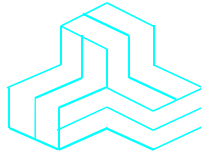


# ENGINEERING TEST REPORT



**IXM SENSE PROXL**  
**Model: IXM122**  
**FCC ID: S38-TSPROX**

Applicant:

**Invixium Access Inc.**  
#5 – 205 Riviera Drive  
Markham, Ontario  
Canada L3R 5J8

**In Accordance With**  
**Federal Communications Commission (FCC)**  
**Part 15, Subpart C, Section 15.209**

**UltraTech's File No.: 16INVX028\_FCC15C209**

This Test report is Issued under the Authority of  
Tri M. Luu  
Vice President of Engineering  
UltraTech Group of Labs

Date: February 10, 2016

Report Prepared by: Dan Huynh

Tested by: Hung Trinh

Issued Date: February 10, 2016

Test Date(s): September 15, 2014

- The results in this Test Report apply only to the sample(s) tested, and the sample tested is randomly selected.
- This report must not be used by the client to claim product endorsement by NVLAP or any agency of the US Government.

## UltraTech

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NVLAP LAB  
CODE 200093-0



AT-1945



SL2-IN-E-  
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TL363\_B



TPTDP  
DA1300

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February 10, 2016

*All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

## EXHIBIT 1. INTRODUCTION

### 1.1. SCOPE

|                                      |                                                                                                    |
|--------------------------------------|----------------------------------------------------------------------------------------------------|
| <b>Reference:</b>                    | FCC Part 15, Subpart C                                                                             |
| <b>Title:</b>                        | Code of Federal Regulations (CFR), Title 47 – Telecommunication, Part 15 – Radio Frequency Devices |
| <b>Purpose of Test:</b>              | Equipment Certification for FCC Part 15C.                                                          |
| <b>Test Procedures:</b>              | ANSI C63.4 and ANSI C63.10                                                                         |
| <b>Environmental Classification:</b> | Commercial, industrial or business environment                                                     |

### 1.2. RELATED SUBMITTAL(S)/GRANT(S)

None.

### 1.3. NORMATIVE REFERENCES

| Publication          | Year                         | Title                                                                                                                                                               |
|----------------------|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FCC 47 CFR 15        | 2015                         | Code of Federal Regulations (CFR), Title 47 – Telecommunication, Part 15 – Radio Frequency Devices                                                                  |
| ANSI C63.4           | 2009                         | American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 KHz to 40 GHz |
| ANSI C63.10          | 2013                         | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices                                                                      |
| CISPR 22<br>EN 55022 | 2008-09, Edition 6.0<br>2006 | Information Technology Equipment - Radio Disturbance Characteristics - Limits and Methods of Measurement                                                            |

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## EXHIBIT 2. PERFORMANCE ASSESSMENT

### 2.1. CLIENT INFORMATION

| Applicant              |                                                                                                   |
|------------------------|---------------------------------------------------------------------------------------------------|
| <b>Name:</b>           | Invixium Access Inc.                                                                              |
| <b>Address:</b>        | #5 – 205 Riviera Drive<br>Markham, Ontario<br>Canada L3R 5J8                                      |
| <b>Contact Person:</b> | Shiraz Kapadia<br>Phone #: 647-282-1745 (M)<br>Fax #: N/A<br>Email Address: skapadia@invixium.com |

| Manufacturer           |                                                                                                           |
|------------------------|-----------------------------------------------------------------------------------------------------------|
| <b>Name:</b>           | Mara Technologies Inc.                                                                                    |
| <b>Address:</b>        | 5680 14th Avenue<br>Markham, Ontario<br>Canada L3S 3K8                                                    |
| <b>Contact Person:</b> | Matthew Ruscica<br>Phone #: 1-905-201-1787<br>Fax #: 1-905-201-9114<br>Email Address: matthew@maratech.ca |

### 2.2. EQUIPMENT UNDER TEST (EUT) INFORMATION

The following information (with the exception of the Date of Receipt) has been supplied by the applicant.

