EMC TEST REPORT

Report No.:	SET2022-16630
Product:	BL6-U Series elevator integrated controller
Trade name:	/
Model No.:	BL6-UO4110
Applicant:	Shenyang bluelight new generation technology Co.,Ltd
Issued by:	CCIC Southern Electronic Product Testing (Shenzhen) CO., Ltd
Lab Location:	Electronic Testing Building, No. 43 Shahe Road, Xili Jiedao, Nanshan District, Shenzhen, Guangdong, China
	Tel: 86 755 26627338 **Fax:** 86 755 26627238

This test report consists of 42 pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by CCIC-SET. The test results in the report only apply to the tested sample. The test report shall be invalid without all the signatures of testing engineers, reviewer and approver. Any objections must be raised to CCIC-SET within 15 days since the date when the report is received. It will not be taken into consideration beyond this limit.

Query No. :Z3JbXZa1

Test Report

Product.....:	BL6-U Series elevator integrated controller
Model No. .....:	BL6-UO4110
Trade Name.....:	/
Applicant.....:	Shenyang bluelight new generation technology Co.,Ltd
Applicant Address.....:	No. 37 Shiji Road, Hunnan New District, Shenyang, China
Manufacturer.....:	Shenyang bluelight new generation technology Co.,Ltd
Manufacturer Address.....:	No. 37 Shiji Road, Hunnan New District, Shenyang, China
Test Standards.....:	**EN 12015:2014** Electromagnetic compatibility - Product family standard for lifts, escalators and moving walks – Emission **EN 12016:2013** Electromagnetic compatibility - Product family standard for lifts, escalators and moving walks - Immunity ☆**EN 12015:2020** Electromagnetic compatibility - Product family standard for lifts, escalators and moving walks – Emission
Test Result.....:	Pass
Tested by .....:	Wu Ferida Jan.06, 2023
Reviewed by.....:	Jin Jing Jan.06, 2023
Approved by.....:	Zhang Rong Jan.06, 2023

CCIC Southern Testing Co., Ltd. CCIC-SET

Table of Contents

1 General Information 5
1.1 Description of EUT 5
1.2 Auxiliary equipment 5
1.3 Objective 5
1.4 Environmental Conditions 5
1.5 Measurement Uncertainty 6
1.6 Test Standards and Results 6
1.7 List of Equipment Used 7
2 Emission Test 8
2.1 EUT Setup and Operating Conditions 8
2.2 Mains Terminal Disturbance Voltage Measurement 8
2.2.1 Limits of Mains Terminal Disturbance Voltage 8
2.2.2 Test Procedure 8
2.2.3 Test Setup 9
2.2.4 Test Result 9
2.3 Radiated Disturbance Measurement 12
2.3.1 Limits of Radiated Disturbance 12
2.3.2 Test Procedure 12
2.3.3 Test Setup 13
2.3.4 Test Result 14
2.4 Discontinuous Disturbance, Click 16
2.4.1 Limits of Discontinuous Disturbance 16
2.4.2 Test Procedure 16
2.4.3 Test Setup 16
2.4.4 Test Result 17

2.5 Harmonic Current Measurement 18

2.5.1 Limits of Harmonic Current 18

2.5.2 Test Setup 18

2.5.3 Test Result 19

2.6 Voltage Fluctuation and Flick Measurement 20

2.6.1 Limits of Voltage Fluctuation and Flick 20

2.6.2 Test Procedure 20

2.6.3 Test Result 20

3 Immunity Test 21

3.1 Performance Criteria 21

3.2 Immunity tests to high-frequency disturbance 22

3.2.1 EUT Setup and Operating Conditions 22

3.2.2 Electrostatic Discharge Immunity Test 22

3.3.3 Radiated, Radio Frequency Electromagnetic Field Immunity Test 25

3.3.4 Electrical Fast Transient/Burst Immunity Test 27

3.3.5 Surge Immunity Test 29

3.3.6 Immunity to Conducted Disturbances Induced by RF Fields 31

3.3.7 Voltage Dips and Short Interruptions Immunity Test 33

Appendix I：Photographs of the EUT 35

Appendix II：Photographs of EMC Test Configuration 36

1 General Information

1.1 Description of EUT

Product:	BL6-U Series elevator integrated controller
Model No.:	BL6-UO4110
Rating:	INPUT: 3~, 380/400VAC, 50/60Hz, 260A, 171KVA OUTPUT: 3~, 0-380VAC for 3~, 380VAC input voltage 3~,0-400VAC for 3~, 400VAC input voltage 0-60Hz, 240A, 158KVA
AC ADAPTER:	/
I/O Port:	/
Accessories:	/

NOTE:

1. For a more detailed features description about the EUT, please refer to User's Manual.
2. The maximum operating frequency is below 108MHz.

1.2 Auxiliary equipment

Name	Model	Manufacturer	Serial No.	Instrument No.
Electric machinery	ZFTWJY250-1600U	/	F1470090MC	/

1.3 Objective

Perform Electro Magnetic Interference (EMI) and Electro Magnetic Susceptibility (EMS) tests for CE Marking.

1.4 Environmental Conditions

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

- Temperature: 15-35 ℃
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

1.5 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

- Uncertainty of Conducted Emission, Uc = ±3.0dB
- Uncertainty of Radiated Emission(30MHz-1GHz), Uc = ±5.8dB

1.6 Test Standards and Results

The EUT has been tested according to the following specifications:

EMISSION		
Standard	**Test Type**	**Result**
EN 12015:2014 ☆EN 12015:2020	Mains terminal disturbance voltage	PASS
	Radiated disturbance	PASS
	Discontinuous Disturbance, Click	PASS
	Harmonic Current Measurement	PASS
	Voltage Fluctuation and Flick Measurement	PASS
IMMUNITY		
Basic Standard	**Test Type**	**Result**
EN 12016:2013	Electrostatic discharge immunity	PASS
	Radiated, radio frequency electromagnetic field immunity	PASS
	Electrical fast transient/burst immunity	PASS
	Surge immunity	PASS
	Immunity to conducted disturbances induced by RF fields	PASS
	Voltage Dips and Short Interruptions Immunity Test	PASS

NOTE: The latest versions of basic standards are applied.

1.7 List of Equipment Used

Description	Manufacturer	Model No.	Cal. Due Date	Serial No.
Test Receiver	KEYSIGHT	N9038A	Jul. 20, 2023	A141202036
LISN	ROHDE&SCHWARZ	ESH2-Z5	Feb. 16, 2023	A0304221
Shielding room	XINJU Electronics	L7300*W4500*H3100	Jul. 29, 2026	A181003226
Test Receiver	ROHDE&SCHWARZ	ESW26	Jul. 30, 2023	A180502935
EMI Horn Ant.	ETC	MCTD 2786	Mar. 04, 2024	A150402239
Anechoic Chamber	Albatross	EMC 12.8 x6.8 x6.4(m)	Mar. 24, 2023	A0304210
ESD Test System	TESEQ	NSG 437	Sep. 20, 2023	A170902745
Surge electrical fast transient comprehensive simulator	3C TEST	CCS500	Apr. 17, 2023	A181003223
Three-phase coupling network	3C TEST	SEPN1000T	Apr. 17, 2023	A181003224
Capacitive coupling clamp	HAEFELY	IP4A	Feb. 16, 2023	C030400465
AC Power source	Chroma	Chroma 61860	Dec. 12, 2023	A150202185
3 phases harmonic analyzer	EM TEST	DPA503N	Sep. 21, 2023	A150202183
3 Phases Flicker Impedance	EM TEST	AIF 503N75	Sep. 21, 2023	A150202184
EM Injection Clamp	FCC	F-2031-23mm	Apr. 23, 2023	A0308322
Current injection probe	AR	F-120-9A	Jul. 20, 2023	343
Signal Generator	ROHDE&SCHWARZ	SMB100A	Dec. 22, 2022	A180502936
Power Amplifier	MILMEGA	80RF1000-250	Apr. 05, 2024	A140901925
Power Amplifier	AR	75A250AMI	Sep. 21, 2023	A0304255
Power Amplifier	Rflight	NTWPA-1060200	Jul. 19, 2023	A181203431
Stacked log periodic antenna	SCHWARZEBCK	STLP 9129	Nov. 19, 2024	A181203430
6/75 attenuator	EM TEST	ATT6/75	Oct. 23, 2023	A0304254
power meter	Agilent	E4417A	Aug. 22, 2023	A151102418
Disturbance analyzer	SCHAFFNER	DIA1512D	Dec. 23, 2023	A0304244

NOTE: Equipment above has been calibrated and is in the period of validation.

2 Emission Test

2.1 EUT Setup and Operating Conditions

The EUT was powered by 380V AC Mains and connected to a motor with no load.

2.2 Mains Terminal Disturbance Voltage Measurement

2.2.1 Limits of Mains Terminal Disturbance Voltage

Frequency range (MHz)	Limits (dBμV) Rated current >100A	
	Quasi-peak	Average
0.15 - 0.50	130	120
0.50 - 5	125	115
5 - 30	115	105

NOTE:

1. The lower limit shall apply at the transition frequencies.

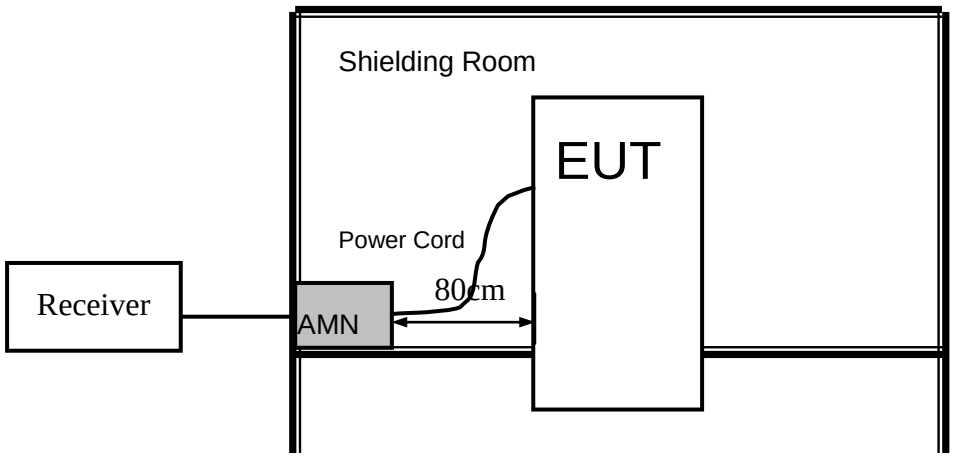
2.2.2 Test Procedure

a. The EUT was placed 0.1 meters above the ground at a semi-anechoic chamber with EUT being connected to the power mains through a line impedance stabilization network (LISN). The LISN provide 50Ω/50μH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits are not reported.

