

# RF TEST REPORT





Report No.: FCC\_IC\_RF\_SL17032201-SEV-019

Supersede Report No.: NONE

Applicant	:	Trek Bicycle Corporation
HostProduct Name	:	Bcycle
Module Model No.	:	MFRFID1
Test Standard	:	FCC 15.225 RSS-210 Issue 9: 2016
Test Method	:	FCC 15.225 ANSI C63.10 2013 RSS Gen Issue 4 2014
FCC ID	:	2AHXDMFRFID1
IC ID	:	21334-MFRFID1
Dates of test	:	12/08/2017-12/27/2017
Issue Date	:	12/27/2017
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:

	
Vijay Chaudhary	Chen Ge
RF 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 & RED 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_SL17032201-SEV-019	None	Original	12/27/2017

## 2 Executive Summary

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

Company: Trek Bicycle Corporation  
Host Product: Bcycle  
Module  
Model: MFRFID1

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

## 3 Customer information

Applicant Name	:	Trek Bicycle Corporation
Applicant Address	:	801 W Madison st, Waterloo, WI-53594
Manufacturer Name	:	Plexus
Manufacturer Address	:	2444 Schultz Drive, Neenah, WI-54956

## 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

Host Product Name	:	Bcycle
Module Model No.	:	MFRFID1
Trade Name	:	BCycle
Serial No.	:	T00FN
Input Power	:	3.5 Watts
Product Hardware version	:	10
Product Software version	:	1.30.0
Radio Hardware version	:	10
Radio Software version	:	1.30.0
Test SW Version	:	1.30.0
Date of EUT received	:	11/15/2017
Working Frequencies	:	125 kHz, 13.56MHz

### 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	Patch Antenna
Antenna Gain(dB)	125KHz: -28.73, 13.56MHz: -42.32
Antenna Connector Type	SMC Connector

#### 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
<b>Note:</b> None	

Test Item	Operating mode	Tested antenna port	Test frequencies
Antenna Requirement	N/A	-	125kHz  13.56MHz
Conducted Emissions Voltage	N/A	-	
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 connected to the PCB board. Only radiated measurements were performed during the test.



