FCC Part 15.256
Certification Application Report

Test Lab:		Applicant:	
Rhein Tech Laboratories, Inc. 360 Herndon Parkway Suite 1400 Herndon, VA 20170 E-Mail: atcbinfo@rheintech.com	Tel: 703-689-0368 Fax: 703-689-2056 www.rheintech.com	VEGA Grieshaber KG Am Hohenstein 113 D-77716 Schiltach Germany Contact: Juergen Motzer	Tel: 49-7836-50113
FCC ID	O6QPSWL61	**Test Report Date**	March 25, 2014
Platform	N/A	**RTL Work Order #**	2013239
Model	VEGAPULS WL61	**RTL Quote #**	QRTL13-239A
FCC Classification	DXX - Part 15 Low Power Communication Device Transmitter		
FCC Rule Part(s)/Guidance	Part 15C, 15.256: Radio Frequency Devices FCC 14-2: ET Docket No. 10-23: Amendment of Part 15 of the Commission's Rules To Establish Regulations for Level Probing Radars and Tank Level Probing Radars in the Frequency Bands 5.925-7.250 GHz, 24.05-29.00 GHz and 75-85 GHz KDB 890966-D01 Meas Level Probing Radars V01 (April 4, 2014)		
Test Procedure	ANSI C63.4-2009: Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz		
Test Procedure	ANSI C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices		
Digital Interface Information	Digital Interface was found to be compliant		

Frequency Range (GHz)	Output Power (W)	Frequency Tolerance	Emission Designator
25.2	0.0001	N/A	N/A

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 and ANSI C63.4.

Signature: _____ Date: March 25, 2014

Typed/Printed Name: Desmond A. Fraser Position: President

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.

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1 General Information

This measurement report is prepared on behalf of VEGA Grieshaber KG in accordance with the applicable Federal Communications Commission Rules and Regulations. The Equipment Under Test (EUT) was the VEGAPULS WL61, Level Probing Radar, FCC ID: O6QPSWL61. The test results reported in this document relate only to the items tested.

1.1 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc., 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report submitted to and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing.

1.2 Modifications

None.

2 Tested System Details

The test sample was received on December 3, 2013. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this testing, as applicable.

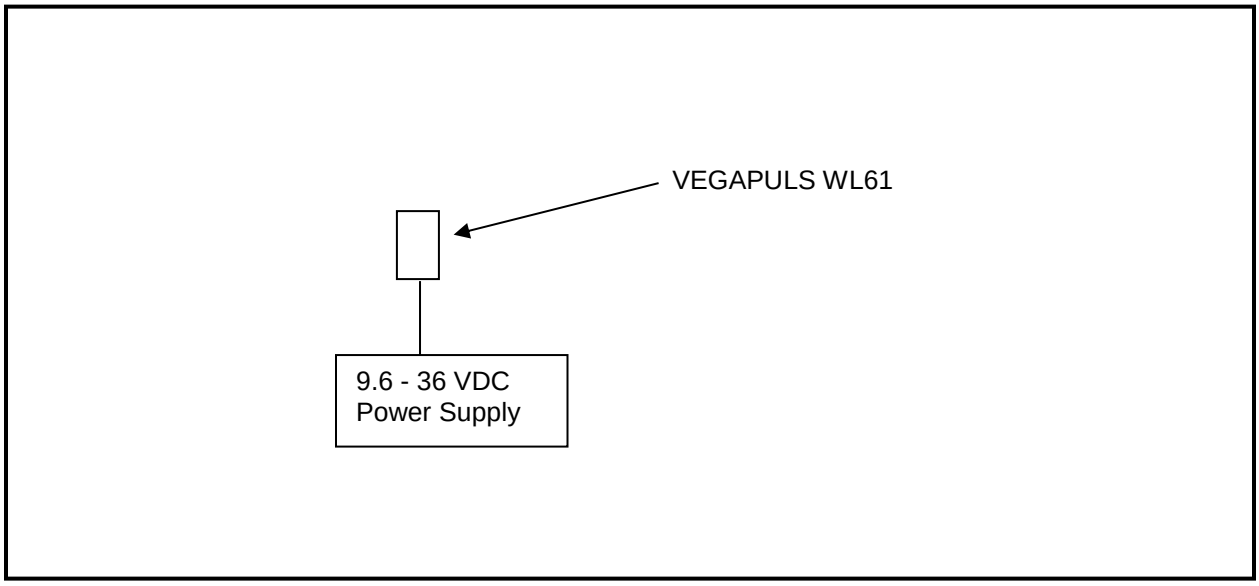
Table 2-1: Equipment under Test (EUT)

Part	Manufacturer	Model	Serial Number	FCC ID	Cable Type	RTL Bar Code
Level Probing Radar	VEGA Grieshaber KG	VEGAPULS WL61	25987627	O6QPSWL61	6m shielded	21345

2.1 Test Distance

The final radiated emissions tests were performed at a 3 meter horizontal distance from the edge of the radar to the test antenna. The EUT was also investigated at closer test distances in order to discern any emissions.

Figure 2-1: Configuration of Tested System



3 Modulated Bandwidth – ANSI C63.10 6.9, FCC 14-2 (15.256(f)(1))

3.1 Modulated Bandwidth Test Procedure - FCC 14-2 (15.256(f)(1))

The minimum 10 dB bandwidth was measured using a 50 ohm spectrum analyzer with the resolution bandwidth set at 1 MHz and the video bandwidth set at 3 MHz. The spectrum analyzer's display markers were set to -10 dB using max hold until the spectrum was filled and a plot taken.

3.2 Limits

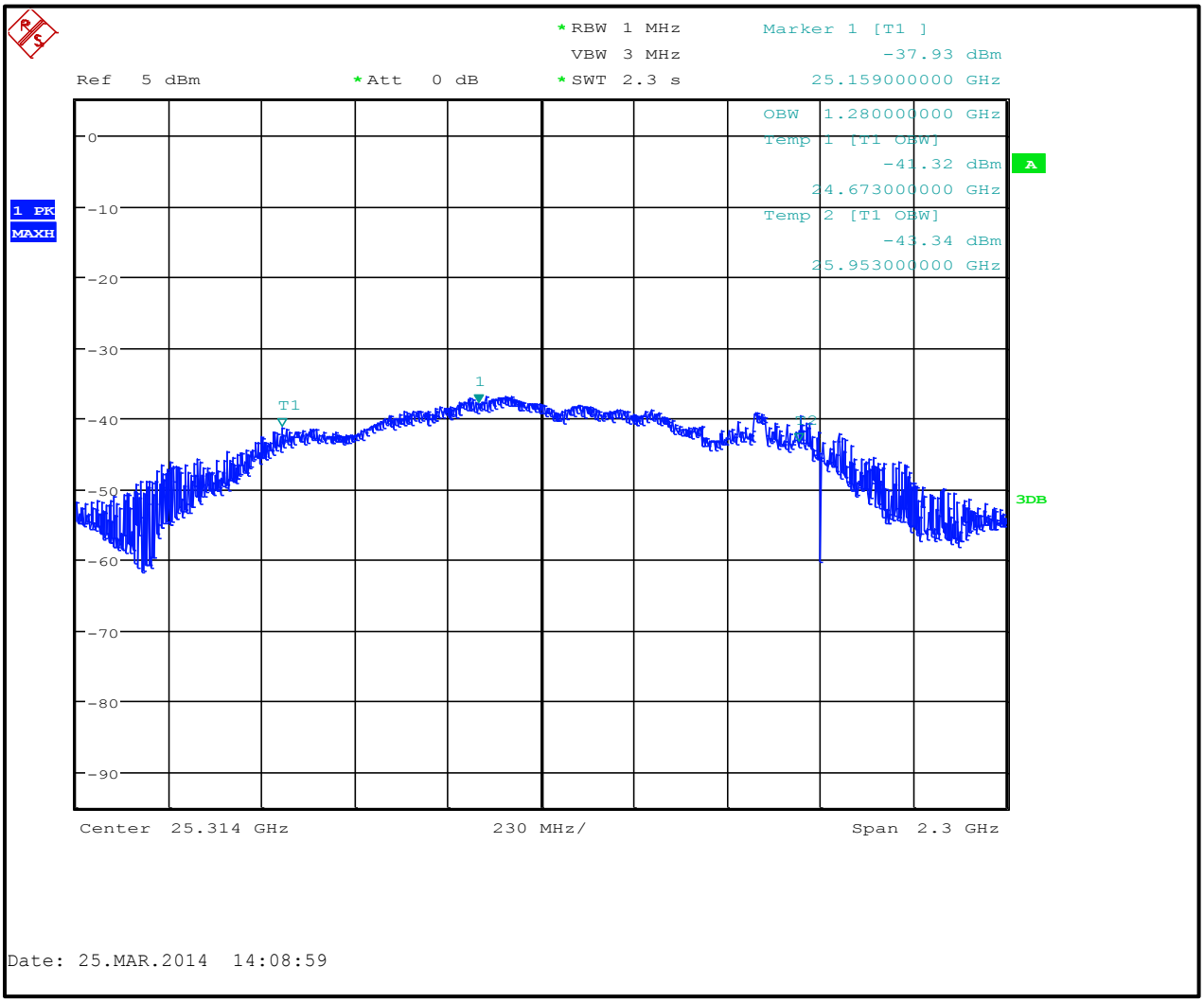
(f) The fundamental bandwidth of an LPR emission is defined as the width of the signal between two points, one below and one above the center frequency, outside of which all emissions are attenuated by at least 10 dB relative to the maximum transmitter output power when measured in an equivalent resolution bandwidth.
(1) The minimum fundamental emission bandwidth shall be 50 MHz for LPR operation under the provisions of this section.