|                                       |                                                                                                                                                                                                                        |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Brand Name:</b>                    | Invixium Access Inc.                                                                                                                                                                                                   |
| <b>Product Name:</b>                  | IXM SENSE PROXL                                                                                                                                                                                                        |
| <b>Model Name or Number:</b>          | IXM122                                                                                                                                                                                                                 |
| <b>Serial Number:</b>                 | Test sample                                                                                                                                                                                                            |
| <b>Type of Equipment:</b>             | Part 15 Low Power Transmitter Below 1705 kHz                                                                                                                                                                           |
| <b>Input Power Supply Type:</b>       | 12-24V DC external power supply                                                                                                                                                                                        |
| <b>Primary User Functions of EUT:</b> | Identifies person, either by fingerprint matching, or by proximity card, or both. Sends result of identification to Access Control Panel, or to Time and Attendance software application., or to Smart Home controller |

## 2.3. EUT'S TECHNICAL SPECIFICATIONS

| Transmitter                            |                                             |
|----------------------------------------|---------------------------------------------|
| <b>Intended Operating Environment:</b> | Commercial, light industry & heavy industry |
| <b>Power Supply Requirement:</b>       | 5V DC                                       |
| <b>RF Output Power Rating:</b>         | 53.85 dBμV/m peak at 3m distance            |
| <b>Operating Frequency Range:</b>      | 125 kHz                                     |
| <b>20 dB Bandwidth:</b>                | 1.21 kHz                                    |
| <b>Modulation Type:</b>                | Unmodulated carrier                         |
| <b>Oscillator Frequencies:</b>         | 125 kHz                                     |
| <b>Antenna Connector Type:</b>         | 720 uH coil, 125 kHz, Air Tuned Antenna     |

## 2.4. LIST OF EUT'S PORTS

| Port Number | EUT's Port Description                            | Number of Identical Ports | Connector Type        | Cable Type (Shielded/Non-shielded) |
|-------------|---------------------------------------------------|---------------------------|-----------------------|------------------------------------|
| 1           | Wiegand Output (to Access Control Panel), 2 lines | 1                         | Header                | Non-shielded                       |
| 2           | Wiegand Input (from external RFID), 2 lines       | 1                         | Header                | 30cm, non-shielded                 |
| 3           | Ethernet !00 BASETX                               | 1                         | RJ-45 on cable        | Non-shielded                       |
| 4           | RS-485 (slave), 2 lines                           | 1                         | Header                | Non-shielded                       |
| 5           | RS-232, 2 lines (Service Port)*                   | 1                         | DB-9, socket on cable | Non-shielded                       |
| 6           | Form C Relay, 3 lines                             | 1                         | Header                | Non-shielded                       |
| 7           | GPO, 4 lines                                      | 1                         | Header                | Non-shielded                       |
| 8           | GPI, 8 lines                                      | 1                         | Header                | Non-shielded                       |
| 9           | GND, 5 lines                                      | 1                         | Header                | Non-shielded                       |
| 10          | USB OTG (Service Port)*                           | 1                         | USB-Micro-AB          | Shielded (service port)            |
| 11          | Power Input (12-24V)                              | 1                         | Header                | Non-shielded                       |
| 12          | EGND                                              | 1                         | Header                | Non-shielded                       |

\* Used for service by administrator only.

