WD-MSOⅡ

2.4GHz/5GHz
WLAN(IEEE 802.11a/b/g/n)
Stand-alone Module

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1. Application

This specification is applied to the 2.4GHz/5GHz WLAN(802.11a/b/g/n) Stand-Alone module of BIXOLON

2. Quality

Quality should meet each condition which are mentioned on this specification. However, items which are not mentioned on this specification should follow the inspection agreements and standards which are agreed with both companies.

3. Appearance and Characteristics

3.1 Appearance

Appearance should not be contaminated by harmful materials and have cracks etc.
Mechanical dimension should meet the contents of clause 7.

3.2 Characteristics

Electrical characteristics should meet the contents of clause 12.

4. Application of 2.4GHz/5GHz WLAN(802.11a/b/g/n) Stand-Alone Module

WD-MSOⅡ is a 2.4GHz/5Ghz WLAN(802.11a/b/g/n) Stand-Alone Module for IoT(Internet of Things) such as Home electronic appliance, Room controller, Smart plug, etc. But, this module is not designed for Life Support Application.

Also it is recommended that this module should be mounted by reflow soldering.

5. Absolute Maximum Rating

		Min.	Max.	Unit
Storage Temperature		-40	+85	deg.C
Supply Voltage	VBAT_SYS		3.6	V
	VDD_PA		3.6	
	VDDIO_1,2		3.6	
	VDD_BBPLL		3.6	
	VDD_MEM		4.0	

6. Test

Electrical characteristics are tested for every product. However, if there are any objections in judgment, it should be treated with agreements of companies.

7. Mechanical Dimension

Dimension	28 mm× 18 mm × ?mm

Figure 1 and Figure 2 show the Bottom Layer(Top View) and the side dimension of WD-MSOⅡ package outline

