



E104-BT54S User Manual

BLUENRG355MC 2.4GHz 8dBm BLE Module



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The test data obtained in the article are all obtained by the Ebyte laboratory, and the actual results may vary slightly.

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1. Overview

1.1 Introduction

The E104-BT54S module is a wireless SOC module designed based on the BLUENRG355MC chip solution..It has a variety of transmission methods, working in the 2.4GHz frequency band, TTL level output, and 3.3V IO port voltage.

The BLUENRG355MC chip is based on a high-performance ARM Cortex-M0+ 32-bit core processor with a working frequency of 1MHz-64 MHz. The chip is embedded with high-speed memory (up to 64kbytes of SRAM), as well as a wide range of enhanced I/Os and peripherals. For more information on the chip, please refer to the official documentation.

This module is a pure hardware SoC module without a program at the factory. The Bluetooth-based function of broadcasting, scanning, connection, transparent transmission etc. can only be used after users' secondary development on it..



1.2 Features

- Support BLE 5.1;
- A new Bluetooth module developed based on BLUENRG355MC;
- Maximum transmit power 8dBm;
- Support deep sleep, the power consumption of the whole machine in this mode is about 1.3uA;
- Support the global license-free ISM 2.4GHz frequency band;
- Flash: 256 kB; RAM: 64 kB;
- 3.3V ~ 3.6V power supply, 3.3V power supply can guarantee the best performance;
- Industrial grade standard design, can work under -40 ~ 85 °C for a long time;
- IPEX interface/PCB antenna are available. .

2. Specification and parameter

2.1 Limit parameter

| Main parameter | Performance | | Remark |
|----------------------------|-------------|------|---|
| | Min. | Max. | |
| Power supply (V) | 0 | 3.6 | Voltage over 3.6V will cause permanent damage to module |
| Operating temperature (°C) | -40 | 85 | Industrial grade |

2.2 Operating parameter

| Main parameter | | Performance | | | Remark |
|---|--------------------|--------------------|------|------|--|
| | | Min. | Typ. | Max. | |
| Operating voltage (V) | | 1.8 | 3.3 | 3.6 | ≥3.3 V can ensures output power |
| Communication level (V) | | - | 3.3 | - | For 5V TTL, it may be at risk of burning down |
| Operating temperature (°C) | | -40 | - | 85 | Industrial design |
| Operating frequency (MHz) | | 2400 | - | 2480 | Support ISM band |
| Power consumption | TX current (mA) | - | 18 | - | Instant power consumption @8dBm |
| | RX current (mA) | - | 11 | - | 3.3V power supply |
| | Sleep current (μA) | - | 1.3 | - | Stop 2 mode, RTC enabled, please refer to the chip user manual for details |
| Max Tx power (dBm) | | 7.5 | 8.0 | 8.2 | - |
| Receiving sensitivity (dBm) | | -118 | - | -148 | - |
| Distance for reference (with PCB antenna) | | 150M | | | with PCB antenna |
| Distance for reference (IPEX interface) | | 300M | | | TX2400-JK-11 rubber antenna/antenna gain 2.5dBi |
| Package | | SMD | | | - |
| IC | | BLUENRG355MC QFN48 | | | - |
| Size | | 28*16mm*2.7mm | | | - |
| Antenna | | PCB/IPEX | | | Impedance is about 50 ohms |

