YLB1 Module Datasheet

Hardware Product Development > Network Modules > BLE Module >

BK Series

Version: 20210311

Online Version

Contents

YLB1 is a low-power embedded Bluetooth module that Tuya has developed. Embedded with the Bluetooth network communication protocol stack and rich library functions

1 Overview

YLB1 consists of a highly integrated Bluetooth chip (BK3432) and a few peripheral circuits. YLB1 further consists of a low-power 32-bit MCU, a Bluetooth 2.4G-radio, a 160-KB flash memory, and a 20-KB static random-access memory (SRAM).

1.1 Features

- Embedded low-power 32-bit MCU, which can also function as an application processor.
- Built-in high-precision 10-bit ADC
- Working voltage: 1.61 to 3.6V
- Support interfaces such as UART, GPIO, I2C, PWM, ADC, SPI and JTAG
- Bluetooth LE RF features
  - Compatible with the Bluetooth LE 4.2
  - The RF data rate can be up to 1 Mbps.
  - TX power:+3 dBm
  - RX sensitivity: -92 dBm@Bluetooth LE 1 Mbps
  - Onboard PCB antenna with a gain of 0.2 dBi
  - Working temperature: -20℃ to +85℃

1.2 Applications

- Smart LED
- Smart home
- Health products

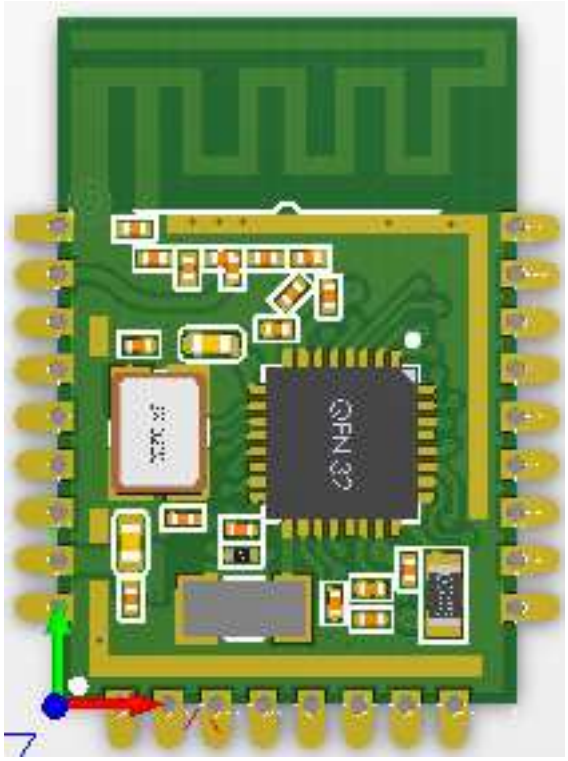
1.3 Change history

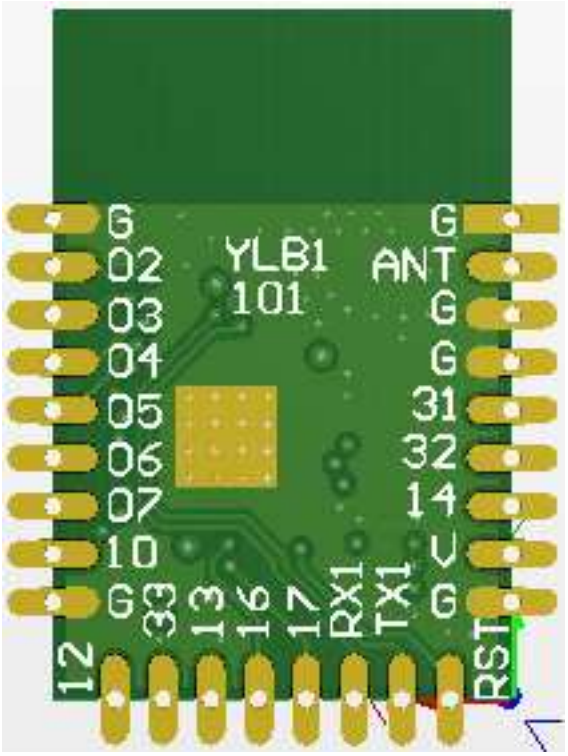
Date	Updated content	Version after update
2021-2-22	This is the first release.	V1.0.0

