NORTHWEST EMC

Onity Inc., A Division of UTCFS

Trillium RFID Wall Reader
RFID Reader Model Number: RH600103
Host Device Model Numbers: 10104338P1, 10104339P1
FCC 15.207:2016
FCC 15.225:2016
13.56 MHz Radio Module

Report # ONIT0020.1

NVLAP TESTING

NVLAP Lab Code: 200630-0

CERTIFICATE OF TEST

Last Date of Test: July 25, 2016
Onity Inc., A Division of UTCFS
Trillium RFID Wall Reader
RFID Reader Model Number: RH600103
Host Device Model Numbers: 10104338P1, 10104339P1

Radio Equipment Testing

Standards

Specification	Method
FCC 15.207:2016	ANSI C63.10:2013
FCC 15.225:2016	

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	AC – Powerline Conducted Emissions	Yes	Pass	
6.4	Field Strength of Fundamental	Yes	Pass	
6.4	Field Strength of Spurious Emissions Less Than 30 MHz	Yes	Pass	
6.5	Field Strength of Spurious Emissions Greater Than 30 MHz	Yes	Pass	
6.8	Frequency Stability	Yes	Pass	

Deviations From Test Standards

None

Approved By:

Kyle Holgate, Operations Manager

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information.

REVISION HISTORY

NORTHWEST EMC
REV 2014.10.14

Revision Number	Description	Date	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS

REV 2016.7.25

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with ISED.

European Union

European Commission – Validated by the European Commission as a Notified Body under the R&TTE Directive.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

MSIP / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFCA – Recognized by OFCA as a CAB for the acceptance of test data.

Vietnam

MIC – Recognized by MIC as a CAB for the acceptance of test data.

SCOPE

For details on the Scopes of our Accreditations, please visit:
http://www.nwemc.com/accreditations/
http://gsi.nist.gov/global/docs/cabs/designations.html

MEASUREMENT UNCERTAINTY

TMU.2015.07.10

Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable test description page. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

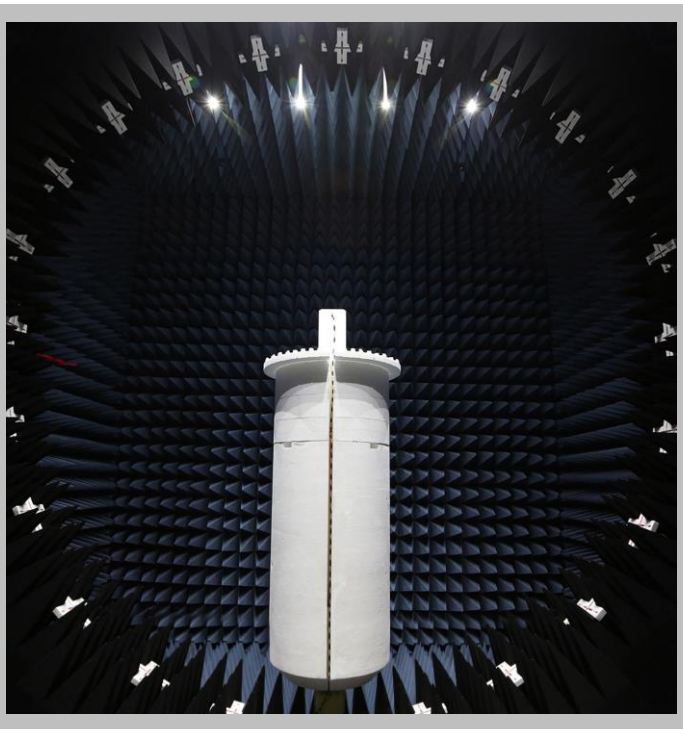
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

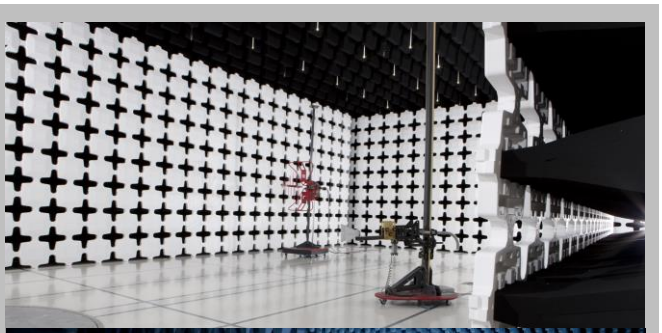
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

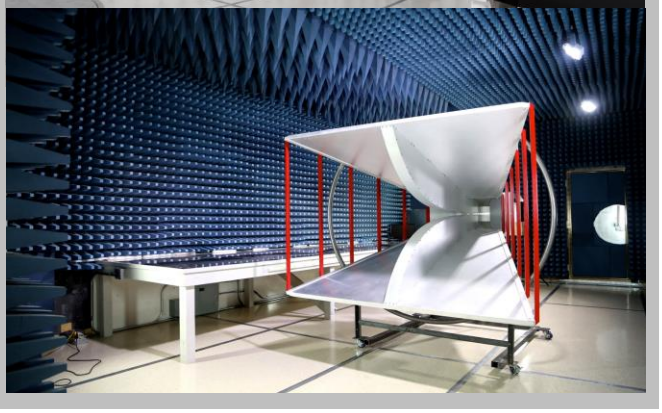
FACILITIES

REV 2016.7.25

California	Minnesota	New York	Oregon	Texas	Washington
Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Innovation, Science and Economic Development Canada					
2834B-1, 2834B-3	2834E-1	N/A	2834D-1, 2834D-*2*	2834G-1	2834F-1
BSMI					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157







PRODUCT DESCRIPTION

NORTHWEST EMC
2014-12-10

Client and Equipment Under Test (EUT) Information

Company Name:	Onity Inc., A Division of UTCFS
Address:	4001 Fairview Industrial Drive
City, State, Zip:	Salem, 97302-1142
Test Requested By:	Troy Klopfenstein
Model:	Trillium RFID Wall Reader RFID Reader Model Number: RH600103 Host Device Model Numbers: 10104338P1, 10104339P1
First Date of Test:	April 25, 2016
Last Date of Test:	July 25, 2016
Receipt Date of Samples:	June 15, 2016
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
RFID reader - wall attached

Client Justification

Model Equivalency Statement

The following lock regulatory model numbers are covered by this EMC test report due to similarities in their configuration:

Regulatory Model Number	Lock Marketing Name	Model Equivalency
10104338P1	Trillium RFID Wall Reader	All electrical and mechanical parts in 10104339P1 are identical to 10104338P1 with the exception of layout changes to the control board to allow the mounting of the Bluetooth DirectKey Module, which enables Bluetooth connectivity.
10104339P1	Trillium RFID Wall Reader with DirectKey	

NOTE: The DirectKey Module's certification information is:
Supra DirectKey™ Module
Model: 002220
FCC ID: TCZ-10103751G1
IC: 1175F-10103751G1

Testing Objective:
To demonstrate compliance to FCC Part 15.225 specifications.

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration ONIT0017- 1

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
RFID Door Lock	Onity Inc.	None	100176

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
RFID Key card	Onity Inc.	None	None

Configuration ONIT0020- 2

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
RFID Reader	Onity	None	None
Power Supply	Onity	None	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Swipe Machine	Onity	None	None
RFID Key Card	Onity	None	None

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Arduino Microcontroller	Arduino. CC	UNO	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
I/O Cable	No	1.5m	No	RFID Reader	Power Supply
AC Power	No	1.7m	No	Power Supply	Ac mains
I/O cable	no	4.0m	no	Arduino Microcontroller	Swipe Machine

Configuration ONIT0020- 3

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
RFID Reader	Onity	None	None
Power Supply	Onity	None	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
RFID Key Card	Onity	None	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
I/O Cable	No	1.5m	No	RFID Reader	Power Supply
AC Power	No	1.7m	No	Power Supply	Ac mains

MODIFICATIONS

NORTHWEST EMC
2014-12-10

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	4/25/2016	Frequency Stability	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	7/11/2016	Field Strength of Fundamental	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
3	7/11/2016	Field Strength of Spurious Emissions Less Than 30 MHz	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
4	7/12/2016	AC – Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
5	7/25/2016	Field Strength of Spurious Emissions Greater Than 30 MHz	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

FREQUENCY STABILITY

XMit 2015.01.14

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Attenuator	Fairview Microwave	SA3N512-20	TWQ	5/28/2015	12
Thermometer	Omegaette	HH311	DTY	1/21/2015	36
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPH-8-2-SCT/AC	TBI	NCR	0
Meter - Multimeter	Tektronix	DMM912	MMH	2/17/2016	36
Power Supply - DC	Topward	TPS-2000	TPD	NCR	0
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	2/13/2016	12
Probe - Near Field Set	EMCO	7405	IPD	NCR	0

TEST DESCRIPTION

A near field measurement was made using a near field probe between the EUT's integral antenna and a spectrum analyzer. The spectrum analyzer is equipped with a precision frequency reference that exceeds the stability requirement of the EUT.

