



Flom Test Lab
EMI, EMC, RF Testing Experts Since 1963

toll-free: (866) 311-3268

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Date: April 16, 2009

Federal Communications Commission
Via: Electronic Filing

Attention: Authorization & Evaluation Division

Applicant: Blackboard, Inc.
Equipment: VR4100
FCC ID: TMEVR4100X003
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,

Hoosamuddin S. Bandukwala, Lab Director

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

p0910004, d0940011 Rev 2.0

List Of Exhibits(FCC **Certification** (Transmitters) - Revised 9/28/98)**Applicant:** Blackboard, Inc.**FCC ID:** TMEVR4100X003**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 F.T.L. Inc.

- A. Testimonial & Statement of Certification
- B. Statement of Qualifications



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Test Report

for

FCC ID: TMEVR4100X003

Model: VR4100

to

Federal Communications Commission

Rule Part(s)15.225

Date Of Report: April 16, 2009

On the Behalf of the Applicant: Blackboard, Inc.
22601 North 19th Ave, Suite 200
Phoenix, AZ 85027

Attention of: Tom Kuestersteffen
623-476-1263
email: tkuestersteffen@blackboard.com
and/or Tim Mattson
623-476-1400

Supervised By:

Hoosamuddin S. Bandukwala, Lab Director

Test Report Revision History

Revision	Date	Revised By	Reason for revision
1.0	April 16, 2009	J Erhard	Original Document
2.0	June 2, 2009	J Erhard	Add conducted emissions test data

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.

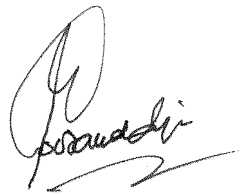
Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply 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:

Hoosamuddin S. Bandukwala, Lab Director

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Required information per ISO 17025-2005, paragraph 5.10.2:

a) **Test Report**

b) Laboratory: Flom Test Lab, Inc.
(FCC: 31040/SIT) 3356 N. San Marcos Place, Suite 107
(Canada: IC 2044A-1) Chandler, AZ 85225

c) Report Number: d0940011

d) Client: Blackboard, Inc.

e) Identification: VR4100

Description: 13.56 MHz Transmitter

f) EUT Condition: Not required unless specified in individual tests.

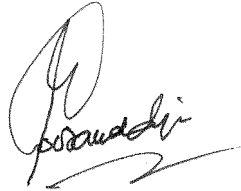
g) Report Date: April 16, 2009

h, j, k): As indicated in individual tests.

i) Sampling method: No sampling procedure used.

l) Uncertainty: In accordance with FTL internal quality manual.

m) Supervised by:



Hoosamuddin S. Bandukwala, Lab Director

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: Blackboard, Inc.

(c)(2): **FCC ID:** TMEVR4100X003

Model Number: VR4100

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

Please See Attached Exhibits

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

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

(c)(6): **Power Rating** 0.632 μ W
 Switchable Variable N/A

(c)(7): **Maximum Allowable Power** 5 μ W

15.203: **Antenna Requirement:**

- 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

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 Flom Test Labs, Inc. 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



FCC OATS Reg. #933597

IC Reg. # 2044A-1

Test Results Summary

Specification	Test Name	Pass, Fail, N/A	Comments
15.225(a)	Fundamental Field Strength	Pass	
15.225(b)(c)(d)	Out of Band Spurious Emissions	Pass	
15.225(e)	Frequency Stability	Pass	
12.207	Conducted Powerline Emissions	Pass	
RSS-210	99% Occupied Bandwidth	Pass	

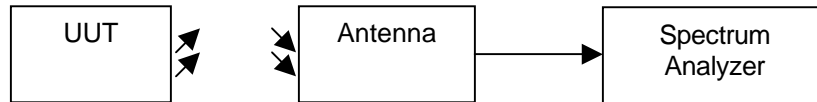
Name of Test: Field Strength
Specification: 15.225(a)(b)(c)(d)
Test Equipment Utilized i00033, i00054, i00326

Engineer: J Erhard
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.

