

Engineering Solutions & Electromagnetic Compatibility Services

FCC Part 15.247 & Industry Canada RSS-210 Certification Application Report

Test Lab:		Applicant:			
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	I				
FCC/IC ID	VR3-101500X 7465A-101500X	Test Report Date	November 8, 2012		
Platform	N/A	RTL Work Order #	2012180		
Model #'s	10-15007 & 10-15009	RTL Quote #	QRTL12-180A		
American National Standard Institute	ANSI C63.4-2003: Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz				
FCC Classification	DTS – Part 15 Digital Transmi	ission System			
FCC Rule Part(s)/ Guidance	FCC Rules Part 15.247: Operation within the bands 920-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz Direct Sequence System November 1, 2009, DA 00-705				
Industry Canada	RSS-210 Issue 8: Low Power License-Exempt Communications Devices RSS-Gen: Issue 3; 2010 General Requirements and Information for the Certification of Radio Apparatus				
Digital Interface Information	Digital Interface was found to be compliant				
Frequency Range (MHz)	Output Power (W) Frequency Tolerance Emission Designator				
2405 – 2475	0.000 000 5	N/A	1M59FXD		

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. No modifications were made to the equipment during testing in order to achieve compliance with these standards. Furthermore, there was no deviation from, additions to, or exclusions from, the applicable parts of FCC Part 2, FCC Part 15, RSS-210, and ANSI C63.4.

Signature:

Date: November 8, 2012

Typed/Printed Name: Desmond A. Fraser

Position: President

This report may not be reproduced, except in full, without the written approval of Rhein Tech Laboratories, Inc. and Medeco Security Locks, Inc. The test results relate only to the item(s) tested.

These tests are accredited and meet the requirements of ISO/IEC 17025 as verified by ANSI-ASQ National Accreditation Board/ACLASS. Refer to certificate and scope of accreditation AT-1445.

Client: Medeco Security Locks, Inc. Model #'s: 10-15007 & 10-15009 Standards: FCC 15.247/IC RSS-210 ID's: VR3-101500X/7465A-101500X Report #: 2012180DTS

Table of Contents

1	Gene	eral Information	5
	1.1	Scope	5
	1.2	Description of EUT	
	1.3	Test Facility	
	1.4	Related Submittal(s)/Grant(s)	
	1.5	Modifications	
2	Test	Information	
	2.1	Description of Test Modes	6
	2.2	Exercising the EUT	
	2.3	Test Result Summary	6
	2.4	Test System Details	7
	2.5	Configuration of Tested System	
3	Peak	: Output Power – FCC §15.247(b)(1); RSS-210 §A8.4(4)	8
	3.1	Power Output Test Procedure	8
	3.2	Power Output Test Data	8
4	Com	pliance with the Band Edge – FCC §15.247(d); RSS-210 §2.2	9
	4.1	Band Edge Test Procedure	
	4.2	Restricted Band Edge Test Results	. 10
	4.2.1		
	4.2.2		
5	Ante	nna Conducted Spurious Emissions – FCC §15.247(d); RSS-Gen	. 12
	5.1	Antenna Conducted Spurious Emissions Test Procedures	
	5.2	Antenna Conducted Spurious Emissions Test Results	. 12
6	Powe	er Spectral Density – FCC §15.247(e); RSS-210 §A8.2	. 15
	6.1	Power Spectral Density Test Procedure	. 15
	6.2	Power Spectral Density Test Data	. 15
7	Radi	ated Emissions – FCC §15.209, RSS-210 §A8.5	. 19
	7.1	Limits of Radiated Emissions Measurement	. 19
	7.2	Radiated Emissions Measurement Test Procedure	. 19
	7.3	Radiated Emissions Harmonics/Spurious Test Data	. 21
8	AC C	Conducted Emissions - FCC §15.207; RSS-Gen §7.2.4: Conducted Limits	. 23
9		Bandwidth - FCC §15.247(a)(2); RSS-210 §A8.2	
	9.1	6 db Bandwidth Test Procedure - Minimum 6 dB Bandwidth	
	9.2	6 dB Modulated Bandwidth Test Data	. 23
41	0000	directions.	27

Client: Medeco Security Locks, Inc. Model #'s: 10-15007 & 10-15009 Standards: FCC 15.247/IC RSS-210 ID's: VR3-101500X/7465A-101500X Report #: 2012180DTS

