



**BUREAU
VERITAS**


Test Report No.: CE150727N017R1



Test Lab
Cert 2951.01

TEST REPORT

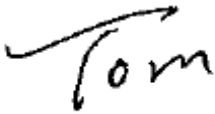
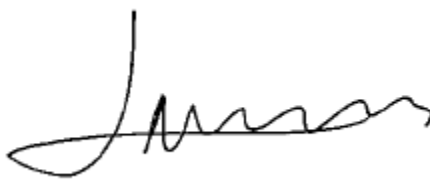
Applicant	Huawei Technologies Co., Ltd
Address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

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, SUN2000-40KTL	
Additional Model & Model Difference	SUN2000-30KTL-A, See item 2.1	
Date of tests	Apr. 27, 2015 ~ May 19, 2015 Jun. 17, 2015 ~ Jul. 29, 2015	

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

<input checked="" type="checkbox"/> EN 61000-6-4:2007 + A1:2011	<input checked="" type="checkbox"/> IEC 61000-6-4:2006 + A1:2011
<input checked="" type="checkbox"/> EN 61000-3-12:2011	<input checked="" type="checkbox"/> IEC 61000-3-12:2011
<input checked="" type="checkbox"/> EN 61000-3-11:2000	<input checked="" type="checkbox"/> IEC 61000-3-11:2000
<input checked="" type="checkbox"/> EN 61000-6-2:2005	<input checked="" type="checkbox"/> 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
	
	Date: Sep. 15, 2015

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification

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Table of Contents

RELEASE CONTROL RECORD	5
1 SUMMARY OF TEST RESULTS	6
1.1 MEASUREMENT UNCERTAINTY	8
2 GENERAL INFORMATION	9
2.1 GENERAL DESCRIPTION OF EUT	9
2.2 DESCRIPTION OF TEST MODES	11
2.3 GENERAL DESCRIPTION OF APPLIED STANDARDS	13
2.4 DESCRIPTION OF SUPPORT UNITS	14
3 EMISSION TEST	15
3.1 CONDUCTED EMISSION MEASUREMENT	15
3.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT	15
3.1.2 TEST INSTRUMENTS	15
3.1.3 TEST PROCEDURE	16
3.1.4 DEVIATION FROM TEST STANDARD	16
3.1.5 TEST SETUP	16
3.1.6 EUT OPERATING CONDITIONS	16
3.1.7 TEST RESULTS	17
3.2 CONDUCTED EMISSION MEASUREMENT AT TELECOMMUNICATION PORTS	21
3.2.1 LIMIT OF CONDUCTED COMMON MODE DISTURBANCE AT TELECOMMUNICATION PORTS	21
3.2.2 TEST INSTRUMENTS	21
3.2.3 TEST PROCEDURE	22
3.2.4 DEVIATION FROM TEST STANDARD	23
3.2.5 TEST SETUP	24
3.2.6 EUT OPERATING CONDITIONS	25
3.2.7 TEST RESULTS	26
3.3 RADIATED EMISSION MEASUREMENT	29
3.3.1 LIMITS OF RADIATED EMISSION MEASUREMENT	29
3.3.2 TEST INSTRUMENTS	30
3.3.3 TEST PROCEDURE	30
3.3.4 DEVIATION FROM TEST STANDARD	31
3.3.5 TEST SETUP	32
3.3.6 EUT OPERATING CONDITIONS	32
3.3.7 TEST RESULTS	33
3.4 HARMONICS CURRENT MEASUREMENT (>16A)	35
3.4.1 TEST INSTRUMENTS	35
3.4.2 CURRENT EMISSION LIMITS FOR EQUIPMENT OTHER THAN BALANCED THREE-PHASE EQUIPMENT	35
3.4.3 CURRENT EMISSION LIMITS FOR BALANCED THREE-PHASE EQUIPMENT	36
3.4.4 CURRENT EMISSION LIMITS FOR BALANCED THREE-PHASE EQUIPMENT UNDER SPECIFIED CONDITIONS	36



3.4.5	DEVIATION FROM TEST STANDARD.....	37
3.4.6	TEST SETUP.....	37
3.4.7	EUT OPERATING CONDITIONS	37
3.4.8	TEST RESULTS	38
3.5	VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT	44
3.5.1	LIMITS OF VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT	44
3.5.2	TEST INSTRUMENTS.....	45
3.5.3	TEST PROCEDURE.....	45
3.5.4	DEVIATION FROM TEST STANDARD.....	45
3.5.5	TEST SETUP.....	45
3.5.6	EUT OPERATING CONDITIONS	45
3.5.7	TEST RESULTS	46
4	IMMUNITY TEST	50
4.1	GENERAL DESCRIPTION	50
4.1.1	GENERAL DESCRIPTION OF EN 61000-6-2	50
4.1.2	PERFORMANCE CRITERIA	51
4.1.3	EUT OPERATING CONDITION.....	51
4.2	ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)	52
4.2.1	TEST SPECIFICATION	52
4.2.2	TEST INSTRUMENTS.....	52
4.2.3	TEST PROCEDURE.....	53
4.2.4	DEVIATION FROM TEST STANDARD.....	53
4.2.5	TEST SETUP.....	54
4.2.6	TEST RESULTS	55
4.3	RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD.....	56
	IMMUNITY TEST (RS).....	56
4.3.1	TEST SPECIFICATION	56
4.3.2	TEST INSTRUMENTS.....	56
4.3.3	TEST PROCEDURE.....	57
4.3.4	DEVIATION FROM TEST STANDARD.....	57
4.3.5	TEST SETUP.....	58
4.3.6	TEST RESULTS	59
4.4	ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST (EFT)	60
4.4.1	TEST SPECIFICATION	60
4.4.2	TEST INSTRUMENTS.....	60
4.4.3	TEST PROCEDURE.....	60
4.4.4	DEVIATION FROM TEST STANDARD.....	61
4.4.5	TEST SETUP.....	61
4.4.6	TEST RESULTS	62
4.5	SURGE IMMUNITY TEST	63
4.5.1	TEST SPECIFICATION	63
4.5.2	TEST INSTRUMENTS.....	63
4.5.3	TEST PROCEDURE.....	64
4.5.4	DEVIATION FROM TEST STANDARD.....	64
4.5.5	TEST SETUP.....	64
4.5.6	TEST RESULTS	65
4.6	IMMUNITY TO CONDUCTED DISTURBANCES INDUCED BY RF.....	66
	FIELDS (CS).....	66



4.6.1	TEST SPECIFICATION	66
4.6.2	TEST INSTRUMENTS.....	66
4.6.3	TEST PROCEDURE.....	67
4.6.4	DEVIATION FROM TEST STANDARD.....	67
4.6.5	TEST SETUP.....	68
4.6.6	TEST RESULTS	69
4.7	POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST	70
4.7.1	TEST SPECIFICATION	70
4.7.2	TEST INSTRUMENTS.....	70
4.7.3	TEST PROCEDURE.....	70
4.7.4	DEVIATION FROM TEST STANDARD.....	70
4.7.5	TEST SETUP.....	71
4.7.6	TEST RESULTS	72
5	PHOTOGRAPHS OF THE TEST CONFIGURATION	73
6	APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB	83

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
CE150521N002	Original release	Jun. 23, 2015
CE150727N017	Based on the original report CE150521N002 delete model PLC CCO01A and delete model PLC CCO01A test data and change standard, cable connector, component specification and quantity and update conducted emission, radiated emission, surge tests.	Jul. 30, 2015
CE150727N017R1	Based on the original report CE150727N017 delete shanghai huawei lab information and change standard, Instrument list, tests date and change radiated immunity test lever.	Sep. 15, 2015



1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

EMISSION			
Standard	Test Type	Result	Remarks
IEC 61000-6-4:2006 + A1:2010 EN61000-6-4:2007 + A1:2011	Conducted Test	PASS	Meets Requirement Limit Minimum passing margin is –3.8dB at 0.829500MHz
	Conducted Test (Telecom port)	PASS	Meets Requirement Limit Minimum passing margin is –13.0dB at 3.677588MHz
	Radiated Test (30MHz~1GHz)	PASS	Meets Limits Minimum passing margin is –0.1dB at 48.784MHz
IEC 61000-3-12:2011 EN 61000-3-12:2011	Harmonic current emissions	PASS	Meets the requirements.
IEC 61000-3-11:2000 EN 61000-3-11:2000	Voltage fluctuations & flicker	PASS	Meets the requirements.



IMMUNITY (IEC 61000-6-2:2005, EN 61000-6-2:2005)			
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(ShangHai Huawei)	0.15MHz ~ 30MHz	+ /-2.7 dB
Radiated emissions(ShangHai Huawei)	30MHz ~ 1000MHz	+ /-4.0 dB

2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	SOLAR INVERTER
MODEL NO.	SUN2000-33KTL, SUN2000-40KTL
ADDITIONAL MODEL	SUN2000-30KTL-A
POWER SUPPLY	SUN2000-30KTL-A, SUN2000-33KTL, SUN2000-40KTL: Input: DC 200V - 1000V, 23A*3, 33.8kW / 33kW / 40kW Output: AC 380V/400V, 50~60Hz, SUN2000-33KTL; AC 480V, 50~60Hz, SUN2000-30KTL-A / SUN2000-40KTL Max: 40A SUN2000-30KTL-A, 48A SUN2000-33KTL / SUN2000-40KTL Power: 33000VA, 30000W; 33000VA, 30000W; 40000VA, 36000W
SOFTWARE VERSION	V200R001
HARDWARE VERSION	V200R001
THE HIGHEST OPERATING FREQUENCY	Below 108MHz
DATA CABLE SUPPLIED	N/A

NOTE:

1. This report CE150727N017R1 supersedes the previous one with the report number CE150727N017 dated on Jul. 30, 2015.
2. For the test results, the EUT had been tested with all conditions. But only the worst case was showed in test report.
3. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.



4. This is a series of PV Inverter with the same PCB layout, Models SUN2000-30KTL-A, SUN2000-33KTL, SUN2000-40KTL Hardware all the same, different output power, power components parameters and DC input port number. the difference has been considered during this test, full test was performed for the model SUN2000-33KTL and partial test for the models SUN2000-40KTL.

Parameter	SUN2000-30KTL-A	SUN2000-33KTL	SUN2000-40KTL
Input (DC)			
MPP DC Voltage range (d.c.V)	250-850	250-850	250-850
Input DC Voltage range (d.c.V)	200-1000	200-1000	200-1000
Input DC current (d.c.A)	23/23/23	23/23/23	23/23/23
Output (AC)			
Output AC Voltage (a.c.V)	480	400/380	480
Output AC current (a.c.A)	40	48	48
Output power(VA)	33000	33000	40000
Output power(W)	30000	30000	36000



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 + PLC Power On	DC 640V	SUN2000-33KTL
Grid Mode(Full Load) + RS485 Data Acquisition + PLC Power On	DC 750V	SUN2000-40KTL

◆ Conducted Emissions At Telecom Port Test

Test Mode	TEST VOLTAGE	Model
Grid Mode(1/6 Load) + RS485 Data Acquisition + PLC Power on	DC 640V	SUN2000-33KTL
Grid Mode(1/8 Load) + RS485 Data Acquisition+ PLC Power on	DC 640V	SUN2000-40KTL
Grid Mode(1/8 Load) + PLC Data Acquisition	DC 500V	SUN2000-40KTL



◆ For Radiated Emission Test

Test Mode	TEST VOLTAGE	Model
Grid Mode(Full Load) + RS485 Data Acquisition + PLC power on	DC 640V	SUN2000-33KTL
Grid Mode(Full Load) + RS485 Data Acquisition + PLC power on	DC 750V	SUN2000-40KTL
Grid Mode(Full Load) + RS485 Data Acquisition + PLC Data Acquisition	DC 640V	SUN2000-33KTL
Grid Mode(Full Load) + RS485 Data Acquisition + PLC Data Acquisition	DC 750V	SUN2000-40KTL

◆ For H/F Emission Test

Test Mode	TEST VOLTAGE	Model
Grid Mode(Full Load) + RS485 Data Acquisition + PLC power on	DC 640V	SUN2000-33KTL
Grid Mode(Full Load) + RS485 Data Acquisition + PLC power on	DC 750V	SUN2000-40KTL

◆ For Immunity Test

Test Mode	TEST VOLTAGE	Model
Grid Mode(1/8 Load) + RS485 Data Acquisition+ PLC Power on	DC 640V	SUN2000-40KTL
Grid Mode(1/8 Load) + PLC Data Acquisition	DC 500V	SUN2000-40KTL



2.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

EN 61000-6-4:2007 + A1:2011

IEC 61000-6-4:2006 + A1:2010

IEC 61000-3-12:2011

EN 61000-3-12:2011

IEC 61000-3-11:2000

EN 61000-3-11:2000

IEC 61000-6-2:2005

EN 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

Notes: 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 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	Personal Computer	HP	HP8200	4C1345N8L	N/A
2	SmartLogger	HUAWEI	SmartLogger1000-10	2102310QHU10D3000005	N/A
3	AC Filter	EPCOS	B84143B1600S024	12334	N/A
4	DC Filter	SCHAFFNER	FN2200-100-35	3054168/88/1137R	N/A
5	Programmable DC Power Supply	CHROMA	62150H 1000S	62150EF00415	N/A
6	Programmable DC Power Supply	CHROMA	62150H 1000S	62150EF00416	N/A
7	Programmable DC Power Supply	CHROMA	62150H 1000S	62150EF00417	N/A
8	Programmable DC Power Supply	CHROMA	62150H 1000S	62150EF00418	N/A
9	Programmable DC Power Supply	CHROMA	62150H 1000S	62150EF00419	N/A
10	Transformer	Shang Hai Voltage Regulator Manufacture Co.,LTD	TSGZ-45	1210	N/A

NO.	DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	AC Line: Unshielded, Detachable 1.8m; DC Line: Unshielded, Undetachable 1.5m.
2	N/A
3	N/A
4	N/A
5	AC Line: Unshielded, Detachable 1.8m; DC Line: Unshielded, Detachable 5m. with one core
6	AC Line: Unshielded, Detachable 1.8m; DC Line: Unshielded, Detachable 5m.
7	AC Line: Unshielded, Detachable 1.8m; DC Line: Unshielded, Detachable 5m.
8	AC Line: Unshielded, Detachable 1.8m; DC Line: Unshielded, Detachable 5m.
9	AC Line: Unshielded, Detachable 1.8m; DC Line: Unshielded, Detachable 5m.
10	N/A

Remarks: Personal Computer 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	101619	2015/4/19	2016/4/18
Artificial Mains Network	R&S	ENV4200	100141	2015/1/13	2016/1/12
RF Current probe	FCC	F-52	111659	2015/1/13	2016/1/12
Capacitive Voltage Probe	Teseq	CVP2200A	31861	2015/1/13	2016/1/12
100Ω Resistance	LUTHI	CR100A	369	2015/1/13	2016/1/12

- 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.

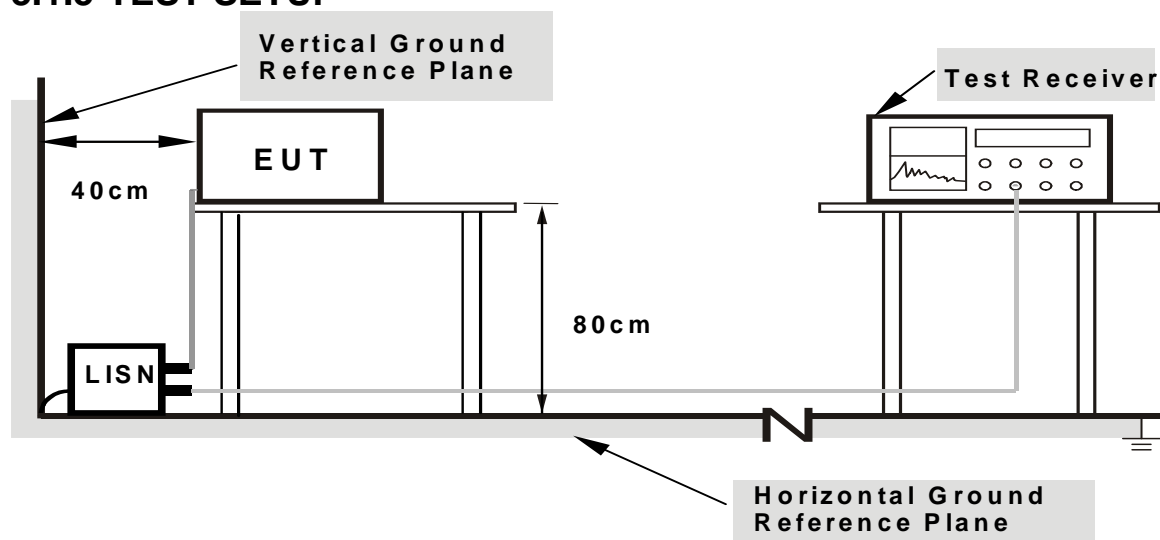
3.1.3 TEST PROCEDURE

- 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

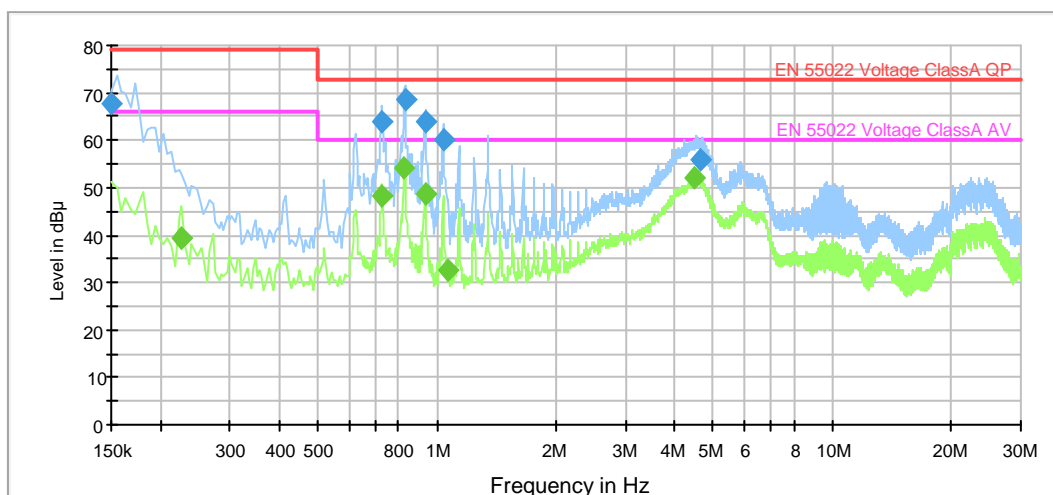
- a. Turned on the power of all equipment.
- b. EUT was operated according to the type used was description in manufacturer's specifications or the User's Manual.