2 Module interfaces

2.1 Dimensions and package

YLB1 has 3 rows of pins with a spacing of 1.25 mm. The YLB1 dimensions are 12±0.35 mm (W)×18±0.35 mm (L) ×2.8±0.15 mm (H). The thickness of the PCB is 0.8 mm±0.1 mm.





2.2 Pin definition

The definition of interface pins is shown in the following table:

Pin No.	Symbol	I/O type	Function
1, 3, 4, 9, 18 and 26	G	P	Power supply reference ground
2	ANT	I/O	Connected to the external antenna if needed
5	31	I/O	Common I/O interface, which can work as ADC input and correspond to P<31> of the IC

Pin No.	Symbol	I/O type	Function
6	32	I/O	Common I/O interface, which can work as ADC input and correspond to P<32> of the IC
7	14	I/O	Common I/O interface, which can output PWM as the drive of LED and correspond to P<14> of the IC
8	V	P	Power supply pin
10	RST	I	Reset pin, active low
11	TX1	I/O	Common I/O interface, the interface for communication between UART_TXD1 and MCU
12	RX1	I/O	Common I/O interface, the interface for communication between UART_RXD1 and MCU

Pin No.	Symbol	I/O type	Function
13	17	I/O	Common I/O interface, UART_RXD2, correspond to P<17> of the IC
14	16	I/O	Common I/O interface, UART_TXD2, correspond to P<16> of the IC
15	13	I/O	Common I/O interface, which can output PWM as the drive of LED and correspond to P<13> of the IC
16	33	I/O	Common I/O interface, which can work as ADC input and correspond to P<33> of the IC
17	12	I/O	Common I/O interface, which can output PWM as the drive of LED and correspond to P<12> of the IC

Pin No.	Symbol	I/O type	Function
19	10	I/O	Common I/O interface, which can output PWM as the drive of LED and correspond to P<10> of the IC
20	07	I/O	Common I/O interface, PWM/SPI_NSS/JTAG_TMS, correspond to P<07> of the IC
21	06	I/O	Common I/O interface, SPI_MISO/PWM/JTAG_TCK, correspond to P<06> of the IC
22	05	I/O	Common I/O interface, SPI_MOSI/JTAG_TDO, correspond to P<05> of the IC
23	04	I/O	Common I/O interface, SPI_SCK/JTAG_TDI, correspond to P<04> of the IC
24	03	I/O	Common I/O interface, I2C_SDA/JTAG_NTRST, correspond to P<03> of the IC

Pin No.	Symbol	I/O type	Function
25	02	I/O	Common I/O interface, I2C_SCL, correspond to P<02> of the IC

> **Note**: P indicates a power supply pin and I/O indicates an input/output pin. If you have your own requirements on the light color controlled by the PWM output, please contact your account manager in Tuya.

3 Electrical parameters

3.1 Absolute electrical parameters

Parameter	Description	Minimum value	Maximum value	Unit
Ts	Storage temperature	-65	150	℃
VCC	Power supply voltage	-0.9	3.6	V
Static electricity discharge voltage (human body model)	TAMB-25℃	-	2	KV
Static electricity discharge voltage (machine model)	TAMB-25℃	-	0.2	KV

3.2 Working conditions

Parameter	Description	Minimum value	Typical value	Maximum value	Unit
Ta	Working tempera-ture	-20	-	85	℃
VCC	Working voltage	1.61	3.3	3.6	V

Parameter	Description	Minimum value	Typical value	Maximum value	Unit
VIL	I/O low level input	VSS	-	VSS+0.3	V
VIH	I/O high level input	VCC-0.3	-	VCC+0.3	V
VOL	I/O low level output	VSS	-	VSS+0.3	V
VOH	I/O high level output	VCC-0. 3	-	VCC	V

