

## RF Exposure Report

**Report No.:** SA170929E01

**FCC ID:** UXX-S5A803A

**Test Model:** S5A803A

**Series Model:** S5A808A, S5A804A, S5A809A

**Received Date:** Sep. 29, 2017

**Test Date:** Oct. 17, 2017

**Issued Date:** Nov. 10, 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

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Taiwan R.O.C.

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### Release Control Record

Issue No.	Description	Date Issued
SA170929E01	Original release.	Nov. 10, 2017

## 1 Certificate of Conformity

**Product:** Integrated Mobile Broadband Router

**Brand:** cradlepoint

**Test Model:** S5A803A

**Series Model:** S5A808A, S5A804A, S5A809A

**Sample Status:** ENGINEERING SAMPLE

**Applicant:** Cradlepoint, Inc

**Test Date:** Oct. 17, 2017

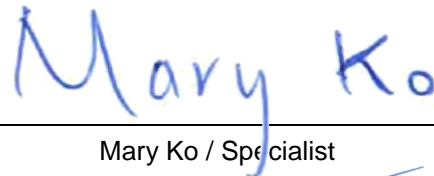
**Standards:** FCC Part 2 (Section 2.1091)

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 :**

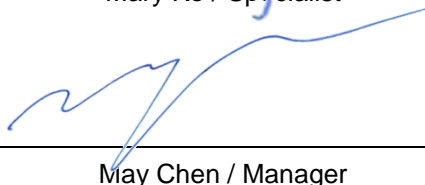


Mary Ko / Specialist

**Date:**

Nov. 10, 2017

**Approved by :**



May Chen / Manager

**Date:**

Nov. 10, 2017

## 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 <sup>2</sup> )	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 <sup>2</sup> )*	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<sup>2</sup>

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 36cm away from the body of the user.

So, this device is classified as **Mobile Device**.

## 2.4 Antenna Gain

WLAN									
Antenna Set	Transmitter Circuit		Model	excluding cable loss Antenna Gain (dBi)	Frequency Range (GHz)	Antenna Type	Connector Type	Cable Length (mm)	Cable Loss(dB)
	Radio 1 (2.4G)	Radio 2 (5G)							
1	Chain (0)	Chain (1)	RFA-25-F17M3-B70-25	2.5	2.4~2.4835	Dipole	R-SMA	230	0.8
				3.5	5.15~5.85				1.4
	-	Chain (0)		2.5	2.4~2.4835	Dipole	R-SMA	230	0.8
				3.5	5.15~5.85				1.4
	-	Chain (3)		2.5	2.4~2.4835	Dipole	R-SMA	230	0.8
				3.5	5.15~5.85				1.4
Chain (1)	Chain (2)	2.5	2.4~2.4835	Dipole	R-SMA	230	0.8		
		3.5	5.15~5.85				1.4		
2	Chain (0)	Chain (1)	TWX-1513RSXX-711	5	2.4~2.4835	Dipole	R-SMA	230	0.8
				5	5.15~5.85				1.4
	-	Chain (0)		5	2.4~2.4835	Dipole	R-SMA	230	0.8
				5	5.15~5.85				1.4
	-	Chain (3)		5	2.4~2.4835	Dipole	R-SMA	230	0.8
				5	5.15~5.85				1.4
Chain (1)	Chain (2)	5	2.4~2.4835	Dipole	R-SMA	230	0.8		
		5	5.15~5.85				1.4		
WWAN – 3G / LTE									
Antenna Set	Transmitter Circuit		Model	Antenna Gain including cable loss (dBi)	Frequency Range (MHz)	Antenna Type	Connector Type	Cable Length (mm)	Cable Loss(dB)
1	Main	Aux	YWX-6252SABX-711	2	698~960	Dipole	SMA	100	0.2
				3	1710~2700				0.4
	-			2	698~960	Dipole	SMA	100	0.2
				3	1710~2700				0.4
2	Main	Aux	YWX-6241SAXX-711D	2	698~960	Dipole	SMA	100	0.2
				3	1710~2700				0.4
	-			2	698~960	Dipole	SMA	100	0.2
				3	1710~2700				0.4
GPS (only for test not for sale)									
Antenna Gain including cable loss (dBi)		Frequency Range (MHz)			Antenna Type		Connector Type		
GPS	1.36	1574.42±3			Dipole		SMA		
GLONASS	0.09	1602±0.5							
Note: 1. For WLAN: Ant set 2 was selected for the final test.									