Figure Index

Figure 2-1:	Configuration of System Under Test	7
	Table Index	
Table 0.4.	Observation Tracked	
Table 2-1: Table 2-2:	Channels Tested Test Result Summary – FCC Part 15, Subpart C (Section 15.247)	
Table 2-2.	Equipment Under Test	
Table 2-3.	Power Output Test Equipment	
Table 3-1:	Power Output Test Data	
Table 3-2.	Band Edge Test Equipment	
Table 5-1:	Antenna Conducted Spurious Emissions Test Equipment	14
Table 6-1:	Power Spectral Density Test Equipment	
Table 6-2:	Power Spectral Density Test Data – 802.11b	
Table 7-1:	Radiated Emissions Test Equipment	
Table 7-2:	Radiated Emissions Harmonics/Spurious - 2405 MHz – Peak Detector	
Table 7-3:	Radiated Emissions Harmonics/Spurious - 2405 MHz – Average Detector	
Table 7-4:	Radiated Emissions Harmonics/Spurious - 2430 MHz – Peak Detector	
Table 7-5:	Radiated Emissions Harmonics/Spurious - 2430 MHz – Average Detector	22
Table 7-6:	Radiated Emissions Harmonics/Spurious - 2475 MHz – Peak Detector	
Table 7-7:	Radiated Emissions Harmonics/Spurious - 2475 MHz – Average Detector	22
Table 9-1:	6 dB Bandwidth Test Equipment	
Table 9-2:	6 db Bandwidth Test Data – 802.11b	23
	Plot Index	
Plot 4-1:	Lower Band Edge - 2405 MHz	10
Plot 4-2:	Upper Band Edge - 2475 MHz	
Plot 5-1:	Antenna Conducted Spurious Emissions - 2405 MHz	
Plot 5-2:	Antenna Conducted Spurious Emissions - 2430 MHz	
Plot 5-3:	Antenna Conducted Spurious Emissions - 2475 MHz	
Plot 6-1:	Power Spectral Density - 2405 MHz	16
Plot 6-2:	Power Spectral Density - 2430 MHz	17
Plot 6-3:	Power Spectral Density - 2475 MHz	18
Plot 9-1:	6 dB Bandwidth - 2405 MHz	
Plot 9-2:	6 dB Bandwidth - 2430 MHz	
Plot 9-3:	6 dB Bandwidth - 2475 MHz	26

Client: Medeco Security Locks, Inc. Model #'s: 10-15007 & 10-15009 Standards: FCC 15.247/IC RSS-210 ID's: VR3-101500X/7465A-101500X Report #: 2012180DTS

Appendix Index

Appendix A:	FCC Part 1.1307, 1.1310, 2.1091, 2.1093; IC RSS-Gen: RF Exposure	28
Appendix B:	Agency Authorization Letter	29
Appendix C:	FCC Confidentiality Request Letter	
Appendix D:	IC Letters	
Appendix E:	Canadian Based Representative Attestation Letter	32
Appendix F:	IC Confidentiality Request Letter	
Appendix G:	ID Label and Label Location	
Appendix H:	Technical Operational Description	
Appendix I:	Schematics	
Appendix J:	Block Diagram	
Appendix K:	Manual	
Appendix L:	Test Photographs	
Appendix M:	External Photographs	
Appendix N:	Internal Photographs	
	Photograph Index	
Photograph 1:	Radiated Testing – Front View	39
Photograph 2:	Radiated Testing – Rear View	

Client: Medeco Security Locks, Inc. Model #'s: 10-15007 & 10-15009 Standards: FCC 15.247/IC RSS-210 ID's: VR3-101500X/7465A-101500X Report #: 2012180DTS

1 General Information

1.1 Scope

This is an original certification application request for the Medeco Security Locks, Inc. Aperio M100 Wireless Lock, Model # 10-15007 and Model # 10-15009.

Applicable Standards:

- FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz.
- Industry Canada RSS-210: Low Power License-Exempt Communications Devices

1.2 Description of EUT

Equipment Under Test	Transceiver
Model/Model #	Aperio M100 Wireless Lock/10-15007 & 10-15009
Power Supply	3 VDC "CR21" size cell
Modulation Type	DSSS
Frequency Range	2405 – 2475 MHz
Antenna Connector Type	Chip
Antenna Type	Internal

1.3 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4-2003).

1.4 Related Submittal(s)/Grant(s)

This is an original certification application for Medeco Security Locks, Inc., Aperio M100 Wireless Lock, Model #'s: 10-15007 and 10-15009, FCC ID: VR3-101500X, IC: 7465A-101500X. IC will require a family certification.

1.5 Modifications

No modifications were made to the equipment during testing in order to achieve compliance with these standards.

Client: Medeco Security Locks, Inc. Model #'s: 10-15007 & 10-15009 Standards: FCC 15.247/IC RSS-210 ID's: VR3-101500X/7465A-101500X Report #: 2012180DTS

2 Test Information

2.1 Description of Test Modes

In accordance with FCC 15.31(m), and because the EUT utilizes an operating band greater than 10 MHz, the following frequencies were tested:

Table 2-1: Channels Tested

Channel	Frequency
Low (11)	2405
Middle (16)	2430
High (25)	2475

2.2 Exercising the EUT

The EUT was supplied with test firmware programmed with a high, mid, and low channel for testing. The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. The EUT was provided with software to continuously transmit during testing. The carrier was also checked to verify that information was being transmitted.

