NORTHWEST EMC

Onity Inc., A Division of UTCFS

HT22R RFID Encoder

RFID Reader Model Number: RH600110

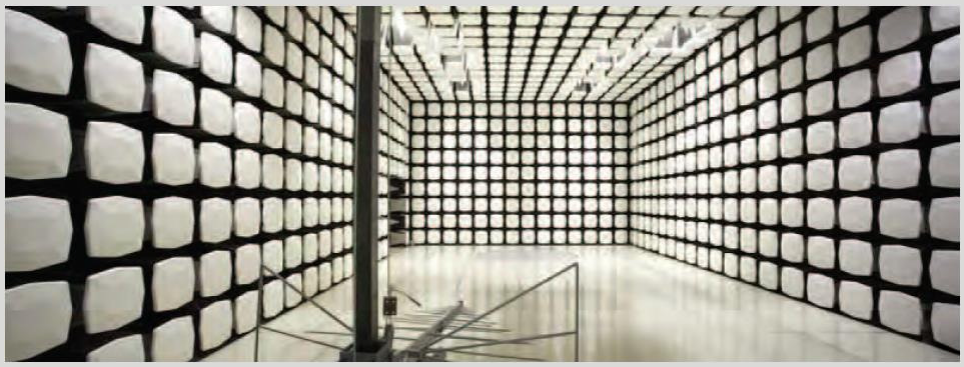
Host Device Model Number: 10104340P1

FCC 15.207:2016

FCC 15.225:2016

13.56 MHz radio using RFID

Report # ONIT0019.1



NVLAP Lab Code: 200630-0

CERTIFICATE OF TEST

NORTHWEST EMC
2014-12-10

Last Date of Test: June 20, 2016
Onity Inc., A Division of UTCFS
HT22R RFID Encoder
RFID Reader Model Number: RH600110
Host Device Model Number: 10104340P1

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	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

Revision Number	Description	Date	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS

NORTHWEST EMC
REV 2016.3.22

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

IC - Recognized by Industry Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with IC.

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.

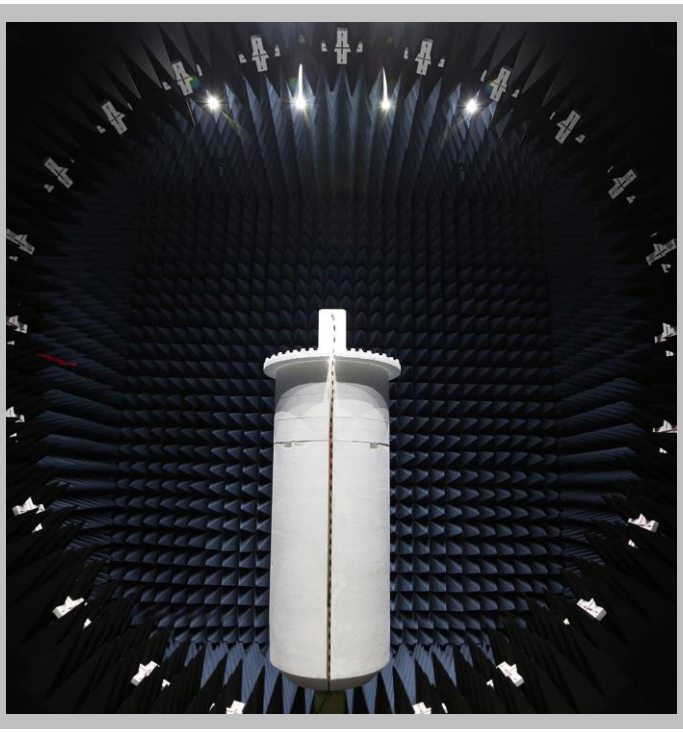
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

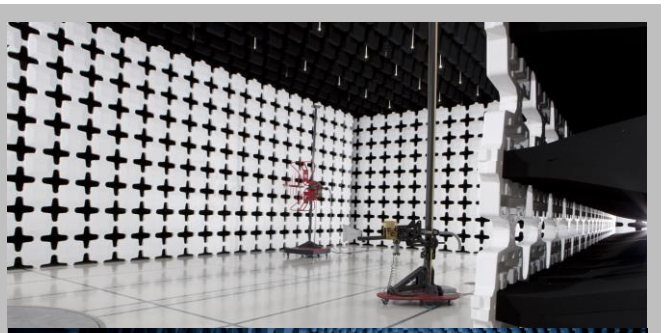
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%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

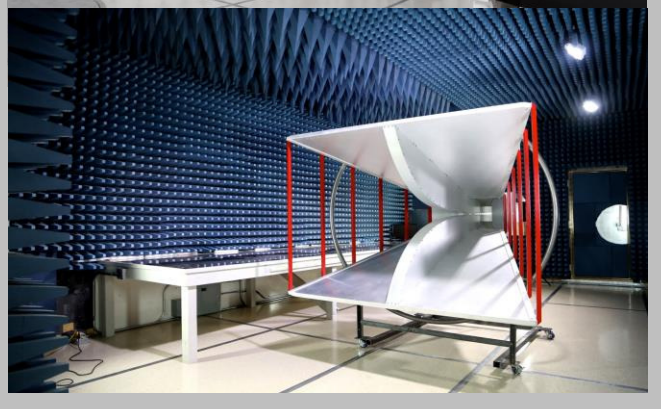
FACILITIES

NORTHWEST EMC
REV 2015.2.19

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
Industry 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, OR 97302-1142
Test Requested By:	Troy Klopfenstein
Model:	HT22R RFID Encoder RFID Reader Model Number: RH600110 Host Device Model Number: 10104340P1
First Date of Test:	April 25, 2016
Last Date of Test:	June 20, 2016
Receipt Date of Samples:	April 25, 2016
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
RFID Encoder using a 13.56 MHz radio.

Client Justification

Model Equivalency Statement

The following lock regulatory model numbers are covered by this EMC test report.

Regulatory Model Number	Lock Marketing Name
10104340P1	HT22R RFID Encoder

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., A Division of UTCFS	None	100176

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
RFID Key Card	Onity Inc., A Division of UTCFS	None	None

Configuration ONIT0019- 1

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
RFID Encoder	Onity Inc., A Division of UTCFS	HT22P	HT22P15111400Q

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Switching Adaptor	Mean Well	GS40A15	EB54A49085
RFID Key Card	Onity Inc., A Division of UTCFS	None	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Power	No	1.7m	No	AC Power	AC/DC Switching Adaptor
DC Power	No	0.9m	Yes	AC/DC Switching Adaptor	RFID Encoder
Parallel Cable	No	1.8m	No	RFID Encoder	Unterminated
Phone Cord	No	2.0m	No	RFID Encoder	Unterminated
Serial to Parallel Cable	No	1.8m	No	RFID Encoder	Unterminated
Serial Cable	No	0.9m	No	RFID Encoder	Unterminated

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration ONIT0019- 2

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
RFID Encoder	Onity Inc., A Division of UTCFS	HT22R	HT22P15111400Q

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Switching Adaptor	Mean Well	GS40A15	EB54A49085
RFID Key Card	Onity Inc., A Division of UTCFS	None	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Power	No	1.7m	No	AC Power	AC/DC Switching Adaptor
DC Power	No	0.9m	Yes	AC/DC Switching Adaptor	RFID Encoder
Parallel Cable	No	1.8m	No	RFID Encoder	Unterminated
Phone Cord	No	2.0m	No	RFID Encoder	Unterminated
Serial to Parallel Cable	No	1.8m	No	RFID Encoder	Unterminated
Serial Cable	No	0.9m	No	RFID Encoder	Unterminated

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration ONIT0019- 4

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
RFID Encoder	Onity Inc., A Division of UTCFS	HT22P	HT22P15111400Q

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC/DC Switching Adaptor	Mean Well	GS40A15	EB54A49085
RFID Key Card	Onity Inc., A Division of UTCFS	None	None
Swipe Machine	Onity Inc., A Division of UTCFS	None	None

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

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Power	No	1.7m	No	AC Power	AC/DC Switching Adaptor
DC Power	No	0.9m	Yes	AC/DC Switching Adaptor	RFID Encoder
Parallel Cable	No	1.8m	No	RFID Encoder	Unterminated
Phone Cord	No	2.0m	No	RFID Encoder	Unterminated
Serial to Parallel Cable	No	1.8m	No	RFID Encoder	Unterminated
Serial Cable	No	0.9m	No	RFID Encoder	Unterminated
I/O Cable	No	4.0m	No	Swipe Machine	Arduino Microcontroller

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	5/24/2016	Field Strength of Spurious Emissions > 30 MHz	Modified from delivered configuration.	Installed a ferrite (Fairrite brand PN#0321164951) to the cable between the RFID radio and the Encoder PCB. Modification authorized by Troy Klopfenstein.	EUT remained at Northwest EMC following the test.
3	5/26/2016	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.
4	5/31/2016	Field Strength of Spurious Emissions < 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.
5	6/20/2016	Field Strength of Fundamental	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 -20 ° 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:	RFID Encoder			**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.

