



EMC TEST REPORT
EN 55032:2015/A11:2020
EN 55035:2017/A11:2020
EN IEC 61000-3-2:2019/A1:2021
EN 61000-3-3:2013/A1:2019
MEASUREMENT AND TEST REPORT


For

Shenzhen Rteligent Technology Co.,Ltd

B301Room 301,B Building,Zhuangbian Industrial park,Nanchang Road,Gushu,Baoan
District,Shenzhen,Guangdong China

Model: R110PLUS, R130, 3R110PLUS, 3R130, R110PLUS-IO, R130-IO, NT110

2022-07-04

This Report Concerns:	Equipment Type:
Original Report	Stepper Servo Drives/Microstep Drives
Test Engineer:	Eric Tao/ 
Report Number:	TH2206052-C26-R01
Test Date:	2022-06-05 to 2022-06-23
Reviewed By:	Prince Huang/ 
Approved By:	Prince Huang/ 
Prepared By:	Shenzhen Tian Hai Test Technology Co., Ltd. 125-126, No.66, Zhangge Road, Zhangge Community, Fucheng Street, Longhua District, Shenzhen, Guangdong Province, P.R. 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.



TABLE OF CONTENTS

1 - SUMMARY OF STANDARDS AND RESULTS.....	4
1.1 DESCRIPTION OF STANDARDS AND RESULTS.....	4
1.2 DESCRIPTION OF PERFORMANCE CRITERIA.....	5
2 - GENERAL INFORMATION.....	6
2.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....	6
2.2 STATEMENT OF THE MEASUREMENT UNCERTAINTY TEST FACILITY.....	6
2.3 MEASUREMENT UNCERTAINTY.....	7
2.4 TEST LOCATION.....	7
2.5 PRINCIPLE OF CONFIGURATION SELECTION.....	7
2.6 TEST OPERATION.....	7
2.7 SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT.....	7
3 - TEST EQUIPMENT LIST AND DETAILS.....	8
4 - CONDUCTED EMISSION MEASUREMENT.....	10
4.1 BLOCK DIAGRAM OF TEST SETUP.....	10
4.2 LIMITS.....	10
4.3 TEST PROCEDURE.....	10
4.4 TEST RESULTS AND DATA.....	11
5 - RADIATED DISTURBANCE MEASUREMENT.....	13
5.1 BLOCK DIAGRAM OF TEST SETUP.....	13
5.2 LIMITS.....	13
5.3 TEST PROCEDURE.....	13
5.4 TEST RESULTS AND DATA.....	14
6 - HARMONIC CURRENT EMISSION MEASUREMENT.....	15
6.1 BLOCK DIAGRAM OF TEST SETUP.....	16
6.2 TEST STANDARD.....	16
6.3 TEST PROCEDURE.....	16
6.4 TEST RESULTS.....	16
7 - VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT.....	17
7.1 BLOCK DIAGRAM OF TEST SETUP.....	17
7.2 TEST STANDARD.....	17
7.3 TEST PROCEDURE.....	17
7.4 TEST RESULTS.....	17
8 - IMMUNITY TEST.....	18
8.1 ELECTROSTATIC DISCHARGE IMMUNITY TEST.....	18
8.1.1 Block Diagram of Test Setup.....	18
8.1.2 Test Specification.....	18
8.1.3 Test Procedure.....	18
8.1.4 Test Results.....	19
8.2 RADIO FREQUENCY ELECTROMAGNETIC FIELDS.....	20
8.2.1 Block Diagram of Test Setup.....	20
8.2.2 Test Specification.....	20
8.2.3 Test Procedure.....	20
8.2.4 Test Results.....	21
8.3 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST.....	22
8.3.1 Block Diagram of Test Setup.....	22
8.3.2 Test Specification.....	22
8.3.3 Test Procedure.....	22
8.3.4 Test Results.....	23
8.4 SURGE IMMUNITY TEST.....	24
8.4.1 Block Diagram of Test Setup.....	24
8.4.2 Test Specification.....	24



8.4.3 Test Procedure.....	24
8.4.4 Test Results.....	25
8.5 INJECTED CURRENTS SUSCEPTIBILITY TEST.....	26
8.5.1 Block Diagram of Test Setup.....	26
8.5.2 Test Specification.....	26
8.5.3 Test Procedure.....	26
8.5.4 Test Results.....	27
8.6 VOLTAGE DIPS AND INTERRUPTIONS TEST.....	28
8.6.1 Block Diagram of Test Setup.....	28
8.6.2 Test Specification.....	28
8.6.3 Test Procedure.....	28
8.6.4 Test Results.....	29
APPENDIX A - TEST SETUP PHOTOGRAPHS.....	30
APPENDIX B - EUT PHOTOGRAPHS.....	34



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 55032:2015/A11:2020	EN 55032:2015/A11:2020	Class B	N/A
Radiated disturbance	EN 55032:2015/A11:2020	EN 55032:2015/A11:2020	Class B	PASS
Harmonic current emissions	EN IEC 61000- 2:2019/A1:2021	EN IEC 61000- 2:2019/A1:2021	Class A	N/A
Voltage fluctuations & flicker	EN 61000-3- 3:2013/A2:2021	EN 61000-3- 3:2013/A2:2021	Clause 5	N/A
IMMUNITY				
Description of Test Item	Test Standard	Basic Standard	Requirement	Results
Electrostatic discharge (ESD)	EN 55035:2017/A11:2020	IEC 61000-4-2:2008	See Section 8.1	PASS
Radio-frequency, Continuous radiated disturbance	EN 55035:2017/A11:2020	IEC 61000-4-3:2020	See Section 8.2	PASS
Electrical fast transient (EFT)	EN 55035:2017/A11:2020	IEC 61000-4-4:2012	See Section 8.3	N/A
Surge (Input a.c. power ports)	EN 55035:2017/A11:2020	IEC 61000-4- 5:2014+A1:2017	See Section 8.4	N/A
Radio-frequency, Continuous conducted disturbance	EN 55035:2017/A11:2020	IEC 61000-4-6:2013	See Section 8.5	N/A
Power frequency magnetic field*	EN 55035:2017/A11:2020	IEC 61000-4-8:2009	--	N/A
Voltage dips and interruptions	EN 55035:2017/A11:2020	IEC 61000-4-11:2020	See Section 8.6	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

Examples of functions defined by the manufacturer to be evaluated during testing include, but are not limited to, the following:

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

1.2.1 Performance criterion A

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

1.2.2 Performance criterion B

After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacture, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.

During the test, degradation of performance is allowed. However, no change of operation state or stored data is allowed to persist after the test.

If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be deliver from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

1.2.3 Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacture's instructions.

Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be loss.



2 - GENERAL INFORMATION

2.1 Product Description for Equipment under Test (EUT)

Client Information

Applicant: Shenzhen Rtelligent Technology Co.,Ltd
Address: B301Room 301,B Building,Zhuangbian Industrial park,Nanchang Road,Gushu,Baoan District,Shenzhen,Guangdong China
Manufacturer: Shenzhen Rtelligent Technology Co.,Ltd
Address: B301Room 301,B Building,Zhuangbian Industrial park,Nanchang Road,Gushu,Baoan District,Shenzhen,Guangdong China

General Description of E.U.T

EUT Name: **Stepper Servo Drives/Microstep Drives**
Sample No.: TH2206052-26
Trade Mark: /
Model No.: R110PLUS, R130, 3R110PLUS, 3R130, R110PLUS-IO, R130-IO, NT110
Ratings: 220VAC, 50/60Hz, 1.5A, 400W
Test Mode: A. On
1. Normal working
B. Off
Note: All the models are identical with circuit diagram and PCB layout, only different in ratings of some components and appearance.

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 4-2: Uncertainties, statistics and limit modelling - Measurement instrumentation uncertainty" and is documented in the LCS quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.