Measurements were made on the single transmit frequency as called out on the data sheets. Testing was done while the EUT was continuously polling.

The primary supply voltage was varied from 85 % to 115% of the nominal voltage while at ambient temperature. Using a temperature chamber, the transmit frequency was recorded at the extremes of the specified temperature range of -30 ° to +50° C and at 10°C intervals.

The requirement of a frequency tolerance of ±0.01% is equivalent to 100 ppm
The formula to check for compliance is:

ppm = (Measured Frequency / Measured Nominal Frequency - 1) * 1,000,000

FREQUENCY STABILITY

NORTHWEST EMC

XMit 2015.01.14

EUT:	Wall Reader			**Work Order:**	ONIT0017
Serial Number:	100176			**Date:**	04/25/16
Customer:	Onity Inc., A Division of UTCFS			**Temperature:**	23°C
Attendees:	None			**Humidity:**	42%
Project:	None			**Barometric Pres.:**	1012 mbr
Tested by:	Brandon Hobbs	**Power:**	Battery	**Job Site:**	EV01

TEST SPECIFICATIONS	Test Method
FCC 15.225:2016	ANSI C63.10:2013

COMMENTS

The EUT was RFID tag driven.

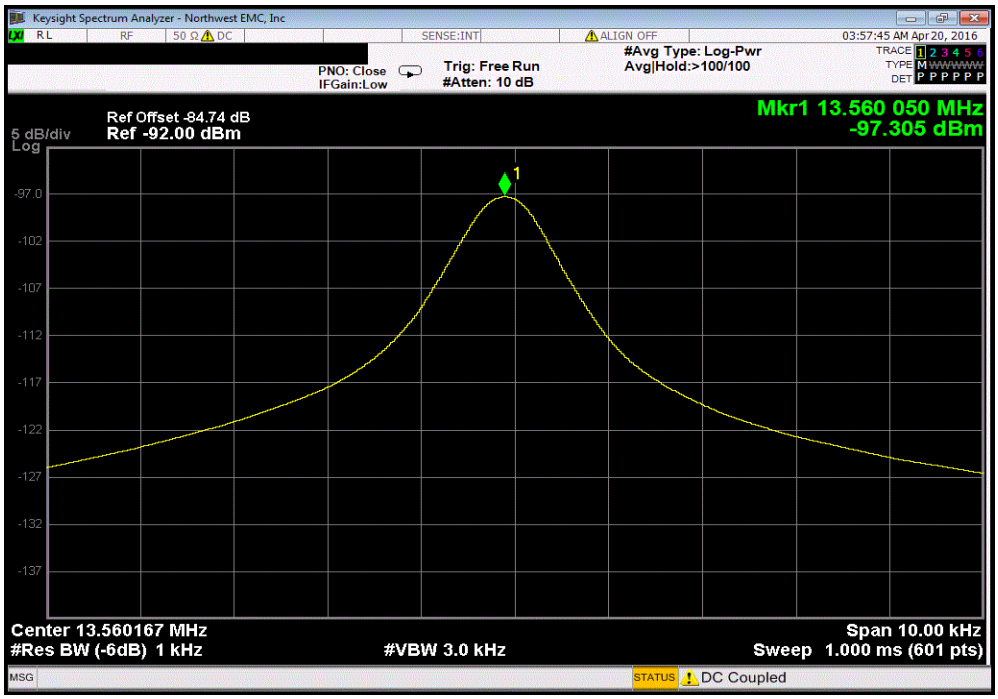
DEVIATIONS FROM TEST STANDARD

None

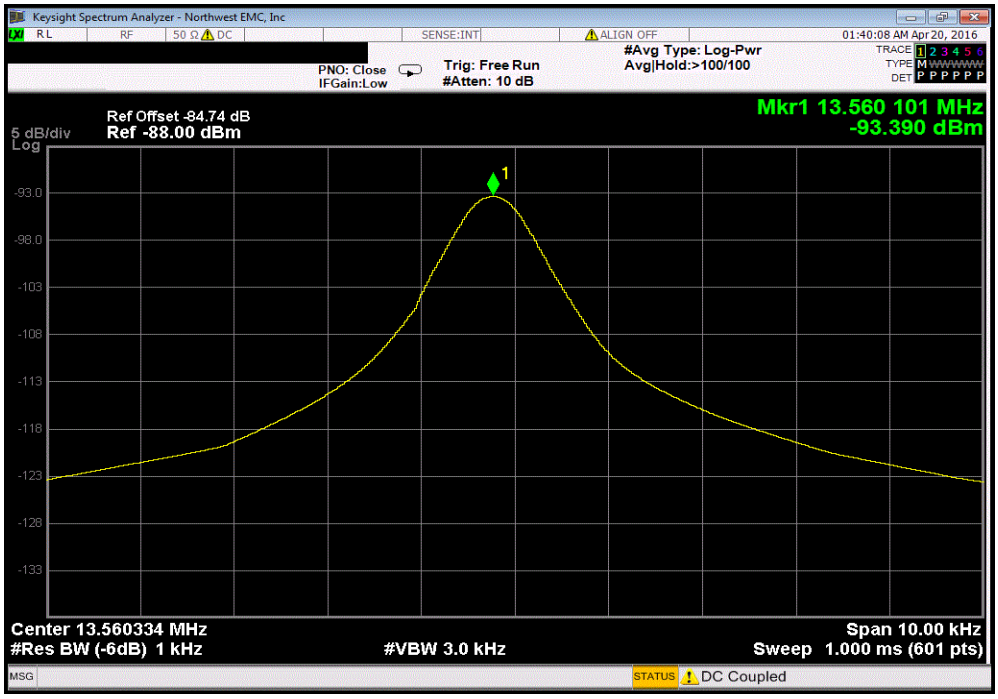
Configuration #	1	Signature

	Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
RFID, 13.56 MHz					
Voltage: 115%	13.56005033	13.56	3.7	100	Pass
Voltage: 100%	13.56010067	13.56	7.4	100	Pass
Voltage: 85%	13.56006633	13.56	4.9	100	Pass
Temperature: +50°	13.560084	13.56	6.2	100	Pass
Temperature: +40°	13.560083	13.56	6.1	100	Pass
Temperature: +30°	13.560083	13.56	6.1	100	Pass
Temperature: +20°	13.56010067	13.56	7.4	100	Pass
Temperature: +10°	13.560083	13.56	6.1	100	Pass
Temperature: 0°	13.560083	13.56	6.1	100	Pass
Temperature: -10°	13.5601	13.56	7.4	100	Pass
Temperature: -20°	13.5601	13.56	7.4	100	Pass
Temperature: -30°	13.56006667	13.56	4.9	100	Pass

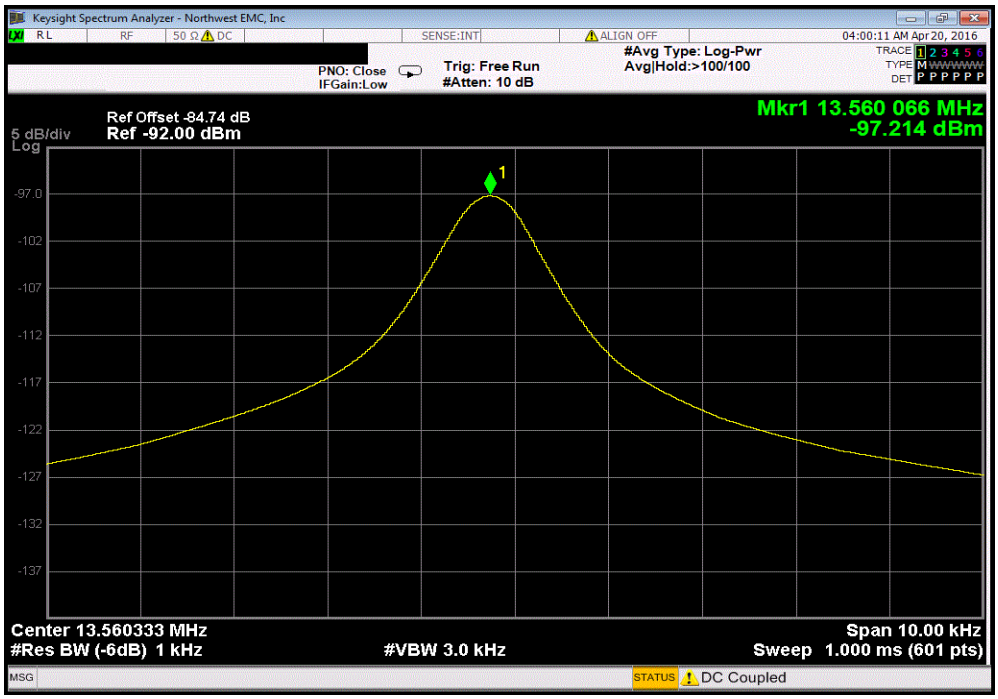
RFID, 13.56 MHz, Voltage: 115%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56005033	13.56	3.7	100	Pass



