

Product Specification

LOW-Energy Wi-Fi Single-band 802.11 b/g/n Module

Version 0.3

Product : Recon WiFi Module

Test Model : 2856610100

<i>Edition #</i>	<i>Reason for revision</i>	<i>Issue date</i>	<i>Editor</i>	<i>Reviewer</i>	<i>Approver</i>
V0.1	Generic Version	2018/07/24	Ben Chang	Alex Chang	Alex Chang
V0.2	FCC message	2018/08/09	Meg Tseng	Yuanwei	Yuanwei
V0.3	Add antenna peak gain	2018/08/29	Ben Chang	Alex Chang	Alex Chang

Preliminary information (Official release may be changed without notice)

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1. Introduction

1.1 Scope

The document is for design engineers responsible for adding a Qualcomm QCA4010 solution to white - goods to enable wireless function, and more. Sections of this document include the Wi-Fi, interfaces, microprocessor and memory unit, and specification.



TV



Notebook



White goods

***Wi-Fi module design-in suggestion**

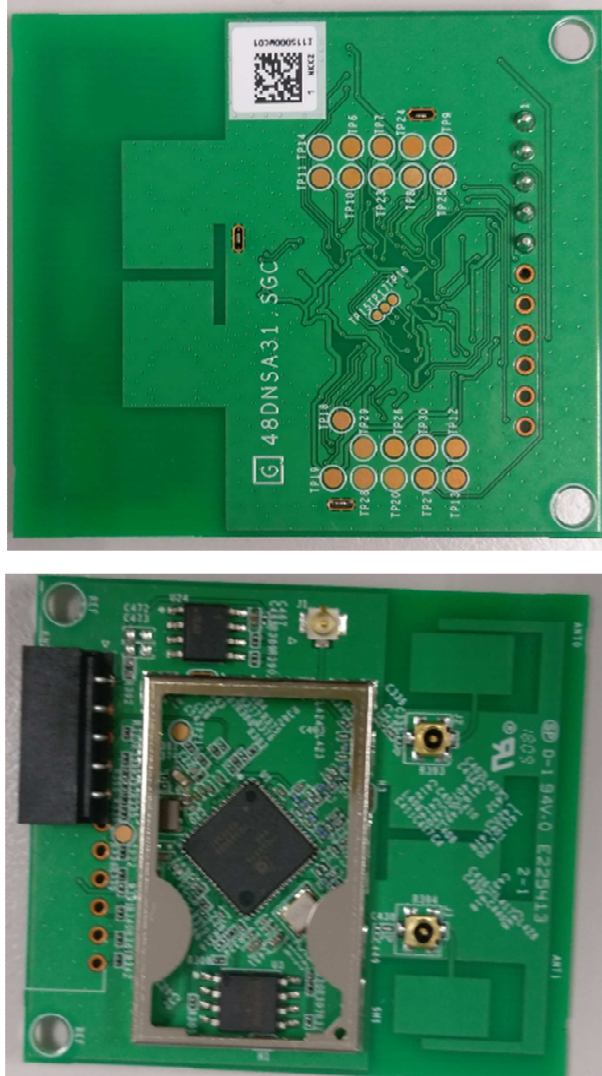
1.2 Applicable Documents

Document (or Item) Name

QCA4010 device spec Ver F 80-Y9047-3

DP25-Y9523, Full build HDK - RevB

1.3 Product Photograph (SGE)



2. Key Features

Wi-Fi Key Feature

- IEEE 802.11b/g/n compliant
- Single band 2.4GHz
- Single stream 1X1 , and support Rx diversity
- UART interface
- 32Mbit Flash
- Atmel Crypto-Authentication

3. General Specifications

- Form Factor Wi-Fi Module
- PCB Dimension 32.2mm(+/-0.2mm) x 48.4mm(+/-0.2mm) x 1.0mm(+/-0.1mm)
- PCBA Height 6.1mm(+/-0.3mm)
- Main Chipset QCA4010
- Crystal Frequency 40MHz
- Host Interface UART
- Transmitter/Receiver 1TX / 1 RX with Rx diversity
- Data Rates (kbps) Support 802.11b/g/n
- Operation Voltage DC 3.3V(Typical) +/-5%
- Operation Temperature -5°C ~ 85°C
- Storage Temperature -10°C ~ 90°C
- Operation Humidity 0% ~ 80%
- Storage Humidity Up to 85%

