User Manual

Mesh BLE 5.0 Module

Module No.: BT002

Version: V1.0

Change History:

Version	Description	Prepared By	Date
V1.0	1st Edition		2020/6/27

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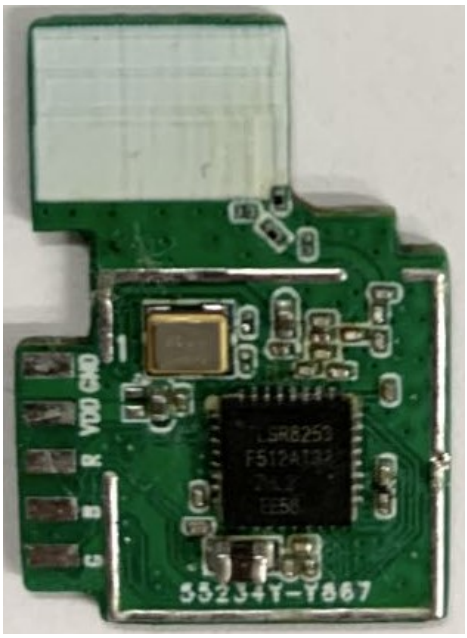


1 Introduction

BT002 intelligent lighting module is a Bluetooth 5.0 low power module based on TLSR8253F512AT32 chip. The Bluetooth module with BLE and Bluetooth mesh networking function, Peer to peer satellite network communication, using Bluetooth broadcast for communication, can ensure timely response in case of multiple devices.

It is mainly used in intelligent light control. It can meet the requirements of low power consumption, low delay and short distance wireless data communication.

2 Features

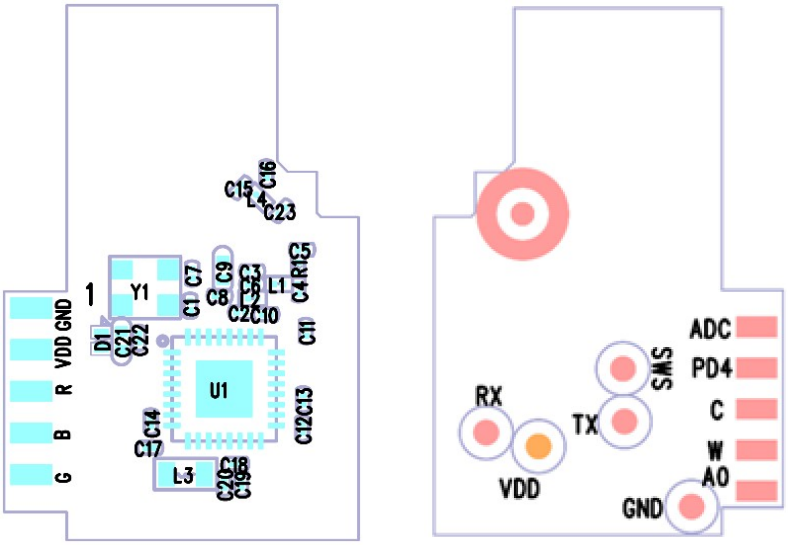
- TLSR8253F512AT32 system on chip
- Built-in Flash 512KBytes
- Compact size 28 x 12
- Up to 6 channels PWM
- Host Controller Interface (HCI) over UART
- Class 1 supported with 10.0dBm maximum TX power
- BLE 5.0 1Mbps

- Stamp hole patch package, easy to machine paste
- PCB antenna

3 Applications

- LED Lighting control
- Smart Devices Switch, Remote Control
- Smart Home

Module Pins Assignments



4 Electronic Specification

Item	Min	TYP	Max	Unit
RF Specifications				
RF Transmitting Power Level	9.76	9.9	9.76	dBm
RF Receiver Sensitivity @FER<30.8%, 1Mbps	-92	-94	-96	dBm
RF TX Frequency tolerance		+/-10	+/-15	KHz
RF TX Frequency range	2402		2480	MHz
RF Channel	CH0		CH39	/
RF Channel Space		2		MHz
AC /DC Characteristics				
Operation Voltage	3.0	3.3	3.6	V
Supply voltage rise time （3.3V ）			10	ms
Input High Voltage	0.7VDD		VDD	V
Input Low Voltage	VSS		0.3VDD	V
Output High Voltage	0.9VDD		VDD	V
Output Low Voltage	VSS		0.1VDD	V

5 Power Consumption

Operation Mode	Consumption
TX current	4.8mA Whole chip with 0dBm
RX current	5.3mA Whole chip
Standby (Deep Sleep) depend on firmware	0.4uA (optional by firmware)

6 Antenna Specification

ITEM	UNIT	MIN	TYP	MAX
Frequency	MHz	2400		2500
V.S.W.R				2.0
Gain(AVG)	dBi		1.0	
Maximum input power	W			1
Antenna type	PCB antenna			
Radiated Pattern	Omni-directional			
Impendence	50Ω			

OEM/Integrators Installation Manual

1. List of applicable FCC rules

This module has been tested and found to comply with part 15.247 requirements for Modular Approval.

