

Technical Compliance Statement



Ref. No.: ACWE-RC200253 (ACWE-C1W2009044)

For the following equipment

Applicant : JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO., LTD.
Manufacturer : JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO., LTD.
Product : Grid-Tied PV Inverter
Model Number : GW136K-HTH
Brand : GOODWE

We, **AUDIX Technology (Wujiang) Co., Ltd. EMC Dept.** hereby certify that the above product has been tested by us with the listed standards and found in compliance with the council EMC directive 2014/30/EU. The test data & results are issued on the EMC test report No. **ACWE-E2012018**.

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

IEC 61000-6-4:2006+A1:2010 and AS/NZS 61000.6.4: 2012
EN 61000-3-11:2000, EN 61000-3-12:2011+AC:2013
(IEC 61000-3-11:2000, IEC 61000-3-12:2011)

Immunity: EN 61000-6-2:2005

IEC 61000-6-2:2016
(IEC 61000-4-2:2008, IEC 61000-4-3:2006+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)

Dec.29, 2020

Ken Lu/ Vice General Manager

AUDIX Technology (Wujiang) Co., Ltd. EMC Dept.

The statement is based on a single evaluation of one sample of the above-mentioned product. It does not imply an assessment of the whole production and does not permit the use of the test lab logo.

EMC TEST REPORT
For
JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO., LTD.
Grid-Tied PV Inverter
Model No. : GW136K-HTH
Brand: GOODWE

Prepared for
JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO., LTD.
No. 90 Zijin Rd., New District, Suzhou, 215011, China

Prepared by
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Report Number : ACWE-E2012018
Date of Test : Nov.05~Dec.17, 2020
Date of Report : Dec.21, 2020

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APPENDIX Photos of EUT

TEST REPORT VERIFICATION

Applicant : JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO., LTD.
 Manufacturer : JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO., LTD.
 EUT Description : Grid-Tied PV Inverter
 (A) Model No. : GW136K-HTH
 (B) Brand : GOODWE
 (C) Test Voltage : AC 500V, 50Hz; DC 700V

Applicable standards:

**Emission: EN 61000-6-4:2007+A1:2011
 IEC 61000-6-4:2006+A1:2010 and
 AS/NZS 61000.6.4: 2012**
 EN 61000-3-11:2000, EN 61000-3-12:2011+AC:2013
 (IEC 61000-3-11:2000, IEC 61000-3-12:2011)

**Immunity: EN 61000-6-2:2005
 IEC 61000-6-2:2016**
 (IEC 61000-4-2:2008, IEC 61000-4-3:2006+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)

(Note: The EN 61000-6-4:2007+A1:2011 emission measurement results are deemed satisfactory evidence of compliance with AS/NZS 61000.6.4 regulations)

The device described above is tested by Audix Technology (Wujiang) Co., Ltd. EMC Dept. to determine the Maximum emission levels emanating from the device, its ensured severity levels, and performance criterion. This test report contains the measurement results, and Audix Technology (Wujiang) Co., Ltd. EMC Dept. assumes full responsibility for the accuracy and completeness of these measurements. Also, this test report shows that the EUT is technically compliance with the requirements of EN 61000-6 -2, -4 and IEC 61000-6 -2, -4 and EN 61000-3-11, -12 and IEC 610003-11, -12 standards.

This test report applies to above tested sample only and shall not be reproduced in part without written approval of Audix Technology (Wujiang) Co., Ltd. EMC Dept.

Date of Test: Nov.05~Dec.17, 2020

Date of Report: Dec.21, 2020

Prepared by

:

Emma Hu

(Emma Hu/Assistant Administrator)

Approved & Authorized Signer

:

Ken Lu 12/9/20

(Ken Lu/ Vice General Manager)

1 DESCRIPTION OF VERSION

Edition No.	Date of Rev.	Summary	Report No.
0	Dec.21, 2020	Original Report.	ACWE-E2012018

2 SUMMARY OF STANDARDS AND RESULTS

2.1 Description of Standards and Results

The EUT has been tested according to the applicable standards and test results are referred as below.

EMISSION (EN 61000-6-4:2007+A1:2011, IEC 61000-6-4:2016+A1:2010)				
Description of Test Item	Standard	Limits	Results	Remark
Conducted disturbance at main terminal	EN 61000-6-4:2007+A1:2011& IEC 61000-6-4:2006+A1:2010	Table 2	PASS	Minimum passing margin is 7.37dB at 1.122MHz
Conducted common mode disturbance at telecommunication port	EN 61000-6-4:2007+A1:2011& IEC 61000-6-4:2006+A1:2010	Table 3	-	Note
Radiated disturbance	EN 61000-6-4:2007+A1:2011& IEC 61000-6-4:2006+A1:2010	Table 1	PASS	Minimum passing margin is 5.88dB at 30.44MHz
Harmonic current emissions	EN 61000-3-12:2011+AC:2013	Table 2, Rsce=33	PASS	Meets the requirement
	IEC 61000-3-12:2011			
Voltage fluctuations & flicker	EN 61000-3-11:2000	P _{st} =1 dc(%)=3.3% dMax.(%)=4% Tmax>3.3%≤ 500ms	PASS	Meets the requirement
	IEC 61000-3-11:2000			
IMMUNITY (EN 61000-6-2:2005, IEC 61000-6-2:2016)				
Description of Test Item	Basic Standard	Results	Performance Criteria	Observation Criteria
Electrostatic discharge (ESD)	IEC 61000-4-2:2008	PASS	B	A
Radio-frequency, Continuous radiated disturbance	IEC 61000-4-3:2006+A2:2010	PASS	A	A
Electrical fast transient (EFT)	IEC 61000-4-4:2012	PASS	B	A
Surge	IEC 61000-4-5:2014	PASS	B	B
Radio-frequency, Continuous conducted disturbance	IEC 61000-4-6:2013	PASS	A	A

Power frequency magnetic field	IEC 61000-4-8:2009	PASS	A	A
Voltage dips, 100% reduction	IEC 61000-4-11:2004	PASS	B	B
Voltage dips, 30% reduction		PASS	C	A
Voltage dips, 60% reduction		PASS	C	A
Voltage interruptions		PASS	C	B

Note: A port generally intended for interconnection of components of an ITE system under test (e.g. RS-232, RS-485, field buses in the scope of IEC 61158, IEEE Standard 1284 (parallel printer), Universal Serial Bus (USB), IEEE Standard 1394 (“Fire Wire”), etc.) and used in accordance with its functional specifications (e.g. for the maximum length of cable connected to it), is not considered to be a telecommunications port.

2.2 Description of Performance Criteria

The variety and the diversity of the apparatus within the scope of this standard makes it difficult to define precise criteria for the evaluation of the immunity test results.

If, as a result of the application of the tests defined in this standard, the apparatus becomes dangerous or unsafe, the apparatus shall be deemed to have failed the test.

A functional description and a definition of performance criteria, during or as a consequence of the EMC testing, shall be provided by the manufacturer and noted in the test report, based on one of the following criteria for each test as specified in Tables 1 to 4.

2.2.1 Performance 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.

2.2.2 Performance criterion B

The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

2.2.3 Performance criterion C

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

3 GENERAL INFORMATION

3.1 Description of Device (EUT)

Product : Grid-Tied PV Inverter

Model Number : GW136K-HTH

Brand : GOODWE

Applicant : JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO., LTD.
No. 90 Zijin Rd., New District, Suzhou, 215011, China

Manufacturer : JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO., LTD.
No. 90 Zijin Rd., New District, Suzhou, 215011, China

I/O Ports : (1) DC Input port*12
(2) AC Output port*1
(3) COM port*4
(4) WiFi port*1
(5) Switch port*4

Date of Receipt : Sep.15, 2020
of Sample

Date of Test : Nov.05~Dec.17, 2020

3.2 EUT's Specifications under test

Technical Data	GW136K-HTH
Max. DC Input Power	205 · 000W
Max. DC Input Voltage	1100V
MPPT Range	180V~1000V
Min. Start-up Voltage	200V
MPPT Range for Full Load	620V~850V
Nominal DC Input Voltage	750V
Max. Input Current	12×30A
Max. Short Current	12×45A
No. of MPP Trackers	12
No. of Input Strings per Tracker	2
Nominal Output Power	136 · 000W
Max. Output Power	150 · 000W
Max. Output Apparent Power	150 · 000VA
Nominal Output Voltage	500V , 3L/PE
Nominal Output Frequency	50Hz / 60Hz
Max. Output Current	173.2A
Output Power Factor	~1 (Adjustable from 0.8 leading to 0.8 lagging)
Output THDi (@Nominal Output)	<3%
Max. Efficiency	99.0%
Europe Efficiency	98.5%
PV String Current Monitoring	Integrated
Internal Humidity Detection	Integrated
Insulation Resistor Detection	Integrated
Residual Current Monitoring	Integrated
Anti-islanding Protection	Integrated
Input Reverse Polarity Protection	Integrated
DC SPD Protection	Type II (Type I optional)
AC SPD Protection	Type II (Type I optional)
Output Over Current Protection	Integrated
Output Short Protection	Integrated
Output Over Voltage Protection	Integrated
Arc Fault Protection	Optional
Emergency Power off	Optional
AC Terminal Over-temperature Protection	Optional
PID Recovery	Optional
Operating Temperature Range	- 30°C ~ 60°C
Relative Humidity	0~100%
Operating Altitude	≤ 4000m
Cooling	Fan Cooling
Display	LED(Standard), LCD(Optional) ,Bluetooth+APP
Communication	RS485 & PLC
Weight	98.5kg
Dimensions (W×H×D)	1005 × 676 × 340 mm
Protection Degree	IP66
Night Self Consumption	<2W
Topology	Transformerless

3.3 Operating Condition of EUT

- 3.3.1 Set up the EUT as showed each respective block diagram of test setup.
- 3.3.2 Turn on all equipment.
- 3.3.3 Adjust the output of the DC power supply which made the EUT working in Full load and Half load for EMI test, 10% load for EMS test.

3.4 Tested Supporting System Details (AE)

3.4.1 Programmable DC Power Supply

Manufacturer/Brand : Chroma
 Model Number : 62150H-1000S
 Serial Number : 62150EF00756

3.5 Description of Test Facility

Name of Firm #1 : **Audix Technology (Wujiang) Co., Ltd. EMC Dept.**
 Site Location : No. 1289, Jiangxing East Road, the Eastern Part of Wujiang Economic Development Zone, Jiangsu, China 215200
 Test Facilities : **No.1 10m Semi-anechoic Chamber
The Complex Immunity Test Room
RS & CS Test Room**
 NVLAP Lab Code : 200786-0
 Valid until on Sep. 30, 2021
 (NVLAP is a signatory member of ILAC MRA)
 Remark: This report shall not be imply endorsement, certification or approval by NVLAP, NIST, or any agency of the U.S. Federal Government.
 Name of Firm #2 : **Testing & Inspection Center of New United Group Co., Ltd.**
 Site Location : No.199, South Fenglin Road, Hi-Tech Industrial Zone, Wujin District, Changzhou, Jiangsu, China
 Test Item : Conducted disturbance measurement
 Radiated disturbance measurement

3.6 Measurement Uncertainty

Test Item	Range Frequency	Uncertainty
At 10m Semi-Anechoic Chamber(New United Group)		
Radiated Disturbance Measurement	30MHz~1GHz	4.5 dB
At 10m Semi-Anechoic Chamber		
Radiated Disturbance Measurement (Distance: 3m)	1GHz~6GHz	$\pm 5.66\text{dB}$

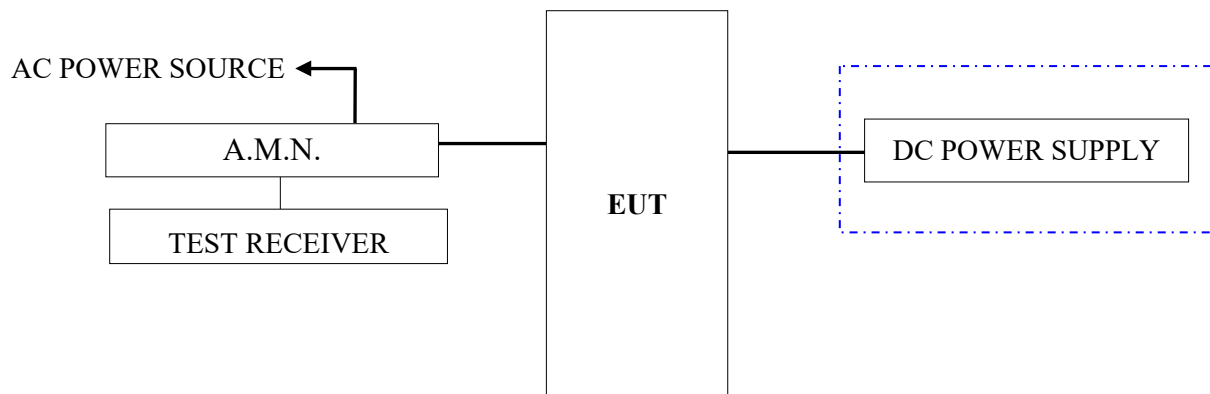
4 CONDUCTED DISTURBANCE MEASUREMENT

4.1 Test Equipment

The following test equipments were used during the conducted emission measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	Test Receiver	ROHDE& SCHWARZ	ESW8	DA-081	2020-12-16	1 Year
2.	A.M.N.	SCHWARZBECK	NNLK 8130	DA-021	2020-09-17	1 Year

4.2 Block Diagram of Test Setup



— : POWER LINE
 — : SIGNAL LINE

4.3 Limits for Conducted Disturbance Voltage

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level	Average Level
EN61000-6-4		
0.15MHz~0.5MHz	79 dB μ V	66 dB μ V
0.5MHz~30MHz	73 dB μ V	60 dB μ V

- Remark 1. If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary.
2. The lower limit applies at the band edges.

4.4 Test Procedure

The measuring process is according to EN 61000-6-4:2007+A1:2011 (IEC 61000-6-4:2016+A1:2010), and laboratory internal procedure TKC-301-004.

In the conducted emission measurement, the EUT and all peripheral devices were set up on a non-metallic table which was 0.8 meter height above the ground plane, and 0.4 meter far away from the vertical plane. The mains cable of the EUT connected to one Artificial Main Network (AMN). All other unit of the EUT and AE connected to a second Line Impedance Stabilization Network (L.I.S.N.). The telecommunication cable connected to the AE through an Impedance Stabilization Network (ISN) which terminated a 50Ω resistor. For the measurement, the A.M.N measuring port was terminated by a 50Ω measuring equipment and the second L.I.S.N measuring port was terminated by a 50Ω terminator. All measurements were done between the phase lead and the reference ground, and between the neutral lead and the reference ground. All cables or wires placement were verified to find out the maximum emission.

The bandwidth of measuring receiver was set at 9 kHz.

The required frequency band (0.15 MHz ~ 30 MHz) was pre-scanned with peak detector; the final measurement was measured with quasi-peak detector and average detector.

The emission level is calculated automatically by the test system which uses the following equation:

Emission level (dBμV) = Reading (dBμV) + A.M.N /I.S.N factor (dB) + Cable loss (dB).
(Cable loss includes Pulse Att + Switch + Cable)

4.5 Measurement Results

PASSED.

EUT with the following test modes were performed during this section testing and all the test results are listed in next pages.

Test Date: Dec.16, 2020

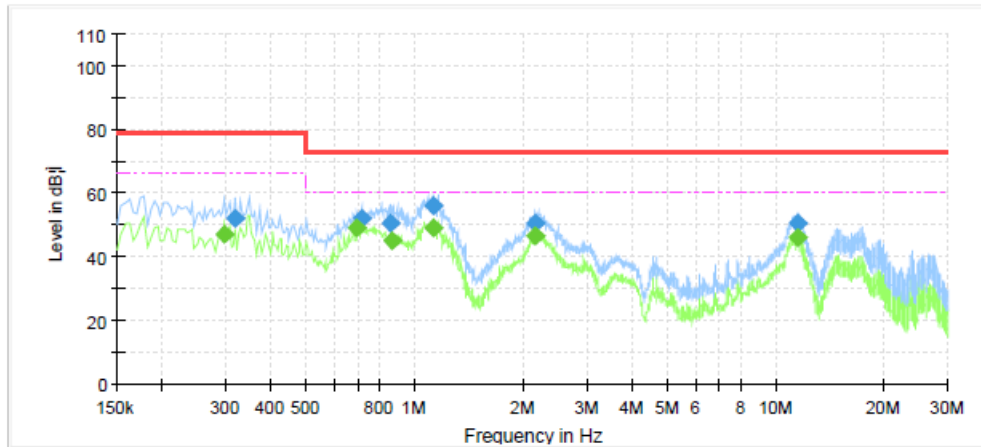
Temperature: 21.4°C

Humidity: 48%

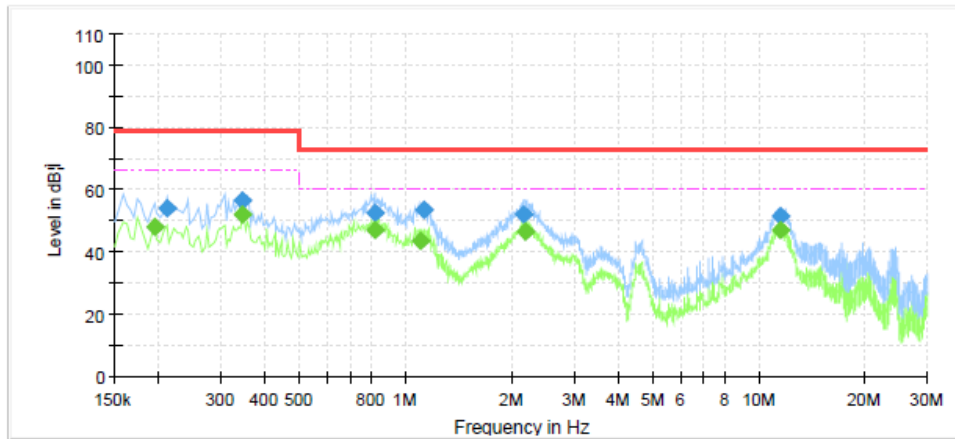
Item	Test Condition
1	AC Full Load
2	AC Half Load

NOTE 1 - ‘※’means the worst test mode.

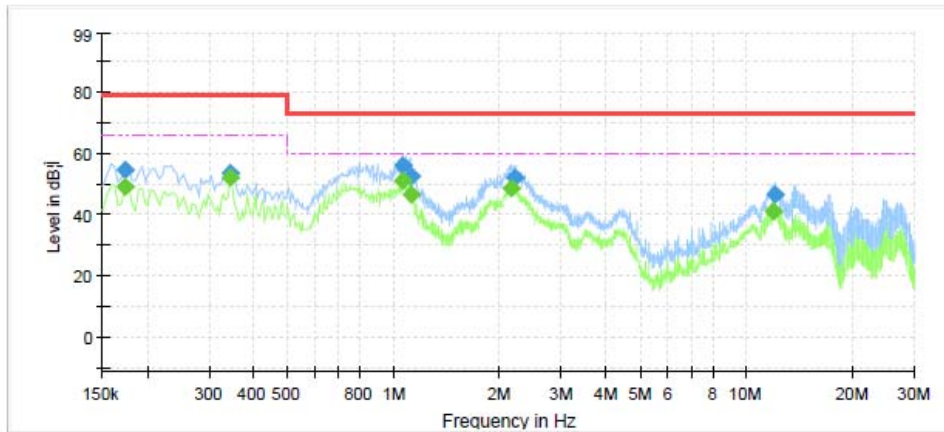
NOTE 2 - The worst emission is detected at 1.066MHz with with AV detector(limit is 60.00 dB (μV), when the Line3 of the EUT is connected to A.M.N.

Full Spectrum**Final Result**

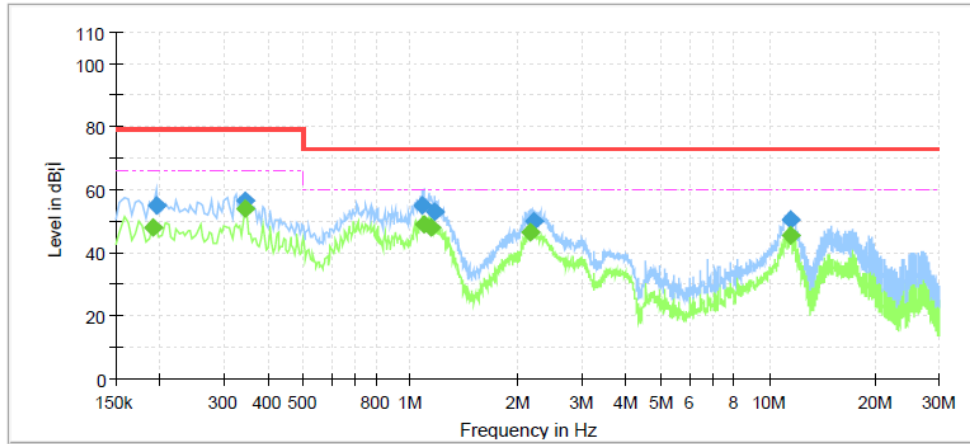
Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Line	Comment
0.298000	---	47.16	66.00	18.84	1000.0	L1	18:03:33 - 2020/12/16
0.318000	51.81	---	79.00	27.19	1000.0	L1	18:03:00 - 2020/12/16
0.694000	---	48.77	60.00	11.23	1000.0	L1	18:03:37 - 2020/12/16
0.714000	51.81	---	73.00	21.19	1000.0	L1	18:03:06 - 2020/12/16
0.858000	50.34	---	73.00	22.66	1000.0	L1	18:03:12 - 2020/12/16
0.870000	---	45.19	60.00	14.81	1000.0	L1	18:03:40 - 2020/12/16
1.122000	55.85	---	73.00	17.15	1000.0	L1	18:03:17 - 2020/12/16
1.122000	---	49.16	60.00	10.84	1000.0	L1	18:03:44 - 2020/12/16
2.166000	---	46.26	60.00	13.74	1000.0	L1	18:03:48 - 2020/12/16
2.170000	50.74	---	73.00	22.26	1000.0	L1	18:03:23 - 2020/12/16
11.486000	---	46.05	60.00	13.95	1000.0	L1	18:03:51 - 2020/12/16
11.566000	50.66	---	73.00	22.34	1000.0	L1	18:03:29 - 2020/12/16

Full Spectrum**Final Result**

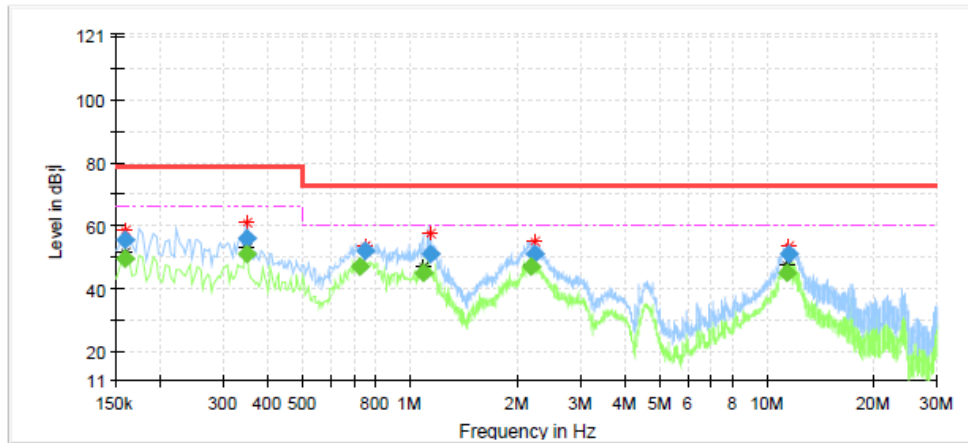
Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Line	Comment
0.194000	---	48.16	66.00	17.84	1000.0	L2	17:57:32 - 2020/12/16
0.210000	53.76	---	79.00	25.24	1000.0	L2	17:56:59 - 2020/12/16
0.346000	---	52.14	66.00	13.86	1000.0	L2	17:57:36 - 2020/12/16
0.346000	56.31	---	79.00	22.69	1000.0	L2	17:57:05 - 2020/12/16
0.818000	---	47.05	60.00	12.95	1000.0	L2	17:57:39 - 2020/12/16
0.818000	52.73	---	73.00	20.27	1000.0	L2	17:57:11 - 2020/12/16
1.102000	---	43.62	60.00	16.38	1000.0	L2	17:57:43 - 2020/12/16
1.126000	53.58	---	73.00	19.42	1000.0	L2	17:57:16 - 2020/12/16
2.170000	51.92	---	73.00	21.08	1000.0	L2	17:57:22 - 2020/12/16
2.194000	---	46.47	60.00	13.53	1000.0	L2	17:57:47 - 2020/12/16
11.486000	---	47.23	60.00	12.77	1000.0	L2	17:57:51 - 2020/12/16
11.526000	51.75	---	73.00	21.25	1000.0	L2	17:57:28 - 2020/12/16

Full Spectrum**Final Result**

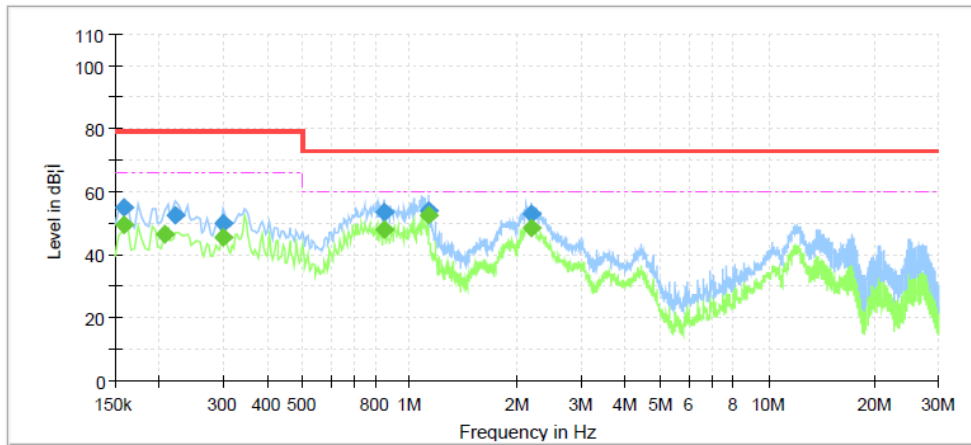
Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Line	Comment
0.174000	---	48.84	66.00	17.16	1000.0	L3	17:52:11 - 2020/12/16
0.174000	54.56	---	79.00	24.44	1000.0	L3	17:51:39 - 2020/12/16
0.346000	---	51.78	66.00	14.22	1000.0	L3	17:52:15 - 2020/12/16
0.346000	53.39	---	79.00	25.61	1000.0	L3	17:51:45 - 2020/12/16
1.066000	56.18	---	73.00	16.82	1000.0	L3	17:51:51 - 2020/12/16
1.066000	---	51.20	60.00	8.80	1000.0	L3	17:52:19 - 2020/12/16
1.122000	52.45	---	73.00	20.55	1000.0	L3	17:51:56 - 2020/12/16
1.122000	---	46.30	60.00	13.70	1000.0	L3	17:52:22 - 2020/12/16
2.146000	---	48.39	60.00	11.61	1000.0	L3	17:52:26 - 2020/12/16
2.214000	51.99	---	73.00	21.01	1000.0	L3	17:52:02 - 2020/12/16
11.990000	---	40.79	60.00	19.21	1000.0	L3	17:52:30 - 2020/12/16
12.014000	46.31	---	73.00	26.69	1000.0	L3	17:52:08 - 2020/12/16

Full Spectrum**Final Result**

Frequency (MHz)	QuasiPeak (dB μ V)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Meas. Time (ms)	Line	Comment
0.190000	---	48.00	66.00	18.00	1000.0	L1	17:39:11 - 2020/12/16
0.194000	54.84	---	79.00	24.16	1000.0	L1	17:38:39 - 2020/12/16
0.346000	---	53.97	66.00	12.03	1000.0	L1	17:39:14 - 2020/12/16
0.346000	56.28	---	79.00	22.72	1000.0	L1	17:38:44 - 2020/12/16
1.082000	55.25	---	73.00	17.75	1000.0	L1	17:38:50 - 2020/12/16
1.086000	---	49.21	60.00	10.79	1000.0	L1	17:39:18 - 2020/12/16
1.146000	---	48.10	60.00	11.90	1000.0	L1	17:39:22 - 2020/12/16
1.166000	52.90	---	73.00	20.10	1000.0	L1	17:38:56 - 2020/12/16
2.162000	---	46.30	60.00	13.70	1000.0	L1	17:39:26 - 2020/12/16
2.218000	50.22	---	73.00	22.78	1000.0	L1	17:39:01 - 2020/12/16
11.474000	50.30	---	73.00	22.70	1000.0	L1	17:39:07 - 2020/12/16
11.486000	---	45.50	60.00	14.50	1000.0	L1	17:39:30 - 2020/12/16

Full Spectrum**Final Result**

Frequency (MHz)	QuasiPeak (dB; I V)	Average (dB; I V)	Limit (dB; I V)	Margin (dB)	Meas. Time (ms)	Line	Comment
0.158000	---	49.57	66.00	16.43	1000.0	L2	17:23:53 - 2020/12/16
0.158000	55.64	---	79.00	23.36	1000.0	L2	17:22:29 - 2020/12/16
0.350000	---	51.21	66.00	14.79	1000.0	L2	17:23:57 - 2020/12/16
0.350000	55.80	---	79.00	23.20	1000.0	L2	17:22:47 - 2020/12/16
0.726000	---	46.96	60.00	13.04	1000.0	L2	17:24:00 - 2020/12/16
0.746000	51.80	---	73.00	21.20	1000.0	L2	17:23:31 - 2020/12/16
1.090000	---	44.91	60.00	15.09	1000.0	L2	17:24:04 - 2020/12/16
1.146000	51.16	---	73.00	21.84	1000.0	L2	17:23:37 - 2020/12/16
2.194000	---	46.81	60.00	13.19	1000.0	L2	17:24:08 - 2020/12/16
2.222000	51.22	---	73.00	21.78	1000.0	L2	17:23:44 - 2020/12/16
11.442000	---	45.24	60.00	14.76	1000.0	L2	17:24:11 - 2020/12/16
11.546000	51.05	---	73.00	21.95	1000.0	L2	17:23:49 - 2020/12/16

