

Report No: CCISE160901101

FCC REPORT

(BLE)

Applicant: Awear Solutions

Address of Applicant: 12 Rekanati St., Tel-Aviv, Israel 6949412

Equipment Under Test (EUT)

Product Name: Bluetooth Module

Model No.: AW-16

Trade mark: Awear

FCC ID: 2AJOV-AW16AZ

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247

Date of sample receipt: 31 Aug., 2016

Date of Test: 31 Aug., to 21 Sep., 2016

Date of report issued: 22 Sep., 2016

Test Result: PASS *

Authorized Signature:



Bruce Zhang Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

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^{*} In the configuration tested, the EUT complied with the standards specified above.





2 Version

Version No.	Date	Description
00	22 Sep., 2016	Original

Tested by:

Test Engineer

Date: 22 Sep., 2016

Reviewed by: Date: 22 Sep., 2016

Project Engineer

Telephone: +86 (0) 755 23118282 Fax: +86 (0) 755 23116366 Page 2 of 38



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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Peak Output Power	15.247 (b)(3)	Pass
6dB Emission Bandwidth	15.247 (a)(2)	Pass
Power Spectral Density	15.247 (e)	Pass
Band Edge	15.247(d)	Pass
Spurious Emission	15.205/15.209	Pass

Pass: The EUT complies with the essential requirements in the standard.



5 General Information

5.1 Client Information

Applicant:	Awear Solutions
Address of Applicant:	12 Rekanati St., Tel-Aviv, Israel 6949412
Manufacturer	Shenzhen RF-star Technology Co., Ltd
Address of Manufacturer:	2F, Block 8, A Zone, Internet Industry Base, Baoyuan Road, Bao'an District, Shenzhen 518100, P.R.China

5.2 General Description of E.U.T.

Product Name:	Bluetooth Module
Model No.:	AW-16
Operation Frequency:	2402-2480 MHz
Channel numbers:	40
Channel separation:	2 MHz
Modulation technology:	GFSK
Data speed :	1Mbps
Antenna Type:	Internal Antenna
Antenna gain:	0 dBi
Power supply:	AC 120V/60Hz



Operation	Operation Frequency each of channel						
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	10	2422MHz	20	2442MHz	30	2462MHz
1	2404MHz	11	2424MHz	21	2444MHz	31	2464MHz
2	2406MHz	12	2426MHz	22	2446MHz	32	2466MHz
3	2408MHz	13	2428MHz	23	2448MHz	33	2468MHz
4	2410MHz	14	2430MHz	24	2450MHz	34	2470MHz
5	2412MHz	15	2432MHz	25	2452MHz	35	2472MHz
6	2414MHz	16	2434MHz	26	2454MHz	36	2474MHz
7	2416MHz	17	2436MHz	27	2456MHz	37	2476MHz
8	2418MHz	18	2438MHz	28	2458MHz	38	2478MHz
9	2420MHz	19	2440MHz	29	2460MHz	39	2480MHz

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2402MHz
The middle channel	2442MHz
The Highest channel	2480MHz



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5.3 Test environment and mode

Operating Environment:					
Temperature:	24.0 °C				
Humidity:	54 % RH				
Atmospheric Pressure:	1010 mbar				
Test mode:	Test mode:				
Operation mode Keep the EUT in continuous transmitting with modulation					

The sample was placed 0.8m(below 1GHz)/1.5m(above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages. Duty cycle setting during the transmission is 100% with maximum power setting for all modulations.

5.4 Measurement Uncertainty

Items	Expanded Uncertainty (Confidence of 95%)
Conducted Emission (9kHz ~ 30MHz)	2.14 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	4.24 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	4.35 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	4.44 dB (k=2)
Radiated Emission (18GHz ~ 26.5GHz)	4.56 dB (k=2)

5.5 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

• FCC - Registration No.: 817957

Shenzhen Zhongjian Nanfang Testing Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in out files. Registration 817957, February 27, 2012.

• IC - Registration No.: 10106A-1

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

• CNAS - Registration No.: CNAS L6048

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

5.6 Laboratory Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd.

Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,

Bao'an District, Shenzhen, Guangdong, China

Tel: +86-755-23118282 Fax: +86-755-23116366

Shenzhen Zhongjian Nanfang Testing Co., Ltd.
No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road, Bao'an District, Shenzhen, Guangdong, China
Telephone: +86 (0) 755 23118282 Fax: +86 (0) 755 23116366



5.7 Test Instruments list

Rad	Radiated Emission:							
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)		
1	3m SAC	SAEMC	9(L)*6(W)* 6(H)	CCIS0001	08-23-2014	08-22-2017		
2	BiConiLog Antenna	SCHWARZBECK	VULB9163	CCIS0005	03-25-2016	03-25-2017		
3	Horn Antenna	SCHWARZBECK	BBHA9120D	CCIS0006	03-25-2016	03-25-2017		
4	Pre-amplifier (10kHz-1.3GHz)	HP	8447D	CCIS0003	04-01-2016	03-31-2017		
5	Pre-amplifier (1GHz-18GHz)	Compliance Direction Systems Inc.	PAP-1G18	CCIS0011	04-01-2016	03-31-2017		
6	Pre-amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	04-01-2016	03-31-2017		
7	Horn Antenna	ETS-LINDGREN	3160	GTS217	04-01-2016	03-31-2017		
8	Spectrum analyzer 9k-30GHz	Rohde & Schwarz	FSP30	CCIS0023	03-28-2016	03-28-2017		
9	EMI Test Receiver	Rohde & Schwarz	ESRP7	CCIS0167	03-28-2016	03-28-2017		
10	Loop antenna	Laplace instrument	RF300	EMC0701	04-01-2016	03-31-2017		
11	EMI Test Software	AUDIX	E3	N/A	N/A	N/A		

