

EMC EMISSION - TEST REPORT

Report Number : **64.772.18.05999.01 – (E)** Date of Issue: 2019-01-30

Model : EA5KHD

Product Type : HYBRID SOLAR INVERTER

Applicant : EAST Group Co., Ltd.

Manufacturer : EAST Group Co., Ltd.

License holder : EAST Group Co., Ltd.

Brand name : EAST

Address : No. 6 Northern Industry Road, Songshan Lake Sci.&Tech. Industrial Park,
Dongguan City, Guangdong Province, China

Test Result : ☒ **Positive** ☐ **Negative**



Total pages including
Appendices : 33

TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch is a subcontractor to TÜV SÜD Product Service, GmbH according to the principles outlined in ISO/IEC Guide 25 and EN 45001.

TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch reports apply only to the specific samples tested under stated test conditions. Construction of the actual test samples has been documented. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. The manufacturer/importer is responsible to the Competent Authorities in Europe for any modifications made to the production units which result in non-compliance to the relevant regulations. TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch issued reports.

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China

EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to the following regulations:

■ - EMC - Directive 2014/30/EU and its amendments

■ - EN 61000-6-3:2007+A1:2011



China

Environmental Conditions In The Laboratory:

	<u>Actual</u>
Temperature:	: 22-24°C
Relative Humidity:	: 47-52 %
Atmospheric Pressure:	: 100.7-101.0 kPa

Rated of EUT:

Rated voltage:	DC 360V
Rated power :	5000W

STATEMENT OF MEASUREMENT UNCERTAINTY

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities that can account for a nominal measurement error (please refer to each test item). Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Symbol Definitions:

- - Applicable
- - Not Applicable

■ - East Group Co., Ltd. Test Center

Add: No.6, Gongye North Road, Songshan Lake Science and Technology Industrial Park, Dongguan, Guangdong, China

■ - TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch

Add: Building 12 & 13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District, Shenzhen 518052, P.R. China

Emissions Test Conditions: CONDUCTED EMISSIONS (Interference Voltage)

The **CONDUCTED EMISSIONS (INTERFERENCE VOLTAGE)** measurements were performed at the following test location:

☐ - Test not applicable

■ - Test Area (East) – shielded room

Test Equipment Used:

	Model Number	Manufacturer	Description	Serial Number	Cal. Due
■ -	ESCI 7	Rohde & Schwarz	EMI Test Receiver	100147	2019-12-26
■ -	ENV4200	Rohde & Schwarz	AMN	100798	2019-12-26

Measurement Uncertainty: ± 3.10 dB

Remarks: All test equipments used are calibrated on a regular basis.

Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The **RADIATED EMISSIONS (ELECTRIC FIELD)** measurements, in the frequency range of 30 MHz-6000 MHz, were tested in a horizontal and vertical polarization at the following test location :

☐ - Test not applicable

■ - Test Area (East) – Anechoic ferrite lined shielded room

Testing was performed at a test distance of:

■ - 3 meters

☐ - 10 meters

Test Equipment Used:

Model Number	Manufacturer	Description	Serial Number	Cal. Due
■ - ESCI 7	Rohde & Schwarz	EMI Test Receiver	100147	2019-12-26
■ - 3142D	ETS-LINDGREN	Trilog Super Broadband Test Antenna	00135455	2019-12-26

Measurement Uncertainty: Horizontal: $\pm 4.83\text{dB}$; Vertical: $\pm 4.91\text{dB}$; (30MHz-1000MHz);

Remarks: All test equipments used are calibrated on a regular basis.

Emissions Test Conditions: CONDUCTED EMISSIONS (Harmonics and Flicker)

The *Harmonic Current Emissions and Voltage Fluctuations and Flicker* measurements were performed at the following test location :

☒ - Test not applicable

☐ - Test Area (TÜV SÜD Shenzhen) –Laboratory open area

Test Equipment Used :

	Model Number	Manufacturer	Description	Serial Number	Cal. Due
<input type="checkbox"/> -	PCR6000LA	Kikusui	Multi purpose power supply	MG002890	2017-03-12
<input type="checkbox"/> -	PM6000-1	Voltech	Power analyser	100006700229	2017-03-12
<input type="checkbox"/> -	IMP555	Voltech	Impedance network	1494	2017-03-12

Remarks: All test equipments used are calibrated on a regular basis.

Equipment Under Test (EUT) Test Operation Mode - Emissions Tests :

The equipment under test was operated under the following conditions during emissions testing:

- ☐ - Standby
- ☐ - Test Program (H - Pattern)
- ☐ - Test Program (Color Bar)
- ☐ - Test Program (Customer Specified)
- ☒ - Normal Operating Mode

- ☐ - _____
- ☐ - _____
- _____

Configuration of the equipment under test:

- ☒ - See Constructional Data Form in Appendix B
- ☒ - See Product Information Form(s) in Appendix B

The following peripheral devices and interface cables were connected during the testing:

- | | |
|----------------------------------|--------------|
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |

☒ - unshielded power cable

☐ - unshielded cables

☐ - shielded cables

TUVPS.No.: _____

☐ - customer specific cables

- ☐ - _____
- ☐ - _____



China

Emissions Test Results:

Conducted Emissions, 150 kHz - 30 MHz

☐ - PASS

☐ - FAIL

☒ - NOT APPLICABLE

Minimum limit margin _____ dB at _____ MHz

Maximum limit exceeding _____ dB at _____ MHz

Remarks: _____

Radiated Emissions (Electric Field), 30 MHz - 1000 MHz

☒ - PASS

☐ - FAIL

☐ - NOT APPLICABLE

Minimum limit margin _____ dB at _____ MHz

Maximum limit exceeding _____ dB at _____ MHz

Remarks: The highest internal frequency of the EUT is less than 108 MHz, the measurement was made up to 1 GHz

Harmonic Current Emissions and Voltage Changes and Flicker

☐ - PASS

☐ - FAIL

☒ - NOT APPLICABLE

Harmonic measurement exceeding limit _____ Above at _____ Harmonic

Flicker measurement exceeding limit _____ Above the _____ Requirement

Remarks: _____

GENERAL REMARKS:

SUMMARY:

All tests according to the regulations cited on page 3 were

■ - Performed

□ - Not Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements cited on page 3.

□ - **Does not** fulfill the general approval requirements cited on page 3.

Sample Receive Date: 2019-01-08

Testing Start Date: 2019-01-09

Testing End Date: 2019-01-09

- TÜV SÜD CERTIFICATION AND TESTING (CHINA) CO., LTD. GUANGZHOU BRANCH -

Reviewed by:



Tony Liu



Prepared by:



Damon Leung



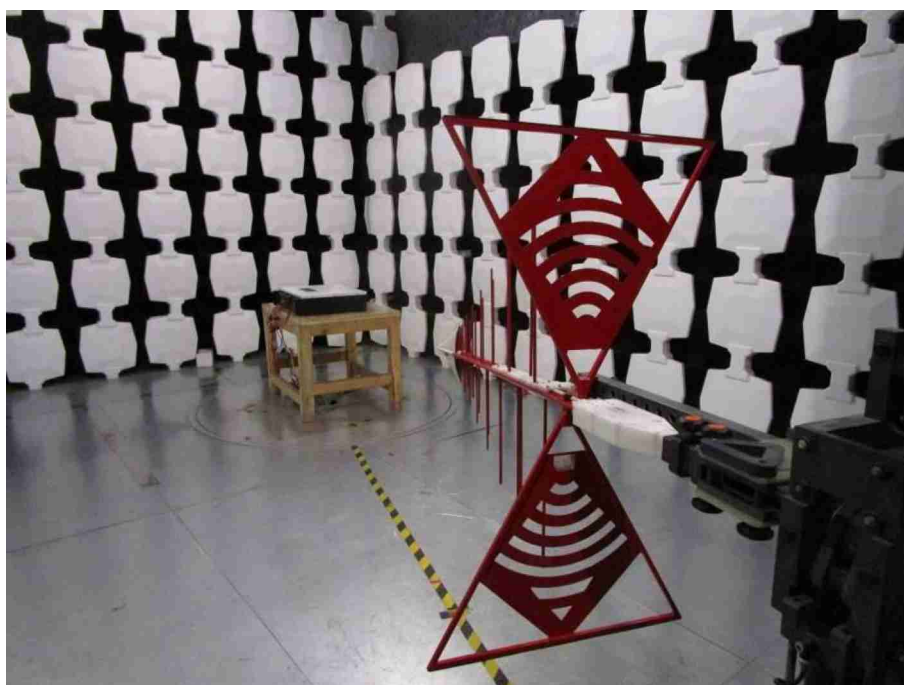
Appendix A

Test Setup Photos
and
Test Data Sheets

Test Setup Photo of Conducted Emission



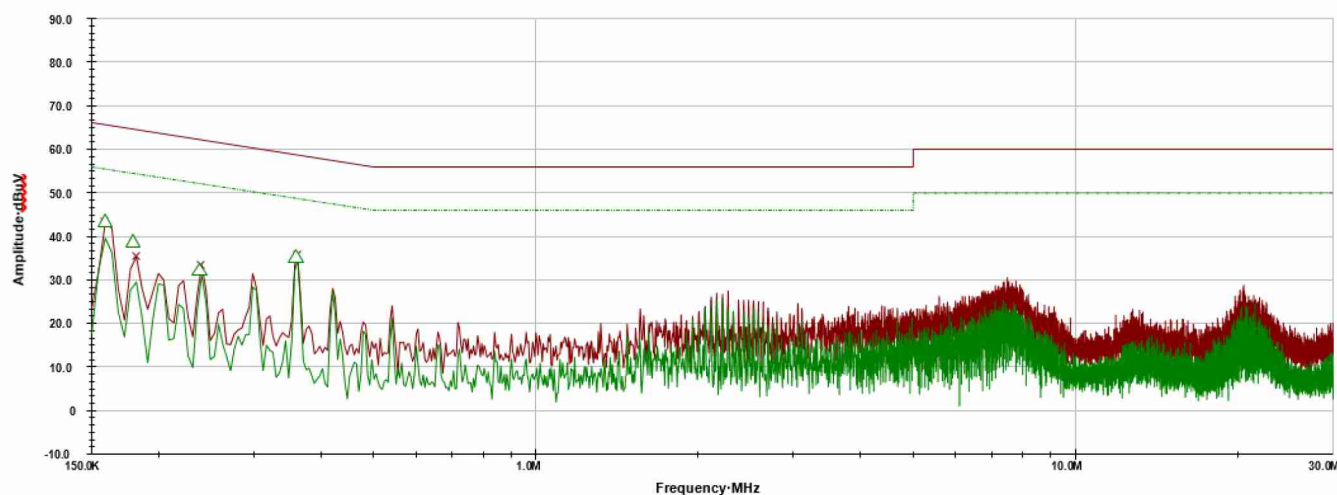
Test Setup Photo of Radiated Emission





China

Conducted Emission (150kHz-30MHz)