3.1 Power table for CE and FCC

CE power table:

Report No.	180628C20				CEDRIC
Model:	DNSA-A10				
Tester:	Wayne			Meter	E2-010285
Time:	2018/7/5		SN:C180628-002-006-004		
	Conducted Power				EIRP (Con.+Gain)
	SET	1.5dB margin	Meter AV (dBm)	AV Power(dBm)	
			CHAN 0	TOTAL	
EN 300 328					
11b					
CH01	12	10.5	11.56	11.56	17.81
CH07	12	10.5	11.68	11.68	17.93
CH13	12	10.5	11.48	11.48	17.73
11g					
CH01	13	11.5	13.06	13.06	19.31
CH07	13	11.5	12.93	12.93	19.18
CH13	13	11.5	13.09	13.09	19.34
11n 20MHz					
CH01	13	11.5	13.16	13.16	19.41
CH07	13	11.5	12.88	12.88	19.13
CH13	13	11.5	12.96	12.96	19.21
11n 40MHz					
CH03	13	11.5	13.13	13.13	19.38
CH07	13	11.5	13.00	13.00	19.25
CH11	13	11.5	13.06	13.06	19.31

FCC power table:

Report No.	180628C20					
Model:	DNSA-A10					
Tester:	Noah cahng					
Time:	2018/7/4		SN:C180628-002-006-004			
	AV Output Power				PK Output Power	
	SET	1.5dB margin	Meter AV (dBm)	AV Power(dBm)	Meter PK (dBm)	PK Power(dBm)
			CHAN 0	TOTAL	CHAN 0	TOTAL
2.4G 15.247						
11b						
CH01	14	12.5	13.21	13.21	15.55	15.55
CH06	15	13.5	14.15	14.15	16.45	16.45
CH11	16	14.5	15.42	15.42	17.82	17.82
11g						
CH01	16.5	15	16.59	16.59	22.13	22.13
CH06	23	21.5	21.87	21.87	25.45	25.45
CH11	18	16.5	17.94	17.94	23.15	23.15
11n 20MHz						
CH01	15.5	14	15.43	15.43	21.45	21.45
CH06	23	21.5	22.07	22.07	25.56	25.56
CH11	18.5	17	18.27	18.27	23.49	23.49
11n 40MHz						
CH03	14	12.5	14.49	14.49	19.55	19.55
CH06	18	16.5	18.11	18.11	22.38	22.38
CH09	17.5	16	17.83	17.83	22.18	22.18