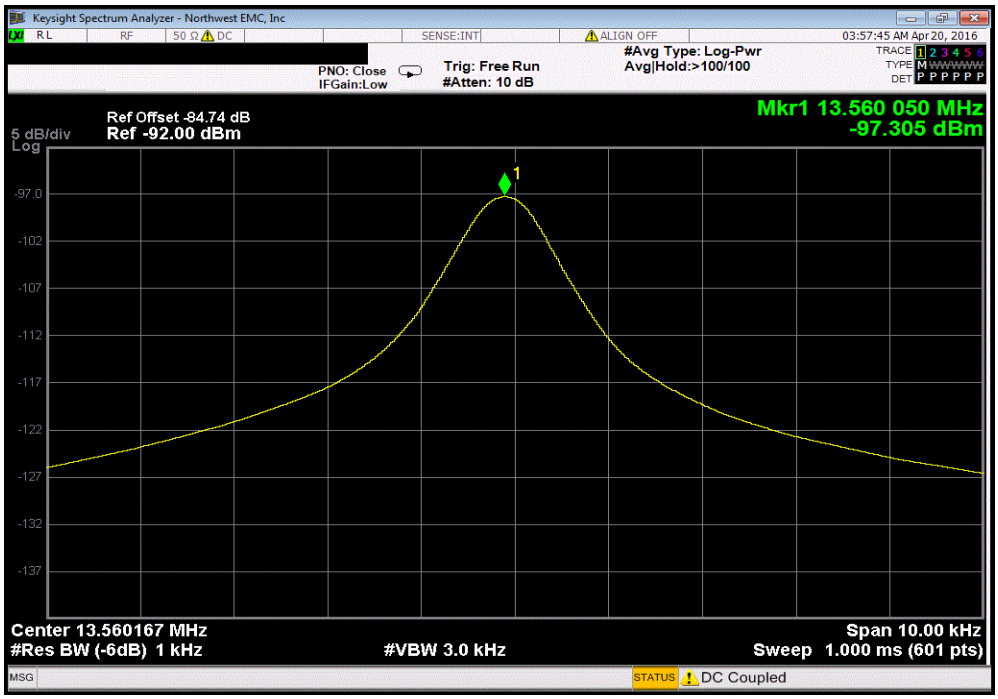
DEVIATIONS FROM TEST STANDARD

None

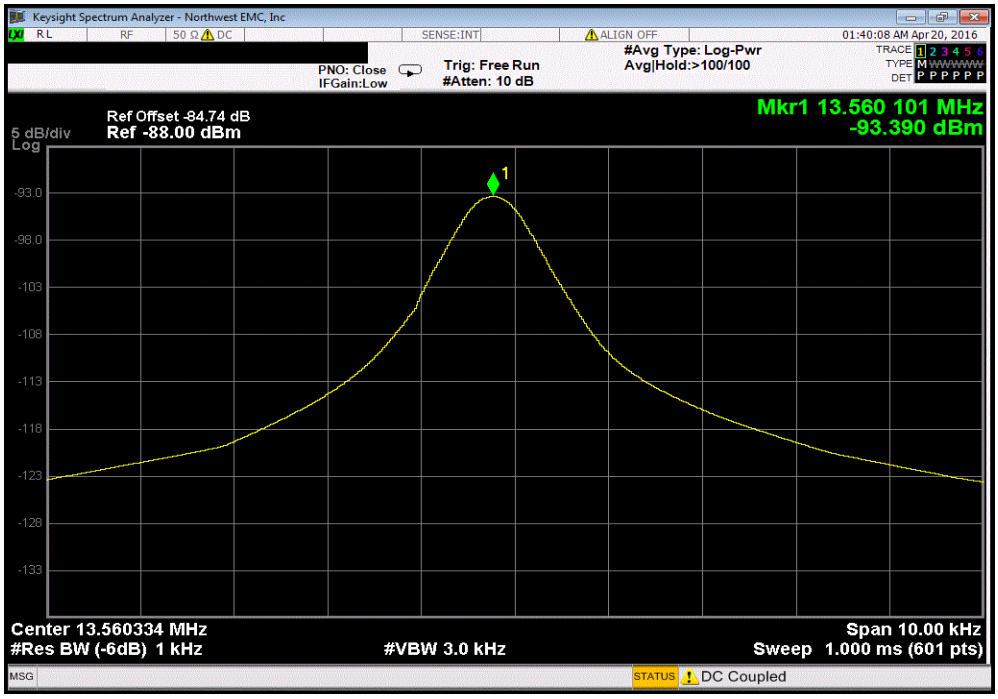
Configuration #	ONIT0017 - 1	Signature

	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

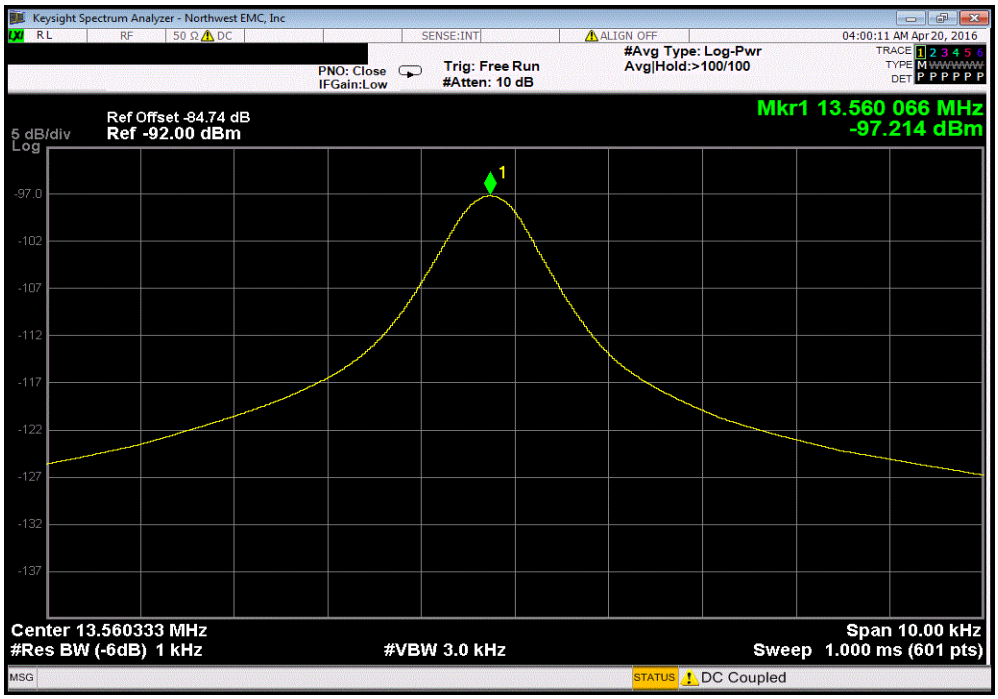
RFID, 13.56 MHz, Voltage: 115%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56005033	13.56	3.7	100	Pass



