



EMI TEST REPORT

FOR
Internal Power, AC to DC

MODEL : TPP 450-136BA-MB4, TPP 450-124BA-MB4

SERIES MODEL : Refer to item 5.1 for more details

REPORT NUMBER : 4789043511B-US-E0-V0

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Prepared for
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Revision History

Rev.	Issue Date	Revisions	Revised By
--	Sep. 2, 2019	Initial Issue	Cindy Hsin

Summary of Test Results			
Standard	Test Item	Limit	Result
FCC Part 18 MP-5 : 1986	Conducted emission	Refer to 6.1.1	PASS
	Radiated emission (9kHz to 30 MHz)	Refer to 6.2.1	PASS
	Radiated emission (Below 1 GHz)	Refer to 6.3.1	PASS
	Radiated emission (Above 1 GHz)	Refer to 6.4.1	N/A (Note 1)

Note 1: Since the EUT highest operation frequency less than 100MHz, the test is unnecessary.

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: Internal Power, AC to DC

MODEL: TPP 450-136BA-MB4, TPP 450-124BA-MB4

SERIES MODEL: Rrefer to item 5.1 for more details

DATE of TESTED: Jul. 10, 2019 ~ Jul. 22, 2019

APPLICABLE STANDARDS	
STANDARDS	TEST RESULTS
FCC Part 18 MP-5 : 1986	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:



Cindy Hsin
Project Handler

Date : Sep. 2, 2019

Approved and Authorized By:



Roy Chen
Operations Manager

Date : Sep. 2, 2019

2. TEST METHODOLOGY

All tests were performed in accordance with the procedures documented FCC Part 18 and MP-5

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

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	9kHz ~ 30MHz	2	1.7
966-1 Test Site			
Radiated disturbance 9kHz to 30MHz	9kHz ~ 30MHz	2	2.2
Radiated disturbance 30 to 1000MHz	30MHz ~ 1000MHz	2	5.2

5. EQUIPMENT UNDER TEST

5.1. Description of EUT

EUT Name:	Internal Power, AC to DC
Model:	TPP 450-136BA-MB4, TPP 450-124BA-MB4
Series Model:	TPP 450-112BA-MB4, TPP 450-115BA-MB4, TPP 450-118BA-MB4, TPP 450-124BA-MB4, TPP 450-128BA-MB4, TPP 450-136BA-MB4, TPP 450-136BA-MC2, TPP 450-142BA-MB4, TPP 450-148BA-MB4, TPP 450-153BA-MB4, TPP 450-112BA-M, TPP 450-115BA-M, TPP 450-118BA-M, TPP 450-124BA-M, TPP 450-128BA-M, TPP 450-136BA-M, TPP 450-142BA-M, TPP 450-148BA-M, TPP 450-153BA-M, TPP 450-112B-MB5, TPP 450-115B-MB5, TPP 450-118B-MB5, TPP 450-124B-MB5, TPP 450-128B-MB5, TPP 450-136B-MB5, TPP 450-142B-MB5, TPP 450-148B-MB5, TPP 450-153B-MB5, TPP 450-112B-MB6, TPP 450-115B-MB6, TPP 450-118B-MB6, TPP 450-124B-MB6, TPP 450-128B-MB6, TPP 450-136B-MB6, TPP 450-142B-MB6, TPP 450-148B-MB6, TPP 450-153B-MB6, TPP 450-112B-MB3, TPP 450-115B-MB3, TPP 450-118B-MB3, TPP 450-124B-MB3, TPP 450-128B-MB3, TPP 450-136B-MB3, TPP 450-142B-MB3, TPP 450-148B-MB3, TPP 450-153B-MB3, TPP 450-112B-MB1, TPP 450-115B-MB1, TPP 450-118B-MB1, TPP 450-124B-MB1, TPP 450-128B-MB1, TPP 450-136B-MB1, TPP 450-142B-MB1, TPP 450-148B-MB1, TPP 450-153B-MB1, TPP 450-112B-MB2, TPP 450-115B-MB2, TPP 450-118B-MB2, TPP 450-124B-MB2, TPP 450-128B-MB2, TPP 450-136B-MB2, TPP 450-142B-MB2, TPP 450-148B-MB2, TPP 450-153B-MB2, TPP 450-112B-M, TPP 450-115B-M, TPP 450-118B-M, TPP 450-124B-M, TPP 450-128B-M, TPP 450-136B-M, TPP 450-142B-M, TPP 450-148B-M, TPP 450-153B-M
Power Rating:	For TPP 450-136BA-MB4 : I/P: 85 – 264 Vac, O/P: 36 Vdc, 8.9A For TPP 450-124BA-MB4 : I/P: 85 – 264 Vac, O/P: 24 Vdc, 13.3A
Highest Frequency within EUT:	Less than 100MHz
Condition of EUT:	Pre-Production
Date Of Receipt Of Sample:	Jul. 10, 2019

5.2. Test Mode

The pre-test mode:

Mode	Description	Conducted Emission	Radiated Emission
Mode 1	TPP 450-136BA-MB4	v	v
Mode 2	TPP 450-124BA-MB4	v	v

There are some DC output voltage, current and market segmentation between the serials model no. show as 5.1, others PCB layout and enclosure are the same. So client only provided TPP 450-136BA-MB4 and TPP 450-124BA-MB4 for lab test.

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

Test Items		Test Mode
Emission	Conducted Emission	Mode 1,2
	Radiated Emission	Mode 1,2

5.3. EUT Operation Test Setup

Mode 1~2:

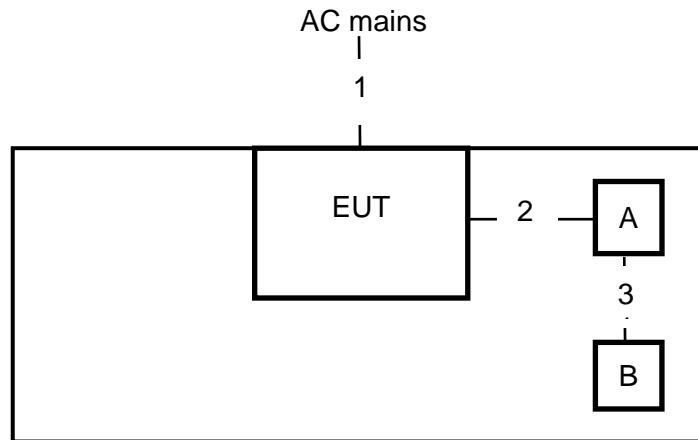
- a. The EUT was linked to resistance load with full load and the resistance load was connected with a meter during the testing.

5.4. Accessory

Item	Accessory	Brand Name	Model Name	Note
-	N/A	N/A	N/A	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	Load	N/A	N/A	N/A	N/A	Supported by the client
B	Meter	N/A	N/A	N/A	N/A	N/A

Item	Connection	Shielded Type	Length	Note
1	Power cable	Non-Shielded	2.1 m	Supported by the client
2	Power cable	Non-Shielded	0.1 m	Supported by the client
3	Power Wire	Non-shielded	1.4 m	N/A

Note: (1) for detachable type I/O cable should be specified the length in m in "Length" column.

5.7. Measuring Instrument List

Instrument						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Expired date
Conducted Disturbance						
<input checked="" type="checkbox"/>	EMI Test Receiver	Rohde & Schwarz	ESR7	101753	2018/11/14	2019/11/13
<input checked="" type="checkbox"/>	Two-Line V-Network	Rohde & Schwarz	ENV216	102136	2018/8/5	2019/8/4
<input checked="" type="checkbox"/>	Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	2018/8/2	2019/8/1
<input checked="" type="checkbox"/>	Measurement Software	Farad	EZ-EMC Ver: EMEC-3A1	N/A	N/A	N/A
Radiated Disturbance						
966-1						
<input checked="" type="checkbox"/>	EMI Test Receiver	Rohde & Schwarz	ESR7	101755	2018/11/27	2019/11/26
<input checked="" type="checkbox"/>	Trilog-Broadband Antena with 5dB Attenuator	SCHWARZ BECK	VULB 9168 & N-6-05	9168-773 & AT-N0539	2019/1/14	2020/1/13
<input type="checkbox"/>	Double Ridged Guide Horn Antenna	SCHWARZ BECK	BBHA 9120 D	1686	2019/1/16	2020/1/15
<input type="checkbox"/>	Broadband Horn Antenna	SCHWARZ BECK	BBHA 9170	759	2018/11/13	2019/11/12
<input checked="" type="checkbox"/>	Preamplifier	EMC Instrument	EMC330E	980404	2019/1/8	2020/1/7
<input type="checkbox"/>	Preamplifier	EMC Instrument	EMC051835BE	980407	2019/1/8	2020/1/7
<input type="checkbox"/>	Preamplifier	EMC Instrument	EMC184045SE	980408	2018/3/13	2019/3/12
<input checked="" type="checkbox"/>	Measurement Software	Farad	EZ-EMC Ver: EMEC-3A1	N/A	N/A	N/A
<input checked="" type="checkbox"/>	Loop antenna	ETS	6502	00213440	2018/12/11	2018/12/10

6. EMISSION TEST

6.1. Conducted Disturbance Measurement

6.1.1. Limits of conducted disturbance voltage and common mode disturbance

All Induction cooking ranges and ultrasonic equipment :

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	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

All other part 18 consumer devices :

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

RF lighting devices :

Frequency (MHz)	Maximum RF line voltage measured with a 50 μ H/50 ohm LISN (uV)
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

Note:

The tighter limit applies at the band edges.

The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

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

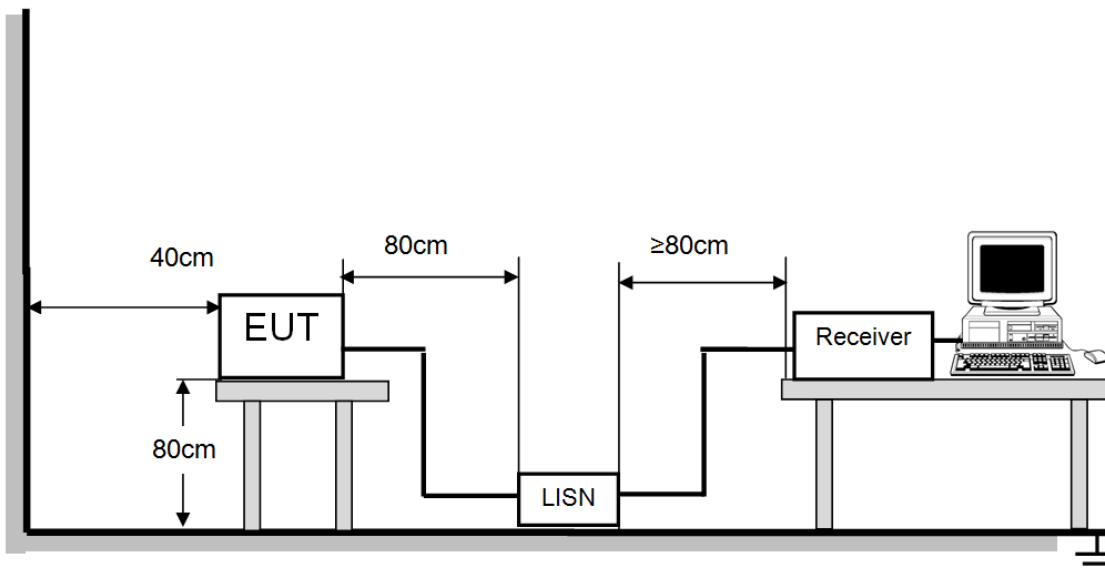
The following table is the setting of the spectrum or receiver

Receiver Parameters	Setting
Attenuation	10 dB
IF Bandwidth (below 150kHz)	200Hz
IF Bandwidth (150kHz to 30MHz)	9kHz