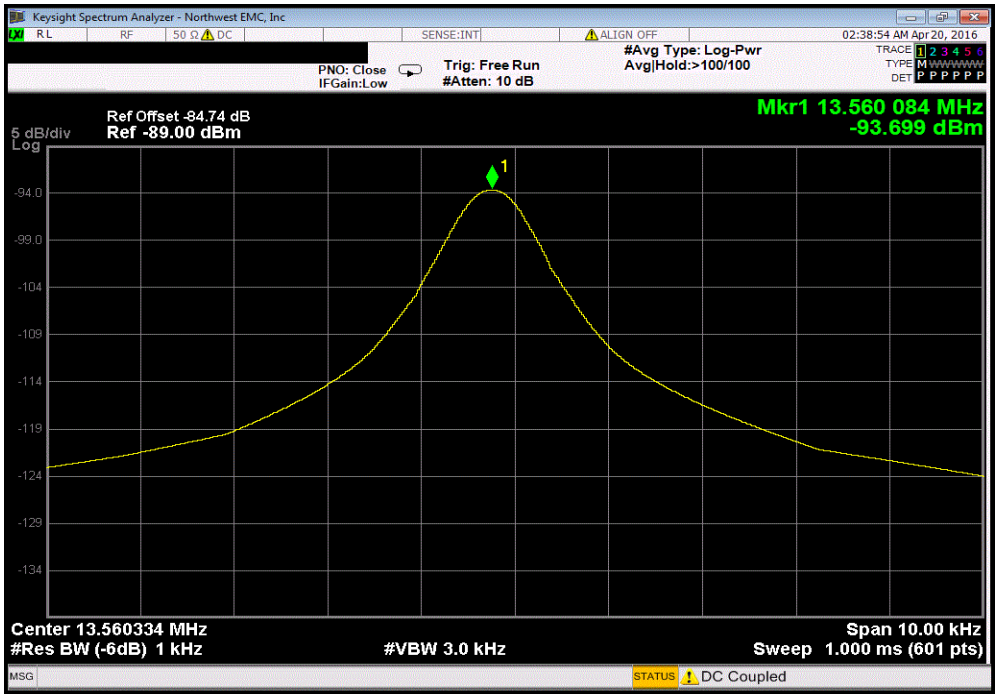
RFID, 13.56 MHz, Voltage: 100%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56010067	13.56	7.4	100	Pass



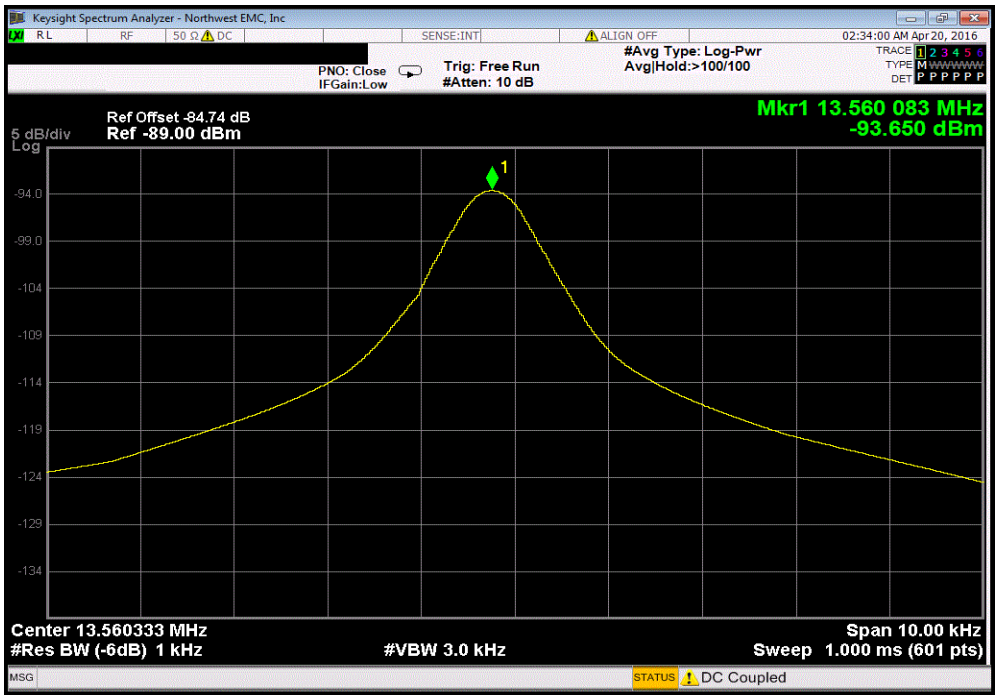
RFID, 13.56 MHz, Voltage: 85%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56006633	13.56	4.9	100	Pass



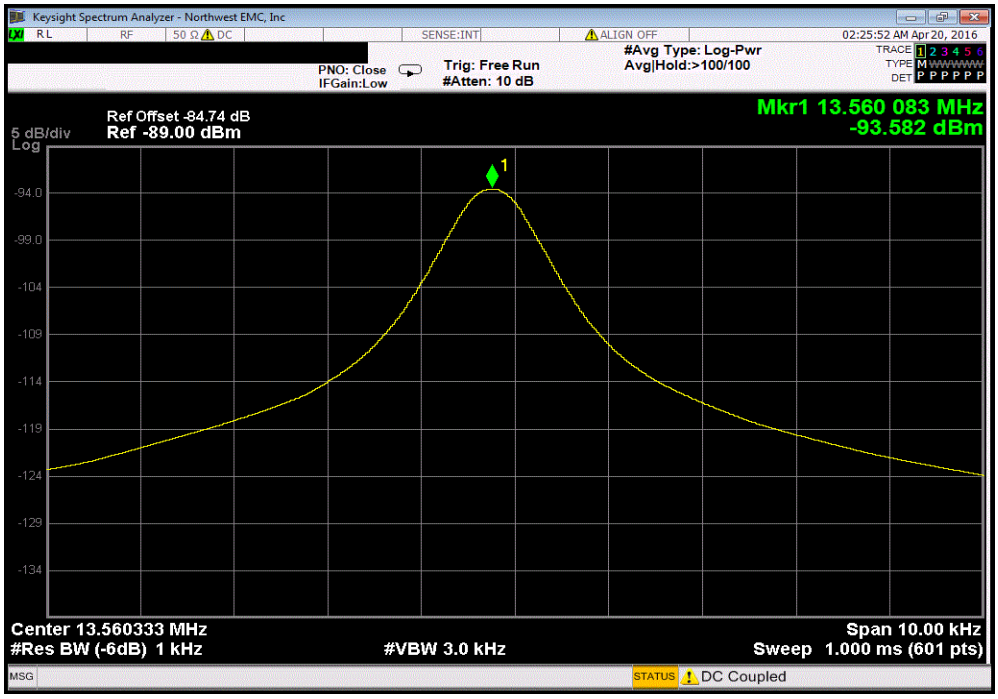
RFID, 13.56 MHz, Temperature: +50°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560084	13.56	6.2	100	Pass