Test Setup



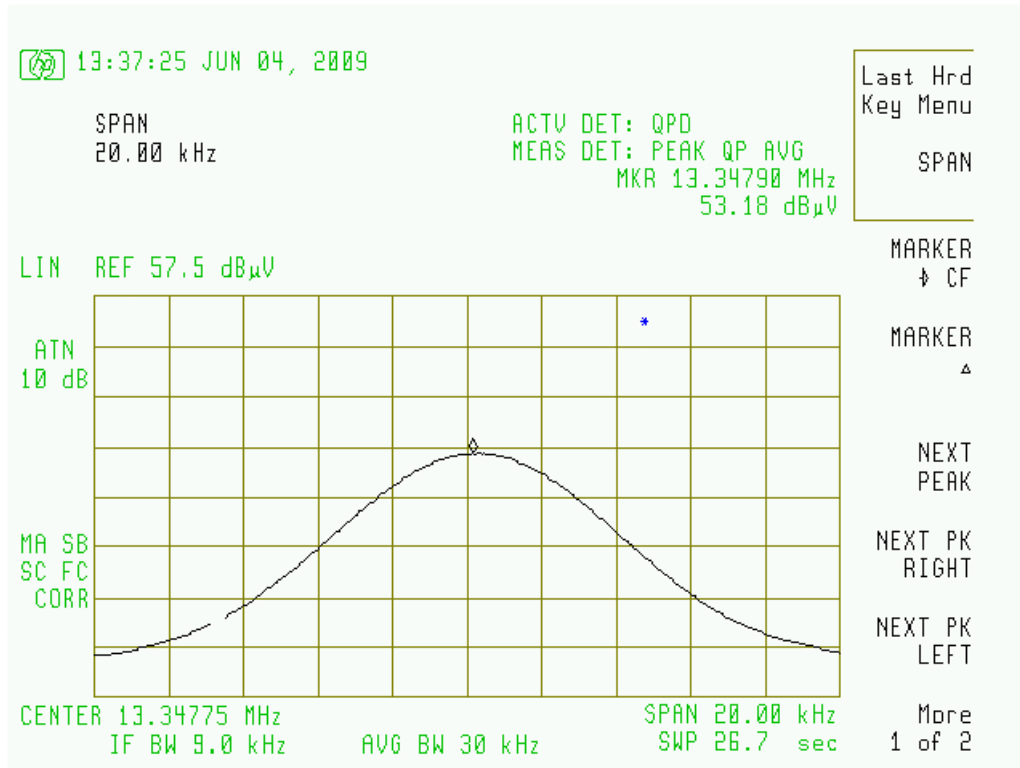
Field Strength

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	13.3479	53.18	59.1	17.8	-23.72	40.51	Pass
13.410_13.553	13.552	60.40	59.1	17.8	-16.50	50.47	Pass
13.553_13.567	13.560	75.00	59.1	17.8	-1.900	84.00	Pass
13.567_13.710	13.588	57.92	59.1	17.8	-18.98	50.47	Pass
13.710_14.010	13.7715	48.59	59.1	17.8	-28.31	40.51	Pass

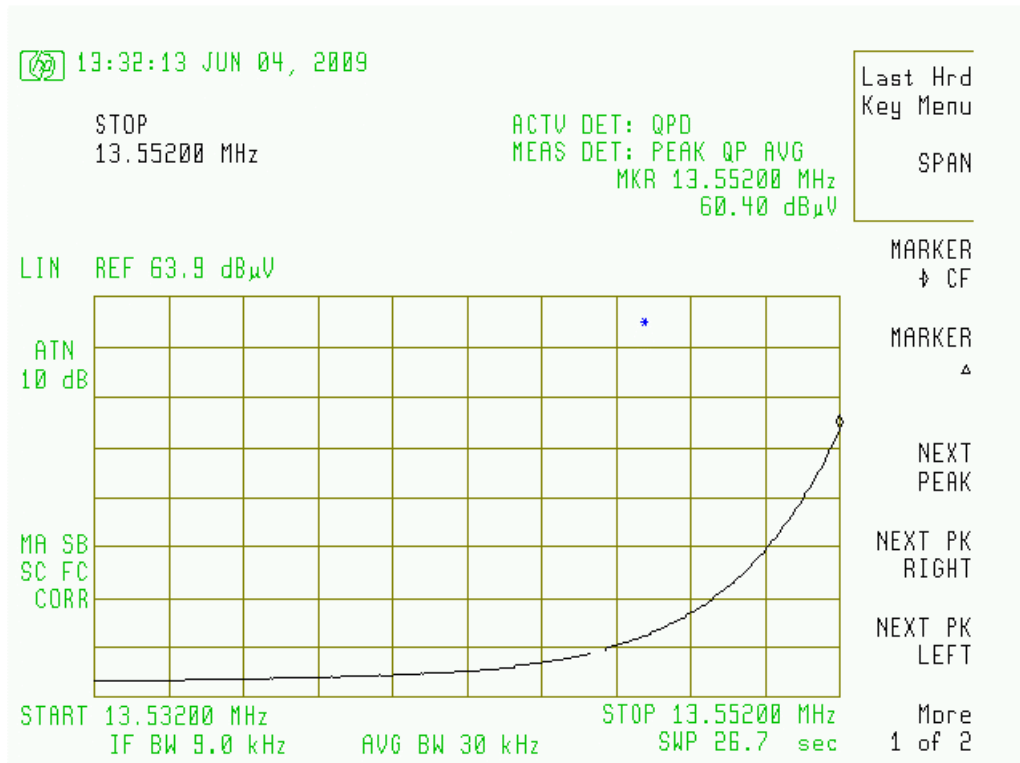
* Note. Cable correction factors are not included in this measurement as the low loss of the high quality TWINAX cable at low frequencies is practically non-existent.

