

EMI TEST REPORT

FOR
AC/DC Power Supply

BRAND : 

MODEL : TPP 15-105A-J

SERIES MODEL : Refer to item 5.1 for more details

REPORT NUMBER : 4790771479A-US-E0-V0

ISSUE DATE : Mar. 22, 2023

Prepared for
TRACO ELECTRONIC AG
Sihlbruggstrasse 111 CH-6340 Baar Switzerland

Prepared by
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Revision History

Rev.	Issue Date	Revisions	Revised By
--	Mar. 22, 2023	Initial Issue	Sally Lu

Summary of Test Results			
Standard	Test Item	Limit	Result
FCC Part 15 Subpart B Class B ANSI C63.4:2014	Conducted emission	Class B	PASS
	Radiated emission (Below 1 GHz)	Class B	PASS
	Radiated emission (Above 1 GHz)	Class B	N/A (Note 1)

Note 1: Since the highest frequency of EUT is less than 108 MHz, the measurement above 1 GHz is unnecessary.

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: TRACO ELECTRONIC AG
Sihlbruggstrasse 111 CH-6340 Baar Switzerland

MANUFACTURER: TRACO ELECTRONIC AG
Sihlbruggstrasse 111 CH-6340 Baar Switzerland

EUT DESCRIPTION: AC/DC Power Supply

BRAND:



MODEL: TPP 15-105A-J

SERIES MODEL: Refer to item 5.1 for more details

DATE of TESTED: Nov. 30, 2022 ~ Dec. 16, 2022

APPLICABLE STANDARDS	
STANDARDS	TEST RESULTS
FCC Part 15 Subpart B: Class B	PASS

Underwriters Laboratories Taiwan Co., Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Taiwan Co., Ltd. based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Prepared By:

Handwritten signature of Sally Lu in blue ink.

Sally Lu
Project Handler

Date : Mar. 22, 2023

Approved and Authorized By:

Handwritten signature of Hank Yang in black ink.

Hank Yang
Laboratory Engineer Associate

Date : Mar. 22, 2023

2. TEST METHODOLOGY

All tests were performed in accordance with the correspond to each test item's procedure of this report and refer to each standard.

3. FACILITIES AND ACCREDITATION

Test Location	Underwriters Laboratories Taiwan Co., Ltd.,
Address	Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
Description	All measurement facilities use to collect the measurement data are located at Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

4. CALIBRATION AND UNCERTAINTY

4.1. Measuring Instrument Calibration

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. Measurement Uncertainty

The decision rule refer to CISPR 16-4-2 clause 4.2 accordingly. If U_{lab} is less than U_{cispr} , then :

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit ;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor $k=2$.

Test Item	Measurement Frequency Range	K	U(dB)
Conducted disturbance at mains terminals ports	0.15MHz ~ 30MHz	2	3.2
966-1 Test Site			
Radiated disturbance below 1 GHz	30MHz ~ 1000MHz	2	5.9

5. EQUIPMENT UNDER TEST

5.1. Description of EUT

EUT Name:	AC/DC Power Supply
Brand:	
Model:	TPP 15-105A-J
Series Model:	TPP 15-103abc(x), TPP 15-105abc(x), TPP 15-107abc(x), TPP 15-109abc(x), TPP 15-112abc(x), TPP 15-115abc(x), TPP 15-118abc(x), TPP 15-124abc(x), TPP 15-128abc(x), TPP 15-136abc(x), TPP 15-148abc(x), TPP 15-153abc(x)
Power Rating:	From AC power
Highest Frequency within EUT:	Less than 108MHz
Condition of EUT:	Mass-Production Test sample
Sample ID:	5574627
Date Of Receipt Of Sample:	Nov. 28, 2022

Note :

1. The models difference table as below:

Model Number	Input Range (Vac)	Output Voltage (Vdc)
TPP 15-103abc(x)	85 ~ 264	3.3
TPP 15-105abc(x)	85 ~ 264	5
TPP 15-107abc(x)	85 ~ 264	7.5
TPP 15-109abc(x)	85 ~ 264	9
TPP 15-112abc(x)	85 ~ 264	12
TPP 15-115abc(x)	85 ~ 264	15
TPP 15-118abc(x)	85 ~ 264	18
TPP 15-124abc(x)	85 ~ 264	24
TPP 15-128abc(x)	85 ~ 264	28
TPP 15-136abc(x)	85 ~ 264	36
TPP 15-148abc(x)	85 ~ 264	48
TPP 15-153abc(x)	85 ~ 264	53

a can be B or blank
 b can be A, A2, or blank
 c can be -J, -M, -D or blank
 (x) can be six variables, each variable may be A through Z, 0 through 9, dash, any punctuation marks or blank.
 ※ All the model's rated voltage is 100 ~ 240 Vac; input range is 85 ~ 264 Vac.