## 6.4 EUT Photos – External



Top View



Bottom View



Front Side



Rear Side



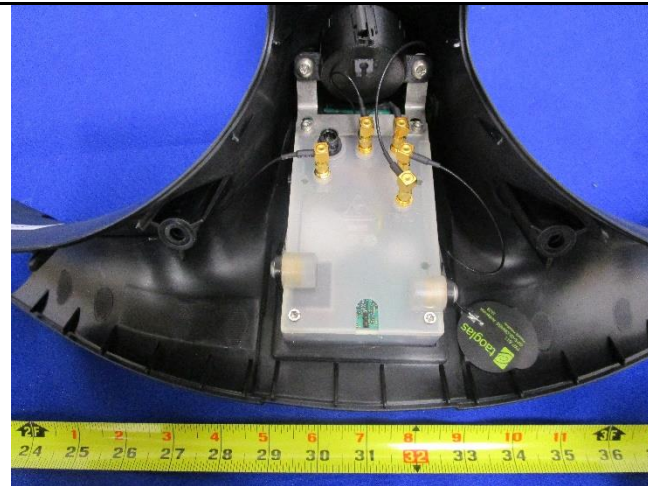
Left Side



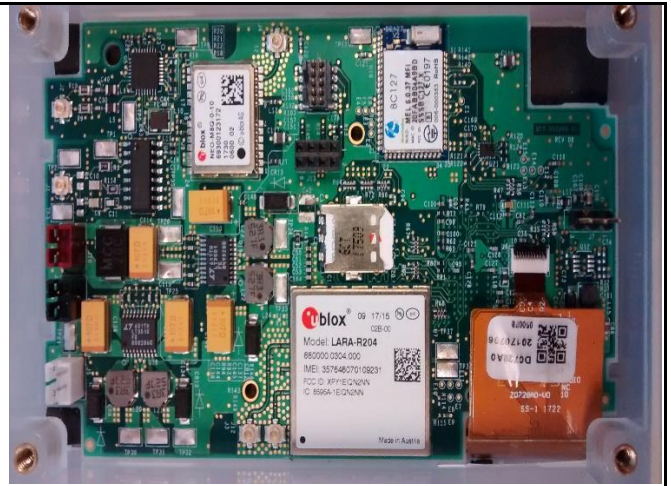
Right Side



## 6.5 EUT Photos – Internal



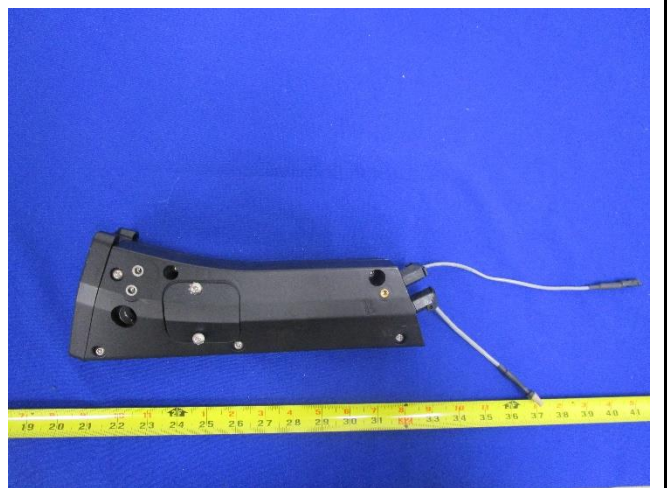
PCB View with Cover



Cover off PCB View



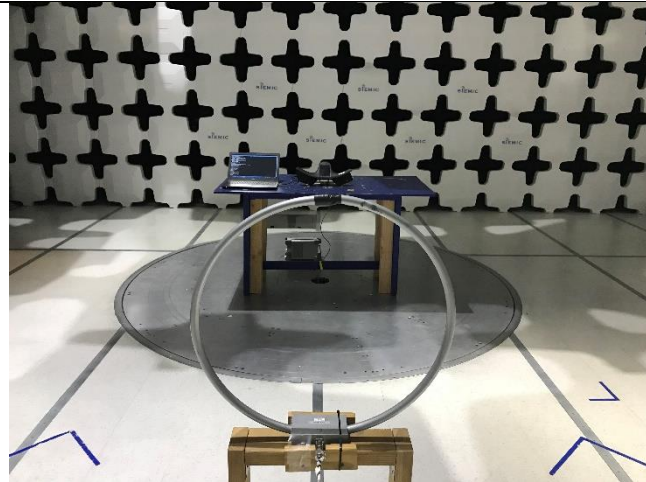
Battery Top View



Battery Side View



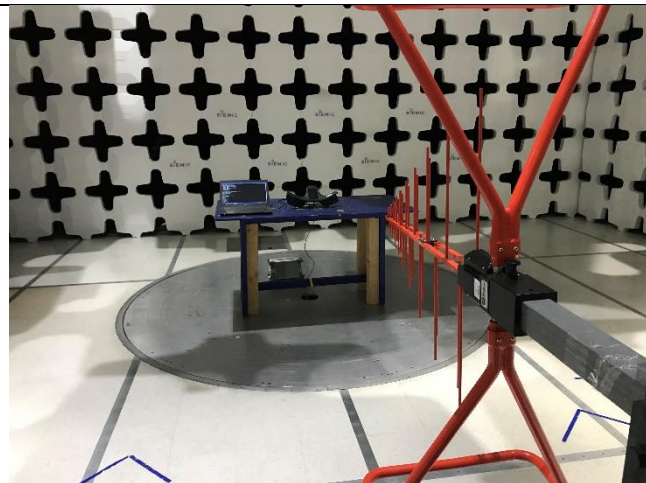
## 6.6 EUT Test Setup Photos



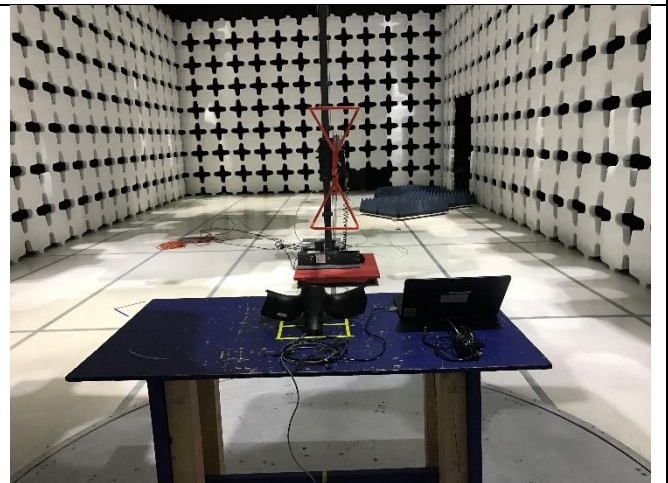
Radiated Emissions (<30MHz) – Front View



Radiated Emissions (<30MHz) – Rear View



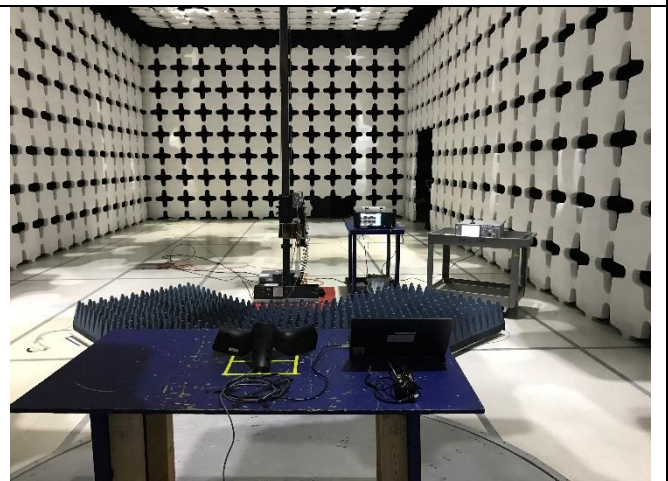
Radiated Emissions (<1GHz) – Front View



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

Index	Supporting Equipment Description	Model	Serial No	Manu	Note
-	-	-	-	-	-

### 7.2 Cabling Description

Name	Connection Start		Connection Stop		Length / shielding Info		Note
	From	I/O Port	To	I/O Port	Length (m)	Shielding	
1	EUT	Connector	Computer	USB	5	-	-

### 7.3 Test Software Description

Test Item	Software	Description
RF Testing	Tera Term	Set the EUT to transmit continuously in 125KHz and 13.56MHz test mode
-	-	-

## 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 type="checkbox"/> Pass
	IC	-		<input checked="" type="checkbox"/> N/A
AC Conducted Emissions Voltage	FCC	15.225(a)	ANSI C63.10 2013 RSS Gen. 8.8	<input type="checkbox"/> Pass
	IC	RSS Gen (7.2.2)		<input checked="" type="checkbox"/> N/A
Remark	1. Device is battery operated. Conducted Emission test is not required			

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
	IC	RSS210(B.6)	IC	RSS Gen 6.13
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
	IC	RSS210(B.6)	IC	RSS Gen 6.13
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
	IC	RSS210(B.6)	IC	RSS Gen 6.13
Limit outside the band of 13.110 – 14.010 MHz	FCC	15.225(d), 15.209	FCC	ANSI C63.10 2013
	IC	RSS210(B.6)	IC	RSS Gen 6.13
Receiver Spurious Emission	IC	-	IC	RSS Gen 7.1
Frequency Stability	FCC	15.225(e)	FCC	-
	IC	RSS210(B.6)	IC	RSS Gen 6.11
Occupied Bandwidth	FCC	-	FCC	-
	IC	RSS-210(5.9.1)	IC	RSS Gen 6.6
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.			

