Telink 8258 EVK TLSR8258DK48 Specification

PS-18122800-E4

Ver 1.3.0

2019/4/25

Keyword:

Features; Pin layout; Mechanical dimensions;

Electrical specifications; Reference design;

Pin connection

Brief：

This is a specification for Telink 8258 EVK TLSR8258DK48. This document is dedicated for application development based on Telink 8258/8250/8251/8253/8359/8656 SoC.

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Revision History

Version	Major Changes	Date	Author
1.0.0	Initial release	2019/1	HZF, LX, Cynthia
1.1.0	Updated the sections below: 3.2 RF performance, 3.3 Audio performance	2019/1	HZF, LX, Cynthia
1.2.0	Updated the sections below: 3.2 DC characteristics 4 Reference Design	2019/2	HZF, LX, Cynthia
1.3.0	3.2.1 Power consumption	2019/3	HZF, LX, Cynthia
1.3.0	Updated the Section below 3.1.1	2019/4	LX, JF

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1 Product Introduction

This is a specification for Telink 8258 EVK TLSR8258DK48. This document is dedicated for application development based on Telink 8258/8250/8251/8253/8359/8656 SoC.

1.1 General description

The TLSR8258DK48, which is based on Telink TLSR8258F512ET48 chip, provides a Bluetooth LE + IEEE802.15.4 multi-standard wireless system.

The TLSR8258DK48 integrates a power-balanced 32-bit MCU, BLE/802.15.4/2.4GHz Radio, 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 and Zigbee/IEEE 802.15.4/RF4CE).

The TLSR8258DK48 supports standards and industrial alliance specifications including Bluetooth Low Energy (up to Bluetooth 5), BLE Mesh, 6LoWPAN, Thread, Zigbee, RF4CE, HomeKit, ANT and 2.4GHz proprietary standard.

Telink TLSR8258DK48 board can be used for SDK development. Firmware can be directly downloaded to the TLSR8258DK48 board to be up and running.

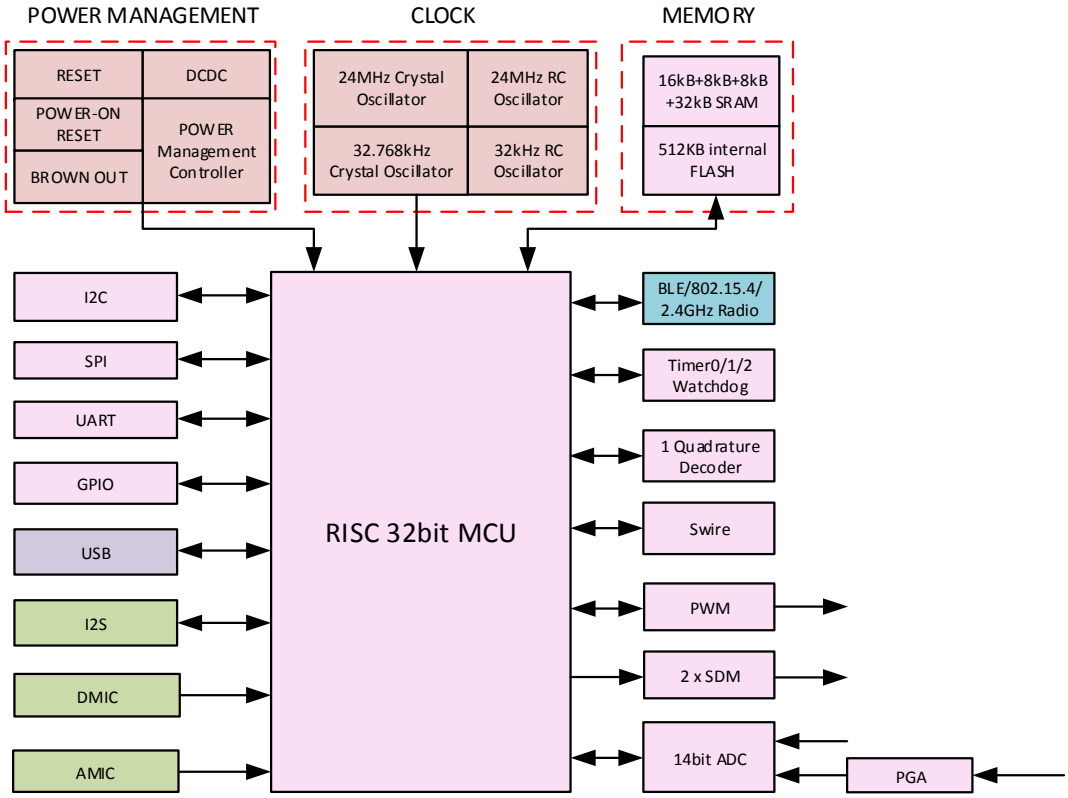


Figure 1 Block diagram

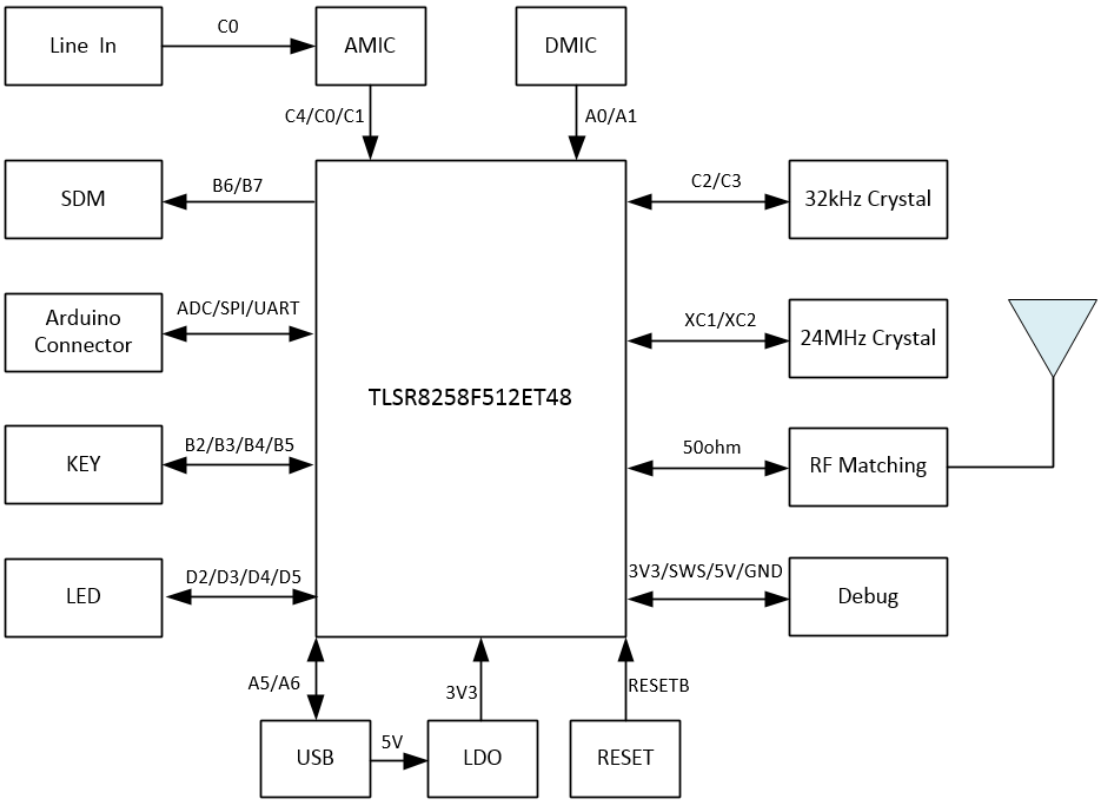


Figure 2 Hardware interface

1.2 Key features

- ✧ Bluetooth 5 Compliant, 1Mbps, 2Mbps, Long Range 125kbps and 500kbps
- ✧ IEEE802.15.4 compliant, 250kbps
- ✧ 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: SPI, I2C, USB, Single wire, up to 16 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
- ✧ 10-channel (only GPIO input), 14-bit SAR ADC with 10.5-bit ENOB
- ✧ 4-channel PGA, differential input
- ✧ Rx sensitivity: -96dBm@BLE 1Mbps, -100dBm@ IEEE802.15.4 250kbps, -93dBm @ BLE 2Mbps mode, -98dBm @ BLE 500kbps mode, -100dBm @ BLE 125kbps mode
- ✧ Tx output power: Typ. +11.5dBm
- ✧ RSSI monitoring with +/-1dB resolution
- ✧ Power supply: 1.8V~3.6V (Battery) or 4.5V~5.5V (USB)
- ✧ Whole module TX mode: 4.9mA @0dBm Tx power, 19.5mA @+11.8dBm Tx power
- ✧ Whole module RX mode: 5.7mA

1.3 Mechanical and PCB fabrication Specifications

- ✧ PCB dimension: 68.6mm*63.3mm*1.6mm
- ✧ PCB layer: 2 layers
- ✧ Dielectric constant: 4.2
- ✧ Impedance: 50 Ω

