



Compliance Testing, LLC
Previously Flom Test Lab
EMI, EMC, RF Testing Experts Since 1963

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Date: October 28, 2010

Federal Communications Commission
Via: Electronic Filing

Attention: Authorization & Evaluation Division

Applicant: Blackboard, Inc.

Equipment: DR4100 Series Module

FCC ID: TMEDR4100X007

FCC Rules: 15.225

Enclosed please find your copy of the Test Data Report for the referenced equipment.

Please keep the original on record for submission to the FCC, **but only if and when they request it.**

In the event the FCC ever requests this submission, please complete all the documentation requirements, (as per the LIST OF EXHIBITS) before sending.

This report may not be reproduced, except in full, without written permission from Compliance Testing, LLC.

Should you have any questions, please do not hesitate to call.

Sincerely,

Compliance Testing, LLC



List of Exhibits

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

Applicant: Blackboard, Inc.

FCC ID: TMEDR4100X007

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



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Test Report

for

FCC ID: TMEDR4100X007

Model: DR4100 Series Module

to

Federal Communications Commission

Rule Part(s) 15.225

Date of Report: October 28, 2010

On the Behalf of the Applicant: Blackboard, Inc.
22601 North 19th Ave, Suite 130
Phoenix, AZ 85027

Attention of: Tim Mattson, Senior Engineer
Ph: (623) 476-1263
Fax: (602) 861-9617
email: tim.mattson@blackboard.com



Test Report Revision History

Revision	Date	Revised By	Reason for revision
1.0	October 28, 2010	J. Erhard	Original Document
2.0	November 29, 2010	J. Erhard	Add Detector Bandwidths for Radiated Emission Tests



The applicant has been cautioned as to the following:

15.21 Information to User

The user's 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 is true and correct.

A handwritten signature in black ink, appearing to read "John Erhard".

Certifying Engineer:

John Erhard: Engineering Manager



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Required information per ISO 17025-2005, paragraph 5.10.2:

a) **Test Report**

b) Laboratory: Compliance Testing
(FCC: 933597) 3356 N. San Marcos Place, Suite 107
(Canada: IC 2044A-1) Chandler, AZ 85225

c) Report Number: d10a0015

d) Client: Blackboard, Inc.

e) Identification: DR4100 Series Module

Description: Contactless Card Readers

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

g) Report Date: October 28, 2010

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: Blackboard, Inc.

(c)(2): **FCC ID:** TMEDR4100X007

Model Number: DR4100 Series Module
Models: DR4100, DR4110, DR4200, DR4210

(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, W:** 0.000000000008

☐ Switchable

☐ Variable

☒ N/A

(c)(7): **Maximum Power Rating, W:** 0.000005

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

The device was placed in a continuously modulates test mode as the momentary nature of normal operation makes testing impractical.



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 C63.4-2009 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



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)	Fundamental Field Strength	Pass	
15.225(b)(c)(d)	Out of Band Spurious Emissions	Pass	
15.225(e)	Frequency Stability	Pass	
12.209	Radiated Emissions	Pass	
12.207	Conducted Powerline Emissions	Pass	
RSS-210	99% Occupied Bandwidth	Pass	



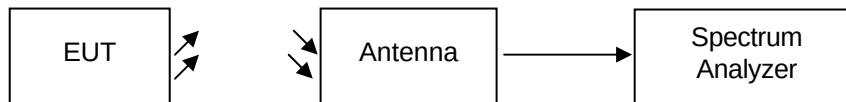
Name of Test: Field Strength
Specification: 15.225(a)(b)(c)(d)
Test Equipment Utilized: i00033, i00326

Engineer: J. Erhard
Test Date: 10/26/2010

Test Procedure

The EUT 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 EUT 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 spectrum analyzer resolution and video bandwidths were set to 9 kHz and 30 kHz respectively. The following table indicates the highest emission in each of the indicated bands.

