Ultratech's Accreditations:

0685

31040/SIT

C-1376

46390-2049

200093-0

SL2-IN-E-1119R

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

Jan. 16, 2008

Ultratech Engineering Labs Inc.
FCC TCB Division
3000 Bristol Circle,
Oakville, Ontario,
Canada, L6H 6G4

Subject: **FCC Certification Application Testing under FCC PART 15, Subpart C - Unlicensed Low Power Transmitter operating in the frequency band 13.553-13.567 MHz.**

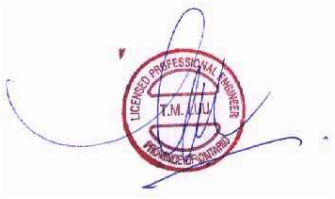
Product: **SAFEPLUG IN-WALL ELECTRICAL OUTLET**
Model No.: **1300**
FCC ID: **S9C-1300**

Dear Sir/Madam

As appointed agent for OFI, Inc., we would like to submit the application for certification of the above product. Please review all required documents uploaded to your E-Filing web site.

If you have any queries, please do not hesitate to contact us.

Yours truly,



Tri Minh Luu, P. Eng.,
V.P., Engineering

Encl

UltraTech
Group of Labs

Ultratech's Accreditations:

ANSI American National Standards Institute
0685

FC
31040/SIT

VCCI
C-1376

Canada
46390-2049

NVLAP
200093-0

BSMI
SL2-IN-E-1119R

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Tel.: (905) 829-1570
Fax.: (905) 829-8050

Website: www.ultratech-labs.com
Email: vic@ultratech-labs.com

Jan. 16, 2008

OFI, Inc.
1351 Strasburg Road
Kitchener, Ontario
Canada, N2R 1H2

Attn.: **Mr. Nick Jones**

Subject: **FCC Certification Application Testing under FCC PART 15, Subpart C - Unlicensed Low Power Transmitter operating in the frequency band 13.553-13.567 MHz.**

Product: **SAFEPLUG IN-WALL ELECTRICAL OUTLET**
Model No.: **1300**
FCC ID: **S9C-1300**

Dear Mr. Jones,

The product sample, as provided by you, has been tested and found to comply with **FCC PART 15, Subpart C - Unlicensed Low Power Transmitter operating in the frequency band 13.553-13.567 MHz.**

Enclosed you will find copies of the engineering report. If you have any queries, please do not hesitate to contact us.

Yours truly,

Tri Minh Luu, P. Eng.,
V.P., Engineering

Encl

ENGINEERING TEST REPORT

SAFEPLUG IN-WALL ELECTRICAL OUTLET
Model No.: 1300

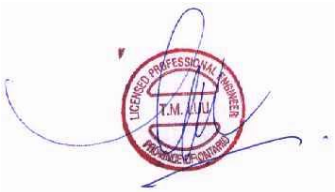
FCC ID: S9C-1300

Applicant: **OFI, Inc.**
1351 Strasburg Road
Kitchener, Ontario
Canada, N2R 1H2

In Accordance With

FEDERAL COMMUNICATIONS COMMISSION (FCC)
PART 15, SUBPART C
Unlicensed Low Power Transmitter
operating in the band 13.553-13.567 MHz

UltraTech's File No.: OFI-004FCC15-225

This Test report is Issued under the Authority of Tri M. Luu, Professional Engineer, Vice President of Engineering UltraTech Group of Labs Date: Jan. 16, 2008	
Report Prepared by: Dan Huynh Issued Date: Jan. 16, 2008	Tested by: Hung Trinh, RFI Test Technician and Phuong Luu, EMI Technician Test Dates: Jan. 07-14, 2008

- *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

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.luu@sympatico.ca

TABLE OF CONTENTS

EXHIBIT 1. INTRODUCTION

1.1. SCOPE

Reference:	FCC Part 15, Subpart C, Sec. 15.225 - Operation within the band 13.553-13.567 MHz.
Title	Telecommunication - Code of Federal Regulations, CFR 47, Part 15, Subpart C
Purpose of Test:	This report is covered test results for Certification compliance with FCC regulations for Unlicensed Low Power Transmitter operating in the 13.553-13.567 MHz band.
Test Procedures	Both conducted and radiated emissions measurements were conducted in accordance with American National Standards Institute ANSI C63.4 - 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.
Environmental Classification:	• Residential • Light-industry, Commercial • Industry

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

None

1.3. NORMATIVE REFERENCES

Publication	YEAR	Title
FCC CFR Parts 0-19	2006	Code of Federal Regulations – Telecommunication
ANSI C63.4	2003	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
CISPR 22 EN 55022	2006 2006	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
CISPR 16-1-1	2003	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-1: Measuring Apparatus
CISPR 16-2-1	2003	Specification for radio disturbance and immunity measuring apparatus and methods. Part 2-1: Conducted disturbance measurement
CISPR 16-2-3	2003	Specification for radio disturbance and immunity measuring apparatus and methods. Part 2-3: Radiated disturbance measurement

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1. CLIENT INFORMATION

APPLICANT:	
Name:	OFI, Inc.
Address:	1351 Strasburg Road Kitchener, Ontario Canada, N2R 1H2
Contact Person:	Mr. Nick Jones Phone #: 519-884-3100 Fax #: 519-884-9800 Email Address: njones@safeplug.com

MANUFACTURER:	
Name:	OFI, Inc.
Address:	1351 Strasburg Road Kitchener, Ontario Canada, N2R 1H2
Contact Person:	Mr. Nick Jones Phone #: 519-884-3100 Fax #: 519-884-9800 Email Address: njones@safeplug.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.