Con	Conducted Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)	
1	Shielding Room	ZhongShuo Electron	11.0(L)x4.0(W)x3.0(H)	CCIS0061	08-23-2014	08-22-2017	
2	EMI Test Receiver	Rohde & Schwarz	ESCI	CCIS0002	03-24-2016	03-24-2017	
3	LISN	CHASE	MN2050D	CCIS0074	03-26-2016	03-26-2017	
4	Coaxial Cable	CCIS	N/A	CCIS0086	04-01-2016	03-31-2017	
5	EMI Test Software	AUDIX	E3	N/A	N/A	N/A	

5.8 Description of Support Units

Manufacturer	Description	Model	S/N	FCC ID/DoC
DELL	PC	OPTIPLEX745	N/A	DoC
DELL	MONITOR	E178FPC	N/A	DoC
DELL	KEYBOARD	SK-8115	N/A	DoC
DELL	MOUSE	MOC5UO	N/A	DoC
HP	Printer	CB495A	05257893	DoC



6 Test results and Measurement Data

6.1 Antenna requirement:

Standard requirement:

FCC Part 15 C Section 15.203 /247(c)

15.203 requirement:

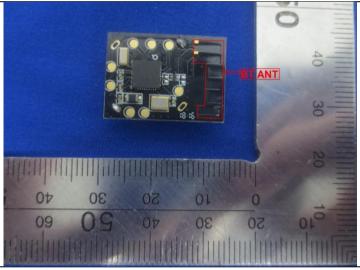
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(c) (1)(i) requirement:

(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

E.U.T Antenna:

The BLE antenna is an internal antenna which cannot replace by end-user, the best case gain of the antenna is 0 dBi.







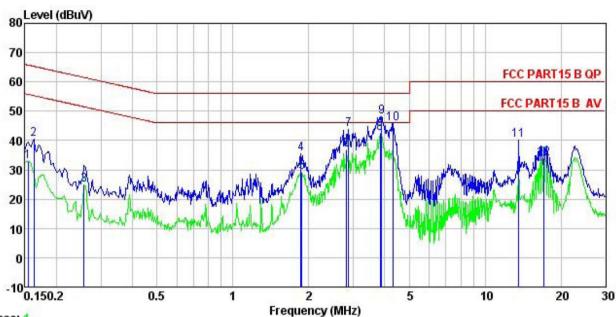
6.2 Conducted Emission

Test Requirement:	FCC Part 15 C Section 15	.207				
Test Method:	ANSI C63.4: 2014	ANSI C63.4: 2014				
Test Frequency Range:	150 kHz to 30 MHz					
Class / Severity:	Class B					
Receiver setup:	RBW=9kHz, VBW=30kHz					
Limit:	·	(dBuV)				
	Frequency range (MHz)	Quasi-peak	Average			
	0.15-0.5	66 to 56*	56 to 46*			
	0.5-5	56	46			
	5-30	60	50			
	* Decreases with the logar					
Test procedure	 The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.), which provides a 50ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed 					
Test setup:	according to ANSI C63.4: 2014 on conducted measurement. Reference Plane					
	LISN	Dom 80cm LISN E.U.T EMI Receiver	ilter — AC power			
Test Instruments:	Refer to section 5.7 for det	tails				
Test mode:	Refer to section 5.3 for det	tails				
Test results:	Passed					
-						



Measurement Data:

Neutral:



Trace: 1

Site

: CCIS Shielding Room : FCC PART15 B QP LISN NEUTRAL Condition

EUT : Bluetooth Module

: AW-16 Model Test Mode : BLE mode Power Rating : AC120/60HZ

Environment : Temp: 23 °C Huni: 56% Atmos: 101KPa

Test Engineer: steven

Remark

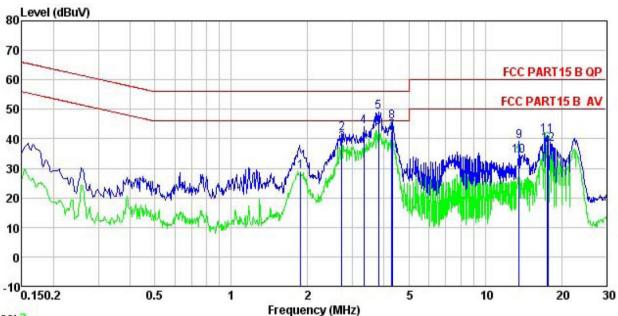
TOMALK	Freq	Read Level	LISN Factor	Cable Loss		Limit Line	Over Limit	Remark
	MHz	dBu∀	<u>dB</u>	dB	dBu₹	dBu₹	<u>dB</u>	
1	0.154	22.07	0.12	10.78	32.97	55.78	-22.81	Average
2	0.162	29.50	0.13	10.77	40.40	65.34	-24.94	QP
1 2 3 4 5 6 7 8 9	0.258	14.01	0.17	10.75	24.93	51.51	-26.58	Average
4	1.858	24.14	0.26	10.95	35.35	56.00	-20.65	QP
5	1.878	17.94	0.26	10.95	29.15	46.00	-16.85	Average
6	2.824	25.54	0.30	10.93	36.77	46.00	-9.23	Average
7	2.869	32.64	0.30	10.92	43.86	56.00	-12.14	QP
8	3.840	31.23	0.34	10.89	42.46	46.00	-3.54	Average
9	3.881	37.01	0.34	10.89	48.24	56.00	-7.76	QP
10	4.315	34.64	0.34	10.88	45.86	56.00	-10.14	QP
11	13.623	29.06	0.26	10.91	40.23	60.00	-19.77	QP
12	17.109	22.77	0.27	10.91	33.95	50.00	-16.05	Average

Notes:

- 1. An initial pre-scan was performed on the live and neutral lines with peak detector.
- 2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
- 3. Final Level = Receiver Read level + LISN Factor + Cable Loss.



