



Product Specifications

IEEE802.11a/b/g/n/ac/ax 1T1R 2.4G/5G Dual
with Integrated Bluetooth 2.1+EDR/3.0/4.x/5.3/5.4

Project Name	WD_8800D80_V30
Main model	WD_8800D80_V30
Version number	V30
Customer's Part NO	
Customer	

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Contents

1. Introduction	3
1.1 Overview	3
1.2 Product Features	4
1.3 Applications	4
2. GENERAL SPECIFICATION	5
2.1 WiFi RF Specifications	5
2.2 BT RF Specifications	7
2.3 Operating Conditions	8
3. Mechanical Specification	9
3.1 Outline Drawing (Unit: $\pm 0.3\text{mm}$)	9
3.2 PIN Assignment	10
3.3 WIFI RF Circuit reference pictures	11
4. Environmental Requirements	13
4.1 Operating& Storage Conditions	13
4.2 Recommended Reflow Profile	13
4.3 Patch WIFI modules installed before the notice:	13
5. PACKING INFORMATION	14
5.1 Blister packaging	18



1. Introduction

1.1 Overview

The WD_8800D80_V30 is a highly-integrated IEEE 802.11 a/b/g/n/ac/ax MAC/Baseband/Rf WLAN and Bluetooth/Rf single chip. For Wireless LAN (WLAN) operation, it supports 1-stream 802.11ac solution with Multi-user MIMO (Multiple-Input, Multiple-Output) STA mode with SDIO3.0 network interface controller. For Bluetooth operation, it supports Bluetooth 5.4 with UART interface controller.

The WD_8800D80_V30 baseband implements multiuser Multiple-Input Multiple-Output (MIMO) Orthogonal Frequency Division Multiplexing (OFDM) STA mode with one transmit and one receive path (1T1R). Features include one spatial stream transmission. Short Guard Interval (GI) of 400ns, spatial spreading, and support for variant channel bandwidths. Moreover, WD_8800D80_V30 provides one spatial stream Space-Time Block Code (STBC) and Low Density Parity Check (LDPC) to extend the range of transmission. As the recipient, the WD_8800D80_V30 also supports explicit sounding packet feedback that helps senders with beamforming capability.

The WD_8800D80_V30 builds in an enhanced signal detector, an adaptive frequency domain equalizer, and a soft-decision Viterbi decoder to alleviate severe multi-path effects and mutual interference in the reception of multiple streams. Robust interference detection and suppression are provided to protect against Bluetooth, cordless phone, and microwave oven interference.

Receive vector diversity for multi-stream application is implemented for efficient utilization of the MIMO channel. Efficient IQ-imbalance, DC offset, phase noise, frequency offset, and timing offset compensations are provided for the radio frequency front-end.

The WD_8800D80_V30 supports fast receiver Automatic Gain Control (AGC) with synchronous and asynchronous control loops among antennas, antenna diversity functions, and adaptive transmit power control functions to obtain better performance in the analog portions of the transceiver.

