



EMC TEST REPORT

EN 55011:2016/A2:2021

EN IEC 61000-6-2:2019

EN IEC 61000-6-4:2019

EN IEC 61800-3:2018

MEASUREMENT AND TEST REPORT

For

Shenzhen Rtelligent Technology Co.,Ltd

2F-6F, A Building, Ruitech Industrial Park, Xingyu Road No.23, Xixiang Street, Bao an District, Shenzhen,Guangdong Province China,518102

Model:See the Page 5

2024-07-17

This Report Concerns: ◆ Original Report	Equipment Type: AC Servo Drives
Test Engineer:	Leon Gao/ <i>Leon Gao</i>
Report Number:	TH2407145-C06-R01
Test Date:	2024-07-10 to 2024-07-17
Reviewed By:	Neo Dong/ <i>Neo Dong</i>
Approved By:	Prince Huang/ <i>Prince Huang</i>
Prepared By:	Shenzhen Tian Hai Test Technology Co.,Ltd. 125-126, No.66, Zhangge Road, Zhangge Community, Fucheng Street, Longhua District, Shenzhen, Guangdong, China Tel : +86-755-86615100 Fax: +86-755-86615105

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of TianHai Compliance Testing Laboratory Ltd.



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1 - SUMMARY OF STANDARDS AND RESULTS

1.1 DESCRIPTION OF STANDARDS AND RESULTS

The EUT have been tested according to the applicable standards as referenced below.

EMISSION				
Description of Test Item	Test Standard	Basic Standard	Requirement	Results
Conducted disturbance	EN 55011:2016/A2:2021 EN IEC 61000-6-4:2019 EN IEC 61800-3:2018	EN 55011:2016 /A2:2021 EN IEC 61000-6-4: 2019 EN IEC 61800-3:2018	See Section 4	N/A
Radiated disturbance	EN 55011:2016/A2:2021 EN IEC 61000-6-4:2019 EN IEC 61800-3:2018	EN 55011:2016 /A2:2021 EN IEC 61000-6-4: 2019 EN IEC 61800-3:2018	See Section 5	PASS
Harmonic current emissions	/	/	/	N/A
Voltage fluctuations & flicker*	/	/	/	N/A
IMMUNITY				
Description of Test Item	Test Standard	Basic Standard	Test configuration	Results
Electrostatic discharge (ESD)	EN IEC 61000-6-2 :2019 EN IEC 61800-3:2018	IEC 61000-4-2:2008	See Section 6.1	PASS
Radio-frequency, Continuous radiated disturbance	EN IEC 61000-6-2 :2019 EN IEC 61800-3:2018	IEC 61000-4-3:2020	See Section 6.2	PASS
Electrical fast transient (EFT)	EN IEC 61000-6-2 :2019 EN IEC 61800-3:2018	IEC 61000-4-4:2012	See Section 6.3	N/A
Surge (Input a.c. power ports)	EN IEC 61000-6-2 :2019 EN IEC 61800-3:2018	IEC 61000-4-5:2014 +AMD1:2017	See Section 6.4	N/A
Radio-frequency, Continuous conducted disturbance	EN IEC 61000-6-2 :2019 EN IEC 61800-3:2018	IEC 61000-4-6:2013	See Section 6.5	N/A
Power frequency magnetic field*	/	/	/	N/A
Voltage dips and interruptions	EN IEC 61000-6-2 :2019 EN IEC 61800-3:2018	IEC 61000-4-11:2020	See Section 6.6	N/A



Note:

N/A is an abbreviation for Not Applicable

“ * ” : The EUT does not contain devices susceptible to magnetic fields; therefore the Power-Frequency Magnetic Fields test is not necessary.

1.2 DESCRIPTION OF PERFORMANCE CRITERIA

General Performance Criteria

A functional description and a definition of specific performance criteria, during or as a consequence of immunity testing of equipment under test (EUT), shall be provided by the manufacturer and noted in the test report.

1.2.1 Performance criterion A

The EUT shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the EUT is used as intended. If the performance level is not specified by the manufacturer, this may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

1.2.2 Performance criterion B

The EUT 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 EUT is used as intended. The performance level may be replaced by a permissible loss of performance. However, during the test degradation of performance is allowed but 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, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.

1.2.3 Performance criterion C

Temporary loss of function is allowed during the test, provided the function is self-recoverable or can be restored by the operation of the controls.

If, as a result of the application of the tests defined in this standard, the EUT becomes dangerous or unsafe, it shall be deemed to have failed the test.



2 - GENERAL INFORMATION

2.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST EUT

Client Information

Applicant: Shenzhen Rtelligent Technology Co.,Ltd
Address: 2F-6F, A Building, Ruitech Industrial Park, Xingyu Road No.23, Xixiang Street, Bao an District, Shenzhen,Guangdong Province China,518102
Manufacturer: Shenzhen Rtelligent Technology Co.,Ltd
Address: 2F-6F, A Building, Ruitech Industrial Park, Xingyu Road No.23, Xixiang Street, Bao an District, Shenzhen,Guangdong Province China,518102

General Description of E.U.T

EUT Name: AC Servo Drives
Trade Mark: /
Model No.: See the models list below
Sample No.: TH2407145
Ratings: Input: AC 220V,50Hz ,1.5A,400W
Test Mode: ON
Note: All test results are based on model RS400CR

Models List					
RS400CR	RS750CR	RS1000CR	R5L028	R5L042	R5L150
R5L028M	R5L042M	R5L150M	R5L028E	R5L042E	R5L150E
R6L028	R6L042	R6L150	R6L028M	R6L042M	R6L150M
R6L028E	R6L042E	R6L150E			
<p>AC Servo Drive Model: XXX Remark: 1: First "X" means AC Series Type, can be "RS" means Standard Type "R5L"means 5th version 220V Type "R5H"means 5th version 380V Type "R5D"means 5th version 110V Type "R6L"means 6th version 220V Type "R6H"means 6th version 380V Type "R6D"means 6th version 110V Type</p>					



Second “X” can be

“100” means output power 100W

“200” means output power 200W

“400” means output power 400W

“750” means output power 750W

“1000” means output power 1000W

“1500” means output power 1500W

“2000” means output power 2000W

“3000” means output power 3000W

“028” means rated current 2.8A

“042” means rated current 4.2A

“130” means rated current 13A

“150” means rated current 15A

Third “X” means communication function code, can be

“Null” means Pulse type for 5th and 6th version or standard pulse type+RS485 with DB44 signal terminal for standard series

“E” means EtherCAT bus type

“C” means Canopen bus type or Pulse type with DB44 signal terminal for standard series

“CS” means Pulse economic type with 20 PIN push-type terminal

“CR” means Pulse economic type + RS485 with 20 PIN push-type terminal

“P” means Profinet bus type with 20 PIN push-type terminal

“M” means Modbus bus type with 20 PIN push-type terminal

2.2 STATEMENT OF THE MEASUREMENT UNCERTAINTY TEST FACILITY

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 16-4-2 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN ENISO/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.

2.3 MEASUREMENT UNCERTAINTY

Test Item	Frequency range	Results	Limits
Conducted disturbance at mains terminals	9kHz to 150kHz	± 2.63 dB	± 3.8 dB
	150kHz to 30MHz	± 2.35 dB	± 3.4 dB
Radiated disturbance	30MHz to 1GHz	± 5.78 dB	± 6.3 dB

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

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

(3) The measurement uncertainty is not included in the test result.



