313 West 12800 South, Suite 311

Draper, UT 84020

(801) 260-4040

Test Report

Declaration of Conformity

Equipment Under Test	GWL1300 and VWL1300
Test Report Serial No	V072639_03
Date of Test	February 7, 2024
Report Issue Date	March 19, 2024

Test Specifications:	**Applicant:**
FCC Part 18	WiTricity Corporation 57 Water Street Watertown, MA 02472 U.S.A.

NVLAP TESTING
NVLAP LAB CODE 100272-0

ilac-MRA

Certification of Engineering Report

This report has been prepared by VPI Laboratories, Inc. to document compliance of the device described below with the requirements of Federal Communications Commission (FCC) Part 18. This report may be reproduced in full. Partial reproduction of this report may only be made with the written consent of the laboratory. The results in this report apply only to the sample tested.

Applicant	WiTricity
Manufacturer	WiTricity
Brand Name	WiTricity
Model Number	GWL1300 and VWL1300
FCC ID	2BFEF-GWL1300

On this 19th day of March 2024, I, individually and for VPI Laboratories, Inc., certify that the statements made in this engineering report are true, complete, and correct to the best of my knowledge, and are made in good faith.

Although NVLAP has accredited the VPI Laboratories, Inc. EMC testing facilities, this report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

VPI Laboratories, Inc.

Tested by: Benjamin N. Antczak

Reviewed by: Jason Stewart

Revision History		
Revision	**Description**	**Date**
01	Original Report Release	March 19, 2024
02	Correcting Text in Section 6.6	March 20, 2024
03	Correcting Applicant Address	March 21, 2024

Table of Contents

1 Client Information

1.1 Applicant

Company Name	WiTricity Corporation 57 Water Street Watertown, MA 02472 U.S.A.
Contact Name	Ky Sealy
Title	Engineering Fellow

1.2 Manufacturer

Company Name	WiTricity Corporation 2340 S. Heritage Dr., Ste. B Nibley, UT 84321 U.S.A.
Contact Name	Ky Sealy
Title	Engineering Fellow

1.3 Party Responsible for Declaration of Conformity

Company Name	WiTricity Corporation 57 Water Street Watertown, MA 02472 U.S.A.
Contact Name	Ky Sealy
Title	Engineering Fellow

2 Equipment Under Test (EUT)

2.1 Identification of EUT

Brand Name	WiTricity					
Model Name	WiTricity Halo Power Hub and WiTricity Halo Receiver					
Model Number	GWL1300 and VWL1300					
Serial Number	GWL13001023314000600 (Power Hub)					
	VWL13001023314000400 (Receiver)					
Dimensions (m)	1.6	x	1.6	x	0.09	Power Hub
	1.3	x	1.3	x	0.11	Receiver

2.2 Description of EUT

The WiTricity Halo Power Hub and WiTricity Halo Receiver work as a power transfer system for charging electric vehicle batteries.

2.3 EUT and Support Equipment

The EUT and support equipment used during the test are listed below.

Brand Name **Model Number** **Serial Number**	**Description**	**Name of Interface Ports / Interface Cables**
BN: WiTricity MN: GWL1300 (Note 1) SN: GWL13001023314000600	Power Transfer Unit	None
BN: WiTricity MN: VWL1300 (Note 1) SN: VWL13001023314000400	Power Receive Unit	See Section 2.4
BN: Dell MN: Precision 5550 SN: N/A	Control PC	CAN bus Adaptor to USB (Notes 2 & 3)
BN: BK Precision MN: 9110 SN: N/A	DC Power Supply	DC Output
BN: BK Precision MN: 8514B SN: N/A	DC Electronic Load	PRU Monitor (Note 2)

Notes: (1) EUT

(2) Interface port connected to EUT (See Section 2.4)

(3) Cable includes manufacturer-supplied ferrite.

The support equipment listed above was not modified in order to achieve compliance with this standard.

2.4 Interface Ports on EUT

Name of Ports	No. of Ports Fitted to EUT	Cable Description/Length
CAN Bus (VWL1300)	1 of 1	CAN DC Input Shielded Twisted Pairs / 5 m CAN Load / 0.1 m
DC Out (VWL1300)	1 of 1	Twisted Pair Conductors / 5 m

2.5 Modification Incorporated/Special Accessories on EUT

There were no modifications or special accessories required to comply with the specification.

2.6 Deviation from Test Standard

There were no deviations from the test specification.

3 Test Specification, Methods and Procedures

3.1 Test Specification

Title	FCC Part 18 Industrial, Scientific, and Medical Equipment
Purpose of Test	The tests were performed to demonstrate initial compliance

3.2 Methods & Procedures

3.2.1 §18.301 Operating Frequencies

ISM equipment may be operated on any frequency above 9 kHz except as indicated in §18.303. The following frequency bands, in accordance with §2.106 of the rules, are allocated for use by ISM equipment.

ISM Frequency Range	Tolerance
6.78 MHz	±15.0 kHz
13.56 MHz	±7.0 kHz
27.12 MHz	±163.0 kHz
40.68 MHz	±20.0 kHz
9150 MHz	±13.0 kHz
2,450 MHz	±50.0 MHz
5,800 MHz	±75.0 MHz
24,125 MHz	±125.0 MHz
61.25 GHz	±250.0 MHz
122.50 GHz	±500.0 MHz
245.00 GHz	±1.0 GHz

Note: The use of the 6.78 MHz ±15.0 kHz frequency band is subject to the conditions of footnote 524 of the Table of Allocations. See §2.106.

Table 1: Operating Frequencies

3.2.2 §18.303 Prohibited Frequency Bands

Operation of ISM equipment within the following safety, search and rescue frequency bands is prohibited: 490 – 510 kHz, 2170 – 2194 kHz, 8354 – 8374 kHz, 121.4 – 121.6 MHz, 156.7 – 156.9 MHz, and 242.8 – 243.2 MHz.

3.2.3 §18.305 Field Strength Limits

a) ISM equipment operating on a frequency specified in §18.301 is permitted unlimited radiated energy in the band specified for that frequency.

b) The field strength levels of emissions which lie outside the bands specified in 18.301, unless otherwise indicated, shall not exceed the following.

Equipment	Operating Frequency	RF Power Generated by Equipment (Watts)	Field Strength Limit (µV/M)	Distance (Meters)
Any type unless otherwise specified (Miscellaneous)	Any ISM frequency	Below 500	25	300
		500 or more	25 x SQRT(power/500)	[1]300
	Any non-ISM frequency	Below 500	15	300
		500 or more	15 x SQRT(power/500)	[1]300
Industrial heaters and RF stabilized arc welders	On or below 5,725 MHz	Any	10	1600
	Above 5,725 MHz	Any	([2])	([2])
Medical diathermy	Any ISM frequency	Any	25	300
	Any non-ISM frequency	Any	15	300
Ultrasonic	Below 490 kHz	Below 500	2,400/F (kHz)	300
		500 or more	2,400/F (kHz) x SQRT (power/500)	[3]300
	490 to 1,650 kHz	Any	24,000/F (kHz)	30
	Above 1,600 kHz	Any	15	30
Induction cooking ranges	Below 90 kHz	Any	1,500	[4]30
	On or above 90 kHz	Any	300	[4]30

[1]Field strength may not exceed 10 µV/m at 1600 meters. Consumer equipment operating below 1000 MHz is not permitted the increase in field strength otherwise permitted here for power over 500 watts.

