



Engineering Solutions & Electromagnetic Compatibility Services

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

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FCC/IC ID	VR3-101501X 7465A-101501X	Test Report Date	June 27, 2014
Platform	N/A	RTL Work Order #	2014065
Model #	10-15013	RTL Quote #	QRTL14-065A
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 Transmission 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 (10-01-13)		
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 (uW)	Frequency Tolerance	Emission Designator
2405 – 2475	4.0	N/A	1M64FXD

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: June 27, 2014

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.

Table of Contents

1	General Information	5
1.1	Scope	5
1.2	Description of EUT	5
1.3	Test Facility	5
1.4	Related Submittal(s)/Grant(s)	5
1.5	Modifications	5
2	Test Information	6
2.1	Description of Test Modes	6
2.2	Exercising the EUT	6
2.3	Test Result Summary	6
2.4	Test System Details	7
2.5	Configuration of Tested System	7
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	Compliance with the Band Edge – FCC §15.247(d); RSS-210 §2.2	9
4.1	Band Edge Test Procedure	9
4.2	Restricted Band Edge Test Results	10
4.2.1	Calculation of Lower Band Edge	10
4.2.2	Calculation of Upper Band Edge – 802.11b	11
5	Power Spectral Density – FCC §15.247(e); RSS-210 §A8.2	12
5.1	Power Spectral Density Test Procedure	12
5.2	Power Spectral Density Test Data	12
6	Radiated Emissions – FCC §15.209, RSS-210 §A8.5	16
6.1	Limits of Radiated Emissions Measurement	16
6.2	Radiated Emissions Measurement Test Procedure	16
6.3	Radiated Emissions Harmonics/Spurious Test Data	18
7	AC Conducted Emissions - FCC §15.207; RSS-Gen §7.2.4: Conducted Limits	20
8	6 dB Bandwidth – FCC §15.247(a)(2); RSS-210 §A8.2	20
8.1	6 dB Bandwidth Test Procedure – Minimum 6 dB Bandwidth	20
8.2	6 dB Modulated Bandwidth Test Data	20
9	Conclusion	24

Figure Index

Figure 2-1:	Configuration of System Under Test.....	7
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Table Index

Table 2-1:	Channels Tested	6
Table 2-2:	Test Result Summary – FCC Part 15, Subpart C (Section 15.247).....	6
Table 2-3:	Equipment Under Test	7
Table 3-1:	Power Output Test Equipment	8
Table 3-2:	Power Output Test Data.....	8
Table 4-1:	Band Edge Test Equipment	9
Table 5-1:	Power Spectral Density Test Equipment	12
Table 5-2:	Power Spectral Density Test Data – 802.11b	12
Table 6-1:	Radiated Emissions Test Equipment	17
Table 6-2:	Radiated Emissions Harmonics/Spurious - 2405 MHz – Peak.....	18
Table 6-3:	Radiated Emissions Harmonics/Spurious - 2405 MHz – Average.....	18
Table 6-4:	Radiated Emissions Harmonics/Spurious - 2430 MHz – Peak.....	18
Table 6-5:	Radiated Emissions Harmonics/Spurious - 2430 MHz – Average.....	18
Table 6-6:	Radiated Emissions Harmonics/Spurious - 2475 MHz – Peak.....	19
Table 6-7:	Radiated Emissions Harmonics/Spurious - 2475 MHz – Average.....	19
Table 8-1:	6 dB Bandwidth Test Equipment.....	20
Table 8-2:	6 db Bandwidth Test Data – 802.11b.....	20

Plot Index

Plot 4-1:	Lower Band Edge - 2405 MHz	10
Plot 4-2:	Upper Band Edge - 2475 MHz	11
Plot 5-1:	Power Spectral Density - 2405 MHz	13
Plot 5-2:	Power Spectral Density - 2430 MHz	14
Plot 5-3:	Power Spectral Density - 2475 MHz	15
Plot 8-1:	6 dB Bandwidth - 2405 MHz	21
Plot 8-2:	6 dB Bandwidth - 2430 MHz	22
Plot 8-3:	6 dB Bandwidth - 2475 MHz	23

Appendix Index

Appendix A:	FCC Part 1.1307, 1.1310, 2.1091, 2.1093; IC RSS-Gen: RF Exposure	25
Appendix B:	Agency Authorization Letter	26
Appendix C:	FCC Confidentiality Request Letter	27
Appendix D:	IC Letters	28
Appendix E:	Canadian Based Representative Attestation Letter	29
Appendix F:	IC Confidentiality Request Letter	30
Appendix G:	ID Label and Label Location	31
Appendix H:	Technical Operational Description	32
Appendix I:	Schematics	33
Appendix J:	Block Diagram	34
Appendix K:	Manual	35
Appendix L:	Test Photographs	36
Appendix M:	External Photographs	38
Appendix N:	Internal Photographs	39

Photograph Index

Photograph 1:	Radiated Emissions Testing – Front View	36
Photograph 2:	Radiated Testing – Rear View	37

1 General Information

1.1 Scope

This is an original certification application request for the Medeco Security Locks, Inc. Model # 10-15013.

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 #	10-15013
Power Supply	3 VDC "CR2" 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., Model #: 10-15013, FCC ID: VR3-101501X, IC: 7465A-101501X. The IC certification application will be a family certification that includes Model #'s 10-15013 and 10-15015.

