ComplianceTesting.com
Previously Flom Test Lab
EMI, EMC, RF Testing Experts Since 1963

toll-free: (866) 311-3268
fax: (480) 926-3598
http://www.ComplianceTesting.com
info@ComplianceTesting.com

Date: June 9, 2009

Federal Communications Commission
Via: Electronic Filing

Attention: Authorization & Evaluation Division

Applicant: FreeLinc.
Equipment: FDM300
FCC ID: TDA-FDM300
FCC Rules: 15.225

Gentlemen:

On behalf of the Applicant, enclosed please find Application Form 731, Engineering Test Report and all pertinent documentation, the whole for approval of the referenced equipment as shown.

We trust the same is in order. Should you need any further information, kindly contact the writer who is authorized to act as agent.

Sincerely yours,

John Erhard; Engineering Manager

List Of Exhibits

(FCC **Certification** (Transmitters) - Revised 9/28/98)

Applicant: FreeLinc.

FCC ID: TDA-FDM300

By Applicant:

1. Letter Of Authorization

2. Identification Drawings
   - __ Id Label
   - __ Location Info
   - __ Attestation Statement(S)
   - __ Location of Compliance Statement

3. Documentation: 2.1033(B)
   - (3) User Manual(S)
   - (4) Operational Description
   - (5) Block Diagram
   - (5) Schematic Diagram
   - (7) External Photographs
   - Internal Photographs
   - Parts List
   - Active Devices

By Compliance Testing:

A. Testimonial & Statement of Certification

B. Statement of Qualifications

ComplianceTesting.com
Previously Flom Test Lab
EMI, EMC, RF Testing Experts Since 1963

toll-free: (866) 311-3268
fax: (480) 926-3598
http://www.ComplianceTesting.com
info@ComplianceTesting.com

Test Report

for

FCC ID: TDA-FDM300

Model: FDM300

to

Federal Communications Commission

Rule Part(s)15.225

Date Of Report: June 9, 2009

On the Behalf of the Applicant: FreeLinc
255 W Center St
Orem, UT 85047

Attention of: Michael Wheeler
Ph: (801) 467-1199
Fax: (801) 672-3003
E-mail: mwheeler@freelinc.com

Supervised By: John Erhard; Engineering Manager

Test Report Revision History

Revision	Date	Revised By	Reason for revision
1.0	June 9, 2009	J Erhard	Original Document
2.0	September 8, 2009	J. Erhard	Edit report to correct FCC ID and equipment list
3.0	September 23, 2009	G.Corbin	Deleted RSS-210 OBW test data for Industry Canada
4.0	September 23, 2009	G. Corbin	Added Necessary Bandwidth Calculation

The applicant has been cautioned as to the following:

15.21 Information to User.

The users manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a) Special Accessories.

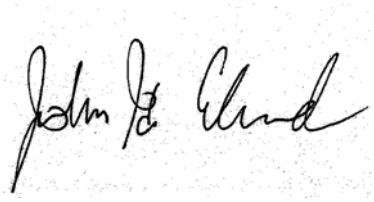
Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

Testimonial And Statement Of Certification

This is to certify that:

1. **That** the application was prepared either by, or under the direct supervision of, the undersigned.
2. **That** the technical data supplied with the application was taken under my direction and supervision.
3. **That** the data was obtained on representative units, randomly selected.
4. **That**, to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data are true and correct.



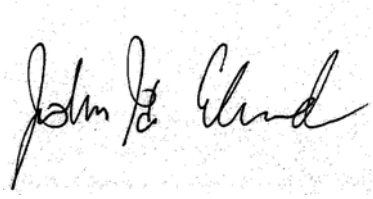
Certifying Engineer: John Erhard; Engineering Manager

Compliance Testing
3356 N. San Marcos Place, Suite 107
Chandler, Arizona 85225-7176
(866) 311-3268 phone, (480) 926-3598 fax

