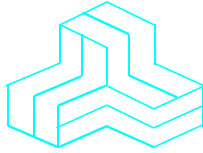


ENGINEERING TEST REPORT



IXM TOUCH2 FP2W
Model: IXM401W
FCC ID: S38-TS2ENXP

Applicant:

Invoxium Access Inc.
50 Acadia Avenue, Suite 310
Markham, Ontario
Canada L3R 0B3

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

UltraTech's File No.: 19IN VX067_FCC15C209

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

Date: August 6, 2019

Report Prepared by: Dan Huynh

Tested by: Hung Trinh

Issued Date: August 6, 2019

Test Date(s): August 3, 2018

- *The results in this Test Report apply only to the sample(s) tested, and the sample tested is randomly selected.*
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UltraTech

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel.: (905) 829-1570 Fax.: (905) 829-8050
Website: www.ultratech-labs.com, Email: vic@ultratech-labs.com, Email: tri@ultratech-labs.com



APEC TEL CA0001



1309



CA 0001/2049



AT-1945



SL2-IN-E-1119R



Korea KCC-RRA
CA2049

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EXHIBIT 1. INTRODUCTION

1.1. SCOPE

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

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

None.

1.3. NORMATIVE REFERENCES

Publication	Year	Title
FCC 47 CFR 15	2018	Code of Federal Regulations (CFR), Title 47 – Telecommunication, Part 15 – Radio Frequency Devices
ANSI C63.4	2014	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

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1. CLIENT INFORMATION

Applicant	
Name:	Invixium Access Inc.
Address:	50 Acadia Avenue, Suite 310 Markham, Ontario Canada L3R 0B3
Contact Person:	Shiraz Kapadia Phone #: 1-647-282-1745 Fax #: N/A Email Address: skapadia@invixium.com

Manufacturer	
Name:	Mara Technologies Inc.
Address:	5680 14th Avenue Markham, Ontario Canada L3S 3K8
Contact Person:	Matthew Ruscica Phone #: 1-905-201-1787 Fax #: 1-905-201-9114 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.

Brand Name:	Invixium Access Inc.
Product Name:	IXM TOUCH2 FP2W
Model Name or Number:	IXM401W
Serial Number:	Test sample
Type of Equipment:	Part 15 Low Power Transmitter Below 1705 kHz
Input Power Supply Type:	12-24V DC external power supply / Power over Ethernet (PoE)
Primary User Functions of EUT:	Identify person based on fingerprint and/or smart of proximity card, send data to Access Control Panel to open the door. Device can control the door by itself. Device can send the data to a Time & Attendance software.

2.3. EUT'S TECHNICAL SPECIFICATIONS

Transmitter	
Intended Operating Environment:	Commercial, light industry & heavy industry
Power Supply Requirement:	5V, 3.3V DC
RF Output Power Rating:	69.73 dBμV/m peak at 3m distance
Operating Frequency Range:	120 – 130 kHz
20 dB Bandwidth:	801.28 Hz
Modulation Type:	Unmodulated carrier
Oscillator Frequencies:	24 MHz +/-2%
Antenna Connector Type:	Integral, Invixium Access Inc. 125 kHz Loop antenna (860uH coil)

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	Non-shielded
3	Ethernet 100 BASETX	1	RJ-45 on cable	Non-shielded
4	RS-485 (2 lines)	1	Header	Non-shielded
5	RS-232 (Tx, Rx)*	1	DB-9, socket on cable	Non-shielded
6	Form C Relay, 3 lines	1	Header	Non-shielded
7	GPO	4	Header	Non-shielded
8	GPI	8	Header	Non-shielded
9	GND for different interfaces	4	Header	Non-shielded
10	USB 2.0 OTG*	1	USB-Micro-AB	Shielded
11	Power Input (12-24V)	1	Header	Non-shielded
12	RS-485 GND	1	Header	Non-shielded
13	EGND	1	Header	Non-shielded
14	DS_OUT	1	Header	Non-shielded

* Used for service by administrator only.

