Telink Module TLSR825XML32D User Manual

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Keyword:

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Brief：

This is a user manual for Telink 825X Module TLSR825XDB48.

TELINK SEMICONDUCTOR

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1 Product Introduction

This is a user manual for Telink Module TLSR825XML32D.

1.1 General description

The TLSR825XML32D, which is based on Telink TLSR825XF512ET32 chip, provides a BLE wireless system.

The TLSR825XML32D integrates a power-balanced 32-bit MCU, BLE, 64kB SRAM, 512kB internal Flash, 14bit ADC with PGA, analog and digital microphone input, stereo audio output, 6-channel PWM, one quadrature decoder (QDEC), abundant and flexible GPIO interfaces, and nearly all the peripherals needed for IoT (Internet of Things) and HID (Human Interface Devices) application development (e.g. Bluetooth Low Energy).

The TLSR825XML32D supports standards and industrial alliance specifications including Bluetooth Low Energy (up to Bluetooth 5).

Telink TLSR825XML32D board can be used for SDK development. Firmware can be directly downloaded to the TLSR825XML32D board to be up and running.

1.2 Key features

- ✧ Bluetooth 5 Compliant, 1Mbps, 2Mbps, Long Range 125kbps and 500kbps
- ✧ 64kB on-chip SRAM with up to up to 32kB retention
- ✧ 512kB internal Flash
- ✧ A rich set of I/Os: SPI, I2C, Single wire, up to 17 GPIOs, UART with hardware flow control and 7816 protocol support, DMIC (Digital Mic), AMIC (Analog Mic), I2S,

Stereo Audio output

- ✧ 6-channel PWM (Pulse Width Modulation) output
- ✧ 6-channel (only GPIO input), 14-bit SAR ADC with 10.5-bit ENOB
- ✧ 4-channel PGA, differential input
- ✧ Tx output power: Typ. +9.47dBm
- ✧ RSSI monitoring with +/-1dB resolution
- ✧ Power supply: DC3.3V

1.3 GPIO Pin layout

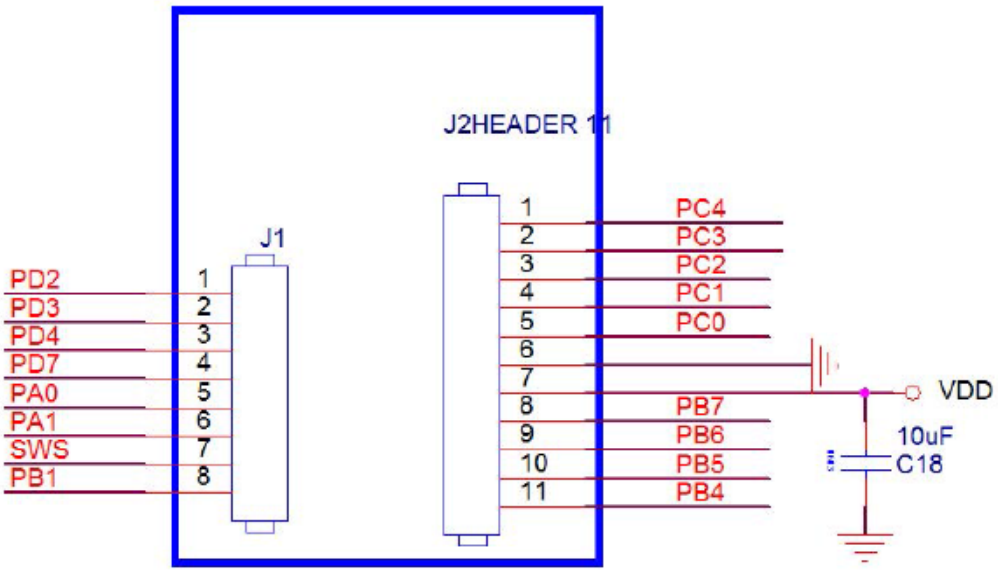

Figure 1 Pin layout

Pin definition is shown as the Table 1:

Table 1 Pin definition

Pin No	Module Pin Name	Chip Pin Name	Description
J1			
1	TL_GPIO2	SPI_CN/I2S_LR/PWM3/PD<2>	SPI chip select (Active low) / I2S left right channel select / PWM3 output / GPIO PD[2]
2	TL_GPIO1	PWM1_N/I2S_SDI/7816_TRX (UART_TX)/PD<3>	PWM1 inverting output / I2S serial data input / UART 7816 TRX (UART_TX) / GPIO PD[3]
3	TL_GPIO0	SWM/I2S_SDO/PWM2_N/ PD<4>	Single wire master / I2S serial data output / PWM2 inverting output / GPIO PD[4]
4	TL_Grant	SPI_CK/I2S_BCK/7816_TRX (UART_TX)/PD<7>	SPI clock (I2C_SCK) / I2S bit clock / UART 7816 TRX (UART_TX) / GPIO PD[7]
5	TL_Priority	DMIC_DI/PWM0_N/UART_RX/ PA<0>	DMIC data input / PWM0 inverting output / UART_RX / GPIO PA[0]
6	TL_Request	DMIC_CLK/7816_CLK/I2S_CLK/ PA<1>	DMIC clock / UART 7816 clock / I2S clock / GPIO PA[1]

