

RF TEST REPORT

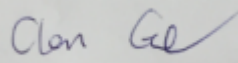


Report No.: FCC_IC_RF_SL16071801-ZBR-020_Rev. 1.0

Supersede Report No.: NONE

Applicant	:	Zebra Technologies Corporation
Product Name	:	Contactless Encoder Module
Module Model No.	:	CPMFS02
Host Model No.	:	ZXP Series 8, ZXP Series 9
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	:	I28RFID-CPMFS-02
IC ID	:	3798B-CPMFS02
Dates of test	:	08/08/2016 – 08/11/2016
Issue Date	:	08/29/2016
Test Result	:	☒ Pass ☐ Fail
Equipment complied with the specification		[X]
Equipment did not comply with the specification		[]

This Test Report is Issued Under the Authority of:

	
Rachana Khanduri	Chen Ge
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/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_SL16071801-ZBR-020	-	Original	08/22/2016
FCC_IC_RF_SL16071801-ZBR-020_Rev 1.0	Rev 1.0	Updated EUT Description	08/29/2016

2 Executive Summary

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

Company: Zebra Technologies Corporation
Product: Contactless Encoder Module
Module Model: CPMFS02
Host Model: ZXP Series 8, ZXP Series 9

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

Both ZXP Series 8 and ZXP Series 9 models are electrically and mechanically identical.

3 Customer information

Applicant Name	:	Zebra Technologies Corporation
Applicant Address	:	333 Corporate Woods Parkway, Vernon Hills, IL, 60061, USA
Manufacturer Name	:	Zebra Technologies Corporation
Manufacturer Address	:	333 Corporate Woods Parkway, Vernon Hills, IL, 60061, USA

4 Test site information

Lab performing tests	:	SIEMIC Laboratories
Lab Address	:	775 Montague Expressway, Milpitas, CA 95035
FCC Test Site No.	:	881796
IC Test Site No.	:	4842D-2
VCCI Test Site No.	:	A0133

5 Modification

Index	Item	Description	Note
-	-	-	-

6 EUT Information

6.1 EUT Description

Product Name	Contactless Encoder Module
Module Model No.	CPMFS02
Host Model No.	ZXP Series 8, ZXP Series 9
Trade Name	Zebra
Serial No.	Z9J162100021
Input Power	100-240V _{AC} , 50-60Hz
Product Hardware version	N/A
Product Software version	v01.xx.xx
Radio Hardware version	Rev A
Radio Software version	7.48
Test SW Version	ZMotif Test App.exe
Date of EUT received	08/08/2016
Equipment Class/ Category	DXX
Working Frequencies	13.56MHz
Port/Connectors	USB, Ethernet

6.2 Radio Description

Specifications for Radio:

Radio Type	RFID
Operating Frequency	13.56MHz
Modulation	ASK (13.56MHz)
Channel Spacing	None
Antenna Type	PCB Loop Antenna
Antenna Gain	-20 dBi
Antenna Connector Type	N/A

Channel List:

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

6.3 EUT test modes/configuration Description

Mode	Note
RF test	EUT is set to transmit continuously at 13.56MHz.
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 performed during the test.			

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Index	Supporting Equipment Description	Model	Serial No	Manu	Note
1	Laptop	Latitude D610	N/A	Dell	-

7.2 Cabling Description

Name	Connection Start		Connection Stop		Length / shielding Info		Note
	From	I/O Port	To	I/O Port	Length (m)	Shielding	
USB	EUT	I/O	Laptop	USB	1m	No	-

7.3 Test Software Description

Test Item	Software	Description
RF Testing	ZMotif Test App.exe	Set the EUT to transmit at 13.56MHz.

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	☒ Pass
	IC			☐ N/A
AC Conducted Emissions Voltage	FCC	15.225(a)	ANSI C63.10 2013 RSS Gen. 8.8	☒ Pass
	IC	RSS Gen (7.2.2)		☐ 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	☒ Pass
	IC	RSS210(A2.6)	IC	RSS Gen 6.13	☐ 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	☒ Pass
	IC	RSS210(A2.6)	IC	RSS Gen 6.13	☐ 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	☒ Pass
	IC	RSS210(A2.6)	IC	RSS Gen 6.13	☐ N/A
Limit outside the band of 13.110 – 14.010 MHz	FCC	15.225(d), 15.209	FCC	ANSI C63.10 2013	☒ Pass
	IC	RSS210(A2.6)	IC	RSS Gen 6.13	☐ N/A
Receiver Spurious Emission	IC	-	IC	RSS Gen 7.1	☐ Pass ☒ N/A
Frequency Stability	FCC	15.225(e)	FCC	-	☒ Pass
	IC	RSS210(A2.6)	IC	RSS Gen 6.11	☐ N/A
Occupied Bandwidth	FCC	-	FCC	-	☒ Pass
	IC	RSS-210(5.9.1)	IC	RSS Gen 6.6	☐ N/A
Remark	- All measurement uncertainties are not taken into consideration for all presented test result. - The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual. - 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

