

Report on the FCC and ISED Testing of the

Invue Security Products Inc
IR2 Ecosystem:
PK4404 (F1266 Charger)

In accordance with:
LP0002, Updated July 2020

Prepared for: InVue Security Products Inc
9201 Baybrook Lane
Charlotte, NC 28277



America

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SIGNATURE

A handwritten signature in black ink, appearing to read "Sean Sellergren".

NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Sean Sellergren	Sr EMC Engineer	Authorized Signatory	23 November 2021

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD America, Inc. document control rules.

FCC Accreditation	Innovation, Science, and Economic Development Canada
Designation Number US1148 New Brighton, MN Test	Accreditation
Laboratory	Site Number 4512A New Brighton, MN Test Laboratory

EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with the standard(s) listed above.



A2LA Cert. No. 2955.11

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TÜV SÜD America Inc
141 14th Street NW
New Brighton, MN 55112

Phone: 651-631-2487
www.tuv-sud-america.com



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1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Table 1.1-1 – Modification Record

Issue	Description of Change	Date of Issue
1	First Issue	10 September 2021
2	Pictures Added; Antenna Information Added	23 November 2021

1.2 Introduction

Applicant	Invue Security Products Inc
Manufacturer	Invue Security Products Inc
Applicant's Email Address	DanHepka@invue.com
Model Number(s)	PK4404 (F1266 Charger)
Serial Number(s)	n/a
Number of Samples Tested	1
Test Specification/Issue/Date	LP0002, Updated July 2020
Order Number	72170636
Date of Receipt of EUT	18 June 2021
Start of Test	10 AUG 2021
Finish of Test	11 AUG 2021
Related Document(s)	n/a



1.3 Summary of Results

A summary of the tests carried out in accordance with the specifications shown below.

Table 1.3-1 – Summary of Results

Section	LP0002 Clause	Test Description	Accreditation	Base Standard
2.1	3.6	Radiated Disturbance	A2LA	ANSI C63.10-2013
2.2	3.3	Conducted Disturbance at Mains Terminals	A2LA	ANSI C63.10-2013

Table 1.3-2 – Test Accreditation

Test Name	Name of Tester(s)	Results / Comments
Radiated Emissions	Franklin Rose	Pass
Conducted Emissions	Franklin Rose	Pass



1.4 Product Information

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Wireless Power Transfer charging base for the IR2 Security Key (x4). A full description and detailed product specification details are available from the manufacturer.

Test Arrangement (Client & Source, Client w/ artificial Source, Source w/ Load)	Client & Source
WPT Frequency (kHz)	127 kHz
WPT Intended Distance (cm)	0 cm
EUT Utilizes RF Data Communication in addition to WPT	No
EUT Utilizes Modulation Communication within WPT function	No
EUT Incorporates another Wireless Device	No
Additional Wireless Device is located in Source or Client	n/a

WPT Source-Specific

WPT Number of Inductive areas	1
WPT Number of Clients	4
WPT Client(s) Position (Fixed or Variable)	Fixed

LP0002-Specific

Frequency Classification	Section 3 "Test Item and Criteria -General requirements"
WPT Role	WPT Source
EUT is subject to another LP0002 Clause	No

Antenna Information

Antenna Brand	InVue
Antenna Model	PK4404 Coil
Antenna Type	Coil
Antenna Gain	0.0 dBi

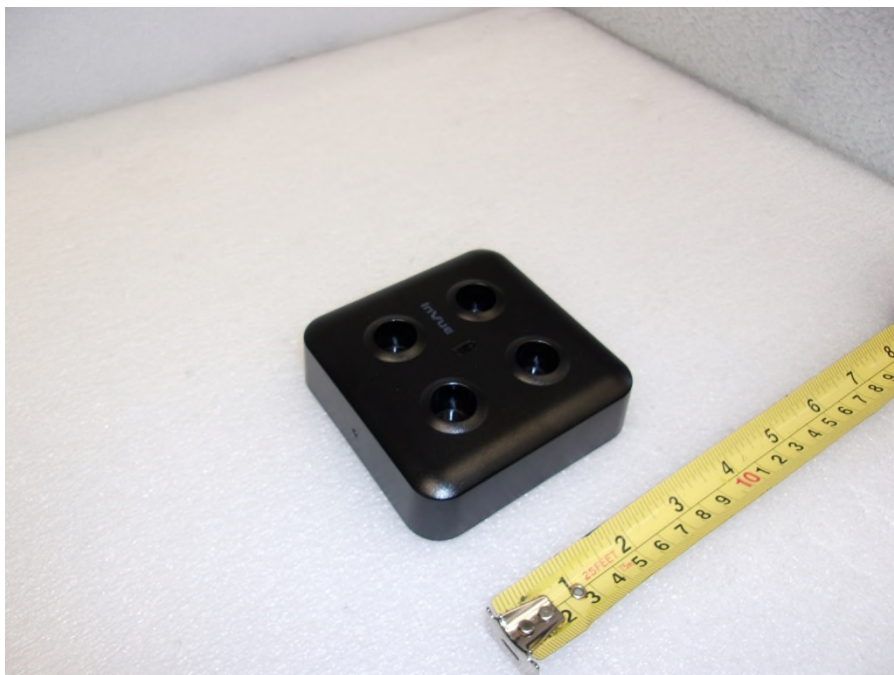


Photo 1.4-1 – Front View of the EUT



Photo 1.4-2 – Rear View of the EUT



Photo 1.4-3 – Front View of the PSU



Photo 1.4-4 – Rear View of the PSU



Photo 1.4-5 – Side View of the PSU



Photo 1.4-6 – EUT Populated w/ Client(s), PSU & Accessories

**Table 1.4-1 – Cable Descriptions**

Cable/Port	Description
AC/DC adapter Cable	1.7m cable

Table 1.4-2 – Support Equipment Descriptions

Make/Model	Description
AC/DC adapter	110 VAC 60 Hz Input to 18 VDC @ 840 mA Output, Taiwan
WPT Client (x4)	IR2 Security Key Fobs (for loading EUT during WPT)

1.4.2 Modes of Operation

The tested mode of operation was normal charging of x4 clients.

1.5 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

1.6 EUT Modification Record

The table below details modifications made to the EUT during the test program. The modifications incorporated during each test are recorded on the appropriate test pages.

Table 1.6-1 – Modification Record

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	Initial State		

1.7 Test Location

TÜV SÜD conducted the following tests at our New Brighton, MN Test Laboratory.

Office address:

TÜV SÜD America
141 14th Street NW
New Brighton, MN 55112 USA



2 Test Details

2.1 Radiated Emissions

2.1.1 Specification Reference

LP0002 3.6

2.1.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state “0”, as noted in §1.6.

