EMC TEST REPORT

Report No.:	CE2012-PDS8043E
Product:	BL3-U series elevator integrated controller
Brand Name:	/
Model No:	UO4005-S, UO4007-S, UO4011-S, UO4015-S, UO4018, UO4022, UO4030
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Report

Product. ..... :	BL3-U series elevator integrated controller
Model No. ……..:	UO4005-S, UO4007-S, UO4011-S, UO4015-S, UO4018, UO4022, UO4030
Brand Name……..:	/
Applicant……...:	ShenYang Bluelight Automatic Technology co.,Ltd
Applicant Address……..:	No. 37 Shiji Road, Hunnan New District, Shenyang, China
Manufacturer……:	ShenYang Bluelight Automatic Technology co.,Ltd
Manufacturer Address……...:	No. 37 Shiji Road, Hunnan New District, Shenyang, China
Test Standards……:	**EN 61800-3:2004** Adjustable speed electrical power drive systems – Part 3: EMC requirements and specific test methods
Test Result……:	Pass
Tested by ……..:	_____
Reviewed by……:	_____
Approved by……:	_____

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1 General Information

1.1 Description of EUT

Product: BL3-U series elevator integrated controller

Model No.: UO4005-S, UO4015-S, UO4030

Brand Name: /

Serial No.: /

Rating:

Model No:	UO4005-S	UO4007-S	UO4011-S	UO4015-S
Power:	5.5kW	7.5kW	11kW	15kW
Input:	a.c. 380/400V, 50/60Hz, 17.0A	a.c. 380/400V, 50/60Hz, 22.0A	a.c. 380/400V, 50/60Hz, 32.0A	a.c. 380/400V, 50/60Hz, 41.0A
Output:	a.c. 0-380V, 0-50Hz, 14.0A	a.c. 0-380V, 0-50Hz, 18.0A	a.c. 0-380V, 0-50Hz, 27.0A	a.c. 0-380V, 0-50Hz, 34.0A
Model No:	UO4018	UO4022	UO4030	/
Power:	18.5kW	22kW	30kW	/
Input:	a.c. 380/400V, 50/60Hz, 49.0A	a.c. 380/400V, 50/60Hz, 58.0A	a.c. 380/400V, 50/60Hz, 78.0A	/
Output:	a.c. 0-380V, 0-50Hz, 41.0A	a.c. 0-380V, 0-50Hz, 48.0A	a.c. 0-380V, 0-50Hz, 65.0A	/

Accessories: /

NOTE:

1. All models of UO4005-S, UO4007-S, UO4011-S, UO4015-S, UO4018, UO4022 and UO4030 are series elevator integrated controller which have identical circuit except for different output power and Insulated Gate Bipolar Transistor. According to the differences all tests were performed on UO4005-S, UO4015-S and UO4030 and the test results should also represent the other models.
2. For a more detailed features description about the EUT, please refer to User's Manual.

1.2 Objective

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

1.3 Test Date

Emission: 2012.05.24 ~ 2012.05.26

Immunity: 2012.05.28 ~ 2012.05.31

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1.4 Test Standards and Results

The EUT has been tested according to the following specifications:

EMISSION		
Standard	**Test Type**	**Result**
EN 61800-3:2004	Mains terminal disturbance voltage	PASS
	Radiated disturbance	PASS
IMMUNITY (EN 61800-3:2004)		
Basic Standard	**Test Type**	**Result**
Immunity to Low-frequency disturbances		
IEC 60146-1-1	Commutation notches immunity	PASS
IEC 61000-2-4	Harmonics and interharmonics voltages	PASS
IEC 61000-2-4	Voltage changes, fluctuations,	PASS
IEC 61000-2-4	Voltage unbalance and Frequency variations	PASS
IEC 61000-2-1	Voltage dips and short interruptions interruption	PASS
Immunity to High-frequency disturbances		
IEC 61000-4-2	Electrostatic discharge immunity	PASS
IEC 61000-4-3	Radiated, radio frequency electromagnetic field immunity	PASS
IEC 61000-4-4	Electrical fast transient/burst immunity	PASS
IEC 61000-4-5	Surge immunity	PASS
IEC 61000-4-6	Immunity to conducted disturbances induced by RF fields	PASS

NOTE: The latest versions of basic standards are applied.

