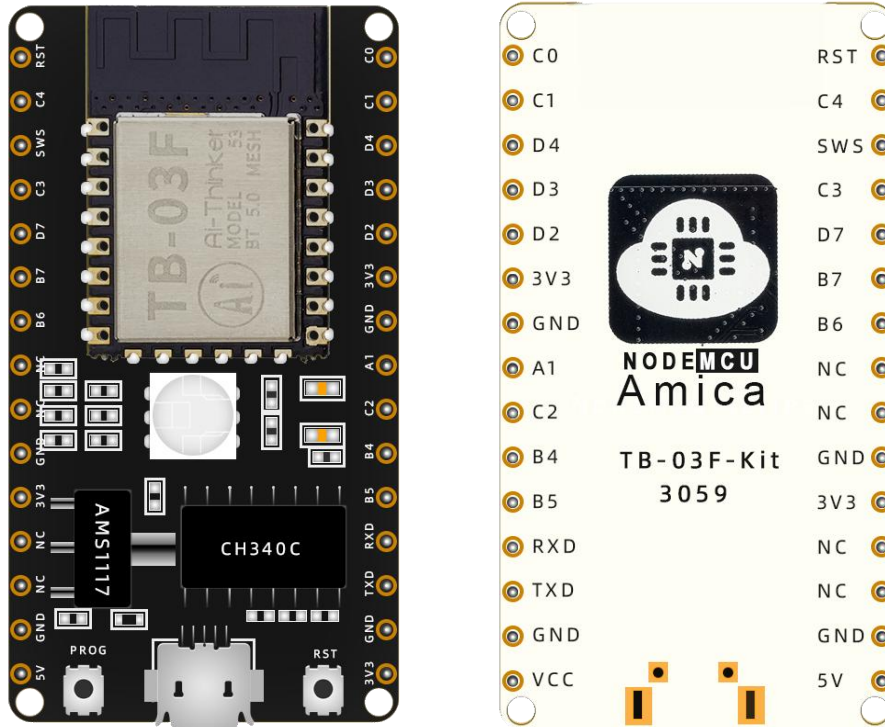


# 4.Pin definition

TB-03F-KIT development board module had lead out 30 interfaces, refer to below pin diagram, pin function definition table is interface definition.

TB-03F-KIT pin diagram

Table Pin Definitions

| No. | Pin Name | Function |
|---|---|---|
| 1 | RST | reset |
| 2 | C4 | PWM2 output/UART_CTS/PWM0 reverse output/SAR ADC input/GPIO PC4 |
| 3 | SWS | Single Line Slave/UART_RTS/GPIO PA7 |
| 4 | C3 | PWM1 output/UART_RX/I2C Serial Clock/32kHz Crystal input（selection） /GPIO PC3 |
| 5 | D7 | GPIO PD7/SPI clock（I2C_SCK） |
| 6 | B7 | SPI_DO data output/UART_RX/SAR ADC input/GPIO PB7 |
| 7 | B6 | SPI_DI data input （ I2C_SDA ） /UART_RTS/SAR ADC input/GPIO PB6 |
| 8 | NC | Empty |
| 9 | NC | Empty |
| 10 | GND | Ground |
| 11 | 3V3 | 3.3V power supply |

| 12 | NC | Empty |
|---|---|---|
| 13 | NC | Empty |
| 14 | GND | Ground |
| 15 | 5V | 5V power supply |
| 16 | VCC | 3.3V power supply |
| 17 | GND | Ground |
| 18 | TXD | UART_TX/GPIO PB1/PWM4 output/SAR ADC input |
| 19 | RXD | UART_RX/GPIO PA0/PWM0 reverse output |
| 20 | B5 | PWM5 output/SAR ADC input/GPIO PB5 |
| 21 | B4 | PWM4 output/SAR ADC input/GPIO PB4 |
| 22 | C2 | PWM0 output/I2C serial data/32kHz Crystal output（selection）/GPIO PC2 |
| 23 | A1 | GPIO PA1/ I2S_clock |
| 24 | GND | Ground |
| 25 | 3V3 | 3.3V power supply |
| 256 | D2 | GPIO PD2/PWM3 output/SPI Chip Selection（Low Level Effective）/I2S_LR |
| 27 | D3 | GPIO PD3/PWM1 reverse output/I2S_SDI |
| 28 | D4 | GPIO PD4/Single Line Host SWM/PWM2 Reverse output/I2S_SDO |
| 29 | C1 | I2C_CLK/PWM1 Reverse output/PWM0 output/GPIO PC1 |
| 30 | C0 | I2C_SDA/PWM4 Reverse output/UART_RTS /GPIO PC0 |