1.5 Modifications

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

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	N/A
FCC 15.247(e)	Power Spectral Density	Pass
FCC 15.247(d)	Band Edge Measurement	Pass

2.4 Test System Details

The test samples were received on May 5, 2014. 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.	10-15013	N/A	VR3-101501X	N/A	21442
Wireless Lock	Medeco Security Locks, Inc.	10-15013	N/A	VR3-101501X	N/A	21469

2.5 Configuration of Tested System

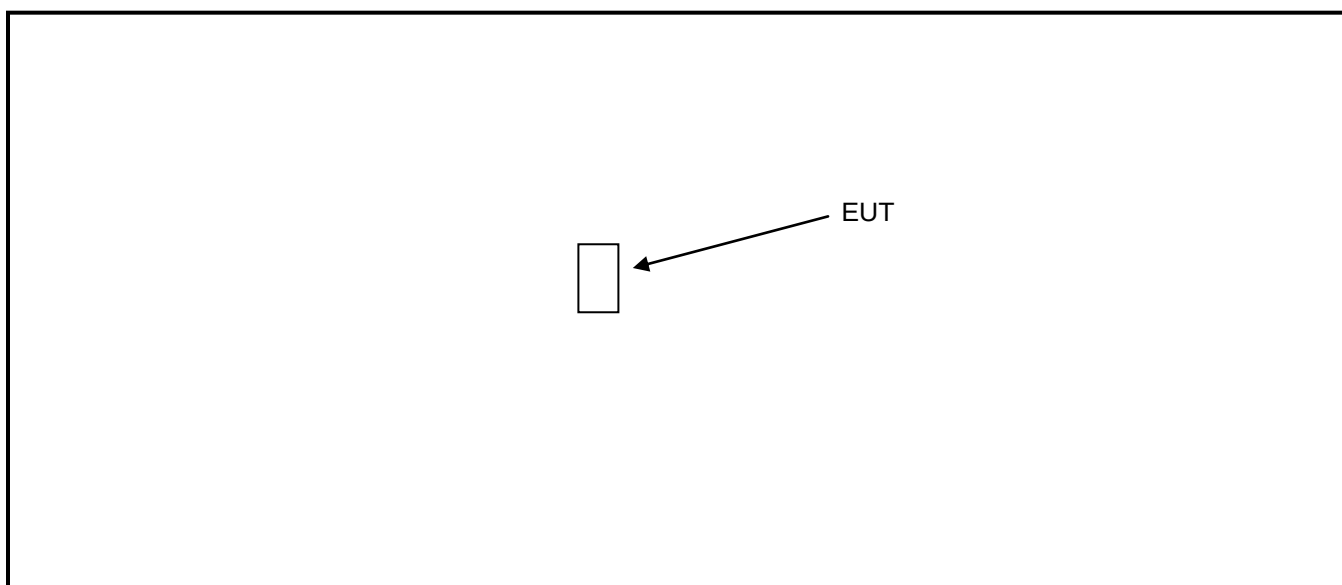


Figure 2-1: Configuration of System Under Test

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

3.1 Power Output Test Procedure

A radiated power measurement of the EUT was taken using a Rhode & Schwarz FSU Spectrum Analyzer since no antenna test port was available.

Table 3-1: Power Output Test Equipment

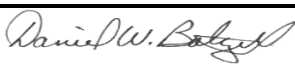
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	11/13/14
901592	Insulated Wire Inc.	KPS-1503-3600-KPR	SMK RF Cables 20'	NA	8/27/14
901593	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36"	NA	8/27/14
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1 - 26.5 GHz)	3008A00505	8/27/14
900772	EMCO	3161-02	Horn Antenna (2 – 4 GHz)	9804-1044	4/20/15

3.2 Power Output Test Data

Table 3-2: Power Output Test Data

Channel	Emission Frequency (MHz)	Peak Analyzer Reading (dBuV/m) (1 MHz RBW/VBW)	Average Analyzer Reading (dBuV/m) (1 MHz RBW/ 10 Hz VBW)	Site Correction Factor (dB/m)	Peak Corrected (dBuV/m)	Peak Corrected (uW)
11	2405	80.3	77.4	-9.0	71.3	4.0
16	2430	45.7	42.0	22.3	68.0	1.9
25	2475	46.9	43.6	22.4	69.3	2.6

Test Personnel:

Daniel W. Baltzell		May 13 and June 24, 2014
Test Engineer	Signature	Dates of Test

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	11/13/14
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
900772	EMCO	3161-02	Horn Antenna (2 – 4 GHz)	9804-1044	4/20/15
901593	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36"	NA	8/27/14
901592	Insulated Wire Inc.	KPS-1503-3600-KPR	SMK RF Cables 20'	NA	8/27/14
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1 - 26.5 GHz)	3008A00505	8/27/14