3.1.7 TEST RESULTS

TEST MODE	SUN2000-33KTL Grid Mode(Full Load) + RS485 Data Acquisition + PLC Power On	6dB BANDWIDTH	9 kHz
TEST VOLTAGE	DC 640V	PHASE	Line (L1)
ENVIRONMENTAL CONDITIONS	25 deg. C, 50% RH	TESTED BY: Jia Wang	

Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Com ment
0.150000	67.9	1000.0	9.000	GND	L1	9.5	11.1	79.0	
0.725999	64.1	1000.0	9.000	GND	L1	9.4	8.9	73.0	
0.829500	68.8	1000.0	9.000	GND	L1	9.3	4.2	73.0	
0.932835	63.8	1000.0	9.000	GND	L1	9.3	9.2	73.0	
1.035818	60.2	1000.0	9.000	GND	L1	9.2	12.8	73.0	
4.622362	56.0	1000.0	9.000	GND	L1	9.3	17.0	73.0	
Frequency (MHz)	Average (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Com ment
0.226500	39.4	1000.0	9.000	GND	L1	9.5	26.6	66.0	
0.725999	48.4	1000.0	9.000	GND	L1	9.4	11.6	60.0	
0.825000	54.1	1000.0	9.000	GND	L1	9.3	5.9	60.0	
0.932835	48.7	1000.0	9.000	GND	L1	9.3	11.3	60.0	
1.062705	32.4	1000.0	9.000	GND	L1	9.2	27.6	60.0	
4.483650	52.2	1000.0	9.000	GND	L1	9.3	7.8	60.0	

Voltage with 4-Line-LISN

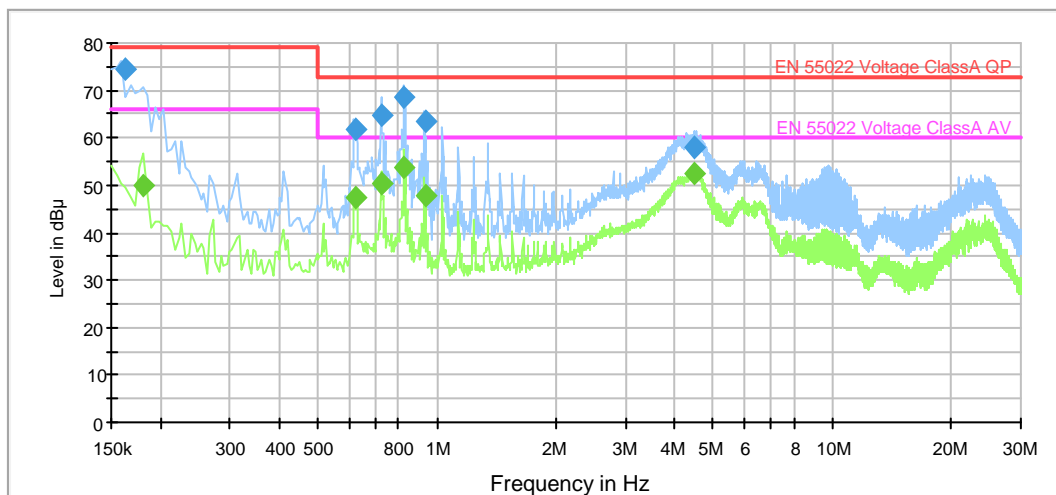




TEST MODE	SUN2000-33KTL Grid Mode(Full Load) + RS485 Data Acquisition + PLC Power On	6dB BANDWIDTH	9 kHz
TEST VOLTAGE	DC 640V	PHASE	Line (L2)
ENVIRONMENTAL CONDITIONS	25 deg. C, 50% RH	TESTED BY: Jia Wang	

Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comm ent
0.163500	74.4	1000.0	9.000	GND	L2	9.8	4.6	79.0	
0.622500	61.9	1000.0	9.000	GND	L2	9.9	11.1	73.0	
0.721500	64.9	1000.0	9.000	GND	L2	9.8	8.1	73.0	
0.825000	68.7	1000.0	9.000	GND	L2	9.7	4.3	73.0	
0.932858	63.5	1000.0	9.000	GND	L2	9.7	9.5	73.0	
4.470082	58.1	1000.0	9.000	GND	L2	9.6	14.9	73.0	
Frequency (MHz)	Average (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comm ent
0.181500	50.0	1000.0	9.000	GND	L2	9.8	16.0	66.0	
0.622500	47.2	1000.0	9.000	GND	L2	9.9	12.8	60.0	
0.726000	50.4	1000.0	9.000	GND	L2	9.8	9.6	60.0	
0.825000	53.8	1000.0	9.000	GND	L2	9.7	6.2	60.0	
0.932858	47.9	1000.0	9.000	GND	L2	9.7	12.1	60.0	
4.470082	52.7	1000.0	9.000	GND	L2	9.6	7.3	60.0	

Voltage with 4-Line-LISN

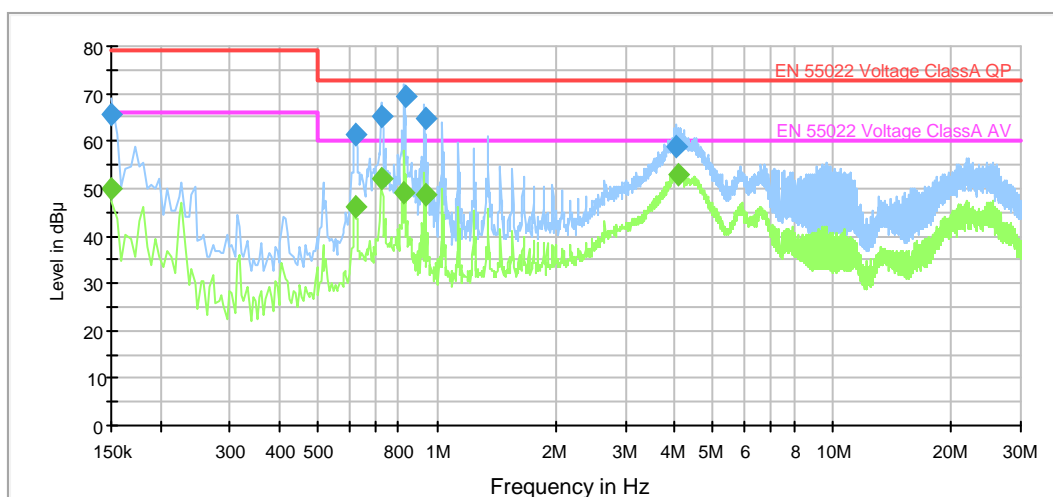




EST MODE	SUN2000-33KTL Grid Mode(Full Load) + RS485 Data Acquisition + PLC Power On	6dB BANDWIDTH	9 kHz
TEST VOLTAGE	DC 640V	PHASE	Line (L3)
ENVIRONMENTAL CONDITIONS	25 deg. C, 50% RH	TESTED BY: Jia Wang	

Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comm ent
0.150000	65.6	1000.0	9.000	GND	L3	9.9	13.4	79.0	
0.622500	61.2	1000.0	9.000	GND	L3	10.2	11.8	73.0	
0.726000	65.4	1000.0	9.000	GND	L3	10.1	7.6	73.0	
0.829500	69.3	1000.0	9.000	GND	L3	10.1	3.8	73.0	
0.933143	64.8	1000.0	9.000	GND	L3	10.0	8.2	73.0	
4.049288	58.7	1000.0	9.000	GND	L3	10.0	14.3	73.0	
Frequency (MHz)	Average (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comm ent
0.150000	49.8	1000.0	9.000	GND	L3	9.9	16.2	66.0	
0.622500	46.3	1000.0	9.000	GND	L3	10.2	13.7	60.0	
0.726000	51.9	1000.0	9.000	GND	L3	10.1	8.1	60.0	
0.820500	49.1	1000.0	9.000	GND	L3	10.1	10.9	60.0	
0.932858	48.7	1000.0	9.000	GND	L3	10.0	11.3	60.0	
4.076198	52.9	1000.0	9.000	GND	L3	10.0	7.1	60.0	

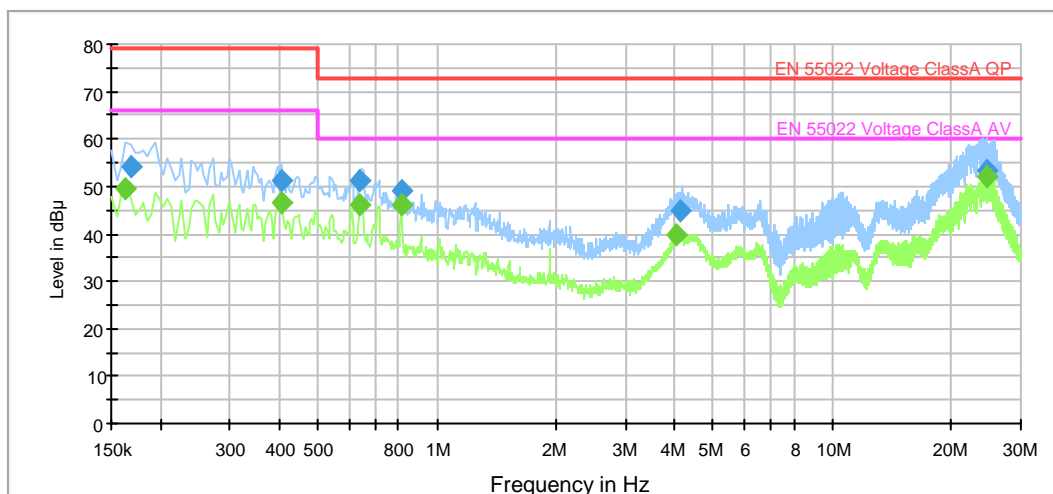
Voltage with 4-Line-LISN



TEST MODE	SUN2000-33KTL Grid Mode(Full Load) + RS485 Data Acquisition + PLC Power On	6dB BANDWIDTH	9 kHz
TEST VOLTAGE	DC 640V	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	25 deg. C, 50% RH	TESTED BY: Jia Wang	

Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Com ment
0.168000	54.3	1000.0	9.000	GND	N	9.8	24.7	79.0	
0.406500	51.3	1000.0	9.000	GND	N	9.8	27.7	79.0	
0.640500	51.2	1000.0	9.000	GND	N	9.8	21.8	73.0	
0.811500	49.0	1000.0	9.000	GND	N	9.7	24.0	73.0	
4.134225	44.7	1000.0	9.000	GND	N	9.8	28.3	73.0	
24.52028	53.5	1000.0	9.000	GND	N	10.3	19.5	73.0	
Frequency (MHz)	Average (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Com ment
0.163500	49.5	1000.0	9.000	GND	N	9.8	16.5	66.0	
0.406500	46.5	1000.0	9.000	GND	N	9.8	19.5	66.0	
0.640500	46.0	1000.0	9.000	GND	N	9.8	14.0	60.0	
0.811500	46.3	1000.0	9.000	GND	N	9.7	13.7	60.0	
4.053742	39.7	1000.0	9.000	GND	N	9.8	20.3	60.0	

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
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

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	R&S	ESCI3	101619	2015/4/19	2016/4/18
Artificial Mains Network	R&S	ENV4200	100141	2015/1/13	2016/1/12
RF Current probe	FCC	F-52	111659	2015/1/13	2016/1/12
Capacitive Voltage Probe	Teseq	CVP2200A	31861	2015/1/13	2016/1/12
100Ω Resistance	LUTHI	CR100A	369	2015/1/13	2016/1/12

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 $50\ \Omega$ 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 $150\ \Omega$ load to the outside surface of the shield cable:

- a. Break the insulation and connect a $150\ \Omega$ resistor from the outside surface of the shield cable to ground, and apply a ferrite tube or clamp between $150\ \Omega$ 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 $150\ \Omega$ 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.

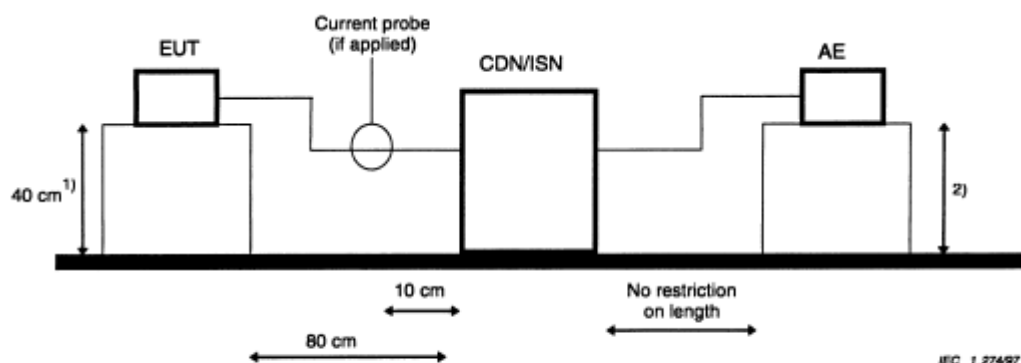
3.2.4 DEVIATION FROM TEST STANDARD

No deviation



3.2.5 TEST SETUP

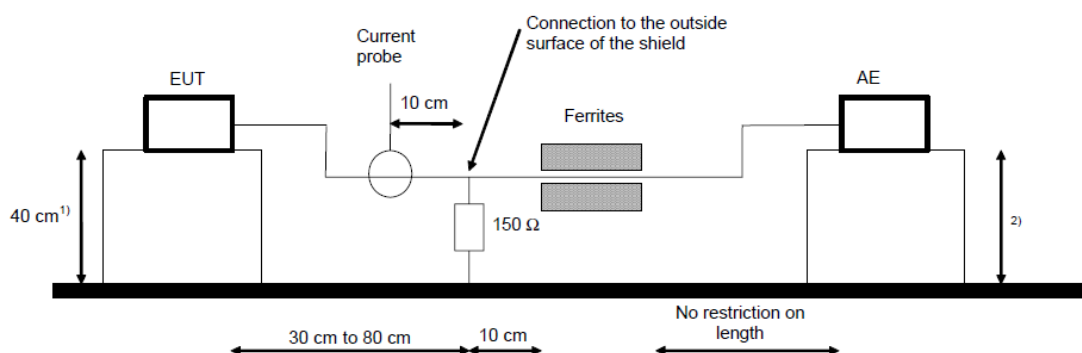
For using ISN:



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.