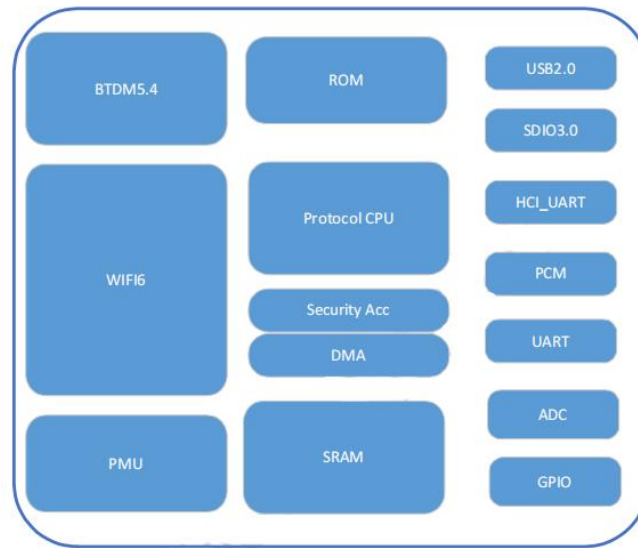


Figure1 AIC8800D80 Block Diagram

1.2 Product Features

- CMOS single-chip fully-integrated RF, Modemand MAC
- Support 2.4GHz/5GHz Wi-Fi6
- Data rates up to 286.8Mbps with 20/40MHz bandwidth
- Support 5MHz/10MHz mode
- RX sensitivity -97dBmin 11b 1M mode
- Tx power up to 23dBm in 11b mode, 18dBm in HT/VHT/HE MCS7 mode
- Support STA, AP, Wi-Fi Direct modes concurrently
- Support STBC, beamforming
- Support Wi-Fi6 TWT
- Support Two NAV, Buffer Report, Spatial reuse, Multi-BSSID, intra-PPDU power save
- Support LDPC
- Support MU-MIMO, OFDMA
- Support DCM, Mid-amble, UORA
- Support WEP/WPA/WPA2/WPA3-SAE Personal, MFP

1.3 Applications

- NOTE-BOOK
- TV
- Tablet PC
- Set-Top box



2. GENERAL SPECIFICATION

2.1 WiFi RF Specifications

Features	Descriptions
Main Chip	AIC8800D40
Frequency Range	2400 ~ 2483.5MHz / 5150 MHz ~ 5850MHZ
Host Interface	WiFi:SDIO BT:UART
Standards	WiFi: IEEE 802.11a/b/g/n/ac/ax
Modulation	WiFi: 2.4G: 802.11b: DBPSK/DQPSK/CCK/DSSS 802.11g/n: OFDM/BPSK/QPSK/16-QAM/64-QAM 802.11ax: OFDMA/BPSK/QPSK/16-QAM/64-QAM/256-QAM/1024-QAM 5G: 802.11a/n: OFDM/BPSK/QPSK/16-QAM/64-QAM 802.11ac: OFDM/BPSK/QPSK/16-QAM/64-QAM/256-QAM 802.11ax: OFDMA/BPSK/QPSK/16-QAM/64-QAM/256-QAM/1024-QAM
Transmit Output Power (Tolerance: ± 2.0 dBm)	WiFi: 802.11b@11Mbps 16dBm 802.11g@54Mbps 16dBm 802.11n@ MCS 7 /2.4G 15dBm 802.11ax@ MCS 11 /2.4G 17dBm 802.11a@ 54Mbps /5.8G 11dBm 802.11n@ MCS 7 /5.8G 11dBm 802.11ac@ MCS9 /5.8G 11dBm 802.11ax@ MCS11 /5.8G 11dBm
EVM	802.11b /11Mbps : EVM ≤ -9 dB 802.11a /g 54Mbps : EVM ≤ -25 dB



	802.11n /MCS7 : $EVM \leq -28dB(2.4G/5.8G)$ 802.11ac /MCS9 : $EVM \leq -32dB(5.8G)$ 802.11ax /MCS11 : $EVM \leq -35dB(2.4G/5.8G)$		
Receiver Sensitivity 2.4G	802.11b@8% PER Receive maximum level ≥ -10 11Mbps $\leq -86dBm$		
	802.11g@10% PER Receive maximum level ≥ -20 54Mbps $\leq -74dBm$		
	802.11n@10% PER Receive maximum level ≥ -20 MCS7_HT20 $\leq -72dBm$ MCS7_HT40 $\leq -70dBm$		
	802.11ax@10% PER Receive maximum level ≥ -20 MCS11_HT20 $\leq -64dBm$ MCS11_HT40 $\leq -59dBm$		
Receiver Sensitivity 5.8G	802.11a@10% PER Receive maximum level ≥ -30 54Mbps $\leq -71dBm$		
	802.11n@10% PER Receive maximum level ≥ -30 MCS7_HT20 $\leq -69dBm$ MCS7_HT40 $\leq -67dBm$		
	802.11ac@10% PER Receive maximum level ≥ -30 MCS8_HT20 $\leq -64dBm$ MCS9_HT40 $\leq -61dBm$		
	802.11ax@10% PER Receive maximum level ≥ -30 MCS11_HT20 $\leq -59dBm$ MCS11_HT40 $\leq -54dBm$		
Operating Channel	WiFi 2.4GHz: 11: (Ch. 1-11) - United States(North America) 13: (Ch. 1-13) - Europe 14: (Ch. 1-14) - Japan		
	WiFi 5.8GHz:		
	Band range	Operating Channel Numbers	Channel center frequencies(MHz)
	5150MHz~5250MHz	36	5180
		40	5200
		44	5220
		48	5240
	5250MHz~5350MHz	52	5260
		56	5280
		60	5300
		64	5320
	5470MHz~5725MHz	100	5500



