# LK8728B Wireless Bluetooth Module Data Sheet

LK8728B is a module designed and built to meet the performance, security, and reliability of IoT products for Bluetooth MESH.

Based on the TLSR8250 SoC, the LK8728B enables Bluetooth® Low Energy connectivity while delivering best-in-class RF range and performance, future-proof capability for feature and OTA firmware updates and low energy consumption.

The LK8728B is targeted for a broad range of application, including:

- Smart home
- Connected lighting
- Building automation and security
- Factory automation

- Bluetooth 5.0 and Bluetooth MESH
- IPX
- Up to 10 dBm TX power
- -97dBm BLE RX sensitivity at 1 Mbps
- 32-bit core
- 512/48 kB of Flash/RAM memory
- Optimal selection of MCU peripherals
- 4 GPIO pins
- -40 to + 85
- 13.6 mm x 14.0 mm x 2.4 mm
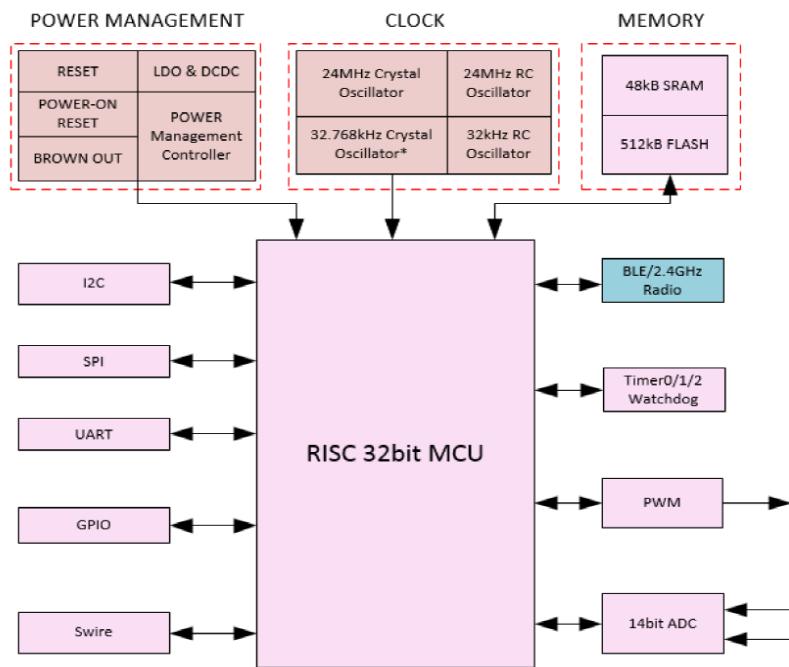
TLSR8250 Block diagram

Revised records

edition	date changed	revise content	
V 1.0	2024-7-29	First release	Liang

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1. Feature List

LK8728B is a wireless module for Bluetooth 5.0 and MESH.

- **Low-Power Wireless System-on-Chip**

  - Embedded 32-bit microcontroller

  - Up to 512kB flash program memory

  - 648kB RAM data memory

  - 2.4 GHz radio

- **Radio Performance**

  - -97 dBm sensitivity @1 Mbps GFSK

  - -93 dBm sensitivity @2 Mbps GFSK

  - TX power up to 10 dBm

- **Low System Energy Consumption**

  - 4.8 mA TX current at 0 dBm output power

  - 5.3 mA RX current at 1 Mbps GFSK

- **Supported Modulation Format**

  - GFSK

- **Protocol Support**

  - Bluetooth Low power consumption (Bluetooth 5.0)

- **Wide selection of MCU peripherals**

  - GPIO

  - UART

- **working range**

  - 1.8 to 3.6 V

  - -40 to +85 °C

2. Ordering Information

Model	Chip part number	Flash	Ram	Power	Attenna	GPIO	Temperature
LK8728B	TLSR8250F512ET32	512KB	48KB	10dBm	IPX	4	-40—85℃

3. System Overview

3.1 Block Diagram

 The LK8728B module is a highly-integrated, high-performance system, with all the hardware components needed to enable 2.4GHz wireless connectivity and supports Bluetooth Low Energy 5.0.