4.2 Restricted Band Edge Test Results

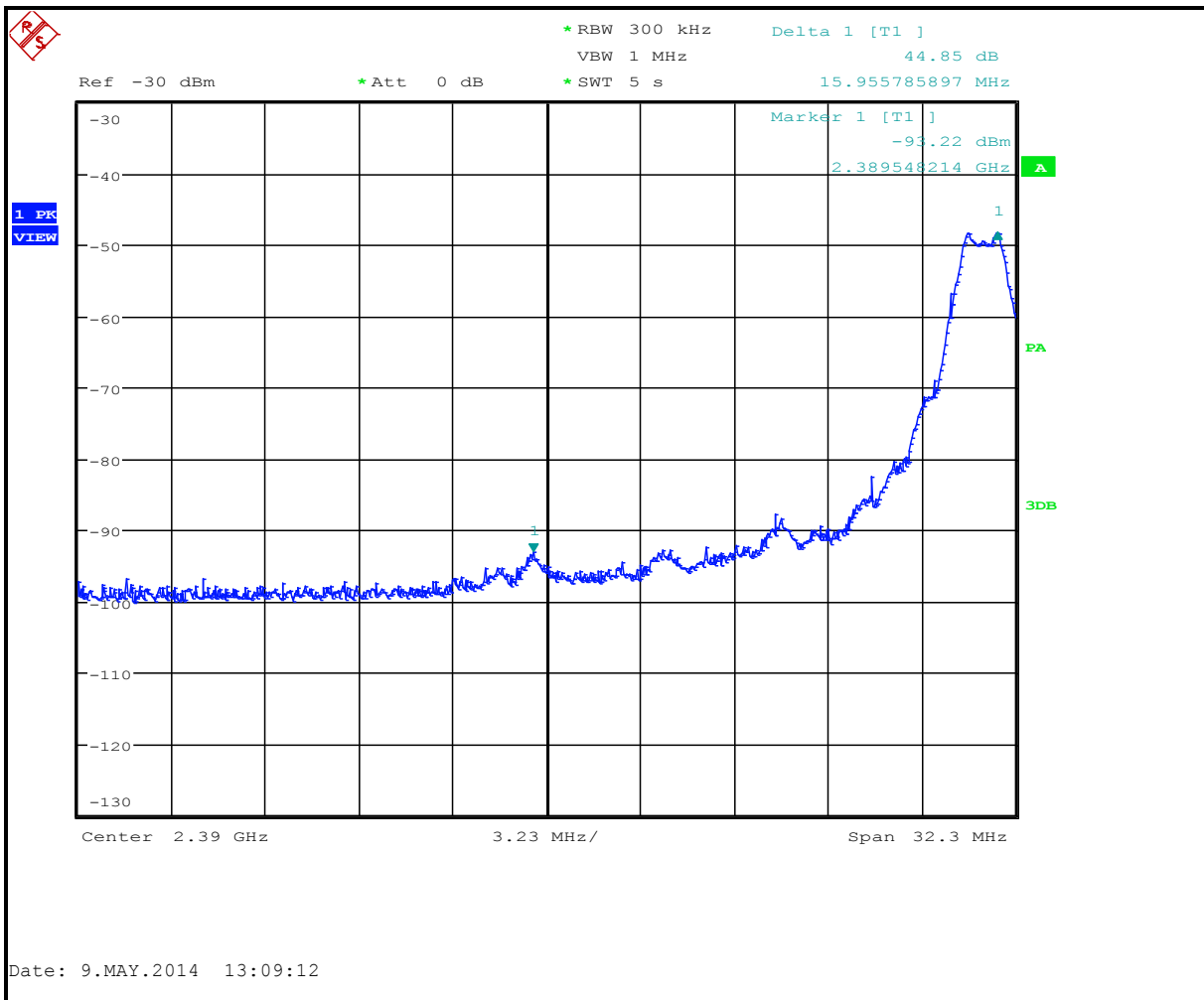
4.2.1 Calculation of Lower Band Edge

68.4 dBuV/m is the field strength measurement, from which the delta measurement of 44.9 dB is subtracted (reference plots), resulting in a level of 23.5 dBuV/m. This level has a margin of 30.5 dB below the limit of 54 dBuV/m.

Calculation: $68.4 \text{ dBuV/m} - 44.9 \text{ dB} - 54 \text{ dBuV/m} = -30.5 \text{ dB}$

Peak Field Strength of Lower Band Edge (1 MHz RBW/3 MHz VBW, Pk Det.) = 68.4 dBuV/m
 Average Field Strength of Lower Band Edge (1 MHz RBW/3 MHz VBW, Av Det.) = 71.3 dBuV/m
 Delta measurement = 44.9 dB

Plot 4-1: Lower Band Edge - 2405 MHz



4.2.2 Calculation of Upper Band Edge – 802.11b

66.0 dBuV/m is the field strength measurement, from which the delta measurement of 47.2 dB is subtracted (reference plots), resulting in a level of 18.8 dBuV/m. This level has a margin of 35.2 dB below the limit of 54 dBuV/m.

Calculation: $66.0 \text{ dBuV/m} - 47.2 \text{ dB} - 54 \text{ dBuV/m} = -35.2 \text{ dB}$

Peak Field Strength of Upper Band Edge (1 MHz RBW/3 MHz VBW, Pk. Det.) = 69.3 dBuV/m
 Average Field Strength of Upper Band Edge (1 MHz RBW/3 MHz VBW, Av Det.) = 66.0 dBuV/m
 Delta measurement = 47.2 dB

Plot 4-2: Upper Band Edge - 2475 MHz



Test Personnel:

Daniel W. Baltzell	<i>Daniel W. Baltzell</i>	May 9, June 24, 2014
Test Engineer	Signature	Dates of Test

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

5.1 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 5-1: Power Spectral Density Test Equipment

