

CE EMC Test Report

Report No.: CP200518C01

Test Model: TMPS 15-103, TMPS 15-105, TMPS 15-112, TMPS 15-115, TMPS 15-148

Series Model: TMPS 15-109, TMPS 15-124

Received Date: Mar. 16, 2020

Test Date: Mar. 17 to 23, 2020

Issued Date: Jun. 4, 2020

Applicant: TRACO ELECTRONIC AG

Address: SIHLBRUGGSTRASSE 111 CH-6340 BAAR, SWITZERLAND

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

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Release Control Record

| Issue No. | Description | Date Issued |
|-------------|-------------------|--------------|
| CP200518C01 | Original release. | Jun. 4, 2020 |

1 Certificate of Conformity

Product: DC to DC Converter
Brand: TRACO
Test Model: TMPS 15-103, TMPS 15-105, TMPS 15-112, TMPS 15-115, TMPS 15-148
Series Model: TMPS 15-109, TMPS 15-124
Sample Status: Engineering sample
Applicant: TRACO ELECTRONIC AG
Test Date: Mar. 17 to 23, 2020
Standards: **EN 61204-3:2000, Class B**
IEC 61000-3-2:2014 ED. 4.0
IEC 61000-3-3:2013 ED. 3.0
IEC 61000-4-2:2008 ED. 2.0
IEC 61000-4-3:2010 ED. 3.2
IEC 61000-4-4:2012 ED. 3.0
IEC 61000-4-5:2014 +A1:2017 ED. 3.0
IEC 61000-4-6:2013 ED. 4.0
IEC 61000-4-11:2004 +A1:2017 ED. 2.0

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.

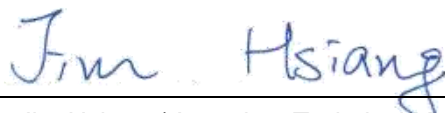
Prepared by :



, Date: Jun. 4, 2020

Sandra Lin / Specialist

Approved by :



, Date: Jun. 4, 2020

Jim Hsiang / Associate Technical Manager

2 Summary of Test Results

| Emission | | | |
|----------------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------|---------|
| Standard | Test Item | Result/Remarks | Verdict |
| EN 61204-3:2000 | Conducted Disturbance at Mains Ports | Meets Requirement Limit margin is -5.48 dB at 0.19689 MHz | Pass |
| | Radiated disturbance 30-1000 MHz | Meets Requirement Limit margin is -4.77 dB at 136.21 MHz | Pass |
| IEC 61000-3-2:2014 ED. 4.0 | Harmonic current emissions | The power consumption of EUT is less than 75W and no limits apply. | Pass |
| IEC 61000-3-3:2013 ED. 3.0 | Voltage fluctuations and flicker | $P_{st} \leq 1.0$ $d_{max} \leq 4\%$ $P_{lt} \leq 0.65$ $d_c \leq 3.3\%$ $T_{max} \leq 500ms$ | Pass |

| Immunity | | | |
|--------------------------------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Basic standard | Test Item | Result/Remarks | Verdict |
| IEC 61000-4-2:2008 ED. 2.0 | Electrostatic discharges (ESD) | Performance Criterion A | Pass |
| IEC 61000-4-3:2010 ED. 3.2 | Continuous radiated disturbances (RS) | Performance Criterion A | Pass |
| IEC 61000-4-4:2012 ED. 3.0 | Electrical fast transients (EFT) | Performance Criterion A | Pass |
| IEC 61000-4-5:2014 +A1:2017 ED. 3.0 | Surges | Performance Criterion A | Pass |
| IEC 61000-4-6:2013 ED. 4.0 | Continuous conducted disturbances (CS) | Performance Criterion A | Pass |
| IEC 61000-4-11:2004 +A1:2017 ED. 2.0 | Voltage dips and interruptions | Meets the requirements of Voltage Dips: i).30% reduction - Performance Criterion A ii).60% reduction – Performance Criterion B Voltage Interruptions: i). >95% reduction – Performance Criterion B | Pass |

Note:

1. The above IEC basic standards are applied with latest version if customer has no special requirement.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
3. There is no deviation to the applied test methods and requirements covered by the scope of this report.
4. N/A: Not Applicable.

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 | Expanded Uncertainty (k=2) (\pm) |
|--------------------------------------|-----------------------------------------|
| Conducted Disturbance at Mains Ports | 3.00 dB |
| Radiated disturbance, 30-1000 MHz | 3.97 dB |

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 Description of EUT

| | |
|---------------------|-----------------------------------------------------------------|
| Product | DC to DC Converter |
| Brand | TRACO |
| Test Model | TMPS 15-103, TMPS 15-105, TMPS 15-112, TMPS 15-115, TMPS 15-148 |
| Series Model | TMPS 15-109, TMPS 15-124 |
| Model Difference | Refer to note as below |
| Sample Status | Engineering sample |
| Operating Software | N/A |
| Power Supply Rating | Refer to note as below |
| Accessory Device | N/A |
| Data Cable Supplied | N/A |

Note:

1. This report is issued as a duplicate report of BV CPS report no.: 200518C01. The difference compared with original report are changing applicant, brand and models for marketing purpose; therefore all test data was copied from the original test report.
2. The EUT is a DC to DC Converter, the specifications of standard models were listed as below:

| Model Number | Input Voltage (Range) | Output Voltage |
|--------------|------------------------------|----------------|
| | VDC | VDC |
| TMPS 15-103 | 115Vac, 60Hz 230Vac, 50Hz | 3.3 |
| TMPS 15-105 | | 5 |
| TMPS 15-109 | | 9 |
| TMPS 15-112 | | 12 |
| TMPS 15-115 | | 15 |
| TMPS 15-124 | | 24 |
| TMPS 15-148 | | 48 |

During the test, the **Model No.: TMPS 15-103, TMPS 15-105, TMPS 15-112, TMPS 15-115, TMPS 15-148** were selected as the representative one for the test and therefore only its test data were recorded in this report.

3.2 Features of EUT

The tests reported herein were performed according to the method specified by TRACO ELECTRONIC AG, for detailed feature description, please refer to the manufacturer's specifications or user's manual.

3.3 Operating Modes of EUT and Determination of Worst Case Operating Mode

The EUT was tested under the following modes:

| Test Mode | Model | Input Power |
|-----------------------------------------------------------------|--------------|--------------|
| Conducted emission test, Radiated emission & EFT, Surge tests | | |
| Mode 1 | TMPS 15-103 | 230Vac/ 50Hz |
| Mode 2 | TMPS 15-105 | |
| Mode 3 | TMPS 15-112 | |
| Mode 4 | TMPS 15-115 | |
| Mode 5 | TMPS 15-148 | |
| Harmonics, Flicker, Immunity tests (EFT & Surge tests excluded) | | |
| Mode 5 | TMPS 15-148* | 230Vac/ 50Hz |

*The test Model was selected the worst case from Conducted Test (230Vac/ 50Hz).

3.4 Test Program Used and Operation Descriptions

◆ For Conducted & Radiated tests:

Set the EUT under full resistor load.

◆ For Harmonics, Flicker tests:

Connected a resistor load to DC output port of EUT to make EUT have maximum power consumption.

◆ For Immunity tests:

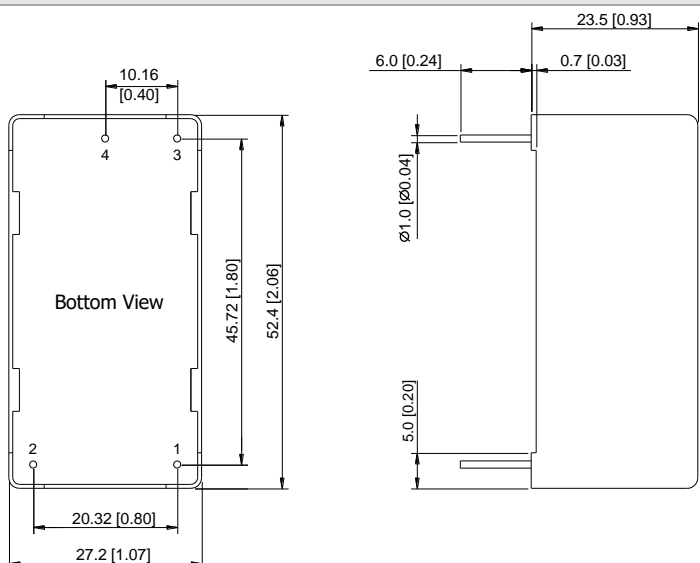
Connected a resistor load to DC output port of EUT to make EUT have maximum power consumption and a multimeter was used to monitor voltage of output.

3.5 Primary Clock Frequencies of Internal Source

The highest frequency generated or used within the EUT or on which the EUT operates or tunes is below 108MHz, provided by TRACO ELECTRONIC AG, for detailed internal source, please refer to the manufacturer's specifications.

3.6 Package Specifications by Manufacturer

Package Specifications

| Mechanical Dimensions | | Pin Connections | |
|-------------------------------------------------------------------------------------------------------|--|-----------------|----------|
|  <p>Bottom View</p> | | Pin | Function |
| | | 1 | AC(N) |
| | | 2 | AC(L) |
| | | 3 | +Vout |
| | | 4 | -Vout |

- ▶ All dimensions in mm (inches)
- ▶ Tolerance: ± 0.5 (± 0.01)
- ▶ Pin diameter $\varnothing 1.0 \pm 0.1$ (0.02 ± 0.004)

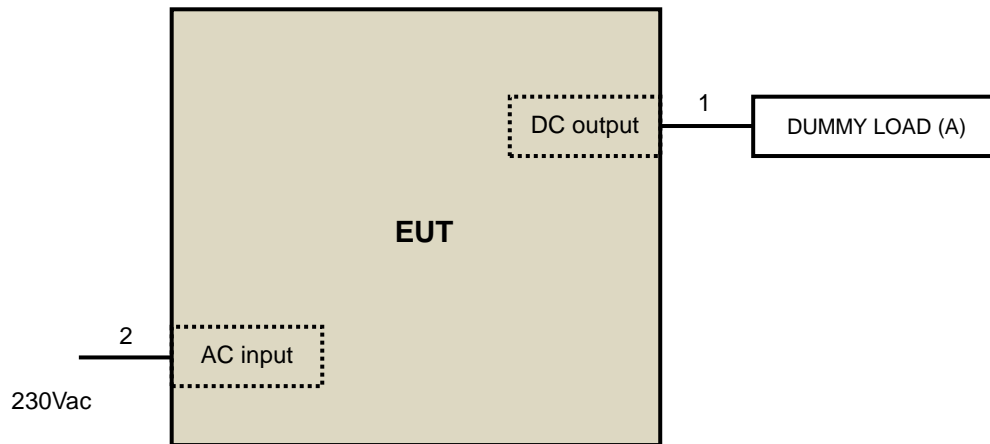
Physical Characteristics

| | |
|---------------|--------------------------------------------------|
| Case Size | : 52.4x27.2x23.5mm (2.06x1.07x0.93 inches) |
| Case Material | : Plastic resin (flammability to UL 94V-0 rated) |
| Pin Material | : Tinned Copper |
| Weight | : 60g |

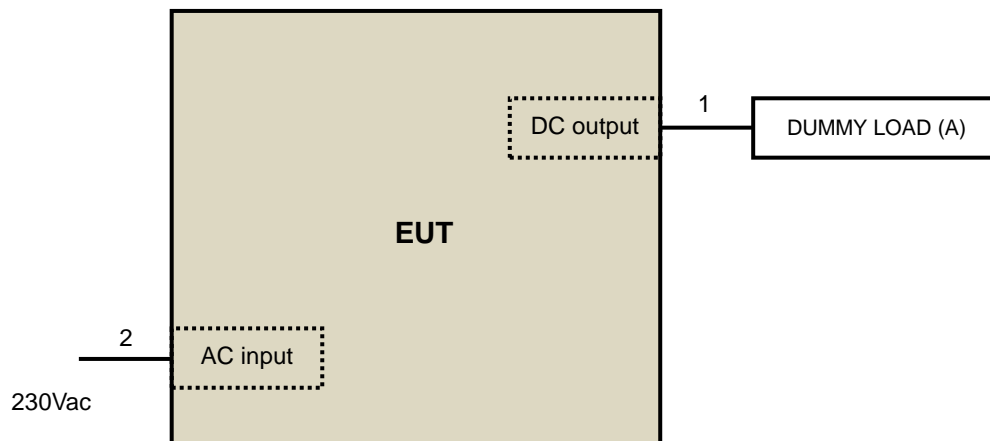
4 Configuration and Connections with EUT

4.1 Connection Diagram of EUT and Peripheral Devices

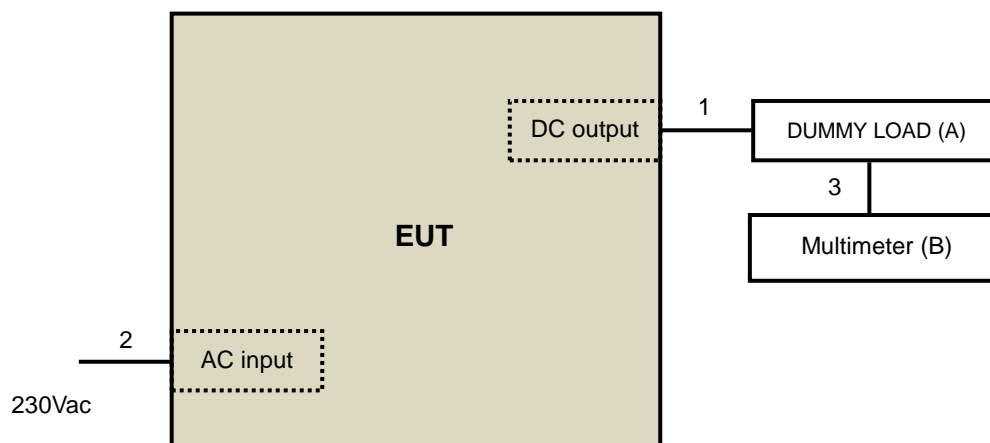
Emission tests (Harmonics & Flicker excluded):



Harmonics, Flicker tests:



Immunity tests:



4.2 Configuration of Peripheral Devices and Cable Connections

Emission tests (Harmonics, Flicker excluded):

| ID | Product | Brand | Model No. | Serial No. | FCC ID | Remarks |
|----|------------|-------|-----------|------------|--------|--------------------|
| A. | DUMMY LOAD | N/A | N/A | N/A | N/A | Supplied by client |

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

| ID | Descriptions | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks |
|----|--------------|------|------------|--------------------|--------------|--------------------|
| 1. | DC cable | 1 | 0.1 | N | 0 | Supplied by client |
| 2. | AC cable | 1 | 1.1 | N | 0 | Provided by Lab |

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

Harmonics, Flicker, Immunity tests:

| ID | Product | Brand | Model No. | Serial No. | FCC ID | Remarks |
|----|------------|-------|-----------|------------|--------|--------------------|
| A. | DUMMY LOAD | N/A | N/A | N/A | N/A | Supplied by client |
| B. | Multimeter | YFE | YF-370A | N/A | N/A | Provided by Lab |

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

| ID | Descriptions | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks |
|----|--------------|------|------------|--------------------|--------------|--------------------|
| 1. | DC cable | 1 | 0.1 | N | 0 | Supplied by client |
| 2. | AC cable | 1 | 2.1 | N | 0 | Provided by Lab |
| 3. | Data cable | 1 | 0.65 | N | 0 | Provided by Lab |

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

5 Conducted Disturbance at Mains Ports

5.1 Limits

| Frequency (MHz) | Class A (dBuV) | | Class B (dBuV) | |
|-----------------|----------------|---------|----------------|---------|
| | Quasi-peak | Average | Quasi-peak | Average |
| 0.15 - 0.5 | 79 | 66 | 66 - 56 | 56 - 46 |
| 0.50 - 5.0 | 73 | 60 | 56 | 46 |
| 5.0 - 30.0 | 73 | 60 | 60 | 50 |

Notes: 1. The lower limit shall apply at the transition frequencies.
 2. The limit decreases linearly with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

5.2 Test Instruments

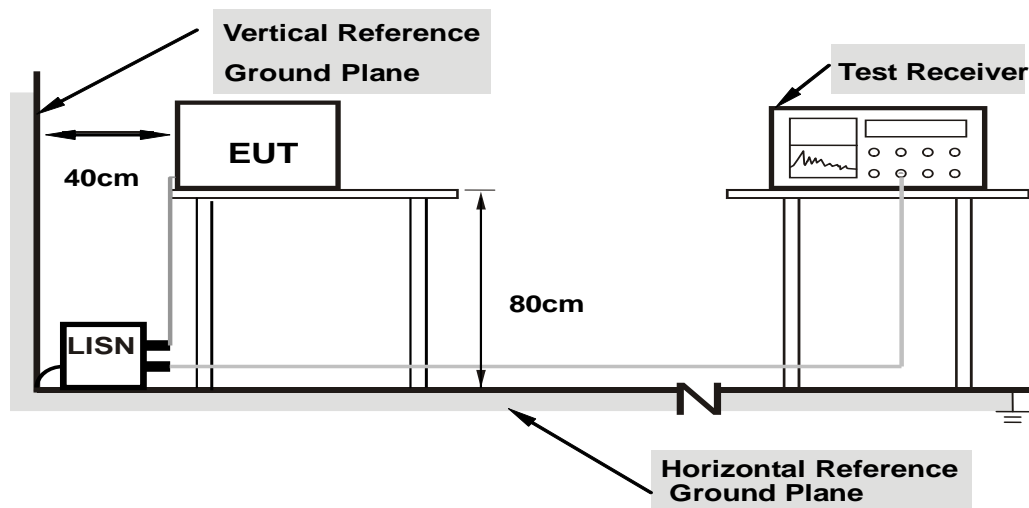
| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|----------------------------------------------------------|---------------|--------------|---------------|---------------|
| ROHDE & SCHWARZ TEST RECEIVER | ESCS 30 | 838251/021 | Oct. 30, 2019 | Oct. 29, 2020 |
| ROHDE & SCHWARZ Artificial Mains Network (For EUT) | ENV216 | 101195 | May 9, 2019 | May 8, 2020 |
| LISN With Adapter (for EUT) | 101195 | N/A | May 9, 2019 | May 8, 2020 |
| EMCO L.I.S.N. (For peripherals) | 3825/2 | 9504-2359 | Jul. 31, 2019 | Jul. 30, 2020 |
| SCHWARZBECK Artificial Mains Network (For EUT) | NNLK8129 | 8129229 | May 14, 2019 | May 13, 2020 |
| SCHWARZBECK Artificial Mains Network (for EUT) | NSLK 8128 | 8128-244 | Nov. 11, 2019 | Nov. 10, 2020 |
| Software | Cond_V7.3.7.4 | NA | NA | NA |
| RF cable (JYEBAO) With 10dB PAD | 5D-FB | Cable-C03-01 | Sep. 17, 2019 | Sep. 16, 2020 |
| LYNICS Terminator (For EMCO LISN) | 0900510 | E1-01-300 | Jan. 20, 2020 | Jan. 19, 2021 |
| LYNICS Terminator (For EMCO LISN) | 0900510 | E1-01-301 | Jan. 20, 2020 | Jan. 19, 2021 |
| ROHDE & SCHWARZ Artificial Mains Network (For TV EUT) | ENV216 | 101196 | Apr. 16, 2019 | Apr. 15, 2020 |
| LISN With Adapter (for TV EUT) | 101196 | NA | Apr. 16, 2019 | Apr. 15, 2020 |

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in Shielded Room No. 3.
 3. The VCCI Site Registration No. C-10274.
 4. Tested Date: Mar. 17, 2020

5.3 Test Arrangement

- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The test results of conducted emissions at mains ports are recorded of six worst margins for quasi-peak (mandatory) [and average (if necessary)] values against the limits at frequencies of interest unless the margin is 20 dB or greater.