2. This supplemental report was issued based on the original report with report number 4790423395A-US-E0-V0, the differences were as below:

- Change model, series model, applicant, manufacturer and brand.
 - Remove EMI data from Mode 2.
3. According to above conditions, there is no addition test has to be performed. All test data are copied from the original test report (Report No.: 4790423395A-US-E0-V0), and all data are verified to meet the requirements.

5.2. Test Mode

The pre-test mode:

Mode	Description	Conducted Emission	Radiated Emission
Mode 1	Full Load (TPP 15-105A-J)	v	v

After pre-testing, the final test mode was displayed as below table.

Test Items		Test Mode
Emission	Conducted Emission	Mode 1
	Radiated Emission	Mode 1

Note: The customer only provided TPP 15-105A-J for the EMC test.

5.3. EUT Operation Test Setup

Mode 1&2:

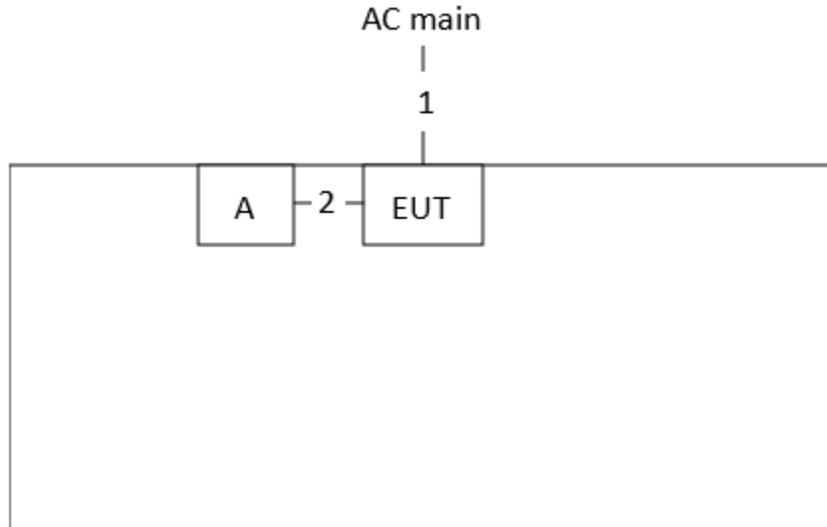
- a. The EUT was linked to resistance load with full load during the testing.
- b. Power on the EUT and run test.

5.4. Accessory

N/A

5.5. Block diagram showing the configuration of system tested

Mode 1, 2:



5.6. Description of support units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	FCC ID	Note
A	Resistance Load	N/A	N/A	N/A	N/A	Provided by customer

Item	Connection	Shielded Type	Note
1	AC power cable	Non-shielded	Provided by customer
2	DC Power wire	Non-shielded	Provided by customer

5.7. Measuring Instrument List

Instrument					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Expired date
Conducted Disturbance					
EMI Test Receiver	Rohde & Schwarz	ESR7	101753	2022/11/10	2023/11/9
Two-Line V-Network	Rohde & Schwarz	ENV216	102136	2022/8/29	2023/8/28
Two-Path V-LISN	SCHWARZBECK	NSLK 8127	8127-946	2022/11/10	2023/11/9
Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	2022/8/30	2023/8/29
Cable	TITAN	CFD200	T0732ACFD20020A300-2	2022/4/9	2023/4/8
Measurement Software	Farad	EZ-EMC Ver: UL-3A1.2	N/A	N/A	N/A
Radiated Disturbance					
966-1					
EMI Test Receiver	Rohde & Schwarz	ESR7	101755	2021/12/6	2022/12/5
Trilog-Broadband Antena with 5dB Attenuator	SCHWARZBECK	VULB 9168 & N-6-05	9168-774 & AT-N0538	2022/2/8	2023/2/7
Double Ridged Guide Horn Antenna	SCHWARZBECK	BBHA 9120 D	1686	2021/12/13	2022/12/12
Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	759	2021/12/1	2022/11/30
Preamplifier	EMC Instrument	EMC330E	980404	2022/5/13	2023/5/12
Preamplifier	EMC Instrument	EMC051835BE	980407	2022/1/14	2023/1/13
Preamplifier	EMC Instrument	EMC184045SE	980408	2022/3/9	2023/3/8
EXA Spectrum Analyzer	Keysight Technologies	N9010A	MY56070821	2021/12/8	2022/12/7
Cables	UltraPhase&EMC Instrument	A1K50-UP0358-A1K50-1500&EMC106-NM-SM-2500/8000	170111-3&170104/170223	2022/1/18	2023/1/17
Cables	UltraPhase / Taitan	K1K50-UP0264-K1K50-500/2500/T0712AT340A12A400	1701214-3/170214-3/J09004	2022/3/28	2023/3/27
Measurement Software	Farad	EZ-EMC Ver: UL-3A1	N/A	N/A	N/A

