TEST REPORT

FROM

SIEMIC, INC.
Accessing global markets

FOR

QI Systems, Inc.

PicoPass Reader Module

Model: M210-3G-F

TO

47 CFR 15.225:2006

Test Report Serial No.:
SL07021502-QIS-001

This report supersedes None

Remarks: Equipment complied with the specification   [X]
Equipment did not comply with the specification   [   ]

This Test Report is Issued Under the Authority of:

....
Tested by: Benjamin Jing, Test Engineer

....
Reviewed by: Kerwinn Corpuz, EMC Lab Manager

Issue date: 02 April 2007
Manufacturer: QI Systems, Inc.

Registration No. 783147   Registration No. 4842   Lab Code: KR0032   RTA No. D23/16V   Registration No. 2195

Lab Code : U S 0 1 6 0   CSHI Code. SL2-I4-C-1090R

This test report may be reproduced in full only.

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Executive Summary

The purpose of this test programme was to demonstrate compliance of the QI Systems, Inc., PicoPass Reader Module, model M210-3G-F against the current 47 CFR 15.225:2006. The PicoPass Reader Module demonstrated compliance with the 47 CFR 15.225:2006.

QI Systems, Inc. is the applicant and claimed manufacturer of this tested product. For the detailed description of this product, please refer to the PicoPass Reader Module User Manual.

The equipment under test operating frequency is 13.56 MHz.

Note 1: The power supply brick that was tested with the EUT will not be marketed. It was used for testing purposes only.

Note 2: To comply with Conducted Emissions Limit, the RFID module was installed in SmartKit II System (HOST). The shielding of the HOST was preventing the 13.56 MHz couple into the AC line. The RFID module will be marketed with these HOST, Smartkit II System and Cash to Card System. It will never be sold as a stand – alone device.

The test has demonstrated that this unit complies with stipulated standards.

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1   Technical Details

Purpose	Compliance testing of PicoPass Reader Module with 47 CFR 15.225:2006
Applicant / Client	QI Systems, Inc. 101-3820 Jacombs Road Richmond, BC V6V1Y6 Canada
Manufacturer	QI Systems, Inc.
Laboratory performing the tests	SIEMIC Labs 2206 Ringwood Avenue San Jose, CA 95131
Test location(s)	SIEMIC Labs 2206 Ringwood Avenue San Jose, CA 95131
Test report reference number	SL07021502-QIS-001
Date EUT received	28 February 2007
Standard applied	47 CFR 15.225:2006
Dates of test (from – to)	12 March 2007 to 5 April 2007
No of Units:	1 of each devices
Equipment Category:	DXX
Trade/Product Name:	Cash-To-Card and SmartKit II
Type/Model Name/No:	M210-3G-F
Technical Variants:	none
FCC ID No.	U4BM210-3G

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2   Tests Required

The product was tested in accordance with the following specifications.
The test results recorded in this Test Report are exclusively referred to the tested sample(s).

Test Standard		Description	Pass / Fail
47 CFR Part 15.225: 2006			
15.203		Antenna Requirement	Pass
15.207(a)		Conducted Emissions Voltage	Pass
15.225(a)		Limit in the band of 13.553 – 13.567 MHz	Pass
15.225(b)		Limit in the band of 13.410 – 13.553 MHz and 13.567 – 13.710 MHz	Pass
15.225(c)		Limit in the band of 13.110 – 13.410 MHz and 13.710 – 14.010 MHz	Pass
15.225(d)		Limit outside the band of 13.110 – 14.010 MHz	Pass
15.225(e)		Frequency Stability	Pass
15.209		Radiated Emission Limits	Pass
ANSI C63.4: 2003			

Notes: Deviations to above standards are outlined in specific test sections if applicable.
Cable loss and external attenuation are compensated for in the measurement system when
applicable.

