

RF TEST REPORT



Report No.: FCC_IC_RF_SL19011001-SEV-006_UNII
Supersede Report No.:

Applicant	:	ChargePoint, Inc.
Product Name	:	Network Communication
Model No.	:	28010161
Test Standard	:	47 CFR 15.407 RSS-247 Issue 2, February 2017
Test Method	:	ANSI C63.10: 2013 RSS-Gen Issue 5, April 2018 789033 D02 General UNII Test Procedures New Rules v01r02
FCC ID	:	W38-28010161
IC ID	:	8854A-28010161
Dates of test	:	01/17/2019 – 01/30/2019
Issue Date	:	01/30/2019
Test Result	:	☒ Pass ☐ Fail
Equipment complied with the specification ☒		
Equipment did not comply with the specification ☐		

This Test Report is Issued Under the Authority of:	
Gary Chou	Chen Ge
Compliance Engineer	Engineer Reviewer
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Issued By:
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Laboratory Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.



In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Accreditation Body	Scope
USA	FCC, A2LA	EMC, RF/Wireless, Telecom
Canada	IC, A2LA, NIST	EMC, RF/Wireless, Telecom
Taiwan	BSMI, NCC, NIST	EMC, RF, Telecom, Safety
Hong Kong	OFTA, NIST	RF/Wireless, Telecom
Australia	NATA, NIST	EMC, RF, Telecom, Safety
Korea	KCC/RRR, NIST	EMI, EMS, RF, Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	Safety, EMC, RF/Wireless, Telecom
Europe	A2LA, NIST	EMC, RF, Telecom, Safety
Israel	MOC, NIST	EMC, RF, Telecom, Safety

Accreditations for Product Certifications

Country	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC, RF, Telecom
Canada	IC FCB, NIST	EMC, RF, Telecom
Singapore	iDA, NIST	EMC, RF, Telecom
EU	NB	EMC & Radio Equipment Directive (RED)
Japan	MIC (RCB 208)	RF, Telecom
Hong Kong	OFTA (US002)	RF, Telecom

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1 Report Revision History

Report No.	Report Version	Description	Issue Date
FCC_IC_RF_SL19011001-SEV-006_UNII	None	Original	01/29/2019

2 Executive Summary

The purpose of this test program was to demonstrate compliance of following product

Company: ChargePoint, Inc.
Product Name: Network Communication
Model No.: 28010161

against the current Stipulated Standards. The specified model product stated above has demonstrated compliance with the Stipulated Standard listed on 1st page.

3 Customer information

Applicant Name	ChargePoint, Inc.
Applicant Address	254 E. Hacienda Ave Campbell, CA 95148
Manufacturer Name	ChargePoint, Inc.
Manufacturer Address	254 E. Hacienda Ave Campbell, CA 95148

4 Test site information

Lab performing tests	SIEMIC Laboratories
Lab Address	775 Montague Expressway, Milpitas, CA 95035
FCC Test Site No.	540430
IC Test Site No.	4842D-2
VCCI Test Site No.	A0133

5 Modification

Index	Item	Description	Note
-	-	-	-

6 EUT Information

6.1 EUT Description

Product Name	Network Communication
Model No.	28010161
Trade Name	ChargePoint
Serial No.	N/A
Input Power	5Vdc
Radio Hardware version	27-010077
Radio Software version	4.0.0.41
Date of EUT received	01/17/2019
Equipment Class/ Category	UNII
Port/Connectors	N/A
Remark	None

6.2 Radio Description

Radio Type	802.11a
Operating Frequency	5180-5240MHz 5745-5825MHz
Modulation	OFDM (BPSK, QPSK, 16QAM, 64QAM)
Channel Spacing	20MHz
Number of Channels	9
Antenna Type	PIFA
Antenna Gain (Peak)	3.5dBi (5GHz)
Note	2.4GHz and 5GHz Radio does not transmit simultaneously

EUT Power level setting

Band	Mode	Frequency	Power setting
5150-5250MHz	802.11a	5180	20
		5200	20
		5240	20
5725-5850MHz	802.11a	5745	20
		5785	20
		5825	20

7 Supporting Equipment/Software and Cabling Description

7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	Laptop	Latitude E6510	N/A	Dell	-

7.2 Cabling Description

Name	Connection Start		Connection Stop		Length / shielding Info		Note
	From	I/O Port	To	I/O Port	Length (m)	Shielding	
Serial to USB	Serial	EUT	USB	Laptop	10	Unshielded	-