3. Size and pin definition

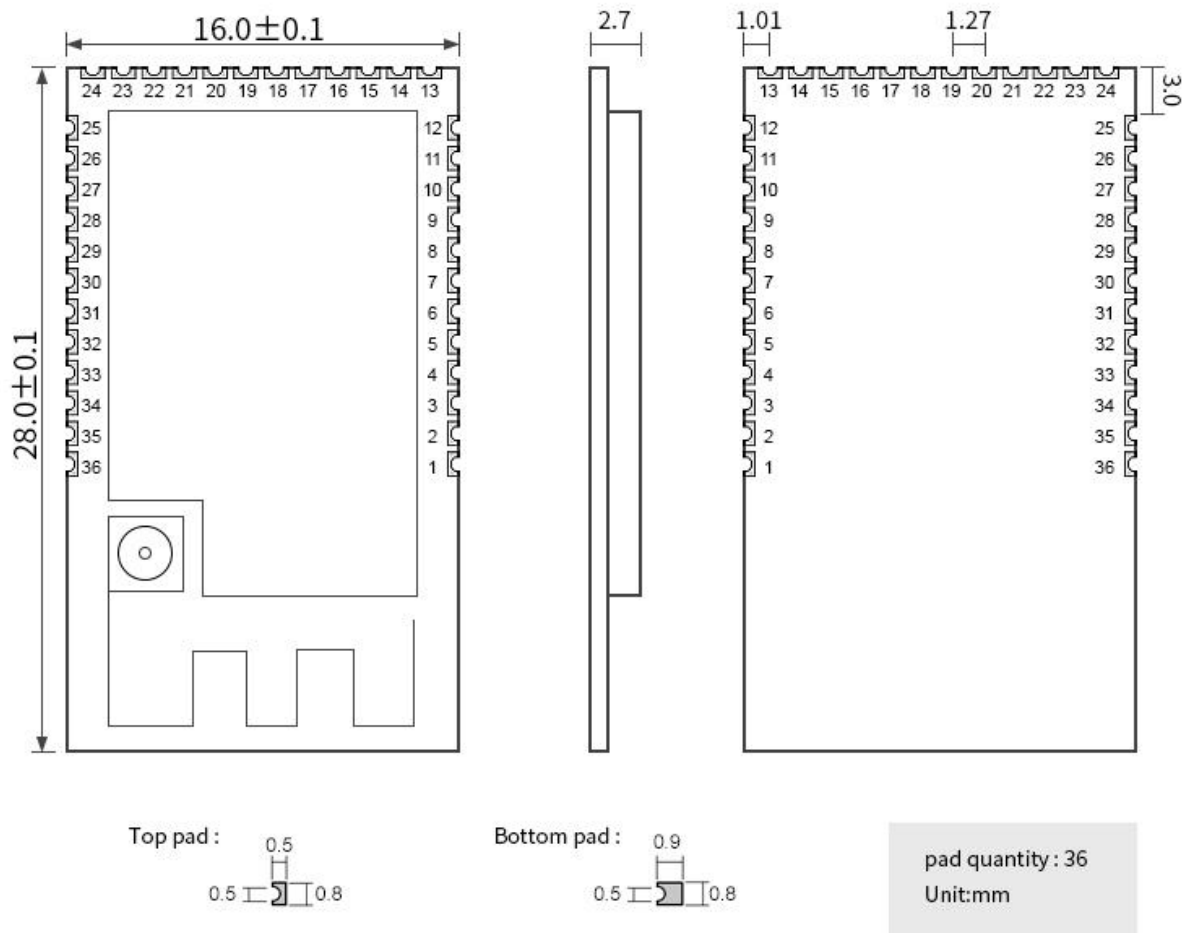


Figure 3-1 Mechanical size and pin definition

Table 3-1 Pin definition table

| Pin No. | Pin Name | Pin direction | Description |
|---------|---------------|---------------|---|
| 1 | GND | S | Ground wire, connected to the power reference ground; |
| 2 | PA0 | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 3 | PA1 | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 4 | PA2/SWDIO | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 5 | PA3/SWCLK | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 6 | PA4/LPUART TX | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 7 | PA5/LPUART RX | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 8 | PA6 | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 9 | PA7 | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 10 | PB15 | I/O | MCU GPIO, please refer to the chip user manual for details; |

| | | | |
|----|---------|-----|--|
| 11 | PB14 | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 12 | VDD | S | Power supply pin, 1.7-3.6V, read the chip user manual for details |
| 13 | GND | S | Ground wire, connected to the power reference ground; |
| 14 | RST | I/O | Module reset pin, built-in power-on reset circuit; |
| 15 | VDDA | S | 1.2 V analog ADC core, read the chip user manual for details ; |
| 16 | PB11 | I/O | Module power supply is positive, voltage range: 1.8~3.6V DC (recommend to add ceramic filter capacitor) |
| 17 | PB10 | I/O | Ground wire, connected to the power reference ground; |
| 18 | PB9 | I/O | The backup power supply is positive, the voltage range: 1.55~3.6V DC (recommend to add ceramic filter capacitors externally) |
| 19 | PB8 | I/O | Analog power supply is positive, voltage range: 1.71~3.6V DC (recommend to add ceramic filter capacitors externally) |
| 20 | PB7 | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 21 | PB6 | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 22 | PB5 | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 23 | PB4 | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 24 | GND | S | MCU GPIO, please refer to the chip user manual for details; |
| 25 | PB3 | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 26 | PB2 | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 27 | PB1 | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 28 | PB0 | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 29 | PA15 | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 30 | PA14 | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 31 | PA13 | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 32 | PA12 | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 33 | PA11 | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 34 | PA10 | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 35 | PA9/TXD | I/O | MCU GPIO, please refer to the chip user manual for details; |
| 36 | PA8/RXD | I/O | MCU GPIO, please refer to the chip user manual for details; |

Note: For more chip information, please refer to the official information of "BLUENRG355MC".

