



## TEST REPORT

**EN IEC 61000-6-4:2019**

**Electromagnetic compatibility (EMC) -- Part 6-4: Generic standards - Emission standard for industrial environments**

**EN IEC 61000-6-2:2019**

**Electromagnetic compatibility (EMC) -- Part 6-2: Generic standards - Immunity for industrial environments**

**Report Reference No.....: CHTE24050160**



Date of issue.....: May. 27, 2024

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*Tony Jiang*

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

Address.....: Huatongwei 101, No.006, Keji south 12th Road, High-tech zone community, Yuehai Street, Nanshan District, Shenzhen, Guangdong, China

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

**Applicant's name.....: China Leadshine Technology Co.,Ltd.**

Address.....: 15-20/F, Block B, Nanshan I Valley, No.3157, Shahe West Road, Nanshan District, Shenzhen

### Test specification:

Standard.....: **EN IEC 61000-6-2:2019** **EN IEC 61000-6-4:2019**

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

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


Master TRF.....: Dated 2021-01

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**Test item description.....: AC Servo Drives**

Manufacturer.....: China Leadshine Technology Co., Ltd.

Trademark.....: 

Model/Type reference.....: EL7-EC2000N

Listed models.....: L7N-(a)1500(b), L6N-(a)1500(b), EL7-EC1500(a), EL6-EC1500(a), L7N-(a)2000(b), L6N-(a)2000(b), EL7-EC2000(a), EL6-EC2000(a).

(a)(b):The model number may include a suffix "XXXXXXXXXX", Where "XXXXXXXXXX" can be blank or combination of any alph anumeric and/or symbols that represents customer identity.

Ratings.....: See page 6 for details

Result.....: Positive

**EMC -- TEST REPORT**

<b>Test Report No. :</b> CHTE24050160	May. 27, 2024 Date of issue
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Equipment under Test : AC Servo Drives

Model /Type : EL7-EC2000N

Listed Models : L7N-(a)1500(b), L6N-(a)1500(b), EL7-EC1500(a), EL6-EC1500(a), L7N-(a)2000(b), L6N-(a)2000(b), EL7-EC2000(a), EL6-EC2000(a).

(a)(b):The model number may include a suffix “XXXXXX XXXX” , Where “XXXXXXXXXX” can be blank or combination of any alphanumeric and/or symbols that represents customer identity.

**Applicant** : **China Leadshine Technology Co., Ltd.**

Address : 15-20/F, Block B, Nanshan I Valley, No.3157, Shahe West Road, Nanshan District, Shenzhen

**Manufacturer** : **China Leadshine Technology Co., Ltd.**

Address : 15-20/F, Block B, Nanshan I Valley, No.3157, Shahe West Road, Nanshan District, Shenzhen

<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 IEC 61000-6-4:2019](#) Electromagnetic compatibility (EMC) – Part 6-4: Generic standards - Emission standard for industrial environments

[EN IEC 61000-6-2:2019](#) Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample : Apr. 08, 2024

Testing commenced on : Apr. 08, 2024

Testing concluded on : Apr.23, 2024

2.2. Equipment Under Test

Power supply system utilised

Power supply voltage : ☐ 230 V / 50 Hz ☐ 110 V / 60 Hz  
☐ 12 V DC ☐ 24 V DC  
☒ Other (specified in blank below)  
3PH 220V 50Hz

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

The EUT is a AC Servo Drives

Unless otherwise specified, the model EL7-EC2000N were chosen as representative models to perform all the tests.

All models are identical except for model name and power, see below table for details.

Model	Rated input	Rated output
EL7-EC2000N, L7N-(a)2000(b), L6N-(a)2000(b), EL7-EC2000(a), EL6-EC2000(a).	1PH AC 200-240V, 50/60Hz, 15.5A 3PH AC 200-240V, 50/60Hz, 7.4A	3PH AC 0-240VAC, 0-500Hz, 12.0A, 2000W
L7N-(a)1500(b), L6N-(a)1500(b), EL7-EC1500(a), EL6-EC1500(a).	1PH AC 200-240V, 50/60Hz, 13.0A 3PH AC 200-240V, 50/60Hz, 5.8A	3PH AC 0-240VAC, 0-500Hz, 9.5A, 1500W

Serial number: 991234518082000010

Report version information:

This copy was issued base on CHTE24040146(Issued:2024-04-23).

## 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 61000-6-4, searching for the highest disturbance.

Immunity tests.....: According to EN 61000-6-2, searching for the highest susceptibility.

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## 2.5. EUT configuration

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

■ - supplied by the manufacturer

○ - supplied by the lab

■ AC SERVO MOTOR

M/N : /

Manufacturer : /

■ EMI FILTER

M/N : Schaffner

Manufacturer : FN3258-16-44

## 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

### Criterion A:

The apparatus shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

### Criterion B:

After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

### Criterion C:

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.



### **3. TEST ENVIRONMENT**

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

Shenzhen Huatongwei International Inspection Co., Ltd.  
Huatongwei 101, No.006, Keji south 12th Road, High-tech zone community, Yuehai Street, Nanshan District,  
Shenzhen, Guangdong, China  
Phone: 86-755-26715499 E-mail: [cs@szhtw.com.cn](mailto:cs@szhtw.com.cn)

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

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

##### **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.

### 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>950-1050 mbar</u>

### 3.4. Test Description

Emission Measurement		
Radiated Emission	EN IEC 61000-6-4:2019	PASS
Conducted Disturbance	EN IEC 61000-6-4:2019	PASS
Immunity Measurement		
Electrostatic Discharge	EN IEC 61000-6-2:2019 EN 61000-4-2: 2009	PASS
RF Field Strength Susceptibility	EN IEC 61000-6-2:2019 EN IEC 61000-4-3:2020	PASS
Electrical Fast Transient/Burst Test	EN IEC 61000-6-2:2019 EN 61000-4-4: 2012	PASS
Surge Test	EN IEC 61000-6-2:2019 EN 61000-4-5: 2014+A1: 2017	PASS
Conducted Susceptibility Test	EN IEC 61000-6-2:2019 EN 61000-4-6: 2014	PASS
Power Frequency Magnetic Field Susceptibility Test	EN IEC 61000-6-2:2019 EN 61000-4-8: 2010	PASS
Voltage Dips and Interruptions Test	EN IEC 61000-6-2:2019 EN IEC 61000-4-11:2020	PASS

Remark:

1. N/A" means "not applicable".
2. 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	4.90dB	(1)
Radiated Emission	1-18GHz	4.96dB	(1)
Conducted Disturbance (AMN)	0.15~30MHz	3.02dB	(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 (3m) 30M-1GHz							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0127	SAC-3m-02	C11121	2023/4/6	2026/4/5
●	EMI Test Receiver	R&S	HTWE0099	ESCI 7	100900	2023/8/30	2024/8/29
●	Ultra-Broadband Antenna	SCHWARZBECK	HTWE0119	VULB9163	546	2023/2/22	2026/2/21
●	Pre-Amplifier	SCHWARZBECK	HTWE0295	BBV 9742	/	2023/5/25	2024/5/24
●	Test Software	R&S	N/A	EMC32	N/A	N/A	N/A

● Conducted Emission							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	EMI Test Receiver	R&S	HTWE0111	ESCI	101247	2023/8/30	2024/8/29
●	Artificial Mains	SCHWARZBECK	HTWE0113	NNLK 8121	573	2023/8/18	2024/8/17
●	Protection Network	SCHWARZBECK	HTWE0567	VTSD9561FN	00899	2023/8/18	2024/8/17
○	ISN	FCC	HTWE0148	FCC-TLISN-T2-02	20371	2023/8/18	2024/8/17
○	ISN	FCC	HTWE0150	FCC-TLISN-T8-02	20375	2023/8/18	2024/8/17
●	Test Software	R&S	N/A	EMC32	N/A	N/A	N/A

● Electrostatic Discharge							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	ESD Simulator	EM TEST	HTWE0500	esd NX30.1	11971	2023/5/26	2024/5/25

● Radio Frequency Electromagnetic Field							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Anechoic Chamber	CRT	HTWE0418	8.0*5.0*4.0m	CRTSAC845	2023/3/18	2028/3/17
●	Signal Generator	R&S	HTWE0276	SMB100A	114360	2024/3/14	2025/3/13
●	Amplifier	R&S	HTWE0277	BBA150-BC500	102664	2024/3/14	2025/3/13
●	Amplifier	R&S	HTWE0395	BBA150 D400	104197	2024/3/14	2025/3/13
●	Amplifier	R&S	HTWE0396	BBA150 E400	104198	2024/3/14	2025/3/13
●	Power Head	R&S	HTWE0278	NRP18A	101010	2024/3/14	2025/3/13
●	Power Head	R&S	HTWE0389	NRP18A	101386	2024/3/14	2025/3/13
●	Transmit Antenna	Schwarzbeck	HTWE0280	STLP9129	00044	2023/8/25	2024/8/24
●	Field Probe	ETS-LINDGREN	HTWE0321	HI-6153	00130812	2023/11/17	2024/11/16
●	Test Software	R&S	N/A	EMC32	N/A	N/A	N/A

