CE EMC Test Report

(Declaration of Conformity)
For
Electromagnetic compatibility
Of

Product : MCAC series AC servo driver
Trade Mark : N/A
Model Number : Refer to Page 8

Prepared for

Shenzhen Just Motion Control Electromechanics Co.,Ltd.
Building B, Jiayu Science Park, Jin'an Road, Matian Street, Guangming District, Shenzhen China.

Prepared by

Shenzhen NTEK Testing Technology Co., Ltd.
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TEST RESULT CERTIFICATION

Applicant's Name ..... :	Shenzhen Just Motion Control Electromechanics Co.,Ltd.
Address ..... :	Building B, Jiayu Science Park, Jin'an Road, Matian Street, Guangming District, Shenzhen China.
Manufacturer's Name ..... :	Shenzhen Just Motion Control Electromechanics Co.,Ltd.
Address ..... :	Building B, Jiayu Science Park, Jin'an Road, Matian Street, Guangming District, Shenzhen China.
Factory's Name ..... :	Shenzhen Just Motion Control Electromechanics Co.,Ltd.
Address ..... :	Building B, Jiayu Science Park, Jin'an Road, Matian Street, Guangming District, Shenzhen China.

Product description

Product Name ..... :	MCAC series AC servo driver
Model Number ..... :	Refer to Page 8
Standards ..... :	EN IEC 61000-6-4:2019 EN IEC 61000-6-2:2019

Test Sample Number ..... :	S230923012003
Date of Test ..... :	
Date (s) of performance of tests ..... :	26 Sep. 2023 ~ 22 Dec. 2023
Date of Issue ..... :	22 Dec. 2023
Test Result ..... :	**Pass**

Testing Engineer : Korka Lin (Korka Lin)

Technical Manager : Sky Zhang (Sky Zhang)

Authorized Signatory : Alex (Alex)

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1. TEST SUMMARY

Test procedures according to the technical standards:

EMC Emission				
Standard	Test Item	Limit	Judgment	Remark
EN IEC 61000-6-4:2019	Conducted Emission	------	PASS	
	Radiated Emission	------	PASS	
EMC Immunity				
Section EN IEC 61000-6-2:2019	Test Item	Performance Criteria	Judgment	Remark
EN 61000-4-2	Electrostatic Discharge	B	PASS	
EN 61000-4-3	RF electromagnetic field	A	PASS	Note (2)
EN 61000-4-4	Fast transients	B	PASS	
EN 61000-4-5	Surges	B	N/A	
EN 61000-4-6	Continuous radio frequency disturbances	A	PASS	
EN 61000-4-8	Power Frequency Magnetic Field	A	N/A	Note (3)
EN 61000-4-11	Volt. Interruptions Volt. Dips	B / C / C / C	N/A	

NOTE:

(1) "N/A" denotes test is not applicable in this Test Report

(2) The power consumption of EUT is less than 75W and no Limits apply.

(3) The test site is located in site B.

(4) Applicable only to equipment containing devices intrinsically susceptible to magnetic fields, such as CRT monitors, Hall effect elements, electro-dynamic microphones, magnetic field sensors or audio frequency transformers.

(5) For client's request and manual description, the test will not be executed.

1.1 TEST FACILITY

Shenzhen NTEK Testing Technology Co., Ltd.

Add.(Site A) : 1&5/F, Building C, 1&2/F, Building E, Fenda Science Park, Sanwei Community, Hangcheng Street, Baoan District, Shenzhen, Guangdong, China

Add.(Site B) : Building 30, Furong Third Road, Furong Industrial Zone, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, China

CNAS-Lab.	:	The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2018 (identical to ISO/IEC 17025:2017) The Certificate Registration Number is L5516
ISED-Registration	:	The Company Number: 9270A. CAB identifier: CN0074.
FCC- Accredited	:	Test Firm Registration Number: 463705 Designation Number: CN1184
A2LA-Lab.	:	The Certificate Registration Number is 4298.01 This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**, where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**, providing a level of confidence of approximately **95** %.

Test Item	Measurement Frequency Range	K	U(dB)
Conducted Emission	0.009MHz ~ 0.15MHz	2	3.6
Conducted Emission	0.15MHz ~ 30MHz	2	3.1
Telecom Conducted Emission(Cat 3)	0.15MHz ~ 30MHz	2	3.1
Telecom Conducted Emission(Cat 5)	0.15MHz ~ 30MHz	2	3.6
Telecom Conducted Emission(Cat 6)	0.15MHz ~ 30MHz	2	4.2
Radiated Emission	30MHz ~ 1000MHz	2	5.2
Radiated Emission	1000MHz ~ 18000MHz	2	5.1
Power Clamp	30MHz ~ 300MHz	2	2.2

Revision History

Report No.	Version	Description	Issued Date
S23092301203001	Rev.01	Initial issue of report	Dec. 22, 2023

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	MCAC series AC servo driver
Model Number	MCAC825-RC
Additional Model Number(s)	MCAC610-R, MCAC610-RC, MCAC825-R, MCAC845-R, MCAC845-RC, MCAC8A0-R, MCAC8A0-RC, MCAC610-EC, MCAC825-EC, MCAC845-EC, MCAC8A0-EC, MCAC610-20B, MCAC610-20B-R, MCAC610-20B-RC, MCAC610-20B-EC, MCAC610-M20B, MCAC610-M20B-R, MCAC610-M20B-RC, MCAC610-M20B-EC, MCAC825-20B, MCAC825-20B-R, MCAC825-20B-RC, MCAC825-20B-EC, MCAC825-M20B, MCAC825-M20B-R, MCAC825-M20B-RC, MCAC825-M20B-EC, MCAC845-20B, MCAC845-20B-R, MCAC845-20B-RC, MCAC845-20B-EC, MCAC845-M20B, MCAC845-M20B-R, MCAC845-M20B-RC, MCAC845-M20B-EC, MCAC8A0-20B, MCAC8A0-20B-R, MCAC8A0-20B-RC, MCAC8A0-20B-EC, MCAC8A0-M20B, MCAC8A0-M20B-R, MCAC8A0-M20B-RC, MCAC8A0-M20B-EC, MCAC610-1024-5-100W, MCAC610-1024-5-200W, MCAC610-2500-5-100W, MCAC610-2500-5-200W, MCAC825-1024-5-400W, MCAC825-2500-5-400W, MCAC825-1024-5-750W, MCAC825-2500-5-750W, MCAC845-1024-5-750W, MCAC845-2500-5-750W, MCAC845-1024-5-1000W, MCAC845-2500-5-1000W, MCAC8A0-1024-5-1500W, MCAC8A0-2500-5-1500W, MCAC8A0-1024-5-2000W, MCAC8A0-2500-5-2000W, MCAC8A0-1024-5-3000W, MCAC8A0-2500-5-3000W, MCAC620-2X-RC, MCAC620-2X-20B, MCAC620-2X-EC, MCAC640-RC, MCAC640-EC,MCAC640-20B
Model Difference	All models are identical except model's name.
Product Description	The EUT is a MCAC series AC servo driver. Operating frequency: 25 MHz (Declaration by Manufacturer) Connecting I/O port: N/A Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as a Residential, commercial environments Device. More details of EUT technical specification, please refer to the User's Manual.
Power Source	DC Voltage
Power Rating	Input: DC 24-80V

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Working

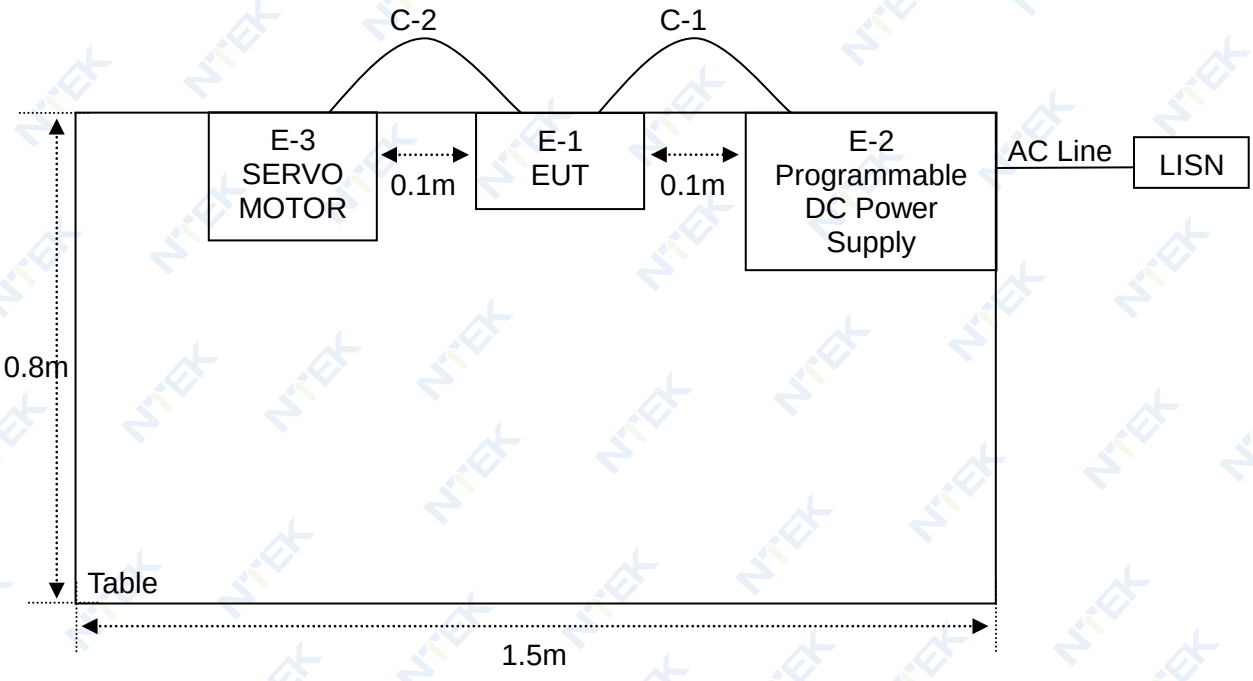
For Conducted Test	
Final Test Mode	Description
Mode 1	Working

For Radiated Test	
Final Test Mode	Description
Mode 1	Working

For EMS Test	
Final Test Mode	Description
Mode 1	Working

2.3 DESCRIPTION OF TEST SETUP

Mode CE : Working



2.4 DESCRIPTION TEST PERIPHERAL AND EUT PERIPHERAL

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Brand	Model/Type No.	Series No.	Note
E-1	MCAC series AC servo driver	N/A	MCAC825-RC	N/A	EUT
E-2	Programmable DC Power Supply	Chroma	62012P-100-50	62012PA01225	
E-3	SERVO MOTOR	N/A	60ASM400-5-1024C-H0M6	N/A	

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	60cm	
C-2	NO	NO	75cm	Power Line
	NO	NO	60cm	Signal Line

Note:

(1) The support equipment was authorized by Declaration of Confirmation.

(2) For detachable type I/O cable should be specified the length in cm in『Length』column.

(3) "YES" means "shielded" "with core"; "NO" means "unshielded" "without core".