Full Spectrum**Final Result**

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Line	Comment
0.158000	---	49.28	66.00	16.72	1000.0	L3	17:46:28 - 2020/12/16
0.158000	54.82	---	79.00	24.18	1000.0	L3	17:45:56 - 2020/12/16
0.206000	---	46.67	66.00	19.33	1000.0	L3	17:46:31 - 2020/12/16
0.222000	52.59	---	79.00	26.41	1000.0	L3	17:46:02 - 2020/12/16
0.302000	50.20	---	79.00	28.80	1000.0	L3	17:46:07 - 2020/12/16
0.302000	---	45.63	66.00	20.37	1000.0	L3	17:46:35 - 2020/12/16
0.846000	53.49	---	73.00	19.51	1000.0	L3	17:46:13 - 2020/12/16
0.846000	---	48.00	60.00	12.00	1000.0	L3	17:46:39 - 2020/12/16
1.122000	---	52.63	60.00	7.37	1000.0	L3	17:46:43 - 2020/12/16
1.126000	54.17	---	73.00	18.83	1000.0	L3	17:46:18 - 2020/12/16
2.182000	53.10	---	73.00	19.90	1000.0	L3	17:46:24 - 2020/12/16
2.186000	---	48.63	60.00	11.37	1000.0	L3	17:46:46 - 2020/12/16

5 RADIATED DISTURBANCE MEASUREMENT

5.1 Test Equipment

The following test equipments were used during the radiated emission measurement:

5.1.1 For Frequency Range 30MHz~1GHz(At New United Group 10m Semi-Anechoic Chamber)

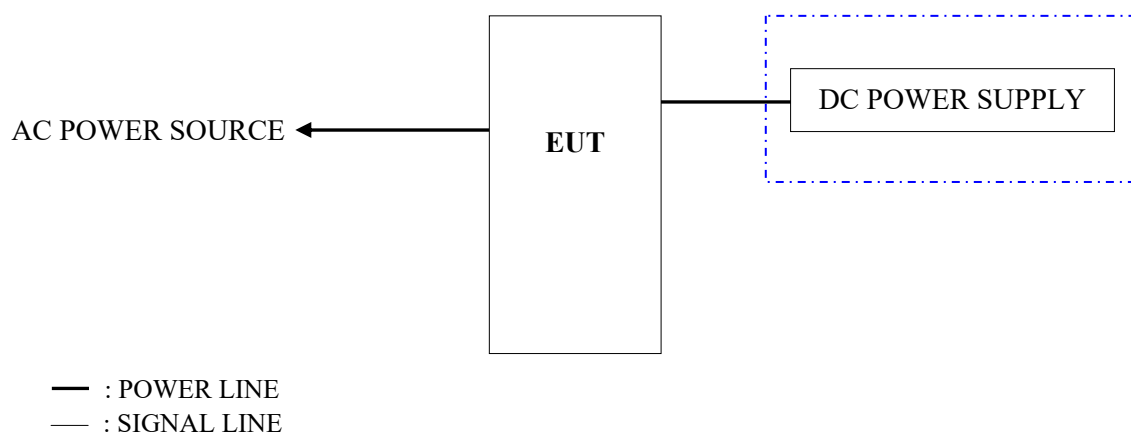
Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	Bi-log Antenna	ROHDE&SCHWARZ	HL562	DA-006	2020-05-20	1 Year
2.	Test Receiver	ROHDE&SCHWARZ	ESW8	DA-081	2020-12-16	1 Year
3.	Pre-Amplifier	SCHAFFNER	LNA6900	DA-036	2020-01-06	1 Year

5.1.2 For Frequency Range above 1GHz(At Audix 10m Semi-Anechoic Chamber)

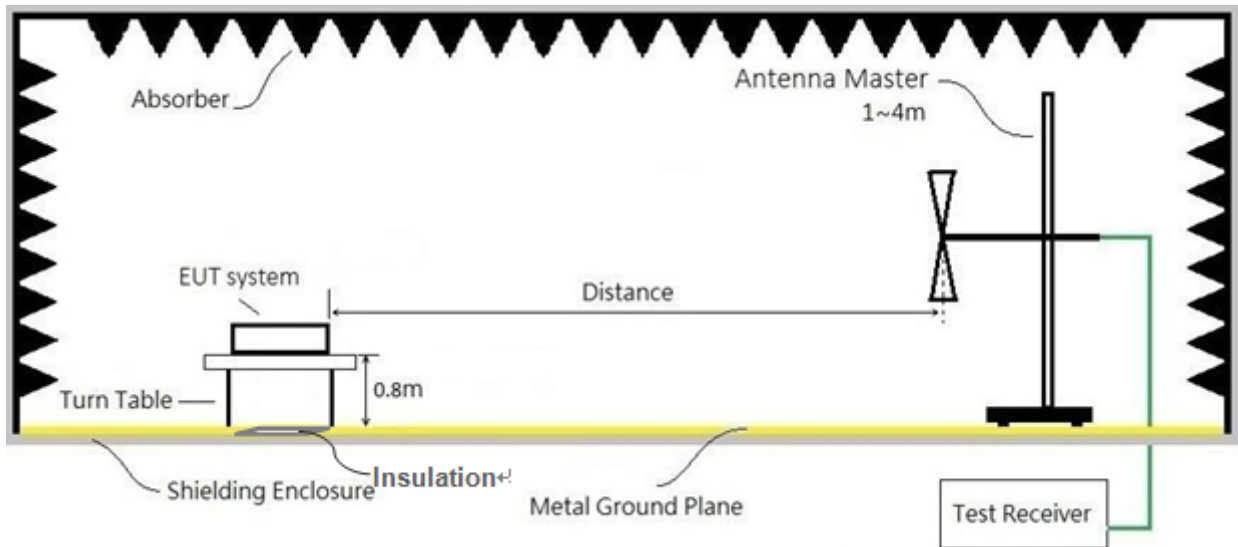
Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. period
1.	PXA signal analyzer	Agilent	N9030A	MY53120217	2020-04-07	1 Year
2.	Microwave Amplifier	Agilent	8449B	3008A02232	2020-04-03	1 Year
3.	Horn Antenna	ETS	3115	00062959	2020-03-16	1 Year
4.	RF Cable	Chengyi	EMC104-SF-NM-1000+5000	190934+190935	2020-10-27	1 Year
5.	Software	Audix/e3(9.160323)				

5.2 Block Diagram of Test Setup

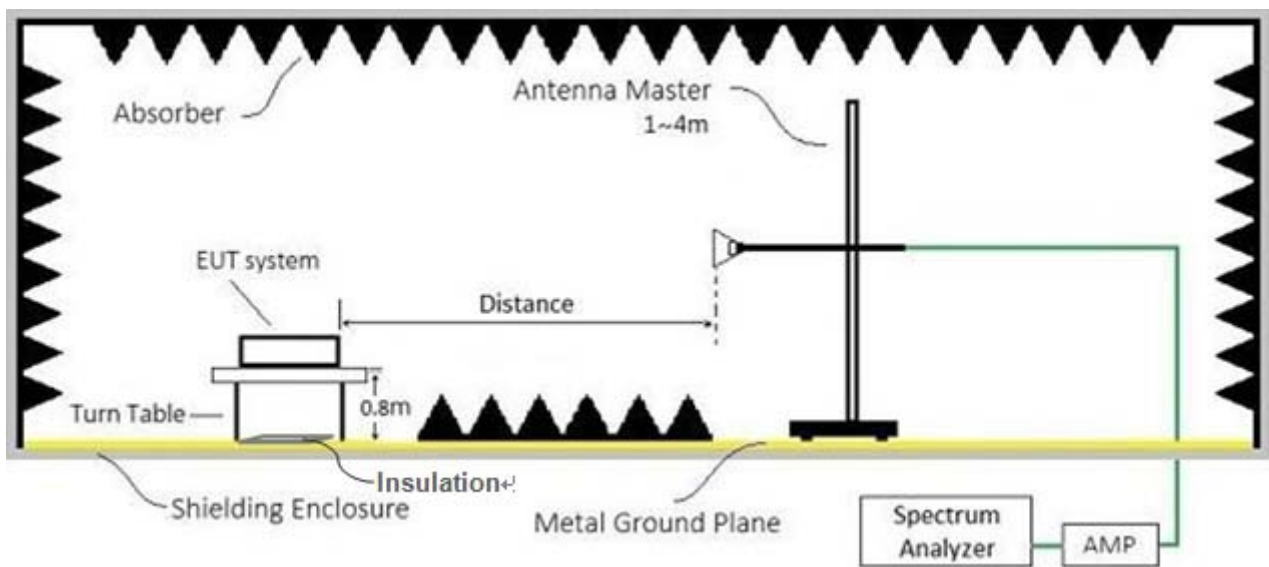
5.2.1 Block Diagram of connection between EUT and simulators



5.2.2 10m Semi-Anechoic Chamber Setup Diagram (Test distance: 10m)
For 30MHz~1GHz



5.2.3 10m Semi-Anechoic Chamber Setup Diagram (Test distance: 3m)
For Above 1GHz



5.3 Limits for Radiated Disturbance

5.3.1 Limits for Radiated Disturbance (30MHz~1GHz)

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT (dB μ V/m)
EN61000-6-4		
30 ~ 230	10	40
230 ~ 1000	10	47

Note: (1) The tighter limit shall apply at the edge between two frequency bands.

(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the E.U.T.

5.3.2 Limits for Radiated Disturbance (Above 1GHz for EN61000-6-4)

FREQUENCY (GHz)	DISTANCE (Meters)	AVERAGE LIMIT (dB μ V/m)	PEAK LIMIT (dB μ V/m)
1~ 3	3	56	76
3~ 6	3	60	80

Note: The lower limit applies at the transition frequency.

5.4 Test Procedure

The measuring process is according to the standard of EN 61000-6-4:2007+A1:2011(IEC 61000-6-4:2016+A1:2010) and laboratory internal procedure TKC-301-001.

In the radiated disturbance measurement, the EUT and all simulators were set up on a non-metallic turn table which was 0.8 meter above the ground plane. Measurement distance between EUT and receiving antennas was set at 10 meters at 30MHz~1GHz and 3 meters at 1GHz~6GHz. The measurement distance is the shortest horizontal distance between an imaginary circular periphery which consists of EUT periphery and cables and the reference point of the antenna. During the radiated measurement, the EUT was rotated 360° and receiving antennas were moved from 1 ~ 4 meters for finding maximum emission. Two receiving antennas were used for both horizontal and vertical polarization detection for 30MHz~1GHz, One receiving antennas was used for both horizontal and vertical polarization detection for 1GHz~6GHz (the absorbing material was added when testing of 1GHz~6GHz was done). All cables or wires placement were verified to find out the maximum emission.

The bandwidth of measuring receiver (or spectrum analyzer) was set to:

RBW (120kHz), VBW (300kHz) for QP detector below 1GHz
 RBW (1MHz), VBW (1MHz) for Peak detector above 1GHz
 RBW (1MHz), VBW (1Hz) for Average detector above 1GHz

which is defined against CISPR16-1-1 section.

The required frequency band (30MHz ~ 6GHz) was pre-scanned with peak detector; all final measurements were measured with quasi-peak detector below 1GHz, measured with average detector and peak detector above 1GHz.

The emission level is calculated automatically by the test system which uses the following equation:

1. For 30MHz~1GHz measurement:

$$\text{Emission Level (dB}\mu\text{V/m)} = \text{Reading (dB}\mu\text{V)} + \text{Antenna Factor (dB/m)} + \text{Cable Loss(dB)} \\ - \text{Pre-amplifier factor (dB}\mu\text{V)}$$

2. For 1GHz~6GHz measurement:

$$\text{Emission Level (dB}\mu\text{V/m)} = \text{Reading (dB}\mu\text{V)} + \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} - \text{Pre-amplifier factor (dB}\mu\text{V)}$$

In chapter 7.6.6.1 the standard EN 55016-2-3 requires to include the values of w in the test report: “ w : The dimension of the line tangent to the EUT formed by θ_{3dB} at the measurement distance d . Equation (10) shall be used to calculate w for each actual antenna and measurement distance used. The values of w shall be included in the test report. This calculation may be based on the manufacturer-provided receive-antenna beamwidth specifications:

$$w = 2 \times d \times \tan(0,5 \times \theta_{3dB})$$

Frequency	3115 Horn	
GHz	θ_{3dB}	d=3m
	(°)	w (M)
1.00	66	3.90
2.00	54	3.06
4.00	50	2.80
6.00	34	1.83

The values of w . are greater than chapter 7.6.6.1 of Table 2, the minimum dimension of w . (W_{min}) requirements.

5.5 Measurement Results

PASSED.

The details of test modes and reference test data are as follows:

5.5.1 For 30MHz~1GHz frequency range

Item	Test Condition
1	Full Load
2	Half Load

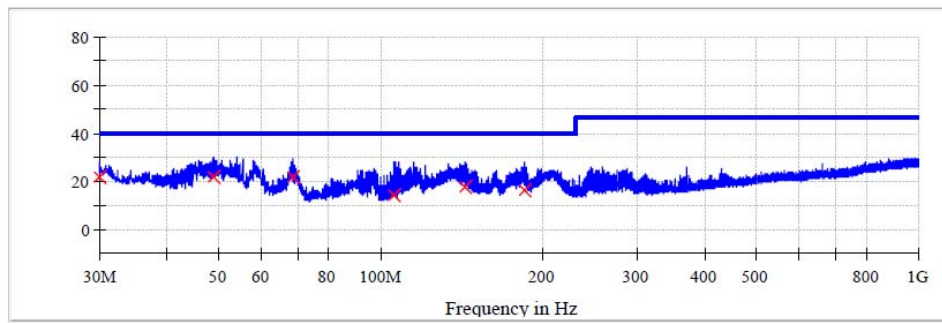
NOTE 1 - ‘※’ means the worst test mode.

NOTE 2 - 0° was the table front facing the antenna. Degree is calculated from 0° clockwise facing the antenna.

NOTE 3 - The worst emission at horizontal polarization was detected at 52.48MHz with limit of 40.00dB μ V/m. The worst emission at vertical polarization was detected at 30.44MHz with limit of 40.00dB μ V/m.

EMI Auto Test(7)

1 / 1

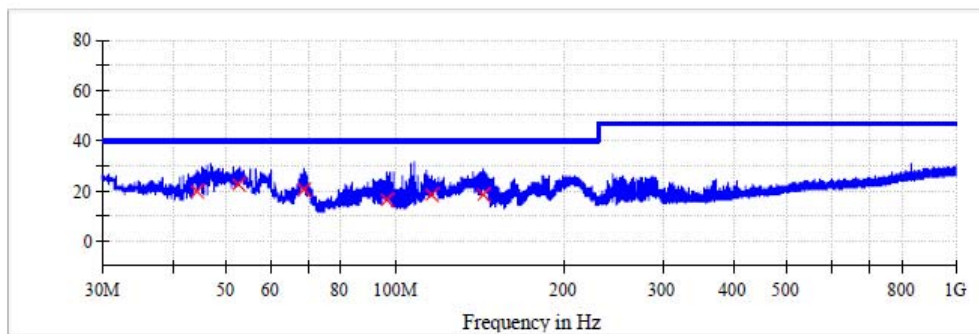
**Final Result**

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.000000	21.86	40.00	18.14	3000.0	120.000	400.	H	270.0	1.4
48.760000	22.03	40.00	17.97	3000.0	120.000	400.	H	180.0	-8.4
68.680000	21.70	40.00	18.30	3000.0	120.000	400.	H	90.0	-10.6
105.680000	14.01	40.00	25.99	3000.0	120.000	400.	H	90.0	-6.8
143.280000	17.93	40.00	22.07	3000.0	120.000	400.	H	0.0	-7.8
185.320000	16.36	40.00	23.64	3000.0	120.000	400.	H	90.0	-7.3

(continuation of the "Final_Result" table from column 16 ...)

EMI Auto Test(7)

1 / 1

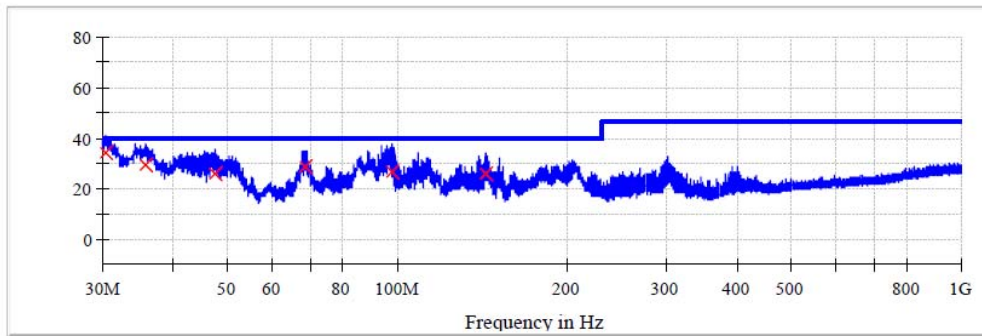
**Final Result**

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
44.360000	19.99	40.00	20.01	3000.0	120.000	400.	H	90.0	-6.1
52.480000	22.24	40.00	17.76	3000.0	120.000	400.	H	180.0	-10.2
68.640000	20.21	40.00	19.79	3000.0	120.000	400.	H	180.0	-10.7
96.640000	16.34	40.00	23.66	3000.0	120.000	400.	H	0.0	-7.3
116.320000	18.08	40.00	21.92	3000.0	120.000	400.	H	180.0	-6.6
143.200000	18.15	40.00	21.85	3000.0	120.000	400.	H	0.0	-7.8

(continuation of the "Final_Result" table from column 16 ...)

EMI Auto Test(7)

1 / 1



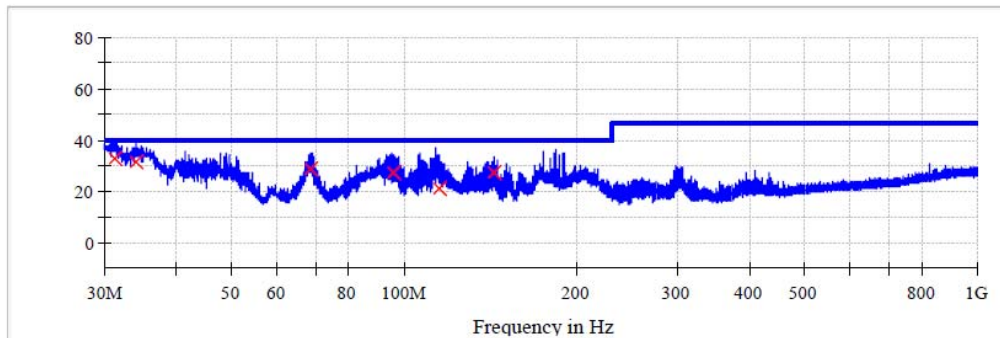
Final_Result

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.440000	34.12	40.00	5.88	3000.0	120.000	100.	V	90.0	1.2
35.920000	29.58	40.00	10.42	3000.0	120.000	100.	V	0.0	-1.6
47.440000	25.71	40.00	14.29	3000.0	120.000	100.	V	0.0	-7.7
68.800000	28.91	40.00	11.09	3000.0	120.000	100.	V	270.0	-10.6
98.000000	26.51	40.00	13.49	3000.0	120.000	100.	V	0.0	-7.2
143.440000	25.85	40.00	14.15	3000.0	120.000	100.	V	270.0	-7.8

(continuation of the "Final_Result" table from column 16 ...)

EMI Auto Test(7)

1 / 1



Final_Result

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
31.360000	33.20	40.00	6.80	3000.0	120.000	100.	V	0.0	0.7
34.160000	31.53	40.00	8.47	3000.0	120.000	100.	V	0.0	-0.7
68.640000	28.81	40.00	11.19	3000.0	120.000	100.	V	270.0	-10.7
95.560000	27.44	40.00	12.56	3000.0	120.000	100.	V	270.0	-7.4
115.160000	21.40	40.00	18.60	3000.0	120.000	100.	V	0.0	-6.6
143.680000	27.40	40.00	12.60	3000.0	120.000	100.	V	270.0	-7.8

(continuation of the "Final_Result" table from column 16 ...)

5.5.2 For 1GHz~6GHz frequency range

Test Date: Dec.06, 2020

Temperature: 21°C

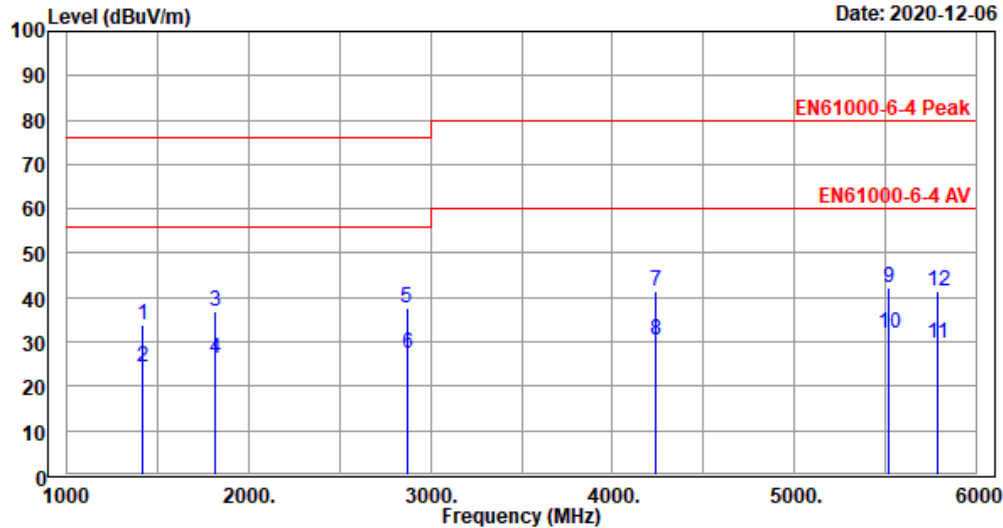
Humidity: 52%

Item	Test Condition	Reference Test Data No.	
		Horizontal	Vertical
1	Full Load	# 2	# 1
2	Half Load	# 3	# 4



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File: H:\TEST DATA\2020\Report\1W2009044\1W2009044_00002.EMI



Site NO. : 10M Chamber
AMN/LISN : 3115-959-2003
Limit : EN61000-6-4 Peak
Env. / Ins. : 21°C&52% /N9030A
EUT : Grid-Tied PV Inverter
M/N : GW136K-HTH
Power Rating : 700Vdc,500Vac/50Hz
Test Mode : Full Load
Memo :

phase.: Horizontal Data NO.:2
Engineer : jiaohuliang

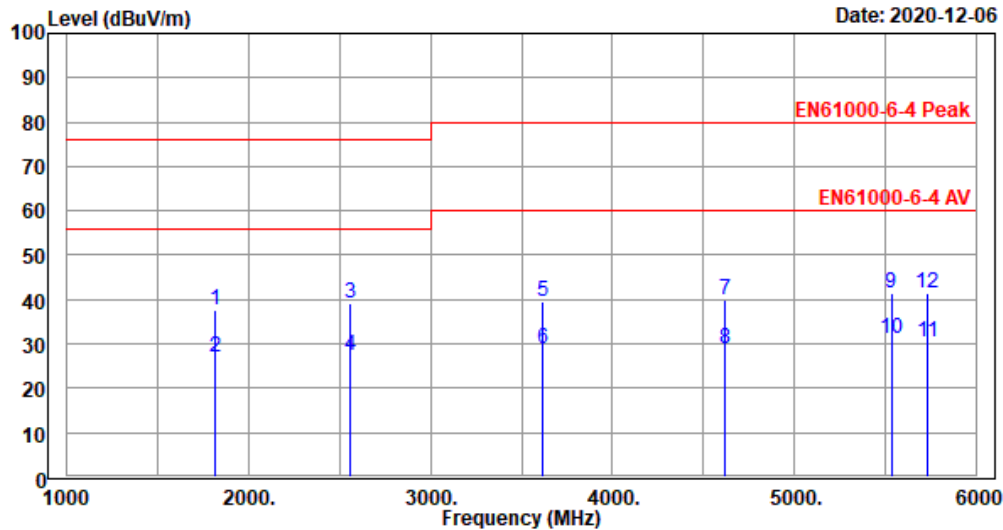
Freq. MHz	ISN. Factor dB	Cable Loss dB	Reading dBuV	Emission Level dBuV	Limits dBuV	Margin dB	Remark
1415.000	25.36	0.79	42.12	34.00	76.00	42.00	Peak
1415.850	25.36	0.79	32.52	24.40	56.00	31.60	Average
1820.000	26.88	0.85	43.23	37.02	76.00	38.98	Peak
1820.321	26.88	0.85	32.52	26.31	56.00	29.69	Average
2870.000	29.45	1.08	40.87	37.51	76.00	38.49	Peak
2870.842	29.46	1.08	30.82	27.47	56.00	28.53	Average
4240.000	32.31	1.60	40.98	41.31	80.00	38.69	Peak
4240.531	32.31	1.60	30.13	30.46	60.00	29.54	Average
5520.000	34.28	2.13	39.33	42.24	80.00	37.76	Peak
5520.324	34.28	2.13	29.14	32.05	60.00	27.95	Average
5785.000	34.07	2.21	26.98	29.76	60.00	30.24	Average
5785.000	34.07	2.21	38.83	41.61	80.00	38.39	Peak

remarks:Emission Level = ISN factor+Cable loss(Pulse Att+Cable+Switch)+Reading



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File: H:\TEST DATA\2020\Report\C1W2009044\C1W2009044_00001.EMI



Site NO. : 10M Chamber
 AMN/LISN : 3115-959-2003
 Limit : EN61000-6-4 Peak
 Env. / Ins. : 21°C&52% /N9030A
 EUT : Grid-Tied PV Inverter
 M/N : GW136K-HTH
 Power Rating : 700Vdc,500Vac/50Hz
 Test Mode : Full Load
 Memo :

phase.: Vertical Data NO.:1
 Engineer : jiaohuliang

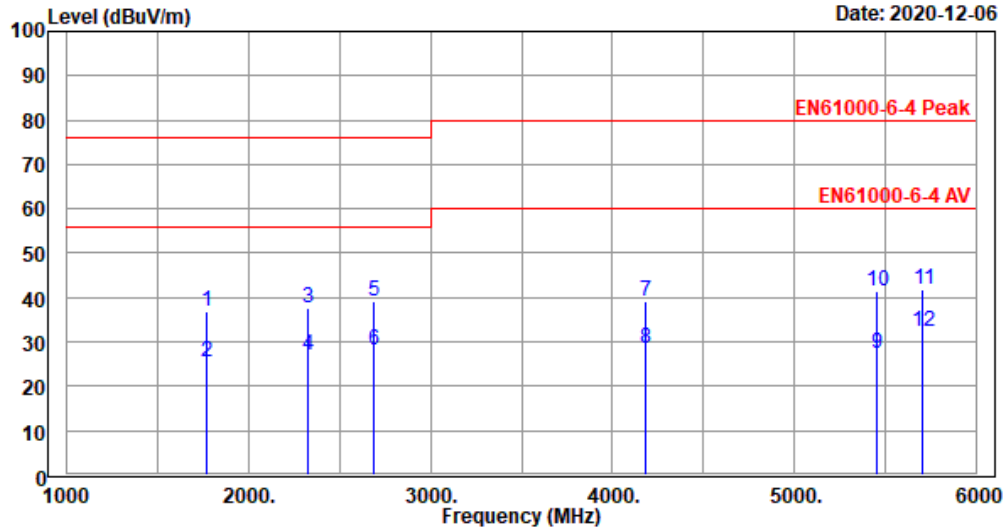
Freq. MHz	ISN. Factor dB	Cable Loss dB	Reading dBuV	Emission Level dBuV	Limits dBuV	Margin dB	Remark
1820.000	26.88	0.85	43.94	37.73	76.00	38.27	Peak
1820.320	26.88	0.85	33.12	26.91	56.00	29.09	Average
2560.000	28.15	1.01	43.96	39.26	76.00	36.74	Peak
2560.120	28.15	1.01	32.12	27.42	56.00	28.58	Average
3620.000	31.28	1.34	40.69	39.60	80.00	40.40	Peak
3620.221	31.28	1.34	30.12	29.03	60.00	30.97	Average
4620.000	32.36	1.79	39.28	39.89	80.00	40.11	Peak
4620.542	32.37	1.79	28.12	28.74	60.00	31.26	Average
5530.000	34.28	2.13	38.43	41.34	80.00	38.66	Peak
5530.321	34.28	2.13	28.14	31.05	60.00	28.95	Average
5725.000	34.12	2.19	27.68	30.49	60.00	29.51	Average
5725.000	34.12	2.19	38.53	41.34	80.00	38.66	Peak

remarks:Emission Level = ISN factor+Cable loss(Pulse Att+Cable+Switch)+Reading



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File: H:\TEST DATA\2020\Report\IC1W2009044\IC1W2009044_00003.EMI



Site NO. : 10M Chamber
 AMN/LISN : 3115-959-2003
 Limit : EN61000-6-4 Peak
 Env. / Ins. : 21°C&52% /N9030A
 EUT : Grid-Tied PV Inverter
 M/N : GW136K-HTH
 Power Rating : 700Vdc,500Vac/50Hz
 Test Mode : Half Load
 Memo :

phase.: Horizontal Data NO.:3
 Engineer : jiaohuliang

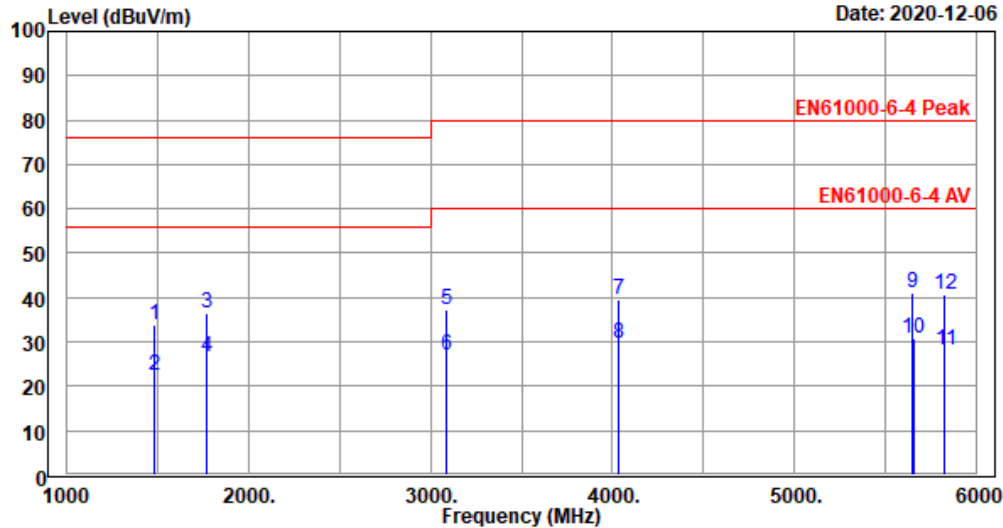
Freq. MHz	ISN. Factor dB	Cable Loss dB	Reading dBuV	Emission Level dBuV	Limits dBuV	Margin dB	Remark
1770.000	26.68	0.85	43.50	37.05	76.00	38.95	Peak
1770.320	26.68	0.85	32.11	25.66	56.00	30.34	Average
2325.000	27.80	0.95	42.91	37.83	76.00	38.17	Peak
2325.320	27.80	0.95	32.12	27.04	56.00	28.96	Average
2690.000	28.70	1.04	43.21	39.08	76.00	36.92	Peak
2690.121	28.70	1.04	32.12	27.99	56.00	28.01	Average
4185.000	32.35	1.57	38.92	39.26	80.00	40.74	Peak
4185.421	32.35	1.57	28.12	28.46	60.00	31.54	Average
5455.000	34.20	2.11	24.69	27.50	60.00	32.50	Average
5455.000	34.20	2.11	38.48	41.29	80.00	38.71	Peak
5705.000	34.14	2.18	39.05	41.87	80.00	38.13	Peak
5705.120	34.14	2.18	29.42	32.24	60.00	27.76	Average

remarks:Emission Level = ISN factor+Cable loss(Pulse Att+Cable+Switch)+Reading



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File: H:\TEST DATA\2020\Report\IC1W2009044\IC1W2009044_00004.EMI



Site NO. : 10M Chamber
AMN/LISN : 3115-959-2003
Limit : EN61000-6-4 Peak
Env. / Ins. : 21°C&52% /N9030A
EUT : Grid-Tied PV Inverter
M/N : GW136K-HTH
Power Rating : 700Vdc,500Vac/50Hz
Test Mode : Half Load
Memo :

phase.: Vertical Data NO.:4
Engineer : jiaohuliang

Freq. MHz	ISN. Factor dB	Cable Loss dB	Reading dBuV	Emission Level dBuV	Limits dBuV	Margin dB	Remark
1480.000	25.54	0.80	41.77	33.89	76.00	42.11	Peak
1480.321	25.54	0.80	30.22	22.34	56.00	33.66	Average
1770.000	26.68	0.85	43.13	36.68	76.00	39.32	Peak
1770.131	26.68	0.85	33.12	26.67	56.00	29.33	Average
3090.000	30.16	1.14	39.86	37.29	80.00	42.71	Peak
3090.320	30.16	1.14	29.42	26.85	60.00	33.15	Average
4035.000	32.47	1.50	39.06	39.43	80.00	40.57	Peak
4035.842	32.47	1.50	29.16	29.53	60.00	30.47	Average
5650.000	34.18	2.17	38.03	40.88	80.00	39.12	Peak
5650.520	34.18	2.17	28.12	30.97	60.00	29.03	Average
5825.000	34.04	2.22	25.33	28.09	60.00	31.91	Average
5825.000	34.04	2.22	38.08	40.84	80.00	39.16	Peak

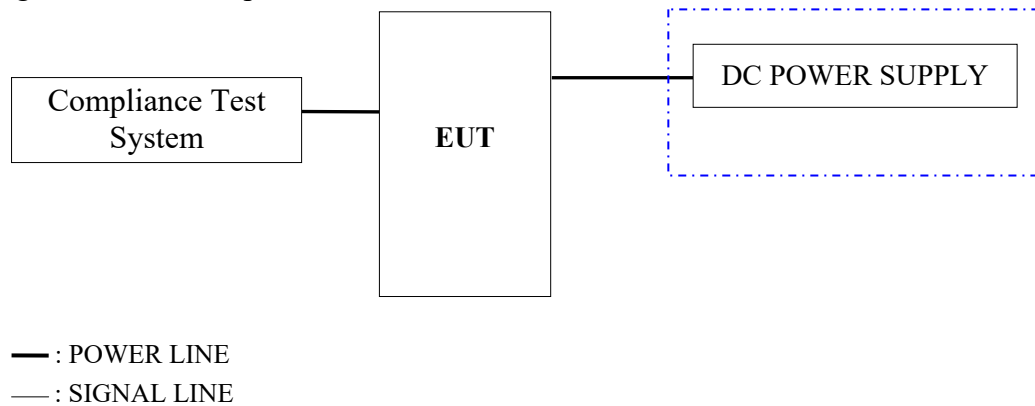
remarks:Emission Level = ISN factor+Cable loss(Pulse Att+Cable+Switch)+Reading

6 POWER HARMONICS AND FLICKER MEASUREMENT

6.1 Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	AC power source	TESEQ	NSG1007-45	1236A00705	2020-03-10	1 Year
2.	Signal Conditioning Unit	TESEQ	CCN1000-3	1236A00705	2020-03-10	1 Year
3.	LOAD	DUFEI	N/A	1302018	NCR	NCR

6.2 Block Diagram of Test Setup



6.3 Test Standard

EN 61000-3-11:2000 and EN 61000-3-12:2011+AC:2013 (IEC 61000-3-11:2000 and IEC 61000-3-12:2011)

6.4 Test Procedure

The measuring process is according to EN 61000-3-11:2000 (IEC 61000-3-11:2000) and EN 61000-3-12:2011+AC:2013 (IEC 61000-3-12:2011) and laboratory internal procedure TKC-301-011&-012.

