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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

Moca AP cable Modem

Model: CGNVM-3589

Data Applies To : CGNVM-3580,CGNVM-3582

Issued for

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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

Product Name	Moca AP cable Modem
Model Number	CGNVM-3589
Data Applies To	CGNVM-3580,CGNVM-3582
Identify Number	T160324S01
Received Date	March 24, 2016
Frequency band (Operating)	802.11b/g/gn HT20 Mode: 2412MHz ~ 2462MHz 802.11gn HT40 Mode: 2422MHz ~ 2452MHz 802.11a, 802.11ac VHT20 Mode: 5180 MHz ~ 5240 MHz / 5745 MHz ~ 5825 MHz 802.11ac VHT40 Mode: 5190 MHz ~ 5230 MHz / 5755 MHz ~ 5795 MHz 802.11ac VHT80 Mode: 5210 MHz / 5775 MHz
Device category	Mobile (>20cm separation)
Exposure classification	☐ Occupational/Controlled exposure (S = 5mW/cm^2) ☒ General Population/Uncontrolled exposure (S=1mW/cm^2)
Antenna Specification	PIFA Antenna × 3 WiFi (2.4GHz) Ant. 1 (Chain 0): 5.20 dBi (Numeric gain: 3.31) WiFi (2.4GHz) Ant. 2 (Chain 1): 3.90 dBi (Numeric gain: 2.45) WiFi (2.4GHz) Ant. 3 (Chain 2): 3.80 dBi (Numeric gain: 2.40) PIFA Antenna × 4 WiFi (5GHz) Ant. 5 (Chain 0): 4.30 dBi (Numeric gain: 2.69) WiFi (5GHz) Ant. 6 (Chain 1): 5.00 dBi (Numeric gain: 3.16) WiFi (5GHz) Ant. 7 (Chain 2): 4.60 dBi (Numeric gain: 2.88) WiFi (5GHz) Ant. 8 (Chain 3): 5.10 dBi (Numeric gain: 3.24) For beamforming directional gain 10.78 dBm (Numeric gain: 11.97)

Maximum average output power	IEEE 802.11b Mode: 22.31 dBm (170.216 mW) IEEE 802.11g Mode: 21.15 dBm (130.317 mW) IEEE 802.11gn HT 20 Mode: 20.79 dBm (119.950 mW) IEEE 802.11gn HT 40 Mode: 19.73 dBm (93.972 mW) For Non-beamforming : UNII Band 1 : IEEE 802.11a Mode: 24.45 dBm (278.612 mW) IEEE 802.11ac VHT20 Mode: 24.74 dBm (297.852 mW) IEEE 802.11ac VHT40 Mode: 24.70 dBm (295.121 mW) IEEE 802.11ac VHT80 Mode: 16.24 dBm (42.073 mW) UNII Band 3 : IEEE 802.11a Mode: 24.39 dBm (274.789 mW) IEEE 802.11ac VHT20 Mode: 24.99 dBm (315.500 mW) IEEE 802.11ac VHT40 Mode: 24.86 dBm (306.196 mW) IEEE 802.11ac VHT80 Mode: 13.10 dBm (20.417 mW) For Beamforming : UNII Band 1 : IEEE 802.11ac VHT20 Mode: 20.71 dBm (117.761 mW) IEEE 802.11ac VHT40 Mode: 23.80 dBm (239.883 mW) IEEE 802.11ac VHT80 Mode: 16.94 dBm (49.431 mW) UNII Band 3 : IEEE 802.11ac VHT20 Mode: 22.06 dBm (160.694 mW) IEEE 802.11ac VHT40 Mode: 22.05 dBm (160.325 mW) IEEE 802.11ac VHT80 Mode: 17.26 dBm (53.211 mW)
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: U4P-CGNVM358 filing.

3. 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

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

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm²)
2437	170.216	3.31	20	0.1121	1

IEEE 802.11g Mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm²)
2437	130.317	3.31	20	0.0858	1

IEEE 802.11gn HT20 Mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm²)
2462	119.950	3.31	20	0.0790	1

IEEE 802.11gn HT40 Mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm²)
2437	93.972	3.31	20	0.0619	1

For Non-beamforming

UNII Band 1

IEEE 802.11a Mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm²)
5240	278.612	3.24	20	0.1796	1

IEEE 802.11ac VHT20 Mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm²)
5240	297.852	3.24	20	0.1920	1

IEEE 802.11ac VHT40 Mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm²)
5230	295.121	3.24	20	0.1902	1

IEEE 802.11ac VHT80 Mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm²)
5210	42.073	3.24	20	0.0271	1

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)
5825	274.789	3.24	20	0.1771	1

IEEE 802.11ac VHT20 Mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5785	315.5	3.24	20	0.2034	1

IEEE 802.11ac VHT40 Mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5795	306.196	3.24	20	0.1974	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	20.417	3.24	20	0.0132	1

For Beamforming

UNII Band 1

IEEE 802.11ac VHT20 Mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5240	117.761	11.97	20	0.2804	1

IEEE 802.11ac VHT40 Mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5230	239.883	11.97	20	0.5712	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	49.431	11.97	20	0.1177	1

UNII Band 3

IEEE 802.11ac VHT20 Mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5825	160.694	11.97	20	0.3827	1

IEEE 802.11ac VHT40 Mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5795	160.325	11.97	20	0.3818	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	53.211	11.97	20	0.1267	1

Simultaneously MPE

Simultaneously MPE = MPE 1 / Limit 1 + MPE 2 / Limit2

2.4GHz + 5GHz

Simultaneously MPE = (0.0858 mW/cm^2 /1) + (0.5712 mW/cm^2 /1) = 0.657