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BLE MESH MODULE - PT825XXBTV1

This datasheet is dedicated for
Plexilent BLE Mesh module PT825XXBTV1 : Version 1

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The PT825XXBTV1 is Plexilent developed module based on Bluetooth LE SoC solution with internal flash and is completely RoHS compliant and 100% lead (Pb)-free is well suited for connected lighting and automation solutions. It consists of a highly integrated Bluetooth chip (TLSR8250F512GT32) and several peripheral components, with an embedded Bluetooth network protocol stack and rich library functions.

1 Overview

The PT825XXBTV1 integrates a power-balanced 32-bit MCU, BLE/2.4GHz Radio, 48kB SRAM, 512kB internal Flash, 14bit ADC, 6-channel PWM (1-channel IR/IR FIFO/IR DMA FIFO) and flexible GPIO interfaces.

1.1 Features

Embedded low-power 32-bit MCU, which can also function as an application processor.

- Clock rate: 48 MHz
- Operating voltage: 1.8 V to 3.6 V (Under 1.8 V to 2.7 V, the module can start but the RF performance is not guaranteed. Under 2.8 V to 3.6 V, the module performance is normal.)
- Peripherals: Six pulse width modulation (PWM) interfaces.
- Bluetooth RF features
  – Bluetooth LE 5.0
  – Up to 2 Mbit/s RF data rate
  – TX power: +10 dBm
  – RX sensitivity: – 94.5 dBm at 1 Mbit/s
- Embedded advanced encryption standard (AES) hardware encryption
- Onboard PCB antenna with 2.5 dBi gain
- Operating temperature: – 40°C to +125°C