6.1.2. Test Procedure

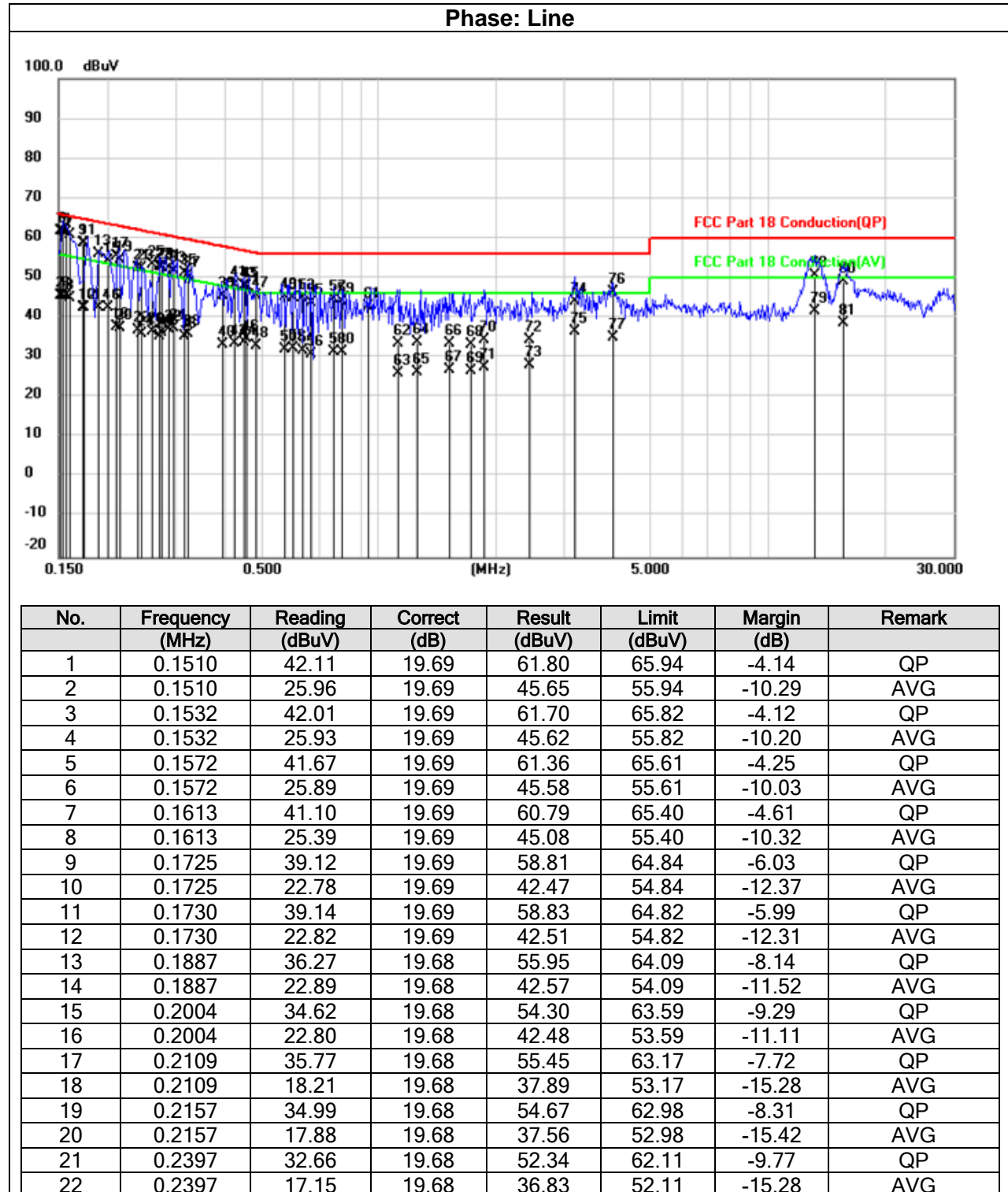
- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- 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.
- 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.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item: EUT Test Photos.

6.1.3. Test Setup



6.1.4. Test Result

Test Mode:	Mode 1	Temperature:	23°C
Test Voltage:	AC 120V/60Hz	Humidity:	60%
Tested By:	Eric T. Fan	Test Date:	Jul. 15, 2019



23	0.2452	32.63	19.68	52.31	61.92	-9.61	QP
24	0.2452	16.38	19.68	36.06	51.92	-15.86	AVG
25	0.2621	33.75	19.68	53.43	61.36	-7.93	QP
26	0.2621	16.94	19.68	36.62	51.36	-14.74	AVG
27	0.2710	33.10	19.68	52.78	61.09	-8.31	QP
28	0.2710	15.74	19.68	35.42	51.09	-15.67	AVG
29	0.2759	33.19	19.68	52.87	60.94	-8.07	QP
30	0.2759	16.63	19.68	36.31	50.94	-14.63	AVG
31	0.2894	32.63	19.68	52.31	60.54	-8.23	QP
32	0.2894	17.56	19.68	37.24	50.54	-13.30	AVG
33	0.2973	32.15	19.68	51.83	60.32	-8.49	QP
34	0.2973	17.69	19.68	37.37	50.32	-12.95	AVG
35	0.3171	31.53	19.67	51.20	59.78	-8.58	QP
36	0.3171	15.60	19.67	35.27	49.78	-14.51	AVG
37	0.3224	30.93	19.67	50.60	59.64	-9.04	QP
38	0.3224	16.35	19.67	36.02	49.64	-13.62	AVG
39	0.3976	25.98	19.67	45.65	57.90	-12.25	QP
40	0.3976	13.49	19.67	33.16	47.90	-14.74	AVG
41	0.4256	28.64	19.67	48.31	57.34	-9.03	QP
42	0.4256	13.80	19.67	33.47	47.34	-13.87	AVG
43	0.4483	28.41	19.67	48.08	56.91	-8.83	QP
44	0.4483	14.32	19.67	33.99	46.91	-12.92	AVG
45	0.4580	28.32	19.67	47.99	56.73	-8.74	QP
46	0.4580	15.01	19.67	34.68	46.73	-12.05	AVG
47	0.4831	25.77	19.67	45.44	56.29	-10.85	QP
48	0.4831	13.39	19.67	33.06	46.29	-13.23	AVG
49	0.5765	25.54	19.67	45.21	56.00	-10.79	QP
50	0.5765	12.47	19.67	32.14	46.00	-13.86	AVG
51	0.5985	25.24	19.67	44.91	56.00	-11.09	QP
52	0.5985	12.64	19.67	32.31	46.00	-13.69	AVG
53	0.6371	25.34	19.67	45.01	56.00	-10.99	QP
54	0.6371	12.08	19.67	31.75	46.00	-14.25	AVG
55	0.6703	24.15	19.67	43.82	56.00	-12.18	QP
56	0.6703	11.32	19.67	30.99	46.00	-15.01	AVG
57	0.7681	25.06	19.68	44.74	56.00	-11.26	QP
58	0.7681	11.84	19.68	31.52	46.00	-14.48	AVG
59	0.8043	24.24	19.68	43.92	56.00	-12.08	QP
60	0.8043	11.63	19.68	31.31	46.00	-14.69	AVG
61	0.9458	23.26	19.68	42.94	56.00	-13.06	QP
62	1.1254	13.89	19.68	33.57	56.00	-22.43	QP
63	1.1254	6.28	19.68	25.96	46.00	-20.04	AVG
64	1.2585	14.18	19.68	33.86	56.00	-22.14	QP
65	1.2585	6.79	19.68	26.47	46.00	-19.53	AVG
66	1.5239	13.89	19.69	33.58	56.00	-22.42	QP
67	1.5239	7.26	19.69	26.95	46.00	-19.05	AVG
68	1.7193	13.52	19.69	33.21	56.00	-22.79	QP
69	1.7193	7.01	19.69	26.70	46.00	-19.30	AVG
70	1.8550	14.82	19.69	34.51	56.00	-21.49	QP
71	1.8550	7.92	19.69	27.61	46.00	-18.39	AVG
72	2.4539	14.63	19.70	34.33	56.00	-21.67	QP
73	2.4539	8.58	19.70	28.28	46.00	-17.72	AVG
74	3.1867	24.44	19.72	44.16	56.00	-11.84	QP
75	3.1867	16.84	19.72	36.56	46.00	-9.44	AVG
76	3.9862	26.81	19.73	46.54	56.00	-9.46	QP
77	3.9862	15.37	19.73	35.10	46.00	-10.90	AVG

78	13.2477	30.85	19.83	50.68	60.00	-9.32	QP
79	13.2477	21.68	19.83	41.51	50.00	-8.49	AVG
80	15.7084	29.45	19.83	49.28	60.00	-10.72	QP
81	15.7084	18.84	19.83	38.67	50.00	-11.33	AVG

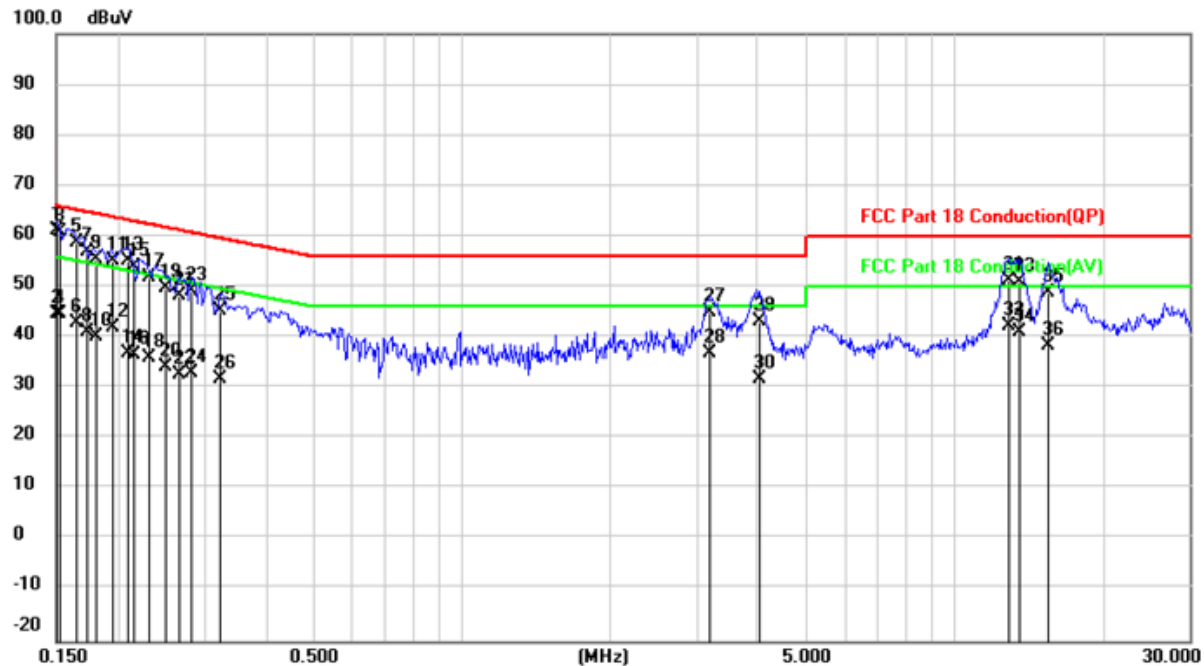
Remark:

Result = Reading +Correct

Margin = Result - Limit

Test Mode:	Mode 1	Temperature:	23°C
Test Voltage:	AC 120V/60Hz	Humidity:	60%
Tested By:	Eric T. Fan	Test Date:	Jul. 15, 2019

Phase: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1504	41.34	19.68	61.02	65.98	-4.96	QP
2	0.1504	25.00	19.68	44.68	55.98	-11.30	AVG
3	0.1533	41.04	19.68	60.72	65.82	-5.10	QP
4	0.1533	25.02	19.68	44.70	55.82	-11.12	AVG
5	0.1651	39.13	19.68	58.81	65.20	-6.39	QP
6	0.1651	23.15	19.68	42.83	55.20	-12.37	AVG
7	0.1730	37.40	19.68	57.08	64.82	-7.74	QP
8	0.1730	21.51	19.68	41.19	54.82	-13.63	AVG
9	0.1817	35.72	19.68	55.40	64.41	-9.01	QP
10	0.1817	20.38	19.68	40.06	54.41	-14.35	AVG
11	0.1960	35.61	19.68	55.29	63.78	-8.49	QP
12	0.1960	22.39	19.68	42.07	53.78	-11.71	AVG
13	0.2099	35.41	19.68	55.09	63.21	-8.12	QP
14	0.2099	17.25	19.68	36.93	53.21	-16.28	AVG
15	0.2174	34.39	19.68	54.07	62.92	-8.85	QP
16	0.2174	16.83	19.68	36.51	52.92	-16.41	AVG
17	0.2330	32.27	19.68	51.95	62.34	-10.39	QP
18	0.2330	16.41	19.68	36.09	52.34	-16.25	AVG
19	0.2507	29.98	19.68	49.66	61.73	-12.07	QP
20	0.2507	14.42	19.68	34.10	51.73	-17.63	AVG
21	0.2686	28.59	19.68	48.27	61.16	-12.89	QP
22	0.2686	13.08	19.68	32.76	51.16	-18.40	AVG
23	0.2816	29.35	19.68	49.03	60.77	-11.74	QP