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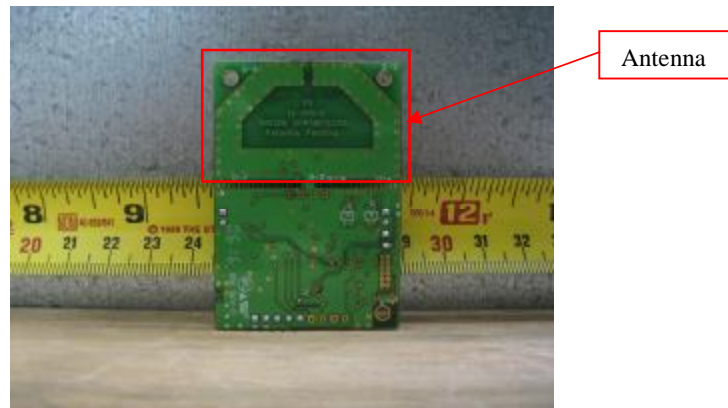|		
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3   Antenna Requirement

Requirement(s): 47 CFR §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna requirement must meet at least one of the following:

a) Antenna must be permanently attached to the device.

b) Antenna must use a unique type of connector to attach to the device.

c) Device must be professionally installed. Installer shall be responsible for ensuring that the correct antenna is employed with the device.

The antenna is attached permanently to the device which meets the requirement.

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4 Measurements, Examinations and Derived Results

4.1 General observations

Equipment serial number(s)		
Module:	Model number:	Serial number:
PicoPass Reader Module	M210-3G-F	none

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4.2 Test Results

4.2.1 Conducted Emissions Voltage

Requirement(s): 47 CFR §15.207

Procedures:

The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table. The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable. All other supporting equipment were powered separately from another mains.
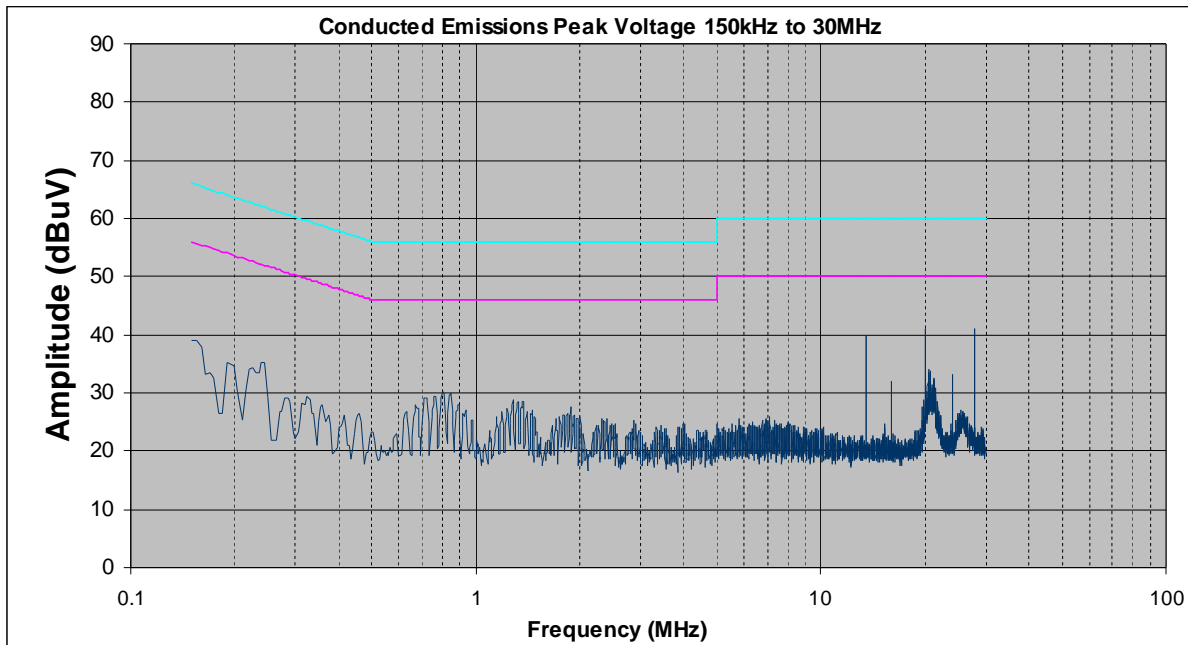
The EUT was switched on and allowed to warm up to its normal operating condition. A scan was made on the NEUTRAL line over the required frequency range using an EMI test receiver. High peaks, relative to the limit line, were then selected. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10kHz. Quasi-peak and Average measurements were made. The procedure was then repeated for the PHASE line.