2.1.3 Test Voltage / Frequency

110 VAC to 18 VDC Adapter

2.1.4 Date of Test

11 August 2021

2.1.5 Test Method

The EUT was set up in a semi-anechoic chamber on a remotely controlled turntable and placed on a non-conductive support 0.8 m above a reference ground plane using a measurement distance of 3m.

A pre-scan of the EUT emissions profile was made while varying the antennae-to-EUT azimuth and antennae-to-EUT polarization using a peak detector. Using the pre-scan list of the highest emissions detected, their bearing and associated antenna polarization, the EUT was then formally measured using an Average detector. The readings were maximized by adjusting the antenna height, polarization and turntable azimuth, in accordance with the specification.

Measurements were extrapolated to their respective limit distance(s) using the formulae found in LP0002.

2.1.6 Environmental Conditions

The EUT was evaluated within the climatic range of the EUT as specified by the manufacturer. When the manufacturer does not specify climatic parameters for the EUT, all tests are performed within the ambient climatic conditions of the laboratory.



2.1.7 Additional Observations

The frequency range investigated was determined in accordance with LP0002. Emissions > 20 dB were not recorded.

Measurements were done using BAT-EMC (v3.18) automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only.

2.1.8 Sample Computation (Radiated Emissions)

Measuring equipment raw measurement (dB μ V) @ 30 MHz		20.0
Correction Factor (dB/m)	Cable 2	0.24
	TEMC00011 (antenna)	18.70
Reported Quasi-peak Final Measurement (dB μ V/m) @ 30 MHz		38.94

2.1.9 Test Results

Test Summary: EUT operated as intended before, during, and after testing.

Test Result: Pass

NOTE: In accordance with other methods of measurement used for this test, testing was carried out at 3m with extrapolation factor added to the entire measurement range (9 kHz – 30 MHz) to 300m. Because measurements were extrapolated to 300m, the limits of LP0002 were also extrapolated to 300m in the range where they are specified at 30m. Therefore, both the measurement and the limit have been extrapolated to the same distance of 300 m.

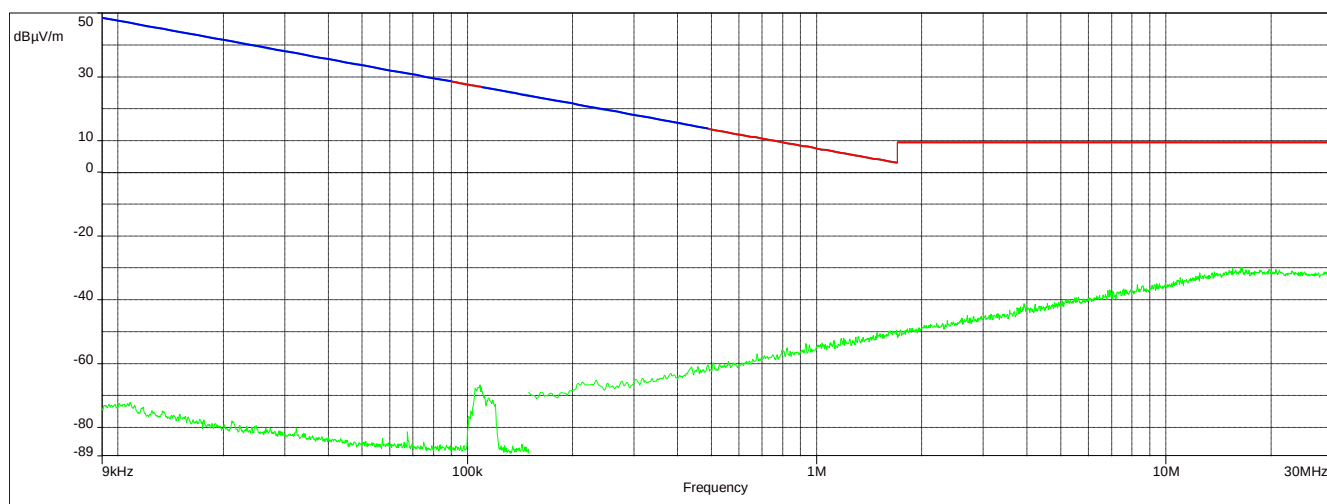
See data below for detailed results.



Spurious 9kHz - 30M, EUT X-Axis

Frequency Range	Polarity	Antenna Distance	RBW	Step Size	Sweep Time
9kHz- 150kHz	Vertical	3m	200Hz	18001Pts	Auto
150kHz- 30MHz	Vertical	3m	9kHz	18001Pts	Auto

— Taiwan LP0002 General Field Strength Limits, @ 300m 300m - Average/3.0m/
 — Taiwan LP0002 General Field Strength Limits, @ 300m 300m - QPeak/3.0m/
 — Taiwan LP0002 General Field Strength Limits, @ 300m 300m - Peak/3.0m/
 — Meas.Peak (Vertical)

