

RF TEST REPORT



Report No.: FCC_IC_RF_SL16041401-HID-013 RPKCL40E

Supersede Report No.: NONE

Applicant	:	HID Global Corporation
Product Name	:	iClass Reader
Model No.	:	RPKCL40E
Test Standard	:	FCC 15.225 RSS-210 Issue 8: 2010
Test Method	:	FCC 15.225 ANSI C63.10 2013 RSS Gen Issue 4 2014
FCC ID	:	JQ6-RPKCL40E
IC ID	:	2236B-RPKCL40E
Dates of test	:	04/18/2016 to 04/27/2016
Issue Date	:	05/02/2016
Test Result	:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
Equipment complied with the specification [X]		
Equipment did not comply with the specification []		
This Test Report is Issued Under the Authority of:		
		
Rachana Khanduri		Teody Manansala
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

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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/RRA, 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_IC_RF_SL16041401-HID-013_RPKCL40E	-	Original	05/02/2016

2 Executive Summary

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

Company: HID Global Corporation
Product: iClass Reader
Model: RPKCL40E

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	:	HID Global Corporation
Applicant Address	:	15370 Barranca Parkway, Irvine, CA 92618 USA
Manufacturer Name	:	HID Global Corporation
Manufacturer Address	:	10385 Westmoor Drive, Suite 300, Westminster, CO 80021

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	:	iClass Reader
Model No.	:	RPKCL40E
Trade Name	:	HID
Serial No.	:	N/A
Input Power	:	12V DC
Product Hardware version	:	N/A
Product Software version	:	N/A
Radio Hardware version	:	N/A
Radio Software version	:	N/A
Test SW Version	:	N/A
Date of EUT received	:	04/18//2016
Equipment Class/ Category	:	DXX, DCD
Working Frequencies	:	125 kHz, 13.56MHz
Port/Connectors	:	7 pin terminal block x 2

6.2 Radio Description

Specifications for Radio:

Radio Type	RFID
Operating Frequency	125KHz, 13.56MHz
Modulation	ASK (125KHz), ASK (13.56MHz)
Channel Spacing	None
Antenna Type	PCB Loop Antenna
Antenna Gain	1 dBi
Antenna Connector Type	N/A

Channel List:

Type	Mode	Channel No.	Frequency (MHz)	Available (Y/N)
RFID	125KHz	1	0.125	Y
RFID	13.56MHz	1	13.56	Y

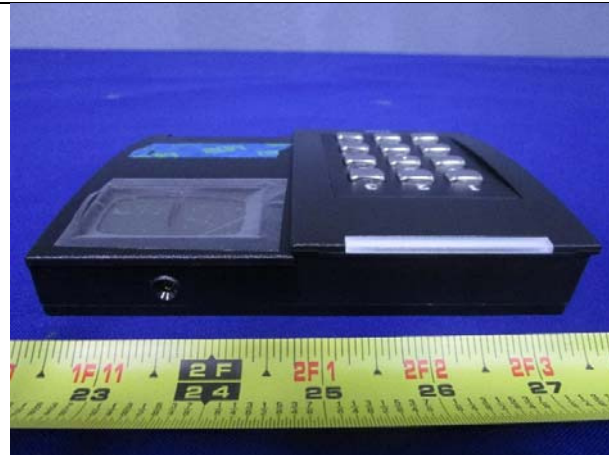
6.3 EUT test modes/configuration Description

Mode	Note
RF test	EUT is set to continuously transmit at 13.56MHz and 125kHz
Note: None	

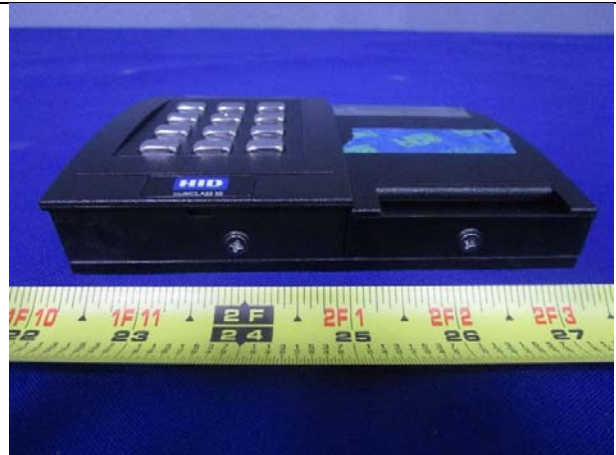
Test Item	Operating mode	Tested antenna port	Test frequencies
Antenna Requirement	N/A	-	125kHz 13.56MHz
Conducted Emissions Voltage	Continuous Transmit	-	
Limit in the band of 13.553 – 13.567 MHz	Continuous Transmit	-	
Limit in the band of 13.410 – 13.553 MHz and 13.567 – 13.710 MHz	Continuous Transmit	-	
Limit in the band of 13.110 – 13.410 MHz and 13.710 – 14.010 MHz	Continuous Transmit	-	
Limit outside the band of 13.110 – 14.010 MHz	Continuous Transmit	-	
Frequency Stability	Continuous Transmit	-	
Occupied Bandwidth	Continuous Transmit	-	

Note: EUT uses a PCB trace antenna attached to the PCB board. Only radiated measurements were performed during the test.