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.



- Note:**
- 1.Support units were connected to second LISN.
 - 2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

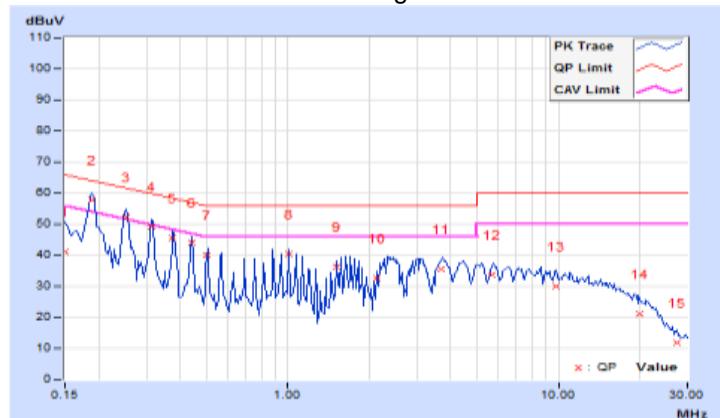
5.4 Test Results

| | | | |
|-----------------|----------------|-------------------------------|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 230Vac, 50Hz | Environmental Conditions | 25°C, 75%RH |
| Tested by | Vhenson Huang | | |
| Test Mode | Mode 1 | | |

| Phase Of Power : Line (L) | | | | | | | | | | |
|---------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) | | Emission Level (dBuV) | | Limit (dBuV) | | Margin (dB) | |
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.15000 | 9.62 | 31.38 | 7.79 | 41.00 | 17.41 | 66.00 | 56.00 | -25.00 | -38.59 |
| 2 | 0.18906 | 9.61 | 48.09 | 34.93 | 57.70 | 44.54 | 64.08 | 54.08 | -6.38 | -9.54 |
| 3 | 0.25154 | 9.62 | 42.64 | 31.97 | 52.26 | 41.59 | 61.71 | 51.71 | -9.45 | -10.12 |
| 4 | 0.31406 | 9.62 | 39.78 | 31.85 | 49.40 | 41.47 | 59.86 | 49.86 | -10.46 | -8.39 |
| 5 | 0.37667 | 9.63 | 36.00 | 29.37 | 45.63 | 39.00 | 58.35 | 48.35 | -12.72 | -9.35 |
| 6 | 0.44034 | 9.63 | 34.47 | 29.63 | 44.10 | 39.26 | 57.06 | 47.06 | -12.96 | -7.80 |
| 7 | 0.50292 | 9.64 | 30.54 | 25.42 | 40.18 | 35.06 | 56.00 | 46.00 | -15.82 | -10.94 |
| 8 | 1.00536 | 9.66 | 30.88 | 29.98 | 40.54 | 39.64 | 56.00 | 46.00 | -15.46 | -6.36 |
| 9 | 1.50591 | 9.69 | 26.64 | 25.33 | 36.33 | 35.02 | 56.00 | 46.00 | -19.67 | -10.98 |
| 10 | 2.13290 | 9.72 | 22.71 | 20.56 | 32.43 | 30.28 | 56.00 | 46.00 | -23.57 | -15.72 |
| 11 | 3.70206 | 9.75 | 25.83 | 22.10 | 35.58 | 31.85 | 56.00 | 46.00 | -20.42 | -14.15 |
| 12 | 5.70516 | 9.78 | 24.06 | 19.79 | 33.84 | 29.57 | 60.00 | 50.00 | -26.16 | -20.43 |
| 13 | 9.76953 | 9.82 | 20.10 | 15.23 | 29.92 | 25.05 | 60.00 | 50.00 | -30.08 | -24.95 |
| 14 | 20.00781 | 9.88 | 11.17 | 4.76 | 21.05 | 14.64 | 60.00 | 50.00 | -38.95 | -35.36 |
| 15 | 27.32277 | 9.87 | 1.88 | 0.03 | 11.75 | 9.90 | 60.00 | 50.00 | -48.25 | -40.10 |

Remarks:

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

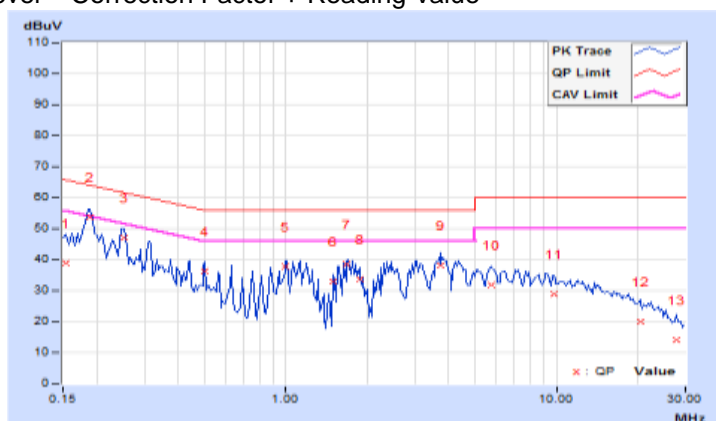


| | | | |
|-----------------|----------------|-------------------------------|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 230Vac, 50Hz | Environmental Conditions | 25°C, 75%RH |
| Tested by | Vhenson Huang | | |
| Test Mode | Mode 1 | | |

| Phase Of Power : Neutral (N) | | | | | | | | | | |
|------------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) | | Emission Level (dBuV) | | Limit (dBuV) | | Margin (dB) | |
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.15391 | 9.60 | 29.25 | 7.26 | 38.85 | 16.86 | 65.79 | 55.79 | -26.94 | -38.93 |
| 2 | 0.18778 | 9.60 | 44.22 | 29.23 | 53.82 | 38.83 | 64.13 | 54.13 | -10.31 | -15.30 |
| 3 | 0.25156 | 9.60 | 37.34 | 24.23 | 46.94 | 33.83 | 61.71 | 51.71 | -14.77 | -17.88 |
| 4 | 0.49901 | 9.61 | 26.70 | 22.15 | 36.31 | 31.76 | 56.02 | 46.02 | -19.71 | -14.26 |
| 5 | 1.00009 | 9.64 | 28.10 | 25.59 | 37.74 | 35.23 | 56.00 | 46.00 | -18.26 | -10.77 |
| 6 | 1.50000 | 9.67 | 23.34 | 19.95 | 33.01 | 29.62 | 56.00 | 46.00 | -22.99 | -16.38 |
| 7 | 1.68494 | 9.68 | 28.68 | 24.47 | 38.36 | 34.15 | 56.00 | 46.00 | -17.64 | -11.85 |
| 8 | 1.87509 | 9.69 | 24.00 | 21.17 | 33.69 | 30.86 | 56.00 | 46.00 | -22.31 | -15.14 |
| 9 | 3.74355 | 9.73 | 28.47 | 21.42 | 38.20 | 31.15 | 56.00 | 46.00 | -17.80 | -14.85 |
| 10 | 5.75391 | 9.76 | 21.96 | 16.56 | 31.72 | 26.32 | 60.00 | 50.00 | -28.28 | -23.68 |
| 11 | 9.80188 | 9.82 | 18.89 | 13.12 | 28.71 | 22.94 | 60.00 | 50.00 | -31.29 | -27.06 |
| 12 | 20.39063 | 9.92 | 9.91 | 4.00 | 19.83 | 13.92 | 60.00 | 50.00 | -40.17 | -36.08 |
| 13 | 27.89844 | 9.96 | 4.25 | 0.82 | 14.21 | 10.78 | 60.00 | 50.00 | -45.79 | -39.22 |

Remarks:

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

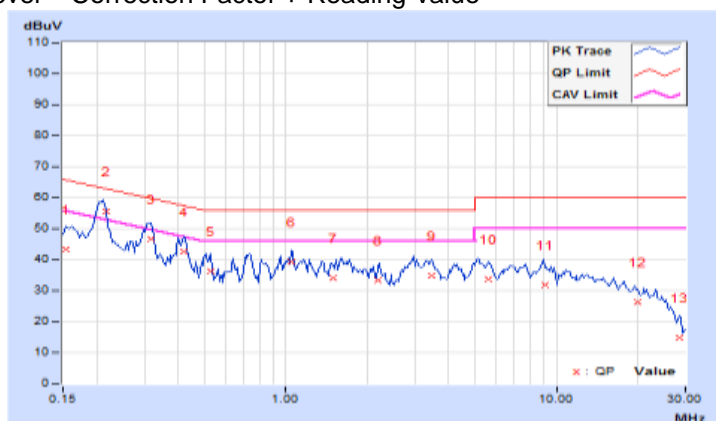


| | | | |
|-----------------|----------------|-------------------------------|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 230Vac, 50Hz | Environmental Conditions | 25°C, 75%RH |
| Tested by | Vhenson Huang | | |
| Test Mode | Mode 2 | | |

| Phase Of Power : Line (L) | | | | | | | | | | |
|---------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) | | Emission Level (dBuV) | | Limit (dBuV) | | Margin (dB) | |
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.15391 | 9.62 | 33.61 | 17.72 | 43.23 | 27.34 | 65.79 | 55.79 | -22.56 | -28.45 |
| 2 | 0.21605 | 9.61 | 45.87 | 34.40 | 55.48 | 44.01 | 62.97 | 52.97 | -7.49 | -8.96 |
| 3 | 0.31797 | 9.62 | 36.89 | 29.33 | 46.51 | 38.95 | 59.76 | 49.76 | -13.25 | -10.81 |
| 4 | 0.41953 | 9.63 | 32.84 | 27.85 | 42.47 | 37.48 | 57.46 | 47.46 | -14.99 | -9.98 |
| 5 | 0.52725 | 9.64 | 26.67 | 21.68 | 36.31 | 31.32 | 56.00 | 46.00 | -19.69 | -14.68 |
| 6 | 1.04688 | 9.66 | 29.48 | 25.39 | 39.14 | 35.05 | 56.00 | 46.00 | -16.86 | -10.95 |
| 7 | 1.49342 | 9.69 | 24.26 | 19.44 | 33.95 | 29.13 | 56.00 | 46.00 | -22.05 | -16.87 |
| 8 | 2.19449 | 9.72 | 23.58 | 18.87 | 33.30 | 28.59 | 56.00 | 46.00 | -22.70 | -17.41 |
| 9 | 3.46757 | 9.75 | 24.97 | 20.38 | 34.72 | 30.13 | 56.00 | 46.00 | -21.28 | -15.87 |
| 10 | 5.63281 | 9.78 | 24.00 | 19.22 | 33.78 | 29.00 | 60.00 | 50.00 | -26.22 | -21.00 |
| 11 | 9.10094 | 9.81 | 22.06 | 16.33 | 31.87 | 26.14 | 60.00 | 50.00 | -28.13 | -23.86 |
| 12 | 20.07813 | 9.88 | 16.35 | 10.86 | 26.23 | 20.74 | 60.00 | 50.00 | -33.77 | -29.26 |
| 13 | 28.37891 | 9.88 | 4.96 | 0.23 | 14.84 | 10.11 | 60.00 | 50.00 | -45.16 | -39.89 |

Remarks:

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

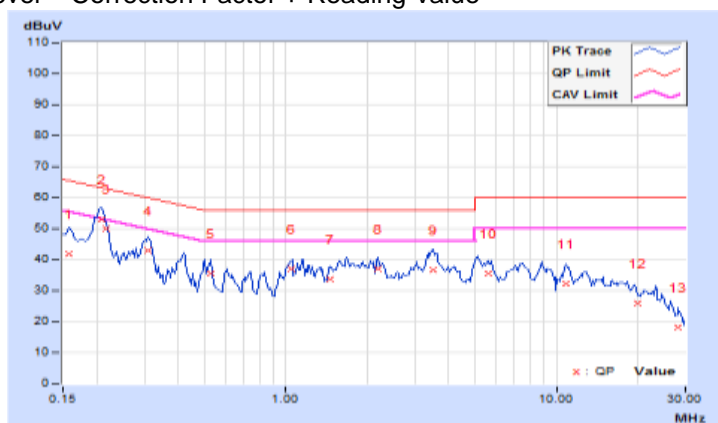


| | | | |
|-----------------|----------------|-------------------------------|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 230Vac, 50Hz | Environmental Conditions | 25°C, 75%RH |
| Tested by | Vhenson Huang | | |
| Test Mode | Mode 2 | | |

| Phase Of Power : Neutral (N) | | | | | | | | | | |
|------------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) | | Emission Level (dBuV) | | Limit (dBuV) | | Margin (dB) | |
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.15781 | 9.60 | 32.31 | 15.25 | 41.91 | 24.85 | 65.58 | 55.58 | -23.67 | -30.73 |
| 2 | 0.20859 | 9.60 | 43.29 | 29.74 | 52.89 | 39.34 | 63.26 | 53.26 | -10.37 | -13.92 |
| 3 | 0.21602 | 9.60 | 40.49 | 26.98 | 50.09 | 36.58 | 62.97 | 52.97 | -12.88 | -16.39 |
| 4 | 0.31016 | 9.61 | 33.24 | 24.59 | 42.85 | 34.20 | 59.97 | 49.97 | -17.12 | -15.77 |
| 5 | 0.52509 | 9.62 | 25.99 | 22.50 | 35.61 | 32.12 | 56.00 | 46.00 | -20.39 | -13.88 |
| 6 | 1.04839 | 9.64 | 27.54 | 23.95 | 37.18 | 33.59 | 56.00 | 46.00 | -18.82 | -12.41 |
| 7 | 1.45313 | 9.67 | 24.10 | 19.26 | 33.77 | 28.93 | 56.00 | 46.00 | -22.23 | -17.07 |
| 8 | 2.19286 | 9.70 | 27.20 | 21.73 | 36.90 | 31.43 | 56.00 | 46.00 | -19.10 | -14.57 |
| 9 | 3.49872 | 9.73 | 26.77 | 20.68 | 36.50 | 30.41 | 56.00 | 46.00 | -19.50 | -15.59 |
| 10 | 5.57813 | 9.76 | 25.85 | 20.96 | 35.61 | 30.72 | 60.00 | 50.00 | -24.39 | -19.28 |
| 11 | 10.91797 | 9.83 | 22.26 | 16.72 | 32.09 | 26.55 | 60.00 | 50.00 | -27.91 | -23.45 |
| 12 | 20.00781 | 9.92 | 16.00 | 10.65 | 25.92 | 20.57 | 60.00 | 50.00 | -34.08 | -29.43 |
| 13 | 28.27734 | 9.97 | 8.14 | 2.92 | 18.11 | 12.89 | 60.00 | 50.00 | -41.89 | -37.11 |

Remarks:

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



| | | | |
|-----------------|----------------|-------------------------------|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 230Vac, 50Hz | Environmental Conditions | 25°C, 75%RH |
| Tested by | Vhenson Huang | | |
| Test Mode | Mode 3 | | |

| Phase Of Power : Line (L) | | | | | | | | | | |
|---------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) | | Emission Level (dBuV) | | Limit (dBuV) | | Margin (dB) | |
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.15382 | 9.62 | 31.85 | 15.13 | 41.47 | 24.75 | 65.79 | 55.79 | -24.32 | -31.04 |
| 2 | 0.20207 | 9.61 | 45.44 | 30.75 | 55.05 | 40.36 | 63.53 | 53.53 | -8.48 | -13.17 |
| 3 | 0.21641 | 9.61 | 41.54 | 27.10 | 51.15 | 36.71 | 62.96 | 52.96 | -11.81 | -16.25 |
| 4 | 0.29844 | 9.62 | 38.56 | 29.06 | 48.18 | 38.68 | 60.29 | 50.29 | -12.11 | -11.61 |
| 5 | 0.40781 | 9.63 | 31.29 | 24.80 | 40.92 | 34.43 | 57.69 | 47.69 | -16.77 | -13.26 |
| 6 | 0.49547 | 9.63 | 28.80 | 23.85 | 38.43 | 33.48 | 56.08 | 46.08 | -17.65 | -12.60 |
| 7 | 0.94688 | 9.66 | 28.19 | 23.86 | 37.85 | 33.52 | 56.00 | 46.00 | -18.15 | -12.48 |
| 8 | 1.42578 | 9.69 | 24.60 | 19.69 | 34.29 | 29.38 | 56.00 | 46.00 | -21.71 | -16.62 |
| 9 | 2.17188 | 9.72 | 24.58 | 19.56 | 34.30 | 29.28 | 56.00 | 46.00 | -21.70 | -16.72 |
| 10 | 3.32031 | 9.75 | 25.07 | 20.18 | 34.82 | 29.93 | 56.00 | 46.00 | -21.18 | -16.07 |
| 11 | 6.43359 | 9.78 | 22.76 | 17.29 | 32.54 | 27.07 | 60.00 | 50.00 | -27.46 | -22.93 |
| 12 | 10.39063 | 9.82 | 20.54 | 15.31 | 30.36 | 25.13 | 60.00 | 50.00 | -29.64 | -24.87 |
| 13 | 20.41406 | 9.88 | 12.08 | 6.56 | 21.96 | 16.44 | 60.00 | 50.00 | -38.04 | -33.56 |
| 14 | 27.74219 | 9.88 | 3.03 | 0.02 | 12.91 | 9.90 | 60.00 | 50.00 | -47.09 | -40.10 |

Remarks:

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

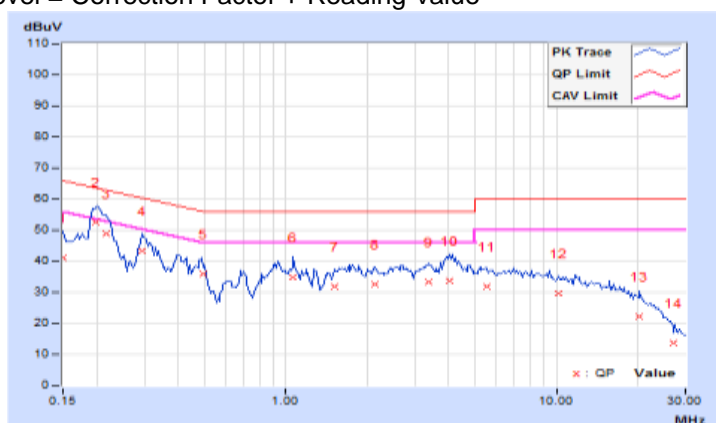


| | | | |
|-----------------|----------------|-------------------------------|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 230Vac, 50Hz | Environmental Conditions | 25°C, 75%RH |
| Tested by | Vhenson Huang | | |
| Test Mode | Mode 3 | | |

| Phase Of Power : Neutral (N) | | | | | | | | | | |
|------------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) | | Emission Level (dBuV) | | Limit (dBuV) | | Margin (dB) | |
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.15000 | 9.60 | 31.55 | 13.34 | 41.15 | 22.94 | 66.00 | 56.00 | -24.85 | -33.06 |
| 2 | 0.19951 | 9.60 | 42.84 | 26.63 | 52.44 | 36.23 | 63.63 | 53.63 | -11.19 | -17.40 |
| 3 | 0.21648 | 9.60 | 39.33 | 24.34 | 48.93 | 33.94 | 62.95 | 52.95 | -14.02 | -19.01 |
| 4 | 0.29453 | 9.60 | 33.74 | 23.76 | 43.34 | 33.36 | 60.40 | 50.40 | -17.06 | -17.04 |
| 5 | 0.49504 | 9.61 | 26.36 | 21.97 | 35.97 | 31.58 | 56.08 | 46.08 | -20.11 | -14.50 |
| 6 | 1.06641 | 9.64 | 25.24 | 19.97 | 34.88 | 29.61 | 56.00 | 46.00 | -21.12 | -16.39 |
| 7 | 1.51563 | 9.67 | 22.28 | 16.39 | 31.95 | 26.06 | 56.00 | 46.00 | -24.05 | -19.94 |
| 8 | 2.14060 | 9.70 | 22.86 | 17.71 | 32.56 | 27.41 | 56.00 | 46.00 | -23.44 | -18.59 |
| 9 | 3.37892 | 9.73 | 23.56 | 18.26 | 33.29 | 27.99 | 56.00 | 46.00 | -22.71 | -18.01 |
| 10 | 4.05078 | 9.74 | 23.88 | 17.63 | 33.62 | 27.37 | 56.00 | 46.00 | -22.38 | -18.63 |
| 11 | 5.50396 | 9.76 | 21.97 | 16.48 | 31.73 | 26.24 | 60.00 | 50.00 | -28.27 | -23.76 |
| 12 | 10.12888 | 9.82 | 19.67 | 14.09 | 29.49 | 23.91 | 60.00 | 50.00 | -30.51 | -26.09 |
| 13 | 20.16797 | 9.92 | 12.46 | 6.98 | 22.38 | 16.90 | 60.00 | 50.00 | -37.62 | -33.10 |
| 14 | 27.12891 | 9.96 | 3.70 | 0.92 | 13.66 | 10.88 | 60.00 | 50.00 | -46.34 | -39.12 |

Remarks:

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

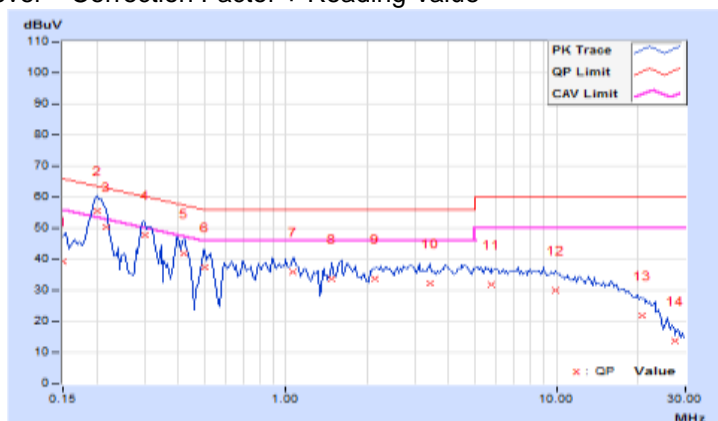


| | | | |
|-----------------|----------------|-------------------------------|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 230Vac, 50Hz | Environmental Conditions | 25°C, 75%RH |
| Tested by | Vhenson Huang | | |
| Test Mode | Mode 4 | | |

| Phase Of Power : Line (L) | | | | | | | | | | |
|---------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) | | Emission Level (dBuV) | | Limit (dBuV) | | Margin (dB) | |
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.15001 | 9.62 | 29.54 | 8.05 | 39.16 | 17.67 | 66.00 | 56.00 | -26.84 | -38.33 |
| 2 | 0.20206 | 9.61 | 45.81 | 32.18 | 55.42 | 41.79 | 63.53 | 53.53 | -8.11 | -11.74 |
| 3 | 0.21604 | 9.61 | 40.60 | 26.14 | 50.21 | 35.75 | 62.97 | 52.97 | -12.76 | -17.22 |
| 4 | 0.30099 | 9.62 | 38.23 | 29.03 | 47.85 | 38.65 | 60.22 | 50.22 | -12.37 | -11.57 |
| 5 | 0.42089 | 9.63 | 32.09 | 26.95 | 41.72 | 36.58 | 57.43 | 47.43 | -15.71 | -10.85 |
| 6 | 0.50156 | 9.64 | 27.83 | 22.12 | 37.47 | 31.76 | 56.00 | 46.00 | -18.53 | -14.24 |
| 7 | 1.06786 | 9.66 | 26.22 | 22.39 | 35.88 | 32.05 | 56.00 | 46.00 | -20.12 | -13.95 |
| 8 | 1.48504 | 9.69 | 24.04 | 19.69 | 33.73 | 29.38 | 56.00 | 46.00 | -22.27 | -16.62 |
| 9 | 2.14558 | 9.72 | 24.16 | 18.75 | 33.88 | 28.47 | 56.00 | 46.00 | -22.12 | -17.53 |
| 10 | 3.40625 | 9.75 | 22.46 | 17.75 | 32.21 | 27.50 | 56.00 | 46.00 | -23.79 | -18.50 |
| 11 | 5.77734 | 9.78 | 22.08 | 17.15 | 31.86 | 26.93 | 60.00 | 50.00 | -28.14 | -23.07 |
| 12 | 9.89063 | 9.82 | 20.20 | 14.60 | 30.02 | 24.42 | 60.00 | 50.00 | -29.98 | -25.58 |
| 13 | 20.79816 | 9.88 | 11.79 | 6.24 | 21.67 | 16.12 | 60.00 | 50.00 | -38.33 | -33.88 |
| 14 | 27.27344 | 9.87 | 4.00 | 0.31 | 13.87 | 10.18 | 60.00 | 50.00 | -46.13 | -39.82 |

Remarks:

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

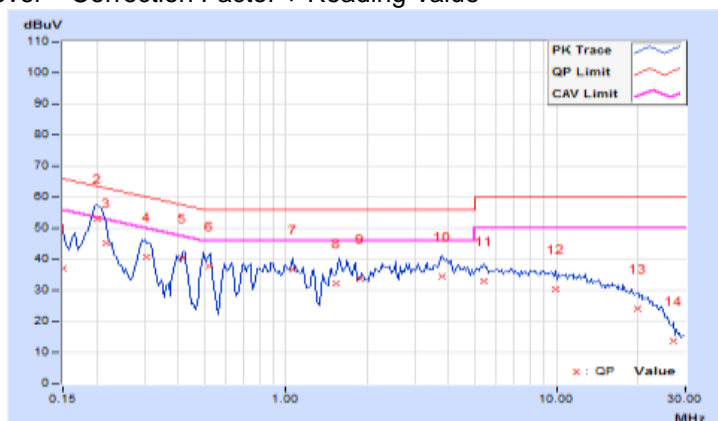


| | | | |
|-----------------|----------------|-------------------------------|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 230Vac, 50Hz | Environmental Conditions | 25°C, 75%RH |
| Tested by | Vhenson Huang | | |
| Test Mode | Mode 4 | | |

| Phase Of Power : Neutral (N) | | | | | | | | | | |
|------------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) | | Emission Level (dBuV) | | Limit (dBuV) | | Margin (dB) | |
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.15000 | 9.60 | 27.48 | 5.12 | 37.08 | 14.72 | 66.00 | 56.00 | -28.92 | -41.28 |
| 2 | 0.20206 | 9.60 | 43.47 | 29.39 | 53.07 | 38.99 | 63.53 | 53.53 | -10.46 | -14.54 |
| 3 | 0.21605 | 9.60 | 35.50 | 21.46 | 45.10 | 31.06 | 62.97 | 52.97 | -17.87 | -21.91 |
| 4 | 0.30412 | 9.61 | 31.16 | 24.17 | 40.77 | 33.78 | 60.13 | 50.13 | -19.36 | -16.35 |
| 5 | 0.41444 | 9.61 | 30.63 | 27.91 | 40.24 | 37.52 | 57.56 | 47.56 | -17.32 | -10.04 |
| 6 | 0.52119 | 9.62 | 28.31 | 24.70 | 37.93 | 34.32 | 56.00 | 46.00 | -18.07 | -11.68 |
| 7 | 1.05469 | 9.64 | 26.98 | 23.99 | 36.62 | 33.63 | 56.00 | 46.00 | -19.38 | -12.37 |
| 8 | 1.53492 | 9.67 | 22.66 | 18.67 | 32.33 | 28.34 | 56.00 | 46.00 | -23.67 | -17.66 |
| 9 | 1.88855 | 9.69 | 24.15 | 20.34 | 33.84 | 30.03 | 56.00 | 46.00 | -22.16 | -15.97 |
| 10 | 3.79706 | 9.74 | 24.54 | 19.63 | 34.28 | 29.37 | 56.00 | 46.00 | -21.72 | -16.63 |
| 11 | 5.41534 | 9.76 | 23.12 | 16.84 | 32.88 | 26.60 | 60.00 | 50.00 | -27.12 | -23.40 |
| 12 | 9.93097 | 9.82 | 20.46 | 14.69 | 30.28 | 24.51 | 60.00 | 50.00 | -29.72 | -25.49 |
| 13 | 19.99276 | 9.92 | 14.18 | 8.96 | 24.10 | 18.88 | 60.00 | 50.00 | -35.90 | -31.12 |
| 14 | 27.17578 | 9.96 | 3.66 | 0.48 | 13.62 | 10.44 | 60.00 | 50.00 | -46.38 | -39.56 |

Remarks:

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

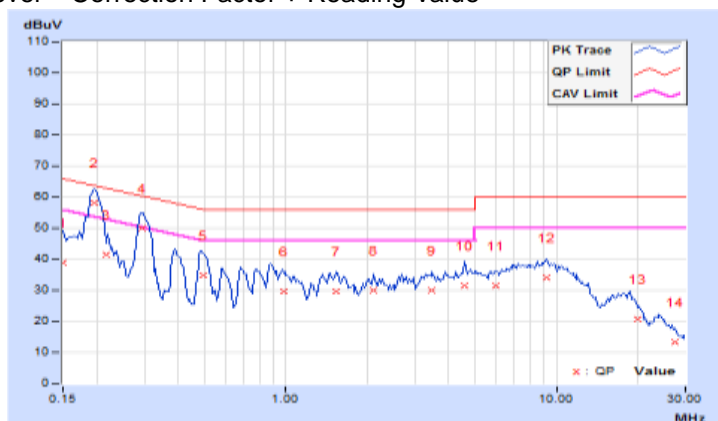


| | | | |
|------------------------|----------------|------------------------------------------|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 230Vac, 50Hz | Environmental Conditions | 25°C, 75%RH |
| Tested by | Vhenson Huang | | |
| Test Mode | Mode 5 | | |

| Phase Of Power : Line (L) | | | | | | | | | | |
|---------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) | | Emission Level (dBuV) | | Limit (dBuV) | | Margin (dB) | |
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.15000 | 9.62 | 29.42 | 5.22 | 39.04 | 14.84 | 66.00 | 56.00 | -26.96 | -41.16 |
| 2 | 0.19689 | 9.61 | 48.65 | 34.71 | 58.26 | 44.32 | 63.74 | 53.74 | -5.48 | -9.42 |
| 3 | 0.21602 | 9.61 | 31.70 | 14.59 | 41.31 | 24.20 | 62.97 | 52.97 | -21.66 | -28.77 |
| 4 | 0.29589 | 9.62 | 40.31 | 30.79 | 49.93 | 40.41 | 60.36 | 50.36 | -10.43 | -9.95 |
| 5 | 0.49647 | 9.63 | 25.14 | 19.36 | 34.77 | 28.99 | 56.06 | 46.06 | -21.29 | -17.07 |
| 6 | 0.97794 | 9.66 | 20.07 | 16.32 | 29.73 | 25.98 | 56.00 | 46.00 | -26.27 | -20.02 |
| 7 | 1.53007 | 9.69 | 20.10 | 16.03 | 29.79 | 25.72 | 56.00 | 46.00 | -26.21 | -20.28 |
| 8 | 2.11574 | 9.72 | 20.13 | 16.26 | 29.85 | 25.98 | 56.00 | 46.00 | -26.15 | -20.02 |
| 9 | 3.46875 | 9.75 | 20.17 | 15.39 | 29.92 | 25.14 | 56.00 | 46.00 | -26.08 | -20.86 |
| 10 | 4.59375 | 9.77 | 21.84 | 16.90 | 31.61 | 26.67 | 56.00 | 46.00 | -24.39 | -19.33 |
| 11 | 5.96875 | 9.78 | 21.76 | 17.25 | 31.54 | 27.03 | 60.00 | 50.00 | -28.46 | -22.97 |
| 12 | 9.18359 | 9.81 | 24.35 | 19.45 | 34.16 | 29.26 | 60.00 | 50.00 | -25.84 | -20.74 |
| 13 | 20.00255 | 9.88 | 10.68 | 5.46 | 20.56 | 15.34 | 60.00 | 50.00 | -39.44 | -34.66 |
| 14 | 27.36328 | 9.87 | 3.45 | 0.66 | 13.32 | 10.53 | 60.00 | 50.00 | -46.68 | -39.47 |

Remarks:

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



| | | | |
|-----------------|----------------|-------------------------------|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 230Vac, 50Hz | Environmental Conditions | 25°C, 75%RH |
| Tested by | Vhenson Huang | | |
| Test Mode | Mode 5 | | |

| Phase Of Power : Neutral (N) | | | | | | | | | | |
|------------------------------|-----------------|------------------------|----------------------|-------|-----------------------|-------|--------------|-------|-------------|--------|
| No | Frequency (MHz) | Correction Factor (dB) | Reading Value (dBuV) | | Emission Level (dBuV) | | Limit (dBuV) | | Margin (dB) | |
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.15000 | 9.60 | 27.74 | 3.90 | 37.34 | 13.50 | 66.00 | 56.00 | -28.66 | -42.50 |
| 2 | 0.19567 | 9.60 | 46.74 | 31.30 | 56.34 | 40.90 | 63.79 | 53.79 | -7.45 | -12.89 |
| 3 | 0.21609 | 9.60 | 31.72 | 14.33 | 41.32 | 23.93 | 62.97 | 52.97 | -21.65 | -29.04 |
| 4 | 0.29435 | 9.60 | 36.39 | 27.02 | 45.99 | 36.62 | 60.40 | 50.40 | -14.41 | -13.78 |
| 5 | 0.49565 | 9.61 | 21.52 | 13.28 | 31.13 | 22.89 | 56.07 | 46.07 | -24.94 | -23.18 |
| 6 | 1.05078 | 9.64 | 17.92 | 13.10 | 27.56 | 22.74 | 56.00 | 46.00 | -28.44 | -23.26 |
| 7 | 1.53359 | 9.67 | 18.28 | 12.79 | 27.95 | 22.46 | 56.00 | 46.00 | -28.05 | -23.54 |
| 8 | 2.10938 | 9.70 | 13.14 | 8.47 | 22.84 | 18.17 | 56.00 | 46.00 | -33.16 | -27.83 |
| 9 | 3.62891 | 9.73 | 17.17 | 12.27 | 26.90 | 22.00 | 56.00 | 46.00 | -29.10 | -24.00 |
| 10 | 6.30859 | 9.77 | 22.71 | 17.79 | 32.48 | 27.56 | 60.00 | 50.00 | -27.52 | -22.44 |
| 11 | 9.33594 | 9.81 | 24.34 | 19.44 | 34.15 | 29.25 | 60.00 | 50.00 | -25.85 | -20.75 |
| 12 | 20.05625 | 9.92 | 12.18 | 7.06 | 22.10 | 16.98 | 60.00 | 50.00 | -37.90 | -33.02 |
| 13 | 27.00628 | 9.96 | 3.60 | 0.52 | 13.56 | 10.48 | 60.00 | 50.00 | -46.44 | -39.52 |

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



6 Radiated Disturbance up to 1 GHz

6.1 Limits

| Frequency (MHz) | Class A (at 10m) | Class B (at 10m) |
|-----------------|------------------|------------------|
| | dBuV/m | dBuV/m |
| 30 - 230 | 40 | 30 |
| 230 - 1000 | 47 | 37 |

- Notes:
1. The lower limit shall apply at the transition frequencies.
 2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
 3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

6.2 Test Instruments

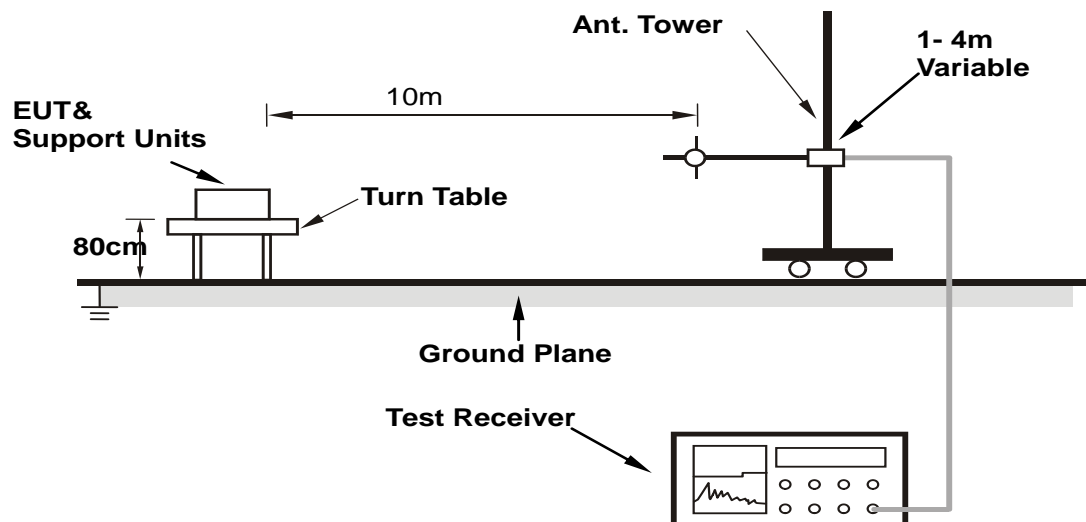
| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|---------------------------------|------------------|-----------------|---------------|---------------|
| EMCI Preamplifier | EMC9135 | 980326 | Feb. 19, 2020 | Feb. 18, 2021 |
| EMCI Preamplifier | EMC9135 | 980327 | Feb. 19, 2020 | Feb. 18, 2021 |
| Agilent Test Receiver | N9038A | MY50010158 | Oct. 8, 2019 | Oct. 7, 2020 |
| Agilent Test Receiver | N9038A | MY51210114 | Jan. 20, 2020 | Jan. 19, 2021 |
| Schwarzbeck Antenna | VULB9168 | 9168-316 | Nov. 11, 2019 | Nov. 10, 2020 |
| Schwarzbeck Antenna | VULB9168 | 9168-317 | Nov. 11, 2019 | Nov. 10, 2020 |
| Max Full. Turn Table & Tower | MF7802 | MF7802121 | NA | NA |
| Max Full. Tower | MF7802 | MF780208105 | NA | NA |
| Software | Radiated_V8.7.08 | NA | NA | NA |
| JYEBAO RF cable With 5dB PAD | LMR-600 | CABLE-CH8-01.V | Sep. 27, 2019 | Sep. 26, 2020 |
| JYEBAO RF cable With 5dB PAD | LMR-600 | CABLE-CH8-02.H | Sep. 27, 2019 | Sep. 26, 2020 |
| WOKEN RF cable With 5dB PAD | 8D | CABLE-CH8-03.3M | Sep. 27, 2019 | Sep. 26, 2020 |

- 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 Chamber No. 8.
 3. The VCCI Site Registration No. R-12946.
 4. Tested Date: Mar. 17 to 23, 2020

6.3 Test Arrangement

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited test facility. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna is a broadband antenna, and its height 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.
- 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.
- The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is up to 1 GHz.

Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for quasi-peak detection (QP) at frequency up to 1GHz.



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

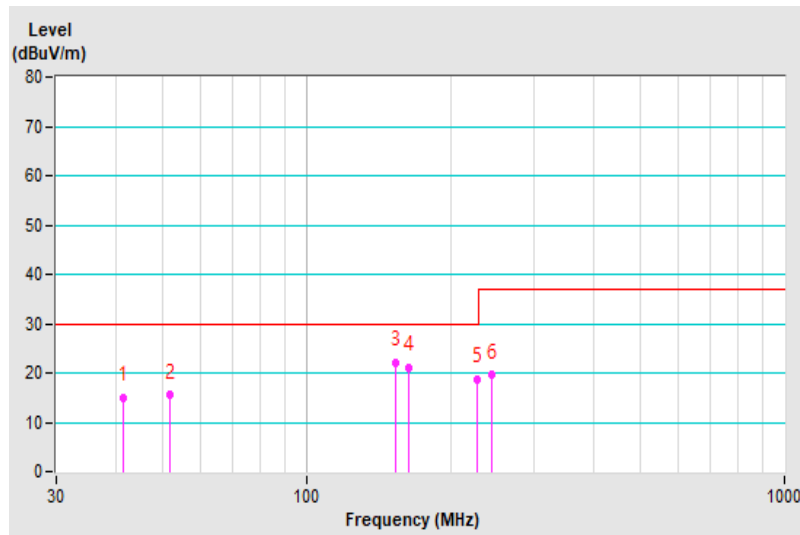
6.4 Test Results

| | | | |
|------------------------|--------------|------------------------------------------|-------------------------|
| Frequency Range | 30MHz ~ 1GHz | Detector Function & Bandwidth | Quasi-Peak (QP), 120kHz |
| Input Power | 230Vac, 50Hz | Environmental Conditions | 23°C, 80%RH, 1008mbar |
| Tested by | Ken Lee | | |
| Test Mode | Mode 1 | | |

| Antenna Polarity & Test Distance : Horizontal at 10 m | | | | | | | | |
|-------------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | 41.37 | 15.08 QP | 30.00 | -14.92 | 3.23 H | 74 | 32.70 | -17.62 |
| 2 | 51.73 | 15.46 QP | 30.00 | -14.54 | 3.99 H | 187 | 32.62 | -17.16 |
| 3 | 154.04 | 22.17 QP | 30.00 | -7.83 | 4.00 H | 141 | 38.13 | -15.96 |
| 4 | 163.37 | 21.14 QP | 30.00 | -8.86 | 3.91 H | 176 | 37.22 | -16.08 |
| 5 | 227.88 | 18.57 QP | 30.00 | -11.43 | 3.28 H | 309 | 37.37 | -18.80 |
| 6 | 245.00 | 19.56 QP | 37.00 | -17.44 | 3.94 H | 140 | 36.63 | -17.07 |

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

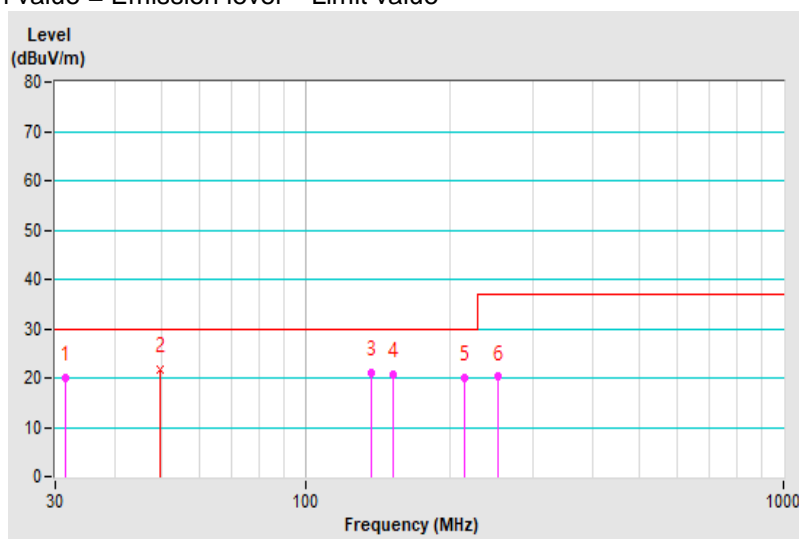


| | | | |
|-----------------|--------------|-------------------------------|-------------------------|
| Frequency Range | 30MHz ~ 1GHz | Detector Function & Bandwidth | Quasi-Peak (QP), 120kHz |
| Input Power | 230Vac, 50Hz | Environmental Conditions | 23°C, 80%RH, 1008mbar |
| Tested by | Ken Lee | | |
| Test Mode | Mode 1 | | |

| Antenna Polarity & Test Distance : Vertical at 10 m | | | | | | | | |
|-----------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | 31.45 | 20.13 QP | 30.00 | -9.87 | 1.00 V | 352 | 39.81 | -19.68 |
| 2 | 49.78 | 21.65 QP | 30.00 | -8.35 | 1.00 V | 158 | 39.41 | -17.76 |
| 3 | 137.60 | 21.11 QP | 30.00 | -8.89 | 1.20 V | 126 | 38.35 | -17.24 |
| 4 | 153.00 | 20.61 QP | 30.00 | -9.39 | 1.00 V | 176 | 37.21 | -16.60 |
| 5 | 214.54 | 20.13 QP | 30.00 | -9.87 | 1.01 V | 80 | 39.51 | -19.38 |
| 6 | 253.80 | 20.22 QP | 37.00 | -16.78 | 1.13 V | 199 | 37.53 | -17.31 |

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

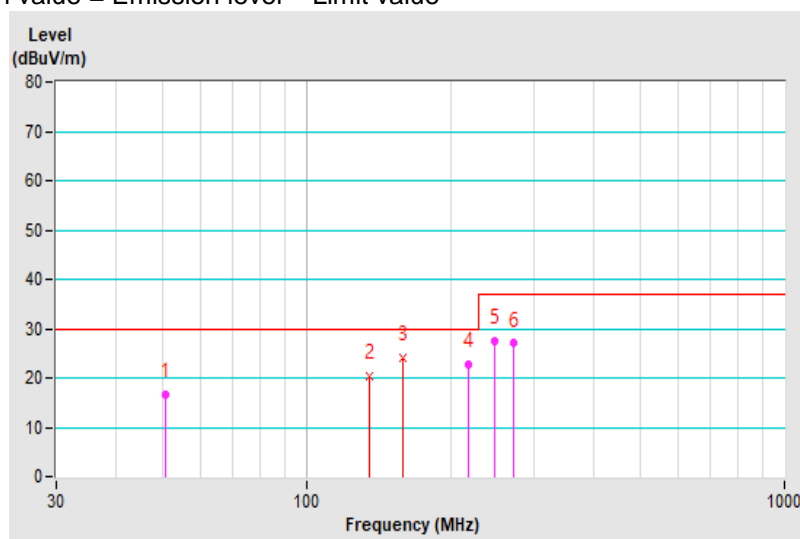


| | | | |
|------------------------|--------------|------------------------------------------|-------------------------|
| Frequency Range | 30MHz ~ 1GHz | Detector Function & Bandwidth | Quasi-Peak (QP), 120kHz |
| Input Power | 230Vac, 50Hz | Environmental Conditions | 23°C, 80%RH, 1008mbar |
| Tested by | Ken Lee | | |
| Test Mode | Mode 2 | | |

| Antenna Polarity & Test Distance : Horizontal at 10 m | | | | | | | | |
|-------------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | 50.73 | 16.76 QP | 30.00 | -13.24 | 4.00 H | 132 | 33.84 | -17.08 |
| 2 | 135.57 | 20.31 QP | 30.00 | -9.69 | 3.99 H | 296 | 37.31 | -17.00 |
| 3 | 158.75 | 24.11 QP | 30.00 | -5.89 | 3.57 H | 129 | 40.13 | -16.02 |
| 4 | 217.57 | 22.83 QP | 30.00 | -7.17 | 3.80 H | 345 | 41.80 | -18.97 |
| 5 | 247.11 | 27.46 QP | 37.00 | -9.54 | 4.00 H | 307 | 44.45 | -16.99 |
| 6 | 271.82 | 26.96 QP | 37.00 | -10.04 | 3.96 H | 325 | 42.92 | -15.96 |

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

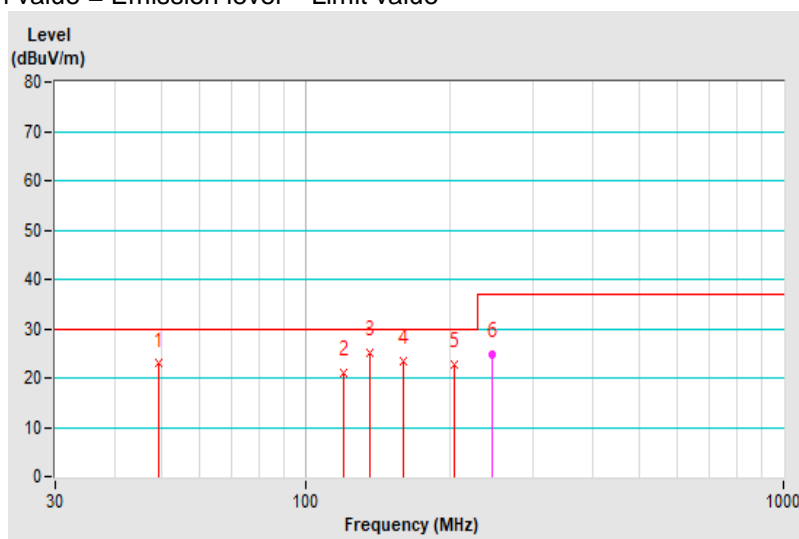


| | | | |
|-----------------|--------------|-------------------------------|-------------------------|
| Frequency Range | 30MHz ~ 1GHz | Detector Function & Bandwidth | Quasi-Peak (QP), 120kHz |
| Input Power | 230Vac, 50Hz | Environmental Conditions | 23°C, 80%RH, 1008mbar |
| Tested by | Ken Lee | | |
| Test Mode | Mode 2 | | |

| Antenna Polarity & Test Distance : Vertical at 10 m | | | | | | | | |
|-----------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | 49.19 | 22.94 QP | 30.00 | -7.06 | 1.00 V | 147 | 40.67 | -17.73 |
| 2 | 120.22 | 21.15 QP | 30.00 | -8.85 | 1.42 V | 295 | 40.05 | -18.90 |
| 3 | 136.21 | 25.23 QP | 30.00 | -4.77 | 1.03 V | 63 | 42.55 | -17.32 |
| 4 | 160.50 | 23.43 QP | 30.00 | -6.57 | 1.00 V | 83 | 39.93 | -16.50 |
| 5 | 205.34 | 22.70 QP | 30.00 | -7.30 | 1.02 V | 278 | 42.38 | -19.68 |
| 6 | 246.02 | 24.67 QP | 37.00 | -12.33 | 1.00 V | 286 | 42.20 | -17.53 |