[2]Reduced to the greatest extent possible.

[3]Field strength may not exceed 10 µV/m at 1600 meters. Consumer equipment is not permitted the increase in field strength otherwise permitted here for power over 500 watts.

[4] Induction cooking ranges manufactured prior to February 1, 1980, shall be subject to the field strength limits for miscellaneous ISM equipment.

Table 2: Field Strength Limits

c) The field strength limits for RF lighting devices shall be the following.

Frequency (MHz)	Field Strength Limit at 30 meters (µV/M)
Non-consumer equipment	
30 – 88	30
88 – 216	50
216 – 1000	70
Consumer equipment	
30 – 88	10
88 – 216	15
216 – 1000	20

Table 3:RF Lighting Field Strength Limits

1. The tighter limit shall apply at the boundary between two frequency ranges.
2. Testing for compliance with these limits may be made at closer distances, provided a sufficient number of measurements are taken to plot the radiation pattern to determine the major lobes of radiation, and to determine the expected field strength level at 30, 300, or 1600 meters. Alternately, if measurements are made at only one closer fixed distance, then the permissible field strength limits shall be adjusted using a 1/d as an attenuation factor.

3.2.4 §18.307 Conduction Limits

For the following equipment, when designed to be connected to the public utility (AC) power line the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies shall not exceed the limits in the following tables. Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal using a 50 µH/50 ohms line impedance stabilization network (LISN).

(a) All Induction cooking ranges and ultrasonic equipment:

Frequency range (MHz)	Conducted Limits (dBµV)	
	Quasi-peak	Average
0.009 – 0.05	110	---
0.05 – 0.15	90 – 80*	---
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 - 30	60	50
*Decreases with the logarithm of the frequency.		

Table 4: Limits for conducted emissions all induction cooking ranges and ultrasonic equipment.

(b) All other part 18 consumer devices.

Frequency range (MHz)	Conducted Limit (dBµV)	
	Quasi-peak	Average
0.15 to 0.50*	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50
*Decreases with the logarithm of the frequency.		

Table 5: Limits for conducted emissions all other part 18 consumer devices.

(c) RF lighting devices.

Frequency of Emission (MHz)		Maximum RF line voltage measured with a 50 µH/50Ω LISN (µV)
Non-consumer equipment	0.45 to 1.6	1,000
	1.6 to 30	3,000
Consumer equipment	0.45 to 2.51	250
	2.51 to 3.0	3,000
	3.0 to 30	250

Table 6: Limits of conducted emissions RF lighting devices.

(d) If testing with a quasi-pead detector demonstrates that the equipment complies with the average limits specified in the appropriate table in this section, additional testing to demonstrate compliance using an average detector is not required.
(e) These conduction limits shall apply only outside of the frequency bands specified in §18.301.
(f) For ultrasonic equipment, compliance with the conducted limits shall preclude the need to show compliance with the field strength limits below 30 MHz unless requested by the Commission.
(g) The tighter limits shall apply at the boundary between two frequency ranges.

3.2.5 §18.309 Frequency Range of Measurements

(a) For field strength measurements.

Frequency Band In Which Device Operates (MHz)	Range of Frequency Measurements	
	Lowest Frequency	Highest Frequency
Below 1.705	Lowest frequency generated in the device, but not lower than 9 kHz	30 MHz
1.705 to 30	Lowest frequency generated in the device, but not lower than 9 kHz	400 MHz
30 to 500	Lowest frequency generated in the device or 25 MHz, whichever is lower	Tenth harmonic or 1,000 MHz, whichever is higher
500 to 1,000	Lowest frequency generated in the device or 100 MHz, whichever is lower	Tenth harmonic
Above 1,000	. . . . . do	Tenth harmonic or highest detectable emission

Table 7: Frequency Range of Measurements.

(b) For conducted power line measurements, the frequency range over which the limits are specified will be scanned.

3.2.6 §18.311 Methods of Measurement

The measurement techniques which will be used by the FCC to determine compliance with the technical requirements for this part are set out in FCC Measurement Procedure MP-5, "Methods of Measurements of Radio Noise Emissions from ISM equipment". Although the procedures in MP-5 are not mandated, manufacturers are encouraged to follow the same techniques which will be used by the FCC.

3.3 Test Procedure

The emission testing was performed according to the procedures in FCC MP-5, Methods of Measurements of Radio Noise Emissions from ISM Equipment and ANSI C63.30. VPI Laboratories, Inc. main office is located at 313 W 128 S, Suite 311, Draper, UT 84020. VPI Laboratories, Inc. is accredited by National Voluntary Laboratory Accreditation Program (NVLAP); NVLAP Lab Code: 100272-0, which is effective until September 30, 2024. VPI Laboratories, Inc. carries FCC Accreditation Designation Number US5263.

4 Operation of EUT During Testing

4.1 Operating Environment

Power Supply	120 VAC
AC Mains Frequency	60 Hz

4.2 Operating Modes

Each mode of operation was exercised to produce worst-case emissions. EUT was tested in standby, and while transferring power at the best-case and worst-case power transfer coupling positions. The highest radiated emissions were found with the PRU at its worst-case power transfer coupling position, while the highest conducted AC mains emissions were found with the PRU at its best-case power transfer coupling position. EUT is floor-standing and was tested in a single orthogonal orientation. The AC Mains Cable was not bundled in accordance with normal use and the EUT manual, and will only be installed professionally. The separation distance for the PRU was found to be worst at 14 cm from the PTU.

4.3 EUT Exercise Software

WiTricity Firmware was used to exercise the EUT.

