# TEST REPORT

| | | |
|---|---|---|
| **Reference No.** | : | WTZ20F04017944E |
| **Applicant** | : | V-TAC EXPORTS LTD |
| **Address** | : | 301, KAM ON BUILDING, 176 A QUEENS ROAD CENTRAL, CENTRAL, HONGKONG |
| **Manufacturer** | : | The same as above |
| **Address** | : | The same as above |
| **Trade Mark** | : | V-TAC® |
| **Product Name** | : | UVC Germicidal Lamp |
| **Model No.** | : | VT-3238,VT-3239,VT-3338 |
| **Standards** | : | EN 55015:2013+A1:2015<br>EN 61547:2009<br>EN IEC 61000-3-2:2019<br>EN 61000-3-3:2013+A1:2019 |
| **Date of Receipt sample** | : | 2020-04-13 |
| **Date of Test** | : | 2020-04-13 to 2020-04-17 |
| **Date of Issue** | : | 2020-04-30 |
| **Test Report Form No.** | : | WEL-55015A-01A |
| **Test Result** | : | **Pass** |

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.


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Compiled by:

Roy Hong / Project Engineer

Approved by:

Danny Zhou / Manager

# 1 Test Summary

| EMISSION | | | |
|---|---|---|---|
| **Test Item** | **Test Standard** | **Class / Severity** | **Result** |
| Mains Terminal Disturbance Voltage, 9kHz to 30MHz | EN 55015:2013+A1:2015 | Clause 4.3.1 | Pass |
| Radiated Electromagnetic Disturbance, 9kHz to 30MHz | EN 55015:2013+A1:2015 | Clause 4.4.1 | Pass |
| Radiated Emission, 30MHz to 300MHz | EN 55015:2013+A1:2015 | Clause 4.4.2 | Pass |
| Harmonic Current Emission | EN IEC 61000-3-2:2019 | Class C | Pass |
| Voltage Fluctuation and Flicker | EN 61000-3-3:2013+A1:2019 | Clause 5 | Pass** |

| IMMUNITY (EN 61547:2009) | | | | |
|---|---|---|---|---|
| **Test Item** | **Test Method** | **Class / Severity** | **Performance Criteria** | **Result** |
| Electrostatic Discharge(ESD) | IEC 61000-4-2:2008 | ±4 kV Contact<br>±8 kV Air | B | Pass |
| Radio-Frequency Electromagnetic Fields (80MHz to 1GHz) | IEC 61000-4-3:2010 | 3V/m, 80%, 1kHz, Amp. Mod. | A | Pass |
| Electrical Fast Transients (EFT) | IEC 61000-4-4:2012 | AC ±1.0kV<br>DC ±0.5kV | B | Pass |
| Surge | IEC 61000-4-5:2005 | ±1kV D.M.†<br>±2kV C.M.‡ | C | Pass |
| Injected Currents, 0.15MHz to 80MHz | IEC 61000-4-6:2013 | 3Vr.m.s.(emf), 80%, 1kHz Amp. Mod. | A | Pass |
| Power-Frequency Magnetic Field | IEC 61000-4-8:2009 | 3A/m | A | N/A |
| Voltage Dips and Interruptions | IEC 61000-4-11:2004 | 0 % $U_T$ * for 0.5per | B | Pass |
| | | 70 % $U_T$ * for 10per | C | Pass |

Remark:

| | |
|---|---|
| Pass | Test item meets the requirement |
| Fail | Test item does not meet the requirement |
| N/A | Test case does not apply to the test object |
| A.M | Amplitude Modulation |
| † | Differential Mode |
| ‡ | Common Mode |
| * | $U_T$ is the nominal supply voltage |
| ** | According to EN 61000-3-3 which states:"Pst and Plt evaluations are required only for lighting equipment which is likely to produce flicker; for example: disco lighting and automatically regulated equipment." Incandescent lamp luminaires with ratings less than or equal to 1 000 W and discharge lamp luminaires with ratings less than or equal to 600 W and LED luminaires with ratings less than or equal to 200 W, are deemed to comply with the dmax limits in this standard and are not required to be tested. |

## 2 Contents

# 3 General Information

## 3.1 General Description of E.U.T.

**Product Name** ..... : UVC Germicidal Lamp

**Model No.** ..... : VT-3238,VT-3239,VT-3338

**Remark** ..... : ---

## 3.2 Details of E.U.T.

**Technical Data** ..... : 220-240V~, 50/60Hz, 38W

## 3.3 Description of Support Units

The EUT has been tested as an independent unit. VT-3238 is the test sample. The DV&RE tests were performed in the condition of AC 245V/50Hz input. The other tests were performed in the condition of AC 230V/50Hz input.

## 3.4 Standards Applicable for Testing

The tests were performed according to following standards:

| | |
|---|---|
| EN 55015:2013+A1:2015 | Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment |
| EN 61547:2009 | Equipment for general lighting purposes — EMC immunity requirements |
| EN IEC 61000-3-2:2019 | Electromagnetic compatibility (EMC) -- Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16 A per phase). |
| EN 61000-3-3:2013+A1:2019 | Electromagnetic compatibility (EMC) -- Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection. |

## 3.5 Test Facility

The test facility has a test site registered with the following organizations:

- **ISED – Registration No.: 21895**

Waltek Services (Foshan) Co., Ltd. has been registered and fully described in a report filed with the Innovation, Science an Economic Development Canada(ISED). The acceptance letter from the ISED is maintained in our files. Registration ISED number:21895, March 12, 2019

- **FCC – Registration No.: 820106**

Waltek Services (Foshan) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 820106, August 16, 2018

- **NVLAP – Lab Code: 600191-0**

Waltek Services (Foshan) Co., Ltd. EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 600191-0.
This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

## 3.6 Subcontracted

Whether parts of tests for the product have been subcontracted to other labs:

☐ Yes ☒ No

If Yes, list the related test items and lab information:

Test items: ---

Lab information: ---

## 3.7 Abnormalities from Standard Conditions

None.

## 4 Equipment Used during Test

| Mains Terminal Disturbance Voltage 1#(Conducted Emission) | | | | | |
|---|---|---|---|---|---|
| **Item** | **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Calibration Status** |
| 1. | EMI Test Receiver | R&S | ESR3 | 102423 | Valid |
| 2. | LISN | R&S | ENV216 | 101343 | Valid |
| 3. | Cable | HUBER+SUHNER | CBL2-NN-6M | 223NN624 | Valid |
| 4. | Switch | CD | RSU-A4 18G | RSUA4008 | Valid |
| **Mains Terminal Disturbance Voltage 2#(Conducted Emission)** | | | | | |
| **Item** | **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Calibration Status** |
| 1. | EMI Test Receiver | R&S | ESCI | 101178 | Valid |
| 2. | LISN | R&S | ENV216 | 101215 | Valid |
| 3. | Cable | HUBER+SUHNER | CBL2-NN-6M | 6102701 | Valid |
| 4. | Switch | ESE | RSU/M2 | --- | Valid |
| **Radiated electromagnetic disturbance(9kHz to 30MHz)** | | | | | |
| **Item** | **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Calibration Status** |
| 1. | EMI Test Receiver | R&S | ESCI | 101178 | Valid |
| 2 | Three Loops Antenna | SCHWARZBECK | HXYZ9170 | 213 | Valid |
| **Radiated Emission** | | | | | |
| **Item** | **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Calibration Status** |
| 1. | EMI Test Receiver | R&S | ESR7 | 101566 | Valid |
| 2. | Active Loop Antenna | SCHWARZBECK | FMZB1519B | 00004 | Valid |
| 3. | Trilog Broadband Antenna | SCHWARZBECK | VULB 9162 | 9162-117 | Valid |
| 4. | Broad-band Horn Antenna | SCHWARZBECK | BBHA 9120 D | 01561 | Valid |
| 5. | Preamplifier | Lunar E M | LNA1G18-40 | 20160501002 | Valid |
| **Harmonics and Flicker Measuring System** | | | | | |
| **Item** | **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Calibration Status** |
| 1. | Harmonics and Flicker Measuring System | TESEQ | CCN1000-1 | 1133A01498 | Valid |
| **ESD** | | | | | |
| **Item** | **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Calibration Status** |
| 1. | ESD Simulator | TESEQ | NSG437 | 521 | Valid |
| **EFT & Voltage Dips and Interruptions** | | | | | |
| **Item** | **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Calibration Status** |
| 1. | EMS test system | TESEQ | NSG3040 | 0319 | Valid |
| 2. | Clamp | TESEQ | CDN8014 | 31405 | Valid |
| **Surge** | | | | | |
| **Item** | **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Calibration Status** |
| 1. | Surge Simulator | TESEQ | NSG3060 | 1395 | Valid |

| Injected Currents | | | | | |
|---|---|---|---|---|---|
| **Item** | **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Calibration Status** |
| 1. | Conducted Immunity test system | TESEQ | NSG4070 | 31469 | Valid |
| 2. | CDN | TESEQ | CDN M016 | 31586 | Valid |
| 3. | Clamp | TESEQ | KEMZ801 | 32362 | Valid |
| **Radio-frequency electromagnetic fields** | | | | | |
| **Item** | **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Calibration Status** |
| 1. | RF Power Amplifier | OPHIR | 5225R | 1051/1712 | Valid |
| 2. | RF Power Amplifier | OPHIR | 5293RE | 1051/171 | Valid |
| 3. | Stacked double logarithmic periodic antenna | SCHWARZBECK | STLP9128E-SPECIAL | 142 | Valid |
| 4. | Stacked double logarithmic periodic antenna | SCHWARZBECK | STLP 9149 | 476 | Valid |
| 5. | RF signal generator | Agilent | N5181A | MY48080720 | Valid |
| 6. | Power meter | RS | NRP6A | 101133 | Valid |
| 7. | Power meter | RS | NRP6A | 101134 | Valid |
| 8. | Electric field probe | Narda | EP 601 | 611WX70311 | Valid |

## 4.1 Software List

| Description | Manufacturer | Model | Version |
|---|---|---|---|
| EMI Test Software (Conducted Emission1#) | FARATRONIC | EZ-EMC | EMEC-3A1 |
| EMI Test Software (Conducted Emission2#) | FARATRONIC | EZ-EMC | CON-03A1 |
| EMI Test Software (LOOP) | FARATRONIC | EZ-EMC | CON-03A1 |
| EMI Test Software (Radiated Emission) | FARATRONIC | EZ-EMC | RA-03A1-1 |
| Harmonics and Flicker Test Software | TESEQ | Win2100 | V4 |
| Radiated Immunity Test Software | TONSCEND | JS35-RS | V2.0.1.7 |

## 4.2 Measurement Uncertainty

| Test Item | Frequency Range | Uncertainty | Note |
|---|---|---|---|
| Conducted Emission | 150kHz~30MHz | ±2.7dB | (1) |
| Radiated Electromagnetic Disturbance | 9kHz~30MHz | ±3.0dB | (1) |
| Radiated Emission | 30MHz~1GHz | ±4.1dB | (1) |

(1)This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

## 4.3 Special Accessories and Auxiliary Equipment

| Item | Equipment | Technical Data | Manufacturer | Model No. | Serial No. |
|---|---|---|---|---|---|
| 1. | / | / | / | / | / |

## 4.4 Decision Rule

Compliance or non-compliance with a disturbance limit shall be determined in the following manner.