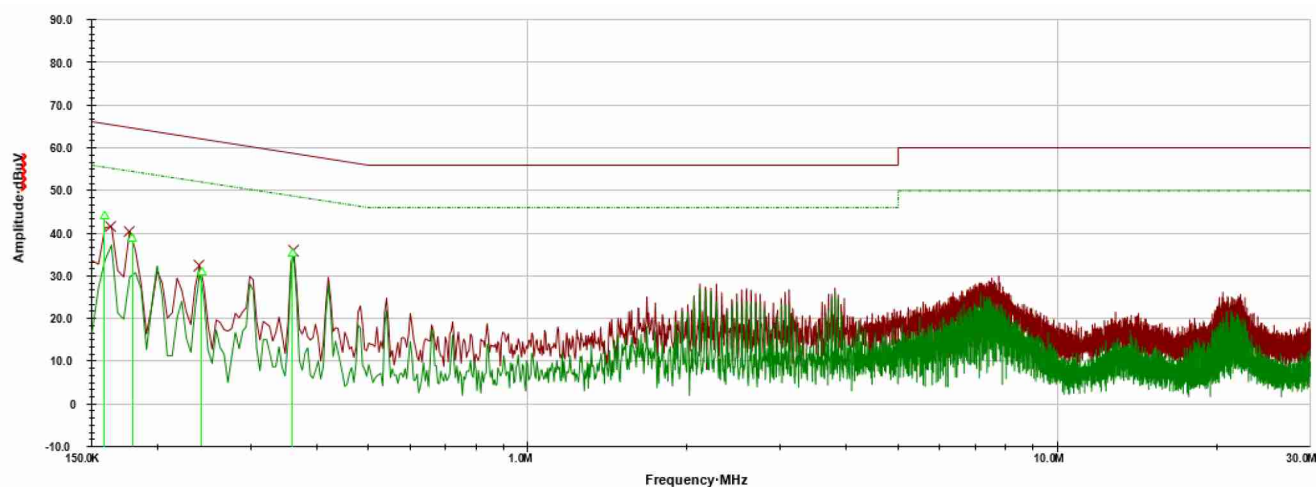


Final_Result

Frequency	QP	QP Limit	Margin	AVE	AVE Limit	Margin
MHz	dBuV	dBuV	dB	dBuV	dBuV	dB
0.159000	43.46	65.52	22.06	39.68	55.52	15.83
0.179500	38.73	64.51	25.78	28.75	54.51	25.76
0.238000	32.18	62.17	29.99	27.63	52.17	24.53
0.359500	35.25	58.74	23.49	33.60	48.74	15.14

Model : EA5KHD
Operating Mode : Half Load (PV Inverter Combine to the Power Grid)
Conduct Line/Port : L1
Test By : Damon Leung
Test Date : 2019-01-09

Conducted Emission (150kHz-30MHz)



Final Result

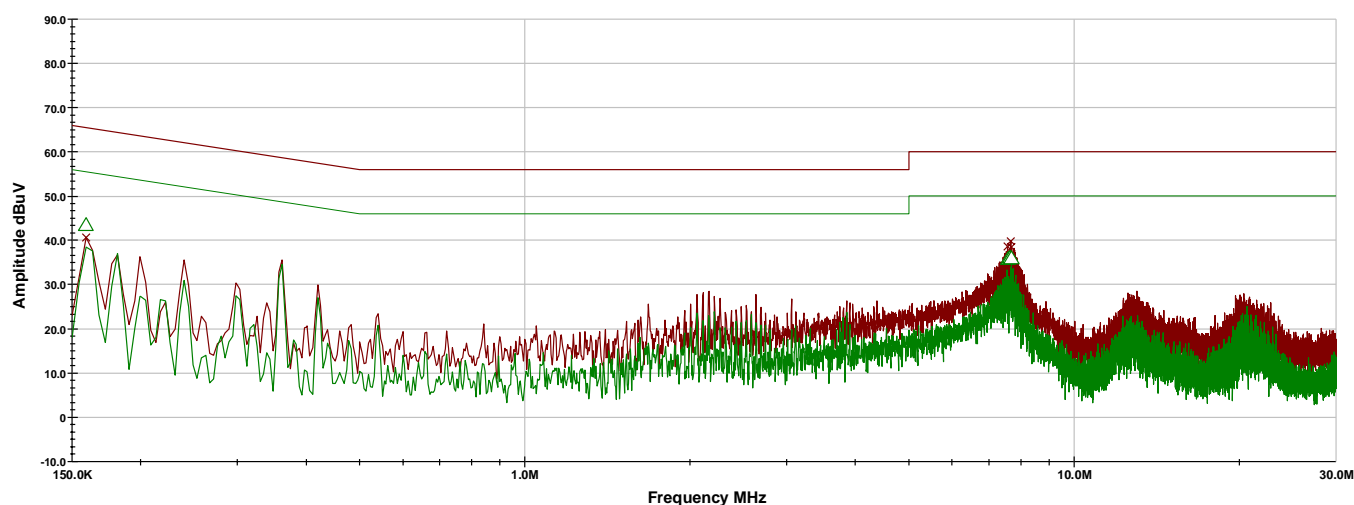
Frequency MHz	QP dBuV	QP Limit dBuV	Margin dB	AVE dBuV	AVE Limit dBuV	Margin dB
0.359500	35.30	58.74	23.44	33.34	48.74	15.40
0.242500	30.98	62.01	31.03	27.45	52.01	24.57
0.179500	38.97	64.51	25.53	30.40	54.51	24.11
0.159000	44.08	65.52	21.43	33.83	55.52	21.69

Model : EA5KHD
Operating Mode : Half Load (PV Inverter Combine to the Power Grid)
Conduct Line/Port : N
Test By : Damon Leung
Test Date : 2019-01-09



China

Conducted Emission (150kHz-30MHz)



Final_Result

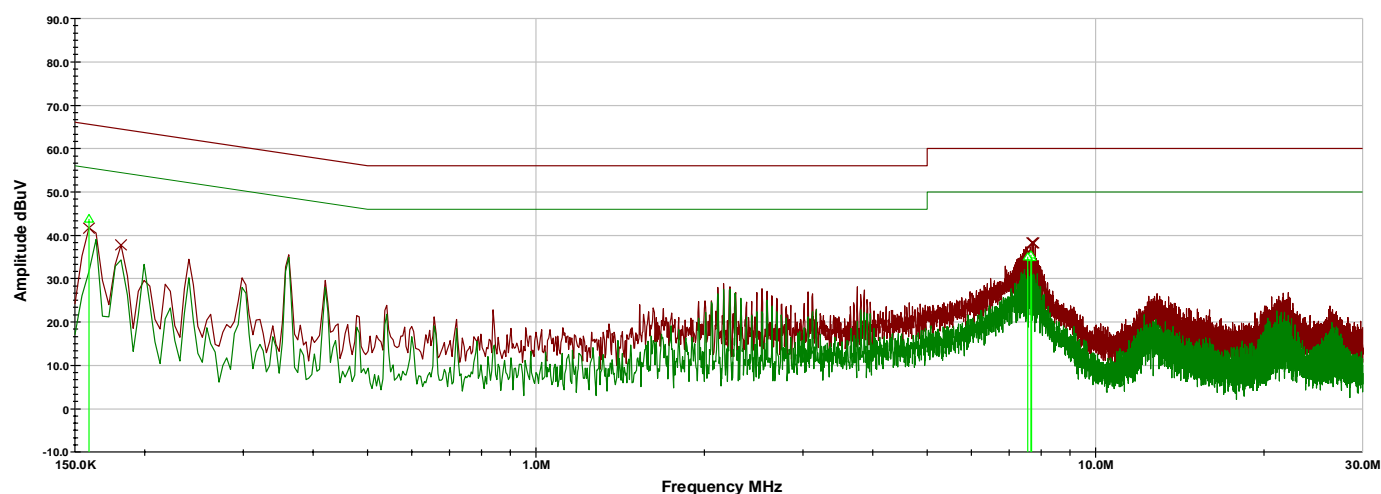
Frequency	QP	QP Limit	Margin	AVE	AVE Limit	Margin
MHz	dBuV	dBuV	dB	dBuV	dBuV	dB
0.159000	43.36	65.52	22.16	38.50	55.52	17.01
7.579500	35.69	60.00	24.31	31.70	50.00	18.30
7.649500	36.12	60.00	23.88	31.17	50.00	18.83
7.690000	35.87	60.00	24.13	25.23	50.00	24.77

Model : EA5KHD
Operating Mode : Full Load (PV Inverter Combine to the Power Grid)
Conduct Line/Port : L1
Test By : Damon Leung
Test Date : 2019-01-09



China

Conducted Emission (150kHz-30MHz)