6.4 EUT Photos – External



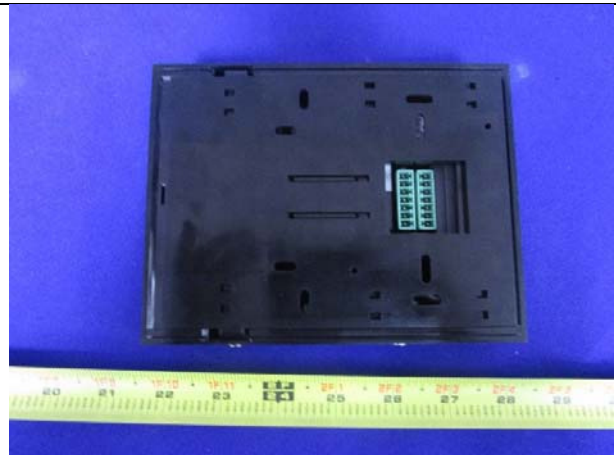
Top Side



Bottom Side



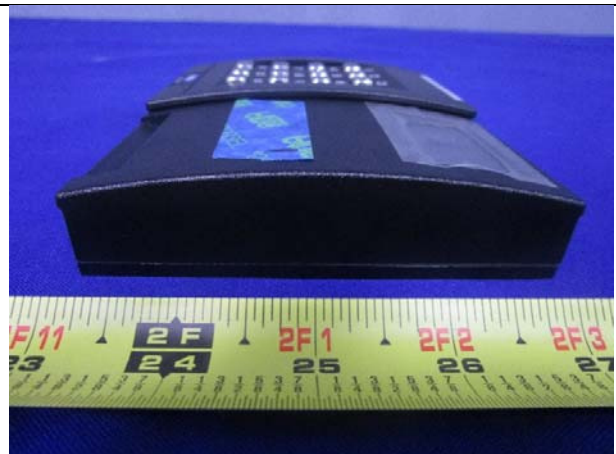
Front Side



Rear Side



Left Side



Right Side

6.5 EUT Photos – Internal



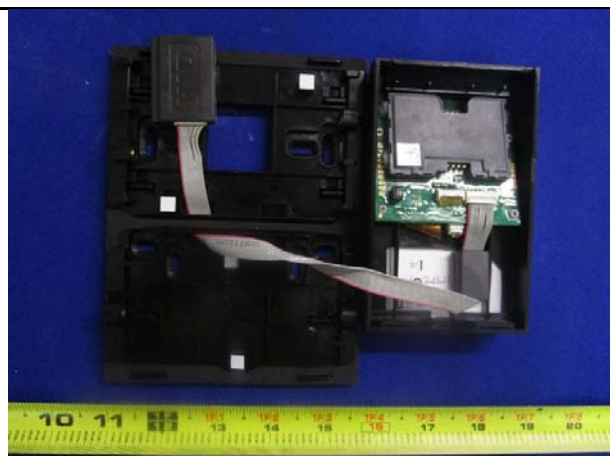
Cover off View 1 with PCBA2



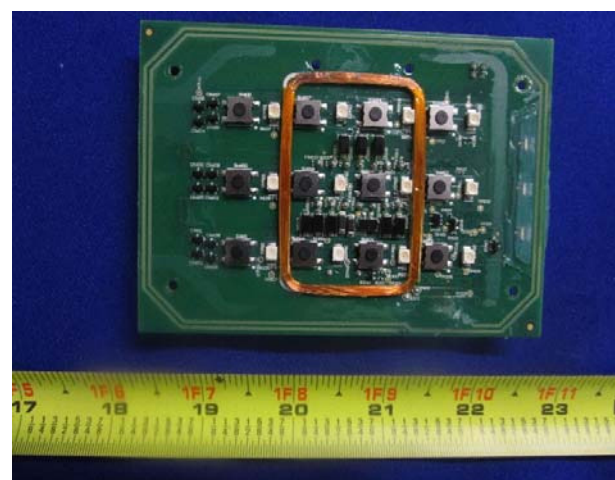
Cover off View 2 with PCBA2



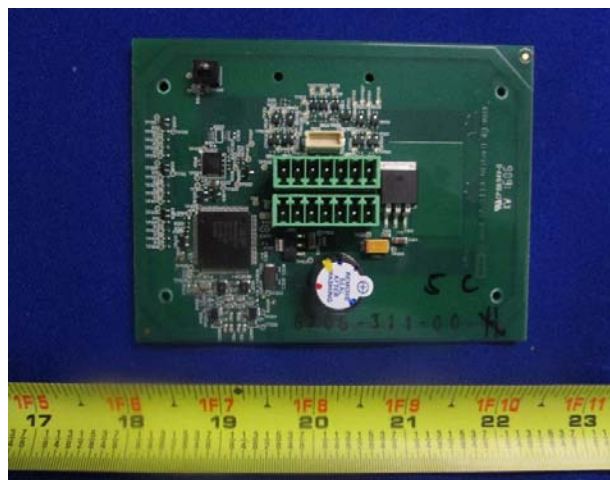
Cover off View 3 without PCBA2



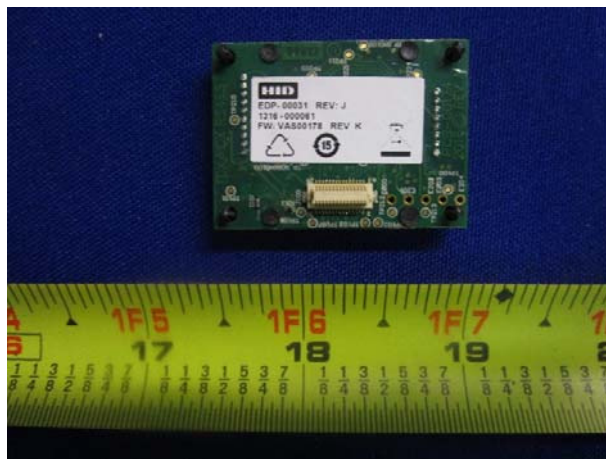
Cover off View 4 PCBA2



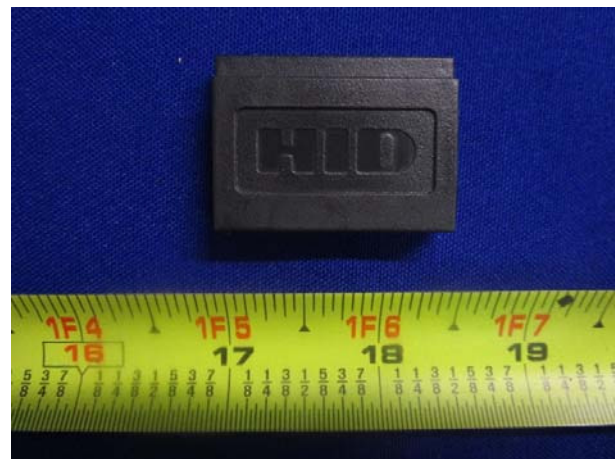
PCBA 1 Top View 1 without PCBA2



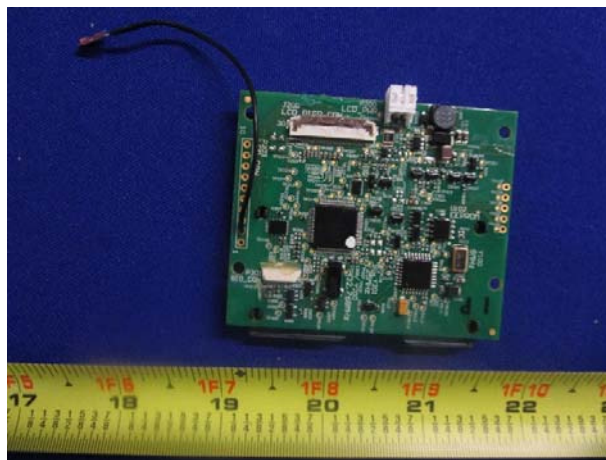
PCBA 1 Top View 2 with PCBA2



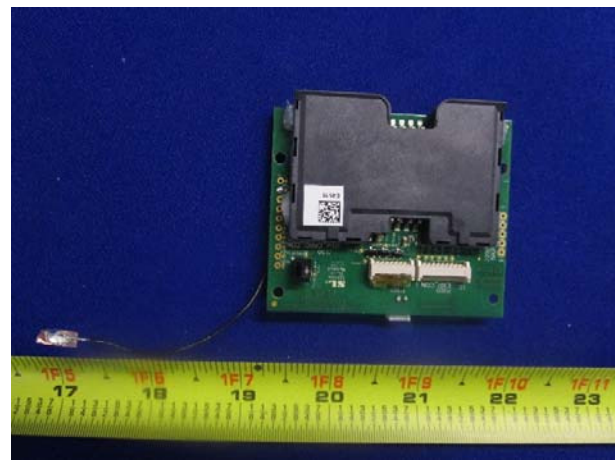
PCBA 1 Bottom View



PCBA2 Top View 1



PCBA2 Top View 2



PCBA2 Bottom View

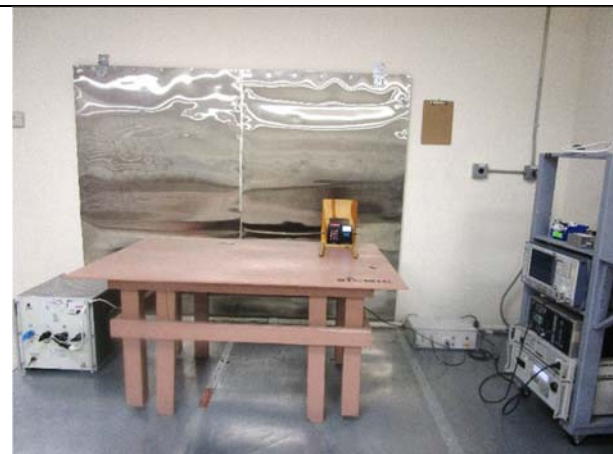


LCD Display View 1



LCD Display View 2

6.6 EUT Test Setup Photos



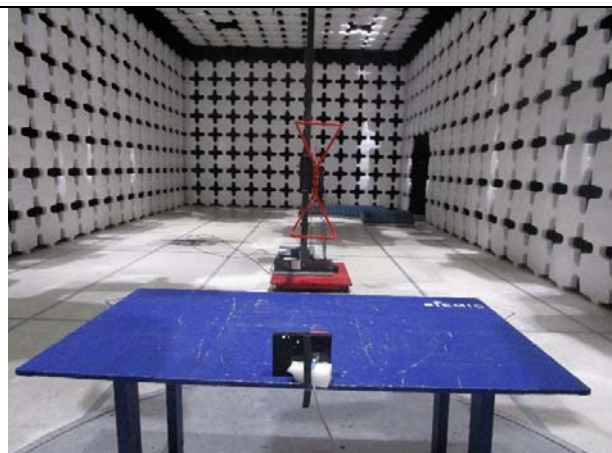
AC Line Conducted Emissions– Front View



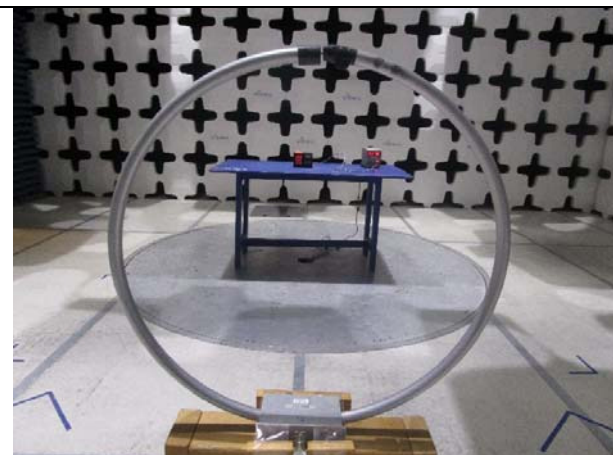
AC Line Conducted Emissions– Rear View



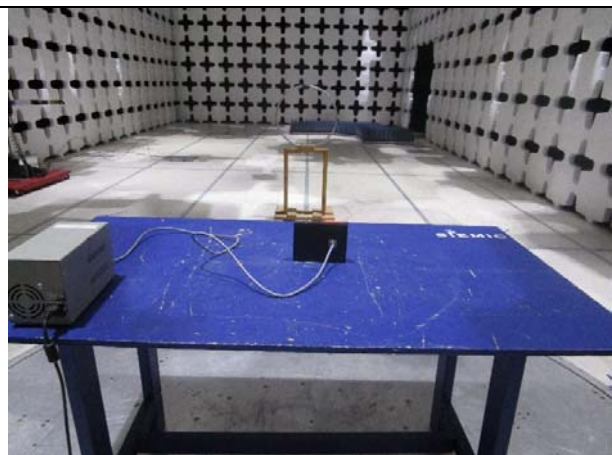
Radiated Emissions (<1GHz) – Front View



Radiated Emissions (<1GHz) – Rear View



Radiated Emissions (<30MHz) – Front View



Radiated Emissions (<30MHz) – Rear View

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Index	Supporting Equipment Description	Model	Serial No	Manu	Note
1	DC Power Supply	605D	10SL0200	XPower	-

