Electromagnetic Compatibility Test Report

Prepared in accordance with

CFR 47 part15.225, RSS210

On

PRJ-0690

Prepared for:

Enercon Technologies
2500 Northbrook Ln
Gray, Maine 04039
U.S.A.

Prepared by:

TUV Rheinland of North America, Inc.
1279 Quarry Lane, Ste. A
Pleasanton, CA 94566 U.S.A.

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Revisions

Revision No.	Date	Reason for Change	Author
0		Original Document	D. Foster

Note: Latest revision report will replace all previous reports.

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ATTESTATION OF TEST RESULTS

Client:	Enercon Technologies 2500 Northbrook Ln Gray, Maine 04039 U.S.A.	Ben Clarke Tel. 207-657-7000 bclarke@enercontechnologies.com	
Model Name:	Vialmix	***Serial Number:***	1830600023
Model Numbers:	PRJ-0690	***Date(s) Tested:***	December 12-19, 2018
Test Location:	TUV Rheinland of North America 1279 Quarry Lane, Ste. A Pleasanton, CA 94566 U.S.A. Tel. (925) 249-9123		
Test Specifications:	Emissions:	CFR47 part15.225, RSS 210	
	Immunity:	N/A	
Test Result:	**The above product was found to be Compliant to the above test standard(s)**		

Prepared by: Donn Foster	***Reviewed by: Josie Sabado***
December 19, 2018 *Date* *Name* *Signature*	December 21, 2018 *Date* *Name* *Signature*

Other aspects:	**None**

PLEASANTON

US1131	**Testing Cert #3331.02**	**INDUSTRY CANADA 2932M-1**	**1097 (A-0268)**

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1 General Information

1.1 Scope

This report is intended to document the status of conformance with the listed standards based on the results of testing performed on December 12-19, 2018 on the Vialmix, Model No.:PRJ-0690, manufactured by Enercon Technologies. This report only applies to the specific samples tested under the stated test conditions. It is the responsibility of the manufacturer to assure that additional production units of this model are manufactured with identical or EMI equivalent electrical and mechanical components. This report is further intended to document changes and modifications to the EUT throughout its life cycle. All documentation will be included as a supplement.

1.2 Purpose

Testing was performed to evaluate the EMC performance of the EUT (Equipment Under Test) in accordance with the applicable requirements, procedures, and criteria defined in the application of regulations and application of standards listed in this report.

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1.3 Summary of Test Results

Applicant	Enercon Technologies 2500 Northbrook Ln Gray, Maine 04039 U.S.A.
Contact	Ben Clarke
Tel.	207-657-7000
E-mail	bclarke@enercontechnologies.com
Description	Precision vial shaker for intravenous tracking serum
Model Name	Vialmix
Model Number	PRJ-06900
Serial Number	1830600023
Input Power	120V 60 Hz
Test Date(s)	December 12-19, 2018

	Description	Severity Level or Limit	Criteria	Test Result
CFR47 part 15.225, RSS 210 Product Family Standard Emissions	Radio Equipment Operation within the band 13.110-14.010 MHz.	See called out basic standards below	See Below	Complies
CFR47 part 15.225, RSS 210	Radiated Emissions	CLASS B 9KHZ- 1GHZ	Limit	Complies
CFR47 part 15.225, RSS 210	Conducted Emissions	Class B 150 kHz - 30 MHz	Limit	Complies

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2 Laboratory Information

2.1 Accreditations & Endorsements

2.1.1 US Federal Communications Commission

TUV Rheinland of North America EMC test facilities located at 1279 Quarry Lane, Ste. A, Pleasanton, CA, 94566, and 5015 Brandin Ct. Fremont, CA, 94538 are recognized by the Commission for performing testing services for the general public on a fee basis. These laboratory test facilities have been fully described in reports submitted to and accepted by the FCC (Pleasanton Registration No. US1131, Fremont Registration No. US5251). The laboratory Scopes of Accreditation include Title 47 CFR Parts 15, 18 and 90. The accreditations are updated every three years.

2.1.2 A2LA

TUV Rheinland of North America EMC test facilities are accredited by the American Association for Laboratory Accreditation (A2LA). The laboratories have been assessed and accredited by A2LA in accordance with ISO Standard 17025:2005 (Testing Certificate #3331.02). The Scope of Laboratory Accreditation includes emission and immunity testing. The accreditations are updated annually.

2.1.3 Industry Canada

The Pleasanton 5-meter Semi-Anechoic Chamber, Registration No. 2932M-1, has been accepted by Industry Canada to perform testing to 3 and 5 meters based on the test procedures described in ANSI C63.4-2014. The Fremont 10-meter Semi-Anechoic Chamber, Registration No. 2932D-1, has been accepted by Industry Canada to perform testing to 3 and 10 meters based on the test procedures described in ANSI C63.4-2014.

2.1.4 Japan – VCCI

The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) is a group that consists of Information Technology Equipment (ITE) manufacturers and EMC test laboratories. The purpose of the Council is to take voluntary control measures against electromagnetic interference from Information Technology Equipment, and thereby contribute to the development of a socially beneficial and responsible state of affairs in the realm of Information Technology Equipment in Japan. TUV Rheinland of North America EMC test facilities located at 1279 Quarry Lane, Ste. A, Pleasanton, CA, 94566, and 5015 Brandin Ct. Fremont, CA, 94538, have been assessed and approved in accordance with the Regulations for Voluntary Control Measures.

VCCI Registration No. for Pleasanton: A-0268

VCCI Registration No. for Santa Clara: A-0268

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2.2 Test Facilities and EMC Software

Test facilities are located at 1279 Quarry Lane, Ste. A, Pleasanton, California 94566, U.S.A. and 5015 Brandin Ct, Fremont, CA 94538.

2.2.1 Emission Test Facility

The Semi-Anechoic Chambers and AC Line Conducted measurement facilities used to collect radiated and conducted emissions data have been constructed in accordance with ANSI C63.7:1992. The Santa Clara 10 meter semi-anechoic chamber has been measured in accordance with and verified to comply with the theoretical volumetric normalized site attenuation of ANSI C63.4:2009 and SVSWR requirements of CISPR 16-1-4 Consol. Ed. 3.0 (2010-04), at test distances of 3 and 10 meters. This site has been described in reports dated November 1st, 2006, submitted to the FCC, and accepted by letter dated November 28, 2006. The site is listed with the FCC and accredited by A2LA (Testing Certificate #3331.02). The Pleasanton 5 meter semi-anechoic chamber has been verified to comply with the theoretical volumetric normalized site attenuation of ANSI C63.4:2009 and SVSWR requirements of CISPR 16-1-4 Consol. Ed. 3.0 (2010-04) at a test distance of 3 meters. This site has been described in reports dated November 1st, 2006, submitted to the FCC, and accepted by letter dated November 28, 2006. The site is listed with the FCC and accredited by A2LA (Testing Certificate #3331.02).

2.2.2 Immunity Test Facility

ESD, EFT, Surge, PQF: These tests are performed in an environmentally controlled room with a 3.7 m x 3.7 m x 3.175 mm thick aluminum floor connected to PE ground. For ESD testing, tabletop equipment is placed on an insulated mat with a surface resistivity of 10^9 Ohms/square on a 1.6 m x 0.8 m x 0.8 m high non-conductive table with a 3.175 mm aluminum top (Horizontal Coupling Plane). The HCP is connected to the main ground plane via a low impedance ground strap through two 470 kΩ resistors. The Vertical Coupling Plane consists of an aluminum plate 50 cm x 50 cm x 3.175 mm thick. The VCP is connected to the main ground plane via a low impedance ground strap through two 470 kΩ resistors. For each of the other tests, the HCP is removed.

RF Field Immunity testing is performed in a 10m semi-anechoic chamber with absorber added to floor.

RF Conducted and Magnetic Field Immunity testing is performed on a 4.9 m x 3.7 m x 3.175 mm thick aluminum ground plane which is connected to one end of the anechoic chamber.

All test areas allow a minimum distance of 1 meter from the EUT to walls or conducting objects.

2.2.3 EMC Software - Fremont

Manufacturer	Name	Version	Test Type
EMISoft	Vasona	5.0	Radiated & Conducted Emissions
ETS-Lindgren	TILE	4.2.A	Radiated Emissions > 1 GHz
ETS-Lindgren	TILE	V.3.4.K.22	Radiated & Conducted Immunity
Haefely	WinFEAT	1.6.3	Surge

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Manufacturer	Name	Version	Test Type
Thermo Electron - Keytek	CEWare32	3.0	EFT/Surge/Voltage Dips & Interrupt
Voltech	IEC61000-3	1.15.07RC	Harmonic & Flicker

2.2.4 EMC Software - Pleasanton

Manufacturer	Name	Version	Test Type
ETS-Lindgren	TILE	3.4.K.14 @ 4.0.A.5	Radiated & Conducted Emissions
EMISoft	Vasona	5.0	Radiated & Conducted Emissions
Agilent	Agilent MXE	A.11.02	Radiated & Conducted Emissions
ETS-Lindgren	TILE	3.4.K.14	Radiated & Conducted Immunity
Thermo Electron - Keytek	CEWare32	4.00	EFT/Surge/Voltage Dips & Interrupt
Voltech	IEC61000-3	1.21.07RC2	Harmonic & Flicker

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2.3 Measurement Uncertainty

Two types of measurement uncertainty are expressed in this report, per *ISO Guide To The Expression Of Uncertainty In Measurement*, 1st Edition, 1995.

The Combined Standard Uncertainty is the standard uncertainty of the result of a measurement when that result is obtained from the values of a number of other quantities, equal to the positive square root of a sum of terms, the terms being the variances or co-variances of these other quantities weighted according to how the measurement result varies with changes in these quantities. The term standard uncertainty is the result of a measurement expressed as a standard deviation.