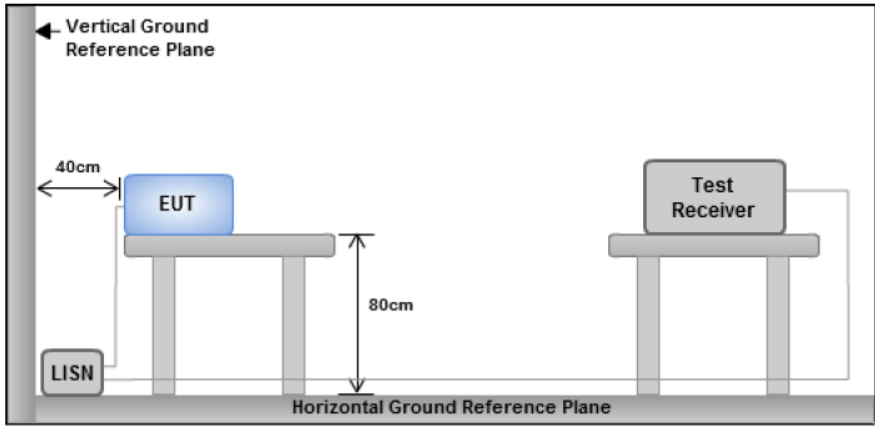
10.1 Antenna Requirement

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

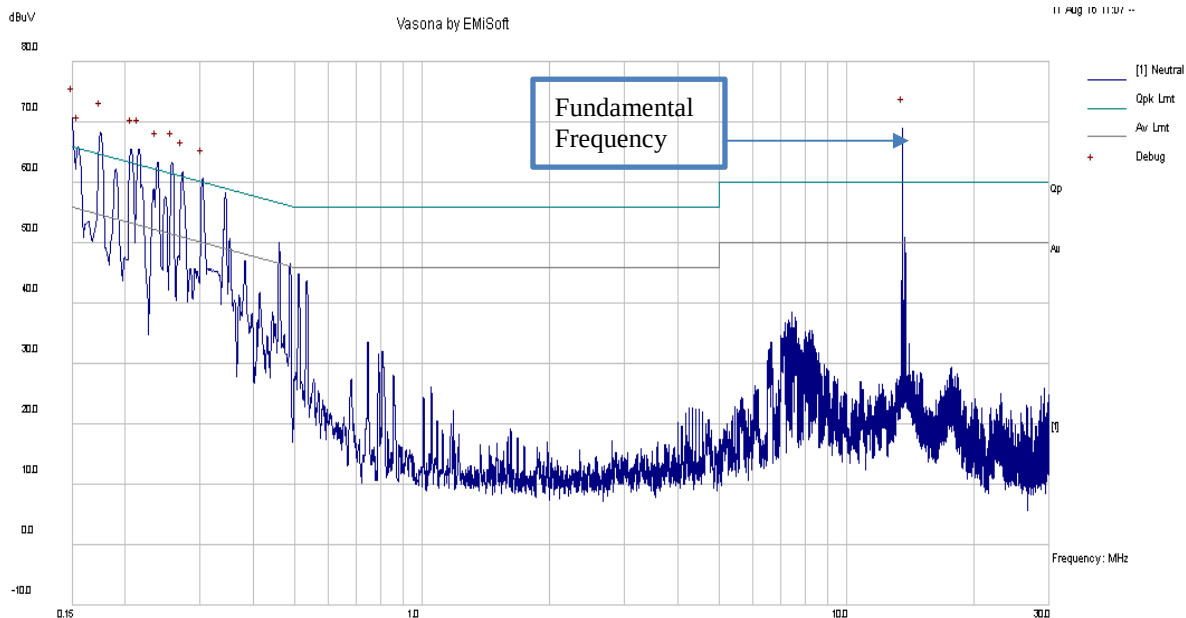
Spec	Item	Requirement	Applicable
§ 15.207, RSS210(A8.1)	a)	For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits set in § 15.207, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). AC Line conducted emission within the band 150kHz to 30MHz	☒
Test Setup	 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		
Procedure	- 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	08/11/2016	Environmental conditions	Temperature 21.5 °C Relative Humidity 45.5 % Atmospheric Pressure 1013.7 mbar
Remark	The EUT was tested at 120VAC, 60Hz.		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes ☐ N/A

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

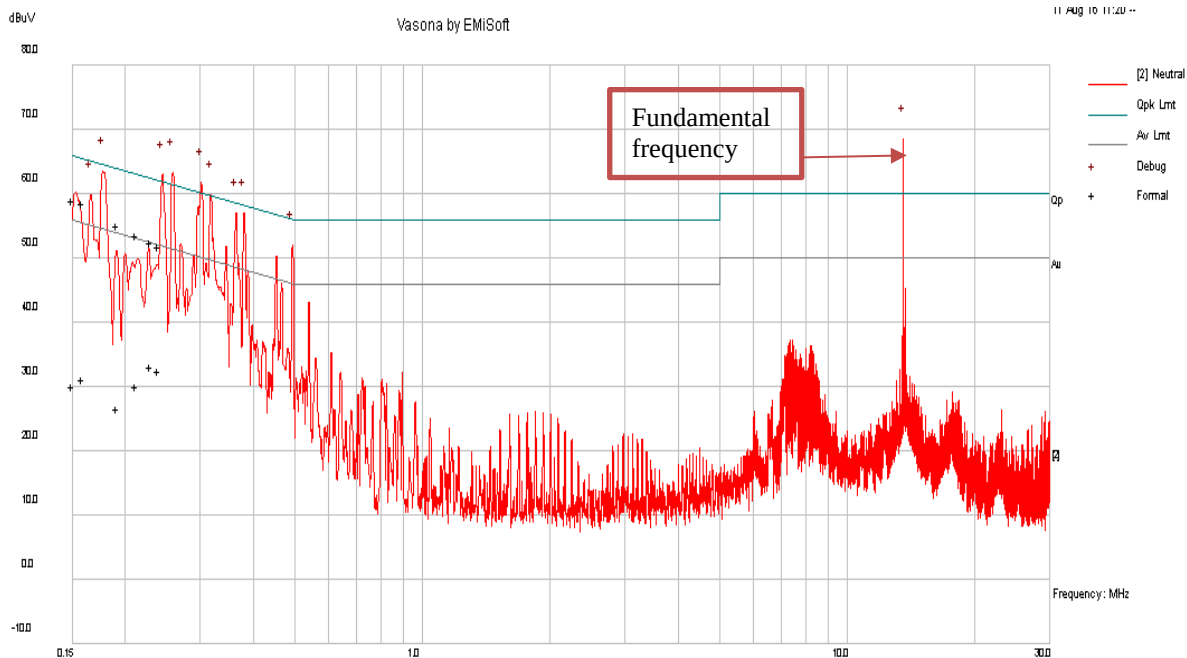
Test specification:	Conducted Emissions				
Environmental Conditions:	Temp(°C):	21.5	Result:	☒ Pass ☐ Fail	
	Humidity (%):	45.5			
	Atmospheric(mbar):	1013.7			
Mains Power:	120VAC, 60Hz				
Tested by:	Rachana Khanduri				
Test Date:	08/11/2016				
Remarks:	AC Line @ Neutral				



Neutral Measurements

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line/ Neutral	Limit dBuV	Margin dB	Pass /Fail
0.150377	47.89	10	1.24	59.13	Quasi Peak	Neutral	65.98	-6.85	Pass
0.158899	47.42	10	1.15	58.57	Quasi Peak	Neutral	65.52	-6.95	Pass
0.212565	42.80	10	0.79	53.59	Quasi Peak	Neutral	63.10	-9.51	Pass
0.191306	44.32	10	0.89	55.22	Quasi Peak	Neutral	63.98	-8.76	Pass
0.23943	41.19	10	0.69	51.88	Quasi Peak	Neutral	62.12	-10.24	Pass
0.230404	41.78	10	0.72	52.50	Quasi Peak	Neutral	62.44	-9.94	Pass
0.150377	18.96	10	1.24	30.20	Average	Neutral	55.98	-25.78	Pass
0.158899	20.20	10	1.15	31.35	Average	Neutral	55.52	-24.17	Pass
0.212565	19.37	10	0.79	30.16	Average	Neutral	53.10	-22.94	Pass
0.191306	15.84	10	0.89	26.74	Average	Neutral	53.98	-27.24	Pass
0.23943	21.80	10	0.69	32.49	Average	Neutral	52.12	-19.62	Pass
0.230404	22.46	10	0.72	33.18	Average	Neutral	52.44	-19.26	Pass

