ENGINEERING TEST REPORT

Mid-Range RFID Reader
Model No.: RML-HFMR101
FCC ID: WVF-HFMR101

Applicant:

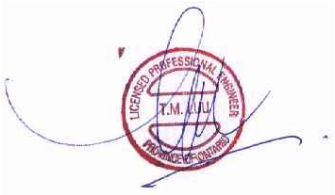
R Moroz Limited
19-25 Valleywood Drive
Markham, Ontario
Canada L3R 5L9

In Accordance With

Federal Communications Commission (FCC)
Part 15, Subpart C
Unlicensed Low Power Transmitter Operating in the Band 13.110-14.010 MHz

UltraTech's File No.: SYSS-005F15C225

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



Date: December 5, 2008

Report Prepared by: Dan Huynh Issued Date: December 5, 2008	Tested by: Hung Trinh & Wei Wu, EMC Technicians Test Dates: February 20 & 26, 2007 March 6 & 21, 2007 Oct 29. & Nov. 11, 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

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ANSI	FC	VCCI	Industry Canada	NVLAP	BSMI	Korea MIC-RRL
0685	31040/SIT	C-1376	46390-2049	200093-0	SL2-IN-E-1119R	2005-82 & 83

TABLE OF CONTENTS

EXHIBIT 1. INTRODUCTION

1.1. SCOPE

Reference:	47 CFR 15.225 - Operation within the band 13.110 – 14.010 MHz.
Title:	Code of Federal Regulations (CFR), Title 47 - Telecommunication, Part 15, Subpart C
Purpose of Test:	To gain FCC Certification Authorization for Section 15.225 - Operation within the Band 13.110 - 14.010 MHz.
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:	Commercial, industrial or business environment

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

None.

1.3. NORMATIVE REFERENCES

Publication	Year	Title
FCC 47 CFR 15	2008	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	2008-09, Edition 6.0 2006	Information Technology Equipment - Radio Disturbance Characteristics - Limits and Methods of Measurement
CISPR 16-1-1 +A1 +A2	2006 2006 2007	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-1: Measuring Apparatus
CISPR 16-1-2 +A1 +A2	2003 2004 2006	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-2: Conducted disturbances

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1. CLIENT INFORMATION

APPLICANT	
Name:	R Moroz Limited
Address:	19-25 Valleywood Drive Markham, ON Canada L3R 5L9
Contact Person:	Mr. Sam Aghigh, VP of Technology Phone #: 905-513-8919 ext 29 Fax #: 905-513-7651 Email Address: sama@rfidcanada.com

MANUFACTURER	
Name:	Feig Electronic
Address:	Lange Strasse 4 Weilburg, Hessen Germany D-35781
Contact Person:	Horst Grosser, Customer Support Phone #: +49 (0) 6471-3109.421 Fax #: +49 (0) 6471-3109.99 Email Address: obid-support@feig.de

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:	R Moroz Limited
Product Name:	Mid-Range RFID Reader
Model Name or Number:	RML-HFMR101
Serial Number:	Test sample
Type of Equipment:	Low Power Communication Device Transmitter
Input Power Supply Type:	12 VDC
Primary User Functions of EUT:	Smart Card Tracking

2.3. EUT'S TECHNICAL SPECIFICATIONS

Transmitter	
Equipment Type:	Base station (fixed use)
Intended Operating Environment:	Commercial, light industry & heavy industry
Power Supply Requirement:	12 VDC
Field Strength:	94.64 dBµV/m Peak at 10m
Operating Frequency Range:	13.56MHz ± 7 kHz
RF Output Impedance:	50 Ω
26 dB Bandwidth:	34.87 kHz
Modulation Type:	ASK
Oscillator Frequency(ies):	13.56 MHz
Antenna Connector Type:	SMA
Antenna Description:	**Antenna 1** Manufacturer: R. Moroz Limited Type: Inductive Loop Model: RML-HFANT500/500-B Frequency Range: 13.56MHz ± 7kHz Gain (dBi): -30dBi maximum **Antenna 1** Manufacturer: R. Moroz Limited Type: Inductive Loop Model: RML-HFANT500/300-B Frequency Range: 13.56MHz ± 7kHz Gain (dBi): -30dBi maximum

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	Antenna Port	1	SMA Female	RG58 Shielded 1 meter
2	RS232	1	DB9 Female	RS232 Non-Shielded 2 meters

