

AP6212

WiFi Module
User manual

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1. General Specification

1.1 General Specification

Model Name	AP6212
Product Description	Support WiFi
Dimension	L x W x H: 12 x 12 x 1.5 (typical) mm
WiFi Interface	SDIOV2.0
Operating temperature	-30°C to 85°C
Storage temperature	-40°C to 85°C
Humidity	Operating Humidity 10% to 95% Non-Condensing

1.2 Voltage

1.2.1 Absolute Maximum Ratings

Symbol	Description	Min.	Max.	Unit
VBAT	Input supply Voltage	-0.5	5.5	V
WL_VIO_SD	Digital/SDIO/ I/O Voltage	-0.5	3.6	V

1.2.2 Absolute Maximum Ratings

Recommended Operating Rating

Symbol	Min.	Min.	Max.	Unit
Operating Temperature	-30	25	85	deg.C
VDDIO	1.7	3.3	3.6	V

2. WiFi RF Specification

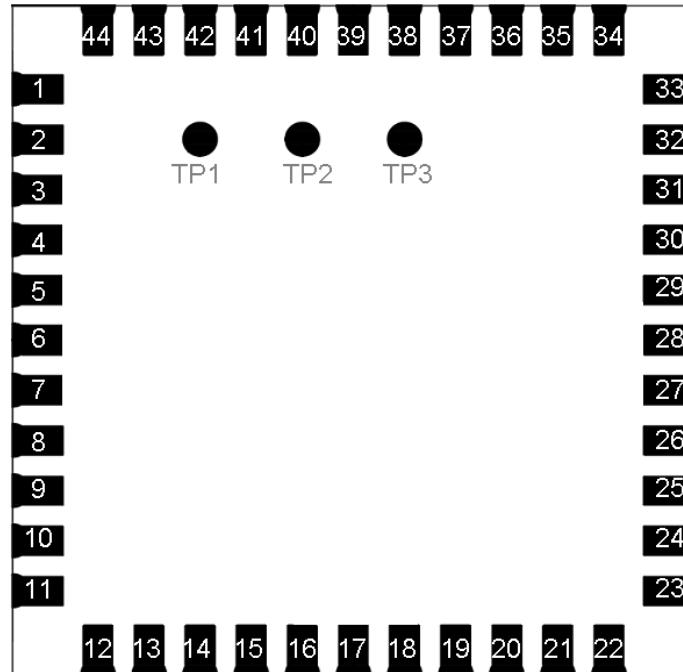
2.1 2.4GHz RF Specification

Feature	Description
WLAN Standard	IEEE 802.11b/g/n, WiFi compliant
Frequency Range	2.412 GHz ~ 2.462 GHz (2.4 GHz ISM Band)
Number of Channels	2.4GHz : 11 ch
Modulation	802.11b: QPSK, BPSK, CCK 802.11g/n: 64QAM, 16QAM, QPSK, BPSK
Output Power	802.11b / 1 Mbps: 10 dBm ± 1.5 dB @ EVM ≤ -9 dB
	802.11g / 6 Mbps: 11 dBm ± 1.5 dB @ EVM ≤ -25 dB
	802.11n / MCS0: 11 dBm ± 1.5 dB @ EVM ≤ -28dB
Receive Sensitivity (11n, 20 MHz) @10 % PER	- MCS=0 PER @ -85 dBm, typical
	- MCS=1 PER @ -84 dBm, typical
	- MCS=2 PER @ -82 dBm, typical
	- MCS=3 PER @ -80 dBm, typical
	- MCS=4 PER @ -77 dBm, typical
	- MCS=5 PER @ -73 dBm, typical
	- MCS=6 PER @ -71 dBm, typical
	- MCS=7 PER @ -68 dBm, typical
Receive Sensitivity (11g) @10 % PER	- 6 Mbps PER @ -86 dBm, typical
	- 9 Mbps PER @ -85 dBm, typical
	- 12 Mbps PER @ -85 dBm, typical
	- 18 Mbps PER @ -83 dBm, typical
	- 24 Mbps PER @ -81 dBm, typical
	- 36 Mbps PER @ -78 dBm, typical
	- 48 Mbps PER @ -73 dBm, typical
	- 54 Mbps PER @ -71 dBm, typical
Receive Sensitivity (11b) @8 % PER	- 1 Mbps PER @ -90 dBm, typical
	- 2 Mbps PER @ -88 dBm, typical
	- 5.5 Mbps PER @ -87 dBm, typical
	- 11 Mbps PER @ -84 dBm, typical
Data Rate	802.11b: 1, 2, 5.5, 11 Mbps
	802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
Data Rate (20 MHz, Long GI, 800 ns)	802.11n: 6.5, 13, 19.5, 26, 39, 52, 58.5, 65 Mbps
Data Rate (20 MHz, Short GI, 400 ns)	802.11n: 7.2, 14.4, 21.7, 28.9, 43.3, 57.8, 65, 72.2 Mbps
Maximum Input Level	802.11b: -10 dBm
	802.11g/n: -20 dBm
Antenna Reference	Dipole antenna with 5.82 dBi peak gain

