

RF TEST REPORT

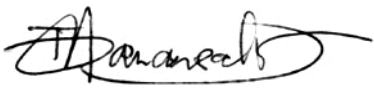


Report No.: FCC_RF_SL14090901-CPC-006_Rev1.0

Supersede Report No.: FCC_RF_SL14090901-CPC-006

Applicant	:	ChargePoint, Inc.
Product Name	:	Communication Board with 802.11 WLAN module
Model No.	:	241083G and PXS8
Test Standard	:	47 CRF 15.247: 2013 RSS-210 Issue 8: 2010
Test Method	:	ANSI C63.10: 2009 RSS-Gen Issue 3: 2010 558074 D01 DTS Meas Guidance v03r02
FCC ID	:	WLAN Module: W38-241083G WWAN Module: W38-PXS8
IC ID	:	WLAN Module: 8854A-241083G WWAN Module: 8854A -PXS8
Dates of test	:	Oct 2, 2014 to Oct 10, 2014
Issue Date	:	11/03/2014
Test Result	:	☒ Pass ☐ Fail
Equipment complied with the specification [X] Equipment did not comply with the specification []		

This Test Report is Issued Under the Authority of:

	
Teody Manansala	Nima Molaei
Test Engineer	Engineer Reviewer
This test report may be reproduced in full only Test result presented in this test report is applicable to the tested sample only	

Issued By:
SIEMIC Laboratories
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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	EMC, RF/Wireless, Telecom, Safety
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 & R&TTE Directive
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_RF_SL14090901-CPC-006	None	Original	10/15/2014
FCC_RF_SL14090901-CPC-006_Rev1.0	1.0	Change the product name	11/3/2014

2 Executive Summary

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

Company: ChargePoint, Inc.
Product: Communication Board with 802.11 WLAN module
Model: 241083G and PXS8

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	:	1692 Dell Ave. Campbell, CA 95008, USA
Manufacturer Name	:	ChargePoint, Inc.
Manufacturer Address	:	1692 Dell Ave. Campbell, CA 95008, USA

4 Test site information

Lab performing tests	SIEMIC Laboratories
Lab Address	775 Montague Expressway, Milpitas, CA 95035
FCC Test Site No.	881796
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	:	Communication Board with 802.11 WLAN module
Model No.	:	241083G and PXS8
Trade Name	:	ChargePoint
Serial No.	:	N/A
Host Model No.	:	N/A
Input Power	:	5VDC
Power Adapter Manu/Model	:	N/A
Power Adapter SN	:	N/A
Hardware version	:	N/A
Software version	:	N/A
Date of EUT received	:	10/02/2014
Equipment Class/ Category	:	DTS
Clock Frequencies	:	N/A
Port/Connectors	:	Ethernet, Console

6.2 Radio Description

Spec for Radio -

Radio Type	802.11b	802.11g	802.11n-20
Operating Frequency	2412-2462MHz	2412-2462MHz	2412-2462MHz
Modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (BPSK, QPSK, 16QAM, 64QAM)	OFDM (BPSK, QPSK, 16QAM, 64QAM)
Channel Spacing	5MHz	5MHz	5MHz
Number of Channels	11	11	11
Antenna Type	WLAN: Embedded; WWAN: Embedded		
Antenna Gain	WLAN: 2.5 dBi; WWAN: 2.5 dBi		
Antenna Connector Type	UFL		

Channel List

Type		Channel No.	Frequency (MHz)	Available (Y/N)
802.11b/g/n-20	2412-2462	1	2412	Y
		2	2417	Y
		3	2422	Y
		4	2427	Y
		5	2432	Y
		6	2437	Y
		7	2442	Y
		8	2447	Y
		9	2452	Y
		10	2457	Y
		11	2462	Y
		12	2467	N
		13	2472	N

