

FCC Test Report

Report No.: RF190222D16

FCC ID: EMJHSAP001MP

Test Model: HSA-P001MP

Received Date: Feb. 22, 2019

Test Date: Mar. 7 ~ 11, 2019

Issued Date: Mar. 14, 2019

Applicant: PRIMAX ELECTRONICS LTD.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

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**FCC Registration /
Designation Number:** 198487 / TW2021



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Release Control Record

Issue No.	Description	Date Issued
RF190222D16	Original release	Mar. 14, 2019

1 Certificate of Conformity

Product: OMEN Outpost Mousepad with Qi Wireless Charging

Brand: hp

Test Model: HSA-P001MP

Sample Status: Engineering sample

Applicant: PRIMAX ELECTRONICS LTD.

Test Date: Mar. 7 ~ 11, 2019

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.209)
ANSI C63.10: 2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by :

Annie Chang

Date:

Mar. 14, 2019

Annie Chang / Senior Specialist

Approved by :

Rex Lai

Date:

Mar. 14, 2019

Rex Lai / Associate Technical Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.209)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -5.83 dB at 0.15000 MHz
15.215	Channel Bandwidth Measurement		
15.209	Radiated Emission Test	Pass	Meet the requirement of limit. Minimum passing margin is -8.45 dB at 191.166 MHz

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (\pm)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.79 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	2.38 dB
	30MHz ~ 1000MHz	5.54 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	OMEN Outpost Mousepad with Qi Wireless Charging
Brand	hp
Test Model	HSA-P001MP
Sample Status	Engineering sample
Rating	Input: 5Vdc, 3A, Output: 5W
Modulation Type	FSK
Operating Frequency	111-148kHz
Antenna Type	Coil antenna
Field Strength	79.00dBuV/m
Dimensions	14.86cm ² (diameter = 435mm)
Accessory Device	USB-C to two USB-A Dongle (with two USB cables (0.15m each))
Data Cable Supplied	Shielded USB type C cable (1.2m) attached on EUT
Maximum Power Output from the Charging Coil	5W

Note:

1. The EUT is an OMEN Outpost Mousepad with Qi Wireless Charging with Qi charging function.
2. EUT has been pre-tested under following test modes, and test **mode 1** was the worst case for final test.

Mode	Test Condition
1	EUT Link to System (via USB Type C cable)
2	EUT Link to System (via USB-C to two USB-A Dongle)

3. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

The following test frequencies are provided to this EUT:

Operating Frequency (kHz)	Tested Frequency (kHz)	Mode
111-148	143	Charging Mode with Full Load
111-148	147	Standby Mode

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To			Description
	RE<1G	PLC	CBW	
A	√	√	√	Charging Mode with Full Load
B	√	√	√	Standby Mode

Where **RE<1G**: Radiated Emission below 1GHz **PLC**: Power Line Conducted Emission
CBW: Channel Bandwidth

Radiated Emission Test (Below 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Operating Frequency (kHz)	Tested Frequency (kHz)
A	111-148	143
B	111-148	147

Power Line Conducted Emission Test:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Operating Frequency (kHz)	Tested Frequency (kHz)
A	111-148	143

Channel Bandwidth Test:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Operating Frequency (kHz)	Tested Frequency (kHz)
A	111-148	143
B	111-148	147

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE<1G	24 deg. C, 71% RH	120Vac, 60Hz (System)	Ian Chang
PLC	25 deg. C, 75% RH	120Vac, 60Hz (System)	Dalen Dai
CBW	25 deg. C, 76% RH	120Vac, 60Hz (System)	Saxon Lee

3.3 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.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Load	N/A	N/A	N/A	N/A	Supplied by client
B.	Notebook PC	Lenovo	20L6-S4GW00	PF1EZSA2	N/A	Provided by Lab

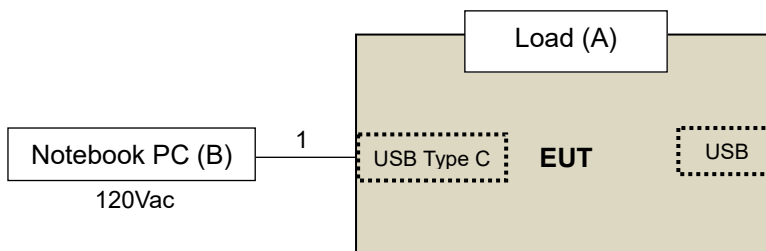
Note: All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB Type C cable	1	1.2	N	0	Supplied by client

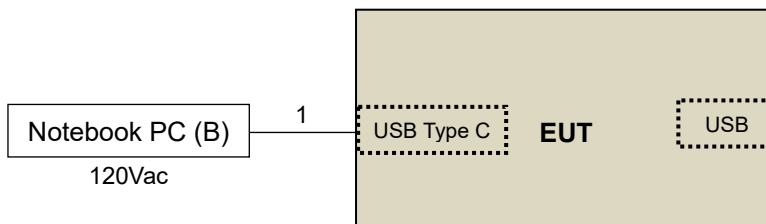
Note: The core(s) is(are) originally attached to the cable(s).