● Electrical fast transient/burst immunity test							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Transient immunity simulator	EM TEST	HTWE0512	compact NX5	P2125254008	2024/3/14	2025/3/13
●	3-Phase Coupling Network	EM TEST	HTWE0516	coupling NX5	P2128254484	2024/3/14	2025/3/13
○	Coupling Clamp	EM TEST	HTWE0513	CCI	P2125253835	2024/3/14	2025/3/13
●	Test Software	EM TEST	N/A	ISM IEC	N/A	N/A	N/A

● Surge							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Transient immunity simulator	EM TEST	HTWE0512	compact NX5	P2125254008	2024/3/14	2025/3/13
●	3-Phase Coupling Network	EM TEST	HTWE0516	coupling NX5	P2128254484	2024/3/14	2025/3/13
○	4-Lines Coupling Network	EM TEST	HTWE0514	DCD 5 SR-4-1	P2128254471	2024/3/14	2025/3/13
○	8-Lines Coupling Network	EM TEST	HTWE0515	DCD 5 ST-4-1	P2128254472	2024/3/14	2025/3/13
●	Test Software	EM TEST	N/A	ISM IEC	N/A	N/A	N/A

● Voltage Dips and Interruptions							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Transient immunity simulator	EM TEST	HTWE0512	compact NX5	P2128254484	2024/3/14	2025/3/13
●	Motor Driven Voltage Transformer	EM TEST	HTWE0008	MV2616	0301-11	2024/3/14	2025/3/13
●	Test Software	EM TEST	N/A	ISM IEC	N/A	N/A	N/A

● Conducted Immunity							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Signal Generator	R&S	HTWE0603	SMC100A	108535	2024/3/14	2025/3/13
●	Amplifier	R&S	HTWE0606	BBA150-A125	104839	2024/3/14	2025/3/13
●	6db Attenuator	Bird	HTWE0622	150-A-FFN6	2129	2024/4/8	2025/4/7
●	Power Head	R&S	HTWE0604	NRP6AN	101713	2024/3/14	2025/3/13
●	Power Head	R&S	HTWE0605	NRP6AN	101714	2024/3/14	2025/3/13
●	CDN	EMTEST	HTWE0609	CDN M2/M3PE 16A	00083	2023/8/18	2024/8/17
●	Test Software	R&S	N/A	EMC32	N/A	N/A	N/A
○	EM Clamp	FCC	HTWE0616	F-203I	196034	2024/3/14	2025/3/13
○	CDN	Schwarzbeck	HTWE0607	CDN-T8RJ45	00035	2023/8/18	2024/8/17
○	CDN	Schwarzbeck	HTWE0608	CDN M1 16A	00032	2023/8/18	2024/8/17
○	CDN	Schwarzbeck	HTWE0610	CDN M4PE 32A	00006	2023/8/18	2024/8/17
○	CDN	Schwarzbeck	HTWE0611	CDN M5PE 63A	00006	2023/8/18	2024/8/17
○	CDN	Schwarzbeck	HTWE0612	CDN M5 125A	00008	2023/8/18	2024/8/17
○	CDN	Schwarzbeck	HTWE0613	CDN T2	00024	2023/8/18	2024/8/17
○	CDN	Schwarzbeck	HTWE0614	CDN T4 RJ45	00003	2023/8/18	2024/8/17
○	CDN	Schwarzbeck	HTWE0615	CDN S1 BNC	00013	2023/8/18	2024/8/17

○	current clamp	FCC	HTWE0618	F-120-9A	196028	2024/3/14	2025/3/13
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● Power Frequency Magnetic Field Susceptibility							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Current Transformer	EM TEST	HTWE0009	MC2630	D5101	2024/3/14	2025/3/13
●	Magnetic Coil	EM TEST	HTWE0010	MS100	0500-19	2024/3/14	2025/3/13

## 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: Shielded room

#### 4.1.2. Limits of disturbance

Limits below 1 GHz:

Frequency (MHz)	Distance (Meters)	Field Strengths Limits (dB $\mu$ V/m)
30 ~ 230	3	50
230 ~ 1000	3	57

Limits above 1GHz

Frequency (GHz)	Distance (Meters)	Average limit (dB $\mu$ V/m)	Peak limit (dB $\mu$ V/m)
1~3	3	56	76
3~6	3	60	80

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

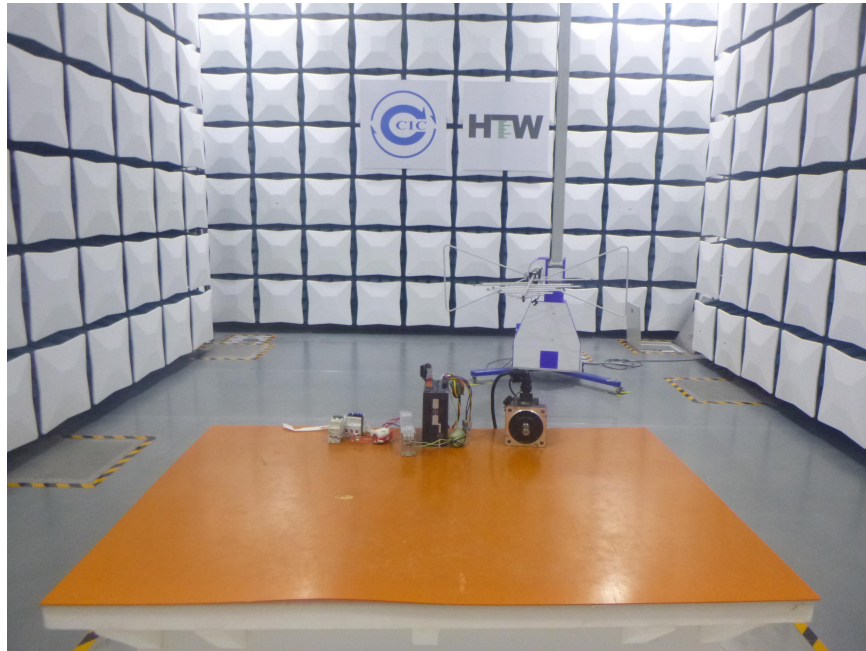
##### 4.1.3.1. Operating Condition

The EUT is operated in the normal working 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 meters away from the center of receiving antenna, and 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: 120 kHz

Frequency Range: 30 MHz to 1 000 MHz

□ Band Width: 1MHz

Frequency Range: 1000MHz to 6000MHz

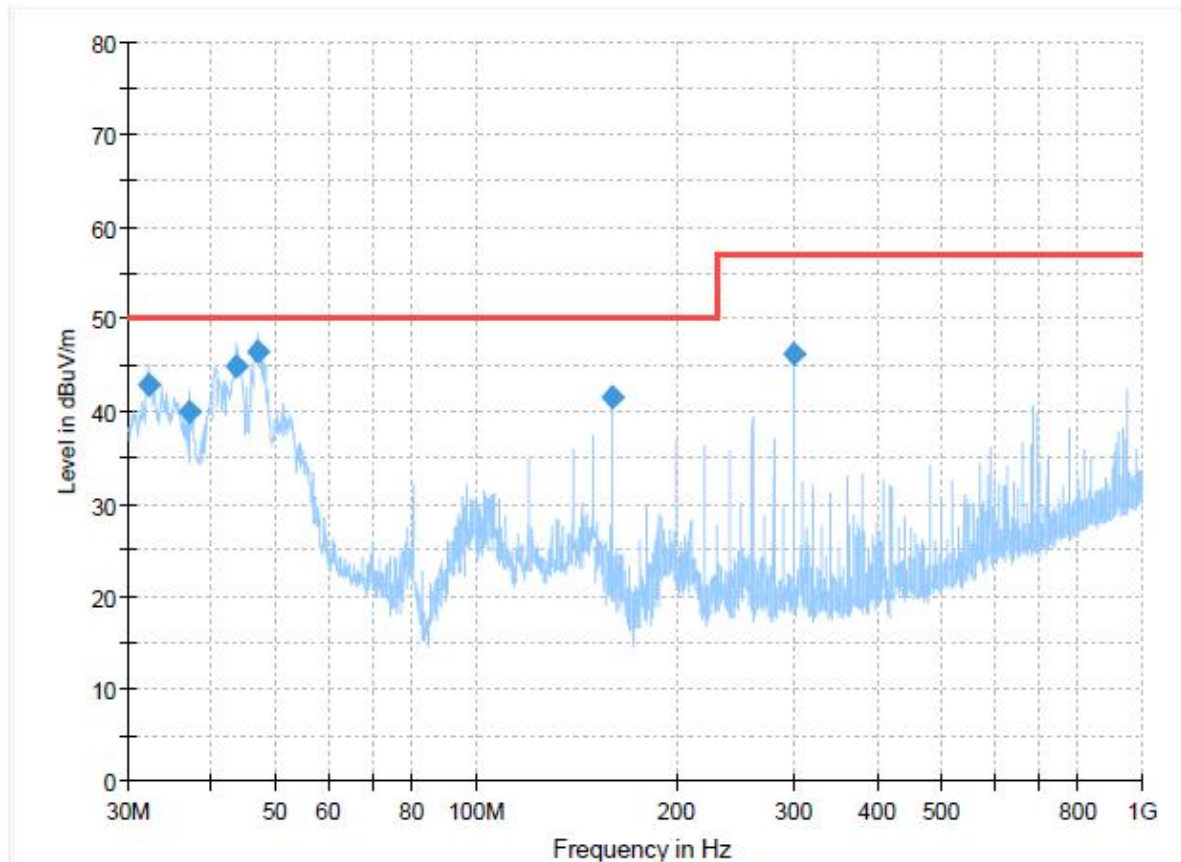
**Remarks:** The limits are kept. For detailed results, please see the following page(s).

