

TLSR8251 Bluetooth Module Specifications

1, Product Overview

TLSR8251 The Bluetooth module is an intelligent wireless data transmission module independently developed by our company, featuring low cost and low power consumption. In practical applications, customers only need to cooperate with the corresponding firmware, access the application product, and quickly connect, then they can control the product through instructions.

2, Application Fields

This module can be easily connected to Bluetooth devices such as mobile phones, tablet computers, laptops, and other digital products, enabling command control of the products through wireless data transmission.

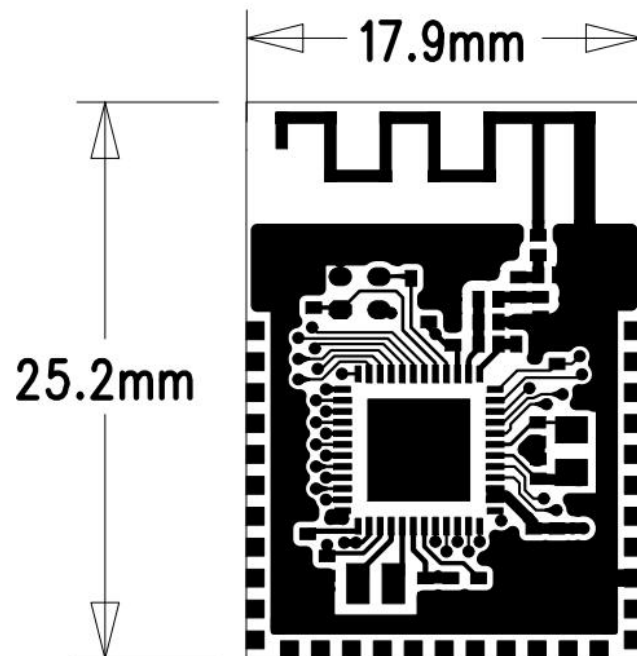
- smart home appliances
- smart toy
- bluetooth control

Module performance parameters::

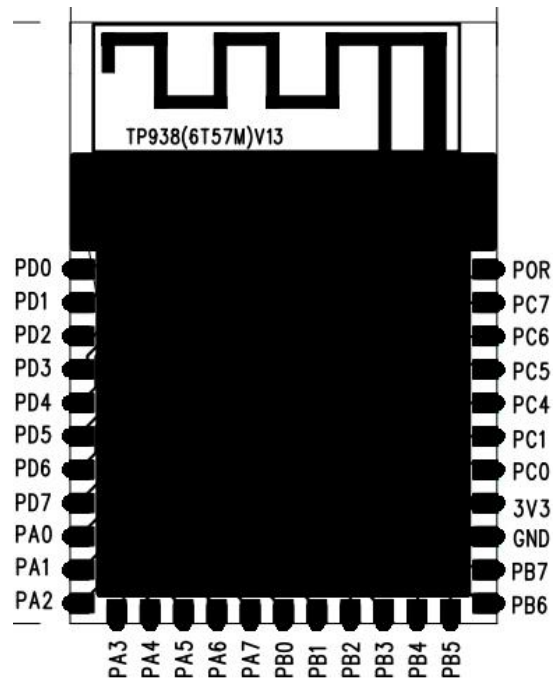
model	TLSR8251
Bluetooth specifications	Bluetooth 5.0
Working Voltage	1.8~3.6V

storage	512KB
interface	I2C、SPI、UART、I2S 、14-bit ADC
temperature range	-40℃~85℃
transmit power	-20~7dBm
module size	25.2*17.9MM

Module Dimension Drawing:



Module function pin:



PIN	definition	function
1	PD0	Digital and Analog GPIO
2	PD1	Digital and Analog GPIO
3	PD2	Digital and Analog GPIO
4	PD3	Digital and Analog GPIO
5	PD4	Digital and Analog GPIO
6	PD5	Digital and Analog GPIO
7	PD6	Digital and Analog GPIO
8	PD7	Digital and Analog GPIO
9	PA0	Digital and Analog GPIO
10	PA1	Digital and Analog GPIO
11	PA2	Digital and Analog GPIO

