# FCC Test Report

| | |
|---|---|
| Product Name | In Wall Smart Dimmer |
| Model No. | PAD07 |
| FCC ID. | RHHPAD07 |

| | |
|---|---|
| Applicant | Philio Technology Corporation |
| Address | 8F.,No.653-2,Zhongzheng Rd., Xinzhuang Dist., New Taipei City 24257,Taiwan(R.O.C) |

| | |
|---|---|
| Date of Receipt | Mar. 04, 2017 |
| Issued Date | Apr. 19, 2017 |
| Report No. | 1730090R-RFUSP15V00 |
| Report Version | V1.0 |

Testing Laboratory
3023

# Test Report

Issued Date: Apr. 19, 2017
Report No. : 1730090R-RFUSP15V00

| | |
|---|---|
| Product Name | In Wall Smart Dimmer |
| Applicant | Philio Technology Corporation |
| Address | 8F.,No.653-2,Zhongzheng Rd., Xinzhuang Dist., New Taipei City 24257,Taiwan(R.O.C) |
| Manufacturer | Philio Technology Corporation |
| Model No. | PAD07 |
| FCC ID. | RHHPAD07 |
| EUT Rated Voltage | AC 100-240V, 50-60Hz |
| EUT Test Voltage | AC 120V/60Hz |
| Trade Name | |
| Applicable Standard | FCC CFR Title 47 Part 15 Subpart C: 2015<br>ANSI C63.4: 2014, ANSI C63.10: 2013 |
| Test Result | Complied |

Documented By : Leven Huang
(Senior Adm. Specialist / Leven Huang )

Tested By : Vic Chen
(Engineer / Vic Chen )

Approved By :
( Director / Vincent Lin )

# TABLE OF CONTENTS

# 1. GENERAL INFORMATION

## 1.1. EUT Description

| | |
|---|---|
| Product Name | In Wall Smart Dimmer |
| Trade Name | |
| Model No. | PAD07 |
| FCC ID. | RHHPAD07 |
| Frequency Range | 908.4MHz,916MHz |
| Number of Channels | 2 |
| Channel Control | Auto |
| Antenna Type | Monopole Antenna |
| Type of Modulation | FSK |

**Antenna List**

| No. | Manufacturer | Part No. | Antenna Type | Peak Gain |
|---|---|---|---|---|
| 1 | Philio | ANT-001 | Monopole Antenna | 0dBi for 908-916MHz |

Center Frequency of Each Channel:

| Channel | Frequency | Channel | Frequency |
|---|---|---|---|
| Channel 1: | 908.4MHz | Channel 2: | 916MHz |

Note:

1. The EUT is an In Wall Smart Dimmer with a built-in Z-Wave transceiver module.
2. These tests are conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.249.
3. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
4. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

| | |
|---|---|
| Test Mode | Mode 1: Transmit |

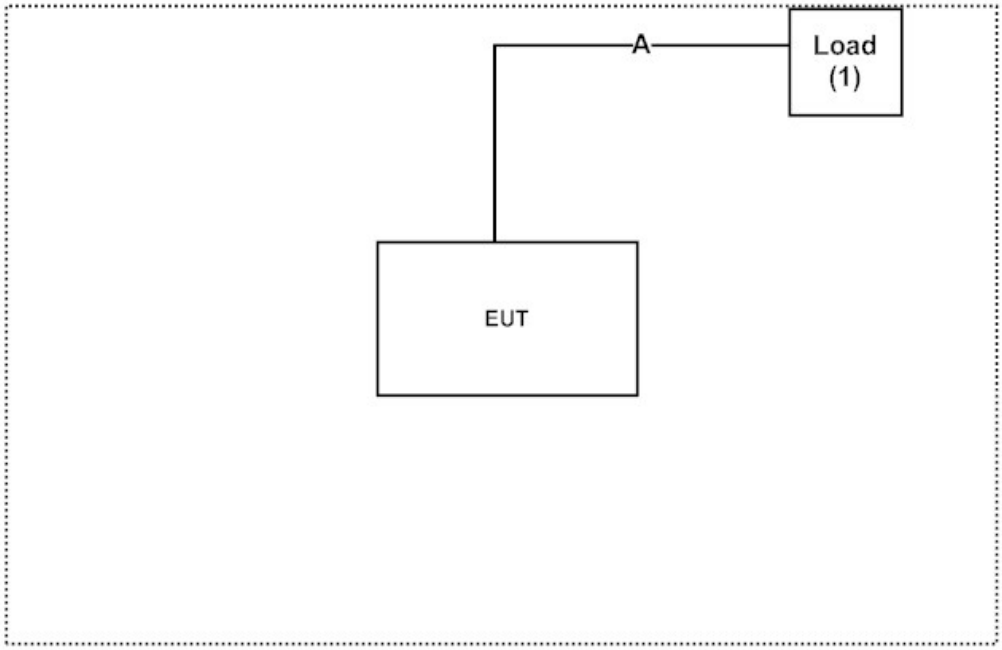
## 1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

| Product | | Manufacturer | Model No. | Serial No. | Power Cord |
|---|---|---|---|---|---|
| 1. | Load | N/A | 10702FK0425 | N/A | N/A |

| Signal Cable Type | | Signal cable Description |
|---|---|---|
| A. | Power Line Cable | Non-Shielded, 1m, two PCS. |

## 1.4. Configuration of Test System




## 1.5. EUT Exercise Software

(1) Setup the EUT as shown in section 1.4.
(2) Provide the AC Power Source.
(3) Starts the continuous transmit.
(4) Verify that the EUT works correctly.