Brand Name:	OFI, Inc.
Product Name:	SAFEPLUG IN-WALL ELECTRICAL OUTLET
Model Name or Number:	1300
Part Number:	N/A
Serial Number:	Preproduction
Power input source:	120 Vac, 60 Hz
Primary User Functions of EUT:	The SafePlug system protects against fires caused by overloaded wires via an Overload Fault Interrupter™ (also called OFI™). Damaged and defective appliances including lamps and electronics as well as misuse can draw excessive electricity and overheat wires. OFI continuously monitors the electricity flowing to appliances, 24 hours per day, 7 days a week, and automatically turns it off when it exceeds safe limits. It reads the safe limit for each appliance from the RightPlug technology in its cord-set plug.

2.3. EUT'S TECHNICAL SPECIFICATIONS

Transmitter	
Equipment Type:	▪ Fixed
Intended Operating Environment:	▪ Residential ▪ Commercial, light industry & heavy industry
Power Supply Requirement:	120 VAC 60 Hz
Field Strength:	50.8 dBµV/m peak at 10 m
Operating Frequency Range:	13.553-13.567 MHz
RF Output Impedance:	50 Ohms
20 dB Bandwidth:	5.61 kHz
Modulation Type:	AM
Oscillator Frequencies:	8 MHz (microprocessor)
Antenna Connector Type:	Integral inductive loops, one at each receptacle, multiplexed (Antenna Gain = -55 dBi)
Channel access protocol:	Simplex
Mode of operation:	Non-continuous, repeat rate = 15Hz (7.5Hz at each 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	Receptacle	2	3 Prong	Non Shielded

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:	Desk top lamp with RightPlug compliant Tag
Brand name:	Generic
Model Name or Number:	n/a
FCC Certification:	n/a
Serial Number:	n/a
Connected to EUT's Port:	Receptacle

2.6. GENERAL TEST SETUP

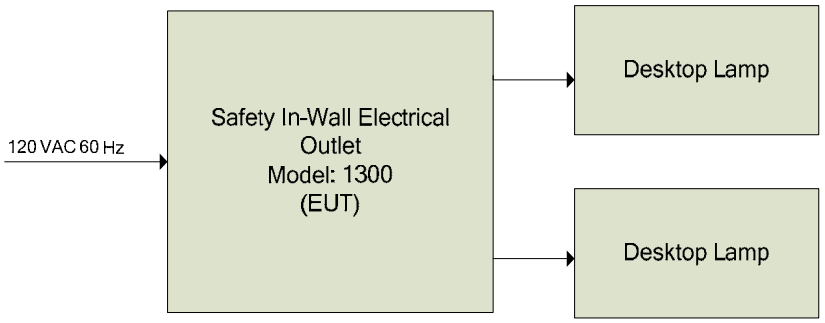


EXHIBIT 3. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

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:	120 Vac, 60 Hz

3.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TESTS

Operating Modes:	Normal
Special Test Software:	None
Special Hardware Used:	None
Transmitter Test Antenna:	Integral

Transmitter Test Signals:	
Frequency:	13.56 MHz
Transmitter Wanted Output Test Signals:	
▪ RF Power Output (measured maximum output power):	50.8 dBµV/m peak at 10 m
▪ Normal Test Modulation:	AM
▪ 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 Powerline Conducted Emissions were performed in UltraTech's shielded room, 16'(L) by 12'(W) by 12'(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.: 31040/SIT 1300B3) and Industry Canada office (Industry Canada File No.: IC2049-3). Last Date of Site Calibration: May 17, 2007.

4.2. APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC PARAGRAPH.	TEST REQUIREMENTS	COMPLIANCE (YES/NO)
15.203 & 15.204	The transmitter shall use a transmitting antenna that is an integral part of the device	Yes
	Power Limits & 20 dB Bandwidth	Yes
15.225(a)	Field Strength of Emissions inside and outside the permitted band 13.553-13.567 MHz	Yes
15.225(c)	Frequency Stability	Yes
15.107 & 15.207	Class B - AC Power Conducted Emissions on Tx, Rx and standby modes	Yes
15.109(a)	Class B - Radiated Emissions from Unintentional Radiators	Yes. A separate test report will be provided upon request.

EXHIBIT 5. MEASUREMENTS, EXAMINATIONS & TEST DATA FOR EMC EMISSIONS

5.1. TEST PROCEDURES

This section contains test results only. Details of test methods and procedures can be found in ANSI C63.4 and ULTR-P001-2004.

5.2. MEASUREMENT UNCERTAINTIES

The measurement uncertainties stated were calculated in accordance with requirements of UKAS Document LAB 34 with a confidence level of 95%. Please refer to Exhibit 6 for Measurement Uncertainties.

5.3. MEASUREMENT EQUIPMENT USED:

The measurement equipment used complied with the requirements of the Standards referenced in the Methods & Procedures ANSI C63.4 and CISPR 16-1-1.