2.3 Measurement Uncertainty

Test Item	Frequency Range	Results	Limits
Conducted disturbance at mains terminals	9kHz to 150kHz	± 2.52 dB	± 3.8 dB
	150kHz to 30MHz	± 2.36 dB	± 3.4 dB
Radiated disturbance	30MHz to 1GHz	± 5.78 dB	± 6.3 dB
Radiated disturbance	1GHz to 6GHz	± 4.62 dB	± 5.2 dB
Mains Harmonic	Voltage	$\pm 0.512\%$	N/A
Voltage Fluctuations & Flicker	Voltage	$\pm 0.512\%$	N/A

(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%.

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, 7 & 8.

Pre-test in all operation modes, and find out the worst case for compliance test.

According to section 2.1, full tests were applied on model R110PLUS.

2.7 Special Accessories and Auxiliary Equipment

None.



3 - TEST EQUIPMENT LIST AND DETAILS

Kind of Equipment	Manufacturer	Type	S/N	Calibrated until
Conducted Emission				
EMI Test Receiver	R&S	ESRP3	102242	2022-11-15
L.I.S.N	Schwarzbeck	NNLK 8128	5089	2022-11-15
8-Wire ISN CAT6	Schwarzbeck	NTFM 8158	231	2022-11-15
Pulse Limiter	Schwarzbeck	VTSD 9561-F	00723	2022-11-15
Radiated Emission (3m)				
EMI Test Receiver	R&S	ESR7	102333	2022-11-15
Bilog Antenna	Schwarzbeck	VULB 9168	01148	2022-11-20
Pre-Amplifier	Schwarzbeck	BBV 9718 B	00109	2022-11-16
Pre-Amplifier	Schwarzbeck	BBV 9743 B	00253	2022-11-15
Horn Antenna	Schwarzbeck	BBHA 9120	02379	2022-11-20
Harmonics & Flicker				
5kVA AC Power Source	AMETEK CTS	5001iX-CTS-400	2046A03237	2022-11-15
Signal Conditioning Unit	AMETEK CTS	PACS-1	2046A03238	2022-11-15
ESD				
ESD Simulator	TESEQ	NSG 437	1569	2022-11-20
Radio-Frequency Electromagnetic Field Amplitude Modulated (RS)				
Signal generator	R&S	SMB 100A	113650	2023-04-15
Power meter	Agilent	E4417A	MY45100899	2023-04-15
Power sensor	Agilent	E9300	US40390494	2023-04-15
Power sensor	Agilent	E9300	MY44420219	2023-04-15
Power amplifier	Micotop	MPA-80-1000-250	MPA2112426	2023-04-15
Power amplifier	Micotop	MPA-1000-6000-100	MPA2201013	2023-04-15
Stacked Log. Periodic Antenna	Schwarzbeck	STLP 9129	201	N/A
Field strength probe	PMM	EP601	811ZX10673	2023-04-17
RF Switch	Emtrace	SW X4	/	N/A
Software	Emtrace	EM 3	V1.2.1	N/A
EFT				
Burst Tester	3C test	EFT 500T	ES027000120015	2022-11-15
Coupling Clamp	3C test	CCC 100	CCC 20092269	2022-11-15
Surge				
Surge simulator	3C test	CWS 600CT	ES058000920005	2022-11-15
Three phases CDN	3C test	SPN 3832T	ES0911910	2022-11-15
CDN for unshielded symmetrical high-speed Telecom cable	3C test	CDN405T8A	ES064001220010	2022-11-15
CDN for Telecom cable	3C test	CDN405M40-5	ES1071910	2022-11-15
Radio-Frequency Continuous Conducted (CS)				



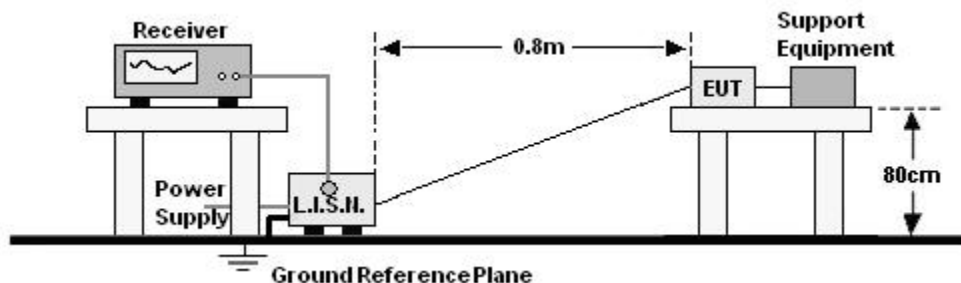
Kind of Equipment	Manufacturer	Type	S/N	Calibrated until
Conducted Immunity Test System	3C test	CST 1075	ES096000120008	2022-11-15
6dB Attenuator	3C test	DTC75-6	ES095000120006	2022-11-15
Single phase CDN	3C test	CDN M2M3	ES064002620007	2022-11-15
Three phases CDN	3C test	CDN M5-16	ES064003320004	2022-11-15
Calibration Set	3C test	CDN 100KIT	ES064002820016	2022-11-15
Calibration Set	3C test	EM CL100KIT	EM C20032816	2022-11-15
EM-Clamp	3C test	EM CL100	EM C20032811	2022-11-15
Power Frequency Magnetic Field (PFMF)				
PFMF simulator	3C test	MFS 400	ES045000720001	2022-11-15
Transformer	3C test	MFT 400	ES046000220003	2022-11-15
Magnetic field antenna	3C test	TCXS111	TCXS20060910	2022-11-15
Voltage Dips and Interruptions				
Power failure simulator	3C test	PFS 2216SD	ES049001220003	2022-11-15



4 - CONDUCTED EMISSION MEASUREMENT

4.1 Block Diagram of Test Setup

For mains terminals:



4.2 Limits

Frequency Range (MHz)	Limits dB(μV)	
	Quasi-Peak	Average
0.150~0.500	66~56*	56~46*
0.500~5.000	56	46
5.000~30.00	60	50

Remark: * means decreasing linearly with logarithm of frequency.

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 55014-1 regulations during conducted emission measurement.

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

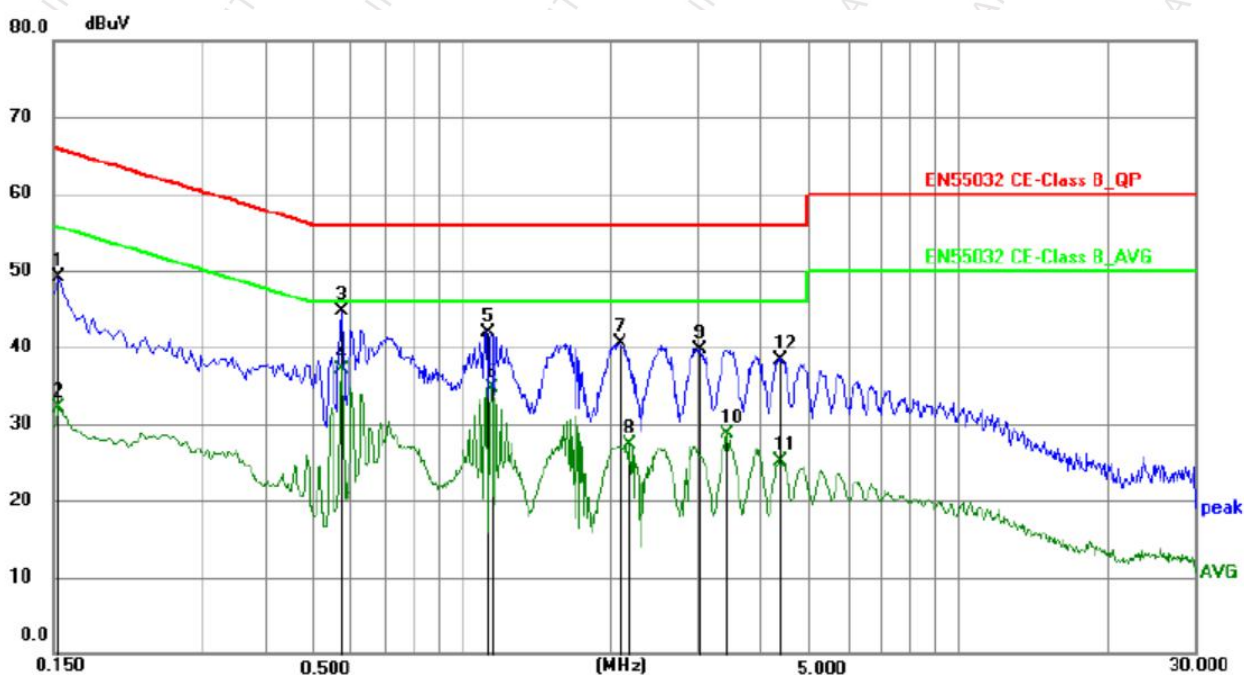
The frequency range from 150kHz to 30MHz is investigated. The scanning waveform please refer to the next page.



