

**FCC PART 15 SUBPART B & C
TEST REPORT**

for

**eForce Aperio iClass Keycard Entry System
Model: 3090AC**

Prepared for

ADAMS RITE MANUFACTURING CO.
260 SANTA FE STREET
POMONA, CA 91767 USA

Prepared by: _____

MATT HARRISON

Approved by: _____

JOSH HANSEN

COMPATIBLE ELECTRONICS INC.
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DATE: FEBRUARY 16, 2012

	REPORT BODY	APPENDICES					TOTAL
		A	B	C	D	E	
PAGES	19	2	2	2	7	8	40

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GENERAL REPORT SUMMARY

This electromagnetic emission test report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced in any form unless done so in full with the written permission of Compatible Electronics.

This report must not be used to claim product endorsement by NVLAP, NIST, or any other agency of the U.S. Government or other governments.

Device Tested: eForce Aperio iClass Keycard Entry System
Model: 3090AC
S/N: 1

Product Description: See Expository Statement.

Modifications: The EUT was not modified during testing.

Manufacturer: Adams Rite Manufacturing Co.
260 Santa Fe Street
Pomona, California 91767

Test Date: December 1st, 2nd, & 5th, 2011

Test Specifications: EMI requirements
CFR Title 47, Part 15 Subpart B and Subpart C Sections 15.205, 15.209 and 15.225

Test Procedure: ANSI C63.10



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SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 150 kHz - 30 MHz.	The EUT is battery powered; therefore this test was not performed.
2	Radiated RF Emissions & Harmonics, 10 kHz - 1000 MHz.	Complies with the limits of CFR Title 47 Part 15 Subpart B Section 15.109 and Subpart C Section 15.205, 15.209, and 15.225
3	Frequency Tolerance, Temperature and Voltage Variation	Complies with the limits of CFR Title 47 Part 15 Subpart C Section 15.225



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SIX HIGHEST RADIATED EMISSIONS READINGS

Reading Type (PK / QP / AV)	Polarization (Vert / Horz)	Frequency (MHz)	Level (dB μ V/m)	Limit (dB μ V/m)	Delta (dB)	Test Distance
1	QP	H	881.30	27.62	46.00	-18.38
2	QP	H	888.60	27.61	46.00	-18.39
3	QP	H	889.50	27.45	46.00	-18.55
4	QP	V	889.50	26.60	46.00	-19.40
5	QP	H	893.50	24.88	46.00	-21.12
6	QP	V	887.00	24.51	46.00	-21.49



1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the eForce Aperio iClass Keycard Entry System Model: 3090AC. The EMI measurements were performed according to the measurement procedure described in ANSI C63.10. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT (equipment under test) hereafter, are within the **Class B** specification limits defined by the Code of Federal Regulations Title 47, Part 15 Subpart B and Subpart C sections 15.205, 15.209 and 15.225.



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2. ADMINISTRATIVE DATA

2.1 Location of Testing

The EMI tests described herein were performed at the test facility of Compatible Electronics, 20621 Pascal Way Lake Forest, California 92630.

2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

2.3 Cognizant Personnel

Adams Rite Manufacturing Co.

Brian Whipple Test Engineer

Compatible Electronics Inc.

Josh Hansen
Matt Harrison
Jeff Klinger

Lab Manager
Test Technician
Director of Engineering

2.4 Date Test Sample was Received

The test sample was received on December 1, 2011.

2.5 Disposition of the Test Sample

The test sample remains at Compatible Electronics, Inc. as the date of this test report.

2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
HP	Hewlett PACard
ITE	Information Technology Equipment
CML	Corrected Meter Limit
LISN	Line Impedance Stabilization Network
NVLAP	National Voluntary Laboratory Accreditation Program
CFR	Code of Federal Regulations
PCB	Printed Circuit Board
TX	Transmit
RX	Receive



3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this EMI Test Report.

