

FCC 47 CFR PART 15 SUBPART E

Applicant : AzureWave Technologies, Inc.
Address : 8F, No. 94, Baozhong Rd., Xindian,231 Taiwan
Product Type : IEEE 802.11 a/b/g/n Wireless LAN and Bluetooth Combo LGA Module
Trade Name : AzureWave
Model Number : AW-AM691NF
Test Specification : FCC 47 CFR PART 15 SUBPART E
ANSI C63.10:2013
Application Purpose : Original
Receive Date : Oct. 12, 2015
Test Period : Nov. 09, 2015
Issue Date : Nov. 11, 2015

Issue by

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Taiwan Accreditation Foundation accreditation number: 1330

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Revision History

Rev.	Issue Date	Revisions	Revised By
00	Nov. 11, 2015	Initial Issue	

Verification of Compliance

Issued Date: 11/11/2015

Applicant : AzureWave Technologies, Inc.
Address : 8F, No. 94, Baozhong Rd., Xindian,231 Taiwan
Product Type : IEEE 802.11 a/b/g/n Wireless LAN and Bluetooth Combo LGA Module
Trade Name : AzureWave
Model Number : AW-AM691NF
FCC ID : TLZ-AM691NF
EUT Rated Voltage : DC 3.3V
Test Voltage : 120 Vac / 60 Hz
Applicable Standard : FCC 47 CFR PART 15 SUBPART E
ANSI C63.10:2013

Test Result : Complied
Application Purpose : Original
Performing Lab. : A Test Lab Techno Corp.

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<http://www.atl-lab.com.tw/e-index.htm>

A Test Lab Techno Corp. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by A Test Lab Techno Corp. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Approved By : Fly Lu Reviewed By : Eric Ou Yang
(Manager) (Fly Lu) (Testing Engineer) (Eric Ou Yang)

TABLE OF CONTENTS

1	General Information.....	5
1.1.	Summary of Test Result	5
1.2.	Measurement Uncertainty	5
2	EUT Description.....	6
3	Test Methodology	7
3.1.	Mode of Operation	7
3.2.	EUT Exercise Software	7
3.3.	Configuration of Test System Details	8
3.4.	Test Site Environment	8
4	Radiated Emission Measurement.....	9
4.1.	Limit	9
4.2.	Test Instruments.....	9
4.3.	Setup.....	10
4.4.	Test Procedure	11
4.5.	Test Result	12

1 General Information

1.1. Summary of Test Result

Standard	Item	Result	Remark
FCC			
15.407(b)(6) 15.207	AC Power Conducted Emission	N/A	---
15.407(b) 15.205 / 15.209	Transmitter Radiated Emissions	PASS	---
15.407(a)	Maximum Conducted Output Power	N/A	---
15.407(a)	26dB RF Bandwidth	N/A	---
15.407(a)	6dB RF Bandwidth	N/A	----
15.407(a)	Peak Power Spectral Density	N/A	---
15.407(g)	Frequency Stability	N/A	---
15.407(a) 15.203	Antenna Requirement	N/A	---

The test results of this report relate only to the tested sample(s) identified in this report. Manufacturer or whom it may concern should recognize the pass or fail of the test result.

1.2. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty (dB)
Conducted Emission	9kHz ~ 150KHz	2.7
	150kHz ~ 30MHz	2.8
Radiated Emission	30MHz ~ 1000MHz	6.300
	1000MHz ~ 18000MHz	5.474
	18000MHz ~ 26500MHz	5.630
	26500MHz ~ 40000MHz	5.054

2 EUT Description

Applicant	Polk Audio 8F, No. 94, Baozhong Rd., Xindian, 231 Taiwan		
Manufacturer	Polk Audio 8F, No. 94, Baozhong Rd., Xindian, 231 Taiwan		
Product Type	IEEE 802.11 a/b/g/n Wireless LAN and Bluetooth Combo LGA Module		
Trade Name	AzureWave Technologies, Inc.		
Model No.	AW-AM691NF		
FCC ID	TLZ-AM691NF		
Class II Permissive Change	Add Platform.		
Frequency Range	Band	Mode	Frequency Range (MHz)
	U-NII Band I	IEEE 802.11a	5180 – 5240
		IEEE 802.11n 20 MHz	5180 – 5240
		IEEE 802.11n 40 MHz	5190 – 5230
Modulation Type	OFDM		
Equipment Type	Client		
Antenna Type	PIFA PCB Antenna		
Antenna Gain	2.64 dBi		
Host Information	Product Type: Personal Computer Trade Name: ECS ELITEGROUP Model Name: EF20RA		

3 Test Methodology

3.1. Mode of Operation

Decision of Test ATL has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: Normal Operation Mode

Software used to control the EUT for staying in continuous transmitting mode was programmed.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in normal link mode only.