## 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

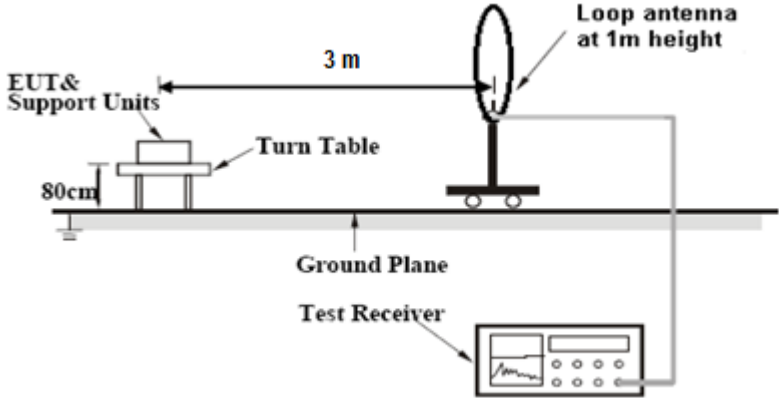
Spec	Requirement	Applicable
§15.203	<p>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.</p> <p>Antenna requirement must meet at least one of the following:</p> <p>a) Antenna must be permanently attached 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.</p>	<input checked="" type="checkbox"/>
Remark	All Radio use special SMC connector for antenna connection.	
Result	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL	



## 10.2 Radiated Measurements

### 10.2.1 Radiated Measurements below 30MHz

#### Requirement(s):

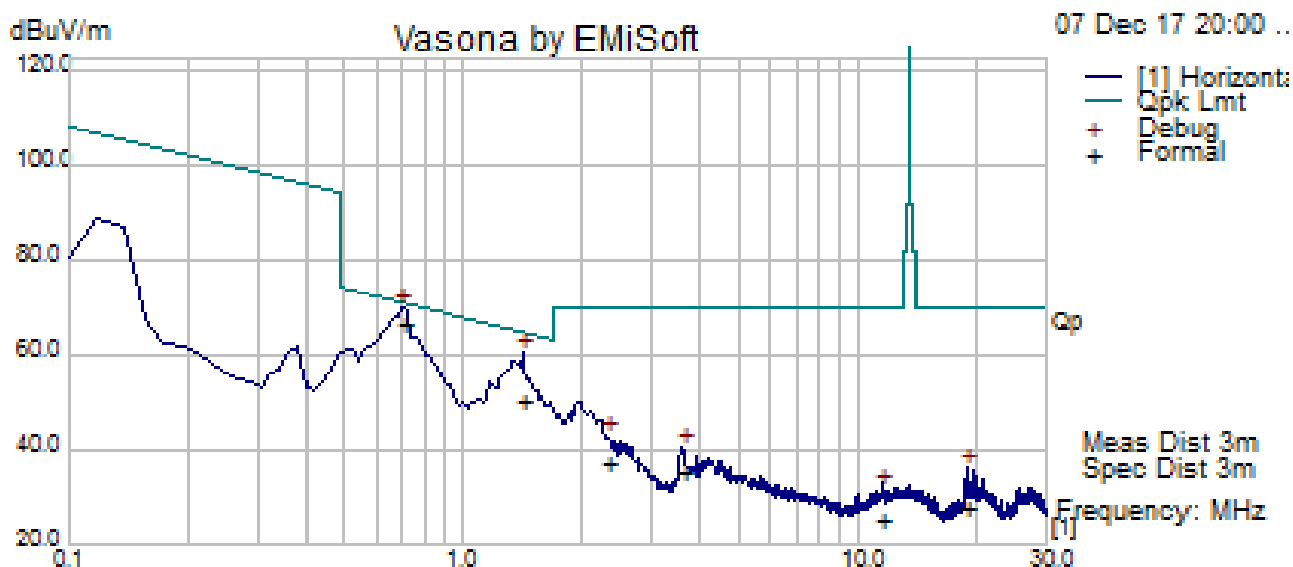
Spec	Requirement	Applicable
47 CFR §15.225 RSS-210 (B.6)	<p>Operation within the band 13.110–14.010 MHz</p> <p>(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.</p> <p>(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.</p> <p>(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.</p> <p>(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.</p>	<input checked="" type="checkbox"/>
Test Setup		
Procedure	<p>For &lt; 30MHz, Radiated emissions were measured according to ANSI C63.10. The EUT was set to transmit at the highest output power.</p> <p>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.</p> <p>The limit is converted from microvolt/meter to decibel microvolt/meter.</p>	
Test Date	12/08/2017-12/12/2017	Environmental conditions
		<p>Temperature 22°C</p> <p>Relative Humidity 40%</p> <p>Atmospheric Pressure 1026mbar</p>
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 Vijay Chaudhary at 10-meter chamber.**

