

TZ8258-27A1

ZigBee Module Datasheet

(Draft Version)

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1. Device Overview

1.1 Description

The TZ8258-27A1 module is a ZigBee module developed based on Telink TLSR8258 chip. Supports IEEE 802.15.4 standard and Zigbee-compliant platform. The solution can be used for a wide range of applications and is perfect for creating interoperable solution for use within the home combined with leading Zigbee software stack. The module is equipped with 1MB Flash and 64kB SRAM, which also has hardware OTA upgrades support and multiple boot switching, allowing convenient product feature roll outs and upgrades. The TZ8258-27A1 also includes multi-stage power management design allowing ultra-low power operation and making it the ideal candidate for power-constraint applications.

The module greatly helps on the design and use of customers, and saves time and development cost for the product to the market.

1.2 Applications

Applications of TZ8258-27A1 module include but not limited to:

- Smart Lighting, Smart Home devices
- Building Automation
- Smart Grid
- Intelligent Logistics/Transportation/City
- Consumer Electronics
- Industrial Control
- Health Care

1.3 General Features

- Module Size: 17.0±0.2mm*14.0±0.2mm*4.4±0.2mm(TZ8258-27A1)
- Complies with 2.4GHz IEEE 802.15.4 protocol
- Working frequency band: 2400~2483.5MHz
- Modulation mode: O-QPSK, GFSK
- Transmission rate: 250Kbps@Zigbee, 2Mbps, 1Mbps@BLE
- 32-bit RISC-V micro-controller
- Program memory: built-in 512kB Flash
- Data memory: 64kB SRAM
- Cycle endurance: 100,000 program/erases
- Rich IO interfaces, including PWM interface, I2C interface, Uart interface, etc.
- Receiving sensitivity: -96dBm@ IEEE802.15.4 250 kbps
- Transmit power: 12dBm
- Deep sleep with SRAM retention (with 32kB SRAM retention): 3.0μA
- Working voltage: 1.8V~3.6V
- Working temperature: -40°C~85°C
- Metal antenna