一、Antenna Information:
1. Antenna type
TP938

12	PA3	Digital and Analog GPIO
13	PA4	Digital and Analog GPIO
14	PA5	Digital and Analog GPIO
15	PA6	Digital and Analog GPIO
16	PA7	Digital and Analog GPIO
17	PB0	Digital and Analog GPIO
18	PB1	Digital and Analog GPIO
19	PB2	Digital and Analog GPIO
20	PB3	Digital and Analog GPIO
21	PB4	Digital and Analog GPIO
22	PB5	Digital and Analog GPIO
23	PB6	Digital and Analog GPIO
24	PB7	Digital and Analog GPIO
25	GND	GND
26	VDD	Power supply
27	PC0	Digital and Analog GPIO
28	PC1	Digital and Analog GPIO
29	PC4	Digital and Analog GPIO /ADC4
30	PC5	Digital and Analog GPIO /ADC3
31	PC6	Digital and Analog GPIO /ADC2
32	PC7	Digital and Analog GPIO /ADC1
33	POR	RST

uses the onboard PCB antenna.

2. Antenna Interference Reduction

To ensure optimal Bluetooth performance when the Bluetooth module uses the onboard PCB antenna, it is recommended that there be a space of at least 15 mm between the Module antenna and other metal parts.

二、Precautions:

1、Regarding the operating environment for wireless Bluetooth, both wireless signals and Bluetooth applications are significantly affected by surrounding conditions. Obstacles such as trees and metal structures can absorb wireless signals, thereby limiting the effective data transmission range in practical applications.

2、Since Bluetooth modules must be integrated with existing systems and housed within enclosures, it is recommended not to install them in metal enclosures, as these enclosures shield wireless radio frequency signals.

Requirement per KDB996369 D03

2.2 List of applicable FCC rules

List the FCC rules that are applicable to the modular transmitter. These are the rules that specifically establish the

bands of operation, the power, spurious emissions, and operating fundamental frequencies. DO NOT list compliance to unintentional-radiator rules (Part 15 Subpart B) since that is not a condition of a module grant that is extended to a host manufacturer. See also Section 2.10 below concerning the need to notify host manufacturers that further testing is required.³

Explanation: This module meets the requirements of FCC part 15C(15.247).

2.3 Summarize the specific operational use conditions

Describe use conditions that are applicable to the modular transmitter, including for example any limits on antennas, etc. For example, if point-to-point antennas are used that require reduction in power or compensation for cable loss, then this information must be in the instructions.

If the use condition limitations extend to professional users, then instructions must state that this information also

extends to the host manufacturer's instruction manual. In addition, certain information may also be needed, such as peak gain per frequency band and minimum gain, specifically for master devices in

Explanation: The EUT has a

Internal antenna, and the antenna use a permanently attached antenna which is not replaceable.

2.4 Limited module procedures

If a modular transmitter is approved as a "limited module," then the module manufacturer is responsible for approving the host environment that the limited module is used with.

The manufacturer of a limited module must describe, both in the filing and in the installation instructions, the alternative

means that the limited module manufacturer uses to verify that the host meets the

necessary requirements

to satisfy the module limiting conditions.

A limited module manufacturer has the flexibility to define its alternative method to address the conditions that limit

the initial approval, such as: shielding, minimum signaling amplitude, buffered modulation/data inputs, or power

supply regulation. The alternative method could include that the limited module manufacturer reviews detailed test

data or host designs prior to giving the host manufacturer approval.

This limited module procedure is also applicable for RF exposure evaluation when it is necessary to demonstrate

compliance in a specific host. The module manufacturer must state how control of the product into which the

modular transmitter will be installed will be maintained such that full compliance of the product is always ensured.

For additional hosts other than the specific host originally granted with a limited module, a Class II permissive change is required on the module grant to register the additional host as a specific host also approved with the module.