3.3.1 Configuration of System under Test

For Mode A :



For Mode B:



3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.209)

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

For Frequency Below 30MHz

Frequency (MHz)	Field Strength (dBuV/m)		Measurement Distance (meters)
	uV/m	dBuV/m	
0.009 – 0.490	2400 / F (kHz)	48.52-13.80	300
0.490 – 1.705	24000 / F (kHz)	33.80-22.97	30
1.705 – 30.0	30	29.54	30

For Frequency Between 30-1000MHz

Frequency (MHz)	Class A (at 10m)		Class B (at 3m)	
	uV/m	dBuV/m	uV/m	dBuV/m
30-88	90	39.1	100	40.0
88-216	150	43.5	150	43.5
216-960	210	46.4	200	46.0
Above 960	300	49.5	500	54.0

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
HP Preamplifier	8447D	2432A03504	Feb. 20, 2019	Feb. 19, 2020
HP Preamplifier	8449B	3008A01201	Feb. 21, 2019	Feb. 20, 2020
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Feb. 20, 2019	Feb. 19, 2020
Agilent TEST RECEIVER	N9038A	MY51210129	Mar. 05, 2019	Mar. 04, 2020
Schwarzbeck Antenna	VULB 9168	139	Nov. 26, 2018	Nov. 25, 2019
Schwarzbeck Antenna	VHBA 9123	480	May 19, 2017	May 18, 2019
Schwarzbeck Horn Antenna	BBHA-9170	212	Nov. 25, 2018	Nov. 24, 2019
Schwarzbeck Horn Antenna	BBHA 9120-D1	D130	Nov. 25, 2018	Nov. 24, 2019
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	Radiated_V7.6.15.9.5	NA	NA	NA
SUHNER RF cable With 4dB PAD	SF102	Cable-CH6-01	Aug. 13, 2018	Aug. 12, 2019
SUHNER RF cable With 3/4dB PAD	SF102	Cable-CH8-3.6m	Aug. 13, 2018	Aug. 12, 2019
KEYSIGHT MIMO Powermeasurement Test set	U2021XA	U2021XA-001	Jun. 4, 2018	Jun. 3, 2019
KEYSIGHT Spectrum Analyzer	N9030A	MY54490260	Aug. 3, 2018	Aug. 2, 2019
Loop Antenna EMCI	LPA600	270	Aug. 11, 2017	Aug. 10, 2019
EMCO Horn Antenna	3115	00028257	Nov. 25, 2018	Nov. 24, 2019
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	NA	NA
ROHDE & SCHWARZ Spectrum Analyzer	FSV40	101042	Sep. 27, 2018	Sep. 26, 2019

- NOTE:**
1. The calibration interval of the above test instruments is 12/24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
 2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 3. The test was performed in Chamber No. 6.
 4. The Industry Canada Reference No. IC 7450E-6.

4.1.3 Test Procedures

For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

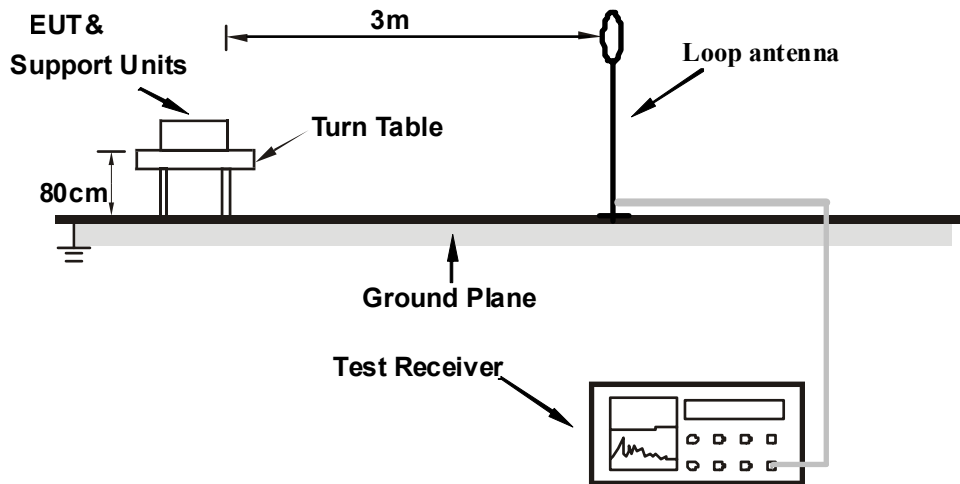
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

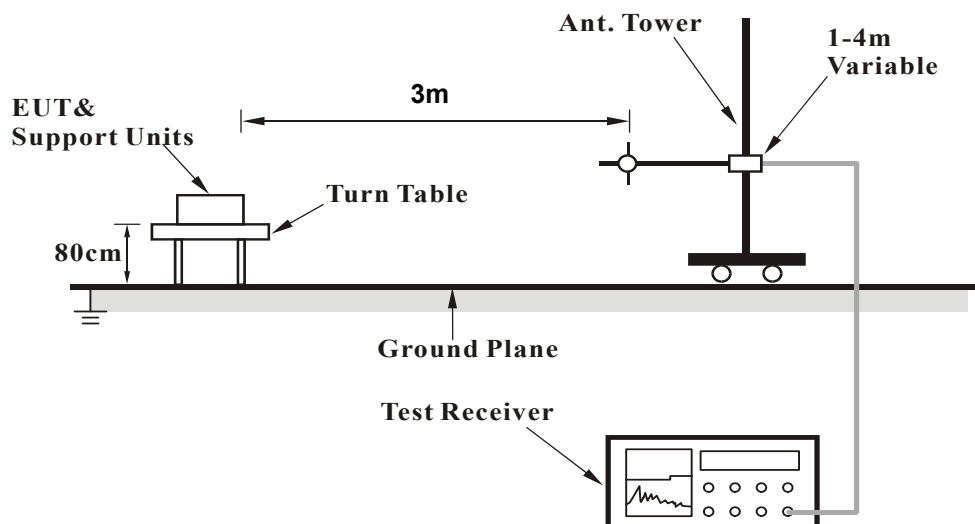
No deviation.

4.1.5 Test Set Up

For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT Operating Conditions

Test Mode A:

- Connect the EUT to Notebook PC.
- Put the Load on the EUT (wireless charging) during the test.

Test Mode B:

- Connect the EUT to Notebook PC.
- Set the EUT under standby condition.