The Expanded Uncertainty defines an interval about the result of a measurement that may be expected to encompass a large fraction of the distribution of values that could reasonably be attributed to the measurand. The fraction may be viewed as the coverage probability or level of confidence of the interval.

2.3.1 Sample Calculation – radiated & conducted emissions

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

Field Strength (dBμV/m) = RAW - AMP + CBL + ACF

Where: RAW = Measured level before correction (dBμV)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

$$\mu V/m = 10^{\frac{dB\mu V/m}{20}}$$

Sample radiated emissions calculation @ 30 MHz

Measurement +Antenna Factor–Amplifier Gain+Cable loss=Radiated Emissions (dBuV/m)

25 dBuV/m + 17.5 dB – 20 dB + 1.0 dB = 23.5 dBuV/m

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2.3.2 Measurement Uncertainty Emissions

Per CISPR 16-4-2	**U_{lab}**	**U_{cispr}**
Radiated Disturbance @ 10 meters		
30 – 1,000 MHz	2.25 dB	4.51 dB
Radiated Disturbance @ 3 meters		
30 – 1,000 MHz	2.26 dB	4.52 dB
1 – 6 GHz	2.12 dB	4.25 dB
6 – 18 GHz	2.47 dB	4.93 dB
Conducted Disturbance @ Mains Terminals		
150 kHz – 30 MHz	1.09 dB	2.18 dB
Disturbance Power		

Voltech PM6000A

The estimated combined standard uncertainty for harmonic current and flicker measurements is ± 5.0%.	Per CISPR 16-4-2

2.3.3 Measurement Uncertainty Immunity

The estimated expanded uncertainty for ESD immunity measurements is ± 8.2%.	Per IEC 61000-4-2
The estimated expanded uncertainty for radiated immunity measurements is ± 4.10 dB.	Per IEC 61000-4-3
The estimated expanded uncertainty for EFT fast transient immunity measurements is ± 5.84%.	Per IEC 61000-4-4
The estimated expanded uncertainty for surge immunity measurements is ± 5.84 %.	Per IEC 61000-4-4
The estimated expanded uncertainty for conducted immunity measurements with CDN is ± 3.66 dB	Per IEC 61000-4-6
The estimated expanded uncertainty for power frequency magnetic field immunity is ± 11.6%.	Per IEC 61000-4-8
The estimated expanded uncertainty for voltage variation and interruption measurements is ± 3.48%.	Per IEC 61000-4-11

The expanded uncertainty at a level of 95% confidence is obtained by multiplying the combined standard uncertainty by a coverage factor of 2. Compliance criteria are not based on measurement uncertainty.

2.4 Calibration Traceability

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Measurement method complies with ANSI/NCSL Z540-1-1994 and ISO Standard 17025:2005. Equipment calibration records are kept on file at the test facility.

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2.5 Measurement Equipment Used

Equipment	Manufacturer	Model #	Serial/Inst #	Last Cal mm/dd/yy	Next Cal mm/dd/yy	Test
Bilog Antenna	Sunol Sciences	JB3	A102606	11/20/2017	11/20/2019	RE
Amplifier	Sonoma Instruments	310	165516	01/25/2018	01/25/2019	RE
Spectrum Analyzer	Agilent	PXA	US513358291	01/22/2019	01/22/2019	FS
LISN	Compower	n/a	12100	01/24/2018	01/24/2019	CE
AC programmable supply	California Instrument	1001P	L06329	…..	…..	FS
Temp chamber	Espec	BTZ-133	0613436	05/31/2018	05/31/2019	FS
Spectrum Analyzer	Rohde&Schwarz	ESI	100169	01/22/2018	01/22/2019	CE,RE
Active loop antenna	Emco	6502	00062531	06/08/2018	06/08/2019	RE

Note: CE=Conducted Emissions, CI=Conducted Immunity, DP=Disturbance Power, EFT=Electrical Fast Transients, ESD=Electrostatic Discharge, FLI=Flicker, FS=Frequency Stability, HAR=Harmonics, MF=Magnetic Field Immunity, NCR=No Calibration Required, RE=Radiated Emissions, RI=Radiated Immunity, SI=Surge Immunity, VDSI=Voltage Dips and Short Interruptions

3 Product Information

3.1 Product Description

See Section 6.4.

3.2 Equipment Modifications

See Appendix B for details

3.3 Test Plan

The EUT product information, test configuration, mode of operation, test types, test procedures, test levels, pass/failure criteria, in this report were carried out per the product test plan located in Appendix A of this report.

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Figure 1 - External Photo of EUT

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3.1 Radiated Emissions

This test measures the electromagnetic levels of spurious signals generated by the EUT on the AC power line that may affect the performance of other nearby electronic equipment.

3.1.1 Overview of Test

Results	**Complies** (as tested per this report)			**Test Date(s)**		December 12, 2018	
Standard	CFR 47 part 15.225, RSS 210						
Model Number	PRJ-0609			**Serial #**	1830600023		
Configuration	See test plan for details.						
Test Setup	Tested in the 5-meter chamber, placed on turntable: see test plan for details.						
EUT Powered By	120 Vac, 60 Hz						
Environmental Conditions	December 12, 2018	**Temp**	22º C	**Humidity**	44%	**Pressure**	1010 mbar
Frequency Range	9kHz - 1 GHz						
Perf. Criteria	Class B		**Perf. Verification**		Readings Under Limit		
Mod. to EUT	None		**Test Performed By**		Donn Foster		

3.1.2 Test Procedure

Radiated emissions tests were performed using the procedures of ANSI C63.10 including methods for signal maximizations and EUT configuration.

The frequency range from

9 kHz - 1 GHz was investigated for radiated emissions.

3.1.3 Deviations

There were no deviations from the test methodology listed in the test plan for the radiated emission test.

3.1.4 Final Test

All final radiated emissions measurements were below the specification limits.

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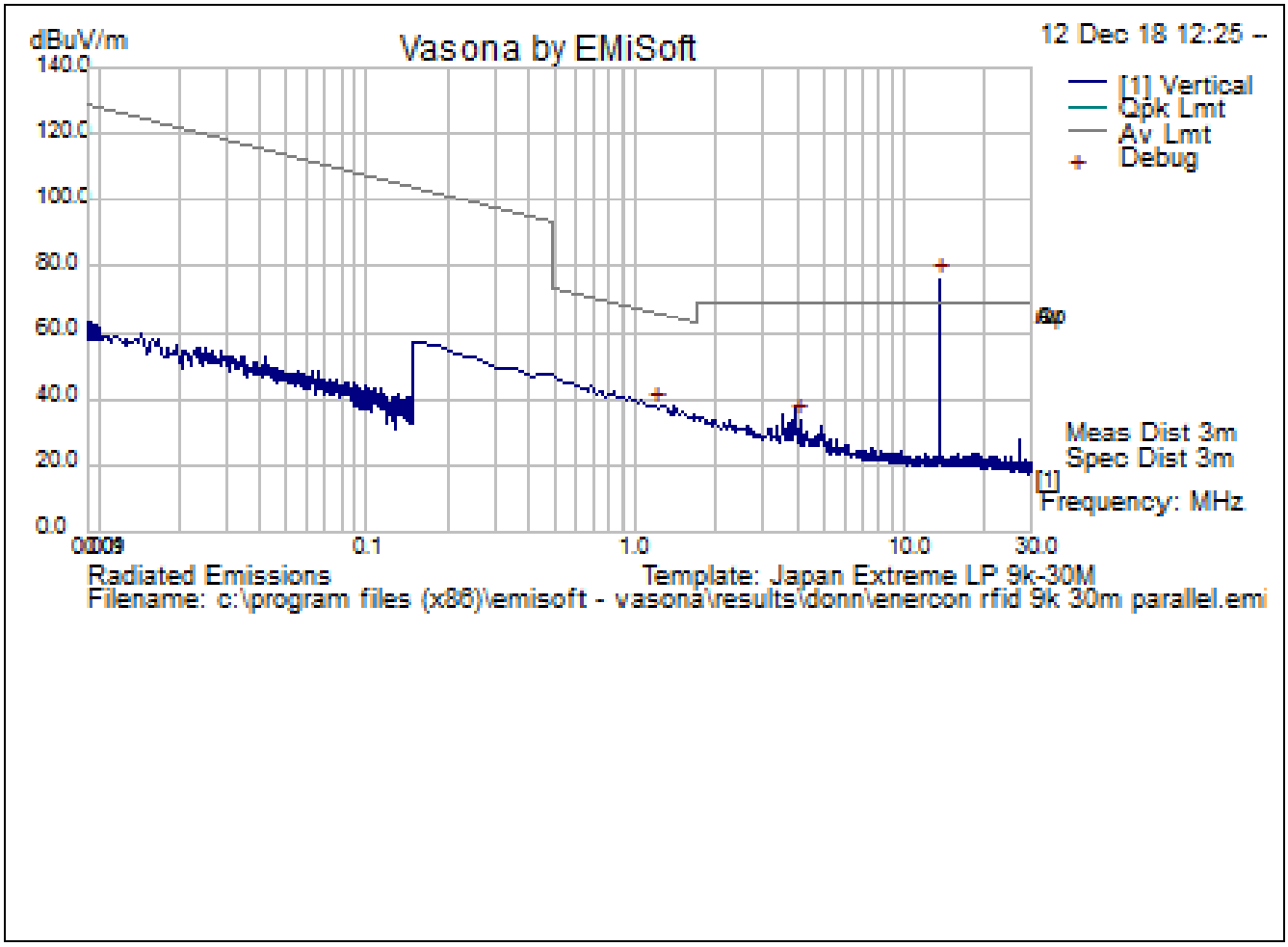
3.1.5 Plots

NOTES:

Radiated Emissions Pre-Scan
9k-30M Parallel



Note: The frequency seen over the limit is the intentional transmitter

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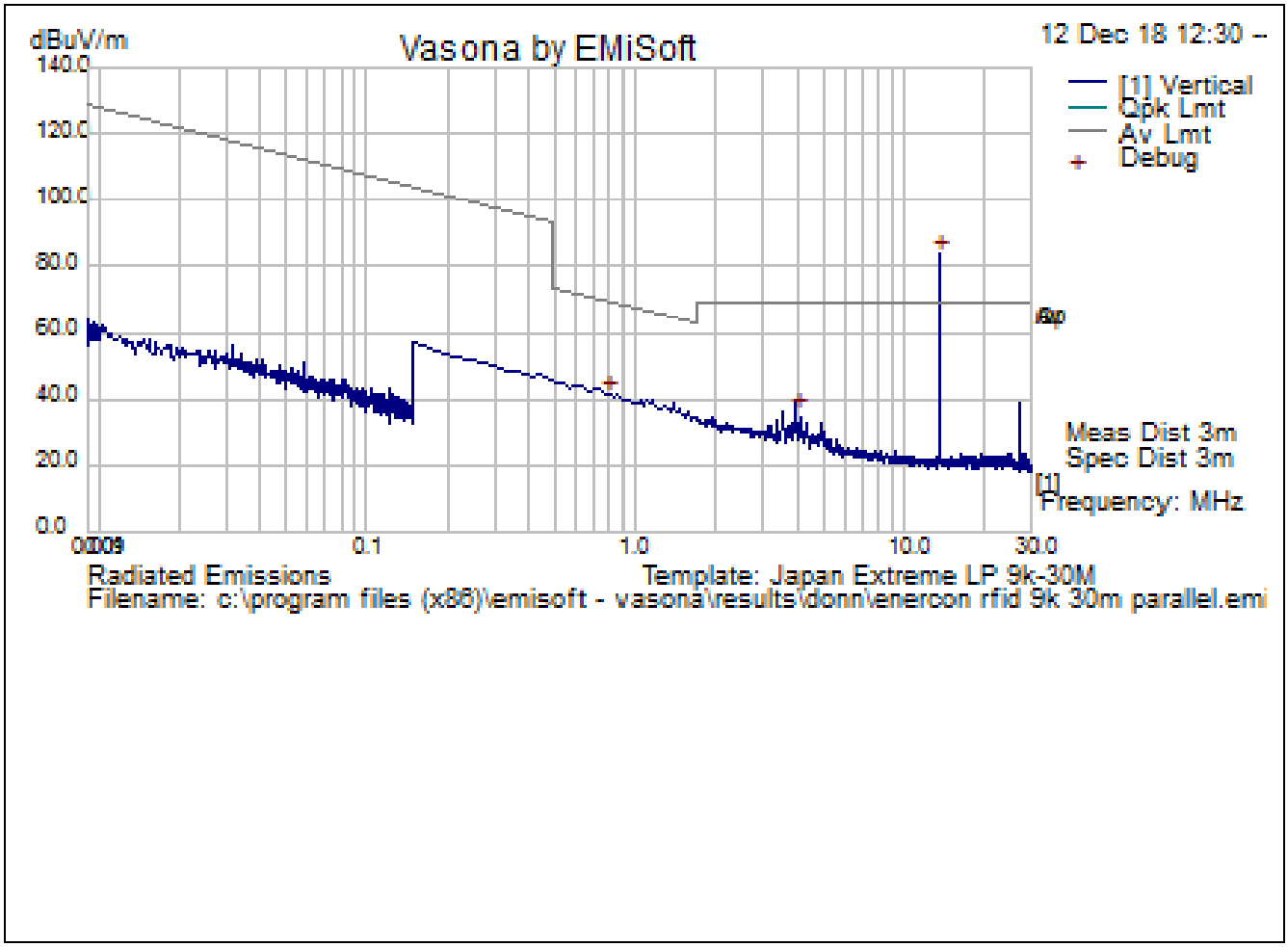
NOTES:

Radiated Emissions Full Scan
9k-30M Perpendicular



Note: The frequency seen over the limit is the intentional transmitter

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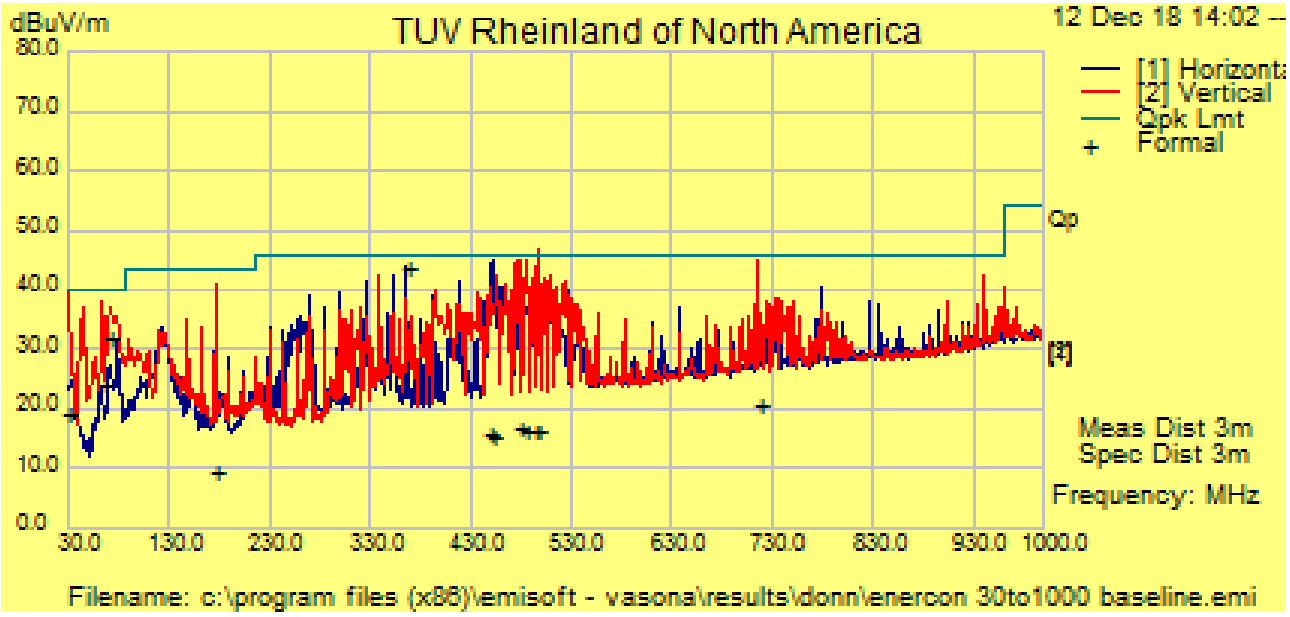
NOTES:

Radiated Emissions Full Scan
30-1000 MHz



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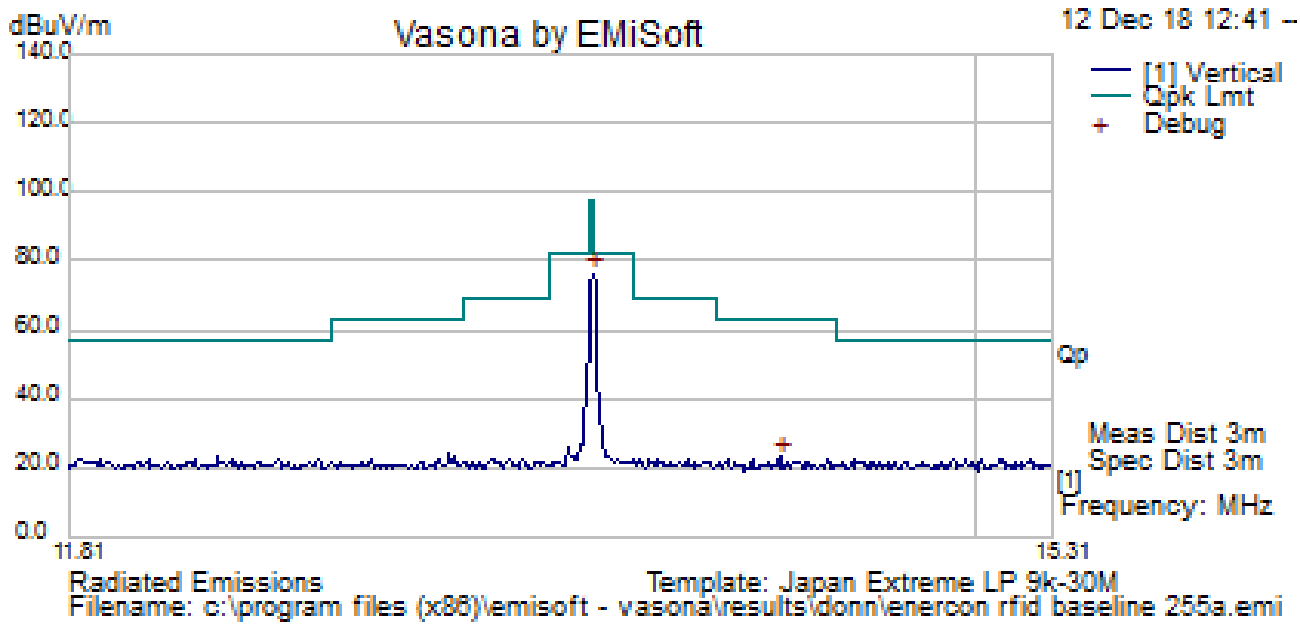
NOTES:

Radiated Emissions Full Scan
Transmitter Mask Parallel



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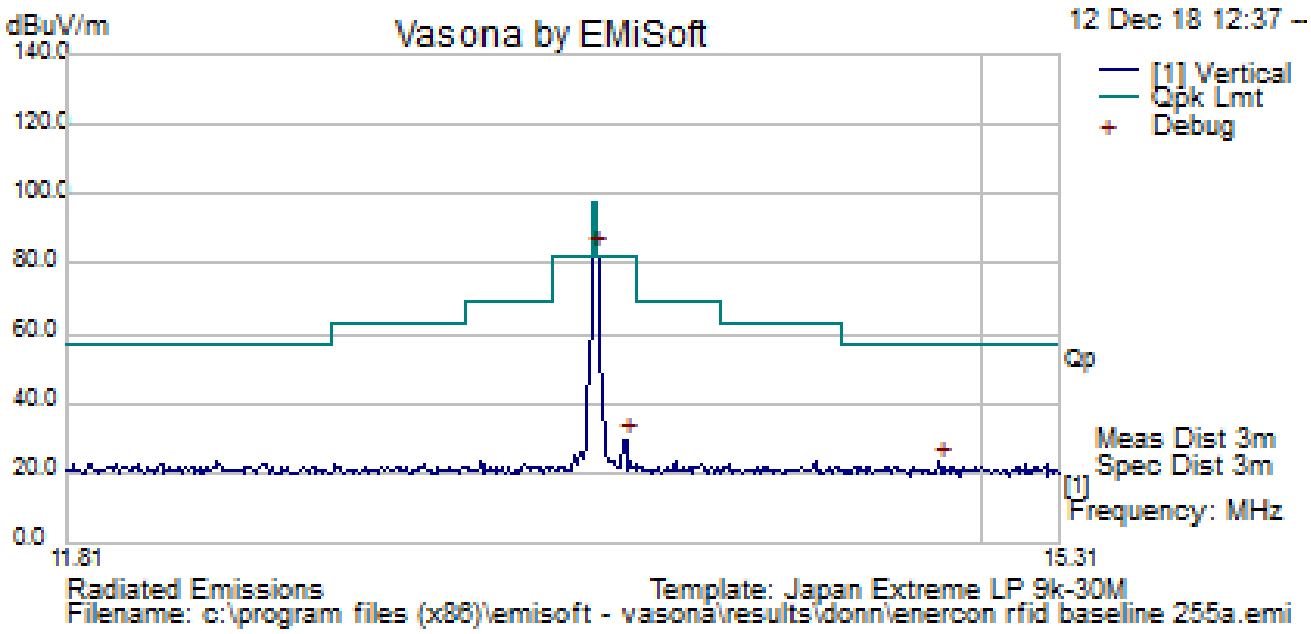
NOTES:

Radiated Emissions Full Scan
Transmitter Mask Perpendicular



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3.1.6 Final Tabulated Data – 9 kHz-30 MHz, 110 Vac 60 Hz Horizontal

Freq	Raw Reading	Cable Loss	AF	Corrected	Detector Type	Pol H/V	Ant Height	Azi	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m			Cm	Deg	dBuV/m	dB
13.57606	65.14	0.45	10.8	76.38	Peak	V	125	0	69.5	6.88
1.189	26.82	0.31	10.6	37.73	Peak	V	125	360	66.1	-28.37
3.948	22.94	0.37	10.7	34.01	Peak	V	125	360	69.5	-35.49

3.1.1 Final Tabulated Data – 9 kHz-30 MHz, 110 Vac 60 Hz Vertical

Freq	Raw Reading	Cable Loss	AF	Corrected	Detector Type	Pol H/V	Ant Height	Azi	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m			Cm	Deg	dBuV/m	dB
13.57606	72.3	0.45	10.8	83.54	Peak	V	125	0	69.5	14.04
3.948	24.52	0.37	10.7	35.59	Peak	V	125	360	69.5	-33.91
0.776	30.46	0.28	10.32	41.07	Peak	V	125	360	69.81	-28.74

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3.1.2 Final Tabulated Data – 30 - 1000 MHz, 110 Vac 60 Hz

Freq	Raw Reading	Cable Loss	AF	Corrected	Detector Type	Pol H/V	Ant Height	Azi	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m			Cm	Deg	dBuV/m	dB
366.1197	52.43	3.78	-12.56	43.66	Quasi	H	103	82	46	-2.34
71.87024	49.31	2.76	-20.06	32.01	Quasi	V	160	296	40	-7.99
63.94038	41.87	2.7	-20.47	24.1	Quasi	V	191	94	40	-15.9
30	23.01	2.49	-6.28	19.22	Quasi	V	176	360	40	-20.78
716.27	22.96	4.62	-7.14	20.44	Quasi	V	183	164	46	-25.56
478.1588	22.77	4.09	-10.34	16.51	Quasi	V	341	279	46	-29.49
366.1197	52.43	3.78	-12.56	43.66	Quasi	H	103	82	46	-2.34

3.1.1 Final Tabulated Data – 11.8-15.3 MHz, 110 Vac 60 Hz Parallel

Freq	Raw Reading	Cable Loss	AF	Corrected	Detector Type	Pol H/V	Ant Height	Azi	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m			Cm	Deg	dBuV/m	dB
13.56351	65.03	0.44	10.8	76.28	Peak	V	125	0	98	-21.72
14.25088	12.03	0.45	10.8	23.28	Peak	V	125	0	63	-39.72

3.1.2 Final Tabulated Data – 11.8-15.3 MHz, 110 Vac 60 Hz Perpendicular

Freq	Raw Reading	Cable Loss	AF	Corrected	Detector Type	Pol H/V	Ant Height	Azi	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m			Cm	Deg	dBuV/m	dB
13.56351	72.47	0.44	10.8	83.72	Peak	V	125	0	98	-14.28
14.83305	11.79	0.45	10.8	23.04	Peak	V	125	0	57	-33.96
13.66872	18.41	0.45	10.8	29.66	Peak	V	125	0	82	-52.34

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3.2 Photos

Figure 3 Radiated Emissions Test Setup 9 kHz- 30 MHz - Front

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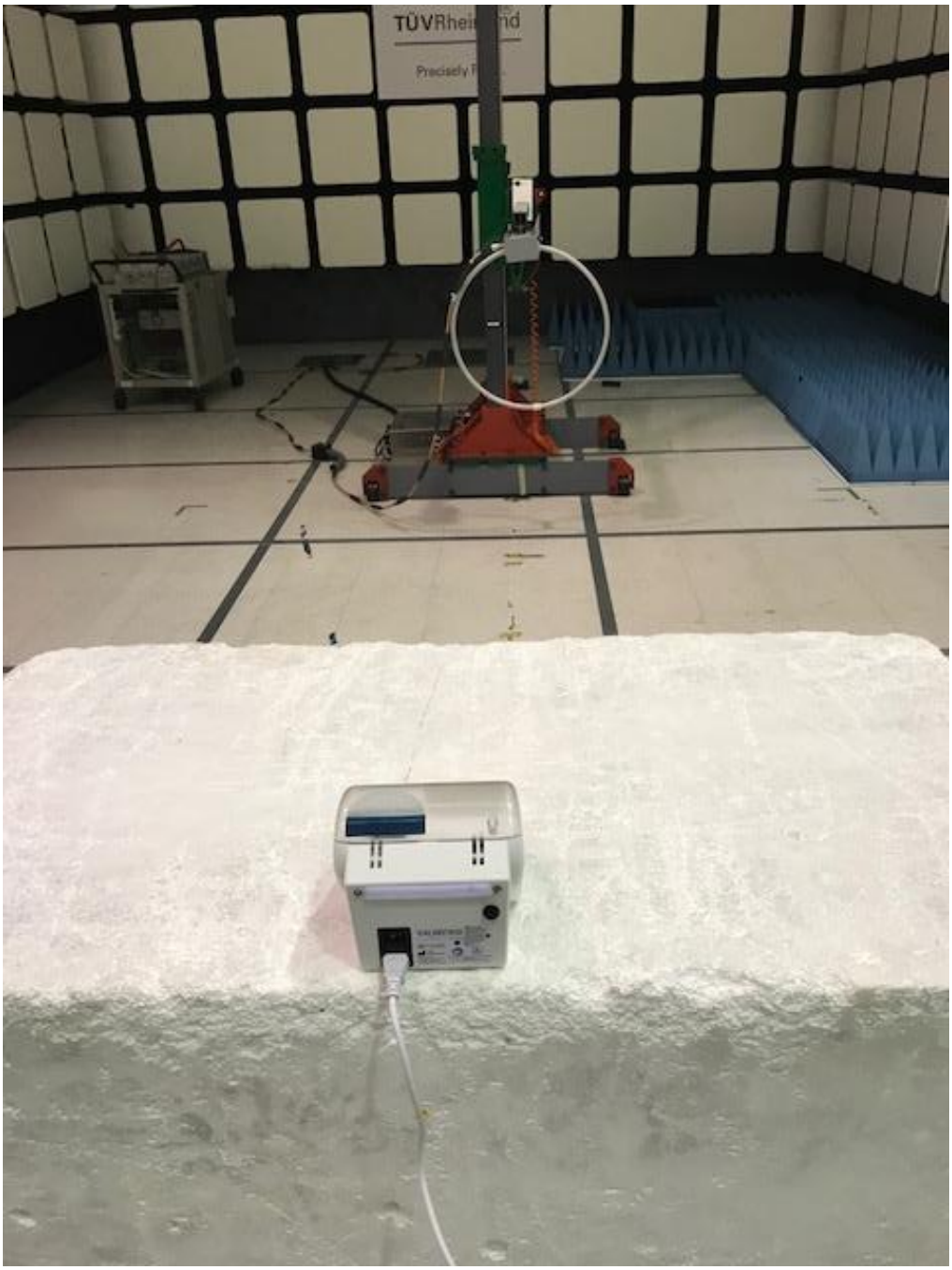

