

KLMKBM-01 Bluetooth module instructions

Ble mesh

Version update instructions

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1	2021-05-08	New document	V1.0.0
2			
3			

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1 Product description

The Bluetooth module uses Telink's TLSR8258 Bluetooth chip, which is a Bluetooth mesh ad hoc network module specially designed based on BLE V5.0 protocol, it supports the Sig Mesh V1.0 standard. Customers only need to connect the module to the application product and turn on the power to link with mobile phone equipment, digital product equipment and PDA equipment to realize remote control of the mesh network. It can also facilitate the realization of intra-network broadcast or arbitrary fixed-point data transmission support. It is very suitable for IoT information collection, large-scale networking and communication scenarios, smart home and other applications.

2 Performance characteristics

2.1 main feature

- (1) **Default broadcast status:** It Memorizes networking information, and automatically access the network after power-on.
- (2) **Broadcast cycle, adjustable connection interval:** The key parameters of the module can be configured freely, and the efficiency and power consumption can be independently balanced.
- (3) **Low-power standby:** Using Bluetooth BLE-5.0 technology, 0.1uA in sleep mode.
- (4) **RF power consumption:** TLSR8258: Rx: 6.3mA, TX:0Db 4.8mA/10dbm 23mA, lower power consumption.
- (5) **Power-off save:** Avoid repeating settings each time power-on.
- (6) **Scope of application:** Smart LED, smart home, smart low-power sensor. Can be seamlessly connected with Bluetooth laptops, computers plus Bluetooth adapters, PDAs and other devices

3 Module interface

3.1 Size package

The KLMKBM-01 Bluetooth module has 2 rows of pins, with a pitch of 2mm. KLMKBM-01 Bluetooth module size: 16 ± 0.35 mm (W) $\times 24 \pm 0.35$ mm (L) $\times 2.8 \pm 0.15$ mm (H), and the PCB thickness is 0.8 ± 0.1 mm. The package is shown in Figure 3.1

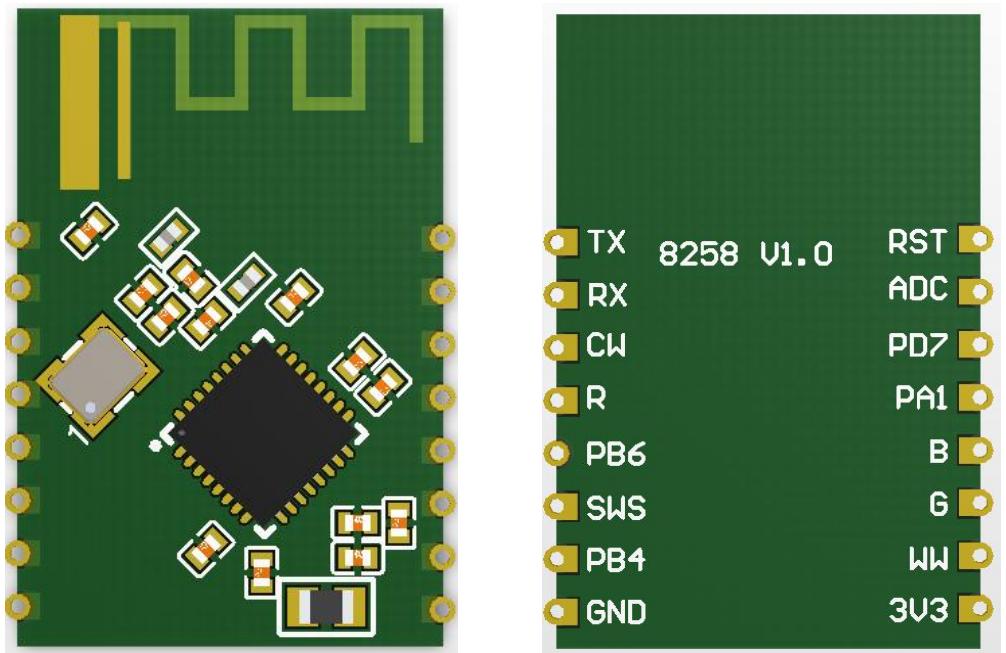


Figure 3.1 Schematic diagram of KLMKBM-01 Bluetooth module

3.2 Pin definition

The interface pin definition is shown in Table 3.2:

Table 3.2 KLMKBM-01 Bluetooth module interface pinout description

No.	Symbol	I/O Types	Features
1	RST	I/O	Hardware reset pin (active low), corresponding to RESETB of the IC.
2	ADC	AI	ADC port, 12bits ADC, corresponding to TL_B1 of the IC
3	PD7	I/O	GPIO port, corresponding to TL_D7 of the IC
4	PA1	I/O	GPIO port, corresponding to TL_A1 of the IC
5	B	I/O	GPIO port, can be used as LED drive PWM output, default corresponding to blue light
6	G	I/O	GPIO port, can be used as LED drive PWM output, default corresponding to green light
7	WW	I/O	GPIO port, can be used as LED driver PWM output, default corresponding to warm white light
8	3V3	P	Module Power pin (3.3V)
9	GND	P	Ground reference
10	PB4	I/O	GPIO port, corresponding to TL_B4 of the IC
11	SWS	I	The programming pin of the module corresponds to TL_D4 of the IC.
12	PB6	I/O	GPIO port, corresponding to TL_B6 of the IC

13	R	I/O	GPIO port, can be used as LED drive PWM output, default corresponding to red light
14	CW	I/O	GPIO port, can be used as LED driver PWM output, default corresponding to cold white light
15	RX	I/O	Serial port receiving pin UART RX
16	TX	I/O	Serial port sending pin UART TX

Note: P stands for power supply pin, I/O stands for input and output pin, AI stands for analog input. If you have your own requirements for the light color controlled by the PWM output, please contact us.

4 Electrical parameters

4.1 Absolute electrical parameters

Table 4.1 Absolute parameters

Parameter	Description	Min	Max	Unit
T _s	Storage temperature	-65	150	°C
V _{CC}	Supply voltage	-0.3	3.9	V
Electrostatic discharge voltage (human body model)	TAMB-25°C	-	2	KV
Electrostatic discharge voltage (machine model)	TAMB-25°C	-	0.5	KV

4.2 Working conditions

Table 4.2 Normal working conditions

Parameter	Description	Min	Typical	Max	Unit
T _a	Operating temperature	-40	-	85	°C
V _{CC}	Operating Voltage	2.8	3.3	3.6	V
V _{IL}	I _O low level input	VSS	-	VCC*0.3	V
V _{IH}	I _O high level input	VCC*0.7	-	VCC	V
V _{OL}	I _O low level output	VSS	-	VCC*0.1	V
V _{OH}	I _O high level output	VCC*0.9	-	VCC	V

4.3 Power consumption in working mode

Table 4.3 Power consumption during TX continuous transmission

Symbol	Condition	Typical	Unit
I_{tx}	Continuous transmission, 10.5dBm output power	23	mA
I_{rx}	Continuous reception	6.3	mA
I_{DC}	In Mesh network working state	7	mA
$I_{deepsleep1}$	Deep sleep mode (reserved 16KBRAM)	1.2	uA
$I_{deepsleep2}$	Deep sleep mode (no RAM reserved)	0.4	uA

5 RF parameters

5.1 Basic RF characteristics

Table 5.1 Basic RF characteristics

Parameter	Description
Working frequency	2.4GHz ISM band
Wireless standard	BLE 5.0
Data transfer rate	1Mbps, 2Mbps
Antenna type	On board PCB antenna

5.2 RF output power

Table 5.2 TX power during continuous transmission

Parameter	Min	Typical	Max	Unit
RF average output power	-22	10	10.5	dBm
20dB modulation signal bandwidth (1M)	-	2500	-	KHz
20dB modulation signal bandwidth (2M)	-	1400	-	KHz

5.3 RF receiving sensitivity

Table 5.3 RX sensitivity

Parameter		Min	Typical	Max	Unit
RX sensitivity	1Mbps	–	-94.5	–	dBm
	2Mbps	–	-91	–	
Frequency offset error	1Mbps	-250	–	+300	KHz
	2Mbps	-300	–	+200	
Co-channel interference suppression	–	–	-10	–	dB

