

FCC Test Report

Report No.: RF190627C18

FCC ID: K7SF8J233V2

Test Model: F8J233V2

Received Date: Jun. 27, 2019

Test Date: Jun. 29 to Jul. 8, 2019

Issued Date: Jul. 16, 2019

Applicant: Belkin International, Inc.

Address: 12045 E. Waterfront Drive, Playa Vista, CA 90094 USA

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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Report Issue History Record

Issue No.	Description	Date Issued
RF190627C18	Original release.	Jul. 16, 2019

Release Control Record

Issue No.	Description	Date Issued
RF190627C18	Original release.	Jul. 16, 2019

1 Certificate of Conformity

Product: BOOST↑CHARGE™

Brand: belkin

Test Model: F8J233V2

Sample Status: Engineering sample

Applicant: Belkin International, Inc.

Test Date: Jun. 29 to Jul. 8, 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 : Celia Chen , **Date:** Jul. 16, 2019
Celia Chen / Supervisor

Approved by : Rex Lai , **Date:** Jul. 16, 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 -13.90dB at 0.75547MHz.
15.209	Radiated Emission Test	Pass	Meet the requirement of limit. Minimum passing margin is -7.50dB at 38.83MHz

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	2.77 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	2.38 dB
	30MHz ~ 1000MHz	5.43 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	BOOST↑CHARGE™
Brand	belkin
Test Model	F8J233V2
Sample Status	Engineering sample
Rating	5Vdc (Adapter) 3.83Vdc (Battery)
Modulation Type	FSK
Operating Frequency	326.5 kHz
Antenna Type	Coil antenna
Field Strength	54.69dBuV/m
Dimensions	3.80cm ² (diameter = 22mm)
Accessory Device	N/A
Data Cable Supplied	0.17m shielded USB cable without core
Maximum Power Output from the Charging Coil	5W

Note:

1. The EUT has a wireless inductive charging coil for charging Apple watch.
2. The EUT uses following battery.

Brand	Dongguan Amperex Technology Limited
Model	B03543
Power Rating	3.83Vdc, 2200mAh

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 frequency is provided to this EUT:

Operating Frequency (kHz)	Test Mode
326.5	Charging Mode with Apple Watch
326.5	Standby Mode

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To		Description
	RE<1G	PLC	
A	√	√	Charging Mode with Apple Watch
B	√	√	Standby Mode

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

Note: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

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	326.5	326.5
B	326.5	326.5

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	326.5	326.5
B	326.5	326.5

Test Condition:

Applicable To	Environmental Conditions	Input Power (Adapter)	Tested by
RE<1G	24 deg. C, 76% RH	120Vac, 60Hz	Ian Chang
PLC	25 deg. C, 75% RH	120Vac, 60Hz	Starlaly Wu

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.	Apple Watch	Apple	A1889	NA	BCG-A1889	Supplied by client
B.	Adapter	Apple	A1385	NA	NA	-

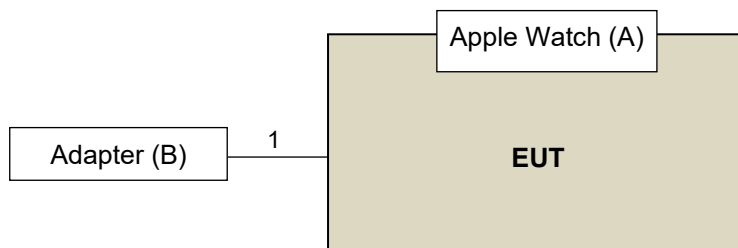
NOTE: All power cords of the above support units are non-shielded (1.8 m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB cable	1	0.17	Y	0	Supplied by client

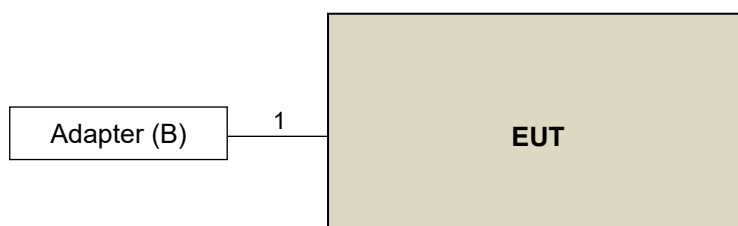
Note: The core(s) is(are) originally attached to the cable(s)

3.3.1 Configuration of System under Test

Test Mode A:



Test 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:

47 CFR FCC Part 15, Subpart C (Section 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	Jun. 3, 2019	Jun. 2, 2021
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. 11, 2019	Jun. 10, 2020
KEYSIGHT Spectrum Analyzer	N9030A	MY54490260	Aug. 3, 2018	Aug. 2, 2019
Loop Antenna EMCI	LPA600	270	Aug. 11, 2017	Aug. 10, 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.