2. Functional Block Diagram

2.1 Module Block Diagram

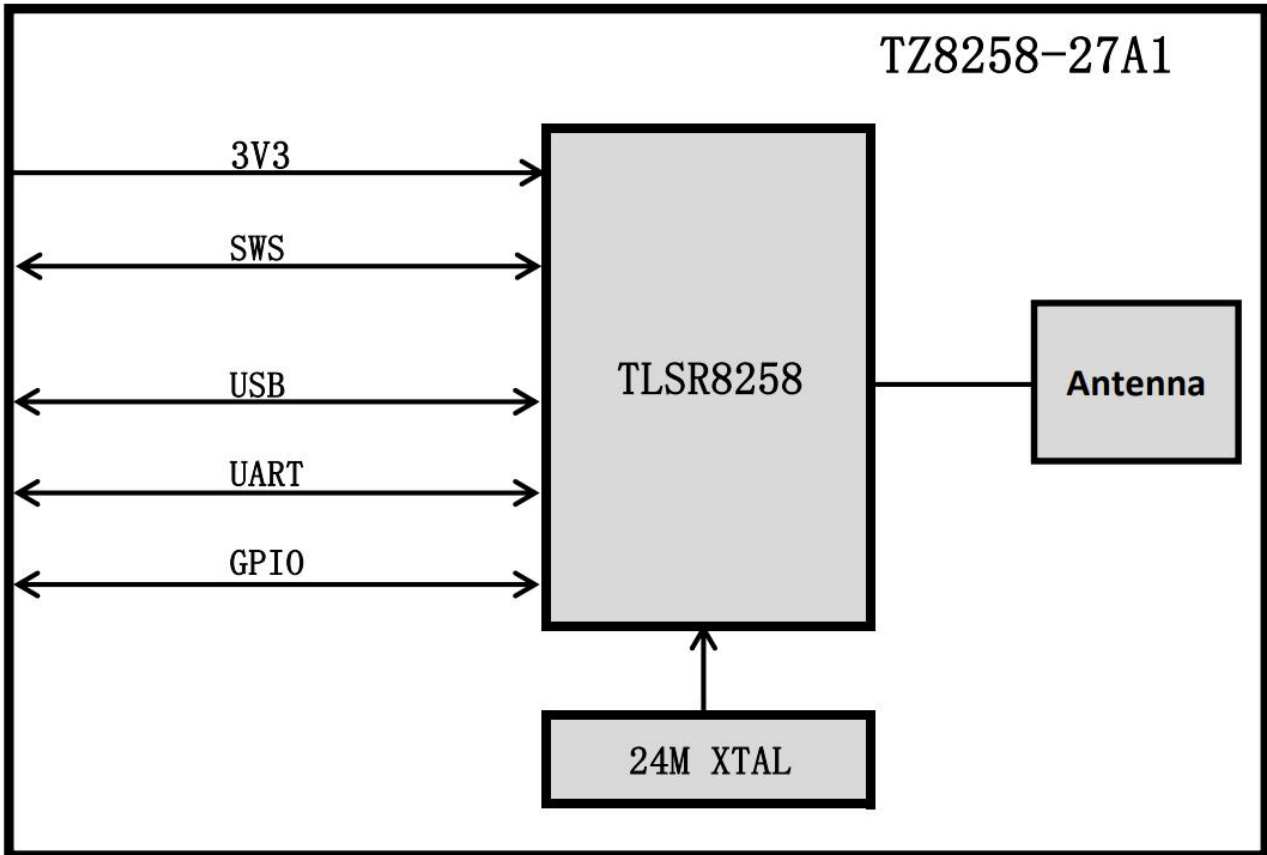


Figure 1. TZ8258-27A1 module Block Diagram

TZ8258-27A1 is a wireless module based on the IEEE802.15.4 2.4GHz protocol, built-in 2.4G antenna for wireless communication.

3. Technical Specifications

3.1 RF Parameters

Category	Descriptions
Standard	2.4G IEEE 802.15.4
Modulation mode	O-QPSK,GFSK
Number of channels	16
Channel bandwidth	5M
Transmission rate	250Kbps

Parameter	Min.	Typ.	Max.	Unit
Operating frequency	2400	--	2483.5	MHz
Transmit power	10	12	14	dBm
Receiving sensitivity@802.15.4	--	-96	--	dBm
Receiving sensitivity@ 1 Mbps	--	-95	--	dBm
Receiving sensitivity@ 2 Mbps	--	-92	--	dBm
Frequency deviation	-25	--	+25	KHz

Figure 2. TZ8258-27A1 module RF parameters

3.2 Module Pin Functions

TZ8258-27A1 has 27 pins in total, and the pin definitions are shown in Figure 3 and Figure 4 below.
 Note: Each type of product has definitions of the general IO port, and cannot be changed at will.

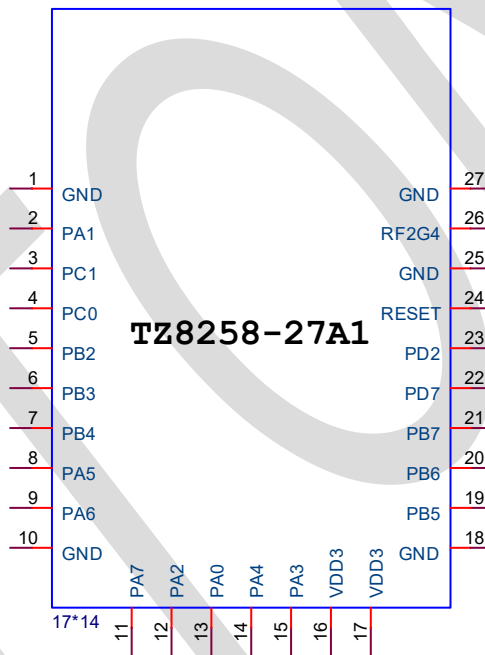


Figure 3. TZ8258-27A1 module PIN No.

