RF Exposure Report

Report No.:	SA130927E08L
FCC ID:	Z3M-FG1100
Test Model:	FiOS-G1100
Received Date:	Jan. 22, 2016
Test Date:	Jan. 28, 2016
Issued Date:	Feb. 25, 2016
Applicant:	Greenwave Systems Pte. Ltd.
Address:	10 Science Park Road, #02-07/08, The Alpha (Science Park II), Singapore 117684
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location (1):	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C.

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Release Control Record

Issue No.	Description	Date Issued
SA130927E08L	Original release.	Feb. 25, 2016

1 Certificate of Conformity

Product:	FiOS Gateway
Brand:	Frontier
Test Model:	FiOS-G1100
Sample Status:	ENGINEERING SAMPLE
Applicant:	Greenwave Systems Pte. Ltd.
Test Date:	Jan. 28, 2016
Standards:	FCC Part 2 (Section 2.1091) KDB 447498 D01 General RF Exposure Guidance v06 IEEE C95.1-2005

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:** Feb. 25, 2016

Claire Kuan / Specialist

Approved by : _____ , **Date:** Feb. 25, 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 28cm away from the body of the user. So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

WLAN Antenna Spec.				
2.4GHz				
Transmitter Circuit	Gain (dBi) (Include cable loss)	Antenna Type	Connecter Type	Frequency range (GHz to GHz)
Chain (0)	3.97	Dipole(Metal)	NA	2.4~2.4835
Chain (1)	4.1	Dipole(Metal)	NA	2.4~2.4835
Chain (2)	3.36	PIFA(Metal)	NA	2.4~2.4835
5GHz				
Transmitter Circuit	Gain (dBi) (Include cable loss)	Antenna Type	Connecter Type	Frequency range (GHz to GHz)
Chain (0)	3.56	Dipole(Metal)	NA	5.15~5.25
	4.05			5.725~5.85
Chain (1)	5.3	Dipole(Metal)	NA	5.15~5.25
	5.71			5.725~5.85
Chain (2)	4.6	Dipole(Metal)	NA	5.15~5.25
	4.21			5.725~5.85

Z-Wave Antenna Spec.			
Gain (dBi) (Include cable loss)	Antenna Type	Connecter Type	Frequency range (MHz to MHz)
1.73	PIFA (Metal)	NA	902~928

3 Calculation Result of Maximum Conducted Power

For WLAN:

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2412-2462	919.616	8.59	28	0.67465	1
5180-5240	406.897	5.30	28	0.13995	1
5745-5825	357.337	5.71	28	0.13507	1

NOTE:
2.4GHz: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 8.59dBi.
5GHz (5150-5250MHz): Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 5.30dBi
5GHz (5725-5850MHz): Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 5.71dBi.

For Zwave:

Frequency BAND (MHz)	Field Strength of Fundamental@3 m (dBuV/m)	Pout EIRP (dBm)	Pout EIRP (mW)	Distance (cm)	Power Density (mW/ cm^2)	Limit (mW/cm^2)
908.4-916.0	100.9	5.67	3.691	28	0.00037	0.61

Conclusion:

All of the Z-Wave and WLAN (2.4GHz & 5GHz) can transmit simultaneously, the formula of calculated the MPE is:

$CPD_1 / LPD_1 + CPD_2 / LPD_2$ + ……etc. < 1

CPD = Calculation power density

LPD = Limit of power density

Therefore, the worst-case situation is 0.67465 / 1 + 0.13995 / 1 + 0.00037 / 0.61 = 0.81461, which is less than "1". This confirmed that the device comply with FCC 1.1310 MPE limit.

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