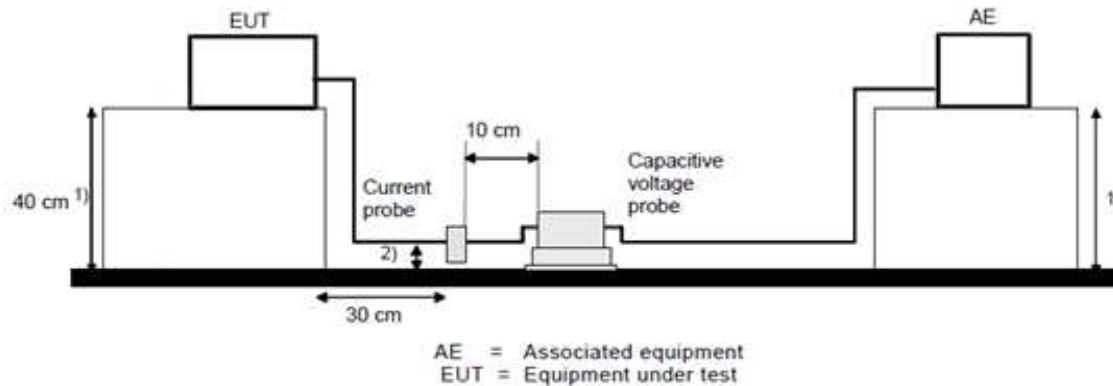
For using a 150 Ω load to the outside surface of the shield cable:



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

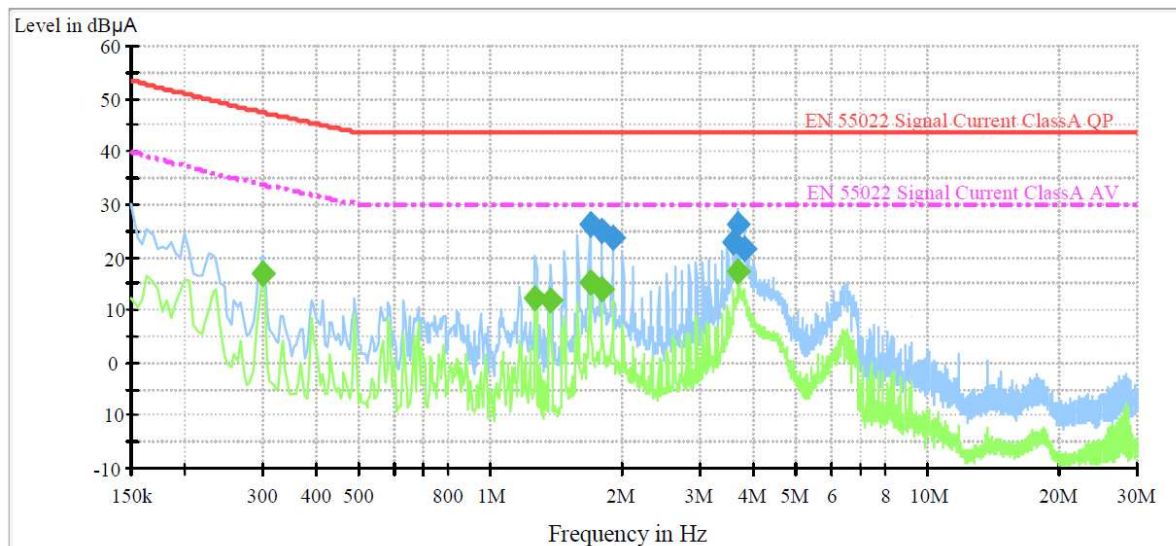
Same as item 3.1.6



3.2.7 TEST RESULTS

TEST MODE	SUN2000-40KTL Grid Mode(1/8 Load) + RS485 Data Acquisition+ PLC Power on	6dB BANDWIDTH	9kHz
TEST VOLTAGE	DC 640V	PHASE	RS485 PORT (RJ45 Cable)
ENVIRONMENTAL CONDITIONS	25 deg. C, 50% RH	TEST BY	Jia Wang

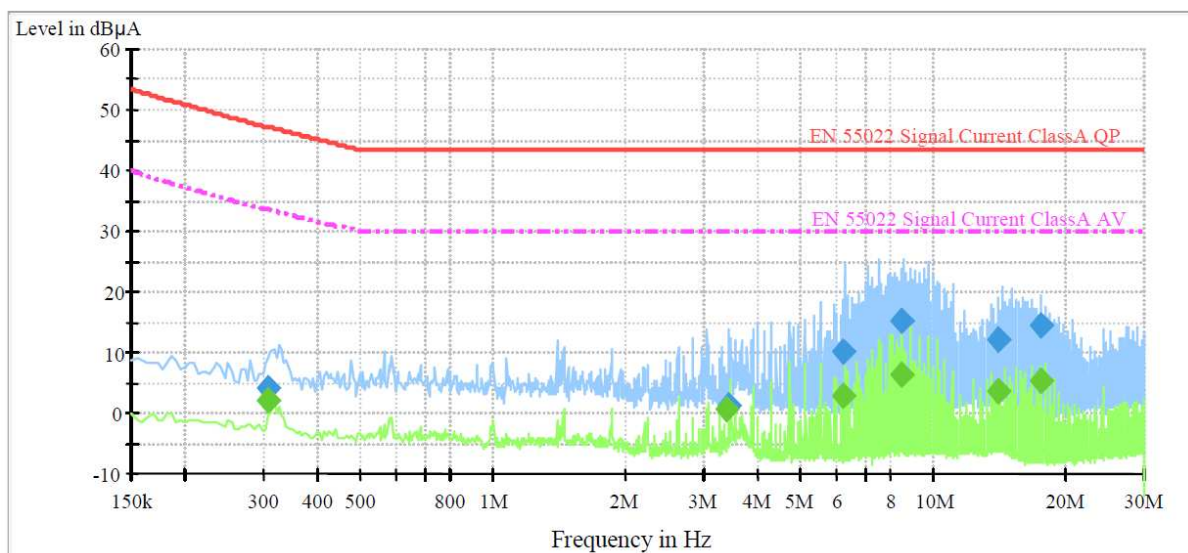
Frequency (MHz)	QuasiPeak (dB μ A)	Meas. Time (ms)	Bandwidth (kHz)	Corr. (dB)	Margin (dB)	Limit (dB μ A)	Comment
1.680578	25.8	1000.0	9.000	-9.4	17.2	43.0	
1.788060	24.7	1000.0	9.000	-9.6	18.3	43.0	
1.891042	23.3	1000.0	9.000	-9.7	19.7	43.0	
3.574605	22.4	1000.0	9.000	-12.0	20.6	43.0	
3.677588	25.8	1000.0	9.000	-12.1	17.2	43.0	
3.785048	21.3	1000.0	9.000	-12.2	21.7	43.0	
Frequency (MHz)	QuasiPeak (dB μ A)	Meas. Time (ms)	Bandwidth (kHz)	Corr. (dB)	Margin (dB)	Limit (dB μ A)	Comment
0.298500	16.6	1000.0	9.000	-1.5	17.2	33.8	
1.264192	11.7	1000.0	9.000	-8.7	18.3	30.0	
1.362698	11.6	1000.0	9.000	-8.9	18.4	30.0	
1.680578	14.7	1000.0	9.000	-9.4	15.3	30.0	
1.788060	13.7	1000.0	9.000	-9.6	16.3	30.0	
3.677588	17.0	1000.0	9.000	-12.1	13.0	30.0	





TEST MODE	SUN2000-40KTL Grid Mode(1/8 Load) + PLC Data Acquisition	6dB BANDWIDTH	9kHz
TEST VOLTAGE	DC 500V	PHASE	PLC PORT
ENVIRONMENTAL CONDITIONS	25 deg. C, 50% RH	TEST BY	Jia Wang

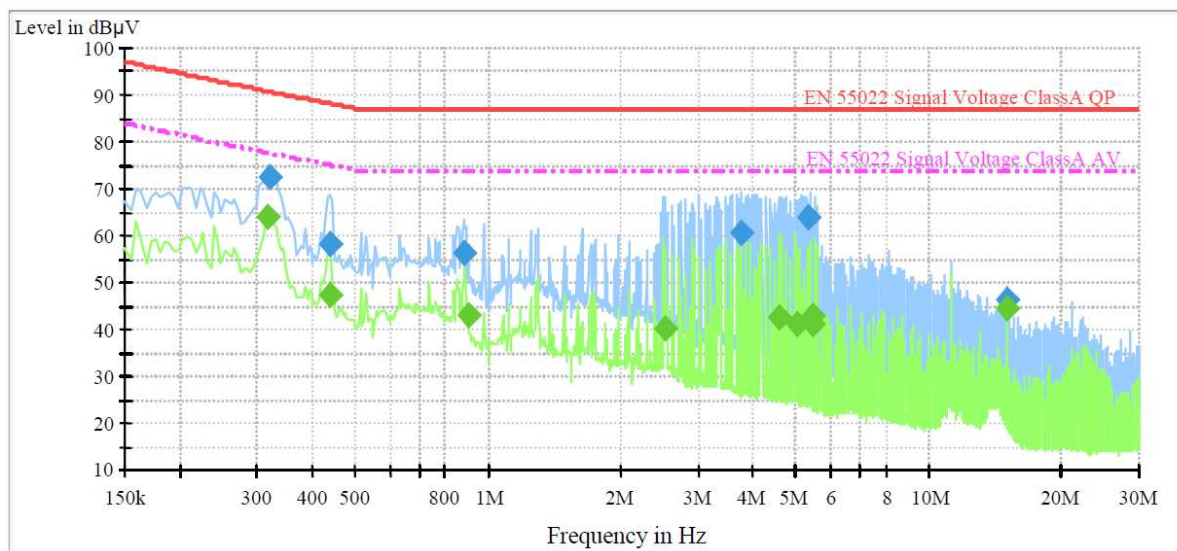
Frequency (MHz)	QuasiPeak (dB μ A)	Meas. Time (ms)	Bandwidth (kHz)	Corr. (dB)	Margin (dB)	Limit (dB μ A)	Comment
0.307500	4.3	1000.0	9.000	-0.4	42.4	46.7	
3.395482	1.2	1000.0	9.000	-12.2	41.8	43.0	
6.225820	10.0	1000.0	9.000	-14.2	33.0	43.0	
8.457420	15.6	1000.0	9.000	-14.9	27.4	43.0	
14.025000	12.3	1000.0	9.000	-15.6	30.7	43.0	
17.406000	14.7	1000.0	9.000	-15.9	28.3	43.0	
Frequency (MHz)	QuasiPeak (dB μ A)	Meas. Time (ms)	Bandwidth (kHz)	Corr. (dB)	Margin (dB)	Limit (dB μ A)	Comment
0.307500	2.0	1000.0	9.000	-0.4	31.6	33.6	
3.355208	0.7	1000.0	9.000	-12.2	29.3	30.0	
6.225820	3.0	1000.0	9.000	-14.2	27.0	30.0	
8.457420	6.6	1000.0	9.000	-14.9	23.4	30.0	
14.025000	3.6	1000.0	9.000	-15.6	26.4	30.0	
17.406000	5.8	1000.0	9.000	-15.9	24.2	30.0	





TEST MODE	SUN2000-40KTL Grid Mode(1/8 Load) + PLC Data Acquisition	6dB BANDWIDTH	9kHz
TEST VOLTAGE	DC 500V	PHASE	PLC PORT
ENVIRONMENTAL CONDITIONS	25 deg. C, 50% RH	TEST BY	Jia Wang

Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment
0.321000	72.5	1000.0	9.000	28.8	18.5	91.0	
0.440000	58.0	1000.0	9.000	28.7	30.0	88.0	
0.883500	56.1	1000.0	9.000	28.8	30.9	87.0	
3.777000	60.4	1000.0	9.000	28.8	26.6	87.0	
5.347500	63.8	1000.0	9.000	28.7	23.2	87.0	
14.991000	46.1	1000.0	9.000	28.8	40.9	87.0	
Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment
0.316500	64.4	1000.0	9.000	28.8	13.6	78.0	
0.438000	47.6	1000.0	9.000	28.8	27.4	75.0	
0.906000	43.2	1000.0	9.000	28.8	30.8	74.0	
2.526000	40.6	1000.0	9.000	28.8	33.4	74.0	
4.564500	42.8	1000.0	9.000	28.7	31.2	74.0	
5.010000	41.5	1000.0	9.000	28.7	32.5	74.0	



3.3 RADIATED EMISSION MEASUREMENT

3.3.1 LIMITS OF RADIATED EMISSION MEASUREMENT

TEST STANDARD: EN 61000-6-4

FOR FREQUENCY BELOW 1000 MHz

FREQUENCY (MHz)	Class A (at 3m)	Class A (at 10m)
	Quasi-Peak (dBuV/m)	Quasi-Peak (dBuV/m)
30 – 230	50	40
230 – 1000	57	47

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 Test Receiver	Agilent	N9038A	MY5121023 3	2015/4/27	2016/4/26
Bilog antenna(30M-1G)	SCHWARZBECK	VULB 9163	548	2014/5/24	2016/5/23
Preamplifier(30M-1G)	Agilent	8447D	2944A1017 5	2015/1/13	2016/1/12

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.

3.3.3 TEST PROCEDURE

<Frequency Range below 1GHz>

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters Semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- 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:

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

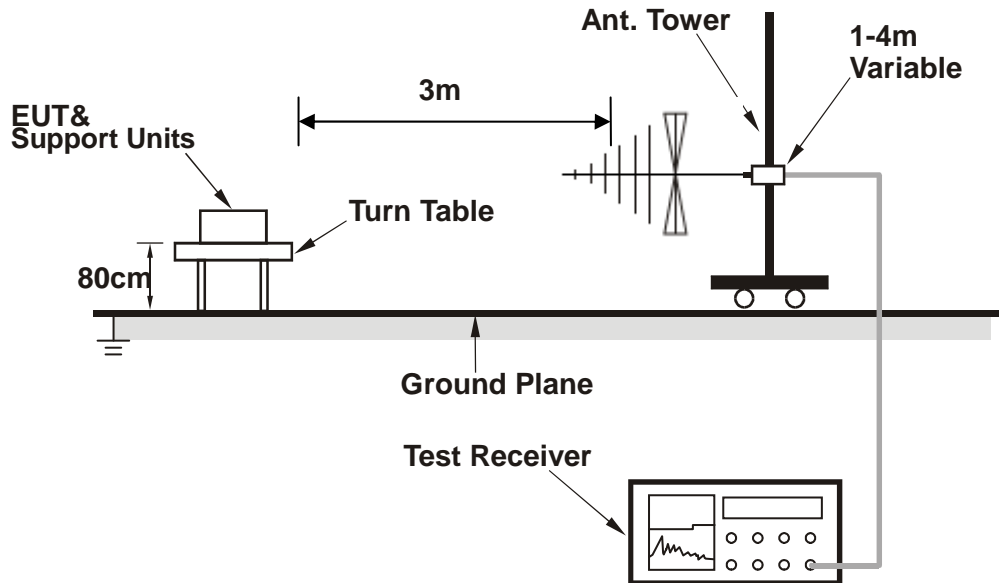
3.3.4 DEVIATION FROM TEST STANDARD

No deviation

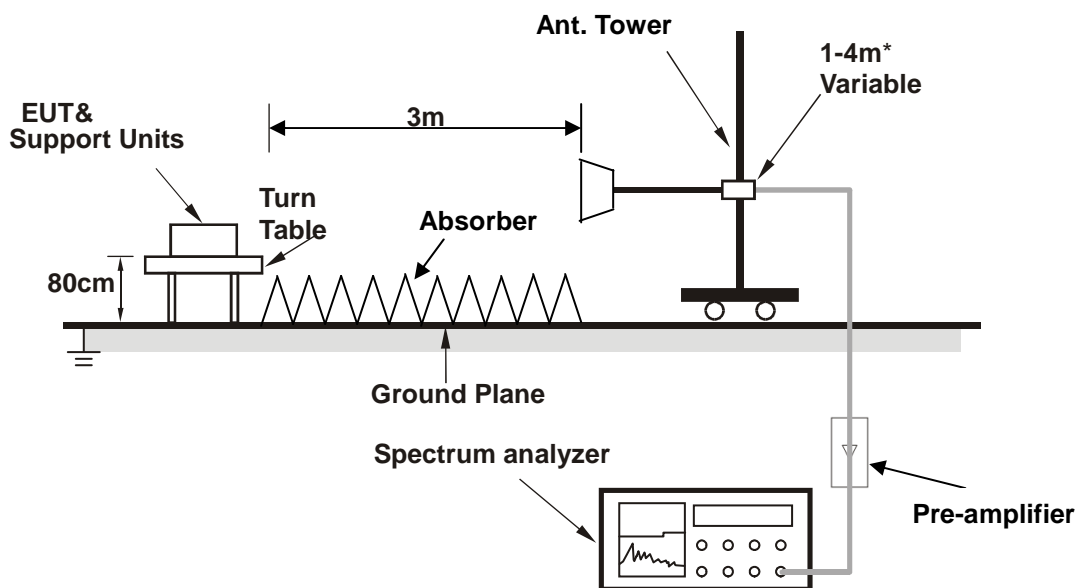


3.3.5 TEST SETUP

<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

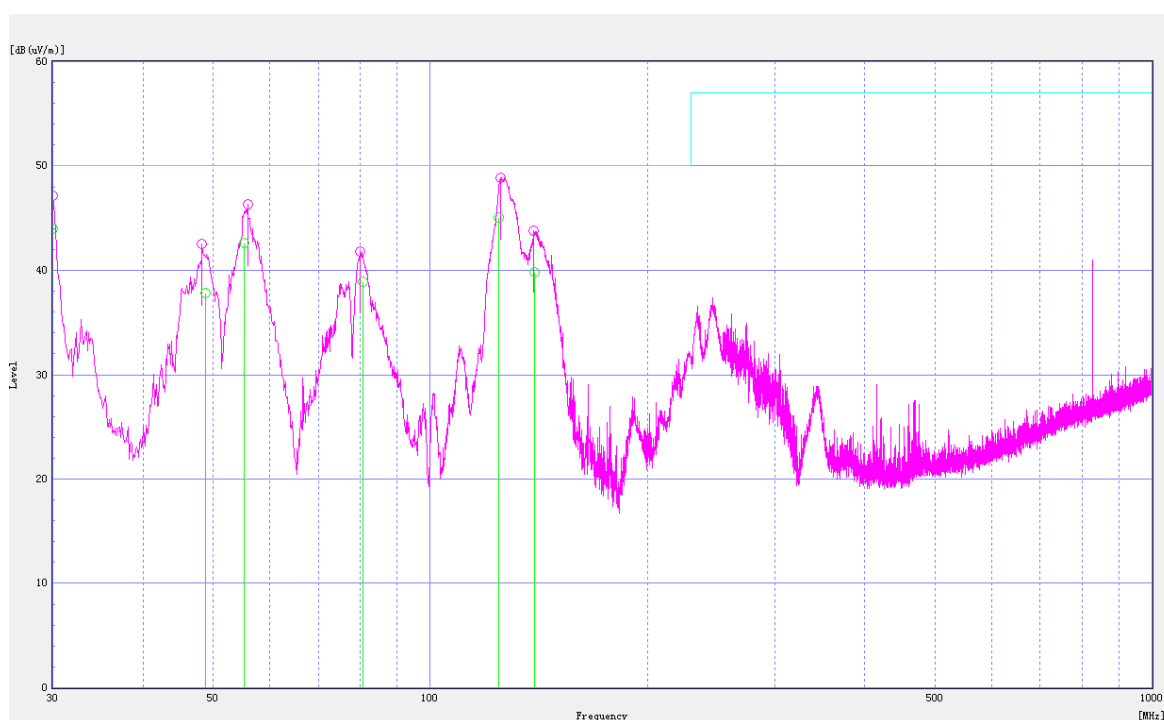
Same as item 3.1.6



3.3.7 TEST RESULTS

TEST MODE	SUN2000-40KTL	FREQUENCY RANGE	30-1000 MHz
	Grid Mode + RS485 Data Acquisition + PLC Data Acquisition		
TEST VOLTAGE	DC 750V	DETECTOR FUNCTION & BANDWIDTH	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	25 deg. C, 55% RH	TESTED BY: Jia Wang	

Frequency (MHz)	Quasi Peak	Meas. Time	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
30.043	44.0	1000.0	120.000	116.0	H	104.0	-15.2	6.0	50.0
48.794	37.8	1000.0	120.000	230.0	H	8.0	-12.5	12.2	50.0
55.191	42.7	1000.0	120.000	100.0	H	61.0	-13.2	7.3	50.0
80.764	38.9	1000.0	120.000	216.0	H	171.0	-17.4	11.1	50.0
124.572	45.1	1000.0	120.000	172.0	H	28.0	-16.8	4.9	50.0
139.414	39.8	1000.0	120.000	223.0	H	20.0	-17.3	10.2	50.0

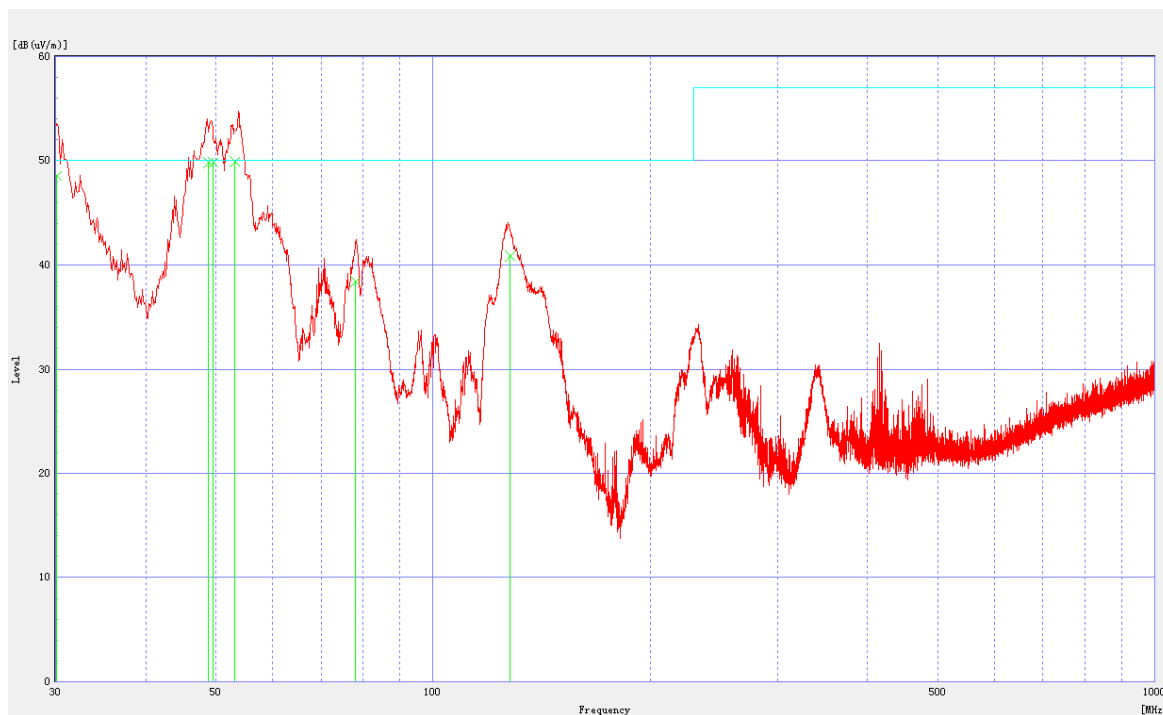


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Email: customerservice.dg@cn.bureauveritas.com



TEST MODE	SUN2000-40KTL Grid Mode + RS485 Data Acquisition + PLC Data Acquisition	FREQUENCY RANGE	30-1000 MHz
TEST VOLTAGE	DC 750V	DETECTOR FUNCTION & BANDWIDTH	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	25 deg. C, 55% RH	TESTED BY: Jia Wang	

Frequency (MHz)	Quasi Peak	Meas. Time	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
30.052	48.6	1000.0	120.000	100.0	V	96.0	-15.2	1.4	50.0
48.784	49.9	1000.0	120.000	100.0	V	67.0	-12.5	0.1	50.0
49.506	49.9	1000.0	120.000	100.0	V	56.0	-12.5	0.1	50.0
53.153	49.9	1000.0	120.000	100.0	V	102.0	-12.7	0.1	50.0
78.030	38.4	1000.0	120.000	179.0	V	250.0	-17.5	11.6	50.0
127.937	40.9	1000.0	120.000	100.0	V	95.0	-16.9	9.1	50.0



3.4 HARMONICS CURRENT MEASUREMENT (>16A)

3.4.1 TEST INSTRUMENTS

TEST STANDARD: EN 61000-3-12

DESCRIPTION & MANUFACTURER	MANUFACTURER	MODEL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Analyzer	YOKOGAWA	WT3000	2014/11/29	2015/11/28
Current Sensor	HIOKI	CT6863	2014/11/26	2015/11/25
AC Source	California Instrument	MX45	2015/5/6	2016/5/5

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.

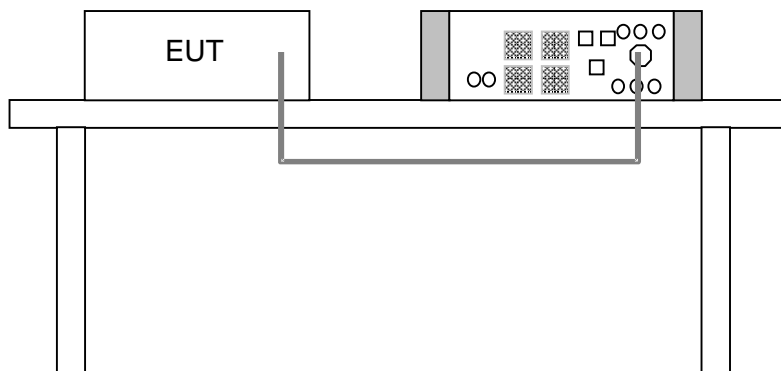
NOTE Linear interpolation between successive R_{sce} values is permitted. See also Annex B.

^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

Regulation : IEC61000-3-12 Ed2.0
IEC61000-4-7 Ed2.0 A1
MeasureTime : 156sec
Model : YOKOGAWA WT3000
Wiring : 3P4W(3P:three-phase)
Element : 1
Range : 300V/100.0A
Rating Voltage : 400 V
I_{equ} : 44.0000 A
Z Impedance : 0.1200 ohm
I_{ref} : 43.3473 A
Set I_{ref} : -----
Power Rsce : 44.282
Max Rsce : 33.000

PASS

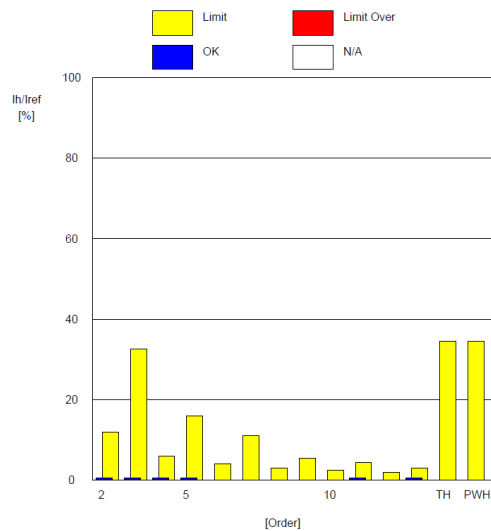
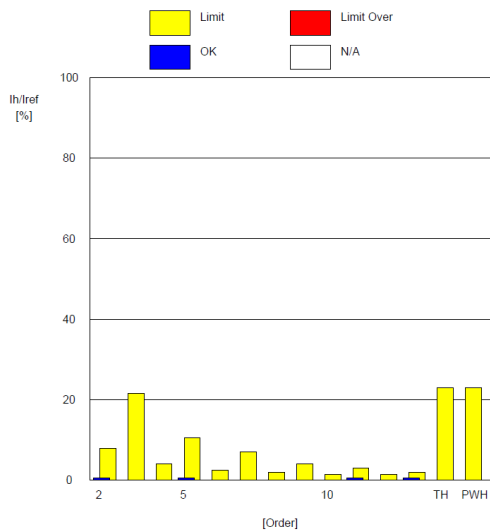
Ssc : 993629.64
Min Rsce : 33.0000
Apply Limit : Table2-Other than balanced 3-phase
Circumstance a : 0.28% (Pass)
Term a(I5) : 0.47% (Pass)
Term a(I7) : 0.23% (Pass)
Term c : 183.93 - 209.54deg (Fail)
Term d(I5) : 0.47% (Pass)
Term d(I7) : 0.23% (Pass)
Term f : 183.93 - 209.54deg (Pass)

[Average]
Voltage(rms) : 230.64 V
Current(rms) : 43.35 A
Frequency : 50.00 Hz
Power Factor : 1.00
Sigma W : 30006.26 W
THC : 0.70 A
V THD : 0.61 %
A THD : 1.62 %
P THD : 0.00 %

[Maximum]
Voltage(rms) : 230.65 V
Current(rms) : 43.36 A
Frequency : 50.17 Hz
Power Factor : 1.00
Sigma W : 30017.68 W
THC : 0.73 A
V THD : 0.63 %
A THD : 1.85 %
P THD : 0.00 %

Order	Measure[%]	Limit[%]	Margin[%]
2	0.3112	8.0000	96.1
3	0.1985	21.6000	99.1
4	0.2227	4.0000	94.4
5	0.4376	10.7000	95.9
6	0.1114	2.6667	95.8
7	0.1905	7.2000	97.4
8	0.0763	2.0000	96.2
9	0.0814	3.8000	97.9
10	0.0779	1.6000	95.1
11	0.6350	3.1000	79.5
12	0.0634	1.3333	95.3
13	0.5685	2.0000	71.6
TH	0.0000	23.0000	100.0
PWH	0.0000	23.0000	100.0

Order	Measure[%]	Limit[%]	Margin[%]
2	0.4700	12.0000	96.1
3	0.2760	32.4000	99.1
4	0.2932	6.0000	95.1
5	0.4741	16.0500	97.0
6	0.1622	4.0000	95.9
7	0.2314	10.8000	97.9
8	0.1201	3.0000	96.0
9	0.1270	5.7000	97.8
10	0.1178	2.4000	95.1
11	0.6436	4.6500	86.2
12	0.1125	2.0000	94.4
13	0.5789	3.0000	80.7
TH	0.0000	34.5000	100.0
PWH	0.0000	34.5000	100.0





Test Report No.: CE150727N017R1

Regulation : IEC61000-3-12 Ed2.0
IEC61000-4-7 Ed2.0 A1
MeasureTime : 156sec
Model : YOKOGAWA WT3000
Wiring : 3P4W(3P:three-phase)
Element : 2
Range : 300V/100.0A
Rating Voltage : 400 V
I_{eq} : 44.0000 A
Z Impedance : 0.1200 ohm
I_{ref} : 43.3004 A
Set I_{ref} : -----
Power Rsce : 44.282
Max Rsce : 33.000

PASS

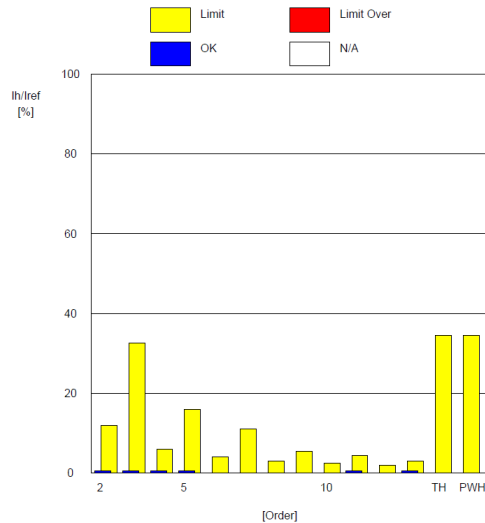
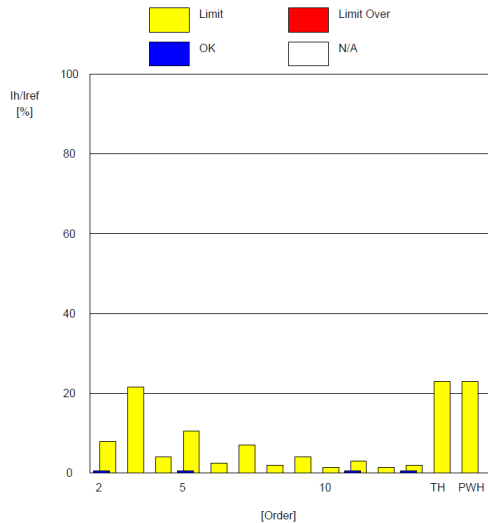
Ssc : 993629.64
Min Rsce : 33.0000
Apply Limit : Table2-Other than balanced 3-phase
Circumstance a : 0.32% (Pass)
Term a(I₅) : 0.48% (Pass)
Term a(I₇) : 0.21% (Pass)
Term c : 182.01 - 206.13deg (Fail)
Term d(I₅) : 0.48% (Pass)
Term d(I₇) : 0.21% (Pass)
Term f : 182.01 - 206.13deg (Pass)

[Average]
Voltage(rms) : 230.83 V
Current(rms) : 43.30 A
Frequency : 50.00 Hz
Power Factor : 1.00
Sigma W : 30006.26 W
THC : 0.70 A
V THD : 0.61 %
A THD : 1.61 %
P THD : 0.00 %

[Maximum]
Voltage(rms) : 230.85 V
Current(rms) : 43.32 A
Frequency : 50.17 Hz
Power Factor : 1.00
Sigma W : 30017.68 W
THC : 0.72 A
V THD : 0.62 %
A THD : 1.81 %
P THD : 0.00 %

Order	Measure[%]	Limit[%]	Margin[%]
2	0.3227	8.0000	96.0
3	0.2221	21.6000	99.0
4	0.2004	4.0000	95.0
5	0.4441	10.7000	95.9
6	0.1007	2.6667	96.2
7	0.1798	7.2000	97.5
8	0.0682	2.0000	96.6
9	0.0851	3.8000	97.8
10	0.0704	1.6000	95.6
11	0.6105	3.1000	80.3
12	0.0668	1.3333	95.0
13	0.5708	2.0000	71.5
TH	0.0000	23.0000	100.0
PWH	0.0000	23.0000	100.0