Field Strength Plots

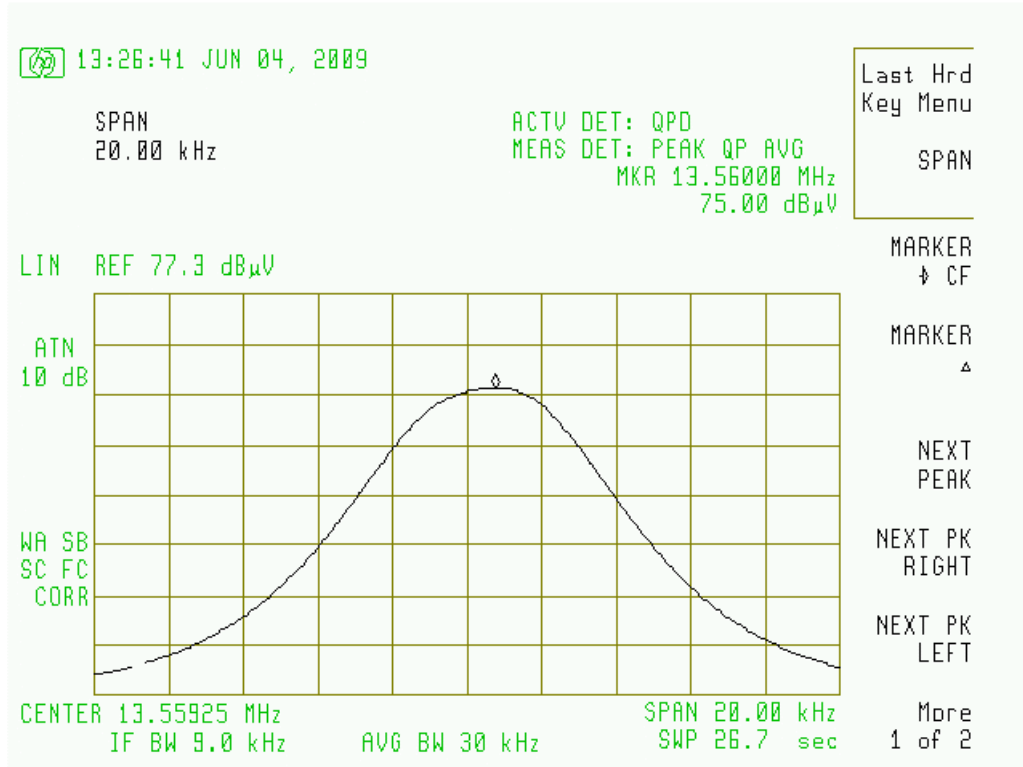
13.110_13.410 MHz



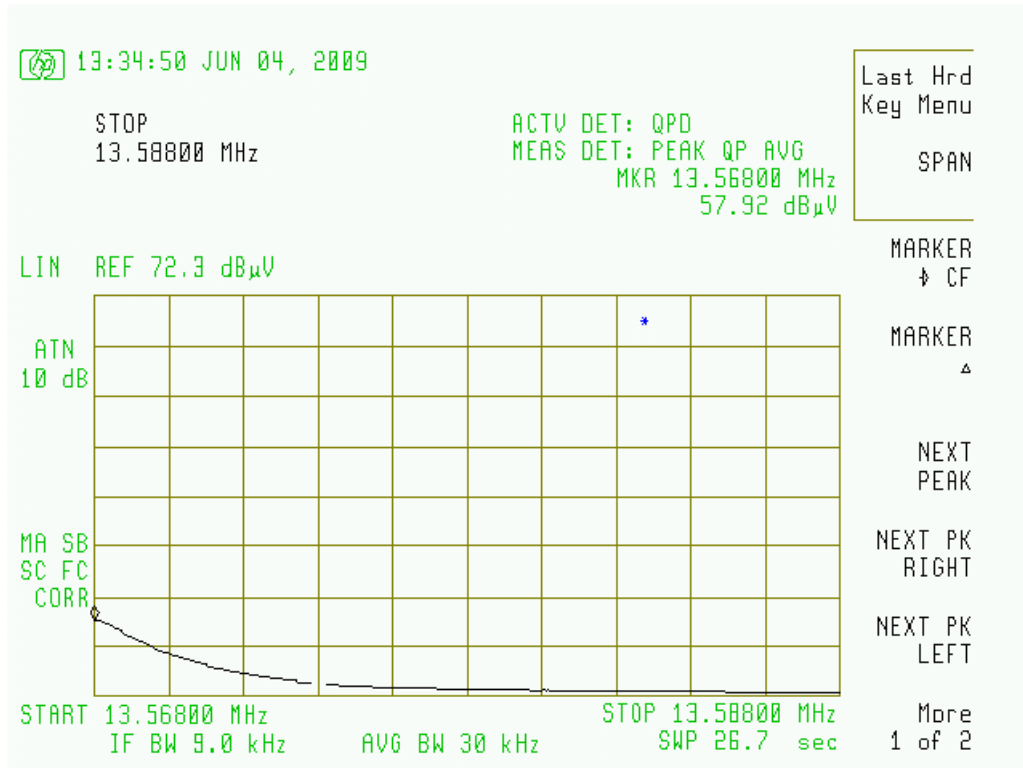
13.410_13.553 MHz



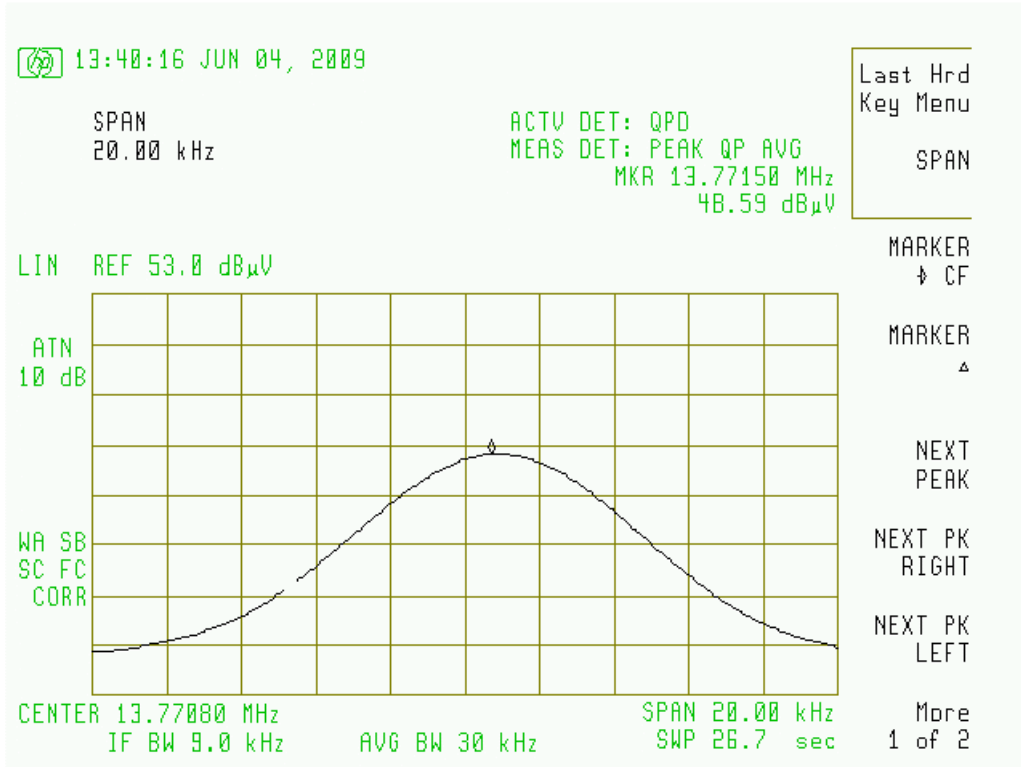
13.553_13.567 MHz



13.567_13.710 MHz



13.710_14.010 MHz



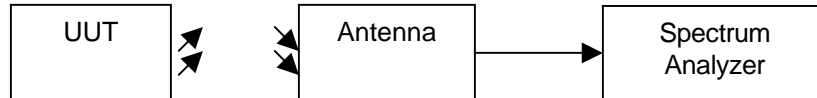
Name of Test: Radiated Emissions
Specification: 15.209