4.1.7 Test Results

Below 30MHz Data:

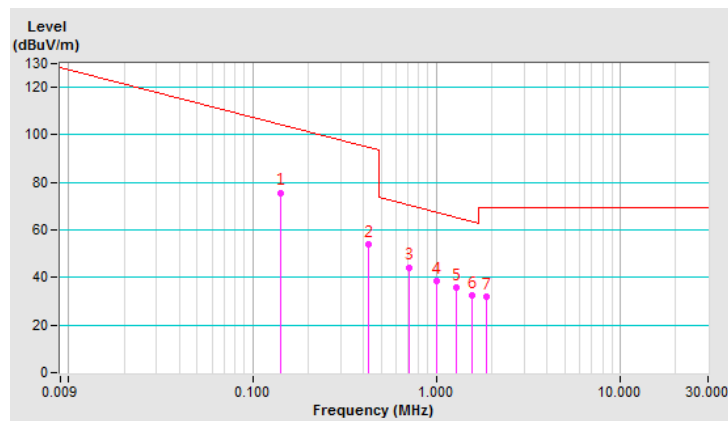
Charging Mode

Test Frequency	143kHz	Detector Function	Quasi-Peak
Frequency Range	9 kHz ~ 30 MHz		
Test Mode	A		

Antenna Polarity & Test Distance: Loop Antenna Open At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*0.143	75.70 QP	104.50	-28.80	1.00	1	56.69	19.01
2	0.429	53.88 QP	94.95	-41.07	1.00	159	43.79	10.09
3	0.715	44.34 QP	70.52	-26.18	1.00	58	37.35	6.99
4	1.001	38.62 QP	67.60	-28.98	1.00	211	33.48	5.14
5	1.287	35.97 QP	65.41	-29.44	1.00	274	31.49	4.48
6	1.573	32.53 QP	63.67	-31.14	1.00	322	28.70	3.83
7	1.859	31.72 QP	69.54	-37.82	1.00	360	28.55	3.17

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * “: Fundamental frequency.
6. Loop antenna was used for all radiated emission below 30MHz.
7. Limit @3m=Limit@300m+40log(300 / 3)=Limit@300m+80
8. Limit @3m=Limit@30m+40log(30 / 3)=Limit@30m+40

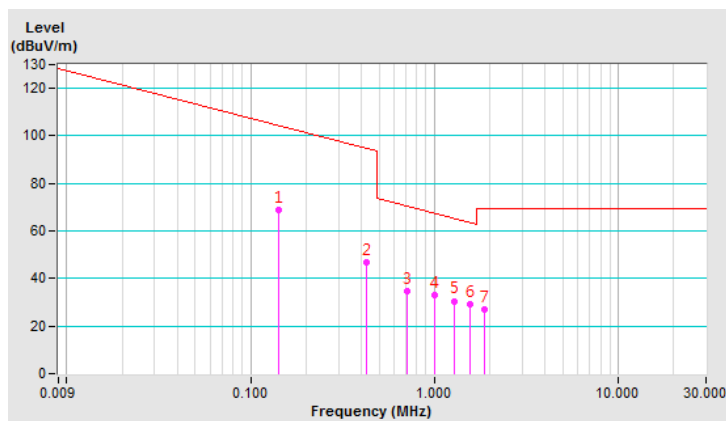


Test Frequency	143kHz	Detector Function	Quasi-Peak
Frequency Range	9 kHz ~ 30 MHz		
Test Mode	A		

Antenna Polarity & Test Distance: Loop Antenna Close At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*0.143	68.97 QP	104.50	-35.53	1.00	110	49.96	19.01
2	0.429	46.89 QP	94.95	-48.06	1.00	150	36.80	10.09
3	0.715	34.69 QP	70.52	-35.83	1.00	321	27.70	6.99
4	1.001	33.14 QP	67.60	-34.46	1.00	206	28.00	5.14
5	1.287	30.56 QP	65.41	-34.85	1.00	157	26.08	4.48
6	1.573	29.18 QP	63.67	-34.49	1.00	278	25.35	3.83
7	1.859	27.14 QP	69.54	-42.40	1.00	360	23.97	3.17

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * “: Fundamental frequency.
6. Loop antenna was used for all radiated emission below 30MHz.
7. Limit @3m=Limit@300m+40log(300 / 3)=Limit@300m+80
8. Limit @3m=Limit@30m+40log(30 / 3)=Limit@30m+40

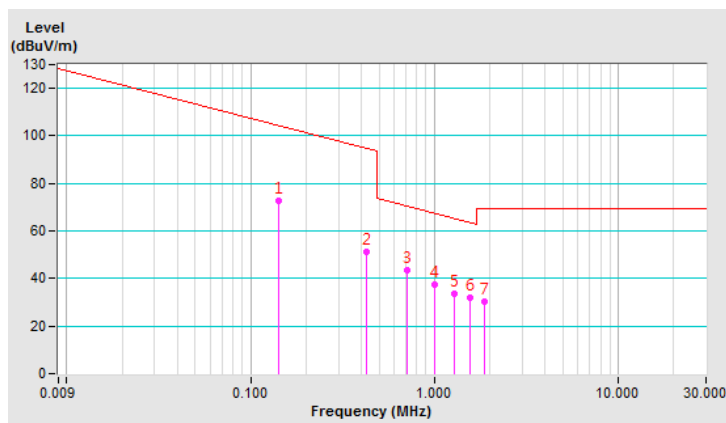


Test Frequency	143kHz	Detector Function	Quasi-Peak
Frequency Range	9 kHz ~ 30 MHz		
Test Mode	A		

Antenna Polarity & Test Distance: Loop Antenna Ground-parallel At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*0.143	72.79 QP	104.50	-31.71	1.00	299	53.78	19.01
2	0.429	51.44 QP	94.95	-43.51	1.00	288	41.35	10.09
3	0.715	43.35 QP	70.52	-27.17	1.00	223	36.36	6.99
4	1.001	37.64 QP	67.60	-29.96	1.00	174	32.50	5.14
5	1.287	33.34 QP	65.41	-32.07	1.00	104	28.86	4.48
6	1.573	31.73 QP	63.67	-31.94	1.00	57	27.90	3.83
7	1.859	30.20 QP	69.54	-39.34	1.00	6	27.03	3.17

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * “: Fundamental frequency.
6. Loop antenna was used for all radiated emission below 30MHz.
7. Limit @3m=Limit@300m+40log(300 / 3)=Limit@300m+80
8. Limit @3m=Limit@30m+40log(30 / 3)=Limit@30m+40