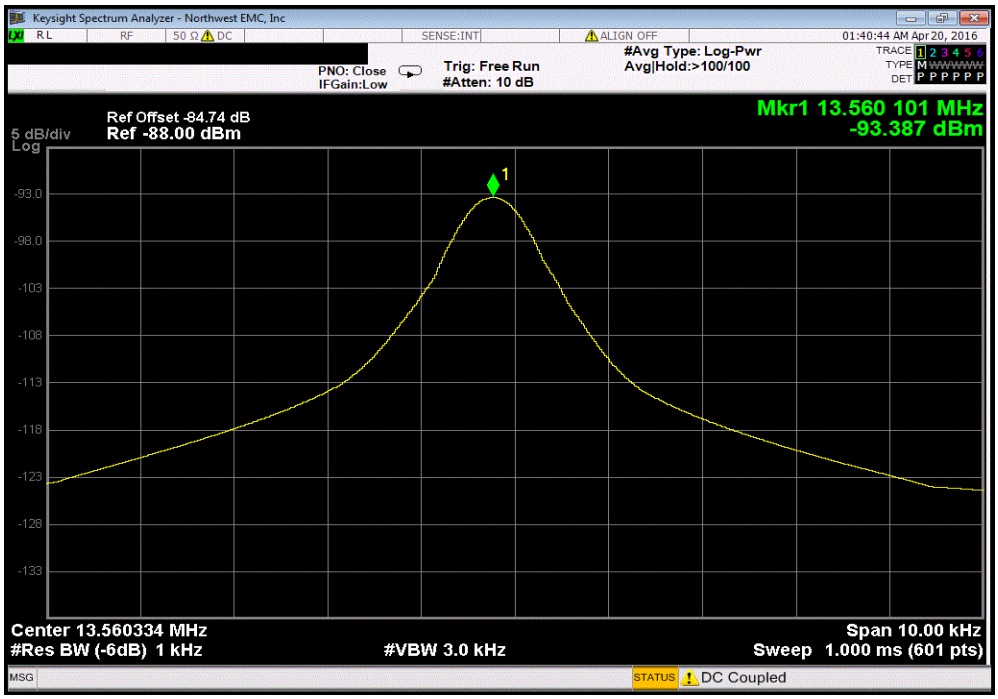
RFID, 13.56 MHz, Temperature: +40°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560083	13.56	6.1	100	Pass



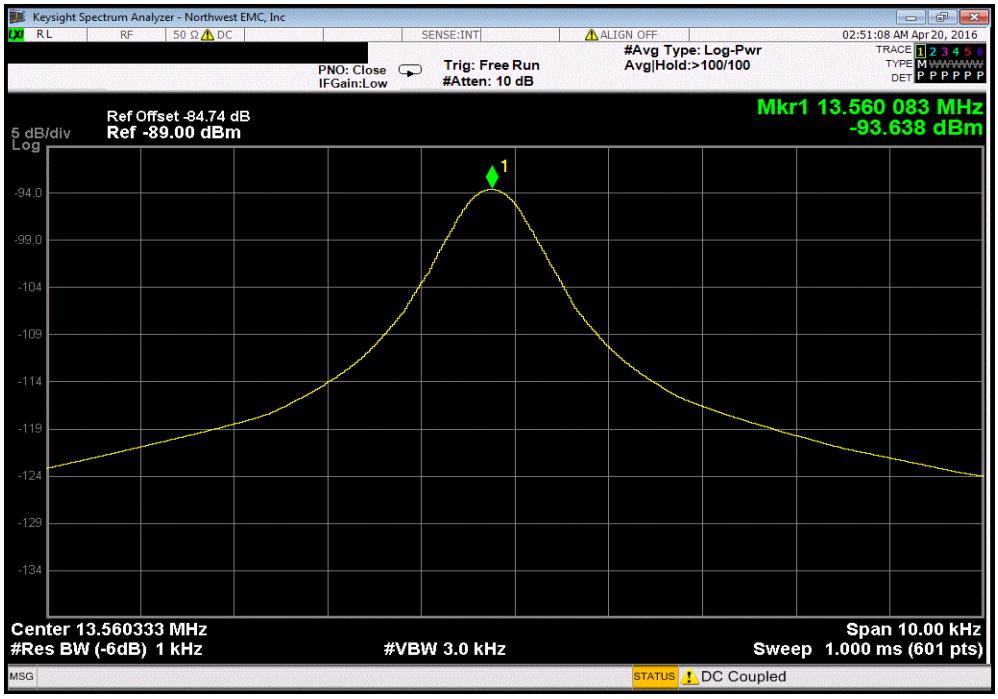
RFID, 13.56 MHz, Temperature: +30°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560083	13.56	6.1	100	Pass



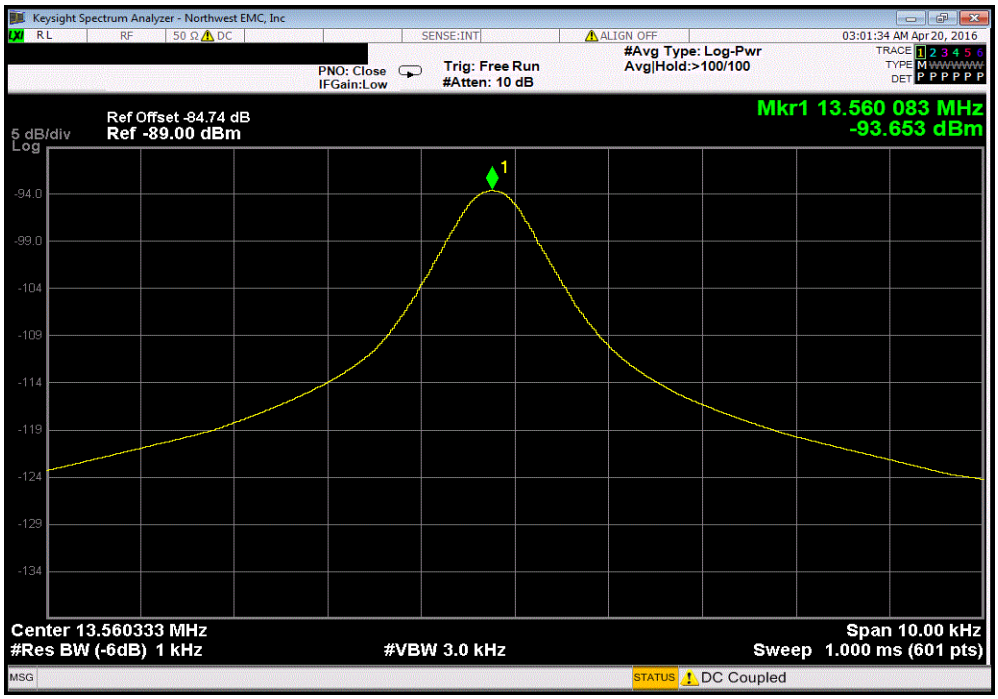
RFID, 13.56 MHz, Temperature: +20°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56010067	13.56	7.4	100	Pass



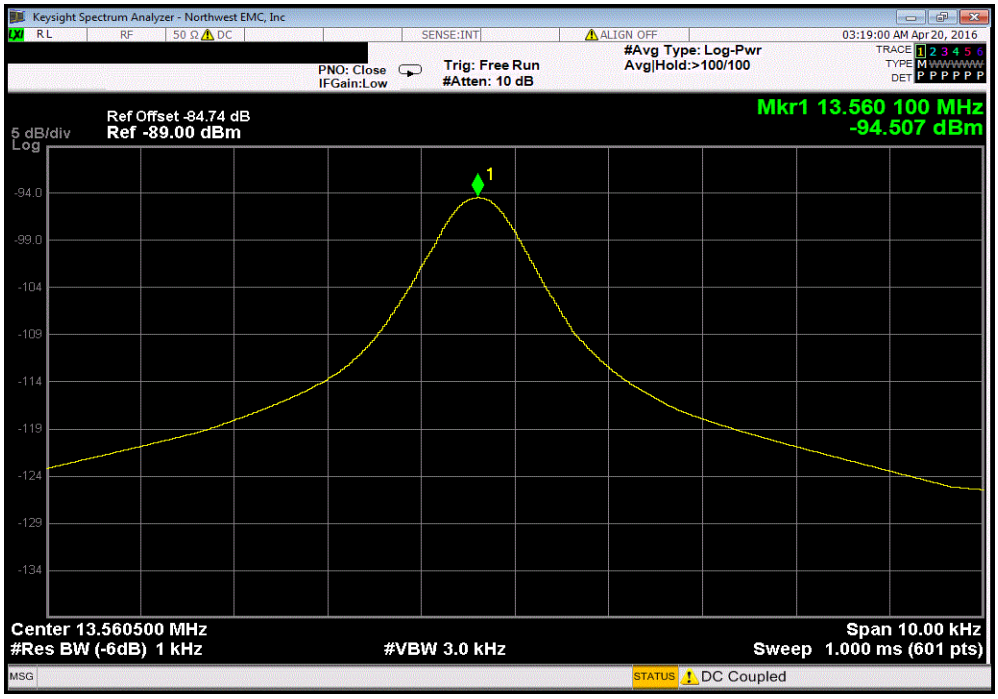
RFID, 13.56 MHz, Temperature: +10°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560083	13.56	6.1	100	Pass



