Telink 8258 Dongle Specification

PS-19012802-E1

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Keyword:

Features; Pin layout; Mechanical dimensions;

Pin connection; Electrical specifications;

Reference design;

Brief：

This document is a specification for Telink 8258 Dongle.

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Revision History

Version	Major Changes	Date	Author
1.0.0	Initial release	2019/1	HZF, LX, Cynthia

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1 Product Introduction

1.1 General description

The TLSR8258 Dongle, which is based on Telink TLSR8258F512ET48 chip, provides a Bluetooth LE wireless system.

The TLSR8258 Dongle integrates a power-balanced 32-bit MCU, BLE /2.4GHz Radio, 64kB SRAM, 512kB internal Flash, 14bit ADC, 6-channel PWM, 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 TLSR8258 Dongle supports standards and industrial alliance specifications including Bluetooth Low Energy (up to Bluetooth 5), BLE Mesh, 6LoWPAN, Thread, RF4CE, HomeKit, ANT and 2.4GHz proprietary standard.

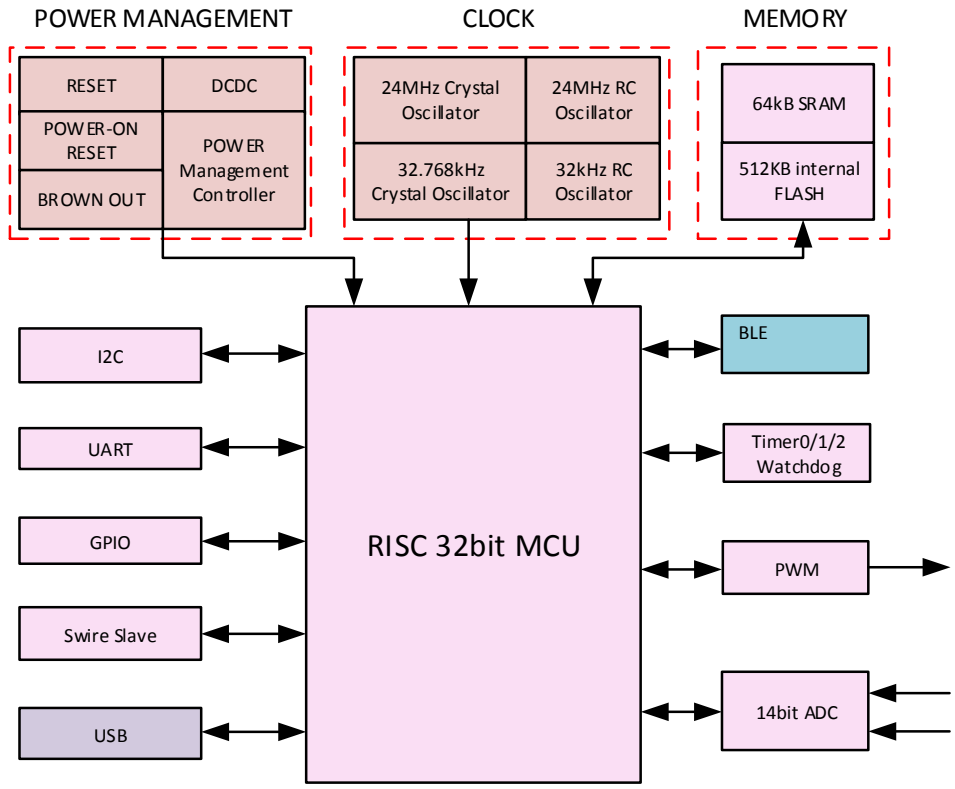


Figure 1 Block diagram

1.2 Key features

- ✧ Bluetooth 5 Compliant, 1Mbps, 2Mbps, Long Range 125kbps and 500kbps
- ✧ 2.4GHz proprietary 1Mbps/2Mbps/250kbps/500kbps mode with Adaptive Frequency Hopping feature support
- ✧ 64kB on-chip SRAM with up to up to 32kB retention
- ✧ 512kB internal Flash
- ✧ A rich set of I/Os: I2C, USB, Single wire slave, up to 10 GPIOs, UART with hardware flow control support
- ✧ 6-channel PWM (Pulse Width Modulation) output
- ✧ Rx sensitivity: -98dBm@BLE 1Mbps
- ✧ RSSI monitoring with +/-1dB resolution
- ✧ Power supply: 1.8V~3.6V (Battery) or 4.5V~5.5V (USB)
- ✧ TX mode: 19.1mA@12dBm Tx power
- ✧ RX mode: 12mA

1.3 Mechanical and PCB fabrication Specifications

- ✧ PCB dimension: 51mm*18.5mm*1.0mm
- ✧ PCB layer: 2 layers
- ✧ Dielectric constant: 4.2
- ✧ Impedance: 50 Ω

Figure 2 TLSR8258 Dongle photo

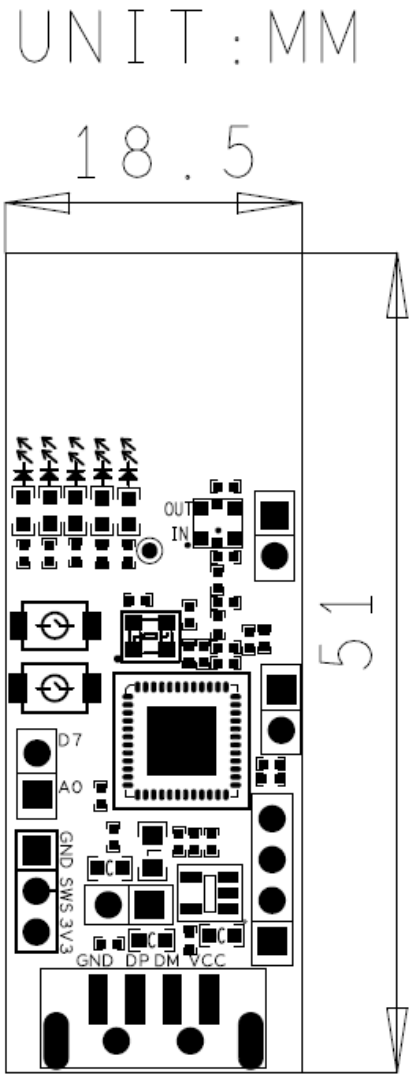


Figure 3 Mechanical dimensions

1.4 Pin layout

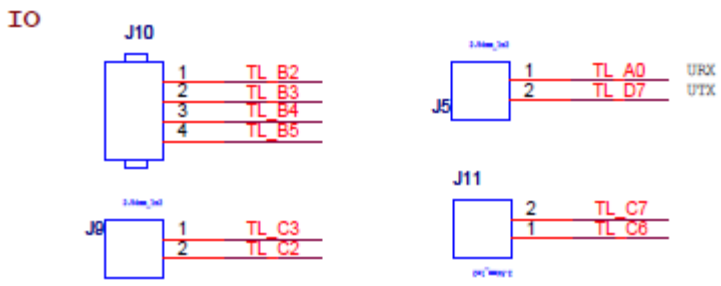
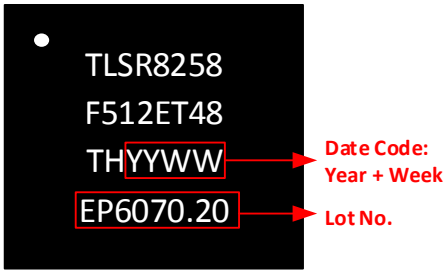