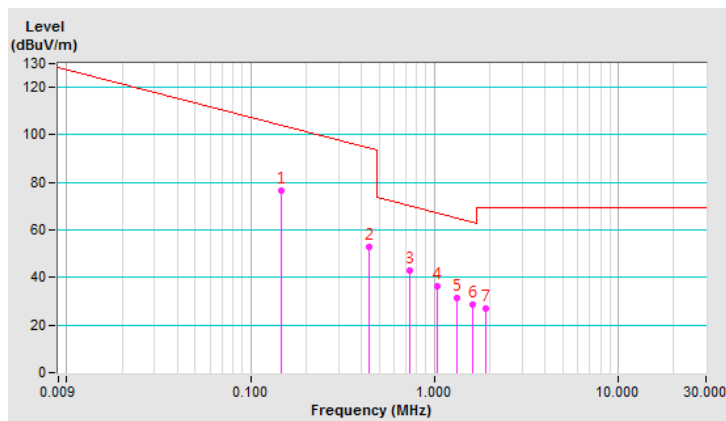
Standby Mode

Test Frequency	147kHz	Detector Function	Quasi-Peak
Frequency Range	9 kHz ~ 30 MHz		
Test Mode	B		

Antenna Polarity & Test Distance: Loop Antenna Open At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*0.147	76.64 QP	104.26	-27.62	1.00	347	57.85	18.79
2	0.441	52.67 QP	94.72	-42.05	1.00	337	42.73	9.94
3	0.735	42.92 QP	70.28	-27.36	1.00	164	36.09	6.83
4	1.029	36.20 QP	67.36	-31.16	1.00	252	31.13	5.07
5	1.323	31.26 QP	65.17	-33.91	1.00	302	26.85	4.41
6	1.617	28.76 QP	63.43	-34.67	1.00	242	25.03	3.73
7	1.911	26.97 QP	69.54	-42.57	1.00	91	23.91	3.06

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * “: Fundamental frequency.
6. Loop antenna was used for all radiated emission below 30MHz.
7. Limit @3m=Limit@300m+40log(300 / 3)=Limit@300m+80
8. Limit @3m=Limit@30m+40log(30 / 3)=Limit@30m+40

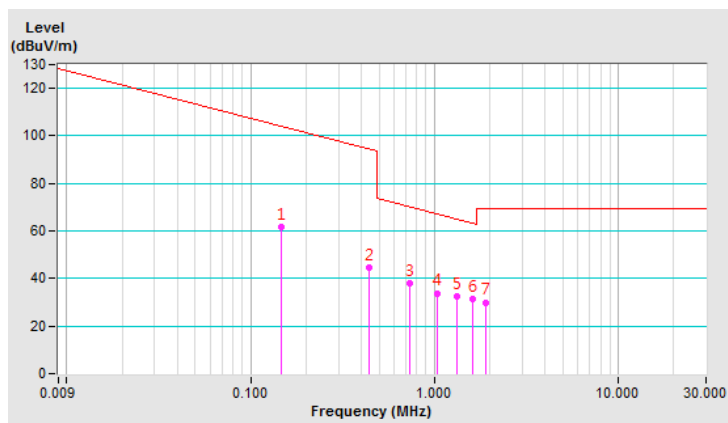


Test Frequency	147kHz	Detector Function	Quasi-Peak
Frequency Range	9 kHz ~ 30 MHz		
Test Mode	B		

Antenna Polarity & Test Distance: Loop Antenna Close At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*0.147	61.52 QP	104.26	-42.74	1.00	360	42.73	18.79
2	0.441	44.57 QP	94.72	-50.15	1.00	336	34.63	9.94
3	0.735	37.92 QP	70.28	-32.36	1.00	202	31.09	6.83
4	1.029	33.86 QP	67.36	-33.50	1.00	151	28.79	5.07
5	1.323	32.70 QP	65.17	-32.47	1.00	72	28.29	4.41
6	1.617	31.54 QP	63.43	-31.89	1.00	11	27.81	3.73
7	1.911	30.02 QP	69.54	-39.52	1.00	0	26.96	3.06

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * “: Fundamental frequency.
6. Loop antenna was used for all radiated emission below 30MHz.
7. Limit @3m=Limit@300m+40log(300 / 3)=Limit@300m+80
8. Limit @3m=Limit@30m+40log(30 / 3)=Limit@30m+40

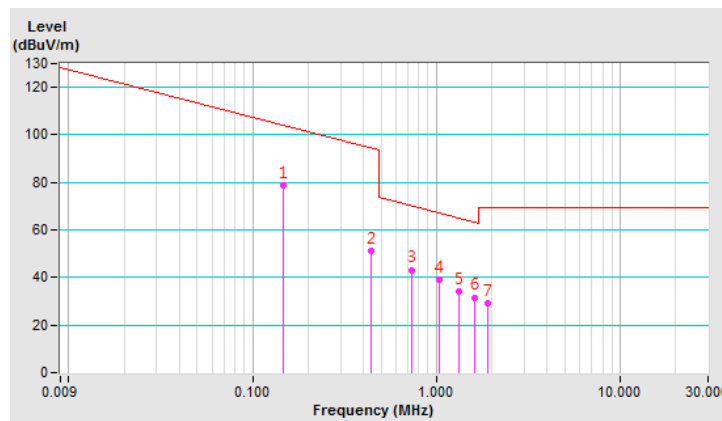


Test Frequency	147kHz	Detector Function	Quasi-Peak
Frequency Range	9 kHz ~ 30 MHz		
Test Mode	B		