Order	Measure[%]	Limit[%]	Margin[%]
2	0.4340	12.0000	96.4
3	0.3170	32.4000	99.0
4	0.2773	6.0000	95.4
5	0.4776	16.0500	97.0
6	0.1636	4.0000	95.9
7	0.2123	10.8000	98.0
8	0.1056	3.0000	96.5
9	0.1206	5.7000	97.9
10	0.1065	2.4000	95.6
11	0.6181	4.6500	86.7
12	0.1079	2.0000	94.6
13	0.5800	3.0000	80.7
TH	0.0000	34.5000	100.0
PWH	0.0000	34.5000	100.0



Regulation : IEC61000-3-12 Ed2.0
IEC61000-4-7 Ed2.0 A1
MeasureTime : 156sec
Model : YOKOGAWA WT3000
Wiring : 3P4W(3P:three-phase)
Element : 3
Range : 300V/100.0A
Rating Voltage : 400 V
I_{eq} : 44.0000 A
Z Impedance : 0.1200 ohm
I_{ref} : 43.4445 A
Set I_{ref} : -----
Power Rsce : 44.282
Max Rsce : 33.000

PASS

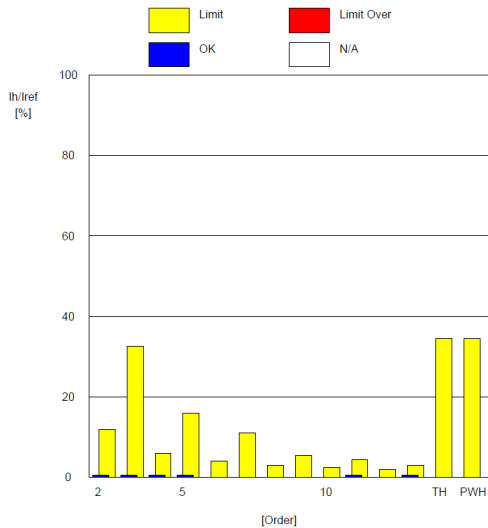
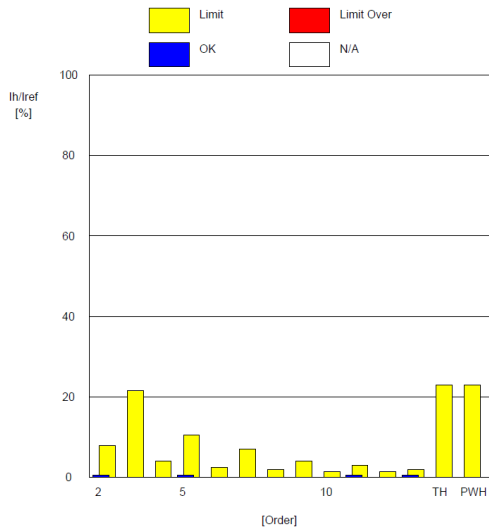
Ssc : 993629.64
Min Rsce : 33.0000
Apply Limit : Table2-Other than balanced 3-phase
Circumstance a : 0.28% (Pass)
Term a(I5) : 0.47% (Pass)
Term a(I7) : 0.22% (Pass)
Term c : 191.94 - 205.68deg (Fail)
Term d(I5) : 0.47% (Pass)
Term d(I7) : 0.22% (Pass)
Term f : 191.94 - 205.68deg (Pass)

[Average]
Voltage(rms) : 230.61 V
Current(rms) : 43.44 A
Frequency : 50.00 Hz
Power Factor : 1.00
Sigma W : 30006.26 W
THC : 0.68 A
V THD : 0.57 %
A THD : 1.56 %
P THD : 0.00 %

[Maximum]
Voltage(rms) : 230.63 V
Current(rms) : 43.46 A
Frequency : 50.17 Hz
Power Factor : 1.00
Sigma W : 30017.68 W
THC : 0.70 A
V THD : 0.58 %
A THD : 1.73 %
P THD : 0.00 %

Order	Measure[%]	Limit[%]	Margin[%]
2	0.2593	8.0000	96.8
3	0.1746	21.6000	99.2
4	0.1929	4.0000	95.2
5	0.4390	10.7000	95.9
6	0.0915	2.6667	96.6
7	0.1784	7.2000	97.5
8	0.0656	2.0000	96.7
9	0.0606	3.8000	98.4
10	0.0652	1.6000	95.9
11	0.6073	3.1000	80.4
12	0.0596	1.3333	95.5
13	0.5653	2.0000	71.7
TH	0.0000	23.0000	100.0
PWH	0.0000	23.0000	100.0

Order	Measure[%]	Limit[%]	Margin[%]
2	0.3920	12.0000	96.7
3	0.2754	32.4000	99.1
4	0.2758	6.0000	95.4
5	0.4706	16.0500	97.1
6	0.1409	4.0000	96.5
7	0.2221	10.8000	97.9
8	0.0985	3.0000	96.7
9	0.0953	5.7000	98.3
10	0.0973	2.4000	95.9
11	0.6147	4.6500	86.8
12	0.0951	2.0000	95.2
13	0.5745	3.0000	80.8
TH	0.0000	34.5000	100.0
PWH	0.0000	34.5000	100.0





Test Report No.: CE150727N017R1

SUN2000-40KTL

Regulation : IEC61000-3-12 Ed2.0
IEC61000-4-7 Ed2.0 A1
MeasureTime : 151sec
Model : YOKOGAWA WT3000
Wiring : 3P4W(3P:three-phase)
Element : 1
Range : 300V/100.0A
Rating Voltage : 400 V
Ieq : 44.0000 A
Z Impedance : 0.1200 ohm
Iref : 43.2320 A
Set Iref : -----
Power Rsce : 44.397
Max Rsce : 33.000

PASS

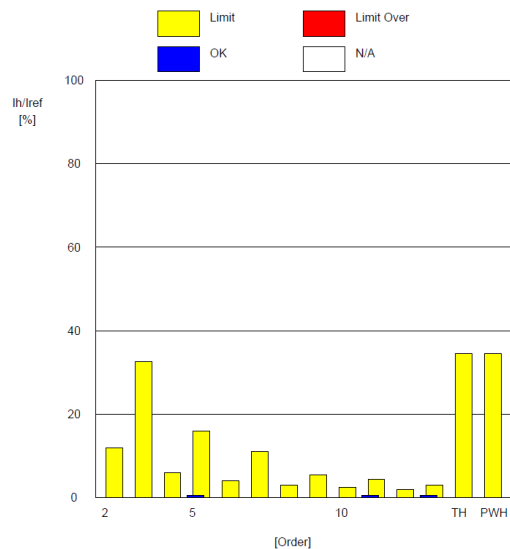
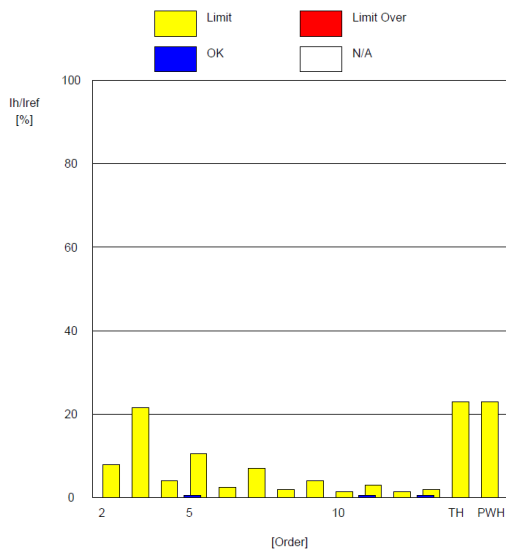
Ssc : 991057.04
Min Rsce : 33.0000
Apply Limit : Table2-Other than balanced 3-phase
Circumstance a : 0.08% (Pass)
Term a(I5) : 0.45% (Pass)
Term a(I7) : 0.20% (Pass)
Term c : 189.35 - 208.90deg (Fail)
Term d(I5) : 0.45% (Pass)
Term d(I7) : 0.20% (Pass)
Term f : 189.35 - 208.90deg (Pass)

[Average]
Voltage(rms) : 277.68 V
Current(rms) : 43.23 A
Frequency : 50.00 Hz
Power Factor : 1.00
Sigma W : 36028.95 W
THC : 0.72 A
V THD : 0.55 %
A THD : 1.66 %
P THD : 0.00 %

[Maximum]
Voltage(rms) : 277.70 V
Current(rms) : 43.25 A
Frequency : 50.03 Hz
Power Factor : 1.00
Sigma W : 36043.00 W
THC : 0.73 A
V THD : 0.56 %
A THD : 1.74 %
P THD : 0.00 %

Order	Measure[%]	Limit[%]	Margin[%]
2	0.1580	8.0000	98.0
3	0.0671	21.6000	99.7
4	0.1663	4.0000	95.8
5	0.3243	10.7000	97.0
6	0.0508	2.6667	98.1
7	0.1749	7.2000	97.6
8	0.0384	2.0000	98.1
9	0.0305	3.8000	99.2
10	0.0451	1.6000	97.2
11	0.7338	3.1000	76.3
12	0.0296	1.3333	97.8
13	0.6548	2.0000	67.3
TH	0.0000	23.0000	100.0
PWH	0.0000	23.0000	100.0

Order	Measure[%]	Limit[%]	Margin[%]
2	0.1817	12.0000	98.5
3	0.0831	32.4000	99.7
4	0.1786	6.0000	97.0
5	0.4512	16.0500	97.2
6	0.0617	4.0000	98.5
7	0.1968	10.8000	98.2
8	0.0438	3.0000	98.5
9	0.0353	5.7000	99.4
10	0.0499	2.4000	97.9
11	0.7431	4.6500	84.0
12	0.0334	2.0000	98.3
13	0.6649	3.0000	77.8
TH	0.0000	34.5000	100.0
PWH	0.0000	34.5000	100.0



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Test Report No.: CE150727N017R1

Regulation : IEC61000-3-12 Ed2.0
IEC61000-4-7 Ed2.0 A1
MeasureTime : 151sec
Model : YOKOGAWA WT3000
Wiring : 3P4W(3P:three-phase)
Element : 2
Range : 300V/100.0A
Rating Voltage : 400 V
I_{eq} : 44.0000 A
Z Impedance : 0.1200 ohm
I_{ref} : 43.1822 A
Set I_{ref} : -----
Power Rsce : 44.397
Max Rsce : 33.000

PASS

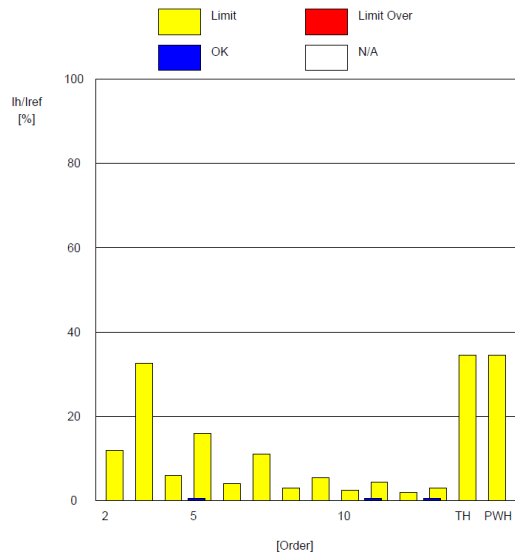
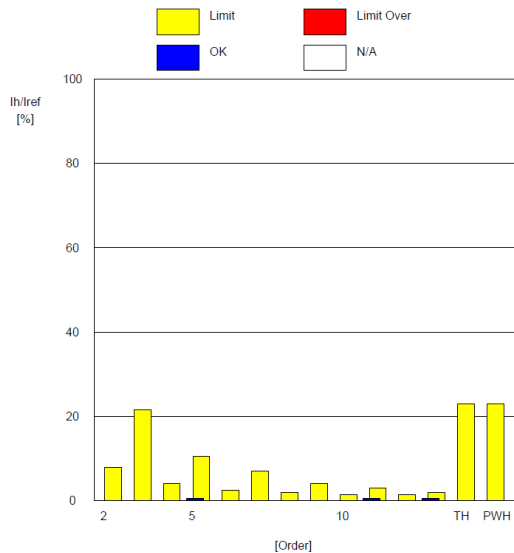
Ssc : 991057.04
Min Rsce : 33.0000
Apply Limit : Table2-Other than balanced 3-phase
Circumstance a : 0.19% (Pass)
Term a(I5) : 0.46% (Pass)
Term a(I7) : 0.19% (Pass)
Term c : 187.17 - 203.59deg (Fail)
Term d(I5) : 0.46% (Pass)
Term d(I7) : 0.19% (Pass)
Term f : 187.17 - 203.59deg (Pass)

[Average]
Voltage(rms) : 277.88 V
Current(rms) : 43.18 A
Frequency : 50.00 Hz
Power Factor : 1.00
Sigma W : 36028.95 W
THC : 0.72 A
V THD : 0.55 %
A THD : 1.66 %
P THD : 0.00 %

[Maximum]
Voltage(rms) : 277.90 V
Current(rms) : 43.20 A
Frequency : 50.03 Hz
Power Factor : 1.00
Sigma W : 36043.00 W
THC : 0.73 A
V THD : 0.56 %
A THD : 1.74 %
P THD : 0.00 %

Order	Measure[%]	Limit[%]	Margin[%]
2	0.1291	8.0000	98.4
3	0.1690	21.6000	99.2
4	0.1567	4.0000	96.1
5	0.3382	10.7000	96.8
6	0.0502	2.6667	98.1
7	0.1672	7.2000	97.7
8	0.0373	2.0000	98.1
9	0.0425	3.8000	98.9
10	0.0445	1.6000	97.2
11	0.7193	3.1000	76.8
12	0.0288	1.3333	97.8
13	0.6637	2.0000	66.8
TH	0.0000	23.0000	100.0
PWH	0.0000	23.0000	100.0

Order	Measure[%]	Limit[%]	Margin[%]
2	0.1623	12.0000	98.6
3	0.1880	32.4000	99.4
4	0.1700	6.0000	97.2
5	0.4623	16.0500	97.1
6	0.0576	4.0000	98.6
7	0.1903	10.8000	98.2
8	0.0427	3.0000	98.6
9	0.0465	5.7000	99.2
10	0.0487	2.4000	98.0
11	0.7293	4.6500	84.3
12	0.0336	2.0000	98.3
13	0.6718	3.0000	77.6
TH	0.0000	34.5000	100.0
PWH	0.0000	34.5000	100.0



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Test Report No.: CE150727N017R1

Regulation : IEC61000-3-12 Ed2.0
IEC61000-4-7 Ed2.0 A1
MeasureTime : 151sec
Model : YOKOGAWA WT3000
Wiring : 3P4W(3P:three-phase)
Element : 3
Range : 300V/100.0A
Rating Voltage : 400 V
Ieq : 44.0000 A
Z Impedance : 0.1200 ohm
Iref : 43.3309 A
Set Iref : -----
Power Rsce : 44.397
Max Rsce : 33.000

PASS

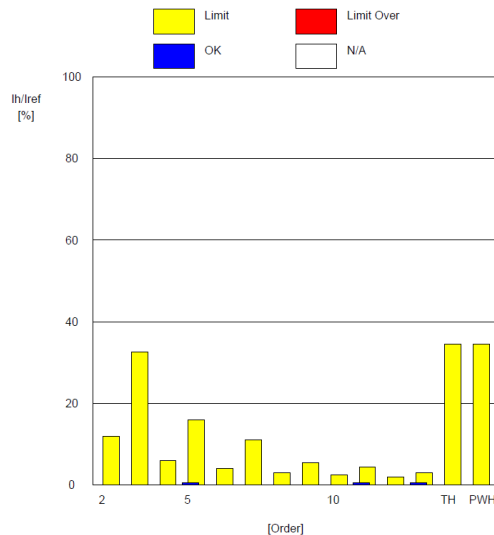
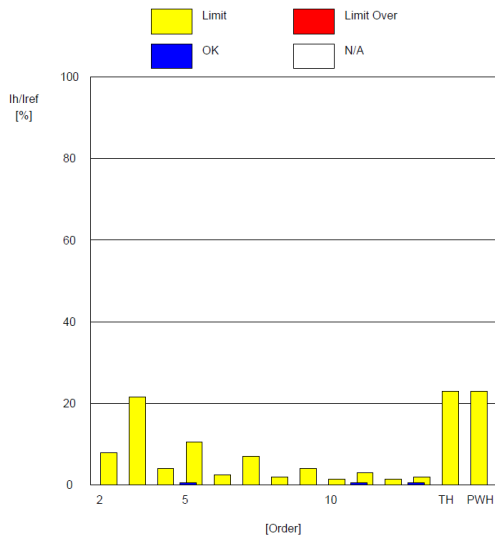
Ssc : 991057.04
Min Rsce : 33.0000
Apply Limit : Table2-Other than balanced 3-phase
Circumstance a : 0.12% (Pass)
Term a(I5) : 0.46% (Pass)
Term a(I7) : 0.19% (Pass)
Term c : 192.03 - 212.47deg (Fail)
Term d(I5) : 0.46% (Pass)
Term d(I7) : 0.19% (Pass)
Term f : 192.03 - 212.47deg (Fail)

[Average]
Voltage(rms) : 277.66 V
Current(rms) : 43.33 A
Frequency : 50.00 Hz
Power Factor : 1.00
Sigma W : 36028.95 W
THC : 0.70 A
V THD : 0.51 %
A THD : 1.62 %
P THD : 0.00 %

[Maximum]
Voltage(rms) : 277.67 V
Current(rms) : 43.35 A
Frequency : 50.03 Hz
Power Factor : 1.00
Sigma W : 36043.00 W
THC : 0.72 A
V THD : 0.53 %
A THD : 1.71 %
P THD : 0.00 %

Order	Measure[%]	Limit[%]	Margin[%]
2	0.1166	8.0000	98.5
3	0.1020	21.6000	99.5
4	0.1238	4.0000	96.9
5	0.3325	10.7000	96.9
6	0.0412	2.6667	98.5
7	0.1678	7.2000	97.7
8	0.0324	2.0000	98.4
9	0.0257	3.8000	99.3
10	0.0344	1.6000	97.9
11	0.6945	3.1000	77.6
12	0.0228	1.3333	98.3
13	0.6699	2.0000	66.5
TH	0.0000	23.0000	100.0
PWH	0.0000	23.0000	100.0

Order	Measure[%]	Limit[%]	Margin[%]
2	0.1366	12.0000	98.9
3	0.1171	32.4000	99.6
4	0.1338	6.0000	97.8
5	0.4578	16.0500	97.1
6	0.0452	4.0000	98.9
7	0.1910	10.8000	98.2
8	0.0353	3.0000	98.8
9	0.0285	5.7000	99.5
10	0.0377	2.4000	98.4
11	0.7021	4.6500	84.9
12	0.0260	2.0000	98.7
13	0.6783	3.0000	77.4
TH	0.0000	34.5000	100.0
PWH	0.0000	34.5000	100.0



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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	d_{max} 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 $\leq 16A$

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 $d_{c \text{ test}}$, $d_{max \text{ test}}$, $P_{st \text{ test}}$ and $P_{lt \text{ test}}$ shall be measured. The definitions of d_c , d_{max} , P_{st} , and P_{lt} are given in IEC 61000-3-3.