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:	Power Adaptor
Brand Name:	I.T.E.
Model Name or Number:	D12-12-950
Serial Number:	030197
Connected to EUT's Port:	RS232 via adaptor cable

Ancillary Equipment # 2	
Description:	Notebook / Laptop
Brand Name:	Dell Latitude D505 PP10L
Model Name or Number:	PP10L
Serial Number:	CN-0A2049-48643-520-3401
Connected to EUT's Port:	RS232

2.6. GENERAL TEST SETUP

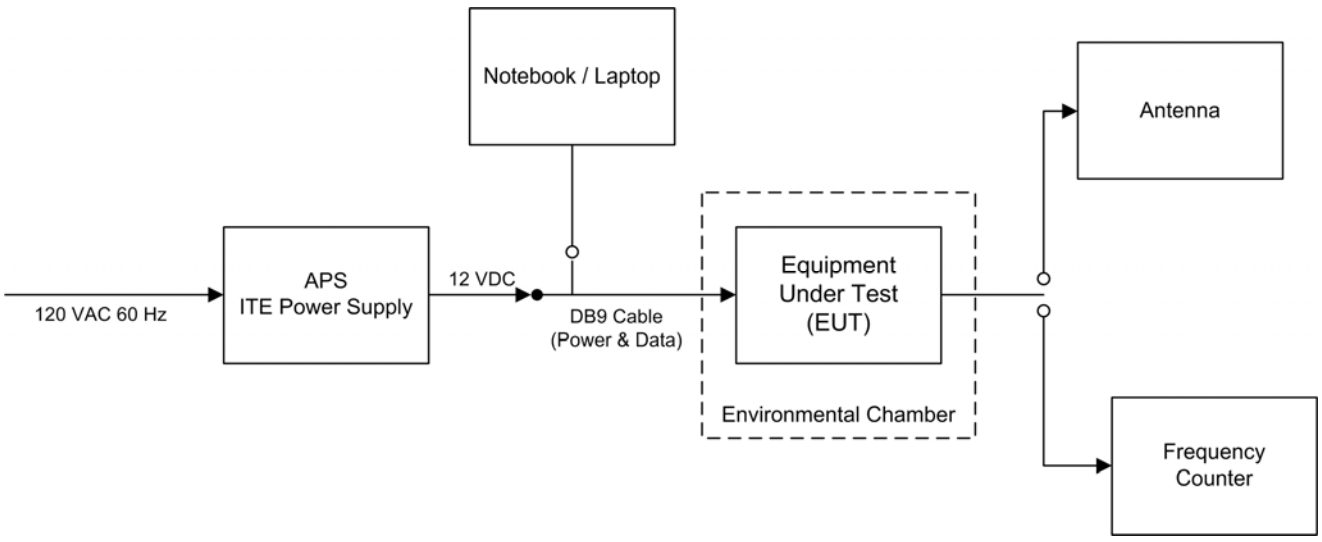


EXHIBIT 3. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

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:	12 VDC

3.2. OPEPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TESTS

Operating Modes:	Transmitting continuously, reading TAG.
Special Test Software:	None
Special Hardware Used:	None
Transmitter Test Antenna:	Non-integral

Transmitter Test Signals:	
Frequency:	13.56 MHz
Transmitter Wanted Output Test Signals:	
▪ RF Power Output (measured maximum output power):	94.64 dBµV/m Peak at 10m
▪ Normal Test Modulation:	ASK
▪ 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 FCC office (FCC File No.: 31040/SIT 1300B3) and Industry Canada office (Industry Canada File No.: 2049A-3). Expiry Date of Site Calibration: May 17, 2009.

4.2. APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC Regulations	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
	26 dB Bandwidth	Yes
15.225(a) – (d)	Field Strength of Emissions Inside and Outside the Permitted Band 13.110 - 14.010 MHz	Yes
15.225(e)	Frequency Stability	Yes
15.107 & 15.207	Class B - Power Line Conducted Emissions	Yes
15.109(a)/15.209(a)	Class B - Radiated Emissions from Unintentional Radiators	Yes

4.3. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

1) Added Copper tape shielding to the Transceiver case and the PCB board.
2) Added a LC filter (RML-HF-LC5LO, Manufacturer: R Moroz Ltd.) between the transceiver and the antenna connector.
3) Serial communication cable looped $3^{1/2}$ turns around torroid (RML-HF-7427014 Manufacturer: Metuchen Capacitors Inc.) near the end of dB9 connector.
4) Power adaptor cable looped $3^{1/2}$ turns around torroid (RML-HF-7427014 Manufacturer: Metuchen Capacitors Inc.) near the end of adaptor connector.
5) Steward Ferrite (PN: 28A2029-0A0) clamped on Patch Antenna cable looped $3^{1/2}$ turns.