Line:



Trace: 3

Site : CCIS Shielding Room Condition : FCC PART15 B QP LISN LINE

EUT : Bluetooth Module

Model : AW-16 Test Mode : BLE mode Power Rating : AC120/60HZ

Environment : Temp: 23 °C Huni:56% Atmos:101KPa

Test Engineer: steven

Remark

•	Road	TTCM	Coblo		Limit	Orrow		
Freq							Remark	
MHz	dBu∜	<u>dB</u>	<u>ab</u>	dBu₹	dBu∜	<u>ab</u>		
1.878	17.66	0.31	10.95	28.92	46.00	-17.08	Average	
2.721	30.44	0.33	10.93	41.70	56.00	-14.30	QP	
2.721	27.18	0.33	10.93	38.44	46.00	-7.56	Average	
3.328	32.78	0.33	10.91	44.02	56.00	-11.98	QP	
3.799	37.90	0.34	10.90	49.14	56.00	-6.86	QP	
3.799	32.57	0.34	10.90	43.81	46.00	-2.19	Average	
4.292	31.28	0.34	10.88	42.50	46.00	-3.50	Average	
4.315	34.73	0.34	10.88	45.95	56.00	-10.05	QP	
13.623	28.09	0.26	10.91	39.26	60.00	-20.74	QP	
13.623	23.09	0.26	10.91	34.26	50.00	-15.74	Average	
17.568	29.78	0.30	10.90	40.98	60.00	-19.02	QP	
17.661	26.83	0.30	10.90	38.03	50.00	-11.97	Average	
	MHz 1.878 2.721 2.721 3.328 3.799 3.799 4.292 4.315 13.623 13.623 17.568	MHz dBuV 1.878 17.66 2.721 30.44 2.721 27.18 3.328 32.78 3.799 37.90 3.799 32.57 4.292 31.28 4.315 34.73 13.623 28.09 13.623 23.09 17.568 29.78	MHz dBuV dB 1.878 17.66 0.31 2.721 30.44 0.33 2.721 27.18 0.33 3.328 32.78 0.33 3.799 37.90 0.34 3.799 32.57 0.34 4.292 31.28 0.34 4.315 34.73 0.34 13.623 28.09 0.26 13.623 23.09 0.26 17.568 29.78 0.30	MHz dBuV dB dB 1.878 17.66 0.31 10.95 2.721 30.44 0.33 10.93 2.721 27.18 0.33 10.93 3.328 32.78 0.33 10.91 3.799 37.90 0.34 10.90 3.799 32.57 0.34 10.90 4.292 31.28 0.34 10.88 4.315 34.73 0.34 10.88 13.623 28.09 0.26 10.91 13.623 23.09 0.26 10.91 17.568 29.78 0.30 10.90	MHz dBuV dB dB dBuV 1.878 17.66 0.31 10.95 28.92 2.721 30.44 0.33 10.93 41.70 2.721 27.18 0.33 10.93 38.44 3.328 32.78 0.33 10.91 44.02 3.799 37.90 0.34 10.90 49.14 3.799 32.57 0.34 10.90 43.81 4.292 31.28 0.34 10.88 42.50 4.315 34.73 0.34 10.88 45.95 13.623 28.09 0.26 10.91 39.26 13.623 23.09 0.26 10.91 34.26 17.568 29.78 0.30 10.90 40.98	Freq Level Factor Loss Level Line MHz dBuV dB dB dBuV dBuV 1.878 17.66 0.31 10.95 28.92 46.00 2.721 30.44 0.33 10.93 41.70 56.00 2.721 27.18 0.33 10.93 38.44 46.00 3.328 32.78 0.33 10.91 44.02 56.00 3.799 37.90 0.34 10.90 49.14 56.00 3.799 32.57 0.34 10.90 43.81 46.00 4.292 31.28 0.34 10.88 42.50 46.00 4.315 34.73 0.34 10.88 45.95 56.00 13.623 28.09 0.26 10.91 39.26 60.00 13.623 23.09 0.26 10.91 34.26 50.00 17.568 29.78 0.30 10.90 40.98 60.00	MHz dBuV dB dB dBuV dBuV dB 1.878 17.66 0.31 10.95 28.92 46.00 -17.08 2.721 30.44 0.33 10.93 41.70 56.00 -14.30 2.721 27.18 0.33 10.93 38.44 46.00 -7.56 3.328 32.78 0.33 10.91 44.02 56.00 -11.98 3.799 37.90 0.34 10.90 49.14 56.00 -6.86 3.799 32.57 0.34 10.90 49.14 56.00 -2.19 4.292 31.28 0.34 10.90 43.81 46.00 -2.19 4.315 34.73 0.34 10.88 42.50 46.00 -3.50 4.315 34.73 0.34 10.88 45.95 56.00 -10.05 13.623 28.09 0.26 10.91 39.26 60.00 -20.74 13.623 29.78 0.30	Treq Level Factor

Notes:

- 1. An initial pre-scan was performed on the live and neutral lines with peak detector.
- 2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
- 3. Final Level =Receiver Read level + LISN Factor + Cable Loss.