Test Report No.: CE150727N017R1

3.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MANUFACTURER	MODEL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Analyzer	YOKOGAWA	WT3000	2014/11/29	2015/11/28
Current Sensor	HIOKI	CT6863	2014/11/26	2015/11/25
AC Source	California Instrument	MX45	2015/5/6	2016/5/5

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.

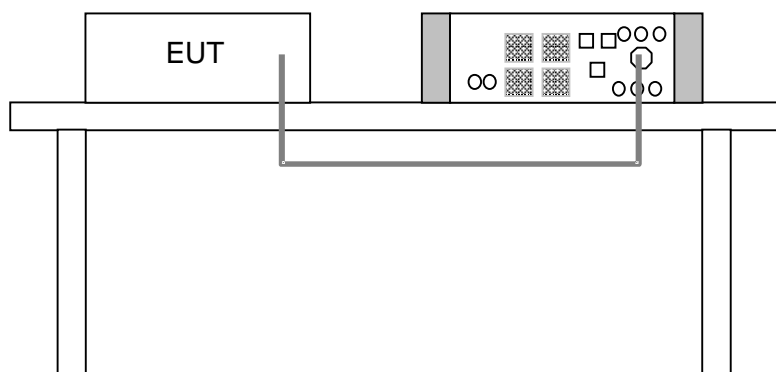
3.5.3 TEST PROCEDURE

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



Test Report No.: CE150727N017R1

3.5.7 TEST RESULTS

SUN2000-33KTL

Regulation : IEC61000-3-11 Ed1.0
IEC61000-4-15 Ed1.1
Interval : 10Min0Sec
Model : YOKOGAWA WT3000
Impedance : 0.24+j0.15
Wiring : three-phase 4wire
Voltage Range : 300.00V
Set Voltage : ---
Set Frequency : 50Hz
Voltage U1 : 231.97V
Frequency U1 : 50.002Hz
Element : 1
dmin : 0.20%

PASS

Compatibility Condi: Compliance with IEC61000-3-3(Ztest)
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	0.00	0.00	-----	0.07
2	0.57	0.72	-----	0.11
3	0.54	0.71	-----	0.12
4	0.58	0.74	-----	0.13
5	0.55	0.72	-----	0.15
6	0.60	0.72	-----	0.17
7	0.51	0.67	-----	0.19
8	0.54	0.62	-----	0.20
9	0.51	0.67	-----	0.23
10	0.51	0.58	-----	0.25
11	0.13	0.40	-----	0.25
12	0.09	0.32	-----	0.23

Plt
0.19

Regulation : IEC61000-3-11 Ed1.0
IEC61000-4-15 Ed1.1
Interval : 10Min0Sec
Model : YOKOGAWA WT3000
Impedance : 0.24+j0.15
Wiring : three-phase 4wire
Voltage Range : 300.00V
Set Voltage : ---
Set Frequency : 50Hz
Voltage U2 : 231.98V
Frequency U2 : 50.000Hz
Element : 2
dmin : 0.20%

PASS

Compatibility Condi: Compliance with IEC61000-3-3(Ztest)
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	0.00	0.00	-----	0.07
2	0.63	0.81	-----	0.12
3	0.62	0.80	-----	0.12
4	0.65	0.82	-----	0.14
5	0.65	0.77	-----	0.15
6	0.58	0.76	-----	0.17
7	0.53	0.71	-----	0.19
8	0.64	0.77	-----	0.20
9	0.48	0.67	-----	0.23
10	0.54	0.63	-----	0.25
11	0.14	0.24	-----	0.25
12	0.16	0.30	-----	0.23

Plt
0.19

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Test Report No.: CE150727N017R1

Regulation : IEC61000-3-11 Ed1.0
IEC61000-4-15 Ed1.1
Interval : 10Min0Sec
Model : YOKOGAWA WT3000
Impedance : $0.24+j0.15$
Wiring : three-phase 4wire
Voltage Range : 300.00V
Set Voltage : ---
Set Frequency : 50Hz
Voltage U2 : 231.98V
Frequency U2 : 50.000Hz
Element : 2
dmin : 0.20%

PASS

Compatibility Condi: Compliance with IEC61000-3-3(Ztest)
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	0.00	0.00	-----	0.07
2	0.63	0.81	-----	0.12
3	0.62	0.80	-----	0.12
4	0.65	0.82	-----	0.14
5	0.65	0.77	-----	0.15
6	0.58	0.76	-----	0.17
7	0.53	0.71	-----	0.19
8	0.64	0.77	-----	0.20
9	0.48	0.67	-----	0.23
10	0.54	0.63	-----	0.25
11	0.14	0.24	-----	0.25
12	0.16	0.30	-----	0.23

Plt
0.19



Test Report No.: CE150727N017R1

SUN2000-40KTL

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 : 279.01V
Frequency U1 : 50.002Hz
Element : 1
dmin : 0.20%

PASS
(Under dmin)

Compatibility Condition : Compliance with IEC61000-3-3(Ztest)
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	0.00	0.00	-----	0.07
2	0.42	0.45	-----	0.10
3	0.45	0.57	-----	0.10
4	0.40	0.53	-----	0.10
5	0.33	0.34	-----	0.09
6	0.44	0.53	-----	0.10
7	0.42	0.47	-----	0.10
8	0.49	0.54	-----	0.09
9	0.43	0.57	-----	0.10
10	0.46	0.49	-----	0.09
11	0.00	0.00	-----	0.07
12	0.00	0.00	-----	0.07

Plt
0.09

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 : 279.01V
Frequency U1 : 50.002Hz
Element : 1
dmin : 0.20%

PASS
(Under dmin)

Compatibility Condition : Compliance with IEC61000-3-3(Ztest)
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	0.00	0.00	-----	0.07
2	0.42	0.45	-----	0.10
3	0.45	0.57	-----	0.10
4	0.40	0.53	-----	0.10
5	0.33	0.34	-----	0.09
6	0.44	0.53	-----	0.10
7	0.42	0.47	-----	0.10
8	0.49	0.54	-----	0.09
9	0.43	0.57	-----	0.10
10	0.46	0.49	-----	0.09
11	0.00	0.00	-----	0.07
12	0.00	0.00	-----	0.07

Plt
0.09

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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 : 278.70V
 Frequency U3 : Error
 Element : 3
 dmin : 0.20%

PASS
(Under dmin)

Compatibility Condition : Compliance with IEC61000-3-3(Ztest)
 Element3 : 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	0.00	0.00	-----	0.07
2	0.37	0.46	-----	0.09
3	0.21	0.29	-----	0.09
4	0.21	0.35	-----	0.09
5	0.36	0.38	-----	0.08
6	0.18	0.35	-----	0.09
7	0.39	0.40	-----	0.09
8	0.33	0.46	-----	0.09
9	0.33	0.40	-----	0.09
10	0.25	0.35	-----	0.08
11	0.00	0.00	-----	0.07
12	0.00	0.00	-----	0.07

Plt
0.08



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: 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, 10V/m, 80% AM (1kHz) 2000-2700 MHz, 10V/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 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	2015/1/13	2016/1/12

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:

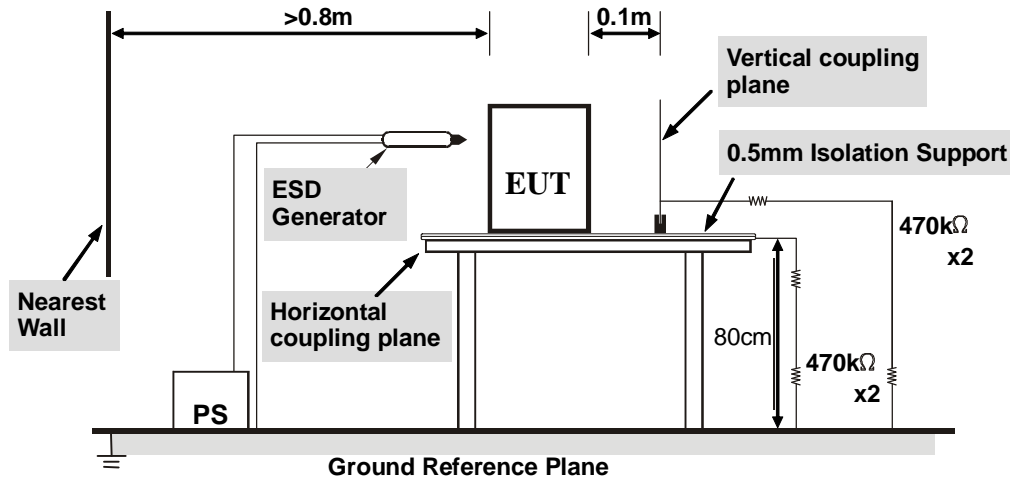
- a. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.
- b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
- c. The time interval between two successive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

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

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 640V or DC 500V
ENVIRONMENTAL CONDITIONS	21deg. C, 50% RH 101.00kPa	TESTED BY: Jia Wang	

Direct Discharge Application				
Test Level (kV)	Polarity	Test Point	Test Result of Contact Discharge	Test Result of Air Discharge
2, 4, 6	+/-	All Metal Part	A	N/A
2, 4, 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
2, 4, 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, 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	AR	SG6000	327339	2015/4/27	2016/4/26
Power Meter	AR	PM2003	339736	2015/1/13	2016/1/12
Amplifier	AR	500W1000A	337312	2015/1/13	2016/1/12
Amplifier	AR	175S1G4M3	340318	2015/4/16	2016/4/15
Directional Coupler	AR	DC6180A	311186	2015/1/13	2016/1/12
Directional Coupler	AR	DC7144A	336840	2015/1/13	2016/1/12
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

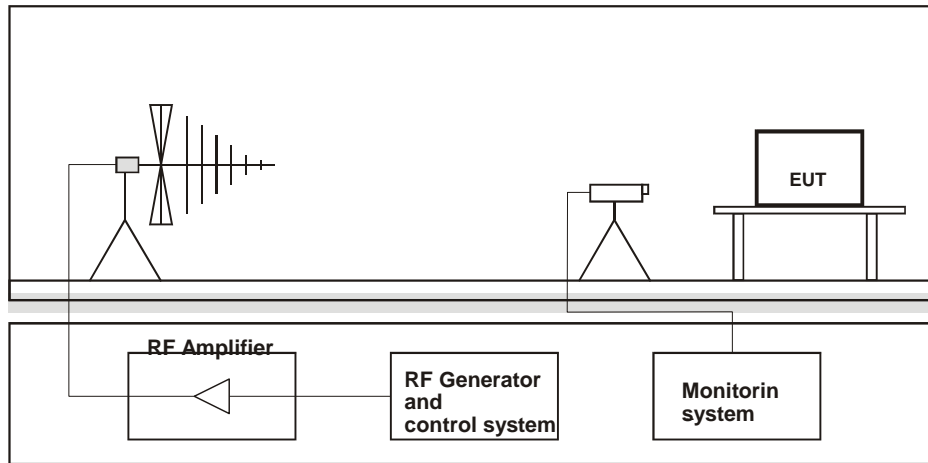
- a. The testing was performed in a fully-anechoic chamber.
- b. The frequency range is swept from 80 MHz to 1000 MHz, 1400MHz to 2000MHz, 2000MHz to 2700MHz with the signal 80% amplitude modulated with a 1kHz sine wave.
- c. The dwell time at each frequency shall not be less than the time necessary 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, 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 item 2.2	TEST VOLTAGE	DC 640V or DC 500V
ENVIRONMENTAL CONDITIONS	21deg. C, 58% RH	TESTED BY: Jia Wang	

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: 1kV
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	2015/4/27	2016/4/26
Coupling clamp	Teseq	CDN8014	31839	2015/4/27	2016/4/26
Coupling Decoupling Network	Teseq	CDN163	160	2015/4/27	2016/4/26

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

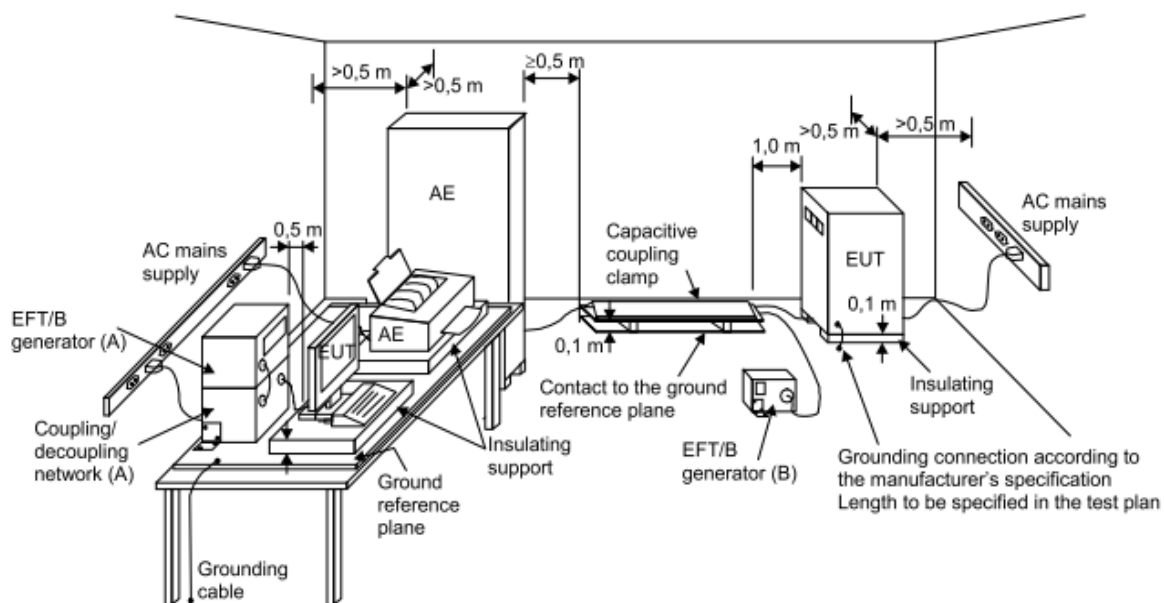
- Both positive and negative polarity discharges were applied.
- The distance between any coupling devices and the EUT should be (0.5 – 0/+0.1) m for table-top equipment testing, and (1.0 ± 0.1) m for floor standing equipment.
- The duration time of each test sequential was 1 minute.
- The transient/burst 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



IEC 645/12

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



Test Report No.: CE150727N017R1

4.4.6 TEST RESULTS

TEST MODE	See item 2.2	TEST VOLTAGE	DC 640V or DC 500V
ENVIRONMENTAL CONDITIONS	21 deg. C, 55% RH	TESTED BY: Jia Wang	

Pulse Voltage	1 kV		2 kV		kV		kV	
Pulse Polarity	+	—	+	—	+	—	+	—
L1+L2+L3 + N + PE	/	/	A	A	/	/	/	/
DC Line	/	/	A	A	/	/	/	/
485 Port	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	2015/4/16	2016/4/15
Coupling Decoupling Network	EMTEST	CNV 503S10	V1121109604	2015/4/27	2016/4/26

- 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).