Pin	Name	Description
1	GND	Ground
2	PA1	DMIC clock / UART 7816 clock / I2S clock / GPIO PA[1]
3	PC1	General Purpose I/O.Can be used to I2C_SCL.
4	PC0	General Purpose I/O.Can be used to I2C_SDA.
5	PB2	PWM5 output / UART_CTS / Control external LNA / Low power comparator input / SAR ADC input / GPIO PB[2]

6	PB3	PWM0 inverting output / UART_RTS / Control external PA / Low power comparator input / SAR ADC input / GPIO PB[3]
7	PB4	SDM positive output 0 / PWM4 output / Low power comparator input / SAR ADC input / GPIO PB[4]
8	PA5	General Purpose I/O.Can be used to USB_DM.
9	PA6	General Purpose I/O.Can be used to USB_DP.
10	GND	Ground
11	PA7	Can be used to SWS.
12	PA2	UART0_TX Pin.Connected to UART_RX of Host.
13	PA0	UART0_RX Pin.Connected to UART_TX of Host.
14	PA4	UART0_RTS Pin.Connected to UART_CTS of Host.
15	PA3	UART0_CTS Pin.Connected to UART_RTS of Host.
16	VDD3	3.3V power supply(Typical)
17	VDD3	3.3V power supply(Typical)
18	GND	Ground
19	PB5	SDM negative output 0 / PWM5 output / Low power comparator input / SAR ADC input / GPIO PB[5]
20	PB6	SDM positive output 1 / SPI data input (I2C_SDA) / UART_RTS / Low power comparator input / SAR ADC input / GPIO PB[6]
21	PB7	SDM negative output 1 / SPI data output / UART_RX / Low power comparator input / SAR ADC input / GPIO PB[7]
22	PD7	SPI clock (I2C_SCK) / I2S bit clock / UART 7816 TRX (UART_TX) / GPIO PD[7]
23	PD2	SPI chip select (Active low) / I2S left right channel select / PWM3 output / GPIO PD[2]
24	RESET	Power on reset, active low
25	GND	Ground
26	RF2G4	2.4 GHz RF Port.Keep floating.
27	GND	Ground

Figure 4. TZ8258-27A1 module Pin definition

3.3 Electrical Specifications

Parameter	Min.	Typ.	Max.	Unit	Remarks
Working Voltage	1.8	3.3	3.6	V	
Sleep Current	--	3	--	uA	deep sleep mode
Standby Current	--	TBD	--	mA	vary with power

RX Current	--	TBD	--	mA	vary with power
TX Current	--	TBD	--	mA	vary with power

Figure 5. TZ8258-27A1 module electrical specifications

3.4 Working Environment

Parameter	Min.	Typ.	Max.	Unit	Remarks
Working Temperature	-40	25	85	°C	
Storage Temperature	-40	--	125	°C	
Working Humidity	--	--	--	%	
Storage Humidity	--	--	--	%	

