TEST REPORT

Applicant	Huawei Technologies Co., Ltd
Address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

Manufacturer or Supplier	Huawei Technologies Co., Ltd	
Address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C	
Product	SOLAR INVERTER	
Brand Name	HUAWEI	
Model	SUN2000-33KTL	
Additional Model & Model Difference	SUN2000-33KTL-E001, See item 2.1	
Date of tests	Apr. 29, 2017 ～ May 17, 2017	

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

☒ **EN 61000-6-3:2007 + A1:2011**	☒ **IEC 61000-6-3:2006 + A1:2010**
☒ **EN 61000-6-4:2007 + A1:2011**	☒ **IEC 61000-6-4:2006 + A1:2010**
☒ **EN 61000-3-12:2011**	☒ **IEC 61000-3-12:2011**
☒ **EN 61000-3-11:2000**	☒ **IEC 61000-3-11:2000**
☒ **EN 61000-6-1:2007**	☒ **IEC 61000-6-1:2005**
☒ **EN 61000-6-2:2005**	☒ **IEC 61000-6-2:2005**

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

Tested by Tom Chen Project Engineer / EMC Department	Approved by Madison Luo Supervisor / EMC Department
Tom	
	Date: May 19, 2017

Bureau Veritas Shenzhen Co., Ltd.
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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
CE170518N005	Original release	May 19, 2017

1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

EMISSION			
Standard	**Test Type**	**Result**	**Remarks**
EN61000-6-3:2007 + A1:2011(*) EN 61000-6-4:2007 + A1:2011 IEC 61000-6-3:2006 + A1:2010(*) IEC 61000-6-4:2006 + A1:2010	Conducted Test	PASS	Meets Requirement Limit Minimum passing margin is –6.3dB at 0.15000MHz
	Conducted Test (Telecom port)	PASS	Meets Requirement Limit Minimum passing margin is –4.4dB at 3.60597MHz
	Radiated Test (30MHz~1GHz)	PASS	Meets Limits Minimum passing margin is –4.4dB at 37.625MHz
EN 61000-3-12:2011 IEC 61000-3-12:2011	Harmonic current emissions	PASS	Meets the requirements.
EN 61000-3-11:2000 IEC 61000-3-11:2000	Voltage fluctuations & flicker	PASS	Meets the requirements.

* The PLC communication mode of Solar Inverter is not apply to this standard.

IMMUNITY (EN 61000-6-2:2005, IEC 61000-6-2:2005, IEC 61000-6-1:2005, EN 61000-6-1:2007)			
Standard	**Test Type**	**Result**	**Remarks**
IEC 61000-4-2:2008	Electrostatic discharge immunity test	PASS	Electrostatic Discharge – ESD: 8kV Air discharge, 4kV Contact discharge, Performance Criterion A
IEC 61000-4-3:2006 + A1:2007 +A2:2010	Radiated, radio-frequency, electromagnetic field immunity test	PASS	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80-1000 MHz, 10V/m, 80% AM (1kHz), 1400-2000 MHz, 10V/m, 80% AM (1kHz) 2000-2700 MHz, 10V/m, 80% AM (1kHz), Performance Criterion A
IEC 61000-4-4:2012	Electrical fast transient / burst immunity test.	PASS	Electrical Fast Transient/Burst - EFT AC Power line: 2kV, DC Power line: 2kV, Signal line: 1kV Performance Criterion A
IEC 61000-4-5:2014	Surge immunity test	PASS	Surge Immunity Test: 1.2/50 us Open Circuit Voltage, 8 /20 us Short Circuit Current, AC Power Line: line to line 1 kV, line to earth 2kV , DC Power Line: line to line 0.5 kV line to earth 0.5kV Signal Line: 1kV Performance Criterion A
IEC 61000-4-6:2013	Immunity to conducted disturbances, induced by radio-frequency fields	PASS	Conducted Radio Frequency Disturbances Test – CS: 0.15-80 MHz, 10Vrms, 80% AM, 1kHz, Performance Criterion A
IEC 61000-4-8:2009	Power frequency magnetic field immunity test.	PASS	Power Frequency Magnetic Field Test, 50 Hz , 30A/m, 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
Conducted emissions	0.15MHz ~ 30MHz	+ /-2.55 dB
Conducted emissions at telecom port	0.15MHz ~ 30MHz	+ /-2.55 dB
Radiated emissions	30MHz ~ 1000MHz	+ /-4.59 dB

2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	SOLAR INVERTER
MODEL NO.	SUN2000-33KTL
ADDITIONAL MODEL	SUN2000-33KTL-E001
POWER SUPPLY	Input: DC 480V - 800V, 30.6kW Output: AC 400V, 50/60Hz
SOFTWARE VERSION	V200R001
HARDWARE VERSION	V200R001
THE HIGHEST OPERATING FREQUENCY	Below 108MHz
DATA 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. Product support two kinds of communication mode, RS485 and PLC. PLC communication use the IEC/EN 61000-6-4 standard limit. RS485 communication use the IEC/EN 61000-6-3 standard limit.
4. This is a series of PV Inverter with the same PCB layout, Models SUN2000-33KTL, SUN2000-33KTL-E001, Hardware all the same, different model number and Max. output power. the difference has been considered during this test, full test was performed for the model SUN2000-33KTL.

Parameter	SUN2000-33KTL	SUN2000-33KTL-E001
MPPT Input	DC 480-800V, 30.6kW 23A*4	DC 480-800V, 30.6kW 23A*4
Output	3×220V /380V+(N)+PE, 3×230V /400V+(N)+PE, 50Hz/60Hz, 30kW	3×230V /400V+(N)+PE, 50/60Hz, 30kW
Max	48.0A, 33kW	48.0A, 30kW
Power	33000VA	33000VA
RS485	Support	Support
PLC	Support	Support

2.2 DESCRIPTION OF TEST MODES

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

◆ For Conducted Emission Test

Test Mode	TEST VOLTAGE	Model
Grid Mode(Full Load) + RS485 Data Acquisition	**DC 480V; AC 400V**	**SUN2000-33KTL**
Grid Mode(Full Load) + RS485 Data Acquisition	DC 640V; AC 400V	
Grid Mode(Full Load) + RS485 Data Acquisition	DC 800V; AC 400V	
Grid Mode(20% Load) + RS485 Data Acquisition	DC 480V; AC 400V	
Grid Mode(20% Load) + RS485 Data Acquisition	DC 640V; AC 400V	
Grid Mode(20% Load) + RS485 Data Acquisition	DC 800V; AC 400V	

◆ Conducted Emissions At Telecom Port Test

Test Mode	TEST VOLTAGE	Model
Grid Mode(Full Load) + RS485 Data Acquisition	DC 480V; AC 400V	SUN2000-33KTL
Grid Mode(Full Load) + RS485 Data Acquisition	DC 640V; AC 400V	
Grid Mode(Full Load) + RS485 Data Acquisition	**DC 800V; AC 400V**	
Grid Mode(Full Load) + PLC Data Acquisition	**DC 480V; AC 400V**	
Grid Mode(Full Load) + PLC Data Acquisition	**DC 640V; AC 400V**	
Grid Mode(Full Load) + PLC Data Acquisition	DC 800V; AC 400V	
Grid Mode(20% Load) + RS485 Data Acquisition	DC 480V; AC 400V	
Grid Mode(20% Load) + RS485 Data Acquisition	DC 640V; AC 400V	
Grid Mode(20% Load) + RS485 Data Acquisition	DC 800V; AC 400V	
Grid Mode(20% Load) + PLC Data Acquisition	DC 480V; AC 400V	
Grid Mode(20% Load) + PLC Data Acquisition	DC 640V; AC 400V	
Grid Mode(20% Load) + PLC Data Acquisition	DC 800V; AC 400V	

◆ For Radiated Emission Test

Test Mode	TEST VOLTAGE	Model
Grid Mode(Full Load) + RS485 Data Acquisition	DC 480V; AC 400V	SUN2000-33KTL
Grid Mode(Full Load) + RS485 Data Acquisition	DC 640V; AC 400V	
Grid Mode(Full Load) + RS485 Data Acquisition	**DC 800V; AC 400V**	
Grid Mode(Full Load) + PLC Data Acquisition	DC 480V; AC 400V	
Grid Mode(Full Load) + PLC Data Acquisition	DC 640V; AC 400V	
Grid Mode(Full Load) + PLC Data Acquisition	**DC 800V; AC 400V**	
Grid Mode(20% Load) + RS485 Data Acquisition	DC 480V; AC 400V	
Grid Mode(20% Load) + RS485 Data Acquisition	DC 640V; AC 400V	
Grid Mode(20% Load) + RS485 Data Acquisition	DC 800V; AC 400V	
Grid Mode(20% Load) + PLC Data Acquisition	DC 480V; AC 400V	
Grid Mode(20% Load) + PLC Data Acquisition	DC 640V; AC 400V	
Grid Mode(20% Load) + PLC Data Acquisition	DC 800V; AC 400V	

◆ For H/F Emission Tests

Test Mode	TEST VOLTAGE	Model
Grid Mode(Full Load) + PLC Data Acquisition	**DC 620V; AC 400V**	**SUN2000-33KTL**
Grid Mode(Full Load) + RS485 Data Acquisition	**DC 620V; AC 400V**	**SUN2000-33KTL**

◆ For Surge Test

Test Mode	TEST VOLTAGE	Model
Grid Mode(1/10 Load) + RS485 Data Acquisition	DC 400V; AC 400V	SUN2000-33KTL
Grid Mode(1/10 Load) + PLC Data Acquisition	DC 400V; AC 400V	SUN2000-33KTL

◆ For Other Immunity Tests

Test Mode	TEST VOLTAGE	Model
Grid Mode(1/10 Load) + RS485 Data Acquisition	DC 500V; AC 400V	SUN2000-33KTL
Grid Mode(1/10 Load) + PLC Data Acquisition	DC 500V; AC 400V	SUN2000-33KTL

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(*)
EN 61000-6-4:2007 + A1:2011
IEC 61000-6-3:2006 + A1:2010(*)
IEC 61000-6-4:2006 + A1:2010
EN 61000-3-12:2011
IEC 61000-3-12:2011
EN 61000-3-11:2000
IEC 61000-3-11:2000
EN 61000-6-1:2007
EN 61000-6-2:2005
IEC 61000-6-1:2005
IEC 61000-6-2:2005
IEC 61000-4-2:2008
IEC 61000-4-3:2006 + A1:2007 + A2:2010
IEC 61000-4-4:2012
IEC 61000-4-5:2014
IEC 61000-4-6:2013
IEC 61000-4-8:2009
IEC 61000-4-11:2004

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

* The PLC communication mode of Solar Inverter is not apply to this standard.

2.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an dependent 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	SmartLogger	HUAWEI	SmartLogger2000	2102311HJB10FB000072	N/A
2	AC Filter	EPCOS	B84143B1600S024	12334	N/A
3	DC Filter	SCHAFFNER	FN2200-100-35	3054168/88/1137R	N/A
4	Programmable DC Power Supply	KEYSIGHT	N8957APV	16391774	N/A
5	Programmable DC Power Supply	KEYSIGHT	N8957APV	16081381	N/A
6	Programmable DC Power Supply	KEYSIGHT	N8957APV	16151438	N/A
7	Programmable DC Power Supply	KEYSIGHT	N8957APV	16321633	N/A
8	Programmable DC Power Supply	KEYSIGHT	N8957APV	16341870	N/A
9	Personal Computer	HP	HP8200	4C1345N8L	N/A

NO.	DESCRIPTION OF THE ABOVE SUPPORT UNITS
1-3	PLC Cable: Unshielded, Detachable 10m; RS485 Cable: Shielded, Detachable 10m.
4-9	AC Line: Unshielded, Detachable 1.8m; DC Line: Unshielded, Detachable 1.5m.

Remarks: SmartLogger and Programmable DC Power Supply is distal support units.

3 EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

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) 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.

3.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	R&S	ESCI3	101019	2017/1/21	2018/1/20
Artificial Mains Network	R&S	ENV4200	100141	2017/1/21	2018/1/20
RF Current probe	FCC	F-52	111659	2017/1/21	2018/1/20
Capacitive Voltage Probe	Teseq	CVP2200A	31861	2017/1/21	2018/1/20
100Ω Resistance	LUTHI	CR100A	369	2017/1/21	2018/1/20

NOTE: 1. The test was performed by witness in conducted shielding room of ShangHai Huawei Technology Co., Ltd.

2. The test was performed in Conducted shielding room.

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.

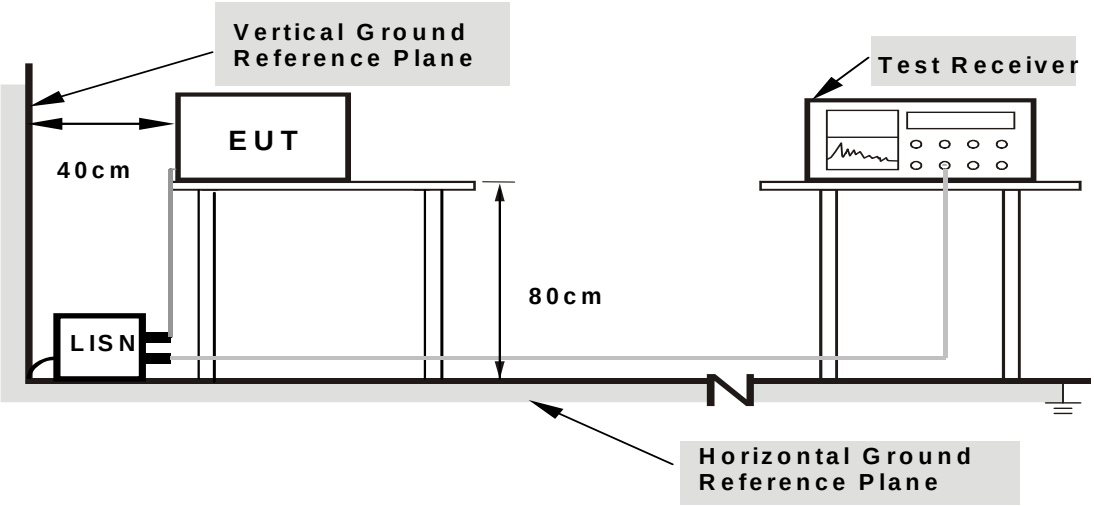
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

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 used was description in manufacturer's specifications or the User's Manual.