5.4. COMPLIANCE WITH FCC PART 15 – GENERAL TECHNICAL REQUIREMENTS

FCC Section	FCC Rules	
15.203	Described how the EUT complies with the requirement that either its antenna is permanently attached, or that it employs a unique antenna connector, for every antenna proposed for use with the EUT. The exception is in those cases where EUT must be professionally installed. In order to demonstrate that professional installation is required, the following 3 points must be addressed: • The application (or intended use) of the EUT • The installation requirements of the EUT • The method by which the EUT will be marketed	The antenna is permanently attached and enclosed inside the EUT's chassis.
15.204	Provided the information for every antenna proposed for use with the EUT: (a) type (e.g. Yagi, patch, grid, dish, etc…), (b) manufacturer and model number (c) gain with reference to an isotropic radiator	N/A

5.5. AC POWERLINE CONDUCTED EMISSIONS @ FCC PART 15, SUBPART B, PARA.15.107(A) & 15.207

5.5.1. Limits

The equipment shall meet the limits of the following table:

	CLASS B LIMITS		
Test Frequency Range (MHz)	**Quasi-Peak (dBμV)**	**Average* (dBμV)**	**Measuring Bandwidth**
0.15 to 0.5	66 to 56*	56 to 46*	RBW = 9 kHz VBW ≥ 9 kHz for QP VBW = 1 Hz for Average
0.5 to 5	56	46	RBW = 9 kHz VBW ≥ 9 kHz for QP VBW = 1 Hz for Average
5 to 30	60	50	RBW = 9 kHz VBW ≥ 9 kHz for QP VBW = 1 Hz for Average

* Decreasing linearly with logarithm of frequency

5.5.2. Method of Measurements

Refer to Ultratech Test Procedures, File # ULTR P001-2004 and ANSI C63.4 for measurement methods

5.5.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer	Hewlett Packard	8593EM	3412A00103	9 kHz- 26.5 GHz
Transient Limiter	Hewlett Packard	11947A	310707998	9 kHz- 200 MHz (10dB)
L.I.S.N.	Emco	3825/2	89071531	9 kHz- 200 MHz (50ohms/50uH)
12'x16'x12' RF Shielded Chamber	RF Shielding	…	..	…

5.5.4. Photographs of Test Setup

Refer to photos # 1 & 2 in Annex 1 for photos of test setup.

5.5.5. Test Data

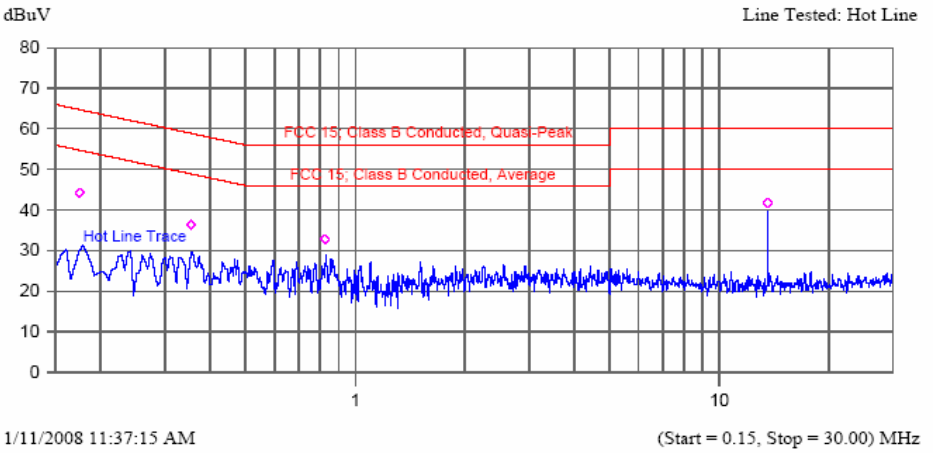
Plot #1(a): The EUT was tested with the damping antennas

FCC Part 15; Class B Conducted

Test Header

Description: Damping Antenna Sample (#6) ; Two desk lamps were connected to the outlet and in "Switch-on" condition.
Power Line: 120V / 60Hz
Setup Name: FCC Part 15; Class A&B Conducted
Customer Name: OFI INC.
Project Number: OFI-004Q
Operator Name: Steven Lu
EUT Name: SafePlug, Modil 1300 - 13.56MHz Transmitter & Receiver: Passive Load Detector
Date Created: 1/11/2008 9:43:40 AM
Date Modified: 1/11/2008 9:43:40 AM

Current Graph



Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta QP-Limit dB	Avg dBuV	Delta Avg-Limit dB	Trace Name	Comment
0.175	44.3	38.5	-26.8	29.3	-26.0	Hot Line Trace	
0.354	36.4	32.4	-27.7	27.4	-22.7	Hot Line Trace	
0.826	32.8	28.3	-27.7	24.3	-21.7	Hot Line Trace	
13.562	41.7	38.9	-21.1	20.6	-29.4	Hot Line Trace	

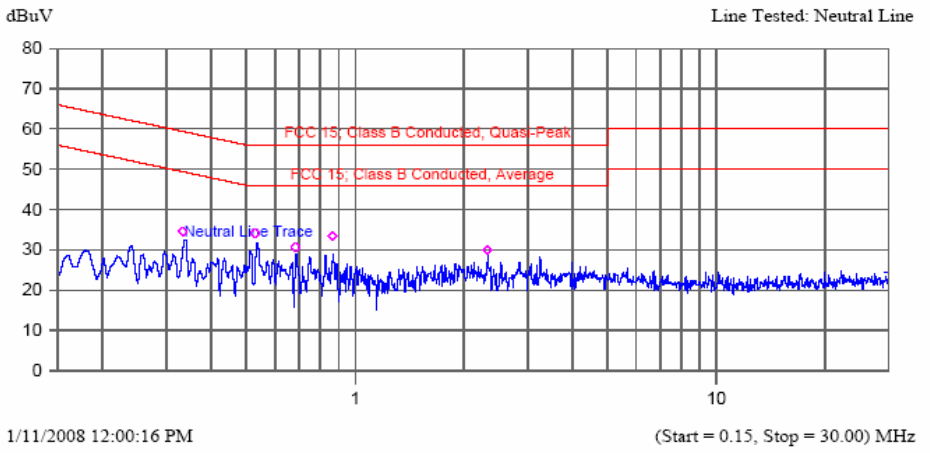
Plot #1(b): The EUT was tested with the damping antennas