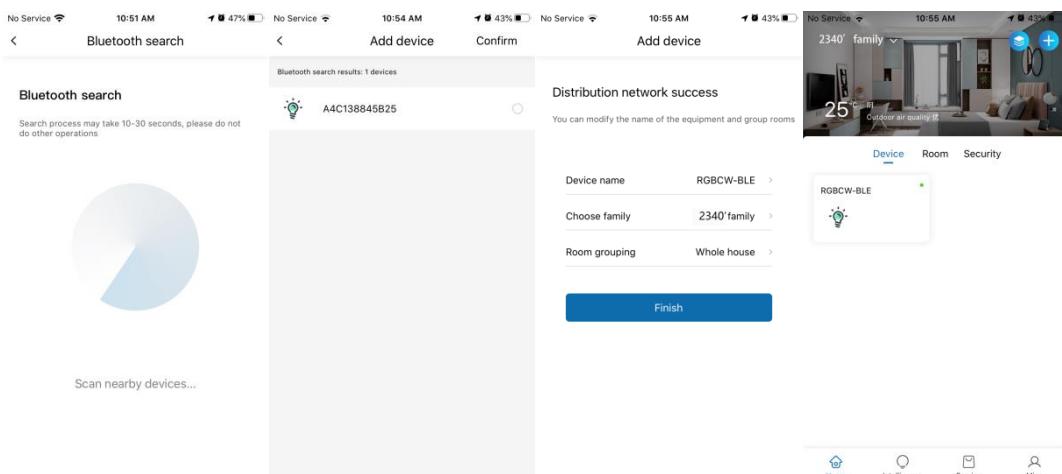
6 Module basic instructions

KLMKBM-01 module recommends that users can access the network through the APP—"zihui connect" developed by our company configuration.

Two bulbs are needed for control, and our module needs to be soldered to the corresponding lamp board. If the bulb is pre-configured, you need to perform 5 short power cycles (on/off every 2 seconds) to reset the bulb.

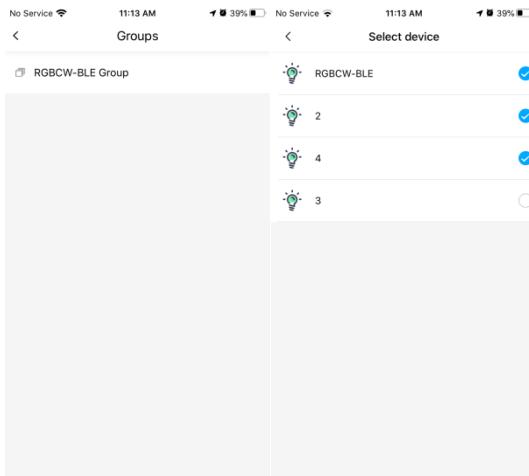
6.1 Add equipment

- ❖ Click "Add Device" in the upper right corner to select the device you need to add or enter the device name directly, such as RGBCW-BLE.
- ❖ The initial device has entered the distribution network mode as soon as the power is turned on, and then the lights start to flash; if it is a secondary distribution network, follow the instructions of the distribution network diagram, and then click the "start adding device" button.
- ❖ Search the device, select the corresponding device to add.
- ❖ After the connection is complete, click "Finish" --device rename--choose a family/room--connection succeeded;



6.2 Group control

- ❖ Enter the created group to control the devices assigned to the group at the same time.



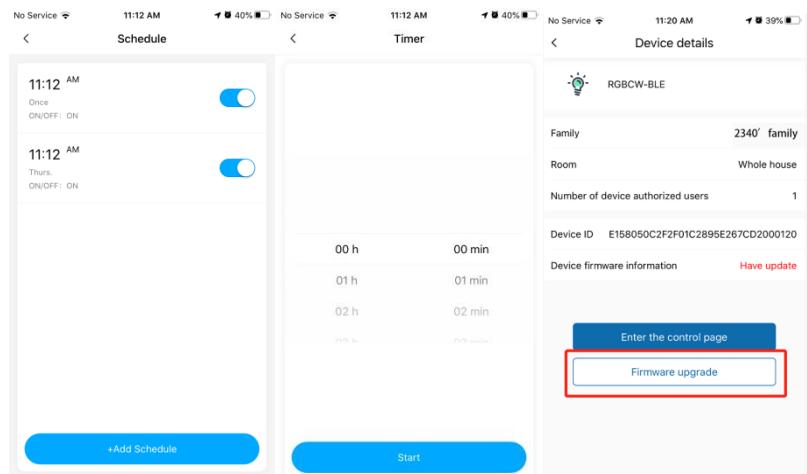
6.3 Single light control

After the added device enters the device control page, you can perform other operation controls such as switching/dimming of a single light.