		104	5520
		108	5540
		112	5560
		116	5580
		120	5600
		124	5620
		128	5640
		132	5660
		136	5680
		140	5700
	5725MHz~5850MHz	149	5745
		153	5765
		157	5785
		161	5805
		165	5825
Media Access Control	WiFi: CSMA/CA with ACK		
Network Architecture	WiFi: Ad-hoc mode (Peer-to-Peer) Infrastructure mode Software AP WiFi Direct		
Security	WiFi: WEP, TKIP, AES, WPA, WPA2, WPA3		
Antenna	External		
OS Supported	Android / Linux		
Dimension	Typical L12.0 mm *W12.0mm *H1.75mm (+/-0.3mm)		

2.2 BT RF Specifications

Feature	Description		
Bluetooth Standard	Bluetooth5.4		
Modulation	BT:GFSK; $\pi/4$ -DQPSK; 8-DPSK		
Frequency Band	2.400~2.483.5GHz		
Channel numbers	79 (0~78)		
	Min	Typical	Max
Output Power	0dBm	3.6dBm	10dBm
Sensitivity @ BER=0.1% for GFSK (1Mbps)		-88dBm	
Sensitivity @ BER=0.01%		-88dBm	



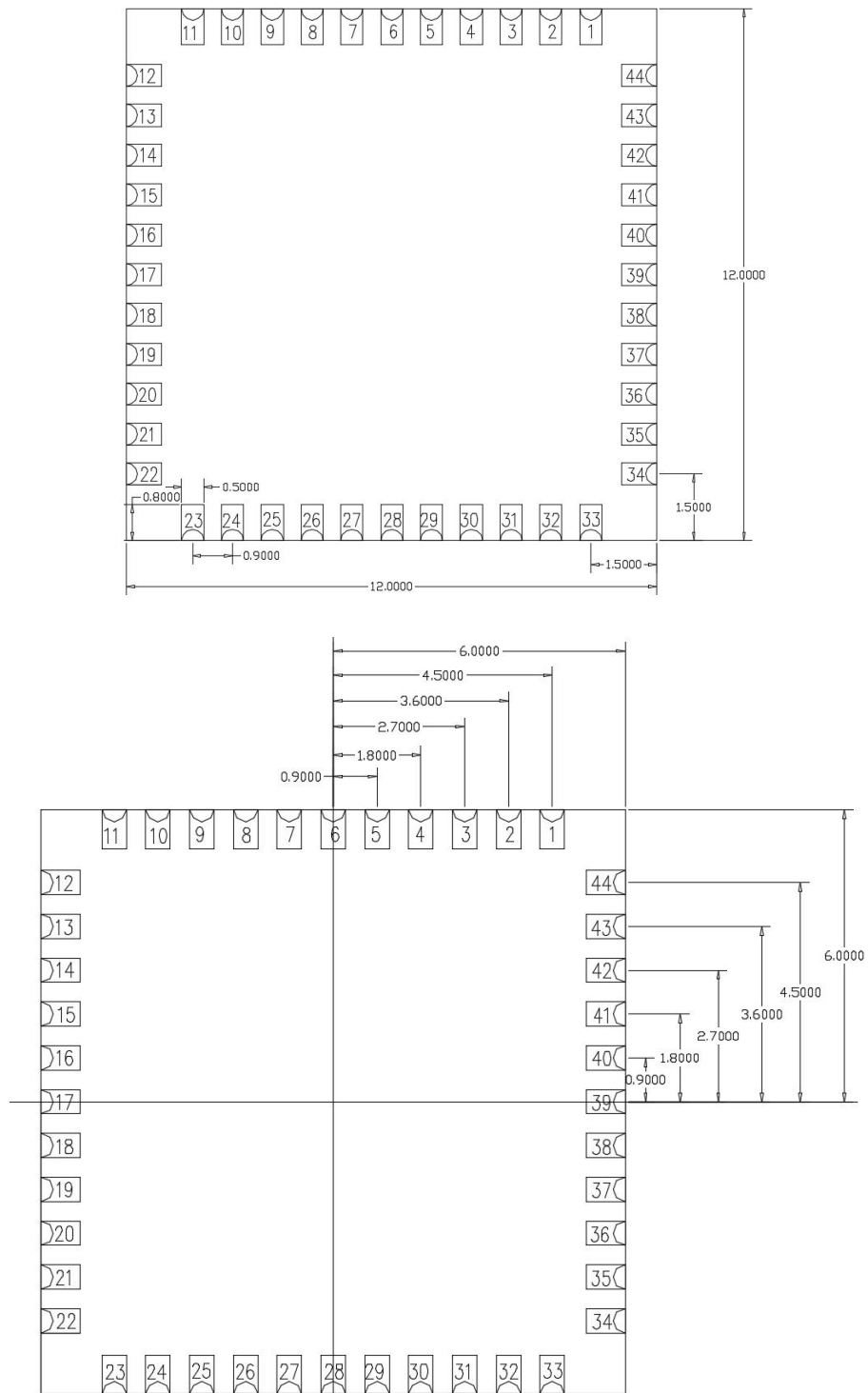
for $\pi/4$ -DQPSK (2Mbps)			
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)		-81dBm	