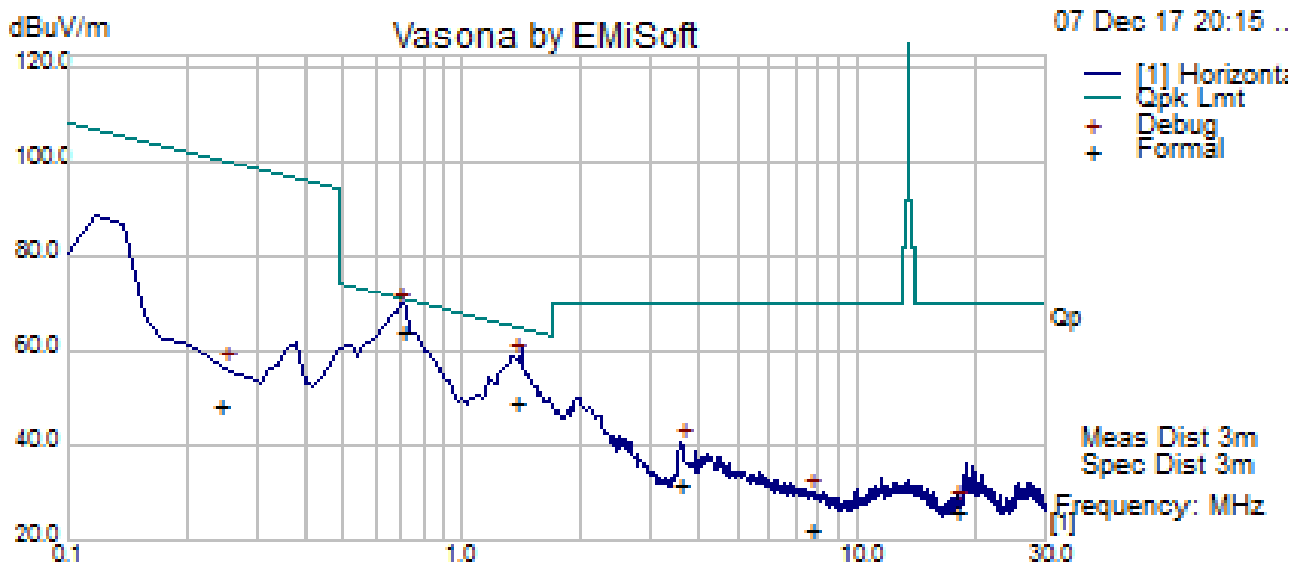
Test specification:	Radiated Spurious Emissions			
Mains Power:	10V DC		Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
Tested by:	Vijay Chaudhary			
Test Date:	12/07/2017			
Remarks:	125KHz f= 100kHz – 30MHz plot, and loop antenna at 0 degree			



#### 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
0.70	40.4	10.2	15.68	66.27	Quasi Max	0	99	4	70.69	-4.42	Pass
1.39	29.44	10.24	10.22	49.91	Quasi Max	0	99	20	64.7	-14.79	Pass
2.32	20.24	10.29	6.42	36.95	Quasi Max	0	99	319	69.54	-32.6	Pass
3.58	20.98	10.31	3.48	34.77	Quasi Max	0	99	54	69.54	-34.77	Pass
18.93	15.93	10.71	1.1	27.74	Quasi Max	0	99	245	69.54	-41.8	Pass
11.47	13.20	10.55	1.58	25.34	Quasi Max	0	99	327	69.54	-44.21	Pass

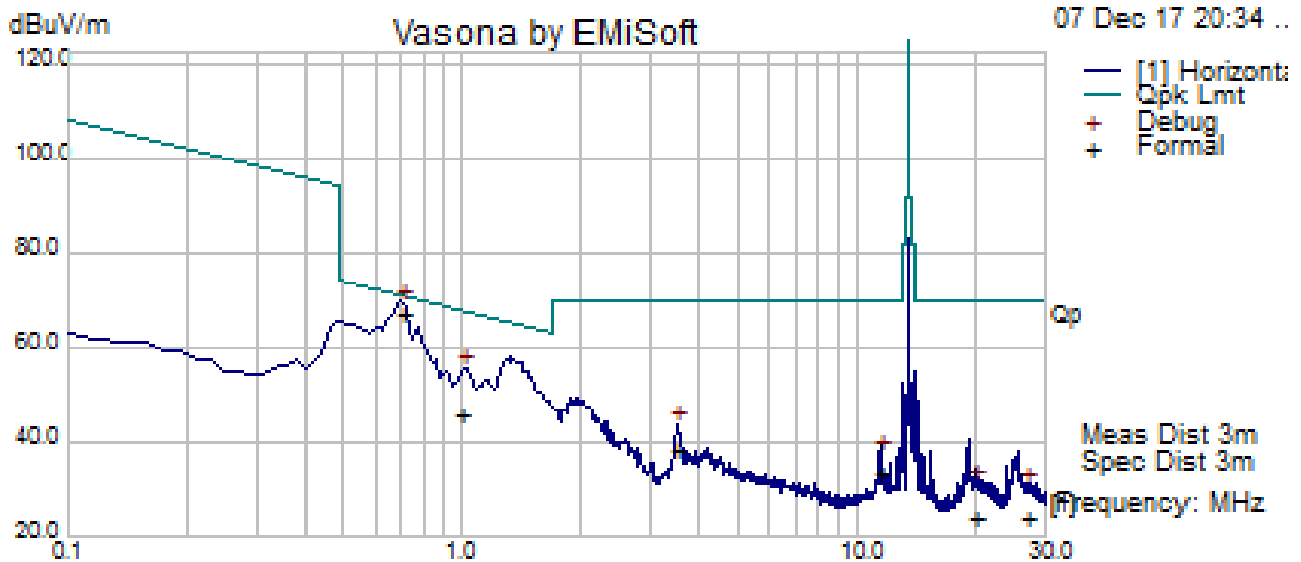
Test specification:	Radiated Spurious Emissions			
Mains Power:	10V DC		Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
Tested by:	Vijay Chaudhary			
Test Date:	12/07/2017			
Remarks:	125KHz f= 100kHz – 30MHz plot, and loop antenna at 90 degrees			