3.1.7 TEST RESULTS

TEST MODE	SUN2000-33KTL Grid Mode(Full Load) + RS485 Data Acquisition	**6dB BANDWIDTH**	9 kHz
TEST VOLTAGE	DC 480V AC 400V	**PHASE**	Line (L1)
ENVIRONMENTAL CONDITIONS	25 deg. C, 50% RH	**TESTED BY**: Wang Jia	

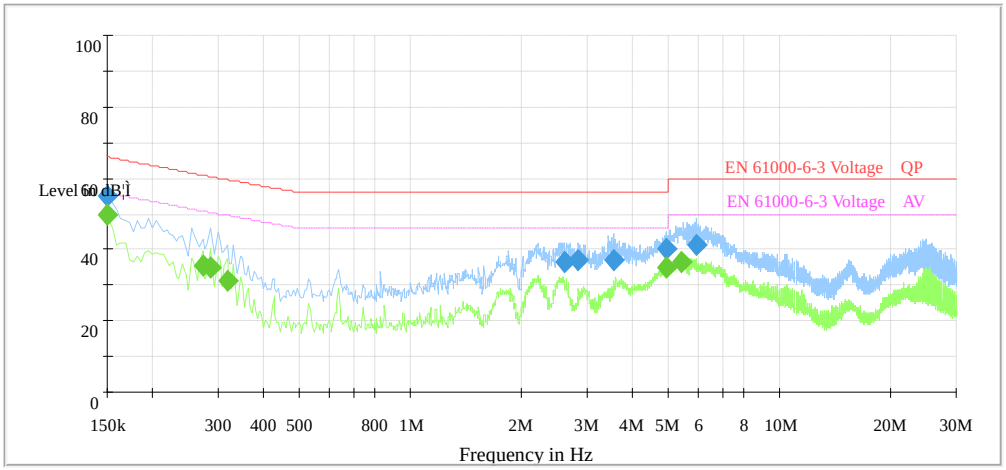
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμ	Comment
0.150000	54.8	1000.0	9.000	GND	L3	10.0	11.2	66.0	
2.593988	36.8	1000.0	9.000	GND	L3	10.1	19.2	56.0	
2.844795	37.0	1000.0	9.000	GND	L3	10.1	19.0	56.0	
3.552240	37.0	1000.0	9.000	GND	L2	10.1	19.0	56.0	
4.890945	40.1	1000.0	9.000	GND	L3	10.1	15.9	56.0	
5.943270	41.5	1000.0	9.000	GND	N	10.2	18.5	60.0	

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμ	Comment
0.150000	49.7	1000.0	9.000	GND	L2	9.9	6.3	56.0	
0.271500	35.3	1000.0	9.000	GND	L2	9.9	15.5	50.8	
0.285000	34.9	1000.0	9.000	GND	L2	9.9	15.6	50.4	
0.316500	31.4	1000.0	9.000	GND	L2	9.9	18.2	49.6	
4.926810	35.0	1000.0	9.000	GND	L3	10.1	11.0	46.0	
5.428425	36.3	1000.0	9.000	GND	L3	10.1	13.7	50.0	

Voltage with 4-Line-LISN



3.2 CONDUCTED EMISSION MEASUREMENT AT TELECOMMUNICATION PORTS

3.2.1 LIMIT OF CONDUCTED COMMON MODE DISTURBANCE AT TELECOMMUNICATION PORTS

TEST STANDARD: EN 61000-6-3, EN 61000-6-4

FOR CLASS A EQUIPMENT

FREQUENCY (MHz)	Voltage Limit (dBuV)		Current Limit (dBuA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	97 – 87	84 - 74	53 – 43	40 – 30
0.5 - 30.0	87	74	43	30

FOR CLASS B EQUIPMENT

FREQUENCY (MHz)	Voltage Limit (dBuV)		Current Limit (dBuA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	84 - 74	74 - 64	40 – 30	30 – 20
0.5 - 30.0	74	64	30	20

NOTE: (1) The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

3.2.2 TEST INSTRUMENTS

4 Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	R&S	ESCI3	101019	2017/1/21	2018/1/20
Artificial Mains Network	R&S	ENV4200	100141	2017/1/21	2018/1/20
RF Current probe	FCC	F-52	111659	2017/1/21	2018/1/20
Capacitive Voltage Probe	Teseq	CVP2200A	31861	2017/1/21	2018/1/20
100Ω Resistance	LUTHI	CR100A	369	2017/1/21	2018/1/20

NOTE: 1. The test was performed by witness in conducted shielding room of ShangHai Huawei Technology Co., Ltd.
2. The test was performed in Conducted shielding room.

3.2.3 TEST PROCEDURE

For using ISN:

a. The EUT is placed 0.4 meters from the conducting wall of the shielded room and connected to ISN directly to reference ground plane.

b. If voltage measurement is used, measure voltage at the measurement port of the ISN, correct the reading by adding the ISN voltage division factor, and compare to the voltage limit.

c. If current measurement is used, measure current with the current probe and compare to the current limit.

d. It is not necessary to apply the voltage and the current limit if the ISN is used. A 50 Ω load has to be connected to the measurement port of the ISN during the current measurement.

e. The disturbance levels and the frequencies of at least six highest disturbances are recorded from be measured each telecommunication port, which comprises the EUT.

For using a 150 Ω load to the outside surface of the shield cable:

a. Break the insulation and connect a 150 Ω resistor from the outside surface of the shield cable to ground, and apply a ferrite tube or clamp between 150Ω connection and AE.

b. The EUT is placed 0.4 meters from the conducting wall of the shielded room and connected to AE with the shield cable.

c. Measure current with a current probe and compare to the current limit. The common mode impedance towards the right of the 150Ω resistor.

d. The disturbance levels and the frequencies of at least six highest disturbances are recorded from be measured each telecommunication port, which comprises the EUT.

For using a combination of current probe and capacitive voltage probe:

a. The EUT is placed 0.4 meters from the conducting wall of the shielded room and connected to AE with a cable. The cable contains more than four balanced pairs or to unbalanced cable.

b. Measure current with a current probe and compare to the current limit.

c. Measure voltage with a capacitive probe and adjust the measured voltage as follows:

d. – current margin ≤ 6 dB – subtract the actual current margin from measured voltage;

e. – current margin > 6 dB – subtract 6 dB from measured voltage.

f. Compare adjusted voltage with the applicable voltage limit.

g. Both the measured current and the adjusted voltage shall be below the applicable current and voltage limits.

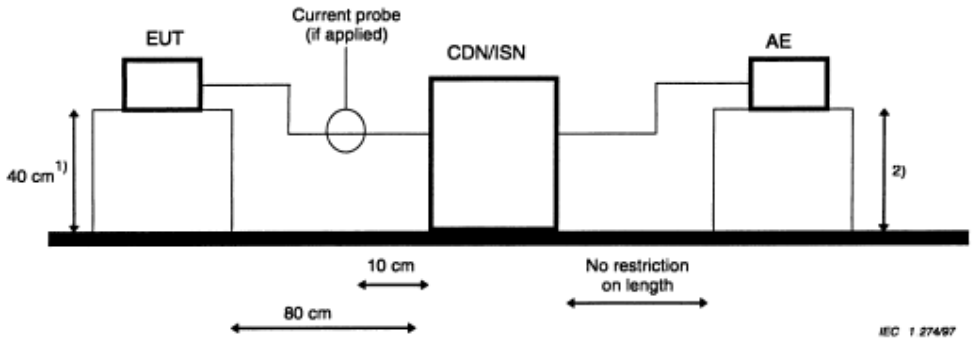
h. The disturbance levels and the frequencies of at least six highest disturbances are recorded from be measured each telecommunication port, which comprises the EUT.

3.2.4 DEVIATION FROM TEST STANDARD

No deviation

3.2.5 TEST SETUP

For using ISN:

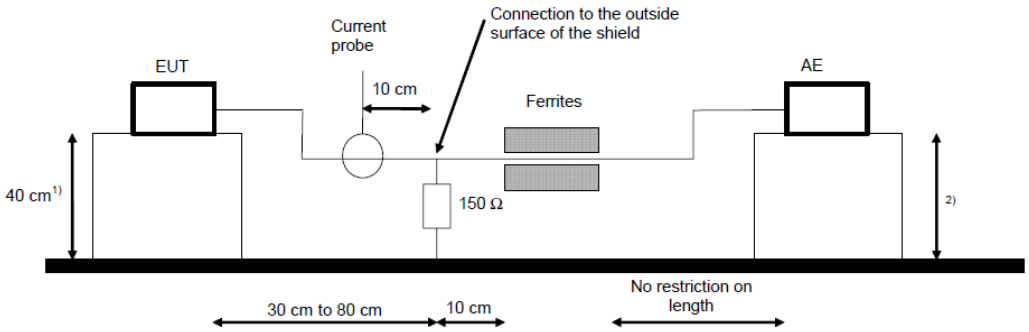


AE = Associated equipment
EUT = Equipment under test

1) Distance to the reference groundplane (vertical or horizontal).

2) Distance to the reference groundplane is not critical.

For using a 150 Ω load to the outside surface of the shield cable:

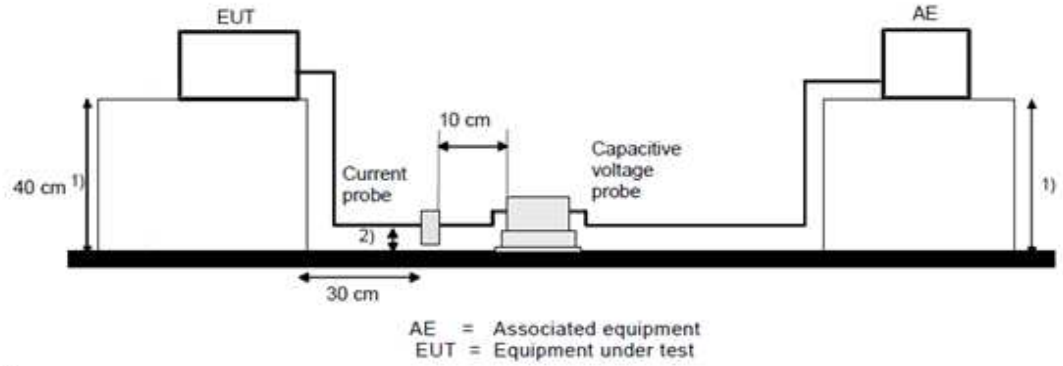


AE = Associated equipment
EUT = Equipment under test

1) Distance to the reference groundplane (vertical or horizontal).

2) Distance to the reference groundplane is not critical.

For using a combination of current probe and capacitive voltage probe:



1) Distance to the reference groundplane (vertical or horizontal)

2) Distance 4 ± 1 cm from the reference groundplane.

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

3.2.6 EUT OPERATING CONDITIONS

Same as item 3.1.6

3.2.7 TEST RESULTS

TEST MODE	SUN2000-33KTL Grid Mode(Full Load) + RS485 Data Acquisition	**6dB BANDWIDTH**	9kHz
TEST VOLTAGE	DC 800V AC 400V	**PHASE**	RS485 PORT (RJ45 Cable)
ENVIRONMENTAL CONDITIONS	25 deg. C, 50% RH	**TEST BY**	Wang Jia

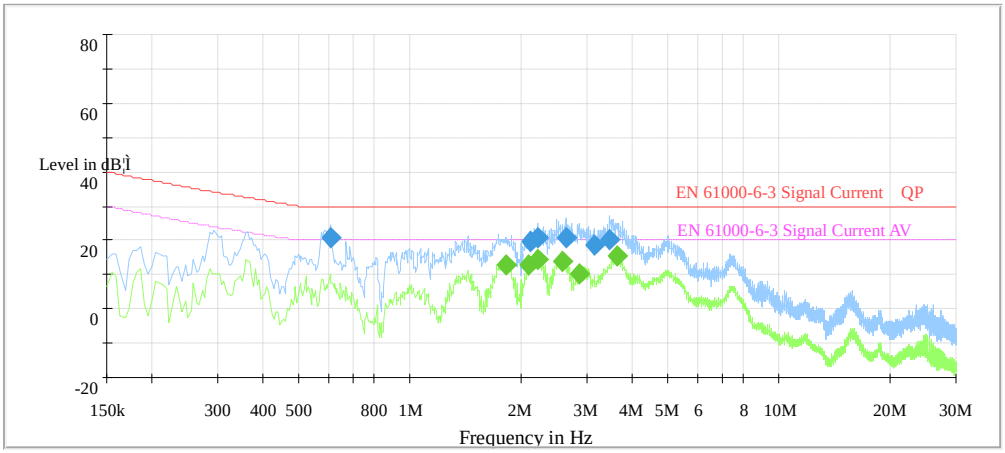
Final Result 1

Frequency (MHz)	Quasi-Peak (dB μA)	Meas. Time (ms)	Bandwidth (kHz)	Corr. (dB)	Margin (dB)	Limit (dB μA)	Comment
0.609000	20.9	1000.0	9.000	-7.2	9.1	30.0	
2.105985	19.7	1000.0	9.000	-13.4	10.3	30.0	
2.222422	20.5	1000.0	9.000	-13.4	9.5	30.0	
2.638125	20.9	1000.0	9.000	-13.4	9.1	30.0	
3.126810	18.4	1000.0	9.000	-13.4	11.6	30.0	
3.440212	20.0	1000.0	9.000	-13.4	10.0	30.0	

Final Result 2

Frequency (MHz)	Average (dB μA)	Meas. Time (ms)	Bandwidth (kHz)	Corr. (dB)	Margin (dB)	Limit (dB μA)	Comment
1.801463	12.6	1000.0	9.000	-13.2	7.4	20.0	
2.092485	13.0	1000.0	9.000	-13.4	7.0	20.0	
2.213378	14.3	1000.0	9.000	-13.4	5.7	20.0	
2.562668	14.1	1000.0	9.000	-13.4	5.9	20.0	
2.849272	10.2	1000.0	9.000	-13.4	9.8	20.0	
3.605970	15.6	1000.0	9.000	-13.4	4.4	20.0	

Current



TEST MODE	SUN2000-33KTL Grid Mode(Full Load) + PLC Data Acquisition	**6dB BANDWIDTH**	9kHz
TEST VOLTAGE	DC 640V AC 400V	**PHASE**	PLC PORT
ENVIRONMENTAL CONDITIONS	25 deg. C, 50% RH	**TEST BY**	Wang Jia

