E104-BT30-TB1 User Manual

CSRA64215 Wireless Audio Module+ Adaptor Board

CONTENT

1. Overview

1.1 Brief introduction

E104-BT30-TB1 is a multifunctional and cost-effective module developed by our company for audio Bluetooth transmission. The main control uses the CSRA64215 chip of CSR to provide the module with high-quality sound and compatibility. The Bluetooth module uses a driver-free method. Users only need to connect the module to the application product to quickly achieve high-quality Bluetooth audio transmission and enjoy wireless music. And the module supports APTX, APTXLL, ACC and other high-quality sound effects.
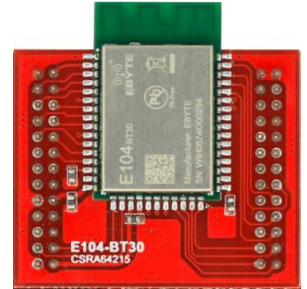
1.2 Features

- Bluetooth V4.2+EDR standard specifications
- Support TWS
- Automatic reconnection
- MIC input
- APTX、ACC、Aptx Low latency
- AVRCP 1.5、A2DP 1.3 、HFP 1.5
- CSR latest sixth-generation CVC enhancement technology implements noise reduction and echo cancellation
- PCB antenna, the maximum communication distance is 50 meters in open air
- Battery level display

1.3 Application

- High-quality wireless stereo headphones;
- High-fidelity speaker and sound;
- Bluetooth car audio&video;
- Bluetooth speaker calling.

2. Specification and parameter

2.1 Electrical performance parameters

Main parameter		Performance			Remark
		Min.	Typ.	Max.	
Operating voltage （V）		1.9	3.3	3.6	≥3.3V can guarantee output power
Communication level （V）		1.8	3.3	3.6	Level is determined by VDD-PADS-1 level and VDD-PADS-2 level
Operating temperature （℃）		-40	20	+85	Industrial design
Operating frequency （MHz）		2402	-	2480	Support Bluetooth protocol standard frequency band
Power consumption	Not connected current (mA)	0.5	-	8	≥3.3V can guarantee output power
	Connected unplayed current (mA)	10	-	14	Level is determined by VDD-PADS-1 level and VDD-PADS-2 level
	Audio output status current (mA)	15	-	18	Bluetooth is connected and playing music
Max Tx power （dBm）		-	9	9	--
Receiving sensitivity （dBm）		-	-90.5	-92.0	BDR

Main parameter	Description	Remark
Distance for reference	50m	Clear and open area, antenna height: 2.5m, indoor communication ≥10m
Crystal frequency	26MHz	--
On-board Flash	4M	--
Package	SMD	--
Connector	1.1mm	Refer to size drawings and PCB package library for details
Antenna	PCB	50 ohm impedance