Figure 6. TZ8258-27A1 module working environment

4. Application and Module Mechanical

4.1 Application Diagram

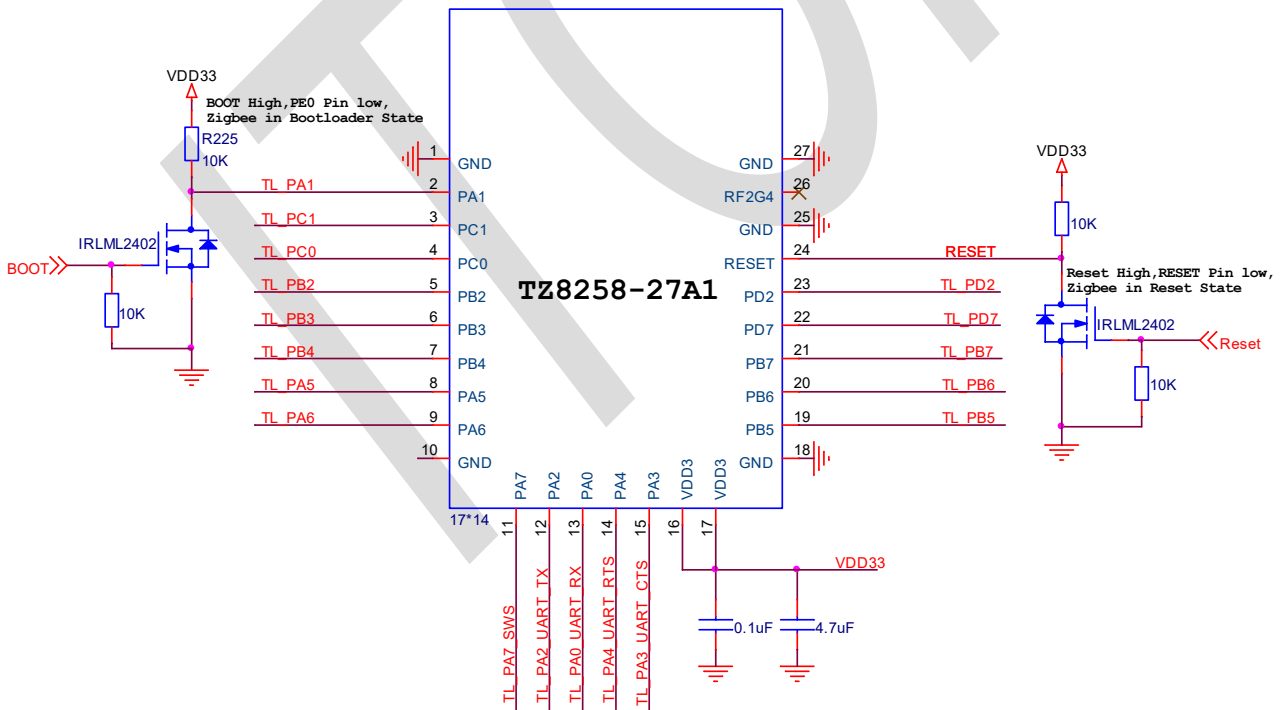


Figure 7. Application Circuit Diagram of TZ8258-27A1

4.2 Module Size

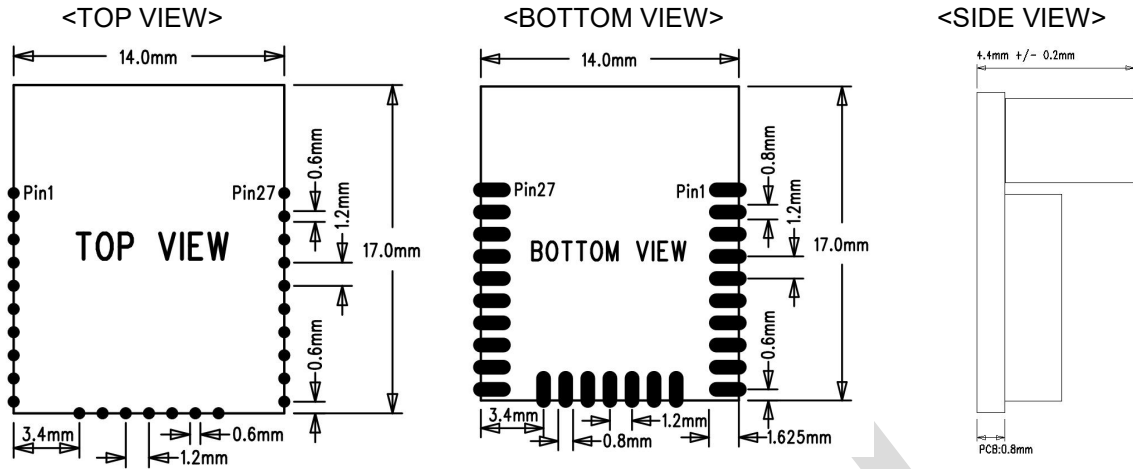


Figure 8. TZ8258-27A1 Module Size

4.3 Recommended Land Pattern

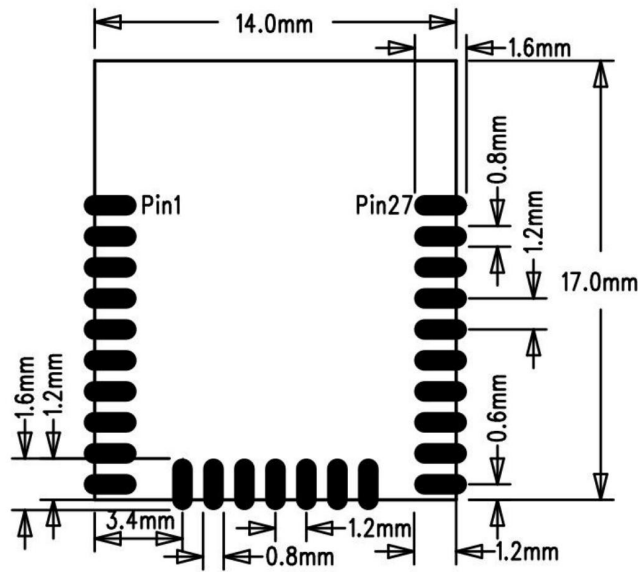


Figure 9. TZ8258-27A1 Module Recommended land Pattern

5. Application Notice

5.1 SMT Temperature Setting Recommendation

Referred to JEDEC/IPC J-STD-020 standard.

Peak temperature: <math><260^{\circ}\text{C}</math>

Number of times: ≤ 2

Profile Feature	Lead Free SMD
Average ramp up rate ($T_{S_{max}}$ to T_p)	3 °C/s Max.
Preheat	
<ul style="list-style-type: none"> Temperature Min ($T_{S_{min}}$) Temperature Max ($T_{S_{max}}$) Time ($T_{S_{max}}$ to $T_{S_{min}}$) 	<ul style="list-style-type: none"> 150 °C 200 °C 60 to 180 seconds
Time maintained above	
<ul style="list-style-type: none"> Temperature (T_L) Time (t_L) 	<ul style="list-style-type: none"> 217 °C 60 to 150 seconds
Peak/Classification temperature (T_p)	260 °C
Time within 5 °C of peak temperature (t_p)	20 to 40 seconds
Ramp down rate	6 °C/s Max.
Time from 25 °C to peak temperature	8 minutes Max.