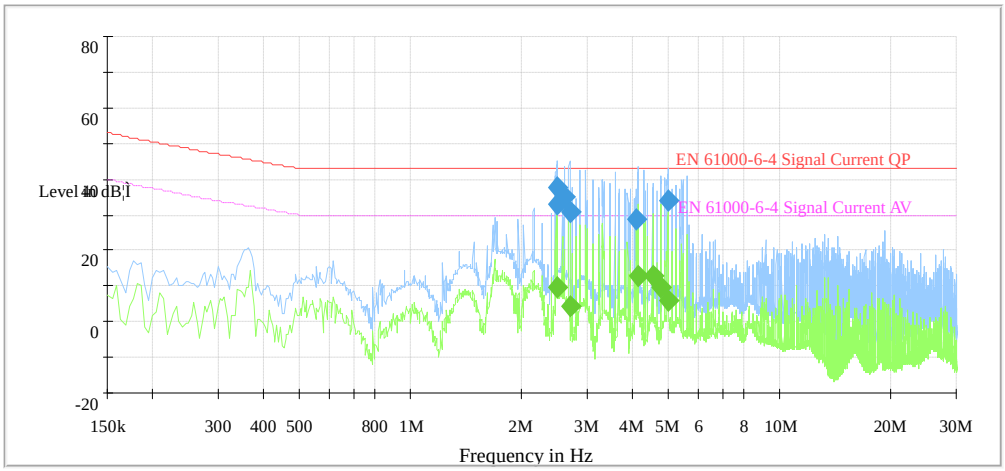
Final Result 1

Frequency (MHz)	Quasi-Peak (dB μ A)	Meas. Time (ms)	Bandwidth (kHz)	Corr. (dB)	Margin (dB)	Limit (dB μ A)	Comment
2.488883	37.9	1000.0	9.000	-13.4	5.1	43.0	
2.500050	32.7	1000.0	9.000	-13.4	10.3	43.0	
2.616465	35.2	1000.0	9.000	-13.4	7.8	43.0	
2.696918	31.0	1000.0	9.000	-13.4	12.0	43.0	
4.093995	28.7	1000.0	9.000	-13.4	14.3	43.0	
4.976198	33.7	1000.0	9.000	-13.3	9.3	43.0	

Final Result 2

Frequency (MHz)	Average (dB μ A)	Meas. Time (ms)	Bandwidth (kHz)	Corr. (dB)	Margin (dB)	Limit (dB μ A)	Comment
2.488883	9.7	1000.0	9.000	-13.4	20.3	30.0	
2.692395	4.4	1000.0	9.000	-13.4	25.6	30.0	
4.125382	12.7	1000.0	9.000	-13.4	17.3	30.0	
4.514902	13.0	1000.0	9.000	-13.4	17.0	30.0	
4.743278	9.8	1000.0	9.000	-13.3	20.2	30.0	
4.985130	5.7	1000.0	9.000	-13.3	24.3	30.0	

Current



TEST MODE	SUN2000-33KTL Grid Mode(Full Load) + PLC Data Acquisition	**6dB BANDWIDTH**	9kHz
TEST VOLTAGE	DC 480V AC 400V	**PHASE**	PLC PORT
ENVIRONMENTAL CONDITIONS	25 deg. C, 50% RH	**TEST BY**	Wang Jia

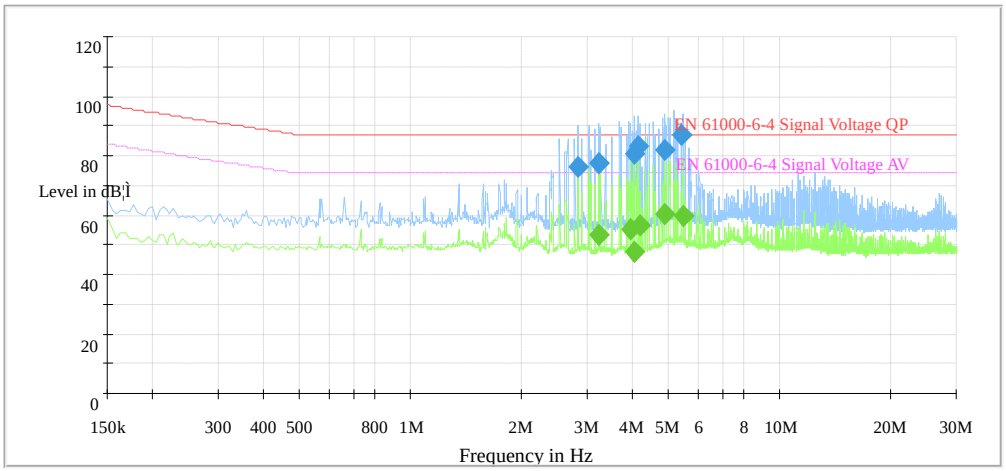
Final Result 1

Frequency (MHz)	Raw Value Quasi – Peak (dB μV)	Current Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Emission (dB μV)*	Corr. (dB)	Margin (dB)	Limit (dB μV)
2.840362	76.1	5.1	1000.0	9.000	71.0	33.2	16.0	87.0
3.202905	77.6	5.1	1000.0	9.000	72.5	33.2	14.5	87.0
4.008855	80.5	5.1	1000.0	9.000	75.4	33.1	11.6	87.0
4.129882	83.4	5.1	1000.0	9.000	78.3	33.1	8.7	87.0
4.850670	81.8	5.1	1000.0	9.000	76.7	33.1	10.3	87.0
5.419268	86.9	5.1	1000.0	9.000	81.8	33.1	5.2	87.0

Final Result 2

Frequency (MHz)	Raw Value Average (dB μV)	Current Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Emission (dB μV)*	Corr. (dB)	Margin (dB)	Limit (dB μV)
3.211905	53.4	5.1	1000.0	9.000	48.3	33.2	25.7	74.0
3.928305	55.4	5.1	1000.0	9.000	50.3	33.1	23.7	74.0
4.022355	47.7	5.1	1000.0	9.000	42.6	33.1	31.4	74.0
4.144118	56.8	5.1	1000.0	9.000	51.7	33.1	22.3	74.0
4.841670	60.2	5.1	1000.0	9.000	55.1	33.1	18.9	74.0
5.432812	59.7	5.1	1000.0	9.000	54.6	33.1	19.4	74.0

Capacitive Voltage Probe CVP2200a



Remark:*:current margin ≤ 6 dB – subtract the actual current margin from measured voltage.
*: Emission level(dBuV)=Raw Value(dBuV) - Current Margin (dB)

3.3 RADIATED EMISSION MEASUREMENT

3.3.1 LIMITS OF RADIATED EMISSION MEASUREMENT

TEST STANDARD: EN 61000-6-3, EN 61000-6-4

FOR FREQUENCY BELOW 1000 MHz

FREQUENCY (MHz)	Class B (at 3m) Quasi-Peak (dBuV/m)	Class B (at 10m) 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)	Class A (dBuV/m) (at 3m)		Class B (dBuV/m) (at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
1 to 3	76	56	70	50
3 to 6	80	60	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) All emanation 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.

3.3.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Receiver	Agilent	N9038A	MY51210233	2017/1/21	2018/1/20
Spectrum Analyzer	Agilent	E4447A	MY52090002	2017/1/21	2018/1/20
Bilog antenna(30M-1G)	SCHWARZBECK	VULB 9163	548	2016/5/21	2017/5/20
Bilog antenna(30M-1G)	SCHWARZBECK	VULB 9163	549	2016/12/2	2017/12/01
Preamplifier(30M-1G)	SONOMA INSTRUMENT	317	321043	2016/7/25	2017/7/24
Preamplifier(30M-1G)	Agilent	8447D	2944A10175	2017/1/21	2018/1/20

NOTE: 1.The test was performed by witness in 10m chamber of ShangHai Huawei Technology Co., Ltd.
2.The test was performed in 10m Chamber.

3.3.3 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 meters Semi-anechoic 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 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:

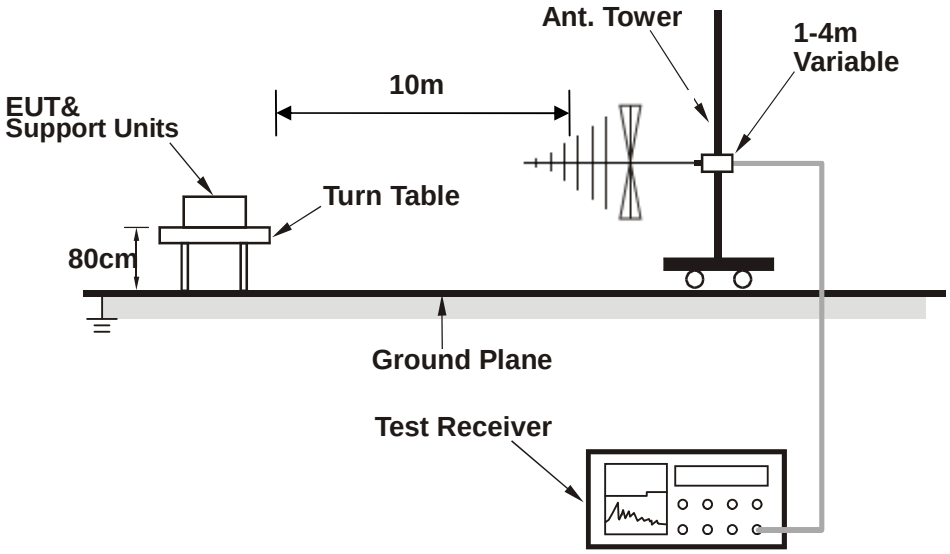
1. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.
2. For measurement of frequency above 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.

3.3.4 DEVIATION FROM TEST STANDARD

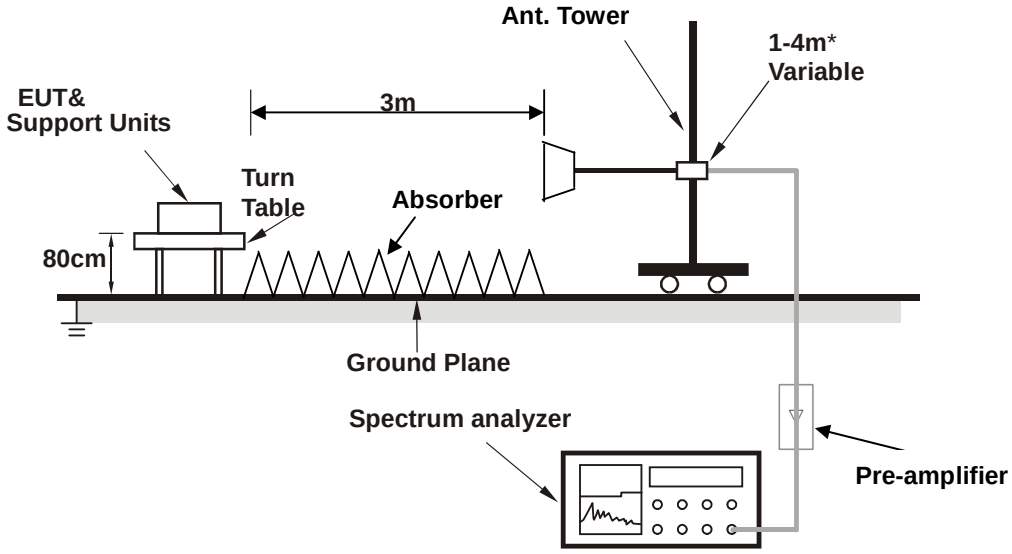
No deviation

3.3.5 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.