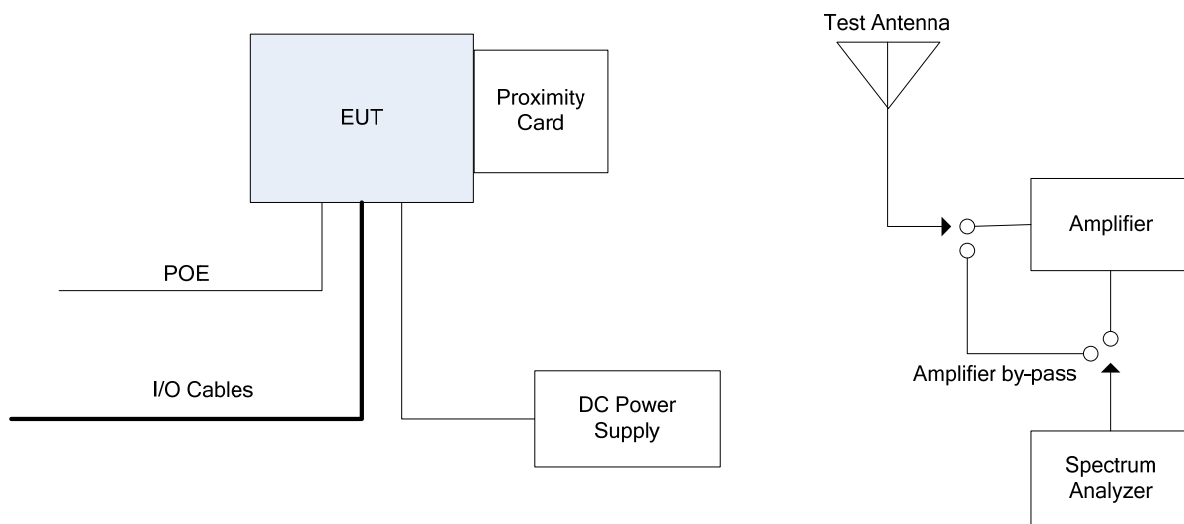
2.5. ANCILLARY EQUIPMENT

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

- 1) Invixium Proximity Card
- 2) PowerDsine 3001 POE Injector Power over Ethernet

2.6. TEST SETUP BLOCK DIAGRAM

EUT Powered by External DC Power Supply



EUT Powered by PoE Injector Power over Ethernet

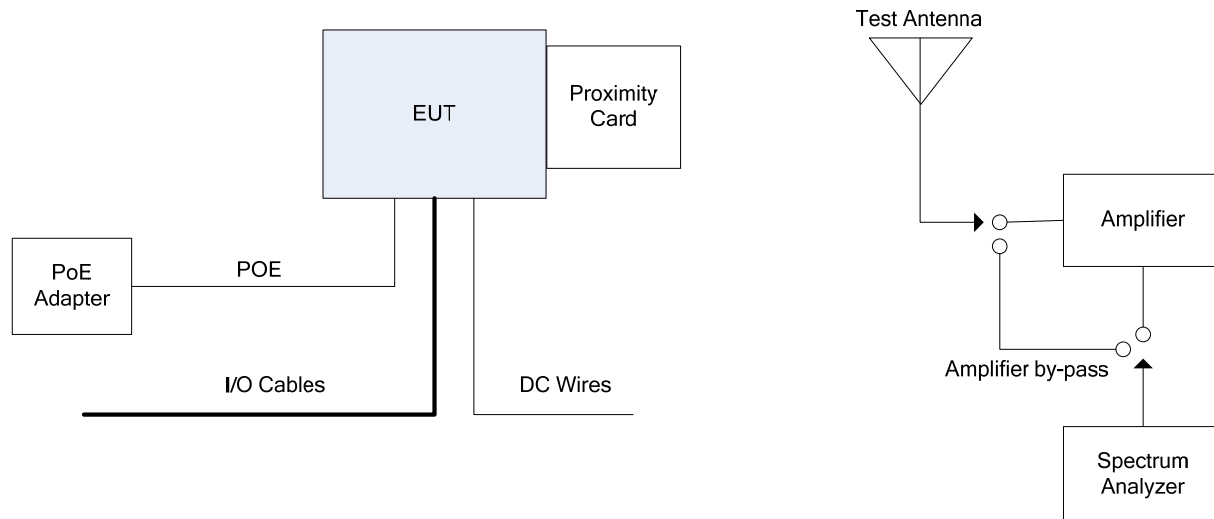


EXHIBIT 3. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

3.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

Temperature:	21 to 23 °C
Humidity:	45 to 58%
Pressure:	102 kPa
Power input source:	12-24V DC / Power over Ethernet (PoE)

3.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TESTS

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

Transmitter Test Signals	
Frequency Band(s):	120 – 130 kHz
Test Frequency(ies):	127 kHz
RF Power Output:	69.73 dBµV/m Peak at 3m distance
Normal Test Modulation:	Unmodulated carrier
Modulating Signal Source:	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 ANAB File No.: AT-1945.

