NORTHWEST EMC

# Onity Inc., A Division of UTCFS

## Advance RFID BTLE Wall Reader

## FCC 15.225:2015

## Report # ONIT0007.2

NVLAP Lab Code: 200630-0

# CERTIFICATE OF TEST

**Last Date of Test: September 30, 2015**
**Onity Inc., A Division of UTCFS**
**Model: Advance RFID BTLE Wall Reader**
**For a complete model list, reference document P/N 10104088P1**
**(DOC, ADVANCE RFID BTLE WALL READER MODEL LIST)**

## Radio Equipment Testing

### Standards

| Specification | Method |
|---|---|
| FCC 15.225:2015 | ANSI C63.10:2013 |

### Results

| Method Clause | Test Description | Applied | Results | Comments |
|---|---|---|---|---|
| 6.2 | Powerline Conducted Emissions | No | N\A | Not required for a battery powered EUT. |
| 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 2015.2.19

## 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 Conformity Assessment Body (CAB) under the EMC directive and 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 WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) for each test is on each data sheet. 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.

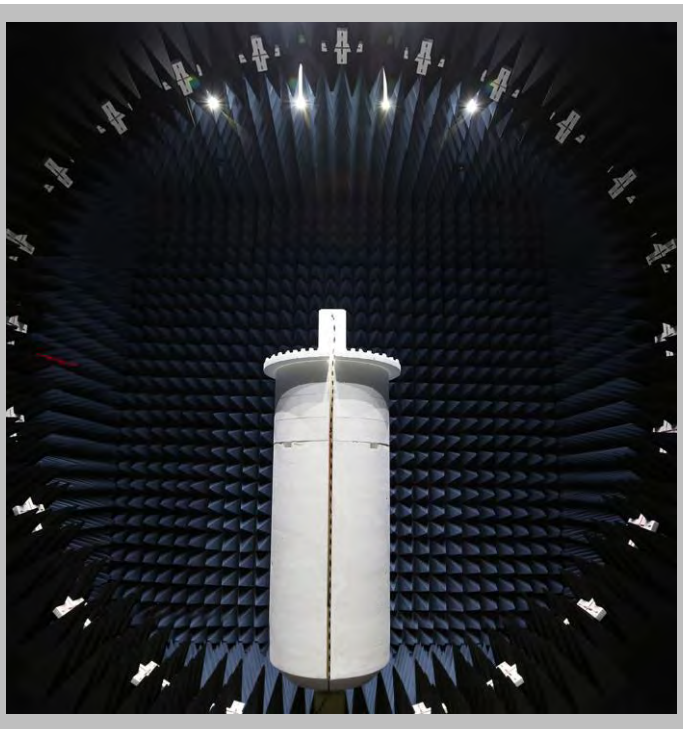
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

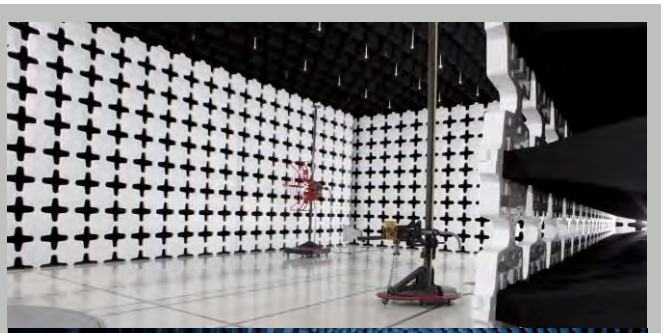
| Test | + MU | - MU |
|---|---|---|
| Frequency Accuracy (Hz) | 0.0007% | -0.0007% |
| Amplitude Accuracy (dB) | 1.2 dB | -1.2 dB |
| Conducted Power (dB) | 0.3 dB | -0.3 dB |
| Radiated Power via Substitution (dB) | 0.7 dB | -0.7 dB |
| Temperature (degrees C) | 0.7°C | -0.7°C |
| Humidity (% RH) | 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 |

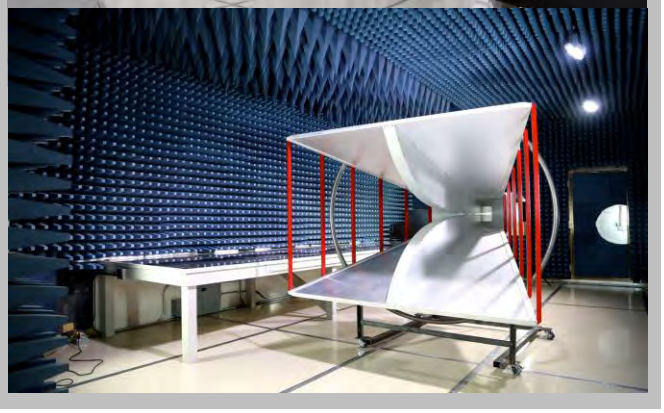
# FACILITIES

NORTHWEST EMC
REV 2015.2.19

| California | Minnesota | New York | Oregon | Texas | Washington |
|---|---|---|---|---|---|
| Labs OC01-13<br>41 Tesla<br>Irvine, CA 92618<br>(949) 861-8918 | Labs MN01-08, MN10<br>9349 W Broadway Ave.<br>Brooklyn Park, MN 55445<br>(612)-638-5136 | Labs NY01-04<br>4939 Jordan Rd.<br>Elbridge, NY 13060<br>(315) 554-8214 | Labs EV01-12<br>22975 NW Evergreen Pkwy<br>Hillsboro, OR 97124<br>(503) 844-4066 | Labs TX01-09<br>3801 E Plano Pkwy<br>Plano, TX 75074<br>(469) 304-5255 | Labs NC01-05<br>19201 120th Ave NE<br>Bothell, WA 9801<br>(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:** | Mike Gersztyn |
| **Model:** | Advance RFID BTLE Wall Reader |
| **First Date of Test:** | September 28, 2015 |
| **Last Date of Test:** | September 30, 2015 |
| **Receipt Date of Samples:** | September 02, 2015 |
| **Equipment Design Stage:** | Production |
| **Equipment Condition:** | No Damage |

## Information Provided by the Party Requesting the Test

| **Functional Description of the EUT:** |
|---|
| RFID card reading device w/ DirectKey Module |

| **Testing Objective:** |
|---|
| To demonstrate compliance to FCC Part 15.225 specifications for 13.56 MHz RFID radio. |

# CONFIGURATIONS

NORTHWEST EMC 2014-12-10

## Configuration ONIT0007- 2

| EUT | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| BT/RFID Lock | Onity Inc., A Division of UTCFS | Advance RFID BTLE Wall Reader | None |

| Peripherals in test setup boundary | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| Lock Power Supply/Charger Box | Onity Inc., A Division of UTCFS | AL300ALT | None |

| Remote Equipment Outside of Test Setup Boundary | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| Tablet | Microsoft | WinBook | None |

| Cables | | | | | |
|---|---|---|---|---|---|
| **Cable Type** | **Shield** | **Length (m)** | **Ferrite** | **Connection 1** | **Connection 2** |
| AC Power | No | 1.7m | No | AC Mains | Lock Power Supply/Charger Box |
| Lock Cable | No | 0.8m | No | Lock Power Supply/Charger Box | BT/RFID Lock |
| DC Leads x2 | No | 1.0m | No | DC Power Supply | Lock Power Supply/Charger Box |