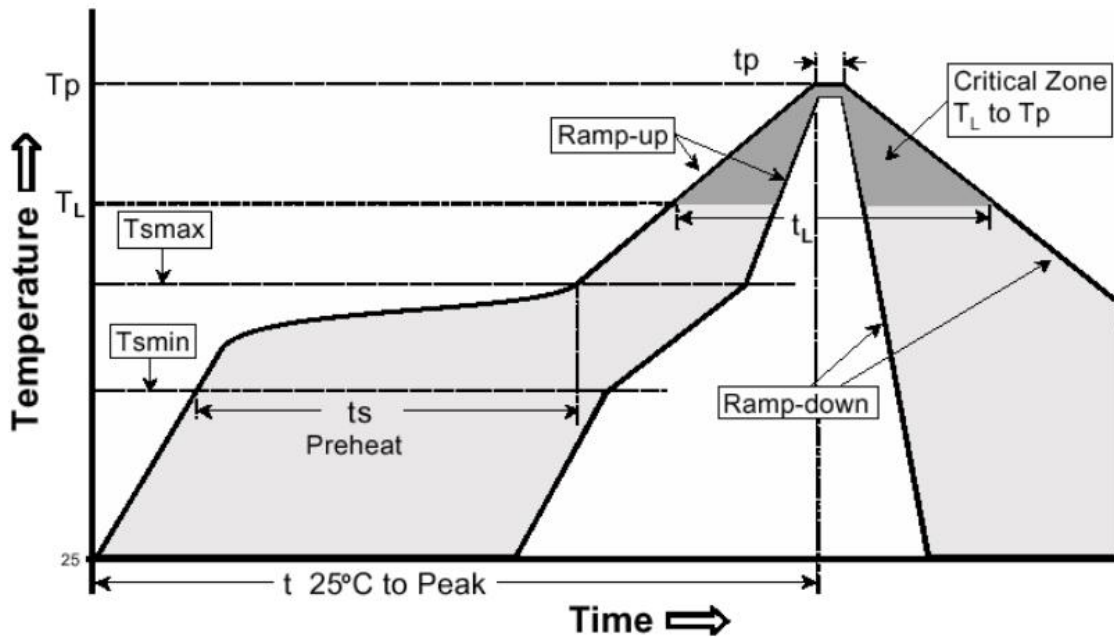


Figure 10. TZ8258-27A1 module SMT temperature settings recommendation

6. Packaging

The TZ8258-27A1 module is shipped in tape and reel, and the minimum package is 600 PCS.

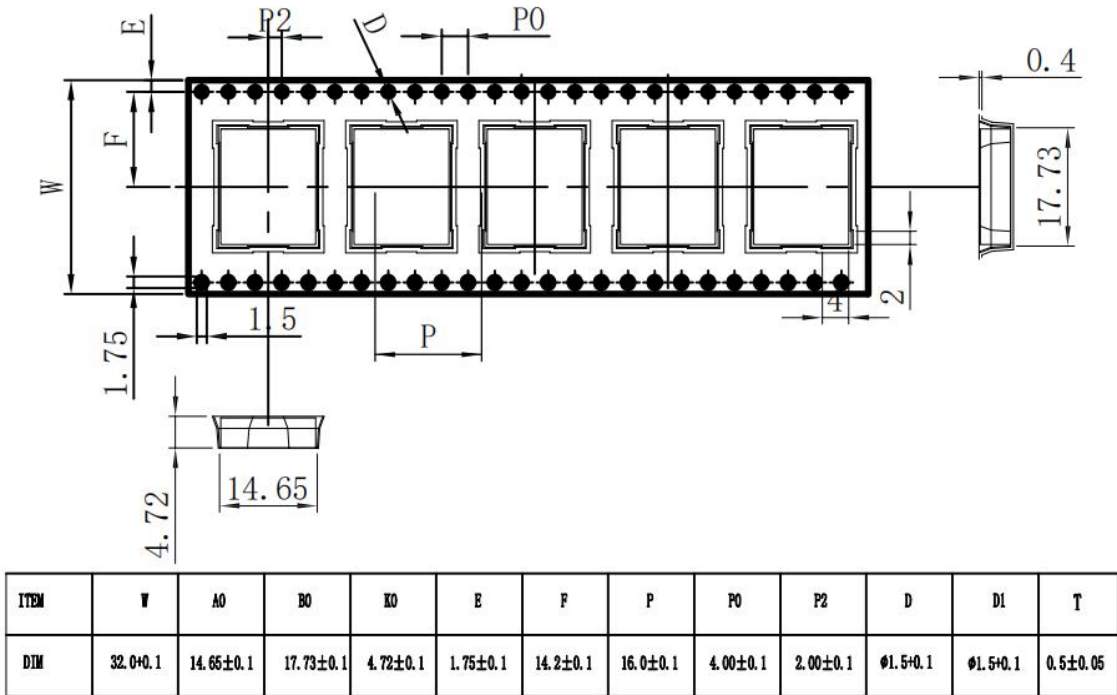


Figure 11. TZ8258-27A1 module packaging

7. Ordering Information

Part NO.	Working Voltage	ANT	Size	Mark
TZ8258-27A1	3.3V	Metal antenna	17.0mm*14.0mm*4.4mm	

8. Revision History

Version	Change Content	Date	Reviser
V0.1	Draft Version	2024.1.30	Phil

FCC Interference Statement

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 device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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

***RF warning for Mobile device:**

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.