Table Of Contents

Required information per ISO 17025-2005, paragraph 5.10.2:

a) **Test Report**

b) Laboratory: (FCC: 31040/SIT) (Canada: IC 2044A-1)	Compliance Testing 3356 N. San Marcos Place, Suite 107 Chandler, AZ 85225
c) Report Number:	d0960014
d) Client:	FreeLinc
e) Identification:	FDM300
Description:	13.56 MHz Transmitter
f) EUT Condition:	Not required unless specified in individual tests.
g) Report Date:	June 9, 2009
h, j, k):	As indicated in individual tests.
i) Sampling method:	No sampling procedure used.
l) Uncertainty:	In accordance with Compliance Testing internal quality manual.
m) Supervised by:	 John Erhard; Engineering Manager
n) Results:	The results presented in this report relate only to the item tested.
o) Reproduction:	This report must not be reproduced, except in full, without written permission from this laboratory.

List Of General Information Required For Certification

In Accordance with FCC Rules and Regulations, Volume II, Part 2 and to 15.225

Sub-Part 2.1033
(c)(1):

Name and Address of Applicant: FreeLinc

(c)(2): **FCC ID**: TDA-FDM300

Model Number: FDM300

(c)(3): **Instruction Manual(s)**:

Please See Attached Exhibits

(c)(4): **Type of Emission**: TDMA

(c)(5): **FREQUENCY RANGE, MHz**: 13.56, 13.95

(c)(6): **Power Rating** 2.5 fempto W

____ Switchable ____ Variable __X__ N/A

(c)(7): **Maximum Allowable Power** 5 µW

15.203: **Antenna Requirement**:

__X__ The antenna is permanently attached to the EUT
_____ The antenna uses a unique coupling
_____ The EUT must be professionally installed
_____ The antenna requirement does not apply

Subpart 2.1033 (continued)

(c)(8): **Circuit Diagram/Circuit Description**:
Including description of circuitry & devices provided for determining and stabilizing frequency, for suppression of spurious radiation, for limiting modulation and limiting power.

Please See Attached Exhibits

(c)(9): **Label Information**:

Please See Attached Exhibits

(c)(10): **Photographs**:

Please See Attached Exhibits

(c)(11): **Digital Modulation Description**:

___ Attached Exhibits
_x_ N/A

(c)(12): **Test And Measurement Data**:

Follows

Sub-part 2.1033(b):

Test And Measurement Data

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2 and the following individual Parts, 15.225.

Standard Test Conditions and Engineering Practices

Except as noted herein, the following conditions and procedures were observed during the testing:

In accordance with ANSI C63.4-2003 unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104 °F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Measurement results, unless otherwise noted, are worst-case measurements.

A2LA

"A2LA has accredited Compliance Testing in Chandler, AZ for technical competence in the field of Electrical testing. The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO 17025:2005 'General Requirements for the Competence of Testing and Calibration Laboratories' and any additional program requirements in the identified field of testing."

Please refer to www.a2la.org for current scope of accreditation.

Certificate number: 2152.01

ACCREDITED
TESTING CERT# 2152.01

FCC OATS Reg. #933597

IC Reg. # 2044A-1

Test Results Summary

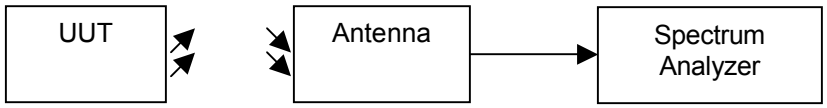
Specification	Test Name	Pass, Fail, N/A	Comments
15.225(a) (b)(c)(d)	Field Strength	Pass	
15.209	Radiated Emissions	Pass	
15.225(e)	Frequency Stability	Pass	
12.207	Conducted Powerline Emissions	Pass	
	Necessary Bandwidth Calculations	Pass	

Name of Test: Field Strength
Specification: 15.225(a)(b)(c)(d) **Engineer: J Erhard**
Test Equipment Utilized i00033, i00326 **Test Date: 6/4/2009**

Test Procedure

The UUT was tested on an anechoic chamber at a distance of 1 meter from the receiving loop antenna. A spectrum analyzer was used to verify that the UUT met the requirements for Fundamental Field Strength. The antenna correction and distance correction factors were summed with the quasi-peak measurement to ensure accurate readings were obtained. The following table indicates the highest emission in each of the indicated bands. The UUT was rotated 360 degrees with the receiving antenna in the X, Y, and Z-Axis to ensure maximum levels were obtained.