3.3 Power consumption in working mode

Symbol	Conditions	Maximum value (typical value)	Unit
Itx	Constantly transmit, the output power of 3 dBm	22	mA
Irx	Constantly receive	9	mA
IDC	Average value under networking	2.6	mA
IDC	Peak value under networking	3.4	mA
Ideepsleep	Deep sleep mode	7	μA

4 RF parameters

4.1 Basic RF features

Parameter	Description
Working frequency	2.4 GHz ISM band
Wireless standard	Bluetooth LE 4.2
Data transmission rate	1 Mbps
Antenna type	Onboard PCB antenna

4.2 RF output power

Parameter	Minimum value	Typical value	Maximum value	Unit
Average RF output power	-20	0	4	dBm
20 dB modulation signal bandwidth (1M)	-	1000	-	KHz

4.3 RF receiving sensitivity

Parameter	Minimum value	Typical value	Maximum value	Unit
RX sensitivity 1 Mbps	-	-92	-	dBm
Frequency offset 1 Mbps	115	-	+300	KHz

Parameter	Minimum value	Typical value	Maximum value	Unit
Co-channel interference suppression	-	-	7	dB

5 Antenna

5.1 Antenna type

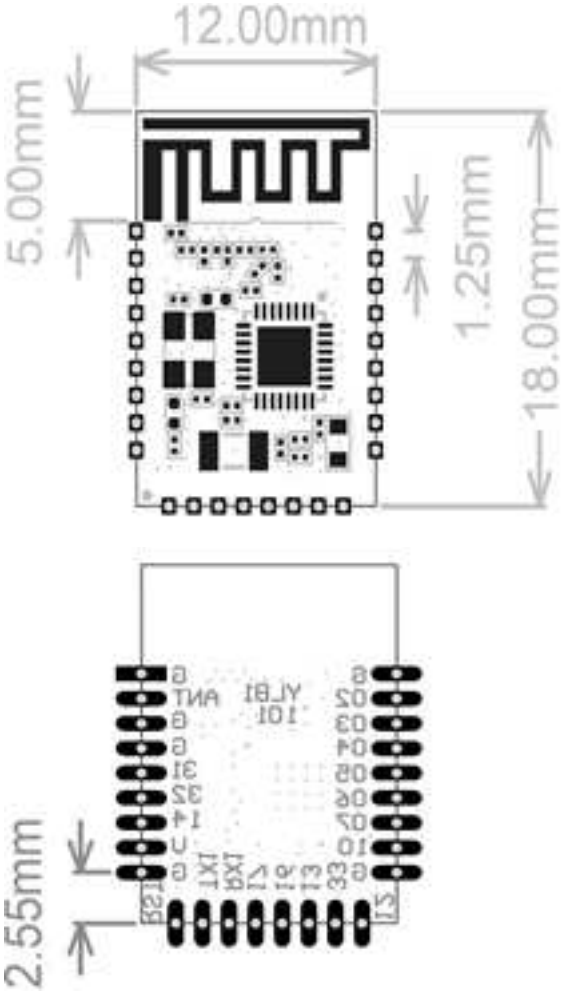
YLB1 uses the onboard PCB antenna with a gain of 0.2 dBi.

5.2 Antenna interference reduction

To ensure RF performance, it is recommended that the antenna be at least 15 mm away from other metal parts. If metal materials wrap the surrounding of the antenna, the wireless signal will be greatly attenuated and the RF performance will deteriorate. When designing the finished product, please leave enough space for the antenna area.

6 Packaging information and production instructions

6.1 Mechanical dimensions and dimensions of the back of the pad



> **Note**: The default outline dimension tolerance is ±0.35 mm, and the critical dimension tolerance is ±0.1 mm.

