# FCC Test Report

| | |
|---|---|
| **Report No.:** | RF170614C23 |
| **FCC ID:** | K7SF8J200 |
| **Test Model:** | F8J200 |
| **Received Date:** | Jun. 14, 2017 |
| **Test Date:** | Aug. 12 ~ Sep. 13, 2017 |
| **Issued Date:** | Sep. 26, 2017 |
| **Applicant:** | Belkin International., Inc |
| **Address:** | 12045 East Waterfront Drive, Playa Vista, CA 90094 |
| **Issued By:** | Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch |
| **Lab Address:** | No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan, R.O.C. |
| **Test Location:** | No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.) |

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The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

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## Release Control Record

| Issue No. | Description | Date Issued |
|---|---|---|
| RF170614C23 | Original release | Sep. 26, 2017 |

## 1 Certificate of Conformity

| | |
|---|---|
| **Product:** | Belkin PowerHouse Charging Dock |
| **Brand:** | belkin |
| **Model No.:** | F8J200 |
| **Sample Status:** | Engineering sample |
| **Applicant:** | Belkin International., Inc |
| **Test Date:** | Aug. 12 ~ Sep. 13, 2017 |
| **Standards:** | 47 CFR FCC Part 15, Subpart C (Section 15.209)<br>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 EMC characteristics under the conditions specified in this report.

**Prepared by :** Celine Chou , **Date:** Sep. 26, 2017

Celine Chou / Specialist

**Approved by :** Ken Liu , **Date:** Sep. 26, 2017

Ken Liu / Senior 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 -11.67dB at 0.18125MHz. |
| 15.209 | Radiated Emission Test | Pass | Meet the requirement of limit. Minimum passing margin is -7.2dB at 138.78MHz. |

### 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) (±) |
|---|---|---|
| Conducted Emissions at mains ports | 150kHz ~ 30MHz | 2.94 dB |
| Radiated Emissions up to 1 GHz | 30MHz ~ 200MHz | 3.86 dB |
| | 200MHz ~ 1000MHz | 3.87 dB |

### 2.2 Modification Record

There were no modifications required for compliance.

## 3 General Information

### 3.1 General Description of EUT

| | |
|---|---|
| Product | Belkin PowerHouse Charging Dock |
| Test Model | F8J200 |
| Sample Status | Engineering sample |
| Power Supply Rating | 12Vdc (adapter) |
| Modulation Type | FSK |
| Operating Frequency | 326.5kHz |
| Antenna Type | Coil antenna |
| Accessory Device | Adapter |
| Data Cable Supplied | NA |
| Maximum Power Output from the Charging Coil | Less than 5W |

Note:

1. The EUT uses following adapter.

| | |
|---|---|
| Brand | HONOTO/belkin |
| Model | ADS-25SGP-12 12019E |
| Input Power | 100-240Vac, 50/60Hz, Max 0.7A |
| Output Power | 12Vdc, 1.6A |
| Power Line | 1.5m non-shielded DC cable without core attached on adapter |

2. The EUT has a wireless inductive charging coil for charging Apple watch.

### 3.2 Description of Test Modes

1 channel is provided to this EUT

| Channel | Freq. (kHz) |
|---|---|
| 1 | 326.5 |

### 3.2.1 Test Mode Applicability and Tested Channel Detail

| EUT CONFIGURE MODE | APPLICABLE TO | | DESCRIPTION |
|---|---|---|---|
| | RE<1G | PLC | |
| A | √ | √ | Charging Mode |
| B | √ | √ | Standby Mode |

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

**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 | Available Channel | Tested Channel |
|---|---|---|
| A, B | 1 | 1 |

**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 | Available Channel | Tested Channel |
|---|---|---|
| A, B | 1 | 1 |

**Test Condition:**

| Applicable To | Environmental Conditions | Input Power | Tested by |
|---|---|---|---|
| RE<1G | 23 deg. C, 69% RH | 120Vac, 60Hz | Willy Cheng |
| PLC | 24 deg. C, 66% RH | 120Vac, 60Hz | Willy Cheng |

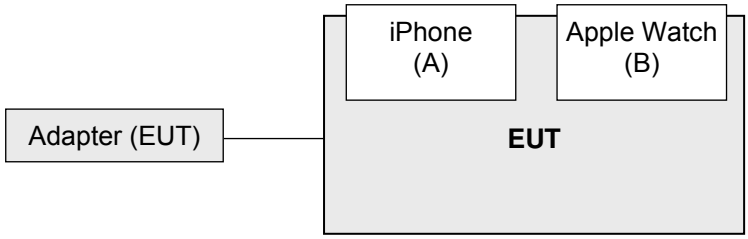
### 3.3 Description of Support Units

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.