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 following modification(s) implemented for compliance:

Steward ferrite P/N 28A0392-0A0 clamped on Ethernet line Close to device.

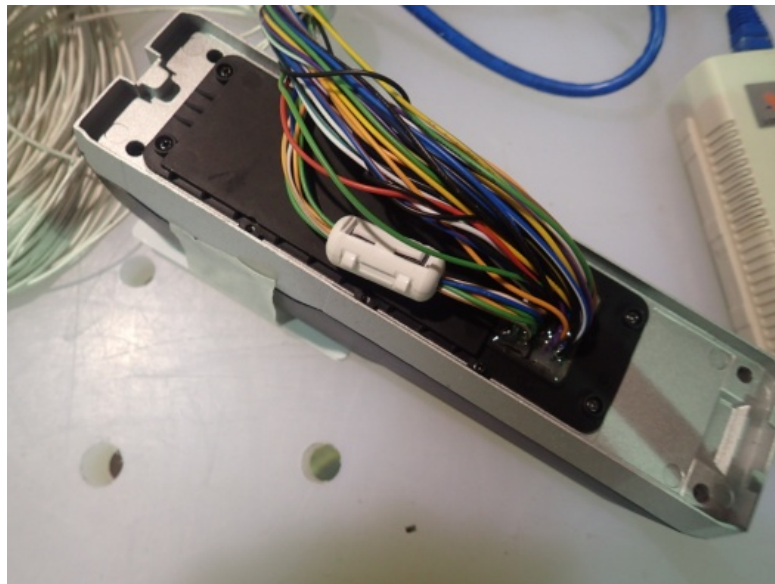


EXHIBIT 5. TEST DATA

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 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).

5.1.3.1. Fundamental Emissions

Remarks:

- Field strength limit of the fundamental 127 kHz at 300m distance is $20 \cdot \log(2400/127) = 25.5$ dB μ V/m
- 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 $40 \cdot \log(3/300) = -80$ dB

EUT with POE AC Adapter Power Source					
Frequency (MHz)	Peak E-Field @ 3m (dB μ V/m)	Extrapolated E-Field Level @ 300m (dB μ V/m)	Antenna Plane (H/V)	§ 15.209 (a) Limits @ 300m (dB μ V/m)	Margin (dB)
0.127	69.73	-10.27	V	25.5	-35.8
0.127	66.23	-13.77	H	25.5	-39.3

EUT with 24 VDC from DC Power Supply Source					
Frequency (MHz)	Peak E-Field @ 3m (dB μ V/m)	Extrapolated E-Field Level @ 300m (dB μ V/m)	Antenna Plane (H/V)	§ 15.209 (a) Limits @ 300m (dB μ V/m)	Margin (dB)
0.127	69.46	-10.54	V	25.5	-36.0
0.127	66.57	-13.43	H	25.5	-38.9

5.1.3.2. Harmonic/Spurious Emissions

Remarks: <ul style="list-style-type: none">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 $40 \cdot \log(3/300) = -80$ dBFor 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 $40 \cdot \log(3/30) = -40$ dB					
Frequency (MHz)	Peak E-Field @ 3m (dB μ V/m)	Extrapolated E-Field Level (dB μ V/m)	Antenna Plane (H/V)	§ 15.209 (a) Limits (dB μ V/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