6.3 EUT test modes/configuration Description

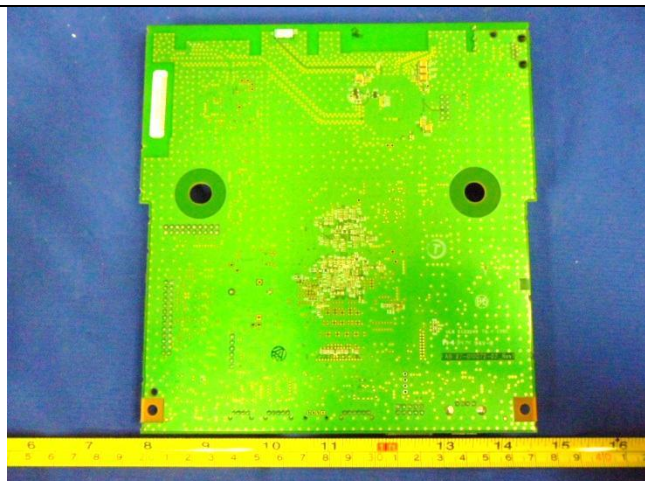
Test mode

Final Test Mode		Note
Final_test_mode_1	EUT set to continuous transmit (802.11n-20) and GPRS 850MHz simultaneously	Radiated spurious emissions below 1GHz
Final_test_mode_2	EUT set to continuous transmit (802.11n-20) and GPRS 1900MHz simultaneously	Radiated spurious emissions above 1GHz
Remarks:		