3.1 WIFI RF specification

Item	Wi-Fi - Key Specifications																																																																																																	
Frequency Range	<table border="1"> <thead> <tr> <th colspan="6">2.4 GHz</th> </tr> <tr> <th>Channel Number</th> <th>Center Frequency</th> <th>North America (FCC)</th> <th>Europe (ETSI)</th> <th>Japan</th> <th>ROW</th> </tr> </thead> <tbody> <tr><td>1</td><td>2412</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td></tr> <tr><td>2</td><td>2417</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td></tr> <tr><td>3</td><td>2422</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td></tr> <tr><td>4</td><td>2427</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td></tr> <tr><td>5</td><td>2432</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td></tr> <tr><td>6</td><td>2437</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td></tr> <tr><td>7</td><td>2442</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td></tr> <tr><td>8</td><td>2447</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td></tr> <tr><td>9</td><td>2452</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td></tr> <tr><td>10</td><td>2457</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td></tr> <tr><td>11</td><td>2462</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td></tr> <tr><td>12</td><td>2467</td><td>No</td><td>Yes</td><td>Yes</td><td>Yes</td></tr> <tr><td>13</td><td>2472</td><td>No</td><td>Yes</td><td>Yes</td><td>Yes</td></tr> <tr><td>14</td><td>2484</td><td>No</td><td>No</td><td>802.11b only</td><td>No</td></tr> </tbody> </table>		2.4 GHz						Channel Number	Center Frequency	North America (FCC)	Europe (ETSI)	Japan	ROW	1	2412	Yes	Yes	Yes	Yes	2	2417	Yes	Yes	Yes	Yes	3	2422	Yes	Yes	Yes	Yes	4	2427	Yes	Yes	Yes	Yes	5	2432	Yes	Yes	Yes	Yes	6	2437	Yes	Yes	Yes	Yes	7	2442	Yes	Yes	Yes	Yes	8	2447	Yes	Yes	Yes	Yes	9	2452	Yes	Yes	Yes	Yes	10	2457	Yes	Yes	Yes	Yes	11	2462	Yes	Yes	Yes	Yes	12	2467	No	Yes	Yes	Yes	13	2472	No	Yes	Yes	Yes	14	2484	No	No	802.11b only	No
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Modulation	802.11 Legacy b/a/g																																																																																																	
	DSSS	DBPSK, DQPSK, CCK																																																																																																
	OFDM	BPSK, QPSK, 16-QAM, 64-QAM																																																																																																
	* DSSS(Direct Sequence Spread Spectrum) with																																																																																																	
	Note	DBPSK (Differential Binary Phase Shift Keying) 1Mbps,																																																																																																
		DQPSK (Differential Quaternary Phase Shift Keying) 2Mbps,																																																																																																
		CCK (Complementary Code Keying) 5.5Mbps and 11Mbps,																																																																																																
		OFDM (Orthogonal Frequency Division Multiplexing with																																																																																																
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> 16QAM for 24Mbps, 36Mbps																																																																																																		
> 64QAM for 48Mbps, 54Mbps																																																																																																		

Wi-Fi - Key Specifications
Transmitter Power (NSS=1, with +/- 2dB tolerance)
Hardware power limitation (not CE/FCC power table)

802.11b	Frequency (MHz)	Channel	1Mbps	2Mbps	5.5Mbps	11Mbps	
	2412	1	15	15	15	15	
	2442	7	15	15	15	15	
	2472	13	15	15	15	15	
802.11g	Frequency (MHz)	Channel	6, 9Mbps	12, 18Mbps	24, 36Mbps	48Mbps	54Mbps
	2412	1	15	15	15	15	15
	2442	7	15	15	15	15	15
	2472	13	15	15	15	15	15
802.11n (HT20)	Frequency (MHz)	Channel	MCS0,1	MCS2,3	MCS4,5	MCS6,7	
	2412	1	15	15	15	15	15
	2442	7	15	15	15	15	15
	2472	13	15	15	15	15	15
802.11n (HT40)	Frequency (MHz)	Channel	MCS0,1	MCS2,3	MCS4,5	MCS6,7	
	2422	1	15	15	15	15	15
	2442	7	15	15	15	15	15
	2462	13	15	15	15	15	15

EVM

The transmit modulation accuracy is measured using error vector magnitude (EVM).

EVM is the magnitude of the phase difference as a function of time between an ideal reference signal and the measured transmitted signal. The EVM is complying with IEEE 802.11 spec

Receiver Sensitivity (NSS=1 with +/-2dB tolerance)

802.11b	Modulation	Data Rate (Mbps)	IEEE Spec 20MHz (dBm)	Typical Spec 20MHz (dBm)	
	DBPSK	1	not specified	-93	
	DQPSK	2		-90	
	CCK	5.5		-90	
	CCK	11		-87	
802.11g	Modulation	Code Rate	IEEE Spec 20MHz (dBm)	Typical Spec 20MHz (dBm)	
	BPSK	1/2	-82	-90	
	BPSK	3/4	-81	-89	
	QPSK	1/2	-79	-88	
	QPSK	3/4	-77	-86	