4.4 Test Results and Data

EUT: Stepper Servo Drives/Microstep Drives
M/N: R110PLUS
Test Mode: A.1
Test voltage: AC 230V, 50Hz
Temperature: 24℃
Humidity: 60%
Atmosphere pressure: 101Kpa
Test Results: pass

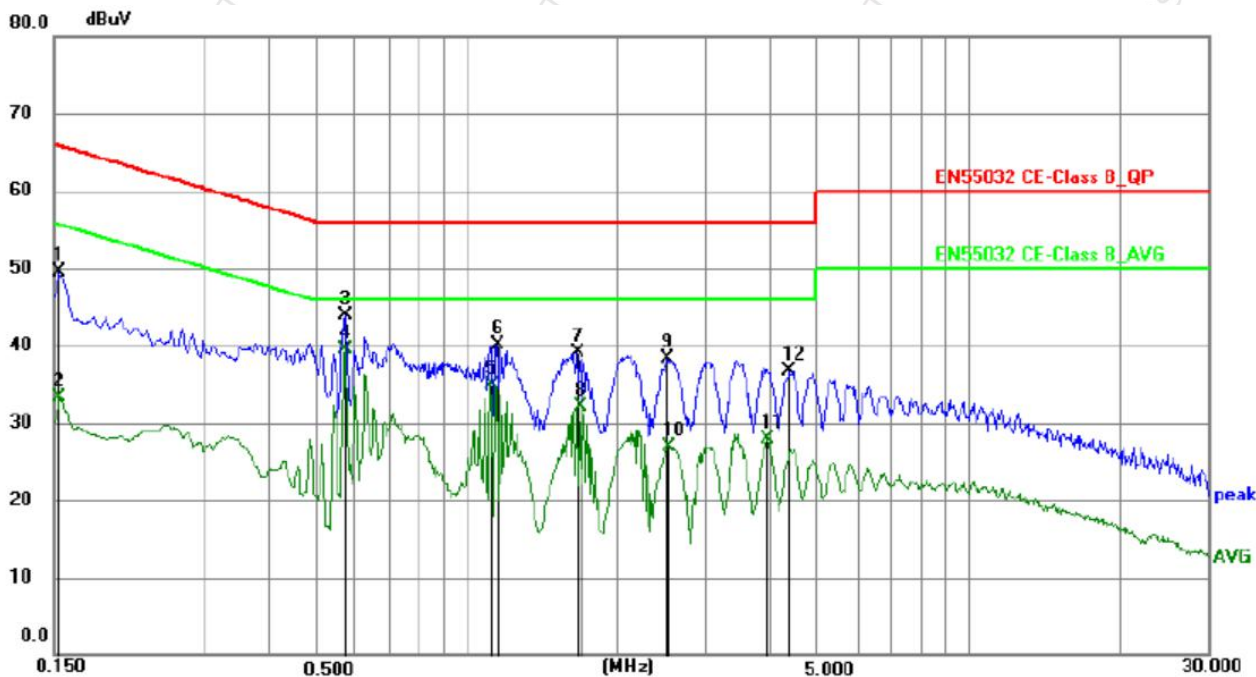
Phase: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1544	38.96	10.13	49.09	65.76	-16.67	peak	P	
2	0.1544	21.99	10.13	32.12	55.76	-23.64	AVG	P	
3	0.5730	34.58	10.16	44.74	56.00	-11.26	peak	P	
4 *	0.5730	26.97	10.16	37.13	46.00	-8.87	AVG	P	
5	1.1174	31.63	10.20	41.83	56.00	-14.17	peak	P	
6	1.1445	24.58	10.20	34.78	46.00	-11.22	AVG	P	
7	2.0760	30.35	10.22	40.57	56.00	-15.43	peak	P	
8	2.1750	17.10	10.22	27.32	46.00	-18.68	AVG	P	
9	3.0120	29.44	10.25	39.69	56.00	-16.31	peak	P	
10	3.4304	18.40	10.26	28.66	46.00	-17.34	AVG	P	
11	4.3484	14.81	10.28	25.09	46.00	-20.91	AVG	P	
12	4.4024	28.08	10.28	38.36	56.00	-17.64	peak	P	



Phase: N



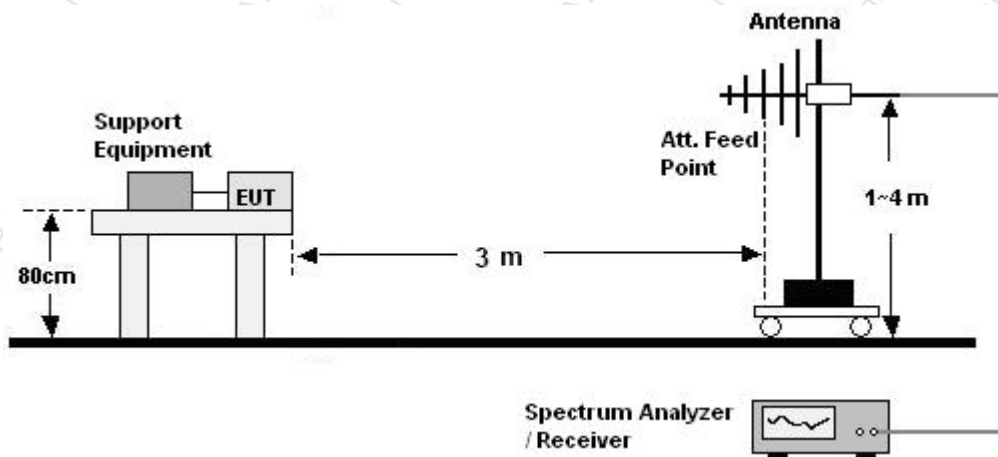
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1544	39.27	10.16	49.43	65.76	-16.33	peak	P	
2	0.1544	23.11	10.16	33.27	55.76	-22.49	AVG	P	
3	0.5730	33.79	10.18	43.97	56.00	-12.03	peak	P	
4 *	0.5730	29.31	10.18	39.49	46.00	-6.51	AVG	P	
5	1.1130	24.60	10.22	34.82	46.00	-11.18	AVG	P	
6	1.1445	29.91	10.22	40.13	56.00	-15.87	peak	P	
7	1.6575	28.78	10.24	39.02	56.00	-16.98	peak	P	
8	1.6845	21.94	10.24	32.18	46.00	-13.82	AVG	P	
9	2.5034	28.12	10.26	38.38	56.00	-17.62	peak	P	
10	2.5393	16.69	10.26	26.95	46.00	-19.05	AVG	P	
11	3.9704	17.51	10.30	27.81	46.00	-18.19	AVG	P	
12	4.4024	26.36	10.30	36.66	56.00	-19.34	peak	P	