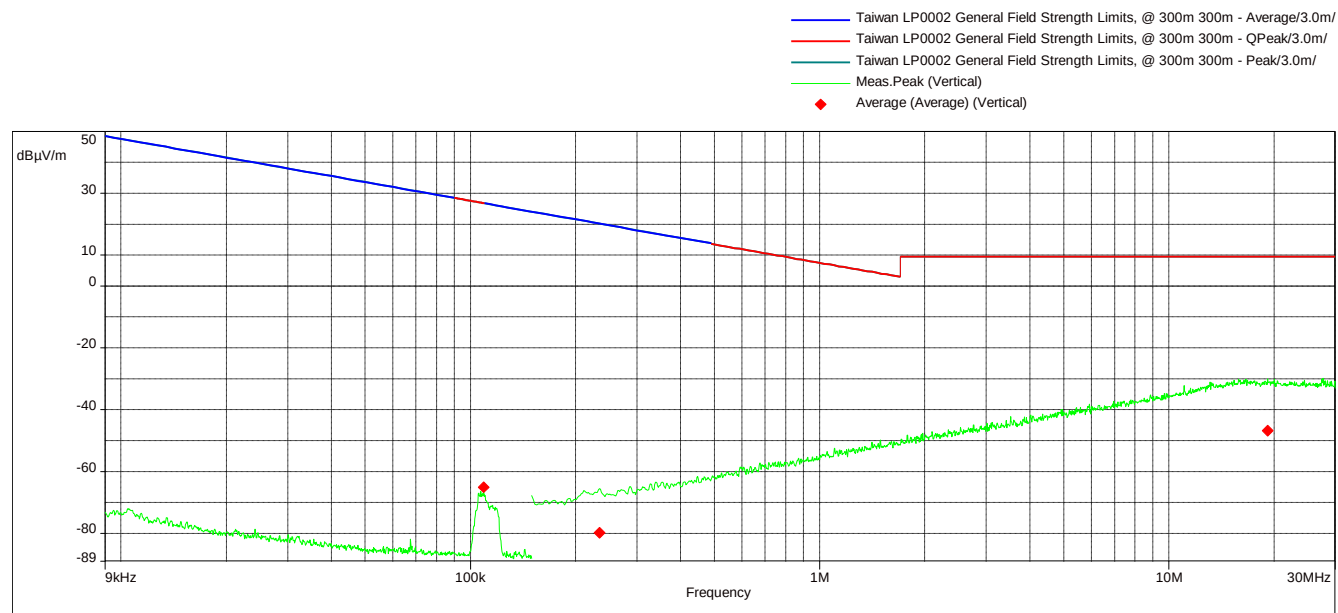


Limit:
 FCC 18 misc non-ISM <500 W

Test Results:
 Pass

Test Notes: No emissions within 20 dB of the limit.

Figure 2.1-1 – Graphical Results – 9 kHz to 30 MHz – Vertical Polarity



Limit:
LP0002 3.1.1.1 (1)

Test Results:
Pass

Test Notes: No emissions within 20 dB of the limit.

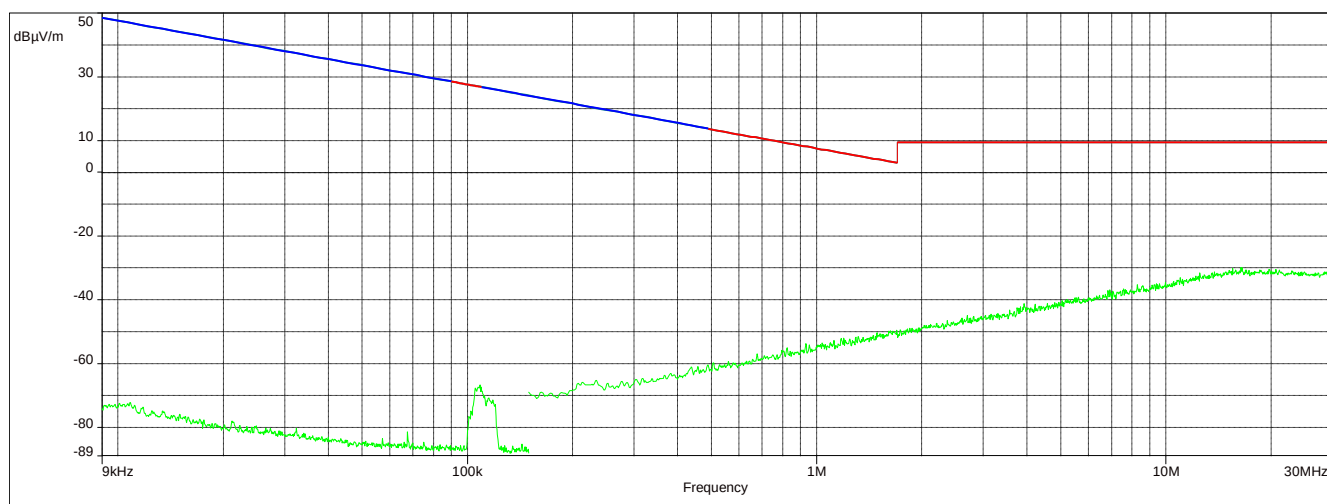
Figure 2.1-2 – Graphical Results – 9 kHz to 30 MHz – Horizontal Polarity



Spurious 9kHz - 30M, EUT Y-Axis

Frequency Range	Polarity	Antenna Distance	RBW	Step Size	Sweep Time
9kHz- 150kHz	Vertical	3m	200Hz	18001Pts	Auto
150kHz- 30MHz	Vertical	3m	9kHz	18001Pts	Auto

— Taiwan LP0002 General Field Strength Limits, @ 300m 300m - Average/3.0m/
 — Taiwan LP0002 General Field Strength Limits, @ 300m 300m - QPeak/3.0m/
 — Taiwan LP0002 General Field Strength Limits, @ 300m 300m - Peak/3.0m/
 — Meas.Peak (Vertical)



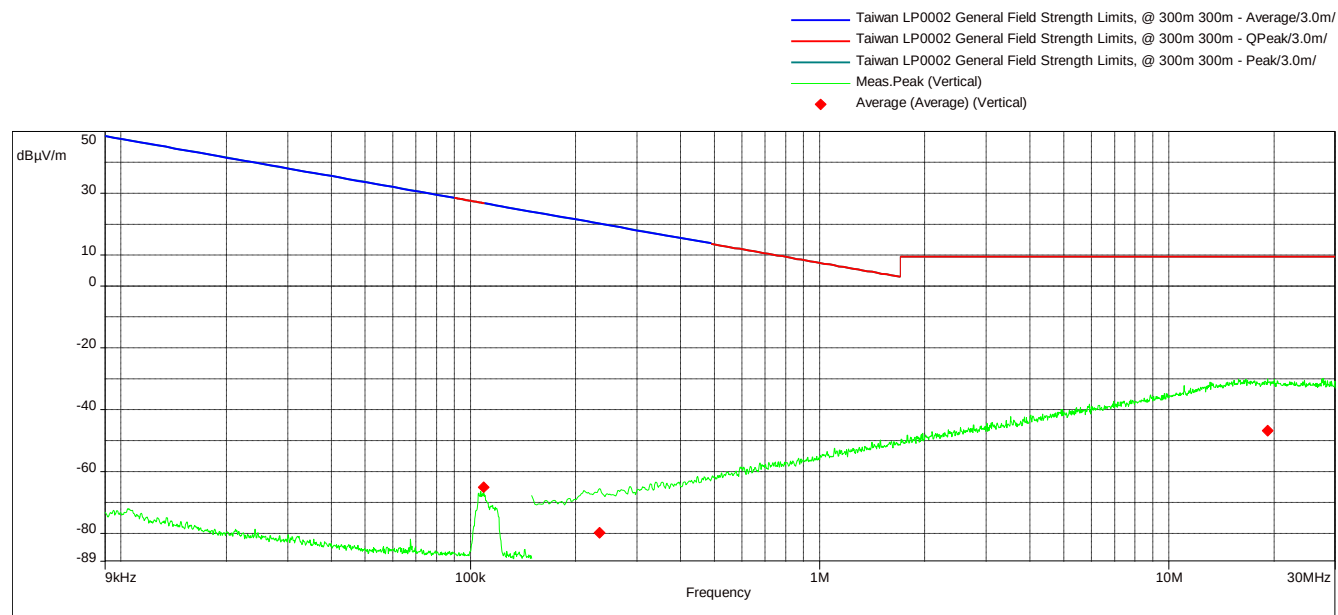
08/26/2021 15:30

Limit:
FCC 18 misc non-ISM <500 W

Test Results:
Pass

Test Notes: No emissions within 20 dB of the limit.