2.3 Test Result Summary

Table 2-2: Test Result Summary – FCC Part 15, Subpart C (Section 15.247)

Standard	Test	Pass/Fail or N/A
FCC 15.207	AC Power Conducted Emissions	N/A
FCC 15.209	Radiated Emissions	Pass
FCC 15.247(a)(2)	6 dB Bandwidth	Pass
FCC 15.247(b)	Maximum Peak Power Output	Pass
FCC 15.247(d)	Antenna Conducted Spurious Emissions	Pass
FCC 15.247(e)	Power Spectral Density	Pass
FCC 15.247(d)	Band Edge Measurement	Pass

Client: Medeco Security Locks, Inc. Model #'s: 10-15007 & 10-15009 Standards: FCC 15.247/IC RSS-210 ID's: VR3-101500X/7465A-101500X Report #: 2012180DTS

2.4 Test System Details

The test samples were received on September 25, 2012. The FCC identifiers for all applicable equipment, plus descriptions of all cables used in the tested system, are identified in the following table.

Table 2-3: Equipment Under Test

Part	Manufacturer	Model	Serial Number	FCC ID	Cable Description	RTL Bar Code
Wireless Lock	Medeco Security Locks, Inc.	Aperio M100 Model #'s 10-15007 & 10-15009	N/A	VR3- 101500X	N/A	20838

2.5 Configuration of Tested System

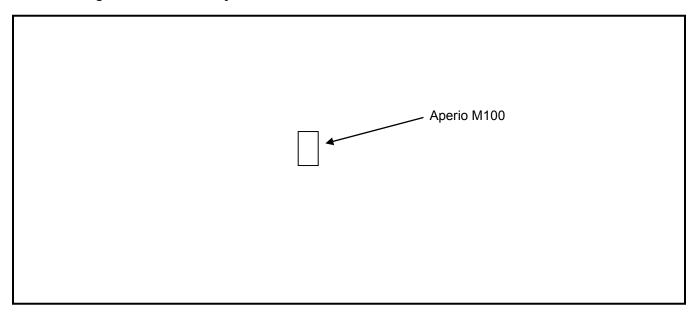


Figure 2-1: Configuration of System Under Test

Client: Medeco Security Locks, Inc. Model #'s: 10-15007 & 10-15009 Standards: FCC 15.247/IC RSS-210 ID's: VR3-101500X/7465A-101500X

Report #: 2012180DTS

3 Peak Output Power – FCC §15.247(b)(1); RSS-210 §A8.4(4)

3.1 Power Output Test Procedure

A conducted power measurement of the EUT was taken using a Rhode & Schwarz FSU Spectrum Analyzer.

Table 3-1: Power Output Test Equipment

ĺ	RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
	901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	6/3/13

3.2 Power Output Test Data

Table 3-2: Power Output Test Data

Channel	Frequency (MHz)	Peak Power Conducted Output (dBm)
11	2405	-33.0
16	2430	-35.6
25	2475	-32.8

Test Personnel:

Daniel W. Baltzell

Test Engineer

Signature

November 8, 2012

Date of Test

Client: Medeco Security Locks, Inc. Model #'s: 10-15007 & 10-15009 Standards: FCC 15.247/IC RSS-210 ID's: VR3-101500X/7465A-101500X Report #: 2012180DTS

4 Compliance with the Band Edge – FCC §15.247(d); RSS-210 §2.2

4.1 Band Edge Test Procedure

The transmitter output was connected to its appropriate antenna. Peak (1 MHz RBW/VBW) and average (1 MHz RBW/10 Hz VBW) radiated measurements were taken with a suitable span to encompass the peak of the fundamental. A delta measurement was performed from the highest peak in the restricted band to the peak of the fundamental, and subtracted from the field strength; the result was compared to the limit in the restricted band (54 dBuV/m).

Table 4-1: Band Edge Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	6/3/13
900878	Rhein Tech Laboratories	AM3-1197- 0005	3 meter antenna mast, polarizing	Outdoor Range 1	Not Required
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	6/3/13
901242	Rhein Tech Laboratories	WRT-000- 0003	Wood rotating table	N/A	Not Required
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	4/19/14