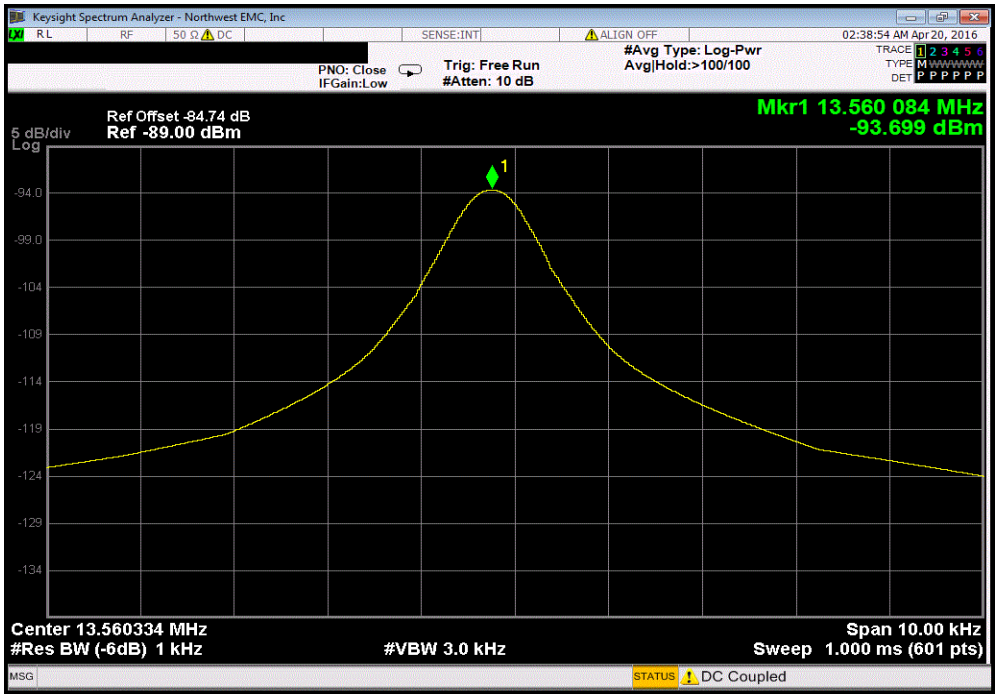
RFID, 13.56 MHz, Voltage: 100%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56010067	13.56	7.4	100	Pass



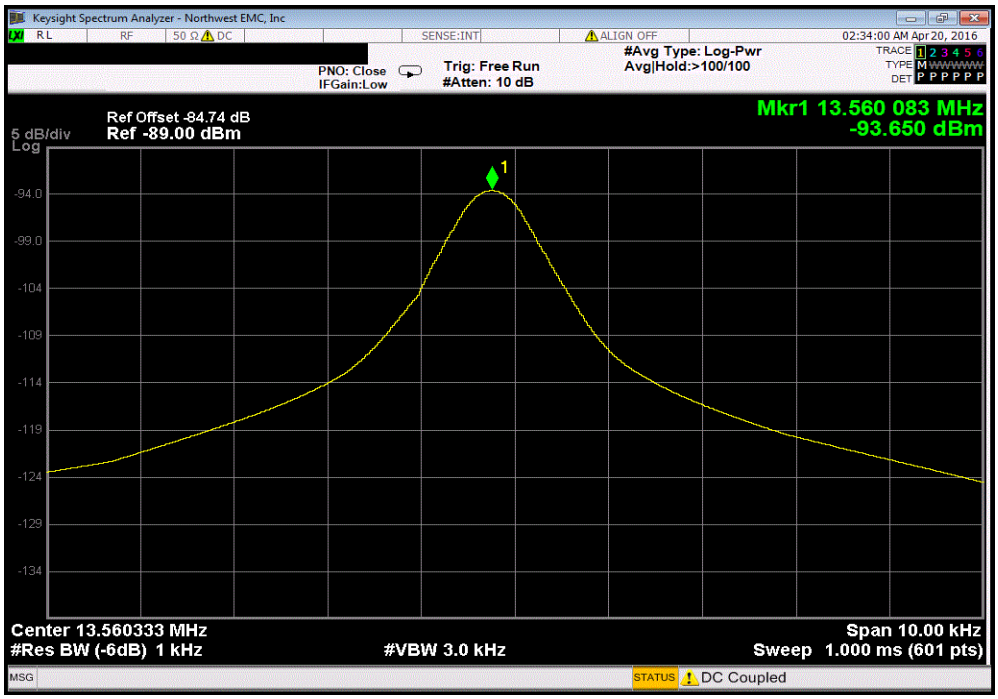
RFID, 13.56 MHz, Voltage: 85%						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56006633	13.56	4.9	100	Pass



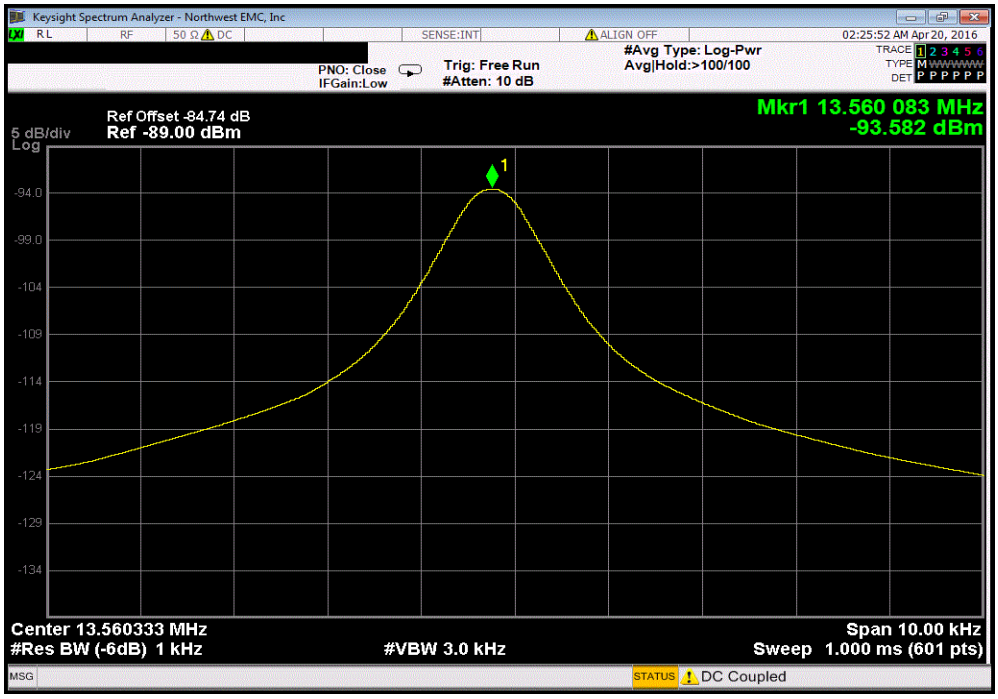
RFID, 13.56 MHz, Temperature: +50°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560084	13.56	6.2	100	Pass



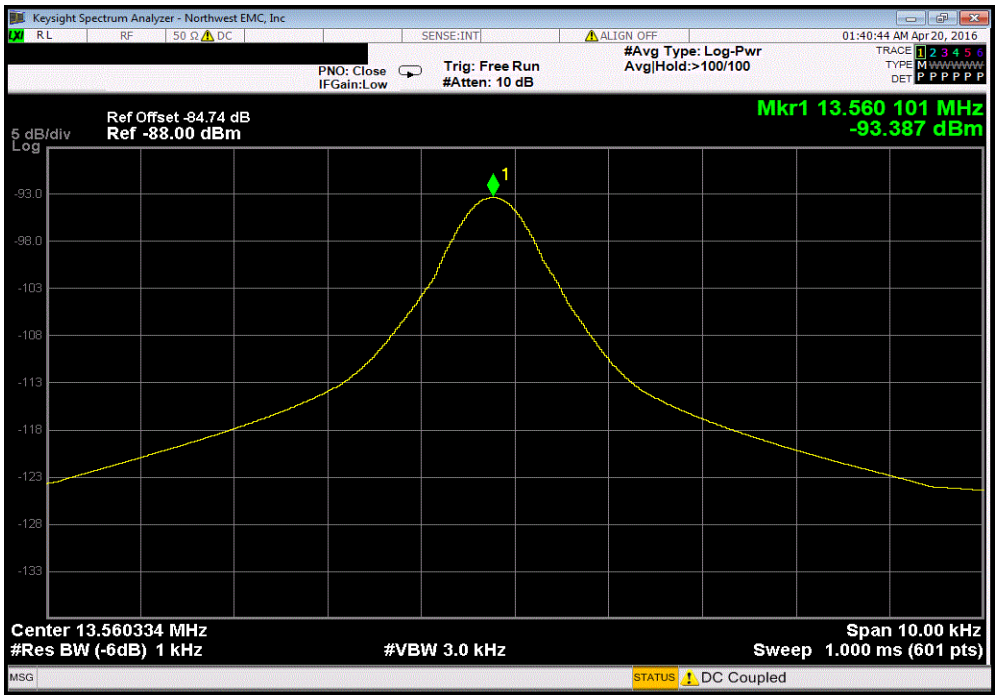
RFID, 13.56 MHz, Temperature: +40°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560083	13.56	6.1	100	Pass