2.2.3 Test Setup



For the actual test configuration, please refer to the related item - Photographs of the Test Configuration.

2.2.4 Test Result

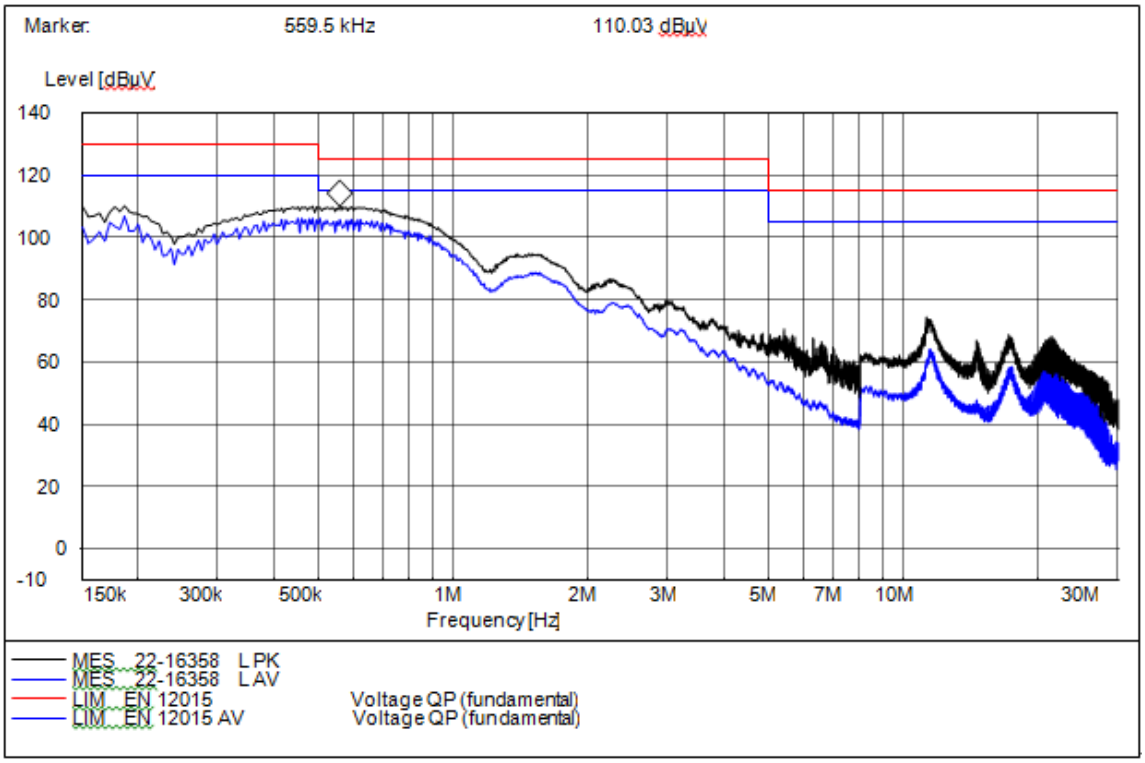
NO.	Freq. (MHz)	Limit Value (dBμV)		Emission Level (dBμV)	
		QP	AV	QP	AV
L1 Phase					
1	0.1868	130.0	120.0	110.05	NOTE 2
2	0.5416	125.0	115.0	105.83	NOTE 2
3	0.6310	125.0	115.0	108.65	NOTE 2
L2 Phase					
1	0.1500	130.0	120.0	120.46	119.70
2	0.1860	130.0	120.0	120.91	119.70
3	0.2355	130.0	120.0	117.78	NOTE 2
L3 Phase					
1	0.1500	130.0	120.0	111.36	NOTE 2
2	0.1860	130.0	120.0	109.40	NOTE 2
3	0.2355	125.0	115.0	105.52	NOTE 2

NOTE:

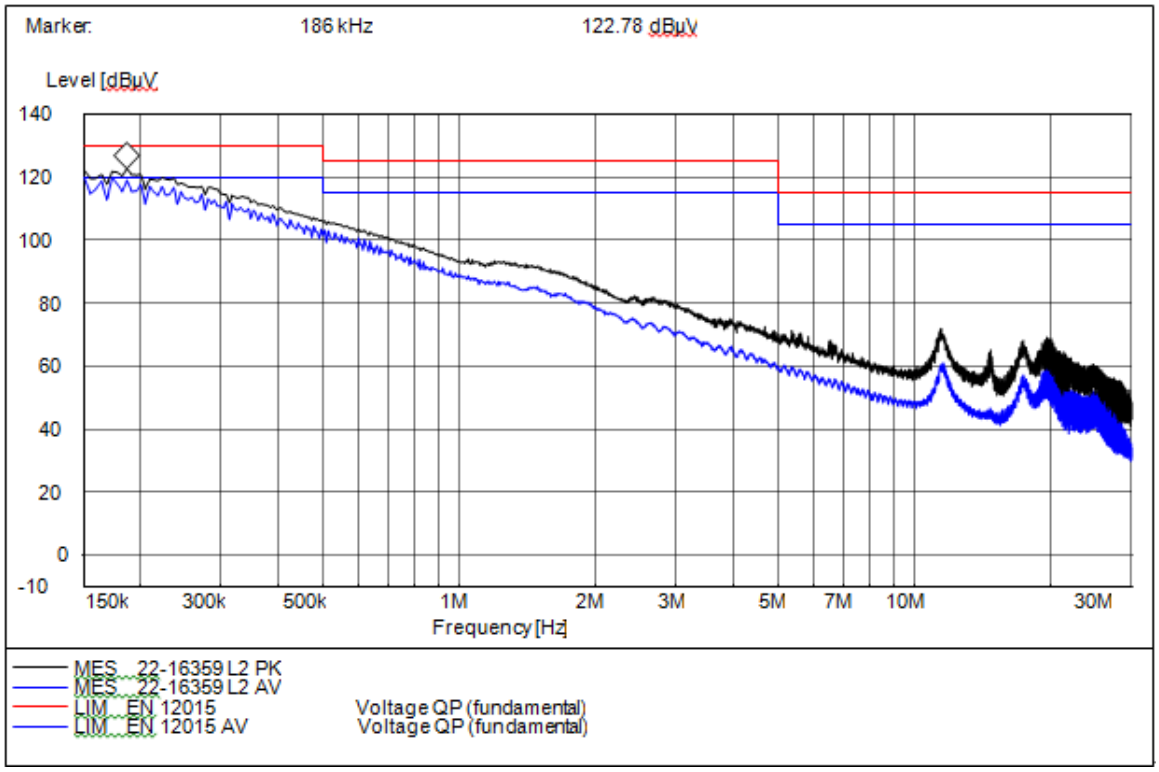
1. QP and AV are abbreviations of the quasi-peak and average individually.
2. If the emission levels measured with QP detector are lower than AV limits, there is unnecessary to measure with AV detector.
3. The emission levels recorded above is the larger ones of each phase.

Measurement Plots

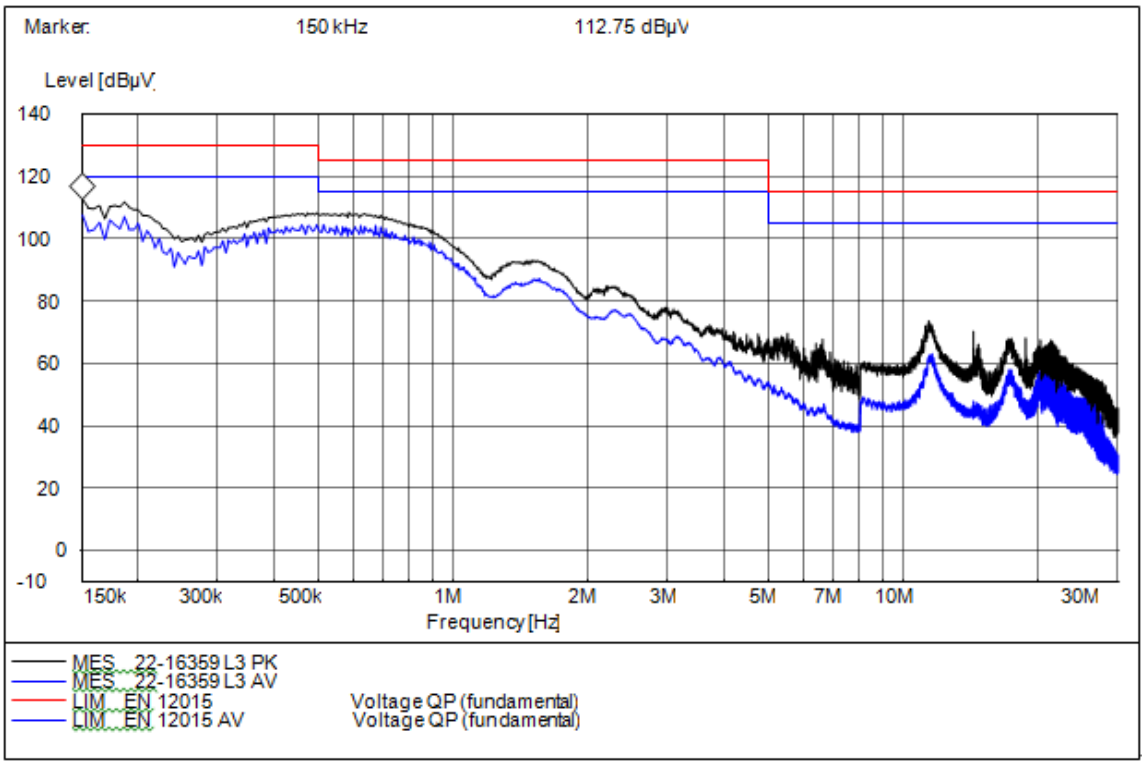
1. Mains terminal disturbance voltage，L1 phase



2. Mains terminal disturbance voltage，L2 phase



3. Mains terminal disturbance voltage，L3 phase



2.3 Radiated Disturbance Measurement

2.3.1 Limits of Radiated Disturbance

Frequency range (MHz)	Quasi peak limits(dBμV/m), at 3m measurement distance
30 - 230	50
230 - 1000	57

Notes:

(1) The lower limit shall apply at the transition frequency.