Figure 2.1-3 – Graphical Results – 9 kHz to 30 MHz – Vertical Polarity



Limit:
FCC 18 misc non-ISM <500 W

Test Results:
Pass

Test Notes: No emissions within 20 dB of the limit.

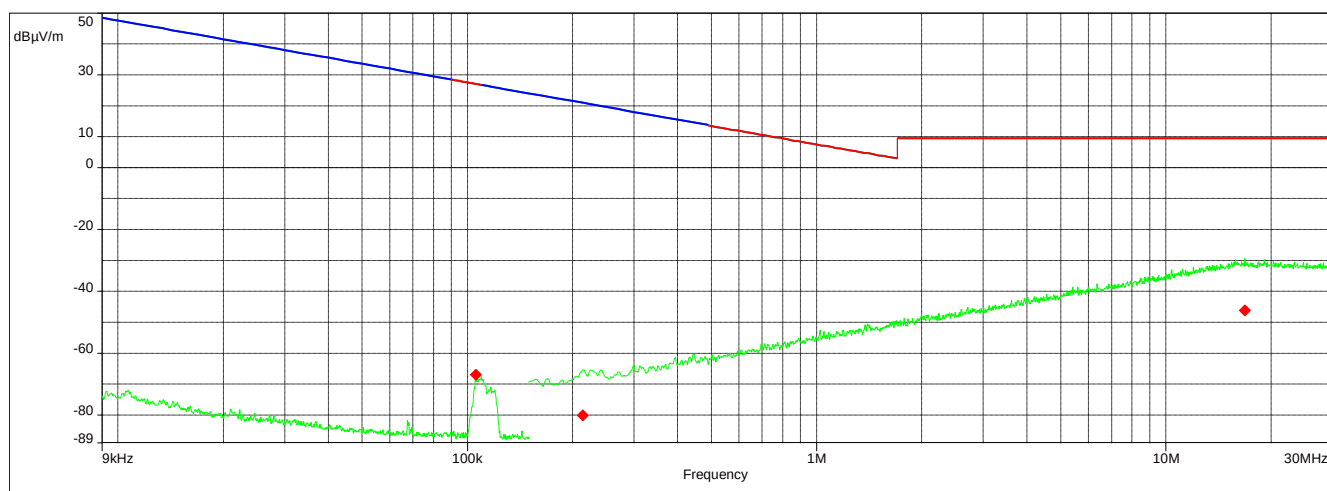
Figure 2.1-4 – Graphical Results – 9 kHz to 30 MHz – Horizontal Polarity



Spurious 9kHz - 30M, EUT Z-Axis

Frequency Range	Polarity	Antenna Distance	RBW	Step Size	Sweep Time
9kHz- 150kHz	Vertical	3m	200Hz	18001Pts	Auto
150kHz- 30MHz	Vertical	3m	9kHz	18001Pts	Auto

— Taiwan LP0002 General Field Strength Limits, @ 300m 300m - Average/3.0m/
 — Taiwan LP0002 General Field Strength Limits, @ 300m 300m - QPeak/3.0m/
 — Taiwan LP0002 General Field Strength Limits, @ 300m 300m - Peak/3.0m/
 — Meas.Peak (Vertical)
 ◆ Average (Average) (Vertical)



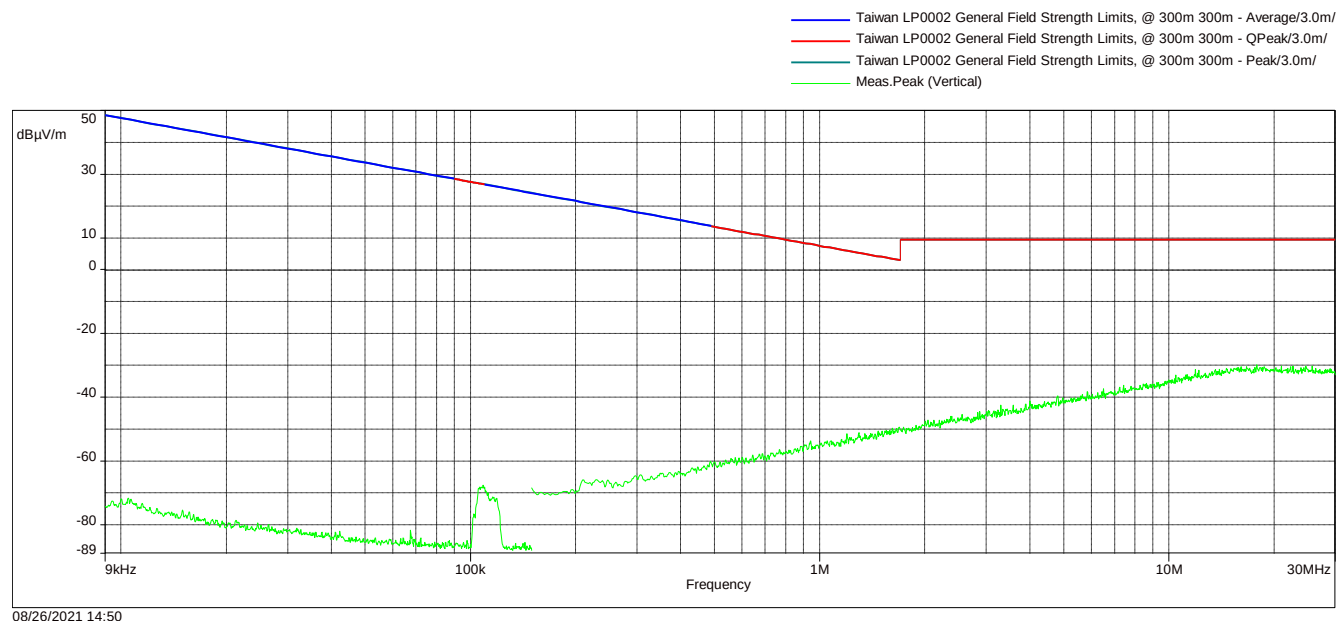
08/26/2021 14:57

Limit:
FCC 18 misc non-ISM <500 W

Test Results:
Pass

Test Notes: No emissions within 20 dB of the limit.

