# TEST REPORT

| | |
|---|---|
| Applicant | Shenzhen SOFAR SOLAR Co., Ltd. |
| Address | 401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, China. |

| | |
|---|---|
| Manufacturer or Supplier | Shenzhen SOFAR SOLAR Co., Ltd. |
| Address | 401, Building 4, AnTongDa Industrial Park, District 68, XingDong Community, XinAn Street, BaoAn District, Shenzhen, China. |
| Product | Solar Grid-tied Inverter |
| Brand Name | SOFAR SOLAR |
| Model | SOFAR 3000TL, SOFAR 1100TL |
| Additional Model & Model Difference | SOFAR 2200TL, SOFAR 1600TL, SOFAR 2700TL, See items 2.1 |
| Date of tests | May 08, 2020 ~ May 25, 2020 |

The submitted sample of the above equipment has been tested according to the requirements of the following standards:

☒ **EN 61000-6-3:2007+A1:2011+AC:2012**
☒ **EN IEC 61000-3-2:2019**
☒ **EN 61000-3-3:2013+A1:2019**
☒ **EN 61000-6-2:2005**

**CONCLUSION: The submitted sample was found to COMPLY with the test requirement**

| Tested by Ryan Lu<br>Project Engineer / EMC Department | Approved by Glyn He<br>Assistant Manager / EMC Department |
|---|---|
| Ryan | Date: May 28, 2020 |



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# RELEASE CONTROL RECORD

| ISSUE NO. | REASON FOR CHANGE | DATE ISSUED |
|---|---|---|
| CE200423N070 | Original release | May 28, 2020 |

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# 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| EMISSION | | | |
|---|---|---|---|
| **Standard** | **Test Type** | **Result** | **Remark** |
| EN61000-6-3:2007+A1: 2011+AC:2012 | Conducted test | PASS | Meets Limits Minimum passing margin is –2.24 dB at 0.47813 MHz |
| | Radiated test (30MHz~1GHz) | PASS | Meets limits minimum passing margin is –3.60 dB at 32.1700 MHz |
| EN IEC 61000-3-2:2019 | Harmonic current emissions | PASS | Meets the requirements. |
| EN 61000-3-3:2013+A1:2019 | Voltage fluctuations & flicker | PASS | Meets the requirements. |

| IMMUNITY (EN 61000-6-2:2005) | | | |
|---|---|---|---|
| **Standard** | **Test Type** | **Result** | **Remark** |
| IEC 61000-4-2:2008 ED. 2.0 | Electrostatic discharge immunity test | PASS | Electrostatic Discharge – ESD:<br>8kV Air discharge,<br>4kV Contact discharge,<br>Performance Criterion A |
| IEC 61000-4-3:2010 ED. 3.2 | Radiated, radio-frequency, electromagnetic field immunity test | PASS | Radio-Frequency Electromagnetic Field Susceptibility Test – RS:<br>80-1000 MHz, 10V/m, 80% AM (1kHz),<br>1400-2000 MHz, 3V/m, 80% AM (1kHz)<br>2000-2700 MHz, 1V/m, 80% AM (1kHz)<br>Performance Criterion A |
| IEC 61000-4-4:2012 ED. 3.0 | Electrical fast transient / burst immunity test. | PASS | Electrical Fast Transient/Burst - EFT<br>AC Power line: 2kV,<br>DC Power line: 2kV,<br>Performance Criterion A |
| IEC 61000-4-5:2017 ED. 3.1 | Surge immunity test | PASS | Surge Immunity Test:<br>1.2/50 us Open Circuit Voltage, 8 /20 us Short Circuit Current,<br>AC Power Line: line to line 1 kV,<br>line to earth 2kV<br>DC Power Line: line to line 0.5kV<br>Performance Criterion A |
| IEC 61000-4-6:2013 ED. 4.0 | Immunity to conducted disturbances, induced by radio-frequency fields | PASS | Conducted Radio Frequency Disturbances Test – CS:<br>0.15-80 MHz, 3Vrms, 80% AM, 1kHz,<br>Performance Criterion A |
| IEC 61000-4-8:2009 ED. 2.0 | Power frequency magnetic field immunity test. | PASS | Power Frequency Magnetic Field Test, 50/60Hz, 30A/m,<br>Performance Criterion A |

## 1.1 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:

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

| MEASUREMENT | FREQUENCY | UNCERTAINTY |
|---|---|---|
| Mains Terminal Disturbance Voltage Test | 0.15MHz ~ 30MHz | + /-2.70 dB |
| Radiated Disturbance Test | 30MHz ~ 1000MHz | + /-3.99 dB |

# 2 GENERAL INFORMATION

## 2.1 GENERAL DESCRIPTION OF EUT

| | |
|---|---|
| **PRODUCT** | Solar Grid-tied Inverter |
| **MODEL NO.** | SOFAR 3000TL, SOFAR 1100TL |
| **ADDITIONAL MODEL** | SOFAR 1600TL, SOFAR 2700TL, SOFAR 2200TL |
| **POWER SUPPLY** | DC Input: DC 90 - 450V Max. 10A For SOFAR 1100TL;<br>DC Input: DC 90 - 450V Max. 10A For SOFAR 1600TL ;<br>DC Input: DC 100 - 500V Max. 13A For SOFAR 2200TL;<br>DC Input: DC 100 - 500V Max. 13A For SOFAR 2700TL;<br>DC Input: DC 100 - 500V Max. 13A For SOFAR 3000TL<br>Output:<br>SOFAR 1100TL: AC 230V 50/60Hz 6.8A 1500W<br>SOFAR 1600TL:AC 230V 50/60Hz 7.0A 1550W<br>SOFAR 2200TL:AC 230V 50/60Hz 9.5A 2100W<br>SOFAR 2700TL:AC 230V 50/60Hz 11.5A 2500W<br>SOFAR 3000TL:AC 230V 50/60Hz 13.0A 2800W |
| **THE HIGHEST OPERATING FREQUENCY** | Below 108MHz |
| **CABLE SUPPLIED** | N/A |

**NOTE:**

1. For the test results, the EUT had been tested with all conditions. But only the worst case was showed in test report.

2. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

3. RS485 port on the product is for client to collect data, according to client requirements, no need to test.

4. All models shell include red, blue, white and other colors. All models of DC switch and WIFI module is optional accessories, optional installation according to the need of client.

5. This is a series of PV Grid Inverter with the same as in hardware except the amount of BUS capacitor, inverter inductor, Boost and IGBT component and DC switch are different. Identical in software the output power just adjusted by software; models SOFAR 3000TL, SOFAR 1100TL are selected to test. full test was performed for the model SOFAR 3000TL, and partial test for the models SOFAR 1100TL test CE,RE.

| **Ratings ..... :** | SOFAR 1100TL | SOFAR 1600TL | SOFAR 2200TL | SOFAR 2700TL | SOFAR 3000TL |
|---|---|---|---|---|---|
| Input DC voltage range [V]..... : | 90-450 | 90-450 | 100-500 | 100-500 | 100-500 |
| MPP DC voltage range[V] ..... : | 155-380 | 160-380 | 165-450 | 205-450 | 225-455 |
| Max. Input DC current [A]..... : | 10 | | 13 | | |
| Output AC voltage[V]..... : | 230V, 50/60Hz | | | | |
| Max. Output AC current [A] ..... : | 6.8 | 7.0 | 9.5 | 11.5 | 13.0 |
| Output power [W] ..... : | 1500 | 1550 | 2100 | 2500 | 2800 |

6. Model Difference:

| **Difference:** | SOFAR 3000TL | SOFAR 2700TL | SOFAR 2200TL | SOFAR 1600TL | SOFAR 1100TL |
|---|---|---|---|---|---|
| Boost inductor | 1.9mH | 1.9mH | 1.9mH | 2.6mH | 2.6mH |
| Input sampling resistor (RP105,RP108 /RP189,RP109) | 200ohm / 7.5Kohm | 200ohm / 7.5Kohm | 200ohm / 7.5Kohm | 220ohm / 10Kohm | 220ohm / 10Kohm |
| Bus capacitor | 3pcs | 3pcs | 3pcs | 2pcs | 2pcs |
| Inverter inductor | 1.3mH | 1.3mH | 1.3mH | 2.3mH | 3.4mH |
| Output sampling resistor (RP118, RP119, RC18 /RP120, RP121,RC22) | 2Kohm,100ohm,100ohm | 2Kohm,100ohm,100ohm | 2Kohm,100ohm,100ohm | 1.0Kohm,200ohm,100ohm | 499ohm,200ohm,200ohm |

## 2.2 DESCRIPTION OF TEST MODES

The EUT were tested under the following modes, the final worst mode was marked in boldface and recorded in this report.

**CONDUCTED EMISSION TEST:**

| Test Mode | Test Model | Test Voltage |
|---|---|---|
| **Grid Mode (Full load)** | **SOFAR 3000TL** | Input 225VDC Output 230VAC 50Hz |
| | | Input 330VDC Output 230VAC 50Hz |
| | | **Input 455VDC Output 230VAC 50Hz** |
| | SOFAR 1100TL | Input 155VDC Output 230VAC 50Hz |
| | | Input 270VDC Output 230VAC 50Hz |
| | | Input 380VDC Output 230VAC 50Hz |

**RADIATED EMISSION TEST:**

| Test Mode | Test Model | Test Voltage |
|---|---|---|
| **Grid Mode (Full load)** | **SOFAR 3000TL** | Input 225VDC Output 230VAC 50Hz |
| | | **Input 330VDC Output 230VAC 50Hz** |
| | | Input 455VDC Output 230VAC 50Hz |
| | SOFAR 1100TL | Input 155VDC Output 230VAC 50Hz |
| | | Input 270VDC Output 230VAC 50Hz |
| | | Input 380VDC Output 230VAC 50Hz |

**FOR HARMONICS AND FLICKER TEST:**

| Test Mode | Test Model | Test Voltage |
|---|---|---|
| **Grid Mode (Full load)** | **SOFAR 3000TL** | **Input 455VDC Output 230VAC 50Hz** |

**IMMUNITY TESTS:**

| Test Mode | Test Model | Test Voltage |
|---|---|---|
| **Grid Mode (10% load)** | **SOFAR 3000TL** | **Input 455VDC Output 230VAC 50Hz** |

## 2.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT has been tested and complied with the requirements of the following standards:

**EN 61000-6-3:2007+A1:2011+AC:2012**
**EN IEC 61000-3-2:2019**
**EN 61000-3-3:2013+A1:2019**
**EN 61000-6-2:2005**
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 61000-4-5:2017 ED. 3.1
IEC 61000-4-6:2013 ED. 4.0
IEC 61000-4-8:2009 ED. 2.0

**NOTE:** The above IEC basic standards are applied with latest version if customer has no special requirement.

## 2.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| NO. | PRODUCT | BRAND | MODEL NO. | SERIAL NO. | FCC ID |
|---|---|---|---|---|---|
| 1 | DC Source | Chroma | 62150H-1000S | 62150EF00488 | N/A |

| NO. | SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS |
|---|---|
| 1 | AC Line: Unshielded, Detachable 2.0m, DC Line: Unshielded, Detachable 2.0m; |

# 3 EMISSION TEST

## 3.1 CONDUCTED EMISSION MEASUREMENT

### 3.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

| FREQUENCY (MHz) | dBuV | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 - 0.5 | 66 - 56 | 56 - 46 |
| 0.50 - 5.0 | 56 | 46 |
| 5.0 - 30.0 | 60 | 50 |

**Note:** (1) The lower limit shall apply at the transition frequencies.
(2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

### 3.1.2 TEST INSTRUMENTS

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| EMI Test Receiver | Rohde&Schwarz | ESCS30 | 100199 | Mar. 18,20 | Mar. 17,21 |
| Pulse Limiter | Rohde&Schwarz | ESH3-Z2 | 100168 | Sep. 18,19 | Sep. 17,20 |
| Artificial Mains Network | Rohde&Schwarz | ESH2-Z5 | 100071 | Mar. 25,20 | Mar. 24,21 |
| Artificial Mains Network | SCHWARZBECK | NNLK 8129 | 8129-264 | Mar. 18,20 | Mar. 17,21 |
| Voltage probe | SCHWARZBECK | TK 9421 | TK 9421-176 | Sep. 24,19 | Sep. 23,20 |
| Test software | ADT | ADT_Cond_V7.3.7 | N/A | N/A | N/A |

**NOTE:** 1. The test was performed in shielded room 843.
2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

## 3.1.3 TEST PROCEDURE

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

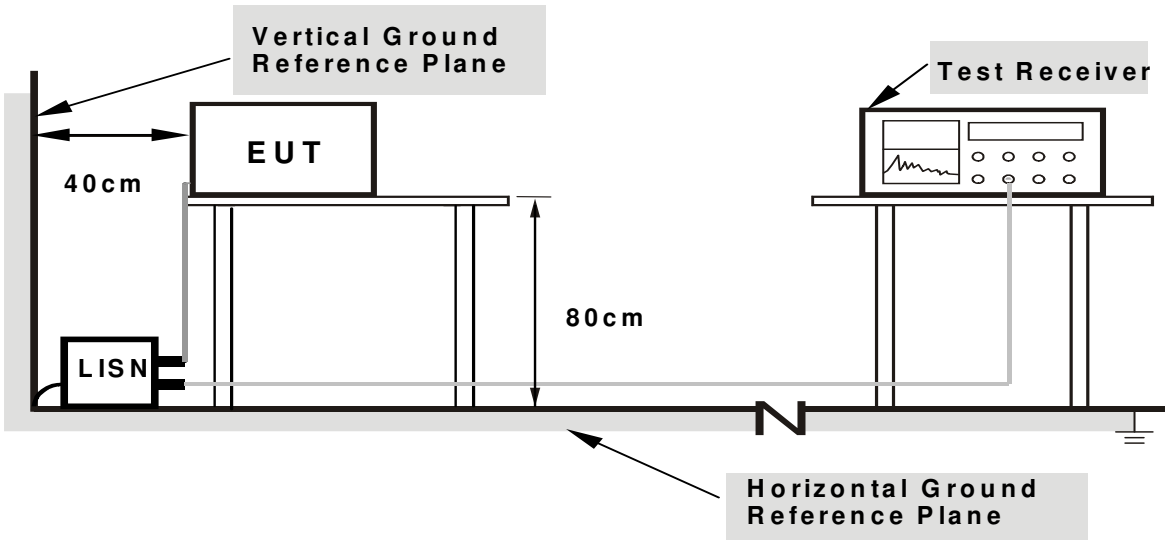
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