2.3 Operating Conditions

Parameter	Min.	Typ.	Max.	Unit
Operating Temperature	-20	-	+80	°C
Operating Humidity	10	-	90	%
VCC33	3.15	3.3	3.45	V
External power supply current design	$\geq 1000\text{mA}$			

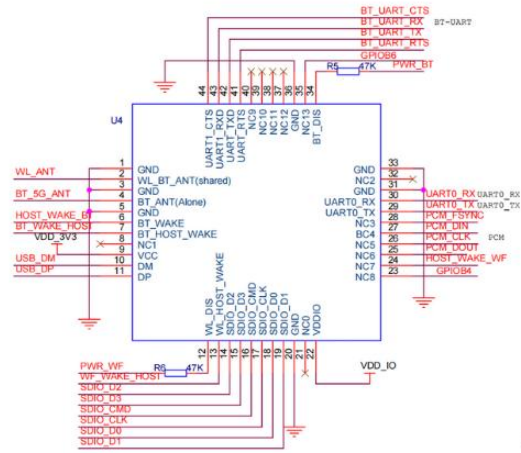
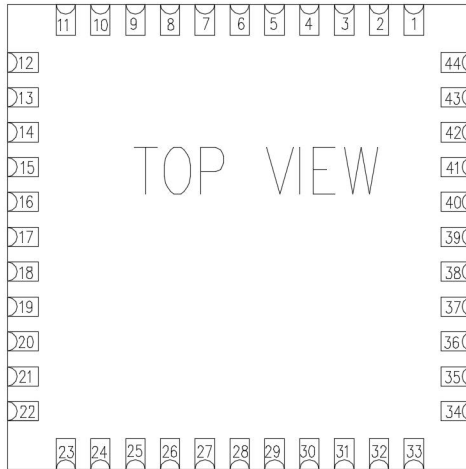
3. Mechanical Specification