Test specification:	Conducted Emissions			
Environmental Conditions:	Temp(°C):	21.5	Result:	☒ Pass ☐ Fail
	Humidity (%):	45.5		
	Atmospheric(mbar):	1013.7		
Mains Power:	120VAC, 60Hz			
Tested by:	Rachana Khanduri			
Test Date:	08/11/2016			
Remarks:	AC Line @ Line			

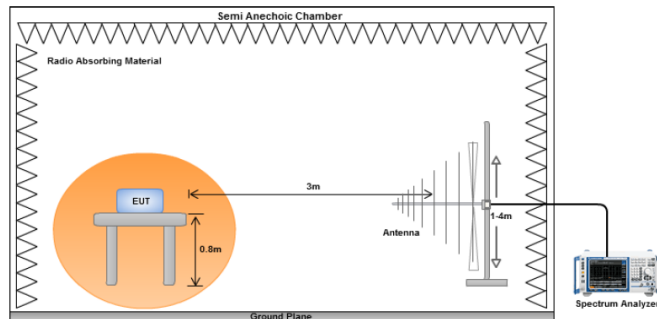


Line Measurements

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line/ Neutral	Limit dBuV	Margin dB	Pass /Fail
0.241834	40.83	10	0.68	51.51	Quasi Peak	Neutral	62.03	-10.52	Pass
0.317476	39.32	10	0.50	49.83	Quasi Peak	Neutral	59.77	-9.94	Pass
0.232609	41.69	10	0.71	52.40	Quasi Peak	Neutral	62.36	-9.95	Pass
0.317805	37.85	10	0.50	48.36	Quasi Peak	Neutral	59.76	-11.41	Pass
0.175002	45.58	10	1.00	56.58	Quasi Peak	Neutral	64.72	-8.14	Pass
0.379276	33.91	10	0.44	44.35	Quasi Peak	Neutral	58.30	-13.94	Pass
0.241834	23.43	10	0.68	34.11	Average	Neutral	52.03	-17.93	Pass
0.317476	20.85	10	0.50	31.36	Average	Neutral	49.77	-18.41	Pass
0.232609	26.12	10	0.71	36.83	Average	Neutral	52.36	-15.53	Pass
0.317805	21.36	10	0.50	31.87	Average	Neutral	49.76	-17.89	Pass
0.175002	19.79	10	1.00	30.80	Average	Neutral	54.72	-23.92	Pass
0.379276	13.67	10	0.44	24.12	Average	Neutral	48.30	-24.18	Pass

10.3 Radiated Measurements 30MHz to 1GHz

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. <table><thead><tr><th>Frequency range (MHz)</th><th>Field Strength (uV/m)</th></tr></thead><tbody><tr><td>30 – 88</td><td>100</td></tr><tr><td>88 – 216</td><td>150</td></tr><tr><td>216 960</td><td>200</td></tr><tr><td>Above 960</td><td>500</td></tr></tbody></table>	Frequency range (MHz)	Field Strength (uV/m)	30 – 88	100	88 – 216	150	216 960	200	Above 960	500	☒
Frequency range (MHz)	Field Strength (uV/m)											
30 – 88	100											
88 – 216	150											
216 960	200											
Above 960	500											
Test Setup												
Procedure	1. The EUT was switched on and allowed to warm up to its normal operating condition. 2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. A Quasi-peak measurement was then made for that frequency point. 4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.											
Test Date	08/08/2016 – 08/09/2016	Environmental conditions Temperature21.7°C Relative Humidity45.6% Atmospheric Pressure1007.4 mbar										
Remark	-											
Result	☒ Pass ☐ Fail											

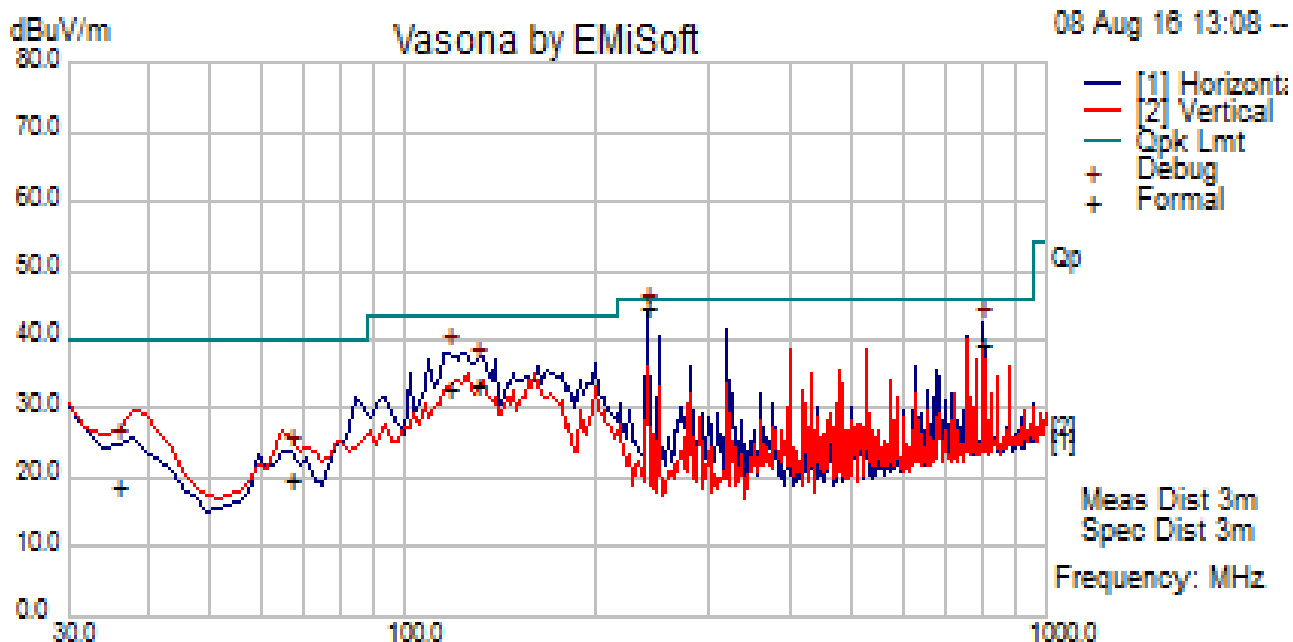
Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Rachana Khanduri at 10 meter chamber.

