®

nRF52832 Wireless Module

E73 Series

User Manual

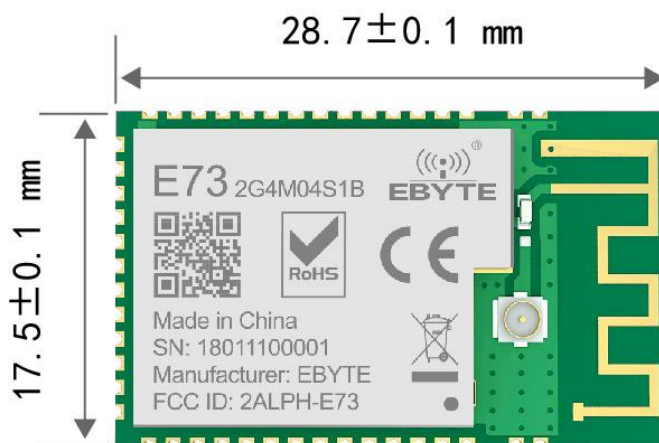| Version	Date	Description	Issued by
1.00	2017/12/06	Initial version	huaa

Brief Introduction

FIG. 1   E73

E73 series are wireless Bluetooth modules designed by Chengdu Ebyte which feature small size, low power consumption, built in PCB antenna . E73 series adopt the originally imported RFIC nRF52832of NORDIC, supporting BLE 5.0. The chip has high-performance ARM CORTEX-M4F kernel and other peripheral resources, such as UART, I2C, SPI, ADC, DMA, PWM etc. The module led out all the IO port of nRF52832 for multilateral development. For more details about nRF52832, please refer to the datasheet of NORDIC.

Compared with Bluetooth 4.2, Bluetooth 5 has the following advantages: Four data rates are now available 2Mbps, 1Mbps, 500kbps and 125kbps. The 2Mbps clearly offers higher throughput possibilities. The broadcasting capacity is increased(x8). Broadcasting extension makes the data length increase to 251 bytes which enables more effective data transmission in beacon applications.

E73 series are hardware platform without firmware, so users need to conduct a secondary development. This series have maximized the RF characteristics of chip. The built-in 32.768K real-time clock crystal oscillator can benefit the users in programming.

Model	Frequency	Transmitting power	Distance(PCB)	Packing	Antenna
E73-2G4M04S-52832	2.4GHz	4dBm	100m	SMD	PCB

NOTE:IPEX antenna port dont connect to all circuit and permanently disable function in device with FCC ID:2ALPH-E73

CONTENTS

1. Technical Parameters

Model	IC	Size	Net weight	Operating temperature	Operating humidity	Storage temperature
E73-2G4M04S-52832	nRF52832	PCB	17.5 * 28.7 mm	1.8±0.1g	-40 ~ 85C°	10% ~ 90%

1.1 E73-2G4M04S-52832

| Parameter	Min	Typ	Max	Unit
Transmitting current	78	83	91	mA
Receiving current	14.7	18.5	20.0	mA
Turn-off current	0.4	0.5	0.6	μA
Transmitting power	19	20	21	dBm
Receiving sensitivity	-119	-121	-123	dBm
Voltage supply	425	433	525	MHz
Communication level	1.8	3.3	3.6	V

Parameters Notes

- When designing current supply circuit, 30% margin is recommended to be remained so as to ensure long-term stable operation of the whole module.

- The current at the instant of transmitting may be high, but the total energy consumed may be lower due to very short transmitting time.

- When using external antenna, the impedance matching degree at different frequency points between antenna and module may affect the transmitting current at different levels.

- The current consumed when the RF chip is only working at receiving mode is called as receiving current. The tested receiving current may be higher for some RF chips with communication protocol or when the developers have loaded their own protocol to the whole module.

- The current at pure receiving mode is at mA level. To achieve μA level receiving current, the users need to manage it through firmware development.

- The receiving sensitivity is tested at the speed rate of 1kbps.

- The turn-off current is always lower than the current consumed when the power supply source of the whole module is at no-load status.

- Each LRC component has ±0.1% error, and the error will accumulate since multiple LRC components are used in the whole RF circuit, and the transmitting current will be different at different modules.

- The power consumption can be lowered by lowering the transmitting power, but the efficiency of the internal PA will be decreased by lowering transmitting power due to various reasons.