2.2 Size and pin definition
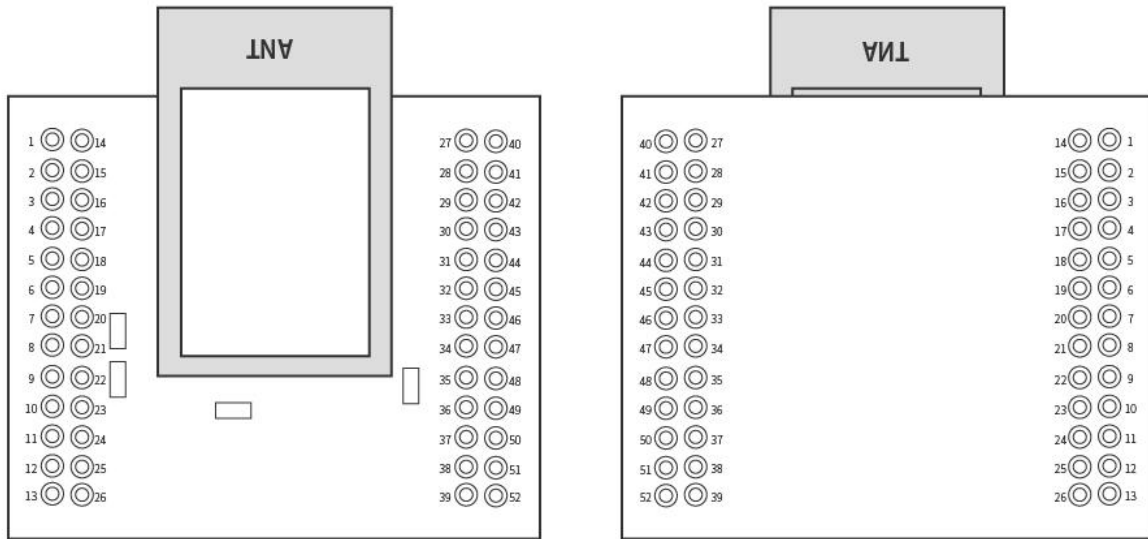
| Pin No.	Pin item	Pin direction	Application
1	GND	P	Ground, connect to power reference ground
2	PIO4	I/O	SPI-CS debug load pin
3	PIO3	I/O	SPI-MISO debug load pin
4	PIO17	I/O	AUX input trigger pin(reserved function)
5	PIO3	I/O	SPI-MISO debug load pin
6	Reserve	O	Unused
7	Reserve	O	Unused
8	VREGENA BLE	I	Bluetooth module power-on / power-off control pin, high level is effective. Note that the module needs to be initialized before powering on.
9	GND	P	Ground, connect to power reference ground
10	Reserve	O	Unused
11	PIO18	I/O	General-purpose I / O (reserved function)
12	VBAT_SE	P	Battery charge sensing input (reserved function)
13	GND	P	Ground, connect to power reference ground
14	VBAT-IN	P	Battery power input pin, cannot exceed 3.6V, otherwise the module will be damaged
15	CHG_EXT	P	External battery charger control (reserved function)
16	USB-DP	I/O	USB cable positive (reserved function)
17	USB-DN	I/O	USB cable negative (reserved function)
18	VCHG	P	Internal charger input, usually connected to VBUS, see Typical application circuit for details
19	RST	I	Module reset pin, pull down for 5ms to trigger reset

20	SPI-PCM	I	SPI/PCM input selection, 0=PCM/PIO interface, 1=SPI
21	LED2	O	Bluetooth status indication LED2 driver output
22	LED0	O	Bluetooth status indication LED0 driver output
23	PIO5	I/O	SPI-CLK debug load pin
24	PIO2	I/O	SPI-MOSI debug load pin
25	PIO16	I/O	Module audio output indication pin, high level is effective
26	AIO0	I/O	Analog programmable I/O pin 0 (reserved function)
27	GND	P	Ground, connect to power reference ground
28	Reserve	O	Unused
29	Reserve	O	Unused
30	Reserve	O	Unused
31	Reserve	O	Unused
32	Reserve	O	Unused
33	PIO9	I/O	Play / Pause　　Key input, high level effective
34	PIO7	I/O	Volume +　　Key input, high level effective, long press to continuously increase;
35	VDD-PADS-2	P	Input and output port power 2, usually 1.8V power connection
36	1V8-SMPS	P	Module 1.8V power output, external decoupling capacitor is recommended, see 4.2 Recommended circuit for details
37	VDD-PADS-1	P	Input and output port power supply 1, usually 1.8V power supply connection
38	PIO8	I/O	Previous song　　Key input, high level is effective
39	PIO6	I/O	General-purpose I / O (reserved function)
40	GND	P	Ground, connect to power reference ground
41	MIC-AN	I	Channel A line or microphone input negative
42	MIC-AP	I	Channel A line or microphone input positive
43	LINE-BN	I	Channel B line input negative
44	LINE-BP	I	Channel B line input positive
45	MIC-BIAS	I	Microphone bias
46	PIO0	I/O	Volume -　　Key input, high level effective, long press to continuously decrease;
47	SPK-LN	O	Left channel speaker output negative
48	SPK-LP	O	Left channel speaker output positive
49	SPK-RP	O	Right channel speaker output positive
50	SPK-LN	O	Left channel speaker output negative
51	PIO1	I/O	Next song　　Key input, high level is effective
52	PIO21	I/O	General-purpose I / O (reserved function)

Pay attention:

The function description of the above pins is only for the default program functions of our company. If you need other functions, please contact us for customization. For the self-developed pin functions, please refer to the official user manual of CSRA64215.