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

## 3.1.4 DEVIATION FROM TEST STANDARD

No deviation

## 3.1.5 TEST SETUP




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

## 3.1.6 EUT OPERATING CONDITIONS

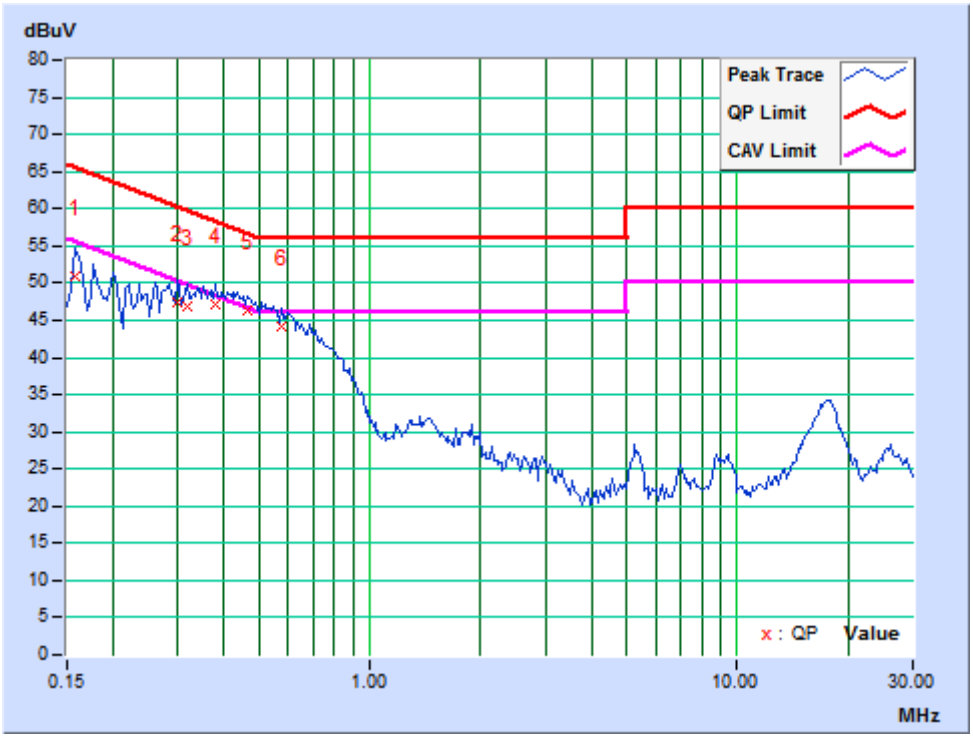
a. Turned on the power of all equipment.
b. EUT was operated according to the type description in manufacturer's specifications or the User's Manual.

## 3.1.7 TEST RESULTS

| | | | |
|---|---|---|---|
| **TEST MODE** | See section 2.2 | **6dB BANDWIDTH** | 9 kHz |
| **TEST VOLTAGE** | See section 2.2 | **PHASE** | Line (L) |
| **ENVIRONMENTAL CONDITIONS** | 25deg. C, 46% RH | **TESTED BY**: Wang | |

| No | Freq. | Corr. Factor | Reading Value [dB (uV)] | | Emission Level [dB (uV)] | | Limit [dB (uV)] | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | [MHz] | (dB) | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.15781 | 9.05 | 41.94 | 37.64 | 50.99 | 46.69 | 65.58 | 55.58 | -14.58 | -8.88 |
| 2 | 0.29844 | 9.69 | 37.75 | 34.21 | 47.44 | 43.90 | 60.29 | 50.29 | -12.85 | -6.39 |
| 3 | 0.31797 | 9.69 | 37.09 | 34.22 | 46.78 | 43.91 | 59.76 | 49.76 | -12.98 | -5.85 |
| 4 | 0.38047 | 9.69 | 37.32 | 34.00 | 47.01 | 43.69 | 58.27 | 48.27 | -11.26 | -4.58 |
| 5 | 0.46250 | 9.71 | 36.49 | 33.19 | 46.20 | 42.90 | 56.65 | 46.65 | -10.45 | -3.75 |
| 6 | 0.57188 | 9.69 | 34.61 | 31.50 | 44.30 | 41.19 | 56.00 | 46.00 | -11.70 | -4.81 |

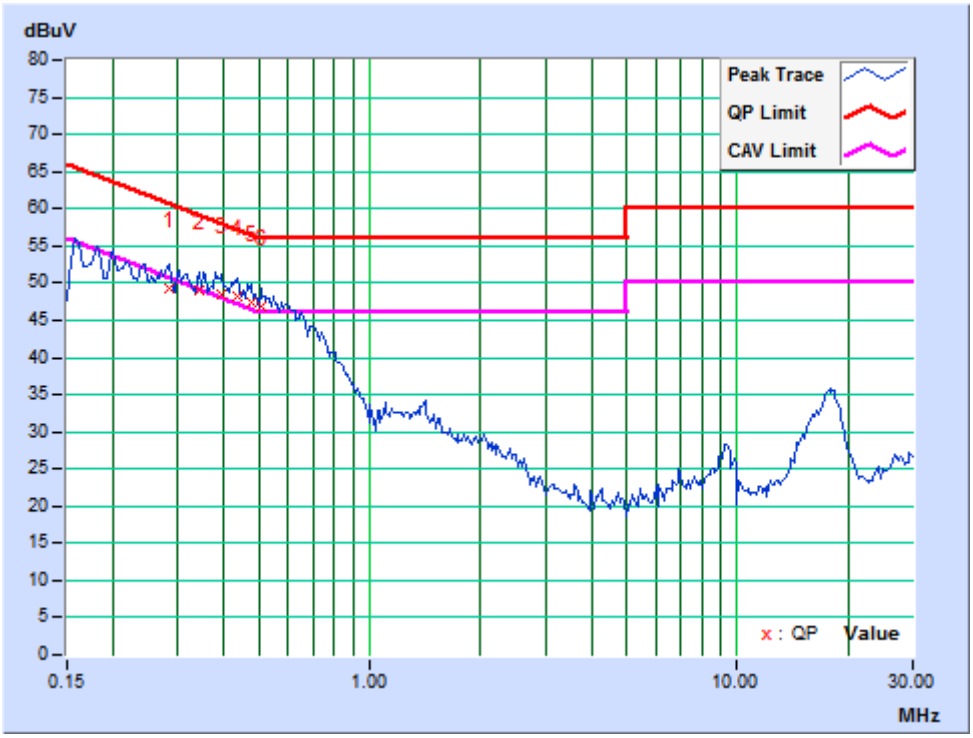
**REMARK:** The emission levels of other frequencies were very low against the limit.



| | | | |
|---|---|---|---|
| **TEST MODE** | See section 2.2 | **6dB BANDWIDTH** | 9 kHz |
| **TEST VOLTAGE** | See section 2.2 | **PHASE** | Neutral (N) |
| **ENVIRONMENTAL CONDITIONS** | 25deg. C, 46% RH | **TESTED BY**: Wang | |

| No | Freq. | Corr. Factor | Reading Value [dB (uV)] | | Emission Level [dB (uV)] | | Limit [dB (uV)] | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | [MHz] | (dB) | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.28281 | 9.75 | 39.48 | 35.82 | 49.23 | 45.57 | 60.73 | 50.73 | -11.50 | -5.16 |
| 2 | 0.34141 | 9.76 | 39.22 | 35.55 | 48.98 | 45.31 | 59.17 | 49.17 | -10.19 | -3.86 |
| 3 | 0.39609 | 9.75 | 38.76 | 35.24 | 48.51 | 44.99 | 57.93 | 47.93 | -9.42 | -2.94 |
| 4 | 0.43516 | 9.77 | 38.37 | 34.77 | 48.14 | 44.54 | 57.15 | 47.15 | -9.01 | -2.61 |
| **5** | **0.47813** | **9.77** | **37.64** | **34.36** | **47.41** | **44.13** | **56.37** | **46.37** | **-8.96** | **-2.24** |
| 6 | 0.50547 | 9.76 | 37.11 | 33.96 | 46.87 | 43.72 | 56.00 | 46.00 | -9.13 | -2.28 |

**REMARK:** The emission levels of other frequencies were very low against the limit.



## 3.2 RADIATED EMISSION MEASUREMENT

### 3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

### TEST STANDARD: EN 61000-6-3

### FOR FREQUENCY BELOW 1000 MHz

| FREQUENCY (MHz) | 3m | 10m |
|---|---|---|
| | Quasi-Peak(dBuV/m) | Quasi-Peak (dBuV/m) |
| 30 – 230 | 40 | 30 |
| 230 – 1000 | 47 | 37 |

### FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

| Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz) | Range (MHz) |
|---|---|
| Below 108 | 1000 |
| 108 – 500 | 2000 |
| 500 – 1000 | 5000 |
| Above 1000 | Up to 5 times of the highest frequency or 6 GHz, whichever is less |

### FOR FREQUENCY ABOVE 1000 MHz

| FREQUENCY (GHz) | 3m | |
|---|---|---|
| | PEAK(dBuV/m) | AVERAGE(dBuV/m) |
| 1 to 3 | 70 | 50 |
| 3 to 6 | 74 | 54 |

**NOTE:** (1) The lower limit shall apply at the transition frequencies.
(2) Emission level (dBuV/m) = 20 log Emission level (uV/m).

## 3.2.2 TEST INSTRUMENTS

### FOR FREQUENCY BELOW 1GHz

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| EMI Test Receiver | Rohde&Schwarz | ESU26 | 100005 | May 14, 20 | May 13, 21 |
| EMI Test Receiver | Rohde&Schwarz | ESR7 | 101564 | Mar. 18,20 | Mar. 17,21 |
| Trilog-Broadband Antenna | SCHWARZBECK | VULB 9168 | 9168-555 | Nov. 24, 19 | Nov. 23, 20 |
| Trilog-Broadband Antenna | SCHWARZBECK | VULB 9168 | 9168-554 | Dec. 01, 19 | Nov. 30, 20 |
| Preamplifier | EMCI | EMC1135 | 980378 | Mar. 15,20 | Mar. 14,21 |
| Preamplifier | EMCI | EMC1135 | 980423 | Mar. 15,20 | Mar. 14,21 |
| 10m Semi-anechoic Chamber | CHANGLING | 21.4m*12.1m* 8.8m | NSEMC006 | Oct. 19,19 | Oct. 18,20 |
| Test Software | ADT | ADT_Radiated _V8.7.07 | N/A | N/A | N/A |

**NOTE:** 1. The test was performed in 10m Chamber.
2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA

### FOR FREQUENCY ABOVE 1GHz

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| Horn Antenna | ETS-Lindgren | 3117 | 00085519 | Nov. 24, 19 | Nov. 23, 20 |
| Horn Antenna | SCHWARZBECK | BBHA 9170 | BBHA9170147 | May 10,20 | May 09,21 |
| Signal and Spectrum Analyzer | Rohde&Schwarz | FSV40 | 101003 | Mar. 18,20 | Mar. 17,21 |
| Broadband Preamplifier (1~18GHz) | SCHWARZBECK | BBV9718 | 266 | May 09,20 | May 08,21 |
| Pre-Amplifier (18GHz-40GHz) | EMCI | EMC 184045 | 980102 | Mar. 04,20 | Mar. 03,21 |
| Test Software | ADT | ADT_Radiated_V 8.7.07 | N/A | N/A | N/A |

**NOTE:** 1. The test was performed in 10m Chamber.
2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

## 3.2.3 TEST PROCEDURE

**<Frequency Range below 1GHz>**

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

**NOTE:**

1. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
3. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) (if the raw value not contains the amplifier);
4. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain(dB) (if the raw value contains the amplifier).
5. Margin value = Emission level – Limit value.

**<Frequency Range above 1GHz>**

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter Semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna can be varied from one meter-to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. The bore sight should be used during the test above 1GHz.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test receiver/spectrum was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

**NOTE:**

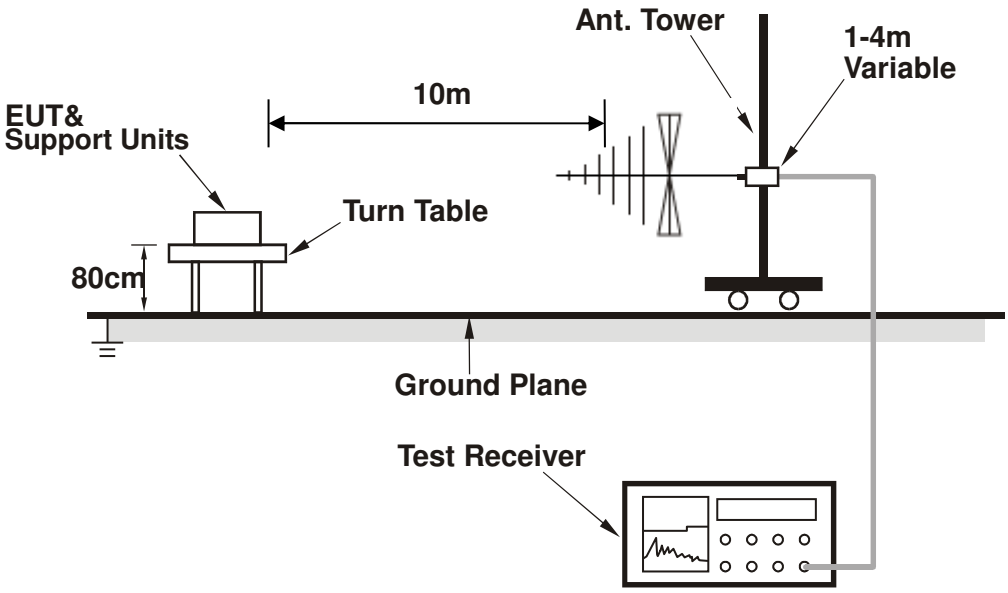
1. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.
2. For measurement of frequency above 1000 MHz, the EUT was set 3 meters away from the receiver antenna.
3. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
4. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) (if the raw value not contains the amplifier);
5. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain(dB) (if the raw value contains the amplifier).
6. Margin value = Emission level – Limit value.