Test Setup



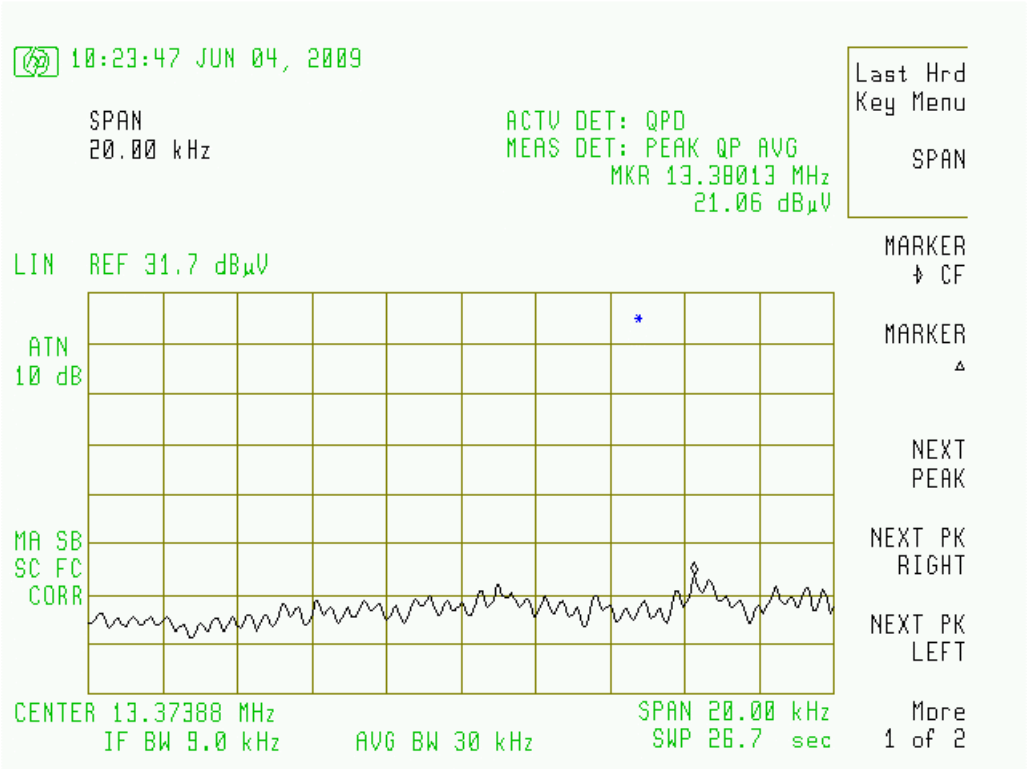
Field Strength

Frequency Band (MHz)	Measured Frequency (MHz)	Monitored Level (dBuV/m)	Distance CF (dB)	Antenna CF (dB)	Corrected Measurement (dBuV/m)	Limit (dBuV/m)	Result
13.110_13.410	13.38013	21.06	59.1	17.8	-55.84	40.51	Pass
13.410_13.553	13.50863	61.4	59.1	17.8	-15.5	50.47	Pass
13.553_13.567	13.55900	58.83	59.1	17.8	-18.07	84.00	Pass
13.567_13.710	13.60864	53.32	59.1	17.8	-23.58	50.47	Pass
13.710_14.010	13.90895	67.53	59.1	17.8	-9.37	40.51	Pass