3. Quick start

This quick use requires the test baseboard.
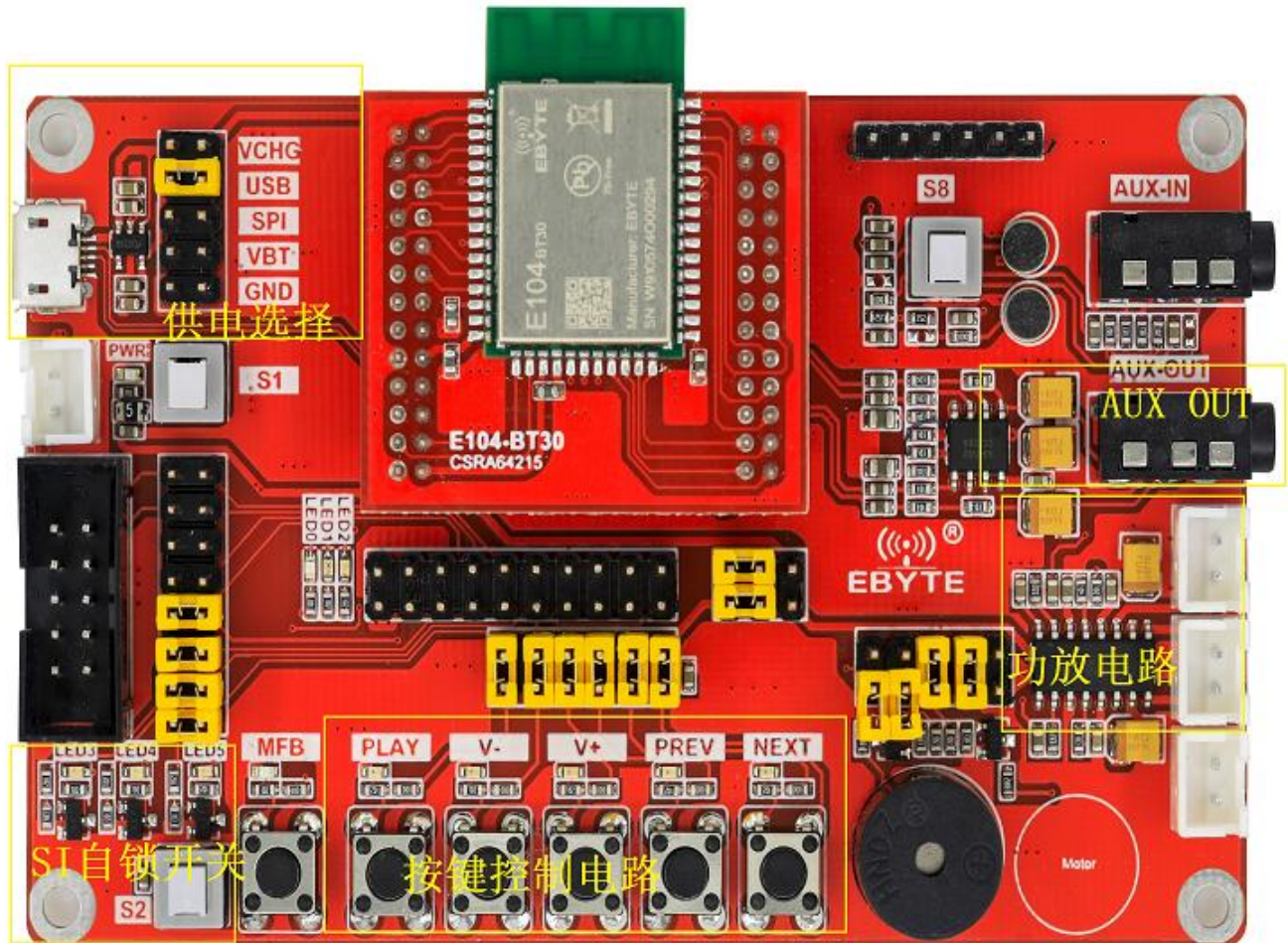
Instruction

