



SHENZHEN HUATONGWEI INTERNATIONAL INSPECTION Co., Ltd.

## Test Verification of Conformity

Certificate No.: CTE18090152

R/C: 32048

Issued Date: Oct 24, 2018

In accordance with the following Applicable Directives:

**2014/30/EU**

**Electromagnetic Compatibility**

The equipment, as described herewith, was tested pursuant to applicable test procedure and complies with the requirements of:

**EN 61800-3: 2004+A1: 2012**

The test results are traceable to the international or national standards.

**Applicant:** Zhejiang CHINT Electrics Co.,Ltd.

No.1, Chint Road, Chint Industrial Zone, North Baixiang, Yueqing, Zhejiang Province, P.R China.  
325603

**Manufacturer:** Zhejiang CHINT Electrics Co.,Ltd.

No.1, Chint Road, Chint Industrial Zone, North Baixiang, Yueqing, Zhejiang Province, P.R China.  
325603

**EUT Name:** INVERTER

**Model number:** NVF5-18.5/TS4

**Listed Model(s):** NVF5-15GS, NVF5-15/TS4, NVF5-18.5GS

**Laboratory:** Shenzhen Huatongwei International Inspection Co., Ltd.

Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, Guangdong, China

Tel: 86-755-26748078 Fax: 86-755-26748089

Http: //www.szhtw.com.cn E-mail: cs@szhtw.com.cn



**Note:**

The certification is only valid for the equipment and configuration described, in conjunction with the test data detailed above.

The CE mark as shown beside can be used, under the responsibility of the manufacturer, after completion of an EC Directive of Conformity and compliance with all relevant EC Directive.

For and on behalf of  
Shenzhen Huatongwei International Inspection Co., Ltd.

Authorized by:





### TEST REPORT

**EN 61800-3: 2004+A1: 2012**

**Adjustable speed electrical power drive systems -- Part 3: EMC requirements and specific test methods**

**Report Reference No.**.....: **TRE18090152 R/C: 32048**

Compiled by  
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*Stellar Xu*

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(printed name + signature) .....: Tony Jiang

*Tony Jiang*

Date of issue.....: Oct. 24, 2018

**Testing Laboratory Name**.....: **Shenzhen Huatongwei International Inspection Co., Ltd.**

Address.....: Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, Guangdong, China

Testing location/ procedure .....: Full application of Harmonised standards   
Partial application of Harmonised standards   
Other standard testing methods

**Applicant's name**.....: **Zhejiang CHINT Electrics Co.,Ltd.**

Address.....: No.1, Chint Road, Chint Industrial Zone, North Baixiang, Yueqing, Zhejiang Province, P.R China. 325603

**Test specification:**

Standard.....: **EN 61800-3: 2004+A1: 2012**

**Test Report Form No.**.....: HTWEMCCE\_1B

TRF Originator.....: Shenzhen Huatongwei International Inspection Co., Ltd.

Master TRF.....: Dated 2014-06

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**Test item description** .....: INVERTER

Trade Mark .....: **CHINT**

Manufacturer .....: Zhejiang CHINT Electrics Co.,Ltd.

Model/Type reference.....: NVF5-18.5/TS4

Listed Models .....: NVF5-15GS, NVF5-15/TS4, NVF5-18.5GS

Ratings.....: See page 5

Result.....: **Positive**

**Report version information:**

**This copy was issued based on TRE17040294 (Issued: 2017-06-15).**

**EMC -- TEST REPORT**

<b>Test Report No. :</b>	<b>TRE18090152</b>	Oct. 24, 2018
		Date of issue

Equipment under Test : INVERTER

Model /Type : NVF5-18.5/TS4

Listed Models : NVF5-15GS, NVF5-15/TS4, NVF5-18.5GS

**Applicant** : **Zhejiang CHINT Electrics Co.,Ltd.**

Address : No.1, Chint Road, Chint Industrial Zone, North Baixiang, Yueqing, Zhejiang Province, P.R China. 325603

**Manufacturer** : **Zhejiang CHINT Electrics Co.,Ltd.**

Address : No.1, Chint Road, Chint Industrial Zone, North Baixiang, Yueqing, Zhejiang Province, P.R China. 325603

<b>Test Result</b> according to the standards on page 4:	<b>Positive</b>
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The test report merely corresponds to the test sample.  
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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## 1. TEST STANDARDS

The tests were performed according to following standards:

[EN 61800-3: 2004+A1: 2012](#) Adjustable speed electrical power drive systems -- Part 3: EMC requirements and specific test methods

According to EN 61800-3, the EUT intended for use in the second environment, Environment that includes all establishments other than those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

## 2. SUMMARY

### 2.1. General Remarks

Date of receipt of test sample : May 09, 2017

Testing commenced on : May 09, 2017

Testing concluded on : Jun 09, 2017

### 2.2. Equipment Under Test

#### Power supply system utilised

Power supply voltage :  230V / 50 Hz  120V / 60Hz  
 12 V DC  24 V DC  
 Other (specified in blank below)

AC 380V

### 2.3. Short description of the Equipment under Test (EUT)

The EUT is an INVERTER. If no otherwise specified, all tests performed at the model: NVF5-18.5/TS4.

The all models have the same constructions, circuit diagram and PCB layout. Only the rating and some components are different

Details as below:

Model	Input	Output	Display
NVF5-15GS	3P, AC380V, 50Hz/60Hz, 32A	3P, AC 0V~380V, 0Hz~120Hz, 30A	LED display
NVF5-15/TS4	3P, AC380V, 50Hz/60Hz, 32A	3P, AC 0V~380V, 0Hz~120Hz, 30A	LCD display
NVF5-18.5GS	3P, AC380V, 50Hz/60Hz, 38.5A	3P, AC 0V~380V, 0Hz~120Hz, 37A	LED display
NVF5-18.5/TS4	3P, AC380V, 50Hz/60Hz, 38.5A	3P, AC 0V~380V, 0Hz~120Hz, 37A	LCD display

Serial number: Prototype

#### Report version information:

**This copy was issued based on TRE17040294 (Issued: 2017-06-15).** Change the models type, details see bellows:

From	to
Ex9VF6-0150VT43-0-B	NVF5-15GS
Ex9VF6-0150VT43-1-B	NVF5-15/TS4
Ex9VF6-0185VT43-0-B	NVF5-18.5GS
Ex9VF6-0185VT43-1-B	NVF5-18.5/TS4

## 2.4. EUT operation mode

The equipment under test was operated during the measurement under the following conditions:

Test program (customer specific)

Emissions tests.....: According to EN 61800-3, searching for the highest disturbance.

---

Immunity tests .....: According to EN 61800-3, searching for the highest susceptibility.

---

Harmonic current.....: According to EN 61800-3. searching for the highest disturbance

---

Voltage fluctuation.....: According to EN 61800-3 searching for the highest disturbance

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## 2.5. EUT configuration

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

■ - supplied by the manufacturer

o - supplied by the lab

o MOTOR

Manufacturer : FOSHANSHI FENGSHENG  
MACHINE CO., LTD

M/N : Y100L<sub>1</sub>-4

## 2.6. Performance level

The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test relative to a performance criteria defined by its manufacturer or the requestor of the test, or agreed between the manufacturer and the purchaser of the product. Examples of functions defined by the manufacturer to be evaluated during testing include, but are not limited to, the following:

- essential operational modes and states;
- tests of all peripheral access(hard disks, floppy disks, printers, keyboard, mouse, etc.);
- quality of software execution
- quality of data display and transmission
- quality of speech transmission

**Definition related to the performance level:**

- based on the used product standard
- o based on the declaration of the manufacturer, requestor or purchaser