2.5 MEASUREMENT INSTRUMENTS LIST

2.5.1 CONDUCTED TEST

Item	Name of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Single Phase LISN	R&S	ENV216	101490	May 29, 2023	May 28, 2024	1 year
2	Single Phase LISN	R&S	ENV216	101313	Mar. 27, 2023	Mar. 26, 2024	1 year
3	Three-Phase LISN	SCHWARZBECK	NNLK 8129	8129245	Mar. 27, 2023	Mar. 26, 2024	1 year
4	Low Frequency Cable	N/A	R-03	N/A	Jun. 17, 2022	Jun. 16, 2025	3 years
5	50Ω Coaxial Switch	Anritsu	MP59B	6200983704	May 06, 2023	May 05, 2026	3 years
6	EMI Test Receiver	R&S	ESCI	101160	Mar. 27, 2023	Mar. 26, 2024	1 year
7	EMI Test Receiver	R&S	ESPI3	101417	Nov. 03, 2023	Nov. 02, 2024	1 year
8	EMI Test Receiver	R&S	ESPI3	100145	Nov. 03, 2023	Nov. 02, 2024	1 year

2.5.2 RADIATED TEST

Item	Name of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	3m Anechoic Chamber	N/A	9*6*6	N/A	May 14, 2021	May 13, 2024	3 years
2	3m Anechoic Chamber	N/A	9*6*6	N/A	Jul. 28, 2022	Jul. 27, 2025	3 years
3	EMI Test Receiver	R&S	ESPI7	101318	Mar. 27, 2023	Mar. 26, 2024	1 year
4	Bilog Antenna	TESEQ	CBL6111D	31216	Mar. 16, 2023	Mar. 15, 2024	1 year
5	50Ω Coaxial Switch	Anritsu	MP59B	6200983705	May 06, 2023	May 05, 2026	3 years
6	Cable	Talent Microwave	A81-NWMSMAM-12M	21120897	Dec. 16, 2021	Dec. 15, 2024	3 years
7	Cable	Talent Microwave	A81-NMNM-10M	22084896	Sep. 09, 2022	Sep. 08, 2025	3 years
8	Cable	Talent Microwave	A81-NMNM-2M	22084895	Sep. 09, 2022	Sep. 08, 2025	3 years
9	Log-Periodic Antenna	SCHWARZBECK	VULB 9162	584	Jan. 11, 2023	Jan. 10, 2024	1 year
10	Log-Periodic Antenna	SCHWARZBECK	VULB 9162	586	Jan. 11, 2023	Jan. 10, 2024	1 year
11	Attenuator	Eastsheep	5W-N-JK-6G-6DB	N/A	Aug. 08, 2023	Aug. 07, 2024	1 year
12	Attenuator	Eastsheep	5W-N-JK-6G-6DB	N/A	Jul. 31, 2023	Jul. 30, 2024	1 year
13	Broadband Horn Antenna	EM	EM-AH-10180	2011071402	Mar. 31, 2022	Mar. 30, 2025	3 years
14	Broadband Horn Antenna	SCHWARZBECK	BBHA 9120D	2816	Jan. 12, 2023	Jan. 11, 2024	1 year
15	Broadband Horn Antenna	SCHWARZBECK	BBHA 9120D	2817	Jan. 12, 2023	Jan. 11, 2024	1 year
16	Spectrum Analyzer	Keysight	N9020A	MY53280244	Nov. 03, 2023	Nov. 02, 2024	1 year
17	Spectrum Analyzer	Agilent	E4440A	MY41000130	Mar. 27, 2023	Mar. 26, 2024	1 year
18	Pre-Amplifier	EMC	EMC051835SE	980246	May 29, 2023	May 28, 2024	1 year
19	Cable	Keysight	A40-2.92M2.92M-2M	1808041	Nov. 01, 2022	Oct. 31, 2025	3 years

2.5.3 ESD

Item	Name of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	ESD Generator	EVERFINE	EMS61000-2A	P615727TA 1421113	Jul. 06, 2023	Jul. 05, 2024	1 year
2	Electrostatic Discharge Generator	Lioncel	ESD-203B	ESD203B0 150402	Aug. 11, 2023	Aug. 10, 2024	1 year

2.5.4 RS

Item	Name of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	RF Test System Controller	AR	SC1000	0350156	Feb. 22, 2021	Feb. 21, 2024	3 years
2	3m Anechoic Chamber	N/A	9*6*6	N/A	Mar. 24, 2023	Mar. 23, 2026	3 years
3	3m Anechoic Chamber	N/A	7*5*4	N/A	May 19, 2023	May 18, 2026	3 years
4	Broadband Amplifier	AR	60S1G6	0350414	Mar. 21, 2023	Mar. 20, 2024	1 year
5	Bilog Antenna	ETS	3142E	00214344	Nov. 07, 2023	Nov. 06, 2025	3 years
6	Power Amplifier	rflight	NTWPA-00 810200	17063153	May 29, 2023	May 28, 2024	1 year
7	ESG Vetctor Signal Generator	Agilent	E4438C	MY450933 47	Mar. 21, 2023	Mar. 20, 2024	1 year

2.5.5 EFT/BURST

Item	Name of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Electrical Intelligent Transient Generator	EVERFINE	EMS61000-4A	P612005C M5421115	Jul. 04, 2023	Jul. 03, 2024	1 year
2	Capacitive Coupling Clamp	EVERFINE	EFTC-2-V1	910006	Mar. 27, 2023	Mar. 26, 2024	1 year

2.5.6 CONTINUOUS RADIO FREQUENCY DISTURBANCES

Item	Name of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Signal Generator	R&S	SML03	100954	Sep. 14, 2023	Sep. 13, 2024	1 year
2	Coupling and Decoupling Network	TESEQ	CDN M016	38722	May 29, 2023	May 28, 2024	1 year
3	Power Amplifier	TESEQ	CBA 230M-080	T44376	Aug. 08, 2023	Aug. 07, 2024	1 year
4	Attenuator	Jingtenghong	JTH-SJ-100 W-6dB	100145143 000686	Apr. 01, 2022	Mar. 31, 2025	3 years
5	EM Clamp	TESEQ	KEMZ 801A	47860	Sep. 14, 2023	Sep. 13, 2024	1 year

2.6 MEASUREMENT SOFTWARE

CONDUCTED TEST		
Software name	Manufacturer	Version number
EZ-EMC_CE	Farad	AIT-03A
RADIATED TEST		
Software name	Manufacturer	Version number
EZ-EMC_RE	Farad	AIT-03A
RF ELECTROMAGNETIC FIELD TEST		
Software name	Manufacturer	Version number
Emcware	AR RF/Microwave Instrumentation	3.2.0.4
INJECTED CURRENT TEST		
Software name	Manufacturer	Version number
CS_test	NTEK	10.0

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION (Frequency Range 150kHz-30MHz)

FREQUENCY (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 - 0.50	79	66
0.50 - 30.0	73	60

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

3.1.2 WIRED NETWORK PORT CONDUCTED EMISSION(VOLTAGE LIMITS) (Frequency Range 150kHz-30MHz)

FREQUENCY (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 - 0.50	97 - 87	84 - 74
0.50 - 30.0	87	74

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

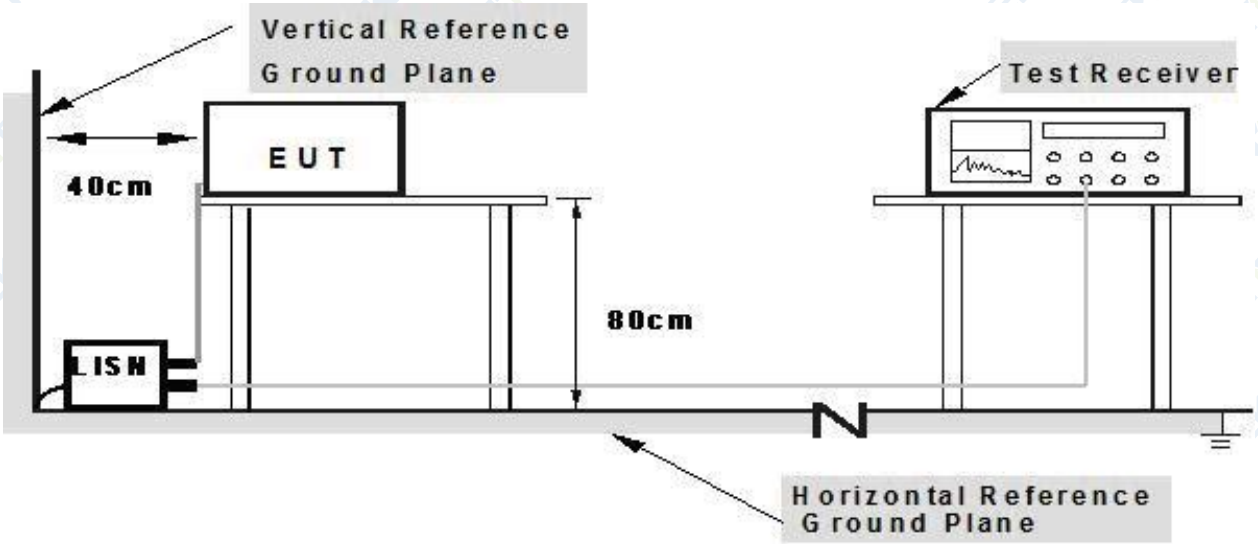
The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

3.1.3 TEST PROCEDURE

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item -EUT Test Photos.

3.1.4 TEST SETUP



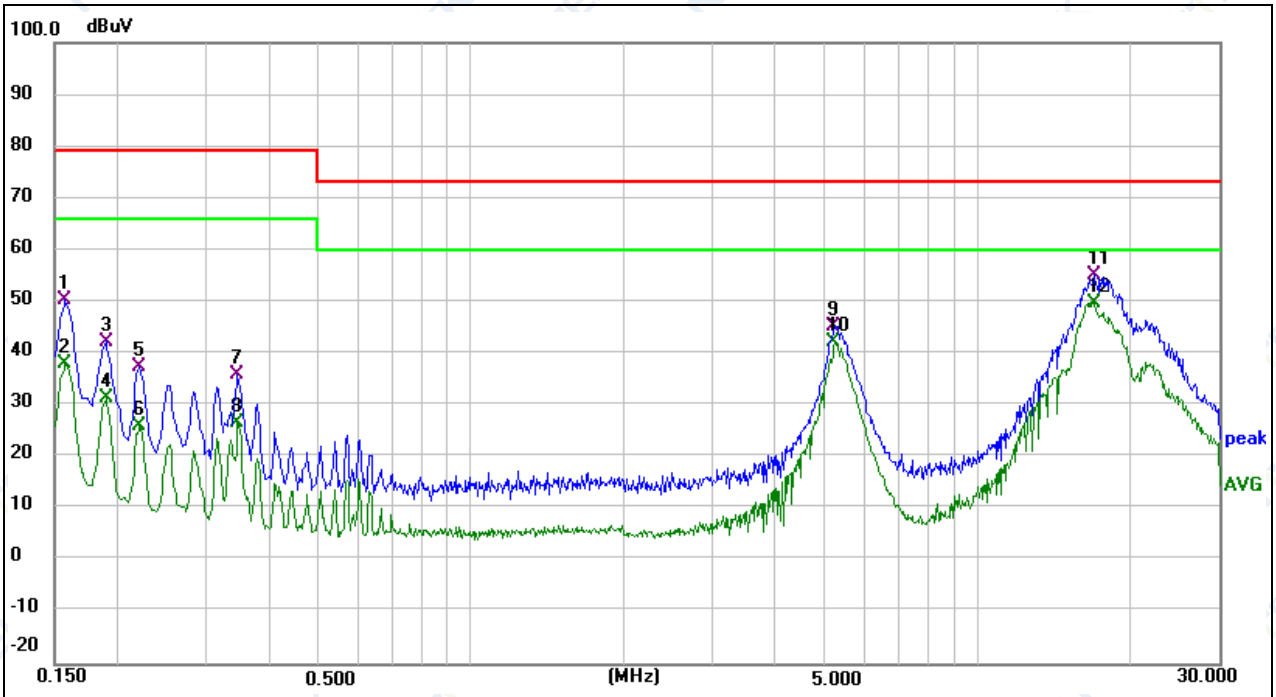
Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the follows during the testing.

3.1.6 TEST RESULTS

EUT:	MCAC series AC servo driver	Model Name:	MCAC825-RC
Temperature:	23.8℃	Relative Humidity:	57%
Pressure:	1010hPa	Test Date:	2023-11-06
Test Mode:	Working	Phase:	L
Test Voltage:	DC 36V powered by Programmable DC Power Supply AC 230V/50Hz		

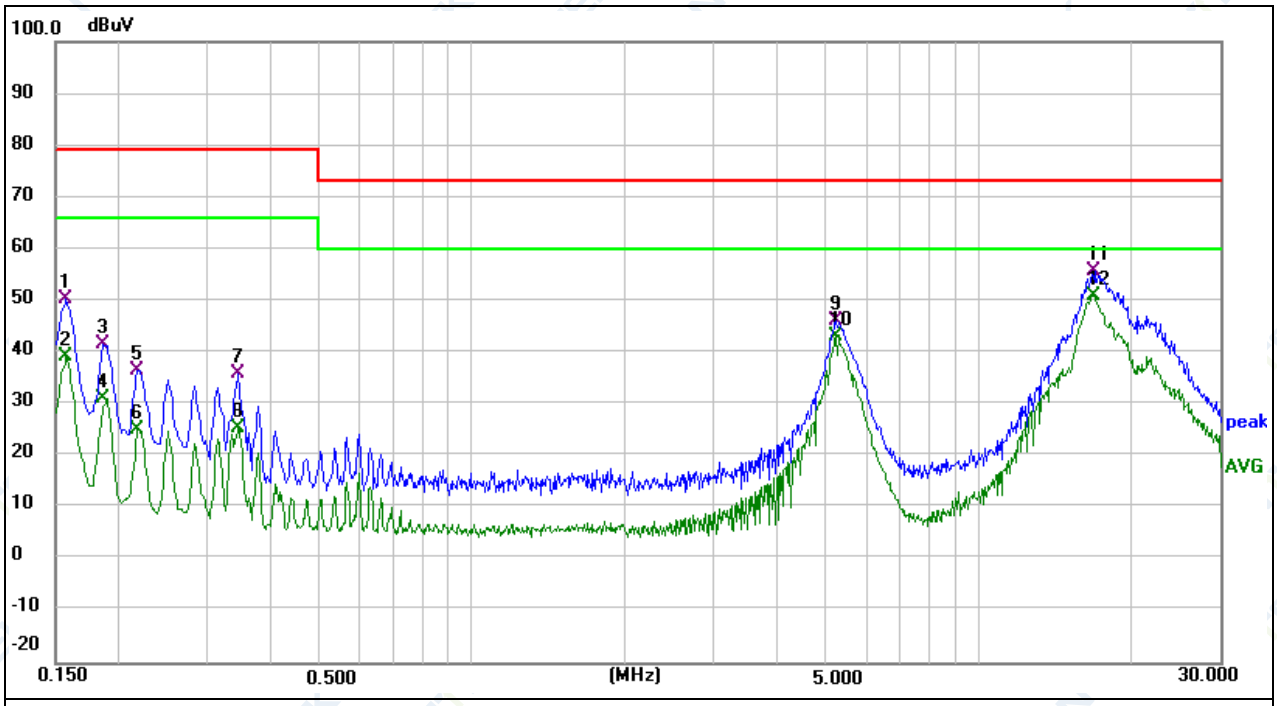


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1580	40.54	9.95	50.49	79.00	-28.51	QP	P	
2	0.1580	28.15	9.95	38.10	66.00	-27.90	AVG	P	
3	0.1900	32.39	10.01	42.40	79.00	-36.60	QP	P	
4	0.1900	21.55	10.01	31.56	66.00	-34.44	AVG	P	
5	0.2220	27.45	10.08	37.53	79.00	-41.47	QP	P	
6	0.2220	15.90	10.08	25.98	66.00	-40.02	AVG	P	
7	0.3460	25.71	10.34	36.05	79.00	-42.95	QP	P	
8	0.3460	16.45	10.34	26.79	66.00	-39.21	AVG	P	
9	5.2339	35.68	9.67	45.35	73.00	-27.65	QP	P	
10	5.2339	32.66	9.67	42.33	60.00	-17.67	AVG	P	
11	16.9899	45.46	9.71	55.17	73.00	-17.83	QP	P	
12 *	16.9899	40.15	9.71	49.86	60.00	-10.14	AVG	P	

Remark:

Factor = Insertion Loss + Cable Loss.