Figure 3 - Radiated Emissions Test Setup 9 kHz-30 MHz - Back

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3.2.1 Photos

Figure 3 - Radiated Emissions Test Setup 30 - 1000 MHz - Front

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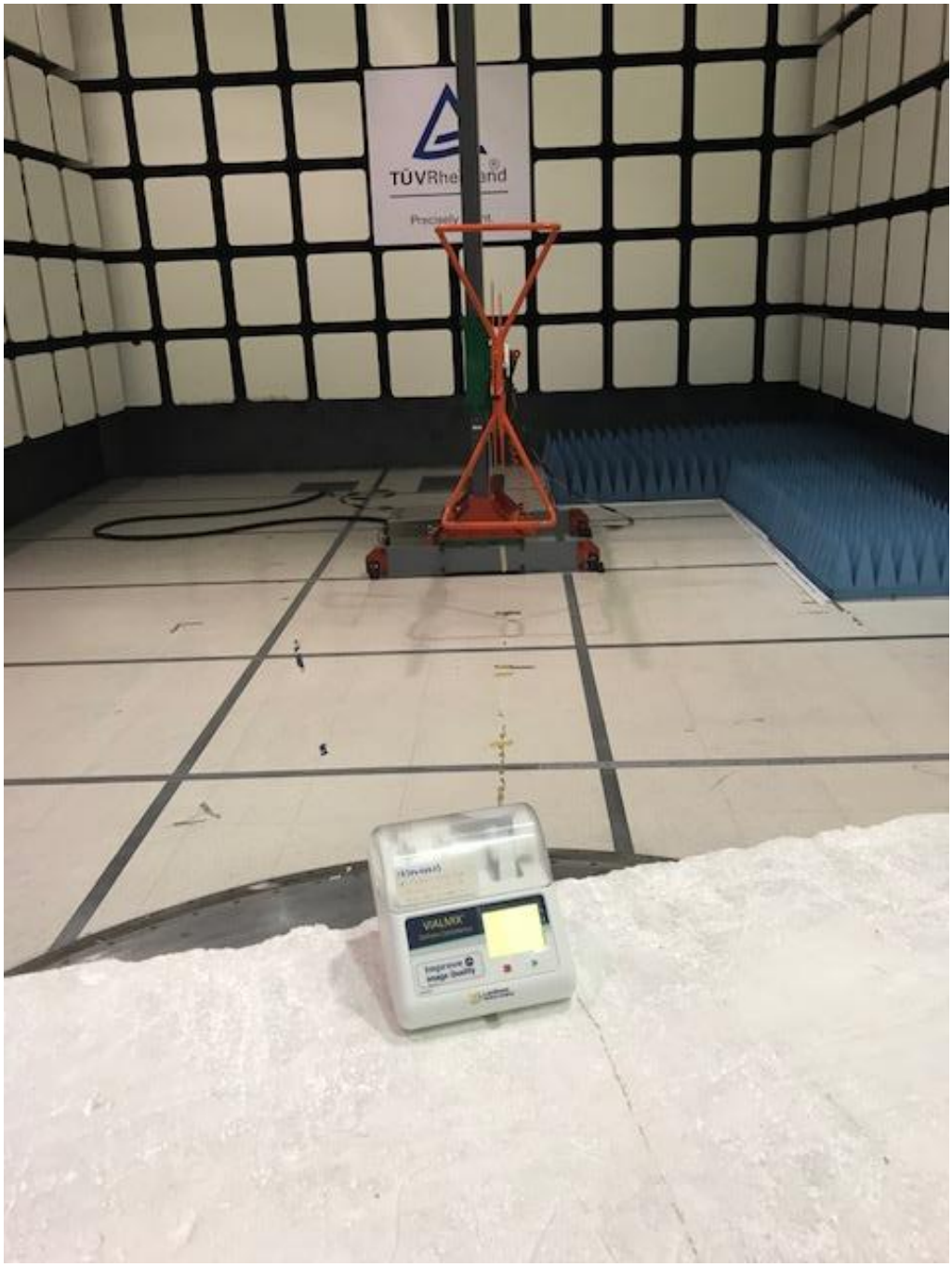

Figure 4 - Radiated Emissions Test Setup 30 - 1000 MHz - Back

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3.3 Conducted Emissions

This test measures the electromagnetic levels of spurious signals generated by the EUT on the AC power line that may affect the performance of other nearby electronic equipment.

3.3.1 Overview of Test

Results	**Complies** (as tested per this report)			**Test Date(s)**	December 19, 2018		
Standard	CFR 47 part 15.207, RSS 210						
Model Number	PRJ-0690			**Serial #**	1830600023		
Configuration	See test plan for details.						
Test Setup	Tested in Lab 5, EUT placed on table: see test plan for details.						
EUT Powered By	, 120 Vac, 60 Hz						
Environmental Conditions	December 19, 2018	**Temp**	22º C	**Humidity**	39%	**Pressure**	1010 mbar
Frequency Range	150 kHz - 30 MHz						
Perf. Criteria	Class B		**Perf. Verification**		Readings Under Limit for L1 & Neutral		
Mod. to EUT	None		**Test Performed By**		Donn Foster		

3.3.2 Test Procedure

Conducted emissions tests were performed using the procedures of ANSI C63.4:2009 including methods for signal maximizations and EUT configuration. The photos included with the report show the EUT in its maximized configuration.

The frequency range from

150 kHz - 30 MHz was investigated for conducted emissions.

Conducted Emissions measurements were performed in the shielded room using procedures specified in the test plan and standard.

3.3.3 Deviations

There were no deviations from the test methodology listed in the test plan for the conducted emission test.

3.3.4 Final Test

All final conducted emissions measurements were below the specification limits.

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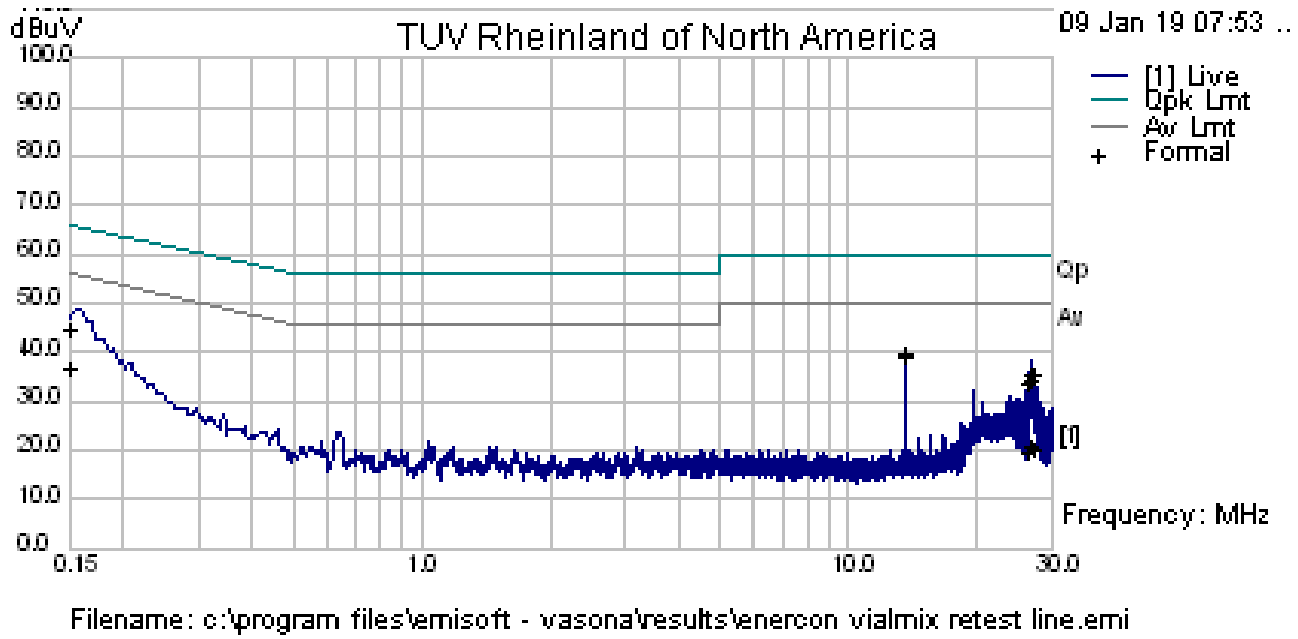
3.3.5 Plots

NOTES:

Conducted Emissions @ 110 Vac/60 Hz
Line



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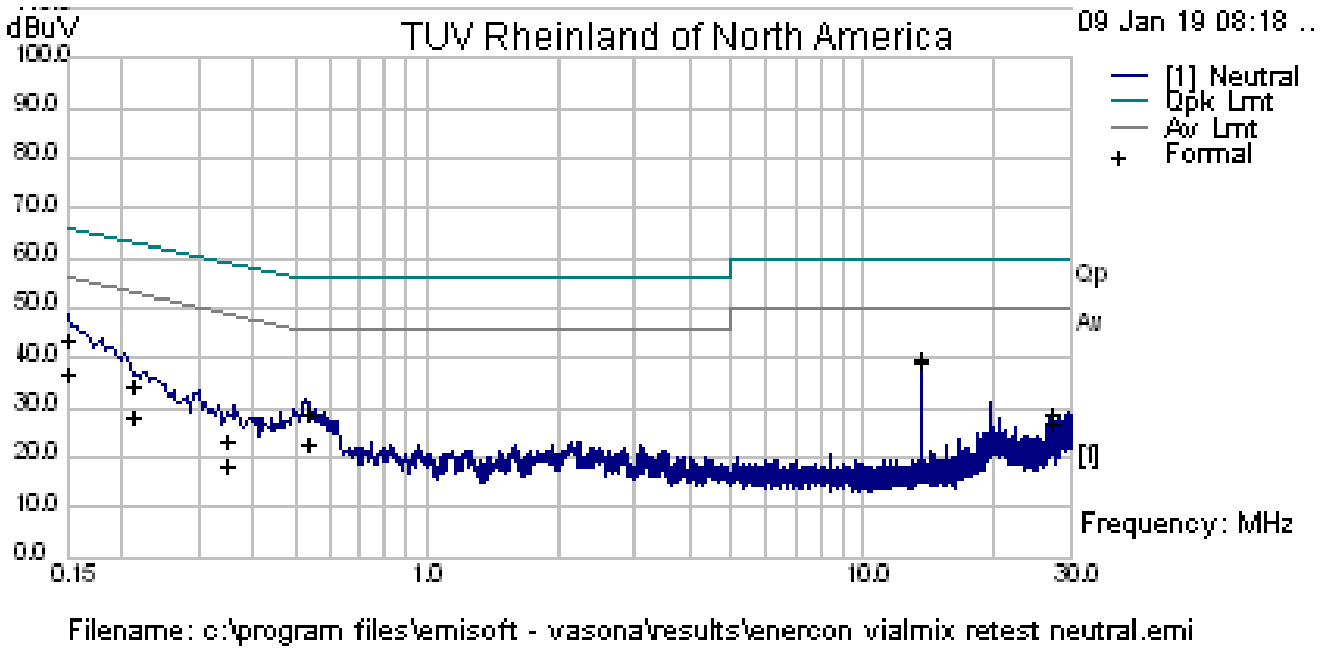
NOTES:

Conducted Emissions @ 110 Vac/60 Hz
Neutral



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3.4 Final Tabulated Data – 150 kHz-30 MHz, 110 Vac 60 Hz

Line

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB
0.15	34.8	9.82	0.06	44.68	Quasi Peak	Live	66	-21.32
13.5609	29.49	10.01	0	39.49	Quasi Peak	Live	60	-20.51
26.8766	24.08	10.11	-0.06	34.13	Quasi Peak	Live	60	-25.87
26.70684	25.74	10.1	-0.06	35.78	Quasi Peak	Live	60	-24.22
27.04845	25.78	10.11	-0.06	35.83	Quasi Peak	Live	60	-24.17
26.36038	23.77	10.1	-0.06	33.81	Quasi Peak	Live	60	-26.19
0.15	27.12	9.82	0.06	37	Average	Live	56	-19
13.5609	29.55	10.01	0	39.55	Average	Live	50	-10.45
26.8766	10.6	10.11	-0.06	20.65	Average	Live	50	-29.35
26.70684	10.72	10.1	-0.06	20.77	Average	Live	50	-29.23
27.04845	10.47	10.11	-0.06	20.52	Average	Live	50	-29.48
26.36038	9.55	10.1	-0.06	19.59	Average	Live	50	-30.41

Neutral

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB
0.150241	33.65	9.82	0.06	43.53	Quasi Peak	Neutral	65.99	-22.45
13.56054	29.53	10.01	0	39.54	Quasi Peak	Neutral	60	-20.46
0.531968	19.17	9.84	0.03	29.05	Quasi Peak	Neutral	56	-26.95
0.210673	24.57	9.83	0.04	34.44	Quasi Peak	Neutral	63.18	-28.74
0.346665	13.36	9.84	0.03	23.22	Quasi Peak	Neutral	59.04	-35.82
27.11994	18.83	10.11	-0.06	28.88	Quasi Peak	Neutral	60	-31.12
0.150241	26.86	9.82	0.06	36.74	Average	Neutral	55.99	-19.25
13.56054	29.58	10.01	0	39.58	Average	Neutral	50	-10.42
0.531968	13.05	9.84	0.03	22.92	Average	Neutral	46	-23.08
0.210673	18.65	9.83	0.04	28.52	Average	Neutral	53.18	-24.65
0.346665	8.79	9.84	0.03	18.65	Average	Neutral	49.04	-30.39
0.207962	18.87	9.83	0.04	28.74	Average	Neutral	53.29	-24.55

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3.4.1 Photos

Figure 7 - Conducted Emissions Test Setup - Front

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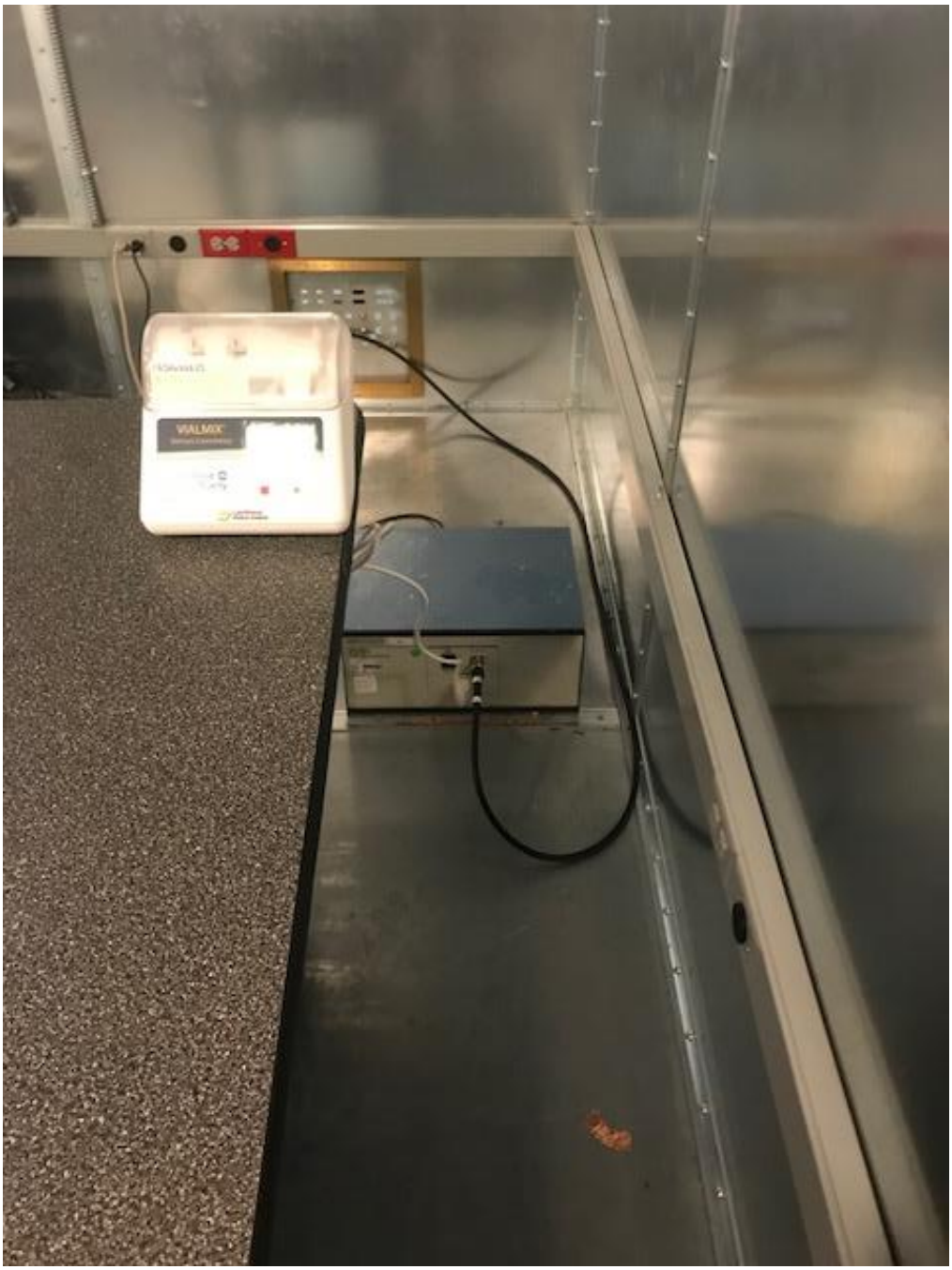

Figure 8 - Conducted Emissions Test Setup - Back

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3.4.2 Frequency Stability

Testing was performed in accordance ANSI C63.10: 2013 subsections 6.8.1 and 6.8.2. The requirements of ANSI section 5.6 could not be met since the NFC reader runs only at 13.56 MHz.

3.4.1 Overview of Test

Results	**Complies** (as tested per this report)			**Test Date(s)**		December 19, 2018	
Standard	CFR 47 part 15.225, RSS 210						
Model Number	PRJ-0609			**Serial #**		1830600023	
Configuration	See test plan for details.						
Test Setup	Tested in lab 7 temperature chamber						
EUT Powered By	120 Vac, 60 Hz						
Environmental Conditions	December 19, 2018	**Temp**	22º C	**Humidity**	44%	**Pressure**	1010 mbar
Frequency Range	13.56 MHz						
Perf. Criteria	Less than .01% frequency error			**Perf. Verification**		Meets limit	
Mod. to EUT	None			**Test Performed By**		Donn Foster	

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Measured frequency in Hz.