4.1.3 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 200Hz at frequency range 9kHz to 150kHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency range 150kHz to 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:

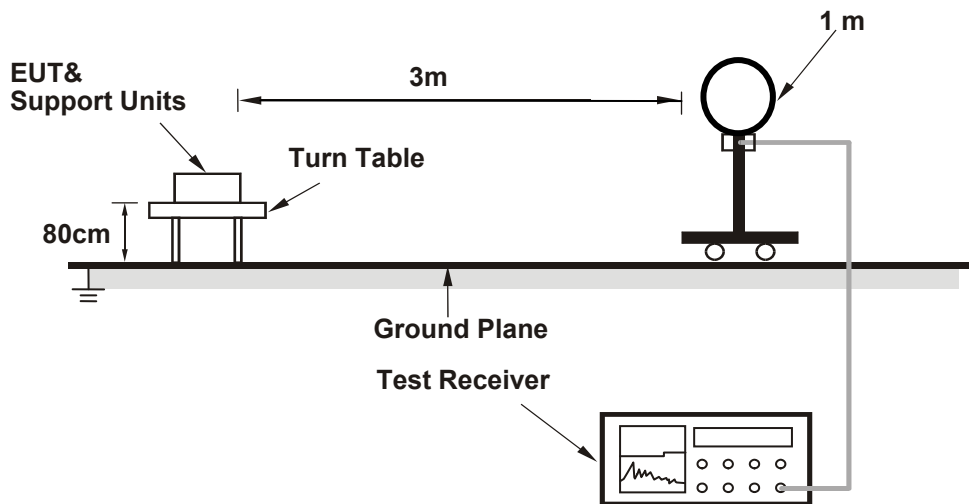
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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

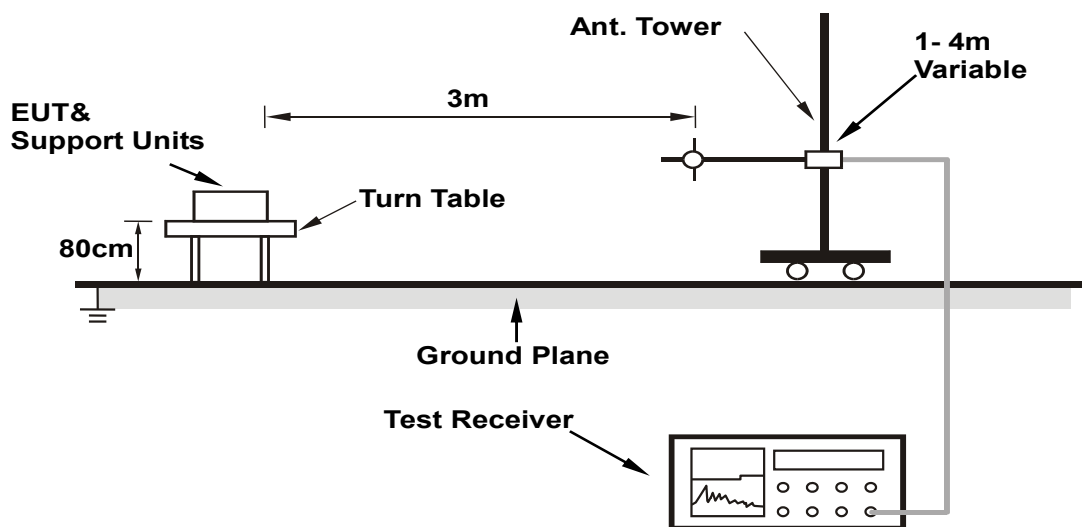
No deviation.

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:

- a. The EUT powered by adapter.
- b. Put the Apple Watch on the EUT (wireless charging) during the test.

Test Mode B:

- a. The EUT powered by adapter.
- b. Set the EUT under standby condition.