Margin = limit - level

Level = read values + transducer

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

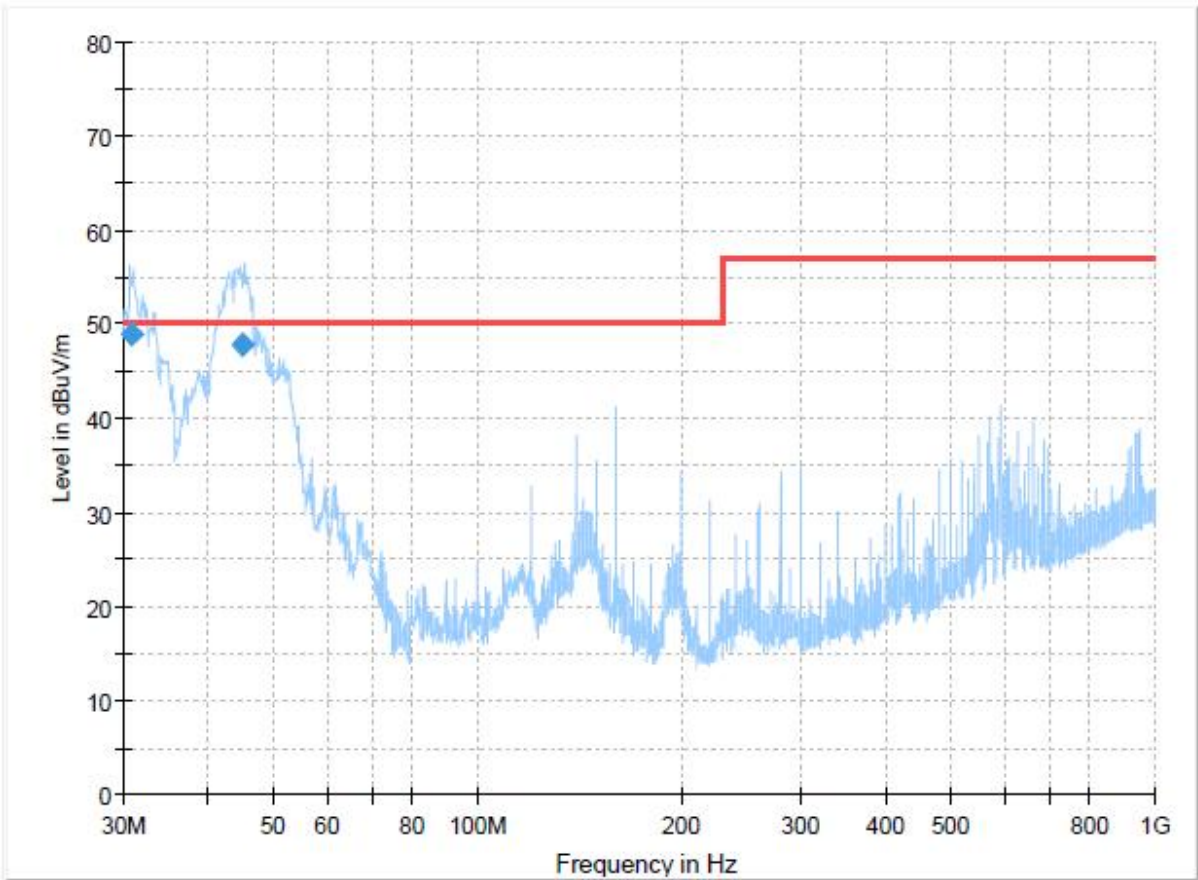
Below 1GHz    Polarity: Horizontal



## Final Result

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
32.1825	43.00	50.00	7.00	300.0	H	190.0	-12.8
37.1538	39.92	50.00	10.08	300.0	H	178.0	-10.9
43.8225	44.89	50.00	5.11	300.0	H	355.0	-9.1
47.0963	46.42	50.00	3.58	300.0	H	32.0	-8.8
159.9800	41.62	50.00	8.38	100.0	H	177.0	-13.8
300.0238	46.31	57.00	10.69	100.0	H	121.0	-7.4

Below 1GHz    Polarity: Vertical



Final Result

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.9475	48.89	50.00	1.11	100.0	V	128.0	-13.1
44.9775	47.93	50.00	2.07	100.0	V	0.0	-9.0

## 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

### 4.2.2. Limits of disturbance

Limit of conducted disturbance at the mains ports

Frequency Range (MHz)	Limits (dBuV)	
	Quasi-Peak	Average
0.150 ~ 0.500	79	66
0.500 ~ 30.000	73	60

Limit of conducted disturbance at the telecommunication ports

Frequency Range (MHz)	Limits (dBuV)	
	Quasi-Peak	Average
0.150 ~ 0.500	97 ~ 87	84 ~ 74
0.500 ~ 30.000	87	74

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

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

#### 4.2.3.1. Operating Condition

The EUT is operated in the normal working during the test, and the results of the maximum emanation are recorded.

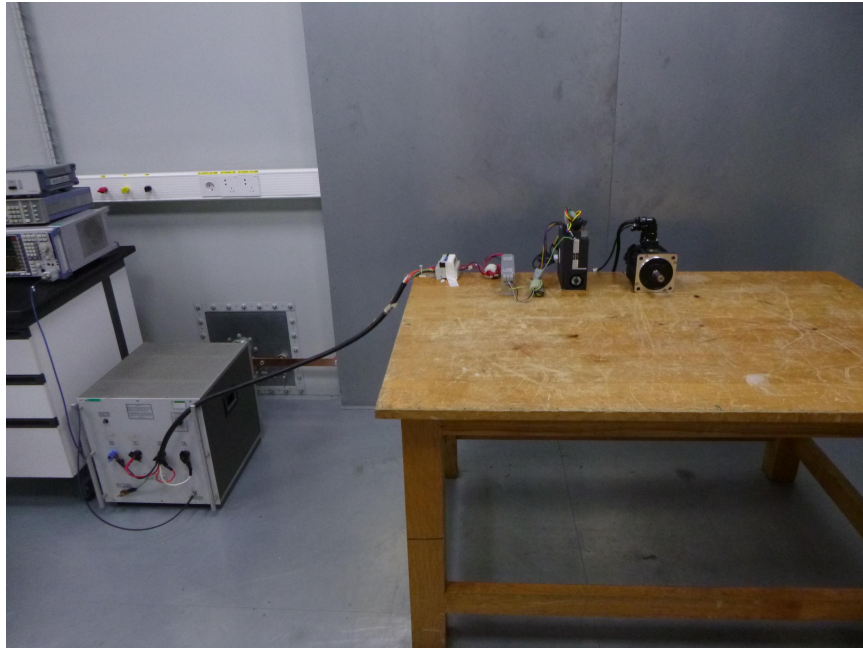
#### 4.2.3.2. Test Configuration and Procedure

For the main ports:

EUT is placed on a nonmetal table which is 0.1 meter 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 of the neutral line and live line can be detected by the receiver.

## 4.2.3.3. Photos of the test set-up

AC mains ports



## 4.2.4. Test result

The requirements are **Fulfilled**.

