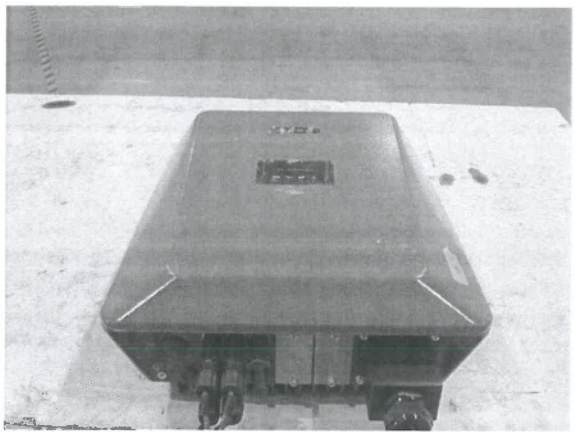
Prüfbericht-Nr.: *Test Report No.:*	**50136896 001**	**Auftrags-Nr.:** *Order No.:*	164122707	Seite 1 von 28 *Page 1 of 28*
Kunden-Referenz-Nr.: *Client Reference No.:*	675974	**Auftragsdatum:** *Order date.:*	09 Apr. 2018	
Auftraggeber: *Client:*	Magnizon Power Systems FZE LOB11, Office 132, Jebel Ali Free Zone, 263819 Dubai, United Arab Emirates			
Prüfgegenstand: *Test item:*	Solar (PV) Grid Inverter			
Bezeichnung / Typ-Nr.: *Identification / Type No.:*	OG-6K-DM, OG-8K-DM, OG-10K-DM, OG-12K-DM, OG-15K-DM			
Auftrags-Inhalt: *Order content:*	TUV Rheinland - EMC service			
Prüfgrundlage: *Test specification:*	EN 61000-6-1:2007 EN 61000-6-2:2005 EN 61000-6-3:2007+A1 EN 61000-6-4:2007+A1			
Wareneingangsdatum: *Date of receipt:*	16 June 2017			
Prüfmuster-Nr.: *Test sample No.:*	17-13344			
Prüfzeitraum: *Testing period:*	Refer to test report			
Ort der Prüfung: *Place of testing:*	Refer to section 2.1			
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: *Test result*:*	Pass			



geprüft von / *tested by:*

12.04.2018	Felix Tao Project Manager	
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

kontrolliert von / *reviewed by:*

12.04.2018	Tongle Lee Technical Certifier	
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

Sonstiges / *Other:*

Zustand des Prüfgegenstandes bei Anlieferung:
Condition of the test item at delivery:
Prüfmuster vollständig und unbeschädigt
Test item complete and undamaged

* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut	3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar	5 = mangelhalt N/T = nicht getestet
Legend:	1 = very good P(ass) = passed a.m. test specifications(s)	2 = good	3 = satisfactory F(ail) = failed a.m. test specifications(s)	4 = sufficient N/A = not applicable	5 = poor N/T = not tested

TÜV Rheinland (Shenzhen) Co., Ltd., East of F/1, F/2 - F/4, Building 1, Cybio Technology Building, No. 6 Langshan No. 2 Road, North Hi-tech Industry Park, Nanshan District, Shenzhen, P.R. China
http://www.tuv.com

TEST SUMMARY

5.1.1 HARMONICS ON AC MAINS
RESULT: Not Applicable

5.1.2 VOLTAGE FLUCTUATIONS ON AC MAINS
RESULT: Not Applicable

5.1.3 AC MAINS TERMINAL CONTINUOUS DISTURBANCE VOLTAGE
RESULT: Pass

5.2.1 RADIATED EMISSION
RESULT: Pass

6.2.1 RADIO-FREQUENCY ELECTROMAGNETIC FIELD AMPLITUDE MODULATED (RS)
RESULT: Pass

6.2.2 RADIO-FREQUENCY CONTINUOUS CONDUCTED (CS)
RESULT: Pass

6.2.3 POWER-FREQUENCY MAGNETIC FIELDS
RESULT: Pass

6.3.1 FAST TRANSIENTS (EFT)
RESULT: Pass

6.3.2 SURGE
RESULT: Pass

6.3.3 ELECTROSTATIC DISCHARGES (ESD)
RESULT: Pass

6.4.1 VOLTAGE DIPS AND INTERRUPTIONS
RESULT: Not Applicable

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1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix 1: Test result

Appendix 2: Measurement uncertainties

(Remark: The model no. shown on the test result is “SE 10KTL” & “SE 15KTL”, which represent “OG-10K-DM” & “OG-15K-DM” respectively.)

2. Test Sites

2.1 Test Facilities

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. (SET)
Building 28/29, Shigudong, Xili Industrial Area, Xili Street, Nanshan District,
Shenzhen, Guangdong, China

The tests at the test site have been conducted under the supervision of a TÜV engineer.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Kind of Equipment	Manufacturer	Type	S/N	Calibrated until
Conducted Emission (SET)				
Test Receiver	ROHDE&SCHWARZ	ESCI	A0902601	2018-06-05
L.I.S.N.	SCHWARZBECK	NNLK8130	A131001541	2018-06-05
Pulse Limiter	ROHDE&SCHWARZ	ESH3-Z2	0357.8810.54	2018-06-05
Radiated Emission (SET)				
Test Receiver	ROHDE&SCHWARZ	ESCI	A0902601	2018-06-05
Broadband Antenna	SCHWARZBECK	VULB 09160	A0805560	2019-05-25
ESD (SET)				
ESD Tester	EMTEST	ESD30N	A130301203	2018-06-12
Radio-Frequency Electromagnetic Field Amplitude Modulated (SET)				
Signal Generator	ROHDE&SCHWARZ	SMB100A	A141002004	2017-11-02
Power Amplifier	MILMEGA	80RF1000-1000	A140101634	2018-03-29
Power Amplifier	MILMEGA	AS0104R-800/400	1072771	2018-03-29
Power Meter	Amplifier Research	E4417A	A140701873	2017-11-02
Log.-Per. Antenna	Amplifier Research	STLP 9128 E	A151002436	2019-03-09
Broad-Band Horn Antenna	Amplifier Research	BBHA 9120 J	A160322002	2018-01-20
EFT (SET)				
EFT/Surge Test System	EM TEST	UCS500N7.7	A130201094	2017-11-02
Three Phase CDN	EM TEST	CNI503B9.3	A130201095	2017-11-02
Coupling Clamp	HAEFELY	IP4A	147506	2017-11-02
Surge (SET)				
EFT/Surge Test System	EM TEST	UCS500N7.7	A130201094	2017-11-02
Three Phase CDN	EM TEST	CNI503B9.3	A130201095	2017-11-02
Radio-Frequency Continuous Conducted (SET)				
Power Amplifier	TESEQ	NSG4060	A160602544	2018-03-29
CDN	TESEQ	CDN-M5-100-750V	A161102606	2018-03-27
Capacitive Clamp	ROHDE&SCHWARZ	F2031	A0304258	2018-08-05

Kind of Equipment	Manufacturer	Type	S/N	Calibrated until
Attenuator	Amplifier Research	ATT6/75	A0304254	2018-08-05
Power Frequency Magnetic Fields (SET)				
Frequency Magnetic Field Generator	HAEFELY	MAG 100.1	A0103109	2018-06-04

3. General Product Information

3.1 Product Function and Intended Use

The EUTs are PV Grid Inverter used for industrial, residential, commercial and light-industrial environments.

Model list:

MODEL	INPUT	OUTPUT		
		Voltage	Current	Power
OG-6K-DM	DC 160-1000V, 11A / 11A Max.	380/400/415 Vac	3*10A Max.	6 kW
OG-8K-DM	DC 160-1000V, 11A / 11A Max.	380/400/415 Vac	3*13A Max.	8 kW
OG-10K-DM	DC 160-1000V, 11A / 11A Max.	380/400/415 Vac	3*16A Max.	10 kW
OG-12K-DM	DC 160-1000V, 22A / 11A Max.	380/400/415 Vac	3*19A Max.	12 kW
OG-15K-DM	DC 160-1000V, 22A / 11A Max.	380/400/415 Vac	3*23A Max.	15 kW

Models OG-6K-DM, OG-8K-DM and OG-10K-DM are identical except the type designation and power.
Models OG-12K-DM and OG-15K-DM are identical except the type designation and power.

For details please refer to the Circuit Diagram & Instruction Manual.

3.2 Ratings and System Details

Input voltage range:	refer to section 3.1
Max. input voltage:	DC 1000V
Input current:	refer to section 3.1
Output voltage:	AC 380/400/415V (3W/N/PE)
Frequency:	50/60Hz
Output current:	refer to section 3.1
Output power:	refer to section 3.1
Earthing:	Connected

3.3 Independent Operation Modes

The basic operation modes are:

A. On
B. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Circuit Diagram
- Instruction Manual
- Rating Label

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure their highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

Immunity: The equipment under test (EUT) was configured to have their highest possible susceptibility against the tested phenomena. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5 & 6.
Pre-test in all operation modes, and find out the worst case for compliance test.
According to section 3.1, full tests were applied on models OG-10K-DM and OG-15K-DM.

4.3 Special Accessories and Auxiliary Equipment

The EUT was tested together with the following accessories:

Item	Manufacturer	Model	Rating
DC Power Supply	AC POWER CORP.	DCST-900V-150A	Input: AC 380V, 50Hz Output: DC 100-900V, 150A Max.
DC Power Supply	Topcorn	TC.P.32.1000.400.S.HMI	Input: AC 380V, 50Hz Output: DC 0-1000V, 32kW Max.

4.4 Countermeasures to achieve EMC Compliance

The test samples, which have been tested, contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

5. Test Results EMISSION

5.1 Emission in the Frequency Range up to 30 MHz

5.1.1 Harmonics on AC Mains

RESULT: **Not Applicable**

Due to the characteristics of the system which mentioned in section 3.2, the harmonic current emission requirements as specified by EN 61000-3-2:2014 or EN 61000-3-12:2011 are not applicable to the EUT.