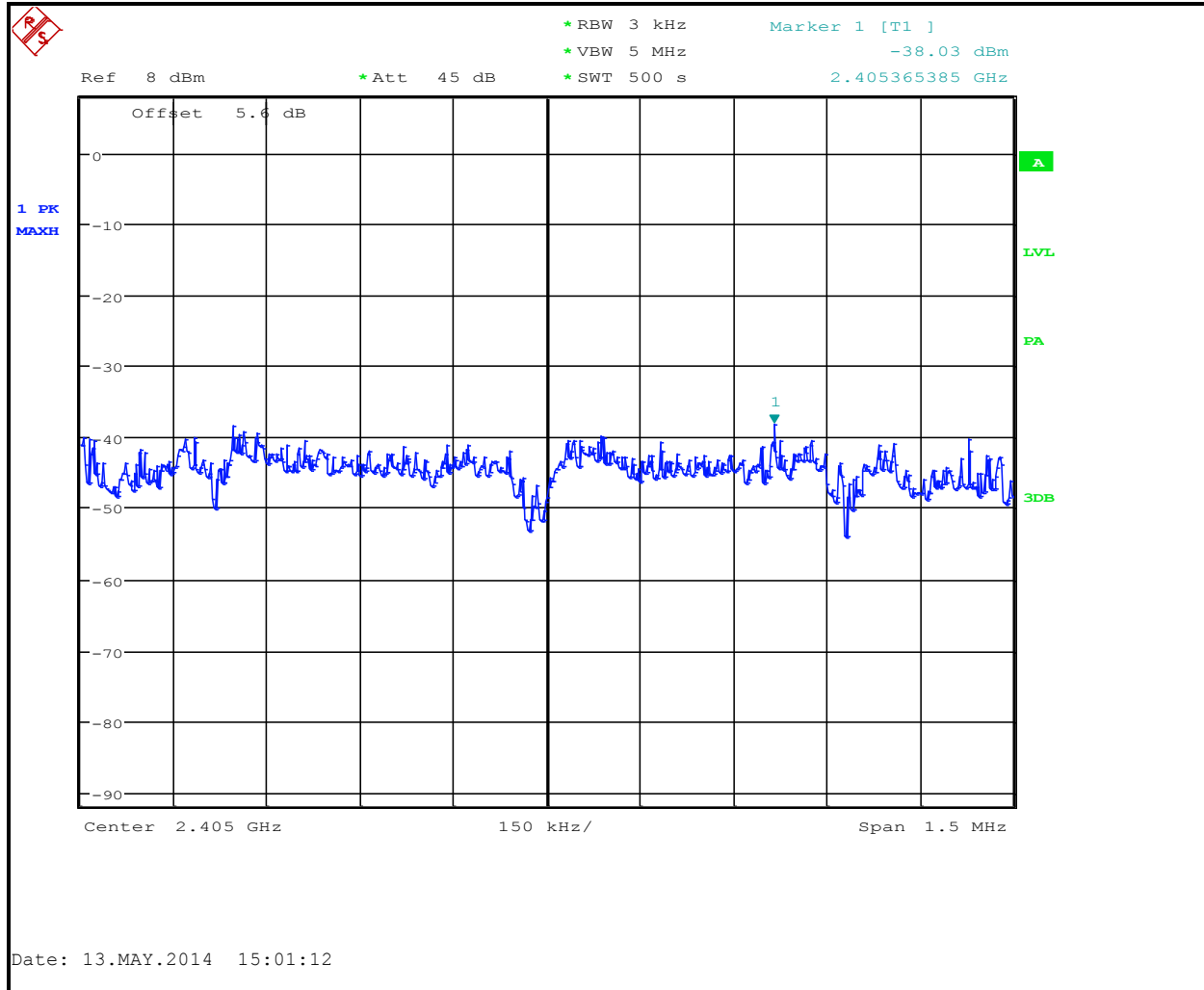
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	11/13/14

5.2 Power Spectral Density Test Data

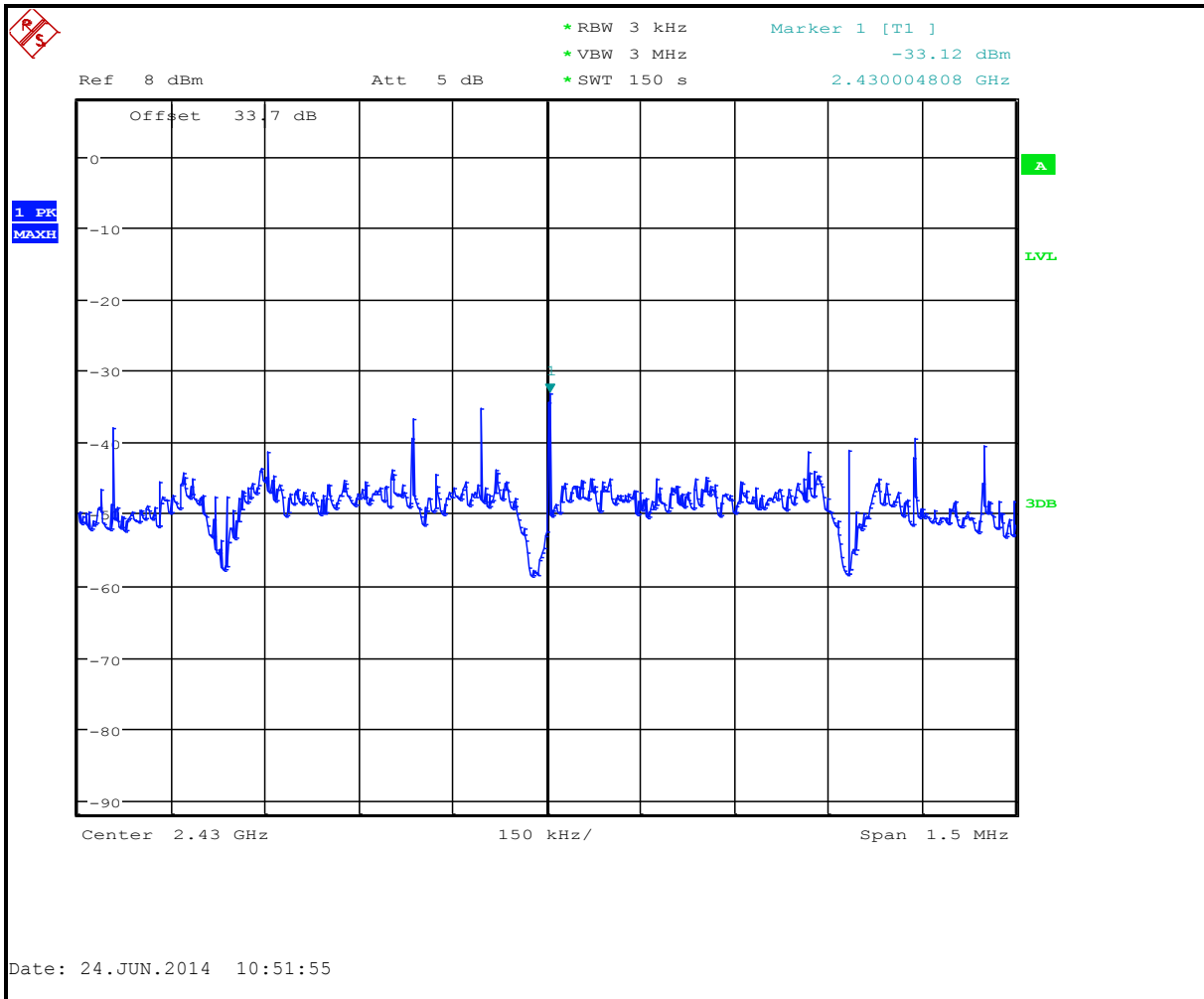
Table 5-2: Power Spectral Density Test Data – 802.11b