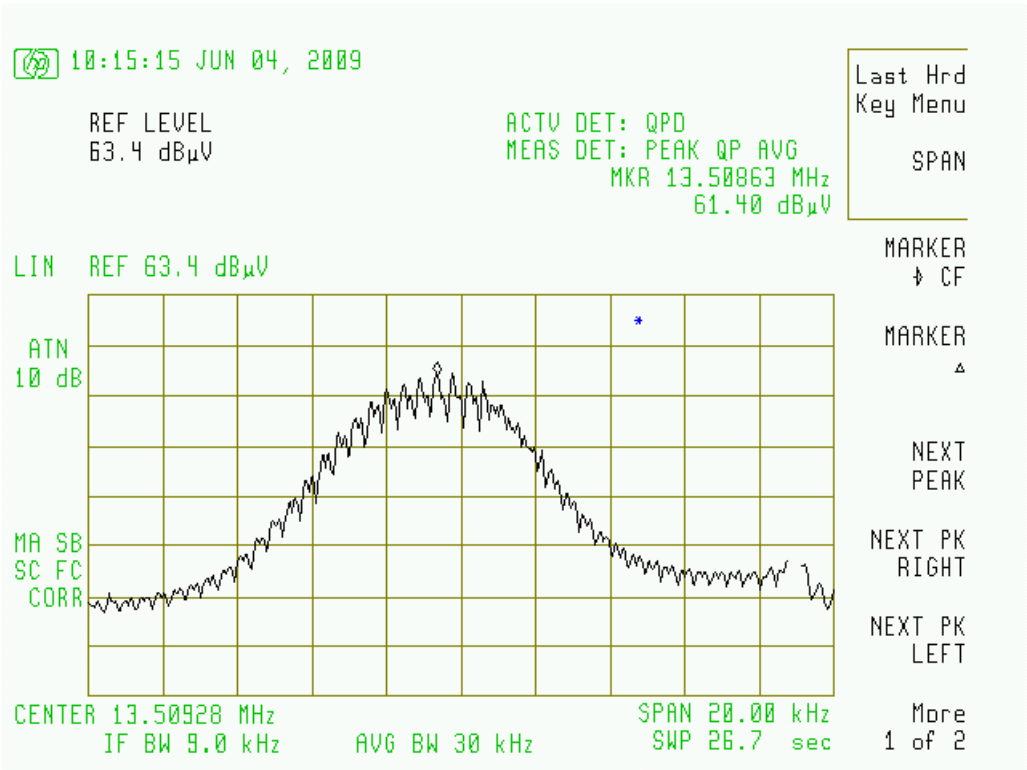
* Note. Cable correction factors are not included in this measurement as the low loss of the high quality TWINAX cable at these low frequencies is less that 0.01 dB.