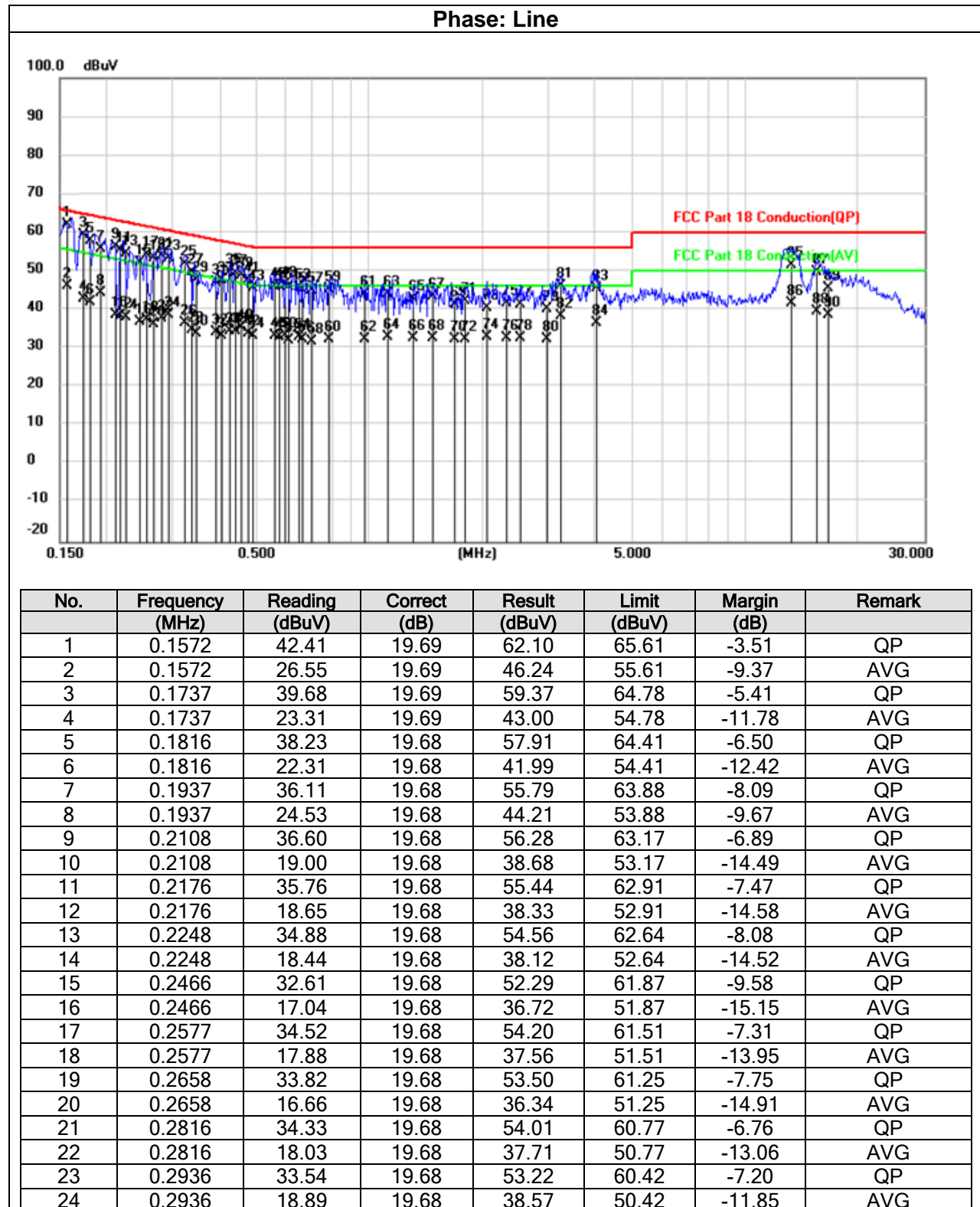
24	0.2816	13.23	19.68	32.91	50.77	-17.86	AVG
25	0.3212	25.72	19.67	45.39	59.68	-14.29	QP
26	0.3212	11.94	19.67	31.61	49.68	-18.07	AVG
27	3.1971	25.14	19.72	44.86	56.00	-11.14	QP
28	3.1971	17.04	19.72	36.76	46.00	-9.24	AVG
29	4.0328	23.53	19.74	43.27	56.00	-12.73	QP
30	4.0328	11.93	19.74	31.67	46.00	-14.33	AVG
31	12.8627	31.53	19.87	51.40	60.00	-8.60	QP
32	12.8627	22.31	19.87	42.18	50.00	-7.82	AVG
33	13.5262	31.01	19.88	50.89	60.00	-9.11	QP
34	13.5262	21.19	19.88	41.07	50.00	-8.93	AVG
35	15.5867	29.01	19.90	48.91	60.00	-11.09	QP
36	15.5867	18.35	19.90	38.25	50.00	-11.75	AVG

Remark:

Result = Reading +Correct

Margin = Result - Limit

Test Mode:	Mode 2	Temperature:	23°C
Test Voltage:	AC 120V/60Hz	Humidity:	60%
Tested By:	Eric T. Fan	Test Date:	Jul. 15, 2019



25	0.3209	32.04	19.67	51.71	59.68	-7.97	QP
26	0.3209	16.98	19.67	36.65	49.68	-13.03	AVG
27	0.3364	29.99	19.67	49.66	59.29	-9.63	QP
28	0.3364	14.96	19.67	34.63	49.29	-14.66	AVG
29	0.3484	28.10	19.67	47.77	59.00	-11.23	QP
30	0.3484	14.27	19.67	33.94	49.00	-15.06	AVG
31	0.3938	27.24	19.67	46.91	57.98	-11.07	QP
32	0.3938	14.63	19.67	34.30	47.98	-13.68	AVG
33	0.4043	28.13	19.67	47.80	57.76	-9.96	QP
34	0.4043	13.64	19.67	33.31	47.76	-14.45	AVG
35	0.4244	30.15	19.67	49.82	57.36	-7.54	QP
36	0.4244	14.69	19.67	34.36	47.36	-13.00	AVG
37	0.4407	29.77	19.67	49.44	57.05	-7.61	QP
38	0.4407	14.87	19.67	34.54	47.05	-12.51	AVG
39	0.4546	29.22	19.67	48.89	56.79	-7.90	QP
40	0.4546	15.58	19.67	35.25	46.79	-11.54	AVG
41	0.4747	27.85	19.67	47.52	56.43	-8.91	QP
42	0.4747	14.19	19.67	33.86	46.43	-12.57	AVG
43	0.4925	25.95	19.67	45.62	56.13	-10.51	QP
44	0.4925	13.57	19.67	33.24	46.13	-12.89	AVG
45	0.5645	26.47	19.67	46.14	56.00	-9.86	QP
46	0.5645	13.51	19.67	33.18	46.00	-12.82	AVG
47	0.5743	26.45	19.67	46.12	56.00	-9.88	QP
48	0.5743	13.24	19.67	32.91	46.00	-13.09	AVG
49	0.5947	26.77	19.67	46.44	56.00	-9.56	QP
50	0.5947	13.48	19.67	33.15	46.00	-12.85	AVG
51	0.6114	26.10	19.67	45.77	56.00	-10.23	QP
52	0.6114	12.46	19.67	32.13	46.00	-13.87	AVG
53	0.6500	26.33	19.67	46.00	56.00	-10.00	QP
54	0.6500	13.34	19.67	33.01	46.00	-12.99	AVG
55	0.6628	25.42	19.67	45.09	56.00	-10.91	QP
56	0.6628	12.71	19.67	32.38	46.00	-13.62	AVG
57	0.7019	25.20	19.68	44.88	56.00	-11.12	QP
58	0.7019	12.02	19.68	31.70	46.00	-14.30	AVG
59	0.7823	25.68	19.68	45.36	56.00	-10.64	QP
60	0.7823	12.76	19.68	32.44	46.00	-13.56	AVG
61	0.9759	24.42	19.68	44.10	56.00	-11.90	QP
62	0.9759	12.62	19.68	32.30	46.00	-13.70	AVG
63	1.1196	24.50	19.68	44.18	56.00	-11.82	QP
64	1.1196	13.14	19.68	32.82	46.00	-13.18	AVG
65	1.3080	23.21	19.68	42.89	56.00	-13.11	QP
66	1.3080	12.84	19.68	32.52	46.00	-13.48	AVG
67	1.4741	23.71	19.68	43.39	56.00	-12.61	QP
68	1.4741	12.89	19.68	32.57	46.00	-13.43	AVG
69	1.6802	21.79	19.69	41.48	56.00	-14.52	QP
70	1.6802	12.70	19.69	32.39	46.00	-13.61	AVG
71	1.7959	22.54	19.69	42.23	56.00	-13.77	QP
72	1.7959	12.70	19.69	32.39	46.00	-13.61	AVG
73	2.0584	20.90	19.69	40.59	56.00	-15.41	QP
74	2.0584	13.12	19.69	32.81	46.00	-13.19	AVG
75	2.3131	21.92	19.69	41.61	56.00	-14.39	QP
76	2.3131	13.01	19.69	32.70	46.00	-13.30	AVG
77	2.5211	21.67	19.70	41.37	56.00	-14.63	QP
78	2.5211	12.94	19.70	32.64	46.00	-13.36	AVG
79	2.9572	20.35	19.71	40.06	56.00	-15.94	QP

80	2.9572	12.63	19.71	32.34	46.00	-13.66	AVG
81	3.2176	26.43	19.72	46.15	56.00	-9.85	QP
82	3.2176	18.55	19.72	38.27	46.00	-7.73	AVG
83	4.0288	25.85	19.73	45.58	56.00	-10.42	QP
84	4.0288	16.70	19.73	36.43	46.00	-9.57	AVG
85	13.2863	31.72	19.83	51.55	60.00	-8.45	QP
86	13.2863	21.85	19.83	41.68	50.00	-8.32	AVG
87	15.5653	29.83	19.83	49.66	60.00	-10.34	QP
88	15.5653	19.71	19.83	39.54	50.00	-10.46	AVG
89	16.5937	25.72	19.84	45.56	60.00	-14.44	QP
90	16.5937	18.70	19.84	38.54	50.00	-11.46	AVG

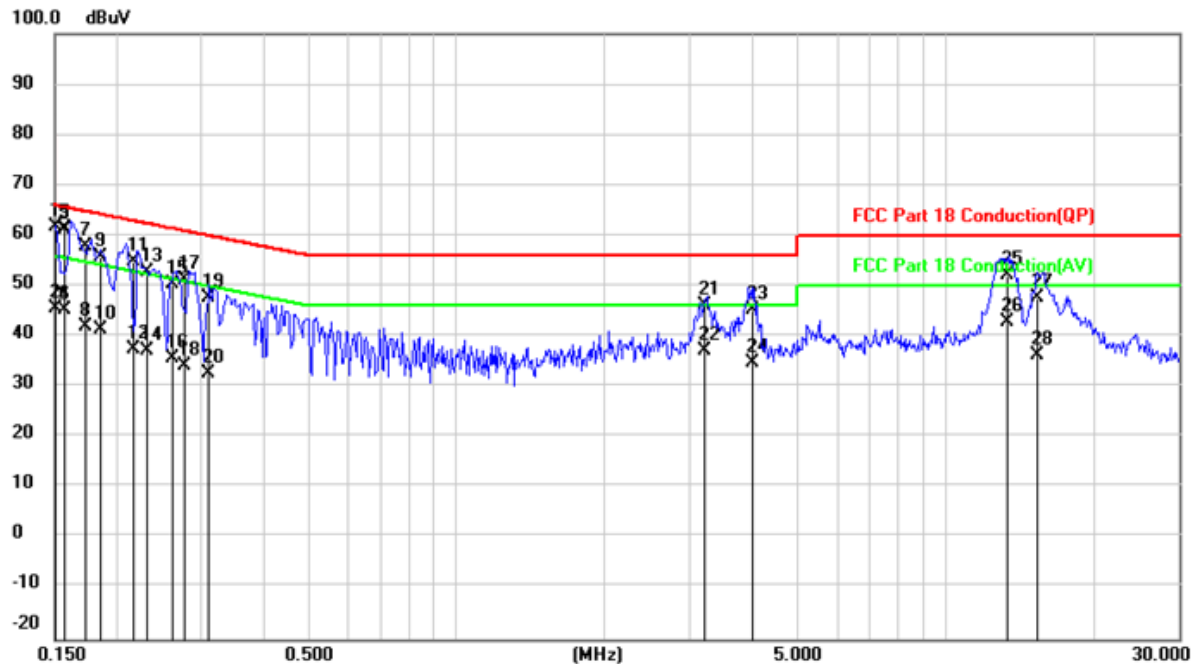
Remark:

Result = Reading +Correct

Margin = Result - Limit

Test Mode:	Mode 2	Temperature:	23°C
Test Voltage:	AC 120V/60Hz	Humidity:	60%
Tested By:	Eric T. Fan	Test Date:	Jul. 15, 2019

Phase: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1512	42.15	19.68	61.83	65.93	-4.10	QP
2	0.1512	25.85	19.68	45.53	55.93	-10.40	AVG
3	0.1570	41.62	19.68	61.30	65.62	-4.32	QP
4	0.1570	25.56	19.68	45.24	55.62	-10.38	AVG
5	0.1570	41.64	19.68	61.32	65.62	-4.30	QP
6	0.1570	25.60	19.68	45.28	55.62	-10.34	AVG
7	0.1731	38.11	19.68	57.79	64.81	-7.02	QP
8	0.1731	22.18	19.68	41.86	54.81	-12.95	AVG
9	0.1853	35.95	19.68	55.63	64.24	-8.61	QP
10	0.1853	21.74	19.68	41.42	54.24	-12.82	AVG
11	0.2180	35.25	19.68	54.93	62.89	-7.96	QP
12	0.2180	17.63	19.68	37.31	52.89	-15.58	AVG
13	0.2331	33.01	19.68	52.69	62.34	-9.65	QP
14	0.2331	17.42	19.68	37.10	52.34	-15.24	AVG
15	0.2611	30.80	19.68	50.48	61.40	-10.92	QP
16	0.2611	15.86	19.68	35.54	51.40	-15.86	AVG
17	0.2773	31.42	19.68	51.10	60.90	-9.80	QP
18	0.2773	14.51	19.68	34.19	50.90	-16.71	AVG
19	0.3110	28.12	19.67	47.79	59.94	-12.15	QP
20	0.3110	13.02	19.67	32.69	49.94	-17.25	AVG
21	3.2174	26.33	19.72	46.05	56.00	-9.95	QP
22	3.2174	17.37	19.72	37.09	46.00	-8.91	AVG
23	4.0136	25.61	19.74	45.35	56.00	-10.65	QP