Channel	Frequency (MHz)	RF Power Level (dBm)	Maximum Limit +8dBm	Pass/Fail
11	2405	-38.0	8	Pass
16	2430	-33.1	8	Pass
25	2475	-42.0	8	Pass

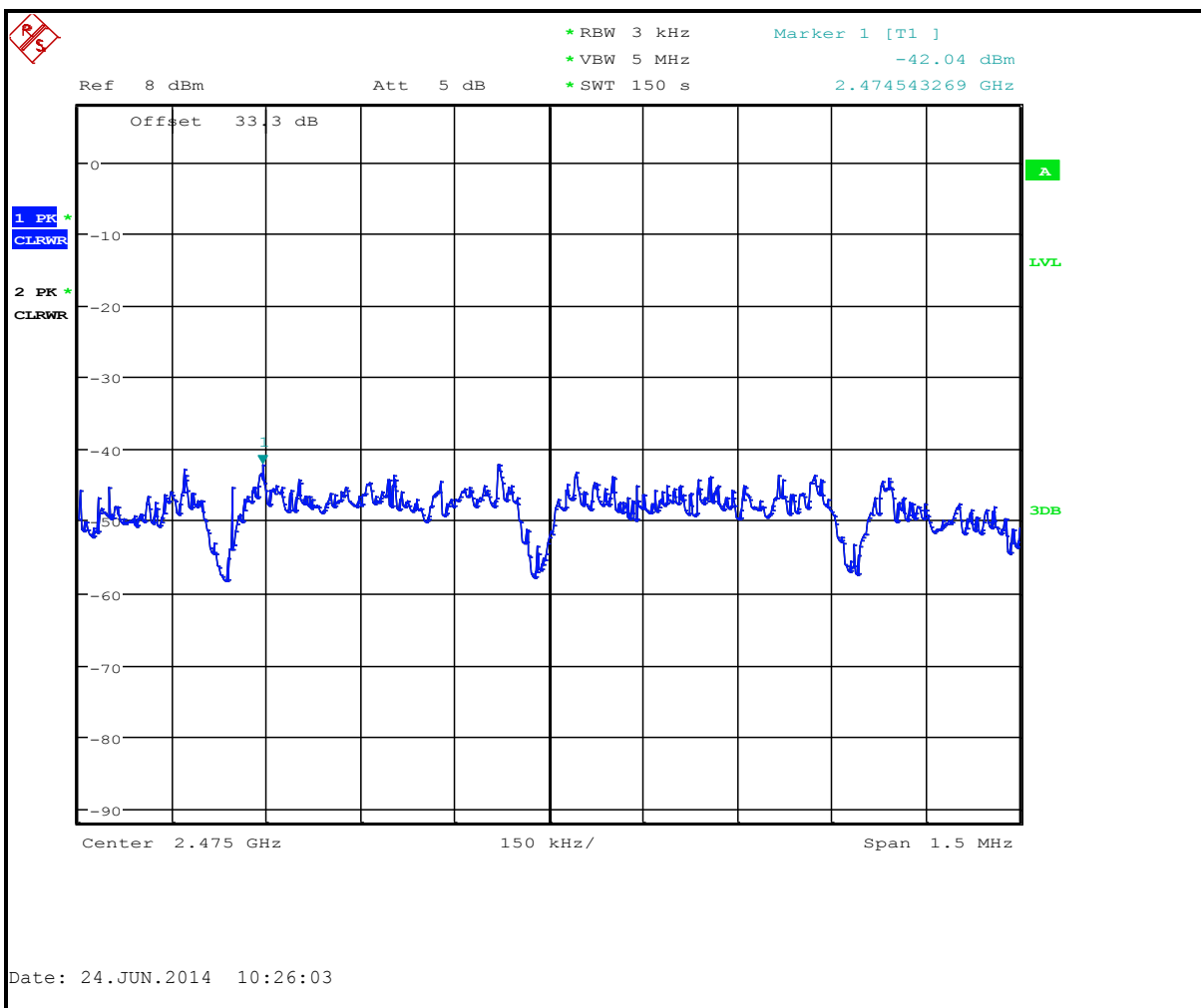
Plot 5-1: Power Spectral Density - 2405 MHz



Plot 5-2: Power Spectral Density - 2430 MHz



Plot 5-3: Power Spectral Density - 2475 MHz



Test Personnel:

Daniel W. Baltzell	<i>Daniel W. Baltzell</i>	May 13 and June 24, 2014
Test Engineer	Signature	Dates of Test

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

6.1 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.