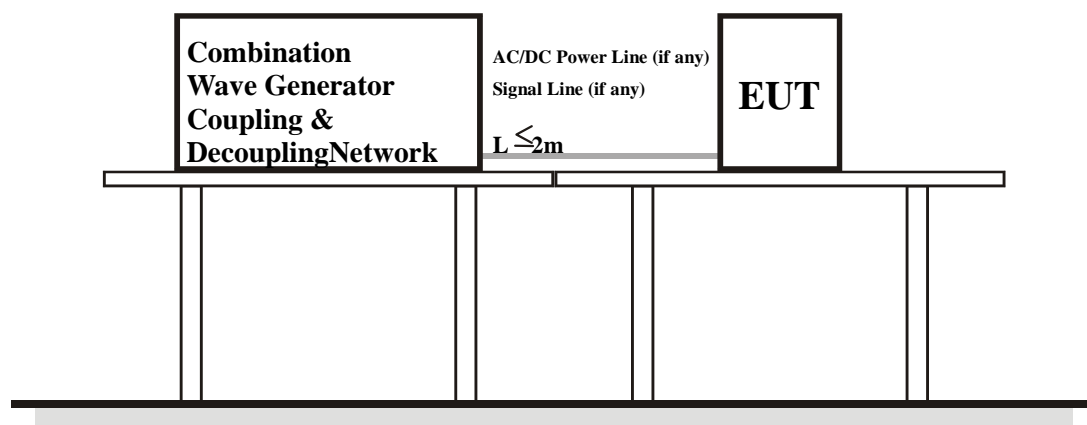
c. For test applied to unshielded symmetrically operated interconnection / telecommunication lines of EUT:

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 640V or DC 500V
ENVIRONMENTAL CONDITIONS	21deg. C, 55% RH	TESTED BY: Jia Wang	

AC/DC 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	PV+ - PV-	A
		-	A	A	A		A
1	L2-N	+	A	A	A	/	/
		-	A	A	A	/	/
1	L3-N	+	A	A	A	/	/
		-	A	A	A	/	/
2	L1-PE	+	A	A	A	PV+ - PE	A
		-	A	A	A		A
2	L2-PE	+	A	A	A	PV- - PE	A
		-	A	A	A		A
2	L3-PE	+	A	A	A	/	/
		-	A	A	A	/	/
2	N-PE	+	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
1	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	2015/4/16	2016/4/15
Amplifier	R&S	BBA100	5354.9000k50-100984-Ut	2015/1/13	2016/1/12
6dB Attenuator	Bird	75-A-FFN-06	1136	2015/1/13	2016/1/12
Power Meter	R&S	NRVD	857.8008.02	2015/1/13	2016/1/12
Coupling Decoupling Network	FCC	FCC-801-M1-50A	111651	2015/1/13	2016/1/12
RF Inject Clamp	FCC	F-120-9A	111657	2015/1/13	2016/1/12
100Ω Resistance	Luthi	CR100A	370	2015/1/13	2016/1/12

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

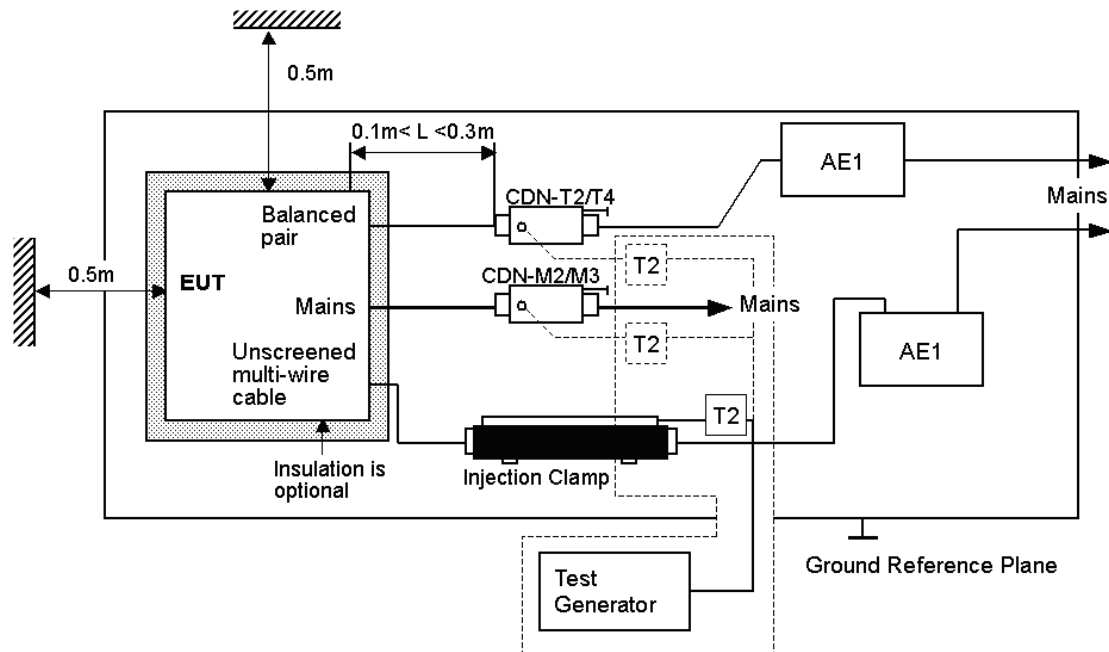
- a. The EUT shall be tested within its intended operating and climatic conditions.
- b. An artificial hand was placed on the hand-held accessory and connected to the ground reference plane.
- c. The test shall be performed with the test generator connected to each of the coupling and decoupling devices 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.



Test Report No.: CE150727N017R1

4.6.6 TEST RESULTS

TEST MODE	See item 2.2	TEST VOLTAGE	DC 640V or DC 500V
ENVIRONMENTAL CONDITIONS	21deg. C, 54% RH	TESTED BY: Jia Wang	

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

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	2015/1/13	2016/1/12
Helmholtz coil	EMTEST	HHS 5215-100	5215-100 102	2015/1/13	2016/1/12

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

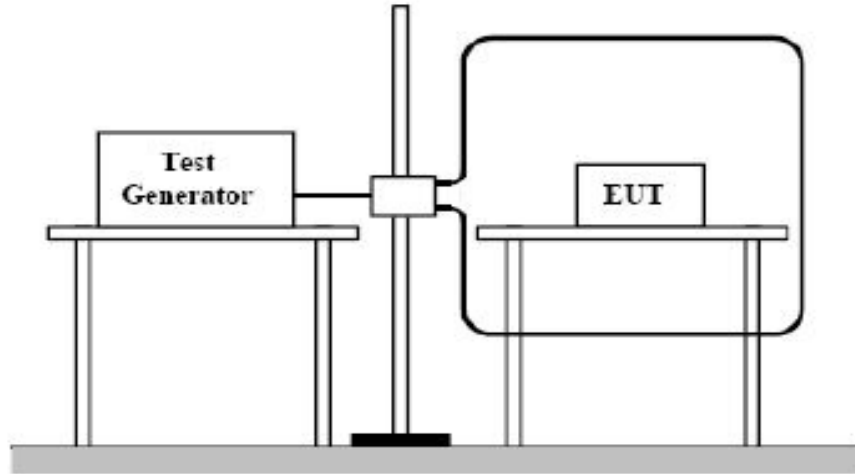
- The equipment is configured and connected to satisfy its functional requirements.
- The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.
- The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables 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.



Test Report No.: CE150727N017R1

4.7.6 TEST RESULTS

TEST MODE	See item 2.2	TEST VOLTAGE	DC 640V or DC 500V
ENVIRONMENTAL CONDITIONS	21deg. C, 55% RH	TESTED BY: Jia 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 is no change compared with the initial operation during the test.



5 PHOTOGRAPHS OF THE TEST CONFIGURATION

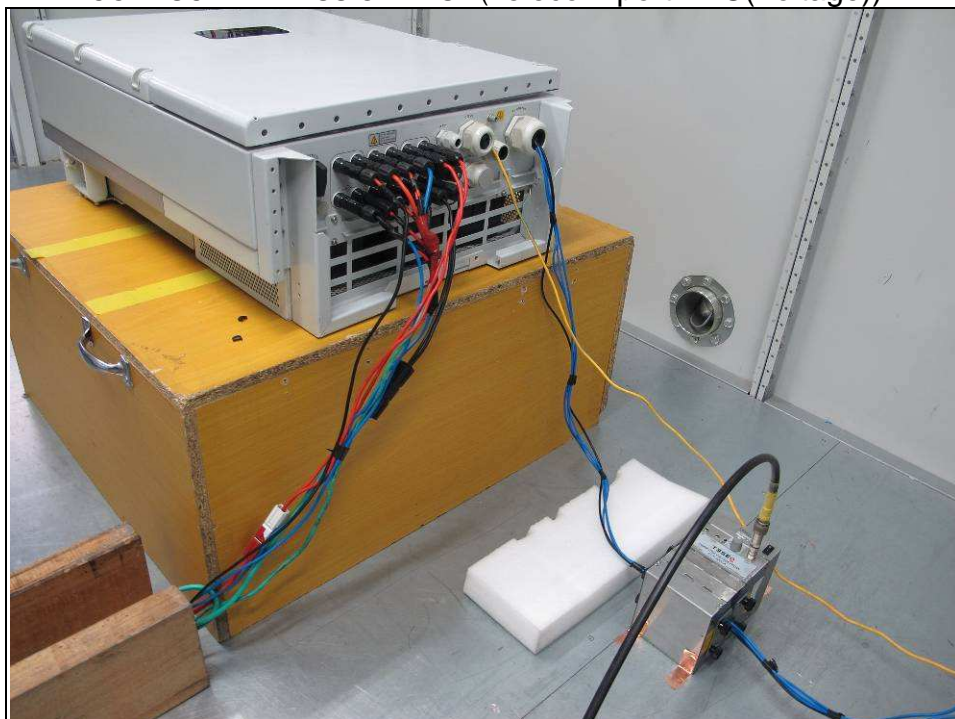
CONDUCTED EMISSION TEST



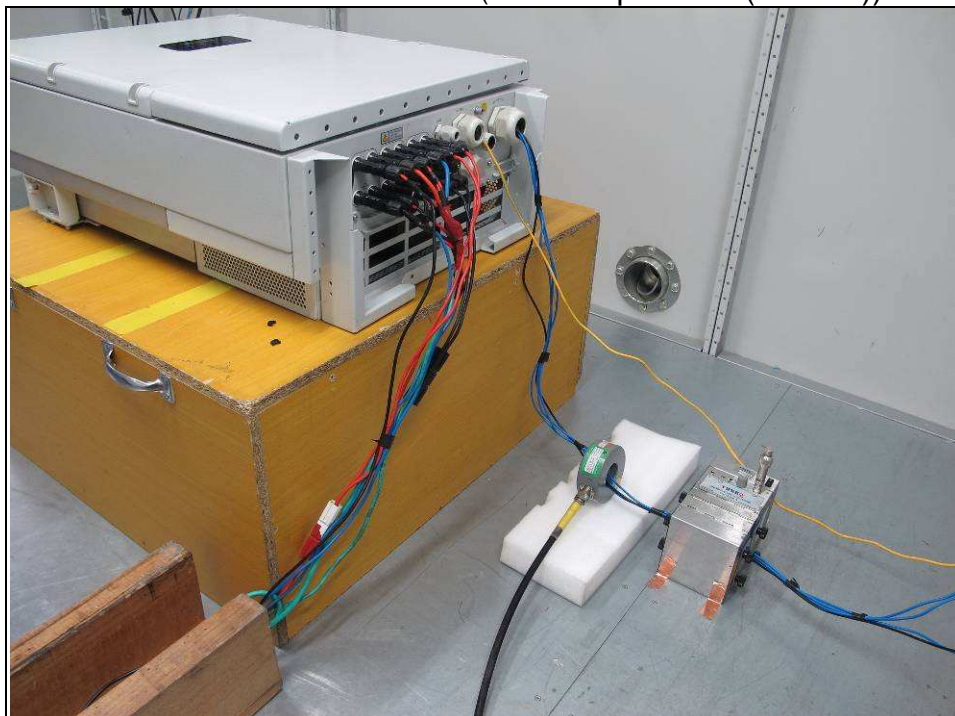
CONDUCTED EMISSION TEST (Telecom port-RS485)



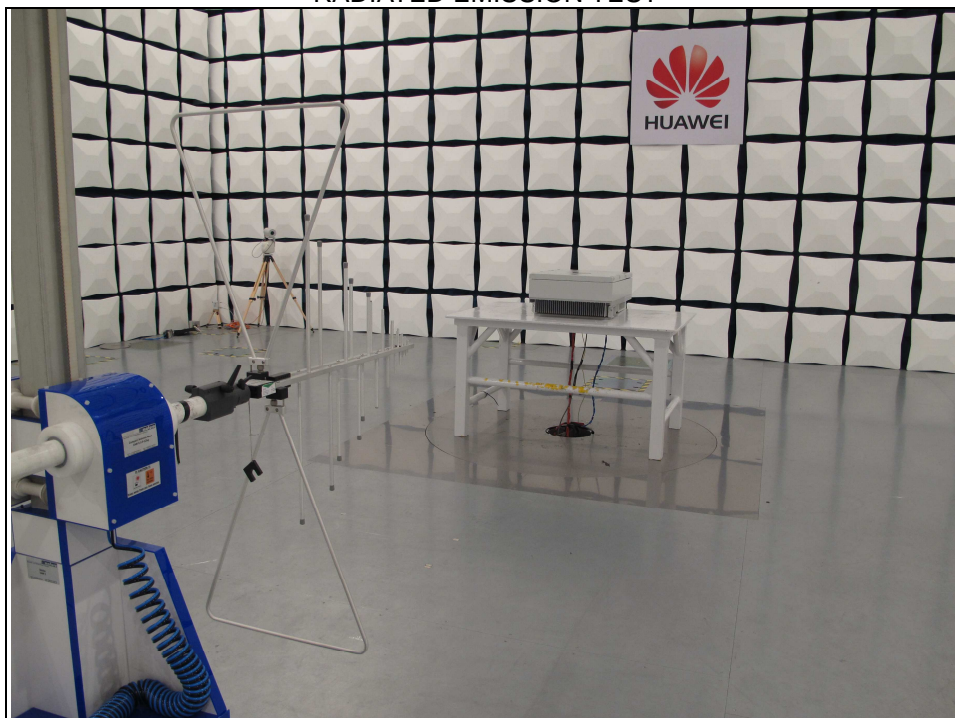
CONDUCTED EMISSION TEST (Telecom port-PLC(Voltage))



