RADIO FREQUENCY EXPOSURE

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.

EUT Specification

EUT	Module
Model	830E
Frequency band (Operating)	☒ 802.11b/g: 2.412GHz ~ 2.462GHz ☐ 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	2.4GHz: Antenna 1 Gain : 14.00 dBi (Numeric gain 25.12) 2.4GHz: Antenna 2 Gain : 8.00 dBi (Numeric gain 6.31) 2.4GHz: Antenna 3 Gain : 14.00 dBi (Numeric gain 25.12)
Maximum Average output power	Yagi Antenna: IEEE 802.11b Mode: 18.29 dBm (67.453 mW) IEEE 802.11g Mode: 19.62 dBm (91.622 mW) Omni Antenna: IEEE 802.11b Mode: 17.03 dBm (50.466 mW) IEEE 802.11g Mode: 19.87 dBm (97.051 mW) Patch Antenna: IEEE 802.11b Mode: 18.30 dBm (67.608 mW) IEEE 802.11g Mode: 18.71 dBm (74.302 mW)
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	2014/10/13	Initial Issue	ALL	Gloria Chang

TEST RESULTS

No non-compliance noted.

Calculation

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

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 (mW) = P (W) / 1000 and

d (cm) = d(m) / 100

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$ ***Equation 1***

Where d = Distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm^2

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 / Antenna 1:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm²)
2412~2462	67.453	25.12	20	0.3372	1

IEEE 802.11g mode / Antenna 1:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm²)
2412~2462	91.622	25.12	20	0.4580	1

IEEE 802.11b mode / Antenna 2:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm²)
2412~2462	50.466	6.31	20	0.0634	1

IEEE 802.11g mode / Antenna 2:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm²)
2412~2462	97.051	6.31	20	0.1219	1

IEEE 802.11b mode / Antenna 3:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm²)
2412~2462	67.608	25.12	20	0.3380	1

IEEE 802.11g mode / Antenna 3:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm²)
2412~2462	74.302	25.12	20	0.3714	1