4. Welding operation guidance

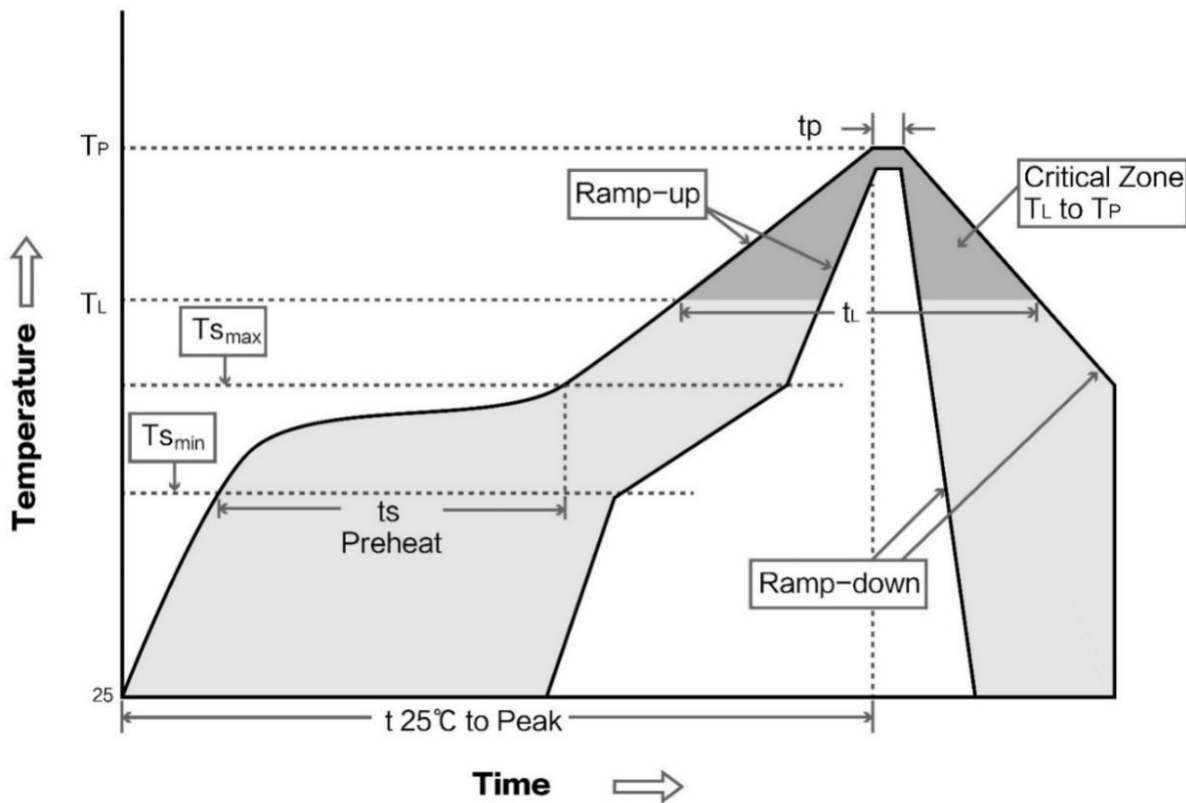
4.1 Reflow Soldering Temperature

Table 4-1 Reflow soldering temperature table

| Profile Feature | Curve feature | Sn-Pb Assembly | Pb-Free Assembly |
|-----------------|---------------|----------------|------------------|
| Solder Paste | Solder paste | Sn63/Pb37 | Sn96.5/Ag3/Cu0.5 |

| | | | |
|---|------------------------------------|---------------|---------------|
| Preheat Temperature min (T _{smin}) | Minimum preheating temperature | 100℃ | 150℃ |
| Preheat temperature max (T _{smax}) | Maximum preheating temperature | 150℃ | 200℃ |
| Preheat Time (T _{smin} to T _{smax})(t _s) | Preheating time | 60-120 sec | 60-120 sec |
| Average ramp-up rate(T _{smax} to T _p) | Average rising rate | 3℃/second max | 3℃/second max |
| Liquidous Temperature (T _L) | Liquid phase temperature | 183℃ | 217℃ |
| Time (t _L) Maintained Above (T _L) | Time above liquidus | 60-90 sec | 30-90 sec |
| Peak temperature (T _p) | Peak temperature | 220-235℃ | 230-250℃ |
| Average ramp-down rate (T _p to T _{smax}) | Average descent rate | 6℃/second max | 6℃/second max |
| Time 25℃ to peak temperature | Time of 25 ° C to peak temperature | 6 minutes max | 8 minutes max |