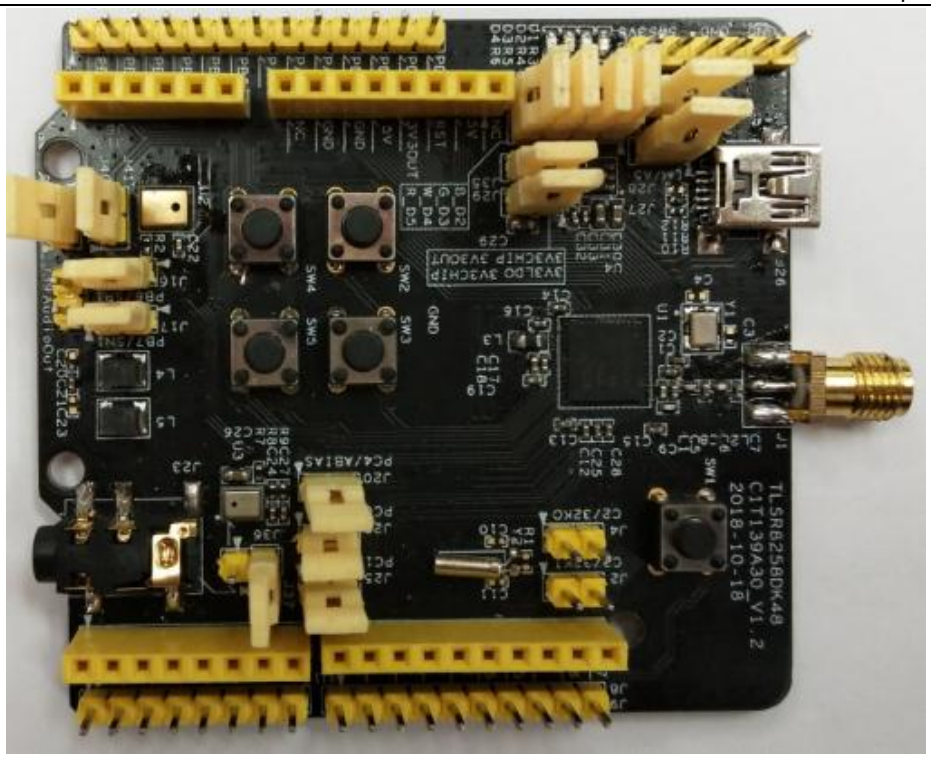


Figure 3 TLSR8258DK48 photo

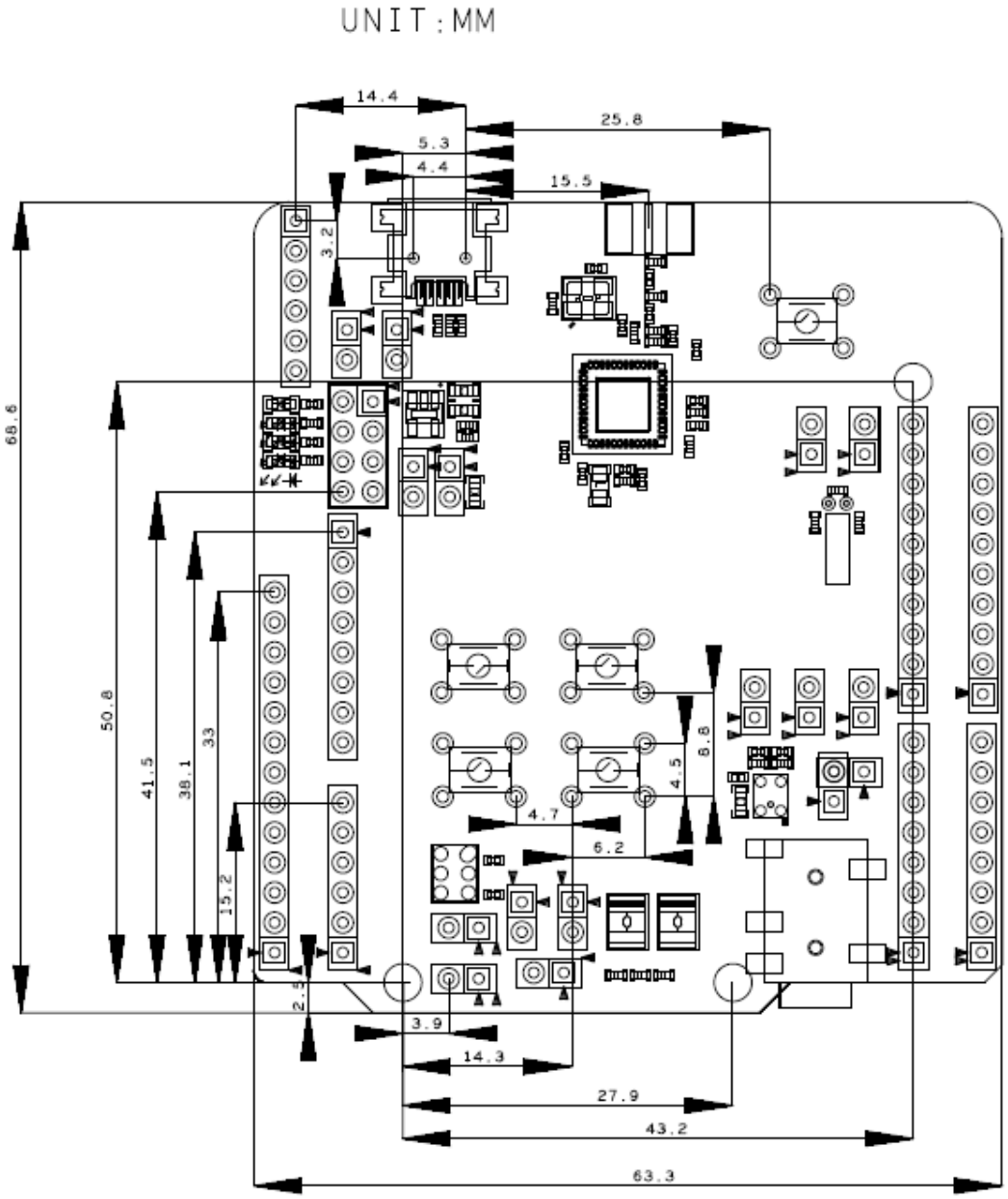


Figure 4 Mechanical dimensions

1.4 Pin layout

1.4.1 GPIO interface

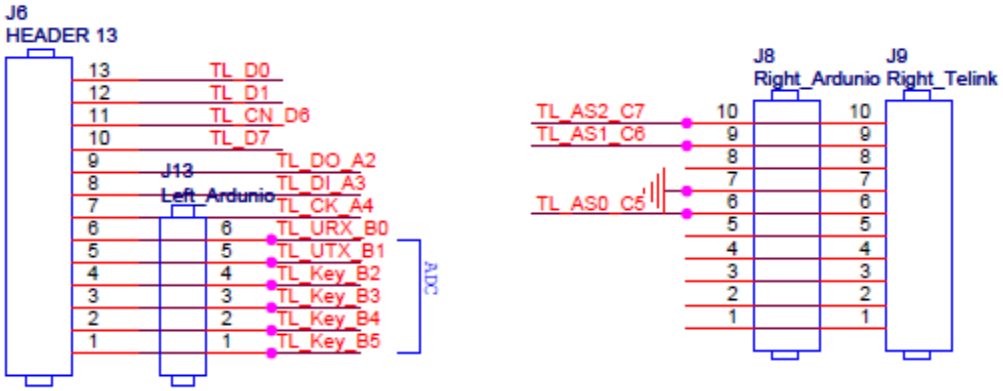


Figure 5 Pin layout

Pin definition is shown as the Table 1:

Table 1 Pin definition

Pin No	Module Pin Name	Chip Pin Name	Description
J6			
1	TL_Key_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]
2	TL_Key_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]
3	TL_Key_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]
4	TL_Key_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]
5	TL_UTX_B1	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]

Pin No	Module Pin Name	Chip Pin Name	Description
6	TL_URX_B0	PWM3/UART_RX/ATSEL1/ sar_aio<0>/PB<0>	PWM3 output / UART_RX / Antenna select pin 1 / SAR ADC input / GPIO PB[0]
7	TL_CK_A4	CK/UART_RTS/PWM2/PA<4>	SPI clock (I2C_SCK) / UART_RTS / PWM2 output / GPIO PA[4]
8	TL_DI_A3	DI/UART_CTS/PWM1/PA<3>	SPI data input (I2C_SDA) / UART_CTS / PWM1 output / GPIO PA[3]
9	TL_DO_A2	DO/UART_TX/PWM0/PA<2>	SPI data output / UART_TX / PWM0 output / GPIO PA[2]
10	TL_D7	SPI_CK/I2S_BCK/7816_TRX /PD<7>	SPI clock (I2C_SCK) / I2S bit clock / UART 7816 TRX / GPIO PD[7]
11	TL_CN_D6	CN/UART_RX/ATSEL0/PD<6>	SPI chip select (Active low) / UART_RX / Antenna select pin 0 / GPIO PD[6]
12	TL_D1	TX_CYC2PA/UART_CTS/PD<1>	Control external PA / UART_CTS / GPIO PD[1]
13	TL_D0	RX_CYC2LNA/7816_TRX/ PD<0>	Control external LNA / UART 7816 TRX / GPIO PD[0]
J9			
1	NC		Not connect
2	NC		Not connect
3	NC		Not connect
4	NC		Not connect
5	NC		Not connect
6	TL_AS0_C5	PWM3_N/UART_RX/ATSEL0/ sar_aio<9>/PC<5>	PWM3 inverting output / UART_RX / Antenna select pin 0 / SAR ADC input / GPIO PC[5]
7	GND		Ground
8	NC		Not connect
9	TL_AS1_C6	RX_CYC2LNA/ATSEL1/PWM4_N/ PC<6>	Control external LNA / Antenna select pin 1 / PWM4 inverting output / GPIO PC[6]
10	TL_AS2_C7	TX_CYC2PA/ATSEL2/PWM5_N/ PC<7>	Control external PA / Antenna select pin 2 / PWM5 inverting output / GPIO PC[7]

1.4.2 Arduino interface

Telink TLSR8258DK48 is compatible with Arduino standard interface, which adopts single-column direct-in female headers (J7, J8, J11, J13) with pin distance of 2.54mm. The TLSR8258DK48 can be used as “Host control board” or “Arduino shield daughter board”.