**If $U_{LAB}$ is less than or equal to $U_{cispr}$, then**

-Compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;

-Non-compliance is deemed to occur is any measured disturbance level exceeds the disturbance limt.

**If $U_{LAB}$ is greater than $U_{cispr}$, then**

-Compliance is deemed to occur if no measured disturbance level, increased by($U_{LAB}$-$U_{cispr}$) , exceeds the disturbance limit;

-Non-compliance is deemed to occur if any measured disturbance level, increased by($U_{LAB}$-$U_{cispr}$) , exceeds the disturbance limit.

# 5 Emission Test Results

## 5.1 Mains Terminals Disturbance Voltage, 9kHz to 30MHz

**Test Requirement**..... : EN 55015 Clause 4.3.1

**Test Method**..... : EN 55015 Clause 8

**Test Result**..... : Pass

**Frequency Range**..... : 9kHz to 30MHz

**Class/Severity**..... : Table 2a of EN 55015

### 5.1.1 E.U.T. Operation

**Operating Environment:**

**Temperature** ..... : 25.0°C

**Humidity**..... : 60.0%RH

**Atmospheric Pressure** ..... : 101.2kPa

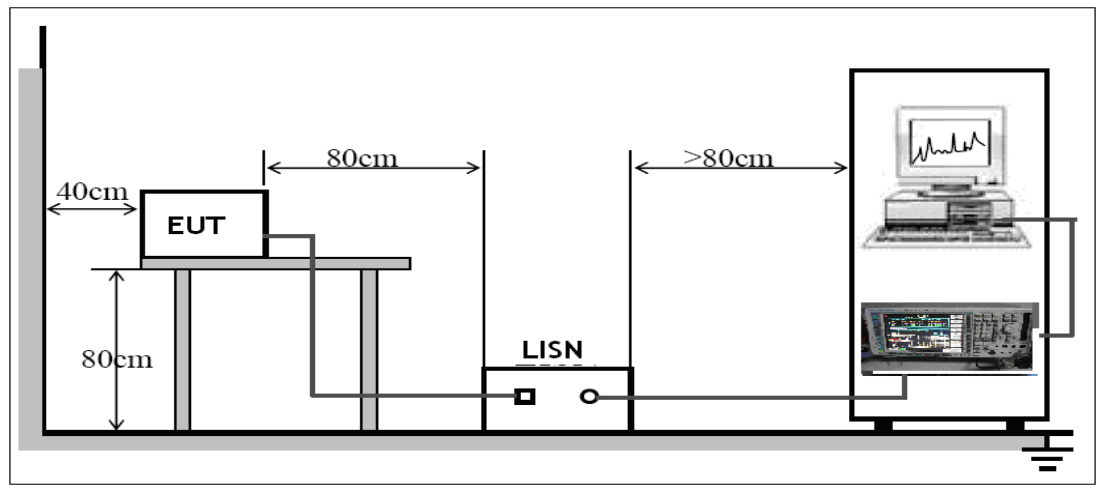
**EUT Operation:**

**Input Voltage** ..... : AC 245V/50Hz

**Operating Mode**..... : Lighting Mode

### 5.1.2 Block Diagram of Test Setup

The Mains Terminals Disturbance Voltage tests were performed in accordance with the EN 55015.




### 5.1.3 Measurement Data

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

### 5.1.4 Corrected Amplitude & Margin Calculation

The Corrected factor is calculated by adding LISN VDF(Voltage Division Facotr), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Measurement=Reading Level+Correct Factor

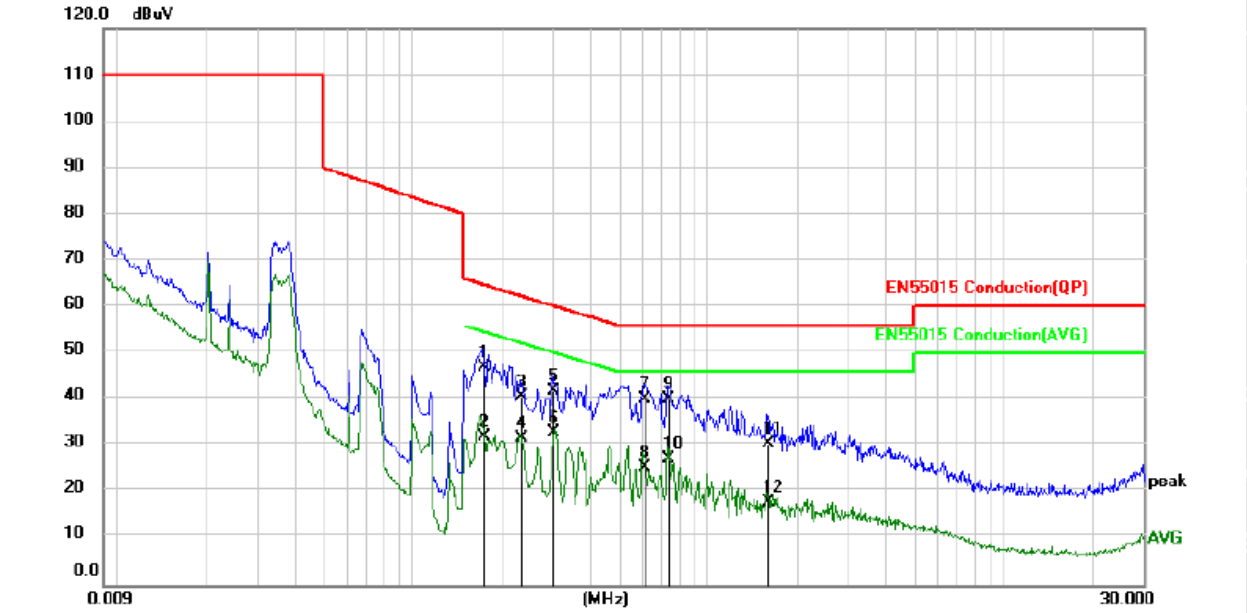
Correct Facotor=LISN VDF+Cable Loss

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin=Limit-Measurement

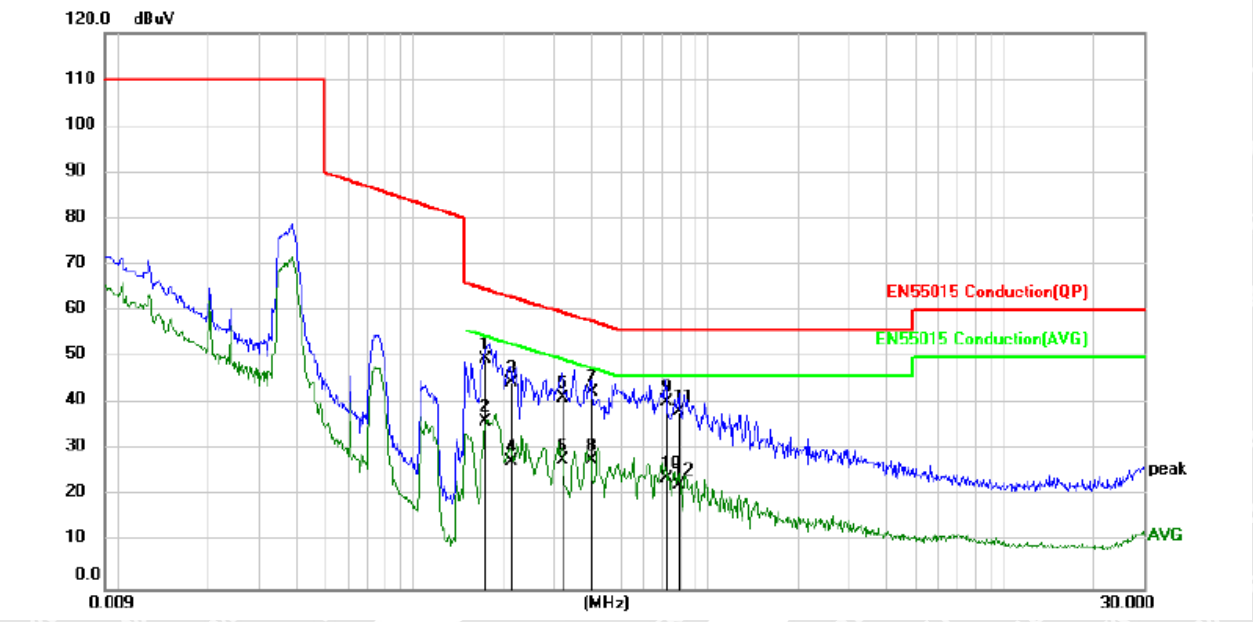
### 5.1.5 Mains Terminals Disturbance Voltage Test Data

## Live Line




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.1740 | 37.42 | 9.64 | 47.06 | 64.77 | -17.71 | QP | |
| 2 | | 0.1740 | 22.45 | 9.64 | 32.09 | 54.77 | -22.68 | AVG | |
| 3 | | 0.2340 | 30.97 | 9.65 | 40.62 | 62.31 | -21.69 | QP | |
| 4 | | 0.2340 | 21.99 | 9.65 | 31.64 | 52.31 | -20.67 | AVG | |
| 5 | | 0.2980 | 32.34 | 9.64 | 41.98 | 60.30 | -18.32 | QP | |
| 6 | | 0.2980 | 23.24 | 9.64 | 32.88 | 50.30 | -17.42 | AVG | |
| 7 | * | 0.6140 | 30.29 | 9.66 | 39.95 | 56.00 | -16.05 | QP | |
| 8 | | 0.6140 | 15.83 | 9.66 | 25.49 | 46.00 | -20.51 | AVG | |
| 9 | | 0.7340 | 30.26 | 9.67 | 39.93 | 56.00 | -16.07 | QP | |
| 10 | | 0.7340 | 17.35 | 9.67 | 27.02 | 46.00 | -18.98 | AVG | |
| 11 | | 1.6019 | 20.67 | 9.71 | 30.38 | 56.00 | -25.62 | QP | |
| 12 | | 1.6019 | 8.08 | 9.71 | 17.79 | 46.00 | -28.21 | AVG | |

## Neutral Line




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | * | 0.1751 | 39.86 | 9.66 | 49.52 | 64.71 | -15.19 | QP | |
| 2 | | 0.1751 | 26.36 | 9.66 | 36.02 | 54.71 | -18.69 | AVG | |
| 3 | | 0.2140 | 35.01 | 9.67 | 44.68 | 63.05 | -18.37 | QP | |
| 4 | | 0.2140 | 17.79 | 9.67 | 27.46 | 53.05 | -25.59 | AVG | |
| 5 | | 0.3180 | 31.45 | 9.68 | 41.13 | 59.76 | -18.63 | QP | |
| 6 | | 0.3180 | 18.16 | 9.68 | 27.84 | 49.76 | -21.92 | AVG | |
| 7 | | 0.4020 | 32.86 | 9.69 | 42.55 | 57.81 | -15.26 | QP | |
| 8 | | 0.4020 | 18.00 | 9.69 | 27.69 | 47.81 | -20.12 | AVG | |
| 9 | | 0.7180 | 30.63 | 9.70 | 40.33 | 56.00 | -15.67 | QP | |
| 10 | | 0.7180 | 14.23 | 9.70 | 23.93 | 46.00 | -22.07 | AVG | |
| 11 | | 0.7980 | 28.47 | 9.71 | 38.18 | 56.00 | -17.82 | QP | |
| 12 | | 0.7980 | 12.63 | 9.71 | 22.34 | 46.00 | -23.66 | AVG | |