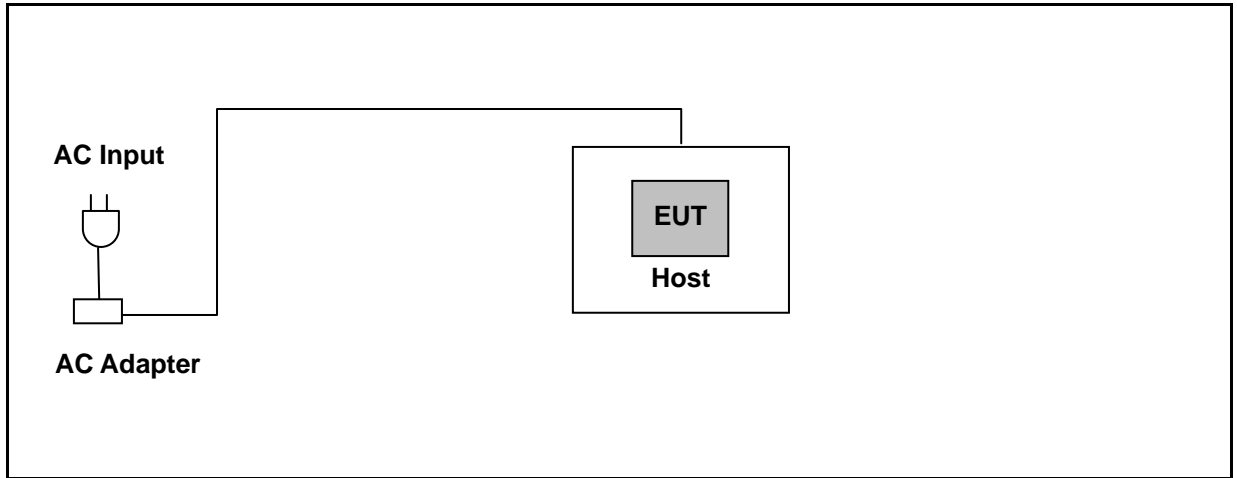
3.2. EUT Exercise Software

The EUT is operated in the engineering mode to fix the TX frequency for the purposes of measurement.

According to its specifications, the EUT must comply with the requirements of Section 15.407 under the FCC Rules Part 15 Subpart E.

1.	Setup the EUT shown on 3.3.
2.	Turn on the power of all equipment.
3.	Turn on Wi-Fi function link to Notebook.
4.	EUT run test program.

3.3. Configuration of Test System Details



3.4. Test Site Environment

Items	Required (IEC 60068-1)	Actual
Temperature (°C)	15-35	26
Humidity (%RH)	25-75	60
Barometric pressure (mbar)	860-1060	950

4 Radiated Emission Measurement

4.1. Limit

Limits of Radiated Emission Measurement

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequency Range (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	10	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note: 1. The lower limit shall apply at the transition frequencies.