2. Mechanical Characteristics

2.1 E73-2G4M04S-52832

2.1.1 Dimension
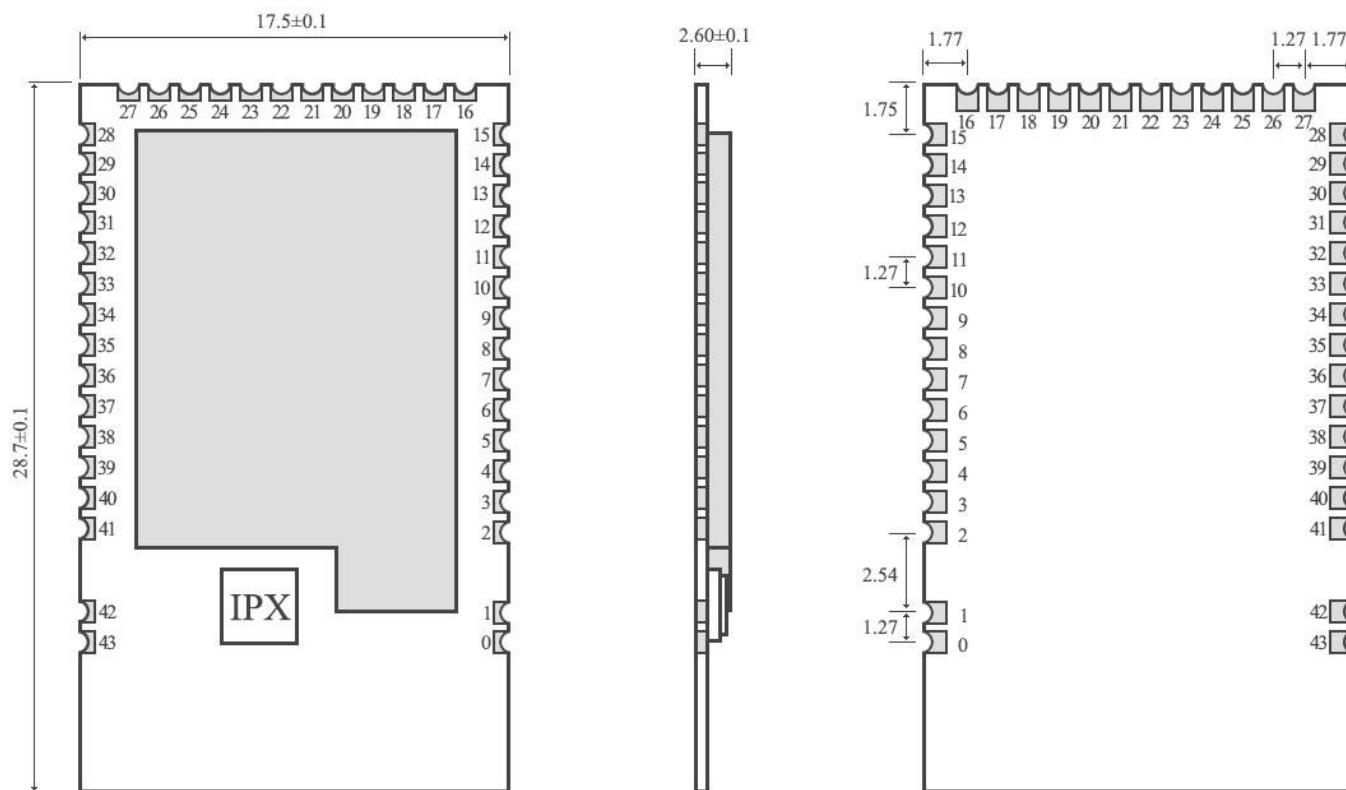
2.1.2 Pin Definition

No.	Pin item	Pin direction	Application
0	GND	Input	Ground electrode, connect to reference ground of power
1	GND	Input	Ground electrode, connect to reference ground of power
2	GND	Input	Ground electrode, connect to reference ground of power
3	DEC2	Input/Output	MCU GPIO
4	DEC3	Input/Output	MCU GPIO
5	P0.25	Input/Output	MCU GPIO
6	P0.26	Input/Output	MCU GPIO
7	P0.27	Input/Output	MCU GPIO
8	P0.28	Input/Output	MCU GPIO
9	P0.29	Input/Output	MCU GPIO
10	P0.30	Input/Output	MCU GPIO