Report #: 2012180DTS

4.2 Restricted Band Edge Test Results

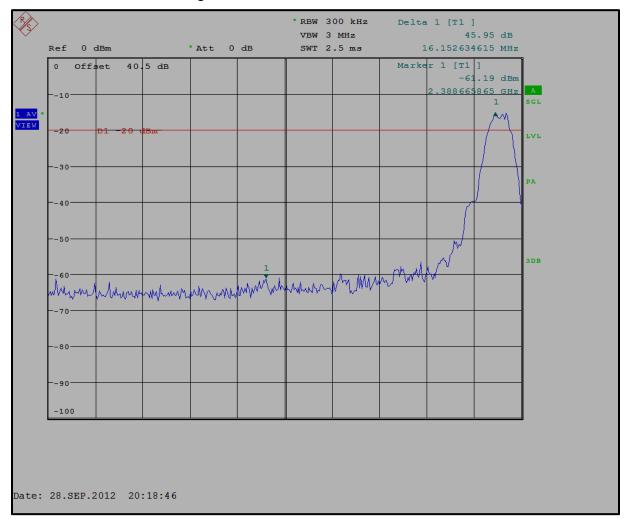
4.2.1 Calculation of Lower Band Edge

66.9 dBuV/m is the field strength measurement, from which the delta measurement of 46.0 dB is subtracted (reference plots), resulting in a level of 20.9 dBuV/m. This level has a margin of 33.1 dB below the limit of 54 dBuV/m.

Calculation: 66.9 dBuV/m - 46.0 dB - 54 dBuV/m = -33.1 dB

Peak Field Strength of Lower Band Edge (1 MHz RBW/3 MHz VBW, Pk Det.) = 68.3 dBuV/m Average Field Strength of Lower Band Edge (1 MHz RBW/3 MHz VBW, Av Det.) = 66.9 dBuV/m Delta measurement = 46.0 dB

Plot 4-1: Lower Band Edge - 2405 MHz



Client: Medeco Security Locks, Inc. Model #'s: 10-15007 & 10-15009 Standards: FCC 15.247/IC RSS-210 ID's: VR3-101500X/7465A-101500X Report #: 2012180DTS

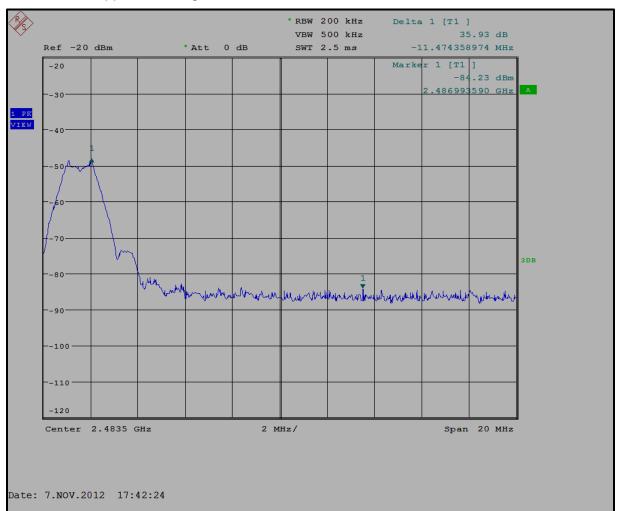
4.2.2 Calculation of Upper Band Edge - 802.11b

68.6 dBuV/m is the field strength measurement, from which the delta measurement of 35.9 dB is subtracted (reference plots), resulting in a level of 32.7 dBuV/m. This level has a margin of 21.3 dB below the limit of 54 dBuV/m.

Calculation: 68.6 dBuV/m - 35.9 dB - 54 dBuV/m = -21.3 dB

Peak Field Strength of Upper Band Edge (1 MHz RBW/3 MHz VBW, Pk. Det.) = 71.0 dBuV/m Average Field Strength of Upper Band Edge (1 MHz RBW/3 MHz VBW, Av Det.) = 68.6 dBuV/m Delta measurement = 35.9 dB

Plot 4-2: Upper Band Edge - 2475 MHz



Test Personnel:

Daniel W. Baltzell Test Engineer

Signature

September 28 & November 7, 2012

Dates of Test

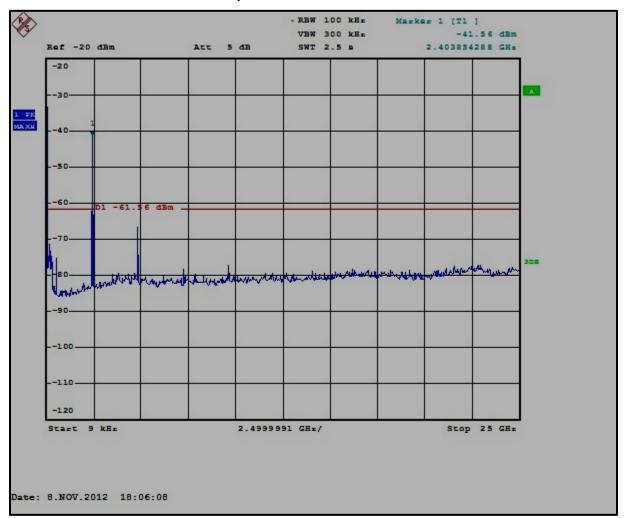
5 Antenna Conducted Spurious Emissions – FCC §15.247(d); RSS-Gen

