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RF EXPOSURE REPORT

REPORT NO.: SA140707E06

MODEL NO.: IBR1100LPE

FCC ID: UXX-S3A438A

RECEIVED: July 07, 2014

TESTED: Aug. 06, 2014

ISSUED: Aug. 15, 2014

APPLICANT: Cradlepoint, Inc.

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ISSUED BY: Bureau Veritas Consumer Products Services
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RELEASE CONTROL RECORD

| ISSUE NO. | REASON FOR CHANGE | DATE ISSUED |
|-------------|-------------------|---------------|
| SA140707E06 | Original release | Aug. 15, 2014 |



1. CERTIFICATION

PRODUCT: Industrial Broadband Router
BRAND NAME: cradlepoint
MODEL NO.: IBR1100LPE
TEST SAMPLE: ENGINEERING SAMPLE
APPLICANT: Cradlepoint, Inc.
TESTED DATE: Aug. 06, 2014
STANDARDS: FCC Part 2 (Section 2.1091)
KDB 447498 D03
IEEE C95.1

The above equipment (Model: IBR1100LPE) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Phoenix Huang, **DATE:** Aug. 15, 2014
(Phoenix Huang, Specialist)

APPROVED BY : May Chen, **DATE:** Aug. 15, 2014
(May Chen, Manager)



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2. RF EXPOSURE LIMIT

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

| FREQUENCY RANGE (MHz) | ELECTRIC FIELD STRENGTH (V/m) | MAGNETIC FIELD STRENGTH (A/m) | POWER DENSITY (mW/cm ²) | AVERAGE TIME (minutes) |
|---|-------------------------------|-------------------------------|-------------------------------------|------------------------|
| LIMITS FOR GENERAL POPULATION / UNCONTROLLED EXPOSURE | | | | |
| 300-1500 | ... | ... | F/1500 | 30 |
| 1500-100,000 | ... | ... | 1.0 | 30 |

F = Frequency in MHz

3. MPE CALCULATION FORMULA

$$Pd = (Pout * G) / (4 * \pi * r^2)$$

where

Pd = power density in mW/cm²

Pout = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

r = distance between observation point and center of the radiator in cm

4. CLASSIFICATION

The antenna of this product, under normal use condition, is at least 40cm away from the body of the user. So, this device is classified as **Mobile Device**.



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5. ANTENNA GAIN

The antennas provided to the EUT, please refer to the following table:

| For WLAN used | | | | | | | | |
|-----------------------|---------------------|--|-----------------|-----------------|------------------------------|-----------|----------------|-------------------|
| Ant. No. | Transmitter Circuit | Ant. Gain (dBi) <Excluding cable loss> | Cable Loss (dB) | Net. Gain (dBi) | Frequency range (MHz to MHz) | Ant. Type | Connector Type | Cable Length (mm) |
| 1 (beside DC Jack) | Chain (0) | 4.5 | 1.1 | 3.4 | 2400~2500 | Dipole | R-SMA | 125 |
| | | 5.0 | 1.7 | 3.3 | 5150~5900 | | | |
| For LTE used | | | | | | | | |
| Ant. No. | Transmitter Circuit | Ant. Gain (dBi) <Excluding cable loss> | Cable Loss (dB) | Net. Gain (dBi) | Frequency range (MHz to MHz) | Ant. Type | Connector Type | Cable Length (mm) |
| 1 | Main | 3 | 1.0 | 2 | 700~2700 | Dipole | SMA | 135 |
| 2 | Aux | | | | | | | |
| 3 | Main | 2 | 1.0 | 1 | 700~2700 | Dipole | SMA | 135 |
| 4 | Aux | | | | | | | |

Note: 1. For WLAN: 1TX configuration mode will fix transmission on Chain (0).
2. For LTE: Antenna No.: 1~2 was selected as representative antenna for the test.