(2) Additional provisions may be required for cases where interference occurs.

2.3.2 Test Procedure

a. The EUT was placed on the top of an insulating table 0.1 meters above the ground at a semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

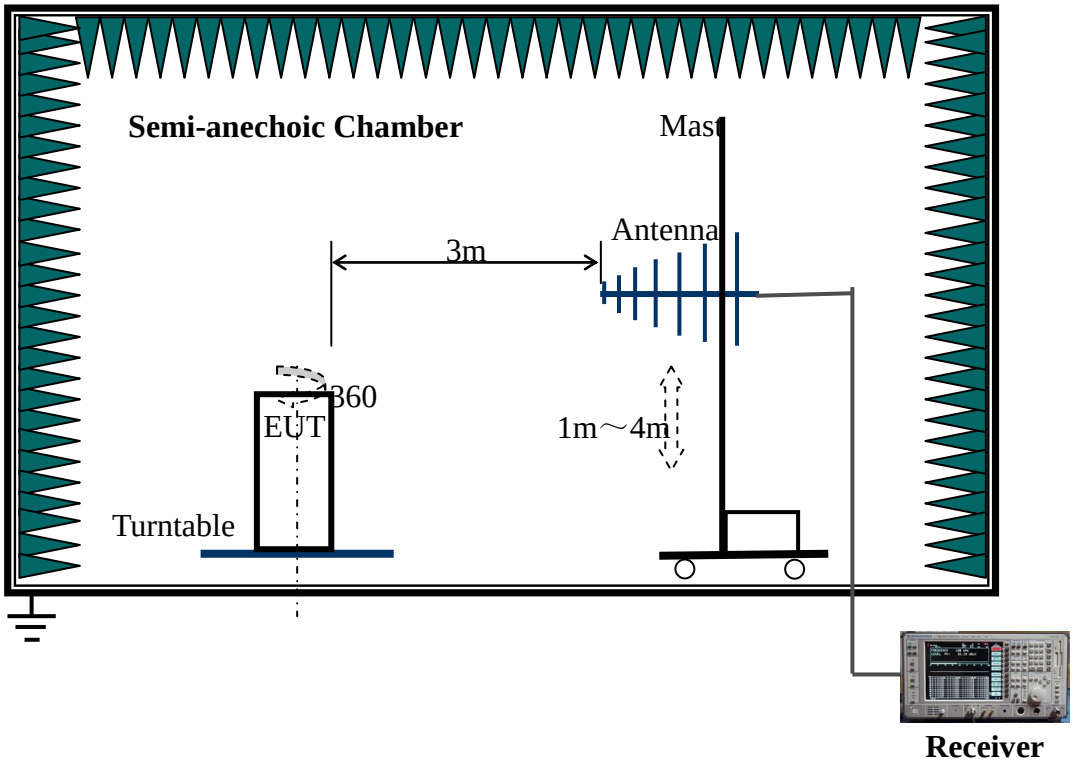
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna is a broadband antenna, and its height is varied from 1 to 4 meter above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to the heights from 1 to 4 meters and the ratable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detector Function and Specified Bandwidth with Maximum Hold Mode. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emission that did not have 10dB margin would be retested one by one using the quasi-peak method.

2.3.3 Test Setup

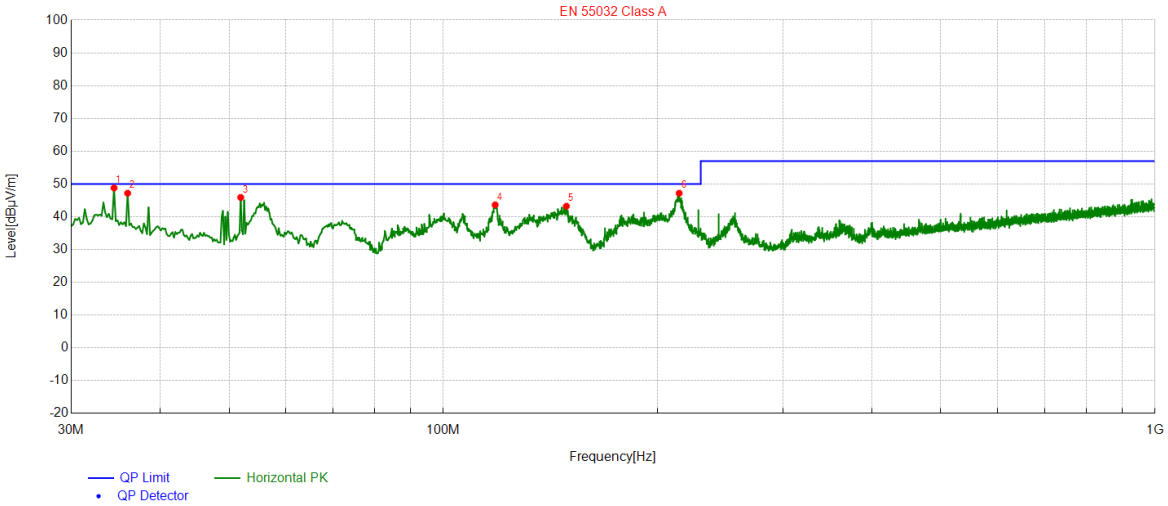


For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

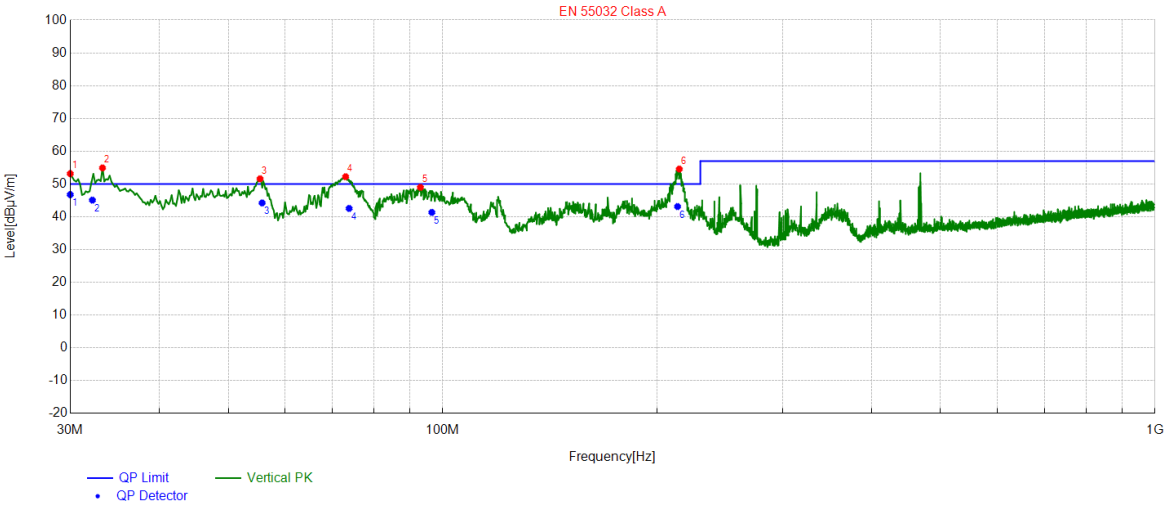
2.3.4 Test Result

No.	Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Table Angle (Degree)	QP Limits (dBμV/m)	Emission Level (dBμV/m)
1	34.4600	H	200	142	50.0	40.79
2	36.0100	H	200	133	50.0	39.19
3	51.9200	H	200	142	50.0	37.89
4	118.2700	H	200	352	50.0	35.63
5	148.9200	H	200	347	50.0	35.22
6	214.4900	H	200	307	50.0	39.18
7	30.0000	V	100	276	50.0	46.75
8	32.2276	V	100	145.6	50.0	45.07
9	55.7861	V	100	146	50.0	44.22
10	73.8965	V	100	360	50.0	42.54
11	96.5630	V	100	356	50.0	41.33
12	213.6641	V	100	276.5	50.0	43.11

1. Electromagnetic radiation disturbances, max peak detector, antenna polarization: Horizontal



2. Electromagnetic radiation disturbances, max peak detector, antenna polarization: Vertical



2.4 Discontinuous Disturbance, Click

2.4.1 Limits of Discontinuous Disturbance

For all equipment which produced discontinuous disturbances other than clicks, or clicks with a click rate N equal to or greater than 30, the limits listed in the following table apply (same as the limits of mains terminal disturbance voltage).

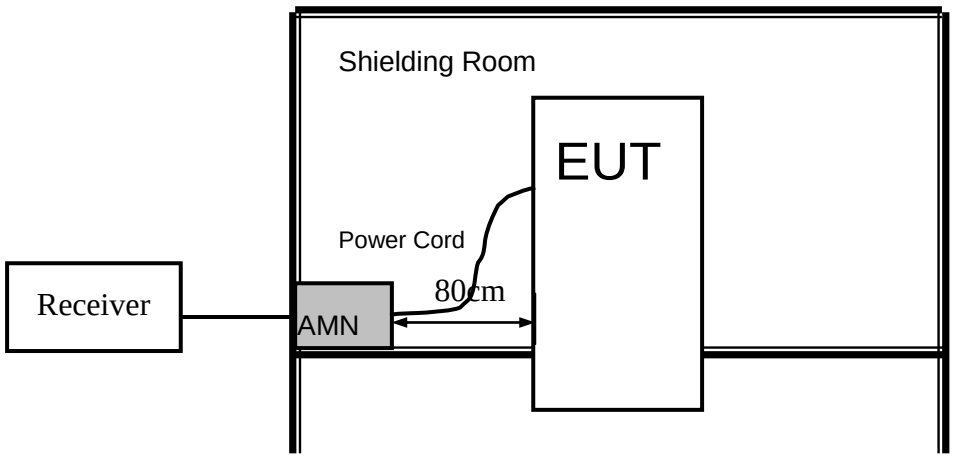
Otherwise, the click limit Lq is attained by increasing the relevant limit L listed in the following table with:

20lg(30/N)dB, for 0.2≤N<30.