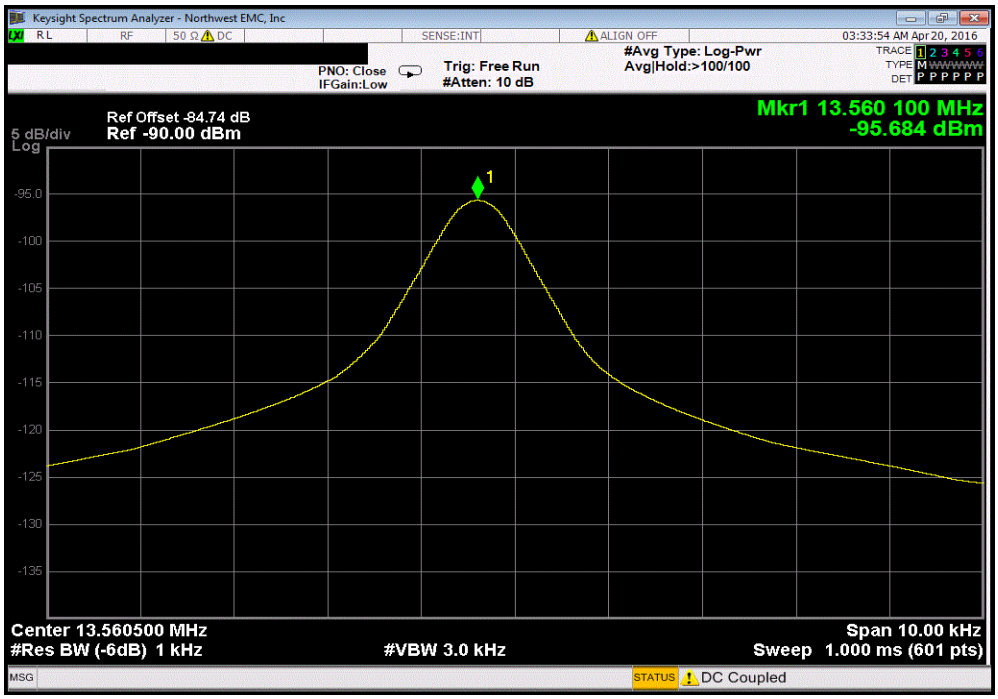
RFID, 13.56 MHz, Temperature: 0°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560083	13.56	6.1	100	Pass



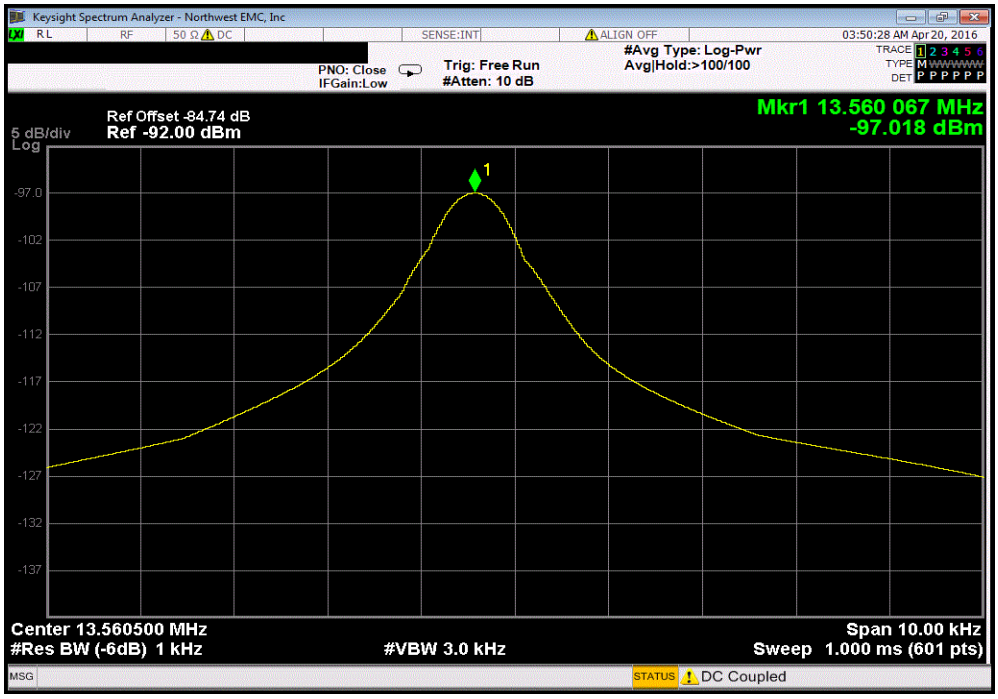
RFID, 13.56 MHz, Temperature: -10°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.5601	13.56	7.4	100	Pass



RFID, 13.56 MHz, Temperature: -20°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.5601	13.56	7.4	100	Pass



RFID, 13.56 MHz, Temperature: -30°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56006667	13.56	4.9	100	Pass



FIELD STRENGTH OF FUNDAMENTAL

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Reading RFID key card, 13.56MHz

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

ONIT0020 - 3

FREQUENCY RANGE INVESTIGATED

Start Frequency	12.5 MHz	Stop Frequency	14.5 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	None	10m Test Distance Cable	EVL	5/12/2016	12 mo
Analyzer - Spectrum Analyzer	Agilent	E4443A	AFB	5/17/2016	12 mo
Antenna	EMCO	6502	AZC	5/20/2015	24 mo

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specifi

While scanning, fundamental carrier from the EUT was maximized by rotating the EUT, adjusting the measurement antenna height and orientation in 3 orthogonal planes, the EUT and/or associated antenna is positioned in 3 orthogonal planes (pe ANSI C63.10). An active loop antenna was used for this test in order to provide sufficient measurement sensitivity.

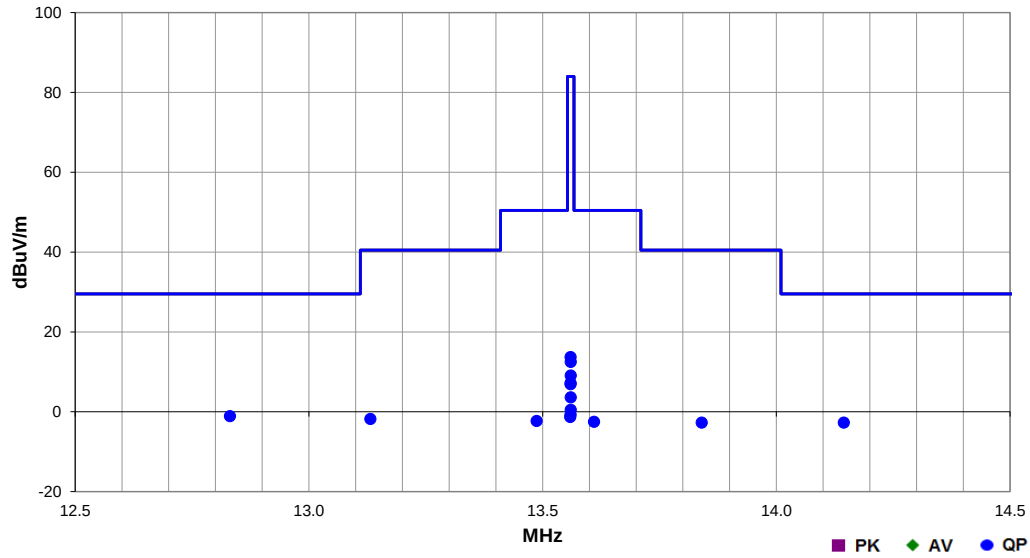
As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

FIELD STRENGTH OF FUNDAMENTAL

Work Order:	ONIT0020	**Date:**	07/11/16		
Project:	None	**Temperature:**	22.5 °C		
Job Site:	EV11	**Humidity:**	46.9% RH		
Serial Number:	None	**Barometric Pres.:**	1023 mbar	**Tested by:**	Jeff Alcoke and Rod Peloquin
EUT:	Wall Reader				
Configuration:	3				
Customer:	Onity Inc., A Division of UTCFS				
Attendees:	None				
EUT Power:	110VAC/60Hz				
Operating Mode:	Reading RFID key card, 13.56MHz				
Deviations:	None				
Comments:	See data comments for antenna and EUT orientation				