Figure 4 Pin layout for GPIO interface

Table 1 Pin definition

Pin No	Dongle Pin Name	Chip Pin Name	Description
J5			
1	TL_A0	PWM0_N/UART_RX/PA<0>	PWM0 inverting output / UART_RX / GPIO PA[0]
2	TL_D7	UART_TX /PD<7>	UART_TX / GPIO PD[7]
J9			
1	TL_C3	PWM1/UART_RX/I2C_SCK/XC32K_I/ PC<3>	PWM1 output / UART_RX / I2C serial clock / (optional) 32kHz crystal input / GPIO PC[3]
2	TL_C2*[1]	PWM0/UART_TX/I2C_SDA/XC32K_O/ PC<2>	PWM0 output / UART_TX / I2C serial data / (optional) 32kHz crystal output / GPIO PC[2]
J10			
1	TL_B2	PWM5/UART_CTS/RX_CYC2LNA/ lc_comp_ain<2>/sar_aio<2>/PB<2>	PWM5 output / UART_CTS / Control external LNA / Low power comparator input / SAR ADC input / GPIO PB[2]
2	TL_B3	PWM0_N/UART_RTS/TX_CYC2PA/ lc_comp_ain<3>/sar_aio<3>/PB<3>	PWM0 inverting output / UART_RTS / Control external PA / Low power comparator input / SAR ADC input / GPIO PB[3]
3	TL_B4	PWM4/lc_comp_ain<4>/ sar_aio<4>/PB<4>	PWM4 output / Low power comparator input / SAR ADC input / GPIO PB[4]
4	TL_B5	PWM5/lc_comp_ain<5>/ sar_aio<5>/PB<5>	PWM5 output / Low power comparator input / SAR ADC input / GPIO PB[5]
J11			
1	TL_C6	RX_CYC2LNA/ PWM4_N/PC<6>	Control external LNA /PWM4 inverting output / GPIO PC[6]
2	TL_C7	TX_CYC2PA/ PWM5_N/PC<7>	Control external PA /PWM5 inverting output / GPIO PC[7]

[1] For 8258 chips with lot No. of EP5682.20 (VID=0x01, 1827 ≤ Data code < 1844), since PC2 is pulled down by an internal diode, all of its functions cannot act normally.
For 8258 chips with lot No. of EP6070.20 (VID=0x03, Date code≥1844), PC2 function bug has already been fixed.



2 Pin Connection Guide

2.1 Supply power

There are two methods supported to supply power for the TLSR8258 Dongle.

1) Supply power via battery:

   Connect PIN1 and PIN3 of J6 with GND and 3.3V of power, respectively.

   Note: There is no need to connect any header with jumper cap. Make sure the cap is removed from J8.

2) Supply power via USB interface:

   Make sure one jumper cap is connected on J8 of TLSR8258 Dongle.

   Connect the USB interface of the TLSR8258 Dongle with PC USB.

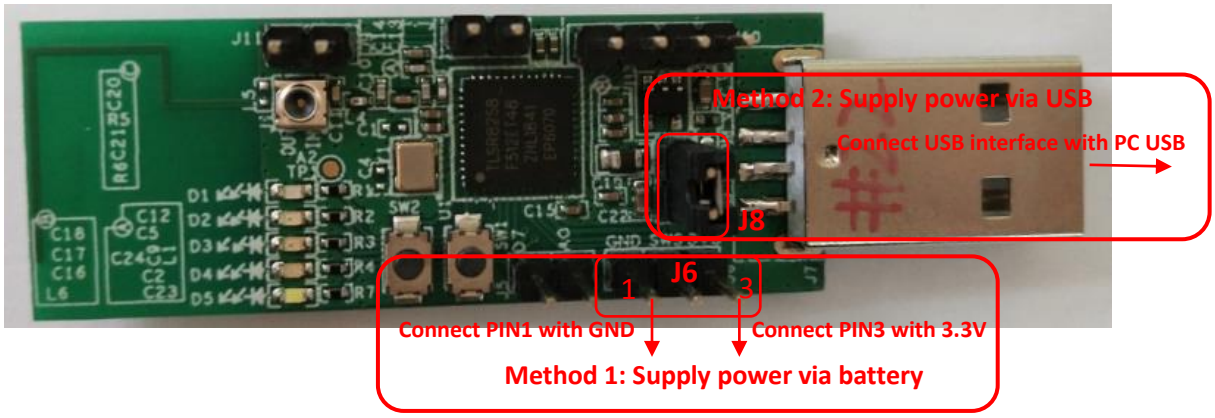


Figure 5 Connection chart to supply power

2.2 Download firmware

To download firmware into TLSR8258 Dongle, first make sure the TLSR8258 Dongle is supplied with power normally (please refer to section **2.1**).