## Configuration ONIT0007- 3

| EUT | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| BT/RFID Lock | Onity Inc., A Division of UTCFS | Advance RFID BTLE Wall Reader | None |

| Peripherals in test setup boundary | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| Lock Power Supply/Charger Box | Onity Inc., A Division of UTCFS | AL300ALT | None |

| Cables | | | | | |
|---|---|---|---|---|---|
| **Cable Type** | **Shield** | **Length (m)** | **Ferrite** | **Connection 1** | **Connection 2** |
| AC Power | No | 1.7m | No | AC Mains | Lock Power Supply/Charger Box |
| Lock Cable | No | 0.8m | No | Lock Power Supply/Charger Box | BT/RFID Lock |

# MODIFICATIONS

NORTHWEST EMC
2014-12-10

## Equipment Modifications

| Item | Date | Test | Modification | Note | Disposition of EUT |
|---|---|---|---|---|---|
| 1 | 9/28/2015 | 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 | 9/30/2015 | 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. | EUT remained at Northwest EMC following the test. |
| 3 | 9/30/2015 | 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. |
| 4 | 9/30/2015 | 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. | Scheduled testing was completed. |

# 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

RFID continuous Tx at 13.56MHz

## POWER SETTINGS INVESTIGATED

120VAC/60Hz

## CONFIGURATIONS INVESTIGATED

ONIT0007 - 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 | 5/11/2015 | 12 mo |
| Antenna, Loop | EMCO | 6502 | AOA | 6/24/2014 | 24 mo |
| Analyzer - Spectrum Analyzer | Agilent | E4443A | AFB | 3/17/2015 | 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.

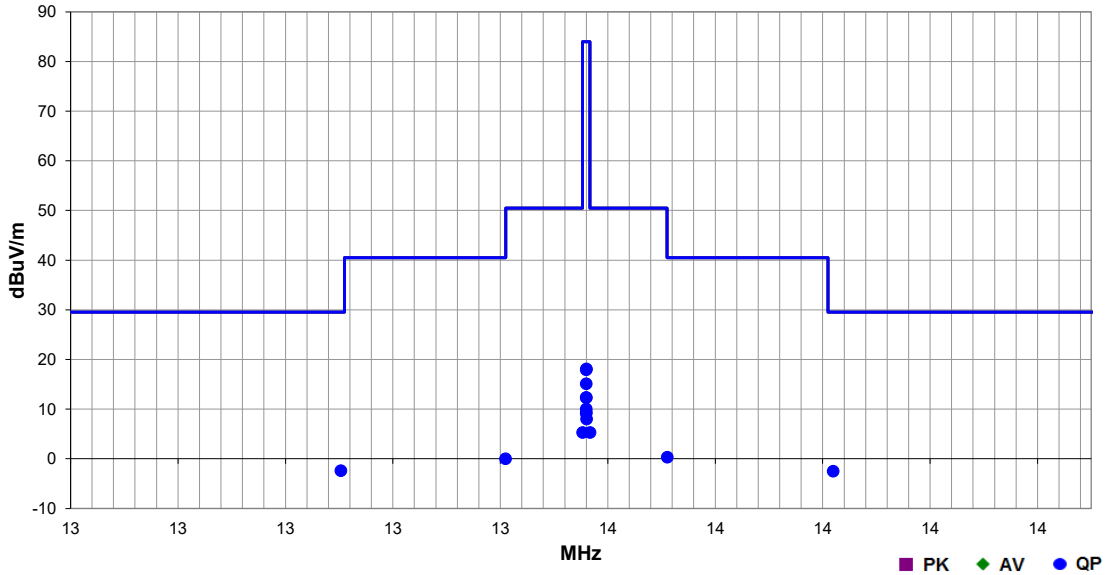
As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of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

# FIELD STRENGTH OF FUNDAMENTAL

| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | ONIT0007 | **Date:** | 09/30/15 | | |
| **Project:** | None | **Temperature:** | 21.3 °C | | |
| **Job Site:** | EV11 | **Humidity:** | 41.3% RH | | |
| **Serial Number:** | None | **Barometric Pres.:** | 1012.6 mbar | **Tested by:** | Cole Ghizzone, Brandon Hobbs |
| **EUT:** | Advance RFID BTLE Wall Reader | | | | |
| **Configuration:** | 3 | | | | |
| **Customer:** | Onity Inc., A Division of UTCFS | | | | |
| **Attendees:** | None | | | | |
| **EUT Power:** | 120VAC/60Hz | | | | |
| **Operating Mode:** | RFID continuous Tx at 13.56MHz | | | | |
| **Deviations:** | None | | | | |
| **Comments:** | See data comments for EUT orientation | | | | |

| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.225:2015 | ANSI C63.10:2013 |

| **Run #** | 14 | **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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13.103 | 5.9 | 10.8 | 1.0 | 192.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | -2.4 | 29.5 | -31.9 | Ant. perp to floor/perp to EUT, EUT On Side |
| 14.020 | 5.8 | 10.8 | 1.0 | 126.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | -2.5 | 29.5 | -32.0 | Ant. perp to floor/perp to EUT, EUT On Side |
| 13.711 | 8.6 | 10.8 | 1.0 | 100.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | 0.3 | 40.5 | -40.2 | Ant. perp to floor/perp to EUT, EUT On Side |
| 13.410 | 8.3 | 10.8 | 1.0 | 84.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | 0.0 | 40.5 | -40.5 | Ant. perp to floor/perp to EUT, EUT On Side |
| 13.553 | 13.6 | 10.8 | 1.0 | 114.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | 5.3 | 50.5 | -45.2 | Ant. perp to floor/perp to EUT, EUT On Side |
| 13.567 | 13.6 | 10.8 | 1.0 | 91.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | 5.3 | 50.5 | -45.2 | Ant. perp to floor/perp to EUT, EUT On Side |
| 13.560 | 26.4 | 10.8 | 1.0 | 48.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | 18.1 | 84.0 | -65.9 | Ant. perp to floor/perp to EUT, EUT On Side |
| 13.560 | 26.2 | 10.8 | 1.0 | 92.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | 17.9 | 84.0 | -66.1 | Ant. perp to floor/perp to EUT, EUT Vert |
| 13.560 | 23.4 | 10.8 | 1.0 | 265.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | 15.1 | 84.0 | -68.9 | Ant. perp to floor/perp to EUT, EUT Horz |
| 13.560 | 20.6 | 10.8 | 1.0 | 162.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | 12.3 | 84.0 | -71.7 | Ant. perp to floor/para to EUT, EUT On Side |
| 13.560 | 20.6 | 10.8 | 1.0 | 220.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | 12.3 | 84.0 | -71.7 | Ant. perp to floor/para to EUT, EUT Vert |
| 13.560 | 18.3 | 10.8 | 1.0 | 21.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | 10.0 | 84.0 | -74.0 | Ant. perp to floor/para to EUT, EUT Horz |
| 13.560 | 17.7 | 10.8 | 1.0 | 84.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | 9.4 | 84.0 | -74.6 | Ant. para to floor/perp to EUT, EUT Vert |
| 13.560 | 17.4 | 10.8 | 1.0 | 51.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | 9.1 | 84.0 | -74.9 | Ant. para to floor/perp to EUT, EUT On Side |
| 13.560 | 16.3 | 10.8 | 1.0 | 286.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | 8.0 | 84.0 | -76.0 | Ant. para to floor/perp to EUT, EUT Horz |

NORTHWEST EMC
description

# FIELD STRENGTH OF SPURIOUS EMISSIONS LESS THAN 30MHz

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

RFID continuous Tx at 13.56MHz

## POWER SETTINGS INVESTIGATED

120VAC/60Hz

## CONFIGURATIONS INVESTIGATED

ONIT0007 - 3

## FREQUENCY RANGE INVESTIGATED

| | | | |
|---|---|---|---|
| Start Frequency | 9 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 | 5/11/2015 | 12 mo |
| Antenna, Loop | EMCO | 6502 | AOA | 6/24/2014 | 24 mo |
| Analyzer - Spectrum Analyzer | Agilent | E4443A | AFB | 3/17/2015 | 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.