## 1.6. Test Facility

Ambient conditions in the laboratory:

| Items | Required (IEC 68-1) | Actual |
|---|---|---|
| Temperature (°C) | 15-35 | 20-35 |
| Humidity (%RH) | 25-75 | 50-65 |
| Barometric pressure (mbar) | 860-1060 | 950-1000 |

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:
http://www.dekra.com.tw/english/about/certificates.aspx?bval=5
The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: http://www.dekra.com.tw/index_en.aspx

Site Description: Accredited by TAF
Accredited Number: 3023

Site Name: DEKRA Testing and Certification Co., Ltd
Site Address: No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451, Taiwan, R.O.C.
TEL : 886-2-8601-3788 / FAX : 886-2-8601-3789
E-Mail : info.tw@dekra.com

FCC Accreditation Number: TW1014

## 1.7. List of Test Equipment

**For Conducted measurements /CB3/SR8**

| | Equipment | Manufacturer | Model No. | Serial No. | Cali. Data | Due. Data |
|---|---|---|---|---|---|---|
| | Temperature Chamber | WIT GROUP | TH-1S-B | EQ-201-00146 | 2016/11/28 | 2017/11/27 |
| X | Spectrum Analyzer | Agilent | N9010A | MY48030495 | 2016/7/22 | 2017/7/21 |
| X | Power Meter | Anritsu | ML2495A | 6K00003357 | 2016/6/23 | 2017/6/22 |
| X | Pulse power sensor | Anritsu | MA2411B | 0846193 | 2016/6/23 | 2017/6/22 |
| X | EMI Test Receiver | R&S | ESCS 30 | 100369 | 2016/10/13 | 2017/10/12 |
| X | LISN | R&S | ESH3-Z5 | 836679/017 | 2017/1/7 | 2018/1/6 |
| X | LISN | R&S | ENV216 | 100097 | 2017/1/7 | 2018/1/6 |
| X | Coaxial Cable | QTK(Arnist) | RG 400 | LC018-RG | 2016/6/25 | 2017/6/24 |

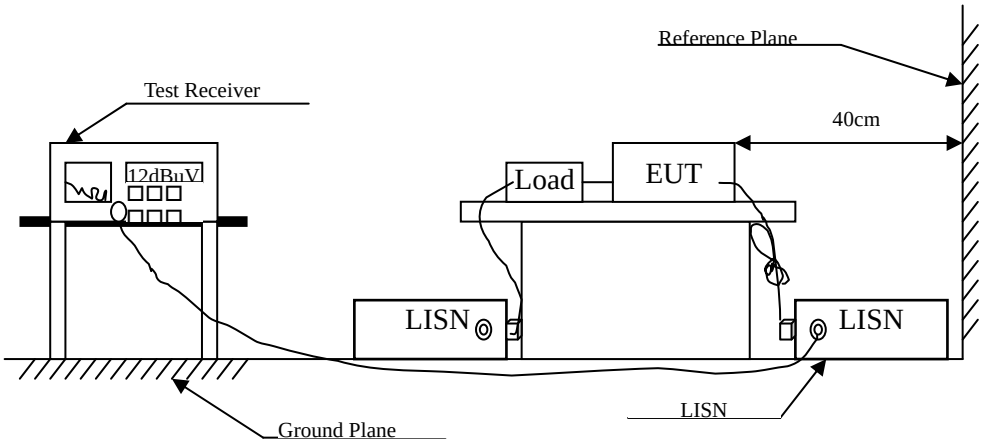
**For Radiated measurements /Site3/CB8**

| | Equipment | Manufacturer | Model No. | Serial No. | Cali. Data | Due. Data |
|---|---|---|---|---|---|---|
| X | Spectrum Analyzer | R&S | FSP40 | 100170 | 2017/1/5 | 2018/1/4 |
| | Loop Antenna | Teseq | HLA6121 | 37133 | 2017/3/18 | 2018/3/17 |
| X | Bi-Log Antenna | Schaffner Chase | CBL6112B | 2707 | 2016/6/11 | 2017/6/10 |
| X | Horn Antenna | ETS-Lindgren | 3117 | 00135205 | 2017/4/6 | 2018/4/5 |
| | Horn Antenna | Schwarzbeck | BBHA9170 | 9170430 | 2017/1/11 | 2018/1/10 |
| X | Pre-Amplifier | QTK | AP/0100A | CHM/0901069 | 2016/6/23 | 2017/6/22 |
| X | Pre-Amplifier | EMCI | EMC012630SE | 980210 | 2017/1/26 | 2018/1/24 |
| | Pre-Amplifier | NARDA WE | DBL-1840N506 | 013 | 2016/9/30 | 2017/9/29 |
| X | Filter | MicroTRON | BRM50701 | 019 | 2016/11/2 | 2017/11/1 |
| | Filter | Microwave Circuits | N0257881 | 36681 | 2016/12/7 | 2017/12/6 |
| X | EMI Test Receiver | R&S | ESR26 | 101385 | 2016/9/29 | 2017/9/28 |
| X | Coaxial Cable | QTK(Arnist) | SUCOFLEX 106 | L1606-015C | 2016/6/23 | 2017/6/22 |
| X | EMI Test Receiver | R&S | ESCS 30 | 838251/001 | 2016/7/21 | 2017/7/20 |
| X | Coaxial Cable | QTK(Arnist) | RG 214 | LC003-RG | 2016/6/16 | 2017/6/15 |
| X | Coaxial signal switch | Anritsu | MP59B | 6201415889 | 2016/6/16 | 2017/6/15 |

Note:
1. All equipments are calibrated every one year.
2. The test instruments marked with “X” are used to measure the final test results.
3. Test Software version :QuieTek EMI 2.0 V2.1.113.

## 2. Conducted Emission

### 2.1. Test Setup




### 2.2. Limits

| FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit | | |
|---|---|---|
| Frequency MHz | Limits | |
| | QP | AV |
| 0.15 - 0.50 | 66-56 | 56-46 |
| 0.50-5.0 | 56 | 46 |
| 5.0 - 30 | 60 | 50 |

Remarks: In the above table, the tighter limit applies at the band edges.

## 2.3. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)
Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.
Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

## 2.4. Uncertainty

± 2.26 dB

## 2.5. Test Result of Conducted Emission

Product : In Wall Smart Dimmer
Test Item : Conducted Emission Test
Power Line : Line 1
Test Date : 2017/03/24
Test Mode : Mode 1: Transmit

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV | dB | dBuV |
| **Line 1** | | | | | |
| **Quasi-Peak** | | | | | |
| 0.193 | 9.766 | 37.190 | 46.956 | -17.815 | 64.771 |
| 0.263 | 9.753 | 35.480 | 45.233 | -17.538 | 62.771 |
| 0.443 | 9.724 | 29.910 | 39.634 | -17.995 | 57.629 |
| 1.076 | 9.734 | 21.480 | 31.214 | -24.786 | 56.000 |
| 3.880 | 9.805 | 13.970 | 23.775 | -32.225 | 56.000 |
| 9.826 | 9.874 | 11.050 | 20.924 | -39.076 | 60.000 |
| **Average** | | | | | |
| 0.193 | 9.766 | 35.370 | 45.136 | -9.635 | 54.771 |
| 0.263 | 9.753 | 30.960 | 40.713 | -12.058 | 52.771 |
| 0.443 | 9.724 | 24.910 | 34.634 | -12.995 | 47.629 |
| 1.076 | 9.734 | 17.640 | 27.374 | -18.626 | 46.000 |
| 3.880 | 9.805 | 9.900 | 19.705 | -26.295 | 46.000 |
| 9.826 | 9.874 | 7.240 | 17.114 | -32.886 | 50.000 |