Test Specifications	**Test Method**
FCC 15.225:2016	ANSI C63.10:2013

Run #	7	**Test Distance (m)**	10	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
12.831	7.4	10.6	1.0	98.0	10.0	0.0	Horz	QP	-19.1	-1.1	29.5	-30.6	Antenna perp to ground, perp to EUT, EUT vertical
14.144	5.8	10.6	1.0	159.0	10.0	0.0	Horz	QP	-19.1	-2.7	29.5	-32.2	Antenna perp to ground, perp to EUT, EUT vertical
13.132	6.7	10.6	1.0	15.0	10.0	0.0	Horz	QP	-19.1	-1.8	40.5	-42.3	Antenna perp to ground, perp to EUT, EUT vertical
13.840	5.8	10.6	1.0	278.0	10.0	0.0	Horz	QP	-19.1	-2.7	40.5	-43.2	Antenna perp to ground, perp to EUT, EUT vertical
13.487	6.2	10.6	1.0	135.0	10.0	0.0	Horz	QP	-19.1	-2.3	50.5	-52.8	Antenna perp to ground, perp to EUT, EUT vertical
13.610	6.0	10.6	1.0	117.0	10.0	0.0	Horz	QP	-19.1	-2.5	50.5	-53.0	Antenna perp to ground, perp to EUT, EUT vertical
13.560	22.2	10.6	1.0	311.0	10.0	0.0	Horz	QP	-19.1	13.7	84.0	-70.3	Antenna perp to ground, perp to EUT, EUT vertical
13.560	21.0	10.6	1.0	271.0	10.0	0.0	Horz	QP	-19.1	12.5	84.0	-71.5	Antenna perp to ground, perp to EUT, EUT on side
13.560	17.6	10.6	1.0	60.0	10.0	0.0	Horz	QP	-19.1	9.1	84.0	-74.9	Antenna perp to ground, perp to EUT, EUT horizontal
13.560	15.7	10.6	1.0	229.0	10.0	0.0	Horz	QP	-19.1	7.2	84.0	-76.8	Antenna perp to ground, para to EUT, EUT vertical
13.560	15.4	10.6	1.0	207.0	10.0	0.0	Horz	QP	-19.1	6.9	84.0	-77.1	Antenna perp to ground, para to EUT, EUT on side
13.560	12.1	10.6	1.0	39.0	10.0	0.0	Horz	QP	-19.1	3.6	84.0	-80.4	Antenna perp to ground, para to EUT, EUT horizontal
13.560	9.0	10.6	1.0	17.0	10.0	0.0	Vert	QP	-19.1	0.5	84.0	-83.5	Anetnna para to ground, perp to EUT, EUT vertical
13.560	7.8	10.6	1.0	252.0	10.0	0.0	Vert	QP	-19.1	-0.7	84.0	-84.7	Antenna para to ground, perp to EUT, EUT on side
13.559	7.2	10.6	1.0	56.0	10.0	0.0	Vert	QP	-19.1	-1.3	84.0	-85.3	Antenna para to ground, perp to EUT, EUT hoizontal

FIELD STRENGTH OF SPURIOUS EMISSIONS LESS THAN 30 MHz

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Reading RFID key card, 13.56MHz

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

ONIT0020 - 3

FREQUENCY RANGE INVESTIGATED

Start Frequency	490 kHz	Stop Frequency	30 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	None	10m Test Distance Cable	EVL	5/12/2016	12 mo
Analyzer - Spectrum Analyzer	Agilent	E4443A	AFB	5/17/2016	12 mo
Antenna	EMCO	6502	AZC	5/20/2015	24 mo

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was continuously transmitting while set to the channel specified.

While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and orientation in 3 orthogonal planes, the EUT and/or associated antenna is positioned in 3 orthogonal planes (per ANSI C63.10). An active loop antenna was used for this test in order to provide sufficient measurement sensitivity.

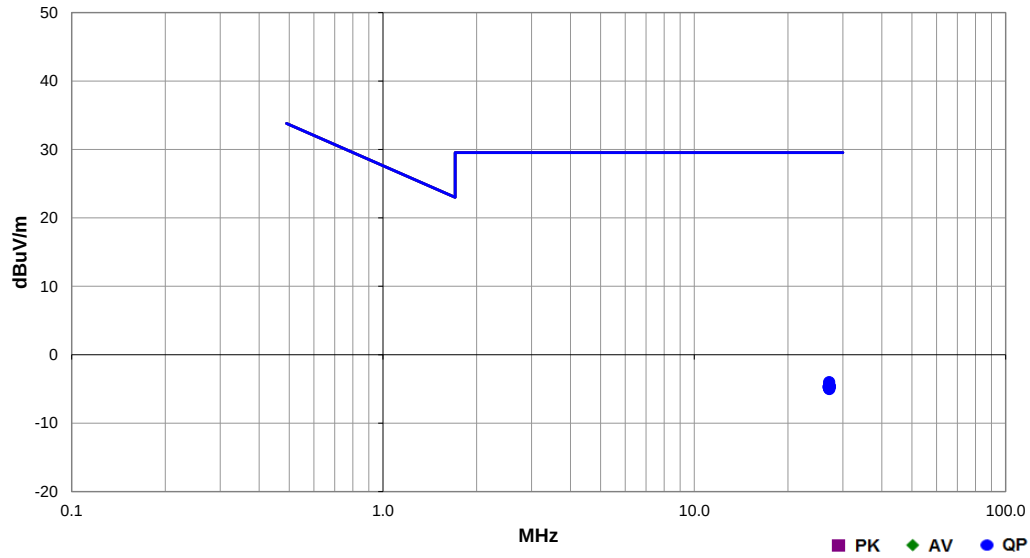
As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of 40dB/decade for comparison to the limit.

FIELD STRENGTH OF SPURIOUS EMISSIONS LESS THAN 30 MHz

Work Order:	ONIT0020	**Date:**	07/11/16		
Project:	None	**Temperature:**	22.7 °C		
Job Site:	EV11	**Humidity:**	46.6% RH		
Serial Number:	None	**Barometric Pres.:**	1022 mbar	**Tested by:**	Jeff Alcoke and Rod Peloquin
EUT:	Wall Reader				
Configuration:	3				
Customer:	Onity Inc., A Division of UTCFS				
Attendees:	None				
EUT Power:	110VAC/60Hz				
Operating Mode:	Reading RFID key card, 13.56MHz				
Deviations:	None				
Comments:	See data comments for antenna and EUT orientation				

Test Specifications	**Test Method**
FCC 15.225:2016	ANSI C63.10:2013

Run #	8	**Test Distance (m)**	10	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
27.120	6.1	9.0	1.0	24.0	10.0	0.0	Horz	QP	-19.1	-4.0	29.5	-33.5	Antenna perp to ground, perp to EUT, EUT vertical
27.119	5.6	9.0	1.0	282.0	10.0	0.0	Horz	QP	-19.1	-4.5	29.5	-34.0	Antenna perp to ground, perp to EUT, EUT horizontal
27.244	5.5	9.0	1.0	25.0	10.0	0.0	Vert	QP	-19.1	-4.6	29.5	-34.1	Antenna para to ground, perp to EUT, EUT on side
27.195	5.4	9.0	1.0	236.0	10.0	0.0	Vert	QP	-19.1	-4.7	29.5	-34.2	Antenna perp to ground, perp to EUT, EUT on side
27.004	5.4	9.0	1.0	60.0	10.0	0.0	Horz	QP	-19.1	-4.7	29.5	-34.2	Antenna perp to ground, para to EUT, EUT horizontal
27.224	5.4	9.0	1.0	354.0	10.0	0.0	Horz	QP	-19.1	-4.7	29.5	-34.2	Antenna para to ground, perp to EUT, EUT vertical
27.017	5.4	9.0	1.0	330.0	10.0	0.0	Horz	QP	-19.1	-4.7	29.5	-34.2	Antenna para to ground, perp to EUT, EUT horizontal
27.071	5.2	9.0	1.0	26.0	10.0	0.0	Horz	QP	-19.1	-4.9	29.5	-34.4	Antenna para to ground, para to EUT, EUT on side
27.154	5.1	9.0	1.0	37.0	10.0	0.0	Horz	QP	-19.1	-5.0	29.5	-34.5	Antenna para to ground, para to EUT, EUT vertical

FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER THAN 30MHz

PSA-ESCI 2016.04.26.1

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Reading RFID key card, 13.56MHz

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ONIT0020 - 3

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	1000 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	N/A	Bilog Cables	EVA	3/11/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AOL	3/11/2016	12 mo
Antenna - Biconilog	EMCO	3141	AXE	8/29/2014	24 mo
Power Supply - DC	Topward	TPS-2000	TPD	NCR	0 mo
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	4/22/2016	12 mo

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was transmitting while set at the operating channel.