Figure 2.1-5 – Graphical Results – 9 kHz to 30 MHz – Vertical Polarity



Limit:
FCC 18 misc non-ISM <500 W

Test Results:
Pass

Test Notes: No emissions within 20 dB of the limit.

Figure 2.1-6 – Graphical Results – 9 kHz to 30 MHz – Horizontal Polarity

2.1.10 Radiated Emissions Test Set-up Photos

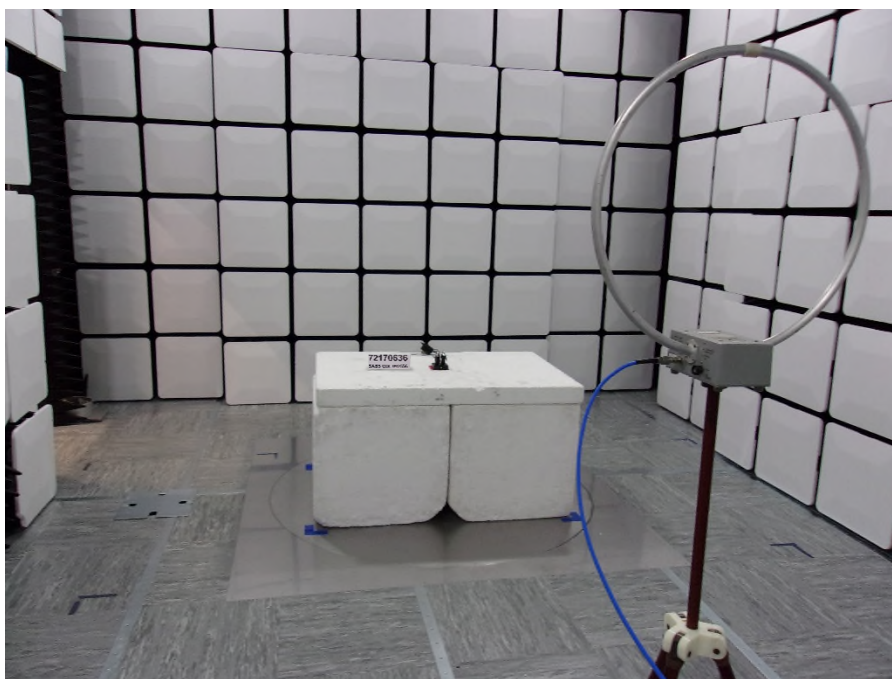


Photo 2.1-1 – Front View of the Test Setup up to 1 GHz

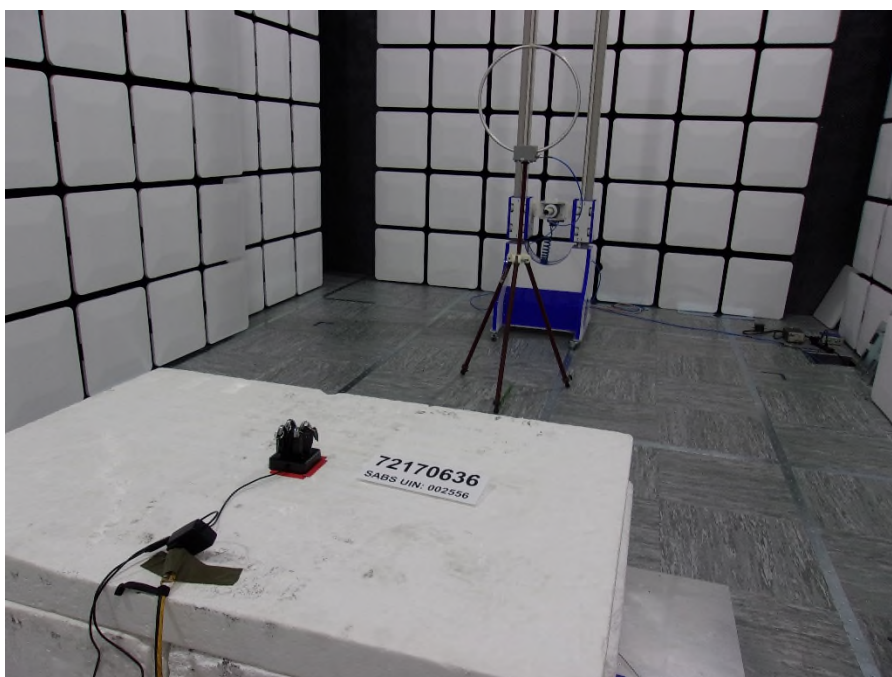


Photo 2.1-2 – Rear View of the Test Setup up to 1 GHz



2.1.11 Test Location and Test Equipment Used

The tests were carried out in New Brighton, MN.

Test Area: 3mSAC

Table 2.1-1 – Radiated Emissions Equipment List

Device #	Manufacturer	Description	Model	Serial #	Cal Code	Cal Date	Cal Due
WRLE02418	EMCO/EMC Test	Antenna, Loop	6502	2215	G	11/10/2020	11/10/2022
NBLE11555	Rohde & Schwarz	Receiver, 2 Hz-44 GHz	ESW44	101537	G	12/31/2020	12/31/2021

Cal Code G = Calibration performed by an accredited outside source.

Cal Code B = Calibration verification performed internally.

Cal Code Y = Passive Device, or Calibration not required when used with other calibrated equipment.



2.2 Conducted Emissions

2.2.1 Specification Reference

LP0002 3.3

2.2.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state “0”, as noted in §1.6.

2.2.3 Test Voltage / Frequency

110 VAC to DC Adapter

2.2.4 Date of Test

13 August 2021

2.2.5 Test Method

The EUT was placed on a non-conductive table 0.8 m above a reference ground plane and 0.4 m away from a vertical coupling plane.

All power was connected to the EUT through an Artificial Mains Network (AMN). Conducted emissions measurements on mains lines were made at the output of the AMN. The AMN was placed 0.8m from the boundary of the EUT and bonded to the reference ground plane.

2.2.6 Environmental Conditions

The EUT was evaluated within the climatic range of the EUT as specified by the manufacturer. When the manufacturer does not specify climatic parameters for the EUT, all tests are performed within the ambient climatic conditions of the laboratory.

2.2.7 Additional Observations

Measurements were performed using BAT-EMC (v3.18) automated software. The reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only.