24	4.0136	15.11	19.74	34.85	46.00	-11.15	AVG
25	13.4039	32.42	19.88	52.30	60.00	-7.70	QP
26	13.4039	22.92	19.88	42.80	50.00	-7.20	AVG
27	15.4223	27.66	19.90	47.56	60.00	-12.44	QP
28	15.4223	16.30	19.90	36.20	50.00	-13.80	AVG

Remark:

Result = Reading +Correct

Margin = Result - Limit

6.2. Radiated Disturbance Measurement (9kHz to 30MHz)

6.2.1. Limits of radiated disturbance measurement

Equipment	Operating frequency	RF power (watts)	Field strength limit (uV/m)	Distance (meters)
Any types unless otherwise specified (miscellaneous)	Any ISM frequency	Below 500 500 or more	25 25* SQRT(power/500)	300 (*)
	Any non-ISM frequency	Below 500 500 or more	15 15* SQRT(power/500)	300 (*)
Industrial heaters and RF stabilized arc welders	On or below 5,725MHz	Any	10	1600 (**)
	Above 5,725MHz	Any	10	
Medical diathermy	Any ISM frequency	Any	25	300
	Any non-ISM frequency	Any	15	
Ultrasonic	Below 490kHz	Below 500 500 or more	2400/F(kHz) 2400/F(kHz)* SQRT(power/500)	300 (***)
	490 to 1600kHz Above 1600kHz	Any Any	24000/F(kHz) 15	30
Induction cooking ranges	Below 90kHz	Any	1500	30 (****)
	On or above 90kHz	Any	300	

NOTE:

(*) Field strength may not exceed 10 μ V/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.

(**) Reduced to the greatest extent possible.

(***) Field strength may not exceed 10 μ V/m at 1600 meters. Consumer equipment is not permitted the increase in field strength otherwise permitted here for over 500 watts.

(****) Induction cooking ranges manufactured prior to February 1, 1980, shall be subject to the field strength limits for miscellaneous ISM equipment.

Emission level (dB μ V/m)=20*log Emission level (uV/m).

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.

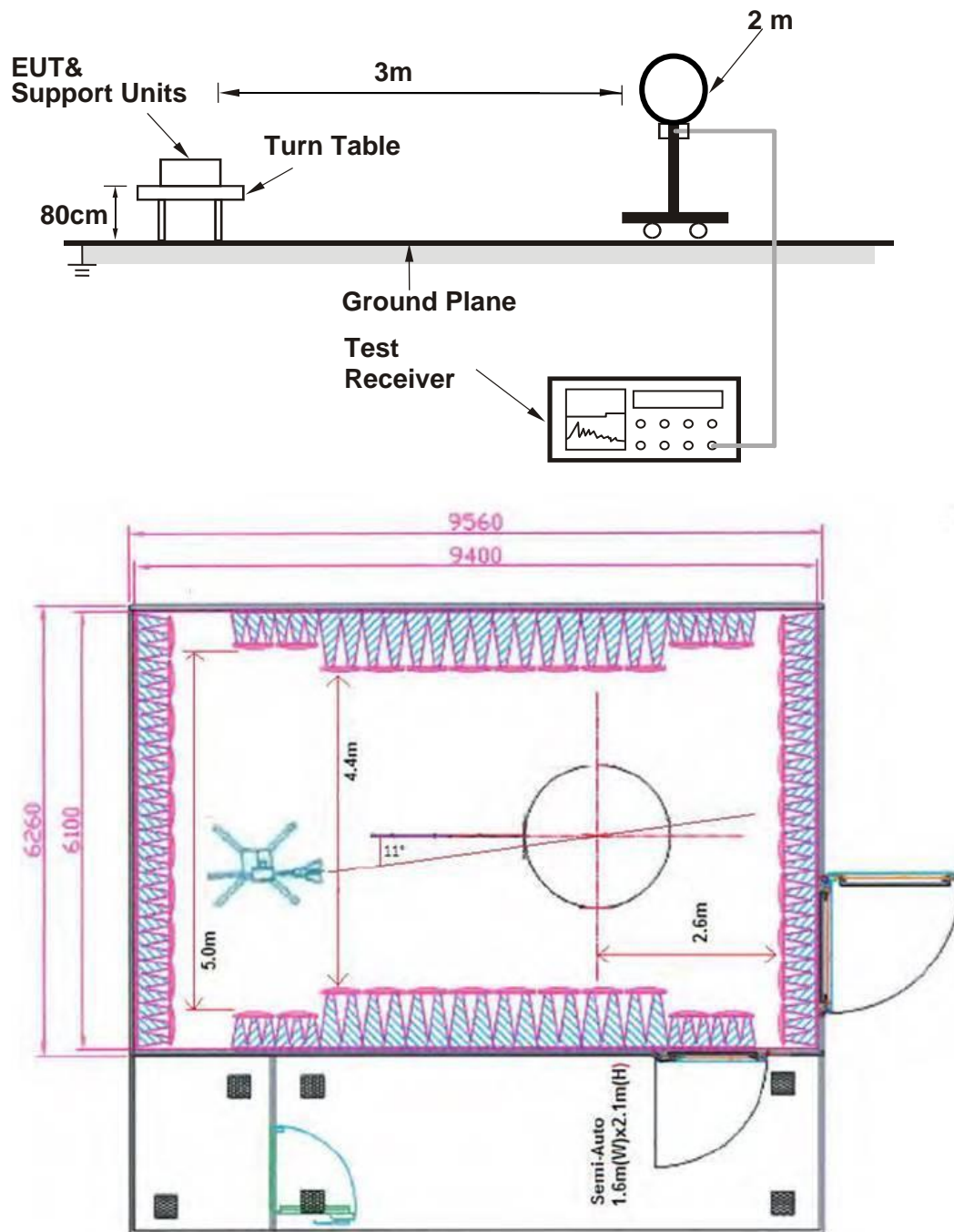
For measurement distance not defined in above table. In this case the limit L_2 , corresponding to the selected distance d_2 , shall be calculated by applying the following formula: $L_2 = L_1 + 20 \cdot \log(d_1/d_2)$

Where L_1 is specified limit in dB(uV) at distance d_1 ; and L_2 is new limit for distance d_2 .

6.2.2. Test Procedure

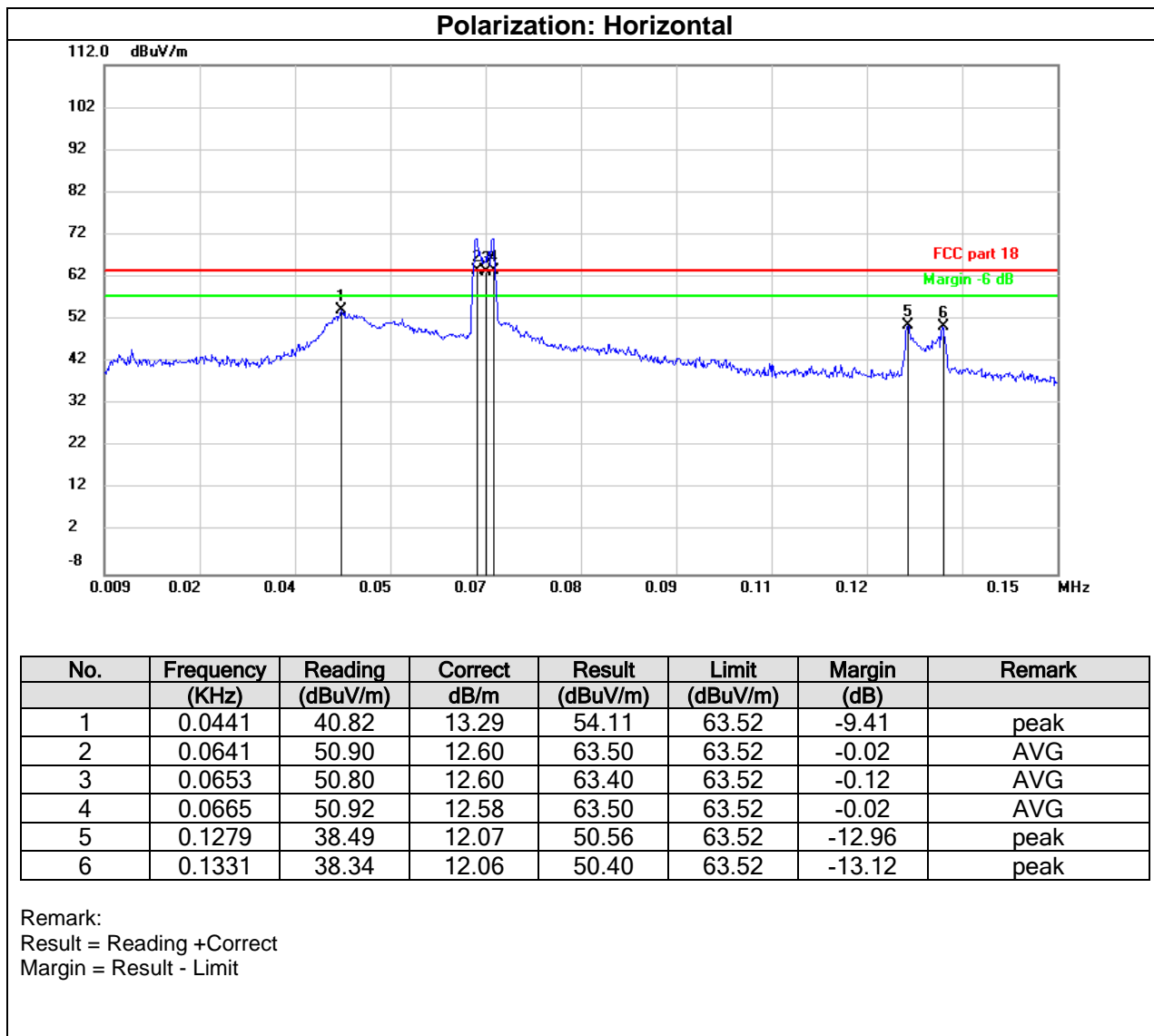
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall fix at 2m.
- c. 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 average detector mode re-measured.
- d. If the Peak Mode measured value compliance with and lower than limit, the EUT shall be deemed to meet Limits and then no additional AVG Mode measurement performed.
- e. For the actual test configuration, please refer to the related Item: EUT Test Photos.

6.2.3. Test Setup

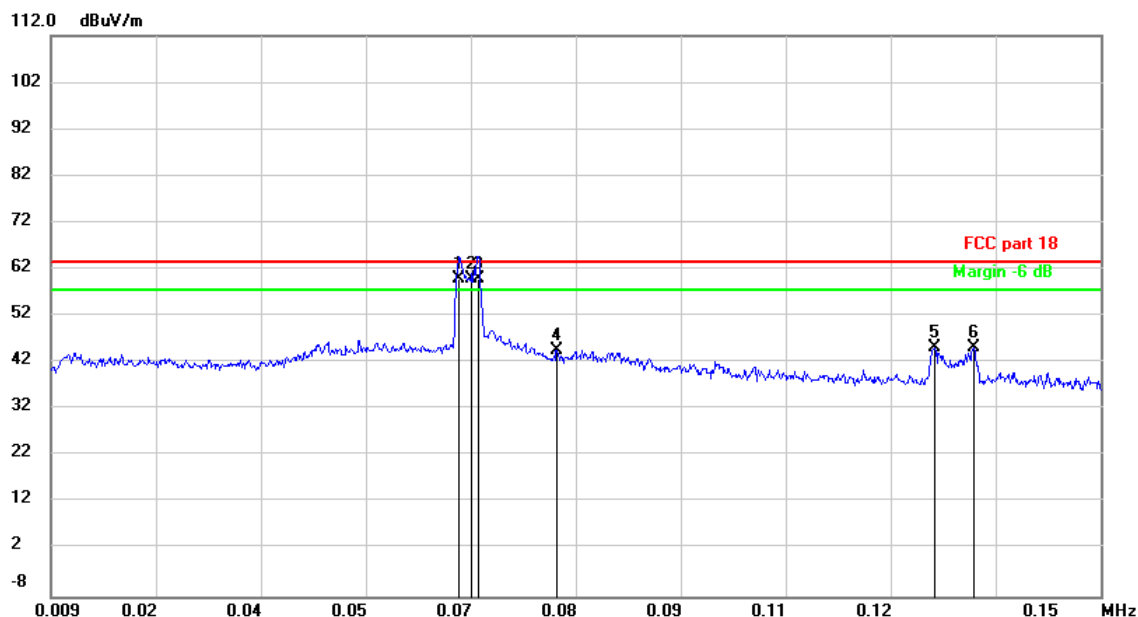


6.2.4. Test Result

Test Mode:	Mode 1	Temperature:	25°C
Test Voltage:	AC 120V/60Hz	Humidity:	52%
Tested By:	Eric T. Fan	Test Date:	Jul. 22, 2019