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	Comments
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	Required professional installation.
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	See section 2.3 of this test report for antennas information.

5.5. OCCUPIED BANDWIDTH

5.5.1. Limits

Must ensure that the bandwidth of the emission, is contained within the frequency band designated in the rule section under which the equipment is operated.

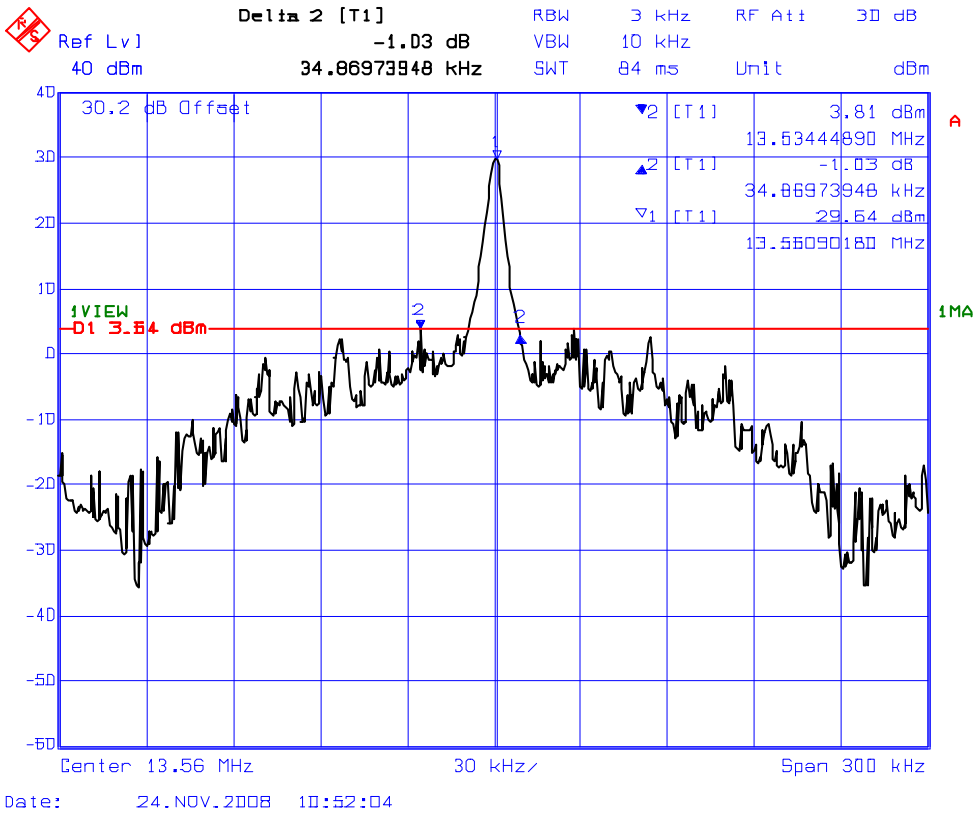
5.5.2. Method of Measurements

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

5.5.3. Test Data

Test Frequency (MHz)	26 dB Occupied Bandwidth (kHz)
13.56	34.87

Plot 5.5.3.1 26 dB Bandwidth
Test Frequency: 13.56 MHz



5.6. FIELD STRENGTH OF EMISSIONS INSIDE & OUTSIDE THE PERMITTED BAND 13.110-14.010 MHz [47 CFR 15.225 (a) to (d)]

5.6.1. 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.
(b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
(c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
(d) The field strength of any emissions appearing outside of the 13.110 – 14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

47 CFR 15.209(a) – Radiated Emission Limts; general requirements

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

5.6.2. 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 high-pass 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.

If the emission is pulsed, modified the unit for continuous operation, then use the settings above for measurements, then correct the reading by subtracting the peak-average correction factor derived from the appropriate duty cycle calculation. See Section 15.35(b) and (c).