Antenna Polarity & Test Distance: Loop Antenna Ground-parallel At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*0.147	79.00 QP	104.26	-25.26	1.00	360	60.21	18.79
2	0.441	51.15 QP	94.72	-43.57	1.00	176	41.21	9.94
3	0.735	43.23 QP	70.28	-27.05	1.00	359	36.40	6.83
4	1.029	38.94 QP	67.36	-28.42	1.00	360	33.87	5.07
5	1.323	33.88 QP	65.17	-31.29	1.00	360	29.47	4.41
6	1.617	31.65 QP	63.43	-31.78	1.00	310	27.92	3.73
7	1.911	29.00 QP	69.54	-40.54	1.00	343	25.94	3.06

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * “: Fundamental frequency.
6. Loop antenna was used for all radiated emission below 30MHz.
7. Limit @3m=Limit@300m+40log(300 / 3)=Limit@300m+80
8. Limit @3m=Limit@30m+40log(30 / 3)=Limit@30m+40



Below 1GHz Data:

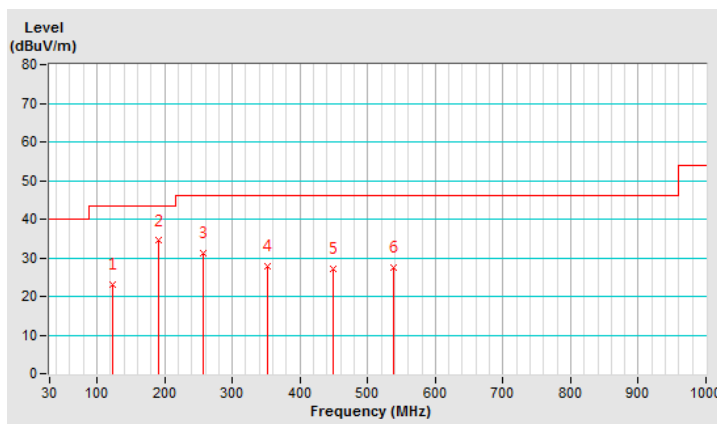
Charging Mode

Test Frequency	143kHz	Detector Function	Quasi-Peak
Frequency Range	30 MHz ~ 1GHz		
Test Mode	A		

Antenna Polarity & Test Distance: Horizontal At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	123.945	23.21 QP	43.50	-20.29	1.57 H	146	31.98	-8.77
2	190.875	34.45 QP	43.50	-9.05	1.52 H	146	43.47	-9.02
3	257.029	31.23 QP	46.00	-14.77	2.39 H	177	37.93	-6.70
4	352.137	27.96 QP	46.00	-18.04	2.25 H	114	32.18	-4.22
5	449.913	27.14 QP	46.00	-18.86	1.82 H	190	29.15	-2.01
6	537.843	27.59 QP	46.00	-18.41	1.06 H	306	28.31	-0.72

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

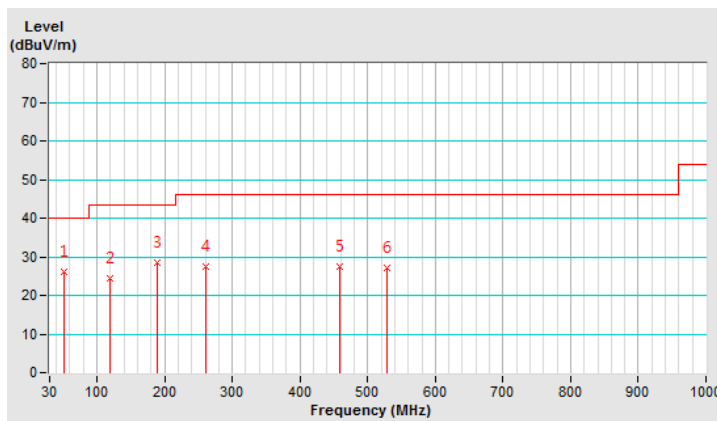


Test Frequency	143kHz	Detector Function	Quasi-Peak
Frequency Range	30 MHz ~ 1GHz		
Test Mode	A		

Antenna Polarity & Test Distance: Vertical At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	52.261	26.11 QP	40.00	-13.89	1.32 V	121	33.28	-7.17
2	118.561	24.55 QP	43.50	-18.95	1.60 V	134	33.80	-9.25
3	189.759	28.47 QP	43.50	-15.03	1.26 V	69	37.42	-8.95
4	261.345	27.51 QP	46.00	-18.49	1.05 V	94	33.99	-6.48
5	458.546	27.39 QP	46.00	-18.61	1.45 V	162	29.29	-1.90
6	529.162	27.19 QP	46.00	-18.81	1.67 V	112	28.01	-0.82

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



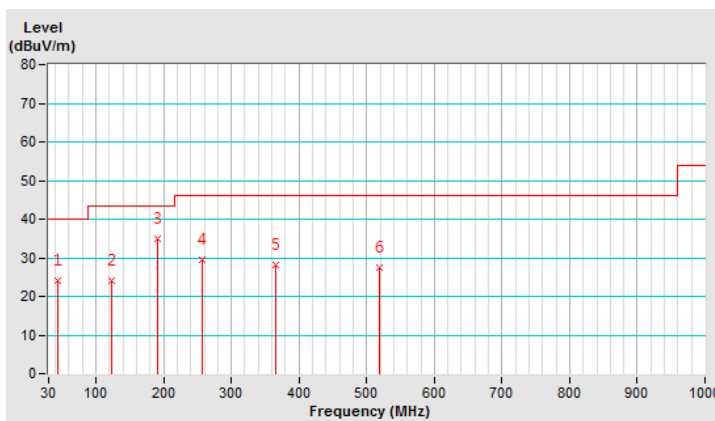
Standby Mode

Test Frequency	147kHz	Detector Function	Quasi-Peak
Frequency Range	30 MHz ~ 1GHz		
Test Mode	B		

Antenna Polarity & Test Distance: Horizontal At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	43.095	24.18 QP	40.00	-15.82	2.34 H	61	31.60	-7.42
2	123.993	24.13 QP	43.50	-19.37	2.10 H	122	32.90	-8.77
3	191.166	35.05 QP	43.50	-8.45	2.09 H	127	44.07	-9.02
4	257.077	29.42 QP	46.00	-16.58	1.82 H	169	36.12	-6.70
5	365.911	28.14 QP	46.00	-17.86	1.76 H	109	32.04	-3.90
6	519.705	27.51 QP	46.00	-18.49	1.28 H	202	28.50	-0.99