2.4 TEST LOCATION

All tests were performed at Shenzhen Tianhai Test Technology Co., Ltd.
125-126, No.66, Zhangge Road ,Zhangge Community, Fucheng Street, Longhua District,
Shenzhen, Guangdong Province, P.R. China

2.5 PRINCIPLE OF CONFIGURATION SELECTION

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

2.6 TEST OPERATION

Test operation refers to test setup in chapter 4 & 5 & 6
Pretest in all operation modes, and find out the worst case for compliance test.
According to section 2.1,all test results are based on model RS400CR

2.7 SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT

The EUT was tested together with the following accessories:

Kind of Equipment	Manufacturer	Model Number	S/N
/	/	/	/

The EUT was tested with following cables:

Cable name	Length (m)	Shield	Core No.
/	/	/	/



3 - TEST EQUIPMENT LIST AND DETAILS

Kind of Equipment	Manufacturer	Type	S/N	Calibrate until
Conducted Emission				
EMI Test Receiver	R&S	ESR7	102333	2024-11-13
L.I.S.N	Schwarzbeck	NNLK 8128	5089	2024-11-13
8-Wire ISN CAT6	Schwarzbeck	NTFM 8158	231	2024-11-13
Pulse Limiter	Schwarzbeck	VTSD 9561-F	847	2024-11-13
Test software	EZ	EMC-CON 3A1.1	/	/
Disturbance power				
EMI Test Receiver	R&S	ESR7	102333	2024-11-13
EMI Absorbing Clamp	Teseq	MDS 21B	58115	2024-11-20
Test software	EZ	EMC-CON 3A1.1	/	/
LLAS Radiated Disturbance (2m)				
EMI Test Receiver	R&S	ESR7	102333	2024-11-13
Loop Antenna	Schwarzbeck	HXYZ 9170	353	2024-11-13
Test software	EZ	EMC-CON 3A1.1	/	/
Radiated Emission (3m)				
EMI Test Receiver	R&S	ESR7	102333	2024-11-13
MXA Signal Analyzer	Keysight	N9020A	MY51281805	2025-04-22
Bilog Antenna	Schwarzbeck	VULB 9168	01148	2024-11-20
Pre-Amplifier	Schwarzbeck	BBV 9718 B	00109	2024-11-13
Pre-Amplifier	Schwarzbeck	BBV 9743 B	00253	2024-11-13
Pre-Amplifier	GUANGGU ELECTRONIC	GLNA18-40GK-5372	20210331001	2024-11-13
Active Loop Antenna	Schwarzbeck	FMZB 1519 B	00148	2024-11-13
Horn Antenna	Schwarzbeck	BBHA 9120	02379	2024-11-20
Test software	FALA	/	FA-03A2 RE	/
Harmonics & Flicker				
5kVA AC Power Source	AMETEK CTS	5001iX-CTS-400	2046A03237	2024-11-13
Signal Conditioning Unit	AMETEK CTS	PACS-1	2046A03238	2024-11-13
Test software	AMETEK CTS	CTS 4	Version 4.26.0	/
Electrostatic discharge (ESD)				
ESD Simulator	TESEQ	NSG 437	1569	2024-11-15



Radio-frequency,Continuous radiated disturbance (RS)				
Signal generator	R&S	SMB 100A	113650	2025-04-22
Power meter	Agilent	E4417A	MY45100899	2025-04-22
Power sensor	Agilent	E9321A	US40390494	2025-04-22
Power sensor	Agilent	E9322A	MY44420219	2025-04-22
Power amplifier	Micotop	MPA-80-1000-250	MPA2112426	2025-04-22
Power amplifier	Micotop	MPA-1000-6000-100	MPA2201013	2025-04-22
Stacked Log. Periodic Antenna	Schwarzbeck	STLP 9129	201	N/A
Field strength probe	PMM	EP601	811ZX10673	2025-04-22
RF Switch	Emtrace	SW X4	/	N/A
Test Software	Emtrace	EM 3	V1.2.1	N/A
Electrical fast transient (EFT)				
Burst Tester	3C TEST	EFT 500T	ES027000120015	2024-11-13
Coupling Clamp	3C TEST	CCC 100	CCC 20092269	2024-11-13
CCS	3C TEST	V4.2.7	ES027000120015	/
Surge				
Surge simulator	3C TEST	CWS 600CT	ES058000920005	2024-11-13
Three phases CDN	3C TEST	SPN 3832T	ES0911910	2024-11-13
CDN for unshielded symmetrical high-speed Telecom cable	3C TEST	CDN405T8A	ES064001220010	2024-11-13
CDN for Telecom cable	3C TEST	CDN405M40-5	ES1071910	2024-11-13
CWS	3C TEST	V1.0.5.2	ES058000920005	/
Radio-frequency,Continuous conducted disturbance (CS)				
Conducted Immunity Test System	3C TEST	CST 1075	ES096000120008	2024-11-13
6dB Attenuator	3C TEST	DTC75-6	ES095000120006	2024-11-13
Single phase CDN	3C TEST	CDN M2M3	ES064002620007	2024-11-13
Three phases CDN	3C TEST	CDN M5-16	ES064003320004	2024-11-13
Calibration Set	3C TEST	CDN 100KIT	ES064002820016	2024-11-13
Calibration Set	3C TEST	EM CL100KIT	EM C20032816	2024-11-13
EM-Clamp	3C TEST	EM CL100	EM C20032811	2024-11-13

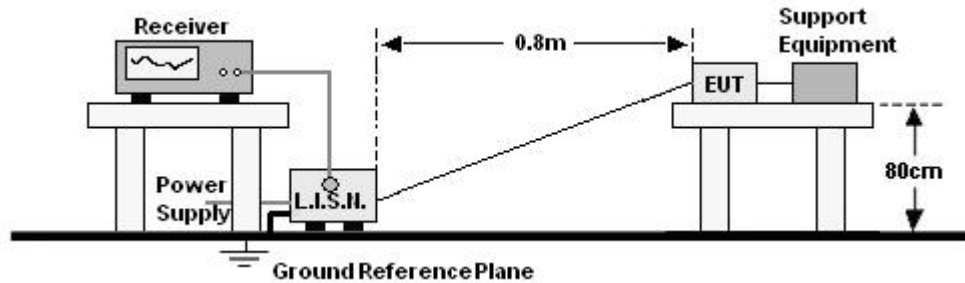


EMC-s	SKET	V1.4.0.54	/	/
Power Frequency Magnetic Field (PFMF)				
PFMF simulator	3C TEST	MFS 400	ES045000720001	2024-11-13
Transformer	3C TEST	MFT 400	ES046000220003	2024-11-13
Magnetic field antenna	3C TEST	TCXS111	TCXS20060910	2024-11-13
CWS	3C TEST	V4.2.7	ES045000720001	/
Voltage dips & Voltage interruptions				
Power failure simulator	3C TEST	PFS 2216SD	ES049001220003	2024-11-13
CCS	3C TEST	V4.2.8	ES049001220003	/



4 - CONDUCTED EMISSION MEASUREMENT

4.1 BLOCK DIAGRAM OF TEST SETUP



4.2 LIMITS

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

NOTE: The lower limit shall apply at the transition frequencies.

4.3 TEST PROCEDURE

The EUT is put on the plane 0.8m high above the ground by insulating support and connected to the AC mains through a Line Impedance Stability Network (L.I.S.N). This provided a 50ohm coupling impedance for the tested equipments. Both sides of AC line are investigated to find out the maximum conducted emission according to the EN IEC 61000-6-4 regulations during conducted emission measurement.

The bandwidth of the field strength meter is set at 9kHz.

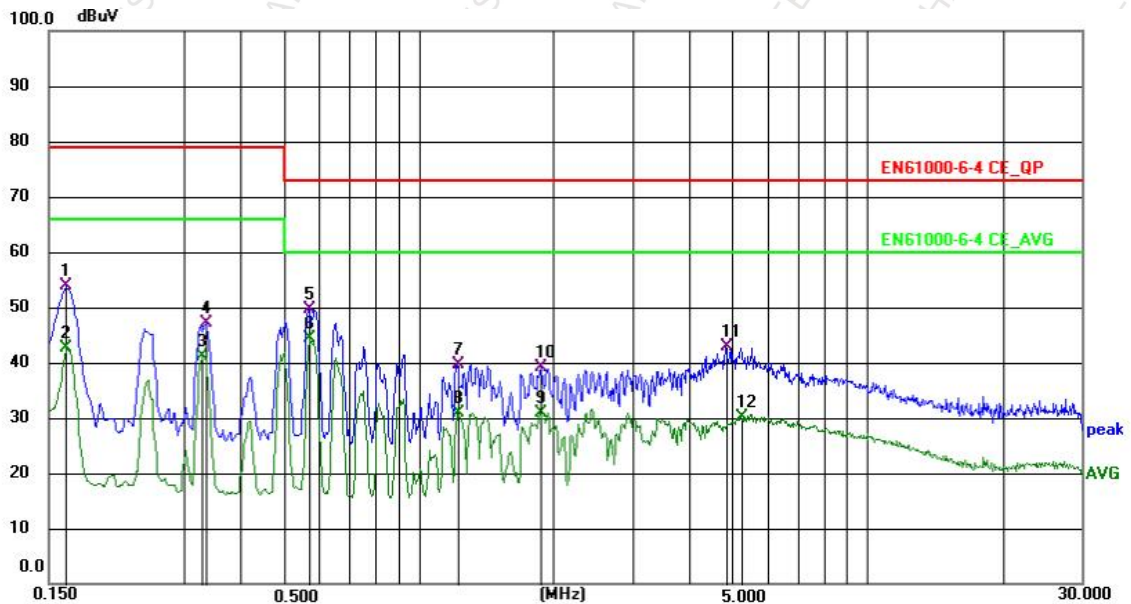
The frequency range from 150kHz to 30MHz is investigated. The scanning waveform please refer to the next page.