Criteria to prove the acceptance of a PDS against electromagnetic disturbances

Item	Acceptance (performance) criterion <sup>a</sup>		
	A	B	C
General system performance	No noticeable changes of the operating characteristic. Operating as intended, within specified tolerance	Noticeable changes (visible or audible) of the operating characteristic. Self-recoverable	Shutdown, changes in operating characteristics. Triggering of protective devices <sup>b</sup> Not self-recoverable
Special system performance Torque generating behaviour	Torque deviation within specified tolerances	Temporary torque deviation outside specified tolerances Self-recoverable	Loss of torque Not self-recoverable
Sub-component performance Operation of power electronics and driving circuits	No malfunction of a power semiconductor	Temporary malfunction which cannot cause unintended shut-down of the PDS	Shut-down, triggering of protective devices <sup>b</sup> No loss of stored program, No loss of user program. No loss of settings Not self-recoverable
Sub-component performance. Information processing and sensing functions	Undisturbed communication and data exchange to external devices	Temporarily disturbed communication, but no error reports of the internal or external devices which could cause shut-down	Errors in communication, loss of data and information. No loss of stored program, no loss of user program. No loss of settings. Not self-recoverable

Continued

Item	Acceptance (performance) criterion <sup>a</sup>		
	A	B	C
Sub-component performance Operation of displays and control panels	No changes of visible display information, only slight light intensity fluctuation of LEDs, or slight movement of characters	Visible temporary changes of information, undesired LED illumination	Shut down, permanent loss of information, or unpermitted operating mode, obviously wrong display information. No loss of stored program, no loss of user program. No loss of settings
<sup>a</sup> Acceptance criteria A, B, C – False starts are not acceptable. A false start is an unintended change from the logical state "STOPPED" which can make the motor run. <sup>b</sup> Acceptance criterion C – The function can be restored by operator intervention (manual reset). Opening of fuses is allowed for line-commutated converters operating in inverting mode.			



### **3. TEST ENVIRONMENT**

#### **3.1. Address of the test laboratory**

Shenzhen Huatongwei International Inspection Co., Ltd.  
Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, Guangdong, China  
Tel: 86-755-26748019 Fax: 86-755-26748089

#### **3.2. Test Facility**

The test facility is recognized, certified, or accredited by the following organizations:

##### **CNAS-Lab Code: L1225**

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories,

##### **A2LA-Lab Cert. No. 3902.01**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

##### **FCC-Registration No.: 762235**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration No: 762235.

##### **IC-Registration No.: 5377B-1, 5377B-2**

Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377B.

##### **ACA**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

##### **VCCI**

Radiated disturbance above 1GHz measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20007.

Main Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. Has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: C-20001.

Telecommunication Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: T-20001.

The 3m Semi-anechoic chamber (9.1m×6.4m×6.0m) of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.:R-4398.

### 3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	<u>15-35 ° C</u>
Humidity:	<u>30-60 %</u>
Atmospheric pressure:	<u>950-1050mbar</u>

### 3.4. Test Description

Emission Measurement		
Radiated Emission	EN 61800-3: 2004+A1: 2012 CISPR 11: 2010	PASS
Conducted Disturbance	EN 61800-3: 2004+A1: 2012 CISPR 11: 2010	PASS
Harmonic Current	EN 61800-3: 2004+A1: 2012 IEC 61000-3-2: 2014 IEC 61000-3-12: 2011	PASS
Voltage Fluctuation and Flicker	EN 61800-3: 2004+A1: 2012 IEC 61000-3-3: 2013 IEC 61000-3-11: 2000:	PASS
Commutation Notches	EN 61800-3: 2004+A1: 2012	PASS
Immunity Measurement		
Electrostatic Discharge	EN 61800-3: 2004+A1: 2012 IEC 61000-4-2: 2008	PASS
RF Field Strength Susceptibility	EN 61800-3: 2004+A1: 2012 IEC 61000-4-3: 2006+A1: 2007+A2:2010	PASS
Electrical Fast Transient/Burst Test	EN 61800-3: 2004+A1: 2012 IEC 61000-4-4: 2012	PASS
Surge Test	EN 61800-3: 2004+A1: 2012 IEC 61000-4-5: 2014	PASS
Conducted Susceptibility Test	EN 61800-3: 2004+A1: 2012 IEC 61000-4-6: 2013	PASS
Immunity to Harmonics and commutation notches/voltage distortion	EN 61800-3: 2004+A1: 2012 IEC 61000-2-4: 2002 IEC 60146-1-1: 2009	PASS
Immunity to Voltage deviation (Variations, changes, fluctuations), dips and short interruptions	EN 61800-3: 2004+A1: 2012 IEC 61000-2-4: 2002 IEC 60146-1-1: 2009	PASS
Immunity to Voltage unbalance and frequency variations	EN 61800-3: 2004+A1: 2012 IEC 61000-2-4: 2002	PASS

Remark: The measurement uncertainty is not included in the test result.

### 3.5. Statement of the 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. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd quality system acc. to DIN EN ISO/IEC 17025. 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.

Hereafter the best measurement capability for Shenzhen Huatongwei laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.24 dB	(1)
Conducted Disturbance	0.15~30MHz	3.35 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

### 3.6. Equipments Used during the Test

Radiated Emission						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1	Ultra-Broadband Antenna	SCHWARZB ECK	VULB9163	538	11/8/2014	11/7/2017
2	Emi Test Receiver	R&S	ESCI	101247	11/13/2016	11/12/2017
3	Pre-amplifier	SCHWARZB ECK	BBV 9743	9743-0022	11/13/2016	11/12/2017
4	Turntable	Maturo Germany	TT2.0-1T	/	N/A	N/A
5	Antenna Mast	Maturo Germany	CAM-4.0-P-12	/	N/A	N/A
6	Test Software	R&S	ES-K1	/	N/A	N/A

Conducted Disturbance						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1	EMI Test Receiver	R&S	ESCI	100900	11/13/2016	11/12/2017
2	Artificial Mains	SCHWARZB ECK	NNLK 8121	573	11/13/2016	11/12/2017
3	Pulse Limiter	R&S	ESH3-Z2	101488	11/13/2016	11/12/2017
4	Test Software	R&S	ES-K1	/	N/A	N/A

Electrostatic Discharge						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1	ESD Simulator	EM TEST	ESD30C	V051110021 0	11/13/2016	11/12/2017

RF Field Strength Susceptibility						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1	Signal Generator	IFR	2032	203002/100	11/13/2016	11/12/2017
2	Amplifier	AR	150W1000	301584	11/13/2016	11/12/2017
3	Dual Directional Coupler	AR	DC6080	301508	11/13/2016	11/12/2017
4	Power Head	AR	PH2000	301193	11/13/2016	11/12/2017
5	Power Meter	AR	PM2002	302799	11/13/2016	11/12/2017
6	Transmit Antenna	AR	AT1080	28570	11/13/2016	11/12/2017
7	Power Amplifier	AR	25S1G4A	0325511	11/13/2016	11/12/2017
8	Dual Directional Coupler	AR	DC7144A	0325100	11/13/2016	11/12/2017
9	Microwave Horn Antenna	AR	AT4002A	0324848	11/13/2016	11/12/2017
10	Test Software	AR	SW1004	/	N/A	N/A

Electrical Fast Transient/Burst						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1	Ultra Compact Simulator	EM TEST	UCS500M6	0500-19	11/13/2016	11/12/2017
2	3-Phase Coupling Network	EM TEST	CNI503 S5/16A	0606-01	11/13/2016	11/12/2017
3	Test Software	EM TEST	ISM IEC	/	N/A	N/A

Surge						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1	Ultra Compact Simulator	EM TEST	UCS500M6	0500-19	11/13/2016	11/12/2017
2	3-Phase Coupling Network	EM TEST	CNI503 S5/16A	0606-01	11/13/2016	11/12/2017
3	Test Software	EM TEST	ISM IEC	/	N/A	N/A

Conducted Susceptibility						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1	Signal Generator	IFR	2023A	202304/060	11/13/2016	11/12/2017
2	Amplifier	AR	75A250	302205	11/13/2016	11/12/2017
3	6db Attenuator	EMTEST	ATT6/75	0010230A	11/13/2016	11/12/2017
4	CDN	EMTEST	CDN M3/16A	0802-03	11/13/2016	11/12/2017
5	Test Software	AR	SW1004	/	N/A	N/A

Harmonic Current and Flicker						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	NextCal.
1	Purified Power Source	CALIFORNIA INSTRUMENTS	ACS500N	/	05/04/2017	05/04/2018
2	Harmonic And Flicker Analyzer	EM TEST	DPA500N	/	05/04/2017	05/04/2018
3	Test Software	EM TEST	DPA	/	N/A	N/A

## **4. TEST CONDITIONS AND RESULTS**

### **4.1. Radiated Emission**

For test instruments and accessories used see section 3.6.