3. Pin Assignments

3.1 Pin Outline

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3.2 Pin Definition

NO	Name	Type	Description
1	GND	-	Ground connections
2	WL_BT_ANT	I/O	RF I/O
3	GND	-	Ground connections
4	FM_RX	I	FM radio RF input antenna port
5	NC	-	Floating (Don't connected to ground)
6	BT_WAKE	I	HOST wake-up Bluetooth device
7	BT_HOST_WAKE	O	Bluetooth device to wake-up HOST
8	NC	-	Floating (Don't connected to ground)
9	VBAT	P	Main power voltage source input
10	XTAL_IN	I	Crystal
11	XTAL_OUT	O	Crystal
12	WL_REG_ON	I	Internal regulators power enable/disable
13	WL_HOST_WAKE	O	WLAN to wake-up HOST

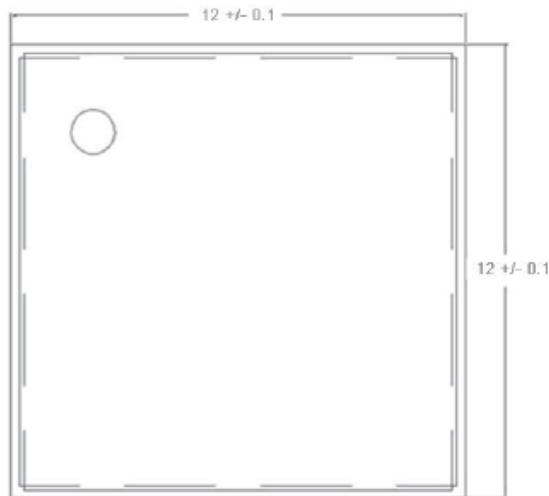
14	SDIO_DATA_2	I/O	SDIO data line
15	SDIO_DATA_3	I/O	SDIO data line
16	SDIO_DATA_CMD	I/O	SDIO command line
17	SDIO_DATA_CLK	I/O	SDIO clock
18	SDIO_DATA_0	I/O	SDIO data line
19	SDIO_DATA_1	I/O	SDIO data line
20	GND	-	Ground connections
21	VIN_LDO_OUT	P	Internal Buck voltage generation pin
22	VDDIO	P	I/O Voltage supply input
23	VIN_LDO	P	Internal Buck voltage generation pin
24	LPO	I	External Low Power Clock input (32.768KHz)
25	PCM_OUT	O	PCM Data
26	PCM_CLK	I/O	PCM
27	PCM_IN	I	PCM data
28	PCM_SYNC	I/O	PCM sync
29	NC	-	Floating (Don't connected to ground)
30	NC	-	Floating (Don't connected to ground)
31	GND	-	Ground connections
32	NC	-	Floating (Don't connected to ground)
33	GND	-	Ground connections
34	BT_RST_N	I	Low asserting reset for Bluetooth core
35	NC	-	Floating (Don't connected to ground)
36	GND	-	Ground connections
37	GPIO4	I/O	WiFi Co-existence pin with LTE
38	GPIO3	I/O	WiFi Co-existence pin with LTE
39	GPIO2	I/O	WiFi Co-existence pin with LTE
40	GPIO1	I/O	WiFi Co-existence pin with LTE
41	UART_RTS_N	O	Bluetooth/FM UART interface
42	UART_TXD	O	Bluetooth/FM UART interface
43	UART_RXD	I	Bluetooth/FM UART interface
44	UART_CTS_N	I	Bluetooth/FM UART interface
45	TP1	O	FM Analog AUDIO left output
46	TP2	O	FM Analog AUDIO right output
47	TP3 (NC)	-	Floating (Don't connected to ground)