4.1.7 Test Results

Below 30MHz Data:

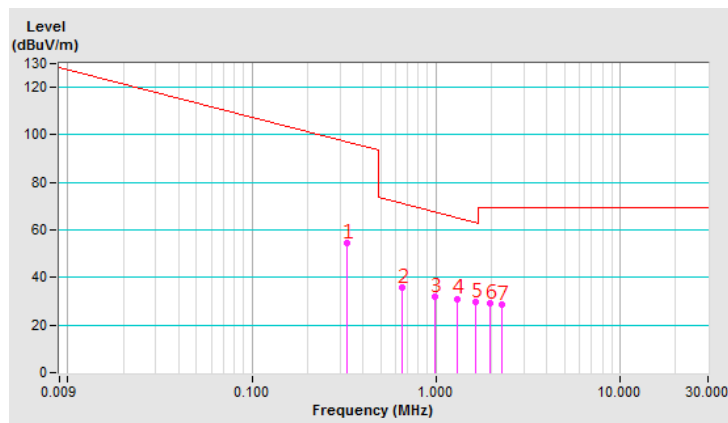
Charging Mode

TEST FREQUENCY	326.5kHz	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 30MHz		
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: LOOP ANTENNA PARALLEL AT 3 M								
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	*0.3265	54.69 QP	97.33	-42.64	1.00	264	42.68	12.01
2	0.6530	36.02 QP	71.31	-35.29	1.00	313	28.45	7.57
3	0.9795	32.07 QP	67.78	-35.71	1.00	246	26.81	5.26
4	1.3060	31.12 QP	65.29	-34.17	1.00	223	26.62	4.50
5	1.6325	29.73 QP	63.35	-33.62	1.00	207	25.97	3.76
6	1.9590	29.14 QP	69.54	-40.40	1.00	191	26.14	3.00
7	2.2855	28.80 QP	69.54	-40.74	1.00	174	26.14	2.66

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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



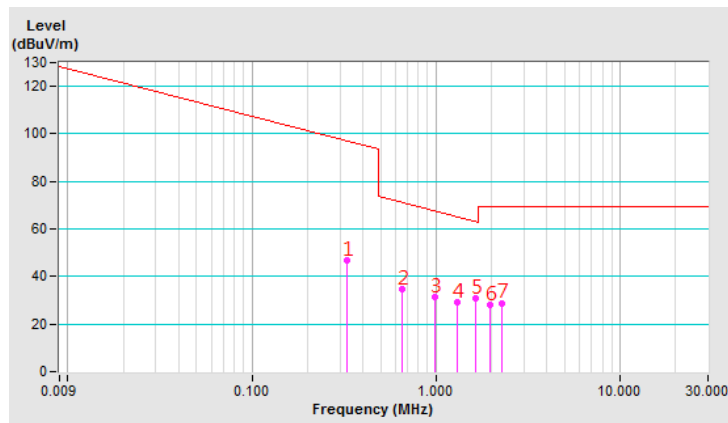
TEST FREQUENCY	326.5kHz	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 30MHz		
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: LOOP ANTENNA PERPENDICULAR AT 3 M

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	*0.3265	46.63 QP	97.33	-50.70	1.00	0	34.62	12.01
2	0.6530	34.52 QP	71.31	-36.79	1.00	140	26.95	7.57
3	0.9795	31.53 QP	67.78	-36.25	1.00	169	26.27	5.26
4	1.3060	29.05 QP	65.29	-36.24	1.00	195	24.55	4.50
5	1.6325	30.72 QP	63.35	-32.63	1.00	219	26.96	3.76
6	1.9590	27.98 QP	69.54	-41.56	1.00	245	24.98	3.00
7	2.2855	28.90 QP	69.54	-40.64	1.00	277	26.24	2.66

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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



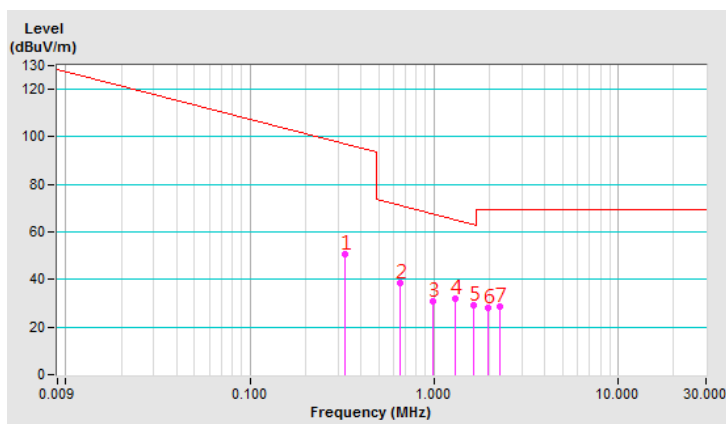
TEST FREQUENCY	326.5kHz	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 30MHz		
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: LOOP ANTENNA GROUND-PARALLEL AT 3 M

