TEST REPORT

Report Number: 14629526-E3V3

Applicant	:	CRADLEPOINT, INC. 1100 W Idaho St Boise, ID, 83702 U.S.A
Model	:	S5A312A
FCC ID	:	UXX-S5A312A
Contains FCC ID	:	XMR2022RM520NGL
EUT Description	:	W1855 Series 5G Wideband Adapter
Test Standard(s)	:	FCC Part 1 Subpart I FCC Part 2 Subpart J

Date Of Issue:
2023-06-19

Prepared by:
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Revision History

ACCREDITED
CERT #0751.05

Rev.	Issue Date	Revisions	Revised By
V1	2023-06-08	Initial Issue	
V2	2023-06-13	Updated Section 7	Kiya Kedida
V3	2023-06-19	Updated Section 7	Kiya Kedida

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TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: CRADLEPOINT, INC.
1100 W Idaho St
Boise, ID, 83702
U.S.A

EUT DESCRIPTION: W1855 Series 5G Wideband Adapter

MODEL: S5A312A

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 1 SUBPART I & PART 2 SUBPART J	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, any agency of the Federal Government, or any agency of the U.S. government.

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2. TEST METHODOLOGY

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. is only responsible for the validity of results after the integration of the data provided by the customer.

All calculations were made in accordance with FCC KDB 447498 D01, KDB 447498 D03, IEEE Std C95.1-2005 and IEEE Std C95.3-2002.

3. REFERENCES

The purpose of this test report is to show continued compliance of a radio module installed in a host. Therefore all test measurements was taken from the original FCC ID:MR2022RM520NGL applications.

Measurements were made as documented in test reports UL Verification Services. Documents 14629526-E2 for operation in the BLE 2.4 GHz band.

Antenna gain data is provided by the applicant.

4. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47658 Kato Road, Fremont, California, USA.

UL Verification Services Inc. is accredited by A2LA, Certificate Number #0751.05, for all testing performed within the scope of this report.

5. MAXIMUM PERMISSIBLE RF EXPOSURE

5.1. FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 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)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	$*900/f^2$	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
(B) 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
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

Notes:

(1) Occupational/controlled exposure limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when a person is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

(2) General population/uncontrolled exposure limits apply in situations in which the general public may be exposed, or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure

6. EQUATIONS

POWER DENSITY

Power density is given by:

S = EIRP / (4 * Pi * D^2)

Where

S = Power density in mW/cm^2
EIRP = Equivalent Isotropic Radiated Power in mW
D = Separation distance in cm

Power density in units of mW/cm^2 is converted to units of W/m^2 by multiplying by 10.

DISTANCE

Distance is given by:

D = SQRT (EIRP / (4 * Pi * S))

Where

D = Separation distance in cm
EIRP = Equivalent Isotropic Radiated Power in mW
S = Power density in mW/cm^2

SOURCE-BASED DUTY CYCLE

Where applicable (for example, multi-slot cell phone applications) a duty cycle factor may be applied.

Source-based time-averaged EIRP = (DC / 100) * EIRP

Where

DC = Duty Cycle in %, as applicable
EIRP = Equivalent Isotropic Radiated Power in W

MIMO AND COLOCATED TRANSMITTERS (IDENTICAL LIMIT FOR ALL TRANSMITTERS)

For multiple chain devices, and colocated transmitters operating simultaneously in frequency bands where the limit is identical, the total power density is calculated using the total EIRP obtained by summing the EIRP (in linear units) of each transmitter.

Total EIRP = (EIRP1) + (EIRP2) + ... + (EIRPn)

where

EIRPx = Source-based time-averaged EIRP of chain x or transmitter x

The total EIRP is then used to calculate the Power Density or the Distance as applicable.

MIMO AND COLOCATED TRANSMITTERS

For multiple co-located transmitters operating simultaneously in frequency bands where different limits apply:

The Power Density at the specified separation distance is calculated for each transmitter chain or transmitter.

The fraction of the exposure limit is calculated for each chain or transmitter as
(Power Density of chain or transmitter) / (Limit applicable to that chain or transmitter).

The fractions are summed.

Compliance is established if the sum of the fractions is less than or equal to one.

