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1. General Description

YGB-T3LB is a low power embedded Bluetooth module developed by Argrace. It is mainly composed of a highly integrated Bluetooth chip TG7120B and a small number of peripheral circuits. It has built-in Bluetooth network communication protocol stack and rich library functions. The YGB-T3LB also includes a low-power 32-bit MCU that supports Bluetooth SIG MESH, BLE5.2/2.4g Radio, nine reusable IO ports, 512KB built-in FLASH, and over-the-AIR upgrades.

2. Features

- Built-in low power 32 bit MCU, can double as application processor.
- Operating voltage: 1.8V-3.6V, between 1.8V and 2.7V, the module can start, but cannot guarantee optimal RF performance; If the module performance is normal between 2.8V and 3.6V, 3.3V is recommended.
- Peripheral: 5xPWM, IIC, UART
- BLE RF features - BLE 5.0 TX transmit power: +8dBm, RX receive sensitivity: -93dBm
- With onboard PCB antenna, antenna gain 1.5dBi
- Operating temperature: -20°C to +105°C
- Application area
 - Smart LED
 - Smart home
 - Intelligent low power sensor

3. Electrical Parameters

3.1 Absolute electrical parameters

Parameter	Description	Min.	Max.	Unit
Ts	Storage temperature	-40	120	°C
VCC	Supply voltage	-0.3	3.6	V
ESD_HBM	Electrostatic release voltage (human model)	-	2000	V
ESD_MM	Electrostatic release voltage (Machine Model)	-	500	V

3.2 Normal working conditions

Parameter	Description	Min	Typical	Max	Unit
Ta	Operating temperature	-40	-	105	°C

VCC	Supply voltage	2.8	3.3	3.6	V
VIL	IO low level input	VSS	-	$VCC \times 0.3$	V
VIH	IO high level input	$VCC \times 0.7$	-	VCC	V
VOL	IO low level output	VSS	-	$VCC \times 0.1$	V
VOH	IO high level Output	$VCC \times 0.9$	-	VCC	V

3.3 Power consumption during continuous transmission and reception

Symbol	Condition	Avg.	Unit
I _{tx}	Continuous transmission, 0dBm output power	10	mA
I _{tx}	Continuous transmission, 0dBm output power	35	mA
I _{rx}	Continuous receive	10	mA
I _{deepsleep}	Deep sleep mode (reserved RAM)	4	uA

4. RF parameters

4.1 Basic RF parameters

Item	Description
Working frequency	2.4GHz ISM band
Wireless standards	BLE 5.2
Message transmission rate	1Mbps, 2Mbps
Type of antenna	Onboard PCB antenna

