

EWN-8852BSN3DB

SPECIFICATION V1.1

IEEE 802.11ax/ac/a/b/g/n 2T2R WLAN+ Bluetooth 5.2
with SDIO/HS-UART Mixed Interface Module



Contents

1	General Specifications	- 7 -
2	Features	- 7 -
2.1	WLAN	- 7 -
2.2	Bluetooth	- 8 -
3	System Block Diagram	- 8 -
4	PHY Specification	- 9 -
4.1	Wi-Fi Specification	- 9 -
4.2	BT Specification	- 12 -
5	Other Specifications	- 12 -
6	DC Characteristics	- 13 -
7	Module configurations	- 14 -
8	Pin Definition	- 15 -
9	Key material list	- 17 -
10	Module Photos	- 18 -
11	Marking description	- 18 -
12	Package Information	- 19 -
13	Reference design	- 20 -
13.1	Power supply requirement	- 20 -
13.2	System power on sequence	- 21 -
13.3	System power off sequence	- 22 -
13.4	SDIO Interface	- 23 -
13.5	RF circuit	- 23 -
13.6	Application Circuit for SD_RESET and BT_DIS_N with Platform	- 26 -
13.7	PTA interface design reference	- 27 -
13.8	Motherboard interference avoidance	- 28 -
13.8.1	Interface interference	- 28 -
13.8.2	The main chip interferes with DDR	- 29 -
13.9	Recommended secondary reflux temperature curve	- 30 -
14	Revision History	- 31 -
15	Certification	- 31 -

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 the user's authority to operate the equipment.

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

Important Note:

Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Country Code selection feature to be disabled for products marketed to the US/Canada.

This device is intended only for OEM integrators under the following conditions:

1. The antenna must be installed such that 20 cm is maintained between the antenna and users, and
2. The transmitter module may not be co-located with any other transmitter or antenna,
3. For all products market in US, OEM has to limit the operation channels in CH1 to CH11 for 2.4G band by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change. (if modular only test Channel 1-11)

As long as the three conditions above are met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Important Note:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

The final end product must be labeled in a visible area with the following"

Contains **FCC ID: 2AMM6EWN-8852BSN3DB**

Manual Information to the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

Integration instructions for host product manufacturers according to KDB 996369 D03

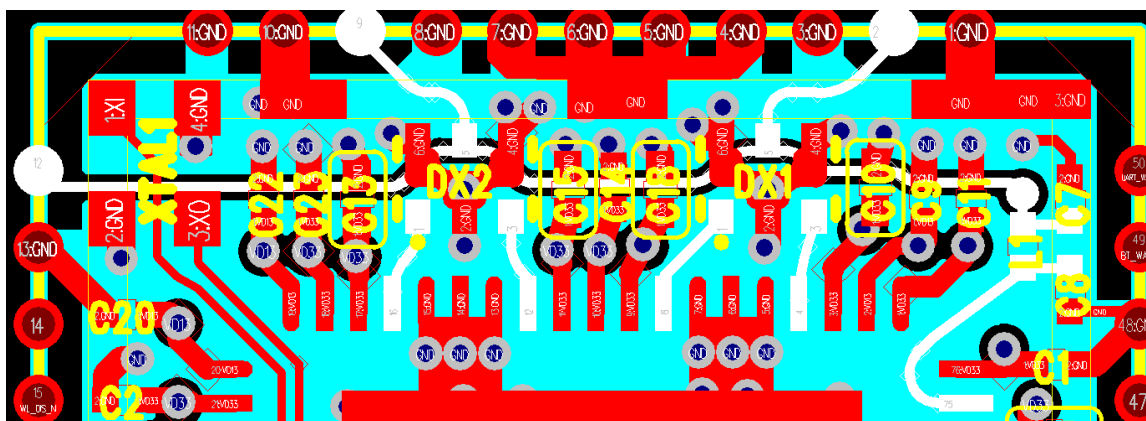
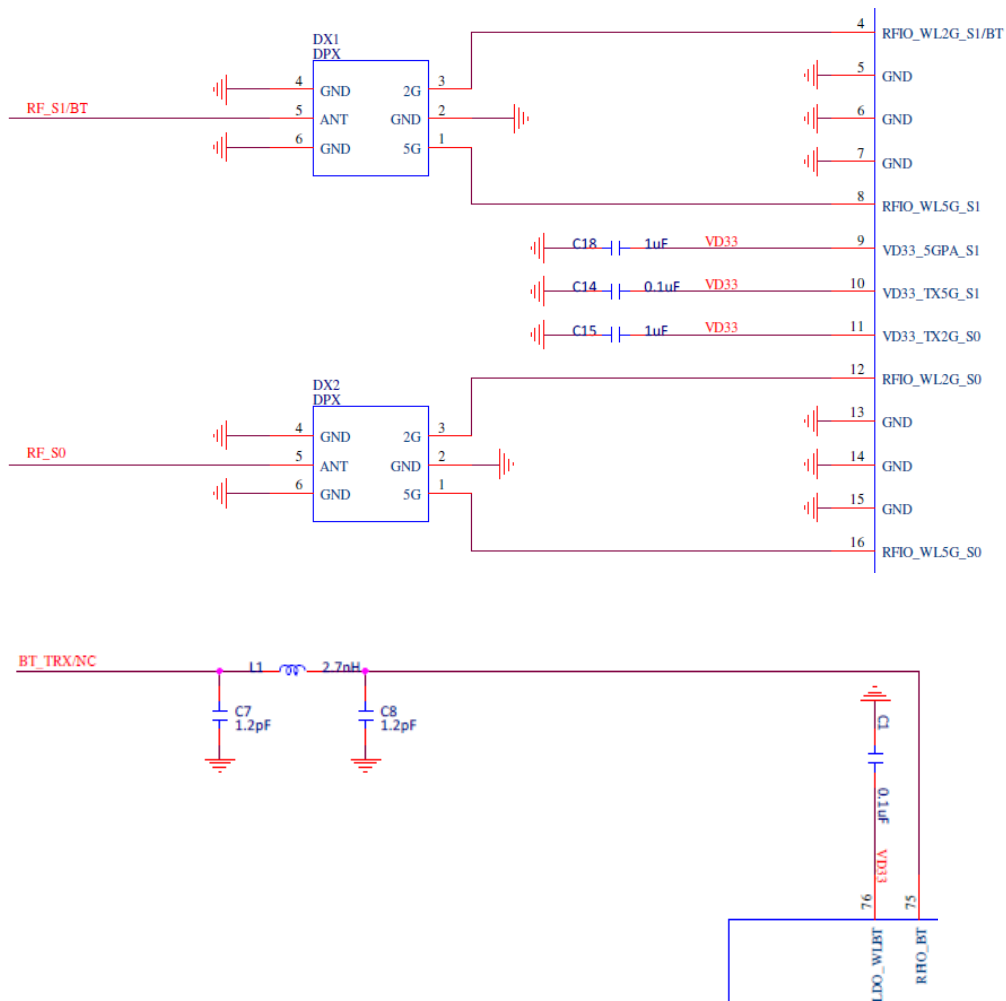
OEM Manual v01r01

2.2 List of applicable FCC rules

CFR 47 FCC PART 15 SUBPART C and CFR 47 FCC PART 15 SUBPART E has been investigated. It is applicable to the modular transmitter

2.3 Specific operational use conditions

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.



Type	Model	Footprint	PartNumber
Diplexers	FLT18D24254959D-3288B	1608	DX1, DX2
	LD18D2450LAN-D86/N		
Capacitor	1.2pF; ±0.1pF; 0201; 25V; C0G		C7, C8
Inductor	2.7nH; ±0.3nH; 0201;		L1

2.6 RF exposure considerations

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

2.7 Antennas

This radio transmitter **FCC ID: 2AMM6EWN-8852BSN3DB** has been approved by Federal Communications Commission to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Antenna No.	Model No. of antenna:	Type of antenna:	Gain of the antenna (Max.)		Frequency range:
			Antenna 1	Antenna 2	
Bluetooth	DV8949-OTT	PCB Antenna	5.25	/	2402-2480MHz
2.4G Wi-Fi	DV8949-OTT	PCB Antenna	5.25	3.29	2412-2462MHz
U-NII-1	DV8949-OTT	PCB Antenna	5.14	4.39	5180-5240MHz
U-NII-2A	DV8949-OTT	PCB Antenna	5.36	5.40	5260-5320MHz
U-NII-2C	DV8949-OTT	PCB Antenna	5.78	5.55	5500-5720MHz
U-NII-3	DV8949-OTT	PCB Antenna	5.84	5.44	5745-5825MHz

2.8 Label and compliance information

The final end product must be labeled in a visible area with the following" Contains **FCC ID: 2AMM6EWN-8852BSN3DB**

2.9 Information on test modes and additional testing requirements

Host manufacturer which install this modular with single modular approval should perform the test of radiated emission and spurious emission according to FCC part 15C:15.247 and FCC Part 15 Subpart E 15.407 and 15.209 requirement, only if the test result comply with FCC part 15.247 and FCC Part 15 Subpart E 15.407 and 15.209 requirement, then the host can be sold legally.

2.10 Additional testing, Part 15 Subpart B disclaimer

Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B.

2.11 Note EMI Considerations

Host manufacture is recommended to use D04 Module Integration Guide recommending as "best practice" RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant limits due to module placement to host components or properties.

2.12 How to make changes

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system. According to the KDB 996369 D02 Q&A Q12, that a host manufacture only needs to do an evaluation (i.e., no C2PC required when no emission exceeds the limit of any individual device (including unintentional radiators) as a composite. The host manufacturer must fix any failure.