Band Width: 9 kHz

Frequency Range: 150 kHz to 30 MHz

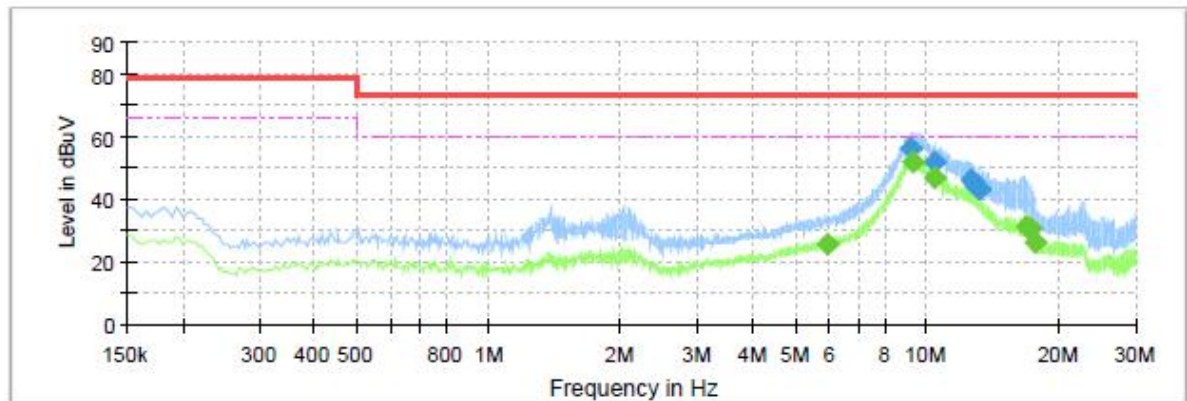
**Remarks:** The limits are kept. For detailed results, please see the following page(s).

Margin = limit - level

Level = read values + transducer

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

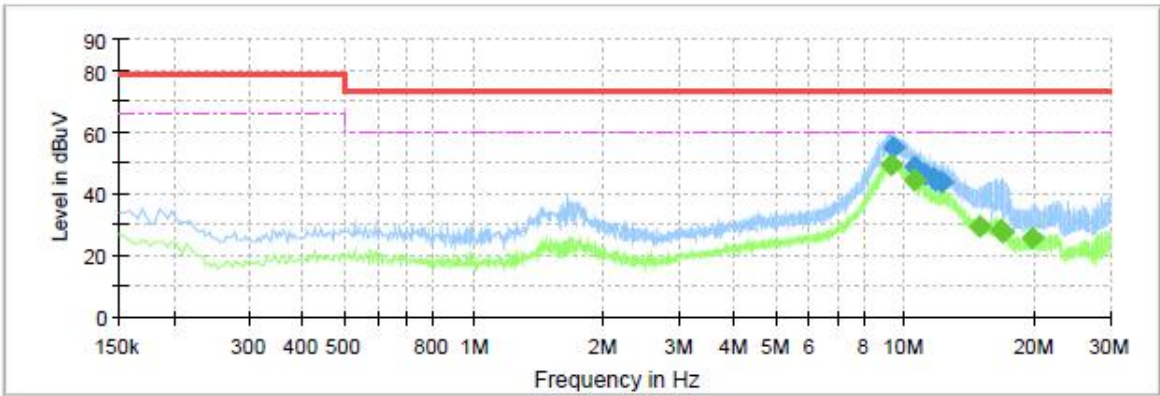
AC mains ports



## Final Result

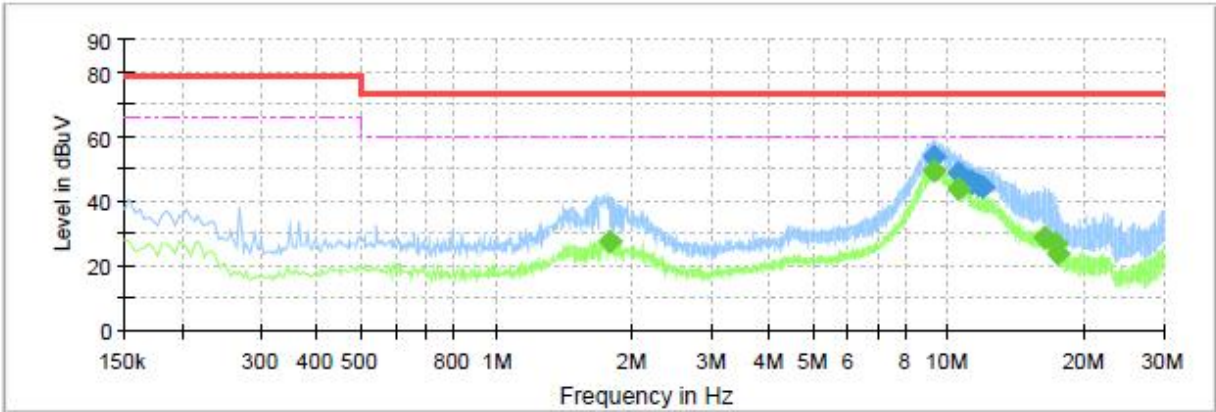
Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr. (dB)
5.9525	---	25.75	60.00	34.25	L1	11.1
9.1635	55.96	---	73.00	17.04	L1	11.1
9.3555	---	51.60	60.00	8.40	L1	11.1
10.4115	---	46.90	60.00	13.10	L1	11.1
10.4155	52.16	---	73.00	20.84	L1	11.1
12.5635	46.09	---	73.00	26.91	L1	11.2
12.7355	45.59	---	73.00	27.41	L1	11.2
12.9275	44.42	---	73.00	28.58	L1	11.3
13.2275	42.93	---	73.00	30.07	L1	11.3
16.8235	---	30.98	60.00	29.02	L1	11.4
17.2475	---	30.66	60.00	29.34	L1	11.4
17.7765	---	26.06	60.00	33.94	L1	11.4





Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr. (dB)
9.2955	---	49.54	60.00	10.46	L2	11.1
9.3755	55.06	---	73.00	17.94	L2	11.1
10.5355	---	44.07	60.00	15.93	L2	11.1
10.5755	48.65	---	73.00	24.35	L2	11.1
11.1275	46.56	---	73.00	26.44	L2	11.2
11.6485	44.97	---	73.00	28.03	L2	11.2
11.8275	44.63	---	73.00	28.37	L2	11.2
12.1355	43.98	---	73.00	29.02	L2	11.2
14.9355	---	29.23	60.00	30.77	L2	11.2
16.7515	---	28.32	60.00	31.68	L2	11.3
16.9515	---	27.39	60.00	32.61	L2	11.3
19.8115	---	25.71	60.00	34.29	L2	11.3



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr. (dB)
1.7755	---	27.20	60.00	32.80	L3	10.7
9.2795	---	49.40	60.00	10.60	L3	10.9
9.2995	53.62	---	73.00	19.38	L3	10.9
10.5355	---	43.77	60.00	16.23	L3	10.9
10.5445	48.83	---	73.00	24.17	L3	10.9
11.2715	46.09	---	73.00	26.91	L3	11.0
11.3315	45.66	---	73.00	27.34	L3	11.0
11.6275	44.97	---	73.00	28.03	L3	11.0
11.9195	44.57	---	73.00	28.43	L3	11.0
16.4275	---	28.67	60.00	31.33	L3	11.1
17.2835	---	27.13	60.00	32.87	L3	11.1
17.3875	---	23.81	60.00	36.19	L3	11.1



### 4.3. Electrostatic discharge

For test instruments and accessories used see section 3.6.

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

Test location: Shielded room

#### 4.3.2. Severity levels of electrostatic discharge

4.3.2.1. Severity level: Contact Discharge at  $\pm 2, 4$  kV    Air Discharge at  $\pm 2, 4, 8$  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

4.3.2.2. Performance criterion: **B**

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

##### 4.3.3.1. Operating Condition

The EUT is operated in the normal working during the test, and the results of the maximum emanation are recorded.

##### 4.3.3.2. Test Configuration and Procedure:

Direct Discharge:

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 10 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 10 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 10 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.

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



#### 4.3.4. Test specification:

- Contact discharge voltage: ☒ 2 kV ☒ 4 kV ☐ 6 kV ☐ 8 kV
- Number of discharges: ☒ 10 ☐ 25
- Air discharge voltage: ☒ 2 kV ☒ 4 kV ☒ 8 kV ☐ 15 kV
- Number of discharges: ☒ 10 ☐ 25
- Type of discharge: Direct discharge ☒ Air 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)

#### 4.3.5. Test result

The requirements are **Fulfilled**

Performance Criterion: **A**

**Remarks:** During the test, the EUT has no loss of function or performance.

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

For test instruments and accessories used see section 3.6.

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

Test location: Shielded room

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

4.4.2.1. Severity level: 10V/m 3V/m 1V/m

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

4.4.2.2. Performance criterion: **A**

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

4.4.3.1. Operating Condition

The EUT is operated in the normal working during the test, and the results of the maximum emanation are recorded.