FCC Part 15; Class B Conducted

Test Header

Description: Damping Antenna Sample (#6) ; Two desk lamps were connected to the outlet and in "Switch-on" condition.
Power Line: 120V / 60Hz
Setup Name: FCC Part 15; Class A&B Conducted
Customer Name: OFI INC.
Project Number: OFI-004Q
Operator Name: Steven Lu
EUT Name: SafePlug, Modil 1300 - 13.56MHz Transmitter & Receiver: Passive Load Detector
Date Created: 1/11/2008 9:43:40 AM
Date Modified: 1/11/2008 11:59:23 AM

Current Graph



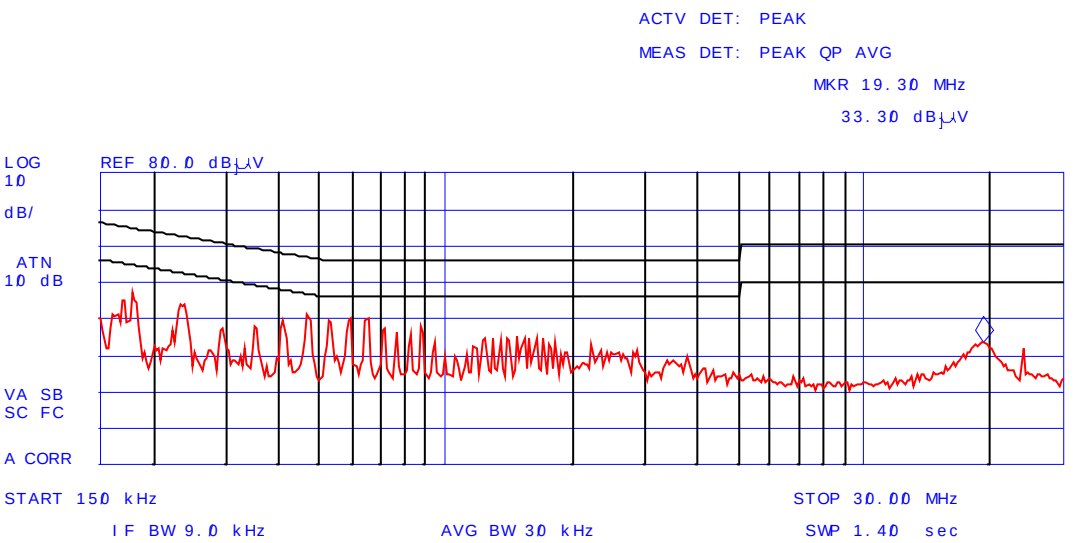
Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta QP-Limit dB	Avg dBuV	Delta Avg-Limit dB	Trace Name	Comment
0.334	34.5	30.9	-29.8	26.3	-24.3	Neutral Line Trace	
0.529	34.1	30.5	-25.5	25.7	-20.3	Neutral Line Trace	
0.683	30.6	26.1	-29.9	20.9	-25.1	Neutral Line Trace	
0.864	33.4	30.4	-25.6	26.2	-19.8	Neutral Line Trace	
2.321	29.9	23.5	-32.5	17.7	-28.3	Neutral Line Trace	

Plot #2(a): The EUT was tested with the damping antennas replaced by an dummy load

Detector: [X] PEAK [X] QUASI-PEAK [X] AVERAGE		Temp: 23C°	Humidity: 32%
Line Tested: Line 1	Line Voltage 120V AC	Test Tech: Hung	Test Date: 19 July 06
Standard: FCC 15 B			

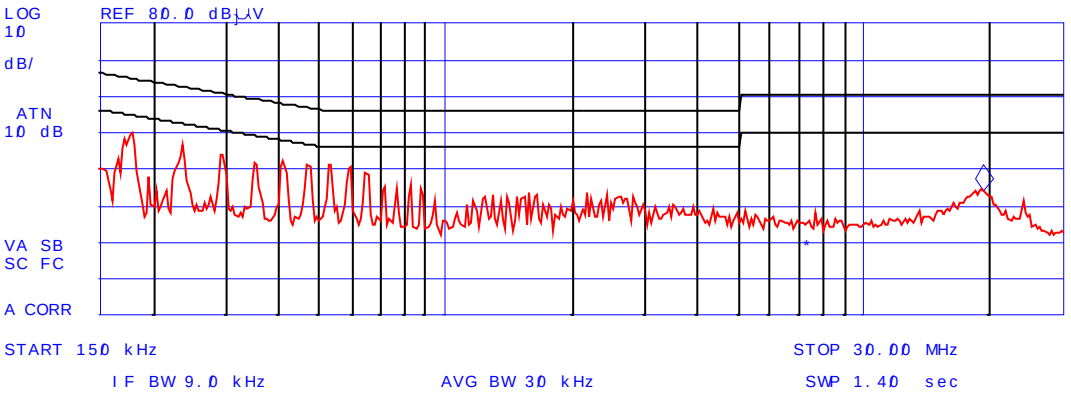
Signal	Freq (MHz)	PK Amp	QP Amp	AV Amp	AV△L2
1	0.178775	49.2	48.0	39.9	-14.7
2	0.595463	40.3	38.8	37.6	-8.4
3	1.609175	36.3	33.3	31.1	-14.9
4	19.313550	34.1	29.4	23.6	-26.4