ISED Statement

ISED Statement

- English: This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference.

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

- French: Cet appareil contient des émetteurs/récepteurs exempts de licence qui sont conformes aux CNR exempts de licence d'Innovation, Sciences et Développement économique Canada. Le fonctionnement est soumis aux deux conditions suivantes :

(1) Cet appareil ne doit pas causer d'interférences.

(2) Cet appareil doit accepter toute interférence, y compris les interférences susceptibles de provoquer un fonctionnement indésirable de l'appareil.

This device meets the exemption from the routine evaluation limits in section 6.3 of RSS 102 and compliance with RSS 102 RF exposure, users can obtain Canadian information on RF exposure and compliance.

cet appareil est conforme à l'exemption des limites d'évaluation courante dans la section 6.3 du cnr - 102 et conformité avec rss 102 de l'exposition aux rf, les utilisateurs peuvent obtenir des données canadiennes sur l'exposition aux champs rf et la conformité.

This equipment complies with Canada radiation exposure limits set forth for an uncontrolled environment.

This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Cet équipement est conforme Canada limites d'exposition aux radiations dans un environnement non contrôlé.

Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps.

The device for operation in the band 5150–5250 MHz is only for indoor use to reduce the potential for harmful interference to cochannel mobile satellite systems.

L'appareil destiné à fonctionner dans la bande 5150-5250 MHz est uniquement destiné à une utilisation en intérieur afin de réduire le potentiel d'interférences nuisibles aux systèmes mobiles par satellite cocanaux.

1 General Specifications

The module provides a complete solution for a high-performance integrated wireless and Bluetooth device. It supports 2-stream 802.11ax solutions with Multi-user MIMO (Multiple- Input, Multiple-Output) with Wireless LAN(WLAN)SDIO(SDIO1.1/2.0/3.0) interface controller with Bluetooth 5 HS-UART interface controller. The module complies with IEEE 802.11 ax/ac/a/b/g/n/ 2T2R MIMO standard, and Provides up to 1201Mbps for IEEE802.11ax MIMO OFDM.

2 Features

2.1 WLAN

- ❖ IEEE802.11a/b/g/n/ac/ax compatible WLAN
- ❖ Supports 802.11ac/ax 2x2, Wave-2 compliant with MU-MIMO
- ❖ Completes 802.11n MIMO solution for 2.4GHz and 5GHz band
- ❖ complies with SDIO 1.1/2.0/3.0 for WLAN with clock rate up to 208MHz
- ❖ Maximum PHY data rate up to 286.8Mbps using 20MHz bandwidth, 573.5Mbps using 40MHz bandwidth, and 1201Mbps using 80MHz bandwidth
- ❖ Maximum data rate 54Mbps in 802.11g, 300Mbps in 802.11n and 866.7Mbps in 802.11ac, 1201Mbps in 802.11ax
- ❖ Backward compatible with 802.11a/b/g devices while operating at 802.11n data rates
- ❖ Backward compatible with 802.11a/n/ac devices while operating at 802.11ax data rates
- ❖ IEEE802.11e QoS Enhancement(WMM)
- ❖ IEEE802.11i (WPA,WPA2,WPA3). Open, shared key, and pair-wise key authentication services
- ❖ IEEE 802.11h DFS, TPC, Spectrum Measurement
- ❖ IEEE 802.11k Radio Resource Measurement
- ❖ IEEE 802.11v WNM (Wireless Network Management)
- ❖ IEEE 802.11r Fast Basic Service Set Transition
- ❖ Channel management and co-existence
- ❖ Wi-Fi Direct supports wireless peer to peer applications. Support BSR and queue size of Qos
- ❖ Support DFS, Channel info, PPDU state by RX path
- ❖ Support TWT function for power saving
- ❖ Support S3/S4 AES/TKIP group key update

- ❖ FTM support distance measurement
- ❖ Support Network List Offload
- ❖ Supports TCP/UDP/IP checksum offload
- ❖ DSSS with DBPSK and DQPSK, CCK modulation with long and short preamble
- ❖ OFDM with BPSK, QPSK, 16QAM, 64QAM and 256 QAM modulation. Convolutional Coding Rate : 1/2, 2/3, 3/4 and 5/6

2.2 Bluetooth

- ❖ Complies with HS-UART with configurable baud rate for Bluetooth
- ❖ Supports Bluetooth 5 Systems (BT 5.2 Logo compliant)
- ❖ Compatible with Bluetooth v2.1+EDR
- ❖ Supports all packet type in basic rate and enhanced data rate
- ❖ Supports Secure Simple Pairing
- ❖ Dual Mode support : Simultaneous LE and BR/EDR
- ❖ Supports multiple Low Energy states
- ❖ Supports Enhanced Power Control
- ❖ Integrated 32K oscillator for power management

3 System Block Diagram

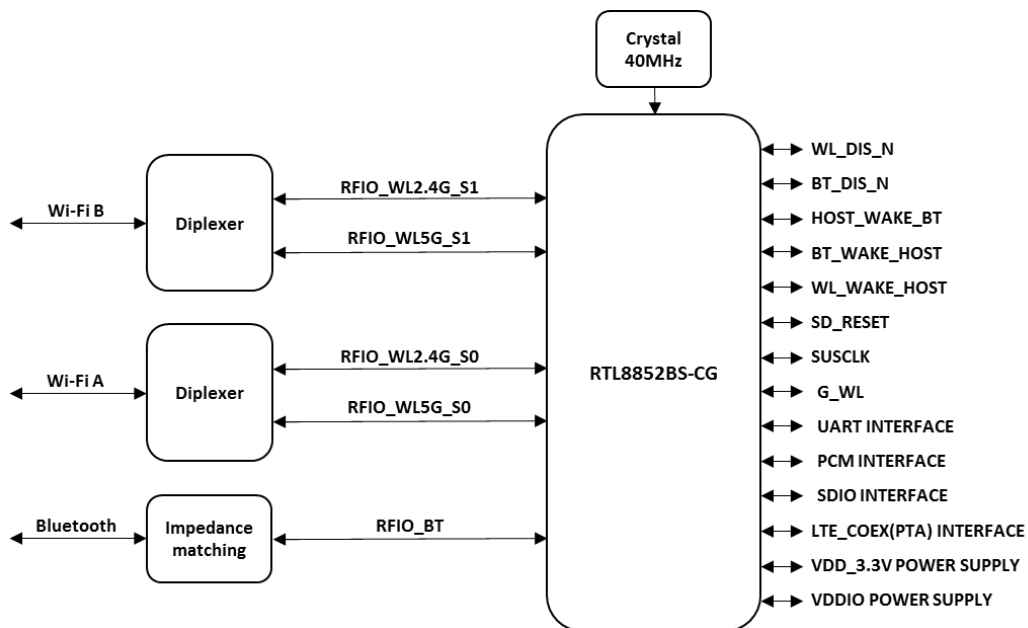


FIG 1 EWN-8852BSN3DB Block Diagram

4 PHY Specification

4.1 Wi-Fi Specification

Table 1 EWN-8852BSN3DB Wi-Fi RF Parameters

Protocol	IEEE 802.11b/g/n/a/ac/ax	
Interface	SDIO 1.1 / 2.0 / 3.0	
Modulation	BPSK/QPSK/16QAM/64QAM/256QAM/1024QAM/DBPSK/DQPSK/CCK	
Frequency	2.4GHz band CH1~CH13/2400 -2483.5MHz	
	5GHz Band CH36~CH48/5150-5250MHz CH52~CH64/5250-5350MHz CH100~CH144/5470-5725MHz CH149~CH165/5725-5850MHz	
	2.4G&5G Band Refer to Channel Plan Domain Code	
Bandwidth	20/40/80 MHz	
PHY Rate	Maximum PHY data rate up to 286.8 Mbps using 20MHz bandwidth;	
	Maximum PHY data rate up to 573.5 Mbps using 40MHz bandwidth;	
	Maximum PHY data rate up to 1201 Mbps using 80MHz bandwidth .	
Frequency Error	<±10ppm/802.11b/g/n/a/ac/ax	
Mask	-20dB/±11MHz/OFDM;	
	-28dB/±20MHz/OFDM;	
	-30dB/±11MHz/DSSS, CCK;	
	-50dB/±20MHz/DSSS, CCK.	
2.4G Transmit Power	802.11b (2.4G 11Mbps):	17±2dBm
	802.11g (2.4G 54Mbps):	15±2dBm
	802.11n (2.4G HT20 MCS7):	14±2dBm
	802.11n (2.4G HT40 MCS7):	14±2dBm
	802.11ax (2.4G HE20 MCS11):	12±2dBm
	802.11ax (2.4G HE40 MCS11):	12±2dBm
	ALL rate's TX power base on the "power by rate" (It can be customized)	
2.4G EVM	802.11b (2.4G 11Mbps):	≤-15dB
	802.11g (2.4G 54Mbps):	≤-28dB
	802.11n (2.4G HT20 MCS7):	≤-30dB
	802.11n (2.4G HT40 MCS7):	≤-30dB