5 - RADIATED DISTURBANCE MEASUREMENT

5.1 Block Diagram of Test Setup

30MHz ~ 1GHz:



5.2 Limits

Frequency (MHz)	Quasi-peak limits at 3m dB(μV/m)
30-230	40
230-1000	47

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

5.3 Test Procedure

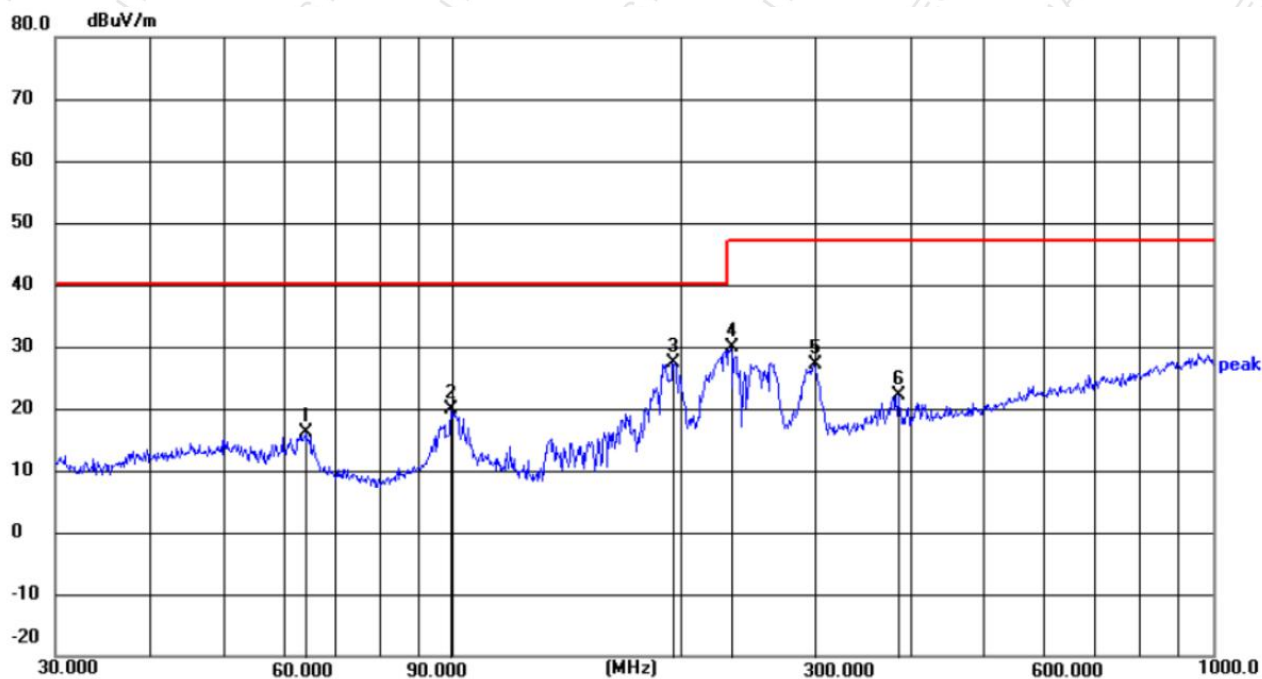
- The Product was placed on the non-conductive turntable 0.8/0.1 m above the ground at a chamber.
- Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- 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: Stepper Servo Drives/Microstep Drives
M/N: R110PLUS
Test Mode: ON
Test voltage: AC 230V, 50Hz
Temperature: 24℃
Humidity: 60%
Atmosphere pressure: 101Kpa

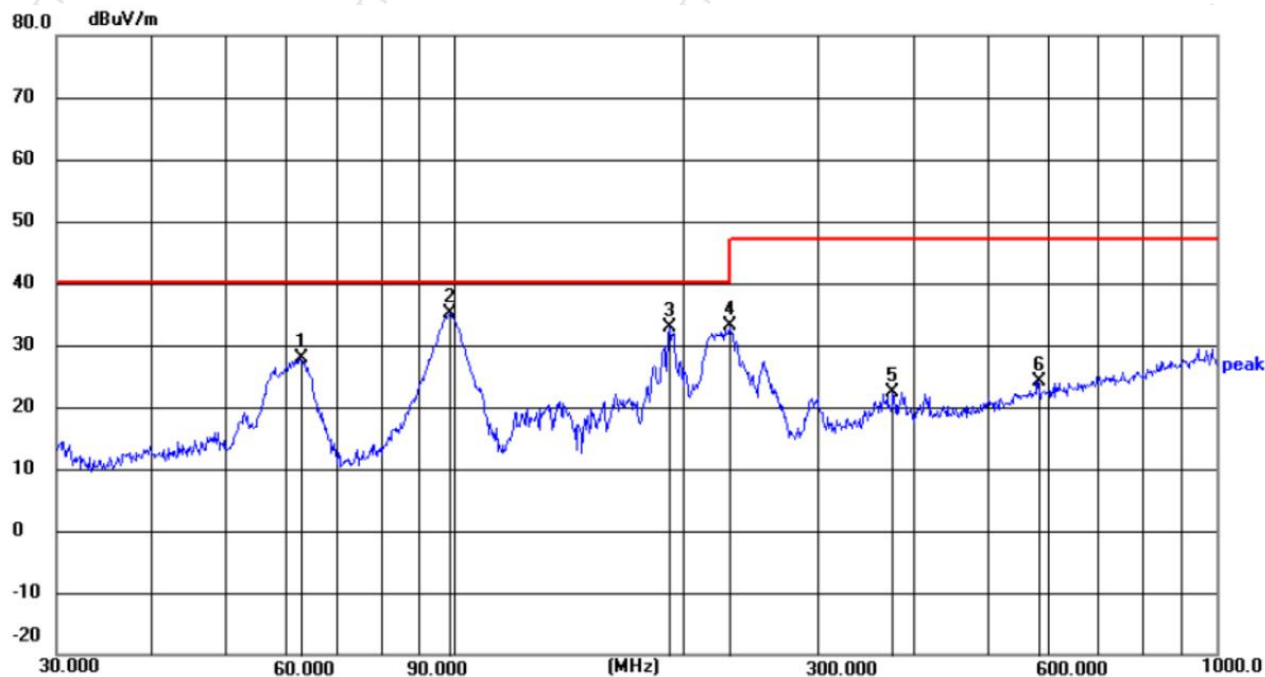
Polarization: Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	64.039	33.66	-17.54	16.12	40.00	23.88	peak			P	
2	99.563	37.04	-17.21	19.83	40.00	20.17	peak			P	
3 *	194.829	44.50	-17.10	27.40	40.00	12.60	peak			P	
4	232.206	45.41	-15.52	29.89	47.00	17.11	peak			P	
5	298.844	40.74	-13.70	27.04	47.00	19.96	peak			P	
6	385.618	34.10	-12.06	22.04	47.00	24.96	peak			P	



Polarization: Vertical

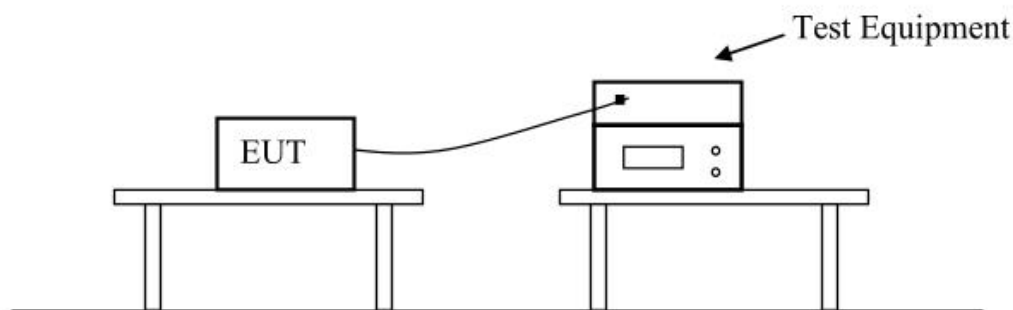


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	62.739	44.99	-17.20	27.79	40.00	12.21	peak			P	
2 *	98.538	52.43	-17.36	35.07	40.00	4.93	peak			P	
3	191.913	50.26	-17.39	32.87	40.00	7.13	peak			P	
4	230.018	48.62	-15.60	33.02	47.00	13.98	peak			P	
5	376.532	34.71	-12.23	22.48	47.00	24.52	peak			P	
6	583.458	32.87	-8.65	24.22	47.00	22.78	peak			P	