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# 5. Schematics
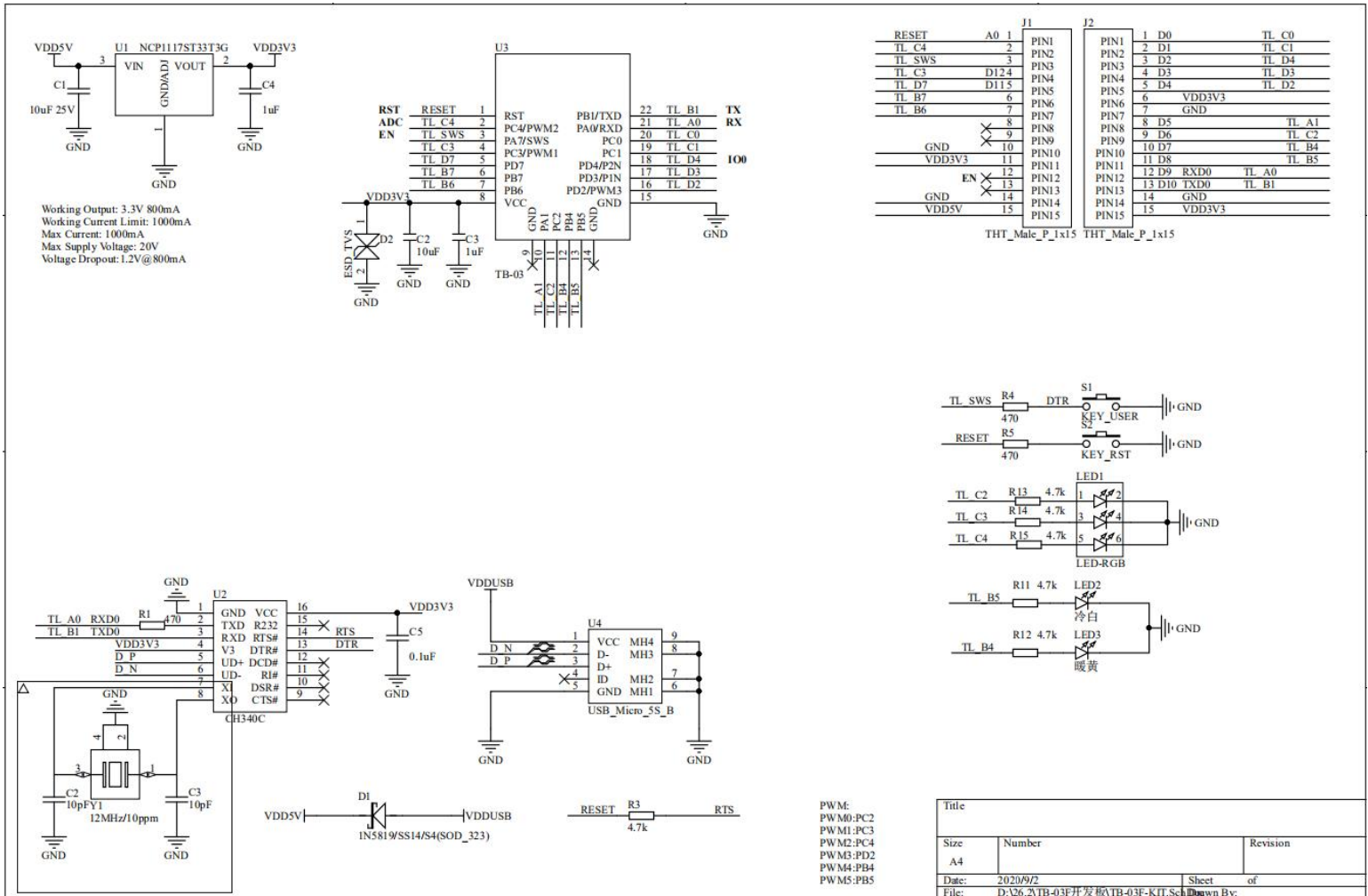