6.5 Test Results

PASSED.

EUT with the following test modes were measured during this section testing and all the test results are listed in next page.

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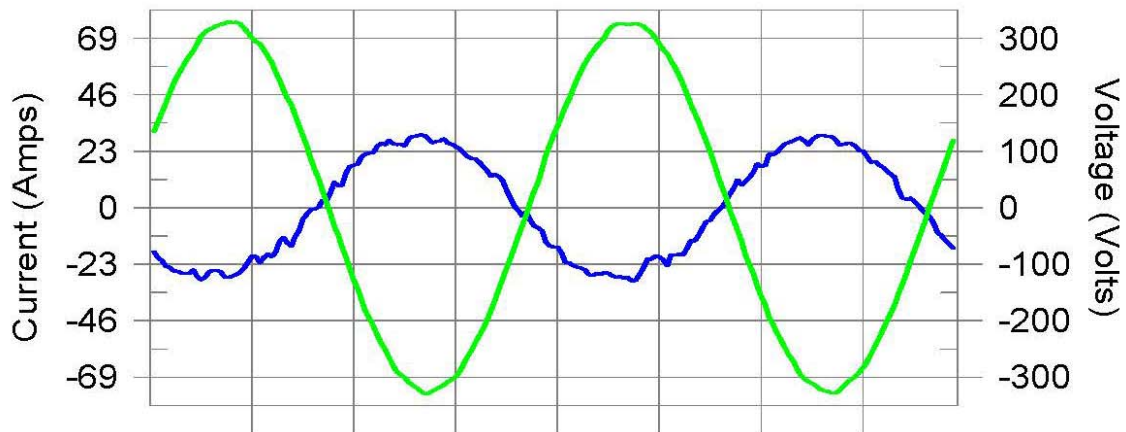
1/12/2021
1:10 PM

Harmonics – Per EN/IEC61000-3-12(Phase A-Run time)

EUT: Grid-Tied PV Inverter Tested by: Zhang ming
Test category: Table:3, Rsce=33, Test Margin: 100
Test date: 2020/11/5 Start time: 14:34:15 End time: 14:39:37
Test duration (min): 5 Data file name: WIN2106_H-000023.cts_data
Comment: M/N:GW136K-HT Test Mode:Full Load
Customer: JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO.,LTD.

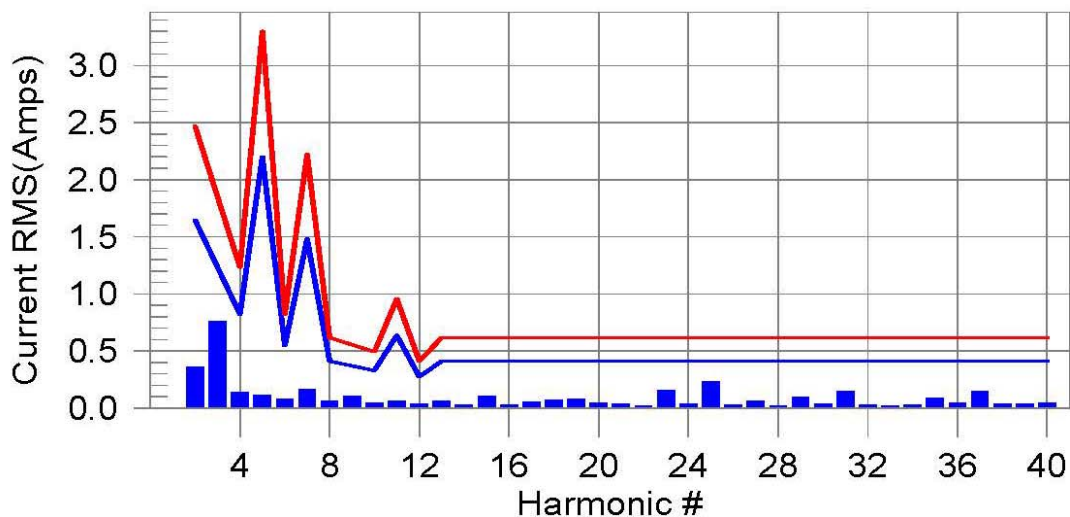
Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class 3 limit line

European Limits



Test result: Pass **Worst harmonic was #12 with 23.46 % of the limit.**

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4542 Luterbach, Switzerland

1/12/2021
1:10 PM

Current Test Result Summary (Phase A-Run time)

EUT: Grid-Tied PV Inverter Tested by: Zhang ming
Test category: Table:3, Rsce=33, Test Margin: 100
Test date: 2020/11/5 Start time: 14:34:15 End time: 14:39:37
Test duration (min): 5 Data file name: WIN2106_H-000023.cts_data
Comment: M/N: GW136K-HTH Test Mode:Full Load
Customer: JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO.,LTD.

Test Result: Pass Measured I-ref: 20.538 Amp rms Source: Normal
I-THC(%): 4.8 Limit(%): 13.0 PWHC(%): 10.7 PWHC Limit(%): 22.0

Highest parameter values during test:

V_RMS (Volts):	289.47	Frequency(Hz):	50.00
I_Peak (Amps):	37.301	I_RMS (Amps):	20.750
I_Fund (Amps):	20.538	Crest Factor:	1.808
Power (Watts):	-4703	Power Factor:	-0.983

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.359	1.645	21.8	0.389	2.467	15.8	Pass
3	0.755	N/A	N/A	0.802	N/A	N/A	N/A
4	0.138	0.822	16.8	0.176	1.234	14.3	Pass
5	0.112	2.200	5.1	0.142	3.300	4.3	Pass
6	0.078	0.548	14.3	0.116	0.822	14.1	Pass
7	0.164	1.480	11.1	0.204	2.221	9.2	Pass
8	0.060	0.411	14.6	0.082	0.617	13.3	Pass
9	0.108	N/A	N/A	0.134	N/A	N/A	N/A
10	0.047	0.329	14.4	0.067	0.493	13.7	Pass
11	0.058	0.637	9.1	0.084	0.956	8.8	Pass
12	0.033	0.274	12.1	0.059	0.411	14.4	Pass
13	0.058	0.411	14.0	0.077	0.617	12.5	Pass
14	0.026	N/A	N/A	0.037	N/A	N/A	N/A
15	0.107	N/A	N/A	0.124	N/A	N/A	N/A
16	0.027	N/A	N/A	0.040	N/A	N/A	N/A
17	0.051	N/A	N/A	0.077	N/A	N/A	N/A
18	0.070	N/A	N/A	0.086	N/A	N/A	N/A
19	0.077	N/A	N/A	0.105	N/A	N/A	N/A
20	0.044	N/A	N/A	0.055	N/A	N/A	N/A
21	0.032	N/A	N/A	0.059	N/A	N/A	N/A
22	0.019	N/A	N/A	0.027	N/A	N/A	N/A
23	0.152	N/A	N/A	0.166	N/A	N/A	N/A
24	0.035	N/A	N/A	0.047	N/A	N/A	N/A
25	0.228	N/A	N/A	0.244	N/A	N/A	N/A
26	0.023	N/A	N/A	0.033	N/A	N/A	N/A
27	0.063	N/A	N/A	0.076	N/A	N/A	N/A
28	0.018	N/A	N/A	0.026	N/A	N/A	N/A
29	0.099	N/A	N/A	0.114	N/A	N/A	N/A
30	0.033	N/A	N/A	0.043	N/A	N/A	N/A
31	0.148	N/A	N/A	0.169	N/A	N/A	N/A
32	0.029	N/A	N/A	0.040	N/A	N/A	N/A
33	0.015	N/A	N/A	0.027	N/A	N/A	N/A
34	0.029	N/A	N/A	0.042	N/A	N/A	N/A
35	0.086	N/A	N/A	0.095	N/A	N/A	N/A
36	0.041	N/A	N/A	0.053	N/A	N/A	N/A
37	0.149	N/A	N/A	0.166	N/A	N/A	N/A
38	0.039	N/A	N/A	0.050	N/A	N/A	N/A
39	0.038	N/A	N/A	0.053	N/A	N/A	N/A
40	0.042	N/A	N/A	0.076	N/A	N/A	N/A

Note: Measured I-ref was applied for this test.

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Voltage Source Verification Data (Phase A-Run time)

EUT: Grid-Tied PV Inverter Tested by: Zhang ming
Test category: Table:3, Rsce=33, Test Margin: 100
Test date: 2020/11/5 Start time: 14:34:15 End time: 14:39:37
Test duration (min): 5 Data file name: WIN2106_H-000023.cts_data
Comment: M/N: GW136K-HTH Test Mode:Full Load
Customer: JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO.,LTD.

Test Result: Pass Source qualification: Normal
Measured source distortion is within the requirements of the standards
Measurements are compliant with IEC/EN61000-3-12 Ed.2 (2011) & IEC/EN61000-4-7

Highest parameter values during test:

Voltage (Vrms):	289.47	Frequency(Hz):	50.00
I_Peak (Amps):	37.301	I_RMS (Amps):	20.750
I_Fund (Amps):	20.538	Crest Factor:	1.808
Power (Watts):	-4703	Power Factor:	-0.983

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.313	0.924	33.91	OK
3	0.125	2.889	4.31	OK
4	0.055	0.924	5.96	OK
5	0.140	3.467	4.04	OK
6	0.069	0.924	7.46	OK
7	0.200	2.889	6.93	OK
8	0.078	0.924	8.42	OK
9	0.146	1.387	10.55	OK
10	0.075	0.924	8.13	OK
11	0.186	1.618	11.50	OK
12	0.083	0.693	11.93	OK
13	0.157	1.386	11.33	OK
14	0.074	0.693	10.66	OK
15	0.137	0.693	19.74	OK
16	0.077	0.693	11.16	OK
17	0.115	0.693	16.63	OK
18	0.114	0.693	16.42	OK
19	0.114	0.693	16.45	OK
20	0.085	0.693	12.23	OK
21	0.128	0.693	18.51	OK
22	0.059	0.693	8.52	OK
23	0.182	0.693	26.20	OK
24	0.078	0.693	11.18	OK
25	0.255	0.693	36.80	OK
26	0.067	0.693	9.63	OK
27	0.094	0.693	13.52	OK
28	0.070	0.693	10.17	OK
29	0.186	0.693	26.85	OK
30	0.077	0.693	11.16	OK
31	0.203	0.693	29.33	OK
32	0.070	0.693	10.16	OK
33	0.067	0.693	9.60	OK
34	0.067	0.693	9.60	OK
35	0.149	0.693	21.50	OK
36	0.087	0.693	12.51	OK
37	0.229	0.693	33.08	OK
38	0.086	0.693	12.36	OK
39	0.088	0.693	12.65	OK
40	0.070	0.693	10.17	OK

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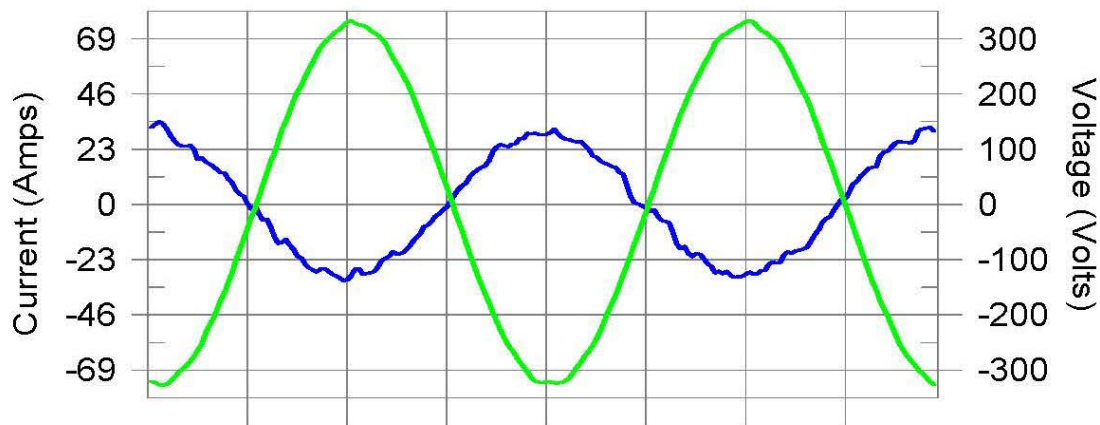
Harmonics – Per EN/IEC61000-3-12(Phase B-Run time)

EUT: Grid-Tied PV Inverter
Test category: Table:3, Rsce=33,
Test date: 2020/11/5
Test duration (min): 5
Comment: M/N: GW136K-HTH Test Mode:Full Load
Customer: JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO.,LTD.

Tested by: Zhang ming
Test Margin: 100
Start time: 14:34:15
End time: 14:39:37

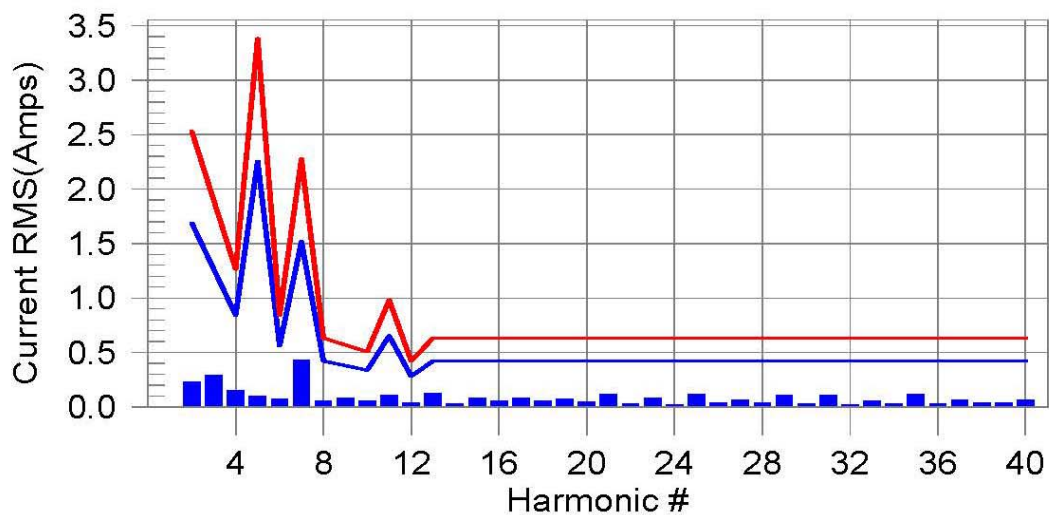
Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class 3 limit line

European Limits



Test result: Pass

Worst harmonic was #13 with 30.12 % of the limit.

Teseq Profline
4542 Luterbach, Switzerland

1/12/2021
1:10 PM

Current Test Result Summary (Phase B-Run time)

EUT: Grid-Tied PV Inverter Tested by: Zhang ming
Test category: Table:3, Rsce=33, Test Margin: 100
Test date: 2020/11/5 Start time: 14:34:15 End time: 14:39:37
Test duration (min): 5 Data file name: WIN2106_H-000023.cts_data
Comment: M/N: GW136K-HTH Test Mode:Full Load
Customer: JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO.,LTD.

Test Result: Pass Measured I-ref: 21.062 Amp rms Source: Normal
I-THC(%): 3.4 Limit(%): 13.0 PWHC(%): 8.3 PWHC Limit(%): 22.0

Highest parameter values during test:

V_RMS (Volts):	289.47	Frequency(Hz):	50.00
I_Peak (Amps):	37.316	I_RMS (Amps):	21.209
I_Fund (Amps):	21.062	Crest Factor:	1.775
Power (Watts):	-4854	Power Factor:	-0.992

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.224	1.686	13.3	0.275	2.529	10.9	Pass
3	0.755	N/A	N/A	0.336	N/A	N/A	N/A
4	0.147	0.843	17.5	0.196	1.264	15.5	Pass
5	0.099	2.255	4.4	0.132	3.382	3.9	Pass
6	0.072	0.562	12.9	0.125	0.843	14.8	Pass
7	0.433	1.517	28.5	0.472	2.276	20.8	Pass
8	0.052	0.421	12.3	0.075	0.632	11.9	Pass
9	0.108	N/A	N/A	0.105	N/A	N/A	N/A
10	0.056	0.337	16.7	0.085	0.506	16.8	Pass
11	0.106	0.653	16.3	0.128	0.980	13.1	Pass
12	0.033	0.281	11.6	0.051	0.421	12.1	Pass
13	0.123	0.421	29.3	0.138	0.632	21.9	Pass
14	0.026	N/A	N/A	0.039	N/A	N/A	N/A
15	0.081	N/A	N/A	0.095	N/A	N/A	N/A
16	0.052	N/A	N/A	0.065	N/A	N/A	N/A
17	0.082	N/A	N/A	0.099	N/A	N/A	N/A
18	0.059	N/A	N/A	0.073	N/A	N/A	N/A
19	0.076	N/A	N/A	0.090	N/A	N/A	N/A
20	0.046	N/A	N/A	0.060	N/A	N/A	N/A
21	0.112	N/A	N/A	0.129	N/A	N/A	N/A
22	0.031	N/A	N/A	0.045	N/A	N/A	N/A
23	0.079	N/A	N/A	0.097	N/A	N/A	N/A
24	0.023	N/A	N/A	0.034	N/A	N/A	N/A
25	0.115	N/A	N/A	0.135	N/A	N/A	N/A
26	0.035	N/A	N/A	0.043	N/A	N/A	N/A
27	0.063	N/A	N/A	0.095	N/A	N/A	N/A
28	0.034	N/A	N/A	0.046	N/A	N/A	N/A
29	0.105	N/A	N/A	0.125	N/A	N/A	N/A
30	0.030	N/A	N/A	0.040	N/A	N/A	N/A
31	0.103	N/A	N/A	0.124	N/A	N/A	N/A
32	0.017	N/A	N/A	0.029	N/A	N/A	N/A
33	0.056	N/A	N/A	0.068	N/A	N/A	N/A
34	0.024	N/A	N/A	0.036	N/A	N/A	N/A
35	0.113	N/A	N/A	0.136	N/A	N/A	N/A
36	0.026	N/A	N/A	0.035	N/A	N/A	N/A
37	0.060	N/A	N/A	0.072	N/A	N/A	N/A
38	0.034	N/A	N/A	0.046	N/A	N/A	N/A
39	0.034	N/A	N/A	0.068	N/A	N/A	N/A
40	0.061	N/A	N/A	0.105	N/A	N/A	N/A

Note: Measured I-ref was applied for this test.

Voltage Source Verification Data (Phase B-Run time)

EUT: Grid-Tied PV Inverter Tested by: Zhang ming
 Test category: Table:3, Rsce=33, Test Margin: 100
 Test date: 2020/11/5 Start time: 14:34:15 End time: 14:39:37
 Test duration (min): 5 Data file name: WIN2106_H-000023.cts_data
 Comment: M/N:GW136K-HTH Test Mode:Full Load
 Customer: JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO.,LTD.

Test Result: Pass Source qualification: Normal
 Measured source distortion is within the requirements of the standards
 Measurements are compliant with IEC/EN61000-3-12 Ed.2 (2011) & IEC/EN61000-4-7

Highest parameter values during test:

Voltage (Vrms):	289.47	Frequency(Hz):	50.00
I_Peak (Amps):	37.316	I_RMS (Amps):	21.209
I_Fund (Amps):	21.062	Crest Factor:	1.775
Power (Watts):	-4854	Power Factor:	-0.992

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.306	0.925	33.05	OK
3	0.179	2.891	6.19	OK
4	0.070	0.925	7.61	OK
5	0.125	3.469	3.59	OK
6	0.055	0.925	5.99	OK
7	0.299	2.890	10.35	OK
8	0.079	0.925	8.52	OK
9	0.223	1.387	16.05	OK
10	0.079	0.925	8.54	OK
11	0.202	1.619	12.46	OK
12	0.068	0.694	9.77	OK
13	0.128	1.388	9.21	OK
14	0.079	0.694	11.39	OK
15	0.207	0.694	29.85	OK
16	0.102	0.694	14.70	OK
17	0.169	0.694	24.38	OK
18	0.094	0.694	13.51	OK
19	0.173	0.694	24.99	OK
20	0.073	0.694	10.47	OK
21	0.197	0.694	28.47	OK
22	0.094	0.694	13.55	OK
23	0.099	0.694	14.20	OK
24	0.070	0.694	10.05	OK
25	0.100	0.694	14.40	OK
26	0.071	0.694	10.26	OK
27	0.178	0.694	25.68	OK
28	0.080	0.694	11.54	OK
29	0.123	0.694	17.75	OK
30	0.069	0.694	10.02	OK
31	0.110	0.694	15.84	OK
32	0.066	0.694	9.51	OK
33	0.079	0.694	11.36	OK
34	0.084	0.694	12.12	OK
35	0.146	0.694	21.03	OK
36	0.074	0.694	10.69	OK
37	0.092	0.694	13.23	OK
38	0.081	0.694	11.61	OK
39	0.109	0.694	15.70	OK
40	0.098	0.694	14.12	OK

Teseq Proflin
4542 Luterbach, Switzerland

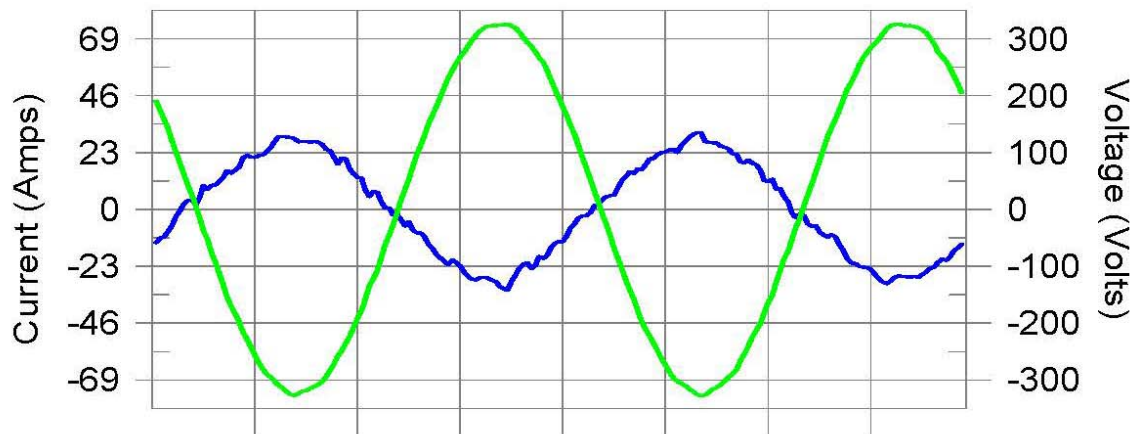
1/12/2021
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Harmonics – Per EN/IEC61000-3-12(Phase C-Run time)

EUT: Grid-Tied PV Inverter
Test category: Table:3, Rsce=33,
Test date: 2020/11/5 Start time: 14:34:15 Test Margin: 100
Test duration (min): 5 Data file name: WIN2106_H-000023.cts_data End time: 14:39:37
Comment: M/N:GW136K-HTH Test Mode:Full Load
Customer: JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO.,LTD.

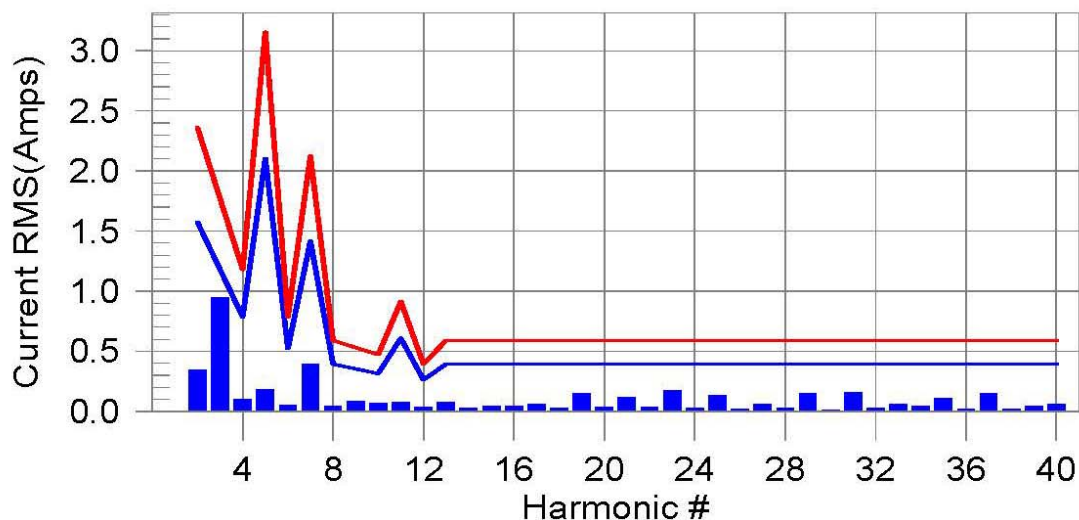
Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class 3 limit line

European Limits



Test result: Pass Worst harmonic was #7 with 27.73 % of the limit.

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4542 Luterbach, Switzerland

1/12/2021
1:10 PM

Current Test Result Summary (Phase C-Run time)

EUT: Grid-Tied PV Inverter Tested by: Zhang ming
Test category: Table:3, Rsce=33, Test Margin: 100
Test date: 2020/11/5 Start time: 14:34:15 End time: 14:39:37
Test duration (min): 5 Data file name: WIN2106_H-000023.cts_data
Comment: M/N:GW136K-HTH Test Mode:Full Load
Customer: JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO.,LTD.