4.2 RF output power

Item	Min.	Typ.	Max.	Unit
RF average output power	-20	0	8	dBm

4.3 RF sensitivity

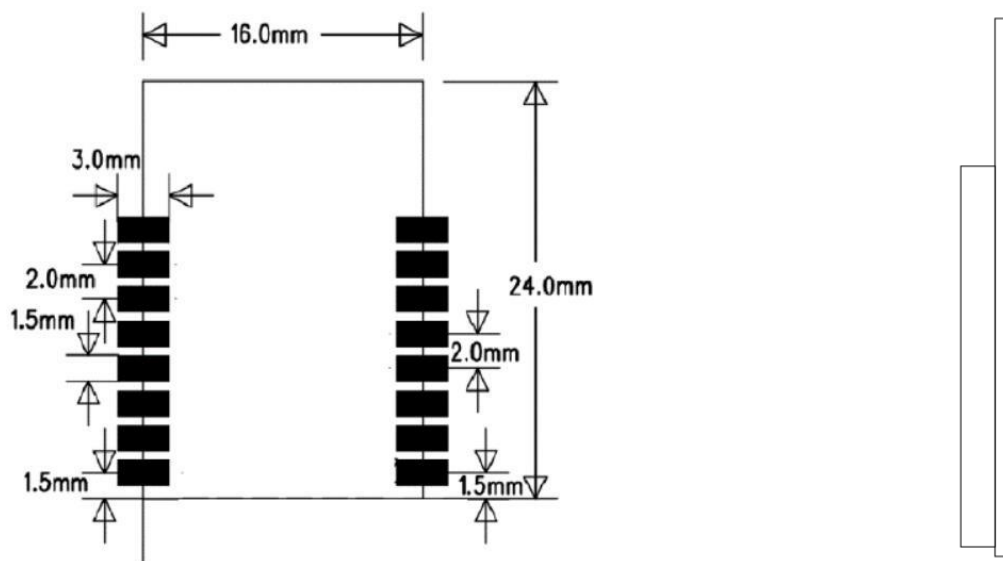
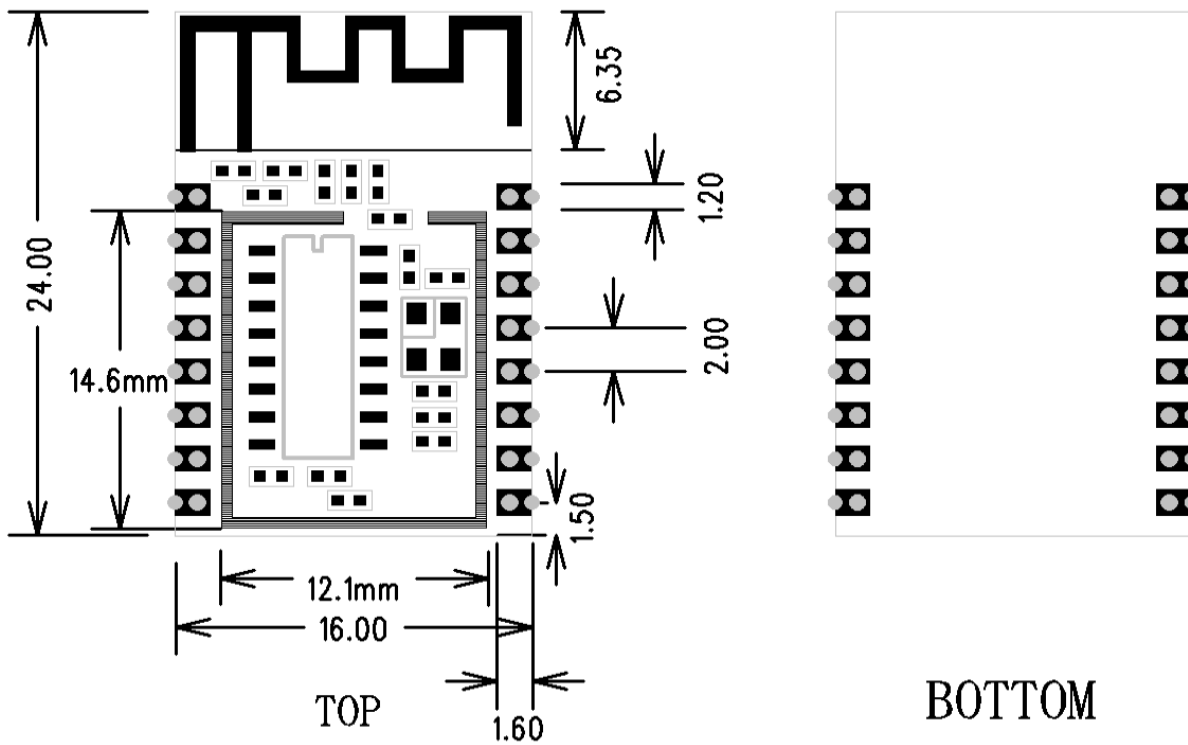
Item	Min.	Typ.	Max.	Unit
RX sensitivity (1Mbps)	-	-93		dBm
Co-channel interference suppression	-	-6	-	dB