7.3 Test Software Description

Test Item	Software	Description
RF Testing	Putty	Set the EUT to transmit continuously in diferent test mode

8 Test Summary

Test Item	Test standard		Test Method/Procedure		Pass / Fail
Antenna Requirement	FCC	15.203	FCC	ANSI C63.10 – 2013	☒ Pass
	IC	-	IC	558074 D01 DTS Meas. Guidance v03r02	☐ N/A
Restricted Band of Operation	FCC	15.205	FCC	ANSI C63.10: 2013	☒ Pass
	IC	RSS 247 (2.2)	IC	789033 D02 General UNII Test Procedures New Rules v01r02	☐ N/A
AC Conducted Emissions Voltage	FCC	15.207(a)	FCC	ANSI C63.10: 2013	☒ Pass*
	IC	RSS Gen 8.8	IC	RSS Gen Issue 5: 2018	☐ N/A

Test Item	Test standard		Test Method/Procedure		Pass / Fail
99% Bandwidth	FCC	-	FCC	-	☒ Pass*
	IC	RSS 247 (A6.2)	IC	RSS Gen Issue 5: 2018	☐ N/A
26 & 6 dB Emission Bandwidth	FCC	15.407 (a) (2)	FCC	789033 D02 General UNII Test Procedures New Rules v01r02	☒ Pass*
	IC	RSS 247 (A6.2)	IC		☐ N/A
Maximum conducted Output Power	FCC	15.407 (a) (2)	FCC	789033 D02 General UNII Test Procedures New Rules v01r02	☒ Pass**
	IC	RSS247 (5.4.4)	IC		☐ N/A
Power reduction (Antenna Gain > 6 dBi)	FCC	15.407 (a) (2)	FCC	-	☒ Pass*
	IC	-	IC		☐ N/A
Band Edge and Radiated Spurious Emissions	FCC	15.407(b)(2), 15.407(b)(6)	FCC	ANSI C63.10: 2013	☒ Pass
	IC	RSS 247(A6.3)	IC	789033 D02 General UNII Test Procedures New Rules v01r02	☐ N/A
Power Spectral Density	FCC	15.407 (a) (2)	FCC	789033 D02 General UNII Test Procedures New Rules v01r02	☒ Pass*
	IC	RSS 247 (A6.2)	IC		☐ N/A
Remark	- All measurement uncertainties are not taken into consideration for all presented test result. - The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual. - Pass** Output power verification - Pass* Please refer to test report number FCC_RF_SL15060501-CPC-006_UNII_5G Rev 1.0 FCC ID: W38-28010077, IC: 8854A-28010077				

9 Measurement Uncertainty

9.1 Conducted Emissions

The test is to measure the conducted emissions to the mains port of the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the receiver
- Uncertainty of the LISN
- Uncertainty of cables
- Uncertainty due to the mismatches
- Etc, see the below table for details

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Filter Insertion Loss	0.25	Normal	2	1	0.125
LISN Insertion Loss	0.40	Normal	2	1	0.20
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.86605081
PRF Response	1.5	Rectangular	1.732	1	0.86605081
Mismatch LISN - Receiver	0.25	U-Shape	1.414	1	0.1768033
LISN Impedance	2.5	Triangular	2.449	1	1.0208248
Combined Standard Uncertainty					1.928133
Expanded Uncertainty (K=2)					3.856266

The total derived measurement uncertainty is +/- 3.86 dB.

9.2 Radiated Emissions (30MHz to 1GHz)

The test is to measure the radiated emissions of the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- NSA Calibration
- Etc., details see the below table

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Filter Insertion Loss	0.25	Normal	2	1	0.125
Antenna Factor	0.65	Normal	2	1	0.325
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.86605081
PRF Response	1.5	Rectangular	1.732	1	0.86605081
Mismatch Filter - Receiver	0.25	U-Shape	1.414	1	0.1768033
NSA Calibration	4.0	U-Shape	1.414	1	2.8288543
Combined Standard Uncertainty					3.0059131
Expanded Uncertainty (K=2)					6.0118262

The total derived measurement uncertainty is +/- 6.00 dB.