4.4 TEST RESULTS AND DATA

EUT: AC Servo Drives
M/N: RS400CR
Test Mode: ON
Test Voltage: AC 230V 50Hz
Temperature: 23°C
Humidity: 55%
Atmosphere pressure: 101Kpa
Test Results Pass

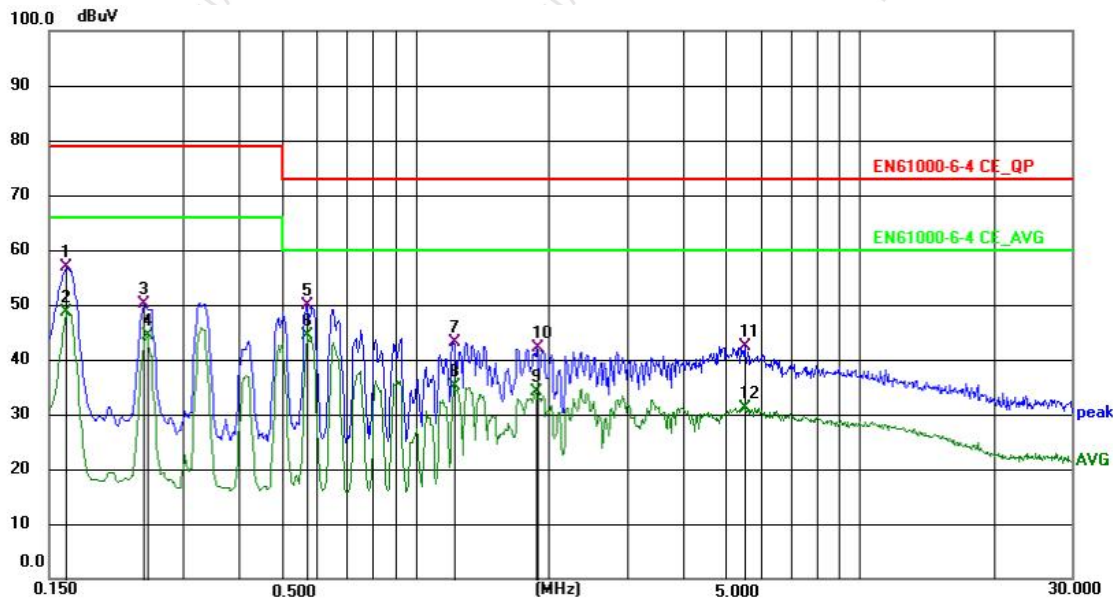
Phase:L1



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1635	47.52	6.29	53.81	79.00	-25.19	QP	P
2	0.1635	36.38	6.29	42.67	66.00	-23.33	AVG	P
3	0.3300	34.95	6.30	41.25	66.00	-24.75	AVG	P
4	0.3345	40.71	6.30	47.01	79.00	-31.99	QP	P
5	0.5685	43.42	6.32	49.74	73.00	-23.26	QP	P
6 *	0.5730	38.18	6.32	44.50	60.00	-15.50	AVG	P
7	1.2210	33.31	6.35	39.66	73.00	-33.34	QP	P
8	1.2210	24.45	6.35	30.80	60.00	-29.20	AVG	P
9	1.8645	24.56	6.37	30.93	60.00	-29.07	AVG	P
10	1.8690	32.76	6.37	39.13	73.00	-33.87	QP	P
11	4.8480	36.42	6.45	42.87	73.00	-30.13	QP	P
12	5.2385	23.73	6.45	30.18	60.00	-29.82	AVG	P



Phase:N

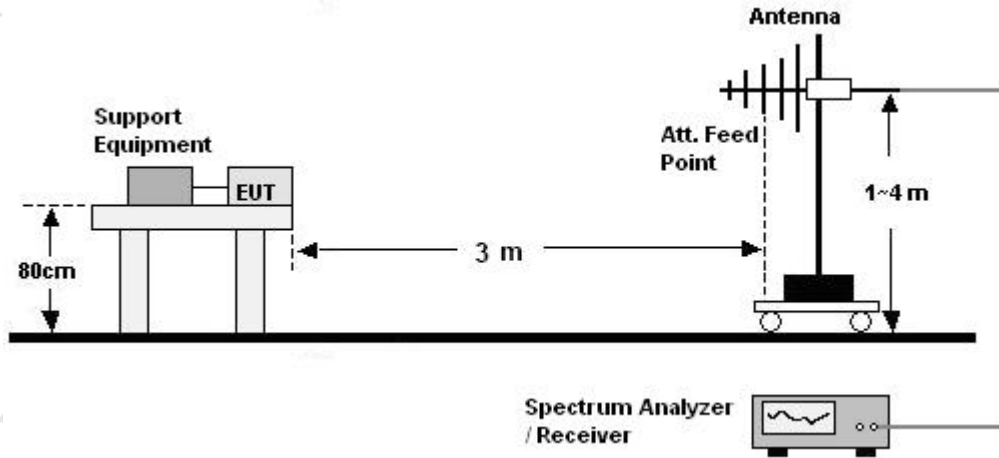


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1635	50.49	6.29	56.78	79.00	-22.22	QP	P
2	0.1635	42.38	6.29	48.67	66.00	-17.33	AVG	P
3	0.2445	43.72	6.30	50.02	79.00	-28.98	QP	P
4	0.2490	38.08	6.30	44.38	66.00	-21.62	AVG	P
5	0.5685	43.48	6.32	49.80	73.00	-23.20	QP	P
6 *	0.5730	38.10	6.32	44.42	60.00	-15.58	AVG	P
7	1.2210	36.73	6.35	43.08	73.00	-29.92	QP	P
8	1.2210	28.78	6.35	35.13	60.00	-24.87	AVG	P
9	1.8645	27.65	6.37	34.02	60.00	-25.98	AVG	P
10	1.8780	35.75	6.37	42.12	73.00	-30.88	QP	P
11	5.5085	36.04	6.46	42.50	73.00	-30.50	QP	P
12	5.5085	24.73	6.46	31.19	60.00	-28.81	AVG	P



5- RADIATED DISTURBANCE MEASUREMENT

5.1 BLOCK DIAGRAM OF TEST SETUP



5.2 LIMITS

Frequency (MHz)	Quasi-peak Limits at 3m dB(μ V/m)
30-230	50
230-1000	57

NOTE: The lower limit shall apply at the transition frequencies.

5.3 TEST PROCEDURE

a. The Product was placed on the non-conductive turntable 0.8/0.1 m above the ground at a chamber.

b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.

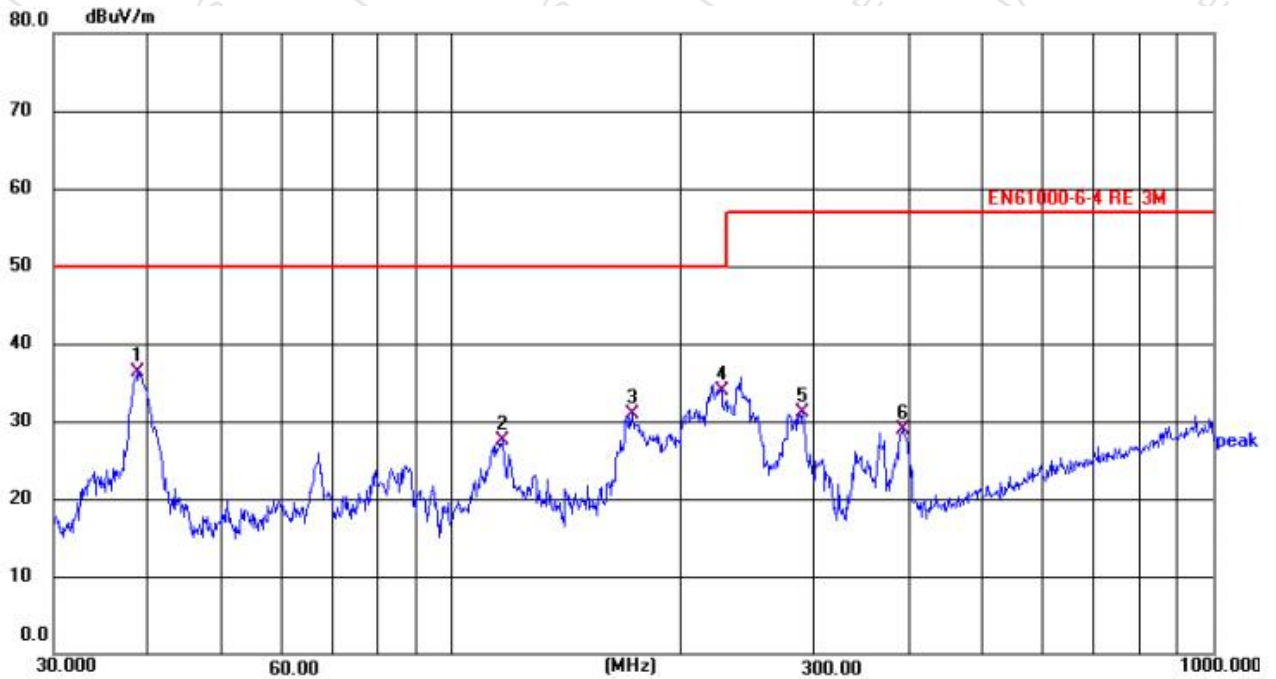
c. For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value