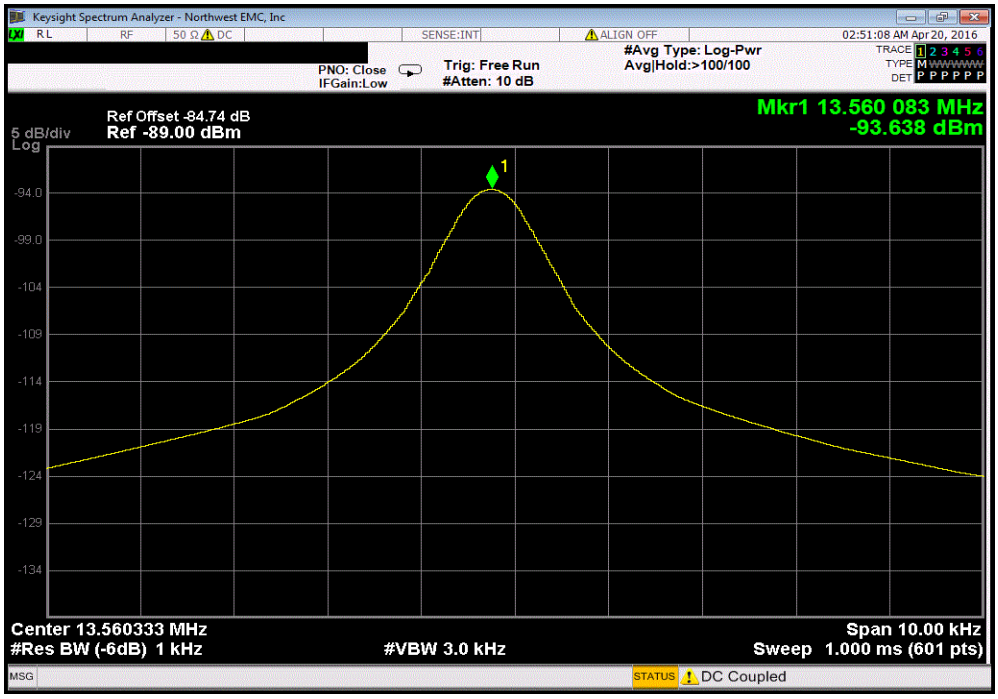
RFID, 13.56 MHz, Temperature: +30°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560083	13.56	6.1	100	Pass



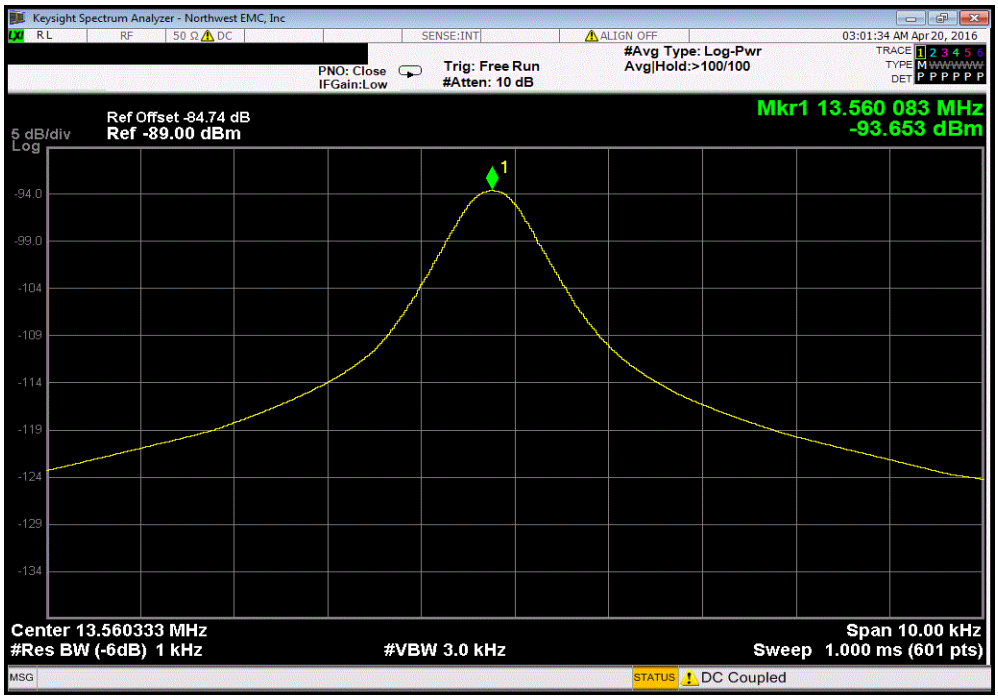
RFID, 13.56 MHz, Temperature: +20°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.56010067	13.56	7.4	100	Pass



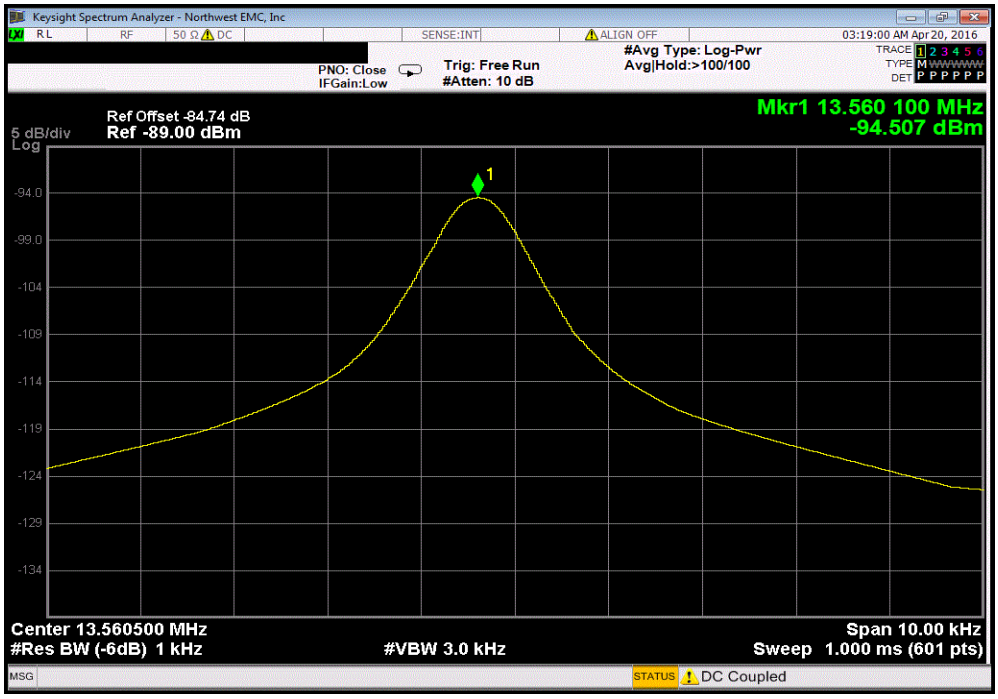
RFID, 13.56 MHz, Temperature: +10°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560083	13.56	6.1	100	Pass



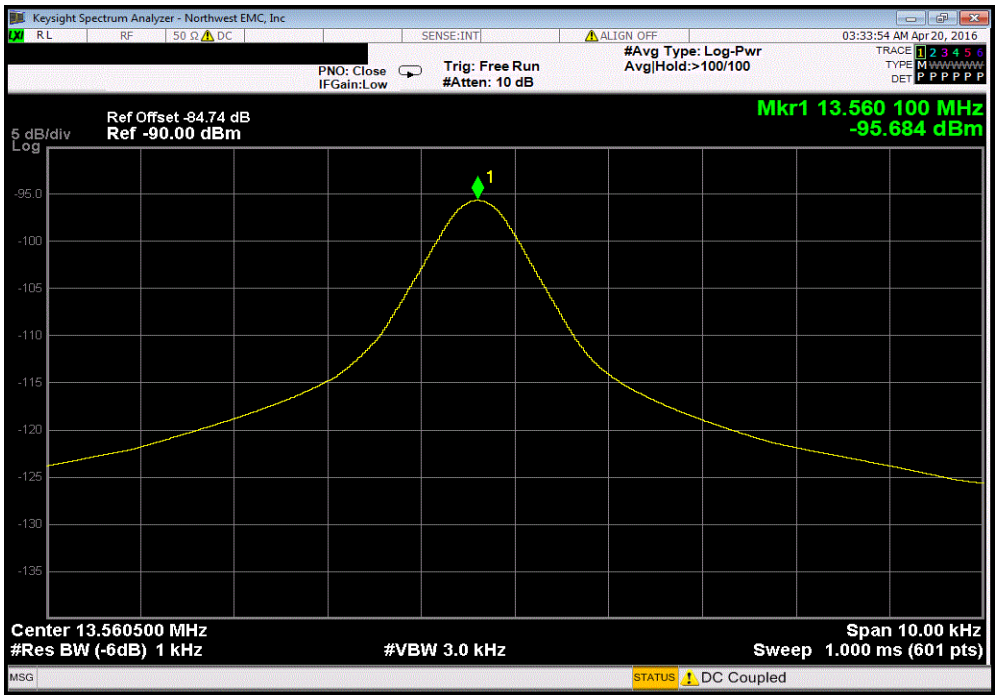
RFID, 13.56 MHz, Temperature: 0°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.560083	13.56	6.1	100	Pass