5.1.2 Voltage Fluctuations on AC Mains

RESULT: **Not Applicable**

Due to the characteristics of the system which mentioned in section 3.2, the voltage changes, voltage fluctuations and flicker requirements as specified by EN 61000-3-3:2013 or EN 61000-3-11:2000 are not applicable to the EUT.

5.1.3 AC Mains Terminal Continuous Disturbance Voltage

RESULT: **Pass**

Date of testing	:	2017-08-11
Test standard	:	EN 61000-6-3:2007+A1 & EN 61000-6-4:2007+A1
Frequency range	:	0.15 - 30MHz
Limits	:	Table 2 of EN 61000-6-3:2007+A1 Table 2 of EN 61000-6-4:2007+A1
Kind of test site	:	10m Chamber
Tested port	:	AC Mains

Test setup

Mains Voltage	:	AC 400V, 50Hz
Operation Condition	:	Clause 4 of EN 61000-6-3:2007+A1 Clause 4 of EN 61000-6-4:2007+A1
Operation mode	:	A
Artificial hand	:	Not applied
Earthing	:	Connected

Note: The DC power input port of EUT isn't connected to a local DC power network or a remote local battery by a connecting cable exceeding a length of 30 m, hence Disturbance Voltage test is not applicable to this port.

Refer to attached Appendix 1.

5.2 Emission in the Frequency Range above 30 MHz

5.2.1 Radiated Emission

RESULT: **Pass**

Date of testing	:	2017-08-11
Test standard	:	EN 61000-6-3:2007+A1 & EN 61000-6-4:2007+A1
Frequency range	:	30 - 1000MHz *
Limits	:	Table 1 of EN 61000-6-3:2007+A1 Table 1 of EN 61000-6-4:2007+A1
Kind of test site	:	10m Semi-Anechoic Chamber
Tested Port	:	Enclosure

Test setup

Input Voltage	:	DC 160-1000V
Operation Condition	:	Clause 4 of EN 61000-6-3:2007+A1 Clause 4 of EN 61000-6-4:2007+A1
Operation mode	:	A
Earthing	:	Connected

* The highest frequency generated or used in the EUT is below 108MHz, hence the upper frequency of this test is 1GHz.

Refer to attached Appendix 1.

6. Test Results IMMUNITY

6.1 Classification of apparatus

According to EN 61000-6-1:2007 & EN 61000-6-2:2005, the EUT shall be tested in accordance with table 1, 3 & 4, and comply with following performance criterion:

Continuous Disturbance

Power-Frequency Magnetic Fields	**Criterion A**
Radio-Frequency Electromagnetic Field Amplitude Modulated (RS)	**Criterion A**
Radio-Frequency Continuous Conducted (CS)	**Criterion A**

Transient Disturbance

Fast Transients (EFT)	**Criterion B**
Surge	**Criterion B**
Electrostatic Discharges (ESD)	**Criterion B**

Power Supply Alterations

Voltage Dips and Interruptions	**Criterion B & C**

6.2 Continuous Disturbances

6.2.1 Radio-Frequency Electromagnetic Field Amplitude Modulated (RS)

RESULT: **Pass**

Date of Testing	:	2017-08-16
Test Specification	:	EN 61000-6-1:2007 & EN 61000-6-2:2005
Basic Standard	:	IEC 61000-4-3:2006
Criterion	:	A
Frequency Range	:	80 - 2,700MHz
Test Level	:	10V/m, 80 – 1000MHz 3V/m, 1.4 – 2.0GHz 1V/m, 2.0 – 2.7GHz (Unmodulated, r.m.s.)
Modulation	:	AM 80%, 1kHz sine-wave
Tested Port	:	Enclosure

Test setup

Input Voltage	:	DC 160-1000V
Operation Mode	:	A
Earthing	:	Connected
Ambient temperature	:	See Appendix 1
Relative humidity	:	See Appendix 1
Atmospheric pressure	:	101kPa

Refer to attached Appendix 1.

6.2.2 Radio-Frequency Continuous Conducted (CS)

RESULT: **Pass**

Date of testing	:	2017-08-16
Test Specification	:	EN 61000-6-1:2007 & EN 61000-6-2:2005
Basic Standard	:	IEC 61000-4-6:2008
Criterion	:	A
Frequency range	:	0.15 - 80 MHz
Source impedance	:	150Ω
Test level	:	10V (unmodulated, r.m.s.)
Modulation	:	AM 80%, 1kHz sine-wave
Sweep mode	:	automatic
Sweep rate	:	$<1.5\times10^{-3}$decade/sec.
Tested Port	:	AC Output, DC Input

Test setup

Input Voltage	:	DC 160-1000V
Operation Mode	:	A
Earthing	:	Connected
Ambient temperature	:	See Appendix 1
Relative humidity	:	See Appendix 1
Atmospheric pressure	:	101kPa

Refer to attached Appendix 1.

6.2.3 Power-frequency Magnetic Fields

RESULT: **Pass**

Date of testing	:	2017-08-16
Test Specification	:	EN 61000-6-1:2007 & EN 61000-6-2:2005
Basic Standard	:	IEC 61000-4-8:2009
Criterion	:	A
Test Frequency	:	50/60Hz
Test level	:	30A/m
Tested Port	:	Enclosure

Test setup

Input Voltage	:	DC 160-1000V
Operation Mode	:	A
Earthing	:	Connected
Ambient temperature	:	See Appendix 1
Relative humidity	:	See Appendix 1
Atmospheric pressure	:	101kPa

Refer to attached Appendix 1.

6.3 Transient Disturbances

6.3.1 Fast Transients (EFT)

RESULT: **Pass**

Date of testing	:	2017-08-16
Test Specification	:	EN 61000-6-1:2007 & EN 61000-6-2:2005
Basic Standard	:	IEC 61000-4-4:2004
Criterion	:	B
Test level	:	±0.5kV, ±1kV, ±2kV
Test duration	:	≥60sec
Rise time	:	5/50ns
Repetition frequency	:	5kHz
Tested Port	:	AC Output, DC Input

Test setup

Input Voltage	:	DC 160-1000V
Operation Mode	:	A
Earthing	:	Connected
Ambient temperature	:	See Appendix 1
Relative humidity	:	See Appendix 1
Atmospheric pressure	:	101kPa

Refer to attached Appendix 1.

6.3.2 Surge

RESULT: **Pass**

Date of testing	:	2017-08-17
Test Specification	:	EN 61000-6-1:2007 & EN 61000-6-2:2005
Basic Standard	:	IEC 61000-4-5:2005
Criterion	:	B
Source impedance	:	2Ω, 12Ω
Test level	:	±0.5kV, ±1kV, ±2kV
Number of surges	:	5 (for each combination of parameters)
Repetition rate	:	Max. 1/min
Tested Port	:	AC Output, DC Input

Test Setup

Input Voltage	:	DC 160-1000V
Operation Mode	:	A
Earthing	:	Connected
Ambient temperature	:	See Appendix 1
Relative humidity	:	See Appendix 1
Atmospheric pressure	:	101kPa

Refer to attached Appendix 1.

6.3.3 Electrostatic Discharges (ESD)

RESULT: **Pass**

Date of testing	:	2017-08-16
Test Specification	:	EN 61000-6-1:2007 & EN 61000-6-2:2005
Basic Standard	:	IEC 61000-4-2:2008
Criterion	:	B
Charge voltage	:	±2.0kV, ±4.0kV, ±8kV (air discharge) ±2.0kV, ±4.0kV (contact discharge)
Number of discharges	:	>10
Tested Port	:	Enclosure

Test Setup

Input Voltage	:	DC 160-1000V
Operation Mode	:	A
Earthing	:	Connected
Ambient temperature	:	Refer to Appendix 1
Relative humidity	:	Refer to Appendix 1
Atmospheric pressure	:	101kPa

Refer to attached Appendix 1.

6.4 Power Supply Alterations

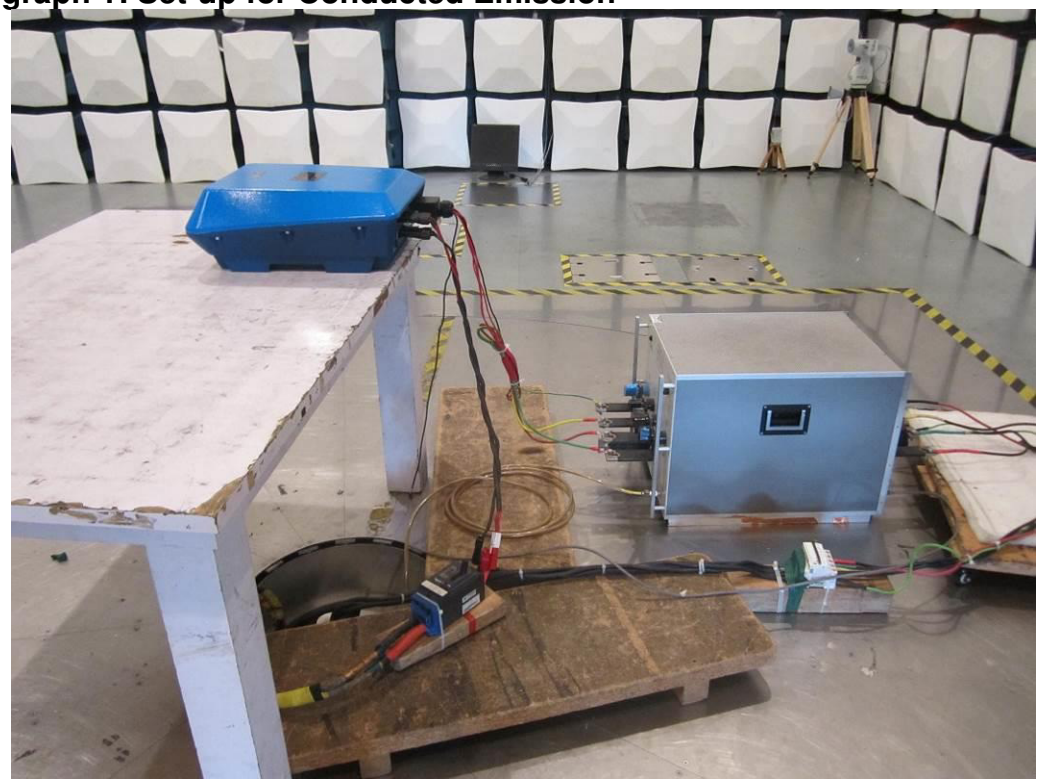
6.4.1 Voltage Dips and Interruptions

RESULT: **Not Applicable**

The EUT does not have AC input port, therefore the Voltage Dips and Interruptions test is not applicable.

