TEST REPORT

Applicant:	Guangzhou Auctech Automation Technology Ltd
Address of Applicant:	Hongshi Business Building, 11 Kehua Road, SCI-TECH Industry Park, Taihe Town, Baiyun District, Guangzhou, CHINA

Equipment Under Test (EUT)

Product Name:	Servo Drive
Brand Name:	AUCTECH
Model No.:	Please Refer To Page 5.
Applicable standards:	EN IEC 61800-3:2018
Date of sample receipt:	May 29, 2023
Date of Test:	May 29, 2023 To June 15, 2023
Date of report issued:	August 29, 2023
Test Result:	PASS *

*In the configuration tested, the EUT complied with the standards specified above.

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EU Declaration of Conformity and compliance with all relevant EU Directives.

Authorized Signature

Kevin Wang
Laboratory Manager

2 Version

Version No.	Date	Description
00	*June 16, 2023*	*Original*
01	*June 25, 2023*	*New report (Change model)*
02	*August 29, 2023*	*New report (Change Applicant , Change Manufacturer, Address, Brand Name, Product Name, Model Name)*

Prepared By: Gary Wang ***Date:*** *August 29, 2023*

Project Engineer

Reviewed By: Kevin Wang ***Date:*** *August 29, 2023*

Reviewer

3 Contents

4 Test Summary

Test Item	Test Requirement	Test Method	Class / Severity	Result
Radiated Emission	EN IEC 61800-3	CISPR 11	Table 20	PASS
Conducted Emission	EN IEC 61800-3	CISPR 11	Table 19	PASS
Commutation notches immunity	EN IEC 61800-3	IEC 60146-1-1	Value of the compatibility level	PASS
Harmonics and interharmonics voltages	EN IEC 61800-3	IEC 61000-4-13	Class 3	PASS
Voltage changes, fluctuations,	EN IEC 61800-3	IEC 61000-2-4	Class 2	PASS
Voltage unbalance and Frequency variations	EN IEC 61800-3	IEC 61000-2-4	Class 3	PASS
Voltage dips and short interruptions interruption	EN IEC 61800-3	IEC 61000-2-1	0%,40%,70%,80% remaining, 1,10,25,250 cycles	PASS
Commutation notches immunity	EN IEC 61800-3	IEC 60146-1-1	Depth=40%,total area=250in per cent degrees	PASS
Electrostatic discharges	EN IEC 61800-3	EN 61000-4-2	Contact ±4 kV Air ±8 kV	PASS
Radiated Immunity	EN IEC 61800-3	EN 61000-4-3	10V/m,3V/m,1V/m, 80%, 1kHz Amp. Mod.	PASS
Electrical Fast Transients	EN IEC 61800-3	EN 61000-4- 4	±2.0kV	PASS
Surges	EN IEC 61800-3	EN 61000-4-5	1kV Line to Line 2kV Line to Ground	PASS
Conducted Immunity	EN IEC 61800-3	EN 61000-4-6	10Vrms (emf), 80%, 1kHz Amp. Mod.	PASS

Remark:
Pass: Comply with the essential requirements in the standard.

Model No.:

AD2RE-1R8SA-E	AD2RE-2R8SA-E	AD2RE-3R5SA-E	AD2RE-4R2SA-E
AD2RE-060PA-E	AD2RE-100SA-E	AD2RE-120SA-E	AD2RE-120PA-E
AD2RE-140SA-E	AD2RE-6R8SC-E	AD2RE-8R3SC-E	AD2RE-100SC-E
AD2RE-120SC-E	AD2RE-140SC-E	AD2RE-180SC-E	AD2RE-210SC-E
AD2RE-250SC-E	AD2RE-340SC-E	AD3RE-1R8SA-E-S	AD3RE-2R8SA-E-S
AD3RE-3R5SA-E-S	AD3RE-4R2SA-E-S	AD2RE-1R8SA-E-□	AD2RE-2R8SA-E-□
AD2RE-3R5SA-E-□	AD2RE-4R2SA-E-□	AD2RE-060PA-E-□	AD2RE-100SA-E-□
AD2RE-120SA-E-□	AD2RE-120PA-E-□	AD2RE-140SA-E-□	AD2RE-6R8SC-E-□
AD2RE-8R3SC-E-□	AD2RE-100SC-E-□	AD2RE-120SC-E-□	AD2RE-140SC-E-□
AD2RE-180SC-E-□	AD2RE-210SC-E-□	AD2RE-250SC-E-□	AD2RE-340SC-E-□
AD3RE-1R8SA-E-□	AD3RE-2R8SA-E-□	AD3RE-3R5SA-E-□	AD3RE-4R2SA-E-□

Note:
□ = A~Z (contain 26 letters), or □ = 0~9 (contain 10 numbers) , or □ is empty.
Remark: All models are identical in the same PCB layout, interior structure and electrical circuits. The only differences are the model name and appearance color for commercial purpose.

5 General Information

5.1 Client Information

Applicant:	Guangzhou Auctech Automation Technology Ltd
Address of Applicant:	Hongshi Business Building, 11 Kehua Road, SCI-TECH Industry Park, Taihe Town, Baiyun District, Guangzhou, CHINA
Manufacturer/Factory:	Guangzhou Auctech Automation Technology Ltd
Address of Manufacturer/Factory:	Hongshi Business Building, 11 Kehua Road, SCI-TECH Industry Park, Taihe Town, Baiyun District, Guangzhou, CHINA

5.2 General Description of E.U.T

Product Name:	Servo Drive
Brand Name:	AUCTECH
Model No.:	Please Refer To Page 5.
Test Model No.:	AD2RE-1R8SA-E
Power Supply:	Input: AC 200-240V, 50/60Hz Output: AC 0-240V, 0-600HZ, 4.2A, 750W

5.3 Test mode and Test Voltage

On mode:	Keep the EUT in the operation status.
Test Voltage:	AC 230V, 50Hz

5.4 Description of Support Units

Manufacturer	Description	Model	Serial Number
HUAWEI	Notebook	Matebook14	N/A
Customer Furnished Equipment	AC SERVO MOTOR	N/A	N/A

5.5 Deviation from Standards

None.

5.6 Abnormalities from Standard Conditions

None.