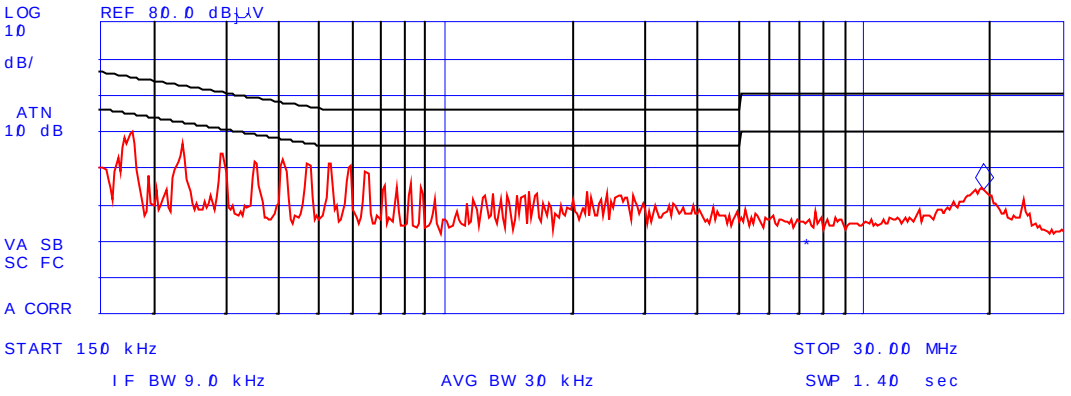
Plot #2(b): The EUT was tested with the damping antennas replaced by an dummy load

Detector: [X] PEAK [X] QUASI-PEAK [X] AVERAGE		Temp: 23C°	Humidity: 32%
Line Tested: Line 1	Line Voltage 120V AC	Test Tech: Hung	Test Date: 19 July 06
Standard: FCC 15 B			

Signal	Freq (MHz)	PK Amp	QP Amp	AV Amp	AV△L2
1	0.178783	50.2	49.2	43.4	-11.2
2	0.595457	41.1	39.1	37.5	-8.5
3	1.609167	34.5	31.7	29.1	-16.9
4	19.313549	34.4	30.0	24.1	-25.9



Signal	Freq (MHz)	PK Amp	QP Amp	AV Amp	AV△L2
1	0.178783	50.2	49.2	43.4	-11.2
2	0.595457	41.1	39.1	37.5	-8.5
3	1.609167	34.5	31.7	29.1	-16.9
4	19.313549	34.4	30.0	24.1	-25.9



5.6. 20 DB BANDWIDTH

5.6.1. Limits

N/A

5.6.2. Method of Measurements

Refer to Ultratech Test Procedures, File # ULTR P001-2004 and ANSI C63.4 for measurement methods

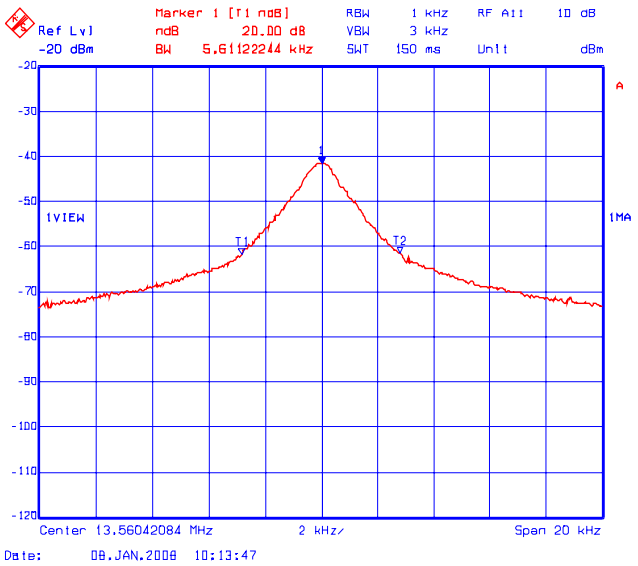
5.6.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer	Rohde & Schwarz	FSEK30	100077	20 Hz- 40 GHz
Loop Antenna	Emco	6502	9104-2611	10 kHz – 30 MHz

5.6.4. Test Data

CHANNEL FREQUENCY (MHz)	20 dB Bandwidth (kHz)
13.56 MHz	5.61

Plot #3: 20 dB Bandwidth Measurement



5.7. FIELD STRENGTH OF EMISSIONS INSIDE & OUTSIDE THE PERMITTED BAND 13.553-13.567 MHZ @ 10 METERS, FCC 15.225(A)

5.7.1. Limits

(a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

Alternative the limit @ 3 meters = 20*log(15,848*30/10) = 93.5 dBµV/m

Remarks:

FCC CFR 47, Part 15, Subpart C, Para. 15.205(a) - Restricted Frequency Bands

MHz	MHz	MHz	GHz
0.090 - 0.110	162.0125 - 167.17	2310 - 2390	9.3 - 9.5
0.49 – 0.51	167.72 - 173.2	2483.5 - 2500	10.6 - 12.7
2.1735 - 2.1905	240 - 285	2655 - 2900	13.25 - 13.4
8.362 - 8.366	322 - 335.4	3260 - 3267	14.47 - 14.5
13.36 - 13.41	399.9 - 410	3332 - 3339	14.35 - 16.2
25.5 – 25.67	608 - 614	3345.8 - 3358	17.7 - 21.4
37.5 – 38.25	960 - 1240	3600 - 4400	22.01 - 23.12
73 - 75.4	1300 - 1427	4500 - 5250	23.6 - 24.0
108 – 121.94	1435 - 1626.5	5350 - 5460	31.2 - 31.8
123 – 138	1660 - 1710	7250 - 7750	36.43 - 36.5
149.9 – 150.05	1718.8 - 1722.2	8025 - 8500	Above 38.6
156.7 – 156.9	2200 - 2300	9000 - 9200	