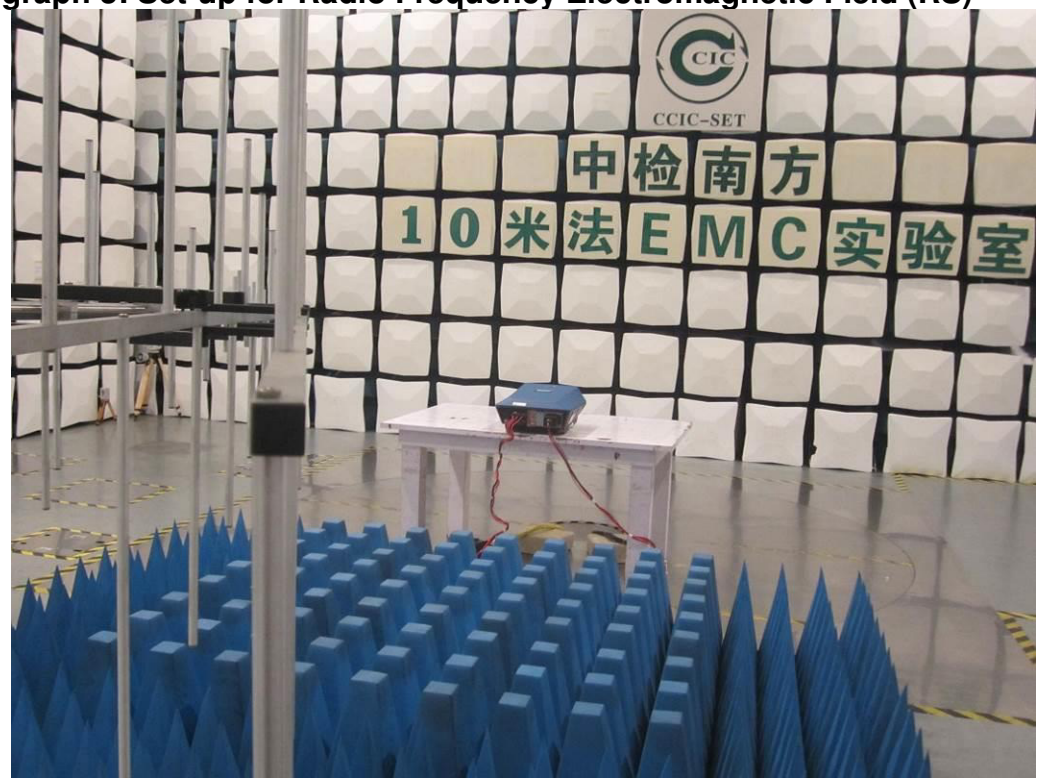
7. Photographs of the Test Set-Up

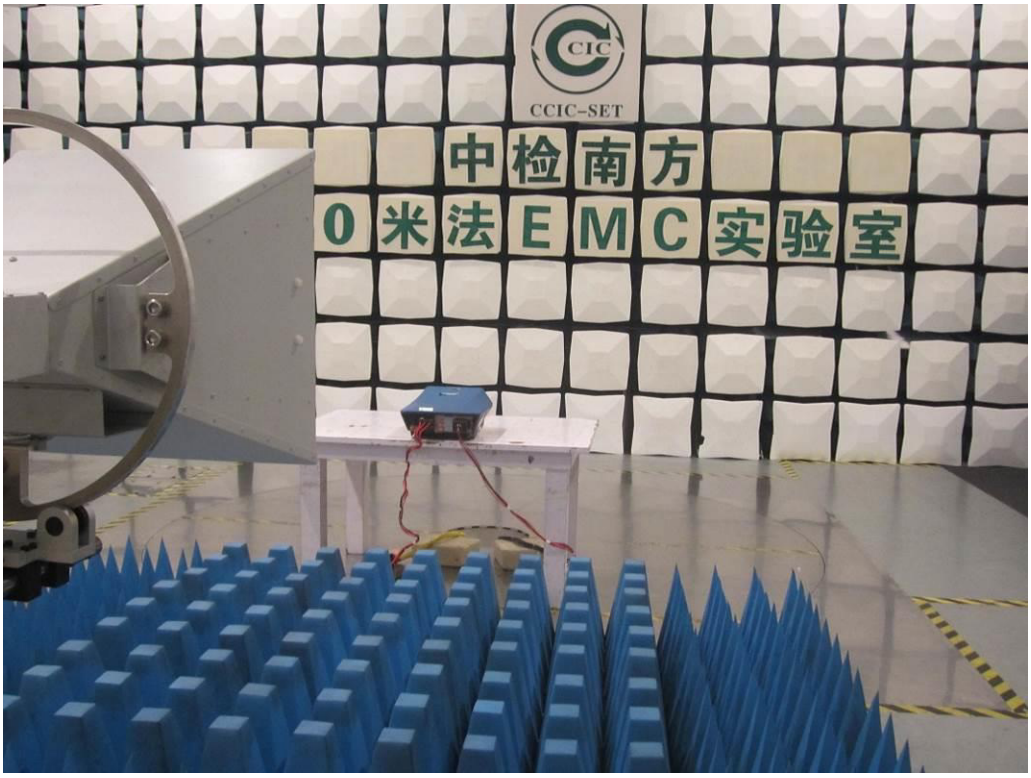
Photograph 1: Set-up for Conducted Emission



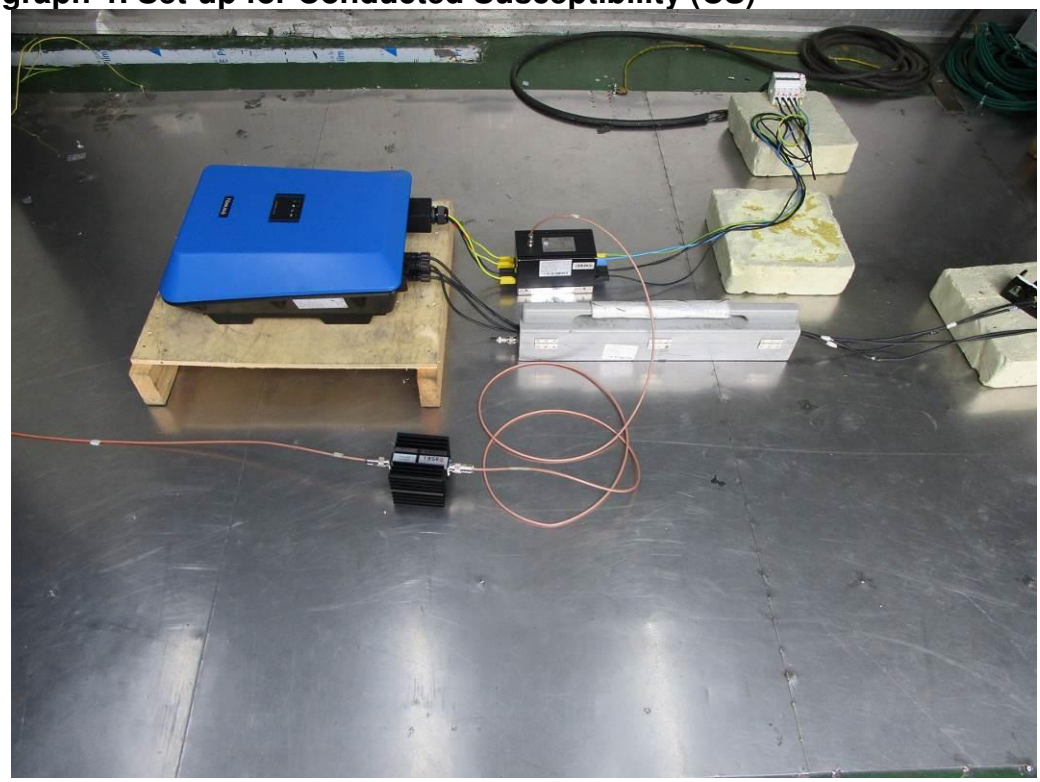
Photograph 2: Set-up for Radiated Emission

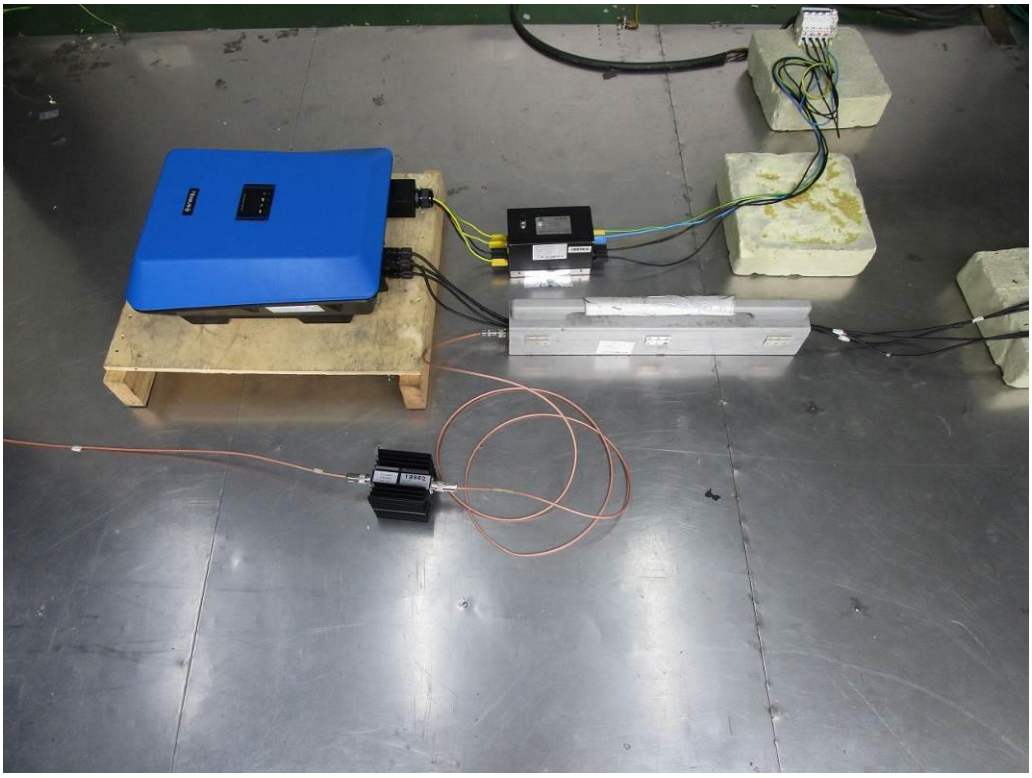
Photograph 3: Set-up for Radio Frequency Electromagnetic Field (RS)