	802.11ax (2.4G HE20 MCS11):	≤-36dB	
	802.11ax (2.4G HE40 MCS11):	≤-36dB	
5G Transmit Power	802.11a(5G 54Mbps):	15±2dBm	
	802.11n (5G HT20 MCS7):	14±2dBm	
	802.11n (5G HT40 MCS7):	14±2dBm	
	802.11ac (5G VHT20 MCS8):	13±2dBm	
	802.11ac (5G VHT40 MCS9):	12±2dBm	
	802.11ac (5G VHT80 MCS9):	12±2dBm	
	802.11ax (5G HE20 MCS10):	12±2dBm	
	802.11ax (5G HE20 MCS11):	12±2dBm	
	802.11ax (5G HE40 MCS10):	12±2dBm	
	802.11ax (5G HE40 MCS11):	12±2dBm	
	802.11ax (5G HE80 MCS10):	12±2dBm	
	802.11ax (5G HE80 MCS11):	12±2dBm	
	ALL rate's TX power base on the “power by rate” (It can be customized)		
	5G EVM	802.11a(5G 54Mbps):	≤-28dB
802.11n(5G HT20 MCS7):		≤-30dB	
802.11n(5G HT40 MCS7):		≤-30dB	
802.11ac(5G VHT20 MCS8):		≤-33dB	
802.11ac(5G VHT40 MCS9):		≤-35dB	
802.11ac(5G VHT80 MCS9):		≤-35dB	
802.11ax(5G HE20 MCS10):		≤-36dB	
802.11ax(5G HE20 MCS11):		≤-36dB	
802.11ax(5G HE40 MCS10):		≤-36dB	
802.11ax(5G HE40 MCS11):		≤-36dB	
802.11ax(5G HE80 MCS10):		≤-36dB	
802.11ax(5G HE80 MCS11):		≤-36dB	
2.4G Receive Sensitivity @ PER<10%	802.11b (2.4G 1Mbps):	-91dBm (Max.)	-97dBm (Typ.)
	802.11b (2.4G 11Mbps):	-85dBm (Max.)	-93dBm (Typ.)
	802.11g (2.4G 6Mbps):	-87dBm (Max.)	-96dBm (Typ.)
	802.11g (2.4G 24Mbps):	-79dBm (Max.)	-83dBm (Typ.)
	802.11g (2.4G 54Mbps):	-70dBm (Max.)	-77dBm (Typ.)
	802.11n (2.4G HT20 MCS0):	-87dBm (Max.)	-95dBm (Typ.)

	802.11n (2.4G HT20 MCS4):	-75dBm (Max.)	-80dBm (Typ.)
	802.11n (2.4G HT20 MCS7):	-69dBm (Max.)	-77dBm (Typ.)
	802.11n (2.4G HT40 MCS0):	-84dBm (Max.)	-92dBm (Typ.)
	802.11n (2.4G HT40 MCS4):	-72dBm (Max.)	-76dBm (Typ.)
	802.11n (2.4G HT40 MCS7):	-66dBm (Max.)	-71dBm (Typ.)
	802.11ax (2.4G HE20 MCS10):	-59dBm (Max.)	-61dBm (Typ.)
	802.11ax (2.4G HE20 MCS11):	-57dBm (Max.)	-59dBm (Typ.)
	802.11ax (2.4G HE40 MCS10):	-57dBm (Max.)	-59dBm (Typ.)
	802.11ax (2.4G HE40 MCS11):	-55dBm (Max.)	-57dBm (Typ.)
5G Receive Sensitivity @ PER<10%	802.11a (5G 6Mbps):	-87dBm (Max.)	-94dBm (Typ.)
	802.11a (5G 24Mbps):	-79dBm (Max.)	-88dBm (Typ.)
	802.11a (5G 54Mbps):	-70dBm (Max.)	-79dBm (Typ.)
	802.11n (5G HT20 MCS0):	-87dBm (Max.)	-93dBm (Typ.)
	802.11n (5G HT20 MCS4):	-75dBm (Max.)	-80dBm (Typ.)
	802.11n (5G HT20 MCS7):	-69dBm (Max.)	-77dBm (Typ.)
	802.11n (5G HT40 MCS0):	-84dBm (Max.)	-92dBm (Typ.)
	802.11n (5G HT40 MCS4):	-72dBm (Max.)	-76dBm (Typ.)
	802.11n (5G HT40 MCS7):	-66dBm (Max.)	-70dBm (Typ.)
	802.11ac (5G VHT20 MCS0):	-87dBm (Max.)	-94dBm (Typ.)
	802.11ac (5G VHT20 MCS5):	-71dBm (Max.)	-76dBm (Typ.)
	802.11ac (5G VHT20 MCS8):	-64dBm (Max.)	-72dBm (Typ.)
	802.11ac (5G VHT40 MCS0):	-84dBm (Max.)	-91dBm (Typ.)
	802.11ac (5G VHT40 MCS5):	-68dBm (Max.)	-72dBm (Typ.)
	802.11ac (5G VHT40 MCS9):	-59dBm (Max.)	-68dBm (Typ.)
	802.11ac (5G VHT80 MCS0):	-81dBm (Max.)	-87dBm (Typ.)
	802.11ac (5G VHT80 MCS5):	-65dBm (Max.)	-70dBm (Typ.)
	802.11ac (5G VHT80 MCS9):	-56dBm (Max.)	-65dBm (Typ.)
	802.11ax (5G HE20 MCS10):	-57dBm (Max.)	-59dBm (Typ.)
	802.11ax (5G HE20 MCS11):	-55dBm (Max.)	-57dBm (Typ.)
	802.11ax (5G HE40 MCS10):	-55dBm (Max.)	-57dBm (Typ.)
	802.11ax (5G HE40 MCS11):	-53dBm (Max.)	-55dBm (Typ.)
	802.11ax (5G HE80 MCS10):	-53dBm (Max.)	-55dBm (Typ.)
	802.11ax (5G HE80 MCS11):	-51dBm (Max.)	-53dBm (Typ.)

4.2 BT Specification

Table 2 EWN-8852BSN3DB Bluetooth RF Parameters

Protocol	BTv2.1+EDR/+BTv3.0/BT v4.2/BT v5.2
Interface	UART
Frequency	2400 MHz ~ 2483.5 MHz (79 channels)
Modulation	GFSK, $\pi/4$ -DQPSK, 8-DPSK
PHY Rate	1Mbps for Basic Rate; 2、 3 Mbps for Enhanced Data Rate; 1、 2 Mbps for BLE
Transmit Power	6dBm, typical
Receive Sensitivity	<-89dBm @ BER=0.1% for GFSK (1Mbps); <-90dBm @ BER=0.01% for $\pi/4$ -DQPSK (2Mbps); <-83dBm @ BER=0.01% for 8-DPSK (3Mbps); <-90dBm @ PER=30.8% for BLE

5 Other Specifications

Table 3 Other Specifications

Operating Temperature	0℃~+70℃
Storage Temperature	Module: -20℃~+125℃ Package: -20℃~+70℃
Operating Humidity	RH 95%(Non-Condensing)
Storage Humidity	RH 95%(Non-Condensing)
Humidity level	Level 3
Security	WEP 64/128bit,WPA,WPA2,WPA3,TKIP,AES
Other characteristics:	QoS-WMM, WMM-PS
Operation System	Linux/Android/Win7
ESD(IEC61000-4-2)	>±500V(Contact) @ RF Port

6 DC Characteristics

Table 4 Power Supply Characteristics

Symbol	Parameter	Min.	Typical	Max.	Unit
VDD_3.3V	3.3V Supply Voltage	3.0	3.3	3.6	V
IDD_3.3V	3.3V Rating Current	-	-	1500	mA
VDDIO	SDIO I/O Voltage	Depend on the SDIO protocol (1.8V or 3.3V)			

Table 5 3.3V IO Pin DC Characteristics

Symbol	Parameter	Min.	Typical	Max.	Unit
V_{IH}	Input high Voltage	2.0	3.3	3.6	V
V_{IL}	Input low Voltage	-	0	0.9	V
V_{OH}	Output high Voltage	2.97	-	3.3	V
V_{OL}	Output low Voltage	0	-	0.33	V

Table 6 1.8V IO Pin DC Characteristics

Symbol	Parameter	Min.	Typical	Max.	Unit
V_{IH}	Input high Voltage	1.7	1.8	3.6	V
V_{IL}	Input low Voltage	-	0	0.8	V
V_{OH}	Output high Voltage	1.62	-	1.8	V
V_{OL}	Output low Voltage	0	-	0.18	V

7 Module configurations

Module Dimension (L*W*T): $15.2\pm0.2\text{mm}\times13.2\pm0.2\text{mm}\times2.3\pm0.2\text{mm}$.

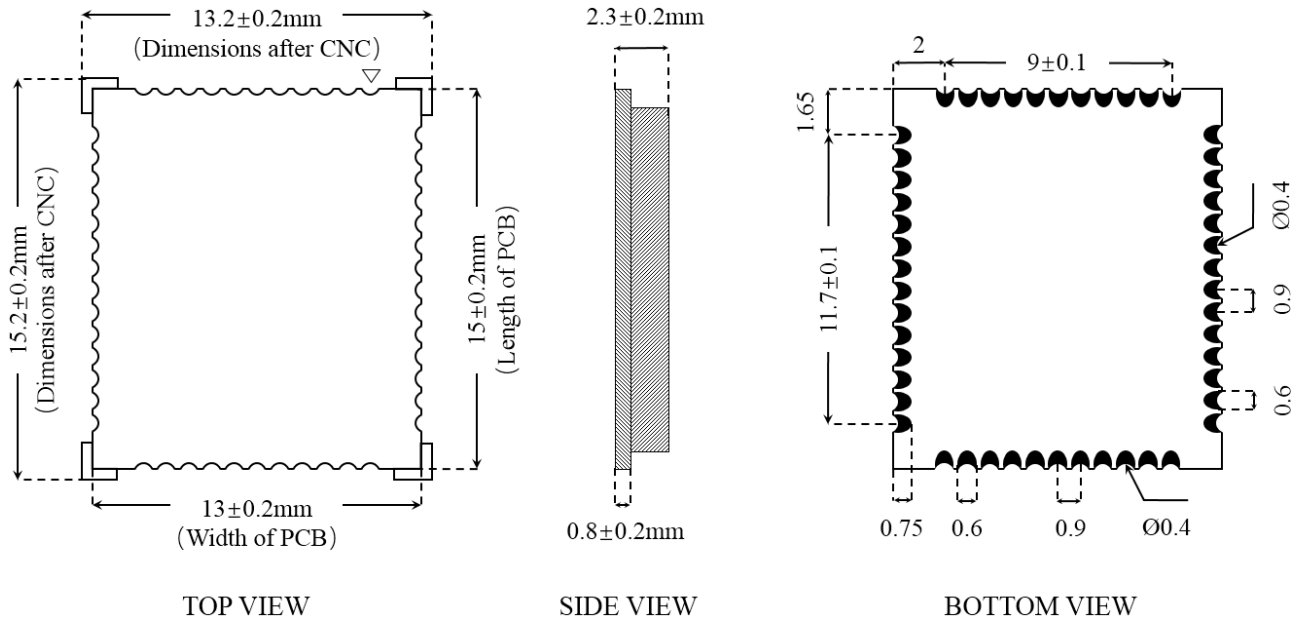


FIG 2 EWN-8852BSN3DB Module Dimension

Recommended Footprint :

