FZT5625 Module Specifications

V1.00

地址：深圳市南山区留仙大道3370号南山智园崇文园区2号楼14楼
Addr: 14F, Building 2, Nanshan iPark Chongwen, 3370 Liuxian Avenue, Nanshan District, Shenzhen

Copyright Statement

Disclaimer

Due to the version upgrading and other reasons, the content of the manual will update irregular. Unless with the other appointment, the manual will be only used as the user’s guide, and all the statement, information and suggestion will not constitute any guarantee.

Trademark Statement

is used as the trademark of Shenzhen Feibit Electronic Technology Co.,Ltd. All other trademarks and registered trademarks are property of their respective owners.

Versions History

Versions	Date	Description	Updater
V1.00	2021.04.15	First release	Kluas

地址：深圳市南山区留仙大道3370号南山智园崇文园区2号楼14楼
Addr: 14F, Building 2, Nanshan iPark Chongwen, 3370 Liuxian Avenue, Nanshan District, Shenzhen

Catalogue

地址：深圳市南山区留仙大道3370号南山智园崇文园区2号楼14楼
Addr: 14F, Building 2, Nanshan iPark Chongwen, 3370 Liuxian Avenue, Nanshan District, Shenzhen

1 Terminal Configuration And Functions

1.1 Hardware Description

Specification	Parameter
Weight	5 g(including antenna)
Dimensions（depth×width×height）	15mm×24mm×2mm

1.2 Hardware Picture

1.3 Hardware Specifications

Performances	Specification
Transmitted Power of Zigbee	+12dBm
Receiver Sensitivity of Zigbee	-95dBm
Outdoor Accessible Communication Range of Zigbee	150m
Outdoor Accessible Network Range of Zigbee	100m

Transmitted Power of BLE	+6dBm
Receiver Sensitivity of BLE	-94dBm@1Mbps, -91dBm@2Mbps
Outdoor Accessible Network Range of BLE	10M
Working Temperature	-20℃ ～ + 85℃
Supply Voltage	+1.8V ～ +3.6V（Recommend Value:+3.3V）
Standby Current	25mA
Sleeping Current	3uA
Protocol	ZigBee 3.0/BLE5.1

1.4 Pin Assignments and Pin Attributes

Pin Number	Name	I/O	Description
1	VCC	P	Power（+3.3V）
2	PB0	I/O	GPIO/PWM1/Interrupt
3	PB1	I/O	GPIO/PWM2/Interrupt
4	GND	P	Ground

地址：深圳市南山区留仙大道3370号南山智园崇文园区2号楼14楼
Addr: 14F, Building 2, Nanshan iPark Chongwen, 3370 Liuxian Avenue, Nanshan District, Shenzhen

Pin Number	Name	I/O	Description
5	PB12	I/O	GPIO
6	PB10	I/O	GPIO/ADC1/PWM3
7	PB2	I/O	GPIO/PWM3/Interrupt
8	PB11	I/O	GPIO/PWM4/Interrupt
9	PB4	I/O	GPIO/PWM5/UART2_TX
10	PB5	I/O	GPIO/PWM6/UART2_RX
11	PB3	I/O	GPIO/PWM4/Interrupt
12	PB13	I/O	GPIO/Interrupt
13	GND	P	Ground
14	RESETn	I	System reset signal, active low
15	PA5	I/O	GPIO/SWD_DA
16	PA4	I	SWD_CLK
17	VCC	P	Power(+3.3V)
18	PB6	O	UART0_TX
19	PB7	I	UART0_RX

Comments:

P: Power Pin，I/O: Input/Output.

地址：深圳市南山区留仙大道3370号南山智园崇文园区2号楼14楼
Addr: 14F, Building 2, Nanshan iPark Chongwen, 3370 Liuxian Avenue, Nanshan District, Shenzhen

1.5 Debug Interface

Debug interface use Pin13,Pin17,Pin18,Pin19;

FZT5625 Debug Interface		
Pin13	GND	Ground
Pin17	VCC	Power(+3.3V)
Pin18	UART0_TX	Debug Uart TX
Pin19	UART0_RX	Debug Uart RX

2 Electrical Characteristics

The load applied to the device in excess of the value given in the "absolute maximum rating" tables (Tables 2-1, 2-2, and 2-3) may cause permanent damage to the device. The maximum allowable load is given here, but it does not mean that the functions of the device work well under these conditions. The device reliability will be affected if the device works at the maximum conditions for a long time.