Test Equipment Utilized i00049, i00054, i00267

Engineer: J Erhard
Test Date: 4/13/2009

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

Emission Freq (MHz)	Measured Level (dBuV/m)	Correction Factor (dB)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
50.465	9.5	9.8	19.3	40.0	-20.7
117.990	15.8	13.2	29.0	43.0	-14.0
221.699	22.2	12.2	34.4	46.0	-11.6
224.449	8.6	12.5	21.1	46.0	-24.9
346.424	20.9	17.4	38.3	46.0	-7.7
406.235	10.8	19.2	30.0	46.0	-16.0

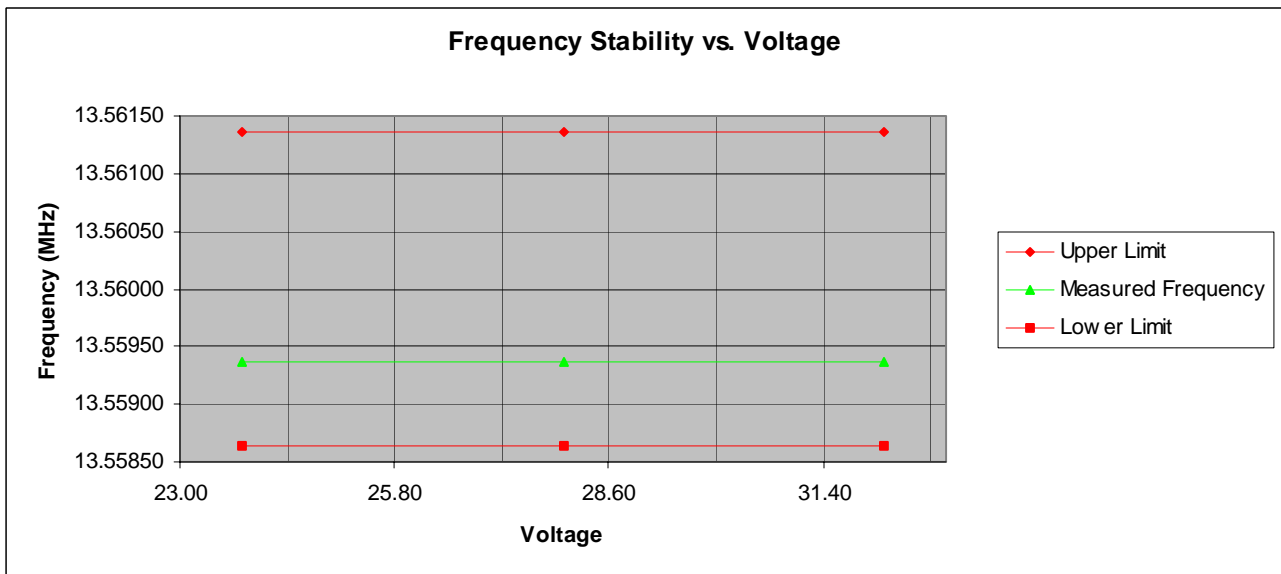
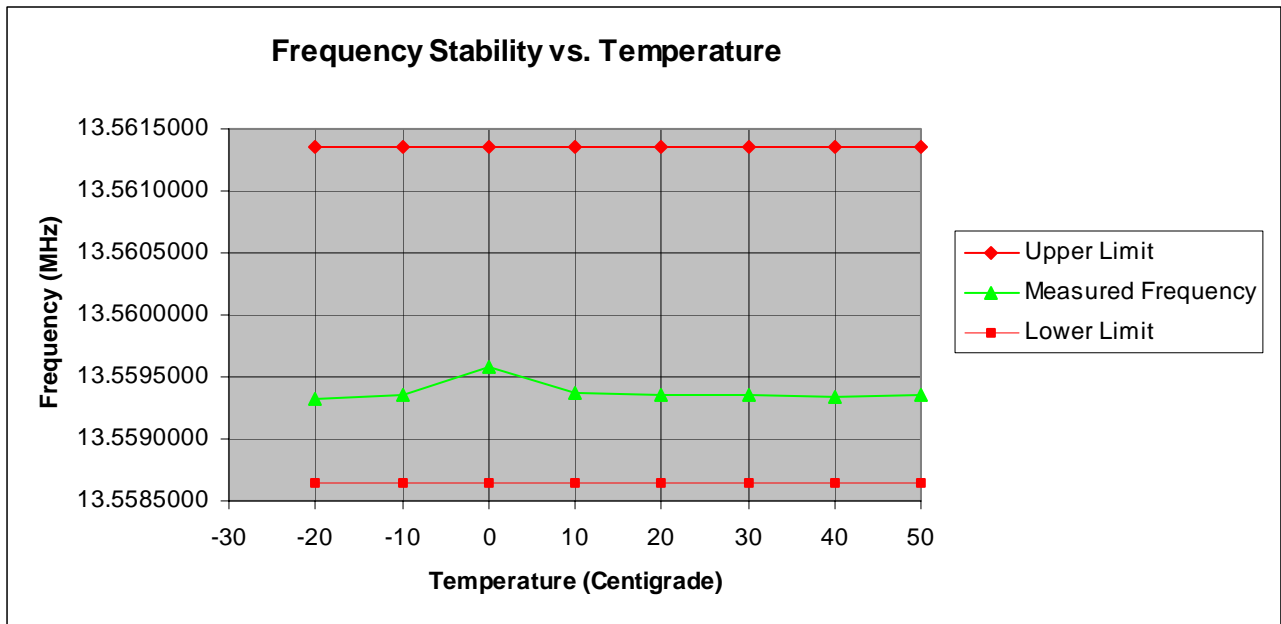
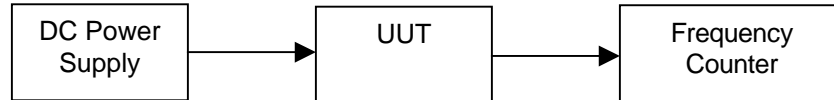
Name of Test: Frequency Stability
Specification: 15.225(e)
Test Equipment Utilized i00019, i00027, i00054, i00319