Test Result: Pass Measured I-ref: 19.624 Amp rms Source: Normal
I-THC(%): 6.0 Limit(%): 13.0 PWHC(%): 11.7 PWHC Limit(%): 22.0

Highest parameter values during test:

V_RMS (Volts):	289.05	Frequency(Hz):	50.00
I_Peak (Amps):	37.812	I_RMS (Amps):	19.838
I_Fund (Amps):	19.624	Crest Factor:	1.922
Power (Watts):	-4510	Power Factor:	-0.990

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.341	1.573	21.7	0.377	2.359	16.0	Pass
3	0.755	N/A	N/A	1.001	N/A	N/A	N/A
4	0.096	0.786	12.2	0.133	1.180	11.2	Pass
5	0.178	2.104	8.4	0.212	3.155	6.7	Pass
6	0.054	0.524	10.3	0.081	0.786	10.3	Pass
7	0.390	1.416	27.6	0.426	2.123	20.1	Pass
8	0.044	0.393	11.1	0.065	0.590	11.0	Pass
9	0.108	N/A	N/A	0.105	N/A	N/A	N/A
10	0.063	0.315	20.0	0.083	0.472	17.7	Pass
11	0.077	0.609	12.6	0.094	0.914	10.3	Pass
12	0.031	0.262	11.9	0.047	0.393	12.1	Pass
13	0.074	0.393	18.7	0.105	0.590	17.8	Pass
14	0.026	N/A	N/A	0.038	N/A	N/A	N/A
15	0.045	N/A	N/A	0.082	N/A	N/A	N/A
16	0.040	N/A	N/A	0.056	N/A	N/A	N/A
17	0.062	N/A	N/A	0.080	N/A	N/A	N/A
18	0.030	N/A	N/A	0.043	N/A	N/A	N/A
19	0.149	N/A	N/A	0.170	N/A	N/A	N/A
20	0.035	N/A	N/A	0.046	N/A	N/A	N/A
21	0.118	N/A	N/A	0.137	N/A	N/A	N/A
22	0.034	N/A	N/A	0.045	N/A	N/A	N/A
23	0.176	N/A	N/A	0.188	N/A	N/A	N/A
24	0.022	N/A	N/A	0.031	N/A	N/A	N/A
25	0.134	N/A	N/A	0.152	N/A	N/A	N/A
26	0.021	N/A	N/A	0.029	N/A	N/A	N/A
27	0.056	N/A	N/A	0.077	N/A	N/A	N/A
28	0.026	N/A	N/A	0.038	N/A	N/A	N/A
29	0.151	N/A	N/A	0.163	N/A	N/A	N/A
30	0.014	N/A	N/A	0.022	N/A	N/A	N/A
31	0.156	N/A	N/A	0.180	N/A	N/A	N/A
32	0.024	N/A	N/A	0.035	N/A	N/A	N/A
33	0.059	N/A	N/A	0.076	N/A	N/A	N/A
34	0.045	N/A	N/A	0.057	N/A	N/A	N/A
35	0.110	N/A	N/A	0.135	N/A	N/A	N/A
36	0.020	N/A	N/A	0.030	N/A	N/A	N/A
37	0.146	N/A	N/A	0.155	N/A	N/A	N/A
38	0.018	N/A	N/A	0.026	N/A	N/A	N/A
39	0.040	N/A	N/A	0.064	N/A	N/A	N/A
40	0.061	N/A	N/A	0.099	N/A	N/A	N/A

Note: Measured I-ref was applied for this test.

Voltage Source Verification Data (Phase C-Run time)

EUT: Grid-Tied PV Inverter Tested by: Zhang ming
 Test category: Table:3, Rsce=33, Test Margin: 100
 Test date: 2020/11/5 Start time: 14:34:15 End time: 14:39:37
 Test duration (min): 5 Data file name: WIN2106_H-000023.cts_data
 Comment: M/N:GW136K-HTH Test Mode:Full Load
 Customer: JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO.,LTD.

Test Result: Pass Source qualification: Normal
 Measured source distortion is within the requirements of the standards
 Measurements are compliant with IEC/EN61000-3-12 Ed.2 (2011) & IEC/EN61000-4-7

Highest parameter values during test:

Voltage (Vrms):	289.05	Frequency(Hz):	50.00
I _{Peak} (Amps):	37.812	I _{RMS} (Amps):	19.838
I _{Fund} (Amps):	19.624	Crest Factor:	1.922
Power (Watts):	-4510	Power Factor:	-0.990

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.263	0.920	28.64	OK
3	0.268	2.875	9.33	OK
4	0.056	0.920	6.09	OK
5	0.185	3.450	5.35	OK
6	0.056	0.920	6.12	OK
7	0.308	2.875	10.72	OK
8	0.069	0.920	7.52	OK
9	0.235	1.380	17.01	OK
10	0.084	0.920	9.09	OK
11	0.162	1.610	10.05	OK
12	0.076	0.690	11.07	OK
13	0.189	1.380	13.68	OK
14	0.075	0.690	10.81	OK
15	0.174	0.690	25.16	OK
16	0.076	0.690	10.95	OK
17	0.127	0.690	18.47	OK
18	0.073	0.690	10.57	OK
19	0.181	0.690	26.29	OK
20	0.071	0.690	10.28	OK
21	0.090	0.690	13.11	OK
22	0.084	0.690	12.24	OK
23	0.124	0.690	17.91	OK
24	0.078	0.690	11.29	OK
25	0.173	0.690	25.04	OK
26	0.072	0.690	10.47	OK
27	0.125	0.690	18.07	OK
28	0.077	0.690	11.16	OK
29	0.155	0.690	22.51	OK
30	0.057	0.690	8.32	OK
31	0.185	0.690	26.78	OK
32	0.070	0.690	10.14	OK
33	0.128	0.690	18.50	OK
34	0.102	0.690	14.71	OK
35	0.157	0.690	22.79	OK
36	0.063	0.690	9.19	OK
37	0.193	0.690	27.92	OK
38	0.063	0.690	9.15	OK
39	0.076	0.690	11.06	OK
40	0.063	0.690	9.17	OK

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1/12/2021
1:10 PM

5th Harmonic Phase Angle and Magnitude for Phase A :

H-5_min_phase : 274.4 Degree (Leading)

H-5_max_phase : 356.6 Degree (Leading)

H-5_ave_phase : 318.7 Degree (Leading)

H-5_ave_vector_magnitude : 0.173 Amp

H-5_standard_ave_magnitude : 0.112 Amp

H-5_standard_max_magnitude : 0.212 Amp

Ratio of H-5_ave_vector / H-5_standard_ave : 0.923

Phase A = 48.760% of tested Rsce = 33.000, Rsce = 16.091

Phase B = 37.755% of tested Rsce = 33.000, Rsce = 12.459

Phase C = 53.040% of tested Rsce = 33.000, Rsce = 17.503

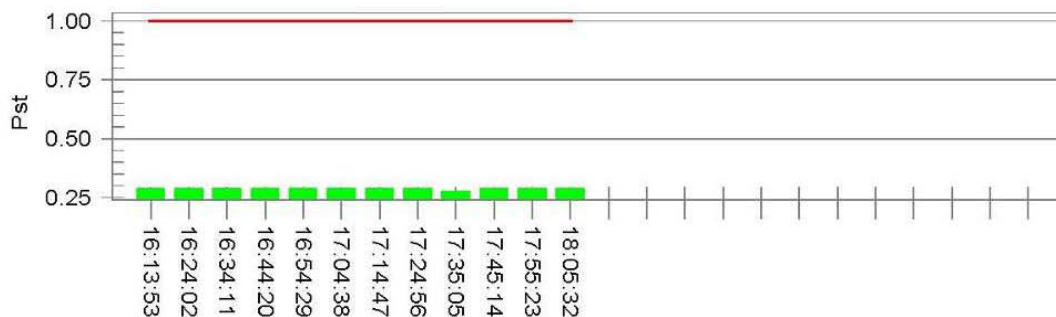
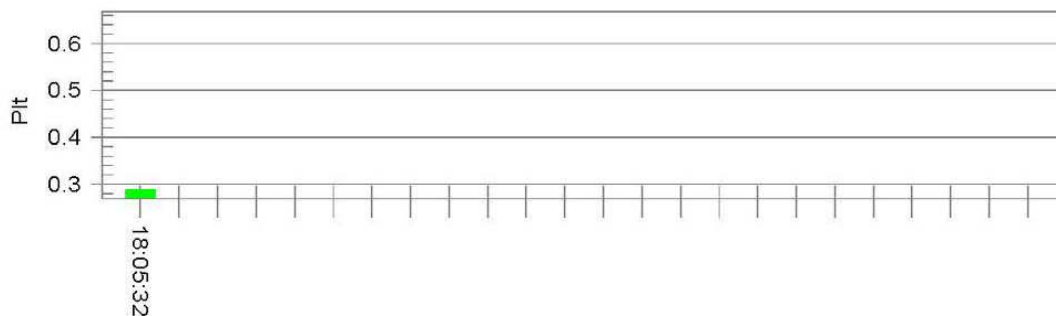
Minimum Rsce required: Rsce = 17.503

Flicker Test Summary (Phase A-Run time) per EN/IEC61000-3-11

EUT: Grid-Tied PV Inverter
 Test category: All parameters
 Test date: 2020/11/4
 Test duration (min): 120
 Comment: M/N:GW136K-HTH Test Mode:Underloading
 Customer: JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO.,LTD.
 Z-test Phase = (0.150 + j 0.150 Ohm) Neutral = (0.100 + j 0.100 Ohm)

Tested by: Zhanyao
 Test Margin: 100
 End time: 18:05:33
 Data file name: WIN2106_F-000061.cts_data

Test Result: Pass
 Status: Test Completed

Pst_i and limit line**Plt and limit line****Parameter values recorded during the test:**

Vrms at the end of test (Volt): 284.43

T-max (mS):	0.0	Test limit (mS):	500.0	Pass
Highest dc (%):	0.00	Test limit (%):	3.30	Pass
Highest dmax (%):	-0.14	Test limit (%):	4.00	Pass
Highest Pst (10 min. period):	0.288	Test limit:	1.000	Pass
Highest Plt (2 hr. period):	0.287	Test limit:	0.650	Pass

Calculated dmax(%): 0.000

Calculated dc(%): 0.000

Calculated Pst : 0.385

Calculated Plt : 0.384

The maximum permissible system impedance Zsys:

Z-phase A = 0.530 Ohm + j 0.331 Ohm (0.530 Ohm + 1054 ?H)
 Z-neutral A = 0.353 Ohm + j 0.221 Ohm (0.353 Ohm + 702 ?H)

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12/21/2020
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Flicker Test Summary (Phase B-Run time) per EN/IEC61000-3-11

EUT: Grid-Tied PV Inverter
Test category: All parameters

Tested by: Zhanyao

Test Margin: 100

Test date: 2020/11/4

Start time: 16:03:21

End time: 18:05:33

Test duration (min): 120

Data file name: WIN2106_F-000061.cts_data

Comment: M/N:GW136K-HTH Test Mode:Underloading

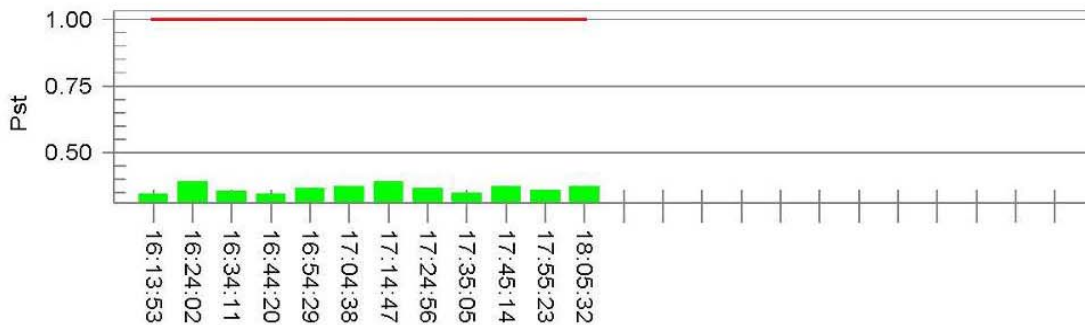
Customer: JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO.,LTD.

Z-test Phase = (0.150 + j 0.150 Ohm) Neutral = (0.100 + j 0.100 Ohm)

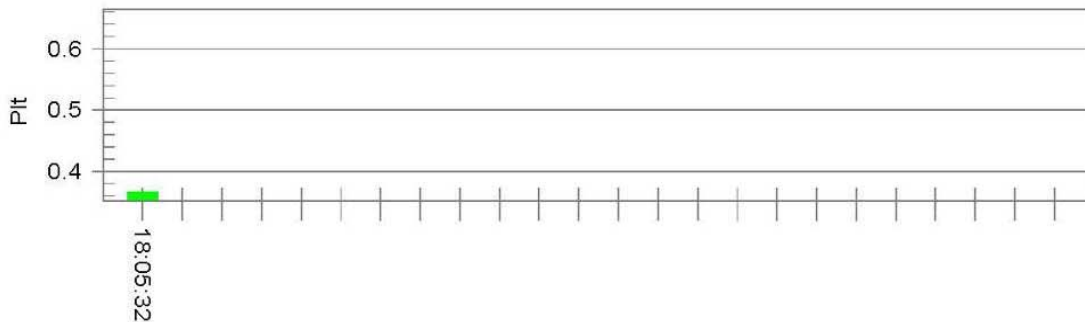
Test Result: Pass

Status: Test Completed

Pst and limit line



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt): 283.54

Time(mS) > dt:	0.0	Test limit (mS):	500.0	Pass
Highest dc (%):	-0.20	Test limit (%):	3.30	Pass
Highest dmax (%):	-0.27	Test limit (%):	4.00	Pass
Highest Pst (10 min. period):	0.391	Test limit:	1.000	Pass
Highest Plt (2 hr. period):	0.366	Test limit:	0.650	Pass

Calculated dmax(%): 0.359

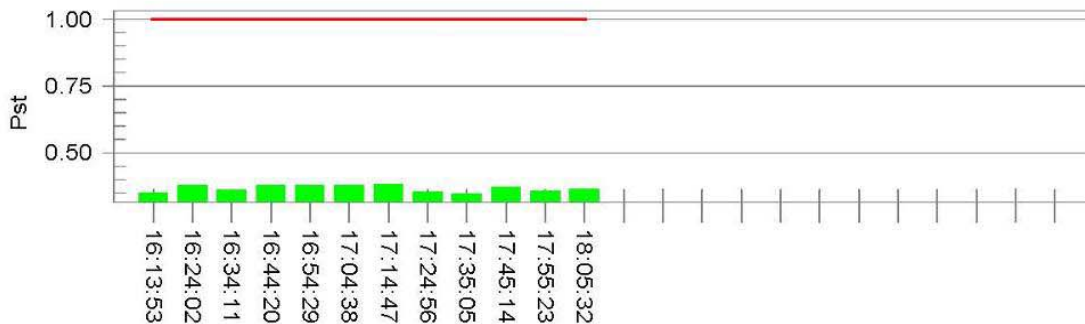
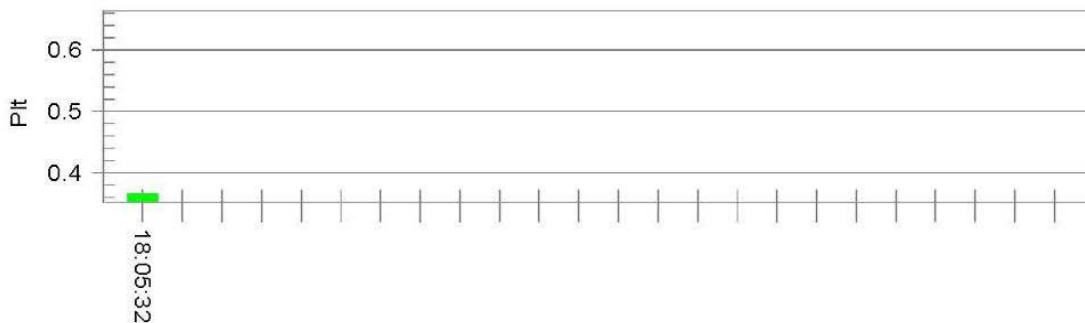
Calculated dc(%): -0.273

Calculated Pst : 0.522

Calculated Plt : 0.489

The maximum permissible system impedance Zsys :

Z-phase B = 0.368 Ohm + j 0.230 Ohm (0.368 Ohm + 733 ?H)
Z-neutral B = 0.246 Ohm + j 0.153 Ohm (0.246 Ohm + 489 ?H)

Flicker Test Summary (Phase C-Run time) per EN/IEC61000-3-11**EUT: Grid-Tied PV Inverter**
Test category: All parameters**Tested by: Zhanyao****Test date: 2020/11/4****Start time: 16:03:21****Test Margin: 100****End time: 18:05:33****Test duration (min): 120****Data file name: WIN2106_F-000061.cts_data****Comment: M/N:GW136K-HTH Test Mode:Underloading****Customer: JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO.,LTD.****Z-test Phase = (0.150 + j 0.150 Ohm) Neutral = (0.100 + j 0.100 Ohm)****Test Result: Pass****Status: Test Completed****Pst_i and limit line****Plt and limit line****Parameter values recorded during the test:****Vrms at the end of test (Volt): 282.78**

Time(mS) > dt:	0.0	Test limit (mS):	500.0	Pass
Highest dc (%):	0.00	Test limit (%):	3.30	Pass
Highest dmax (%):	-0.14	Test limit (%):	4.00	Pass
Highest Pst (10 min. period):	0.382	Test limit:	1.000	Pass
Highest Plt (2 hr. period):	0.366	Test limit:	0.650	Pass

Calculated dmax(%): 0.000**Calculated dc(%): 0.000****Calculated Pst : 0.510****Calculated Plt : 0.489****The maximum permissible system impedance Zsys :**

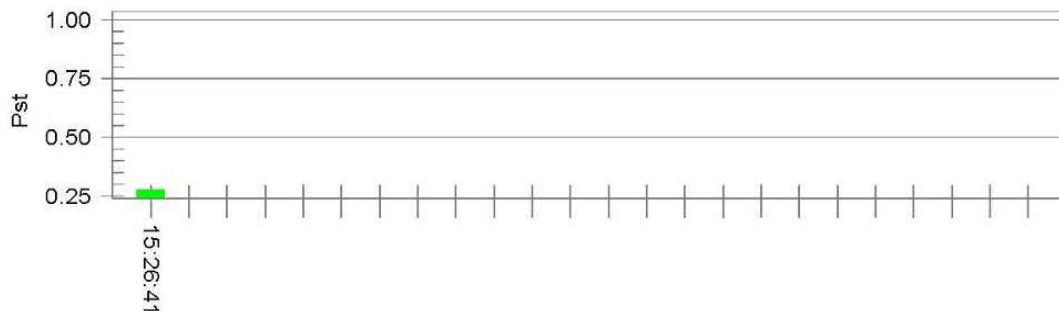
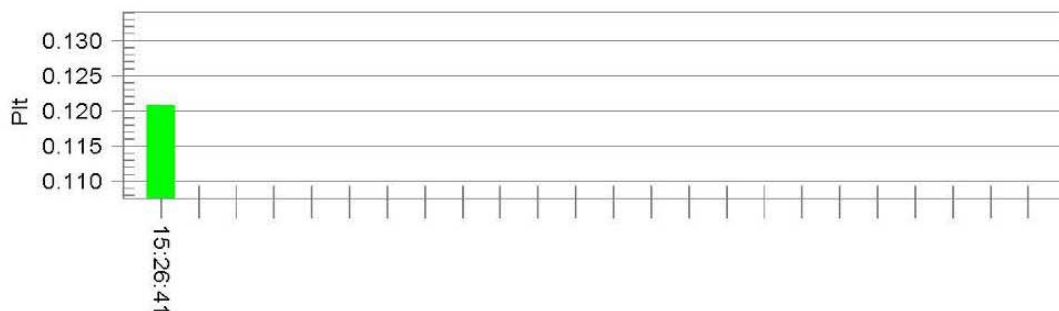
Z-phase C = 0.368 Ohm + j 0.230 Ohm (0.368 Ohm + 732 ?H)
Z-neutral C = 0.245 Ohm + j 0.153 Ohm (0.245 Ohm + 488 ?H)

Flicker Test Summary (Phase A-Run time) per EN/IEC61000-3-11

EUT: Grid-Tied PV Inverter
Test category: dt, dmax, dc and Pst
Test date: 2020/11/4 **Start time:** 15:16:09
Test duration (min): 10 **Data file name:** WIN2106_F-000059.cts_data
Comment: M/N:GW136K-HTH Test Mode: Underloading
Customer: JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO.,LTD.
Z-test Phase = (0.150 + j 0.150 Ohm) **Neutral** = (0.100 + j 0.100 Ohm)

Tested by: Zhanyao**Test Margin:** 100**End time:** 15:26:42

Test Result: Pass
Status: Test Completed

Pst_t and limit line**Plt and limit line****Parameter values recorded during the test:****Vrms at the end of test (Volt):** 284.73

T-max (mS):	0.0	Test limit (mS):	500.0	Pass
Highest dc (%):	0.00	Test limit (%):	3.30	Pass
Highest dmax (%):	-0.30	Test limit (%):	4.00	Pass
Highest Pst (10 min. period):	0.277	Test limit:	1.000	Pass

Calculated dmax(%): 0.404**Calculated dc(%):** 0.000**Calculated Pst :** 0.369**The maximum permissible system impedance Zsys:**

Z-phase A = 1.070 Ohm + j 0.669 Ohm (1.070 Ohm + 2129 ?H)
Z-neutral A = 0.713 Ohm + j 0.446 Ohm (0.713 Ohm + 1419 ?H)

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12/21/2020
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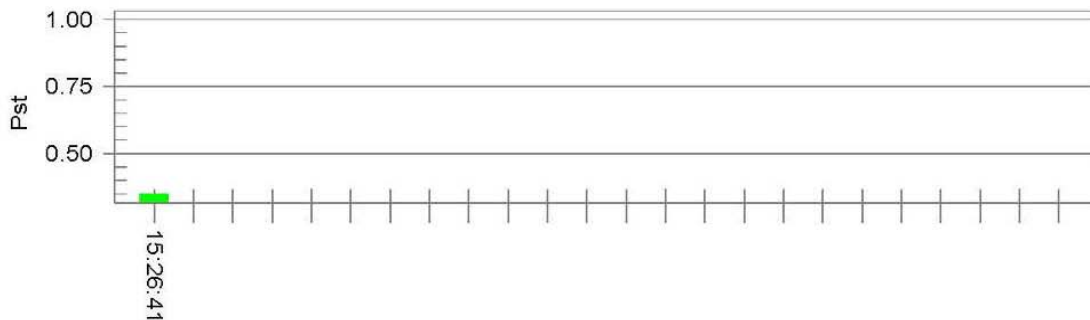
Flicker Test Summary (Phase C-Run time) per EN/IEC61000-3-11

EUT: Grid-Tied PV Inverter
Test category: dt, dmax, dc and Pst
Test date: 2020/11/4
Test duration (min): 10
Comment: M/N:GW136K-HTH Test Mode:Underloading
Customer: JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO.,LTD.
Z-test Phase = (0.150 + j 0.150 Ohm) Neutral = (0.100 + j 0.100 Ohm)

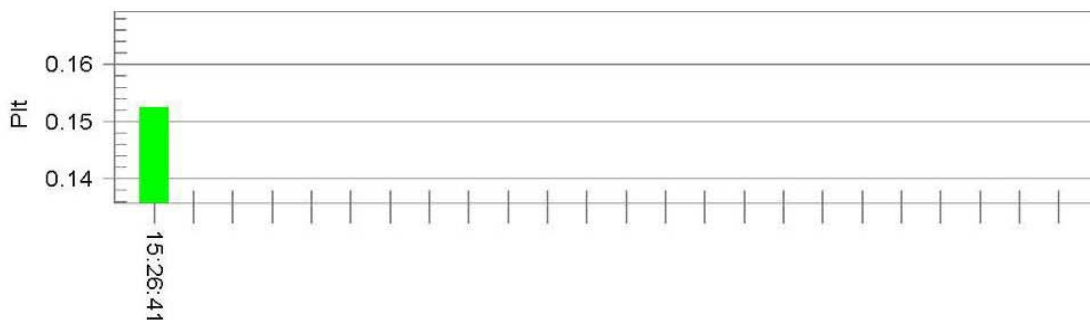
Tested by: Zhanyao
Test Margin: 100
Start time: 15:16:09
End time: 15:26:42
Data file name: WIN2106_F-000059.cts_data

Test Result: Pass
Status: Test Completed

Pst_i and limit line



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt): 283.07

Time(mS) > dt:	0.0	Test limit (mS):	500.0	Pass
Highest dc (%):	-0.21	Test limit (%):	3.30	Pass
Highest dmax (%):	-0.35	Test limit (%):	4.00	Pass
Highest Pst (10 min. period):	0.349	Test limit:	1.000	Pass

Calculated dmax(%): 0.000
Calculated dc(%): -0.280
Calculated Pst : 0.466

The maximum permissible system impedance Zsys :

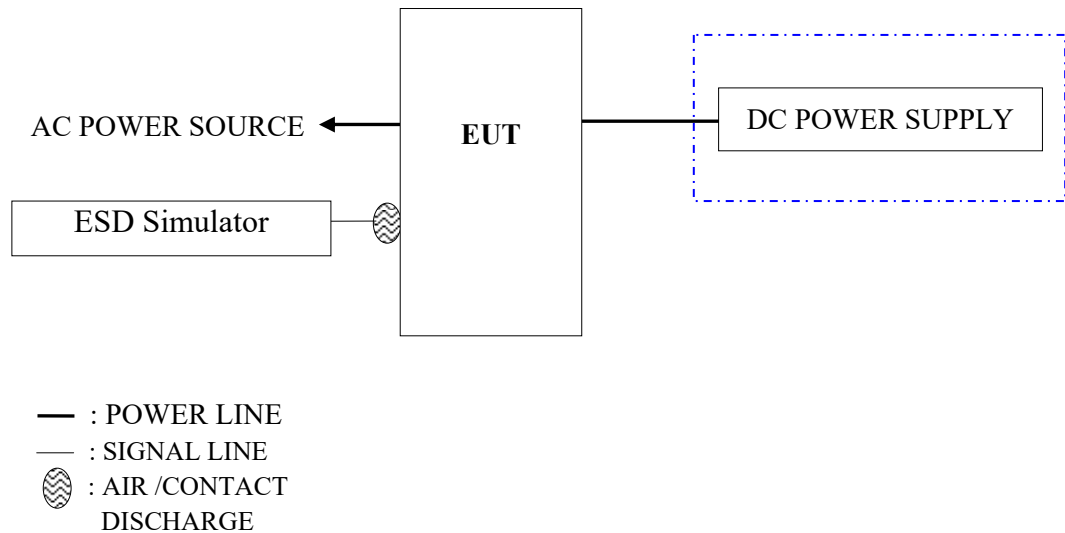
Z-phase C = 0.755 Ohm + j 0.472 Ohm (0.755 Ohm + 1501 ?H)
Z-neutral C = 0.503 Ohm + j 0.314 Ohm (0.503 Ohm + 1001 ?H)

7 ELECTROSTATIC DISCHARGE IMMUNITY TEST

7.1 Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	ESD Simulator	EM TEST	DITO	V0503100054	2020-04-09	1 Year

7.2 Block Diagram of Test Setup



7.3 Test Standard

EN 61000-6-2 (IEC 61000-6-2)
[IEC 61000-4-2:2008]

7.4 Severity Levels and Performance Criterion

7.4.1 Severity level

Level	Test Voltage Contact Discharge (kV)	Test Voltage Air Discharge (kV)
1.	2	2
2.	4	4
3.	6	8
4.	8	15
X	Special	Special

Test Level: Contact Discharge (level 2): $\pm 4\text{kV}$, Air Discharge(level 3): $\pm 8\text{kV}$

7.4.2 Performance criterion: B

7.5 Test Procedure

The measuring process is according to EN 61000-6-2 (IEC 61000-6-2) (IEC 61000-4-2:2008) and laboratory internal procedure TKC-301-015.

7.5.1 Air Discharge:

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible until contact the EUT. After each discharge, the ESD generator discharge electrode shall be removed from the EUT. The generator is then ret rigged for a new single discharge and repeated 10 discharges each at positive and negative polarity for each reselected test point. This procedure shall be repeated until all the air discharge completed.

7.5.2 Contact Discharge:

All the procedure shall be same as 7.5.1. Except that the tip of the discharge electrode shall touch the EUT conductive surfaces & repeated 10 discharges each at positive and negative polarity for each test point before the discharge switch is operated.

7.5.3 Indirect discharge for horizontal coupling plane:

At least 10 discharges each at positive and negative polarity shall be applied to the horizontal coupling plane, at points on each side of the EUT. The ESD generator positions vertically at a distance of 0.1m from the EUT and with the discharge electrode touching the coupling plane.

7.5.4 Indirect discharge for vertical coupling plane:

At least 10 discharges each at positive and negative polarity shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m×0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

7.5.5 For above tests, the voltage was increased from the minimum to the selected test level.

7.6 Test Results

PASSED.

EUT was tested with the following test mode and all the test results are listed in next page.

Note: Because the power of the EUT is out of the range of the test equipment, so we choose 10% load to test for EMS items.

