TEST REPORT

FROM

SIEMIC, INC.
Accessing global markets

FOR

Applied Wireless ID Group, Inc.

RFID Reader

Model: SC-2300

TO

47 CFR 15.225:2006 & RSS-210 Issue 6:2005

Test Report Serial No.:
SL06121203-AWID-015

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:

Kerwinn Corpuz

.....

Tested by: Kerwinn Corpuz, Test Engineer

Snell Leong

.....

Reviewed by: Snell Leong, Reviewer

Issue date: 1 February 2007
Manufacturer: Applied Wireless ID Group, Inc.

Industry Canada
Industrie Canada

OFTA
電訊管理局

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

Lab Code : U S 0 1 6 0

NVLAP®

NVLAP Lab Code: 200729-0

CSMI Code. SL2-V-E-1130R

This page has been left blank intentionally.

CONTENTS

This page has been left blank intentionally.

Executive Summary

The purpose of this test programme was to demonstrate compliance of the Applied Wireless ID Group, Inc., RFID Reader, model SC-2300 against the current 47 CFR 15.225:2006 & RSS-210 Issue 6:2005. The SC-2300 demonstrated compliance with the 47 CFR 15.225:2006 & RSS-210 Issue 6:2005.

Applied Wireless ID Group, Inc. is the applicant and claimed manufacturer of this tested product. For the detailed description of this product, please refer to the SC-2300 User Manual.

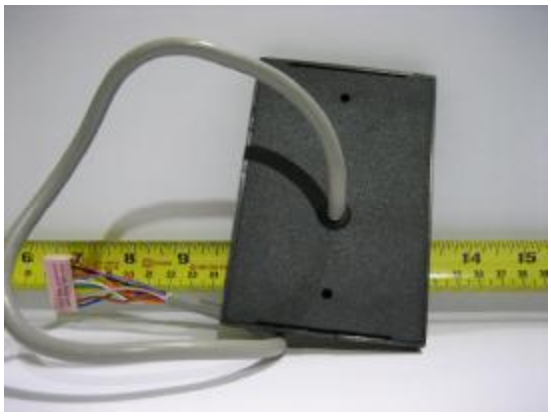
The equipment under test operating frequency is 13.56 MHz.

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

To comply with Radiated Emissions > 30 MHz, (1) added two ferrite cores with single turn to each ferrite onto its wire harness. The ferrite manufacturer is FAIR-RITE and Part number is 0443164151. (2) Connected the shield ground wire to DC negative line.

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

FRONT



BACK

RFID Reader Sample

1 Technical Details

Purpose	Compliance testing of SC-2300 with 47 CFR 15.225:2006 & RSS-210 Issue 6:2005
Applicant / Client	Applied Wireless ID Group, Inc. 18300 Sutter Blvd. Morgan Hill, CA 95037
Manufacturer	Applied Wireless ID Group, Inc. 18300 Sutter Blvd. Morgan Hill, CA 95037
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	SL06121203-AWID-015
Date EUT received	20 December 2006
Standard applied	47 CFR 15.225:2006 & RSS-210 Issue 6:2005
Dates of test (from – to)	20 December 2006 to 30 January 2007
No of Units:	1
Equipment Category:	DXX
Trade/Product Name:	SC-2300
Type/Model Name/No:	SC-2300
Technical Variants:	
FCC ID No.	OGSSC2300
IC ID No.	6449A-SC2300

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	RSS 210 Issue 6: 2005		
15.203		Antenna Requirement	Pass
15.207(a)	RSSGen(7.2.2)	Conducted Emissions Voltage	Pass
15.225(a)	RSS210(A2.6)	Limit in the band of 13.553 – 13.567 MHz	Pass
15.225(b)	RSS210(A2.6)	Limit in the band of 13.410 – 13.553 MHz and 13.567 – 13.710 MHz	Pass
15.225(c)	RSS210(A2.6)	Limit in the band of 13.110 – 13.410 MHz and 13.710 – 14.010 MHz	Pass
15.225(d)	RSS210(A2.6)	Limit outside the band of 13.110 – 14.010 MHz	Pass
15.225(e)	RSS210(A2.6)	Frequency Stability	Pass
15.209	RSS210(A8.5)	Radiated Emission Limits	Pass
ANSI C63.4: 2003 / RSS-Gen Issue 1: 2005			

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.

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.