#### **4.1.1. Description of the test location**

Test location: SAC1

Date of test: May 31, 2017

Operator: LuoRin

#### **4.1.2. Limits of disturbance (PDS in the second environment, PDS of category C3)**

<b>Frequency (MHz)</b>	<b>Distance (Meters)</b>	<b>Field Strengths Limits (dB<math>\mu</math>V/m)</b>
30 ~ 230	3	60
230 ~ 1000	3	70

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

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

#### **4.1.3. Description of the test set-up**

##### **4.1.3.1. Operating Condition**

The EUT is load during the test, and the results of the maximum emanation are recorded.

##### **4.1.3.2. Test Configuration and Procedure**

EUT is tested in Semi-Anechoic Chamber. EUT is placed on a nonmetal table which is 0.8 meter above a grounded turntable. The turntable can rotate 360 degrees to determine the azimuth of the maximum emission level. EUT is set 3 or 10 meters away from the center of receiving antenna. The antenna can move up and down from 1 to 4 meter to find out the maximum emission level. Both horizontal and vertical polarizations of the antenna are set on the test.

4.1.3.3. Photos of the test set-up



#### 4.1.4. Test result

The requirements are **Fulfilled**

Band Width: 120kHz

Frequency Range: 30MHz to 1000MHz

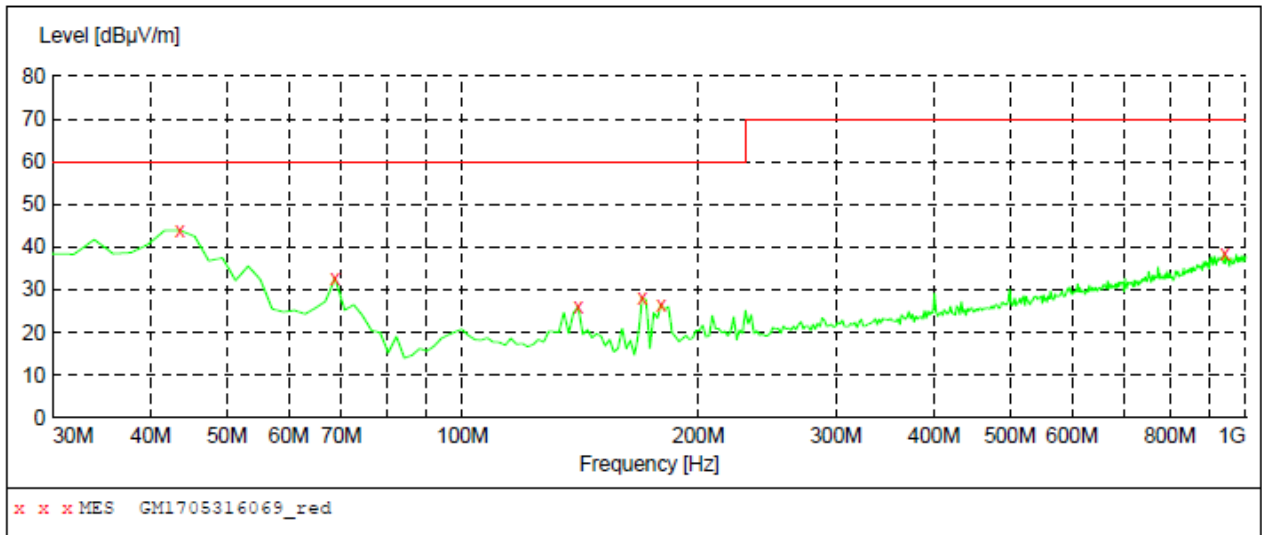
**Remarks:** The limits are kept. For detailed results, please see the following page(s).

Margin=limit-level

Level=read values+transducer

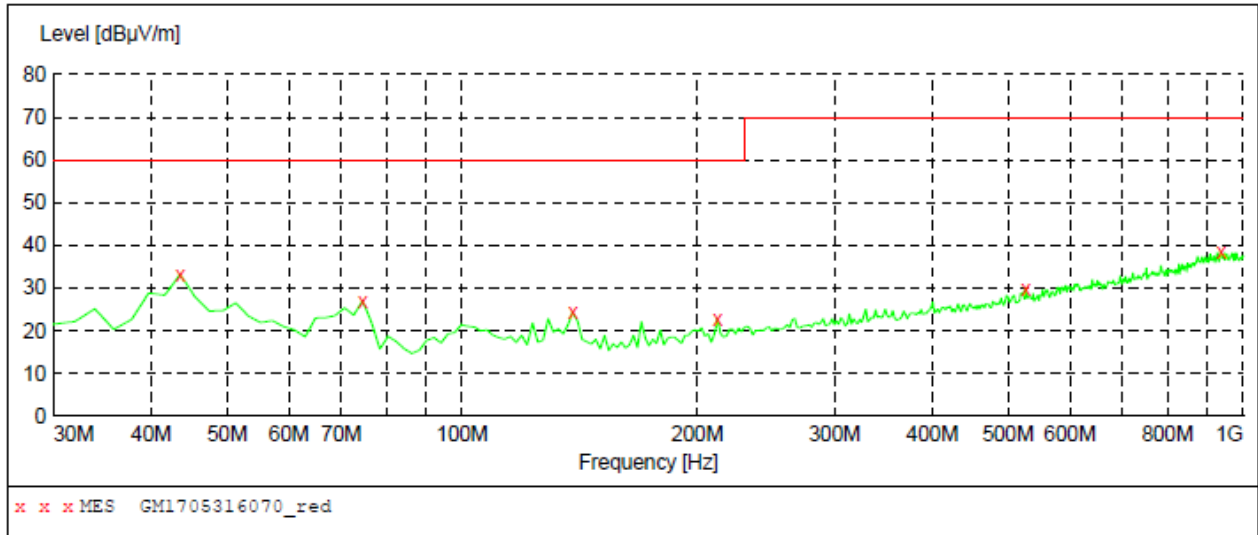
Transducer=antenna factor+pre-amplifier factor+cable loss





**MEASUREMENT RESULT: "GM1705316069\_red"**

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
43.580000	43.90	-9.1	60.0	16.1	QP	100.0	103.00	VERTICAL
68.800000	32.70	-12.6	60.0	27.3	QP	100.0	169.00	VERTICAL
140.580000	26.00	-13.8	60.0	34.0	QP	100.0	186.00	VERTICAL
169.680000	28.20	-13.0	60.0	31.8	QP	100.0	356.00	VERTICAL
179.380000	26.60	-12.3	60.0	33.4	QP	100.0	238.00	VERTICAL
939.860000	38.40	7.2	70.0	31.6	QP	100.0	319.00	VERTICAL



**MEASUREMENT RESULT: "GM1705316070\_red"**

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
43.580000	33.20	-9.1	60.0	26.8	QP	300.0	54.00	HORIZONTAL
74.620000	27.00	-14.8	60.0	33.0	QP	300.0	122.00	HORIZONTAL
138.640000	24.30	-13.8	60.0	35.7	QP	300.0	82.00	HORIZONTAL
212.360000	22.80	-10.4	60.0	37.2	QP	100.0	189.00	HORIZONTAL
526.640000	30.00	-1.2	70.0	40.0	QP	300.0	285.00	HORIZONTAL
935.980000	38.40	7.1	70.0	31.6	QP	300.0	360.00	HORIZONTAL

## 4.2. Conducted disturbance

For test instruments and accessories used see section 3.6.