5.7 Monitoring of EUT for All Immunity Test

Visual:	Monitor the EUT operating status.
Audio:	N/A

6 Test Instruments List

Radiated Emission:

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	N/A	N/A
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	ROHDE & SCHWARZ	ESRP	GTS602	Mar. 17 2023	Mar. 16 2024
4	BiConiLog Antenna	SCHWARZBECK	VULB 9168	GTS606	Mar. 18 2022	Mar. 17 2023
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 22 2022	June. 21 2023
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 22 2022	June. 21 2023
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 22 2022	June. 21 2023
9	Coaxial Cable	GTS	N/A	GTS211	June. 22 2022	June. 21 2023
10	Coaxial cable	GTS	N/A	GTS210	June. 22 2022	June. 21 2023
11	Coaxial Cable	GTS	N/A	GTS212	June. 22 2022	June. 21 2023
12	Amplifier(100kHz-3GHz)	N/A	LNA 0920N	GTS605	Mar. 18 2022	Mar. 17 2023
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 22 2022	June. 21 2023
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 22 2022	June. 21 2023
15	Band filter	Amindeon	82346	GTS219	June. 22 2022	June. 21 2023
16	Power Meter	Anritsu	ML2495A	GTS540	June. 22 2022	June. 21 2023
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 22 2022	June. 21 2023
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 22 2022	June. 21 2023
19	Splitter	Agilent	11636B	GTS237	June. 22 2022	June. 21 2023
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 22 2022	June. 21 2023
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 7 2022	Oct. 6 2023
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 7 2022	Oct. 6 2023
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 7 2022	Oct. 6 2023
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 22 2022	June. 21 2023

Conducted Emission

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May.14 2022	May.13 2025
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 22 2022	June. 21 2023
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June. 22 2022	June. 21 2023
4	ENV216 2-L-V-NETZNACHB.DE	ROHDE&SCHWARZ	ENV216	GTS226	June. 22 2022	June. 21 2023
5	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Thermo meter	KTJ	TA328	GTS233	June. 22 2022	June. 21 2023
8	Absorbing clamp	Elektronik-Feinmechanik	MDS21	GTS229	June. 22 2022	June. 21 2023

9	ISN	SCHWARZBECK	NTFM 8158	GTS565	June. 22 2022	June. 21 2023

ESD

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	ESD Simulator	KIKUSUI	KES4021A	GTS242	June. 22 2022	June. 21 2023
2	Thermo meter	KTJ	TA328	GTS243	June. 22 2022	June. 21 2023

Conducted Immunity

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Signal Generator	ROHDE & SCHWARZ	SMB 100A	GTS553	June. 22 2022	June. 21 2023
2	CDN	LionCEL	CDN-M3-16	GTS554	June. 22 2022	June. 21 2023
3	CDN	CYBERTEK	EM 5070	GTS559	June. 22 2022	June. 21 2023
4	Power amplifier	rflight	NTWPA-00010475	GTS555	June. 22 2022	June. 21 2023
5	ATT	SUNWAVE	SJ-50-06DB	GTS556	June. 22 2022	June. 21 2023
6	Clamp	SCHAFFNER	KEMZ 801	GTS558	June. 22 2022	June. 21 2023

Harmonic/ Flicker

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Power Analyzer H/F	EMTEST	DPA500	GTS235	June. 22 2022	June. 21 2023
2	AC POWER SUPPLY	EMTEST	ACS500	GTS236	June. 22 2022	June. 21 2023
3	Thermo meter	KTJ	TA328	GTS256	June. 22 2022	June. 21 2023

EFT, Surge, Voltage dips and Interruption

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	EMTEST system	EMTEST	UCS500N	GTS239	June. 22 2022	June. 21 2023
2	Clamp	EMTEST	HFK	GTS557	June. 22 2022	June. 21 2023
3	Thermo meter	KTJ	TA328	GTS238	June. 22 2022	June. 21 2023

Radiated Immunity

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Fully-Anechoic Chamber 2	Chang Zhou Zhong Shuo	854	SEM001-05	April. 07, 2023	April. 06, 2024
2	Power Sensor	Rohde & Schwarz	NRP-Z91	SEM009-09	April. 07, 2023	April. 06, 2024
3	Stacked Log.-Per.-Broadband Antenna (70MHz-10GHz)	Schwarzbeck	STLP 9129	SEM003-25	N/A	N/A
4	Signal Generator (9kHz-6GHz)	Rohde & Schwarz	SMB100A	SEM006-11	April. 07, 2023	April. 06, 2024
5	Broadband Amplifier (80MHz-1GHz)	Rohde & Schwarz	BBA150-BC250	SEM005-12	Sep. 21 2022	Sep. 20 2023
6	Broadband Amplifier(800MHz-3GHz)	Rohde & Schwarz	BBA150-D110	SEM005-13	April. 07, 2023	April. 06, 2024
7	Broadband Amplifier(2.5GHz-	Rohde & Schwarz	BBA150-E60	SEM005-16	April. 07, 2023	April. 06, 2024

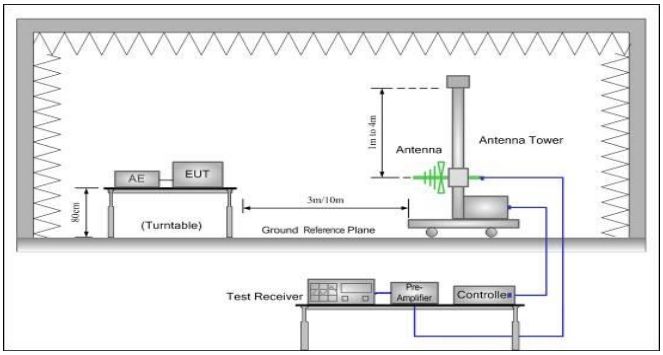
	6GHz)					
8	Measurement Software	Rohde & Schwarz	EMC32 V9.25.00	N/A	N/A	N/A

General used equipment:

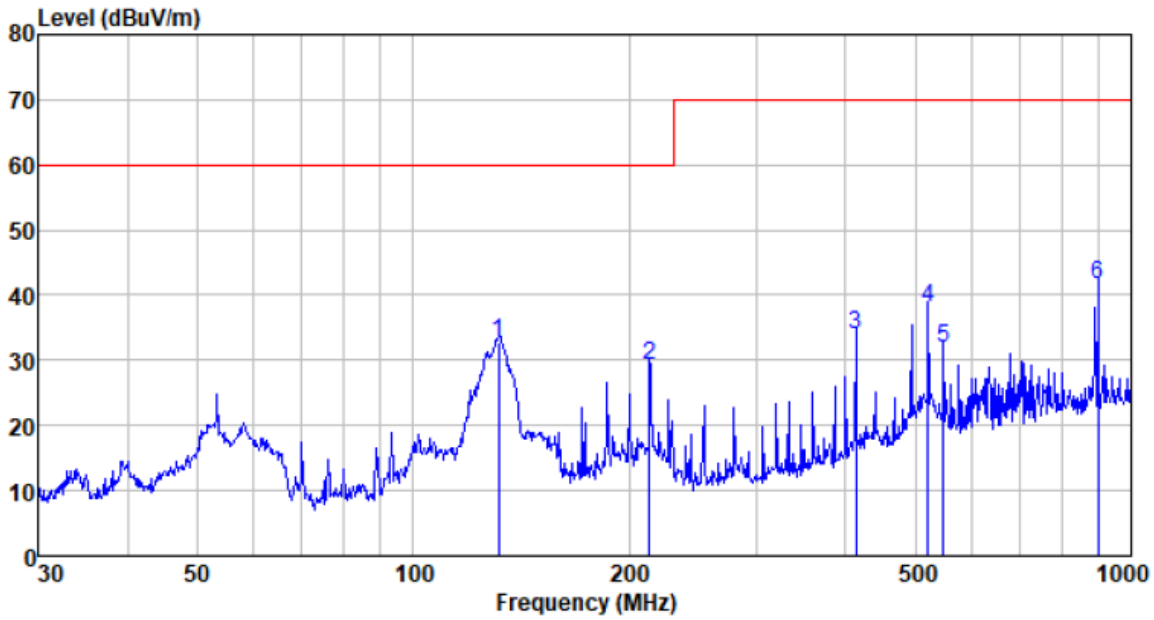
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 22 2022	June. 21 2023
2	Barometer	ChangChun	DYM3	GTS255	June. 22 2022	June. 21 2023

