

IEEE C95.1**KDB 447498 D01 v06****47 C.F.R. Part 1, Subpart I, Section 1.1310
47 C.F.R. Part 2, Subpart J, Section 2.1091****RF EXPOSURE REPORT****For****ZigBee Module****Model: MD1000****Trade Name: Billion****Issued for****Billion Electric Co., Ltd.****8F., No.192, Sec. 2, Zhongxing Rd., Xindian Dist., New Taipei City 231,
Taiwan (R.O.C.)****Issued by****Compliance Certification Services Inc.
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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	10/03/2016	Initial Issue	All Page	Michelle Chiu

TABLE OF CONTENTS

1. LIMIT	4
2. EUT SPECIFICATION.....	4
3. TEST RESULTS	5
4. MAXIMUM PERMISSIBLE EXPOSURE.....	6

1. Limit

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this chapter.

2. EUT Specification

Product Name	ZigBee Module
Model Number	MD1000
Identify Number	T160809S01
Received Date	August 09, 2016
Frequency band (Operating)	2405MHz ~ 2480MHz
Device category	Mobile (>20cm separation)
Exposure classification	<input type="checkbox"/> Occupational/Controlled exposure ($S = 5\text{mW/cm}^2$) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure ($S=1\text{mW/cm}^2$)
Antenna Specification	Internal : PCB Antenna x 1, Antenna Gain : 2.73dBi External : Dipole Antenna x 1, Antenna Gain : 1.8dBi
Maximum average output power	Zigbee Mode: 7.66 dBm
Evaluation applied	MPE Evaluation*

Remark:

1. For more details, please refer to the User's manual of the EUT.
2. This submittal(s) (test report) is intended for FCC ID: QI3BIL-MD1000 filing.

3. Test Results

No non-compliance noted.

Calculation

$$\text{Given } E = \frac{\sqrt{30 \times P \times G}}{d} \quad \& \quad S = \frac{E^2}{3770}$$

Where E = Field strength in Volts / meter

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770 d^2}$$

Changing to units of mW and cm, using:

$P(\text{mW}) = P(\text{W}) / 1000$ and

$d(\text{cm}) = d(\text{m}) / 100$

Yields

$$S = \frac{30 \times (P/1000) \times G}{377 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \text{Equation 1}$$

Where d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm^2

4. Maximum Permissible Exposure

Substituting the MPE safe distance using $d = 20$ cm into Equation 1:

$$S = 0.000199 \times P \times G$$

Where

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

Mode	Frequency (MHz)	Power (dBm)	Ant. Gain (dBi)	Distance (cm)	Power density (mW/cm ²)	Limit (mW/cm ²)
Zigbee	2405	7.66	2.73	20	0.0022	1