Field Strength Plots

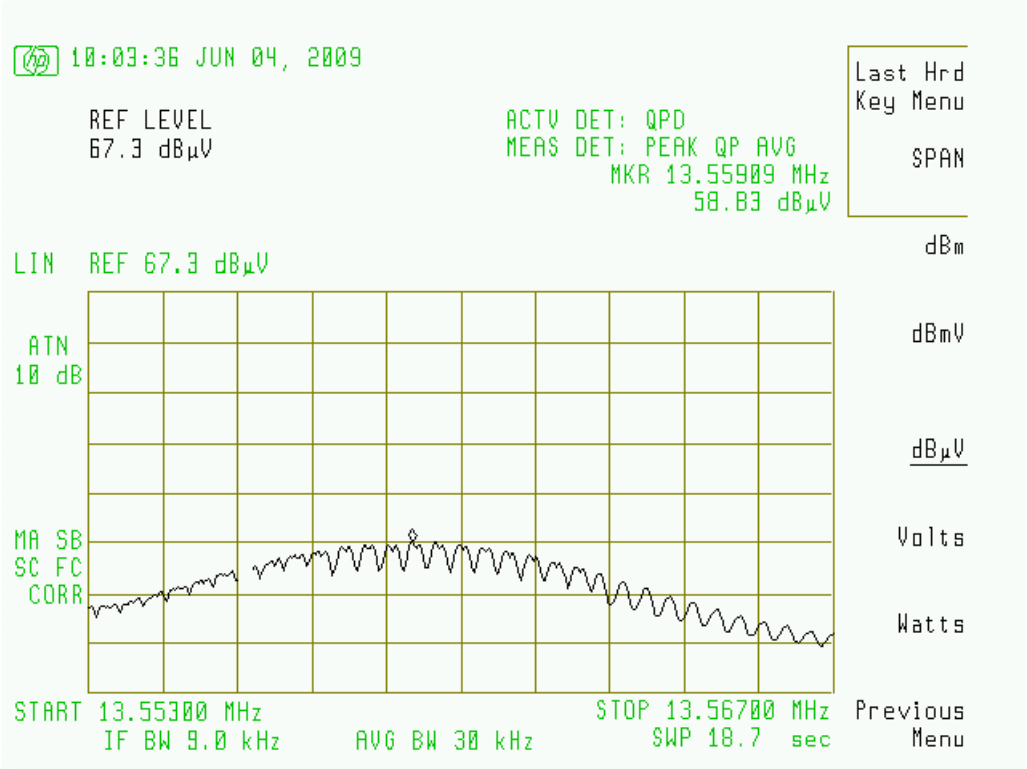
13.110_13.410 MHz



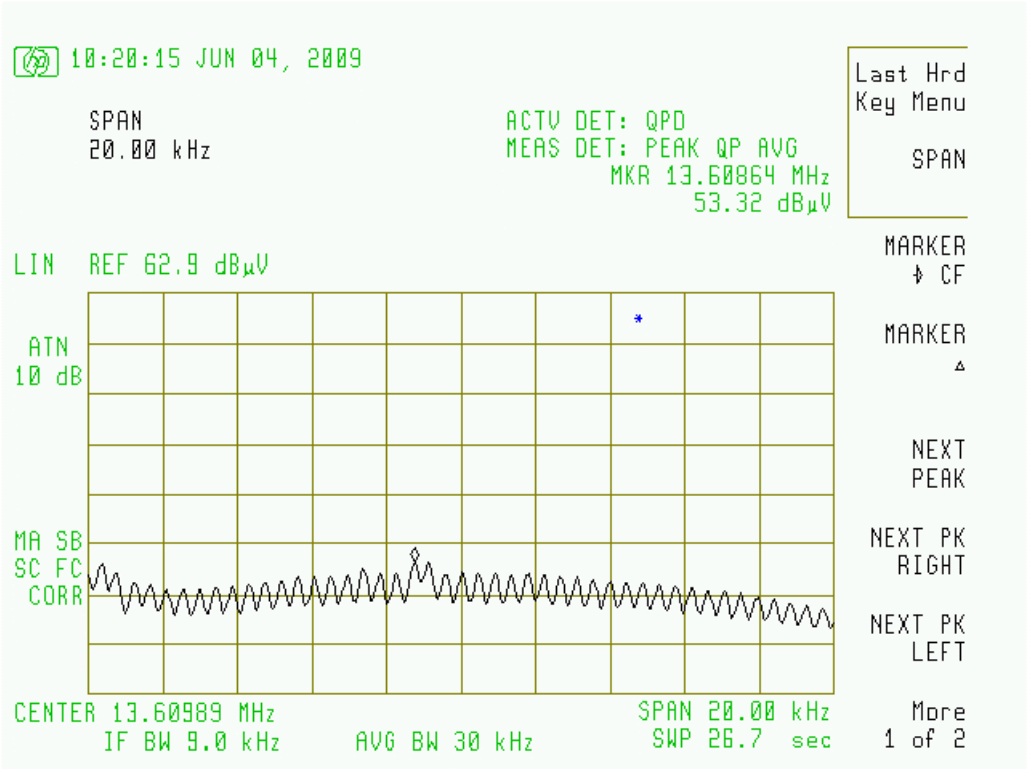
13.410_13.553 MHz



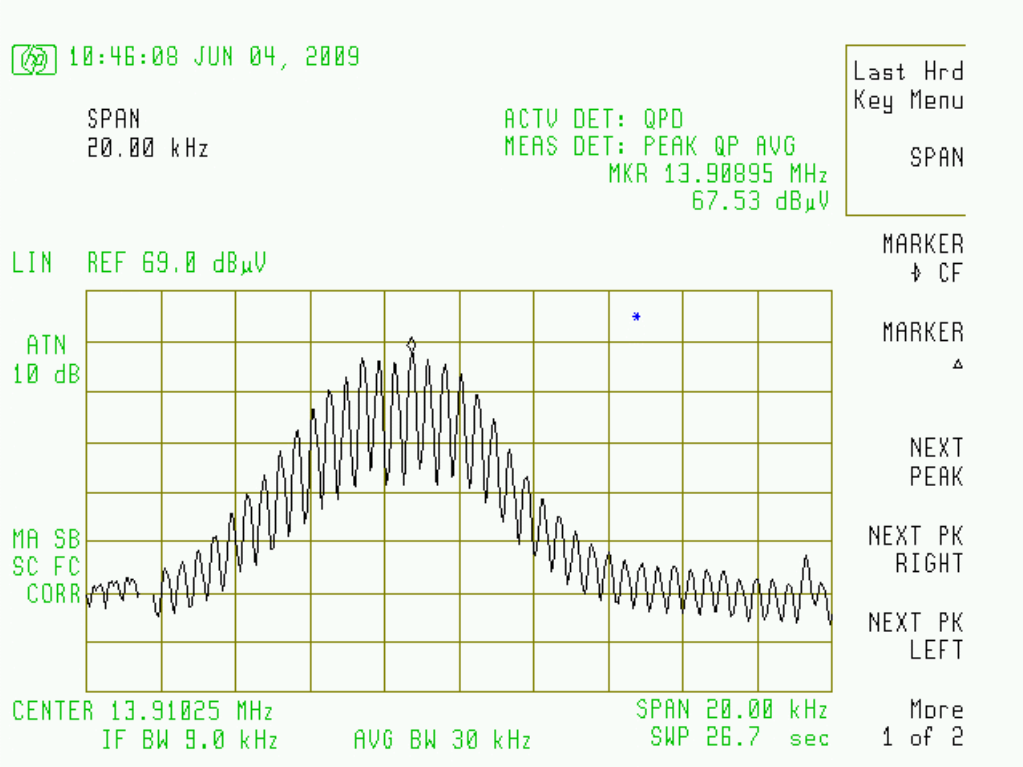
13.553_13.567 MHz



13.567_13.710 MHz



13.710_14.010 MHz

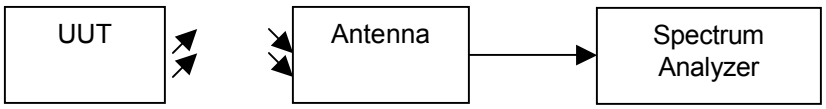


Name of Test: Radiated Emissions
Specification: 15.209 **Engineer: J Erhard**
Test Equipment Utilized i00049, i00267 **Test Date: 6/4/2009**

Test Procedure

The UUT was tested on an Open Area Test Site (OATS) at a distance of 3 meters from the receiving antenna. A spectrum analyzer was used to verify that the UUT met the requirements for Radiated Emissions. The spectrum for each tuned frequency was examined beyond the 10th harmonic.

Test Setup



Radiated Emissions

Settings
RBW = 100 KHz
VBW = 100KHz
Detector – Quasi Peak
Sample Calculations
Corrected Value = Measured Value + Correction factor
Correction factor = ACF + Cable loss

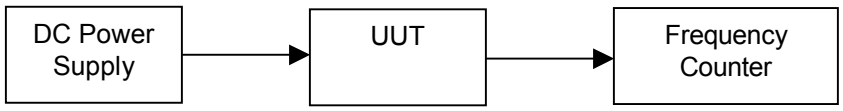
Emission Freq (MHz)	Measured Level (dBuV/m)	Correction Factor (dB)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
32.311	13.0	8.9	21.9	39.1	-17.2
170.631	13.1	1.2	14.3	43.5	-29.2
325.532	13.1	6.1	19.2	46.4	-27.3
634.976	13.1	12.6	25.7	46.4	-20.7
845.970	13.2	16.0	29.2	46.4	-17.2
999.000	13.2	18.5	31.7	49.5	-17.8

