Product Name	Confidential
TXLE12MSM Bluetooth Module	Secret
Product Version	
V1.4	

TXLE12MSM Bluetooth Module
Products Datasheet

V1.4

Establish ： _____Kai Huang_____ Date： _____2020-10-15_____

Audit： _____Date： _____

Audit： _____Date： _____

Approve ： _____Date： _____

Revision History

Date：	Revision version	Description	Author
2020-10-15	1.0	Establish	Kai Huang
2021-06-21	1.1	Modified pin definition	Kai Huang
2021-07-23	1.2	Modified power consumption	Kai Huang
2021-07-25	1.3	Add small package	Kai Huang
2021-09-20	1.4	PIN change	Kai Huang

SHANGHAI YCT ELECTRONICS GROUP CO.,LTD

1. DESCRIPTION

TXLE12M series low power Bluetooth module is a low power module supporting bluetooth 5.1 protocol.The module adopts stamp hole package and supports PCB antenna and external antenna interfaces.Full interface extraction, flexible use, reduce a lot of early research and development work, complete documentation, easy to achieve bluetooth application development.

TYPICAL APPLICATIONS;

Smart Watches

Power meter

Smart home

Human Interface Devices

Bluetooth car audio unit

2. FEATURES

Compliant with Bluetooth Specification BLE, support   1M, 500K and 125K data rate

Support host mode, slave mode, master - slave mode

The Bluetooth Smart firmware includes the L2CAP service layer protocols, Security Manager (SM), Attribute Protocol (ATT), the Generic Attribute Profile (GATT) and the Generic Access Profile (GAP).

Up to 5dBm RF transmit power

Receiver sensitivity：-94dBm typical

Low Power Consumption：

 1) Deep sleep current (include 48K retention RAM)：6uA

 2) Power off：2.7uA

Users can develop various applications based on embedded 32-bits high performance MCU.

2.1 Part Number

| P.N.	DESCRIPTION
TXLE012M	General Module
TXLE012MPM	Power Meter Module
TXLE012MSM	Small Size Package Module
The model does not include software. If it is a product with software, please communicate the specific model and MPQ information with the sales.	

3. Specifications

3.1 Product appearance and dimensions

Size: *SM(Length * width * height): 10mm*16mm*2.5mm
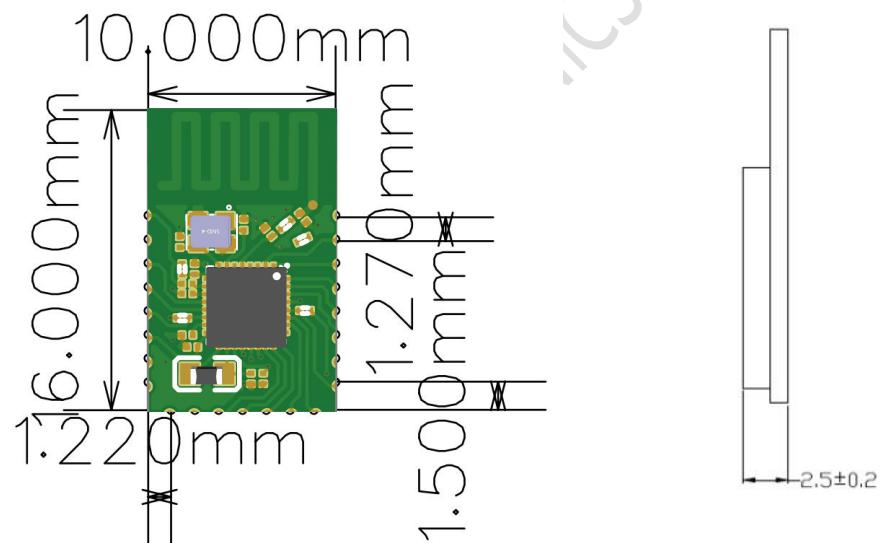
3.2 Pins Description
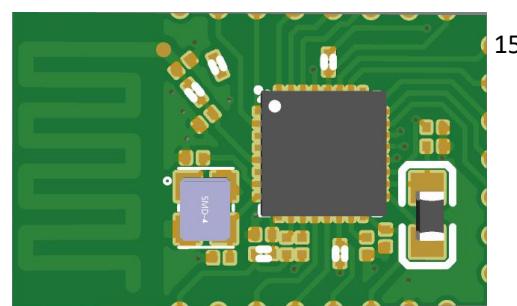
定义			
	Pin N	Pin name	Description
	1	MIC+	Voice positive input
	2	MIC-	Voice negative input
	3	SPK+	The audio positive output
	4	SPK-	The audio negative output
	5	VCHG	Power supply for charger
	6	VBAT	Positive power supply for
	7	GND	Ground
	8	PD7	I/O
	9	PD6	I/O
	10	PD5	I/O
	11	PD4	I/O
	12	PC7	SWDIO
	13	PC6	SWTCK
针脚定义	14	PC5	I/O
	15	PA3	Debug TXD
	16	PA2	Debug TXD
	17	PA1	I/O
	18	PA0	I/O
	19	PA7	I/O
	20	PA6	I/O
	21	PA4	I/O
	22	PA5	I/O
	23	ANT	External antenna

4. Electrical Characteristics

4.1 Absolute Maximum Ratings

Rating	Parameters	Unit
Supply Voltage	4.3V	VCHG
Storage Temperature	-40-105	℃
Operating Temperature	-20-70	℃