Then connect J6 PIN2 (SWS) of the TLSR8258 Dongle with SWM of a burning EVK (TLSR8266BR56). Meanwhile, connect the miniUSB interface of the burning EVK with PC USB.

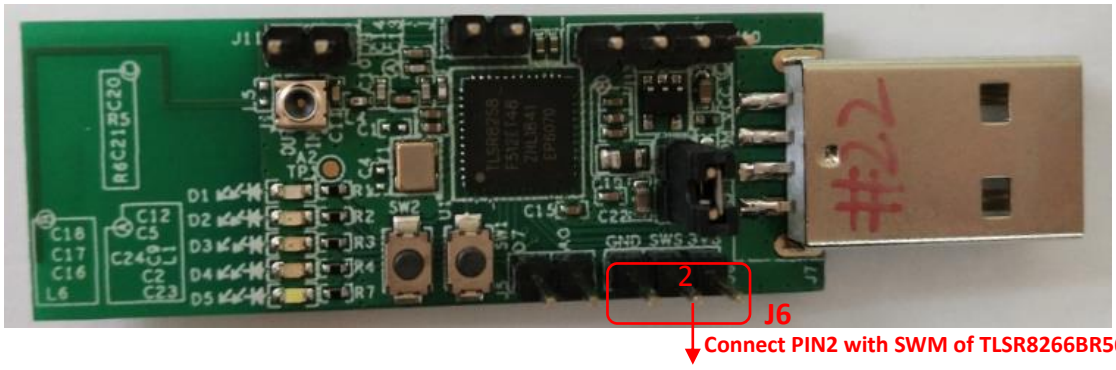


Figure 6 Connection chart to download firmware

2.3 Test RF signal

To test RF signal of TLSR8258 Dongle, first make sure the TLSR8258 Dongle is supplied with power normally (please refer to section **2.1**).

The J1 should be connected with a spectrum analyzer via a RF cable (supplied by Telink).