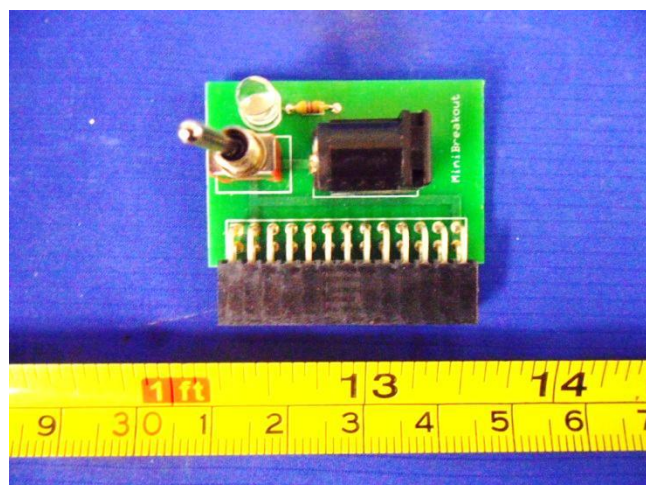
6.4 EUT Photos



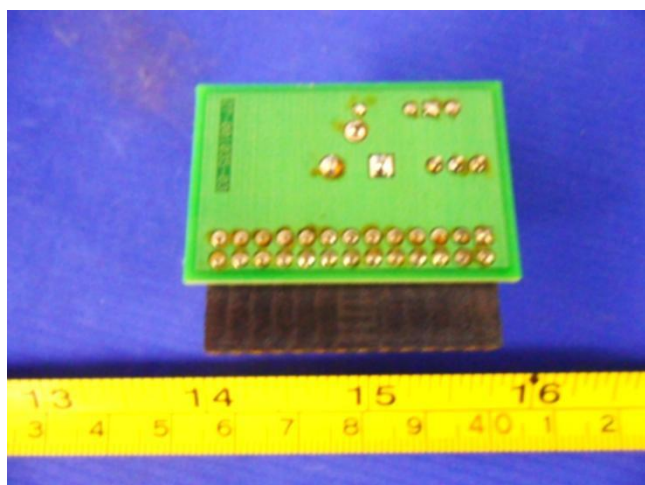
EUT – PCBA 1 Component Side



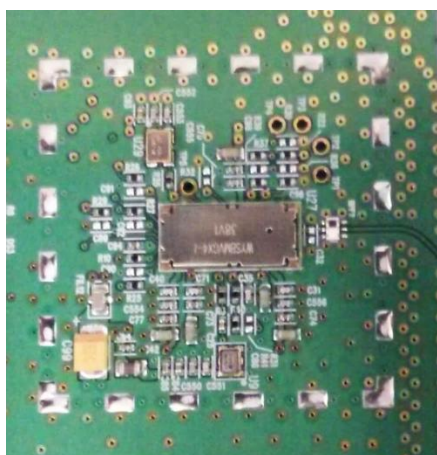
EUT – PCBA 1 Solder Side



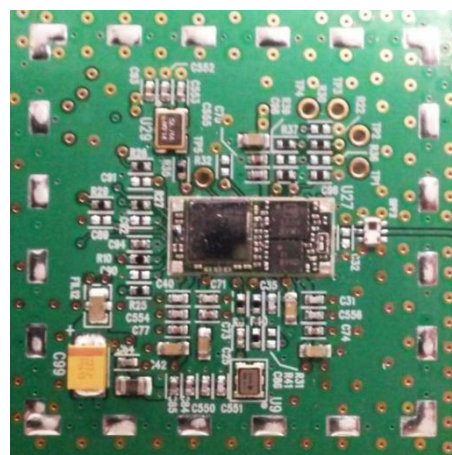
EUT – PCBA1 Component Side



EUT – PCBA1 Solder Side



EUT – WLAN Radio with Shielding



EUT – WLAN Radio without Shielding

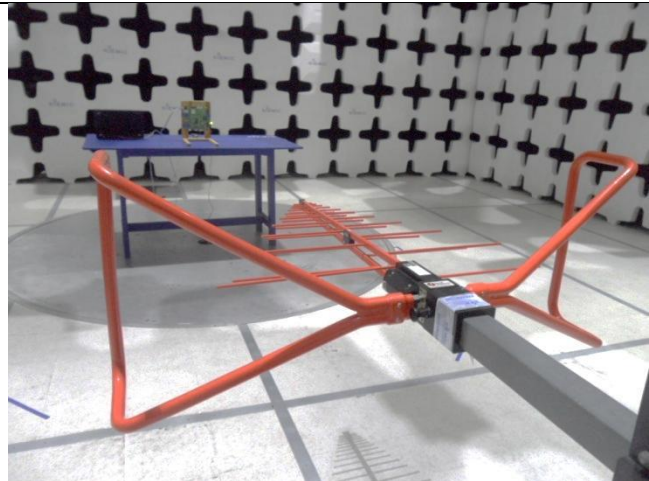


EUT – WWAN Radio with Shielding

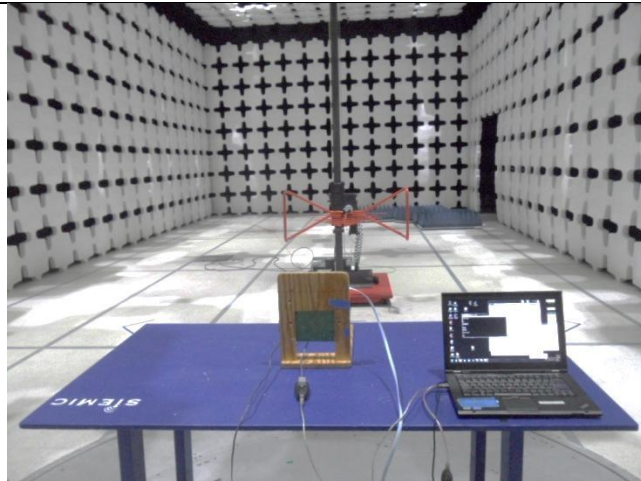


EUT – WWAN Radio without Shielding

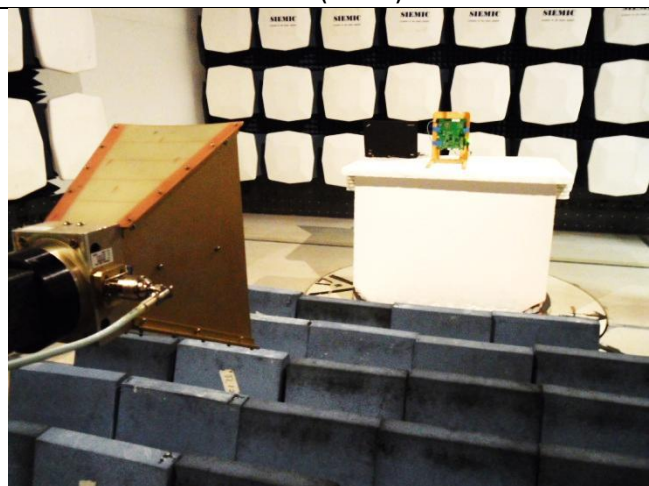
6.5 EUT Test Setup Photos



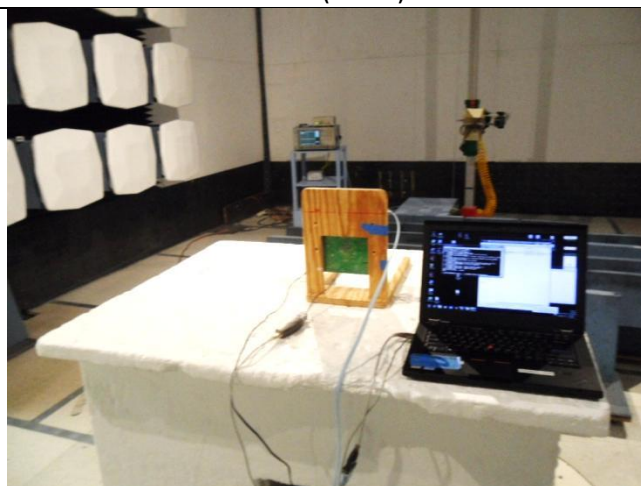
Radiated Emissions (<1GHz) – Front View



Radiated Emissions (<1GHz) – Rear View



Radiated Emissions (>1GHz) – Front View



Radiated Emissions (>1GHz) – Rear View

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	Laptop	ThinkPad	R90152737	Lenovo	-
2	AC/DC Power Supply	EPSA050250U	-	V-Infinity	-

7.2 Cabling Description

Name	Connection Start		Connection Stop		Length / shielding Info		Note
	From	I/O Port	To	I/O Port	Length (m)	Shielding	
-	EUT	Ethernet	Laptop	USB	0.5M	No	-
-	EUT	I/O	Laptop	USB	0.5M	No	

7.3 Test Software Description

Test Item	Software	Description
RF Testing	Labtool and Tera Term	Set the EUT to transmit continuously in different test modes

8 Test Summary

Test Item	Test standard		Test Method/Procedure		Pass / Fail
Restricted Band of Operation	FCC/IC	15.205 RSS 210 (2.2)	FCC/IC	ANSI C63.10 – 2009 558074 D01 DTS Meas Guidance v03r02	☐ Pass ☒ N/A
AC Conducted Emissions Voltage	FCC/IC	15.207(a) RSS Gen (7.2.4)	FCC/IC	ANSI C63.10 – 2009 RSS Gen (7.2.4)	☐ Pass ☒ N/A