6 - HARMONIC CURRENT EMISSION MEASUREMENT



6.1 Block Diagram of Test Setup



6.2 Test Standard

Please refer to EN IEC 61000-3-2:2019/A1:2021

6.3 Test procedure

- The Product was placed on the top of a non-conductive table above the ground and operated to produce the maximum harmonic components under normal Test Modes for each successive harmonic component in turn.
- The correspondent test program of test instrument to measure the current harmonics emanated from Product was chosen. The measure time shall be not less than the time necessary for the Product to be exercised.

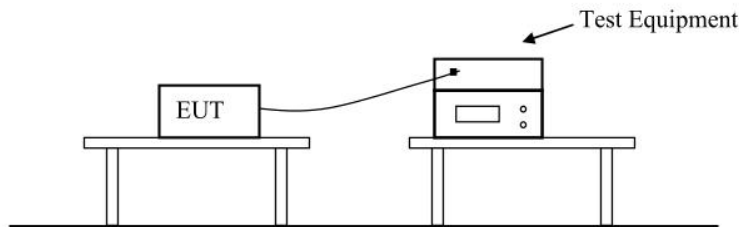
6.4 Test Results

Pass.



7 - VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

7.1 Block Diagram of Test Setup



7.2 Test Standard

Please refer to EN 61000-3-3:2013/A1:2019

7.3 Test procedure

- The Product was placed on the top of a non-conductive table above the ground and operated to produce the most unfavorable sequence of voltage changes under normal Test Modes.
- During the flick test, the measure time shall include that part of whole operation cycle in which the Product procedure the most unfavorable sequence of voltage changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

7.4 Test Results

The rated input power of the EUT's is 400W only, which unlikely to produce significant voltage fluctuation. Therefore no test was applied.

See clause 6.1***

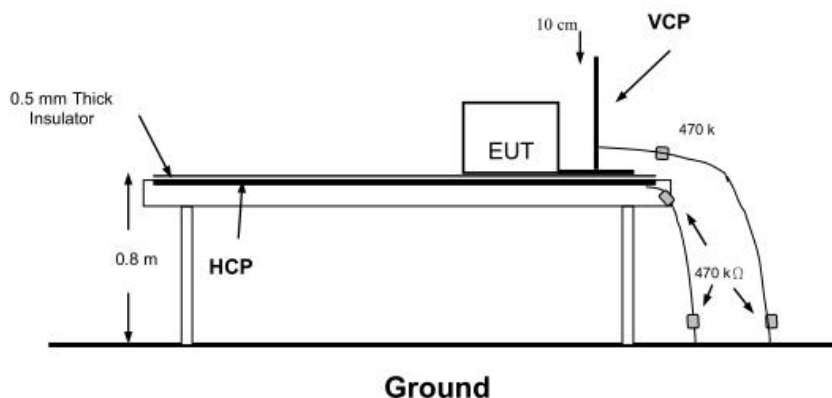
*** EN 61000-3-3:2013/A1:2019, clause 6.1:" ... Tests need not be made on equipment which is unlikely to produce significant voltage fluctuations or flicker....".



8 - IMMUNITY TEST

8.1 ELECTROSTATIC DISCHARGE IMMUNITY TEST

8.1.1 Block Diagram of Test Setup



8.1.2 Test Specification

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

8.1.3 Test Procedure

8.1.3.1. 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.

8.1.3.2. Contact Discharge

All the procedure shall be same as Section 8.1.3.1, except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

8.1.3.3. 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.

8.1.3.4. 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.



8.1.4 Test Results

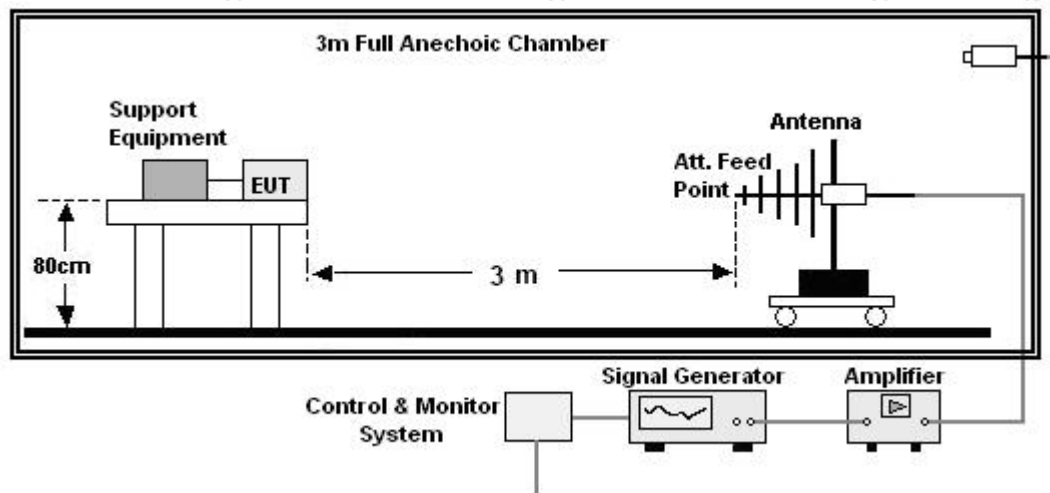
Electrostatic Discharge	
Basic Standard:	IEC 61000-4-2
EUT:	Stepper Servo Drives/Microstep Drives
M/N:	R110PLUS
Test Voltage:	AC 230V, 50Hz
Test Mode:	A.1
Temperature:	24℃
Humidity:	60%
Atmosphere pressure:	101Kpa

Discharge Method	Discharge Position	Voltage (± kV)	Min. No. of Discharge per polarity (Each Point)	Performance Criterion	Result
Contact Discharge	Surface, metal, screw	2, 4	10	B	A
	Indirect Discharge HCP	2, 4	10	B	A
	Indirect Discharge VCP	2, 4	10	B	A
Air Discharge	Surface	2, 4, 8	10	B	A



8.2 Radio frequency electromagnetic fields

8.2.1 Block Diagram of Test Setup



8.2.2 Test Specification

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

8.2.3 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, 1800MHz, 2600MHz, 3500MHz and 5000MHz 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.



8.2.4 Test Results

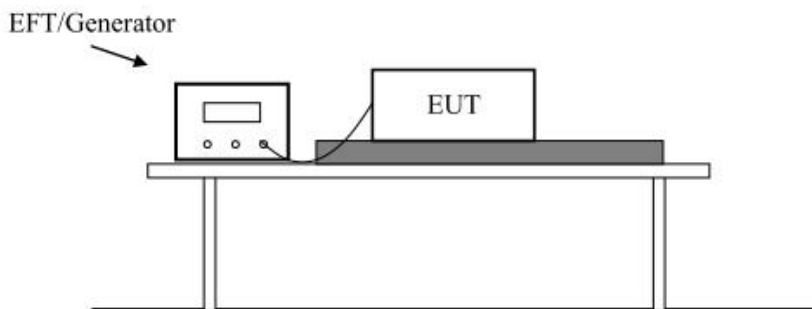
Radio frequency electromagnetic fields	
Basic Standard:	IEC 61000-4-3
EUT:	Stepper Servo Drives/Microstep Drives
M/N:	R110PLUS
Test Voltage:	AC 230V, 50Hz
Test Mode:	A.1
Temperature:	24℃
Humidity:	60%
Atmosphere pressure:	101Kpa

Frequency (MHz)	Position	Field Strength (V/m)	Performance Criterion	Result
80 - 1000	Front, Right, Back, Left	3	A	A
1800	Front, Right, Back, Left	3	A	A
2600	Front, Right, Back, Left	3	A	A
3500	Front, Right, Back, Left	3	A	A
5000	Front, Right, Back, Left	3	A	A



8.3 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

8.3.1 Block Diagram of Test Setup



8.3.2 Test Specification

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

8.3.3 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.