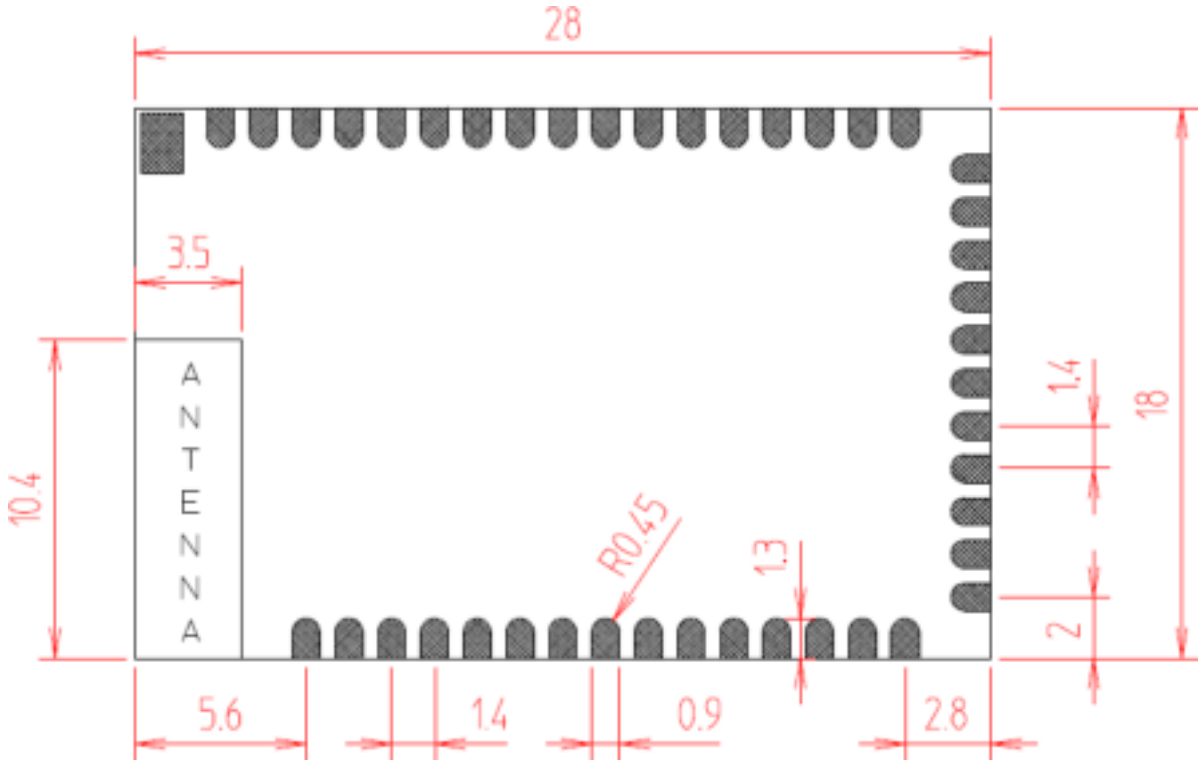


Figure 1. Package Outline (Top View)

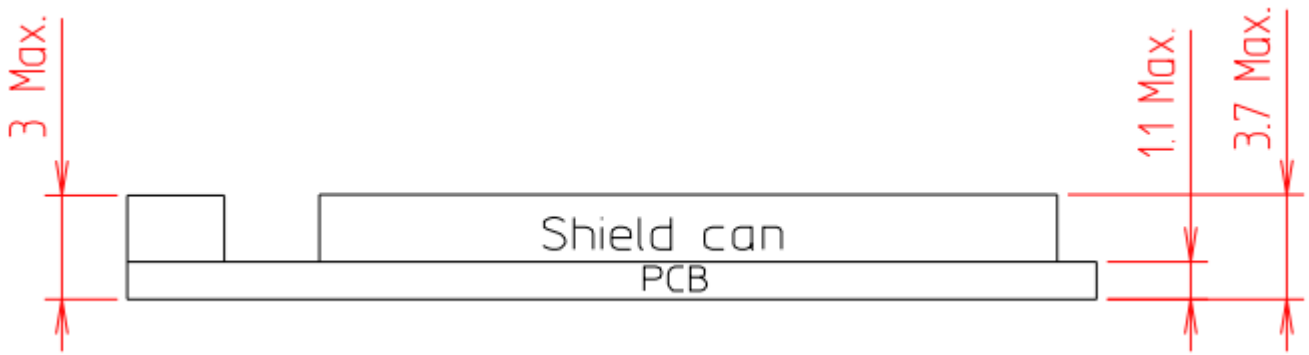


Figure 2. Package Outline (Side View)

8. General Description

WD-MSOⅡ is a compact size and low power System-in-Package (SiP) for 2.4GHz/5GHz WLAN(802.11a/b/g/n) aimed at embedded and IOT applications.

WD-MSOⅡ can be available as 3~46 pin. (28mm x 18mm x ? mm)

9. External Clock Reference

9.1 External LPO Signal Requirement

Parameters	External LPO Clock	Unit
Nominal input frequency	32.768	kHz
Frequency accuracy	±200	ppm
Input signal amplitude*	VDDIO	mVp-p
Signal type	Square-wave or sine-wave	-
Input impedance	> 100k < 5 When power is applied or power is off	Ω pF

10. Input/Output DC Terminal Characteristics

	Parameters	Conditions	Min.	Typ.	Max.	Unit
V_{IH}	High Level Input Voltage	VDDIO=3.3V	2.1			V
V_{IL}	Low Level Input Voltage	VDDIO=3.3V			0.7	V
V_{OH}	High Level Output Voltage	VDDIO=3.3V	VDDIO-0.4			V
V_{OL}	Low Level Output Voltage	VDDIO=3.3V			0.4	V

11. Electrical Characteristics

11.1 Operating Condition\

		Min.	Typ.	Max.	Unit
Operating Temperature		-30	25	+85	deg.C
Supply Voltage	VDD_SYS	3.0	3.3	3.6	V
	VDD_PA	3.0	3.3	3.6	
	VDD_BBPLL	3.0	3.3	3.6	
	VDDIO_1,2	3.0	3.3	3.6	
	VDD_MEM	3.0	3.3	3.6	

* The optimal RF performance specified in this datasheet is guaranteed for temperatures from -20℃~+70℃

11.2 2.4GHz Tx Characteristics

All measurements are made under nominal supply voltage,

(VBAT_A,B = 3.3V, VDDIO_1,2, RF=3.3V, VDD_MEM=3.3V) and room temperature (25℃)condition.