11	P0.31	Input/Output	MCU GPIO
12	DEC4	Input/Output	MCU GPIO
13	DCC	Input/Output	MCU GPIO
14	DEC1	Input/Output	MCU GPIO
15	GND	Input/Output	MCU GPIO
16	VCC	Input	Power supply 1.8 ~ 3.6V DC (Note: The voltage higher 3.6V is forbidden)
17	P0.02	Input/Output	MCU GPIO
18	P0.03	Input/Output	MCU GPIO
19	P0.04	Input/Output	MCU GPIO
20	P0.05	Input/Output	MCU GPIO
21	P0.06	Input/Output	MCU GPIO
22	P0.07	Input/Output	MCU GPIO
23	P0.08	Input/Output	MCU GPIO
24	P0.09	Input/Output	MCU GPIO
25	P0.10	Input/Output	MCU GPIO
26	P0.11	Input/Output	MCU GPIO
27	P0.12	Input/Output	MCU GPIO
28	P0.13	Input/Output	MCU GPIO
29	P0.14	Input/Output	MCU GPIO
30	P0.15	Input/Output	MCU GPIO
31	P0.16	Input/Output	MCU GPIO
32	P0.17	Input/Output	MCU GPIO
33	P0.18	Input/Output	MCU GPIO
34	P0.19	Input/Output	MCU GPIO
35	P0.20	Input/Output	MCU GPIO
36	P0.21	Input/Output/RST	MCU GPIO
37	SWDCLK	Input	MCU GPIO
38	SWDIO	Input/Output	MCU GPIO
39	P0.22	Input/Output	MCU GPIO
40	P0.23	Input/Output	MCU GPIO
41	P0.24	Input/Output	MCU GPIO
42	GND	Input	Ground electrode, connect to power reference ground
43	GND	Input	Ground electrode, connect to power reference ground
For more details, please refer to 《nRF52832Datasheet》 in NORDIC.			

3. Development and Application

| No.	Item	Notes
1	Burn Firmware	1. The module is embedded with ARM MCU. For program downloading, please use the J-LINK downloader, any other serial port or JTAG、ISP、ICP are unavailable to download. 2. There are two ways to download the program. The protocol stack of NORDIC is not programmed yet, so users need to use the official nRFgo studio of NORDIC to program the protocol stack first, then program the hex of application code. Or, to program the protocol stack of NORDIC first and download via the IAR or KEIL. Website of tool download: http://www.nordicsemi.com/eng/Products/Bluetooth-low-energy/nRF52832/(language)/eng-GB
2	Testing Board	Testing board is not available.

4. Production Guidance

4.1 Reflow Soldering Temperature

Profile Feature	Sn-Pb Assembly	Pb-Free Assembly
Solder Paste	Sn63/Pb37	Sn96.5/Ag3/Cu0.5
Preheat Temperature min （Tsmin）	100C°	150C°
Preheat temperature max (Tsmax)	150C°	200C°
Preheat Time (Tsmin to Tsmax)(ts)	60-120 sec	60-120 sec
Average ramp-up rate(Tsmax to Tp)	3C°/second max	3C°/second max
Liquidous Temperature (TL)	183C°	217C°
Time（tL）Maintained Above（TL）	60-90 sec	30-90 sec
Peak temperature（Tp）	220-235C°	230-250C°
Aveage ramp-down rate（Tp to Tsmax）	6C°/second max	6C°/second max
Time 25C° to peak temperature	6 minutes　max	8 minutes　max