FCC CFR 47, Part 15, Subpart C, Para. 15.209(a)
-- Field Strength Limits within Restricted Frequency Bands --

FREQUENCY (MHz)	FIELD STRENGTH LIMITS (microvolts/m)	DISTANCE (Meters)
0.009 - 0.490	2,400 / F (KHz)	300
0.490 - 1.705	24,000 / 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

5.7.2. Method of Measurements

Refer to Ultratech Test Procedures, File # ULTR P001-2004 and ANSI C63.4 for measurement methods

Applies to harmonics/spurious that fall in the restricted bands listed in Section 15.205. the maximum permitted average field strength is listed in Section 15.209. A Pre-Amp and highpass filter are used for this measurement.

- For measurements from 9 KHz to 150 KHz, set RBW = 200 Hz, VBW ≥ RBW, SWEEP=AUTO.
- For measurements from 150 KHz to 30 MHz, set RBW = 10 KHz, VBW ≥ RBW, SWEEP=AUTO.
- For measurements from 30 MHz to 1 GHz, set RBW = 100 KHz, VBW ≥ RBW, SWEEP=AUTO.
- For measurement above 1 GHz, set RBW = 1 MHz, VBW = 1 MHz, SWEEP=AUTO.

5.7.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Hewlett Packard	8546A	3650A00371	9 kHz- 6.5 GHz Build in amplifier 30dB
Spectrum Analyzer	Rohde & Schwarz	FSEK30	100077	20 Hz- 40 GHz
Biconilog Anenna	Emco	3142	10005	0.03 – 2 GHz
Loop Antenna	Emco	6502	9104-2611	10 kHz – 30 MHz

5.7.4. Photographs of Test Setup

Refer to photos # 3 & 4 in Annex 1 for photos of test setup.

5.7.5. Test Data

FREQUENCY (MHz)	RF LEVEL (dBµV/m)	EMI DETECTOR	ANTENNA PLANE (V/H)	LIMIT 15.209 (dBµV/m)	LIMIT MARGIN (dB)	PASS/ FAIL	Distance (m)
13.56	46.7	Peak	V	93.5	-33.4	PASS	10
13.56	50.8	Peak	H	93.5	-29.5	PASS	10
104.00	23.2	Peak	V	33.1	-9.9	PASS	10
105.30	25.6	Peak	V	33.1	-7.5	PASS	10
105.30	18.6	Peak	H	33.1	-14.5	PASS	10
109.75	21.2	Peak	V	33.1	-11.9	PASS	10
140.30	19.1	Peak	V	33.1	-14.0	PASS	10
144.70	25.2	Peak	V	33.1	-7.9	PASS	10
149.90	25.8	Peak	V	33.1	-7.3	PASS	10
159.10	23.2	Peak	V	33.1	-9.9	PASS	10
190.20	21.9	Peak	V	33.1	-11.2	PASS	10
217.30	20.7	Peak	V	35.6	-14.9	PASS	10
217.30	18.4	Peak	H	35.6	-17.2	PASS	10
230.90	19.7	Peak	V	35.6	-15.9	PASS	10
230.90	19.1	Peak	H	35.6	-16.5	PASS	10
325.00	27.6	Peak	V	35.6	-8.0	PASS	10
339.60	27.1	Peak	V	35.6	-8.5	PASS	10
339.60	20.6	Peak	H	35.6	-15.0	PASS	10
The spurious emissions were scanned from 10 kHz to 1 GHz at 10 meters and all emissions of less than 20 dB below the limits were recorded.							

5.8. FREQUENCY STABILITY @ FCC §15.225(E)

5.8.1. Limits

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of –20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For operated equipment, the equipment tests shall be performed using a new.

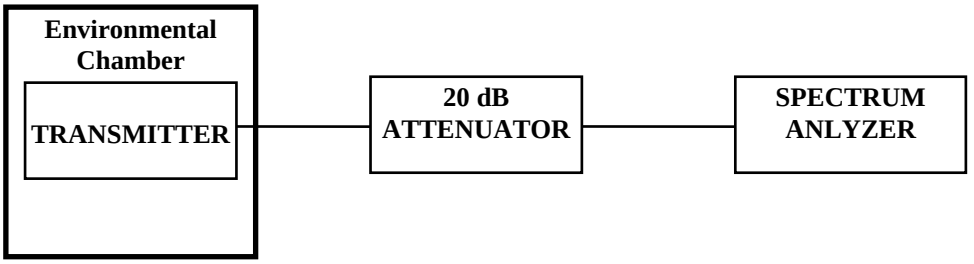
5.8.2. Method of Measurements

Refer to Ultratech Test Procedures, File # ULTR P001-2004 and ANSI C63.4 for measurement methods

5.8.3. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Rohde & Schawrz	FSEK20/B4/B21	834157/005	9 kHz – 40 GHz with external mixer
Attenuator(s)	Bird	..	…	DC – 22 GHz
Temperature & Humidity Chamber	Tenney	T5	9723B	-40^{o} to +60 ^{o} C range

5.8.4. Test Arrangement



5.8.5. Test Data

Frequency Band:	13.553-13.567 MHz
Center Frequency:	13.56 MHz
Frequency Tolerance Limit:	Stay within the permitted bands
Max. Frequency Tolerance Measured:	- 0.0024 %
Input Voltage Rating:	120 Vac, 60 Hz