4.4 Block Diagram of Test Configuration

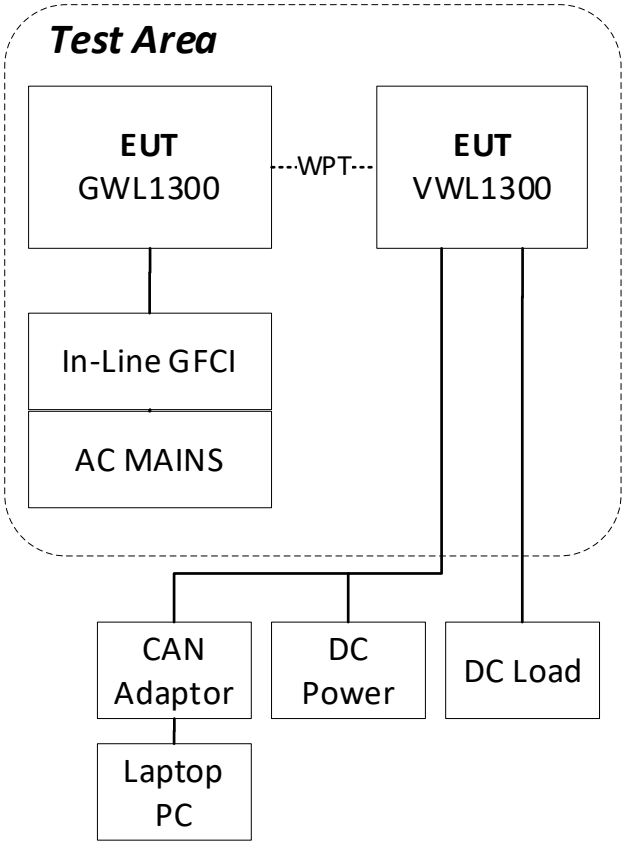


Diagram 1: Test Configuration Block Diagram

5 Summary of Test Results

5.1 FCC Part 18

5.1.1 Summary of Tests

Port	Test Description	Frequency Range (MHz)	Result
AC Power	Conducted Emissions (Hot Lead to Ground)	0.009 to 30	Complied
AC Power	Conducted Emissions (Neutral Lead to Ground)	0.009 to 30	Complied
Enclosure	Radiated Emissions (Vertical Polarity)	0.009 to 30	Complied
Enclosure	Radiated Emissions (Horizontal Polarity)	0.009 to 30	Complied

5.2 Result

In the configuration tested, the EUT complied with the requirements of the specification.

6 Measurements, Examinations and Derived Results

6.1 General Comments

This section contains the test results only. Details of the test methods used and a list of the test equipment used during the measurements can be found in Section 7 of this report.

6.2 Test Results

6.2.1 Conducted Emissions at Mains Ports Data (Hot Lead)

Frequency (MHz)	Detector	Receiver Reading (dBµV)	Correction Factor (dB)	Measured Level (dBµV)	Class B Limit (dBµV)	Margin (dB)
0.15	Average (Note 2)	30.0	13.5	43.5	56.0	-12.5
0.15	Quasi-Peak (Note 2)	41.6	13.5	55.1	66.0	-10.9
0.27	Average (Note 2)	27.7	12.0	39.7	51.1	-11.4
0.27	Quasi-Peak (Note 2)	40.1	12.0	52.1	61.1	-9.1
0.29	Average (Note 2)	28.1	11.8	40.0	50.4	-10.5
0.29	Quasi-Peak (Note 2)	40.8	11.8	52.6	60.4	-7.8
0.44	Average (Note 2)	24.3	11.3	35.6	47.1	-11.5
0.44	Quasi-Peak (Note 2)	36.9	11.3	48.2	57.1	-8.8
4.0	Average (Note 2)	35.0	10.2	45.2	46.0	-0.8
4.0	Quasi-Peak (Note 2)	35.6	10.2	45.8	56.0	-10.2
10.4	Average (Note 2)	38.0	10.4	48.4	50.0	-1.6
10.4	Quasi-Peak (Note 2)	40.0	10.4	50.4	60.0	-9.6

Note 1: The reference detector used for the measurements was Quasi-Peak or Peak and the data was compared to the average limit; therefore, the EUT was deemed to meet both the average and quasi-peak limits.
Note 2: The reference detector used for the measurements was quasi-peak and average and the data was compared to the respective limits.

Result

The EUT complied with the specification limit by a margin of 0.8 dB.

6.2.2 Conducted Emissions at Mains Ports Data (Neutral Lead)

Frequency (MHz)	Detector	Receiver Reading (dBµV)	Correction Factor (dB)	Measured Level (dBµV)	Class B Limit (dBµV)	Margin (dB)
0.15	Average (Note 2)	34.1	13.5	47.6	56.0	-8.4
0.15	Quasi-Peak (Note 2)	45.0	13.5	58.5	66.0	-7.5
0.27	Average (Note 2)	28.4	12.0	40.4	51.1	-10.8
0.27	Quasi-Peak (Note 2)	40.8	12.0	52.8	61.1	-8.3
0.29	Average (Note 2)	29.5	11.8	41.4	50.5	-9.1
0.29	Quasi-Peak (Note 2)	41.7	11.8	53.6	60.5	-6.9
0.40	Average (Note 2)	23.3	11.4	34.7	47.8	-13.1
0.40	Quasi-Peak (Note 2)	36.7	11.4	48.1	57.8	-9.8
2.1	Average (Note 2)	29.4	10.2	39.5	46.0	-6.5
2.1	Quasi-Peak (Note 2)	33.7	10.2	43.9	56.0	-12.2
4.0	Average (Note 2)	34.4	10.2	44.6	46.0	-1.4
4.0	Quasi-Peak (Note 2)	35.2	10.2	45.4	56.0	-10.6
4.2	Average (Note 2)	34.2	10.2	44.5	46.0	-1.6
4.2	Quasi-Peak (Note 2)	35.0	10.2	45.2	56.0	-10.8
10.1	Average (Note 2)	39.2	10.4	49.5	50.0	-0.5
10.1	Quasi-Peak (Note 2)	41.3	10.4	51.6	60.0	-8.4
10.6	Average (Note 2)	38.1	10.4	48.4	50.0	-1.6
10.6	Quasi-Peak (Note 2)	41.0	10.4	51.3	60.0	-8.7

Note 1: The reference detector used for the measurements was Quasi-Peak or Peak and the data was compared to the average limit; therefore, the EUT was deemed to meet both the average and quasi-peak limits.
Note 2: The reference detector used for the measurements was quasi-peak and average and the data was compared to the respective limits.

Result

The EUT complied with the specification limit by a margin of 0.5 dB.

6.2.3 Radiated Emissions Data (Vertical Polarity)

Frequency (MHz)	Detector	Receiver Reading (dBµA)	Correction Factor (dB/m)	Field Strength (dBµA/m)	3 m Limit (dBµA/m)	Margin (dB)
0.060	Peak (Note 1)	53.7	-40.9	12.8	91.44	-78.6
0.085	Peak (Note 1)	117.8	-41.3	76.5	90.93	-14.5
0.18	Peak (Note 1)	51.2	-41.8	9.4	88.55	-79.2
0.25	Peak (Note 1)	67.1	-41.9	25.2	86.66	-61.5
0.42	Peak (Note 1)	58.4	-41.8	16.6	81.74	-65.1
5.0	Peak (Note 1)	46.8	-41.2	5.6	38.58	-33.0
9.3	Peak (Note 1)	56.6	-41.3	15.4	28.65	-13.3
Note 1: The reference detector used for the measurements was peak and the data was compared to the average or quasi-peak limit.						

Result

The EUT complied with the specification limit by a margin of 13.3 dB.

6.2.4 Radiated Emissions Data (Horizontal Polarity)

Frequency (MHz)	Detector	Receiver Reading (dBµA)	Correction Factor (dB/m)	Field Strength (dBµA/m)	3 m Limit (dBµA/m)	Margin (dB)
0.010	Peak (Note 1)	57.2	-33.0	24.2	92.0	-67.8
0.085	Peak (Note 1)	114.3	-41.3	73.0	90.9	-18.0
0.25	Peak (Note 1)	66.8	-41.9	24.9	86.7	-61.8
0.42	Peak (Note 1)	58.5	-41.8	16.6	81.7	-65.1
0.59	Peak (Note 1)	52.7	-41.5	11.2	75.6	-64.4
0.76	Peak (Note 1)	48.9	-41.5	7.4	71.1	-63.7
0.93	Peak (Note 1)	46.0	-41.3	4.8	67.5	-62.7
Note 1: The reference detector used for the measurements was peak and the data was compared to the average or quasi-peak limit.						