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



RADIATED EMISSION TEST





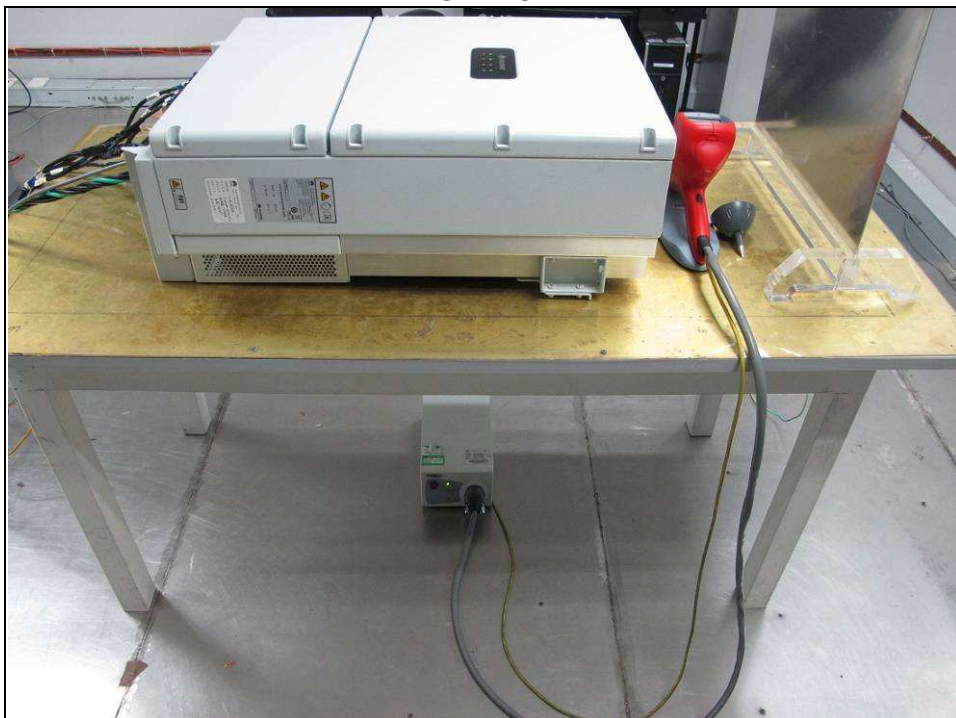
**BUREAU
VERITAS**

Test Report No.: CE150727N017R1

HARMONICS EMISSION TEST & VOLTAGE FLUCTUATIONS AND FLICKER TEST



ESD TEST

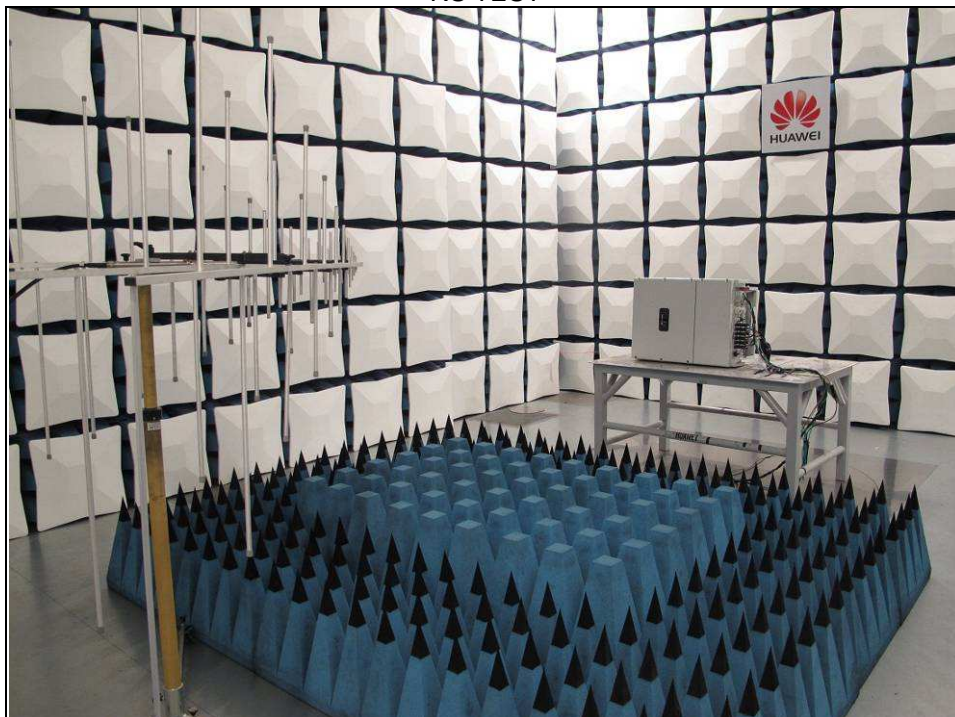


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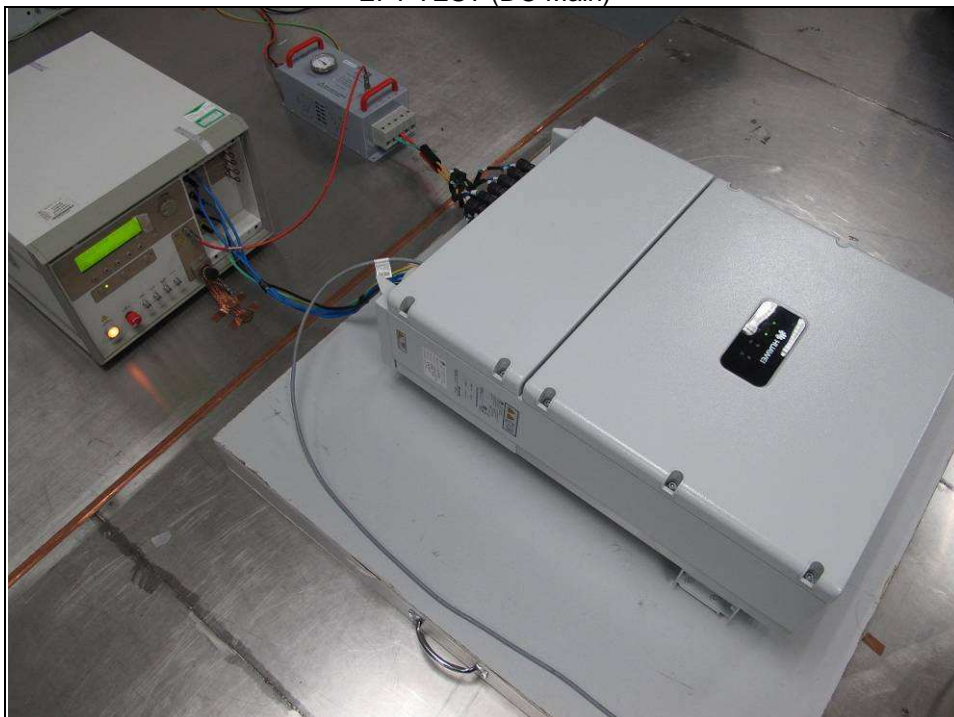
RS TEST



EFT TEST (AC Main)



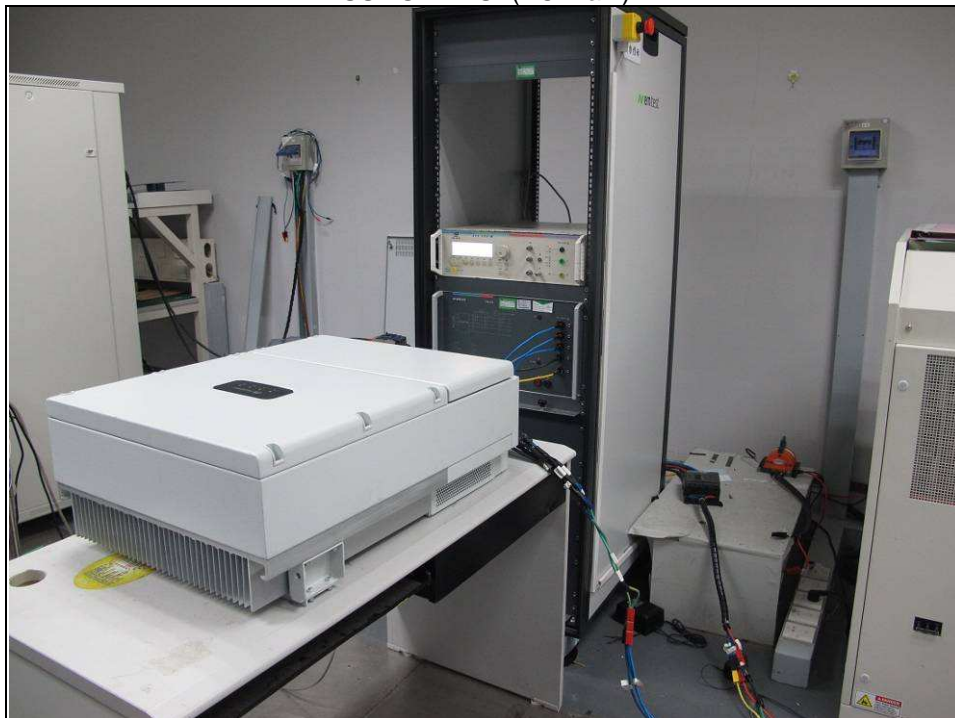
EFT TEST (DC Main)



EFT TEST (485 Cable)



SURGE TEST(AC Main)



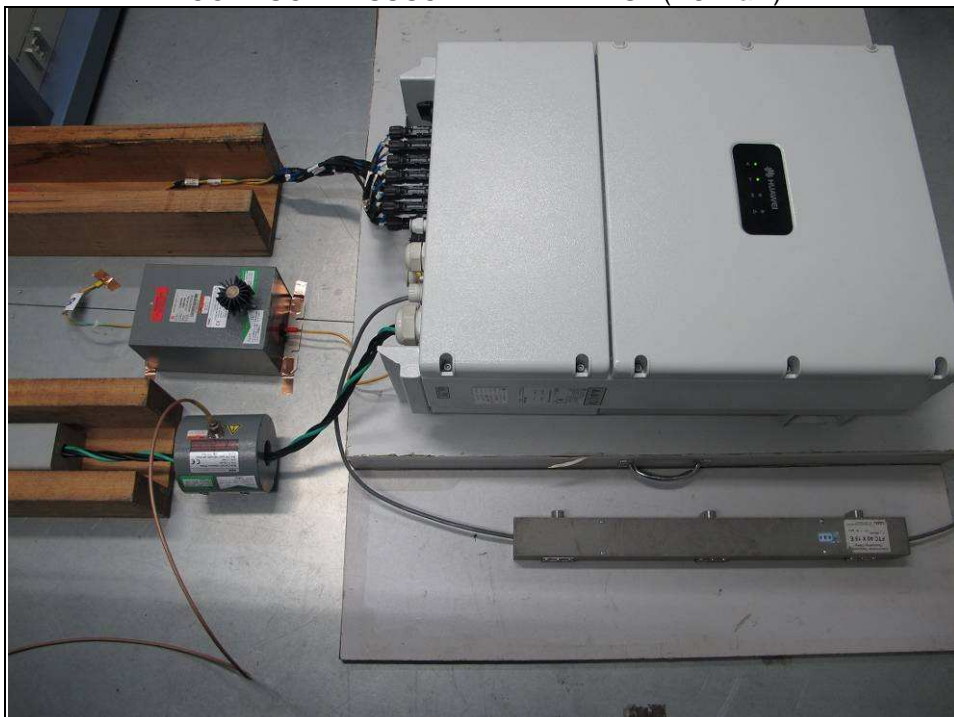
SURGE TEST(DC Main)



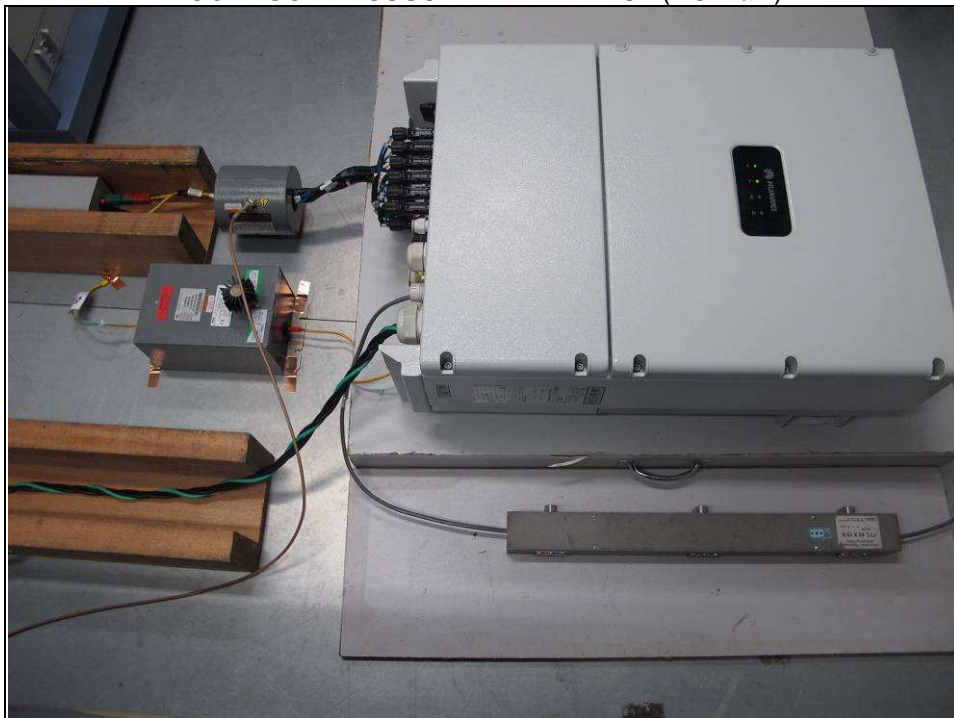
SURGE TEST(485 Cable)



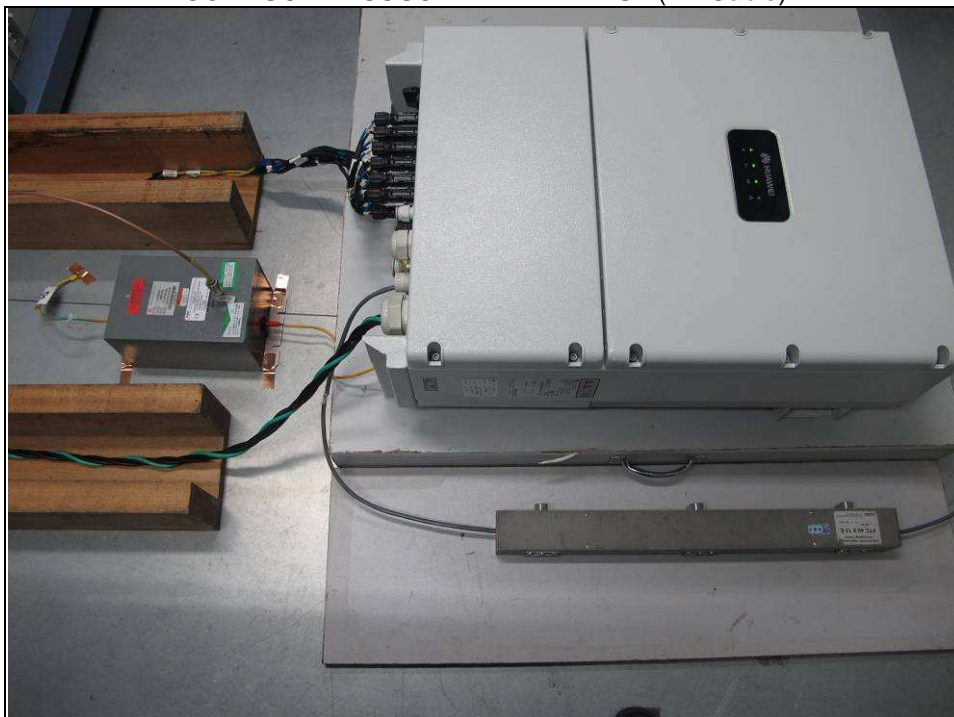
CONDUCTED SUSCEPTIBILITY TEST (AC Main)



CONDUCTED SUSCEPTIBILITY TEST (DC Main)



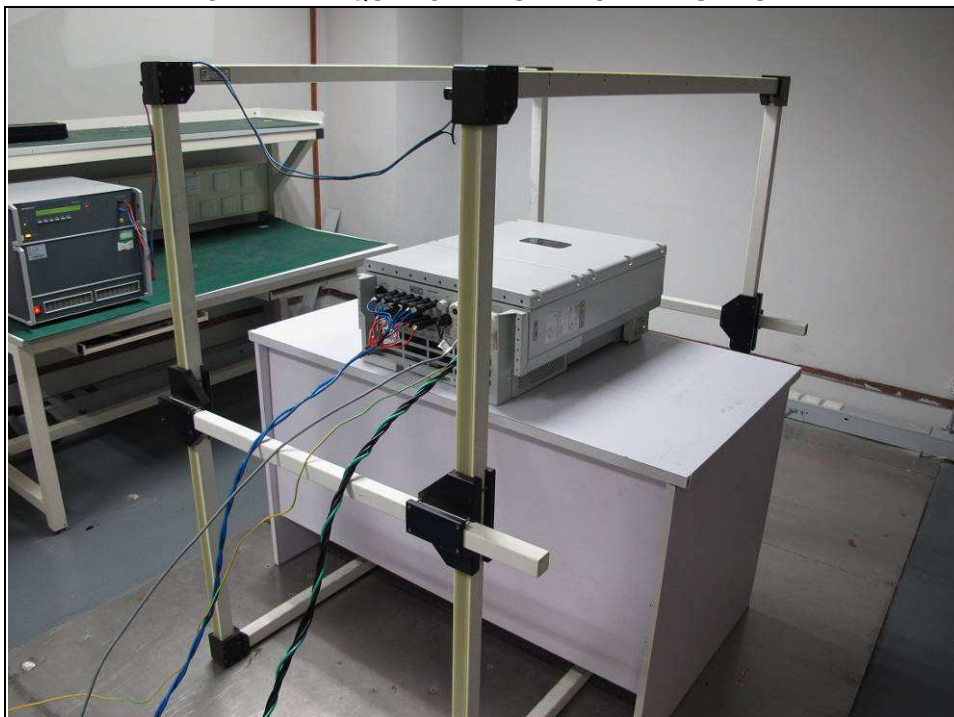
CONDUCTED SUSCEPTIBILITY TEST (PE Cable)



CONDUCTED SUSCEPTIBILITY TEST (485 Cable)



POWER-FREQUENCY MAGNETIC FIELDS TEST





Test Report No.: CE150727N017R1

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---