Engineer: J Erhard
Test Date: 4/13/2009

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 $+50^{\circ}\text{C}$. A variable DC power supply was used to vary the voltage from 85% to 115% of the rated voltage.

Test Setup



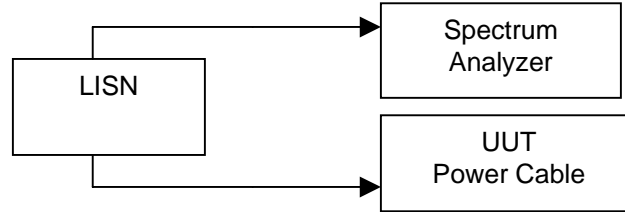
Name of Test: Powerline Conducted Emissions
Specification: 15.207
Test Equipment Utilized i00033, i00054, i00270

Engineer: J Erhard
Test Date: 4/10/2009

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 average 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/m)	LISN Factor (dB)	Attenuation (dB)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
208.93 KHz	43.93	0.2	10	54.16	64.32	-10.16
200.84 KHz	44.1	0.2	10	54.33	64.55	-10.22
200.44 KHz	43.88	0.2	10	54.1	64.56	-10.46
184.11 KHz	43.83	0.2	10	54.03	65.03	-10.99
183.14 KHz	43.76	0.2	10	53.96	65.05	-11.09
162.08 KHz	44.31	0.2	10	54.54	65.65	-11.11