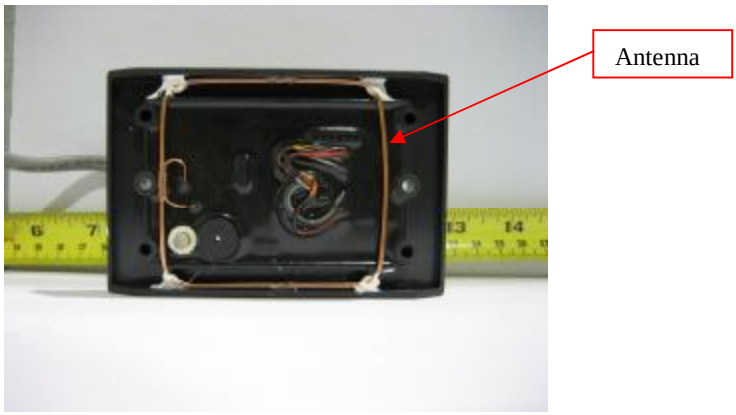
Antenna requirement must meet at least one of the following:

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.



4 Measurements, Examinations and Derived Results

4.1 General observations

Equipment serial number(s)		
Module:	Part number:	Serial number:
SC-2300	SC-2300	none

4.2 Test Results

4.2.1 Conducted Emissions Voltage

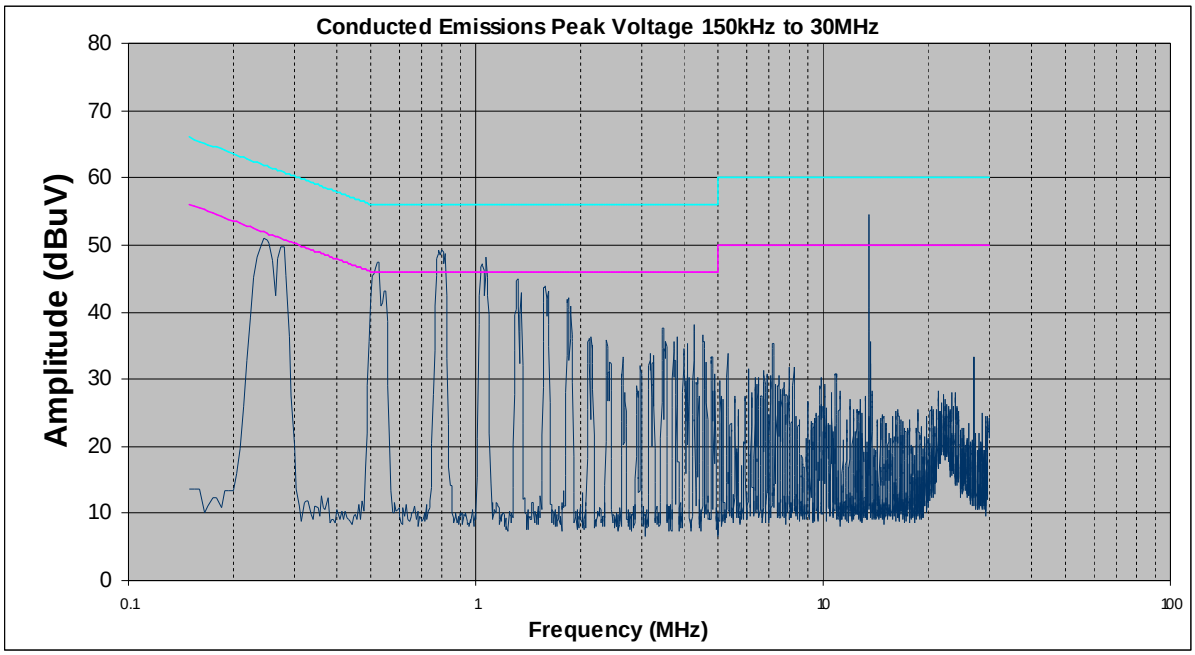
Requirement(s): 47 CFR §15.207 & RSS-Gen Issue 1(7.2.2)

Procedures:

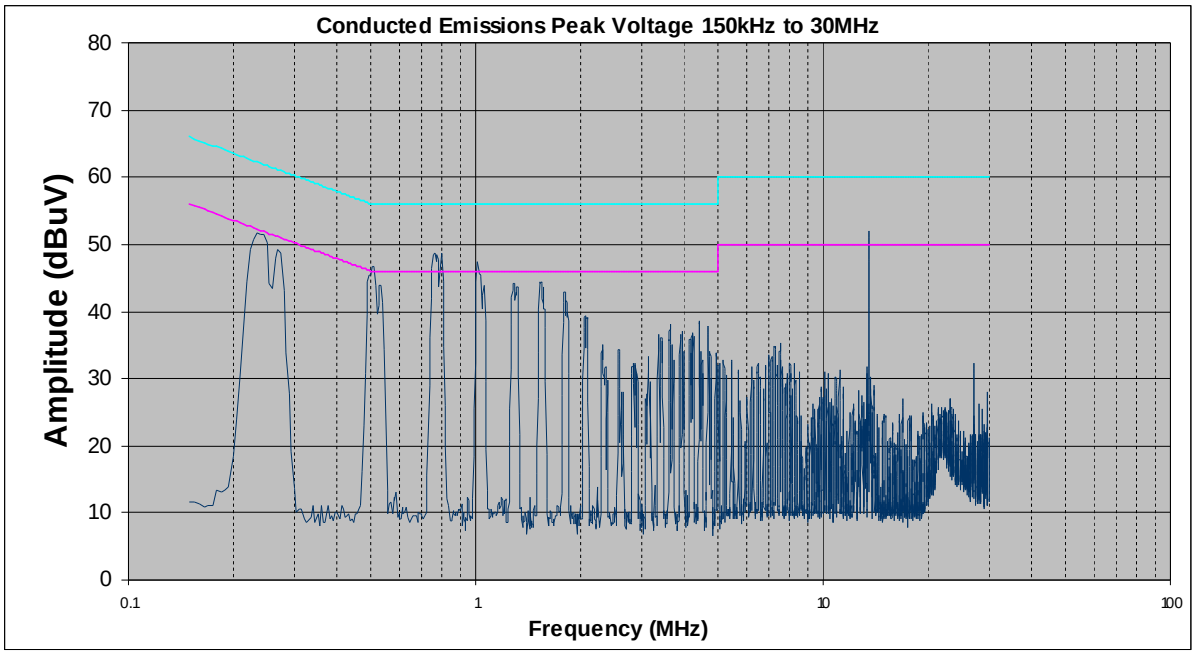
The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table. The power supply for the EUT was fed through a 50Ω/50µH EUT LISN, connected to filtered mains. The RF OUT of the EUT LISN was connected to the EMI test 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



Phase Line Plot at 120Vac, 60Hz

LINE	FREQ (MHz)	Corrected Amplitude (dBµV) QP	Limit (dBµV) QP	Margin (dB) QP	Corrected Amplitude (dBµV) AVG	Limit (dBµV) AVG	Margin (dB) AVG
Neutral	0.265	43.4	61.27	-17.87	42	51.27	-9.27
Neutral	0.518	42.8	56	-13.2	41.6	46	-4.4
Neutral	0.777	45.6	56	-10.4	43.2	46	-2.8
Neutral	1.037	44.8	56	-11.2	42.8	46	-3.2
Neutral	13.56	48.7	60	-11.3	46.7	50	-3.3
Phase	0.528	45	56	-11	38.7	46	-7.3
Phase	0.778	45.9	56	-10.1	44	46	-2
Phase	1.038	44.7	56	-11.3	42.6	46	-3.4
Phase	13.56	50.2	60	-9.8	48.2	50	-1.8

Conducted Emission Table

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

Tested By: Kerwinn Corpuz

Date Tested: 20 December 2006

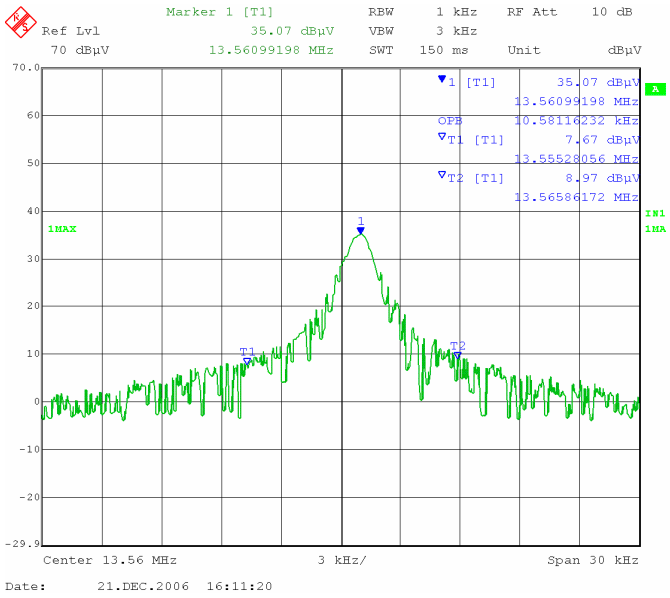
4.2.2 Occupied Bandwidth

Requirement(s):