## 3.2.4 DEVIATION FROM TEST STANDARD

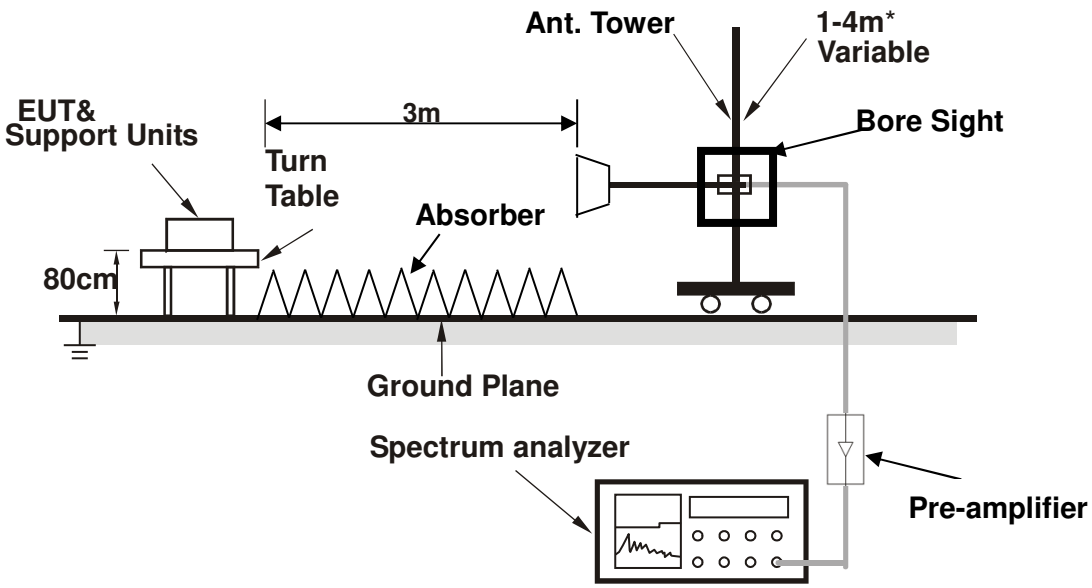
No deviation

## 3.2.5 TEST SETUP

**<Frequency Range below 1GHz>**




**<Frequency Range above 1GHz>**




* :depends on the EUT height and the antenna 3dB beamwidth both, refer to section 7.3 of CISPR 16-2-3.

## 3.2.6 EUT OPERATING CONDITIONS

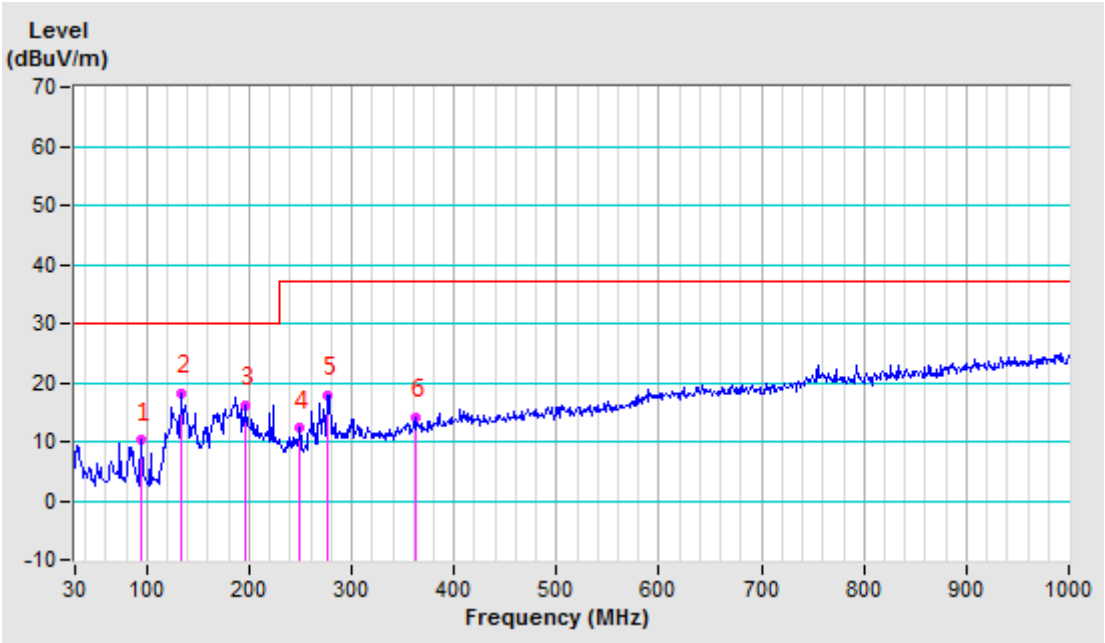
Same as item 3.1.6

## 3.2.7 TEST RESULTS

| | | | |
|---|---|---|---|
| **TEST MODE** | See section 2.2 | **FREQUENCY RANGE** | 30-1000 MHz |
| **TEST VOLTAGE** | See section 2.2 | **DETECTOR FUNCTION & BANDWIDTH** | Quasi-Peak, 120kHz |
| **ENVIRONMENTAL CONDITIONS** | 17 deg. C, 64% RH | **TESTED BY**: Kamiko | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 10 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| No. | Freq. (MHz) | Correction Factor (dB/m) | Raw Value (dBuV) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) |
| 1 | 94.9900 | -28.01 | 38.19 | 10.18 | 30.00 | -19.82 | 200 | 23 |
| 2 | 133.7900 | -22.97 | 41.26 | 18.29 | 30.00 | -11.71 | 200 | 130 |
| 3 | 196.2337 | -23.62 | 39.65 | 16.03 | 30.00 | -13.97 | 400 | 167 |
| 4 | 249.9475 | -21.25 | 33.49 | 12.24 | 37.00 | -24.76 | 200 | 65 |
| 5 | 276.3800 | -20.21 | 37.96 | 17.75 | 37.00 | -19.25 | 200 | 114 |
| 6 | 361.7400 | -18.07 | 32.21 | 14.14 | 37.00 | -22.86 | 200 | 265 |

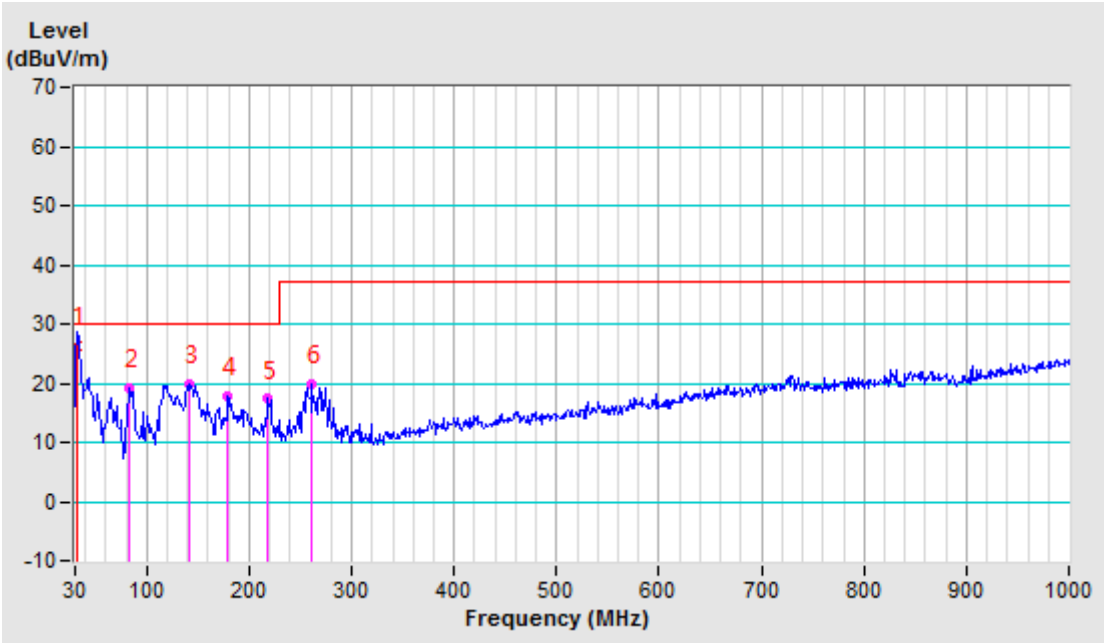
**REMARK:** 1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
2. Negative sign (-) in the margin column signify levels below the limit.
3. Frequency range scanned: 30MHz to 1000MHz.
4. Only emissions significantly above equipment noise floor are reported



| | | | |
|---|---|---|---|
| **TEST MODE** | See section 2.2 | **FREQUENCY RANGE** | 30-1000 MHz |
| **TEST VOLTAGE** | See section 2.2 | **DETECTOR FUNCTION & BANDWIDTH** | Quasi-Peak, 120kHz |
| **ENVIRONMENTAL CONDITIONS** | 17 deg. C, 64% RH | **TESTED BY**: Kamiko | |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT10 M | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| No. | Freq. (MHz) | Correction Factor (dB/m) | Raw Value (dBuV) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (cm) | Table Angle (Degree) |
| **1** | **32.1700** | **-23.31** | **49.71** | **26.40** | **30.00** | **-3.60** | **100** | **214** |
| 2 | 83.6437 | -26.15 | 45.40 | 19.25 | 30.00 | -10.75 | 100 | 124 |
| 3 | 142.0891 | -21.26 | 41.01 | 19.75 | 30.00 | -10.25 | 100 | 221 |
| 4 | 179.4360 | -22.92 | 40.80 | 17.88 | 30.00 | -12.12 | 100 | 37 |
| 5 | 218.4804 | -23.16 | 40.47 | 17.31 | 30.00 | -12.69 | 300 | 20 |
| 6 | 260.6290 | -21.41 | 41.25 | 19.84 | 37.00 | -17.16 | 300 | 20 |

**REMARK:** 1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
2. Negative sign (-) in the margin column signify levels below the limit.
3. Frequency range scanned: 30MHz to 1000MHz.
4. Only emissions significantly above equipment noise floor are reported



# 3.3 HARMONICS CURRENT MEASUREMENT

## 3.3.1 LIMITS OF HARMONICS CURRENT MEASUREMENT

### TEST STANDARD: EN 61000-3-2 and EN 61000-3-12

| DESCRIPTION & MANUFACTURER | MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|---|---|---|---|---|
| PRECISION POWER ANALYZER | YOKOGAWA | WT3000 | 91M210852 | Sep. 11,19 | Sep. 11,20 |
| Test Software | YOKOGAWA | IEC61000 | N/A | N/A | N/A |
| PEFERENCE IMPEDANCE NETWORK | Voltech | EUR | 3018 | Sep. 11,19 | Sep. 11,20 |

**NOTE:** 1. The test was performed in PV Room.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA and NIM/CHINA.

## 3.3.2 CURRENT EMISSION LIMITS FOR EQUIPMENT OTHER THAN BALANCED THREE-PHASE EQUIPMENT

| Minimal $R_{sce}$ | Admissible individual harmonic current $I_n/I_1$ [a] % | | | | | | Admissible harmonic current distortion factors % | |
|---|---|---|---|---|---|---|---|---|
| | $I_3$ | $I_5$ | $I_7$ | $I_9$ | $I_{11}$ | $I_{13}$ | $THD$ | $PWHD$ |
| 33 | 21,6 | 10,7 | 7,2 | 3,8 | 3,1 | 2 | 23 | 23 |
| 66 | 24 | 13 | 8 | 5 | 4 | 3 | 26 | 26 |
| 120 | 27 | 15 | 10 | 6 | 5 | 4 | 30 | 30 |
| 250 | 35 | 20 | 13 | 9 | 8 | 6 | 40 | 40 |
| ≥ 350 | 41 | 24 | 15 | 12 | 10 | 8 | 47 | 47 |
| The relative values of even harmonics up to order 12 shall not exceed $16/n$ %. Even harmonics above order 12 are taken into account in $THD$ and $PWHD$ in the same way as odd order harmonics.<br>NOTE Linear interpolation between successive $R_{sce}$ values is permitted. See also Annex B. | | | | | | | | |
| [a] $I_1$ = reference fundamental current; $I_n$ = harmonic current component. | | | | | | | | |

## 3.3.3 CURRENT EMISSION LIMITS FOR BALANCED THREE-PHASE EQUIPMENT

| Minimal $R_{sce}$ | Admissible individual harmonic current $I_n/I_1$ [a] % | | | | Admissible harmonic current distortion factors % | |
|---|---|---|---|---|---|---|
| | $I_5$ | $I_7$ | $I_{11}$ | $I_{13}$ | *THD* | *PWHD* |
| 33 | 10,7 | 7,2 | 3,1 | 2 | 13 | 22 |
| 66 | 14 | 9 | 5 | 3 | 16 | 25 |
| 120 | 19 | 12 | 7 | 4 | 22 | 28 |
| 250 | 31 | 20 | 12 | 7 | 37 | 38 |
| ≥350 | 40 | 25 | 15 | 10 | 48 | 46 |
| The relative values of even harmonics up to order 12 shall not exceed 16/*n* %. Even harmonics above order 12 are taken into account in *THD* and *PWHD* in the same way as odd order harmonics.<br>NOTE Linear interpolation between successive $R_{sce}$ values is permitted. See also Annex B. | | | | | | |
| [a] $I_1$ = reference fundamental current; $I_n$ = harmonic current component. | | | | | | |