7.2 Cabling Description

Name	Connection Start		Connection Stop		Length / shielding Info		Note
	From	I/O Port	To	I/O Port	Length (m)	Shielding	

7.3 Test Software Description

Test Item	Software	Description
RF Testing	N/A	The EUT continuously transmit itself when powered on.

8 Test Summary

Test Item	Test standard		Test Method/Procedure	Pass / Fail
Antenna Requirement	FCC	15.203	ANSI C63.10 – 2013 558074 D01 DTS Meas. Guidance v03r02	<input checked="" type="checkbox"/> Pass
	IC			<input type="checkbox"/> N/A
AC Conducted Emissions Voltage	FCC	15.225(a)	ANSI C63.10 2013 RSS Gen. 8.8	<input checked="" type="checkbox"/> Pass
	IC	RSS Gen (7.2.2)		<input type="checkbox"/> N/A
Remark	1. AC Line tests were performed on the support equipment's power adapter, laptop.			

Test Item	Test standard		Test Method/Procedure		Pass / Fail
Limit in the band of 13.553 – 13.567 MHz	FCC	15.225(a)	FCC	ANSI C63.10 2013	<input checked="" type="checkbox"/> Pass
	IC	RSS210(A2.6)	IC	RSS Gen 6.13	<input type="checkbox"/> N/A
Limit in the band of 13.410 – 13.553 MHz and 13.567 – 13.710 MHz	FCC	15.225(b)	FCC	ANSI C63.10 2013	<input checked="" type="checkbox"/> Pass
	IC	RSS210(A2.6)	IC	RSS Gen 6.13	<input type="checkbox"/> N/A
Limit in the band of 13.110 – 13.410 MHz and 13.710 – 14.010 MHz	FCC	15.225(c)	FCC	ANSI C63.10 2013	<input checked="" type="checkbox"/> Pass
	IC	RSS210(A2.6)	IC	RSS Gen 6.13	<input type="checkbox"/> N/A
Limit outside the band of 13.110 – 14.010 MHz	FCC	15.225(d), 15.209	FCC	ANSI C63.10 2013	<input checked="" type="checkbox"/> Pass
	IC	RSS210(A2.6)	IC	RSS Gen 6.13	<input type="checkbox"/> N/A
Receiver Spurious Emission	IC	-	IC	RSS Gen 7.1	<input type="checkbox"/> Pass <input checked="" type="checkbox"/> N/A
Frequency Stability	FCC	15.225(e)	FCC	-	<input checked="" type="checkbox"/> Pass
	IC	RSS210(A2.6)	IC	RSS Gen 6.11	<input type="checkbox"/> N/A
Occupied Bandwidth	FCC	-	FCC	-	<input checked="" type="checkbox"/> Pass
	IC	RSS-210(5.9.1)	IC	RSS Gen 6.6	<input type="checkbox"/> N/A
Remark	2. All measurement uncertainties are not taken into consideration for all presented test result. 3. 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. 4. Test Method: ANSI C63.10: 2013 / RSS – Gen Issue 4: November 2014.				

9 Measurement Uncertainty

Test Item	Description	Uncertainty
AC Conducted Emissions Voltage	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2	$\pm 3.5\text{dB}$
Limit in the band of 13.553 – 13.567 MHz	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
Limit in the band of 13.410 – 13.553 MHz and 13.567 – 13.710 MHz		+5.6dB/-4.5dB
Limit in the band of 13.110 – 13.410 MHz and 13.710 – 14.010 MHz		+5.6dB/-4.5dB
Limit outside the band of 13.110 – 14.010 MHz		+5.6dB/-4.5dB
Radiated Spurious Emissions		+5.6dB/-4.5dB

10 Measurements, examination and derived results

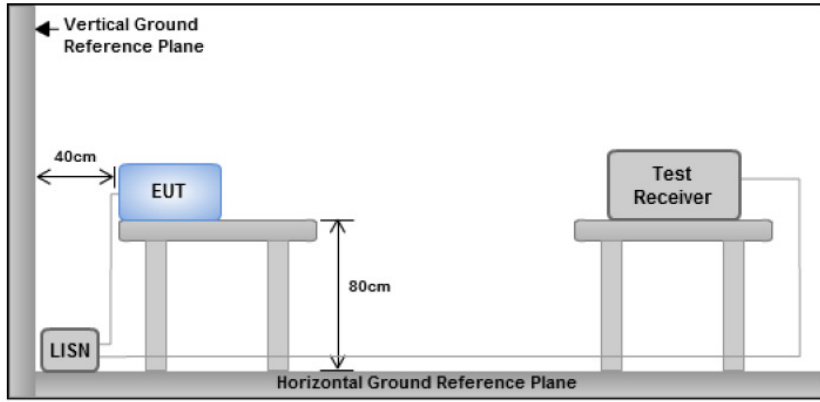
10.1 Antenna Requirement

Spec	Requirement	Applicable
§15.203	<p>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.</p> <p>Antenna requirement must meet at least one of the following:</p> <ul style="list-style-type: none"> 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. 	<input checked="" type="checkbox"/>
Remark	The RFID antenna is integral to the PCB board permanently to the device which meets the requirement (See Internal Photographs submitted as another Exhibit).	
Result	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL	

10.2 Conducted Emissions Test Result

Conducted Emission Limit

Section	Frequency ranges (MHz)	Limit (dBuV)	
		QP	Average
Class B devices	0.15 ~ 0.5	66 – 56	56 – 46
	0.5 ~ 5	56	46
	5 ~ 30	60	50

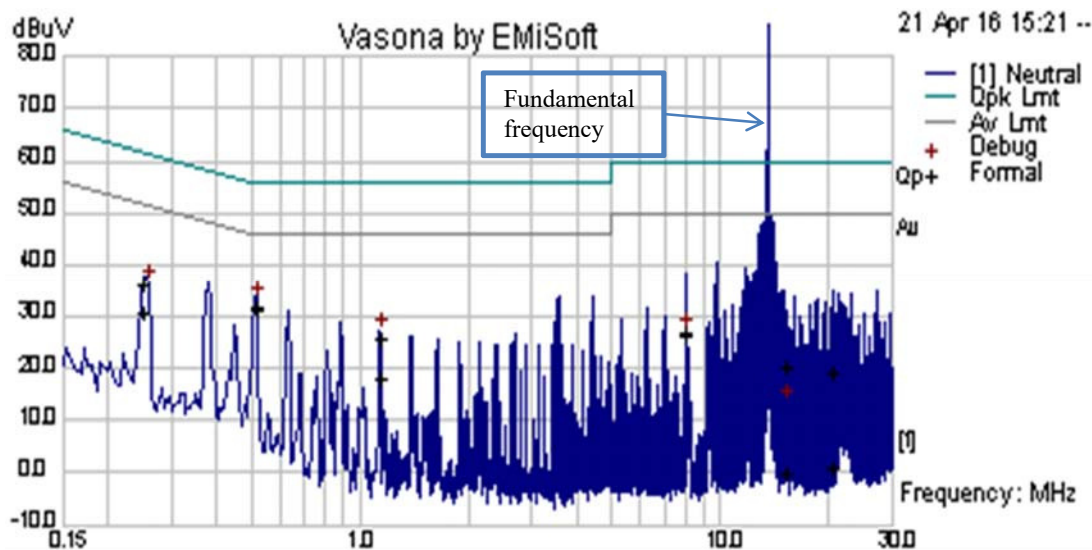
Spec	Item	Requirement	Applicable
§ 15.207, RSS210(A8.1)	a)	For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits set in § 15.207, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). AC Line conducted emission within the band 150kHz to 30MHz	<input checked="" type="checkbox"/>
Test Setup	 <p>Note: 1. Support units were connected to second LISN. 2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes</p>		
Procedure	<ul style="list-style-type: none"> - The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table, as shown in Annex B. - The power supply for the EUT was fed through a 50Ω/50µH EUT LISN, connected to filtered mains. - The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable. - All other supporting equipment was powered separately from another main supply. 		
Test Date	04/21/2016	Environmental conditions	Temperature 21°C Relative Humidity 38 % Atmospheric Pressure 1025 mbar
Remark	The EUT was tested at 120VAC, 60Hz.		
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