9.3 Radiated Emissions (1GHz to 40GHz)

The test is to measure the radiated emissions of the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- VSWR Calibration
- Etc., details see the below table

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.0692840
Cable Insertion Loss	0.21	Normal	2	1	0.1050000
Filter Insertion Loss	0.25	Normal	2	1	0.1250000
Antenna Factor	0.65	Normal	2	1	0.3250000
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.8660508
PRF Response	1.5	Rectangular	1.732	1	0.8660508
Mismatch Filter - Receiver	0.25	U-Shape	1.414	1	0.1768033
VSWR Calibration	2.0	U-Shape	1.414	1	1.4144272
Combined Standard Uncertainty					4.2363
Expanded Uncertainty (K=2)					8.4726

The total derived measurement uncertainty is +/- 8.47 dB.

9.4 RF conducted measurement

The test is to measure the RF output power from the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the Reference Level Uncertainty
- Uncertainty of variable attenuators
- Uncertainty of cables
- Uncertainty due to the mismatches

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Reference Level	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Attenuator	0.25	Normal	2	1	0.125
Mismatch	0.25	U-Shape	1.414	1	0.1768033
Combined Standard Uncertainty					0.476087
Expanded Uncertainty (K=2)					0.952174

The total derived measurement uncertainty is +/- 0.95 dB.

10 Measurements, Examination and Derived Results

10.1 Antenna Requirement

Spec	Requirement	Applicable
§15.203	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. Antenna requirement must meet at least one of the following: a) Antenna must be permanently attached to the device. b) The antenna must use a unique type of connector to attach to the device. c) Device must be professionally installed. The installer shall be responsible for ensuring that the correct antenna is employed by the device.	☒
Remark	Antenna is permanently attached to the device.	
Result	☒ PASS ☐ FAIL	

10.2 Peak Output Power

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.407 RSS 247	a)(1)(i)	For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).	☐
	a)(1)(ii)	For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi.	☒
	a)(1)(iii)	For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.	☐
	a)(1)(iv)	For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.	☐
	a)(2)	For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm 10 log B, where B is the 26 dB emission bandwidth in megahertz.	☐
	a)(3)	For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.	☒
Test Setup			
Test Procedure	789033 D02 General UNII Test Procedures New Rules v01r02 <u>Measurement using a Power Meter (PM)</u> Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required. - Connect EUT's RF output power to power meter - Set EUT to be continuous transmission mode - Measurement the average output power using power meter and record the result - Repeat above steps for different test channel and other modulation type.		
Test Date	01 /28 /2019	Environmental condition	Temperature 21°C Relative Humidity 40% Atmospheric Pressure 1019mbar
Remark	-		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Output Power Verification measurement result for 5.2GHz

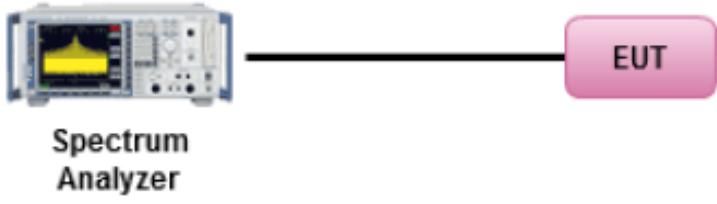
Test mode	Freq (MHz)	CH	Conducted Power (dBm)	Limit (dBm)	Result
802.11a	5180	Low	11.27	30	Pass
	5200	Mid	12.18	30	Pass
	5240	High	12.36	30	Pass

Output Power Verification Measurement Results for 5.8GHz

Test mode	Freq(MHz)	CH	Conducted Power (dBm)	Limit (dBm)	Result
802.11a	5745	Low	11.53	30	Pass
	5785	Mid	11.72	30	Pass
	5825	High	11.43	30	Pass

10.3 Band Edge and Emission Mask Measurement

Requirement(s):