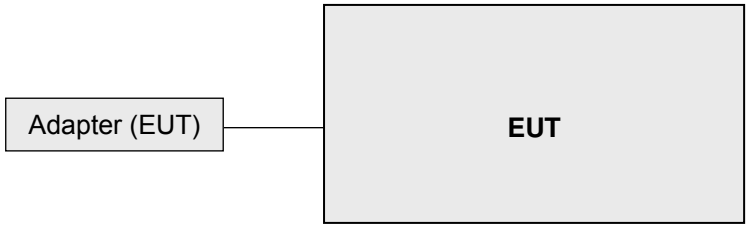
| ID | Product | Brand | Model No. | Serial No. | FCC ID | Remarks |
|---|---|---|---|---|---|---|
| A. | iPhone | APPLE | A1778 | NA | NA | - |
| B. | Apple Watch | APPLE | A1554 | NA | NA | - |

#### 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:

**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. | Cal. Date | Cal. Due |
|---|---|---|---|---|
| Test Receiver<br>ROHDE & SCHWARZ | ESIB7 | 100187 | May 02, 2017 | May 01, 2018 |
| Spectrum Analyzer<br>ROHDE & SCHWARZ | FSP40 | 100041 | Nov. 16, 2016 | Nov. 15, 2017 |
| BILOG Antenna<br>SCHWARZBECK | VULB9168 | 9168-171 | Dec. 28, 2016 | Dec. 27, 2017 |
| HORN Antenna<br>SCHWARZBECK | 9120D | 209 | Dec. 27, 2016 | Dec. 26, 2017 |
| HORN Antenna<br>SCHWARZBECK | BBHA 9170 | BBHA9170241 | Dec. 14, 2016 | Dec. 13, 2017 |
| Loop Antenna<br>TESEQ | HLA 6121 | 45745 | May 19, 2017 | May 18, 2018 |
| Preamplifier<br>Agilent | 8449B | 3008A01960 | Aug. 08, 2017 | Aug. 07, 2018 |
| Preamplifier<br>Agilent | 8447D | 2944A10631 | Aug. 08, 2017 | Aug. 07, 2018 |
| RF signal cable<br>HUBER+SUHNER | SUCOFLEX 104 | MY 13380+295012/04 | Aug. 08, 2017 | Aug. 07, 2018 |
| RF signal cable<br>HUBER+SUHNER&<br>EMCI | SUCOFLEX 104 | Cable-CH4-03 (250724) | Aug. 08, 2017 | Aug. 07, 2018 |
| Software<br>BV ADT | ADT_Radiated_<br>V7.6.15.9.4 | NA | NA | NA |
| Antenna Tower<br>inn-co GmbH | MA 4000 | 013303 | NA | NA |
| Antenna Tower Controller<br>BV ADT | AT100 | AT93021702 | NA | NA |
| Turn Table<br>BV ADT | TT100 | TT93021702 | NA | NA |
| Turn Table Controller<br>BV ADT | SC100 | SC93021702 | NA | NA |

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 HwaYa Chamber 3.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Designation Number is TW0003. The number will be varied with the Lab location and scope as attached.
5. The IC Site Registration No. is IC 7450F-3.

### 4.1.3 Test Procedures

**For Frequency range 9kHz~30MHz**

a. 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.

b. 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.

c. The test-receiver system was set to Quasi-peak detect function and specified bandwidth.