Built in the TLSR8250 SoC, the LK8728B with IPX termina, up to TX power of 10dBm.
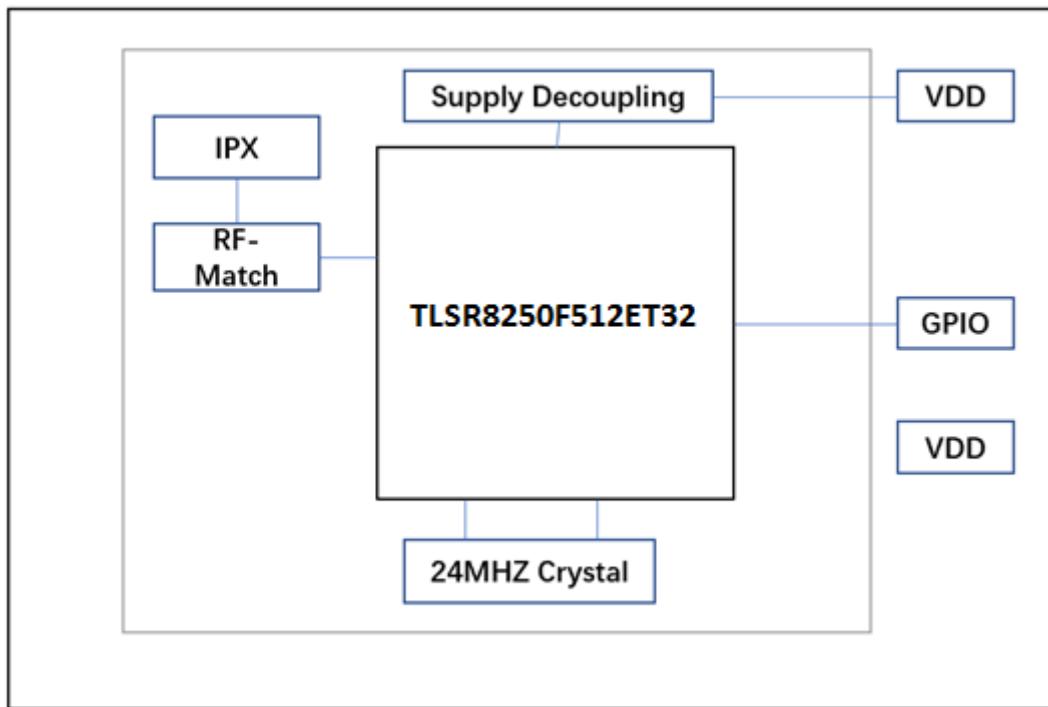
Figure 3.1. LK8728B **Block diagram**

3.2 TLSR8250

The TLSR8250 SoC features a 32-bit core, a 2.4 GHz high-performance radio, 512KB Flash memory, a rich set of MCU peripherals.

3.3 Antenna

The LK8728B module include a IPX termina

4. Electrical Characteristics

4.1 Absolute Maximum Ratings

Parameter	Symbol	Test condition	Min	Typ	Max	Unit
Storage temperature range	T_{stg}		-40	—	+125	℃
Voltage on any supply pin	V ccmax		-0.3	—	3.6	V
DC voltage on any GPIO pin	V_{DIGPIN}		-0.3	—	$V_{IOVDD}+0.3$	V

4.2 Normal operating parameters

LK8728B

Parameter	Symbol	Test condition	Min	Typ	Max	Unit
Operating ambient temperature range	T_A	-I temperature grade	-40	—	+85	℃
VCC Supply voltage	Vcc		1.8	3	3.6	V
IOVDD opetating supply voltage(All IOVDD pins)	V_{IOVDD}		1.8	3	3.6	V

4.3 Radio Current Consumption @ 3V

RF current consumption measured all MCU peripheral disabled. T_A: 25 ℃.

Parameter	Symbol	Test condition	Min	Typ	Max	Unit
Current consumption in receive mode,	I_{RX_ACTIVE}	Whole Chip	_	5.3	_	m A
Current consumption in transmit mode	I_{TX}	Whole chip @0dBm with DCDC	_	4.8	_	m A

4.4 RF General Characteristics

Conditions: T_A=25 ℃, VCC=3.0V. Measured with RF center frequency of 2.45G.

Parameter	Symbol	Test condition	Min	Typ	Max	Unit
RF tuning frequency range	F_{range}		2400	_	2483.5	M HZ

Maximum TX output power	POUT$_{MAX}$	LK8728B Module, VCC = 3.3 V	_	10	_	d Bm
Sensitivity	SENS	1Mbps,VCC=3.3V	_	-96	_	dBm
		2Mbps,VCC=3.3V	_	-93	_	dBm
		500Kbps,VDD=3.3V	_	-99	_	dBm
		125Kbps,VDD=3.3V	_	-101	_	dBm