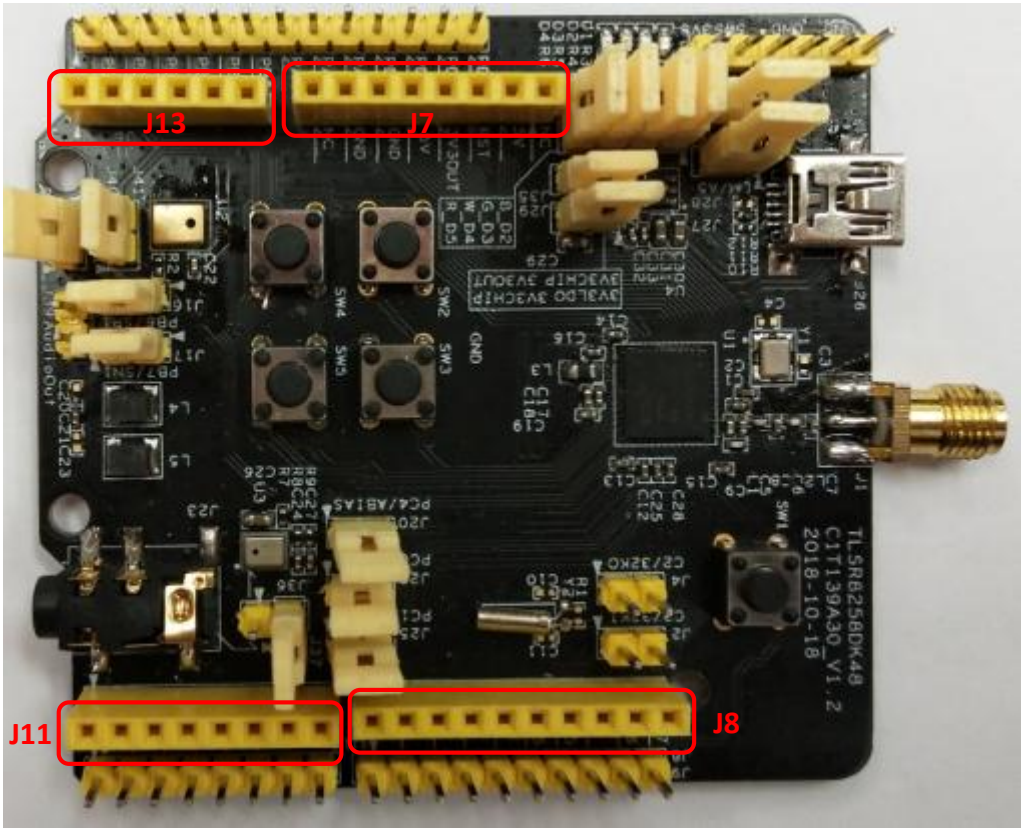


Figure 6 Connection chart to use Arduino interface

2 Pin Connection Guide

2.1 Supply power

There are two methods supported to supply power for the TLSR8258DK48.

1) Supply power via battery:

   Connect PIN3 and PIN6 of J18 with GND and 3.3V of power, respectively.

   Note: There is no need to connect any header with jumper cap.

2) Supply power via USB interface:

   Make sure one jumper cap is connected on J29 of TLSR8258DK48.

   Connect the miniUSB interface of the TLSR8258DK48 with PC USB.

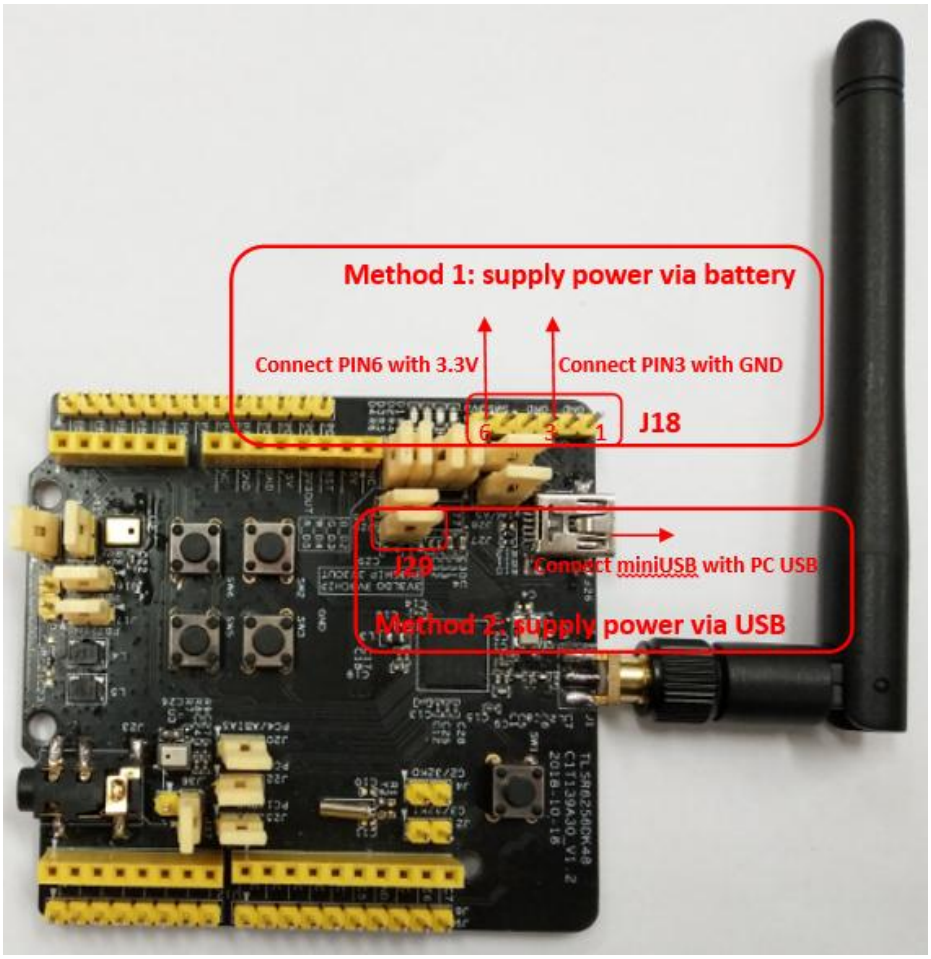


Figure 7 Connection chart to supply power

2.2 Download firmware

To download firmware into TLSR8258DK48, first make sure the TLSR8258DK48 is supplied with power normally (please refer to section **2.1**).

Then connect J18 PIN5 (SWS) of the TLSR8258DK48 with SWM of a burning EVK (TLSR8266BR56). Meanwhile, connect the miniUSB interface of the burning EVK with PC USB.

Figure 8 Connection chart to download firmware

2.3 Test RF signal

To test RF signal of TLSR8258DK48, first make sure the TLSR8258DK48 is supplied with power normally (please refer to section **2.1**).

Then remove the antenna from J1 of the TLSR8258DK48, and directly connect the J1 with a spectrum analyzer.