Explanation: The module is not a limited module.

2.5 Trace antenna designs

For a modular transmitter with trace antenna designs, see the guidance in Question 11 of KDB Publication 996369

D02 FAQ – Modules for Micro-Strip Antennas and traces.

The integration information shall include for the TCB review the integration instructions for the following aspects:

layout of trace design, parts list (BOM), antenna, connectors, and isolation requirements.

- a) Information that includes permitted variances (e.g., trace boundary limits, thickness, length, width, shape(s), dielectric constant, and impedance as applicable for each type of antenna);
- b) Each design shall be considered a different type (e.g., antenna length in multiple(s) of frequency, the wavelength, and antenna shape (traces in phase) can affect antenna gain and must be considered);
- c) The parameters shall be provided in a manner permitting host manufacturers to design the printed circuit (PC) board layout;
- d) Appropriate parts by manufacturer and specifications;
- e) Test procedures for design verification; and
- f) Production test procedures for ensuring compliance.

The module grantee shall provide a notice that any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify the module grantee that they wish to change the antenna trace design. In this case, a Class II permissive change application is required to be filed by the grantee, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

Explanation: Yes, The module with trace antenna designs, and This manual has been shown the layout of trace design,, antenna, connectors, and isolation requirements.

2.6 RF exposure considerations

It is essential for module grantees to clearly and explicitly state the RF exposure conditions that permit a host product manufacturer to use the module. Two types of instructions are required for RF exposure information: (1) to the

host product manufacturer, to define the application conditions (mobile, portable – xx cm from a person's body);

and (2) additional text needed for the host product manufacturer to provide to end users in their end-product manuals.

If RF exposure statements and use conditions are not provided, then the host product manufacturer is required

to take responsibility of the module through a change in FCC ID (new application).

Explanation: This module complies with FCC RF radiation exposure limits set forth for an uncontrolled environment,

This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator

and your body." This module is designed to comply with the FCC statement, FCC ID is:2AATP-TP938

2.7Antennas

A list of antennas included in the application for certification must be provided in the instructions.

For modular transmitters approved as limited modules, all applicable professional installer instructions must be

included as part of the information to the host product manufacturer. The antenna list shall also identify the antenna

types (monopole, PIFA, dipole, etc. (note that for example an "omni-directional antenna" is not considered to be a specific "antenna type"))).

For situations where the host product manufacturer is responsible for an external connector, for example with an

RF pin and antenna trace design, the integration instructions shall inform the installer that unique antenna connector

must be used on the Part 15 authorized transmitters used in the host product. The module manufacturers shall

provide a list of acceptable unique connectors.

Explanation: The EUT has a Internal antenna , and the antenna use a permanently attached antenna which is unique.

2.8 Label and compliance information

Grantees are responsible for the continued compliance of their modules to the FCC rules. This includes advising host

product manufacturers that they need to provide a physical or e-label stating "Contains FCC ID" with their finished

product. See Guidelines for Labeling and User Information for RF Devices – KDB Publication 784748.

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

"Contains FCC ID: 2AATP-TP938

2.9 Information on test modes and additional testing requirements

Additional guidance for testing host products is given in KDB Publication 996369 D04

Module Integration Guide.

Test modes should take into consideration different operational conditions for a stand-alone modular transmitter in

a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

The grantee should provide information on how to configure test modes for host product evaluation for different

operational conditions for a stand-alone modular transmitter in a host, versus with multiple, simultaneously transmitting

modules or other transmitters in a host.

Grantees can increase the utility of their modular transmitters by providing special means, modes, or instructions

that simulates or characterizes a connection by enabling a transmitter.

This can greatly simplify a host manufacturer's determination that a module as installed in a host complies with

FCC requirements.

Explanation: Topband can increase the utility of our modular transmitters by providing instructions that simulates

or characterizes a connection by enabling a transmitter.

FCC WARNING

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 warning:

Any 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.

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.