Test Setup



Field Strength Stand Alone

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	13.348	46.48	59.1	17.8	-30.42	40.51	Pass
13.410 - 13.553	13.553	61.24	59.1	17.8	-15.66	50.47	Pass
13.553 - 13.567	13.559	73.47	59.1	17.8	-3.43	84.00	Pass
13.567 - 13.710	13.567	59.84	59.1	17.8	-17.06	50.47	Pass
13.710 - 14.010	13.771	42.73	59.1	17.8	-34.17	40.51	Pass

**Field Strength 4100**

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	13.376	46.1	59.1	17.8	-30.8	40.51	Pass
13.410 - 13.553	13.553	61.64	59.1	17.8	-15.26	50.47	Pass
13.553 - 13.567	13.559	74.02	59.1	17.8	-2.88	84.00	Pass
13.567 - 13.710	13.567	60.94	59.1	17.8	-15.96	50.47	Pass
13.710 - 14.010	13.716	42.95	59.1	17.8	-33.95	40.51	Pass

Field Strength 4110

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	13.346	46.57	59.1	17.8	-30.33	40.51	Pass
13.410 - 13.553	13.553	61.66	59.1	17.8	-15.24	50.47	Pass
13.553 - 13.567	13.559	74.26	59.1	17.8	-2.64	84.00	Pass
13.567 - 13.710	13.567	61.24	59.1	17.8	-15.66	50.47	Pass
13.710 - 14.010	13.767	42.4	59.1	17.8	-34.5	40.51	Pass

Field Strength 4200

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	13.352	44.76	59.1	17.8	-32.14	40.51	Pass
13.410 - 13.553	13.553	61.12	59.1	17.8	-15.78	50.47	Pass
13.553 - 13.567	13.559	73.12	59.1	17.8	-3.78	84.00	Pass
13.567 - 13.710	13.567	59.56	59.1	17.8	-17.34	50.47	Pass
13.710 - 14.010	13.774	41.19	59.1	17.8	-35.71	40.51	Pass

Field Strength 4210

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	13.399	45.83	59.1	17.8	-31.07	40.51	Pass
13.410 - 13.553	13.553	61.46	59.1	17.8	-15.44	50.47	Pass
13.553 - 13.567	13.560	73.9	59.1	17.8	-3	84.00	Pass
13.567 - 13.710	13.567	60.78	59.1	17.8	-16.12	50.47	Pass
13.710 - 14.010	13.748	42.25	59.1	17.8	-34.65	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.



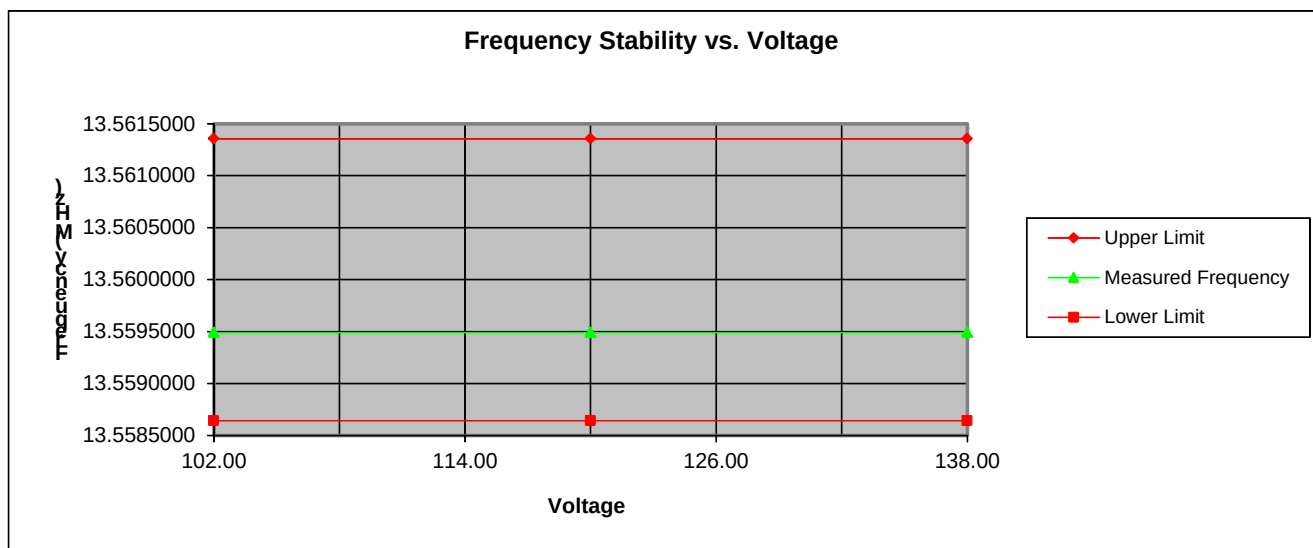
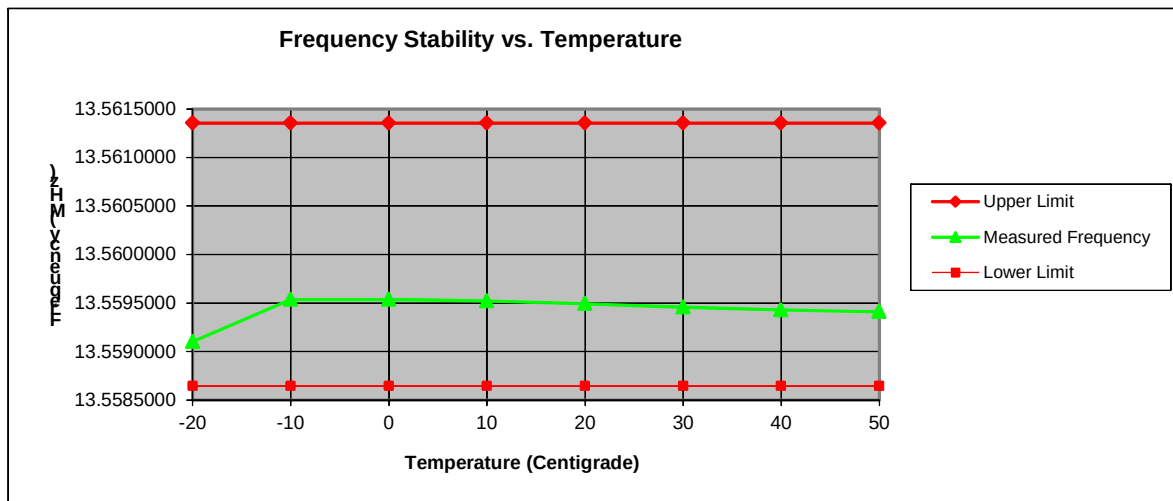
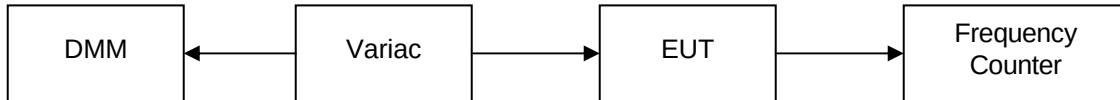
Name of Test: Frequency Stability
Specification: 15.225(e)
Test Equipment Utilized: i00019, i00027, i00108, i00320