Temp	0min	2min	5min	10min
50	13560090	13560090	13560090	13560090
40	13560100	13560100	13560090	13560090
30	13560120	13560110	13560110	13560100
20(normal)	13560100	13560100	13560100	13560100
10	13560100	13560100	13560100	13560110
0	13560110	13560110	13560110	13560110
-10	13560110	13560120	13560120	13560120
-20	13560120	13560120	13560120	13560120

Percent of Frequency error

Temp	0min %	2min %	5min %	10min %
50	0.006	0.006	0.006	0.006
40	0.007	0.007	0.006	0.006
30	0.009	0.008	0.008	0.007
20(normal)	0.007	0.007	0.007	0.007
10	0.007	0.007	0.007	0.008
0	0.008	0.008	0.008	0.008
-10	0.008	0.009	0.009	0.009
-20	0.009	0.009	0.009	0.009

Percent of error over voltage extremes

Voltage	102VAC	120VAC	138VAC
Frequency	13560100	13560090	13560100
% error	0.007	0.006	0.007

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3.4.2 Photos

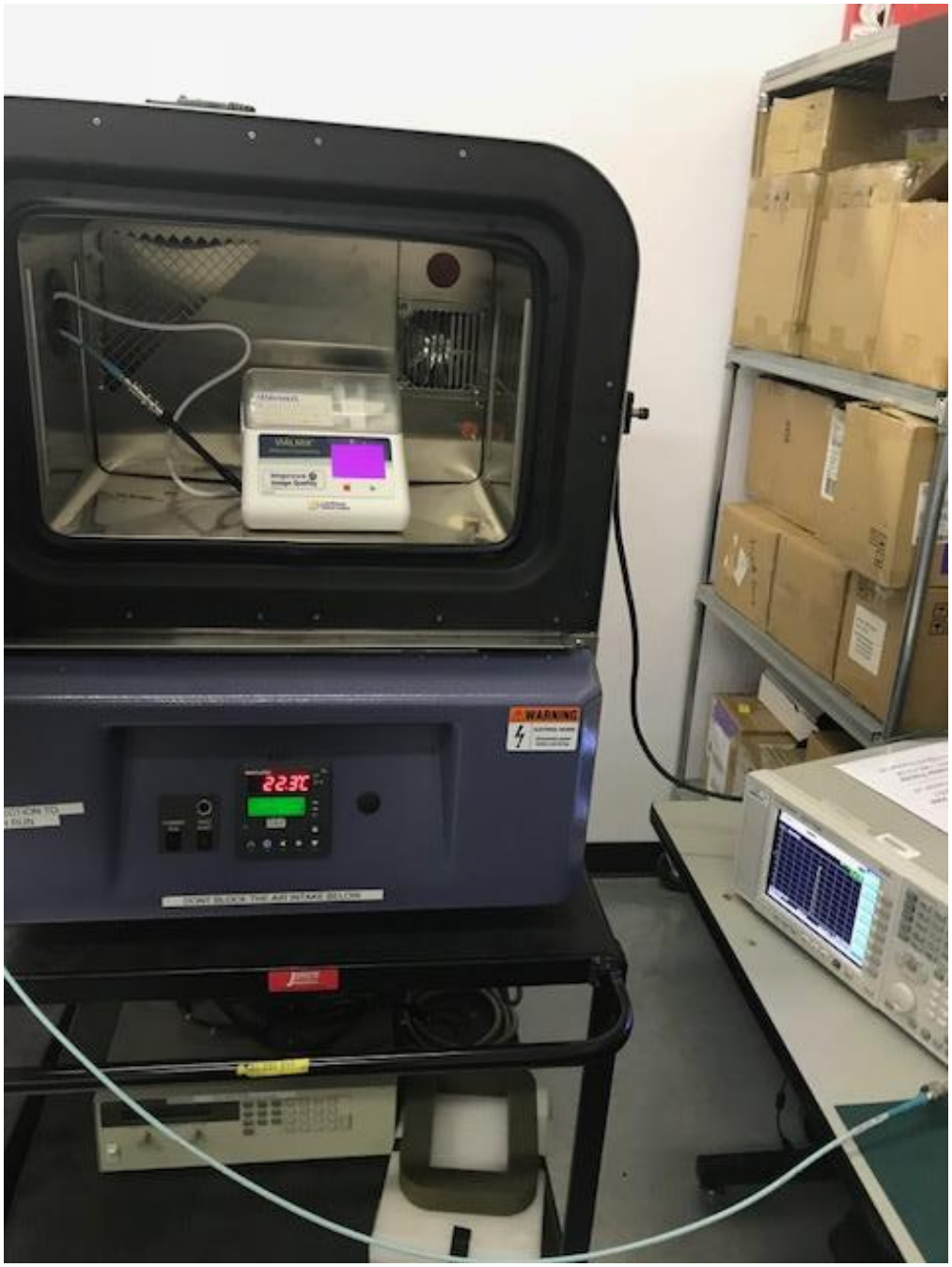

Figure 11 – Frequency Stability test setup

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Appendix A

4 Test Plan

This test report is intended to follow this test plan outlined here in unless otherwise stated in this here report. The following test plan will give details on product information, standards to be used, test set ups and refer to TUV test procedures. The test procedures will give the steps to be taken when performing the stated test. The product information below came via client, product manual, product itself and or the internet.

4.1 General Information

Client	Enercon Technologies
Address	2500 Northbrook Ln
	Gray, Maine 04039 U.S.A.
Contact Person	Ben Clarke
Telephone	207-657-7000
e-mail	bclarke@enercontechnologies.com

4.2 EUT Designation

Model Name	Vialmix
Model Number(s)	PRJ-0690

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4.3 Equipment Under Test (EUT) Description

Vialmix® is the activation device designed specifically for Definity® Vial for (Perflutren Lipid Microsphere) Injectable Suspension, an intravenous ultrasound contrast agent. Definity® is supplied as a liquid-filled glass vial and requires shaking in order to create the lipid-encapsulated microbubbles.The shaking rate and duration are controlled by Vialmix® to ensure reproducible activation of Definity®.

4.4 Product Environment(s)

☐	**Domestic/Residential**	☒	**Hospital**
☐	**Light Industrial/Commercial**	☒	**Small Clinic**
☐	**Industrial**	☐	**Doctor's office**
☐	**Telecommunications Center**	☐	**Other than Telecommunications Center**
☐	**Other**		

*Check all that apply

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4.5 Applicable Documents

Standards	Description
CFR 47 part 15.225, RSS 210 Product Family Standard Emissions	Radio Equipment Operation within the band 13.110-14.010 MHz.
CFR 47 part 15.225, RSS 210	Radiated Emissions
CFR 47 part 15.225, RSS 210	Conducted Emissions

4.6 EUT specifications

Dimensions	160mm x 195mm x 195mm
AC Input	110-240 50/60
Environment	Indoor
Operating Temperature Range:	15-30 °C recommended
Multiple Feeds:	☐ Yes and how many ☒ No
Product Marketing Name (PMN)	Vialmix
Hardware Version Identification Number (HVIN)	PRJ-0690
Firmware Version Identification Number (FVIN)	n/a
NFC Radio	
Operating Mode	RFID reader
Transmitter Frequency Band	13.56 MHz
Operating Bandwidth	Up to 1.8 MHz
Max. Radiated Voltage Output	.41 dbm
Power Setting @ Operating Channel	Max
Antenna Type	Integrated Coil antenna
Modulation Type	ASK/OOK
Data Rate	26.48 kHz

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4.7 EUT Electrical Power Information

Name	# of Phases	Type	Input Voltage		AC Voltage Frequency	Current Max.	Power
			Min	Max			
	1 ☒ 3 ☐ None ☐	AC ☒ DC ☐ Host ☐ Batteries ☐	110	240	50 Hz to 60 Hz	2 A	220 W
Notes							

4.8 EUT Clock/Oscillator Frequencies

Reference Designation	Speed (MHz)	Type
RFID transmit frequency	13.56	☐ Oscillator ☒ Transmitter
		☐ Oscillator ☐ Microprocessor
		☐ Oscillator ☐ Microprocessor

4.8.1 Radiated Emissions, Upper Frequency

☒	**Less than 108 MHz**	**Scan to 1 GHz**
☐	**Less than 500 MHz**	**Scan to 2 GHz**
☐	**Less than 1000 MHz**	**Scan to 5 GHz**
☐	**Greater than 1000 MHz**	**Scan to 5th Harmonic or 40 GHz (whichever is lower)**

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4.9 Electrical Support Equipment

Reference Designation	Manufacturer	Model	Serial Number	BSMI #

4.10 Non - Electrical Support Equipment

Reference Designation	Manufacturer	Model	Serial Number or Description (e.g., Type of Gas or Liquid)

4.11 EUT Equipment/Cabling Information

EUT Port	Connected To	Cable Type				
		Length (Meters)	Shielded Yes / No		Bead Yes / No	
			☐	☐	☐	☐
			☐	☐	☐	☐
			☐	☐	☐	☐
			☐	☐	☐	☐
			☐	☐	☐	☐
			☐	☐	☐	☐
			☐	☐	☐	☐
			☐	☐	☐	☐
			☐	☐	☐	☐
			☐	☐	☐	☐
			☐	☐	☐	☐

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4.12 EUT Test Program

Firmware v_1.0.1_TUV_RF_RADIO

4.13 EUT Modes of Operation

The Vialmix is configured to continuously transmit the RFID signal. No other functions such as shaking are enabled.