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

Results:

Measured 99% occupied bandwidth: 10.58 kHz



Tested By: Kerwinn Corpuz

Date Tested: 21 December 2006

4.2.3 Radiated Emissions within the Band of 13.110 – 14.010 MHz

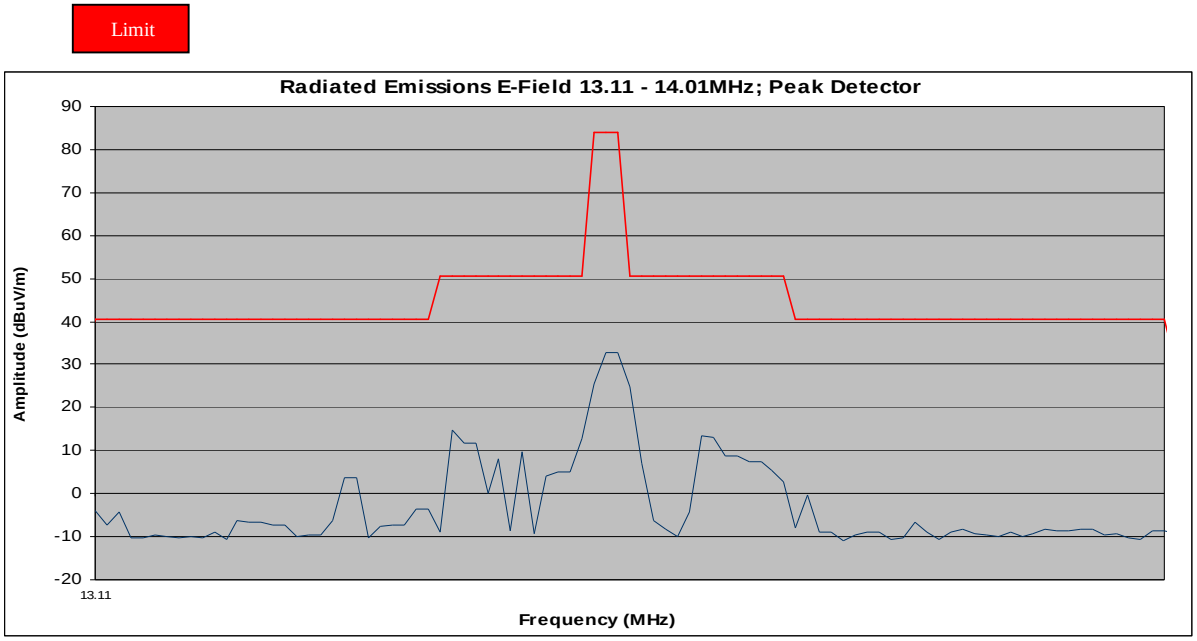
Requirement(s): 47 CFR §15.225(a) – (c) & RSS-210 (A2.6)

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.