**For Frequency range 30 ~ 1000MHz**

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:**

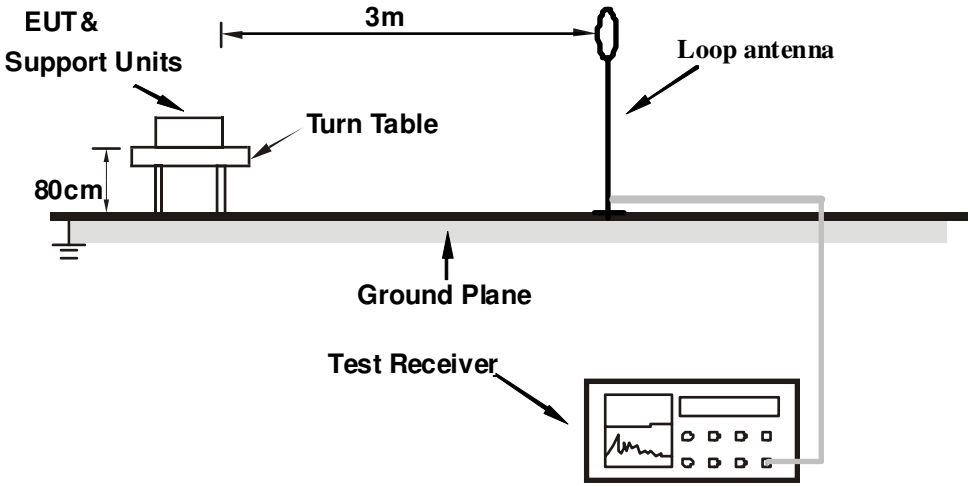
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

### 4.1.4 Deviation from Test Standard

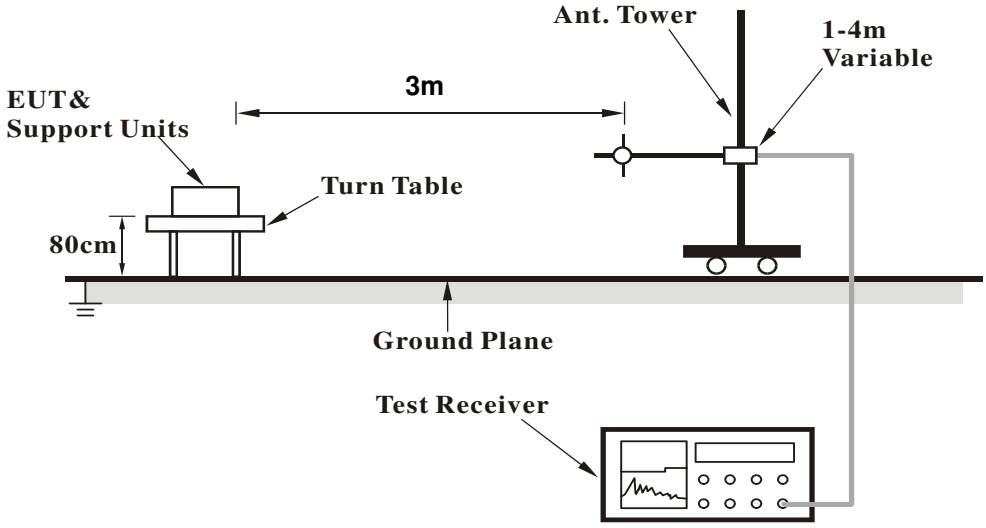
No deviation.

### 4.1.5 Test Set Up

**For Frequency range 9kHz~30MHz**




**For Frequency range 30 ~ 1000MHz**




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 iPhone & Apple watch on the EUT (wireless charging) during the test.

Test Mode B

a. The EUT powered by adapter.

### 4.1.7 Test Results

Below 30MHz Data:

Charging Mode

| Channel | TX Channel 1 | 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 | *0.327 | 42.3 | 97.3 | -55.0 | 1.00 | 356 | 22.0 | 20.3 |
| 2 | 0.369 | 36.9 | 96.3 | -59.4 | 1.00 | 111 | 16.6 | 20.3 |
| 3 | 1.808 | 37.5 | 69.5 | -32.0 | 1.00 | 109 | 17.2 | 20.3 |
| 4 | 3.128 | 35.3 | 69.5 | -34.2 | 1.00 | 56 | 14.9 | 20.4 |
| 5 | 4.448 | 33.9 | 69.5 | -35.6 | 1.00 | 116 | 13.4 | 20.5 |
| 6 | 10.746 | 36.0 | 69.5 | -33.5 | 1.00 | 10 | 15.5 | 20.5 |
| 7 | 24.122 | 35.1 | 69.5 | -34.4 | 1.00 | 303 | 14.5 | 20.6 |
| 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 | *0.327 | 35.3 | 97.3 | -62.0 | 1.00 | 86 | 15.0 | 20.3 |
| 2 | 0.309 | 33.9 | 97.8 | -63.9 | 1.00 | 36 | 13.6 | 20.3 |
| 3 | 0.669 | 34.8 | 71.1 | -36.3 | 1.00 | 314 | 14.5 | 20.3 |
| 4 | 1.149 | 34.1 | 66.4 | -32.3 | 1.00 | 19 | 13.8 | 20.3 |
| 5 | 3.548 | 33.7 | 69.5 | -35.8 | 1.00 | 359 | 13.3 | 20.4 |
| 6 | 13.265 | 35.0 | 69.5 | -34.5 | 1.00 | 218 | 14.5 | 20.5 |
| 7 | 26.101 | 35.2 | 69.5 | -34.3 | 1.00 | 47 | 14.5 | 20.7 |