8.3.3.1. 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.

8.3.3.2. For signal lines and control lines ports:

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

8.3.3.3. For DC output line ports:

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



8.3.4 Test Results

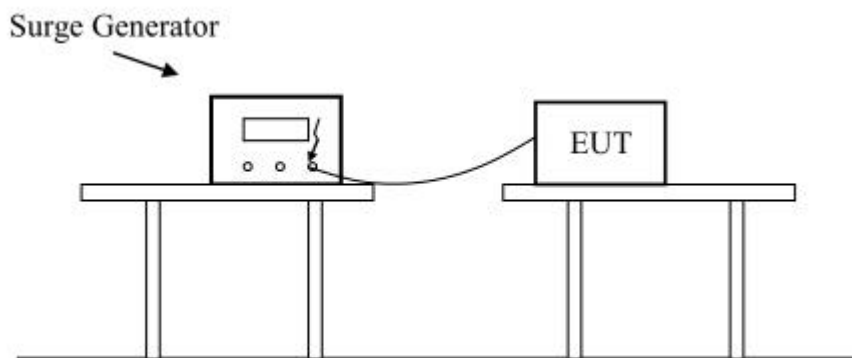
Electrical Fast Transient/Burst	
Basic Standard:	IEC 61000-4-4
EUT:	Stepper Servo Drives/Microstep Drives
M/N:	R110PLUS
Test Voltage:	AC 230V, 50Hz
Test Mode:	A.1
Temperature:	24°C
Humidity:	60%
Atmosphere pressure:	101Kpa

Coupling	Voltage (kV)	Polarity	Performance Criterion	Result
AC mains power port	1	±	B	B



8.4 SURGE IMMUNITY TEST

8.4.1 Block Diagram of Test Setup



8.4.2 Test Specification

Basic Standard	IEC 61000-4-5
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	5 pulses (positive & negative) for each polarity

8.4.3 Test Procedure

8.4.3.1. Set up the EUT and test generator as shown on Section 8.4.1.

8.4.3.2. 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.

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

8.4.3.4. Different phase angles are done individually.

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



8.4.4 Test Results

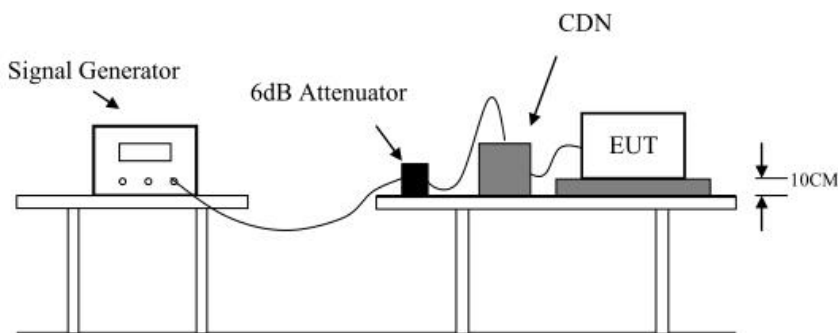
SURGE IMMUNITY	
Basic Standard:	IEC 61000-4-5
EUT:	Stepper Servo Drives/Microstep Drives
M/N:	R110PLUS
Test Mode:	A.1
Temperature:	24℃
Humidity:	60%
Atmosphere pressure:	101Kpa

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



8.5 INJECTED CURRENTS SUSCEPTIBILITY TEST

8.5.1 Block Diagram of Test Setup



8.5.2 Test Specification

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

8.5.3 Test Procedure

For input AC mains power port:

8.5.3.1. The Product and support units were located at a ground reference plane with the interposition of a 0.1 m thickness insulating support and the CDN was located on GRP directly.

8.5.3.2. The frequency range is swept from 150 kHz to 80MHz, 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.

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

For signal / control / telecommunication ports:

8.5.3.4. The Product and support units were located at a ground reference plane with the interposition of a 0.1 m thickness insulating support, and the telecommunication port under test was connected to support units through the current clamp

8.5.3.5. The frequency range is swept from 150 kHz to 80MHz, 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

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

8.5.3.7. Test level varies of changes linearly with respect to the logarithm of the frequency in the range 10MHz to 30MHz.



8.5.4 Test Results

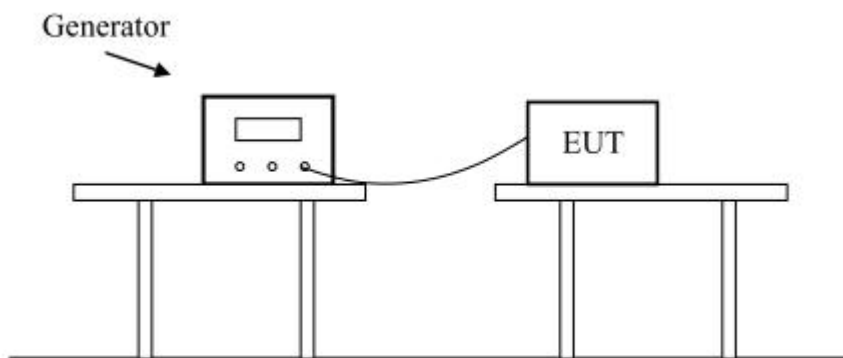
INJECTED CURRENTS SUSCEPTIBILITY	
Basic Standard:	IEC 61000-4-6
EUT:	Stepper Servo Drives/Microstep Drives
M/N:	R110PLUS
Test Mode:	A.1
Temperature:	24℃
Humidity:	60%
Atmosphere pressure:	101Kpa

Inject Line	Frequency (MHz)	Voltage Level (V r.m.s.)	Performance Criterion	Result
AC mains power port	0.15 to 10	3	A	A
AC mains power port	10 to 30	3 to1	A	A
AC mains power port	30 to 80	1	A	A
AC mains power port	0.15 to 80	10	A	A



8.6 VOLTAGE DIPS AND INTERRUPTIONS TEST

8.6.1 Block Diagram of Test Setup



8.6.2 Test Specification

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

8.6.3 Test Procedure

8.6.3.1. Set up the EUT and test generator as shown on Section 8.6.1.

8.6.3.2. The interruptions is introduced at selected phase angles with specified duration.

8.6.3.3. Record any degradation of performance.



8.6.4 Test Results

VOLTAGE DIPS AND INTERRUPTIONS	
Basic Standard:	IEC 61000-4-11
EUT:	Stepper Servo Drives/Microstep Drives
M/N:	R110PLUS
Test Mode:	ON
Temperature:	24℃
Humidity:	60%
Atmosphere pressure:	101Kpa

Voltage Dips:

Test Level % UT	Reduction (%)	Number of cycles		Performance criteria	Result
		50Hz	60Hz		
<5	>95	0.5		B	A
70	30	25	30	B	A

Voltage Interruptions:

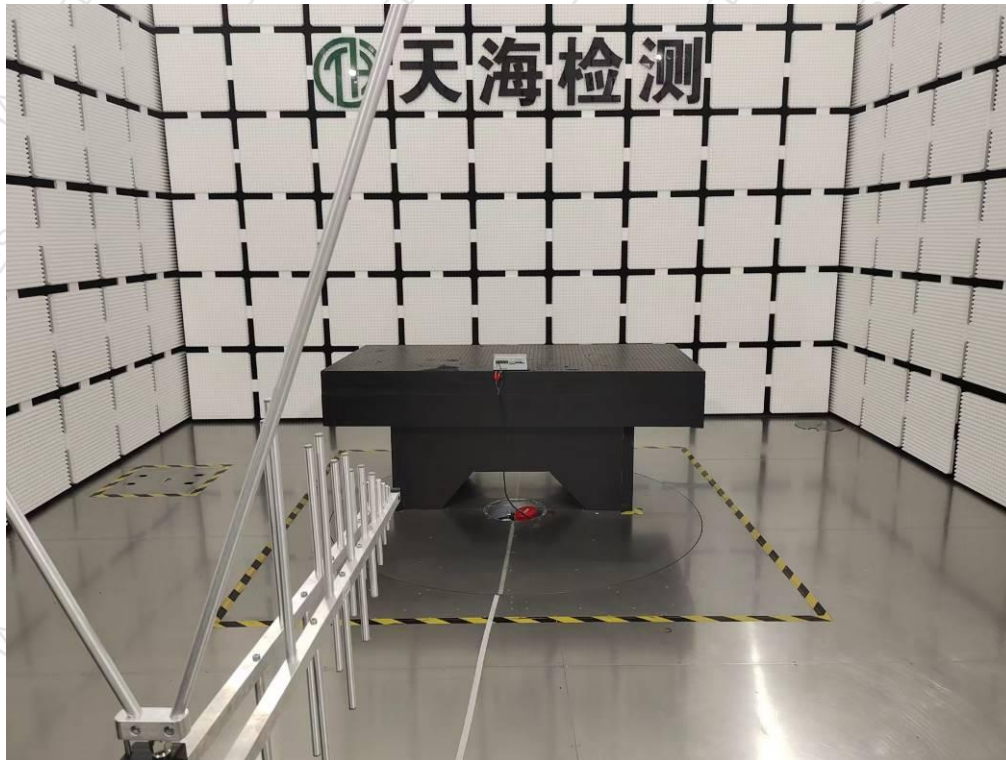
Test Level % UT	Reduction (%)	Number of cycles		Performance criteria	Result
		50Hz	60Hz		
<5	>95	250	300	C	C*

Remark*: The product pause during the test, but it can recover to normal by itself after testing.



APPENDIX A - TEST SETUP PHOTOGRAPHS

Photograph 1: Set-up for Radiated Disturbance

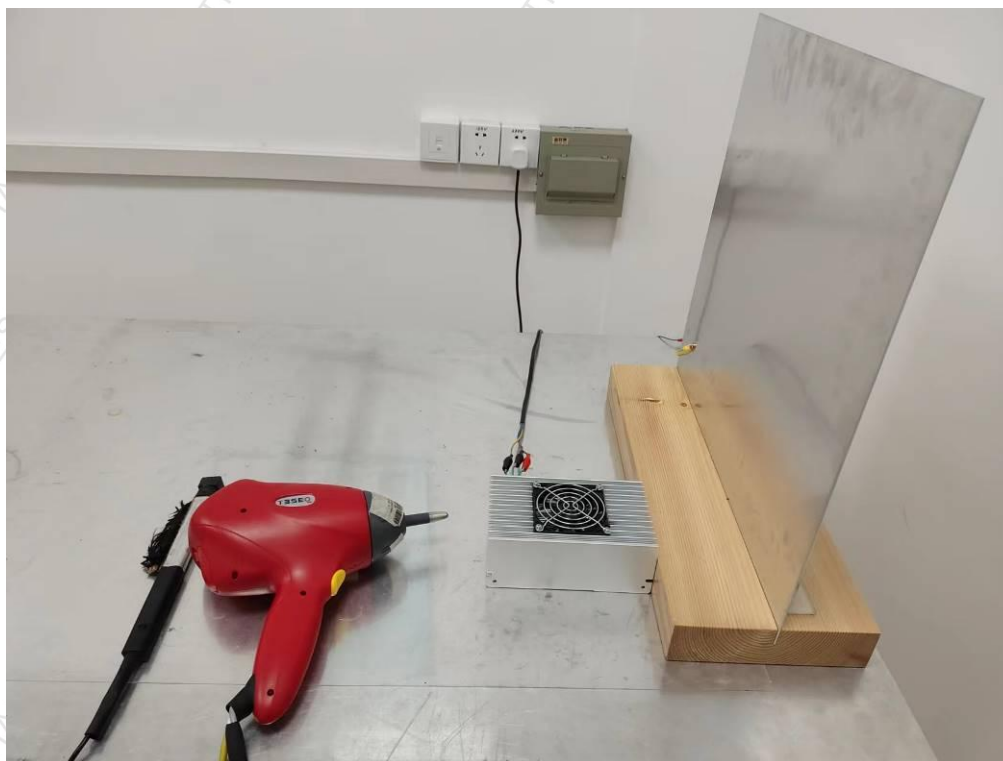


Photograph 2: Set-up for Mains Terminal Continuous Disturbance Voltage

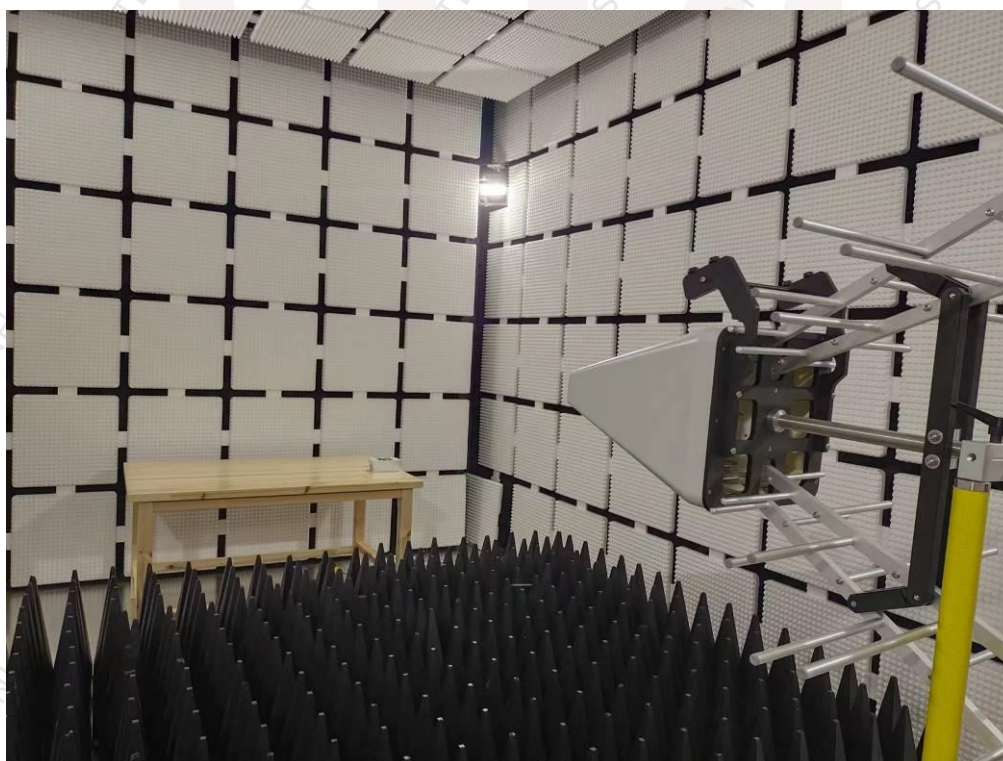




Photograph 3: Set-up for Electrostatic Discharges (ESD)



Photograph 4: Set-up for Radio-Frequency Electromagnetic Field (RS)