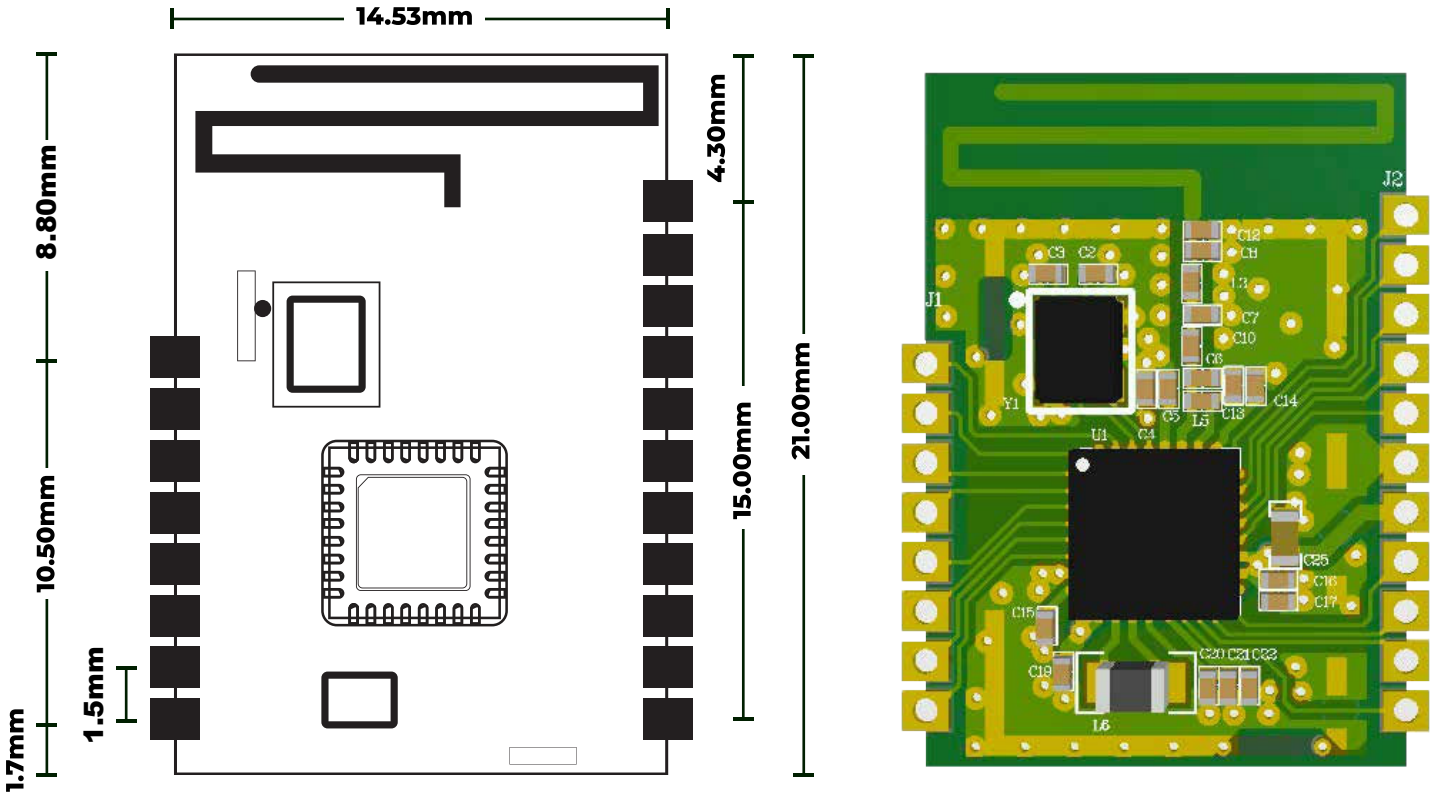
1.2 Applications

- Smart LED lights
- Smart households
- Smart low-power sensors

2 Module interfaces

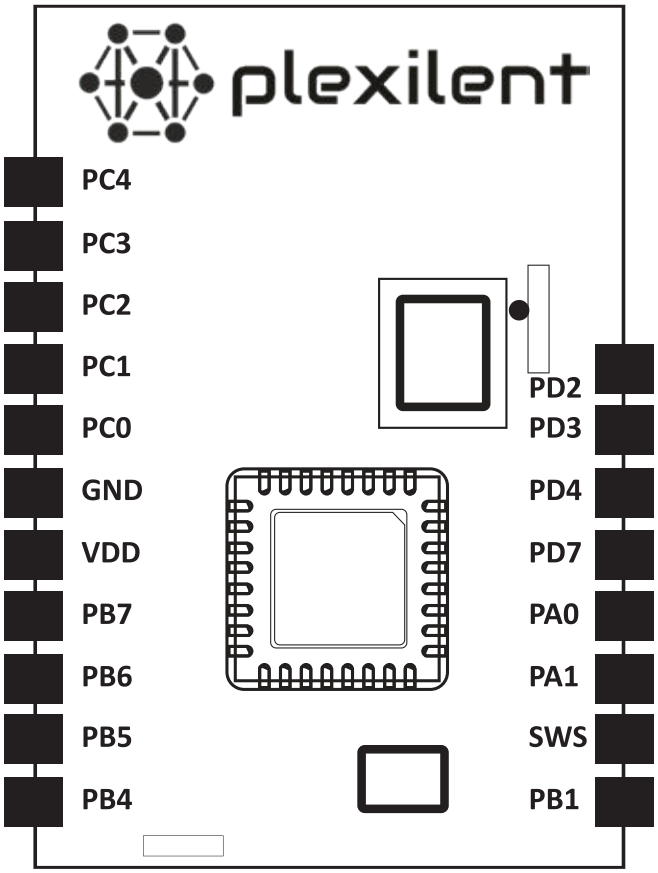
2.1 Dimensions and footprint

The PT825XXBTV1 dimensions (H x W x L) are 2 mm x 14.53 mm x 21 mm. The PCB thickness is 1 ±0.1 mm. The PT825XXBTV1 pins are shown below:

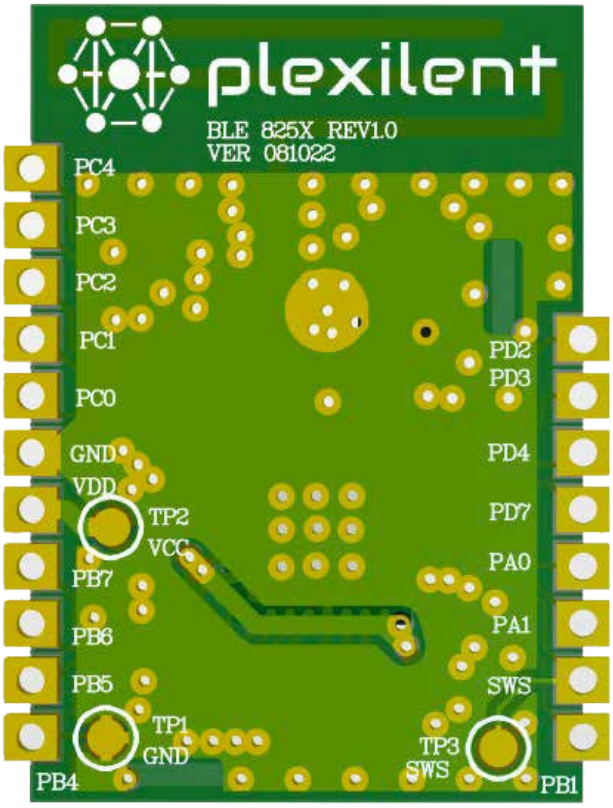


*Front View

*Back View



*Back View



2.2 Pin definition

The following table shows definitions of pins:

Pin No.	Symbols	I/O type	Function
1	PC4	I/O	I/O used for PWM Output, PWM2/P0N, 14-bit ADC
2	PC3	I/O	I/O pin programmed to drive Warm White LED as PWM Output
3	PC2	I/O	I/O pin programmed to drive White LED as PWM Output
4	PC1	I/O	I/O used for PWM Output, PWM1/I2C_SCK
5	PC0	I/O	I/O used for PWM Output, PWM4/I2C_SDA
6	GND	P	Power Supply Reference to Ground Pin
7	VDD	P	Power Supply Pin (3.3V)
8	PB7	I/O	Serial Interface receiving pin (UART RX), SPI_DO, 14-bit ADC
9	PB6	I/O	SPI_DI, 14-bit ADC
10	PB5	I/O	I/O used for PWM Output, PWM5
11	PB4	I/O	I/O used for PWM Output, PWM4
12	PD2	I/O	I/O pin programmed to drive Red LED as PWM Output
13	PD3	I/O	I/O used for PWM Output, PWM1N
14	PD4	I/O	I/O pin programmed to drive Green LED as PWM Output
15	PD7	I/O	SPI_CK, Serial Interface receiving pin (UART TX)
16	PA0	I/O	I/O used for PWM Output, PWM0N
17	PA1	I/O	GPIO
18	SWS	I	Single Wire Slave used for Programming
19	PB1	I/O	I/O pin programmed to drive Blue LED as PWM Output

Note:
1. P signifies a power supply pin, I/O represents an input/output pin, and AI denotes an analog input pin.
2. If you have any particular needs for controlling light colors via PWM outputs, please contact the business personnel at Plexilent.

3 Electrical parameters

3.1 Absolute electrical parameters

Parameter	Description	Minimum Value	Maximum Value	Unit
Ts	Storage temperature	-65	150	℃
VCC	Power supply voltage	-0.3	3.9	V
ESD voltage (human body model)	TAMB-25℃	-	2	KV
ESD voltage (human body model)	TAMB-25℃	-	0.5	KV