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1.5 List of Equipments Used

Description	Manufacturer	Model No.	Calibration date	Serial No.
Test Receiver	ROHDE&SCHWARZ	ESU8	Jun,10. 2012	A0805559
LISN	ROHDE&SCHWARZ	NNLK8121	Jun,10. 2012	A0804548
Broadband Ant.	ROHDE&SCHWARZ	VULB09160	Jun,10. 2012	A0805560
EMS Antenna	Amplifier Research	AR AT1080	Jun,10. 2012	A0304249
ESD Test System	EM TEST	ESD30C	Jul,04. 2012	A0103108
EFT Test System	Hangzhou Yuanfang	EMS61000-4A	Feb.19, 2012	YY106898 N1010005
Surge Test System	EM TEST	VCS500M10	Jun.10, 2012	A0712509
Capacitive clamp	ROHDE&SCHWARZ	F2301	/	A0304258
Signal Generator	ROHDE&SCHWARZ	SML02	Jun,10. 2012	A0304261
Power Amplifier	Amplifier Research	AR 150W1000	/	A0304247
Power Amplifier	Amplifier Research	AR 75A250M	/	A0304255
Field Monitor	Amplifier Research	AR FM5004	/	305128
Anechoic Chamber	Albatross	EMC 19.6*11.8*8.55(m)	Mar,08. 2012	A0802520

NOTE: Equipments above have been calibrated and are in the period of validation.

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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. The EUT operated in SVC control and max carrier frequency mode. A power filter (model NFI-036) was used during tests.

2.2 Mains Terminal Disturbance Voltage Measurement

2.2.1 Limits of Mains Terminal Disturbance Voltage

Frequency range (MHz)	Limits (dBmV)	
	Quasi-peak	Average
0.15 - 0.50	79	66
0.50 - 5	73	60
5 - 30	73	60

NOTE:

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

2.2.2 Test Procedure

a. The EUT was placed 0.4 meters from the conducting wall of shielded room 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.

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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 (dBmV)		Emission Level (dBmV)	
		QP	AV	QP	AV
UO4005-S					
1	0.1500	79.0	66.0	72.10	57.10
2	8.4065	73.0	60.0	55.23	48.00
3	9.9866	73.0	60.0	58.15	50.41
4	10.5975	73.0	60.0	55.20	47.10
UO4015-S					
5	0.1500	79.0	66.0	71.87	54.24
6	6.9080	73.0	60.0	56.75	49.51
7	10.2154	73.0	60.0	59.31	52.80
8	16.3526	73.0	60.0	49.65	38.41
9	16.3645	73.0	60.0	50.59	39.46

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No.	Freq. (MHz)	Limit Value (dBmV)		Emission Level (dBmV)	
		QP	AV	QP	AV
UO4030					
10	0.1500	79.0	66.0	71.50	50.00
11	8.6990	73.0	60.0	62.52	55.98
12	11.2960	73.0	60.0	67.77	55.34
13	14.3108	73.0	60.0	63.66	53.50
14	15.1168	73.0	60.0	62.68	52.16

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 .

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Measurement Plots of UO4005-S

1. Mains terminal disturbance voltage，L1 phase

2. Mains terminal disturbance voltage，L2 phase

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3. Mains terminal disturbance voltage，L3 phase

Measurement Plots of UO4015-S

1. Mains terminal disturbance voltage，L1 phase

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2. Mains terminal disturbance voltage，L2 phase

3. Mains terminal disturbance voltage，L3 phase

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Measurement Plots of UO4030

1. Mains terminal disturbance voltage，L1 phase

2. Mains terminal disturbance voltage，L2 phase

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3. Mains terminal disturbance voltage，L3 phase

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2.3 Radiated Disturbance Measurement

2.3.1 Limits of Radiated Disturbance

Frequency range (MHz)	Quasi peak limits(dBmV/m), at 10m measurement distance
30 - 230	40
230 - 1000	47

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 0.8 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 10 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.

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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 (dBmV/m)	Emission Level (dBmV/m)
UO4005-S						
1	30.04	V	100	0	40.0	38.20
2	33.92	V	100	11	40.0	35.00
3	66.28	V	100	354	40.0	29.60
4	86.07	H	120	120	40.0	30.00
5	230-1000	V/H	100-400	0-360	47.0	<30

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No.	Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Table Angle (Degree)	QP Limits (dBmV/m)	Emission Level (dBmV/m)
UO4015-S						
1	30.36	V	100	2	40.0	34.40
2	34.00	V	100	26	40.0	29.30
3	37.08	V	100	0	40.0	28.50
4	112.64	H	150	30	40.0	26.50
5	230-1000	V/H	100-400	0-360	47.0	<30
UO4030						
1	34.08	V	100	0	40.0	39.50
2	41.68	V	100	0	40.0	34.20
3	70.44	V	100	0	40.0	36.60
4	64.73	H	120	0	40.0	32.16
5	230-1000	V/H	100-400	0-360	47.0	<30

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Measurement Plots of UO4005-S

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

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

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Measurement Plots of UO4015-S

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

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

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Measurement Plots of UO4030

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

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

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3 Immunity Test

3.1 Performance Criteria

Criterion A	The apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.
Criterion B	The 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 the manufacturer, when the apparatus is 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.