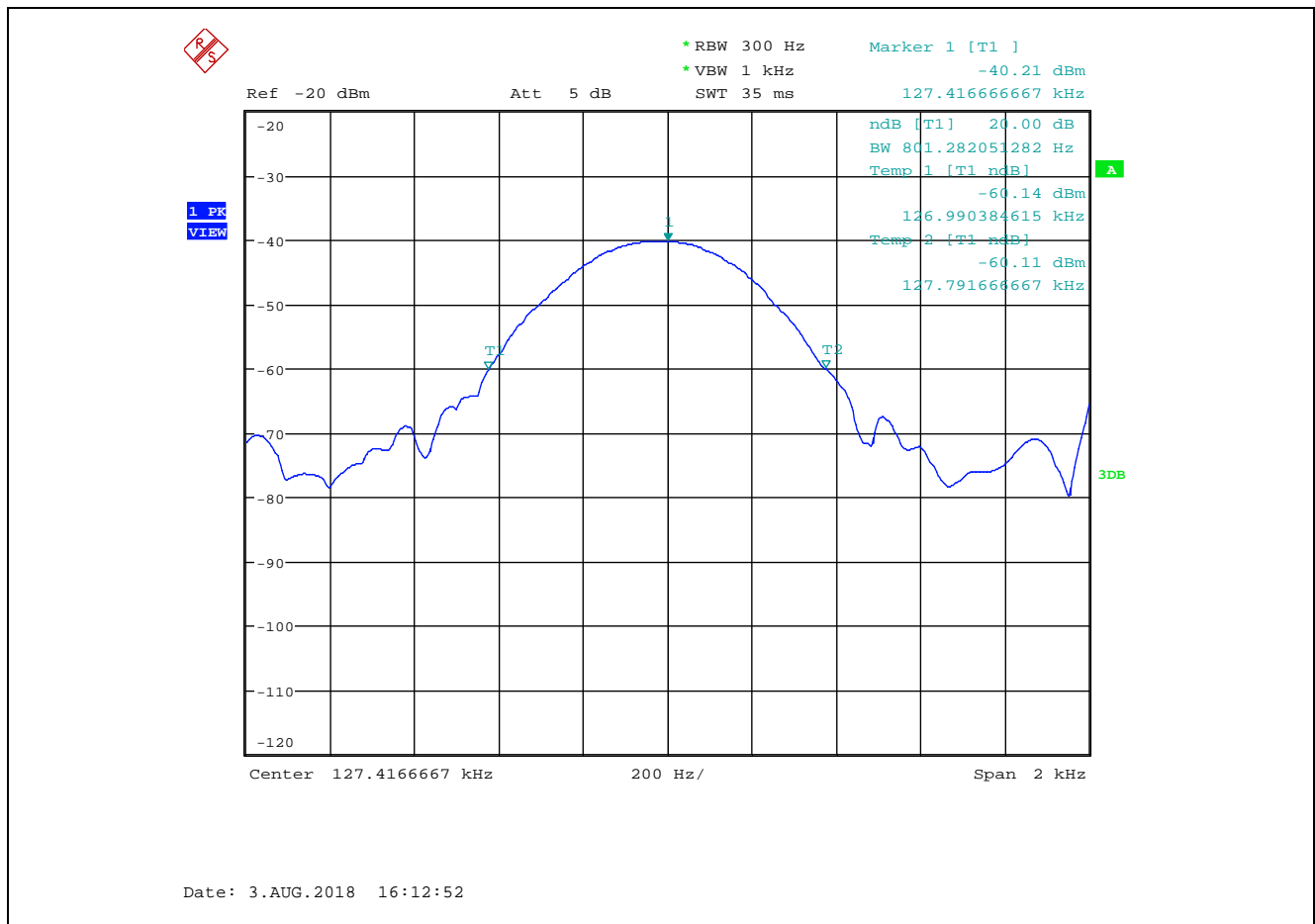
ANSI C63.4

5.2.3. Test Data

Channel Frequency	20 dB Bandwidth	99 %Occupied Bandwidth
127 kHz	801.28 Hz	721.15 Hz

See the following plot for details.