6. EMISSION TEST

6.1. Conducted Disturbance Measurement

6.1.1. Limits of conducted disturbance voltage and common mode disturbance

FREQUENCY (MHz)	<input type="checkbox"/> Class A (dBµV)		<input checked="" type="checkbox"/> Class B (dBµV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	60.00	50.00

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.
- (3) The test result calculated as following:
 Measurement Value = Reading Level + Correct Factor
 Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)
 Margin Level = Measurement Value - Limit Value

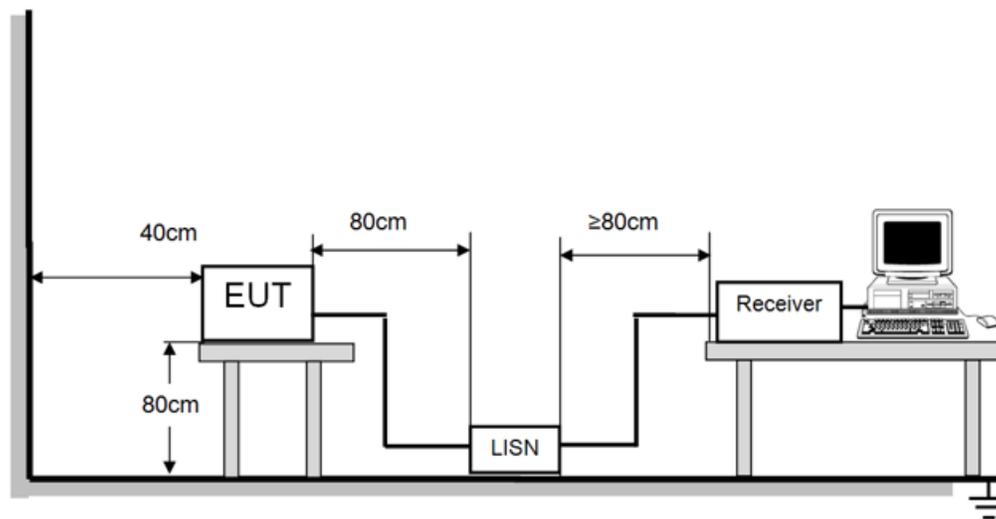
The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

6.1.2. Test Procedure

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall at least 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item: EUT Test Photos.

6.1.3. Test Setup

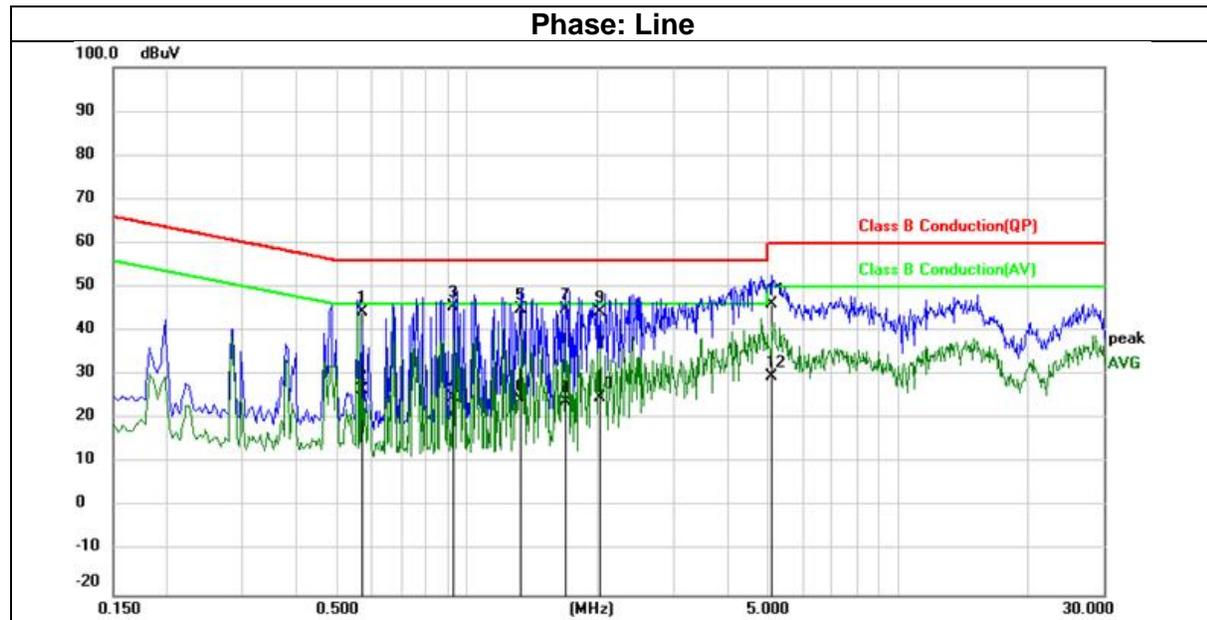


For the actual test configuration, please refer to Appendix I: Photographs of the Test Configuration.