SPEC	TITLE
CFR Title 47, Part 15 Subpart B	FCC Rules – Radio frequency devices (including digital devices) - Unintentional Radiators
CFR Title 47, Part 15 Subpart C	FCC Rules – Radio frequency devices (including digital devices) - Intentional Radiators
ANSI C63.10: 2009	Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz



4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration - EMI

The eForce Aperio iClass Keycard Entry System Model: 3090AC (EUT) was setup in a tabletop configuration. The EUT was powered by 4-AA batteries. The EUT was continuously transmitting a data stream and continuously receiving.

The AA batteries were replaced with 4 new AA batteries. Transmitter resulted with no variation of amplitude or frequency.

The EUT was tested in an orientation that would be typical of what would be oriented in the field.

The final radiated data was taken in the above configuration. Please see Appendix E for the test data.

4.1.1 Photograph Test Configuration - EMI



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4.1.2 **Cable Construction and Termination**

Cable 1

There were no interconnecting cables.



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5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

5.1 EUT and Accessory List

#	EQUIPMENT TYPE	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID
1	eForce Aperio iClass Keycard Entry System (EUT)	ADAMS RITE	3090AC	1	YBE3090AC
2	BATTERIES	ENERCELL	AA	N/A	N/A



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5.2 EMI Test Equipment

EQUIPMENT TYPE	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
Computer	Compatible Electronics	NONE	NONE	N/A	N/A
EMI Receiver	Rohde & Schwarz	ESIB40	100219	09/20/2011	09/20/2012
Antenna, Loop	Com Power	AL-130	17085	01/26/2011	01/26/2012
Antenna, CombiLog	Com Power	AC-220	25857	06/07/2011	06/07/2012
Mast, Antenna Positioner	Sunol Science Corporation	TWR 95-4	020808-3	N/A	N/A
Antenna Mast	Sunol Science Corporation	TWR 95-4	020808-3	N/A	N/A
Turntable	Sunol Science Corporation	FM 2001	N/A	N/A	N/A
Mast and Turntable Controller	Sunol Science Corporation	SC104V	020808-1	N/A	N/A
Measurement and Automation Software	TDK, Inc.	TDK Emissions Labs	V5.53	N/A	N/A



6. TEST SITE DESCRIPTION

6.1 Test Facility Description

Please refer to section 2.1 of this report for EMI test location.

6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 1.0 by 1.5 by 0.8 meter high non-conductive table, which was placed on the ground plane.

The EUT was not grounded.

6.3 Facility Environmental Characteristics

When applicable refer to the data sheets in Appendix E for the relative humidity, air temperature, and barometric pressure.

6.4 Measurement Uncertainty

“Compatible Electronics’ U_{lab} value is less than U_{cispr} , thus based on this – compliance is deemed to occur if no measured disturbance exceeds the disturbance limit.

$$u_c(y) = \sqrt{\sum_i c_i^2 u^2(x_i)}$$

Measurement		U_{cispr}	$U_{lab} = 2 u_c(y)$
Conducted disturbance (mains port)	(150 kHz – 30 MHz)	4,0 dB 3,6 dB	2.88
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(30 MHz – 1 000 MHz)	5,2 dB	4.04



7. CHARACTERISTICS OF THE TRANSMITTER

7.1 Channel Number and Frequencies

The EUT is a single-channel transmitter.

1 == 13.56099 MHz

7.3 Antenna

The antenna is a loop antenna made up of a trace on a PCB and has a gain of 1.0 dBi.



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8. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

8.1 RF Emissions

8.1.1 Conducted Emissions Test

This test was not performed

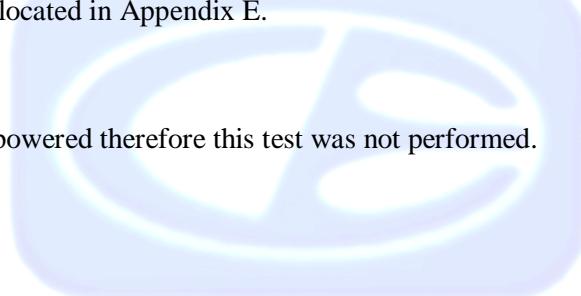
The EMI receiver was used as a measuring meter. A quasi-peak and/or average reading was taken only where indicated in the data sheets. The LISN output was measured using the EMI receiver. The output of the second LISN was terminated by a 50-ohm termination. The effective measurement bandwidth used for this test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding, and grounding of the EUT. The EUT received its power through the LISN, which was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI 63.4. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The conducted emissions from the EUT were maximized for operating mode as well as cable placement. The final data was collected under program control by the computer software. The final qualification data is located in Appendix E.