2.1 Voltage Characteristics

Table 2-1 Voltage Characteristics

Symbol	Description	Min	Max	Unit
VCC-VSS	External main supply voltage	-0.3	3.6	V
V_{IN}	Input voltage on other pins	VSS-0.3	VCC+0.3	
$V_{ESD(HBM)}$	Electrostatic discharge (ESD) voltage (human body model)		2000	

2.2 Current Characteristics

Table 2-2 Current Characteristics

Symbol	Description	Max	Unit
I_{VCC}	Total current (supply current) passing through VCC power cable	150	mA
I_{VSS}	Total current (output current) passing through VSS ground wire	150	
I_{IO}	Output sink current of any I/O and control pins	12	
	Output current of any I/O and control pins	-12	

2.3 Temperature Characteristics

Table 2-3 Temperature Characteristics

Symbol	Description	Value	Unit
T_{STG}	Storage temperature range	-40 to + 125	°C
T_J	Maximum junction temperature	105	

2.4 I/O port characteristics

Table 2-4 Characteristics of I/O

Symbol	Parameter	Condition	Min	Max	Unit
V_{IL}	Input low level voltage	VCC=3.3V	VSS	0.8	V
V_{IH}	Input high level voltage		2	VCC	
V_{OL}	Output low level	VCC=3.3V, I_{OH}=2mA, 4mA, 8mA, 12mA	VSS	0.4	
V_{OH}	Output high level	VCC=3.3V, I_{OH}=-2mA, -4mA, -8mA, -12mA	2.4	VCC	

3 Characteristics of RF

3.1 Characteristics of BLE

Table 3-1 BLE Receiving Characteristics (1)

No.	Parameter	Test Condition	Min	Typical Value	Max	Unit
1	Sensitivity, 1 Mbps	VCC=3.3V, T_A=25 °C		-94		dBm
2	Sensitivity, 2 Mbps			-91		dBm
3	Co-channel interference			8		dB
4	Adjacent channel interference, +-1 MHz			1		dB
5	Adjacent channel interference, +-2 MHz			-31		dB
6	Adjacent channel interference, >=+-3 MHz			-40		dB
7	Mirror channel interference			-24		dB
8	Adjacent mirror channel interference, +-1 MHz			-28		dB

9	Maximum input power				6	dBm

(1) They are obtained from laboratory tests and are not tested in production.

Table 3-2 BLE Transmitting Characteristics (1)

No.	Parameter	Test Condition	Min	Typical Value	Max	Unit
1	Output power	VCC=3.3V, T_A=25 °C			6	dBm
2	Frequency accuracy			7.5		kHz
3	Frequency drift rate			-9.4		kHz/ 50us
4	Frequency drift			-15.1		kHz
5	Initial frequency drift			-13.2		kHz
6	Δf1 average			258		kHz
7	Δf2 99.9%			218		kHz
8	Δf2/Δf1			1.06		-
9	Harmonic power, second harmonic			-26		dBm
10	Harmonic power, third harmonic			-28		dBm
11	Harmonic power, fourth harmonic			-54		dBm
12	Harmonic power, quintuple harmonic			-55		dBm

(1) They are obtained from laboratory tests and are not tested in production.

3.2 Characteristics of Zigbee

Unless otherwise specified, the parameters below are obtained by measuring at the ambient temperature and VCC supply voltage listed in Table 3-3. **VCC=3.3V ， T_A=25ºC， LO frequency=2.445GHz**

Table 3-3 Zigbee Receiving Characteristics

No.	Parameter	Test Condition	Min	Typical	Max	Unit

				Value		
1	RF input frequency	Compatible to IEEE802.15.4-2006	2.405		2.480	GHz
2	RF sensitivity	At antenna input with O-QPSK signal — 250Kbps		-94		dBm
		2Mbps		-91		
3	Maximum RF input	@250Kbps		5		dBm
4	Adjacent channel rejection	@+/-5 MHz, 250 Kbps		20		dB
5	Alternate channel rejection	@+/-10 MHz, 250 Kbps		45		
6	RSSI range	Normal mode (250 Kbps)		45		dB
		Turbo mode (2M bps)				

Table 3-4 Zigbee Transmitting Characteristics

No.	Parameter	Test Condition	Min	Typical Value	Max	Unit
1	RF carrier frequency	Compatible to IEEE802.15.4-2006	2.405		2.480	GHz
2	Maximum RF output power			12		dBm
3	RF output power control range	12 to -2 dBm TX power control range in 2 dB step -14 to -29 dBm TX power control range in 5 dB step		41		dB
4	TX spectrum mask for O - QPSK signal	Offset frequency > 3.5 MHz At 0 dBm output power			-30	dBm
			20			dBc
5	TX offset EVM for O-QPSK 250 Kbps modes			7		%

FCC Regulatory notices

Modification statement

SHENZHEN FEIBIT ELECTRONIC TECHNOLOGY Co., LTD. has not approved any changes or modifications to this device by the user. Any changes or modifications could void the user's authority to operate the equipment. **Interference 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 interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

RF exposure

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. The antenna should be installed and operated with minimum distance of 20cm between the radiator and your body. Antenna gain must be below 3.53dBi(Zigbee), 1.73dBi(BLE).