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ “ means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : In Wall Smart Dimmer
Test Item : Conducted Emission Test
Power Line : Line 2
Test Date : 2017/03/24
Test Mode : Mode 1: Transmit

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV | dB | dBuV |
| **Line 2** | | | | | |
| **Quasi-Peak** | | | | | |
| 0.197 | 9.739 | 37.870 | 47.609 | -17.048 | 64.657 |
| 0.330 | 9.750 | 34.790 | 44.540 | -16.317 | 60.857 |
| 0.560 | 9.782 | 25.580 | 35.361 | -20.639 | 56.000 |
| 1.076 | 9.854 | 24.130 | 33.984 | -22.016 | 56.000 |
| 4.630 | 9.893 | 16.060 | 25.953 | -30.047 | 56.000 |
| 11.861 | 9.978 | 12.030 | 22.008 | -37.992 | 60.000 |
| **Average** | | | | | |
| 0.197 | 9.739 | 34.040 | 43.779 | -10.878 | 54.657 |
| 0.330 | 9.750 | 29.430 | 39.180 | -11.677 | 50.857 |
| 0.560 | 9.782 | 19.290 | 29.071 | -16.929 | 46.000 |
| 1.076 | 9.854 | 19.920 | 29.774 | -16.226 | 46.000 |
| 4.630 | 9.893 | 10.040 | 19.933 | -26.067 | 46.000 |
| 11.861 | 9.978 | 6.690 | 16.668 | -33.332 | 50.000 |

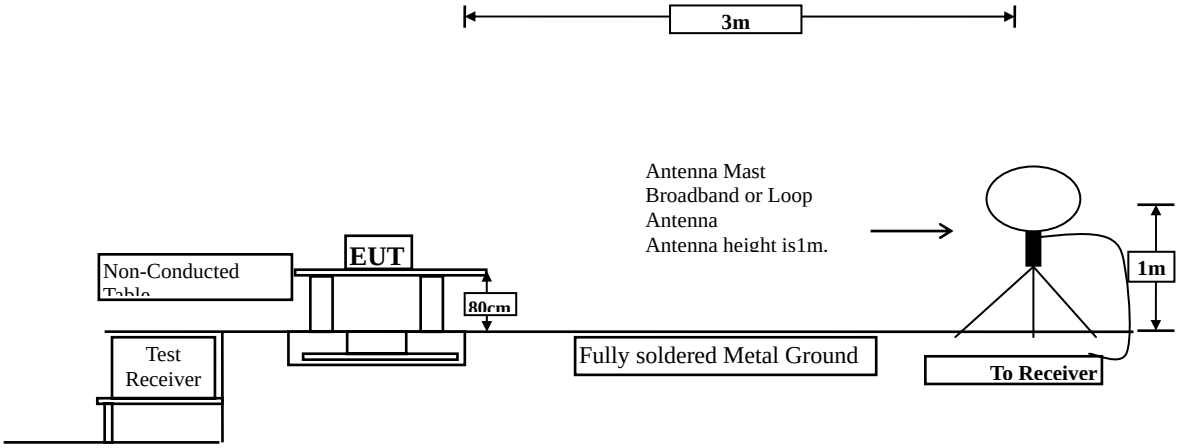
Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ “ means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