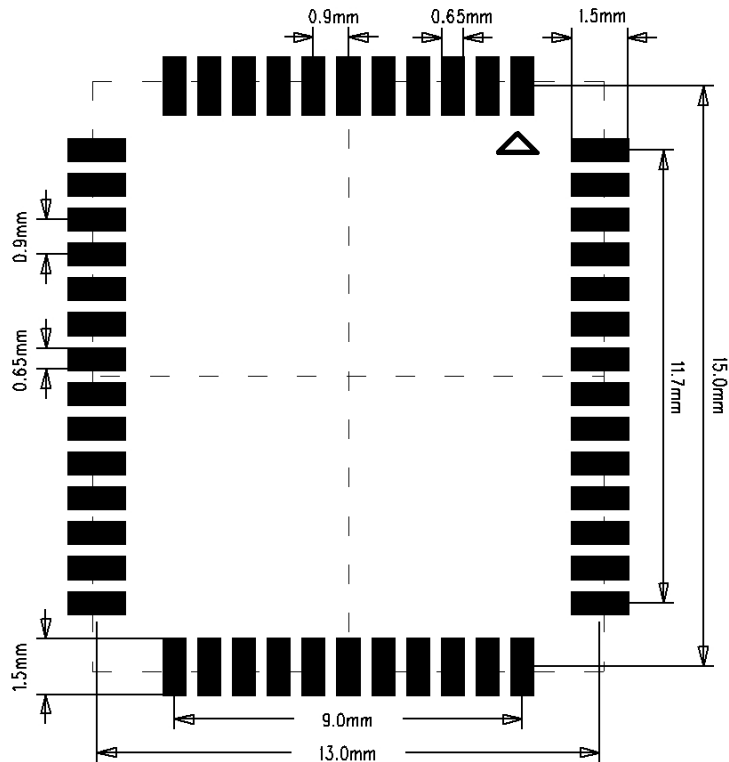


FIG 3 EWN-8852BSN3DB Module Dimension

8 Pin Definition

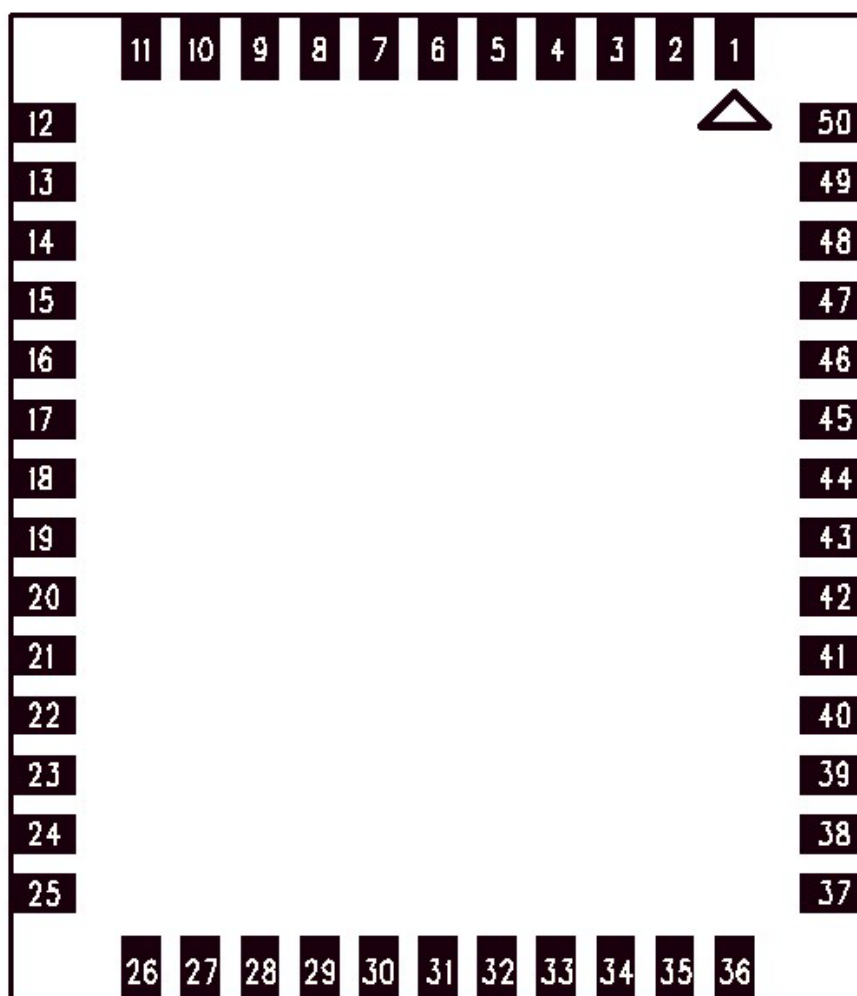


FIG 4 EWN-8852BSN3DB Block Diagram
TOP VIEW

See table 7 for the module hardware pin definition.

Table 7 EWN-8852BSN3DB Pin Description

Pin	Definition	Type	Description	Default Pull	Power level
1	GND	-	Ground	-	-
2	Wi-Fi B	I/O	Wi-Fi Path S1 ANT I/O port	-	-
3	GND	-	Ground	-	-
4	GND	-	Ground	-	-
5	GND	-	Ground	-	-
6	GND	-	Ground	-	-
7	GND	-	Ground	-	-

Pin	Definition	Type	Description	Default Pull	Power level
8	GND	-	Ground	-	-
9	Wi-Fi A	I/O	Wi-Fi Path S0 ANT I/O port	-	-
10	GND	-	Ground	-	-
11	GND	-	Ground	-	-
12	RF_BT	I/O	Bluetooth ANT I/O port	-	-
13	GND	I/O	Ground	-	-
14	NC	-	No connect	-	-
15	WL_DIS_N	I	Reserved	-	VDDIO
16	WL_WAKE_HOST	O	WLAN to wake-up the host	-	VDDIO
17	SDIO_CMD	I/O	SDIO interface command line	Internal PU	VDDIO
18	SDIO_CLK	I/O	SDIO interface clock line	-	VDDIO
19	SDIO_DATA_3	I/O	SDIO interface data line 3	Internal PU	VDDIO
20	SDIO_DATA_2	I/O	SDIO interface data line 2	Internal PU	VDDIO
21	SDIO_DATA_0	I/O	SDIO interface data line 0	Internal PU	VDDIO
22	SDIO_DATA_1	I/O	SDIO interface data line 1	Internal PU	VDDIO
23	GND	-	Ground	-	-
24	WL_WAKE_HOST	O	WLAN to wake-up the host	-	VDDIO
25	LTE_COEX1	I/O	LTE_COEX1, Shared with GPIO5	-	VDDIO
26	LTE_COEX2	I/O	LTE_COEX2, Shared with GPIO6 (We suggest configuring the control pin in platform side as open-drain)	-	VDDIO
27	PCM_SYNC	I/O	PCM SYNC signal	-	VDDIO
28	PCM_IN	I	PCM data input	-	VDDIO
29	PCM_OUT	O	PCM data output	-	VDDIO
30	PCM_CLK	I/O	PCM clock	-	VDDIO
31	SUSCLK	I/O	External low power clock input (32.768KHz)	Internal PD	VDDIO
32	GND	-	Ground	-	-
33	LTE_COEX3	I/O	LTE_COEX3, Shared with GPIO12 (We suggest configuring the control pin in platform side as open-drain)	-	VDDIO
34	VDDIO	I/O	I/O voltage supply input (1.8V typ.)	-	VDDIO
35	NC	-	No connect	-	-
36	VDD_3.3V	I/O	Main power voltage source input (3.3V±0.3V)	-	DC 3.3V±0.3V

Pin	Definition	Type	Description	Default Pull	Power level
37	NC	-	No connect	-	-
38	BT_DIS_N	I	Enable pin for Bluetooth device ON:pull high;OFF:pull low External pull low to shut down BT	Internal PU	VDDIO
39	GND	-	Ground	-	-
40	UART_TXD	O	Bluetooth UART interface(connect to host UART RX)	-	VDDIO
41	UART_RXD	I	Bluetooth UART interface(connect to host UART TX)	-	VDDIO
42	UART_RTS	O	Bluetooth UART interface	-	VDDIO
43	UART_CTS	I	Bluetooth UART interface	-	VDDIO
44	SD_RESET	I	Reset pin for SDIO bus External pull low to reset SDIO bus	Internal PU	VDDIO
45	G_WL	I/O	GPIO4, General Purpose Input/Output Pin(Keep low when system start up)	Internal PD	VDDIO
46	GND	-	Ground	-	-
47	NC	-	No connect	-	-
48	GND	-	Ground	-	-
49	HOST_WAKE_BT	I	Host wake-up Bluetooth	-	VDDIO
50	BT_WAKE_HOST	O	Bluetooth to wake-up the host	-	VDDIO

Note: The internal pull-up/down resistances of the chip are about 50K~100K ohm.