5. Pin Definitions

5.1 Module Pinout
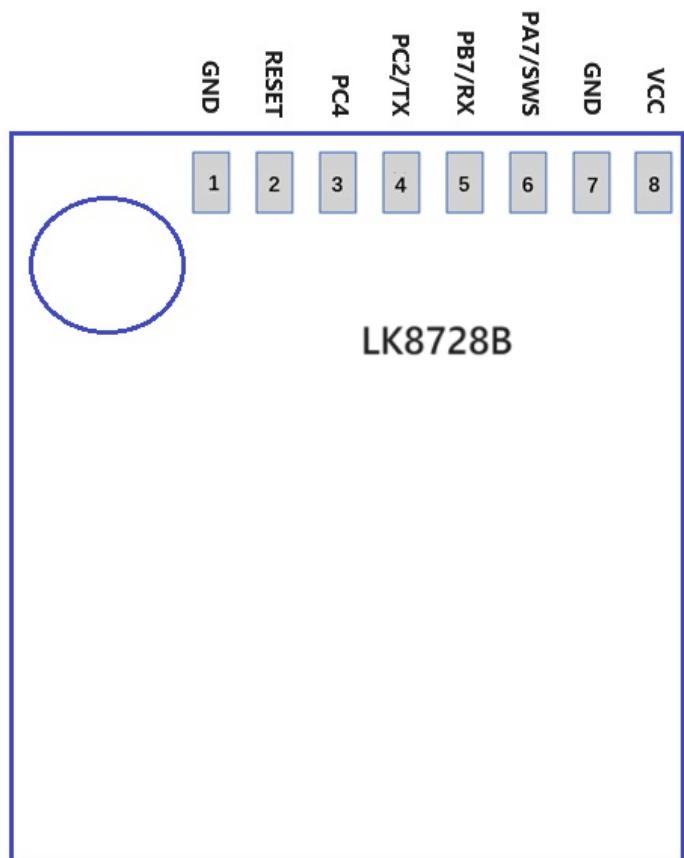
Figure 5.1 LK8728B Module Pinout

Table 6.1 LK8728B Pin Definitions

PIN	Chip Pin	Pin Description
1	GND	Ground
2	RESET	RESET
3	PC<4> / PWM2/UART_CTS/PWM0_N/sar_aio<8>/BIAS	Digital I/O
4	PC<2>/ PWM0/7816_TRX(UART_TX)/I2C_SDA/XC32K_O/PGA_P1	Digital I/O
5	PB<7>/SDM_N1 / SPI_DO / UART_RX / Ic_comp_ain<7>/sar_aio<7>	Digital I/O
6	PA<7> / SWS / UART_RTS	Digital I/O
7	GND	Ground
8	VCC	VCC

