

## RF Exposure Report

**Report No.:** SA160914E09

**FCC ID:** UXX-S5A643A

**Test Model:** S5A643A

**Series Model:** S5A644A, S5A648A

**Received Date:** Sep. 19, 2016

**Test Date:** Oct. 04, 2016

**Issued Date:** Oct. 19, 2016

**Applicant:** Cradlepoint, Inc

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**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
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## Table of Contents

<b>Release Control Record .....</b>	<b>3</b>
<b>1     Certificate of Conformity .....</b>	<b>4</b>
<b>2     RF Exposure .....</b>	<b>5</b>
2.1   Limits for Maximum Permissible Exposure (MPE) .....	5
2.2   MPE Calculation Formula .....	5
2.3   Classification .....	5
2.4   Antenna Gain .....	6
2.5   Calculation Result of Maximum Conducted Power .....	7
<b>Appendix .....</b>	<b>8</b>

### Release Control Record

Issue No.	Description	Date Issued
SA160914E09	Original release.	Oct. 19, 2016

## 1 Certificate of Conformity

**Product:** 2x2 Dual Band Concurrent AP

**Brand:** Cradlepoint

**Test Model:** S5A643A

**Series Model:** S5A644A, S5A648A

**Sample Status:** ENGINEERING SAMPLE

**Applicant:** Cradlepoint, Inc

**Test Date:** Oct. 04, 2016

**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 :**



**Date:**

Oct. 19, 2016

Midoli Peng / Specialist

**Approved by :**



**Date:**

Oct. 19, 2016

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 <sup>2</sup> )	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<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 40cm away from the body of the user.

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

## 2.4 Antenna Gain

### For WLAN

Antenna No.	Antenna Gain(dBi) Including cable loss	Frequency Range (GHz to GHz)	Antenna Type	Connector Type
1	4.49	2.4~2.4835	Dipole	R-SMA
	4.56	5.15~5.25		
	4.56	5.25~5.35		
	4.63	5.47~5.725		
	4.44	5.725~5.85		
2	4.49	2.4~2.4835	Dipole	R-SMA
	4.56	5.15~5.25		
	4.56	5.25~5.35		
	4.63	5.47~5.725		
	4.44	5.725~5.85		

### For WWAN(LTE) module

Antenna Set.	Model	Antenna Gain(dBi)	Frequency range	Antenna Type	Connector Type
1	NA	3dBi@704~960MHz 5.5dBi@1710~2700MHz	740~960MHz 1710~2700MHz	Dipole	SMA
2	NA	3dBi@704~960MHz 5.5dBi@1710~2700MHz			SMA

## 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 <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
2412-2462	645.542	7.50	40	0.18055	1
5180-5240	180.436	7.57	40	0.05129	1
5745-5825	351.186	7.45	40	0.09710	1

#### NOTE:

- 2.4GHz: Directional gain = 4.49dBi + 10log(2) = 7.50dBi
- 5GHz (U-NII-1 band): Directional gain = 4.56dBi + 10log(2) = 7.57dBi
- 5GHz (U-NII-3 band): Directional gain = 4.44dBi + 10log(2) = 7.45dBi

### For WWAN(LTE) module:

Frequency (MHz)	Max Power (mW)	Max Power (dBm)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
699	251	24	40	0.02491	0.466*

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

This product inside has one WWAN(LTE) module device which has maximum of 251W output power.

### 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 + WLAN 5GHz + WWAN= 0.18055 / 1 + 0.09710 / 1 + 0.02491 / 0.466 = 0.33110

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

--- END ---

## Appendix

MPE Evaluation for WWAN(LTE) module (FCC ID: N7NMC7455)

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	5.5	0.0441	1	0.04412
WCDMA Band IV LTE Band 4	1710	1755	24	0.25	5.5	0.0441	1	0.04412
WCDMA Band V LTE Band 5	824	849	24	0.25	3	0.0248	0.54933	0.045164
LTE Band 7	2500	2570	23	0.2	5.5	0.0353	1	0.03529
LTE Band 12	699	716	24	0.25	3	0.0248	0.466	0.05324
LTE Band 13	777	787	24	0.25	3	0.0248	0.518	0.047896
LTE Band 25	1850	1915	24	0.25	5.5	0.0441	1	0.04412
LTE Band 26	814	849	24	0.25	3	0.0248	0.54266	0.045719
LTE Band 41	2496	2690	23	0.2	5.5	0.0353	1	0.03529

Note:

1. The ratios which were indicated in bold type of the max ratio.
2. 704~960MHz: Antenna gain is 3dBi
3. 1710~2700MHz: Antenna gain is 5.5dBi