6.2 Production instructions

1. Use an SMT machine to mount components to the stamp-hole module that Tuya produces within 24 hours after the module is unpacked and the firmware is burned. If not, pack the module again in a vacuum. Bake the module before mounting components to the module

- SMT equipment
  - Reflow soldering machine
  - Automated optical inspection (AOI) equipment
  - Nozzle with a 6 to 8 mm diameter
- Baking equipment
  - Cabinet oven
  - Anti-static heat-resistant trays
  - Anti-static heat-resistant gloves

2. Storage conditions for a delivered module are as follows:

   - The moisture-proof bag must be placed in an environment where the temperature is below 30°C and the relative humidity is lower than 70%.
   - The shelf life of a dry-packaged product is 6 months from the date when the product is packaged and sealed.
   - The package contains a humidity indicator card (HIC).

3. Bake a module based on HIC status as follows when you unpack the module package:

   - If the 30%, 40%, and 50% circles are blue, bake the module for 2 consecutive hours.
   - If the 30% circle is pink, bake the module for 4 consecutive hours.
   - If the 30% and 40% circles are pink, bake the module for 6 consecutive hours.
   - If the 30%, 40%, and 50% circles are pink, bake the module for 12 consecutive hours.

1. Baking settings:

   - Baking temperature: 125±5°C
   - Alarm temperature: 130°C
   - SMT ready temperature: naturally cooling temperature: < 36°C

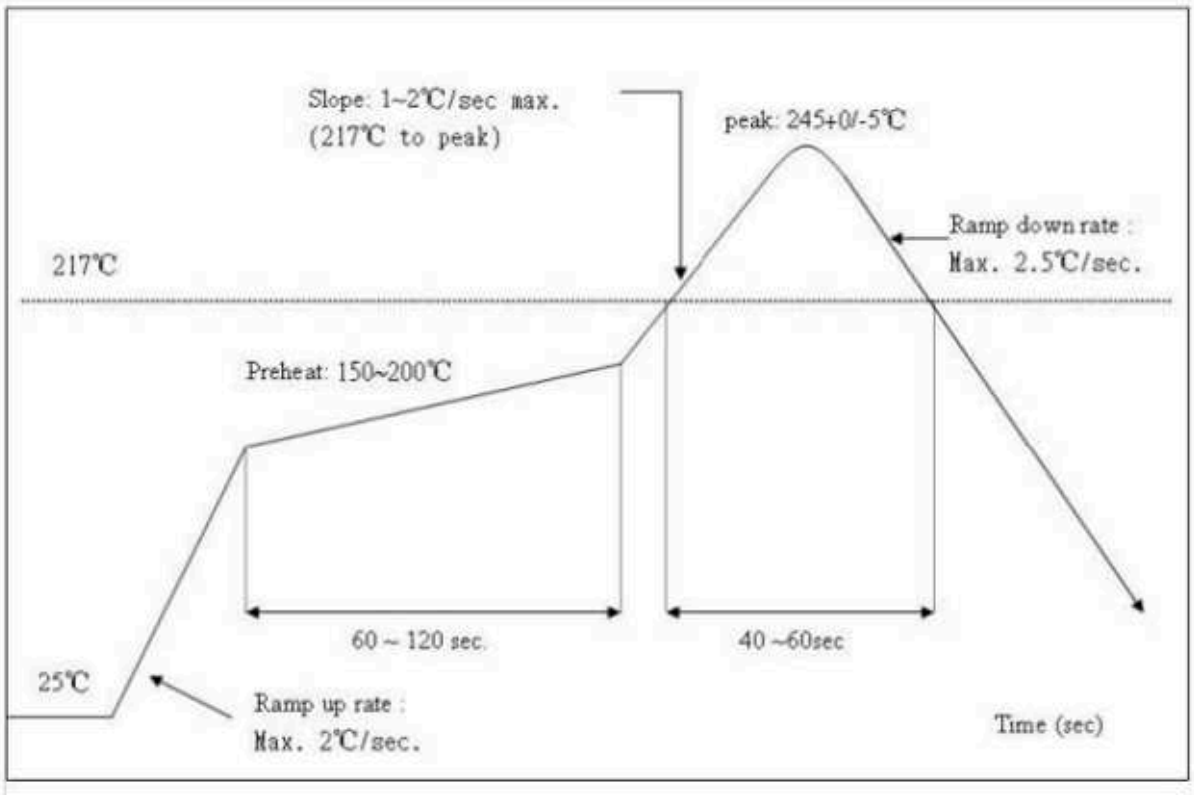
- The number of drying times: 1
- Rebaking condition: The module is not soldered within 12 hours after baking