Results: **Note –** | Quasi-Peak Limit | | Average Limit |
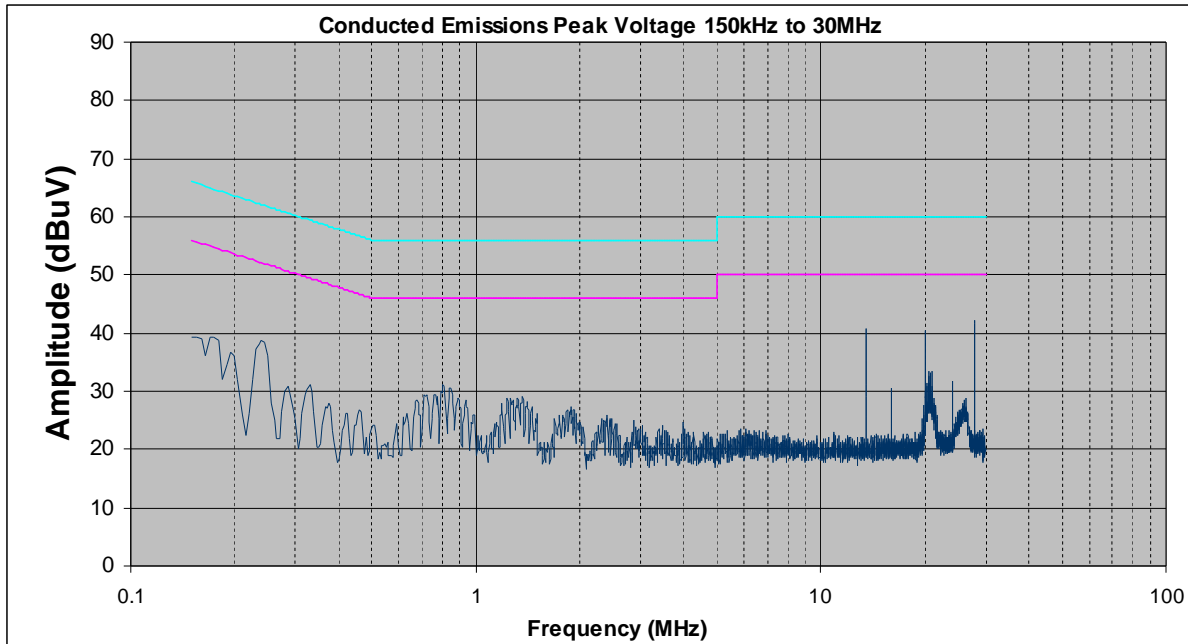

Neutral Line Plot at 120Vac, 60Hz

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Conducted Emissions Peak Voltage 150kHz to 30MHz

Phase Line Plot at 120Vac, 60Hz

LINE	FREQ (MHz)	Corrected Amplitude (dBμV) PK	Limit (dBμV) QP	Margin (dB) QP	Corrected Amplitude (dBμV) PK	Limit (dBμV) AVG	Margin (dB) AVG
Neutral	13.56	39.8	60	-20.2	39.8	50	-10.2
Neutral	20	41.1	60	-18.9	41.1	50	-8.9
Neutral	28	41	60	-19	41	50	-9
Phase	13.56	40.9	60	-19.1	40.9	50	-9.1
Phase	20	40.4	60	-19.6	40.4	50	-9.6
Phase	28	41.6	60	-18.4	41.6	50	-8.4

Conducted Emission Table

Note: PK = peak; QP = quasi-peak; AVG = average detector.