Pin No	Module Pin Name	Chip Pin Name	Description
7	TL_SWS	SWS/UART_RTS/PA<7>	Single wire slave/ UART_RTS / GPIO PA[7]
8	TL_UTX	PWM4/UART_TX/ATSEL2/lc_comp_ain<1>/sar_aio<1>/PB<1>	PWM4 output / UART_TX / Antenna select pin 2 / Low power comparator input / SAR ADC input / GPIO PB[1]
J2			
1	TL_C4	PWM2/UART_CTS/PWM0_N/ sar_aio<8>/BIAS/PC<4>	PWM2 output / UART_CTS / PWM0 inverting output / SAR ADC input / AMIC BIAS / GPIO PC[4]
2	TL_C3	PWM1/UART_RX/I2C_SCK/XC32K_I/PGA_N1/PC<3>	PWM1 output / UART_RX / I2C serial clock / (optional) 32kHz crystal input / PGA right channel negative input / GPIO PC[3]
3	TL_C2	PWM0/7816_TRX(UART_TX)/I2C_SDA/XC32K_O/PGA_P1/PC<2> *1	PWM0 output / UART 7816 TRX (UART_TX) / I2C serial data / (optional) 32kHz crystal output / PGA right channel positive input / GPIO PC[2]
4	TL_C1	I2C_SCK/PWM1_N/PWM0/ PGA_N0/PC<1>	I2C serial clock / PWM1 inverting output / PWM0 output / PGA left channel negative input / GPIO PC[1]
5	TL_C0	I2C_SDA/PWM4_N/UART_RTS/ PGA_P0/PC<0>	I2C serial data / PWM4 inverting output / UART_RTS / PGA left channel positive input / GPIO PC[0]
6	GND		Ground
7	TL_VDD	VDD_IO/VDD3/VDDIO_AMS	3.3V power supply
8	TL_URX	SDM_N1/SPI_DO/UART_RX/ lc_comp_ain<7>/sar_aio<7>/ PB<7>	SDM negative output 1 / SPI data output / UART_RX / Low power comparator input / SAR ADC input / GPIO PB[7]
9	TL_B6	SDM_P1/SPI_DI/UART_RTS/ lc_comp_ain<6>/sar_aio<6>/ PB<6>	SDM positive output 1 / SPI data input (I2C_SDA) / UART_RTS / Low power comparator input / SAR ADC input / GPIO PB[6]

Pin No	Module Pin Name	Chip Pin Name	Description
10	TL_B5	SDM_N0/PWM5/lc_comp_ain<5>/ sar_aio<5>/PB<5>	SDM negative output 0 / PWM5 output / Low power comparator input / SAR ADC input / GPIO PB[5]
11	TL_B4	SDM_P0/PWM4/lc_comp_ain<4>/ sar_aio<4>/PB<4>	SDM positive output 0 / PWM4 output / Low power comparator input / SAR ADC input / GPIO PB[4]

2 Pin Connection Guide

2.1 Supply power

The TLSR825XML32D supports supply power via battery.

Connect PIN6 (GND) and PIN7 (TL_VDD) of J2 with GND and 3.3V of power, respectively.