### 4.2.1. Description of the test location

Test location: Shielded room No. 5

Date of test: May 31, 2017

Operator: LuoRin

### 4.2.2. Limits of disturbance (PDS in the second environment, PDS of category C3)

Limit of conducted disturbance at the mains ports ( $I \leq 100A$ )

Frequency Range (MHz)	Limits (dBuV)	
	Quasi-Peak	Average
0.150 ~ 0.500	100	90
0.500 ~ 5.000	86	76
5.000 ~ 30.000	70	60

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

(2) These limits do not apply to power ports operating above 1000V

### 4.2.3. Description of the test set-up

#### 4.2.3.1. Operating Condition

The EUT is load during the test, and the results of the maximum emanation are recorded.

#### 4.2.3.2. Test Configuration and Procedure

For the main ports:

EUT is placed on a nonmetal table above the grounded reference plane. Connect the power line of the EUT to the LISN which is connected to receiver by coaxial line, then disturbance signals can be detected by the receiver.

## 4.2.3.3. Photo of the test set-up



## 4.2.4. Test result

The requirements are **Fulfilled**

Band Width: 9kHz

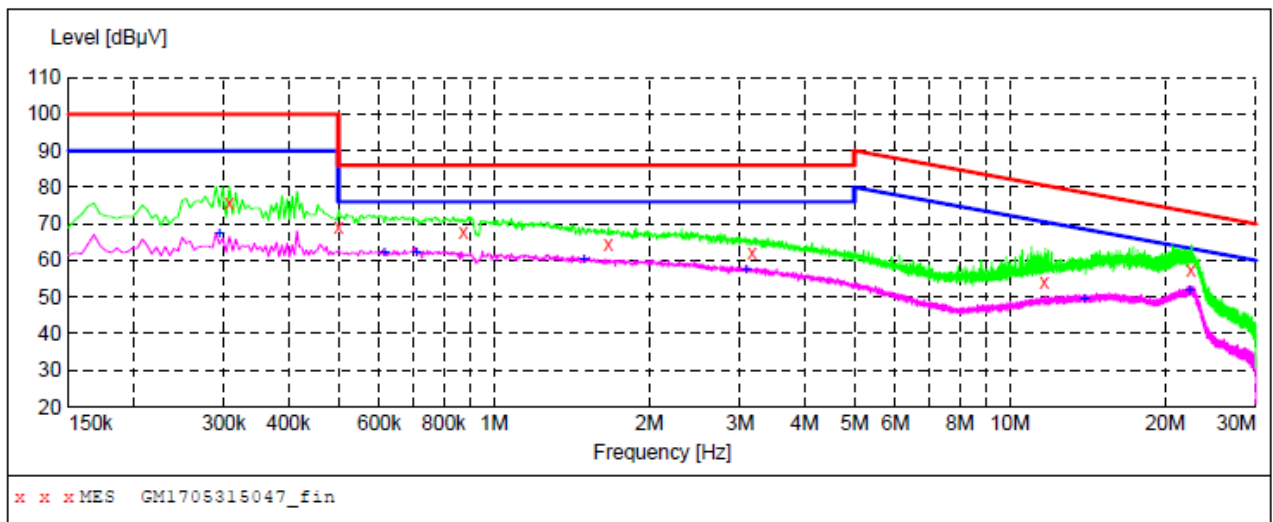
Frequency Range: 150kHz to 30MHz

**Remarks:** The limits are kept. For detailed results, please see the following page(s).

Margin=limit-level

Level=read values+transducer

Transducer=insertion loss of LISN+cable loss+insertion loss of pulse limiter



**MEASUREMENT RESULT: "GM1705315047\_fin"**

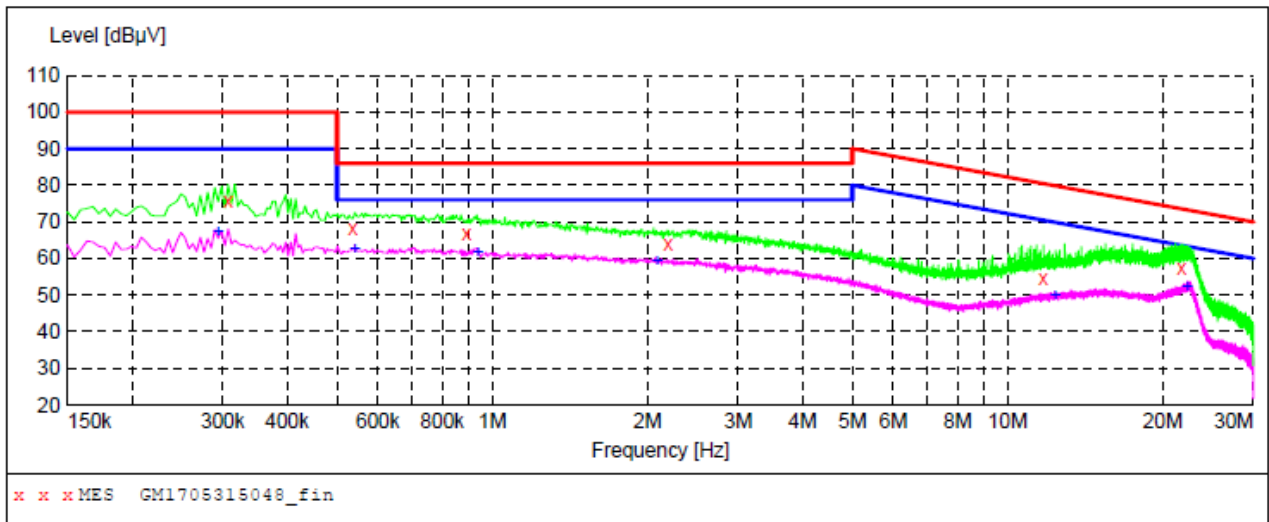
5/31/2017 7:12PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.307500	75.60	10.2	100	24.4	QP	L1	GND
0.501000	69.20	10.2	86	16.8	QP	L1	GND
0.874500	67.80	10.1	86	18.2	QP	L1	GND
1.666500	64.50	10.2	86	21.5	QP	L1	GND
3.169500	62.20	10.2	86	23.8	QP	L1	GND
11.679000	54.20	10.6	81	26.3	QP	L1	GND
22.488000	57.40	10.6	73	15.8	QP	L1	GND

**MEASUREMENT RESULT: "GM1705315047\_fin2"**

5/31/2017 7:12PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.294000	67.10	10.2	90	22.9	AV	L1	GND
0.613500	62.30	10.2	76	13.7	AV	L1	GND
0.708000	62.10	10.2	76	13.9	AV	L1	GND
1.495500	60.40	10.2	76	15.6	AV	L1	GND
3.084000	57.20	10.2	76	18.8	AV	L1	GND
13.965000	49.40	10.5	69	19.1	AV	L1	GND
22.326000	51.80	10.6	63	11.5	AV	L1	GND



**MEASUREMENT RESULT: "GM1705315048\_fin"**

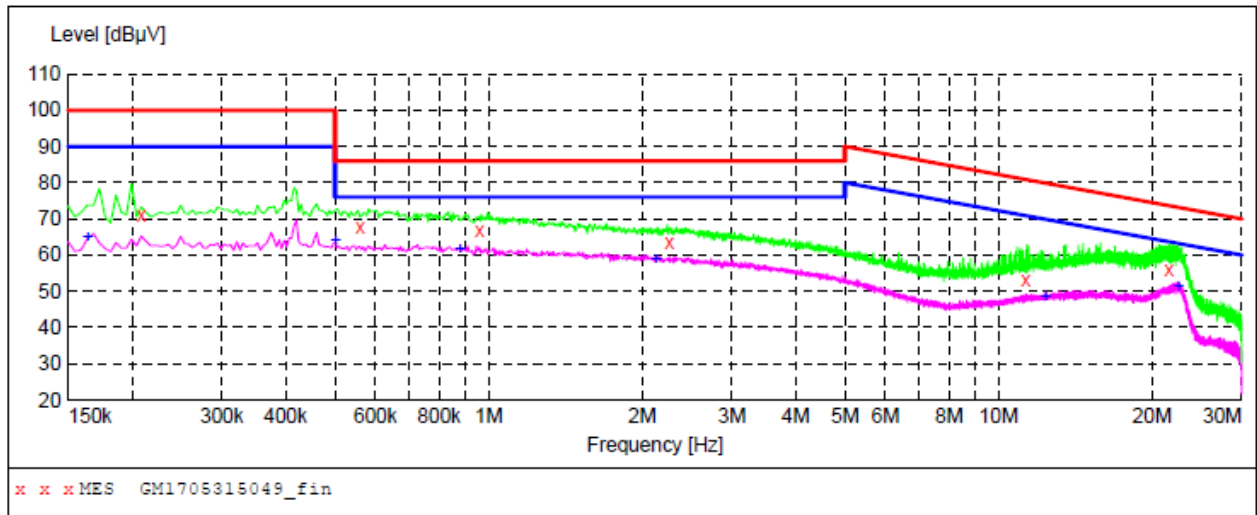
5/31/2017 7:15PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.307500	75.70	10.2	100	24.3	QP	L2	GND
0.537000	68.10	10.2	86	17.9	QP	L2	GND
0.892500	66.60	10.1	86	19.4	QP	L2	GND
2.193000	64.00	10.2	86	22.0	QP	L2	GND
11.742000	54.70	10.6	81	25.8	QP	L2	GND
21.736500	57.20	10.6	74	16.4	QP	L2	GND