5.6.3. Test Data

Remarks:

- The EUT's antennas were tuned to yield maximum coverage for worst case test configuration.
- Radiated spurious emissions measurements were performed at 10 m distance, from 10 MHz – 10th harmonic of the fundamental 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 30 m distance using an extrapolation factor of 40 dB/decade (40*log(10/30)).
- For frequencies at or above 30 MHz, the results measured at 10 m distance shall be extrapolated to 3 m distance using an extrapolation factor of 20 dB/decade (20*log(10/3)).

5.6.3.1. Field Strength of Emissions Inside the Permitted Band

Test Configuration 1: EUT with RML-HFANT500/500-B Inductive Loop Antenna

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	Margin (dB)
13.56	94.64	Peak	V	75.6	84.0	-8.4
13.56	84.56	Peak	H	65.5	84.0	-18.5

Test Configuration 2: EUT with RML-HFANT500/300-B Inductive Loop Antenna

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	Margin (dB)
13.56	78.39	Peak	V	59.3	84.0	-24.7
13.56	75.55	Peak	H	56.5	84.0	-27.5

5.6.3.2. Field Strength of Emissions Outside the Permitted Band

Test Configuration 1: EUT with RML-HFANT500/500-B Inductive Loop Antenna

Frequency (MHz)	Measured Field Strength @ 10 m (dBµV/m)	Detector Used (Peak/QP)	Antenna Plane (H/V)	Field Strength Extrapolated Value (dBµV/m)	§ 15.209 Field Strength Limits	Margin (dB)
41.12	25.24	Peak	V	35.7	40.0	-4.3
41.12	16.99	Peak	H	27.4	40.0	-12.6
50.00	21.64	Peak	V	32.1	40.0	-7.9
53.83	17.14	Peak	V	27.6	40.0	-12.4
54.72	18.87	Peak	V	29.3	40.0	-10.7
57.67	17.94	Peak	V	28.4	40.0	-11.6
61.51	15.08	Peak	V	25.5	40.0	-14.5
68.77	14.34	Peak	V	24.8	40.0	-15.2
81.91	20.91	Peak	V	31.4	40.0	-8.6
81.91	15.34	Peak	H	25.8	40.0	-14.2
86.55	21.22	Peak	V	31.7	40.0	-8.3
103.11	25.27	Peak	V	35.7	43.5	-7.8
134.51	19.56	Peak	H	30.0	43.5	-13.5
143.15	18.58	Peak	V	29.0	43.5	-14.5
203.53	17.22	Peak	H	27.7	43.5	-15.8
231.03	19.98	Peak	H	30.4	46.0	-15.6
244.52	19.41	Peak	V	29.9	46.0	-16.1
244.52	21.76	Peak	H	32.2	46.0	-13.8
258.07	23.69	Peak	V	34.1	46.0	-11.9
258.07	26.10	Peak	H	36.6	46.0	-9.4
272.09	27.77	Peak	V	38.2	46.0	-7.8
272.09	30.87	QP	H	41.3	46.0	-4.7
285.54	28.06	Peak	V	38.5	46.0	-7.5
285.54	31.06	QP	H	41.5	46.0	-4.5
299.01	28.39	Peak	V	38.8	46.0	-7.2
299.01	30.98	QP	H	41.4	46.0	-4.6
312.51	22.26	Peak	V	32.7	46.0	-13.3
312.51	24.66	Peak	H	35.1	46.0	-10.9
339.54	24.85	Peak	V	35.3	46.0	-10.7
339.54	27.66	Peak	H	38.1	46.0	-7.9
353.08	24.37	Peak	H	34.8	46.0	-11.2
380.05	23.85	Peak	V	34.3	46.0	-11.7
380.05	24.94	Peak	H	35.4	46.0	-10.6
393.55	24.35	Peak	H	34.8	46.0	-11.2
420.52	24.43	Peak	V	34.9	46.0	-11.1

Frequency (MHz)	Measured Field Strength @ 10 m (dBµV/m)	Detector Used (Peak/QP)	Antenna Plane (H/V)	Field Strength Extrapolated Value (dBµV/m)	§ 15.209 Field Strength Limits	Margin (dB)
420.52	26.90	Peak	H	37.4	46.0	-8.6
448.07	23.32	Peak	H	33.8	46.0	-12.2