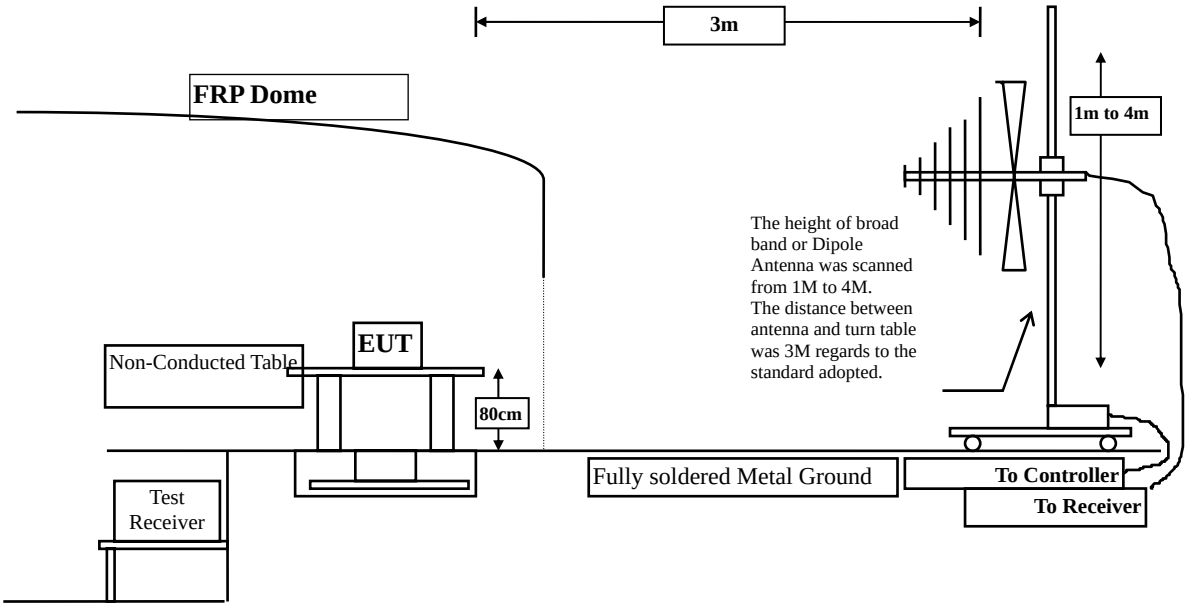
# 3. Radiated Emission

## 3.1. Test Setup

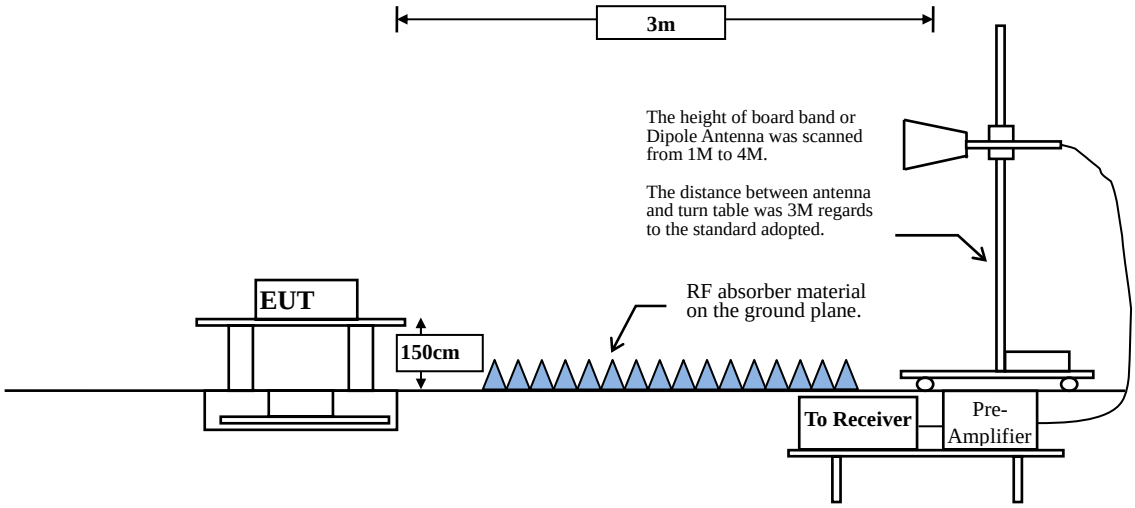
Under 30MHz




Below 1GHz



Above 1GHz


3m
The height of board band or Dipole Antenna was scanned from 1M to 4M.
The distance between antenna and turn table was 3M regards to the standard adopted.
EUT
150cm
RF absorber material on the ground plane.
To Receiver
Pre-Amplifier

## 3.2. Limits

➢ **Fundamental and Harmonics Emission Limits**

| FCC Part 15 Subpart C Paragraph 15.249 Limits | | | | |
|---|---|---|---|---|
| Frequency MHz | Field Strength of Fundamental | | Field Strength of Harmonics | |
| | (mV/m @3m) | (dBuV/m @3m) | (uV/m @3m) | (dBuV/m @3m) |
| 902-928 | 50 | 94 | 500 | 54 |
| 2400-2483.5 | 50 | 94 | 500 | 54 |
| 5725-5875 | 50 | 94 | 500 | 54 |

Remarks : 1. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

➢ **General Radiated Emission Limits**

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

| FCC Part 15 Subpart C Paragraph 15.209 Limits | | |
|---|---|---|
| Frequency MHz | Field strength (microvolts/meter) | Measurement distance (meter) |
| 0.009-0.490 | 2400/F(kHz) | 300 |
| 0.490-1.705 | 24000/F(kHz) | 30 |
| 1.705-30 | 30 | 30 |
| 30-88 | 100 | 3 |
| 88-216 | 150 | 3 |
| 216-960 | 200 | 3 |
| Above 960 | 500 | 3 |

Remarks : 1. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

## 3.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested compliance to FCC 47CFR 15.249 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground,when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured in the Open Area Test Site on the Final Measurement.

The measurement frequency range form 9kHz - 10th Harmonic of fundamental was investigated.

## 3.4. Uncertainty

± 4.08 dB above 1GHz

± 4.22 dB below 1GHz

## 3.5. Test Result of Radiated Emission

Product : In Wall Smart Dimmer
Test Item : Fundamental Radiated Emission
Test Site : No.3OATS
Test Date : 2017/04/11
Test Mode : Mode 1: Transmit (X-asix )

| Frequency MHz | Correct Factor dB | Reading Level dBuV | Measurement Level dBuV/m | Margin dB | Limit dBuV/m |
|---|---|---|---|---|---|
| **Horizontal** | | | | | |
| 908.400 | 4.762 | 88.200 | 92.962 | -1.038 | 94.000 |
| 916.000 | 4.900 | 86.900 | 91.800 | -2.200 | 94.000 |
| **Vertical** | | | | | |
| 908.400 | 4.762 | 82.800 | 87.562 | -6.438 | 94.000 |
| 916.000 | 4.900 | 83.000 | 87.900 | -6.100 | 94.000 |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna Factor + Cable Loss – PreAMP.

| | | |
|---|---|---|
| Product | : | In Wall Smart Dimmer |
| Test Item | : | Fundamental Radiated Emission |
| Test Site | : | No.3OATS |
| Test Date | : | 2017/04/11 |
| Test Mode | : | Mode 1: Transmit (Y-asix ) |

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| 908.400 | 4.762 | 86.900 | 91.662 | -2.338 | 94.000 |
| 916.000 | 4.900 | 87.000 | 91.900 | -2.100 | 94.000 |
| **Vertical** | | | | | |
| 908.400 | 4.762 | 84.900 | 89.662 | -4.338 | 94.000 |
| 916.000 | 4.900 | 84.200 | 89.100 | -4.900 | 94.000 |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna Factor + Cable Loss – PreAMP.

| | | |
|---|---|---|
| Product | : | In Wall Smart Dimmer |
| Test Item | : | Fundamental Radiated Emission |
| Test Site | : | No.3OATS |
| Test Date | : | 2017/04/11 |
| Test Mode | : | Mode 1: Transmit (Z-asix ) |

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| 908.400 | 4.762 | 86.800 | 91.562 | -2.438 | 94.000 |
| 916.000 | 4.900 | 86.200 | 91.100 | -2.900 | 94.000 |
| **Vertical** | | | | | |
| 908.400 | 4.762 | 86.400 | 91.162 | -2.838 | 94.000 |
| 916.000 | 4.900 | 86.600 | 91.500 | -2.500 | 94.000 |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna Factor + Cable Loss – PreAMP.