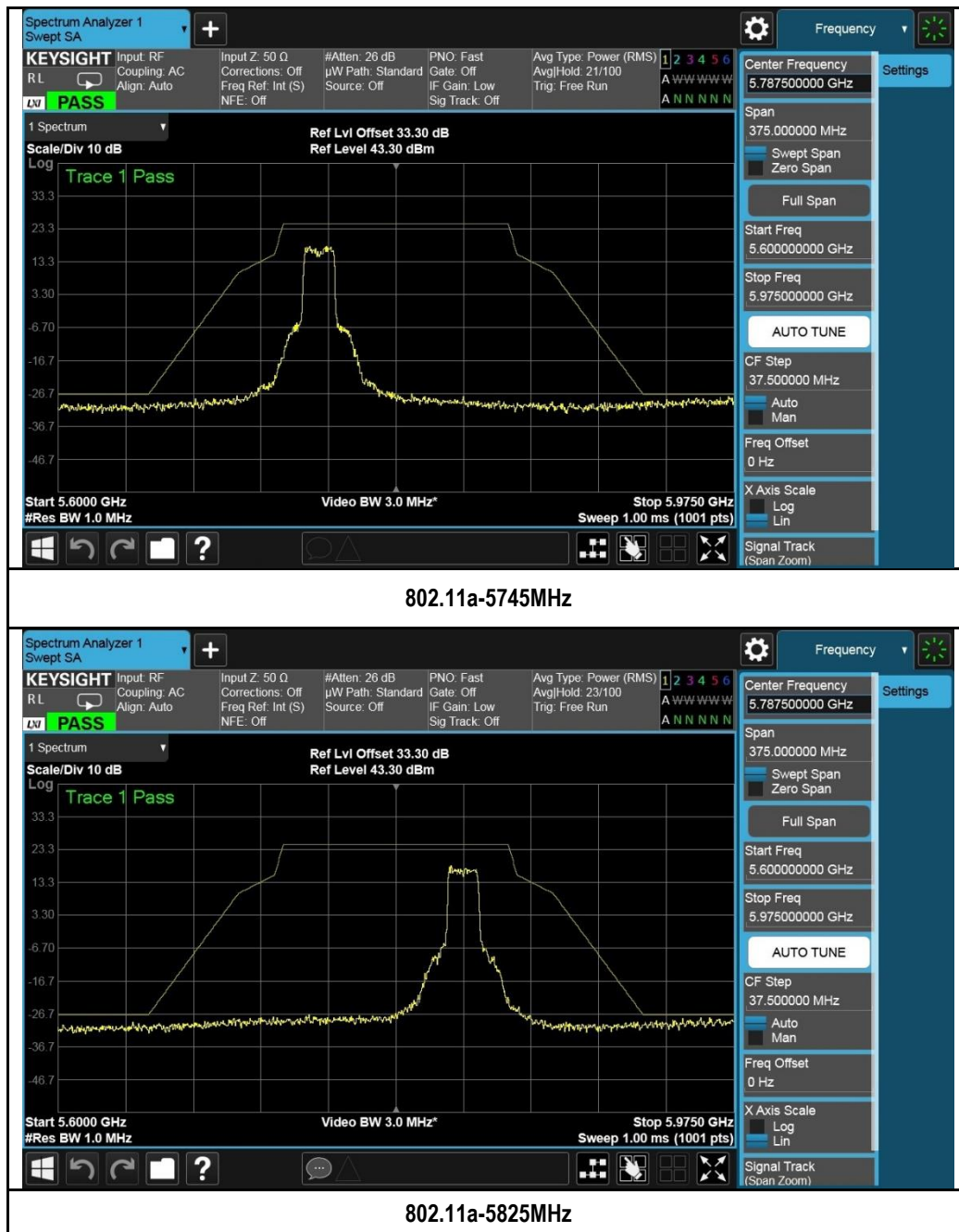
Spec	Item	Requirement	Applicable
RSS 247 Issue 2, 2017	(1)	For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.	☐
	(2)	For transmitters operating in the 5.725-5.825 GHz band: all emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.	☒
Test Setup	 Spectrum Analyzer		
Procedure	789033 D02 General UNII Test Procedures New Rules v01, II.F. Method SA-1 <u>Band Edge measurement:</u> - For average emissions measurements, follow the procedures described in section II.G.6., "Procedures for Average Unwanted Emissions Measurements above 1000 MHz", except for the following changes: - Set RBW=100kHz - Set VBW=300kHz - Perform a band-power integration across the 1 MHz bandwidth in which the band-edge emission level is to be measured.		
Remark	Antenna gain was added to the offset.		
Result	☒ Pass ☐ Fail		