4.2 Reflow Soldering Curve
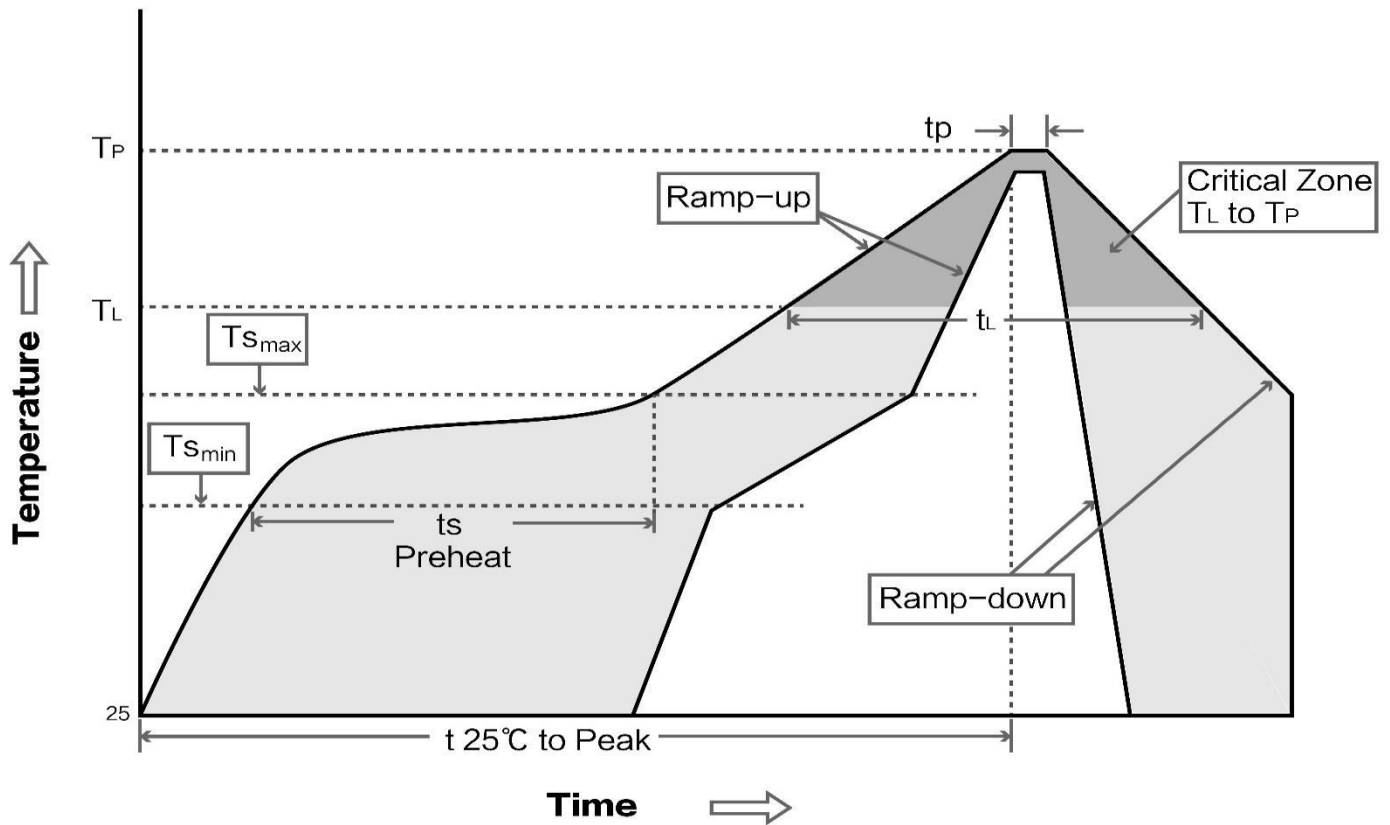
5. FAQ

5.1 Communication range is too short

● The communication distance will be affected when obstacle exists.

● Data lose rate will be affected by temperature, humidity and co-channel interference.

● The ground will absorb and reflect wireless radio wave, so the performance will be poor when testing near ground.

● Sea water has great ability in absorbing wireless radio wave, so performance will be poor when testing near the sea.

● The signal will be affected when the antenna is near metal object or put in a metal case.

● Power register was set incorrectly, air data rate is set as too high (the higher the air data rate, the shorter the distance).

● When the power supply at room temperature is lower than the recommended low voltage, the lower the voltage is, the lower the transmitting power is.

● Due to antenna quality or poor matching between antenna and module.

5.2 Module is easy to damage

● Please check the power supply and ensure it is within the recommended range. Voltage higher than the peak will lead to a permanent damage to the module.

● Please check the stability of power supply and ensure the voltage not to fluctuate too much.

● Please make sure anti-static measures are taken when installing and using, high frequency devices have electrostatic susceptibility.

● Please ensure the humidity is within limited range for some parts are sensitive to humidity.

● Please avoid using modules under too high or too low temperature.

6. Important Notes

- All rights to interpret and modify this manual belong to Ebyte.
- This manual will be updated based on the upgrade of firmware and hardware, please refer to the latest version.
- Please refer to our website for new product information.

7. About Us

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FCC Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Radiation Exposure Statement

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: 2ALPH-E73 Or Contains FCC ID: 2ALPH-E73 "

When the module is installed inside another device, the user manual of the host must contain below warning statements;

1. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference.
(2) This device must accept any interference received, including interference that may cause undesired operation.

2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

IPEX antenna port dont connect to all circuit and permanent disable function in device with FCC ID:2ALPH-E73