Parameters	Conditions	Spec.			
		Min.	Typ.	Max.	Unit
Frequency Range		2400	-	2500	MHz
Output Power (VBAT=3.3V, spectral mask, EVM compliance)	802. 11b, EVM = -9 dB		18.5		dBm
	OFDM , BPSK, EVM = -8 dB		17		
	OFDM, QPSK, EVM = -13 dB		16		
	OFDM, 16QAM, EVM = -19 dB		16		
	OFDM, 64QAM 3/4, EVM = -25 dB		15		
	OFDM, 64QAM 5/6, EVM = -28 dB		14		

11.3 2.4Ghz Rx Characteristics

All measurements are made under nominal supply voltage,

(VBAT_A,B = 3.3V, VDDIO_1,2, RF=3.3V, VDD_MEM=3.3V) and room temperature (25℃)condition.

Parameters	Conditions	Spec.			
		Min.	Typ.	Max.	Unit
Frequency Range		2400	-	2500	**MHz**
11b, Rx Sensitivity (8% PER for 1024 octet PSDU)	CCK, 1 Mbps		-95		dBm
	CCK, 2 Mbps		-93		
	CCK, 5.5 Mbps		-91		
	CCK, 11 Mbps		-87		
11g, Rx Sensitivity (10% PER for 1024 octet PSDU)	OFDM, 6 Mbps		-92.5		
	OFDM, 9 Mbps		-91.5		
	OFDM, 12 Mbps		-89.5		
	OFDM, 18 Mbps		-87		
	OFDM, 24 Mbps		-84		
	OFDM, 36 Mbps		-81		
	OFDM, 48 Mbps		-76.5		
	OFDM, 54 Mbps		-75		
11n, Rx Sensitivity (10% PER for 4096 octet PSDU)	HT20, MCS0		-92.5		
	HT20, MCS1		-89		
	HT20, MCS2		-86.5		
	HT20, MCS3		-83.5		
	HT20, MCS4		-81		
	HT20, MCS5		-76		
	HT20, MCS6		-74		
	HT20, MCS7		-73		
Adjacent Channel Rejection	CCK, 1 Mbps (signal; -74dBm)	35	-		dB
	CCK, 11 Mbps (signal; -70dBm)	35	-		

	OFDM, 6 Mbps (signal; -79dBm)	16	-		
	OFDM, 54 Mbps (signal; -62dBm)	-1	-		
Max Input level	11b 1M,2M		0		dBm
	11b 5.5M, 11M		0		
	11g		-10		
	11n		-10		

11.4 5GHz band Tx Characteristics

All measurements are made under nominal supply voltage,

(VBAT_A,B = 3.3V, VDDIO_1,2, RF=3.3V, VDD_MEM=3.3V, VDD_FEM=3.3V) and room temperature (25℃)condition

Parameters	Conditions	Spec.			
		Min.	Typ.	Max.	Unit
Frequency Range		4900	-	5845	MHz
Output Power (VBAT, VDD_FEM=3.3V, spectral mask, EVM compliance)	11a, OFDM, 64QAM 3/4, EVM = -25 dB		12.5		dBm
	11n, OFDM, 64QAM 5/6, EVM = -28 dB		11		

