

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

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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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.

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Date:

Nov. 10, 2017

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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 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

$$P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$$

where

P_d = power density in mW/cm²

P_{out} = 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

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	YWX-6252SABX-711	2	698~960	Dipole	SMA	100	0.2	
			3	1710~2700				0.4	
	Aux		2	698~960	Dipole	SMA	100	0.2	
			3	1710~2700				0.4	
2	Main	YWX-6241SAXX-711D	2	698~960	Dipole	SMA	100	0.2	
			3	1710~2700				0.4	
	Aux		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 ²)	Limit (mW/cm ²)
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 ²)	Limit (mW/cm ²)
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: R17LM940)

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
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 ²)	Limit (mW/cm ²)
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 ²)		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	0.04671
	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 ²)		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	0.05208
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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