7 Emission Test Results

7.1 Radiated Emission

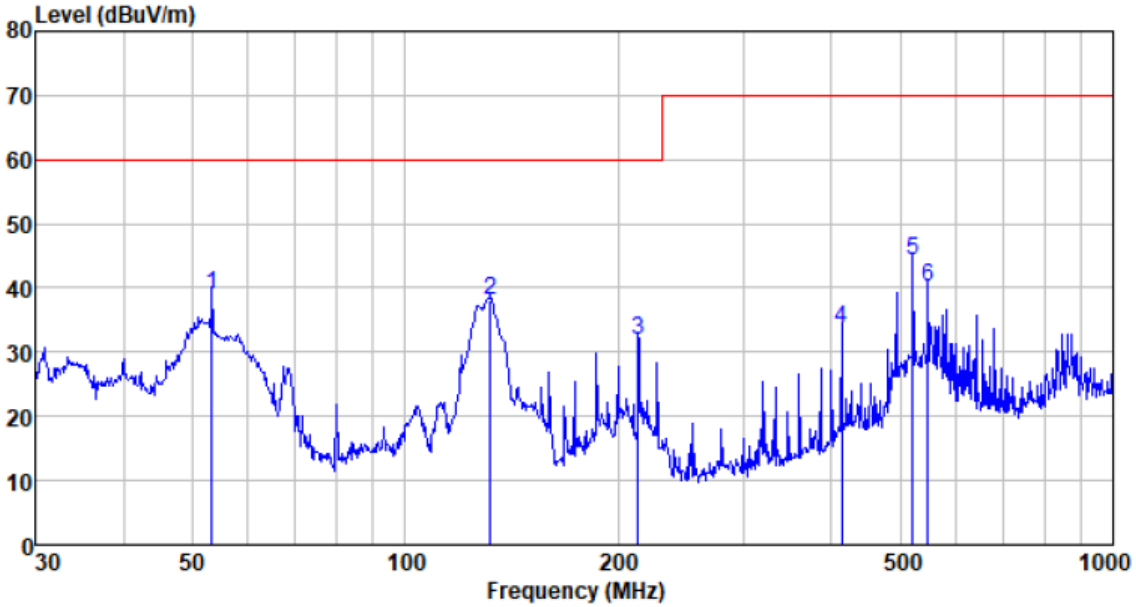
Test Requirement:	EN IEC 61800-3
Test Method:	CISPR 11
Test Frequency Range:	30MHz to 1GHz
Measurement Distance:	3 m
Limit:	Frequency / Limit (dBμV/m) / Value 30MHz-230MHz / 60.00 / Quasi-peak 230MHz-1GHz / 70.00 / Quasi-peak
Test setup:	
Test Procedure:	1. The radiated emissions test was conducted in a semi-anechoic chamber. 2. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation. 3. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emissions spectrum plots of the EUT. 4. The frequencies of maximum emission were determined in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.
Test environment:	Temp.: 25 °C / Humid.: 52% / Press.: 1 012mbar
Measurement Record:	**Uncertainty: ± 4.50dB**
Test Instruments:	Refer to section 6 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data
Horizontal



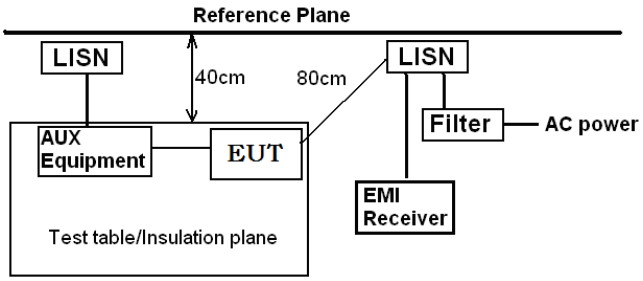
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
131.297	49.50	11.90	1.44	30.00	32.84	60.00	-27.16	QP
213.015	47.24	9.93	1.92	30.00	29.09	60.00	-30.91	QP
413.271	45.17	15.98	2.92	30.00	34.07	70.00	-35.93	QP
520.888	46.58	17.98	3.39	30.00	37.95	70.00	-32.05	QP
547.098	39.79	18.44	3.51	30.00	31.74	70.00	-38.26	QP
900.147	42.79	23.90	4.85	30.00	41.54	70.00	-28.46	QP

Vertical



Freq	Reading level	Antenna factor	Cable loss	Preamp factor	level	Limit level	Over limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
53.318	55.21	12.99	0.80	30.00	39.00	60.00	-21.00	QP
131.758	54.72	11.93	1.45	30.00	38.10	60.00	-21.90	QP
213.015	49.93	9.93	1.92	30.00	31.78	60.00	-28.22	QP
413.271	44.77	15.98	2.92	30.00	33.67	70.00	-36.33	QP
520.888	52.88	17.98	3.39	30.00	44.25	70.00	-25.75	QP
547.098	48.21	18.44	3.51	30.00	40.16	70.00	-29.84	QP