3.1 Outline Drawing (Unit: $\pm 0.3\text{mm}$)



PCB Layout

3.2 PIN Assignment

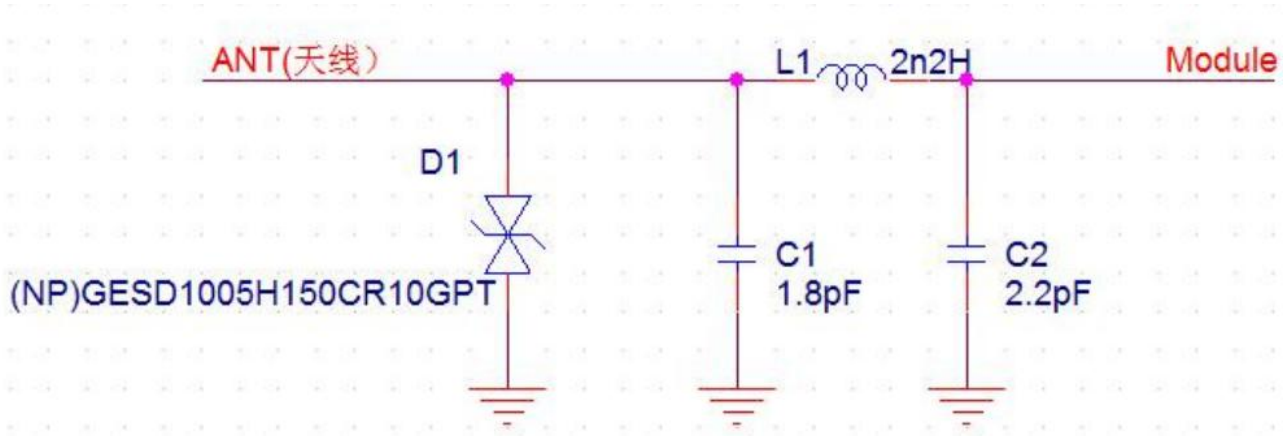


Pin #	Name	Description
1	GND	Ground connections
2	WL_ANT	2.4/5G WIFI ANT
3	GND	Ground connections
4	BT_5G_ANT	NC
5	GND	Ground connections
6	HOST_WAKE_BT	HOST wake-up Bluetooth device
7	BT_WAKE_HOST	Bluetooth wake-up HOST device
8	NC	NC
9	VDD_3V3	3.3V INPUT
10	USB_DM	USB Data Minus
11	USB_DP	USB Data Positive
12	PWR_WF	WiFi system enable
13	WF_WAKE_HOST	GPIOB1
14	SDIO_D2	GPIOA15
15	SDIO_D3	GPIOA14
16	SDIO_CMD	GPIOA13
17	SDIO_CLK	GPIOA12
18	SDIO_D0	GPIOA11
19	SDIO_D1	GPIOA10
20	GND	Ground connections



21	NC	NC
22	VDD_IO	IO Power Supply, Support 1.8v/3.3v
23	GPIOB4	GPIOB4
24	HOST_WAKE_WF	GPIOB0
25	PCM_DOUT	GPIOA3
26	PCM_CLK	GPIOA1
27	PCM_DIN	GPIOA2
28	PCM_FSYNC	GPIOA0
29	UART0_TX	The send channel in the UART0 interface
30	UART0_RX	The receive channel in the UART0 interface
31	GND	Ground connections
32	NC	NC
33	GND	Ground connections
34	PWR_BT	BT system enable
35	GPIOB6	GPIOB6
36	GND	Ground connections
37	NC	NC
38	NC	NC
39	NC	NC
40	NC	NC
41	BT_UART_RTS	GPIOA7
42	BT_UART_TX	GPIOA5
43	BT_UART_RX	GPIOA4
44	BT_UART_CTS	GPIOA6

3.3 WIFI RF Circuit reference pictures



NOTE: Antenna design requirements

1. RF-line need 50Ω single line impedance;
2. Layout is arc line or straight line;
3. Parameter need adjustment according to different antenna;
4. Please antenna close to the WIFI module, its farthest distance can not exceed 20 mm.

Note: Please be sure to add a TVS tube at the end of the welding antenna to prevent ESD static damage to the WIFI module (as shown in the above reference circuit).