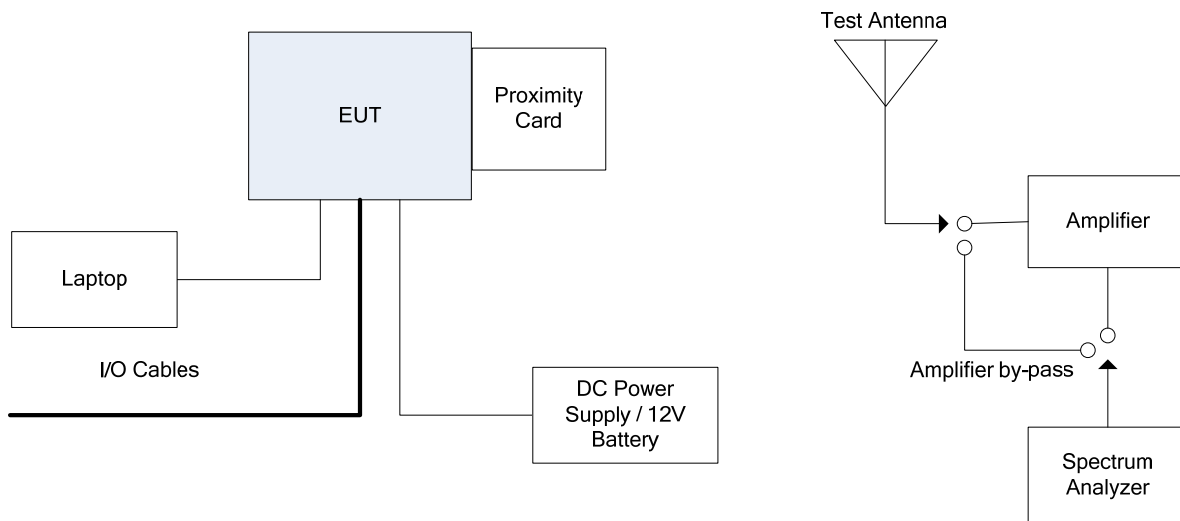
## 2.5. ANCILLARY EQUIPMENT

The EUT was tested while connected to the following representative configuration of ancillary equipment necessary to exercise the ports during tests:

| Ancillary Equipment # 1  |                |
|--------------------------|----------------|
| Description:             | Proximity Card |
| Brand Name:              | HID            |
| Model Name or Number:    | Prox Card II   |
| Serial Number:           | N/A            |
| Cable Length & Type:     | N/A            |
| Connected to EUT's Port: | N/A            |

## 2.6. TEST SETUP BLOCK DIAGRAM

### 2.6.1. Radiated Emission Test Setup



## EXHIBIT 3. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

### 3.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

|                     |           |
|---------------------|-----------|
| Temperature:        | 21°C      |
| Humidity:           | 51%       |
| Pressure:           | 102 kPa   |
| Power input source: | 12-24 VDC |

### 3.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TESTS

|                                  |                                                                                                                      |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>Operating Modes:</b>          | The EUT was configured for continuous transmission for the duration of testing.                                      |
| <b>Special Test Software:</b>    | N/A                                                                                                                  |
| <b>Special Hardware Used:</b>    | N/A                                                                                                                  |
| <b>Transmitter Test Antenna:</b> | The EUT was tested with the antenna fitted in a manner typical of normal intended use as integral antenna equipment. |

|                                  |                                  |
|----------------------------------|----------------------------------|
| <b>Transmitter Test Signals</b>  |                                  |
| <b>Frequency Band(s):</b>        | 125 kHz                          |
| <b>Test Frequency(ies):</b>      | 125 kHz                          |
| <b>RF Power Output:</b>          | 53.85 dBµV/m peak at 3m distance |
| <b>Normal Test Modulation:</b>   | Unmodulated carrier              |
| <b>Modulating Signal Source:</b> | Internal                         |

## EXHIBIT 4. SUMMARY OF TEST RESULTS

### 4.1. LOCATION OF TESTS

All of the measurements described in this report were performed at Ultratech Group of Labs located in the city of Oakville, Province of Ontario, Canada.

- AC Power Line Conducted Emissions were performed in UltraTech's shielded room, 24'(L) by 16'(W) by 8'(H).
- Radiated Emissions were performed at the Ultratech's 3-10 TDK Semi-Anechoic Chamber situated in the Town of Oakville, province of Ontario. This test site been calibrated in accordance with ANSI C63.4, and found to be in compliance with the requirements of Sec. 2.948 of the FCC Rules. The descriptions and site measurement data of the Oakville 3-10 TDK Semi-Anechoic Chamber has been filed with FCC office (FCC File No.: 91038) and Industry Canada office (Industry Canada File No.: 2049A-3). Expiry Date: 2017-04-02.

### 4.2. APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

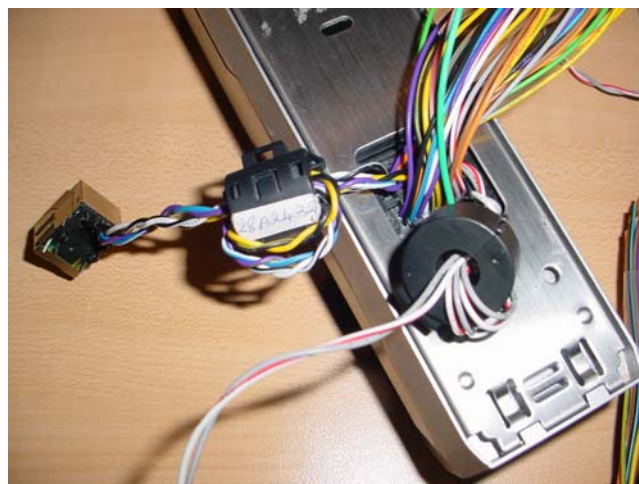
| FCC Section(s) | Test Requirements                                                             | Compliance (Yes/No) |
|----------------|-------------------------------------------------------------------------------|---------------------|
| 15.203         | Antenna Requirement                                                           | Yes*                |
| 15.207(a)      | Power Line Conducted Emissions                                                | Yes**               |
| 15.209(a)      | 20 dB Bandwidth                                                               | Yes                 |
| 15.209         | Transmitter Radiated Emissions - Fundamental, Harmonic and Spurious Emissions | Yes                 |

\* The EUT complies with the requirement; it employs integral antenna.