Electrostatic Discharge Immunity Test Results

Applicant	JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO., LTD.			Date of Test		2020.12.14			
EUT	Grid-Tied PV Inverter			Input Volt.		700Vdc	Output Volt.		500Vac/50Hz
Model No.	GW136K-HTH			Temp.	24 ℃	Humidity	46%	Pressure	101kPa
Test Mode	10% Load								
Working Condition	Operating				Results		PASS		
Item	Amount of Discharges		Discharge Voltage				Performance Criterion		
Contact Discharge	25	+2kV,+4kV				A			
		-2kV,-4kV							
Air Discharge	10	+2kV,+4kV,+6kV,+8kV				A			
		-2kV,-4kV, -6kV,-8kV							
Indirect Discharge (HCP)	25	+2kV,+4kV				A			
		-2kV,-4kV							
Indirect Discharge (VCP Front)	25	+2kV,+4kV				A			
		-2kV,-4kV							
Indirect Discharge (VCP Left)	25	+2kV,+4kV				A			
		-2kV,-4kV							
Indirect Discharge (VCP Back)	25	+2kV,+4kV				A			
		-2kV,-4kV							
Indirect Discharge (VCP Right)	25	+2kV,+4kV				A			
		-2kV,-4kV							
Measurement Points	1.	Screw X18	Contact Discharge	2.	Insulation surface X26	Air Discharge			
	3.	AC Port	Air Discharge	4.	GAP X15	Air Discharge			
	5.	Switch X4	Air Discharge	6.	DC Port X12	Air Discharge			
	7.	COM X4	Air Discharge	8.	WIFI	Air Discharge			
Note: EN61000-6-2					Engineer: Chencai				

Photos of Discharge Points:







8 RF FIELD STRENGTH IMMUNITY TEST

8.1 Test Equipment

For 80MHz~1GHz Test

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	Signal Generator	Agilent	E8257D	MY46130042	2020-07-17	1 Year
2.	Power Amplifier	AR	KAW 2180	10088-2	NCR	NCR
3.	Log-Periodic Antenna	AR	AT1080	0323131	NCR	NCR
4.	Direction Coupler	AR	DC6180A	322333	2020-04-28	1 Year
5.	Test Software	Audix/i2(5.8.1)				

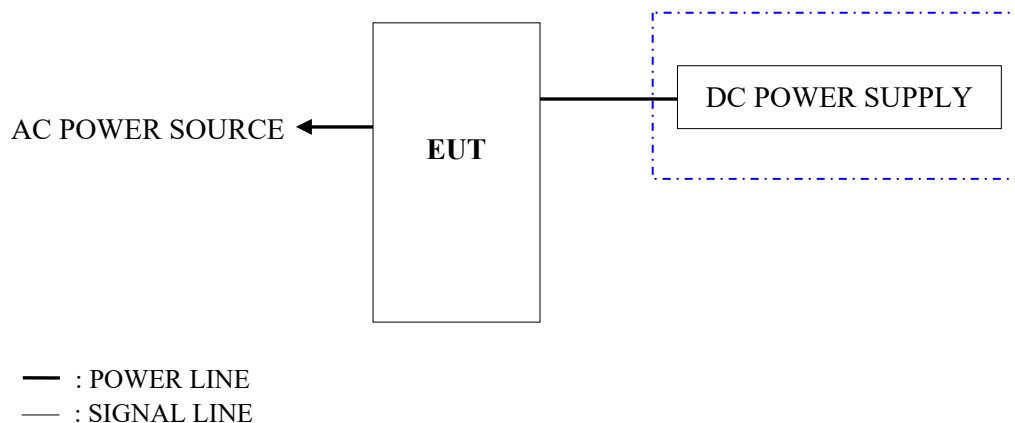
For 1GHz~6GHz Test

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	Signal Generator	Agilent	E8257D	MY46130042	2020-07-17	1 Year
2.	LINEAR POWER AMPLIFIER	MILMEGA	AS0104-200-200	1016528	NCR	NCR
3.	Power Amplifier	MILMEGA	AS1860-50	1055611	NCR	NCR
4.	Horn Antenna	AR	AT4002A	322311	NCR	NCR
5.	Direction Coupler	AR	DC7144A	322193	2020-04-28	1 Year
9.	Test Software	Audix/i2(5.8.1)				

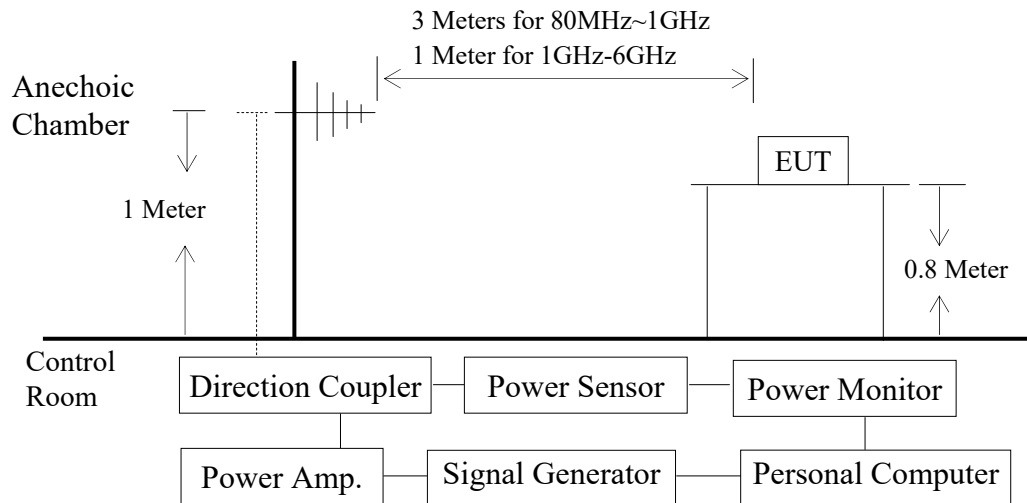
NCR: Non-Calibration Requirement

8.2 Block Diagram of Test Setup

8.2.1 Block Diagram of connection between EUT and simulators.



8.2.2 R/S Test Setup



8.3 Test Standard

EN 61000-6-2 (IEC 61000-6-2) [IEC 61000-4-3:2006+A2:2010]

8.4 Severity Levels and Performance Criterion

8.4.1 Severity level

Level	Field Strength V/m
1.	1
2.	3
3.	10
X	Special

Test Level: 2&3; Field strength: 10/3 V/m

8.4.2 Performance criterion: A

8.5 Test Procedure

The measuring process is according to EN 61000-6-2 (IEC 61000-6-2)(IEC 61000-4-3:2006+A2:2010) and laboratory internal procedure TKC-301-016.

The field sensor is placed on the EUT table (0.8 meter above the ground) which is 3 meters for frequency range 80MHz-1GHz and 1meter for frequency range 1GHz-6GHz away from the transmitting antenna. Through the signal generator, power amplifier and transmitting antenna to produce a uniformity field strength (10/3 V/m measured by field sensor) around the EUT table from frequency range 80MHz-1GHz,1GHz-6GHz and records the signal generator's output level at the same time for whole measured frequency range. Then, put EUT and its simulators on the EUT turn table and keep them 3 meters away from the transmitting antenna which is mounted on an antenna tower and fixes at 1 meter height above the ground. Using the recorded signal generator's output level to measure the EUT from frequency range 80MHz-1GHz, 1GHz-6GHz and both horizontal & vertical polarization of antenna must be set and measured. Each of the four sides of EUT must be faced this transmitting antenna and measures individually.

In this report, chose the most sensible side to measure that is right side to face transmitting antenna.

A CCD camera was put inside the chamber and through its display to monitor the EUT operational situation to judge the EUT performance criterion during measurement.

All the scanning conditions are as follows:

Condition of Test	Remarks
1. Fielded Strength	10/3/1 V/m
2. Amplitude Modulated	1kHz, 80%AM
3. Scanning Frequency	80MHz~1GHz, 1.4GHz~2GHz, 2GHz~2.7GHz
4. Step Size	1% increments
5. The Rate of Sweep	0.0015 decade/s
6. Dwell Time	3 sec.

8.6 Test Results

PASSED.

EUT was tested with the following test mode and all the test results are listed in next page.

RF Field Strength Immunity Test Results

<i>Applicant</i>	<i>JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO., LTD.</i>		<i>Date of Test</i>	<i>2020.12.10</i>	
<i>EUT</i>	<i>Grid-Tied PV Inverter</i>		<i>Input Volt.</i>	<i>700Vdc</i>	<i>Output Volt. 500Vac/50Hz</i>
<i>Model No.</i>	<i>GW136K-HTH</i>		<i>Temp.</i>	<i>25.3 °C</i>	<i>Humidity 56%</i>
<i>Test Mode</i>	<i>10% Load</i>				
<i>Working Condition</i>	<i>Operating</i>			<i>Results</i>	<i>PASS</i>
<i>Frequency Range (MHz)</i>	<i>E.U.T. Position (Angle)</i>	<i>Ant. Polarity (Hor. or Ver.)</i>	<i>Field Strength (V/m)</i>	<i>Observation Criterion</i>	<i>Remark</i>
<i>80~1000</i>	<i>0</i>	<i>H</i>	<i>10</i>	<i>A</i>	
<i>80~1000</i>	<i>90</i>	<i>H</i>	<i>10</i>	<i>A</i>	
<i>80~1000</i>	<i>180</i>	<i>H</i>	<i>10</i>	<i>A</i>	
<i>80~1000</i>	<i>270</i>	<i>H</i>	<i>10</i>	<i>A</i>	
<i>80~1000</i>	<i>0</i>	<i>V</i>	<i>10</i>	<i>A</i>	
<i>80~1000</i>	<i>90</i>	<i>V</i>	<i>10</i>	<i>A</i>	
<i>80~1000</i>	<i>180</i>	<i>V</i>	<i>10</i>	<i>A</i>	
<i>80~1000</i>	<i>270</i>	<i>V</i>	<i>10</i>	<i>A</i>	
<i>Note:</i> <i>EN61000-6-2</i> <i>Modulation Condition: 80% AM(1kHz)</i> <i>Dwell Time: 3s</i> <i>Stepped Frequency: 1%</i> <i>Test distance: 1.5m</i>					
			<i>Engineer: Zhanyao</i>		

RF Field Strength Immunity Test Results

Applicant	JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO., LTD.			Date of Test	2020.12.10		
EUT	Grid-Tied PV Inverter			Input Volt.	700Vdc	Output Volt.	500Vac/50Hz
Model No.	GW136K-HTH			Temp.	25.3 ℃	Humidity	56%
Test Mode	10% Load						
Working Condition	Operating					Results	PASS
Frequency Range (MHz)	E.U.T. Position (Angle)	Ant. Polarity (Hor. or Ver.)	Field Strength (V/m)		Observation Criterion		Remark
1000~2000	0	H	3		A		
1000~2000	90	H	3		A		
1000~2000	180	H	3		A		
1000~2000	270	H	3		A		
1000~2000	0	V	3		A		
1000~2000	90	V	3		A		
1000~2000	180	V	3		A		
1000~2000	270	V	3		A		
Note: EN61000-6-2 Modulation Condition: 80% AM(1kHz) Dwell Time:3s Stepped Frequency:1% Test distance:1m							
			Engineer: Zhanyao				

RF Field Strength Immunity Test Results

Applicant	JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO., LTD.		Date of Test	2020.12.10	
EUT	Grid-Tied PV Inverter		Input Volt.	700Vdc	Output Volt. 500Vac/50Hz
Model No.	GW136K-HTH		Temp.	25.3 °C	Humidity 56%
Test Mode	10% Load				
Working Condition	Operating			Results	PASS
Frequency Range (MHz)	E.U.T. Position (Angle)	Ant. Polarity (Hor. or Ver.)	Field Strength (V/m)	Observation Criterion	Remark
2000~6000	0	H	I	A	
2000~6000	90	H	I	A	
2000~6000	180	H	I	A	
2000~6000	270	H	I	A	
2000~6000	0	V	I	A	
2000~6000	90	V	I	A	
2000~6000	180	V	I	A	
2000~6000	270	V	I	A	
Note: EN61000-6-2 Modulation Condition: 80% AM(1kHz) Dwell Time: 3s Stepped Frequency: 1% Test distance: 1m					
			Engineer: Zhanyao		

9 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

9.1 Test Equipment

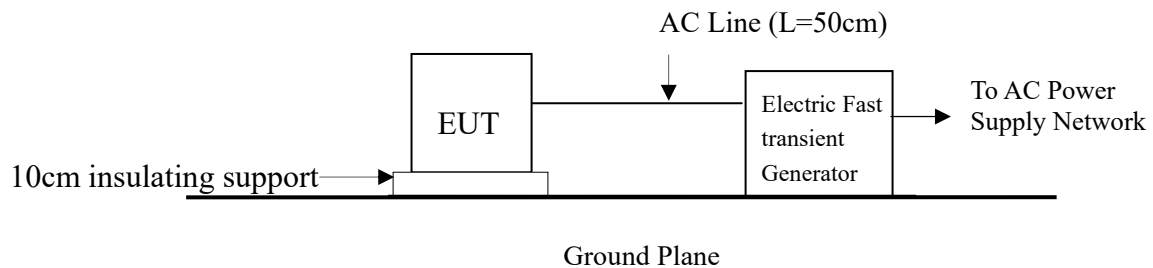
Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	Electric Fast Transient Generator	3C TEST	EFT-4003G	EC0471226	2020-04-03	1 Year

9.2 Block Diagram of Test Setup

9.2.1 Block Diagram of connection between EUT and simulators.

Same as section 8.2.1.

9.2.2 EFT Test Setup



Remark: Combination wave generator and decoupling networks are included in test.

9.3 Test Standard

EN 61000-6-2 (IEC 61000-6-2) [IEC 61000-4-4:2012]

9.4 Severity Levels and Performance Criterion

9.4.1 Severity levels

Open circuit output test voltage and repetition rate of the impulses				
Level	On power port, PE		On I/O (input/output) signal, data and control ports	
	Voltage peak kV	Repetition rate kHz	Voltage peak kV	Repetition rate kHz
1.	0.5	5 or 100	0.25	5 or 100
2.	1	5 or 100	0.5	5 or 100
3.	2	5 or 100	1	5 or 100
4.	4	5 or 100	2	5 or 100
X ^a	Special	Special	Special	Special
<p>Note 1 : Use of 5kHz repetition rates is traditional; however, 100kHz is closer to reality. Product committees should determine which frequencies are relevant for specific products or product types.</p> <p>Note 2 : With some products, there may be no clear distinction between power ports and I/O ports, in which case it is up to product committees to make this determination for test purposes.</p>				
^a “X” is an open level. The level has to be specified in the dedicated equipment specification.				

Test Level: 3, 5/50 Tr/Th ns, 5kHz

9.4.2 Performance criterion: **B**

9.5 Test Procedure

The measuring process is according to EN 61000-6-2 (IEC 61000-6-2)(IEC 61000-4-4:2012) and laboratory internal procedure TKC-301-017.

The EUT and its simulators shall be placed 0.1m high above the ground reference plane which was a min. 1m*1m metallic sheet with 0.65mm minimum thickness. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

The EUT was powered by coupling network of the EFT generator. The distance between coupling devices and the EUT shall be (0.5-0/+0.1)m for table-top equipment, and (1.0±0.1)m for floor standing equipment. The cable between the EUT and the coupling device, if detachable, shall be as short as possible to comply with this requirement. If the manufacturer provides a cable exceeding the distance between the coupling device and the point of entry of the EUT, the excess of this cable shall be bundled and situated at a distance of 0.1m above the ground reference plane.

9.6 Test Results

PASSED.

EUT was tested with the following test mode and all the test results are listed in next page.

Electrical Fast Transient / Burst Immunity Test Results

Applicant	JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO., LTD.				Date of Test	2020.12.11			
EUT	Grid-Tied PV Inverter				Input Volt.	500Vac/50Hz			
Model No.	GW136K-HTH				Temp.	26 ℃	Humidity	54%	
Test Mode	10% Load								
Working Condition	Operating				Results		PASS		
Inject Place: Power Supply Line					Inject Place: I/O Cable				
Inject Line	Voltage (kV)	Inject Time(s)	Inject Method	Performance Criterion	Inject Line	Voltage (kV)	Inject Time(s)	Inject Method	Performance Criterion
L1	±0.5, ±1.0, ±2.0	60	Direct	A					
L2	±0.5, ±1.0, ±2.0	60	Direct	A					
L3	±0.5, ±1.0, ±2.0	60	Direct	A					
PE	±0.5, ±1.0, ±2.0	60	Direct	A					
L1,L2	±0.5, ±1.0, ±2.0	60	Direct	A					
L1,L3	±0.5, ±1.0, ±2.0	60	Direct	A					
L1,PE	±0.5, ±1.0, ±2.0	60	Direct	A					
L2,L3	±0.5, ±1.0, ±2.0	60	Direct	A					
L2,PE	±0.5, ±1.0, ±2.0	60	Direct	A					
L3,PE	±0.5, ±1.0, ±2.0	60	Direct	A					
L1,L2,L3	±0.5, ±1.0, ±2.0	60	Direct	A					
L1,L2,PE	±0.5, ±1.0, ±2.0	60	Direct	A					
L1,L3,PE	±0.5, ±1.0, ±2.0	60	Direct	A					
L2,L3,PE	±0.5, ±1.0, ±2.0	60	Direct	A					
L1,L2,L3,PE	±0.5, ±1.0, ±2.0	60	Direct	A					
Note: EN61000-6-2									
					Engineer: Jiao Huliang				

Electrical Fast Transient / Burst Immunity Test Results

<i>Applicant</i>	<i>JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO., LTD.</i>				<i>Date of Test</i>	<i>2020.12.11</i>			
<i>EUT</i>	<i>Grid-Tied PV Inverter</i>				<i>Input Volt.</i>	<i>700Vdc</i>			
<i>Model No.</i>	<i>GW136K-HTH</i>				<i>Temp.</i>	<i>26 ℃</i>	<i>Humidity</i>	<i>54%</i>	
<i>Test Mode</i>	<i>10% Load</i>								
<i>Working Condition</i>	<i>Operating</i>				<i>Results</i>		<i>PASS</i>		
<i>Inject Place: DC mains input port</i>					<i>Inject Place: I/O Cable</i>				
<i>Inject Line</i>	<i>Voltage (kV)</i>	<i>Inject Time(s)</i>	<i>Inject Method</i>	<i>Observation Criterion</i>	<i>Inject Line</i>	<i>Voltage (kV)</i>	<i>Inject Time(s)</i>	<i>Inject Method</i>	<i>Observation Criterion</i>
<i>PV+</i>	<i>+0.5,+I</i>	<i>60</i>	<i>Direct</i>	<i>A</i>					
<i>PV+</i>	<i>-0.5,-I</i>	<i>60</i>	<i>Direct</i>	<i>A</i>					
<i>PV-</i>	<i>+0.5,+I</i>	<i>60</i>	<i>Direct</i>	<i>A</i>					
<i>PV-</i>	<i>-0.5,-I</i>	<i>60</i>	<i>Direct</i>	<i>A</i>					
<i>PV+,PV-</i>	<i>+0.5,+I</i>	<i>60</i>	<i>Direct</i>	<i>A</i>					
<i>PV+,PV-</i>	<i>-0.5,-I</i>	<i>60</i>	<i>Direct</i>	<i>A</i>					
<i>Note: EN61000-6-2</i>									
					<i>Engineer: Jiao Huliang</i>				

10 SURGE IMMUNITY TEST

10.1 Test Equipment

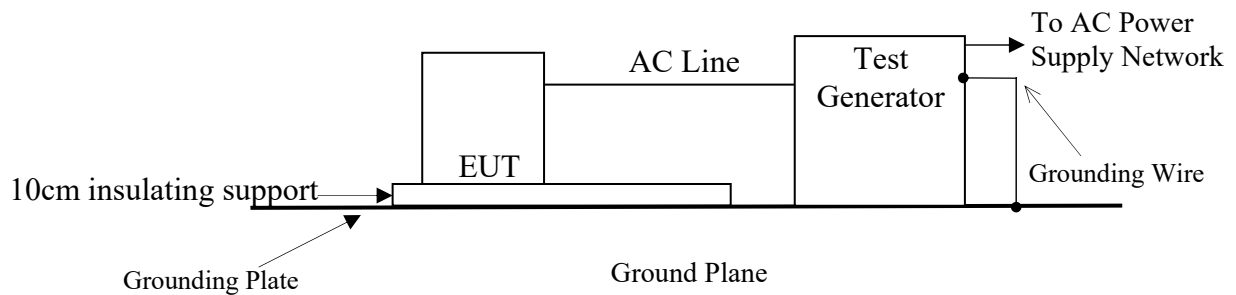
Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	Surge Generator	3C TEST	SG-5010G	EC5531208	2020-04-03	1 Year

10.2 Block Diagram of Test Setup

10.2.1 Block Diagram of connection between EUT and simulators.

Same as section 8.2.1.

10.2.2 Test Setup



Remark: Test generator includes control center, surge combination and coupler.

10.3 Test Standard

EN 61000-6-2 (IEC 61000-6-2) [IEC 61000-4-5:2014]

10.4 Severity Levels and Performance Criterion

10.4.1 Test Levels

Level	Open-circuit test Voltage +/- 10%, kV
1.	0.5
2.	1.0
3.	2.0
4.	4.0
X	Special

Test Level: line to earth - $\pm 2.0\text{kV}$, line to line - $\pm 0.1\text{kV}$, 1.2/50 (8/20) Tr/Th μs .

10.4.2 Performance Criterion: **B**

10.5 Test Procedure

The measuring process is according to EN 61000-6-2 (EC 61000-6-2) (IEC 61000-4-5:2014) and laboratory internal procedure TKC-301-018.

- 10.5.1 Set up the EUT and test generator as shown on section 10.2.1 & 10.2.2.
- 10.5.2 For line to line coupling mode, provided a 0.5/1kV 1.2/50 μ s voltage surge (at open-circuit condition) and 8/20 μ s current surge to EUT selected points.
- 10.5.3 At least 5 positive and 5 negative (polarity) tests with a Maximum 1/min repetition rate were conducted during test.
- 10.5.4 Four phase angles (0°, 90°, 180°, 270°) were done individually.
- 10.5.5 Repeat procedure 10.5.2. to 10.5.4. except the open-circuit test voltages 0.5kV/1kV/2kV for line to earth coupling mode test.
- 10.5.6 Record the EUT Operating situation during compliance test and decide the EUT immunity criterion for above each test.

10.6 Test Results

PASSED.

EUT was tested with the following test mode and all the test results are listed in next page.

Surge Immunity Test Results

Applicant	JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO., LTD.			Date of Test	2020.12.11	
EUT	Grid-Tied PV Inverter			I/P Volt.	500Vac/50Hz	
Model No.	GW136K-HTH			Temp.	26 ℃	Humidity 54%
Test Mode	10% Load					
Working Condition	Operating			Results	PASS	
Output AC Power Port						
Combination wave <input checked="" type="checkbox"/> 1.2/50 μs <input type="checkbox"/> 10/700μs						
Location	Polarity	Phase Angle	No of Pulse	Pulse Voltage kV	Impedance	Observation Criterion
L1-PE	+	0	5	1.0,2.0	12Ω	B
	+	90	5	1.0,2.0		B
	+	180	5	1.0,2.0		B
	+	270	5	1.0,2.0		B
	-	0	5	1.0,2.0		B
	-	90	5	1.0,2.0		B
	-	180	5	1.0,2.0		B
	-	270	5	1.0,2.0		B
L2-PE	+	0	5	1.0,2.0	12Ω	B
	+	90	5	1.0,2.0		B
	+	180	5	1.0,2.0		B
	+	270	5	1.0,2.0		B
	-	0	5	1.0,2.0		B
	-	90	5	1.0,2.0		B
	-	180	5	1.0,2.0		B
	-	270	5	1.0,2.0		B
L3-PE	+	0	5	1.0,2.0	12Ω	B
	+	90	5	1.0,2.0		B
	+	180	5	1.0,2.0		B
	+	270	5	1.0,2.0		B
	-	0	5	1.0,2.0		B
	-	90	5	1.0,2.0		B
	-	180	5	1.0,2.0		B
	-	270	5	1.0,2.0		B
L1-L2	+	0	5	0.5,1.0	2Ω	B
	+	90	5	0.5,1.0		B
	+	180	5	0.5,1.0		B
	+	270	5	0.5,1.0		B
	-	0	5	0.5,1.0		B
	-	90	5	0.5,1.0		B
	-	180	5	0.5,1.0		B
	-	270	5	0.5,1.0		B

	-	270	5	0.5,1.0		B
L1-L3	+	0	5	0.5,1.0	2Ω	B
	+	90	5	0.5,1.0		B
	+	180	5	0.5,1.0		B
	+	270	5	0.5,1.0		B
	-	0	5	0.5,1.0		B
	-	90	5	0.5,1.0		B
	-	180	5	0.5,1.0		B
	-	270	5	0.5,1.0		B
L2-L3	+	0	5	0.5,1.0	2Ω	B
	+	90	5	0.5,1.0		B
	+	180	5	0.5,1.0		B
	+	270	5	0.5,1.0		B
	-	0	5	0.5,1.0		B
	-	90	5	0.5,1.0		B
	-	180	5	0.5,1.0		B
	-	270	5	0.5,1.0		B
Note: EN61000-6-2 The performance criterion B means that when 2kV interference is applied to the AC terminal, the DC of EUT will be cut off and can be recovered automatically.						
				Engineer: Jiao Huliang		

Surge Immunity Test Results 2

<i>Applicant</i>	<i>JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO., LTD.</i>			<i>Date of Test</i>	2020.12.11	
<i>EUT</i>	<i>Grid-Tied PV Inverter</i>			<i>I/P Volt.</i>	700Vdc	
<i>Model No.</i>	<i>GW136K-HTH</i>			<i>Temp.</i>	26 °C	<i>Humidity</i> 54%
<i>Test Mode</i>	10% Load					
<i>Working Condition</i>	Operating			<i>Results</i>	PASS	
Input DC Power Port						
<i>Combination wave</i>				<input checked="" type="checkbox"/> 1.2/50 μ s <input type="checkbox"/> 10/700 μ s		
<i>Location</i>	<i>Polarity</i>	<i>Phase Angle</i>	<i>No of Pulse</i>	<i>Pulse Voltage kV</i>	<i>Impedance</i>	<i>Observation Criterion</i>
<i>PV+,PV-</i>	+	N/A	5	0.5,1.0	2 Ω	B
	-	N/A	5	0.5,1.0		B
<i>Note:</i> EN61000-6-2 The performance criterion B means that when 2kV interference is applied to the AC terminal, the DC of EUT will be cut off and can be recovered automatically.						
				<i>Engineer: Jiao Huliang</i>		

11 CONDUCTED DISTURBANCE IMMUNITY TEST

11.1 Test Equipment

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	Signal Generator	Agilent	E8257D	MY46130042	2020-07-17	1 Year
2.	Power Amplifier	AR	KAW 2180	10088-2	NCR	NCR
3.	Attenuator	ShanghaiHuaxiang	DTS250	17110301	2020-10-13	1 Year
4.	CDN	FCC	FCC-801-M2-25A	06025	2019-12-20	1 Year
5.	CDN	FRANKONIA	CDN-M5/32A	A2520060/2012	2020-04-03	1 Year
6.	CDN	FCC	FCC-801-M3-25A	06042	2019-12-25	1 Year
10.	Software	Audix/i2(5.8.1)				

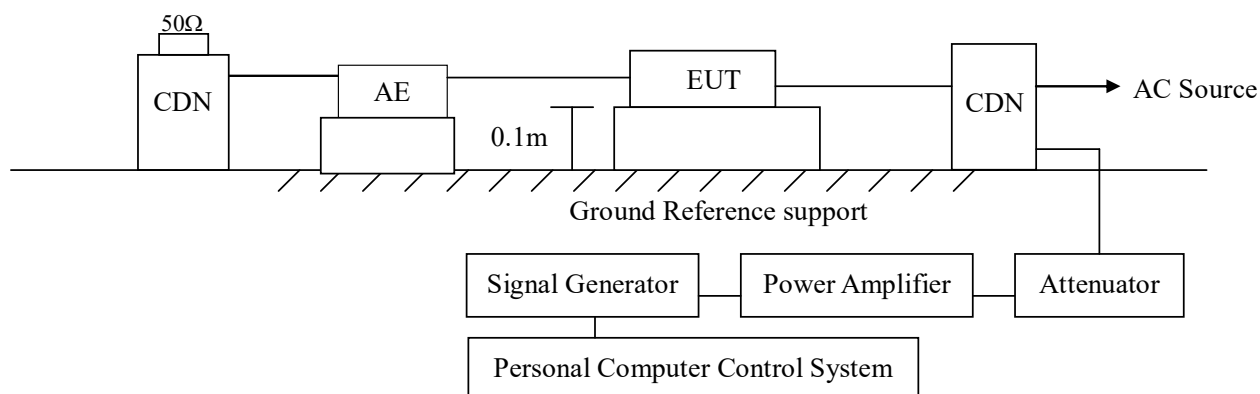
NCR: Non-Calibration Requirement.

11.2 Block Diagram of Test Setup

11.2.1 Block Diagram of connection between EUT and simulators.

Same as Section 8.2.1.

11.2.2 Common Mode Test Setup



11.3 Test Standard

EN 61000-6-2 (IEC 61000-6-2) [IEC 61000-4-6:2013]

11.4 Severity Levels and Performance Criterion

11.4.1 Severity levels

Frequency range 0.15MHz - 80MHz		
Level	Voltage level (e.m.f.)	
	U_0 dB(μV)	U_0 V
1.	120	1
2.	130	3
3.	140	10
X ^a	Special	
^a X is an open level.		

Test Level: 0.15-80MHz, 10 V, 80%AM (1kHz)

11.4.2 Performance criterion: A

11.5 Test Procedure

The measuring process is according to EN 61000-6-2 (IEC 61000-6-2) (IEC 61000-4-6:2013) and laboratory internal procedure TKC-301-019.

11.5.1 Set up the EUT, CDN and test generators as shown on section 11.2.2.

11.5.2 The EUT and supporting equipment were placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) was placed on the ground plane making contact with it at about 0.1-0.3m from EUT. Cables between CDN and EUT were as short as possible.

11.5.3 The disturbance signal described below was injected to EUT through CDN.

11.5.4 The EUT operates within its operational mode(s) under intended climatic conditions after power on.

11.5.5 The frequency range was swept from 150 kHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1 kHz sine wave.

11.5.6 The rate of sweep shall not exceed 1.5×10^{-3} decades/s. Where the frequency was swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.

11.5.7 Recording the EUT Operating situation during compliance testing and decide the EUT immunity criterion.

11.6 Test Results

PASSED.

EUT was tested with the following test mode and all the test results are listed in next page.

Inject Currents Immunity Test Results

<i>Applicant</i>	<i>JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO., LTD.</i>		<i>Date of Test</i>	<i>2020.12.10</i>		
<i>EUT</i>	<i>Grid-Tied PV Inverter</i>		<i>Input Volt.</i>	<i>700Vdc</i>	<i>Output Volt.</i>	<i>500Vac/50Hz</i>
<i>Model No.</i>	<i>GW136K-HTH</i>		<i>Temp.</i>	<i>25.6 ℃</i>	<i>Humidity</i>	<i>56%</i>
<i>Test Mode</i>	<i>10% Load</i>					
<i>Working Condition</i>	<i>Operating</i>			<i>Results</i>		<i>PASS</i>
<i>Frequency Range (MHz)</i>	<i>Inject Position</i>		<i>Strength(V/m)</i>		<i>Observation Criterion</i>	<i>Remark</i>
<i>0.15MHz~80MHz</i>	<i>AC Port</i>		<i>10</i>		<i>A</i>	<i>CDN</i>
<i>0.15MHz~80MHz</i>	<i>DC Port</i>		<i>10</i>		<i>A</i>	<i>CDN</i>
<i>Note:</i> <i>EN61000-6-2</i> <i>Modulation Condition: 80% AM(1kHz)</i> <i>Dwell Time:3s</i> <i>Step Frequency:1%</i>						
			<i>Engineer:Zhanyao</i>			

12 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST

12.1 Test Equipment

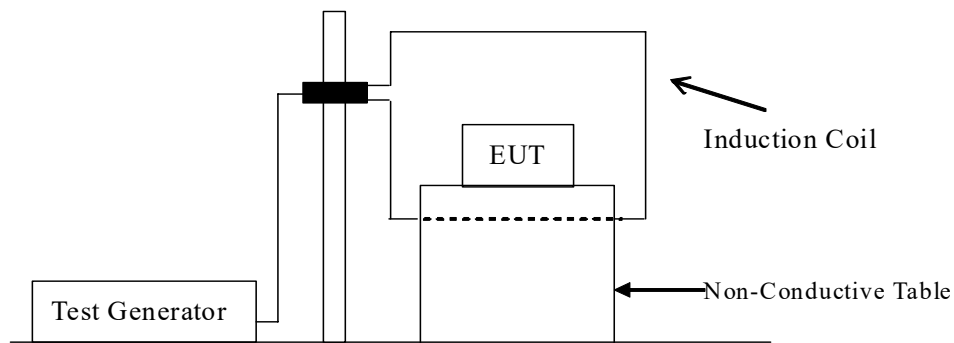
Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	Power Frequency Magnetic Field Generator	3C TEST	PFMF-6108G	EC0881205	2020-08-25	1 Year

12.2 Block Diagram of Test Setup

12.2.1 Block Diagram of connection between EUT and simulators.

Same as section 8.2.1.