4. Environmental Requirements

4.1 Operating& Storage Conditions

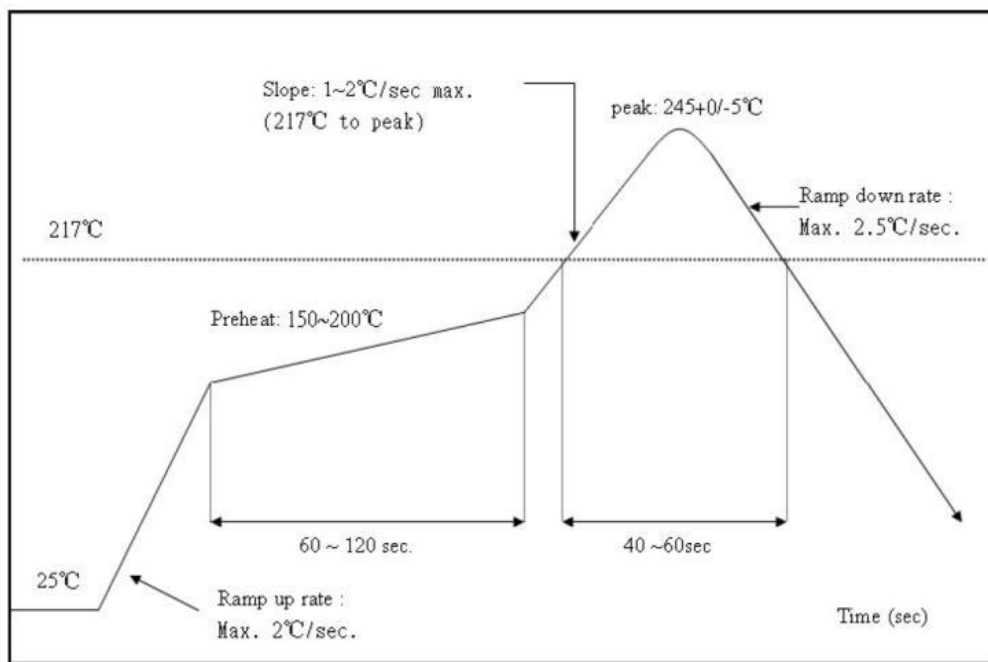
Operating	Temperature: -20°C to +80°C
	Relative Humidity: 10-85% (non-condensing)
Storage	Temperature: -55°C to +125°C (non-operating)
	Relative Humidity: 5-90% (non-condensing)

4.2 Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <250°C

Number of Times : ≤2 times



4.3 Patch WIFI modules installed before the notice:

WIFI module installed note:

1. Please press 1 : 1 and then expand outward proportion to 0.7 mm, 0.12 mm thickness When open a stencil



2. Take and use the WIFI module, please insure the electrostatic protective measures.
3. Reflow soldering temperature should be according to the customer the main size of the products, such as the temperature set at $250 + 5\text{ }^{\circ}\text{C}$ for the MID motherboard.

About the module packaging, storage and use of matters needing attention are as follows:

1. The module of the reel and storage life of vacuum packing: 1). Shelf life: 8 months, storage environment conditions: temperature in: $< 40\text{ }^{\circ}\text{C}$, relative humidity: $< 90\%$ r.h.
2. The module vacuum packing once opened, time limit of the assembly:
Card: 1) check the humidity display value should be less than 30% (in blue), such as: 30% ~ 40% (pink), or greater than 40% (red) the module have been moisture absorption.
2) factory environmental temperature humidity control: $\leq 30\text{ }^{\circ}\text{C}$, $\leq 60\%$ r.h..
3) Once opened, the workshop the preservation of life for 168 hours.
3. Once opened, such as when not used up within 168 hours:
1) The module must be again to remove the module moisture absorption.
2) The baking temperature: 125°C , 8 hours.
3) After baking, put the right amount of desiccant to seal package.

FCC Warning:

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01

2.2 List of applicable FCC rules

FCC Part 15.247、Part 15.407

2.3 Specific operational use conditions

This transmitter/module and its antenna(s) must not be co-located or operating in conjunction with any transmitter. This information also extends to the host manufacturer's instruction manual.

2.4 Limited module procedures

Not applicable

2.5 Trace antenna designs

It is "not applicable" as trace antenna which is not used on the module.

2.6 RF exposure considerations

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This compliance to FCC radiation exposure limits for an uncontrolled environment,



and minimum of 20cm separation between antenna and body.

The host product manufacturer would provide the above information to end users in their end-product manuals.

2.7 Antennas

Columnar Antenna

3.02dBi; 2400-2480MHz

3.03dBi; 5150-5850 MHz

2.8 Label and compliance information

The end product must carry a physical label or shall use e-labeling followed KDB784748D01 and KDB 784748 stating "Contains Transmitter Module FCC ID: 2AXHE-WD8800D80V30".

2.9 Information on test modes and additional testing requirements

For more information on testing, please contact the manufacturer.

2.10 Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is only FCC authorized for the specific rule parts (FCC Part 15.247) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed when contains digital circuitry.