Tested By: Benjamin Jing

Date Tested: 03 April 2007

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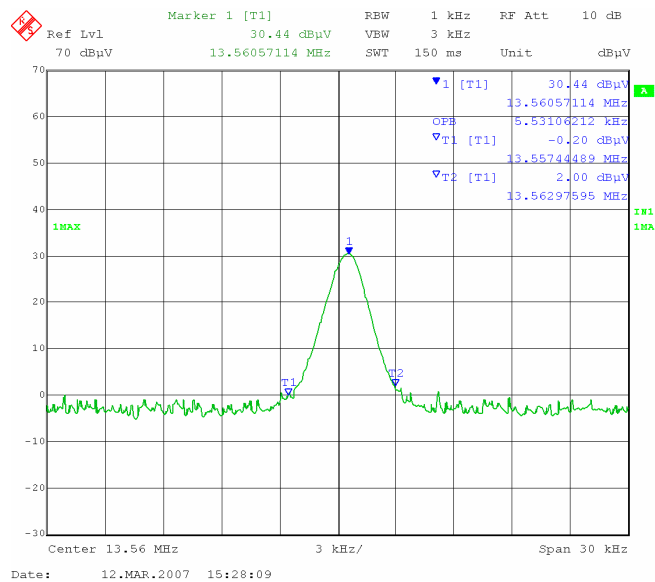**Page** **12 of 28**

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4.2.2 Occupied Bandwidth

Requirement(s):

Procedures: The 99% bandwidth was measured radiated emissions using a spectrum analyzer.

Results:

Measured 99% occupied bandwidth: 5.531 kHz

Tested By: Benjamin Jing

Date Tested: 12 March 2007

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4.2.3   Radiated Emissions within the Band of 13.110 – 14.010 MHz

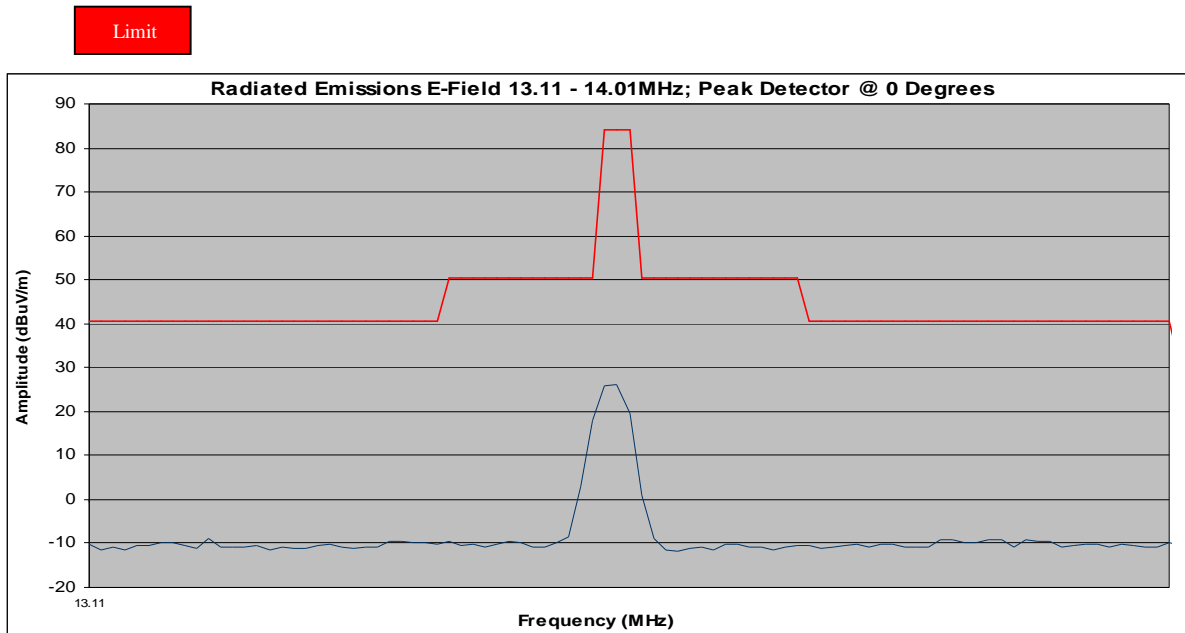**Requirement(s):** 47 CFR §15.225(a) – (c)

Procedures: Radiated emissions were measured according to ANSI C63.4. The EUT was set to transmit at the highest output power. The EUT was set 3 meter away from the measuring antenna. The loop antenna was positioned 1 meter above the ground from the center of the loop. The measuring bandwidth was set to 10 kHz.

The limit is converted from microvolts/meter to decibel microvolts/meter.

Distance Correction Factor was calculated with 40 dB/decade.