11.5 5GHz Rx Characteristics

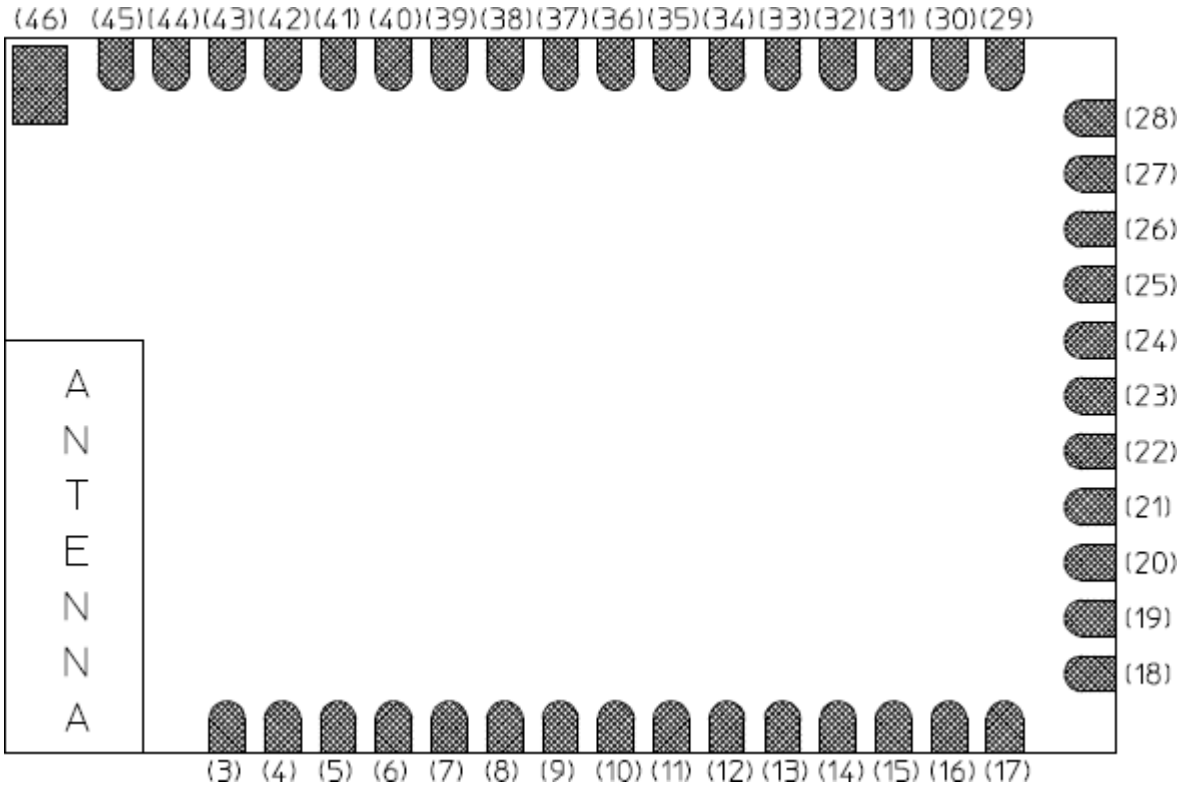
All measurements are made under nominal supply voltage,

(VBAT_A,B = 3.3V, VDDIO_1,2, RF=3.3V, VDD_MEM=3.3V, VDD_FEM=3.3V) and room temperature (25℃)condition

Parameters	Conditions	Spec.			
		Min.	Typ.	Max.	Unit
Frequency Range		4900	-	5845	**MHz**
11a, Rx Sensitivity (10% PER for 1024 octet PSDU)	OFDM, 6 Mbps		-91.5		dBm
	OFDM, 9 Mbps		-90.5		
	OFDM, 12 Mbps		-89		
	OFDM, 18 Mbps		-86		
	OFDM, 24 Mbps		-82.5		
	OFDM, 36 Mbps		-79		
	OFDM, 48 Mbps		-74.5		
	OFDM, 54 Mbps		-73		
11n, Rx Sensitivity (10% PER for 4096 octet PSDU)	HT20, MCS0		-91		
	HT20, MCS1		-88		
	HT20, MCS2		-85.5		
	HT20, MCS3		-83.5		
	HT20, MCS4		-80.5		
	HT20, MCS5		-73.5		
	HT20, MCS6		-72		
	HT20, MCS7		-71		
Adjacent Channel Rejection	11a, OFDM, 54Mbps (Signal : -62dBm)	-1			dBm
	11n, HT20, MCS7 (Signal : -61dBm)	-2			

