

RF TEST REPORT

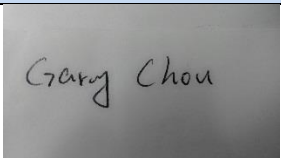
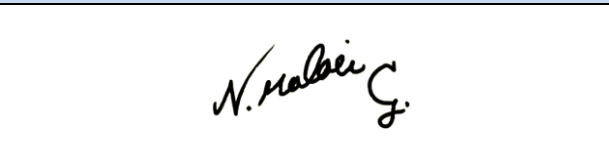


Report No.: FCC-IC_RF_SL15052091-HID-016_RFID_Rev 3.0

Supersede Report No.: FCC-IC_RF_SL15052091-HID-016_RFID Rev 2.0

Applicant	:	HID Global Corporation
Product Name	:	Lumidigm® V-Series V371 Fingerprint Reader
Model No.	:	V371
Test Standard	:	FCC 15.225 FCC 15.207 RSS 210 Issue 8 (2010)
Test Method	:	ANSI C63.10: 2013 RSS Gen 4.6, RSS Gen 4.7 & RSS Gen 4.9
FCC ID	:	JQ6-V371
IC ID	:	2236B-V371
Dates of test	:	07/09/2015 ~ 07/10/2015
Issue Date	:	08/29/2015
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:

	
Gary Chou	Nima Molaei
Test Engineer	Engineer Reviewer

Issued By:
SIEMIC Laboratories
775 Montague Expressway, Milpitas, 95035 CA



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Laboratory Introduction

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



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

Accreditations for Conformity Assessment

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

Accreditations for Product Certifications

Country	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC, RF, Telecom
Canada	IC FCB, NIST	EMC, RF, Telecom
Singapore	iDA, NIST	EMC, RF, Telecom
EU	NB	EMC & 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_SL15052091-HID-016_RFID	-	Original	07/28/2015
FCC-IC_RF_SL15052091-HID-016_RFID_Rev1.0	Rev1.0	Update customer information	08/11/2015
FCC-IC_RF_SL15052091-HID-016_RFID_Rev2.0	Rev2.0	Update conducted emission data	08/29/2015
FCC-IC_RF_SL15052091-HID-016_RFID_Rev3.0	Rev3.0	Update conducted emission data and radiated emission result	09/01/2015

2 Executive Summary

The purpose of this test program was to demonstrate compliance of the HID Global Corporation., and model: V371 against the current Stipulated Standards. The V371 has demonstrated compliance with the Stipulated Standard listed on 1st page.

3 Customer information

Applicant Name	:	HID Global Corporation
Applicant Address	:	611 Center Ridge Dr., Austin, TX 78753
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	:	Lumidigm® V-Series V371 Fingerprint Reader
Model No.	:	V371
Trade Name	:	HID
Serial No.	:	Conducted Emission Unit: 020021 Radiated Emission Unit: 020458
Input Power	:	5Vdc (USB)
Date of EUT received	:	07/08/2015
Equipment Class/ Category	:	Class B
Clock/Operating Frequencies	:	8MHz/13.56 MHz
Port/Connectors	:	USB

6.2 Radio Description

Spec for Radio

Radio Type	RFID
Operating Frequency	13.56MHz
Modulation	ASK
Antenna Type	PCB
Antenna Gain	1

6.3 EUT test modes/configuration Description

Mode	Note
RF test	EUT continuous transmit when power on
Note: None	

Test Item	Operating mode	Tested antenna port	Test frequencies
Antenna Requirement	N/A	-	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 tested.			