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

| Channel | TX Channel 1 | 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 | 0.653 | 40.5 | 71.3 | -30.8 | 1.00 | 150 | 20.2 | 20.3 |
| 2 | 0.969 | 41.3 | 67.9 | -26.6 | 1.00 | 187 | 21.0 | 20.3 |
| 3 | 1.748 | 39.5 | 69.5 | -30.0 | 1.00 | 13 | 19.2 | 20.3 |
| 4 | 3.548 | 39.7 | 69.5 | -29.8 | 1.00 | 120 | 19.3 | 20.4 |
| 5 | 10.206 | 36.5 | 69.5 | -33.0 | 1.00 | 7 | 16.0 | 20.5 |
| 6 | 17.404 | 37.6 | 69.5 | -31.9 | 1.00 | 284 | 17.1 | 20.5 |
| 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 | 0.653 | 33.8 | 71.3 | -37.5 | 1.00 | 99 | 13.5 | 20.3 |
| 2 | 1.329 | 35.0 | 65.1 | -30.1 | 1.00 | 9 | 14.7 | 20.3 |
| 3 | 3.548 | 33.1 | 69.5 | -36.4 | 1.00 | 251 | 12.7 | 20.4 |
| 4 | 8.406 | 32.4 | 69.5 | -37.1 | 1.00 | 7 | 12.0 | 20.4 |
| 5 | 16.504 | 33.4 | 69.5 | -36.1 | 1.00 | 21 | 12.8 | 20.6 |
| 6 | 19.683 | 32.8 | 69.5 | -36.7 | 1.00 | 88 | 12.4 | 20.4 |

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

| Channel | TX Channel 1 | 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 | 31.84 | 23.9 QP | 40.0 | -16.1 | 1.49 H | 306 | 40.3 | -16.4 |
| 2 | 80.45 | 30.7 QP | 40.0 | -9.3 | 1.99 H | 228 | 49.3 | -18.6 |
| **3** | **138.78** | **36.3 QP** | **43.5** | **-7.2** | **1.99 H** | **262** | **50.6** | **-14.3** |
| 4 | 222.38 | 33.8 QP | 46.0 | -12.2 | 1.99 H | 13 | 49.6 | -15.8 |
| 5 | 305.99 | 31.9 QP | 46.0 | -14.1 | 1.00 H | 114 | 43.8 | -11.9 |
| 6 | 729.40 | 20.8 QP | 46.0 | -25.2 | 1.00 H | 13 | 23.6 | -2.8 |
| 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 | 29.90 | 32.6 QP | 40.0 | -7.4 | 1.00 V | 135 | 49.0 | -16.4 |
| 2 | 72.67 | 31.6 QP | 40.0 | -8.4 | 1.49 V | 315 | 48.4 | -16.8 |
| 3 | 136.84 | 31.1 QP | 43.5 | -12.4 | 1.00 V | 211 | 45.7 | -14.6 |
| 4 | 220.44 | 30.3 QP | 46.0 | -15.7 | 1.00 V | 163 | 46.0 | -15.7 |
| 5 | 296.27 | 32.9 QP | 46.0 | -13.1 | 1.49 V | 228 | 45.0 | -12.1 |
| 6 | 731.41 | 19.4 QP | 46.0 | -26.6 | 1.99 V | 117 | 22.2 | -2.8 |