9 Key material list

Table 8 EWN-8852BSN3DB Key material list

Type	Model	Footprint	QTY.
Diplexers	FLT18D24254959D-3288B (飞特尔)	1608	2PCS
	LD18D2450LAN-D86/N(佳利)		
IC	RTL8852BS-CG	QFN76	1 PCS
Crystal	40MHz (CX/JWT/TJ)	X2016	1 PCS

10 Module Photos



FIG 5 TOP VIEW

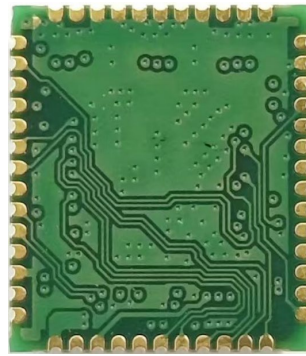


FIG 6 BOTTOM VIEW

11 Marking description

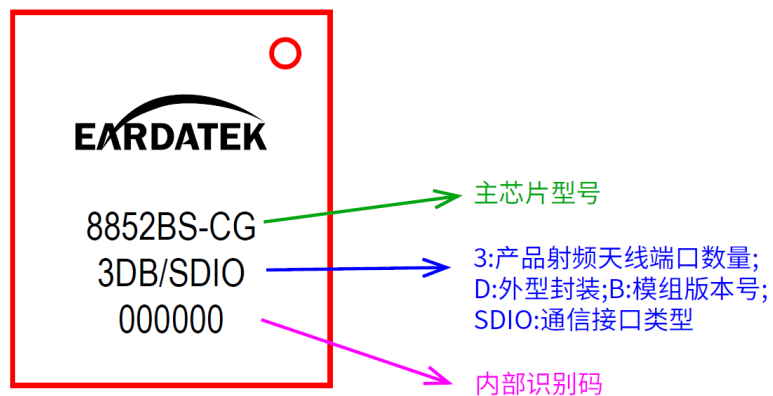
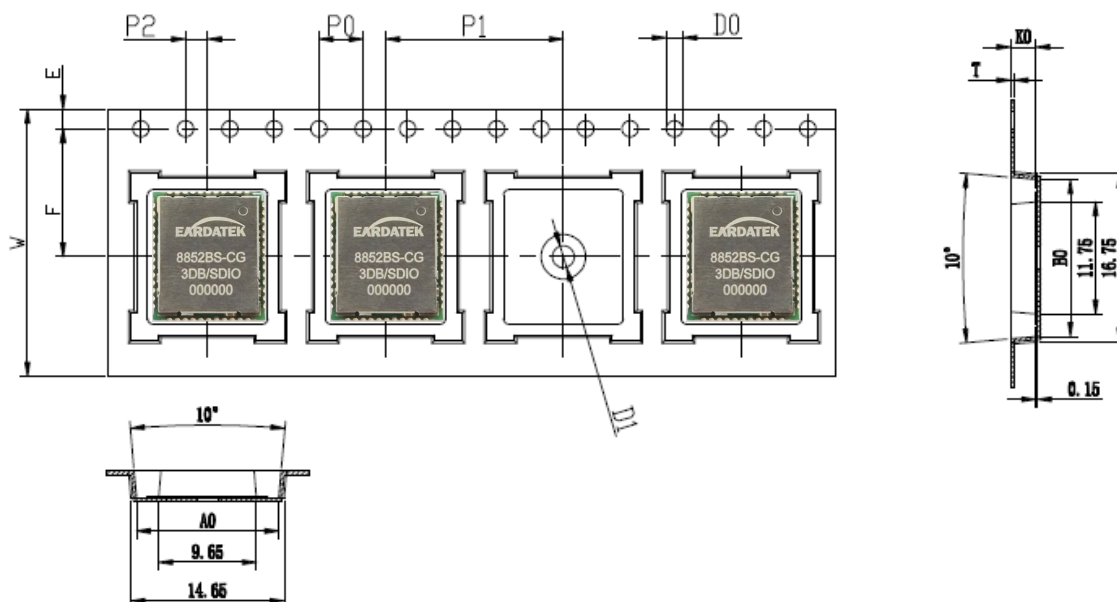


FIG 7 EWN-8852BSN3DB Marking description

12 Package Information

Carrier dimension: (Unit : mm)



A0	B0	K0	P0	P1	P2
13.65±0.1	15.75±0.1	2.60±0.1	4.0±0.1	20.0±0.1	2.0±0.1
W	T	E	F	D0	D1
24.0±0.3	0.3±0.05	1.75±0.1	11.50±0.1	φ1.5 ^{+0.1} ₋₀	φ1.50 ^{+0.1} ₋₀

FIG 8 Carrier size

Reel dimension: D=38cm 1400PCS Modules Per Reel

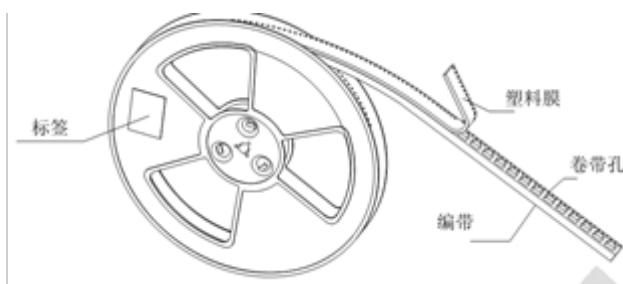


FIG 9 Reel



FIG 10 Reel figure

13 Reference design

13.1 Power supply requirement

- To use a dedicated power supply circuit for Wi-Fi (and BT)
- The VD33 power ripple shall be $<300\text{mVpp}$ for ripple frequency $<200\text{KHz}$
- Transient-response: ①the ripple raised from 100/800mA step-response test should be small than 200mVpp . ②The ripple swing shall settle down within 1~2 cycles, 2 cycles for the worst case.
- Power supply spur: make sure the spurs from switching mode power supply or other noisy circuits are reasonable small. Once issue concerned with such a power supply spur, alternative power supply filtering might be needed.

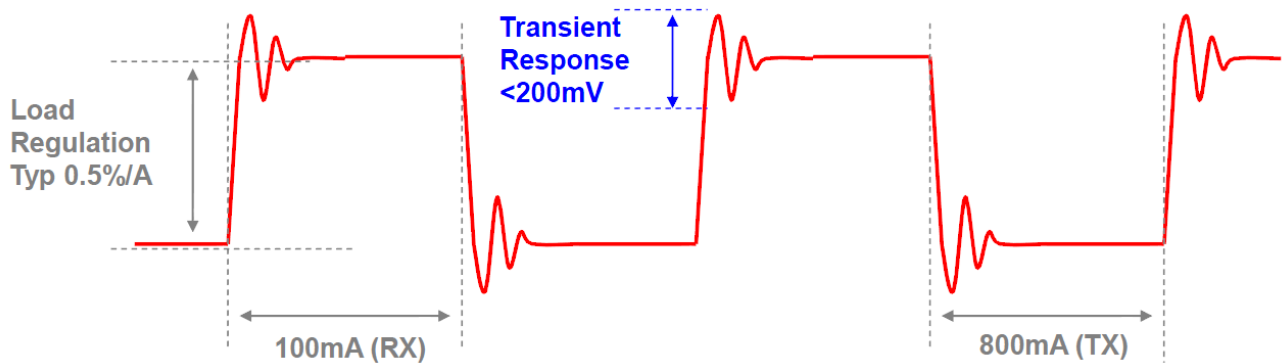


FIG 10 Power supply requirement

Table 9 Platform Power Rail Requirements

VDD_3.3V Power range	VDD_3.3V Ripple	VDD_3.3V Noise	Rise time	
			Min	Max
+/-0.165V	300mVpp@switching frequency > 100KHz		0.5ms	5ms