6.3 Conducted Output Power

Test Requirement: Test Method:	FCC Part 15 C Section 15.247 (b)(3) ANSI C63.10:2013 and KDB558074v03r05 section 9.1.1					
Limit:	30dBm					
Test setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane					
Test Instruments:	Refer to section 5.7 for details					
Test mode:	Refer to section 5.3 for details					
Test results:	Passed					

Measurement Data:

Test CH	Peak Conducted Output Power (dBm)	Limit(dBm)	Result
Lowest	-3.92		
Middle	-4.09	30.00	Pass
Highest	-4.22		

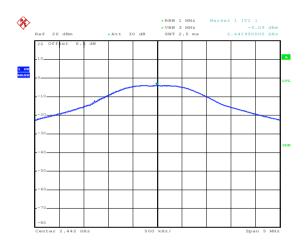


Test plot as follows:



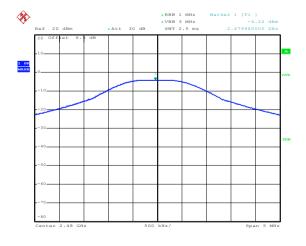
Date: 18.SEP.2016 17:30:06

Lowest channel



Date: 18.SEP.2016 17:30:38

Middle channel



Date: 18.SEP.2016 17:31:05

Highest channel



6.4 Occupy Bandwidth

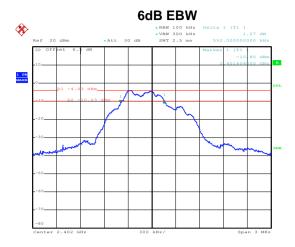
Test Requirement:	FCC Part 15 C Section 15.247 (a)(2)				
Test Method:	ANSI C63.10:2013 and KDB558074v03r05 section 8.1				
Limit:	>500kHz				
Test setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane				
Test Instruments:	Refer to section 5.7 for details				
Test mode:	Refer to section 5.3 for details				
Test results:	Passed				

Measurement Data:

Test CH	6dB Emission Bandwidth (MHz)	Limit(kHz)	Result	
Lowest	0.552			
Middle	0.564	>500	Pass	
Highest	0.564			
Test CH	99% Occupy Bandwidth (MHz)	Limit(kHz) Result		
Lowest	1.098			
Middle	1.098	N/A	N/A	
Highest	1.104			

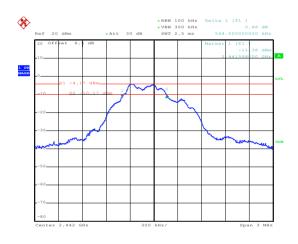


Test plot as follows:



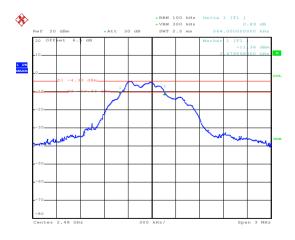
Date: 18.SEP.2016 17:34:42

Lowest channel



Date: 18.SEP.2016 17:33:53

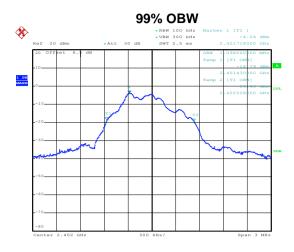
Middle channel



Date: 18.SEP.2016 17:33:07

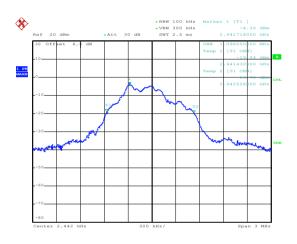
Highest channel





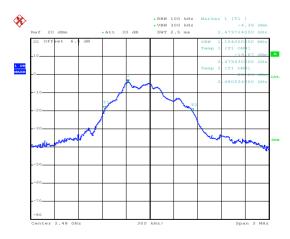
Date: 18.SEP.2016 17:35:25

Lowest channel



Date: 18.SEP.2016 17:35:45

Middle channel



Date: 18.SEP.2016 17:36:08

Highest channel



6.5 Power Spectral Density

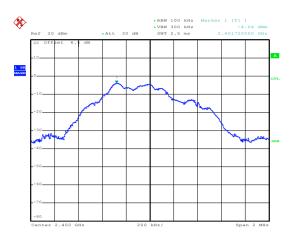
Test Requirement:	FCC Part 15 C Section 15.247 (e)				
Test Method:	ANSI C63.10:2013 and KDB558074v03r05 section 10.2				
Limit:	8 dBm				
Test setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane				
Test Instruments:	Refer to section 5.7 for details				
Test mode:	Refer to section 5.3 for details				
Test results:	Passed				

Measurement Data:

Test CH	Power Spectral Density (dBm)	Limit(dBm)	Result					
Lowest	-4.04							
Middle	-4.19	8.00	Pass					
Highest	-4.34							

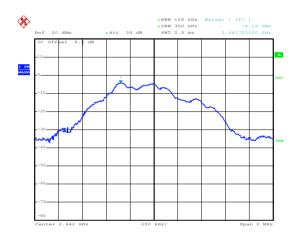


Test plots as follow:



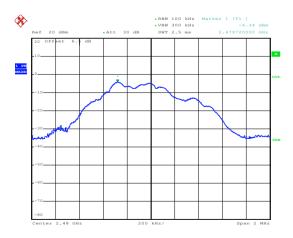
Date: 18.SEP.2016 17:37:20

Lowest channel



Date: 18.SEP.2016 17:37:02

Middle channel



Date: 18.SEP.2016 17:36:45

Highest channel

Page 19 of 38



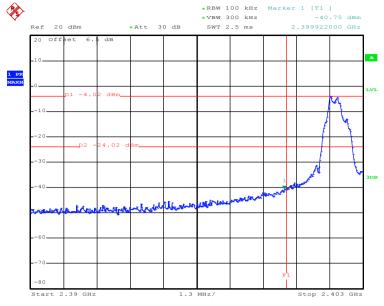
6.6 Band Edge

6.6.1 Conducted Emission Method

Test Requirement:	FCC Part 15 C Section 15.247 (d)						
Test Method:	ANSI C63.10:2013 and KDB558074v03r05 section 13						
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.						
Test setup:							
	Spectrum Analyzer						
	E.U.T						
	Non-Conducted Table						
	Non-Conducted Table						
	Ground Reference Plane						
Test Instruments:	Refer to section 5.7 for details						
Test mode:	Refer to section 5.3 for details						
Test results:	Passed						

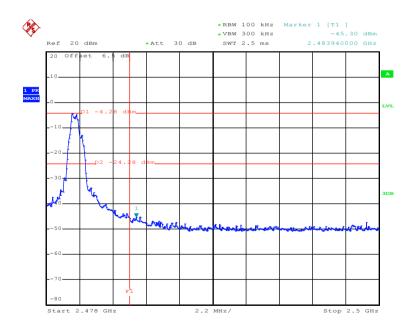


Test plots as follow:



Date: 18.SEP.2016 17:38:43

Lowest channel



Date: 18.SEP.2016 17:39:48

Highest channel



6.6.2 Radiated Emission Method

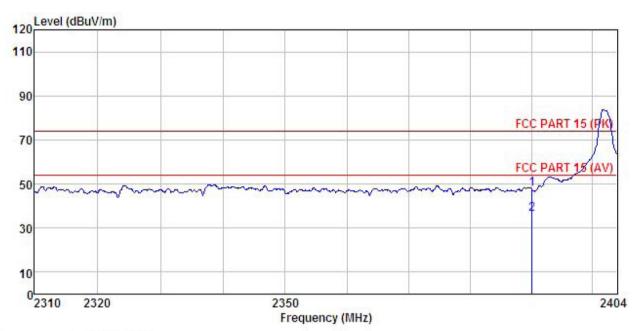
Test Method: Test Frequency Range: Z.3GHz to Z.5GHz Test site: Measurement Distance: 3m Frequency Detector RBW VBW Remark Above 1GHz Above 1GHz Frequency Detector RBW Above 1GHz RMS IMHz JMHz Above 1GHz Frequency Limit: Frequency Limit (dBuV/m @ 3m) Remark Above 1GHz Test Procedure: Test Procedure: 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be revested one by one using peak, quasipeak or average method as specified and then reported in a data sheet. Test setup: Test setup: Refer to section 5.7 for details Fest results: Passed	Test Requirement:	FCC Part 15 C Section 15.209 and 15.205							
Test site: Measurement Distance: 3m Receiver setup: Frequency Detector RBW VBW Remark Above 1GHz Peak 1MHz 3MHz Peak Value RMS 1MHz 3MHz Average Value Frequency Limit (dBuV/m @3m) Remark Above 1GHz 54.00 Average Value Above 1GHz 74.00 Peak Value Test Procedure: 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one sing peak, quasipeak or average method as specified and then reported in a data sheet. Test setup: Test Instruments: Refer to section 5.7 for details Refer to section 5.3 for details	Test Method:	ANSI C63.10: 2013 and KDB 558074v03r05 section 12.1							
Receiver setup: Frequency Detector RBW VBW Remark	Test Frequency Range:	2.3GHz to 2.50	GHz						
Above 1GHz RMS 1MHz 3MHz Peak Value RMS 1MHz 3MHz Peak Value RMS 1MHz 3MHz Average Value Frequency Limit (dBuV/m @3m) Remark Above 1GHz 74.00 Peak Value Test Procedure: 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be re-tested one by one using peak, quasipeak or average method as specified and then reported in a data sheet. Test setup: Test setup: Refer to section 5.7 for details Refer to section 5.3 for details	Test site:	Measurement	Distance: 3n	n					
Above 1GHz Peak 1MHz 3MHz Peak Value RMS 1MHz 3MHz Average Value Frequency Limit (dBuV/m @3m) Remark Above 1GHz 74.00 Peak Value 74.00 Peak Valu	Receiver setup:	Frequency	Detector	RBW	VI	BW	Remark		
Limit: Frequency Limit (dBuV/m@3m) Remark Above 1GHz 74.00 Average Value 74.00 Peak Value Test Procedure: 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. Test setup: Refer to section 5.7 for details Refer to section 5.3 for details	'	Above 1GHz	Peak	1MHz			Peak Value		
Above 1GHz Test Procedure: 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasipeak or average method as specified and then reported in a data sheet. Test setup: Test instruments: Refer to section 5.7 for details Refer to section 5.3 for details						ИHz			
Test Procedure: 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and then troat table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that idin on have 10 dB margin would be re-tested one by one using peak, quasipeak or average method as specified and then reported in a data sheet. Test setup: Refer to section 5.7 for details Refer to section 5.3 for details	Limit:				Bm)				
Test Procedure: 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was turned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasipeak or average method as specified and then reported in a data sheet. Test setup: Refer to section 5.7 for details Refer to section 5.3 for details									
Test Instruments: Refer to section 5.7 for details Test mode: Refer to section 5.3 for details	Test Procedure:	the groun to determ 2. The EUT antenna, tower. 3. The anter the groun Both horiz make the 4. For each case and meters ar to find the 5. The test-r Specified 6. If the emisting of the EU have 10 copeak or a	d at a 3 meterine the position was set 3 meterine was set 3 meterine was a mana height is a do determine a measurement of the rota tate of maximum receiver systems. Bandwidth was a maximum receiver systems and the rota tate of maximum receiver systems and the rota tate of maximum receiver systems. Bandwidth was a maximum receiver systems and the rota tate of maximum receiver systems are some simulation of the systems and the rota tate of the systems are successful.	on the top of a rotal er camber. The tall ion of the highest eters away from the top waried from one neethe maximum wartical polarizations. The enna was tuned from the was turned from the was turned from was set to Peasing. The EUT in peak of the EUT in peak on testing could be eported. Otherwis build be re-tested controller.	ble waradiation into the interior of a value	able 1. as rotation. erference variable to four point the fine anter rrange hts from degrees sect Funde. was 10 bed and emission	5 meters above ed 360 degrees ce-receiving e-height antenna meters above eld strength. In a are set to d to its worst in 1 meter to 4 is to 360 degrees inction and the peak values ons that did not sing peak, quasi-		
Test mode: Refer to section 5.3 for details	Test setup:	Sileet.	(Turntable)	Ground Reference Plane			ver V		
	Test Instruments:	Refer to section	n 5.7 for det	ails					
Test results: Passed	Test mode:	Refer to section	on 5.3 for deta	ails					
	Test results:	Passed							