\*\* Refer to attestation letter from the Applicant.

### 4.3. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

The device shall be installed with Steward Ferrite on Ethernet and DC power line cables in order to meet the limit of radiated emissions. Part # 28A2432 will be used for Ethernet wires with 2 ½ turns. Part # 28A3039 will be used for DC power line wires with 2 ½ turns.



## EXHIBIT 5. TEST DATA

### 5.1. TRANSMITTER RADIATED EMISSIONS [47 CFR §§ 15.209 & 15.205]

#### 5.1.1. Limit(s)

§ 15.209 Radiated emission limits; general requirements.

(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field strength (microvolts/meter) | Measurement distance (meters) |
|-----------------|-----------------------------------|-------------------------------|
| 0.009-0.490     | 2400/F(kHz)                       | 300                           |
| 0.490-1.705     | 24000/F(kHz)                      | 30                            |
| 1.705-30.0      | 30                                | 30                            |
| 30-88           | 100 **                            | 3                             |
| 88-216          | 150 **                            | 3                             |
| 216-960         | 200 **                            | 3                             |
| Above 960       | 500                               | 3                             |

\*\* Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.

(b) In the emission table above, the tighter limit applies at the band edges.

(c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other sections within this part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.

(d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

(e) The provisions in §§ 15.31, 15.33, and 15.35 for measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

(f) In accordance with § 15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in § 15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in § 15.205, the limit

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on spurious emissions specified for the intentional radiator, whichever is the higher limit. Emissions which must be measured above the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator and which fall within the restricted bands shall comply with the general radiated emission limits in § 15.109 that are applicable to the incorporated digital device.

(g) Perimeter protection systems may operate in the 54-72 MHz and 76-88 MHz bands under the provisions of this section. The use of such perimeter protection systems is limited to industrial, business and commercial applications.

### 5.1.2. Method of Measurements

ANSI C63.4 for measurement methods.

### 5.1.3. Test Data

#### Remarks:

- The measuring receiver shall be tuned over the frequency range 10 kHz to 1 GHz.
- All spurious emissions that are in excess of 20 dB below the specified limit shall be recorded.
- EUT was initially tested at 3m and the value measured at 3m shall be extrapolated as applicable to compare with limit and measurement distance specified in section 15.209(a).
- Extrapolation factor of 40dB/decade shall be used for frequencies below 30 MHz.

#### 5.1.3.1. Fundamental Emissions

| <b>Remarks:</b> <ul style="list-style-type: none"><li>• Field strength limit of the fundamental 125 kHz at 300m distance is <math>20 \cdot \log(2400/125) = 25.7</math> dB<math>\mu</math>V/m</li><li>• For frequency band 0.009- 0.490 MHz, the measured E-Field at 3m (column 2) will be extrapolated to 300m E-Field Level (column 3) using the extrapolation factor of <math>40 \cdot \log(3/300) = -80</math> dB</li></ul> |                                  |                                                  |                     |                                           |             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|--------------------------------------------------|---------------------|-------------------------------------------|-------------|
| Frequency (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                 | Peak E-Field @ 3m (dB $\mu$ V/m) | Extrapolated E-Field Level @ 300m (dB $\mu$ V/m) | Antenna Plane (H/V) | § 15.209 (a) Limits @ 300m (dB $\mu$ V/m) | Margin (dB) |
| 0.125                                                                                                                                                                                                                                                                                                                                                                                                                           | 53.85                            | -26.15                                           | V                   | 25.7                                      | -51.9       |
| 0.125                                                                                                                                                                                                                                                                                                                                                                                                                           | 51.23                            | -28.77                                           | H                   | 25.7                                      | -54.5       |