	16-QAM	1/2	-74	-82	
	16-QAM	3/4	-70	-79	
	64-QAM	2/3	-66	-76	
	64-QAM	3/4	-65	-73	
802.11n (HT20)	MCS Index, Modulation	Code Rate	IEEE Spec 20MHz (dBm)	Typical Spec 20MHz (dBm)	
	MCS0, BPSK	1/2	-82	-90	
	MCS1, BPSK	1/2	-79	-87	
	MCS2, QPSK	3/4	-77	-85	
	MCS3, QPSK	1/2	-74	-85	
	MCS4, 16-QAM	3/4	-70	-77	
	MCS5, 16-QAM	2/3	-66	-73	
	MCS6, 64-QAM	3/4	-65	-72	
	MCS7, 64-QAM	5/6	-64	-70	
802.11n (HT40)	MCS Index, Modulation	Code Rate	IEEE Spec 40MHz (dBm)	Typical Spec 40MHz (dBm)	
	MCS0, BPSK	1/2	-79	-87	
	MCS1, BPSK	1/2	-76	-84	
	MCS2, QPSK	3/4	-74	-82	
	MCS3, QPSK	1/2	-71	-77	
	MCS4, 16-QAM	3/4	-67	-74	
	MCS5, 16-QAM	2/3	-63	-70	
	MCS6, 64-QAM	3/4	-62	-68	
	MCS7, 64-QAM	5/6	-61	-67	

Transmit Spectrum Mask

Ø Frequency mask is complying with IEEE 802.11 specification.

See table 3-1 Conducted Tx spectrum mask

Transmit Center Frequency Tolerance

Ø The transmitted center frequency tolerance shall be ± 20 ppm maximum.

Receiver Maximum Input Level

802.11b	Modulation	Code Rate	IEEE Spec, 20MHz, NSS1 (dBm)	
			> -10	
802.11g	Modulation	Code Rate	IEEE Spec, 20MHz, NSS1 (dBm)	
			> -20	

802.11n	Modulation	Code Rate	IEEE Spec, 20MHz, NSS1 (dBm)			
			> -20			
Transfer Data Rates						
802.11b	Modulation	Code Rate	Data Rates (Mbps)			
	DBPSK		1			
	DQPSK		2			
	CCK		5.5			
	CCK		11			
802.11a/g	Modulation	Code Rate	Data Rates (Mbps)			
	BPSK	1/2	6			
	BPSK	3/4	9			
	QPSK	1/2	12			
	QPSK	3/4	18			
	16-QAM	1/2	24			
	16-QAM	3/4	36			
	64-QAM	2/3	48			
64-QAM	3/4	54				
Bandwidth (MHz)	MCS Index, Modulation	Code Rate	Data Rates (Mbps), NSS=1		Data Rates (Mbps), NSS=2	
			800ns GI	400ns GI	800ns GI	400ns GI
40MHz	MCS7, 64-QAM	5/6	135	150	270	300

4. Pin Definition

Pin Number	Name	Configuration	Description
1	3.3V	Power	Power
2	Ground	Ground	GND
3	Interrupt	GPIO	GPIO interrupt
4	UART Tx	I/O	General purpose input/output
5	UART Rx	I/O	General purpose input/output

5. Electrical Specification

Symbol	Parameter	Minimum	Typical	Maximum	Unit
3.3V	3.3V power supply	3.15	3.3	3.45	V
T storage	Storage temperature	-5		85	°C
H storage	Storage humidity	-10		90	%RH

6. Current Consumption

Power consumption for continuous Rx (2.4GHz)

Mode\Rate (Mbps)	Current consumption (mA)
Rx 1M	127
Rx 6M	123
Rx HT20 MCS0	121
Rx HT40 MCS0	129

Power consumption for continuous Tx (2.4GHz)

Mode\Rate (Mbps)	Power (dBm)	Current consumption (mA)
Tx 1M	18	360
Tx 6M	18	371
Tx HT20 MCS0	18	363
TX HT40 MCS0	16	329

Note:

[1] 3.3V/(+/-5%) input voltage

[2] The module current variation is +/-15%

[3] Measure at 25° C.

[4] Using QCA Art2 tool to measure current consumption with continuous TX/RX by USB interface.

