RF Exposure Evaluation Declaration

Product Name	:	4G/LTE Industrial M2M Router
Trade Name	:	BEC, Billion
Model No.	:	MX-230 M1
FCC ID.	:	QI3BIL-MX230M1

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	:	Jul. 03, 2018
Date of Declaration	:	Jul. 27, 2018
Report No.	:	1870018R-SAUSP03V00
Report Version	:	V1.0

Testing Laboratory
3024

1. RF Exposure Evaluation

1.1. 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^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 Exposures				
300-1500	--	--	F/1500	6
1500-100,000	--	--	1	30

F= Frequency in MHz

Friis Formula

Friis 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 = 3.1416

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

Pd id the limit of MPE, 1 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.

1.2. Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

The temperature and related humidity: 18℃ and 78％ RH.

1.3. Test Result of RF Exposure Evaluation

Product	4G/LTE Industrial M2M Router
Test Mode	Mode 1: LTE_CAT-M1_Band 13_QPSK_Link Mode 2: LTE_CAT-M1_Band 13_16-QAM_Link
Test Condition	RF Exposure Evaluation

Antenna Gain

Based on the Maximum Conducted Output Power, the usable maximum antenna gain is 0.28 dBi or 1.07 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

Frequency (MHz)	Maximum Output Power by manufacturer's declaration		Conducted Output Power by Testing		Maximum Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2.)
	(dBm)	(mW)	(dBm)	(mW)		
779.5	25	316.23	23.91	246.04	0.052	0.520
782.0	25	316.23	24.08	255.86	0.054	0.521
784.5	25	316.23	23.72	235.50	0.050	0.523