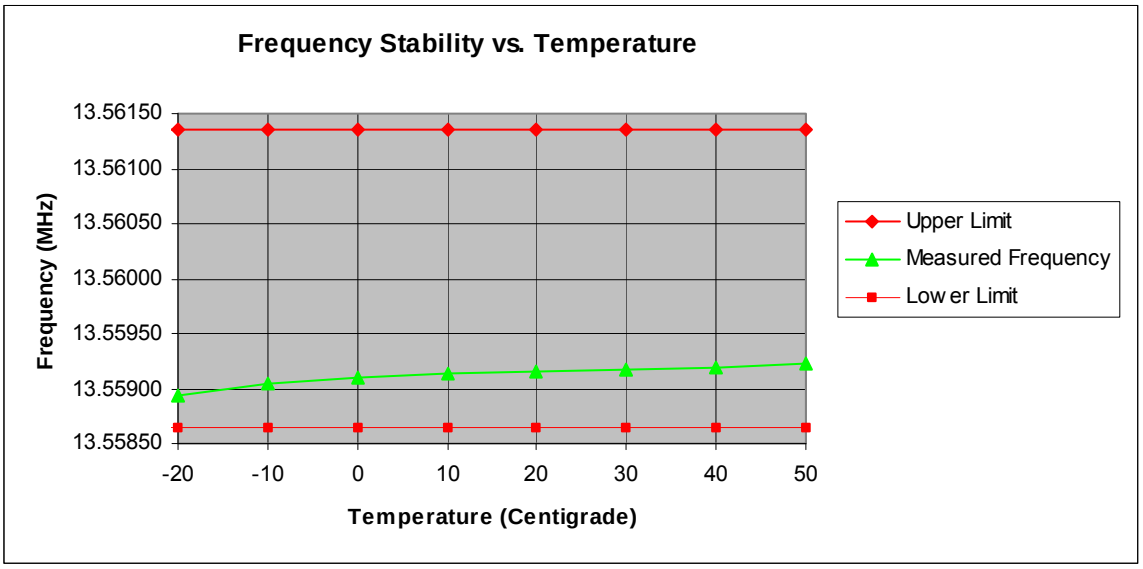
Name of Test: Frequency Stability
Specification: 15.225(e) **Engineer: J Erhard**
Test Equipment Utilized i00019, i00027, i00054 **Test Date: 6/4/2009**

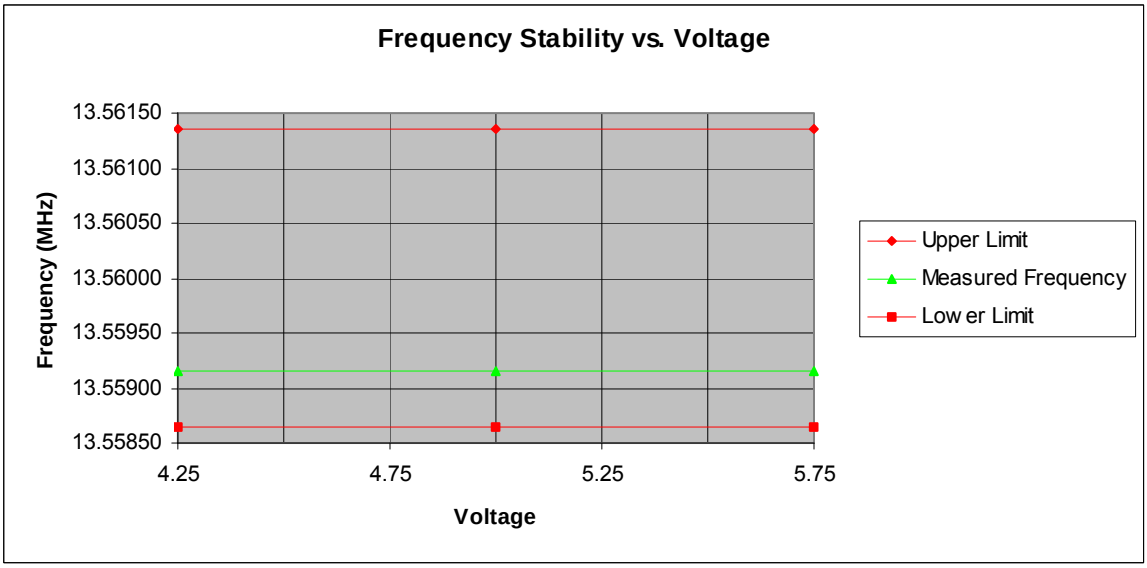
Test Procedure

The UUT was placed in an environmental test chamber and a frequency counter was utilized to verify that the frequency stability met the requirement for frequency stability across the temperature range from –20°C to +50°C. A variable DC power supply was used to vary the voltage from 85% to 115% of the rated voltage.