Test Configuration 2: EUT with RML-HFANT500/300-B Inductive Loop Antenna

Frequency (MHz)	Measured Field Strength @ 10 m (dBµV/m)	Detector Used (Peak/QP)	Antenna Plane (H/V)	Field Strength Extrapolated Value (dBµV/m)	§ 15.209 Field Strength Limits	Margin (dB)
27.12	37.21	Peak	V	18.1	29.5	-11.4
27.12	28.83	Peak	H	9.7	29.5	-19.8
36.65	20.60	Peak	V	31.1	40.0	-8.9
40.68	26.48	QP	V	36.9	40.0	-3.1
40.68	18.84	Peak	H	29.3	40.0	-10.7
54.24	16.97	Peak	V	27.4	40.0	-12.6
57.13	18.02	Peak	V	28.5	40.0	-11.5
66.00	13.52	Peak	H	24.0	40.0	-16.0
68.10	14.45	Peak	H	24.9	40.0	-15.1
116.00	23.09	Peak	V	33.5	43.5	-10.0
116.00	21.86	Peak	H	32.3	43.5	-11.2
118.50	21.04	Peak	V	31.5	43.5	-12.0
118.50	20.39	Peak	H	30.8	43.5	-12.7
122.50	20.79	Peak	V	31.2	43.5	-12.3
122.50	19.37	Peak	H	29.8	43.5	-13.7
126.31	16.44	Peak	H	26.9	43.5	-16.6
131.40	17.25	Peak	H	27.7	43.5	-15.8
154.50	18.87	Peak	V	29.3	43.5	-14.2
158.00	19.59	Peak	V	30.0	43.5	-13.5
163.00	21.48	Peak	V	31.9	43.5	-11.6
168.50	21.59	Peak	V	32.0	43.5	-11.5
168.50	18.06	Peak	H	28.5	43.5	-15.0
179.00	18.91	Peak	V	29.4	43.5	-14.1
179.00	17.82	Peak	H	28.3	43.5	-15.2
190.50	18.76	Peak	V	29.2	43.5	-14.3
190.50	19.94	Peak	H	30.4	43.5	-13.1
204.00	18.33	Peak	H	28.8	43.5	-14.7
217.50	19.30	Peak	H	29.8	46.0	-16.2
231.00	19.39	Peak	V	29.8	46.0	-16.2
231.00	19.00	Peak	H	29.5	46.0	-16.5

Frequency (MHz)	Measured Field Strength @ 10 m (dBµV/m)	Detector Used (Peak/QP)	Antenna Plane (H/V)	Field Strength Extrapolated Value (dBµV/m)	§ 15.209 Field Strength Limits	Margin (dB)
244.50	19.68	Peak	V	30.1	46.0	-15.9
244.50	20.85	Peak	H	31.3	46.0	-14.7
258.00	22.02	Peak	V	32.5	46.0	-13.5
258.00	27.67	Peak	H	38.1	46.0	-7.9
271.90	22.90	Peak	H	33.4	46.0	-12.6
285.50	30.07	Peak	V	40.5	46.0	-5.5
285.50	33.09	QP	H	43.5	46.0	-2.5
299.00	28.68	Peak	V	39.1	46.0	-6.9
299.00	30.46	Peak	H	40.9	46.0	-5.1
312.50	26.10	Peak	V	36.6	46.0	-9.4
312.50	27.77	Peak	H	38.2	46.0	-7.8
326.90	21.49	Peak	V	31.9	46.0	-14.1
326.90	22.66	Peak	H	33.1	46.0	-12.9
377.50	25.13	Peak	V	35.6	46.0	-10.4
393.50	23.31	Peak	V	33.8	46.0	-12.2
393.50	25.64	Peak	H	36.1	46.0	-9.9
407.00	22.84	Peak	H	33.3	46.0	-12.7
665.00	27.75	Peak	H	38.2	46.0	-7.8

5.7. FREQUENCY STABILITY [47 CFR 15.225(e)]

5.7.1. 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 battery operated equipment, the equipment tests shall be performed using a new battery.

5.7.2. Method of Measurements

Refer to Ultratech Test Procedures, File # ULTR P001-2004.

