RF Exposure Exhibit

EUT Name: FIBERGATEWAY

Model No.: GR240BG FCC ID: 2ACJF-FGW-GR240BG

CFR 47 Part 15.247 and Part 15.407

Prepared for:

Altice Labs, SA
Rua Eng. Ferreira Pinto Basto
3810-106 Aveiro, Portugal
Tel: 351234403200

Prepared by:

Intertek
1365 Adams Court
Menlo Park, CA 94025 USA
Tel: (650) 463-2900
Fax: (650) 463-2901

Report/Issue Date: October 23, 2017

Contents

1 Test Methodology

In this document, we evaluate the RF Exposure to human body due the intentional transmission from the transmitter (EUT). The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.

Although the Friis transmission formula is a far field assumption, the calculated result of that is an over-prediction for near field power density. We will take that as the worst case to specify the safety range.

1.1 RF Exposure Limit

According to FCC 1.1310 table 1: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b)

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)
(A)Limits For Occupational / Control Exposures				
300 - 1500	…	…	F/300	6
1500 - 100,000	…	…	5	6
(B)Limits For General Population / Uncontrolled Exposure				
300 - 1500	…	…	F/1500	6
1500 - 100,000	…	…	1.0	30

F = Frequency in MHz

1.2 EUT Operating Condition

Altice Labs, SA supplied the following description of the EUT:

The FiberGateway GR240AG is an ONT (Optical Network Terminal) solution based on Rec. ITU-T G.984.x that supports triple play services (high speed internet, voice and video) which are deployed over Ethernet and Wi-Fi interfaces. GEM (GPON encapsulation method) is employed to adapt technologies. This system can be used in triple play service delivery network solutions. It includes Home Gateway functionalities, 4 GbE ports and Wi-Fi Dual-Band Concurrent (2.4 GHz bgn 4x4 + 5 GHz anac 4x4) for internet access and IPTV, 2 FXS ports for voice and 1 USB 2.0 port.

The software provided by Manufacturer enabled the EUT to transmit data at lowest, middle and highest channel individually. Software provided enables to transmit on multi channels simultaneously.

1.2.1 Classification

EUT is installed inside a mobile host device. The antenna of the product, under normal use condition, is at least 20cm away from the body of the user and accessible to the end user. Warning statement to the user for keeping at least 20cm or more separation distance with the antenna should be included in user's manual.

1.3 Test Results

1.3.1 Antenna Gain

Antennas	Polarization	Band	Peak Gain (dBi)	Band	Peak Gain (dBi)
Antenna 0	Vertical	2.4 GHz	4,0	5 GHz	4,8
Antenna 1	Horizontal		3,6		3,4
Antenna 2	Horizontal		2,4		4,0
Antenna 3	Vertical		3,8		5,1

2.4GHz Band combined highest gain = 3.9dBi, see test report 103224477MPK-002A page # 8

5GHz Band = 4.9dBi see test report 103224477MPK-003A Page #8

1.3.2 Mobile Configuration

Calculations for this report are based on highest power measured for each band.

Band	Mode	Output Power dBm	Antenna gain (Max)	EIRP/ERP dBm	EIRP/ERP W	# of Channels ON	Total EIRP W	Total EIRP dBm
2400 – 2483.5MHz	802.11b, g & HT20	29.98	3.9	33.88		1	2.44	33.88
5150-5250MHz	802.11a,HT20, H40, ac	20.67	4.9	25.57		1	3.013	34.79
5725-5750MHz	802.11a,HT20, H40, ac	29.89		34.79				
					Totals:	2	**5.453**	**37.37**

Note 1: Stations using 2400 to 2483.5MHz Power limited 1 Watt Max gain of antenna 6dBi; Note2: Out of two 5GHz band only one will Transmitting at a time. For the band 5.725 – 5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

Calculating the Power Density at 20cm

The highest simultaneous power measured power is +37.37dBm or 5.453W.

Using the Friss transmission formula, the EIRP is Pout*G, and R is 20cm.

Pd= EIRP/(1600π)

Pd = (5453) / (1600π) = 1.08 mW/ cm^2, which is above the limit. Limit is 1.0mWatts/ cm^2

Calculating the distance at which Power density equal the limit

Calculation uses the free space transmission formula:

$$S = (PG)/(4\ \pi d^2)$$

Where: S is power density (W/m^2), P is output power (W), G is antenna gain relative to isotropic, d is separation distance from the transmitting antenna (m).

d = Sqroot (PG/4π) d in Cm when PG in mW/cm^2 Limit for Frequency above 1500MHz permissible power density is 1.0 mW/cm^2

d = Sqroot {5453/4π (1)}

d = 20.88cm

The device should used at least 21cm away from the body of the user and accessible to the end user.

1.3.3 Sample Calculation

The Friss transmission 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
$\pi \approx 3.1416$
R = distance between observation point and center of the radiator in cm

Ref. : David K. Cheng, *Field and Wave Electromagnetics*, Second Edition, Page 640, Eq. (11-133).