Test Mode:	Mode 1	Temperature:	25°C
Test Voltage:	AC 120V/60Hz	Humidity:	52%
Tested By:	Eric T. Fan	Test Date:	Jul. 22, 2019

Polarization: Vertical

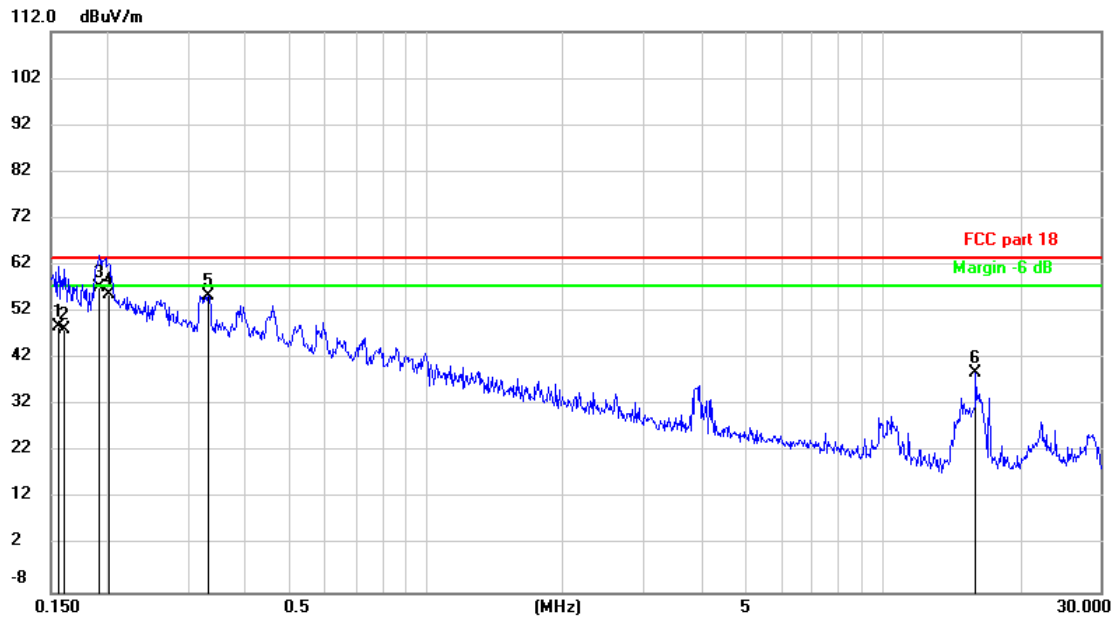
No.	Frequency (KHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0639	47.30	12.61	59.91	63.52	-3.61	AVG
2	0.0653	47.34	12.60	59.94	63.52	-3.58	peak
3	0.0663	47.40	12.58	59.98	63.52	-3.54	AVG
4	0.0769	32.35	12.43	44.78	63.52	-18.74	peak
5	0.1278	33.23	12.07	45.30	63.52	-18.22	peak
6	0.1330	33.29	12.06	45.35	63.52	-18.17	peak

Remark:

Result = Reading +Correct

Margin = Result - Limit

Test Mode:	Mode 1	Temperature:	25°C
Test Voltage:	AC 120V/60Hz	Humidity:	52%
Tested By:	Eric T. Fan	Test Date:	Jul. 22, 2019

Polarization: Horizontal

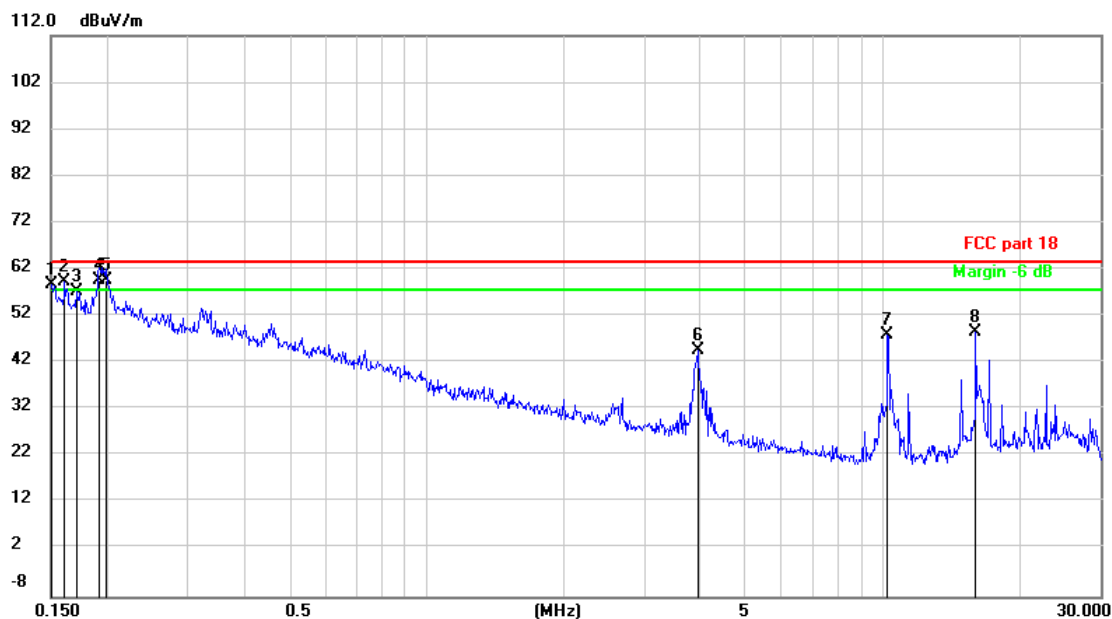
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.1563	36.80	12.03	48.83	63.52	-14.69	AVG
2	0.1600	36.10	12.02	48.12	63.52	-15.40	AVG
3	0.1920	45.20	11.96	57.16	63.52	-6.36	AVG
4	0.2014	43.70	11.95	55.65	63.52	-7.87	AVG
5	0.3329	43.53	11.78	55.31	63.52	-8.21	peak
6	16.0008	27.47	11.55	39.02	63.52	-24.50	peak

Remark:

Result = Reading + Correct

Margin = Result - Limit

Test Mode:	Mode 1	Temperature:	25°C
Test Voltage:	AC 120V/60Hz	Humidity:	52%
Tested By:	Eric T. Fan	Test Date:	Jul. 22, 2019

Polarization: Vertical

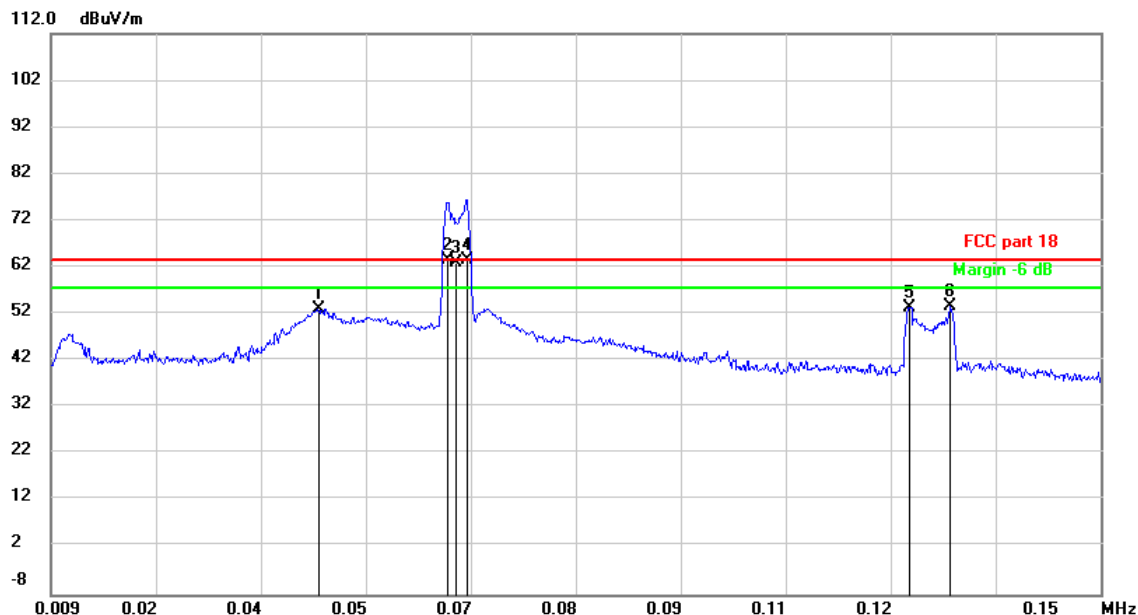
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.1511	46.72	12.03	58.75	63.52	-4.77	peak
2	0.1612	47.42	12.02	59.44	63.52	-4.08	peak
3	0.1712	45.20	12.00	57.20	63.52	-6.32	peak
4	0.1916	47.70	11.96	59.66	63.52	-3.86	AVG
5	0.1981	47.60	11.95	59.55	63.52	-3.97	AVG
6	3.9367	33.29	11.48	44.77	63.52	-18.75	peak
7	10.2876	36.37	11.71	48.08	63.52	-15.44	peak
8	16.0008	36.92	11.55	48.47	63.52	-15.05	peak

Remark:

Result = Reading + Correct

Margin = Result - Limit

Test Mode:	Mode 2	Temperature:	25°C
Test Voltage:	AC 120V/60Hz	Humidity:	52%
Tested By:	Eric T. Fan	Test Date:	Jul. 22, 2019

Polarization: Horizontal

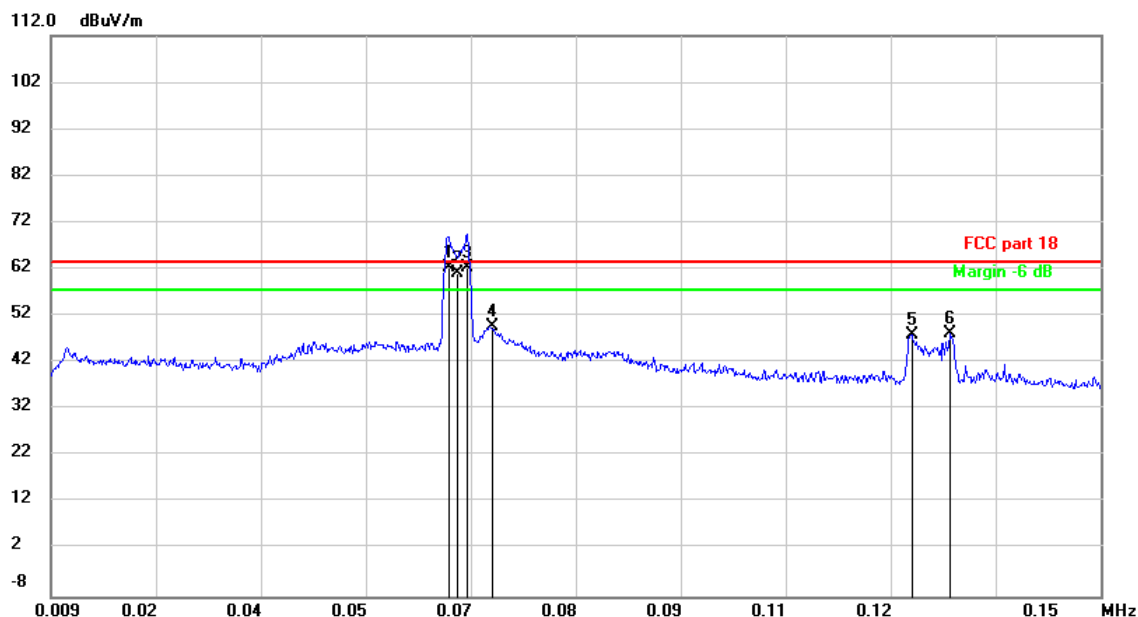
No.	Frequency (KHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0449	39.73	13.22	52.95	63.52	-10.57	peak
2	0.0623	50.87	12.63	63.50	63.52	-0.02	AVG
3	0.0634	50.28	12.62	62.90	63.52	-0.62	AVG
4	0.0649	50.87	12.60	63.47	63.52	-0.05	AVG
5	0.1243	41.36	12.08	53.44	63.52	-10.08	peak
6	0.1299	41.50	12.06	53.56	63.52	-9.96	peak

Remark:

Result = Reading +Correct

Margin = Result - Limit

Test Mode:	Mode 2	Temperature:	25°C
Test Voltage:	AC 120V/60Hz	Humidity:	52%
Tested By:	Eric T. Fan	Test Date:	Jul. 22, 2019