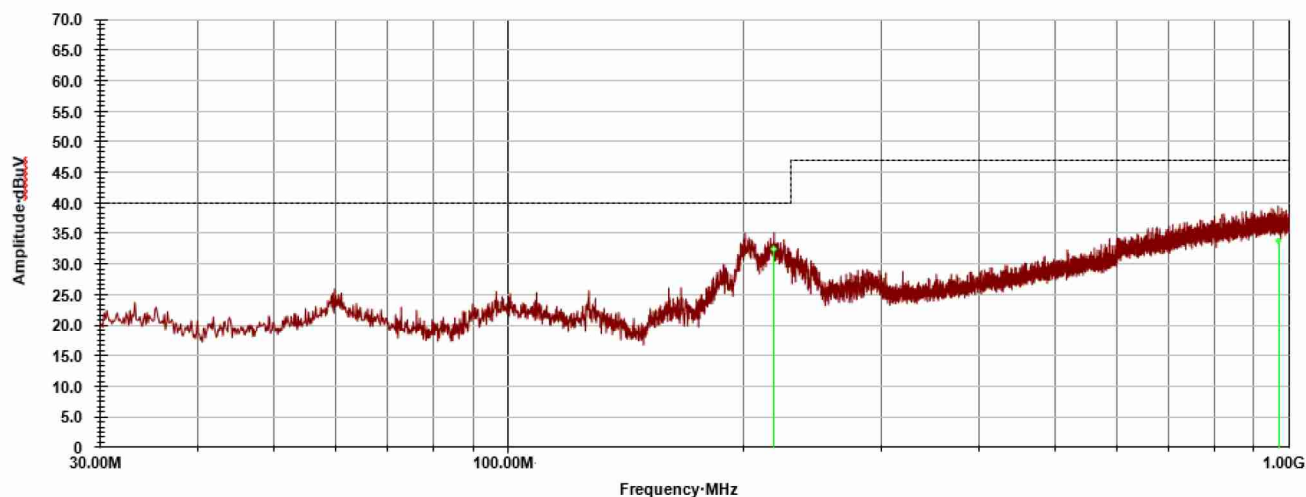


Final Result

Frequency MHz	QP dBuV	QP Limit dBuV	Margin dB	AVE dBuV	AVE Limit dBuV	Margin dB
0.159000	43.78	65.52	21.74	31.70	55.52	23.82
7.568500	35.00	60.00	25.00	28.88	50.00	21.12
7.690000	34.90	60.00	25.10	29.33	50.00	20.67
7.669500	35.44	60.00	24.56	28.45	50.00	21.55

Model : EA5KHD
Operating Mode : Full Load (PV Inverter Combine to the Power Grid)
Conduct Line/Port : N
Test By : Damon Leung
Test Date : 2019-01-09

Radiated Emission(30-1000MHz)

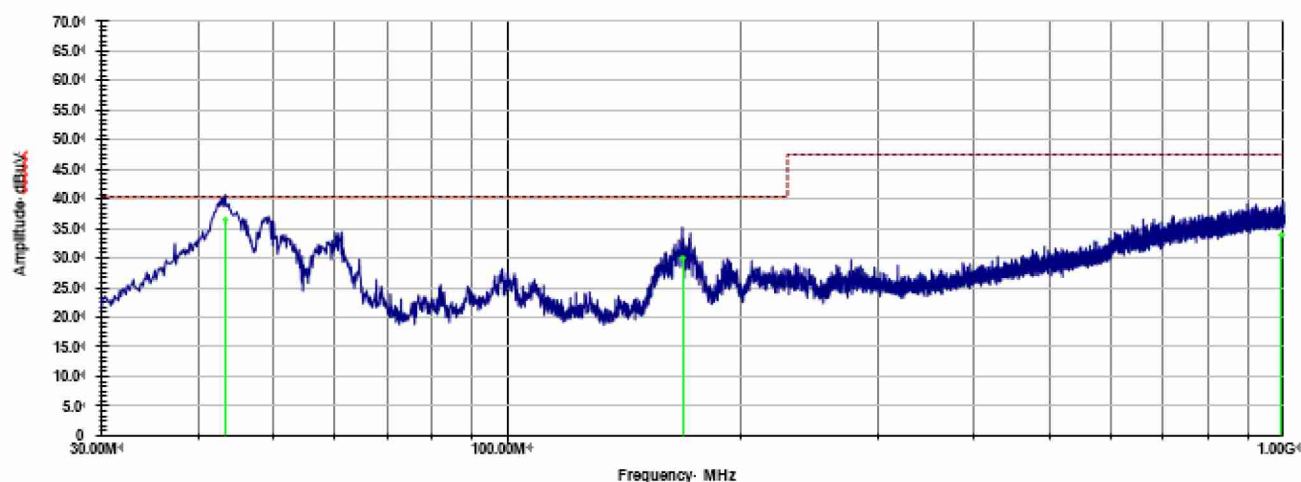


Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
218.4 MHz	32.42	40.00	7.58	100.0	H	90.0
968.4 MHz	33.76	47.00	13.24	100.0	H	90.0

Model : EA5KHD
Test Mode : Full Load (PV Inverter Charging for Battery)
Antenna Polarity : Horizontal
Test By : Damon Leung
Test Date : 2019-01-09
Remark : The worst case was considered

Radiated Emission(30-1000MHz)

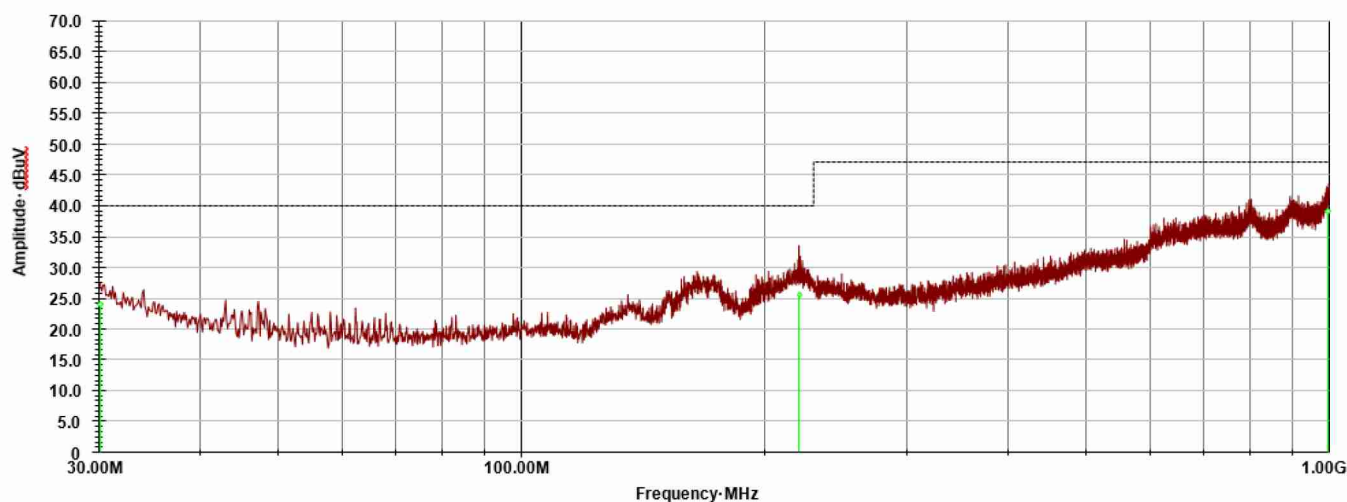


Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
43.320 MHz	36.45	40.00	3.55	100.0	V	270.0
168.480 MHz	30.03	40.00	9.97	100.0	V	270.0
995.160 MHz	33.80	47.00	13.20	100.0	V	270.0

Model : EA5KHD
Test Mode : Full Load (PV Inverter Charging for Battery)
Antenna Polarity : Vertical
Test By : Damon Leung
Test Date : 2019-01-09
Remark : The worst case was considered

Radiated Emission(30-1000MHz)

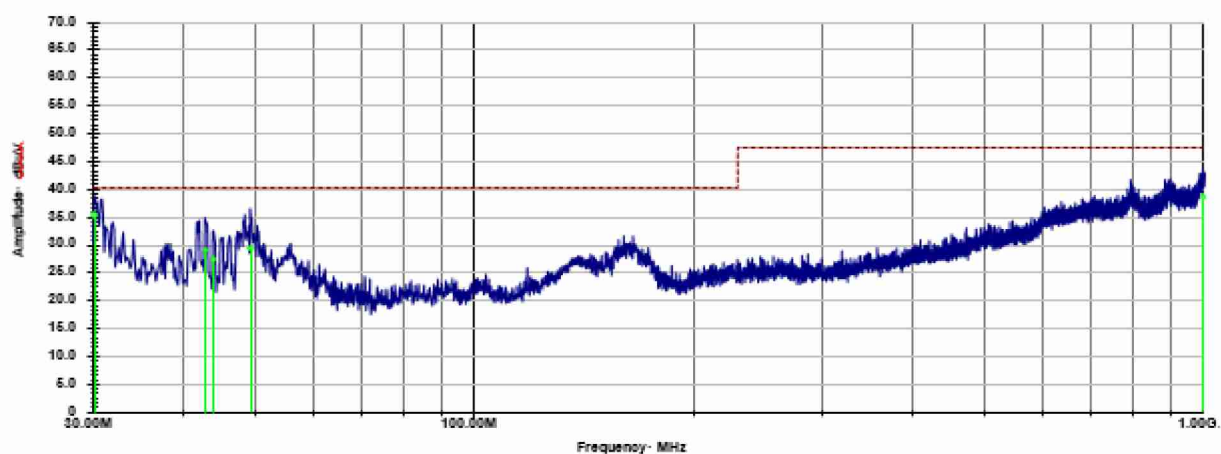


Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
30.120	23.97	40.00	16.03	100.0	H	90.0
221.160	25.47	40.00	14.53	100.0	H	90.0
998.400	39.09	47.00	7.91	100.0	H	90.0