Test Data ☐ Yes (See below) ☒ N/A

Test Plot ☒ Yes (See below) ☐ N/A

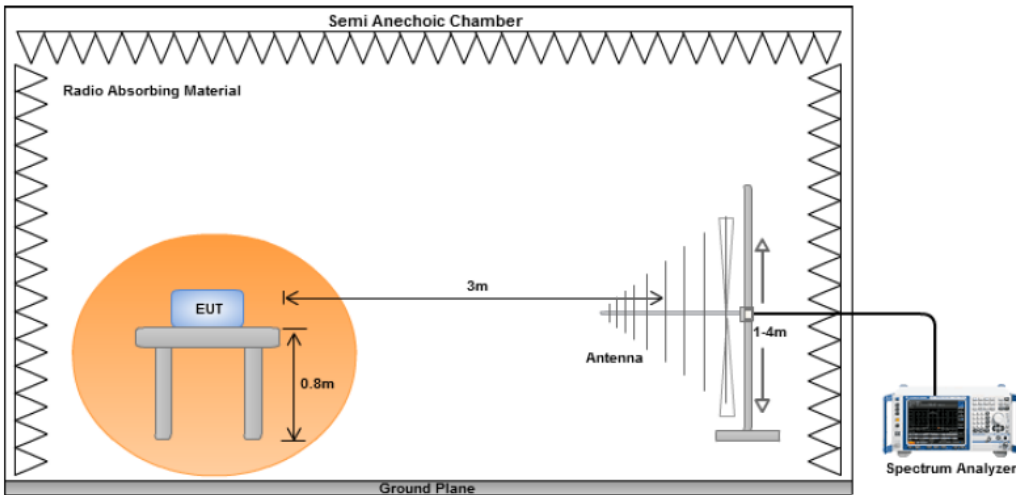
Test was done by Gary Chou at RF test site.

Band Edge Measurement Plots:



10.4 Radiated Emissions below 1GHz

Requirement(s):

Spec	Requirement	Applicable										
47CFR§ 15.407(b) 15.209 (a) RSS Gen	Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges <table><thead><tr><th>Frequency range (MHz)</th><th>Field Strength (uV/m)</th></tr></thead><tbody><tr><td>30 – 88</td><td>100</td></tr><tr><td>88 – 216</td><td>150</td></tr><tr><td>216 960</td><td>200</td></tr><tr><td>Above 960</td><td>500</td></tr></tbody></table>	Frequency range (MHz)	Field Strength (uV/m)	30 – 88	100	88 – 216	150	216 960	200	Above 960	500	☒
Frequency range (MHz)	Field Strength (uV/m)											
30 – 88	100											
88 – 216	150											
216 960	200											
Above 960	500											
Test Setup												
Procedure	1. The EUT was switched on and allowed to warm up to its normal operating condition. 2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. A Quasi-peak measurement was then made for that frequency point. 4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.											
Remark	The EUT was scanned up to 1GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.											
Result	☒ Pass ☐ Fail											

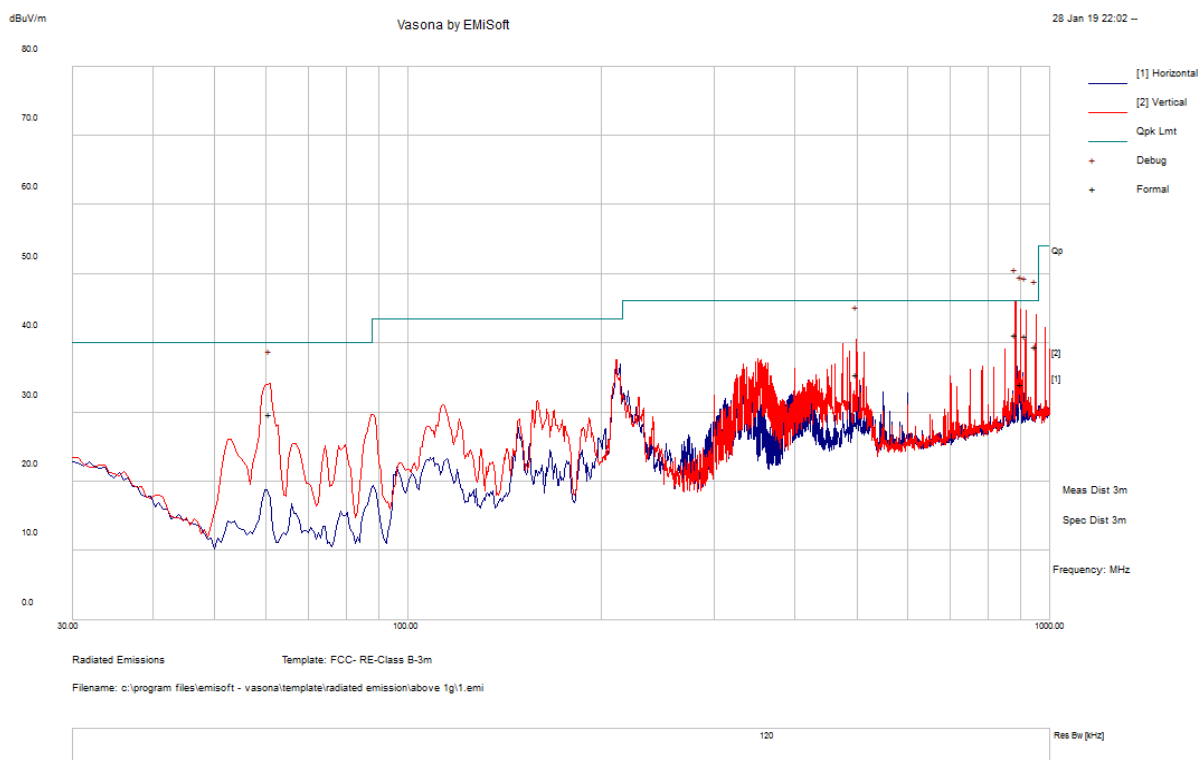
Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Gary Chou at 10m chamber.