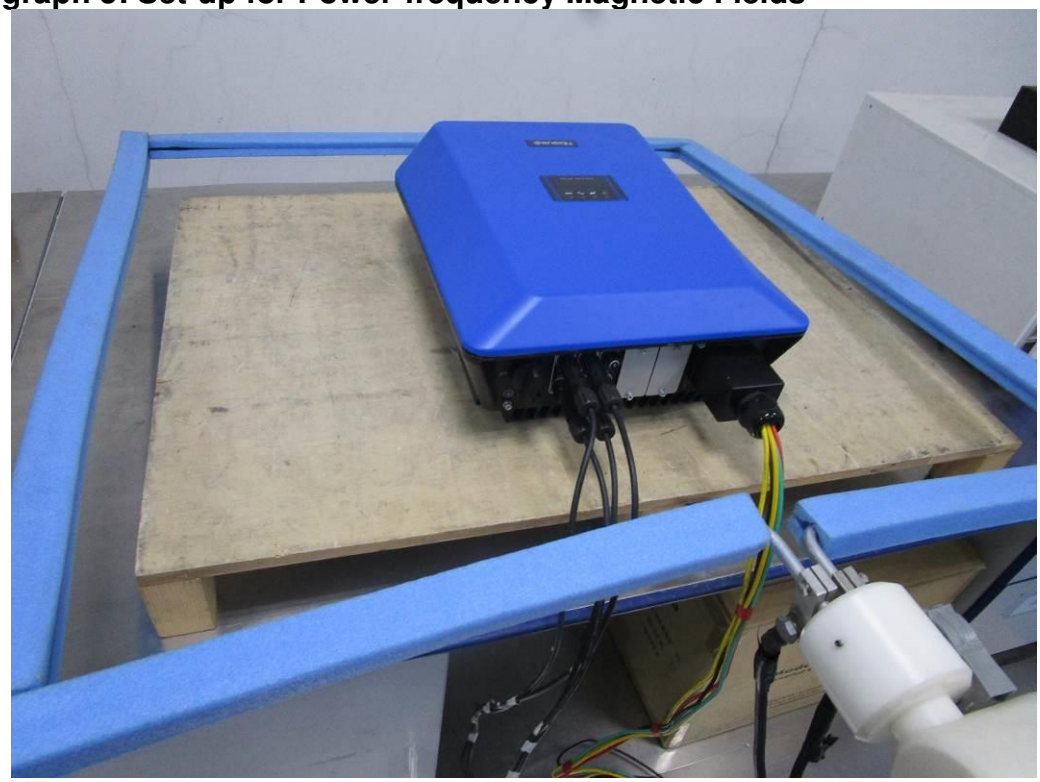


Photograph 4: Set-up for Conducted Susceptibility (CS)





Photograph 5: Set-up for Power-frequency Magnetic Fields



Photograph 6: Set-up for EFT, Surge

Photograph 7: Set-up for Electrostatic Discharges (ESD)

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SE 10KTL-L1

EMC32 Report

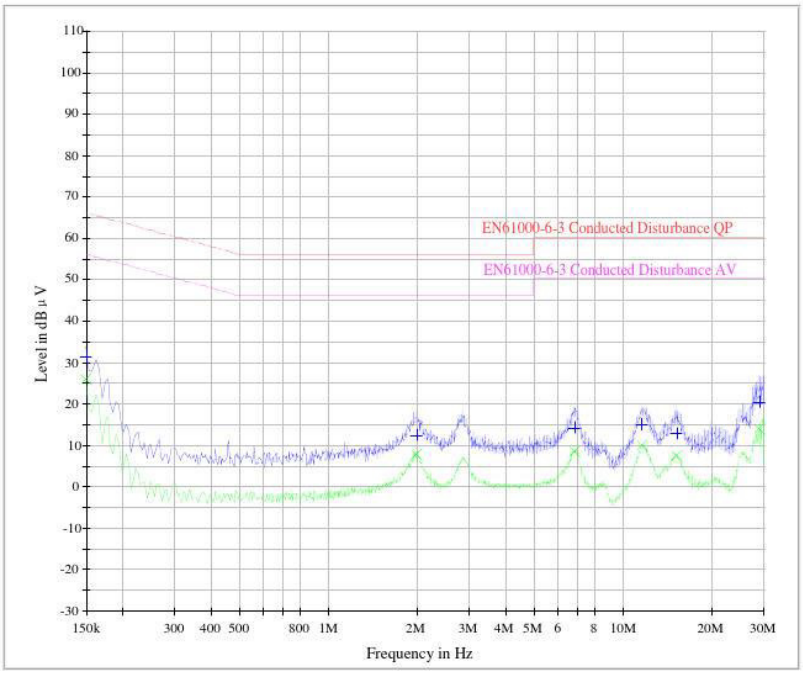
Common Information

Test Description:	SET 10m Chamber Laboratory
Test Site:	Shenzhen Electronic Product Quality Test Center
Test Standard:	EN61000-6-3:2007+A1:2011
Environment Conditions:	Temperature: 23.3--24.2℃ Relative humidity: 46--49.5%
Operator Name:	jianghaibiao
Comment:	680V 10KW

Limit and Margin QP

Frequency (MHz)	QuasiPeak (dB µ V)	Average (dB µ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin QP (dB)	Limit QP (dB µ V)	Margin AV (dB)	Limit AV (dB µ V)
0.150000	31.4	25.9	20.00	9.000	Local	Local	10.0	34.6	66.0	30.1	56.0
1.982000	12.3	7.8	20.00	9.000	Local	Local	10.1	43.7	56.0	38.2	46.0
6.826000	14.4	8.5	20.00	9.000	Local	Local	10.2	45.6	60.0	41.5	50.0
11.618000	14.8	9.9	20.00	9.000	Local	Local	10.3	45.2	60.0	40.1	50.0
15.206000	13.0	7.4	20.00	9.000	Local	Local	10.3	47.0	60.0	42.6	50.0
29.118000	20.3	14.0	20.00	9.000	Local	Local	10.5	39.7	60.0	36.0	50.0

EMI Conducted disturbances Scan



2017-8-11

SE 10KTL-L2

EMC32 Report

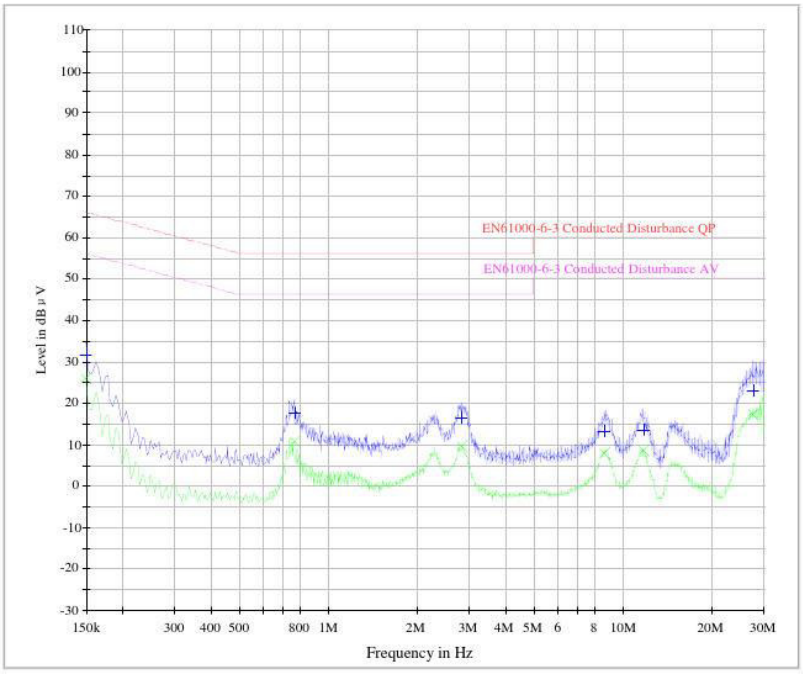
Common Information

Test Description:	SET 10m Chamber Laboratory
Test Site:	Shenzhen Electronic Product Quality Test Center
Test Standard:	EN61000-6-3:2007+A1:2011
Environment Conditions:	Temperature: 23.3--24.2℃ Relative humidity: 46--49.5%
Operator Name:	jianghaibiao
Comment:	680V 10KW

Limit and Margin QP

Frequency (MHz)	QuasiPeak (dB µ V)	Average (dB µ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin QP (dB)	Limit QP (dB µ	Margin AV (dB)	Limit AV (dB µ
0.150000	31.6	25.7	20.00	9.000	Local	Local	10.0	34.4	66.0	30.3	56.0
0.766000	17.6	10.8	20.00	9.000	Local	Local	10.0	38.4	56.0	35.2	46.0
2.838000	16.3	9.4	20.00	9.000	Local	Local	10.1	39.7	56.0	36.6	46.0
8.678000	13.2	7.6	20.00	9.000	Local	Local	10.3	46.8	60.0	42.4	50.0
11.666000	13.4	8.5	20.00	9.000	Local	Local	10.3	46.6	60.0	41.5	50.0
27.638000	23.0	17.3	20.00	9.000	Local	Local	10.5	37.0	60.0	32.7	50.0