6.4 EUT Photos – External



Top Side



Bottom Side



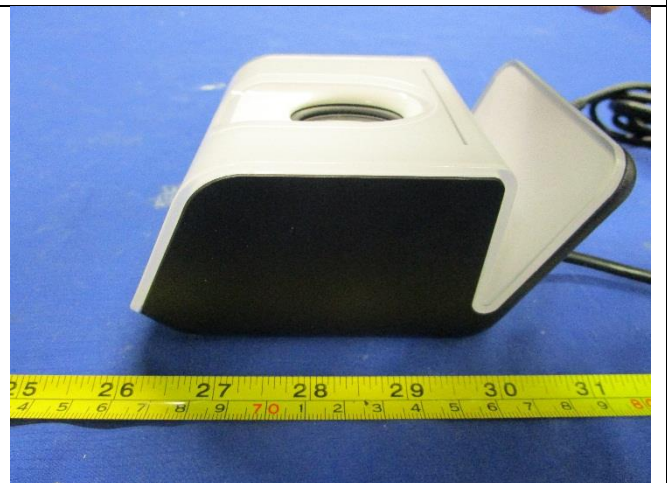
Front Side



Rear Side



Left Side

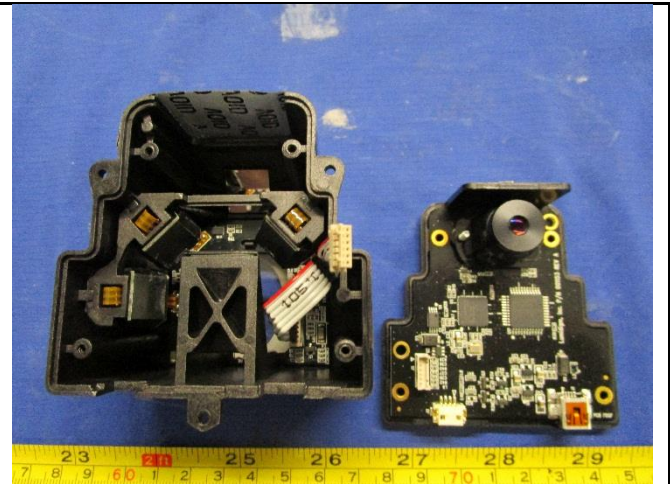


Right Side

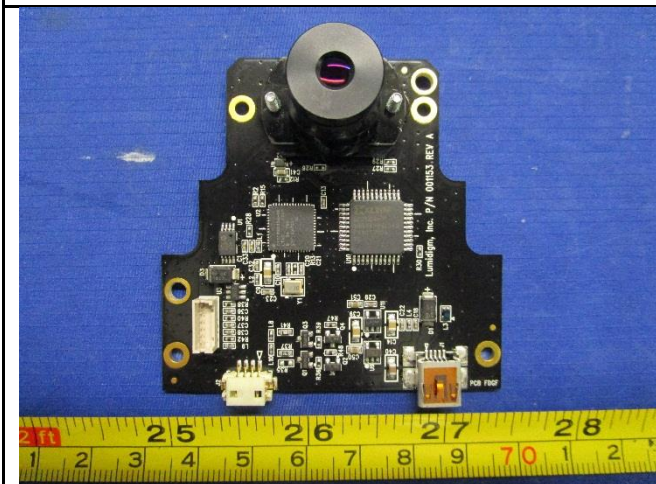
6.5 EUT Photos – Internal



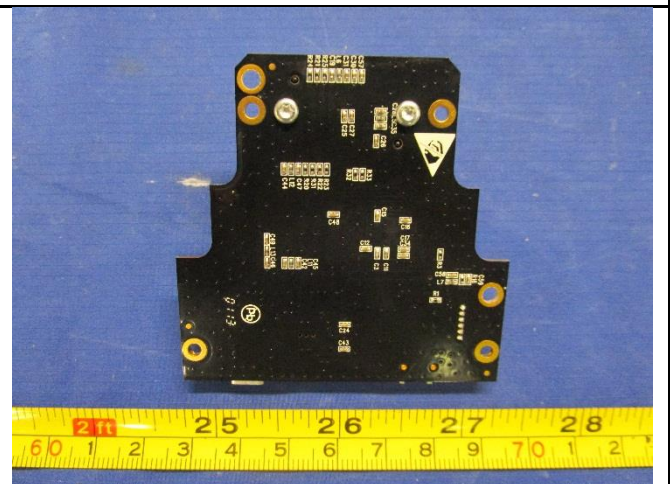
Cover off View 1



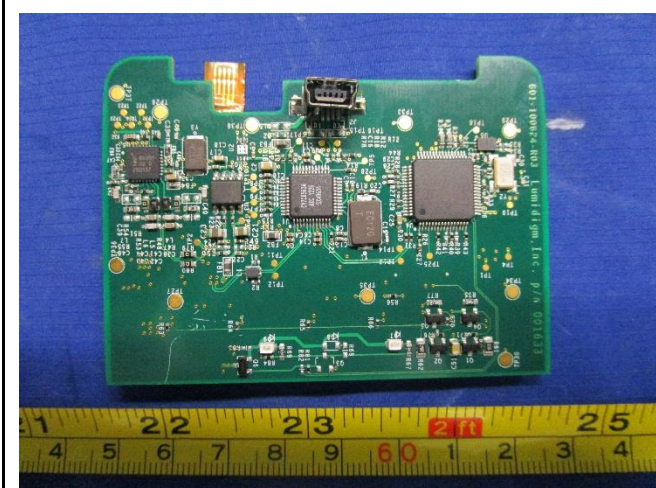
Cover off View 2 with PCBA1



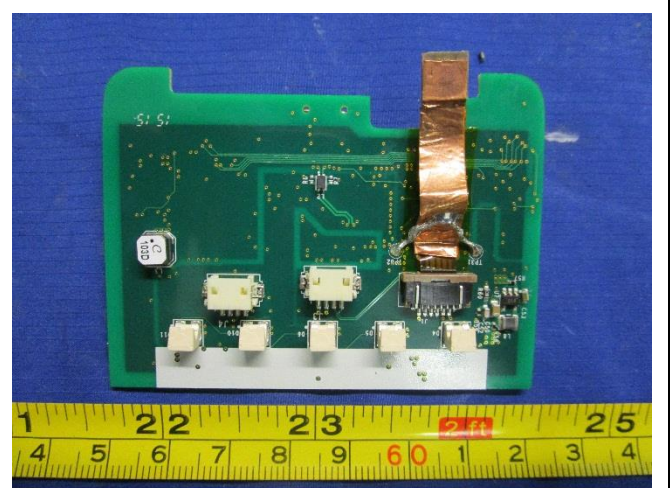
PCBA1 Top View



PCBA1 Bottom View



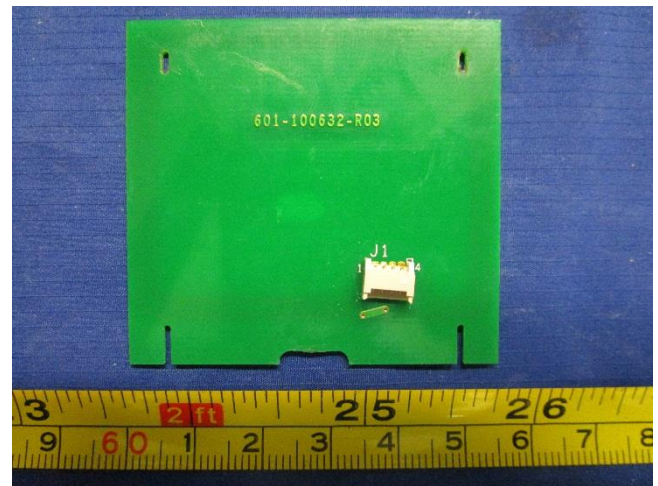
PCBA 2 Bottom View2



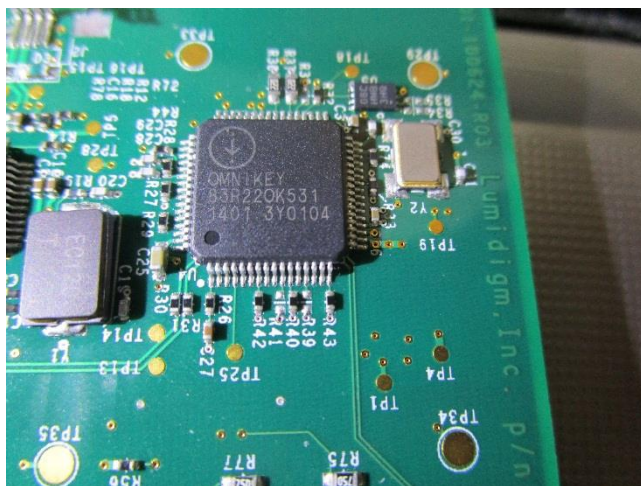
PCBA 2 Bottom View



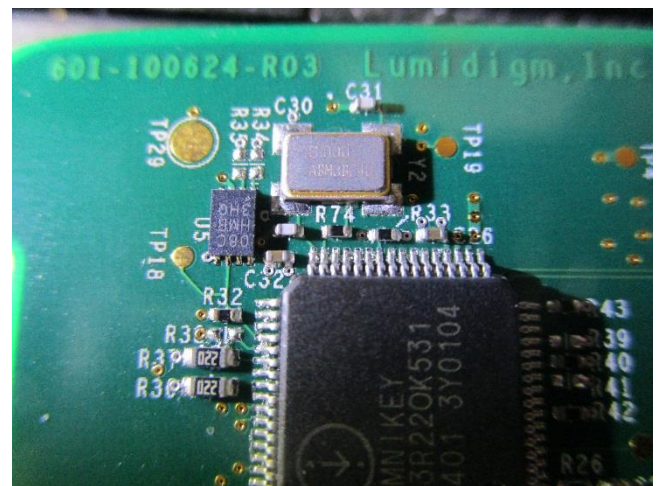
PCBA 2(ANTENNA) Bottom View3



PCBA 2(ANTENNA) Bottom View3



RF MAIN CHIP

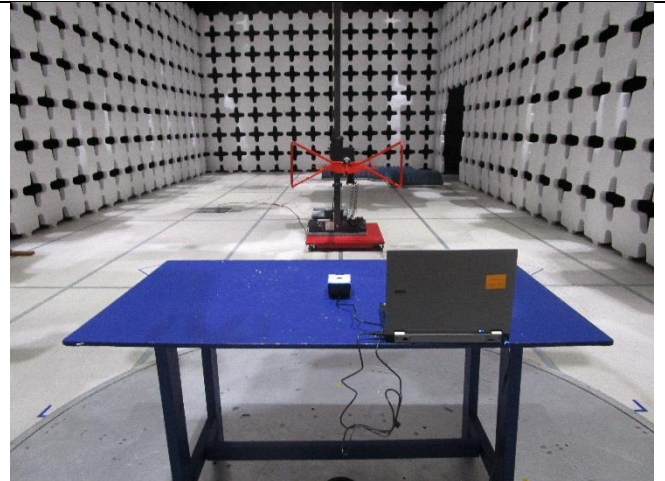


Oscillator

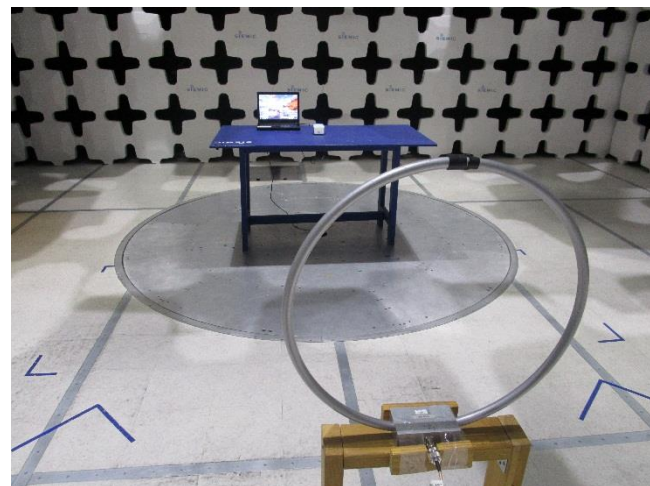
6.6 EUT Test Setup Photos



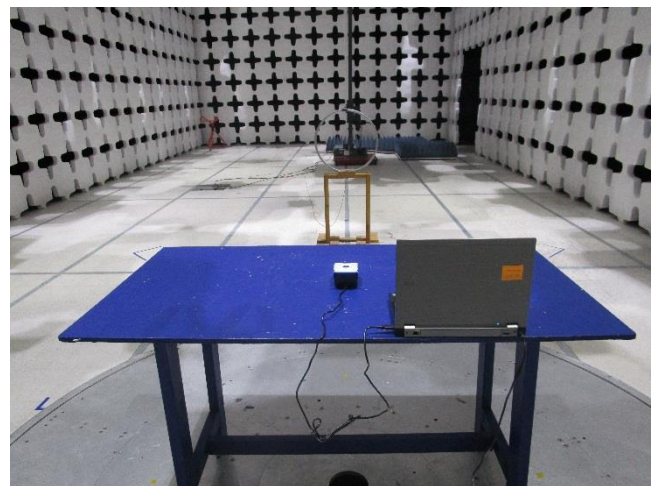
Radiated Emission Test setup (<1GHz) – Front View



Radiated Emission Test setup (<1GHz) – Rear View



Radiation Emission Test setup (<30MHz) – Front View



R Emission Test setup (<30MHz) – Rear View



Conducted Emissions –Front View



Conducted Emissions – Rear View

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Index	Supporting Equipment Description	Model	Serial No.	Manu	Note
1	NOTEBOOK PC	D6410	18209556397	DELL	-

7.2 Cabling Description

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

7.3 Test Software Description

Test Item	Software	Description
-	-	-

8 Test Summary

Test Item	Test standard		Test Method/Procedure		Pass / Fail
Antenna Requirement	FCC	15.203	FCC	-	<input checked="" type="checkbox"/> Pass
	IC		IC	-	<input type="checkbox"/> N/A
AC Conducted Emissions Voltage	FCC	15.207(a)	FCC	ANSI C63.10 2013	<input checked="" type="checkbox"/> Pass