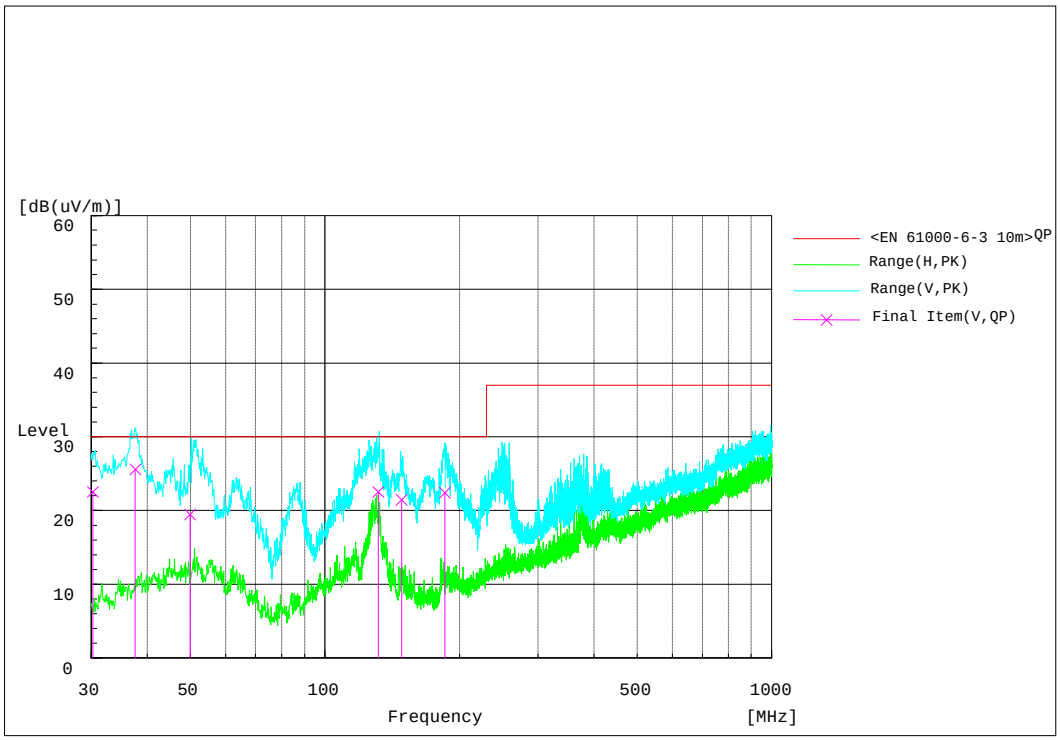
3.3.6 EUT OPERATING CONDITIONS

Same as item 3.1.6

3.3.7 TEST RESULTS

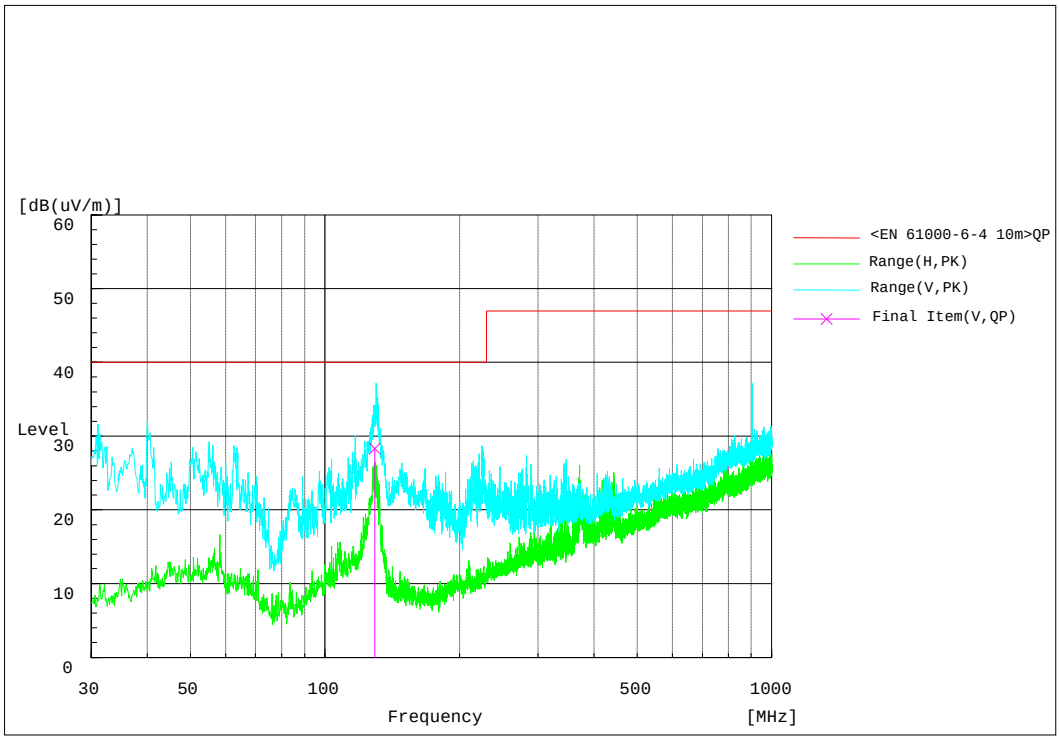
TEST MODE	SUN2000-33KTL Grid Mode(Full Load) + RS485 Data Acquisition	**FREQUENCY RANGE**	30-1000 MHz
TEST VOLTAGE	DC 800V AC 400V	**DETECTOR FUNCTION & BANDWIDTH**	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	25 deg. C, 48% RH	**TESTED BY**: Wang Jia	

Frequency (MHz)	Level (dBµV/m)	Transd (dB)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
30.232	22.5	-16.2	30.0	7.5	101.0	183.0	V
37.625	25.6	-13.3	30.0	4.4	107.0	21.0	V
49.919	19.5	-12.7	30.0	10.5	100.0	185.0	V
131.675	22.5	-17.3	30.0	7.5	106.0	94.0	V
148.528	21.5	-16.9	30.0	8.5	101.0	265.0	V
185.462	22.4	-14.6	30.0	7.6	101.0	0.0	V



TEST MODE	SUN2000-33KTL Grid Mode(Full Load) + PLC Data Acquisition	**FREQUENCY RANGE**	30-1000 MHz
TEST VOLTAGE	DC 800V AC 400V	**DETECTOR FUNCTION & BANDWIDTH**	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	25 deg. C, 48% RH	**TESTED BY**: Wang Jia	

Frequency (MHz)	Level (dBµV/m)	Transd (dB)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
129.280	28.3	-17.1	40.0	11.7	106.0	5.0	V



3.4 HARMONICS CURRENT MEASUREMENT (>16A)

3.4.1 TEST INSTRUMENTS

TEST STANDARD: EN 61000-3-12

Description	Manufacturer	Model no.	Serial No.	Last Cal.	Next Cal.
Power Analyzer	YOKOGAWA	WT3000	91J902079	2017/02/13	2018/02/12
AC Source	AMETEK	MX45-3Pi-400-411-HV-LF-SNK	1640A00767	2016/10/13	2017/10/12

NOTE: 1.The test was performed by witness in H/F Room of ShangHai Huawei Technology Co., Ltd.
2. The test was performed in Harmonics Room.

3.4.2 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.

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.

3.4.3 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. 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.						

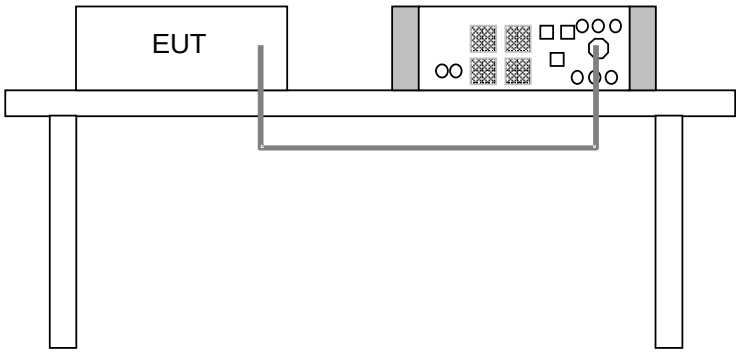
3.4.4 CURRENT EMISSION LIMITS FOR BALANCED THREE-PHASE EQUIPMENT UNDER SPECIFIED CONDITIONS

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. 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.						

3.4.5 DEVIATION FROM TEST STANDARD

No deviation

3.4.6 TEST SETUP



3.4.7 EUT OPERATING CONDITIONS

Same as item 3.1.6

3.4.8 TEST RESULTS

SUN2000-33KTL

***** appliances

Print Date	:	Tue May 16 22:05:55 2017
MeasureDate	:	Tue May 16 22:05:35 2017
Comment	:	Experimental model Pattern A

Regulation	:	IEC61000-3-12	Ed2.0
		IEC61000-4-7	Ed2.0 A1
MeasureTime	:	150sec	
Model	:	YOKOGAWA WT3000	
Wiring	:	3P4W(3P:three-phase)	
Element	:	1	
Range	:	300V/50.0A	
Rating Voltage	:	230	V
Iequ	:	15.0000	A
Z Impedance	:	0.1200	ohm
Iref	:	43.5150	A
Set Iref	:	---------	
Power Rsce	:	73.773	
Max Rsce	:	33.000	

PASS

Ssc	:	197193.98	
Min Rsce	:	33.0000	
Apply Limit	:	Table3-Balanced 3-phase	
Circumstance a	:	0.12%	(Pass)
Term a(I5)	:	0.50%	(Pass)
Term a(I7)	:	0.26%	(Pass)
Term c	:	192.24 - 200.32deg	(Fail)
Term d(I5)	:	0.50%	(Pass)
Term d(I7)	:	0.26%	(Pass)
Term f	:	192.24 - 200.32deg	(Pass)

[Average]

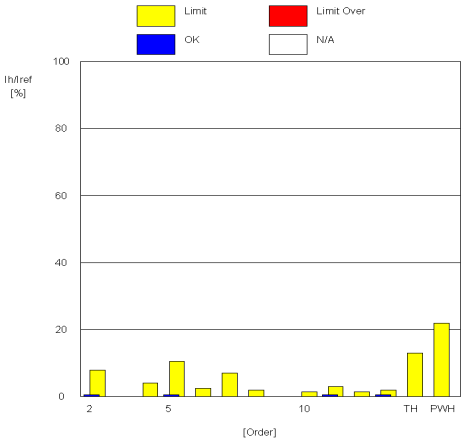
Voltage(rms)	:	230.39	V
Current(rms)	:	43.52	A
Frequency	:	50.00	Hz
Power Factor	:	1.00	
Sigma W	:	10023.42	W
THC	:	0.71	A
V THD	:	0.63	%
A THD	:	1.64	%
P THD	:	0.00	%

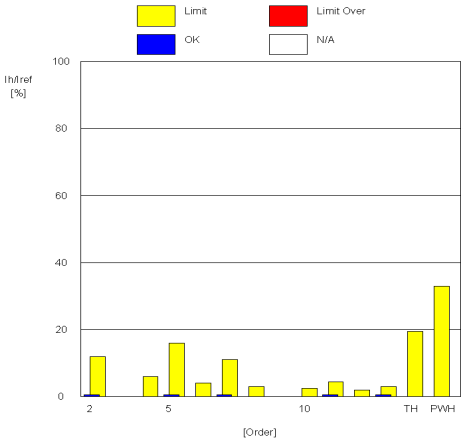
[Maximum]

Voltage(rms)	:	230.41	V
Current(rms)	:	43.54	A
Frequency	:	50.04	Hz
Power Factor	:	1.00	
Sigma W	:	30056.26	W
THC	:	0.73	A
V THD	:	0.65	%
A THD	:	1.74	%
P THD	:	0.00	%

Order	Measure[%]	Limit[%]	Margin[%]
2	0.6890	8.0000	91.4
3	0.0953	-------	-------
4	0.1838	4.0000	95.4
5	0.4643	10.7000	95.7
6	0.0502	2.6667	98.1
7	0.2352	7.2000	96.7
8	0.0624	2.0000	96.9
9	0.0776	-------	-------
10	0.0505	1.6000	96.9
11	0.5423	3.1000	82.5
12	0.0393	1.3333	97.1
13	0.5124	2.0000	74.4
TH	0.0000	13.0000	100.0
PWH	0.0000	22.0000	100.0

Order	Measure[%]	Limit[%]	Margin[%]
2	0.7383	12.0000	93.8
3	0.1159	-------	-------
4	0.2496	6.0000	95.8
5	0.4958	16.0500	96.9
6	0.0554	4.0000	98.6
7	0.2559	10.8000	97.6
8	0.0684	3.0000	97.7
9	0.0835	-------	-------
10	0.0552	2.4000	97.7
11	0.5512	4.6500	88.1
12	0.0449	2.0000	97.8
13	0.5196	3.0000	82.7
TH	0.0000	19.5000	100.0
PWH	0.0000	33.0000	100.0





Regulation	:	IEC61000-3-12	Ed2.0
		IEC61000-4-7	Ed2.0 A1
MeasureTime	:	150sec	
Model	:	YOKOGAWA WT3000	
Wiring	:	3P4W(3P:three-phase)	
Element	:	2	
Range	:	300V/50.0A	
Rating Voltage	:	230 V	
Iequ	:	15.0000 A	
Z Impedance	:	0.1200 ohm	
Iref	:	43.4672 A	
Set Iref	:	--------	
Power Rsce	:	73.773	
Max Rsce	:	33.000	

PASS

Ssc	:	197193.98	
Min Rsce	:	33.0000	
Apply Limit	:	Table3-Balanced 3-phase	
Circumstance a	:	0.17%	(Pass)
Term a(I5)	:	0.50%	(Pass)
Term a(I7)	:	0.25%	(Pass)
Term c	:	190.73 - 198.48deg	(Fail)
Term d(I5)	:	0.50%	(Pass)
Term d(I7)	:	0.25%	(Pass)
Term f	:	190.73 - 198.48deg	(Pass)

[Average]

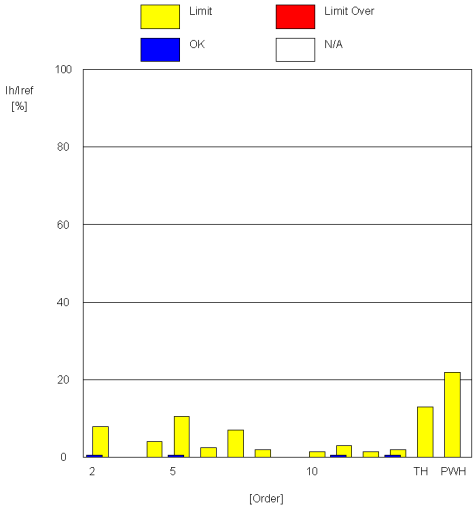
Voltage(rms)	:	230.44	V
Current(rms)	:	43.47	A
Frequency	:	50.00	Hz
Power Factor	:	1.00	
Sigma W	:	10023.42	W
THC	:	0.69	A
V THD	:	0.63	%
A THD	:	1.60	%
P THD	:	0.00	%

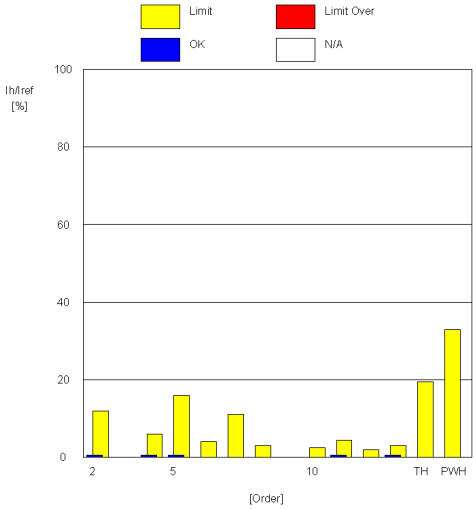
[Maximum]

Voltage(rms)	:	230.46	V
Current(rms)	:	43.49	A
Frequency	:	50.04	Hz
Power Factor	:	1.00	
Sigma W	:	30056.26	W
THC	:	0.71	A
V THD	:	0.65	%
A THD	:	1.67	%
P THD	:	0.00	%

Order	Measure[%]	Limit[%]	Margin[%]
2	0.4879	8.0000	93.9
3	0.1518	------	------
4	0.2228	4.0000	94.4
5	0.4728	10.7000	95.6
6	0.0520	2.6667	98.1
7	0.2305	7.2000	96.8
8	0.0581	2.0000	97.1
9	0.0946	------	------
10	0.0452	1.6000	97.2
11	0.5765	3.1000	81.4
12	0.0376	1.3333	97.2
13	0.5411	2.0000	73.0
TH	0.0000	13.0000	100.0
PWH	0.0000	22.0000	100.0

Order	Measure[%]	Limit[%]	Margin[%]
2	0.5534	12.0000	95.4
3	0.1717	------	------
4	0.2791	6.0000	95.3
5	0.5006	16.0500	96.9
6	0.0583	4.0000	98.5
7	0.2498	10.8000	97.7
8	0.0650	3.0000	97.8
9	0.1017	------	------
10	0.0527	2.4000	97.8
11	0.5871	4.6500	87.4
12	0.0420	2.0000	97.9
13	0.5476	3.0000	81.7
TH	0.0000	19.5000	100.0
PWH	0.0000	33.0000	100.0