EMI Conducted disturbances Scan



2017-8-11

SE 10KTL-L3

EMC32 Report

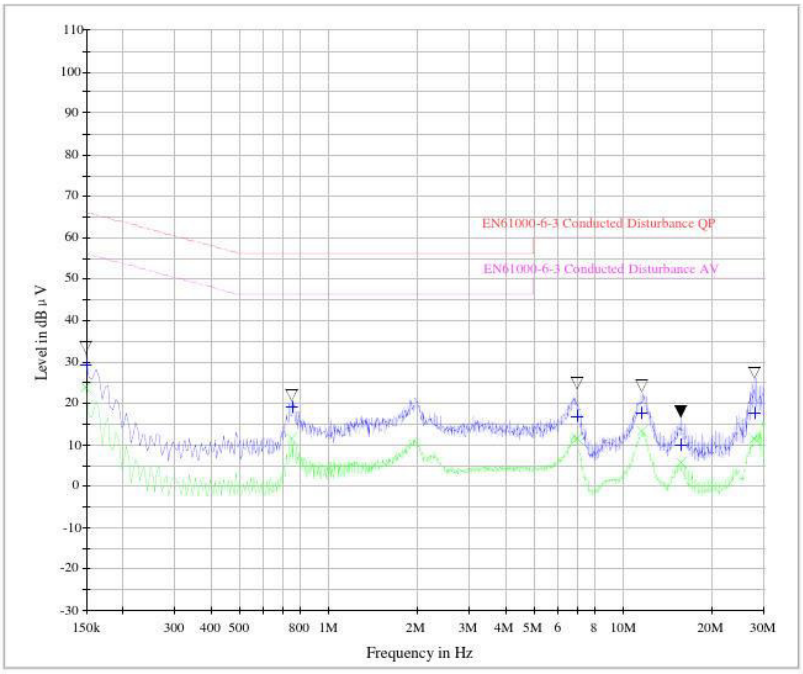
Common Information

Test Description:	SET 10m Chamber Laboratory
Test Site:	Shenzhen Electronic Product Quality Test Center
Test Standard:	EN61000-6-3:2007+A1:2011
Environment Conditions:	Temperature: 23.3--24.2℃ Relative humidity: 46--49.5%
Operator Name:	jianghaibiao
Comment:	680V 10KW

Limit and Margin QP

Frequency (MHz)	QuasiPeak (dB µ V)	Average (dB µ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin QP (dB)	Limit QP (dB µ	Margin AV (dB)	Limit AV (dB µ
0.150000	29.3	23.8	20.00	9.000	Local	Local	10.0	36.7	66.0	32.2	56.0
0.750000	18.9	11.2	20.00	9.000	Local	Local	10.0	37.1	56.0	34.8	46.0
6.966000	16.9	11.3	20.00	9.000	Local	Local	10.2	43.1	60.0	38.7	50.0
11.630000	17.7	13.0	20.00	9.000	Local	Local	10.3	42.3	60.0	37.0	50.0
15.730000	10.0	5.4	20.00	9.000	Local	Local	10.4	50.0	60.0	44.6	50.0
27.866000	17.6	11.3	20.00	9.000	Local	Local	10.5	42.4	60.0	38.7	50.0

EMI Conducted disturbances Scan



2017-8-11

SE 10KTL-N

EMC32 Report

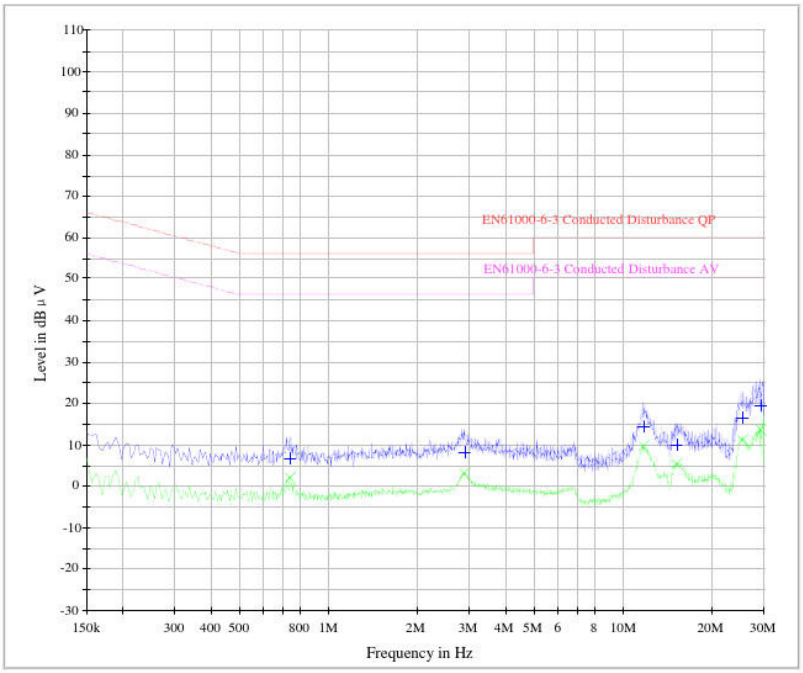
Common Information

Test Description:	SET 10m Chamber Laboratory
Test Site:	Shenzhen Electronic Product Quality Test Center
Test Standard:	EN61000-6-3:2007+A1:2011
Environment Conditions:	Temperature: 23.3--24.2℃ Relative humidity: 46--49.5%
Operator Name:	jianghaibiao
Comment:	680V 10KW

Limit and Margin QP

Frequency (MHz)	QuasiPeak (dB µ V)	Average (dB µ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)	Margin AV (dB)	Limit AV (dB µ
0.738000	6.7	1.8	20.00	9.000	Local	Local	10.0	49.3	56.0	44.2	46.0
2.882000	8.2	2.9	20.00	9.000	Local	Local	10.1	47.8	56.0	43.1	46.0
11.742000	14.1	9.5	20.00	9.000	Local	Local	10.3	45.9	60.0	40.5	50.0
15.258000	9.9	5.0	20.00	9.000	Local	Local	10.3	50.1	60.0	45.0	50.0
25.510000	16.6	11.1	20.00	9.000	Local	Local	10.4	43.4	60.0	38.9	50.0
29.150000	19.3	13.5	20.00	9.000	Local	Local	10.5	40.7	60.0	36.5	50.0

EMI Conducted disturbances Scan



2017-8-11

SE 15KTL-L1

EMC32 Report

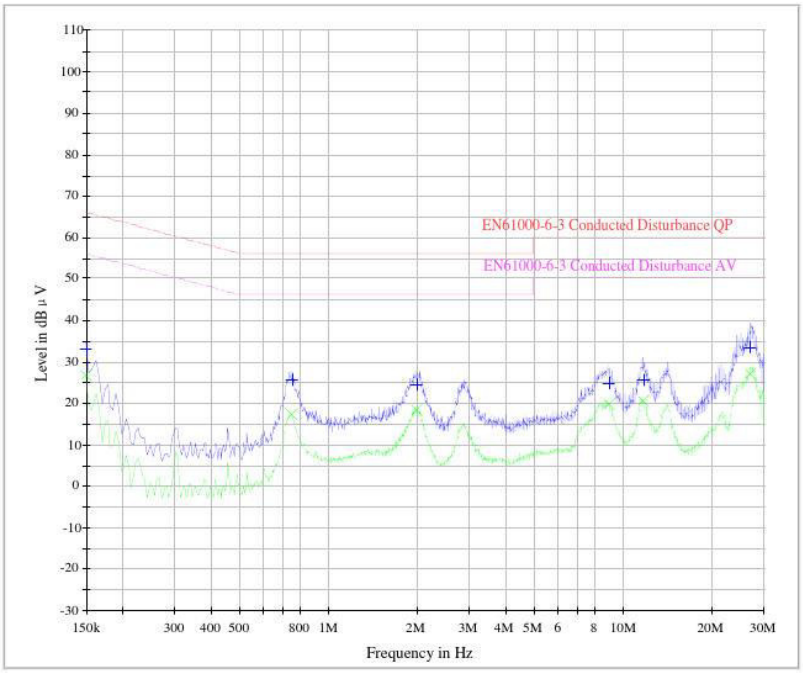
Common Information

Test Description:	SET 10m Chamber Laboratory
Test Site:	Shenzhen Electronic Product Quality Test Center
Test Standard:	EN61000-6-3:2007+A1:2011
Environment Conditions:	Temperature: 23.3--24.2℃ Relative humidity: 46--49.5%
Operator Name:	jianghaibiao
Comment:	680V 15KW

Limit and Margin QP

Frequency (MHz)	QuasiPeak (dB µ V)	Average (dB µ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin QP (dB)	Limit QP (dB µ	Margin AV (dB)	Limit AV (dB µ
0.150000	33.2	26.7	20.00	9.000	Local	Local	10.0	32.8	66.0	29.3	56.0
0.750000	25.5	17.2	20.00	9.000	Local	Local	10.0	30.5	56.0	28.8	46.0
1.986000	24.3	18.2	20.00	9.000	Local	Local	10.1	31.7	56.0	27.8	46.0
8.914000	24.6	19.8	20.00	9.000	Local	Local	10.3	35.4	60.0	30.2	50.0
11.658000	25.6	20.4	20.00	9.000	Local	Local	10.3	34.4	60.0	29.6	50.0
26.942000	33.4	26.9	20.00	9.000	Local	Local	10.5	26.6	60.0	23.1	50.0