	IC	RSS Gen (7.2.2)	IC	-	<input type="checkbox"/> N/A

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 4.9	<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 4.9	<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 4.9	<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 4.9	<input type="checkbox"/> N/A
Frequency Stability	FCC	15.225(e)	FCC	-	<input checked="" type="checkbox"/> Pass
	IC	RSS210(A2.6)	IC	RSS Gen 4.7	<input type="checkbox"/> N/A
Occupied Bandwidth	FCC	-	FCC	-	<input checked="" type="checkbox"/> Pass
	IC	RSS-210(5.9.1)	IC	RSS Gen 4.6	<input type="checkbox"/> N/A
Remark	<ol style="list-style-type: none"> All measurement uncertainties are not taken into consideration for all presented test result. The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual. Test Method: ANSI C63.10: 2009 / RSS – Gen Issue 3: 2010 				

9 Measurement Uncertainty

Test Item	Frequency Range	Description	Uncertainty
AC Conducted Emissions Voltage	150KHz – 30MHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2	±3.5dB
Limit in the band of 13.553 – 13.567 MHz	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	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	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	9KHz – 30MHz		+5.6dB/-4.5dB
Radiated Spurious Emissions	30MHz – 1GHz		+5.6dB/-4.5dB

10 Measurements, examination and derived results

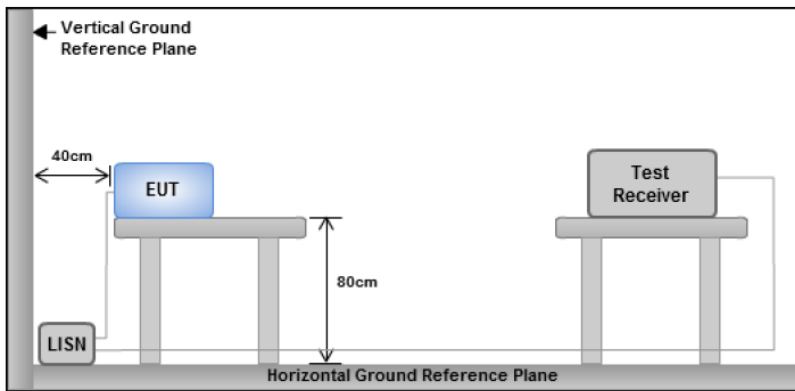
10.1 Antenna Requirement

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	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 Emission Test Result

Conducted Emission Limits

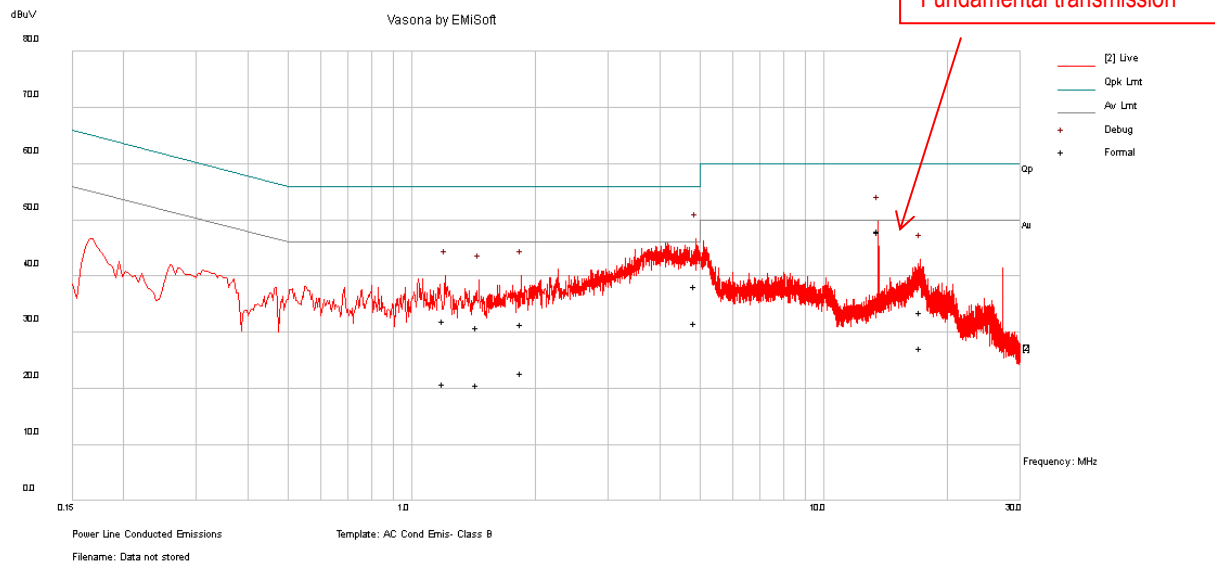
Section	Frequency ranges (MHz)	Limit (dBuV)	
		QP	Average
Class B devices	0.15 ~ 0.5	66 – 56	56 – 46
	0.5 ~ 5	56	46
	5 ~ 30	60	50