Engineer: J. Erhard
Test Date: 10/26/2010

Test Procedure

The EUT 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 variac was used to vary the voltage from 85% to 115% of the rated voltage.

Test Setup





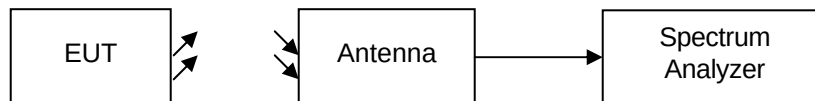
Name of Test: Radiated Emissions
Specification: 15.209
Test Equipment Utilized: i00033, i00267

Engineer: J. Erhard
Test Date: 10/28/2010

Test Procedure

The EUT 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



Spectrum analyzer Settings

RBW = 120 KHz

VBW = 300 KHz

Detector – Quasi Peak

Sample Calculations

Corrected Value = Measured Value + Correction factor

Correction factor = ACF + Cable loss

Radiated Emissions Stand Alone

Emission Freq (MHz)	Measured Value (dBuV/m)	Correction Factor (dB)	Corrected Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
34.28	13.3	17.8	31.1	40.0	-8.9
159.20	13.2	12.3	25.5	43.0	-17.5
287.12	12.9	15.6	28.5	46.0	-17.5
398.42	16.3	18.6	34.9	46.0	-11.1
608.84	12.6	22.1	35.0	46.0	-10.0
752.80	16.8	23.9	40.7	46.0	-5.3

Radiated Emissions 4100

Emission Freq (MHz)	Measured Value (dBuV/m)	Correction Factor (dB)	Corrected Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
38.46	10.1	15.6	25.7	40.0	-14.3
228.08	6.0	13.6	19.6	46.0	-26.4
423.45	7.0	19.5	26.4	46.0	-19.6
554.75	7.2	21.9	29.1	46.0	-16.9
689.75	10.8	23.0	33.8	46.0	-12.2
812.25	6.5	24.5	31.0	46.0	-15.0