Test specification:	Radiated Emission 30MHz – 1GHz			
Environmental Conditions:	Temp(°C):	21.7	Result:	☒ Pass ☐ Fail
	Humidity (%):	45.6		
	Atmospheric(mbar):	1007.4		
Mains Power:	120VAC, 60Hz			
Tested by:	Rachana Khanduri			
Test Date:	08/08/2016			
Remarks:	RFID 13.56MHz CEM			

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

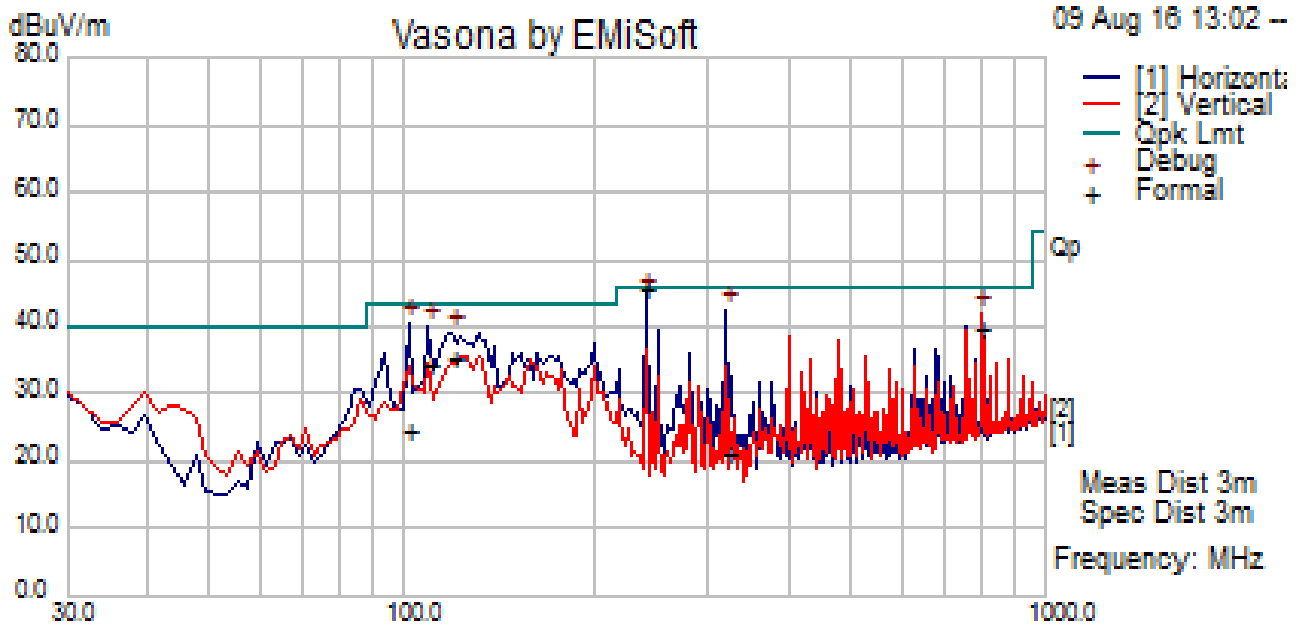


$f=30\text{MHz} - 1000\text{MHz}$ Measurements

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Amp dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt	Limit dBuV/m	Margin dB	Pass /Fail
240.00	70.62	2.33	11.79	39.92	44.82	Quasi Max	H	124	208	46.02	-1.20	Pass
797.67	52.36	4.53	21.58	39.34	39.13	Quasi Max	H	104	305	46.02	-6.89	Pass
117.23	58.77	1.61	12.19	39.67	32.90	Quasi Max	H	380	316	43.52	-10.62	Pass
129.21	57.16	1.71	14.31	39.73	33.45	Quasi Max	H	215	5	43.52	-10.07	Pass
35.87	33.79	0.86	21.54	37.49	18.70	Quasi Max	H	347	346	40.00	-21.30	Pass
66.49	50.19	1.23	7.27	38.88	19.81	Quasi Max	H	342	277	40.00	-20.19	Pass

Test specification:	Radiated Emission 30MHz – 1GHz			
Environmental Conditions:	Temp(°C):	21.7	Result:	☒ Pass ☐ Fail
	Humidity (%):	45.6		
	Atmospheric(mbar):	1007.4		
Mains Power:	120VAC, 60Hz			
Tested by:	Rachana Khanduri			
Test Date:	08/09/2016			
Remarks:	13.56MHz RFID CEM, 13.56MHz RFID MAICD and WLAN b/g radio transmitting.			

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

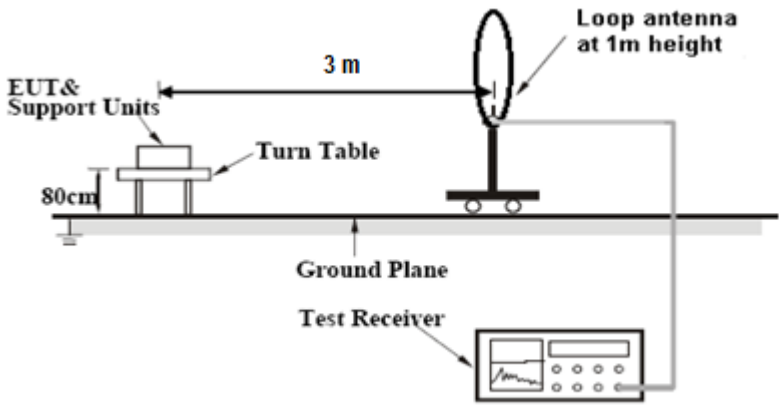


f=30MHz – 1000MHz Measurements

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Amp dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt	Limit dBuV/m	Margin dB	Pass /Fail
239.99	71.41	2.33	11.79	39.92	45.61	Quasi Max	H	130	206	46.02	-0.41	Pass
101.93	53.11	1.55	9.66	39.67	24.65	Quasi Max	H	343	172	43.52	-18.87	Pass
109.95	60.46	1.54	12.19	39.67	34.52	Quasi Max	H	302	151	43.52	-9.00	Pass
319.4	43.83	2.73	14.36	39.77	21.15	Quasi Max	H	111	261	46.02	-24.87	Pass
797.77	52.71	4.53	21.58	39.19	39.63	Quasi Max	V	141	235	46.02	-6.39	Pass
119.64	59.21	1.64	13.95	39.67	35.13	Quasi Max	H	303	9	43.52	-8.39	Pass

10.4 Radiated Measurements below 30MHz

Requirement(s):