Polarization: Vertical

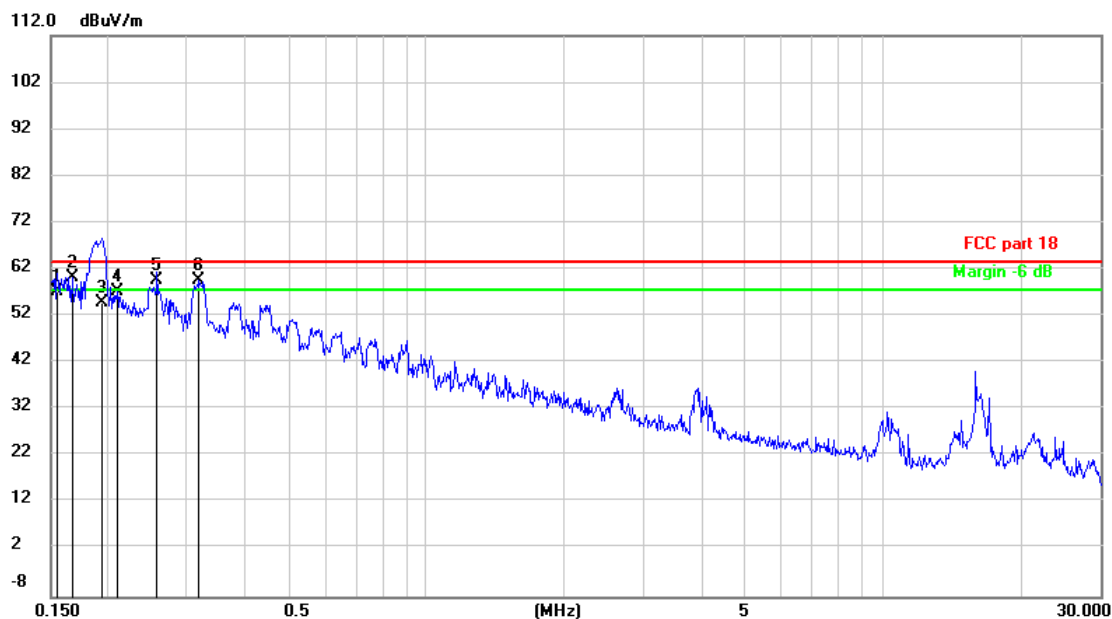
No.	Frequency (KHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0624	49.87	12.63	62.50	63.52	-1.02	AVG
2	0.0636	48.49	12.61	61.10	63.52	-2.42	AVG
3	0.0649	49.90	12.60	62.50	63.52	-1.02	AVG
4	0.0681	37.08	12.55	49.63	63.52	-13.89	peak
5	0.1246	35.93	12.08	48.01	63.52	-15.51	peak
6	0.1299	36.19	12.06	48.25	63.52	-15.27	peak

Remark:

Result = Reading +Correct

Margin = Result - Limit

Test Mode:	Mode 2	Temperature:	25°C
Test Voltage:	AC 120V/60Hz	Humidity:	52%
Tested By:	Eric T. Fan	Test Date:	Jul. 22, 2019

Polarization: Horizontal

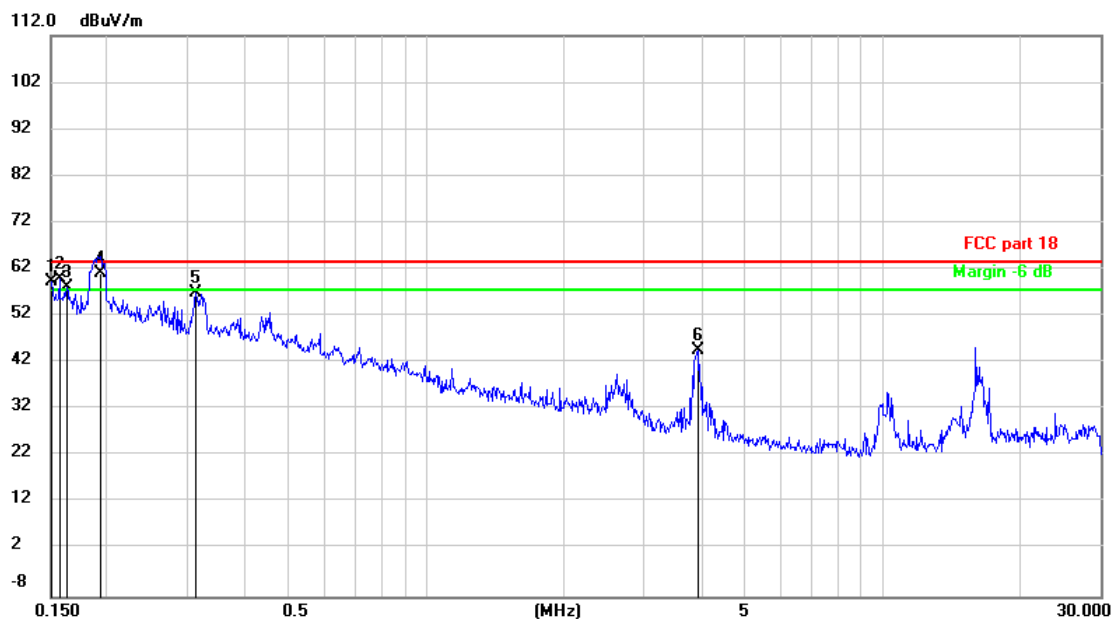
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.1556	45.18	12.03	57.21	63.52	-6.31	AVG
2	0.1669	48.15	12.01	60.16	63.52	-3.36	peak
3	0.1941	42.94	11.96	54.90	63.52	-8.62	AVG
4	0.2098	45.29	11.94	57.23	63.52	-6.29	peak
5	0.2572	47.85	11.85	59.70	63.52	-3.82	AVG
6	0.3171	47.96	11.78	59.74	63.52	-3.78	peak

Remark:

Result = Reading + Correct

Margin = Result - Limit

Test Mode:	Mode 2	Temperature:	25°C
Test Voltage:	AC 120V/60Hz	Humidity:	52%
Tested By:	Eric T. Fan	Test Date:	Jul. 22, 2019

Polarization: Vertical

No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.1512	47.33	12.03	59.36	63.52	-4.16	peak
2	0.1568	48.02	12.02	60.04	63.52	-3.48	peak
3	0.1632	46.07	12.02	58.09	63.52	-5.43	peak
4	0.1930	49.14	11.96	61.10	63.52	-2.42	AVG
5	0.3128	45.15	11.78	56.93	63.52	-6.59	peak
6	3.9395	33.18	11.48	44.66	63.52	-18.86	peak

Remark:

Result = Reading + Correct

Margin = Result - Limit

6.3. Radiated Disturbance Measurement (Above 30MHz)

6.3.1. Limits of radiated disturbance measurement

Equipment	Operating frequency	RF power (watts)	Field strength limit (uV/m)	Distance (meters)
Any types unless otherwise specified (miscellaneous)	Any ISM frequency	Below 500 500 or more	25 25* SQRT(power/500)	300 (*)
	Any non-ISM frequency	Below 500 500 or more	15 15* SQRT(power/500)	300 (*)
Industrial heaters and RF stabilized arc welders	On or below 5,725MHz	Any	10	1600 (**)
	Above 5,725MHz	Any	10	
Medical diathermy	Any ISM frequency	Any	25	300
	Any non-ISM frequency	Any	15	
Ultrasonic	Below 490kHz	Below 500 500 or more	2400/F(kHz) 2400/F(kHz)* SQRT(power/500)	300 (***)
	490 to 1600kHz	Any	24000/F(kHz)	30
	Above 1600kHz	Any	15	
Induction cooking ranges	Below 90kHz	Any	1500	30 (****)
	On or above 90kHz	Any	300	

NOTE:

(*) Field strength may not exceed 10 μ V/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.

(**) Reduced to the greatest extent possible.

(***) Field strength may not exceed 10 μ V/m at 1600 meters. Consumer equipment is not permitted the increase in field strength otherwise permitted here for over 500 watts.

(****) Induction cooking ranges manufactured prior to February 1, 1980, shall be subject to the field strength limits for miscellaneous ISM equipment.

	Frequency(MHz)	Field strength limit at 30meters (uV/m)
RF lighting devices	30-88	30
	88-216	50
	216-1000 (Non-consumer)	70
	30-88	10
	88-216	15
	216-1000 (Consumer)	20

Emission level (dB μ V/m)=20*log Emission level (uV/m).

The test result calculated as following:

Measurement Value = Reading Level + Correct Factor,

Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use),

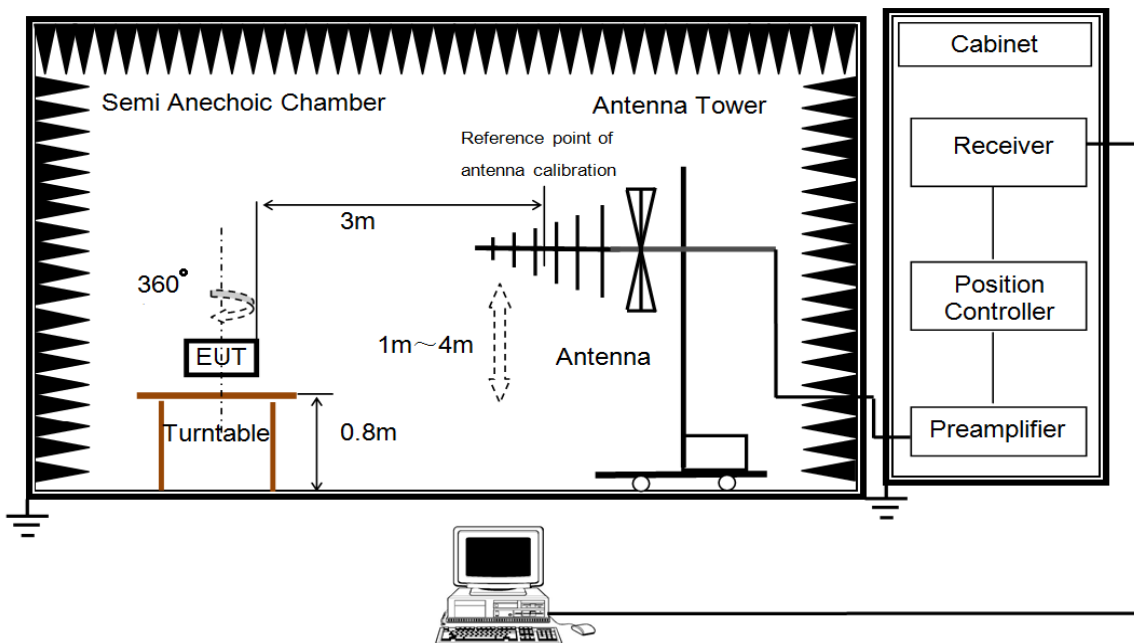
Margin Level = Measurement Value - Limit Value.

The tighter limit applies at the band edges.

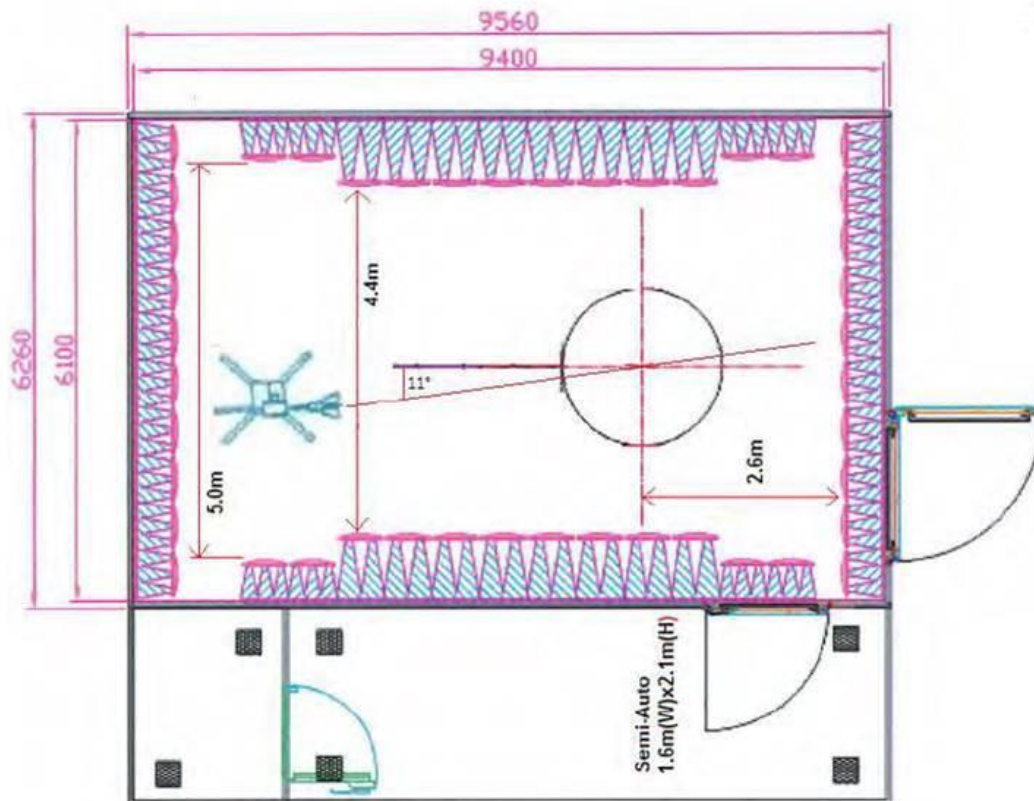
6.3.2. Test Procedure

- 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. 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 AVG detector mode re-measured.
- d. If the Peak Mode measured value compliance with and lower than Limit, the EUT shall be deemed to meet Limits and then no additional AVG Mode measurement performed.
- e. For the actual test configuration, please refer to the related Item: EUT Test Photos.