**MEASUREMENT RESULT: "GM1705315048\_fin2"**

5/31/2017 7:15PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.294000	67.30	10.2	90	22.7	AV	L2	GND
0.541500	62.60	10.2	76	13.4	AV	L2	GND
0.937500	61.80	10.2	76	14.2	AV	L2	GND
2.085000	59.40	10.2	76	16.6	AV	L2	GND
12.372000	49.70	10.5	70	20.2	AV	L2	GND
22.330500	52.20	10.6	63	11.1	AV	L2	GND



**MEASUREMENT RESULT: "GM1705315049\_fin"**

5/31/2017 7:18PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.208500	71.30	10.3	100	28.7	QP	L3	GND
0.559500	67.80	10.2	86	18.2	QP	L3	GND
0.960000	66.80	10.2	86	19.2	QP	L3	GND
2.265000	63.70	10.2	86	22.3	QP	L3	GND
11.319000	53.10	10.6	81	27.8	QP	L3	GND
21.624000	55.90	10.6	74	17.8	QP	L3	GND

**MEASUREMENT RESULT: "GM1705315049\_fin2"**

5/31/2017 7:18PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.163500	64.80	10.4	90	25.2	AV	L3	GND
0.501000	63.90	10.2	76	12.1	AV	L3	GND
0.879000	61.60	10.1	76	14.4	AV	L3	GND
2.134500	59.00	10.2	76	17.0	AV	L3	GND
12.363000	48.40	10.5	70	21.5	AV	L3	GND
22.515000	51.40	10.7	63	11.8	AV	L3	GND

### 4.3. Harmonic current

For test instruments and accessories used see section 3.6.

#### 4.3.1. Description of the test location

Test location: Shielded room No. 5

#### 4.3.2. Limits of harmonic current

Test configuration and procedure see standard EN 61800-3: 2004+A1: 2012, EN 61000-3-2: 2014

#### 4.3.3. Description of the test set-up

##### 4.3.3.1. Operating Condition

The EUT is full load during the test, and the results of the maximum emanation are recorded.

##### 4.3.3.2. Test Configuration and Procedure

Test configuration and procedure see standard EN 61800-3: 2004+A1: 2012, EN 61000-3-2: 2014

#### 4.3.4. Test result

The test results are **passed**

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### 4.4. Voltage Fluctuation and Flicker

For test instruments and accessories used see section 3.6.

#### 4.4.1. Description of the test location

Test location: Shielded room No. 5

#### 4.4.2. Limits of voltage fluctuation and flicker

Test configuration and procedure see standard EN 61800-3: 2004+A1: 2012, EN 61000-3-3: 2013

#### 4.4.3. Description of the test set-up

##### 4.4.3.1. Operating Condition

The EUT is turned on during the test, and the results of the maximum emanation are recorded.

##### 4.4.3.2. Test Configuration and Procedure

Test configuration and procedure see standard EN 61800-3: 2004+A1: 2012, EN 61000-3-3: 2013

#### 4.4.4. Test result

The requirements are **passed**

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## 4.5. Commutation notches

For test instruments and accessories used see section 3.6.

### 4.5.1. Description of the test set-up

#### 4.5.1.1. Operating Condition

The EUT is load during the test, and the results of the maximum emanation are recorded.

### 4.5.2. Test result

The EUT has met the requirements of EN 61800-3 Commutation notches of AC power ports.

## 4.6. Electrostatic discharge

For test instruments and accessories used see section 3.6.

### 4.6.1. Description of the test location and date

Test location: Shielded room No. 8

Date of test: Jun 07, 2017

Operator: LuoRin

### 4.6.2. Severity levels of electrostatic discharge

4.6.2.1. Severity level: Contact Discharge at  $\pm 4\text{KV}$  Air Discharge at  $\pm 8\text{KV}$

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

4.6.2.2. Performance criterion: **B**

### 4.6.3. Description of the test set-up

#### 4.6.3.1. Operating Condition

The EUT is load during the test, and the results of the maximum susceptible results are recorded.

#### 4.6.3.2. Test Configuration and Procedure:

Air Discharge:

- This test is done on a non-conductive surfaces. The round discharge tip of the Electrostatic Discharge simulator shall be approached as fast as possible then to touch the EUT. After each discharge, the simulator shall be removed from the EUT. The simulator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

Contact Discharge:

- All the procedure shall be same as air discharge, except using the acute discharge tip. The top end of

the Electrostatic Discharge simulator is touch the EUT all the time when the simulator is re-triggered for a new single discharge and repeated 25 times for each pre-selected test point.

Indirect Discharge:

- The vertical coupling plane(VCP) is placed 0.1m away from EUT. The top end of Electrostatic Discharge simulator should aim at the center of one border of the VCP for at least 25 times discharge.
- The top end of Electrostatic Discharge simulator should place at the point 0.1m away from EUT on the horizontal coupling plane(HCP). At least 25 times discharge should be done for every pre-selected point around EUT.

Record any performance degradation of the EUT during the test and judge the test result according to performance criterion.

#### 4.6.3.3. Photo of the test set-up



**4.6.4. Test specification:**Contact discharge voltage:

- 2 kV
- 4 kV

Number of discharges:

- 10
- 25

Air discharge voltage:

- 2 kV
- 4 kV
- 8 kV

Number of discharges:

- 10
- 25

Type of discharge:

- Direct discharge
  - Air discharge
  - Contact discharge
- Indirect discharge
  - Contact discharge

Polarity:

- Positive
- Negative

Discharge location:

- see photo documentation of the test set-up
- all external locations accessible by hand
- horizontal coupling plane (HCP)
- vertical coupling plane (VCP)

**4.6.5. Test result**The requirements are **Fulfilled**Performance Criterion: **B****Remarks:** During the test no deviation was detected to the selected operation mode(s).

## 4.7. Radiated, radio-frequency, electromagnetic field

For test instruments and accessories used see section 3.6.

### 4.7.1. Description of the test location and date

Test location: Shielded room No.7

Date of test: Jun 07, 2017

Operator: LuoRin

### 4.7.2. Severity levels of radiated, radio-frequency, electromagnetic field

4.7.2.1. Severity level: 10 V/m

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

4.7.2.2. Performance criterion: A

### 4.7.3. Description of the test set-up

#### 4.7.3.1. Operating Condition

The EUT is load during the test, and the results of the maximum susceptible results are recorded.