2.11 Note EMI Considerations

Manufacturers are ultimately responsible for the compliance of the Host and Module, The final product must be reassessed against all the essential requirements of the FCC rule such as FCC Part 15 Subpart B before it can be placed on the US market. This includes reassessing the transmitter module for compliance with the Radio and EMF essential requirements of the FCC rules. The module must not be incorporated into any other device or system without retesting for compliance as multi-radio and combined equipment.

2.12 How to make changes

In the event that these conditions can't 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 can't



be used on the final product. In these circumstances, the integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

FCC Statements

(OEM) Integrator has to assure compliance of the entire end-product incl. the integrated RF Module. For 15 B (§15.107 and if applicable §15.109) compliance, the host manufacturer is required to show compliance with 15 while the module is installed and operating.

Furthermore the module should be transmitting and the evaluation should confirm that the module's intentional emissions (15C) are compliant (fundamental / out-of-band). Finally the integrator has to apply the appropriate equipment authorization (e.g. Verification) for the new host device per definition in §15.101.

Integrator is reminded to assure that these installation instructions will not be made available to the end-user of the final host device.

The final host device, into which this RF Module is integrated" has to be labeled with an auxiliary label stating the FCC ID of the RF Module, such as "Contains FCC ID: 2AXHE-WD8800D80V30

"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 to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment."

The Integrator will be responsible to satisfy SAR/ RF Exposure requirements, when the module



integrated into the host device.

Module statement

The single-modular transmitter is a self-contained, physically delineated, component for which compliance can be demonstrated independent of the host operating conditions, and which complies with all eight requirements of § 15.212(a)(1) as summarized below.

- 1) The radio elements have the radio frequency circuitry shielded.
- 2) The module has buffered modulation/data inputs to ensure that the device will comply with Part 15 requirements with any type of input signal.
- 3) The module contains power supply regulation on the module.
- 4) The module contains a permanently attached antenna.
- 5) The module demonstrates compliance in a stand-alone configuration.
- 6) The module is labeled with its permanently affixed FCC ID label.
- 7) The module complies with all specific rules applicable to the transmitter, including all the conditions provided in the integration instructions by the grantee.
- 8) The module complies with RF exposure requirements.

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

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

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

For USA: The frequency stability of all transmission frequencies of U-NII-1, U-NII 2A, U-NII 2C and U-NII-3 meets the requirements of 47 CFR FCC Part15.407(g), and the manufacturer declares that their transmission is maintained at Band U-NII-1, U-NII 2A, U-NII 2C and U-NII-3.

5. PACKING INFORMATION

5.1 Blister packaging

Top

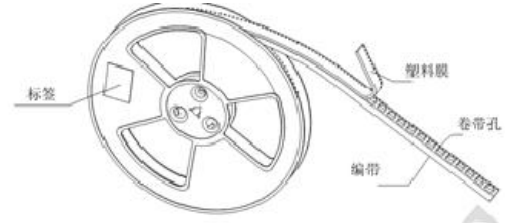
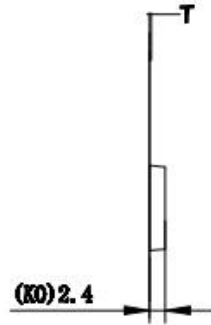
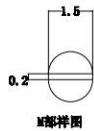
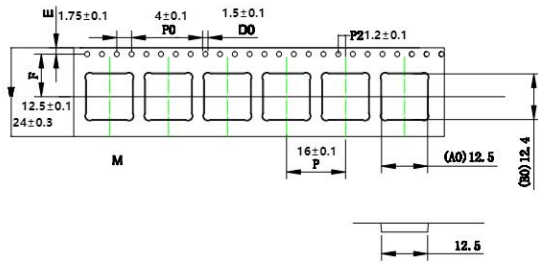


Bottom



Put the product into the load belt, one roll of load belt can put 1500PCS, one roll with an aluminum foil bag, into the humidity card, desiccant together packaging, 5 rolls for a box, a box of 7500PCS.

Humidity sensitivity class: MSL3



Tag content:

Shenzhen MiaoMing Intelligent Technology Co.,Ltd

Model:WD_8800D80_V30_V30

FCC ID: 2AXHE-WD8800D80V30

Made in China

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