Radiated Emission Test Results (Below 1GHz)

Test specification	Below 1GHz			
Environmental Conditions:	Temp (°C):	23	Result	Pass
	Humidity (%)	46		
	Atmospheric (mbar):	1017		
Mains Power:	120VAC, 60Hz			
Tested by:	Gary Chou			
Test Date:	01/28/2019			
Remarks:	TX Mode 11A 5180 MHz			



Quasi Max Measurement

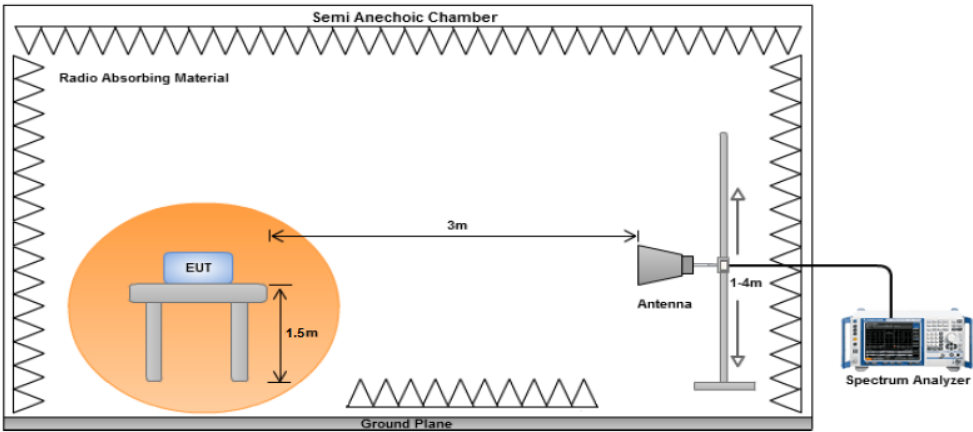
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Po l	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
883.35	39.1	15.9	-13.78	41.22	Quasi Max	V	169	126	46	-4.78	Pass
899.972188	31.39	15.95	-13.29	34.05	Quasi Max	V	118	171	46	-11.95	Pass
916.708438	37.6	15.87	-12.35	41.11	Quasi Max	V	116	175	46	-4.89	Pass
949.82125	36.33	16.04	-12.79	39.58	Quasi Max	V	112	210	46	-6.42	Pass
499.975625	39.57	14.17	-18.27	35.47	Quasi Max	V	150	127	46	-10.54	Pass
60.952813	45.63	11.51	-27.34	29.81	Quasi Max	V	131	285	40	-10.19	Pass

Note: Both horizontal and vertical polarities were investigated. The results above show only the worst case.

10.5 Radiated Spurious Emissions above 1GHz

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§ 15.407(b)(2), 15.407(b)(6) RSS 247 Issue 2, 2017	(1)	For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.	☒
	(2)	For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.	☒
	(3)	For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz.	☒
	(4)	For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.	☒
	(5)	Restricted band, emission must also comply with the radiated emission limits specified in 15.209.	☒

Test Setup			
Procedure	- The EUT was switched on and allowed to warm up to its normal operating condition. - The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: - Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. - The EUT was then rotated to the direction that gave the maximum emission. - Finally, the antenna height was adjusted to the height that gave the maximum emission. - An average measurement was then made for that frequency point. - Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.		
Remark	The EUT was scanned up to 40GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.		
Result	☒ Pass ☐ Fail		

Test Data ☐ Yes (See below) ☒ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Gary Chou at 10m chamber.

