

TEST REPORT

Project No.: TM-2403000345P

Applicant: PERFECTRON Co., Ltd.

Address: 2F., No.190, Sec 2, Zhongxing Rd., Xindian Dist.,
New Taipei City, 23146, Taiwan.

Manufacturer: PERFECTRON Co., Ltd.

Address: 2F., No.190, Sec 2, Zhongxing Rd., Xindian Dist.,
New Taipei City, 23146, Taiwan.

Equipment Under Test (EUT):
Name: MICRO-GRID COMPUTER

Brand Name: PERFECTRON

Model No.: SCH4X2-A9

Added Model(s): N/A

Standards:

EN 60945: 2002 (For Clause 9, 10)	
IEC 60945: 2002 (For Clause 9, 10)	
IEC 60945 corrigendum 1: 2008	
EN IEC 61000-3-2: 2019 + A1: 2021	EN 61000-3-3: 2013 + A1: 2019 + A2: 2021 + AC: 2022
IEC 61000-4-2: 2008	IEC 61000-4-6: 2013 + COR1: 2015
IEC 61000-4-3: 2020 (Ed. 4.0)	Power supply short-term variation
IEC 61000-4-4: 2012	Power supply failure
IEC 61000-4-5: 2014 + A1: 2017	

Date of Sample Receipt : March 20, 2024

Date of Test : April 26, 2024 ~ May 24, 2024

Date of Issue : November 12, 2024

Remarks:

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Disclaimer

Variants information between/among model numbers / trademarks is provided by the applicant, test results of this test report are applicable to the sample EUT received of main test model name.

Approved By

Jason Lee (Section Manager)
Date
November 12, 2024


Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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Revision History

Revision	Report Number	Description	Issue Date
00	TMXD2408003097DT	Original.	November 12, 2024

Note:

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1. General Description

1.1 General Description of EUT

Name of EUT	MICRO-GRID COMPUTER
Brand Name	PERFECTRON
Model No.(s)	SCH4X2-A9
Added Model(s)	N/A

1.2 Details of EUT

EUT Power Rating	110~240V 200W
Highest internal frequency	1000MHz

Accessories Cable List

Cable Type	Core	Length	Category	Shielding/Non-shielding

1.3 Description of Support Units

EUT Devices:

No.	Equipment	Model No.	Brand Name
1	MB	INS8367A	Perfectron
2	CPU(1.0GHz)	i9-13900TE	Intel
3	Memory(64 GB)(DDR4 SO-DIMM)	NA	DSL
4	Storage(SATA SSD)(256 G)	NA	Phison
5	Power	UHP-200-12	Meanwell

Peripherals Devices:

No.	PRODUCT	MANUFACTURER	MODEL NO.	SERIAL NO.
1-4	USB HDD	Transcend	TS1TSJ25MC	N/A
5	USB Mouse	LOGITECT	M-U0026	N/A
6	USB Keyboard	LOGITECH	Y-U0011	1804SY04FP48
7	Monitor	ASUS	MX27UC	K8LMR024567
8	Monitor	GIGABYTE	M28U	SN21490B004523
9	Server PC	Dell	T3610	57TT032
10	Server PC	Dell	Precision 3640 Tower	FQNLFF3
11	Ground	N/A	N/A	N/A

Support Equipment Used in Tested Cable

No.	Cable Type	Core	Length	Shielding/Non-shielding
1-4	USB	N/A	1.4m	Shielding
5	USB	N/A	1.8m	Shielding
6	USB	N/A	1.8m	Shielding
7	DP	N/A	1.8m	Shielding
8	DP	N/A	1.8m	Shielding
9	RJ45	N/A	20m	Non-shielding
10	RJ45	N/A	20m	Non-shielding
11	Ground	N/A	1.8m	Non-shielding

1.4 I/O Port Description

I/O Port Types	Q'TY
1. USB Port	6
2. LAN Port	2
3. Display Port	2

1.5 Decision of Test Mode

The test configuration/ mode is as the following:

Conduction Mode (Power port):