Test Data ☒ Yes ☐ N/A

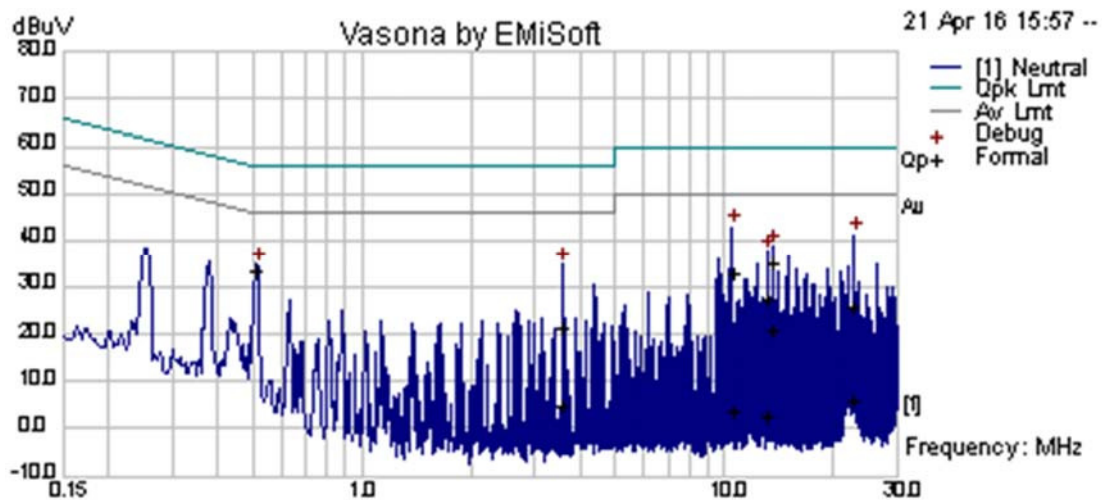
Test Plot ☒ Yes ☐ N/A

Test was done by Rachana Khanduri at Conducted Emission test site.

Test specification:	Conducted Emissions			
Mains Power:	12VDC		Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
Tested by:	Rachana Khanduri			
Test Date:	04/21/2016			
Remarks:	AC Line @ Neutral			



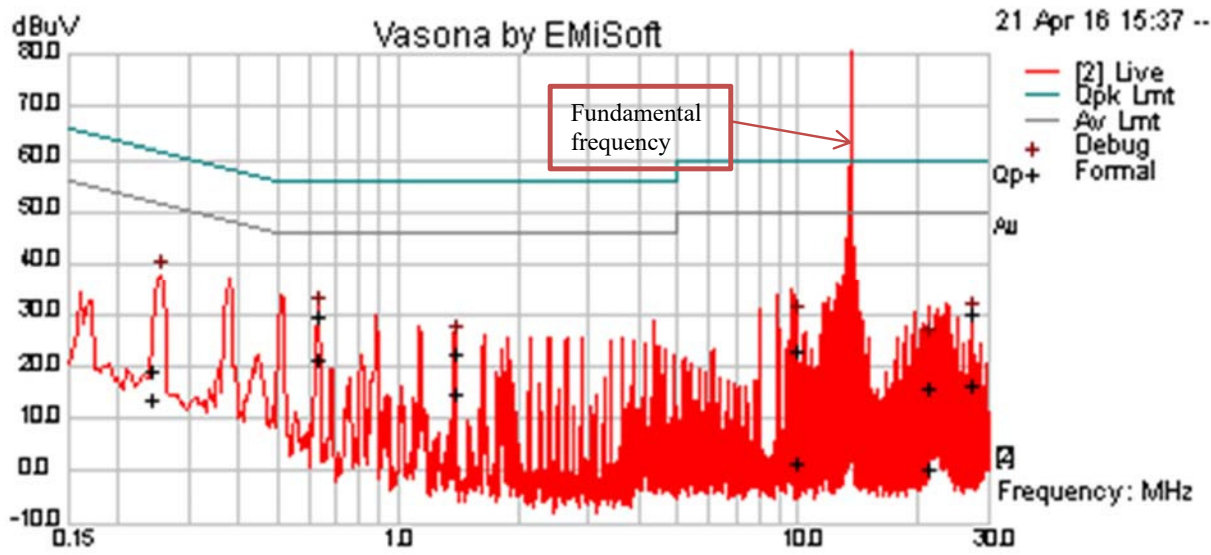
Antenna is terminated



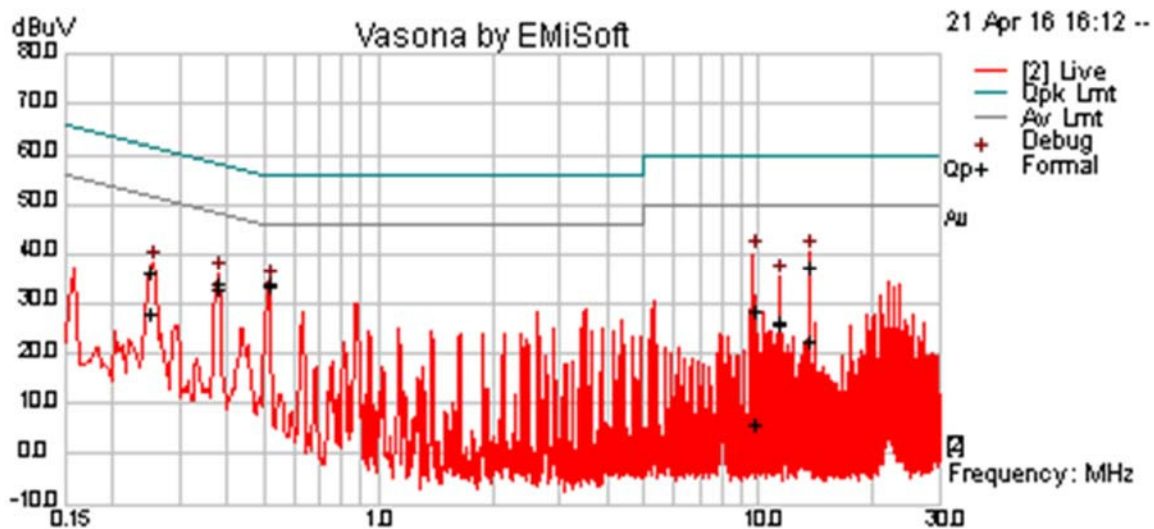
Neutral Measurements

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line/ Neutral	Limit dBuV	Margin dB	Pass /Fail
10.53	22.71	10.05	0.56	33.31	Quasi Peak	Neutral	60.00	-26.69	Pass
22.79	14.85	10.07	0.74	25.66	Quasi Peak	Neutral	60.00	-34.34	Pass
3.57	11.12	10.03	0.55	21.70	Quasi Peak	Neutral	56.00	-34.30	Pass
0.51	23.10	10.01	0.68	33.79	Quasi Peak	Neutral	56.00	-22.21	Pass
13.56	24.45	10.06	0.59	35.10	Quasi Peak	Neutral	60.00	-24.90	Pass
13.13	16.68	10.06	0.58	27.32	Quasi Peak	Neutral	60.00	-32.68	Pass
10.53	-6.87	10.05	0.56	3.73	Average	Neutral	50.00	-46.27	Pass
22.79	-4.71	10.07	0.74	6.10	Average	Neutral	50.00	-43.90	Pass
3.57	-5.90	10.03	0.55	4.68	Average	Neutral	46.00	-41.32	Pass
0.51	22.97	10.01	0.68	33.66	Average	Neutral	46.00	-12.34	Pass
13.56	10.38	10.06	0.59	21.02	Average	Neutral	50.00	-28.98	Pass
13.13	-8.16	10.06	0.58	2.48	Average	Neutral	50.00	-47.52	Pass

Test specification:	Conducted Emissions			
Mains Power:	12VDC		Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
Tested by:	Rachana Khanduri			
Test Date:	04/21/2016			
Remarks:	AC Line @ Line			