Result

The EUT complied with the specification limit by a margin of 18.0 dB.

6.3 Sample Measurement Calculations

6.3.1 Field Strength Calculations

The field strength is calculated by adding the *Correction Factor* (*Antenna Factor* + *Cable Factor*), to the measured level from the receiver. The receiver amplitude reading is compensated for any amplifier gain. The basic equation with a sample calculation is shown below:

Receiver Amplitude Reading=Receiver Reading-Amplifier Gain

Correction Factor=Antenna Factor + Cable Factor

Field Strength=Receiver Amplitude Reading + Correction Factor

Example

Assuming a *Receiver Reading* of 42.5 dBµV is obtained from the receiver, the *Amplifier Gain* is 26.5 dB the *Antenna Factor* is 4.5 dB, and the *Cable Factor* is 4.0 dB. The *Field Strength* is calculated by subtracting the *Amplifier Gain* and adding the *Correction Factor*, giving a *Field Strength* of 24.5 dBµV/m.

$$Receiver\ Amplitude\ Reading\ =\ 42.5 - 26.5\ =\ 16.0\ \text{dBµV/m}$$

$$Correction\ Factor\ =\ 4.5 + 4.0\ =\ 8.5\ \text{dB}$$

$$Field\ Strength\ =\ 16.0 + 8.5\ =\ 24.5\ \text{dBµV/m}$$

6.3.2 Conducted Measurement Value Calculations

A conducted emission value is calculated by adding the *Correction Factor* (*LISN Transducer Factor* + *Cable Factor*) to the measured value from the receiver. The LISN contains an internal 10dB (nominal) attenuation accounted for in the LISN Transducer Factor. Amplifiers are not utilized for this measurement. The basic equation with a sample calculation is shown below:

Correction Factor = LISN Transducer Factor + Cable Factor

Conducted Emission Value = Receiver Amplitude Reading + Correction Factor

Example

Assuming a *Receiver Reading* of 20.8 dBµV is obtained from the receiver, *LISN Transducer Factor* is 10.1 dB, and the *Cable Factor* is 0.3 dB. The *Conducted Emissions Value* is calculated by adding the *Correction Factor*, giving a *Conducted Emissions Value* of 31.2 dBµV.

$$Receiver\ Amplitude\ Reading\ =\ 20.8\ \text{dBµV}$$

$$Correction\ Factor\ =\ 10.1 + 0.3\ =\ 10.4\ \text{dB}$$

$$Conducted\ Emissions\ Value\ =\ 20.8 + 10.4\ =\ 31.2\ \text{dBµV}$$

6.4 Test Procedures and Test Equipment

6.5 Conducted Emissions at Mains Ports

The conducted emissions at mains and telecommunications ports from the EUT were measured using a spectrum analyzer with a quasi-peak adapter for peak, quasi-peak and average readings. The quasi-peak adapter uses a bandwidth of 9 kHz, with the spectrum analyzer's resolution bandwidth set at 100 kHz, for readings in the 150 kHz to 30 MHz frequency ranges.

The conducted emissions at mains ports measurements are performed in a screen room using a (50 Ω/50 µH) Line Impedance Stabilization Network (LISN).

Where mains flexible power cords are longer than 1 m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4 m in length.

Where the EUT is a collection of devices with each device having its own power cord, the point of connection for the LISN is determined from the following rules:

- Each power cord, which is terminated in a mains supply plug, shall be tested separately.
- Power cords, which are not specified by the manufacturer to be connected via a host unit, shall be tested separately.
- Power cords which are specified by the manufacturer to be connected via a host unit or other power supplying equipment shall be connected to that host unit and the power cords of that host unit connected to the LISN and tested.
- Where a special connection is specified, the necessary hardware to effect the connection is supplied by the manufacturer for the testing purpose.
- When testing equipment with multiple mains cords, those cords not under test are connected to an artificial mains network (AMN) different than the AMN used for the mains cord under test.

For testing, desktop EUT are placed on a non-conducting table at least 0.8 meters from the metallic floor and placed 40 cm from the vertical coupling plane (copper plating in the wall behind EUT table). Floor standing equipment is placed directly on the earth grounded floor with insulating material.

Type of Equipment	Manufacturer	Model Number	Asset Number	Date of Last Calibration	Due Date of Calibration
Spectrum Analyzer/Receiver	Rohde & Schwarz	ESU40	V033119	08/20/2023	08/20/2024
LISN	Teseq	NNB 51	V045405	12/05/2023	12/05/2024
Conductance Cable Wanship Upper Site	VPI Labs	Cable J	V034832	12/28/2023	12/28/2024
EMC32 Measurement Software	Rohde & Schwarz	10.60.20	N/A	N/A	N/A

Table 8: List of equipment used for conducted emissions testing at mains ports

All the equipment listed above is calibrated using either an independent calibration laboratory or VPI Laboratories, Inc. personnel at intervals defined in ANSI C63.4:2014 following outlined calibration procedures. All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Supporting documentation relative to tractability is on file and is available for examination upon request.