Product : In Wall Smart Dimmer
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2017/03/24
Test Mode : Mode 1: Transmit (908.4MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 1816.800 | -0.546 | 43.120 | 42.575 | -31.425 | 74.000 |
| 2725.200 | -2.123 | 41.440 | 39.317 | -34.683 | 74.000 |
| 3633.600 | -1.291 | 42.600 | 41.309 | -32.691 | 74.000 |
| 4542.000 | 0.732 | 41.000 | 41.731 | -32.269 | 74.000 |
| 5450.400 | 3.621 | 41.040 | 44.661 | -29.339 | 74.000 |
| 6358.800 | 5.741 | 39.970 | 45.711 | -28.289 | 74.000 |
| 7267.200 | 9.268 | 39.740 | 49.009 | -24.991 | 74.000 |
| 8175.600 | 10.122 | 41.430 | 51.552 | -22.448 | 74.000 |
| 9084.000 | 11.666 | 39.112 | 50.778 | -23.222 | 74.000 |

**Average Detector:**

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Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : In Wall Smart Dimmer
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2017/03/24
Test Mode : Mode 1: Transmit (908.4MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 1816.800 | 0.256 | 42.760 | 43.017 | -30.983 | 74.000 |
| 2725.200 | -2.972 | 40.840 | 37.868 | -36.132 | 74.000 |
| 3633.600 | -1.186 | 42.760 | 41.574 | -32.426 | 74.000 |
| 4542.000 | 2.357 | 40.490 | 42.846 | -31.154 | 74.000 |
| 5450.400 | 3.829 | 40.140 | 43.969 | -30.031 | 74.000 |
| 6358.800 | 5.583 | 40.370 | 45.953 | -28.047 | 74.000 |
| 7267.200 | 9.789 | 39.680 | 49.469 | -24.531 | 74.000 |
| 8175.600 | 11.090 | 38.730 | 49.820 | -24.180 | 74.000 |
| 9084.000 | 11.885 | 36.350 | 48.235 | -25.765 | 74.000 |

**Average Detector:**

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : In Wall Smart Dimmer
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2017/03/24
Test Mode : Mode 1: Transmit (916MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| **Peak Detector:** | | | | | |
| 1832.000 | -1.292 | 42.950 | 41.658 | -32.342 | 74.000 |
| 2748.000 | -1.900 | 42.590 | 40.690 | -33.310 | 74.000 |
| 3664.000 | -1.641 | 42.540 | 40.899 | -33.101 | 74.000 |
| 4580.000 | 0.670 | 40.780 | 41.451 | -32.549 | 74.000 |
| 5496.000 | 4.424 | 40.140 | 44.565 | -29.435 | 74.000 |
| 6412.000 | 5.944 | 39.490 | 45.435 | -28.565 | 74.000 |
| 7328.000 | 10.103 | 38.720 | 48.823 | -25.177 | 74.000 |
| 8244.000 | 10.591 | 38.370 | 48.961 | -25.039 | 74.000 |
| 9160.000 | 11.453 | 38.890 | 50.343 | -23.657 | 74.000 |

**Average Detector:**

--

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : In Wall Smart Dimmer
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2017/03/24
Test Mode : Mode 1: Transmit (916MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Vertical** | | | | | |
| **Peak Detector:** | | | | | |
| 1832.000 | -0.666 | 42.850 | 42.184 | -31.816 | 74.000 |
| 2748.000 | -2.777 | 41.850 | 39.073 | -34.927 | 74.000 |
| 3664.000 | -1.420 | 42.140 | 40.719 | -33.281 | 74.000 |
| 4580.000 | 2.285 | 40.660 | 42.945 | -31.055 | 74.000 |
| 5496.000 | 4.419 | 39.570 | 43.989 | -30.011 | 74.000 |
| 6412.000 | 6.060 | 39.560 | 45.620 | -28.380 | 74.000 |
| 7328.000 | 10.732 | 38.990 | 49.722 | -24.278 | 74.000 |
| 8244.000 | 11.499 | 38.480 | 49.979 | -24.021 | 74.000 |
| 9160.000 | 11.539 | 39.340 | 50.879 | -23.121 | 74.000 |

**Average Detector:**

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : In Wall Smart Dimmer
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2017/03/24
Test Mode : Mode 1: Transmit (908.4MHz)

| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| 371.440 | 0.860 | 23.798 | 24.658 | -21.342 | 46.000 |
| 466.500 | 3.156 | 21.258 | 24.414 | -21.586 | 46.000 |
| 546.040 | 4.386 | 21.709 | 26.095 | -19.905 | 46.000 |
| 596.480 | 3.587 | 23.065 | 26.652 | -19.348 | 46.000 |
| 852.560 | 7.106 | 21.890 | 28.996 | -17.004 | 46.000 |
| 986.420 | 8.189 | 20.638 | 28.827 | -25.173 | 54.000 |
| **Vertical** | | | | | |
| 111.480 | -3.439 | 23.886 | 20.448 | -23.052 | 43.500 |
| 340.400 | -1.287 | 21.952 | 20.665 | -25.335 | 46.000 |
| 365.620 | 0.282 | 21.819 | 22.101 | -23.899 | 46.000 |
| 602.300 | 1.704 | 22.372 | 24.076 | -21.924 | 46.000 |
| 827.340 | 2.711 | 22.305 | 25.016 | -20.984 | 46.000 |
| 924.340 | 3.149 | 21.225 | 24.374 | -21.626 | 46.000 |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

Product : In Wall Smart Dimmer
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test Date : 2017/03/24
Test Mode : Mode 1: Transmit (916MHz)