Photograph 5: Set-up for Fast Transients on AC Power Ports

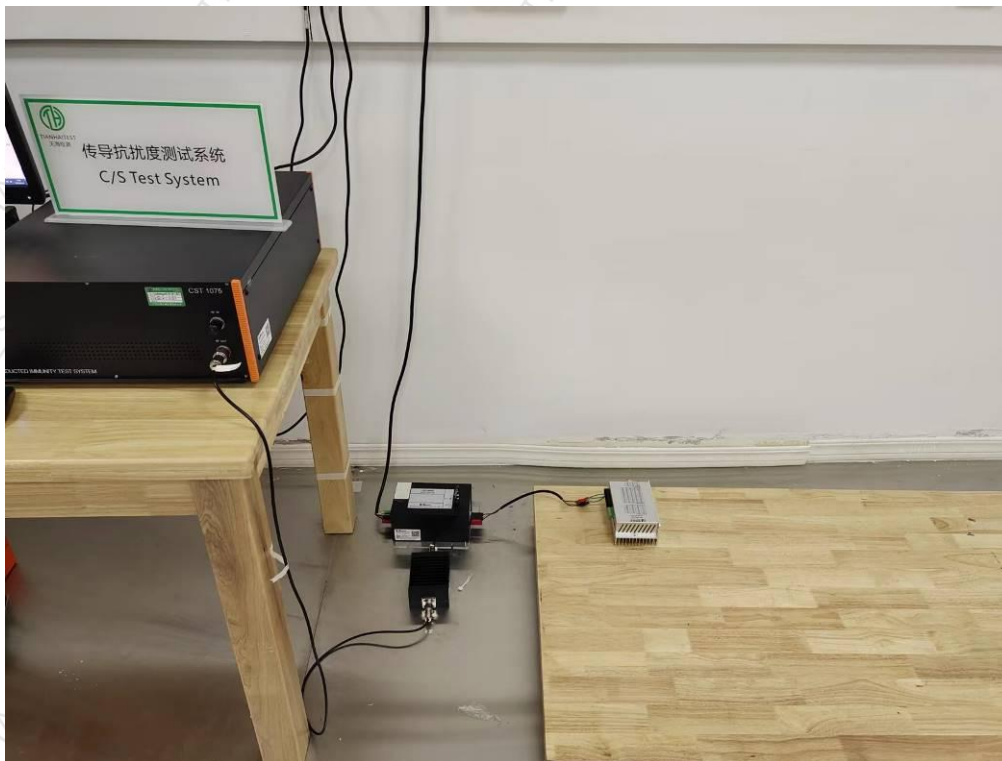


Photograph 6: Set-up for Surge on AC Power Ports





Photograph 7: Set-up for Conducted Susceptibility on AC Power and Signal Ports (CS)

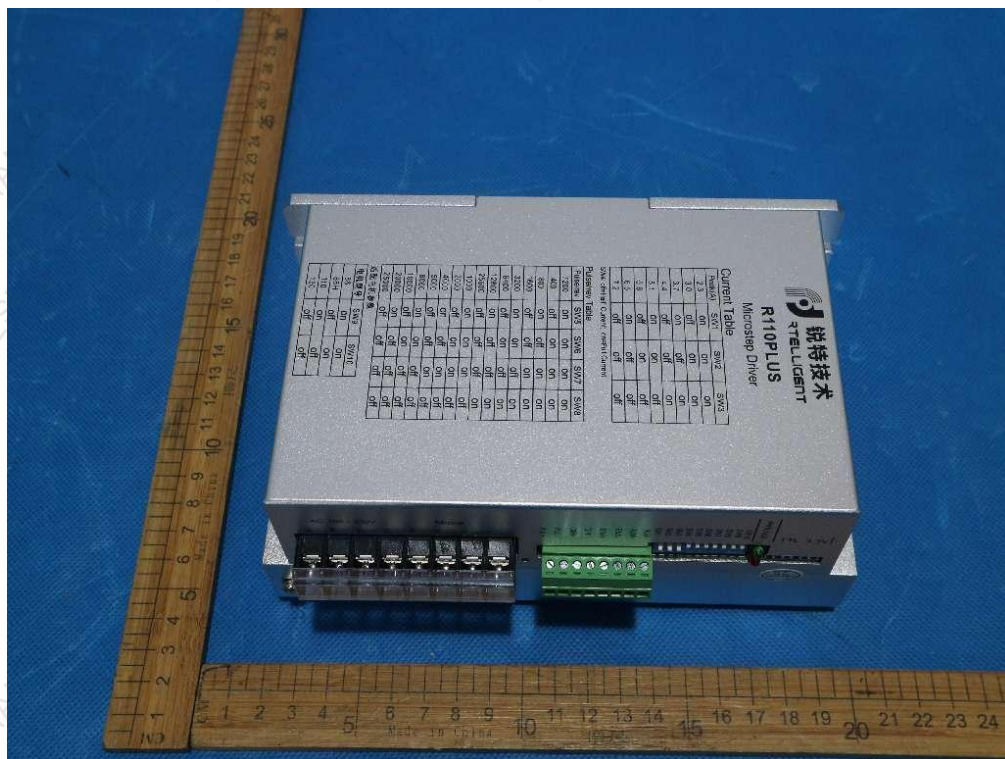


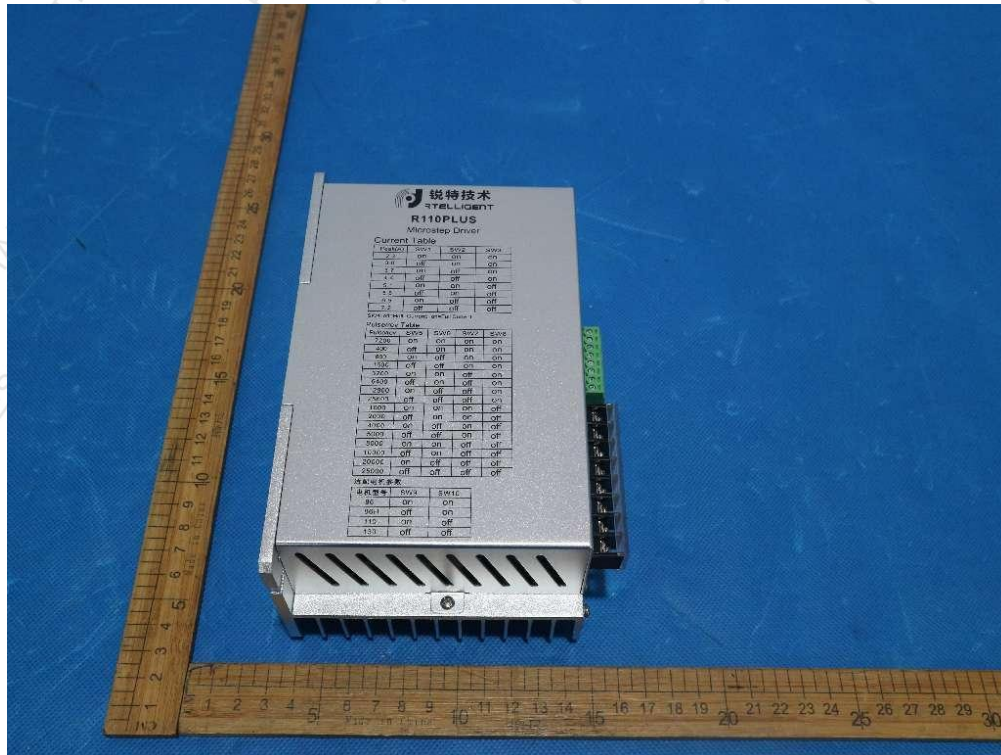
Photograph 8: Set-up for Harmonics & Voltage Dips and Interruptions





APPENDIX B - EUT PHOTOGRAPHS





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