4.2 Recommended Operating Conditions

项目	Min	Typ	Max	单位
Supply Voltage	2.5	3.3	4.3	VBAT
Deep sleep current (include 48K retention RAM)		6		uA
Power off		2.7		uA
TX peek current (0dB)	-	-	8	mA
RX peek current			9.7	mA

4.3．The agreement sample

Communication	UART
Baud rate	9600bps~128000bps
Data length	10bit/LSB First
Parity	无
Start bit	1 bit
End bit	1 bit

4.4 Power consumption under different working conditions

Mode	Power consumption （uA）	Broadcast interval （ms）
0dBm Broadcast	330	100
	177	200
	76.5	500
	60.5	700
	45	1000
	25.5	2000
	17.5	5000
	13.5	7000

Mode	Power consumption （uA）	Connection Interval （ms）
0dBm Connection	271.5	100
	123	200
	78.5	500
	61.5	700
	48.5	1000
	39	2000

Note: The power consumption data tested in connection mode were tested when there was no data communication between the mobile phone and the module.

5. Typical applications
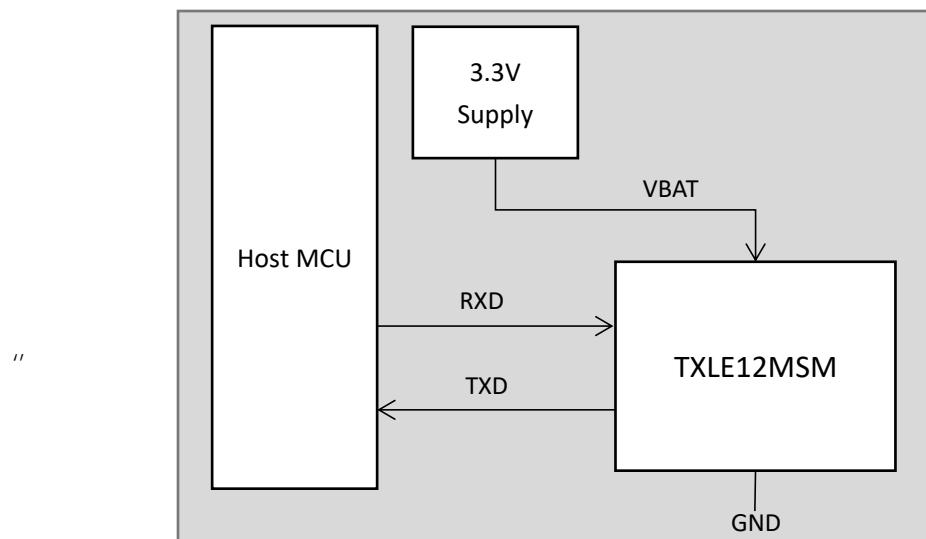
基本应用框图

5.1 Application Precautions

1. Power supply:

   It is recommended to use a dc power supply with a low ripple coefficient.The positive and negative terminals of the module power supply must be correctly connected. Otherwise, the module may be irreparably damaged.

2. Antenna:

2.1 PCB antenna

   The module is equipped with onboard PCB antenna. Ensure that the antenna and surrounding area are completely cleared when the board is laid out, as shown in the figure below. The white area needs to be cleared.Antenna x-Y-Z axis should not have metal parts, otherwise it will affect the performance of the antenna, resulting in a great impact on communication distance.

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

2.3 Specific operational use conditions
The module is a Bluetooth module with BLE function.
Operation Frequency: 2402-2480MHz
Number of Channel: 40
Modulation: GFSK
Type: PCB Antenna
Gain: 1 dBi Max.

The module can be used for mobile or portable applications with a maximum 0dBi antenna. The host manufacturer installing this module into their product must ensure that the final composit product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operaition. 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.

2.4 Limited module procedures
Not applicable. The module is a Single module and complies with the requirement of FCC Part 15.212.

2.5 Trace antenna designs
Not applicable. The module has its own antenna, and doesn't need a host's printed board microstrip trace antenna etc.

2.6 RF exposure considerations
The module must be installed in the host equipment such that at least 20cm is maintained between the antenna and users' 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.

2.7 Antennas
Antenna Specification are as follows:
Type: PCB Antenna
Gain: 1 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 internal antenna(s) that has been originally tested and certified with this module. The antenna must be either permanently attached or employa '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.).

2.8 Label and compliance information

Host product manufacturers need to provide a physical or e-label stating "Contains FCC ID: **2A3L5-TXLE12MSM**" with their finished product.

2.9 Information on test modes and additional testing requirements

Operation Frequency: 2402-2480MHz
Number of Channel: 40
Modulation: GFSK
Host manufacturer must perfom 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.

2.10 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 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.

Federal Communication Commission Statement (FCC, U.S.)

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 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: (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 Caution:
Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

IMPORTANT NOTES

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

OEM integration instructions:
This device is intended only for OEM integrators 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.

As long as the conditions above are met, further transmitter test will not be required. However, the OEM integrator 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.).

Validity of using the module certification:
In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End product labeling:
The final end product must be labeled in a visible area with the following: "Contains Transmitter Module FCC ID: 2A3L5-TXLE12MSM".

Information that must be placed in the end user manual:
The OEM integrator 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.