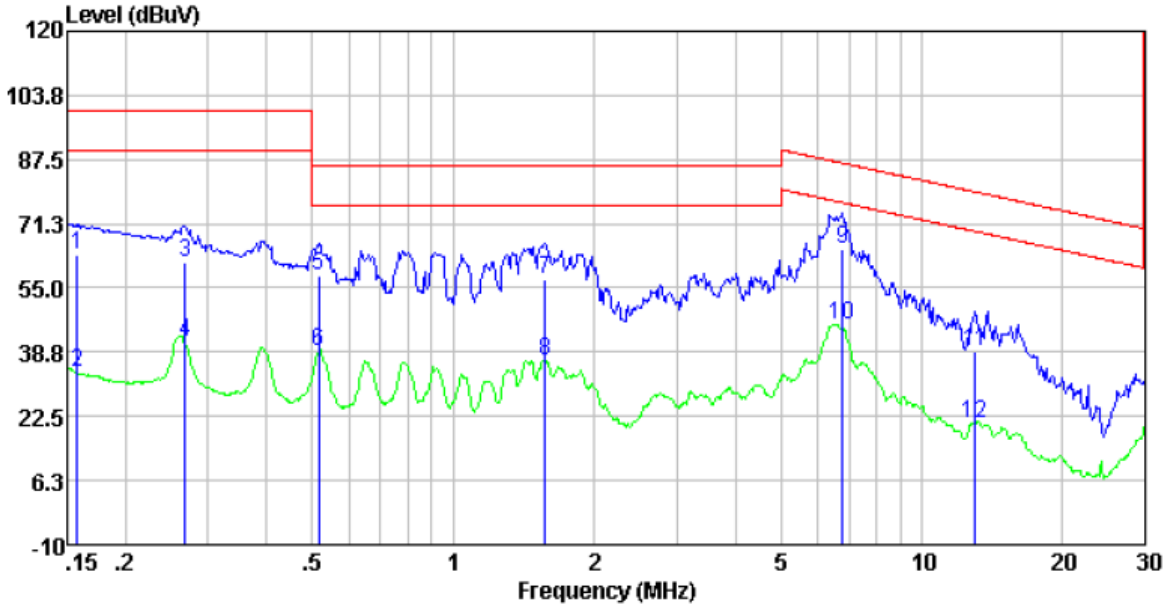
7.2 Conducted Emission

<table>
<tr><td>Test Requirement:</td><td colspan="3">EN IEC 61800-3</td></tr>
<tr><td>Test Method:</td><td colspan="3">CISPR 11</td></tr>
<tr><td>Test Frequency Range:</td><td colspan="3">150kHz to 30MHz</td></tr>
<tr><td>Limit:</td><td colspan="3">
<table>
<tr><td rowspan="2">Frequency range (MHz)</td><td colspan="2">Limit (dBµV)</td></tr>
<tr><td>Quasi-peak</td><td>Average</td></tr>
<tr><td>0.15 - 0.50</td><td>100</td><td>90</td></tr>
<tr><td>0.50 - 5</td><td>86</td><td>76</td></tr>
<tr><td>5 - 30</td><td>90
Decreases with log of frequency down to 70</td><td>80
Decreases with log of frequency down to 60</td></tr>
</table>
NOTE:
1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 5MHz to 30MHz.
</td></tr>
<tr><td>Test setup:</td><td colspan="3"> 

Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m</td></tr>
<tr><td>Test procedure:</td><td colspan="3">3. 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.
4. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
5. The frequency range from 150 kHz to 30MHz was searched. Emission levels over 10dB under the prescribed limits are not reported.</td></tr>
<tr><td>Test environment:</td><td>Temp.: 24 °C</td><td>Humid.: 51%</td><td>Press.: 1012mbar</td></tr>
<tr><td>Measurement Record:</td><td colspan="3">Uncertainty: ±3.45dB</td></tr>
<tr><td>Test Instruments:</td><td colspan="3">Refer to section 6 for details</td></tr>
<tr><td>Test mode:</td><td colspan="3">Refer to section 5.3 for details</td></tr>
<tr><td>Test results:</td><td colspan="3">Pass</td></tr>
</table>

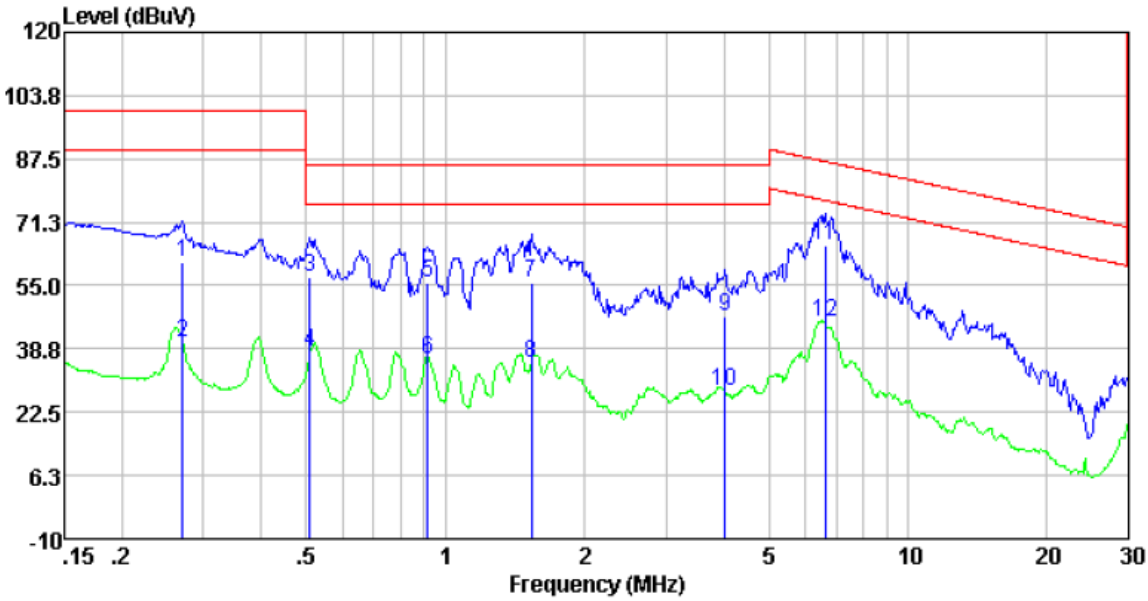
Measurement Data

L:



Freq	Reading level	LISN/ISN factor	Cable loss	Level	Limit level	Over limit	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
0.16	53.26	10.12	0.01	63.39	100.00	-36.61	QP
0.16	23.44	10.12	0.01	33.57	90.00	-56.43	Average
0.27	51.36	10.00	0.01	61.37	100.00	-38.63	QP
0.27	31.39	10.00	0.01	41.40	90.00	-48.60	Average
0.52	47.95	9.96	0.01	57.92	86.00	-28.08	QP
0.52	28.77	9.96	0.01	38.74	76.00	-37.26	Average
1.57	47.20	9.88	0.04	57.12	86.00	-28.88	QP
1.57	26.72	9.88	0.04	36.64	76.00	-39.36	Average
6.77	55.10	9.71	0.08	64.89	86.62	-21.73	QP
6.77	35.95	9.71	0.08	45.74	76.62	-30.88	Average
12.99	29.38	9.53	0.14	39.05	79.34	-40.29	QP
12.99	11.18	9.53	0.14	20.85	69.34	-48.49	Average

N:



Freq	Reading level	LISN/ISN factor	Cable loss	Level	Limit level	Over limit	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
0.27	50.94	9.99	0.01	60.94	100.00	-39.06	QP
0.27	30.46	9.99	0.01	40.46	90.00	-49.54	Average
0.51	47.19	9.96	0.01	57.16	86.00	-28.84	QP
0.51	28.22	9.96	0.01	38.19	76.00	-37.81	Average
0.91	45.67	9.96	0.03	55.66	86.00	-30.34	QP
0.91	25.84	9.96	0.03	35.83	76.00	-40.17	Average
1.54	45.65	9.90	0.04	55.59	86.00	-30.41	QP
1.54	25.01	9.90	0.04	34.95	76.00	-41.05	Average
4.03	38.01	9.21	0.06	47.28	86.00	-38.72	QP
4.03	18.65	9.21	0.06	27.92	76.00	-48.08	Average
6.63	55.57	9.58	0.08	65.23	86.86	-21.63	QP
6.63	36.12	9.58	0.08	45.78	76.86	-31.08	Average

8 Immunity Test Results

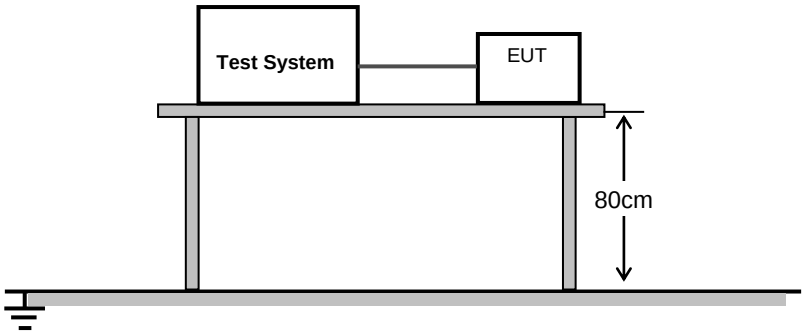
8.1 Performance Criteria Description in EN IEC 61800-3