5.1 Antenna Conducted Spurious Emissions Test Procedures

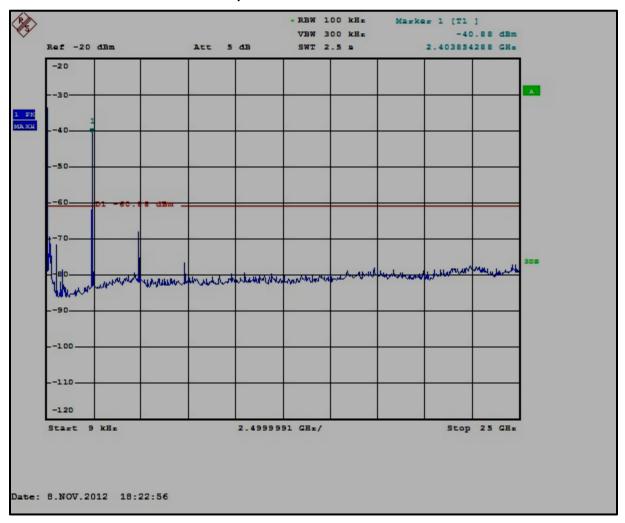
Antenna spurious emissions per FCC 15.247(c) were measured from the EUT antenna port using a 50-ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 300 kHz. The modulated carrier was identified at the following frequencies: 2405 MHz, 2430 MHz and 2475 MHz.

5.2 Antenna Conducted Spurious Emissions Test Results

Plot 5-1: Antenna Conducted Spurious Emissions - 2405 MHz



Plot 5-2: Antenna Conducted Spurious Emissions - 2430 MHz



Client: Medeco Security Locks, Inc. Model #'s: 10-15007 & 10-15009 Standards: FCC 15.247/IC RSS-210 ID's: VR3-101500X/7465A-101500X Report #: 2012180DTS

Plot 5-3: Antenna Conducted Spurious Emissions - 2475 MHz

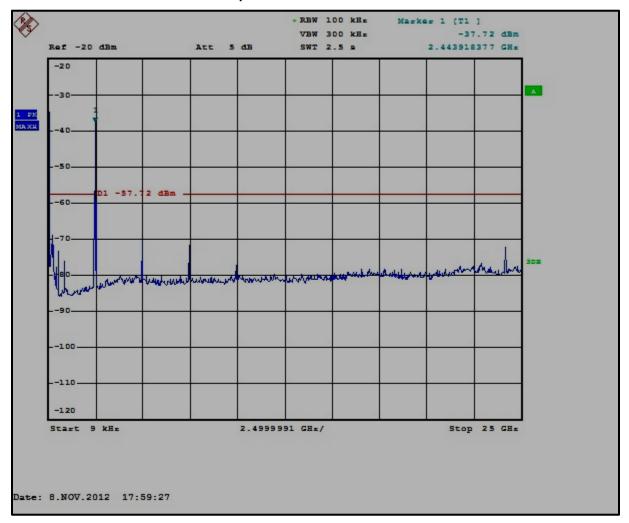


Table 5-1: Antenna Conducted Spurious Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	6/3/13

Test Personnel:

Daniel W. Baltzell
Test Engineer
Signature
November 8, 2012
Date of Test

Client: Medeco Security Locks, Inc. Model #'s: 10-15007 & 10-15009 Standards: FCC 15.247/IC RSS-210 ID's: VR3-101500X/7465A-101500X Report #: 2012180DTS

6 Power Spectral Density – FCC §15.247(e); RSS-210 §A8.2

6.1 Power Spectral Density Test Procedure

The power spectral density per FCC 15.247(d) was measured using a 50-ohm spectrum analyzer with the resolution bandwidth set at 3 kHz, the video bandwidth set at equal to or greater than 10 times the RBW, and the sweep time set at 500 seconds. The spectral lines were resolved for the modulated carriers at 2405 MHz, 2430 MHz, and 2475 MHz respectively. These levels are below the +8 dBm limit. See the power spectral density table and plots.

Table 6-1: Power Spectral Density Test Equipment

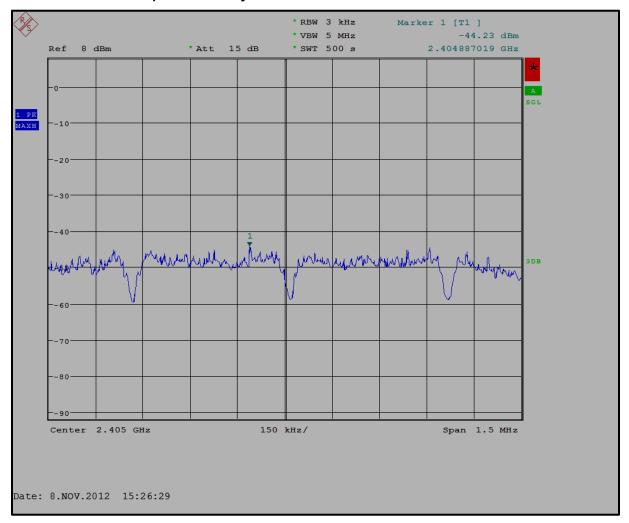
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	6/3/13