5. Module interface

5.1 Size package

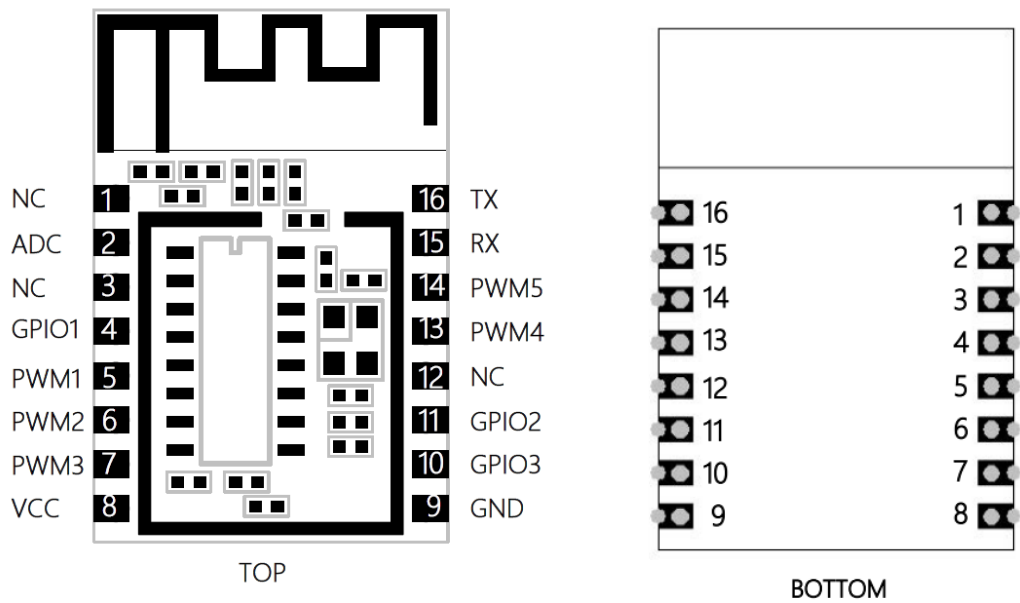
YGB-T3LB has two rows of pins, the pin spacing is 2mm.

YGB-T3LB size: $16.0 \pm 0.3\text{mm}$ (W) $\times 24.0 \pm 0.3\text{mm}$ (L) $\times 3.0 \pm 0.3\text{mm}$ (H), wherein PCB thickness $0.8\text{mm} \pm 0.1\text{mm}$, package as shown in the figure.



PCB Recommended packages

5.2 Pin Definition



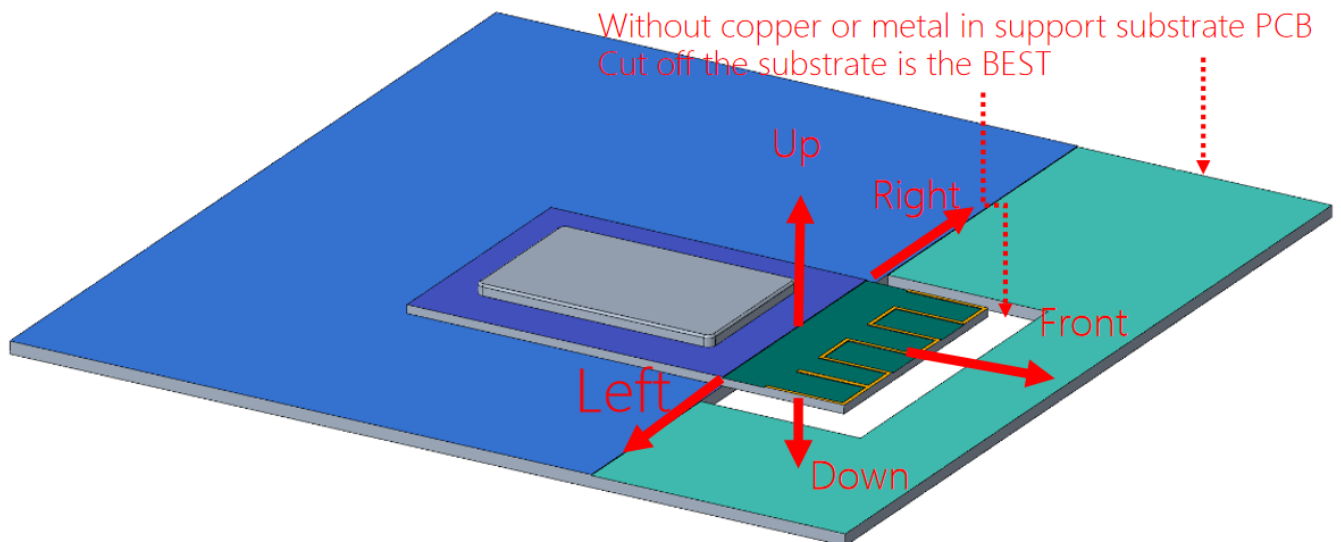
Interface pins are defined in the following table
 Description: P represents the power pin, I/O represents the input/output pin, and AI represents the analog input.

