RF Exposure Report

Report No.:	SA171013E04
FCC ID:	UXXS3A748A
Test Model:	S3A748A, S3A749A
Received Date:	Oct. 13, 2017
Test Date:	Oct. 28, 2017
Issued Date:	Nov. 21, 2017
Applicant:	Cradlepoint, Inc
Address:	1111 W. Jefferson Street Suite 400 Boise, ID 83702 USA
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.

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Release Control Record

Issue No.	Description	Date Issued
SA171013E04	Original release.	Nov. 21, 2017

1 Certificate of Conformity

Product:	Integrated Mobile Broadband Router
Brand:	cradlepoint
Test Model:	S3A748A, S3A749A
Sample Status:	ENGINEERING SAMPLE
Applicant:	Cradlepoint, Inc
Test Date:	Oct. 28, 2017
Standards:	FCC Part 2 (Section 2.1091) KDB 447498 D01 General RF Exposure Guidance v06 IEEE C95.1-1992

The above equipment 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 : Mary Ko , **Date:** Nov. 21, 2017

Mary Ko / Specialist

Approved by : , **Date:** Nov. 21, 2017

May Chen / Manager

2 RF Exposure

2.1 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				
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	($180/f^2$)*	30
30-300	27.5	0.073	0.2	30
300-1500	…	…	f/1500	30
1500-100,000	…	…	1.0	30

f = Frequency in MHz ; *Plane-wave equivalent power density

2.2 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

2.3 Classification

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

WLAN Antenna Spec.

Antenna No.	Model	Ant. Gain (dBi)	Frequency range (MHz)	Antenna Type	Antenna Connector
1	IWX-1511RSJX-999	5	2400~2483.5	Dipole	R-SMA

LTE Antenna Spec.

Ant Set	Model	Chain No.	Ant. Gain (dBi)	Frequency range (MHz)	Antenna Type	Antenna Connector	Cable Length (mm)
1	YWX-614XSACX-711	Main	0	698~960	Dipole	SMA	100
			2	1710~2170			
			3	2500~2700			
	YWX-614XSACX-711	Aux	0	698~960	Dipole	SMA	100
			2	1710~2170			
			3	2500~2700			
2	AN0727-67S02BSM	Main	-0.3	700~960	Dipole	SMA	100
			3.0	1710~2700			
	AN0727-67S02BSM	Aux	-0.3	700~960	Dipole	SMA	100
			3.0	1710~2700			

Note: GPS antenna is used with LTE antenna.

2.5 Calculation Result of Maximum Conducted Power

For WLAN

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2412-2462	338.065	5	20	0.21268	1

For 3G/LTE (FCC ID: N7NWP76A)

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
777-787	242	-0.3	20	0.0449	0.518*

Note: *Limit of Power Density = F/1500

For 3G/LTE (FCC ID: N7NWP76C)

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
699-716	230	0	20	0.04576	0.4665*

Note: *Limit of Power Density = F/1500

Conclusion:

The formula of calculated the MPE is:

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

CPD = Calculation power density

LPD = Limit of power density

WLAN 2.4GHz + 3G/LTE (FCC ID: N7NWP76A) = 0.21268 / 1 + 0.0449 / 0.518 = 0.29942

WLAN 2.4GHz + 3G/LTE (FCC ID: N7NWP76C) = 0.21268 / 1 + 0.04576 / 0.4665 = 0.31078

Therefore the maximum calculations of above situations are less than the “1” limit.

Appendix

3G/LTE module
MPE Evaluation for FCC ID: N7NWP76A Radio Module

Mode	Equipment Category	Transmitter Range (MHz)		Maximum		Antenna Gain (dBi)	Power Density (mW/cm^2)		Ratio
		Start	Stop	(dBm)	(W)		Vaule	Limit	
LTE	LTE Band 4 QPSK	1710	1755	23.34	0.216	3	0.0857	1	0.08574
	LTE Band 4 16QAM	1710	1755	23.12	0.205	3	0.0814	1	0.08137
	LTE Band 13 QPSK	777	787	23.84	0.242	-0.3	0.0449	0.518	**0.08674**
	LTE Band 13 QPSK	777	787	23.71	0.235	-0.3	0.0436	0.518	0.08423
	LTE Band 13 16QAM	777	787	23.03	0.201	-0.3	0.0373	0.518	0.07205

3G/LTE module
MPE Evaluation for FCC ID: N7NWP76C Radio Module

Mode	Equipment Category	Transmitter Range (MHz)		Maximum		Antenna Gain (dBi)	Power Density (mW/cm^2)		Ratio
		Start	Stop	(dBm)	(W)		Vaule	Limit	
WCDMA	Band V	824	849	23.65	0.232	0	0.0462	0.54933	0.08401
	Band IV	1710	1755	23.77	0.238	2	0.075	1	0.07504
	Band II	1850	1910	23.38	0.218	2	0.0687	1	0.06874
LTE	LTE Band 5 QPSK	824	849	23.69	0.234	0	0.0466	0.54933	0.08474
	LTE Band 5 QPSK	824	849	23.05	0.202	0	0.0402	0.54933	0.07316
	LTE Band 5 16QAM	824	849	22.76	0.189	0	0.0376	0.54933	0.06845
	LTE Band 4 QPSK	1710	1755	23.34	0.216	2	0.0681	1	0.06811
	LTE Band 4 16QAM	1710	1755	23.12	0.205	2	0.0646	1	0.06464
	LTE Band 2 QPSK	1850	1910	23.2	0.209	2	0.0659	1	0.06590
	LTE Band 2 16QAM	1850	1910	22.92	0.196	2	0.0618	1	0.06180
	LTE Band 12 QPSK	699	716	23.62	0.23	0	0.0458	0.466	**0.09820**
	LTE Band 12 16QAM	699	716	23.01	0.2	0	0.0398	0.466	0.08539
	LTE Band 12 QPSK	699	716	23.52	0.225	0	0.0448	0.466	0.09605
	LTE Band 12 16QAM	699	716	22.97	0.198	0	0.0394	0.466	0.08453

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