Item	Acceptance (performance) criterion [a]		
	A	B	C
General system performance	No noticeable changes of the operating characteristic Operating as intended, within specified tolerance	Noticeable changes (visible or audible) of the operating characteristic Self-recoverable	Shutdown, changes in operating characteristics Triggering of protective devices [b] Not self-recoverable
Special system performance Torque generating behaviour	Torque deviation within specified tolerances	Temporary torque deviation outside specified tolerances Self-recoverable	Loss of torque Not self-recoverable
Sub-component performance Operation of power electronics and driving circuits	No malfunction of a power semiconductor	Temporary malfunction which cannot cause unintended shut-down of the PDS	Shut-down, triggering of protective devices [b] No loss of stored program No loss of user program No loss of settings Not self-recoverable
Sub-component performance Information processing and sensing functions	Undisturbed communication and data exchange to external devices	Temporarily disturbed communication, but no error reports of the internal or external devices which could cause shut-down	Errors in communication, loss of data and information No loss of stored program, no loss of user program No loss of settings. Not self-recoverable
Sub-component performance Operation of displays and control panels	No changes of visible display information, only slight light intensity fluctuation of LEDs, or slight movement of characters	Visible temporary changes of information, undesired LED illumination	Shut down, permanent loss of information, or unpermitted operating mode, obviously wrong display information No loss of stored program, no loss of user program No loss of settings

[a] Acceptance criteria A, B, C – False starts are not acceptable. A false start is an unintended change from the logical state "STOPPED" which can make the motor run.

[b] Acceptance criterion C – The function can be restored by operator intervention (manual reset). Opening of fuses is allowed for line-commutated converters operating in inverting mode.

8.2 Voltage Dips and Short Interruptions Immunity Test

Test Requirement:	EN IEC 61800-3		
Basic Standard:	IEC 61000-4-11		
Voltage Dips:	0%,40%,70%,80% remaining, 1,10,25,250 cycles		
Short interruptions:	0%, 250 cycles		
Test setup:			
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.		
Test environment:	Temp.: 26 °C	Humid.: 53%	Press.: 1012mbar
Test Instruments:	Refer to section 6 for details		
Test mode:	Refer to section 5.3 for details		
Test results:	Pass		

Measurement Record:

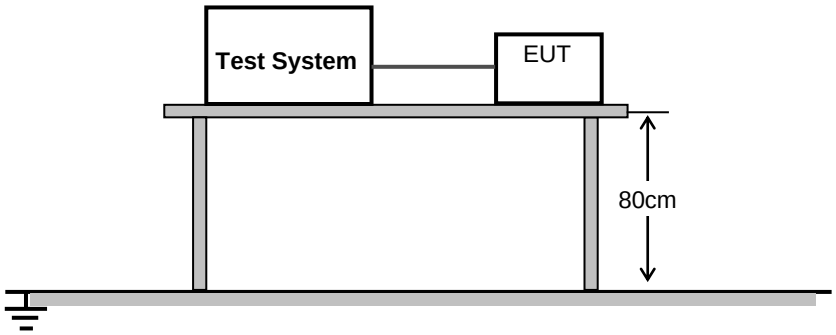
Test Mode	Voltage Remaining	Duration (cycles)	Operating time (minute)	Observation	Comply with Criterion
Voltage dips	0%	1	10	Note (1)	C
	40%	10	10	Note (1)	C
	70%	25	10	Note (1)	C
	80%	250	10	Note (1)	C
Short-time Interruptions	0%	250	10	Note (2)	C

Remark:

(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.

8.3 Voltage deviations, Fluctuations Test

Test Requirement:	EN IEC 61800-3		
Basic Standard:	IEC 61000-2-4-Class 2		
Level:	±10%		
Test setup:			
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.		
Test environment:	Temp.: 26 °C	Humid.: 53%	Press.: 1012mbar
Test Instruments:	Refer to section 6 for details		
Test mode:	Refer to section 5.3 for details		
Test results:	Pass		

Measurement Record:

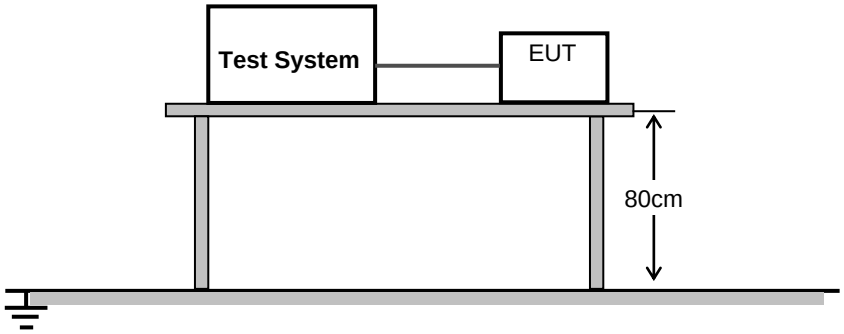
Phenomenon	Reference document and level	Operating time (min.)	Observation	Comply with Criterion
Voltage variations and fluctuations	±10%	10	Note (1)	A(2)

Remark:

(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.

8.4 Voltage unbalance and frequency variations Test

Test Requirement:	EN IEC 61800-3		
Basic Standard:	IEC 61000-2-4		
Level:	Level-Class 3, 3% negative sequence component, 10 min durations		
Power frequency variation:	±2%		
Test setup:			
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.		
Test environment:	Temp.: 26 °C	Humid.: 53%	Press.: 1012mbar
Test Instruments:	Refer to section 6 for details		
Test mode:	Refer to section 5.3 for details		
Test results:	Pass		

Measurement Record:

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 Δf/fN	IEC 61000-2-4 ±2%	10	Note (1)	A

Remark:

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

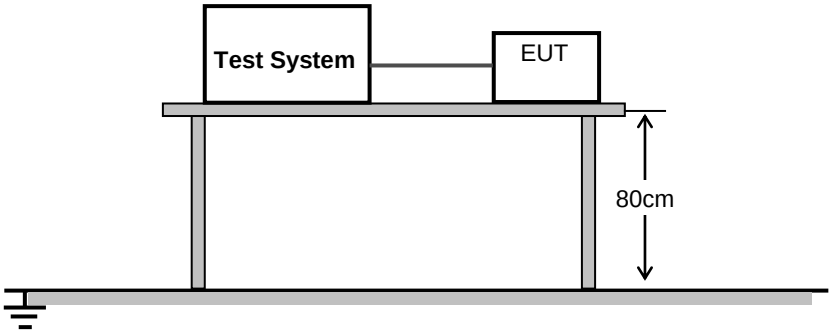
8.5 Harmonics and interharmonics voltages Test

Test Requirement:	EN IEC 61800-3
Basic Standard:	IEC 61000-2-4
Minimum immunity re quirements for total harmonic distortion	Class 3, THD=12%
Minimum immunity requirements for individual harmonic orders	