Test Setup





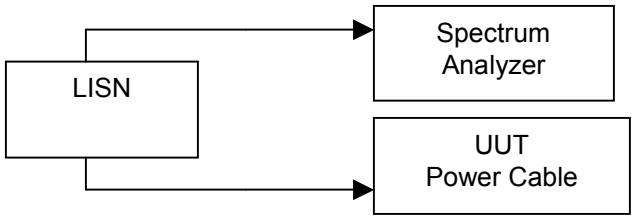


Name of Test: Powerline Conducted Emissions
Specification: 15.207 **Engineer: J Erhard**
Test Equipment Utilized i00033, i00270 **Test Date: 6/4/2009**

Test Procedure

The UUT power cable connected to a LISN and the monitored output of the LISN was connected directly to a spectrum analyzer. The conducted emissions from 150 kHz to 30 MHz were monitored and compared to the specification limits. The quasi-peak measurements were the worst-case and are recorded in the tables below.

Test Setup



Line 1 Quasi-Peak Test Results

Emission Frequency	Monitored Level (dBuV)	LISN Factor (dB)	Attenuation (dB)	Corrected Level (dBuV)	Limit (dBuV)	Margin (dB)
156.03 KHz	56.68	0.275	10	66.955	79	-12.045
156.44 KHz	57.14	0.277	10	67.413	79	-11.587
156.98 KHz	56.85	0.269	10	67.119	79	-11.881
159.9 KHz	57.17	0.233	10	67.404	79	-11.596
160.33 KHz	56.58	0.235	10	66.815	79	-12.185
160.78 KHz	56.51	0.23	10	66.74	79	-12.26

Line 2 Quasi-Peak Test Results

Emission Frequency	Monitored Level (dBuV)	LISN Factor (dB)	Attenuation (dB)	Corrected Level (dBuV)	Limit (dBuV)	Limit (dB)
156.31 KHz	57.04	0.279	10	67.315	79	-11.732
157.25 KHz	57.04	0.267	10	67.304	79	-11.855
157.87 KHz	57.29	0.252	10	67.543	79	-11.794
158.08 KHz	57.13	0.257	10	67.386	79	-11.774
159.12 KHz	57.29	0.25	10	67.539	79	-11.672
159.74 KHz	57.16	0.236	10	67.398	79	-11.612

All other results were greater than 20 dB below the limit.
All Average measurements were greater than 20 dB below the limit.

Name of Test: Necessary Bandwidth Calculation
Engineer: G. Corbin
Date: 9/23/09

Modulation = 6K5F3E

Necessary Bandwidth Calculation:

Maximum Modulation (M), kHz	=	2
Maximum Deviation (D), kHz	=	1.25
Constant Factor (K)	=	1
Necessary Bandwidth (B_N), kHz	=	(2xM)+(2xDxK)
	=	6.5 KHz

Test Equipment Utilized

Description	MFG	Model Number	FTL Asset Number	Last Cal Date	Cal Due Date
Frequency Counter	HP	5334B	i00019	1/26/09	1/26/11
Temperature Chamber	Tenney	Tenney Jr	i00027	12/8/08	12/8/09
Spectrum Analyzer	HP	8546A	i00033	10/14/08	10/14/09
Spectrum Analyzer	HP	8566B	i00049	12/3/08	12/3/09
Power Supply	HP	6286A	i00054	NCR	NCR
Bi-Log Antenna	Schaffner	CBL6111C	i00267	11/6/07	11/6/09
LISN	FCC	FCC-LISN-50-32-2-01	i00270	9/17/08	9/17/10
DMM	Fluke	87 III	i00319	12/5/08	12/5/09
Active Loop Antenna	EMCO	6507	i00326	4/1/09	4/1/11
Spectrum Analyzer	Agilent	E4407B	i00331	11/3/08	11/3/09

In addition to the above listed equipment standard RF connectors and cables were utilized in the testing of the described equipment. Prior to testing these components were tested to verify proper operation.

END OF TEST REPORT