6.3.3. Test Setup (30MHz to 1000MHz)

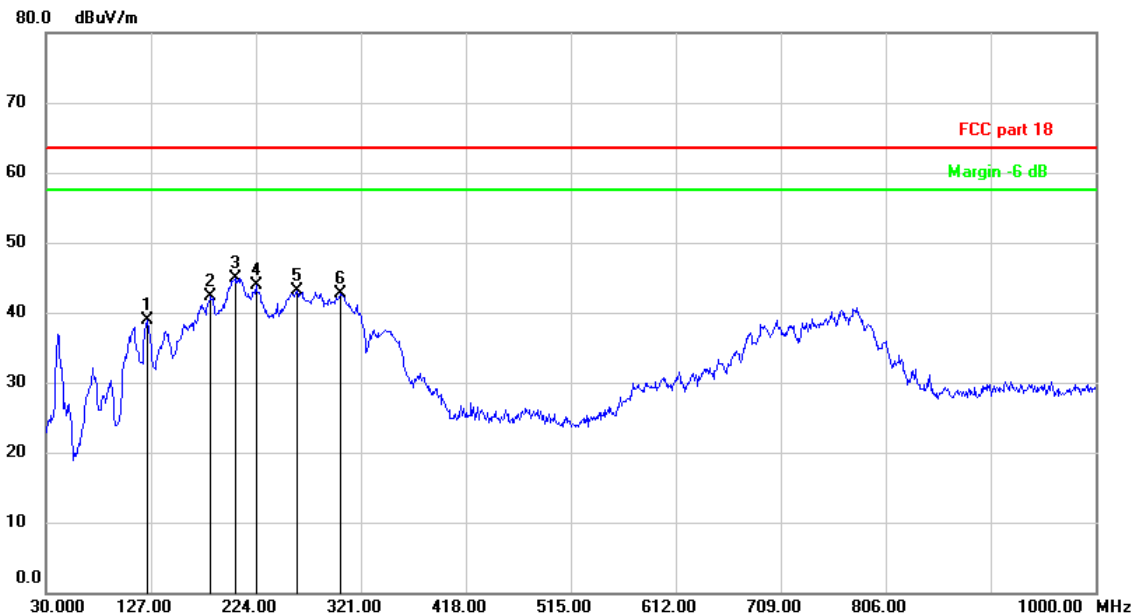


For the actual test configuration, please refer to Appendix I: Photographs of the Test Configuration.



6.3.4. Test Result

Test Mode:	Mode 1	Temperature:	25°C
Test Voltage:	AC 120V/60Hz	Humidity:	52%
Tested By:	Eric T. Fan	Test Date:	Jul. 10, 2019

Polarization: Horizontal

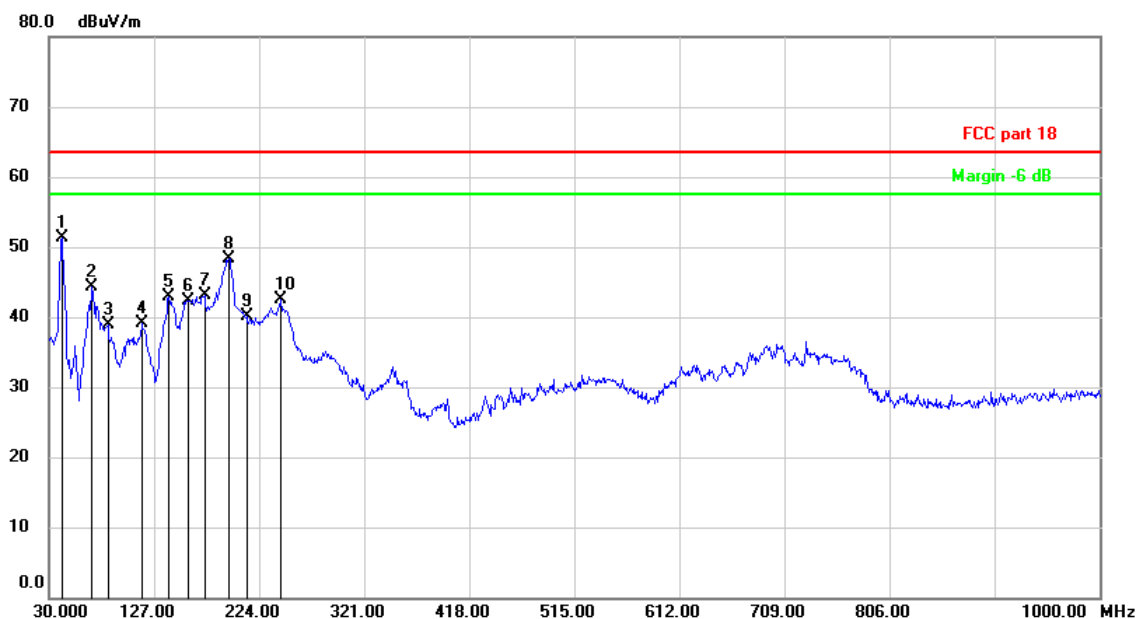
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	123.7020	57.00	-18.09	38.91	63.52	-24.61	peak
2	182.9367	59.73	-17.52	42.21	63.52	-21.31	peak
3	205.1173	63.10	-18.28	44.82	63.52	-18.70	peak
4	224.5497	61.61	-17.75	43.86	63.52	-19.66	peak
5	261.8299	59.35	-16.27	43.08	63.52	-20.44	peak
6	302.5053	57.36	-14.74	42.62	63.52	-20.90	peak

Remark:

Result = Reading +Correct

Margin = Result - Limit

Test Mode:	Mode 1	Temperature:	25°C
Test Voltage:	AC 120V/60Hz	Humidity:	52%
Tested By:	Eric T. Fan	Test Date:	Jul. 10, 2019

Polarization: Vertical

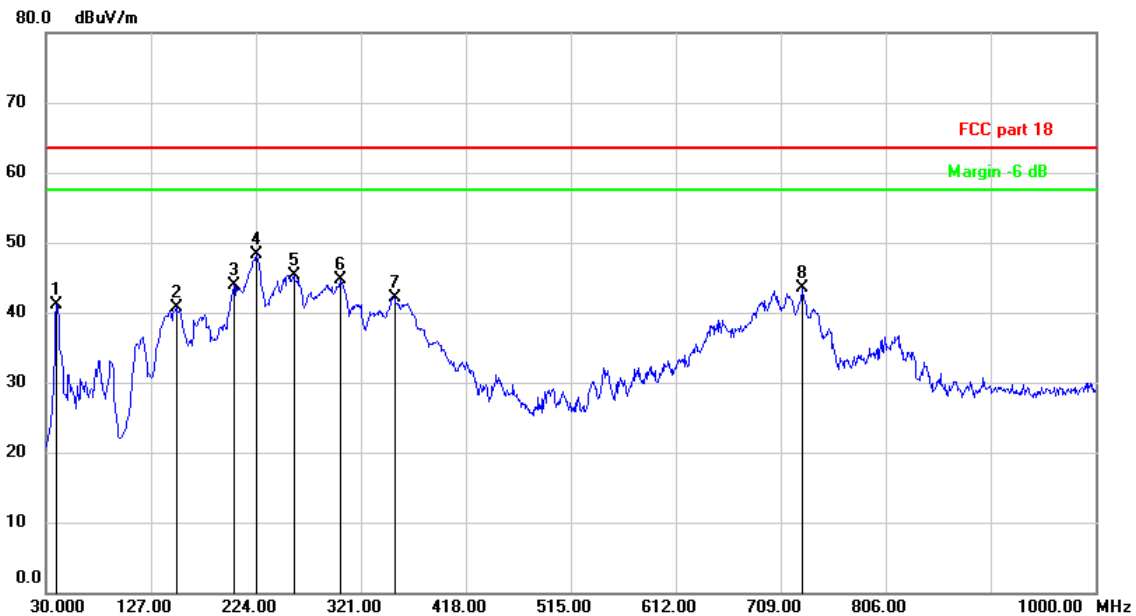
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	41.7047	67.42	-16.16	51.26	63.52	-12.26	peak
2	70.5136	62.86	-18.48	44.38	63.52	-19.14	peak
3	85.1607	60.12	-21.31	38.81	63.52	-24.71	peak
4	116.2977	57.80	-18.77	39.03	63.52	-24.49	peak
5	140.8387	59.12	-16.31	42.81	63.52	-20.71	peak
6	159.0747	58.32	-15.99	42.33	63.52	-21.19	peak
7	173.5922	59.61	-16.48	43.13	63.52	-20.39	peak
8	196.6137	66.67	-18.31	48.36	63.52	-15.16	peak
9	212.7157	58.20	-18.14	40.06	63.52	-23.46	peak
10	244.6610	59.24	-16.78	42.46	63.52	-21.06	peak

Remark:

Result = Reading + Correct

Margin = Result - Limit

Test Mode:	Mode 2	Temperature:	25°C
Test Voltage:	AC 120V/60Hz	Humidity:	52%
Tested By:	Eric T. Fan	Test Date:	Jul. 10, 2019

Polarization: Horizontal

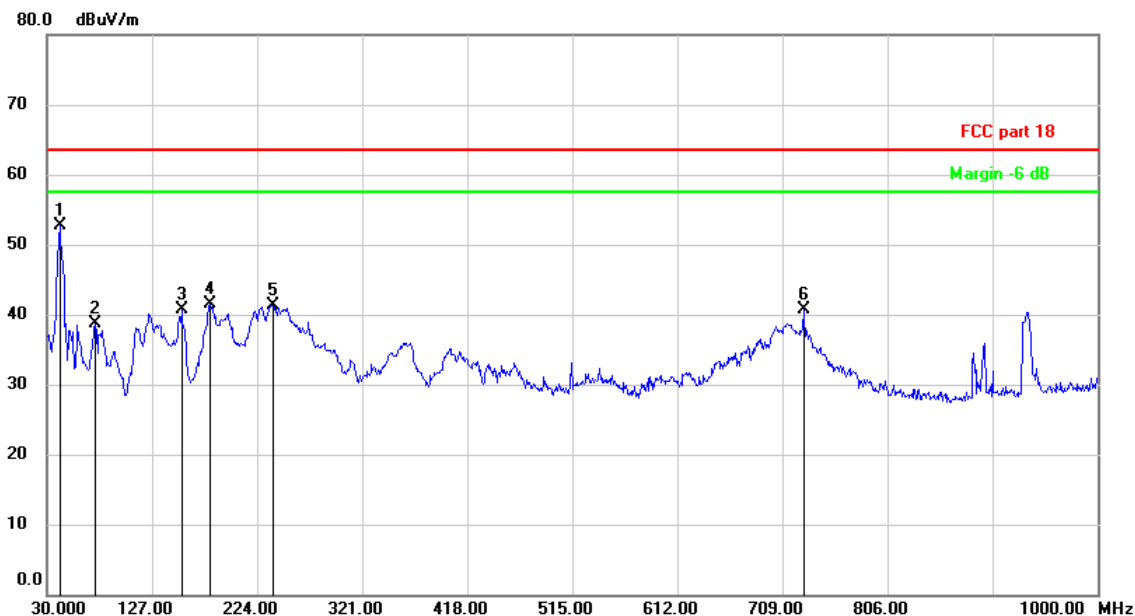
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	40.5730	57.32	-16.26	41.06	63.52	-22.46	peak
2	150.3770	56.91	-16.12	40.79	63.52	-22.73	peak
3	204.3736	62.11	-18.29	43.82	63.52	-19.70	peak
4	224.1616	66.01	-17.76	48.25	63.52	-15.27	peak
5	259.2110	61.73	-16.39	45.34	63.52	-18.18	peak
6	302.3759	59.42	-14.74	44.68	63.52	-18.84	peak
7	352.6865	55.60	-13.48	42.12	63.52	-21.40	peak
8	729.3376	48.52	-5.07	43.45	63.52	-20.07	peak

Remark:

Result = Reading +Correct

Margin = Result - Limit

Test Mode:	Mode 2	Temperature:	25°C
Test Voltage:	AC 120V/60Hz	Humidity:	52%
Tested By:	Eric T. Fan	Test Date:	Jul. 10, 2019