Test Results:

The EUT is battery powered therefore this test was not performed.



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8.1.2 Radiated Emissions (Spurious and Harmonics) Test

The receiver was used as a measuring meter. The receiver was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the receiver records the highest measured reading over all the sweeps.

The quasi-peak detector was used for frequencies below 1GHz.

The measurement bandwidths and transducers used for the radiated emissions test were:

FREQUENCY RANGE (MHz)	TRANSDUCER	EFFECTIVE MEASUREMENT BANDWIDTH
.009 to .150	Active Loop Antenna	200 kHz
.150 to 30	Active Loop Antenna	9 kHz
30 to 1000	Combilog Antenna	120 kHz

The TDK FAC-3 shielded test chamber of Compatible Electronics, Inc. was used for radiated emissions testing. This test site is in full compliance with ANSI C63.10, EN 50147-2, and CISPR 22. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters in both vertical and horizontal polarizations (for E field radiated field strength).

Test Results:

The EUT complies with the limits of CFR Title 47 Part 15 Subpart B (Class B devices) and Subpart C sections 15.205, 15.209 and 15.225.



8.1.3 Peak Transmit EMI

The Peak Transmit EMI was measured using the EMI Receiver at a 3-meter test distance to obtain the final test data. The final qualification data sheets are located in Appendix E.

Test Results:

The EUT complies with Part 15, Subpart C, Section 15.225.

8.1.4 Frequency Tolerance of Carrier Signal

The EUT was placed in temperature chamber and set to +50 degrees C. The EUT was exposed to this temperature for a period of 10 minutes. The temperature was subsequently decreased at 10 degree increments down to -20 degrees with a 30 minute acclimation period between each temperature. At each temperature, the EUT was checked with an EMI Receiver to determine whether the carrier signal was within 0.01% of the fundamental frequency at startup, 2 minutes, 5 minutes and 10 minutes after removal from the temperature chamber. A data sheet of the Frequency Tolerance testing is located in Appendix E.

Test Results:

The EUT complies with the relevant requirements of Part 15, Subpart C, Section 15.225.



9. TEST PROCEDURE DEVIATIONS

The test procedures were not deviated from throughout all tests.

10. CONCLUSIONS

The eForce Aperio iClass Keycard Entry System Model: 3090AC meets all of the Class B specification limits defined in the Code of Federal Regulations Title 47, Part 15 Subpart B and Subpart C sections 15.205, 15.209 and 15.225.



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APPENDIX A***LABORATORY ACCREDITATIONS AND
RECOGNITIONS***

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LABORATORY ACCREDITATIONS AND RECOGNITIONS


 NVLAP LAB CODES 200063-0,
 200528-0, 200527-0

For US, Canada, Australia/New Zealand, Taiwan and the European Union, Compatible Electronics is currently accredited by NVLAP to ISO/IEC 17025 an ISO 9002 equivalent. Please follow the link to the NIST site for each of our facilities NVLAP certificate and scope of accreditation.

NVLAP listing links

 Agoura Division - <http://ts.nist.gov/Standards/scopes/2000630.htm>

 Brea Division - <http://ts.nist.gov/Standards/scopes/2005280.htm>

 Silverado/Lake Forest Division - <http://ts.nist.gov/Standards/scopes/2005270.htm>

ANSI listing
CETCB
<https://www.ansica.org/wwwversion2/outside/ALLdirectoryDetails.asp?menuID=1&prgID=3&orgID=123&status=4>


Compatible Electronics has been nominated as a Conformity Assessment Body (CAB) for EMC under the US/EU Mutual Recognition Agreement (MRA).