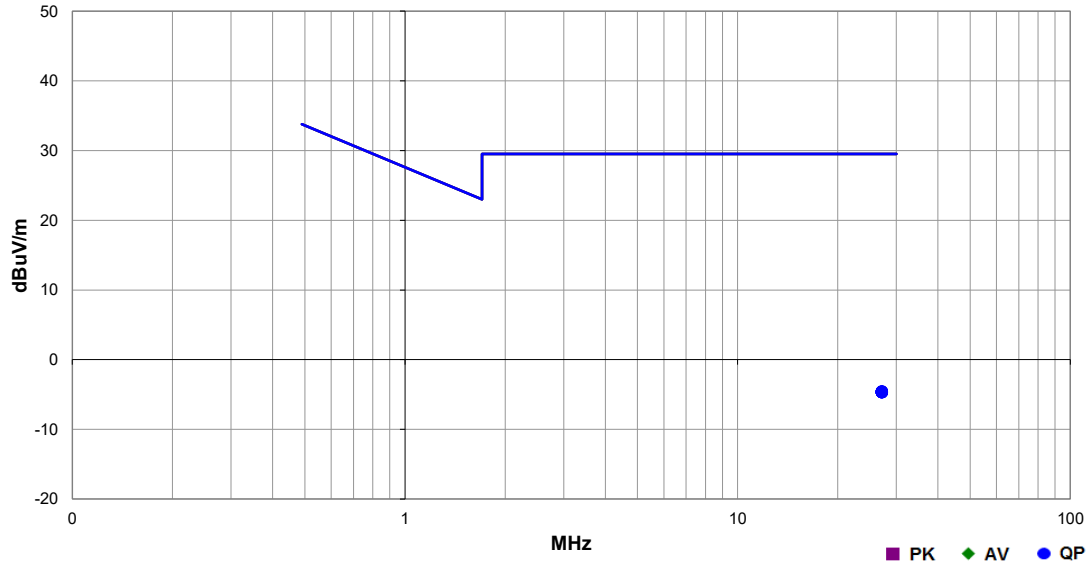
As outlined in 15.209(e) and 15.31(f)(2), measurements may be performed at a distance closer than what is specified with the limit. The limit at the specified distance is shown on the data sheet. Measurements are made at a closer distance and the data is adjusted using a distance correction factor of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

# FIELD STRENGTH OF SPURIOUS EMISSIONS LESS THAN 30MHz

| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | ONIT0007 | **Date:** | 09/30/15 | | |
| **Project:** | None | **Temperature:** | 21.3 °C | | |
| **Job Site:** | EV11 | **Humidity:** | 41.3% RH | | |
| **Serial Number:** | None | **Barometric Pres.:** | 1012.6 mbar | **Tested by:** | Cole Ghizzone, Brandon Hobbs |
| **EUT:** | Advance RFID BTLE Wall Reader | | | | |
| **Configuration:** | 3 | | | | |
| **Customer:** | Onity Inc., A Division of UTCFS | | | | |
| **Attendees:** | None | | | | |
| **EUT Power:** | 120VAC/60Hz | | | | |
| **Operating Mode:** | RFID continuous Tx at 13.56MHz | | | | |
| **Deviations:** | None | | | | |
| **Comments:** | See comments for EUT orientation | | | | |

| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.225:2015 | ANSI C63.10:2013 |

| **Run #** | 21 | **Test Distance (m)** | 10 | **Antenna Height(s)** | 1m | **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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 27.119 | 5.6 | 8.9 | 1.0 | 274.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | -4.5 | 29.5 | -34.1 | Ant. perp to floor/perp to EUT, EUT Horz |
| 27.116 | 5.5 | 8.9 | 1.0 | 65.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | -4.6 | 29.5 | -34.2 | Ant. para to floor/perp to EUT, EUT Horz |
| 27.116 | 5.5 | 8.9 | 1.0 | 32.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | -4.6 | 29.5 | -34.2 | Ant. perp to floor/para to EUT, EUT On Side |
| 27.118 | 5.5 | 8.9 | 1.0 | 284.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | -4.6 | 29.5 | -34.2 | Ant. para to floor/perp to EUT, EUT Vert |
| 27.119 | 5.5 | 8.9 | 1.0 | 308.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | -4.6 | 29.5 | -34.2 | Ant. para to floor/para to EUT, EUT Horz |
| 27.119 | 5.5 | 8.9 | 1.0 | 18.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | -4.6 | 29.5 | -34.2 | Ant. para to floor/perp to EUT, EUT On Side |
| 27.120 | 5.5 | 8.9 | 1.0 | 11.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | -4.6 | 29.5 | -34.2 | Ant. perp to floor/para to EUT, EUT Vert |
| 27.120 | 5.5 | 8.9 | 1.0 | 94.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | -4.6 | 29.5 | -34.2 | Ant. perp to floor/perp to EUT, EUT Vert |
| 27.124 | 5.5 | 8.9 | 1.0 | 74.0 | 10.0 | 0.0 | See Comments | QP | -19.1 | -4.6 | 29.5 | -34.2 | Ant. perp to floor/perp to EUT, EUT On Side |

# FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER THAN 30MHz

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

RFID continuous Tx at 13.56MHz

## POWER SETTINGS INVESTIGATED

120VAC/60Hz

## CONFIGURATIONS INVESTIGATED

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## 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 | 2/10/2015 | 12 mo |
| Amplifier - Pre-Amplifier | Miteq | AM-1616-1000 | AOL | 2/10/2015 | 12 mo |
| Antenna - Biconilog | EMCO | 3141 | AXE | 8/29/2014 | 24 mo |
| Analyzer - Spectrum Analyzer | Keysight | N9010A | AFN | 2/10/2015 | 12 mo |

## TEST DESCRIPTION

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

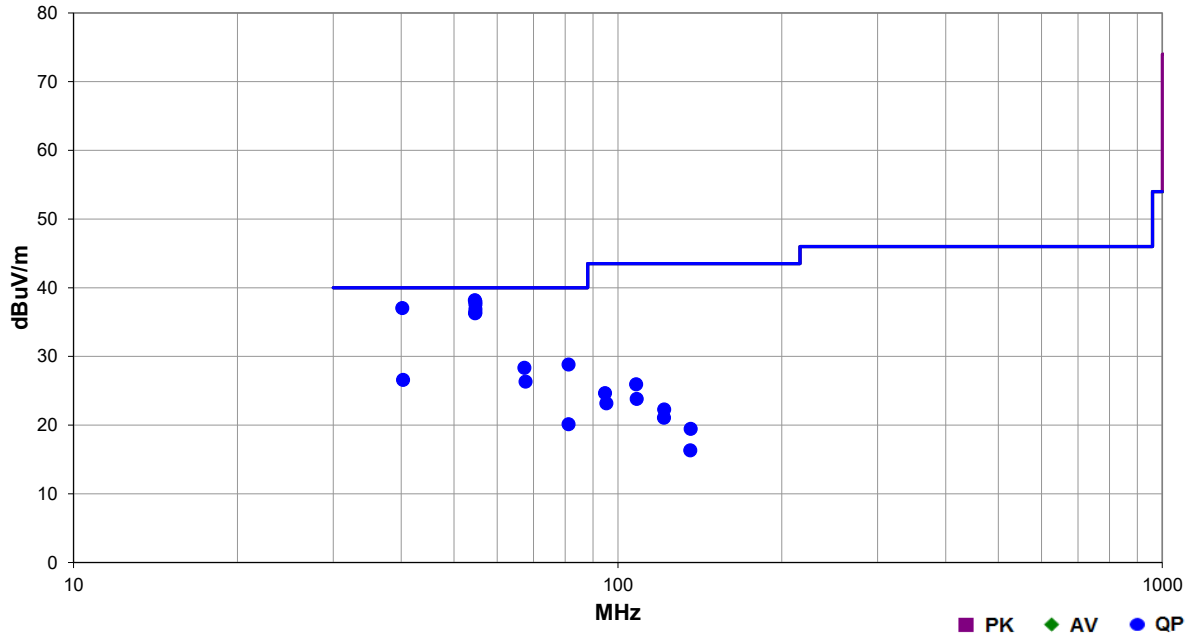
While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.10:2009).