Ambient Temperature	Frequency Tolerance at Nominal Voltage 120 Vac, 60 Hz	Frequency Tolerance at Nominal Voltage 120 Vac, 60 Hz
(°C)	Hz	%
-20	240	0.0018
-10	200	0.0015
0	200	0.0015
10	200	0.0015
20	0	0.0000
30	0	0.0000
40	0	0.0000
50	-321	-0.0024

	Variation of primary supply voltage (Hz)	
Nominal Voltage (120Vnom)	102V AC	138VAC
13.56 MHz	13.56 MHz	13.56 MHz
13.56 MHz	13.56 MHz	13.56 MHz
13.56 MHz	13.56 MHz	13.56 MHz
13.56 MHz	13.56 MHz	13.56 MHz

EXHIBIT 6. MEASUREMENT UNCERTAINTY

The measurement uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 and LAB 34.

6.1. LINE CONDUCTED EMISSION MEASUREMENT UNCERTAINTY

CONTRIBUTION (Line Conducted)	PROBABILITY DISTRIBUTION	UNCERTAINTY (dB)	
		9-150 kHz	0.15-30 MHz
EMI Receiver specification	Rectangular	±1.5	±1.5
LISN coupling specification	Rectangular	±1.5	±1.5
Cable and Input Transient Limiter calibration	Normal (k=2)	±0.3	±0.5
Mismatch: Receiver VRC Γ_1 = 0.03 LISN VRC Γ_R = 0.8(9 kHz) 0.2 (30 MHz) Uncertainty limits 20Log(1±$\Gamma_1\Gamma_R$)	U-Shaped	±0.2	±0.3
System repeatability	Std. deviation	±0.2	±0.05
Repeatability of EUT	--	--	--
Combined standard uncertainty	Normal	±1.25	±1.30
Expanded uncertainty U	Normal (k=2)	±2.50	±2.60

Sample Calculation for Measurement Accuracy in 150 kHz to 30 MHz Band:

$u_c(y) = \sqrt{\sum_{i=1}^{m} u_i^2(y)} = \pm \sqrt{(1.5^2 + 1.5^2)/3 + (0.5/2)^2 + (0.05/2)^2 + 0.35^2} = \pm 1.30$ dB

$U = 2u_c(y) = \pm 2.6$ dB

6.2. RADIATED EMISSION MEASUREMENT UNCERTAINTY

CONTRIBUTION (Radiated Emissions)	PROBABILITY DISTRIBUTION	UNCERTAINTY (± dB)	
		3 m	10 m
Antenna Factor Calibration	Normal (k=2)	±1.0	±1.0
Cable Loss Calibration	Normal (k=2)	±0.3	±0.5
EMI Receiver specification	Rectangular	±1.5	±1.5
Antenna Directivity	Rectangular	+0.5	+0.5
Antenna factor variation with height	Rectangular	±2.0	±0.5
Antenna phase center variation	Rectangular	0.0	±0.2
Antenna factor frequency interpolation	Rectangular	±0.25	±0.25
Measurement distance variation	Rectangular	±0.6	±0.4
Site imperfections	Rectangular	±2.0	±2.0
Mismatch: Receiver VRC $\Gamma_1 = 0.2$ Antenna VRC $\Gamma_R = 0.67$(Bi) 0.3 (Lp) Uncertainty limits 20Log(1±$\Gamma_1\Gamma_R$)	U-Shaped	+1.1 -1.25	±0.5
System repeatability	Std. Deviation	±0.5	±0.5
Repeatability of EUT		-	-
Combined standard uncertainty	Normal	+2.19 / -2.21	+1.74 / -1.72
Expanded uncertainty U	Normal (k=2)	+4.38 / -4.42	+3.48 / -3.44

Calculation for maximum uncertainty when 3m biconical antenna including a factor of k=2 is used:

$U = 2u_c(y) = 2x(+2.19) = +4.38$ dB And $U = 2u_c(y) = 2x(-2.21) = -4.42$ dB

EXHIBIT 7. MEASUREMENT METHODS

7.1. GENERAL TEST CONDITIONS

The following test conditions shall be applied throughout the tests covered in this report.

7.1.1. Normal temperature and humidity

- Normal temperature: +15°C to +35°C
- Relative Humidity: +20% to 75%

The actual values during tests shall be recorded in the test report.

7.1.2. Normal power source

7.1.2.1. Mains Voltage

The nominal test voltage of the equipment to be connected to mains shall be the nominal mains voltage which is the declared voltage or any of the declared voltages for which the equipment was designed.

The frequency of test power source corresponding to the AC mains shall be between 59 Hz and 61 Hz.

7.1.2.2. Battery Power Source.

For operation from power sources, the nominal test voltage shall be as declared by the equipment manufacturer. This shall be recorded in the test report.

7.1.3. Operating Condition of Equipment under Test

- All tests were carried out while the equipment operated at the following frequencies:
  - The lowest operating frequency,
  - The middle operating frequency and
  - The highest operating frequency

- Modulation were applied using the Test Data sequence
- The transmitter was operated at the highest output power, or in the case the equipment able to operate at more than one power level, at the lowest and highest output powers

7.2. SPURIOUS EMISSIONS

For both conducted and radiated measurements, the spurious emissions were scanned from the lowest frequency generated by the EUT or 10 MHz whichever is lower to 10^{th} harmonic of the highest frequency generated by the EUT.