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

| | | | |
|---|---|---|---|
| Channel | TX Channel 1 | 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 | 57.12 | 27.4 QP | 40.0 | -12.6 | 1.99 H | 312 | 42.0 | -14.6 |
| 2 | 84.34 | 27.3 QP | 40.0 | -12.7 | 1.99 H | 123 | 46.7 | -19.4 |
| 3 | 136.84 | 32.0 QP | 43.5 | -11.5 | 1.99 H | 80 | 46.6 | -14.6 |
| 4 | 173.78 | 34.1 QP | 43.5 | -9.4 | 1.49 H | 239 | 48.2 | -14.1 |
| 5 | 284.60 | 33.2 QP | 46.0 | -12.8 | 1.00 H | 166 | 45.5 | -12.3 |
| 6 | 339.04 | 31.4 QP | 46.0 | -14.6 | 1.00 H | 225 | 42.6 | -11.2 |
| 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 | 51.29 | 31.2 QP | 40.0 | -8.8 | 1.00 V | 42 | 45.6 | -14.4 |
| 2 | 72.67 | 25.6 QP | 40.0 | -14.4 | 2.00 V | 14 | 42.4 | -16.8 |
| 3 | 134.89 | 29.2 QP | 43.5 | -14.3 | 1.00 V | 193 | 44.0 | -14.8 |
| 4 | 164.06 | 26.4 QP | 43.5 | -17.1 | 1.00 V | 25 | 40.1 | -13.7 |
| 5 | 269.05 | 27.8 QP | 46.0 | -18.2 | 2.00 V | 6 | 40.8 | -13.0 |
| 6 | 329.32 | 30.4 QP | 46.0 | -15.6 | 1.50 V | 187 | 41.7 | -11.3 |

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 |
|---|---|---|---|---|
| Test Receiver<br>ROHDE & SCHWARZ | ESCI | 100613 | Nov. 21, 2016 | Nov. 20, 2017 |
| RF signal cable (with 10dB PAD)<br>Woken | 5D-FB | Cable-cond2-01 | Sep. 08, 2017 | Sep. 07, 2018 |
| LISN<br>ROHDE & SCHWARZ<br>(EUT) | ESH2-Z5 | 100100 | Jan. 17, 2017 | Jan. 16, 2018 |
| LISN<br>ROHDE & SCHWARZ<br>(Peripheral) | ESH3-Z5 | 100312 | Aug. 02, 2017 | Aug. 01, 2018 |
| Software<br>ADT | BV ADT_Cond_<br>V7.3.7.3 | NA | NA | NA |

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 HwaYa Shielded Room 2.
3. The VCCI Site Registration No. is C-2047.

### 4.2.3 Test Procedures

a. 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.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

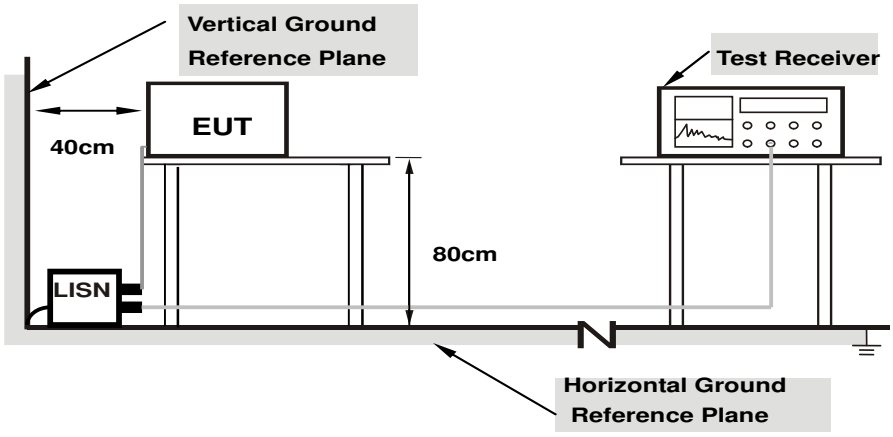
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