EUT:	MCAC series AC servo driver	Model Name:	MCAC825-RC
Temperature:	23.8℃	Relative Humidity:	57%
Pressure:	1010hPa	Test Date:	2023-11-06
Test Mode:	Working	Phase:	N
Test Voltage:	DC 36V powered by Programmable DC Power Supply AC 230V/50Hz		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1580	40.32	9.95	50.27	79.00	-28.73	QP	P	
2	0.1580	29.19	9.95	39.14	66.00	-26.86	AVG	P	
3	0.1860	31.53	10.01	41.54	79.00	-37.46	QP	P	
4	0.1860	21.15	10.01	31.16	66.00	-34.84	AVG	P	
5	0.2180	26.55	10.08	36.63	79.00	-42.37	QP	P	
6	0.2180	15.20	10.08	25.28	66.00	-40.72	AVG	P	
7	0.3460	25.61	10.34	35.95	79.00	-43.05	QP	P	
8	0.3460	15.09	10.34	25.43	66.00	-40.57	AVG	P	
9	5.2460	36.45	9.67	46.12	73.00	-26.88	QP	P	
10	5.2460	33.63	9.67	43.30	60.00	-16.70	AVG	P	
11	16.9100	45.90	9.71	55.61	73.00	-17.39	QP	P	
12 *	16.9100	41.35	9.71	51.06	60.00	-8.94	AVG	P	

Remark:

Factor = Insertion Loss + Cable Loss.

3.2 RADIATED EMISSION MEASUREMENT

3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT (Below 1000MHz)

FREQUENCY (MHz)	Limits For SAC(dBuV/m)	
	☐At 10m	☒At 3m
30 - 230	40	50
230 - 1000	47	57

3.2.2 LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Limits For FAR / SAC(dBuV/m) (At 3m)	
	Peak	Avg
1000 - 3000	76	56
3000 - 6000	80	60

Note:

(1) The limit for radiated test was performed according to as following: EN IEC 61000-6-4.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBμV/m)=20log Emission level (μV/m).

3.2.3 TEST PROCEDURE

a. The measuring distance of at 3m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.

b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

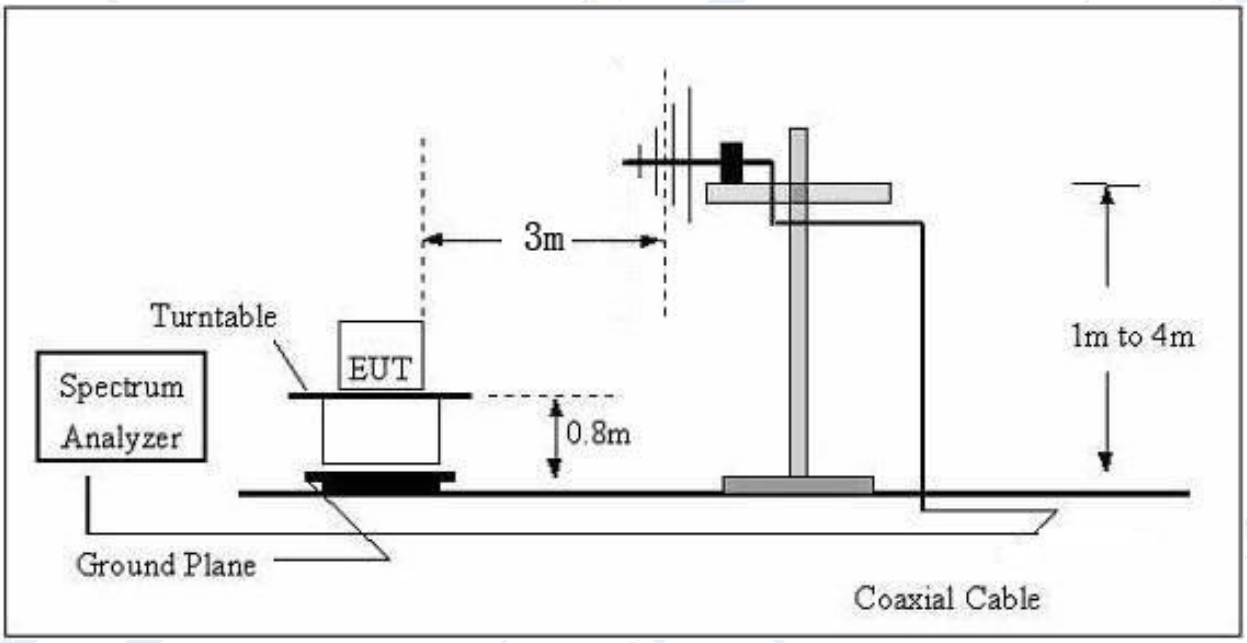
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured, above 1G Average detector mode will be instead.

e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP(AV) Limits and then no additional QP Mode measurement performed.

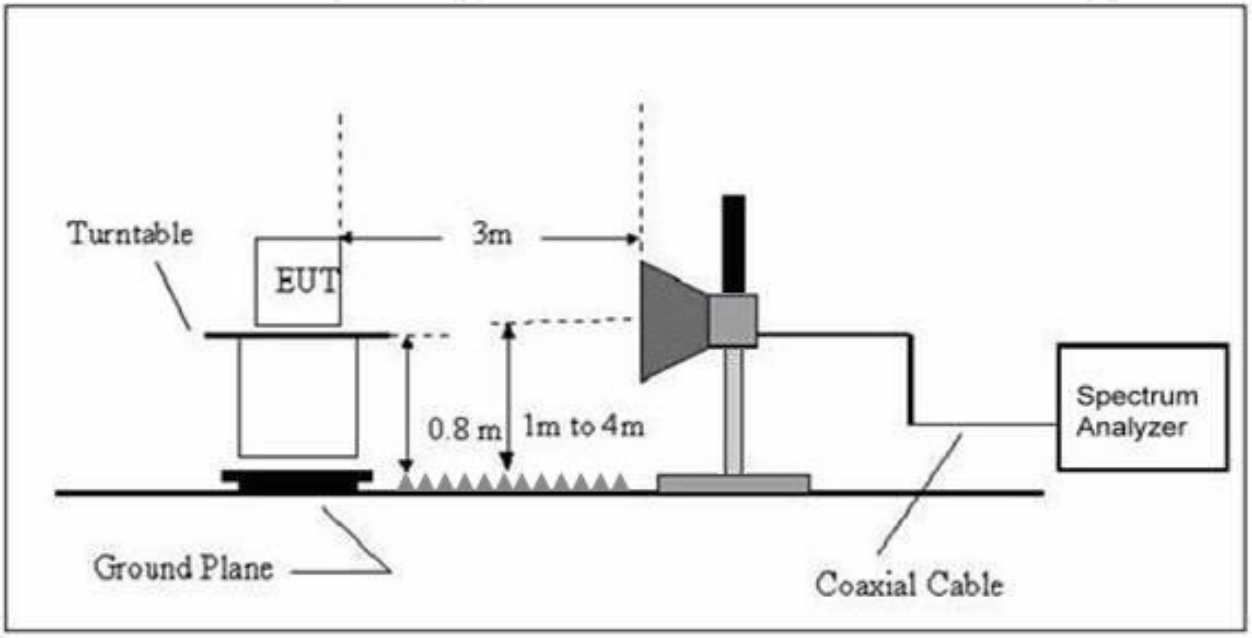
f. For the actual test configuration, please refer to the related Item -EUT Test Photos.

3.2.4 TEST SETUP

(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(B) Radiated Emission Test Set-Up Frequency Above 1GHz

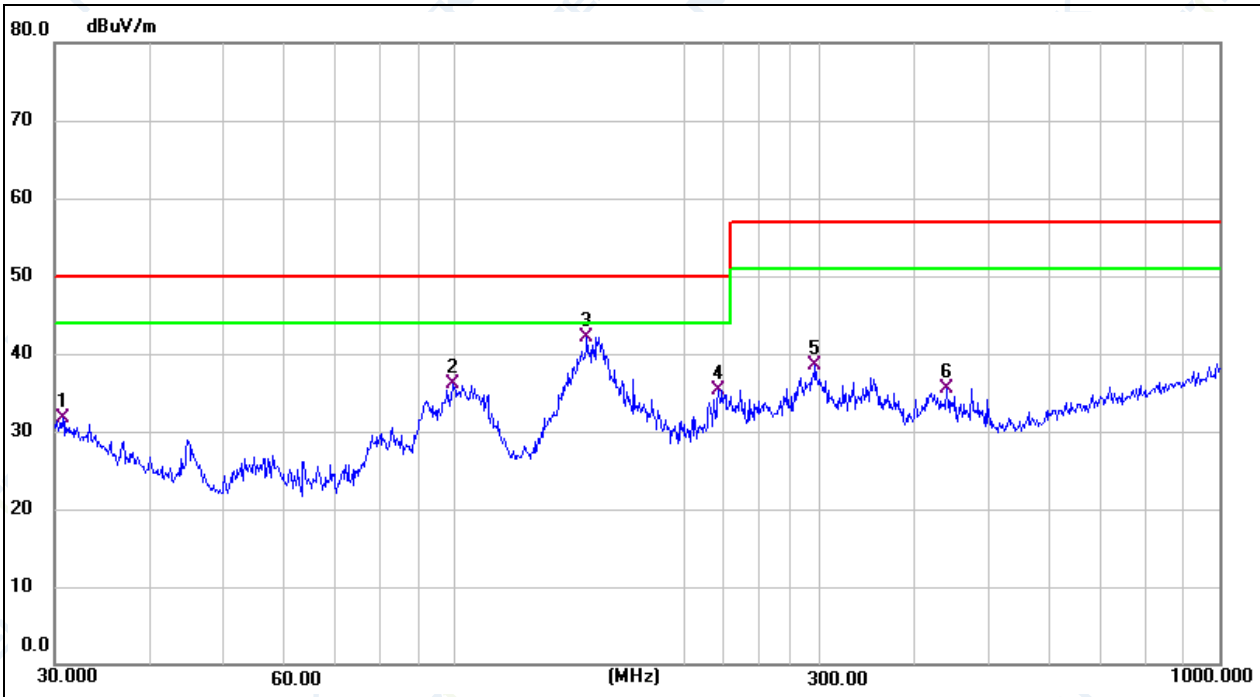


3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the follows during the testing.

