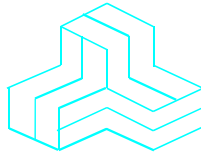


# ENGINEERING TEST REPORT



**NFMI Remote Control**  
**Model: 02-160701**  
**FCC ID: VFC160701**

Applicant:

**Etratech Inc.**  
1047 Cooke Boulevard  
Burlington, Ontario  
Canada L7T 4A8

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

**UltraTech's File No.: 16ETR115\_FCC15C209**

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

Date: October 27, 2016

Report Prepared by: Dan Huynh

Tested by: Wei Wu

Issued Date: October 27, 2016

Test Date(s): August 8 & 10, 2016

- The results in this Test Report apply only to the sample(s) tested, and the sample tested is randomly selected.
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- This test report shall not be reproduced, except in full, without a written approval from UltraTech

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Korea  
KCC-RRR  
CA2049

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## 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>	<ul style="list-style-type: none"><li>▪ Residential</li><li>▪ Commercial, industrial or business environment</li></ul>

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

None.

### 1.3. NORMATIVE REFERENCES

Publication	Year	Title
FCC 47 CFR 15	2016	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
CISPR 22 EN 55022	2008-09, Edition 6.0 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>	Etratech Inc.
<b>Address:</b>	1047 Cooke Boulevard Burlington, ON Canada L7T 4A8
<b>Contact Person:</b>	Wilson Shedden Phone #: 905-681-7544 ext. 229 Fax #: 905-681-7606 Email Address: wshedden@etrtech.com

Manufacturer	
<b>Name:</b>	Etratech Inc.
<b>Address:</b>	1047 Cooke Boulevard Burlington, ON Canada L7T 4A8
<b>Contact Person:</b>	Mike Renneboog Phone #: 905-681-7544 ext. 285 Fax #: 905-681-7606 Email Address: mrenneboog@etrtech.com

### 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>	Etratech Inc.
<b>Product Name:</b>	NFMI Remote Control
<b>Model Name or Number:</b>	02-160701
<b>Serial Number:</b>	Test sample
<b>Type of Equipment:</b>	Part 15 Low Power Communication Device Transmitter
<b>Input Power Supply Type:</b>	1.0 to 1.5 VDC Alkaline Battery
<b>Primary User Functions of EUT:</b>	Remote volume control of the user's hearing aids.

### 2.3. EUT'S TECHNICAL SPECIFICATIONS

Transmitter	
Intended Operating Environment:	<ul style="list-style-type: none"><li>▪ Residential</li><li>▪ Commercial, industrial or business environment</li></ul>
Power Supply Requirement:	1.0 to 1.5 V DC
RF Output Power Rating:	42.34 dB $\mu$ V/m peak at 10m distance
Operating Frequency Range:	10.579 MHz
20 dB Bandwidth:	515.38 kHz
Modulation Type:	CPFSK
Oscillator Frequencies:	24.734 MHz
Antenna Connector Type:	Integral, Ferrite / Loop Frame

### 2.4. LIST OF EUT'S PORTS

Port Number	EUT's Port Description	Number of Identical Ports	Connector Type	Cable Type (Shielded/Non-shielded)
No I/O port.				

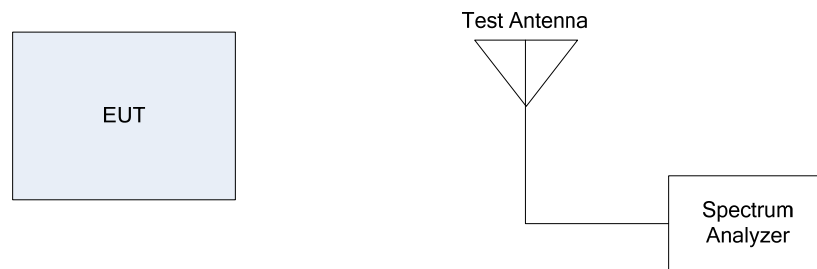
## 2.5. ANCILLARY EQUIPMENT

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

None.