The OEM must certify the final end product to comply with unintentional radiators (FCC Sections 15.107 and 15.109) before declaring compliance of the final product to Part 15 of the FCC rules and regulations. Integration into devices that are directly or indirectly connected to AC lines must add with Class II Permissive Change.

The OEM must comply with the FCC labeling requirements. If the module's label is not visible when installed, then an additional permanent label must be applied on the outside of the finished product which states: "Contains transmitter module FCC ID: 2BF4V-TZ8258-27A1".

Additionally, the following statement should be included on the label and in the final product's user manual:

"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 interferences, and
 - (2) this device must accept any interference received, including interference that may cause undesired operation." The module is limited to installation in applications. Separate approval is required for all other operating configurations, including portable configuration with respect to Part 2.1093 and different antenna configurations. A module or modules can only be used without additional authorizations if they have been tested and granted under the same intended end - use operational conditions, including simultaneous transmission operations. When they have not been tested and granted in this manner, additional testing and/or FCC
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application filing may be required. The most straightforward approach to address additional testing conditions is to have the grantee responsible for the certification of at least one of the modules submit a permissive change application. When having a module grantee file a permissive change is not practical or feasible, the following guidance provides some additional options for host manufacturers. Integrations using modules where additional testing and/or FCC application filing(s) may be required are: (A) a module used in devices requiring additional RF exposure compliance information (e.g., MPE evaluation or SAR testing); (B) limited and/or split modules not meeting all of the module requirements; and (C) simultaneous transmissions for independent collocated transmitters not previously granted together. This Module is full modular approval, it is limited to OEM installation ONLY. Integration into devices that are directly or indirectly connected to AC lines must add with Class II Permissive Change. (OEM) Integrator has to assure compliance of the entire end product include the integrated Module. Additional measurements (15B) and/or equipment authorizations (e.g. Verification) may need to be addressed depending on co-location or simultaneous transmission issues if applicable. (OEM) Integrator is reminded to assure that these installation instructions will not be made available to the end user.

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01

2.2 List of applicable FCC rules

FCC Part 15 Subpart C 15.247 & 15.207 & 15.209 & 15.205

2.3 Specific operational use conditions

When installed in smart terminal products, the host manufacturer must negotiate with the module manufacturer on the final installation method in the system. The module can be used for mobile applications with a maximum 2.26 dBi antenna. The host manufacturer 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. The host manufacturer has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

The module should be installed and operated with minimum distance 20cm between the radiator & your body. and if RF exposure statement or module layout is changed, then the host product manufacturer required to take responsibility of the module through a change in FCC ID or new application. The FCC ID of the module cannot be used on the final product. In these circumstances, the host manufacturer will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization. When the host is a portable device, it is necessary to take a SAR test with your set mounting this module. Class II permissive change application is necessary using the SAR report. Please contact kevin (kevin@sziton.com). And an application for a Class II permissive change from a Mobile equipment to a Portable equipment is also required.

Note) Portable equipment : Equipment for which the spaces between human body and antenna are used within 20cm. Mobile equipment : Equipment used at position in which the spaces between human body and antenna exceeded 20cm.

1. According to the following requirements of the power supply DC3.3V, power up, about 3 seconds to to complete the initial.
2. open application software (need to install the company's specific application software development, application software interface can be customized according to customer's product requirements).

2.4 Limited module procedures

The module is a Single module.