4.14 Monitoring of EUT during Testing

The testing is for Emissions only no monitoring is required

4.15 EUT Configuration

4.15.1 Description

Configuration	Description
Mode 1	Reader running continuously
Notes	

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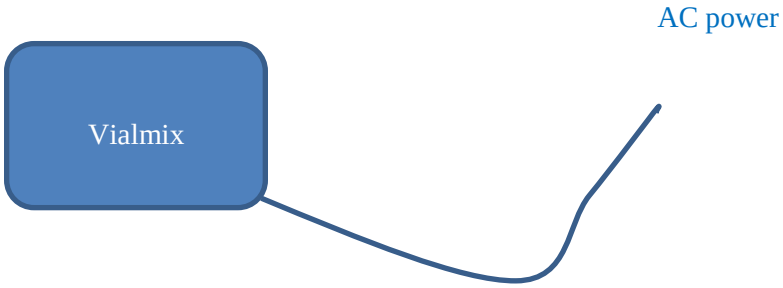
4.15.2 Block Diagram



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4.16 Emissions

4.16.1 Radiated Emissions

4.16.1.1 Preliminary Radiated Emissions Test Setup

Standard	CFR 47 part 15.225, RSS 210			**Procedure**	ANSI C63.10
Limit	Class B	**Emissions Verification**		Emissions Under Limit	
Frequency Range	9 kHz-1 GHz				
Scan #1	Final Scan 9 kHz-30 MHz	**Antenna Distance**	3m	**Detector**	Quasi Peak
Scan #2	Final Scan 30-1000 MHz	**Antenna Distance**	3m	**Detector**	Quasi Peak
Scan #3	Final Scan 13.56 MHz	**Antenna Distance**	3m	**Detector**	Quasi Peak
Configuration	See Section 4.15				
Notes	None				

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4.16.1.2 Final Radiated Emissions Test Setup

Standard	CFR 47 part 15.225, RSS 210			**Procedure**	ANSI C63.10
Limit	Class B	**Emissions Verification**		Emissions Under Limit	
Frequency Range	9 kHz-1000 MHz				
Scan #1	Final Scan 9 kHz-30 MHz	**Antenna Distance**	3m	**Detector**	Quasi Peak
Scan #2	Final Scan 30-1000 MHz	**Antenna Distance**	3m	**Detector**	Quasi Peak
Scan #3	Final Scan 13.56 MHz	**Antenna Distance**	3m	**Detector**	Quasi Peak
Configuration	See Section 4.15				
Notes	None				

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4.16.2 Conducted Emissions

4.16.2.1 Final Conducted Emissions Test Setup

Standard	CFR 47 part 15.207, RSS 210	**Procedure**	ANSI C63.4
Limit(s)	Class B: Quasi Peak Average	**Emissions Verification**	Emissions Under Limit
AC Mains Line	1 AC Line	**LAN Cable(s)**	None
Frequency Range	150 kHz - 30 MHz	**Detectors**	Quasi Peak Average
Scan #2	120 Vac, 60 Hz	**EUT Powered By**	See Section 6.8
Configuration	See Section 4.15		
Notes	None		

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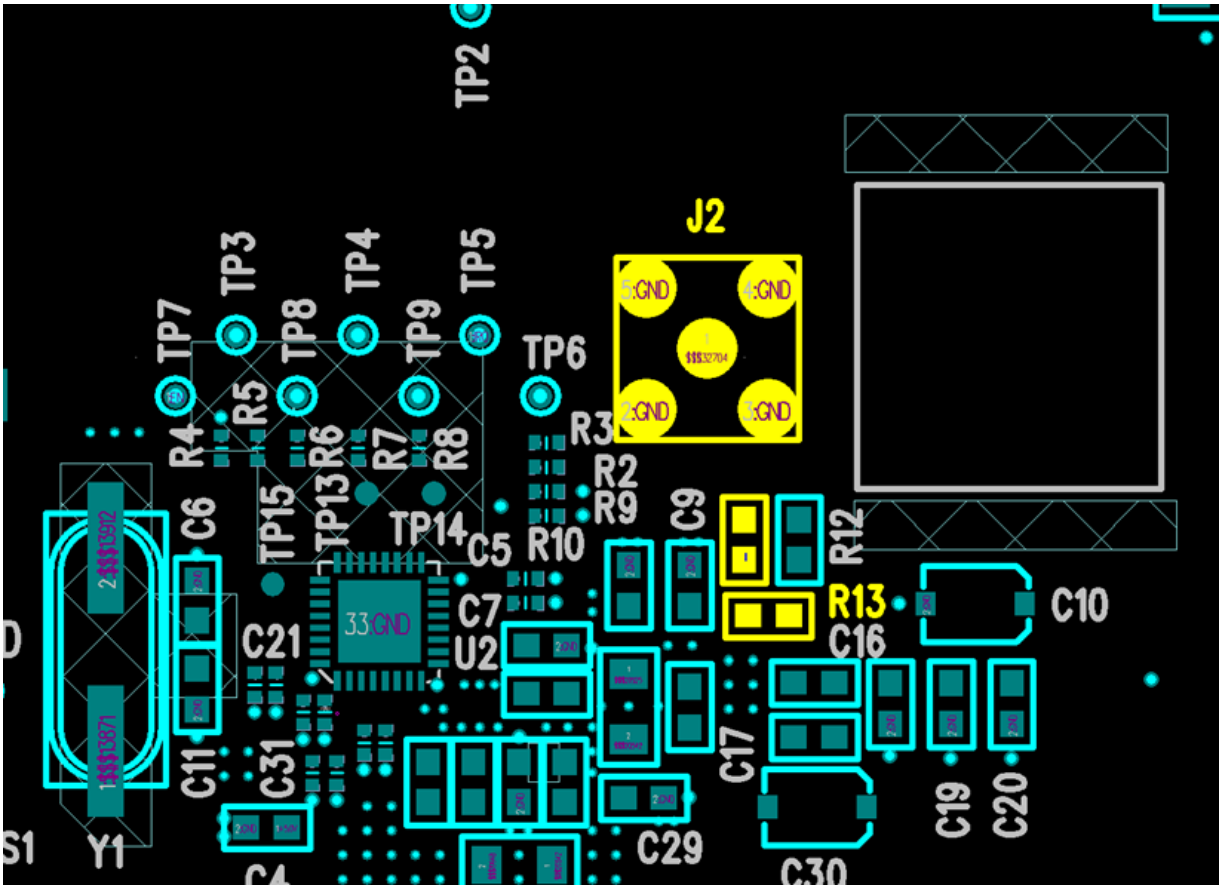
5 Appendix B

5.1 Modifications

It was necessary to disconnect the NFC antenna in order to demonstrate compliance with the part B Conducted emissions requirements. The details are attached below

To get access to the antenna port, remove the zero ohm resistor on R13 (highlighted on bottom) and solder a zero ohm resistor on R11 (highlighted, between C9 and R12). This will give you access to the port via J2.



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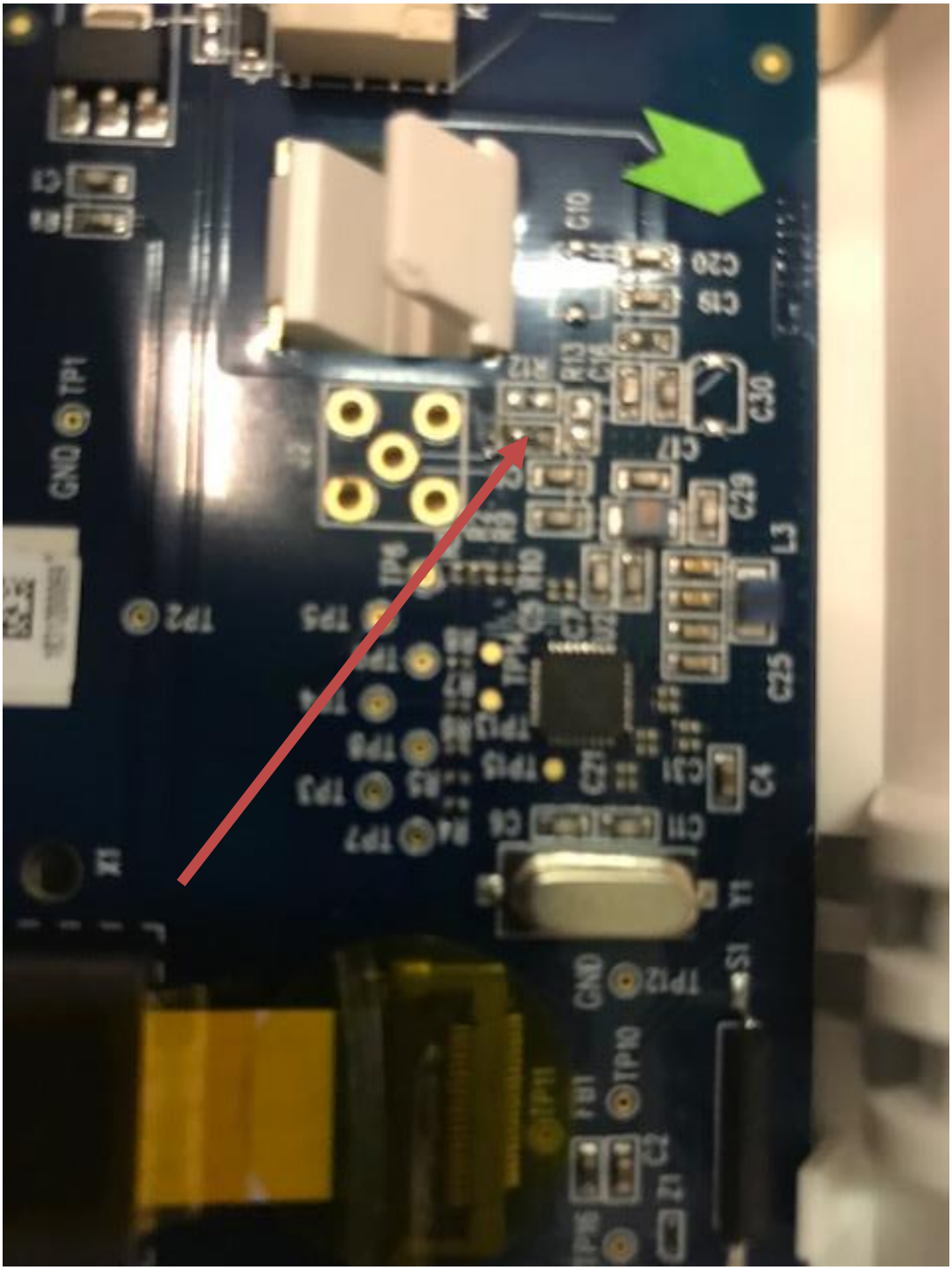

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