3.3 Modulated Bandwidth Test Data

Table 3-1: 10 dB Modulated Bandwidth - 15.256(f)(1)

Frequency (GHz)	10 dB Bandwidth (GHz)	Minimum Limit (MHz)	Margin (MHz)
25.2	1.804	50	-1754

Plot 3-1: 10 dB Modulated Bandwidth



Marker T2: 25.953; Marker T1: 24.673 GHz; OBW= 1.28 GHz

Table 3-2: Modulated Bandwidth Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	11/13/14
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1 - 26.5 GHz)	3008A00505	8/27/14
901593	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36”	NA	8/27/14
901594	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36”	NA	8/27/14

Test Personnel:

Dan Baltzell		March 25, 2014
Test Engineer	Signature	Date of Test

4 Radiated Emissions – ANSI C63.10 6.3, FCC 14-2 (15.256(g)(3))

4.1 Radiated Fundamental Emissions Test Procedure – FCC 14-2 (15.256(g)(3))

Radiated emissions of the fundamental was tested by "bore sighting" the main-beam emissions to produce the maximum realizable antenna coupling. The EUT was also checked in all three orthogonal planes. Measurement was based on an average detector for -14 dBm/1 MHz power density limit and peak detector for 26 dBm/50 MHz limit. Limits are based on FCC 14-2 paragraph 33 using -14 dBm/MHz and 26 dBm in a 50 MHz bandwidth (corrected to 20 MHz). Since these limits are power density no pulse desensitization correction factor is required. Both were also measured finding the maximum amplitude at 3 meters and switching from 1 MHz to 20 MHz resolution bandwidths.

Limits: The EIRP limits for LPR operations in the bands authorized by this rule section are provided in the following table. These emission limits are based on bore sight measurements (*i.e.*, measurements performed within the main beam of the LPR antenna).

Frequency Band of Operation (GHz)	Average Emission Limit (EIRP in dBm measured in 1 MHz)	Peak Emission Limit (EIRP in dBm measured in 50 MHz)
5.925-7.250	-33	7
24.05-29.00	-14	26
75-85	-3	34

Per FCC 14-2 (15.256(g)(2)(ii)): Since the Rhode & Schwarz FSU 50 spectrum analyzer had a lower video bandwidth resolution than the RBW of 50 MHz, a lower RBW of 20 MHz was used and an adjustment to the limit is made by 20 log(RBW/50) dB. The resolution bandwidth used is 20 MHz; therefore 20log(20/50) = -8 dB reduction of the limit for the 50 MHz EIRP or 18 dBm.

4.2 Radiated Fundamental Emissions Test Data

Radiated measurements are converted from dBuV/m to dBm using the following equations:

$$W = \frac{(V/m \cdot d)^2}{30}$$

where:

V/m = volts per meter = $10^{(dBuV/m / 20)} / 1E6$
d = 3 meters
W = Watts

further: dBm = 10log (W · 1000)

Example: for 83.5 dBuV/m $10^{(83.5\ dBuV/m / 20)} / 1E6 = 0.015$ V/m

$$W = \frac{(0.015\ V/m \cdot 3)^2}{30} = 0.000068 \quad \therefore \quad dBm = 10Log(0.000068 \cdot 1000) = -11.7$$

Or from KDB 890966 6 b.

For radiated emission measurements

EIRP (dBm) = F.S. (dBµV/m) – 104.8 + 20 Log D

where:

D is the measurement distance

All power averaging (RMS) emission levels are to be measured utilizing a 1 MHz resolution bandwidth with a one millisecond dwell time over each 1 MHz segment. The frequency span of the analyzer should equal the number of sampling bins times 1 MHz and the sweep rate of the analyzer should equal the number of sampling bins times one millisecond. The video bandwidth of the measurement instrument shall not be less than the resolution bandwidth and trace averaging shall not be employed. The RMS average emission measurement is to be repeated over multiple sweeps with the analyzer set for maximum hold until the amplitude stabilizes. The peak emission measurement is to be repeated over multiple sweeps with the analyzer set for maximum hold until the amplitude stabilizes.

NOTE: Number of sampling BINS used = 1501

Table 4-1: Radiated Fundamental Emissions (EIRP in 1 MHz, Average Detector)

Frequency (GHz)	EIRP Measured (dBuV)	Site Correction Factor (dB/m)	Corrected Average Measurement (dBuV/m)	Converted to dBm	Limit (dBm)	Margin (dB)
25.2	50.2	15.9	66.1	-29.1	-14.0	-15.1

Site Correction Factor Calculation:

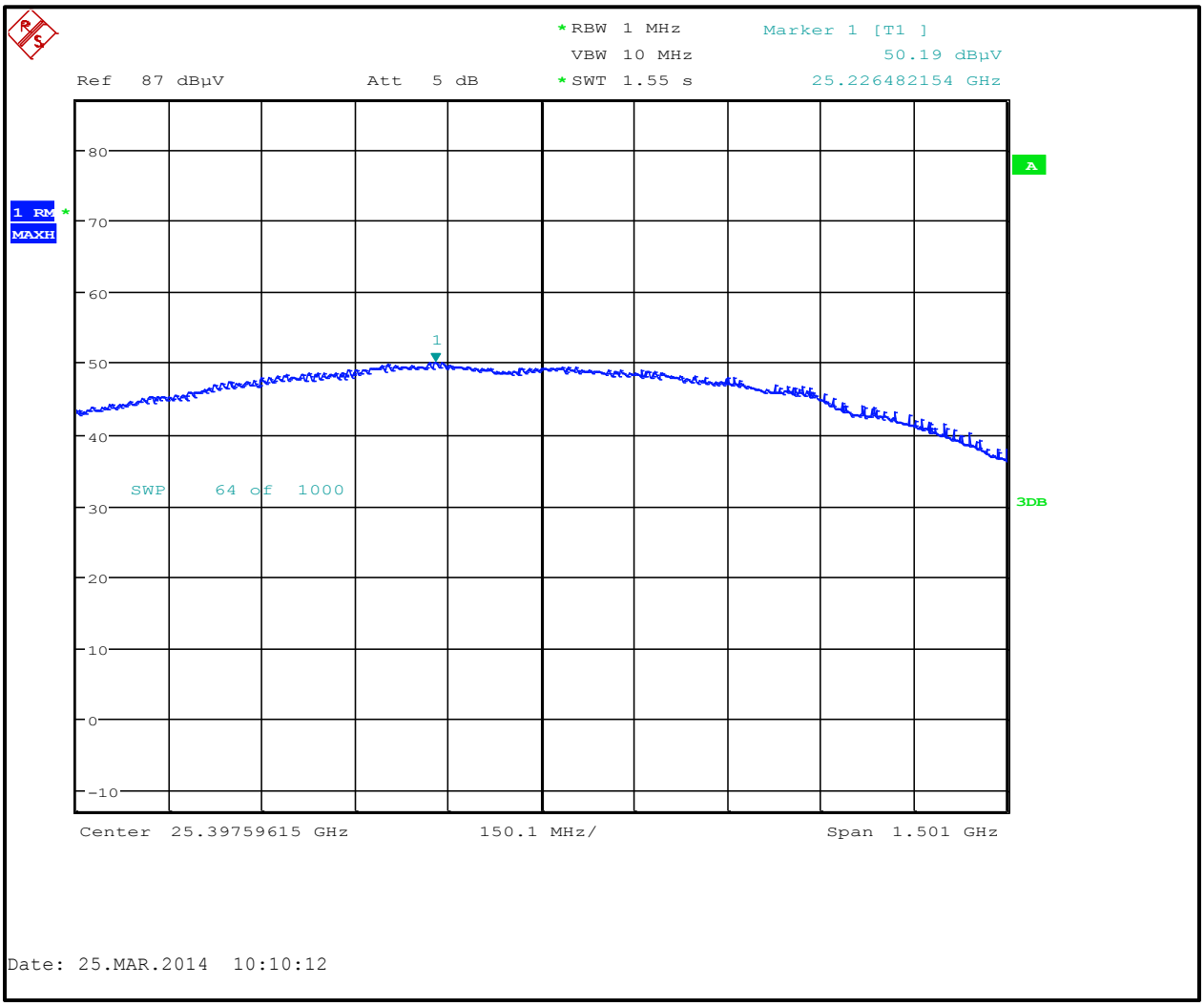
Antenna Correction Factor (40.5 dB/m) + Cable Loss (6.3 dB) – preamp gain (31.0 dB) = 15.9 dB/m