Phenomenon Harmonic order	First environment		Second environment		Performance (acceptance) criterion
	Reference document	Level	Reference document	Level	
2	IEC 61000-4-13 class 2	3 %	IEC 61000-4-13 class 3	5 %	A
3		8 %		9 %	
4		1,5 %		2 %	
5		9 %		12 %	
Even orders $6 \le h \le 50$		No requirement		1,5 %	
7		7,5 %		10 %	
9		2,5 %		4 %	
11		5 %		7 %	
13		4,5 %		7 %	
15		No requirement		3 %	
17		3 %		6 %	
19		2 %		6 %	
21		No requirement		2 %	
23		2 %		6 %	
25		2 %		6 %	
27		No requirement		2 %	
29		1,5 %		5 %	
31		1,5 %		3 %	
33		No requirement		2 %	
35		1,5 %		3 %	
37		1,5 %		3 %	
39		No requirement		2 %	

NOTE 1 For individual harmonic orders in the first environment, levels are from Class 2 in IEC 61000-4-13 (these are approximately 1,5 times the compatibility levels of IEC 61000-2-4).

NOTE 2 For individual harmonic orders in the second environment, levels are from Class 3 in IEC 61000-4-13 (these are approximately 1,5 times the compatibility levels of IEC 61000-2-4).

Test setup:	
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.
Test environment:	Temp.: 26 °C | Humid.: 53% | Press.: 1012mbar
Test Instruments:	Refer to section 6 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

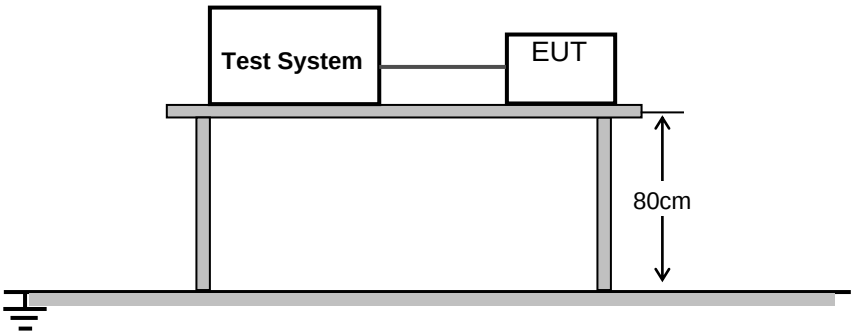
Measurement Record:

Phenomenon	Reference document and level	Operating time (min.)	Observation	Comply with Criterion
Harmonics and Interharmonics	IEC 61000-2-4 THD=12%	2.5	Note (1)	A

Remark:

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

8.6 Commutation Notches Test

Test Requirement:	EN IEC 61800-3		
Basic Standard:	IEC 60146-1-1		
Level:	Level-Class B, depth=40%, total area=250%*degrees		
Test setup:			
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.		
Test environment:	Temp.: 26 °C	Humid.: 53%	Press.: 1012mbar
Test Instruments:	Refer to section 6 for details		
Test mode:	Refer to section 5.3 for details		
Test results:	Pass		

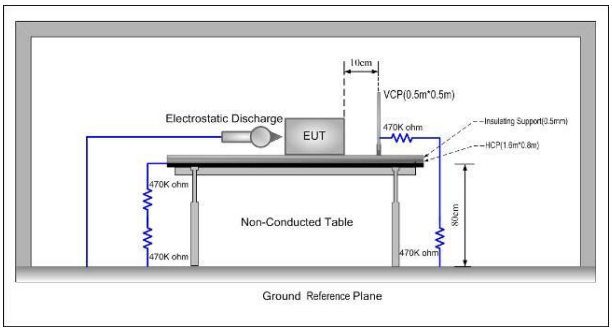
Measurement Record:

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

Remark:

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

8.7 Electrostatic Discharge

Test Requirement:	EN IEC 61800-3
Test Method:	EN 61000-4-2
Discharge Voltage:	Contact Discharge:±4kV Air Discharge: ±8kV HCP/VCP:±4kV
Polarity:	Positive & Negative
Number of Discharge:	Minimum 10 times at each test point.
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum
Performance Criterion:	B
Test setup:	
Test Procedure:	**1. Air discharge:** The test was applied on non-conductive surfaces of EUT. The round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT. After each discharge, the discharge electrode was removed from the EUT. The generator was re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure was repeated until all the air discharge completed **2. Contact Discharge:** The test was applied on conductive surfaces of EUT. the generator was re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. the tip of the discharge electrode was touch the EUT before the discharge switch was operated. **3. Indirect discharge for horizontal coupling plane** At least 10 single discharges shall be applied at the front edge of each HCP opposite the centre point of each unit 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. Consideration should be given to exposing all sides of the EUT. **4. Indirect discharge for vertical coupling plane** At least 10 single discharges were applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, was placed parallel to, and positioned at a distance of 0.1m from

	the EUT. Discharges were applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.		
Test environment:	Temp.: 24 °C	Humid.: 51%	Press.: 1012mbar
Test mode:	Refer to section 6 for details		
Test Instruments:	Refer to section 5.3 for details		
Test results:	Passed		

Measurement Record:

Test points:	I: Metal, Screw, Metal port
	II: Seams, Display panel, Control key

Direct discharge

Discharge Voltage (KV)	Type of discharge	Test points	Observations (Performance Criterion)	Result
± 4	Contact	I	A	Pass
± 8	Air	II	N/A	N/A

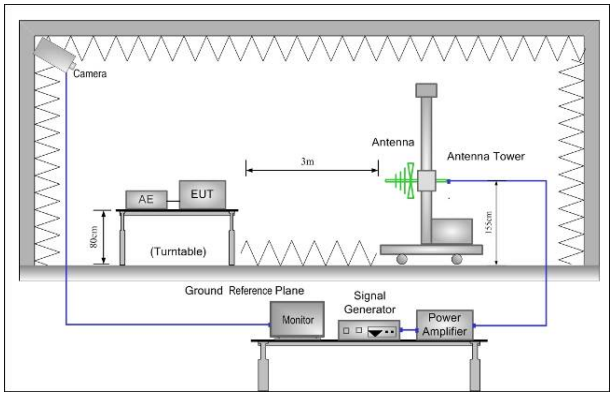
Indirect discharge

Discharge Voltage (KV)	Type of discharge	Test points	Observation Performance	Result
± 4	HCP-Bottom/Top/ Front/Back/Left/Right	Edge of the HCP	A	Pass
± 4	VCP-Front/Back /Left/Right	Center of the VCP	A	Pass

Remark:

A: No degradation in performance of the EUT was observed.

