RF Exposure Report

Report No.:	SA150720E02
FCC ID:	UXX-S4A542A
Test Model:	S4A543A
Series Model:	S4A542A
Received Date:	July 20, 2015
Test Date:	Aug. 06, 2015
Issued Date:	Aug. 14, 2015
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:	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.

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Release Control Record

Issue No.	Description	Date Issued
SA150720E02	Original release.	Aug. 14, 2015

1 Certificate of Conformity

Product:	Advanced Edge Router
Brand:	cradlepoint
Test Model:	S4A543A
Series Model:	S4A542A
Sample Status:	ENGINEERING SAMPLE
Applicant:	Cradlepoint, Inc
Test Date:	Aug. 06, 2015
Standards:	FCC Part 2 (Section 2.1091) KDB 447498 D03 IEEE C95.1

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 : Phoenix Huang , **Date:** Aug. 14, 2015

Phoenix Huang / Specialist

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Approved by , **Date:** Aug. 14, 2015

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				
300-1500	…	…	F/1500	30
1500-100,000	…	…	1.0	30

F = Frequency in MHz

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 27cm away from the body of the user. So, this device is classified as **Mobile Device**.

3 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	710.332	6.51	27	0.34715	1
5180-5240	462.954	7.91	27	0.31232	1
5745-5825	226.046	7.91	27	0.15250	1

Note:
2.4GHz: Directional gain = 3.50dBi + 10log(2) = 6.51dBi
5GHz: Directional gain = 4.9dBi + 10log(2) = 7.91dBi

For 3G/LTE 3G module_FCC ID: N7NMC7355, Model No.: MC7354

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Source-Based Time-Averaged Power Density (mW/cm^2)	Limit (mW/cm^2)
824-849	2000	2.00	27	0.08650	0.5493

Note: 1. Limit of Power Density = F/1500
2. Calculations for RF Exposure compliance in the cellular and PCS bands are base on the maximum source based time-average power obtained from 2-Slot GPRS operation. The resulting duty cycle factor is 2/8, or 6.02dB.

For 3G/LTE 3G USB device_Contains FCC ID: N7NMC7355, Model no.: MC400LPE

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Source-Based Time-Averaged Power Density (mW/cm^2)	Limit (mW/cm^2)
824-849	2000	2.00	27	0.08650	0.5493

Note: 1. Limit of Power Density = F/1500
2. Calculations for RF Exposure compliance in the cellular and PCS bands are base on the maximum source based time-average power obtained from 2-Slot GPRS operation. The resulting duty cycle factor is 2/8, or 6.02dB.

Conclusion:

All of the WLAN/3G/LTE 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 0.34715 / 1 + 0.31232 / 1 + 0.08650 / 1 + 0.08650 / 1= 0.974, which is less than “1”. This confirmed that the device comply with FCC 1.1310 MPE limit.

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Appendix

MPE Evaluation for FCC ID: N7NMC7355 Radio Module

Mode	Equipment Category	Max Transmitter Duty Cycle	Transmitter Range (MHz)		Maximum		Antenna Gain (dBi)	Distance to Human Body (cm)	Power Density (mW/cm^2)		Ratio
			Start	Stop	(dBm)	(W)			Vaule	Limit	
GPRS	Class 10	25%	824	849	33	2	2	27	0.0865	0.54933	**0.15746455**
		25%	1850	1910	30	1	3	27	0.05445	1	0.05445
EDGE	Class 10	25%	824	849	28	0.63	2	27	0.02725	0.54933	0.04960588
		25%	1850	1910	27	0.5	3	27	0.02723	1	0.02723
	Class 11	37.50%	824	849	26.2	0.42	2	27	0.02725	0.54933	0.04960588
		37.50%	1850	1910	25.2	0.33	3	27	0.02695	1	0.02695
	Class 12	50%	824	849	25	0.32	2	27	0.02768	0.54933	0.05038866
		50%	1850	1910	24	0.25	3	27	0.02723	1	0.02723
CDMA	EvDo	100%	824	849	25	0.32	2	27	0.05536	0.54933	0.10077731
		100%	1850	1910	25	0.32	3	27	0.0697	1	0.0697
		100%	817	824	25	0.32	2	27	0.05536	0.54466	0.10164139
UMTS	HSDPA HSUPA	100%	824	849	24	0.25	2	27	0.04325	0.54933	0.07873227
		100%	1710	1755	24	0.25	3	27	0.05445	1	0.05445
		100%	1850	1910	24	0.25	3	27	0.05445	1	0.05445
LTE	Band 17	100%	704	716	24	0.25	2	27	0.04325	0.46933	0.09215264
	Band 13	100%	777	787	24	0.25	2	27	0.04325	0.518	0.08349421
	Band 5	100%	824	849	24	0.25	2	27	0.04325	0.54933	0.07873227
	Band 4	100%	1710	1755	24	0.25	3	27	0.05445	1	0.05445
	Band 2	100%	1850	1910	24	0.25	3	27	0.05445	1	0.05445
	Band 25	100%	1850	1915	24	0.25	3	27	0.05445	1	0.05445

Note:

1. The ratios which were indicated in bold type of the max ratio.
2. 698~960MHz: Antenna gain is 2dBi
3. 1710~2700MHz: Antenna gain is 3dBi