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

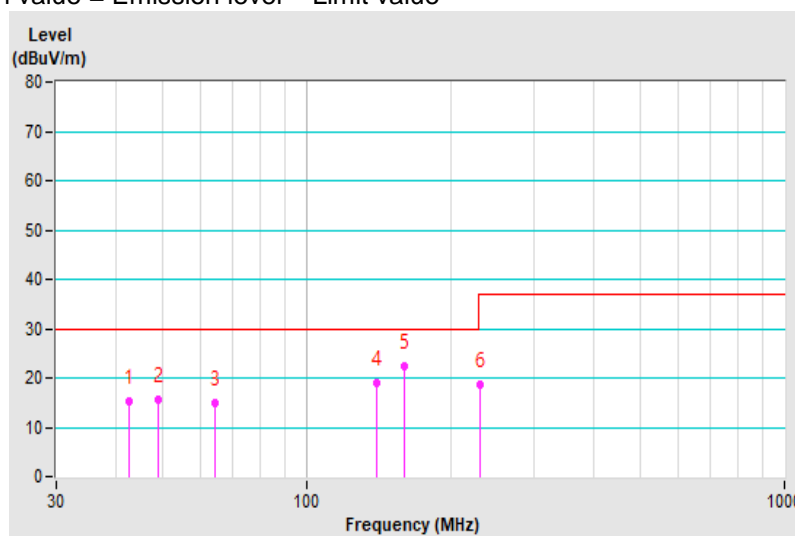


| | | | |
|------------------------|--------------|------------------------------------------|-------------------------|
| Frequency Range | 30MHz ~ 1GHz | Detector Function & Bandwidth | Quasi-Peak (QP), 120kHz |
| Input Power | 230Vac, 50Hz | Environmental Conditions | 23°C, 80%RH, 1008mbar |
| Tested by | Ken Lee | | |
| Test Mode | Mode 3 | | |

| Antenna Polarity & Test Distance : Horizontal at 10 m | | | | | | | | |
|-------------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | 42.66 | 15.26 QP | 30.00 | -14.74 | 4.00 H | 144 | 32.78 | -17.52 |
| 2 | 49.08 | 15.65 QP | 30.00 | -14.35 | 3.90 H | 82 | 32.76 | -17.11 |
| 3 | 64.44 | 14.99 QP | 30.00 | -15.01 | 4.00 H | 256 | 33.02 | -18.03 |
| 4 | 140.58 | 18.97 QP | 30.00 | -11.03 | 3.95 H | 333 | 35.68 | -16.71 |
| 5 | 160.39 | 22.41 QP | 30.00 | -7.59 | 3.99 H | 180 | 38.43 | -16.02 |
| 6 | 231.47 | 18.74 QP | 37.00 | -18.26 | 3.97 H | 51 | 37.18 | -18.44 |

Remarks:

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

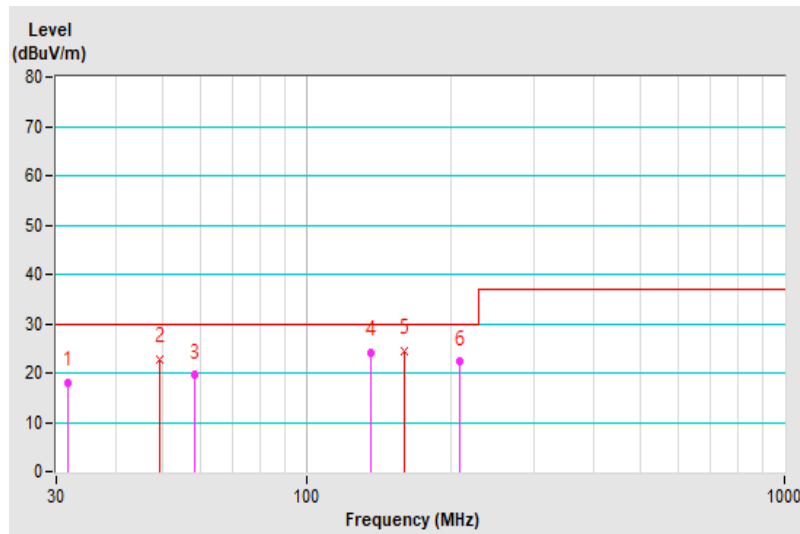


| | | | |
|-----------------|--------------|-------------------------------|-------------------------|
| Frequency Range | 30MHz ~ 1GHz | Detector Function & Bandwidth | Quasi-Peak (QP), 120kHz |
| Input Power | 230Vac, 50Hz | Environmental Conditions | 23°C, 80%RH, 1008mbar |
| Tested by | Ken Lee | | |
| Test Mode | Mode 3 | | |

| Antenna Polarity & Test Distance : Vertical at 10 m | | | | | | | | |
|-----------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | 31.77 | 18.09 QP | 30.00 | -11.91 | 1.00 V | 252 | 37.63 | -19.54 |
| 2 | 49.36 | 22.77 QP | 30.00 | -7.23 | 1.01 V | 124 | 40.51 | -17.74 |
| 3 | 58.25 | 19.56 QP | 30.00 | -10.44 | 2.00 V | 234 | 37.66 | -18.10 |
| 4 | 136.80 | 24.23 QP | 30.00 | -5.77 | 1.05 V | 351 | 41.53 | -17.30 |
| 5 | 160.49 | 24.50 QP | 30.00 | -5.50 | 1.00 V | 224 | 41.00 | -16.50 |
| 6 | 209.86 | 22.21 QP | 30.00 | -7.79 | 1.03 V | 113 | 41.76 | -19.55 |

Remarks:

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

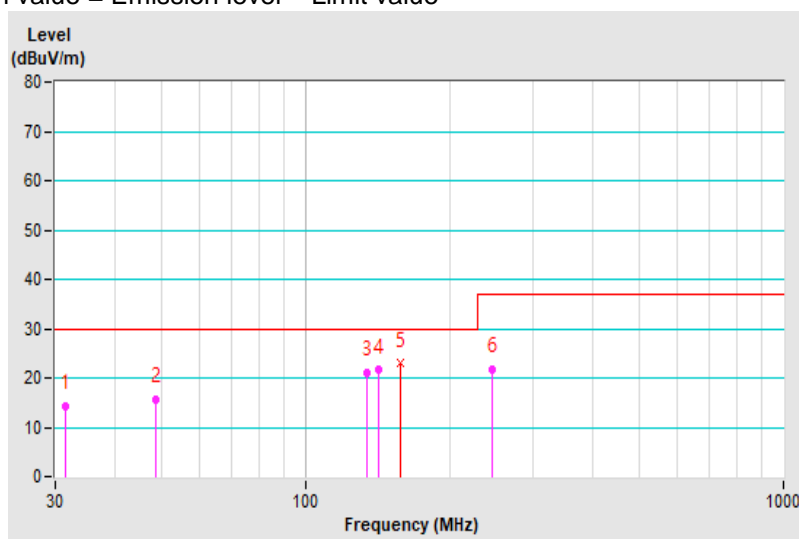


| | | | |
|------------------------|--------------|------------------------------------------|-------------------------|
| Frequency Range | 30MHz ~ 1GHz | Detector Function & Bandwidth | Quasi-Peak (QP), 120kHz |
| Input Power | 230Vac, 50Hz | Environmental Conditions | 23°C, 80%RH, 1008mbar |
| Tested by | Ken Lee | | |
| Test Mode | Mode 4 | | |

| Antenna Polarity & Test Distance : Horizontal at 10 m | | | | | | | | |
|-------------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | 31.50 | 14.22 QP | 30.00 | -15.78 | 3.10 H | 230 | 33.23 | -19.01 |
| 2 | 48.77 | 15.57 QP | 30.00 | -14.43 | 3.00 H | 155 | 32.67 | -17.10 |
| 3 | 134.49 | 21.16 QP | 30.00 | -8.84 | 3.95 H | 344 | 38.26 | -17.10 |
| 4 | 142.35 | 21.53 QP | 30.00 | -8.47 | 4.00 H | 318 | 38.05 | -16.52 |
| 5 | 158.41 | 22.96 QP | 30.00 | -7.04 | 3.59 H | 144 | 38.95 | -15.99 |
| 6 | 245.29 | 21.62 QP | 37.00 | -15.38 | 3.90 H | 134 | 38.68 | -17.06 |

Remarks:

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

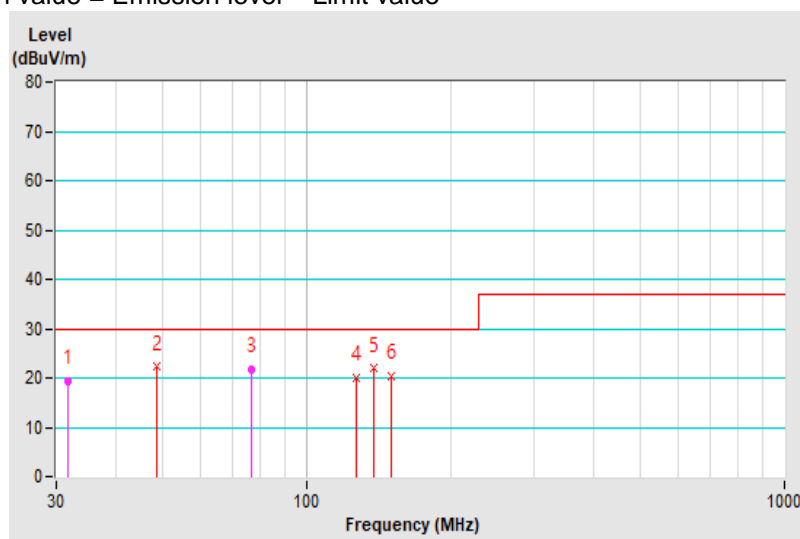


| | | | |
|-----------------|--------------|-------------------------------|-------------------------|
| Frequency Range | 30MHz ~ 1GHz | Detector Function & Bandwidth | Quasi-Peak (QP), 120kHz |
| Input Power | 230Vac, 50Hz | Environmental Conditions | 23°C, 80%RH, 1008mbar |
| Tested by | Ken Lee | | |
| Test Mode | Mode 4 | | |

| Antenna Polarity & Test Distance : Vertical at 10 m | | | | | | | | |
|-----------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | 31.65 | 19.25 QP | 30.00 | -10.75 | 1.08 V | 197 | 38.85 | -19.60 |
| 2 | 48.71 | 22.27 QP | 30.00 | -7.73 | 1.00 V | 161 | 39.99 | -17.72 |
| 3 | 76.71 | 21.85 QP | 30.00 | -8.15 | 1.94 V | 18 | 43.16 | -21.31 |
| 4 | 127.50 | 20.04 QP | 30.00 | -9.96 | 1.21 V | 239 | 38.14 | -18.10 |
| 5 | 138.61 | 21.91 QP | 30.00 | -8.09 | 1.03 V | 236 | 39.05 | -17.14 |
| 6 | 150.03 | 20.40 QP | 30.00 | -9.60 | 1.00 V | 114 | 36.99 | -16.59 |

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

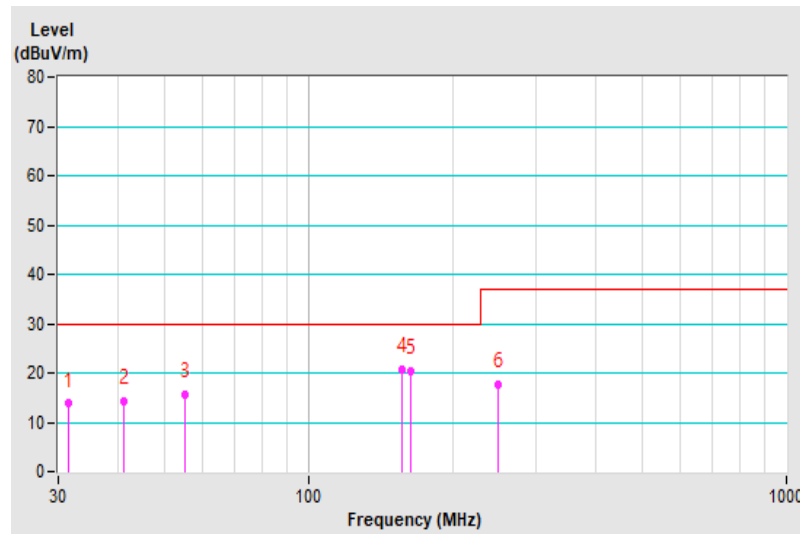


| | | | |
|-----------------|--------------|-------------------------------|-------------------------|
| Frequency Range | 30MHz ~ 1GHz | Detector Function & Bandwidth | Quasi-Peak (QP), 120kHz |
| Input Power | 230Vac, 50Hz | Environmental Conditions | 23°C, 80%RH, 1008mbar |
| Tested by | Ken Lee | | |
| Test Mode | Mode 5 | | |

| Antenna Polarity & Test Distance : Horizontal at 10 m | | | | | | | | |
|-------------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | 31.45 | 13.78 QP | 30.00 | -16.22 | 2.36 H | 263 | 32.80 | -19.02 |
| 2 | 41.20 | 14.22 QP | 30.00 | -15.78 | 3.39 H | 29 | 31.84 | -17.62 |
| 3 | 55.29 | 15.65 QP | 30.00 | -14.35 | 3.00 H | 352 | 32.90 | -17.25 |
| 4 | 157.09 | 20.83 QP | 30.00 | -9.17 | 3.94 H | 328 | 36.77 | -15.94 |
| 5 | 163.47 | 20.32 QP | 30.00 | -9.68 | 4.00 H | 287 | 36.42 | -16.10 |
| 6 | 249.63 | 17.60 QP | 37.00 | -19.40 | 3.87 H | 155 | 34.48 | -16.88 |

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

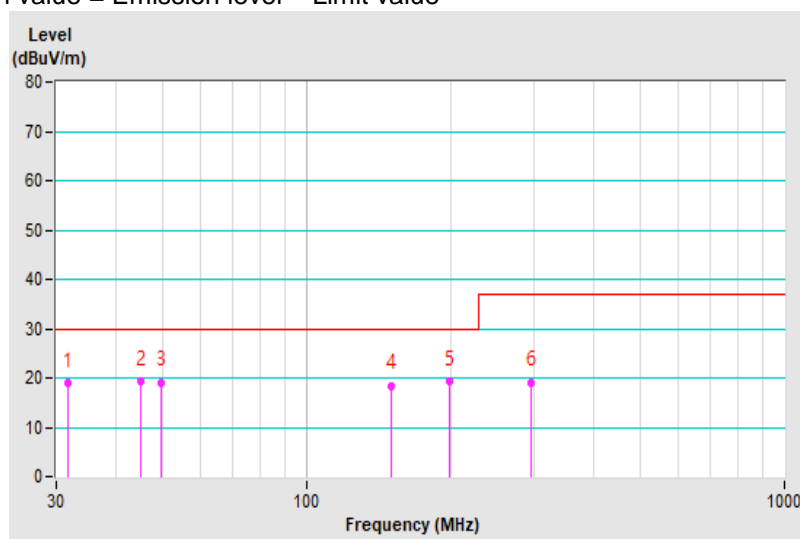


| | | | |
|------------------------|--------------|------------------------------------------|-------------------------|
| Frequency Range | 30MHz ~ 1GHz | Detector Function & Bandwidth | Quasi-Peak (QP), 120kHz |
| Input Power | 230Vac, 50Hz | Environmental Conditions | 23°C, 80%RH, 1008mbar |
| Tested by | Ken Lee | | |
| Test Mode | Mode 5 | | |

| Antenna Polarity & Test Distance : Vertical at 10 m | | | | | | | | |
|-----------------------------------------------------|-----------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No | Frequency (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1 | 31.75 | 18.87 QP | 30.00 | -11.13 | 1.07 V | 26 | 38.42 | -19.55 |
| 2 | 45.08 | 19.22 QP | 30.00 | -10.78 | 1.00 V | 122 | 37.13 | -17.91 |
| 3 | 49.86 | 19.10 QP | 30.00 | -10.90 | 1.14 V | 171 | 36.87 | -17.77 |
| 4 | 150.96 | 18.30 QP | 30.00 | -11.70 | 1.20 V | 165 | 34.91 | -16.61 |
| 5 | 199.73 | 19.20 QP | 30.00 | -10.80 | 1.00 V | 320 | 38.88 | -19.68 |
| 6 | 294.74 | 19.12 QP | 37.00 | -17.88 | 1.23 V | 239 | 34.95 | -15.83 |

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



7 Harmonics Current Measurement

7.1 Limits

| Limits for Class A equipment | | Limits for Class D equipment | | |
|------------------------------|-----------------------------------------|------------------------------|--------------------------------------------------|-----------------------------------------|
| Harmonic Order n | Max. permissible harmonics current A | Harmonic Order n | Max. permissible harmonics current per watt mA/W | Max. permissible harmonics current A |
| Odd harmonics | | Odd Harmonics only | | |
| 3 | 2.30 | 3 | 3.4 | 2.30 |
| 5 | 1.14 | 5 | 1.9 | 1.14 |
| 7 | 0.77 | 7 | 1.0 | 0.77 |
| 9 | 0.40 | 9 | 0.5 | 0.40 |
| 11 | 0.33 | 11 | 0.35 | 0.33 |
| 13 | 0.21 | 13 | 0.30 | 0.21 |
| $15 \leq n \leq 39$ | $0.15 \times 15/n$ | $15 \leq n \leq 39$ | $3.85/n$ | $0.15 \times 15/n$ |
| Even harmonics | | | | |
| 2 | 1.08 | | | |
| 4 | 0.43 | | | |
| 6 | 0.30 | | | |
| $8 \leq n \leq 40$ | $0.23 \times 8/n$ | | | |

Notes: 1. Class A and Class D are classified according to section 5 of IEC 61000-3-2.
 2. According to section 7 of IEC 61000-3-2, the above limits for all equipment except for lighting equipment having an active input power > 75 W and no limits apply for equipment with an active input power up to and including 75 W.