EMI Conducted disturbances Scan



2017-8-11

SE 15KTL-L2

EMC32 Report

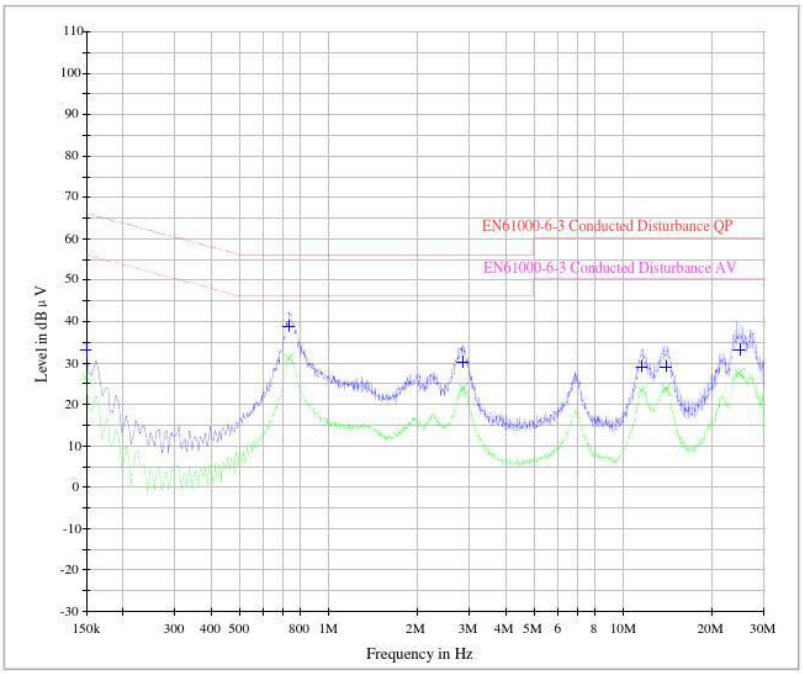
Common Information

Test Description:	SET 10m Chamber Laboratory
Test Site:	Shenzhen Electronic Product Quality Test Center
Test Standard:	EN61000-6-3:2007+A1:2011
Environment Conditions:	Temperature: 23.3--24.2℃ Relative humidity: 46--49.5%
Operator Name:	jianghaibiao
Comment:	680V 15KW

Limit and Margin QP

Frequency (MHz)	QuasiPeak (dB µ V)	Average (dB µ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin QP (dB)	Limit QP (dB µ	Margin AV (dB)	Limit AV (dB µ
0.150000	33.0	26.5	20.00	9.000	Local	Local	10.0	33.0	66.0	29.5	56.0
0.734000	39.0	31.1	20.00	9.000	Local	Local	10.0	17.0	56.0	14.9	46.0
2.846000	30.2	23.8	20.00	9.000	Local	Local	10.1	25.8	56.0	22.2	46.0
11.606000	29.0	23.4	20.00	9.000	Local	Local	10.3	31.0	60.0	26.6	50.0
13.914000	29.0	23.6	20.00	9.000	Local	Local	10.3	31.0	60.0	26.4	50.0
24.898000	33.0	27.3	20.00	9.000	Local	Local	10.4	27.0	60.0	22.7	50.0

EMI Conducted disturbances Scan



2017-8-11

SE 15KTL-L3

EMC32 Report

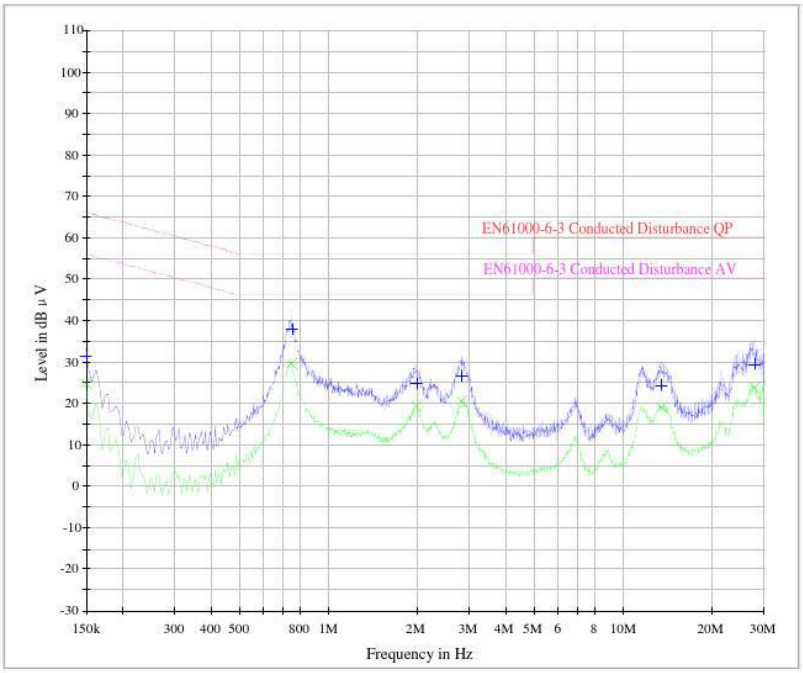
Common Information

Test Description:	SET 10m Chamber Laboratory
Test Site:	Shenzhen Electronic Product Quality Test Center
Test Standard:	EN61000-6-3:2007+A1:2011
Environment Conditions:	Temperature: 23.3--24.2℃ Relative humidity: 46--49.5%
Operator Name:	jianghaibiao
Comment:	680V 15KW

Limit and Margin QP

Frequency (MHz)	QuasiPeak (dB µ V)	Average (dB µ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)	Margin AV (dB)	Limit AV (dB µ
0.150000	31.4	24.7	20.00	9.000	Local	Local	10.0	34.6	66.0	31.3	56.0
0.750000	37.8	29.4	20.00	9.000	Local	Local	10.0	18.2	56.0	16.6	46.0
1.986000	24.8	19.2	20.00	9.000	Local	Local	10.1	31.2	56.0	26.8	46.0
2.818000	26.7	20.5	20.00	9.000	Local	Local	10.1	29.3	56.0	25.5	46.0
13.494000	24.5	19.0	20.00	9.000	Local	Local	10.3	35.5	60.0	31.0	50.0
27.914000	29.4	23.6	20.00	9.000	Local	Local	10.5	30.6	60.0	26.4	50.0

EMI Conducted disturbances Scan



2017-8-11

SE 15KTL-N

EMC32 Report

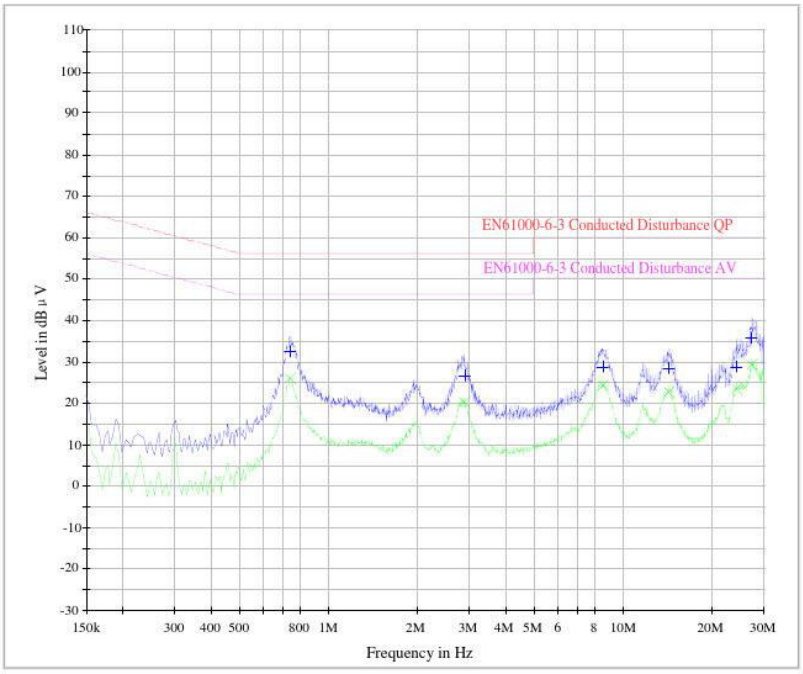
Common Information

Test Description:	SET 10m Chamber Laboratory
Test Site:	Shenzhen Electronic Product Quality Test Center
Test Standard:	EN61000-6-3:2007+A1:2011
Environment Conditions:	Temperature: 23.3--24.2℃ Relative humidity: 46--49.5%
Operator Name:	jianghaibiao
Comment:	680V 15KW

Limit and Margin QP

Frequency (MHz)	QuasiPeak (dB µ V)	Average (dB µ V)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin QP (dB)	Limit QP (dB µ	Margin AV (dB)	Limit AV (dB µ
0.738000	32.5	25.9	20.00	9.000	Local	Local	10.0	23.5	56.0	20.1	46.0
2.898000	26.6	19.9	20.00	9.000	Local	Local	10.1	29.4	56.0	26.1	46.0
8.558000	28.9	24.1	20.00	9.000	Local	Local	10.3	31.1	60.0	25.9	50.0
14.318000	28.6	22.7	20.00	9.000	Local	Local	10.3	31.4	60.0	27.3	50.0
24.338000	28.9	23.2	20.00	9.000	Local	Local	10.4	31.1	60.0	26.8	50.0
27.450000	35.6	29.0	20.00	9.000	Local	Local	10.5	24.4	60.0	21.0	50.0

EMI Conducted disturbances Scan



2017-8-11

SE 10KTL-H

SET 10m Chamber Test Report

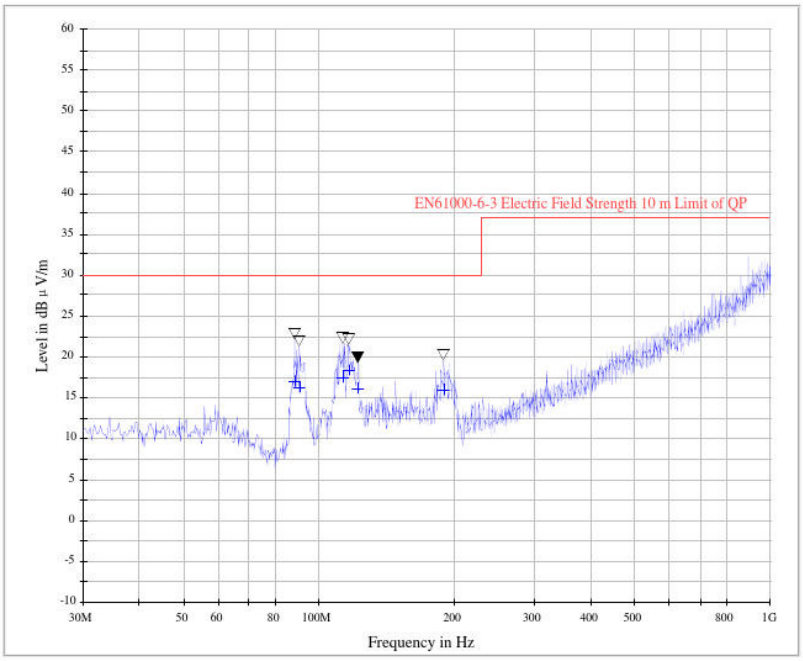
Common Information

Test Description:	SET 10m Chamber Laboratory
Test Site:	Shenzhen Electronic Product Quality Test Center
Test Standard:	EN61000-6-3:2007+A1:2011
Environment Conditions:	Temperature: 23.3--24.2℃ Relative humidity: 46--49.5%
Operator Name:	jianghaibiao
Comment:	680V10KW