2. Emission level (dBuV/m) = 20 log Emission level (uV/m).

3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.2. Test Instruments

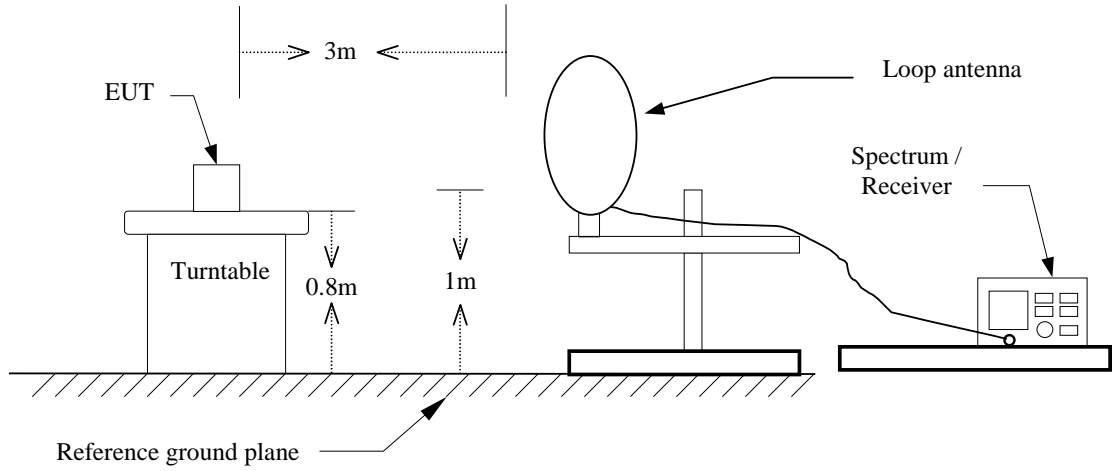
3 Meter Chamber					
Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
RF Pre-selector	Agilent	N9039A	MY46520256	01/06/2015	(1)
Spectrum Analyzer	Agilent	E4446A	MY46180578	01/06/2015	(1)
Pre Amplifier	Agilent	8449B	3008A02237	02/24/2015	(1)
Pre Amplifier	Agilent	8447D	2944A10961	02/24/2015	(1)
Broadband Antenna (30MHz~1GHz)	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	9163-270	08/11/2015	(1)
Horn Antenna (1~18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	9120D-550	06/12/2015	(1)
Horn Antenna (18~40GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9170	9170-320	07/06/2015	(1)
Test Site	ATL	TE01	888001	08/27/2015	(1)

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years.

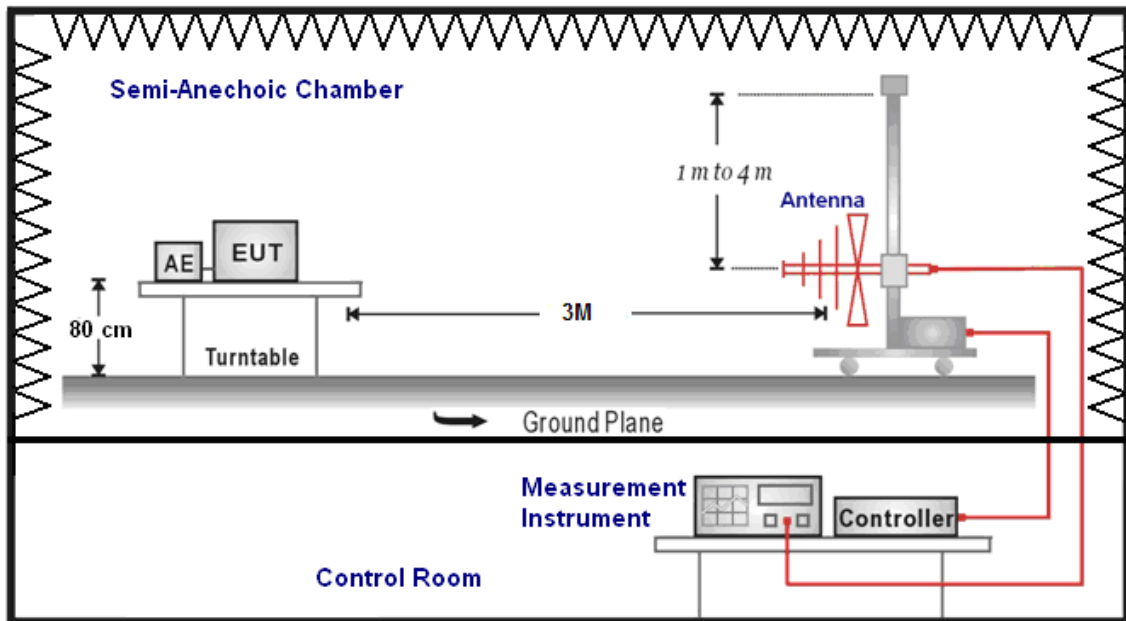
Note: N.C.R. = No Calibration Request.