**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 4.1.6.

### 4.2.7 Test Results

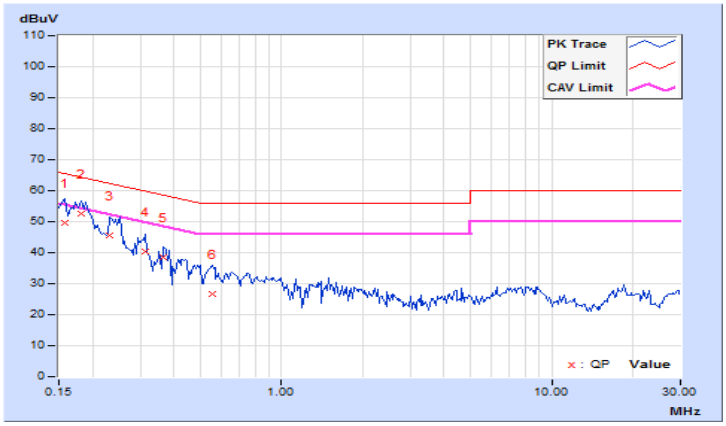
Charging Mode

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

| No | Freq. | Corr. Factor | Reading Value | | Emission Level | | Limit | | Margin | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | [dB (uV)] | | [dB (uV)] | | [dB (uV)] | | (dB) | |
| | [MHz] | (dB) | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.15781 | 10.21 | 39.31 | 31.01 | 49.52 | 41.22 | 65.58 | 55.58 | -16.06 | -14.36 |
| **2** | **0.18125** | **10.21** | **42.55** | **30.03** | **52.76** | **40.24** | **64.43** | **54.43** | **-11.67** | **-14.19** |
| 3 | 0.23203 | 10.22 | 35.35 | 15.46 | 45.57 | 25.68 | 62.38 | 52.38 | -16.81 | -26.70 |
| 4 | 0.31406 | 10.26 | 30.17 | 16.37 | 40.43 | 26.63 | 59.86 | 49.86 | -19.43 | -23.23 |
| 5 | 0.36484 | 10.28 | 28.39 | 16.49 | 38.67 | 26.77 | 58.62 | 48.62 | -19.95 | -21.85 |
| 6 | 0.55234 | 10.29 | 16.50 | 9.17 | 26.79 | 19.46 | 56.00 | 46.00 | -29.21 | -26.54 |

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.

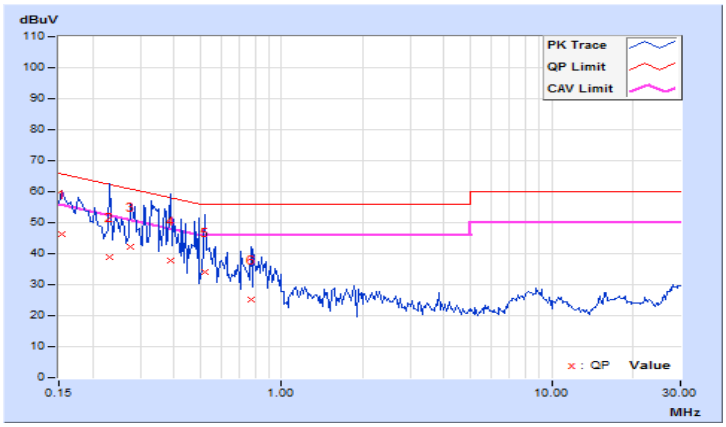


| Phase | Neutral (N) | Detector Function | Quasi-Peak (QP) / Average (AV) |
|---|---|---|---|
| Test Mode | A | | |

| No | Freq. | Corr. Factor | Reading Value | | Emission Level | | Limit | | Margin | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | [dB (uV)] | | [dB (uV)] | | [dB (uV)] | | (dB) | |
| | [MHz] | (dB) | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.15391 | 9.96 | 36.49 | 27.79 | 46.45 | 37.75 | 65.79 | 55.79 | -19.34 | -18.04 |
| 2 | 0.23203 | 9.99 | 28.90 | 14.27 | 38.89 | 24.26 | 62.38 | 52.38 | -23.49 | -28.12 |
| 3 | 0.27500 | 9.99 | 32.24 | 12.10 | 42.23 | 22.09 | 60.97 | 50.97 | -18.74 | -28.88 |
| 4 | 0.38828 | 10.02 | 27.62 | 6.38 | 37.64 | 16.40 | 58.10 | 48.10 | -20.46 | -31.70 |
| 5 | 0.52109 | 10.02 | 24.15 | 6.08 | 34.17 | 16.10 | 56.00 | 46.00 | -21.83 | -29.90 |
| 6 | 0.77109 | 10.03 | 15.21 | 7.40 | 25.24 | 17.43 | 56.00 | 46.00 | -30.76 | -28.57 |

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.