12.2.2 Test Setup



12.3 Test Standard

EN 61000-6-2 (IEC 61000-6-2) [IEC 61000-4-8:2009]

12.4 Severity Levels and Performance Criterion

12.4.1 Severity level

Level	Magnetic Field Strength Continuous Field A/m
1.	1
2.	3
3.	10
4.	30
5.	100
X	Special

Test Level: 50/60Hz, 30A/m

12.4.2 Performance criterion: A

12.5 Test Procedure

The measuring process is according to EN 61000-6-2 (IEC 61000-6-2) (IEC 61000-4-8:2009) and laboratory internal procedure TKC-301-020.

The EUT was placed on 1m high table that above the ground reference plane which is the min. size 1m x 1m and 0.65mm thickness metallic. And subjected to the test magnetic field by using the induction coil of standard dimensions (1m x 1m). The induction coil rotated by 90 degrees in order to expose the EUT to the test field with different orientations. All cables of EUT exposed to magnetic field for 1m of their length.

12.6 Test Results

PASSED.

EUT was tested with the following test mode and all the test results are listed in next page.

Power Frequency Magnetic Field Immunity Test Results

<i>Applicant</i>	<i>JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO., LTD.</i>		<i>Date of Test</i>	<i>2020.11.05</i>	
<i>EUT</i>	<i>Grid-Tied PV Inverter</i>		<i>Input Volt.</i>	<i>700Vdc</i>	<i>Output Volt.</i> <i>500Vac/50Hz</i>
<i>Model No.</i>	<i>GW136K-HTH</i>		<i>Temp.</i>	<i>25.5 °C</i>	<i>Humidity</i> <i>48%</i>
<i>Test Mode</i>	<i>10% Load</i>				
<i>Working Condition</i>	<i>Operating</i>		<i>Results</i>	<i>PASS</i>	
<i>Power Frequency Magnetic Field</i>		<i>Testing Duration</i>	<i>Coil Orientation</i>	<i>Observation Criterion</i>	<i>Remark</i>
<i>50Hz, 30A/m</i>		<i>1 Min</i>	<i>X-axis</i>	<i>A</i>	
<i>50Hz, 30A/m</i>		<i>1 Min</i>	<i>Y-axis</i>	<i>A</i>	
<i>50Hz, 30A/m</i>		<i>1 Min</i>	<i>Z-axis</i>	<i>A</i>	
<i>Note:</i> <i>EN61000-6-2</i>					
			<i>Engineer: Zhanyao</i>		

13 VOLTAGE DIPS AND INTERRUPTIONS IMMUNITY TEST

13.1 Test Equipment

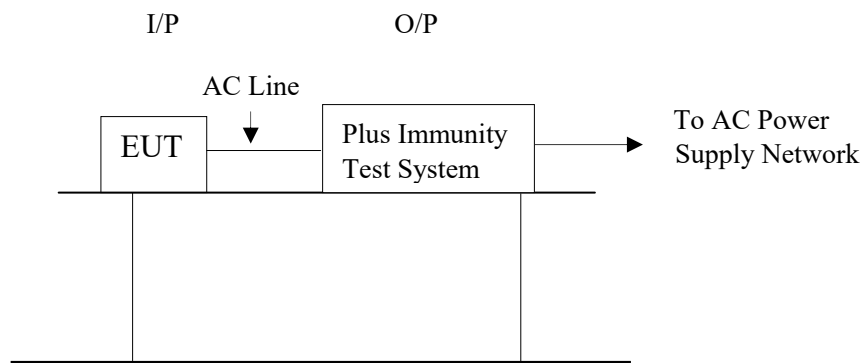
Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Period
1.	AC power source	TESEQ	NSG1007-45	1236A00705	2020-03-10	1 Year
2.	Proflin 2100 AC switching Unit	TESEQ AG	NSG2200-3	A22712	2020-03-10	1 Year

13.2 Block Diagram of Test Setup

13.2.1 Block Diagram of connection between EUT and simulators.

Same as section 8.2.1.

13.2.2 Test Setup



13.3 Test Standard

EN 61000-6-2 (IEC 61000-6-2) [IEC 61000-4-11:2004]

13.4 Severity Levels and Performance Criterion

13.4.1 Preferred severity levels and durations for voltage dips

Class ^a	Test level and durations for voltage dips (t_s) (50Hz/60Hz)				
Class 1	Case-by-case according to the equipment requirements				
Class 2	0% during ½ cycle	0% during 1 cycle	70% during 25/30 ^c cycles		
Class 3	0% during ½ cycle	0% during 1 cycle	40% during 10/12 ^c cycles	70% during 25/30 ^c cycles	80% during 250/300 ^c cycles
Class X ^b	X	X	X	X	X
^a Classes as per IEC 61000-2-4. ^b To be defined by product committee. For equipment connected directly or indirectly to the public network, the levels must not be less severe than Class 2. ^c “25/30 cycles” means “25 cycles for 50Hz test” and “30 cycles for 60Hz test”.					

13.4.2 Preferred severity levels and durations for short interruptions

Class ^a	Test level and durations for short interruptions (t_s) (50Hz/60Hz)
Class 1	Case-by-case according to the equipment requirements
Class 2	0% during 250/300 ^c cycles
Class 3	80% during 250/300 ^c cycles
Class X ^b	X
^a Classes as per IEC 61000-2-4. ^b To be defined by product committee. For equipment connected directly or indirectly to the public network, the levels must not be less severe than Class 2. ^c “250/300 cycles” means “250 cycles for 50Hz test” and “300 cycles for 60Hz test”.	

EN 61000-6-2(IEC 61000-6-2) Voltage dips: Voltage interruptions 100% reduction: 250 period;
Dips 30% reduction: 25 period; 60% reduction: 10 period; 100% reduction: 1.0period

13.4.3 Performance criterion:

- 1) Voltage dips 100% reduction performance criterion **B**.
- 2) Voltage dips 60% reduction performance criterion **C**.
- 3) Voltage dips 30% reduction performance criterion **C**.
- 4) Voltage interruption 100% reduction performance criterion **C**.

13.5 Test Procedure

The measuring process is according to EN 61000-6-2 (IEC 61000-6-2) (IEC 61000-4-11:2004) and laboratory internal procedure TKC-301-021.

13.5.1 Set up the EUT and test generator as shown on section 13.2.

13.5.2 The interruption was introduced at selected phase angles with specified duration. There was a 10s minimum interval between each test event.

13.5.3 After each test a full functional check was performed before the next test.

13.5.4 Repeat procedures 13.5.2. & 13.5.3. for voltage dips, only the test level and duration was changed.

13.5.5 Record any degradation of performance.

13.6 Test Results

PASSED.

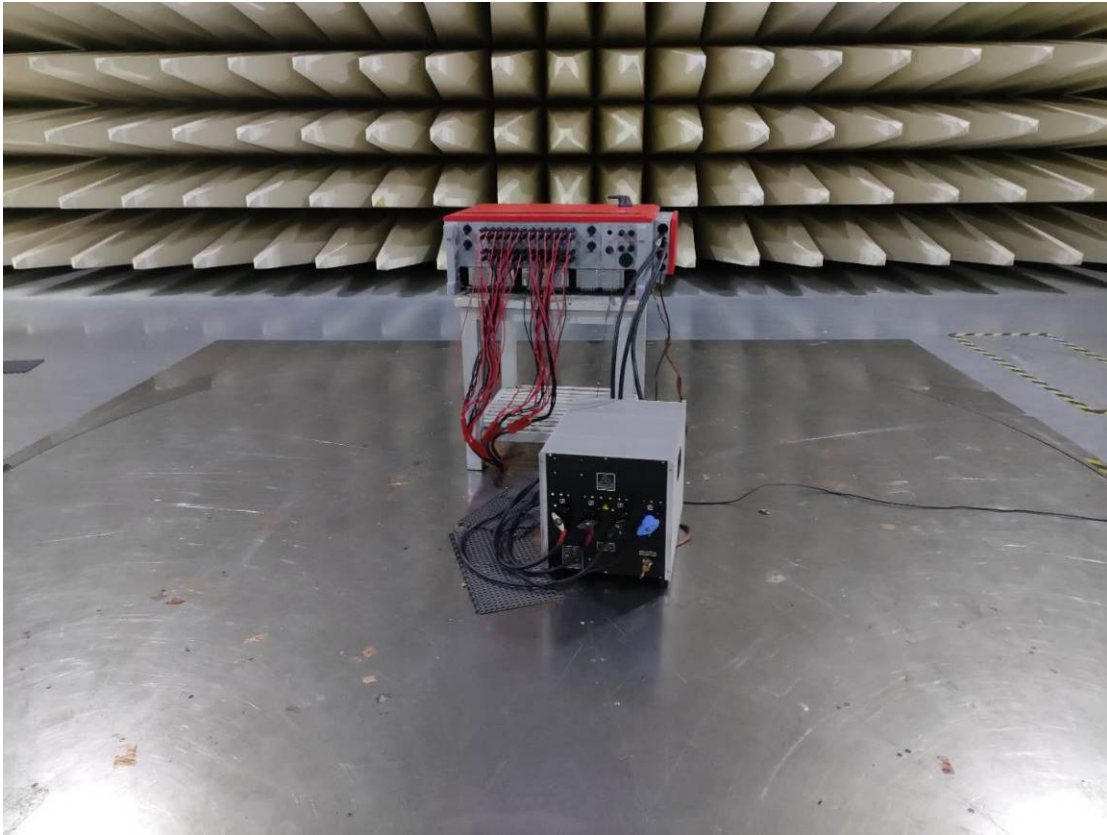
EUT was tested with the following test mode and all the test results are listed in next page.

Voltage Dips and Interruptions Immunity Test Results

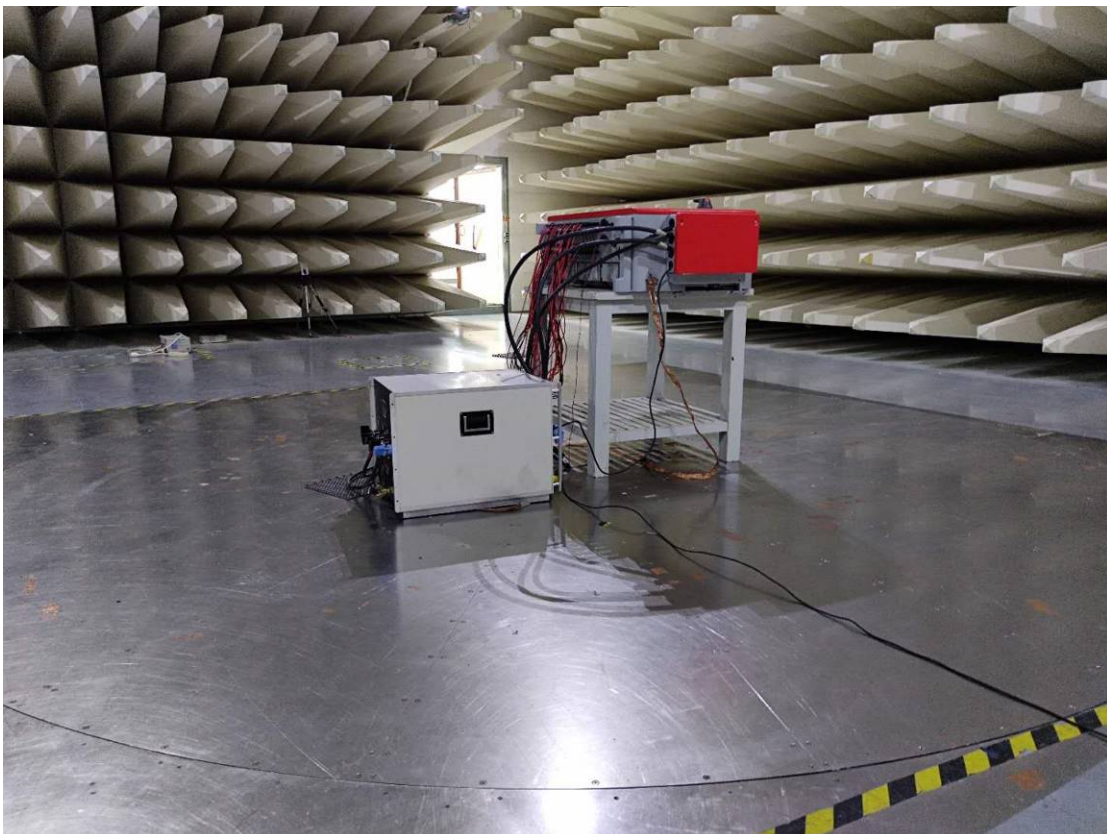
<i>Applicant</i>	JIANGSU GOODWE POWER SUPPLY TECHNOLOGY CO., LTD.			<i>Date of Test</i>	2020.11.05	
<i>EUT</i>	<i>Grid-Tied PV Inverter</i>			<i>Input Volt.</i>	700Vdc	<i>Output Volt.</i> 500Vac/50Hz
<i>Model No.</i>	<i>GW136K-HTH</i>			<i>Temp.</i>	26.9℃	<i>Humidity</i> 48%
<i>Test Mode</i>	10% Load					
<i>Working Condition</i>	Operating				<i>Results</i>	PASS
<i>Type of Test</i>	<i>Test Voltage</i>				<i>Observation Criterion</i>	
<i>Voltage Interruption</i>	500	<i>Phase Angle</i>	<i>%Reduction</i>	<i>Period</i>		
		0	100%	250	B	
		45	100%	250	B	
		90	100%	250	B	
		135	100%	250	B	
		180	100%	250	B	
		225	100%	250	B	
		270	100%	250	B	
<i>Voltage Dips</i>	500	0	30%	25	A	
		45	30%	25	A	
		90	30%	25	A	
		135	30%	25	A	
		180	30%	25	A	
		225	30%	25	A	
		270	30%	25	A	
		315	30%	25	A	
	500	0	60%	10	A	
		45	60%	10	A	
		90	60%	10	A	
		135	60%	10	A	
		180	60%	10	A	
		225	60%	10	A	
		270	60%	10	A	
		315	60%	10	A	
	500	0	100%	1	B	
		45	100%	1	B	
		90	100%	1	B	
		135	100%	1	B	
		180	100%	1	B	
		225	100%	1	B	
		270	100%	1	B	
		315	100%	1	B	
<i>Note:</i> EN61000-6-2 The Performance Criterion B means: the indicates Power decreases, But it can recover automatically.						
			Engineer: Zhanyao			

14 PHOTOGRAPHS

14.1 Photos of Conducted Disturbance Measurement



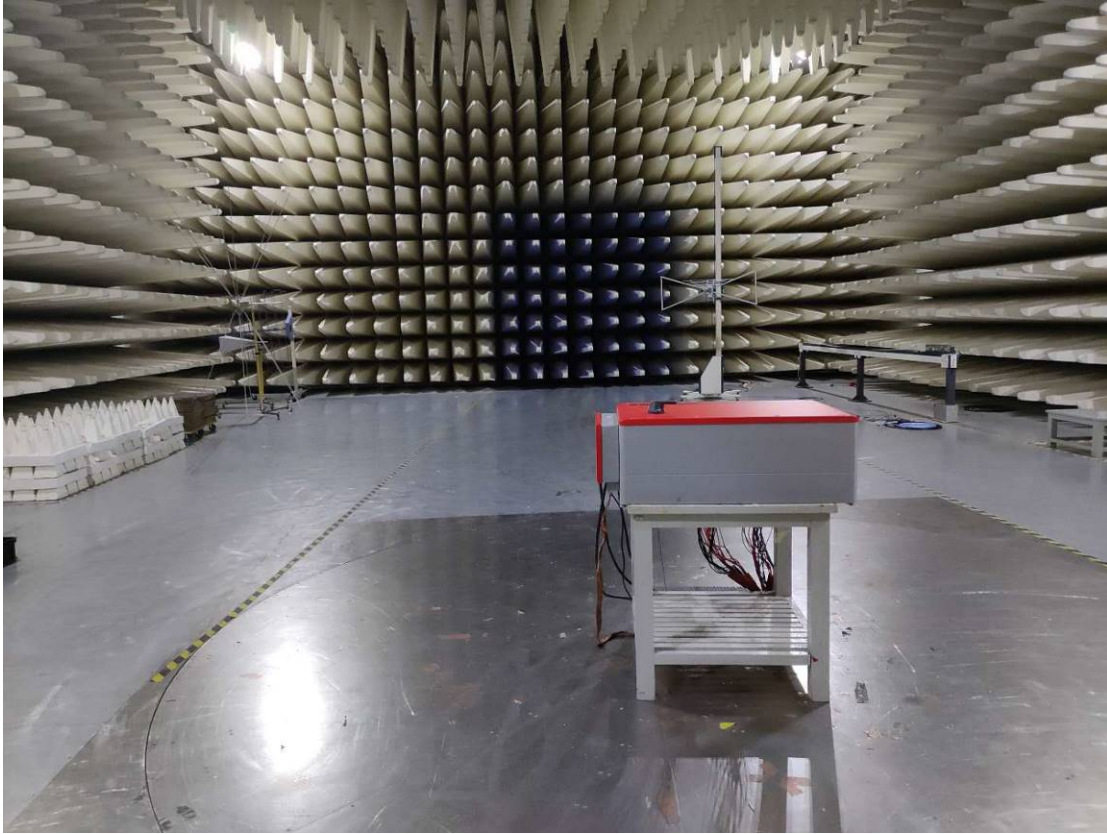
Front View of Conducted Measurement



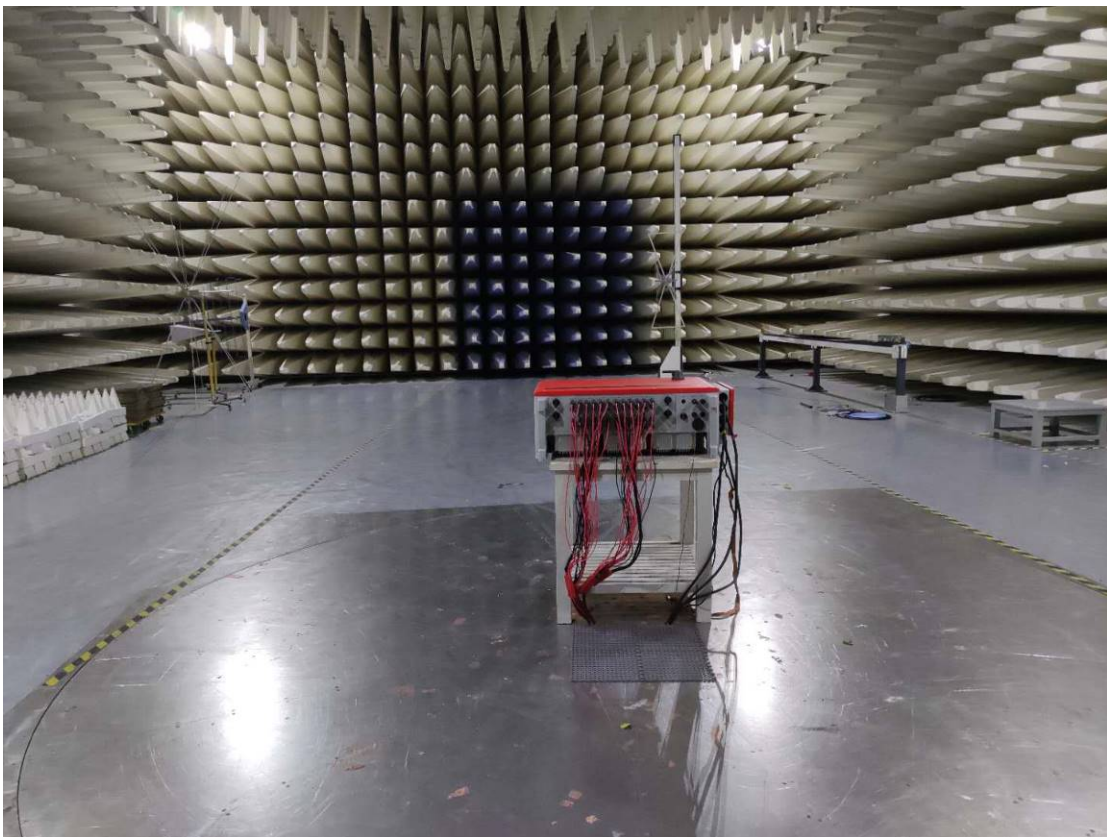
Side View of Conducted Measurement

14.2 Photos of Radiated Disturbance Measurement

For 30MHz ~1GHz



Front View of Radiated Disturbance Measurement



Back View of Radiated Disturbance Measurement

For above 1GHz



Front View of Radiated Disturbance Measurement



Back View of Radiated Disturbance Measurement

14.3 Photos of Harmonic & Flicker Measurement



14.4 Photos of Electrostatic Discharge Immunity Test

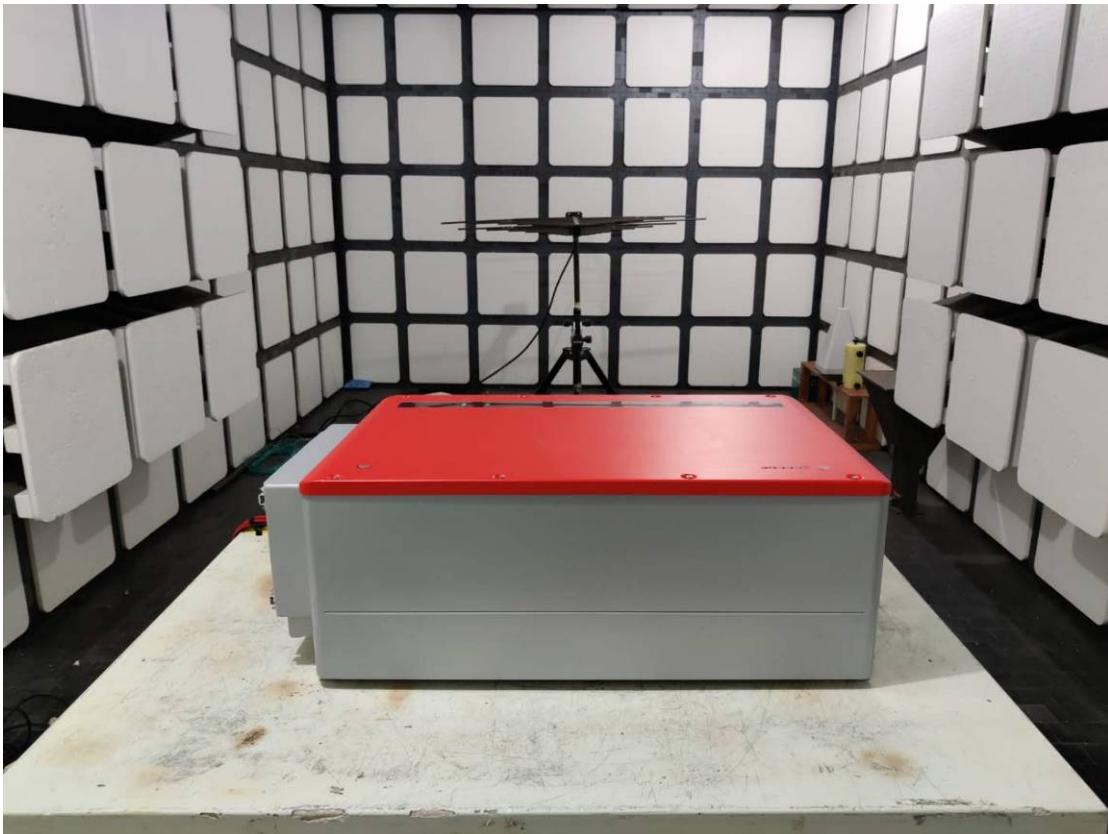


Contact & Air Discharge



VCP & HCP

14.5 Photos of RF Field Strength Immunity Test



Front View of R/S Test (80MHz~1GHz)

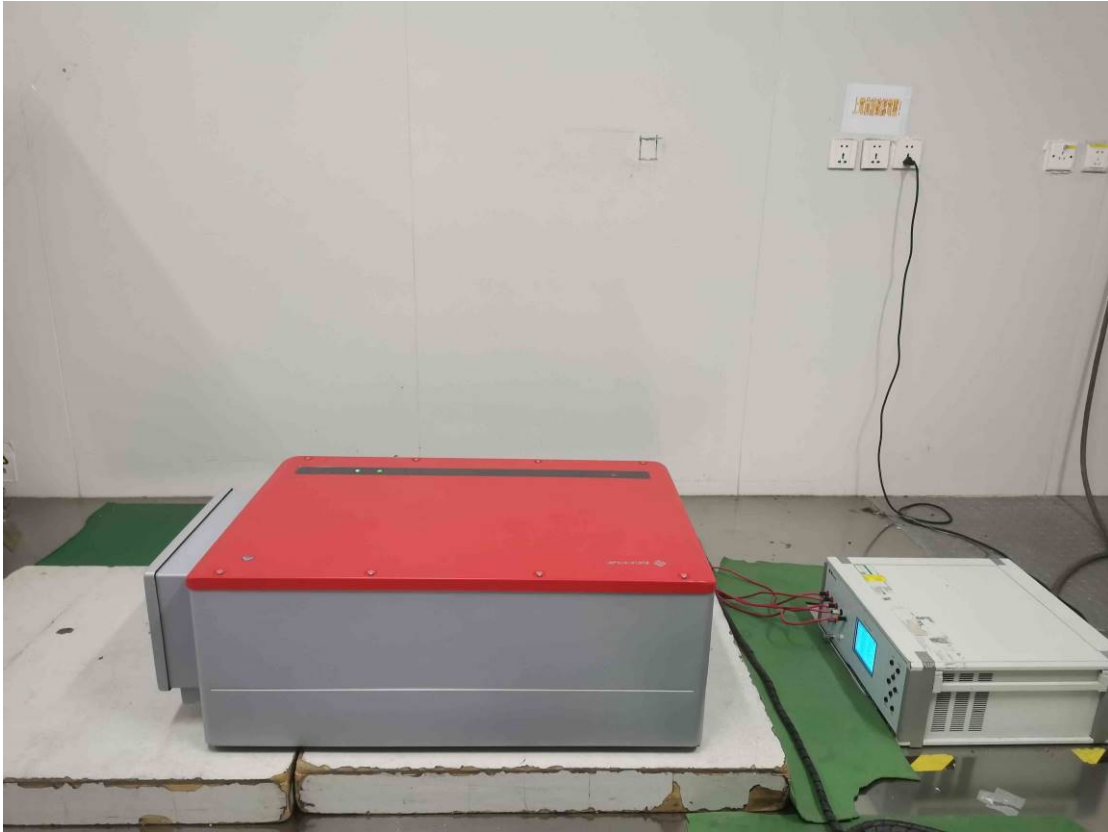


Front View of R/S Test (Above 1GHz)

