

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

Moca AP cable Modem

Model: CGNVM-3589

Data Applies To : CGNVM-3580,CGNVM-3582

Issued for

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Issued Date: June 21, 2016



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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	06/21/2016	Initial Issue	All Page	Michelle Chiu

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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	<input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm ²) <input checked="" type="checkbox"/> 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

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

Where $E = \text{Field strength in Volts / meter}$

$P = \text{Power in Watts}$

$G = \text{Numeric antenna gain}$

$d = \text{Distance in meters}$

$S = \text{Power density in milliwatts / square centimeter}$

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

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

Changing to units of mW and cm, using:

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

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

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 $d = \text{Distance in cm}$

$P = \text{Power in mW}$

$G = \text{Numeric antenna gain}$

$S = \text{Power density in mW / cm}^2$

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 / cm ²	Limit (mW/cm ²)
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 / cm ²	Limit (mW/cm ²)
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 / cm ²	Limit (mW/cm ²)
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 / cm ²	Limit (mW/cm ²)
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 / cm ²	Limit (mW/cm ²)
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 / cm ²	Limit (mW/cm ²)
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 / cm ²	Limit (mW/cm ²)
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 / cm ²	Limit (mW/cm ²)
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/cm² /1) + (0.5712 mW/cm² /1) = 0.657