Radiated Emissions 4110

Emission Freq (MHz)	Measured Value (dBuV/m)	Correction Factor (dB)	Corrected Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
42.60	9.6	13.3	22.8	40.0	-17.2
173.4	14.8	11.6	26.4	43.0	-16.6
241.45	5.2	14.5	19.7	46.0	-26.4
395.65	11.8	18.4	30.2	46.0	-15.8
469.60	9.7	20.0	29.7	46.0	-16.3
646.65	5.2	23.1	28.2	46.0	-17.8

Radiated Emissions 4200

Emission Freq (MHz)	Measured Value (dBuV/m)	Correction Factor (dB)	Corrected Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
32.25	11.1	18.8	29.9	40.0	-10.1
224.317	5.6	13.4	19.0	46.0	-27.1
336.00	7.4	16.5	23.9	46.0	-22.1
563.60	5.1	22.0	27.1	46.0	-18.9
707.35	5.5	23.1	28.5	46.0	-17.5
910.30	6.0	25.7	31.7	46.0	-14.3

Radiated Emissions 4210

Emission Freq (MHz)	Measured Value (dBuV/m)	Correction Factor (dB)	Corrected Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
238.65	7.0	14.3	21.3	46.0	-24.7
340.65	7.6	16.7	24.3	46.0	-21.7
468.90	10.8	20.0	3.8	46.0	-15.2
611.25	5.8	22.2	28.0	46.0	-18.0
727.05	8.5	23.1	31.7	46.0	-14.3
951.90	6.1	26.5	32.6	46.0	-13.4

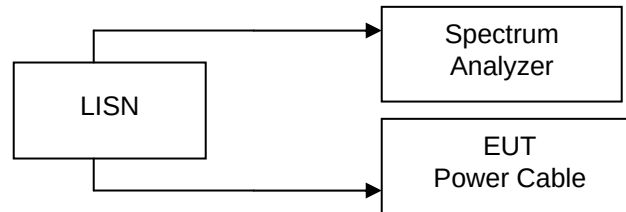
Name of Test: Powerline Conducted Emissions
Specification: 15.207
Test Equipment Utilized: i00033, i00270

Engineer: J. Erhard
Test Date: 10/27/2010

Test Procedure

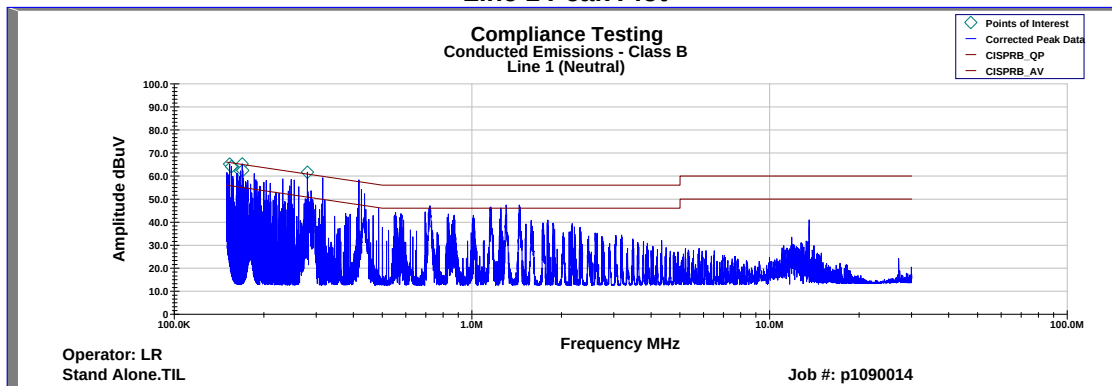
The EUT power cable connected to a LISN and the monitored output of the LISN was connected directly to a spectrum analyzer. The conducted emissions from 150 kHz to 30 MHz were monitored and compared to the specification limits. The spectrum analyzer resolution and video bandwidths were set to 9 kHz and 30 kHz respectively. The worst-case measurements are recorded in the tables below.