Model : EA5KHD
Test Mode : Full Load (PV Inverter Combine to the Power Grid)
Antenna Polarity : Horizontal
Test By : Damon Leung
Test Date : 2019-01-09
Remark : The worst case was considered

Radiated Emission(30-1000MHz)



Final Result

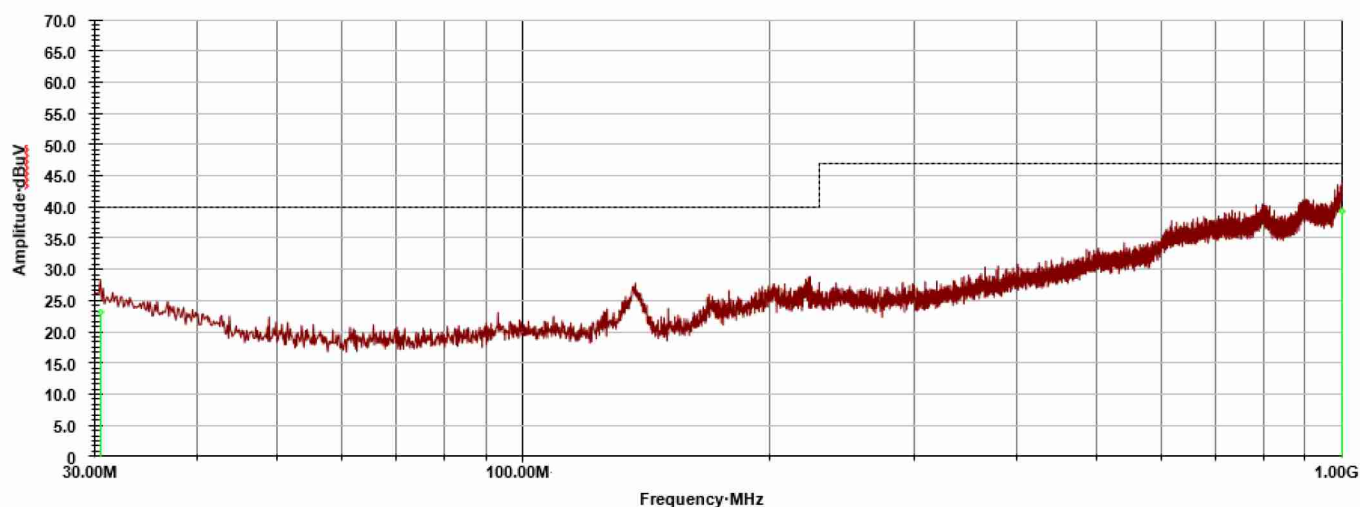
Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
30.12	35.42	40.00	4.58	100.0	V	90.0
42.72	29.24	40.00	10.76	100.0	V	90.0
43.8	27.43	40.00	12.57	100.0	V	90.0
49.32	29.52	40.00	10.48	100.0	V	90.0
995.76	38.68	47.00	8.32	100.0	V	90.0

Model : EA5KHD
Test Mode : Full Load (PV Inverter Combine to the Power Grid)
Antenna Polarity : Vertical
Test By : Damon Leung
Test Date : 2019-01-09
Remark : The worst case was considered



China

Radiated Emission(30-1000MHz)

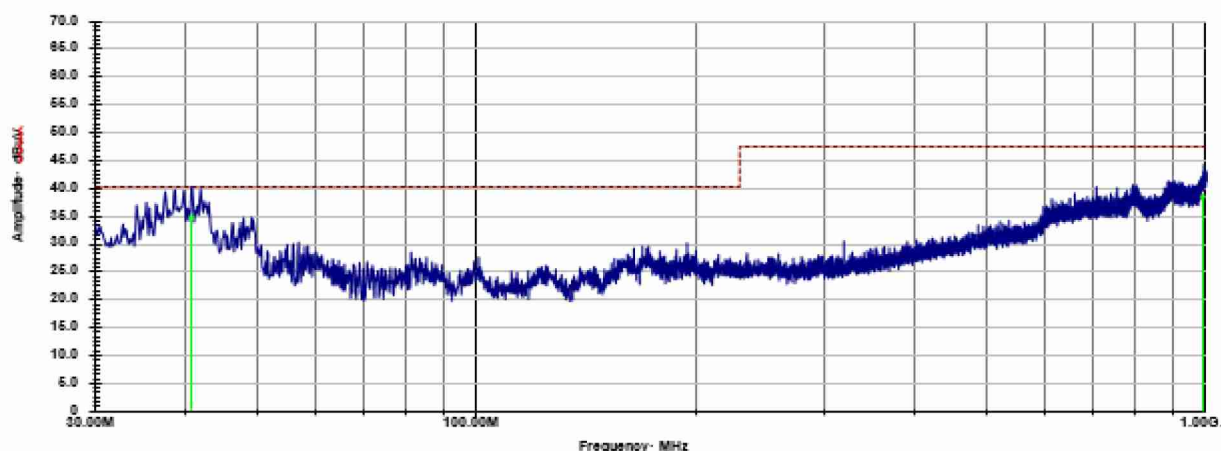


Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
30.480	23.12	40.00	16.88	100.0	H	180.0
999.720	39.39	47.00	7.61	100.0	H	180.0

Model : EA5KHD
Test Mode : Full Load (Power Battery Discharging)
Antenna Polarity : Horizontal
Test By : Damon Leung
Test Date : 2019-01-09
Remark : The worst case was considered

Radiated Emission(30-1000MHz)



Final_Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
40.680	34.71	40.00	5.29	100.0	V	180.0
993.720	38.53	47.00	8.47	100.0	V	180.0

Model : EA5KHD
Test Mode : Full Load (Power Battery Discharging)
Antenna Polarity : Vertical
Test By : Damon Leung
Test Date : 2019-01-09
Remark : The worst case was considered



China

Appendix B

Constructional Data Form

and

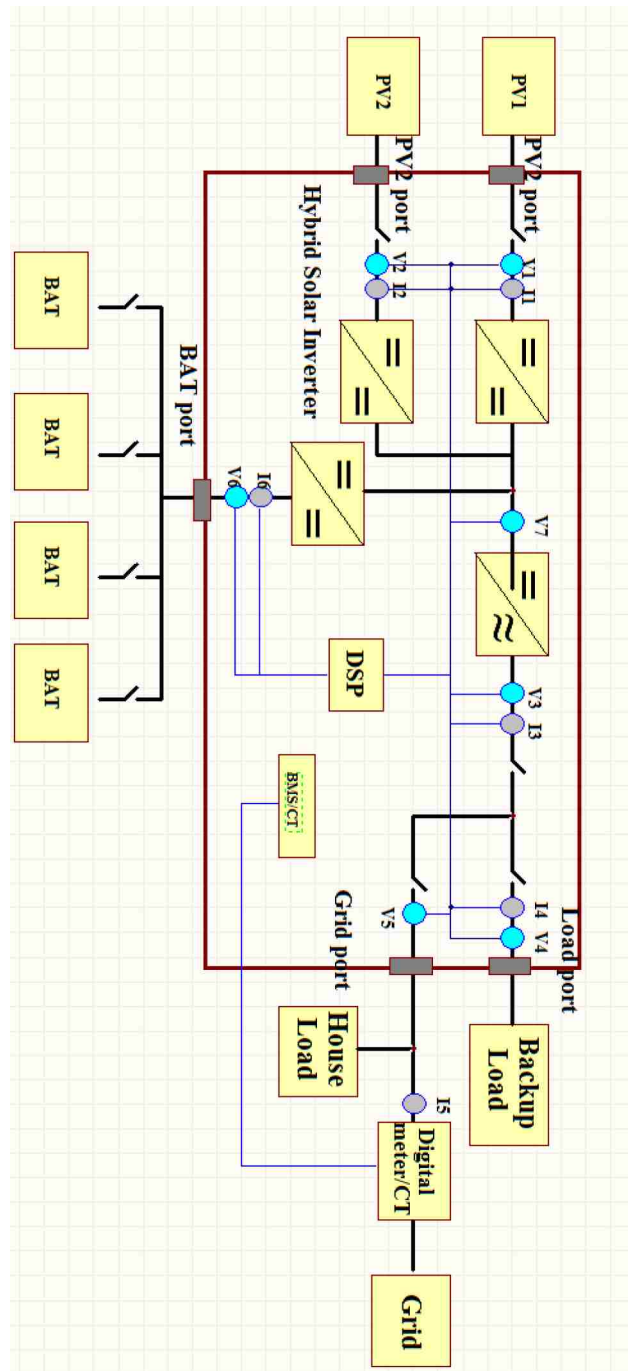
Product Information Form(s)

Any safety relevant information or constructional aspect concerning the sample or equipment under test as submitted by the applicant / report holder / certificate holder or any authorized agent is deemed to have no adverse effect on the electromagnetic compatibility (EMC) performance. Insofar as safety or compliance with Low Voltage Directive (LVD) or any relevant directive is concerned, the applicant / report holder / certificate holder or any authorized agent is required, by virtue of the relevant EU Directive provisions, to have satisfied that the product concerned (for which a sample was tested) meets with LVD or other relevant directives before placing it on the market.

Where applicable, changes or modifications made to the original sample submitted for testing are documented herein. The applicant or manufacturer shall ensure that such changes or modifications are applied to the production units. Any further changes or modifications made to the production units may void the validity of this test report unless such changes or modifications have been formally assessed by TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch through technical evaluations or other means as appropriate and it has been confirmed that the EMC performance of such units is not adversely affected.

The enclosed, if any, circuit diagram / parts list / printed circuit board diagram / component layout / user manual are strictly for reference only. TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch shall not be held responsible for any error or omission in such documents. It is the manufacturer's responsibility to ensure that production units conform to the tested sample.

