RF Exposure Report

Report No.: SA160914E09E

FCC ID: UXX-S5A643A

Test Model: S5A643A

Series Model: S5A644A

Received Date: Nov. 09, 2018

Test Date: Dec. 14, 2018

Issued Date: Jan. 04, 2019

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.

Test Location: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.

FCC Registration / Designation Number: 723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
SA160914E09E	Original release.	Jan. 04, 2019

1   Certificate of Conformity

Product: 2x2 Dual Band Concurrent AP

Brand: Cradlepoint

Test Model: S5A643A

Series Model: S5A644A

Sample Status: ENGINEERING SAMPLE

Applicant: Cradlepoint, Inc

Test Date: Jan. 11, 2017
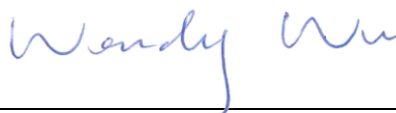
Standards: FCC Part 2 (Section 2.1091)

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.
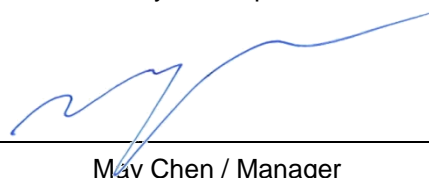
Prepared by : _____ , **Date:** _____Jan. 04, 2019_____

Wendy Wu / Specialist

Approved by : _____ , **Date:** _____Jan. 04, 2019_____

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 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 (FCC ID: N7NMC7455)

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 2.4GHz, 5GHz (U-NII-1 band and U-NII-3 band) and WWAN(LTE) data was copied from the original test report (Report No.: SA160914E09 R1)

For WLAN:

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2412-2462	645.542	7.50	40	0.18055	1
5180-5240	180.436	7.57	40	0.05129	1
5260-5320	231.489	7.57	40	0.06580	1
5500-5700	219.767	7.64	40	0.06348	1
5745-5825	351.186	7.45	40	0.09710	1

NOTE:
1. 2.4GHz: Directional gain = 4.49dBi + 10log(2) = 7.50dBi
2. 5GHz (U-NII-1 & UNII-2A band): Directional gain = 4.56dBi + 10log(2) = 7.57dBi
3. 5GHz (U-NII-2C band): Directional gain = 4.63dBi + 10log(2) = 7.64dBi
3. 5GHz (U-NII-3 band): Directional gain = 4.44dBi + 10log(2) = 7.45dBi

For WWAN(LTE) module (FCC ID: N7NMC7455)

Frequency (MHz)	Max Power (mW)	Max Power (dBm)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
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 251mW 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.

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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^2)		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