### 5.1.3.2. Harmonic/Spurious Emissions

| <b>Remarks:</b> <ul style="list-style-type: none"><li>For frequency band 0.009- 0.490 MHz, the measured E-Field at 3m (column 2) will be extrapolated to 300m E-Field Level (column 3) using the extrapolation factor of <math>40 \cdot \log(3/300) = -80</math> dB</li><li>For frequency bands 0.490-1.705 MHz and 1.705-30.0 MHz, the measured E-Field at 3m (column 2) will be extrapolated to 30m E-Field Level (column 3) using the extrapolation factor of <math>40 \cdot \log(3/30) = -40</math> dB</li></ul> |                            |                                     |                     |                              |             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------|---------------------|------------------------------|-------------|
| Frequency (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Peak E-Field @ 3m (dBμV/m) | Extrapolated E-Field Level (dBμV/m) | Antenna Plane (H/V) | § 15.209 (a) Limits (dBμV/m) | Margin (dB) |
| 0.009 - 0.490                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | *                          | *                                   | H / V               | *                            | *           |
| 0.490 - 1.705                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | *                          | *                                   | H / V               | *                            | *           |
| 1.705 - 30.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | *                          | *                                   | H / V               | *                            | *           |

\* No emissions or harmonics were detected within 20 dB of the limit.

## 5.2. 20 dB BANDWIDTH [47 CFR 15.209 (a)]

### 5.2.1. Limit(s)

Emission bandwidth shall not be located in the restricted bands in 15.205 and the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz.

### 5.2.2. Method of Measurements

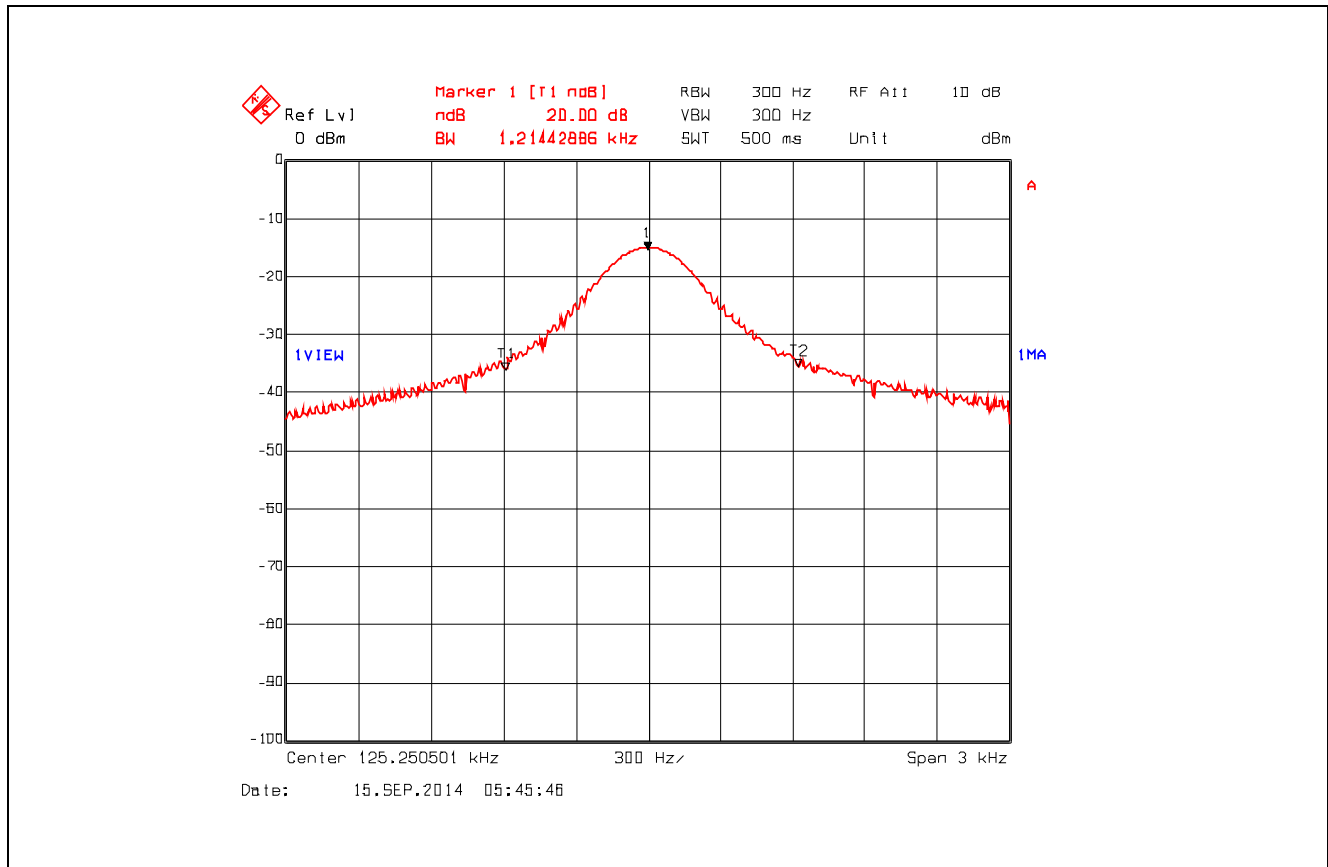
The measurements were performed in accordance with Ultratech Test Procedures, File # ULTR P001-2004 and ANSI C63.4