2.4.2 Test Procedure

a. The discontinuous disturbance is only measured with a measuring receiver including a quasi-peak detector. The EUT is connected to the power mains through a line impedance stabilization network (LISN). The LISN provide 50Ω/50μH of coupling impedance for the measuring receiver.
b. The minimum observation time is either the time to register 40 clicks (or 40 switching operation) or 120 minutes.
c. The click rate N shall be determined at 150 kHz for the frequency range 148.5 kHz to 500 kHz and at 500 kHz for the frequency range 500 kHz to 30 MHz.
d. The measurement of disturbance generated by switching operations shall be performed at the following restricted number of frequencies: 150 kHz, 500 kHz, 1.4 MHz, and 30 MHz.
e. If the EUT is assessed for compliance with the higher Lq in according with the upper quartile method, the EUT shall be tested for a time not less than the minimum observation time T.

2.4.3 Test Setup



For the actual test configuration, please refer to the related item - Photographs of the Test Configuration.

2.4.4 Test Result

	Test Frequency	150kHz	500 kHz	1.4MHz	30MHz
First Test	Sensitive (dBμV)	130	125	125	115
	Short click number, n1(≤10ms)	1	1	0	0
	Long click number, n2(10ms-200ms)	0	0	0	0
	Total click number, n_1=(n1+n2)	1	1	0	0
	Continuous disturbance (>200ms)	0	0	0	0
	Switching operation number, n_2	/			
	Duration limit, T(min)	120			
	Click rate, N=n/T	0.01	0.01	0	0
	Click limit, Lq(dBμV)	170	169	169	159
	Allowable number of click exceeding the limit Lq (n/4)	/	/	/	/
Second Test	Sensitive (dBμV)	/	/	/	/
	Short click number, n1(≤10ms)	/	/	/	/
	Long click number, n2(10ms-200ms)	/	/	/	/
	Total click number, n=(n1+n2)	/	/	/	/
	Number of click exceeding the limit Lq	/	/	/	/

NOTE:

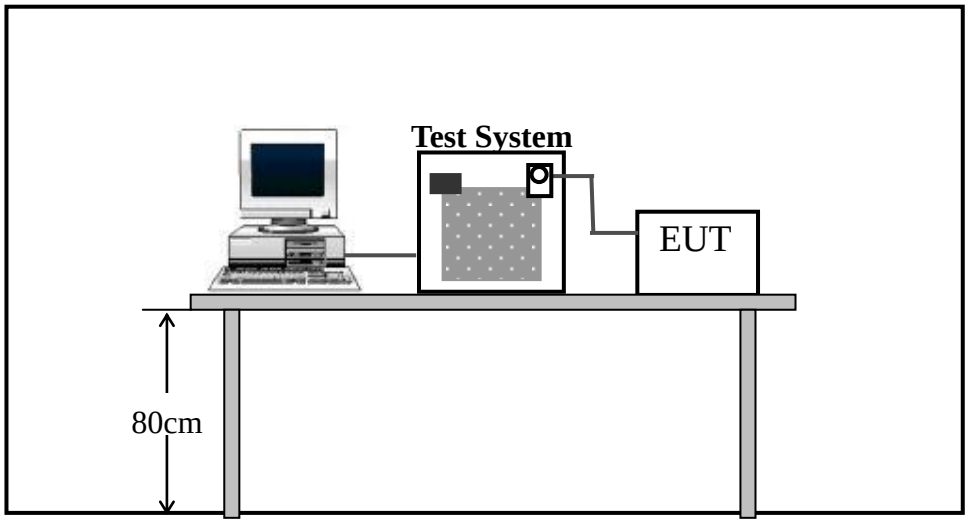
1. No click was detected during the first test, so it’s no need to perform the second test.

2.5 Harmonic Current Measurement

2.5.1 Limits of Harmonic Current

Environmental phenomena	Limits %		
Harmonic distortion	Admissible individual Harmonic current I_h / I_{ref}	I_5 / I_{ref}	31
		I_7 / I_{ref}	20
		I_{11} / I_{ref}	12
		I_{13} / I_{ref}	7
	Admissible harmonic parameters	THC	37
		PWHC	38
The relative value of even harmonics up to order 12 shall not exceed 16/n[%]. Even harmonics above order 12 are taken into account in THD and PWHD in the same way as odd order harmonics.			
[a] The given limits are based on Rsce = 250 (balanced three phase equipment).			

2.5.2 Test Setup



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

2.5.3 Test Result

Test Specification

Test Frequency:	50Hz	**Test Voltage:**	380Vac
Waveform:	Sine	**Test Time:**	2.5min

Test Result：

Environmental phenomena	Units %	Measurement Value			Limits for permanent emission	Remarks
		L1	L2	L3		
Harmonic distortion	I_5/I_1	18.61	19.32	18.96	31	PASS
	I_7/I_1	9.26	8.86	8.92	20	PASS
	I_{11}/I_1	3.35	3.76	4.12	12	PASS
	I_{13}/I_1	1.31	1.26	1.20	7	PASS
Harmonic distortion factor	THC	1.317	1.253	1.289	37	PASS
	PWHC	22.5	21.4	20.0	38	PASS

2.6 Voltage Fluctuation and Flick Measurement

2.6.1 Limits of Voltage Fluctuation and Flick

Test Item	Limit	Note
P_{st}	1.0	P_{st} means Short-term flicker indicator
P_{lt}	0.65	P_{lt} means long-term flicker indicator
T_{dt}	500mS	T_{dt} means maximum time that d_t exceeds 3%
d_{max}(%)	4%	d_{max} means maximum relative voltage change.
d_c(%)	3.3%	d_c means relative steady-state voltage change.

2.6.2 Test Procedure

a. The EUT was placed on the top of a wooden table 0.1 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal conditions

b. During the flick measurement, the measure time shall include that part of whole operation changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

2.6.3 Test Result

Test Specification

Test Frequency:	50Hz	**Test Voltage:**	380Vac
Waveform:	Sine	**Test Time:**	10 minutes(P_{st}); 2 hours (P_{lt})

Test Result

Test Parameter	Measurement Value			Limit	Remarks
	L1	L2	L3		
P_{st}	0.236	0.218	0.227	1.0	Pass
P_{lt}	0.236	0.218	0.227	0.65	Pass
d_c(%)	0.067	0.061	0.071	3.3%	Pass
d_{max}(%)	0.415	0.416	0.409	4%	Pass
Tdt(s)	0.000	0.000	0.000	0.5	Pass

3 Immunity Test

3.1 Performance Criteria

Criterion A	The apparatus/assembly of shall continue to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by its manufacture, when the apparatus or assembly of apparatus is used as intended. In some cases 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 what the user may reasonably expect from the apparatus or assembly of apparatus if used as intended.
Criterion B	The apparatus/assembly of apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by its manufacturer, when the apparatus or assembly of apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer then either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus or assembly of apparatus if used as intended.
Criterion C	Not used.
Criterion D	The apparatus/assembly of apparatus and the associated safety component(s) shall continue to operate as intended. No degradation of performance or loss of function is allowed other than a failure into a safe mode.

3.2 Immunity tests to high-frequency disturbance

3.2.1 EUT Setup and Operating Conditions

The EUT was powered by 380V AC Mains and connected to a motor with no load.

3.2.2 Electrostatic Discharge Immunity Test

3.2.2.1 Test Specification

Ports:	All Circuits	Safety circuits
Basic Standard:	EN 61000-4-2:2009	
Discharge Impedance	330Ω / 150 pF	
Discharge Voltage:	Air Discharge: 8 kV Contact Discharge: 4 kV	Air Discharge: 15 kV Contact Discharge: 6 kV
Polarity:	Positive / Negative	
Number of Discharge:	Minimum 20 times at each test point	
Discharge Mode:	Single discharge	
Discharge Period:	1-second minimum	
Criteria:	B	D

3.3.2.2 Test Procedure

The discharges shall be applied in two ways:

a. Contact discharges to the conductive surfaces and coupling planes:

The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. One of the test points shall be subjected to at least 50 indirect discharges to the center of the front edge of the horizontal coupling plane. The remaining three contact test points shall each receive at least 50 direct contact discharges. If no direct contact test points are available, at least 200 indirect discharges shall be applied in the indirect mode. Test shall be performed at a maximum repetition rate of one discharge per second.

b. Air discharges at slots and apertures and insulating surfaces:

On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur. Such points are tested using the air discharge method. This investigation should be restricted to those area normally handled selected test point for each such area.

The basic test procedure was in accordance with EN 61000-4-2:

a. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.

b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.

c. The time interval between two successive single discharges was at least 1 second.

d. The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the EUT.