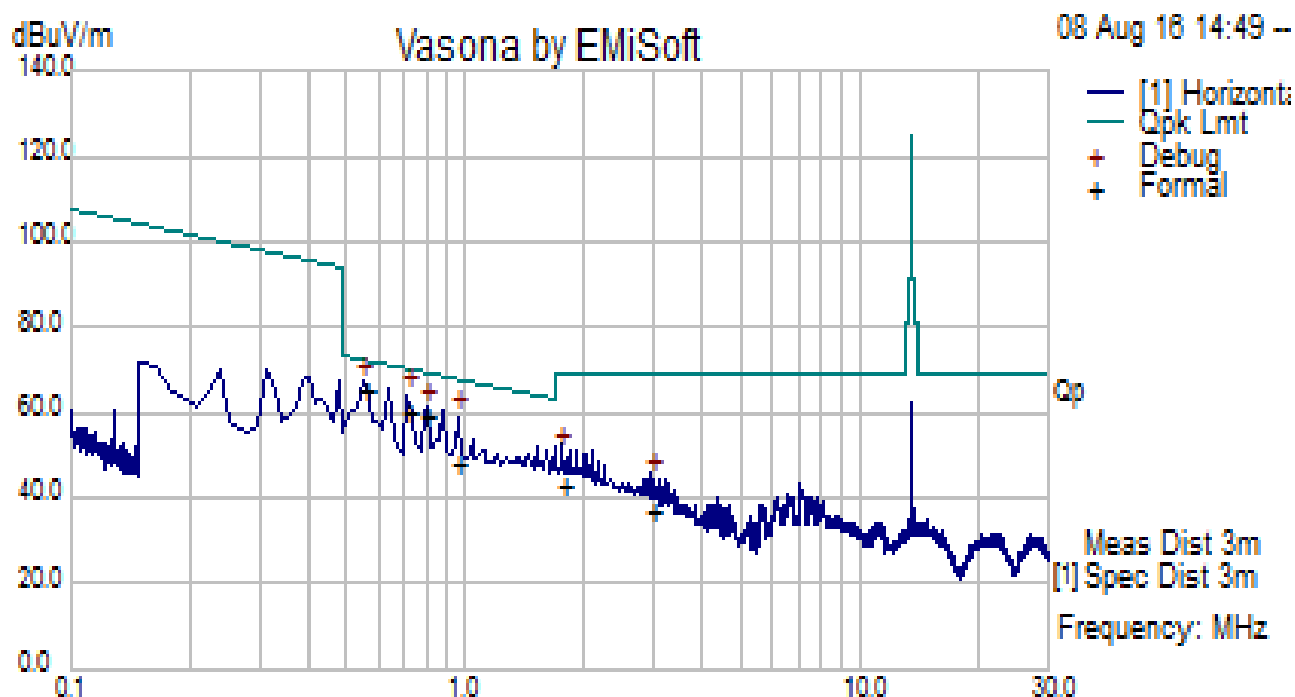
Spec	Requirement	Applicable
47 CFR §15.225 RSS-210 (A2.6)	Operation within the band 13.110–14.010 MHz (a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters. (b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field 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.	☒
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	08/08/2016	Environmental conditions Temperature 21.7°C Relative Humidity 45.6% Atmospheric Pressure 1007.4mbar
Remark	-	
Result	☒ Pass ☐ 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.

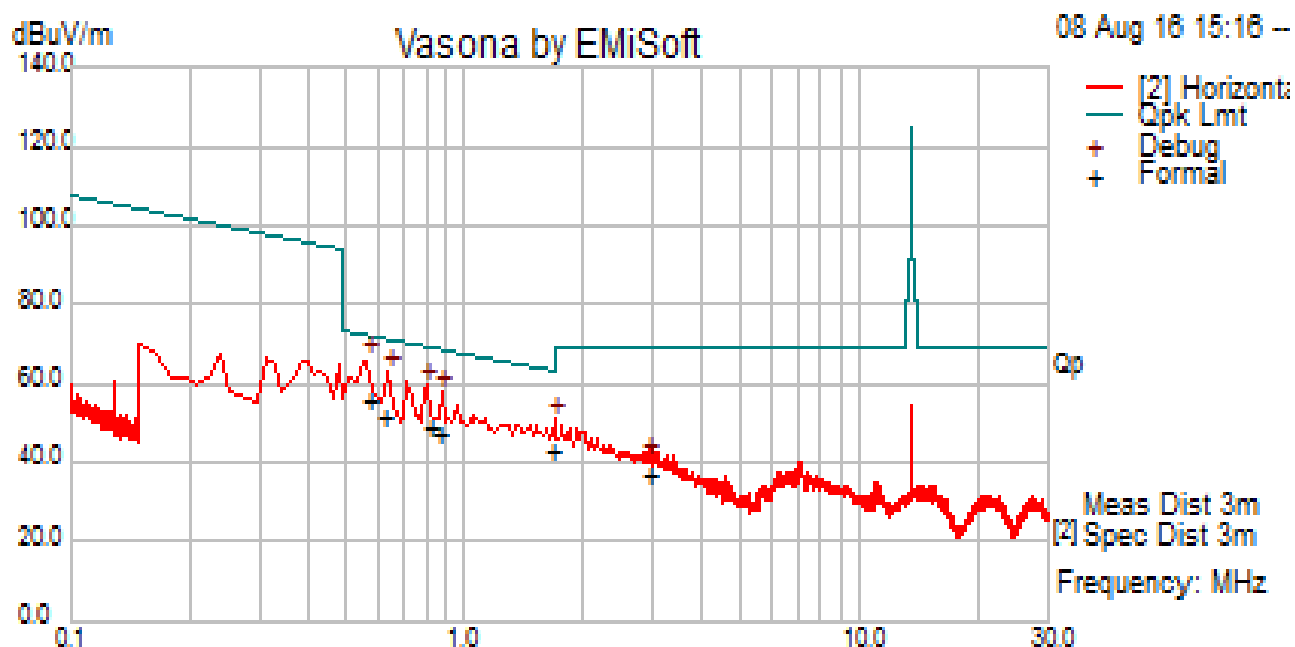
Test specification:	Radiated Spurious Emissions (below 30MHz)			
Environmental Conditions:	Temp(°C):	21.7	Result:	☒ Pass ☐ Fail
	Humidity (%):	45.6		
	Atmospheric(mbar):	1007.4		
Mains Power:	120VAC, 60Hz			
Tested by:	Rachana Khanduri			
Test Date:	08/08/2016			
Remarks:	RFID1 13.56MHz CEM @ 0 Degree			