Test Item	Test standard		Test Method/Procedure		Pass / Fail
Channel Separation	FCC/IC	15.247 (a)(1) RSS210 (A8.1)	FCC/IC	-	☐ Pass ☒ N/A
Occupied Bandwidth	FCC/IC	15.247 (a)(1) RSS210 (A8.1)	FCC/IC	RSS Gen (4.6.1)	☐ Pass ☒ N/A
6 dB Bandwidth	FCC/IC	15.247(a)(2) RSS210 (A8.2)	FCC/IC	558074 D01 DTS Meas Guidance v03r02	☐ Pass ☒ N/A
Number of Hopping Channels	FCC/IC	15.247(a)(1) RSS210(A8.1)	FCC/IC	-	☐ Pass ☒ N/A
Band Edge and Radiated Spurious Emissions	FCC/IC	15.247(d) RSS210(A8.5)	FCC/IC	ANSI C63.10 – 2009 558074 D01 DTS Meas Guidance v03r02	☒ Pass ☐ N/A
Time of Occupancy	FCC/IC	15.247(a)(1) RSS210(A8.1)	FCC/IC	-	☐ Pass ☒ N/A
Output Power	FCC/IC	15.247(b) RSS210 (A8.4)	FCC/IC	558074 D01 DTS Meas Guidance v03r02	☐ Pass ☒ N/A
Receiver Spurious Emissions	FCC/IC	15.247(d) RSS Gen (4.8)	FCC/IC	RSS Gen (4.6.1)	☐ Pass ☒ N/A
Antenna Gain > 6 dBi	FCC/IC	15.247(e) RSS210(A8.4)	FCC/IC	-	☐ Pass ☒ N/A
Power Spectral Density	FCC/IC	15.247(e) RSS210(A8.3)	FCC/IC	558074 D01 DTS Meas Guidance v03r02	☐ Pass ☒ N/A
Hybrid System Requirement	FCC/IC	15.247(f) RSS210(A8.3)	FCC/IC	-	☐ Pass ☒ N/A
Hopping Capability	FCC/IC	15.247(g) RSS210(A8.1)	FCC/IC	-	☐ Pass ☒ N/A
Hopping Coordination Requirement	FCC/IC	15.247(h) RSS210(A8.1)	FCC/IC	-	☐ Pass ☒ N/A
RF Exposure requirement	FCC/IC	15.247(i) RSS Gen (5.5)	FCC/IC	-	☐ Pass ☒ N/A
Remark	- All measurement uncertainties do not take into consideration for all presented test results. - 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.				

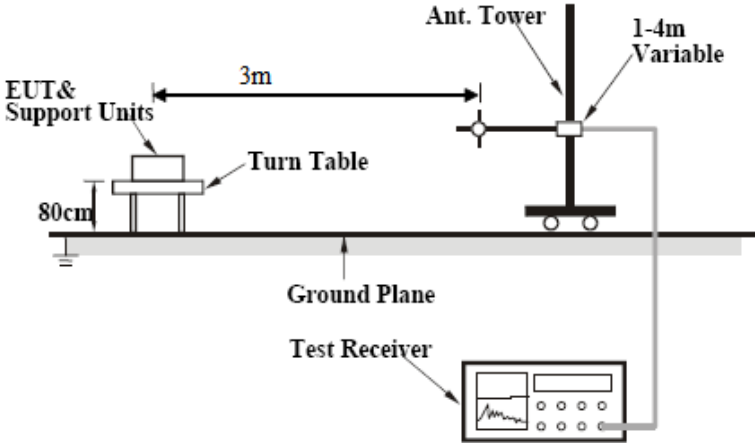
9 Measurement Uncertainty

Emissions			
Test Item	Frequency Range	Description	Uncertainty
Band Edge and Radiated Spurious Emissions	30MHz – 1GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
Band Edge and Radiated Spurious Emissions	1GHz – 40GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+4.3dB/-4.1dB

10 Measurements, Examination and Derived Results

10.1 Radiated Emissions below 1GHz

Requirement(s):