Electric Diagram



Appendix C

Constructional Photographs
of
Equipment under test (EUT)

Any safety relevant information or constructional aspect concerning the sample or equipment under test as submitted by the applicant / report holder / certificate holder or any authorized agent is deemed to have no adverse effect on the electromagnetic compatibility (EMC) performance. Insofar as safety or compliance with Low Voltage Directive (LVD) or any relevant directive is concerned, the applicant / report holder / certificate holder or any authorized agent is required, by virtue of the relevant EU Directive provisions, to have satisfied that the product concerned (for which a sample was tested) meets with LVD or other relevant directives before placing it on the market.

Constructional Photographs



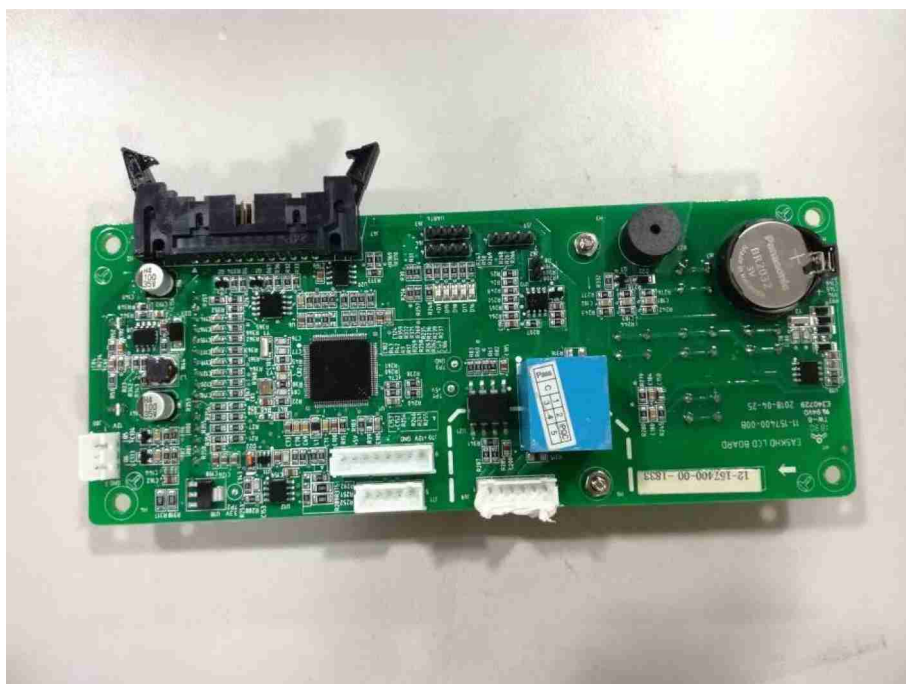
Constructional Photographs



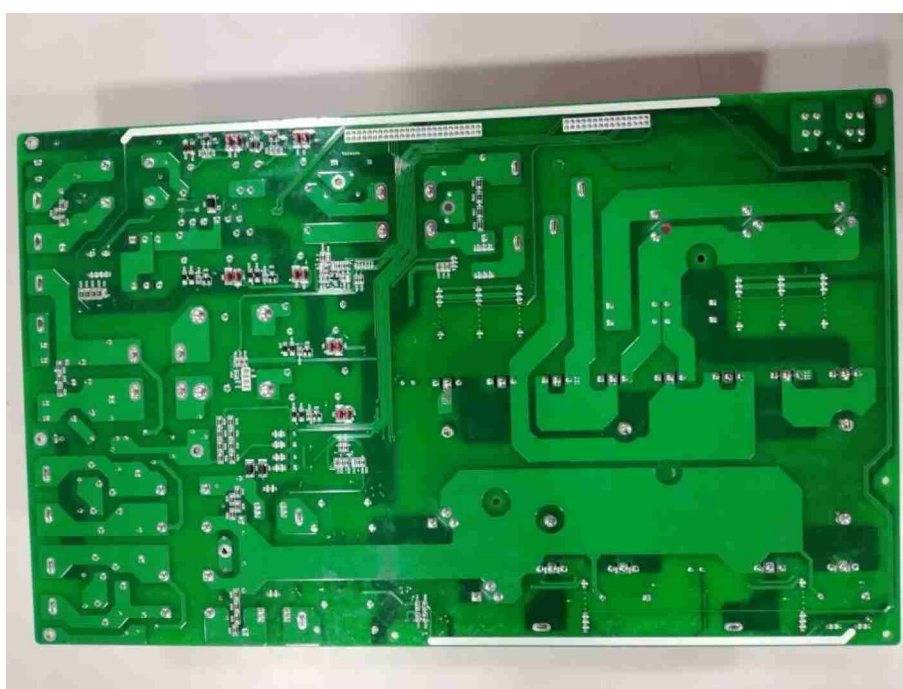
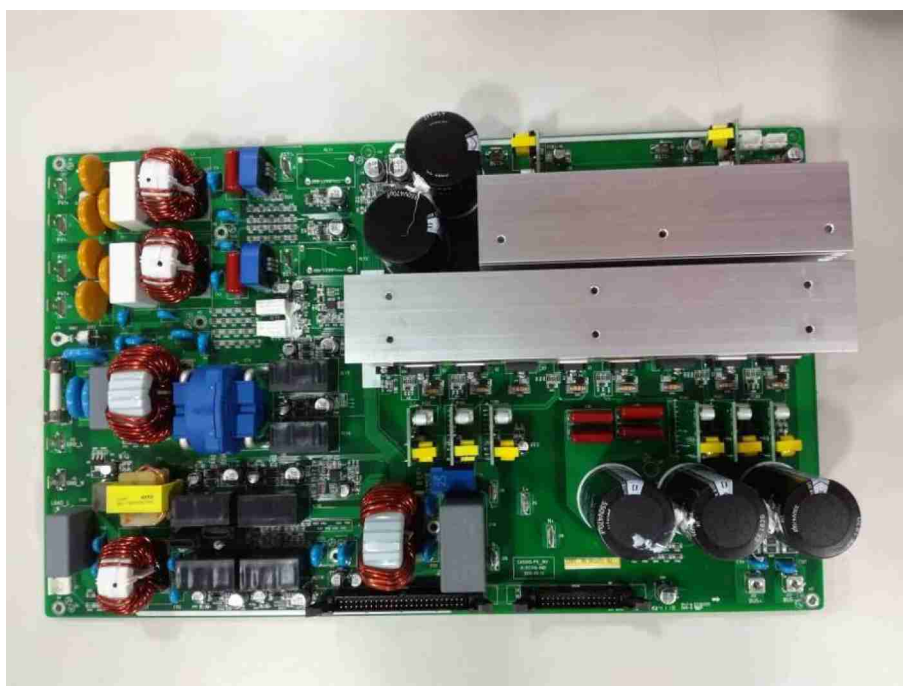
Constructional Photographs



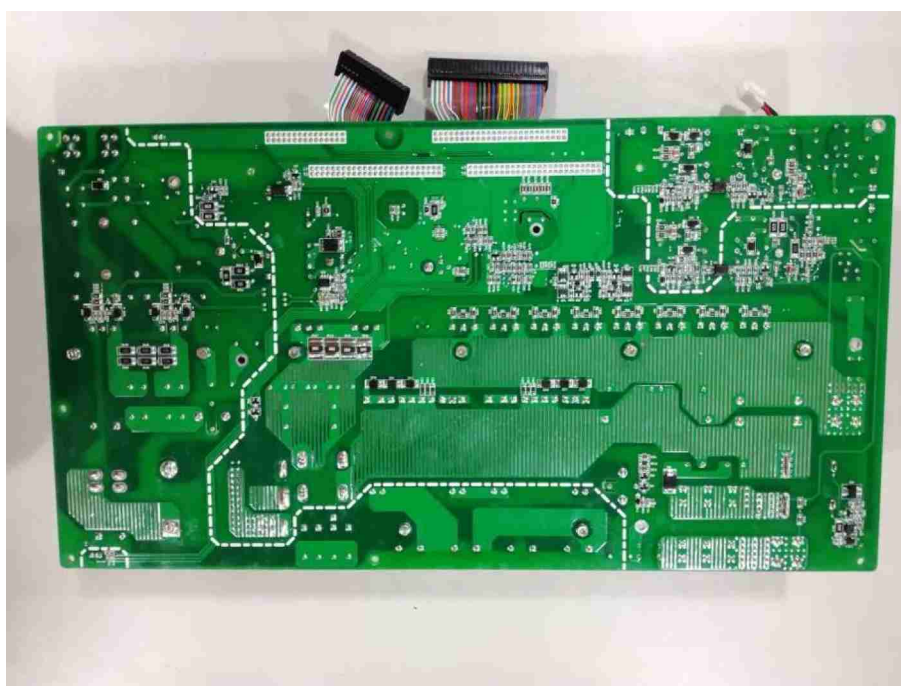
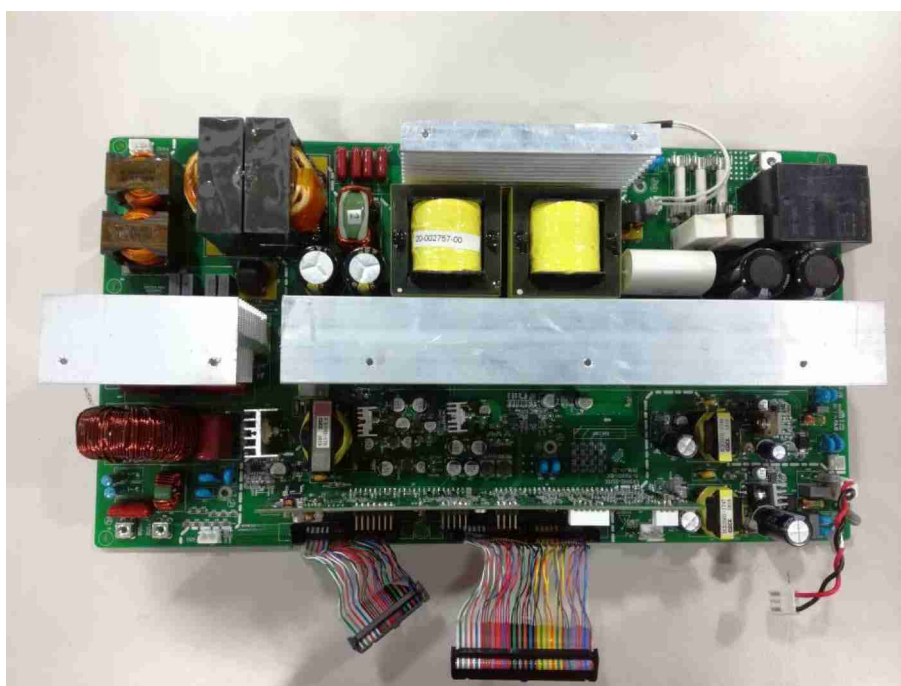
Constructional Photographs