6.2 Power Spectral Density Test Data

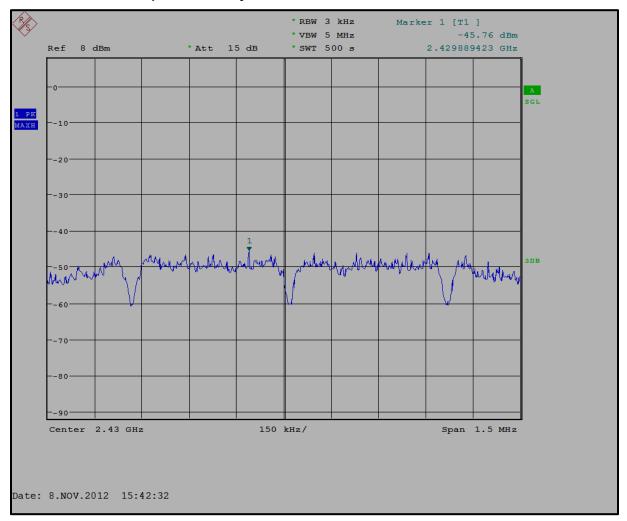
Table 6-2: Power Spectral Density Test Data – 802.11b

Channel	Frequency (MHz)	RF Power Level (dBm)	Maximum Limit +8dBm	Pass/Fail
11	2405	-44.2	8	Pass
16	2430	-45.8	8	Pass
25	2475	-43.7	8	Pass

Plot 6-1: Power Spectral Density - 2405 MHz

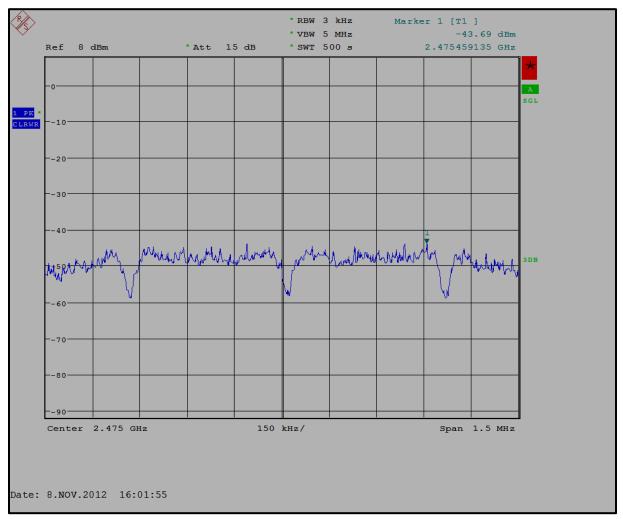


Plot 6-2: Power Spectral Density - 2430 MHz



Client: Medeco Security Locks, Inc. Model #'s: 10-15007 & 10-15009 Standards: FCC 15.247/IC RSS-210 ID's: VR3-101500X/7465A-101500X Report #: 2012180DTS





Test Personnel:

Daniel W. Baltzell

Test Engineer

Signature

November 8, 2012

Date of Test

Report #: 2012180DTS

7 Radiated Emissions – FCC §15.209, RSS-210 §A8.5

7.1 Limits of Radiated Emissions Measurement

Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009-0.490	2400/f (kHz)	300
0.490-1.705	2400/f (kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

As shown in 15.35(b), for frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any circumstances of modulation.

7.2 Radiated Emissions Measurement Test Procedure

Before final measurements of radiated emissions were made on the open-field three/ten meter range, the EUT was scanned indoors at one and three meter distances. This was done in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to ensure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three/ten-meter, open-field test site. The EUT was placed on a nonconductive turntable 0.8 meters above the ground plane. The spectrum was examined from 9 kHz to the 10th harmonic of the highest fundamental transmitter frequency (24.8 GHz).

At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the emission's maximum level. Measurements were taken using both horizontal and vertical antenna polarizations. For frequencies between 30 and 1000 MHz, the spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. For emissions above 1000 MHz, emissions are measured using the average detector function with a minimum resolution bandwidth of 1 MHz. No video filter less than 10 times the resolution bandwidth was used. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

Table 7-1: Radiated Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1-26.5 GH)z	3008A00505	7/14/13
900772	EMCO	3161-02	Horn Antenna (2-4 GHz)	9804-1044	4/19/14
900321	EMCO	3161-03	Horn Antenna (4.0-8.2 GHz)	9508-1020	4/19/14
900323	EMCO	3160-07	Horn Antenna (8.2-12.4 GHz)	9605-1054	4/19/14
900356	EMCO	3160-08	Horn Antenna (12.4-18 GHz)	9607-1044	4/19/14
900325	EMCO	3160-9	Horn Antenna (18-26.5 GHz)	9605-1051	4/19/14
900151	Rohde and Schwarz	HFH2-Z2	Loop Antenna (9 kHz-30 MHz)	827525/019	10/1/13
901595	Mini-Circuits	ZHL-4240V	Amplifier	H090293-5	2/17/13
900878	Rhein Tech Laboratories	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	Not Required
901242	Rhein Tech Laboratories	WRT-000-0003	Wood rotating table	N/A	Not Required
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	6/3/13
900791	Chase	CBL6111B	Bilog Antenna (30 MHz–2000 MHz)	N/A	1/31/13
901592	Insulated Wire Inc.	KPS-1503- 3600-KPR	SMK RF Cables 20'	NA	8/16/13
901593	Insulated Wire Inc.	KPS-1503-360- KPR	SMK RF Cables 36"	NA	8/16/13