# FIELD STRENGTH OF SPURIOUS EMISSIONS GREATER THAN 30MHz

| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | ONIT0007 | **Date:** | 09/30/15 | | |
| **Project:** | None | **Temperature:** | 22.4 °C | | |
| **Job Site:** | EV01 | **Humidity:** | 38.8% RH | | |
| **Serial Number:** | None | **Barometric Pres.:** | 1012.7 mbar | **Tested by:** | Cole Ghizzone, Brandon Hobbs |
| **EUT:** | Advance RFID BTLE Wall Reader | | | | |
| **Configuration:** | 3 | | | | |
| **Customer:** | Onity Inc., A Division of UTCFS | | | | |
| **Attendees:** | None | | | | |
| **EUT Power:** | 120VAC/60Hz | | | | |
| **Operating Mode:** | RFID continuous Tx at 13.56MHz | | | | |
| **Deviations:** | None | | | | |
| **Comments:** | See comments for EUT orientation | | | | |

| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.225:2015 | ANSI C63.10:2013 |

| **Run #** | 3 | **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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 54.585 | 48.3 | -10.1 | 1.0 | 96.0 | 3.0 | 0.0 | Vert | QP | 0.0 | 38.2 | 40.0 | -1.8 | EUT Horz |
| 54.740 | 48.1 | -10.1 | 1.0 | 69.0 | 3.0 | 0.0 | Vert | QP | 0.0 | 38.0 | 40.0 | -2.0 | EUT Vert |
| 54.740 | 47.7 | -10.1 | 4.0 | 182.0 | 3.0 | 0.0 | Horz | QP | 0.0 | 37.6 | 40.0 | -2.4 | EUT On Side |
| 40.180 | 43.3 | -6.3 | 1.0 | 73.0 | 3.0 | 0.0 | Vert | QP | 0.0 | 37.0 | 40.0 | -3.0 | EUT Horz |
| 54.740 | 47.0 | -10.1 | 3.9 | 199.0 | 3.0 | 0.0 | Horz | QP | 0.0 | 36.9 | 40.0 | -3.1 | EUT Vert |
| 54.740 | 46.5 | -10.1 | 1.0 | 71.0 | 3.0 | 0.0 | Vert | QP | 0.0 | 36.4 | 40.0 | -3.6 | EUT On Side |
| 54.652 | 46.4 | -10.1 | 4.0 | 360.0 | 3.0 | 0.0 | Horz | QP | 0.0 | 36.3 | 40.0 | -3.7 | EUT Horz |
| 81.165 | 40.2 | -11.4 | 1.0 | 123.0 | 3.0 | 0.0 | Vert | QP | 0.0 | 28.8 | 40.0 | -11.2 | EUT Horz |
| 67.343 | 39.6 | -11.2 | 1.0 | 145.0 | 3.0 | 0.0 | Vert | QP | 0.0 | 28.4 | 40.0 | -11.6 | EUT Horz |
| 40.290 | 32.9 | -6.3 | 2.4 | 357.0 | 3.0 | 0.0 | Horz | QP | 0.0 | 26.6 | 40.0 | -13.4 | EUT On Side |
| 67.660 | 37.6 | -11.3 | 2.8 | 173.0 | 3.0 | 0.0 | Horz | QP | 0.0 | 26.3 | 40.0 | -13.7 | EUT On Side |
| 107.980 | 35.9 | -10.0 | 3.1 | 32.0 | 3.0 | 0.0 | Horz | QP | 0.0 | 25.9 | 43.5 | -17.6 | EUT On Side |
| 94.730 | 34.7 | -10.0 | 1.0 | 78.0 | 3.0 | 0.0 | Vert | QP | 0.0 | 24.7 | 43.5 | -18.8 | EUT Horz |
| 108.248 | 33.8 | -10.0 | 1.0 | 56.0 | 3.0 | 0.0 | Vert | QP | 0.0 | 23.8 | 43.5 | -19.7 | EUT Horz |
| 81.175 | 31.5 | -11.4 | 3.7 | 199.0 | 3.0 | 0.0 | Horz | QP | 0.0 | 20.1 | 40.0 | -19.9 | EUT On Side |
| 95.212 | 33.2 | -10.0 | 2.4 | 46.0 | 3.0 | 0.0 | Horz | QP | 0.0 | 23.2 | 43.5 | -20.3 | EUT On Side |
| 121.593 | 33.0 | -10.7 | 1.0 | 133.0 | 3.0 | 0.0 | Vert | QP | 0.0 | 22.3 | 43.5 | -21.2 | EUT Horz |
| 121.558 | 31.8 | -10.7 | 2.7 | 66.0 | 3.0 | 0.0 | Horz | QP | 0.0 | 21.1 | 43.5 | -22.4 | EUT On Side |
| 136.073 | 30.0 | -10.5 | 1.0 | 92.0 | 3.0 | 0.0 | Vert | QP | 0.0 | 19.5 | 43.5 | -24.0 | EUT Horz |
| 135.842 | 26.9 | -10.6 | 2.3 | 136.0 | 3.0 | 0.0 | Horz | QP | 0.0 | 16.3 | 43.5 | -27.2 | EUT On Side |

# 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 |
|---|---|---|---|---|---|
| Attenuator | S.M. Electronics | SA26B-20 | AUY | 7/14/2015 | 12 |
| Chamber - Temperature/Humidity | Cincinnati Sub Zero (CSZ) | ZPH-8-2-SCT/AC | TBI | NCR | 0 |
| Thermometer | Omegaette | HH311 | DTY | 1/21/2015 | 36 |
| Power Supply - DC | Topward | TPS-2000 | TPD | NCR | 0 |
| Meter - Multimeter | Tektronix | DMM912 | MMH | 2/5/2013 | 36 |
| Probe - Near Field Set | EMCO | 7405 | IPD | NCR | 0 |
| Block - DC | Fairview Microwave | SD3379 | AMP | 6/18/2015 | 12 |
| Analyzer - Spectrum Analyzer | Agilent | E4446A | AAQ | 3/10/2015 | 12 |

**TEST DESCRIPTION**

A near field probe measurement was made 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 at the edges of the main transmit bands as called out on the data sheets. Testing was done with while poling at 100% duty cycle.

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

# FREQUENCY STABILITY

NORTHWEST EMC

XMit 2015.01.14

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | Advance RFID BTLE Wall Reader | | | **Work Order:** | ONIT0007 |
| **Serial Number:** | None | | | **Date:** | 09/28/15 |
| **Customer:** | Onity Inc., A Division of UTCFS | | | **Temperature:** | 21.7°C |
| **Attendees:** | None | | | **Humidity:** | 37% |
| **Project:** | None | | | **Barometric Pres.:** | 1014.2 |
| **Tested by:** | Brandon Hobbs | **Power:** | 12VDC Nominal | **Job Site:** | EV06 |

| **TEST SPECIFICATIONS** | **Test Method** |
|---|---|
| FCC 15.225:2015 | ANSI C63.10:2013 |

**COMMENTS**

The EUT was operating at 100% duty cycle.