Test channel: Lowest

Horizontal:



Site

: 3m chamber : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL Condition

EUT : Bluetooth Module

: AW-16 Model : BLE-L Mode Test mode

Power Rating: AC 120V/60Hz Environment: Temp:25.5°C Huni:55%

Test Engineer: steven

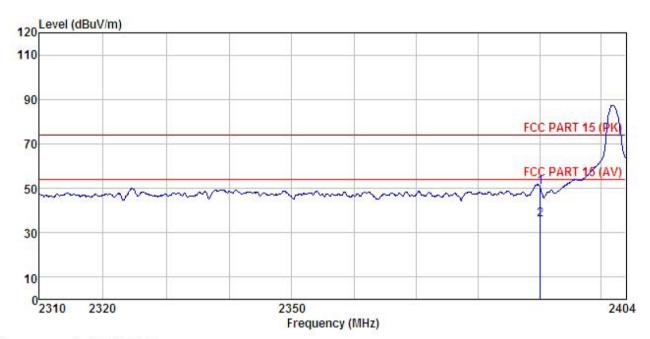
REMARK

	Freq		Antenna Factor							
	MHz	dBu₹	<u>dB</u> /m	<u>d</u> B	<u>dB</u>	dBuV/m	dBuV/m	<u>dB</u>		-
1 2	2390,000 2390,000	70.750.000000	T17 (3) (T17 (3)						OEU/FORESTON	





Vertical:



Site

: 3m chamber : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL Condition

EUT : Bluetooth Module

Model : AW-16
Test mode : BLE-L Mode
Power Rating : AC 120V/60Hz

Environment : Temp: 25.5°C Huni: 55%

Test Engineer: steven REMARK :

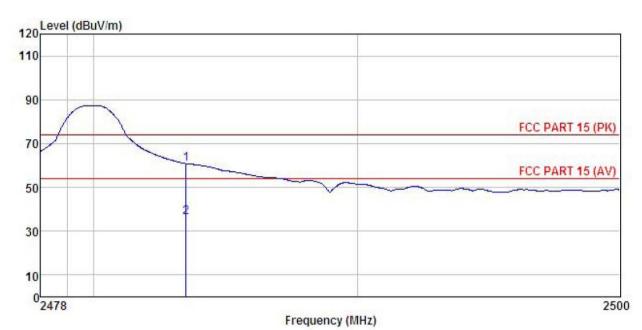
LIMITA			Antenna Factor						
2	MHz	—dBu∇		<u>d</u> B	<u>ab</u>	$\overline{dBuV/m}$	$\overline{dBuV/m}$	<u>ab</u>	
	2390.000 2390.000								





Test channel: Highest

Horizontal:



Site

: 3m chamber : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL Condition

EUT : Bluetooth Module

: AW-16 : BLE-H Mode Model Test mode Power Rating : AC 120V/60Hz

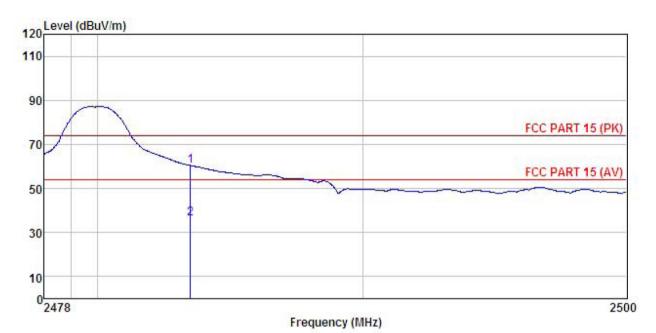
Environment: Temp: 25.5°C Huni: 55%

Test Engineer: steven REMARK :

	Freq		Antenna Factor						
-	MHz	dBuV	$\overline{dB/m}$	<u>d</u> B	dB	dBuV/m	dBuV/m	<u>dB</u>	
1 2	2483.500 2483.500								



Vertical:



Site

: 3m chamber : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL Condition

Silvetooth Module

Model : AW-16

Test mode : BLE-H Mode

Power Rating : AC 120V/60Hz

Environment : Temp:25.5°C Huni:55%

Test Engineer: steven

REMARK :

Lilunx		Read	Antenna	Cable	Preamp		Limit	Over	
	Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
	MHz	—dBu∜	— <u>dB</u> /m		<u>ab</u>	$\overline{\mathtt{dBuV/m}}$	$\overline{dBuV/m}$	<u>ab</u>	
1	2483.500	31.90	23.70	4.81	0.00	60.41	74.00	-13.59	Peak
2	2483.500	7.77	23.70	4.81	0.00	36.28	54.00	-17.72	Average



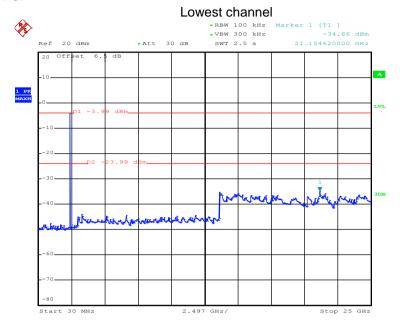
6.7 Spurious Emission

6.7.1 Conducted Emission Method

Test Requirement:	FCC Part 15 C Section 15.247 (d)								
Test Method:	ANSI C63.10:2013 and KDB558074v03r05 section 11								
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.								
Test setup:									
	Spectrum Analyzer								
	Spectrum Analyzer E.U.T Non-Conducted Table								
	Ground Reference Plane								
Test Instruments:	Refer to section 5.7 for details								
Test mode:	Refer to section 5.3 for details								
Test results:	Passed								

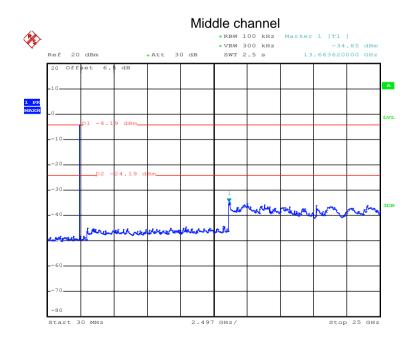


Test plot as follows:



Date: 18.SEP.2016 17:43:37

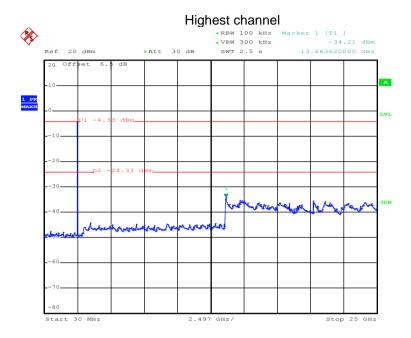
30MHz~25GHz



Date: 18.SEP.2016 17:42:40

30MHz~25GHz





Date: 18.SEP.2016 17:41:36

30MHz~25GHz



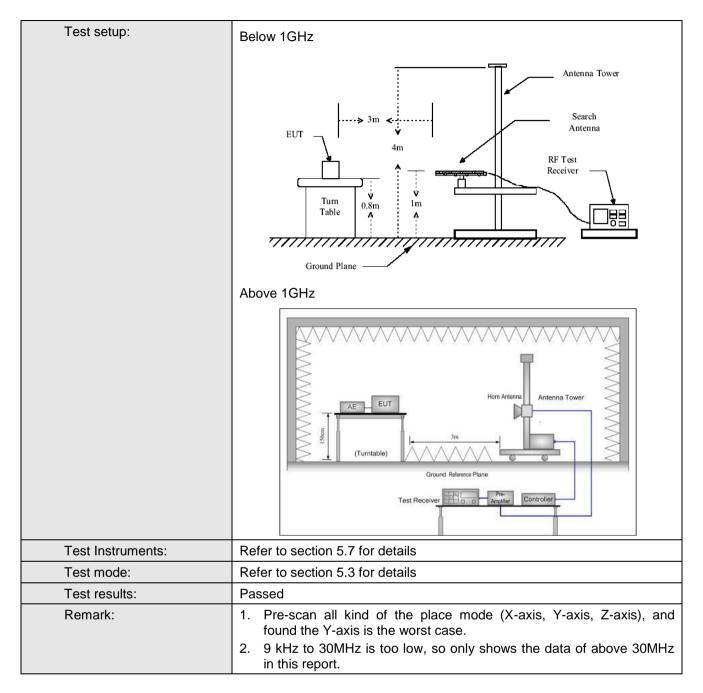


6.7.2 Radiated Emission Method

Test Requirement:	FCC Part 15 C Section 15.209 and 15.205								
Test Method:	ANSI C63.10:20	013							
Test Frequency Range:	9KHz to 25GHz								
Test site:	Measurement D	istance: 3	3m						
Receiver setup:	Frequency	Detecto	or	RBW	VB	W	Remark		
·	30MHz-1GHz	Quasi-pe	eak	120KHz	300	KHz	Quasi-peak Value		
	Above 1GHz	Peak	k 1MHz		3MHz		Peak Value		
	Above IGIIZ	RMS		1MHz	3M	Hz	Average Value		
Limit:	Frequency		Lin	nit (dBuV/m @	3m)		Remark		
	30MHz-88M			40.0			uasi-peak Value		
	88MHz-216N			43.5			uasi-peak Value		
	216MHz-960I			46.0			uasi-peak Value		
	960MHz-1G	Hz		54.0			uasi-peak Value		
	Above 1GF				Average Value				
					·	- ("			
Test Procedure:									