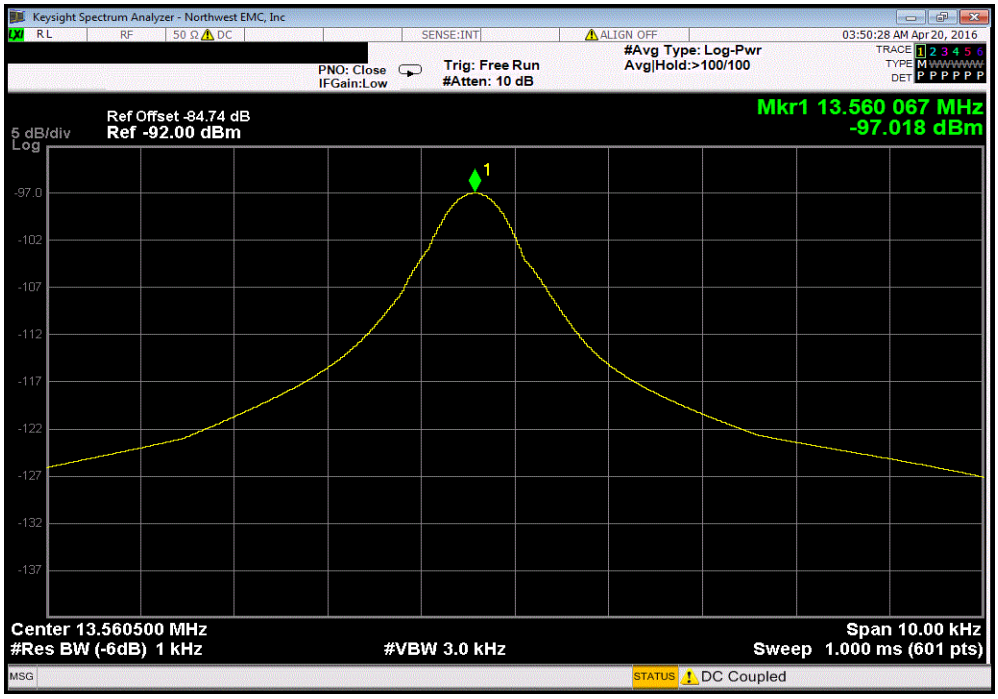
RFID, 13.56 MHz, Temperature: -10°						
		Measured Value (MHz)	Assigned Value (MHz)	Error (ppm)	Limit (ppm)	Results
		13.5601	13.56	7.4	100	Pass



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

Programming spare card keys via RFID

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

ONIT0019 - 4

FREQUENCY RANGE INVESTIGATED

Start Frequency	12 MHz	Stop Frequency	15 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
Antenna	EMCO	6502	AOA	6/24/2014	24 mo
Cable	None	10m Test Distance Cable	EVL	5/12/2016	12 mo
Analyzer - Spectrum Analyzer	Agilent	E4443A	AFB	5/17/2016	12 mo

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, 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 (per ANSI C63.10). An active loop antenna was used for this test in order to provide sufficient measurement sensitivity.

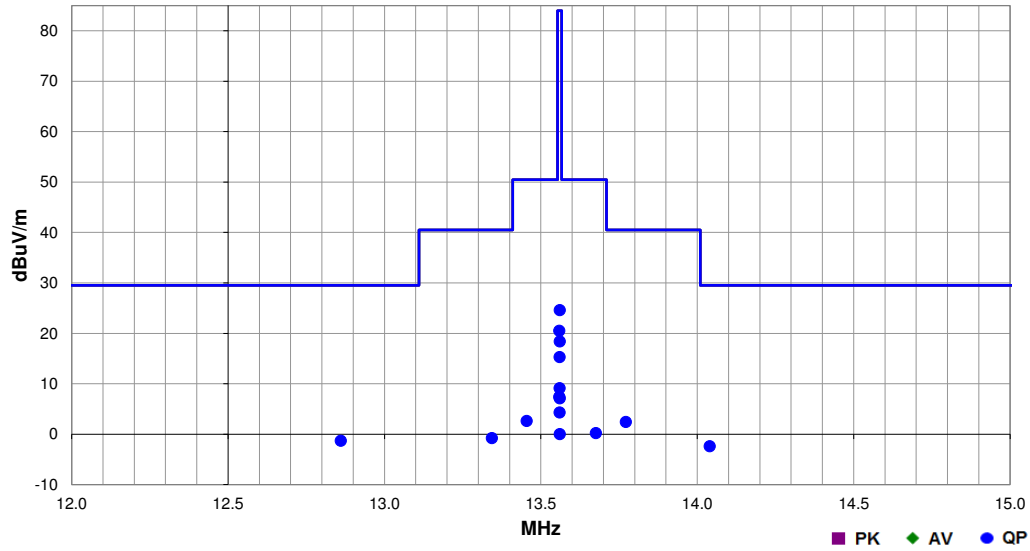
As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of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

FIELD STRENGTH OF FUNDAMENTAL

Work Order:	ONIT0019	**Date:**	06/20/16		
Project:	None	**Temperature:**	23.7 °C		
Job Site:	EV11	**Humidity:**	44.8% RH		
Serial Number:	HT22P15111400Q	**Barometric Pres.:**	1022 mbar	**Tested by:**	Jeff Alcoke and Rod Peloquin
EUT:	RFID Encoder				
Configuration:	4				
Customer:	Onity Inc., A Division of UTCFS				
Attendees:	None				
EUT Power:	110VAC/60Hz				
Operating Mode:	Programming spare card keys via RFID				
Deviations:	None				
Comments:	See data comments for EUT and antenna position.				

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

Run #	23	**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
12.860	6.8	11.0	1.0	268.0	10.0	0.0	Horz	QP	-19.1	-1.3	29.5	-30.8	Antenna perp to EUT, perp to ground, EUT vertical
14.040	5.7	11.0	1.0	130.0	10.0	0.0	Horz	QP	-19.1	-2.4	29.5	-31.9	Antenna perp to EUT, perp to ground, EUT vertical
13.771	10.5	11.0	1.0	231.0	10.0	0.0	Horz	QP	-19.1	2.4	40.5	-38.1	Antenna perp to EUT, perp to ground, EUT vertical
13.343	7.3	11.0	1.0	271.0	10.0	0.0	Horz	QP	-19.1	-0.8	40.5	-41.3	Antenna perp to EUT, perp to ground, EUT vertical
13.454	10.7	11.0	1.0	264.0	10.0	0.0	Horz	QP	-19.1	2.6	50.5	-47.9	Antenna perp to EUT, perp to ground, EUT vertical
13.676	8.3	11.0	1.0	289.0	10.0	0.0	Horz	QP	-19.1	0.2	50.5	-50.3	Antenna perp to EUT, perp to ground, EUT vertical
13.560	32.7	11.0	1.0	269.0	10.0	0.0	Horz	QP	-19.1	24.6	84.0	-59.4	Antenna perp to EUT, perp to ground, EUT vertical
13.559	28.6	11.0	1.0	280.0	10.0	0.0	Horz	QP	-19.1	20.5	84.0	-63.5	Antenna perp to EUT, perp to ground, EUT on side
13.560	26.5	11.0	1.0	224.0	10.0	0.0	Horz	QP	-19.1	18.4	84.0	-65.6	Antenna para to EUT, perp to ground, EUT vertical
13.560	23.4	11.0	1.0	222.0	10.0	0.0	Horz	QP	-19.1	15.3	84.0	-68.7	Antenna para to EUT, perp to ground, EUT on side
13.560	17.2	11.0	1.0	135.0	10.0	0.0	Vert	QP	-19.1	9.1	84.0	-74.9	Antenna perp to EUT, para to ground, EUT vertical
13.559	15.5	11.0	1.0	37.0	10.0	0.0	Horz	QP	-19.1	7.4	84.0	-76.6	Antenna perp to EUT, perp to ground, EUT horizontal
13.560	15.2	11.0	1.0	301.0	10.0	0.0	Vert	QP	-19.1	7.1	84.0	-76.9	Antenna perp to EUT, para to ground, EUT on side
13.560	12.4	11.0	1.0	-1.0	10.0	0.0	Horz	QP	-19.1	4.3	84.0	-79.7	Antenna para to EUT, perp to ground, EUT horizontal
13.561	8.1	11.0	1.0	317.0	10.0	0.0	Vert	QP	-19.1	0.0	84.0	-84.0	Antenna perp to EUT, para to ground, EUT horizontal