## 5.2 Radiated Electromagnetic Disturbance, 9kHz to 30MHz

**Test Requirement**..... : EN 55015 Clause 4.4.1

**Test Method**..... : EN 55015 Clause 9.1

**Test Result**..... : Pass

**Frequency Range**..... : 9kHz to 30MHz

**Class/Severity**..... : Table 3a of EN 55015

### 5.2.1 E.U.T. Operation

**Operating Environment:**

**Temperature** ..... : 24.8°C

**Humidity**..... : 49.3%RH

**Barometric Pressure**..... : 101.2kPa

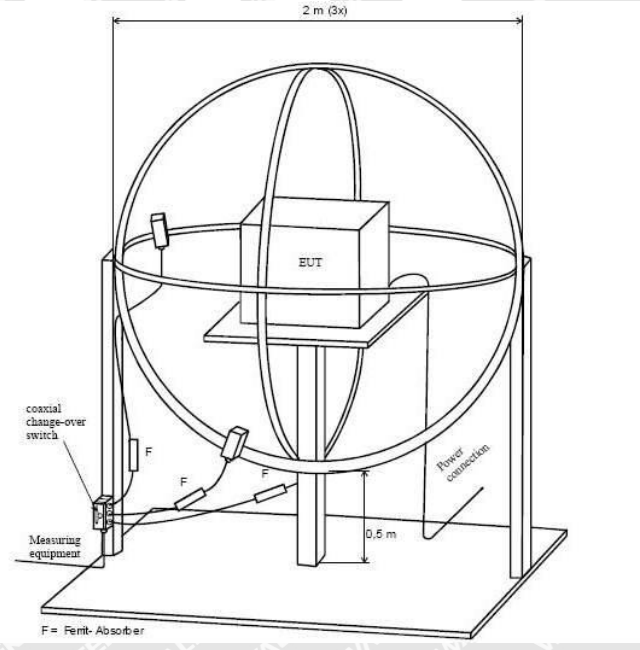
**EUT Operation:**

**Input Voltage** ..... : AC 245V/50Hz

**Operating Mode**..... : Lighting Mode

### 5.2.2 Block Diagram of Test Setup

The Radiated Electromagnetic Disturbance (9kHz to 30MHz) test was performed in accordance with the EN 55015.

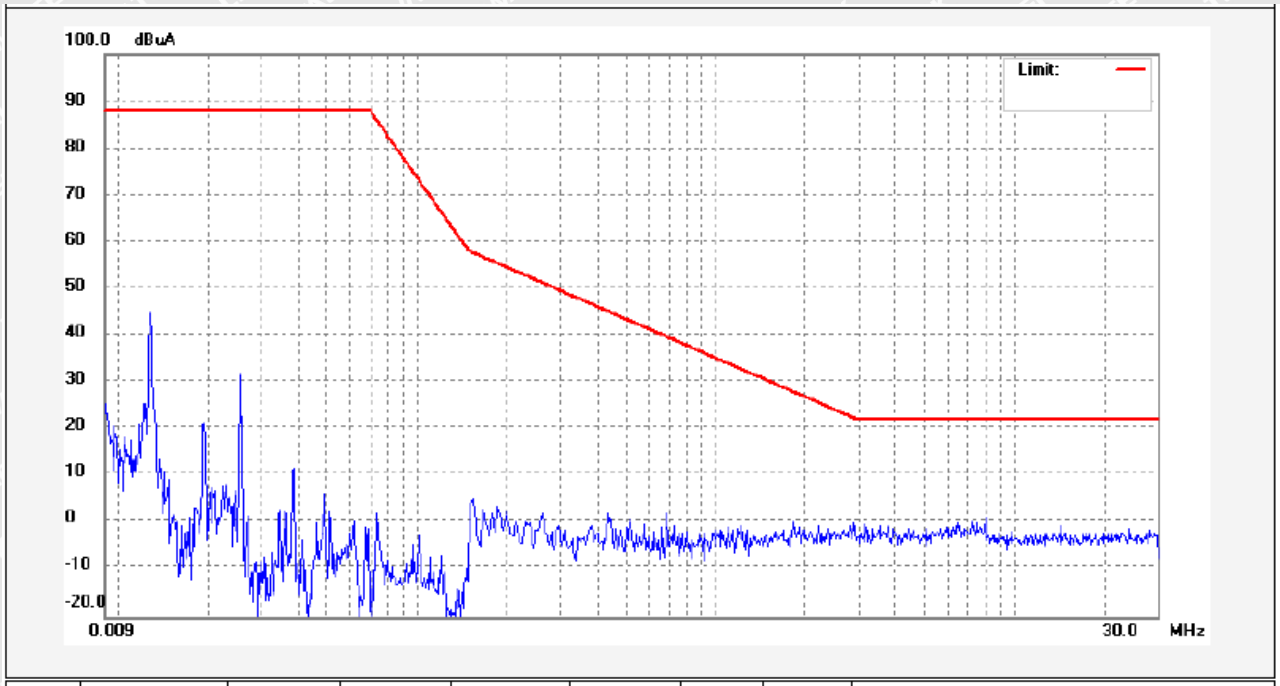



### 5.2.3 Measurement Data

According to the data in section 5.2.4, the EUT complied with the EN 55015 standards.

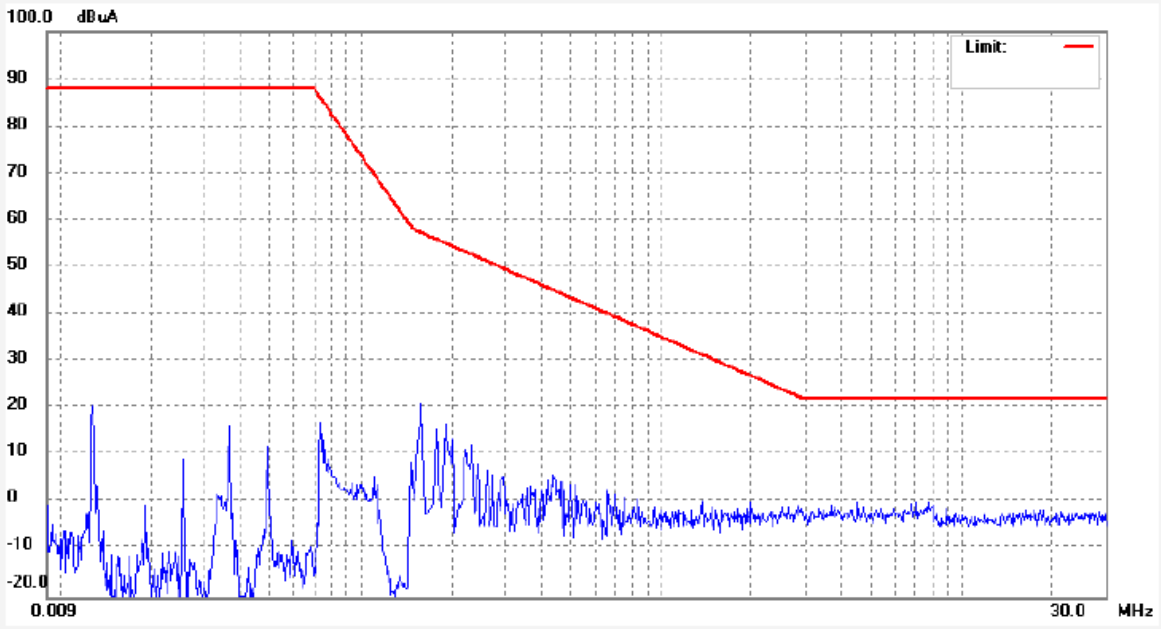
### 5.2.4 Radiated Electromagnetic Disturbance Test Data, 9kHz to 30MHz

**Loop X**



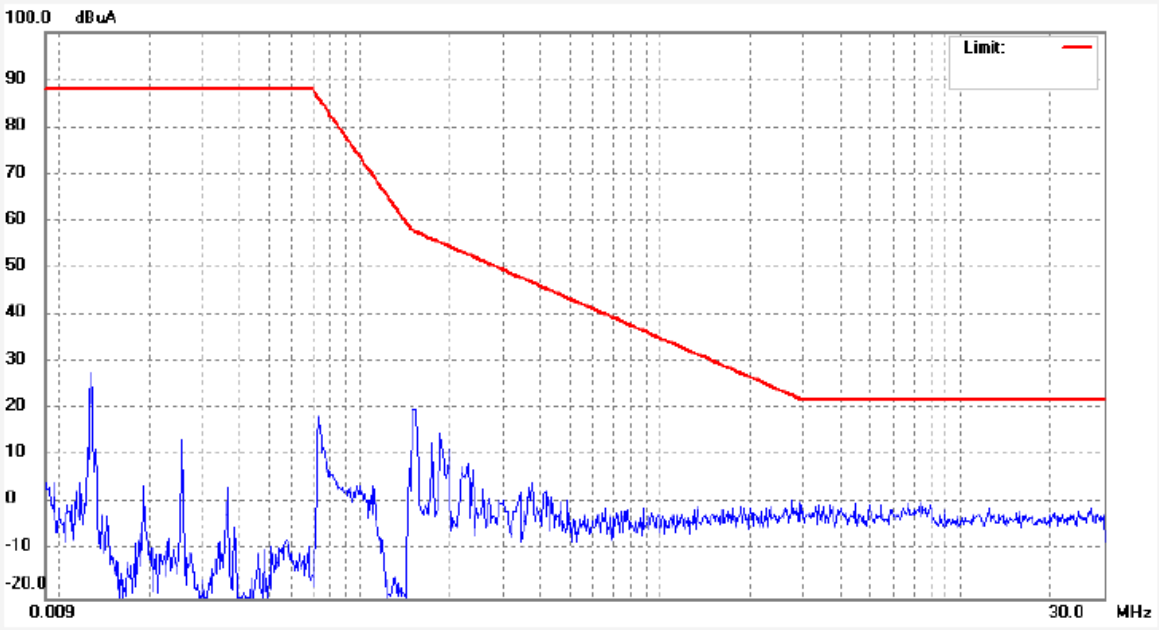

| No. | Freq. (MHz) | Reading (dBuA) | Factor (()) | Result (dBuA) | Limit (dBuA) | Margin (dB) | Detector | Remark |
|---|---|---|---|---|---|---|---|---|

**Loop Y**




| No. | Freq. (MHz) | Reading (dBuA) | Factor (()) | Result (dBuA) | Limit (dBuA) | Margin (dB) | Detector | Remark |
|---|---|---|---|---|---|---|---|---|

**Loop Z**




| No. | Freq. (MHz) | Reading (dBuA) | Factor (()) | Result (dBuA) | Limit (dBuA) | Margin (dB) | Detector | Remark |
|---|---|---|---|---|---|---|---|---|