5.4 TEST RESULTS AND DATA

EUT: AC Servo Drives
M/N: RS400CR
Test Mode: ON
Test Voltage: AC 230V 50Hz
Temperature: 24°C
Humidity: 60%
Atmosphere pressure: 101Kpa
Test Results: Pass

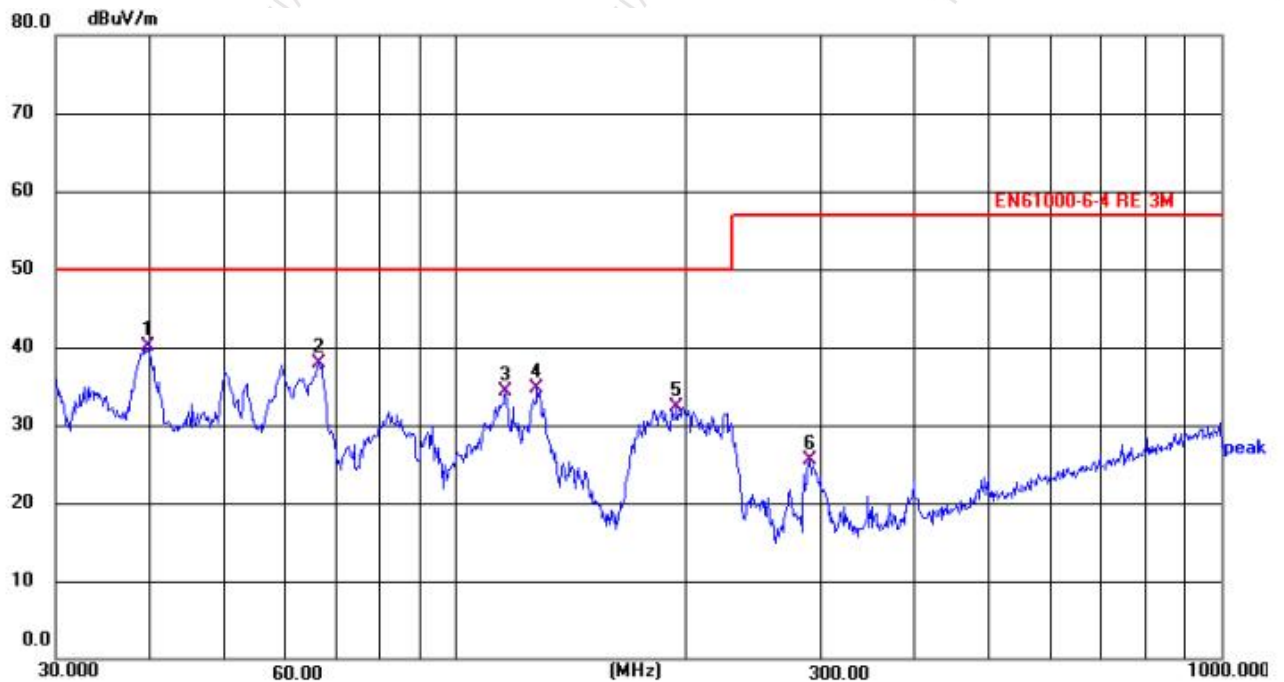
Polarization: Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	38.8809	49.91	-13.57	36.34	50.00	-13.66	QP
2	116.7445	44.72	-17.30	27.42	50.00	-22.58	QP
3	172.8713	47.30	-16.48	30.82	50.00	-19.18	QP
4	226.2580	51.32	-17.33	33.99	50.00	-16.01	QP
5	289.6615	46.03	-15.02	31.01	57.00	-25.99	QP
6	390.8596	41.57	-12.59	28.98	57.00	-28.02	QP



Polarization:Vertical



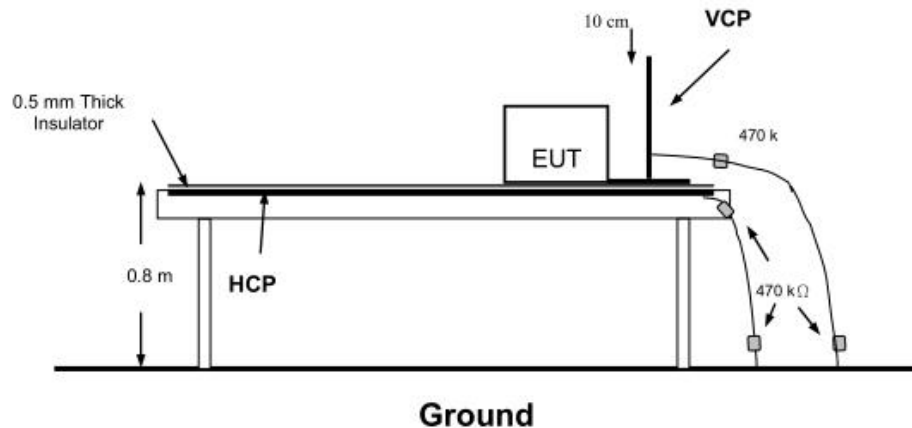
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	39.8052	53.64	-13.55	40.09	50.00	-9.91	QP
2	66.3475	54.74	-16.91	37.83	50.00	-12.17	QP
3	116.1729	51.56	-17.35	34.21	50.00	-15.79	QP
4	128.0007	51.22	-16.44	34.78	50.00	-15.22	QP
5	194.5557	50.48	-18.12	32.36	50.00	-17.64	QP
6	290.4243	40.44	-15.01	25.43	57.00	-31.57	QP



6 - IMMUNITY TEST

6.1 ELECTROSTATIC DISCHARGE IMMUNITY TEST

6.1.1 Block Diagram Of Test Setup



6.1.2 Test Specification

Basic Standard	: IEC 61000-4-2:2008
Test Port	: Enclosure port
Discharge Impedance	: 330 ohm / 150 pF
Discharge Mode	: Single Discharge
Discharge Period	: one second between each discharge

6.1.3 Test Procedure

6.1.3.1. Air Discharge

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator 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.

6.1.3.2. Contact Discharge

All the procedure shall be same as Section 6.1.3.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

6.1.3.3. Indirect Discharge for Horizontal Coupling Plane

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

6.1.3.4. Indirect Discharge for Vertical Coupling Plane

At least 10 single discharges (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.



6.1.4 Test Results

Electrostatic Discharge	
Basic Standard:	IEC 61000-4-2:2008
EUT:	AC Servo Drives
M/N:	RS400CR
Test Mode:	Normal Working
Test Voltage:	AC 230V 50Hz
Temperature:	25°C
Humidity:	55%
Atmosphere pressure:	101Kpa

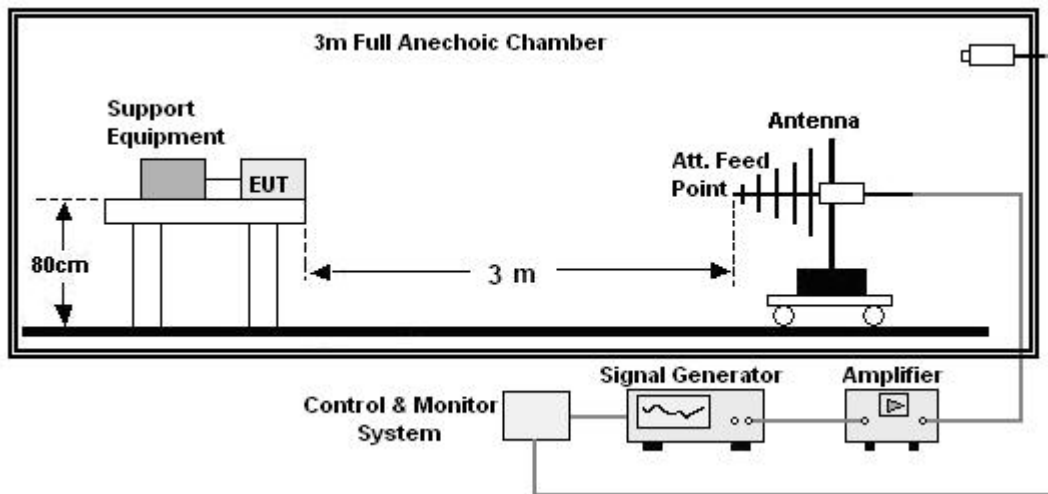
Discharge Method	Discharge Position	Voltage (±kV)	Min. No. of Discharge per polarity (Each Point)	Performance Criterion	Test Results
Contact Discharge	Conductive Surfaces	4	10	B	Pass
	Indirect Discharge HCP	4	10	B	Pass
	Indirect Discharge VCP	4	10	B	Pass
Air Discharge	Slots, Apertures, and Insulating Surfaces	8	10	B	Pass