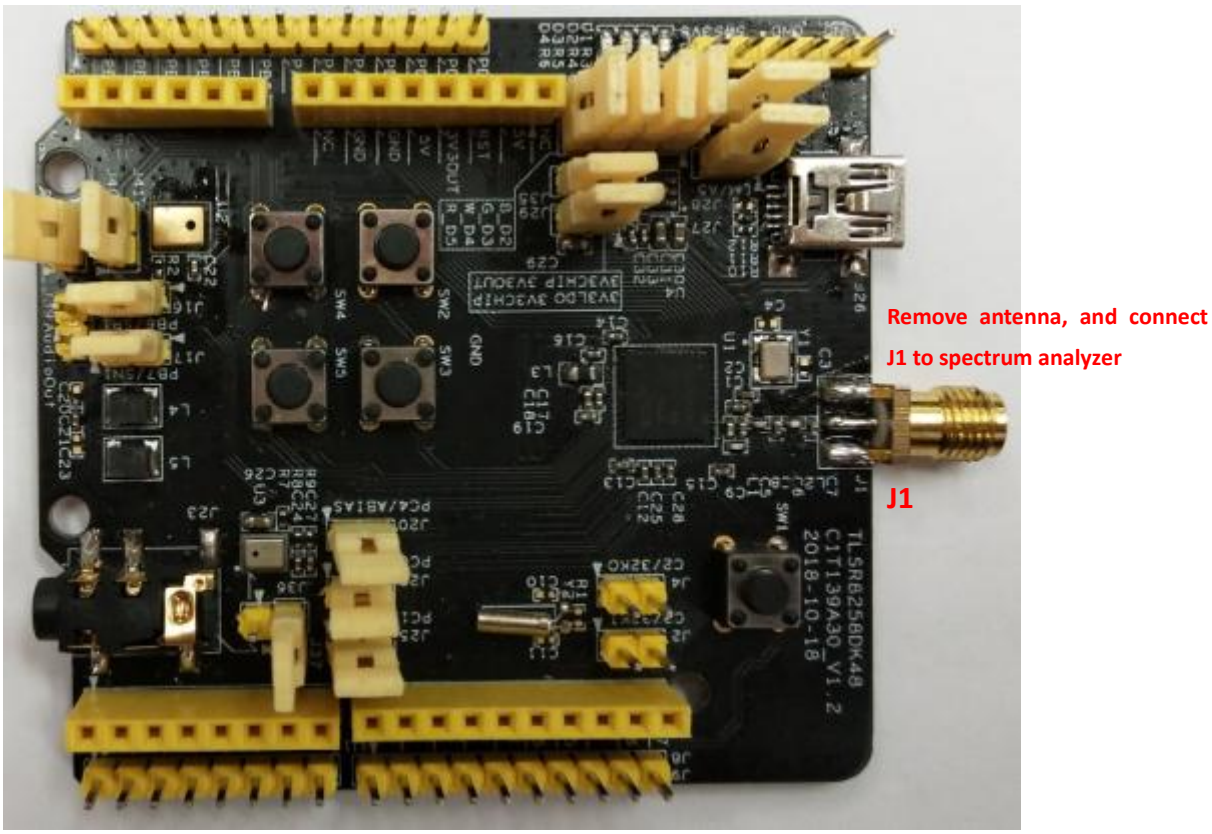


Figure 9 Connection chart to test RF signal

2.4 PWM output function

To control LEDs D1~D4 of TLSR8258DK48 via PWM output, first make sure the TLSR8258DK48 is supplied with power normally (please refer to section **2.1**).

Then make sure four jumper caps are connected on J38 of the TLSR8258DK48.

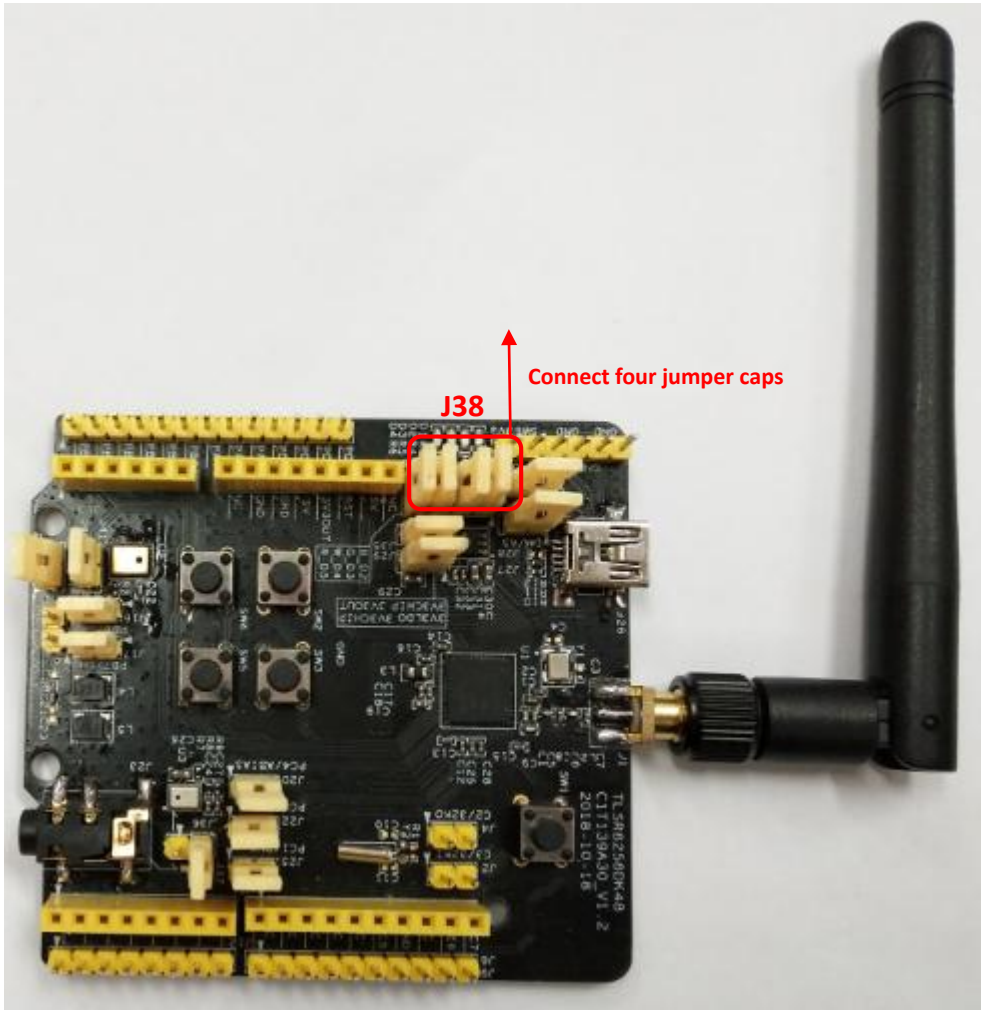


Figure 10 Connection chart to use PWM function

2.5 Audio function

To use audio function of TLSR8258DK48, first make sure the TLSR8258DK48 is supplied with power normally (please refer to section **2.1**).

1) To use DMIC input, make sure two jumper caps are connected on J40 and J41 of the TLSR8258DK48.
2) To use AMIC input, make sure four jumper caps are connected on J20, J22, J25 and J36 of the TLSR8258DK48.
3) To use I2S input, make sure four jumper caps are connected on J20, J22, J25 and J37 of the TLSR8258DK48.
4) To use USB Host input, make sure two jumper caps are connected on J27 and J28 of the TLSR8258DK48.
5) To use SDM output, make sure two jumper caps are connected on J16 and J17 of the TLSR8258DK48.

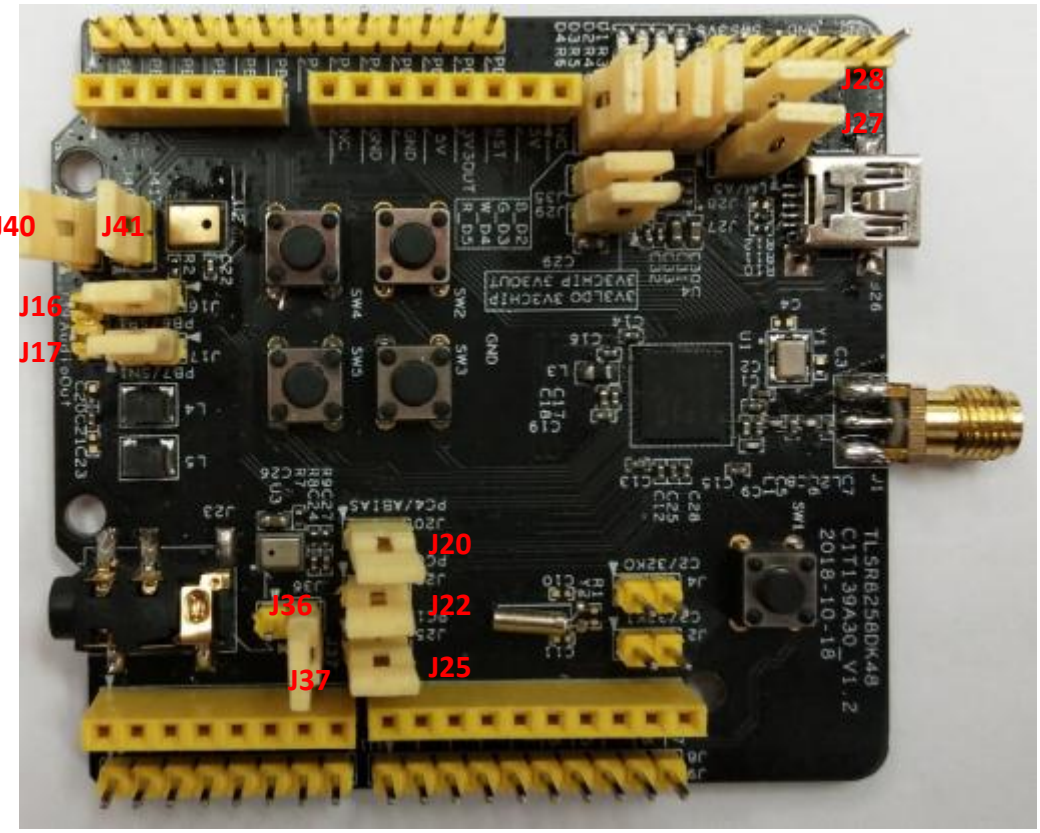


Figure 11 Connection chart to use audio function

3 Electrical Specifications

3.1.1 Tx current vs. Power

Test equipment: Multimeter - FLUKE17B, Spectrum analyzer - N9020B

DUT FW: EMI binary file

Temperature: room temperature (T=25℃)