Antenna is terminated



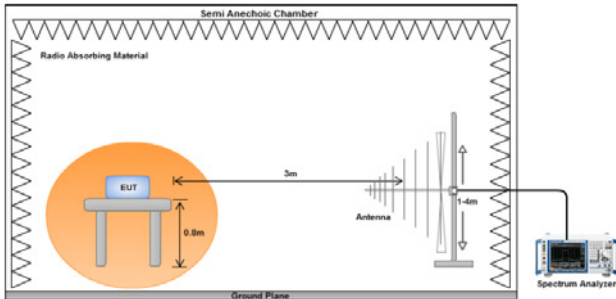
Line Measurements

Frequency MHz	Raw dBμV	Cable Loss	Factors dB	Level dBμV	Measurement Type	Line/ Neutral	Limit dBμV	Margin dB	Pass /Fail
13.56	26.77	10.06	0.59	37.41	Quasi Peak	Live	60.00	-22.59	Pass
9.67	17.84	10.05	0.55	28.44	Quasi Peak	Live	60.00	-31.56	Pass
0.51	23.18	10.01	0.67	33.87	Quasi Peak	Live	56.00	-22.13	Pass
0.38	23.12	10.01	0.78	33.90	Quasi Peak	Live	58.35	-24.45	Pass
0.25	25.31	10.00	1.06	36.37	Quasi Peak	Live	61.72	-25.35	Pass
11.40	14.98	10.05	0.57	25.60	Quasi Peak	Live	60.00	-34.40	Pass
13.56	11.85	10.06	0.59	22.49	Average	Live	50.00	-27.51	Pass
9.67	-4.58	10.05	0.55	6.02	Average	Live	50.00	-43.98	Pass
0.51	23.06	10.01	0.67	33.74	Average	Live	46.00	-12.26	Pass
0.38	22.18	10.01	0.78	32.96	Average	Live	48.35	-15.39	Pass
0.25	16.89	10.00	1.06	27.95	Average	Live	51.72	-23.77	Pass
11.40	15.57	10.05	0.57	26.19	Average	Live	50.00	-23.81	Pass

10.3 Radiated Measurements

10.3.1 Radiated Measurements 30MHz to 1GHz

Requirement(s):

Spec	Requirement	Applicable										
47 CFR §15.225 RSS-210 (A2.6)	<div>Operation within the band 13.110–14.010 MHz:</div> <div>(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.</div> <div>(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.</div> <div>(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.</div> <div>(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.</div> <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	<input checked="" type="checkbox"/>
Frequency range (MHz)	Field Strength (uV/m)											
30 – 88	100											
88 – 216	150											
216 960	200											
Above 960	500											
Test Setup												
Procedure	<div>1. The EUT was switched on and allowed to warm up to its normal operating condition.</div> <div>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:<div>a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.</div><div>b. The EUT was then rotated to the direction that gave the maximum emission.</div><div>c. Finally, the antenna height was adjusted to the height that gave the maximum emission.</div></div> <div>3. A Quasi-peak measurement was then made for that frequency point.</div> <div>4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.</div>											
Test Date	03/18/2016	<div>Environmental conditions</div> <div>Temperature20.1°C</div> <div>Relative Humidity36%</div> <div>Atmospheric Pressure1026mbar</div>										
Remark	-											
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail											

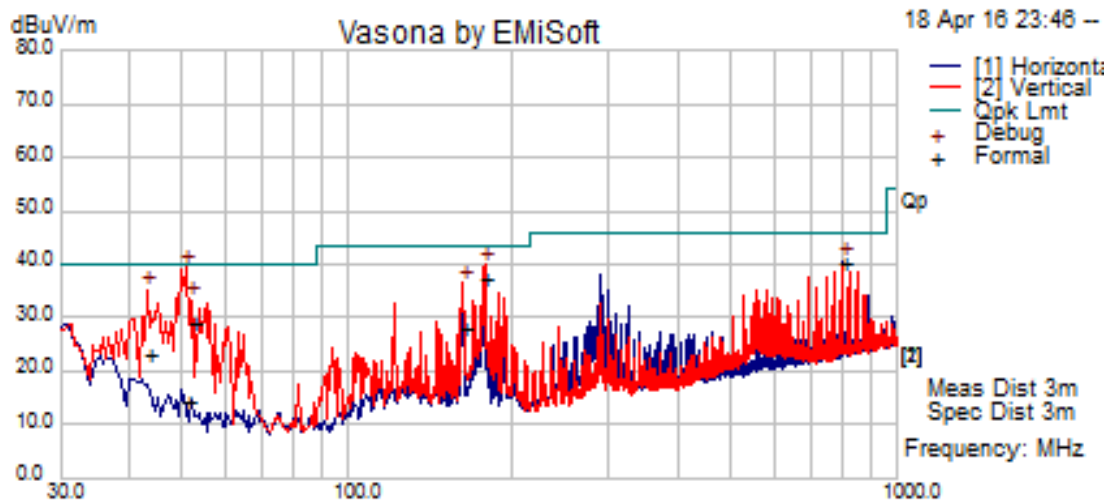
Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Rachana Khanduri at 10 meter chamber.

Test specification:	Radiated Emissions			
Mains Power:	12V DC		Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
Tested by:	Rachana Khanduri			
Test Date:	04/18/2016			
Remarks:	N/A			

$f=30\text{MHz} - 1000\text{MHz}$ plot and 3 meter distance

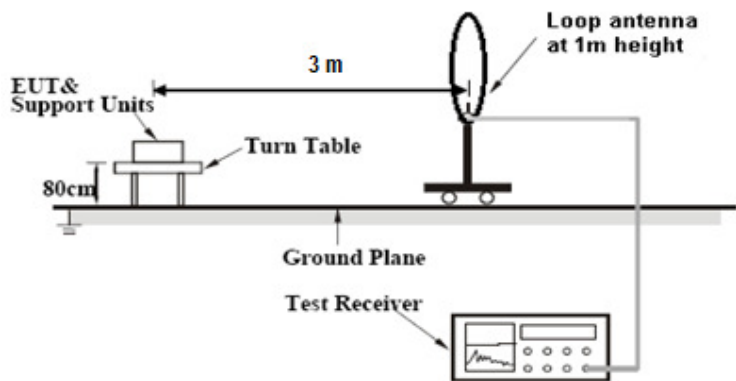


$f=30\text{MHz} - 1000\text{MHz}$ Measurements

Frequency MHz	Raw dBuV/m	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
51.06	43.56	1.11	-30.21	14.45	Quasi Max	V	357	38	40.00	-25.55	Pass
178.08	63.88	1.98	-28.44	37.43	Quasi Max	V	283	147	43.52	-6.09	Pass
43.25	47.97	0.98	-26.00	22.95	Quasi Max	V	233	130	40.00	-17.05	Pass
800.08	52.93	4.51	-17.40	40.04	Quasi Max	H	103	175	46.02	-5.98	Pass
52.07	57.92	1.12	-30.33	28.70	Quasi Max	V	227	348	40.00	-11.30	Pass
162.24	53.25	1.94	-27.41	27.78	Quasi Max	V	179	350	43.52	-15.74	Pass

10.3.2 Radiated Measurements below 30MHz

Requirement(s):

