IEEE C95.1
KDB 447498 D03
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

Wireless-N Selectable-Band Access Point with PoE

Model: WAP321

Trade Name: Cisco

Issued to

Sercomm Corporation
8F, No. 3-1, YuanQu St., NanKang, Taipei 115, Taiwan, R.O.C.

Issued by

Compliance Certification Services Inc.
No.11, Wugong 6th Rd., Wugu Dist.,
New Taipei City 24891, Taiwan. (R.O.C.)
http://www.ccsrf.com
service@ccsrf.com
Issued Date: August 06, 2015

Testing Laboratory
1309

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	2015/08/06	Initial Issue	ALL	Doris Chu

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

EUT	Wireless-N Selectable-Band Access Point with PoE
Model	WAP321
Frequency band (Operating)	☒ 802.11b/g/n HT20: 2.412GHz ~ 2.462GHz 802.11n HT40: 2.422GHz ~ 2.452GHz 802.11a/n HT20: 5.180GHz ~ 5.240GHz / 5.745 ~ 5.825GHz 802.11n HT40: 5.190GHz ~ 5.230GHz / 5.755 ~ 5.795GHz ☐ 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	**Antenna 1:** 2.4GHz: Antenna Gain : 4.32 dBi (Numeric gain: 2.70) 5 GHz: Antenna Gain : 4.88 dBi (Numeric gain: 3.08) **Antenna 2:** 2.4GHz: Antenna Gain : 4.67 dBi (Numeric gain: 2.93) 5 GHz: Antenna Gain : 4.97 dBi (Numeric gain: 3.14) **Antenna 3:** 2.4GHz: Antenna Gain : 3.96 dBi (Numeric gain: 2.49) 5 GHz: Antenna Gain : 4.74 dBi (Numeric gain: 2.98) **Mode 1 (Ant1 + Ant2) :** 2.4GHz: Directional gain = 4.67 dBi +10log (2) = 7.68 dBi (Numeric gain: 5.86) 5GHz: Directional gain = 4.97 dBi +10log (2) = 7.98 dBi (Numeric gain: 6.28) **Mode 2 (Ant2 + Ant3):** 2.4GHz: Directional gain = 4.67 dBi +10log (2) = 7.68 dBi (Numeric gain: 5.86) 5GHz: Directional gain = 4.97 dBi +10log (2) = 7.98 dBi (Numeric gain: 6.28) **Mode 3 (Ant1 + Ant3)::** 2.4GHz: Directional gain = 4.32 dBi +10log (2) = 7.33 dBi (Numeric gain: 5.41) 5GHz: Directional gain = 4.88 dBi +10log (2) = 7.89 dBi (Numeric gain: 6.15)

Maximum Average output power	IEEE 802.11b Mode: 17.89 dBm (61.518 mW) IEEE 802.11g Mode: 15.17 dBm (32.885 mW) IEEE 802.11a Mode: 14.83 dBm (30.409 mW) **Mode1:** 2.4GHz IEEE 802.11n HT 20 Mode: 15.50 dBm (35.481 mW) IEEE 802.11n HT 40 Mode: 15.49 dBm (35.400 mW) 5GHz IEEE 802.11n HT 20 Mode: 14.83 dBm (30.409 mW) IEEE 802.11n HT 40 Mode: 15.86 dBm (38.548 mW) **Mode 2:** 2.4GHz IEEE 802.11n HT 20 Mode: 15.52 dBm (35.645 mW) IEEE 802.11n HT 40 Mode: 15.34 dBm (34.198 mW) 5GHz IEEE 802.11n HT 20 Mode: 15.89 dBm (38.815 mW) IEEE 802.11n HT 40 Mode: 14.87 dBm (30.690 mW) **Mode 3:** 2.4GHz IEEE 802.11n HT 20 Mode: 15.54 dBm (35.810 mW) IEEE 802.11n HT 40 Mode: 15.46 dBm (35.156 mW) 5GHz IEEE 802.11n HT 20 Mode: 15.13 dBm (32.584 mW) IEEE 802.11n HT 40 Mode: 15.36 dBm (34.356 mW)

Maximum Tune up Power	IEEE 802.11b Mode: 19.00 dBm (79.433 mW) IEEE 802.11g Mode: 17.00 dBm (50.119 mW) IEEE 802.11a Mode: 16.00 dBm (39.811 mW) **Mode1:** 2.4GHz IEEE 802.11n HT 20 Mode: 17.00 dBm (50.119 mW) IEEE 802.11n HT 40 Mode: 17.00 dBm (50.119 mW) 5GHz IEEE 802.11n HT 20 Mode: 16.00 dBm (39.811 mW) IEEE 802.11n HT 40 Mode: 17.00 dBm (50.119 mW) **Mode 2:** 2.4GHz IEEE 802.11n HT 20 Mode: 17.00 dBm (50.119 mW) IEEE 802.11n HT 40 Mode: 17.00 dBm (50.119 mW) 5GHz IEEE 802.11n HT 20 Mode: 17.00 dBm (50.119 mW) IEEE 802.11n HT 40 Mode: 16.00 dBm (39.811 mW) **Mode 3:** 2.4GHz IEEE 802.11n HT 20 Mode: 17.00 dBm (50.119 mW) IEEE 802.11n HT 40 Mode: 17.00 dBm (50.119 mW) 5GHz IEEE 802.11n HT 20 Mode: 17.00 dBm (50.119 mW) IEEE 802.11n HT 40 Mode: 17.00 dBm (50.119 mW)
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

3. TEST RESULTS

No non-compliance noted.

Calculation

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{377}$

Where E = Field strength in Volts / meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power density in watts / meter

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

$$S = \frac{30 \times P \times G}{377 d^2}$$

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:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm2)
1	2412	79.433	2.93	20	0.0463	1

IEEE 802.11g mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm2)
7	2442	50.119	2.93	20	0.0292	1

IEEE 802.11a mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm2)
157	5785	39.811	3.14	20	0.0249	1

Mode 1

IEEE 802.11n HT20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm2)
7	2442	50.119	5.86	20	0.0584	1

IEEE 802.11n HT40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm2)
7	2442	50.119	5.86	20	0.0584	1

IEEE 802.11n HT20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm2)
157	5785	39.811	6.28	20	0.0498	1

IEEE 802.11n HT40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm²	Limit (mW/cm2)
159	5795	50.119	6.28	20	0.0626	1

Mode 2

IEEE 802.11n HT20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
7	2442	50.119	5.86	20	0.0584	1

IEEE 802.11n HT40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
7	2442	50.119	5.86	20	0.0584	1

IEEE 802.11n HT20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
165	5825	50.119	6.28	20	0.0626	1

IEEE 802.11n HT40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
159	5795	39.811	6.28	20	0.0498	1

Mode 3

IEEE 802.11n HT20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
7	2442	50.119	5.41	20	0.0540	1

IEEE 802.11n HT40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
7	2442	50.119	5.41	20	0.0540	1

IEEE 802.11n HT20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
165	5825	50.119	6.15	20	0.0613	1

IEEE 802.11n HT40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
151	5755	50.119	6.15	20	0.0613	1

5. SIMULTANEOUS TRANSMISSION SAR ANALYSIS

Both of the 2.4GHz band and 5GHz band can transmit simultaneously, the formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1

CPD = Calculation power density

LPD = Limit of power density

Therefore, the worst-case situation is 0.0626 / 1 + 0.0463 / 1 = 0.1089, which is less than “1”.