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 μ H/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	07/10/2015	Environmental condition	Temperature 22°C Relative Humidity 31% Atmospheric Pressure 1021 HPA
Remark			
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes ☐ N/A

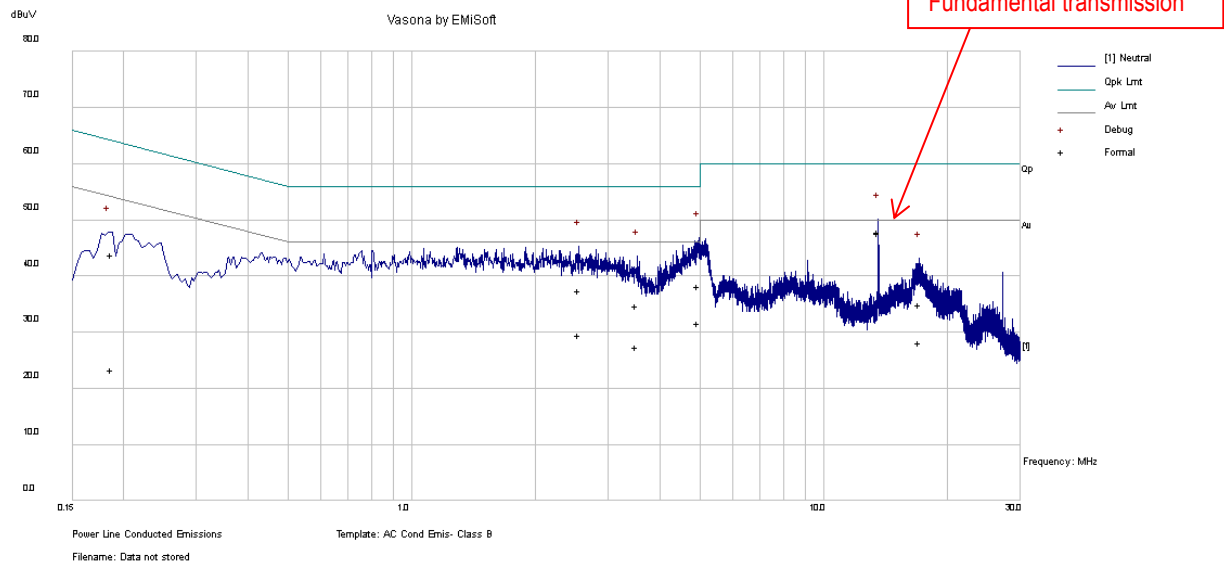
Line Plot at V= 120V_{AC}, 60Hz



Line Measurements

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line/ Neutral	Limit dBuV	Margin dB	Pass /Fail
4.87	27.71	10.04	0.55	38.29	Quasi Peak	Live	56	-17.71	Pass
13.56	37.33	10.06	0.59	47.98	Quasi Peak	Live	60	-12.02	Pass
1.19	21.43	10.02	0.57	32.01	Quasi Peak	Live	56	-23.99	Pass
1.85	20.92	10.02	0.55	31.5	Quasi Peak	Live	56	-24.5	Pass
1.44	20.22	10.02	0.56	30.81	Quasi Peak	Live	56	-25.19	Pass
17.13	22.91	10.06	0.64	33.61	Quasi Peak	Live	60	-26.39	Pass
4.87	20.99	10.04	0.55	31.58	Average	Live	46	-14.42	Pass
13.56	37.15	10.06	0.59	47.79	Average	Live	50	-2.21	Pass
1.19	10.26	10.02	0.57	20.85	Average	Live	46	-25.15	Pass
1.85	12.12	10.02	0.55	22.7	Average	Live	46	-23.3	Pass
1.44	10.09	10.02	0.56	20.67	Average	Live	46	-25.33	Pass
17.13	16.55	10.06	0.64	27.26	Average	Live	50	-22.74	Pass

Neutral Line Plot at V= 120V_{AC}, 60Hz



Neutral Line Measurements

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line/ Neutral	Limit dBuV	Margin dB	Pass /Fail
4.96	27.68	10.04	0.55	38.26	Quasi Peak	Neutral	56	-17.74	Pass
13.56	37.17	10.06	0.59	47.82	Quasi Peak	Neutral	60	-12.18	Pass
2.54	26.86	10.03	0.55	37.43	Quasi Peak	Neutral	56	-18.57	Pass
3.52	24.07	10.03	0.55	34.65	Quasi Peak	Neutral	56	-21.35	Pass
0.19	32.35	10	1.41	43.77	Quasi Peak	Neutral	64.19	-20.42	Pass
17.04	24.3	10.06	0.64	35.01	Quasi Peak	Neutral	60	-24.99	Pass
4.96	21.04	10.04	0.55	31.63	Average	Neutral	46	-14.37	Pass
13.56	37.02	10.06	0.59	47.66	Average	Neutral	50	-2.34	Pass
2.54	19.02	10.03	0.55	29.6	Average	Neutral	46	-16.4	Pass
3.52	16.86	10.03	0.55	27.44	Average	Neutral	46	-18.56	Pass
0.19	11.9	10	1.41	23.32	Average	Neutral	54.19	-30.88	Pass
17.04	17.45	10.06	0.64	28.15	Average	Neutral	50	-21.85	Pass

10.3 Radiated Measurement

Receiver/Spectrum analyzer setting

TEST	Detector	RBW	VBW	Test Distance	NOTES
Radiated Emission < 1GHz (30MHz – 1GHz)	PK	100KHz	300KHz	3m	-
Radiated Emission < 30MHz	PK	10KHz	30KHz	3m	-