8.8 Radiated Immunity

Test Requirement:	EN IEC 61800-3
Test Method:	EN 61000-4-3
Frequency range:	80MHz to 1GHz,1.4GHz-2.0GHz,2.0GHz-2.7GHz
Test Level:	10V/m,3V/m,1V/m
Modulation:	80%, 1kHz Amplitude Modulation
Performance Criterion:	A
Test setup:	
Test Procedure:	1. For table-top equipment, the EUT was placed in the chamber on a non-conductive table 0.8m high. For arrangement of floor-standing equipment, the EUT was mounted on a non-conductive support 0.1m above the supporting plane. For human body-mounted equipment, the EUT may be tested in the same manner as table top items. 2. If possible, a minimum of 1 m of cable is exposed to the electromagnetic field. Excess length of cables interconnecting units of the EUT shall be bundled low-inductively in the approximate center of the cable to form a bundle 30 cm to 40 cm in length. 3. The EUT was initially placed with one face coincident with the calibration plane. The EUT face being illuminated was contained within the UFA (Uniform Field Area). 4. The frequency ranges to be considered were swept with the signal modulated and pausing to adjust the RF signal level or to switch oscillators and antennas as necessary. Were the frequency range was swept incrementally, the step size was not exceed 1 % of the preceding frequency value. 5. The dwell time of the amplitude modulated carrier at each frequency was not be less than the time necessary for the EUT to be exercised and to respond, and was not less than 0,5 s. 6. The test normally was performed with the generating antenna facing each side of the EUT. 7. The polarization of the field generated by each antenna necessitates testing each selected side twice, once with the antenna positioned vertically and again with the antenna positioned horizontally. 8. The EUT was performed in a configuration to actual installation conditions, a video camera and/or a audio monitor were used to

	monitor the performance of the EUT.		
Test environment:	Temp.: 25°C	Humid.: 52%	Press.: 1012mbar
Test Instruments:	Refer to section 6 for details		
Test mode:	Refer to section 5.3 for details		
Test results:	Passed		

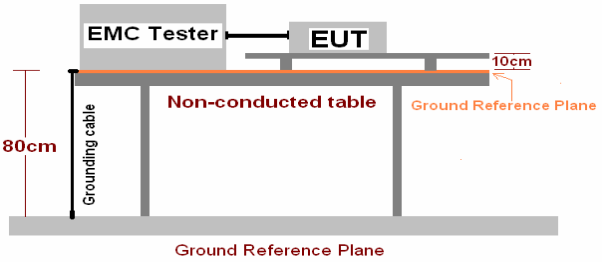
Measurement Record:

Frequency	Level (V/m)	EUT Face	Dwell time	Observations	Result
80MHz-1GHz	10	Front	2s	A	Pass
		Back		A	Pass
		Left		A	Pass
		Right		A	Pass
		Top		A	Pass
		Underside		A	Pass
1.4GHz-2.0GHz	3	Front	2s	A	Pass
		Back		A	Pass
		Left		A	Pass
		Right		A	Pass
		Top		A	Pass
		Underside		A	Pass
2.0 GHz-2.7GHz	1	Front	2s	A	Pass
		Back		A	Pass
		Left		A	Pass
		Right		A	Pass
		Top		A	Pass
		Underside		A	Pass

Remarks:

A: No degradation in the performance of the E.U.T. was observed.

8.9 Electrical Fast Transients

Test Requirement:	EN IEC 61800-3		
Test Method:	EN 61000-4-4		
Test Level:	a.c. power port – 2 kV, Control lines – 1 kV		
Polarity:	Positive & Negative		
Repetition Frequency:	5kHz		
Burst Period:	300ms		
Test Duration:	2 minute per level & polarity		
Performance Criterion:	B		
Test setup:			
Test Procedure:	1. The EUT was tested with 1000 volt discharges to the AC power input leads. 2. Both positive and negative polarity discharges were applied. 3. 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. 4. The duration time of each test sequential was 1 minute. 5. The transient/burst waveform was in accordance with IEC 61000-4-4, 5/50ns.		
Test environment:	Temp.: 26 °C	Humid.: 54%	Press.: 1012mbar
Test Instruments:	Refer to section 6 for details		
Test mode:	Refer to section 5.3 for details		
Test results:	Passed		

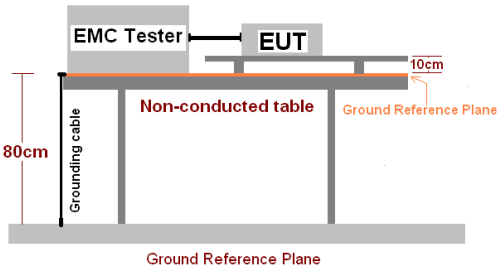
Measurement Record:

Lead under Test	Level (kV)	Coupling Direct/Clamp	Observations (Performance Criterion)	Result
L	± 2.0	Direct	A	Pass
N	± 2.0	Direct	A	Pass
L-N	± 2.0	Direct	A	Pass
PE	± 2.0	Direct	A	Pass
L-PE	± 2.0	Direct	A	Pass
N-PE	± 2.0	Direct	A	Pass
L-N-PE	± 2.0	Direct	A	Pass
Control Lines	± 1.0	Clamp	A	Pass

Remark:

A: No degradation in the performance of the E.U.T. was observed.

8.10 Surges

Test Requirement:	EN IEC 61800-3		
Test Method:	EN 61000-4-5		
Test Level:	1kV line to line 2kV line to earth		
Polarity:	Positive & Negative		
Generator source impedance:	2Ω (line-line coupling) 12Ω (line-earth coupling)		
Test signal specification:	Rise time=1.2us, Duration time=50us; Test Interval: 60s between each surge;		
No. of surges:	5 positive, 5 negative at 0°, 90°, 180°, 270°.		
Performance Criterion:	B		
Test setup:			
Test Procedure:	1. 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). 2. 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). 3. The surges were applied line to line and line(s) to earth. When testing line to earth the test voltage was applied successively between each of the lines and earth. Steps up to the test level specified increased the test voltage. All lower levels including the selected test level were tested. The polarity of each surge level included positive and negative test pulses.		
Test environment:	Temp.: 26 °C	Humid.: 53%	Press.: 1012mbar
Test Instruments:	Refer to section 6 for details		
Test mode:	Refer to section 5.2 for details		
Test results:	Pass		

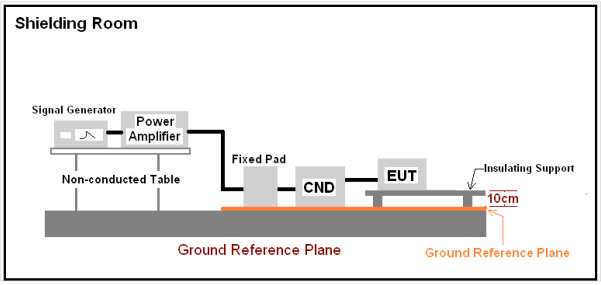
Measurement Record:

Location	Level(kV)	Pulse No	Surge Interval	Phase(deg)	Observations (Performance Criterion)
L-PE	± 2 kV	5	60s	0, 90, 180, 270	A
N-PE	± 2 kV	5	60s	0, 90, 180, 270	A
L-N	± 1 kV	5	60s	0, 90, 180, 270	A

Remark:

A: No degradation in the performance of the E.U.T. was observed.