Table 4-2: Radiated Fundamental Emissions (EIRP in 20 MHz, Peak Detector)

Frequency (GHz)	EIRP Measured (dBuV)	Site Correction Factor (dB/m)	Corrected Peak Measurement (dBuV/m)	Converted to dBm	Limit (dBm)*	Margin (dB)
25.2	67.6	15.9	83.5	-11.7	18.0	-29.7

*NOTE: Per FCC 14-2 (15.256(g)(2)(ii)): Since the Rhode & Schwarz FSU 50 spectrum analyzer had a lower video bandwidth resolution than the RBW of 50 MHz, a lower RBW of 20 MHz was used and an adjustment to the limit is made by 20 log(RBW/50) dB. The resolution bandwidth used is 20 MHz; therefore 20log(20/50) = -8 dB reduction of the limit for the 50 MHz EIRP, from 26 dBm to 18 dBm.

Plot 4-1: Radiated Fundamental (EIRP in 1 MHz)



Plot 4-2: Radiated Fundamental (EIRP in 20 MHz)

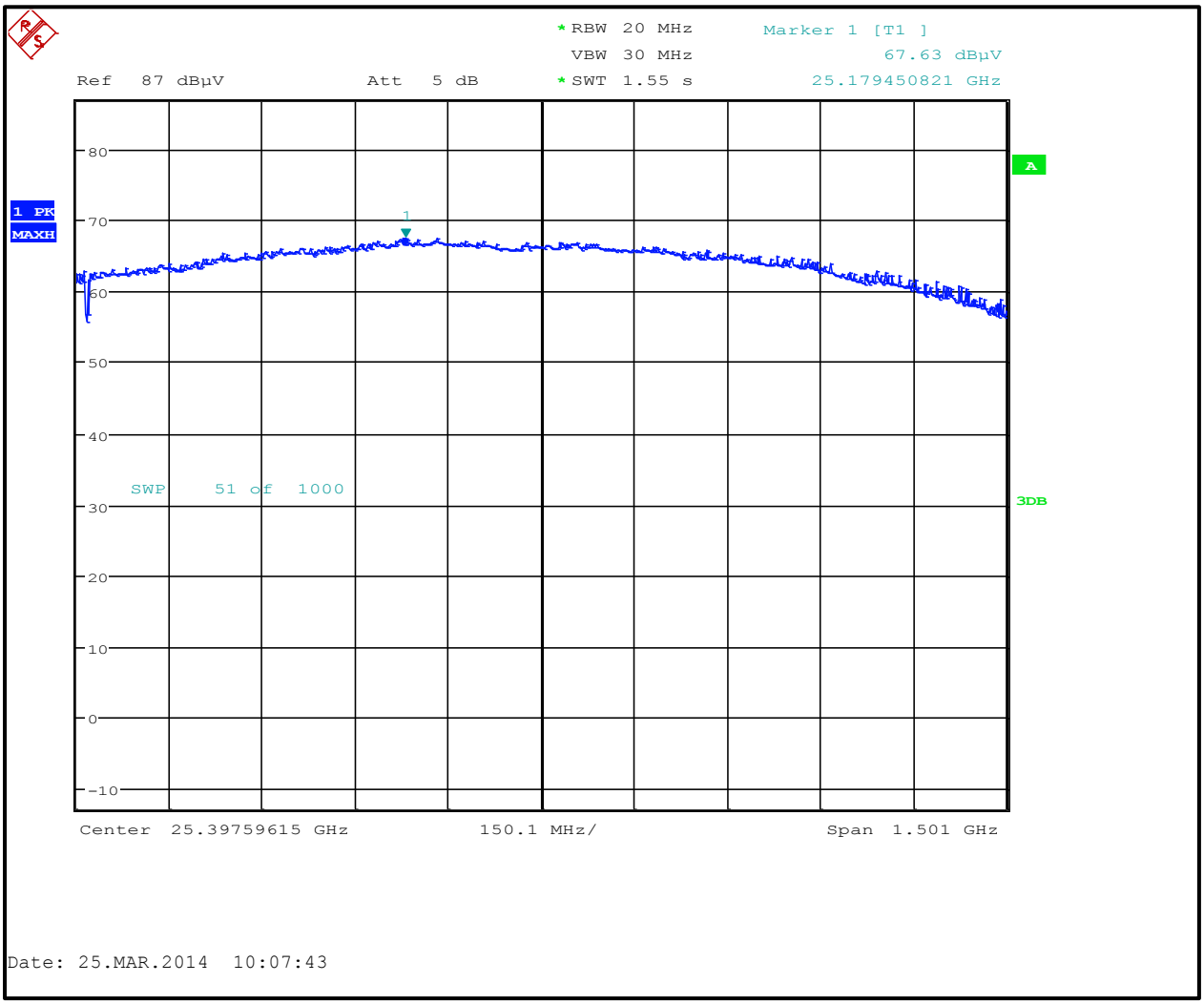


Table 4-3: Radiated Fundamental Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	11/13/14
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1 - 26.5 GHz)	3008A00505	8/27/14
901593	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36”	NA	8/27/14
901594	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36”	NA	8/27/14

Test Personnel:

Dan Baltzell		March 25, 2014
Test Engineer	Signature	Date of Test

4.3 Radiated Emissions – ANSI C63.10 6.3, FCC 14-2 (15.256(h)(k))

4.4 Radiated Emissions Harmonics/Spurious Test Procedure - FCC 14-2 (15.256(h)(k))

No radiated emissions of the harmonics were found to be measured; noise floor data was taken and corrected to three meters. The EUT was checked in the three orthogonal planes with the receive antenna in both polarities. A resolution bandwidth of 100 kHz was used for frequencies less than 1000 MHz, and a resolution bandwidth of 1 MHz was used for frequencies greater than or equal to 1000 MHz.

Limit: Unwanted Emissions from LPR devices shall not exceed the general emission limit in §15.209 of this chapter.

4.5 Radiated Emissions Harmonics/Spurious Test Data

No radiated harmonics were found to be measured or unintentional emissions above 1 GHz. The following plots are provided as reference. The plots were taken with the measuring antenna abutted to the transmit antenna, showing no indication or detectable frequencies, this reduces signal to noise ratio as a distance of 1 mm corrected to 3 m is 20 log (0.001/3) = -69.5 dB. The emissions from the EUT were investigated at 0.1m and 3 m to ensure no indication of detectable emissions.