4.2 Reflow Soldering Curve



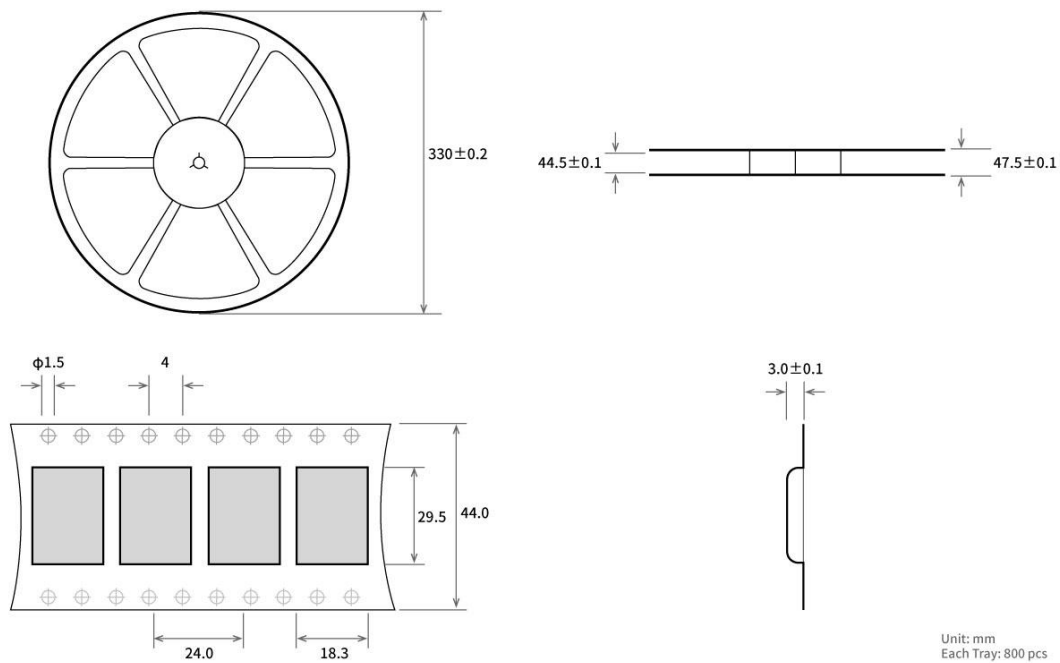
5. Antenna Type

5.1 Antenna recommendation

The antenna plays an important role in the communication process. The inferior antenna often has a great impact on the communication system. Therefore, we recommend some antennas that support our wireless modules and have excellent performance and reasonable price.

| Product | Type | Frequency Hz | Gain dBi | Size mm | Wire cm | Interface | Feature |
|----------------|------------------|--------------|----------|---------|---------|-----------|--------------------------------------|
| TX2400-NP-5010 | Flexible antenna | 2.4G | 2.0 | 10*50 | - | IPEX | Built-in flexible FPC soft |
| TX2400-JZ-3 | Rubber antenna | 2.4G | 2.0 | 30 | - | SMA-J | Short straight, omnidirectional |
| TX2400-JZ-5 | Rubber antenna | 2.4G | 2.0 | 50 | - | SMA-J | Short straight, omnidirectional |
| TX2400-JW-5 | Rubber antenna | 2.4G | 2.0 | 50 | - | SMA-J | Fixed bend, omnidirectional |
| TX2400-JK-11 | Rubber antenna | 2.4G | 2.5 | 110 | - | SMA-J | Bendable, omnidirectional |
| TX2400-JK-20 | Rubber antenna | 2.4G | 3.0 | 200 | - | SMA-J | Bendable, omnidirectional |
| TX2400-XPL-150 | Sucker antenna | 2.4G | 3.5 | 150 | 150 | SMA-J | Small sucker antenna, cost effective |

6. Batch packaging



Revision history

| Version | Date | Description | Issued by |
|---------|-----------|-----------------|-----------|
| 1.0 | 2021-8-18 | Initial version | |

About us



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