10.3.1 Radiated Measurement 30MHz - 1GHz

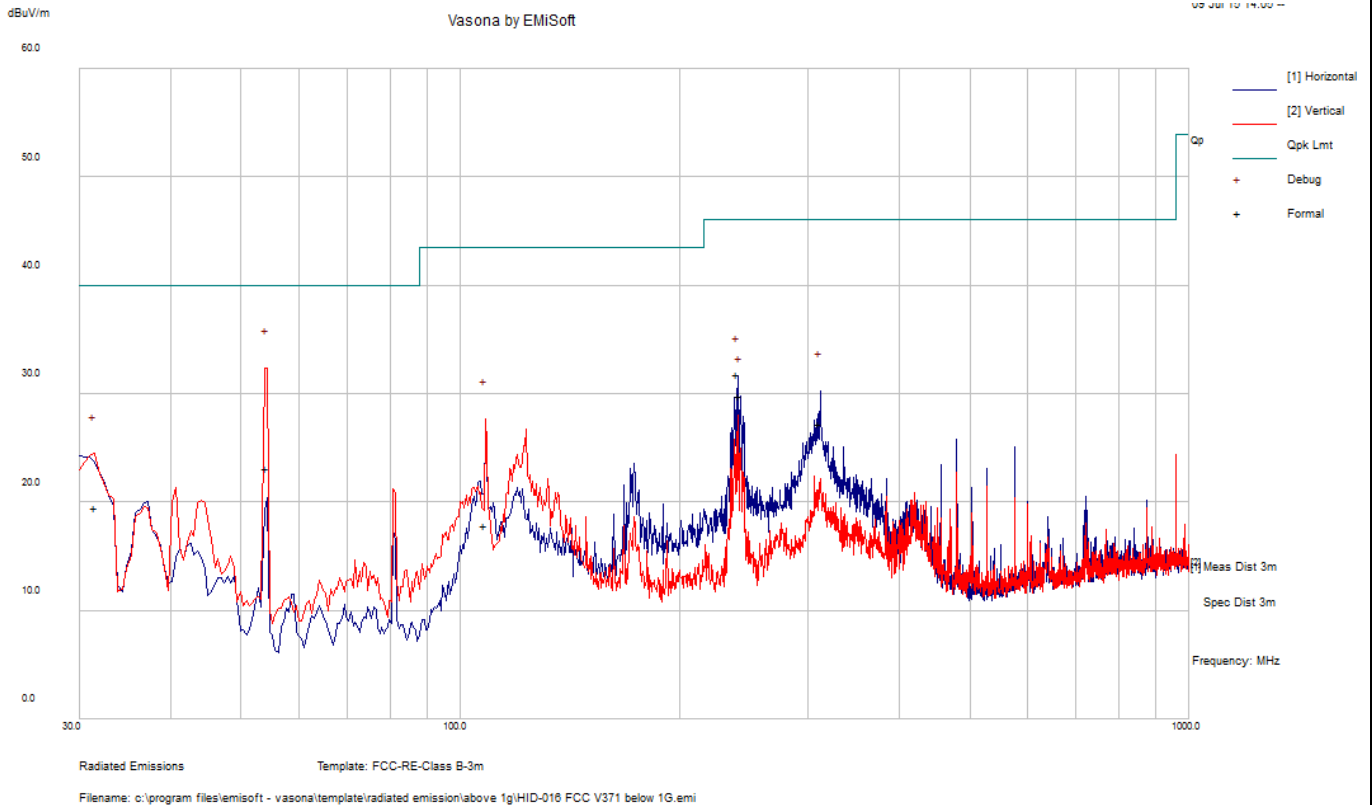
Requirement(s):

Spec	Requirement	Applicable																																							
<div>§ 15.209</div> <div>RSS210 (A8.5)</div>	<div>Except higher limit as specified elsewhere in another 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</div> <table><tr><th colspan="5">FCC Part 15.209</th></tr><tr><th rowspan="2">Frequency (MHz)</th><th colspan="2">Field Strength Limit</th><th colspan="2">Field Strength Limit at 3m Measurement</th></tr><tr><th>(uV/m)</th><th>Dist</th><th>(uV/m)</th><th>(dBuV/m)</th></tr><tr><td>30.0 – 88.0</td><td>100</td><td>3m</td><td>100</td><td>20log 100</td></tr><tr><td>88.0 – 216.0</td><td>150</td><td>3m</td><td>150</td><td>20log 150</td></tr><tr><td>216.0 – 960.0</td><td>200</td><td>3m</td><td>200</td><td>20log 200</td></tr><tr><td>Above 960.0</td><td>500</td><td>3m</td><td>500</td><td>20log 500</td></tr><tr><td>Note</td><td colspan="4">The measurement distance was 3 meter</td></tr></table>	FCC Part 15.209					Frequency (MHz)	Field Strength Limit		Field Strength Limit at 3m Measurement		(uV/m)	Dist	(uV/m)	(dBuV/m)	30.0 – 88.0	100	3m	100	20log 100	88.0 – 216.0	150	3m	150	20log 150	216.0 – 960.0	200	3m	200	20log 200	Above 960.0	500	3m	500	20log 500	Note	The measurement distance was 3 meter				<div>☒</div>
FCC Part 15.209																																									
Frequency (MHz)	Field Strength Limit		Field Strength Limit at 3m Measurement																																						
	(uV/m)	Dist	(uV/m)	(dBuV/m)																																					
30.0 – 88.0	100	3m	100	20log 100																																					
88.0 – 216.0	150	3m	150	20log 150																																					
216.0 – 960.0	200	3m	200	20log 200																																					
Above 960.0	500	3m	500	20log 500																																					
Note	The measurement distance was 3 meter																																								
Test Setup	<div></div>																																								
Procedure	<div><div><div>1.</div><div>The EUT was switched on and allowed to warm up to its normal operating condition.</div></div><div><div>2.</div><div>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><div>a.</div><div>Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.</div></div><div><div>b.</div><div>The EUT was then rotated to the direction that gave the maximum emission.</div></div><div><div>c.</div><div>Finally, the antenna height was adjusted to the height that gave the maximum emission.</div></div></div></div><div><div>3.</div><div>A Quasi-peak measurement was then made for that frequency point.</div></div><div><div>4.</div><div>Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.</div></div></div>																																								
Remark	-																																								
Result	<div><div>☒ Pass</div><div>☐ Fail</div></div>																																								

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test specification:	Radiated Spurious Emissions			
Environmental Conditions:	Temp(°C):	20	Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
	Humidity (%):	36		
	Atmospheric(mbar):	1021		
Mains Power:	5VDC			
Tested by:	Gary Chou			
Test Date:	07/10/2015			
Remarks:	30 – 1000 MHz			



Test Data

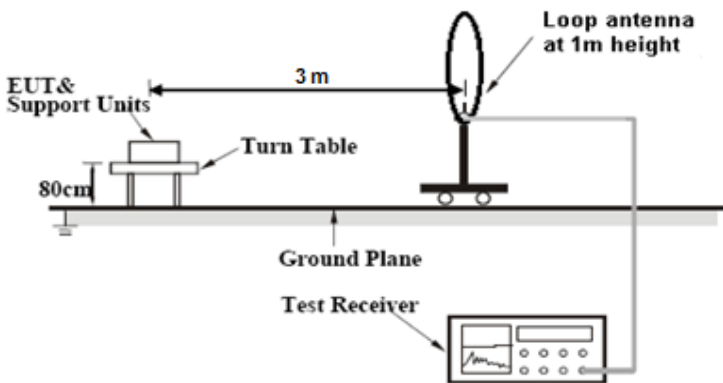
Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Pol (V/H)	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
54.23	54.96	-1.49	-30.37	23.1	Quasi Max	V	258	18	40.00	-16.9	Pass
239.99	61.85	-3.07	-26.97	31.81	Quasi Max	H	101	82	46.02	-14.21	Pass
31.53	39.66	-1.06	-19.07	19.53	Quasi Max	V	301	156	40.00	-20.47	Pass
311.87	55.44	-3.39	-24.87	27.18	Quasi Max	H	100	87	46.02	-18.84	Pass
107.99	46.11	-1.98	-26.25	17.88	Quasi Max	V	125	275	43.52	-25.64	Pass
242.13	59.83	-3.08	-26.97	29.78	Quasi Max	H	123	68	46.02	-16.24	Pass

Note: test was performed at 3 meter distance.