Test Setup

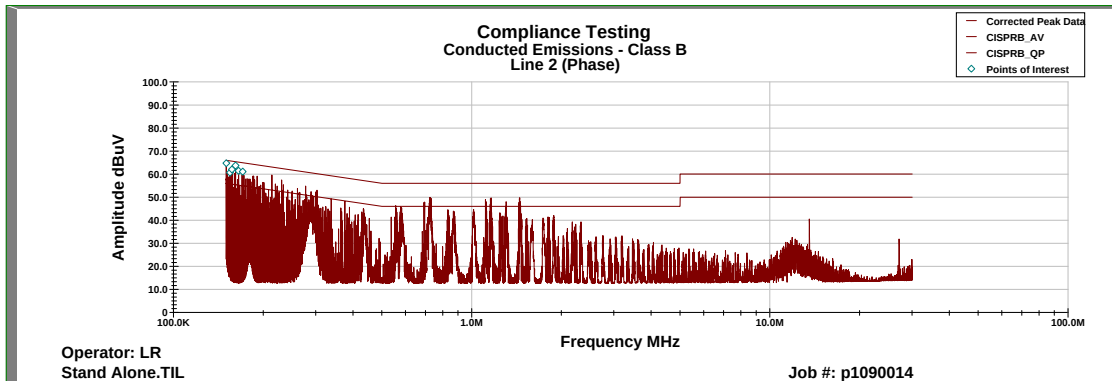


Conducted Emissions Test Results

Line 1 Peak Plot



Line 2 Peak Plot



Line 1 Neutral AVG Detector

Frequency	Measured Data (dBuV)	LISN Corr Fact (dB)	Cable Loss (dB)	Attenuator (dB)	L1 Final Data (dBuV)	Limit (dBuV)	AVG Margin (dB)
291.86 KHz	21.91	0.15	0.116	10	32.184	51.947	-19.763
168.79 KHz	14.06	0.2	0.026	10	24.282	55.463	-31.181
165.44 KHz	13.88	0.2	0.029	10	24.112	55.559	-31.447
156.86 KHz	15.4	0.23	0.041	10	25.672	55.804	-30.132
156.76 KHz	14.91	0.23	0.041	10	25.18	55.807	-30.627
154.11 KHz	16.46	0.26	0.033	10	26.752	55.883	-29.131

Line 2 Phase AVG Detector

Frequency	Measured Data (dBuV)	LISN Corr Fact (dB)	Cable Loss (dB)	Attenuator (dB)	L2 Final Data (dBuV)	Limit (dBuV)	AVG Margin (dB)
161.58 KHz	14.95	0.2	0.032	10	25.179	55.669	-30.491
161.31 KHz	14.56	0.2	0.031	10	24.791	55.677	-30.886
156.08 KHz	16.56	0.24	0.037	10	26.837	55.826	-28.99
153.46 KHz	15.68	0.27	0.037	10	25.982	55.901	-29.919
151.55 KHz	17.5	0.28	0.041	10	27.825	55.956	-28.131
150.9 KHz	16.64	0.29	0.042	10	26.973	55.974	-29.001

Line 1 Neutral QP Detector

Frequency	Measured Data (dBuV)	LISN Corr Fact (dB)	Cable Loss (dB)	Attenuator (dB)	L1 Final Data (dBuV)	Limit (dBuV)	QP Margin (dB)
291.86 KHz	36.36	0.154	0.116	10	46.63	61.947	-15.317
168.79 KHz	37.88	0.2	0.026	10	48.106	65.463	-17.357
165.44 KHz	39.77	0.2	0.029	10	49.999	65.559	-15.56
156.86 KHz	39.73	0.231	0.041	10	50.002	65.804	-15.802
156.76 KHz	38.24	0.232	0.041	10	48.513	65.807	-17.294
154.11 KHz	40.28	0.259	0.033	10	50.572	65.883	-15.311

Line 2 Phase QP Detector

Frequency	Measured Data (dBuV)	LISN Corr Fact (dB)	Cable Loss (dB)	Attenuator (dB)	L2 Final Data (dBuV)	Limit (dBuV)	QP Margin (dB)
161.58 KHz	41.93	0.2	0.032	10	52.162	65.669	-13.507
161.31 KHz	39.57	0.2	0.031	10	49.801	65.677	-15.876
156.08 KHz	40.21	0.24	0.037	10	50.487	65.826	-15.34
153.46 KHz	41.92	0.27	0.037	10	52.222	65.901	-13.679
151.55 KHz	42.25	0.28	0.041	10	52.575	65.956	-13.381
150.9 KHz	45.99	0.29	0.042	10	56.323	65.974	-9.651



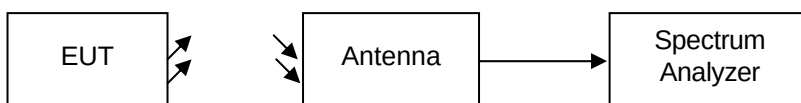
Name of Test: 99% Occupied Bandwidth
Specification: RSS 210 Industry Canada Only
Test Equipment Utilized: i00033, i00326