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

On, transmitting 13.56 MHz with 100% duty cycle

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

ONIT0019 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	10 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	3m Test Distance Cable	EVM	5/12/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1551	AOY	5/12/2016	12 mo
Analyzer - Spectrum Analyzer	Agilent	E4443A	AFB	5/17/2016	12 mo

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.

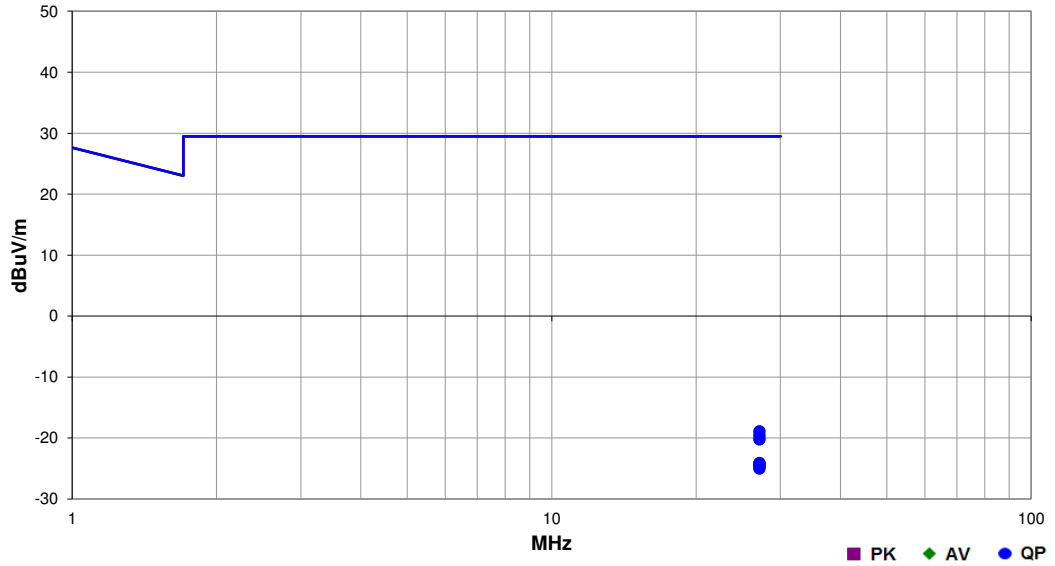
As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of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

FIELD STRENGTH OF SPURIOUS EMISSIONS LESS THAN 30 MHz

Work Order:	ONIT0019	**Date:**	05/31/16		
Project:	None	**Temperature:**	21.7 °C		
Job Site:	EV11	**Humidity:**	41.5% RH		
Serial Number:	HT22P15111400Q	**Barometric Pres.:**	1020 mbar	**Tested by:**	Jeff Alcoke and Rod Peloquin
EUT:	RFID Encoder				
Configuration:	1				
Customer:	Onity Inc., A Division of UTCFS				
Attendees:	None				
EUT Power:	110VAC/60Hz				
Operating Mode:	On, transmitting 13.56 MHz with 100% duty cycle				
Deviations:	None				
Comments:	See comments for antenna and EUT orientation				

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

Run #	9	**Test Distance (m)**	3	**Antenna Height(s)**	1(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	11.7	9.4	1.0	135.0	3.0	0.0	Horz	QP	-40.0	-18.9	29.5	-48.4	Antenna perp to EUT, perp to ground, EUT vertical
27.120	11.0	9.4	1.0	160.0	3.0	0.0	Horz	QP	-40.0	-19.6	29.5	-49.1	Antenna perp to EUT, perp to ground, EUT horizontal
27.121	10.4	9.4	1.0	117.0	3.0	0.0	Horz	QP	-40.0	-20.2	29.5	-49.7	Antenna perp to EUT, perp to ground, EUT on side
27.120	6.5	9.4	1.0	144.0	3.0	0.0	Horz	QP	-40.0	-24.1	29.5	-53.6	Antenna para to EUT, perp to ground, EUT vertical
27.120	6.4	9.4	1.0	29.0	3.0	0.0	Vert	QP	-40.0	-24.2	29.5	-53.7	Antenna perp to EUT, para to ground, EUT on side
27.120	6.3	9.4	1.0	129.0	3.0	0.0	Horz	QP	-40.0	-24.3	29.5	-53.8	Antenna para to EUT, perp to ground, EUT horizontal
27.120	6.1	9.4	1.0	235.0	3.0	0.0	Horz	QP	-40.0	-24.5	29.5	-54.0	Antenna para to EUT, perp to ground, EUT on side
27.121	6.0	9.4	1.0	141.0	3.0	0.0	Vert	QP	-40.0	-24.6	29.5	-54.1	Antenna perp to EUT, para to ground, EUT horizontal
27.122	5.6	9.4	1.0	37.0	3.0	0.0	Vert	QP	-40.0	-25.0	29.5	-54.5	Antenna perp to EUT, para to ground, EUT vertical

FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER 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

On, transmitting 13.56 MHz

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

ONIT0019-1

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
Antenna - Biconilog	EMCO	3141	AXE	8/29/2014	24 mo
Cable	N/A	Bilog Cables	EVA	3/11/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AOL	3/11/2016	12 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.

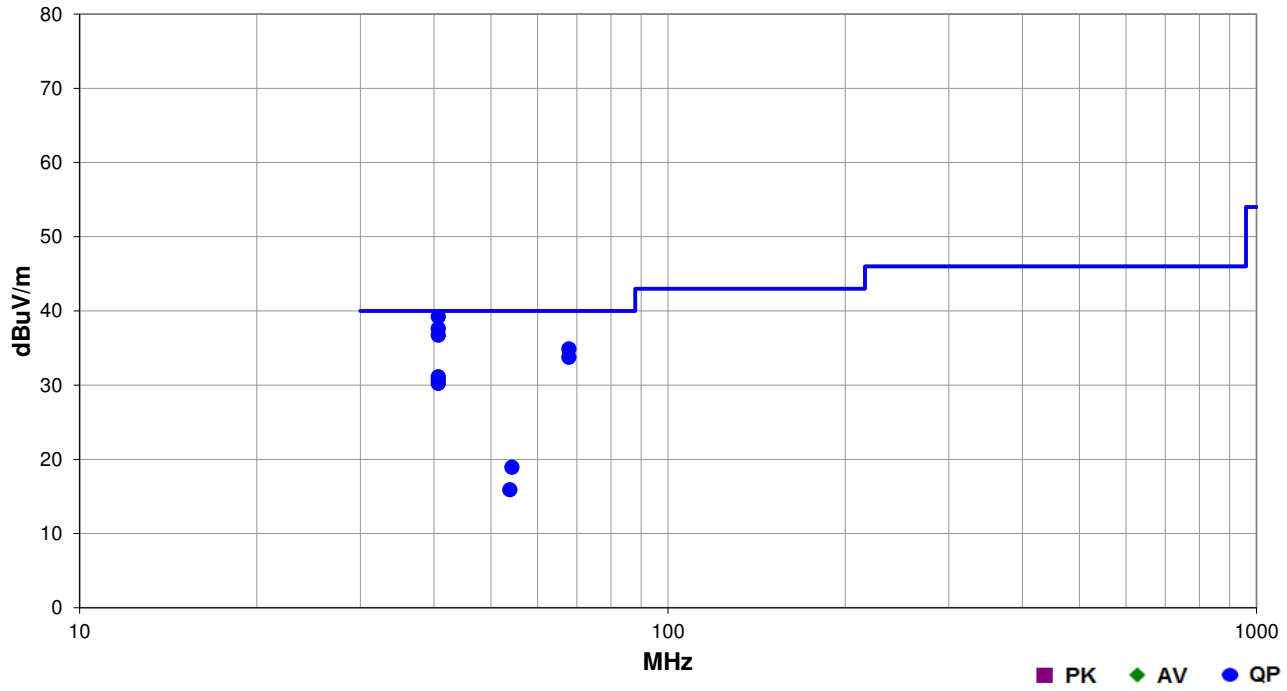
While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.10:2009).

FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER THAN 30 MHz

Work Order:	ONIT0019	**Date:**	05/24/16		
Project:	None	**Temperature:**	22.5 °C		
Job Site:	EV11	**Humidity:**	44.5% RH		
Serial Number:	None	**Barometric Pres.:**	1018 mbar	**Tested by:**	Jeff Alcoke and Rod Peloquin
EUT:	RFID Encoder				
Configuration:	1				
Customer:	Onity Inc., A Division of UTCFS				
Attendees:	None				
EUT Power:	110VAC/60Hz				
Operating Mode:	On, transmitting 13.56 MHz				
Deviations:	None				
Comments:	Added Ferrite brand ferrite (PN#0431164951) between RFID radio PCB and RFID Encoder PCB				

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

Run #	4	**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
40.687	65.2	-26.0	1.0	266.0	3.0	0.0	Vert	QP	0.0	39.2	40.0	-0.8	EUT side
40.693	63.6	-26.0	1.0	84.0	3.0	0.0	Vert	QP	0.0	37.6	40.0	-2.4	EUT vert
40.688	62.7	-26.0	4.0	5.0	3.0	0.0	Horz	QP	0.0	36.7	40.0	-3.3	EUT horz
67.807	65.8	-30.9	2.2	275.0	3.0	0.0	Vert	QP	0.0	34.9	40.0	-5.1	EUT side
67.813	64.7	-30.9	3.1	7.0	3.0	0.0	Horz	QP	0.0	33.8	40.0	-6.2	EUT side
40.693	57.1	-26.0	4.0	14.0	3.0	0.0	Horz	QP	0.0	31.1	40.0	-8.9	EUT side
40.688	56.6	-26.0	3.4	6.0	3.0	0.0	Horz	QP	0.0	30.6	40.0	-9.4	EUT vert
40.692	56.2	-26.0	1.0	273.0	3.0	0.0	Vert	QP	0.0	30.2	40.0	-9.8	EUT horz
54.257	48.7	-29.8	1.0	5.0	3.0	0.0	Vert	QP	0.0	18.9	40.0	-21.1	EUT side
53.830	45.6	-29.7	4.0	38.0	3.0	0.0	Horz	QP	0.0	15.9	40.0	-24.1	EUT side

POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC

WTD.2016.03.10
PSA-ESCI 2016.03.11, EmiR5 2016.03.11

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

ONIT0019-1
ONIT0019-2

MODES INVESTIGATED

On, transmitting 13.56 MHz with 100% duty cycle

POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2016.03.10
PSA-ESCI 2016.03.11, EmiR5 2016.03.11

EUT:	RFID Encoder	Work Order:	ONIT0019
Serial Number:	HT22P15111400Q	Date:	05/26/2016
Customer:	Onity Inc., A Division of UTCFS	Temperature:	21.6°C
Attendees:	None	Relative Humidity:	43.7%
Customer Project:	None	Bar. Pressure:	1027 mb
Tested By:	Jeff Alcoke and Rod Peloquin	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	ONIT0019-1

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	7	Line:	High Line	Add. Ext. Attenuation (dB):	0

COMMENTS

None

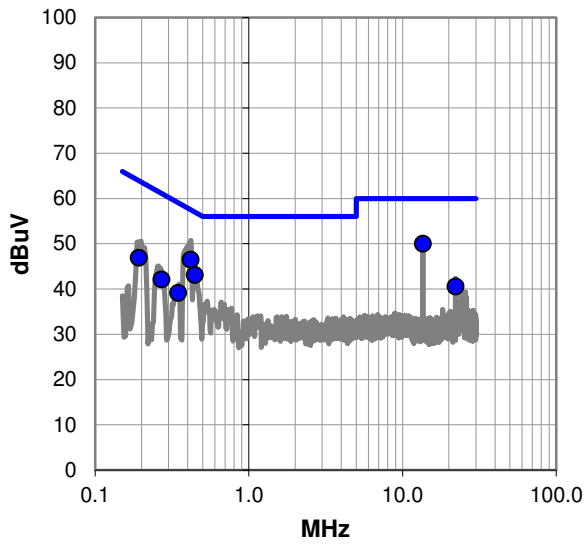
EUT OPERATING MODES

On, transmitting 13.56 MHz with 100% duty cycle

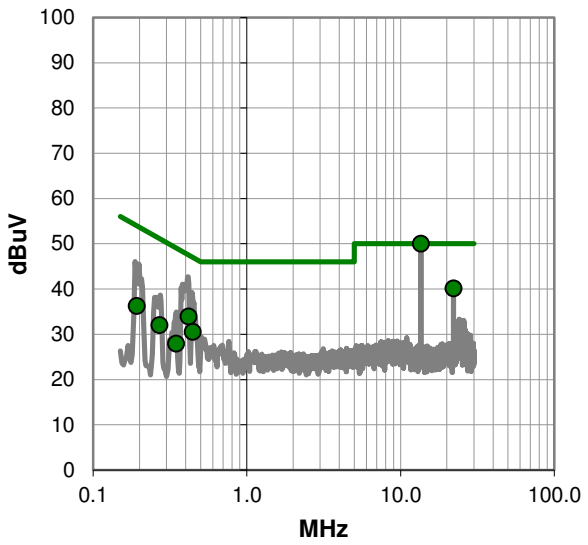
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC

WTD.2016.03.10
PSA-ESCI 2016.03.11, EmiR5 2016.03.11

RESULTS - Run #7

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.560	29.6	20.4	50.0	60.0	-10.0
0.417	26.8	19.7	46.5	57.5	-11.0
0.445	23.4	19.7	43.1	57.0	-13.9
0.193	27.1	19.8	46.9	63.9	-17.0
0.271	22.3	19.8	42.1	61.1	-19.0
22.117	19.8	20.7	40.5	60.0	-19.5
0.346	19.4	19.7	39.1	59.1	-20.0

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.560	29.6	20.4	50.0	50.0	0.0
22.117	19.4	20.7	40.1	50.0	-9.9
0.417	14.2	19.7	33.9	47.5	-13.6
0.445	10.8	19.7	30.5	47.0	-16.5
0.193	16.4	19.8	36.2	53.9	-17.7
0.271	12.2	19.8	32.0	51.1	-19.1
0.346	8.2	19.7	27.9	49.1	-21.2

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2016.03.10
PSA-ESCI 2016.03.11, EmiR5 2016.03.11

EUT:	RFID Encoder	Work Order:	ONIT0019
Serial Number:	HT22P15111400Q	Date:	05/26/2016
Customer:	Onity Inc., A Division of UTCFS	Temperature:	21.6°C
Attendees:	None	Relative Humidity:	43.7%
Customer Project:	None	Bar. Pressure:	1027 mb
Tested By:	Jeff Alcoke and Rod Peloquin	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	ONIT0019-1

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	8	Line:	Neutral	Add. Ext. Attenuation (dB):	0