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

The host end product must include a user manual that clearly defines operating requirements and conditions that must be observed to ensure compliance with current FCC RF exposure guidelines.

For portable devices, in addition to above, a separate approval is required to satisfy the SAR requirements of FCC Part 2.1093.

If the device is used for other equipment that separate approval is required for all other operating configurations, including portable configurations with respect to 2.1093 and different antenna configurations.

FCC Class B digital device notice

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

地址：深圳市南山区留仙大道3370号南山智园崇文园区2号楼14楼
Addr: 14F, Building 2, Nanshan iPark Chongwen, 3370 Liuxian Avenue, Nanshan District, Shenzhen

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.

Labelling Requirements for the Host device

The host device shall be properly labelled to identify the modules within the host device. The certification label of the module shall be clearly visible at all times when installed in the host device, otherwise the host device must be labelled to display the FCC ID and ISED of the module, preceded by the words"Contains transmitter module", or the word "Contains", or similar wording expressing the same meaning, as follows:

Model: FZT5625 module

Contains FCC ID：2BB9L-FZT5625

The host OEM user manual must also contain clear instructions on how end users canfind and/or access

the module and the FCC ID.

Model: FZT5625 module

Contains FCC ID：2BB9L-FZT5625

OEM Statement

a. The module manufacturer must show how compliance can be demonstrated only for specific host or hosts

b. The module manufacturer must limit the applicable operating conditions in which transmitter will be used, and

c. The module manufacturer must disclose that only the module grantee can make the te evaluation that the module is compliant in the host. When the module grantee either refuses to make this evaluation, or does not think it is necessary, the module certification is rendered invalid for use in the host, and the host manufacturer has no choice other than to use a different module, or take responsibility (§ 2.929) and obtain a new FCC ID for the product.

d. The module manufacturer must provide the host manufacturer with the following requirements:

i. The host manufacturer is responsible for additional testing to verify compliance as composite system. When testing the host device for compliance with Part 15 Subpart B, the host manufacturer is required to show compliance with Part 15 Subpart B while the transmitter module(s) are installed and operating. The modules should be transmitting and the evaluation should confirm that the module's intentional emissions are compliant (i.e. fundamental and out of band emissions).

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 Part 15 Subpart C Section 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

地址：深圳市南山区留仙大道3370号南山智园崇文园区2号楼14楼
Addr: 14F, Building 2, Nanshan iPark Chongwen, 3370 Liuxian Avenue, Nanshan District, Shenzhen

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 5 GHz DFS bands.

Explanation: The EUT uses Ceramic antenna, antenna gain: 3.53dBi(Zigbee), 1.73dBi(BLE). There is no restriction

on the installation method.

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:

地址：深圳市南山区留仙大道3370号南山智园崇文园区2号楼14楼
Addr: 14F, Building 2, Nanshan iPark Chongwen, 3370 Liuxian Avenue, Nanshan District, Shenzhen

layout of trace design, parts list (BOM), antenna, connectors, and isolation requirements.4

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 without trace antenna designs

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 module is designed to comply with the FCC statement, FCC ID is: 2BB9L-FZT5625

2.7 Antennas

地址：深圳市南山区留仙大道3370号南山智园崇文园区2号楼14楼
Addr: 14F, Building 2, Nanshan iPark Chongwen, 3370 Liuxian Avenue, Nanshan District, Shenzhen

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 uses Ceramic antenna, antenna gain: 3.53dBi(Zigbee), 1.73dBi(BLE).

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 he following texts: "Contains FCC ID: 2BB9L-FZT5625

2.9 Information on test modes and additional testing requirements5

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 standalone 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: Data transfer module demo board can control the EUT work in RF test mode at

地址：深圳市南山区留仙大道3370号南山智园崇文园区2号楼14楼
Addr: 14F, Building 2, Nanshan iPark Chongwen, 3370 Liuxian Avenue, Nanshan District, Shenzhen

specified test channel

2.10 Additional testing, Part 15 Subpart B disclaimer

The grantee should include a statement that the modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, 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 circuity), 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.

Explanation: 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

地址：深圳市南山区留仙大道3370号南山智园崇文园区2号楼14楼
Addr: 14F, Building 2, Nanshan iPark Chongwen, 3370 Liuxian Avenue, Nanshan District, Shenzhen