3.2.6 TEST RESULTS (30-1000MHz)

EUT:	MCAC series AC servo driver	Model Name:	MCAC825-RC
Temperature:	25.1℃	Relative Humidity:	52%
Pressure:	1010hPa	Test Date:	2023-12-05
Test Mode:	Working	Polarization:	Horizontal
Test Power:	DC 36V powered by Programmable DC Power Supply AC 230V/50Hz		

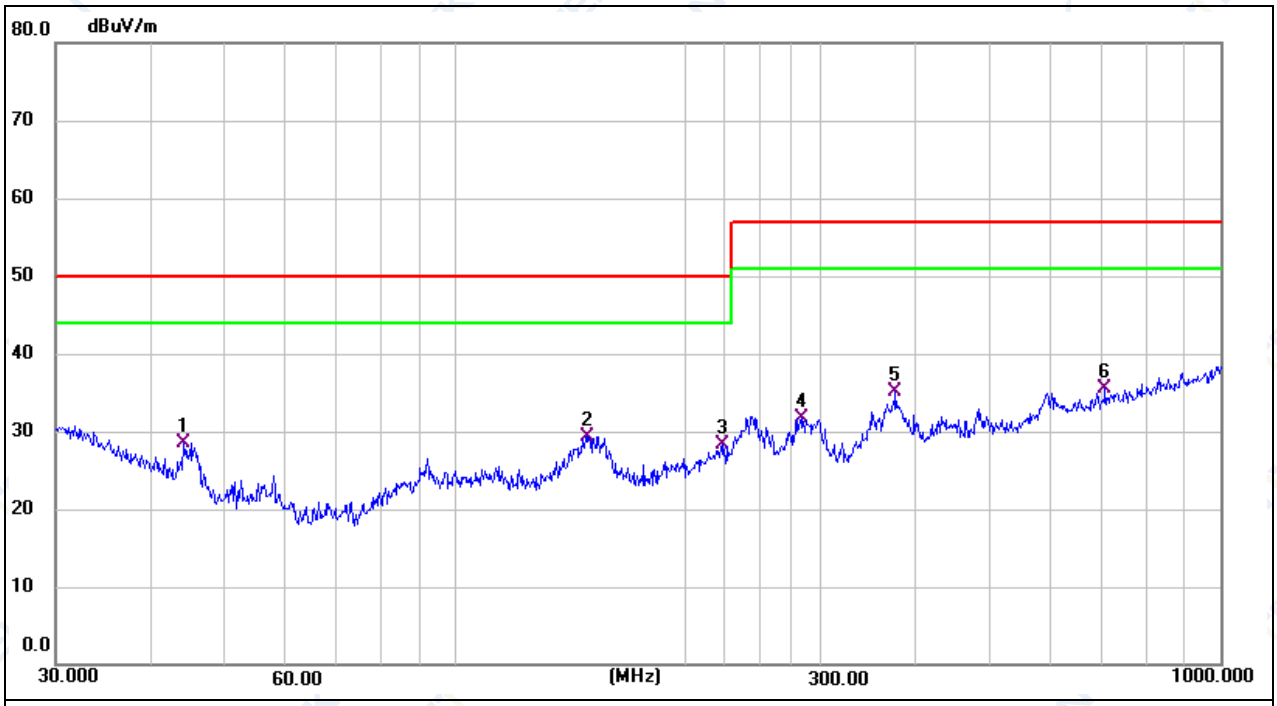


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	30.7455	5.77	26.00	31.77	50.00	-18.23	QP			P	
2	99.5281	18.47	17.55	36.02	50.00	-13.98	QP			P	
3 *	148.9625	23.73	18.41	42.14	50.00	-7.86	QP			P	
4	221.3921	18.43	16.91	35.34	50.00	-14.66	QP			P	
5	296.1836	18.53	20.02	38.55	57.00	-18.45	QP			P	
6	440.1963	11.61	23.87	35.48	57.00	-21.52	QP			P	

Remark:

Factor = Antenna Factor + Cable Loss.

EUT:	MCAC series AC servo driver	Model Name:	MCAC825-RC
Temperature:	25.1℃	Relative Humidity:	52%
Pressure:	1010hPa	Test Date:	2023-12-05
Test Mode:	Working	Polarization:	Vertical
Test Power:	DC 36V powered by Programmable DC Power Supply AC 230V/50Hz		



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	44.1202	9.97	18.58	28.55	50.00	-21.45	QP			P	
2 *	148.9625	10.95	18.41	29.36	50.00	-20.64	QP			P	
3	222.9502	11.42	16.97	28.39	50.00	-21.61	QP			P	
4	282.9852	11.88	19.87	31.75	57.00	-25.25	QP			P	
5	375.9385	12.58	22.61	35.19	57.00	-21.81	QP			P	
6	706.6999	7.62	27.94	35.56	57.00	-21.44	QP			P	

Remark:

Factor = Antenna Factor + Cable Loss.

4. EMC IMMUNITY TEST

4.1 STANDARD COMPLIANCE/SEVERITY LEVEL/CRITERIA

Tests Standard No.	TEST SPECIFICATION	Test Mode Test Ports	Perform Criteria
1. ESD IEC/EN 61000-4-2	8kV air discharge 4kV contact discharge	Direct Mode	B
	4kV HCP discharge 4kV VCP discharge	Indirect Mode	B
2. RS IEC/EN 61000-4-3	80 MHz to 1000 MHz, 1400 MHz to 2700 MHz, 1 kHz, 80%, AM modulated	Enclosure	A
3. EFT/Burst IEC/EN 61000-4-4	5/50ns Tr/Th 5kHz Repetition Freq.	Power Supply Port	B
		CTL/Signal Port Data Line Port	B
4. Continuous radio frequency disturbances IEC/EN 61000-4-6	0.15 MHz to 80 MHz; 1 kHz, 80%, AM Modulated, 150Ω source impedance	AC Power Port	A
		DC Power Port	A
		CTL/Signal Port	A

4.2 GENERAL PERFORMANCE CRITERIA

According to **EN IEC 61000-6-2** standard, the general performance criteria as following:

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 manufacturer 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 derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
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 manufacturer, 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 operating state or stored data is allowed to persist after the test.
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 manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

4.3 GENERAL PERFORMANCE CRITERIA TEST SETUP

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

4.4 ESD TESTING

4.4.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-2
Discharge Impedance:	330ohm / 150pF
Required Performance:	B
Discharge Voltage:	Air Discharge: 2kV/4kV/8kV (Direct) Contact Discharge: 2kV/4kV (Direct/Indirect)
Polarity:	Positive & Negative
Number of Discharge:	Air Discharge: min. 20 times at each test point Contact Discharge: min. 20 times at each test point
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum

4.4.2 TEST PROCEDURE

The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manner:

a. Indirect application of the discharge:

Vertical Coupling Plane (VCP):

At least 10 single discharges (in the most sensitive polarity) shall be applied to the centre of one vertical edge of the coupling plane. The coupling plane, of dimensions 0,5 m × 0,5 m, is placed parallel to, and positioned at a distance of 0,1 m from, the EUT.

Discharges shall be applied to the coupling plane, with sufficient different positions such that the four faces of the EUT are completely illuminated. One VCP position is considered to illuminate 0,5 m × 0,5 m area of the EUT surface.

Horizontal Coupling Plane (HCP):

Discharge to the HCP shall be made horizontally to the edge of the HCP.

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the centre 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.

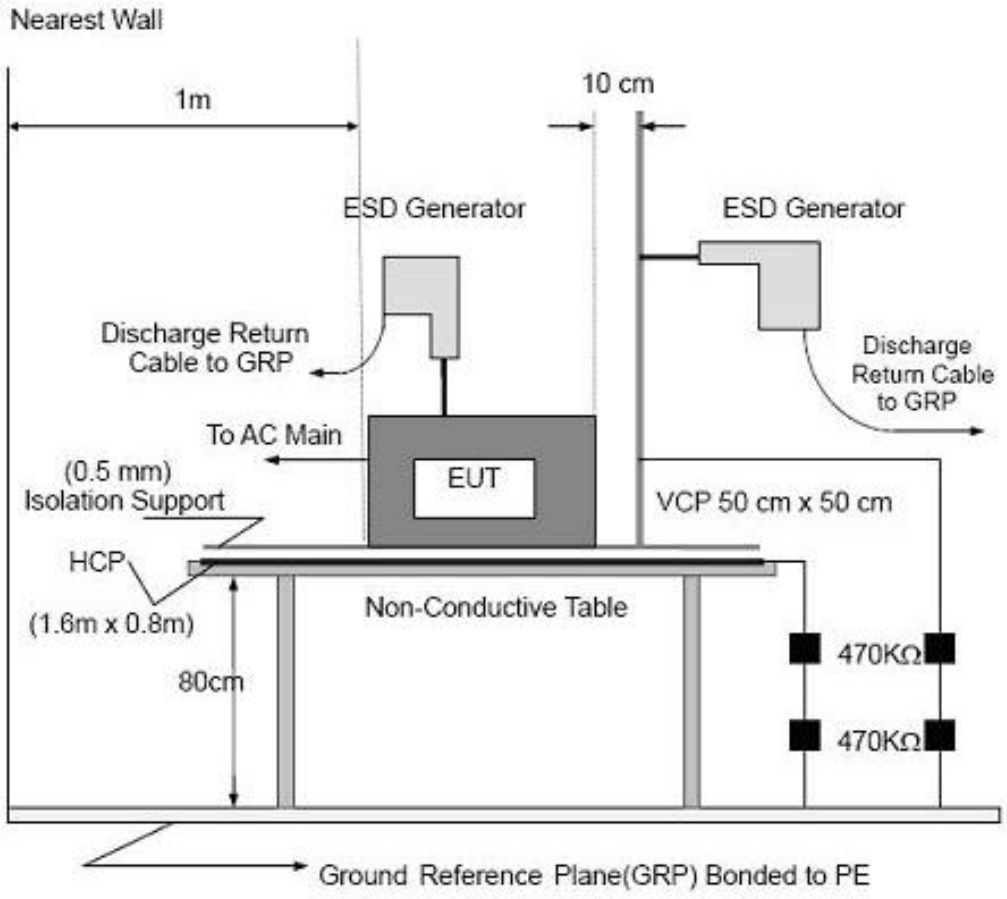
The discharge electrode shall be in contact with the edge of the HCP before the discharge switch is operated

b. Direct application of discharges to the EUT

The test shall be performed with single discharges. On each pre-selected point at least 10 single discharges (in the most sensitive polarity) shall be applied.

For the time interval between successive single discharges an initial value of 1 s is recommended. Longer intervals may be necessary to determine whether a system failure has occurred.

4.4.3 TEST SETUP



Note:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A Horizontal Coupling Plane (1.6m x 0.8m) was placed on the table and attached to the GRP by means of a cable with 940k total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC/EN 61000-4-2, and its cables were placed on the HCP and isolated by an insulating support of 0.5mm thickness. A distance of1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of IEC/EN 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

4.4.4 TEST RESULTS

EUT:	MCAC series AC servo driver	Model Name:	MCAC825-RC
Temperature:	25.2℃	Relative Humidity:	50%
Pressure:	1010hPa	Test Date:	2023-11-08
Test Mode:	Working		
Test Power:	DC 36V powered by Programmable DC Power Supply AC 230V/50Hz		

Mode	Contact Discharge (Indirect)							Criterion	Result
Test Level(kV)	Test Point	2		4		6			
Test Location		+	-	+	-	+	-		
HCP / VCP	Front	P	P	P	P			**B**	**Complies**
	Rear	P	P	P	P				
	Left	P	P	P	P				
	Right	P	P	P	P				

Mode	Air Discharge								Contact Discharge								Criterion	Result
Test Level(kV)	2		4		8		15		2		4		6		8			
Test Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-		
Gap	P	P	P	P	P	P											**B**	**Complies**
Button	P	P	P	P	P	P												
LED	P	P	P	P	P	P												
Screw									P	P	P	P						
Metal									P	P	P	P						

Note:

(1) +/- denotes the Positive/Negative polarity of the output voltage.

(2) In the table: 'P' represents 'PASS'; 'F' represents 'FAIL'.

(3) Criteria A: Normal performance within limits specified by the manufacturer, requestor or purchaser.

(4) Criteria B: Temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the EUT recovers its normal performance, without operator intervention.

(5) Criteria C: Temporary loss of function or degradation of performance, the correction of which requires operator intervention.

(6) Criteria D: Loss of function or degradation of performance which is not recoverable, owing to damage to hardware or software, or loss of data.

4.5 RS TESTING

4.5.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-3
Required Performance:	A
Frequency Range & Field Strength:	80 MHz to 1000 MHz: 10V/m 1400 MHz to 6000 MHz: 3 V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Polarity of Antenna:	Horizontal and Vertical
Test Distance:	3 m
Antenna Height:	1.5 m
Dwell Time:	3 seconds

4.5.2 TEST PROCEDURE

The EUT and support equipment, which are placed on a table that is 0.8 meter above ground and the testing was performed in a fully-anechoic chamber.

The testing distance from antenna to the EUT was 3 meters.