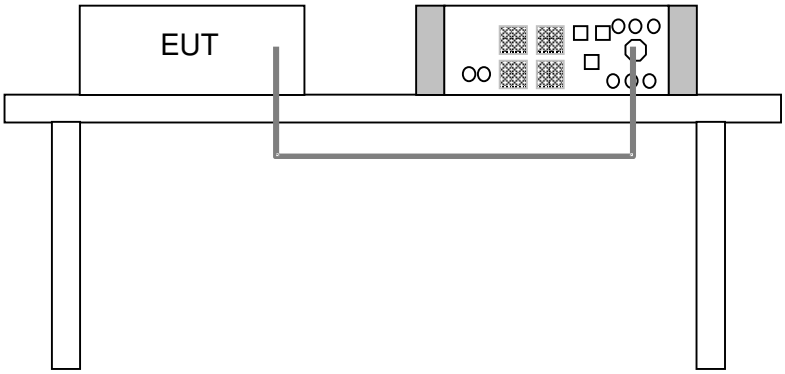
## 3.3.4 CURRENT EMISSION LIMITS FOR BALANCED THREE-PHASE EQUIPMENT UNDER SPECIFIED CONDITIONS

| Minimal $R_{sce}$ | Admissible individual harmonic current $I_n/I_1$ [a] % | | | | Admissible harmonic current distortion factors % | |
|---|---|---|---|---|---|---|
| | $I_5$ | $I_7$ | $I_{11}$ | $I_{13}$ | *THD* | *PWHD* |
| 33 | 10,7 | 7,2 | 3,1 | 2 | 13 | 22 |
| ≥120 | 40 | 25 | 15 | 10 | 48 | 46 |
| The relative values of even harmonics up to order 12 shall not exceed 16/*n* %. Even harmonics above order 12 are taken into account in *THD* and *PWHD* in the same way as odd order harmonics.<br>NOTE Linear interpolation between successive $R_{sce}$ values is permitted. See also Annex B. | | | | | | |
| [a] $I_1$ = reference fundamental current; $I_n$ = harmonic current component. | | | | | | |

## 3.3.5 DEVIATION FROM TEST STANDARD

No deviation

## 3.3.6 TEST SETUP




## 3.3.7 EUT OPERATING CONDITIONS

Same as item 3.1.6

# 3.3.8 TEST RESULTS

## ***** appliances (Average)

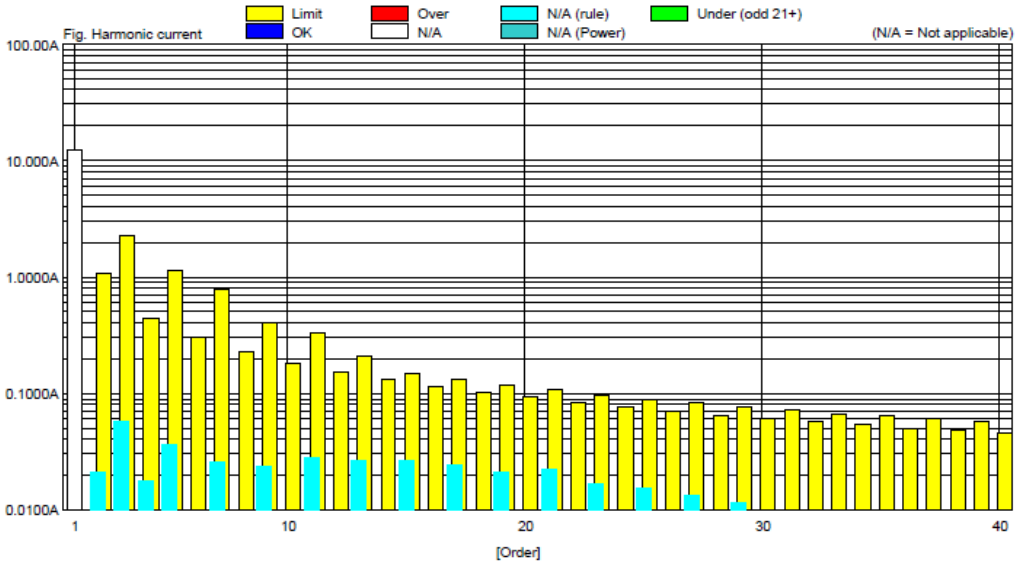
| | | |
|---|---|---|
| Print Date | : | Tue May 19 16:41:33 2020 |
| MeasureDate | : | Tue May 19 16:41:03 2020 |
| Comment | : | Experimental model Pattern A |

| | | |
|---|---|---|
| Regulation | : | IEC61000-3-2 Ed3.0 am2<br>IEC61000-4-7 Ed2.0 A1 |
| Class | : | CLASS A |
| MeasureTime | : | 149.80sec |
| Model | : | YOKOGAWA WT3000 |
| Rating Voltage | : | 230.00 V |
| Wiring | : | single-phase 2-wire |
| Element | : | 1 |
| Range | : | 300V/100.0A |
| Current(rms) | : | 12.3237 A |
| Voltage(rms) | : | 230.53 V |
| Frequency | : | 50.000 Hz |
| Power Factor | : | 0.9997 |
| POHC Limit | : | 0.2514 A |
| POHC Max | : | 0.0408 A |
| THC | : | 0.1099 A |

PASS

| | | |
|---|---|---|
| Set Fundamental I | : | --------- |
| Set Power Factor | : | --------- |
| Set P | : | --------- |
| Sigma W Max | : | 2857.400 W |
| Sigma PF | : | 0.9997 |
| Distortion factor(V) | : | 0.03 % |
| V THDS | : | 0.03 % |
| V THDG | : | 0.03 % |
| Distortion factor(A) | : | 0.81 % |
| A THDS | : | 0.85 % |
| A THDG | : | 0.89 % |
| P THD | : | 0.00 % |
| Power Limit | : | 75 W |

| Order | Measure[A] | Limit[A] | Margin[%] | Order | Measure[A] | Limit[A] | Margin[%] |
|---|---|---|---|---|---|---|---|
| 1 | 12.3233 | | | 2 | 0.0215 | 1.0800 | 98.0 |
| 3 | 0.0583 | 2.3000 | 97.5 | 4 | 0.0177 | 0.4300 | 95.9 |
| 5 | 0.0364 | 1.1400 | 96.8 | 6 | 0.0099 | 0.3000 | 96.7 |
| 7 | 0.0255 | 0.7700 | 96.7 | 8 | 0.0092 | 0.2300 | 96.0 |
| 9 | 0.0241 | 0.4000 | 94.0 | 10 | 0.0071 | 0.1840 | 96.1 |
| 11 | 0.0280 | 0.3300 | 91.5 | 12 | 0.0069 | 0.1533 | 95.5 |
| 13 | 0.0267 | 0.2100 | 87.3 | 14 | 0.0052 | 0.1314 | 96.1 |
| 15 | 0.0261 | 0.1500 | 82.6 | 16 | 0.0047 | 0.1150 | 95.9 |
| 17 | 0.0249 | 0.1324 | 81.2 | 18 | 0.0042 | 0.1022 | 95.9 |
| 19 | 0.0216 | 0.1184 | 81.7 | 20 | 0.0048 | 0.0920 | 94.8 |
| 21 | 0.0218 | 0.1071 | 79.7 | 22 | 0.0034 | 0.0836 | 95.9 |
| 23 | 0.0164 | 0.0978 | 83.2 | 24 | 0.0033 | 0.0767 | 95.7 |
| 25 | 0.0154 | 0.0900 | 82.9 | 26 | 0.0032 | 0.0708 | 95.5 |
| 27 | 0.0133 | 0.0833 | 84.0 | 28 | 0.0035 | 0.0657 | 94.6 |
| 29 | 0.0117 | 0.0776 | 85.0 | 30 | 0.0028 | 0.0613 | 95.5 |
| 31 | 0.0099 | 0.0726 | 86.4 | 32 | 0.0026 | 0.0575 | 95.4 |
| 33 | 0.0080 | 0.0682 | 88.3 | 34 | 0.0026 | 0.0541 | 95.1 |
| 35 | 0.0077 | 0.0643 | 88.0 | 36 | 0.0026 | 0.0511 | 94.9 |
| 37 | 0.0071 | 0.0608 | 88.4 | 38 | 0.0026 | 0.0484 | 94.6 |
| 39 | 0.0065 | 0.0577 | 88.7 | 40 | 0.0026 | 0.0460 | 94.4 |



# ***** appliances (Maximum)

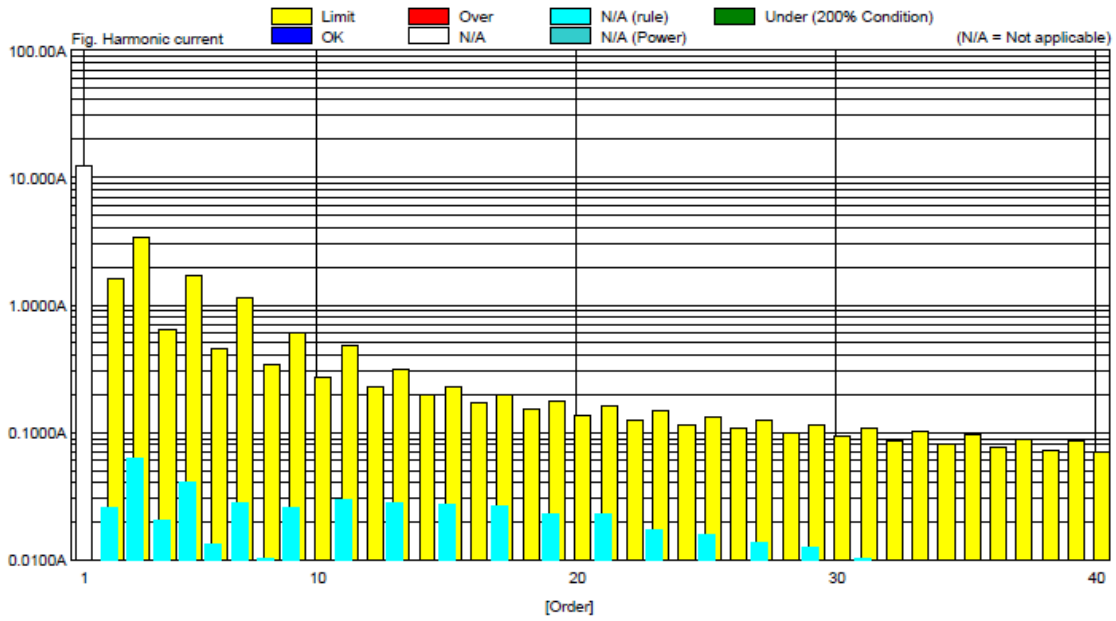
| | | |
|---|---|---|
| Print Date | : | Tue May 19 16:41:34 2020 |
| MeasureDate | : | Tue May 19 16:41:03 2020 |
| Comment | : | Experimental model Pattern A |

| | | |
|---|---|---|
| Regulation | : | IEC61000-3-2 Ed3.0 am2<br>IEC61000-4-7 Ed2.0 A1 |
| Class | : | CLASS A |
| MeasureTime | : | 149.80sec |
| Model | : | YOKOGAWA WT3000 |
| Rating Voltage | : | 230.00 V |
| Wiring | : | single-phase 2-wire |
| Element | : | 1 |
| Range | : | 300V/100.0A |
| Current(rms) | : | 12.3991 A |
| Voltage(rms) | : | 230.53 V |
| Frequency | : | 50.006 Hz |
| Power Factor | : | 0.9997 |
| Beyond Limit Time | : | 14.9800 s |
| Beyond Total Time | : | 0.0000 s |
| THC | : | 0.1135 A |

PASS

| | | |
|---|---|---|
| Set Fundamental I | : | --------- |
| Set Power Factor | : | --------- |
| Set P | : | --------- |
| Sigma W Max | : | 2857.400 W |
| Sigma PF | : | 0.9997 |
| Distortion factor(V) | : | 0.03 % |
| V THDS | : | 0.03 % |
| V THDG | : | 0.03 % |
| Distortion factor(A) | : | 0.87 % |
| A THDS | : | 0.92 % |
| A THDG | : | 0.98 % |
| P THD | : | 0.00 % |
| Power Limit | : | 75 W |

| Order | Measure[A] | Limit[A] | Margin[%] | Order | Measure[A] | Limit[A] | Margin[%] |
|---|---|---|---|---|---|---|---|
| 1 | 12.3986 | | | 2 | 0.0251 | 1.6200 | 98.5 |
| 3 | 0.0618 | 3.4500 | 98.2 | 4 | 0.0208 | 0.6450 | 96.8 |
| 5 | 0.0409 | 1.7100 | 97.6 | 6 | 0.0134 | 0.4500 | 97.0 |
| 7 | 0.0282 | 1.1550 | 97.6 | 8 | 0.0105 | 0.3450 | 97.0 |
| 9 | 0.0251 | 0.6000 | 95.8 | 10 | 0.0089 | 0.2760 | 96.8 |
| 11 | 0.0298 | 0.4950 | 94.0 | 12 | 0.0088 | 0.2300 | 96.2 |
| 13 | 0.0282 | 0.3150 | 91.0 | 14 | 0.0067 | 0.1971 | 96.6 |
| 15 | 0.0273 | 0.2250 | 87.9 | 16 | 0.0058 | 0.1725 | 96.6 |
| 17 | 0.0261 | 0.1985 | 86.8 | 18 | 0.0051 | 0.1533 | 96.7 |
| 19 | 0.0227 | 0.1776 | 87.2 | 20 | 0.0058 | 0.1380 | 95.8 |
| 21 | 0.0229 | 0.1607 | 85.8 | 22 | 0.0041 | 0.1255 | 96.7 |
| 23 | 0.0172 | 0.1467 | 88.3 | 24 | 0.0040 | 0.1150 | 96.5 |
| 25 | 0.0161 | 0.1350 | 88.0 | 26 | 0.0038 | 0.1062 | |
| 27 | 0.0140 | 0.1250 | 88.8 | 28 | 0.0042 | 0.0986 | 95.8 |
| 29 | 0.0124 | 0.1164 | 89.3 | 30 | 0.0033 | 0.0920 | 96.5 |
| 31 | 0.0103 | 0.1089 | 90.5 | 32 | 0.0031 | 0.0862 | 96.4 |
| 33 | 0.0085 | 0.1023 | 91.7 | 34 | 0.0030 | 0.0812 | 96.3 |
| 35 | 0.0083 | 0.0964 | 91.3 | 36 | 0.0031 | 0.0767 | 96.0 |
| 37 | 0.0074 | 0.0912 | 91.9 | 38 | 0.0030 | 0.0726 | 95.9 |
| 39 | 0.0069 | 0.0865 | 92.0 | 40 | 0.0029 | 0.0690 | 95.8 |



# 3.4 VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT

## 3.4.1 LIMITS OF VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT

**TEST STANDARD: EN 61000-3-3**

| TEST ITEM | LIMIT | NOTE |
|---|---|---|
| $P_{st}$ | 1.0 | $P_{st}$ means short-term flicker indicator. |
| $P_{lt}$ | 0.65 | $P_{lt}$ means long-term flicker indicator. |
| $T_{d(t)}$ (ms) | 500 | $T_{d(t)}$ means maximum time that d(t) exceeds 3.3%. |
| $d_{max}$ (%) | 4 | dmax means maximum relative voltage change. |
| dc (%) | 3.3 | dc means relative steady-state voltage change |

**TEST STANDARD: EN 61000-3-11**

The test conditions specified in Annex A of EN 61000-3-3 shall be applicable to equipment rated ≤16A

The test impedance $Z_{test}$ may be lower than $Z_{ref}$, particularly for equipment having a rated input current >16 A. To find the optimal test impedance, two conditions shall be met.