#### 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
0.70	38.12	10.2	15.66	63.98	Quasi Max	90	99	286	70.68	-6.69	Pass
1.35	28.43	10.23	10.43	49.09	Quasi Max	90	99	265	64.94	-15.84	Pass
3.57	17.75	10.31	3.49	31.54	Quasi Max	90	99	290	69.54	-38.00	Pass
7.63	9.51	10.46	2.01	21.98	Quasi Max	90	99	208	69.54	-47.56	Pass
17.99	13.67	10.68	1.21	25.56	Quasi Max	90	99	291	69.54	-43.99	Pass
0.24	13.51	10.18	24.55	48.24	Quasi Max	90	99	90	99.83	-51.59	Pass

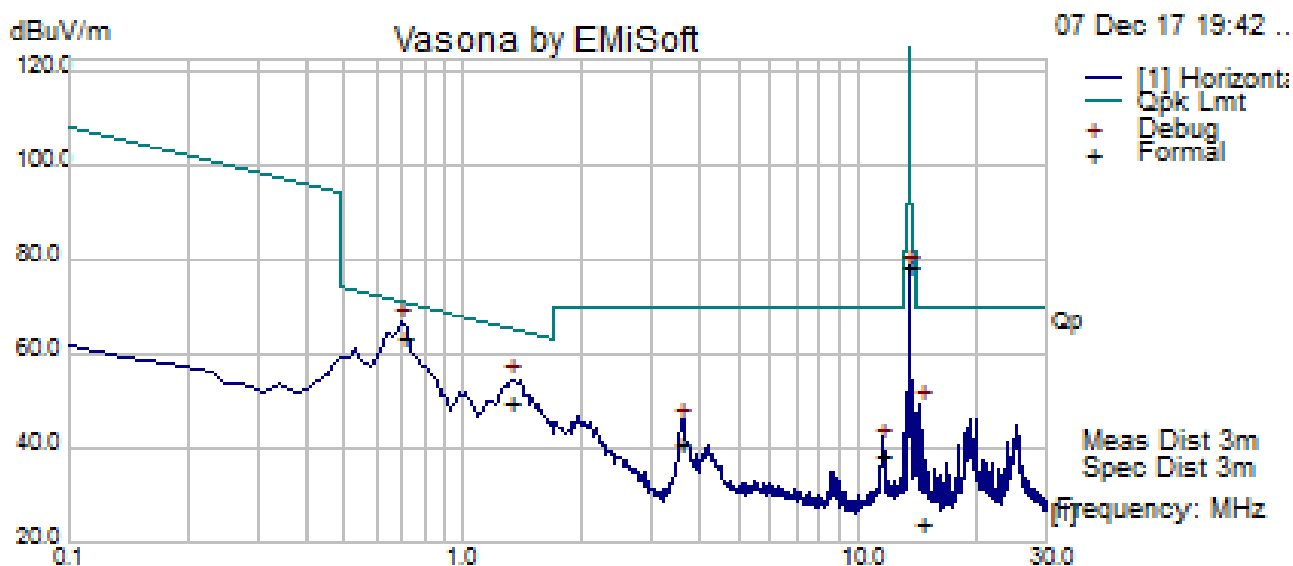
Test specification:	Radiated Spurious Emissions			
Mains Power:	10V DC		Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
Tested by:	Vijay Chaudhary			
Test Date:	12/07/2017			
Remarks:	13.56MHz f= 100kHz – 30MHz plot, and loop antenna at 0 degree			



#### 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
0.70	40.94	10.2	15.67	66.81	Quasi Max	0	99	327	70.68	-3.87	Pass
0.99	22.66	10.21	12.85	45.72	Quasi Max	0	99	352	67.68	-21.96	Pass
3.50	24.03	10.31	3.61	37.95	Quasi Max	0	99	231	69.54	-31.59	Pass
11.40	21.07	10.55	1.59	33.21	Quasi Max	0	99	111	69.54	-36.34	Pass
19.82	12.42	10.72	0.96	24.1	Quasi Max	0	99	199	69.54	-45.44	Pass
27.07	11.92	10.82	0.87	23.61	Quasi Max	0	99	241	69.54	-45.93	Pass

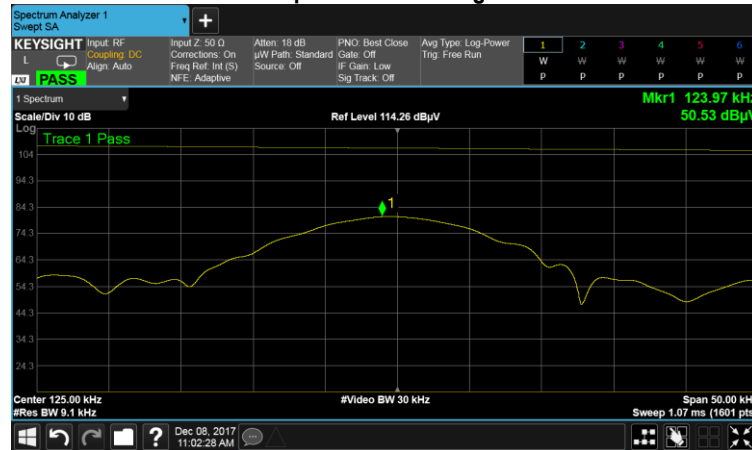
Test specification:	Radiated Spurious Emissions			
Mains Power:	10V DC		Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
Tested by:	Vijay Chaudhary			
Test Date:	12/07/2017			
Remarks:	13.56 MHz f= 100kHz – 30MHz plot, and loop antenna at 90 degrees			