10.3.2 Radiated Measurement 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.	☒				
	FCC Part 15.225(a)/(b)/(c)					
	Frequency (MHz)		Field Strength Limit		Field Strength Limit at 3m Measurement Dist	
			(uV/m) Dist	(dBuV/m)	Dis ConvF (dB)	(dBuV/m)
	13.553 – 13.567		15,848 30m	84	40	124
	13.410 – 13.553 13.567 – 13.710		334 30m	50.5	40	90.5
	13.110 – 13.410 13.710 – 14.010		106 30m	40.5	40	80.5
	FCC Part 15.209					
	Frequency (MHz)		Field Strength Limit		Field Strength Limit at 3m Measurement	
			(uV/m) Dist	(dBuV/m)	Dis ConvF (dB)	(dBuV/m)
	0.009 – 0.490		2400 / F(KHz) 300m	20log 2400/F(KHz)	80	20log 2400/F(KHz) + 80
	0.490 – 1.705		24000 / F(KHz) 30m	20log 24000/F(KHz)	40	20log 24000/F(KHz) + 40
	1.705 – 30.00		30 30m	29.5	40	69.5
Note	The measurement distance was 3 meter					

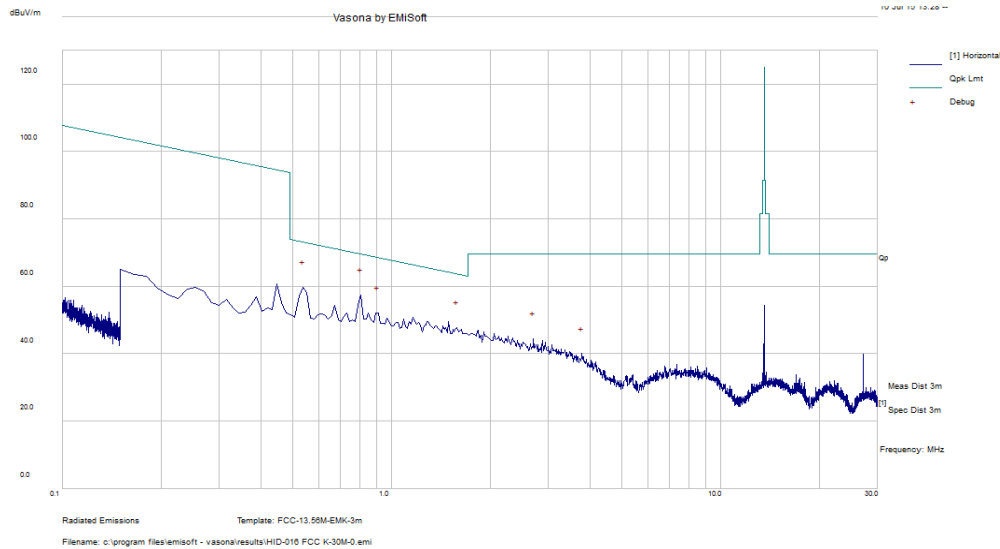
Test Setup	 <ol style="list-style-type: none"> The EUT and supporting equipment was set up in accordance with the requirements of the standard on top of a 1.5m X 1.0m X 0.8m high, non-metallic table. The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable. The relevant loop antenna was set at the required test distance away from the EUT and supporting equipment boundary.
Procedure	<p>For < 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 centre 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> <p>Note: The limit convert from distance D1(dBuV/m) to D2(dBuV/m): add the factor $20 \cdot \log(D1/D2)$ for above 30MHz, and $40 \cdot \log(D1/D2)$ for below 30MHz.</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 specification:	Radiated Spurious Emissions			
Environmental Conditions:	Temp(°C):	21	Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
	Humidity (%):	35		
	Atmospheric(mbar):	1021		
Mains Power:	5VDC			
Tested by:	Gary Chou			
Test Date:	07/10/2015			
Remarks:	100kHz – 30 MHz			

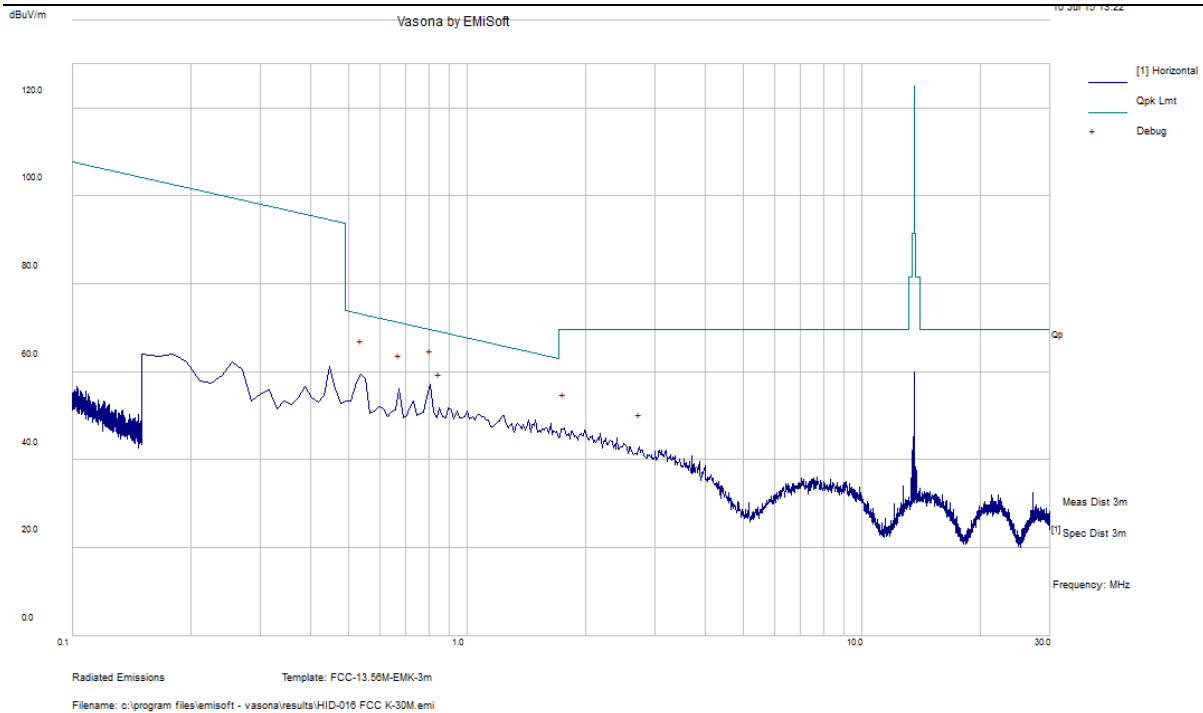
Loop Antenna at 0 degree @ 3meter distance



Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Hgt (cm)	Antenna (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
0.8067	31.84	-0.2	13.82	45.86	Quasi Max	100	0	69.47	-23.61	Pass
0.53805	30.6	-0.18	17.2	47.98	Quasi Max	100	0	72.99	-25.01	Pass
1.5828	27.3	-0.25	8.66	36.21	Quasi Max	100	0	63.62	-27.41	Pass
0.911175	27.39	-0.21	12.86	40.46	Quasi Max	100	0	68.41	-27.95	Pass
2.702175	28.04	-0.31	4.77	33.12	Quasi Max	100	0	69.54	-36.42	Pass
3.7917	25.8	-0.31	2.49	28.6	Quasi Max	100	0	69.54	-40.94	Pass

Note: test was performed at 3 meter distance.

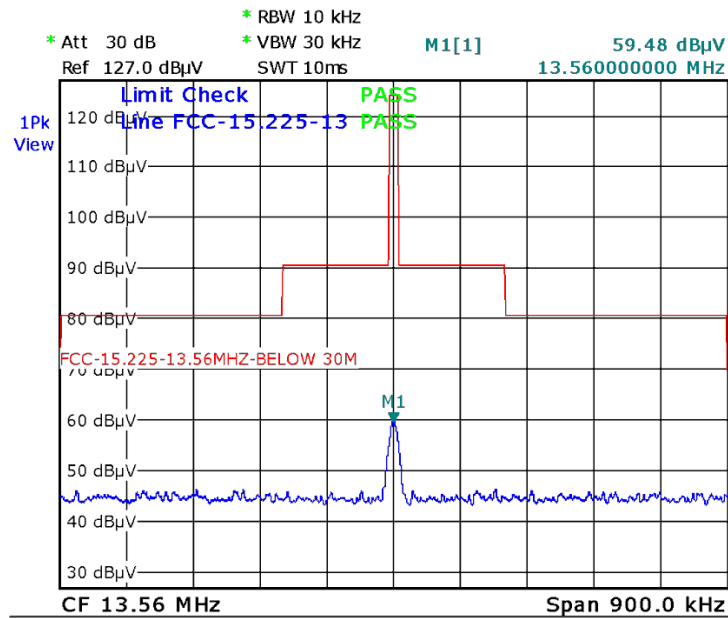
Loop Antenna at 90 degree @ 3meter distance



Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Hgt (cm)	Antenna (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
0.8067	31.57	-0.2	13.82	45.59	Quasi Max	100	90	69.47	-23.88	Pass
0.53805	30.51	-0.18	17.2	47.89	Quasi Max	100	90	72.99	-25.1	Pass
0.672375	29.1	-0.19	15.22	44.51	Quasi Max	100	90	71.05	-26.54	Pass
0.851475	26.63	-0.21	13.4	40.24	Quasi Max	100	90	69	-28.76	Pass
1.7619	27.65	-0.26	7.88	35.79	Quasi Max	100	90	69.54	-33.75	Pass
2.732025	26.42	-0.31	4.69	31.42	Quasi Max	100	90	69.54	-38.12	Pass

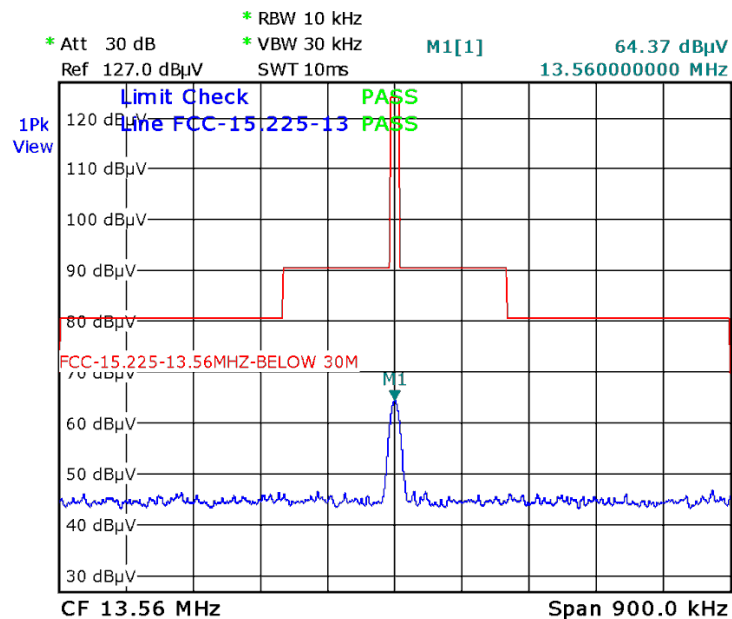
Note: test was performed at 3 meter distance.

Loop Antenna at 0 degree @ 3meter distance



Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Hgt (cm)	Antenna (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
13.56	60.81	1.04	-2.37	59.48	peak	150	0	124	-64.52	PASS

Loop Antenna at 90 degree @ 3meter distance



Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	AF (dB)	Level (dBuV/m)	Measurement Type	Hgt (cm)	Antenna (Deg)	Limit (dBuV/m)	Margin (dB)	Pass /Fail
13.56	65.7	1.04	-2.37	64.37	peak	150	90	124	-59.63	PASS

10.4 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	1. The EUT was set up inside an environmental chamber. 2. 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 a spectrum analyzer. The spectrum analyzer bandwidth and span was set to read in hertz. A voltmeter was used to monitor when varying the voltage.	
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 specification:	Frequency Stability			
Environmental Conditions:	Temp(°C):	22	Result:	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail
	Humidity (%):	35		
	Atmospheric(mbar):	1022		
Mains Power:	5VDC			
Tested by:	Gary Chou			
Test Date:	07/10/2015			
Remarks:	-			

Test Result

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°C at normal supply voltage.

Reference Frequency: 13.56040 MHz at 20°C

Temperature (°C)	Measured Freq. (MHz)	Freq. Drift (KHz)	Freq. Deviation (Limit: 0.01%)	Pass/Fail
50	13.560438	0.038	<0.01	Pass
40	13.560413	0.013	<0.01	Pass
30	13.560413	0.013	<0.01	Pass
20	Reference (13.560400 MHz)			
10	13.560338	0.062	<0.01	Pass
0	13.560195	0.205	<0.01	Pass
-10	13.560446	0.046	<0.01	Pass
-20	13.560507	0.107	<0.01	Pass

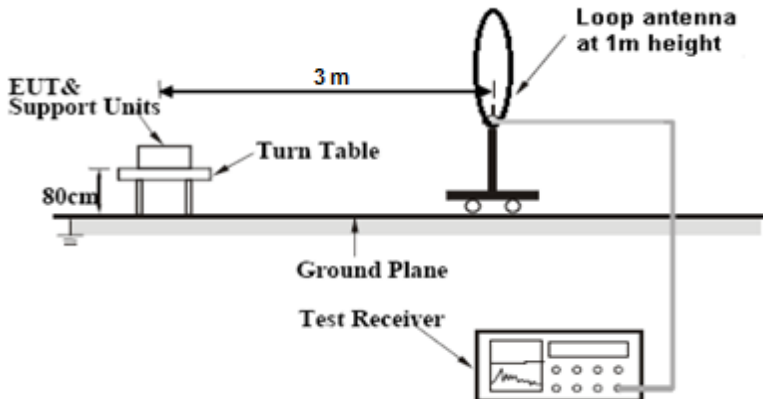
Frequency Stability versus Input Voltage: The Frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$, the frequency of the transmitter was measured at 85% and at 115% of the rated power supply voltage at a 20°C environmental temperature.