Compatible Electronics has been nominated as a Conformity Assessment Body (CAB) for Taiwan/BSMI under the US/APEC (Asia-Pacific Economic Cooperation) Mutual Recognition Agreement (MRA).

We are also certified/listed for IT products by the following country/agency:


VCCI Listing, from VCCI site
[Enter "Compatible" in search form](http://www.vcci.or.jp/vcci_e/activity/registration/setsubi.html) http://www.vcci.or.jp/vcci_e/activity/registration/setsubi.html

FCC Listing, from FCC OET site
[FCC test lab search](https://fjallfoss.fcc.gov/oetcf/eas/reports/TestFirmSearch.cfm) <https://fjallfoss.fcc.gov/oetcf/eas/reports/TestFirmSearch.cfm>


Compatible Electronics IC listing can be found at:
<http://www.ic.gc.ca/eic/site/ic1.nsf/eng/home>



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APPENDIX B

MODIFICATIONS TO THE EUT



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MODIFICATIONS TO THE EUT

No modifications were made to the EUT.



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APPENDIX C***ADDITIONAL MODELS COVERED
UNDER THIS REPORT***

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ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

eForce Aperio iClass Keycard Entry System
Model: 3090AC
S/N: 1

No additional models were tested.



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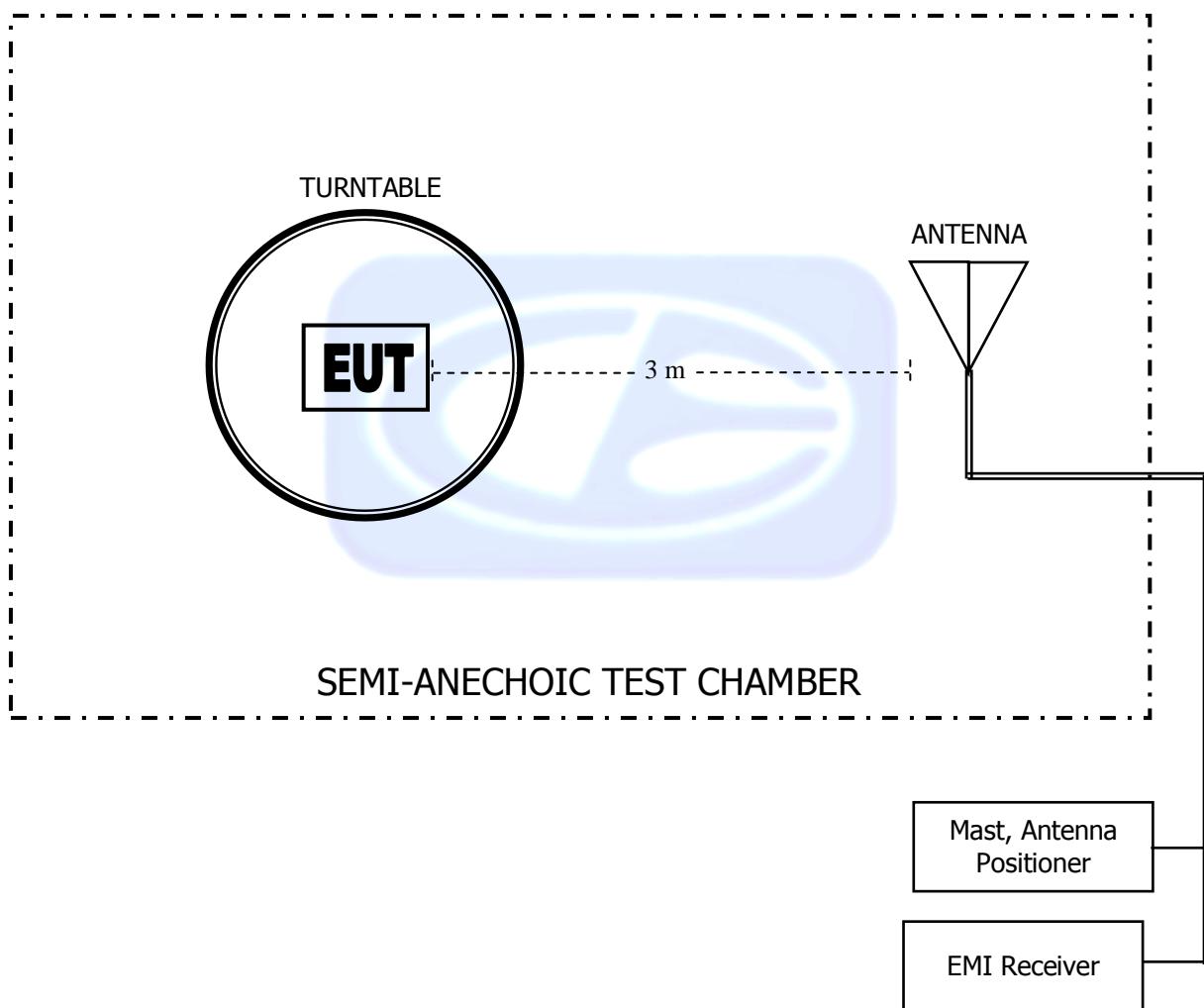
APPENDIX D***DIAGRAMS, CHARTS, AND PHOTOS***