While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.10).

FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER THAN 30MHz

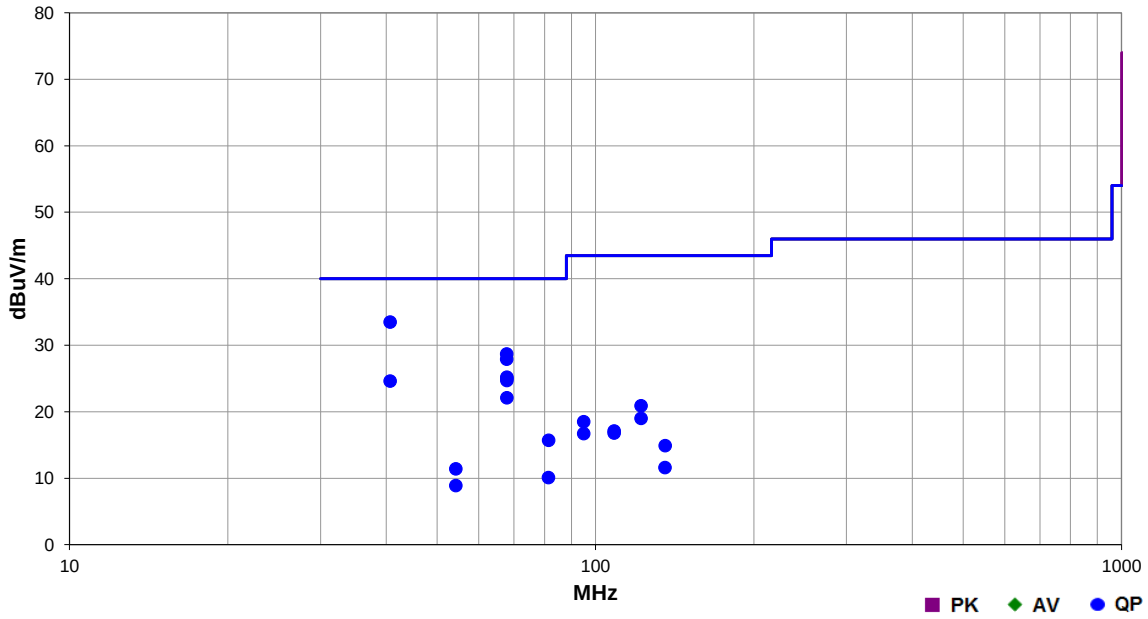
NORTHWEST EMC

PSA-ESCI 2016.04.26.1
EmiR5 2016.04.26.1

Work Order:	ONIT0020	**Date:**	07/25/16		
Project:	None	**Temperature:**	23.6 °C		
Job Site:	EV01	**Humidity:**	46.8% RH		
Serial Number:	None	**Barometric Pres.:**	1021 mbar	**Tested by:**	Brandon Hobbs
EUT:	Wall Reader				
Configuration:	3				
Customer:	Onity Inc., A Division of UTCFS				
Attendees:	None				
EUT Power:	12 VDC				
Operating Mode:	Reading RFID key card, 13.56MHz				
Deviations:	None				
Comments:	Please reference the data comments for EUT orientation.				

Test Specifications	**Test Method**
FCC 15.225:2016	ANSI C63.10:2013

Run #	6	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
40.681	38.6	-5.1	1.0	272.0	3.0	0.0	Vert	QP	0.0	33.5	40.0	-6.5	EUT Vert
67.805	38.2	-9.5	1.7	330.0	3.0	0.0	Vert	QP	0.0	28.7	40.0	-11.3	EUT Vert
67.804	37.4	-9.5	3.1	232.0	3.0	0.0	Horz	QP	0.0	27.9	40.0	-12.1	EUT Vert
67.809	34.7	-9.5	1.0	197.0	3.0	0.0	Vert	QP	0.0	25.2	40.0	-14.8	EUT Horz
67.809	34.5	-9.5	2.9	82.0	3.0	0.0	Horz	QP	0.0	25.0	40.0	-15.0	EUT Horz
67.809	34.2	-9.5	1.0	87.0	3.0	0.0	Vert	QP	0.0	24.7	40.0	-15.3	EUT On Side
40.683	29.7	-5.1	3.7	176.0	3.0	0.0	Horz	QP	0.0	24.6	40.0	-15.4	EUT Vert
67.805	31.6	-9.5	2.8	149.0	3.0	0.0	Horz	QP	0.0	22.1	40.0	-17.9	EUT On Side
122.042	29.2	-8.3	1.7	95.0	3.0	0.0	Horz	QP	0.0	20.9	43.5	-22.6	EUT Vert
81.414	25.2	-9.5	1.0	40.0	3.0	0.0	Vert	QP	0.0	15.7	40.0	-24.3	EUT Vert
122.048	27.3	-8.3	1.0	61.0	3.0	0.0	Vert	QP	0.0	19.0	43.5	-24.5	EUT Vert
94.928	26.4	-7.9	3.1	201.0	3.0	0.0	Horz	QP	0.0	18.5	43.5	-25.0	EUT Vert
108.497	24.8	-7.7	1.8	321.0	3.0	0.0	Horz	QP	0.0	17.1	43.5	-26.4	EUT Vert
108.514	24.6	-7.8	1.0	285.0	3.0	0.0	Vert	QP	0.0	16.8	43.5	-26.7	EUT Vert
94.929	24.6	-7.9	1.0	287.0	3.0	0.0	Vert	QP	0.0	16.7	43.5	-26.8	EUT Vert
54.243	19.8	-8.4	1.1	337.0	3.0	0.0	Vert	QP	0.0	11.4	40.0	-28.6	EUT Vert
135.604	23.0	-8.1	2.0	268.0	3.0	0.0	Horz	QP	0.0	14.9	43.5	-28.6	EUT Vert
81.372	19.6	-9.5	1.7	251.0	3.0	0.0	Horz	QP	0.0	10.1	40.0	-29.9	EUT Vert
54.250	17.3	-8.4	1.0	325.0	3.0	0.0	Horz	QP	0.0	8.9	40.0	-31.1	EUT Vert
135.602	19.7	-8.1	1.0	319.0	3.0	0.0	Vert	QP	0.0	11.6	43.5	-31.9	EUT Vert

AC – POWERLINE CONDUCTED EMISSIONS

WTD.2016.05.18

TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Per the standard, an insulating material was also added to ground plane between the EUT's power and remote I/O cables. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Receiver	Rohde & Schwarz	ESCI	ARH	3/21/2016	3/21/2017
Cable - Conducted Cable Assembly	Northwest EMC	EVG, HHD, RKA	EVGA	5/10/2016	5/10/2017
LISN	Solar Electronics	9252-50-R-24-BNC	LIP	1/27/2015	1/27/2017

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

ONIT0020-2

MODES INVESTIGATED

Continuously activating RFID 13.56 MHz with key swipe machine.

AC – POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2016.05.18

EUT:	Wall Reader	Work Order:	ONIT0020
Serial Number:	None	Date:	07/12/2016
Customer:	Onity Inc., A Division of UTCFS	Temperature:	22.9°C
Attendees:	None	Relative Humidity:	45.8%
Customer Project:	None	Bar. Pressure:	1019 mb
Tested By:	Jeff Alcoke and Rod Peloquin	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	ONIT0020-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

TEST PARAMETERS

Run #:	10	Line:	Neutral	Add. Ext. Attenuation (dB):	0

COMMENTS

None

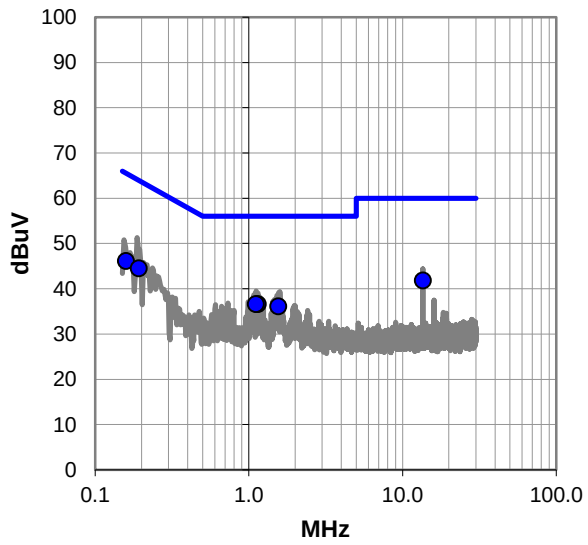
EUT OPERATING MODES

Continuously activating RFID 13.56 MHz with key swipe machine.