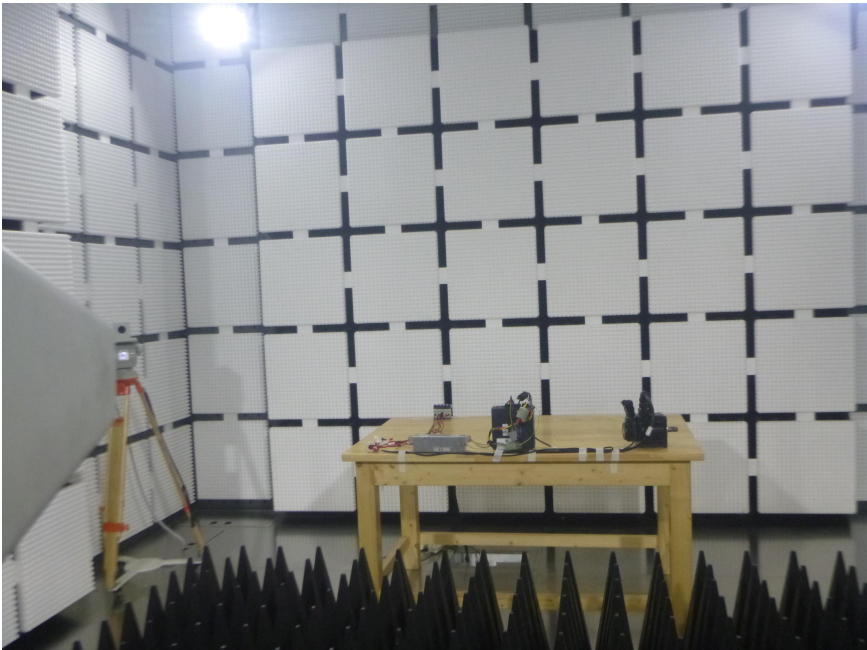
4.4.3.2. Test Configuration and Procedure

EUT is placed on a nonmetal table which is 0.1 meter above the grounded reference plane. The front tip of the transmitting antenna is set 3 meter away from the EUT. During the test, each of 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.

4.4.3.3. Photo of the test set-up



4.4.4. Test specification:

<u>Frequency range:</u>	■ 80 MHz to 1 000 MHz
<u>Field strength:</u>	■ 10 V/m
<u>Frequency range:</u>	■ 1.4GHz to 2 GHz
<u>Field strength:</u>	■ 3 V/m
<u>Frequency range:</u>	■ 2 GHz to 2.7 GHz
<u>Field strength:</u>	■ 1 V/m
<u>Modulation:</u>	■ AM: 80% ■ sinusoidal 1 000 Hz
<u>Frequency step:</u>	■ 1% with 1 s dwell time
<u>Antenna polarisation:</u>	■ horizontal                      ■ vertical

4.4.5. Test result

The requirements are **Fulfilled** Performance Criterion: **A**

**Remarks:**     During the test, the EUT has no loss of function or performance.

## 4.5. Electrical fast transients / Burst

For test instruments and accessories used see section 3.6.

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

Test location: Shielded room

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

4.5.2.1. Severity level:  $\pm 2$  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

4.5.2.2. Performance criterion: **B**

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

#### 4.5.3.1. Operating Condition

The EUT is operated in the normal working during the test, and the results of the maximum emanation are recorded.

#### 4.5.3.2. 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.

The EUT is unnecessary to test on these signal / control lines.

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

4.5.3.3. Photo of the test set-up



4.5.4. Test specification:

<u>Coupling network:</u>	<input checked="" type="checkbox"/> 0.5 kV	<input checked="" type="checkbox"/> 1 kV	<input checked="" type="checkbox"/> 2 kV	<input type="checkbox"/> 4 kV
<u>Coupling clamp:</u>	<input type="checkbox"/> 0.5 kV	<input type="checkbox"/> 1 kV	<input type="checkbox"/> 2 kV	
<u>Burst frequency:</u>	<input checked="" type="checkbox"/> 5.0 kHz			
<u>Coupling duration:</u>	<input checked="" type="checkbox"/> 60 s			
<u>Polarity:</u>	<input checked="" type="checkbox"/> positive	<input checked="" type="checkbox"/> negative		

4.5.5. Coupling points

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

4.5.6. Test result

The requirements are **Fulfilled** Performance Criterion: **A**

Remarks: During the test, the EUT has no loss of function or performance.

## 4.6. Surge

For test instruments and accessories used see section 3.6.

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

Test location: Shielded room

### 4.6.2. Severity levels of surge

4.6.2.1. Severity level: AC power supply: Line to line:  $\pm 1$  kV, line to earth:  $\pm 2$  kV

Level	Test Voltage (kV)
1	0.5
2	1.0
3	2.0
4	4.0
X	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 operated in the normal working during the test, and the results of the maximum emanation are recorded.

#### 4.6.3.2. Test Configuration and Procedure

For AC power ports:

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 1 time more than that for line to line. At least 5 positive and 5 negative (polarity) surge signal with a maximum 1/min repetition rate are injected to AC power lines from 4 different phase angle( 0°, 90°, 180°, 270°) during the test.

The EUT is unnecessary to test on these signal / control lines.

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:

<u>Pulse amplitude-Power line sym.:</u> Source impedance: 2 Ω + 18μF	<input checked="" type="checkbox"/> 0.5 kV	<input checked="" type="checkbox"/> 1 kV	<input type="checkbox"/> 2 kV	<input type="checkbox"/> 4 kV
<u>Pulse amplitude-Power line unsym.:</u> Source impedance: 12 Ω + 9μF	<input checked="" type="checkbox"/> 0.5 kV	<input checked="" type="checkbox"/> 1 kV	<input checked="" type="checkbox"/> 2 kV	<input type="checkbox"/> 4 kV
<u>Signal line :</u>	<input type="checkbox"/> 0.5 kV	<input type="checkbox"/> 1 kV	<input type="checkbox"/> 2 kV	<input type="checkbox"/> 4 kV
<u>Number of surges:</u>	<input checked="" type="checkbox"/> 5 Surges/Phase angle			
<u>Phase angle:</u>	<input checked="" type="checkbox"/> 0°	<input checked="" type="checkbox"/> 90°	<input checked="" type="checkbox"/> 180°	<input checked="" type="checkbox"/> 270°
<u>Repetition rate:</u>	<input checked="" type="checkbox"/> 60 s			
<u>Polarity:</u>	<input checked="" type="checkbox"/> positive		<input checked="" type="checkbox"/> negative	

4.6.5. Coupling points

Cable description:	AC power line	
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
Signal line length:	<input checked="" type="checkbox"/> /	

4.6.6. Test result

The requirements are **Fulfilled**

Performance Criterion: **B**

**Remarks:** During the test the equipment loss of function, but can self-recoverable.

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

For test instruments and accessories used see section 3.6.

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

Test location: Shielded room

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

#### 4.7.2.1. Severity Level: 10V

Level	Field Strength (V)
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 operated in the normal working during the test, and the results of the maximum emanation are recorded.

#### 4.7.3.2. 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.

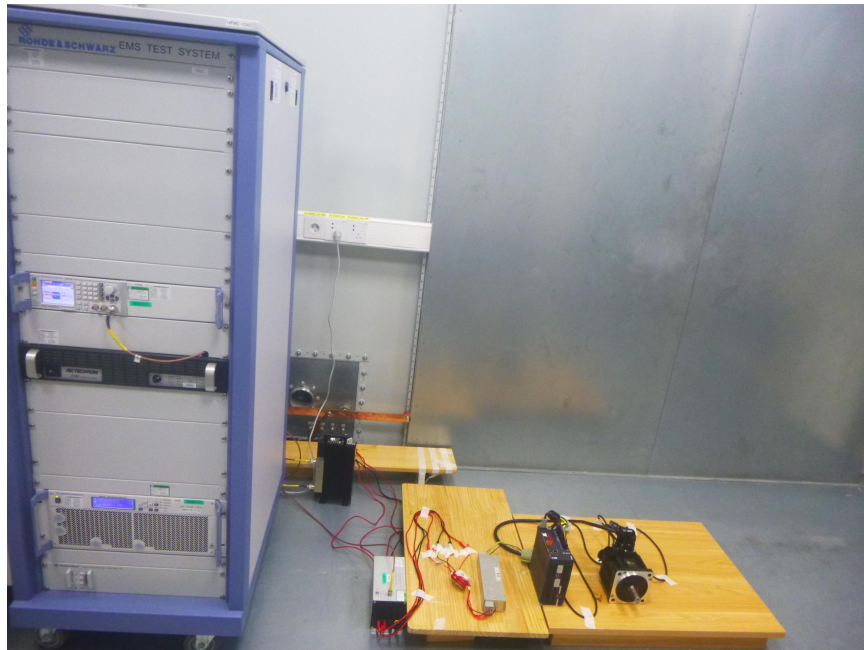
For the main ports:

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 of the neutral line and live line can be detected by the receiver.

For the telecommunication ports:

The EUT shall be set up in accordance with test photos for tabletop equipment, floor-standing equipment, and combined floor-standing equipment and tabletop equipment.

4.7.3.3. Photo of the test set-up



4.7.4. Test specification:

- Frequency range:

Test voltage:

Modulation:

Frequency step:
- 0.15 MHz to 80 MHz

■ 10 V

■ AM: 80%

■ sinusoidal 1 000 Hz

■ 1% with 1 s dwell time

4.7.5. Coupling points

Cable description :	AC Power line	
Screening:	<div><div>o screened</div><div>o passive</div><div>■ analogue</div><div>■ /</div></div>	<div><div>■ unscreened</div><div>■ active</div><div>o digital</div></div>

4.7.6. Test result

The requirements are **Fulfilled**

Performance Criterion: **A**

Remarks:

During the test, the EUT has no loss of function or performance.