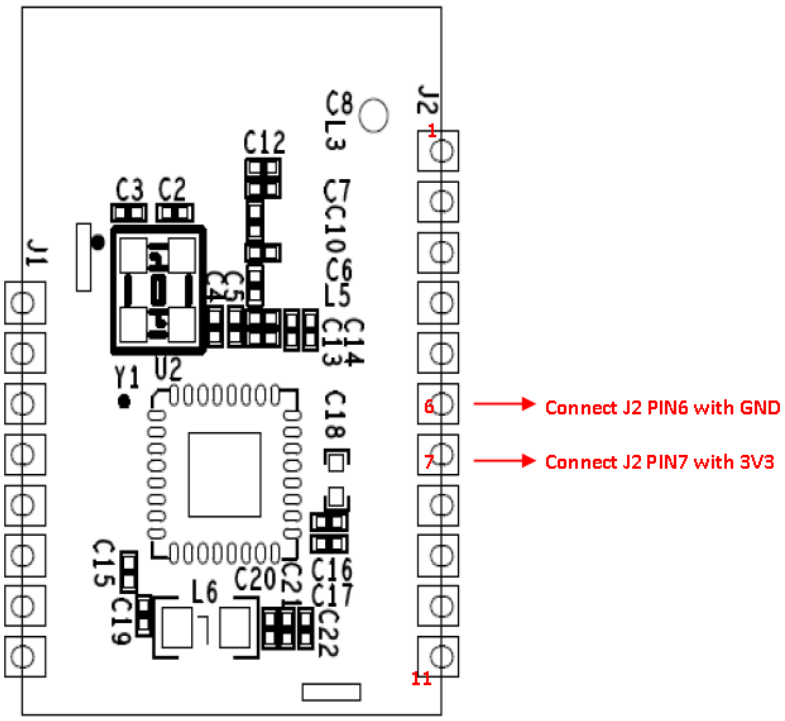

Figure 2 Connection chart to supply power

2.2 Download firmware

To download firmware into TLSR825XML32D, first make sure the TLSR825XML32D is supplied with power normally. That is, connect PIN6 and PIN7 of J2 with GND and 3.3V of power, respectively.

Then connect J1 PIN7 (SWS) of the TLSR825XML32D with SWM of a burning EVK. Meanwhile, connect the miniUSB interface of the burning EVK with PC USB.

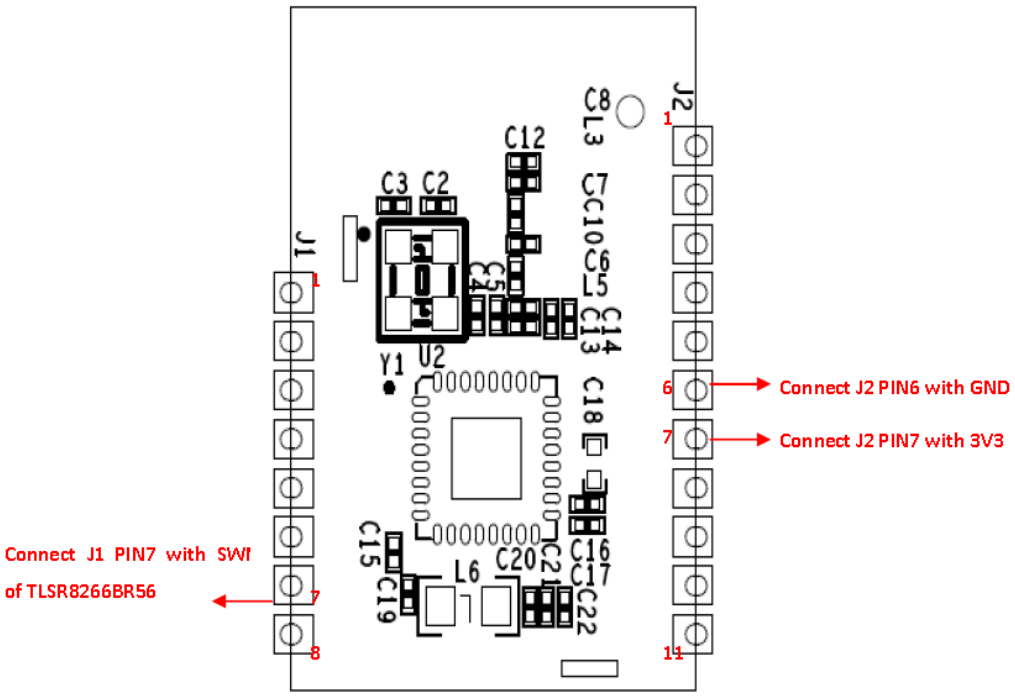

Figure 3 Connection chart to download firmware

2.3 Test RF signal

To test RF signal of TLSR825XML32D, first make sure the TLSR825XML32D is supplied with power normally. That is, connect PIN6 and PIN7 of J2 with GND and 3.3V of power, respectively.

Attach the semi-rigid cable welding steel to the PCBA GND. Then solder wire core to feed point.