3.2 Immunity tests to low-frequency disturbance

3.2.1 EUT Setup and Operating Conditions

The EUT was powered by 380V AC Mains and connected to a motor with full load. The EUT operated in SVC control and max carrier frequency mode.

3.2.2 Voltage Dips and Short Interruptions Immunity Test

3.2.2.1 Test Specification

Basic Standard:	IEC 61000-2-1
Voltage Dips:	10-100% reduction, 1-300 half-cycle
Voltage Interruptions:	100% reduction, <60 seconds

3.2.2.2 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) 10-100% voltage dip of supplied voltage with duration of 1-300 half-cycles.

c. 100% voltage short-time interruption of supplied voltage with duration of 60000ms was followed.

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3.2.2.3 Test Setup

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

3.2.2.4 Test Result

Test Mode	Voltage Reduction	Duration (ms)	Operating time (minute)	Observation	Comply with Criterion
Voltage dips	100%	100	10	Note (1)	B
	30%	500	10	Note (1)	B
Short-time Interruptions	100%	60000	10	Note (2)	C

Note:

(1). The EUT continued to operate as intended after test. Loss of function was observed.

(2). The EUT continued to operate as intended after test. Temporary loss of function was observed during test.

3.2.3 Voltage Changes, Fluctuations Test

3.2.3.1 Test Specification

Basic Standard:	IEC 61000-2-4-Class 3
Voltage changes, deviation with respect to nominal Voltage Un:	+10% to -15%, 0.85 to 0.90Un no longer than 60s; 0.90Un to 1.1Un, longer durations.

3.2.3.2 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.

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b. The Generator generates the typical shapes of the voltage fluctuations given in Figures 3 to 6 of IEC 61000-2-1. The values of the voltages in the range of 0.85 Un to 0.90Un keep no longer than 60 s, longer durations for the range 0.90Un to 1.1Un applies.

3.2.3.3 Test Setup

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

3.2.3.4 Test Result

Phenomenon	Reference document and level	Operating time (min.)	Observation	Comply with Criterion
Voltage variations and fluctuations	IEC 61000-2-4 +10% to -15%	10	Note (1)	A(2)

Note:

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

(2) When the voltage is below nominal, the max output power ratings-speed and/or torque may be reduced.

3.2.4 Voltage unbalance and frequency variations Test

3.2.4.1 Test Specification

Basic Standard:	IEC 61000-2-4
Voltage unbalance:	Level-Class 3, 3% negative sequence component, 10 min durations
Power frequency variation:	±2%

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3.2.4.2 Test Procedure

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.

3.3.3.3 Test Setup

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

3.2.4.4 Test Result

Phenomenon	Reference document and level	Operating time (min.)	Observation	Comply with Criterion
Voltage unbalance	IEC 61000-2-4 3% negative sequence component	10	Note (1)	A
Power frequency variation $\Delta f/f_N$	IEC 61000-2-4 ±2%	10	Note (1)	A

Note:

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

3.2.5 Harmonics and interharmonics voltages Test

3.2.5.1 Test Specification

Basic Standard:	IEC 61000-2-4
Total Harmonics distrotion:	Level-Class 3, THD=10%

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Harmonic voltage components						interharmonics voltage components	
Excluding multiples of 3, odd Order h	**Uh (%)**	**multiples of 3, odd Order h**	**Uh (%)**	**Even Order h**	**Uh (%)**	**Order h**	**Uh (%)**
5	8	3	6	2	3	<11	2.5
7	7	9	2.5	4	1.5	11-13 included	2.25
11	5	15	2	6	1	13-17 included	2
13	4.5	21	1.75	8	1	17-19 included	2
17	4	>21	1	10	1	19-23 included	1.75
19	4			>10	1	23-25 included	1.5
23	3.5					>25	1
25	3.5						
>25	$5\times\sqrt{11/h}$						

3.2.5.2 Test Setup

1. 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.

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

3.2.5.3 Test Result

Phenomenon	Reference document and level	Operating time (min.)	Observation	Comply with Criterion
Harmonics and Interharmonics	IEC 61000-2-4 THD=10%	2.5	Note (1)	A

Note:

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

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3.2.6 Commutation Notches Test

3.2.6.1 Test Specification

Basic Standard:	IEC 60146-1-1
Voltage unbalance:	Level-Class B, depth=40%, total area=250%*degrees

3.2.6.2 Test Setup

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.