Plot 4-3: Radiated Spurious Emissions (Second Harmonic)

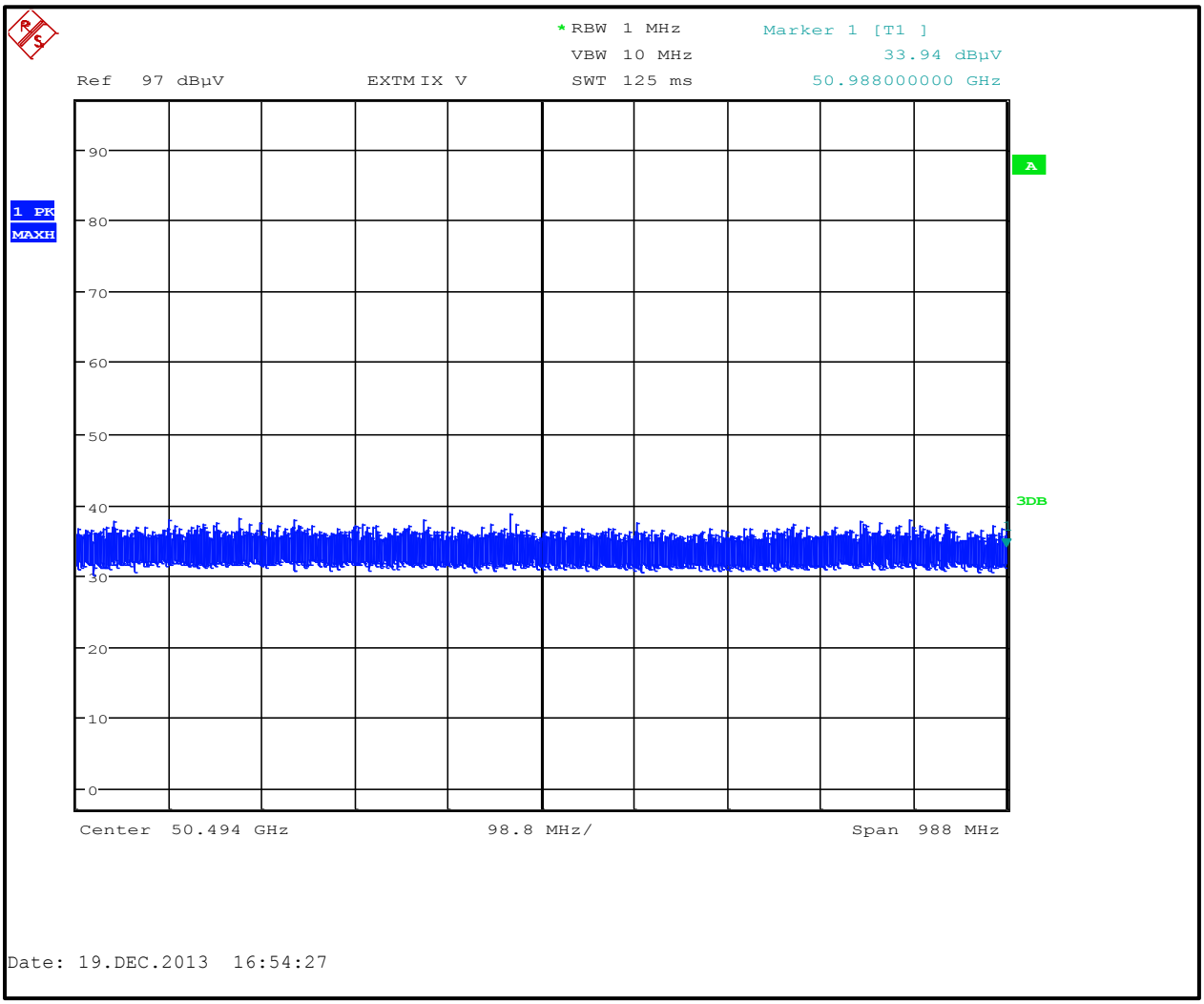


Table 4-4: Radiated Second Harmonic Noise Floor Calculation

Frequency (GHz)	EIRP Measured (dBuV)	Mixer Conversion Loss (dB)	Antenna Gain (dBi)	Correction from .001m to 3m (dB)	Corrected Measure-ment (dBuV/m)	Limit (dBuV/m)	Margin (dB)
50.4	38.0	18.2	24.0	-69.5	10.7	54.0	-43.3

Plot 4-4: Radiated Spurious Emissions (Third Harmonic)

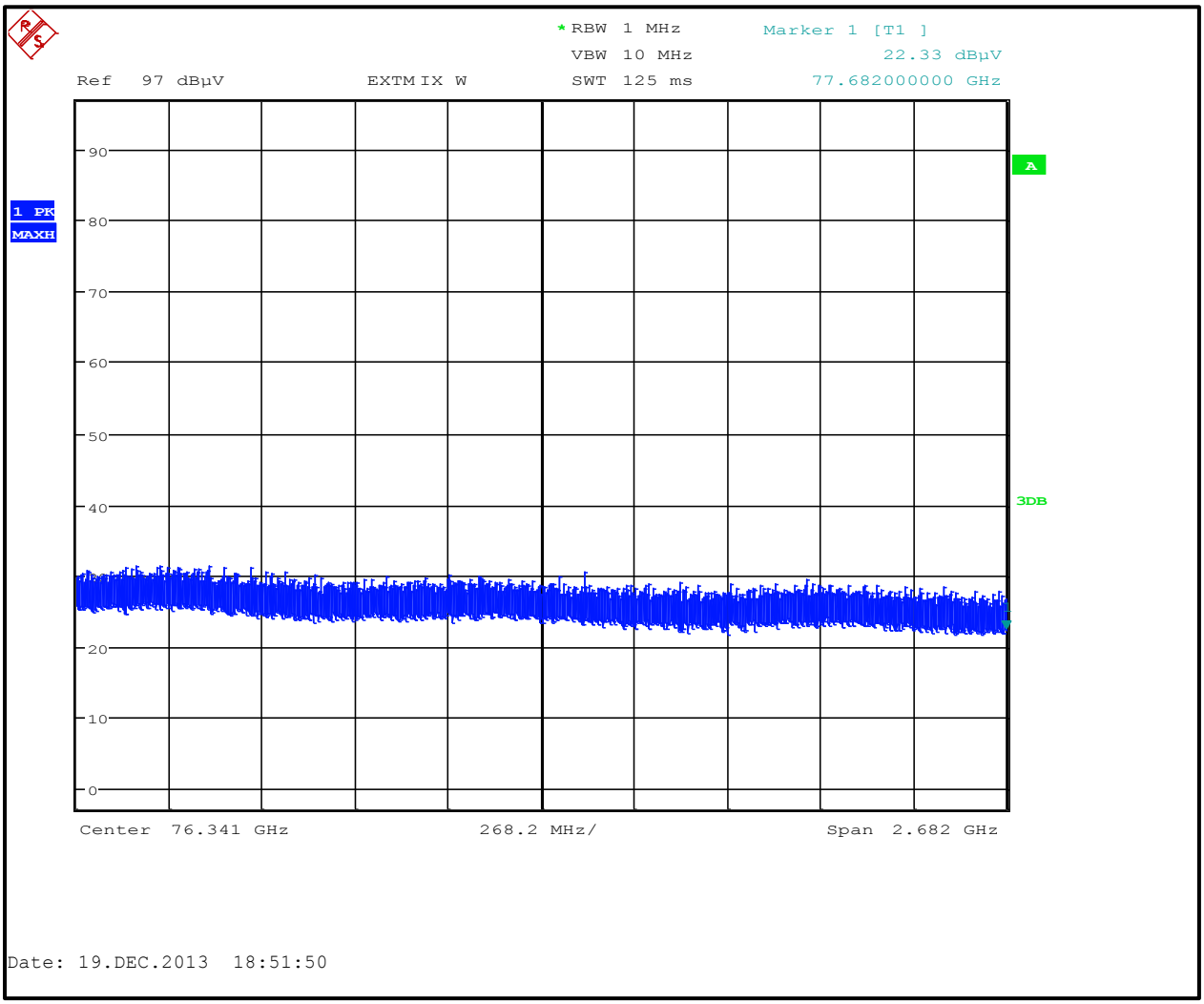


Table 4-5: Radiated Third Harmonic Noise Floor Calculation

Frequency (GHz)	EIRP Measured (dBuV)	Mixer Conversion Loss (dB)	Antenna Gain (dBi)	Correction from .001m to 3m (dB)	Corrected Measure-ment (dBuV/m)	Limit (dBuV/m)	Margin (dB)
75.6	32.0	20.8	22.5	-69.5	5.8	54.0	-48.2