#### Quasi Max Measurement

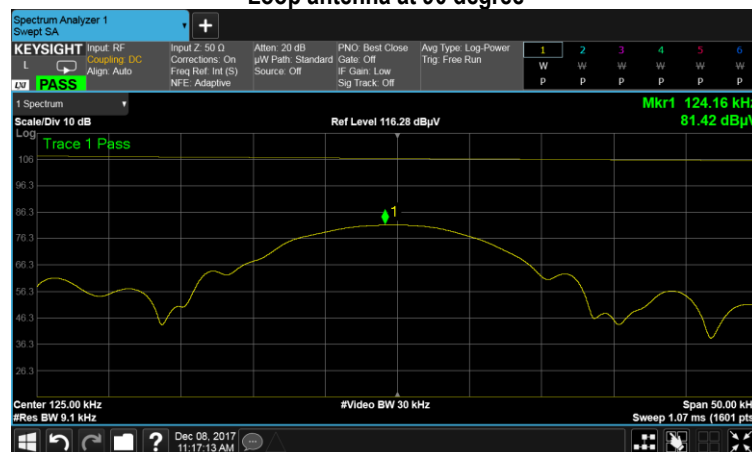
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol (0/90)	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
0.70	37.26	10.2	15.64	63.1	Quasi Max	90	99	279	70.66	-7.56	Pass
1.30	28.51	10.23	10.72	49.46	Quasi Max	90	99	279	65.27	-15.81	Pass
14.43	11.44	10.62	1.68	23.74	Quasi Max	90	99	284	69.54	-45.81	Pass
3.57	27.00	10.31	3.49	40.8	Quasi Max	90	99	312	69.54	-28.75	Pass
11.54	25.82	10.55	1.59	37.95	Quasi Max	90	99	339	69.54	-31.59	Pass
13.56	65.66	10.62	1.67	77.95	Quasi Max	90	99	82	124.92	-46.97	Pass

### Loop antenna at 0 degree



Frequency (kHz)	Amplitude (dBμV)	Limit(dBμV)
123.97	50.53	106

### Loop antenna at 90 degree



Frequency (kHz)	Amplitude (dBμV)	Limit(dBμV)
124.16	81.42	106



### Loop antenna at 0 degree



Frequency (MHz)	Amplitude (dBμV/m)	Limit(dBμV)
13.5611	76.05	84

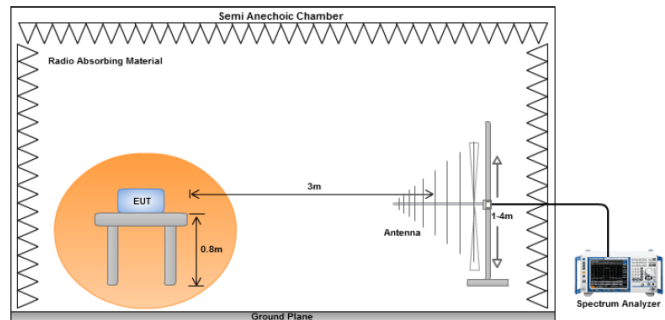
### Loop antenna at 90 degree



Frequency (MHz)	Amplitude (dBμV/m)	Limit(dBμV)
13.5610	78.08	84

## 10.2.2 Radiated Measurements 30MHz to 1GHz

### Requirement(s):

Spec	Requirement	Applicable										
47 CFR §15.225 RSS-210 (B.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	12/0/8/2017-12/12/2017	<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											

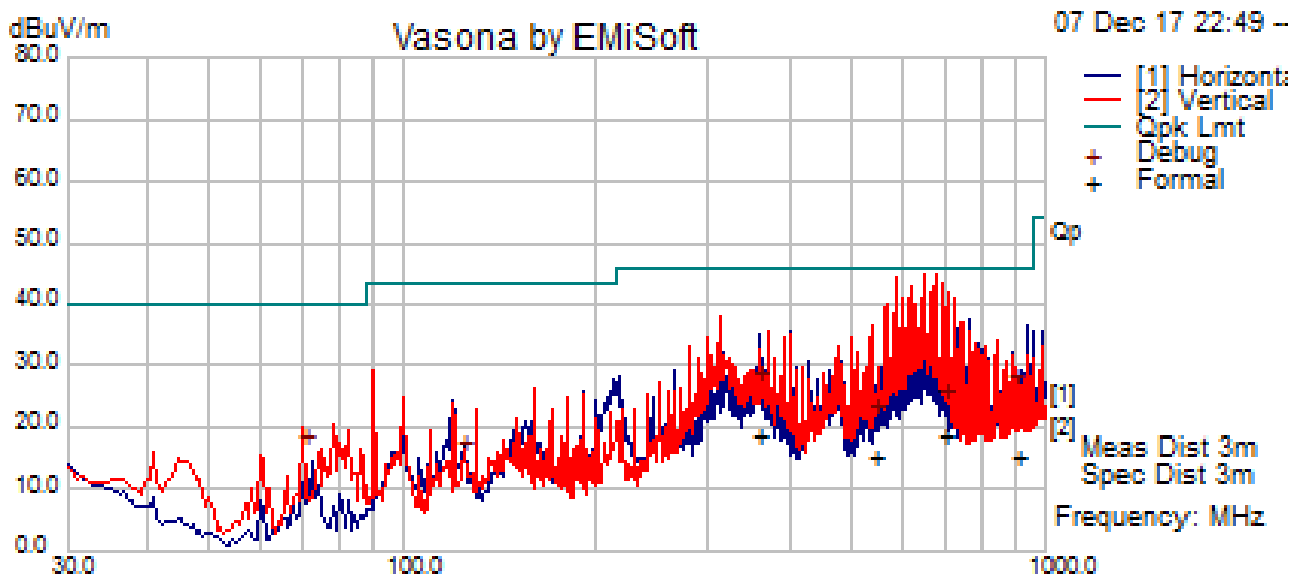
**Test Data**    ☒ Yes (See below)      ☐ N/A