# 6. Design guidance

1、Application circuit
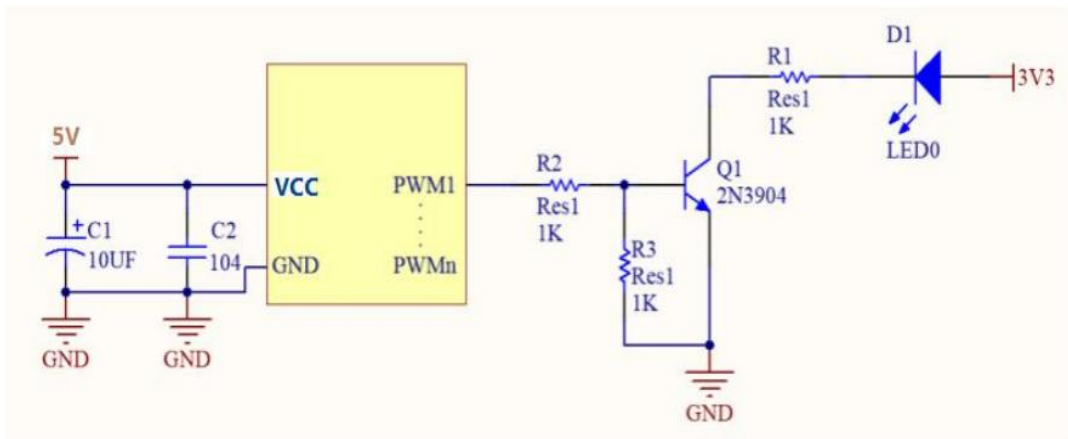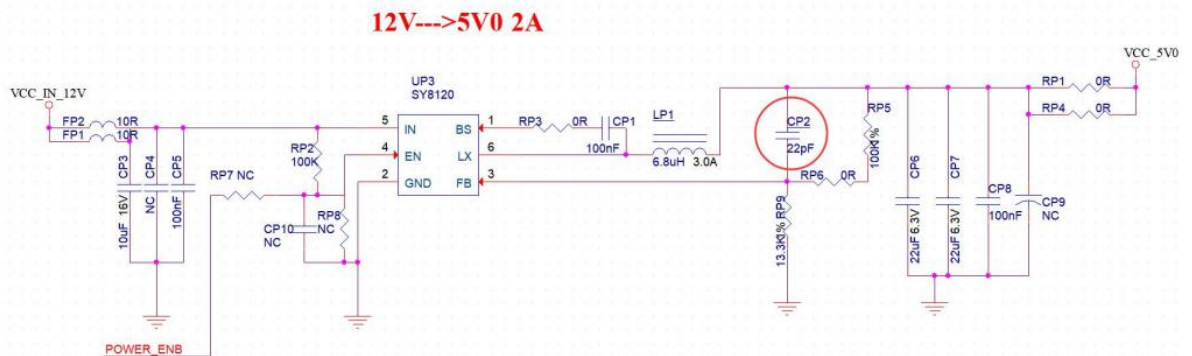
2、Antenna layout requirements