The other condition as following manner:

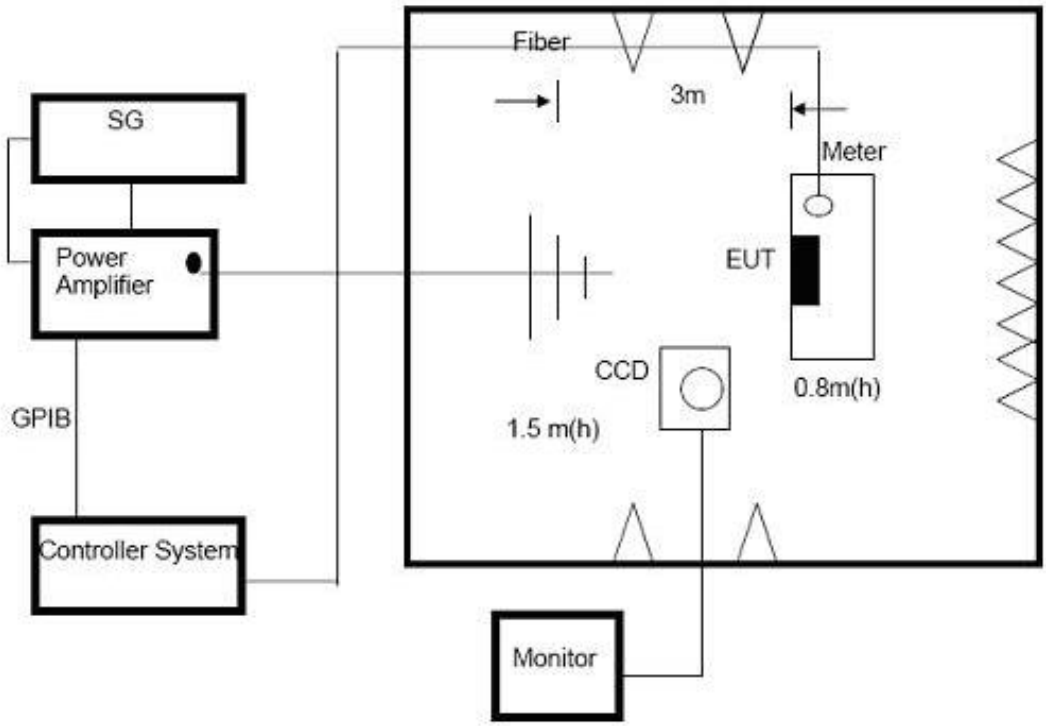
a. The frequency range is swept from 80 MHz to 1000 MHz & 1400 MHz to 6000 MHz with the signal 80% amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5x 10-3 decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.

b. Sweep Frequency 900 MHz, with the Duty Cycle: 1/8 and Modulation: Pulse 217 Hz (if applicable)

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

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

4.5.3 TEST SETUP



Note:

TABLE-TOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

FLOOR-STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

4.5.4 TEST RESULTS

EUT:	MCAC series AC servo driver	Model Name:	MCAC825-RC
Temperature:	25.1℃	Relative Humidity:	48%
Pressure:	1010hPa	Test Date:	2023-12-06
Test Mode:	Working		
Test Power:	AC 230V/50Hz		

Frequency Range (MHz)	R.F. Field Strength	RF Field Position	Azimuth	Criterion	Result
80 - 1000	10 V/m (r.m.s) AM Modulated 1000Hz, 80%	H / V	Front	**A**	**Complies**
			Rear		
1400 - 6000	3 V/m (r.m.s) AM Modulated 1000Hz, 80%		Left		
			Right		

Note:

(1) Criteria A: There was no change operated with initial operating during the test.

(2) Criteria B: The EUT function loss during the test, but self-recoverable after the test.

(3) Criteria C: The system shut down during the test.

4.6 EFT/BURST TESTING

4.6.1 TEST SPECIFICATION

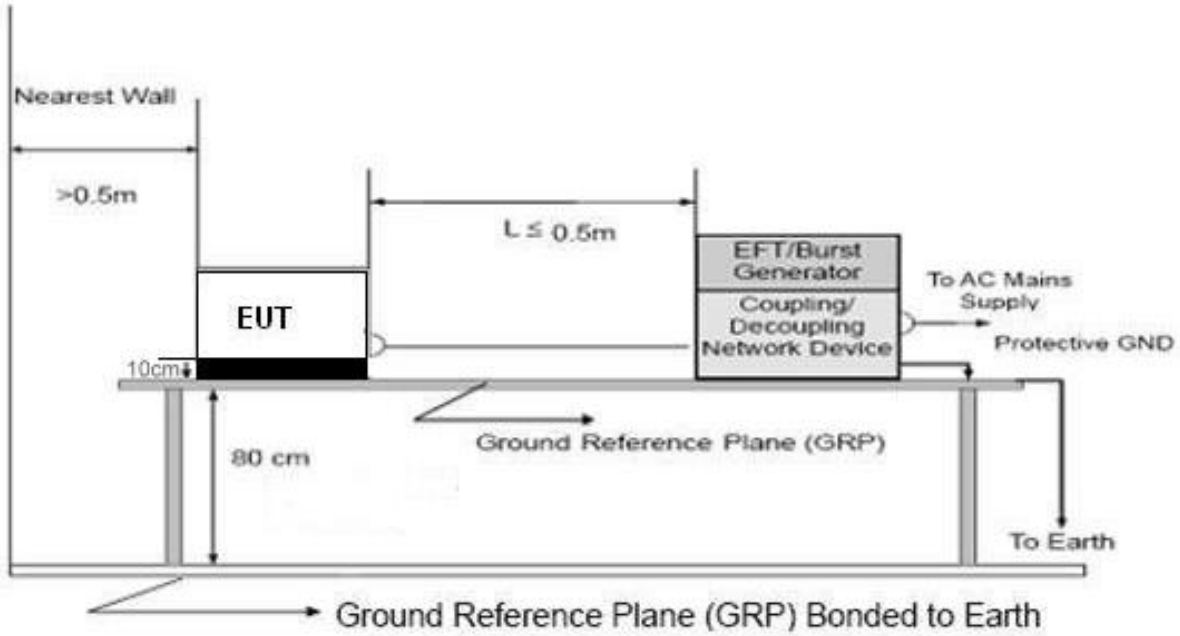
Basic Standard:	IEC/EN 61000-4-4
Required Performance:	B
Test Voltage:	Power Line: 1 kV, 2 kV Signal/Control Line: 1 kV
Polarity:	Positive & Negative
Impulse Frequency:	5 kHz
Impulse Wave shape :	5/50 ns
Burst Duration:	15 ms
Burst Period:	300 ms
Test Duration:	2 minutes

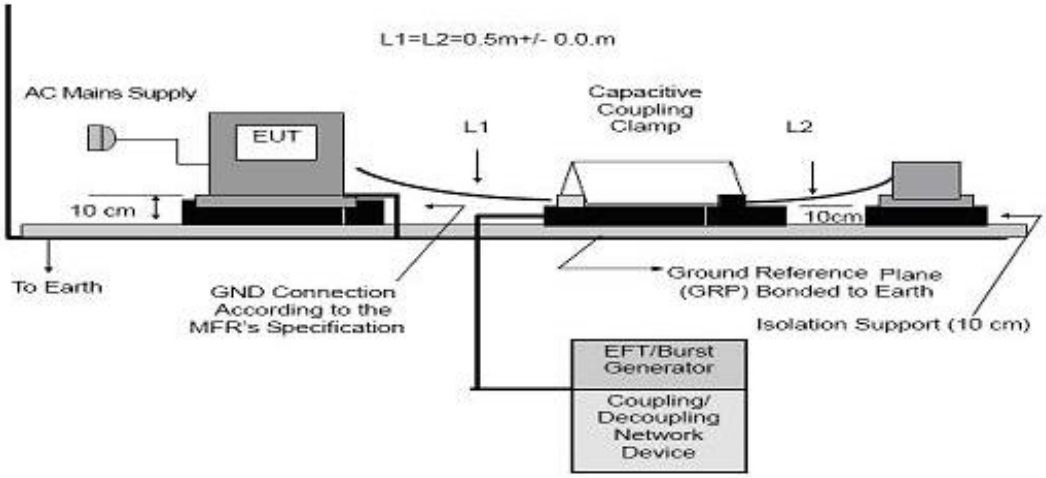
4.6.2 TEST PROCEDURE

The EUT and its simulators were placed on a ground reference plane and were insulated from it by a wood support 0.1m ± 0.01m thick. The ground reference plane was 1m*1m metallic sheet with 0.65mm minimum thickness. The other condition as following manner:

a. The length of power cord between the coupling device and the EUT should not exceed 0.5 meter.
b. Both positive and negative polarity discharges were applied.
c. The duration time of each test sequential was 2 minutes.

4.6.3 TEST SETUP





Note:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table (0.8m high) standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system. A minimum distance of 0.5m was provided between the EUT and the walls of the laboratory or any other metallic structure.

FLOOR-STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-4 and its cables, were isolated from the Ground Reference Plane by an insulating support that is 0.1-meter thick. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system.

4.6.4 TEST RESULTS

EUT:	MCAC series AC servo driver	Model Name:	MCAC825-RC
Temperature:	24.2℃	Relative Humidity:	53%
Pressure:	1010hPa	Test Date:	2023-12-06
Test Mode:	Working		
Test Power:	AC 230V/50Hz		

Coupling Line		Test Level (kV)								Criterion	Result
		0.5		1		2		4			
		+	-	+	-	+	-	+	-		
AC Line	L									/	N/A
	N										
	PE										
	L+N										
	L+PE										
	N+PE										
	L+N+PE										
DC Line		P	P	P	P					B	Complies
Signal Line										/	N/A

Note:

(1) N/A - denotes test is not applicable in this Test Report.

(2) +/- denotes the Positive/Negative polarity of the output voltage.

(3) In the table: 'P' represents 'PASS'; 'F' represents 'FAIL'.

(4) Criteria A: There was no change operated with initial operating during the test.

(5) Criteria B: The EUT function loss during the test, but self-recoverable after the test.

(6) Criteria C: The system shut down during the test.

4.7 CONTINUOUS RADIO FREQUENCY DISTURBANCES TESTING

4.7.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-6
Required Performance:	A
Frequency Range:	0.15 - 80 MHz
Field Strength:	10 Vr.m.s.
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Dwell Time:	3 seconds

4.7.2 TEST PROCEDURE

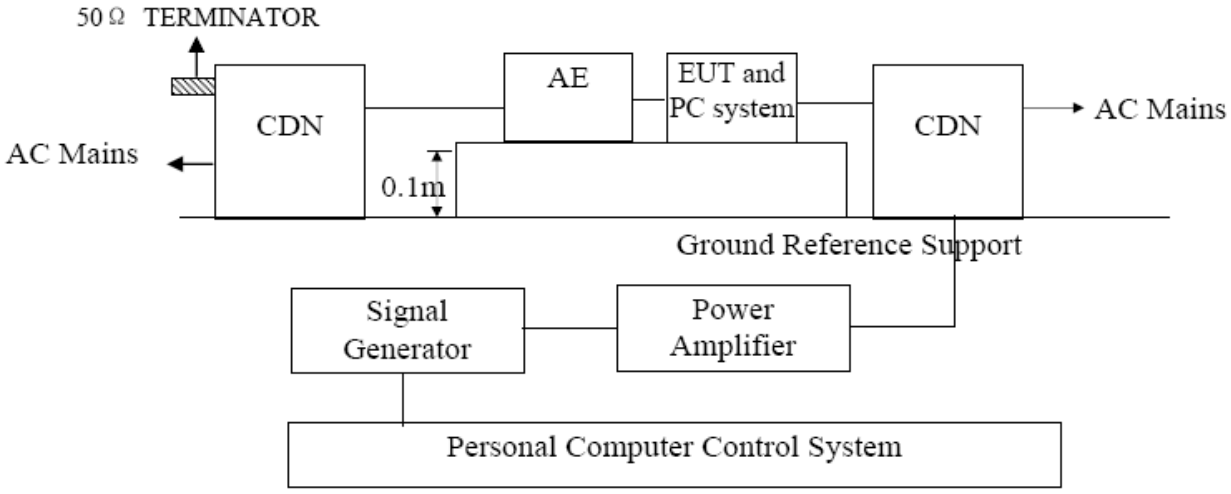
The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50mm (where possible). The disturbance signal described below is injected to EUT through CDN.

The other condition as following manner:

a. The frequency range is swept from 150 kHz to 80 MHz, with the signal 80% amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5x 10-3 decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.

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

4.7.3 TEST SETUP



Note:

FLOOR-STANDING EQUIPMENT

The equipment to be tested is placed on an insulating support of 0.1 meters height above a ground reference plane. All relevant cables shall be provided with the appropriate coupling and decoupling devices at a distance between 0.1 meters and 0.3 meters from the projected geometry of the EUT on the ground reference plane.

4.7.4 TEST RESULTS

EUT:	MCAC series AC servo driver	Model Name:	MCAC825-RC
Temperature:	25.2℃	Relative Humidity:	50%
Pressure:	1010hPa	Test Date:	2023-11-08
Test Mode:	Working		
Test Power:	DC 36V powered by Programmable DC Power Supply AC 230V/50Hz		

Test Ports (Mode)	Freq. Range (MHz)	Field Strength	Result	Result
Input AC. Power Port	0.15 --- 80	10V(r.m.s) AM Modulated 1kHz, 80%	**A**	**N/A**
Input DC. Power Port			**A**	**Complies**
Signal Line			**A**	**N/A**

Note:

(1) N/A - denotes test is not applicable in this Test Report.