**Test Plot**    ☒ Yes (See below)      ☐ N/A

**Test was done by Vijay Chaudhary at 10-meter chamber.**

Test specification:	Radiated Emissions			
Mains Power:	10V DC		Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
Tested by:	Vijay Chaudhary			
Test Date:	12/07/2017			
Remarks:	N/A			

*f*=30MHz – 1000MHz plot and 3-meter distance

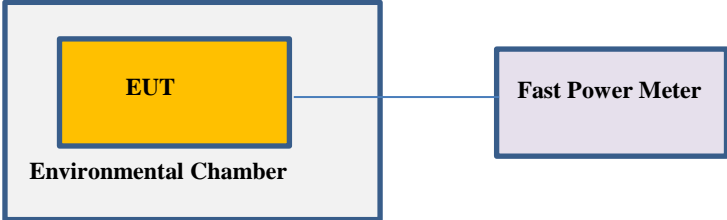


*f*=30MHz – 1000MHz Measurements

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
357.67	29.75	13.87	-21.91	21.71	Quasi Max	H	102	205	46	-24.29	Pass
900.26	33.31	16.68	-13.6	36.39	Quasi Max	V	336	112	46	-9.61	Pass
699.48	44.12	15.66	-16.05	43.73	Quasi Max	H	187	142	46	-2.27	Pass
70.00	19.38	11.7	-28.22	2.86	Quasi Max	H	266	4	40	-37.14	Pass
540.62	37.77	14.86	-18.64	33.99	Quasi Max	V	121	255	46	-12.01	Pass
123.37	18.90	12.27	-22.8	8.37	Quasi Max	V	130	93	43.5	-35.13	Pass

### 10.2.3 Frequency Stability

#### Requirement(s):

Spec	Requirement	Applicable									
47 CFR §15.225 e) RSS-210 (B.6)	Limit: $\pm 0.01\%$ of 13.56 MHz = 1356 Hz	<input checked="" type="checkbox"/>									
Test Setup	 <ol style="list-style-type: none"> <li>The EUT was set up inside an environmental chamber.</li> <li>The EUT was placed in the centre of the environmental.</li> </ol>										
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	12/08/2017-12/12/2017	<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 Vijay Chaudhary at RF test site.**

## Test Result for 125KHz 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  $-20^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  at normal supply voltage.

Reference Frequency: 0.125 MHz

Temperature ( $^{\circ}\text{C}$ )	Measured Freq. (MHz)	Freq. Drift (Hz)	Freq. Deviation (Limit: 0.01%)	Pass/Fail
50	0.125	0	<0.01	Pass
40	0.125	0	<0.01	Pass
30	0.125	0	<0.01	Pass
20	0.125	0	<0.01	Pass
10	0.125	0	<0.01	Pass
0	0.125	0	<0.01	Pass
-10	0.125	0	<0.01	Pass
-20	0.125	0	<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  $20^{\circ}\text{C}$  environmental temperature.

Carrier Frequency: 0.125 MHz at Normal Operation Voltage: 10V

Measured Voltage $\pm 15\%$ of nominal (AC)	Measured Freq. (MHz)	Freq. Drift (Hz)	Freq. Deviation (Limit: 0.01%)	Pass/Fail
11.5	0.125	0	<0.01	Pass
8.5	0.125	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  $-20^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  at normal supply voltage.

Reference Frequency: 13.561 MHz

Temperature ( $^{\circ}\text{C}$ )	Measured Freq. (MHz)	Freq. Drift (Hz)	Freq. Deviation (Limit: 0.01%)	Pass/Fail
50	13.56	0	<0.01	Pass
40	13.561	0	<0.01	Pass
30	13.561	0	<0.01	Pass
20	13.561	0	<0.01	Pass
10	13.561	0	<0.01	Pass
0	13.561	0	<0.01	Pass
-10	13.561	0	<0.01	Pass
-20	13.561	0	<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  $20^{\circ}\text{C}$  environmental temperature.