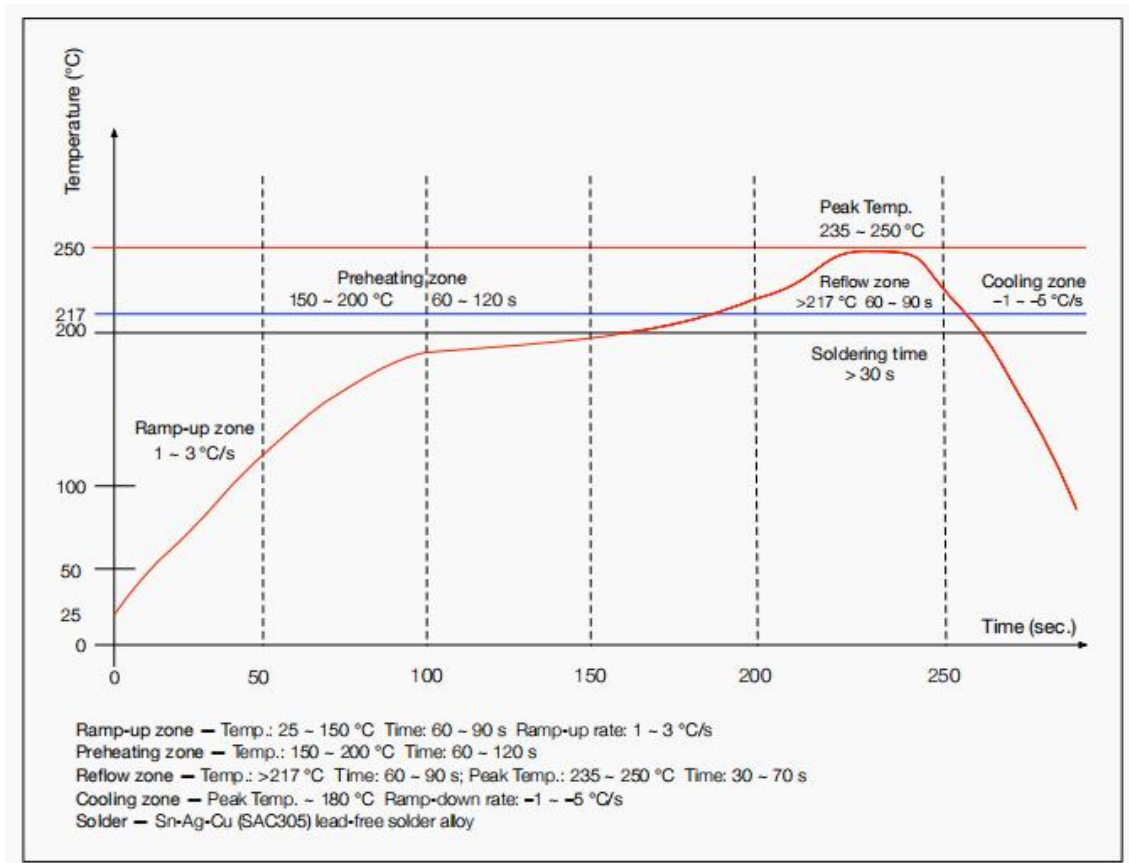Do not place metal parts around the module antenna, away from high frequency

devices.

3、Power supply

（1）、Recommended    voltage 5V, Peak:Current over 800mA .

（2）、It is recommended to use the LDO power supply；If DC-DC is used, the ripple is controlled within 30 mV.

（3）、DC-DC power supply circuit is recommended to reserve the position of the dynamic response capacitor, and the output ripple can be optimized when the load change is large.

（4）、5V power interface proposed to add ESD devices.

## 7.Reflow profile



Ramp-up zone — Temp.: 25 ~ 150 °C  Time: 60 ~ 90 s  Ramp-up rate: 1 ~ 3 °C/s
Preheating zone — Temp.: 150 ~ 200 °C  Time: 60 ~ 120 s
Reflow zone — Temp.: >217 °C  Time: 60 ~ 90 s; Peak Temp.: 235 ~ 250 °C  Time: 30 ~ 70 s
Cooling zone — Peak Temp. ~ 180 °C  Ramp-down rate: −1 ~ −5 °C/s
Solder — Sn-Ag-Cu (SAC305) lead-free solder alloy

## 8.Package Information

TB-03F-KIT is in anti-static bag package.

## 9.Contact us

Company website：https://www.ai-thinker.com

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