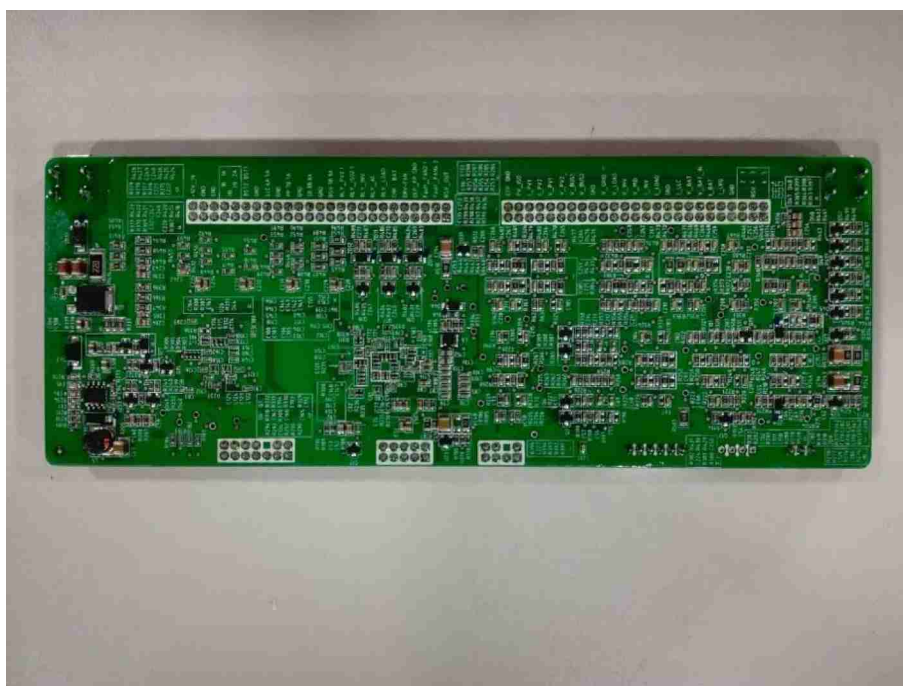
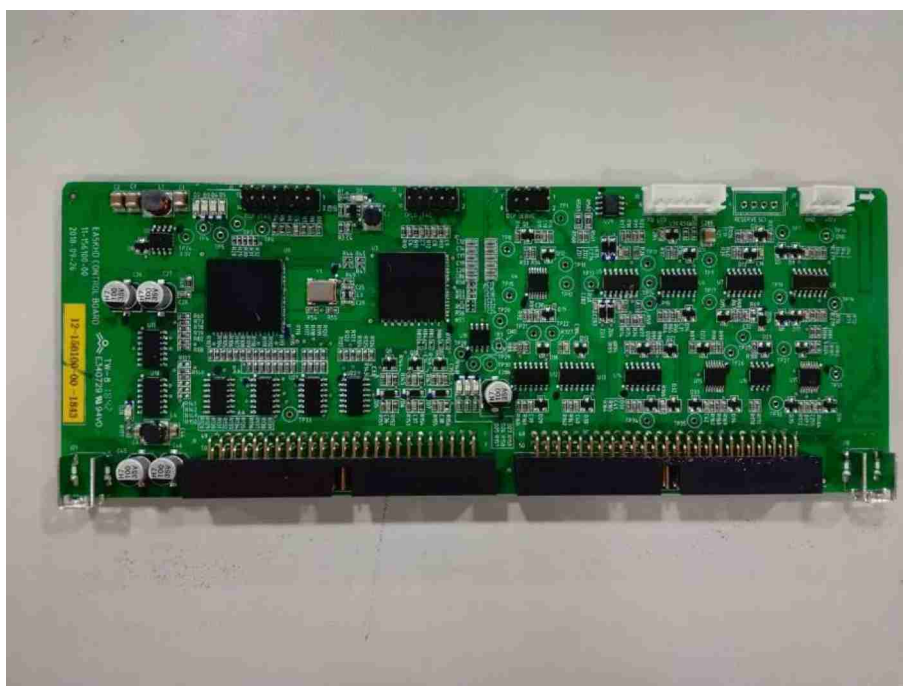
Constructional Photographs



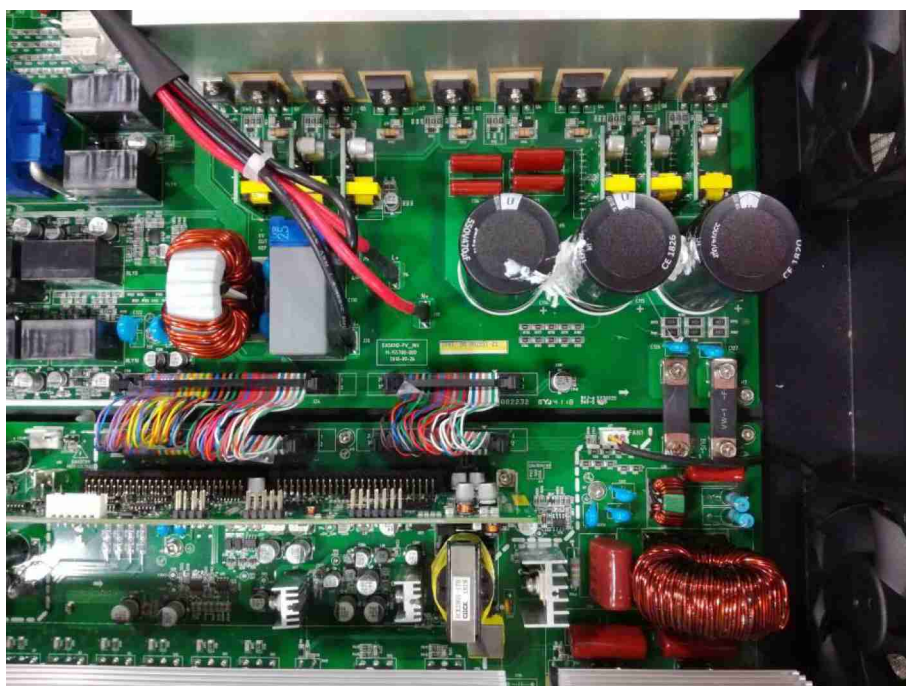
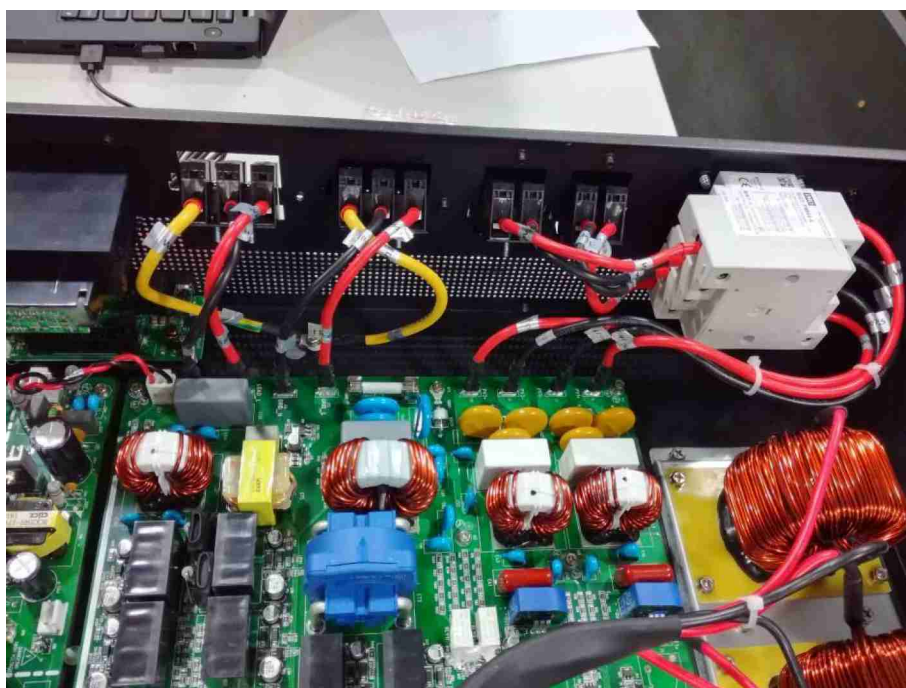
Constructional Photographs



Constructional Photographs



Constructional Photographs



EMC IMMUNITY - TEST REPORT

Report Number : **64.772.18.05999.01 – (I)** Date of Issue: 2019-01-30

Model : EA5KHD

Product Type : HYBRID SOLAR INVERTER

Applicant : EAST Group Co., Ltd.

Manufacturer : EAST Group Co., Ltd.

License holder : EAST Group Co., Ltd.

Brand name : EAST

Address : No. 6 Northern Industry Road, Songshan Lake Sci.&Tech. Industrial Park,
Dongguan City, Guangdong Province, China

Test Result : ☒ **Positive** ☐ **Negative**



Total pages including
Appendices : 16

TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch is a subcontractor to TÜV SÜD Product Service, GmbH according to the principles outlined in ISO/IEC Guide 25 and EN 45001.

TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch reports apply only to the specific samples tested under stated test conditions. Construction of the actual test samples has been documented. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. The manufacturer/importer is responsible to the Competent Authorities in Europe for any modifications made to the production units which result in non-compliance with the relevant regulations. TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch issued reports.

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China

DIRECTORY - IMMUNITY

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IMMUNITY TEST REGULATIONS :

The immunity tests were performed according to the following regulations :

■ - EMC - Directive 2014/30/EU and its amendments

■ - EN 61000-6-2:2005

■ - IEC 61000-6-2:2016

■ - IEC 61000-4-2:2008

■ - IEC 61000-4-3:2006+A1:2007+A2:2010

■ - IEC 61000-4-4:2012

■ - IEC 61000-4-5:2014

■ - IEC 61000-4-6:2013

■ - IEC 61000-4-8:2009

■ - IEC 61000-4-11:2004



China

Environmental Conditions In The laboratory :

	Actual
Temperature	: 23°C
Relative Humidity	: 45-48 %
Atmospheric Pressure	: 100.2~100.8 kPa

Rated of EUT:

Rated voltage:	DC 360V
Rated power:	5000W

STATEMENT OF MEASUREMENT UNCERTAINTY

The tolerances for each tests are reduced by the uncertainty reported on the calibration certificate for the measurement, all the parameters are within the tolerances required by the relevant standard, reduced by the uncertainty reported on the calibration certificate, so the laboratory has confidence that all the tests compliant with the relevant standards with a 95% confidence level.

Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Symbol Definitions:

- - Applicable
- - Not Applicable

Test laboratory:

- - East Group Co., Ltd. Test Center

Add: No.6, Gongye North Road, Songshan Lake Science and Technology Industrial Park, Dongguan, Guangdong, China

- - TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch

Add: Building 12 & 13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District, Shenzhen 518052, P.R. China

Immunity Test Conditions: ELECTROSTATIC DISCHARGE (ESD)

The immunity against *ELECTROSTATIC DISCHARGE (ESD)* events was performed in the following location:

☐ - Test not applicable

- ☐ - Test Area (TÜV SÜD Shenzhen) – Laboratory open area
☒ - Test Area (East) – Laboratory open area

Test Equipment Used :

Model Number	Manufacturer	Description	Serial Number	Cal. due date
<input checked="" type="checkbox"/> - SKS-0220G	SANKI	ESD tester	020413019E	2019-12-26
<input type="checkbox"/> - ESS-2002	Noiseken	Electrostatic Discharge Simulator	ESS0615075	2019-07-31
<input type="checkbox"/> - ---	TÜV SÜD Shenzhen	H/V Coupling Plane	/	/

Test Specification:

Discharge Voltage (Air):

<input type="checkbox"/> - 2 kV	<input checked="" type="checkbox"/> - 8 kV	<input type="checkbox"/> - 6 kV
<input type="checkbox"/> - 4 kV	<input type="checkbox"/> - 15 kV	<input type="checkbox"/> - _ kV

Discharge Voltage (Contact):

<input type="checkbox"/> - 2 kV	<input type="checkbox"/> - 6 kV	<input type="checkbox"/> - _ kV
<input checked="" type="checkbox"/> - 4 kV	<input type="checkbox"/> - 8 kV	

Discharge Impedance:

<input checked="" type="checkbox"/> - 330 Ω / 150 pF	<input type="checkbox"/> - 150 Ω / 150 pF
---	--

Discharge Repetition Rate:

☒ - ≥ 1 sec.

Number of Discharges:

☒ - ≥ 10 at all locations

Kind of Discharges:

<input checked="" type="checkbox"/> - Air discharge	<input checked="" type="checkbox"/> - Conducted discharge (relay)
<input checked="" type="checkbox"/> - Direct	<input checked="" type="checkbox"/> - Indirect

Polarity:

<input checked="" type="checkbox"/> - Positive	<input checked="" type="checkbox"/> - Negative
--	--

Location of Discharge:

<input checked="" type="checkbox"/> - HCVP & VCP
<input checked="" type="checkbox"/> - Each location on the surface touchable by hand
<input type="checkbox"/> - _____

Result :

Result :

- | | |
|--|-------------------------|
| <input checked="" type="checkbox"/> - No degradation of function | - Met Criterion A |
| <input type="checkbox"/> - Distortion of function | - Met Criterion B |
| <input type="checkbox"/> - Error of function | - Met Criterion C |
| <input type="checkbox"/> - Loss of function | - Unrecoverable Failure |

Remarks: _____

Immunity Test Conditions: RADIATED ELECTROMAGNETIC FIELDS

The immunity against *RADIATED ELECTROMAGNETIC FIELDS* exposure was performed in the following location:

☐ - Test not applicable

■ - Test Area (TÜV SÜD Shenzhen) – Anechoic ferrite lined shielded room

Test Equipment Used :

	Model Number	Manufacturer	Description	Serial Number	Cal. Due
■ -	SMB100A	Rohde & Schwarz	Signal Generator	177600	2019-07-06
<input type="checkbox"/> -	BBA100	Rohde & Schwarz	Power Amplifier	101238	2019-07-06
■ -	BBA150	Rohde & Schwarz	Power Amplifier	101671	2019-07-06
■ -	BBA150-E100	Rohde & Schwarz	Power Amplifier	102640	2019-07-06
■ -	HL046E	Rohde & Schwarz	Log-Periodic Antenna	100160	2019-07-06
■ -	STLP 9149	Rohde & Schwarz	Microwave Log-Periodic Antenna	9149-453	2019-07-06
■ -	NRP2	Rohde & Schwarz	Power Meter	103497	2019-06-20
■ -	NRP-Z91	Rohde & Schwarz	Average Power Sensor	102538	2019-06-20
■ -	NRP-Z91	Rohde & Schwarz	Average Power Sensor	102539	2019-06-20
■ -	FL7006/KIT	AMPLIFIER RESEARCH	Starprobe Laser-Powered Probe	0433720	2019-07-06

Remarks: All test equipments used are calibrated on a regular basis.

Test Specification:

Frequency Range/ Field Strength: ■ - 10 V/m (80 MHz - 1000 MHz)
 ■ - 3 V/m (1.4 GHz - 6 GHz)

Distance Antenna - EUT: ☐ - 1 m ■ - 3 m

Test Specification (continued):

Modulation: ■ - AM : 80% 1kHz
☐ - FM : ___ kHz dev. ___ kHz
 ■ - sine wave:
☐ - unmodulated
☐ - Pulse ON/OFF Duty Cycle: ___ %

Step: ☐ - ≤ 0.015 decades / sec ■ - 1%

Polarization of Antenna: ■ - Horizontal ■ - Vertical

Result :

■ - No degradation of function - Met Criterion A
☐ - Distortion of function - Met Criterion B
☐ - Error of function - Met Criterion C
☐ - Loss of function - Unrecoverable Failure

Remarks: _____

Immunity Test Conditions: FAST TRANSIENTS (BURST)

The immunity against *FAST TRANSIENTS (BURST)* events was performed in the following test location:

☐ - Test not applicable

☐ - Test Area (TÜV SÜD Shenzhen) – Laboratory open area

☒ - Test Area (East) – Laboratory open area

Test Equipment Used :

Model Number	Manufacturer	Description	Serial Number	Cal. due date
<input type="checkbox"/> - UCS 500N7	EMTEST	Immunity simulator	P1313116005	2019-07-06
<input type="checkbox"/> - CNI 503B5	EMTEST	7kV Coupling network 3-phase	P1425134991	2019-07-06
<input type="checkbox"/> - HFK	EMTEST	Capacitive Coupling Clamp	P1426135389	2019-07-06
<input checked="" type="checkbox"/> - SKS-0404GB	SANKI	Immunity simulator	040414002E	2019-12-26
<input checked="" type="checkbox"/> - EFTC	SANKI	Capacitive Coupling Clamp	130114004E	2019-12-26

Test Specification:

Pulse Amplitude - AC Power Port: ☐ - 1,0 kV ☒ - 2,0 kV
☐ - 4,0 kV ☐ - ____ kV

Pulse Amplitude - DC Power Port: ☐ - 1,0 kV ☐ - 2,0 kV
☐ - 4,0 kV ☐ - ____ kV

Pulse Amplitude - Signal/Data Non control Port: ☐ - 0,5 kV ☐ - 1,0 kV
☐ - 2,0 kV ☐ - ____ kV

Pulse Amplitude - Process: Measurement & Control Port ☐ - 0,5 kV ☐ - 1,0 kV
☐ - 2,0 kV ☐ - ____ kV

Burst Frequency: ☐ - 2,5 kHz ☒ - 5,0 kHz ☐ - ____ kHz

Time of Coupling: ☐ - 60 seconds ☒ - 120 seconds ☐ - ____ seconds

Coupling Method: ☒ - Coupling/decoupling network ☒ - Coupling clamp

Polarity: ☒ - Positive ☒ - Negative

Location of Coupling:

name of lines: AC Power Port, DC Power Port
 type of lines: ☐ - shielded ☒ - unshielded
 status of lines: ☐ - Passive ☒ - active
 kind of transmission: ☒ - analog ☐ - digital
 length of lines: _____

Result :

☒ - No degradation of function - Met Criterion A
☐ - Distortion of function - Met Criterion B
☐ - Error of function - Met Criterion C
☐ - Loss of function - Unrecoverable Failure

Remarks: _____

Immunity Test Conditions: SURGE TRANSIENTS

The immunity against *SURGE TRANSIENTS* events was performed in the following test location:

☐ - Test not applicable

☐ - Test Area (TÜV SÜD Shenzhen) – Laboratory open area

☒ - Test Area (East) – Laboratory open area

Test Equipment Used :