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	*0.3265	50.69 QP	97.33	-46.64	1.00	267	38.68	12.01
2	0.6530	38.44 QP	71.31	-32.87	1.00	146	30.87	7.57
3	0.9795	30.90 QP	67.78	-36.88	1.00	106	25.64	5.26
4	1.3060	31.90 QP	65.29	-33.39	1.00	63	27.40	4.50
5	1.6325	29.42 QP	63.35	-33.93	1.00	24	25.66	3.76
6	1.9590	27.86 QP	69.54	-41.68	1.00	1	24.86	3.00
7	2.2855	28.66 QP	69.54	-40.88	1.00	0	26.00	2.66

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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



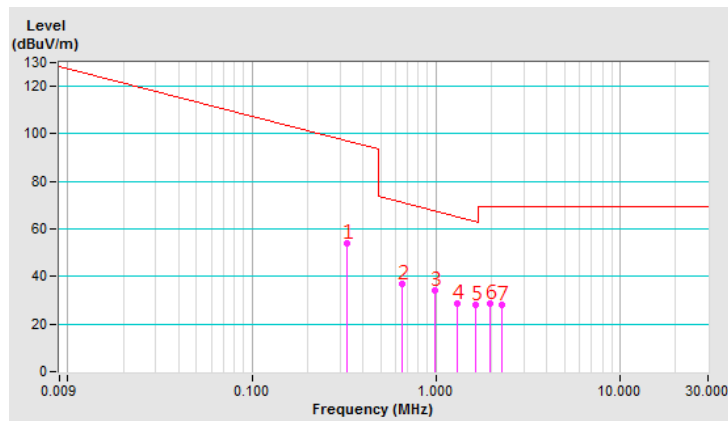
Standby Mode

TEST FREQUENCY	326.5kHz	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 30MHz		
TEST MODE	B		

ANTENNA POLARITY & TEST DISTANCE: LOOP ANTENNA PARALLEL AT 3 M								
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	*0.3265	54.15 QP	97.33	-43.18	1.00	295	42.14	12.01
2	0.6530	36.99 QP	71.31	-34.32	1.00	176	29.42	7.57
3	0.9795	34.25 QP	67.78	-33.53	1.00	118	28.99	5.26
4	1.3060	28.83 QP	65.29	-36.46	1.00	79	24.33	4.50
5	1.6325	27.83 QP	63.35	-35.52	1.00	49	24.07	3.76
6	1.9590	28.46 QP	69.54	-41.08	1.00	23	25.46	3.00
7	2.2855	27.93 QP	69.54	-41.61	1.00	58	25.27	2.66

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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



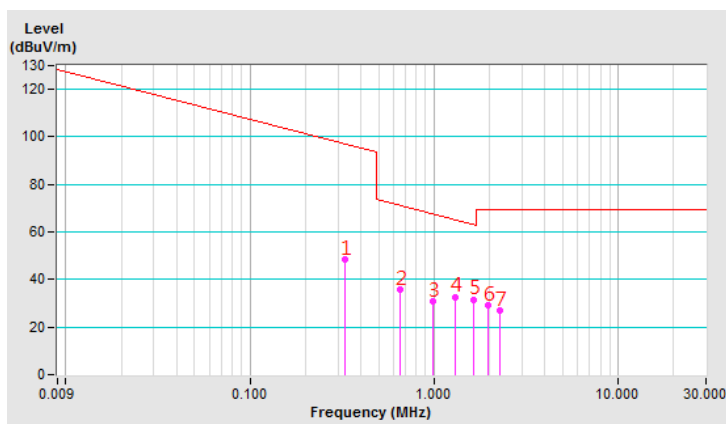
TEST FREQUENCY	326.5kHz	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 30MHz		
TEST MODE	B		

ANTENNA POLARITY & TEST DISTANCE: LOOP ANTENNA PERPENDICULAR AT 3 M

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	*0.3265	48.23 QP	97.33	-49.10	1.00	134	36.22	12.01
2	0.6530	35.78 QP	71.31	-35.53	1.00	59	28.21	7.57
3	0.9795	30.84 QP	67.78	-36.94	1.00	105	25.58	5.26
4	1.3060	32.74 QP	65.29	-32.55	1.00	128	28.24	4.50
5	1.6325	31.64 QP	63.35	-31.71	1.00	149	27.88	3.76
6	1.9590	29.35 QP	69.54	-40.19	1.00	181	26.35	3.00
7	2.2855	26.89 QP	69.54	-42.65	1.00	237	24.23	2.66

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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