Regulation	:	IEC61000-3-12	Ed2.0
		IEC61000-4-7	Ed2.0 A1
MeasureTime	:	150sec	
Model	:	YOKOGAWA WT3000	
Wiring	:	3P4W(3P:three-phase)	
Element	:	3	
Range	:	300V/50.0A	
Rating Voltage	:	230	V
Iequ	:	15.0000	A
Z Impedance	:	0.1200	ohm
Iref	:	43.4783	A
Set Iref	:	---------	
Power Rsce	:	73.773	
Max Rsce	:	33.000	

PASS

Ssc	:	197193.98	
Min Rsce	:	33.0000	
Apply Limit	:	Table3-Balanced 3-phase	
Circumstance a	:	0.11%	(Pass)
Term a(I5)	:	0.50%	(Pass)
Term a(I7)	:	0.24%	(Pass)
Term c	:	192.20 - 201.22deg	(Fail)
Term d(I5)	:	0.50%	(Pass)
Term d(I7)	:	0.24%	(Pass)
Term f	:	192.20 - 201.22deg	(Pass)

[Average]

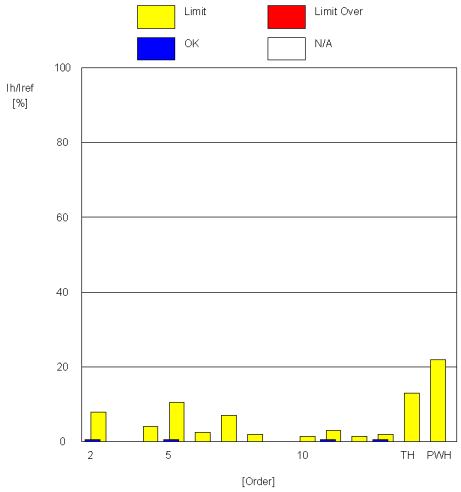
Voltage(rms)	:	230.04	V
Current(rms)	:	43.48	A
Frequency	:	50.00	Hz
Power Factor	:	1.00	
Sigma W	:	10023.42	W
THC	:	0.67	A
V THD	:	0.53	%
A THD	:	1.55	%
P THD	:	0.00	%

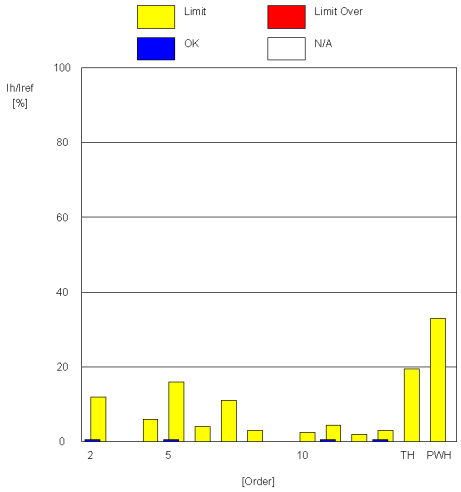
[Maximum]

Voltage(rms)	:	230.05	V
Current(rms)	:	43.50	A
Frequency	:	50.04	Hz
Power Factor	:	1.00	
Sigma W	:	30056.26	W
THC	:	0.69	A
V THD	:	0.55	%
A THD	:	1.63	%
P THD	:	0.00	%

Order	Measure[%]	Limit[%]	Margin[%]
2	0.5747	8.0000	92.8
3	0.0871	------	------
4	0.1745	4.0000	95.6
5	0.4751	10.7000	95.6
6	0.0633	2.6667	97.6
7	0.2190	7.2000	97.0
8	0.0399	2.0000	98.0
9	0.0372	------	------
10	0.0476	1.6000	97.0
11	0.5452	3.1000	82.4
12	0.0414	1.3333	96.9
13	0.4987	2.0000	75.1
TH	0.0000	13.0000	100.0
PWH	0.0000	22.0000	100.0

Order	Measure[%]	Limit[%]	Margin[%]
2	0.6202	12.0000	94.8
3	0.1108	------	------
4	0.2376	6.0000	96.0
5	0.5029	16.0500	96.9
6	0.0684	4.0000	98.3
7	0.2385	10.8000	97.8
8	0.0465	3.0000	98.4
9	0.0406	------	------
10	0.0532	2.4000	97.8
11	0.5531	4.6500	88.1
12	0.0445	2.0000	97.8
13	0.5068	3.0000	83.1
TH	0.0000	19.5000	100.0
PWH	0.0000	33.0000	100.0





3.5 VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT

3.5.1 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, ΔU, 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.

3.5.2 TEST INSTRUMENTS

Description	Manufacturer	Model no.	Serial No.	Last Cal.	Next Cal.
Power Analyzer	YOKOGAWA	WT3000	91J902079	2017/02/13	2018/02/12
AC Source	AMETEK	MX45-3Pi-400-411-HV-LF-SNK	1640A00767	2016/10/13	2017/10/12

NOTE: 1.The test was performed by witness in H/F Room of ShangHai Huawei Technology Co., Ltd.
2. The test was performed in Harmonics Room.

3.5.3 TEST PROCEDURE

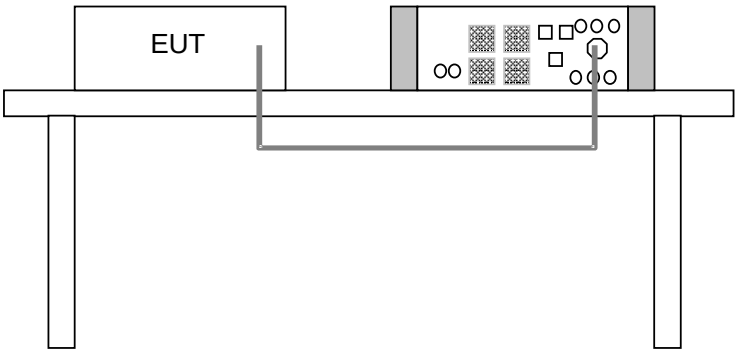
a. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under Normal Operating conditions.

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 120 minutes

3.5.4 DEVIATION FROM TEST STANDARD

No deviation

3.5.5 TEST SETUP



3.5.6 EUT OPERATING CONDITIONS

Same as item 3.1.6.

3.5.7 TEST RESULTS

SUN2000-33KTL

******* appliances**

Print Date	:	Wed May 17 14:29:42 2017
MeasureDate	:	Wed May 17 14:26:06 2017
Comment	:	Experimental model Pattern A

Regulation	:	IEC61000-3-11 Ed1.0
		IEC61000-4-15 Ed2.0
Interval	:	10Min0Sec
Model	:	YOKOGAWA WT3000
Impedance	:	0.24+j0.15
Wiring	:	three-phase 4wire
Voltage Range	:	600.00V
Set Voltage	:	230V
Set Frequency	:	50Hz
Voltage U1	:	230.00V
Frequency U1	:	49.997Hz
Element	:	1
dmin	:	0.20%

PASS (Under dmin)

Compatibility Condition	:	Compliance with IEC61000
Element1	:	Pass(Under dmin)
dc (3.30%)	:	Pass
dmax (4.00%)	:	Pass
d(t) (500ms)	:	-----
Pst (1.00)	:	Pass
Plt (0.65)	:	Pass

No.	dc[%]	dmax[%]	d(t)[ms]	Pst
1	0.15	0.25	-----	0.08
2	0.40	0.49	-----	0.17
3	0.49	0.63	-----	0.16
4	0.46	0.55	-----	0.39
5	0.48	0.62	-----	0.29
6	0.39	0.55	-----	0.31
7	0.38	0.44	-----	0.29
8	0.37	0.36	-----	0.40
9	0.46	0.51	-----	0.18
10	0.25	0.31	-----	0.09
11	0.00	0.00	-----	0.07
12	0.00	0.00	-----	0.07

Plt
0.26

Regulation	:	IEC61000-3-11 Ed1.0
		IEC61000-4-15 Ed2.0
Interval	:	10Min0Sec
Model	:	YOKOGAWA WT3000
Impedance	:	0.24+j0.15
Wiring	:	three-phase 4wire
Voltage Range	:	600.00V
Set Voltage	:	230V
Set Frequency	:	50Hz
Voltage U2	:	230.00V
Frequency U2	:	49.997Hz
Element	:	2
dmin	:	0.20%

PASS (Under dmin)

Compatibility Condition	:	Compliance with IEC610(
Element2	:	Pass(Under dmin)
dc (3.30%)	:	Pass
dmax (4.00%)	:	Pass
d(t) (500ms)	:	-----
Pst (1.00)	:	Pass
Plt (0.65)	:	Pass

No.	dc[%]	dmax[%]	d(t)[ms]	Pst
1	0.25	0.30	-----	0.08
2	0.52	0.62	-----	0.16
3	0.54	0.60	-----	0.15
4	0.59	0.62	-----	0.38
5	0.41	0.61	-----	0.32
6	0.44	0.62	-----	0.34
7	0.50	0.61	-----	0.31
8	0.47	0.54	-----	0.38
9	0.44	0.57	-----	0.17
10	0.46	0.51	-----	0.10
11	0.00	0.00	-----	0.08
12	0.00	0.00	-----	0.08
				Plt
				0.27

Regulation	:	IEC61000-3-11 Ed1.0
		IEC61000-4-15 Ed2.0
Interval	:	10Min0Sec
Model	:	YOKOGAWA WT3000
Impedance	:	0.24+j0.15
Wiring	:	three-phase 4wire
Voltage Range	:	600.00V
Set Voltage	:	230V
Set Frequency	:	50Hz
Voltage U3	:	230.00V
Frequency U3	:	Error
Element	:	3
dmin	:	0.20%

PASS (Under dmin)

Compatibility Condition	:	Compliance witl
Element3	:	Pass(Under dm
dc (3.30%)	:	Pass
dmax (4.00%)	:	Pass
d(t) (500ms)	:	-----
Pst (1.00)	:	Pass
Plt (0.65)	:	Pass

No.	dc[%]	dmax[%]	d(t)[ms]	Pst
1	0.23	0.24	-----	0.08
2	0.50	0.62	-----	0.13
3	0.36	0.46	-----	0.12
4	0.50	0.62	-----	0.55
5	0.55	0.63	-----	0.55
6	0.49	0.60	-----	0.59
7	0.43	0.58	-----	0.53
8	0.43	0.48	-----	0.18
9	0.58	0.59	-----	0.14
10	0.42	0.45	-----	0.09
11	0.00	0.00	-----	0.07
12	0.00	0.00	-----	0.07
				Plt
				0.39

4 IMMUNITY TEST

4.1 GENERAL DESCRIPTION

4.1.1 GENERAL DESCRIPTION

Product Standard:	**EN 61000-6-2:2005, EN 61000-6-1:2007**	
Basic Standard, specification requirement, and Performance Criteria:	IEC 61000-4-2	Electrostatic Discharge – ESD: 4kV Contact discharge, 8kV air discharge, Performance Criterion B
	IEC 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80-1000 MHz, 10V/m, 80% AM (1kHz), 1400-2000 MHz, 3V/m, 80% AM (1kHz) 2000-2700 MHz, 1V/m, 80% AM (1kHz) Performance Criterion A
	IEC 61000-4-4	Electrical Fast Transient/Burst - EFT AC Power line: 2kV, DC Power line: 2kV Signal line: 1kV Performance Criterion B
	IEC 61000-4-5	Surge Immunity Test: 1.2/50 us Open Circuit Voltage, 8 /20 us Short Circuit Current, AC Power Line: line to line 1 kV, line to earth 2kV DC Power Line: line to line 0.5kV line to earth 0.5kV Signal line: 1kV Performance Criterion B
	IEC 61000-4-6	Conducted Radio Frequency Disturbances Test – CS: 0.15-80 MHz, 10Vrms, 80% AM, 1kHz, Performance Criterion A
	IEC 61000-4-8	Power Frequency Magnetic Field Test, 50 Hz, 30A/m, Performance Criterion A

4.1.2 PERFORMANCE CRITERIA

According to Clause 4 of EN 61000-6-2:2005, EN 61000-6-1:2007 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 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) Contact Discharge: 6 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 simulator	Teseq	NSG 437	398	2017/1/22	2018/1/21

NOTE: 1.The test was performed by witness in BF-61 room of ShangHai Huawei Technology Co., Ltd.
2.The test was performed in BF-61 Room.

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.

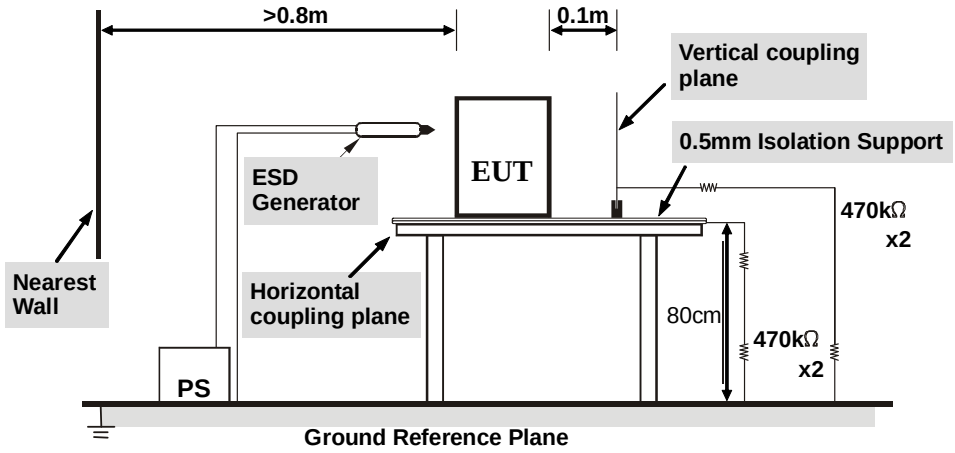
g. At least ten single discharges (in the most sensitive polarity) were applied to the **H**orizontal **C**oupling **P**lane at points on each side of the EUT. The ESD generator was positioned horizontal at a distance of 0.1 meters from the EUT with the discharge electrode touching the **HCP.**

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 item 2.2	TEST VOLTAGE	DC 500V AC 400V
ENVIRONMENTAL CONDITIONS	21deg. C, 50% RH 101.00kPa	TESTED BY: Zhou Xueqiang	

Direct Discharge Application				
Test Level (kV)	Polarity	Test Point	Test Result of Contact Discharge	Test Result of Air Discharge
6	+/-	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
6	+/-	HCP&VCP	A	A

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

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
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	AR	SG6000	327339	2017/1/21	2018/1/20
Power Meter	AR	PM2003	339736	2017/1/21	2018/1/20
Amplifier	AR	500W1000A	337312	2017/1/21	2018/1/20
Amplifier	AR	175S1G4M3	340318	2017/1/21	2018/1/20
Directional Coupler	AR	DC6180A	311186	2017/1/21	2018/1/20
Directional Coupler	AR	DC7144A	336840	2017/1/21	2018/1/20
Power Probe	AR	PH2000	339751	N/A	N/A
Power Probe	AR	PH2000	339752	N/A	N/A
RF TEST SYS CTRLR	AR	SC1000	337402	N/A	N/A
Log-periodic antenna	SCHWARZBECK	STLP 9128D	9128D036	N/A	N/A

NOTE: 1.The test was performed by witness in 3m Chamber of ShangHai Huawei Technology Co., Ltd.
2.The test was performed in 3m Chamber.