Model Number	Manufacturer	Description	Serial Number	Cal. due date
<input type="checkbox"/> - UCS 500N7	EMTEST	Immunity simulator	P1313116005	2019-07-06
<input type="checkbox"/> - CNI 503B5	EMTEST	7kV Coupling network 3-phase	P1425134991	2019-07-06
<input checked="" type="checkbox"/> - SKS-0404GB	SANKI	Immunity simulator	040414002E	2019-12-26

Test Specification:

Pulse Amplitude - AC Power Port:

<input checked="" type="checkbox"/> - 1,0 kV	<input checked="" type="checkbox"/> - 2,0 kV
<input type="checkbox"/> - 4,0 kV	<input type="checkbox"/> - 0.5 kV

Pulse Amplitude - DC Power Port:

<input type="checkbox"/> - 1,0 kV	<input type="checkbox"/> - 2,0 kV
<input type="checkbox"/> - 4,0 kV	<input type="checkbox"/> - ____ kV

Pulse Amplitude - Signal/Data Non control Port:

<input type="checkbox"/> - 0,5 kV	<input type="checkbox"/> - 1,0 kV
<input type="checkbox"/> - 2,0 kV	<input type="checkbox"/> - ____ kV

Pulse Amplitude - Process: Measurement & Control Port

<input type="checkbox"/> - 0,5 kV	<input type="checkbox"/> - 1,0 kV
<input type="checkbox"/> - 2,0 kV	<input type="checkbox"/> - ____ kV

Source Impedance:

<input checked="" type="checkbox"/> - 2 Ω + 18 μ F	<input checked="" type="checkbox"/> - 12 Ω + 9 μ F
<input type="checkbox"/> - 42 Ω + 0,1 μ F	<input type="checkbox"/> - 42 Ω + 0,5 μ F

Number of Surges:

<input type="checkbox"/> - 5 surges/angle	<input type="checkbox"/> - ____ surges /angle
---	---

Angle:

<input type="checkbox"/> - 0 °	<input checked="" type="checkbox"/> - 90 °
<input type="checkbox"/> - 180 °	<input checked="" type="checkbox"/> - 270 °

Repetition Rate:

<input checked="" type="checkbox"/> - 60 sec.	<input type="checkbox"/> - ____ sec.
---	--------------------------------------

Polarity:

<input checked="" type="checkbox"/> - Positive	<input checked="" type="checkbox"/> - Negative
--	--

Location of Coupling:

name of lines: AC Power Port

type of lines:	<input type="checkbox"/> - shielded	<input checked="" type="checkbox"/> - unshielded
status of lines:	<input type="checkbox"/> - Passive	<input checked="" type="checkbox"/> - active
kind of transmission:	<input checked="" type="checkbox"/> - analog	<input type="checkbox"/> - digital
length of lines:	_____	

Result:

<input checked="" type="checkbox"/> - No degradation of function	- Met Criterion A
<input type="checkbox"/> - Distortion of function	- Met Criterion B
<input type="checkbox"/> - Error of function	- Met Criterion C
<input type="checkbox"/> - Loss of function	- Unrecoverable Failure

Remarks: _____

Report Number: 64.772.18.05999.01 – (I)

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Immunity Test Conditions: CONDUCTED DISTURBANCE

The immunity against *CONDUCTED DISTURBANCE* events, induced by radio frequency fields above 9 kHz, was performed in the following test location:

☐ - Test not applicable

■ - Test Area (TÜV SÜD Shenzhen) –Laboratory open area

Test Equipment Used :

Model Number	Manufacturer	Description	Serial Number	Cal. due date
■ - CWS 500N1	EMTEST	Continuous Wave Simulator	P1420134224	2019-07-06
■ - ATT6/80	EMTEST	Attenuator	P1402129090	2019-07-06
<input type="checkbox"/> - CDN-M2/M3	EMTEST	CDN	P1420134163	2019-07-06
<input type="checkbox"/> - CDN-M4	EMTEST	CDN	P1346125919	2019-07-06
■ - EM101	EMTEST	Electromagnetic Injection Clamp	P1411132453	2019-07-06

Test Specification:

Frequency Range: ■ - 0,15 MHz - 80 MHz

Voltage Level (EMF):

☐ - 1 V ☐ - 3 V
 ■ - 10 V ☐ - ___ V

Modulation:

■ - AM : 80 % 1 kHz
☐ - FM : ___ kHz dev. ___ kHz
 ■ - sine wave:
 ■ - unmodulated
☐ - Pulse ON/OFF Duty Cycle: ___ %

Step:

■ - ≤ 0.015 decades / sec

Location of Coupling:

name of lines:

AC Power Port, DC Power Port

type of lines:

☐ - shielded ■ - unshielded

status of lines:

☐ - Passive ■ - active

kind of transmission:

■ - analog ☐ - digital

length of lines:

Result :

■ - No degradation of function - Met Criterion A
☐ - Distortion of function - Met Criterion B
☐ - Error of function - Met Criterion C
☐ - Loss of function - Unrecoverable Failure

Remarks: _____

Immunity Test Conditions: VOLTAGE DIPS and INTERRUPTIONS

The immunity against *VOLTAGE DIPS AND INTERRUPTIONS* were performed in the following test location:

☐ - Test not applicable

■ - Test Area (TÜV SÜD Shenzhen) – Laboratory open area

Test Equipment Used :

Model Number	Manufacturer	Description	Serial Number	Cal. due date
■ - UCS 500N7	EMTEST	Immunity simulator	P1313116005	2019-07-06
■ - MV2616	EMTEST	Motorized Variac	P1401128623	2019-07-06

Test Specification:

Nominal Mains Voltage (V_{NOM}): ■ - 230 Vac □ - 100 Vac □ - ____ Vdc

Level of Reduction (dip):

- - 1 cycle at 100% of V_{NOM}
- - 10 cycle at 60% of V_{NOM} (50Hz)
- - 12 cycle at 60% of V_{NOM} (60Hz)
- - 25 cycle at 30% of V_{NOM} (50Hz)
- - 30 cycle at 30% of V_{NOM} (60Hz)

Interruptions:

- - 250 cycle at 100% of V_{NOM} (50Hz)
- - 300 cycle at 100% of V_{NOM} (60Hz)

Result :

- | | |
|---|-------------------------|
| <input type="checkbox"/> - No degradation of function | - Met Criterion A |
| ■ - Distortion of function | - Met Criterion B |
| <input type="checkbox"/> - Error of function | - Met Criterion C |
| <input type="checkbox"/> - Loss of function | - Unrecoverable Failure |

Remarks: EUT would get power dropped when the dips were applied, and automatically return to work normally after the test.

Immunity Test Conditions: POWER FREQUENCY MAGNETIC FIELD

The immunity against *POWER FREQUENCY MAGNETIC FIELD* exposure, induced by radio frequency fields above 9 kHz, was performed in the following test location:

☐ - Test not applicable

■ - Test Area (TÜV SÜD Shenzhen) - Laboratory open area

Test Equipment Used:

Model Number	Manufacturer	Description	Serial Number	Cal. Due
■ - UCS 500N7	EMTEST	Immunity simulator	P1313116005	2019-07-06
■ - MV2616	EMTEST	Motorized Variac	P1401128623	2019-07-06
■ - MC 2630	EMTEST	Current Transformer	P1408131875	2019-07-06
■ - MS 100N	EMTEST	Magnetic Field Coil	P1325119613	2019-07-06

Test Specification:

Frequency Range: ■ - 50 Hz ■ - 60 Hz ☐ - 400 Hz

Field level (EMF): ☐ - 1 A/m ☐ - 3 A/m ☐ - 10 A/m
 ■ - 30 A/m ☐ - 100 A/m ☐ - ____ A/m

Short Field (1-3 sec): ☐ - 300 A/m ☐ - 1000 A/m ☐ - ____ A/m

Duration: ■ - 60 seconds

Axis of Orientation: ■ - X-axis ■ - Y-axis ■ - Z-axis

Result:

■ - No degradation of function	- Met Criterion A
<input type="checkbox"/> - Distortion of function	- Met Criterion B
<input type="checkbox"/> - Error of function	- Met Criterion C
<input type="checkbox"/> - Loss of function	- Unrecoverable Failure

Remarks: _____

Equipment Under Test (EUT) Test Operation Mode - Immunity Tests:

The equipment under test was operated under the following conditions during immunity testing :

- ☐ - Standby
- ☐ - Test Program (H - Pattern)
- ☐ - Test Program (Color Bar)
- ☐ - Test Program (Customer Specified)
- ☒ - Normal Operating Mode

- ☐ - _____
- ☐ - _____
- _____

Configuration of the equipment under test:

- ☐ - See Constructional Data Form in Appendix B
- ☐ - See Product Information Form(s) in Appendix C

The following peripheral devices and interface cables were connected during the testing:

- | | |
|----------------------------------|--------------|
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |

☒ - unshielded power cable

☐ - unshielded cables

☐ - shielded cables

TÜVPS. No.: _____

☐ - customer specific cables

- ☐ - _____
- ☐ - _____

GENERAL REMARKS:

SUMMARY:

All tests according to the regulations cited on page 3 were

■ - Performed

□ - Not Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements cited on page 3.

□ - **Does not** fulfill the general approval requirements cited on page 3.

Sample Receive Date: 2019-01-08

Testing Start Date: 2019-01-09

Testing End Date: 2019-01-17

- TÜV SÜD CERTIFICATION AND TESTING (CHINA) CO., LTD. GUANGZHOU BRANCH -

Reviewed by:



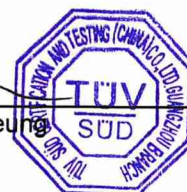
Tony Liu



Prepared by:



Damon Leung



Appendix A

Setup Photo of Electrostatic Discharge



Setup Photo of RS



Setup Photo of Fast Transients & Surge



Setup Photo of Conducted Immunity



Setup Photo of Dip & Interruption



Setup Photo of Power Frequency Magnetic Immunity