Restricted Band Measurement Plots:



Radiated Emission Test Results (Above 1GHz)

1GHz-40GHz – 802.11a – 5180MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (V/H)	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
15953.37	38.24	7.8	5.95	51.99	Peak Max	V	183	231	74	-22.01	Pass
1535.41	51.36	2.38	-6.31	47.43	Peak Max	H	101	330	74	-26.57	Pass
1000.01	53.18	1.88	-7.85	47.21	Peak Max	H	160	356	74	-26.79	Pass
15953.37	26.53	7.8	5.95	40.28	Average Max	V	183	231	54	-13.72	Pass
1535.41	48.62	2.38	-6.31	44.69	Average Max	H	101	330	54	-9.31	Pass
1000.01	48.17	1.88	-7.85	42.2	Average Max	H	160	356	54	-11.8	Pass

1GHz-40GHz – 802.11a – 5200MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (V/H)	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
10402.72	39.36	6.03	1.51	46.9	Peak Max	V	167	36	74	-27.1	Pass
1533.44	40.42	2.37	-6.32	36.47	Peak Max	V	114	64	74	-37.53	Pass
1000.02	48.37	1.88	-7.85	42.4	Peak Max	V	117	76	74	-31.6	Pass
10402.72	27.24	6.03	1.51	34.78	Average Max	V	167	36	54	-19.22	Pass
1533.44	27.52	2.37	-6.32	23.57	Average Max	V	114	64	54	-30.43	Pass
1000.02	41.63	1.88	-7.85	35.66	Average Max	V	117	76	54	-18.34	Pass

1GHz-40GHz – 802.11a – 5240MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (V/H)	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
10475.66	42.41	6.07	1.54	50.02	Peak Max	V	104	74	74	-23.98	Pass
1535.5	47.52	2.38	-6.31	43.59	Peak Max	H	130	62	74	-30.41	Pass
3493.15	45.17	3.58	-1.75	47	Peak Max	V	184	133	74	-27	Pass
10475.66	29.26	6.07	1.54	36.87	Average Max	V	104	74	54	-17.13	Pass
1535.5	43.34	2.38	-6.31	39.41	Average Max	H	130	62	54	-14.59	Pass
3493.15	38.12	3.58	-1.75	39.95	Average Max	V	184	133	54	-14.05	Pass

1GHz-40GHz – 802.11a – 5745MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (V/H)	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
11483.13	52.46	6.07	2.32	60.85	Peak Max	V	105	130	74	-13.15	Pass
1535.49	50.52	2.38	-6.31	46.59	Peak Max	H	103	331	74	-27.41	Pass
3829.77	45.28	3.66	-0.74	48.2	Peak Max	V	133	356	74	-25.8	Pass
11483.13	36.64	6.07	2.32	45.03	Average Max	V	105	130	54	-8.97	Pass
1535.49	48.76	2.38	-6.31	44.83	Average Max	H	103	331	54	-9.17	Pass
3829.77	39.59	3.66	-0.74	42.51	Average Max	V	133	356	54	-11.49	Pass

1GHz-40GHz – 802.11a – 5785MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (V/H)	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
11572.76	54.33	6.13	2.44	62.9	Peak Max	V	177	126	74	-11.1	Pass
17828.5	38.47	8.06	8.41	54.94	Peak Max	H	213	329	74	-19.06	Pass
3856.69	47.11	3.69	-0.65	50.15	Peak Max	V	149	95	74	-23.85	Pass
11572.76	38.69	6.13	2.44	47.26	Average Max	V	177	126	54	-6.74	Pass
17828.5	26.72	8.06	8.41	43.19	Average Max	H	213	329	54	-10.81	Pass
3856.69	43.53	3.69	-0.65	46.57	Average Max	V	149	95	54	-7.43	Pass

1GHz-40GHz – 802.11a – 5825MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (V/H)	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
11650.16	41.17	6.14	2.46	49.77	Peak Max	V	100	156	74	-24.23	Pass
17513.47	38.32	8.26	7.78	54.36	Peak Max	V	269	70	74	-19.64	Pass
1533.06	40.45	2.37	-6.32	36.5	Peak Max	V	269	139	74	-37.5	Pass
11650.16	28.69	6.14	2.46	37.29	Average Max	V	100	156	54	-16.71	Pass
17513.47	26.52	8.26	7.78	42.56	Average Max	V	269	70	54	-11.44	Pass
1533.06	27.43	2.37	-6.32	23.48	Average Max	V	269	139	54	-30.52	Pass

