



Compliance Testing, LLC

Previously Flom Test Lab

EMI, EMC, RF Testing Experts Since 1963

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Test Report

Prepared for: Blackboard, Inc.

Model: MRD5

Description: Hand-held device that reads mag-stripe and contactless cards and operates as a peripheral device to a host such as a smart phone or tablet

Serial Number: N/A

FCC ID: TMEBBMRD5X010

IC: 8327A-BBMRD5X010

To

FCC Part 15.225

Date of Issue: May 6, 2015

On the behalf of the applicant:

Blackboard, Inc.
22601 N 19th Ave
Suite 130
Phoenix, AZ 85027

Attention of:

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Prepared by
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Project No: p1520011

Alex Macon
Project Test Engineer

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All results contained herein relate only to the sample tested



Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	3/6/15	Alex Macon	Original Document
2.0	5/6/15	Alex Macon	Added 15.215 designation in Test Results Summary



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ILAC / A2LA

Compliance Testing, LLC, has been accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to the joint ISO-ILAC-IAF Communiqué dated January 2009).

The tests results contained within this test report all fall within our scope of accreditation, unless noted in the table below.

Please refer to <http://www.compliancetesting.com/labscope.html> for current scope of accreditation.

Testing Certificate Number: **2152.01**



FCC Site Reg. #349717

IC Site Reg. #2044A-2

Non-accredited tests contained in this report:

N/A



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 part may employ other methods of ensuring that the special accessories are provided to the consumer, without an 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.



Standard Test Conditions Engineering Practices

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

In accordance with ANSI C63.10-2009 and 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 specified 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.

Environmental Conditions		
Temperature (°C)	Humidity (%)	Pressure (mbar)
20.2 – 21.8	38.8 – 40.5	976.5 – 978.4

EUT Description

Model: MRD5

Description: Hand-held device that reads mag-stripe and contactless cards and operates as a peripheral device to a host such as a smart phone or tablet.

Firmware: N/A

Software: N/A

Serial Number: N/A

Additional Information:

EUT is a mobile card reader with NFC and Bluetooth LE capabilities.

EUT Operation during Tests

The EUT was placed in constant transmit mode using test cards supplied by the manufacturer.

Accessories:

Qty	Type	Make, Model	S/N
1	AC DC Adapter	Samsung, ETAOU61JBE	N/A

Cables:

Qty	Type	Length (m)	Shield	Shielded Hood	Ferrite
1	USB charging cable	<3m	Y	Y	N



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	
15.209	Radiated Emissions	Pass	
15.207	Conducted Powerline Emissions	Pass	
15.215 RSS-210	99% Occupied Bandwidth	Pass	

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



Field Strength

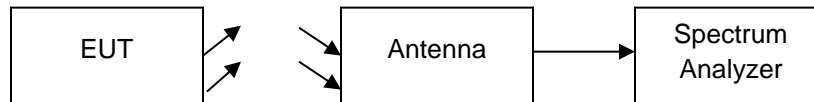
Engineer: Alex Macon

Test Date: 3/5/15

Test Procedure

The EUT was tested in an anechoic chamber at a distance of 1 meter from the receiving loop antenna and characterized to the 30 meter limit. 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 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	13.13325	21.86	59.1	17.8	-55.04	40.51	Pass
13.410_13.553	13.553	79.39	59.1	17.8	2.49	50.47	Pass
13.553_13.567	13.55945	83.73	59.1	17.8	6.83	84.00	Pass
13.567_13.710	13.567357	76.26	59.1	17.8	-0.64	50.47	Pass
13.710_14.010	13.98375	23.26	59.1	17.8	-53.64	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.



Frequency Stability

Engineer: Alex Macon

Test Date: 3/6/15

Test Procedure

The EUT was placed in an environmental test chamber and a spectrum analyzer 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.