Polarization: Vertical

No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	42.5130	73.86	-21.24	52.62	63.52	-10.90
2	75.0727	63.23	-24.62	38.61	63.52	-24.91
3	154.6127	61.93	-21.21	40.72	63.52	-22.80
4	181.1260	63.94	-22.49	41.45	63.52	-22.07
5	238.6147	63.50	-22.12	41.38	63.52	-22.14
6	728.4323	51.06	-10.34	40.72	63.52	-22.80

Remark:

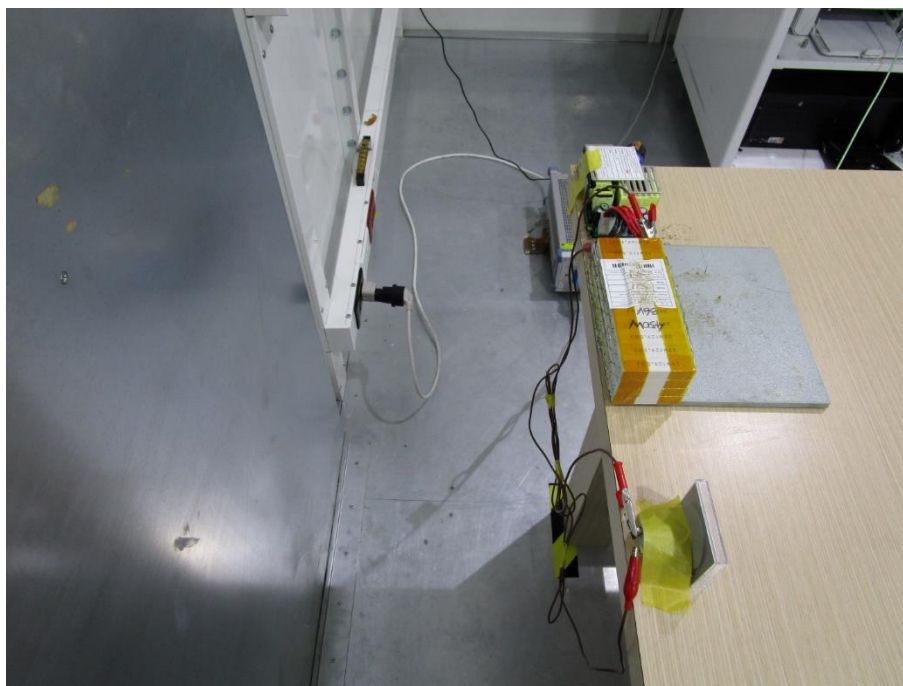
Result = Reading +Correct

Margin = Result - Limit

Appendix I: Photographs of Test Configuration

Conducted Emission

Mode 1

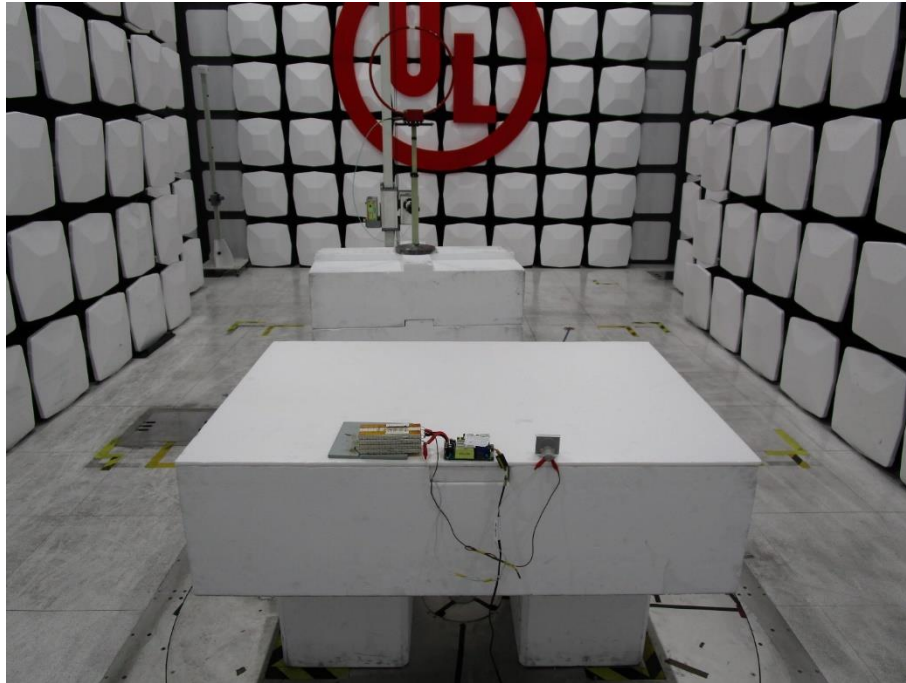


Mode 2

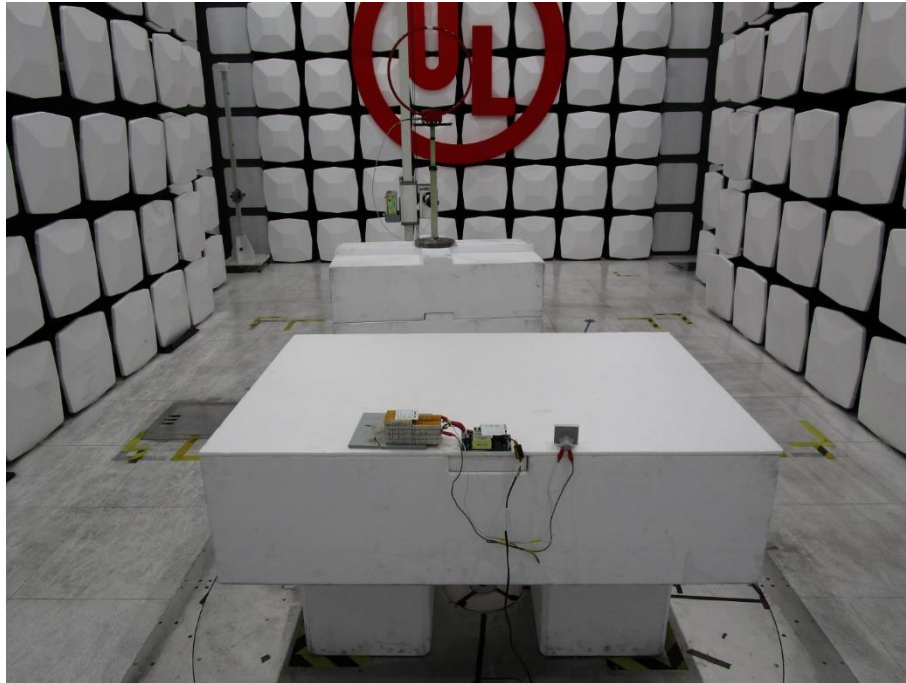


Radiated Emission

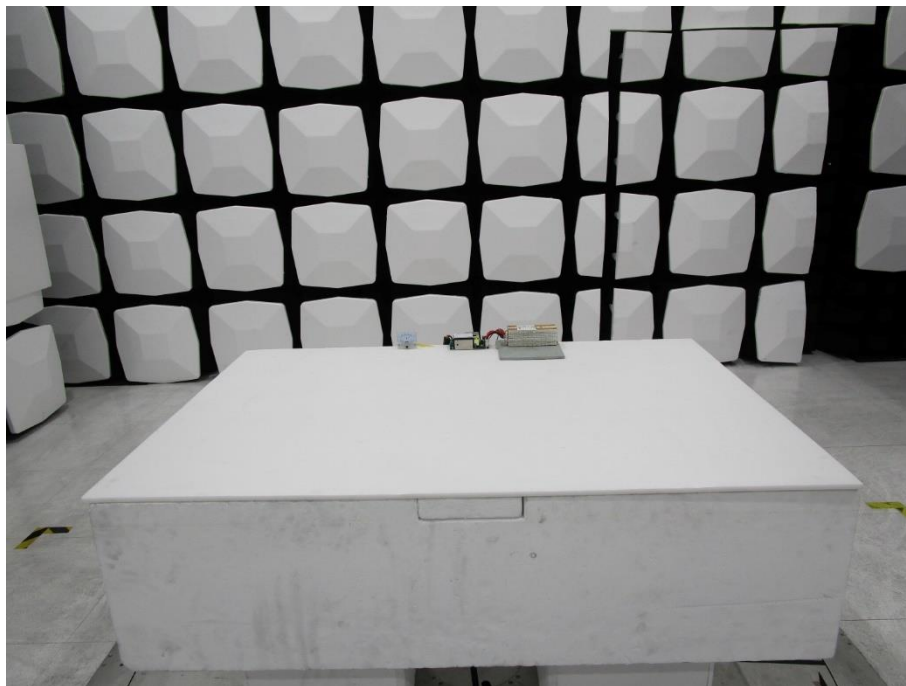
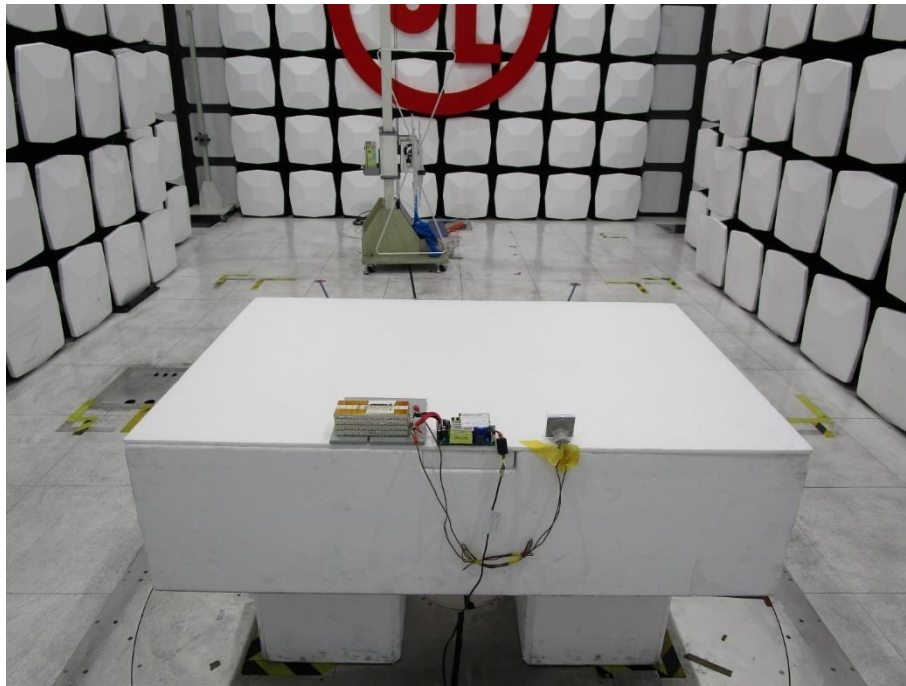
9kHz to 30MHz/ Mode 1



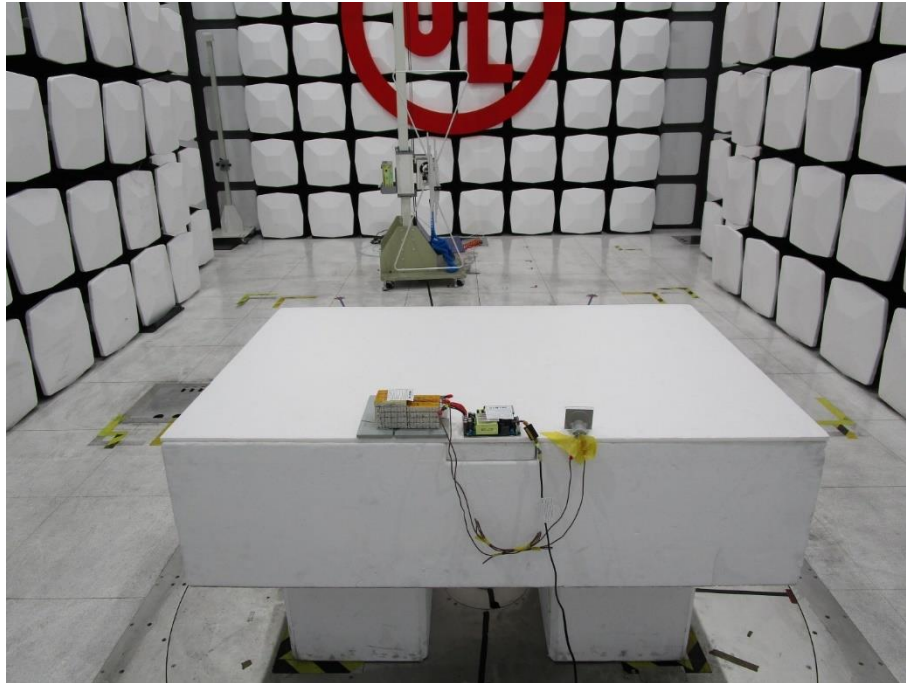
9kHz to 30MHz/ Mode 2



30MHz to 1G/ Mode 1



30MHz to 1G/ Mode 2



Appendix II: Photographs of the EUT

Please see the photographs of EUT in the test report no.: 4789043511-EP.

END OF REPORT