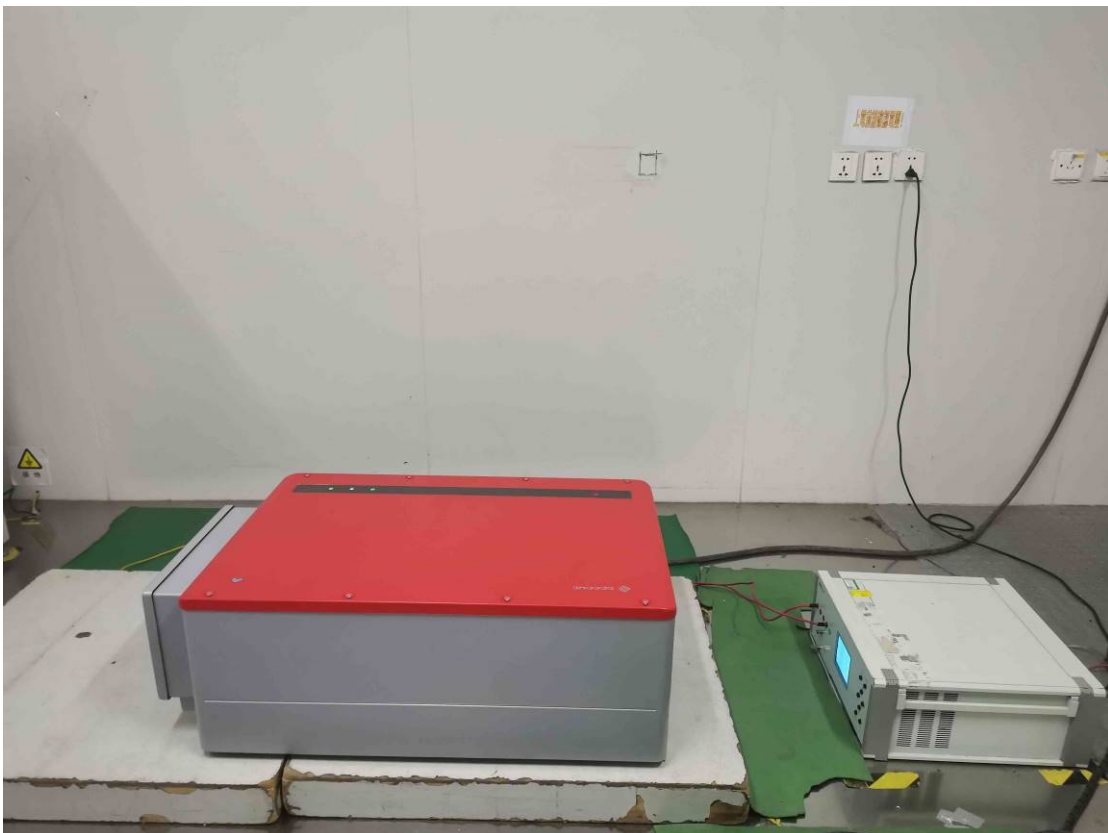


Back View of R/S Test

14.6 Photos of Electrical Fast Transient Immunity Test

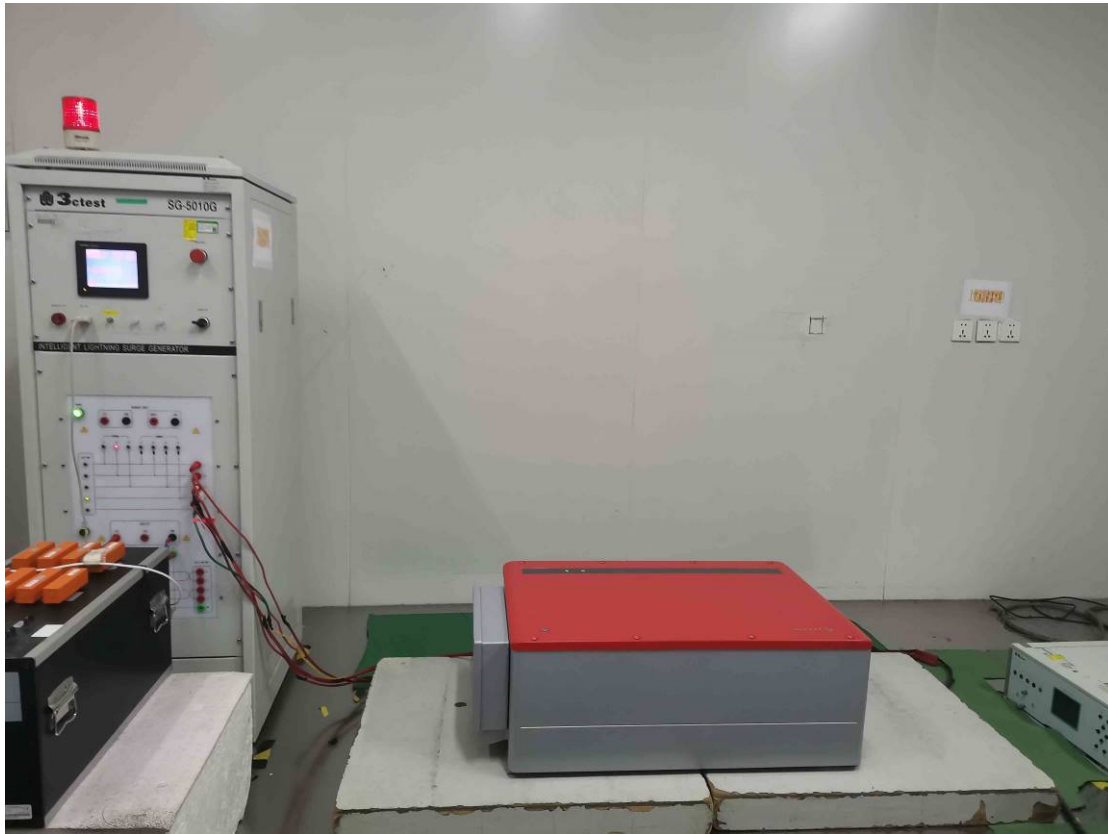


For AC Mains port

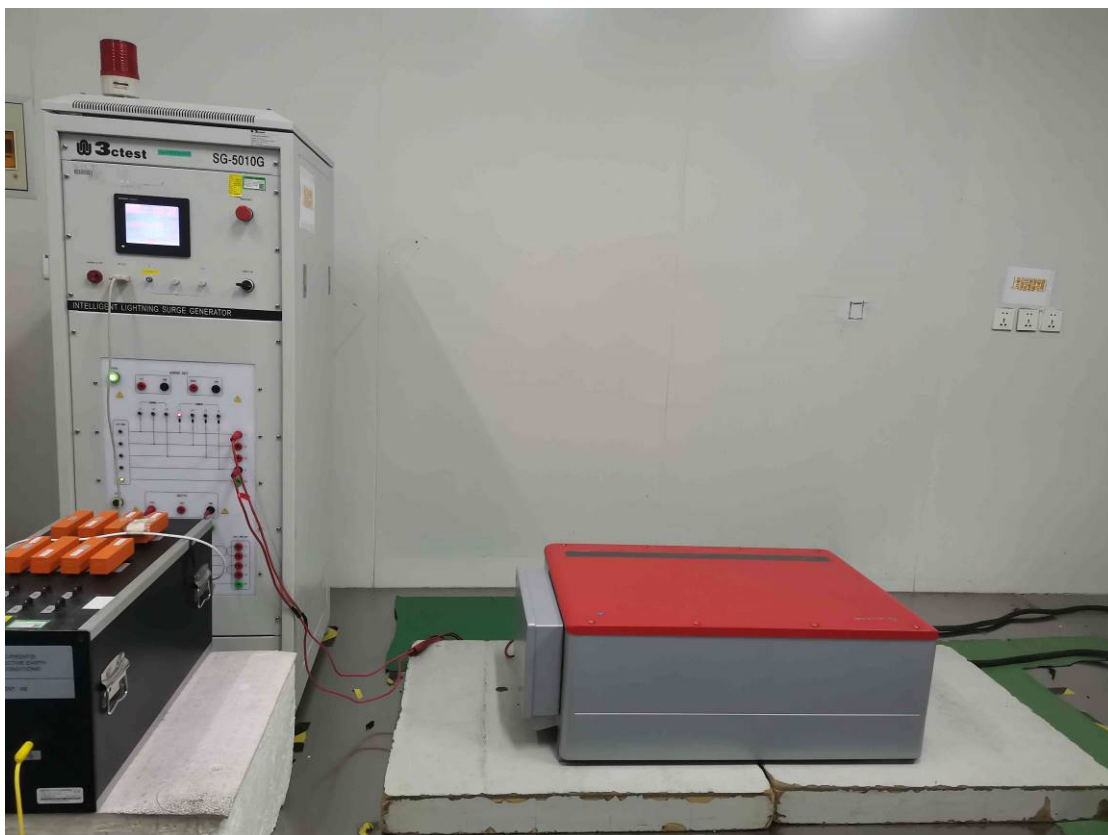


For DC Mains port

14.7 Photos of Surge Immunity Test



For AC Mains port



For DC Mains port

14.8 Photos of Conducted Disturbance Immunity Test

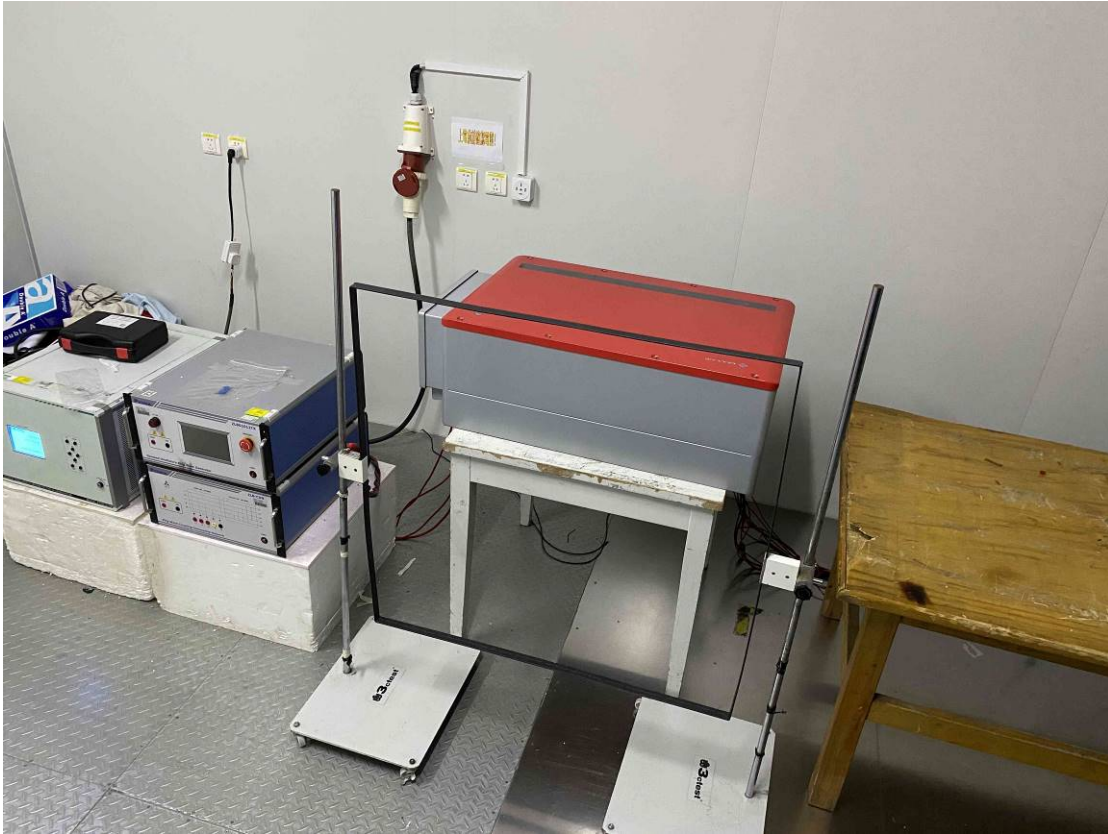


For AC Mains port



For DC Mains port

14.9 Photos of Power Frequency Magnetic Field Immunity Test



14.10 Photos of Voltage Dips and Interruptions Immunity Test



APPENDIX

Photos of EUT

Figure 1
General Appearance (Top View)



Figure 2
General Appearance (Bottom View)



Figure 3
General Appearance (I/O Port)



Figure 4
General Appearance (Side View)



Figure 5
General Appearance (Side View)



Figure 6
General Appearance (Side View)



Figure 7
Cover



Figure 8
Internal View

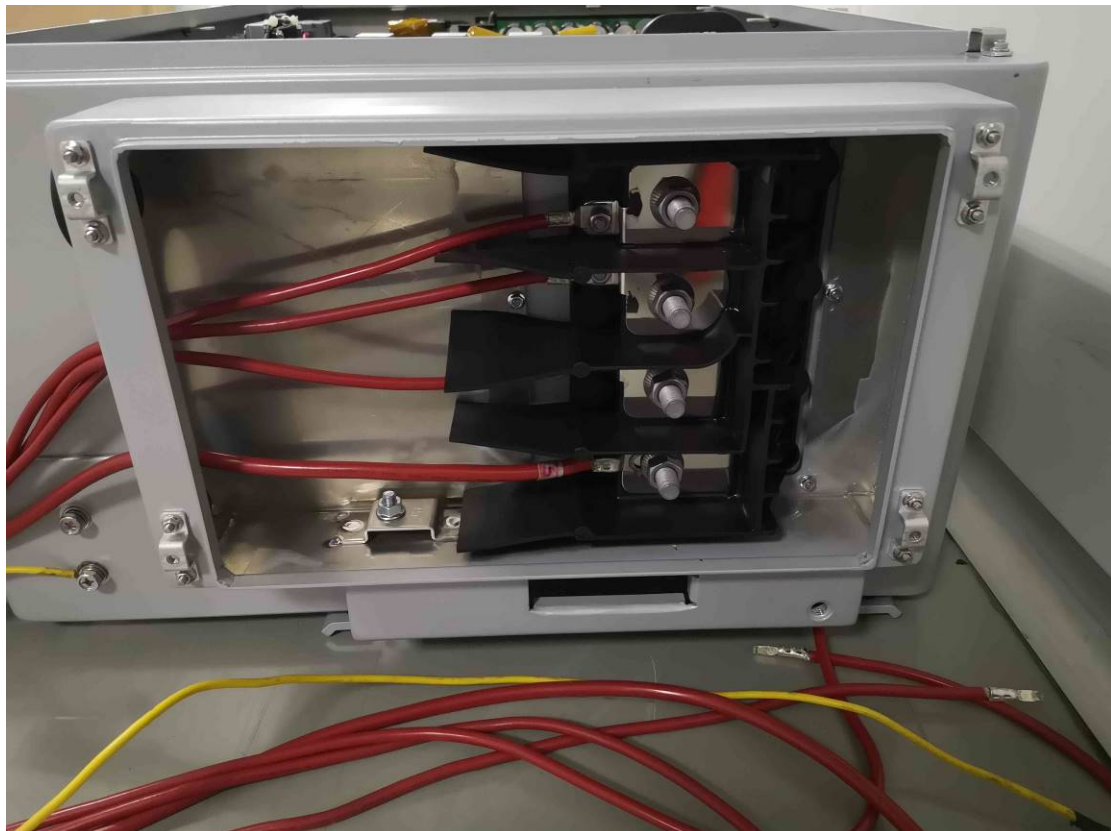


Figure 9
Internal View



Figure 10
PCB Board (Component Side)

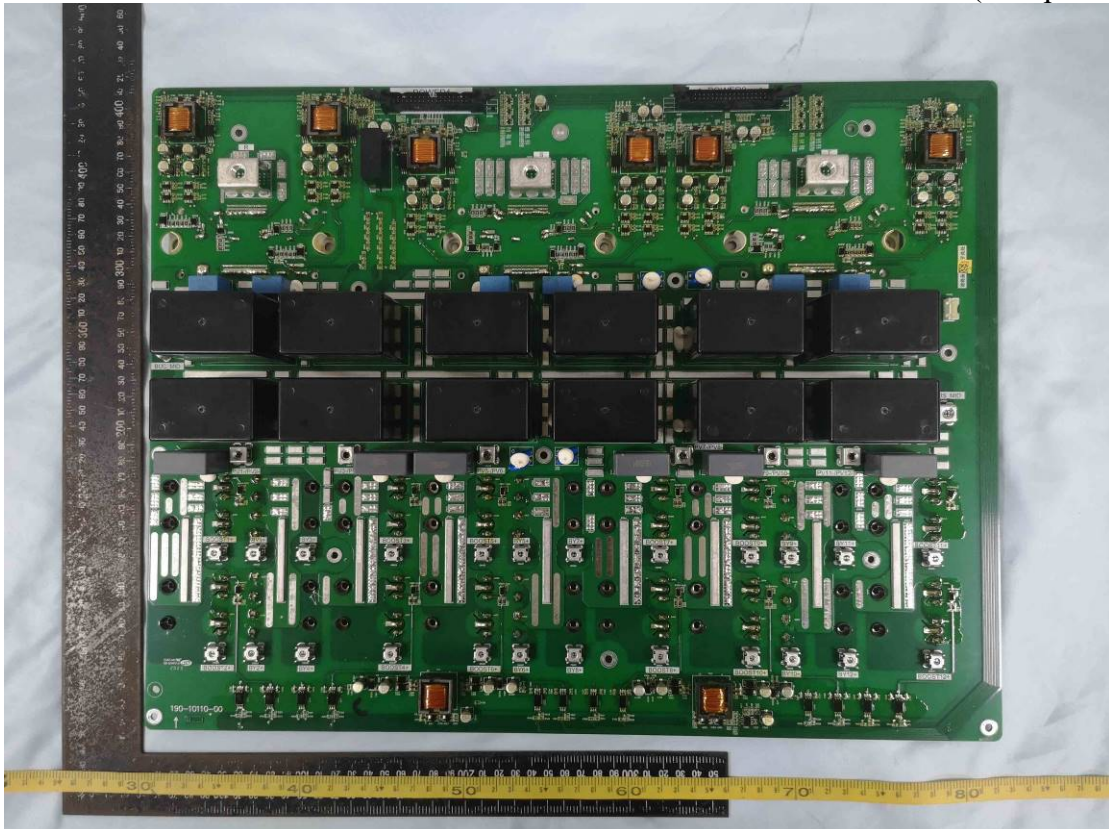


Figure 11
PCB Board (Solder Side)

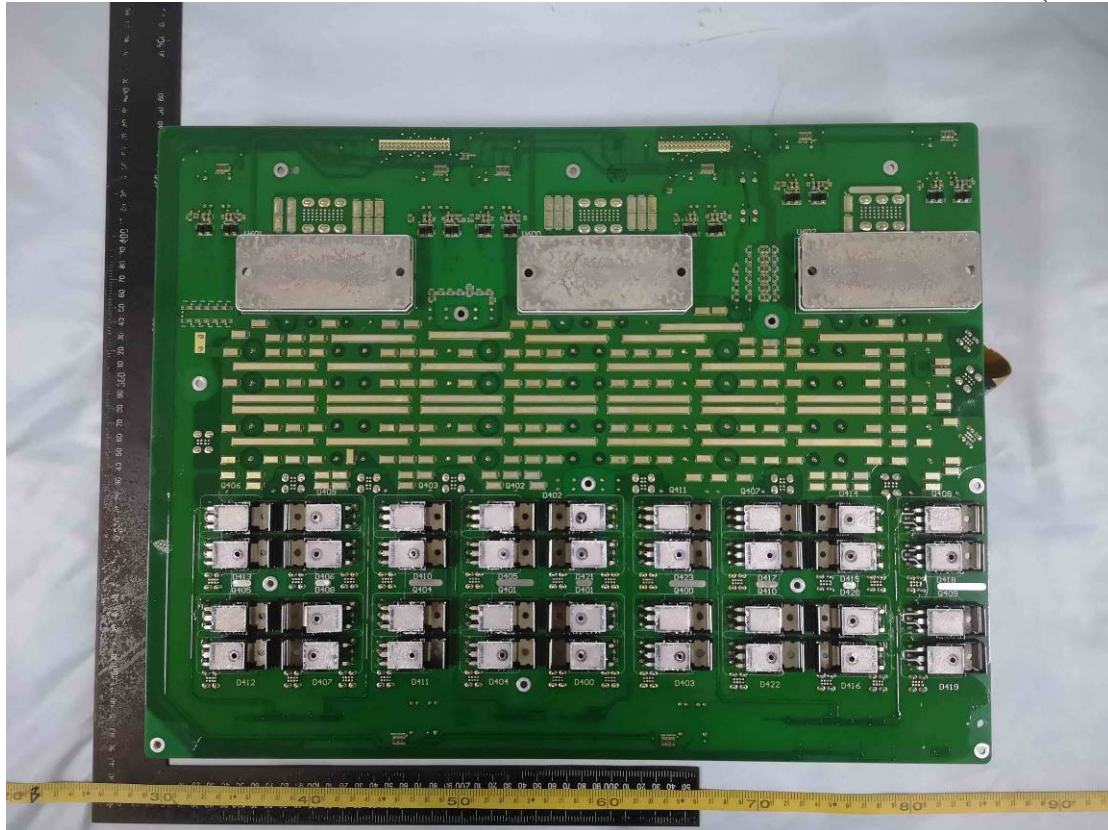


Figure 12
PCB Board (Component Side)

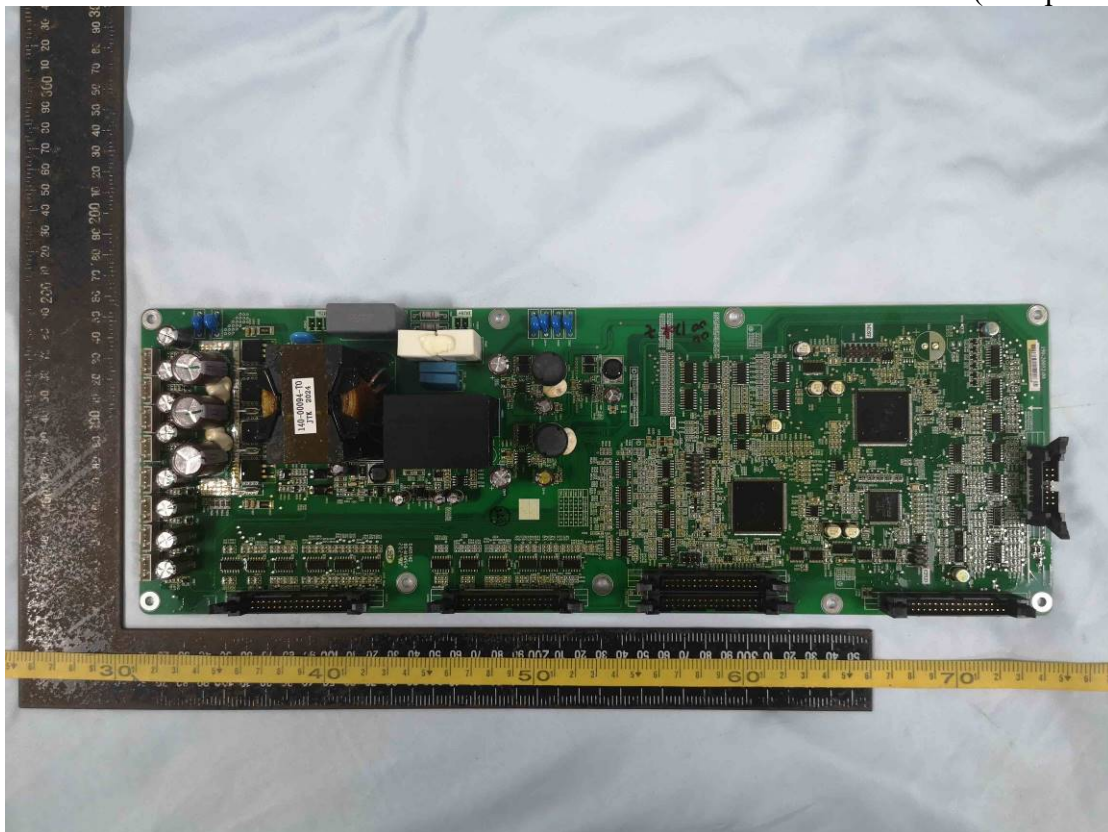


Figure 13
PCB Board (Solder Side)



Figure 14
PCB Board (Crystal Oscillator)

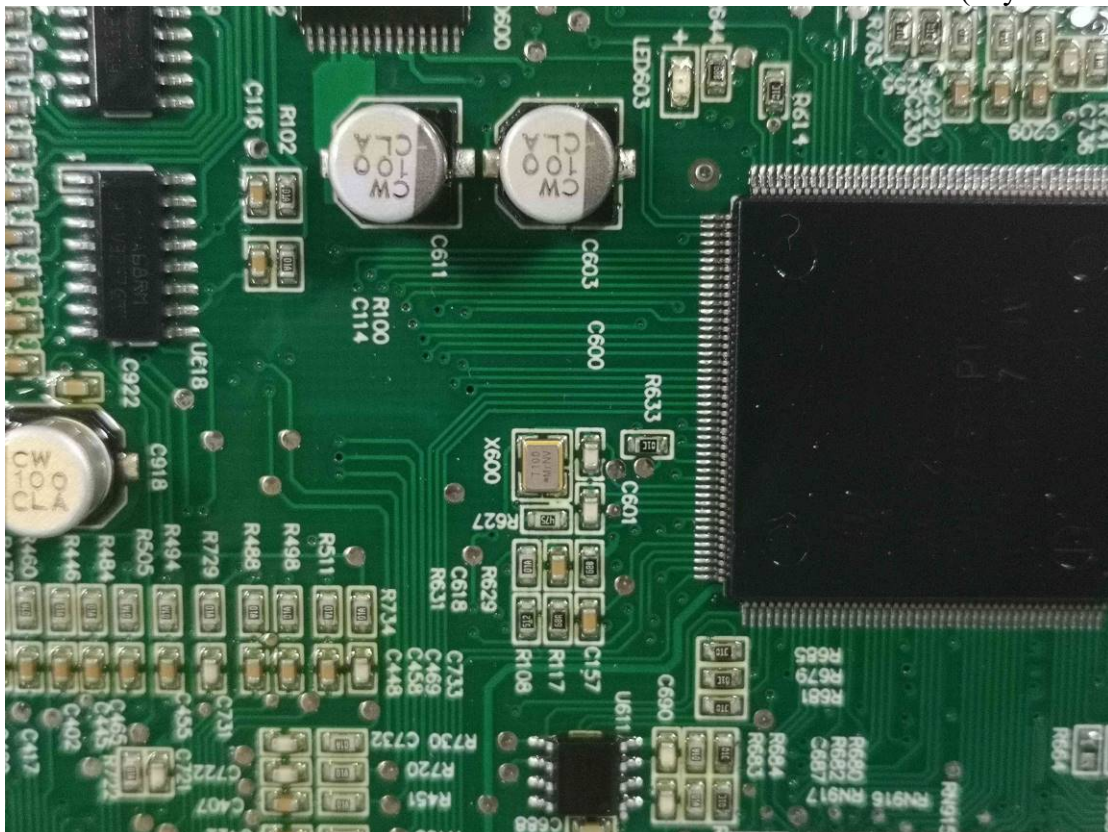


Figure 15
PCB Board (Crystal Oscillator)

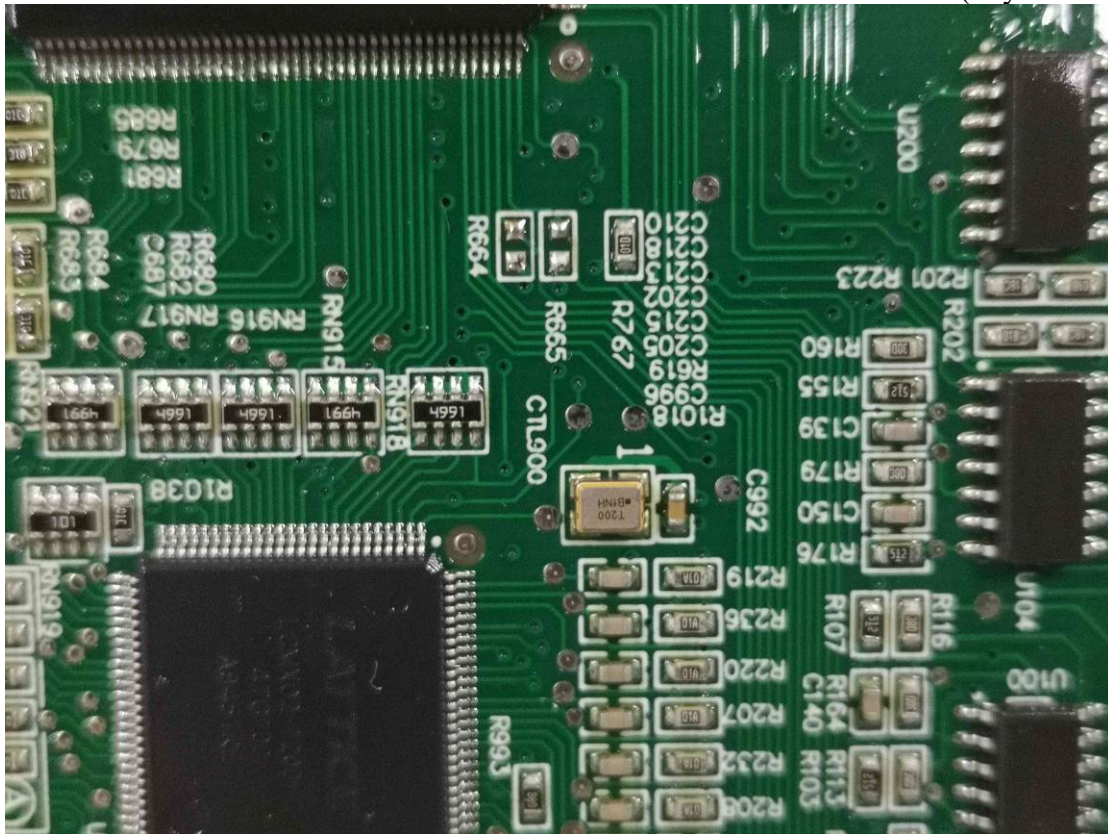


Figure 16
PCB Board (Crystal Oscillator)

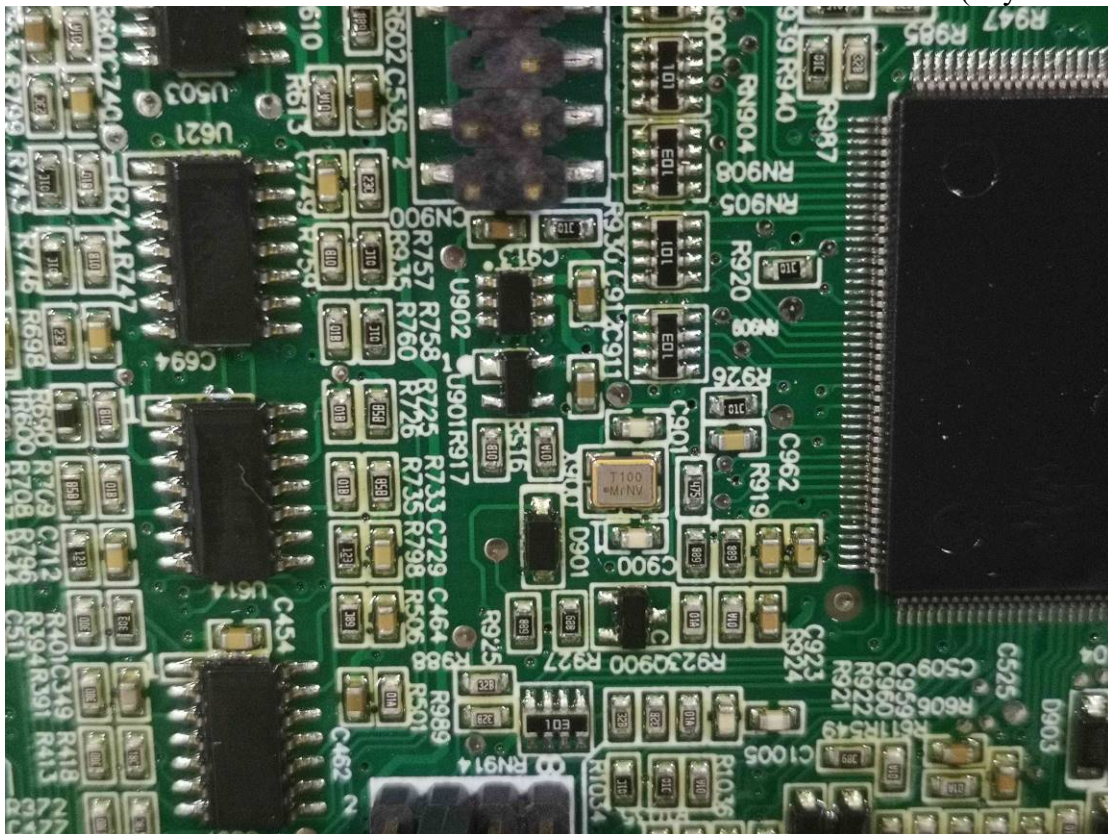


Figure 17
PCB Board (Component Side)

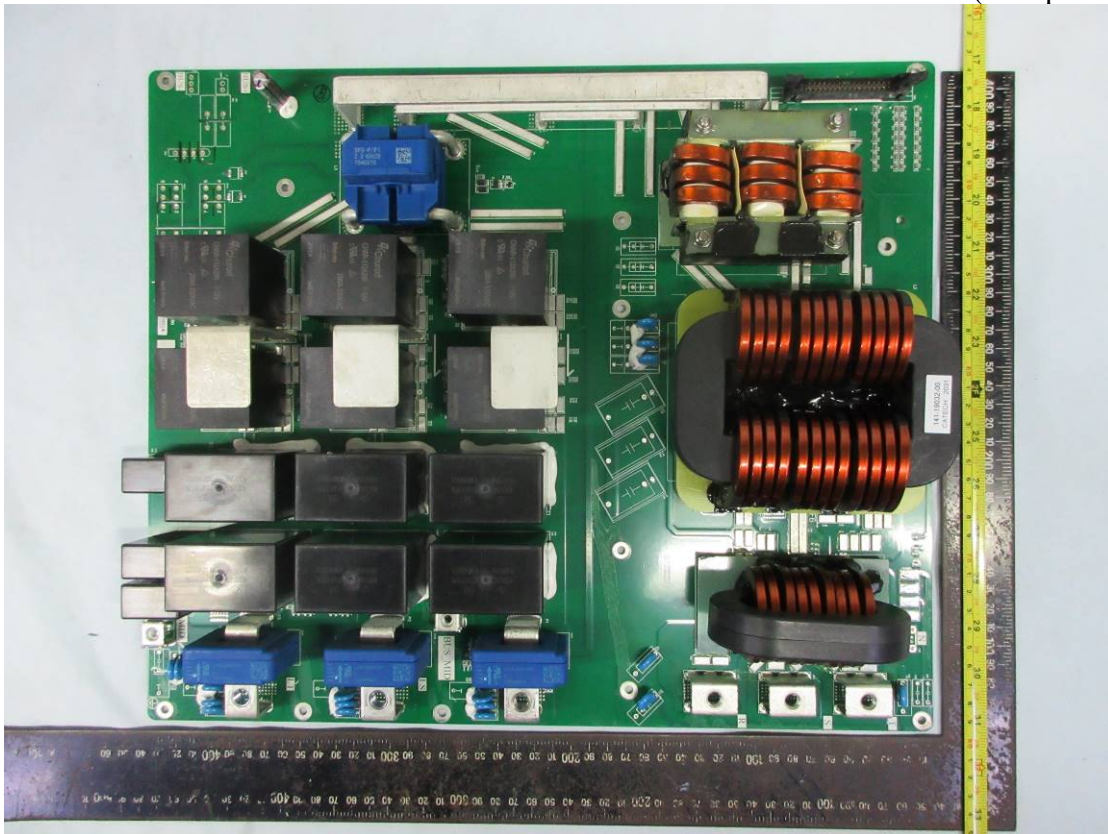


Figure 18
PCB Board (Solder Side)