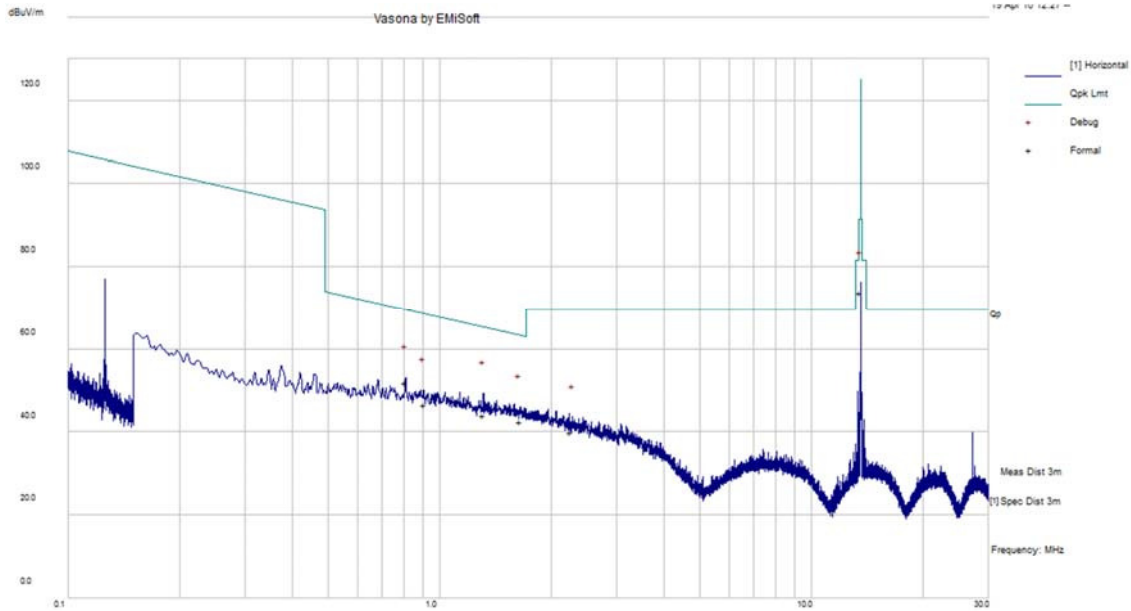
Spec	Requirement	Applicable						
47 CFR §15.225 RSS-210 (A2.6)	Operation within the band 13.110–14.010 MHz (a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters. (b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters. (c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters. (d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.	<input checked="" type="checkbox"/>						
Test Setup								
Procedure	For < 30MHz, Radiated emissions were measured according to ANSI C63.10. The EUT was set to transmit at the highest output power. The EUT was set 3 meter away from the measuring antenna. The loop antenna was positioned 1 meter above the ground from the center of the loop. The measuring bandwidth was set to 10 kHz. The limit is converted from microvolt/meter to decibel microvolt/meter.							
Test Date	04/19/2015	<table><tr><td>Environmental conditions</td><td>Temperature 22°C</td></tr><tr><td></td><td>Relative Humidity 40%</td></tr><tr><td></td><td>Atmospheric Pressure 1026mbar</td></tr></table>	Environmental conditions	Temperature 22°C		Relative Humidity 40%		Atmospheric Pressure 1026mbar
Environmental conditions	Temperature 22°C							
	Relative Humidity 40%							
	Atmospheric Pressure 1026mbar							
Remark	-							
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail							

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Rachana Khanduri at 10 meter chamber.

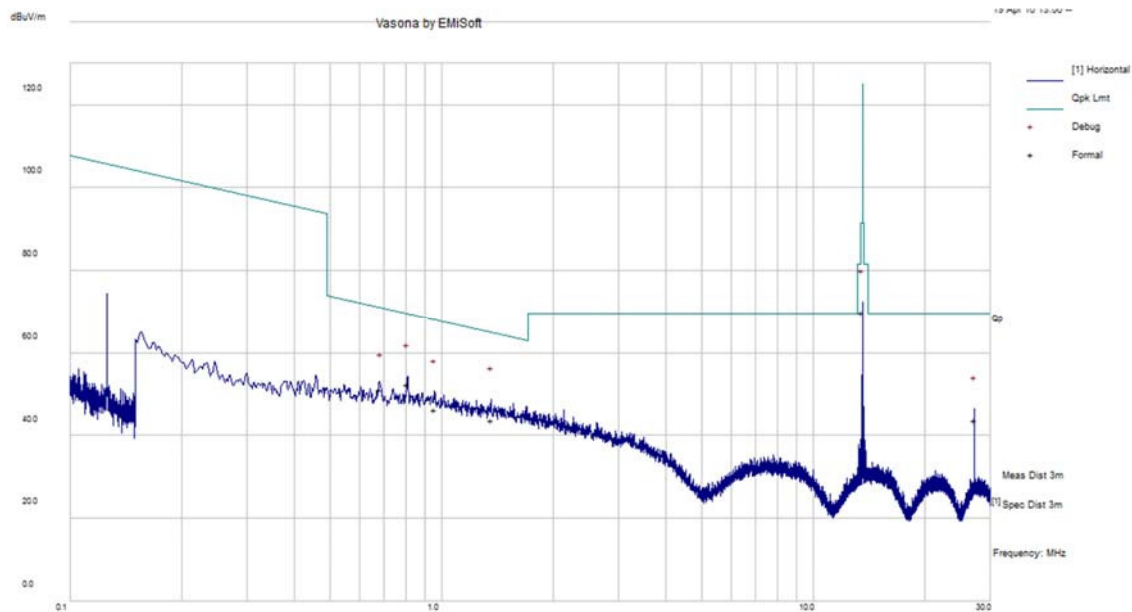
Test specification:	Radiated Spurious Emissions			
Mains Power:	12V DC		Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
Tested by:	Rachana Khanduri			
Test Date:	04/19/2015			
Remarks:	f= 100kHz – 30MHz plot, and loop antenna at 0 degree			



Quasi Max Measurement

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (0/90)	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
1.31	34.19	0.23	9.50	43.92	Quasi Max	0	100	311	65.24	-21.32	Pass
0.80	37.88	0.20	13.89	51.97	Quasi Max	0	100	189	69.45	-17.48	Pass
1.65	34.61	0.25	7.65	42.51	Quasi Max	0	100	211	63.26	-20.76	Pass
0.91	33.45	0.21	13.00	46.65	Quasi Max	0	100	52	68.43	-21.78	Pass
2.26	34.48	0.29	5.15	39.91	Quasi Max	0	100	227	69.54	-29.63	Pass
13.56	74.72	0.62	-1.51	73.83	Quasi Max	0	100	190	124.92	-51.09	Pass

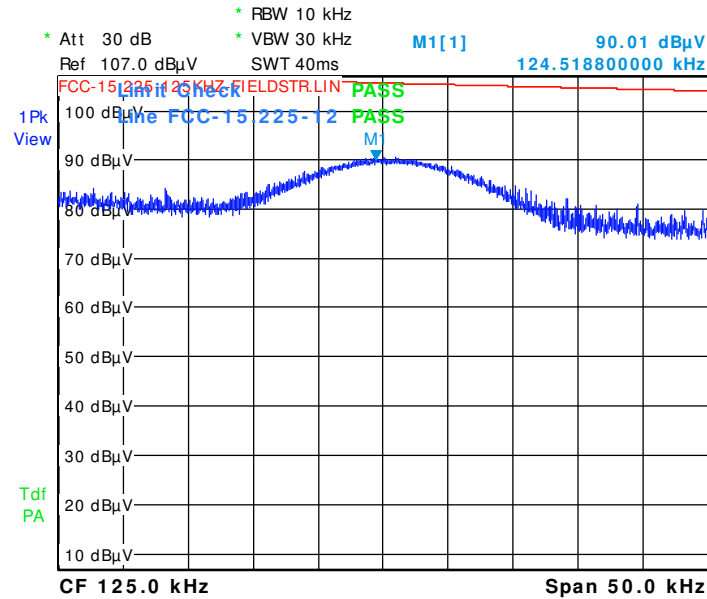
Test specification:	Radiated Spurious Emissions			
Mains Power:	12V DC		Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
Tested by:	Rachana Khanduri			
Test Date:	04/19/2016			
Remarks:	f= 100kHz – 30MHz plot, and loop antenna at 90 degree			



Quasi Max Measurement

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (0/90)	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
0.81	38.44	0.2	13.88	52.52	Quasi Max	90	100	271	69.44	-16.92	Pass
1.37	34.33	0.24	9.18	43.74	Quasi Max	90	100	170	64.9	-21.15	Pass
0.96	33.61	0.21	12.58	46.40	Quasi Max	90	100	144	68	-21.60	Pass
0.68	35.77	0.19	15.26	51.22	Quasi Max	90	100	142	70.94	-19.72	Pass
27.12	46.00	0.82	-3.11	43.71	Quasi Max	90	100	55	69.54	-25.83	Pass
13.56	70.91	0.62	-1.51	70.02	Quasi Max	90	100	92	124.92	-54.90	Pass