Power supply (For pin connection to supply power, see section 2.1)**:**

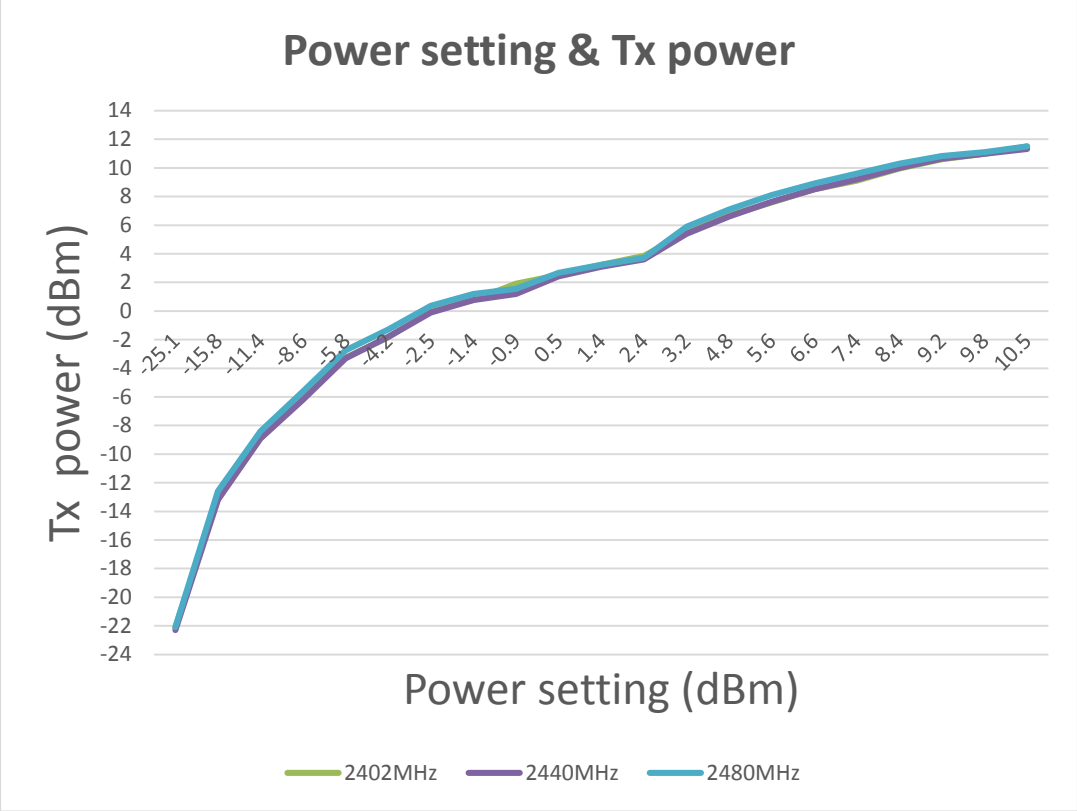
1) Case1: 3.3V battery

2) Case2: 1.8V battery

Note: The current is slightly larger than the number in the datasheet since the MCU is still working in the following test.

Table 2 Tx Current vs. Power @ 3.3V

Channel	2402MHz		2440MHz		2480MHz	
EMI Power set_up (dBm)	Tx power (dBm)	Total Tx current (mA)	Tx power (dBm)	Total Tx current (mA)	Tx power (dBm)	Total Tx current (mA)
-25.1	-22.1	3.6	-22.3	3.6	-22.1	3.6
-15.8	-13.1	3.8	-13.2	3.86	-12.6	3.85
-11.4	-8.9	4.1	-8.9	4.1	-8.4	4.11
-8.6	-6.1	4.4	-6.2	4.4	-5.6	4.35
-5.8	-3.25	4.7	-3.3	4.75	-2.75	4.7
-4.2	-1.83	5	-1.8	5	-1.3	5
-2.5	0	5.4	-0.11	5.4	0.36	5.3
-1.4	0.77	5.6	0.77	5.56	1.2	5.5
-0.9	1.9	5.7	1.2	5.67	1.56	5.6
0.5	2.5	6.1	2.43	6	2.67	5.9
1.4	3.22	6.4	3.1	6.27	3.23	6.11
2.4	3.85	6.7	3.6	6.54	3.73	6.4
3.2	5.48	10.6	5.4	10.6	5.9	10.4
4.8	6.7	11.7	6.61	11.7	7.1	11.5
5.6	7.6	12.9	7.64	12.72	8.1	12.5
6.6	8.5	13.8	8.5	13.7	8.9	13.4
7.4	9.1	14.9	9.2	14.6	9.6	14.2
8.4	9.95	16.3	10	15.9	10.3	15.5
9.2	10.6	17.55	10.65	17.1	10.83	16.66
9.8	11	18.6	11	18.1	11.1	17.7
10.5	11.5	20	11.32	19.5	11.5	19.5


Power setting & Tx power
Tx power (dBm)
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-25.1
-15.8
-11.4
-8.6
-5.8
-4.2
-2.5
-1.4
-0.9
0.5
1.4
2.4
3.2
4.8
5.6
6.6
7.4
8.4
9.2
9.8
10.5
Power setting (dBm)
2402MHz
2440MHz
2480MHz

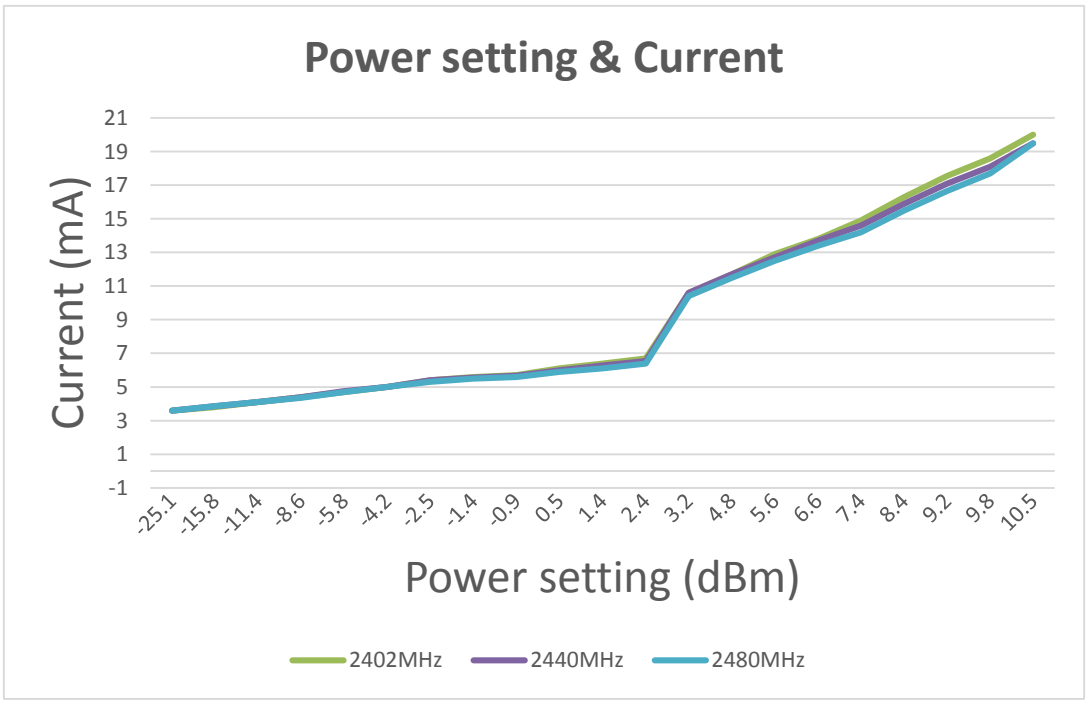

Power setting & Current
Current (mA)
21
19
17
15
13
11
9
7
5
3
1
-1
-25.1
-15.8
-11.4
-8.6
-5.8
-4.2
-2.5
-1.4
-0.9
0.5
1.4
2.4
3.2
4.8
5.6
6.6
7.4
8.4
9.2
9.8
10.5
Power setting (dBm)
2402MHz
2440MHz
2480MHz

Table 3 Tx Current vs. Power @ 1.8V

Channel	2402MHz	
Power set_up (dBm)	Tx power (dBm)	Total Tx current (mA)
-25.1	-22.6	5.5
0	1.6	10.1
10.5	7.2	16.2