13.2 System power on sequence

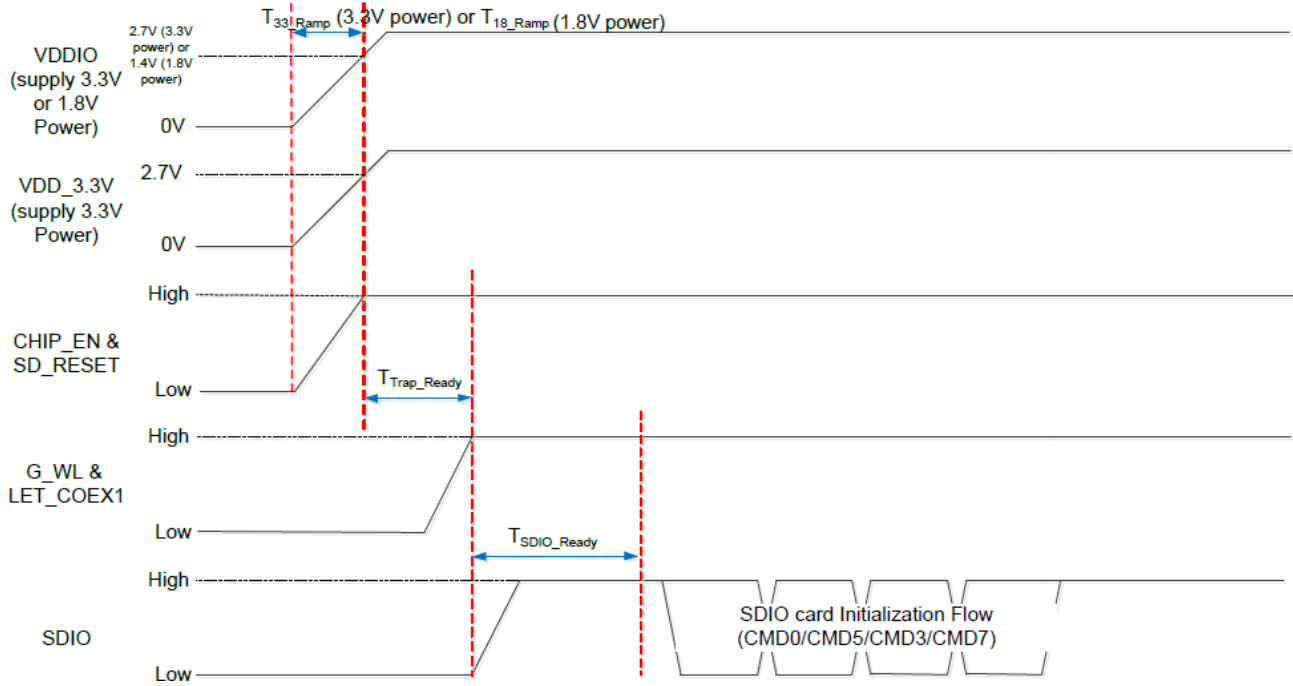


FIG 11 System Power-On Sequence

Table 10 System Power-On Timing Parameters

	Min.	Typical	Max.	Unit	Description
T_{18_Ramp}/T_{33_Ramp}	0.5	1.5	5	ms	The 3.3V or 1.8V power ramp up duration.
T_{Trap_Ready}	400	500	-	ms	WLAN eFuse autoload. $T_{Trap_Ready} = 500\text{ms}$ (Typical)
T_{SDIO_Ready}	10	20	-	ms	SDIO Not Ready Duration. In this state, the module may respond to commands without the ready bit being set. After the ready bit is set, the host will initiate complete card detection procedure.

13.3 System power off sequence

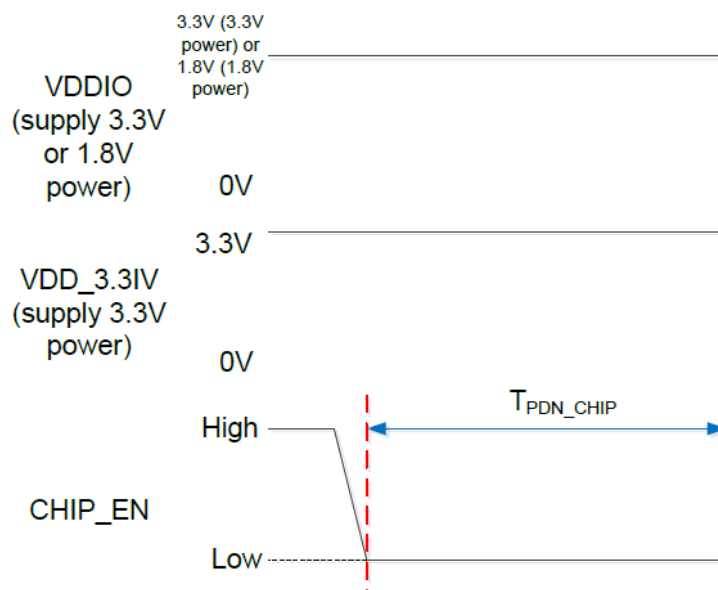


FIG 12 System Power-Off Sequence

Table 11 System Power-Off Timing Parameters

	Min.	Typical	Max.	Unit	Description
T_{PDN_CHIP}	100	100	-	ms	CHIP_EN keep low duration

13.4 SDIO Interface

- The SDIO Bus traces impedance should be 50 Ohm.
- The SDIO Bus traces spacing should be more than 2 times of terrace width ($H=2W$)
- The SDIO Bus traces (CLK, CMD, D0~D3) length matching should be less than ± 100 mils, and the total length should be less than 2.5 inches.
- SDIO CLK traces should be surrounded by GND and keep CMD and data away.
- The SDIO Bus traces should not have Stubs and need to reference to GND.
- The maximum VIA counts of the SDIO Bus traces (CLK, CMD, D0~D3) should be less than 4.
- The SDIO Bus traces (CLK, CMD, D0~D3) should connect an 0 Ohm series resistor which needs to be close to SOC.
- The SDIO Bus traces (CLK, CMD, D0~D3) should reserve pull up resistors 2.2K Ohm to VIO_HOST which needs to be close to WIFI.
- The SDIO Bus Traces (CLK, CMD, D0~D3) should reserve 5.6pF caps to GND which needs to be close to WIFI.

Table 12 SDIO Bus Traces length in the module

Pin	Definition	Length(mil)
17	SDIO_CMD	510.96
18	SDIO_CLK	536.21
19	SDIO_DATA_3	495.14
20	SDIO_DATA_2	489.74
21	SDIO_DATA_0	495.48
22	SDIO_DATA_1	502.96

13.5 RF circuit

Due to the SMD package, the RF port impedance must be offset after the module is soldered to the motherboard. In order to achieve the best performance, it is recommended to add a PI-type matching network to the motherboard, as shown below (C11, R21, C6). The value of the PI type matching network needs to be debugged according to the actual motherboard to match RF port impedance to 50 Ohm.

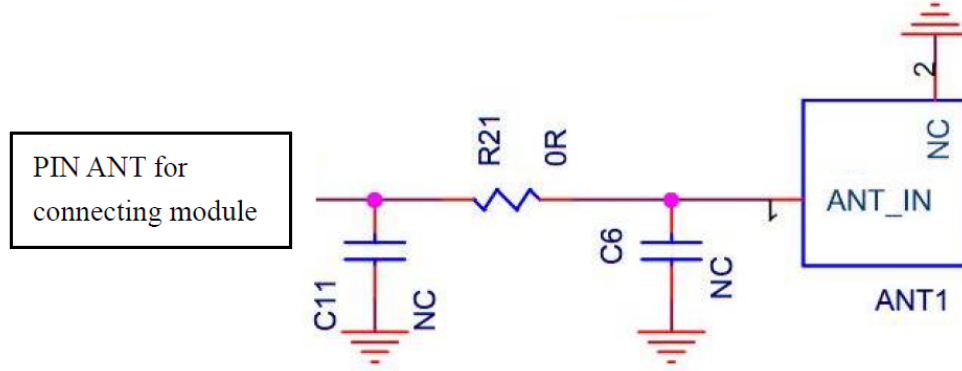


FIG 13 Connect 50 Ohm matching antenna reference circuit

The antenna ANT1 in the figure above must be 50 Ohm. If the antenna is not matched, it is recommended to add a set of PI type matching network at the front of the antenna to match the antenna. Generally, the antenna manufacturers will give Suggestions on matching parameters.

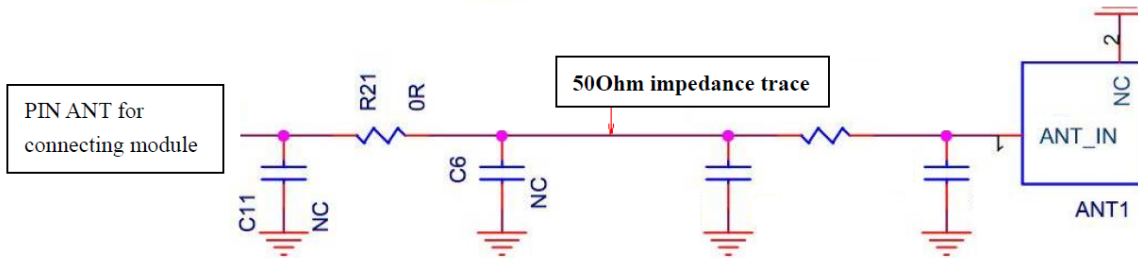


FIG 14 Connect the unmatched antenna reference circuit

The RF line layout should be matched according to 50ohm. The line impedance is related to the plate, plate thickness, line width and copper spacing. Professional software can be used to calculate the line width. Note: for multilayer plates, the plate thickness should calculate the distance from RF routing layer to GND of the next layer. There are RF lines Layout principles :

1. RF line layout needs to match 50 ohms. The line width can be calculated by professional software. (Note: If it is a multi-layer board, The board thickness should calculate the distance from the RF trace layer to the next ground layer.)
2. The RF line must be surrounded by ground copper and ground holes.
3. The PI-type matching circuit for adjusting the impedance of the module is placed close to the module. The PI type matching circuit for matching the antenna is placed close to the antenna.