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**FIGURE 1: RADIATED EMISSIONS 3-METER
SEMI-ANECHOIC TEST CHAMBER BELOW 1GHz**

COM-POWER AC-220
LAB R - COMBILOG ANTENNA
S/N: 25857
CALIBRATION DUE: JUNE 07, 2012

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	17.2	180	8.5
35	17.6	200	9.0
40	18.3	250	11.7
45	17.1	300	14.2
50	16.1	300	13.4
60	13.1	400	15.0
70	8.6	500	16.0
80	5.5	600	17.9
90	7.2	700	20.2
100	8.2	800	21.1
120	9.4	900	20.5
140	8.6	1000	22.6
160	8.4		



**FRONT VIEW**

ADAMS RITE MANUFACTURING CO.
eFORCE APERIO iCLASS KEYCARD ENTRY SYSTEM
Model: 3090AC
FCC SUBPART C - RADIATED EMISSIONS

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**

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**REAR VIEW**

ADAMS RITE MANUFACTURING CO.
eFORCE APERIO iCLASS KEYCARD ENTRY SYSTEM
Model: 3090AC
FCC SUBPART C - RADIATED EMISSIONS

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**

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**FRONT VIEW**

ADAMS RITE MANUFACTURING CO.
eFORCE APERIO iCLASS KEYCARD ENTRY SYSTEM
Model: 3090AC
FCC SUBPART B & C - RADIATED EMISSIONS

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
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**REAR VIEW**

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Model: 3090AC
FCC SUBPART B & C - RADIATED EMISSIONS

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
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APPENDIX E***RADIATED EMISSIONS DATA SHEETS***

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Agoura Division
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Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
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Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400

FCC 15.205, 15.209, 15.225

Adams Rite

 eForce Aperio iClass
 Keycard Entry System

Model: 3090AC

S/N: 1

Date: 12/1/2011

Lab: R

Tested By: Matt Harrison

Spurious Emissions 9kHz to 30MHz

Frequency (MHz)	Reading After Cable Factors (dBuV/m)	Ant Factor (dB)	Corrected Reading (dBuV/m)	LIMIT (dBuV/m)	DELTA (dBuV)	Polarity	Table Angle (Deg)	Tower Height (m)	Comments
20.2684	25.34	12.65	37.99	69.54	-31.55	H	83	1	
20.5549	26.61	12.54	39.15	69.54	-30.39	H	83	1	