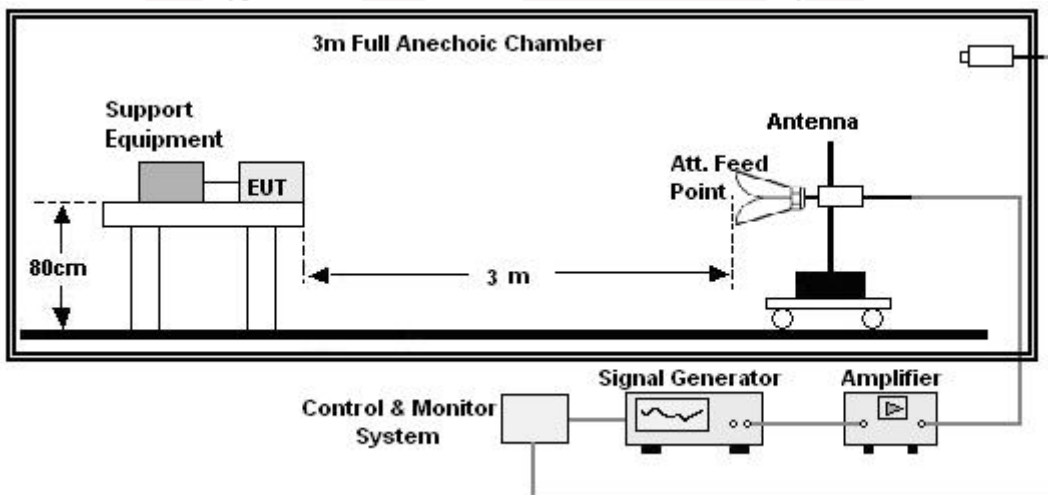
6.2 RADIO FREQUENCY ELECTROMAGNETIC FIELDS

6.2.1 Block Diagram of Test Setup

80-1000MHz:



1000-6000MHz:





6.2.2 Test Specification

Basic Standard	: IEC 61000-4-3:2020
Test Port	: Enclosure port
Step Size	: 1%
Modulation	: 1kHz, 80% AM
Dwell Time	: 1 second
Polarization	: Horizontal & Vertical

6.2.3 Test Procedure

- The testing was performed in a fully-anechoic chamber. The transmit antenna was located at a distance of 3 meters from the Product.
- The frequency range is swept from 80MHz 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%.
- The test was performed with the Product exposed to both vertically and horizontally polarized fields on each of the four sides.

6.2.4 Test Results

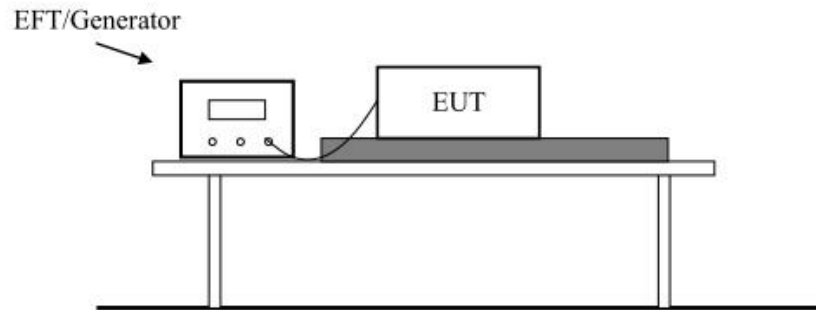
Radio frequency electromagnetic fields	
Basic Standard:	IEC 61000-4-3:2020
EUT:	AC Servo Drives
M/N:	RS400CR
Test Mode:	Normal Working
Test Voltage:	AC 230V, 50Hz
Temperature:	26°C
Humidity:	55%
Atmosphere pressure:	101Kpa

Frequency (MHz)	Position	Field Strength (V/m)	Performance Criterion	Test Results
80 - 1000	Front, Right, Back, Left	10	A	Pass
1400-6000	Front, Right, Back, Left	3	A	Pass



6.3 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

6.3.1 Block Diagram of Test Setup



6.3.2 Test Specification

Basic Standard	: IEC 61000-4-4:2012
Test Port	: input a.c. / d.c. power port signal lines and control lines
Impulse Frequency	: 5 or 100 kHz
Impulse Wave-shape	: 5/50 ns
Burst Duration	: 15 ms
Burst Period	: 300 ms
Test Duration	: 2 minutes per polarity

6.3.3 Test Procedure

The EUT is put on the table which is 0.8 meter high above the ground. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

6.3.3.1. For input and output AC power ports:

The EUT is connected to the power mains by using a coupling device which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 mins.

6.3.3.2. For signal lines and control lines ports:

No I/O ports. It's unnecessary to test.

6.3.3.3. For DC output line ports:

No DC output ports. It's unnecessary to test.



6.3.4 Test Results

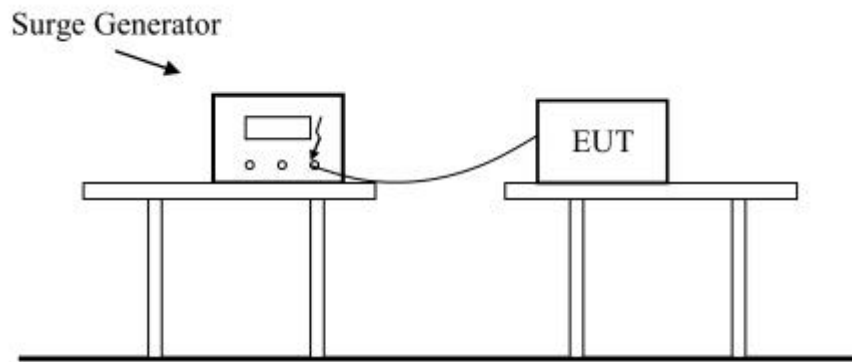
Electrical Fast Transient/Burst	
Basic Standard:	IEC 61000-4-4:2012
EUT:	AC Servo Drives
M/N:	RS400CR
Test Mode:	Normal Working
Test Voltage:	AC 230V 50Hz
Temperature:	24℃
Humidity:	60%
Atmosphere pressure:	101Kpa

Line	Test Voltage	Polarity	Performance Criterion	Results
L+N+PE	2kv	±	B	Pass



6.4 SURGE IMMUNITY TEST

6.4.1 Block Diagram of Test Setup



6.4.2 Test Specification

Basic Standard	IEC 61000-4-5:2014+AMD1:2017
Test Port	input a.c. power port
Wave-Shape	Open Circuit Voltage - 1.2 / 50 us Short Circuit Current - 8 / 20 us
Pulse Repetition Rate	1 pulse / min.
Test Events	Five positive polarity pulses and five negative polarity pulses

6.4.3 Test Procedure

6.4.3.1. Set up the EUT and test generator as shown on Section 6.4.1.

6.4.3.2. For line to line coupling mode, provide a 1.0 KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.

6.4.3.3. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test

6.4.3.4. Different phase angles are done individually.

6.4.3.5. Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.