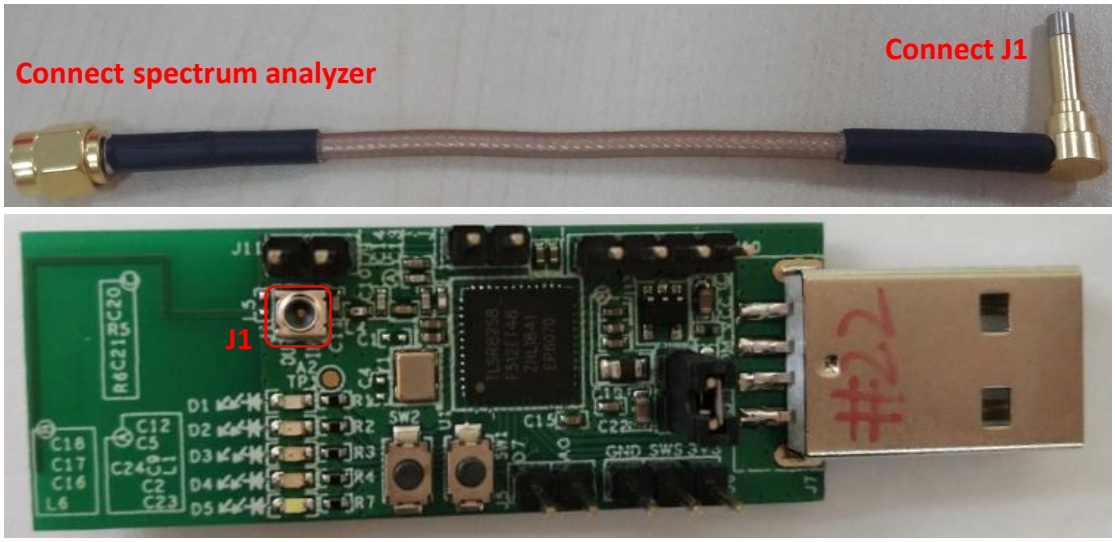


Figure 7 Connection chart to test RF signal

3 Electrical Specifications

3.1 Recommended operating condition

Table 2 Recommended operation condition

Item	Sym.	Min	Typ.	Max	Unit	Condition
Power-supply voltage	VDD	1.8	3.3	3.6	V	battery as power supply
	VBUS	4.5	5.0	5.5	V	USB as power supply
Operating Temperature Range	T_{Opr}	-40		85	°C	

3.2 DC characteristics

Test Condition: All tests below are done at room temperature (T=25℃) and 3.3V battery power supply (For pin connection to supply power, refer to section 2.1).

Test equipment: Multimeter, Spectrum analyzer

DUT FW: EMI binary file

Table 3 DC characteristics

Item	Sym.	Min	Typ.	Max	Unit	Condition
Tx current	I_{Tx}	-	19.1	-	mA	Continuous Tx transmission, 12dBm output power
Rx current	I_{Rx}	-	12	-	mA	Continuous Rx reception

3.3 RF performance

3.3.1 Receiver sensitivity

Test equipment: BLE- CMW500

DUT FW: BQB binary file

Table 5 BLE Receiver Sensitivity*[2]

BLE PHY	Frequency (MHz)	Packet Type	Packet Length	RX Sensitivity (dBm)
1Mbps	2402	PRBS9	37	-98.9
	2440			-98.9
	2480			-98.6

Table 6 IEEE802.15.4 Receiver Sensitivity*[3]

Frequency (MHz)	RX Sensitivity (dBm)
2405	-100.2
2450	-99.7
2480	-102

3.3.2 PHY performance

BLE test equipment: CMW500

IEEE802.15.4 test equipment: FSQ8

DUT FW: BQB binary file

[2] For actual sensitivity level of various BLE modes, please refer to Bluetooth 5 specification: Packet number=10000, PER≤30.8%.

[3] For actual sensitivity level of Zigbee mode, please refer to 802.15.4 specification: Packet number=10000, PER≤ 1%.

Table 8 Frequency Deviation (Drift)

Item	Frequency (MHz)	Δ f1avg (kHz)	Δ f2avg (kHz)	Δ f2/ Δ f1
Frequency Deviation @ BLE 1Mbps	2402	248.00	232.00	0.94
	2440	248.00	228.00	0.92
	2480	249.00	229.00	0.92
Frequency Deviation @ BLE 2Mbps	2402	488.06	448.34	0.92
	2440	496.34	454.56	0.92
	2480	483.67	442.59	0.92

