User Manual

1. Product Description

The ITM is Bluetooth LE module with Telink TLSR8269F512, BLE wireless Soc solution. It provides the feature and functions needed for 2.4GHz BLE standard on IOT devices, using for lighting application devices mainly. The TLSR8269F512 chipset combines the radio frequency, digital processing, protocols stack software and profiles for BLE standards into a single SoC.

The module supports standards and industrial alliance specifications including Bluetooth Smart(BLE4.0 and 4.2) and BLE mesh.

The module is made up of the following components:

- Telink SoC TLSR8269F512AT32 chipset
- Internal 512KB flash memory (IC embedded)
- IC embedded LDO
- 12MHz Crystal
- PCB printed antenna for 2.4GHz ISM band
- 10pins SMD type or 4pins header mold (optional)
- RF can-shield

Product Form Factor

- Module Size (mm): 9.5 (W) X 18.5 (L) X 2.4(H)
- PCB size (mm): 9.5 (W) X 18.5 (L) X 1.0 (H)
- Shield can (mm): 8.1 (W) X 11.5 (L) X 1.4 (H)
- Antenna Type : PCB Printed Antenna
- Weight : 0.67g

2. Key Feature

General Feature

- TLSR8269F512 Embedded 32-bit high performance MCU with clock up to 48Mhz
- Chipset embedded program memory : internal 512KB Flash
- Data memory : 32kB on-chip SRAM
- 4 channels PWM
- UART with hardware flow control
- Debug interface: SWS
- TLSR8269F512 Embedded hardware AES

RF Feature

- TX output power : Typ. +6.5dBm (Max. +7.5dBm) / RX sensitivity : -92dBm (@1Mbps)
- Single printed PCB antenna with about peak gain 3.8dBi
- BLE RF transceiver embedded, working in worldwide 2.4GHz ISM band
- Bluetooth 4.2 Compliant, 1Mbps LE enhancement

Power management Feature

- Power supply : 1.9~3.6V
- Chipset embedded LDO
- Multiple stage power management to minimize power consumption
- Low power consump[tion
  - Receiver mode current: 12mA
  - Transmitter mode current: 15mA (@ 0dBm)

Typical Apllication

- Smart lighting

3. Product Specifications

Absolute Maximum Ratings

Absolute Maximum Ratings (AMR) are stress ratings only. AMR corresponds to the maximum value that can be applied without leading to instantaneous or very short-term unrecoverable hard failure (destructive breakdown). Stresses beyond those listed under AMR may cause permanent damage to the device.

Functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Range" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may adversely affect device reliability.

Device functional operating limits and guaranteed performance specifications are given under Electrical Characteristics at the test conditions specified.

CONDITION	MIN	MAX
Supply Voltage	-0.3V	3.9V
Storage Temperature	-40ºC	+85ºC
Soldering Temperature		+260ºC
Static Discharge Voltage[1]	-30KV	+30KV

Notes;

1) System level ESD : IEC 61000-4-2; C = 150pF, R = 330 Ω

Recommended Operating Conditions

PARAMETER	MIN	TYP	MAX	UNIT
VDD, Supply pin voltage	1.9	3.3	3.6	V
Ambient Temperature (TA)	-20		70	ºC

BLE RF PHY Characteristics

Operating Conditions: VDD = 3.3V, TA = 25 ºC, RF Freq = 2.4Ghz band channel. At conducted measurement port

Parameter		Min	Typ.	Max	Unit
TX power (avg.)		4.5	6.5	7.5	
Bandwidth			2		MHz

In-band emissions	@[± (3+n)MHz, n=0,1,2…]			-30	dBm
	@[± 2MHz]			-20	
TX modulation Characteristics	Delta F2 Maximum	185			KHz
	Delta F2 Average	225		275	
	Delta F1 Average	225		275	
	Ratio@[Delta F2 Average/Delta F1 Average]	0.8			
TX Carrier Frequency	Offset@[10101010bin]	-150		150	KHz
	Drift@[10101010bin]	0		50	
	Max Drift Rate@[10101010bin]	0		20	
RX Sensitivity			-92		dBm