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.

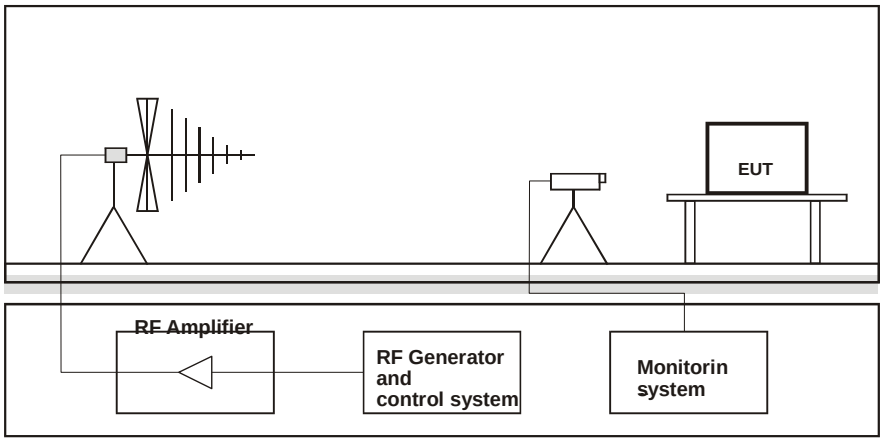
d. The field strength levels were 10V/m.

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 item 2.2	TEST VOLTAGE	DC 500V AC 400V
ENVIRONMENTAL CONDITIONS	21deg. C, 58% RH	TESTED BY: Wang Jia	

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
10	1400 - 2000	H&V	3	A	N/A
10	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 Signal 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.
Fast Transient Burt Simulator	Teseq	NSG2025	32075	2017/1/21	2018/1/20
Coupling clamp	Teseq	CDN8014	31839	2017/1/21	2018/1/20
Coupling Decoupling Network	Teseq	CDN163	160	2017/1/21	2018/1/20

NOTE: 1. The test was performed by witness in BF-65 room of ShangHai Huawei Technology Co., Ltd.
2. The test was performed in BF-65 Room.

4.4.3 TEST PROCEDURE

a. Both positive and negative polarity discharges were applied.

b. The distance between any coupling devices and the EUT should be (0.5 − 0/+0.1) m for table-top equipment testing, and (1.0 ± 0.1) m for floor standing equipment.

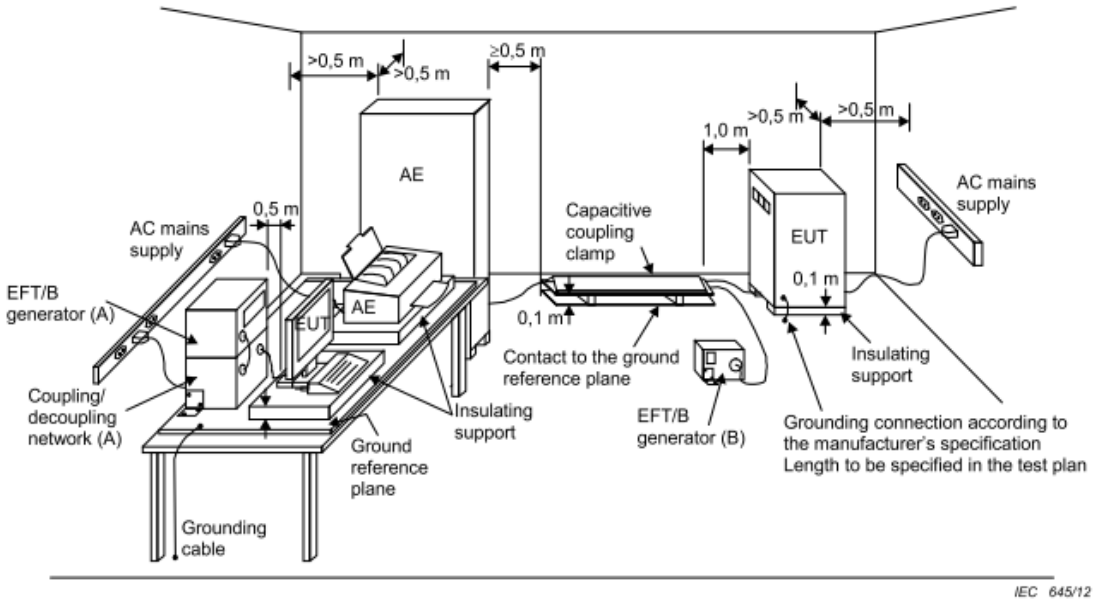
c. The duration time of each test sequential was 1 minute.

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:

(A) location for supply line coupling
(B) location for signal lines coupling

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

4.4.6 TEST RESULTS

TEST MODE	See item 2.2	**TEST VOLTAGE**	DC 500V AC 400V
ENVIRONMENTAL CONDITIONS	21 deg. C, 55% RH	**TESTED BY:** Wang Jia	

Pulse Voltage	__ kV		_2_ kV		___ kV		___ kV	
Pulse Polarity	+	–	+	–	+	–	+	–
L1+L2+L3 + N + PE	/	/	A	A	/	/	/	/
L1+L2+L3	/	/	A	A	/	/	/	/
N	/	/	A	A	/	/	/	/
PE	/	/	A	A	/	/	/	/
L1+L2+L3+PE	/	/	A	A	/	/	/	/
N+PE	/	/	A	A	/	/	/	/
PV+, PV-, PE	/	/	A	A	/	/	/	/
485 Port	/	/	A	A	/	/	/	/
PLC Port (L1+L2+L3 + N + PE)	/	/	A	A	/	/	/	/
L1+L2+L3	/	/	A	A	/	/	/	/
N	/	/	A	A	/	/	/	/
PE	/	/	A	A	/	/	/	/
L1+L2+L3+PE	/	/	A	A	/	/	/	/
N+PE	/	/	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 1.2/50 us Open Circuit Voltage 8 /20 us Short Circuit Current
Test Voltage:	DC/AC Power Line: Line to Line:1kV Line to PE:2kV Signal Line: 1kV
Surge Input/Output:	L-N&L-PE&N-PE
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.
High Energy Pulse Generator	EMTEST	VCS500 10T	V1121109603	2017/1/21	2018/1/20
Coupling Decoupling Network	EMTEST	CNV 503S10	V1121109604	2016/7/25	2017/7/24
Coupling Decoupling Network	EMTEST	CNV 503S12	V1231113305	2016/7/25	2017/7/24

NOTE: 1. The test was performed by witness in BF-65 room of ShangHai Huawei Technology Co., Ltd.
2. The test was performed in BF-65 Room.

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).

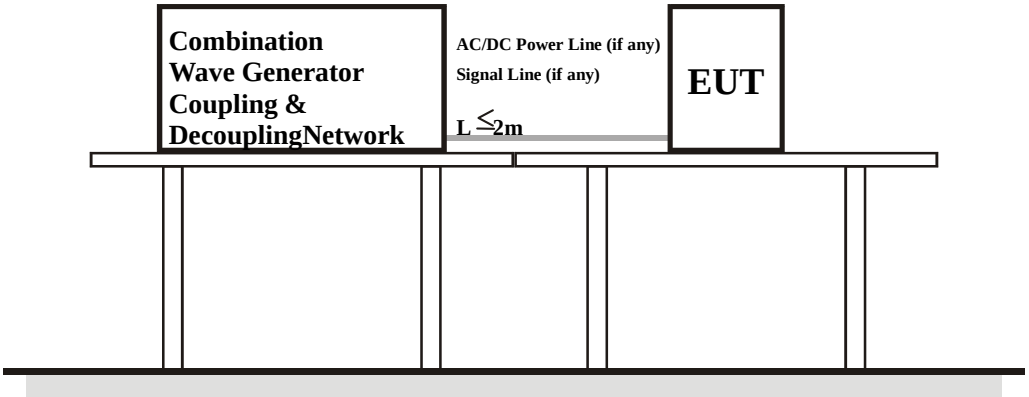
c. For test applied to unshielded symmetrically operated interconnection / telecommunication lines of EUT:

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 item 2.2	TEST VOLTAGE	DC 400V AC 400V
ENVIRONMENTAL CONDITIONS	21deg. C, 55% RH	TESTED BY: Wang Jia	

AC/DC and PLC Power port:

\Phase angle \ Test result \Voltage (kV) \ Test point\ Polarity			0°	90°	180°	270°	Test point	DC Power Port
1	L1-N	+	A	A	A	A	PV+ - PV-	A
		−	A	A	A	A		A
1	L2-N	+	A	A	A	A	/	/
		−	A	A	A	A	/	/
1	L3-N	+	A	A	A	A	/	/
		−	A	A	A	A	/	/
2	L1-PE	+	A	A	A	A	PV+ - PE	A
		−	A	A	A	A		A
2	L2-PE	+	A	A	A	A	PV- - PE	A
		−	A	A	A	A		A
2	L3-PE	+	A	A	A	A	/	/
		−	A	A	A	A	/	/
2	N-PE	+	A	A	A	A	/	/
		−	A	A	A	A	/	/

Signal ports and telecommunication ports:

Voltage (kV)	Test Point	Polarity	Test result	Voltage (kV)	Test Point	Polarity	Test result
2	485 Port	+/-	A	/	/	+/-	/

NOTE: A: There was no change compared with initial operation during the 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-M1 & Clamp & 100Ω Resistance

4.6.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Signal generator	R&S	SMC100A	1411.4002k02-102618-Yb	2017/1/21	2018/1/20
Amplifier	R&S	BBA100	5354.9000k50-100984-Ut	2017/1/21	2018/1/20
6dB Attenuator	Bird	75-A-FFN-06	1136	2017/1/21	2018/1/20
Power Meter	R&S	NRVD	857.8008.02	2017/1/21	2018/1/20
Coupling Decoupling Network	FCC	FCC-801-M1-50A	111651	2017/1/21	2018/1/20
RF Inject Clamp	FCC	F-120-9A	111657	2017/1/21	2018/1/20
100Ω Resistance	Luthi	CR100A	370	2017/1/21	2018/1/20

NOTE: 1. The test was performed by witness in CS Shielding room of ShangHai Huawei Technology Co., Ltd.
2. The test was performed in CS Shielding Room.

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.

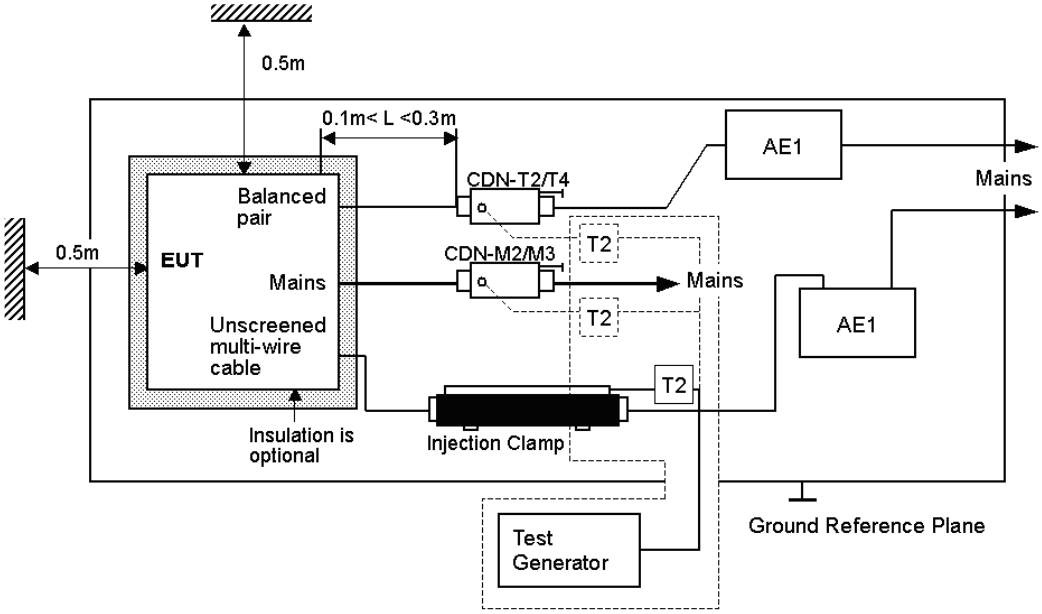
e. The dwell time of the amplitude modulated carrier at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0,5 s. The sensitive frequencies (e.g. clock frequencies) shall be analyzed separately.

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 item 2.2	**TEST VOLTAGE**	DC 500V AC 400V
ENVIRONMENTAL CONDITIONS	21deg. C, 54% RH	**TESTED BY:** Wang Jia	

Voltage (V)	Test Frequency Note#1 (MHz)	Tested Line	Injection Method.	Test Result	Remark
10	0.15 – 80	AC line	Current Probe	A	N/A
10	0.15 – 80	DC line	Current Probe	A	N/A
10	0.15 – 80	485 Cable	Direct injection	A	N/A
10	0.15 – 80	PE line	CDN-M1	A	N/A
10	0.15 – 80	AC(PLC)	Current Probe	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:	50Hz
Field Strength:	30A/m
Observation Time:	1 minute
Inductance Coil:	Rectangular type, 1.5mx1.5m

4.7.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Power source	EMTEST	NET Wave 7	V1129110285	2016/7/25	2017/7/24
Helmholtz coil	EMTEST	HHS 5215-100	5215-100 102	2016/7/25	2017/7/24

NOTE: 1. The test was performed by witness in BF-59 room of ShangHai Huawei Technology Co., Ltd.
2. The test was performed in BF-59 Room.