2.2.8 Sample Computation (Conducted Emission)

Measuring equipment raw measurement (dB μ V) @ 150 kHz			30.0
Correction Factor (dB)	TEMC00002 – LISN	0.03	10.53
	Cable 1	10.50	
Reported Quasi-peak Final Measurement (dB μ V) @ 150 kHz			40.53

2.2.9 Test Results

Test Summary: EUT operated as intended before, during, and after testing.

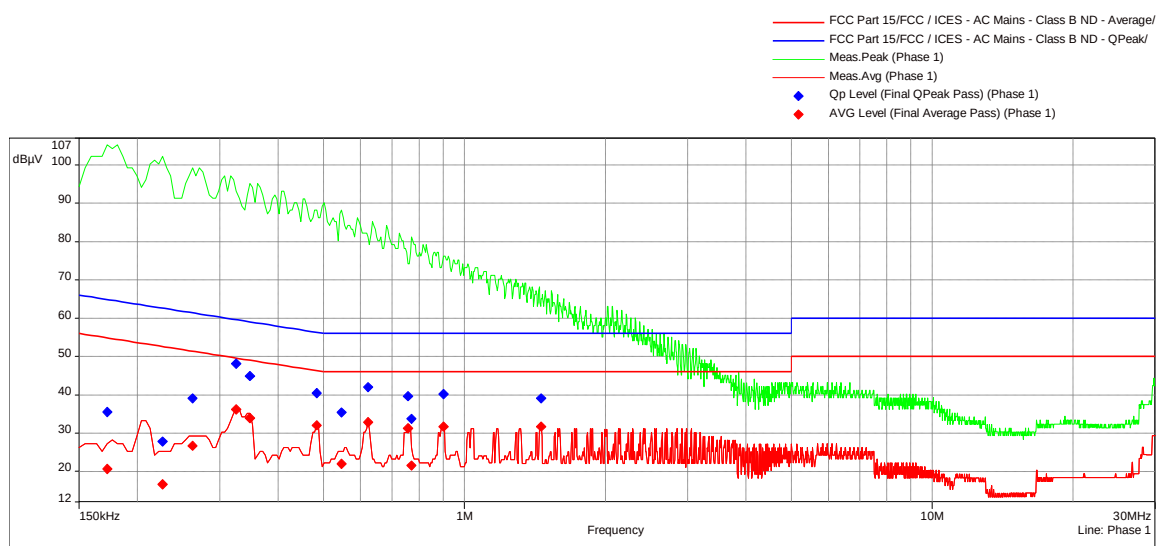
Test Result: Pass

See data below for detailed results.



L1 [120VAC, 60Hz]

Frequency Range	Line Tested	RBW	Step Size	Sweep Time
150kHz- 30MHz	L1	9kHz	4.5kHz	5000 ms/MHz



08/13/2021 14:58

Limit:
FCC Part 18 / ICES – RSS-216

Line Tested:
L1

Test Results:
Pass

Figure 2.2-1 – Graphical Results – XXX MHz to XXX MHz – XXX Polarity

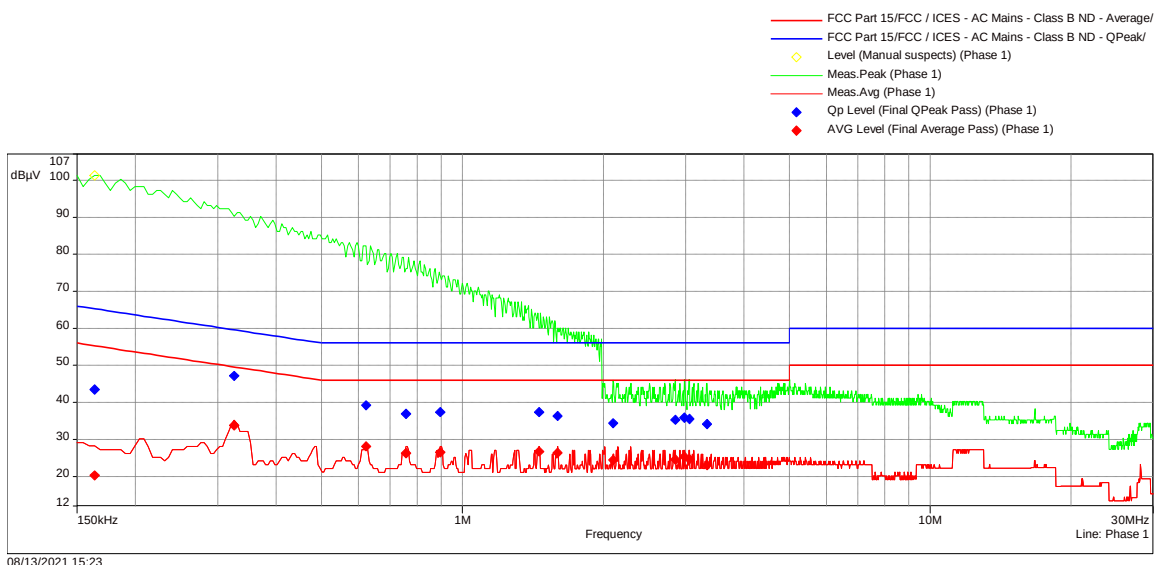
Table 2.2-1 – Electromagnetic Radiation Disturbance Data

Frequency	Average (dBuV)	Average Limit (dBuV)	Average Margin (dB)	QPeak (dBuV)	QPeak Limit (dBuV)	QPeak Margin (dB)	Result
172.5kHz	20.56	54.84	-34.28	35.49	64.84	-29.35	PASS
226.5kHz	16.57	52.58	-36.00	27.78	62.58	-34.79	PASS
262.5kHz	26.68	51.35	-24.67	39.09	61.35	-22.26	PASS
325.5kHz	36.11	49.57	-13.46	48.10	59.57	-11.47	PASS
348kHz	33.92	49.01	-15.09	44.81	59.01	-14.20	PASS
483kHz	32.02	46.29	-14.26	40.42	56.29	-15.86	PASS
546kHz	22.01	46.00	-23.99	35.35	56.00	-20.65	PASS
622.5kHz	32.83	46.00	-13.17	41.94	56.00	-14.06	PASS
757.5kHz	31.28	46.00	-14.72	39.66	56.00	-16.34	PASS
771kHz	21.47	46.00	-24.53	33.74	56.00	-22.26	PASS
901.5kHz	31.73	46.00	-14.27	40.12	56.00	-15.88	PASS
1.4595MHz	31.68	46.00	-14.32	39.09	56.00	-16.91	PASS



L2 [120VAC, 60Hz]

Frequency Range	Line Tested	RBW	Step Size	Sweep Time
150kHz- 30MHz	L2	9kHz	4.5kHz	5000 ms/MHz



