RF Exposure Report

Report No.:	SA191025E02
FCC ID:	UXX-S5A946A
Test Model:	S5A947A
Series Model:	S5A946A
Received Date:	Oct. 25, 2019
Date of Evaluation:	Nov. 29, 2019
Issued Date:	Dec. 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 Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location:	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN
FCC Registration / Designation Number:	788550 / TW0003

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Release Control Record

Issue No.	Description	Date Issued
SA191025E02	Original Release	Dec. 04, 2019

1   Certificate of Conformity

Product:	Advanced Edge Router
Brand:	cradlepoint
Test Model:	S5A947A
Series Model:	S5A946A
Sample Status:	Engineering Sample
Applicant:	Cradlepoint, Inc
Date of Evaluation:	Nov. 29, 2019
Standards:	FCC Part 2 (Section 2.1091)
	KDB 447498 D01 General RF Exposure Guidance v06
	IEEE C95.3 -2002

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 RF characteristics under the conditions specified in this report.

Prepared by : _Rona Chen_ , **Date:** Dec. 04, 2019

Rona Chen / Specialist

Approved by : _Dylan Chiou_ , **Date:** Dec. 04, 2019

Dylan Chiou / Project Engineer

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 20cm away from the body of the user. So, this device is classified as **Mobile Device**.

Note: All models of EUT are listed as below.

Brand	Product Marketing Name (PMN)	Model	Wi-Fi Function	Embedded Radio (WWAN Module)	Number of WWAN Antenna Port
cradlepoint	E300-C18B	S5A946A	Yes	Telit, LM960A18 Contains FCC ID: RI7LM960 Contains IC : 5131A-LM960	4
	E300-C4D	S5A947A	Yes	Quectel, EC25-AF Contains FCC ID: XMR201808EC25AF Contains IC : 10224A-2018EC25AF	2

* The differences compared with different models are embedded WWAN module and number of WWAN antenna port.

2.4 Calculation Result of Maximum Conducted Power

For WWAN Module (Brand: Telit / Model: LM960A18)

Band	Frequency Band (MHz)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
WCDMA II	1850-1910	24.0	2	20	0.079	1.00
WCDMA IV	1710-1755	24.0	2	20	0.079	1.00
WCDMA V	824-849	24.0	1	20	0.063	0.55
LTE 2	1850-1910	24.5	2	20	0.089	1.00
LTE 4	1710-1755	24.5	2	20	0.089	1.00
LTE 5	824-849	24.5	1	20	0.071	0.55
LTE 7	2500-2570	24.5	2	20	0.089	1.00
LTE 12	699-716	24.5	1	20	0.071	0.47
LTE 13	777-787	24.5	1	20	0.071	0.52
LTE 14	788-798	24.5	1	20	0.071	0.53
LTE 17	704-716	24.5	1	20	0.071	0.47
LTE 18	815-830	24.5	1	20	0.071	0.54
LTE 19	830-845	24.5	1	20	0.071	0.55
LTE 25	1850-1915	24.5	2	20	0.089	1.00
LTE 26	814-849	24.5	1	20	0.071	0.54
LTE 30	2305-2315	22.9	2	20	0.061	1.00
LTE 38	2572-2618	24.5	2	20	0.089	1.00
LTE 41	2496-2690	27.5	2	20	0.177	1.00
LTE 66	1710-1780	24.5	2	20	0.089	1.00
LTE 71	663-698	24.5	1	20	0.071	0.44

For WWAN Module (Brand: Quectel / Model: EC25-AF)

Band	Frequency Band (MHz)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
WCDMA II	1850-1910	25.0	2	20	0.100	1.00
WCDMA IV	1710-1755	25.0	2	20	0.100	1.00
WCDMA V	824-849	25.0	1	20	0.079	0.55
LTE 2	1850-1910	25.0	2	20	0.100	1.00
LTE 4	1710-1755	25.0	2	20	0.100	1.00
LTE 5	824-849	25.0	1	20	0.079	0.55
LTE 12	699-716	25.0	1	20	0.079	0.47
LTE 13	777-787	25.0	1	20	0.079	0.52
LTE 14	788-798	25.0	1	20	0.079	0.53
LTE 66	1710-1780	25.0	2	20	0.100	1.00
LTE 71	663-698	25.0	1	20	0.079	0.44

Band	Frequency Band (MHz)	Mode	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
WLAN	2412-2462	CDD	28.02	5.12	20	0.410	1.00
		Beamforming	27.86	5.12	20	0.395	1.00
	5180-5240	CDD	26.78	6.16	20	0.391	1.00
		Beamforming	26.78	6.16	20	0.391	1.00
	5745-5825	CDD	26.65	6.16	20	0.380	1.00
		Beamforming	26.65	6.16	20	0.380	1.00

Note:

1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2. 2.4GHz: Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{ANT}]$ = 5.12 dBi
   5.0GHz: Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{ANT}]$ = 6.16 dBi

Conclusion:

The formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1

CPD = Calculation power density

LPD = Limit of power density

For WWAN Module (Brand: Telit / Model: LM960A18)

WLAN 2.4GHz + WLAN 5GHz + WWAN = 0.410 / 1.00 + 0.391 / 1.00 + 0.177 / 1.00 = 0.978

For WWAN Module (Brand: Quectel / Model: EC25-AF)

WLAN 2.4GHz + WLAN 5GHz + WWAN = 0.410 / 1.00 + 0.391 / 1.00 + 0.079 / 0.44 = 0.981

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

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