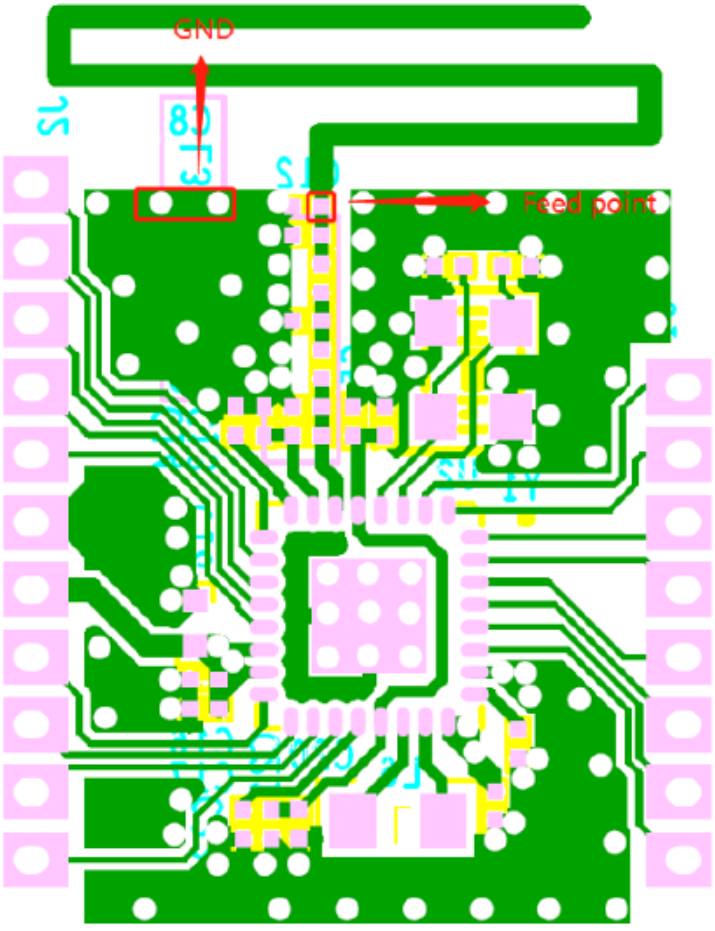

Figure 4 Connection chart to test RF signal

3. Integrators Installation Manual

3.1. List of applicable FCC rules

This device complies with part 15.247 of the FCC Rules.

3.2. Summarize the specific operational use conditions

This module can be used in electronic controls, industrial application and other environment. The power supply is DC 3.3V. The operating temperature range is -40℃ to+85℃.This module using only one kind of antennas with maximum gain is 0 dBi .Other antenna arrangement is not covered by this certification.The antenna is not field replaceable. If the antenna needs to be changed, the certification should be re-applied.

3.3. Limited module procedures

Not applicable

3.4. Trace antenna designs

Not applicable

3.5. RF exposure considerations

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed an d operated with minimum distance 20cm between the radiator& your body. If the device built into a host as a portable usage, the additional RF exposure evaluation may be required as specified by §2.1093.

3.6. Antennas

Antenna type: PCB antenna	2.4GHz band Peak Gain 0(dBi)

3.7. Label and compliance information

The outside of final products that contains this module device must display a label referring to the enclosed module. This exterior label can use wording such as: “Contains Transmitter Module FCC ID: OEOTLSR825XML32D ”,or “Contains FCC ID: OEOTLSR825XML32D ”, Any similar wording that expresses the same meaning may be used.

3.8. Information on test modes and additional testing requirements

a) The modular transmitter has been fully tested by the module grantee on the required number of channels, modulation types, and modes, it should not be necessary for the host installer to re-test all the available transmitter modes or settings. It is recommended that the host product manufacturer, installing the modular transmitter, perform some investigative measurements to confirm that the resulting composite system does not exceed the spurious emissions limits or band edge limits (e.g., where a different antenna may be causing additional emissions).

b) The testing should check for emissions that may occur due to the intermixing of emissions with the other transmitters, digital circuitry, or due to physical properties of the host product (enclosure). This investigation is especially important when integrating multiple modular transmitters where the certification is based on testing each of them in a stand-alone configuration. It is important to note that host product manufacturers should not assume that because the modular transmitter is certified that they do not have any responsibility for final product compliance.

c) If the investigation indicates a compliance concern the host product manufacturer is obligated to mitigate the issue.

3.9. Additional testing, Part 15 Subpart B disclaimer

The final host / module combination need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device.

The host integrator 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 and should refer to guidance in KDB 996369.

Frequency spectrum to be investigated

For host products with certified modular transmitter, the frequency range of investigation of the composite system is specified by rule in Sections 15.33(a)(1) through (a)(3), or the range applicable to the digital device, as shown in Section 15.33(b)(1), whichever is the higher frequency range of investigation.

Operating the host product

When testing the host product, all the transmitters must be operating.The transmitters can be enabled by using publicly-available drivers and turned on, so the transmitters are active. In certain conditions it might be appropriate to use a technology-specific call box (test set) where accessory devices or drivers are not available.

When testing for emissions from the unintentional radiator, the transmitter shall be placed in the receive mode or idle mode, if possible. If receive mode only is not possible then, the radio shall be passive (preferred) and/or active scanning. In these cases, this would need

to enable activity on the communication BUS (i.e., PCIe, SDIO, USB) to ensure the unintentional radiator circuitry is enabled. Testing laboratories may need to add attenuation or filters depending on the signal strength of any active beacons (if applicable) from the enabled radio(s). See ANSI C63.4, ANSI C63.10 and ANSI C63.26 for further general testing details.

The product under test is set into a link/association with a partnering WLAN device, as per the normal intended use of the product. To ease testing, the product under test is set to transmit at a high duty cycle, such as by sending a file or streaming some media content.

FCC Statment:

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