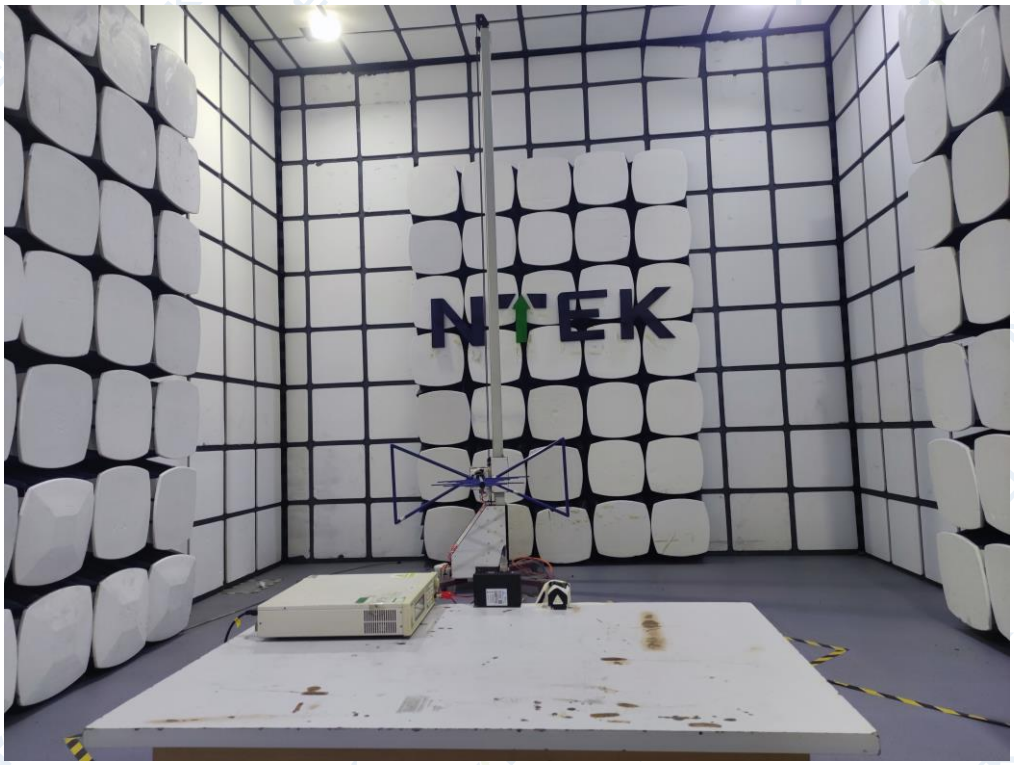
(2) Criteria A: There was no change operated with initial operating during the test.

(3) Criteria B: The EUT function loss during the test, but self-recoverable after the test.

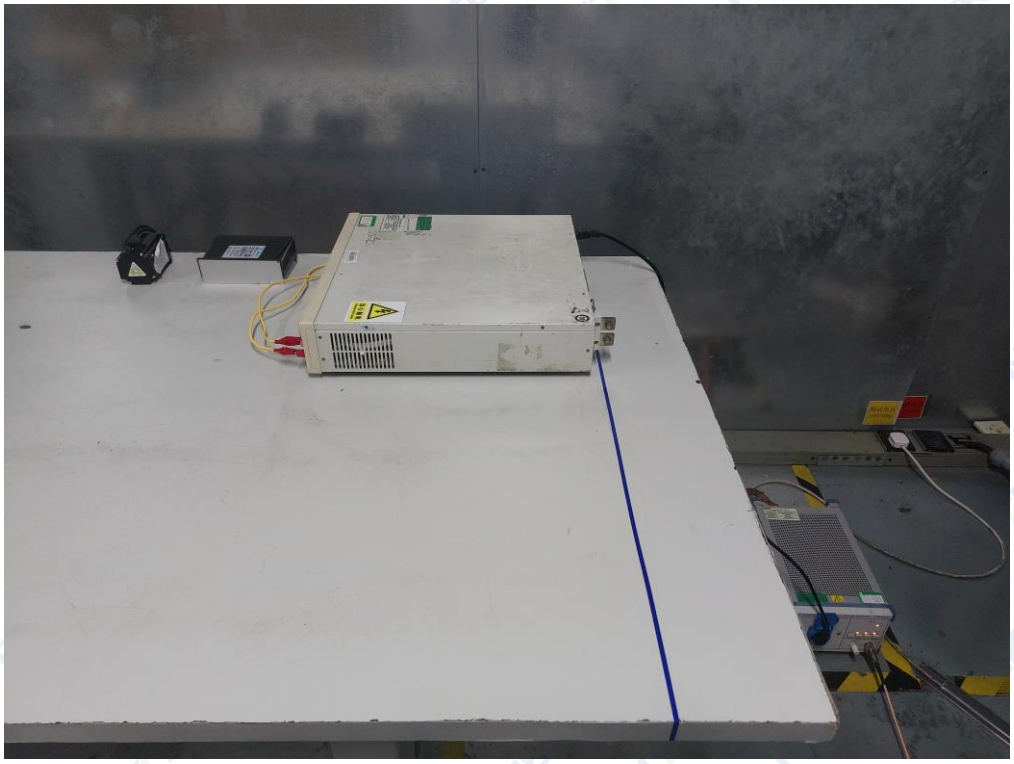
(4) Criteria C: The system shut down during the test.