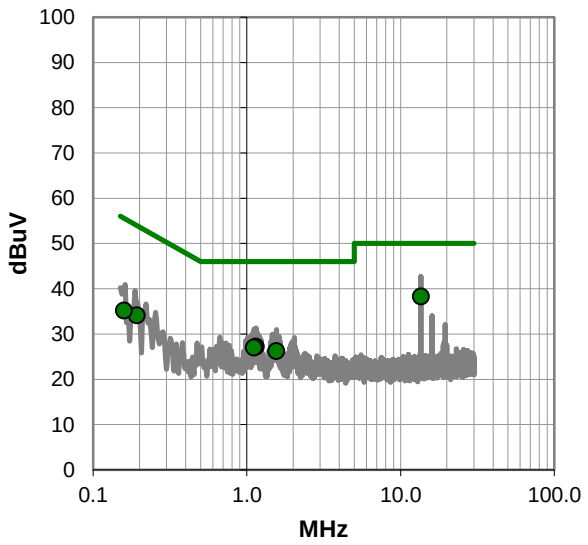
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



AC – POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2016.05.18

RESULTS - Run #10

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.560	21.4	20.4	41.8	60.0	-18.2
0.159	26.3	19.8	46.1	65.5	-19.4
1.147	16.8	19.8	36.6	56.0	-19.4
1.113	16.8	19.8	36.6	56.0	-19.4
0.192	24.7	19.8	44.5	63.9	-19.4
1.558	16.3	19.8	36.1	56.0	-19.9

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.560	17.9	20.4	38.3	50.0	-11.7
1.147	7.4	19.8	27.2	46.0	-18.8
1.113	7.2	19.8	27.0	46.0	-19.0
0.192	14.3	19.8	34.1	53.9	-19.8
1.558	6.4	19.8	26.2	46.0	-19.8
0.159	15.4	19.8	35.2	55.5	-20.3

CONCLUSION

Pass

Tested By

AC – POWERLINE CONDUCTED EMISSIONS

EUT:	Wall Reader	Work Order:	ONIT0020
Serial Number:	None	Date:	07/12/2016
Customer:	Onity Inc., A Division of UTCFS	Temperature:	22.9°C
Attendees:	None	Relative Humidity:	45.8%
Customer Project:	None	Bar. Pressure:	1019 mb
Tested By:	Jeff Alcoke and Rod Peloquin	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	ONIT0020-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

TEST PARAMETERS

Run #:	11	Line:	High Line	Add. Ext. Attenuation (dB):	0

COMMENTS

None

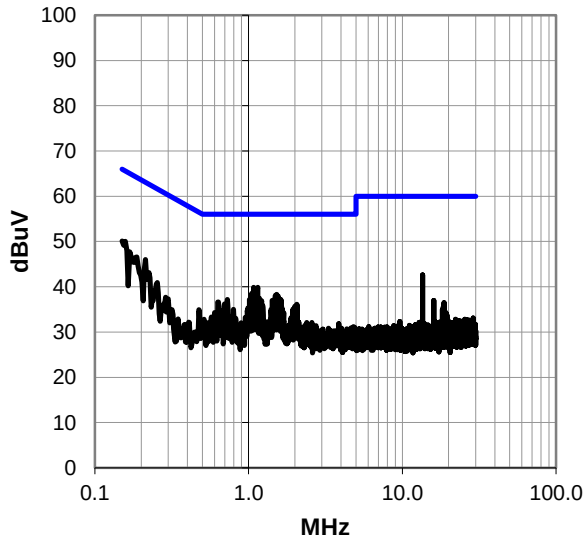
EUT OPERATING MODES

Continuously activating RFID 13.56 MHz with key swipe machine.

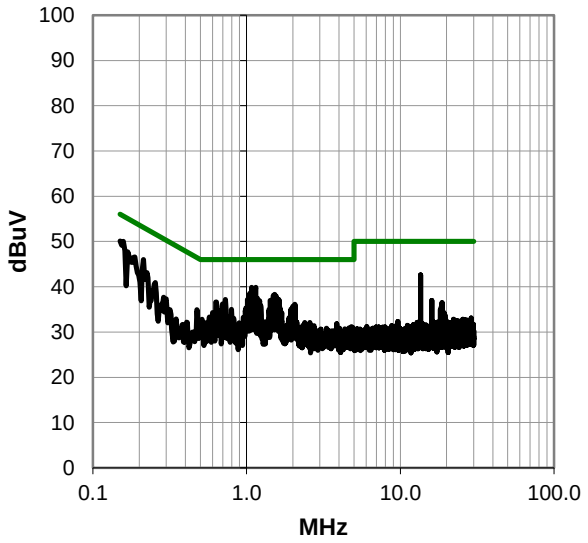
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



AC – POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2016.05.18

RESULTS - Run #11

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.150	30.2	19.9	50.1	66.0	-15.9
1.079	20.1	19.8	39.9	56.0	-16.1
1.146	20.1	19.8	39.9	56.0	-16.1
0.213	26.2	19.8	46.0	63.1	-17.1
1.113	19.0	19.8	38.8	56.0	-17.2
0.169	27.9	19.8	47.7	65.0	-17.3
13.558	22.2	20.4	42.6	60.0	-17.4
1.049	18.7	19.8	38.5	56.0	-17.5
1.523	18.5	19.8	38.3	56.0	-17.7
1.493	18.3	19.8	38.1	56.0	-17.9
1.557	18.1	19.8	37.9	56.0	-18.1
1.176	17.7	19.8	37.5	56.0	-18.5
0.728	17.5	19.7	37.2	56.0	-18.8
1.016	17.4	19.8	37.2	56.0	-18.8
1.590	17.4	19.8	37.2	56.0	-18.8
1.620	17.4	19.8	37.2	56.0	-18.8
1.463	17.3	19.8	37.1	56.0	-18.9
1.426	17.2	19.8	37.0	56.0	-19.0
1.213	17.1	19.8	36.9	56.0	-19.1
0.631	16.9	19.7	36.6	56.0	-19.4
0.698	16.5	19.7	36.2	56.0	-19.8
2.064	16.3	19.8	36.1	56.0	-19.9
1.236	16.1	19.8	35.9	56.0	-20.1
2.004	15.9	19.8	35.7	56.0	-20.3
0.254	21.1	19.8	40.9	61.6	-20.7
0.989	15.5	19.8	35.3	56.0	-20.7

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.150	30.2	19.9	50.1	56.0	-5.9
1.079	20.1	19.8	39.9	46.0	-6.1
1.146	20.1	19.8	39.9	46.0	-6.1
0.213	26.2	19.8	46.0	53.1	-7.1
1.113	19.0	19.8	38.8	46.0	-7.2
0.169	27.9	19.8	47.7	55.0	-7.3
13.558	22.2	20.4	42.6	50.0	-7.4
1.049	18.7	19.8	38.5	46.0	-7.5
1.523	18.5	19.8	38.3	46.0	-7.7
1.493	18.3	19.8	38.1	46.0	-7.9
1.557	18.1	19.8	37.9	46.0	-8.1
1.176	17.7	19.8	37.5	46.0	-8.5
0.728	17.5	19.7	37.2	46.0	-8.8
1.016	17.4	19.8	37.2	46.0	-8.8
1.590	17.4	19.8	37.2	46.0	-8.8
1.620	17.4	19.8	37.2	46.0	-8.8
1.463	17.3	19.8	37.1	46.0	-8.9
1.426	17.2	19.8	37.0	46.0	-9.0
1.213	17.1	19.8	36.9	46.0	-9.1
0.631	16.9	19.7	36.6	46.0	-9.4
0.698	16.5	19.7	36.2	46.0	-9.8
2.064	16.3	19.8	36.1	46.0	-9.9
1.236	16.1	19.8	35.9	46.0	-10.1
2.004	15.9	19.8	35.7	46.0	-10.3
0.254	21.1	19.8	40.9	51.6	-10.7
0.989	15.5	19.8	35.3	46.0	-10.7

CONCLUSION

Pass

Tested By