**DEVIATIONS FROM TEST STANDARD**

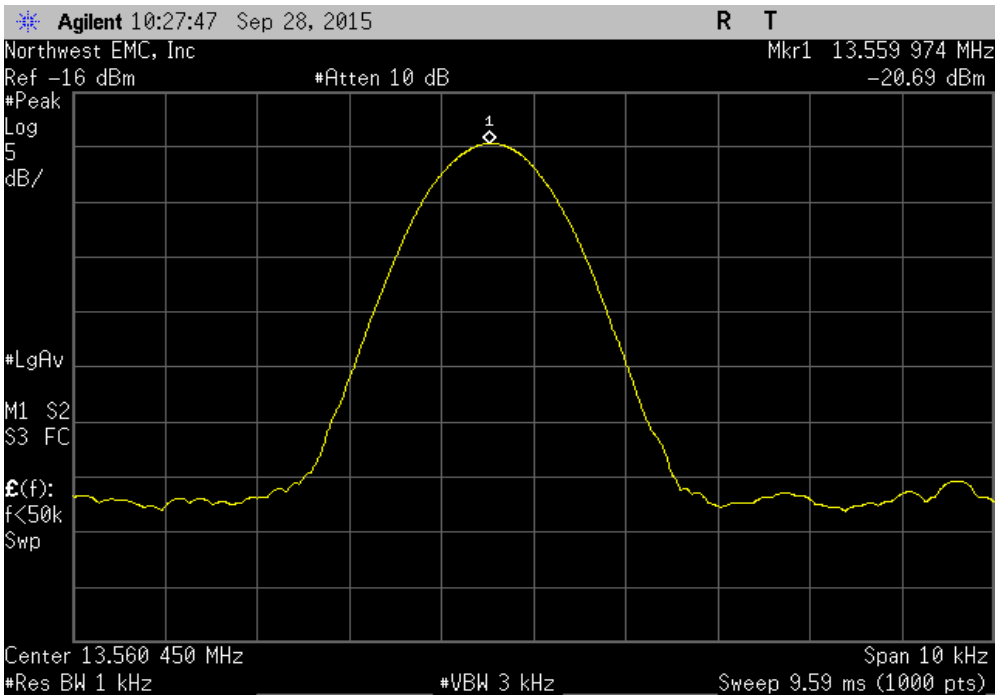
| **Configuration #** | 2 | *Signature* |
|---|---|---|

| | Measured Value (MHz) | Assigned Value (MHz) | Error (ppm) | Limit (ppm) | Results |
|---|---|---|---|---|---|
| RFID 13.56 MHz | | | | | |
| Voltage: 115% | 13.559974 | 13.56 | 1.9 | 100 | Pass |
| Voltage: 100% | 13.559972 | 13.56 | 2.1 | 100 | Pass |
| Voltage: 85% | 13.559982 | 13.56 | 1.3 | 100 | Pass |
| Temperature: +50° | 13.559944 | 13.56 | 4.1 | 100 | Pass |
| Temperature: +40° | 13.559957 | 13.56 | 3.2 | 100 | Pass |
| Temperature: +30° | 13.559945 | 13.56 | 4.1 | 100 | Pass |
| Temperature: +20° | 13.55998 | 13.56 | 1.5 | 100 | Pass |
| Temperature: +10° | 13.559985 | 13.56 | 1.1 | 100 | Pass |
| Temperature: 0° | 13.560024 | 13.56 | 1.8 | 100 | Pass |
| Temperature: -10° | 13.560023 | 13.56 | 1.7 | 100 | Pass |
| Temperature: -20° | 13.560009 | 13.56 | 0.7 | 100 | Pass |
| Temperature: -30° | 13.559959 | 13.56 | 3 | 100 | Pass |

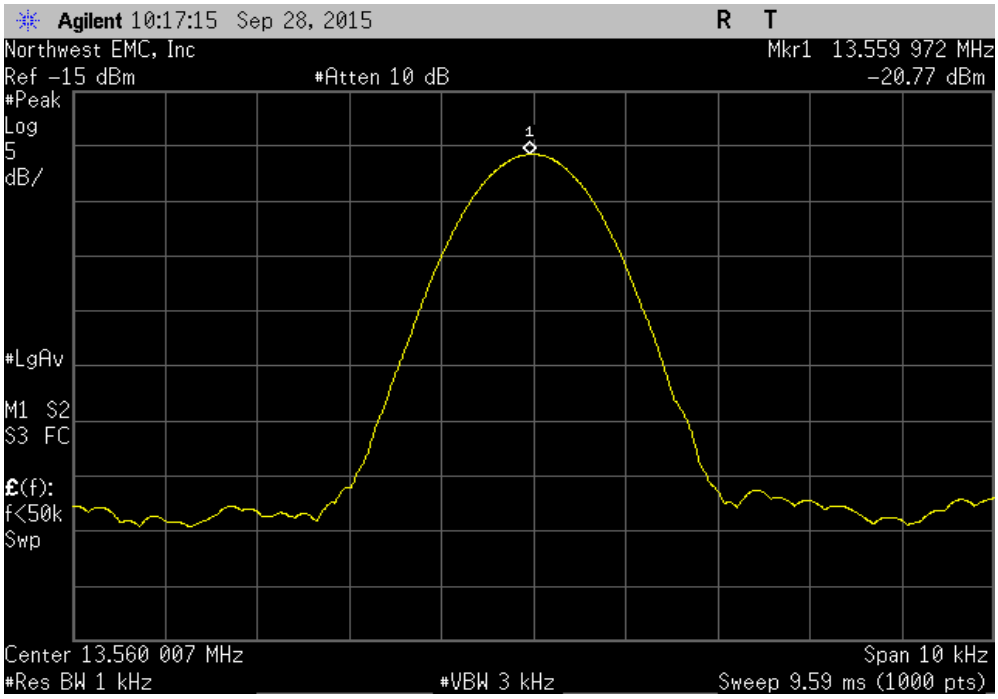
# FREQUENCY STABILITY

XMit 2015.01.14

| RFID 13.56 MHz, Voltage: 115% | | | | | | |
|---|---|---|---|---|---|---|
| | | Measured Value (MHz) | Assigned Value (MHz) | Error (ppm) | Limit (ppm) | Results |
| | | 13.559974 | 13.56 | 1.9 | 100 | Pass |



