KDB 447498 D03
IEEE C95.1
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

IoT Gateway

Model: XI*(*=0~9, A~Z or Blank)

Trade Name: N/A

Issued to

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Testing Laboratory
1309

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	2016/1/14	Initial Issue	ALL	Becca Chen

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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

EUT	IoT Gateway		
Model	XI*(*=0~9, A~Z or Blank)		
RF Module	Broadcom	Model:	BCM43438
Model Discrepancy	All the above models are identical except for the designation of model numbers. The suffix of (*=0~9, A~Z or Blank) on model number is just for marketing purpose only.		
Frequency band (Operating)	☒ 802.11b/g/n HT20: 2.412GHz ~ 2.462GHz ☒ Bluetooth 2.1 + EDR: 2402 ~ 2480 MHz ☒ Bluetooth 4.0: 2402 ~ 2480 MHz ☐ Others		
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others		
Exposure classification	☐ Occupational/Controlled exposure (S = 5mW/cm^2) ☒ General Population/Uncontrolled exposure (S=1mW/cm^2)		
Antenna Specification	Monople-coupled Antenna: 2.4GHz: Antenna Gain : 2.19 dBi (Numeric gain 1.66)		
Maximum Average output power	IEEE 802.11b Mode: 16.49 dBm (44.566 mW) IEEE 802.11g Mode: 15.77 dBm (37.757 mW) IEEE 802.11n HT 20 Mode: 14.78 dBm (30.061 mW) Bluetooth 2.1 + EDR: 9.14 dBm (8.204 mW) Bluetooth 4.0: 7.47 dBm (5.585 mW)		
Maximum Tune up Power	IEEE 802.11b Mode: 18.00 dBm (63.096 mW) IEEE 802.11g Mode: 17.00 dBm (50.119 mW) IEEE 802.11n HT 20 Mode: 16.00 dBm (39.811 mW) Bluetooth 2.1 + EDR: 11.00 dBm (12.589 mW) Bluetooth 4.0: 9.00 dBm (7.943 mW)		
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A		

3. TEST RESULTS

No non-compliance noted.

Calculation

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{377}$

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:

$$S = \frac{30 \times P \times G}{377 d^2}$$

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and

d (cm) = d(m) / 100

Yields

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

IEEE 802.11b mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm2)
1	2412	63.096	1.66	20	0.0208	1

IEEE 802.11g mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm2)
1	2412	50.119	1.66	20	0.0166	1

IEEE 802.11n HT20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm2)
11	2462	39.811	1.66	20	0.0132	1

Bluetooth 2.1 + EDR: :

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm2)
1	2402	12.589	1.66	20	0.0042	1

Bluetooth 4.0 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm2)
0	2402	7.943	1.66	20	0.0026	1