6.4.4 Test Results

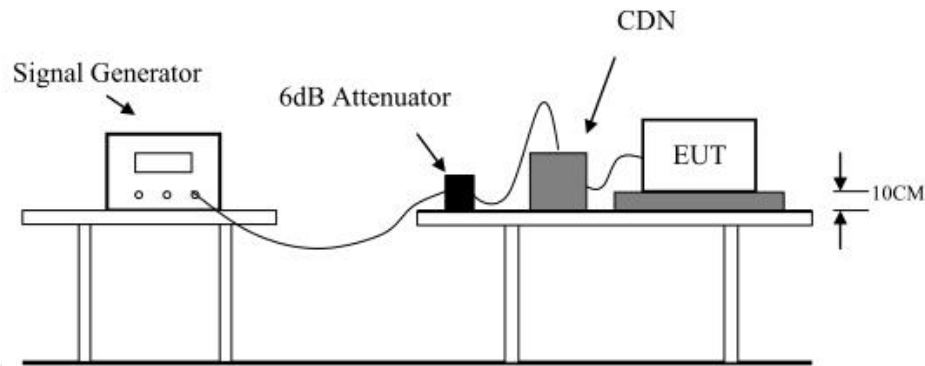
SURGE IMMUNITY	
Basic Standard:	IEC 61000-4-5:2014+AMD1:2017
EUT:	AC Servo Drives
M/N:	RS400CR
Test Mode:	Normal Working
Test Voltage:	AC 230V 50Hz
Temperature:	24°C
Humidity:	60%
Atmosphere pressure:	101Kpa

Coupling Line	Voltage (kV)	Phase Angle	Performance Criterion	Results
L - N	±1	0° ,90° ,180° ,270°	B	Pass
L - PE	±2	0° ,90° ,180° ,270°	B	Pass
N - PE	±2	0° ,90° ,180° ,270°	B	Pass



6.5 INJECTED CURRENTS SUSCEPTIBILITY TEST

6.5.1 Block Diagram of Test Setup



6.5.2 Test Specification

Basic Standard	: IEC 61000-4-6:2013
Test Port	: input a.c. / d.c. power port signal lines and control lines
Step Size	: 1%
Modulation	: 1kHz,80% AM
Dwell Time	: 1 second

6.5.3 Test Procedure

6.5.3.1. Set up the EUT, CDN and test generators as shown on Section 6.5.1.

6.5.3.2. Let the EUT work in test mode and measure it.

6.5.3.3. The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. 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).

6.5.3.4. The disturbance signal described below is injected to EUT through CDN.

6.5.3.5. The EUT operates within its operational mode(s) under intended climatic conditions after power on.

6.5.3.6. The frequency range is swept from 150kHz to 230MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.

6.5.3.7. The rate of sweep shall not exceed 1.5×10^{-3} decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.

6.5.3.8. Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.



6.5.4 Test Results

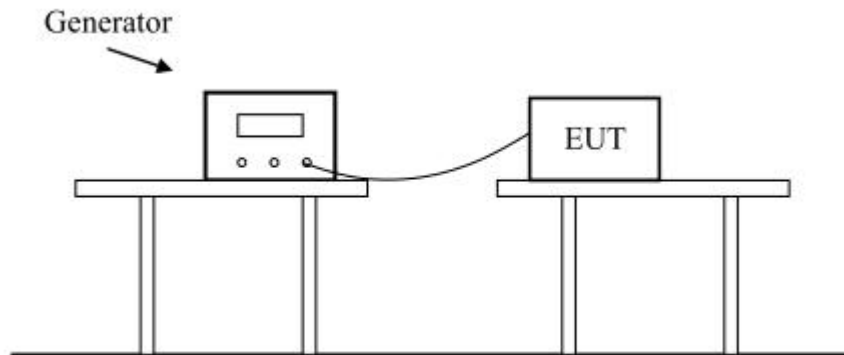
INJECTED CURRENTS SUSCEPTIBILITY	
Basic Standard:	IEC 61000-4-6:2013
EUT:	AC Servo Drives
M/N:	RS400CR
Test Mode:	Normal Working
Test Voltage:	AC 230V 50Hz
Temperature:	24℃
Humidity:	58%
Atmosphere pressure:	101Kpa

Frequency Range (MHz)	Injected Position	Strength (Non-modulated)	Performance Criterion	Results
0.15 ~ 80	AC Mains	10V r.m.s.	A	PASS



6.6 VOLTAGE DIPS AND INTERRUPTIONS TEST

6.6.1 Block Diagram of Test Setup



6.6.2 Test Specification

Basic Standard	: IEC 61000-4-11:2020
Test Port	: input a.c. power port
Phase Angle	: 0°, 180°

6.6.3 Test Procedure

- 6.6.3.1. Set up the EUT and test generator as shown on Section 6.6.1.
- 6.6.3.2. The interruptions is introduced at selected phase angles with specified duration.
- 6.6.3.3. Record any degradation of performance.



6.6.4 Test Results

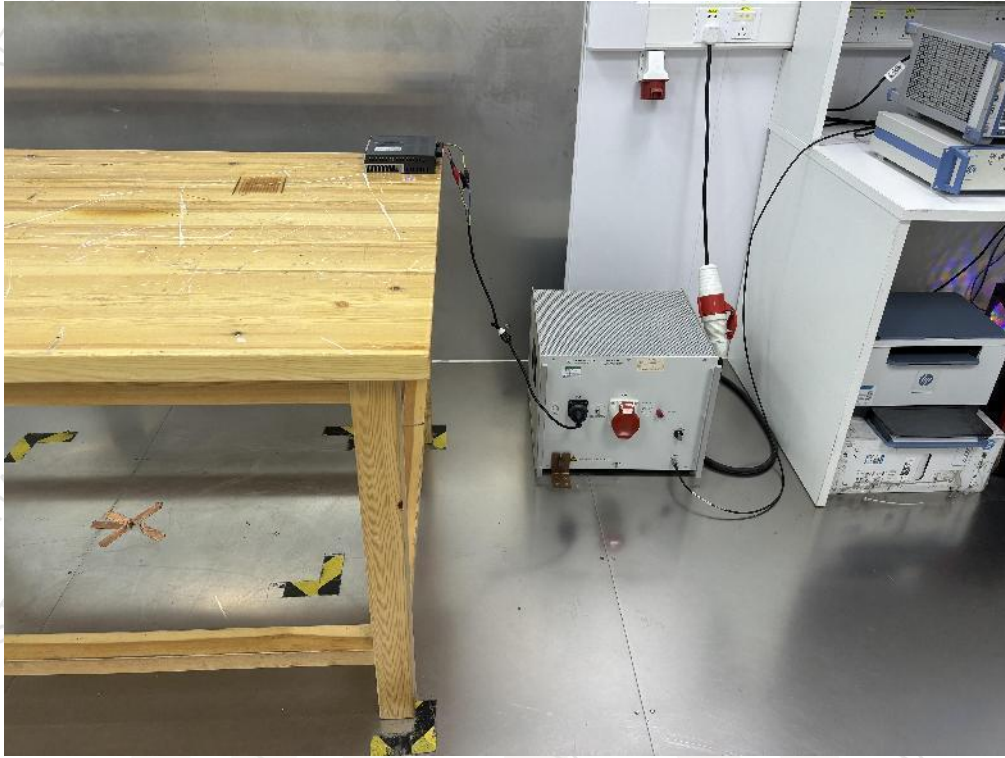
VOLTAGE DIPS AND INTERRUPTIONS	
Basic Standard:	IEC 61000-4-11:2020
EUT:	AC Servo Drives
M/N:	RS400CR
Test Mode:	Normal Working
Test Voltage:	AC 230V 50Hz
Temperature:	24℃
Humidity:	60%
Atmosphere pressure:	101Kpa

Test Level % U_T	Voltage dips in % U_T	Duration (cycles)	Performance Criterion	Results
		50Hz		
0	100	1	B	Pass
40	60	10	C	Pass
70	30	25	C	Pass
0	100	250	C	Pass