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



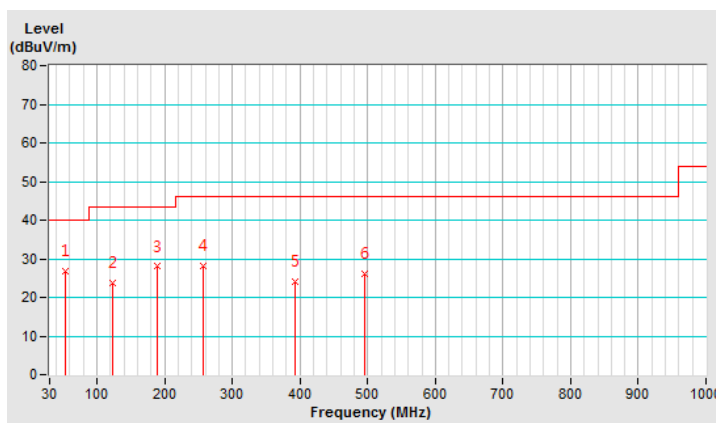
Test Frequency	147kHz	Detector Function	Quasi-Peak
Frequency Range	30 MHz ~ 1GHz		
Test Mode	B		

Antenna Polarity & Test Distance: Vertical At 3m

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	52.892	26.71 QP	40.00	-13.29	1.64 V	103	33.86	-7.15
2	123.945	23.87 QP	43.50	-19.63	1.06 V	349	32.64	-8.77
3	188.789	27.97 QP	43.50	-15.53	1.42 V	52	36.91	-8.94
4	257.271	28.21 QP	46.00	-17.79	1.55 V	203	34.90	-6.69
5	391.810	24.20 QP	46.00	-21.80	1.72 V	253	27.58	-3.38
6	495.794	26.23 QP	46.00	-19.77	1.32 V	155	27.56	-1.33

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESR3	102414	Jan. 17, 2019	Jan. 16, 2020
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ENV216	101197	May 23, 2018	May 22, 2019
LISN With Adapter (for EUT)	AD10	C10Ada-002	May 23, 2018	May 22, 2019
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100218	Nov. 30, 2018	Nov. 29, 2019
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 3, 2018	May 2, 2019
Software	Cond_V7.3.7.4	NA	NA	NA
RF cable (JYEBAO) With 10dB PAD	5D-FB	Cable-C10.01	Feb. 13, 2019	Feb. 12, 2020
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-011484	May 8, 2018	May 7, 2019
ROHDE & SCHWARZ Artificial Mains Network (For TV EUT)	ESH3-Z5	100220	Nov. 21, 2018	Nov. 20, 2019
LISN With Adapter (for TV EUT)	100220	N/A	Nov. 21, 2018	Nov. 20, 2019

Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in Shielded Room No. 10.

4.2.3 Test Procedures

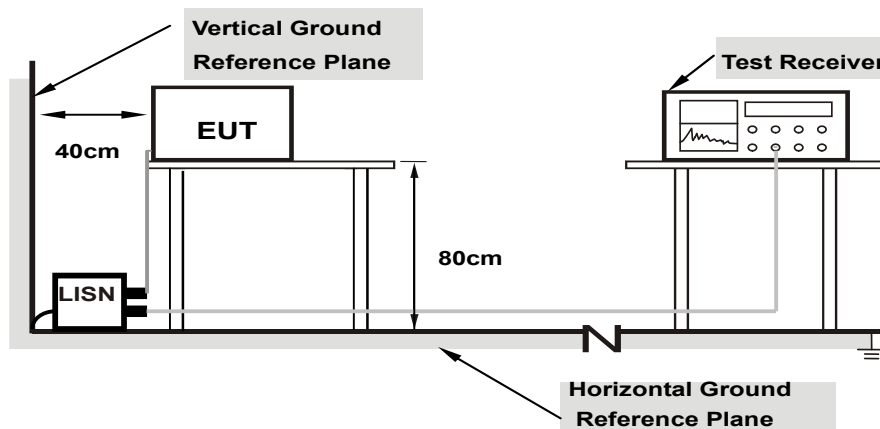
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT Operating Conditions

Same as item 4.1.6.

4.2.7 Test Results

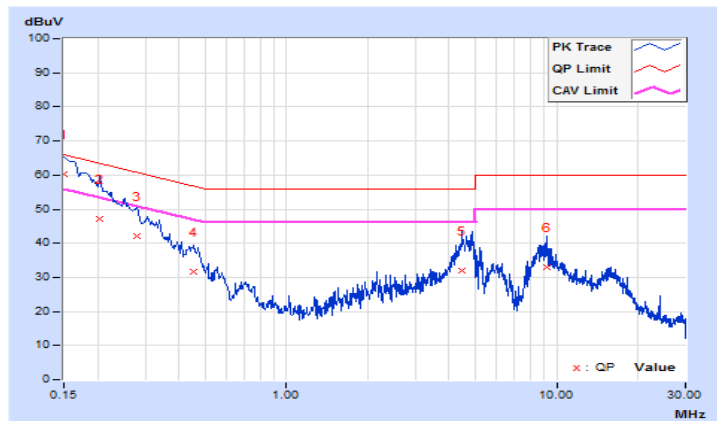
Charging Mode

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.15000	9.66	50.51	34.93	60.17	44.59	66.00
2	0.20474	9.67	37.42	16.77	47.09	26.44	63.42	53.42	-16.33	-26.98
3	0.27844	9.68	32.45	17.00	42.13	26.68	60.86	50.86	-18.73	-24.18
4	0.45498	9.71	22.09	13.15	31.80	22.86	56.78	46.78	-24.98	-23.92
5	4.46083	9.84	22.12	14.03	31.96	23.87	56.00	46.00	-24.04	-22.13
6	9.17588	9.93	23.12	16.61	33.05	26.54	60.00	50.00	-26.95	-23.46