– firstly, the voltage drop, $\Delta U$, caused by the equipment shall be within the range 3 % to 5 % of the test supply voltage;

– secondly, the ratio of inductive to resistive components of $Z_{test}$ given by $X_{test}$ / $R_{test}$ shall be within the range 0,5 to 0,75 (i.e. similar to the ratio of the components of $Z_{ref}$).

NOTE The 3 % to 5 % condition ensures that the relative current changes of the equipment in the real network situation will be nearly the same as those during the test.

The test shall be made with the test circuit specified in Figure 1, except that the impedance $Z_{ref}$ is replaced with $Z_{test}$. Four values $d_{c\ test}$, $d_{max\ test}$, $P_{st\ test}$ and $P_{lt\ test}$ shall be measured. The definitions of $d_c$, $d_{max}$, $P_{st}$, and $P_{lt}$ are given in IEC 61000-3-3.

## 3.4.2 TEST INSTRUMENTS

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| PRECISION POWER ANALYZER | YOKOGAWA | WT3000 | 91M210852 | Sep. 11,19 | Sep. 11,20 |
| Test Software | YOKOGAWA | IEC61000 | N/A | N/A | N/A |
| PEFERENCE IMPEDANCE NETWORK | Voltech | EUR | 3018 | Sep. 11,19 | Sep. 11,20 |

**NOTE:** 1. The test was performed in PV Room.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

## 3.4.3 TEST PROCEDURE

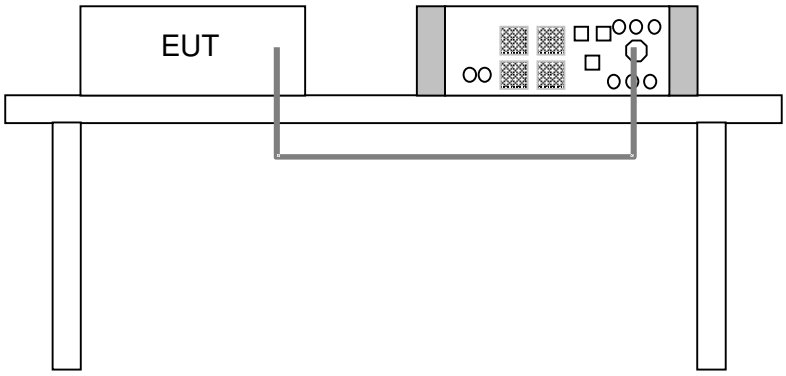
a. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal operating conditions.

b. 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.

## 3.4.4 DEVIATION FROM TEST STANDARD

No deviation

## 3.4.5 TEST SETUP




## 3.4.6 EUT OPERATING CONDITIONS

Same as item 3.1.6

## 3.4.7 TEST RESULTS

| | | |
|---|---|---|
| Regulation | : | IEC61000-3-3 Ed2.0<br>IEC61000-4-15 Ed1.1 |
| Interval | : | 10Min0Sec |
| Model | : | YOKOGAWA WT3000 |
| Wiring | : | single-phase 2wire |
| Voltage Range | : | 300.00V |
| Voltage U1 | : | 235.85V |
| Set Frequency | : | 50Hz |
| Frequency U1 | : | 50.002Hz |
| Element | : | 1 |
| dmin | : | 0.10% |

**PASS**

| | | |
|---|---|---|
| Element1 | | : Pass |
| dc | (3.30%) | : Pass |
| dmax | (4.00%) | : Pass |
| d(t) | (500ms) | : Pass |
| Pst | (1.00) | : Pass |
| Plt | (0.65) | : Pass |

| No. | dc[%] | dmax[%] | d(t)[ms] | Pst |
|---|---|---|---|---|
| 1 | 0.07 | 0.14 | 0.00 | 0.14 |
| 2 | 0.06 | 0.14 | 0.00 | 0.14 |
| 3 | 0.07 | 0.14 | 0.00 | 0.14 |
| 4 | 0.06 | 0.13 | 0.00 | 0.14 |
| 5 | 0.06 | 0.14 | 0.00 | 0.14 |
| 6 | 0.07 | 0.14 | 0.00 | 0.14 |
| 7 | 0.06 | 0.14 | 0.00 | 0.14 |
| 8 | 0.06 | 0.14 | 0.00 | 0.14 |
| 9 | 0.06 | 0.14 | 0.00 | 0.14 |
| 10 | 0.06 | 0.15 | 0.00 | 0.14 |
| 11 | 0.06 | 0.14 | 0.00 | 0.14 |
| 12 | 0.06 | 0.14 | 0.00 | 0.14 |

| Plt |
|---|
| 0.14 |

# 4 IMMUNITY TEST

## 4.1 GENERAL DESCRIPTION

### 4.1.1 GENERAL DESCRIPTION OF EN 61000-6-2

| **Product Standard**: | **EN 61000-6-2:2005** | |
|---|---|---|
| **Basic Standard, specification requirement, and Performance Criteria**: | IEC 61000-4-2 | Electrostatic Discharge – ESD:<br>4kV Contact discharge,<br>8kV air discharge,<br>Performance Criterion B |
| | IEC 61000-4-3 | Radio-Frequency Electromagnetic Field Susceptibility Test – RS:<br>80-1000 MHz, 10V/m, 80% AM (1kHz),<br>1400-2000 MHz, 3V/m, 80% AM (1kHz)<br>2000-2700 MHz, 1V/m, 80% AM (1kHz)<br>Performance Criterion A |
| | IEC 61000-4-4 | Electrical Fast Transient/Burst - EFT<br>AC Power line: 2kV, DC Power line: 2kV<br>Signal line: 1kV<br>Performance Criterion B |
| | IEC 61000-4-5 | Surge Immunity Test:<br>1.2/50 us Open Circuit Voltage, 8 /20 us Short Circuit Current,<br>AC Power Line: line to line 1 kV,<br>line to earth 2kV<br>DC Power Line: line to line 0.5kV<br>line to earth 0.5kV<br>Signal line: 1kV<br>Performance Criterion B |
| | IEC 61000-4-6 | Conducted Radio Frequency Disturbances Test – CS:0.15-80 MHz, 10Vrms, 80% AM, 1kHz,<br>Performance Criterion A |
| | IEC 61000-4-8 | Power Frequency Magnetic Field Test,<br>50/60 Hz, 30A/m,<br>Performance Criterion A |

## 4.1.2 PERFORMANCE CRITERIA

According to Clause 4 of EN 61000-6-2:2005 standard, the following describes the general performance criteria.

| | |
|---|---|
| **CRITERION A** | The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended. |
| **CRITERION B** | The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended. |
| **CRITERION C** | Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls. |

## 4.1.3 EUT OPERATING CONDITION

Same as item 3.1.6

# 4.2 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)

## 4.2.1 TEST SPECIFICATION

| | |
|---|---|
| **Basic Standard:** | IEC 61000-4-2 |
| **Discharge Impedance:** | 330 ohm / 150 pF |
| **Discharge Voltage:** | Air Discharge: 8 kV (Direct)<br>Contact Discharge: 4 kV (Indirect) |
| **Polarity:** | Positive & Negative |
| **Number of Discharge:** | 20 times at each test point |
| **Discharge Mode:** | Single Discharge |
| **Discharge Period:** | 1 second |

## 4.2.2 TEST INSTRUMENTS

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| ESD Generator | TESEQ | NSG 437 | 279 | Mar. 06,20 | Mar. 05,21 |
| Test Software | TESEQ | V03.03 | N/A | N/A | N/A |
| ESD Generator | EM TEST | Dito | V1211112265 | Nov. 30,19 | Nov. 29,20 |
| Test Software | EM TEST | V 2.31 | N/A | N/A | N/A |

**NOTE:** 1. The test was performed in ESD Room.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

## 4.2.3 TEST PROCEDURE

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 discharge return cable of the generator shall be kept at a distance of at least 0. 2 m from the EUT whilst the discharge is being applied and should not be held by the operator.

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.

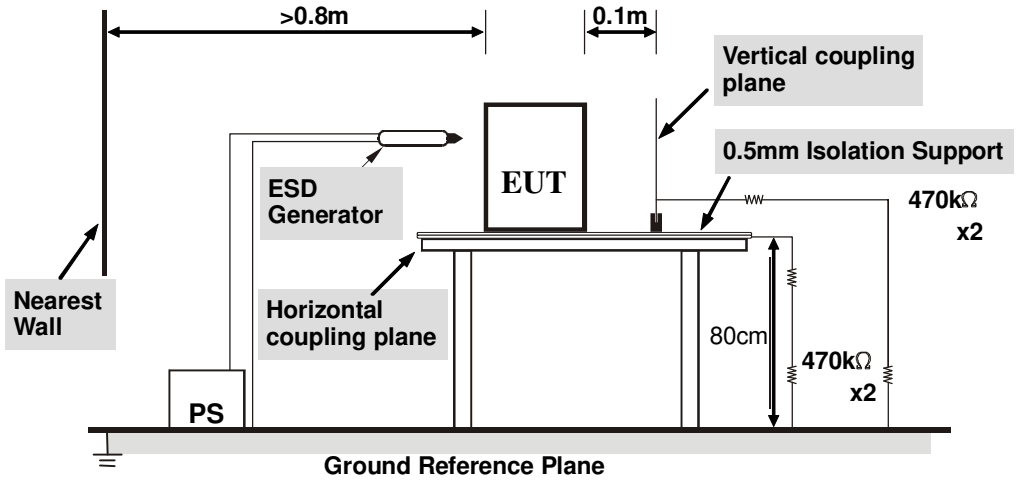
g. At least ten single discharges (in the most sensitive polarity) were applied to the **H**orizontal **C**oupling **P**lane at points on each side of the EUT. The ESD generator was positioned horizontal at a distance of 0.1 meters from the EUT with the discharge electrode touching the **HCP.**

h. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the **V**ertical **C**oupling **P**lane 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.

## 4.2.4 DEVIATION FROM TEST STANDARD

No Deviation

## 4.2.5 TEST SETUP




**NOTE:**

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the **G**round **R**eference **P**lane. 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 **H**orizontal **C**oupling **P**lane (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 0.8-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of IEC 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

## 4.2.6 TEST RESULTS

| TEST MODE | See section 2.2 | TEST VOLTAGE | See section 2.2 |
|---|---|---|---|
| ENVIRONMENTAL CONDITIONS | 24deg. C, 54% RH 101.3kPa | TESTED BY: Dragon | |

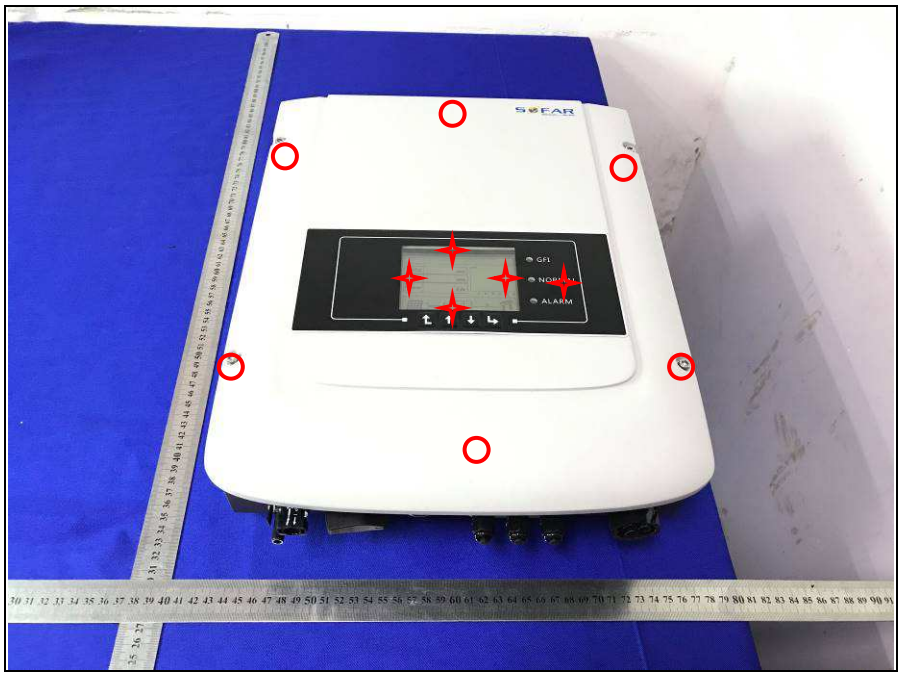
| Direct Discharge Application | | | | |
|---|---|---|---|---|
| Test Level (kV) | Polarity | Test Point | Test Result of Contact Discharge | Test Result of Air Discharge |
| 4 | +/- | All Metal Part | A | N/A |
| 8 | +/- | All Non-metal Part | N/A | A |

| Indirect Discharge Application | | | | |
|---|---|---|---|---|
| Discharge Level (kV) | Polarity | Test Point | Test Result of HCP | Test Result of VCP |
| 4 | +/- | HCP | A | N/A |
| 4 | +/- | VCP | N/A | A |