## 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 to 23 °C
Humidity:	45 to 58%
Pressure:	102 kPa
Power input source:	1.5 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>	10.579 MHz
<b>Test Frequency(ies):</b>	10.579 MHz
<b>RF Power Output:</b>	42.34 dBµV/m peak at 10m distance
<b>Normal Test Modulation:</b>	CPFSK
<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	N/A
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.

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

None.



## 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 C63.10.

### 5.1.3. Test Data

#### Remarks:

- Radiated spurious emissions measurements were performed at a measuring distance of 10 m (for frequencies below 30 MHz) and 3 m (for frequencies at or above 30 MHz), from 10 kHz – 10<sup>th</sup> harmonic of the fundamental or the range applicable to the digital device, whichever is the higher frequency range and all spurious emissions that are in excess of 20 dB below the specified limit shall be recorded.
- For frequencies below 30 MHz, the results measured at 10 m distance shall be extrapolated to the specified distance using an extrapolation factor of 40 dB/decade for determining compliance.
- EUT were tested in three orthogonal positions.

#### 5.1.3.1. Fundamental Emissions

Frequency (MHz)	Measured Field Strength @ 10 m (dBµV/m)	Detector Used (Peak/QP)	Antenna Plane (H/V)	Field Strength Extrapolated Value (dBµV/m)	§ 15.225 Field Strength Limits (dBµV/m)	Margin (dB)
10.579	42.34	Peak	V	23.3	29.5	-6.2
10.579	25.59	Peak	H	6.5	29.5	-23.0

#### 5.1.3.2. Harmonic/Spurious Emissions Below 30 MHz at 10 m

Frequency (MHz)	Peak E-Field @ 10m (dBµV/m)	Extrapolated E-Field Level (dBµV/m)	Antenna Plane (H/V)	§ 15.209 (a) Limits (dBµV/m)	Margin (dB)
0.010 - 30	*	*	H / V	*	*

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

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**5.1.3.3. Harmonic/Spurious Emissions From 30 MHz – 1000 MHz at 3 m**

Frequency (MHz)	Measured Field Strength @ 3 m (dBµV/m)	Detector Used (Peak/QP)	Antenna Plane (H/V)	§ 15.209 Field Strength Limits (dBµV/m)	Margin (dB)
30 – 88	*	Peak	V/H	40.0	*
88 – 216	*	Peak	V/H	43.5	*
216 – 960	*	Peak	V/H	46.0	*
960 - 1000	*	Peak	V/H	54.0	*