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

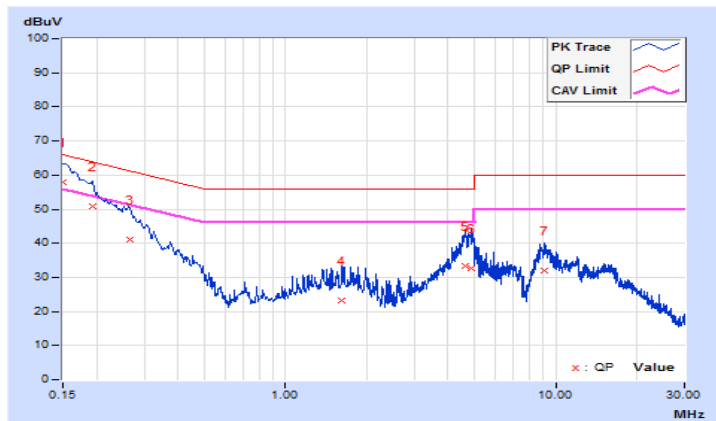


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.15000	9.67	48.21	31.24	57.88	40.91	66.00
2	0.19301	9.69	41.15	22.33	50.84	32.02	63.91	53.91	-13.07	-21.89
3	0.26730	9.70	31.34	12.05	41.04	21.75	61.20	51.20	-20.16	-29.45
4	1.61826	9.79	13.46	8.17	23.25	17.96	56.00	46.00	-32.75	-28.04
5	4.65242	9.85	23.49	15.65	33.34	25.50	56.00	46.00	-22.66	-20.50
6	4.87920	9.86	22.70	14.60	32.56	24.46	56.00	46.00	-23.44	-21.54
7	9.03512	9.95	22.10	15.21	32.05	25.16	60.00	50.00	-27.95	-24.84

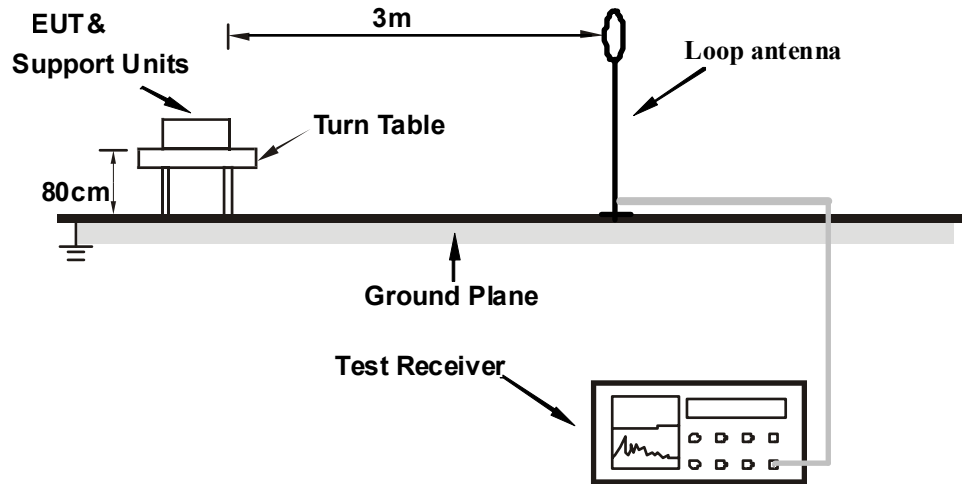
Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.



4.3 Channel Bandwidth

4.3.1 Test Setup



4.3.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.3 Test Procedure

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter Semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation. Then the Loop antenna was rotated 360 degrees to determine the position of the highest radiation.
- The antenna is a broadband loop antenna, which is fixed of a 1m height above the ground, and set away from 3m to the EUT to find the disturbance reading on each frequency.
- The test-receiver system was set to Quasi-peak detect function and specified bandwidth.

4.3.4 Deviation from Test Standard

No deviation.

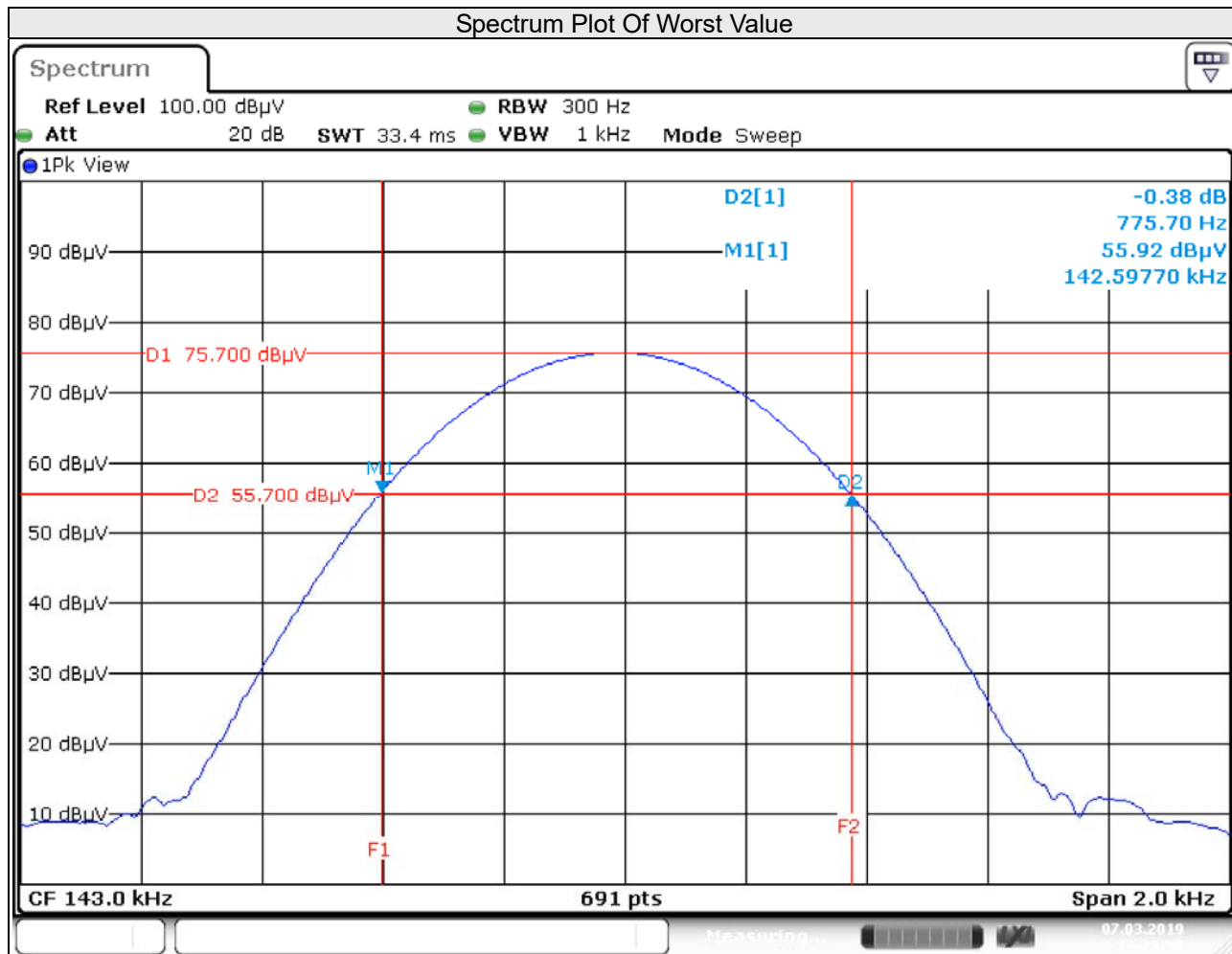
4.3.5 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously.