3.2 Electrical conditions

Parameter	Description	Minimum Value	Typical value	Maximum Value	Unit
Ts	Working temperature	-40	-	85	℃
VCC	Working voltage	2.8	3.3	3.6	V
V_{IL}	I/O low-level input	VSS	-	VCC*0.3	V
V_{IH}	I/O low-level input	VCC*0.7	-	VCC	V
V_{OL}	I/O low-level input	VSS	-	VCC*0.1	V
V_{OH}	I/O high-level output	VCC*0.9	-	VCC	V

4 RF features

4.1 Basic RF features

Parameter	Description
Frequency band	2.4GHz ISM band
Wireless standard	Bluetooth LE 4.2/5.0
Data transmission rate	1 Mbps, 2 Mbps
Antenna type	Onboard PCB antenna

4.2 RF output power

Parameter	Minimum Value	Typical value	Maximum Value	Unit
Average RF output power	-22	10	10.5	dBm
20 dB modulation signal bandwidth (1 Mbit/s)	-	2500	-	KHz
20 dB modulation signal bandwidth (2 Mbit/s)	-	1400	-	KHz

4 RF features

4.3 RF RX sensitivity

Parameter	Minimum Value	Typical value	Maximum Value	Unit
RX sensitivity 1Mbps	-	-94.5	-	dBm
RX sensitivity 2Mbps	-	-91	-	dBm
Frequency offset 1Mbps	-250	-	+300	KHz
Frequency offset 2Mbps	-300	-	+200	KHz
Co-channel interference suppression	-	-10	-	dB