Limit and Margin QP

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
88.440000	16.9	1000.00	120.000	400.0	H	0.0	-20.2	13.1	30.0
90.880000	16.2	1000.00	120.000	400.0	H	0.0	-20.0	13.8	30.0
113.440000	17.5	1000.00	120.000	400.0	H	224.0	-17.7	12.5	30.0
117.040000	18.3	1000.00	120.000	400.0	H	329.0	-17.4	11.7	30.0
122.160000	16.2	1000.00	120.000	400.0	H	3.0	-16.9	13.8	30.0
189.800000	15.9	1000.00	120.000	400.0	H	0.0	-17.2	14.1	30.0

EMI 10M MaxHold Sweep



2017-8-11

SE 10KTL-V

SET 10m Chamber Test Report

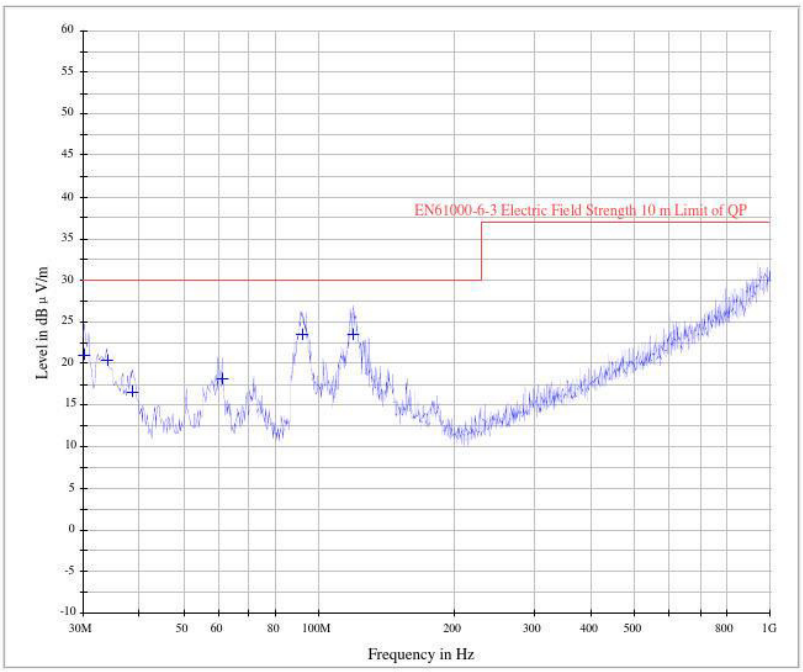
Common Information

Test Description:	SET 10m Chamber Laboratory
Test Site:	Shenzhen Electronic Product Quality Test Center
Test Standard:	EN61000-6-3:2007+A1:2011
Environment Conditions:	Temperature: 23.3--24.2℃ Relative humidity: 46--49.5%
Operator Name:	jianghaibiao
Comment:	680V10KW

Limit and Margin QP

Frequency (MHz)	QuasiPeak (dB µ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB µ V/m)
30.240000	21.1	1000.00	120.000	100.0	V	0.0	-17.8	8.9	30.0
33.880000	20.4	1000.00	120.000	100.0	V	0.0	-17.6	9.6	30.0
38.720000	16.6	1000.00	120.000	100.0	V	0.0	-17.3	13.4	30.0
61.040000	18.2	1000.00	120.000	100.0	V	0.0	-17.0	11.8	30.0
92.320000	23.5	1000.00	120.000	100.0	V	338.0	-19.8	6.5	30.0
119.000000	23.5	1000.00	120.000	100.0	V	23.0	-17.2	6.5	30.0

EMI 10M MaxHold Sweep



2017-8-11

SE 15KTL-H

SET 10m Chamber Test Report

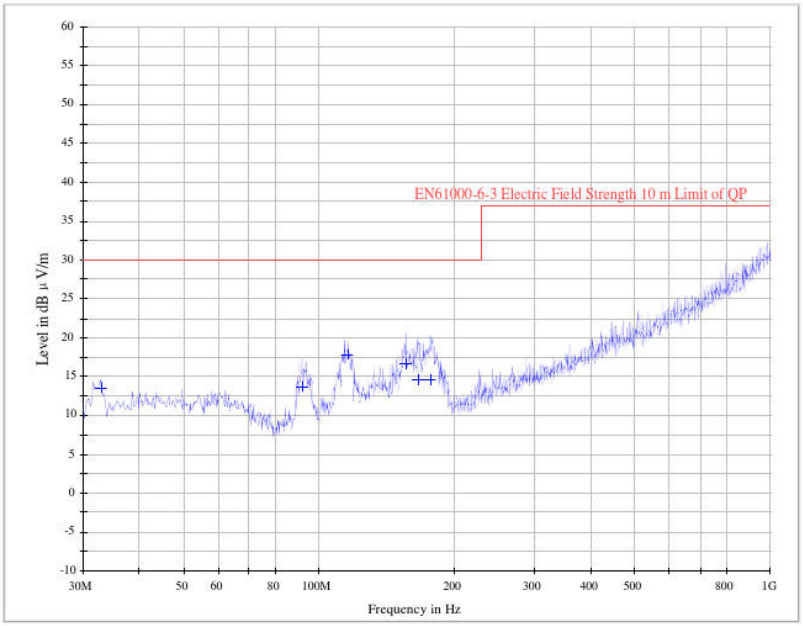
Common Information

Test Description:	SET 10m Chamber Laboratory
Test Site:	Shenzhen Electronic Product Quality Test Center
Test Standard:	EN61000-6-3:2007+A1:2011
Environment Conditions:	Temperature: 23.3--24.2℃ Relative humidity: 46--49.5%
Operator Name:	jianghaibiao
Comment:	680V 15KW

Limit and Margin QP

Frequency (MHz)	QuasiPeak (dB µ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB µ V/m)
32.680000	14.2	1000.00	120.000	400.0	H	0.0	-17.8	15.8	30.0
92.880000	14.5	1000.00	120.000	400.0	H	75.0	-19.5	15.5	30.0
116.540000	17.6	1000.00	120.000	400.0	H	192.0	-19.5	12.4	30.0
160.800000	16.2	1000.00	120.000	400.0	H	0.0	-16.8	13.8	30.0
176.280000	14.8	1000.00	120.000	400.0	H	0.0	-16.2	15.2	30.0
184.800000	14.9	1000.00	120.000	400.0	H	0.0	-15.0	15.1	30.0

EMI 10M MaxHold Sweep



2017-8-11

SE 15KTL-V

SET 10m Chamber Test Report

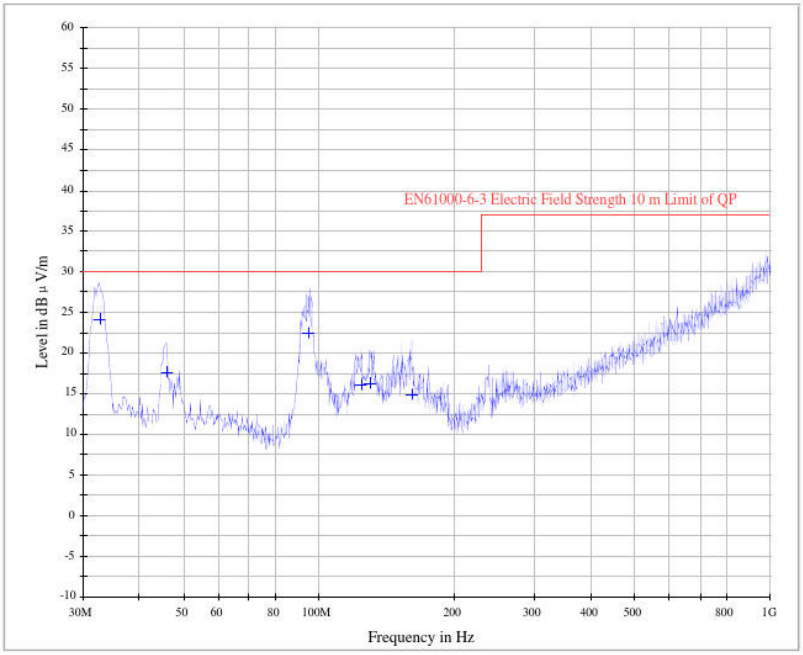
Common Information

Test Description:	SET 10m Chamber Laboratory
Test Site:	Shenzhen Electronic Product Quality Test Center
Test Standard:	EN61000-6-3:2007+A1:2011
Environment Conditions:	Temperature: 23.3--24.2℃ Relative humidity: 46--49.5%
Operator Name:	jianghaibiao
Comment:	680V 15KW

Limit and Margin QP

Frequency (MHz)	QuasiPeak (dB µ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB µ V/m)
32.600000	24.2	1000.00	120.000	100.0	V	0.0	-17.7	5.8	30.0
46.200000	17.6	1000.00	120.000	100.0	V	65.0	-17.2	12.4	30.0
94.880000	22.5	1000.00	120.000	100.0	V	200.0	-19.6	7.5	30.0
124.080000	16.2	1000.00	120.000	100.0	V	0.0	-16.8	13.8	30.0
130.280000	16.2	1000.00	120.000	100.0	V	0.0	-16.2	13.8	30.0
160.800000	14.9	1000.00	120.000	100.0	V	5.0	-15.0	15.1	30.0