4.3. Setup

9kHz ~ 30MHz



30MHz ~ 1GHz



4.4. Test Procedure

Final radiation measurements were made on a three-meter, Semi Anechoic Chamber. The EUT system was placed on a nonconductive turntable which is 0.8 or 1.5 meters height (below 1GHz use 0.8m turntable, top surface 1.0 x 1.5 meter). The spectrum was examined from 250 MHz to 2.5 GHz in order to cover the whole spectrum below 10th harmonic which could generate from the EUT. During the test, EUT was set to transmit continuously & Measurements spectrum range from 9 kHz to 40 GHz is investigated.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For restricted measurements above 1 GHz the resolution bandwidth is set to 1 MHz, and then the video bandwidth is set to 3 MHz for peak measurements and 10 Hz for average measurements when Duty cycle > 0.98 / 1/T for average measurements when Duty cycle < 0.98.

A nonconductive material surrounded the EUT to supporting the EUT for standing on three orthogonal planes. At each condition, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarization.

SCHWARZBECK MESS-ELEKTRONIK Trilog-Broadband Antenna (mode SB AC VULB) at 3 Meter and the ETS-Lindgren Double-Ridged Waveguide Horn antenna (model 3117) Schwarzbeck Mess-Elektronik Broadband Horn Antenna (BBHA 9170) was used in frequencies 1 – 40 GHz at a distance of 3 meter. The antenna at an angle toward the source of the emission. All test results were extrapolated to equivalent signal at 3 meters utilizing an inverse linear distance extrapolation Factor (20dB/decade).

Appropriate preamplifiers were used for improving sensitivity and precautions were taken to avoid overloading or desensitizing the spectrum analyzer. No post – detector video filters were used in the test.

The spectrum analyzer's 6 dB bandwidth was set to 1 MHz, and the analyzer was operated in the peak detection mode, for frequencies both below and up 1 GHz. The average levels were obtained by subtracting the duty cycle correction factor from the peak readings.

The following procedures were used to convert the emission levels measured in decibels referenced to 1 microvolt (dBuV) into field intensity in micro volts per meter (uV/m).

The actual field intensity in decibels referenced to 1 microvolt in to field intensity in micro volts per meter (dBuV/m).

The actual field intensity in decibels referenced to 1 microvolt per meter (dBuV/m) is determined by algebraically adding the measured reading in dBuV, the antenna factor (dB), and cable loss (dB) and Subtracting the gain of preamplifier (dB) is auto calculate in spectrum analyzer.

$$(1) \text{ Amplitude (dBuV/m) = FI (dBuV) +AF (dBuV) +CL (dBuV)-Gain (dB)}$$

FI= Reading of the field intensity.

AF= Antenna factor.

CL= Cable loss.

P.S Amplitude is auto calculate in spectrum analyzer.

$$(2) \text{ Actual Amplitude (dBuV/m) = Amplitude (dBuV)-Dis(dB)}$$

The FCC specified emission limits were calculated according to the EUT operating frequency and by following linear interpolation equations:

(a) For fundamental frequency : Transmitter Output < +30dBm

(b) For spurious frequency : Spurious emission limits = fundamental emission limit /10

4.5. Test Result

Below 1GHz

Standard:	FCC Part 15E	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	AW-AM691NF	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Test Mode:	Mode 1	Date:	11/10/2015
		Test By:	Eric Ou Yang

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
214.0000	26.77	-12.59	14.18	43.50	-29.32	QP	H
288.0000	31.21	-9.44	21.77	46.00	-24.23	QP	H
457.5000	30.94	-6.34	24.60	46.00	-21.40	QP	H
542.5000	27.78	-5.14	22.64	46.00	-23.36	QP	H
690.0000	26.59	-2.54	24.05	46.00	-21.95	QP	H
780.0000	27.35	-0.72	26.63	46.00	-19.37	QP	H
209.5000	29.36	-12.79	16.57	43.50	-26.93	QP	V
351.0000	30.63	-7.38	23.25	46.00	-22.75	QP	V
459.0000	35.25	-6.30	28.95	46.00	-17.05	QP	V
517.0000	35.47	-5.31	30.16	46.00	-15.84	QP	V
729.5000	27.24	-1.57	25.67	46.00	-20.33	QP	V
871.0000	28.41	0.90	29.31	46.00	-16.69	QP	V

Note: No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).