Max Input level	11a/n		-20		dBm

12. Pin Assignment (Top View, Bottom Layer)



No.	Pin Name	No.	Pin Name	No.	Pin Name
3	GND	18	PMIC_EN	33	GP19
4	GND	19	GP03	34	GP20
5	GND	20	SD_CMD	35	NC
6	GND	21	GP02	36	GND
7	VDDIO_1	22	NC	37	NC
8	RSTN	23	CLK_SLOW	38	NC
9	GP24	24	GP01	39	GND
10	NC	25	GP00	40	SPI_CLK
11	VSYS	26	NC	41	SPI_DO
12	NC	27	NC	42	GND
13	VDD_RF	28	VDDIO_2	43	GND
14	VDD_RF	29	GND	44	NC
15	GND	30	DEBUG_RXD	45	GND
16	GND	31	DEBUG_TXD	46	GND
17	GND	32	GP05		

13.Pin Description

Pin Num.	Pin Name	Description
3	GND	Module Ground
4	GND	
5	GND	
6	GND	
7	VDDIO_1	IO Supply Voltage
8	RSTN	Reset (Active Low)
9	GP24	IR RX input / GPIO24
10	NC	Not connected
11	VSYS	INTERNAL DCDC analog supply input
12	NC	Not connected
13	VDD_RF	Wi-Fi PLL Analog Supply Voltage(3.3V DC)
14	VDD_RF	
15	GND	Module Ground
16	GND	
17	GND	
18	PMIC_EN	INTERNAL PMIC PWR EN
19	GP03	UART TX Output for UART 2 / I2S Master Clock / GPIO3
20	SD_CMD	SD CMD or SDIO SPI Mode DI or SPI DI / GPIO10
21	GP02	UART RX Input for UART2 / I2S Data Out for I2S Master / I2S Data In for I2S Slave
22	NC	Not connected
23	CLK_SLOW	Sleep Mode Clock / GPIO18
24	GP01	UART TX Output for UART 1 / I2S BCK /GPIO1
25	GP00	UART RX Input for UART 1 / I2S LRCK / GPIO 0
26	NC	Not connected
27	NC	
28	VDDIO_2	IO Supply Voltage
29	GND	Module Ground
30	DEBUG_RXD	Debug UART0 RXD / I2C Clock / GPIO8
31	DEBUG_TXD	Debug UART0 TXD / I2C Data / GPIO9
32	GP05	UART RX Input for UART1/ SPI DI / GPIO5
33	GP19	JTAG Select / GPIO 19 / PWM Out for Channel 1 / Frequency Counter Input Source
34	GP20	Test Mode: 1, Normal Mode: 0 / GPIO 20(Out Only)
35	NC	Not connected

36	GND	Module Ground
37	NC	Not connected
38	NC	
39	GND	Module Ground
40	SPI_CLK	I2S SDO1 for Master or Slave / I2S SDI1 for Master or Slave / GPIO21
41	SPI_DO	UART TX Output for UART1/ SPI DO / GPIO4
42	GND	Module Ground
43	GND	
44	NC	Not connected
45	GND	Module Ground
46	GND	