EMI 10M MaxHold Sweep



2017-8-11

Electrostatic Discharge Immunity

Project No:	17-13344	Standard:	IEC 61000-4-2
EUT:	Solar (PV) Grid Inverter	Environment :	Temperature 24 ℃
Model No.:	SE 10KTL, SE 15KTL		Humidity 54 %RH
Test Location	10m Chamber	Test Date:	2017.08.16
Test Mode	5kW		

Standard requirement:

Test Level	Air: ☐±2kV; ☐±4kV; ☐±6kV; ■±8kV; ☐±15kV; Contact: ☐±2kV; ■±4kV; ☐±6kV; ☐±8kV;	Performance Criterion	☐A; ■B; ☐C

Test Result:

Discharge Location	Discharge Voltage/kV	Type of discharge	Remarks	Performance Criterion
Metallic enclosure	±2; ±4	☐Air ■Contact	EUT work as intended	A
Screw	±2; ±4	☐Air ■Contact	EUT work as intended	A
HCP	±2; ±4	☐Air ■Contact	EUT work as intended	A
VCP	±2; ±4	☐Air ■Contact	EUT work as intended	A
Switch & LED	±2; ±4; ±8	■Air ☐Contact	EUT work as intended	A
Button	±2; ±4; ±8	■Air ☐Contact	EUT work as intended	A
Display panel	±2; ±4; ±8	■Air ☐Contact	EUT work as intended	A

Test by: Jiang Haibiao Revised By: Chen Weichang

Radiated, Radio-Frequency Electromagnetic Field Immunity

Project No:	17-13344	Standard:	IEC 61000-4-3
EUT:	Solar (PV) Grid Inverter	Environment:	Temperature 24 ℃
Model No.:	SE 10KTL, SE 15KTL		Humidity 55 %RH
Test Location	10m Chamber	Test Date:	2017.08.16
Test Mode	5kW		

Standard requirement:

Frequency range	■80MHz-1000MHz	■1.4GHz -2.0GHz	■2.0GHz -2.7GHz	Performance Criterion
Test Level	■10V/m	■3V/m	■1V/m	■A
Modulation	■80%AM, 1kHz sine; □1/8duty cycle, 217Hz			□B
Frequency Step	■1% □_____			□C
Dwell Time	■3S; □30S; □_____			

Test Result:

EUT orientation	Ant. Polarization	Remark	Performance Criterion
0°	H	EUT work as intended	A
90°	H	EUT work as intended	A
180°	H	EUT work as intended	A
270°	H	EUT work as intended	A
0°	V	EUT work as intended	A
90°	V	EUT work as intended	A
180°	V	EUT work as intended	A
270°	V	EUT work as intended	A

Test by: Jiang Haibiao Revised By: Chen Weichang

Electrical Fast Transient/Burst Immunity

Project No:	17-13344	Standard:	IEC 61000-4-4
EUT:	Solar (PV) Grid Inverter	Environment:	Temperature 24 ℃
Model No.:	SE 10KTL, SE 15KTL		Humidity 55 %RH
Test Location	10m Chamber	Test Date:	2017.08.16
Test Mode	5kW		

Standard requirement:

Test Level	■Power port: ■±0.5kV; ■±1kV; ■±2kV; □±4kV; □Signal port: □±0.5kV; □±1kV; □±2kV;	Performance Criterion	□A ■B □C
Burst Frequency	■5kHz; □100kHz; □_____。		
Dwell Time	□60s; ■ 120s		

Test Result:

Test Location	Test Level /kV	Remark	Performance Criterion
a.c. power line	±0.5, ±1, ±2	EUT work as intended	A
d.c. power line	±0.5, ±1, ±2	EUT work as intended	A

Test by: Jiang Haibiao Revised By: Chen Weichang

Surge Immunity

Project No:	17-13344	Standard:	IEC 61000-4-5
EUT:	Solar (PV) Grid Inverter	Environment:	Temperature 24 ℃
Model No.:	SE 10KTL, SE 15KTL		Humidity 55 %RH
Test Location	10m Chamber	Test Date:	2017.08.17
Test Mode	5kW		

Standard requirement:

Test Level	■line to line: ■±0.5kV; ■±1kV; □±4kV; □± kV;	Performance Criterion	□A ■B □C
	■line to earth: ■±0.5kV; ■±1kV; ■±2kV; □± kV;		
	□Signal port: □±0.5kV; □±1kV; □±2kV; □± kV;		
Phase Angle	■0° ■90° ■180° ■270° □_____		
Repetition Rate	■60s; □_____		
Number of surges	■5; □_____		

Test Result:

Test Location	Test Level /kV	Remark	Performance Criterion
a.c. power line L1-L2	±0.5,±1	EUT work as intended	A
a.c. power line L1-L3	±0.5,±1	EUT work as intended	A
a.c. power line L2-L3	±0.5,±1	EUT work as intended	A
a.c. power line L1-N	±0.5,±1	EUT work as intended	A
a.c. power line L2-N	±0.5,±1	EUT work as intended	A
a.c. power line L3-N	±0.5,±1	EUT work as intended	A
a.c. power line L1-PE	±0.5, ±1,±2	EUT work as intended	A
a.c. power line L2-PE	±0.5, ±1,±2	EUT work as intended	A
a.c. power line L3-PE	±0.5, ±1,±2	EUT work as intended	A
a.c. power line N-PE	±0.5, ±1,±2	EUT work as intended	A

Test by: Jiang Haibiao Revised By: Chen Weichang

Surge Immunity

Project No:	17-13344	Standard:	IEC61000-4-5
EUT:	Solar (PV) Grid Inverter	Environment:	Temperature 24 ℃
Model No.:	SE 10KTL, SE 15KTL		Humidity 55 %RH
Test Location	10m Chamber	Test Date:	2017.08.17
Test Mode	5kW		

Standard requirement:

Test Level	■line to line: ☐±1kV; ☐±2kV; ☐±4kV; ■±0.5kV; ■line to earth: ☐±1kV; ☐±2kV; ☐±4kV; ■±0.5kV; ☐Signal port: ☐±0.5kV; ☐±1kV; ☐±2kV; ☐± kV;	Performance Criterion	☐A ■B ☐C
Phase Angle	☐0° ☐90° ☐180° ☐270° ■____-		
Repetition Rate	■60s; ☐_____		
Number of surges	■5; ☐_____		

Test Result:

Test Location	Test Level /kV	Remark	Performance Criterion
d.c. power line-line	±0.5	EUT work as intended	A
d.c. power line-earth	±0.5	EUT work as intended	A

Test by: Jiang Haibiao

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Immunity to Conducted Disturbances, Induced by RF fields

Project No:	17-13344	Standard:	IEC 61000-4-6
EUT:	Solar (PV) Grid Inverter	Environment:	Temperature 25 ℃
Model No.:	SE 10KTL, SE 15KTL		Humidity 55 %RH
Test Location	10m Chamber	Test Date:	2017.08.16
Test Mode	5kW		

Standard requirement:

Test Level	■Power port, ■10V (Unmodulated, r.m.s); □ ; □Signal port: □1Vrms; □3Vrms; □10Vrms; □ ;	Performance Criterion	■A □B □C
Frequency Range	■0.15MHz-80MHz; □		
Frequency Step	■1% □_____		
Modulation	■80%AM, 1kHz sine; □1/8duty cycle, 217Hz		
Dwell time	■3s □_____		

Test Result:

Test Location	Test Level	Remark	Performance Criterion
a.c. power line	10V (Unmodulated, r.m.s)	EUT work as intended	A
d.c. power line	10V (Unmodulated, r.m.s)	EUT work as intended	A

Test by: Jiang Haibiao

Revised By: Chen Weichang

Power Frequency Magnetic Field Immunity

Project No:	17-13344	Standard:	IEC61000-4-8
EUT:	Solar (PV) Grid Inverter	Environment:	Temperature 24 ℃
Model No.:	SE 10KTL, SE 15KTL		Humidity 53 %RH
Test Location	10m Chamber	Test Date:	2017.08.16
Test Mode	5kW		

Standard requirement:

Magnetic field frequency	■50Hz; ■60Hz	Performance Criterion	■A □B □C
Magnetic field intensity	□1A/m; □3A/m; □10A/m; ■30A/m; □100A/m; □___A/m		
Duration	■300Sec; □_____		

Test Result:

Frequency magnetic field applied orientation (X/Y/Z)	Remark	Performance Criterion
X	EUT work as intended	A
Y	EUT work as intended	A
Z	EUT work as intended	A

Test by: Jiang Haibiao **Revised By:** Chen Weichang

Measurement Uncertainties

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus.

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Table 1: Measurement Uncertainty levels

Test	Parameters	Expanded uncertainty (U_{lab})	Expanded uncertainty (U_{cispr})
Conducted Emission	Level accuracy (9kHz to 150kHz) (150kHz to 30MHz)	± 3.8 dB ± 3.5 dB	± 4.0 dB ± 3.6 dB
Power disturbance	Level accuracy (30MHz to 300MHz)	± 4.2 dB	± 4.5 dB
Electromagnetic Radiated Emission (3-loop)	Level accuracy (9kHz to 30MHz)	± 3.5 dB	N/A
Radiated Emission	Level accuracy (30MHz to 1000MHz, Horizontal) (30MHz to 1000MHz, Vertical)	± 5.1 dB ± 5.0 dB	± 5.2 dB
Radiated Emission	Level accuracy (above 1000MHz, Horizontal) (above 1000MHz, Vertical)	± 5.5 dB ± 4.0 dB	N/A
Mains Harmonic	Voltage	± 4.52%	N/A
Voltage Fluctuations & Flicker	Voltage	± 2.01%	N/A

As U_{lab} in all applicable tests listed above are less than U_{cispr} according to CISPR 16-4-2:2003,

- compliance is deemed to occur if no measured disturbance exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance exceeds the disturbance limit.