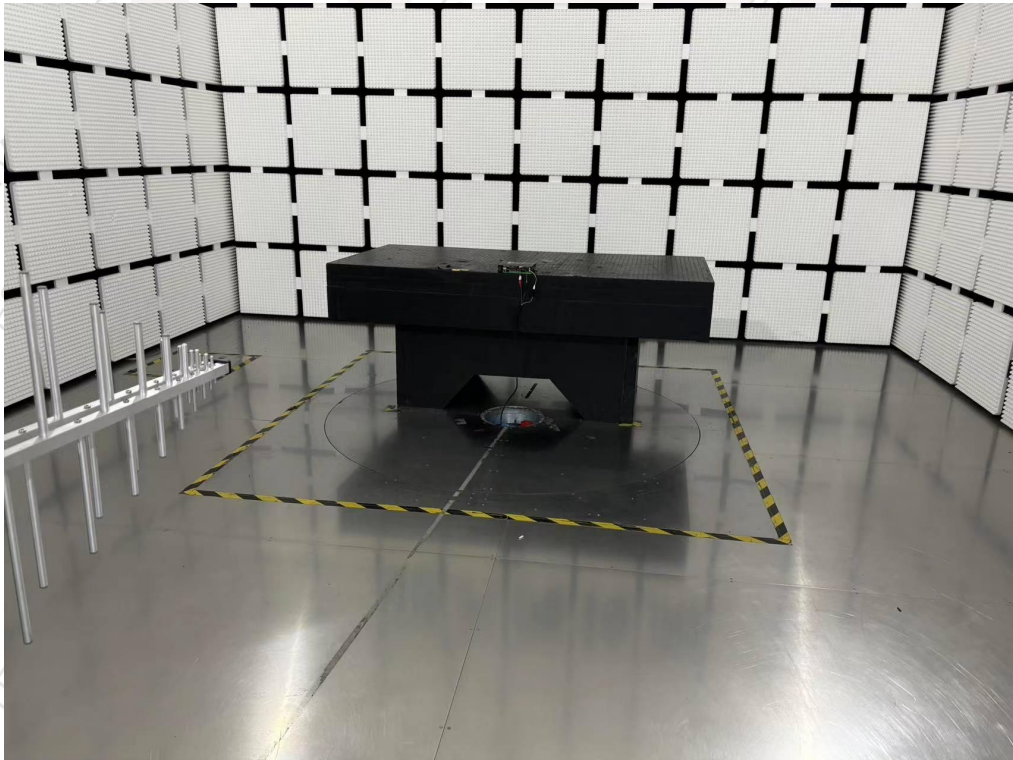


APPENDIX A - TEST SETUP PHOTOGRAPHS

Photograph 1 : Setup for Conducted Emission



Photograph 2 :Setup for Radiated Emission

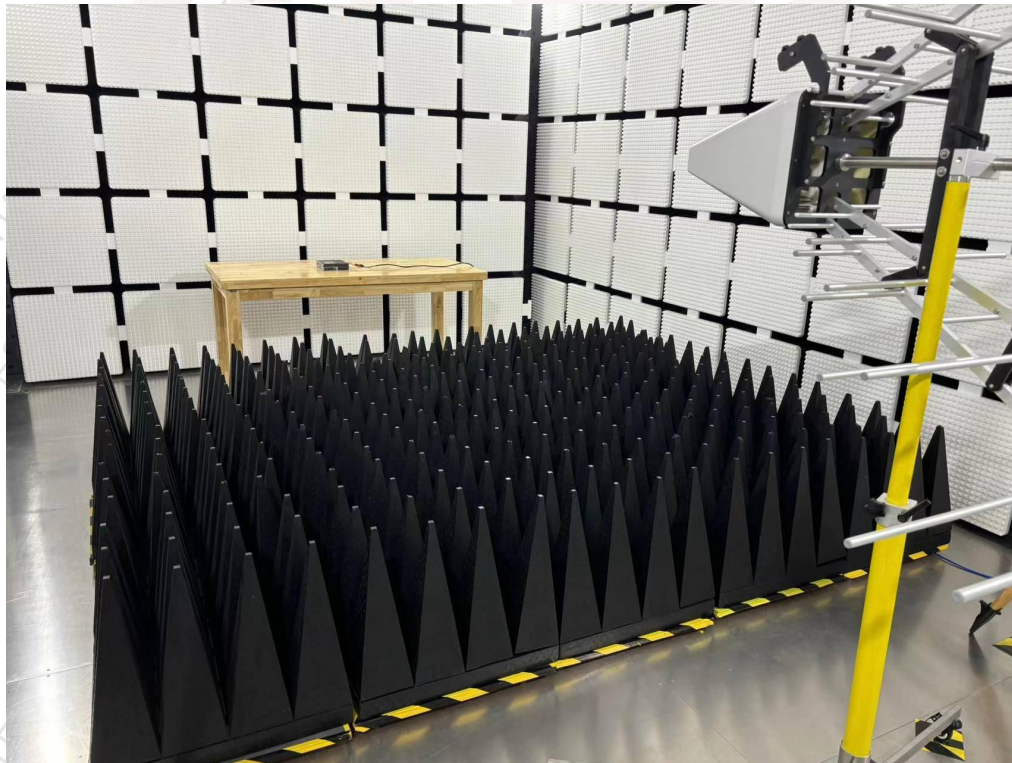




Photograph 3 :Setup for Electrostatic Discharge

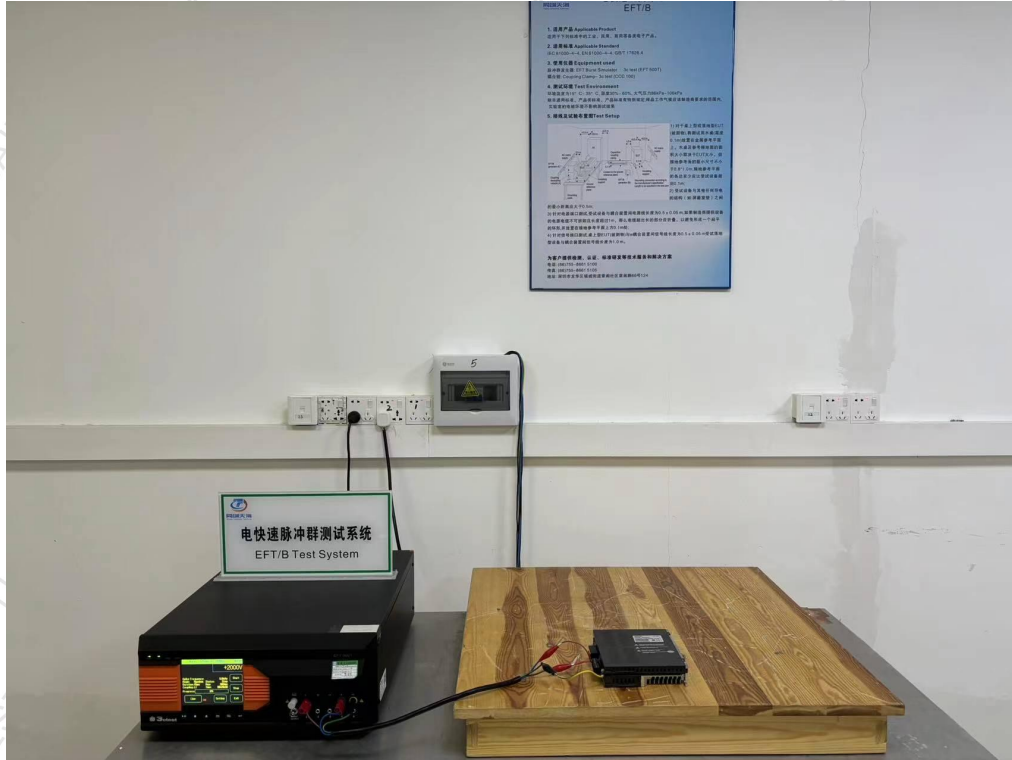


Photograph 4 :Setup for Radio Frequency Electromagnetic Fields





Photograph 5 :Setup for Electrical Fast Transient/Burst