Quasi Max Measurement

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Amp dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt	Limit dBuV/m	Margin dB	Pass /Fail
0.56	99.30	0.18	0.30	34.80	64.98	Quasi Max	0	100	182	72.61	-7.64	Pass
0.72	97.11	0.20	-2.40	34.75	60.16	Quasi Max	0	100	187	70.43	-10.27	Pass
0.80	97.51	0.20	-3.40	34.73	59.58	Quasi Max	0	100	340	69.51	-9.93	Pass
0.96	87.01	0.21	-4.40	34.70	48.12	Quasi Max	0	100	231	68.00	-19.88	Pass
1.76	83.33	0.26	-5.30	35.18	43.11	Quasi Max	0	100	3	69.54	-26.43	Pass
2.97	84.88	0.31	-13.50	35.18	36.51	Quasi Max	0	100	354	69.54	-33.03	Pass

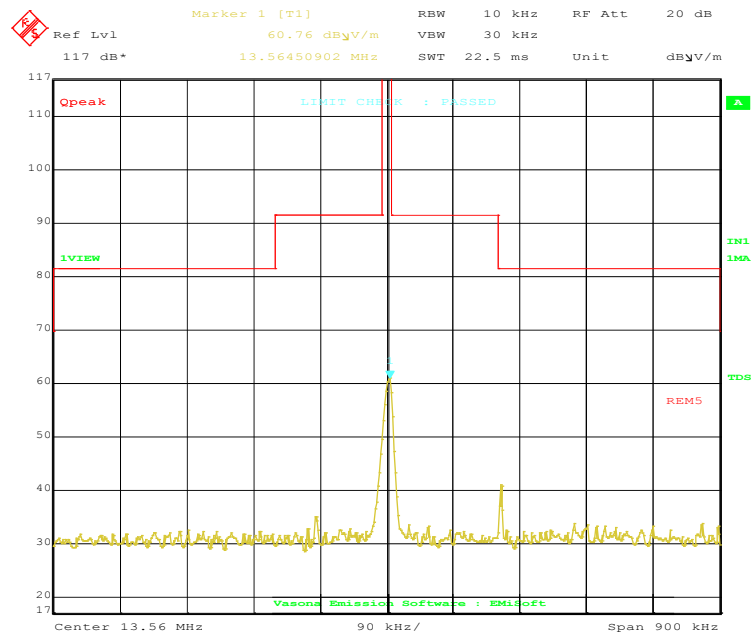
Test specification:	Radiated Spurious Emissions (below 30MHz)			
Environmental Conditions:	Temp(°C):	21.7	Result:	☒ Pass ☐ Fail
	Humidity (%):	45.6		
	Atmospheric(mbar):	1007.4		
Mains Power:	120VAC, 60Hz			
Tested by:	Rachana Khanduri			
Test Date:	08/08/2016			
Remarks:	RFID1 13.56MHz @ 90 Degree			



Quasi Max Measurement

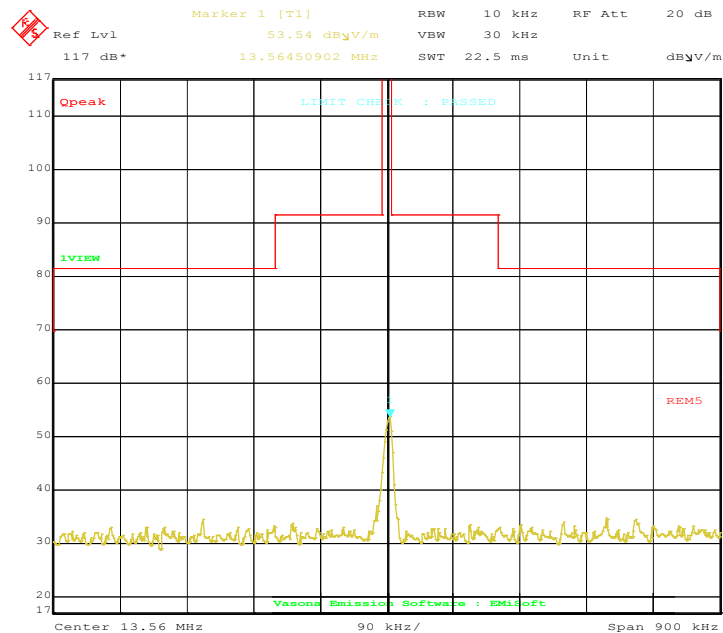
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Amp dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt	Limit dBuV/m	Margin dB	Pass /Fail
0.57	90.06	0.18	0.30	34.79	55.75	Quasi Max	90	100	147	72.42	-16.68	Pass
0.62	86.92	0.19	-1.10	34.78	51.23	Quasi Max	90	100	23	71.71	-20.47	Pass
0.81	86.96	0.20	-3.50	34.72	48.94	Quasi Max	90	100	186	69.45	-20.51	Pass
0.86	85.57	0.21	-3.50	34.72	47.56	Quasi Max	90	100	286	68.89	-21.33	Pass
1.67	83.13	0.26	-5.30	35.18	42.91	Quasi Max	90	100	272	63.16	-20.25	Pass
2.92	85.07	0.31	-13.50	35.18	36.70	Quasi Max	90	100	35	69.54	-32.84	Pass

Loop antenna at 0 degree



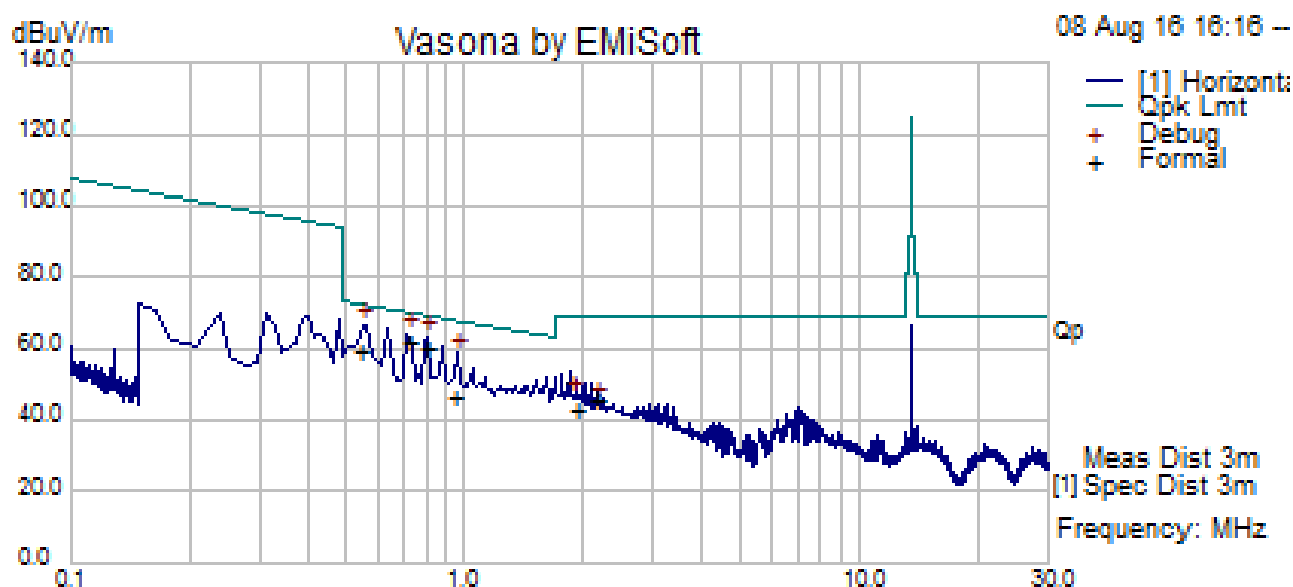
Frequency (MHz)	Amplitude (dBV/m)
13.560450	60.76