6.2 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 6-1: 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 GHz)	3008A00505	8/27/14
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	4/20/15
900321	EMCO	3161-03	Horn Antenna (4.0 - 8.2 GHz)	9508-1020	4/20/15
900323	EMCO	3160-07	Horn Antenna (8.2 - 12.4 GHz)	9605-1054	4/20/15
900356	EMCO	3160-08	Horn Antenna (12.4 - 18 GHz)	9607-1044	4/20/15
900325	EMCO	3160-9	Horn Antenna (18 - 26.5 GHz)	9605-1051	4/19/15
900151	Rohde and Schwarz	HFH2-Z2	Loop Antenna (9 kHz - 30 MHz)	827525/019	3/4/15
901629	Teledyne Cougar	A4C2123	Amplifier	003-003	9/4/14
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	11/13/14
900724	Antenna Research Associates, Inc.	LPB-2520	BiLog Antenna (25 – 1000 MHz)	1037	4/19/15
901592	Insulated Wire Inc.	KPS-1503-3600-KPR	SMK RF Cables 20'	NA	8/27/14
901593	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36"	NA	8/27/14

6.3 Radiated Emissions Harmonics/Spurious Test Data

Table 6-2: Radiated Emissions Harmonics/Spurious - 2405 MHz – Peak

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	46.2	-1.1	45.1	74.0	-28.9
12025.0	43.0	9.9	52.9	74.0	-21.1
19240.0	42.5	20.6	63.1	74.0	-10.9

Table 6-3: Radiated Emissions Harmonics/Spurious - 2405 MHz – Average

Emission Frequency (MHz)	Average Analyzer Reading (dBuV/m) (1 MHz RBW/10 Hz VBW)	Site Correction Factor (dB/m)	Average Corrected (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)
4810.0	34.9	-1.1	33.8	54.0	-20.2
12025.0	28.4	9.9	38.3	54.0	-15.7
19240.0	28.2	20.6	48.8	54.0	-5.2

Table 6-4: Radiated Emissions Harmonics/Spurious - 2430 MHz – Peak

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	13.6	32.8	46.4	74.0	-27.6
7290.0	12.2	34.7	46.9	74.0	-27.1
12150.0	12.8	42.9	55.7	74.0	-18.3
19440.0	13.4	50.8	64.2	74.0	-9.8

Table 6-5: Radiated Emissions Harmonics/Spurious - 2430 MHz – Average

Emission Frequency (MHz)	Average Analyzer Reading (dBuV/m) (1 MHz RBW/10 Hz VBW)	Site Correction Factor (dB/m)	Average Corrected (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)
4860.0	0.3	32.8	33.1	54.0	-20.9
7290.0	-2.5	34.7	32.2	54.0	-21.8
12150.0	-2.4	42.9	40.5	54.0	-13.5
19440.0	-1.5	50.8	49.3	54.0	-4.7

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

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	13.4	33.0	46.4	74.0	-27.6
7425.0	12.9	34.8	47.7	74.0	-26.3
12375.0	12.8	42.9	55.7	74.0	-18.3
19800.0	13.5	51.0	64.5	74.0	-9.5
22275.0	13.0	51.4	64.4	74.0	-9.6

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

Emission Frequency (MHz)	Average Analyzer Reading (dBuV/m) (1 MHz RBW/10 Hz VBW)	Site Correction Factor (dB/m)	Average Corrected (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)
4950.0	0.8	33.0	33.8	54.0	-20.2
7425.0	-1.7	34.8	33.1	54.0	-20.9
12375.0	-2.3	42.9	40.6	54.0	-13.4
19800.0	-1.6	51.0	49.4	54.0	-4.6
22275.0	-1.4	51.4	50.0	54.0	-4.0

Test Personnel:

Daniel W. Baltzell		May 13 and June 24, 2014
Test Engineer	Signature	Dates of Test

7 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.

8 6 dB Bandwidth – FCC §15.247(a)(2); RSS-210 §A8.2

8.1 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 8-1: 6 dB Bandwidth Test Equipment