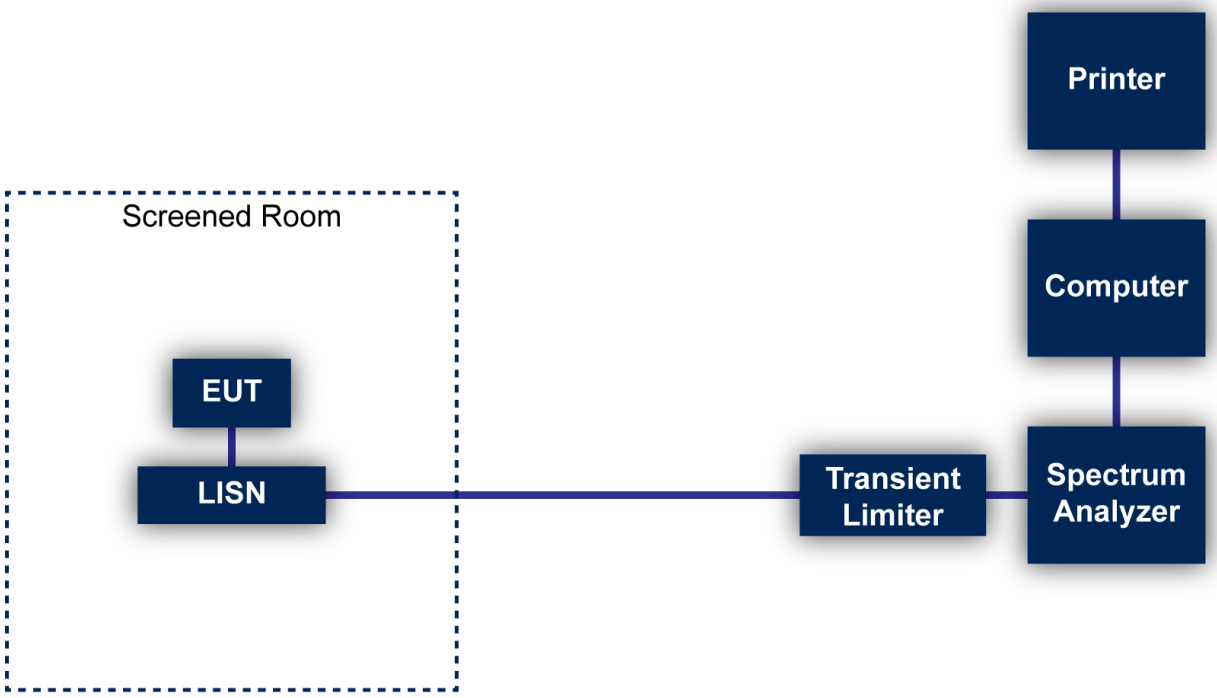


Figure 1: Conducted Emissions Test

6.6 Radiated Emissions

The radiated emissions from the EUT were measured using a spectrum analyzer with a quasi-peak adapter for peak and quasi-peak readings.

A preamplifier with a fixed gain was used to increase the sensitivity of the measuring instrumentation. For frequencies below 150 kHz, a 200 Hz RBW was used. From 150 kHz to 30 MHz, measurements were made using a 9 kHz RBW. Measurements from 30 MHz to 1000 MHz were made using a 100 kHz RBW. For frequencies above 1000 MHz, a 1 MHz RBW was used.

An active loop antenna was used for measurements of emissions below 30 MHz at a distance of 3 meters from the EUT. A biconilog antenna was used to measure the frequency range of 30 to 1000 MHz, at a distance of 3 meters from the EUT. The readings obtained by these antennas are correlated to the levels obtained with a tuned dipole antenna by adding antenna factors. A double-ridged guide antenna was used to measure the emissions at frequencies above 1000 MHz at a distance of 3 and/or 1 meter from the EUT.

The configuration of the EUT was varied to find the maximum radiated emission. The EUT was connected to the peripherals listed in Section 2.3 via the interconnecting cables listed in Section 2.4. A technician manually manipulated these interconnecting cables to obtain worst-case radiated emissions. The EUT was rotated 360 degrees, and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission. Where there were multiple interface ports all of the same type, cables are either placed on all of the ports or cables added to these ports until the emissions do not increase by more than 2 dB.

Desktop EUT are measured on a non-conducting table 0.8 meters above the ground plane. The table is placed on a turntable, which is level with the ground plane. For equipment normally placed on floors, the equipment shall be placed directly on the turntable with insulating material for separation.

For radiated emissions testing that is performed at distances closer than the specified distance; an inverse proportionality factor using ANSI C63.30 was used for calculations of the limits.

Type of Equipment	Manufacturer	Model Number	Asset Number	Date of Last Calibration	Due Date of Calibration
Spectrum Analyzer/Receiver	Rohde & Schwarz	ESU40	V033119	08/20/2023	08/20/2024
Spectrum Analyzer/ Signal Analyzer	Rohde & Schwarz	FSV40	V044352	03/08/2022	03/08/2024
Loop Antenna	EMCO	6502	V034216	04/27/2023	04/27/2024
Biconilog Antenna	EMCO	3142E	V057461	06/06/2023	06/06/2025
Power Amplifier	HP	8447E	V034189	12/28/2023	12/28/2024
Double Ridged Guide Antenna	EMCO	3115	V034413	01/25/2023	01/25/2025
High Frequency Amplifier	Miteq	AFS4-001018000-35-10P-4	V033997	12/28/2023	12/28/2024
900 MHz High Pass Filter	Micro-Tronics	HPM50108-03	V034185	12/28/2023	12/28/2024
2.4 GHz High Pass Filter	Micro-Tronics	HPM50111-03	V034183	12/28/2023	12/28/2024
2.4 GHz Notch Filter	Micro-Tronics	BRM50702-03	V034213	12/28/2023	12/28/2024
6’ High Frequency Cable	Microcoax	UFB197C-0-0720-000000	V033638	12/28/2023	12/28/2024
20’ High Frequency Cable	Microcoax	UFB197C-1-3120-000000	V033979	12/28/2023	12/28/2024
3 Meter Radiated Emissions Cable Wanship Upper Site	Microcoax	UFB205A-0-4700-000000	V033639	12/28/2023	12/28/2024
EMC32 Test Software	Rohde & Schwarz	10.60.20	N/A	N/A	N/A

Table 9: List of equipment used for radiated emissions testing.

All the equipment listed above is calibrated using either an independent calibration laboratory or VPI Laboratories, Inc. personnel at intervals defined in ANSI C63.4:2014 following outlined calibration procedures. All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Supporting documentation relative to tractability is on file and is available for examination upon request.