4.3.6 Test Results

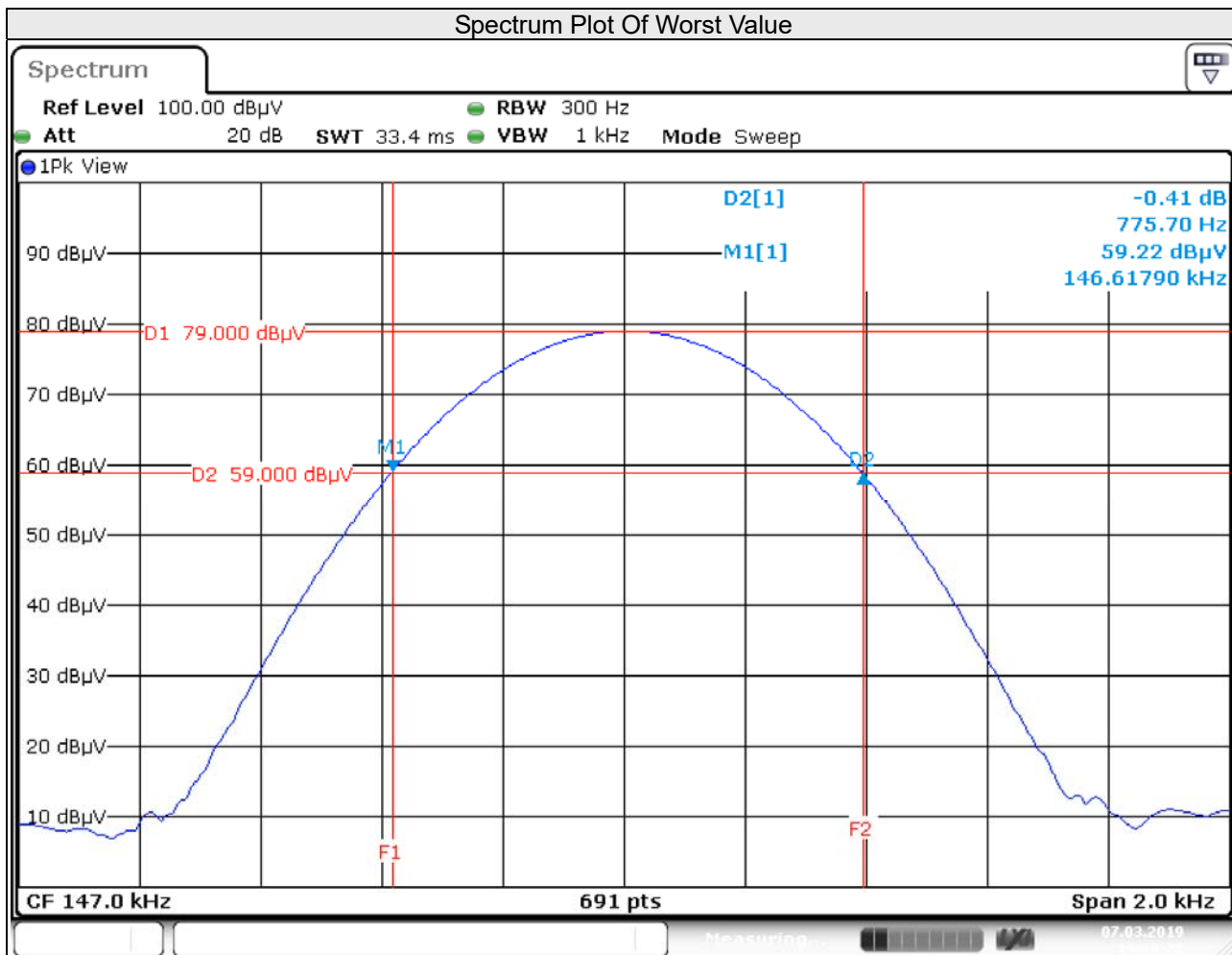
Mode A:

Frequency (kHz)	20dB Bandwidth (kHz)
143	0.775



Mode B:

Frequency (kHz)	20dB Bandwidth (kHz)
147	0.775



5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Fax: 886-2-26051924

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Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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