7. Antenna Specifications

VSWR: <2

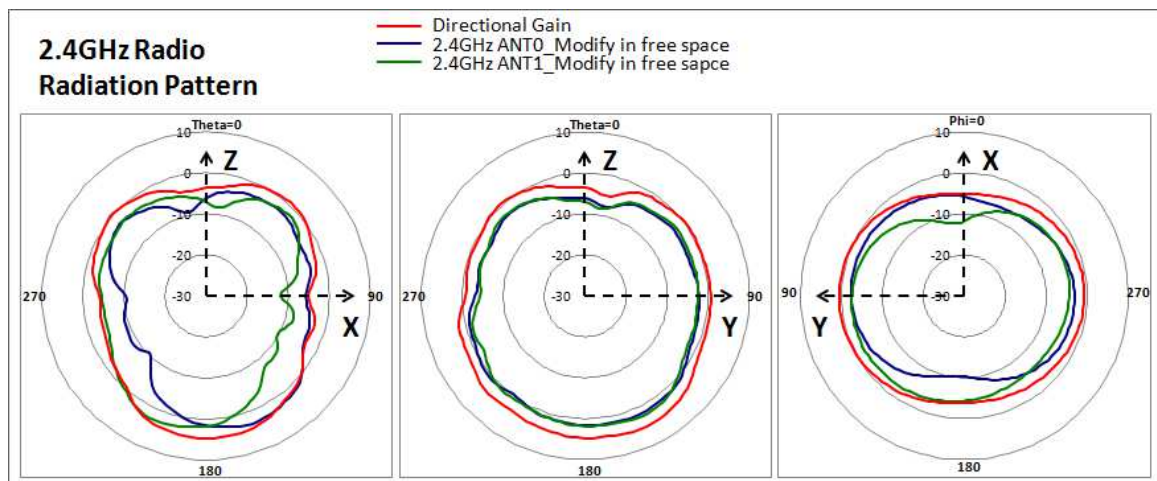
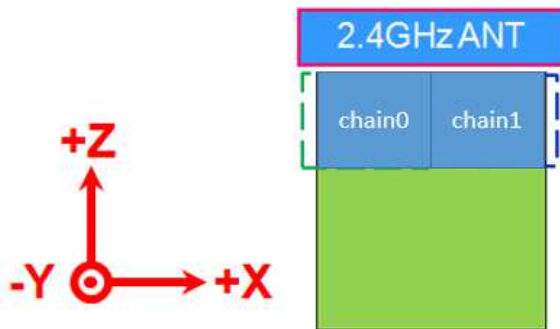
Isolation: 8.4~ 10.5dB

Efficiency: 50~60 % for both antennas

Peak gain: Chain0 is 6.25dBi ; Chain1 is 6.32dBi (embedded in platform)

#note: 3.4dBi (testing in free space)