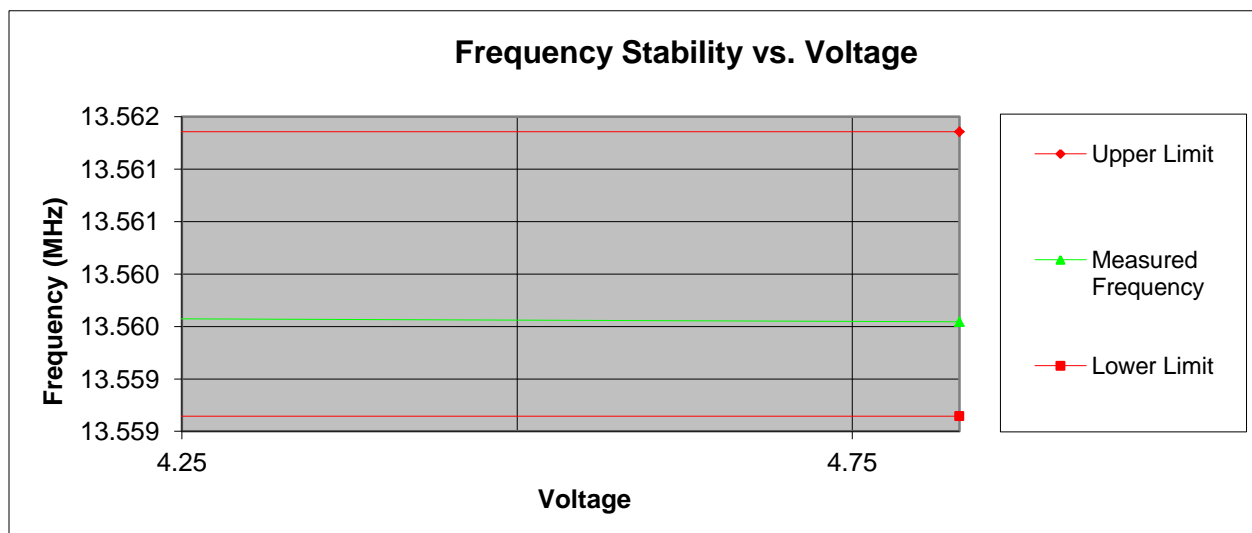
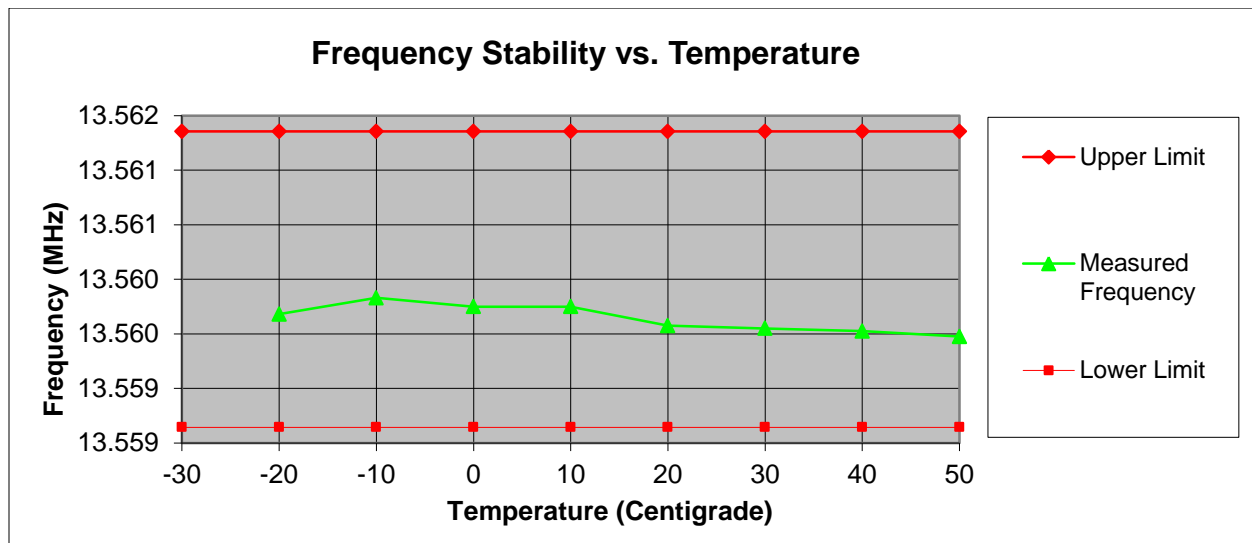
Test Setup



Nominal frequency: 13.559575 MHz

Lower Limit: 13.5586440 MHz

Upper Limit: 13.5613560 MHz





Radiated Emissions

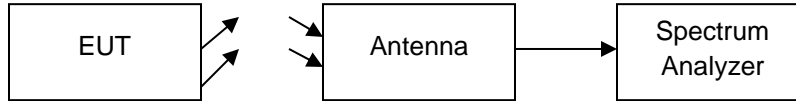
Engineer: Alex Macon

Test Date: 3/5/15

Test Procedure

The EUT was tested in a semi anechoic chamber at a distance of 3 meters from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the requirements for Radiated Emissions. The spectrum for each tuned frequency was examined beyond the 10th harmonic.