7.2 Classification of Equipment

| Class A | Class B | Class C | Class D |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Balanced three-phase equipment; Household appliances excluding equipment as Class D; Tools excluding portable tools; Dimmers for incandescent lamps; Audio equipment; Equipment not specified in one of the three other classes. | Portable tools; Arc welding equipment which is not professional equipment. | Lighting equipment. | Equipment having a specified power less than or equal to 600 W of the following types: Personal computers and personal computer monitors; Television receivers; Refrigerators and freezers having one or more variable-speed drives to control compressor motor(s). |

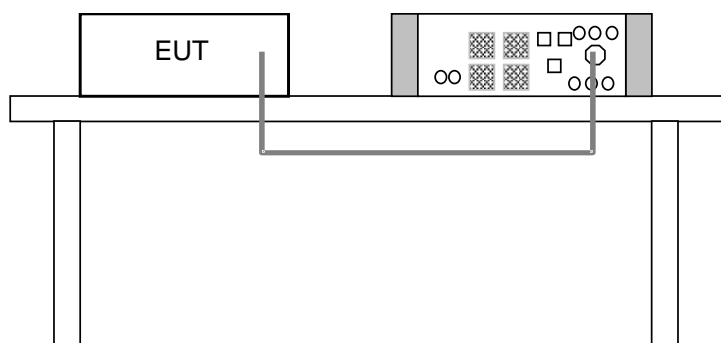
7.3 Test Instruments

| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|---------------------------------------|--------------|-----------------------|---------------|---------------|
| Teseq Harmonics - Flicker Test System | Proflin 2105 | 32A00983 & 1639A01863 | Sep. 17, 2019 | Sep. 16, 2020 |
| Software | CTS 4 | 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 EMS Room No. 1.
 3. According to IEC 61000-4-7: 2002, the time window shall be synchronized with each group of 10 or 12 cycles (200 ms) for power frequency of 50 or 60Hz.
 4. Tested Date: Mar. 19, 2020

7.4 Test Arrangement

- The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.
- The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.5 Test Results

| | | | |
|----------------------------|--------------------------|-----------------|----------|
| Fundamental Voltage/Ampere | 230.42Vrms/ 0.178Arms | Power Frequency | 50.00Hz |
| Power Consumption | 17.4W | Power Factor | 0.428 |
| Environmental conditions | 22°C, 80% RH | Tested by | Josh Lin |
| Test Mode | Mode 5 | | |

Note: 1. Limits are not specified for equipment with a rated power of 75W or less (other than lighting equipment).
 2. According to EN 61000-3-2 the manufacturer shall specify the power of the apparatus. This value shall be used for establishing limits. The specified power shall be within +/-10% of the measured power.

8 Voltage Fluctuations and Flicker Measurement

8.1 Limits

| Test item | Limit | Note |
|----------------|-------|---------------------------------------------------------------------------------------------------------------------------------|
| P_{st} | 1.0 | P_{st} : short-term flicker severity. |
| P_{lt} | 0.65 | P_{lt} : long-term flicker severity. |
| T_{max} (ms) | 500 | T_{max} : maximum time duration during the observation period that the voltage deviation $d(t)$ exceeds the limit for d_c . |
| d_{max} (%) | 4 | d_{max} : maximum absolute voltage change during an observation period. |
| d_c (%) | 3.3 | d_c : maximum steady state voltage change during an observation period. |

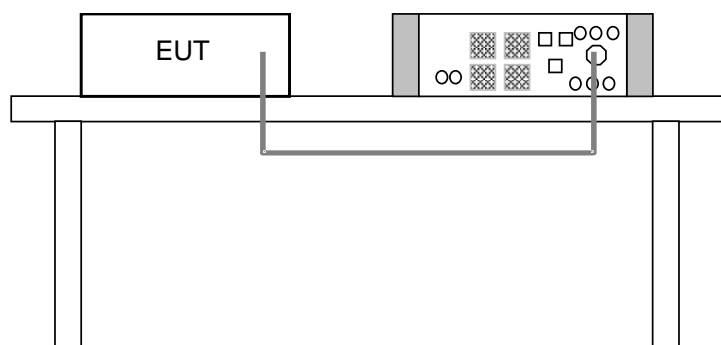
8.2 Test Instruments

| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|---------------------------------------|--------------|-----------------------|---------------|---------------|
| Teseq Harmonics - Flicker Test System | Proflin 2105 | 32A00983 & 1639A01863 | Sep. 17, 2019 | Sep. 16, 2020 |
| Software | CTS 4 | 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 EMS Room No. 1.
 3. Tested Date: Mar. 19, 2020

8.3 Test Arrangement

- The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal operating conditions.
- During the flick measurement, the measure time shall include that part of whole operation cycle in which the EUT produce the most unfavorable sequence of voltage changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

8.4 Test Results

| | | | |
|----------------------------|--------------------------|-----------------|----------|
| Observation (T_p) | 10 min. | Power Frequency | 50.00Hz |
| Fundamental Voltage/Ampere | 230.42Vrms/ 0.178Arms | Power Factor | 0.428 |
| Environmental Conditions | 22°C, 80% RH | Tested by | Josh Lin |
| Test Mode | Mode 5 | | |

| Test Parameter | Measurement Value | Limit | Remarks |
|----------------|-------------------|-------|---------|
| P_{st} | 0.064 | 1.00 | Pass |
| P_{lt} | 0.028 | 0.65 | Pass |
| T_{max} (ms) | 0 | 500 | Pass |
| d_{max} (%) | 0 | 4 | Pass |
| d_c (%) | 0 | 3.3 | Pass |

Note: (1) P_{st} means short-term flicker indicator.
 (2) P_{lt} means long-term flicker indicator.
 (3) T_{max} means accumulated time value of $d(t)$ with a deviation exceeding 3.3 %.
 (4) d_{max} means maximum relative voltage change.
 (5) d_c means maximum relative steady-state voltage change.

9 General Immunity Requirements

| Product Standard: | EN 61204-3: 2000 | |
|-----------------------------------------------------------------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Basic Standard, specification requirement, and Performance Criteria: | IEC 61000-4-2 | Electrostatic Discharge – ESD: 8kV air discharge, 4kV Contact discharge, Performance Criterion B |
| | IEC 61000-4-3 | Radio-Frequency Electromagnetic Field Amplitude modulated – RS: 80-1000 MHz, 3V/m, 80% AM (1kHz), Performance Criterion B |
| | | Radio-Frequency Electromagnetic Field, Keyed carrier: 900+/-5 MHz, 3V/m, 50 % duty cycle, Rep. Frequency 200 Hz, Performance Criterion B |
| | IEC 61000-4-4 | Electrical Fast Transient/Burst - EFT, Power line: 1kV, Signal line: 0.5kV, Performance Criterion B |
| | IEC 61000-4-5 | Surge Immunity Test: 1.2/50 us Open Circuit Voltage, 8 /20 us Short Circuit Current, line to line: 1kV, line to earth: 2kV, Performance Criterion B |
| | IEC 61000-4-6 | Conducted Radio Frequency Disturbances Test – CS: 0.15-80 MHz, 3Vrms, 80% AM, 1kHz, Performance Criterion B |
| | IEC 61000-4-11 | Voltage Dips: i) 30% reduction – 10ms, Performance Criterion B ii) 60% reduction – 100ms, Performance Criterion C Voltage Interruptions: i) >95% reduction – 5000ms, Performance Criterion C |

9.1 Specific Immunity Requirements by Manufacturer

| Immunity requirements | | |
|-----------------------|------------------------------------------------------------------------------------------------------|-----------------------|
| Reference standard | Test specification | Performance Criterion |
| IEC 61000-4-2 | Enclosure port: ±6kV Contact discharge | A |
| IEC 61000-4-3 | Radio-Frequency Electromagnetic Field Amplitude modulated – RS: 80-1000 MHz, 10V/m, 80% AM (1kHz) | A |
| IEC 61000-4-4 | Electrical Fast Transient/Burst - EFT, Power line: 2kV | A |
| IEC 61000-4-6 | Conducted Radio Frequency Disturbances Test – CS: 0.15-80 MHz, 10Vrms, 80% AM, 1kHz | A |

9.2 Performance Criteria

General Performance Criteria

According to Clause 6.1 of EN 61204-3: 2000 standard, the following describes the general performance criteria.

| Performance Criteria | Basic specifications | Remarks |
|----------------------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| A | No loss of function or performance during the test | Operating as intended within specified tolerance |
| B | Temporary loss of function or performance during the test Self recoverable | Degradation of performance shall be specified by the manufacturer PSU shall continue to operate as intended after the test |
| C | Loss of function or performance Not self-recoverable Not damaged | Any re-settable condition allowed including shut-down |

10 Electrostatic Discharge Immunity Test (ESD)

10.1 Test Specification

| | |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Basic Standard: | IEC 61000-4-2 |
| Discharge Impedance: | 330 ohm / 150 pF |
| Discharge Voltage: | Air Discharge: $\pm 2\text{kV}$, $\pm 4\text{kV}$, $\pm 8\text{kV}$ (Direct) Contact Discharge: $\pm 2\text{kV}$, $\pm 4\text{kV}$, $\pm 6\text{kV}$ (Indirect) |
| Number of Discharge: | 20 times at each test point |
| Discharge Mode: | Single Discharge |
| Discharge Period: | 1-second minimum |

10.2 Test Instruments

| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|----------------------------|-----------|-------------|---------------|---------------|
| EM Test ESD Simulator | Dito | V0707102251 | Apr. 08, 2019 | Apr. 07, 2020 |

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 ESD Room No. 3.
3. Tested Date: Mar. 19, 2020

10.3 Test Arrangement

The basic test procedure was in accordance with IEC 61000-4-2:

- a. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.
- b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
- c. The time interval between two successive single discharges was at least 1 second.
- d. The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the EUT.
- e. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- f. Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.
- g. At least ten single discharges (in the most sensitive polarity) were applied to the **Horizontal Coupling Plane** at points on each side of the EUT. The ESD generator was positioned at a distance of 0.1 meters from the EUT with the discharge electrode touching the **HCP**.
- h. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the **Vertical Coupling Plane** in sufficiently different positions that the four faces of the EUT were completely illuminated. The **VCP** (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the EUT.

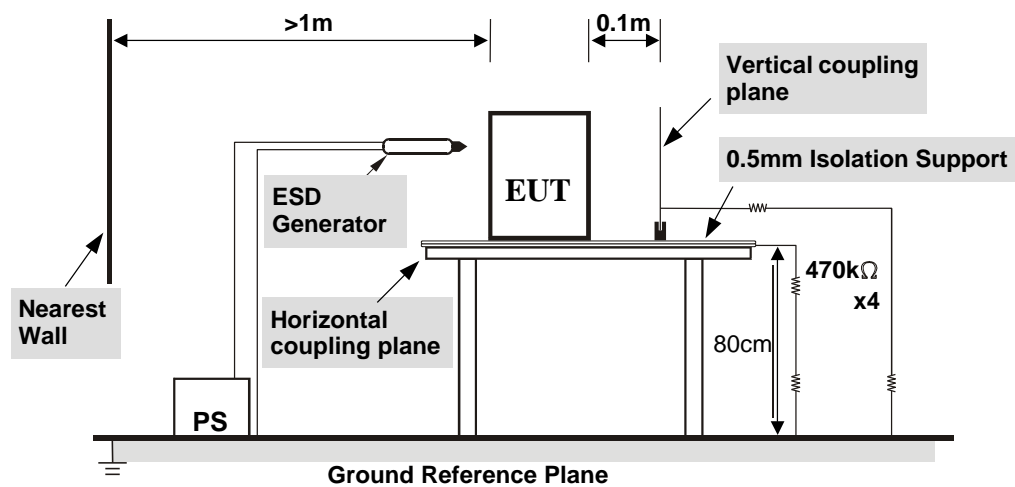


TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the **Ground Reference Plane**. The **GRP** consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A **Horizontal Coupling Plane** (1.6m x 0.8m) was placed on the table and attached to the **GRP** by means of a cable with 940kΩ total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC 61000-4-2, and its cables were placed on the **HCP** and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

10.4 Supplementary Information

The requirement followed by the client's specification. (Refer to item 9.1).

10.5 Test Results

| | | | |
|--------------------------|---------------------------|-----------|-----------|
| Input Power | 230Vac, 50 Hz | Tested by | Bernie Lu |
| Environmental Conditions | 22°C, 48% RH 1007 mbar | Test mode | Mode 5 |

| Test Results of Direct Application | | | | | |
|------------------------------------|----------------|------------|-------------------|---------------|-----------------------|
| Discharge Level (kV) | Polarity (+/-) | Test Point | Contact Discharge | Air Discharge | Performance Criterion |
| 2, 4, 8 | +/- | 1, 2 | NA | Note | A |

Description of test points of direct application: Please refer to following page for representative mark only.

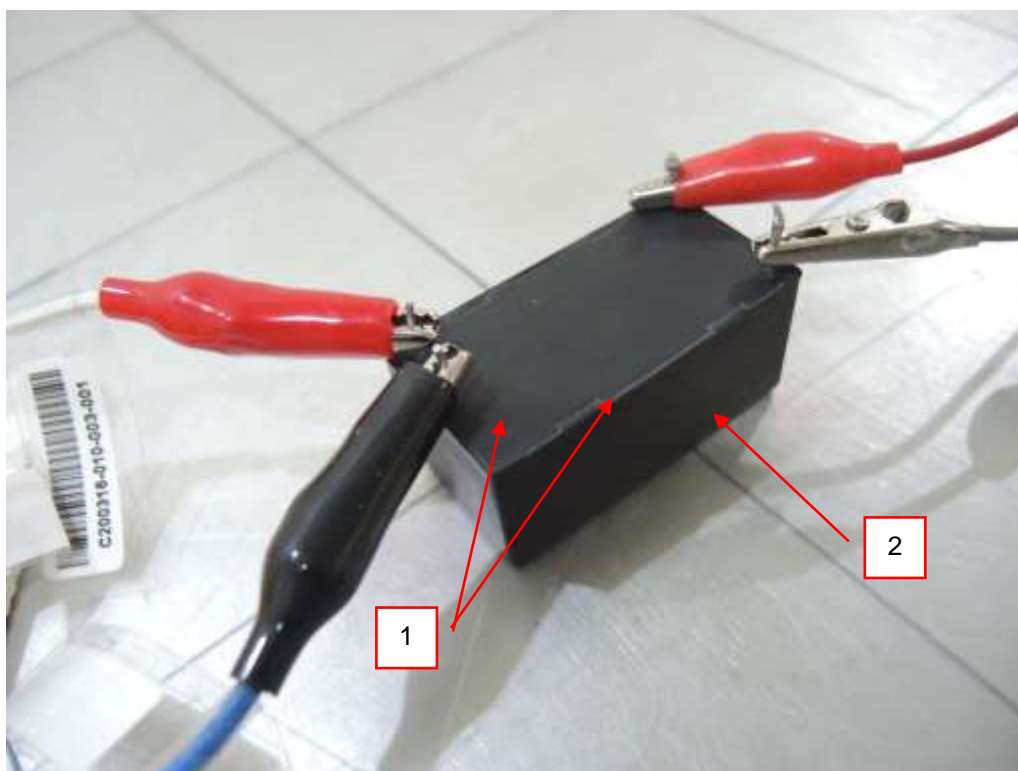
| Test Results of Indirect Application | | | | | |
|--------------------------------------|----------------|------------|---------------------------|-------------------------|-----------------------|
| Discharge Level (kV) | Polarity (+/-) | Test Point | Horizontal Coupling Plane | Vertical Coupling Plane | Performance Criterion |
| 2, 4, 6 | +/- | Four Sides | Note | Note | A |

Description of test points of indirect application:

1. Front side
2. Rear side
3. Right side
4. Left side

Note: The EUT function was correct during the test.

Description of Test Points



11 Radiated, Radio-frequency, Electromagnetic Field Immunity Test (RS)

11.1 Test Specification

| | |
|-----------------------------|------------------------------------|
| Basic Standard: | IEC 61000-4-3 |
| Frequency Range: | 80 MHz - 1000 MHz |
| Field Strength: | 3 V/m, 10 V/m |
| Modulation: | 1kHz Sine Wave, 80%, AM Modulation |
| Frequency Step: | 1 % of preceding frequency value |
| Polarity of Antenna: | Horizontal and Vertical |
| Antenna Height: | 1.5m |
| Dwell Time: | 3 seconds |

11.2 Test Instruments

| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|-----------------------------------------------------|------------|------------|---------------|---------------|
| BOONTON Power Meter | 4232A | 94901 | Jun. 11, 2019 | Jun. 10, 2020 |
| BOONTON Power Sensor | 51011-EMC | 32807 | Jun. 11, 2019 | Jun. 10, 2020 |
| ETS Electric Field Sensor | HI-6105 | 00217912 | Aug. 13, 2019 | Aug. 12, 2020 |
| TESEQ RF Generator | ITS 6006 | 37543 | May 9, 2019 | May 8, 2020 |
| TESEQ RF Amplifier | CBA1G-150 | T44220 | NA | NA |
| TESTQ Amplifier | CBA 3G-050 | T44345 | NA | NA |
| TESTQ Amplifier | AS1860-50 | S-5944/1 | NA | NA |
| Schwarzbeck RS Antenna | STLP 9129 | 9129068 | NA | NA |
| CHANCE MOST Compact Full Anechoic Chamber (7x3x3 m) | NA | NA | Jan. 20, 2020 | Jan. 19, 2021 |
| Software | RS_V7.6 | 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 RS Room No.1.
 3. The transmit antenna was located at a distance of 2 meters from the EUT.
 4. Tested Date: Mar. 20, 2020

11.3 Test Arrangement

The test procedure was in accordance with IEC 61000-4-3.