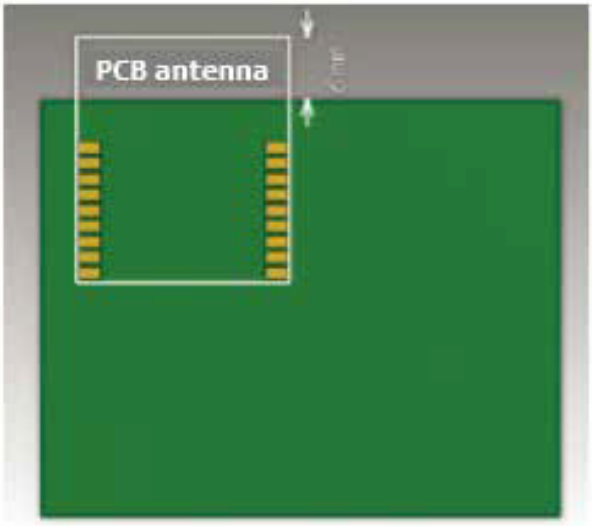
5 Antenna

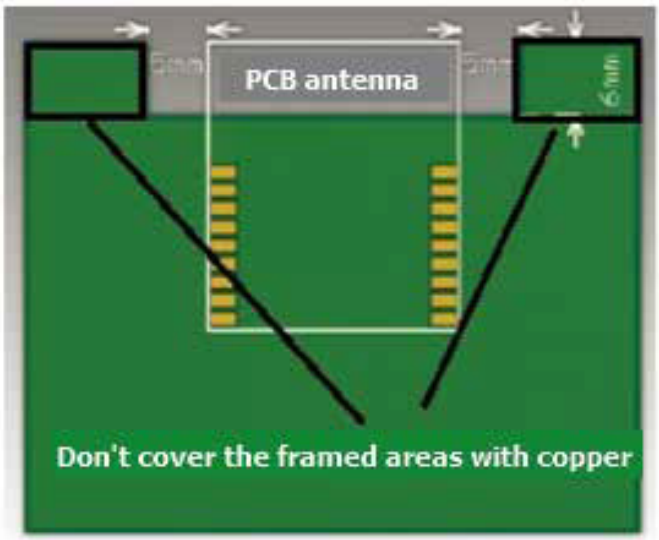
5.1 Antenna type

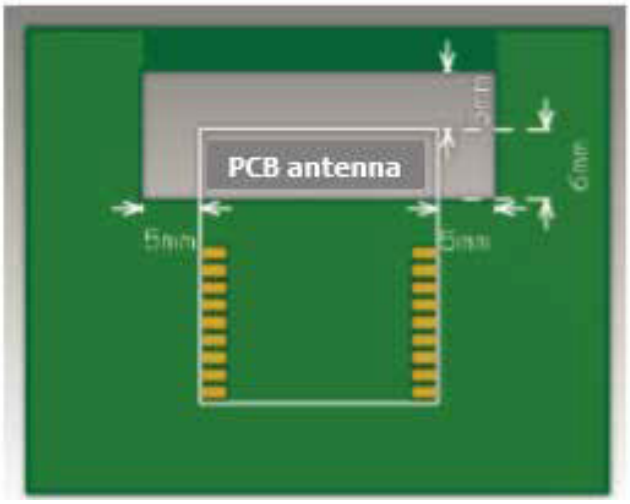
PT825XXBTV1 uses an onboard PCB antenna with a gain of 2.5 dBi.

5.2 Antenna interference reduction

For optimal RF performance, it is advisable to keep the antenna at a minimum distance of 15 mm from other metal components. Presence of metal objects in close proximity to the antenna may significantly diminish wireless signal strength, ultimately impacting the RF performance. Therefore, when creating a final product, sufficient space must be allocated for the antenna.







6 MOQ and packaging information

Product Series	Temperature Range	Production Description	Product Part No.	Minimum Order Quantity
PT8251XBTV1	-40°C ~ 85°C	Dimmable Modules (1CH)	PT8251ABTV1	1000
	-40°C ~ 105°C		PT8251BBTV1	1000
	-40°C ~ 125°C		PT8251CBTV1	1000
PT8252XBTV1	-40°C ~ 85°C	CCT Tunables & Dimmable Modules (CCT)	PT8252ABTV1	1000
	-40°C ~ 105°C		PT8252BBTV1	1000
	-40°C ~ 125°C		PT8252CBTV1	1000
PT8253XBTV1	-40°C ~ 85°C	RGB Tunables & Dimmable Modules (RGB)	PT8253ABTV1	1000
	-40°C ~ 105°C		PT8253BBTV1	1000
	-40°C ~ 125°C		PT8253CBTV1	1000
PT8254XBTV1	-40°C ~ 85°C	RGB WW Tunables & Dimmable Modules (4CHWW)	PT8254ABTV1	1000
	-40°C ~ 105°C		PT8254BBTV1	1000
	-40°C ~ 125°C		PT8254CBTV1	1000
PT8255XBTV1	-40°C ~ 85°C	RGBCW Tunables & Dimmable Modules (4CHCW)	PT8255ABTV1	1000
	-40°C ~ 105°C		PT8255BBTV1	1000
	-40°C ~ 125°C		PT8255CBTV1	1000
PT8256XBTV1	-40°C ~ 85°C	RGBCWWW Tunables & Dimmable Modules (RGBCW)	PT8256ABTV1	1000
	-40°C ~ 105°C		PT8256BBTV1	1000
	-40°C ~ 125°C		PT8256CBTV1	1000
PT8257XBTV1	-40°C ~ 85°C	Isolated CCT Tunables & Dimmable Modules (CCTI)	PT8257ABTV1	1000
	-40°C ~ 105°C		PT8257BBTV1	1000
	-40°C ~ 125°C		PT8257CBTV1	1000
PT8258XBTV1	-40°C ~ 85°C	Dimmable Modules For Fan (FAN)	PT8258ABTV1	1000
	-40°C ~ 105°C		PT8258BBTV1	1000
	-40°C ~ 125°C		PT8258CBTV1	1000

IMPORTANT NOTICE

- Based on security issues, please ensure that the positive pole of the power in the product don't contact with the machine of metal material directly, or use the insulating materials for isolation, avoid short circuit and dangerous in the assembly of the product.

- Avoid twisting, bending, strong collision and falling damage in the assembly of this product. Please take care about ESD every time.

7 ANNEXURE

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