Limit:
FCC Part 18 / ICES – RSS-216

Line Tested:
L1

Test Results:
Pass

Figure 2.2-2 – Graphical Results – AC Mains L2 Plot

Table 2.2-2 – Conducted Emissions Results on the AC Power Port (L2)

Frequency	Average (dBμV)	Average Limit (dBμV)	Average Margin (dB)	QPeak (dBμV)	QPeak Limit (dBμV)	QPeak Margin (dB)	Result
163.5kHz	20.36	55.28	-34.92	43.49	65.28	-21.79	PASS
325.5kHz	33.77	49.57	-15.80	47.17	59.57	-12.40	PASS
622.5kHz	28.09	46.00	-17.91	39.19	56.00	-16.81	PASS
757.5kHz	26.30	46.00	-19.70	36.94	56.00	-19.06	PASS
897kHz	26.48	46.00	-19.52	37.34	56.00	-18.66	PASS
1.4595MHz	26.80	46.00	-19.20	37.43	56.00	-18.57	PASS
1.599MHz	26.45	46.00	-19.55	36.37	56.00	-19.63	PASS
2.103MHz	24.51	46.00	-21.49	34.42	56.00	-21.58	PASS
2.85MHz	24.60	46.00	-21.40	35.27	56.00	-20.73	PASS
2.985MHz	25.34	46.00	-20.66	35.82	56.00	-20.18	PASS
3.057MHz	24.72	46.00	-21.28	35.58	56.00	-20.42	PASS
3.3315MHz	23.07	46.00	-22.93	34.15	56.00	-21.85	PASS

2.2.10 Conducted Emissions Test Set-up Photos



Photo 2.2-1 – Front View of the Test Setup

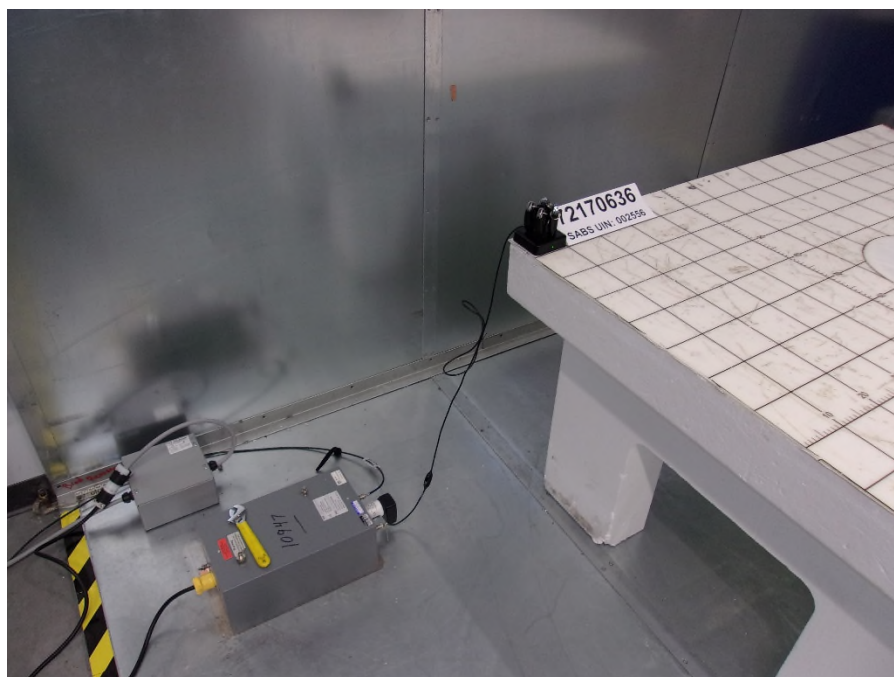


Photo 2.2-2 – Rear View of the Test Setup



2.2.11 Test Location and Test Equipment Used

The tests were carried out in New Brighton, MN.

Test Area: CSAC1

Table 2.2-3 – Conducted Emissions Test Equipment List

Device #	Manufacturer	Description	Model	Serial #	Cal Code	Cal Date	Cal Due
WRLE10947	Fischer Custom Comm.	LISN	FCC-LISN-50-25-2-10	120311	G	10/21/2020	10/21/2022
WRLE11120	Aeroflex Weinschel	Attenuator, 20dB	34-20-33	CE0612	B	11/05/2020	11/05/2021
NBLE11720	PMM	EMI Receiver	9010F	030WW80601	G	05/08/2020	05/08/2022

Cal Code G = Calibration performed by an accredited outside source.

Cal Code B = Calibration verification performed internally.

Cal Code Y = Passive Device, or Calibration not required when used with other calibrated equipment.