**NOTE**: A: There was no change compared with initial operation during the test.

ESD TEST POINT

( O - Direct Contact Discharge; ✦ -Air Discharge)




# 4.3 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS)

## 4.3.1 TEST SPECIFICATION

| | |
|---|---|
| **Basic Standard:** | IEC 61000-4-3 |
| **Frequency Range:** | 80-1000MHz, 1400-2000MHz, 2000-2700MHz |
| **Field Strength:** | 10V/m, 3V/m, 1V/m |
| **Modulation:** | 1kHz Sine Wave, 80%, AM Modulation |
| **Frequency Step:** | 1 % of fundamental |
| **Polarity of Antenna:** | Horizontal and Vertical |
| **Antenna Height:** | 1.5m |
| **Dwell Time:** | at least 3 seconds |

## 4.3.2 TEST INSTRUMENTS

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| Signal Generator | Agilent | N5181A | MY50142530 | Sep. 12,19 | Sep. 11,20 |
| Antenna Log-Periodic | AR | ATR80M6G | 0337307 | N/A | N/A |
| Antenna Log-Periodic | AR | ATS700M11G | 0336821 | N/A | N/A |
| Switch Controller | AR | SC1000 | 0337343 | N/A | N/A |
| RF Power Meter | Boonton | 4242 | 13984 | Sep. 12,19 | Sep. 11,20 |
| Power Sensor | Boonton | 51011EMC | 35716 | Sep. 12,19 | Sep. 11,20 |
| Power Sensor | Boonton | 51011EMC | 35715 | Sep. 12,19 | Sep. 11,20 |
| E-Field probe | Narda | NBM-520 | 2403/01B | Dec. 24,19 | Dec. 23,20 |
| Power Amplifier | TESEQ | CBA 1G-150 | T44029 | N/A | N/A |
| Power Amplifier | TESEQ | CBA 3G-100 | T44030 | N/A | N/A |
| Power Amplifier | TESEQ | CBA 6G-050 | 1041204 | N/A | N/A |
| Dual Directional Coupler | TESEQ | C5982 | 95208 | Sep. 21,19 | Sep. 20,20 |
| Dual Directional Coupler | TESEQ | C6187 | 95175 | Sep. 21,19 | Sep. 20,20 |
| Dual Directional Coupler | TESEQ | CPH-274F | M251304-01 | Sep. 21,19 | Sep. 20,20 |
| Audio analyzer | Rohde&Schwarz | UPV | 101397 | Sep. 18,19 | Sep. 17,20 |
| Conditioning Amplifier | B&K | 2690A0S2 | 2437856 | Oct. 18,19 | Oct. 17,20 |
| EAR SIMULATOR | B&K | 4192 | 2764719 | Jun. 01,19 | May 30,20 |
| Test Software | Tonscend | TS+ | 2.0.1.8 | N/A | N/A |
| Test Software | ADT | BVADT_RS_V 7.6.4-DG | N/A | N/A | N/A |

**NOTE:** 1. The test was performed in RS chamber.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

## 4.3.3 TEST PROCEDURE

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

a. The testing was performed in a fully-anechoic chamber.

b. The frequency range is swept from 80 MHz to 1000 MHz, 1400MHz to 2000MHz, 2000MHz to 2700MHz with the signal 80% amplitude modulated with a 1kHz sine wave.

c. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0,5s.

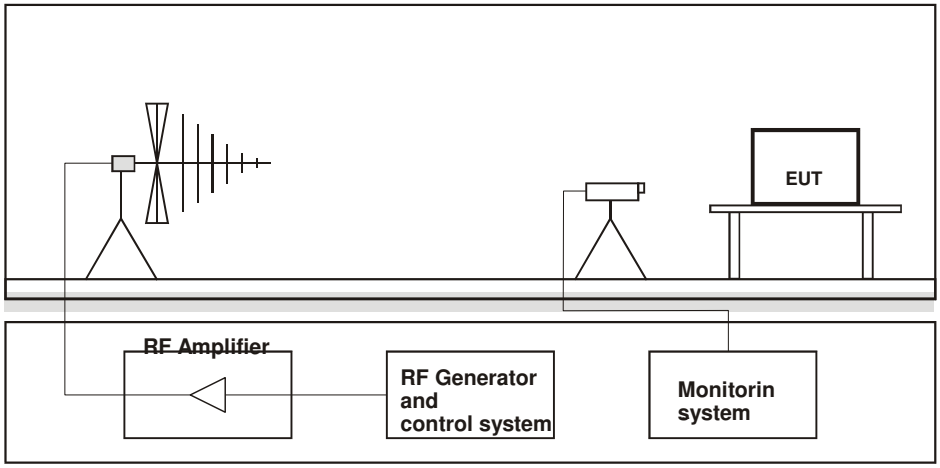
d. The field strength levels were 10V/m, 3V/m, 1V/m.

e. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

## 4.3.4 DEVIATION FROM TEST STANDARD

No Deviation

## 4.3.5 TEST SETUP




**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.

## 4.3.6 TEST RESULTS

| TEST MODE | See section 2.2 | TEST VOLTAGE | See section 2.2 |
|---|---|---|---|
| ENVIRONMENTAL CONDITIONS | 23deg. C, 53% RH | **TESTED BY**: Andy | |

| Field Strength (V/m) | Test Frequency Note#1 (MHz) | Polarization of antenna (Horizontal / Vertical) | Test Distance (m) | Test Result | Remark |
|---|---|---|---|---|---|
| 10 | 80 - 1000 | H&V | 3 | A | N/A |
| 3 | 1400 - 2000 | H&V | 3 | A | N/A |
| 1 | 2000 - 2700 | H&V | 3 | A | N/A |

Note#1:

Tested Israel SII Frequencies 89,100,107,144,163,196,244,315,434,460,600,825,845,880 MHz

**NOTE**: A: There was no change compared with initial operation during the test.

# 4.4 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST (EFT)

## 4.4.1 TEST SPECIFICATION

| | |
|---|---|
| **Basic Standard:** | IEC 61000-4-4 |
| **Test Voltage:** | Power Line: 2kV |
| **Polarity:** | Positive & Negative |
| **Impulse Frequency:** | 5 kHz |
| **Impulse Waveshape :** | 5/50 ns |
| **Burst Duration:** | 15 ms |
| **Burst Period:** | 300 ms |
| **Test Duration:** | 1 min. |

## 4.4.2 TEST INSTRUMENTS

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| EFT Module | TESEQ | NSG 3060 Mainframe | 1404 | Mar. 25,20 | Mar. 24,21 |
| Automated 3- Phase Coupling/ Decoupling Network | TESEQ | CDN 3063 | 2131 | Mar. 25,20 | Mar. 24,21 |
| EFT Coupling Clamp | HAEFELY | IP4A | 150407 | Mar. 18,20 | Mar. 17,21 |
| Test Software | TESEQ | CDM 3061_0002.30 | 1361 | N/A | N/A |
| Test Software | TESEQ | HVM 3060_0002.30 | 293 | N/A | N/A |

**NOTE:** 1. The test was performed in EMS Room.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

## 4.4.3 TEST PROCEDURE

a. Both positive and negative polarity discharges were applied.

b. The length of the “hot wire” from the coaxial output of the EFT generator to the terminals on the EUT should not exceed 0.5 meter ± 0.05 meter.

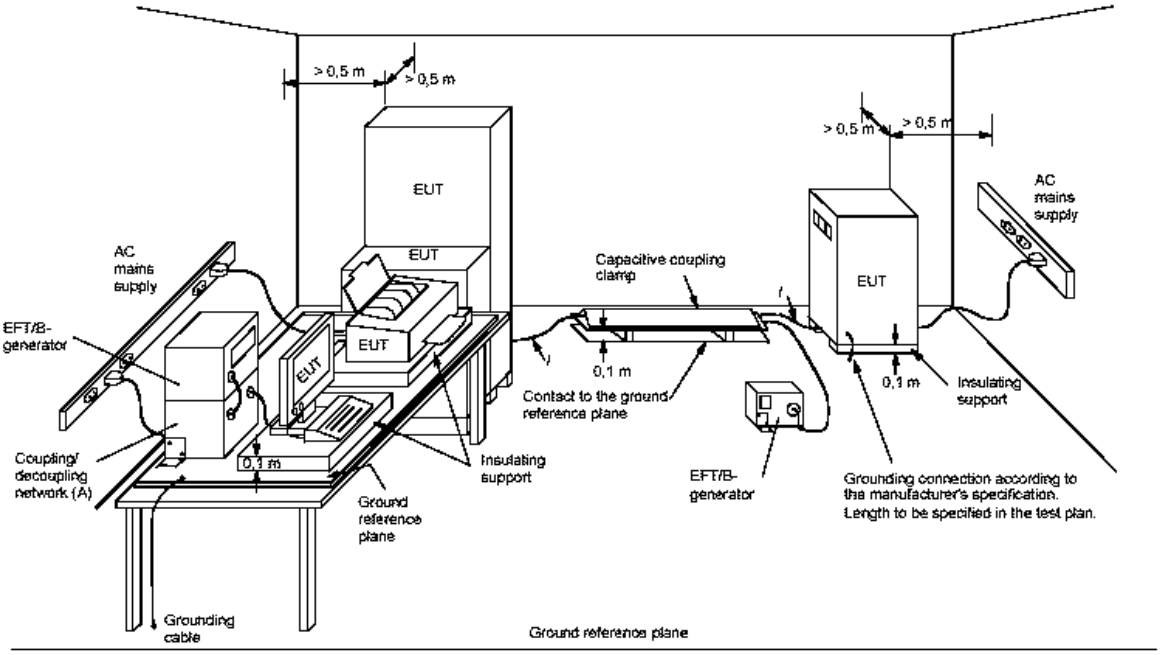
c. The duration time of each test sequential was 1 minute.

d. The transient/burst waveform was in accordance with IEC 61000-4-4, 5/50ns.

## 4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

## 4.4.5 TEST SETUP




**NOTE:**
TABLETOP EQUIPMENT
The configuration consisted of a wooden table standing on the Ground Reference Plane and should be located 0.1m +/- 0.01m above the Ground Reference Plane.
The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system. A minimum distance of 0.5m was provided between the EUT and the walls of the laboratory or any other metallic structure.

FLOOR STANDING EQUIPMENT
The EUT installed in a representative system as described in section 7 of IEC 61000-4-4 and its cables, were isolated from the Ground Reference Plane by an insulating support that is 0.1-meter thick. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system.

## 4.4.6 TEST RESULTS

| TEST MODE | See section 2.2 | TEST VOLTAGE | See section 2.2 |
|---|---|---|---|
| ENVIRONMENTAL CONDITIONS | 21.9 deg. C, 53.5% RH | TESTED BY: Wang | |

| Pulse Voltage | 2.0 kV | | ___ kV | | ___ kV | |
|---|---|---|---|---|---|---|
| Pulse Polarity | + | - | + | - | + | - |
| L | A | A | / | / | / | / |
| N | A | A | / | / | / | / |
| PE | A | A | / | / | / | / |
| L+N | A | A | / | / | / | / |
| L+PE | A | A | / | / | / | / |
| N+PE | A | A | / | / | / | / |
| L+N+PE | A | A | / | / | / | / |
| DC Line | A | A | / | / | / | / |

**NOTE**: A: There was no change compared with initial operation during the test.

## 4.5 SURGE IMMUNITY TEST

### 4.5.1 TEST SPECIFICATION

| | |
|---|---|
| **Basic Standard:** | IEC 61000-4-5 |
| **Wave-Shape:** | Combination Wave<br>1.2/50 us Open Circuit Voltage<br>8 /20 us Short Circuit Current |
| **Test Voltage:** | AC Power Line : Line to Line:1kV<br>Line to PE:2kV |
| **Surge Input/Output:** | L-N&L-PE&N-PE |
| **Generator Source Impedance:** | 2ohm between networks<br>12 ohm between network and ground |
| **Polarity:** | Positive/Negative |
| **Phase Angle:** | 0° /90°/180°/270° |
| **Pulse Repetition Rate:** | 1 time / 60 sec. |
| **Number of Tests:** | 5 positive and 5 negative at selected points |

### 4.5.2 TEST INSTRUMENTS

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| Telecom Surge Module | TESEQ | NSG 3060 Mainframe | 1404 | Mar. 25,20 | Mar. 24,21 |
| Automated 3- Phase Coupling/ Decoupling Network | TESEQ | CDN 3063 | 2131 | Mar. 25,20 | Mar. 24,21 |
| CDN | TESEQ | CDN HSS-2 | 34275 | Mar. 25,20 | Mar. 24,21 |
| CDN | TESEQ | CDN 118 | 30741 | Mar. 25,20 | Mar. 24,21 |
| Test Software | TESEQ | CDM 3061_0002.30 | 1361 | N/A | N/A |
| Test Software | TESEQ | HVM 3060_0002.30 | 293 | N/A | N/A |

**NOTE:** 1. The test was performed in EMS Room.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

## 4.5.3 TEST PROCEDURE

a. For EUT power supply:

The surge is to 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/decoupling networks shall be 2 meters in length (or shorter).

b. For test applied to unshielded unsymmetrically operated interconnection lines of EUT:

The surge is applied to the lines via the capacitive coupling. The coupling / decoupling networks shall not influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

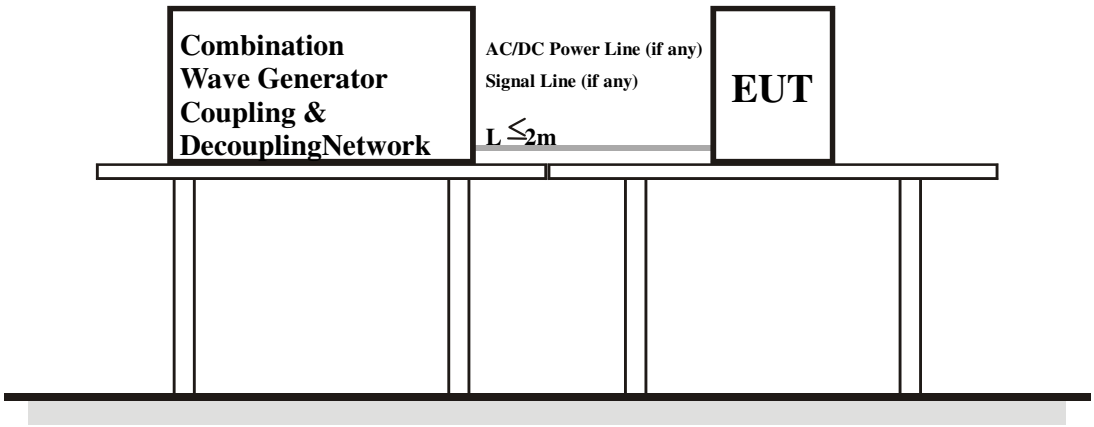
c. For test applied to unshielded symmetrically operated interconnection / telecommunication lines of EUT:

The surge is applied to the lines via gas arrestors coupling. 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 be 2 meters in length (or shorter).