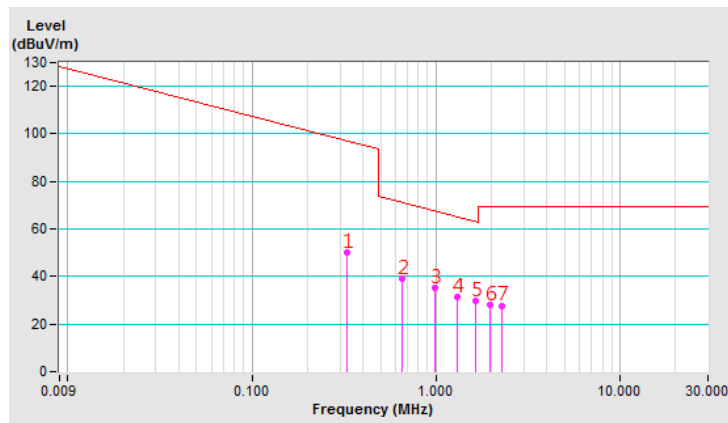
TEST FREQUENCY	326.5kHz	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 30MHz		
TEST MODE	B		

ANTENNA POLARITY & TEST DISTANCE: LOOP ANTENNA GROUND-PARALLEL AT 3 M

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	*0.3265	50.14 QP	97.33	-47.19	1.00	45	38.13	12.01
2	0.6530	38.87 QP	71.31	-32.44	1.00	6	31.30	7.57
3	0.9795	35.02 QP	67.78	-32.76	1.00	44	29.76	5.26
4	1.3060	31.26 QP	65.29	-34.03	1.00	80	26.76	4.50
5	1.6325	29.75 QP	63.35	-33.60	1.00	124	25.99	3.76
6	1.9590	28.25 QP	69.54	-41.29	1.00	170	25.25	3.00
7	2.2855	27.80 QP	69.54	-41.74	1.00	209	25.14	2.66

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
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



Above 30MHz Data:

Charging Mode

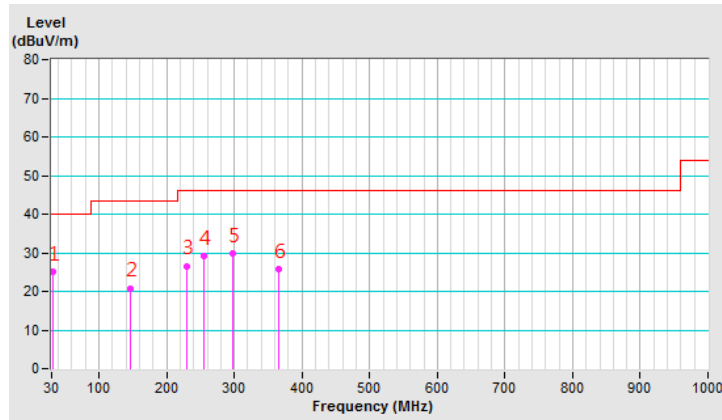
TEST FREQUENCY	326.5kHz	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

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	32.09	24.97 QP	40.00	-15.03	1.84 H	262	33.69	-8.72
2	146.40	20.75 QP	43.50	-22.75	1.66 H	237	27.65	-6.90
3	229.77	26.46 QP	46.00	-19.54	1.28 H	241	34.87	-8.41
4	254.70	29.01 QP	46.00	-16.99	1.54 H	189	35.82	-6.81
5	297.14	29.73 QP	46.00	-16.27	1.42 H	248	34.85	-5.12
6	366.01	25.61 QP	46.00	-20.39	1.74 H	235	29.51	-3.90

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.



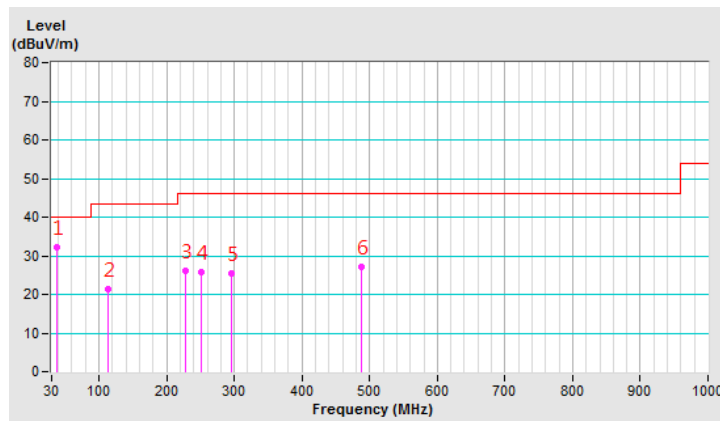
TEST FREQUENCY	326.5kHz	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

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	38.63	32.27 QP	40.00	-7.73	1.12 V	360	40.15	-7.88
2	114.10	21.34 QP	43.50	-22.16	1.62 V	182	31.04	-9.70
3	228.27	26.09 QP	46.00	-19.91	1.71 V	269	34.59	-8.50
4	250.29	25.79 QP	46.00	-20.21	1.58 V	259	32.73	-6.94
5	295.59	25.46 QP	46.00	-20.54	1.94 V	132	30.64	-5.18
6	487.69	27.17 QP	46.00	-18.83	1.08 V	360	28.61	-1.44

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.