3.1.2 Tx Current/Power vs. VDD

Test equipment: Multimeter - FLUKE17B, Spectrum analyzer - N9020B

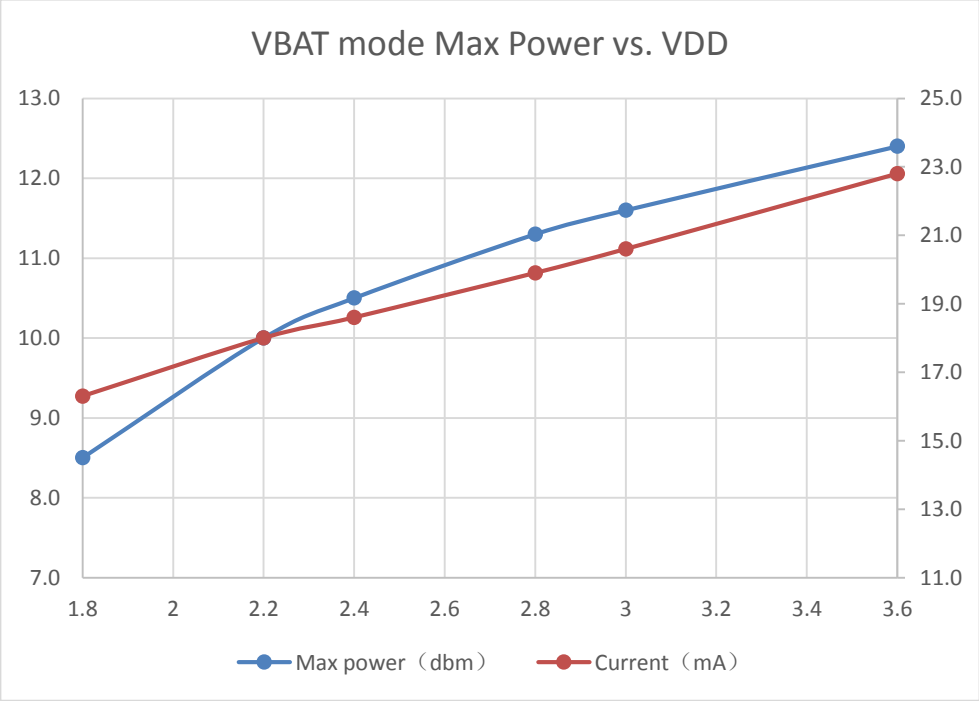
DUT FW: EMI binary file

Temperature: room temperature (T=25℃)

Power supply: DC power — 2230-30-1 (For pin connection to supply power, see section 2.1)

Table 4 Tx current and output power at various voltage

VDD (V)	Max power(dBm)	Current(mA)
1.8	8.5	16.3
2.2	10.0	18.0
2.4	10.5	18.6
2.8	11.3	19.9
3	11.6	20.6
3.6	12.4	22.8



3.2 RF performance

3.2.1 Receiver sensitivity

Test equipment: BLE- CMW500, IEEE802.15.4- SMJ100A

DUT FW: BQB binary file

Table 5 BLE Receiver Sensitivity*[1]

BLE PHY	Frequency (MHz)	Packet Type	Packet Length	RX Sensitivity (dBm)
1Mbps	2402	PRBS9	37	-96.1
	2440			-96.1
	2480			-96.1
2Mbps	2402			-92.9
	2440			-93.0
	2480			-93.0
LE Coded S=2 (500kbps)	2402			-98.1
	2440			-98.0
	2480			-98.0
LE Coded S=8 (125kbps)	2402			-100.3
	2440			-100.2
	2480			-100.2

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

Table 6 IEEE802.15.4 Receiver Sensitivity*[2]

Frequency (MHz)	RX Sensitivity (dBm)
2405	-100.7
2440	-100.1
2480	-101.3

3.2.2 PHY performance

BLE test equipment: CMW500

IEEE802.15.4 test equipment: FSQ8

DUT FW: BQB binary file

Table 7 EVM

Item	Frequency (MHz)	Power (dBm)	EVM Rms (%)	EVM Peak (%)
Error vector magnitude (EVM) @ IEEE802.15.4 250kbps	2405	11.13	0.58	1.74
	2410	11.22	0.7	2.86
	2415	11.32	0.59	2.32
	2420	11.41	0.54	1.61
	2425	11.46	1.14	3.87
	2430	11.51	0.94	3.65
	2435	11.54	0.76	2.85
	2440	11.55	0.98	3.41
	2445	11.54	0.64	2.09
	2450	11.56	0.74	1.98
	2455	11.53	0.75	2.37
	2460	11.52	0.53	1.74
	2465	11.52	0.54	1.5
	2470	11.48	0.55	1.72
	2475	11.42	0.83	3.12
	2480	11.33	0.68	1.88

[2] 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	250.5	230.8	0.921
	2440	249.5	232.3	0.931
	2480	249.8	227.5	0.911
Frequency Deviation @ BLE 2Mbps	2402	498	450	0.904
	2440	500	446	0.892
	2480	497	442	0.889

3.2.3 Radiation performance

DUT: C1T139A30_V1.2_20181019
DUT FW: EMI binary file
Test condition: 3.3V, 25℃
Test equipment: FSQ26
Match network: See Table 12 BOM table

Table 9 Test result

No.	Test Items				Test Result
FCC (DUT FW: EMI binary file)					
1	Tx Peak Power Output - field strength				Pass
	RF Channel	2.402GHz	2.440GHz	2.480GHz	
	dBm	11.5	11.32	11.5	
2	Tx Power Spectral Density				Pass
	RF Channel	2.402GHz	2.440GHz	2.480GHz	
	dBm@100kHz	10.77	10.5	10.6	
	dBm@3kHz	-4.46	-4.73	-4.63	
3	Tx Minimum 6dB Bandwidth				Pass
	RF Channel	2.402GHz	2.440GHz	2.480GHz	
	MHz	770	770	770	
4	Tx Band Limit				Pass
	Frequency	30MHz ~ 2400MHz	2483.5MHz ~ 25GHz	-	
	dB@100kHz	-50	-50	-	
5	TX Mode Harmonic (Radiated), Peak				Pass
	Frequency	4900MHz	7350MHz	9800MHz	
	dBm@1MHz	-53	-42	-46.5	

No.	Test Items				Test Result
6	TX Mode Harmonic (Radiated) 1-25GHz, Average				Pass
	Frequency	4900MHz	7350MHz	9800MHz	
	dBm@1MHz	-61	-43.7	-58	
7	Tx Radiated emission 30-1000MHz, Peak				Pass
	Frequency	475MHz	-	-	
	dBm@100kHz	-51.5	-	-	
8	Tx Radiated emission >1GHz, Average				Pass
	Frequency	2.1GHz	7.35GHz	-	
	dBm@100kHz	-47.6	-42	-	
9	RX Mode Spurious Emission (25MHz ~ 25GHz)				Pass
	Frequency	432MHz	-	-	
	dBm@100kHz	-55.2	-	-	
SRRC Test Items (DUT FW: EMI binary file)					
1	Transmitter power				Pass
	RF Channel	2.402GHz	2.440GHz	2.480GHz	
	dBm	11.5	11.32	11.5	
2	Transmitter Frequency Range				Pass
	RF Channel	ChL	ChM	ChH	
	GHz	2.402	2.44	2.48	
3	Carrier frequency offset (BLE 1M)				Pass
	RF Channel	2.402GHz	2.440GHz	2.480GHz	
	kHz	16	16	16	
4	Occupied Bandwidth (BLE 1M)				Pass
	RF Channel	2.402GHz	2.440GHz	2.480GHz	
	MHz	770	770	770	
5	Emission Spectrum				Pass
	Frequency	30MHz ~ 1GHz	48.5MHz ~ 72.5Mhz	76MHz ~ 108Mhz	
	dBm@100kHz	-55	-70	-71	
	Frequency	167MHz ~ 223MHz	470MHz ~ 566MHz	606MHz ~ 798MHz	
	dBm@100kHz	-80	-80	-80	
	Frequency	1GHz ~ 12.75GHz	10MHz ~ 30MHz	-	
	dBm@100kHz	-42	-70	-	