Power supply options:

The jumper cap on this circuit is used to select the power supply mode, which is selected according to the user's power supply mode.

Boot:

Press the S1 self-locking switch, and then LED0 (green) blinks. 2 seconds later, LED0 and LED2 (blue) blink alternately.

At this time, the Bluetooth named E104-BT30 V1.0 can be searched on the phone, and you can connect

AUX_OUT output power:

Connect the 3.5mm headphones here

Power amplifier circuit:

If the user has a 3W speaker, you can directly connect the two terminals of the power amplifier circuit.

Key control circuit:

PLAY: Music play and pause button, it has the following states.

When connect to a mobile phone, short press the PLAY button to play music and pause.

When connect to a mobile phone, long press to disconnect the current connection and enter the discoverable state.

At this time, LED1 (red) will blink once.

When connect to a mobile phone, when there is an incoming call, short press the PLAY button to answer the call.

V-: This button is volume reduction. There are long-press and short-press of the button.Long-press can continuously decrease the volume. Short-press decreases

it a little.

V +: This button is volume increase. There are long-press and short-press of the button. Long-press continuously increases the volume, and short-press increases it a bit.

Note: The above two volume buttons cannot synchronize the volume of the mobile phone by default. If you need to synchronize the volume of the mobile phone, you need to turn on the "volume synchronization control" in the developer mode of the mobile phone. After it is turned on, please clear the phone pairing and then connect again.

PREV: This button is the previous song button, which can control the phone to play the previous music

NEXT: This button is the next song button, which can control the phone to play the next music,

H: On/Off circuit

If it is currently turned off, press it again to turn it on. If it is turned on,

press it again and then turn it off.

Power on, MFB indicator (green) is always on.

Power off, MFB indicator (green) goes out.

TWS function use:

Requires two modules.

TWS refers to the multi-connection mode, which is also called "pair-to-box". Two speakers can be configured as the master and slave.The master enters the initiating connection mode, and the slave enters the waiting connection mode.

Enter TWS host: PLAY button + PREV button, the blue light flashes quickly after pressing both buttons simultaneously for 2 seconds

Enter slave mode: PLAY button + NEXT button, the blue light flashes quickly after pressing both buttons simultaneously for 2 seconds

When there is a master and a slave, wait for the two sides to connect (about 10s). After the host long presses the PALY button, the phone can connect to the host and use TWS normally.

End TWS connected: Press PREV and NEXT simultaneously for about two seconds to end TWS connected mode.

4. Hardware circuit design and requirements

4.1 Hardware design

- VREGENABLE（MFB） cannot directly pull up the resistor to VBAT, VREGENABLE（MFB）controls the turning on and off of the Bluetooth chip. You must wait until the chip is powered on to complete the initialization before you can start the turn it on, and cannot delay via resistors and capacitors(unstable). Related delay circuit can refer to the recommended circuit in the official user manual.

- The audio output and MIC input of the module are both differential circuits. For related hardware design, please refer to our hardware design circuit.

- The module is a PCB antenna. Do not route or copper under the antenna during layout and wiring. Hollowing is

recommended.