6.1.4. Test Result

Mode 1 ; LISN (150k-30MHz)

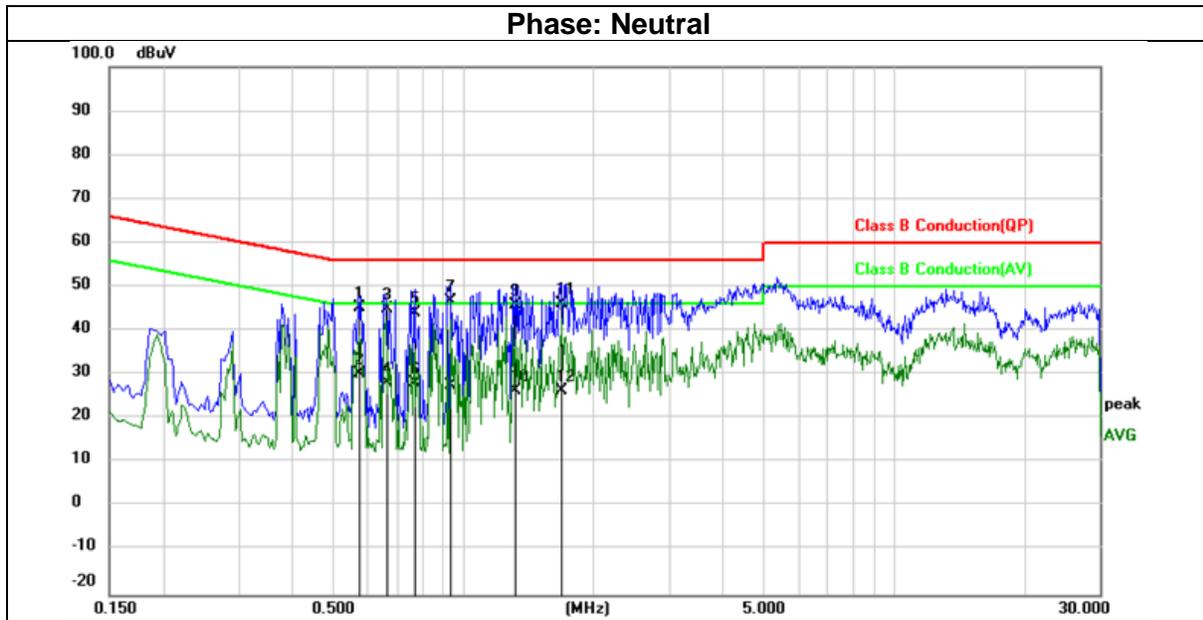
Test Mode:	Mode 1	Temperature:	24°C
Test Voltage:	AC120V/60Hz	Humidity:	62%RH
Tested By:	Rupert Huang	Test Date:	Dec. 16, 2022



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.5695	24.72	19.54	44.26	56.00	-11.74	QP
2	0.5695	7.21	19.54	26.75	46.00	-19.25	AVG
3	0.9289	25.92	19.56	45.48	56.00	-10.52	QP
4	0.9289	5.43	19.56	24.99	46.00	-21.01	AVG
5	1.3243	25.43	19.56	44.99	56.00	-11.01	QP
6	1.3243	4.64	19.56	24.20	46.00	-21.80	AVG
7	1.6975	25.24	19.58	44.82	56.00	-11.18	QP
8	1.6975	4.36	19.58	23.94	46.00	-22.06	AVG
9	2.0292	24.68	19.58	44.26	56.00	-11.74	QP
10	2.0292	5.22	19.58	24.80	46.00	-21.20	AVG
11	5.1022	26.64	19.65	46.29	60.00	-13.71	QP
12	5.1022	10.14	19.65	29.79	50.00	-20.21	AVG

Remark:
 Result = Reading +Correct.
 Correct = Insertion Loss + Cable Loss + Attenuator Factor.
 Margin = Result - Limit.

Test Mode:	Mode 1	Temperature:	24°C
Test Voltage:	AC120V/60Hz	Humidity:	62%RH
Tested By:	Rupert Huang	Test Date:	Dec. 16, 2022



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.5724	25.70	19.55	45.25	56.00	-10.75	QP
2	0.5724	10.61	19.55	30.16	46.00	-15.84	AVG
3	0.6650	25.30	19.55	44.85	56.00	-11.15	QP
4	0.6650	8.73	19.55	28.28	46.00	-17.72	AVG
5	0.7695	24.42	19.56	43.98	56.00	-12.02	QP
6	0.7695	8.73	19.56	28.29	46.00	-17.71	AVG
7	0.9373	27.14	19.56	46.70	56.00	-9.30	QP
8	0.9373	7.93	19.56	27.49	46.00	-18.51	AVG
9	1.3257	26.30	19.56	45.86	56.00	-10.14	QP
10	1.3257	6.89	19.56	26.45	46.00	-19.55	AVG
11	1.6972	26.44	19.58	46.02	56.00	-9.98	QP
12	1.6972	6.86	19.58	26.44	46.00	-19.56	AVG

Remark:
 Result = Reading + Correct.
 Correct = Insertion Loss + Cable Loss + Attenuator Factor.
 Margin = Result - Limit.