Plot 4-5: Radiated Spurious Emissions (Fourth Harmonic)

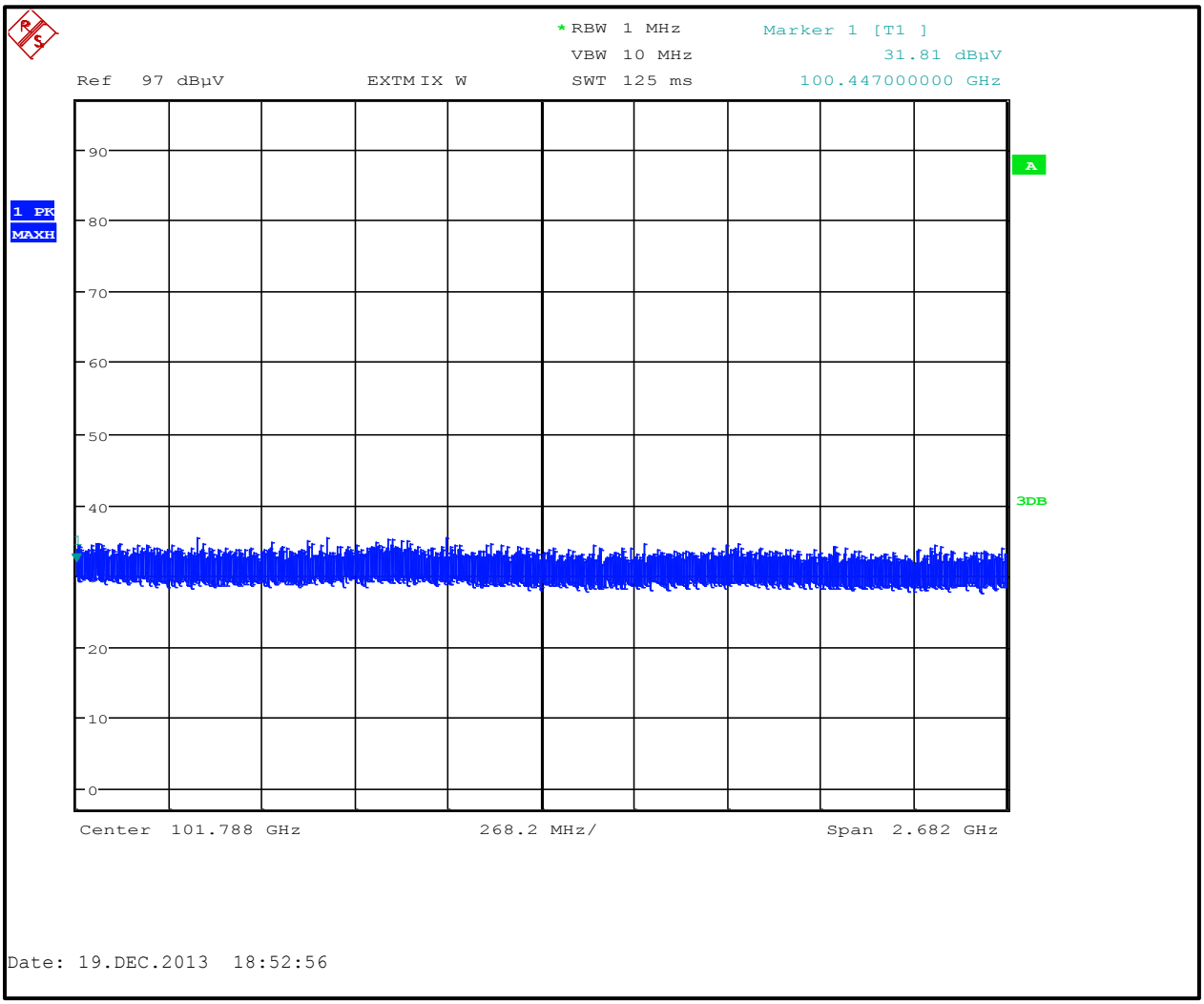


Table 4-6: Radiated Fourth Harmonic Noise Floor Calculation

Frequency (GHz)	EIRP Measured (dBuV)	Mixer Conversion Loss (dB)	Antenna Gain (dBi)	Correction from .001m to 3m (dB)	Corrected Measure-ment (dBuV/m)	Limit (dBuV/m)	Margin (dB)
100.8	36.0	24.8	23.2	-69.5	12.2	54.0	-41.8

Plot 4-6: Radiated Spurious Emissions (50 GHz – 75 GHz)

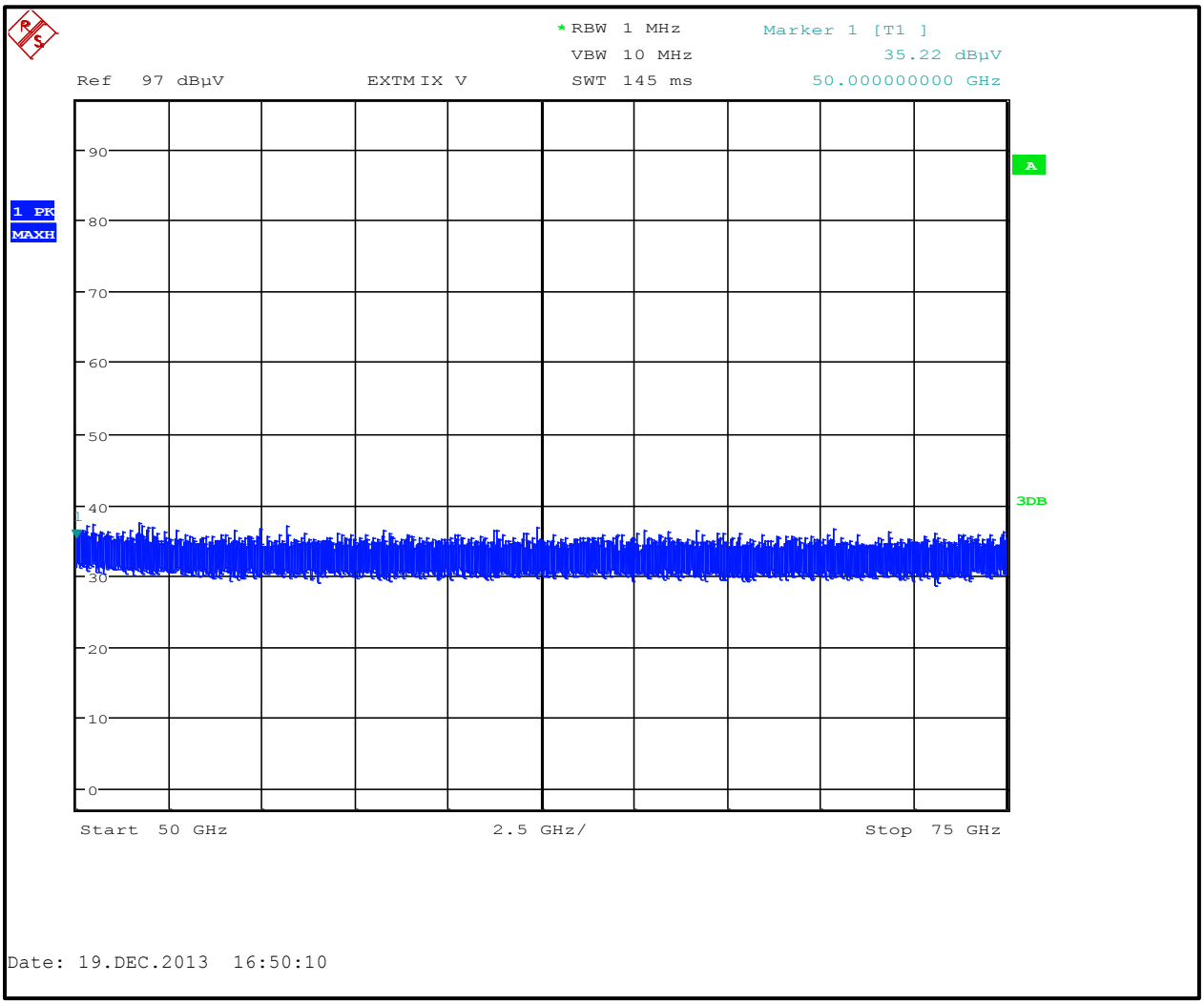


Table 4-7: Radiated Noise Floor Calculation (50 GHz – 75 GHz)