2. Do not use SMT to process modules that have been unpacked for more than 3 months, because electroless nickel/immersion gold (ENIG) is used for PCBs and they are seriously oxidized for over 3 months. SMT is very likely to cause pseudo and missing soldering. Tuya is not liable for such problems and consequences.
3. Before using SMT, take electrostatic discharge (ESD) protective measures.
4. To reduce the reflow defect rate, draw 10% of the products for visual inspection and AOI before the first mounting, to determine the rationality of oven temperature control and component attachment and placement manners. Draw 5 to 10 modules from subsequent batches each hour for visual inspection and AOI.

6.3 Recommended oven temperature curve

Perform SMT based on the following reflow oven temperature curve. The highest temperature is 245°C. The reflow oven temperature curve is as below:

Refer to IPC/JEDEC standard; Peak Temperature: <245℃; Number of Times: ≤2 times


Slope: 1~2℃/sec max.
(217℃ to peak)
peak: 245+0/-5℃
Ramp down rate :
Max. 2.5℃/sec.
217℃
Preheat: 150~200℃
60 ~ 120 sec.
40 ~60sec
25℃
Ramp up rate :
Max. 2℃/sec.
Time (sec)

6.4 Storage conditions

7 MOQ and packaging information

Product number	MOQ (pcs)	Shipping packaging method	The number of modules per reel	The number of reels per carton
YLB1	4800	Tape reel	1200	4

8 Appendix: Statement

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this device.

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.

> **Note**: This device has been tested and found to comply with the limits for a Class B digital device, according to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This device generates, uses, and can radiate radio frequency energy and, if not installed and used following 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 device does cause harmful interference to radio or television reception, which can be determined by turning the device 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 device and receiver.
- Connect the device 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.

Radiation Exposure Statement

This device complies with FCC radiation exposure limits set forth for an uncontrolled rolled environment. This device should be installed and operated with a minimum distance of 20cm between the radiator and your body.

Important Note

This radio module must not be installed to co-locate and operating simultaneously with other radios in the host system except following FCC multi-transmitter product procedures. Additional testing and device authorization may be required to operate simultaneously with other radios.

The availability of some specific channels and/or operational frequency bands are country-dependent and are firmware programmed at the factory to match the intended destination. The firmware setting is not accessible by the end-user.

The host product manufacturer is responsible for compliance with any other FCC rule that applies to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

The end-user manual shall include all required regulatory information/warnings as shown in this manual, including “This product must be installed and operated with a minimum distance of 20 cm between the radiator and user body.”

This device has got an FCC ID: 2ANDL-YLB1. The end product must be labeled in a visible area with the following: “Contains Transmitter Module FCC ID: 2ANDL-YLB1”.

This device is intended only for OEM integrators under the following conditions: The antenna must be installed such that 20cm is maintained between the antenna and users, and 2) The transmitter module may not be co-located with any other transmitter or antenna. As long as the 2 conditions above are met, further transmitter tests 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.

Declaration of Conformity European Notice

Hereby, Hangzhou Tuya Information Technology Co., Ltd declares that this module product is in compliance with essential requirements and other relevant provisions

of Directive 2014/53/EU,2011/65/EU. A copy of the Declaration of conformity can be found at https://www.tuya.com.

This product must not be disposed of as normal household waste, in accordance with the EU directive for the waste electrical and electronic devices (WEEE- 2012/19/EU). Instead, it should be disposed of by returning it to the point of sale, or to a municipal recycling collection point.

The device could be used with a separation distance of 20cm to the human body.