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

DOCSIS 3.1 wifi Gateway

Model: CODA-4782

Data Applies To: CODA-4682, CODA-4580, CODA-4582

Trade Name: Hitron

Issued for

Hitron Technologies,Inc.

No. 1-8,Lihsin 1st Rd.,HsinChu Science Park,HisnChu,Taiwan 300,R.O.C.

Issued by

Compliance Certification Services Inc.
Hsinchu Lab.

NO. 989-1, Wenshan Rd., Shangshan Village,
Qionglin Township, Hsinchu County 30741, Taiwan (R.O.C.)
http://www.ccsrf.com
service@ccsrf.com
Issued Date: October 21, 2016

TAF
Testing Laboratory
0240

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	10/21/2016	Initial Issue	All Page	Gloria Chang

TABLE OF CONTENTS

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	DOCSIS 3.1 wifi Gateway
Model Number	CODA-4782
Data Applies To	CODA-4682, CODA-4580, CODA-4582
Identify Number	T160919S01
Received Date	September 02, 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 802.11ac VHT160 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	WiFi 2.4GHz Antenna, Dipole Antenna × 3 : Ant. 1 / Chain 2, Antenna Gain : 3.69dBi Ant. 2 / Chain 0, Antenna Gain : 3.23dBi Ant. 3 / Chain 1, Antenna Gain : 4.28dBi WiFi 5GHz Antenna, Dipole Antenna × 4 : Ant. 4 / Chain 2, Antenna Gain : 4.51dBi Ant. 5 / Chain 1, Antenna Gain : 6.10dBi Ant. 6 / Chain 0, Antenna Gain : 4.94dBi Ant. 7 / Chain 3, Antenna Gain : 4.83dBi For Beamforming Directional Gain : 11.14dBi

Maximum average output power	IEEE 802.11b Mode: 23.22 dBm
	IEEE 802.11g Mode: 24.31 dBm
	IEEE 802.11gn HT20 MCS0 Mode: 25.16 dBm
	IEEE 802.11gn HT40 MCS0 Mode: 20.87 dBm
	For Non-beamforming :
	UNII Band 1:
	IEEE 802.11a Mode: 22.71 dBm
	IEEE 802.11ac VHT20 NSS1/MCS0 Mode: 22.76 dBm
	IEEE 802.11ac VHT40 NSS1/MCS0 Mode: 26.38 dBm
	IEEE 802.11ac VHT80 NSS1/MCS0 Mode: 20.67 dBm
	UNII Band 3:
	IEEE 802.11a Mode: 25.27 dBm
	IEEE 802.11ac VHT20 NSS1/MCS0 Mode: 25.33 dBm
	IEEE 802.11ac VHT40 NSS1/MCS0 Mode: 26.04 dBm
	IEEE 802.11ac VHT80 NSS1/MCS0 Mode: 25.66 dBm
	UNII Band 1 + Band 3:
	IEEE 802.11ac VHT160 NSS1/MCS0 Mode:
	18.17 dBm / 18.40 dBm
	For Beamforming :
	UNII Band 1:
	IEEE 802.11a Mode: 22.07 dBm
	IEEE 802.11ac VHT20 NSS1/MCS0 Mode: 22.63 dBm
	IEEE 802.11ac VHT40 NSS1/MCS0 Mode: 23.61 dBm
	IEEE 802.11ac VHT80 NSS1/MCS0 Mode: 18.97 dBm
	UNII Band 3:
	IEEE 802.11a Mode: 24.11 dBm
	IEEE 802.11ac VHT20 NSS1/MCS0 Mode: 24.45 dBm
	IEEE 802.11ac VHT40 NSS1/MCS0 Mode: 24.41 dBm
	IEEE 802.11ac VHT80 NSS1/MCS0 Mode: 24.21 dBm
	UNII Band 1 + Band 3:
	IEEE 802.11ac VHT160 NSS1/MCS0 Mode:
	15.54 dBm / 22.46 dBm
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: 2AHKM-CODA4782 filing.*
3. *The model CODA-4782 was considered the main model for testing.*

3. 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

$$S = \frac{30 \times (P/1000) \times G}{377 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \qquad \textit{Equation 1}$$

Where   d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

4. Maximum Permissible Exposure

Substituting the MPE safe distance using d = **21** 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

Mode	Frequency (MHz)	Power (dBm)	Ant. Gain (dBi)	Distance (cm)	Power density (mW/cm^2)	Limit (mW/cm^2)
IEEE 802.11b	2437	23.22	4.28	21	0.1015	1
IEEE 802.11g	2437	24.31	4.28	21	0.1304	1
IEEE 802.11gn HT20 MCS0	2437	25.16	4.28	21	0.1586	1
IEEE 802.11gn HT40 MCS0	2437	20.87	4.28	21	0.0591	1
For Non-beamforming :						
UNII Band 1:						
IEEE 802.11a	5240	22.71	6.10	21	0.1372	1
IEEE 802.11ac VHT20 NSS1/MCS0	5240	22.76	6.10	21	0.1388	1
IEEE 802.11ac VHT40 NSS1/MCS0	5230	26.38	6.10	21	0.3194	1
IEEE 802.11ac VHT80 NSS1/MCS0	5210	20.67	6.10	21	0.0858	1
UNII Band 3:						
IEEE 802.11a	5745	25.27	6.10	21	0.2474	1
IEEE 802.11ac VHT20 NSS1/MCS0	5825	25.33	6.10	21	0.2508	1
IEEE 802.11ac VHT40 NSS1/MCS0	5755	26.04	6.10	21	0.2954	1
IEEE 802.11ac VHT80 NSS1/MCS0	5775	25.66	6.10	21	0.2706	1
UNII Band 1 + Band 3:						
IEEE 802.11ac VHT160 NSS1/MCS0	5210	18.17	6.10	21	0.0482	1
IEEE 802.11ac VHT160 NSS1/MCS0	5775	18.40	6.10	21	0.0509	1

For Beamforming :						
UNII Band 1:						
IEEE 802.11a	5180	22.07	11.14	21	0.3779	1
IEEE 802.11ac VHT20 NSS1/MCS0	5200	22.63	11.14	21	0.4299	1
IEEE 802.11ac VHT40 NSS1/MCS0	5230	23.61	11.14	21	0.5387	1
IEEE 802.11ac VHT80 NSS1/MCS0	5210	18.97	11.14	21	0.1851	1
UNII Band 3:						
IEEE 802.11a	5785	24.11	11.14	21	0.6044	1
IEEE 802.11ac VHT20 NSS1/MCS0	5785	24.45	11.14	21	0.6536	1
IEEE 802.11ac VHT40 NSS1/MCS0	5755	24.41	11.14	21	0.6477	1
IEEE 802.11ac VHT80 NSS1/MCS0	5775	24.21	11.14	21	0.6185	1
UNII Band 1 + Band 3:						
IEEE 802.11ac VHT160 NSS1/MCS0	5210	15.54	11.14	21	0.0840	1
IEEE 802.11ac VHT160 NSS1/MCS0	5775	22.46	11.14	21	0.4134	1

Simultaneously MPE

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

WiFi 2.4GHz + 5GHz Mode

Simultaneously MPE = (0.1586 / 1) + (0.6536 / 1) = **0.8122 mW/cm^2**