6.2. Radiated Disturbance Measurement (below 1G)

6.2.1. Limits of radiated disturbance measurement

FREQUENCY (MHz)	<input type="checkbox"/> Class A	<input checked="" type="checkbox"/> Class B
	<input type="checkbox"/> At 3m	<input checked="" type="checkbox"/> At 3m
	(dBuV/m)	
30 – 88	49.5	40
88 – 216	53.9	43.5
216 – 960	56.9	46
960 – 1000	60	54

NOTE:

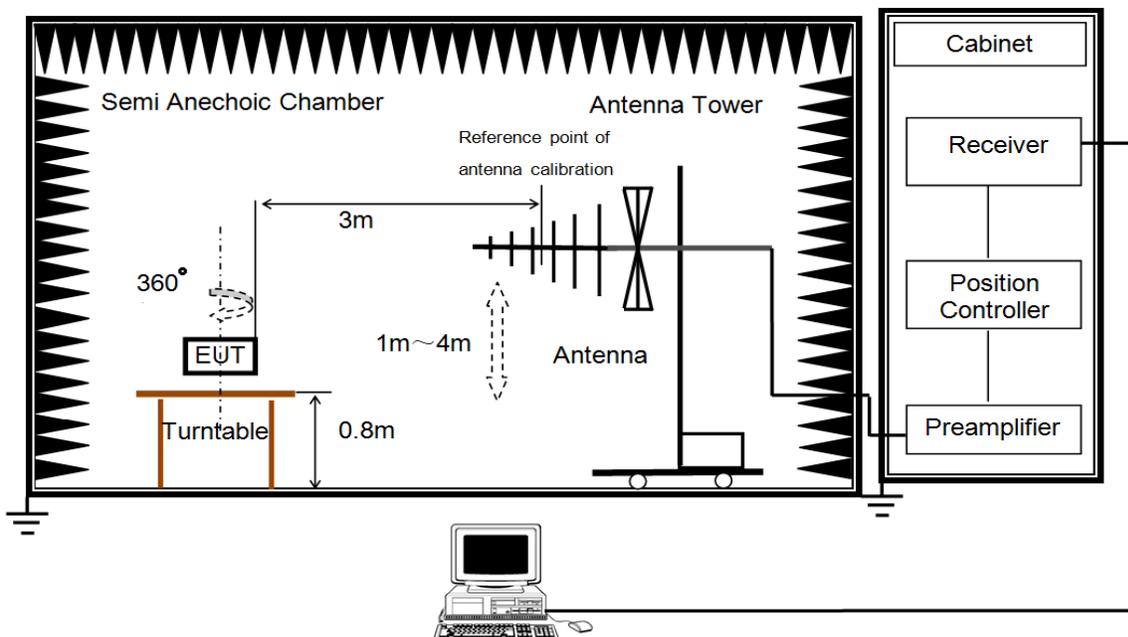
- (1) The tighter limit applies at the band edges.
- (2) Emission level (dB μ V/m)=20*log Emission level (uV/m).
- (3) The test result calculated as following:
 Measurement Value = Reading Level + Correct Factor,
 Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use),
 Margin Level = Measurement Value - Limit Value.
- (4) For class A equipment test distance from 10m translate to 3m, the limit shall be relax by following formula :