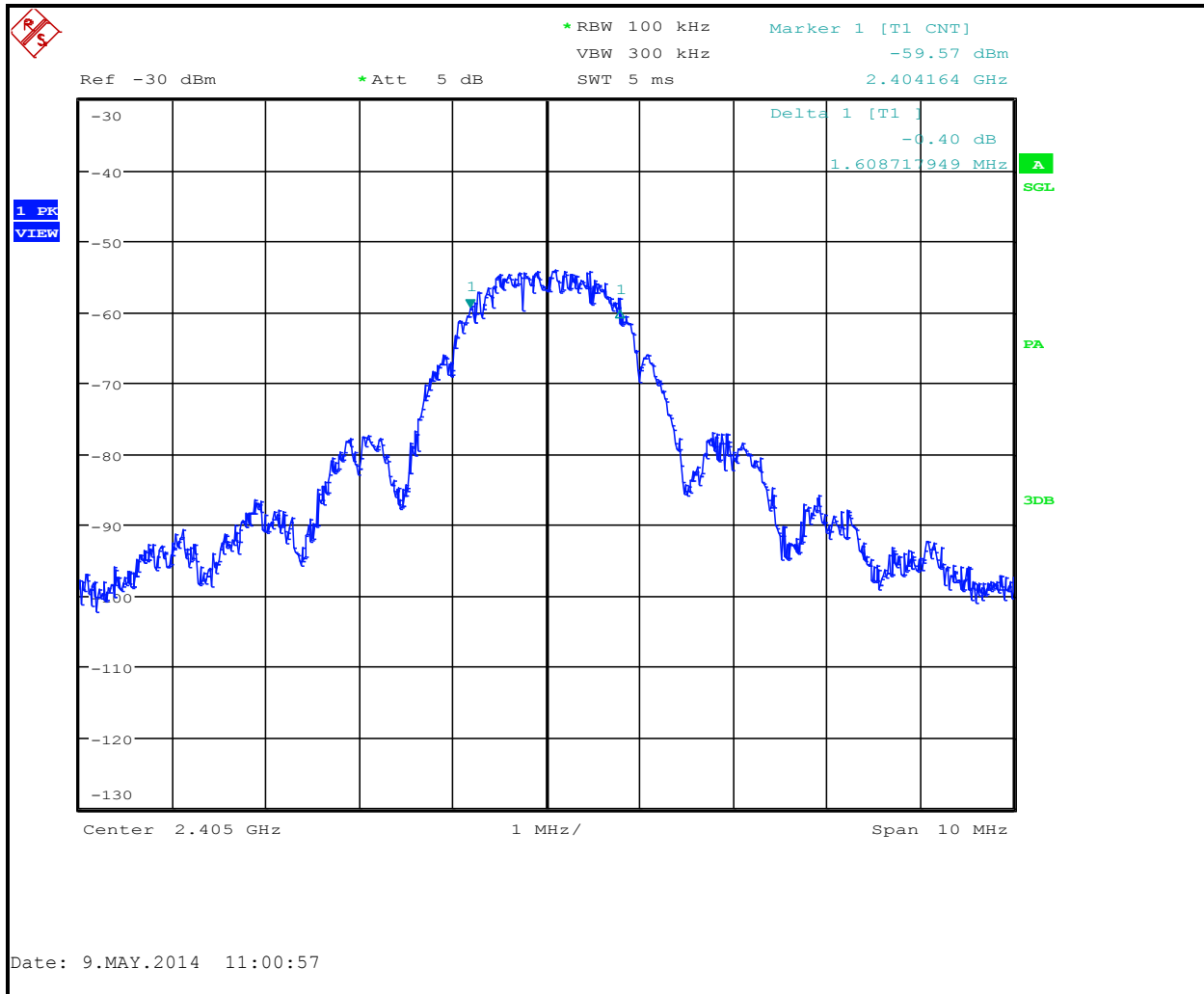
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	11/13/14

8.2 6 dB Modulated Bandwidth Test Data

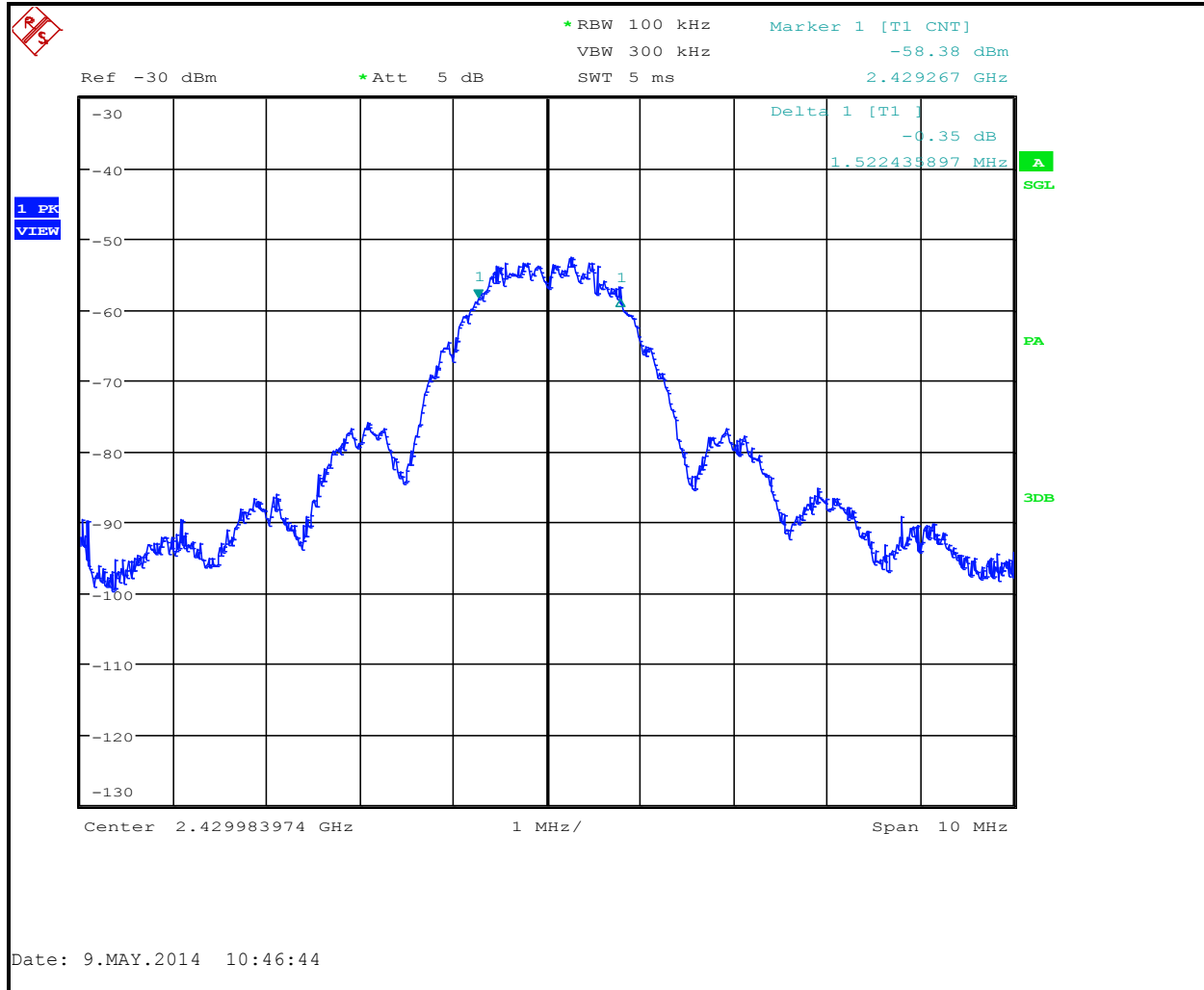
Table 8-2: 6 db Bandwidth Test Data – 802.11b