3 Diagram of Test Set-ups

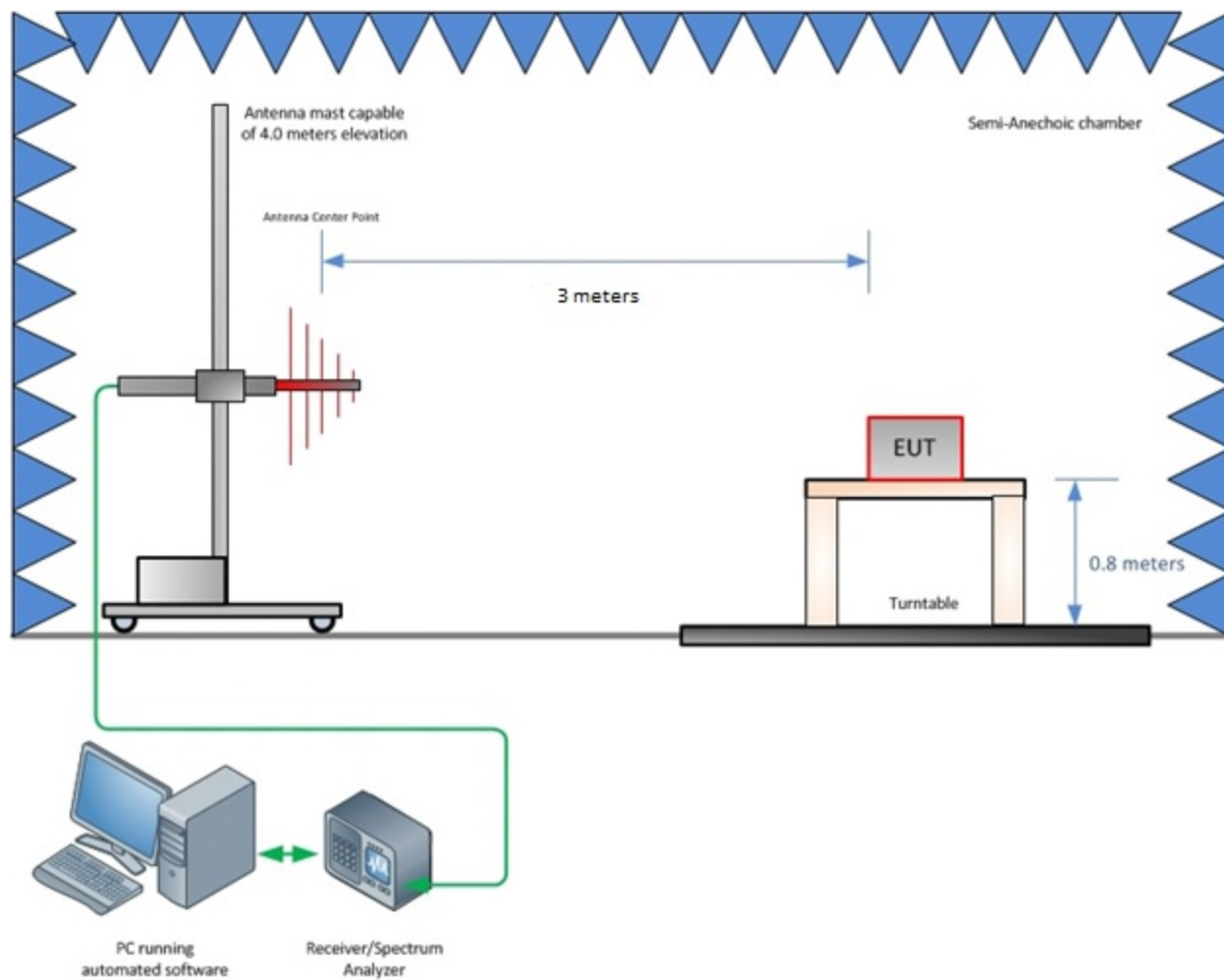


Figure 3-1 – Radiated Emissions Test Setup up to 1 GHz – Tabletop

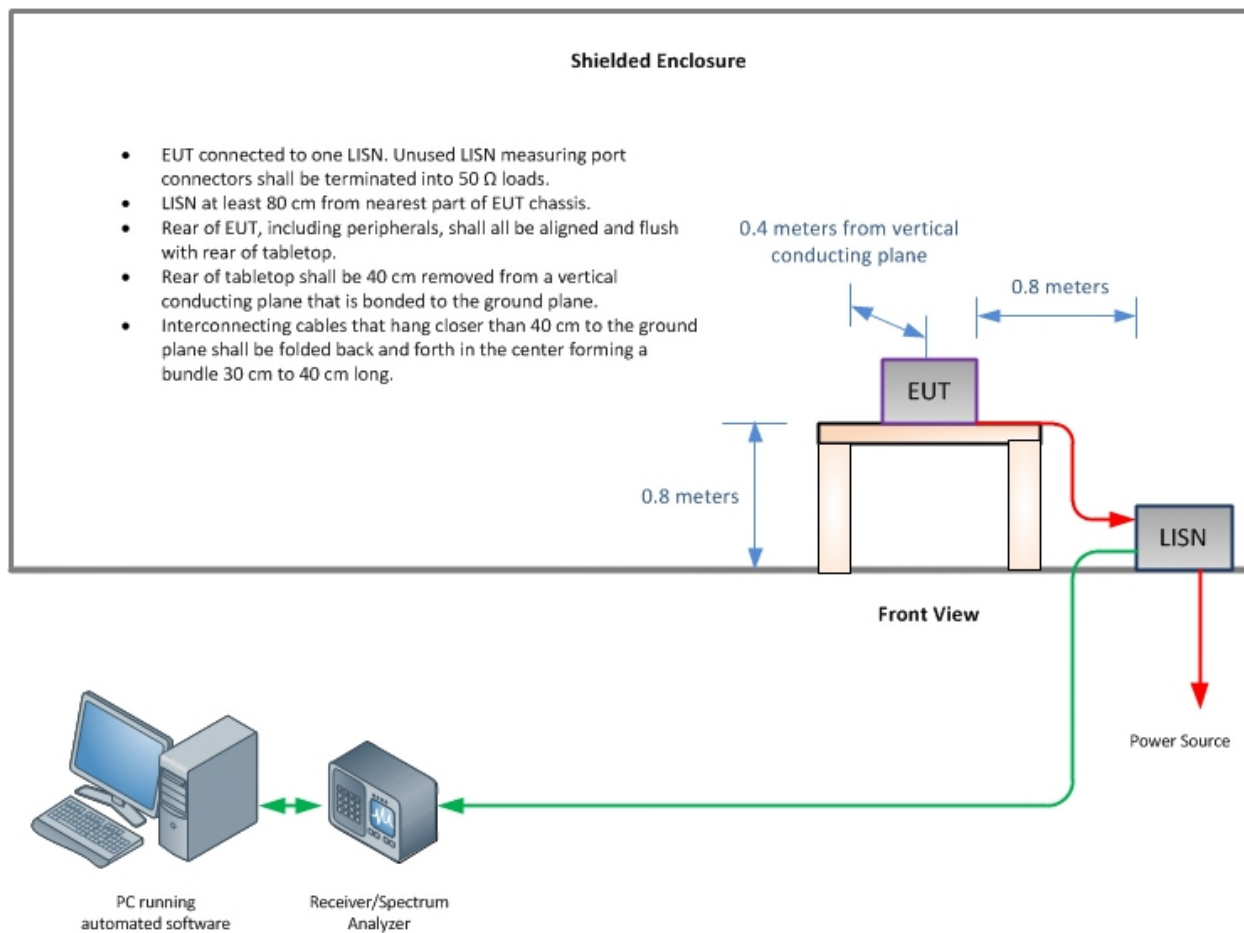


Figure 3-3 – Conducted Emissions Test Setup – Tabletop



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This report must not be used to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the federal government.

STATEMENT OF MEASUREMENT UNCERTAINTY – Emissions

The test system for conducted emissions is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. This test system has a measurement uncertainty of ± 3.30 dB. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. This test system for 30 MHz-1000 MHz has a measurement uncertainty of ± 5.88 dB and above 1 GHz a measurement uncertainty of ± 4.47 dB. The measurement uncertainty values for conducted and radiated emissions meet the requirements as expressed in CISPR 16-4-2. The equipment comprising the test systems is calibrated on an annual basis.

TEST EQUIPMENT

All measurement instrumentation is traceable to the National Institute of Standards and Technology and is calibrated to meet test method standard requirements and/or manufacturer's specifications.