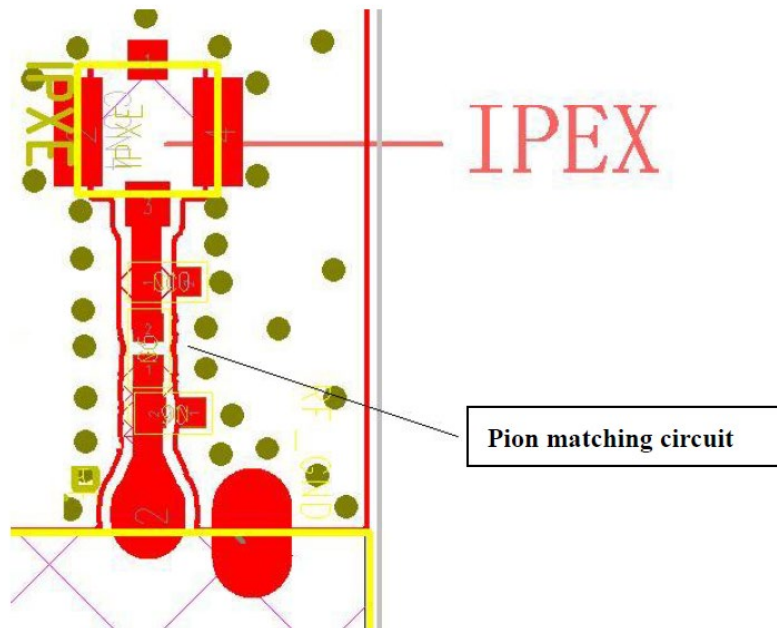


FIG 15 The PI type matching circuit Layout

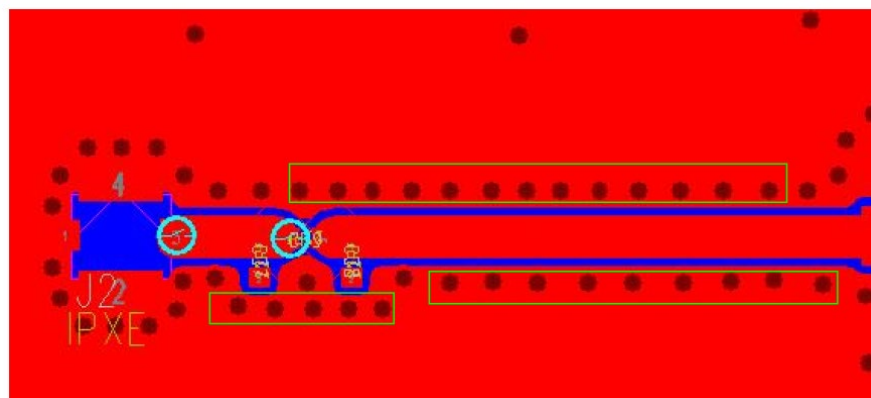


FIG 16 The RF line Layout

13.6 Application Circuit for SD_RESET and BT_DIS_N with Platform

There is internal pull-up, about 100K, resistor design in Module SD_RESET (Pin44) and BT_DIS_N (Pin38) pad. If Host SOC need to control these pins, it is recommended to choose host GPIO without pull capability to avoid voltage divider. Middle range of IO voltage would affect Module booting up (FIG 17).

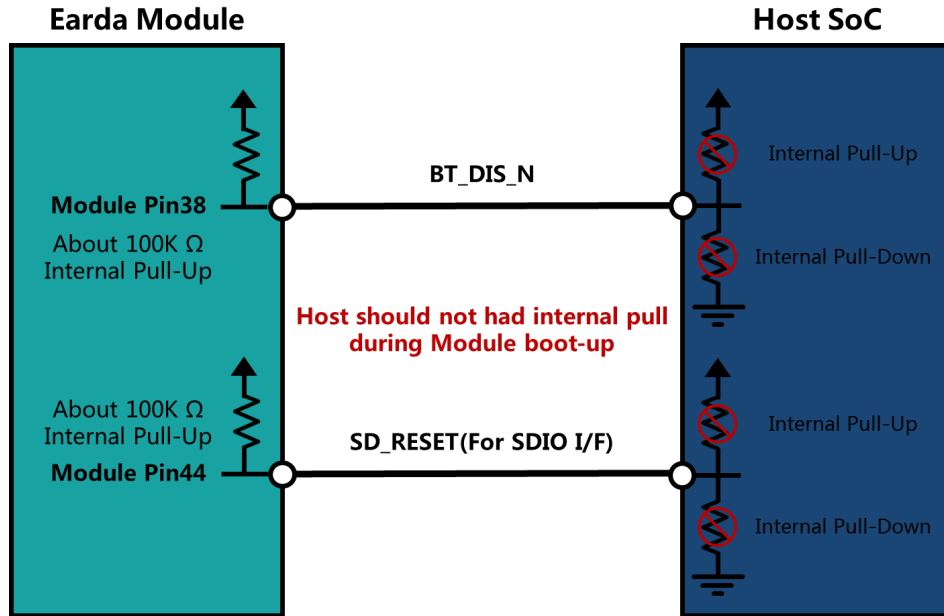


FIG 17 Host GPIO control WL_REG_ON and BT_REG_ON

If the GPIO connected to SD_RESET and BT_DIS_N by the host has pull-down capability and it can't be avoided), suggest to add 10K Ω Pull-Down resistor in circuit to ensure IO is in low level. In this way, Module internal Pull-Up 100K Ω could be neglected (FIG 18). Please note external Pull-Down will cause additional static current. BT_DIS_N exists only high level and low level during power-on. Other uncertain voltage values may cause BT to fail to open.

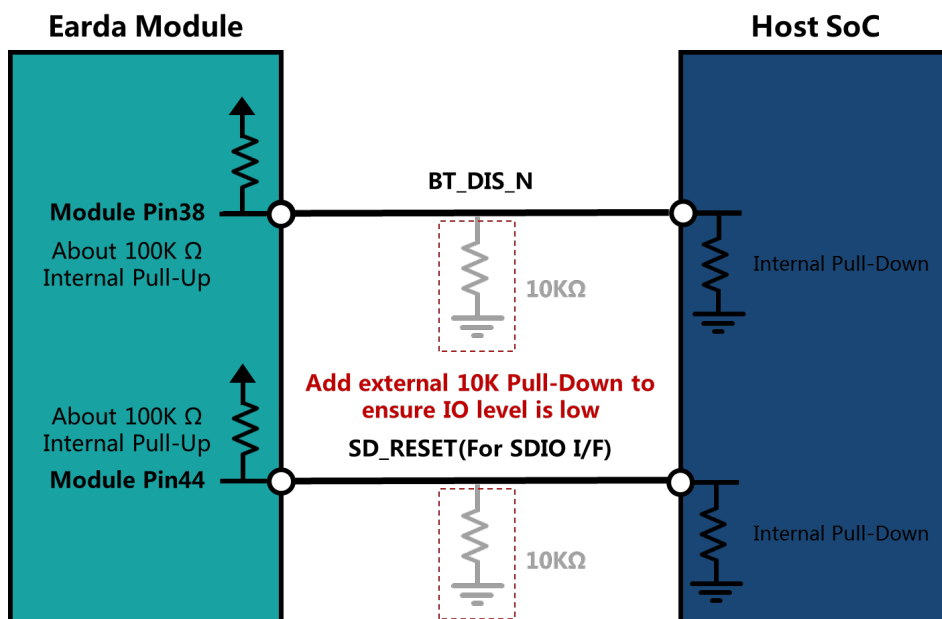


FIG 18 Add external pull down resistor to ensure low level

13.7 PTA interface design reference

EWN-8852BSN3DB supports 3-wire PTA (Packet Traffic Arbitration) interface, and the interface design reference is as follows:

Table 13 Pin Connection Description

Wi-Fi Module		Other PTA Devices
LTE_COEX1(Pin25)	Pull-Down	PTA_COEX_BT_STAT
LTE_COEX2(Pin26)	No Pull	PTA_COEX_BT_ACT
LTE_COEX3(Pin33)	No Pull	PTA_COEX_WL_ACT

If the surface space is sufficient, it is recommended to reserve series and Pull-Up, Pull-Down resistance for the motherboard.

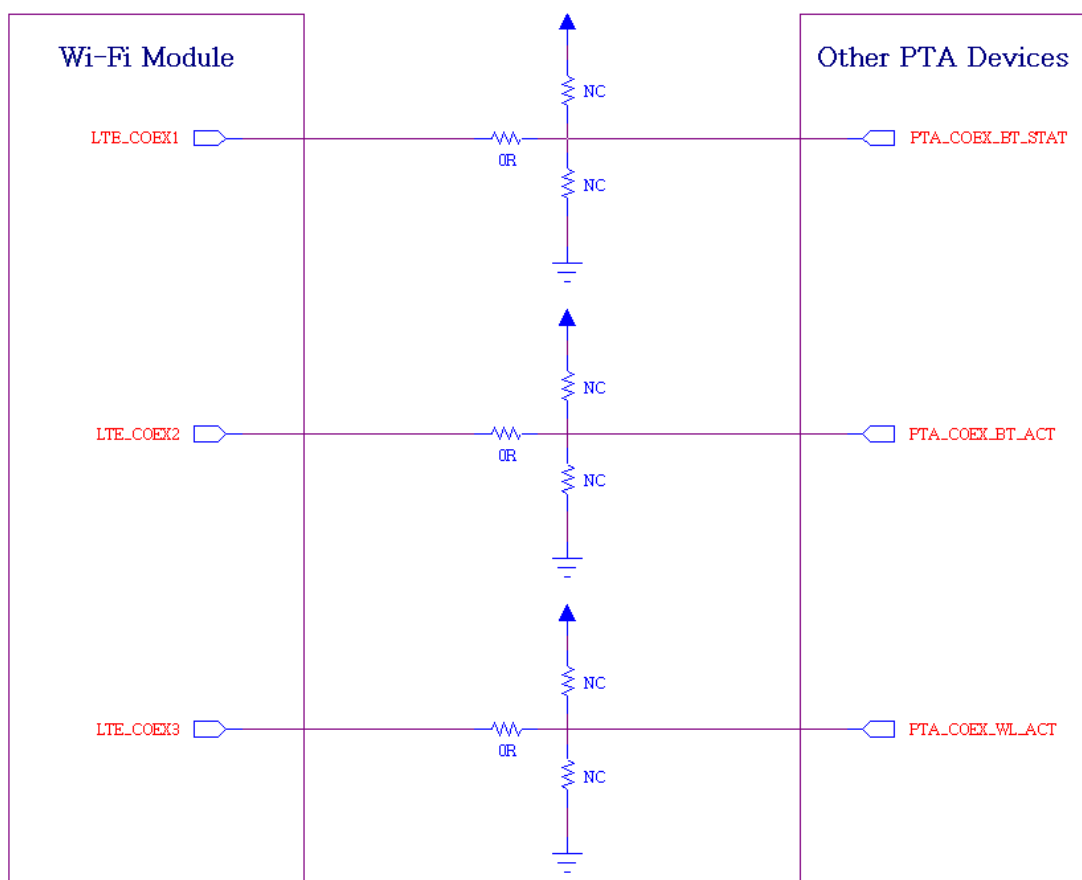


FIG 19 PTA interface design reference

13.8 Motherboard interference avoidance

Motherboard interference comes from: high-speed data interface (HDMI), the Operating frequency of main chip, DDR, DC-DC power supply. The method of avoiding interference according to the characteristics of various signals is also different. The main methods of interference avoidance include :

1. keeping away from the source of interference;
2. Adding shields to avoid interference leakage;
3. Reasonable layout to eliminate interference.