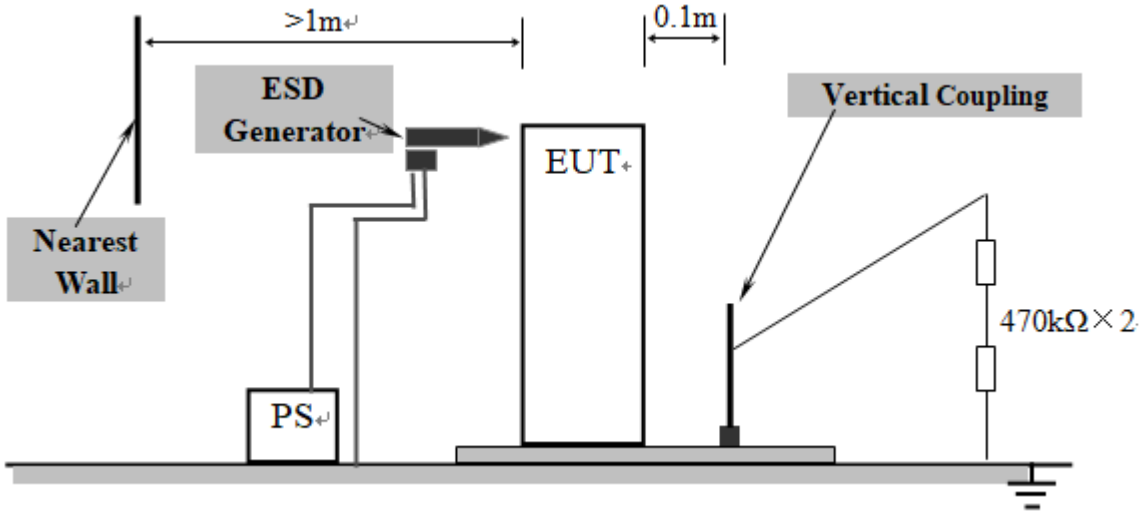
e. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.

f. Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were completed.

g. At least ten single discharges (in the most sensitive polarity) were applied to the Horizontal Coupling Plane at points on each side of the EUT. The ESD generator was positioned vertically at a distance of 0.1 meters from the EUT with the discharge electrode touching the HCP.

h. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the Vertical Coupling Plane in sufficiently different positions that the four faces of the EUT were completely illuminated. The VCP (dimensions 0.5m×0.5m) was placed vertically to and 0.1 meters from the EUT.

3.3.2.3 Test Setup



For the actual test configuration, please refer to Appendix II: Photographs of the Test Configuration.

3.3.2.4 Test Result

Test Points	Discharge Level (kV)	Discharge Mode	Observation	Comply with Criterion
Aperture of the cover	±8	Air	Note(1)	A
USB	±8	Air	Note(1)	A
RS232	±8	Air	Note(1)	A
Screws	±4, ±6	Contact	Note(1)	A
HCP	±4, ±6	Contact	Note(1)	A
VCP	±4, ±6	Contact	Note(1)	A

NOTE:

(1). The EUT continued to operate as intended. No degradation of performance was observed.

3.3.3 Radiated, Radio Frequency Electromagnetic Field Immunity Test

3.3.3.1 Test Specification

Ports:	All Circuits	Safety circuits
Basic Standard:	EN 61000-4-3:2006+A1:2008	
Frequency Range & Field Strength:	80 – 166 MHz, 10V/m; 166 – 1000 MHz, 10V/m; 1429 – 1516 MHz, 10V/m; 1710 – 1785 MHz, 10V/m; 1840 – 2170 MHz, 10V/m; 2300 – 2655 MHz, 10V/m;	80 – 166 MHz, 10V/m; 166 – 1000 MHz, 30V/m; 1429 – 1516 MHz, 30V/m; 1710 – 1785 MHz, 30V/m; 1840 – 2170 MHz, 10V/m; 2300 – 2655 MHz, 10V/m;
Modulation:	1kHz sine wave, 80%, AM modulation	
Frequency Step:	1% of fundamental	
Polarity of Antenna	Horizontal and Vertical	
Test Distance:	3m	
Antenna Height:	1.5m	
Dwell Time:	3 seconds	
Criteria:	A	D

3.3.3.2 Test Procedure

The test procedure was in accordance with EN 61000-4-3.

a. The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.

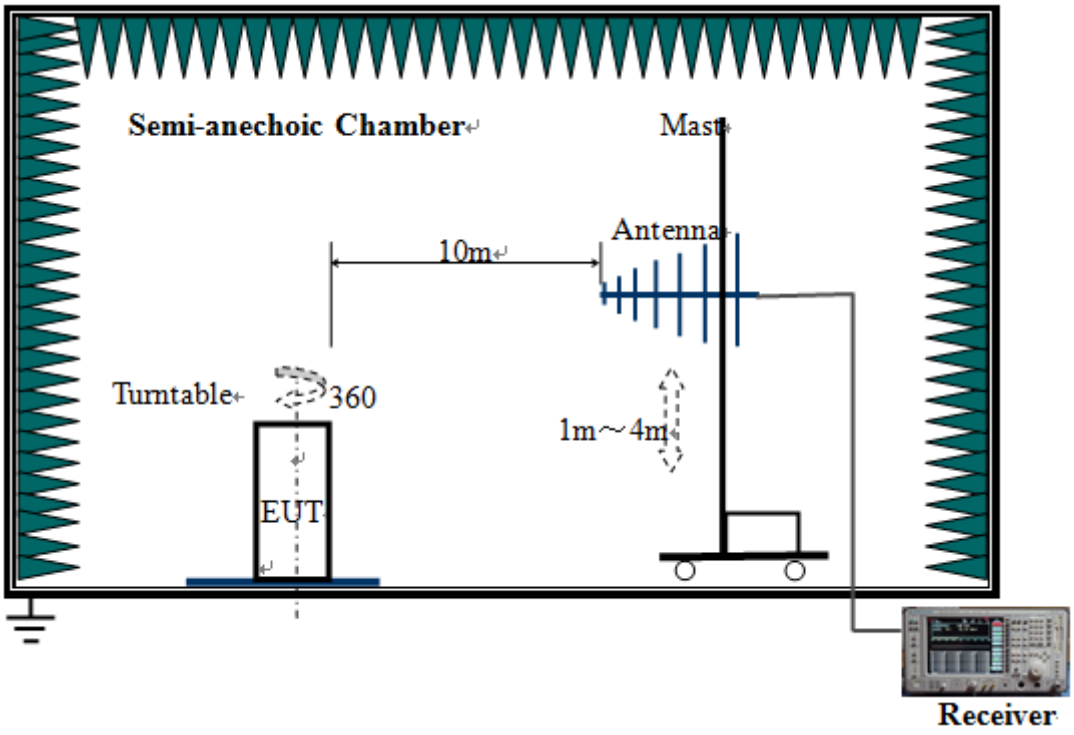
b. The frequency range is swept from 80 MHz to 2655 MHz with the signal 80% amplitude modulated with a 1 kHz sine wave. The rate of sweep did not exceed 1.5×10^{-3} decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.

c. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.

d. The field strength level was 10V/m and 30V/m.

e. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

3.3.3.3 Test Setup



For the actual test configuration, please refer to Appendix II: Photographs of the Test Configuration.

3.3.3.4 Test Result

Frequency	Polarity	Azimuth	Field Strength (V/m)	Observation	Comply with Criterion
80 – 166 MHz	V&H	0, 90, 180, 270	10	Note(1)	A
166 – 1000 MHz	V&H	0, 90, 180, 270	10, 30	Note(1)	A
1429 – 1516 MHz	V&H	0, 90, 180, 270	10, 30	Note(1)	A
1710 – 1785 MHz	V&H	0, 90, 180, 270	10, 30	Note(1)	A
1840 – 2170 MHz	V&H	0, 90, 180, 270	10	Note(1)	A
2300 – 2655 MHz	V&H	0, 90, 180, 270	10	Note(1)	A

NOTE:

(1). The EUT continued to operate as intended. No degradation of performance was observed.

3.3.4 Electrical Fast Transient/Burst Immunity Test

3.3.4.1 Test Specification

Ports:	All Circuits	Safety circuits
Basic Standard:	EN 61000-4-4:2012	
Test Voltage	a.c. power port: 1 kV Signal port: 0.5kV	a.c. power port: 4 kV Signal port: 2kV
Polarity:	Positive/Negative	
Impulse Frequency:	5kHz	2.5kHz
Impulse wave shape:	5/50ns	
Burst Duration:	15ms	
Burst Period:	300ms	
Test Duration:	Not less than 1 min.	
Criteria：	B	D

3.3.4.2 Test Procedure

a. The EUT was tested with 1000, 2000, 4000 volt discharges to the AC power input leads.

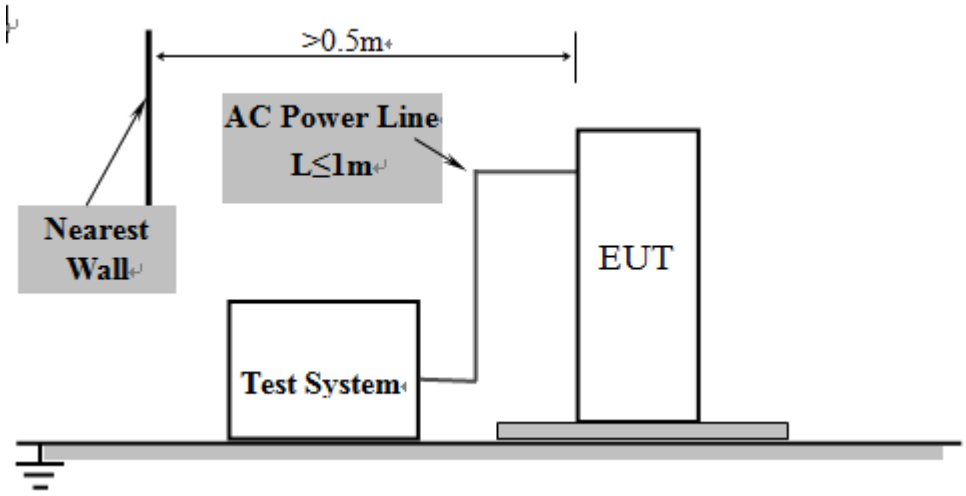
b. Both positive and negative polarity discharges were applied.

c. The length of the “hot wire” from the coaxial output of the EFT generator to the terminals on the EUT should not exceed 1 meter.

d. The duration time of each test sequential was 1 minute.

e. The transient/burst waveform was in accordance with EN 61000-4-4, 5/50ns.

3.3.4.3 Test Setup



For the actual test configuration, please refer to Appendix II: Photographs of the Test Configuration.

3.3.4.4 Test Result

Test Point Power port	Polarity	Test Level (kV)	Observation	Comply with Criterion
a.c. power port	+/-	1, 2, 4	Note (1)	A
Signal port	+/-	0.5, 1, 2	Note (1)	A

NOTE:

(1). The EUT continued to operate as intended. No degradation of performance was observed.