No other emissions found between 9kHz to 30MHz

Test distance

3 meter

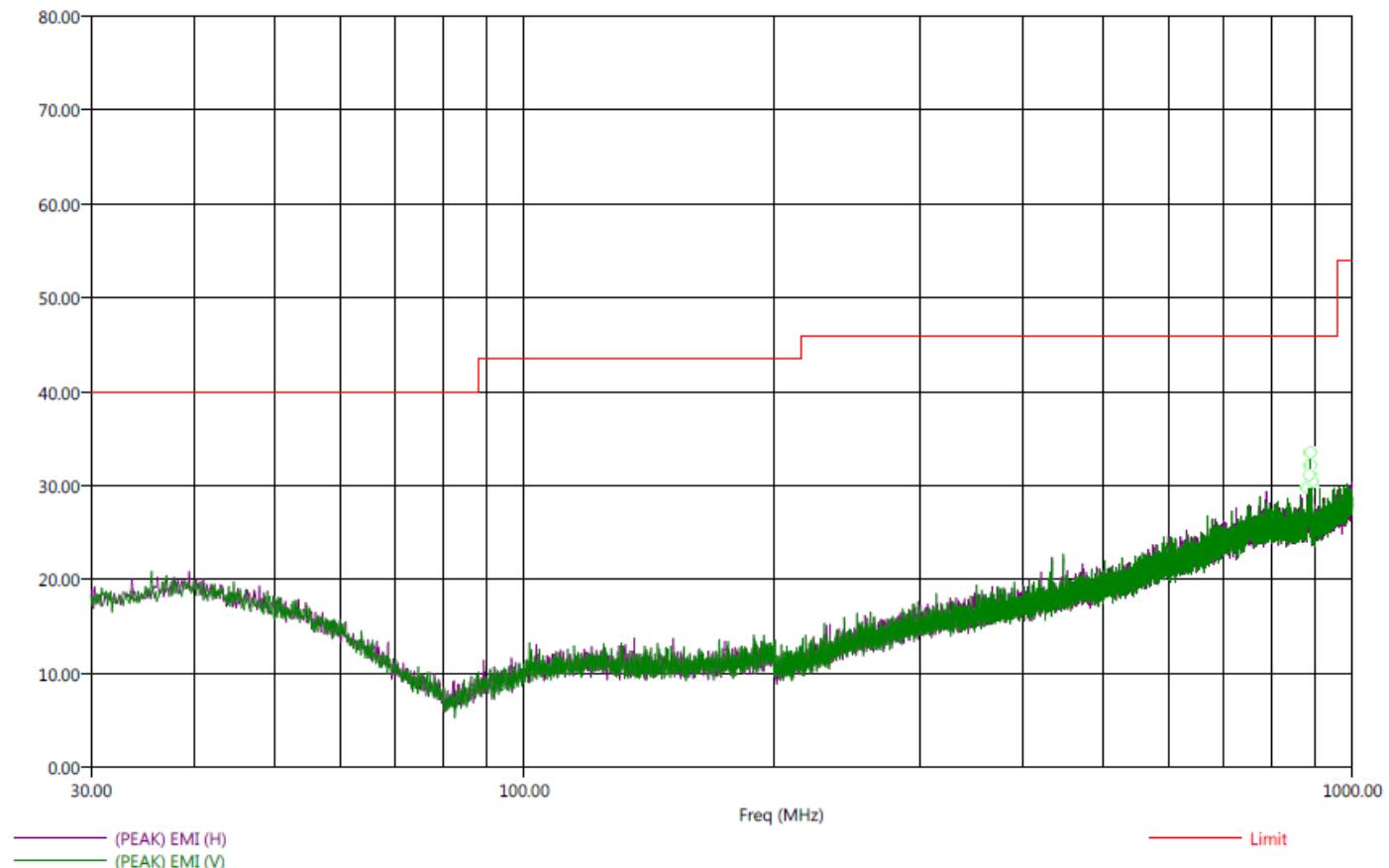


Title: FCC 15.209
 File: Radiated Pre-Scan 30-1000Mhz.set
 Operator: Matt Harrison
 EUT Type: eForce Aperio iClass Keycard Entry System M/N: 3090AC S/N: 1
 EUT Condition: Stand Alone, Transmitting 13.56 MHz
 Comments:
 Witness: Brian
 Temp: 72f
 Hum: 28%
 Battery Operated