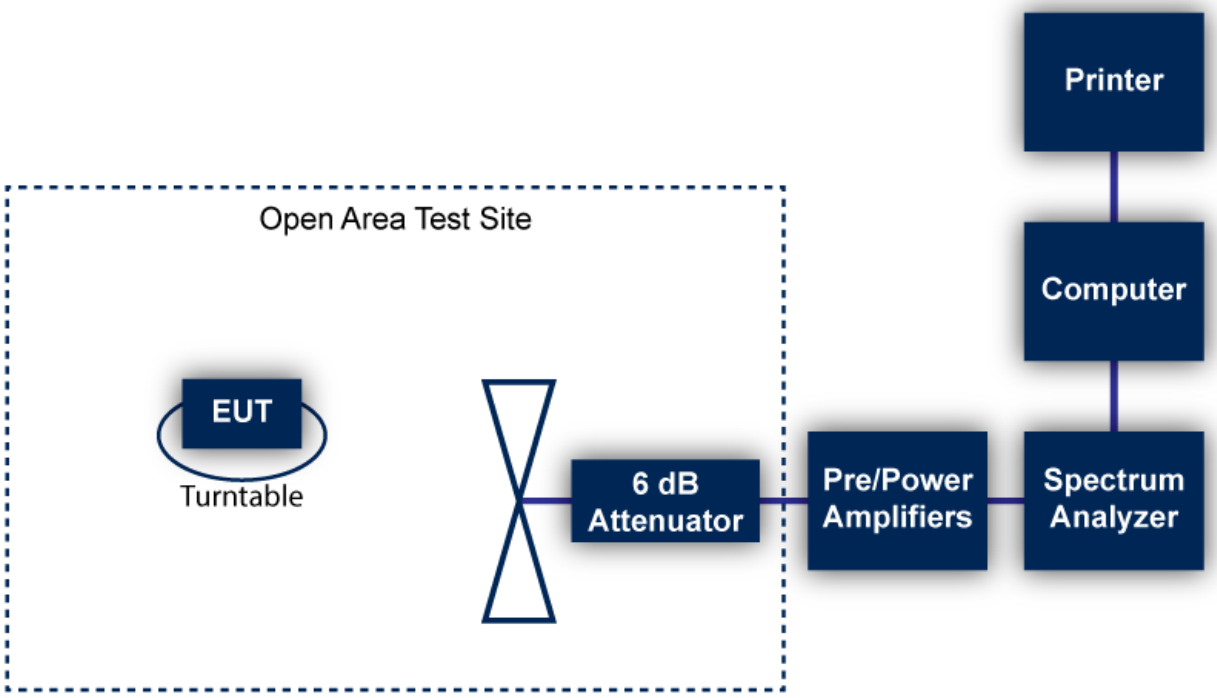
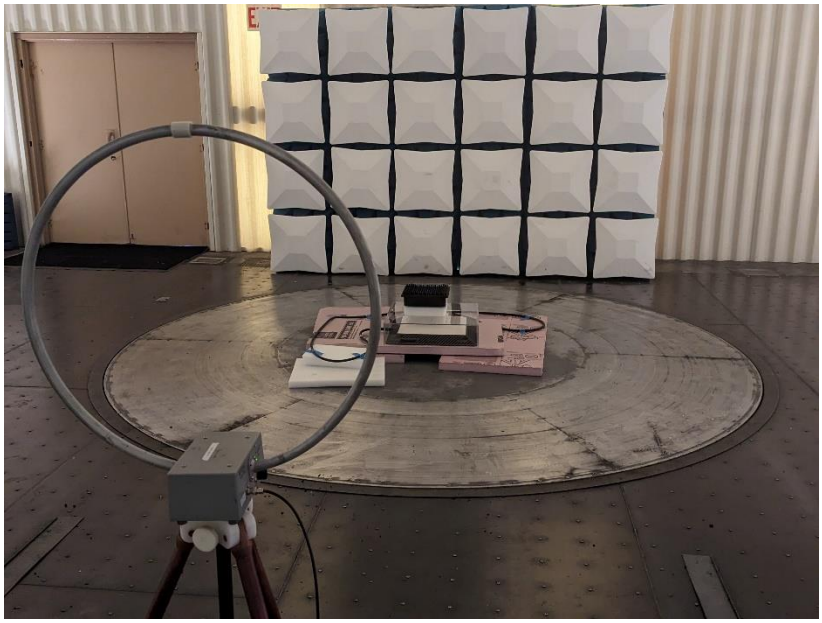


Figure 2: Radiated Emissions Test

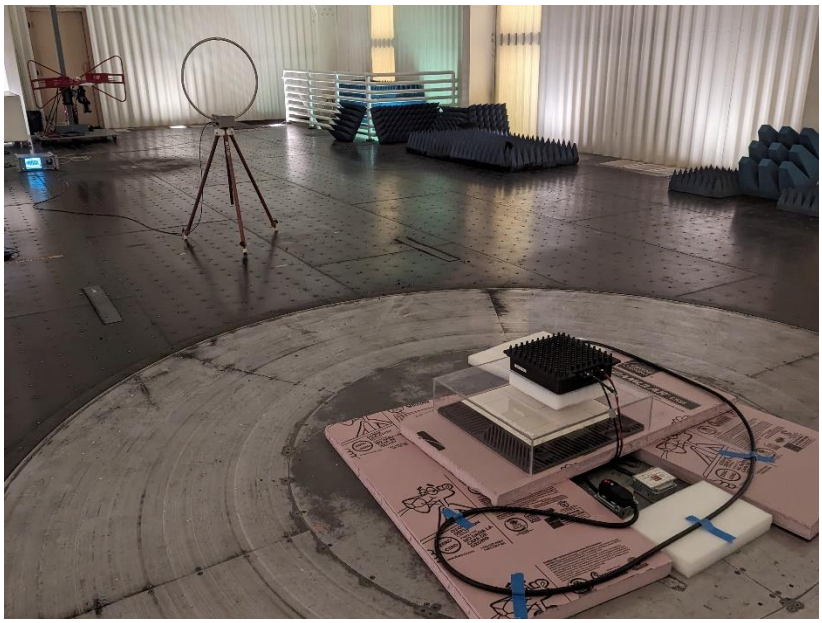
6.7 Measurement Uncertainty

Test	Uncertainty (±dB)	Confidence (%)
Conducted Emissions	2.8	95
Radiated Emission (9 kHz to 30 MHz)	3.3	95
Radiated Emissions (30 MHz to 1 GHz)	3.4	95
Radiated Emissions (1 GHz to 18 GHz)	5.0	95
Radiated Emissions (18 GHz to 40 GHz)	4.1	95

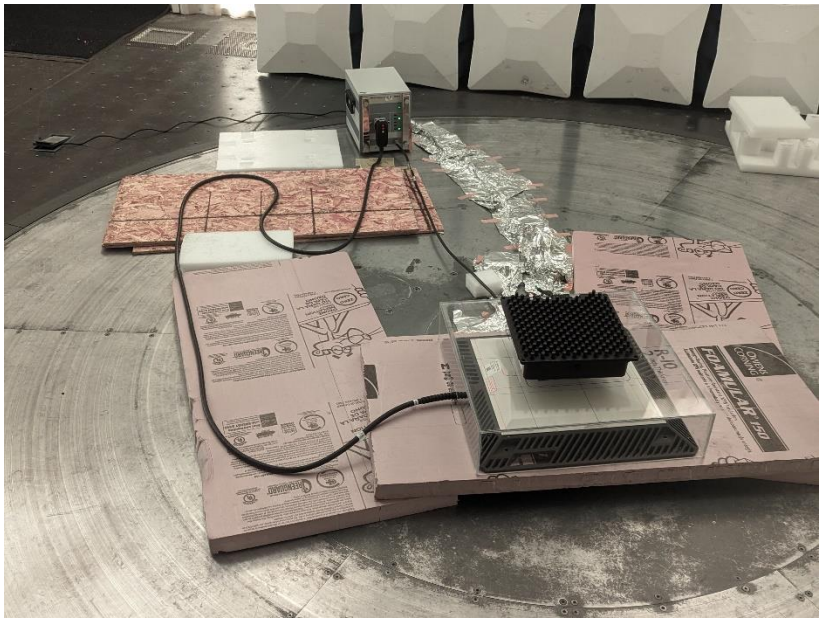
7 Photographs



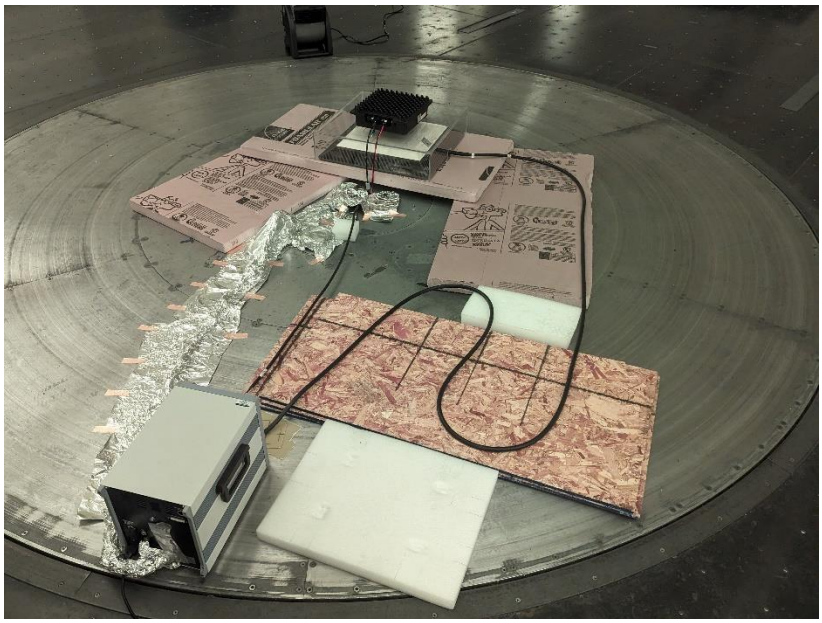
Photograph 1: Front View Radiated Emissions Worst Case Configuration