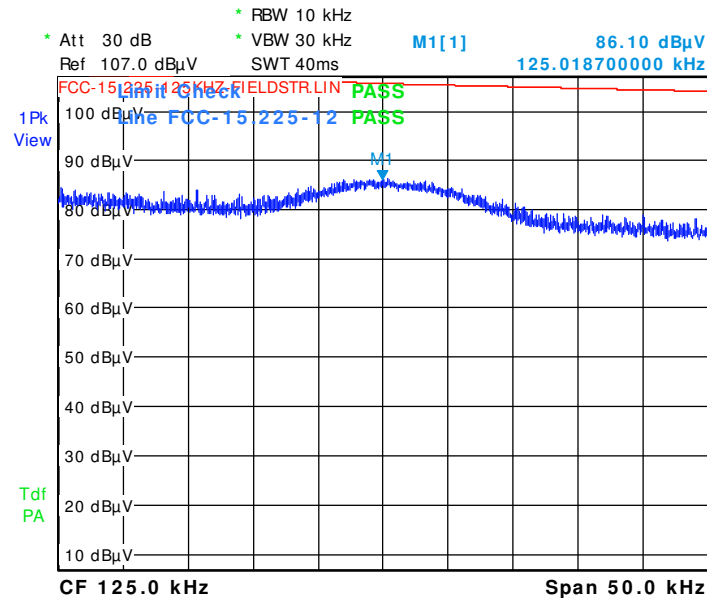
Loop antenna at 0 degree



Date: 20.APR.2016 01:47:04

Frequency (kHz)	Amplitude (dBμV)
124.519	90.01

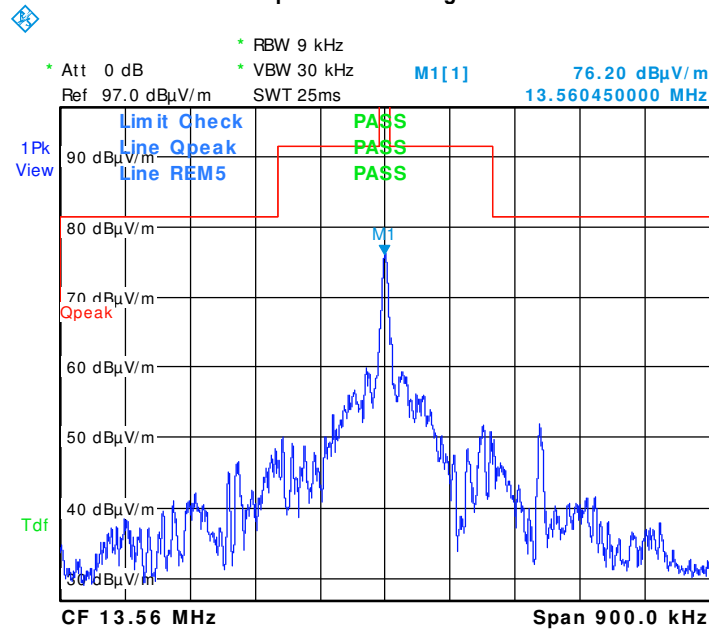
Loop antenna at 90 degree



Date: 20.APR.2016 01:50:24

Frequency (kHz)	Amplitude (dBμV)
125.087	86.10

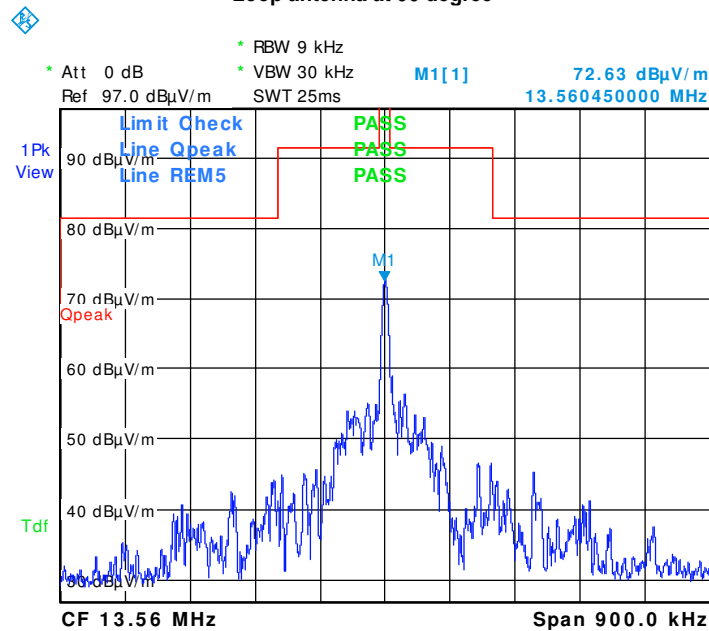
Loop antenna at 0 degree



Date: 19.APR.2016 16:02:08

Frequency (MHz)	Amplitude (dBμV/m)
13.560450	76.20

Loop antenna at 90 degree

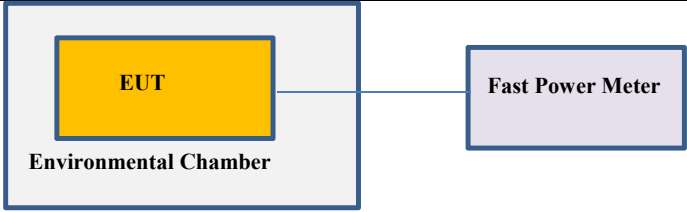


Date: 19.APR.2016 15:58:26

Frequency (MHz)	Amplitude (dBμV/m)
13.560450	72.63

10.3.3 Frequency Stability

Requirement(s):

Spec	Requirement	Applicable									
47 CFR §15.225 e) RSS-210 (A2.6)	Limit: $\pm 0.01\%$ of 13.56 MHz = 1356 Hz	<input checked="" type="checkbox"/>									
Test Setup	 <ol style="list-style-type: none"> The EUT was set up inside an environmental chamber. The EUT was placed in the centre of the environmental. 										
Procedure	Frequency Stability was measured according to 47 CFR §2.1055. Measurement was taken with spectrum analyzer. The spectrum analyzer bandwidth and span was set to read in hertz. A voltmeter was used to monitor when varying the voltage.										
Test Date	04/27/2016	<table border="1"> <tr> <td>Environmental conditions</td> <td>Temperature</td> <td>20°C</td> </tr> <tr> <td></td> <td>Relative Humidity</td> <td>41%</td> </tr> <tr> <td></td> <td>Atmospheric Pressure</td> <td>1026mbar</td> </tr> </table>	Environmental conditions	Temperature	20°C		Relative Humidity	41%		Atmospheric Pressure	1026mbar
Environmental conditions	Temperature	20°C									
	Relative Humidity	41%									
	Atmospheric Pressure	1026mbar									
Remark	None										
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail										

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Test was done by Rachana Khanduri at RF test site.

Test Result for 125 KHz Radio

Frequency Stability versus Temperature: The Frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20°C to $+50^{\circ}\text{C}$ at normal supply voltage.

Reference Frequency: 125.085368 KHz at -20°C and $+50^{\circ}\text{C}$

Temperature ($^{\circ}\text{C}$)	Measured Freq. (KHz)	Freq. Drift (Hz)	Freq. Deviation (Limit: 0.01%)	Pass/Fail
50	125.085132	-0.24	<0.01	Pass
40	125.085098	-0.27	<0.01	Pass
30	125.085086	-0.28	<0.01	Pass
20	Reference (125.085368 KHz)			
10	125.085352	-0.02	<0.01	Pass
0	125.085314	-0.05	<0.01	Pass
-10	125.084831	-0.54	<0.01	Pass
-20	125.084368	-1.00	<0.01	Pass

Frequency Stability versus Input Voltage: The Frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$, the frequency of the transmitter was measured at 85% and at 115% of the rated power supply voltage at 20°C environmental temperature.

Carrier Frequency: 125.085368 at 20°C at 12 VDC

Measured Voltage $\pm 15\%$ of nominal (DC)	Measured Freq. (MHz)	Freq. Drift (Hz)	Freq. Deviation (Limit: 0.01%)	Pass/Fail
13.8	125.085368	0	<0.01	Pass
10.2	125.085368	0	<0.01	Pass

Test Result for 13.56MHz Radio

Frequency Stability versus Temperature: The Frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20°C to $+50^{\circ}\text{C}$ at normal supply voltage.

Reference Frequency: 13.5605453 MHz at 20°C at 12 VDC

Temperature ($^{\circ}\text{C}$)	Measured Freq. (MHz)	Freq. Drift (Hz)	Freq. Deviation (Limit: 0.01%)	Pass/Fail
50	13.5605323	-13.00	<0.01	Pass
40	13.5605367	-8.60	<0.01	Pass
30	13.5605389	-6.40	<0.01	Pass
20	Reference (13.5605453 MHz)			
10	13.5605623	17.00	<0.01	Pass
0	13.5605679	22.60	<0.01	Pass
-10	13.5605726	27.30	<0.01	Pass
-20	13.5605741	28.80	<0.01	Pass

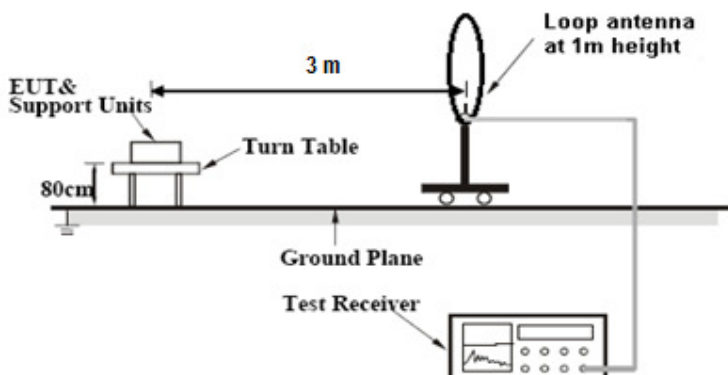
Frequency Stability versus Input Voltage: The Frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$, the frequency of the transmitter was measured at 85% and at 115% of the rated power supply voltage at a 20°C environmental temperature.

