RF Exposure Report

Report No.:	SA140407E07D
FCC ID:	TLZ-CM389NF
Test Model:	AW-CM389NF
Received Date:	Apr. 14, 2016
Test Date:	June 06, 2016
Issued Date:	June 17, 2016
Applicant:	AzureWave Technologies, Inc.
Address:	8F., No.94, Baozhong Rd. , Xindian Dist., New Taipei City , Taiwan 231
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
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Release Control Record

Issue No.	Description	Date Issued
SA140407E07D	Original release.	June 17, 2016

1 Certificate of Conformity

Product:	IEEE 802.11 2X2 MIMO ac/a/b/g/n Wireless LAN + Bluetooth + NFC NGFF Module
Brand:	AzureWave
Test Model:	AW-CM389NF
Sample Status:	ENGINEERING SAMPLE
Applicant:	AzureWave Technologies, Inc.
Test Date:	June 06, 2016
Standards:	FCC Part 2 (Section 2.1093) KDB 447498 D01 General RF Exposure Guidance v06 IEEE C95.1-1992

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : _____ , **Date:** June 17, 2016

Claire Kuan / Specialist

Approved by : _____ , **Date:** June 17, 2016

May Chen / Manager

2 RF Exposure

2.1 Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (minutes)
Limits For General Population / Uncontrolled Exposure				
300-1500	…	…	F/1500	30
1500-100,000	…	…	1.0	30

F = Frequency in MHz

2.2 MPE Calculation Formula

$Pd = (Pout*G) / (4*pi*r^2)$

where

Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

2.3 Classification

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. So, this device is classified as **Mobile Device**.

3 Antenna Gain

1. The WLAN / BT antenna provided to the EUT, please refer to the following table:

Antenna Set.	Transmitter Circuit	Brand	Model	Antenna Gain(dBi) < including cable loss>	Frequency range (MHz to MHz)	Antenna Type	Connecter Type	Cable Length (cm)
1	Chain (0)	MAG.LAYERS	MSA-4008-25GC1-A1	2.98	2400~2500	PIFA	i-pex(MHF)	15
				5.16	4900~5900			
	Chain (1)	MAG.LAYERS	MSA-4008-25GC1-A1	2.98	2400~2500	PIFA	i-pex(MHF)	15
				5.16	4900~5900			
2	Main Antenna Chain 0	Wistron Neweb Corporation	DC33001KT00 (81EAAL15.G92)	1.54	2400~2500	PIFA	i-pex(MHF)	36.3
				1.26	5150~5850			
	Aux Antenna Chain 1	Wistron Neweb Corporation	DC33001KT10 (81EAAL15.G75)	0.63	2400~2500	PIFA	i-pex(MHF)	59.3
				1.84	5150~5850			

Antenna Set.	Transmitter Circuit	Brand	Model	Antenna Gain(dBi)	Frequency range (MHz to MHz)	Antenna Type	Connecter Type	Cable Loss (dB)
3	Chain (0)	TE connectivity	2195487	-0.77	2400~2500	Dipole	i-pex(MHF)	0.4
				3.64	5150~5850			0.5
	Chain (1)	TE connectivity	2195487	-0.77	2400~2500	Dipole	i-pex(MHF)	0.4
				3.64	5150~5850			0.5
4	Chain (0)	TE connectivity	2195501-1	2.35	2400~2500	Slot	i-pex(MHF)	0.35
				4.08	5150~5850			0.45
	Chain (1)	TE connectivity	2195501-1	2.35	2400~2500	Slot	i-pex(MHF)	0.35
				4.08	5150~5850			0.45
5	Chain (0)	TE connectivity	2195505-1	0.41	2400~2500	Slot	i-pex(MHF)	0.35
				4.82	5150~5850			0.45
	Chain (1)	TE connectivity	2195505-1	0.41	2400~2500	Slot	i-pex(MHF)	0.35
				4.82	5150~5850			0.45

2. The NFC antenna provided to the EUT, please refer to the following table:

Brand	Model	Antenna Gain(dBi)	Frequency Range (MHz)	Antenna Type	Connecter Type
Marvell	30X40X4T_PCB	0.5	13.56	PCB	i-pex(MHF)

4 Calculation Result

For NFC max power data was copied from the original test report (Report No.: SA140407E07)

WLAN

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2412-2462	624.507	5.99	20	0.49348	1
5180-5240	64.539	8.17	20	0.08425	1
5260-5320	70.809	8.17	20	0.09243	1
5500 ~ 5580 & 5660 ~ 5700	74.062	8.17	20	0.09668	1
5745-5825	69.979	8.17	20	0.09135	1

Note:
2.4GHz: Directional gain = 2.98dBi + 10log(2) = 5.99dBi
5GHz: Directional gain = 5.16dBi + 10log(2) = 8.17dBi

BT-EDR

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2402-2480	9.016	2.98	20	0.00356	1

BT-LE

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2402-2480	7.031	2.98	20	0.00278	1

NFC

Frequency (MHz)	Max EIPR Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
13.56	0.00055	0.5	20	0.1×10^{-6}	0.9789

Note: Limit of Power Density=$180/f^2$

$E=\sqrt{(30*P*G)}/D$

$P*G=(E*D)^2/30$

E(dBuV/m)=62.6

D(m)= 3

P*G(mW)=0.00055

Conclusion:

Both of the WLAN, Bluetooth and NFC can transmit simultaneously, the formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1

CPD = Calculation power density

LPD = Limit of power density

For WLAN (2.4G), Bluetooth and NFC:

Therefore, the worst-case situation is 0.49348 / 1 + 0.00356 / 1 + (0.1×10^{-6}) / 0.9789 = 0.49704, which is less than “1”.

For WLAN (5G), Bluetooth and NFC:

Therefore, the worst-case situation is 0.09668 / 1 + 0.00356 / 1 + (0.1×10^{-6}) / 0.9789 = 0.10024, which is less than “1”.

Therefore the maximum calculations of above situations are less than the “1” limit.

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