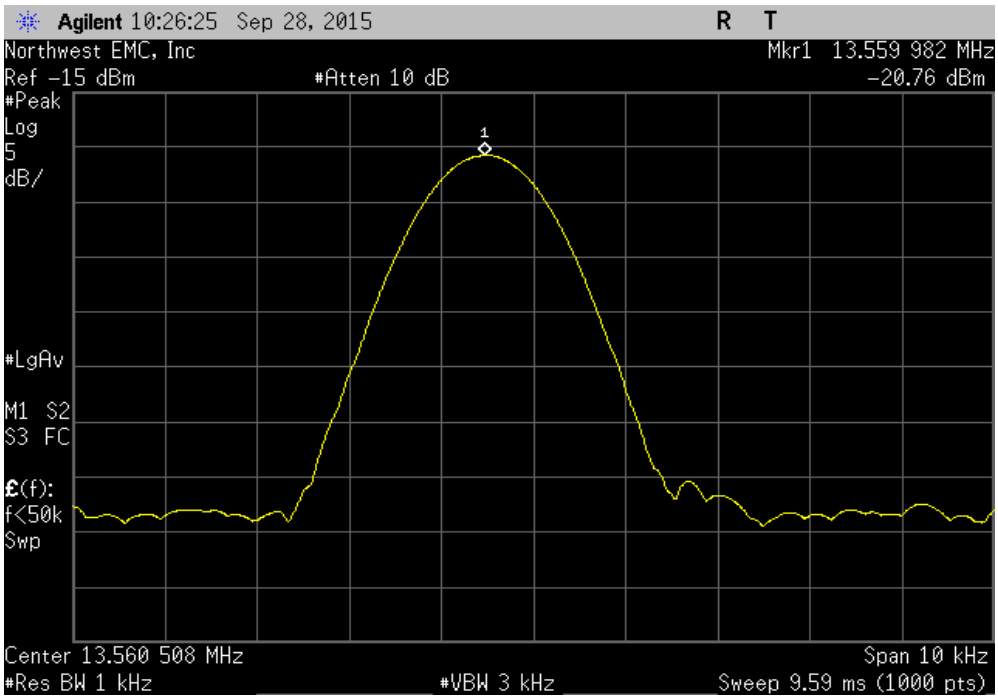

| RFID 13.56 MHz, Voltage: 100% | | | | | | |
|---|---|---|---|---|---|---|
| | | Measured Value (MHz) | Assigned Value (MHz) | Error (ppm) | Limit (ppm) | Results |
| | | 13.559972 | 13.56 | 2.1 | 100 | Pass |



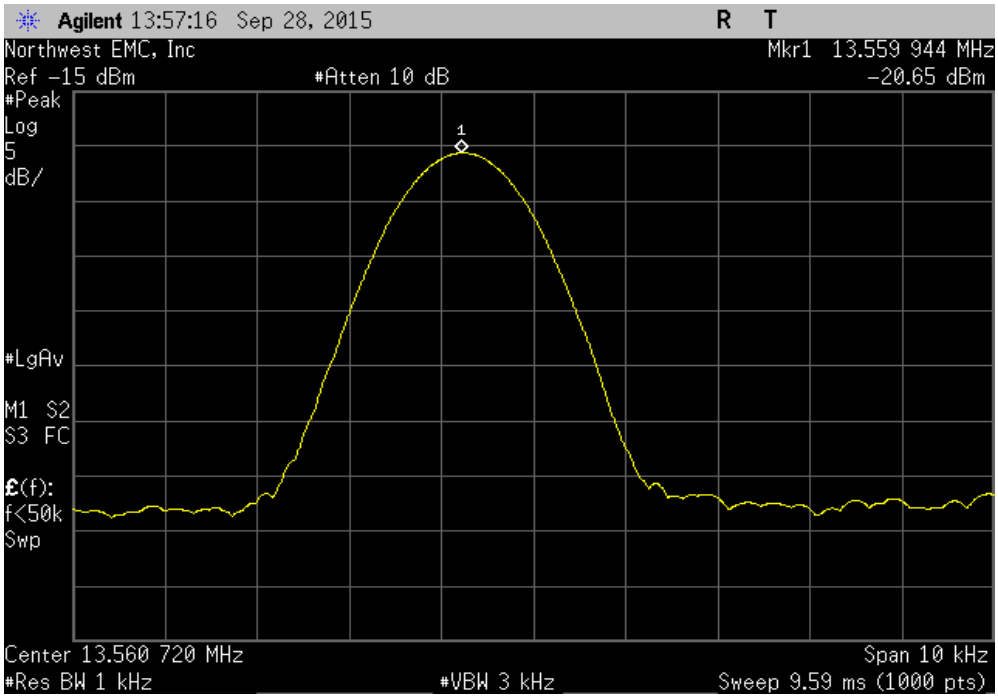
# FREQUENCY STABILITY

XMit 2015.01.14

| RFID 13.56 MHz, Voltage: 85% | | | | | | |
|---|---|---|---|---|---|---|
| | | Measured Value (MHz) | Assigned Value (MHz) | Error (ppm) | Limit (ppm) | Results |
| | | 13.559982 | 13.56 | 1.3 | 100 | Pass |



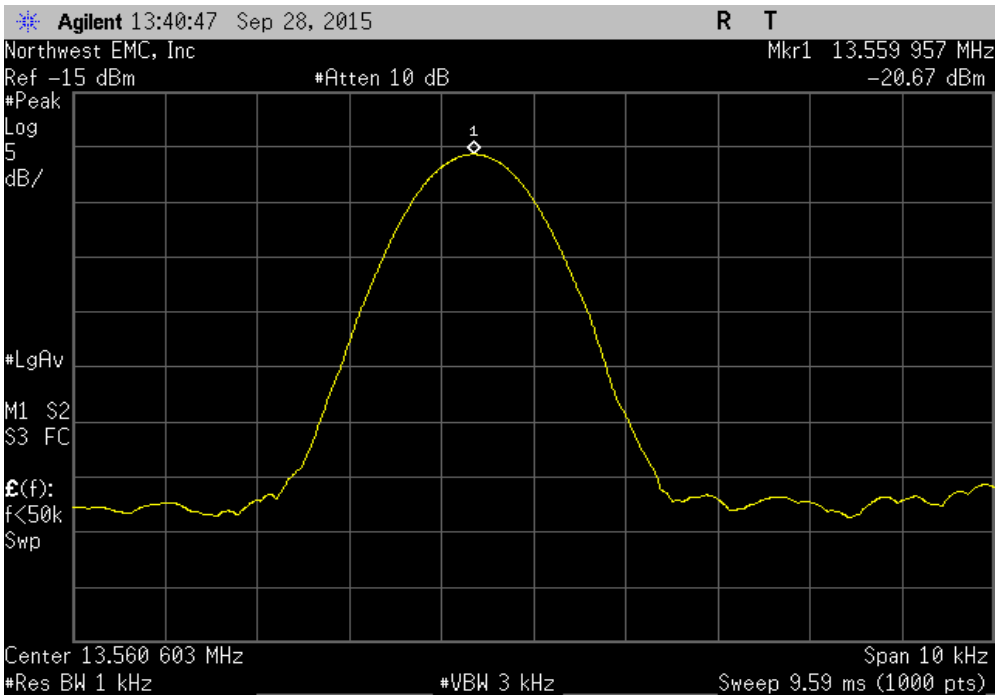

| RFID 13.56 MHz, Temperature: +50° | | | | | | |
|---|---|---|---|---|---|---|
| | | Measured Value (MHz) | Assigned Value (MHz) | Error (ppm) | Limit (ppm) | Results |
| | | 13.559944 | 13.56 | 4.1 | 100 | Pass |