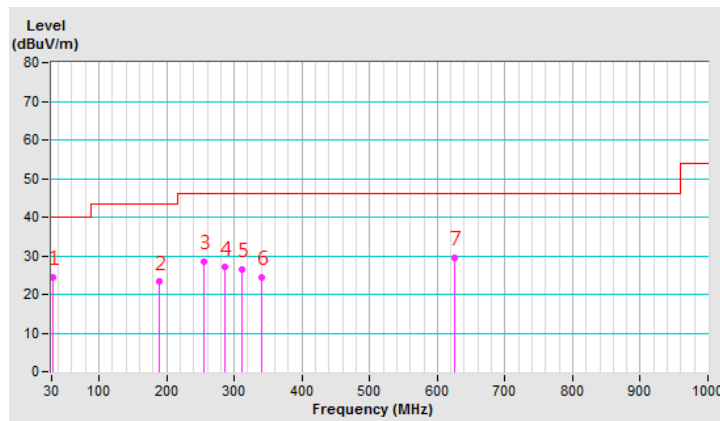
Standby Mode

TEST FREQUENCY	326.5kHz	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		
TEST MODE	B		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
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	31.79	24.57 QP	40.00	-15.43	1.58 H	24	33.32	-8.75
2	189.76	23.30 QP	43.50	-20.20	1.94 H	248	32.25	-8.95
3	254.41	28.43 QP	46.00	-17.57	1.34 H	168	35.24	-6.81
4	285.26	26.99 QP	46.00	-19.01	1.20 H	239	32.47	-5.48
5	311.69	26.58 QP	46.00	-19.42	2.11 H	189	31.27	-4.69
6	339.72	24.51 QP	46.00	-21.49	1.16 H	303	28.88	-4.37
7	624.61	29.51 QP	46.00	-16.49	1.00 H	43	27.96	1.55

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.



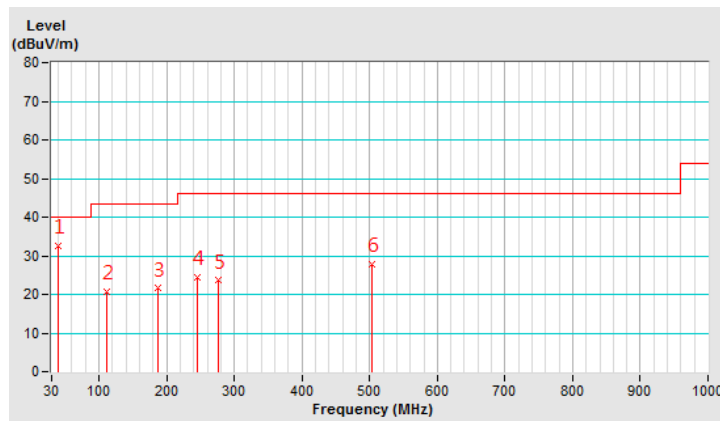
TEST FREQUENCY	326.5kHz	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		
TEST MODE	B		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

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	38.83	32.50 QP	40.00	-7.50	1.34 V	2	40.33	-7.83
2	111.77	20.71 QP	43.50	-22.79	1.27 V	348	30.62	-9.91
3	186.17	21.56 QP	43.50	-21.94	1.84 V	282	30.32	-8.76
4	246.26	24.37 QP	46.00	-21.63	1.18 V	275	31.46	-7.09
5	275.56	23.58 QP	46.00	-22.42	1.46 V	240	29.34	-5.76
6	502.54	27.77 QP	46.00	-18.23	1.90 V	99	28.98	-1.21

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.