5.7.3. Test Data

Frequency Band:	13.56 MHz
Center Frequency:	13.56 MHz
Frequency Tolerance Limit:	± 0.01% (±1356 Hz)
Max. Frequency Tolerance Measured:	+104 Hz
Input Voltage Rating:	12 VDC

Ambient Temperature (°C)	Frequency Drift (Hz)		
	Supply Voltage (Nominal) 12 VDC	Supply Voltage (85 % of Nominal) 10.2 VDC	Supply Voltage (115% of Nominal) 13.8 VDC
-30	-65	--	--
-20	-56	--	--
-10	-86	--	--
0	+29	--	--
+10	+29	--	--
+20	0	0	0
+30	-6	--	--
+40	+34	--	--
+50	+104	--	--

5.8. AC POWERLINE CONDUCTED EMISSIONS [47 CFR 15.107(a) & 15.207]

5.8.1. Limits

The equipment shall meet the limits of the following table:

Test Frequency Range (MHz)	Class B Limits (dBμV)		Measuring Bandwidth
	Quasi-Peak	Average	
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

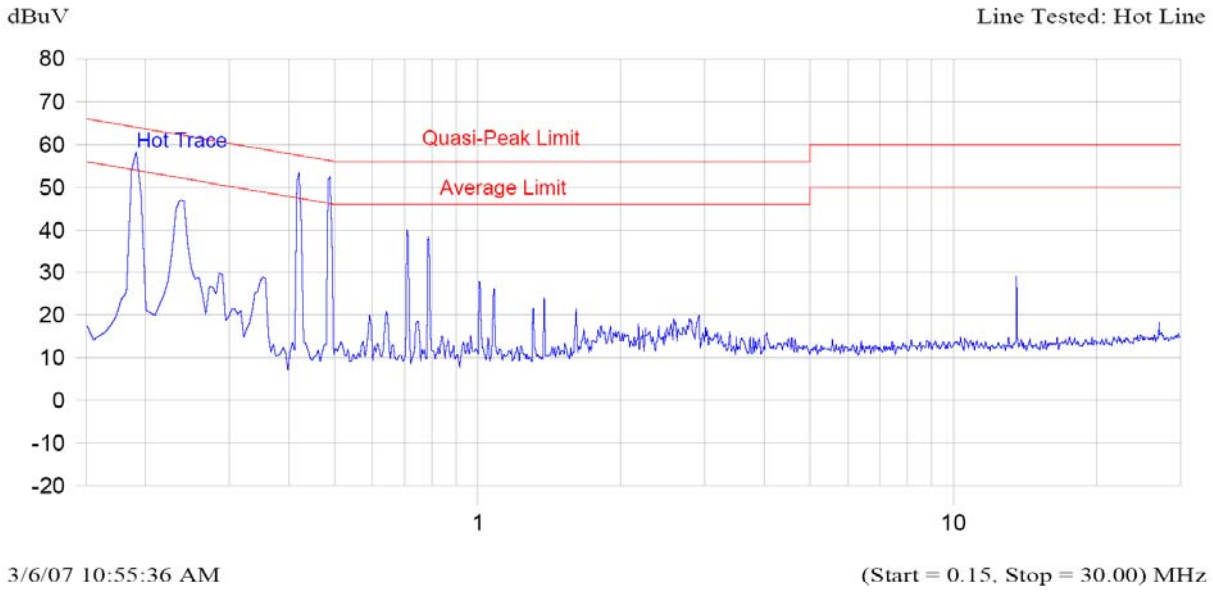
5.8.2. Method of Measurements

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

5.8.3. Test Data

Plot 5.8.3.1 AC Power Line Conducted Emission
Line Tested: Hot
Line Voltage 120 VAC 60 Hz