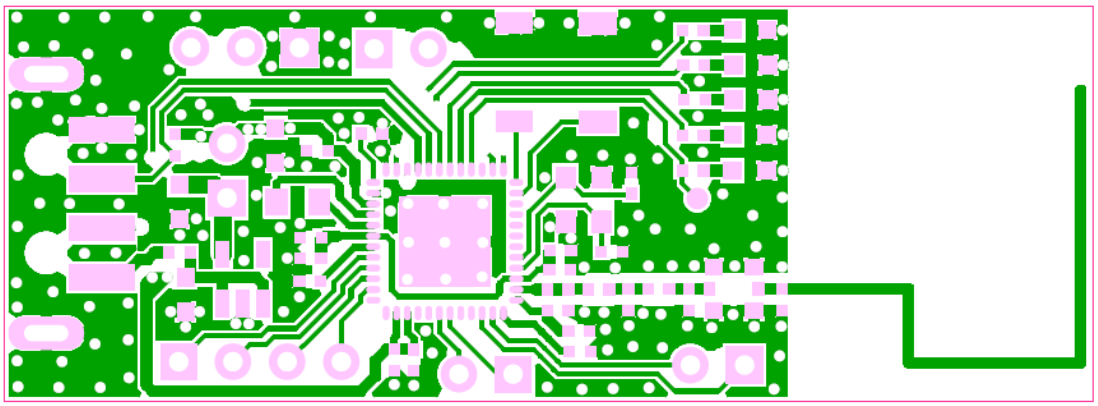
3.3.3 Radiation performance

DUT: C1T139A3_V2_0A
DUT FW: EMI binary file
Test condition: 3.3V, 25℃
Test equipment: FSQ26
Match network: See Table 10 BOM table

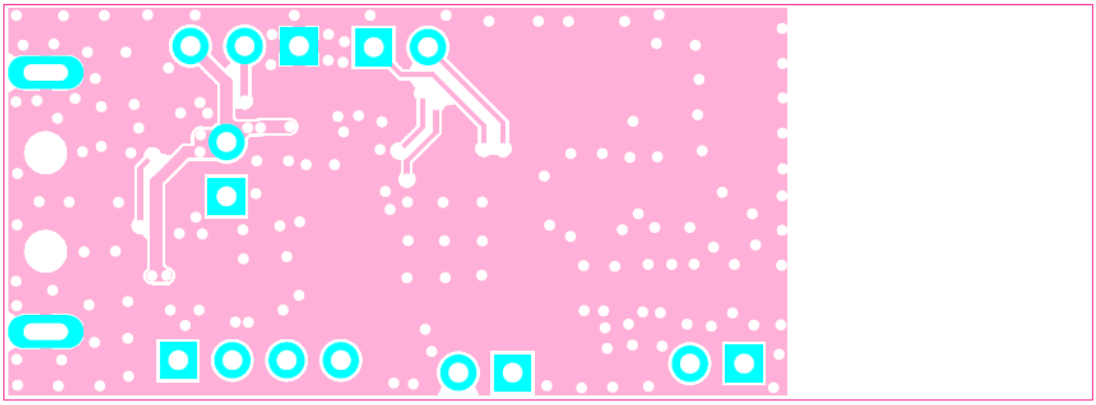
Table 9 Test result

No.	Test Items				Test Result
FCC (DUT FW: EMI binary file)					
4	Tx Band Limit				Pass
	Frequency	30MHz ~ 2400MHz	2483.5MHz ~ 25GHz	-	
	dB@100kHz	-38.3	-37.9	-	
5	TX Mode Harmonic (Radiated), Peak				Pass
	Frequency	4900MHz	7350MHz	9800MHz	
	dBm@1MHz	-42.9	-44.8	-46.8	
6	TX Mode Harmonic (Radiated) 1-25GHz, Average				Pass
	Frequency	4900MHz	7350MHz	9800MHz	
	dBm@1MHz	-42.9	-44.8	-46.8	
7	Tx Radiated emission 30-1000MHz, Peak				Pass
	Frequency	708.6MHz	-	-	
	dBm@100kHz	-70	-	-	
8	Tx Radiated emission >1GHz, Average				Pass
	Frequency	2.3692GHz	4900MHz	7350MHz	
	dBm@100kHz	-52	-42.9	-44.8	
9	RX Mode Spurious Emission (25MHz ~ 25GHz)				Pass
	Frequency	431MHz	2392MHz	-	
	dBm@100kHz	-76	-59.3	-	

4.2 PCB layout



Top view



Bottom view

Figure 9 PCB layout

4.4 32kHz XTAL

The TLSR8258 Dongle supports 32kHz external crystal oscillator (corresponding to PC2, PC3).

FCC 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 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 your authority to operate the equipment.