$$L_3 = L_{10} + 20 \log (d_{10}/d_3)$$

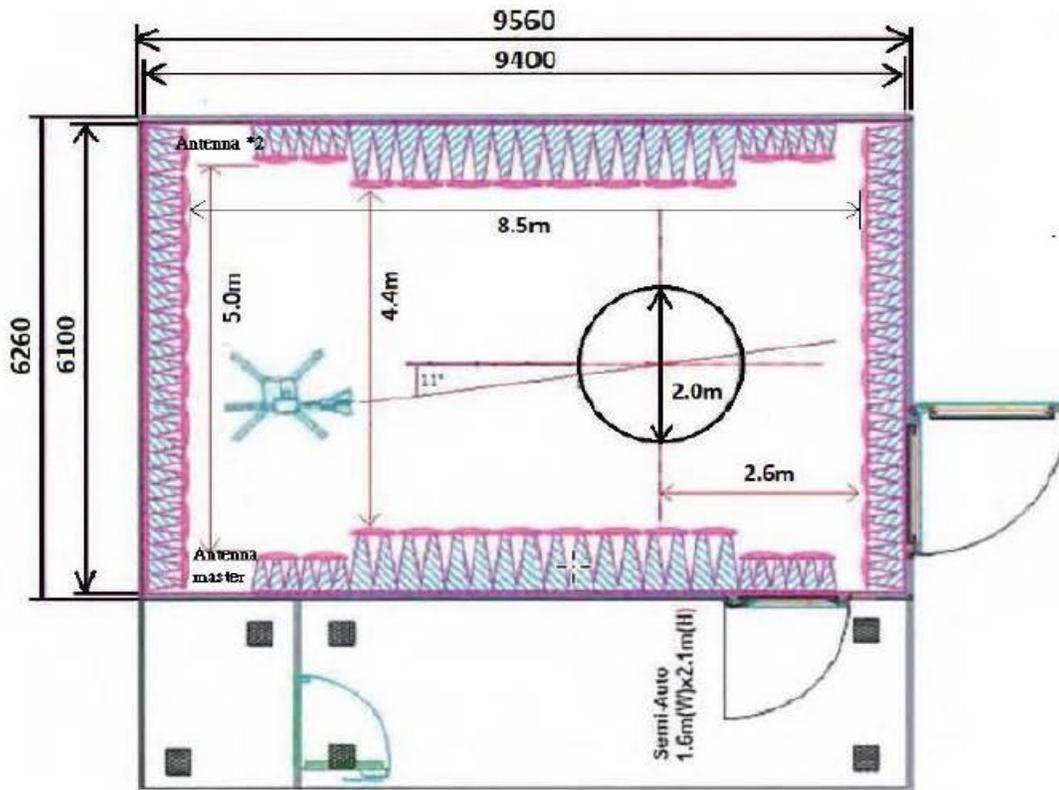
6.2.2. Test Procedure

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- c. Cable or wire placement (each variable within bounds specified elsewhere) shall be explored to produce the emission that has the highest amplitude relative to the limit.
- d. The initial step in collecting radiated emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item: EUT Test Photos.
- j. For the actual test configuration, please refer to the related Item: EUT Test Photos.

6.2.3. Test Setup



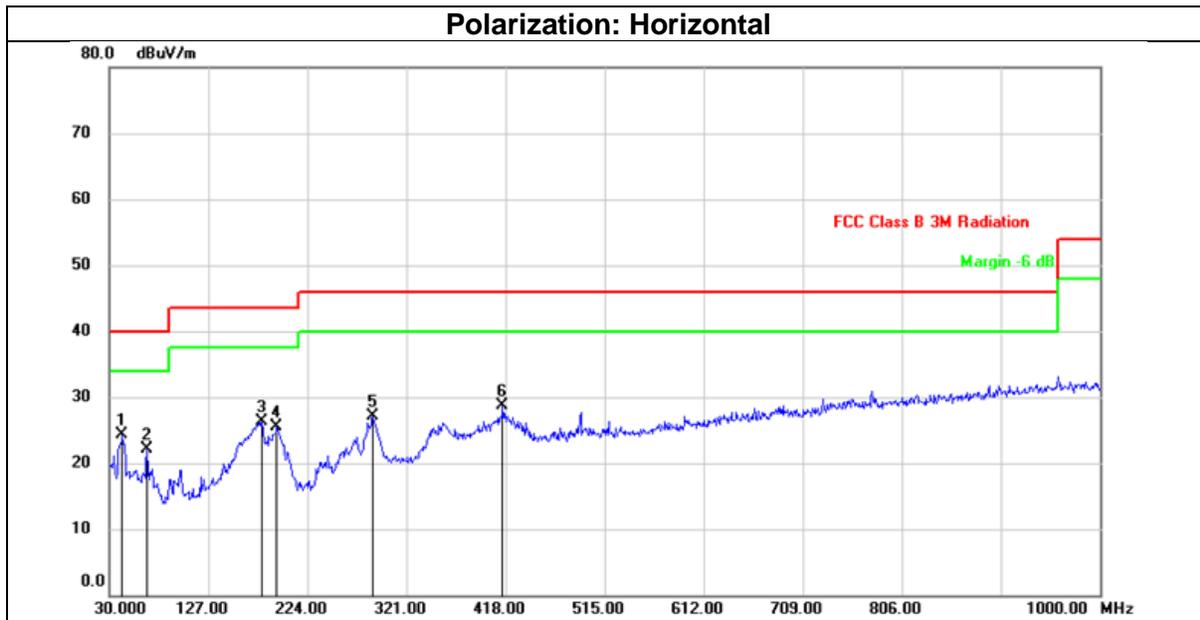
For the actual test configuration, please refer to Appendix I: Photographs of the Test Configuration.