Photograph 2: Back View Radiated Emissions Worst Case Configuration

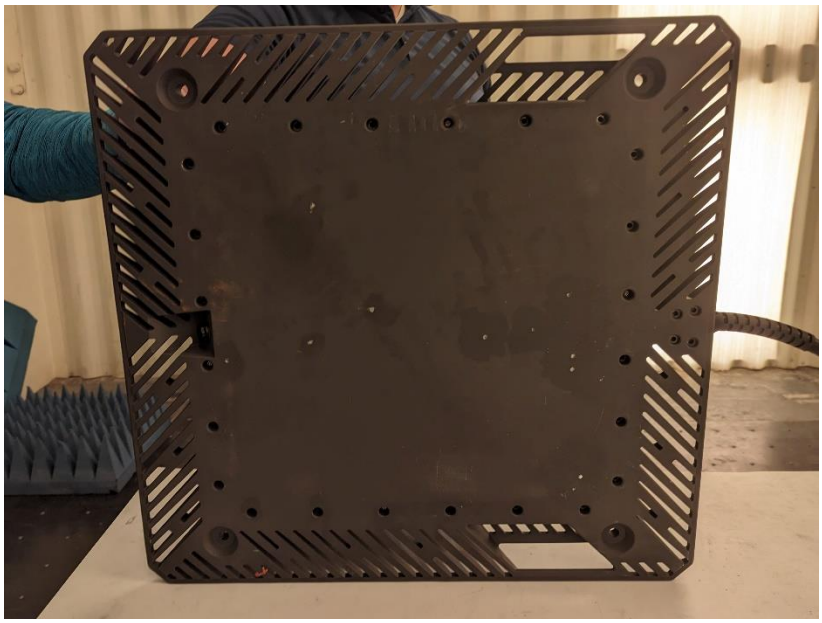


Photograph 3 - Front View Conducted Emissions Worst Case Configuration



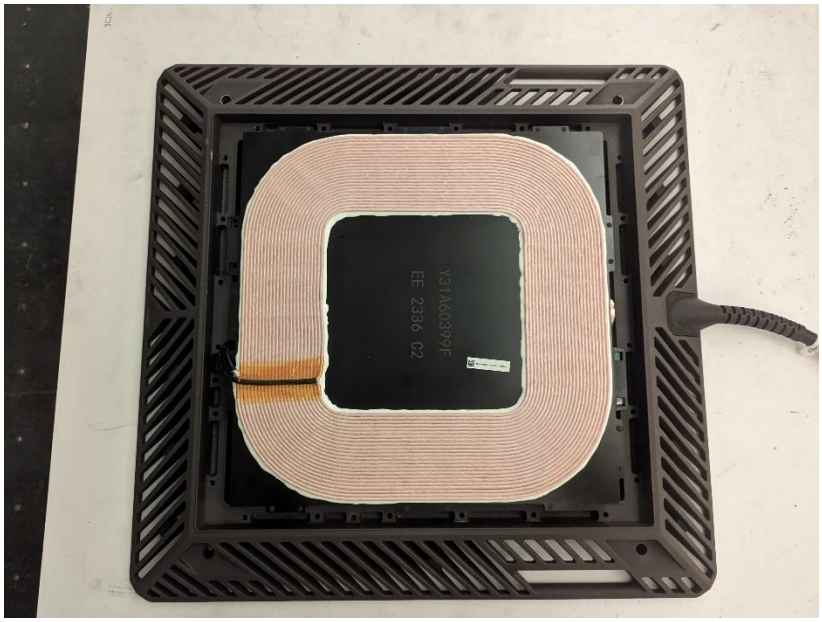
Photograph 4 - Back View Conducted Emissions Worst Case Configuration