Test Setup



Radiated Emissions

Emission Frequency (MHz)	Measured Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Antenna Polarity (V/H)	Turntable Position (deg)	Detector (Pk,Av,QP)
67.783	27.83	40	-12.17	133	V	211	QP
135.568	18.36	43.5	-25.14	100	V	90	QP
170.594	21.4	43.5	-22.1	100	V	256	QP
203.380	19.96	43.5	-23.54	100	V	113	QP
488.132	26.22	46	-19.78	100	V	220	QP
515.248	27.5	46	-18.5	100	V	220	QP



Powerline Conducted Emissions

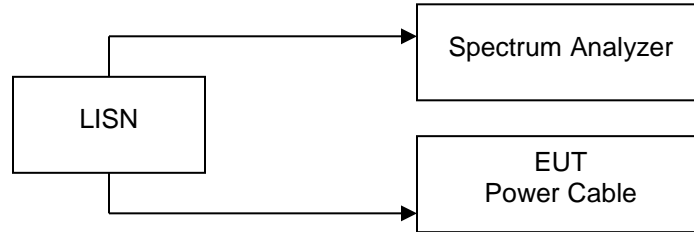
Engineer: Alex Macon

Test Date: 3/5/15

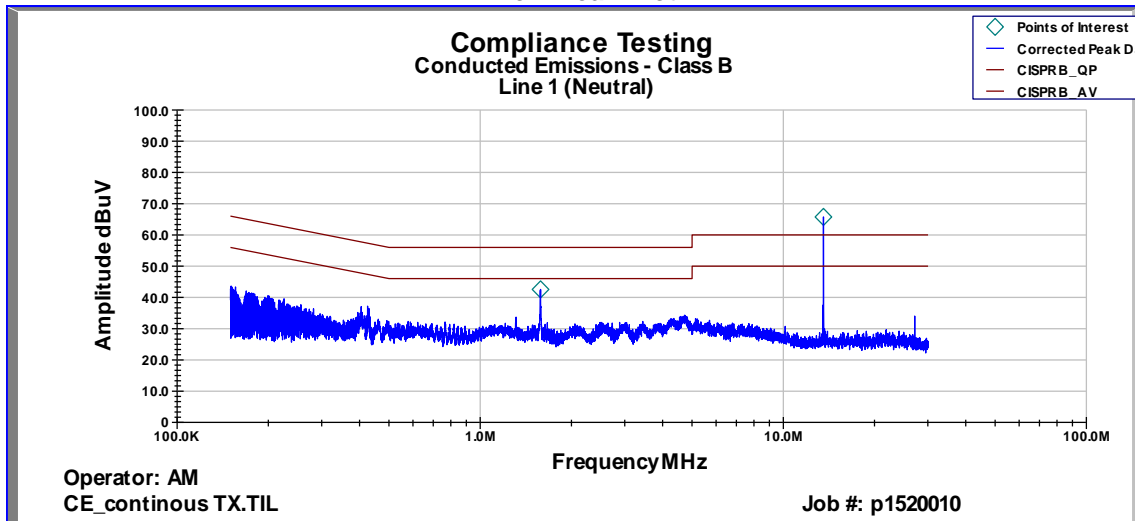
Test Procedure

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 average measurements were the worst case and are recorded in the tables below.