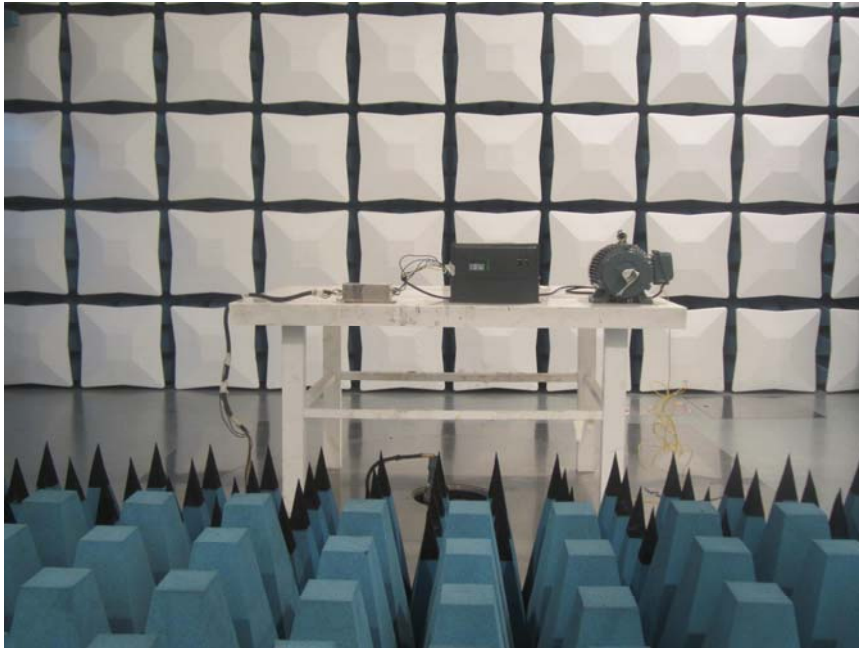
#### 4.7.3.2. Test Configuration and Procedure

EUT and its auxiliary instrument are placed on a turntable which is 0.8 meter above ground. The center of the transmitting antenna mounted on an antenna mast is set 3 meter away from the EUT. During the test, each of the four sides of EUT will face the transmitting antenna with the turntable cycled. Both horizontal and vertical polarization of the antenna are set on test and measured individually.

In order to judge the performance of the EUT, a set of monitor system is used.

Record any performance degradation of the EUT during the test and judge the test result according to performance criterion.

## 4.7.3.3. Photo of the test set-up



## 4.7.4. Test specification:

<u>Frequency range:</u>	■ 80 MHz to 1000 MHz
<u>Field strength:</u>	■ 10 V/m
<u>EUT - antenna separation:</u>	■ 3 m
<u>Modulation:</u>	■ AM: 80 % ■ sinusoidal 1kHz
<u>Frequency step:</u>	■ 1 % with 1s dwell time
<u>Antenna polarisation:</u>	■ horizontal                      ■ vertical

## 4.7.5. Test result

The requirements are **Fulfilled**

Performance Criterion: **A**

**Remarks:** During the test no deviation was detected to the selected operation mode(s).

## 4.8. Electrical fast transients / Burst

For test instruments and accessories used see section 3.6.

### 4.8.1. Description of the test location and date

Test location: Shielded room No. 8

Date of test: Jun 05, 2017

Operator: LuoRin

### 4.8.2. Severity levels of electrical fast transients / Burst

4.8.2.1. Severity level:  $\pm 2\text{kV}$  for AC power supply lines

Open circuit output test voltage and repetition rate of the impulses				
Level	On power port, PE		On I/O signal, data and control ports	
	V peak(KV)	Repetition rate (kHz)	Voltage peak	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	Special	Special	Special	Special

4.8.2.2. Performance criterion: **B**

### 4.8.3. Description of the test set-up

#### 4.8.3.1. Operating Condition

The EUT is load during the test, and the results of the maximum susceptible results are recorded.

#### 4.8.3.2. Test Requirements

EUT and its simulators shall be placed 0.1m high above the ground reference plane which is a minimum 1m $\times$ 1m with minimum 0.65mm 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.

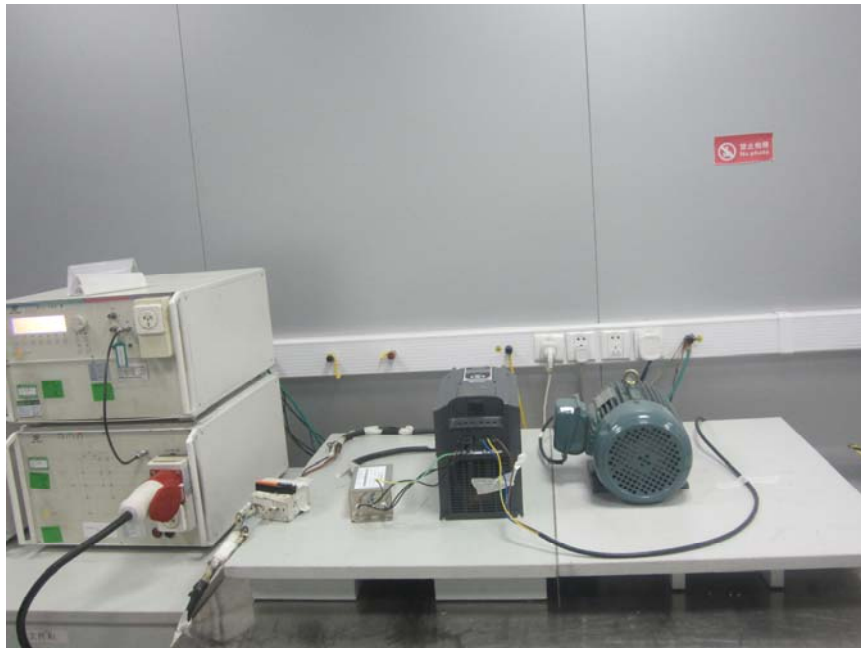
#### 4.8.3.3. Test Configuration and Procedure

For AC power input lines:

- EUT is connected to coupling/decoupling network which couples the EFT signal to power input lines. During the test, both polarities of the test voltage should be applied and the duration of the test can't be less than 1mins.

Record any performance degradation of the EUT during the test and judge the test result according to performance criterion.

4.8.3.4. Photo of the test set-up



**4.8.4. Test specification:**

- Coupling network:  0.5 kV  1 kV  2 kV
- Coupling clamp:  0.5 kV  1 kV
- Burst frequency:  5.0 kHz
- Coupling duration:  60 s
- Polarity:  positive  negative

**4.8.5. Coupling points**

Cable description:  Screening: Status: Signal transmission: Length:	AC power line <hr/> <input type="checkbox"/> screened <input checked="" type="checkbox"/> unshielded <input type="checkbox"/> passive <input checked="" type="checkbox"/> active <input checked="" type="checkbox"/> analogue <input type="checkbox"/> digital <input checked="" type="checkbox"/> / m
--	--

**4.8.6. Test result**

The requirements are **Fulfilled**

Performance Criterion: **B**

**Remarks:** During the test no deviation was detected to the selected operation mode(s).

## 4.9. Surge

For test instruments and accessories used see section 3.6.

### 4.9.1. Description of the test location and date

Test location: Shielded room No. 8

Date of test: Jun 06, 2017

Operator: LuoRin

### 4.9.2. Severity levels of surge

4.9.2.1. Severity level: Line to line:  $\pm 1\text{KV}$  Line to earth:  $\pm 2\text{KV}$

Level	Test Voltage (KV)
1	0.5
2	1.0
3	2.0
4	4.0
x	Special

4.9.2.2. Performance Criterion: **B**

### 4.9.3. Description of the test set-up

4.9.3.1. Operating Condition

The EUT is load during the test, and the results of the maximum susceptible results are recorded.

4.9.3.2. Test Configuration and Procedure

In this test, the 1.2/50us & 8/20us surge generator must be used for AC power ports. The voltage for line to earth coupling mode is twice of that for line to line. At least 5 positive and 5 negative (polarity) surges signal with a maximum 1/min repetition rate are injected to AC power lines from 4 different phase angles ( $0^\circ$ ,  $90^\circ$ ,  $180^\circ$ ,  $270^\circ$ ) during the test.

Record any performance degradation of the EUT during the test and judge the test result according to performance criterion.