Line 2 Quasi-Peak Test Results

Emission Frequency	Monitored Level (dBuV/m)	LISN Factor (dB)	Attenuation (dB)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Limit (dB)
162.32 KHz	44.02	0.2	10	54.25	65.65	-11.39
162.02 KHz	44.00	0.2	10	54.23	65.66	-11.42
158.94 KHz	44.21	0.21	10	54.46	65.74	-11.29
156.58 KHz	44.21	0.23	10	54.48	65.81	-11.33
154.08 KHz	43.95	0.26	10	54.24	65.88	-11.64
151.81 KHz	44.03	0.28	10	54.35	65.95	-11.6

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

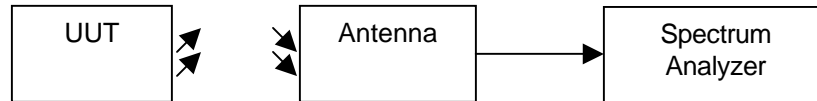
Name of Test: 99% Occupied Bandwidth
Specification: RSS 210 Industry Canada Only
Test Equipment Utilized i00054, i00291, i00326

Engineer: J Erhard
Test Date: 6/4/2009

Test Procedure

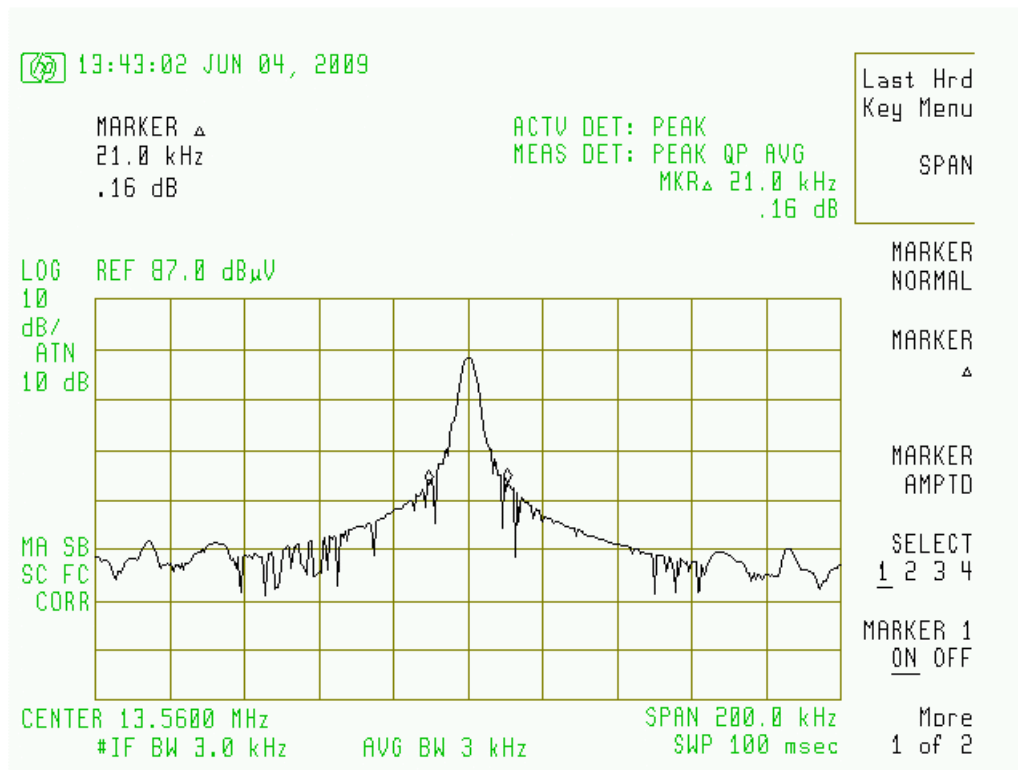
The UUT was tested on an anechoic chamber at a distance of 1 meter from the receiving loop antenna. A spectrum analyzer was used to measure the 99% occupied bandwidth.

Test Setup



99% Bandwidth Summary

Frequency MHz	Recorded Measurement	Result
13.56	21.0 kHz	Pass



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	85462A	i00033	10/14/08	10/14/09
Spectrum Analyzer	HP	8566B	i00049	12/3/08	12/3/08
Power Supply	HP	6286A	i00054	NCR	NCR
Bi-Log Antenna	Schaffner	CBL6111C	i00267	11/6/07	11/6/09
DMM	Fluke	87 III	i00319	12/5/08	12/5/09
Active Loop Antenna	EMCO	6507	i00326	4/1/09	4/1/11

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