## 5.3 Radiated Emission, 30MHz to 300MHz

**Test Requirement**..... : EN 55015

**Test Method**..... : EN 55015

**Test Result**..... : Pass

**Frequency Range**..... : 30MHz to 300MHz

**Class/Severity**..... : Table 3b of EN 55015

### 5.3.1 E.U.T. Operation

**Operating Environment:**

**Temperature** ..... : 23.1°C

**Humidity**..... : 46.5%RH

**Atmospheric Pressure**..... : 101.2kPa

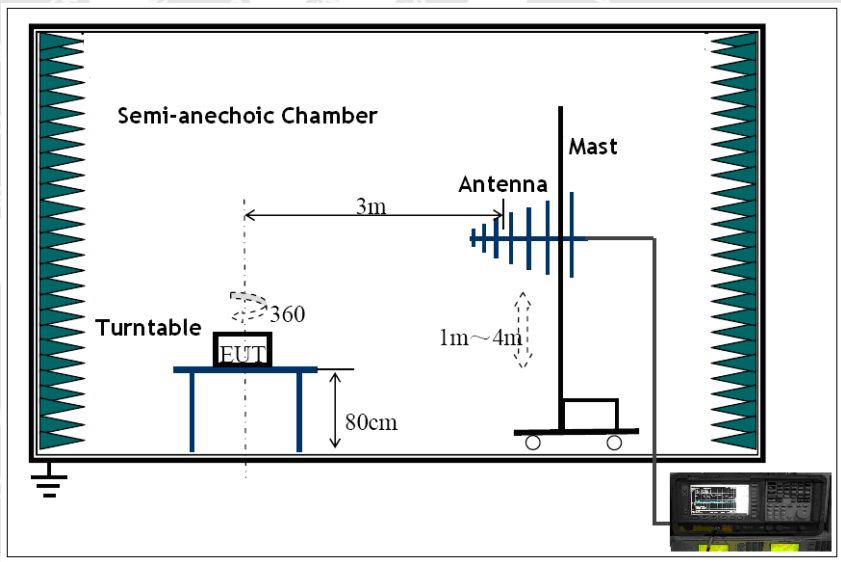
**EUT Operation:**

**Input Voltage** ..... : AC 245V/50Hz

**Operating Mode**..... : Lighting Mode

### 5.3.2 Block Diagram of Test Setup

The Radiated Emission test was performed in the 3m Semi- Anechoic Chamber test site and accordance with CISPR16-2-3.




### 5.3.3 Measurement Data

The maximised peak emissions from the EUT was scanned and measured for Horizontal & Vertical polarisation. Quasi-peak measurements were performed if peak emissions were within 6dB of the limit line.

### 5.3.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Corr. Factor

Corr.Factor=Antenna Factor + Cable Factor - Amplifier Gain

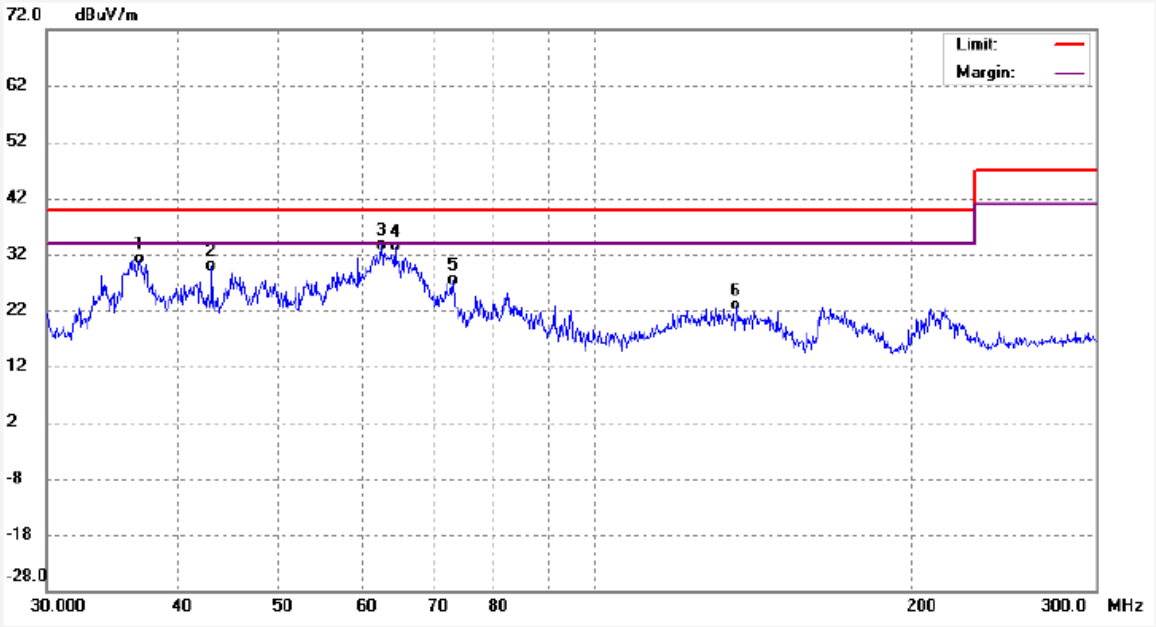
The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit.

The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Limit

### 5.3.5 Radiated Emission Test Data

## Vertical Polarization




| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Remark |
|---|---|---|---|---|---|---|---|---|
| 1 | 36.8232 | 18.73 | 12.37 | 31.10 | 40.00 | -8.90 | QP | |
| 2 | 43.0647 | 16.47 | 13.32 | 29.79 | 40.00 | -10.21 | QP | |
| 3 | 62.5347 | 21.20 | 12.37 | 33.57 | 40.00 | -6.43 | QP | |
| 4 | 64.4349 | 21.54 | 11.86 | 33.40 | 40.00 | -6.60 | QP | |
| 5 | 73.1343 | 17.05 | 10.21 | 27.26 | 40.00 | -12.74 | QP | |
| 6 | 136.1825 | 11.99 | 10.87 | 22.86 | 40.00 | -17.14 | QP | |

## Horizontal Polarization


| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Remark |
|---|---|---|---|---|---|---|---|---|
| 1 | 31.8509 | 5.68 | 12.46 | 18.14 | 40.00 | -21.86 | QP | |
| 2 | 63.1134 | 13.05 | 12.03 | 25.08 | 40.00 | -14.92 | QP | |
| 3 | 79.6382 | 15.28 | 9.97 | 25.25 | 40.00 | -14.75 | QP | |
| 4 | 99.3393 | 7.88 | 12.20 | 20.08 | 40.00 | -19.92 | QP | |
| 5 | 142.2726 | 9.27 | 9.93 | 19.20 | 40.00 | -20.80 | QP | |
| 6 | 208.5073 | 5.72 | 13.38 | 19.10 | 40.00 | -20.90 | QP | |

## 5.4 Harmonics Current Emission

**Test Requirement**..... : EN IEC 61000-3-2

**Test Method**..... : EN IEC 61000-3-2

**Test Result**..... : Pass

**Class/Severity**..... : Class C

### 5.4.1 E.U.T. Operation

**Operating Environment:**

**Temperature** ..... : 23.1°C

**Humidity**..... : 42.0%RH

**Barometric Pressure**..... : 101.2kPa

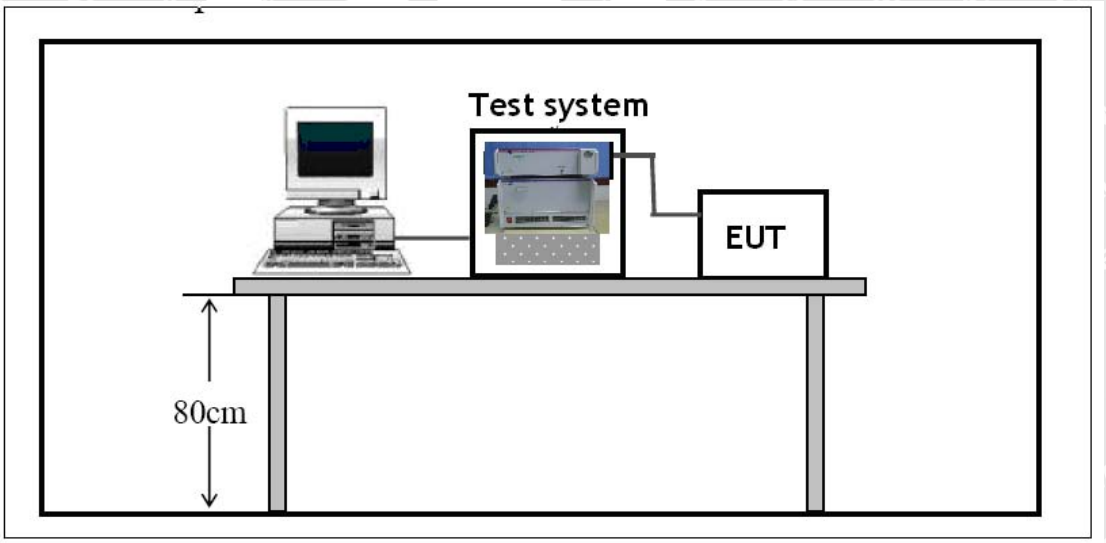
**EUT Operation:**

**Input Voltage** ..... : AC 230V/50Hz

**Operating Mode**..... : Lighting Mode

### 5.4.2 Block Diagram of Setup

The Harmonics Current emission test was performed in accordance with the EN IEC 61000-3-2.



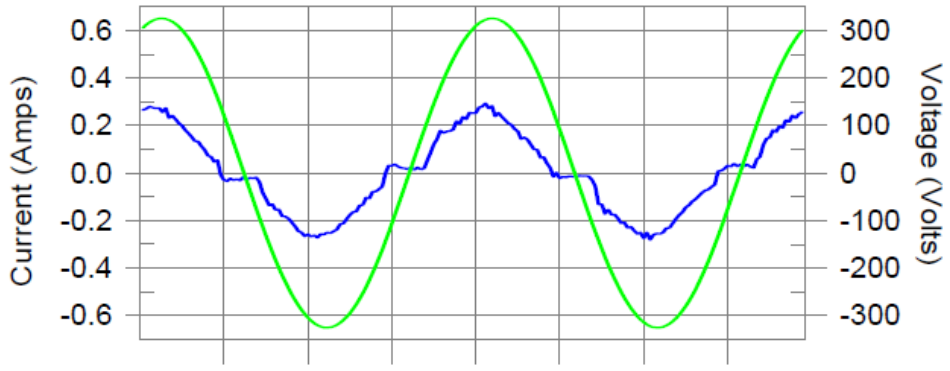
### 5.4.3 Harmonic Current EmissionTest Data

**Harmonics – Class-C per Ed. Ed. 5.0 (2018)(Run time)**

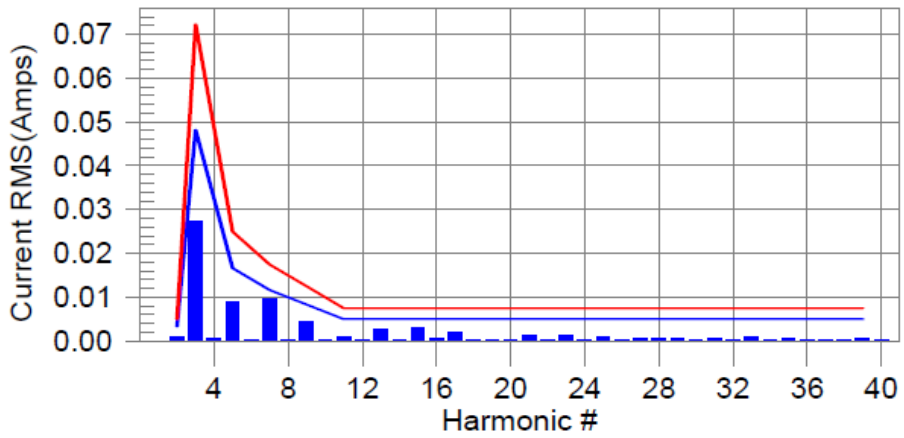
EUT: UVC Germicidal Lamp VT-3238 (WTZ20F04017944E) Tested by: Haley
Test category: Class-C per Ed. 5.0 (2018) (European limits) Test Margin: 100
Test date: 2020/4/30 Start time: 10:32:23 End time: 10:35:05
Test duration (min): 2.5 Data file name: H-001335.cts_data
Comment: Lighting Mode
Customer:

Test Result: Pass Source qualification: Normal

Current & voltage waveforms




Harmonics and Class C limit line European Limits




Test result: Pass Worst harmonics H7-59.3% of 150% limit, H7-82.7% of 100% limit

## Current Test Result Summary (Run time)

EUT: UVC Germicidal Lamp VT-3238 (WTZ20F04017944E) Tested by: Haley
Test category: Class-C per Ed. 5.0 (2018) (European limits) Test Margin: 100
Test date: 2020/4/30 Start time: 10:32:23 End time: 10:35:05
Test duration (min): 2.5 Data file name: H-001335.cts_data
Comment: Lighting Mode
Customer:

Test Result: Pass Source qualification: Normal
THC(A): 0.031 I-THD(%): 18.8 POHC(A): 0.003 POHC Limit(A): 0.016

Highest parameter values during test:

| | | | |
|---|---|---|---|
| V_RMS (Volts): | 230.23 | Frequency(Hz): | 50.00 |
| I_Peak (Amps): | 0.319 | I_RMS (Amps): | 0.170 |
| I_Fund (Amps): | 0.166 | Crest Factor: | 1.885 |
| Power (Watts): | 37.6 | Power Factor: | 0.966 |

| Harm# | Harms(avg) | 100%Limit | %of Limit | Harms(max) | 150%Limit | %of Limit | Status |
|---|---|---|---|---|---|---|---|
| 2 | 0.001 | 0.003 | N/A | 0.001 | 0.005 | N/A | Pass |
| 3 | 0.027 | 0.048 | 56.9 | 0.029 | 0.072 | 39.9 | Pass |
| 4 | 0.001 | 0.000 | N/A | 0.001 | 0.000 | N/A | Pass |
| 5 | 0.009 | 0.017 | 53.8 | 0.009 | 0.025 | 37.7 | Pass |
| 6 | 0.000 | 0.000 | N/A | 0.001 | 0.000 | N/A | Pass |
| 7 | 0.010 | 0.012 | 82.7 | 0.010 | 0.017 | 59.3 | Pass |
| 8 | 0.000 | 0.000 | N/A | 0.000 | 0.000 | N/A | Pass |
| 9 | 0.004 | 0.008 | N/A | 0.005 | 0.012 | N/A | Pass |
| 10 | 0.000 | 0.000 | N/A | 0.000 | 0.000 | N/A | Pass |
| 11 | 0.001 | 0.005 | N/A | 0.001 | 0.007 | N/A | Pass |
| 12 | 0.000 | 0.000 | N/A | 0.000 | 0.000 | N/A | Pass |
| 13 | 0.003 | 0.005 | N/A | 0.003 | 0.007 | N/A | Pass |
| 14 | 0.000 | 0.000 | N/A | 0.000 | 0.000 | N/A | Pass |
| 15 | 0.003 | 0.005 | N/A | 0.003 | 0.007 | N/A | Pass |
| 16 | 0.000 | 0.000 | N/A | 0.001 | 0.000 | N/A | Pass |
| 17 | 0.002 | 0.005 | N/A | 0.002 | 0.007 | N/A | Pass |
| 18 | 0.000 | 0.000 | N/A | 0.000 | 0.000 | N/A | Pass |
| 19 | 0.000 | 0.005 | N/A | 0.001 | 0.007 | N/A | Pass |
| 20 | 0.000 | 0.000 | N/A | 0.000 | 0.000 | N/A | Pass |
| 21 | 0.001 | 0.005 | N/A | 0.002 | 0.007 | N/A | Pass |
| 22 | 0.000 | 0.000 | N/A | 0.000 | 0.000 | N/A | Pass |
| 23 | 0.001 | 0.005 | N/A | 0.002 | 0.007 | N/A | Pass |
| 24 | 0.000 | 0.000 | N/A | 0.000 | 0.000 | N/A | Pass |
| 25 | 0.001 | 0.005 | N/A | 0.001 | 0.007 | N/A | Pass |
| 26 | 0.000 | 0.000 | N/A | 0.000 | 0.000 | N/A | Pass |
| 27 | 0.000 | 0.005 | N/A | 0.001 | 0.007 | N/A | Pass |
| 28 | 0.001 | 0.000 | N/A | 0.001 | 0.000 | N/A | Pass |
| 29 | 0.001 | 0.005 | N/A | 0.001 | 0.007 | N/A | Pass |
| 30 | 0.000 | 0.000 | N/A | 0.000 | 0.000 | N/A | Pass |
| 31 | 0.001 | 0.005 | N/A | 0.001 | 0.007 | N/A | Pass |
| 32 | 0.000 | 0.000 | N/A | 0.000 | 0.000 | N/A | Pass |
| 33 | 0.001 | 0.005 | N/A | 0.001 | 0.007 | N/A | Pass |
| 34 | 0.000 | 0.000 | N/A | 0.000 | 0.000 | N/A | Pass |
| 35 | 0.001 | 0.005 | N/A | 0.001 | 0.007 | N/A | Pass |
| 36 | 0.000 | 0.000 | N/A | 0.000 | 0.000 | N/A | Pass |
| 37 | 0.000 | 0.005 | N/A | 0.000 | 0.007 | N/A | Pass |
| 38 | 0.000 | 0.000 | N/A | 0.000 | 0.000 | N/A | Pass |
| 39 | 0.001 | 0.005 | N/A | 0.001 | 0.007 | N/A | Pass |
| 40 | 0.000 | 0.000 | N/A | 0.000 | 0.000 | N/A | Pass |

*Note: Dynamic limits were applied for this test. The highest harmonics values in the above table may not occur at the same window as the maximum harmonics/limit ratio.*

## Voltage Source Verification Data (Run time)

EUT: UVC Germicidal Lamp VT-3238 (WTZ20F04017944E) Tested by: Haley
Test category: Class-C per Ed. 5.0 (2018) (European limits) Test Margin: 100
Test date: 2020/4/30 Start time: 10:32:23 End time: 10:35:05
Test duration (min): 2.5 Data file name: H-001335.cts_data
Comment: Lighting Mode
Customer:

Test Result: Pass Source qualification: Normal

Highest parameter values during test:

| | | | |
|---|---|---|---|
| Voltage (Vrms): | 230.23 | Frequency(Hz): | 50.00 |
| I_Peak (Amps): | 0.319 | I_RMS (Amps): | 0.170 |
| I_Fund (Amps): | 0.166 | Crest Factor: | 1.885 |
| Power (Watts): | 37.6 | Power Factor: | 0.966 |

| Harm# | Harmonics V-rms | Limit V-rms | % of Limit | Status |
|---|---|---|---|---|
| 2 | 0.061 | 0.460 | 13.31 | OK |
| 3 | 0.572 | 2.072 | 27.59 | OK |
| 4 | 0.076 | 0.460 | 16.58 | OK |
| 5 | 0.060 | 0.920 | 6.47 | OK |
| 6 | 0.031 | 0.460 | 6.71 | OK |
| 7 | 0.049 | 0.690 | 7.08 | OK |
| 8 | 0.012 | 0.460 | 2.61 | OK |
| 9 | 0.019 | 0.460 | 4.16 | OK |
| 10 | 0.014 | 0.460 | 3.01 | OK |
| 11 | 0.010 | 0.230 | 4.25 | OK |
| 12 | 0.013 | 0.230 | 5.73 | OK |
| 13 | 0.011 | 0.230 | 4.72 | OK |
| 14 | 0.007 | 0.230 | 2.94 | OK |
| 15 | 0.012 | 0.230 | 5.19 | OK |
| 16 | 0.010 | 0.230 | 4.40 | OK |
| 17 | 0.006 | 0.230 | 2.70 | OK |
| 18 | 0.013 | 0.230 | 5.86 | OK |
| 19 | 0.007 | 0.230 | 2.83 | OK |
| 20 | 0.020 | 0.230 | 8.48 | OK |
| 21 | 0.010 | 0.230 | 4.54 | OK |
| 22 | 0.004 | 0.230 | 1.81 | OK |
| 23 | 0.006 | 0.230 | 2.73 | OK |
| 24 | 0.004 | 0.230 | 1.58 | OK |
| 25 | 0.006 | 0.230 | 2.42 | OK |
| 26 | 0.004 | 0.230 | 1.55 | OK |
| 27 | 0.007 | 0.230 | 2.85 | OK |
| 28 | 0.007 | 0.230 | 3.10 | OK |
| 29 | 0.008 | 0.230 | 3.31 | OK |
| 30 | 0.004 | 0.230 | 1.61 | OK |
| 31 | 0.003 | 0.230 | 1.50 | OK |
| 32 | 0.003 | 0.230 | 1.15 | OK |
| 33 | 0.004 | 0.230 | 1.92 | OK |
| 34 | 0.003 | 0.230 | 1.30 | OK |
| 35 | 0.004 | 0.230 | 1.58 | OK |
| 36 | 0.003 | 0.230 | 1.31 | OK |
| 37 | 0.004 | 0.230 | 1.71 | OK |
| 38 | 0.003 | 0.230 | 1.22 | OK |
| 39 | 0.005 | 0.230 | 2.35 | OK |
| 40 | 0.008 | 0.230 | 3.51 | OK |

# 6 Immunity Test Results

## 6.1 Performance Criteria

**Performance criterion A:** During the test, no change of the luminous intensity shall be observed and the regulating control, if any, shall operate during the test as intended.

**Performance criterion B:** During the test, the luminous intensity may change to any value. After the test, the luminous intensity shall be restored to its initial value within 1 min. Regulating controls need not function during the test, but after the test, the mode of the control shall be the same as before the test provided that during the test no mode changing commands were given.

**Performance criterion C:** During and after the test, any change of the luminous intensity is allowed and the lamp(s) may be extinguished. After the test, within 30 min, all functions shall return to normal, if necessary by temporary interruption of the mains supply and/or operating the regulating control.