6.2.4. Test Result

Mode 1 ; 30M-1GHz

Test Mode:	Mode 1	Temperature:	21 °C
Test Voltage:	AC 120V/60Hz	Humidity:	64%RH
Tested By:	Duncan Wang	Test Date:	Nov. 30, 2022



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	43.2567	36.94	-12.61	24.33	40.00	-15.67	PK
2	67.4097	36.12	-14.04	22.08	40.00	-17.92	PK
3	180.2530	39.93	-13.63	26.30	43.50	-17.20	PK
4	194.1887	40.42	-14.87	25.55	43.50	-17.95	PK
5	288.3757	38.53	-11.44	27.09	46.00	-18.91	PK
6	415.9307	36.33	-7.71	28.62	46.00	-17.38	PK

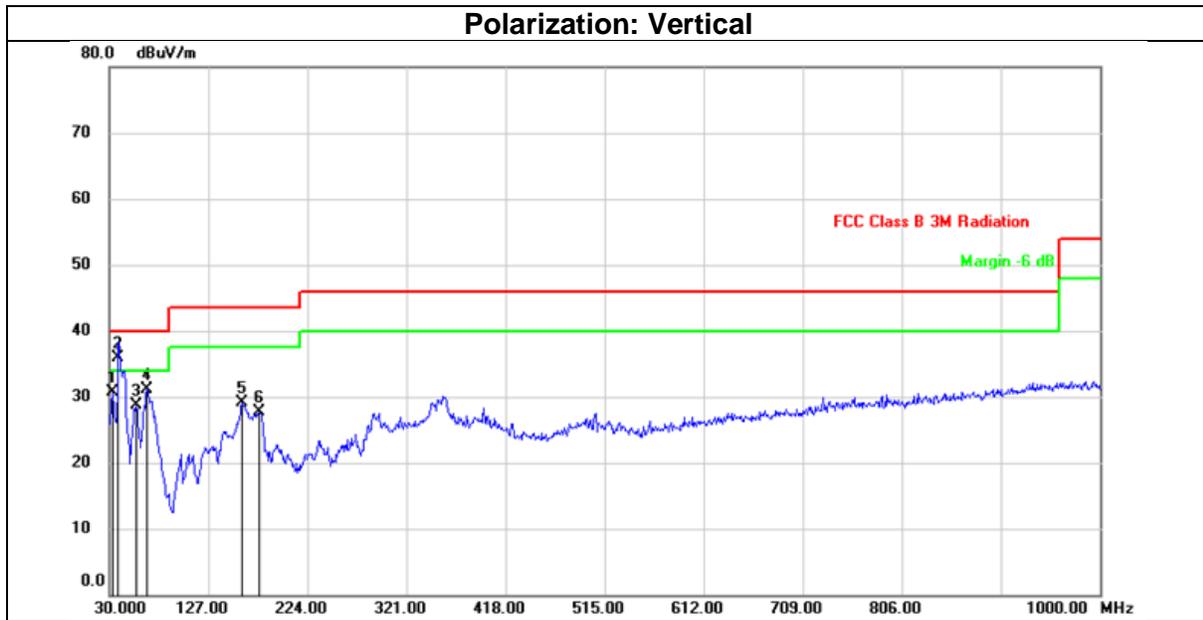
Remark:

Result = Reading +Correct.

Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain.

Margin = Result - Limit.

Test Mode:	Mode 1	Temperature:	21 °C
Test Voltage:	AC 120V/60Hz	Humidity:	64%RH
Tested By:	Duncan Wang	Test Date:	Nov. 30, 2022



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	32.9423	44.58	-13.87	30.71	40.00	-9.29	PK
2	39.4737	48.99	-13.09	35.90	40.00	-4.10	QP
3	56.6750	41.03	-12.36	28.67	40.00	-11.33	PK
4	67.4097	45.16	-14.04	31.12	40.00	-8.88	PK
5	160.6913	41.13	-12.09	29.04	43.50	-14.46	PK
6	177.0843	40.96	-13.32	27.64	43.50	-15.86	PK

Remark:

Result = Reading +Correct.

Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain.