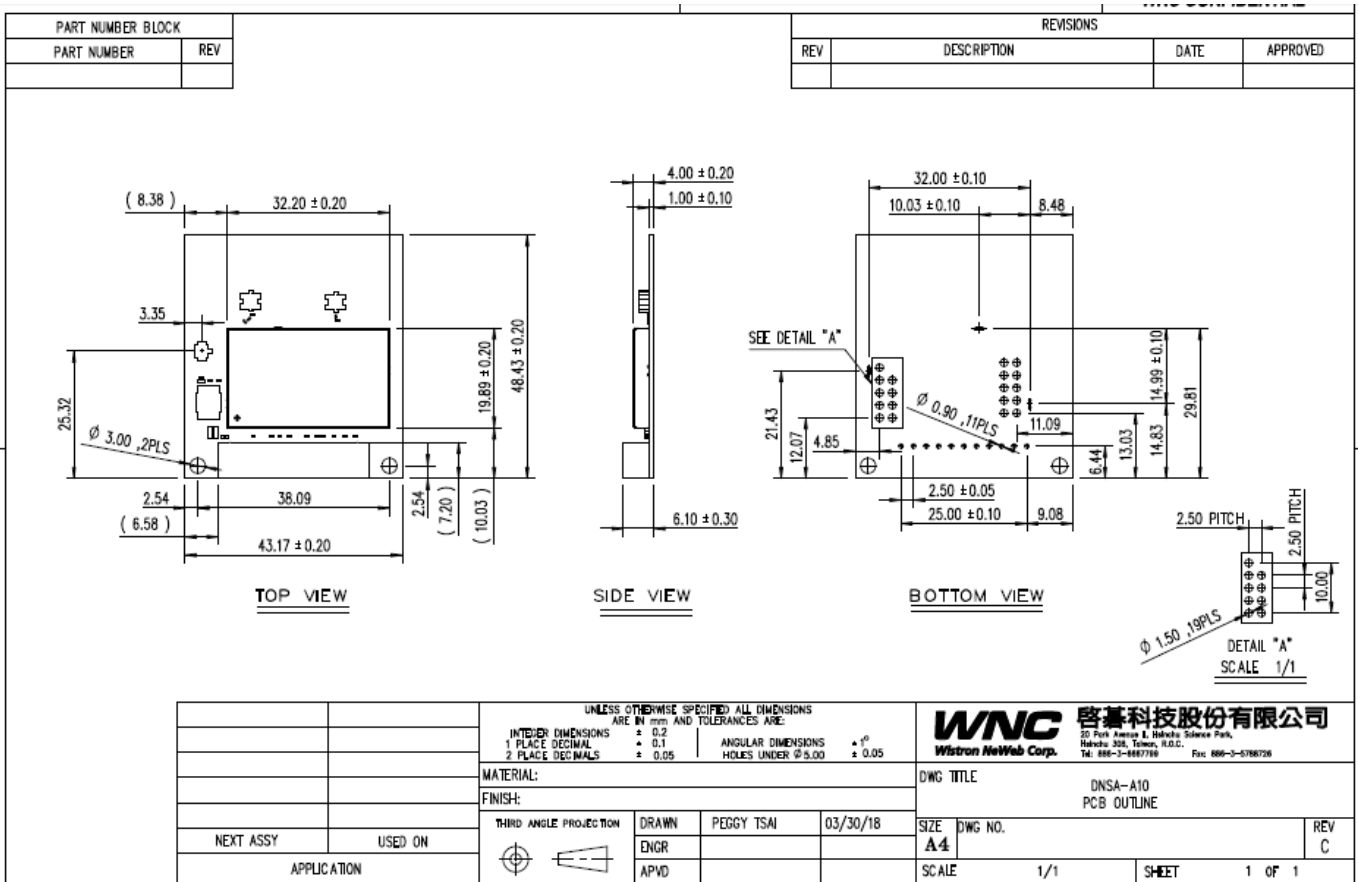
Antenna pattern:



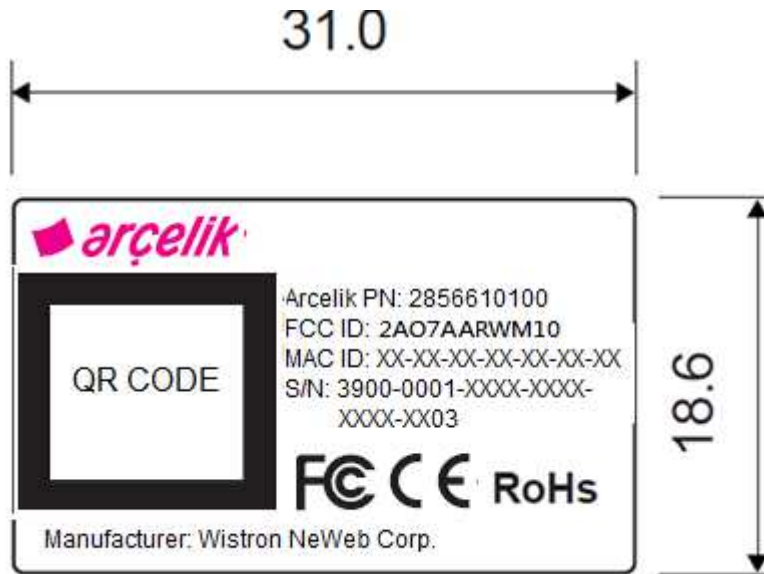
8. Interface of Connector

- Host Interface
Manufacturer: CVILUX
Part Number: CI2505P1H15-R0-NH

9. Mechanical Dimension (SGE)



10. Label information



11. Federal Communication Commission Interference 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.

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 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 Caution:

- Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.
- This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
- **The country code selection is for non-US model only and is not available to all US model. Per FCC regulation, all WiFi product marketed in US must fixed to US operation channels only. (for WLAN Devices)**

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 & your body.

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.

As long as **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

IMPORTANT NOTE: In the event that these conditions can not 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 not 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

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: “Contains FCC ID: **2A07AARWM10**”. The grantee's FCC ID can be used only when all FCC compliance requirements are met.

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.