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	MoCA to WiFi extender
Model	HT-EMN2

Frequency band (Operating)	☒ 802.11b/g/n HT20: 2.412GHz ~ 2.462GHz
	☒ 802.11gn HT40: 2.422GHz ~ 2.452GHz
	☒ 802.11a, 802.11ac VHT20 : 5180 MHz ~ 5240 MHz /
	          5745 MHz ~ 5825 MHz
	802.11ac VHT40 : 5190 MHz ~ 5230 MHz /
	          5755 MHz ~ 5795 MHz
	802.11ac VHT80 : 5210 MHz / 5775 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	Airgain Embedded Antenna × 2 , 2.4GHz: Antenna 0 (Chian 0)Gain 1.90 dBi (Numeric gain 1.55) 2.4GHz: Antenna 1 (Chian 1)Gain 1.20 dBi (Numeric gain 1.32) Airgain Embedded Antenna × 2 , 5GHz: Antenna 0 (Chian 0)Gain 3.20 dBi (Numeric gain 2.09) 5GHz: Antenna 1 (Chian 1)Gain 3.10 dBi (Numeric gain 2.04)

Maximum output power	2.4G IEEE 802.11b Mode: 19.06 dBm (80.538 mW) IEEE 802.11g Mode: 26.16 dBm (413.048 mW) IEEE 802.11gn HT 20 Mode: 25.82 dBm (381.944 mW) IEEE 802.11gn HT 40 Mode: 25.74 dBm (374.973 mW) 5G UNII Band 1 IEEE 802.11a Mode: 16.82 dBm (48.084 mW) IEEE 802.11ac VHT20 Mode: 15.79 dBm (37.931 mW) IEEE 802.11ac VHT40 Mode: 15.86 dBm (38.548 mW) IEEE 802.11ac VHT80 Mode: 15.89 dBm (38.815 mW) 5G UNII Band 3 IEEE 802.11a Mode: 17.39 dBm (54.828 mW) IEEE 802.11ac VHT20 Mode: 16.67 dBm (46.452 mW) IEEE 802.11ac VHT40 Mode: 16.59 dBm (45.604 mW) IEEE 802.11ac VHT80 Mode: 16.40 dBm (43.652 mW)
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	06/16/2015	Initial Issue	ALL	Gloria Chang

TEST RESULTS

No non-compliance noted.

Calculation

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

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

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

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 / cm^2

IEEE 802.11b mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
2412 ~ 2462	80.538	1.55	20	0.0248	1

IEEE 802.11g mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
2412 ~ 2462	413.048	1.55	20	0.1274	1

IEEE 802.11gn HT20 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
2412 ~ 2462	381.944	1.55	20	0.1178	1

IEEE 802.11gn HT40 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
2422 ~ 2452	374.973	1.55	20	0.1157	1

5G UNII Band 1

IEEE 802.11a mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5180 ~ 5240	48.084	2.09	20	0.0200	1

IEEE 802.11ac VHT20 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5180 ~ 5240	37.931	2.09	20	0.0158	1

IEEE 802.11ac VHT40 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5190 ~ 5230	38.548	2.09	20	0.0160	1

IEEE 802.11ac VHT80 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5210	38.815	2.09	20	0.0161	1

5G UNII Band 3

IEEE 802.11a mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5475 ~ 5825	54.858	2.09	20	0.0228	1

IEEE 802.11ac VHT20 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5475 ~ 5825	46.452	2.09	20	0.0193	1

IEEE 802.11ac VHT40 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5755 ~ 5795	45.604	2.09	20	0.0190	1

IEEE 802.11ac VHT80 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5775	43.652	2.09	20	0.0182	1

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Simultaneously MPE

Simultaneously MPE = MPE1/Limit1 + MPE2/Limit2

2.4G + 5G

Simultaneously MPE = 0.1274 + 0.0228= 0.1502 mW/cm^2

Simultaneously MPE

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