Sample Calculation: Corrected Amplitude = Raw Amplitude(dBµV/m) + ACF(dB) + Cable Loss(dB) – Distance Correction Factor

Results: **Loop Antenna Positioned at 0 degrees**

Radiated Emissions Plot

Frequency	Raw Amplitude @ 3m	Antenna Factor	Cable Loss	Distance Correction Factor	Corrected Amplitude @ 3m	Limit @ 30m	Margin	Detector
(MHz)	(dBµV/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dBµV/m)	PK/QP/AVG
13.56	30.2	35.62	0.28	40	26.1	84	-57.9	PK

Radiated Emissions Table

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Results: **Loop Antenna Positioned at 90 degrees**

Radiated Emissions Plot

Frequency	Raw Amplitude @ 3m	Antenna Factor	Cable Loss	Distance Correction Factor	Corrected Amplitude @ 3m	Limit @ 30m	Margin	Detector
(MHz)	(dBμV/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dBμV/m)	PK/QP/AVG
13.56	27.6	35.62	0.28	40	23.5	84	-60.5	PK

Radiated Emissions Table

Tested By: Benjamin Jing

Date Tested: 12 March 2007

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4.2.4 Radiated Emissions < 30 MHz (outside 13.110 – 14.010 MHz)

Requirement(s): 47 CFR §15.209; 47 CFR §15.225(d)

Procedures: Radiated emissions were measured according to ANSI C63.4. The EUT was set to transmit at the highest output power. The EUT was set 3 meter away from the measuring antenna. The loop antenna was positioned 1 meter above the ground from the center of the loop. The measuring bandwidth was set to 10 kHz.
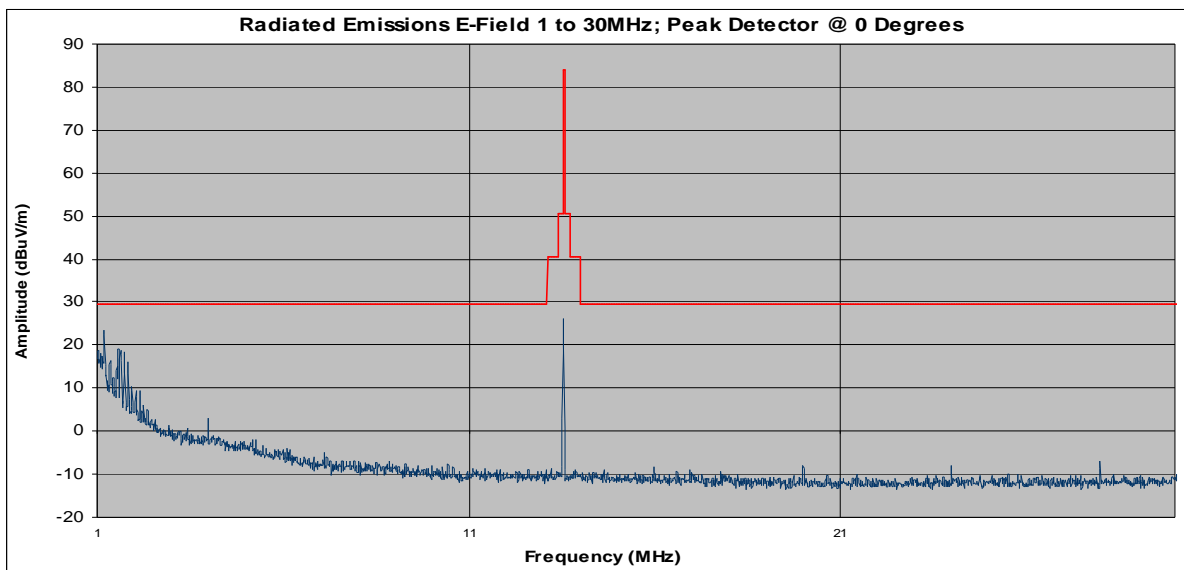
Distance Correction Factor was calculated with 40 dB/decade.

The limit is converted from microvolts/meter to decibel microvolts/meter.