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

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

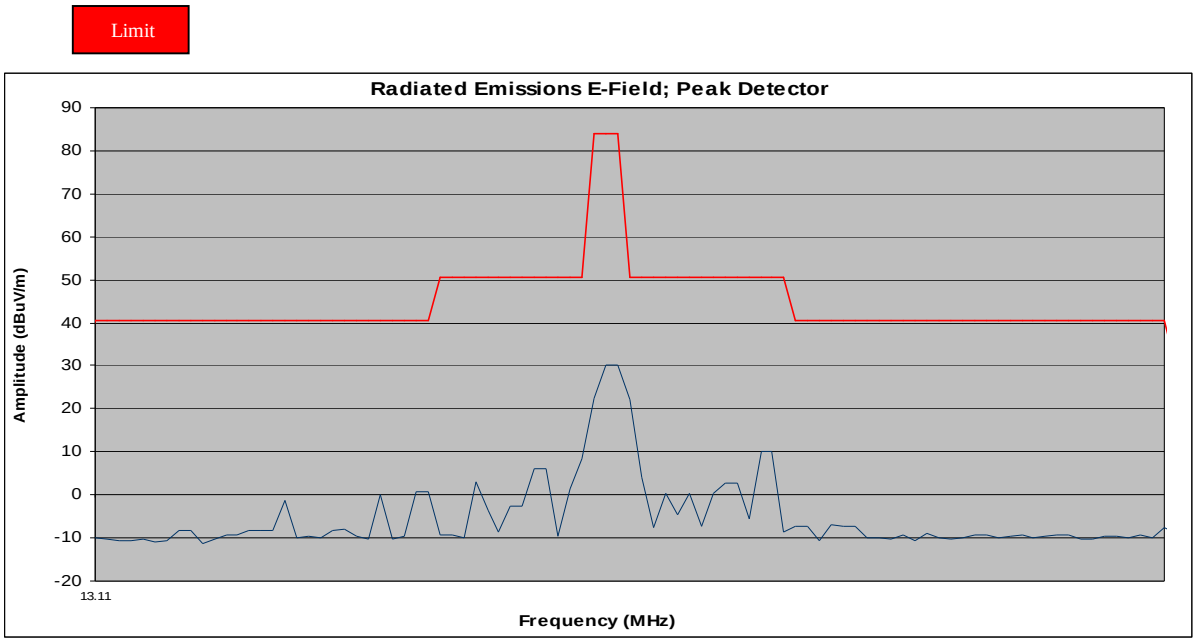


Radiated Emissions Plot

Frequency	Raw Amplitude @ 3m	Antenna Factor	Cable Loss	Distance Correction Factor	Corrected Amplitude @ 3m	Limit @ 30m	Margin
(MHz)	(dBµV/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dBµV/m)
13.56	37	35.62	0.28	40	32.9	84	-51.1

Radiated Emissions Table

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
(MHz)	(dBµV/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dBµV/m)
13.56	34.4	35.62	0.28	40	30.3	84	-53.7

Radiated Emissions Table

Tested By: Kerwinn Corpuz

Date Tested: 21 December 2006

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

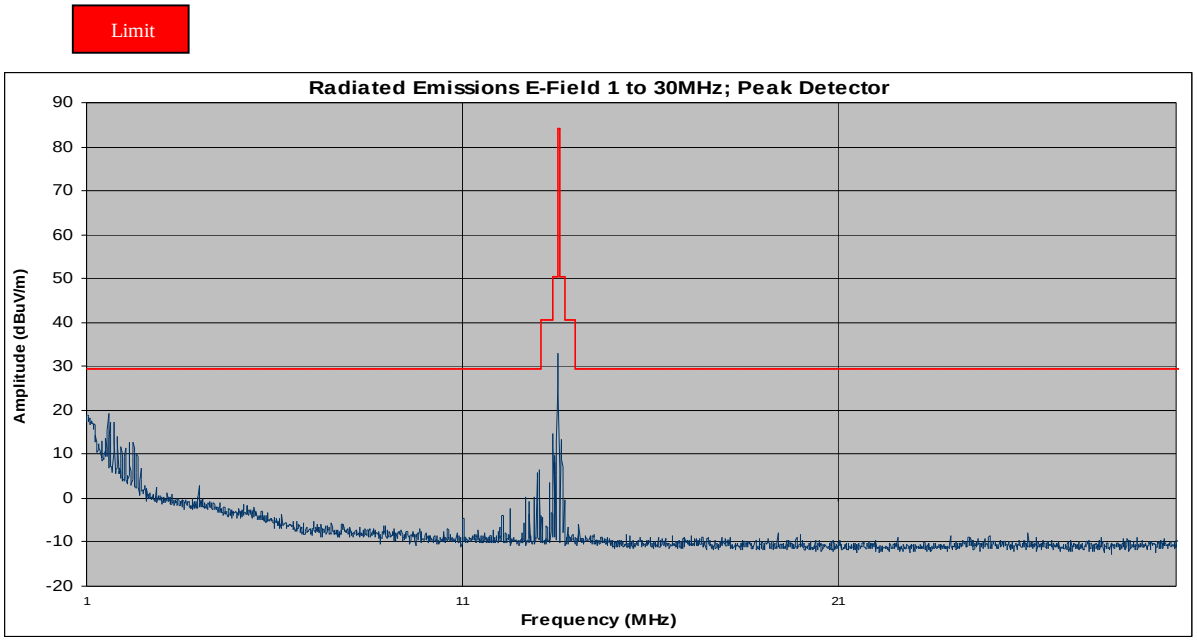
Requirement(s): 47 CFR §15.209; 47 CFR §15.225(d) & RSS-210 (A2.6)

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.