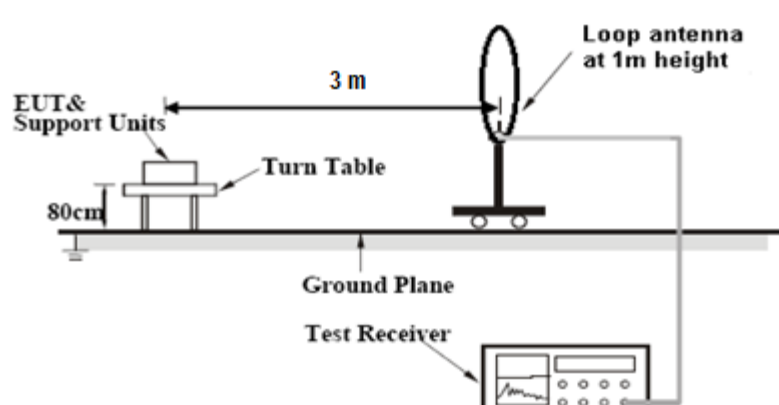
Carrier Frequency: 13.561 MHz at Normal Operation Voltage: 10 V

Measured Voltage $\pm 15\%$ of nominal (AC)	Measured Freq. (MHz)	Freq. Drift (Hz)	Freq. Deviation (Limit: 0.01%)	Pass/Fail
11.5	13.561	0	<0.01	Pass
8.5	13.561	0	<0.01	Pass



#### 10.2.4 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 analyser 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	<div>1. The EUT was switched on and allowed to warm up to its normal operating condition.</div> <div>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.</div> <div>3. Measurement of the 99% Occupied Bandwidth of EUT transmission signal and make record.</div>										
Test Date	12/08/2017-12/12/2017	<table><tr><td>Environmental conditions</td><td>Temperature</td><td>22°C</td></tr><tr><td></td><td>Relative Humidity</td><td>39%</td></tr><tr><td></td><td>Atmospheric Pressure</td><td>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										

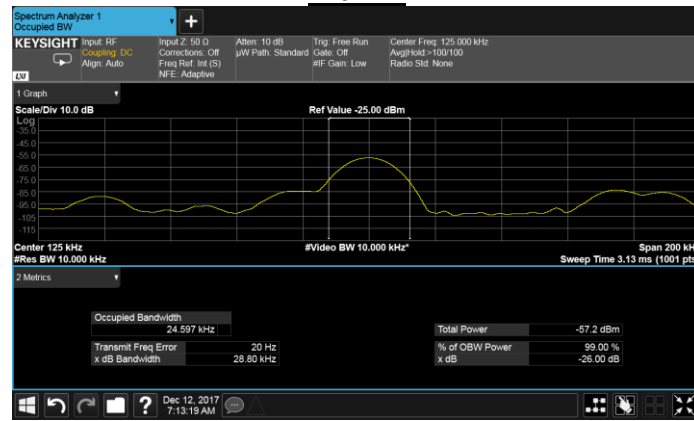
Test Data    ☐ Yes (See below)      ☒ N/A

Test Plot    ☒ Yes (See below)      ☐ N/A

Test was done by Vijay Chaudhary at 10-meter chamber.

## Test results:

### 125 kHz



Frequency (kHz)	Occupied Bandwidth (KHz)
125.00	24.597

### 13.56 MHz




















Frequency (MHz)	Occupied Bandwidth (KHz)
13.56	21.305

## Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
<b>Radiated Emissions</b>						
Spectrum Analyzer	N9030B	10SL0289	09/06/2017	1 Year	09/06/2018	<input checked="" type="checkbox"/>
ETS-Lingren Loop Antenna	6512	00049120	07/14/2016	1 Year	07/14/2019	<input checked="" type="checkbox"/>
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	01/13/2017	1 Year	01/13/2018	<input checked="" type="checkbox"/>
Horn Antenna (1-26.5GHz)	3115	10SL0059	11/09/017	1 Year	11/09/2018	<input checked="" type="checkbox"/>
<b>RF Conducted Measurement</b>						
Spectrum Analyzer	N9030B	10SL0289	09/06/2017	1 Year	09/06/2018	<input checked="" type="checkbox"/>
Test Equity Environment Chamber	1007H	61201	11/08/2017	1 Year	11/08/2018	<input checked="" type="checkbox"/>

## Annex A. 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		<a href="#">A1</a> , <a href="#">A2</a> , <a href="#">A3</a> , <a href="#">A4</a> , <a href="#">B1</a> , <a href="#">B2</a> , <a href="#">B3</a> , <a href="#">B4</a> , 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		<b>Radio Equipment: EN45011:</b> EN ISO/IEC 17065
		<b>Electromagnetic Compatibility:</b> EN45011 – EN ISO/IEC 17065
Singapore iDA CB(Certification Body)	 	<a href="#">Phase I</a> , <a href="#">Phase II</a>
Vietnam MIC CAB Accreditation		Please see the document for the detailed scope
Hong Kong OFCA		<b>(Phase II)</b> OFCA Foreign Certification Body for Radio and Telecom
		<b>(Phase I)</b> Conformity Assessment Body for Radio and Telecom
Industry Canada CAB		<b>Radio:</b> Scope A – All Radio Standard Specification in Category I
		<b>Telecom:</b> CS-03 Part I, II, V, VI, VII, VIII

Japan Recognized Certification Body Designation		<p><b>Radio:</b> A1. Terminal equipment for purpose of calling</p> <p><b>Telecom:</b> B1. Specified radio equipment specified in Article 38-2, Paragraph 1, Item 1 of the Radio Law</p>
Korea CAB Accreditation		<p><b>EMI:</b> KCC Notice 2008-39, RRL Notice 2008-3: CA Procedures for EMI KN22: Test Method for EMI</p> <p><b>EMS:</b> 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><b>Radio:</b> 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><b>Telecom:</b> 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 Measurement</p>
Australia CAB Recognition		<p><b>EMC:</b> AS/NZS CISPR 11, AS/NZS CISPR 14.1, AS/NZS CISPR22, AS/NZS 61000.6.3, AS/NZS 61000.6.4</p> <p><b>Radiocommunications:</b> 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><b>Telecommunications:</b> 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