

# RF Exposure Evaluation declaration

Product Name : 4G/LTE Broadband Router with PoE

Model No. : MX-210NP-R17AF

FCC ID : QI3BIL-210NPR17AF

Applicant : Billion Electric Co., Ltd.

Address : 8F., No.192, Sec. 2, Zhongxing Rd., Xindian Dist.,

New Taipei City 231, Taiwan (R.O.C.)

Date of Receipt : Jan. 07, 2019

Date of Declaration : Jan. 18, 2019

Report No. : 1910066R-SAUSP03V00

Report Version : V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

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## 1. GENERAL INFORMATION

### 1.1. EUT Description

Product Name	4G/LTE Broadband Router with PoE
Model No.	MX-210NP-R17AF
Trade Name	BEC, Billion
IMEI No.	86683404
FCC ID	QI3BIL-210NPR17AF
TX Frequency	LTE Band 2: 1850 MHz ~1910 MHz
Rx Frequency	LTE Band 2: 1930 MHz ~1990 MHz
Frequency Range (WLAN)	2412-2462MHz for 802.11b/g/n-20BW, 2422-2452MHz for 802.11n-40BW
HW Version	1.010
SW Version	1.04.1.299

### 1.2. Antenna List :

No	Manufacturer	Part No	Antenna Type	Peak Gain
1	Grand-Tek Technology (WWAN)	OA-L71-05-04-C5-BL	Dipole Antenna	3dBi for 1.71 GHz ~2.17 GHz
2	Grand-Tek Technology (WLAN)	N/A	PCB Antenna	2.5 dBi for 2.4GHz

## 2. RF Exposure Evaluation

### 2.1. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment 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 <sup>2</sup> )	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 Exposures				
300-1500	--	--	F/1500	30
1500-100,000	--	--	1	30

F= Frequency in MHz

Friis Formula

Friis transmission formula:  $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

$P_d$  = power density in  $\text{mW/cm}^2$

$P_{out}$  = 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

$P_d$  is the limit of MPE, 1  $\text{mW/cm}^2$ . If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance  $r$  where the MPE limit is reached.

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is  $\leq 1.0$ .

## 2.2. Test Result of RF Exposure Evaluation

Product : 4G/LTE Broadband Router with PoE  
 Test Item : RF Exposure Evaluation  
 Test Site : N/A

### LTE Band 2 -Peak Gain: 3dBi

Frequency	Conducted Peak Power (dBm)	Maximum EIRP (W)	Maximum EIRP Limit (W)	Duty Cycle (%)	Conducted Average Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Pass/Fail
1852.5	22.15	0.327	2	100	22.15	164.06	0.0651	1	Pass
1880	22.09	0.323	2	100	22.09	161.81	0.0642	1	Pass
1900	22.23	0.333	2	100	22.23	167.11	0.0663	1	Pass

Note: The conducted output power is refer to report No.: 1910066R-HPUSP40V00 from the DEKRA.

### WLAN

#### Peak Gain for 2.4G: 2.5dBi

Band	Frequency	Conducted maximum Peak Power (dBm)	Worst case Duty Cycle (%)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Pass/Fail
2.4	2437	26.21	69.07	604.9	0.214	1	Pass

Note: The conducted output power is refer to report No.: 1910066R-RFUSP26V00 from the DEKRA.

## 2.3. calculations for Multi-Transmitter

Mode	Exposure Calculations	result	Limit	Pass/Fail
WLAN	0.214	0.2803	1	Pass
WWAN	0.0663			