14. Block Diagram

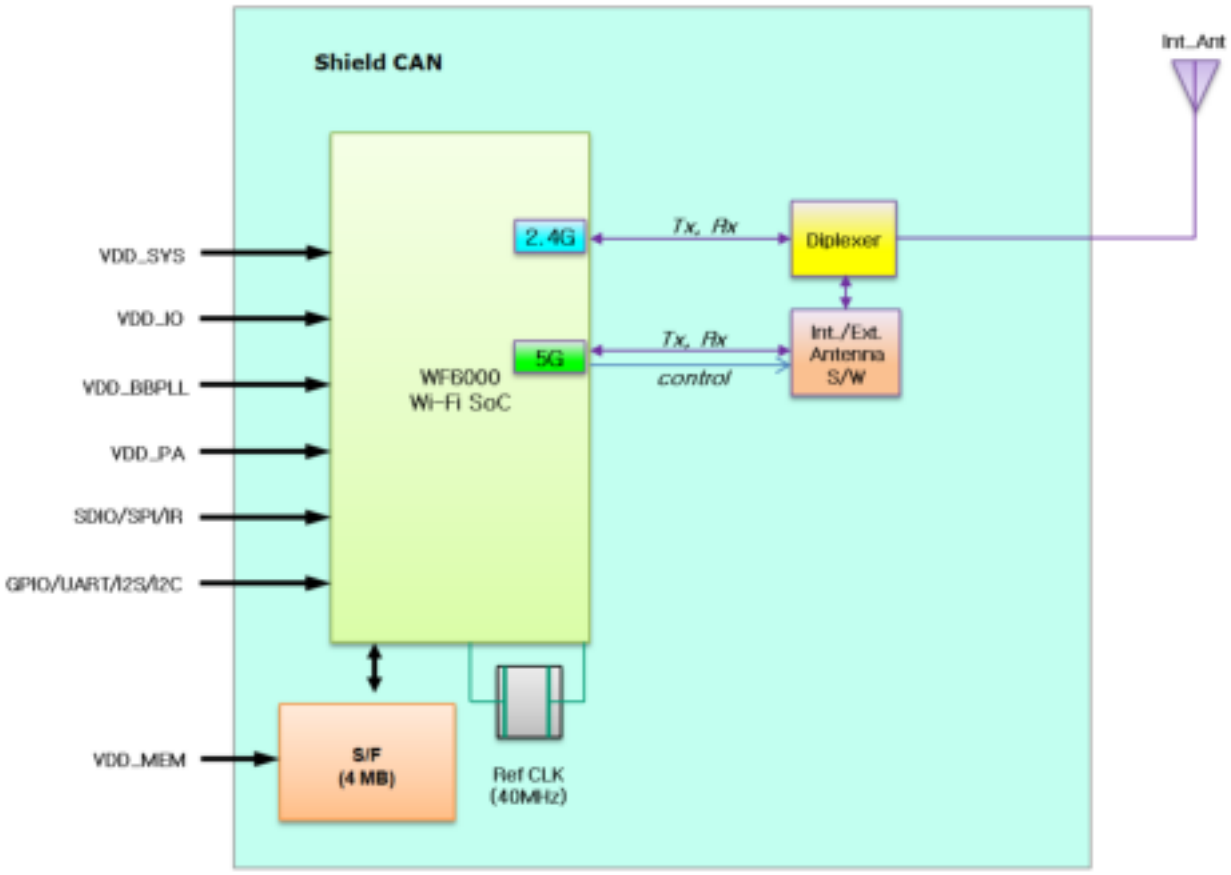
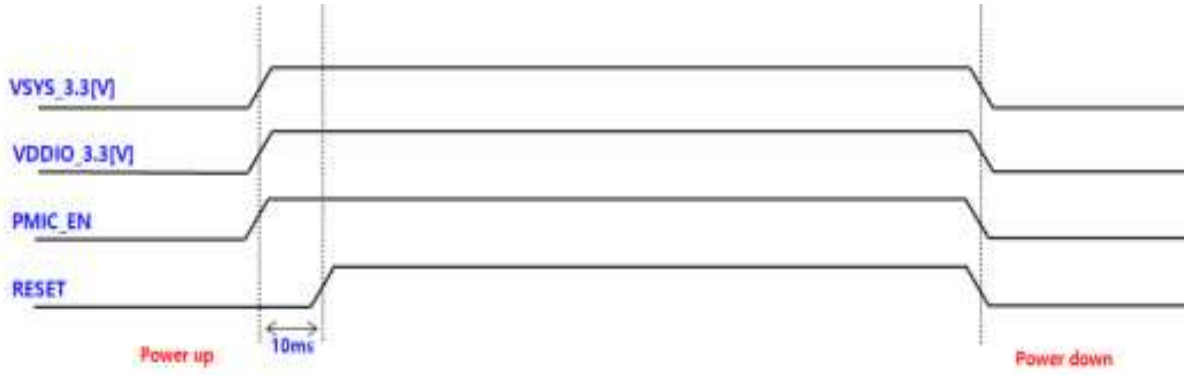