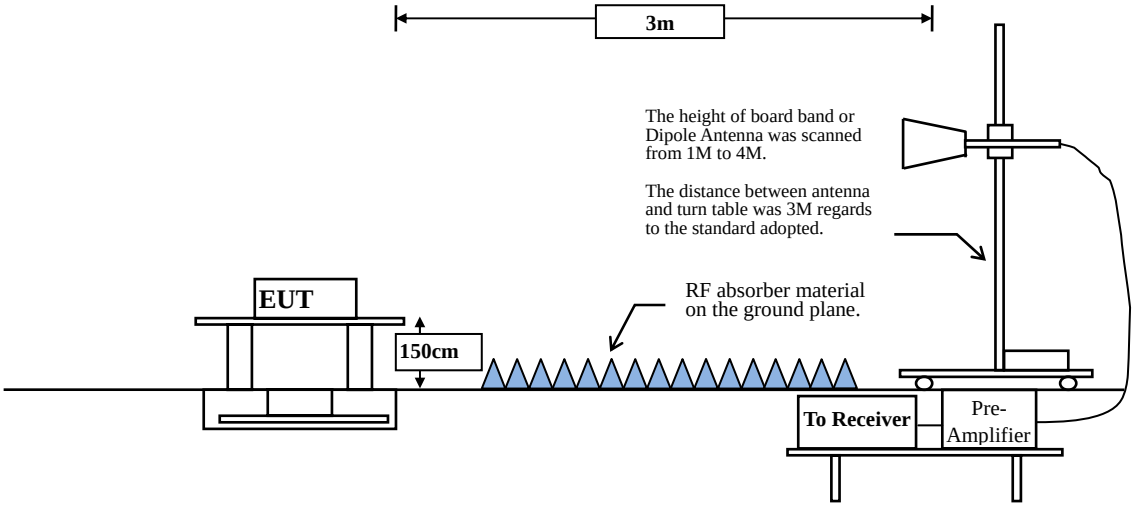
| Frequency | Correct Factor | Reading Level | Measurement Level | Margin | Limit |
|---|---|---|---|---|---|
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| **Horizontal** | | | | | |
| 191.020 | -9.679 | 39.441 | 29.762 | -13.738 | 43.500 |
| 355.920 | -1.242 | 23.678 | 22.436 | -23.564 | 46.000 |
| 522.760 | 3.176 | 23.419 | 26.595 | -19.405 | 46.000 |
| 672.140 | 2.179 | 24.312 | 26.491 | -19.509 | 46.000 |
| 790.480 | 6.363 | 22.108 | 28.471 | -17.529 | 46.000 |
| 928.220 | 7.230 | 22.495 | 29.725 | -16.275 | 46.000 |
| **Vertical** | | | | | |
| 152.220 | -5.306 | 23.111 | 17.805 | -25.695 | 43.500 |
| 365.620 | 0.282 | 23.352 | 23.634 | -22.366 | 46.000 |
| 600.360 | 1.302 | 23.518 | 24.820 | -21.180 | 46.000 |
| 751.680 | 2.372 | 21.636 | 24.008 | -21.992 | 46.000 |
| 842.860 | 2.378 | 22.427 | 24.805 | -21.195 | 46.000 |
| 924.340 | 3.149 | 20.949 | 24.098 | -21.902 | 46.000 |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

# 4. Band Edge

## 4.1. Test Setup



## 4.2. Limit

Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

## 4.3. Test Procedure

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.
The bandwidth setting below 1GHz and above 1GHz on the field strength meter is 120 kHz and 1MHz, respectively.

## 4.4. Uncertainty

± 4.08 dB above 1GHz
± 4.22 dB below 1GHz

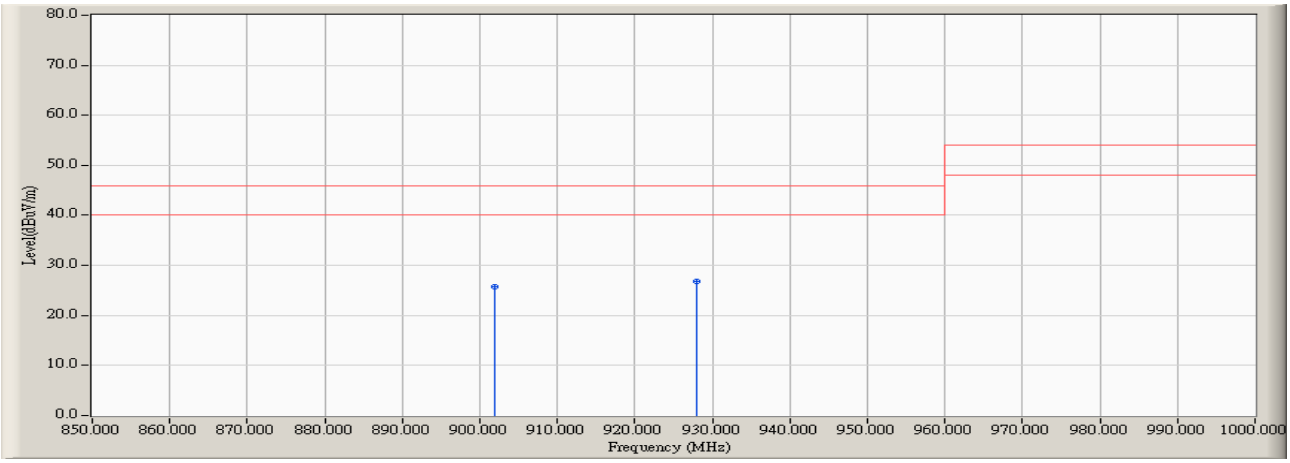
## 4.5. Test Result of Band Edge

| | | |
|---|---|---|
| Product | : | In Wall Smart Dimmer |
| Test Item | : | Band Edge Data |
| Test Site | : | No.3 OATS |
| Test Date | : | 2017/04/11 |
| Test Mode | : | Mode 1: Transmit (908.4MHz) |

**RF Radiated Measurement (Horizontal):**

| No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Quasi-Peak Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|
| 01(Quasi-Peak) | 902.000 | 4.656 | 21.100 | 25.755 | 46.000 | Pass |
| 02(Quasi-Peak) | 928.000 | 5.107 | 21.600 | 26.707 | 46.000 | Pass |

**Figure Channel 01: Horizontal (Quasi-Peak)**




Note:

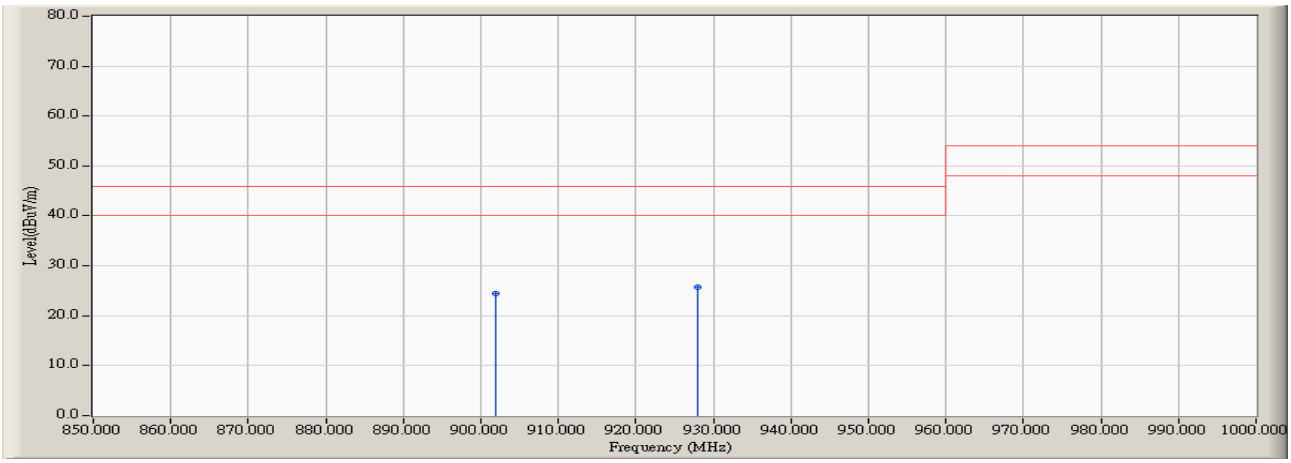
1. Quasi-Peak measurements: RBW=100kHz,VBW=1MHz,Sweep: Auto.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

| | | |
|---|---|---|
| Product | : | In Wall Smart Dimmer |
| Test Item | : | Band Edge Data |
| Test Site | : | No.3 OATS |
| Test Date | : | 2017/04/11 |
| Test Mode | : | Mode 1: Transmit (908.4MHz) |