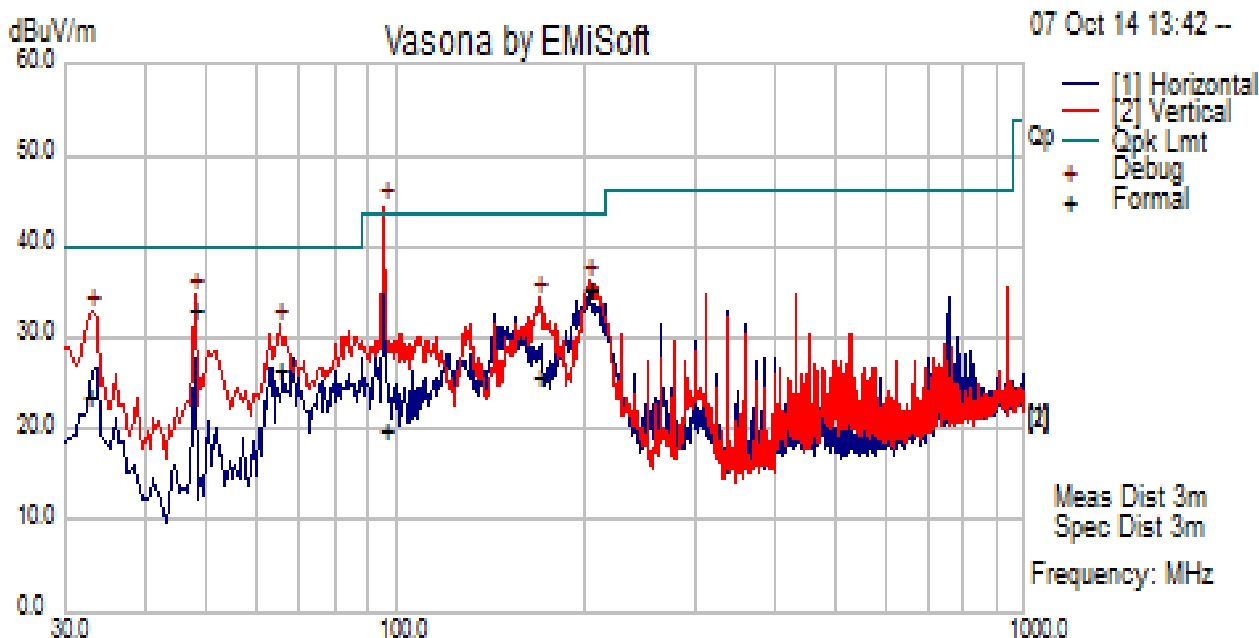
Spec	Item	Requirement	Applicable							
47CFR§15.247(d), RSS210(A8.5)	a)	Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges	☒							
		<table><tr><th>Frequency range (MHz)</th><th>Field Strength (uV/m)</th></tr><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></table>		Frequency range (MHz)	Field Strength (uV/m)	30 – 88	100	88 – 216	150	216 960
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

Radiated Emission Test Results (Below 1GHz)

Test specification	below 1GHz			
Environmental Conditions:	Temp (°C):	26.1	Result	Pass
	Humidity (%)	47.5		
	Atmospheric (mbar):	1020		
Mains Power:	120VAC, 60Hz			
Tested by:	Teody Manansala			
Test Date:	10/07/2014			
Remarks:	WLAN (802.11g 2437MHz) and WWAN (GPRS 1900MHz) transmitting simultaneously			

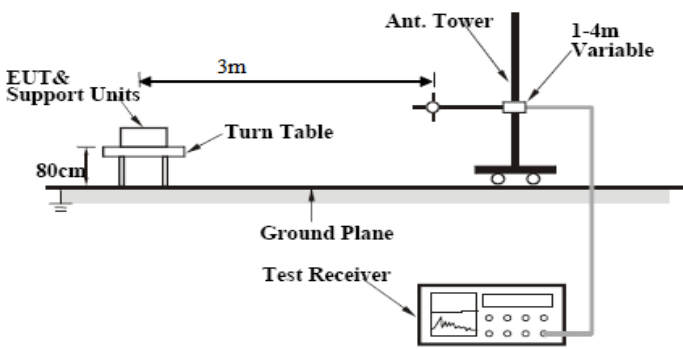


Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
95.95	49.09	1.77	-30.93	19.93	Quasi Max	V	136.00	100.00	43.50	-23.57	Pass
47.99	61.40	1.16	-29.44	33.12	Quasi Max	V	105.00	135.00	40.00	-6.88	Pass
32.69	43.20	1.16	-20.67	23.69	Quasi Max	V	131.00	314.00	40.00	-16.31	Pass
202.96	60.77	2.52	-27.89	35.40	Quasi Max	V	101.00	133.00	43.50	-8.10	Pass
65.53	56.11	1.36	-31.05	26.42	Quasi Max	V	109.00	356.00	40.00	-13.58	Pass
168.84	51.48	2.34	-28.18	25.64	Quasi Max	V	160.00	255.00	43.50	-17.86	Pass

Note: Both horizontal and vertical polarities were investigated. The results above show only the worst case. Collocation test was performed for WLAN and WWAN transmitting simultaneously.