Photograph 5 - Top View of the PTU

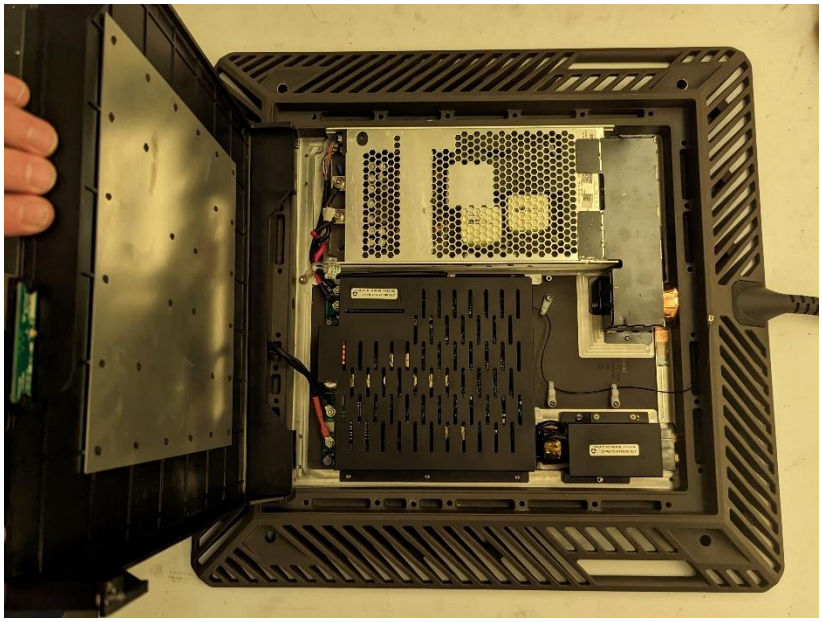


Photograph 6 - Bottom View of the PUT

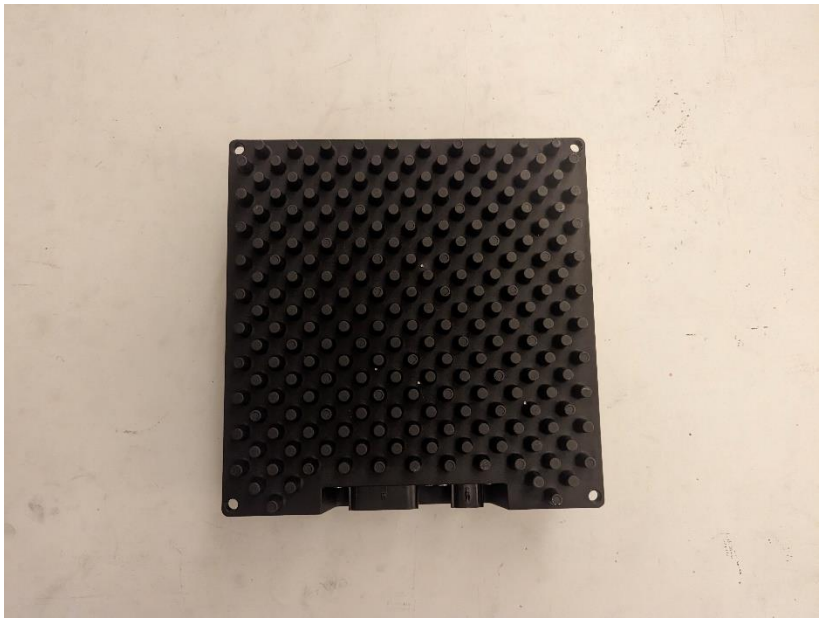
Photograph 7 - PTU Label



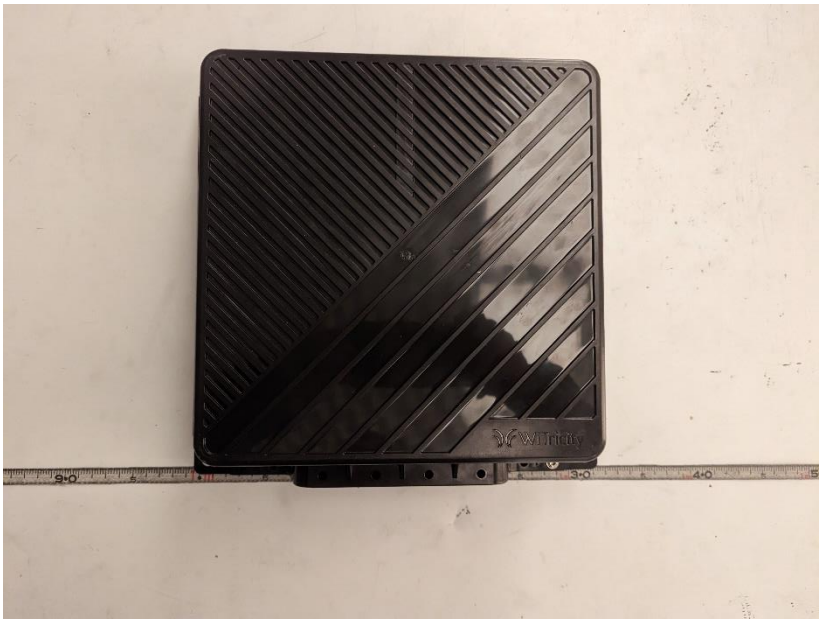
Photograph 8 - Internal View of the PTU (Power Transfer Coil Visible)



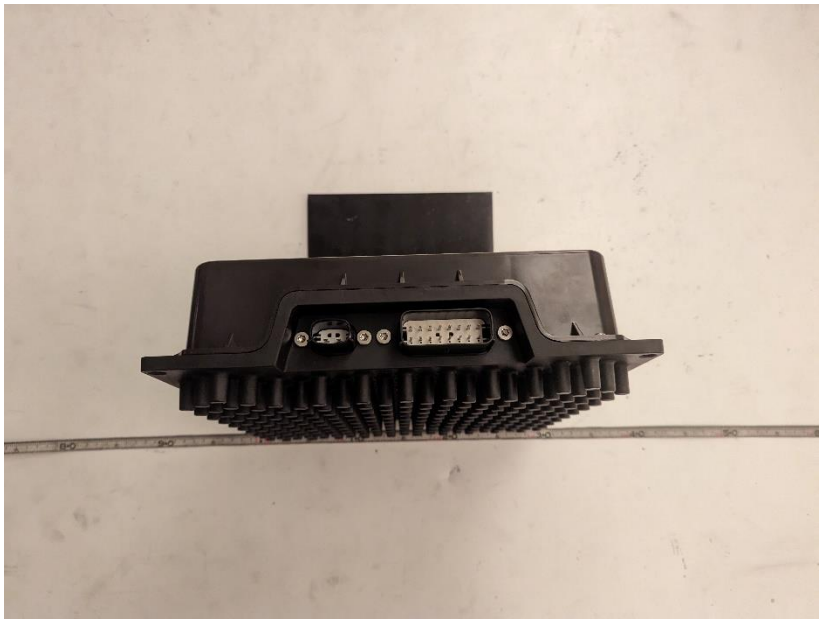
Photograph 9 - Internal View of the PTU (Under Power Transfer Coils)



Photograph 10 - Top View of the PRU

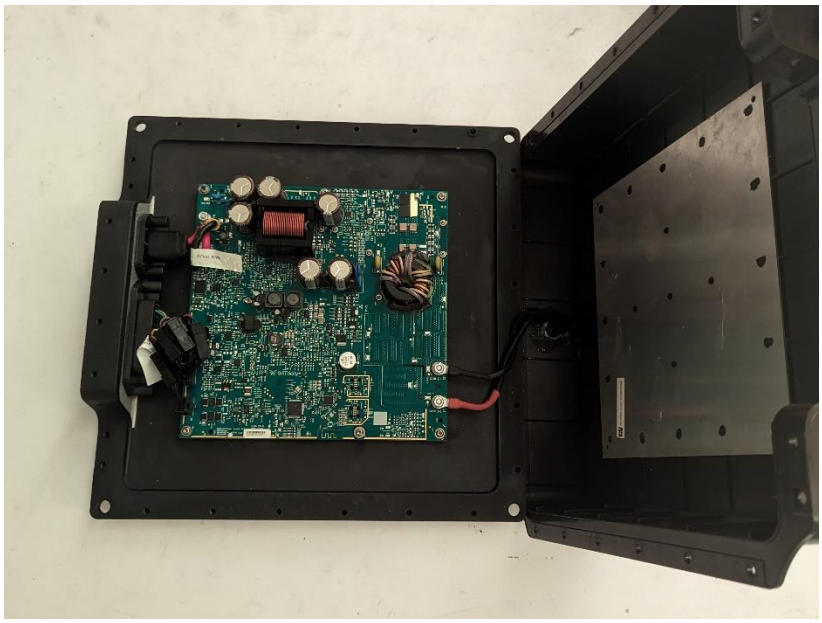


Photograph 11 - Bottom View of the PRU



Photograph 12 - Side View of the PRU

Photograph 13 - PRU Label



Photograph 14 - Internal View of the PRU

8 FCC Part 18 Compliance Information

8.1 Label and Compliance Statement

The label of the WiTricity GWL1300 and VWL1300 is not paginated as part of this report and will be made available by the applicant.

8.2 Block Diagram

A block diagram showing the clock frequencies and signal paths of the WiTricity GWL1300 and VWL1300 is not paginated as part of this report and will be made available by the applicant.

8.3 User's Manual

A copy of the User's manual containing the FCC warning statement is not paginated as part of this report and will be made available by the applicant.

--- End of Report ---