3.3 Audio performance

Equipment to test audio precision: Audio analyzer, Model AP525

DUT FW: Audio binary file

Table 10 Analog line-in performance

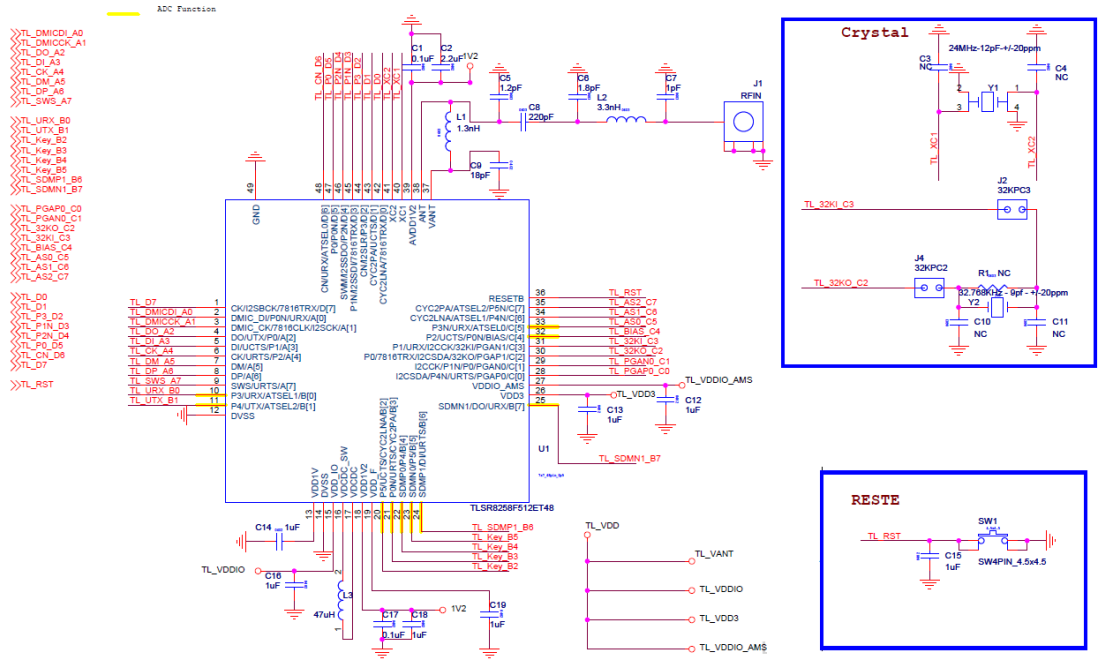
Input Signal	400mV rms
Level	-1.271dBFS
SNR (Signal-Noise Ratio)	64.356dB
THD (Total Harmonic Distortion)	0.0577%

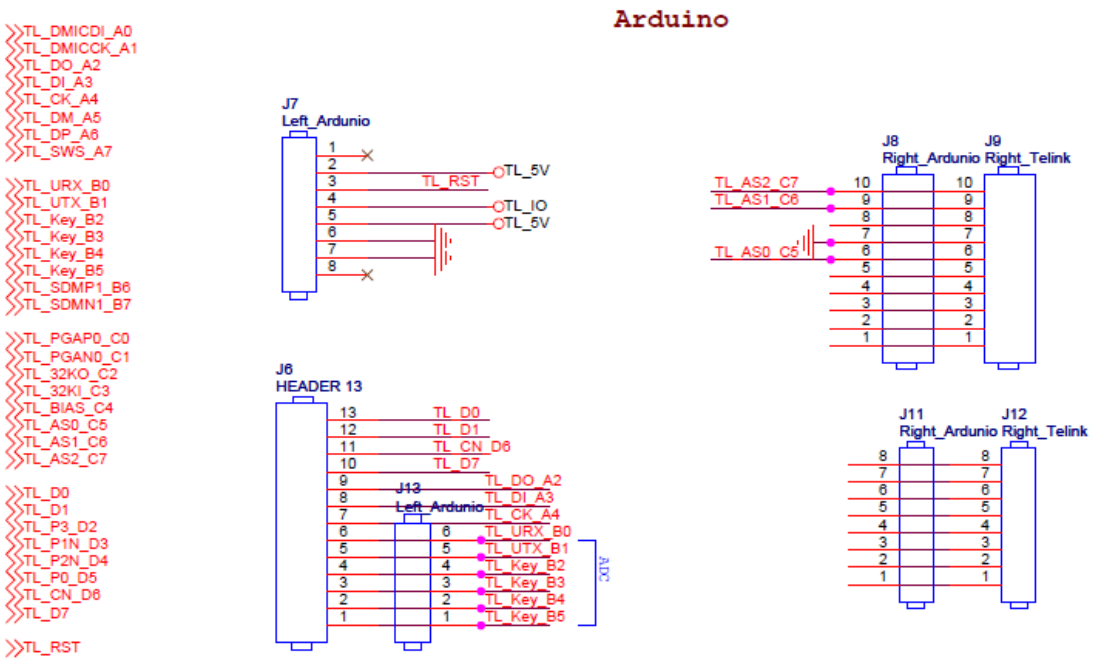
Table 11 SDM performance

Input Signal	0dBFSB
Level	+7.198dbV
SNR (Signal-Noise Ratio)	59.234dB
THD (Total Harmonic Distortion)	1.337%

4 Reference Design

4.1 Schematic





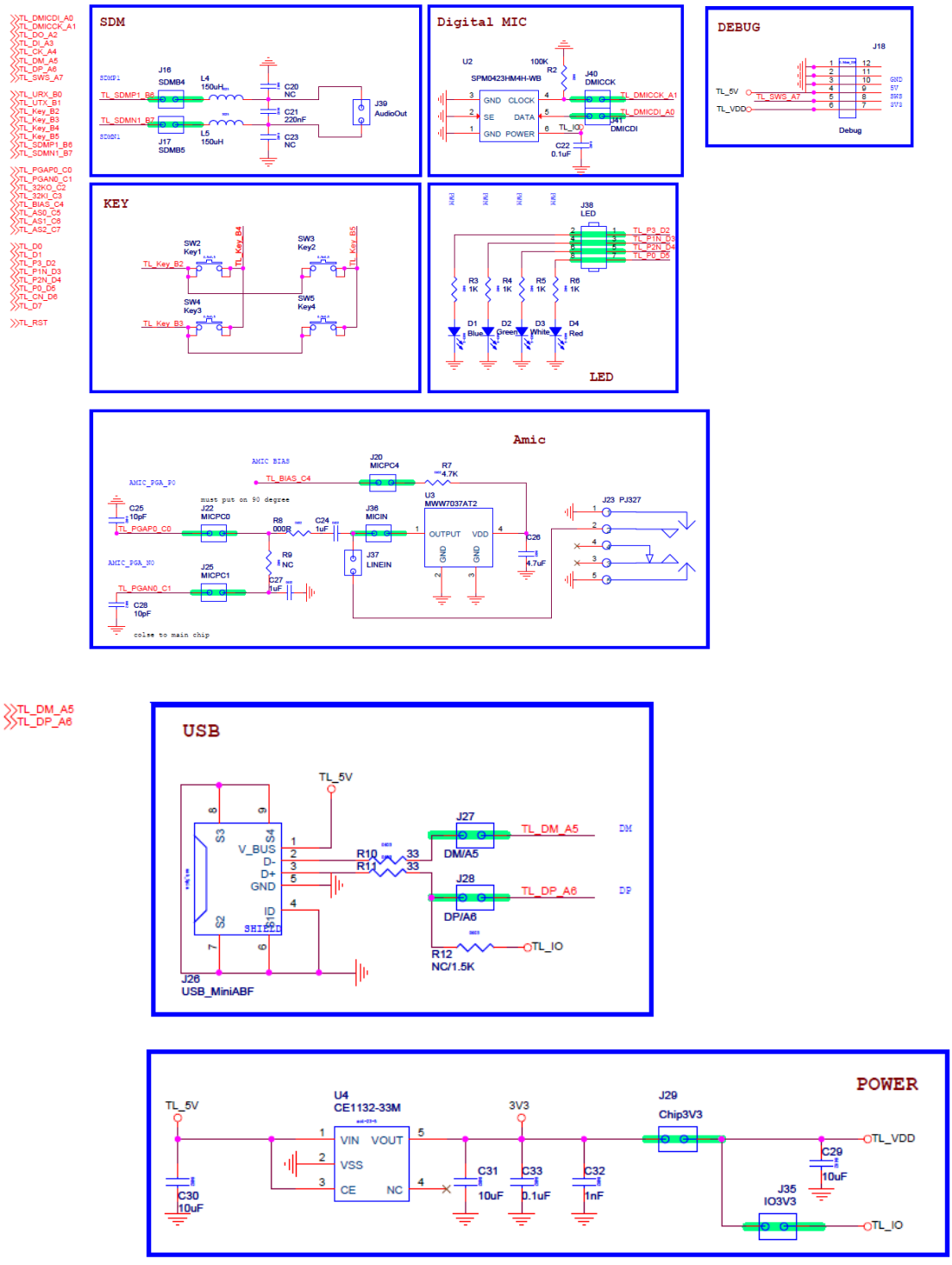


Figure 12 Schematic

4.2 PCB layout

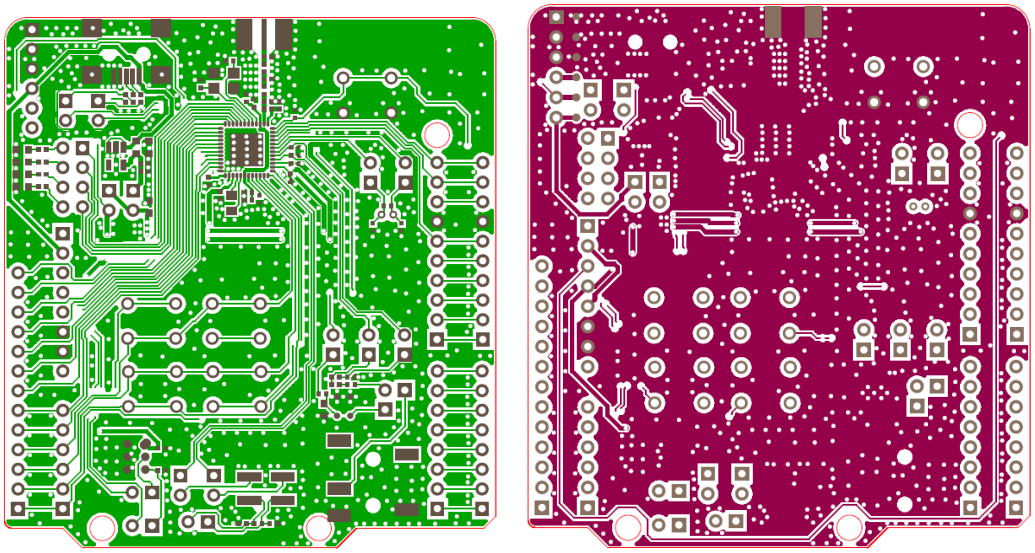


Figure 13 PCB layout

(Left: top view; Right: bottom view)