## 6.2 Electrostatic Discharge (ESD)

**Test Requirement**..... : EN 61547

**Test Method**..... : IEC 61000-4-2

**Test Result**..... : Pass

**Discharge Impedance**..... : 330Ω / 150pF

**Discharge Voltage**..... : Air Discharge: ±8kV
Contact Discharge: ±4kV
HCP & VCP: ±4kV

**Polarity**..... : Positive & Negative

**Number of Discharge**..... : Minimum 10 times at each test point

**Discharge Mode**..... : Single Discharge

**Discharge Period**..... : 1 second minimum

### 6.2.1 E.U.T. Operation

**Operating Environment:**

**Temperature**..... : 22.7°C

**Humidity**..... : 47.9%RH

**Barometric Pressure**..... : 101.1kPa

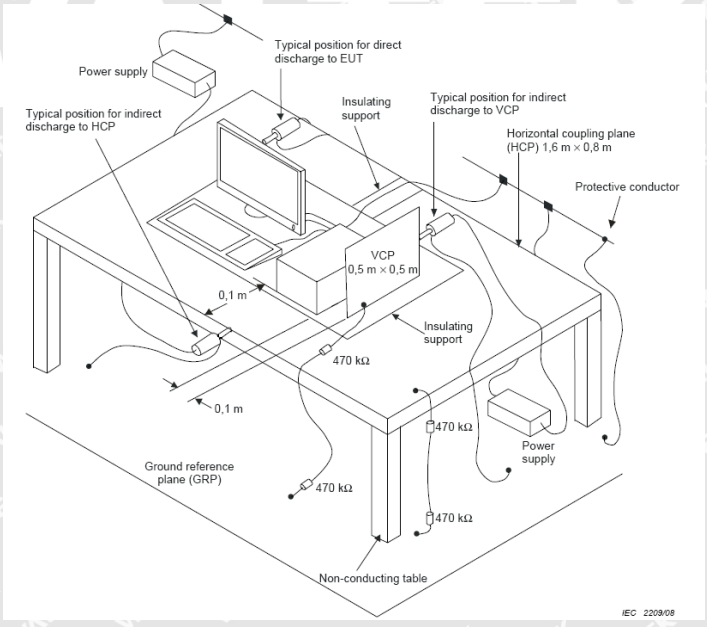
**EUT Operation:**

**Input Voltage**..... : AC 230V/50Hz

**Operating Mode**..... : On mode

### 6.2.2 Block Diagram of Setup

The ESD test was performed in accordance with the IEC 61000-4-2.



### 6.2.3Direct Discharge Test Results

**Observations:** **Test points:** **1. All Exposed Surface & Seams;**
**2. All metallic part**

| Direct Discharge | | | Test Results | |
|---|---|---|---|---|
| Applied Voltage (kV) | Performance Criterion | Test Point | Contact Discharge | Air Discharge |
| ±8 | B | 1 | N/A | Pass* |
| ±4 | B | 2 | Pass* | N/A |

Remark:

* During the test no deviation was detected to the selected operation mode(s)

### 6.2.4 Indirect Discharge Test Results

**Observations:** **Test points:** **1. All sides.**

| Indirect Discharge | | | Test Results | |
|---|---|---|---|---|
| Applied Voltage (kV) | Performance Criterion | Test Point | Horizontal Coupling | Vertical Coupling |
| ±4 | B | 1 | Pass* | Pass* |

Remark:

* During the test no deviation was detected to the selected operation mode(s)

## 6.3 Radio-Frequency Electromagnetic Fields, 80MHz to 1GHz

**Test Requirement**..... : EN 61547

**Test Method** ..... : IEC 61000-4-3

**Test Result**..... : Pass

**Frequency Range** ..... : 80MHz to 1GHz

**Test level**..... : 3V/m

**Modulation** ..... : 80%, 1kHz Amplitude Modulation.

**Face of EUT** ..... : Front, Back, Left, Right

**Antenna polarisation** .... : Horizontal & Vertical

**Test Distance**..... : 3m

### 6.3.1E.U.T. Operation

**Operating Environment:**

**Temperature** ..... : 23.5°C

**Humidity**..... : 40.2% RH

**Barometric Pressure**..... : 100.3kPa

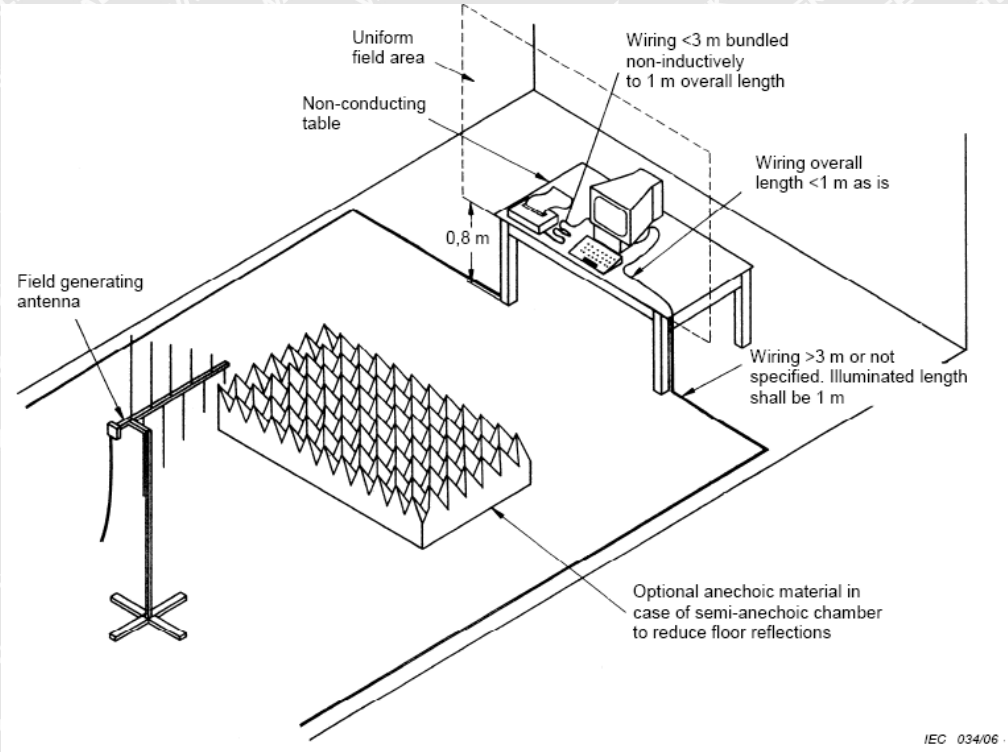
**EUT Operation:**

**Input Voltage** ..... : AC 230V/50Hz

**Operating Mode**..... : On mode

### 6.3.2 Block Diagram of Setup

The Radio-Frequency Electromagnetic Fields Immunity test was performed in accordance with the IEC 61000-4-3.




### 6.3.3 Test Results

| Frequency | Face of EUT | Antenna polarisation | Test Level | Step Size | Dwell Time | Performance Criterion | Result |
|---|---|---|---|---|---|---|---|
| 80 to 1000MHz | Front, Back, Left, Right | Horizontal | 3V/m | 1% | 1s | A | Pass* |
| 80 to 1000MHz | Front, Back, Left, Right | Vertical | 3V/m | 1% | 1s | A | Pass* |

Remark:

* During the test no deviation was detected to the selected operation mode(s)

## 6.4 Electrical Fast Transients (EFT)

**Test Requirement**..... : EN 61547

**Test Method**..... : IEC 61000-4-4

**Test Result**..... : Pass

**Test Level**..... : 1.0kV on AC Mains

**Polarity**..... : Positive & Negative

**Repetition Frequency**.... : 5kHz

**Burst Duration**..... : 300ms

**Test Duration**..... : 2 minutes per level & polarity

### 6.4.1E.U.T. Operation

**Operating Environment:**

**Temperature** ..... : 22.6°C

**Humidity**..... : 47.5%RH

**Barometric Pressure** .... : 101.1kPa

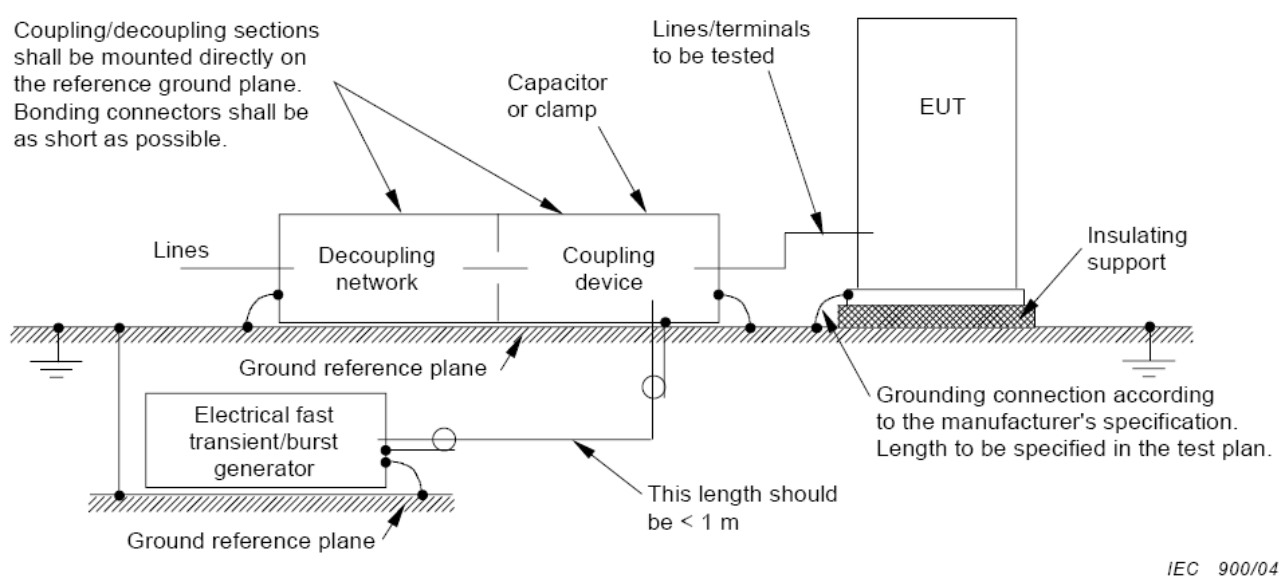
**EUT Operation:**

**Input Voltage** ..... : AC 230V/50Hz

**Operating Mode**..... : On mode

### 6.4.2 Block Diagram of Setup

The Electrical Fast Transients Immunity test was performed in accordance with the IEC 61000-4-4.




