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.
ADDRESS:	805W. Franklin Street, Boise, ID 83702-5560 USA

ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
LAB ADDRESS :	No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (1):	No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

This report should not be used by the client to claim product certification, approval, or endorsement by any government agencies.

TABLE OF CONTENTS

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

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/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

pi = 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**.

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	Connecter 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			
2 (beside RJ45)	Chain (1)	4.5	0.9	3.6	2400~2500	Dipole	R-SMA	70
		5.0	1.5	3.5	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	Connecter Type	Cable Length (mm)
1	Main	3	1.0	2	700~2700	Dipole	SMA	135
2	Aux							85
3	Main	2	1.0	1	700~2700	Dipole	SMA	135
4	Aux							85

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.

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] = 6.51dBi.

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] = 6.51dBi.

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] = 6.41dBi.

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] = 6.41dBi.

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] = 6.41dBi.

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.

CONCLUSION:

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

$CPD_1 / LPD_1 + CPD_2 / LPD_2$ + ……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 ---