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	ESCS 30	838251/021	Nov. 1, 2018	Oct. 31, 2019
ROHDE & SCHWARZ Artificial Mains Network (For EUT)	ENV216	101195	May 9, 2019	May 8, 2020
LISN With Adapter (for EUT)	101195	N/A	May 9, 2019	May 8, 2020
EMCO L.I.S.N. (For peripherals)	3825/2	9504-2359	Jul. 26, 2018	Jul. 25, 2019
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 14, 2019	May 13, 2020
Software	Cond_V7.3.7.4	NA	NA	NA
RF cable (JYEBAO) With 10dB PAD	5D-FB	Cable-C03.01	Sep. 18, 2018	Sep. 17, 2019
LYNICS Terminator (For EMCO LISN)	0900510	E1-01-300	Jan. 25, 2019	Jan. 24, 2020
LYNICS Terminator (For EMCO LISN)	0900510	E1-01-301	Jan. 25, 2019	Jan. 24, 2020
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

Note: 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. 3.

4.2.3 Test Procedures

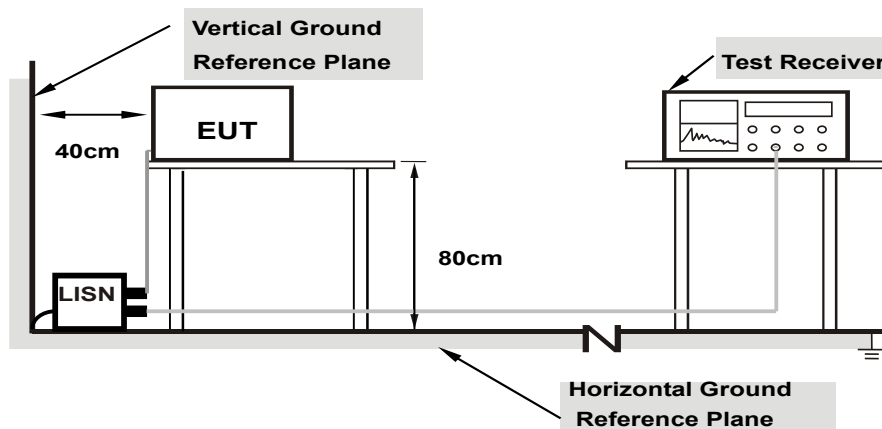
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance 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: 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

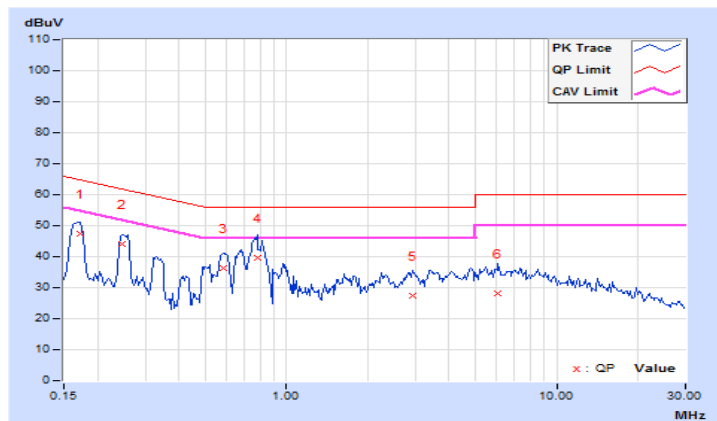
Charging Mode

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Test Mode	A		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17344	9.65	37.63	21.18	47.28	30.83	64.79	54.79	-17.51	-23.96
2	0.24766	9.66	34.40	20.95	44.06	30.61	61.84	51.84	-17.78	-21.23
3	0.58359	9.72	26.63	12.65	36.35	22.37	56.00	46.00	-19.65	-23.63
4	0.77891	9.75	30.00	15.56	39.75	25.31	56.00	46.00	-16.25	-20.69
5	2.92188	9.92	17.59	10.58	27.51	20.50	56.00	46.00	-28.49	-25.50
6	6.06641	10.02	18.02	10.41	28.04	20.43	60.00	50.00	-31.96	-29.57