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass/Fail
11	2405	1.609	500	Pass
16	2430	1.522	500	Pass
25	2475	1.635	500	Pass

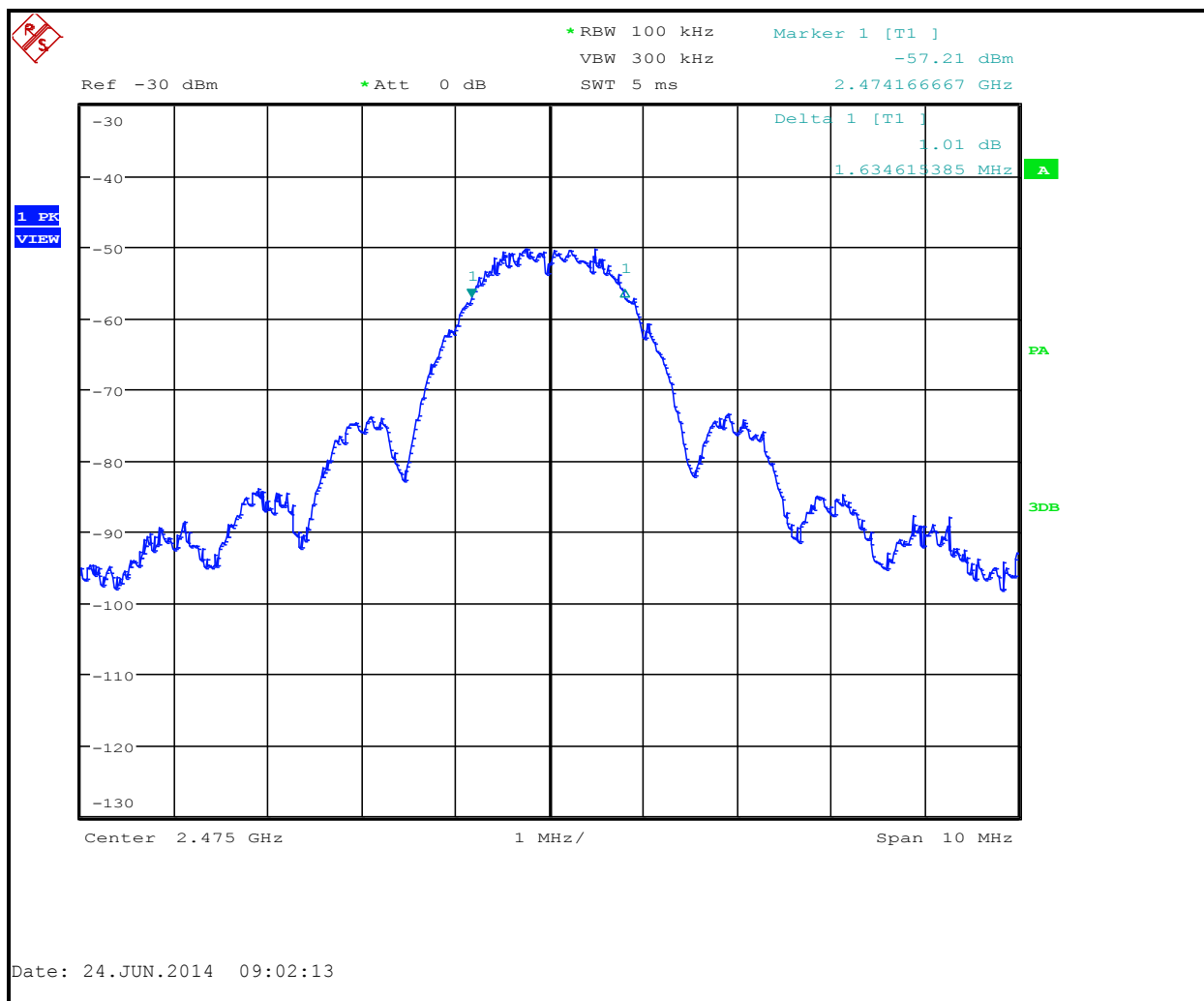
Plot 8-1: 6 dB Bandwidth - 2405 MHz



Plot 8-2: 6 dB Bandwidth - 2430 MHz



Plot 8-3: 6 dB Bandwidth - 2475 MHz



Test Personnel:

Daniel W. Baltzell		May 9 and June 24, 2014
Test Engineer	Signature	Dates of Test

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Client: Medeco Security Locks, Inc.
Model #: 10-15013
Standards: FCC 15.247/IC RSS-210
ID's: VR3-101501X/7465A-101501X
Report #: 2014065DTS

9 Conclusion

The data in this measurement report shows that the EUT as tested, Medeco Security Locks, Inc. Model # 10-15013, FCC ID: VR3-101501X, IC: 7465A-101501X, complies with all the applicable requirements of Parts 2 and 15 of the FCC Rules and Regulations, and IC RSS-210 and RSS-Gen.