Carrier Frequency: 13.559734 MHz at 20°C at 110VAC

Measured Voltage $\pm 15\%$ of nominal (AC)	Measured Freq. (MHz)	Freq. Drift (Hz)	Freq. Deviation (Limit: 0.01%)	Pass/Fail
102	13.560400	0	<0.01	Pass
138	13.560400	0	<0.01	Pass

10.5 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	 <p>1. The EUT was set up inside a semi-anechoic chamber in accordance with the standard. The EUT was placed on top of a 0.8m high, non-metallic table in a typical configuration.</p>	
Procedure	<p>1. The EUT was switched on and allowed to warm up to its normal operating condition.</p> <p>2. To measure conducted, an SMA cable was used to replace the EUT antenna. To measure radiated, an external antenna was used to detect EUT transmission signal.</p> <p>3. Measurement of the 99% Occupied Bandwidth of EUT transmission signal and make records.</p>	
Remark	-	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	

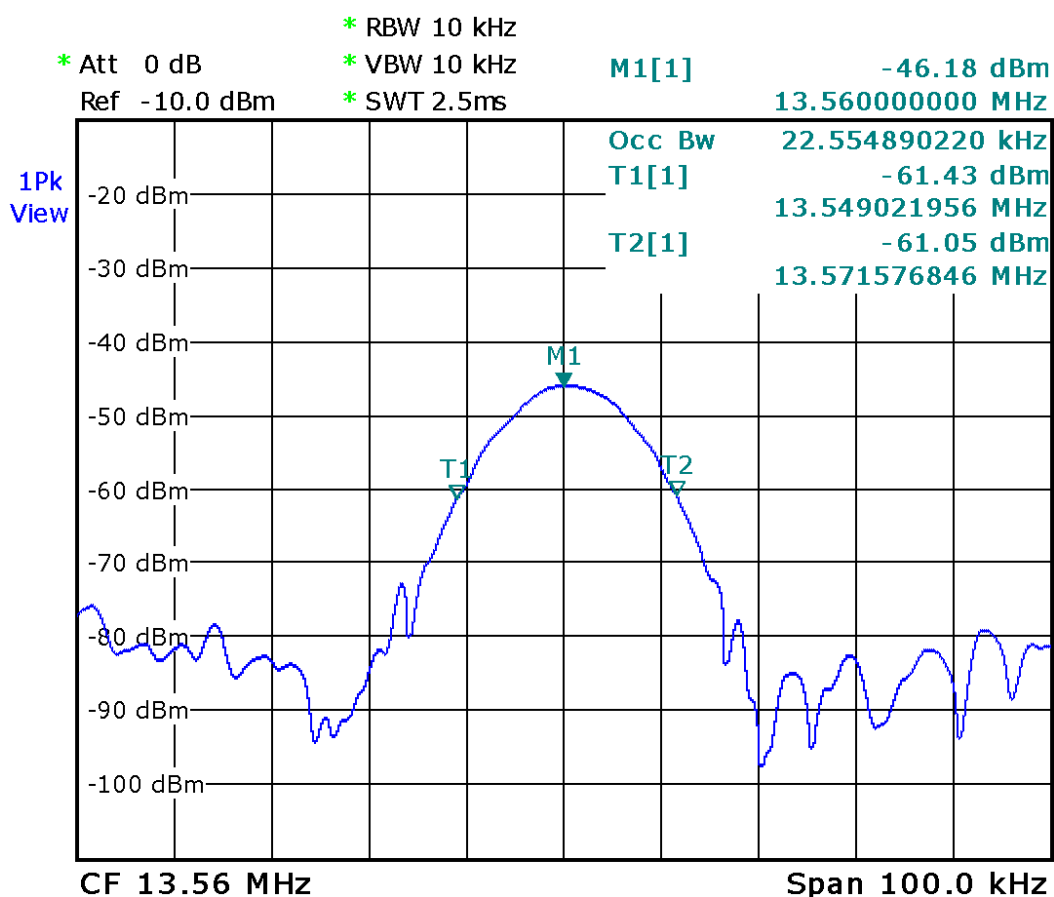
Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test specification:	Frequency Stability			
Environmental Conditions:	Temp(°C):	20	Result:	<div><input checked="" type="checkbox"/> Pass</div> <div><input type="checkbox"/> Fail</div>
	Humidity (%):	36		
	Atmospheric(mbar):	1021		
Mains Power:	5VDC			
Tested by:	Gary Chou			
Test Date:	7/10/2015			
Remarks:	-			

Test Results:

















Radio	Channel Frequency (MHz)	99% Occupied BW (kHz)	Limit (MHz)
13.56MHz	13.56	22.5548	N/A










Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Conducted Emissions						
R & S Receiver	ESIB 40	100179	05/23/2015	1 Year	05/23/2016	<input checked="" type="checkbox"/>
R&S LISN	ESH2-Z5	861741/013	05/18/2014	1 Year	05/18/2015	<input type="checkbox"/>
CHASE LISN	MN2050B	1018	07/24/2014	1 Year	07/24/2015	<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	05/23/2015	1 Year	05/23/2016	<input checked="" type="checkbox"/>
ETS-Lingren Loop Antenna	6512	00049120	05/12/2015	1 Year	05/12/2016	<input checked="" type="checkbox"/>
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	08/12/2014	1 Year	08/12/2015	<input checked="" type="checkbox"/>
Horn Antenna (1-26.5GHz)	3115	10SL0059	08/11/2014	1 Year	08/11/2015	<input checked="" type="checkbox"/>
Horn Antenna (18-40 GHz)	AH-840	101013	04/23/2014	1 Year	04/23/2015	<input type="checkbox"/>
Pre-Amplifier (1-26.5GHz)	8449B	3008A00715	08/11/2014	1 Year	08/11/2015	<input checked="" type="checkbox"/>
Microwave Preamplifier (18-40 GHz)	PA-840	181251	05/30/2014	1 Year	05/30/2015	<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	09/05/2014	1 Year	09/05/2015	<input checked="" type="checkbox"/>
RF Conducted Measurement						
Spectrum Analyzer	N9010A	MY50210206	08/13/2014	1 Year	08/13/2015	<input checked="" type="checkbox"/>
R & S Receiver	ESIB 40	100179	05/23/2015	1 Year	05/23/2016	<input checked="" type="checkbox"/>
Test Equity Environment Chamber	1007H	61201	07/31/2015	1 Year	07/31/2016	<input checked="" type="checkbox"/>

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 Measurement</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