- High-frequency digital routing, high-frequency analog routing, and power routing must be avoided under the module. If it is necessary to pass through the module, assume that the module is soldered to the Top Layer, and the copper is spread on the Top Layer of the module contact part(well grounded), it must be close to the digital part of the module and routed in the Bottom Layer；

- Assuming the module is soldered or placed over the Top Layer, it is wrong to randomly route over the Bottom Layer or other layers, which will affect the module's spurs and receiving sensitivity to varying degrees；

- It is recommended to use a USB or battery to power the module. The ripple factor of the power supply should be as small as possible, and the module should be reliably grounded;

- Please pay attention to the correction of the positive and negative of the power supply, reverse connection may cause permanent damage to the module;

- Please check the power supply to ensure that it is between the recommended power supply voltage, if the maximum value is exceeded, the module will be permanently damaged;

- When designing current supply circuit, 30% margin is recommended to be remained so as to ensure long-term stable operation of the whole module;

- The module should be as far away as possible from the power supply, transformers, high-frequency wiring and other parts with large electromagnetic interference;

- It is assumed that there are devices with large electromagnetic interference around the module that will greatly affect the performance. It is recommended to keep them away from the module according to the strength of the interference. If necessary, appropriate isolation and shielding can be done;

- Assume that there are traces with large electromagnetic interference (high-frequency digital, high-frequency analog, power traces) around the module that will greatly affect the performance of the module. It is recommended to stay away from the module according to the strength of the interference. If necessary, appropriate isolation and shielding can be done;

- The module must not be installed inside metal shield, which will greatly reduce the transmission distance.

4.2 Recommended application circuit

Refer to "Recommended Circuit.pdf" for recommended circuit.

5. FAQ

5.1 Communication range is too short

- The communication distance will be affected when obstacle exists.
- Data lose rate will be affected by temperature, humidity and co-channel interference.
- The ground will absorb and reflect wireless radio wave, so the performance will be poor when testing near ground.
- Seawater has great ability in absorbing wireless radio wave, so performance will be poor when testing near the sea.
- The signal will be affected when the antenna is near metal object or put in a metal case.
- When the power supply at room temperature is lower than the recommended low voltage, the lower the voltage is,

the lower the transmit power is.

5.2 Module is easy to damage

- Please check the power supply and ensure it is within the recommended range. Voltage higher than the peak will lead to a permanent damage to the module.
- Please check the stability of power supply and ensure the voltage not to fluctuate too much.
- Please make sure anti-static measures are taken when installing and using, high frequency devices have electrostatic susceptibility.
- Please ensure the humidity is within limited range for some parts are sensitive to humidity.
- Please avoid using modules under too high or too low temperature.

6. Welding guidance

6.1 Reflow Soldering Temperature

Profile Feature	Curve feature	Sn-Pb Assembly	Pb-Free Assembly
Solder Paste	Solder paste	Sn63/Pb37	Sn96.5/Ag3/Cu0.5
Preheat Temperature min （Tsmin）	Minimum preheating temperature	100℃	150℃
Preheat temperature max (Tsmax)	Maximum preheating temperature	150℃	200℃
Preheat Time (Tsmin to Tsmax)(ts)	Preheating time	60-120 sec	60-120 sec
Average ramp-up rate(Tsmax to Tp)	Average rising rate	3℃/second max	3℃/second max
Liquidous Temperature (TL)	Liquid phase temperature	183℃	217℃
Time（tL）Maintained Above（TL）	Time above liquidus	60-90 sec	30-90 sec
Peak temperature（Tp）	Peak temperature	220-235℃	230-250℃
Aveage ramp-down rate（Tp to Tsmax）	Average descent rate	6℃/second max	6℃/second max
Time 25℃ to peak temperature	Time of 25 ° C to peak temperature	6 minutes max	8 minutes max