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7. RF EXPOSURE RESULTS

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

Single Chain and non-colocated transmitters

Band	Mode	Separ. Distance (cm)	Output AVG Power (dBm)	Ant. Gain (dBi)	EIRP (dBm)	Duty Cycle (%)	EIRP (mW)	FCC PD (mW/cm^2)	FCC PD Limit (mW/cm^2)
1850-1910 MHz	WCDMA B2	20	25.00	2.9	27.90	100.0	616.60	0.123	1.00
1710-1755 MHz	WCDMA B4	20	25.00	2.9	27.90	100.0	616.60	0.123	1.00
824-849 MHz	WCDMA B5	20	25.00	1.0	26.00	100.0	398.11	0.079	0.55
1850-1910 MHz	LTE B2/NR n2	20	25.00	2.9	27.90	100.0	616.60	0.123	1.00
1710-1755 MHz	LTE B4	20	25.00	2.9	27.90	100.0	616.60	0.123	1.00
824-849 MHz	LTE B5/NR n5	20	25.00	1.0	26.00	100.0	398.11	0.079	0.55
2500-2570 MHz	LTE B7/NR n7	20	25.00	3.3	28.30	100.0	676.08	0.135	1.00
699-716 MHz	LTE B12/NR n12	20	25.00	1.0	26.00	100.0	398.11	0.079	0.47
777-787 MHz	LTE B13/NR n13	20	25.00	1.0	26.00	100.0	398.11	0.079	0.52
788-798 MHz	LTE B14/NR n14	20	25.00	1.0	26.00	100.0	398.11	0.079	0.53
704-716 MHz	LTE B17	20	25.00	1.0	26.00	100.0	398.11	0.079	0.47
1850-1915 MHz	LTE B25/NR n25	20	25.00	2.9	27.90	100.0	616.60	0.123	1.00
814-824 MHz	LTE B26/ NR n26 Low	20	25.00	1.0	26.00	100.0	398.11	0.079	0.54
824-849 MHz	LTE B26/ NR n26 High	20	25.00	1.0	26.00	100.0	398.11	0.079	0.55
2570-2620 MHz	LTE B38/NR n38	20	28.00	3.3	31.30	100.0	1348.96	0.269	1.00
3450-3500 MHz	LTE B41/NR n41	20	28.00	6.4	34.40	100.0	2754.23	0.548	1.00
2496-2690 MHz	LTE B48/NR n48	20	25.00	3.3	28.30	100.0	676.08	0.135	1.00
3700-3800 MHz	LTE B42	20	28.00	6.4	34.40	100.0	2754.23	0.548	1.00
3550-3700 MHz	LTE B43	20	28.00	6.4	34.40	100.0	2754.23	0.548	1.00
1710-1780 MHz	LTE B66/NR n66	20	25.00	2.9	27.90	100.0	616.60	0.123	1.00
1695-1710 MHz	NR n70	20	25.00	2.9	27.90	100.0	616.60	0.123	1.00
663-698 MHz	LTE B71/NR n71	20	25.00	1.0	26.00	100.0	398.11	0.079	0.44
3450-3980 MHz	NR n77	20	28.00	6.4	34.40	100.0	2754.23	0.548	1.00
3450-3800 MHz	NR n78	20	28.00	6.4	34.40	100.0	2754.23	0.548	1.00
2400-2483.5 MHz	BLE	20	15.00	2.9	17.90	100.0	61.66	0.012	1.00

- **LTE band 5** (Low Frequency), antenna gain 1dBi is chosen as the worst case to calculate FCC/ISED Density limit for below 1G bands.
- **BLE**, 2440MHz, antenna gain 2.9dBi is chosen as the worst case to calculate FCC Density limit.

Multiple chain or colocated transmitters

Band	(GHz)	0.8	2.4
Mode		LTE 5	BLE
Transmitter		SISO	SISO
Separation Distance	(cm)	20.0	20.0
Output Power	(dBm)	25.0	15.00
Antenna Gain	(dBi)	1.00	2.9
Duty Cycle	(%)	100.0	100.0
Source Based EIRP	(mW)	398.1	61.7
FCC Power Density	(mW/cm^2)	0.08	0.01
FCC Power Density Limit	(mW/cm^2)	0.55	1
FCC Fraction of Limit	(%)	14.4	1.2
FCC Sum of Fractions (%)	15.6		

- **LTE band 42** (High Frequency), antenna gain 6.4dBi is chosen as the worst case to calculate FCC/ISED Density limit for above 1G bands.
- **BLE**, 2440MHz, 100% DC is chosen as the worst case to calculate FCC Density limit.

Multiple chain or colocated transmitters

Band	(GHz)	3.5	2.4
Mode		LTE 42	BLE
Transmitter		SISO	SISO
Separation Distance	(cm)	20	20
Output Power	(dBm)	28.0	15.00
Antenna Gain	(dBi)	6.40	2.90
Duty Cycle	(%)	100.0	100.0
Source Based EIRP	(mW)	2754.2	61.7
FCC Power Density	(mW/cm^2)	0.55	0.01
FCC Power Density Limit	(mW/cm^2)	1	1
FCC Fraction of Limit	(%)	54.8	1.2
FCC Sum of Fractions (%)	56.0		

Notes:

1) The manufacturer configures output power so that the maximum power, after accounting for manufacturing tolerances, will never exceed the maximum power level measured.
2) The output power in the tables above is the maximum power per chain among various channels and various modes within the specific band.
3) The antenna gain in the tables above is the maximum antenna gain among various channels within the specified band.

END OF REPORT