Figure 3. Block Diagram

15. Power Sequence



※ When VCC is below 3.0V, it must be reset.

16. Revision History

Ver.	Comment	Date	Author	Approver
0.1	Initial release			

Regulatory Notice

Part 15.19 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.

Part 15.21 Statement

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This device must not be co-located or operating in conjunction with any other antenna or transmitter.

Regulatory notice to host manufacturer according to KDB 996369 D03 OEM Manual

List of applicable FCC rules

This module has been granted modular approval as below listed FCC rule parts. - FCC Rule parts 15.247, 15.407

Summarize the specific operational use conditions

The OEM integrator should use equivalent antennas which is the same type and equal or less gain then an antenna listed in this instruction manual.

RF exposure considerations

The module has been certified for integration into products only by OEM integrators under the following condition:

-The antenna(s) must be installed such that a minimum separation distance of at least 20 cm is maintained between the radiator (antenna) and all persons at all times.

-The transmitter module must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product procedures.

-Mobile use

As long as the three conditions above are met, further transmitter testing will not be required. OEM integrators should provide the minimum separation distance to end users in their end-product manuals.

Antennas list

This module is certified with the following integrated antenna.

-Type: WI-FI Dual band Chip antenna

- Max. Antenna gain: 2.4 GHz: 0.27 dBi / UNII-1: 0.38 dBi / UNII-2A: 0.27 dBi / UNII-2C: 0.82 dBi / UNII-3: 1.34 dBi

Any new antenna type, higher gain than listed antenna should be met the requirements of FCC rule 15.203 and 2.1043 as permissive change procedure.

Label and compliance information

End Product Labeling

The module is labeled with its own FCC ID. If the FCC ID is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. In that case, the final end product must be labeled in a visible area with the following:

Contains FCC ID: 2AKMF-WD-MSOII

Information on test modes and additional testing requirements

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, additional transmitter in the host, etc.).

Additional testing, Part 15 Subpart B disclaimer

The final host product also requires Part 15 subpart B compliance testing with the modular transmitter installed to be properly authorized for operation as a Part 15 digital device.

Regulatory Notice (ISED)

RSS-GEN, Sec. 7.1.3–(licence-exempt radio apparatus)

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:(1) this device may not cause interference, and(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie 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, et

(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

RF Exposure

The antenna (or antennas) must be installed so as to maintain at all times a distance minimum of at least 20 cm between the radiation source (antenna) and any individual. This device may not be installed or used in conjunction with any other antenna or transmitter.

l'exposition aux RFL'antenne (ou les antennes) doit être installée de façon à maintenir à tout instant une distance minimum de au moins 20 cm entre la source de radiation (l'antenne) et toute personne physique.

End Product Labeling

The module is labeled with its own IC Certification Number. If the IC Certification Number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. In that case, the final end product must be labeled in a visible area with the following:

Contains IC: 22266-WDMSOII

É tiquetage du produit final (IC)

Le module WD-MSOII est étiqueté avec sa propre son propre numéro de certification IC. Si et le numéro de certification IC ne sont pas visibles lorsque le module est installé à l'intérieur d'un autre dispositif, la partie externe du dispositif dans lequel le module est installé devra également présenter une étiquette faisant référence au module inclus. Dans ce cas, le produit final devra être étiqueté sur une zone visible avec les informations suivantes :

Contient module émetteur IC : 22266-WDMSOII