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

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

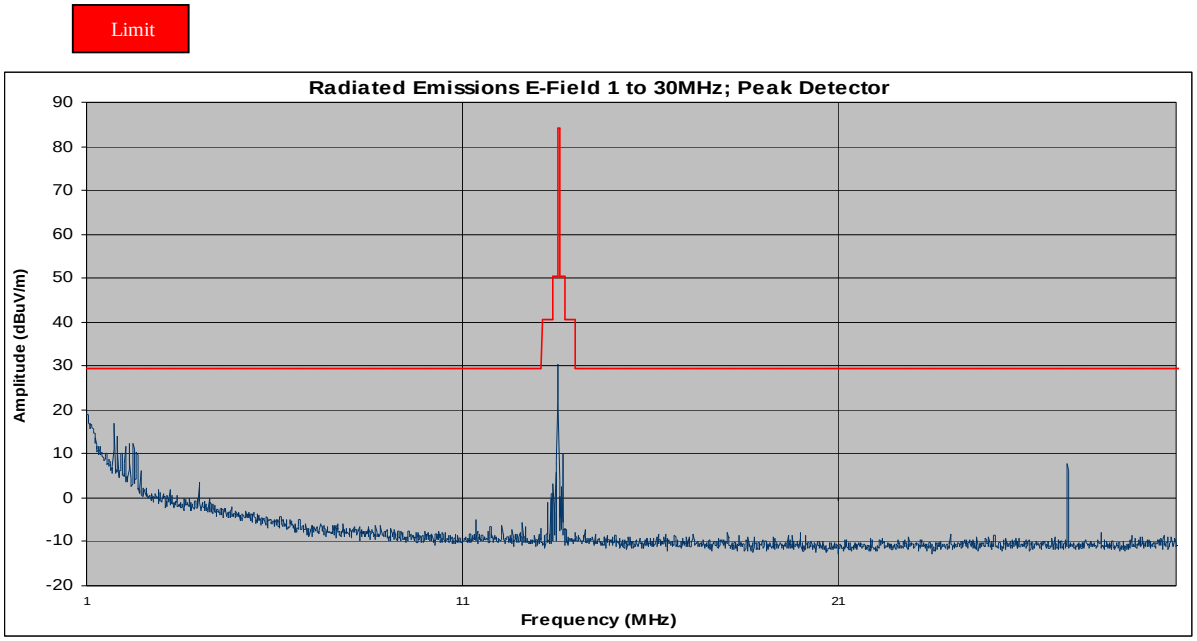


Radiated Emissions Plot

Frequency	Raw Amplitude @ 3m	Antenna Factor	Cable Loss	Distance Correction Factor	Corrected Amplitude @ 3m	Limit @ 30m	Margin
(MHz)	(dBµV/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dBµV/m)
1.03	-4	62.78	0.24	40	19.02	23.3	-4.28
1.72	4.8	52.09	0.28	40	17.17	29.54	-12.37

Radiated Emissions Table

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
(MHz)	(dBµV/m)	(dB)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dBµV/m)
1.04	-4	62.54	0.24	40	18.76	23.07	-4.31
1.72	4.7	52.09	0.28	40	17.07	29.54	-12.47
2.34	1.5	48.81	0.28	40	10.59	29.54	-18.95
27.11	13.2	34.18	0.61	40	7.99	29.54	-21.55