7.3 Radiated Emissions Harmonics/Spurious Test Data

Table 7-2: Radiated Emissions Harmonics/Spurious - 2405 MHz - Peak Detector

Emission Frequency (MHz)	Peak Analyzer Reading (dBuV/m) (1 MHz RBW/VBW)	Site Correction Factor (dB/m)	Peak Corrected (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)
4810.0	48.7	-1.1	47.6	74.0	-26.4
12025.0	33.8	9.9	43.7	74.0	-30.3
19240.0	24.5	20.6	45.1	74.0	-28.9

Table 7-3: Radiated Emissions Harmonics/Spurious - 2405 MHz – Average Detector

Emission Frequency (MHz)	Average Analyzer Reading (dBuV/m) (1 MHz RBW/VBW)	Site Correction Factor (dB/m)	Average Corrected (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)
4810.0	41.7	-1.1	40.6	54.0	-13.4
12025.0	27.6	9.9	37.5	54.0	-16.5
19240.0	18.5	20.6	39.1	54.0	-14.9

Table 7-4: Radiated Emissions Harmonics/Spurious - 2430 MHz - Peak Detector

Emission Frequency (MHz)	Peak Analyzer Reading (dBuV/m) (1 MHz RBW/VBW)	Site Correction Factor (dB/m)	Peak Corrected (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)
4860.0	47.4	-1.1	46.3	74.0	-27.7
7290.0	43.6	0.9	44.5	74.0	-29.5
12150.0	42.6	10.8	53.4	74.0	-20.6
19440.0	24.5	20.3	44.8	74.0	-29.2

Client: Medeco Security Locks, Inc. Model #'s: 10-15007 & 10-15009 Standards: FCC 15.247/IC RSS-210 ID's: VR3-101500X/7465A-101500X Report #: 2012180DTS

Table 7-5: Radiated Emissions Harmonics/Spurious - 2430 MHz - Average Detector

Emission Frequency (MHz)	Peak Analyzer Reading (dBuV/m) (1 MHz RBW/VBW)	Site Correction Factor (dB/m)	Peak Corrected (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)
4860.0	39.5	-1.1	38.4	54.0	-15.6
7290.0	33.8	0.9	34.7	54.0	-19.3
12150.0	32.2	10.8	43.0	54.0	-11.0
19440.0	19.0	20.3	39.3	54.0	-14.7

Table 7-6: Radiated Emissions Harmonics/Spurious - 2475 MHz – Peak Detector

Emission Frequency (MHz)	Peak Analyzer Reading (dBuV/m) (1 MHz RBW/VBW)	Site Correction Factor (dB/m)	Peak Corrected (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)
4950.0	45.1	-1.0	44.1	74.0	-29.9
7425.0	42.9	1.1	44.0	74.0	-30.0
12375.0	43.5	12.4	55.9	74.0	-18.1
19800.0	24.0	20.6	44.6	74.0	-29.4
22275.0	25.5	21.9	47.4	74.0	-26.6

Table 7-7: Radiated Emissions Harmonics/Spurious - 2475 MHz – Average Detector

Emission Frequency (MHz)	Peak Analyzer Reading (dBuV/m) (1 MHz RBW/VBW)	Site Correction Factor (dB/m)	Peak Corrected (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)
4950.0	35.1	-1.0	34.1	54.0	-19.9
7425.0	32.9	1.1	34.0	54.0	-20.0
12375.0	27.0	12.4	39.4	54.0	-14.6
19800.0	18.7	20.6	39.3	54.0	-14.7
22275.0	19.8	21.9	41.7	54.0	-12.3

Test Personnel:

Daniel W. Baltzell

Test Engineer

Daniel W. Bolgson
Signature

November 7, 2012

Date of Test

Report #: 2012180DTS

8 AC Conducted Emissions - FCC §15.207; RSS-Gen §7.2.4: Conducted Limits

No AC conducted tests are required since the device is powered solely by a 3 VDC "CR21" size cell.

9 6 dB Bandwidth – FCC §15.247(a)(2); RSS-210 §A8.2

9.1 6 db Bandwidth Test Procedure - Minimum 6 dB Bandwidth

The minimum 6 dB bandwidths per FCC 15.247(a)(2) were measured using a 50-ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 300 kHz. The device was modulated. The minimum 6 dB bandwidths are presented below.