Current Graph

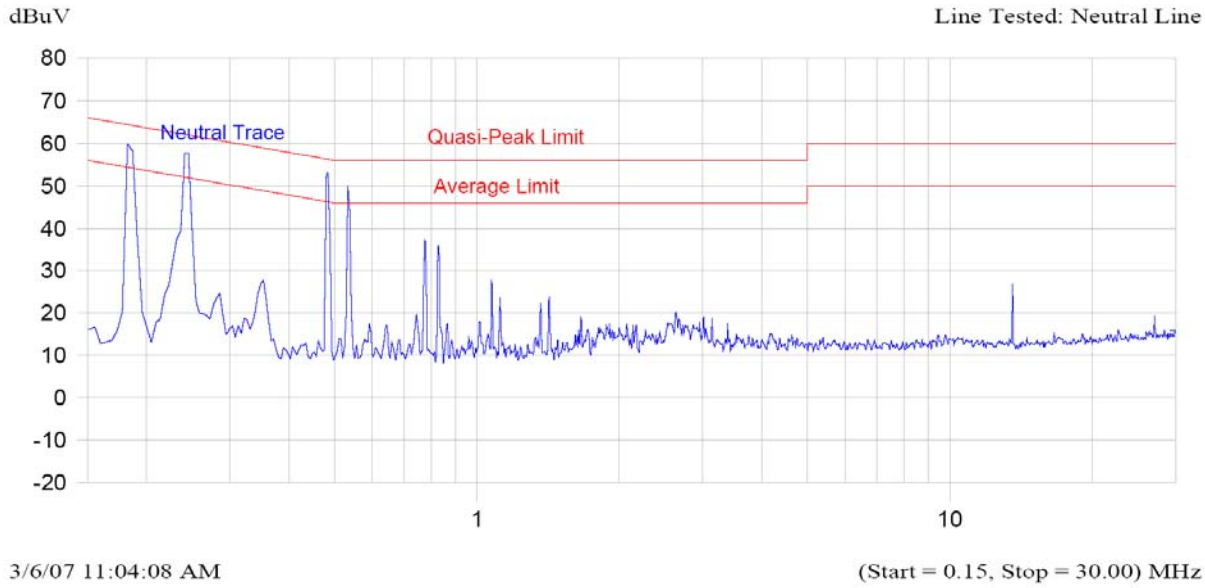


Current List

Frequency MHz	Peak dBuV	QP dBuV	Qp-Qp Limit dB	Avg dBuV	Avg-Avg Limit dB	Trace Name	Comment
0.181	52.9	52.9	-11.6	26.0	-28.4	Hot Trace	
0.417	54.4	48.6	-8.9	16.2	-31.3	Hot Trace	
0.488	16.8	16.8	-39.4	36.9	-9.4	Hot Trace	
13.561	29.9	28.2	-31.8	26.3	-23.7	Hot Trace	
27.123	19.5	12.3	-47.7	9.4	-40.6	Hot Trace	

Plot 5.8.3.2 AC Power Line Conducted Emission
Line Tested: Neutral
Line Voltage 120 VAC 60 Hz

Current Graph



Current List

Frequency MHz	Peak dBuV	QP dBuV	Qp-Qp Limit dB	Avg dBuV	Avg-Avg Limit dB	Trace Name	Comment
0.171	59.9	54.0	-10.9	22.0	-32.9	Neutral Trace	
0.239	58.0	51.8	-10.3	32.9	-19.2	Neutral Trace	
0.478	52.9	46.9	-9.5	13.5	-32.9	Neutral Trace	
0.525	51.2	45.1	-10.9	12.7	-33.3	Neutral Trace	
13.552	16.0	7.4	-52.6	5.0	-45.0	Neutral Trace	
27.129	13.3	1.0	-59.0	-3.6	-53.6	Neutral Trace	

EXHIBIT 6. TEST EQUIPMENT LIST

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Rohde & Schwarz	FSEK20/B4/B21	834157/005	9 kHz – 40 GHz
Spectrum Analyzer/ EMI Receiver	Hewlett Packard	HP 8593EM	3412A00103	9 kHz – 26.5 GHz
Amplifier	Hewlett Packard	8447F	2944A04098	0.1 MHz - 1300 MHz
Loop Antenna	EMCO	6502	2611	10 kHz - 30 MHz
Biconilog Antenna	ETS	3142B	1575	20 MHz - 2 GHz
Transient Limiter	Hewlett Packard	11947A	310701998	9 kHz – 200 MHz 10 dB attenuation
L.I.S.N.	EMCO	3825/2	89071531	9 kHz – 200 MHz 50 Ohms / 50 μH
RF Shielded Chamber	RF Shielding	--	--	--
Frequency Counter	EIP	545A	2683	10Hz-18GHz
Temperature & Humidity Chamber	Tenney	T5	9723B	-40o to +60 o C range
Attenuator	Weinschel Corp	48-30-34	BM5354	DC – 18 GHz
Attenuator	Weinschel Corp	23-20-34	BH7876	DC – 18 GHz

EXHIBIT 7. MEASUREMENT UNCERTAINTY

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

7.1. 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 450 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

7.2. 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 Γ_1 = 0.2 Antenna VRC Γ_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