- The testing was performed in a fully anechoic chamber.
- The frequency range is swept from 80 MHz to 1000 MHz, with the signal 80% amplitude modulated with a 1kHz sine wave.
- The field strength level was 3 V/m, 10 V/m.
- The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

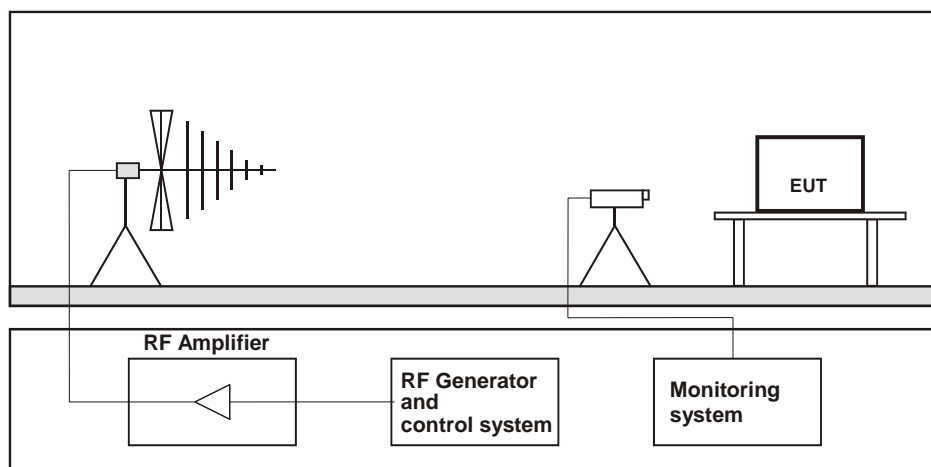


Table-top Equipment

The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

11.4 Supplementary Information

The requirement followed by the client's specification. (Refer to item 9.1).

11.5 Test Results

| | | | |
|--------------------------|----------------|-----------|-----------|
| Input Power | 230 Vac, 50 Hz | Tested by | Sean Chou |
| Environmental Conditions | 22°C, 69% RH | Test mode | Mode 5 |

| Frequency (MHz) | Polarity | Azimuth(°) | Applied Field Strength | | Observation | Performance Criterion |
|-----------------|----------|------------|------------------------|---------------|-------------|-----------------------|
| | | | (V/m) | Modulation | | |
| 80 -1000 | V&H | 0 | 3, 10 | 80% AM (1kHz) | Note | A |
| 80 -1000 | V&H | 90 | 3, 10 | 80% AM (1kHz) | Note | A |
| 80 -1000 | V&H | 180 | 3, 10 | 80% AM (1kHz) | Note | A |
| 80 -1000 | V&H | 270 | 3, 10 | 80% AM (1kHz) | Note | A |

Note: The EUT function was correct during the test.

12 Radio-frequency Electromagnetic Field – KEYED CARRIER Test

12.1 Test Specification

| | |
|-----------------------------|------------------------------|
| Basic Standard: | IEC 61000-4-3 |
| Frequency Range: | 895 MHz - 905 MHz |
| Field Strength: | 3 V/m, 10 V/m |
| Modulation: | Pulse 200 Hz, 50% Duty Cycle |
| Frequency Step: | 1 MHz |
| Polarity of Antenna: | Horizontal and Vertical |
| Antenna Height: | 1.5 m |
| Dwell Time: | 3 seconds |

12.2 Test Instruments

| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|-----------------------------------------------------|------------|------------|---------------|---------------|
| BOONTON Power Meter | 4232A | 94901 | Jun. 11, 2019 | Jun. 10, 2020 |
| BOONTON Power Sensor | 51011-EMC | 32807 | Jun. 11, 2019 | Jun. 10, 2020 |
| ETS Electric Field Sensor | HI-6105 | 00217912 | Aug. 13, 2019 | Aug. 12, 2020 |
| TESEQ RF Generator | ITS 6006 | 37543 | May 9, 2019 | May 8, 2020 |
| TESEQ RF Amplifier | CBA1G-150 | T44220 | NA | NA |
| TESTQ Amplifier | CBA 3G-050 | T44345 | NA | NA |
| TESTQ Amplifier | AS1860-50 | S-5944/1 | NA | NA |
| Schwarzbeck RS Antenna | STLP 9129 | 9129068 | NA | NA |
| CHANCE MOST Compact Full Anechoic Chamber (7x3x3 m) | NA | NA | Jan. 20, 2020 | Jan. 19, 2021 |
| Software | RS_V7.6 | NA | NA | NA |

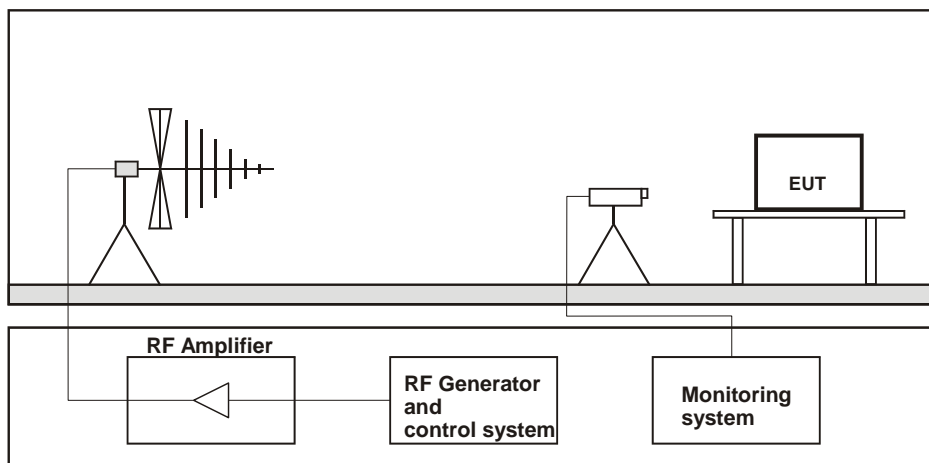
- Note:
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in RS Room No.1.
 3. The transmit antenna was located at a distance of 2 meters from the EUT.
 4. Tested Date: Mar. 20, 2020

12.3 Test Procedure

The test procedure was in accordance with IEC 61000-4-3

- The testing was performed in a fully anechoic chamber.
- The frequency range was from 895 MHz to 905 MHz. The test spot frequencies with keying capability were at 200 Hz, 50 % duty cycle.
- The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond, but shall in no case be less than 0,5s.
- The field strength level was 3 V/m, 10 V/m.
- The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

12.4 Test Setup



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

NOTE:

TABLETOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

FLOOR STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

12.5 Supplementary Information

The requirement followed by the client's specification. (Refer to item 9.1).

12.6 Test Results

| | | | |
|--------------------------|----------------|-----------|-----------|
| Input Power | 230 Vac, 50 Hz | Tested by | Sean Chou |
| Environmental Conditions | 22°C, 69% RH | Test mode | Mode 5 |

| Frequency (MHz) | Polarity | Azimuth(°) | Applied Field Strength | | Observation | Performance Criterion |
|-----------------|----------|------------|------------------------|------------------------------|-------------|-----------------------|
| | | | (V/m) | Modulation | | |
| 895 -905 | V&H | 0 | 3, 10 | Pulse 200 Hz, 50% Duty Cycle | Note | A |
| 895 -905 | V&H | 90 | 3, 10 | Pulse 200 Hz, 50% Duty Cycle | Note | A |
| 895 -905 | V&H | 180 | 3, 10 | Pulse 200 Hz, 50% Duty Cycle | Note | A |
| 895 -905 | V&H | 270 | 3, 10 | Pulse 200 Hz, 50% Duty Cycle | Note | A |

Note: The EUT function was correct during the test.

13 Electrical Fast Transient/Burst Immunity Test (EFT)

13.1 Test Specification

| | |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Basic Standard: | IEC 61000-4-4 |
| Test Voltage: | Signal / telecommunication port: N/A Input DC power port: N/A Input AC power port: $\pm 1\text{kV}$, $\pm 2\text{kV}$ xDSL telecommunication port: 100kHz |
| Impulse Repetition Frequency: | others: 5kHz |
| Impulse Wave Shape: | 5/50 ns |
| Burst Duration: | 0.75 ms for 100kHz Repetition Frequency 15 ms for 5kHz Repetition Frequency |
| Burst Period: | 300 ms |
| Test Duration: | 1 min. |

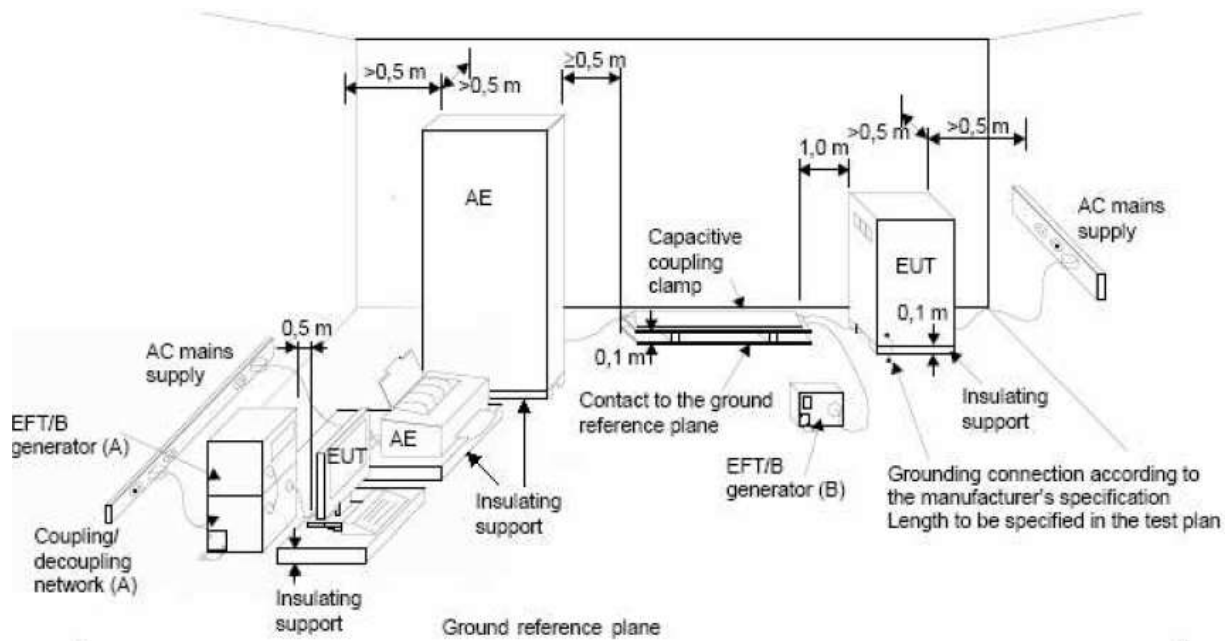
13.2 Test Instruments

| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|----------------------------|-----------|------------|---------------|---------------|
| Haefely, EFT Generator | PEFT 4010 | 154954 | Apr. 23, 2019 | Apr. 22, 2020 |
| Haefely, Capacitive Clamp | IP4A | 155173 | Apr. 23, 2019 | Apr. 22, 2020 |

- 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 EFT Room.
 3. Tested Date: Mar. 23, 2020

13.3 Test Arrangement

- Both positive and negative polarity discharges were applied.
- The distance between any coupling devices and the EUT should be 0.5 m for table-top equipment testing, and 1.0 m for floor standing equipment.
- The duration time of each test sequential was 1 minute.
- The transient/burst waveform was in accordance with IEC 61000-4-4, 5/50 ns.



NOTE:

- location for supply line coupling
- location for signal lines coupling

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

13.4 Supplementary Information

The requirement followed by the client's specification. (Refer to item 9.1).

13.5 Test Results

| | | | |
|--------------------------|---------------|-----------|-----------|
| Input Power | 230Vac, 50 Hz | Tested by | Bernie Lu |
| Environmental Conditions | 21 °C, 70% RH | Test mode | Mode 1-5 |

Input AC power port

| Voltage (kV) | Test Point | Polarity (+/-) | Observation | Performance Criterion |
|--------------|------------|----------------|-------------|-----------------------|
| 1, 2 | L1 | +/- | Note | A |
| 1, 2 | L2 | +/- | Note | A |
| 1, 2 | L1-L2 | +/- | Note | A |

Note: The EUT function was correct during the test.

14 Surge Immunity Test

14.1 Test Specification

| | |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Basic Standard: | IEC 61000-4-5 |
| Wave-Shape: | Signal / telecommunication port (direct to outdoor cables*): 10/700 μ s Open Circuit Voltage 5/320 μ s Short Circuit Current Input DC power port (direct to outdoor cables*): 1.2/50 μ s Open Circuit Voltage 8/20 μ s Short Circuit Current Input AC power port: 1.2/50 μ s Open Circuit Voltage 8/20 μ s Short Circuit Current |
| Test Voltage: | Signal and telecommunication ports**: w/o primary protectors: N/A with primary protectors fitted: N/A Input DC power port: N/A Input AC power ports: Line to line: ± 0.5 kV, ± 1 kV Line to earth or ground: N/A |
| AC Phase Angle (degree): | 0°, 90°, 180°, 270° |
| Pulse Repetition Rate: | 1 time / 20 sec. |
| Number of Tests: | 5 positive and 5 negative at selected points |

* This test is only applicable only to ports, which according to the manufacturer's specification, may connect directly to outdoor cables.

** For ports where primary protection is intended, surges are applied at voltages up to 4 kV with the primary protectors fitted. Otherwise the 1 kV test level is applied without primary protection in place.

14.2 Test Instruments

| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|-----------------------------|-----------|------------|---------------|---------------|
| KeyTek, Surge Simulator | EMC Pro | 9902207 | May 10, 2019 | May 9, 2020 |
| Coupling Decoupling Network | CDN-UTP8 | 045 | Aug. 27, 2019 | Aug. 26, 2020 |
| Software | CEWare32 | 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 EMS Room No. 1.
 3. Tested Date: Mar. 19, 2020

14.3 Test Arrangement

a. EUT Power ports:

The surge shall be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling network shall not exceed 2 meters in length.

For double-insulated products without PE or external earth connections, the test shall be done in a similar way as for grounded products but without adding any additional external grounded connections. If there are no other possible connections to earth, line-to-ground tests may be omitted.

b. Wired network ports

- Unshielded unsymmetrical interconnection lines:

The coupling / decoupling networks shall not influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling network shall not exceed 2 meters in length.

- Unshielded symmetrical interconnection lines:

For symmetrical interconnection lines and high-speed interconnection lines, the CDN shall be selected to match the number of lines/pairs existing in the cable. If coupling arrestors are used, test levels below the ignition point of the coupling arrestor cannot be specified.

The interconnection line between the EUT and the coupling/decoupling networks shall not exceed 2 meters in length.

In order to avoid the coupling and decoupling capacitors having a filtering effect on the data transfer, a balanced high frequency design associating the coupling capacitors with coupling chokes is required. Where normal functioning of high speed communications lines cannot be achieved because of the impact of the CDN on the EUT, product committees should specify appropriate operation or that no surge immunity test is required.

- Shielded lines:

The EUT is isolated from ground and the surge is applied to its metallic enclosure; the termination (or auxiliary equipment) at the port(s) under test is grounded. This test applies to equipment with one or more shielded cables.

The length of the cable between the port(s) under test and the device attached to the other end of the cable shall be:

- 20 m (preferred length) or,
- the shortest length over 10 m, where the manufacturer provides pre-assembled cables used in actual installations.

No test shall be required for cables which according to the manufacturer's specification are ≤ 10 m.

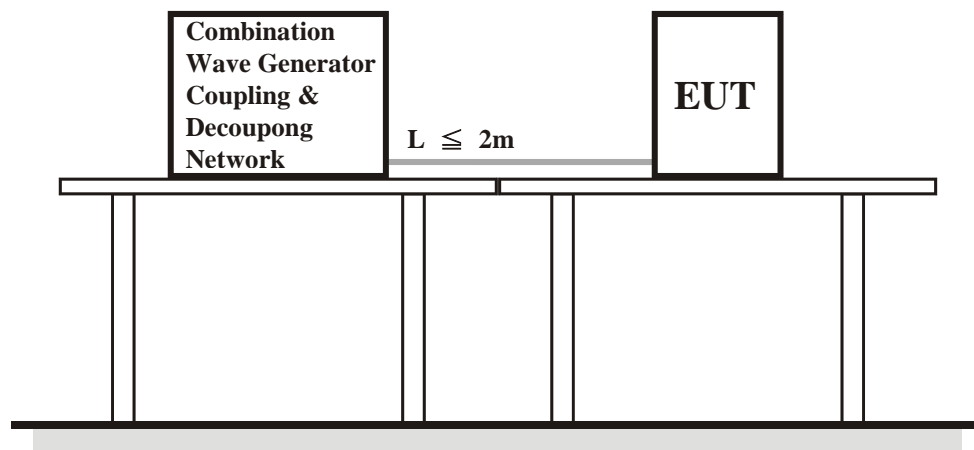
Rules for application of the surge to shielded lines:

- a) Shields grounded at both ends:
 - the test shall be carried out.

The test level is applied on shields with a 2Ω generator source impedance and with the $18 \mu\text{F}$ capacitor.