**RF Radiated Measurement (Vertical):**

| No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Quasi-Peak Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|
| 01(Quasi-Peak) | 902.000 | 4.656 | 19.800 | 24.455 | 46.000 | Pass |
| 02(Quasi-Peak) | 928.000 | 5.107 | 20.700 | 25.807 | 46.000 | Pass |

**Figure Channel 01: Vertical (Quasi-Peak)**




Note:

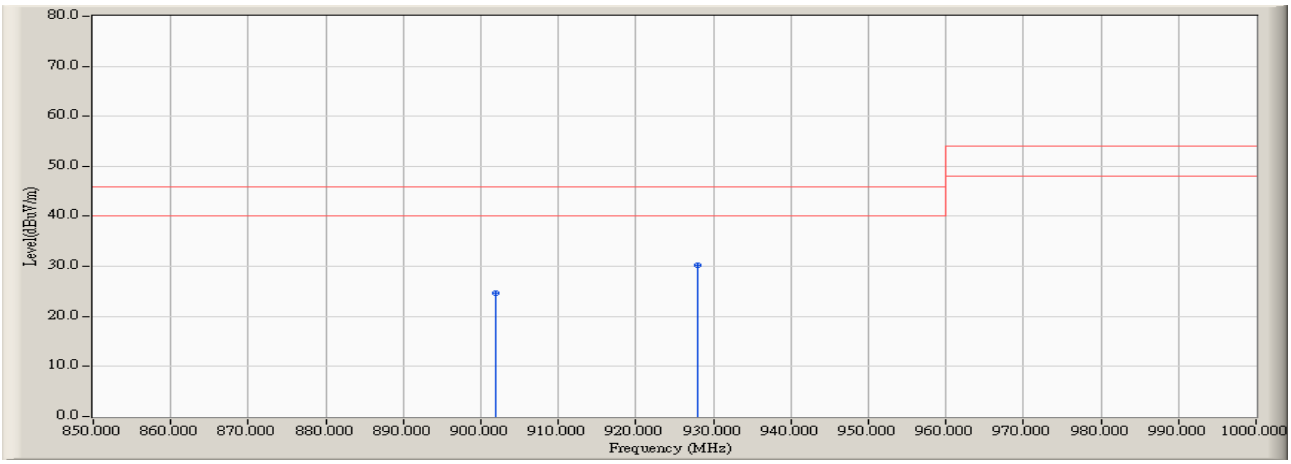
1. Quasi-Peak measurements: RBW=100kHz,VBW=1MHz,Sweep: Auto.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

| | | |
|---|---|---|
| Product | : | In Wall Smart Dimmer |
| Test Item | : | Band Edge Data |
| Test Site | : | No.3 OATS |
| Test Date | : | 2017/04/11 |
| Test Mode | : | Mode 1: Transmit (916MHz) |

**RF Radiated Measurement (Horizontal):**

| No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Quasi-Peak Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|
| 01(Quasi-Peak) | 902.000 | 4.656 | 20.000 | 24.655 | 46.000 | Pass |
| 02(Quasi-Peak) | 928.000 | 5.107 | 25.100 | 30.207 | 46.000 | Pass |

**Figure Channel 01: Horizontal (Quasi-Peak)**




Note:

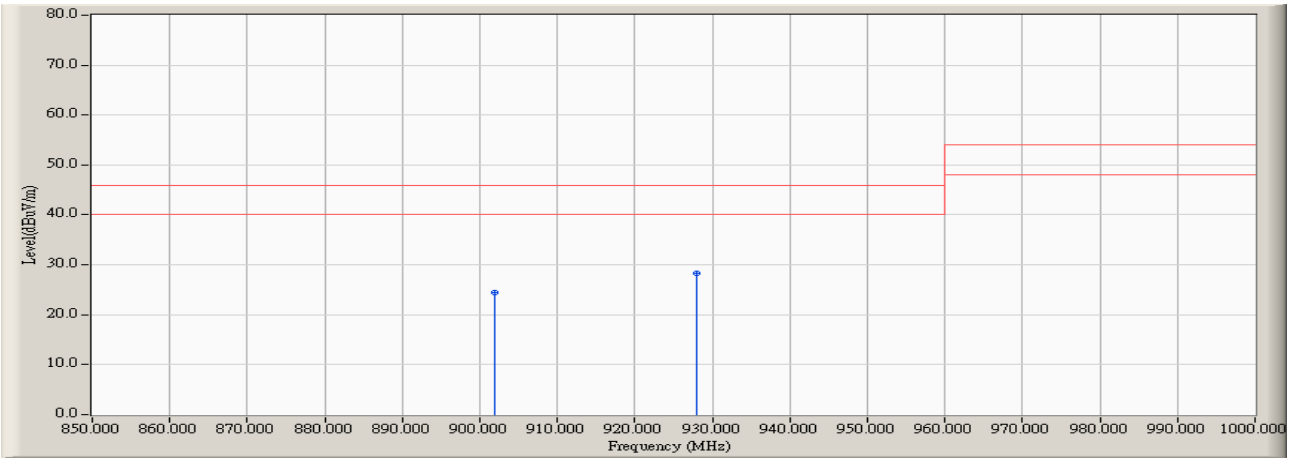
1. Quasi-Peak measurements: RBW=100kHz,VBW=1MHz,Sweep: Auto.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : In Wall Smart Dimmer
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2017/04/11
Test Mode : Mode 1: Transmit (916MHz)