## 6. 6. Package Outline
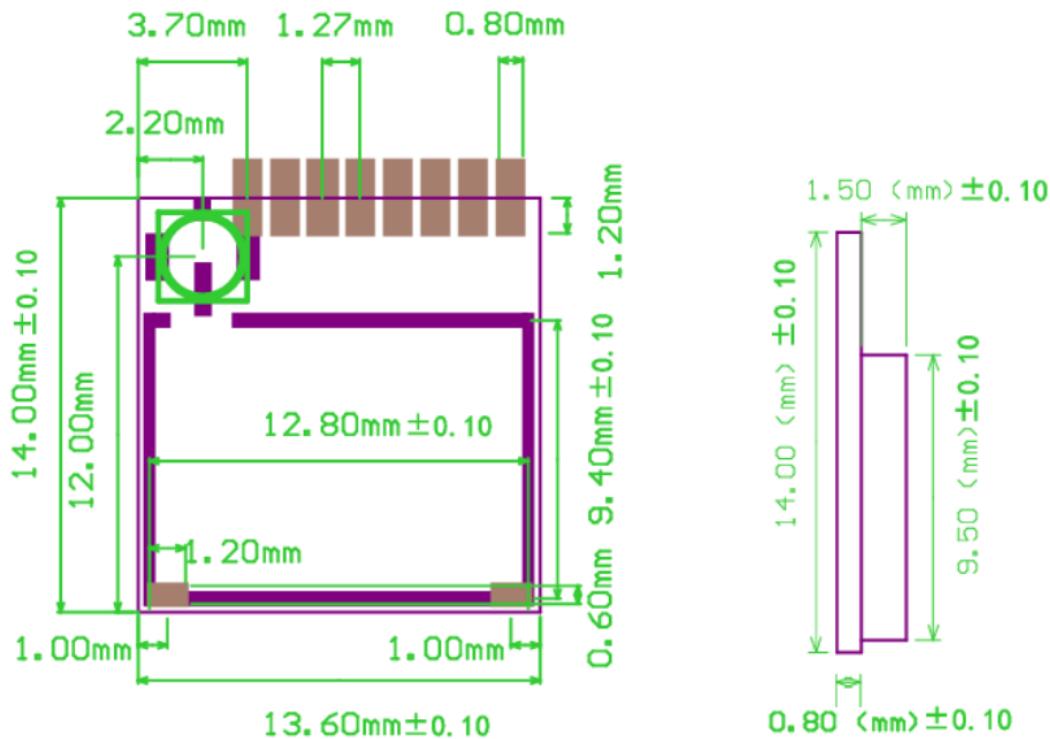
Figure 6.1 Top and Side Views

7. Design Guidelines

(1) It is recommended not to install in a metal housing.

(2) PCB layout: The antenna of the Bluetooth module (the left and right side and front end of the antenna) is strictly prohibited under the floor and trace, if it can be hollowed out better.

8. Module production process precautions:

1. Check the materials before production, if there is moisture, the plated materials are baked in an incubator at 120 °C±5 °C/4H, and the coiled materials are baked around the conditions of 60 °C ± 5 °C/8 hours in a constant temperature box to remove dampness.

2. Steel mesh engraving requirements, internal cutting and external expansion: In principle, the effective welding surface of the module is in the bottom area and the side, the inner cut is to prevent the bottom tin is generally cut inside 0.2MM, the outer expansion is to strengthen the welding strength of the side generally requires the three-side expansion range between 0.3mm-0.8mm according to the size of the pad, it is recommended to expand 0.3mm on both sides and 0.8mm on the outside.

3. Printing requirements, solder paste storage temperature/expiration date: 2-8°C/6 months, thawing time: 4 hours, stirring time: 5 minutes, usable time: 4-6 hours. Use solder paste with good activity, such as: senju solder paste or 3-4 grams of silver 1 kilogram solder paste.

4. Reflow soldering requirements, RoHS process furnace temperature setting Normal peak temp242-245°C time 10 seconds, Between: 160-217°C time 80-95 seconds, Over: 220°C, time 50-65 seconds Upward: 1-3°C/sec.

KDB 996369 D03 statements

2.2 List of applicable FCC rules:

The module complies with FCC Part 15.247.

FCC ID: 2ABYNLK8728B on User manual and on the external of the packaging.

2.3 Summarize the specific operational use conditions

The module has been certified for Potable applications. This transmitter must not beco-located or operating in conjunction with any other antenna or transmitter

2.4 Limited module procedures

The module is not a limited module.

2.5 Trace antenna designs

Not applicable

2.6 RF exposure considerations

This equipment complies with FCC's RF radiation exposure limits set forth for an

uncontrolled environment. The antenna(s) used for this transmitter must not be collocated or operating

in conjunction with any other antenna or transmitter.

2.7 Antennas

The EUT use a permanently attached antenna

which is unique.

2.8 Label and compliance information

The host system using this module, should have label in a visible area indicated the

following texts: "Contains FCC ID: 2ABYNLK8728B

2.9 Information on test modes and additional testing requirements

When testing host product, the host manufacture should follow FCC KDB Publication 996369 D04

Module Integration Guide for testing the host products. The host manufacturer may operate their

product during the measurements. In setting up the configurations, if the pairing and call box options

for testing does not work, then the host product manufacturer should coordinate with the module

manufacturer for access to test mode software.

The module has been certified for Potable applications. This transmitter must not be

co-located or operating in conjunction with any other antenna or transmitter

2.10 Additional testing, Part 15 Subpart B disclaimer

The module without unintentional-radiator digital circuity, so the module does not

require an evaluation by FCC Part 15 Subpart B. The host shoule be evaluated by the FCC Subpart B.

2.11 Note EMI Considerations

host manufacture is recommended to use D04 Module Integration Guide recommending as

"best practice" RF design engineering testing and evaluation in case non-linear interactions generate

additional non-compliant limits due to module placement to host components or properties

2.12 How to make changes

This module is stand-alone modular. If the end product will involve the Multiple simultaneously

transmitting condition or different operational conditions for a stand-alone modular transmitter in

evaluation (i.e., no C2PC required when no emission exceeds the limit of any individual device

(including unintentional radiators) as a composite. The host manufacturer must fix any failure

a host, host manufacturer have to consult with module manufacturer for the installation method in end

system. According to the KDB 996369 D02 Q&A Q12, that a host manufacture only needs to do anevaluation (i.e., no C2PC required when no emission exceeds the limit of any individual device(including unintentional radiators) as a composite. The host manufacturer must fix any failure