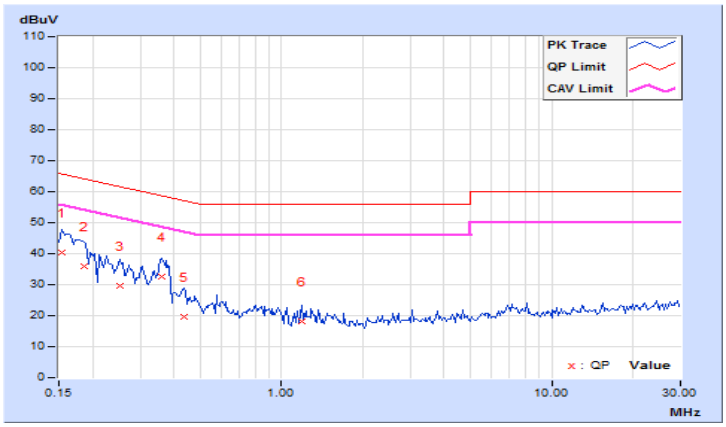
## Standby Mode

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

| No | Freq. | Corr. Factor | Reading Value [dB (uV)] | | Emission Level [dB (uV)] | | Limit [dB (uV)] | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | [MHz] | (dB) | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.15391 | 10.21 | 30.15 | 9.80 | 40.36 | 20.01 | 65.79 | 55.79 | -25.43 | -35.78 |
| 2 | 0.18516 | 10.21 | 25.56 | 7.27 | 35.77 | 17.48 | 64.25 | 54.25 | -28.48 | -36.77 |
| 3 | 0.25156 | 10.23 | 19.30 | 6.81 | 29.53 | 17.04 | 61.71 | 51.71 | -32.18 | -34.67 |
| 4 | 0.36094 | 10.28 | 22.48 | 9.61 | 32.76 | 19.89 | 58.71 | 48.71 | -25.95 | -28.82 |
| 5 | 0.43516 | 10.30 | 9.39 | -1.91 | 19.69 | 8.39 | 57.15 | 47.15 | -37.46 | -38.76 |
| 6 | 1.19141 | 10.27 | 8.06 | 1.73 | 18.33 | 12.00 | 56.00 | 46.00 | -37.67 | -34.00 |

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.

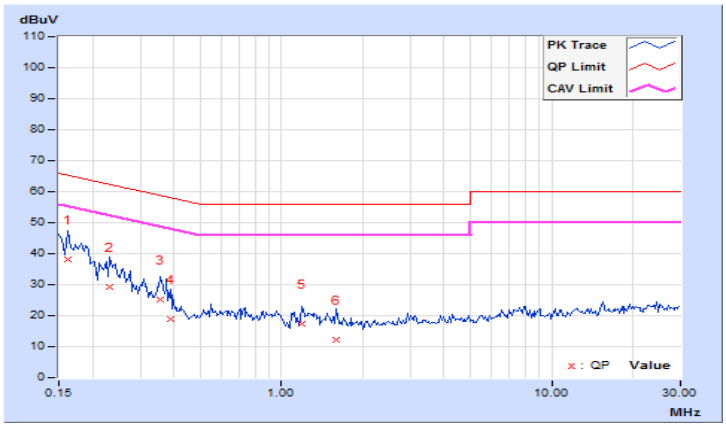


| Phase | Neutral (N) | Detector Function | Quasi-Peak (QP) / Average (AV) |
|---|---|---|---|
| Test Mode | B | | |

| No | Freq. | Corr. Factor | Reading Value | | Emission Level | | Limit | | Margin | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | [dB (uV)] | | [dB (uV)] | | [dB (uV)] | | (dB) | |
| | [MHz] | (dB) | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.16172 | 9.96 | 28.29 | 7.58 | 38.25 | 17.54 | 65.38 | 55.38 | -27.13 | -37.84 |
| 2 | 0.23203 | 9.99 | 19.29 | 2.42 | 29.28 | 12.41 | 62.38 | 52.38 | -33.10 | -39.97 |
| 3 | 0.35703 | 10.01 | 15.15 | 3.23 | 25.16 | 13.24 | 58.80 | 48.80 | -33.64 | -35.56 |
| 4 | 0.38828 | 10.02 | 8.82 | -1.64 | 18.84 | 8.38 | 58.10 | 48.10 | -39.26 | -39.72 |
| 5 | 1.18750 | 10.05 | 7.28 | 3.25 | 17.33 | 13.30 | 56.00 | 46.00 | -38.67 | -32.70 |
| 6 | 1.60156 | 10.06 | 2.18 | -3.27 | 12.24 | 6.79 | 56.00 | 46.00 | -43.76 | -39.21 |

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

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