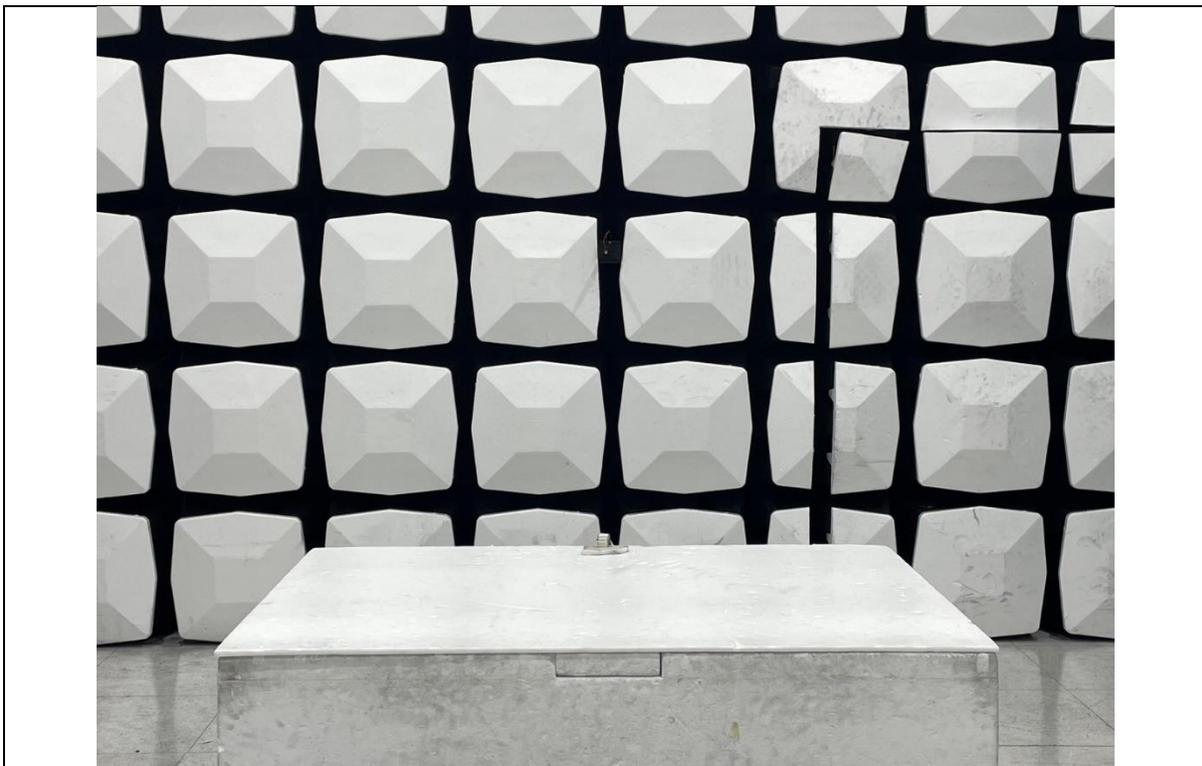
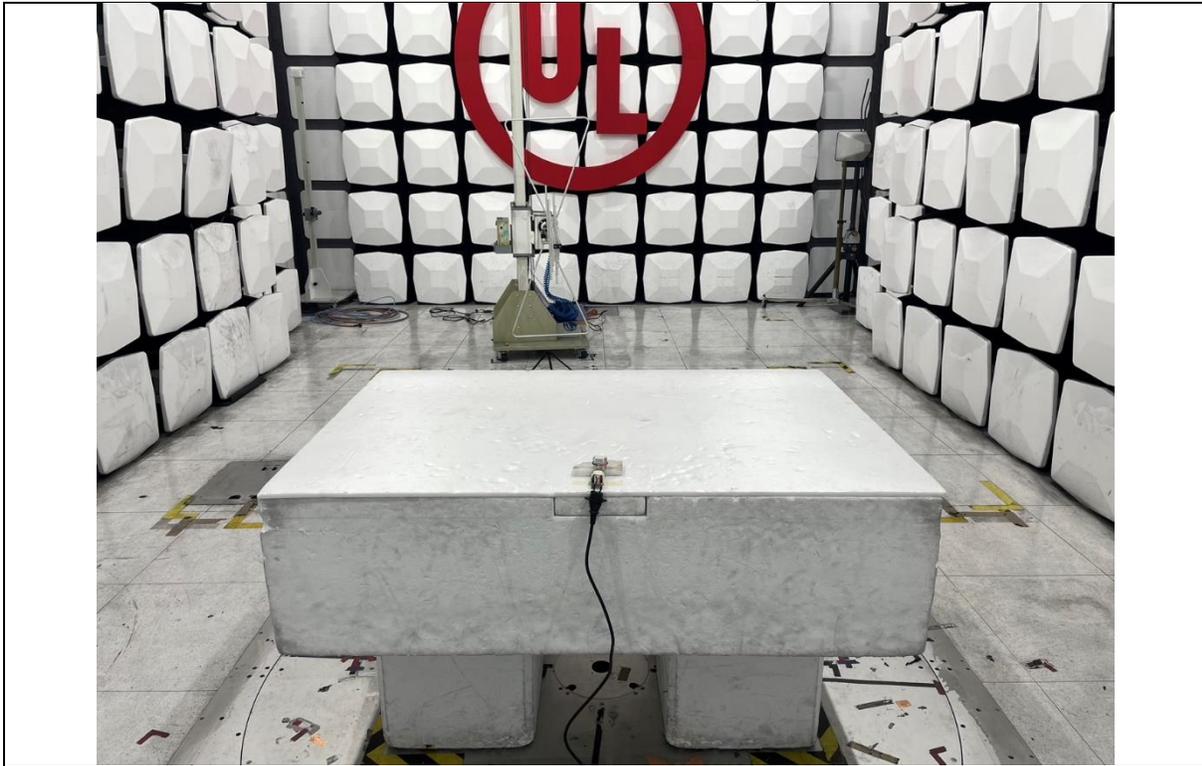
Margin = Result - Limit.

Appendix I: Photographs of Test Configuration

Conducted Disturbance: Mode 1, LISN



Radiated Disturbance: Mode 1, 30M-1GHz



Appendix II: Photographs of the EUT

Please see the photographs of EUT in the test report no.: 4790423395-EP.

END OF REPORT