6.4 Other settings

Timing/countdown can be set, device OTA and bulb can be deleted from the network.



Appendix statement

Federal Communications Commission (FCC) Declaration of Conformity

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 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.

FCC ID: 2AZTV-KLMKBM-01

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

Federal Communication Commission Statement (FCC, U.S.)

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 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.

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.

FCC Caution:

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

IMPORTANT NOTES

Co-location warning:

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

OEM integration instructions:

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

The transmitter module may not be co-located with any other transmitter or antenna. The module shall be only used with the external antenna(s) that has been originally tested and certified with this module.

As long as the 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 (for example, digital device emissions, PC peripheral requirements, etc.).

Validity of using the module certification:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module cannot 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:

The final end product must be labeled in a visible area with the following: "Contains Transmitter Module FCC ID: 2AZTV-KLMKBM-01".

Information that must be placed in the end user manual:

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.

**Integration instructions for host product manufacturers according to KDB 996369 D03 OEM
Manual v01**

2.2 List of applicable FCC rules

FCC Part 15 Subpart C 15.247 & 15.207 & 15.209

2.3 Specific operational use conditions

The module is a Bluetooth module with BLE 2.4G function.

Operation Frequency: 2402~2480MHz

Number of Channel: 40

Modulation: GFSK

Type: PCB Antenna

Gain: 2 dBi

The module can be used for mobile or applications with a maximum 2dBi antenna. The host manufacturer installing this module into their product must ensure that the final composite product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation. The host manufacturer 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 shown in this manual.

2.4 Limited module procedures

Applicable. The module is a Limited module and complies with the requirement of FCC Part 15.212.

2.5 Trace antenna designs

Not applicable. The module has its own antenna, and doesn't need a host's printed board microstrip trace antenna etc.

2.6 RF exposure considerations

The module must be installed in the host equipment such that at least 20cm is maintained between the antenna and users' body; and if RF exposure statement or module layout is changed, then the host product manufacturer required to take responsibility of the module through a change in FCC ID or new application. The FCC ID of the module cannot be used on the final product. In these circumstances, the host manufacturer will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization

2.7 Antennas

Antenna Specification are as follows:

Type: PCB Antenna

Gain: 2 dBi

This device is intended only for host manufacturers under the following conditions:

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

The module shall be only used with the internal antenna(s) that has been originally tested and certified with this module. The antenna must be either permanently attached or employ a 'unique' antenna coupler.

As long as the conditions above are met, further transmitter test will not be required. However, the host manufacturer is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

2.8 Label and compliance information

Host product manufacturers need to provide a physical or e-label stating "Contains FCC ID: 2AZTV-KLMKBM-01" with their finished product.

2.9 Information on test modes and additional testing requirements

Operation Frequency: 2402~2480MHz

Number of Channel: 40

Modulation: GFSK

Host manufacturer must perform test of radiated & conducted emission and spurious emission, etc according to the actual test modes for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

Only when all the test results of test modes comply with FCC requirements, then the end product can be sold legally.

2.10 Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is only FCC authorized for FCC Part 15 Subpart C 15.247 & 15.207 & 15.209 and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

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.

Warning: Changes or modifications 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.

FCC Radiation Exposure Statement:

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

Labels

Host Device must contain the following label on the outside of the unit:

Contains FCC ID: 2AZTV-KLMKBM-01

Installation Guidance

The final host / module combination may also need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device.

The user's manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the Internet, the information required by this section may be included in the manual in that alternative form, provided the user can reasonably be expected to have the capability to access information in that form.

To ensure compliance with all non-transmitter functions the host manufacturer is responsible for ensuring compliance with the module(s) installed and fully operational. For example, if a host was previously authorized as an unintentional radiator under the Declaration of Conformity procedure without a transmitter certified module and a module is added, the host manufacturer is responsible for ensuring that the after the module is installed and operational the host continues to be compliant with the Part 15B unintentional radiator requirements.