Requirement per 15.212 and KDB 996369 D01	Explanation from Grantee (do not write yes/no, but explain why product complies/how it is achieved)
The radio elements must have the radio frequency circuitry shielded. Physical components and tuning capacitor(s) may be located external to the shield, but must be on the module assembly.	Has RF shielding.
The module must have buffered modulation/data inputs to ensure that the device will comply with Part 15 requirements with any type of input signal.	The modular have buffered modulation/data inputs.
The module must contain power supply regulation on the module.	The modular transmitter have its own power supply regulation.(DC 3.3V)
The module must contain a permanently attached antenna, or contain a unique antenna connector, and be marketed and operated only with specific antenna(s), per §§ 15.203, 15.204(b), 15.204(c), 15.212(a), 2.929(b).	Antenna restrictions are added in the manual.The antenna needs to be professionally installed.
The module must demonstrate compliance in a stand-alone configuration.	The module was tested in a stand-alone configuration, please refer to the Setup

	Photo for the detail
The module must be labeled with its permanently affixed FCC ID label, or use an electronic display (see KDB Publication 784748).	Please refer to label sample exhibit - host labeling is described in integration manual
The module must comply with all specific rules applicable to the transmitter, including all the conditions provided in the integration instructions by the grantee.	The required FCC rule has been fulfilled and all the instructions for the maintaining compliance have been clearly stated in the User Manual.
The module must comply with RF exposure requirements	The MPE evaluation with 20cm distance restriction is submitted for the compliance of RF Exposure requirement.

2.5 RF exposure considerations

The module complies with FCC radiation exposure limits set forth for an uncontrolled environment. The module should be installed and operated with minimum distance 20cm between the radiator & your body.

2.6 Antennas

This module has been approved to operate with the antenna types listed below, with the maximum permissible gain indicated. The module antenna requires professional installation, and the antenna type cannot be changed. The gain cannot exceed 2.26dBi.

Frequency band	Antenna Type	Model Number	Max Gain
2405-2480MHz	Shrapnel Antenna	TZ8258-27A1	2.26(dBi)

This device is intended only for host manufacturers under the following conditions: The transmitter module may not be co-located with any other transmitter or antenna; The module shall be only used with the External antenna(s) that has been originally tested and certified with this module. The antenna must be either permanently attached or employ a 'unique' antenna coupler.

As long as the conditions above are met, further transmitter test will not be required. However, the host manufacturer is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

2.7 Label and compliance information

Host product manufacturers need to provide a physical or e-label stating "Contains FCC ID: 2BF4V-TZ8258-27A1 With their finished product.

2.8 Information on test modes and additional testing requirements

The module complies with FCC radiation exposure limits set forth for an uncontrolled environment. The module should be installed and operated with minimum distance 20cm between the radiator & your body. and if RF exposure statement or module layout is changed, then the host product manufacturer required to take responsibility of the module through a change in FCC ID or new application. The FCC ID of the module cannot be used on the final product. In these circumstances, the host manufacturer will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization. When the host is a portable device, it is necessary to take a SAR test with your set mounting this module. Class II permissive change application is necessary using the SAR report. Please contact kevin (kevin@sziton.com). And an application for a Class II permissive change from a Mobile equipment to a Portable equipment is also required.

Note) Portable equipment : Equipment for which the spaces between human body and antenna are used within 20cm. Mobile equipment : Equipment used at position in which the

spaces between human body and antenna exceeded 20cm.

Host manufacturer must perform test of radiated & conducted emission and spurious emission, etc according to the actual test modes for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

Only when all the test results of test modes comply with FCC requirements, then the end product can be sold legally.

2.9 Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is only FCC authorized for FCC Part 15 Subpart C 15.247 & 15.207 & 15.209 & 15.205 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 circuitry), 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.

2.11 The user manual of the end product should include:

- a) Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.
- b) The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons.
- c) 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.
- d) This device is restricted to indoor use.
- e) The antenna(s) used for this transmitter must not transmit simultaneously with any other antenna or transmitter.