## 4.8. Magnetic Field Immunity

For test instruments and accessories used see section 3.6.

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

Test location: Shielded room

### 4.8.2. Severity levels of magnetic field immunity

4.8.2.1. Severity Level: 30 A/m

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

4.8.2.2. Performance Criterion: **A**

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

4.8.3.1. Operating Condition

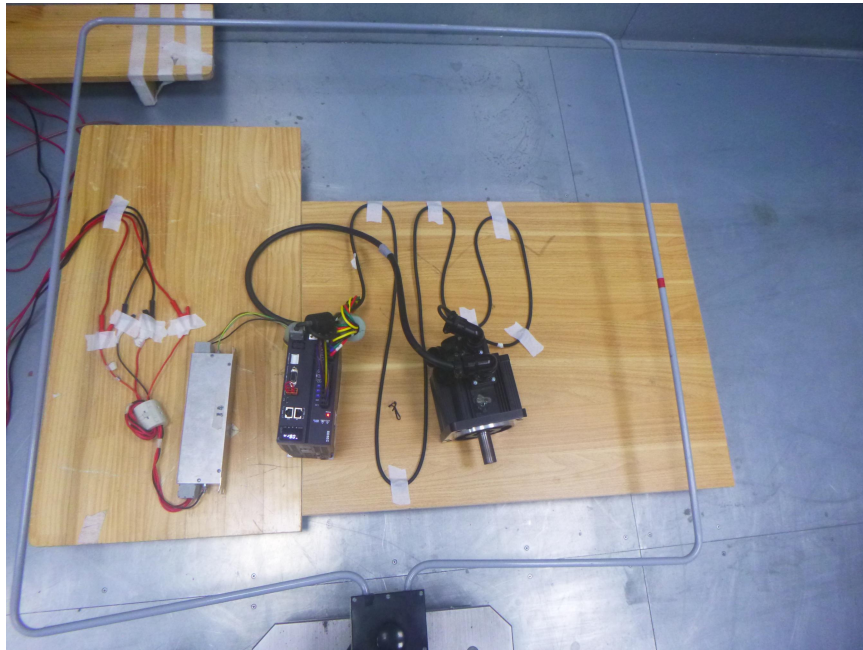
The EUT is operated in the normal working during the test, and the results of the maximum emanation are recorded.

4.8.3.2. Test Configuration and Procedure:

EUT is placed on an insulating support of 0.1m high above a table of 0.8m high. There is a minimum 1m\*1m ground metallic plane put on this table. EUT is put in the center of the magnetic coil then two orientations of the magnetic coil, horizontal and vertical, shall be rotated in order to expose the EUT to the difference polarization magnetic field.

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

## 4.8.3.3. Photo of the test set-up



## 4.8.4. Test specification:

Test frequency: ☒ 50 Hz ☒ 60 Hz

Continuous field: ☒ 30 A/m

Test duration: ☒ 5 mins

Antenna factor: 0.917 A/m

Axis: ☒ x-axis ☒ y-axis ☒ z-axis

## 4.8.5. Test result

The requirements are **Fulfilled**

Performance Criterion: **A**

**Remarks:** During the test, the EUT has no loss of function or performance.

4.9. Voltage Dips and Interruptions

For test instruments and accessories used see section 3.6.

4.9.1. Description of the test location and date

Test location: Shielded room  
Shenzhen CTL Testing Technical Services Co., Ltd. (CNAS Registration Number: L14175)  
Address: 101, Building 1, Longbang Industrial Park Phase 1, No.8, Tianyuan Road, Shutianpu Community, Matian Subdistrict, Guangming District, Shenzhen, Guangdong, China

4.9.2. Severity levels of voltage dips and interruptions

Test Level (%Ut)	Voltage Dip And Short Interruptions (%Ut)	Duration (In Period)		Phase angle (°)	Performance criterion
		50Hz	60Hz		
0	100	1	/	0 ° 45 °, 90 °, 135 °, 180 °, 225 °, 270 °, 315 °	B
0	100	250	300	0 ° 45 °, 90 °, 135 °, 180 °, 225 °, 270 °, 315 °	C
70	30	25	30	0 ° 45 °, 90 °, 135 °, 180 °, 225 °, 270 °, 315 °	C
40	60	10	12	0 ° 45 °, 90 °, 135 °, 180 °, 225 °, 270 °, 315 °	C

4.9.3. Description of the test set-up

4.9.3.1. Operating Condition

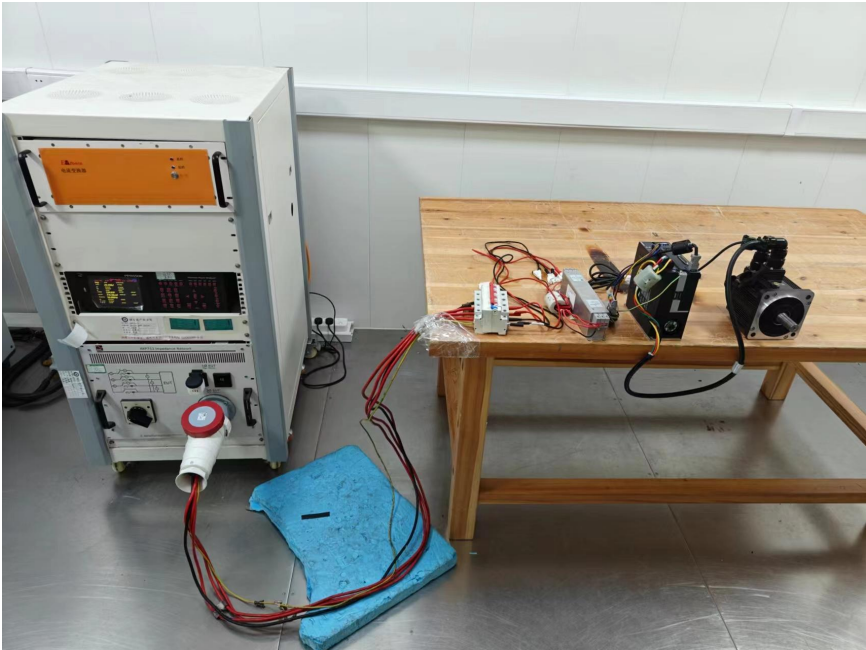
The EUT is operated in the normal working during the test, and the results of the maximum emanation are recorded.

4.9.3.2. Test Configuration and Procedure

EUT is connected to the simulator according to the test photo. When conducting this test, the power supply shall be set at the minimum and maximum rated input voltages and test voltage changes shall be step changes at the phase angle of 0 ° , 45 ° , 90 ° , 135 ° , 180 ° , 225 ° , 270 ° and 315 ° .



4.9.3.3. Photo of the test set-up



4.9.4. Test specification:

- Nominal Mains Voltage ( $V_N$ ):

■ 220 V AC
- Number of voltage fluctuations:

■ 3
- Level of reduction(dip) / duration:

■ 100% / 10 ms ■ 30% / 500 ms ■ 60% / 200 ms
- Nominal Mains Voltage ( $V_N$ ):

■ 220 V AC
- Number of Interruptions:

■ 3
- Duration of the Interruption:

■ 5 000 ms

4.9.5. Test result

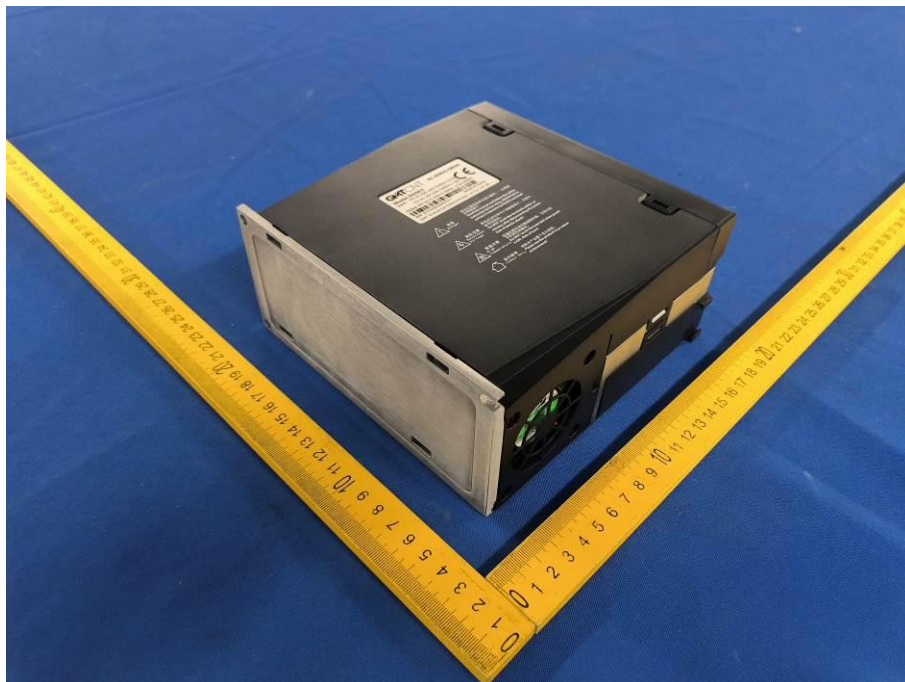
The requirements are **Fulfilled**

Performance Criterion **See the table below**

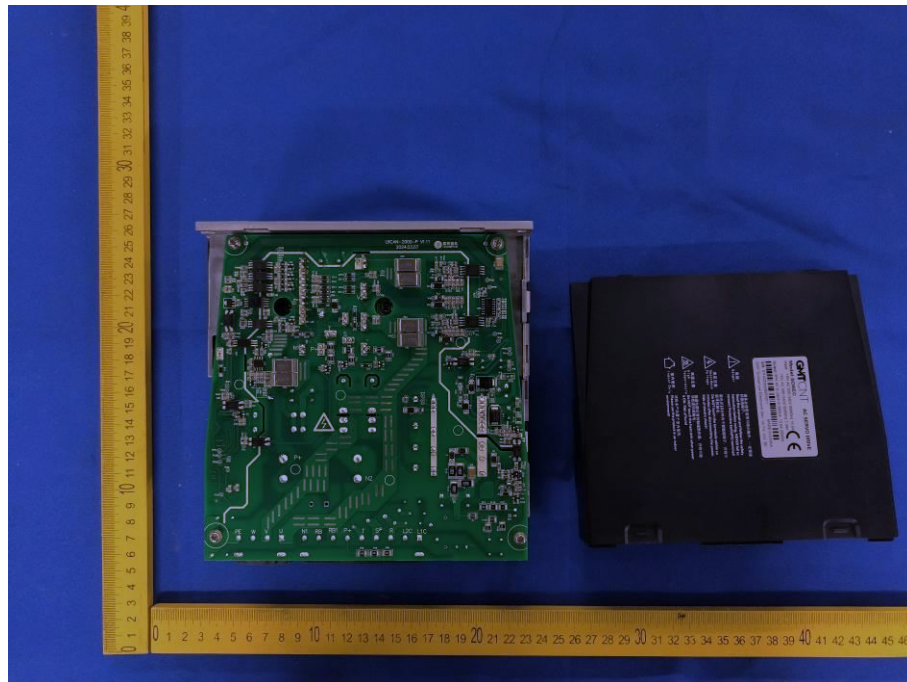
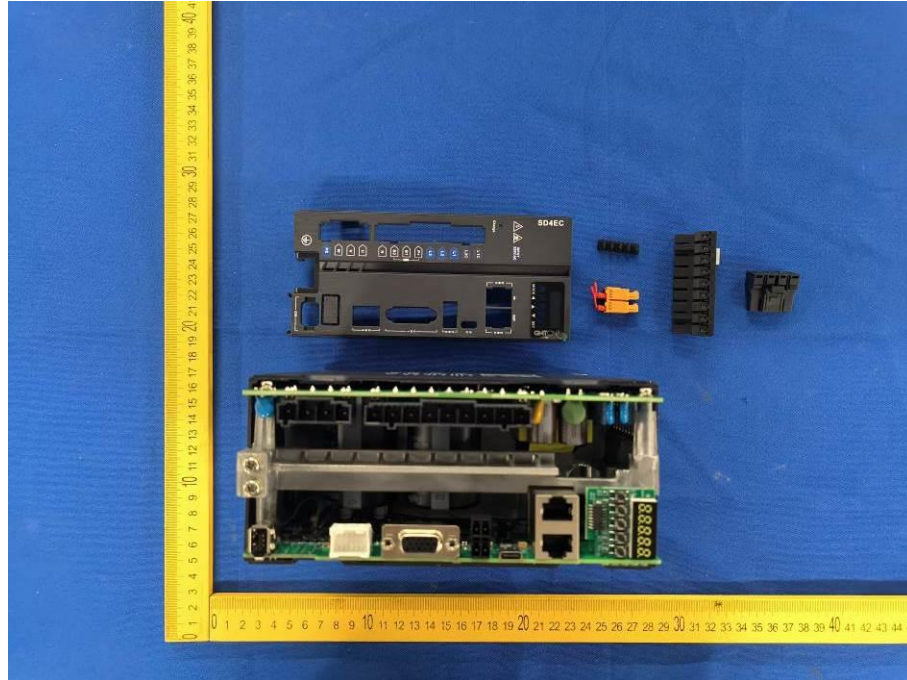
Test Level (%Ut)	Voltage Dip And Short Interruptions (%Ut)	Duration (In Period)		Phase angle (°)	Test result
		50Hz	60Hz		
0	100	1	/	0 ° 45 °, 90 °, 135 °,180 °, 225 °, 270 °, 315 °	A
0	100	250	300	0 ° 45 °, 90 °, 135 °,180 °, 225 °, 270 °, 315 °	C
70	30	25	30	0 ° 45 °, 90 °, 135 °,180 °, 225 °, 270 °, 315 °	A
40	60	10	12	0 ° 45 °, 90 °, 135 °,180 °, 225 °, 270 °, 315 °	A