## 4.5.4 DEVIATION FROM TEST STANDARD

No deviation.

## 4.5.5 TEST SETUP



## 4.5.6 TEST RESULTS

| TEST MODE | See section 2.2 | TEST VOLTAGE | See section 2.2 |
|---|---|---|---|
| ENVIRONMENTAL CONDITIONS | 23.9eg. C, 52.7% RH | TESTED BY: Wang | |

**AC/DC Power port：**

| \Phase angle \ Test result \Voltage (kV) \ Test point\ Polarity | | | 0° | 90° | 180° | 270° | DC Power Port |
|---|---|---|---|---|---|---|---|
| 1 | L-N | + | B | B | B | B | N/A |
| | | - | B | B | B | B | N/A |
| 2 | L-PE | + | B | B | B | B | N/A |
| | | - | B | B | B | B | N/A |
| 2 | N-PE | + | B | B | B | B | N/A |
| | | - | B | B | B | B | N/A |

**Signal ports and telecommunication ports：**

| Voltage (kV) | Test Point | Polarity | Test result | Voltage (kV) | Test Point | Polarity | Test result |
|---|---|---|---|---|---|---|---|
| / | / | + /- | / | / | / | + /- | / |

**NOTE**: A: There was no change compared with initial operation during the test.
B: During test, EUT stopped grid, and could automatically return to normal after test.

# 4.6 IMMUNITY TO CONDUCTED DISTURBANCES INDUCED BY RF FIELDS (CS)

## 4.6.1 TEST SPECIFICATION

| | |
|---|---|
| **Basic Standard:** | IEC 61000-4-6 |
| **Frequency Range:** | 0.15 MHz - 80 MHz |
| **Field Strength:** | $10V_{r.m.s}$ |
| **Modulation:** | 1kHz Sine Wave, 80%, AM Modulation |
| **Frequency Step:** | 1 % of fundamental |
| **Coupled Cable:** | Power Mains & DC Power Line |
| **Coupling Device:** | CDN-M532, Clamp |

## 4.6.2 TEST INSTRUMENTS

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| Signal Generator | Rohde&Schwarz | SMB 100A | 102382 | Mar. 18,20 | Mar. 17,21 |
| CDN | Luthi | L-801M2/M3 | 2015 | Sep. 18,19 | Sep. 17,20 |
| CDN(AUX) | TESEQ | CDN M016 | 27452 | Sep. 18,19 | Sep. 17,20 |
| CDN | TESEQ | T200A | 26944 | Mar. 18,20 | Mar. 17,21 |
| CDN | TESEQ | ST08A | 32256 | Mar. 18,20 | Mar. 17,21 |
| CDN | TESEQ | T800 | 28623 | May 14, 20 | May 13, 21 |
| CDN | FCC | FCC-801-T8-S RJ45 | 160168 | Sep. 18,19 | Sep. 17,20 |
| CDN | TESEQ | CDN M532 | 37300 | Sep. 18,19 | Sep. 17,20 |
| 6dB 150Watt Attenuator | Bird | 150-A-FFN-06 | 1507 | Sep. 18,19 | Sep. 17,20 |
| Bulk Current Injection Probe | FCC | F-120-9A | 160053 | Sep. 18,19 | Sep. 17,20 |
| Power Amplifier | PRANA | DR 220 | 1512-1788 | NA | NA |
| Electromagnetic Injection Clamp | Luthi | EM101 | 35640 | Sep. 25,19 | Sep. 24,20 |
| Audio analyzer | Rohde&Schwarz | UPV | 101397 | Sep. 18,19 | Sep. 17,20 |
| Conditioning Amplifier | B&K | 2690A0S2 | 2437856 | Oct. 18,19 | Oct. 17,20 |
| EAR SIMULATOR | B&K | 4192 | 2764719 | Jun. 01,19 | May 30,20 |
| Test Software | Tonscend | TS+ | 2.0.1.7 | N/A | N/A |
| Test Software | ADT | BVADT_CS_V 7.6.2 | N/A | N/A | N/A |

**NOTE:** 1. The test was performed in CS test room.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

## 4.6.3 TEST PROCEDURE

a. The EUT shall be tested within its intended operating and climatic conditions.

b. An artificial hand was placed on the hand-held accessory and connected to the ground reference plane.

c. The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.

d. The frequency range is swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal is modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. Where the frequency is swept incrementally, the step size shall not exceed 1 % of the preceding frequency value.

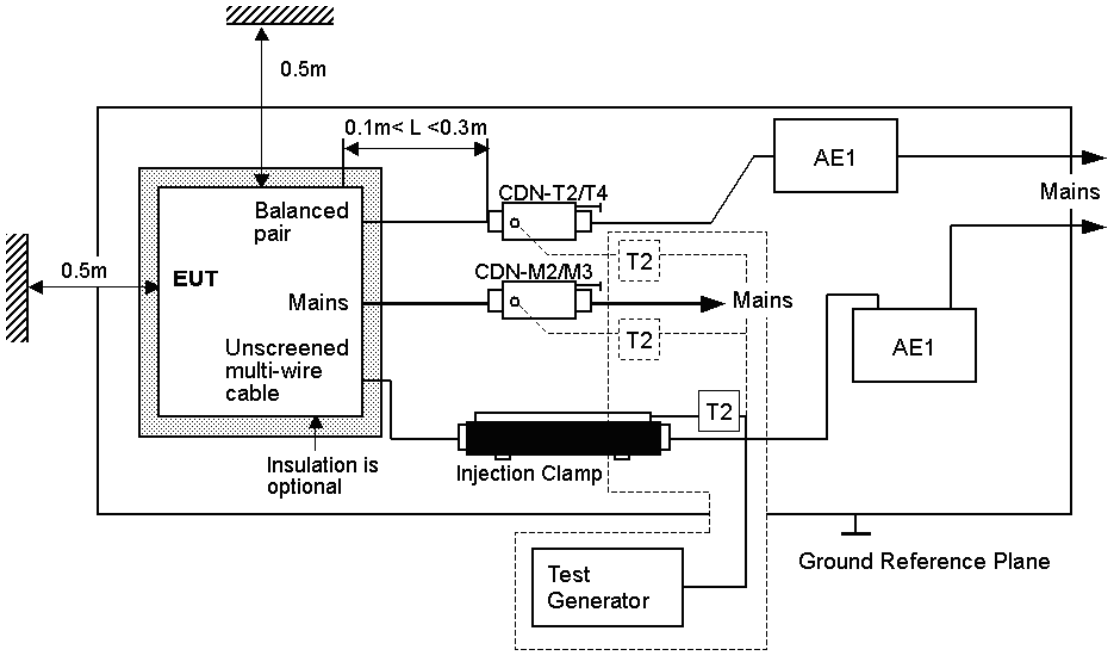
e. The dwell time of the amplitude modulated carrier at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0,5 s. The sensitive frequencies (e.g. clock frequencies) shall be analyzed separately.

f. Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.

## 4.6.4 DEVIATION FROM TEST STANDARD

No deviation.

## 4.6.5 TEST SETUP




NOTE: The EUT clearance from any metallic obstacles shall be at least 0.5m.
All non-excited input ports of the CDNs shall be terminated by 50Ω loads.

**NOTE:**

FLOOR-STANDING EQUIPMENT
The equipment to be tested is placed on an insulating support of 0.1 meters height above a ground reference plane. All relevant cables shall be provided with the appropriate coupling and decoupling devices at a distance between 0.1 meters and 0.3 meters from the projected geometry of the EUT on the ground reference plane.

## 4.6.6 TEST RESULTS

| TEST MODE | See section 2.2 | TEST VOLTAGE | See section 2.2 |
|---|---|---|---|
| ENVIRONMENTAL CONDITIONS | 22deg. C, 54% RH | TESTED BY: Andy | |

| Voltage (V) | Test Frequency Note#1 (MHz) | Tested Line | Injection Method. | Test Result | Remark |
|---|---|---|---|---|---|
| 10 | 0.15 – 80 | AC Line | CDN-M532 | A | N/A |
| 10 | 0.15 – 80 | DC Line | Clamp | A | N/A |

Note#1: Tested Israel SII Frequencies 0.2,0.53,1,1.5,7.1,13.56,21,27.12,40.68,65,68 MHz

**NOTE**: A: There was no change compared with initial operation during the test.

# 4.7 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST

## 4.7.1 TEST SPECIFICATION

| | |
|---|---|
| **Basic Standard:** | IEC 61000-4-8 |
| **Frequency Range:** | 50/60Hz |
| **Field Strength:** | 30A/m |
| **Observation Time:** | 5 minute |
| **Inductance Coil:** | Rectangular type, 1mx1m |

## 4.7.2 TEST INSTRUMENTS

| Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| Magnetic Field Tester | HAEFELY | MAG100.1 | 150579 | Sep. 18,19 | Sep. 17,20 |
| Test Software | N/A | N/A | N/A | N/A | N/A |

**NOTE:** 1. The test was performed in Shielding Room 843.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

## 4.7.3 TEST PROCEDURE

a. The equipment is configured and connected to satisfy its functional requirements.

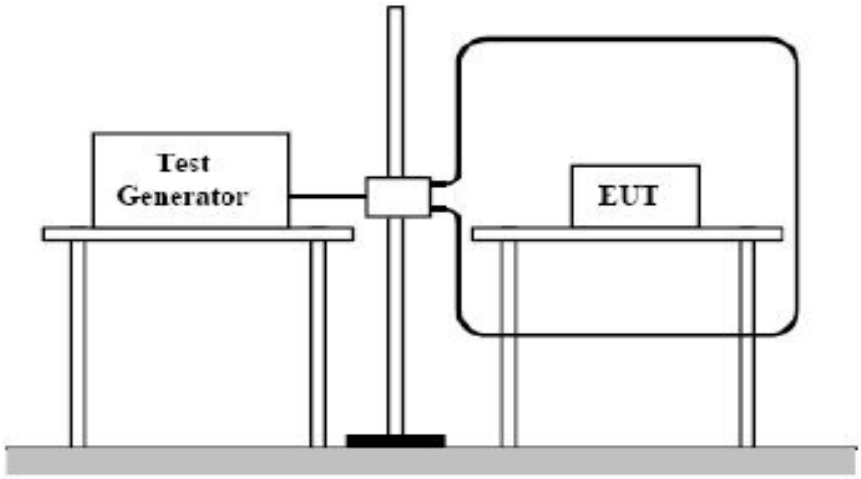
b. The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.

c. The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables used shall be exposed to the magnetic field.

## 4.7.4 DEVIATION FROM TEST STANDARD

No deviation.