- The radiated emission measurements were performed at the UltraTech's 3 Meter Open Field Test Site (OFTS) situated in the Town of Oakville, province of Ontario. The Attenuation Characteristics of OFTS have been filed to FCC, Industry Canada, ACA/Austel, NVLap and ITI.
- Radiated emissions measurements were made using the following test instruments:

1. Calibrated EMCO BiconiLog antenna in the frequency range from 30 MHz to 2000 MHz.
2. Calibrated Emco Horn antennas in the frequency range above 1000 MHz (1GHz - 40 GHz).
3. The test is required for any spurious emission or modulation product that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

   - RBW = 100 kHz for f < 1GHz and RBW = 1 MHz for f $\geq$ 1 GHz
   - VBW = RBW
   - Sweep = auto
   - Detector function = peak
   - Trace = max hold
   - Follows the guidelines in ANSI C63.4-1992 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc.. A pre-amp and highpass filter are required for this test, in order to provide the measuring system with sufficient sensitivity.
   - Allow the trace to stabilize.
   - The peak reading of the emission, after being corrected by the antenna correction factor, cable loss, pre-amp gain, etc…. is the peak field strength which comply with the limit specified in Section 15.35(b)

   Calculation of Field Strength:

   The field strength is calculated by adding the calibrated antenna factor and cable factor, and subtracting the Amplifier gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where FS = Field Strength
RA = Receiver/Analyzer Reading
AF = Antenna Factor
CF = Cable Attenuation Factor
AG = Amplifier Gain

Example: If a receiver reading of 60.0 dBuV is obtained, the antenna factor of 7.0 dB/m and cable factor of 1.0 dB are added, and the amplifier gain of 30 dB is subtracted. The actual field strength will be:

Field Level = 60 + 7.0 + 1.0 - 30 = 38.0 dBuV/m.
Field Level = $10^{(38/20)}$ = 79.43 uV/m.

   - Submit this Test Data

- Now set the VBW to 10Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100ms, then the reading obtained may be further adjusted by a "duty cycle correction factor", derived from 10log(dwell time/100mS) in an effort to demonstrate compliance with the 15.209.
- Submit Test Data

Maximizing The Radiated Emissions:

- The frequencies of emissions was first detected. Then the amplitude of the emissions was measured at the specified measurement distance using required antenna height, polarization, and detector characteristics.
- During this process, cables and peripheral devices were manipulated within the range of likely configuration.
- For each mode of operation required to be tested, the frequency spectrum was monitored. Variations in antenna heights (from 1 meter to 4 meters above the ground plane), antenna polarization (horizontal plane and vertical plane), cable placement and peripheral placement were explored to produce the highest amplitude signal relative to the limit.

The maximum radiated emission for a given mode of operation was found by using the following step-by-step procedure:

Step1: Monitor the frequency range of interest at a fixed antenna height and EUT azimuth.

Step2: Manipulate the system cables to produce highest amplitude signal relative to the limit. Note the amplitude and frequency of the suspect signal.

Step3: Rotate the EUT 360 degrees to maximize the suspected highest amplitude signal. If the signal or another at a different frequency is observed to exceed the previously noted highest amplitude signal by 1 dB or more, go back to the azimuth and repeat Step 2. Otherwise, orient the EUT azimuth to repeat the highest amplitude observation and proceed.

Step4: Move the antenna over its full allowable range of travel (1 to 4 meters) to maximize the suspected highest amplitude signal. If the signal or another at a different frequency is observed to exceed the previously noted highest amplitude signal by 1 dB or more, return to Step 2 with the highest amplitude observation and proceed.

Step5: Change the polarization of the antenna and repeat Step 2 through 4. Compare the resulting suspected highest amplitude signal with that found for the other polarization. Select and note the higher of the two signals. This signal is termed the highest observed signal with respect to the limit for this EUT operational mode.

Step6: The effects of various modes of operation is examined. This is done by varying the equipment modes as steps 2 through 5 are being performed.

Step7: After completing steps 1 through 6, record the final highest emission level, frequency, antenna polarization and detector mode of the measuring instrument.

7.3. 20 DB BANDWIDTH MEASUREMENTS

- Couple the RF output signal to the spectrum analyzer by means of direct connection or by a receiving antenna.
- The spectrum analyzer shall be se as follows:
  - Span: Minimum span to fully display the entire emission, approximately 3 x emission BW.
  - Resolution RBW: 1% to 3% of the approximate emission BW
  - Video VBW: 3 x RBW
  - EMI Detector: Peak
  - Sweep Time: Coupled or set to a slow rate
  - Trace: Max-hold
- Place the marker at both sides of the emission slope and at -20 dB down from the peak value.
- The difference of frequencies of 2 markers will be the 20 dB bandwidth
- Record and plot the test results.

7.4. FREQUENCY STABILITY

Refer to FCC @ 2.1055.

(a) The frequency stability shall be measured with variation of ambient temperature as follows: From -30 to +50 centigrade except that specified in subparagraph (2) & (3) of this paragraph.

(b) Frequency measurements shall be made at extremes of the specified temperature range and at intervals of not more than 10 centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short-term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stability circuitry need be subjected to the temperature variation test.

(d) The frequency stability supply shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried equipment.

(2) For hand carried, powered equipment, reduce primary supply voltage to the operating end point which shall be specified by the manufacturer.

(3) The supply voltage shall be measured at the input to the cable normally provide with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

(e) When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in paragraphs (a), (b), (c) and (d) of this section. (For example, measurements showing the effect of proximity to large metal objects, or of various types of antennas, may be required for portable equipment).