5. EUT TEST PHOTO

Radiated Measurement Photo



Conducted Measurement Photo



ATTACHMENT PHOTOGRAPHS OF EUT

Photo 1

Photo 2

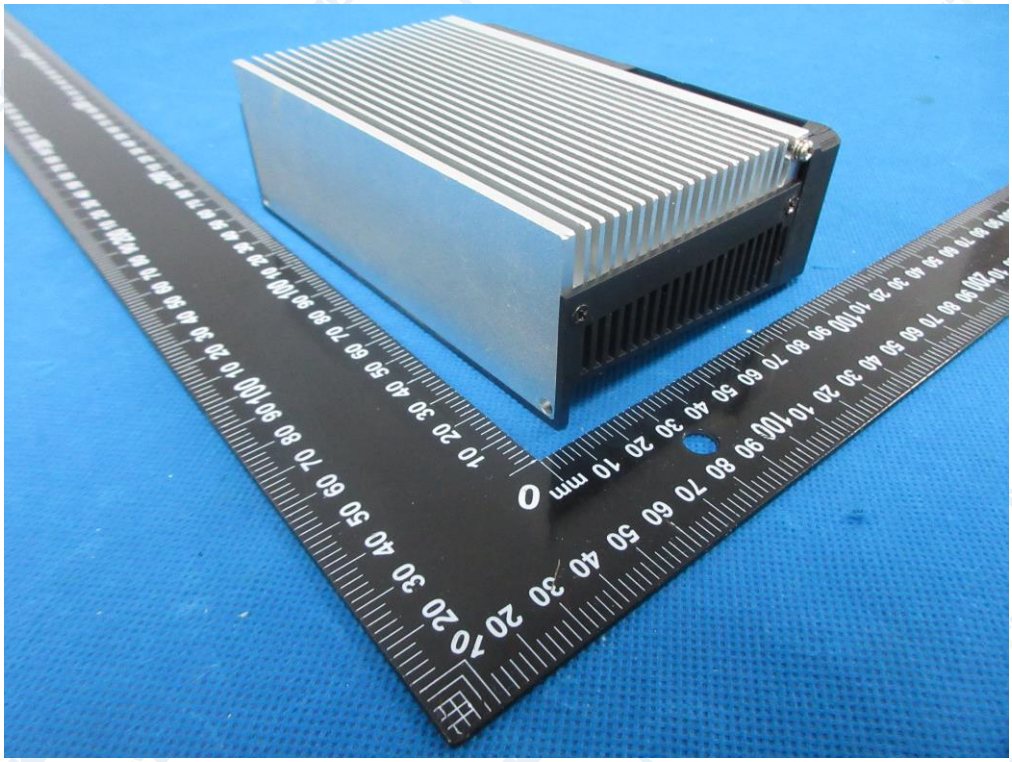


Photo 3

Photo 4

Photo 5

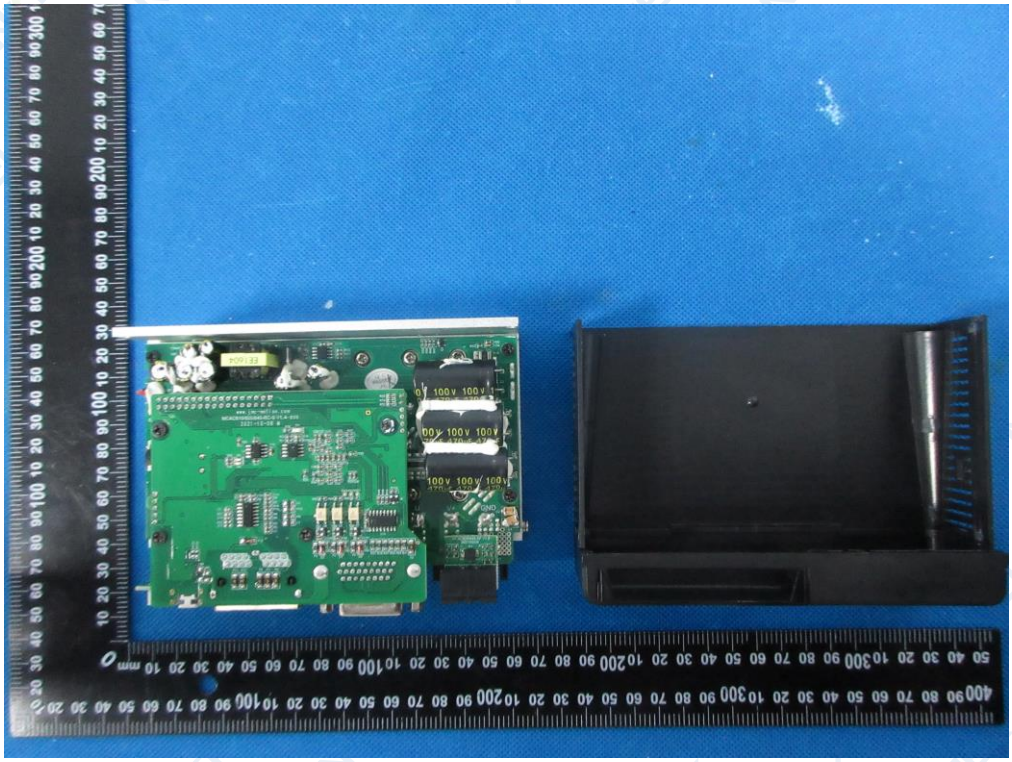


Photo 6

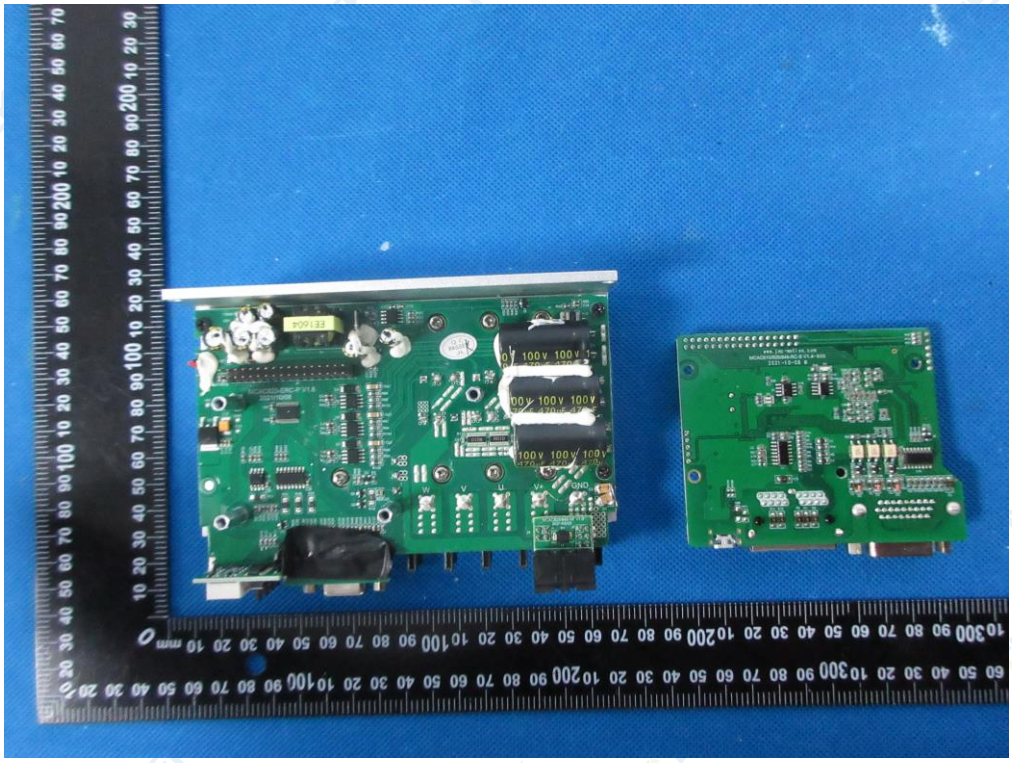


Photo 7

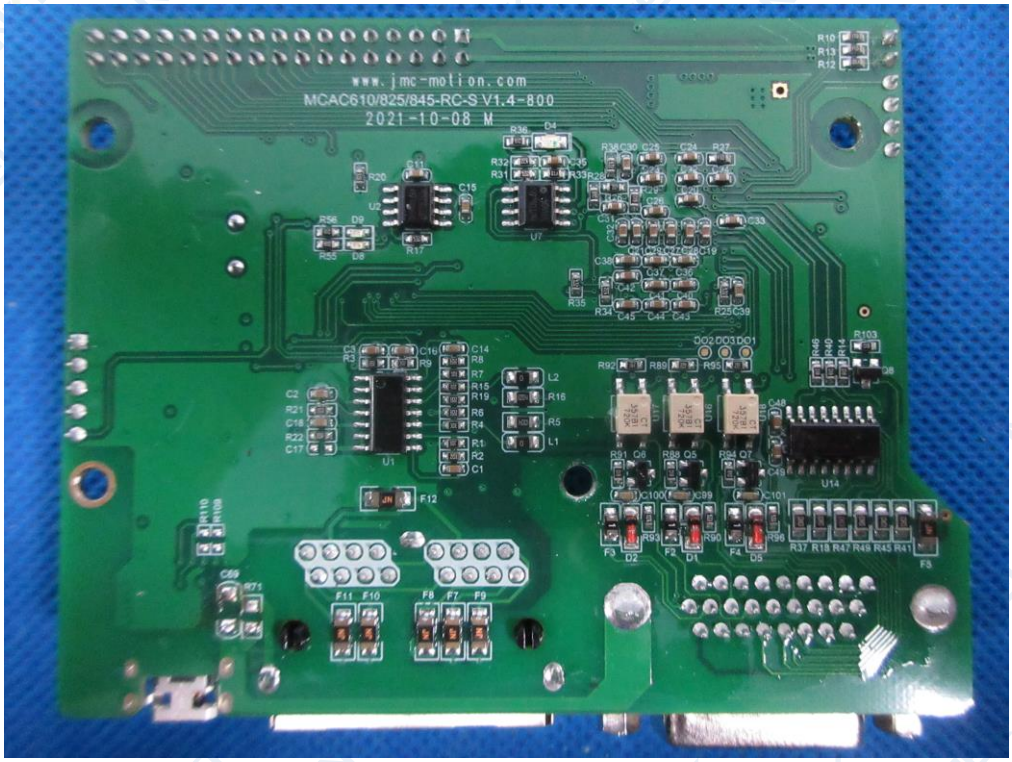


Photo 8

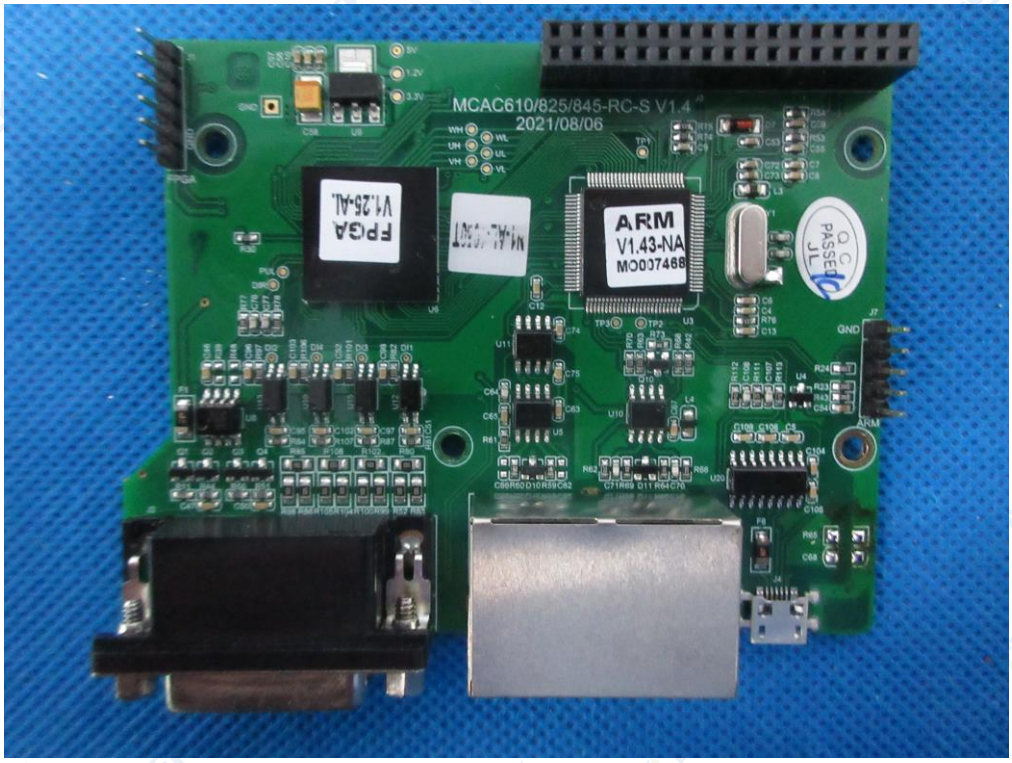


Photo 9

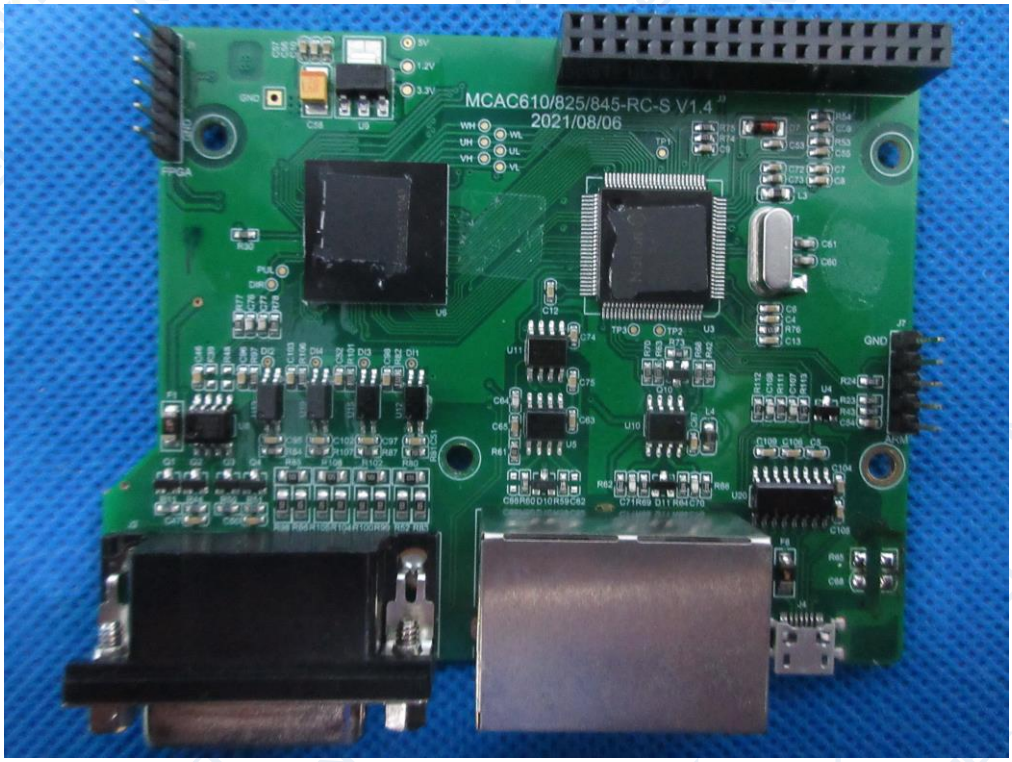