Sample Calculation: Corrected Amplitude = Raw Amplitude(dBµV/m) + ACF(dB) + Cable Loss(dB) – Distance Correction Factor

Results: **Loop Antenna Positioned at 0 degrees**

Limit

Radiated Emissions Plot

Frequency	Raw Amplitude @ 3m	Antenna Factor	Cable Loss	Distance Correction Factor	Corrected Amplitude @ 3m	Limit @ 30m	Margin	Detector
(MHz)	(dBµV/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dBµV/m)	PK/QP/AVG
1.14	-3.2	60.22	0.24	40	17.26	21.05	-3.79	PK
1.73	6	52.04	0.28	40	18.32	29.54	-11.22	PK

Radiated Emissions Table

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Results: **Loop Antenna Positioned at 90 degrees**

Limit

Radiated Emissions Plot

Frequency	Raw Amplitude @ 3m	Antenna Factor	Cable Loss	Distance Correction Factor	Corrected Amplitude @ 3m	Limit @ 30m	Margin	Detector
(MHz)	(dBµV/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dBµV/m)	PK/QP/AVG
1	-6	63.48	0.24	40	17.72	24	-6.28	PK
1.74	-2.1	51.94	0.28	40	10.12	29.54	-19.42	PK

Radiated Emissions Table

Tested By: Benjamin Jing

Date Tested: 12 March 2007

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4.2.5   Radiated Emissions > 30 MHz

Requirement(s): 47 CFR §15.209; 47 CFR §15.225(d)

Procedures: Radiated emissions were measured according to ANSI C63.4. The EUT was set to transmit at the highest output power.

The limit is converted from microvolts/meter to decibel microvolts/meter.
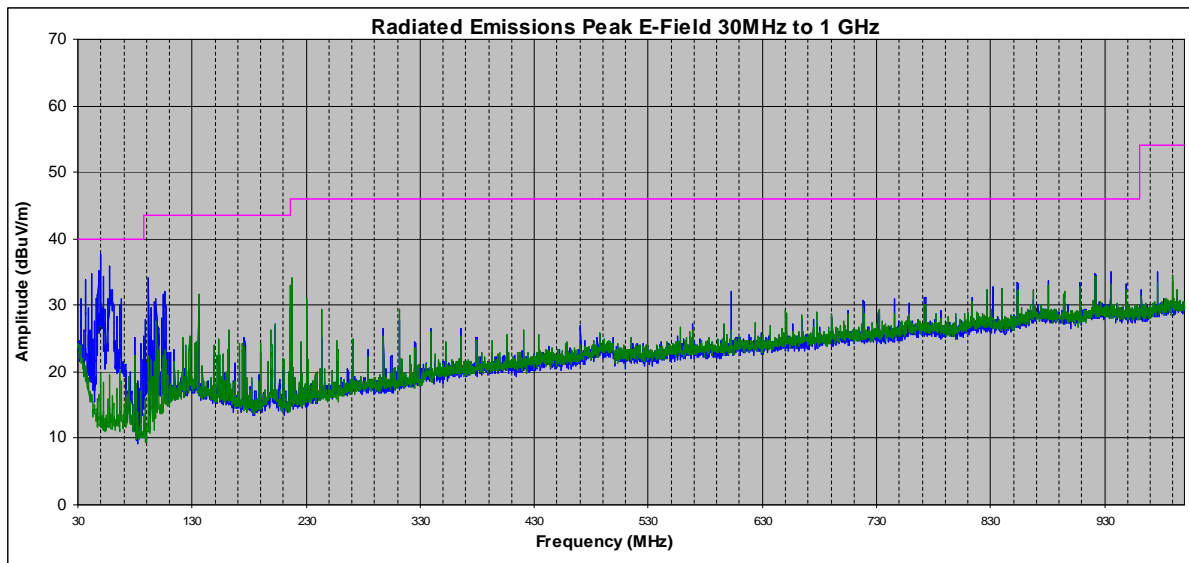
Sample Calculation: Corrected Amplitude = Raw Amplitude(dBµV/m) + ACF(dB) + Cable Loss(dB)

Results:

Vertical Polarization	Horizontal Polarization	Limit

Radiated Emissions Plot

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Frequency	Azimuth	Detector	Antenna Polarization	Antenna Height	Raw Amplitude @ 3m	Antenna Factor	Cable Loss	Corrected Amplitude @ 3m	Limit @ 3m	Margin
(MHz)	(degrees)	(qp/pk)	(H/V)	(m)	(dBμV/m)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dBμV/m)
49.98	340	QP	V	1	29.30	7.91	0.69	37.89	40	-2.11
36.11	350	PK	V	1	17.1	16.01	0.63	33.74	40	-6.26
47.84	10	PK	V	1	26.1	8.61	0.68	35.39	40	-4.61
57.25	355	PK	V	1	27.2	7.3	0.72	35.22	40	-4.78
92.46	45	PK	V	1	16.2	9.54	0.87	26.61	43.5	-16.89
215.17	130	PK	H	1.95	21.8	11.36	1.1	34.26	43.5	-9.24

Radiated Emissions Table

Tested By: Benjamin Jing

Date Tested: 12 March 2007

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4.2.6 Frequency Stability

Requirement(s): 47 CFR §15.225(e)

Procedures: Frequency Stability was measured according to 47 CFR §2.1055. The EUT (RFID Module only) was set in the centre of the Environmental Chamber. A Near Field probe was used to monitor the frequency drift. Measurement was taken with spectrum analyzer. The spectrum analyzer bandwidth and span was set to read in hertz. A voltmeter was used to monitor when varying the voltage.

Limit: ±0.01% of 13.56 MHz = 1356 Hz

Results:

Frequency versus Temperature

Reference Frequency: measured 13.56041 MHz at 20°C

Temperature (Celsius)	Measured Freq. (MHz)	Freq. Drift (Hz)	Freq. Drift (%)
50	13.56031	-100	-0.00074
40	13.56035	-60	-0.00044
30	13.56039	-20	-0.00015
20	Reference		
10	13.56043	20	0.00015
0	13.56047	60	0.00044
-10	13.56049	80	0.00059
-20	13.56043	20	0.00015
-30	13.56038	-30	-0.00022

Frequency versus Voltage

Reference Frequency: measured 13.560417 MHz at 20°C with 120 Vac / 60 Hz

Measured Voltage ±15% of nominal (AC)	Measured Freq. (MHz)	Freq. Drift (Hz)	Freq. Drift (%)
138	13.560403	-14	-0.00010
102	13.560409	-8	-0.00006

Tested By: Benjamin Jing

Date Tested: 14 March 2007

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5 TEST INSTRUMENTATION

5.1 TEST INSTRUMENTATION

Instrument	Manufacturer	Model	CAL Due Date
Spectrum Analyzer	HP	8568B	04/26/2007
Quasi-Peak Adapter	HP	85650A	04/26/2007
RF Pre-Selector	HP	85685A	04/26/2007
Spectrum Analyzer	HP	8564E	05/01/2007
Biconlog Antenna	Sunol Sciences, Inc.	JB1	09/11/2007
Loop Antenna	ETS-Lingren	6512	05/13/2008
Near Field Probe	Chase	MFP9150	See Note
Chamber	Lingren	3m	08/21/2007
DMM	Fluke	73III	07/04/2007
Variac	KRM	AEEC-2090	See Note
Environment Chamber	TestEquity	1007H	01/24/2009
DMM	Fluke	73III	05/01/2007

Note: Functional Verification

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APPENDIX A: EUT TEST CONDITIONS

The following is the description of supporting equipment and details of cables used with the EUT.

Equipment Description (Including Brand Name)	Cable Description
PicoPass Reader Module	1. DC power

EUT Description	:	PicoPass Reader Module
Model No	:	M210-3G-F
Serial No	:	none

The following is the description of how the EUT is exercised during testing.

Test	Description Of Operation
	The EUT was set to enter test mode automatically when powered.

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APPENDIX B: EXTERNAL PHOTOS

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APPENDIX C: CIRCUIT/BLOCK DIAGRAMS

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APPENDIX D: INTERNAL PHOTOS

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APPENDIX E: PRODUCT DESCRIPTION

Detail description of this product is shown in the User's Guide.

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APPENDIX F: FCC LABEL LOCATION

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APPENDIX G: USER MANUAL

See Attachment

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