Frequency (GHz)	EIRP Measured (dBuV)	Mixer Conversion Loss (dB)	Antenna Gain (dBi)	Correction from .001m to 3m (dB)	Corrected Measure-ment (dBuV/m)	Limit (dBuV/m)	Margin (dB)
75.0 (worst case)	46.0	24.2	23.4	-69.5	24.1	54.0	-29.9

Plot 4-7: Radiated Spurious Emissions (75 GHz - 110 GHz)

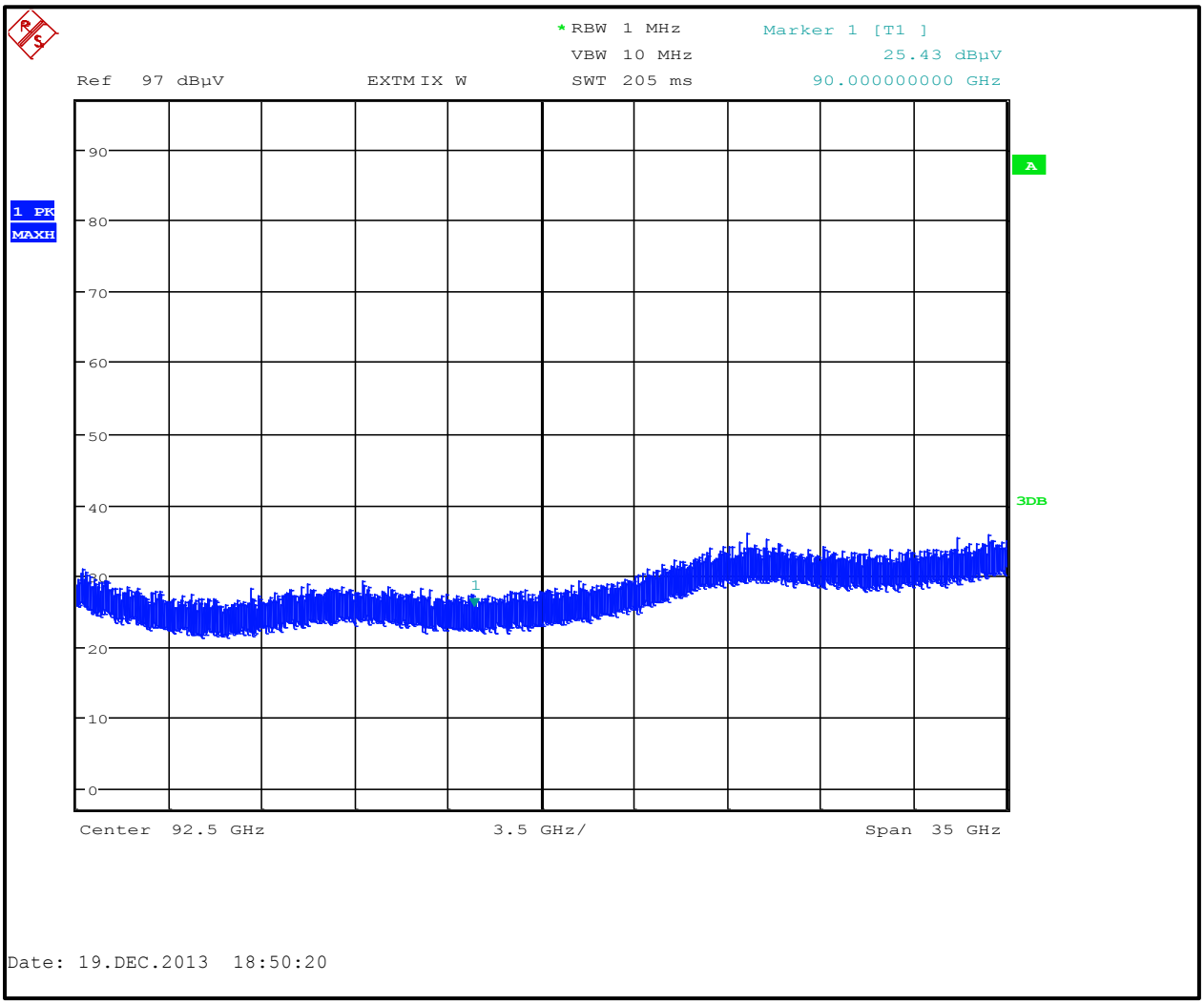


Table 4-8: Radiated Noise Floor Calculation (75 GHz – 110 GHz)

Frequency (GHz)	EIRP Measured (dBuV)	Mixer Conversion Loss (dB)	Antenna Gain (dBi)	Correction from .001m to 3m (dB)	Corrected Measure-ment (dBuV/m)	Limit (dBuV/m)	Margin (dB)
110.0 (worst case)	36.0	26.0	23.4	-69.5	15.9	54.0	-38.1

4.6 Radiated Emissions Unintentional/Digital Test Data

Table 4-9: Digital Radiated Emissions Test Data

Temperature: 47°F Humidity: 71%										
Emission Frequency (MHz)	**Test Detector**	**Antenna Polarity (H/V)**	**Turntable Azimuth (deg)**	**Antenna Height (m)**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB/m)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Pass/ Fail**
118.920	Qp	V	0	1.0	37.0	-19.8	17.2	43.5	-26.3	Pass
198.225	Qp	V	180	1.0	39.5	-21.8	17.7	43.5	-25.8	Pass
207.020	Qp	V	40	1.0	39.7	-21.8	17.9	43.5	-25.6	Pass
215.840	Qp	V	0	1.0	36.7	-21.8	14.9	43.5	-28.6	Pass
307.862	Qp	H	0	1.0	31.6	-17.2	14.4	46.0	-31.6	Pass
315.025	Qp	H	180	1.0	32.7	-17.1	15.6	46.0	-30.4	Pass
322.180	Qp	H	180	1.0	33.9	-16.9	17.0	46.0	-29.0	Pass
327.355	Qp	V	0	1.0	32.3	-16.8	15.5	46.0	-30.5	Pass
329.340	Qp	H	180	1.0	35.1	-16.7	18.4	46.0	-27.6	Pass
336.505	Qp	H	180	1.0	34.6	-16.5	18.1	46.0	-27.9	Pass
343.658	Qp	H	180	1.0	33.8	-16.2	17.6	46.0	-28.4	Pass
390.598	Qp	V	100	1.0	36.1	-14.5	21.6	46.0	-24.4	Pass
399.353	Qp	V	90	1.0	35.8	-14.1	21.7	46.0	-24.3	Pass
417.470	Qp	V	180	1.0	37.3	-13.2	24.1	46.0	-21.9	Pass
433.150	Qp	H	90	1.2	33.1	-13.0	20.1	46.0	-25.9	Pass
440.327	Qp	H	90	1.2	34.3	-12.9	21.4	46.0	-24.6	Pass
444.840	Qp	V	90	1.0	35.8	-12.9	22.9	46.0	-23.1	Pass
447.487	Qp	H	90	1.2	35.2	-12.9	22.3	46.0	-23.7	Pass
454.650	Qp	H	90	1.2	35.5	-12.9	22.6	46.0	-23.4	Pass

Unwanted emissions were investigated (other than harmonics) as required by 15.33(a)(2).

“If the intentional radiator operates at or above 10 GHz and below 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.”