### 6.4.3 Test Results

| Test Port | Test Level(kV) | Performance Criterion | Result |
|---|---|---|---|
| Line-Neutral | ±1.0 | B | Pass* |

Remark:

* During the test no deviation was detected to the selected operation mode(s)

## 6.5 Surge

**Test Requirement**..... : EN 61547

**Test Method**..... : IEC 61000-4-5

**Test Result**..... : Pass

**Test level**..... : Table 10 of EN61547

**Interval** ..... : 60s between each surge

**No. of surges** ..... : 5 positive at 90°, 5 negative at 270°.

### 6.5.1E.U.T. Operation

**Operating Environment:**

**Temperature** ..... : 22.9°C

**Humidity**..... : 47.6%RH

**Barometric Pressure**..... : 101.1kPa

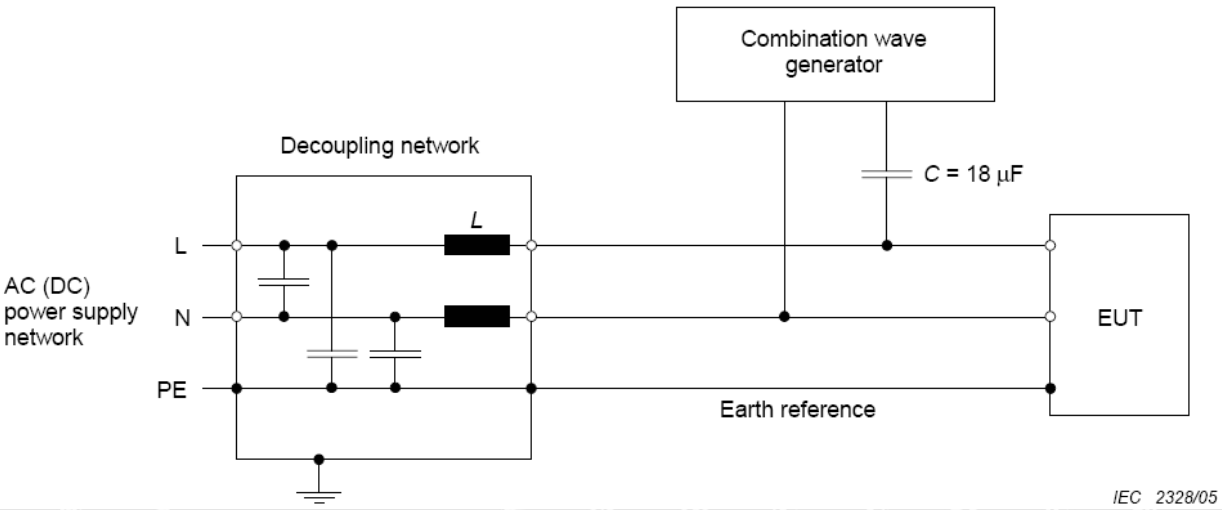
**EUT Operation:**

**Input Voltage** ..... : AC 230V/50Hz

**Operating Mode**..... : On mode

### 6.5.2Block Diagram of Setup

The Surge Immunity test was performed in accordance with the IEC 61000-4-5.



### 6.5.3Test Results

| Test Port | Applied Voltage (kV) | Performance criterion | Result |
|---|---|---|---|
| Between Phase And Phase | ±1 | C | N/A |
| Between Live And Neutral | ±1 | C | Pass* |
| Between Live And Earth | ±2 | C | N/A |
| Between Neutral And Earth | ±2 | C | N/A |

Remark:

* During the test no deviation was detected to the selected operation mode(s)

## 6.6 Injected Currents Immunity, 0.15MHz to 80MHz

**Test Requirement**..... : EN 61547

**Test Method** ..... : IEC 61000-4-6

**Test Result**..... : Pass

**Frequency Range** ..... : 0.15MHz to 80MHz

**Test level**..... : 3V r.m.s. (unmodulated emf into 150 Ω)

**Modulation** ..... : 80%, 1kHz Amplitude Modulation.

### 6.6.1E.U.T. Operation

**Operating Environment:**

**Temperature** ..... : 22.8°C

**Humidity**..... : 47.7% RH

**Barometric Pressure**..... : 101.1kPa

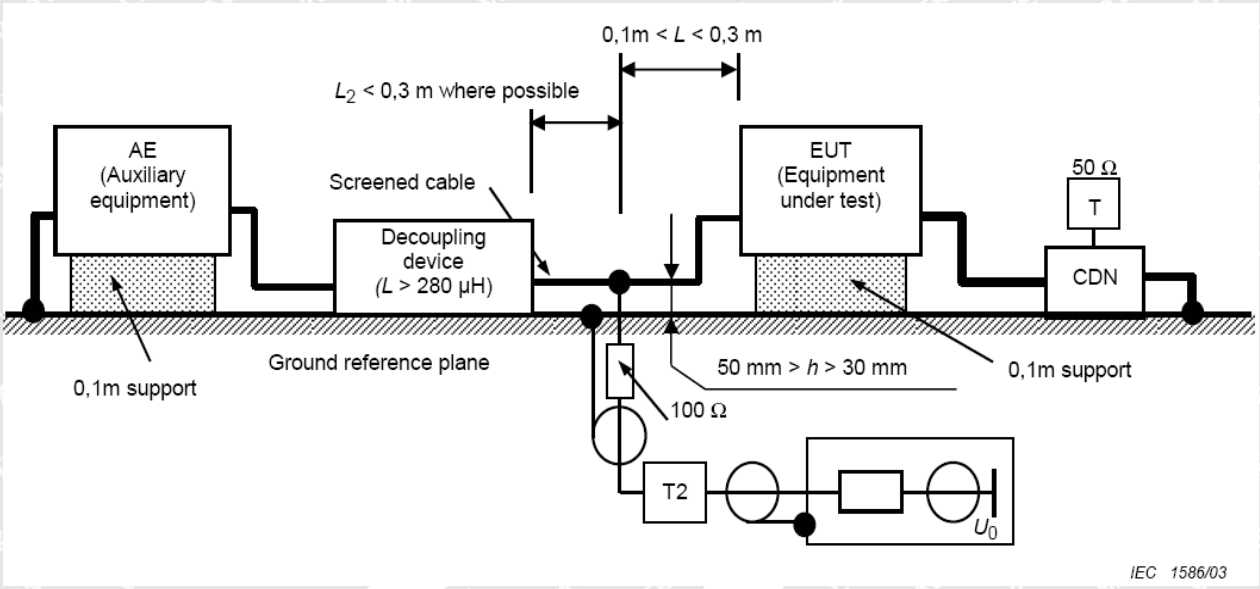
**EUT Operation:**

**Input Voltage** ..... : AC 230V/50Hz

**Operating Mode**..... : On mode

### 6.6.2 Block Diagram of Setup

The Injected Currents Immunity test was performed in accordance with the IEC 61000-4-6.




### 6.6.3 Test Results

| Frequency | Line | Test Level | Modulation | Step Size | Dwell Time | Performance Criterion | Result |
|---|---|---|---|---|---|---|---|
| 0.15MHz to 80MHz | 2 Wire AC Supply Cables | 3Vr.m.s. | 80%, 1kHz Amp. Mod. | 1% | 1s | A | Pass* |

Remark:

* During the test no deviation was detected to the selected operation mode(s)

## 6.7 Voltage Dips and Interruptions

**Test Requirement**..... : EN 61547

**Test Method**..... : IEC 61000-4-11

**Test Result**..... : Pass

**Test Level(Voltage reduction)** : 0%&70 % of $U_T$ (Supply Voltage)

**No. of Dips / Interruptions**..... : 1 per Level at 20ms intervals

### 6.7.1E.U.T. Operation

**Operating Environment:**

**Temperature** ..... : 22.9°C

**Humidity**..... : 47.5%RH

**Barometric Pressure**..... : 101.1kPa

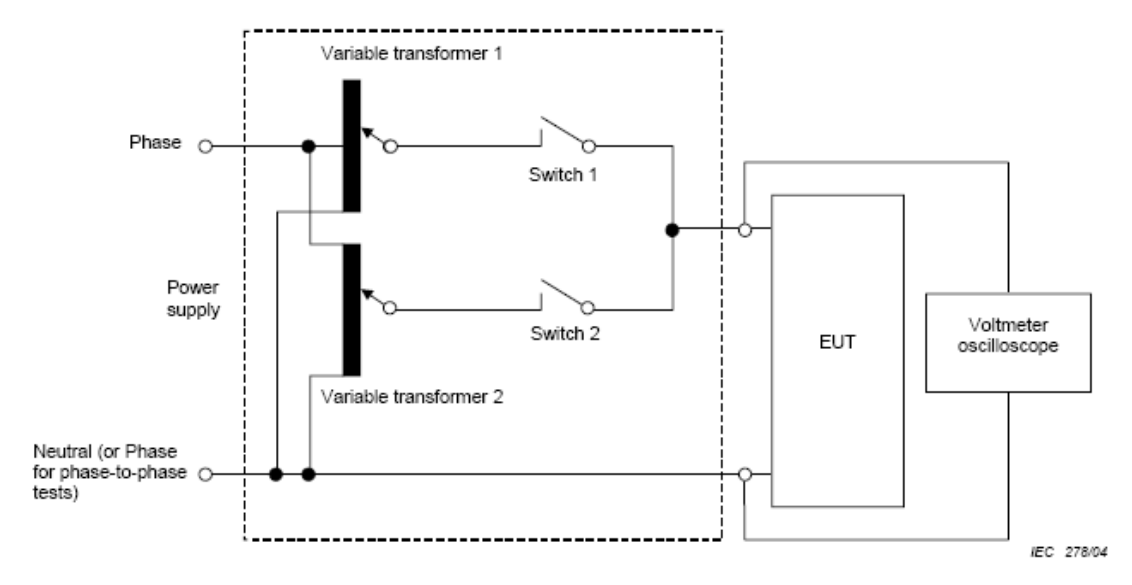
**EUT Operation:**

**Input Voltage** ..... : AC 230V/50Hz

**Operating Mode**..... : On mode

### 6.7.2Block Diagram of Setup

The Voltage Dips and Interruptions Immunity test was performed in accordance with the IEC 61000-4-11.



### 6.7.3Test Results

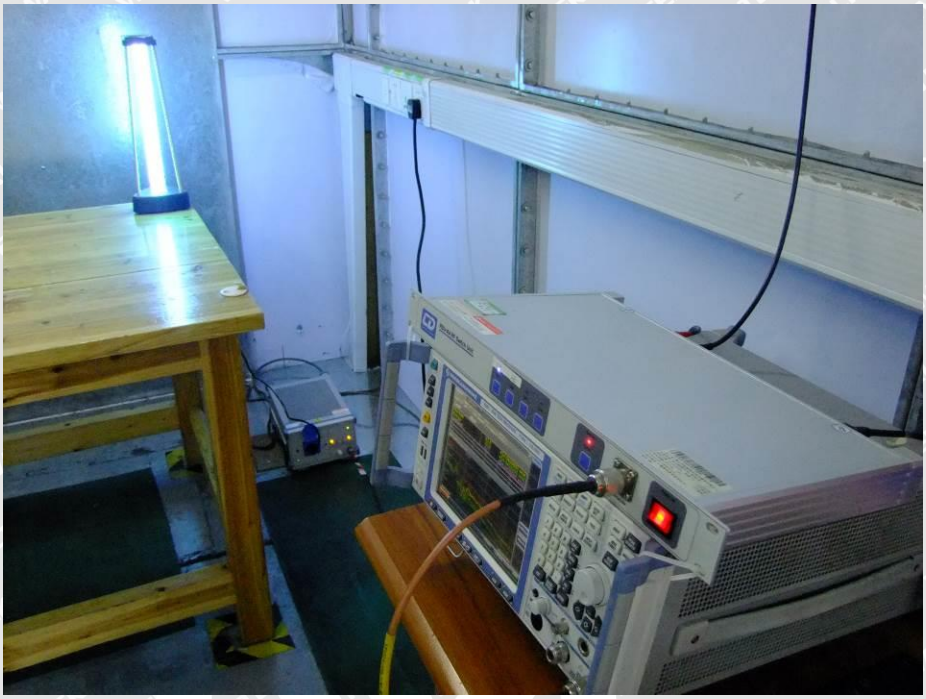
| Test Level in %$U_T$ | Phase | Performance criterion | Duration | Result |
|---|---|---|---|---|
| 0 | 0° | B | 0.5 | Pass* |
| | 180° | | | Pass* |
| 70 | 0° | C | 10 | Pass* |
| | 180° | | | Pass* |

Remark:

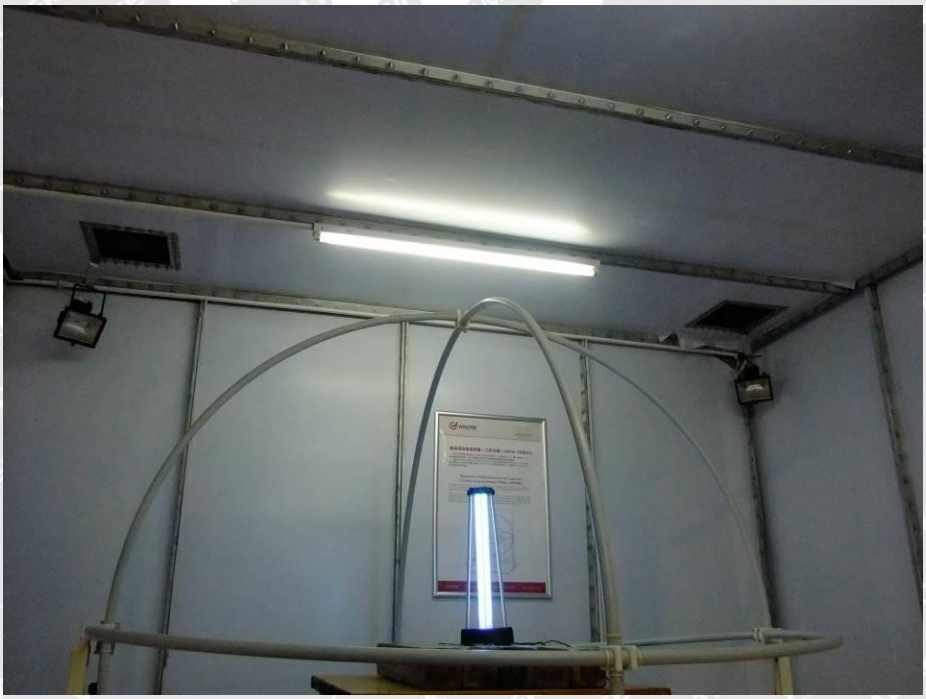
* During the test no deviation was detected to the selected operation mode(s)

# 7 Photographs – Test Setup

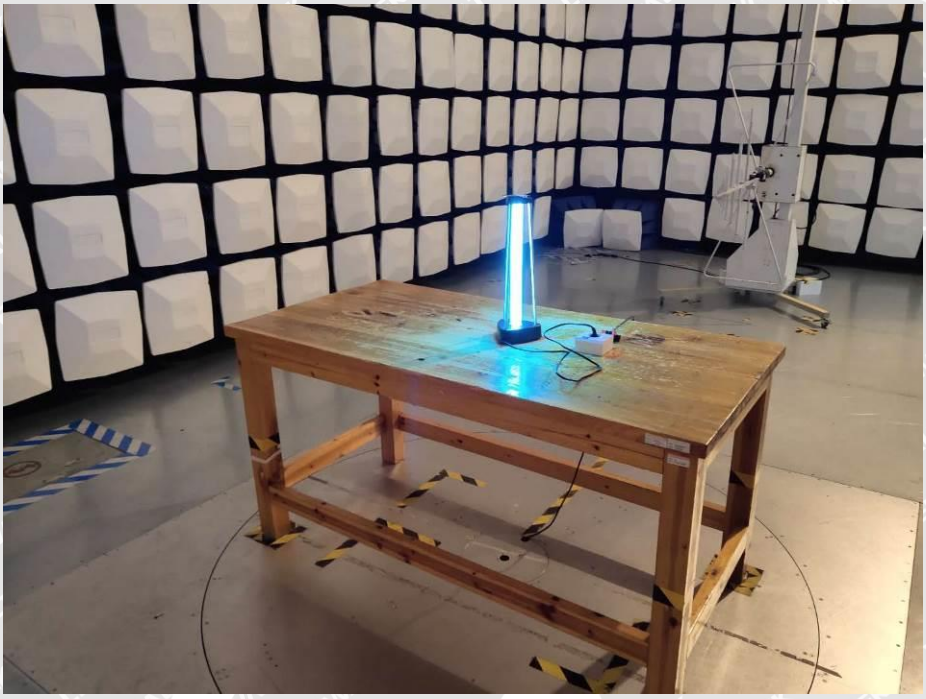
## 7.1 Photograph – Mains Terminal Disturbance Voltage Test Setup



## 7.2 Photograph – Radiated Electromagnetic Disturbance Test Setup

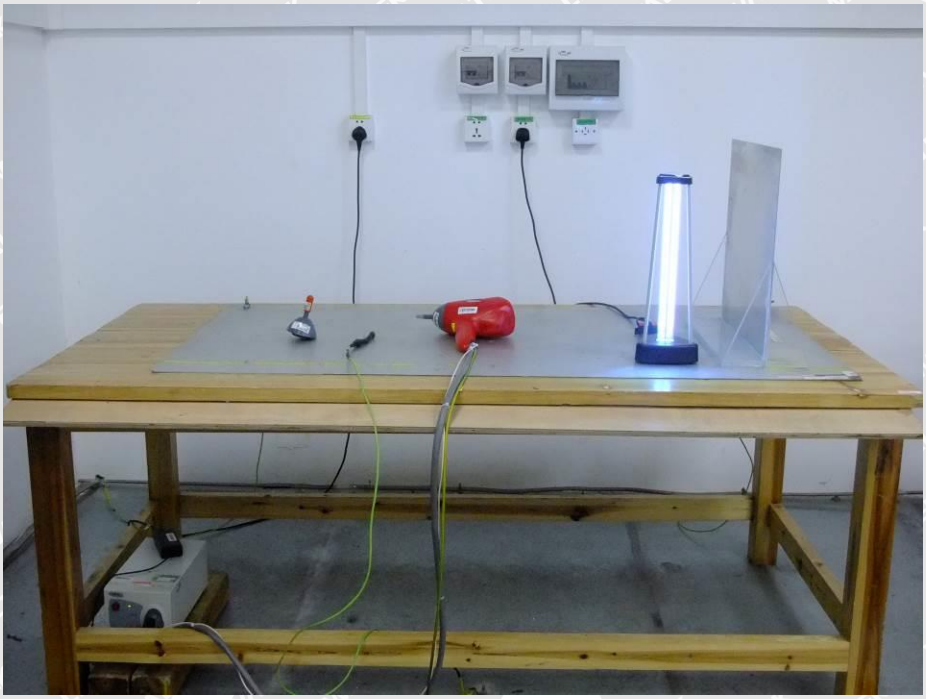


## 7.3 Photograph – Radiated Emission Test Setup, 30MHz to 300MHz

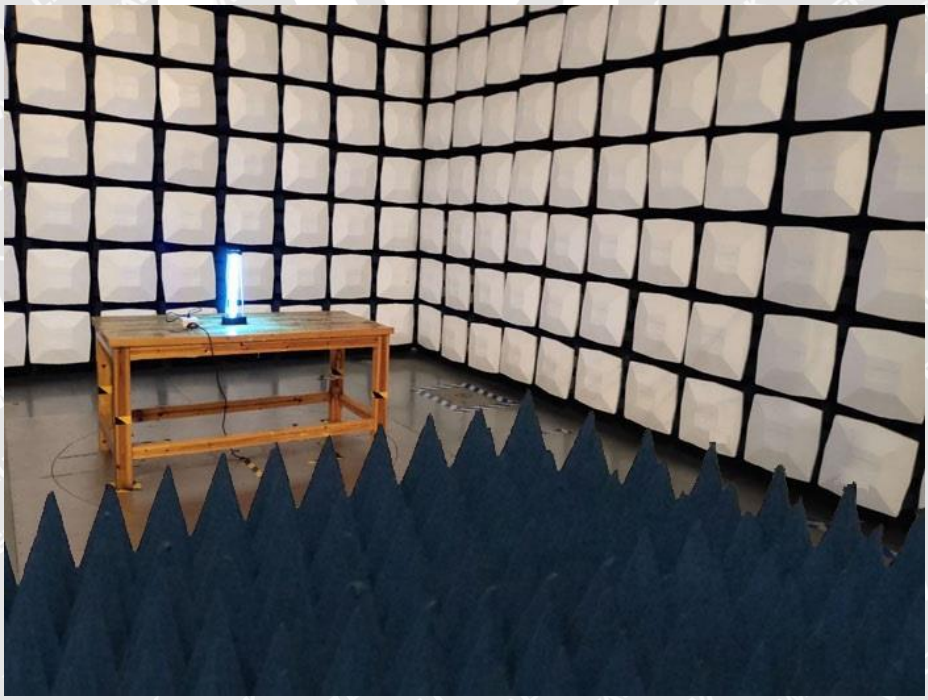


## 7.4 Photograph – Harmonic Current Emission Test Setup

## 7.5 Photograph – ESD Immunity Test Setup



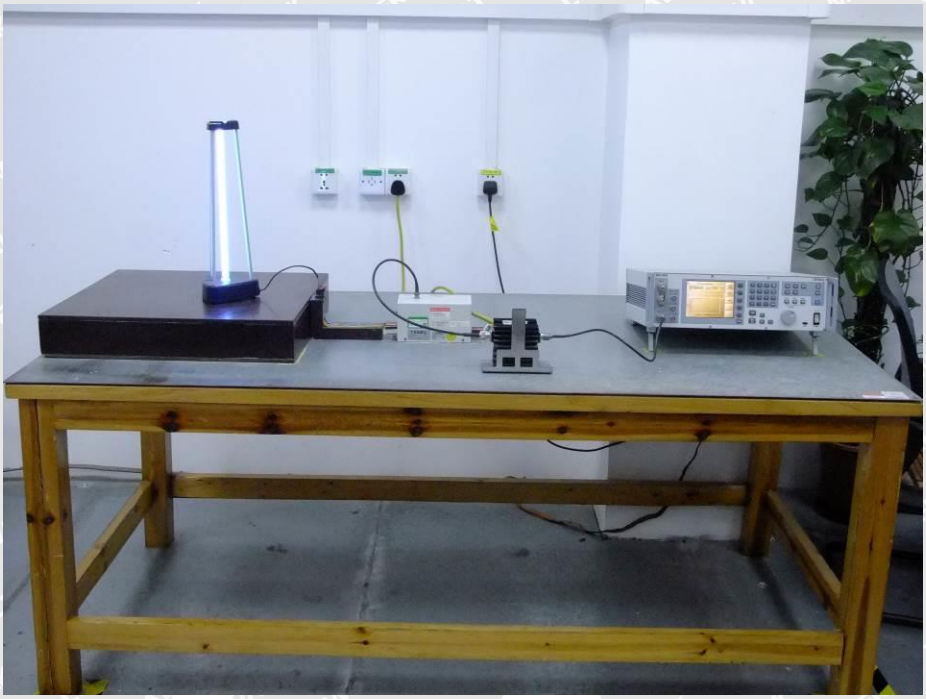
## 7.6 Photograph – Radio-Frequency Electromagnetic Fields Immunity Test Setup



## 7.7 Photograph – EFT Immunity Test Setup

## 7.8 Photograph – Surge Immunity Test Setup

## 7.9 Photograph – Injected Currents Immunity Test Setup



## 7.10 Photograph – Voltage Dips and Interruptions Immunity Test Setup

# 8 Photographs – Constructional Details

## 8.1 EUT – Front View

## 8.2 EUT – Back View

## 8.3 EUT – Label View


====== End of Report ======