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

3.2.6.3 Test Result

Phenomenon	Reference document and level	Operating time (min.)	Observation	Comply with Criterion
Commutation notches	IEC 60146-1-1 Level-Class B, depth=40%, total area=250%*degrees	10	Note (1)	A

Note:

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

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3.3 Immunity tests to high-frequency disturbance

3.3.1 EUT Setup and Operating Conditions

The EUT was powered by 380V AC Mains and connected to a motor with no load. The EUT operated in SVC control and max carrier frequency mode.

3.3.2 Electrostatic Discharge Immunity Test

3.3.2.1 Test Specification

Basic Standard:	IEC 61000-4-2
Discharge Impedance	330Ω / 150 pF
Discharge Voltage:	Air Discharge: 8 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

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 IEC 61000-4-2:

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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

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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
Display panel	±8	Air	Note(1)	A
Aperture of the cover	±8	Air	Note(1)	A
Buttons	±8	Air	Note(1)	A
Knob	±8	Air	Note(1)	A
Screws	±6	Contact	Note(1)	A
HCP	±6	Contact	Note(1)	A
VCP	±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

Basic Standard:	IEC 61000-4-3
Frequency Range:	80 MHz – 1000MHz
Field Strength:	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

3.3.3.2 Test Procedure

The test procedure was in accordance with IEC 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 1000MHz 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.

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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.

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
80-1000 MHz	V&H	0	10	Note(1)	A
80-1000 MHz	V&H	90	10	Note(1)	A
80-1000 MHz	V&H	180	10	Note(1)	A
80-1000 MHz	V&H	270	10	Note(1)	A

NOTE:

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

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3.3.4 Electrical Fast Transient/Burst Immunity Test

3.3.4.1 Test Specification

Basic Standard:	IEC 61000-4-4
Test Voltage:	a.c. power port: 2 kV, signal port: 1kV
Polarity:	Positive/Negative
Impulse Frequency:	5kHz
Impulse wave shape:	5/50ns
Burst Duration:	15ms
Burst Period:	300ms
Test Duration:	Not less than 1 min.

3.3.4.2 Test Procedure

a. The EUT was tested with 2000 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 IEC 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.

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3.3.4.4 Test Result

Test Point Power port	Polarity	Test Level (kV)	Observation	Comply with Criterion
L1	+/-	2	Note (1)	A
L2	+/-	2	Note (1)	A
L3	+/-	2	Note (1)	A
PE	+/-	2	Note (1)	A
L1+PE	+/-	2	Note (1)	A
L123	+/-	2	Note (1)	A
L123+PE	+/-	2	Note (1)	A
Signal port	+/-	1	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

Basic Standard:	IEC 61000-4-5
Waveform:	Voltage 1.2/50 μs; Current 8/20 μs
Test Voltage:	a.c. power port, 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.

3.3.5.2 Test Procedure

a. The EUT and the auxiliary equipment were placed on a table of 0.8m 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

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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, L1-PE	+/-	2	Note (1)	A
a.c. power, L2- PE	+/-	2	Note (1)	A
a.c. power, L3- PE	+/-	2	Note (1)	A
a.c. power, L1-L2	+/-	1	Note (1)	A
a.c. power, L1-L3	+/-	1	Note (1)	A
a.c. power, L2-L3	+/-	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

Basic Standard:	IEC 61000-4-6
Frequency Range:	0.15 MHz – 80 MHz
Field Strength:	10V
Modulation:	1 kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1% of fundamental
Coupled Cable:	a.c. power line, signal port
Coupling Device:	Capacitive Clamp-F2301

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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

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

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
Signal port	0.15 -80 MHz	10	Note(1)	A

NOTE:

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

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Appendix I：Photographs of the EUT

1. Appearance

UO4005-S

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UO4015-S

UO4030

2. Inside

UO4005-S：

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PDF created with pdfFactory Pro trial version www.pdffactory.com

UO4015-S：

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UO4030：

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Appendix II：Photographs of EMC Test Configuration

1. Mains Terminal Disturbance Voltage Measurement

2. Radiated Field Strength Measurement

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3. Electrostatic Discharge Immunity Test

4. Radiated, Radio Frequency Electromagnetic Field Immunity Test

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5. Electrical Fast Transient/Burst Immunity Test

6. Surge Immunity Test

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7. Immunity to Conducted Disturbances Induced by RF Fields

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