Carrier Frequency: 13.5605453 MHz at 20°C at 12 VDC

Measured Voltage $\pm 15\%$ of nominal (AC)	Measured Freq. (MHz)	Freq. Drift (Hz)	Freq. Deviation (Limit: 0.01%)	Pass/Fail
13.8	13.5605471	1.80	<0.01	Pass
10.2	13.5605452	-0.10	<0.01	Pass

10.3.4 Occupied bandwidth

Requirement(s):

Spec	Requirement	Applicable						
RSS-Gen 4.6.1	The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual. The trace data points are recovered and directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth.	<input checked="" type="checkbox"/>						
Test Setup								
Procedure	<ol style="list-style-type: none">1. The EUT was switched on and allowed to warm up to its normal operating condition.2. To measure conducted, a SMA cable was used to replace the EUT antenna. To measure radiated, an external antenna was used to detect EUT transmission signal.3. Measurement of the 99% Occupied Bandwidth of EUT transmission signal and make record.							
Test Date	04/19/2016	<table><tr><td>Environmental conditions</td><td>Temperature 22°C</td></tr><tr><td></td><td>Relative Humidity 39%</td></tr><tr><td></td><td>Atmospheric Pressure 1025mbar</td></tr></table>	Environmental conditions	Temperature 22°C		Relative Humidity 39%		Atmospheric Pressure 1025mbar
Environmental conditions	Temperature 22°C							
	Relative Humidity 39%							
	Atmospheric Pressure 1025mbar							
Remark	-							
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail							

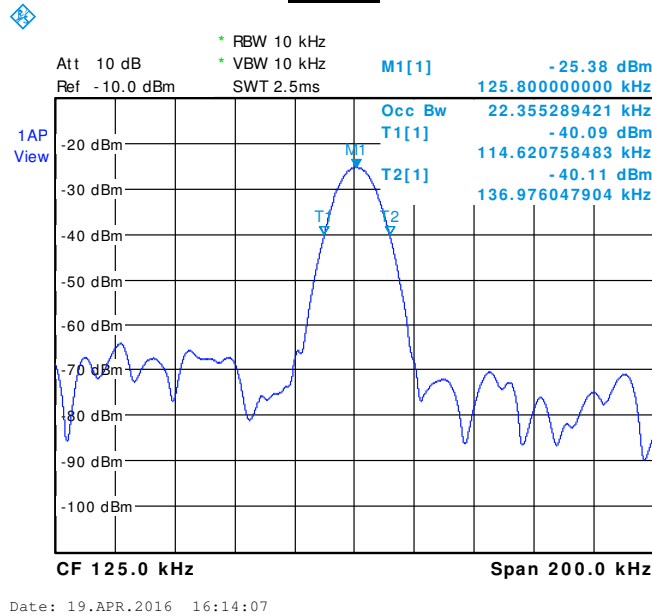
Test Data ☐ Yes (See below) ☒ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Rachana Khanduri at 10 meter chamber.

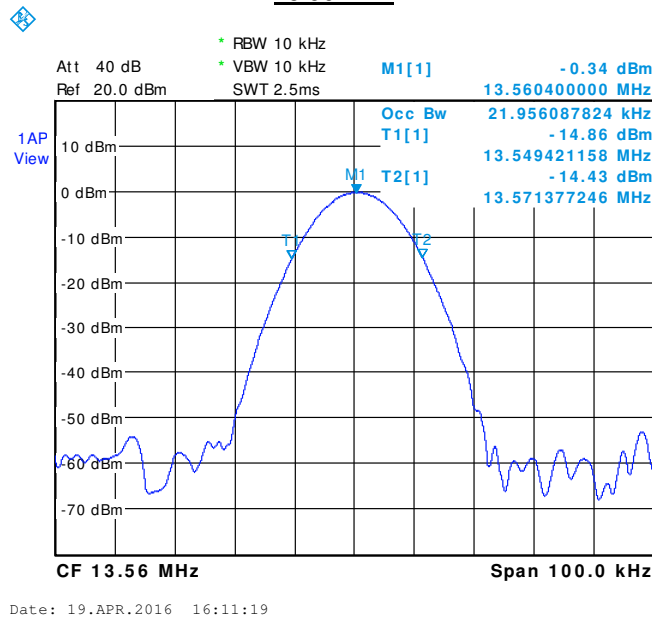
Test results:

125 kHz



Frequency (kHz)	Occupied Bandwidth (KHz)
125.00	22.355289421

13.56 MHz



Frequency (MHz)	Occupied Bandwidth (KHz)
13.56	21.956087824
















Annex A. TEST INSTRUMENT








Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Conducted Emissions						
R & S Receiver	ESIB 40	100179	06/03/2015	1 Year	06/03/2016	<input checked="" type="checkbox"/>
CHASE LISN	MN2050B	1018	08/07/2015	1 Year	08/07/2016	<input checked="" type="checkbox"/>
Radiated Emissions						
R & S Receiver	ESL6	100178	05/27/2015	1 Year	05/27/2016	<input checked="" type="checkbox"/>
R & S Receiver	ESIB 40	100179	06/03/2015	1 Year	06/03/2016	<input checked="" type="checkbox"/>
Pre-Amplifier (1-26.5GHz)	8449B	3008A00715	03/04/2016	1 Year	03/04/2017	<input type="checkbox"/>
Preamplifier (100KHz-7GHz)	LPA-6-30	11140711	02/10/2016	1 Year	02/10/2017	<input checked="" type="checkbox"/>
ETS-Lingren Loop Antenna	6512	00049120	08/20/2015	1 Year	08/20/2016	<input checked="" type="checkbox"/>
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	08/15/2015	1 Year	08/15/2016	<input checked="" type="checkbox"/>
Horn Antenna (1-26.5GHz)	3115	10SL0059	08/25/2015	1 Year	08/25/2016	<input type="checkbox"/>
Tuned Dipole Antenna 30 - 1000 MHz (4pcs set)	AD-100	40133	10/02/2015	1 Year	10/02/2016	<input type="checkbox"/>
3 Meters SAC	3M	N/A	08/08/2015	1 Year	08/08/2016	<input checked="" type="checkbox"/>
10 Meters SAC	10M	N/A	09/05/2015	1 Year	09/05/2016	<input type="checkbox"/>
RF Conducted Measurement						
Spectrum Analyzer	N9010A	10SL0219	10/27/2015	1 Year	10/27/2016	<input checked="" type="checkbox"/>
R & S Receiver	ESIB 40	100179	06/03/2015	1 Year	06/03/2016	<input type="checkbox"/>
Test Equity Environment Chamber	1007H	61201	07/28/2015	1 Year	07/28/2016	<input checked="" type="checkbox"/>
USB RF Power Sensor	7002-006	10SL0190	09/22/2015	1 Year	09/22/2016	<input type="checkbox"/>

Test Software Version

Test Item	Vendor	Software	Version
Radiated Emission	EMISoft	EMISoft Vasona	V5.0
Conducted Emission	EMISoft	EMISoft Vasona	V5.0

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 & 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		<p>Radio: A1. Terminal equipment for purpose of calling</p> <p>Telecom: B1. Specified radio equipment specified in Article 38-2, Paragraph 1, Item 1 of the Radio Law</p>
Korea CAB Accreditation		<p>EMI: KCC Notice 2008-39, RRL Notice 2008-3: CA Procedures for EMI KN22: Test Method for EMI</p> <p>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</p> <p>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</p> <p>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</p>
Taiwan NCC CAB Recognition		LP0002, PSTN01, ADSL01, ID0002, IS6100, CNS14336, PLMN07, PLMN01, PLMN08
Taiwan BSMI CAB Recognition		CNS 13438
Japan VCCI		<p>R-3083: Radiation 3 meter site</p> <p>C-3421: Main Ports Conducted Interference Measurement</p> <p>T-1597: Telecommunication Ports Conducted Interference Measurements</p>
Australia CAB Recognition		<p>EMC: AS/NZS CISPR 11, AS/NZS CISPR 14.1, AS/NZS CISPR22, AS/NZS 61000.6.3, AS/NZS 61000.6.4</p> <p>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</p> <p>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</p>
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