Antenna Characteristics

PARAMETER	BAND	MIN	TYP	MAX	UNIT
Frequency Range		2400		2480	MHz
Return Loss			13		dB
VSWR			1.65		
Peak Gain	2.4GHz			3.8	dBi
Average Gain			-3		dBi
Efficiency			49.7	55	%
Impedance			50		Ω

4. Pin Description

Pin definition table

Pin#	Pin Name	Type	8269IC Pin#	Function Description
1	PWM0	Digital I/O	#29	PWM0 output/GPIO
2	UART_TX/PWM2	Digital I/O	#16	UART_TX/PWM2 output/GPIO
3	UART_RX/PWM3	Digital I/O	#17	UART_RX/PWM3 output/GPIO
4	VDD	PWR	#7,20,24,26	3.3V supply
5	GND	GND		Ground
6	GND	GND		Ground
7	PWM1	Digital I/O	#30	PWM1 output/GPIO
8	SWS	Digital I/O	#10	Single wire slave/GPIO
9	GND	GND		Ground
10	GND	GND		Ground
11	GND	GND		Ground
12	UART_TX/PWM2	Digital I/O	#16	UART_TX/PWM2 output/GPIO
13	UART_RX/PWM3	Digital I/O	#17	UART_RX/PWM3 output/GPIO
14	VDD	PWR		3.3V supply

Pin map
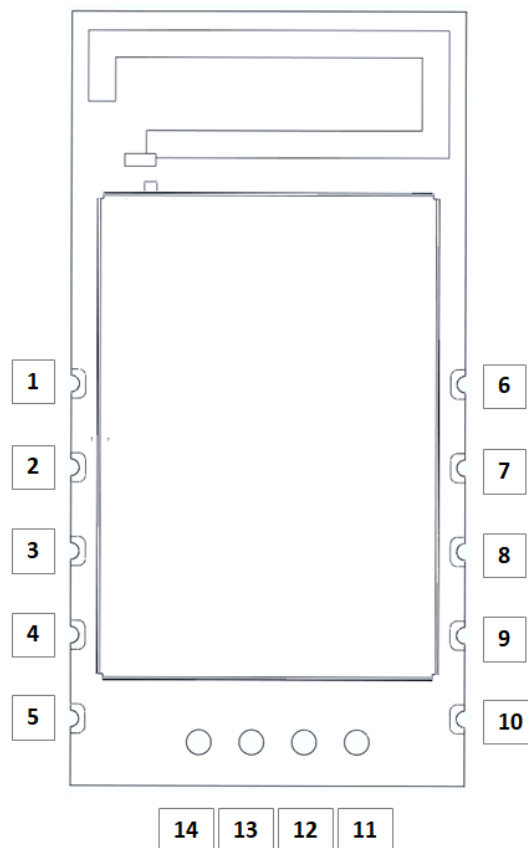
5. Notice

FCC Statement

This device complies with Part 15 of FCC Rules, Operation is Subject to following two conditions:

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

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

This equipment has been tested and found to comply within 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 different circuit from that to which the receiver is connected
• Consult the dealer or an experienced radio/TV technician for help.

IMPORTANT NOTE:

FCC Radiation Exposure Statement;

A minimum separation distance of 20 ㎝ must be maintained between the antenna and the person for this appliance to satisfy the RF exposure requirements.

IMPORTANT NOTE:

This module is intended for OEM integrator. The OEM integrator is still responsible for the FCC compliance requirement of the end product, which integrates this module.

20cm minimum distance has to be able to be maintained between the antenna and the users for the host this module is integrated into. Under such configuration, the FCC Part 2.1091 radiation exposure limits set forth for an population/ uncontrolled environment can be satisfied.

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

That separate approval is required for all other operating configurations, including portable configurations with respect to part 2.1093 and different antenna configurations.

USER MANUAL OF THE END PRODUCT:

In the users manual of the end of product, the end user has to be informed to keep at least 20cm separation with the antenna while this end product is installed and operated.

The end user has to be informed that the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied. The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

If the size of the end product is smaller than 8x10cm, then additional FCC part15.19statement is required to be available in the users manual; This device complies with Part15 of FCC rules.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following " Contains **FCC ID: 2AR3A-ITM-S-B** ". If the size of the end product is larger than 8x10cm, then the following FCC part 15.19 statement has to also be available on the label: This device complies with Part 15 of 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.