\* 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

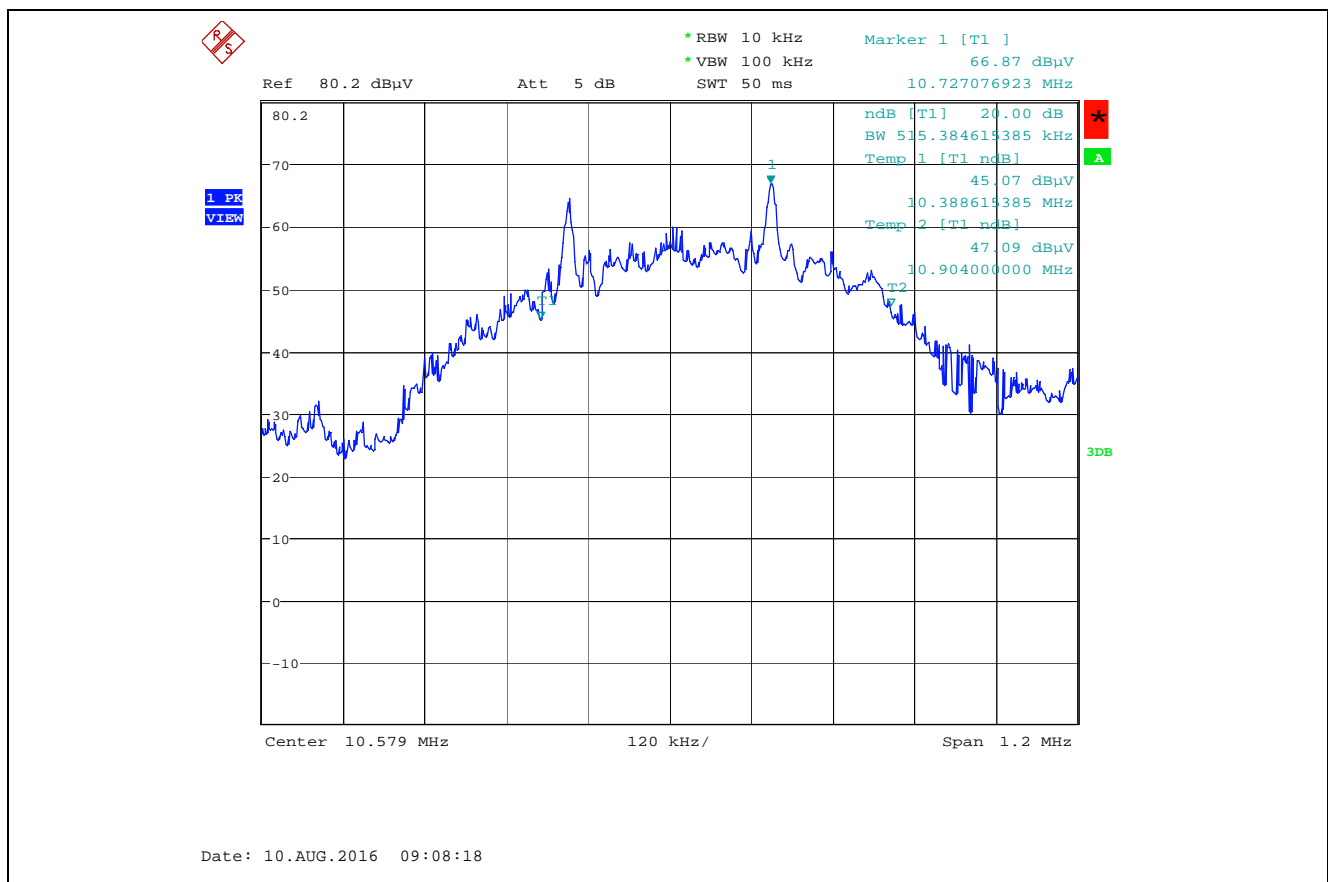
ANSI C63.10

### 5.2.3. Test Data

Channel Frequency	20 dB Bandwidth
10.579	515.38 kHz

See the following plot for details.

**Plot 5.2.3.1. 20 dB Bandwidth, Fc: 10.579 MHz**



## 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	08 May 2017
Loop Antenna	EMCO	6502	9104-2611	10 kHz – 30 MHz	05 Nov 2016
Biconi-Log Antenna	EMCO	3142	9601-1005	26 – 1000 MHz	12 May 2017

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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> $u_c(y) = \sqrt{\sum_{i=1}^m u_i^2(y)}$	<b>± 2.39</b>	<b>± 2.6</b>
<b>U</b>	<b>Expanded uncertainty U:</b> $U = 2u_c(y)$	<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> $u_c(y) = \sqrt{\sum_{i=1}^m u_i^2(y)}$	<b>± 2.39</b>	<b>± 2.6</b>
<b>U</b>	<b>Expanded uncertainty U:</b> $U = 2u_c(y)$	<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> $u_c(y) = \sqrt{\sum_{i=1}^m u_i^2(y)}$	<b>± 1.87</b>	<b>Under consideration</b>
<b>U</b>	<b>Expanded uncertainty U:</b> $U = 2u_c(y)$	<b>± 3.75</b>	<b>Under consideration</b>