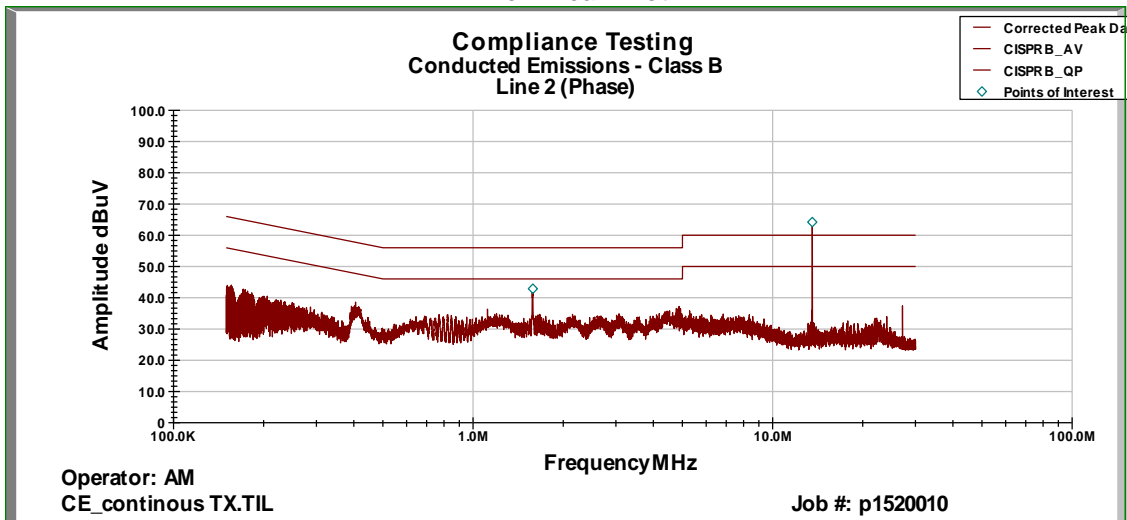
Test Setup



Line 1 Peak Plot



Line 2 Peak Plot



The emission at 1.58 MHz is an ambient signal and is not created by the EUT. All other results were greater than 20 dB below the limit.



99% Occupied Bandwidth

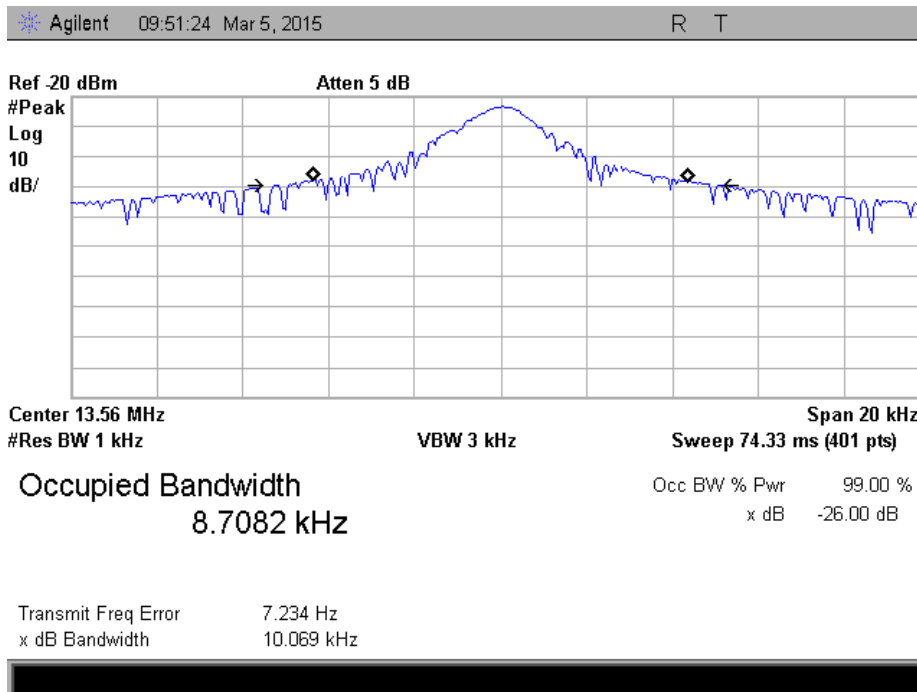
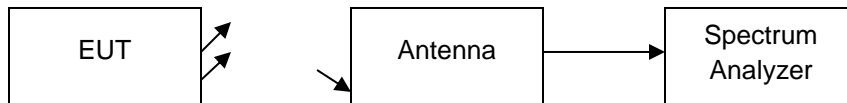
Engineer: Alex Macon

Test Date: 3/6/15

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 (kHz)	Result
13.56	8.7082	Pass



Test Equipment Utilized

Description	Manufacturer	Model #	CT Asset #	Last Cal Date	Cal Due Date
Power Supply	Kenwood	PR18-3A	i00008	Verified on: 3/6/15	
Temperature Chamber	Tenney	Tenney Jr	i00027	Verified on: 3/6/15	
Spectrum Analyzer	HP	85462A	i00033	2/26/15	2/26/16
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	6/13/14	6/13/15
Bi-Log Antenna	Schaffner	CBL 6111D	i00349	10/8/13	10/8/15
EMI Analyzer	Agilent	E7405A	i00379	2/5/15	2/5/16

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