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6. CALCULATION RESULT OF MAXIMUM CONDUCTED POWER

For WLAN 2.4GHz (15.247)

802.11b

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY (mW/cm ²) | LIMIT (mW/cm ²) |
|-----------------|----------------------|--------------------|---------------|-------------------------------------|-----------------------------|
| 2412 - 2462 | 206.538 | 3.4 | 40 | 0.02247 | 1 |

802.11g

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY (mW/cm ²) | LIMIT (mW/cm ²) |
|-----------------|----------------------|--------------------|---------------|-------------------------------------|-----------------------------|
| 2412 - 2462 | 203.236 | 3.4 | 40 | 0.02211 | 1 |

802.11n (HT20)

| FREQUENCY BAND (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY (mW/cm ²) | LIMIT (mW/cm ²) |
|----------------------|----------------------|--------------------|---------------|-------------------------------------|-----------------------------|
| 2412 - 2462 | 482.098 | 6.51 | 40 | 0.10735 | 1 |

NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 6.51 \text{ dBi}$.

802.11n (HT40)

| FREQUENCY BAND (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY (mW/cm ²) | LIMIT (mW/cm ²) |
|----------------------|----------------------|--------------------|---------------|-------------------------------------|-----------------------------|
| 2422 - 2452 | 323.3 | 6.51 | 40 | 0.07199 | 1 |

NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 6.51 \text{ dBi}$.



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For WLAN 5GHz (15.407)

802.11a

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY (mW/cm ²) | LIMIT (mW/cm ²) |
|---------------------------|----------------------|--------------------|---------------|-------------------------------------|-----------------------------|
| 5180 – 5240 & 5745 - 5825 | 184.927 | 3.3 | 40 | 0.01966 | 1 |

802.11ac (VHT20)

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY (mW/cm ²) | LIMIT (mW/cm ²) |
|---------------------------|----------------------|--------------------|---------------|-------------------------------------|-----------------------------|
| 5180 – 5240 & 5745 - 5825 | 355.379 | 6.41 | 40 | 0.07733 | 1 |

NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 6.41 \text{ dBi}$.

802.11ac (VHT40)

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY (mW/cm ²) | LIMIT (mW/cm ²) |
|---------------------------|----------------------|--------------------|---------------|-------------------------------------|-----------------------------|
| 5190 – 5230 & 5755 - 5795 | 226.793 | 6.41 | 40 | 0.04935 | 1 |

NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 6.41 \text{ dBi}$.

802.11ac (VHT80)

| FREQUENCY (MHz) | CONDUCTED POWER (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | POWER DENSITY (mW/cm ²) | LIMIT (mW/cm ²) |
|--------------------------------|----------------------|--------------------|---------------|-------------------------------------|-----------------------------|
| 5210 - 5290, 5530, 5610 & 5775 | 45.869 | 6.41 | 40 | 0.00998 | 1.00 |

NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 6.41 \text{ dBi}$.

For WWAN(2G/3G) module:

| Channel | Channel Frequency (MHz) | Output Power to Antenna (mW) | ANTENNA GAIN (dBi) | DISTANCE (cm) | Power Density (mW/cm ²) | Limit of Power Density (mW/cm ²) |
|---------|-------------------------|------------------------------|--------------------|---------------|-------------------------------------|--|
| 128 | 824.2 | 7000 | 0 | 40 | 0.34815 | 0.55 |

Note: 1. Limit of Electric field=F/1500

2. This product can operate with a plug-in Cellular Modem device which has maximum of 7W output power.



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CONCLUSION:

All of the WLAN, WWAN(2G/3G) and LTE(4G) can transmit simultaneously, the formula of calculated the MPE is:

$$\text{CPD}_1 / \text{LPD}_1 + \text{CPD}_2 / \text{LPD}_2 + \dots \text{etc.} < 1$$

CPD = Calculation power density

LPD = Limit of power density

For WLAN (2.4GHz), WLAN (5GHz) and WWAN(2G/3G):

Therefore, the worst-case situation is $0.10735 / 1 + 0.07733 / 1 + 0.34815 / 0.55 = 0.818$, which is less than "1". This confirmed that the device comply with FCC 1.1310 MPE limit.

-- END --