COMMENTS

None

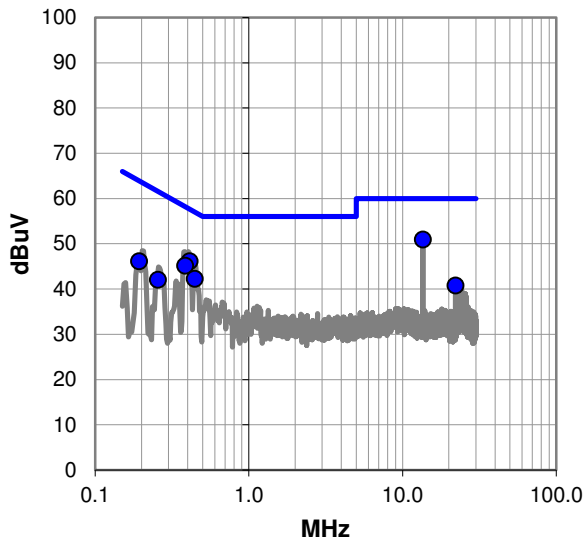
EUT OPERATING MODES

On, transmitting 13.56 MHz with 100% duty cycle

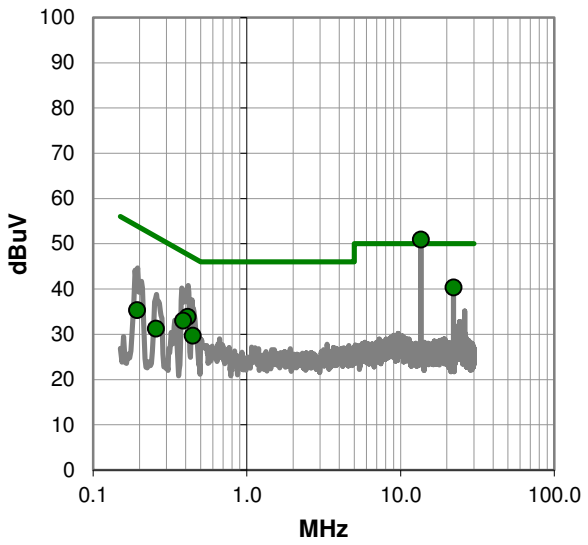
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC

WTD.2016.03.10
PSA-ESCI 2016.03.11, EmiR5 2016.03.11

RESULTS - Run #8

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.560	30.5	20.4	50.9	60.0	-9.1
0.411	26.4	19.7	46.1	57.6	-11.5
0.386	25.4	19.7	45.1	58.2	-13.1
0.445	22.5	19.7	42.2	57.0	-14.8
0.193	26.3	19.8	46.1	63.9	-17.8
22.117	20.0	20.7	40.7	60.0	-19.3
0.257	22.2	19.8	42.0	61.5	-19.5

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.560	30.5	20.4	50.9	50.0	0.9
22.117	19.6	20.7	40.3	50.0	-9.7
0.411	14.1	19.7	33.8	47.6	-13.8
0.386	13.3	19.7	33.0	48.2	-15.2
0.445	10.0	19.7	29.7	47.0	-17.3
0.193	15.5	19.8	35.3	53.9	-18.6
0.257	11.4	19.8	31.2	51.5	-20.3

CONCLUSION

Fail

Tested By

POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2016.03.10
PSA-ESCI 2016.03.11, EmiR5 2016.03.11

EUT:	RFID Encoder	Work Order:	ONIT0019
Serial Number:	HT22P15111400Q	Date:	05/26/2016
Customer:	Onity Inc., A Division of UTCFS	Temperature:	21.6°C
Attendees:	None	Relative Humidity:	43.7%
Customer Project:	None	Bar. Pressure:	1027 mb
Tested By:	Jeff Alcoke and Rod Peloquin	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	ONIT0019-2

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	9	Line:	High Line	Add. Ext. Attenuation (dB):	0

COMMENTS

Antenna removed

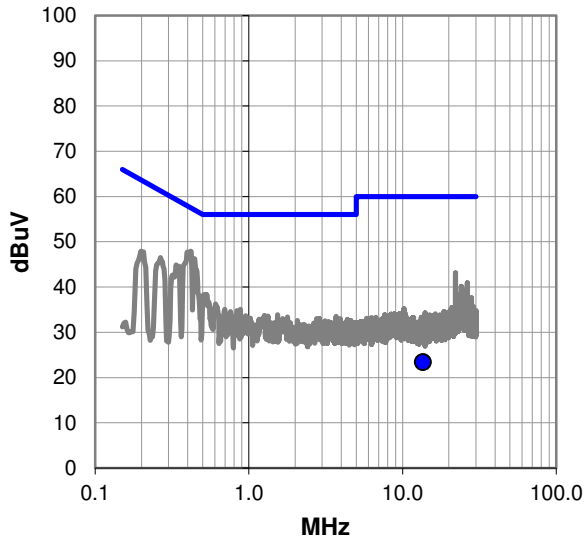
EUT OPERATING MODES

On, transmitting 13.56 MHz with 100% duty cycle

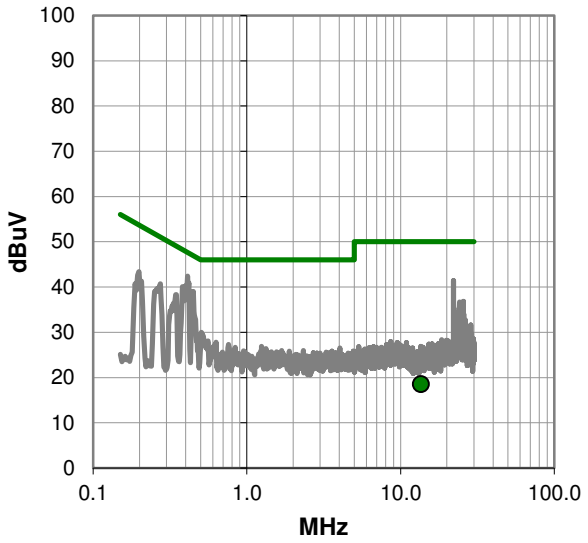
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2016.03.10
PSA-ESCI 2016.03.11, EmiR5 2016.03.11

RESULTS - Run #9

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.559	3.0	20.4	23.4	60.0	-36.6

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.559	-1.9	20.4	18.5	50.0	-31.5

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2016.03.10
PSA-ESCI 2016.03.11, EmiR5 2016.03.11

EUT:	RFID Encoder	Work Order:	ONIT0019
Serial Number:	HT22P15111400Q	Date:	05/26/2016
Customer:	Onity Inc., A Division of UTCFS	Temperature:	21.6°C
Attendees:	None	Relative Humidity:	43.7%
Customer Project:	None	Bar. Pressure:	1027 mb
Tested By:	Jeff Alcoke and Rod Peloquin	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	ONIT0019-2

TEST SPECIFICATIONS

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

TEST PARAMETERS

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

COMMENTS

Antenna removed

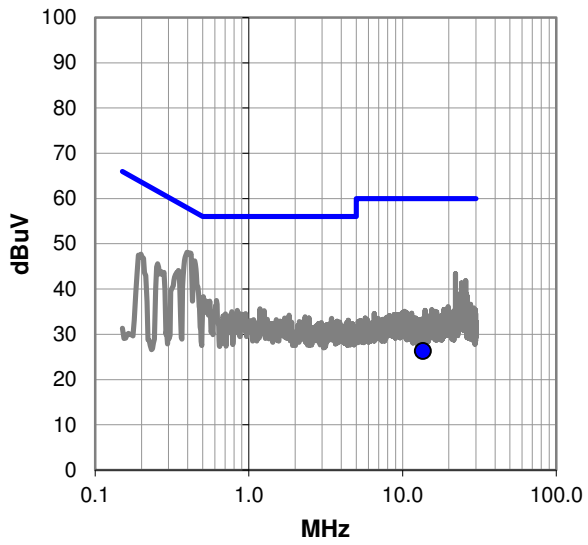
EUT OPERATING MODES

On, transmitting 13.56 MHz with 100% duty cycle

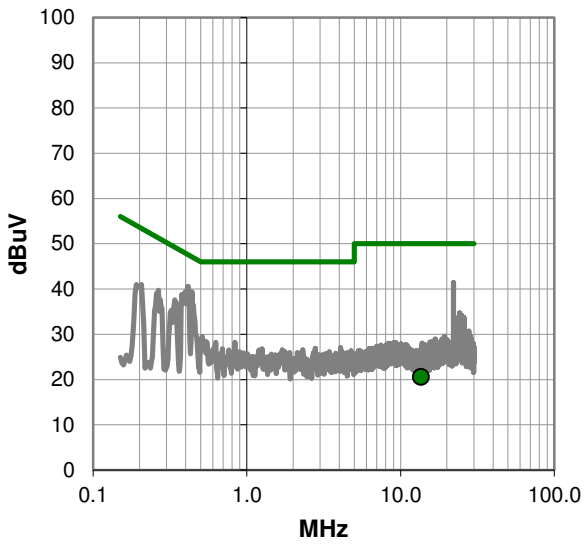
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC

WTD.2016.03.10
PSA-ESCI 2016.03.11, EmiR5 2016.03.11

RESULTS - Run #10

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.570	5.9	20.4	26.3	60.0	-33.7

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.570	0.2	20.4	20.6	50.0	-29.4

CONCLUSION

Pass

Tested By