### 5.2.3. Test Data

| Channel Frequency | 20 dB Bandwidth |
|-------------------|-----------------|
| 125 kHz           | 1.21 kHz        |

See the following plot for details.

Plot 5.2.3.1. 20 dB Bandwidth, Fc: 125 kHz



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## EXHIBIT 6. TEST EQUIPMENT LIST

| Test Instruments   | Manufacturer    | Model No. | Serial No. | Frequency Range | Cal. Due Date |
|--------------------|-----------------|-----------|------------|-----------------|---------------|
| Spectrum Analyzer  | Rohde & Schwarz | ESU40     | 100037     | 20 Hz – 40 GHz  | 05 Apr 2015   |
| RF Amplifier       | AH System       | PAM-0118  | 225        | 20 MHz – 18 GHz | 07 Apr 2015   |
| Loop Antenna       | EMCO            | 6502      | 9104-2611  | 10 kHz – 30 MHz | 27 Aug 2015   |
| Biconi-Log Antenna | ETS Lindgren    | 3142C     | 26873      | 26 – 3000 MHz   | 14 Apr 2015   |
| Spectrum Analyzer  | Rohde & Schwarz | FSEK30    | 100077     | 20 Hz – 40 GHz  | 08 Nov 2014   |

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## EXHIBIT 7. MEASUREMENT UNCERTAINTY

The measurement uncertainties stated were calculated in accordance with the requirements of CISPR 16-4-2 @ IEC:2003 and JCGM 100:2008 (GUM 1995) – Guide to the Expression of Uncertainty in Measurement.

### 7.1. RADIATED EMISSION MEASUREMENT UNCERTAINTY

|                      | Radiated Emission Measurement Uncertainty @ 3m, Horizontal (30-1000 MHz):        | Measured (dB) | Limit (dB)   |
|----------------------|----------------------------------------------------------------------------------|---------------|--------------|
| <b>u<sub>c</sub></b> | <b>Combined standard uncertainty:</b><br>$u_c(y) = \sqrt{\sum_{i=1}^m u_i^2(y)}$ | <b>± 2.39</b> | <b>± 2.6</b> |
| <b>U</b>             | <b>Expanded uncertainty U:</b><br>$U = 2u_c(y)$                                  | <b>± 4.79</b> | <b>± 5.2</b> |

|                      | Radiated Emission Measurement Uncertainty @ 3m, Vertical (30-1000 MHz):          | Measured (dB) | Limit (dB)   |
|----------------------|----------------------------------------------------------------------------------|---------------|--------------|
| <b>u<sub>c</sub></b> | <b>Combined standard uncertainty:</b><br>$u_c(y) = \sqrt{\sum_{i=1}^m u_i^2(y)}$ | <b>± 2.39</b> | <b>± 2.6</b> |
| <b>U</b>             | <b>Expanded uncertainty U:</b><br>$U = 2u_c(y)$                                  | <b>± 4.78</b> | <b>± 5.2</b> |

|                      | Radiated Emission Measurement Uncertainty @ 3 m, Horizontal & Vertical (1 – 18 GHz): | Measured (dB) | Limit (dB)                 |
|----------------------|--------------------------------------------------------------------------------------|---------------|----------------------------|
| <b>u<sub>c</sub></b> | <b>Combined standard uncertainty:</b><br>$u_c(y) = \sqrt{\sum_{i=1}^m u_i^2(y)}$     | <b>± 1.87</b> | <b>Under consideration</b> |
| <b>U</b>             | <b>Expanded uncertainty U:</b><br>$U = 2u_c(y)$                                      | <b>± 3.75</b> | <b>Under consideration</b> |