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Keysight EXA 44GHz Spectrum Analyzer	N9030B(PXA)	MY57140374	07/22/2018	1 Year	07/22/2019	☒
Keysight Signal Generator	MXG N5182A	MY47071065	04/12/2018	1 Year	06/28/2019	☐
Pre-Amplifier (1-26.5GHz)	8449B	3008A00715	05/16/2018	1 Year	05/16/2019	☒
RF Pre-Amplifier (9kHz - 6.5GHz)	LPA-6-30	11170601	02/06/2018	1 Year	02/06/2019	☒
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	03/09/2018	2 Year	03/09/2020	☒
Horn Antenna (1GHz~26GHz)	3117	214309	11/22/2018	1 Year	11/22/2019	☒

Annex B. SIEMIC Accreditation

Accreditations	Document	Scope / Remark
ISO 17025 (A2LA)		Please see the documents for the detailed scope
ISO Guide 65 (A2LA)		Please see the documents for the detailed scope
TCB Designation		A1 , A2 , A3 , A4 , B1 , B2 , B3 , B4 , C
FCC DoC Accreditation		FCC Declaration of Conformity Accreditation
FCC Site Registration		3 meter site
FCC Site Registration		10 meter site
IC Site Registration		3 meter site
IC Site Registration		10 meter site
EU NB		Radio Equipment: EN45011: EN ISO/IEC 17065
		Electromagnetic Compatibility: EN45011 – EN ISO/IEC 17065
Singapore iDA CB(Certification Body)		Phase I , Phase II
Vietnam MIC CAB Accreditation		Please see the document for the detailed scope
Hong Kong OFCA		(Phase II) OFCA Foreign Certification Body for Radio and Telecom
		(Phase I) Conformity Assessment Body for Radio and Telecom
Industry Canada CAB		Radio: Scope A – All Radio Standard Specification in Category I
		Telecom: CS-03 Part I, II, V, VI, VII, VIII

Japan Recognized Certification Body Designation		Radio: A1. Terminal equipment for purpose of calling Telecom: B1. Specified radio equipment specified in Article 38-2, Paragraph 1, Item 1 of the Radio Law
Korea CAB Accreditation		EMI: KCC Notice 2008-39, RRL Notice 2008-3: CA Procedures for EMI KN22: Test Method for EMI EMS: KCC Notice 2008-38, RRL Notice 2008-4: CA Procedures for EMS KN24, KN61000-4-2, -4-3, -4-4, -4-5, -4-6, -4-8, -4-11: Test Method for EMS Radio: RRL Notice 2008-26, RRL Notice 2008-2, RRL Notice 2008-10, RRL Notice 2007-49, RRL Notice 2007-20, RRL Notice 2007-21, RRL Notice 2007-80, RRL Notice 2004-68 Telecom: President Notice 20664, RRL Notice 2007-30, RRL Notice 2008-7 with attachments 1, 3, 5, 6; President Notice 20664, RRL Notice 2008-7 with attachment 4
Taiwan NCC CAB Recognition		LP0002, PSTN01, ADSL01, ID0002, IS6100, CNS14336, PLMN07, PLMN01, PLMN08
Taiwan BSMI CAB Recognition		CNS 13438
Japan VCCI		R-3083: Radiation 3 meter site C-3421: Main Ports Conducted Interference Measurement T-1597: Telecommunication Ports Conducted Interference Measurement
Australia CAB Recognition		EMC: AS/NZS CISPR 11, AS/NZS CISPR 14.1, AS/NZS CISPR22, AS/NZS 61000.6.3, AS/NZS 61000.6.4 Radiocommunications: AS/NZS 4281, AS/NZS 4268, AS/NZS 4280.1, AS/NZS 4280.2, AS/NZS 4295, AS/NZS 4582, AS/NZS 4583, AS/NZS 4769.1, AS/NZS 4769.2, AS/NZS 4770, AS/NZS 4771 Telecommunications: AS/ACIF S002:05, AS/ACIF S003:06, AS/ACIF S004:06, AS/ACIF S006:01, AS/ACIF S016:01, AS/ACIF S031:01, AS/ACIF S038:01, AS/ACIF S040:01, AS/ACIF S041:05, AS/ACIF S043.2:06, AS/ACIF S60950.1
Australia NATA Recognition		AS/ACIF S002, AS/ACIF S003, AS/ACIF S004, AS/ACIF S006, AS/ACIF S016, AS/ACIF S031, AS/ACIF S038, AS/ACIF S040, AS/ACIF S041, AS/ACIF S043.2