Engineer: J. Erhard
Test Date: 10/26/2010

Test Procedure

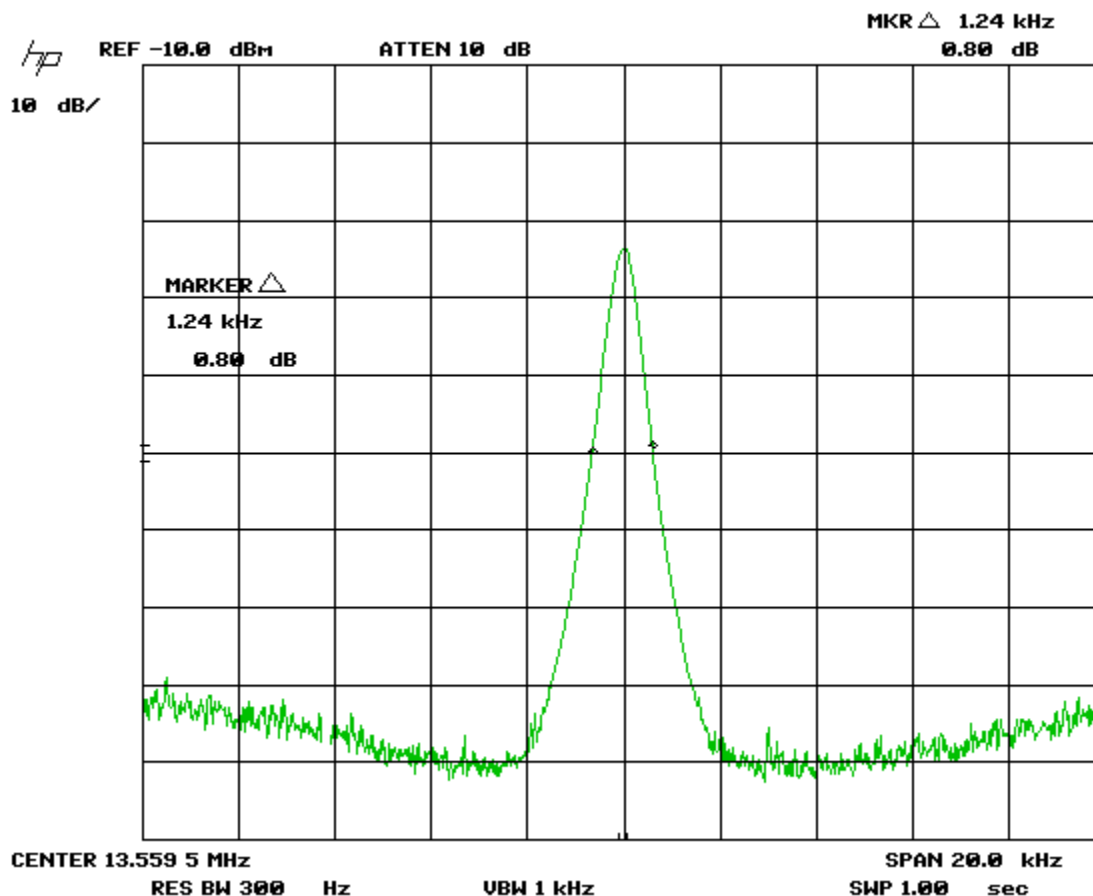
The EUT was tested on an anechoic chamber at a distance of 1 meter from the receiving loop antenna. A spectrum analyzer was used to measure the 99% occupied bandwidth.

Test Setup



99% Bandwidth Summary

Frequency MHz	Recorded Measurement	Result
13.56	1.24 kHz	Pass



**Test Equipment Utilized**

Description	MFG	Model Number	CT Asset Number	Last Cal Date	Cal Due Date
Frequency Counter	HP	5334B	i00019	2/15/2010	2/15/2011
Temperature Chamber	Tenney	Tenney Jr	i00027	12/8/2009	12/08/2010
Spectrum Analyzer	HP	85462A	i00033	11/4/2009	11/4/2010
Variac	Powerstat	3PN126	i00108	NCR	NCR
Bi-Log Antenna	Schaffner	CBL6111C	i00267	11/21/2009	11/21/2011
LISN	FCC	FCC-LISN-50-32-2-01	i00270	9/30/2010	9/30/2012
DMM	Fluke	75 III	i00320	2/10/2010	2/10/2011
Active Loop Antenna	EMCO	6507	i00326	4/1/2009	4/1/2011

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