3.3.5 Surge Immunity Test

3.3.5.1 Test Specification

Ports:	All Circuits	Safety circuits
Basic Standard:	EN 61000-4-5:2014	
Waveform:	Voltage 1.2/50 μs; Current 8/20 μs	
Test Voltage:	line to line 1 kV, line to earth 2kV	line to line 1 kV, line to earth 2kV
Polarity:	Positive/Negative	
Phase Angle:	0°， 90°， 180°, 270°	
Repetition Rate:	60sec	
Times:	5 time/each condition.	
Criteria：	B	D

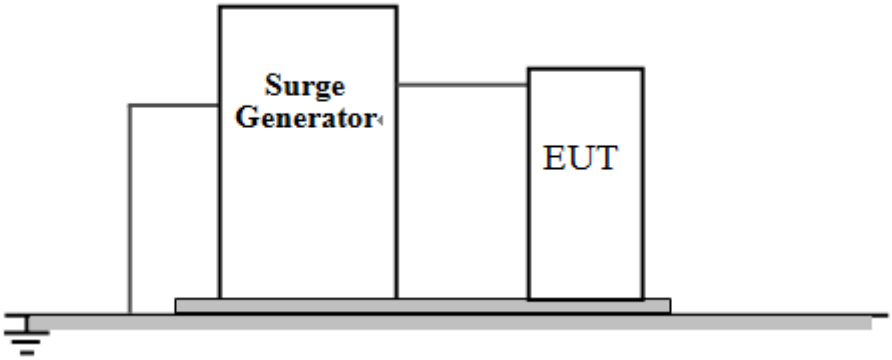
3.3.5.2 Test Procedure

a. The EUT and the auxiliary equipment were placed on a table of 0.1m heights above a metal ground reference plane. The size of ground plane is greater than 1m×1m and project beyond the EUT by at least 0.1m on all sides. The ground plane is connected to the protective earth. The length of power cord between the coupling device and the EUT was less than 2 meters (provided by the manufacturer).

b. The EUT was connected to the power mains through a coupling device that directly couples the surge interference signal. The surge noise was applied synchronized to the voltage phase at the zero crossing and the peak value of the AC voltage wave (positive and negative).

c. The surges were applied line to line and line(s) to earth. When testing line to earth the test voltage was applied successively between each of the lines and earth. Steps up to the test level specified increased the test voltage. All lower levels including the selected test level were tested. The polarity of each surge level included positive and negative test pulses.

3.3.5.3 Test Setup



For the actual test configuration, please refer to Appendix II: Photographs of the Test Configuration.

3.3.5.4 Test Result

Coupling Line	Polarity	Voltage (kV)	Observation	Comply with Criterion
a.c. power, Line to earth	+/-	2	Note (1)	A
a.c. power, Line to line	+/-	1	Note (1)	A

NOTE:

(1). The EUT continued to operate as intended. No degradation of performance was observed.

3.3.6 Immunity to Conducted Disturbances Induced by RF Fields

3.3.6.1 Test Specification

Ports:	All Circuits	Safety circuits
Basic Standard:	EN 61000-4-6:2014	
Frequency Range:	0.15 MHz – 80 MHz	
Field Strength:	3V	10V
Modulation:	1 kHz Sine Wave, 80%, AM Modulation	
Frequency Step:	1% of fundamental	
Coupled Cable:	a.c. power line, signal port	
Coupling Device:	Current clamp, Capacitive clamp	
Criteria:	A	D

3.3.6.2 Test Procedure

a. The EUT shall be tested within its intended operating and climatic conditions.

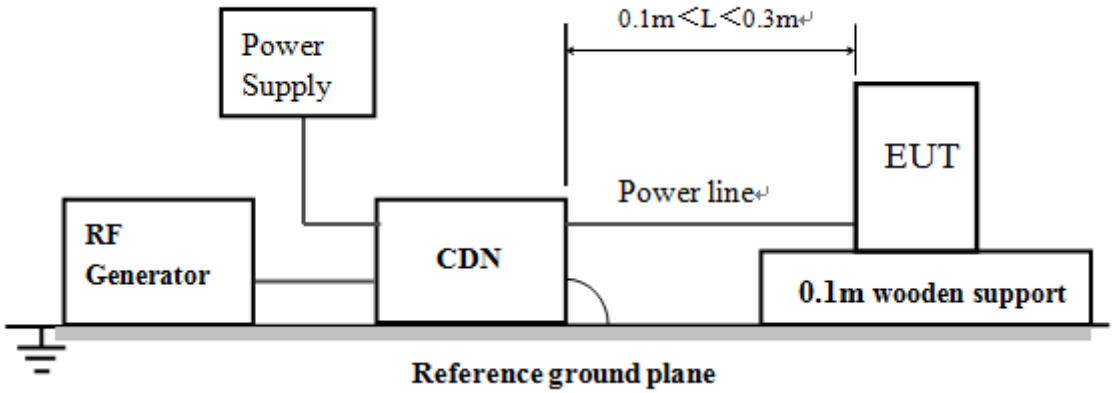
b. The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.

c. The frequency range is swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80% amplitude. The signal is modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. The sweep rate shall not exceed 1.5×10^{-3} decades/s. The step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value where the frequency is swept incrementally.

d. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies such as clock frequencies and harmonics or frequencies of dominant interest, shall be analyzed separately.

e. Attempts should be made to fully exercise the EUT during test, and to fully interrogate all exercise modes selected for susceptibility.

3.3.6.3 Test Setup



3.3.6.4 Test Result

Test Point	Frequency	Field Strength (Vrms)	Observation	Comply with criterion
a.c. power line	0.15 -80 MHz	10	Note(1)	A

NOTE:

(1). The EUT continued to operate as intended. No degradation of performance was observed.

3.3.7 Voltage Dips and Short Interruptions Immunity Test

3.3.7.1 Test Specification

Ports:	All Circuits	Safety circuits
Basic Standard:	EN 61000-4-11:2004	
Voltage Dips:	40% residual, 10 period; 70% residual, 25 period; 0% residual, 1 period	70% residual, 0.5 to 5 in 0.5 period steps; 40% reduction, 10 to 50 in 5 period steps
Voltage Interruptions:	0% residual, 250 period	0% residual, 250 period
Voltage Phase Angle:	0°	
Criteria:	C, C, B, C	D

3.3.7.2 Test Procedure

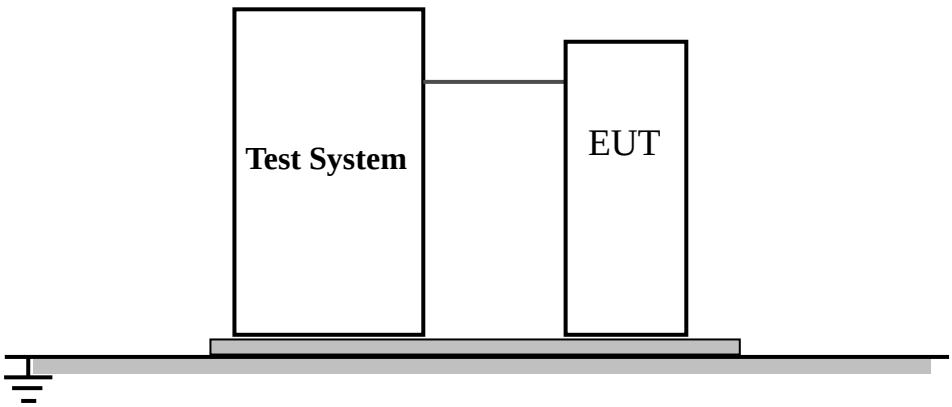
a. The power cord was used as supplied by the manufacturer. The EUT was connected to the line output of the Voltage Dips and Interruption Generator.

b. The EUT was tested for (I) 60% voltage dip of supplied voltage with duration of 200ms, (II) 30% voltage dip of supplied voltage and duration 500ms, (III) 100% voltage dip of supplied voltage and duration 20ms.

c. 100% voltage interruption of supplied voltage with duration of 5000ms was followed, which was a sequence of three voltage interruptions with intervals of 10 seconds.

d. Voltage reductions occur at 0 degree crossover point of the voltage waveform. The performance of the EUT was checked after the voltage dip or interruption.

3.3.7.3 Test Setup



For the actual test configuration, please refer to Appendix II: Photographs of the Test Configuration.

3.3.7.4 Test Result

Test Mode	Voltage Reduction	Duration (ms)	Times	Interval (Sec)	Observation	Comply with Criterion
Voltage dips	60%	200	3	10	Note (1)	A
	30%	500	3	10	Note (1)	A
	100%	20	3	10	Note (1)	A
Voltage interruptions	100%	5000	3	10	Note (3)	C

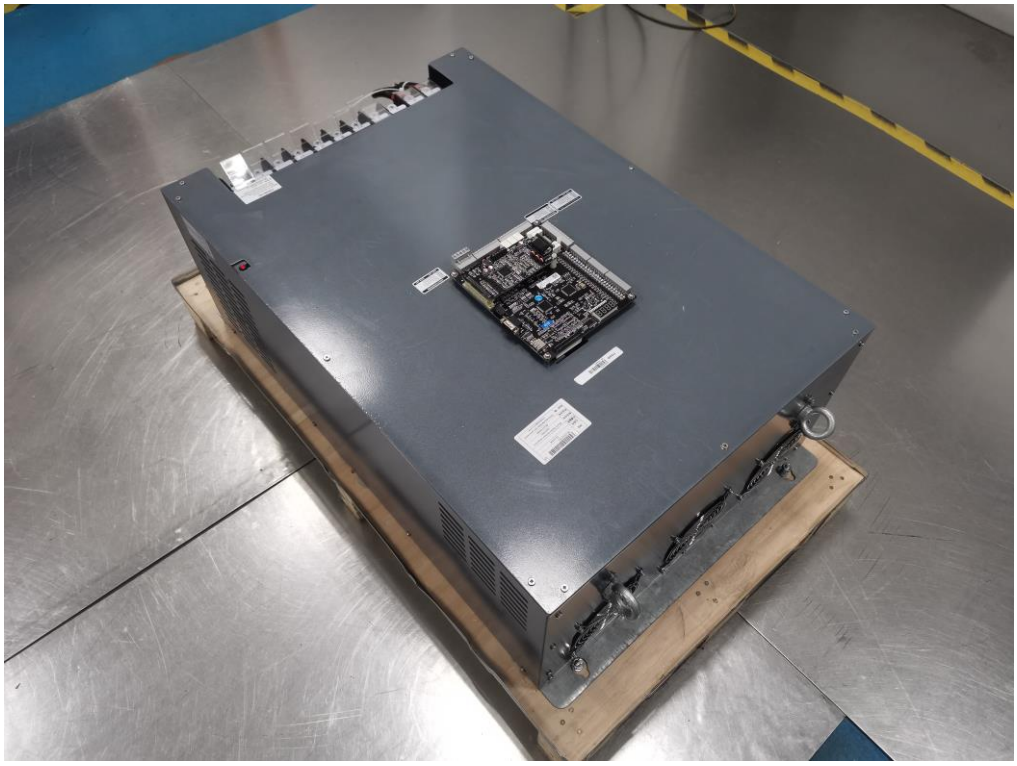
Note:

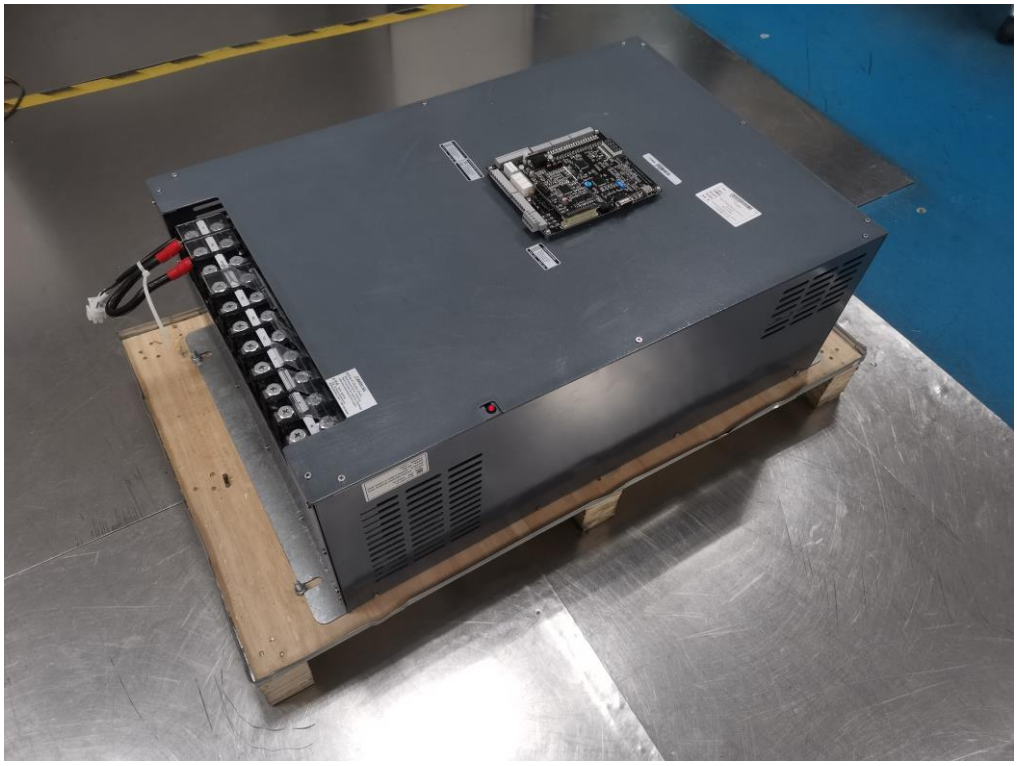
(1). The EUT continued to operate as intended. No degradation of performance was observed.

(2). The output voltage shift of the EUT was larger than 10% during the voltage dips test. After the test, the EUT output restored automatically.

(3). The voltage output of the EUT became zero during the voltage interruption test. After the test, the EUT output restored automatically.

Appendix I：Photographs of the EUT



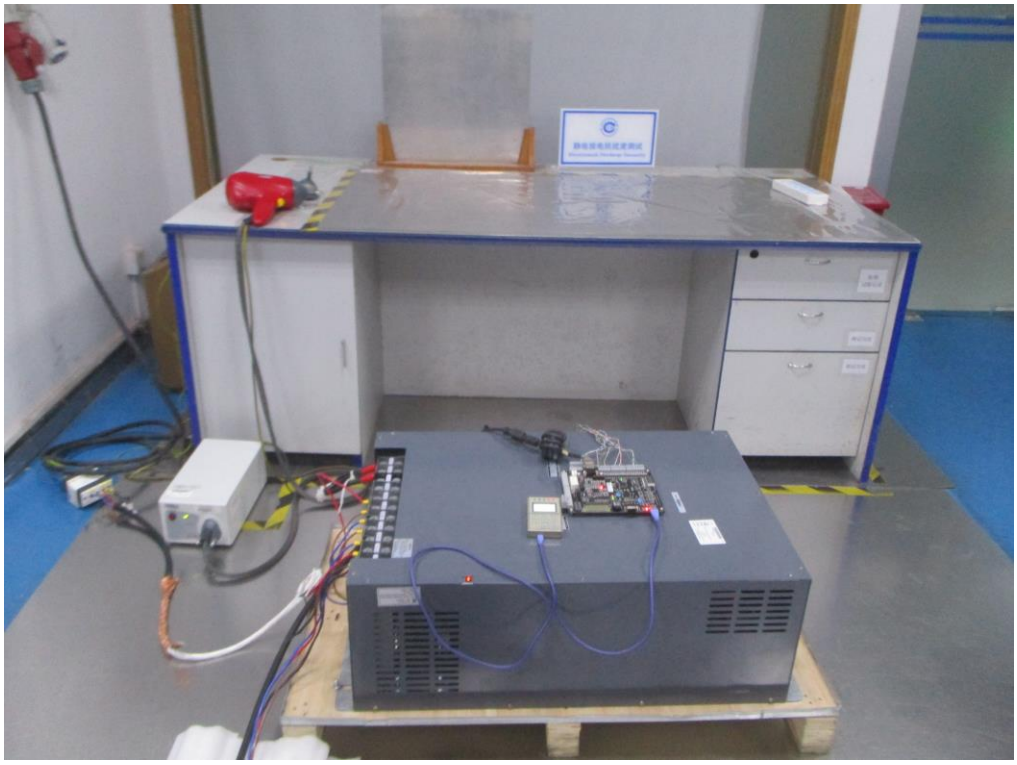


Appendix II：Photographs of EMC Test Configuration

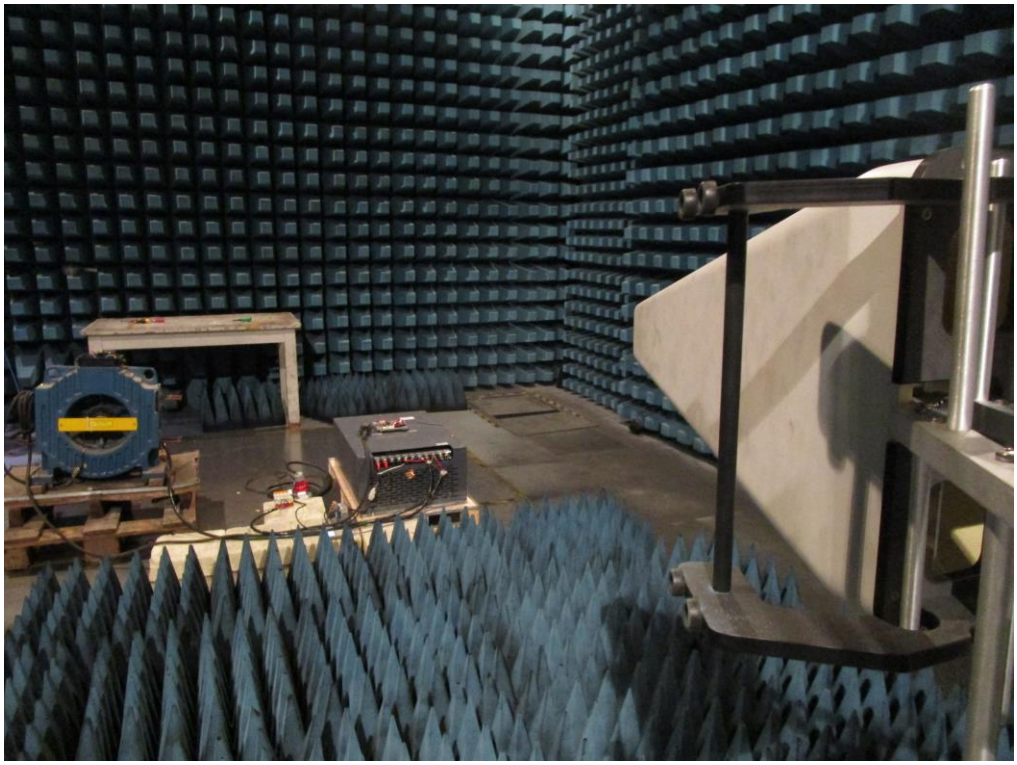
1. Mains Terminal Disturbance Voltage Measurement

2. Radiated Field Strength Measurement

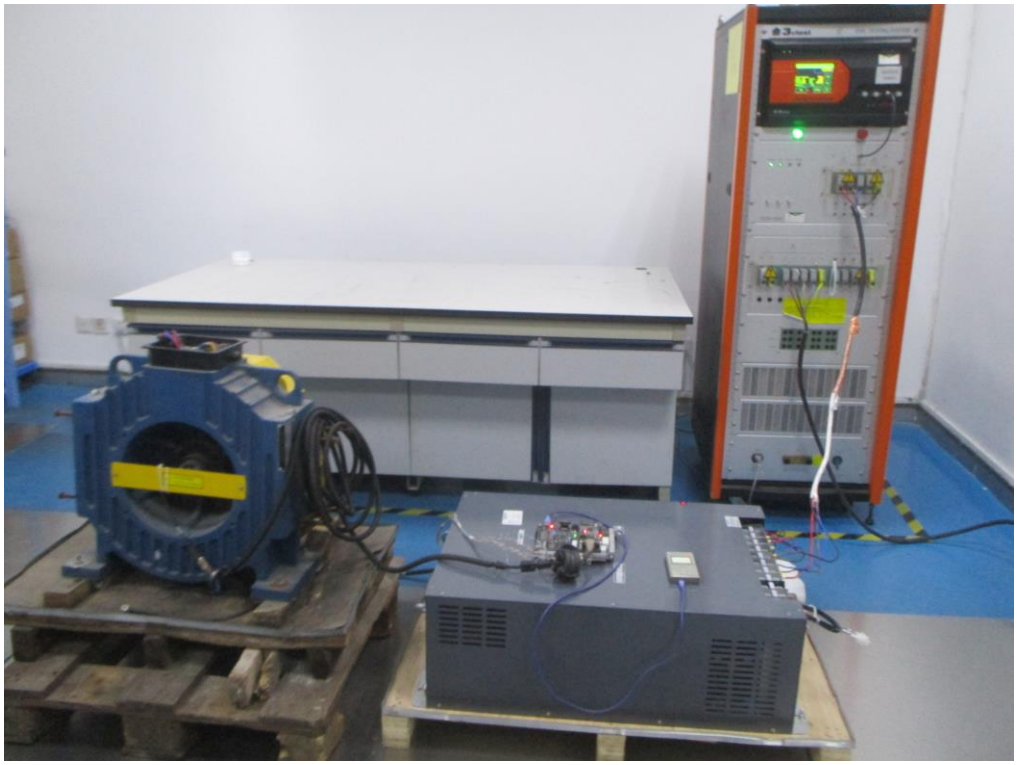
3. Electrostatic Discharge Immunity Test