Loop antenna at 90 degree



Frequency (MHz)	Amplitude (dBV/m)
13.560450	53.54

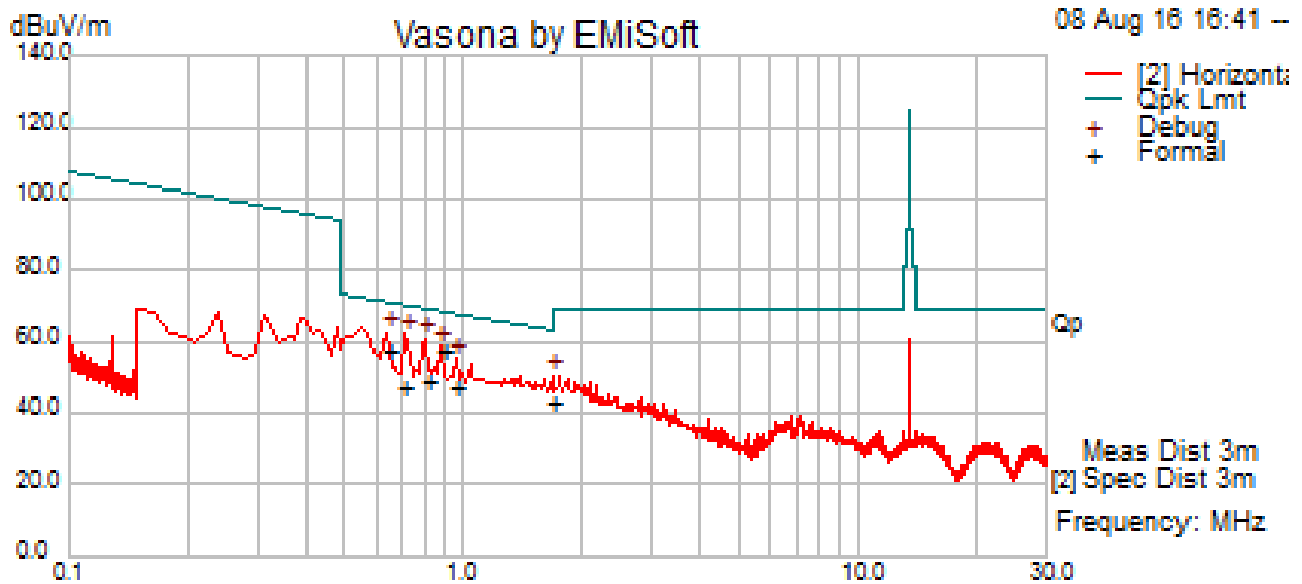
Test specification:	Radiated Spurious Emissions (below 30MHz)			
Environmental Conditions:	Temp(°C):	21.1	Result:	☒ Pass ☐ Fail
	Humidity (%):	46.5		
	Atmospheric(mbar):	1007.2		
Mains Power:	120VAC, 60Hz			
Tested by:	Rachana Khanduri			
Test Date:	08/08/2016			
Remarks:	RFID1 13.56MHz CEM ,13.56MHz RFID MAICD and WLAN b/g radio transmitting @ 0 Degree			



Quasi Max Measurement

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Amp dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt	Limit dBuV/m	Margin dB	Pass /Fail
0.54	93.2	0.18	0.3	34.79	58.89	Quasi Max	0	100	322	72.98	-14.09	Pass
0.72	99.01	0.20	-2.4	34.75	62.06	Quasi Max	0	100	158	70.45	-8.38	Pass
0.80	98.45	0.20	-3.5	34.73	60.42	Quasi Max	0	100	14	69.52	-9.10	Pass
0.94	85.56	0.21	-4.4	34.71	46.66	Quasi Max	0	100	254	68.18	-21.52	Pass
1.90	82.89	0.28	-5.3	35.18	42.69	Quasi Max	0	100	255	69.54	-26.86	Pass
2.16	91.07	0.29	-10.6	35.18	45.58	Quasi Max	0	100	142	69.54	-23.96	Pass

Test specification:	Radiated Spurious Emissions (below 30MHz)			
Environmental Conditions:	Temp(°C):	21.6	Result:	☒ Pass ☐ Fail
	Humidity (%):	46.5		
	Atmospheric(mbar):	1007.2		
Mains Power:	120VAC, 60Hz			
Tested by:	Rachana Khanduri			
Test Date:	08/08/2016			
Remarks:	13.56MHz CEM ,13.56MHz RFID MAICD and WLAN b/g radio transmitting @ 90 Degree			

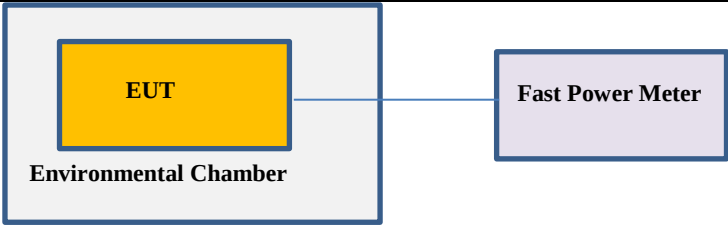


Quasi Max Measurement

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Amp dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt	Limit dBuV/m	Margin dB	Pass /Fail
0.71	84.29	0.20	-2.40	34.76	47.33	Quasi Max	90	100	237	70.63	-23.31	Pass
0.81	87.01	0.20	-3.50	34.72	48.99	Quasi Max	90	100	126	69.44	-20.45	Pass
0.65	93.05	0.19	-1.10	34.77	57.37	Quasi Max	90	100	79	71.41	-14.04	Pass
0.88	96.03	0.21	-4.40	34.72	57.12	Quasi Max	90	100	72	68.70	-11.58	Pass
1.68	83.04	0.26	-5.30	35.18	42.82	Quasi Max	90	100	351	63.12	-20.30	Pass
0.95	86.31	0.21	-4.40	34.71	47.41	Quasi Max	90	100	357	68.08	-20.67	Pass