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

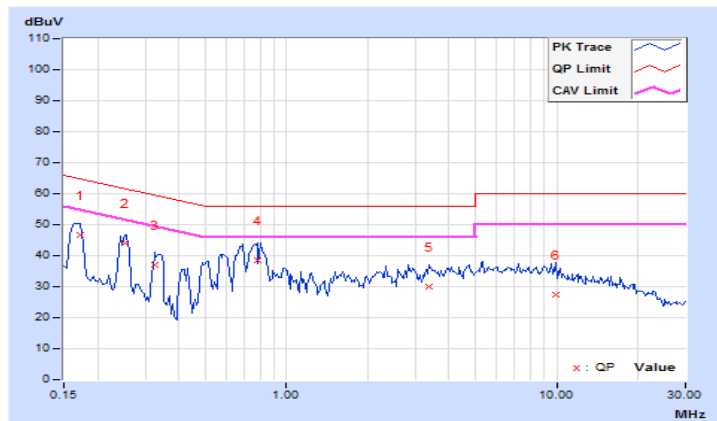


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Test Mode	A		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17344	9.64	37.15	20.62	46.79	30.26	64.79	54.79	-18.00	-24.53
2	0.25156	9.66	34.44	22.73	44.10	32.39	61.71	51.71	-17.61	-19.32
3	0.32578	9.68	27.40	12.63	37.08	22.31	59.56	49.56	-22.48	-27.25
4	0.77891	9.74	28.67	16.82	38.41	26.56	56.00	46.00	-17.59	-19.44
5	3.39063	9.91	20.06	11.97	29.97	21.88	56.00	46.00	-26.03	-24.12
6	9.88672	10.08	17.42	10.11	27.50	20.19	60.00	50.00	-32.50	-29.81

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



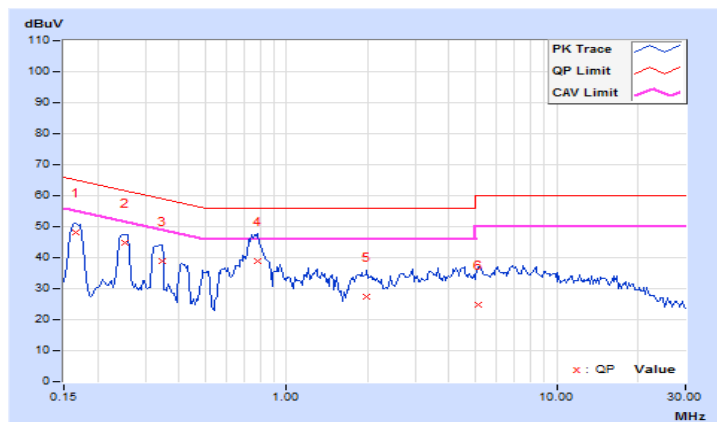
Standby Mode

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Test Mode	B		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16562	9.65	38.48	27.39	48.13	37.04	65.18	55.18	-17.05	-18.14
2	0.25156	9.66	35.16	23.41	44.82	33.07	61.71	51.71	-16.89	-18.64
3	0.34531	9.68	29.10	9.74	38.78	19.42	59.07	49.07	-20.29	-29.65
4	0.77891	9.75	29.08	13.06	38.83	22.81	56.00	46.00	-17.17	-23.19
5	1.98828	9.88	17.36	9.96	27.24	19.84	56.00	46.00	-28.76	-26.16
6	5.11719	10.00	14.76	6.83	24.76	16.83	60.00	50.00	-35.24	-33.17

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

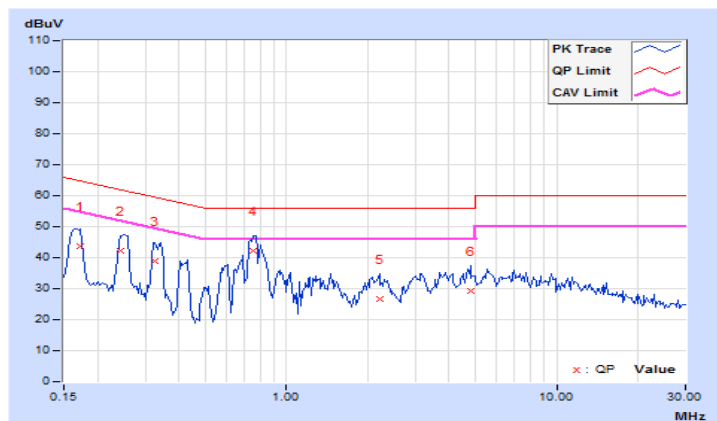


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Test Mode	B		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17344	9.64	34.22	16.14	43.86	25.78	64.79	54.79	-20.93	-29.01
2	0.24375	9.66	32.53	17.29	42.19	26.95	61.97	51.97	-19.78	-25.02
3	0.32578	9.68	29.07	13.73	38.75	23.41	59.56	49.56	-20.81	-26.15
4	0.75547	9.74	32.36	19.70	42.10	29.44	56.00	46.00	-13.90	-16.56
5	2.20703	9.86	16.69	10.40	26.55	20.26	56.00	46.00	-29.45	-25.74
6	4.82031	9.96	19.25	12.64	29.21	22.60	56.00	46.00	-26.79	-23.40

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



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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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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