4.7.3 TEST PROCEDURE

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

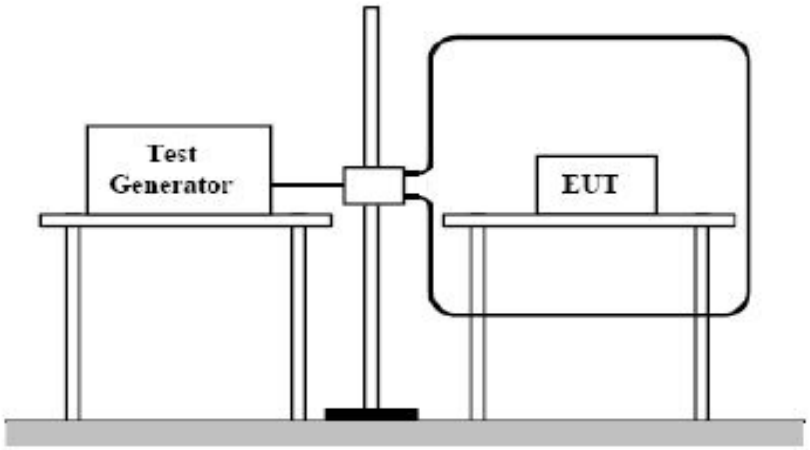
b. The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.

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 item 2.2	**TEST VOLTAGE**	DC 500V AC 400V
ENVIRONMENTAL CONDITIONS	21deg. C, 55% RH	**TESTED BY**: Wang Jia	

MAGNETIC FIELD DIRECTION	TESTING RESULT	REMARK
X - Axis	A	30A/ m
Y - Axis	A	30A/ m
Z - Axis	A	30A/ m

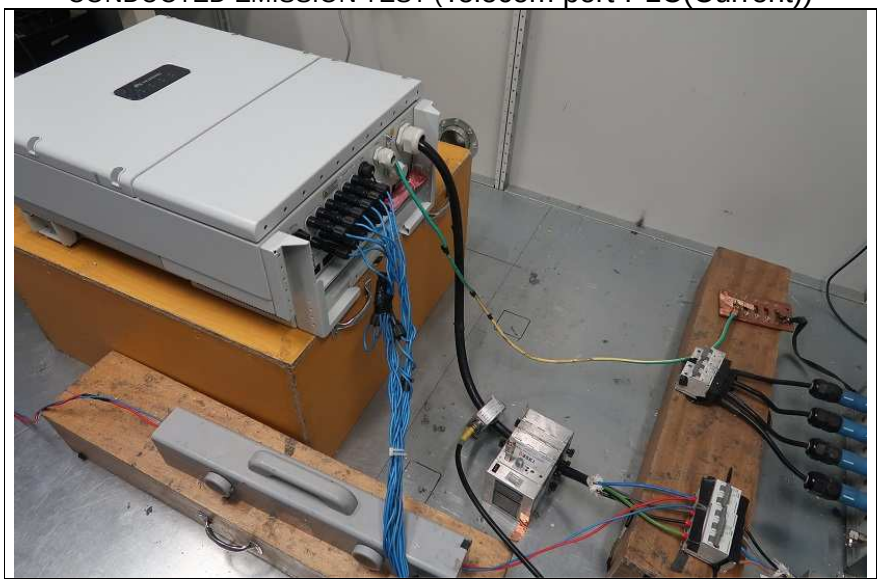
NOTE: A: There is no change compared with the initial operation during the test.

5 PHOTOGRAPHS OF THE TEST CONFIGURATION

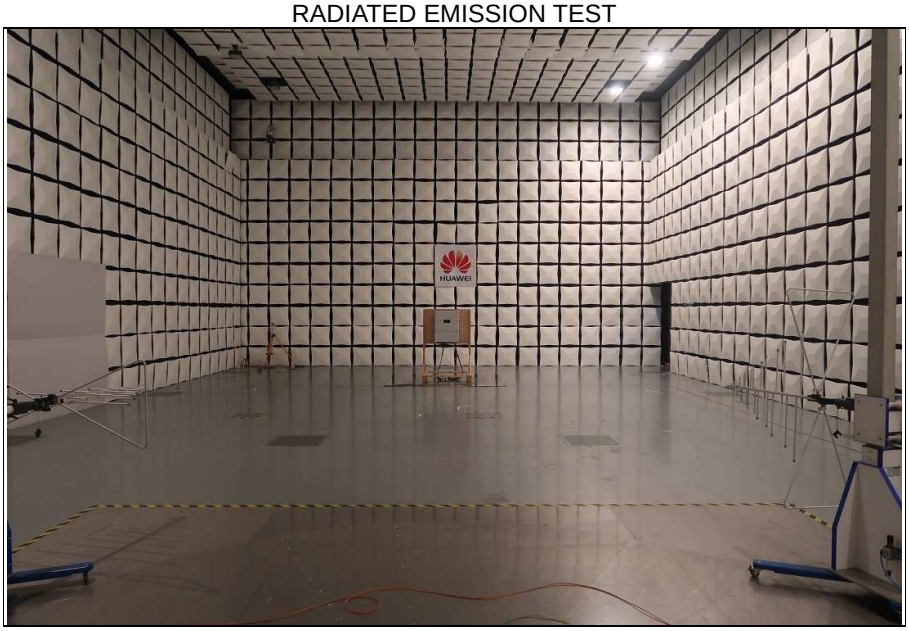
CONDUCTED EMISSION TEST

CONDUCTED EMISSION TEST (Telecom port-RS485)

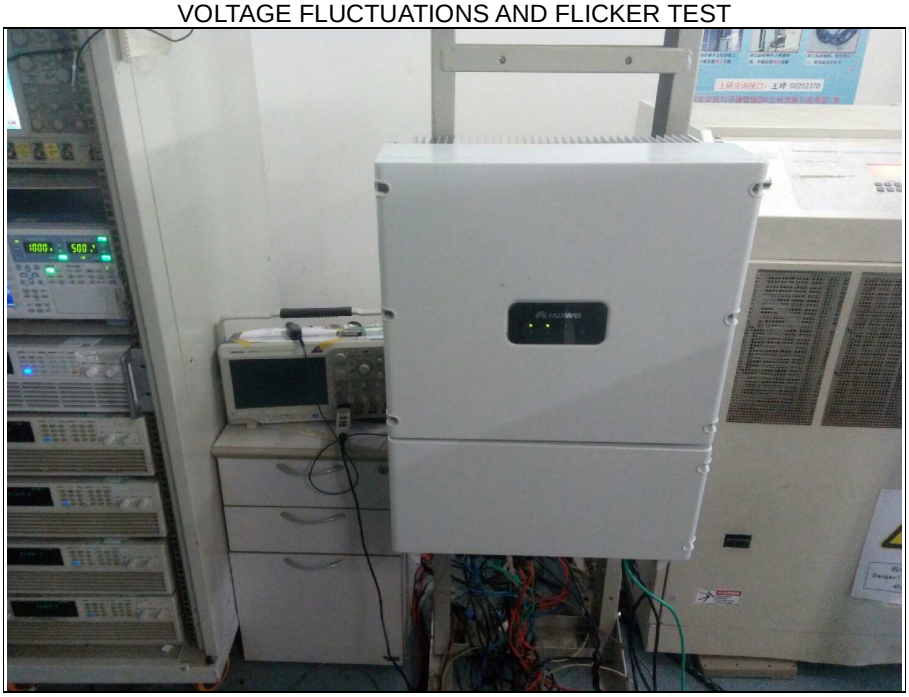
CONDUCTED EMISSION TEST (Telecom port-PLC(Current))