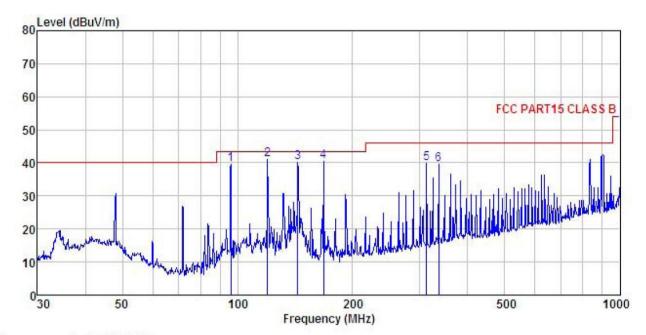






Below 1GHz:

Horizontal:



Site

: 3m chamber : FCC PART15 CLASS B 3m VULB9163(30M3G) HORIZONTAL Condition

EUT : Bluetooth Module

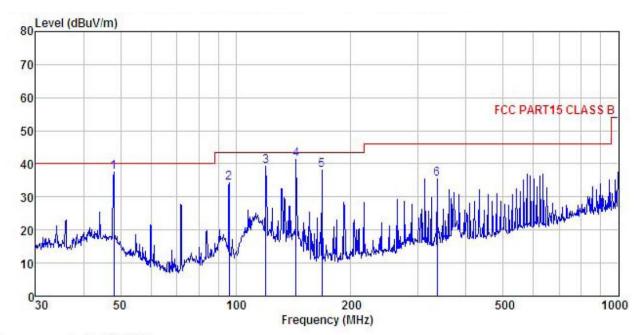
: AW-16 Model Test mode : BLE Mode
Power Rating : AC 120V/60Hz
Environment : Temp:25.5°C Huni:55%

Test Engineer: steven
REMARK :

THUTTE										
	Freq		Antenna Factor				Limit Line	Over Limit	Remark	
_	MHz	dBu₹	<u>dB</u> /m	dB	<u>d</u> B	dBuV/m	$\overline{dBuV/m}$	dB		
1	96.099	58.26	8.93	2.00	29.55	39.64	43.50	-3.86	QP	
1 2 3	119.856	56.49	11.80	2.17	29.39	41.07	43.50	-2.43	QP	
3	143.830	55.70	11.34	2.44	29.25	40.23	43.50	-3.27	QP	
4	167.824	57.03	9.82	2.64	29.07	40.42	43.50	-3.08	QP	
5	312.179	52.34	13.08	2.98	28.48	39.92	46.00	-6.08	QP	
6	336.035	51.27	13.76	3.05	28.53	39.55	46.00	-6.45	QP	



Vertical:



Site

: 3m chamber : FCC PART15 CLASS B 3m VULB9163(30M3G) VERTICAL Condition

EUT : Bluetooth Module

Model : AW-16 Test mode : BLE Mode
Power Rating : AC 120V/60Hz
Environment : Temp:25.5°C Huni:55%

Test Engineer: steven REMARK :

EMARK	:		•						
	Freq		Antenna Factor				Limit Line	Over Limit	
	MHz	dBu∜	dB/m		dB	$\overline{dBuV/m}$	$\overline{dBuV/m}$	<u>dB</u>	
1	47.994	49.87	16.10	1.27	29.84	37.40	40.00	-2.60	QP
2	96.099	52.86	8.93	2.00	29.55	34.24	43.50	-9.26	QP
3	119.856	54.72	11.80	2.17	29.39	39.30	43.50	-4.20	QP
4	143.830	56.67	11.34	2.44	29.25	41.20	43.50	-2.30	QP
5	167.824	54.70	9.82	2.64	29.07	38.09	43.50	-5.41	QP
6	336.035	47.29	13.76	3.05	28.53	35.57	46.00	-10.43	QP



Above 1GHz

Т	est channel	:	Lowest		Le	vel:	Peak		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	
4804.00	51.55	31.53	10.57	40.24	53.41	74.00	-20.59	Vertical	
4804.00	49.94	31.53	10.57	40.24	51.80	74.00	-22.20	Horizontal	
Т	est channel	•	Lowest		Le	vel:	Average		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	
4804.00	42.69	31.53	10.57	40.24	44.55	54.00	-9.45	Vertical	
4804.00	40.32	31.53	10.57	40.24	42.18	54.00	-11.82	Horizontal	

Т	est channel	:	Mi	Middle		vel:	Peak		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	
4884.00	48.12	31.58	10.66	40.15	49.24	74.00	-24.76	Vertical	
4884.00	47.15	31.58	10.66	40.15	49.24	74.00	-24.76	Horizontal	
Т	est channel	•	Middle		Le	vel:	Average		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	
4884.00	39.65	31.58	10.66	40.15	41.74	54.00	-12.26	Vertical	
4884.00	39.11	31.58	10.66	40.15	41.20	54.00	-12.80	Horizontal	

Т	est channel	:	Highest		Le	vel:	Peak		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	
4960.00	48.37	31.69	10.73	40.03	50.76	74.00	-23.24	Vertical	
4960.00	48.23	31.69	10.73	40.03	50.62	74.00	-23.38	Horizontal	
Т	est channel	:	Highest		Le	vel:	Average		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	
4960.00	39.65	31.69	10.73	40.03	42.04	54.00	-11.96	Vertical	
4960.00	39.92	31.69	10.73	40.03	42.31	54.00	-11.69	Horizontal	

Remark:

- 1. Final Level =Receiver Read level + Antenna Factor + Cable Loss Preamplifier Factor
- 2. The emission levels of other frequencies are very lower than the limit and not show in test report.