## 4.7.5 TEST SETUP




**NOTE:**

TABLETOP EQUIPMENT
The equipment shall be subjected to the test magnetic field by using the induction coil of standard dimension (1 m x 1 m). The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

FLOOR-STANDING EQUIPMENT
The equipment shall be subjected to the test magnetic field by using induction coils of suitable dimensions. The test shall be repeated by moving and shifting the induction coils, in order to test the whole volume of the EUT for each orthogonal direction. The test shall be repeated with the coil shifted to different positions along the side of the EUT, in steps corresponding to 50 % of the shortest side of the coil. The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

## 4.7.6 TEST RESULTS

| TEST MODE | See section 2.2 | TEST VOLTAGE | See section 2.2 |
|---|---|---|---|
| ENVIRONMENTAL CONDITIONS | 21.7 deg. C, 52.6% RH | TESTED BY: Wang | |

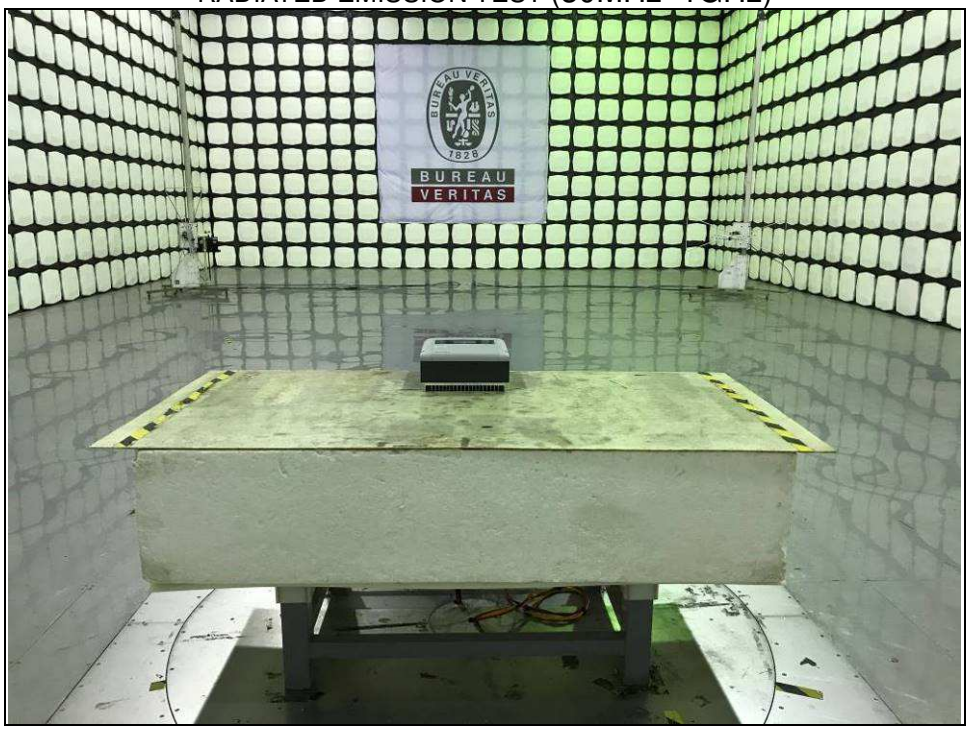
| Magnetic field direction | Testing result | Remark |
|---|---|---|
| X - Axis | A | 30A/m |
| Y - Axis | A | 30A/m |
| Z - Axis | A | 30A/m |

**NOTE**: A: There was no change compared with initial operation during the test.

# 5 PHOTOGRAPHS OF THE TEST CONFIGURATION

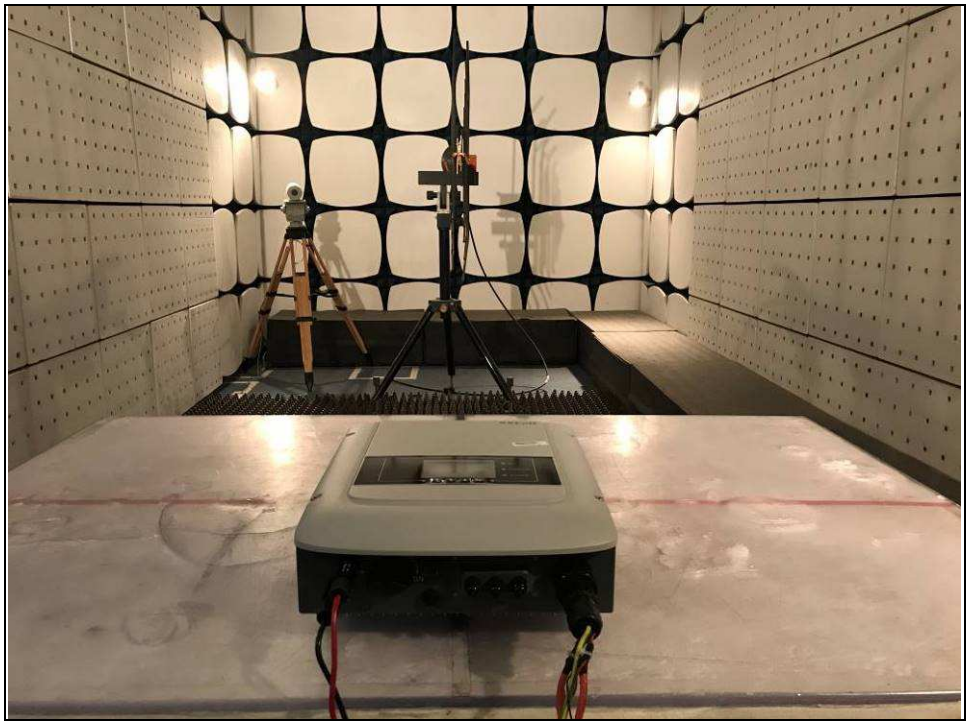
CONDUCTED EMISSION TEST

RADIATED EMISSION TEST (30MHz~1GHz)

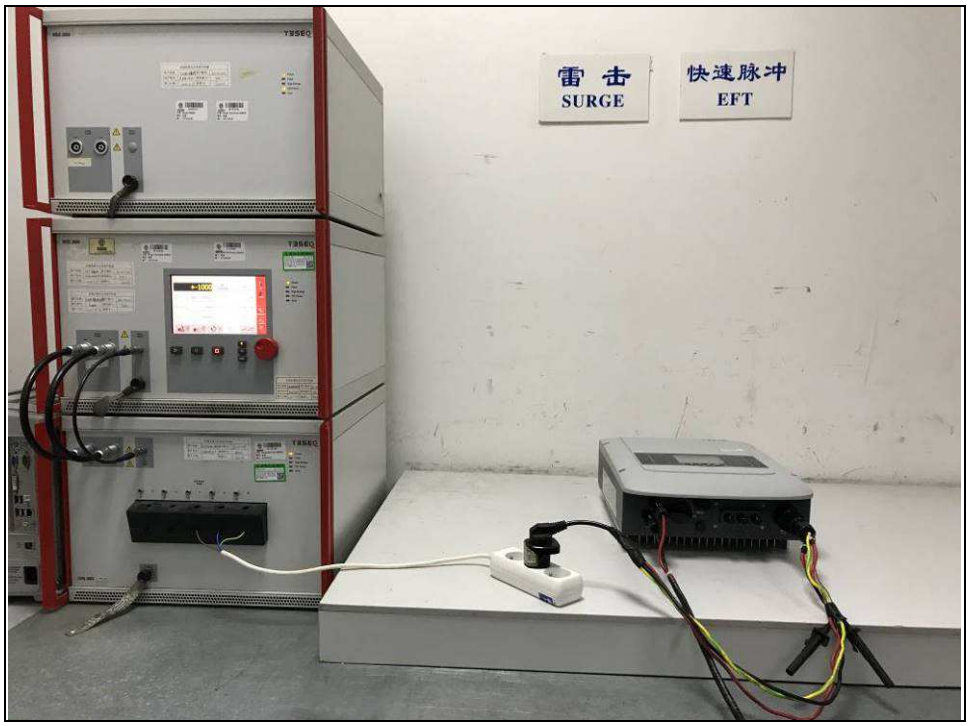


ESD TEST

RS TEST

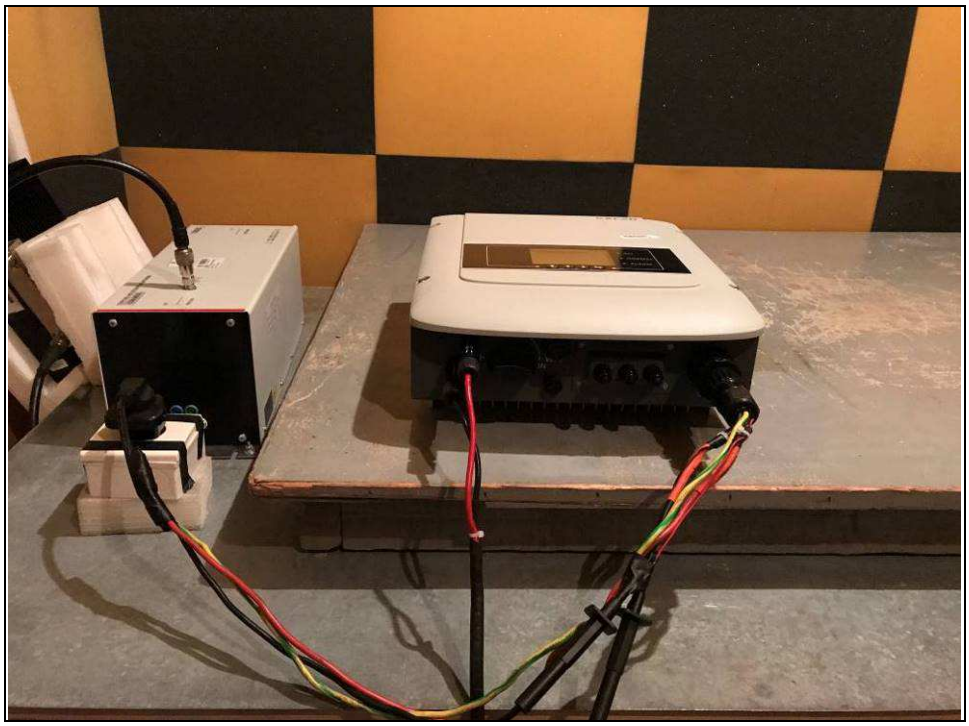


EFT AND SURGE TEST

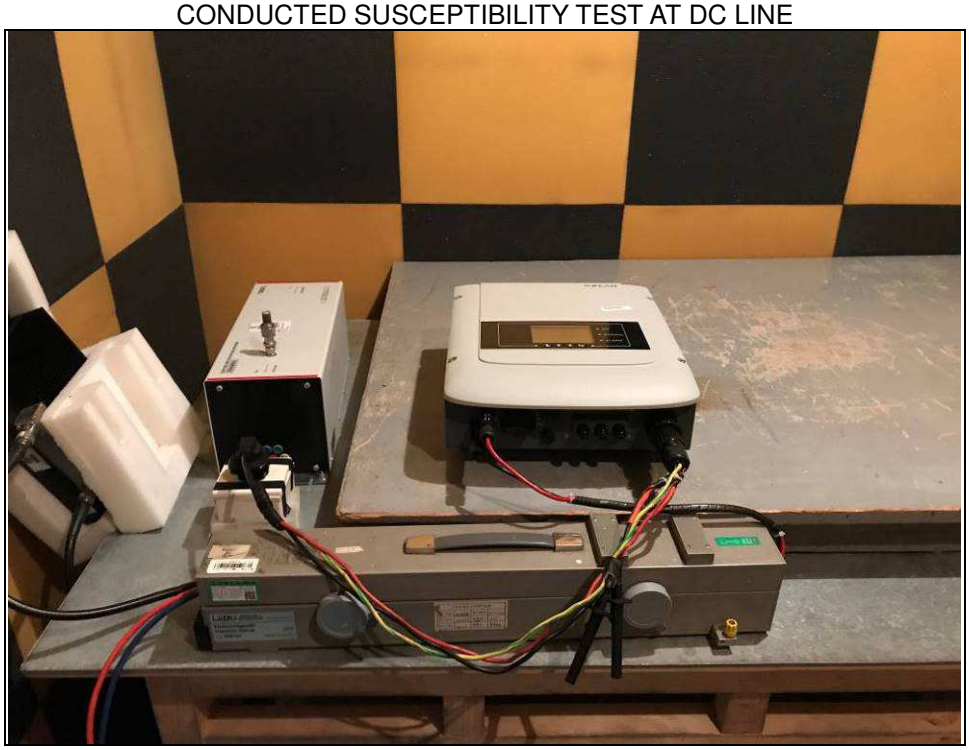



EFT TEST AT DC LINE

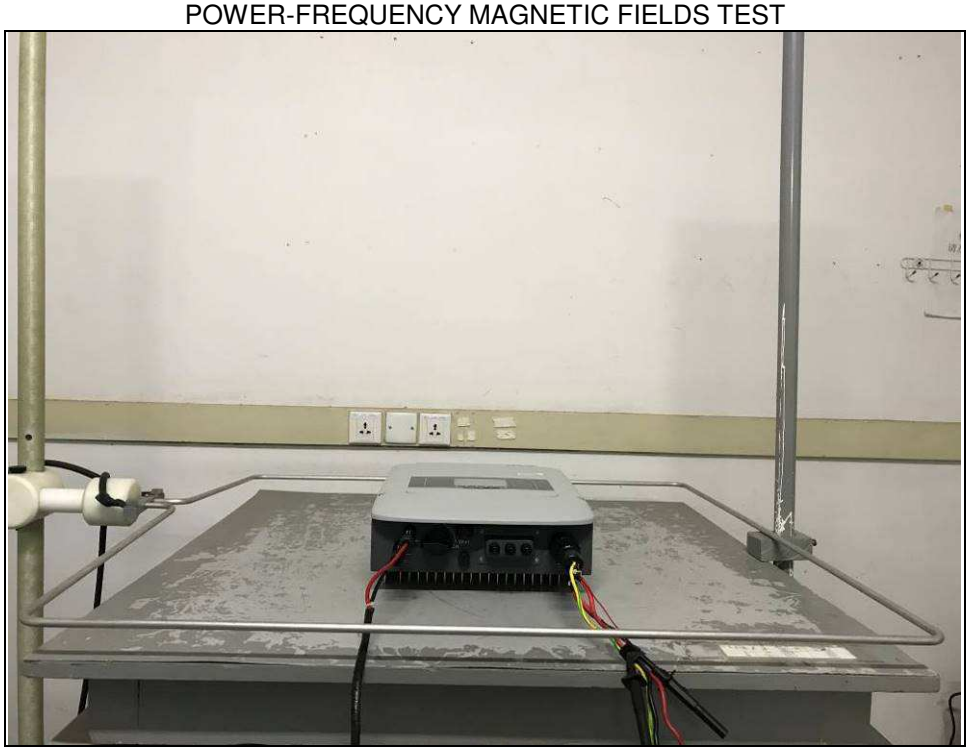
CONDUCTED SUSCEPTIBILITY TEST



CONDUCTED SUSCEPTIBILITY TEST AT DC LINE



POWER-FREQUENCY MAGNETIC FIELDS TEST



# 6 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications were made to the EUT by the lab during the test.

**---END---**