4. Dimensions

4.1 Physical Dimensions

(Unit: mm)

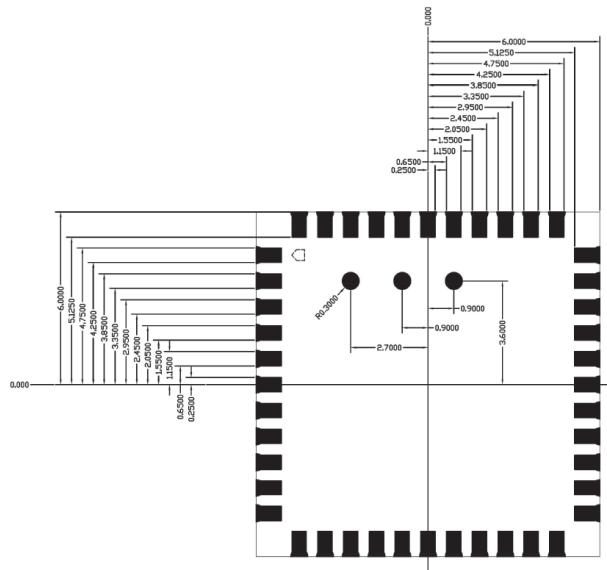
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< Side View >



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Federal Communications Commission (FCC) Statement

FCC ID: 2AFWN-AP6212

§ 15.19

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 of the device.

§ 15.105 Note:

You are cautioned that changes or modifications not expressly approved by the part responsible for compliance could void the user's authority to operate the equipment.

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.

FCC RF Radiation Exposure Statement:

This equipment should be installed and operated with minimum 20 cm between the radiator and your body. If the host device into which this device is integrated is used in close proximity to the human body (less than 20 cm), SAR assessment is required.

(WIFI) For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.

§ 15.21

Changes or modifications not expressly approved by the manufacturer (or party responsible) for compliance could void the user's authority to operate the equipment.



Innovation, Science and Economic Development (ISED) Canada Statement

IC: 22800-AP6212

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.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- 1) L'appareil ne doit pas produire de brouillage;
- 2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Radiation Exposure Statement

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

If the host device in which this device is integrated is used in close proximity to the human body (less than 20 cm), a SAR assessment is required.

Déclaration d'exposition aux radiations

Cet équipement est conforme aux limites d'exposition aux radiations de la FCC définies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps.

Si l'appareil hôte dans lequel cet appareil est intégré est utilisé à proximité immédiate du corps humain (moins de 20 cm), une évaluation du DAS est requise.



Integrators Installation Guide

- **Important Notice to OEM integrators**

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

The transmitter module may not be co-located with any other transmitter or antenna. The module shall be only used with the internal on-board antenna that has been originally tested and certified with this module.

External antennas are not supported. As long as these 2 conditions above are met, further transmitter test 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 (for example, digital device emissions, PC peripheral requirements, etc.). The end-product may need Verification testing, Declaration of Conformity testing, a Permissive Class II Change or new Certification. Please involve a FCC certification specialist in order to determine what will be exactly applicable for the end-product.

- **Must list of Applicable FCC Rule**

The modular transmitter is only FCC and ISED authorized for FCC Part 15C and ISED RSS-247. 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

- **RF Exposure Conditions**

co-location of this module with other radio transmitters will require additional assessment and possible certifications for FCC and ISED in accordance to FCC and ISED RF Exposure multi-transmitter procedures

- **Antennas**

- (1) The transmitter module may not be co-located with any other transmitter or antenna.
- (2) Only antennas of the equal or less gains as shown below may be used with this module:

Frequency Band	2.4 GHz Band
Max. Gain (dBi)	5.82 dBi

When using an antenna higher than the gain mentioned above, the product may require C2PC filing with additional tests (Radiated spurious emissions etc.) and RF exposure evaluation.

- **Label and Compliance Information**

The host system using this module, should have label in a visible area indicated the following texts:

"Contains FCC ID: 2AFWN-AP6212" & "Contains IC: 22800-AP6212".



- **Additional Testing, Part 15 Subpart B Disclaimer**

The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

- **EMI Considerations**

A host manufacture is recommended to use KDB 996369 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. For standalone mode, reference the guidance in KDB 996369 D04 Module Integration Guide and for simultaneous mode; see KDB 996369 D02 Module Q&A Question 12, which permits the host manufacturer to confirm compliance.