Table 4-10: Radiated Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
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
901594	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36”	NA	8/27/14
900905	Rhein Tech Laboratories, Inc.	PR-1040	Amplifier (20 MHz - 2 GHz)	900905	8/20/14
900791	Schaffner Chase	CBL6112	Bilog Periodic Antenna (25 MHz - 2 GHz)	2099	2/2/14
900913	Hewlett Packard	85462A	EMI Receiver RF Section (9 kHz - 6.5 GHz)	3325A00159	11/4/14
900914	Hewlett Packard	85460A	RF Filter Section (100 kHz - 6.5 GHz)	3330A00107	11/4/14
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1 - 26.5 GHz)	3008A00505	8/27/14
900772	EMCO	3161-02	Horn Antenna (2.0 - 4.0 GHz)	9804-1044	4/20/15
900321	EMCO	3161-03	Horn Antenna (4.0 - 8.2 GHz)	9508-1020	4/20/15
900151	Rohde and Schwarz	HFH2-Z2	Loop Antenna, (9 kHz - 30 MHz)	827525/019	10/1/14
900323	EMCO	3160-07	Horn Antenna (8.2 - 12.4 GHz)	9605-1054	4/20/15
900873	CMT	RA28-K-F-4B-C	Waveguide WR-28 (26.5 – 40 GHz)	990706-001	1/23/14
901303	EMCO	3160-10	Horn Antenna WR-28 (26.5 - 40.0 GHz)	960452-007	1/23/14
900874	CMT	RA42-K-F-4B-C	Waveguide (18 - 26.5 GHz)	990706-002	1/23/14
900356	EMCO	3160-08	Horn Antenna (12.4 - 18 GHz)	9607-1044	4/20/15
900711	ATM	10-443-6R	Horn Antenna (75 - 110 GHz)	8051905-1	4/20/15
900712	ATM	15-443-6R	Horn Antenna (50 - 75 GHz)	8051805-1	4/20/15

Radiated Emissions Test Equipment (Continued)

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900717	Hewlett Packard	11970U	Harmonic Mixer (40 – 60 GHz)	2332A01110	4/20/15
901588	Rohde & Schwarz	FS-Z110	Mixer (75 – 110 GHz)	100010	4/2/14
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	11/13/14
901586	Rohde & Schwarz	1089.0876.00	Harmonic Mixer (50 – 75 GHz)	100098	4/2/14
901256	ATM	19-443-6R	Horn antenna (40-60 GHz, WR-19)	8041704-01	12/5/14
900930	Hewlett Packard	85662A	Spectrum Analyzer Display Section	3144A20839	2/7/14
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	2/7/14
N/A	Rhein Tech Laboratories, Inc.	Automated Emissions Tester	Emissions Testing Software	Rev. 14.0.2	N/A

Test Personnel:

Daniel W. Baltzell		December 13, 2013 & January 14, 2014
Test Engineer	Signature	Dates of Test

5 Frequency Stability ANSI C63.10 6.8, FCC 14-2 (15.256(f)(2))

5.1 Frequency Stability Test Procedure - FCC 14-2 (15.256(f)(2))

The carrier frequency stability is the ability of the transmitter to maintain an assigned carrier frequency.

The EUT was evaluated over the temperature range -30°C to +55°C.

The temperature was initially set to -30°C and a 1-hour period was observed for stabilization of the EUT. The frequency stability was measured within one minute after application of primary power to the transmitter. The temperature was raised at intervals of 10 degrees centigrade through the range. A ½-hour period was observed to stabilize the EUT at each measurement step and the frequency stability was measured within one minute after application of primary power to the transmitter. Additionally, the power supply voltage of the EUT was varied +/-15% nominal input voltage, +15% of minimum voltage and -15% of maximum voltage.

5.2 FCC 15.256(f)(2) Limit

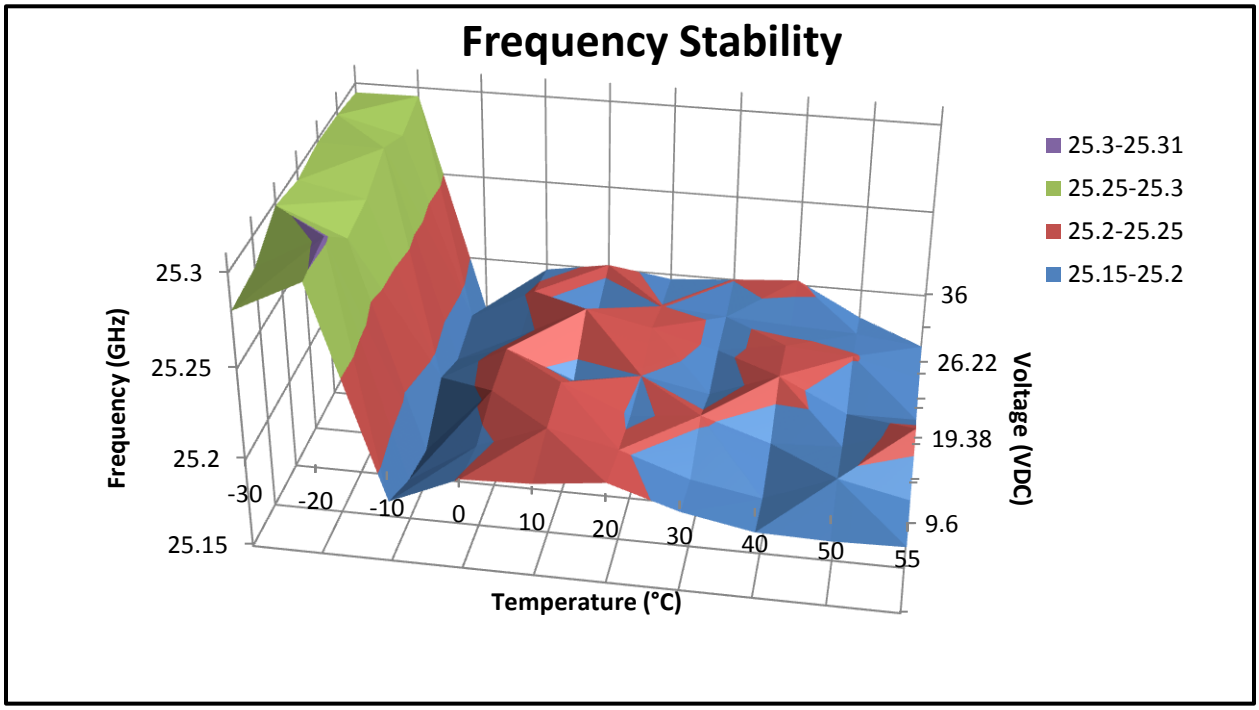
LPR devices operating under this section must confine their fundamental emission bandwidth within the 5.925-7.250 GHz, 24.05-29.00 GHz, and 75-85 GHz bands under all conditions of operation.

5.3 Temperature-Voltage Frequency Stability Test Data

Table 5-1: Temperature-Voltage Frequency Stability (Normalized to 20°C/22 VDC)

Temperature (°C)	+/- 15% VDC						
	9.6	11.04	19.38	22.8	26.22	30.6	36
-30	25.28063	25.28384	25.29830	25.29444	25.29853	25.29753	25.29463
-20	25.29879	**25.30335**	25.28364	25.28669	25.29797	25.28822	25.29505
-10	25.18463	25.17270	25.16691	25.18825	25.17766	25.18433	25.16767
0	25.20126	25.19647	25.20583	25.20879	25.19599	25.20268	25.19671
10	25.20279	25.21057	25.21431	25.19371	25.21523	25.19283	25.20269
20	25.20734	25.20213	25.19858	25.20000	25.20742	25.20016	25.19719
30	25.19507	25.18932	25.20263	25.19285	25.19733	25.19715	25.20013
40	25.18778	25.18237	25.19037	25.20699	25.20377	25.19500	25.20291
50	25.18692	25.19783	25.19225	25.18862	25.20103	25.19363	25.18332
55	25.18793	25.18945	25.20658	25.18907	25.19145	25.18933	**25.16665**

Plot 5-1: Frequency Stability – Voltage/Temperature/ppm



To determine if the bandwidth of the signal remains within the band 24.05 GHz – 29 GHz, the lowest frequency generated, 25.16665 GHz (at -55°C, 36VDC), and the highest frequency generated, 25.30335 GHz (at -20°C, 11.04VDC), are compared to the bandwidth of the signal as measured, 1.28 GHz.