Pin	Definition	Signal Type	Description
1	NC	NC	NC
2	ADC	I/O	General IO, corresponding to IC P11
3	NC	NC	NC
4	GPIO1	I/O	General IO, corresponding to IC P34
5	PWM1	I/O	General IO, can do LED drive PWM output, corresponding to IC P2
6	PWM2	I/O	General IO, can do LED drive PWM output, corresponding to IC P3
7	PWM3	I/O	General IO, can do LED drive PWM output, corresponding to IC P7
8	VCC	P	External supply 3.3V
9	GND	P	GND
10	GPIO3	I/O	General IO, corresponding to IC P14
11	GPIO2	I/O	General IO, corresponding to IC P15
12	NC	NC	NC
13	PWM4	I/O	General IO, can do LED drive PWM output, corresponding to IC P18
14	PWM5	I/O	General IO, can do LED drive PWM output, corresponding to IC P20
15	RX	I/O	Corresponding to IC P10
16	TX	I/O	Corresponding to IC P10

6. Antenna Precautions

- A. Do not install it in a metal housing as it will shield radio frequency signals.
- B. PCB layout: The antenna part of the module is PCB antenna, and the metal material will weaken the function of the antenna. When the module is laid out, it is forbidden to lay the floor and route the cable under the module antenna. It is recommended that the PCB area of the hollow bottom plate be larger than the antenna area and be expanded more than 5mm. It is recommended that the module be placed on the edge or corner of the PCB (not in the middle of the bottom plate), and the antenna area protruding out of the PCB of the customer bottom plate.
- C. Layout wiring layout: It is recommended to use star wiring for power supply lines, and ensure good linearity of power supply of the module. The ground must be separated from the ground of power amplifier and MCU, and there should be no other interference ground at the lower side of the module, and no interference wires such as control wires, power cables, audio wires and MIC wires around the antenna.
- D. If there is a connector row near the module antenna or a metal shell, which may affect the signal, you are advised to use the connector version for external antennas. If there are batteries, metal objects, LCD panels, speakers, etc., on the side of the module antenna, it should be at least 15mm away from the antenna (as shown in the figure).

Antenna Keeout Up/Down/Left/Right and Front without Metal
, at least 15mm away from other metal parts