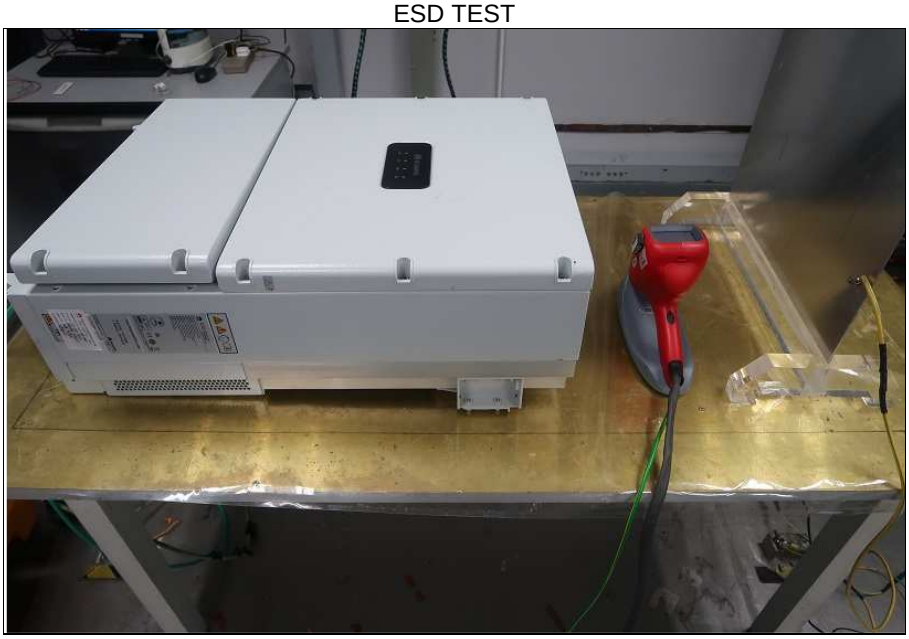
RADIATED EMISSION TEST



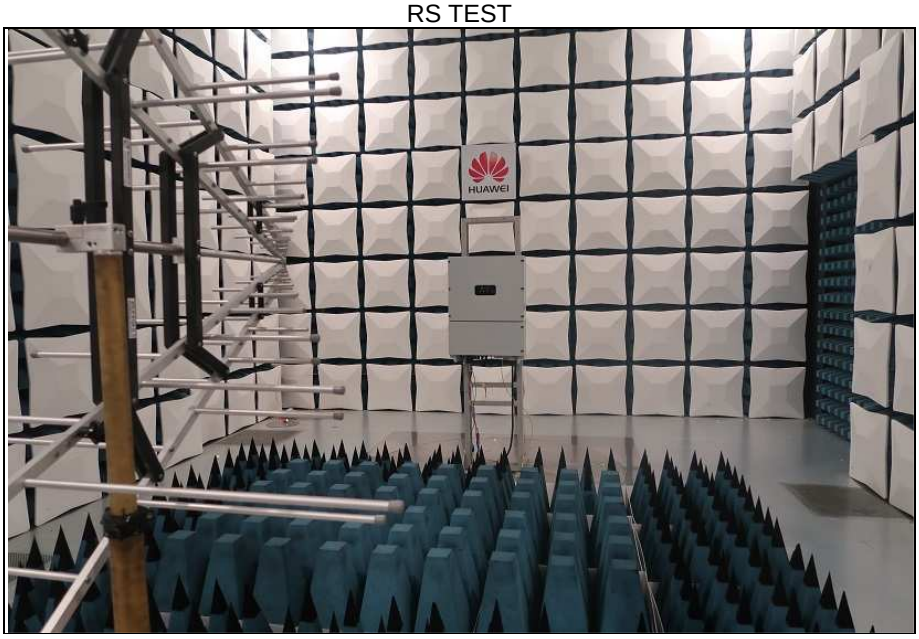
HARMONICS EMISSION TEST &
VOLTAGE FLUCTUATIONS AND FLICKER TEST



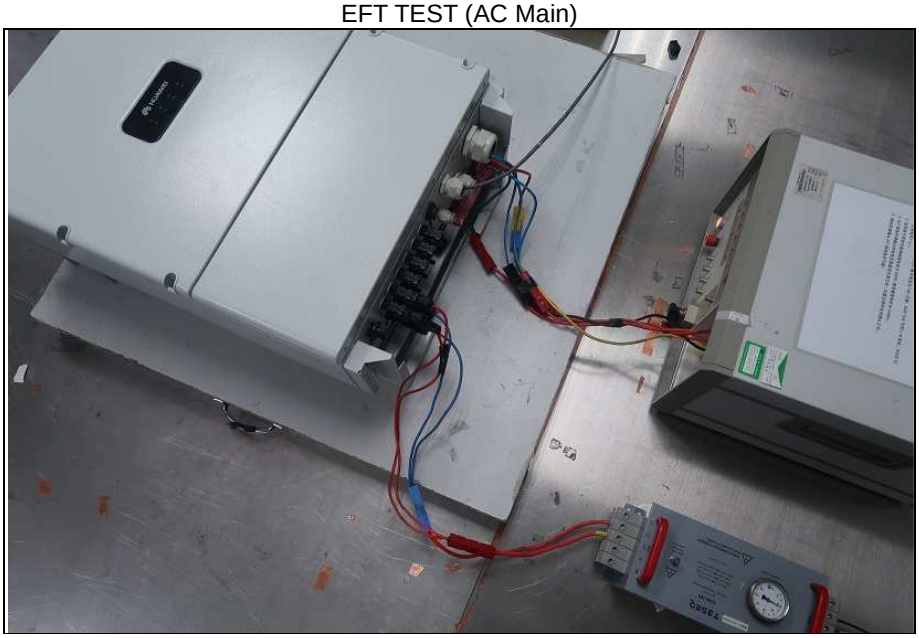
ESD TEST



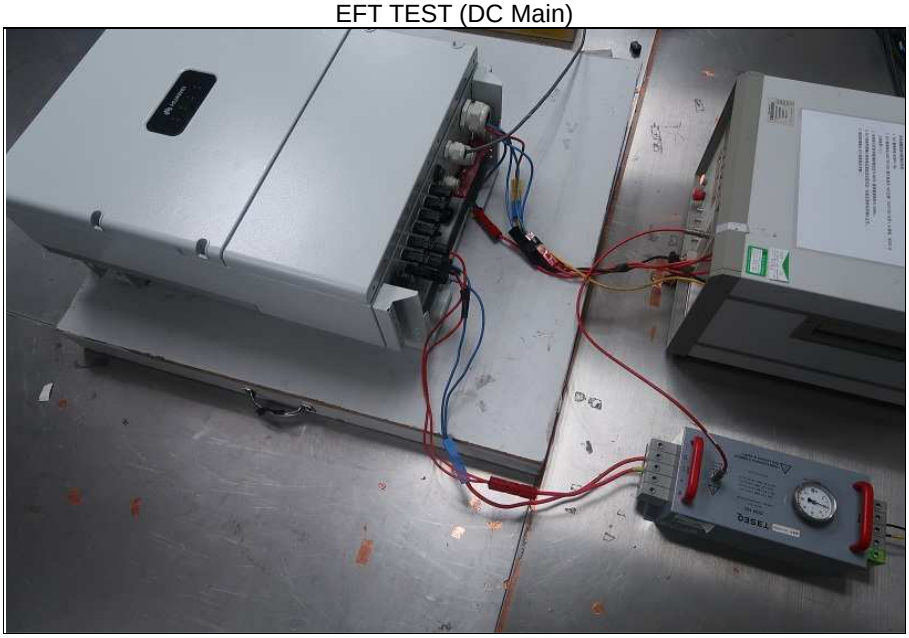
RS TEST



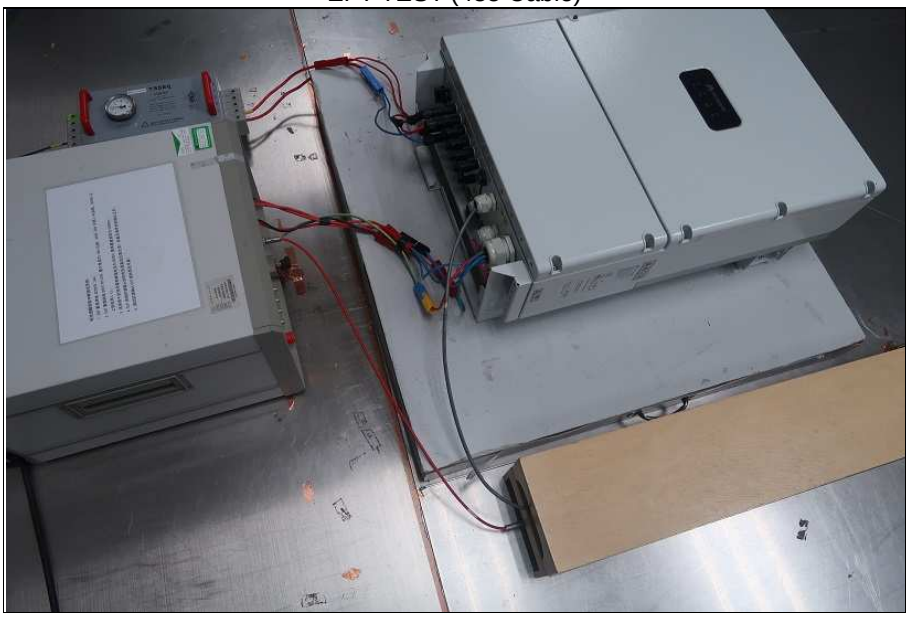
EFT TEST (AC Main)



EFT TEST (DC Main)

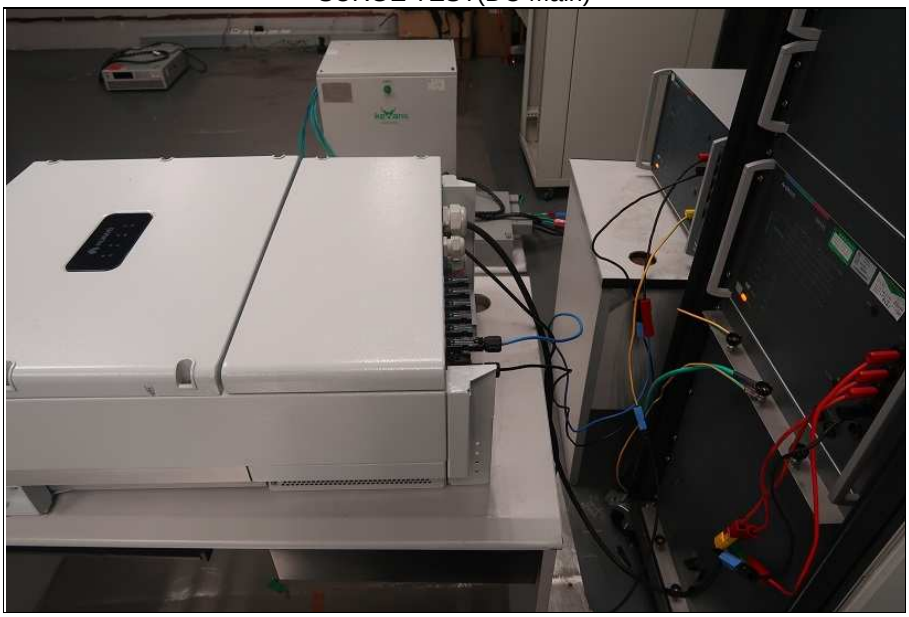


EFT TEST (485 Cable)

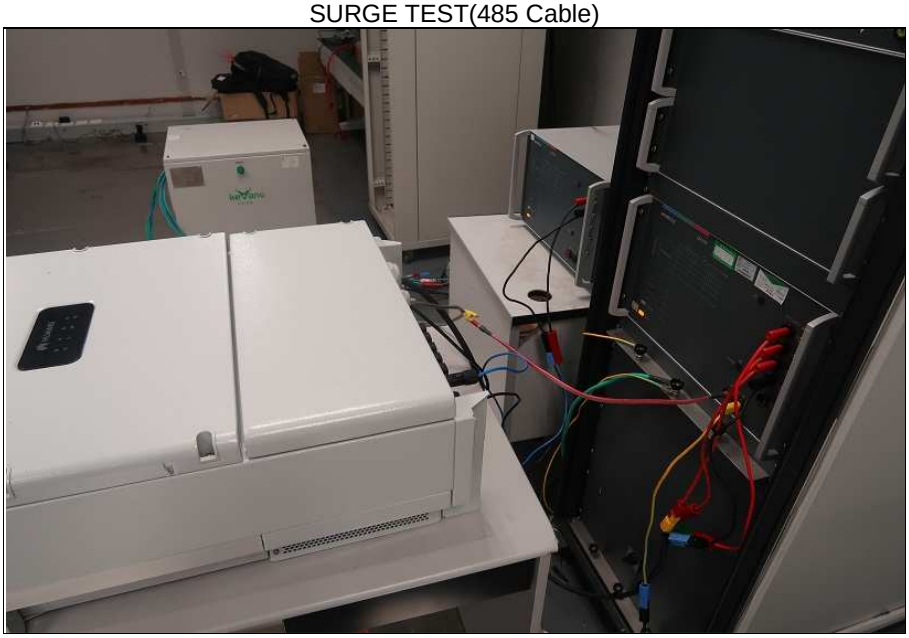


SURGE TEST(AC Main)

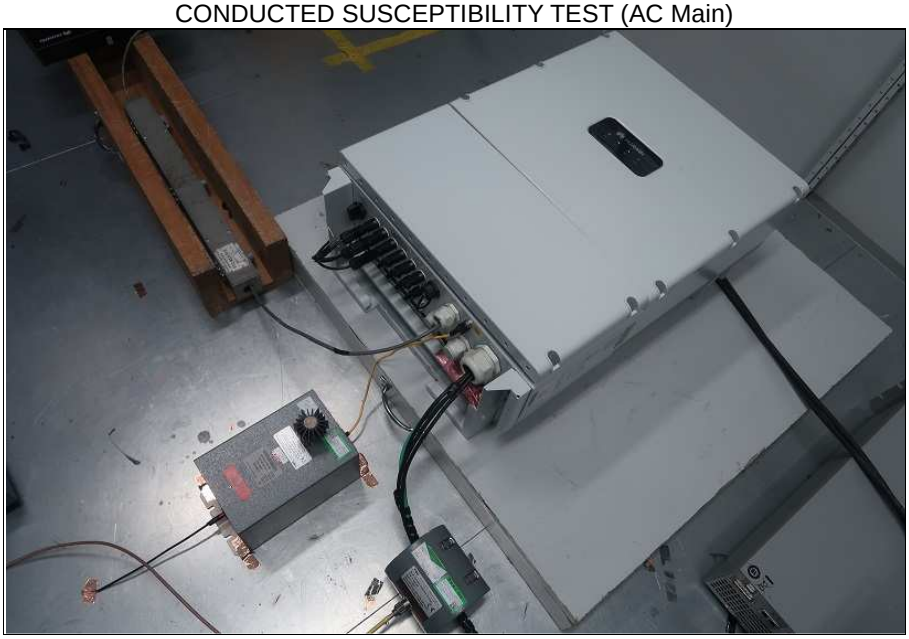
SURGE TEST(DC Main)



SURGE TEST(485 Cable)

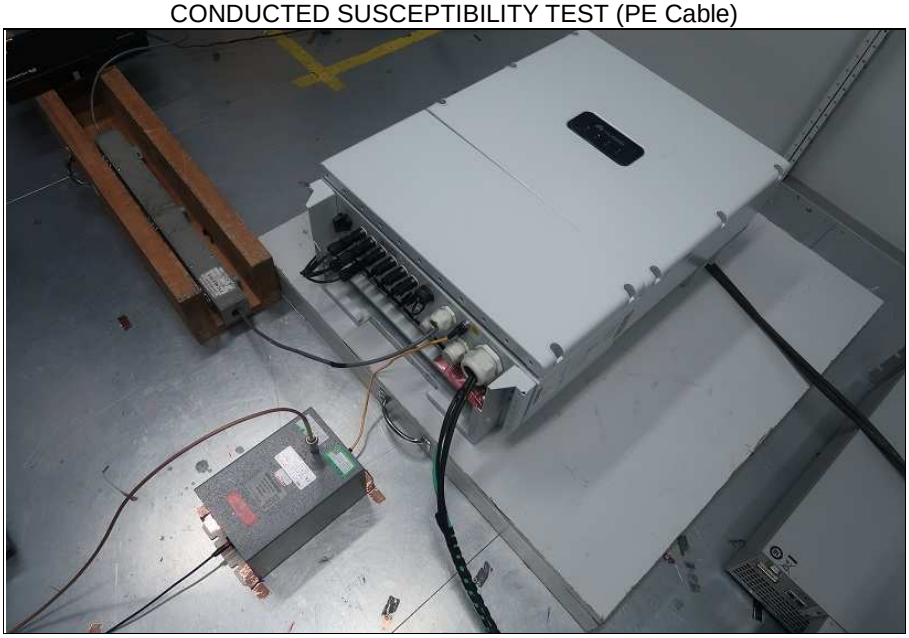


CONDUCTED SUSCEPTIBILITY TEST (AC Main)

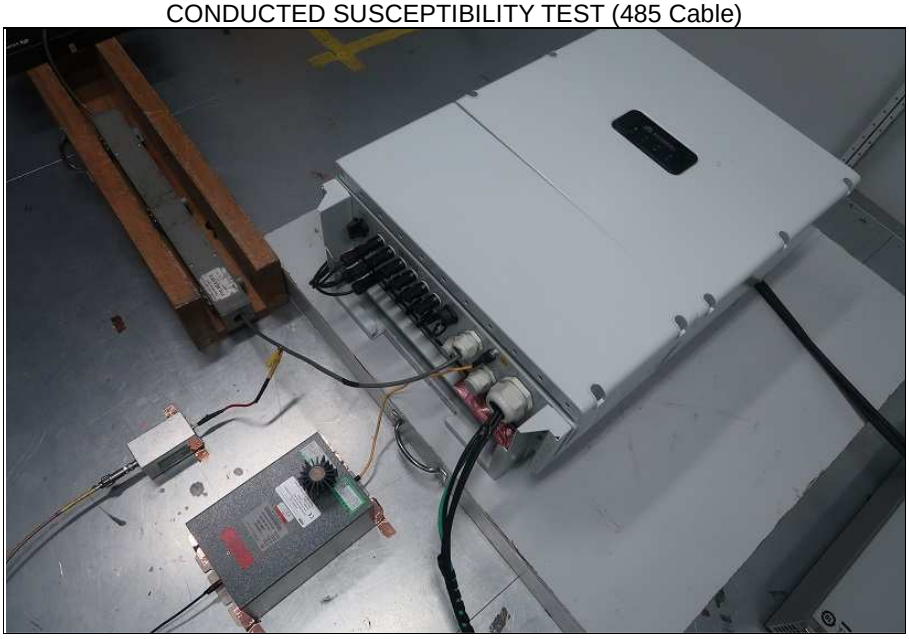


CONDUCTED SUSCEPTIBILITY TEST (DC Main)

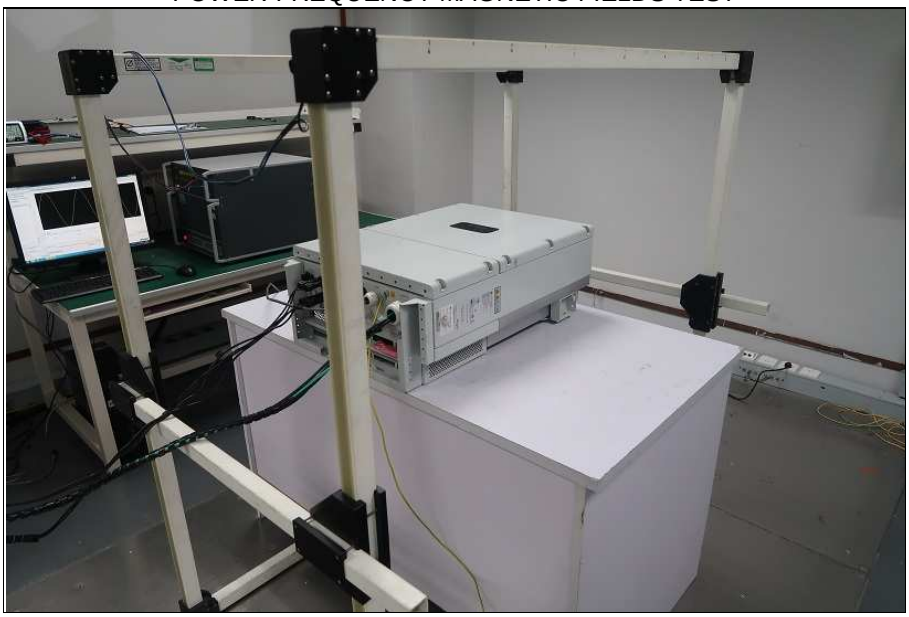
CONDUCTED SUSCEPTIBILITY TEST (PE Cable)



CONDUCTED SUSCEPTIBILITY TEST (485 Cable)



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---