10.2 Radiated Spurious Emissions above 1GHz

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§15.247(d), RSS210(A8.5)	a)	For non-restricted band, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB or 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, determined by the measurement method on output power to be used. Attenuation below the general limits specified in § 15.209(a) is not required ☒ 20 dB down ☐ 30 dB down	☒
	b)	or 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 25GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.		
Result	☒ Pass ☐ Fail		

Equipment Setting

Test	RBW	VBW	Span	Detector	Sweep	Trace	Notes
Radiated Spurious Emission	1MHz	3MHz	1GHz - 25 GHz	Peak	Auto	Max hold	PK Measurement
Radiated Spurious Emission	1MHz	10Hz	1GHz - 25 GHz	Peak	Auto	Max hold	Ave Measurement

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Radiated Emission Test Results (Above 1GHz)

1GHz WLAN (802.11g – 2437MHz) and WWAN (GPRS 1900MHz) transmitting simultaneously

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
17931.78	39.97	6.61	14.24	60.81	Peak Max	V	302.00	354.00	74.00	-13.19	Pass
4161.00	40.75	3.36	-0.22	43.89	Peak Max	H	134.00	348.00	74.00	-30.11	Pass
1007.44	46.98	1.75	-7.17	41.55	Peak Max	V	123.00	182.00	74.00	-32.45	Pass
17931.78	26.72	6.61	14.24	47.56	Average Max	V	302.00	354.00	54.00	-6.44	Pass
4161.00	27.65	3.36	-0.22	30.79	Average Max	H	134.00	348.00	54.00	-23.21	Pass
1007.44	34.02	1.75	-7.17	28.60	Average Max	V	123.00	182.00	54.00	-25.40	Pass

Note: Collocation test was performed for WLAN and WWAN transmitting simultaneously.

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Conducted Emissions						
R & S Receiver	ESIB 40	100179	04/20/2014	1 Year	04/20/2015	☒
R&S LISN	ESH2-Z5	861741/013	05/18/2014	1 Year	05/18/2015	☒
CHASE LISN	MN2050B	1018	07/24/2014	1 Year	07/24/2015	☒
Sekonic Hygro Hermograph	ST-50	HE01-000092	05/25/2014	1 Year	05/25/2015	☒
Radiated Emissions						
R & S Receiver	ESL6	100178	03/01/2014	1 Year	03/01/2015	☒
R & S Receiver	ESIB 40	100179	04/20/2014	1 Year	04/20/2015	☒
ETS-Lingren Loop Antenna	6512	00049120	05/13/2014	1 Year	05/13/2015	☐
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	07/03/2014	1 Year	07/03/2015	☒
Horn Antenna (1-26.5GHz)	3115	10SL0059	04/26/2014	1 Year	04/26/2015	☒
Horn Antenna (18-40 GHz)	AH-840	101013	04/23/2014	1 Year	04/23/2015	☒
Pre-Amplifier (1-26.5GHz)	8449B	3008A00715	05/30/2014	1 Year	05/30/2015	☒
Microwave Preamplifier (18-40 GHz)	PA-840	181251	05/30/2014	1 Year	05/30/2015	☒
3 Meters SAC	3M	N/A	10/13/2013	1 Year	10/13/2014	☒
10 Meters SAC	10M	N/A	06/05/2014	1 Year	06/05/2015	☒
Sekonic Hygro Hermograph	ST-50	HE01-000092	05/25/2014	1 Year	05/25/2015	☒
RF Conducted Measurement						
Spectrum Analyzer	N9010A	MY50210206	05/30/2014	1 Year	05/30/2015	☒
Spectrum Analyzer	E4407B	US88441016	05/31/2014	1 Year	05/31/2015	☐
R & S Receiver	ESIB 40	100179	04/20/2014	1 Year	04/20/2015	☒

Annex B. USER MANUAL, BLOCK & CIRCUIT DIAGRAM

Please see attachment

Annex C. 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 & Telecommunications Terminal Equipment: EN45001 – EN ISO/IEC 17025
		Electromagnetic Compatibility: EN45001 – EN ISO/IEC 17025
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 Radio communications: 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