12/1/2011 10:08:05 AM
 Sequence: Preliminary Scan

Compatible Electronics, Inc. FAC-3 (Lab R)

Electric Field Strength (dB μ V/m)



Title: FCC 15.209
 File: Radiated Final 30-1000Mhz.set
 Operator: Matt Harrison
 EUT Type: eForce Aperio iClass Keycard Entry System M/N: 3090AC S/N: 1
 EUT Condition: Stand Alone, Transmitting 13.5 MHz
 Comments:
 Witness: Brian
 Temp: 72f
 Hum: 28%
 Battery Operated

Compatible Electronics, Inc. FAC-3 (Lab R)

Freq (MHz)	(QP) Margin (dB)	(QP) EMI (dB μ V/m)	(PEAK) EMI (dB μ V/m)	Limit (dB μ V/m)	Pol	Ttbl Agl (deg)	Twr Ht (cm)	Transducer (dB)	Cable(dB)
881.30	-18.38	27.62	32.60	46.00	H	251.75	101.79	20.61	3.54
887.00	-21.49	24.51	30.43	46.00	V	305.75	280.77	20.57	3.56
888.60	-18.39	27.61	33.53	46.00	H	1.50	335.58	20.56	3.57
889.50	-18.55	27.45	31.57	46.00	H	132.00	347.04	20.56	3.57
889.50	-19.40	26.60	31.05	46.00	V	-0.25	173.91	20.56	3.57
893.50	-21.12	24.88	30.00	46.00	H	345.50	370.80	20.54	3.59



FUNDAMENTAL & HARMONICS***DATA SHEETS***

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FCC 15.205, 15.209, 15.225

 Adams Rite
 eForce Aperio iClass
 Keycard Entry System

 Model: 3090AC
 S/N: 1

Date: 12/1/2011

Lab: R

Tested By: Matt Harrison

Fundamental Field Strength

Frequency (MHz)	Reading After Cable Factors (dBuV/m)	Antenna Factor (dB)	Corrected Reading (dBuV/m)	LIMIT (dBuV/m)	DELTA (dBuV)	Polarity	Table Angle (Deg)	Tower Height (m)	Comments
13.56099	40.39	9.8	50.19	124	-73.81	H	287	1	
13.56099	36.71	9.8	46.51	124	-77.49	V	287	1	

No other Harmonics found between 10kHz to 1000MHz

 Test distance
 3 meter


FREQUENCY STABILITY OF THE CARRIER FREQUENCY***DATA SHEETS***

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SECTION 15.225[e] TESTING

COMPANY:	Adams Rite	DATE:	12/5/2011
EUT:	eForce Aperio iClass Keycard Entry System	ENGINEER:	EUGENE ADAMS
MODEL:	3090AC	S/N:	1

TEMPERATURE [C]	FREQUENCY (MHz) AT 0 MINUTES	FREQUENCY (MHz) AT 2 MINUTES	FREQUENCY (MHz) AT 5 MINUTES	FREQUENCY (MHz) AT 10 MINUTES
-20°	13.56099399	13.56099399	13.56099399	13.56099399
-10°	13.56099399	13.56099399	13.56099399	13.56099399
+0°	13.56099399	13.56099399	13.56099399	13.56099399
+10°	13.56099399	13.56099399	13.56099399	13.56099399
+20°	13.56099399	13.56099399	13.56099399	13.56099399
+30°	13.56099399	13.56099399	13.56099399	13.56099399
+40°	13.56099399	13.56099399	13.56099399	13.56099399
+50°	13.56099399	13.56099399	13.56099399	13.56099399

The Frequency Tolerance allowed is 0.01% (± 0.001356099399 MHz) of the frequency measured at $+20^{\circ}\text{C}$ at 100% Supply Voltage.

If the Frequency is between 13.55963789 MHz and 13.56235009 MHz, the EUT is considered within the specification limits of 15.225[e].

FCC Nominal Input Voltage = 4-AA Batteries. A new set was used at the beginning of testing.