Table 9-1: 6 dB Bandwidth Test Equipment

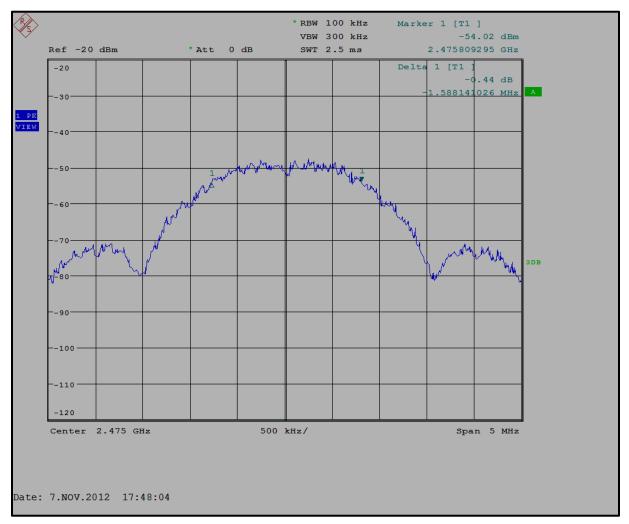
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	6/3/13

9.2 6 dB Modulated Bandwidth Test Data

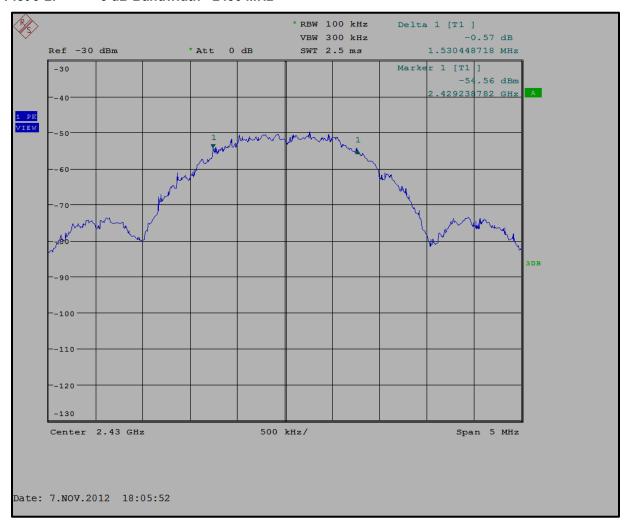
Table 9-2: 6 db Bandwidth Test Data – 802.11b

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass/Fail
11	2405	1.59	500	Pass
16	2430	1.53	500	Pass
25	2475	1.59	500	Pass

Plot 9-1: 6 dB Bandwidth - 2405 MHz

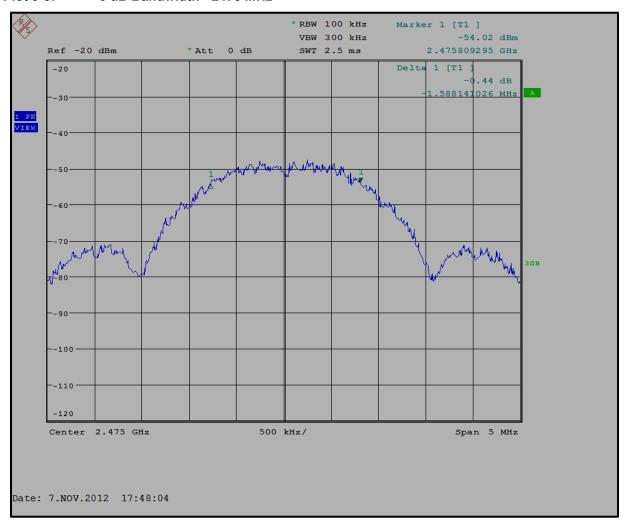


Plot 9-2: 6 dB Bandwidth - 2430 MHz



Client: Medeco Security Locks, Inc. Model #'s: 10-15007 & 10-15009 Standards: FCC 15.247/IC RSS-210 ID's: VR3-101500X/7465A-101500X Report #: 2012180DTS





Test Personnel:

Daniel W. Baltzell
Test Engineer
Signature
November 7, 2012
Date of Test

Client: Medeco Security Locks, Inc. Model #'s: 10-15007 & 10-15009 Standards: FCC 15.247/IC RSS-210 ID's: VR3-101500X/7465A-101500X Report #: 2012180DTS

10 Conclusion

The data in this measurement report shows that the EUT as tested, Medeco Security Locks, Inc. Model Aperio M100 Wireless Lock, Model #'s 10-15007 and 10-15009, FCC ID: VR3-101500X, IC: 7465A-101500X, comply with all the applicable requirements of Parts 2 and 15 of the FCC Rules and Regulations, and IC RSS-210 and RSS-Gen.