Photo 10

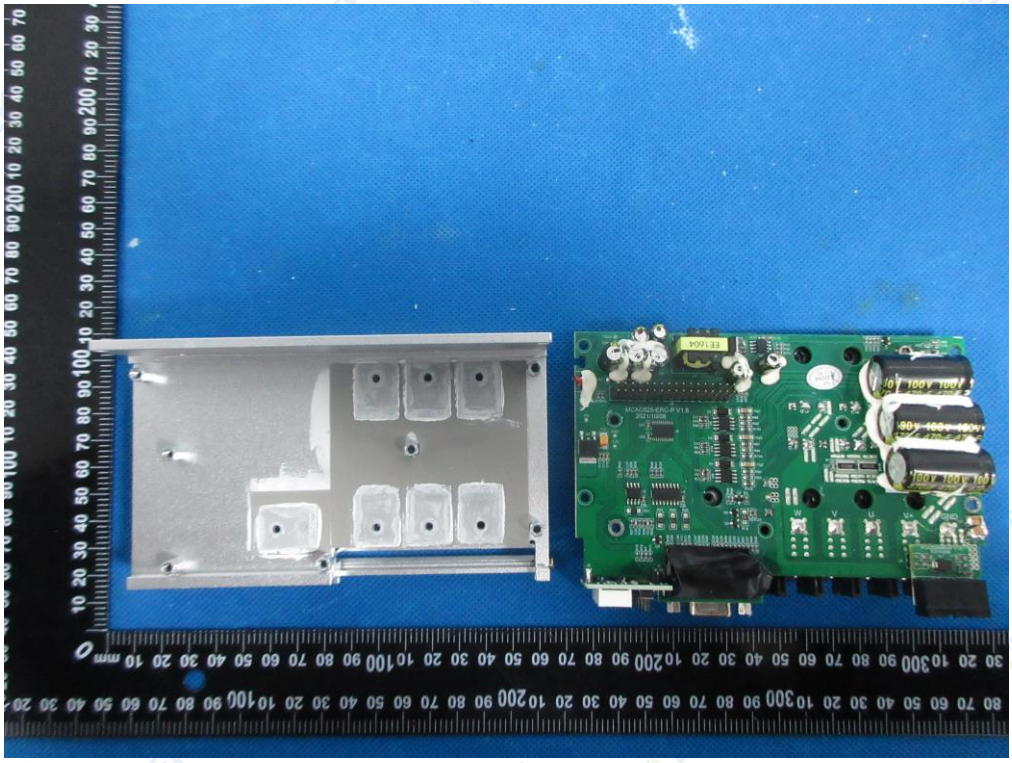


Photo 11

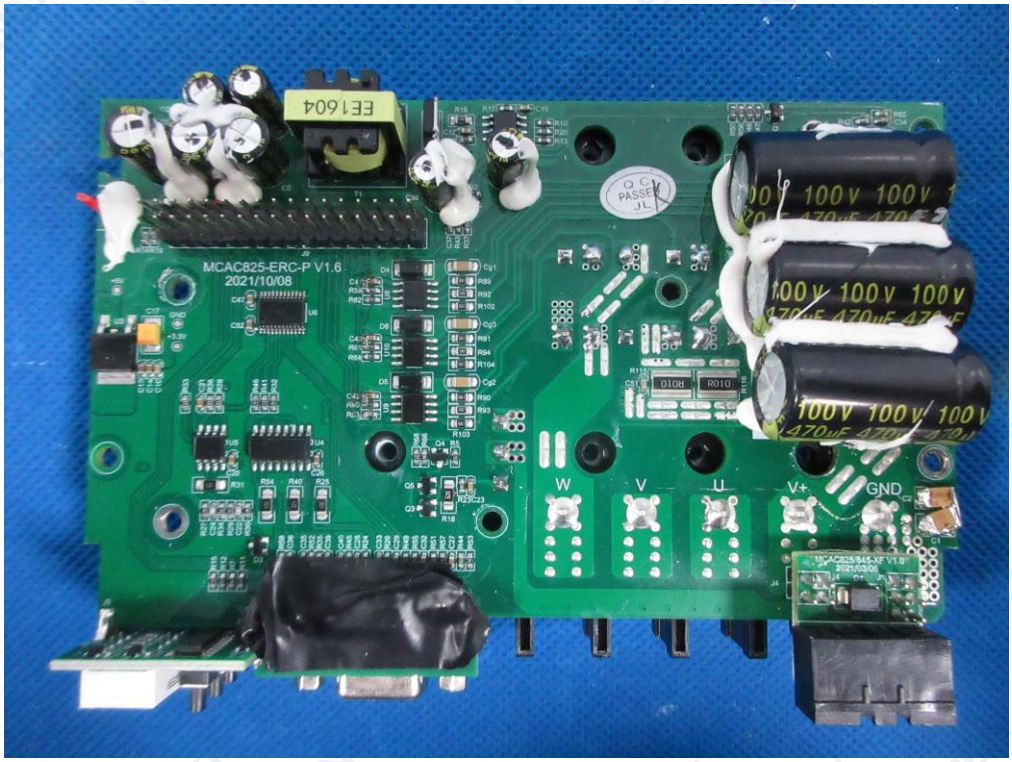


Photo 12

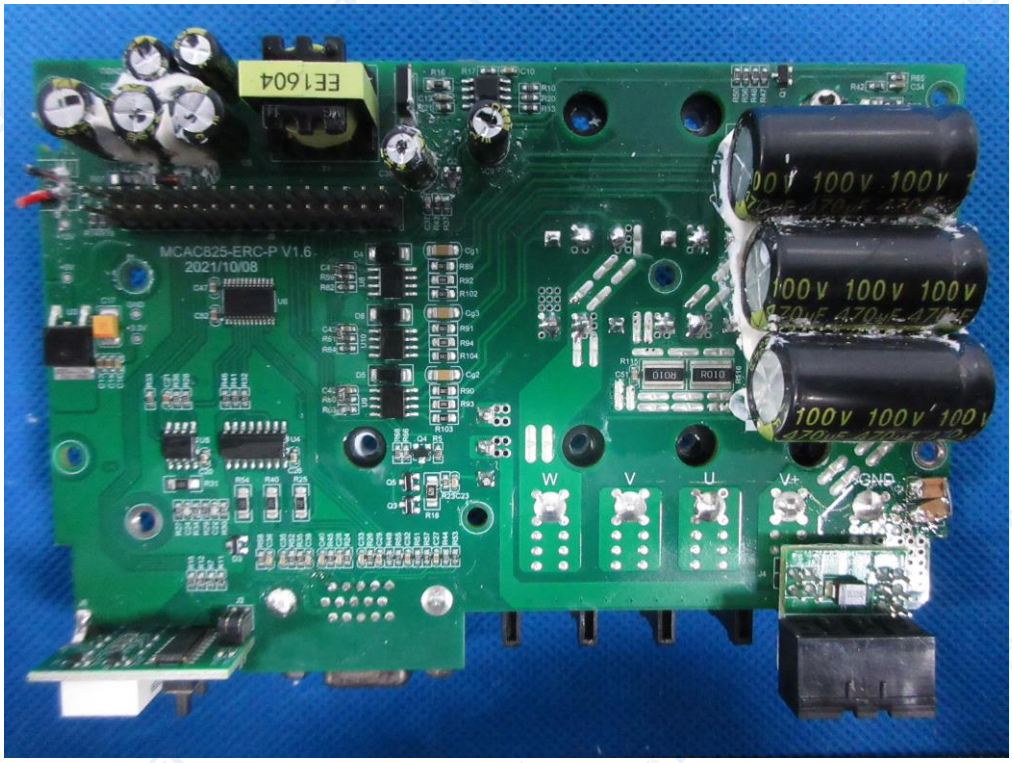


Photo 13

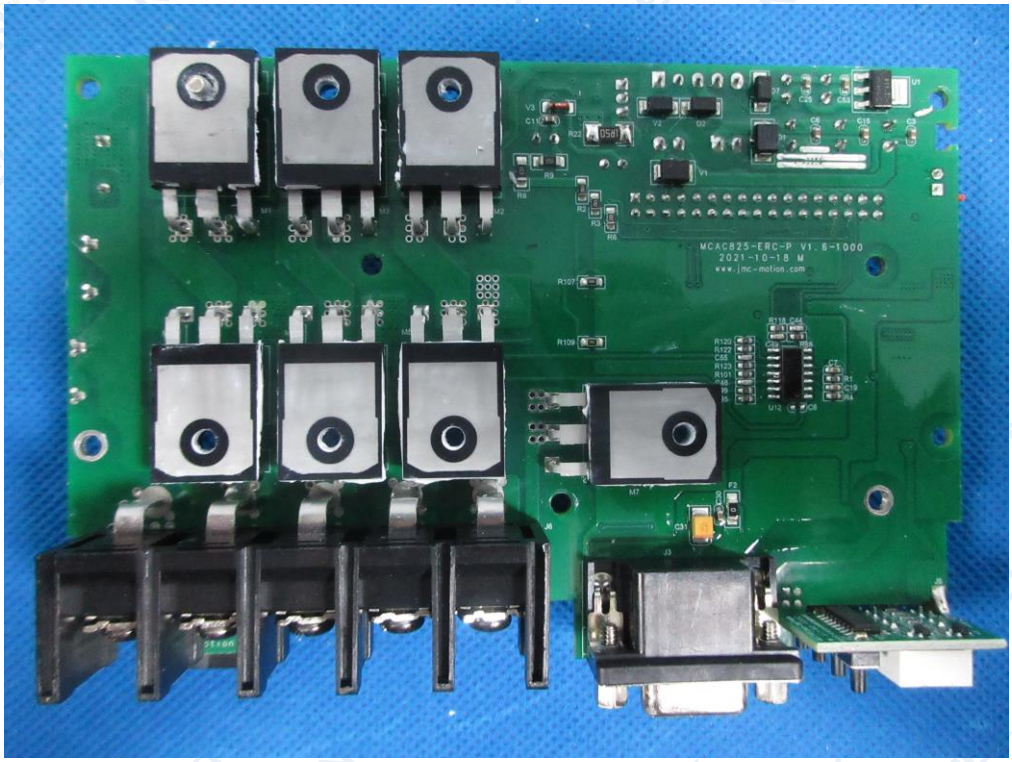


Photo 14

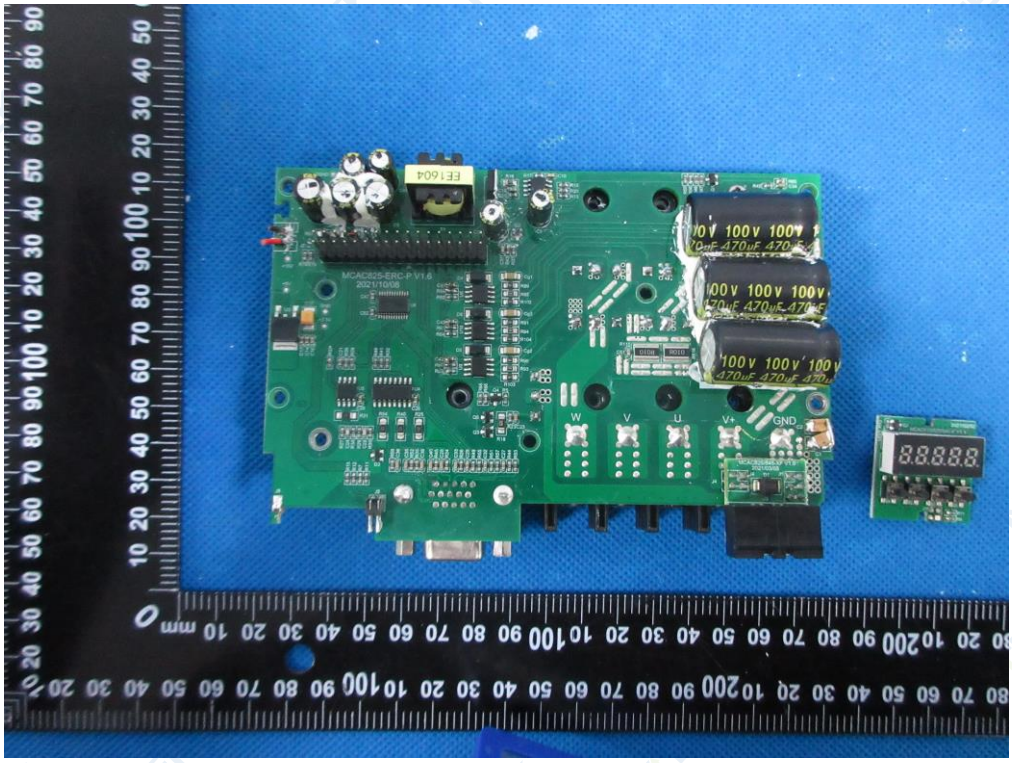


Photo 15

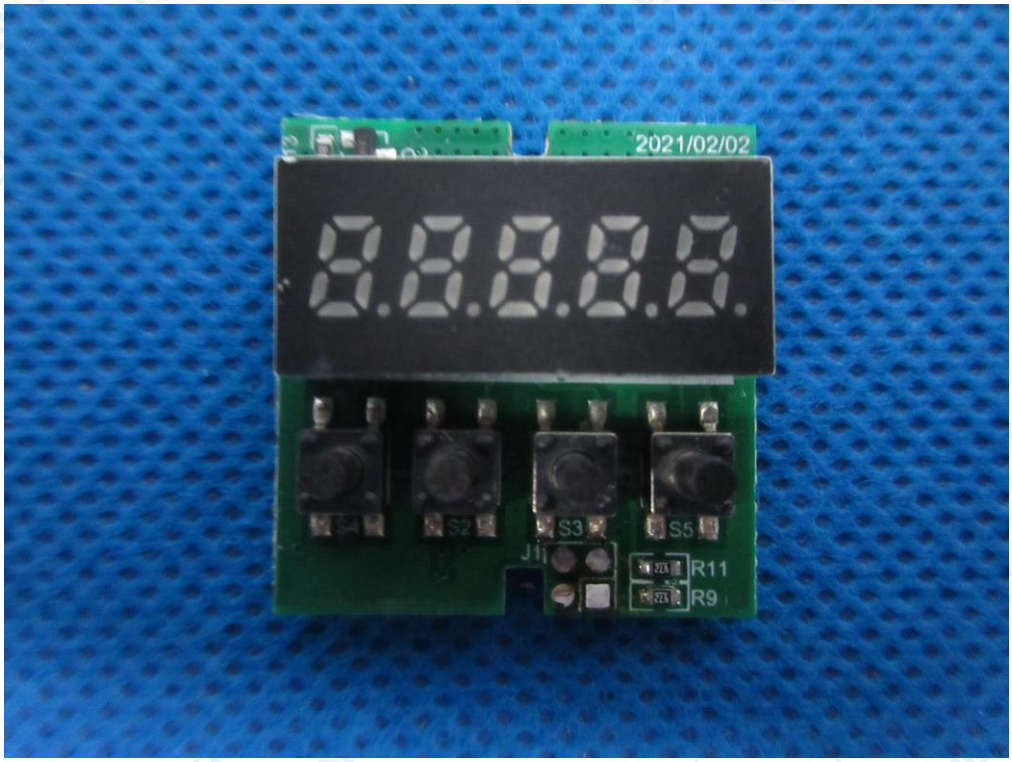
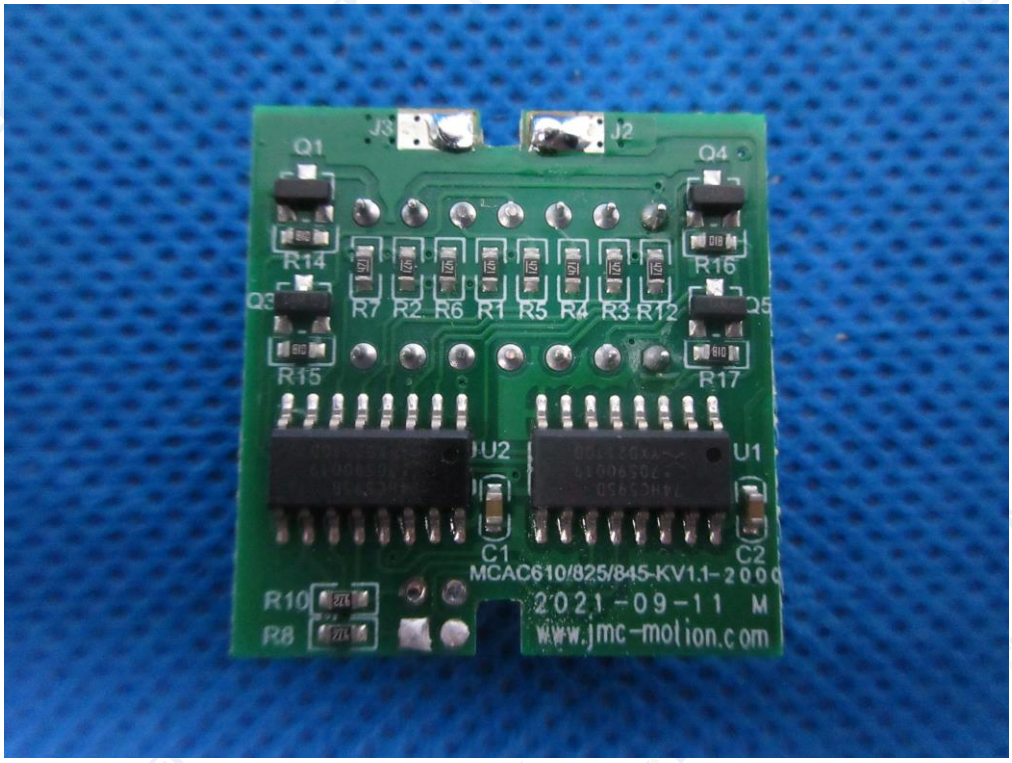


Photo 16



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