4.3 Bill of Materials

Table 12 BOM table

Item	Refe	Supplier	P/N	Description
1	C5	murata	GRM1555C1H1R2CA01	Capacitor 1.2pF+/-0.25pF
2	C6	murata	GRM1555C1H1R8CA01	Capacitor 1.8pF+/-0.25pF
3	C7	murata	GRM1555C1H1R0CA01	Capacitor 1.0pF+/-0.25pF
4	C8	murata	GRM1555C1H221JA01	Capacitor 220pF+/-5%
5	C9	murata	GRM1555C1H180JA01	Capacitor 18pF+/-5%
6	L1	murata	LQG15HS1N3B02	Inductor 1.3nH+/-0.1nH
7	L2	murata	LQG15HS3N3B02	Inductor 3.3nH+/-0.1nH
8	J37			RFIN 50Ω
9	C1			Capacitor 0.1uF
10	C17			Capacitor 0.1uF
11	C2			Capacitor 2.2uF
12	C12			Capacitor 1uF
13	C13			Capacitor 1uF
14	C14			Capacitor 1uF
15	C16			Capacitor 1uF
16	C18			Capacitor 1uF
17	C19			Capacitor 1uF
18	C15			Capacitor 1uF
19	L3	TaiYo	LB2012T470M	Inductor 47uH
20	U1	Telink	TLSR8258F512ET48	
21	Y2			Crystal 32.768KHz_12.5pf_ +/-10ppm
22	Y1	HOSONIC	E3SB24E000026E	Crystal 24MHz_12pF_+/-10ppm
23	C25			Capacitor 10pF
24	C28			Capacitor 10pF
25	C24			Capacitor 1uF
26	C27			Capacitor 1uF
27	C26			Capacitor 4.7uF
28	R7			Resistor 4.7K
29	R8			Resistor 000R
30	R9			Resistor NC
31	U3		MWW7037AT2	AMIC
32	C22			Capacitor 0.1uF
33	R2			Resistor 100K
34	U2		SPM0423HM4H-WB	DMIC
35	C21			Capacitor 220nF
36	L4			Inductor 150uH
37	L5			Inductor 150uH
38	C30			Capacitor 10uF

Item	Refe	Supplier	P/N	Description
39	C31			Capacitor 10uF
40	C29			Capacitor 10uF
41	C33			Capacitor 0.1uF
42	C32			Capacitor 1nF
43	J30			Header 2.54mm_1X2
44	J36			Header 2.54mm_1X2
45	U4		CE1132-33M	
46	J26		USB_MiniABF	
47	R10			Resistor 33Ω
48	R11			Resistor 33Ω
49	J27			Header 2.54mm_1X2
50	J28			Header 2.54mm_1X2
51	D1			LED Blue
52	D2			LED Green
53	D3			LED White
54	D4			LED Red
55	R3			Resistor 1KΩ
56	R4			Resistor 1KΩ
57	R5			Resistor 1KΩ
58	R6			Resistor 1KΩ
59	SW1			Button 4.5cmx4.5cm
60	SW2			Button 4.5cmx4.5cm
61	SW3			Button 4.5cmx4.5cm
62	SW4			Button 4.5cmx4.5cm
63	SW5			Button 4.5cmx4.5cm
64	J38			Header 2.54mm_2x4
65	J6			Header 2.54mm_1x13
66	J18			Header 2.54mm_1x6
67	J7			Female connect 2.54mm_1x8
68	J8			Female connect 2.54mm_1x10
69	J9			Header 2.54mm_1x10
70	J11			Female connect 2.54mm_1x8
71	J12			Header 2.54mm_1x8
72	J13			Female connect 2.54mm_1X6
73	J16			Header 2.54mm_1X2
74	J17			Header 2.54mm_1X2
75	J20			Header 2.54mm_1X2
76	J22			Header 2.54mm_1X2
77	J23			Audio Connect PJ327
78	J25			Header 2.54mm_1X2
79	J29			Header 2.54mm_1X2

Item	Refe	Supplier	P/N	Description
80	J35			Header 2.54mm_1X2
81	J36			Header 2.54mm_1X2
82	J37			Header 2.54mm_1X2
83	J39			Header 2.54mm_1X2
84	J40			Header 2.54mm_1X2
85	J41			Header 2.54mm_1X2
86	J38			Jumper cap 2.54mm_1X2
87	J38			Jumper cap 2.54mm_1X2
88	J38			Jumper cap 2.54mm_1X2
89	J38			Jumper cap 2.54mm_1X2
90	J16			Jumper cap 2.54mm_1X2
91	J17			Jumper cap 2.54mm_1X2
92	J20			Jumper cap 2.54mm_1X2
93	J22			Jumper cap 2.54mm_1X2
94	J25			Jumper cap 2.54mm_1X2
95	J36			Jumper cap 2.54mm_1X2
96	J27			Jumper cap 2.54mm_1X2
97	J28			Jumper cap 2.54mm_1X2
98	J29			Jumper cap 2.54mm_1X2
99	J35			Jumper cap 2.54mm_1X2
100	J40			Jumper cap 2.54mm_1X2
101	J41			Jumper cap 2.54mm_1X2

4.4 32kHz XTAL

The TLSR8258DK48 supports 32kHz external crystal oscillator. To use 32kHz XTAL (corresponding to PC2*[3], PC3), please make sure two jumper caps are connected on J2 and J4 of the TLSR8258DK48.

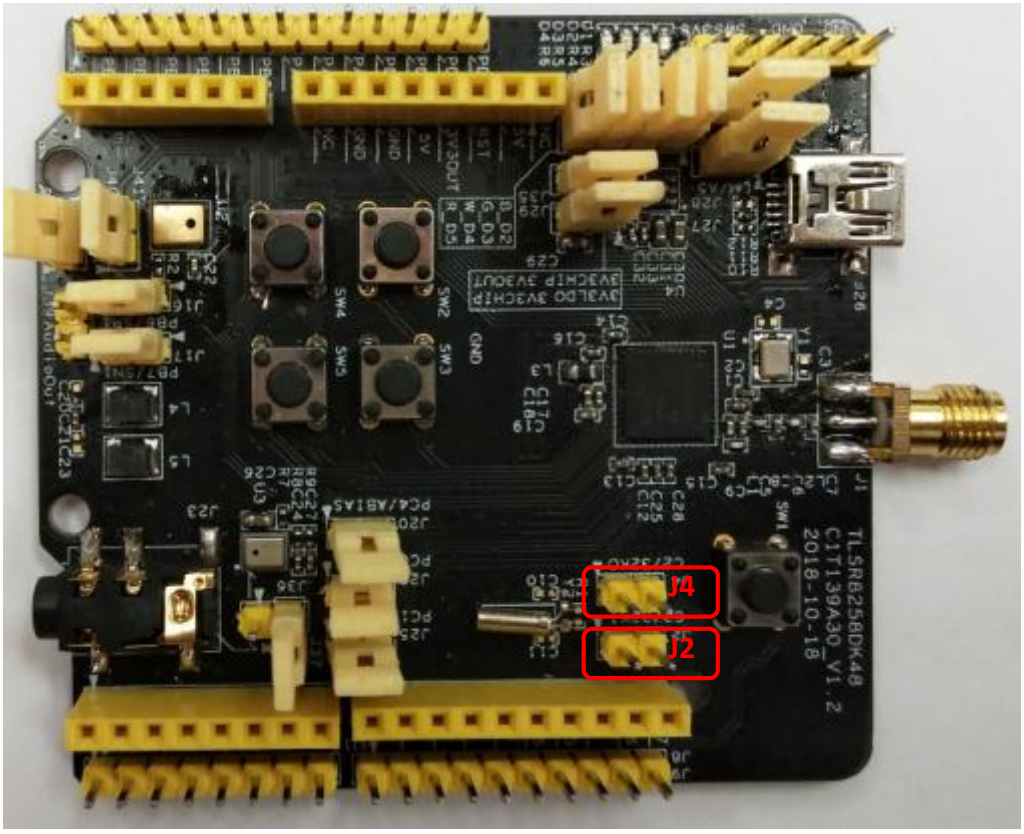


Figure 14 Connection chart to use 32kHz XTAL

[3] 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.