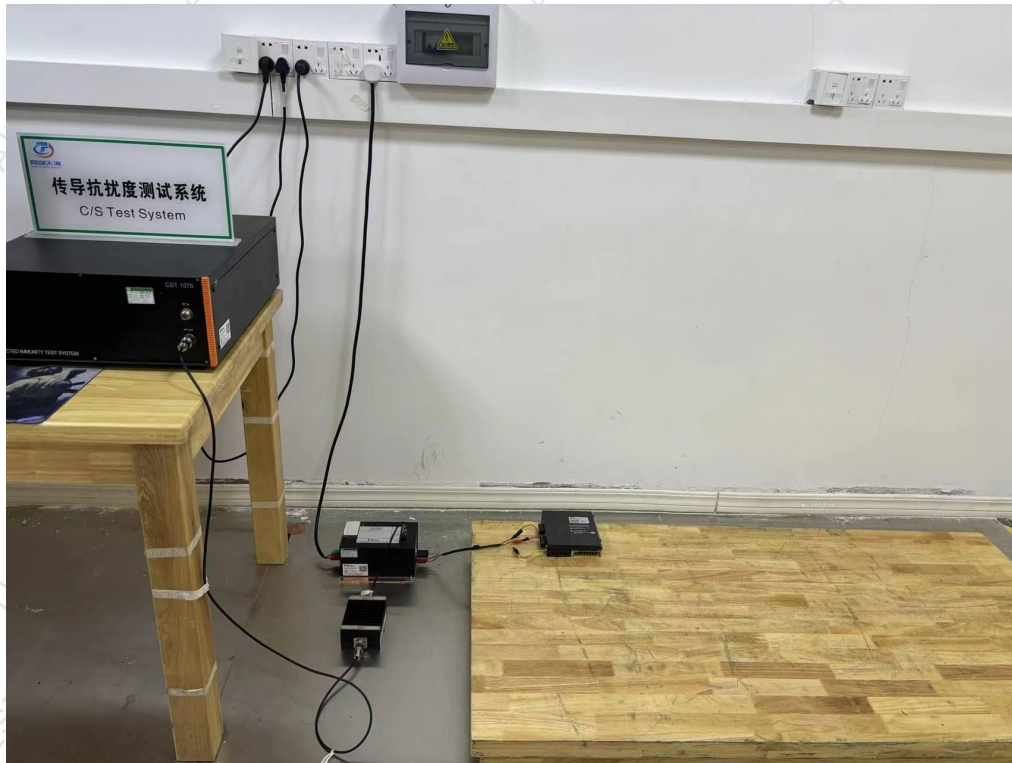


Photograph 6 :Setup for Surge





Photograph 7 :Setup for Injected Currents Susceptibility

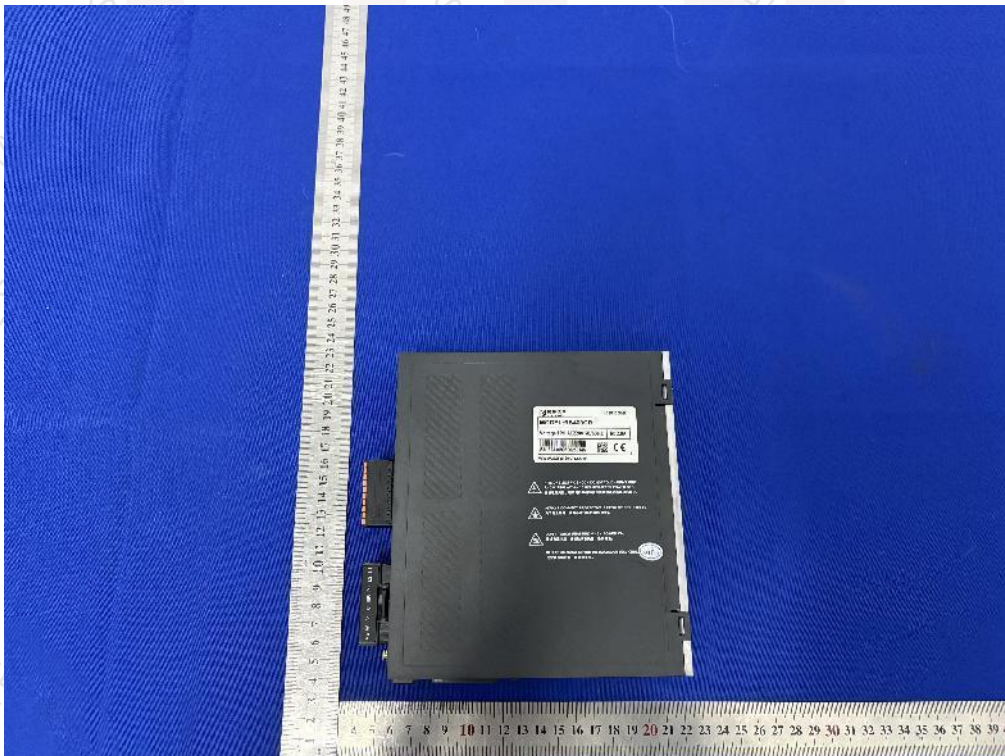
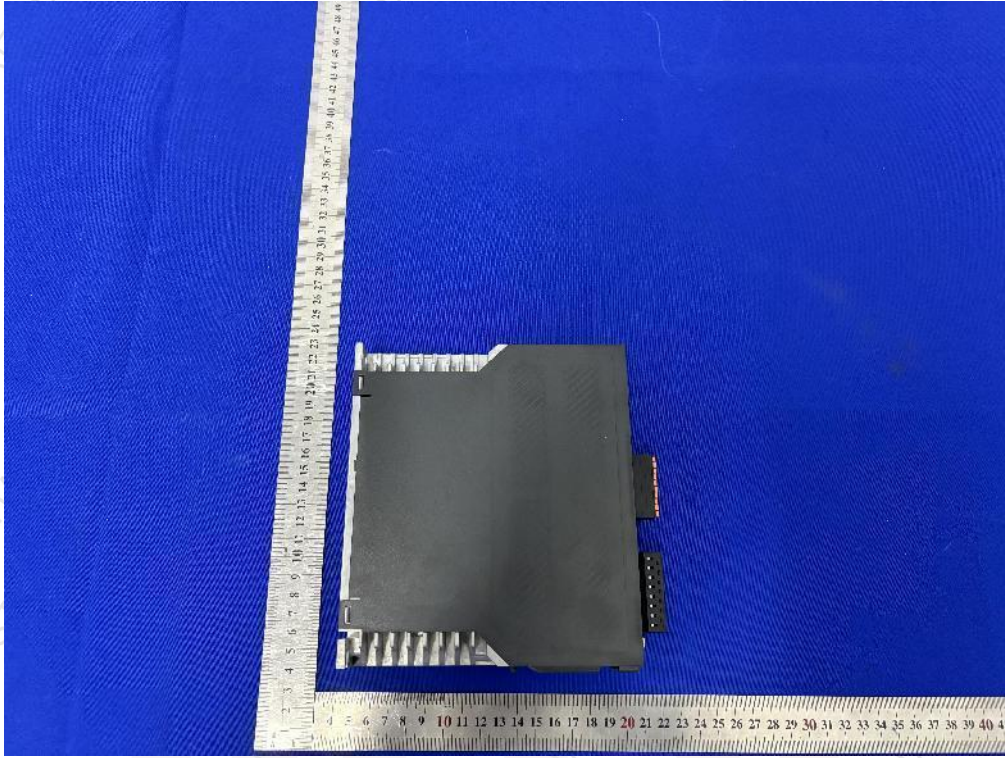


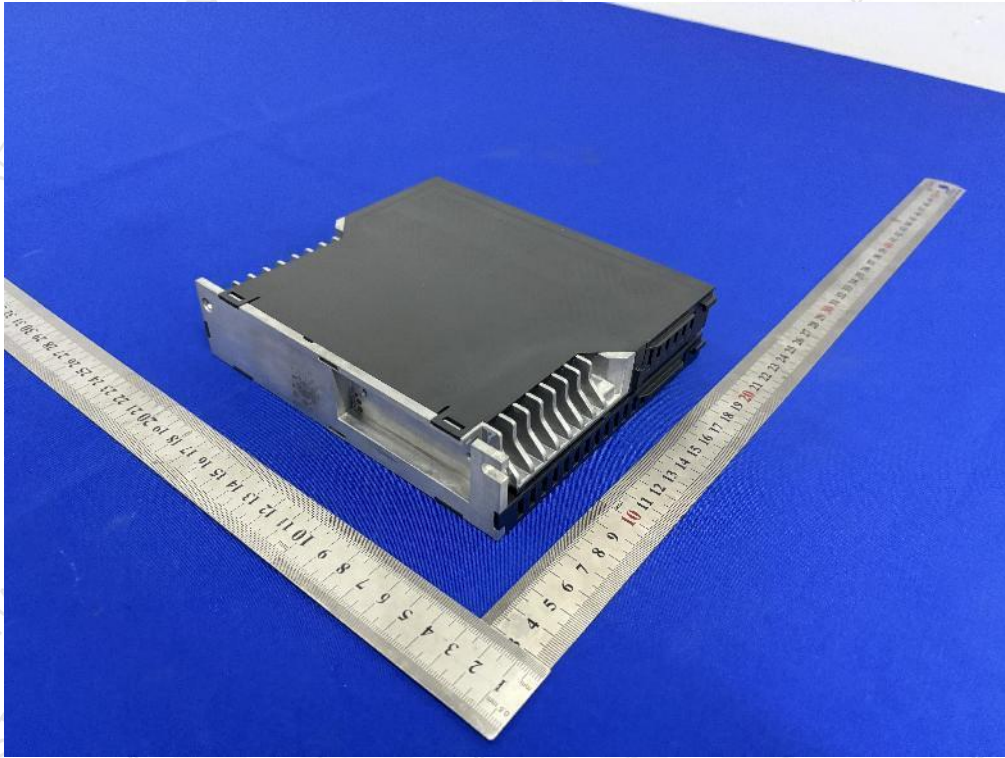
Photograph 8 :Setup for Voltage Dips And Interruptions





APPENDIX B - EUT PHOTOGRAPHS







*****END OF THE REPORT*****