4.9.3.3. Photo of the test set-up





**4.9.4. Test specification:**

Pulse amplitude-Power line sym.:  
Source impedance:  $2 \Omega + 18\mu\text{F}$

0.5 kV     1 kV     2 kV     4 kV

Pulse amplitude-Power line unsym.:  
Source impedance:  $12 \Omega + 9\mu\text{F}$

0.5 kV     1 kV     2 kV     4 kV

Signal line

0.5 kV     1 kV     2 kV     4 kV

Number of surges:

5 Surges/Phase angle

Phase angle:

$0^\circ$       $90^\circ$       $180^\circ$       $270^\circ$

Repetition rate:

60 s

Polarity:

positive     negative

**4.9.5. Coupling points**

Cable description:

AC power line

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Screening:

screened     unscreened

Status:

passive     active

Signal transmission:

analogue     digital

Length:

/ m

**4.9.6. Test result**

The requirements are **Fulfilled**

Performance Criterion: **B**

**Remarks:** During the test no deviation was detected to the selected operation mode(s).

## 4.10. Conducted disturbances induced by radio-frequency fields

For test instruments and accessories used see section 3.6.

### 4.10.1. Description of the test location and date

Test location: Shielded room No. 8

Date of test: Jun 02, 2017

Operator: LuoRin

### 4.10.2. Severity levels of conducted disturbances induced by radio-frequency fields discharge

4.10.2.1. Severity Level: 10V

Level	Field Strength (V)
1	1
2	3
3	10
X	Special

4.10.2.2. Performance Criterion: **A**

### 4.10.3. Description of the test set-up

4.10.3.1. Operating Condition

The EUT is load during the test, and the results of the maximum susceptible results are recorded.

4.10.3.2. Test Configuration and Procedure

EUT is placed on an insulating support of 0.1m high above a ground reference plane. It must be 0.3m away the CDN (coupling and decoupling network) of which the bottom is made of metallic material and placed directly on the ground plane. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible). The disturbance signal amplified by amplifier is injected to EUT through CDN.

Record any performance degradation of the EUT during the test and judge the test result according to performance criterion.

4.10.3.3. Photo of the test set-up



**4.10.4. Test specification:**

<u>Frequency range:</u>	■ 0.15 MHz to 80 MHz
<u>Test voltage:</u>	■ 10 V
<u>Modulation:</u>	■ AM: 80 % ■ sinusoidal 1kHz
<u>Frequency step:</u>	■ 1 % with 1s dwell time

**4.10.5. Coupling points**

Cable description :	<u>AC power line</u>	
Screening:	<input type="radio"/> screened	<input checked="" type="radio"/> unscreened
Status:	<input type="radio"/> passive	<input checked="" type="radio"/> active
Signal transmission:	<input checked="" type="checkbox"/> analogue	<input type="checkbox"/> digital
Length:	<input checked="" type="checkbox"/> / m	

**4.10.6. Test result**The requirements are **Fulfilled**Performance Criterion: **A****Remarks:** During the test no deviation was detected to the selected operation mode(s).

#### 4.11. Immunity to Harmonics and commutation notches/voltage distortion

For test instruments and accessories used see section 3.6.

##### 4.11.1. Description of the test set-up

###### 4.11.1.1. Operating Condition

The EUT is load during the test, the applied level was presented in the below table. The set-up and test methods were according to IEC 61000-2-4, IEC 60146-1-1.

##### 4.11.2. Test result

The EUT has met the requirements of Performance Criterion A and B for Immunity to harmonics and commutation notches/voltage distortion.

**Table 1 Minimum immunity requirements for total Harmonics distortion on power ports of low voltage PDS**

Phenomenon	Reference document	Level	Performance(acceptance) criterion	Conclusion
Harmonics THD	IEC61000-2-4 Class 3	12%	A	Pass

**Table 2 Minimum immunity requirements for commutation notches on power ports of low voltage PDS**

Phenomenon	Reference document	Level	Performance(acceptance) criterion	Conclusion
Commutation notches	IEC 60146-1-1 Class 3	Depth=40%, Total area=250 in per cent degrees	A	Pass

**Table 3 Minimum immunity requirements for individual harmonic orders on power ports of low voltage PDS**

Phenomenon harmonic orders	Reference document	Level	Performance(acceptance) criterion	Conclusion
2	IEC 61000-4-13 class 3	5%	A	Pass
3		9%		
4		2%		
5		12%		
Even orders \ $6 \leq h \leq 50$		1,5%		
7		10%		
9		4%		
11		7%		
13		7%		
15		3%		
17		6%		
19		6%		
21		2%		
23		6%		
25		6%		
27		2%		
29		5%		
31		3%		
33		2%		
35		3%		
37	3%			
39	2%			

## 4.12. Immunity to Voltage deviation (Variations, changes, fluctuations), dips and short interruptions

For test instruments and accessories used see section 3.6.

### 4.12.1. Description of the test set-up

#### 4.12.1.1. Operating Condition

The EUT is load during the test, the applied level was presented in the below table. The set-up and test methods were according to IEC 61000-2-4, IEC 61000-2-1.

### 4.12.2. Test result

The EUT has met the requirements of Performance Criterion A & C for Immunity to Voltage deviation (Variations, changes, fluctuations), dips and short interruptions.

**Table 1**

**Minimum immunity requirements for Voltage deviation, dips and short interruptions on power ports of low voltage PDS**

Phenomenon	Reference document	Level		Performance(acceptance) criterion	Conclusion
Voltage deviations	IEC61000-2-4 Class 2	±10%		A	Pass
Voltage dips	IEC 61000-4-11 class 3 or IEC 61000-4-34 class 3	Volts remaining 0% 40% 70% 80%	Cycles 1 10/12 25/30 250/300	C	Pass
short interruptions	IEC 61000-4-11 class 3 or IEC 61000-4-34 class 3	Volts remaining 0%	Cycles 250/300	C	Pass

### 4.13. Immunity to Voltage unbalance and frequency variations

For test instruments and accessories used see section 3.6.

#### 4.13.1. Description of the test set-up

##### 4.13.1.1. Operating Condition

The EUT is load during the test, the applied level was presented in the below table. The set-up and test methods were according to IEC 61000-2-4.

#### 4.13.2. Test result

The EUT has met the requirements of Performance Criterion A for Immunity to Voltage unbalance and frequency variations

**Table 1**  
**Minimum immunity requirements for voltage unbalance and frequency variations on power ports of low voltage PDS**

Phenomenon	Reference document	Level	Performance(acceptance) criterion	Conclusion
Voltage unbalance	IEC 61000-2-4 class 3	3% negative sequence component	A	Pass
Frequency variations	IEC 61000-2-4	$\pm 2\%$ $\pm 4\%$ where the supply is separated from public supply networks	A	Pass
Frequency rate of change		$\pm 1\%/s$ $2\%/s$ where the supply is separated from public supply network	A	Pass

