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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

802.11ac/b/g/n USB module

Model: WUBM-273ACN

Trade Name: SparkLAN

Issued to

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Testing Laboratory
1309

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	2015//12/9	Initial Issue	ALL	Kelly Cheng

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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

EUT	802.11ac/b/g/n USB module
Model	WUBM-273ACN
Frequency band (Operating)	☒ 802.11b/g/n HT20: 2.412GHz ~ 2.462GHz 802.11n HT40: 2.422GHz ~ 2.452GHz 802.11a/n HT20: 5.270GHz ~ 5.310GHz / 5.500 ~ 5.700GHz 802.11n HT40: 5.190GHz ~ 5.230GHz / 5.510~ 5.670GHz 802.11ac VHT80: 5.530GHz ☐ 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	printed Antenna：SparkLAN / WUBM-234ACN Ant #1 Antenna Gain : 3.05 dBi (Numeric gain: 2.02) Ant #2 Antenna Gain : 1.68 dBi (Numeric gain: 1.47) Dipole Antenna：LCT / DFE_ACBSMA-BGP Antenna Gain : 5.00 dBi (Numeric gain: 3.16) Directional gain = 5.00 dBi +10log (2) = 8.01 dBi (Numeric gain 6.32)
Maximum Average output power	IEEE 802.11a Mode: 19.13 dBm (81.846 mW) IEEE 802.11n HT 20 Mode: 17.94 dBm (62.230 mW) IEEE 802.11n HT 40 Mode: 17.49 dBm (56.105 mW) IEEE 802.11ac VHT80 Mode: 10.23 dBm (10.544 mW)
Maximum Tune up Power	IEEE 802.11a Mode: 21.00 dBm (125.893 mW) IEEE 802.11n HT 20 Mode: 19.50 dBm (89.125 mW) IEEE 802.11n HT 40 Mode: 19.00 dBm (79.433 mW) IEEE 802.11ac VHT80 Mode: 12.00 dBm (15.849 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 milliwatts / square centimeter

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

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

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 / cm^2

IEEE 802.11a mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
116	5580	125.893	6.32	20	0.1583	1

IEEE 802.11a HT20 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
56	5280	89.125	6.32	20	0.1121	1

IEEE 802.11a HT40 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
54	5270	79.433	6.32	20	0.0999	1

IEEE 802.11ac VHT80 mode:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm2)
58	5290	15.849	6.32	20	0.0199	1