- b) Shields grounded at one end:
 - the test shall be carried out according to unshielded unsymmetrical interconnection lines or unshielded symmetrical interconnection lines because the shield does not provide any protection against surges induced by magnetic fields.

For EUTs which do not have metallic enclosures, the surge is applied directly to the shielded cable at the EUT side.



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

14.4 Supplementary Information

The requirement followed by the client's specification. (Refer to item 9.1).

14.5 Test Results

| | | | |
|--------------------------|---------------|-----------|----------|
| Input Power | 230Vac, 50 Hz | Tested by | Josh Lin |
| Environmental Conditions | 22°C, 80% RH | Test mode | Mode 1-5 |

Input AC power port

| Voltage (kV) | Test Point | Polarity (+/-) | Pulse Repetition Rate: | Observation | Performance Criterion |
|--------------|------------|----------------|------------------------|-------------|-----------------------|
| 0.5, 1 | L1-L2 | +/- | 1 time / 20 sec. | Note | A |

Note: The EUT function was correct during the test.

15 Immunity to Conducted Disturbances Induced by RF Fields (CS)

15.1 Test Specification

| | |
|-------------------------|------------------------------------|
| Basic Standard: | IEC 61000-4-6 |
| Frequency Range: | 0.15 MHz - 80 MHz |
| Voltage Level: | 3 V, 10 V |
| Modulation: | 1kHz Sine Wave, 80%, AM Modulation |
| Frequency Step: | 1 % of preceding frequency value |
| Dwell Time | 3 seconds |

15.2 Test Instruments

| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|-------------------------------------------------------------|----------------|------------|---------------|---------------|
| ROHDE & SCHWARZ Signal Generator | SML03 | 101801 | Jan. 17, 2020 | Jan. 16, 2021 |
| Digital Sweep Function Generator | 8120 | 984801 | NA | NA |
| AR Power Amplifier | 75A250AM1 | 306331 | NA | NA |
| FCC Coupling Decoupling Network | FCC-801-M2-16A | 01047 | Jun. 19, 2019 | Jun. 18, 2020 |
| FISCHER CUSTOM COMMUNICATIONS EM Injection Clamp | F-203I-23mm | 455 | NA | NA |
| FISCHER CUSTOM COMMUNICATIONS Current Injection Clamp | F-120-9A | 361 | Jul. 31, 2019 | Jul. 30, 2020 |
| B&K Ear Simulator | 4185 | 2553594 | NA | NA |
| EM TEST Coupling Decoupling Network | CDN M1/32A | 306508 | Jun. 19, 2019 | Jun. 18, 2020 |
| TESEQ Coupling Decoupling Network | CDN T800 | 34428 | Jun. 19, 2019 | Jun. 18, 2020 |
| TESEQ Coupling Decoupling Network | CDN T800 | 29459 | Jun. 19, 2019 | Jun. 18, 2020 |
| FCC Coupling Decoupling Network | FCC-801-T4 | 02031 | Jun. 19, 2019 | Jun. 18, 2020 |
| EM TEST Coupling Decoupling Network | CDN T2 | 306509 | Jun. 19, 2019 | Jun. 18, 2020 |
| R&S Power Sensor | NRV-Z5 | 837878/039 | Nov. 8, 2019 | Nov. 7, 2020 |
| R&S Power Meter | NRVD | 837794/040 | Nov. 8, 2019 | Nov. 7, 2020 |
| TESEQ Coupling Decoupling Network | CDN M232 | 37702 | Jun. 19, 2019 | Jun. 18, 2020 |
| TESEQ Coupling Decoupling Network | CDN M332 | 41258 | Jun. 19, 2019 | Jun. 18, 2020 |
| TESEQ Coupling Decoupling Network | CDN M332 | 41256 | Jun. 19, 2019 | Jun. 18, 2020 |
| TESEQ Coupling Decoupling Network | CDN T8-10 | 40376 | Jun. 19, 2019 | Jun. 18, 2020 |
| TESEQ Coupling Decoupling Network | CDN S751S | 35791 | Mar. 5, 2020 | Mar. 4, 2021 |
| TESEQ Coupling Decoupling Network | CDN S200 | 53490 | May 28, 2019 | May 27, 2020 |
| TESEQ Coupling Decoupling Network | CDN S400 | 52115 | Jul. 23, 2019 | Jul. 22, 2020 |
| TESEQ Coupling Decoupling Network | ISN ST08 | 41212 | Jun. 19, 2019 | Jun. 18, 2020 |
| FCC Coupling Decoupling Network | FCC-801-M5-50A | 100018 | Jan. 20, 2020 | Jan. 19, 2021 |
| Software | CS_V7.4.2 | 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 CS Room No. 1.
 3. Tested Date: Mar. 19, 2020

15.5 Test Results

| | | | |
|--------------------------|----------------|-----------|----------|
| Input Power | 230 Vac, 50 Hz | Tested by | Josh Lin |
| Environmental Conditions | 22°C, 78% RH | Test mode | Mode 5 |

| Frequency (MHz) | Level (Vrms) | Tested Line | Injection Method | Return Path | Observation | Performance Criterion |
|-----------------|--------------|-------------|------------------|-------------|-------------|-----------------------|
| 0.15 – 80 | 3, 10 | AC Power | CDN-M2 | N/A | Note | A |

Note: The EUT function was correct during the test.

16 Voltage Dips and Interruptions

16.1 Test Specification

| | |
|--------------------------------|------------------------------------------------------------------------------------------------------------------|
| Basic Standard: | IEC 61000-4-11 |
| Test levels: | Voltage Dips: 30% reduction –10ms 60% reduction –100ms Voltage Interruptions: >95% reduction –5000ms |
| Interval between Event: | Minimum ten seconds |
| Sync Angle (degrees): | 0° / 180° |
| Test Cycle: | 3 times |

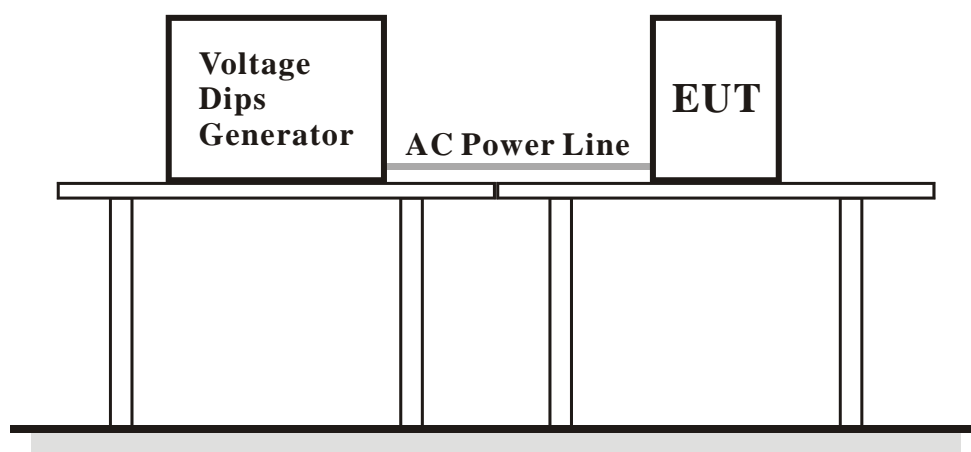
16.2 Test Instruments

| Description & Manufacturer | Model No. | Serial No. | Cal. Date | Cal. Due |
|----------------------------|--------------|----------------------------|---------------|---------------|
| Teseq Immunity Test System | Proflin 2105 | 1632A00983 & 1639A01863 | Jun. 19, 2019 | Jun. 18, 2020 |
| Software | WIN2120 | 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 EMS Room No. 1.
 3. Tested Date: Mar. 19, 2020

16.3 Test Arrangement

The EUT shall be tested for each selected combination of test levels and duration with a sequence of 3 dips/interruptions with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested. Abrupt changes in supply voltage shall occur at 0 degree crossover point of the voltage waveform.



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

16.4 Supplementary Information

The requirement followed by the client's specification. (Refer to item 9.1).

16.5 Test Results

| | | | |
|--------------------------|------------------------------------|-----------|----------|
| Input Power | 230 Vac, 50 Hz & 115 Vac, 50 Hz | Tested by | Josh Lin |
| Environmental Conditions | 22°C, 80% RH | Test mode | Mode 5 |

| Input Power for testing: 230 Vac, 50 Hz | | | | | |
|-----------------------------------------|---------------|----------------|-------|-------------|-----------------------|
| Voltage Reduction (%) | Duration (ms) | Interval (sec) | Times | Observation | Performance Criterion |
| 30 | 10 | 10 | 3 | Note 1 | A |
| 60 | 100 | 10 | 3 | Note 2 | B |
| >95 | 5000 | 10 | 3 | Note 3 | B |

| Input Power for testing: 115 Vac, 50 Hz | | | | | |
|-----------------------------------------|---------------|----------------|-------|-------------|-----------------------|
| Voltage Reduction (%) | Duration (ms) | Interval (sec) | Times | Observation | Performance Criterion |
| 30 | 10 | 10 | 3 | Note 1 | A |
| 60 | 100 | 10 | 3 | Note 2 | B |
| >95 | 5000 | 10 | 3 | Note 3 | B |

- Note:
1. The EUT function was correct during the test.
 2. The output voltage drop during the test, but can be self-recoverable after the test.
 3. The EUT power off during the test, but can be self-recoverable after the test.

17 Pictures of Test Arrangements

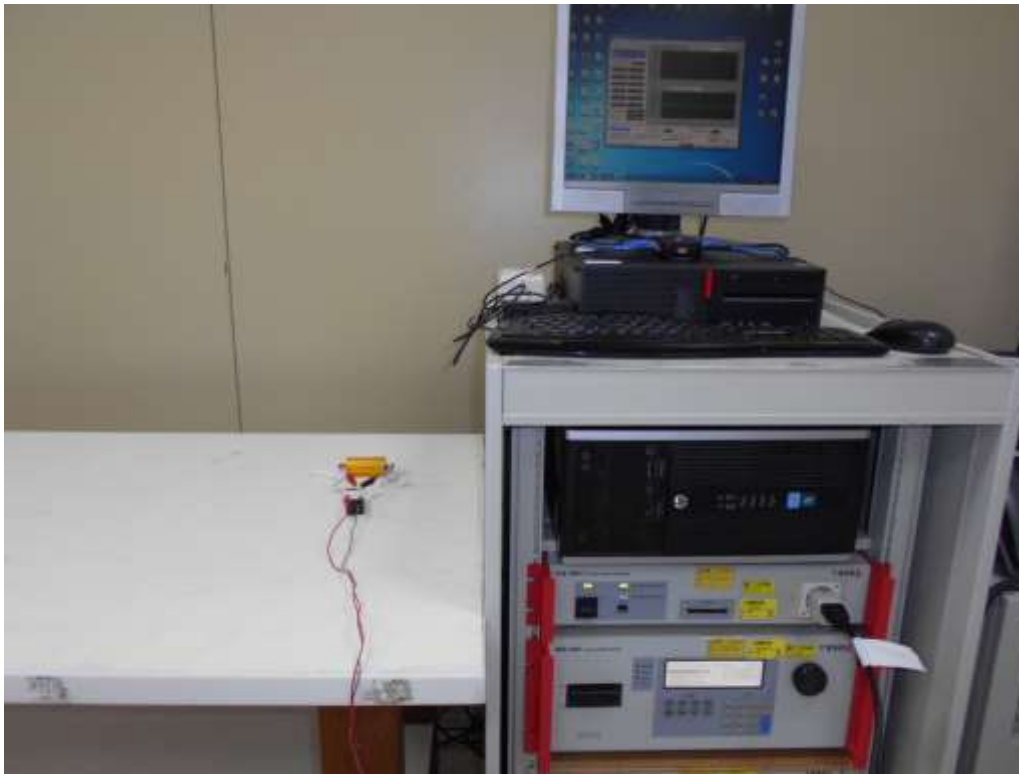
17.1 Conducted Disturbance at Mains Ports



17.2 Radiated Disturbance up to 1 GHz



17.3 Harmonics Current, Voltage Fluctuations and Flicker Measurement



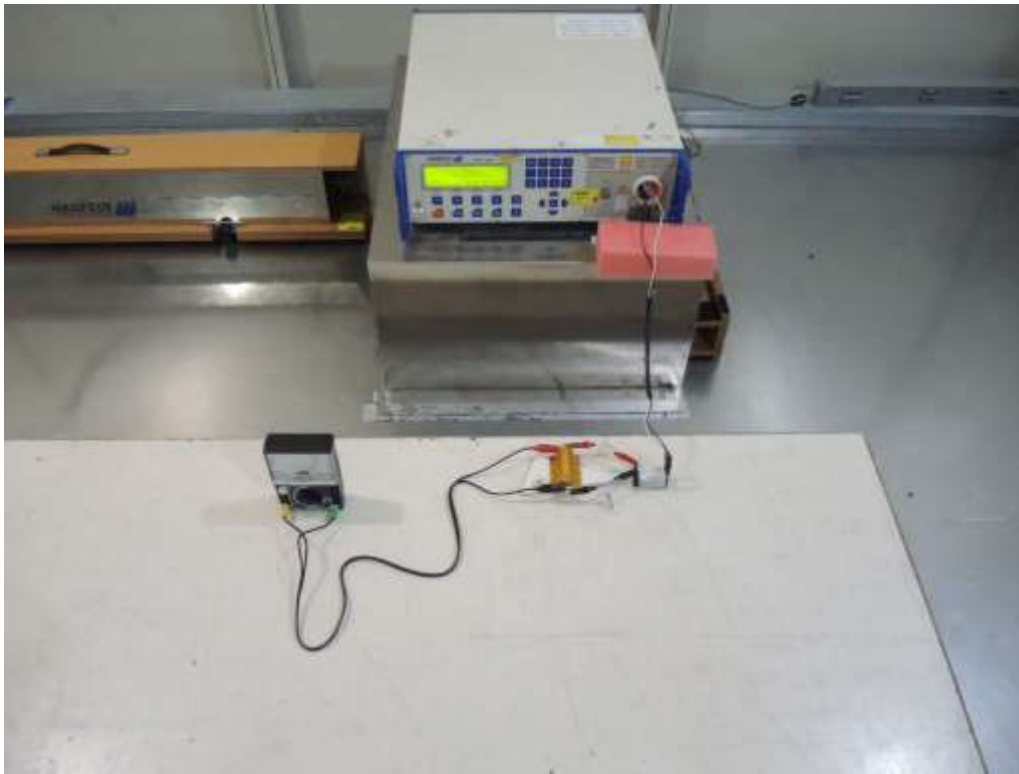
17.4 Electrostatic Discharge Immunity Test (ESD)



17.5 Radio-frequency, Electromagnetic Field Immunity Test (RS)



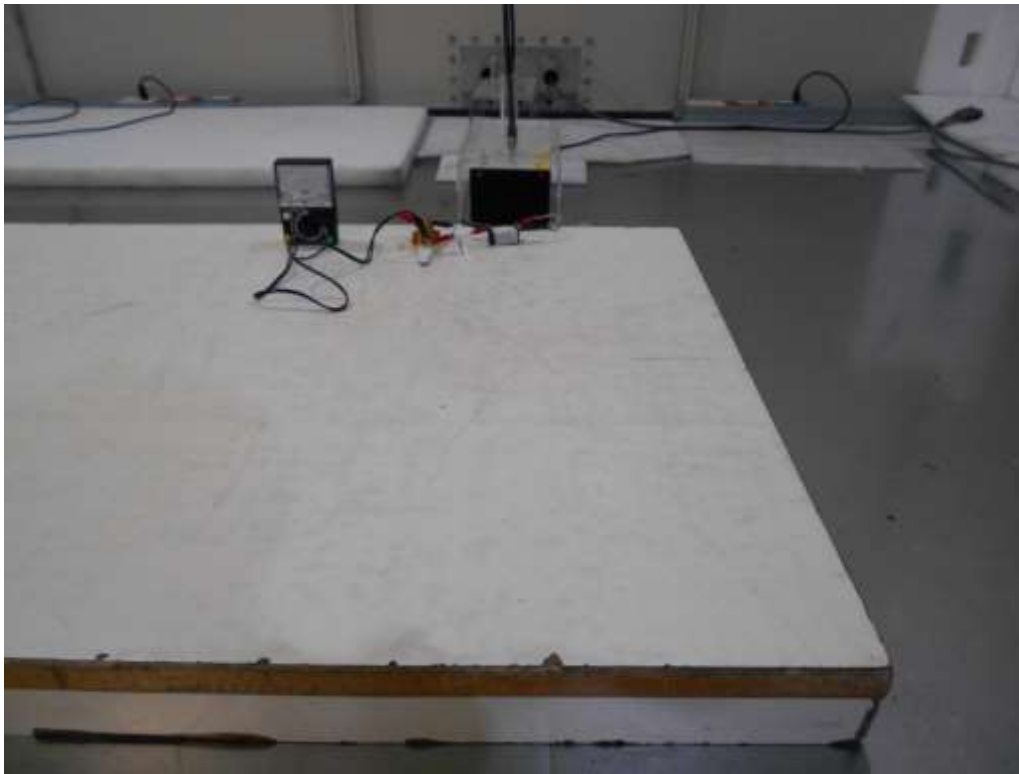
17.6 Electrical Fast Transient/Burst Immunity Test (EFT)



17.7 Surge Immunity Test



17.8 Conducted Disturbances Induced by RF Fields (CS)



17.9 Voltage Dips and Interruptions



Appendix – Information of the Testing Laboratories

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

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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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