10.5 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	☒									
Test Setup	 - 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	08/10/2016	<table border="1"> <tr> <td>Environmental conditions</td> <td>Temperature</td> <td>21.8 °C</td> </tr> <tr> <td></td> <td>Relative Humidity</td> <td>45.6 %</td> </tr> <tr> <td></td> <td>Atmospheric Pressure</td> <td>1010.2 mbar</td> </tr> </table>	Environmental conditions	Temperature	21.8 °C		Relative Humidity	45.6 %		Atmospheric Pressure	1010.2 mbar
Environmental conditions	Temperature	21.8 °C									
	Relative Humidity	45.6 %									
	Atmospheric Pressure	1010.2 mbar									
Remark	None										
Result	☒ Pass ☐ 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 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: 13.56 MHz

Temperature	Measured Freq.	Freq. Drift	Freq. Deviation	Pass/Fail
($^{\circ}\text{C}$)	(MHz)	(Hz)	(Limit: 0.01%)	
50	13.5603	300	<0.01	Pass
40	13.5603	300	<0.01	Pass
30	13.5603	300	<0.01	Pass
20	13.5603	300	<0.01	Pass
10	13.5603	300	<0.01	Pass
0	13.5603	300	<0.01	Pass
-10	13.5603	300	<0.01	Pass
-20	13.5603	300	<0.01	Pass

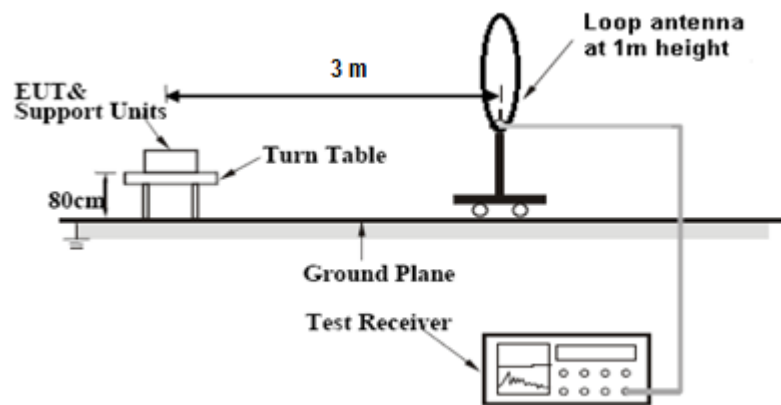
Frequency Stability versus Input Voltage: The Frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$, the frequency of the transmitter was measured at 85% and at 115% of the rated power supply voltage at a 20°C environmental temperature.

Carrier Frequency: 13.56 MHz

Measured Voltage $\pm 15\%$ of nominal (AC)	Measured Freq. (MHz)	Freq. Drift (Hz)	Freq. Deviation (Limit: 0.01%)	Pass/Fail
13.8	13.56	0	<0.01	Pass
10.2	13.56	0	<0.01	Pass

10.6 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.		☒	
Test Setup				
Procedure	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	08/10/2016	Environmental conditions	Temperature Relative Humidity Atmospheric Pressure	21.8 °C 45.6 % 1010.2 mbar
Remark	-			
Result	☒ Pass ☐ Fail			

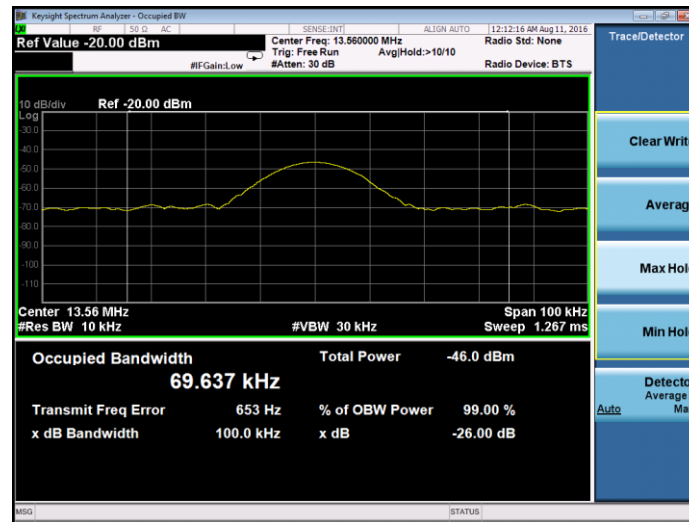
Test Data ☐ Yes (See below) ☒ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Rachana Khanduri at 10 meter chamber.

Test results:

13.56 MHz



Frequency (MHz)	Occupied Bandwidth (KHz)
13.56	69.64

Annex A. TEST INSTRUMENT

Instrument	Model	Manufacturer	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Conducted Emissions							
R & S Receiver	ESIB 40	Rohde & Schwarz	100179	06/08/2016	1 Year	06/08/2017	☒
CHASE LISN (9k-30MHz)	MN2050B	Chase	1018	08/07/2015	1 Year	08/07/2016	☒
Radiated Emissions							
R & S Receiver	ESIB 40	Rohde & Schwarz	100179	06/08/2016	1 Year	06/08/2017	☒
Pre-Amplifier (1-26.5GHz)	8449B	Hewlett Packard	3008A00715	03/30/2016	1 Year	03/30/2017	☐
Preamplifier (100KHz-7GHz)	LPA-6-30	RF Bay, Inc.	11140711	02/10/2016	1 Year	02/10/2017	☒
ETS-Lingren Loop Antenna	6512	ETS-Lingren	00049120	07/14/2016	1 Year	07/14/2017	☒
Bi-Log antenna (30MHz~2GHz)	JB1	Sunol Sciences	A030702	07/08/2016	1 Year	07/08/2017	☒
Horn Antenna (1-26.5GHz)	3115	EMCO	10SL0059	08/25/2015	1 Year	08/25/2016	☐
3 Meters SAC	3M	ETS-Lingren	N/A	06/09/2016	1 Year	06/09/2017	☐
10 Meters SAC	10M	ETS-Lingren	N/A	09/05/2015	1 Year	09/05/2016	☒
RF Conducted Measurement							
Spectrum Analyzer	N9010A	Keysight	10SL0219	08/20/2015	1 Year	08/20/2016	☒
Test Equity Environment Chamber	1007H	Test Equity	61201	07/21/2016	1 Year	07/21/2017	☒
USB RF Power Sensor	7002-006	ETS-Lingren	10SL0190	09/03/2015	1 Year	09/03/2016	☐

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