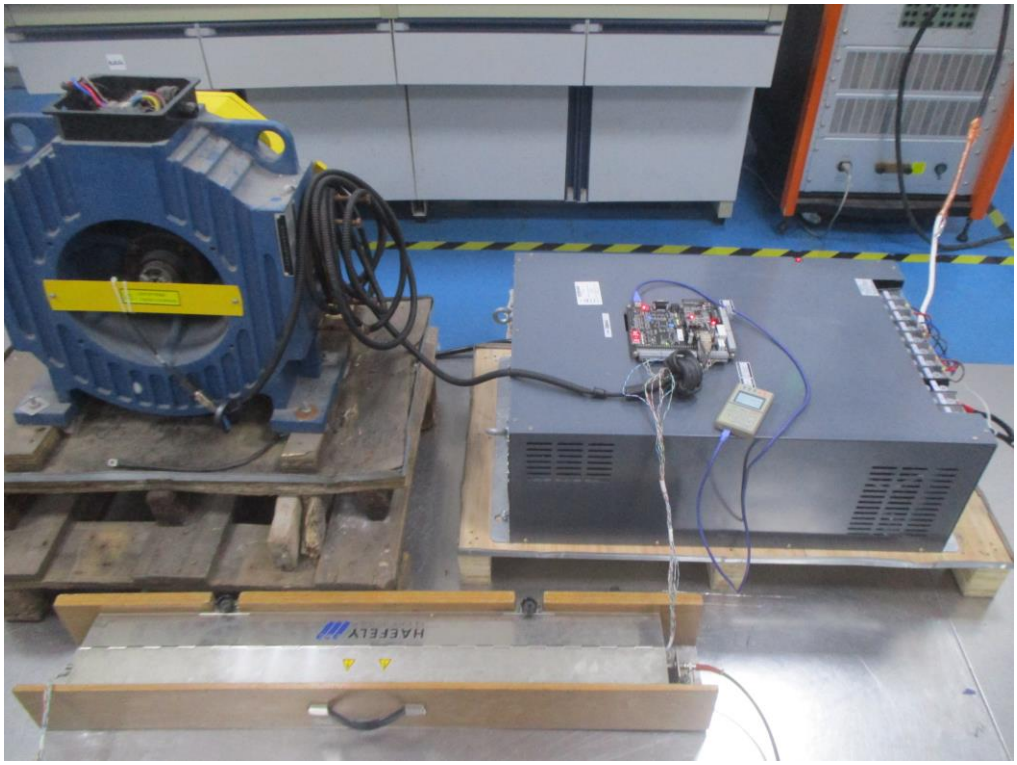


4. Radiated, Radio Frequency Electromagnetic Field Immunity Test



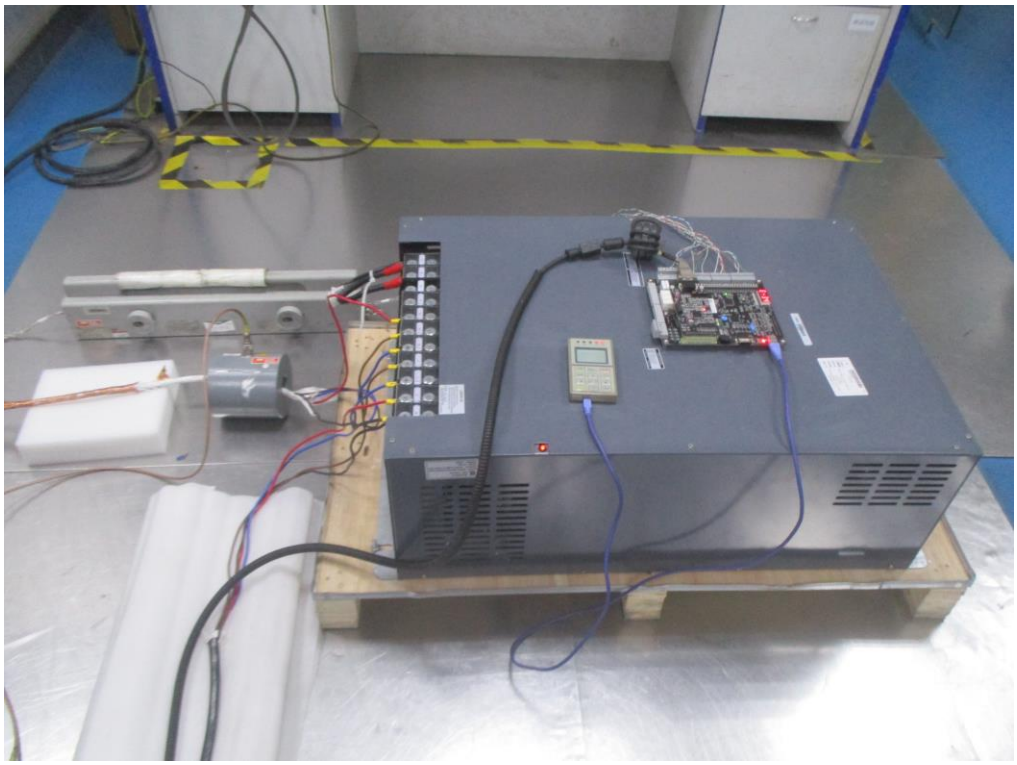
5. Electrical Fast Transient/Burst Immunity Test

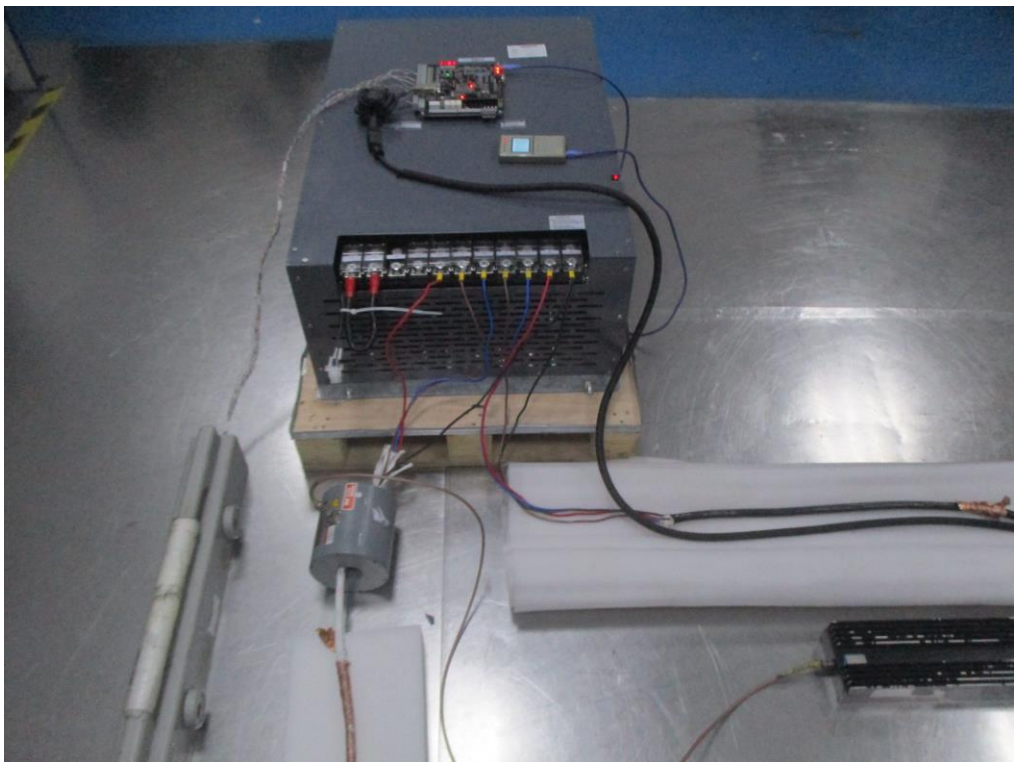




6. Surge Immunity Test

7. Immunity to conducted disturbances induced by RF fields





8. Voltage Dips and Short Interruptions Immunity Test

9. Harmonics Current Measurement and Voltage Fluctuation and Flick Measurement

End of report

STATEMENT

1. The test report is invalid without stamp of laboratory.
2. The test report is invalid without signatureof person(s) testing and authorizing.
3. The test report is invalid if erased and corrected.
4. Test results of the report is valid to the test samplesif sampling by client.
5. “☆” item to be outside the scope of authorized by CNAS.
6. The report without the “CMA”stamp shall not have a certifying effect on the society.
7. The test report shall not be reproduced except in full, without written approval of the laboratory.
8. If there is any objection to report, the client should inform issuing laboratory within 15 days from the date of receiving test report.

Address:Electronic Testing Building, No. 43 Shahe Road, Xili Jiedao, Nanshan District, Shenzhen, Guangdong, China

TEL：86-755-26627338 FAX：86-755-26627238

Internet：http:// www.ccic-set.com E-Mail：manager@ccic-set.com