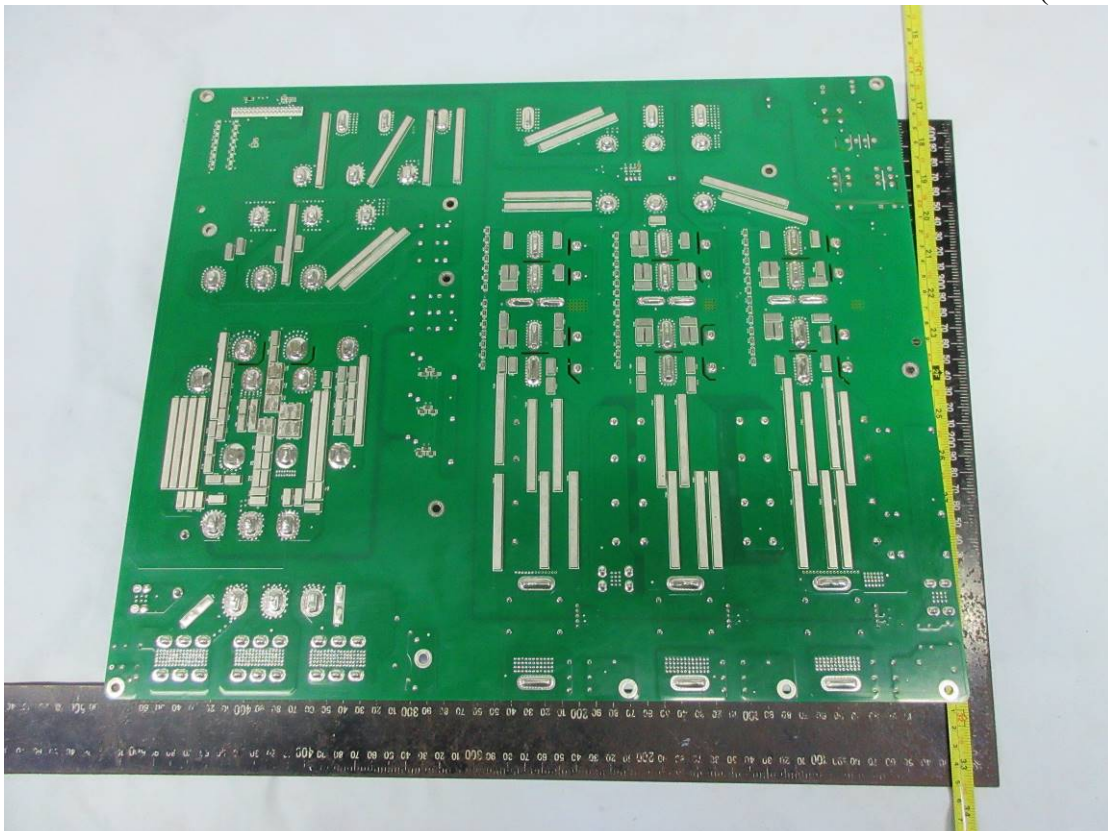


Figure 19
PCB Board (Component Side)



Figure 20
PCB Board (Solder Side)



Figure 21
PCB Board (Crystal Oscillator)

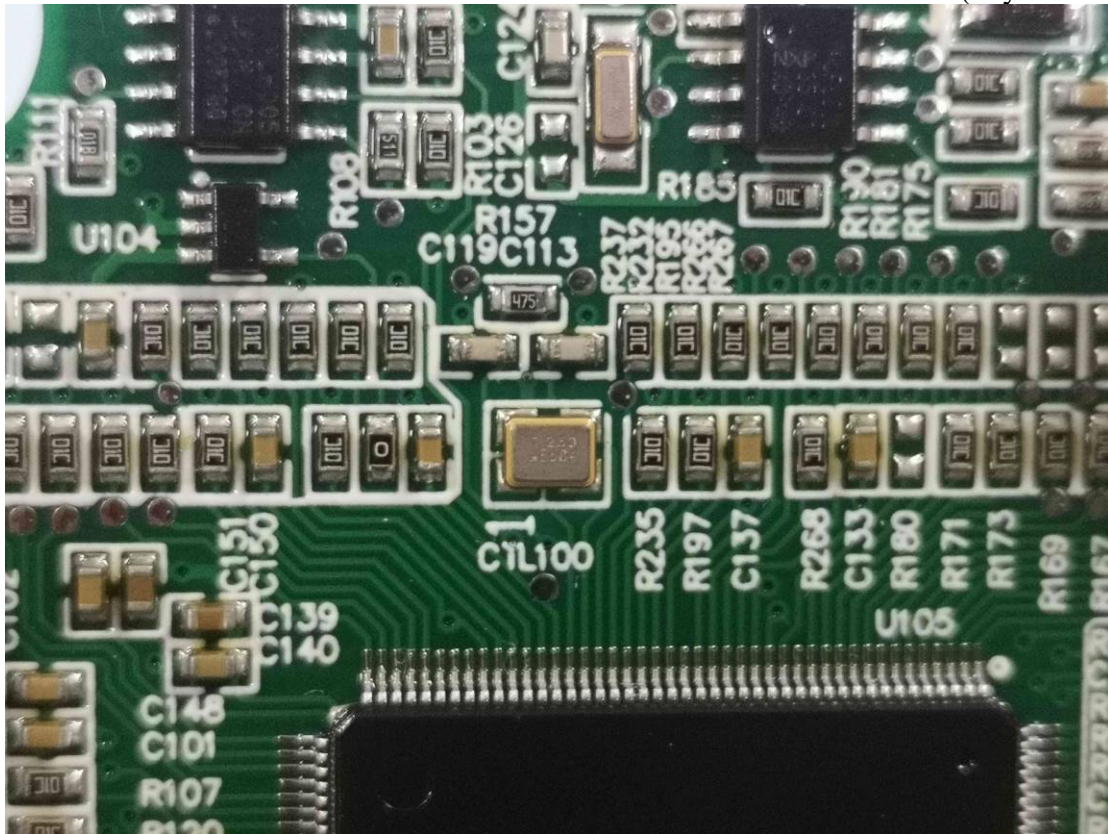


Figure 22
PCB Board (Crystal Oscillator)

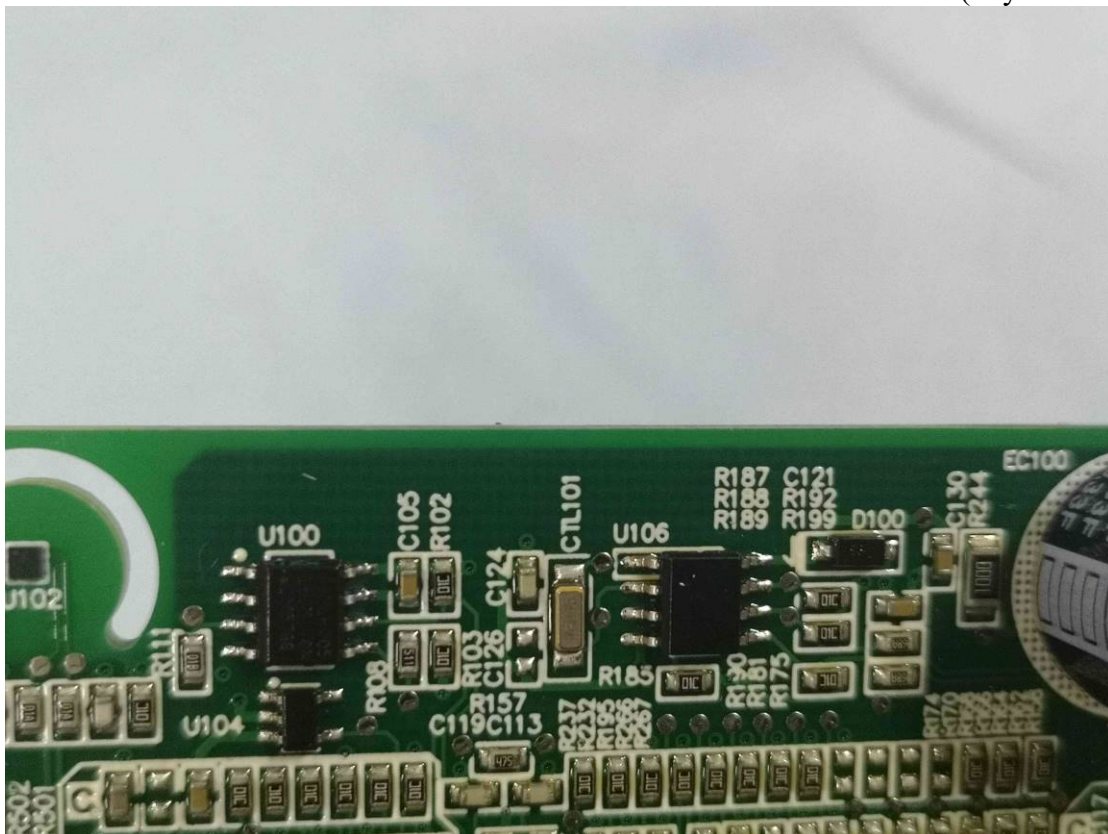


Figure 23
PCB Board (Component Side)

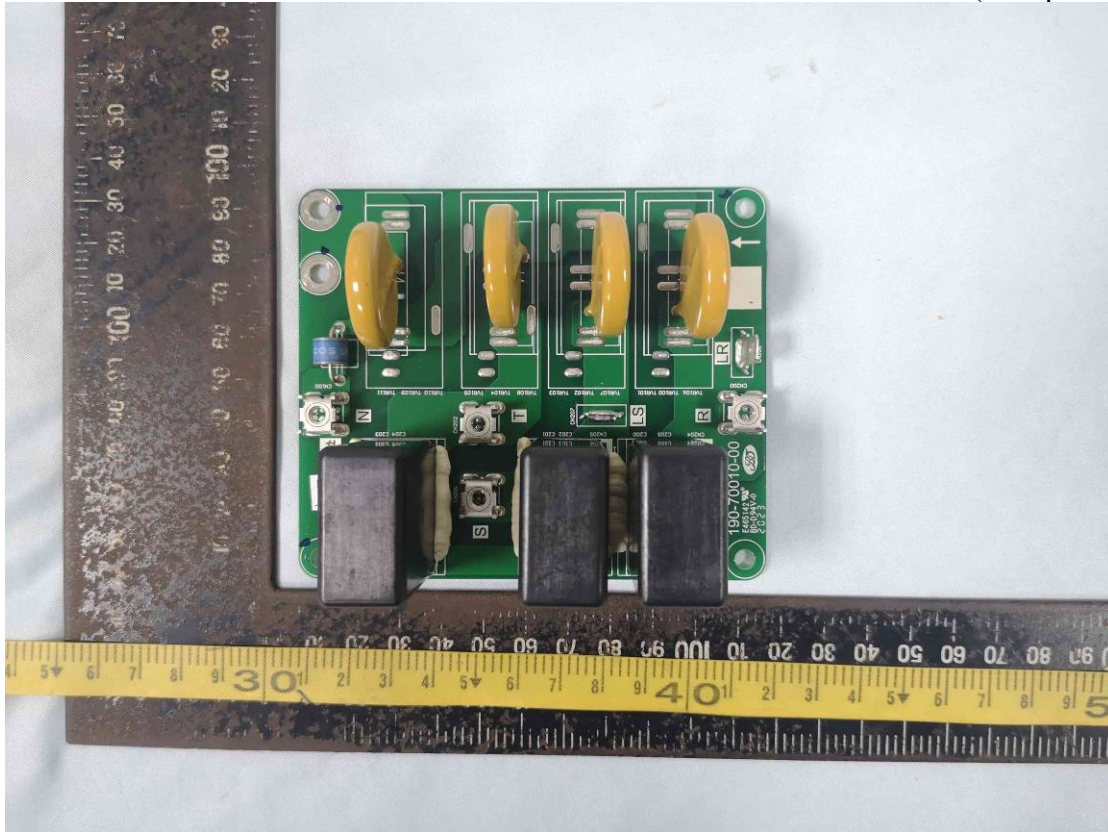


Figure 24
PCB Board (Solder Side)

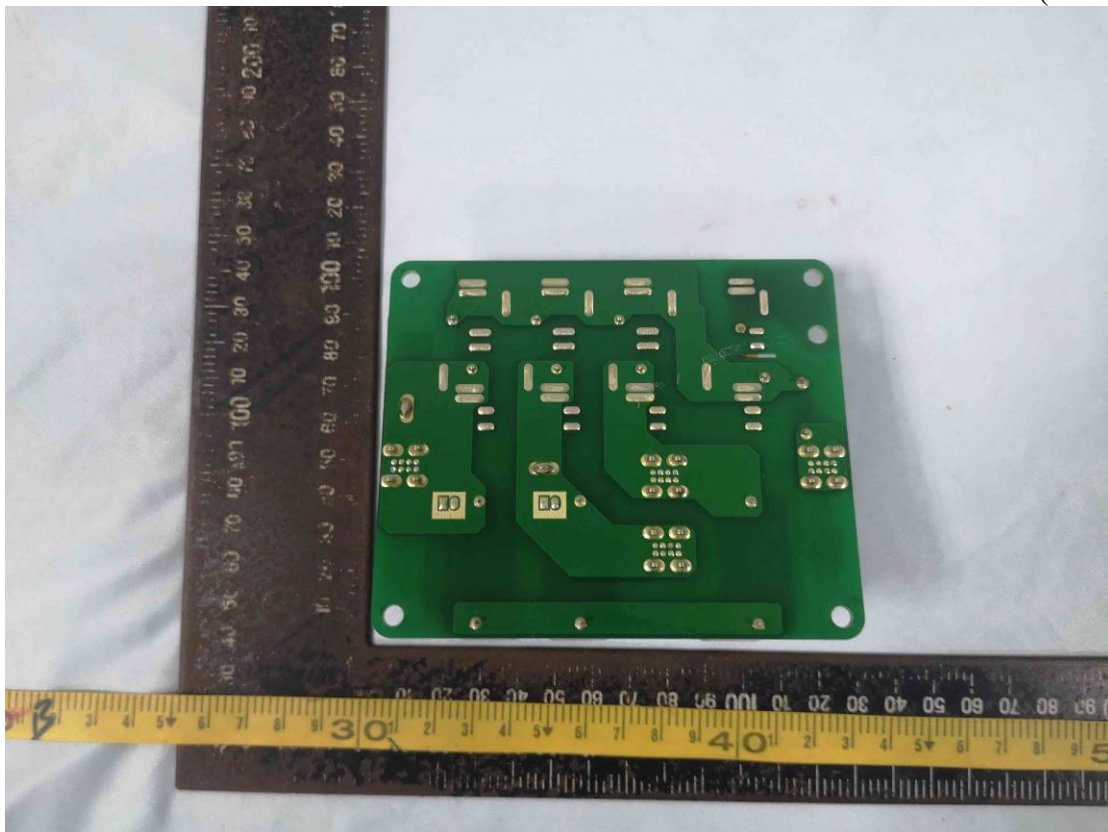


Figure 25
PCB Board (Component Side)

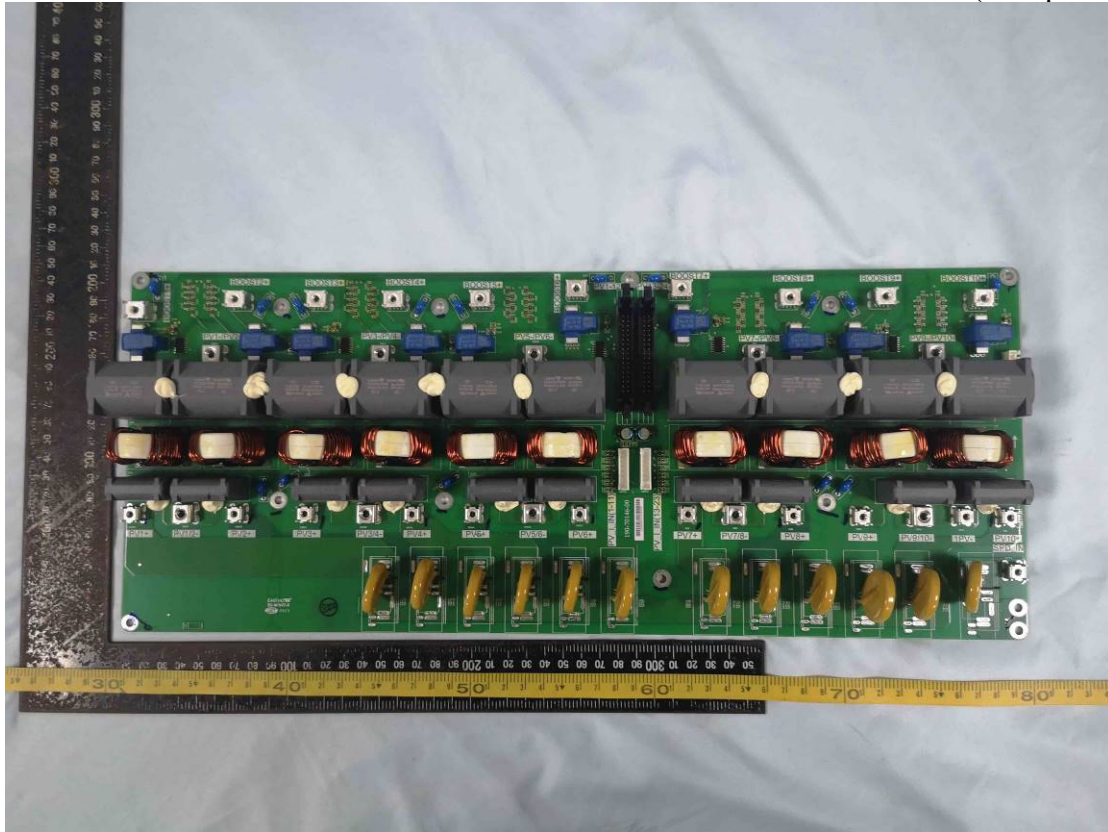


Figure 26
PCB Board (Solder Side)



Figure 27
PCB Board (Component Side)

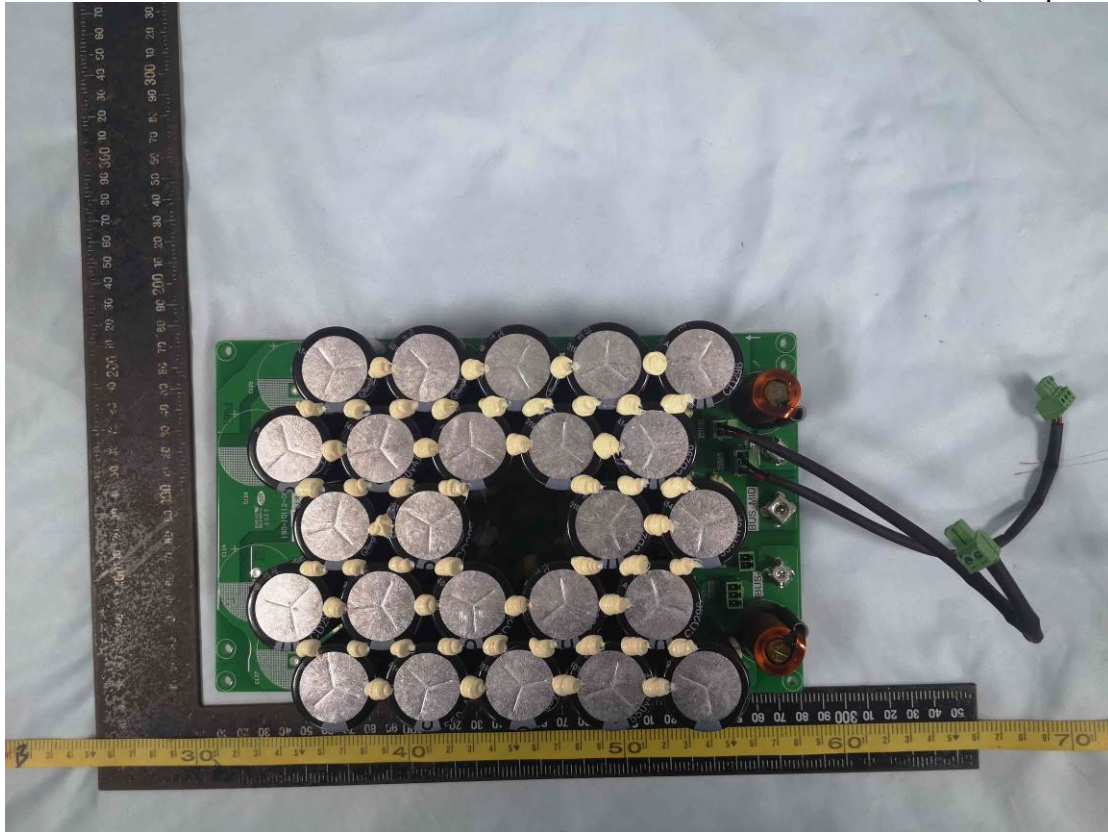


Figure 28
PCB Board (Solder Side)

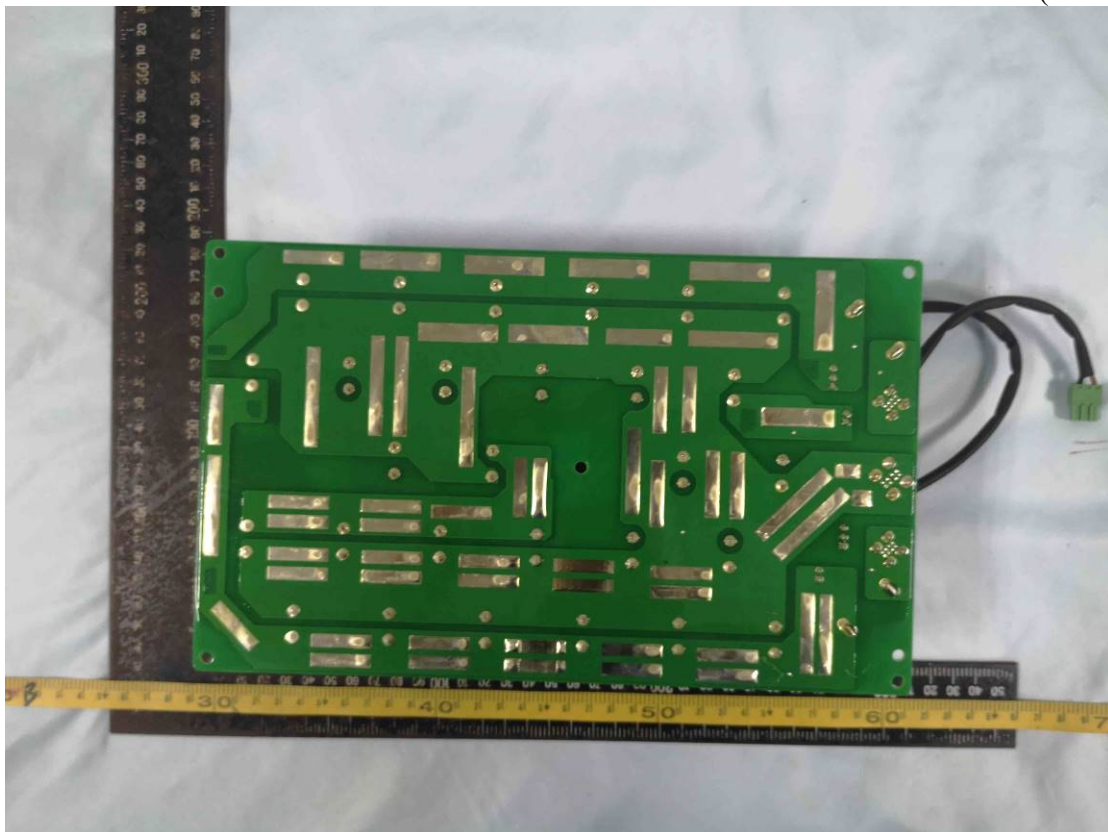


Figure 29
PCB Board (Component Side)

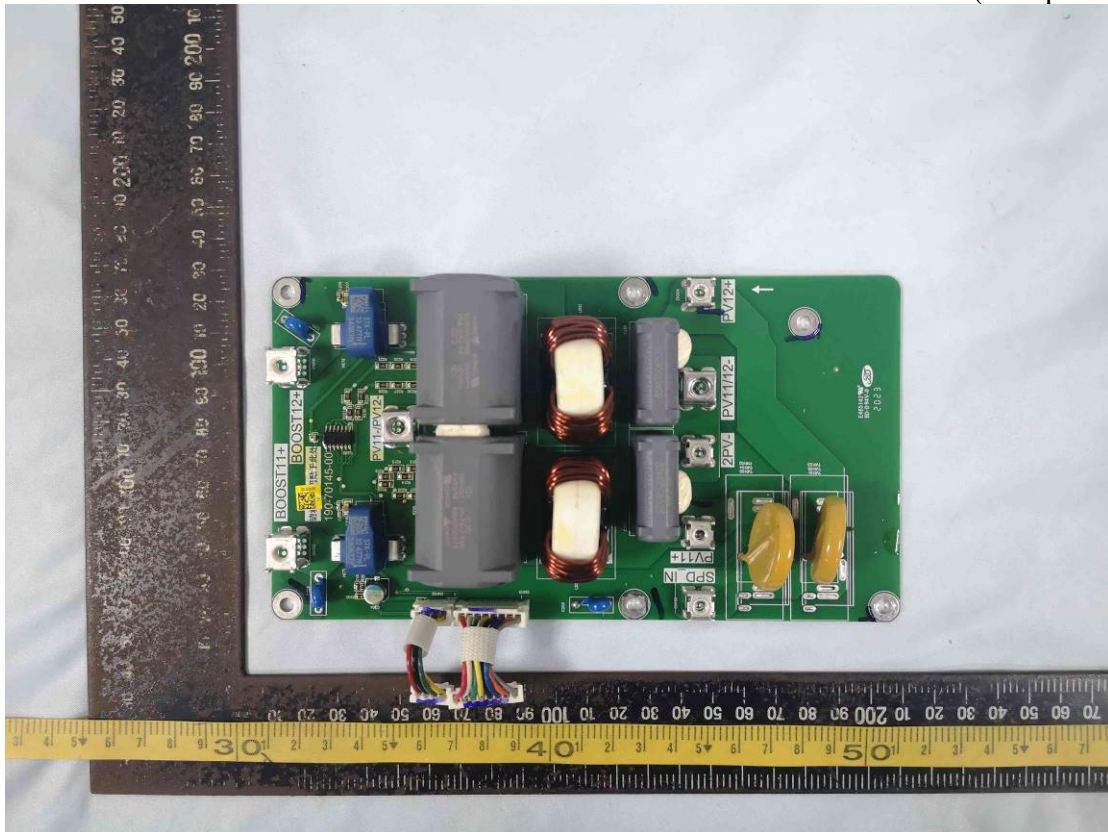


Figure 30
PCB Board (Solder Side)

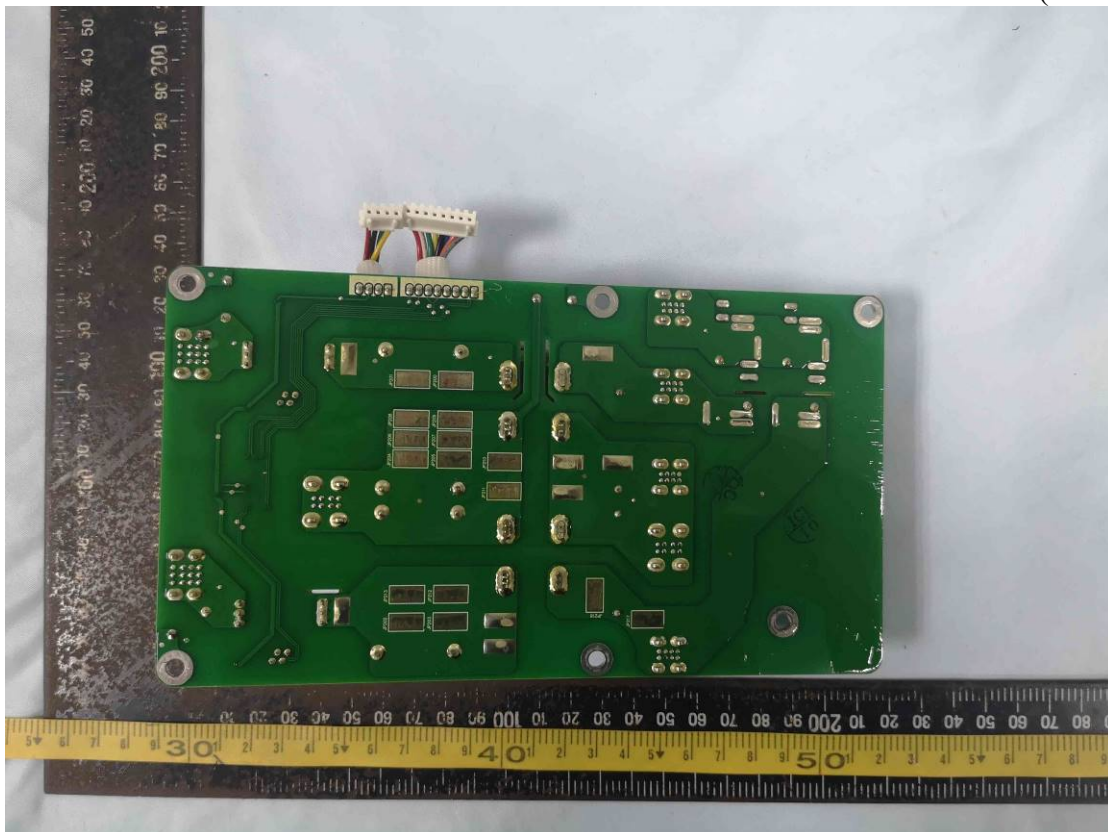


Figure 31
Fan Set