8.11 Conducted Immunity

Test Requirement:	EN IEC 61800-3		
Test Method:	EN 61000-4-6		
Frequency range:	0.15MHz to 80MHz		
Test Level:	10V rms		
Modulation:	80%, 1kHz Amplitude Modulation		
Performance Criterion:	A		
Test setup:			
Test Procedure:	1. The EUT shall be tested within its intended operating and climatic conditions. 2. 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. 3. 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. 4. 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. 5. Attempts should be made to fully exercise the EUT during test, and to fully interrogate all exercise modes selected for susceptibility.		
Test environment:	Temp.: 24 °C	Humid.: 51%	Press.: 1012mbar
Test Instruments:	Refer to section 6 for details		
Test mode:	Refer to section 5.3 for details		
Test results:	Passed		

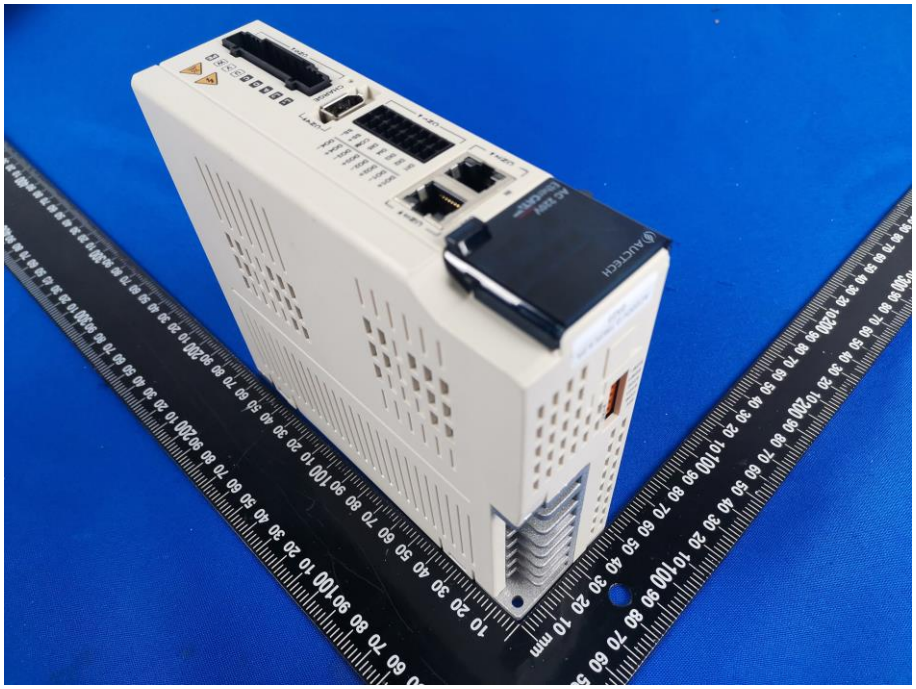
Measurement Record:

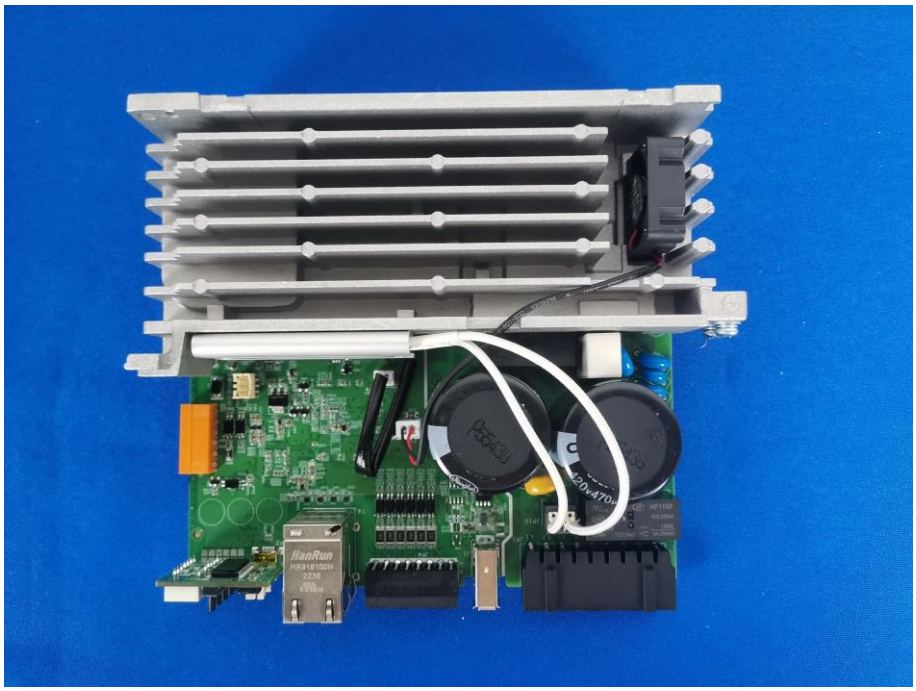
Frequency	Injected Position	Test Level	Modulation	Step Size	Dwell Time	Observations (Performance Criterion)
150kHz to 80MHz	AC Main	10Vrms	80%, 1kHz Amp. Mod.	1%	2s	A
150kHz to 80MHz	Control Lines	10Vrms	80%, 1kHz Amp. Mod.	1%	2s	A

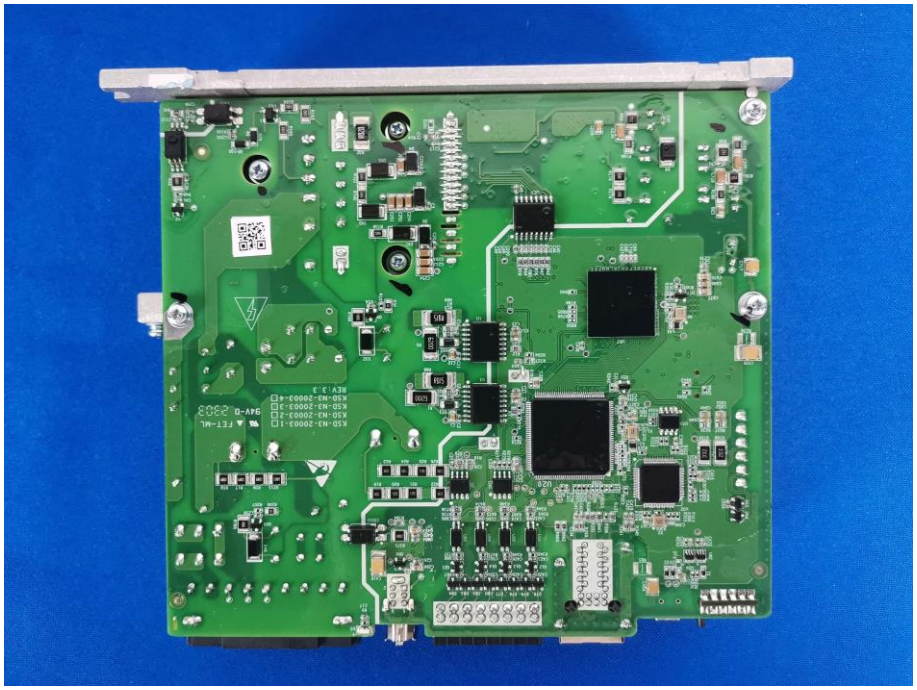
Remark:

A: No loss of function was observed.

9 Photographs of the EUT







Remark: Results & photo(s) of this report refer to test report EBO2305111-E275A

------End------