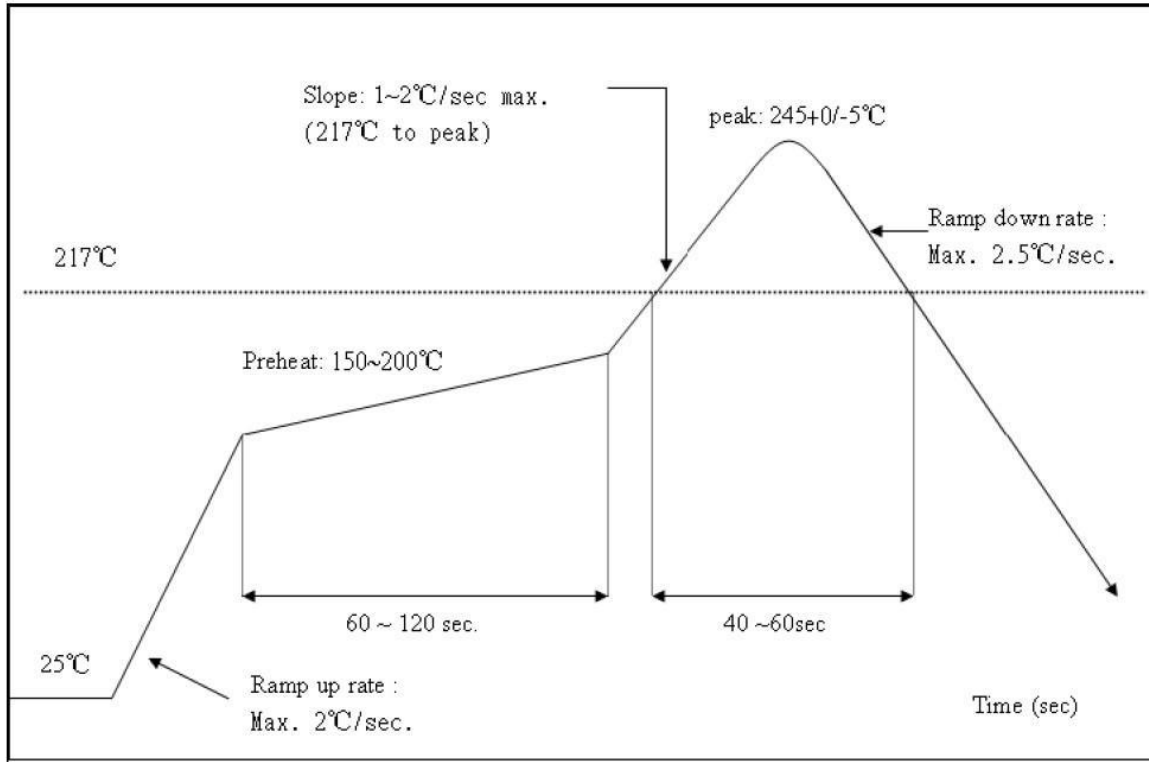
7. Recommended Reflow Profile

7.1 Recommended furnace temperature curve.

Referred to IPC/JEDEC standard

Peak Temperature: $<250^{\circ}\text{C}$

Number of Times: ≤ 2 times



7.2 Storage conditions of factory modules:

7.2.1 Precautions for using modules are as follows:

1. When the customer opens the steel mesh, it is suggested to enlarge the hole of the module pad. Please open the steel mesh at the ratio of 1:1 and then expand 0.2mm outward. The thickness is 0.12mm (according to the process adjustment of each factory).
2. Do not carry modules with bare hands. Wear gloves and static rings.
3. The furnace temperature depends on the size of the customer's motherboard. Generally, the standard temperature on a tablet computer is $250+/-5^{\circ}$.

7.2.2 Precautions for module storage and use control are as follows:

The humidity sensitivity level of the module is MSL3, pay attention to the requirements of preservation after unpacking and re-baking over time.

1. Storage period of vacuum packaging module:

- 1-1. Storage life: 12 months, storage environment: temperature: $<40^{\circ}\text{C}$, relative humidity: $<90\%\text{R.H.}$
- 1-2. SMT assembly time after module packaging is removed:
- 1-3. Check the humidity card: the display value should be less than 30% (blue), for example: 30% to 40% (pink) or greater than 40% (red) indicates that the module has absorbed moisture.
 - 1-3-1 Factory ambient temperature and humidity control: $\leq 30^{\circ}\text{C}$, $\leq 60\%\text{R.H.}$
 - 1-3-2 After unsealing, the storage life of the workshop is 168 hours.
- 1-4. If it is not used up within 168 hours after unpacking, it needs to be baked under the following

conditions:

1-4-1 module must be re-baked to eliminate module moisture absorption problems.

1-4-2 Baking temperature: 125°C, 8 hours..

1-4-3 After baking, put in appropriate desiccant and then seal the package.

1-5. The quantity of module vacuum packaging shall be subject to the actual packaging quantity required by the customer

Packing items of module reels are as follows:

2-1. Storage life: 12 months, storage environment: temperature: <40°C, relative humidity: <90%R.H.

2-2. 168 hours after the module is unpacked, if the patch is to be put on line, it needs to be baked again to remove the moisture absorption problem of the module. The baking temperature is 125°C for 8 hours.

2-3. Module coil packaging is subject to the actual packaging quantity required by the customer. Coil packaging picture <2>

Module tray packing items are as follows:

3-1. Storage life: 3 months, storage environment: temperature: <40°C, relative humidity: <90%R.H.

3-2. If the module is not used within 48 hours, it needs to be baked before it goes online. The baking temperature is 125°C for 8 hours.

Note: the above packing method is subject to customer's requirement, and the packing is subject to actual shipment.

8. FCC Statement

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

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the

following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

The device must not be co-located or operating in conjunction with any other antenna or transmitter. 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.

The minimum separation generally be used is at least 20 cm.

The DUT are produced with a standard PVC enclosure that does not affect wireless transmission and reception characteristics.

This device is intended only for OEM integrators under the following conditions:

The antenna must be installed such that 20 cm is maintained between the antenna and users, and the maximum antenna gain allowed for use with this device is 1.5 dBi.

The transmitter module may not be co-located with any other transmitter or antenna.

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains FCC ID: 2AYYQ-YGB-T3LB". The grantee's FCC ID can be used only when all FCC compliance requirements are met.

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

9. CE Statement

Hereby, Hangzhou Yaguan Technology Co., LTD declares that the radio equipment Bluetooth Low Energy Module non-specific SRD is in compliance with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address: <https://argrace.ai/page/PC/home.html>

This radio equipment operates with the following frequency bands and maximum EIRP power:
 BLUETOOTH_LE 2402MHz ~2480MHz : 5.78 dBm

A minimum separation distance of 20cm must be maintained between the user's body and the device, including the antenna during body-worn operation to comply with the RF exposure requirements in Europe.