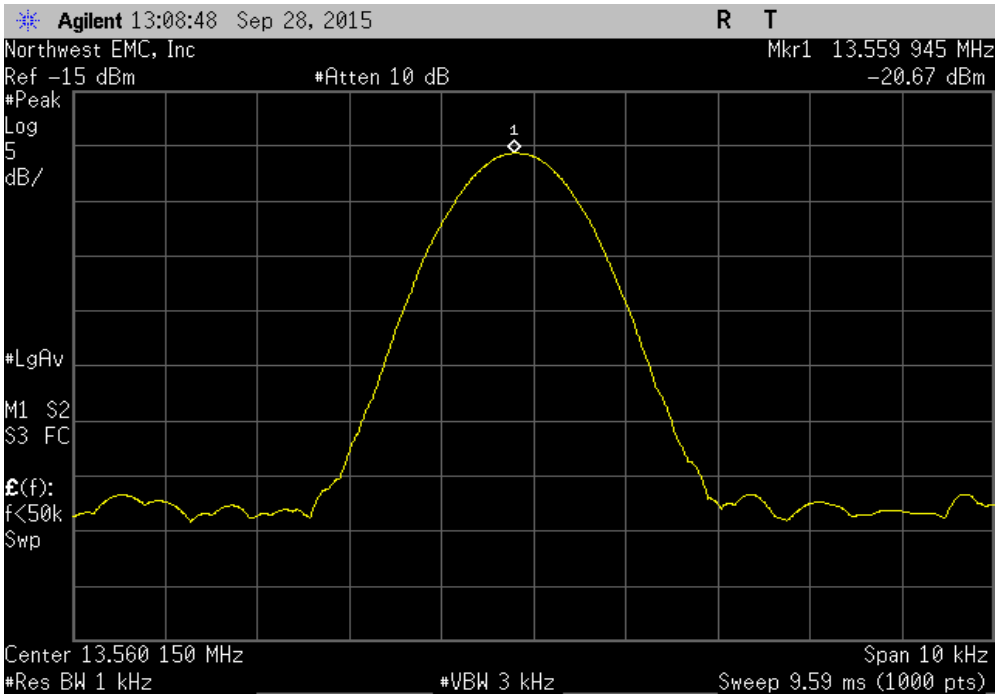
# FREQUENCY STABILITY

XMit 2015.01.14

| RFID 13.56 MHz, Temperature: +40° | | | | | | |
|---|---|---|---|---|---|---|
| | | Measured Value (MHz) | Assigned Value (MHz) | Error (ppm) | Limit (ppm) | Results |
| | | 13.559957 | 13.56 | 3.2 | 100 | Pass |



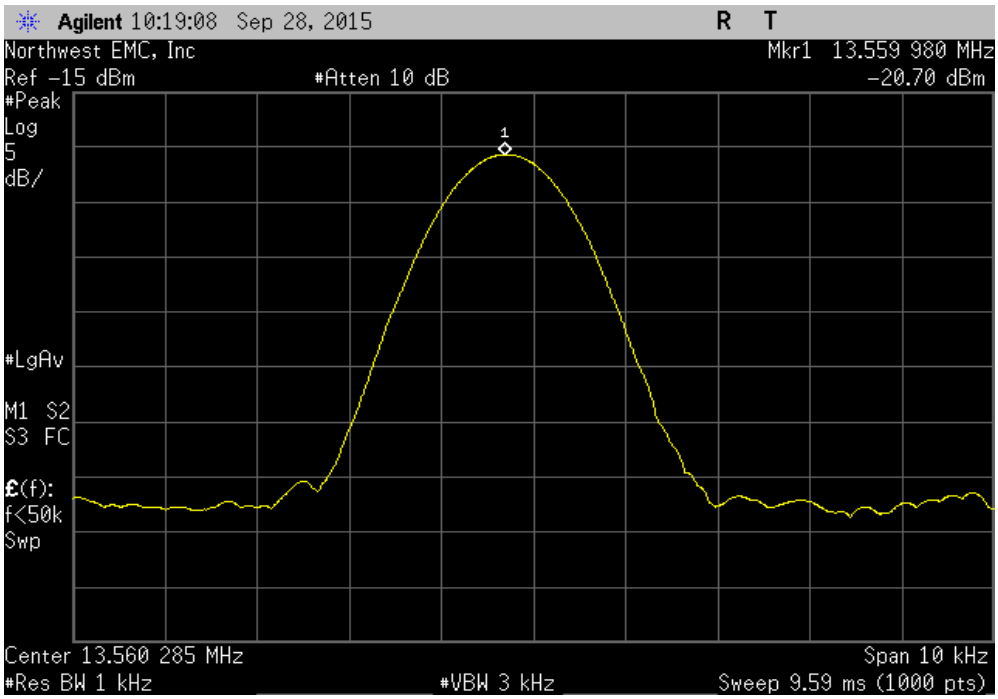

| RFID 13.56 MHz, Temperature: +30° | | | | | | |
|---|---|---|---|---|---|---|
| | | Measured Value (MHz) | Assigned Value (MHz) | Error (ppm) | Limit (ppm) | Results |
| | | 13.559945 | 13.56 | 4.1 | 100 | Pass |



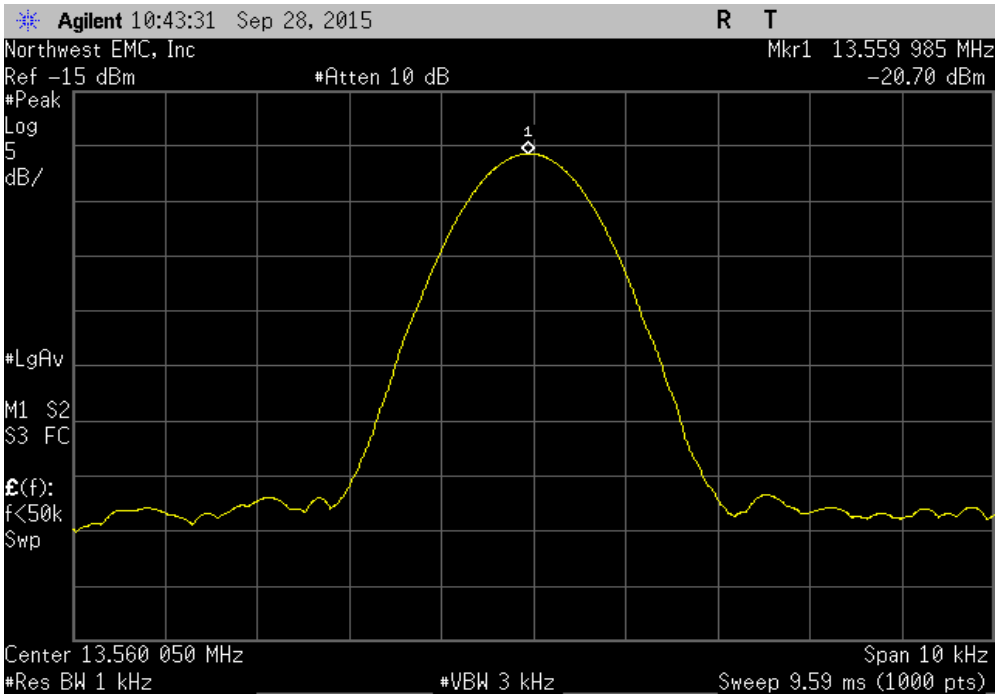
# FREQUENCY STABILITY

XMit 2015.01.14

| RFID 13.56 MHz, Temperature: +20° | | | | | | |
|---|---|---|---|---|---|---|
| | | Measured Value (MHz) | Assigned Value (MHz) | Error (ppm) | Limit (ppm) | Results |
| | | 13.55998 | 13.56 | 1.5 | 100 | Pass |