**RF Radiated Measurement (Vertical):**

| No. | Frequency (MHz) | Correct Factor (dB) | Reading Level (dBuV) | Emission Level (dBuV/m) | Quasi-Peak Limit (dBuV/m) | Result |
|---|---|---|---|---|---|---|
| 01(Quasi-Peak) | 902.000 | 4.656 | 19.700 | 24.355 | 46.000 | Pass |
| 02(Quasi-Peak) | 928.000 | 5.107 | 23.300 | 28.407 | 46.000 | Pass |

**Figure Channel 01: Vertical (Quasi-Peak)**



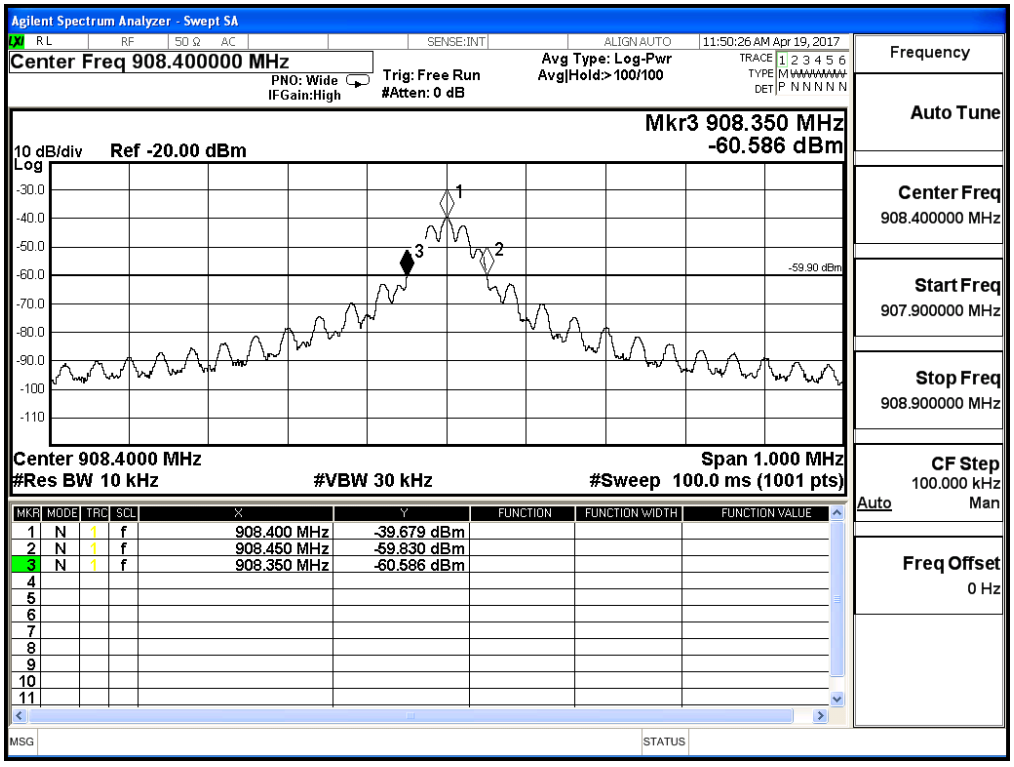

Note:

1. Quasi-Peak measurements: RBW=100kHz,VBW=1MHz,Sweep: Auto.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : In Wall Smart Dimmer
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2017/04/19
Test Mode : Mode 1: Transmit (908.4MHz)

| Test Frequency (MHz) | Measurement Level (20dB BW) (MHz) | Limit (MHz) | Result |
|---|---|---|---|
| 908.4 | 908.35 | >902 | PASS |

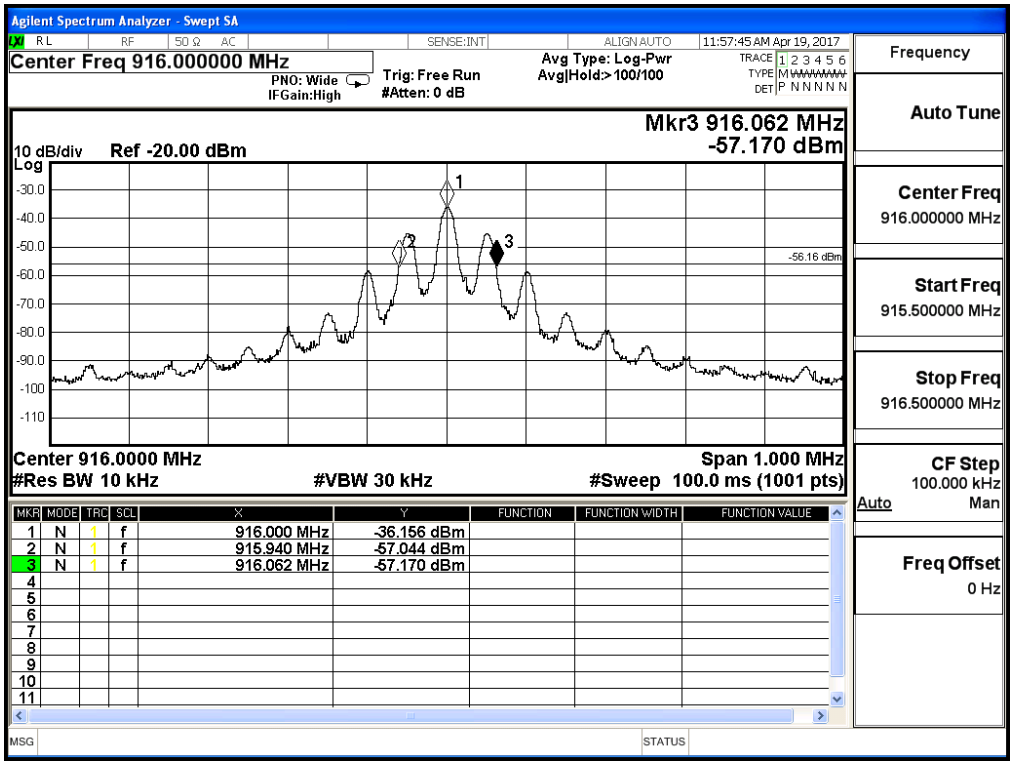
NOTE Accordance with 15.215 requirement.



Product : In Wall Smart Dimmer
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Date : 2017/04/19
Test Mode : Mode 1: Transmit (916MHz)

| Test Frequency (MHz) | Measurement Level (20dB BW) (MHz) | Limit (MHz) | Result |
|---|---|---|---|
| 916.2 | 916.062 | >928 | PASS |

NOTE Accordance with 15.215 requirement.



## 5. EMI Reduction Method During Compliance Testing

No modification was made during testing.