Plot 5.2.3.1. 20 dB Bandwidth, Fc: 127 kHz



Plot 5.2.3.2. 99% Occupied Bandwidth, Fc: 127 kHz

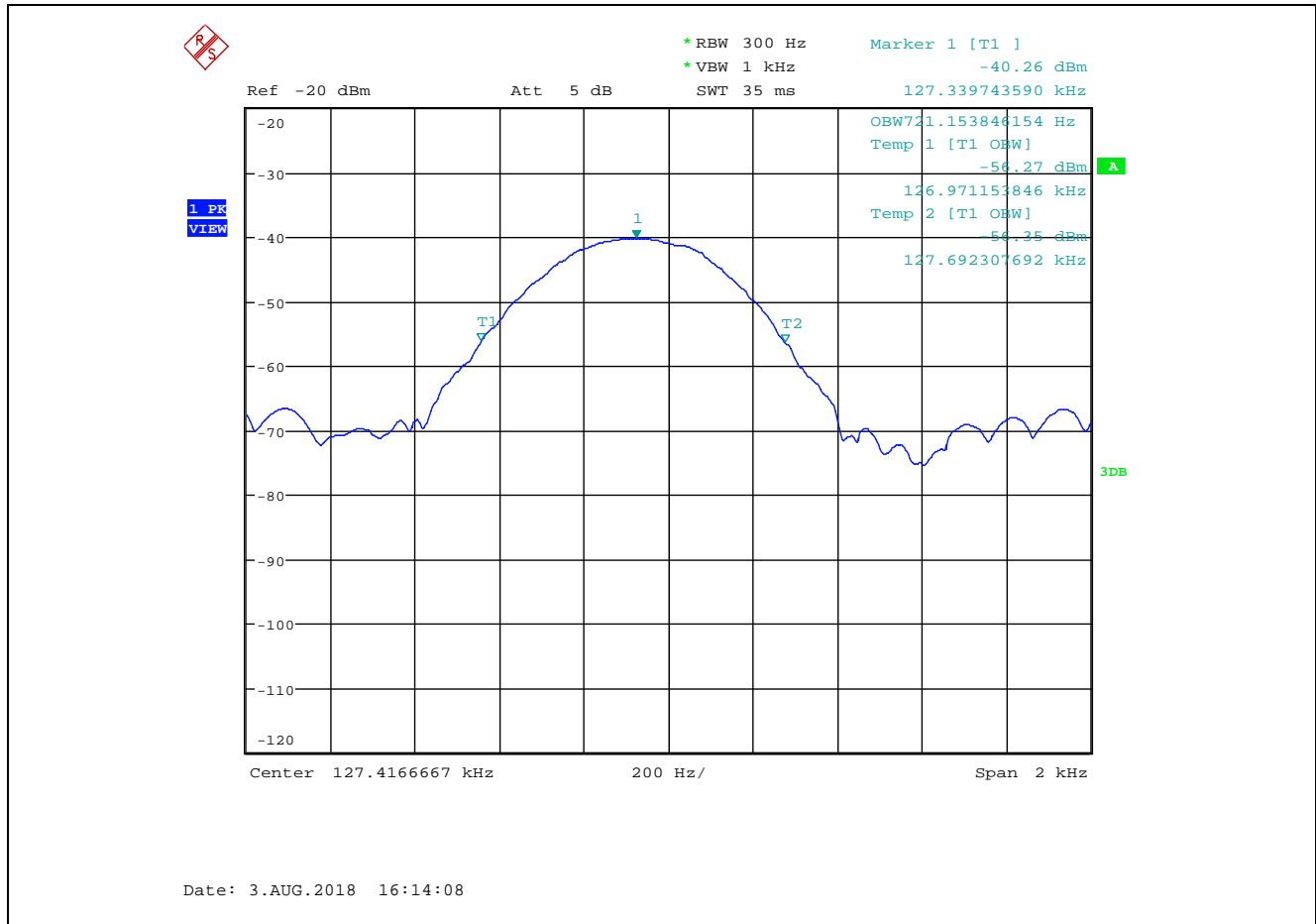


EXHIBIT 6. TEST EQUIPMENT LIST

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range	Cal. Due Date
EMI Receiver	Rohde & Schwarz	ESU40	100037	20Hz–40 GHz	04 May 2019
Spectrum Analyzer	Rohde & Schwarz	FSU26	200946	20Hz–26.5 GHz	25 Jul 2020
RF Amplifier	Com-Power	PAM-0118A	551016	0.5 – 18 GHz	09 Mar 2019
RF Amplifier	Hewlett Packard	84498	3008A00769	1 – 26.5 GHz	04 Oct 2018
Loop Antenna	EMCO	6502	9104-2611	0.01 – 30 MHz	15 Dec 2019
Biconilog	EMCO	3142C	00026873	26-2000 MHz	27 Apr 2019
Horn Antenna	EMCO	3155	6570	1 – 18 GHz	13 Oct 2018
DC Power Supply	Xantrex	HPD 60-5SX	63903	0 – 60 Vdc	See Note 1
Note 1: Internal Verification/Calibration check					

ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: 19INVX067_FCC15C209

August 6, 2019

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

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 (10 kHz - 30 MHz):	Measured (dB)	Limit (dB)
u_c	Combined standard uncertainty: $u_c(y) = \sqrt{\sum_{i=1}^m u_i^2(y)}$	± 1.30	± 2.6
U	Expanded uncertainty U: $U = 2u_c(y)$	± 2.60	± 5.2

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

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

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