2. Summarize the specific operational use conditions

This module can be used in IoT devices. The input voltage to the module should be nominally 3.3VDC and the ambient temperature of the module should not exceed 85℃. BT002 has one PCB antenna with max antenna gain 1.0dBi. If the antenna needs to be changed, the certification should be re-applied.

3. Limited module procedures

NA

4. Trace antenna designs

NA

5. RF exposure considerations

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. If the device built into a host as a portable usage, the additional RF exposure evaluation may be required as specified by § 2.1093.

6. Antennas

Antenna type: PCB antenna	2.4GHz band Peak Gain: 1.0dBi

7. Label and compliance information

When the module is installed in the host device, the FCC ID/IC label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily re-moved. If not, a second label must be placed on the outside of the final device that contains the following text: “Contains FCC ID: 2AGN8-BT002” “Contains IC: 20888-BT002“ The FCC ID/IC can be used only when all FCC ID/IC compliance requirements are met.

8. Information on test modes and additional testing requirements

a) The modular transmitter has been fully tested by the module grantee on the required number of channels, modulation types, and modes, it should not be necessary for the host installer to re-test all the available transmitter modes or settings. It is recommended that the host product manufacturer, installing the modular transmitter,perform some investigative measurements to confirm that the resulting composite system does not exceed the spurious emissions limits or band edge limits (e.g., where a different antenna may be causing additional emissions).

b) The testing should check for emissions that may occur due to the intermixing of emissions with the other transmitters, digital circuitry, or due to physical properties of the host product (enclosure). This investigation is especially important when integrating multiple modular transmitters where the certification is based on testing each of them in a stand-alone configuration. It is important to note that host product manufacturers should not assume that because the modular transmitter is certified that they do not have any responsibility for final product compliance.

c) If the investigation indicates a compliance concern the host product manufacturer is obligated to mitigate the issue. Host products using a modular transmitter are subject to all the applicable individual technical rules as well as to the general conditions of operation in Sections 15.5, 15.15, and 15.29 to not cause interference. The operator of the host product will be obligated to stop operating the device until the interference have been corrected , WIFI and Bluetooth testing using QRCT in FTM mode.

9. Additional testing, Part 15 Subpart B disclaimer

The final host / module combination 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 host integrator 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 and should refer to guidance in KDB 996369.
For host products with certified modular transmitter, the frequency range of investigation of the composite system is specified by rule in Sections 15.33(a)(1) through (a)(3), or the range applicable to the digital device, as shown in Section 15.33(b)(1), whichever is the higher frequency range of investigation
When testing the host product, all the transmitters must be operating.The transmitters can be enabled by using publicly-available drivers and turned on, so the transmitters are active. In certain conditions it might be appropriate to use a technology-specific call box (test set) where accessory devices or drivers are not available.
When testing for emissions from the unintentional radiator, the transmitter shall be placed in the receive mode or idle mode, if possible. If receive mode only is not possible then, the radio shall be passive (preferred) and/or active scanning. In these cases, this would need to enable activity on the communication BUS (i.e., PCIe, SDIO, USB) to ensure the unintentional radiator circuitry is enabled. Testing laboratories may need to add attenuation or filters depending on the signal strength of any active beacons (if applicable) from the enabled radio(s). See ANSI C63.4, ANSI C63.10 and ANSI C63.26 for further general testing details.
The product under test is set into a link/association with a partnering WLAN device, as per the normal intended use of the product. To ease testing, the product under test is set to transmit at a high duty cycle, such as by sending a file or streaming some media content.

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

ISED RSS Warning:
This device complies with Innovation, Science and Economic Development Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:
(1) this device may not cause interference, and
(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'ISED applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:
(1) l'appareil ne doit pas produire de brouillage, et
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

ISED RF exposure statement:
This equipment complies with ISED 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.This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Le rayonnement de la classe b repecte ISED fixaient un environnement non contrôlés. Installation et mise en œuvre de ce matériel devrait avec échangeur distance minimale entre 20 cm tonon corps.Lanceurs ou ne peuvent pas coexister cette antenne ou capteurs avec d'autres.