## 5. External and Internal Photos of the EUT

### 5.1. External Photos of the EUT

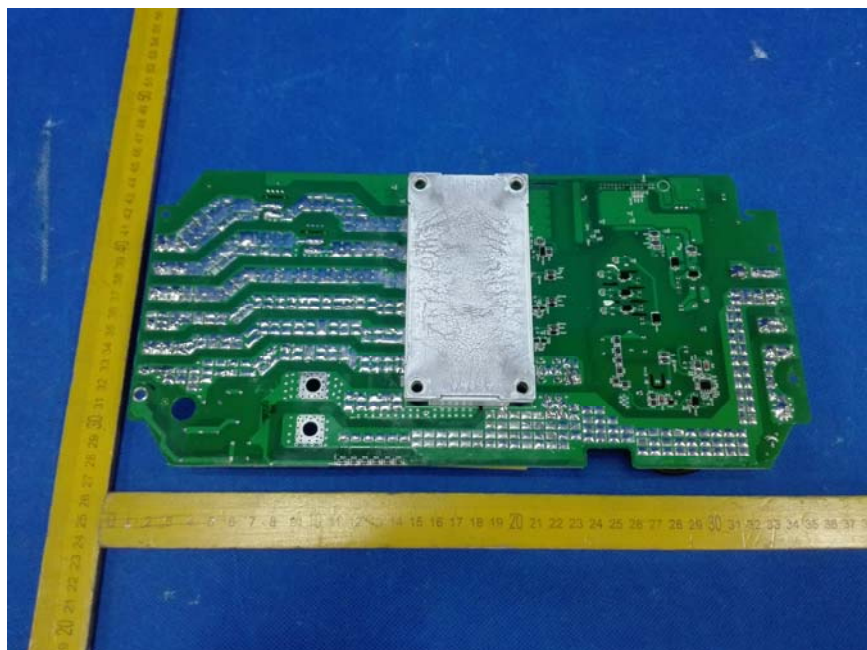
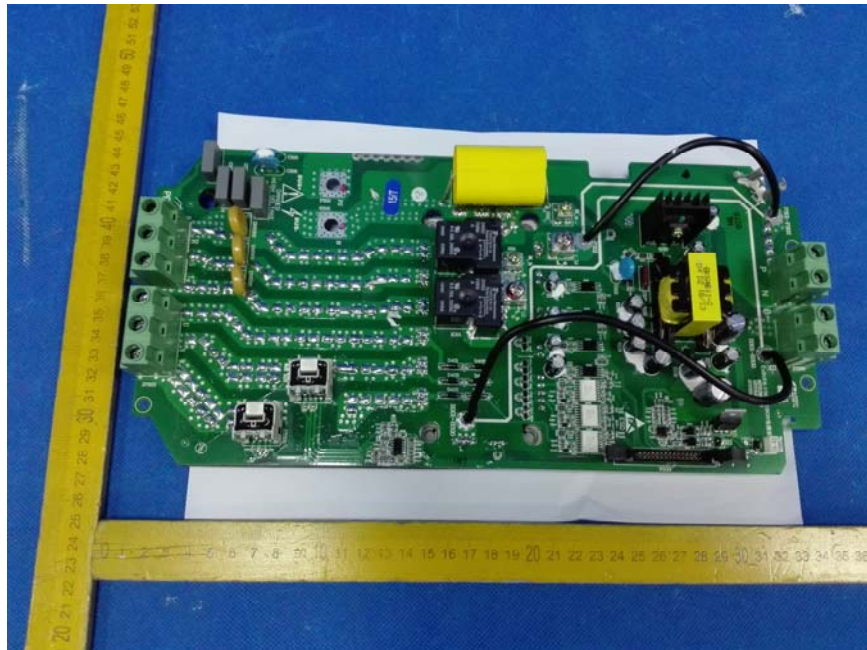


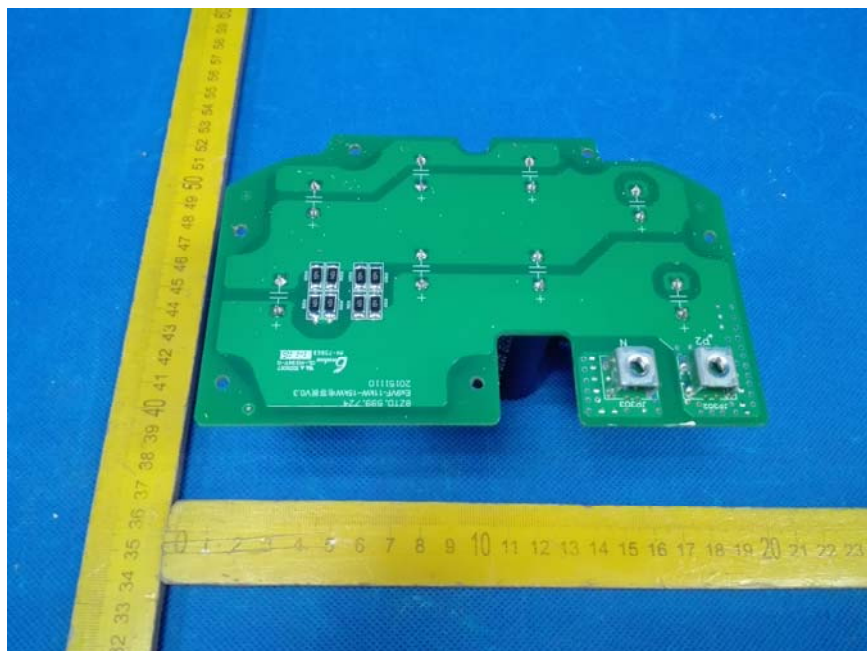




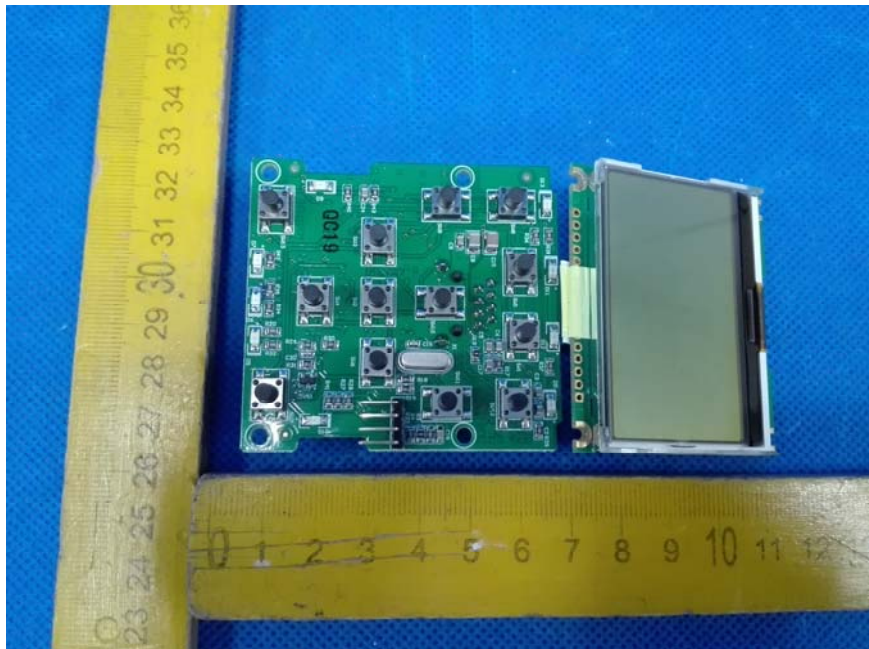
## 5.2. Internal photos of the EUT



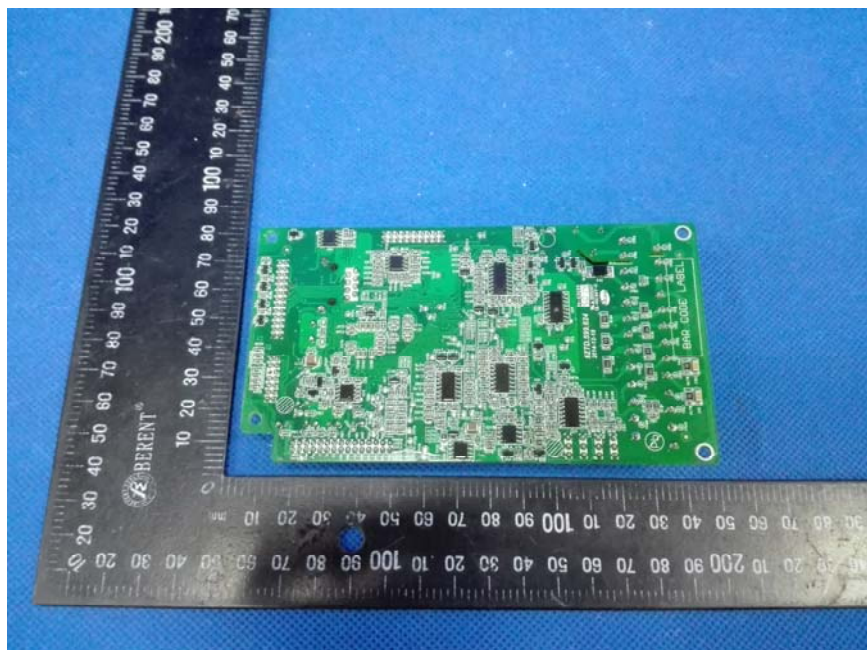














.....End of Report.....