## 2.5 Calculation Result

### For WLAN (Radio 1)

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
2412-2462	670.981	7.21	36	0.21672	1

NOTE:

2.4GHz: Directional gain = 4.2dBi + 10log(2) = 7.21dBi

### For WLAN (Radio 2)

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
5180-5240	810.23	9.62	36	0.45582	1
5745-5825	994.535	9.62	36	0.55951	1

NOTE:

5GHz: Directional gain = 3.6dBi + 10log(4) = 9.62dBi

### For 3G/LTE (Radio 3) (FCC ID: RI7LM940)

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
698-716	223.9	2.00	36	0.02179	0.4665*

Note: \*Limit of Power Density = F/1500

### For 3G/LTE Modem (FCC ID: N7NMC7455)

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
698-716	251.189	1.99	36	0.02439	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 <Radio 1> + WLAN 5GHz <Radio 2> + 3G/LTE <Radio 3> + 3G/LTE Modem = 0.21672 / 1 + 0.55951 / 1 + 0.02179 / 0.4665 + 0.02439 / 0.4665 = 0.87523

**Therefore the maximum calculations of above situations are less than the "1" limit.**

## Appendix

3G/LTE module

MPE Evaluation for FCC ID: RI7LM940 Radio Module

Mode	Equipment Category	Transmitter Range (MHz)		Maximum		Antenna Gain (dBi)	Power Density (mW/cm <sup>2</sup> )		Ratio
		Start	Stop	(dBm)	(W)		Vaule	Limit	
UMTS	Band II	1852.4	1907.6	24	0.2512	3	0.03078	1	0.03078
	Band IV	1712.4	1752.6	24	0.2512	3	0.03078	1	0.03078
	Band V	826.4	846.6	24	0.2512	2	0.02445	0.55093	0.04438
LTE	Band 2	1850.7	1909.3	23.5	0.2239	3	0.02743	1	0.02743
	Band 4	1710.7	1754.3	23.5	0.2239	3	0.02743	1	0.02743
	Band 5	824.7	848.3	24	0.2512	2	0.02445	0.5498	0.04447
	Band 7	2502.5	2567.5	23.5	0.2239	3	0.02743	1	0.02743
	Band 12	699.7	715.3	23.5	0.2239	2	0.02179	0.4665	<b>0.04671</b>
	Band 13	779.5	784.5	23.5	0.2239	2	0.02179	0.51966	0.04193
	Band 17	706.5	713.5	23.5	0.2239	2	0.02179	0.471	0.04626
	Band 25	1850.7	1914.3	23.5	0.2239	3	0.02743	1	0.02743
	Band 26	814.7	848.3	24	0.2512	2	0.02445	0.54313	0.04502
	Band 30	2307.5	2312.5	23	0.1995	3	0.02444	1	0.02444
	Band 38	2572.5	2617.5	23.5	0.2239	3	0.02743	1	0.02743
	Band 41	2498.5	2687.5	23.5	0.2239	3	0.02743	1	0.02743
Band 66	1710.7	1779.3	23.5	0.2239	3	0.02743	1	0.02743	



3G/LTE Modem  
 MPE Evaluation for FCC ID: N7NMC7455 Radio Module

Operating Mode	TX Freq Range (MHz)		Max Time-Avg Cond Power		Antenna Gain (dBi)	Power Density (mW/cm <sup>2</sup> )		Ratio
	Start	Stop	(dBm)	(W)		Vaule	Limit	
WCDMA Band II LTE Band 2	1850	1910	24	0.25	4	0.0386	1	0.03856
WCDMA Band IV LTE Band 4	1710	1755	24	0.25	4	0.0386	1	0.03856
WCDMA Band V LTE Band 5	824	849	24	0.25	1.99	0.0243	0.54933	0.04418
LTE Band 7	2500	2570	23	0.2	2.8	0.0234	1	0.02340
LTE Band 12	699	716	24	0.25	1.99	0.0243	0.4665	<b>0.05208</b>
LTE Band 13	777	787	24	0.25	1.99	0.0243	0.518	0.04685
LTE Band 25	1850	1915	24	0.25	4	0.0386	1	0.03856
LTE Band 26	814	849	24	0.25	1.99	0.0243	0.54266	0.04472
LTE Band 30	2305	2315	23	0.2	1	0.0155	1	0.01546
LTE Band 41	2496	2690	23	0.2	2.8	0.0234	1	0.02340

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