

RF Exposure Evaluation Declaration

Product Name : Multi-Service Modular Router

Brand Name : BEC, Billion

Model No. : BEC MX-600

FCC ID : QI3BEC-MX600

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 : Aug. 27, 2021

Issued Date : Nov. 04, 2021

Report No. : 2181152R-RFUSMPEV02

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.

This report must not be used to claim product endorsement by TAF or any agency of the government.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

The test report shall not be reproduced except in full without the written approval of DEKRA Testing and Certification Co., Ltd.

Test Result for Inspection



Product Name : Multi-Service Modular Router
Applicant : Billion Electric Co., Ltd.
Address : 8F., No.192, Sec. 2, Zhongxing Rd., Xindian Dist., New Taipei
City 231, Taiwan (R.O.C.)
Manufacturer : Billion Electric Co., Ltd.
Address : 8F., No.192, Sec. 2, Zhongxing Rd., Xindian Dist., New Taipei
City 231, Taiwan (R.O.C.)
Brand Name : BEC, Billion
Model No. : BEC MX-600
FCC ID : QI3BEC-MX600
EUT Voltage : DC 12V or DC 15V (adapter)
Testing Voltage : AC 120V/60Hz
Applicable Standard : FCC 47 CFR Part 2.1091 Radiofrequency radiation exposure
evaluation: mobile devices.
Test Lab : Hsin Chu Laboratory
Address : No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu
County 310, Taiwan, R.O.C.
TEL: +886-3-582-8001 / FAX: +886-3-582-8958
Test Result : Complied

Documented By :



(Amelia Wu / Project Specialist)

Approved By :



(Louis Hsu / Deputy Manager)

The test results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of DEKRA Testing and Certification Co., Ltd.

Revision History

Version	Description	Issued Date
V1.0	Initial issue of report	Nov. 04, 2021

1. General Information

1.1. EUT General Information

RF General Information			
Evaluation Mode	Frequency Range (MHz)	Operating Frequency (MHz)	Modulation Type
WLAN 2.4 GHz	2400 ~ 2483.5	2412 ~ 2462	802.11b: DSSS 802.11g/n: OFDM
WLAN 5 GHz	5150 ~ 5250 5725 ~ 5850	5180 ~ 5240 5745 ~ 5825	802.11a/n/ac: OFDM

Optional Accessories Information					
Product	Brand Name	Model No.	FCC ID	Uplink Frequency Range (MHz)	Downlink Frequency Range (MHz)
LTE Modem	BEC	MX-100UG	Contains module FCC ID: RI7LM960	LTE Band 2: 1850 ~ 1910	LTE Band 2: 1930 ~ 1990
				LTE Band 5: 824 ~ 849	LTE Band 5: 869 ~ 894
				LTE Band 13: 777 ~ 787	LTE Band 13: 746 ~ 756
				LTE Band 66: 1710 ~ 1780	LTE Band 66: 2110 ~ 2200

The difference for each model is shown as below:

Brand Name	Description
BEC	There is nothing different of two brand names, just for different marketing use.
Billion	

Note: The above EUT information is declared by the manufacturer.

1.2. Test Facility

Laboratory Information

USA : **FCC Registration Number: TW3024**
Canada : **CAB identifier : TW3024**

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: <http://www.dekra.com.tw>

If you have any comments, please don't hesitate to contact us. Our test sites as below:

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
Address	1. No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C. 2. No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.
Phone number	1. +886-3-582-8001 2. +886-3-582-8001
Fax number	1. +886-3-582-8958 2. +886-3-582-8958
E mail address	info.tw@dekra.com
Website	http://www.dekra.com.tw
Note: Test site number for address 1 includes SR2-H. Test site number for address 2 includes CB2-H, CB3-H, CB4-H, SR10-H and SR12-H.	

2. RF Exposure Evaluation

2.1. Test Limit

(A) Test Limit for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	*(100)	<6
3.0-30	1842/f	4.89/f	*(900/f ²)	<6
30-300	61.4	0.163	1.0	<6
300-1500	-	-	f/300	<6
1500-100,000	-	-	5	<6

(B) Test Limit for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f ²)	<30
30-300	27.5	0.073	0.2	<30
300-1500	-	-	f/1500	<30
1500-100,000	-	-	1.0	<30

Note: f = frequency in MHz; *Plane-wave equivalent power density

Power Density (S) is calculated by the following formula:

$$S = (P \cdot G) / 4\pi R^2$$

where:

S = power density (in appropriate units, e.g. mW/ cm²)

P = power input to the antenna (in appropriate units, e.g., mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

π = 3.1416

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

2.2. Test Result of RF Exposure Evaluation

Exposure Environment: General Population / Uncontrolled Exposure

Evaluation Mode	E.I.R.P (dBm)	E.I.R.P (mW)	Power Density (mW/cm ²)	Limit (mW/cm ²)	PASS / FAIL
WLAN 2.4 GHz	23.700	234.423	0.047	1.000	PASS
WLAN 5 GHz Band 1	24.804	302.273	0.060	1.000	PASS
WLAN 5 GHz Band 4	23.971	249.517	0.050	1.000	PASS
LTE Band 2	33.010	1999.862	0.398	1.000	PASS
LTE Band 5	30.500	1122.018	0.223	0.549	PASS
LTE Band 13	30.500	1122.018	0.223	0.518	PASS
LTE Band 66	30.000	1000.000	0.199	1.000	PASS

Distance (cm): 20

Co-location
Conclusion: The formula of calculated the MPE is: $CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$ CPD = Calculation power density LPD = Limit of power density Simultaneous Transmission Analysis Mode: - WLAN 2.4 GHz function + WWAN LTE function = $0.047 + 0.431 = 0.478$, therefore the maximum calculations of above situations are less than the "1" limit. - WLAN 5 GHz function + WWAN LTE function = $0.060 + 0.431 = 0.491$, therefore the maximum calculations of above situations are less than the "1" limit.

Note:

- The above EUT information is declared by the manufacturer.
- The results are evaluated using the maximum power.