6.2 Reflow Soldering Curve
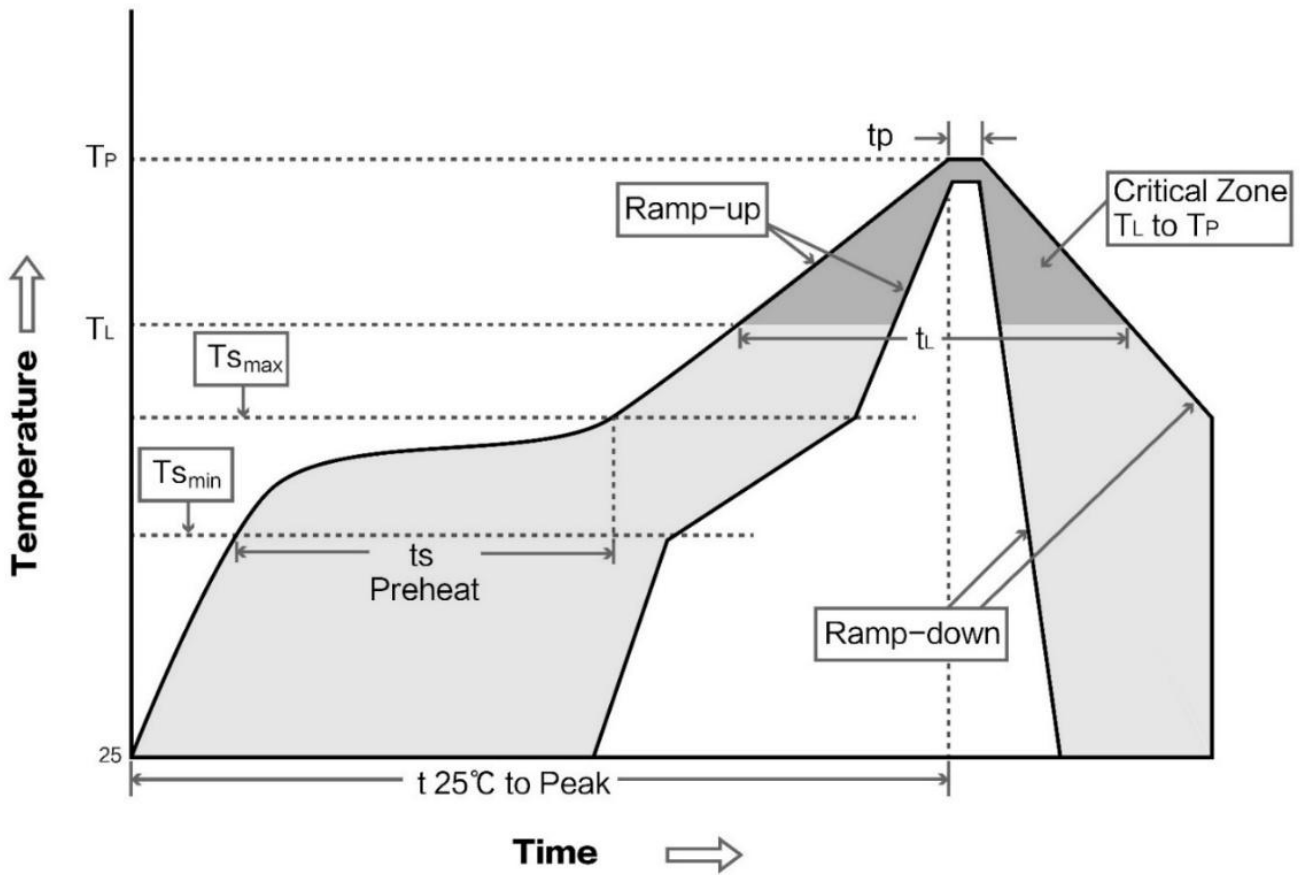
7. E104-BT30

Model No.	Chip	Frequency	Distance	Size	Package	Interface
		Hz	m	mm		
E104-BT30-V1.0	CSRA64215	2.402-2.485G	50	25*16*2.0	SMD	Stereo（R\L）

8. Disclaimer

● This manual is as comprehensive and detailed as possible based on the existing materials. Our company reserves the right to modify the manual without further notice.

● This manual is only used as guide. All information in this manual does not constitute any expressed or implied warranty.

9. Revision history

Version	Date	Description	Issued by
1.0	2019-10-22	Initial version	-
1.1	2020-03-23		Ren

10. About us

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