13.8.1 Interface interference

When HDMI uses the 74.2MHz frequency, its 33x frequency is in the 2.4G band of Wi-Fi, which will seriously interfere with the Wi-Fi signal. If the HDMI frequency is 148.5MHz, although the 16x frequency is not in the Wi-Fi band, the isolation of the frequency is not good, and the Wi-Fi signal will be interfered to some extent. If the distance between the HDMI interface and the Wi-Fi module on the PCB is less than 5cm, the HDMI output display will interfere with the Wi-Fi signal, resulting in problems such as Wi-Fi connection failure and throughput drop. Therefore, keep the location of the Wi-Fi module away from the HDMI port on the hardware layout to avoid interference.

At the same time, if the Wi-Fi antenna is built-in the motherboard, its placement must also be carefully considered to be far from the interface interference. If the antenna is placed in an incorrect position, even if the module is shielded, the interference signal is coupled through the antenna, which will eventually result in a lower Wi-Fi throughput. (Note: In addition to interference, the placement of the internal antenna should also evaluate the effect of the metal interface, motherboard, and housing material on the antenna impedance.)

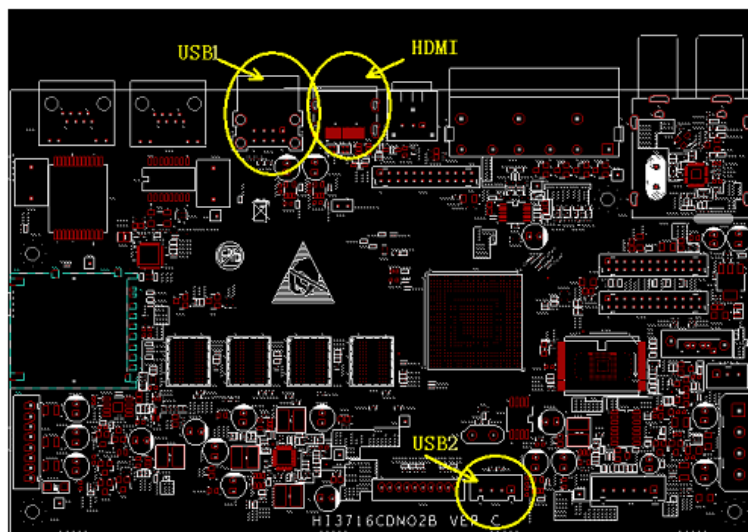


FIG 20 HDMI and USB interference

13.8.2 The main chip interferes with DDR

Because the main chips operate at about 800MHz or DDR2 operate at 667MHz, 3x frequency of 800MHz and 4x frequency of 667MHz are near 2.4GHz band. It must to place Wi-Fi modules and antennas far away from the main chip and DDR. It is strongly recommended that the main chip be isolated from the DDR by a shield. As shown in the figure below.

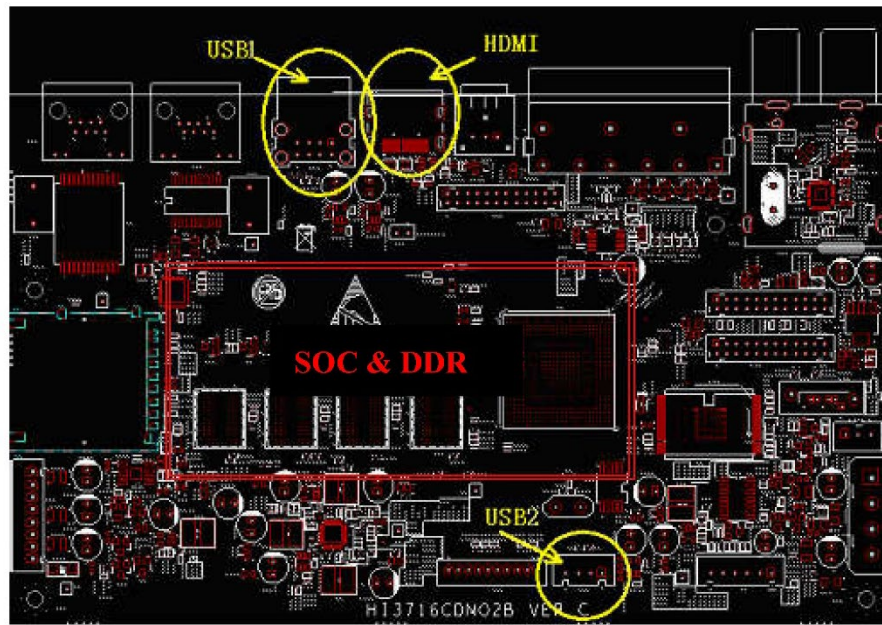


FIG 21 Main chip and DDR interference

13.9 Recommended secondary reflux temperature curve

The number of reflux shall not exceed 2 times, and the tin feeding height of the half hole of the module shall be no less than 1/4.

The lead-free reflux curve requirements of Wi-Fi module products are shown in FIG 22:

Stage	Note	Pb-free assembly
Average ramp-up rate	T_L to T_p	3 °C / second max.
Preheat	Temperature min (T_{smin})	150°C
	Temperature max (T_{smax})	200°C
	Time (t_{smin} to t_{smax})	60 – 120 seconds
Time maintained above	Temperature(T_L)	217°C
	Time (t_L)	60 – 150 seconds
Peak package body temperature (T_p)		T_p must not exceed the specified classification temp($T_c=245$ °C).
Time(t_p) within 5°C of the specified classification temperature (T_c)		30 seconds
Ramp-down rate (T_p to T_L)		6 °C / seconds max.
Time 25°C to peak temperature		8 minutes max.

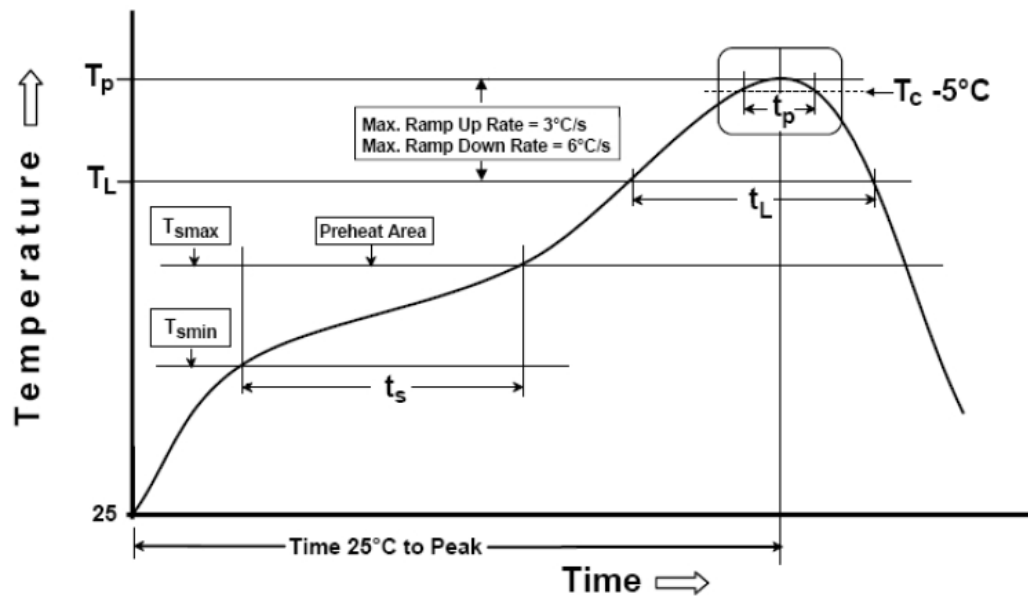


FIG 22 Furnace temperature curve

NOTE:

- 1.The maximum furnace temperature of the module is 260°C, don't exceed this temperature.
- 2.The gold plating thickness of the module pad is 2u".

14 Revision History

Revision	Release Date	Summary	Revised By
V1.0	2024-07-19	First release	Jisheng Wang
V1.1	2024-08-21	Update module photos	Jisheng Wang

15 Certification

FCC ID:2AMM6EWN-8852BSN3DB&IC:26313-8852BSN3DB

Model/HVIN:EWN-8852BSN3DB

Product Name:WiFi & BT combo module