## 5. External and Internal Photos of the EUT

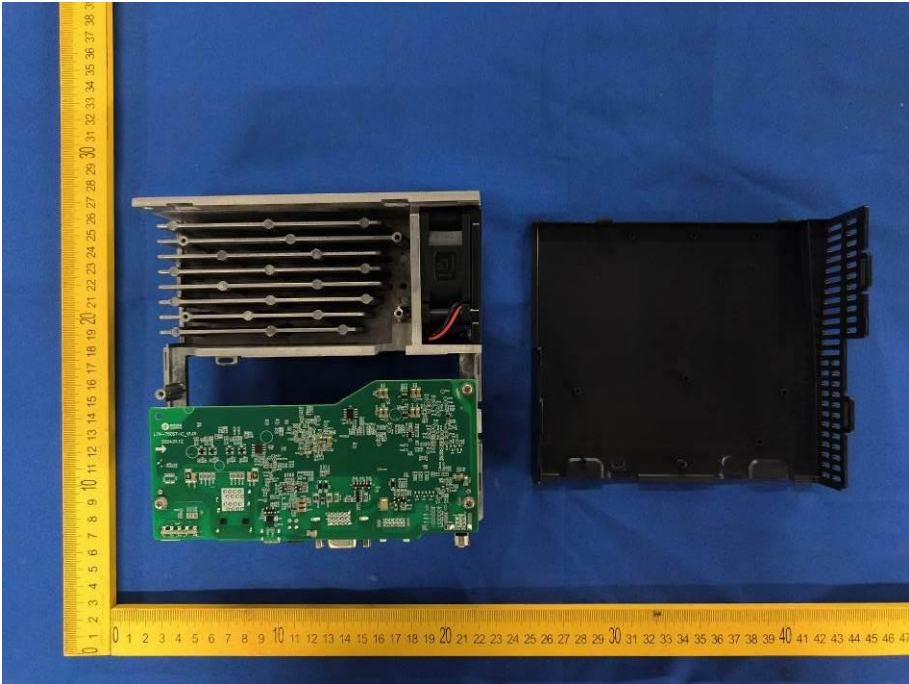
### 5.1. External photos of the EUT

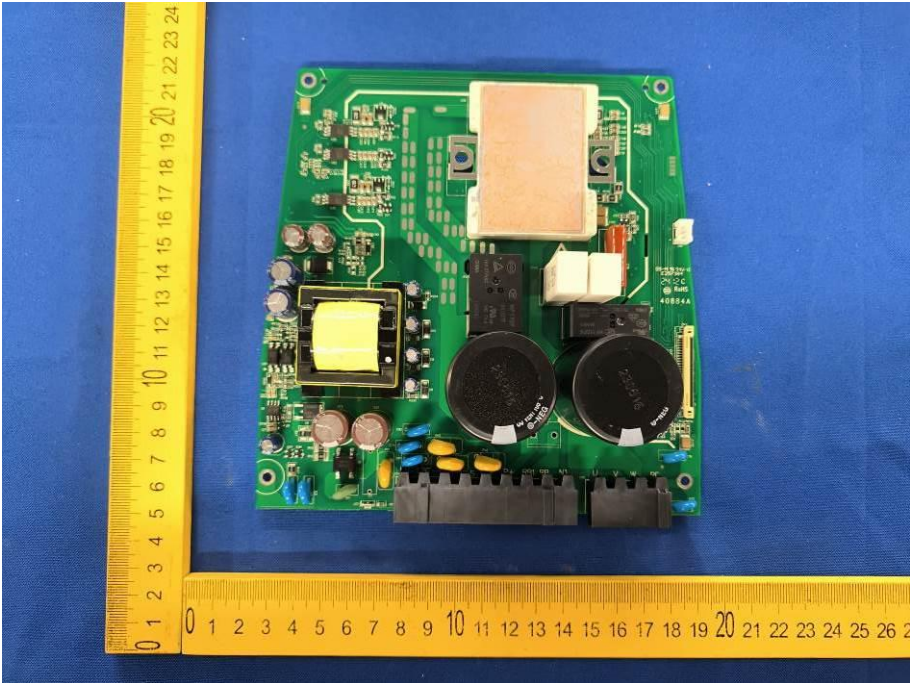
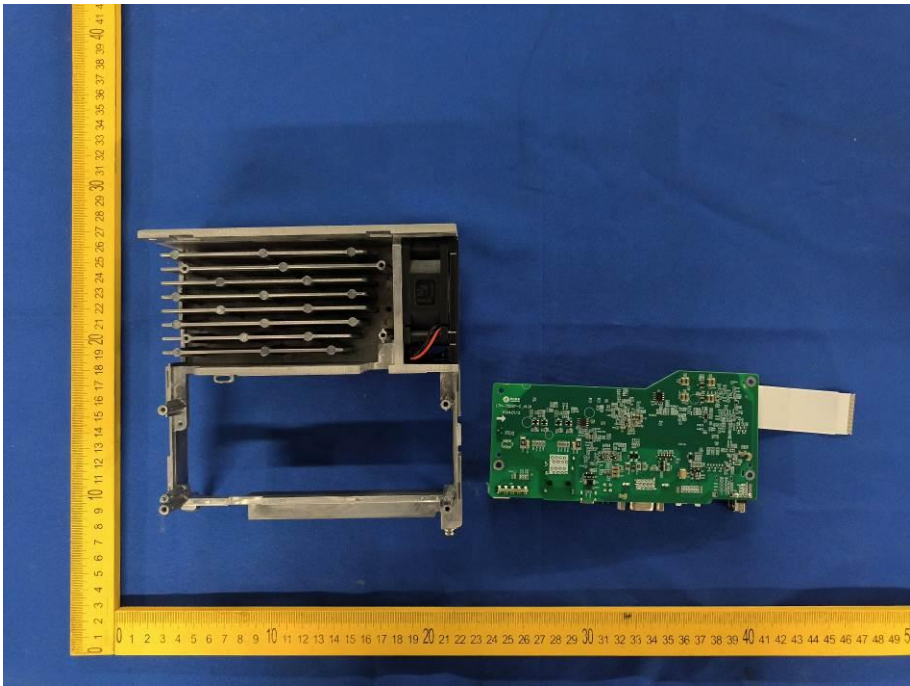


## 5.2. Internal photos of the EUT

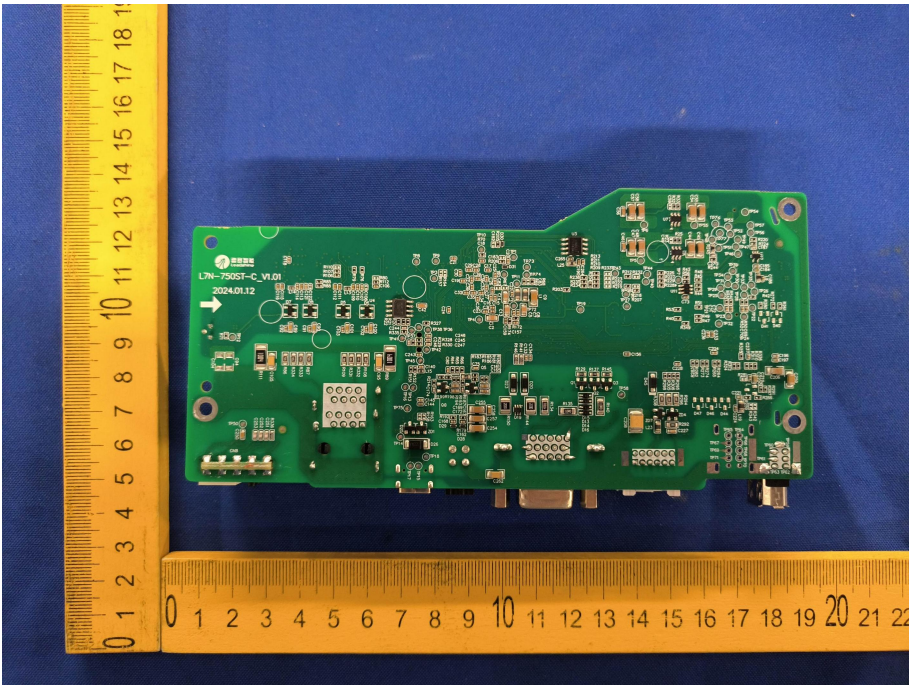
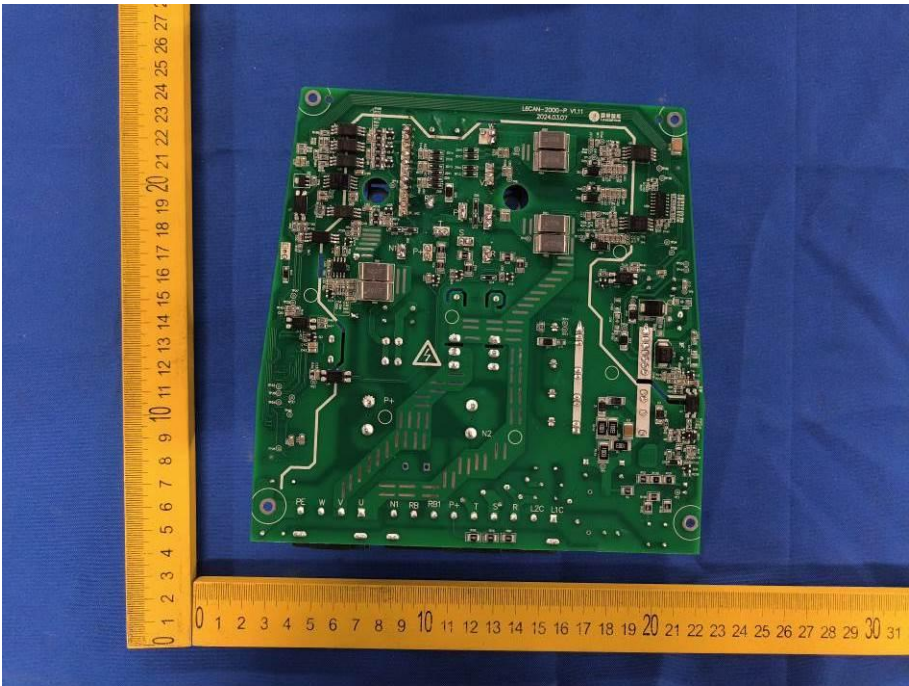


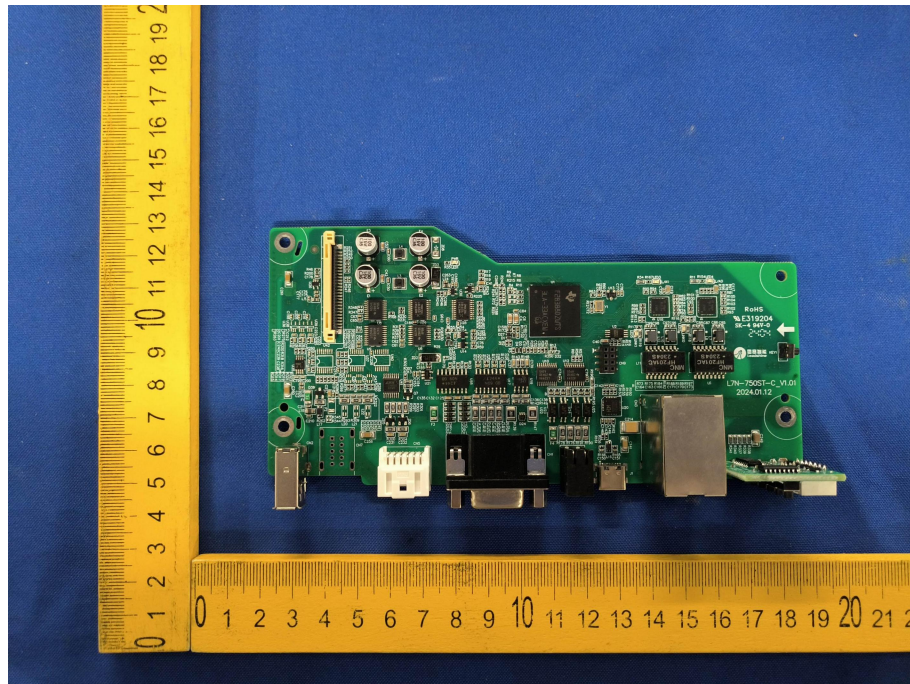












.....End of Report.....