Radiated Emissions Table

Tested By: Kerwinn Corpuz

Date Tested: 21 December 2006

4.2.5 Radiated Emissions > 30 MHz

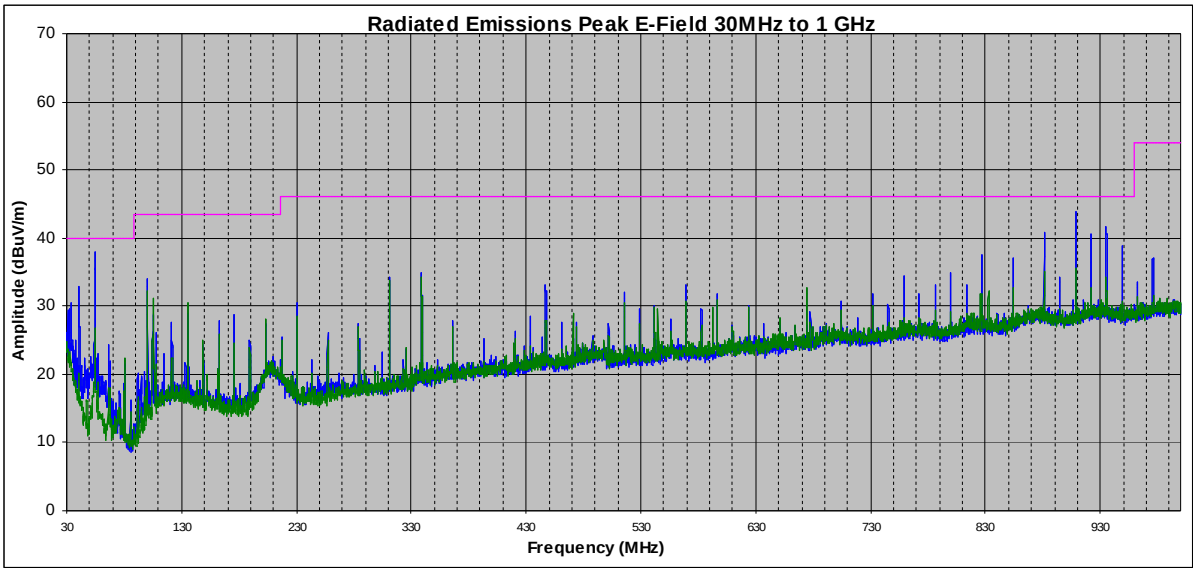
Requirement(s): 47 CFR §15.209; 47 CFR §15.225(d) & RSS-210 (A2.6)

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:



Radiated Emissions Plot

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)
40.67	345	PK	V	1	20	12.16	0.73	32.89	40	-7.11
54.35	0	PK	V	1	29.9	7.23	0.77	37.9	40	-2.1
880.98	352	PK	V	1.15	16.5	21.93	2.36	40.79	46	-5.21
908.53	355	PK	V	1.15	19.3	22.2	2.42	43.92	46	-2.08
922.01	348	PK	V	1.15	15.9	22.22	2.44	40.56	46	-5.44
935.3	0	PK	V	1.15	16.9	22.4	2.47	41.77	46	-4.23

Radiated Emissions Table

Tested By: Kerwinn Corpuz

Date Tested: 30 January 2007

4.2.6 Frequency Stability

Requirement(s): 47 CFR §15.225(e) & RSS-210 (A2.6)

Procedures: Frequency Stability was measured according to 47 CFR §2.1055. 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 13.560842 MHz at 20°C

Temperature (Celsius)	Measured Freq. (MHz)	Freq. Drift (Hz)	Freq. Drift (%)
50	13.560792	-50	-0.00037
40	13.560883	41	0.00030
30	13.560833	-9	-0.00007
20	Reference		
10	13.560892	50	0.00037
0	13.560917	75	0.00055
-10	13.560933	91	0.00067
-20	13.560925	83	0.00061
-30	13.560984	142	0.00105

Frequency versus Voltage

Reference Frequency: measured 13.560843 MHz at 20°C with 120 Vac / 60 Hz

Measured Voltage ±15% of nominal (AC)	Measured Freq. (MHz)	Freq. Drift (Hz)	Freq. Drift (%)
138	13.560833	-10	-0.00007
102	13.560837	-6	-0.00004

Tested By: Kerwinn Corpuz

Date Tested: 22 December 2006

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
EMI Receiver	Rohde&Schwarz	ESIB 40	02/07/2007
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

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
AWID SC-2300	1. DC power

EUT Description	:	RFID Reader
Model No	:	SC-2300
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.

APPENDIX B: EXTERNAL PHOTOS

See Attachment

APPENDIX C: CIRCUIT/BLOCK DIAGRAMS

See Attachment

APPENDIX D: INTERNAL PHOTOS

See Attachment

APPENDIX E: PRODUCT DESCRIPTION

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

APPENDIX F: FCC LABEL LOCATION

See Attachment

APPENDIX G: USER MANUAL

See Attachment

END OF REPORT