Half the bandwidth to determine the edge of the frequency is subtracted from the lowest frequency generated, and added to the highest frequency generated. ½ bandwidth = 1.28 GHz / 2 = 640 MHz

Lowest frequency generated 25.16665 GHz - 640 MHz = 24.52665 GHz, which is within the band 24.05 - 29 GHz (passing with margin 24.05 - 24.52665 = -476.65 MHz)

Highest frequency generated 25.30335 GHz + 640 MHz = 25.94335 GHz, which is within the band 24.05 -- 29 GHz (passing with margin 25.94335 – 29 = -3.05665 GHz)

Results: The EUT is compliant.

Table 5-2: Frequency Stability Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900946	Tenney Engineering, Inc.	TH65	Temperature Chamber with Humidity	11380	1/13/14
901581	Rohde & Schwarz	FSU	Spectrum Analyzer	1166.1660.50	11/13/14
901593	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36”	NA	8/27/14
901218	EMCO	3160-09	Horn Antenna (26.5 GHz)	960281-003	4/19/14
901350	Meterman	33XR	Multimeter	040402802	3/20/15

Test Personnel:

Daniel Baltzell		December 20, 2013
Test Engineer	Signature	Date of Tests

6 AC Conducted Emissions - FCC Rules and Regulations ANSI C63.10 6.2, Part 15.207

6.1 Test Methodology for Conducted Line Emissions Measurements – Part 15.207

The power line conducted emission measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was placed on a wooden table. Power was fed to the EUT through a 50-ohm/50 μHenry Line Impedance Stabilization Network (LISN). The EUT LISN was fed power through an AC filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT's auxiliary equipment. This peripheral LISN was also fed AC power.

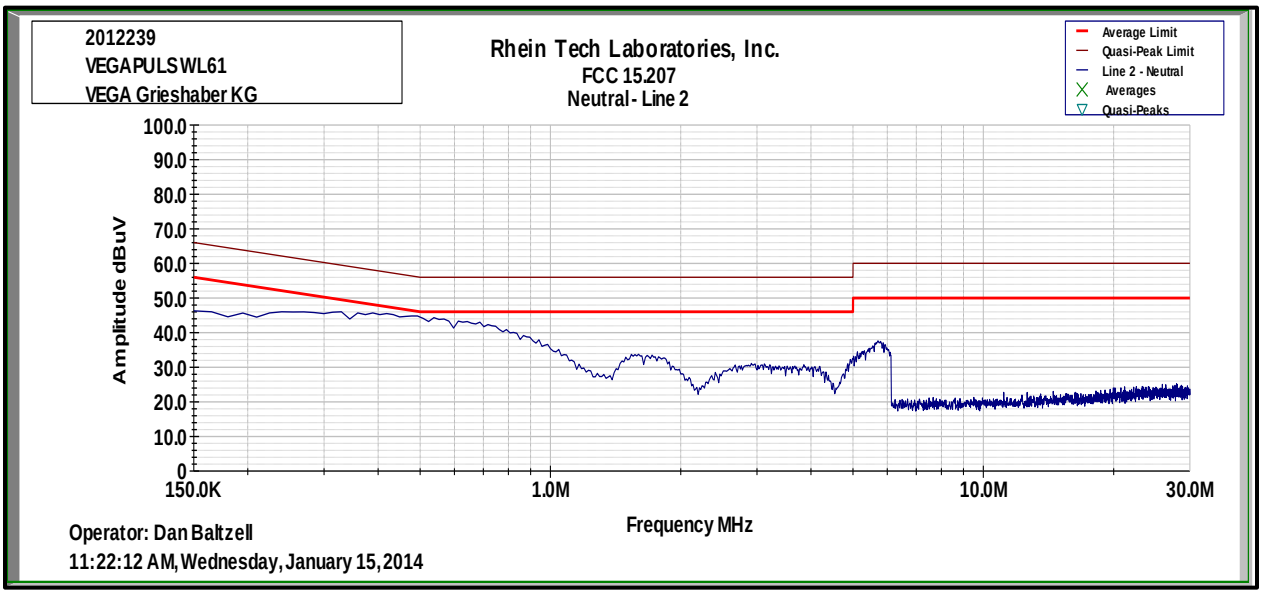
The spectrum analyzer was connected to the AC line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 100 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 100 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. Video filter less than 10 times the resolution bandwidth is not used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from 150 kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limits were measured and have been recorded.

6.2 Conducted Line Emissions Test Procedure

Conducted emissions were performed on the EUT using an off-the-shelf 24 volt power supply. The general conducted limit under Part 15.207 was applied. The emissions were scanned between 150 kHz to 30 MHz on the neutral and phase conductors.

6.3 Conducted Line Emissions Test Data

Plot 6-1: Conducted Emissions Transmit - Neutral Side – VEGAPULS WL61



Plot 6-2: Conducted Emissions Transmit - Hot Side – VEGAPULS WL61

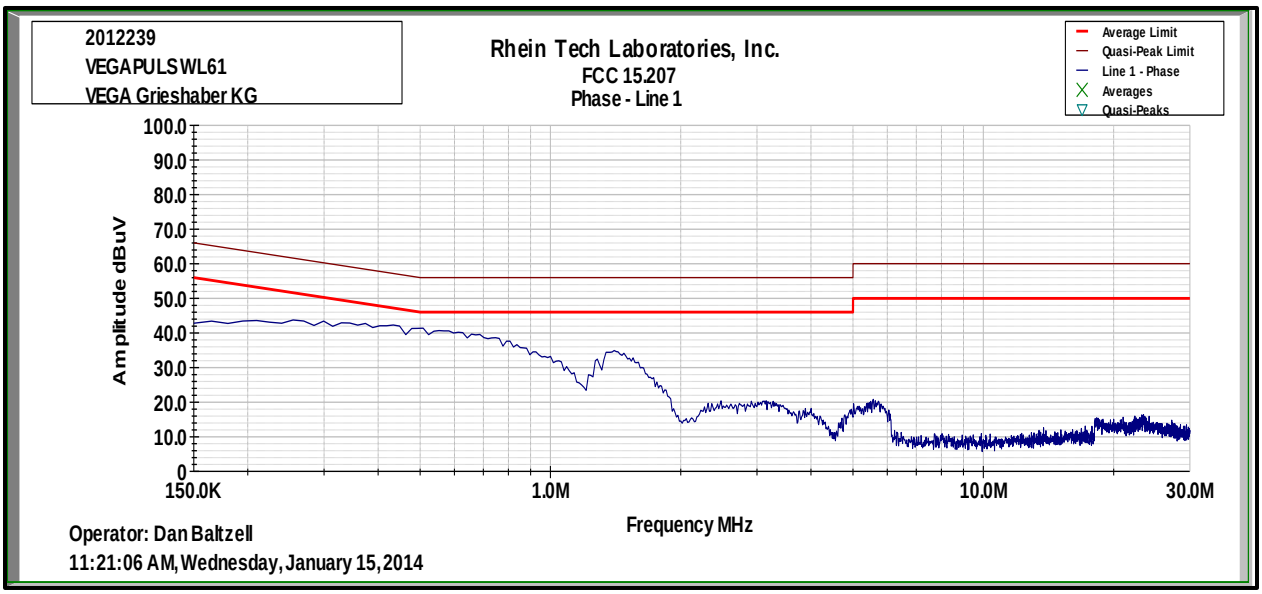
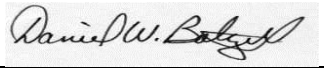


Table 6-1: Conducted Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900968	Hewlett Packard	8567A	Spectrum Analyzer (10 kHz - 1.5 GHz)	2602A00160	2/7/14
900969	Hewlett Packard	85650A	Quasi-Peak Adapter	2412A00414	2/7/14
900970	Hewlett Packard	85662A	Spectrum Analyzer Display	2542A11239	2/7/14
901083	AFJ International	LS16	16A LISN (110 V)	16010020080	8/27/14
N/A	Rhein Tech Laboratories, Inc.	Automated Emissions Tester	Emissions Testing Software Rev. 14.0.2	N/A	N/A

Test Personnel:

Daniel W. Baltzell		January 15, 2014
Test Engineer	Signature	Date of Test

7 Conclusion

The data in this measurement report shows that the Vega Grieshaber KG Model VEGAPULS WL61, FCC ID: O6QPSWL61, complies with the applicable requirements of Parts 2 and 15 of the FCC Rules and Regulations.