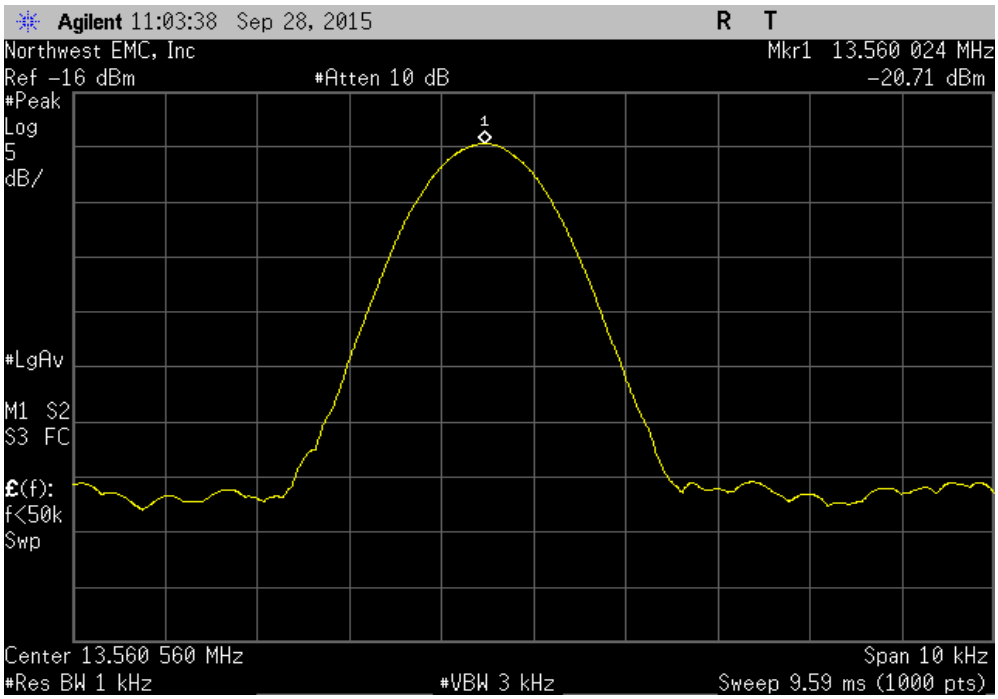

| RFID 13.56 MHz, Temperature: +10° | | | | | | |
|---|---|---|---|---|---|---|
| | | Measured Value (MHz) | Assigned Value (MHz) | Error (ppm) | Limit (ppm) | Results |
| | | 13.559985 | 13.56 | 1.1 | 100 | Pass |



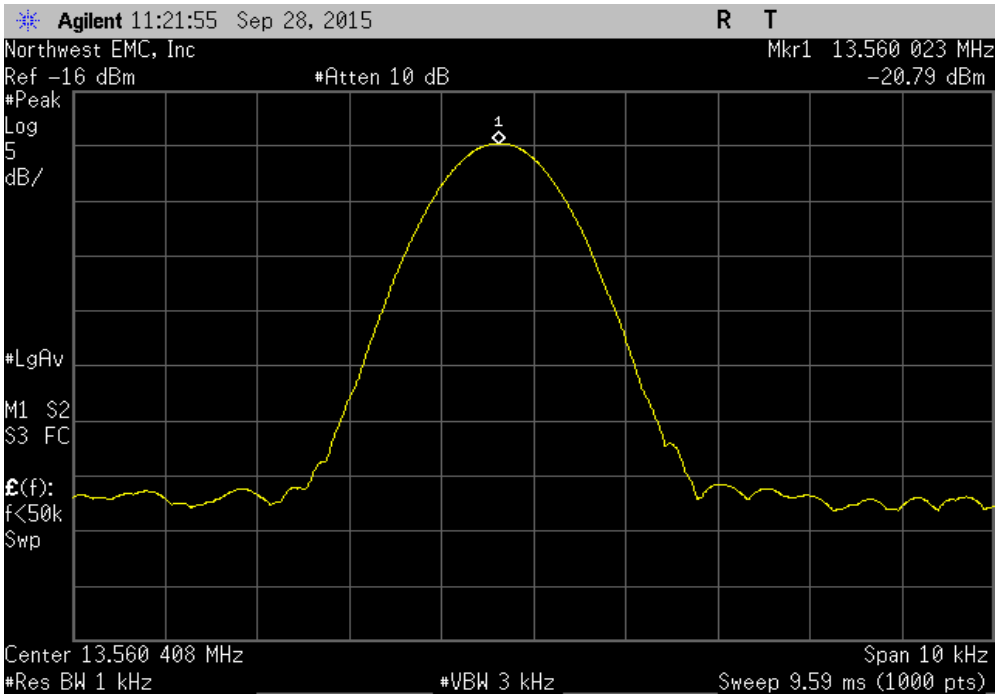
# FREQUENCY STABILITY

XMit 2015.01.14

| RFID 13.56 MHz, Temperature: 0° | | | | | | |
|---|---|---|---|---|---|---|
| | | Measured Value (MHz) | Assigned Value (MHz) | Error (ppm) | Limit (ppm) | Results |
| | | 13.560024 | 13.56 | 1.8 | 100 | Pass |



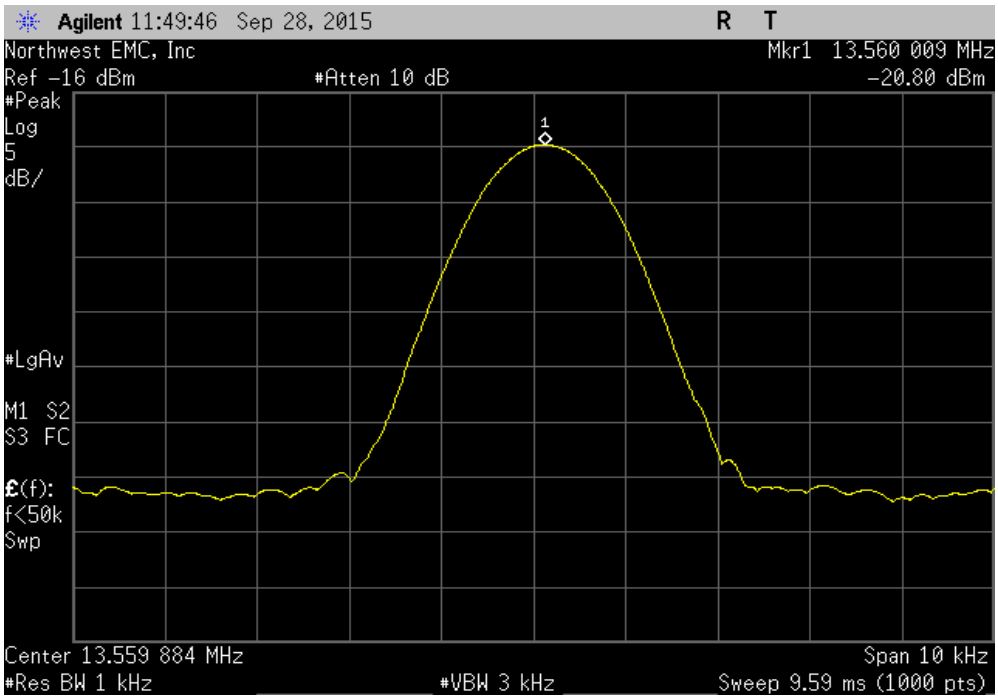

| RFID 13.56 MHz, Temperature: -10° | | | | | | |
|---|---|---|---|---|---|---|
| | | Measured Value (MHz) | Assigned Value (MHz) | Error (ppm) | Limit (ppm) | Results |
| | | 13.560023 | 13.56 | 1.7 | 100 | Pass |



# FREQUENCY STABILITY

XMit 2015.01.14

| RFID 13.56 MHz, Temperature: -20° | | | | | | |
|---|---|---|---|---|---|---|
| | | Measured Value (MHz) | Assigned Value (MHz) | Error (ppm) | Limit (ppm) | Results |
| | | 13.560009 | 13.56 | 0.7 | 100 | Pass |




| RFID 13.56 MHz, Temperature: -30° | | | | | | |
|---|---|---|---|---|---|---|
| | | Measured Value (MHz) | Assigned Value (MHz) | Error (ppm) | Limit (ppm) | Results |
| | | 13.559959 | 13.56 | 3 | 100 | Pass |