1	DP*2 3840*2160@60Hz
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Radiation Mode:

1	DP*2 3840*2160@60Hz
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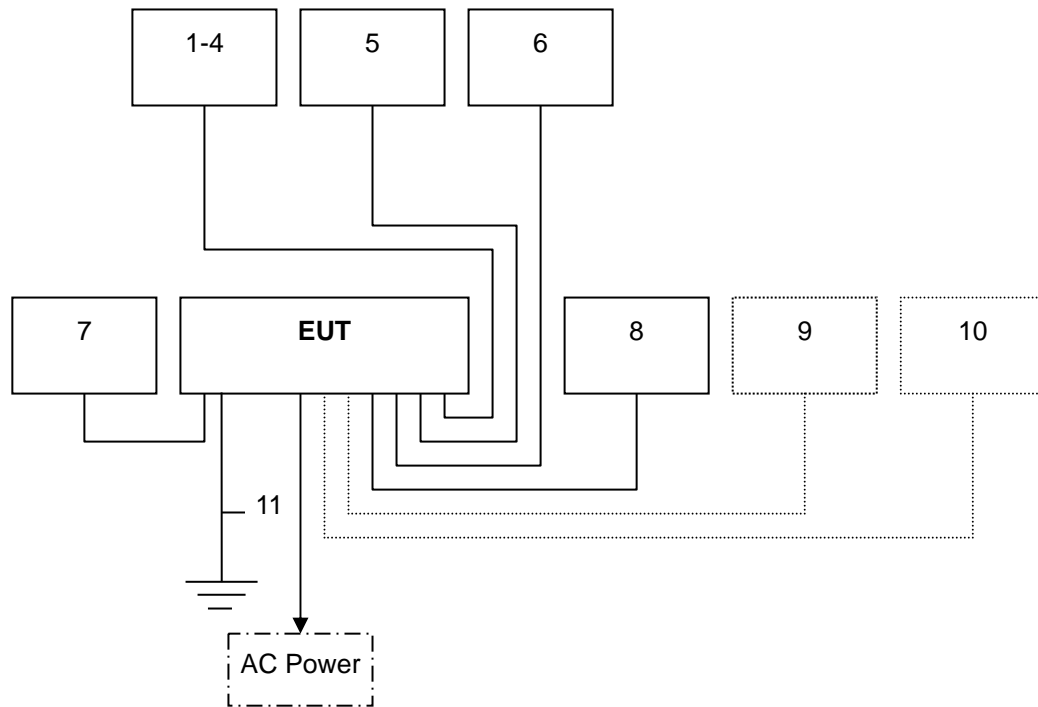
1.6 The Final Test Mode of the EUT

After the preliminary scan, the following test mode was found to produce the highest emission level.

Final Test Mode	
Conducted Emission	Mode 1
Radiated Emission	Mode 1
Harmonics & Flicker	Mode 1
Immunity	Mode 1

Then, the above highest emission mode of the configuration of the EUT and cable was chosen for all final test items.

1.7 Configuration of Tested System



1.8 Operation Procedure

1. Windows 10 boots system.
2. Run Burnintest.exe to activate all peripherals and display "H" pattern on monitor screen.
3. Run Burnintest.exe to activate all peripherals to test EUT.
4. Run Lantest20.exe to ping 192.168.1.20&42 -t (EUT), ping 192.168.1.1&10 -t (Server PC).

1.9 Summary of Results

Emission		
Standard	Test Type	Result
EN 60945: 2002 (For Clause 9, 10) IEC 60945: 2002 (For Clause 9, 10) IEC 60945 corrigendum 1: 2008		
CISPR 16-1-1, CISPR 16-1-2	Conducted Emission	PASS
CISPR 16-1-1, CISPR 16-1-4	Radiated Emission	PASS
EN IEC 61000-3-2: 2019 + A1: 2021	Harmonic current emissions	PASS
EN 61000-3-3: 2013 + A1: 2019 + A2: 2021 + AC: 2022	Voltage changes, voltage fluctuations & flicker	PASS

Immunity			
Standard	Test Type	Result	Performance Criteria
IEC 61000-4-2: 2008	ESD	PASS	B
IEC 61000-4-3: 2020 (Ed. 4.0)	RS	PASS	A
IEC 61000-4-4: 2012	EFT	PASS	B
IEC 61000-4-5: 2014 + A1: 2017	Surge	PASS	B
IEC 61000-4-6: 2013 + COR1: 2015	CS	PASS	A
POWER SUPPLY SHORT-TERM VARIATION		PASS	B
POWER SUPPLY FAILURE TEST		PASS	C

1.10 Reporting Statements of Conformity

The conformity statement in this report is based solely on the test results, measurement uncertainty is excluded.

1.11 Deviation

No deviation from the mentioned test methods and applicable standards.

2. EMISSION

2.1 Limit

TEST STANDARD: Reference to EN 60945 clause 9.2 Table 5

FREQUENCY (MHz)	Quasi-peak
0.01 – 0.15	96~50
0.15 - 0.35	60~50
0.35 - 30.0	50

Note: The lower limit shall apply at the transition frequency.

TEST STANDARD: Reference to EN 60945 clause 9.3 Table 5

FREQUENCY (MHz)	At 3m
0.15 - 0.30	80 ~ 52 (Quasi-peak)
0.30 - 30	52 ~ 34 (Quasi-peak)
30 - 2000	54 (Quasi-peak)
156 - 165	30 (Peak) or 24 (Quasi-peak)

Note: The lower limit shall apply at the transition frequency.

2.2 Conducted Emission

2.2.1 Test Instruments

Conducted Emission Room # B					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
Attenuator	MCL	HAT-10	SD-C012	03/18/2024	03/17/2025
BNC Cable	EMEC	CFD300-NL	SD-C020	12/28/2023	12/27/2024
EMI Test Receiver	R&S	ESR3	102166	03/05/2024	03/04/2025
LISN	Schwarzbeck	NSLK 8127	01082	03/13/2024	03/12/2025
LISN(EUT)	Schwarzbeck	NSLK 8127	01084	03/13/2024	03/12/2025
Thermo-Hygro Meter	Wisewind	N/A	SD-S017	08/16/2023	08/15/2024
Test S/W	EZ-EMC Ver.CCS-03A1				
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					
Measurement Uncertainty of Conducted Emission					
Expanded uncertainty Ulab (k=2) of Conducted Emission is 2.8 dB.					
Expanded uncertainty CISPR 16-4-2:2011+A1:2014+A2:2018 (k=2) of Conducted Emission measurement is 3.8 dB.					

2.2.2 Measurement Level Calculation

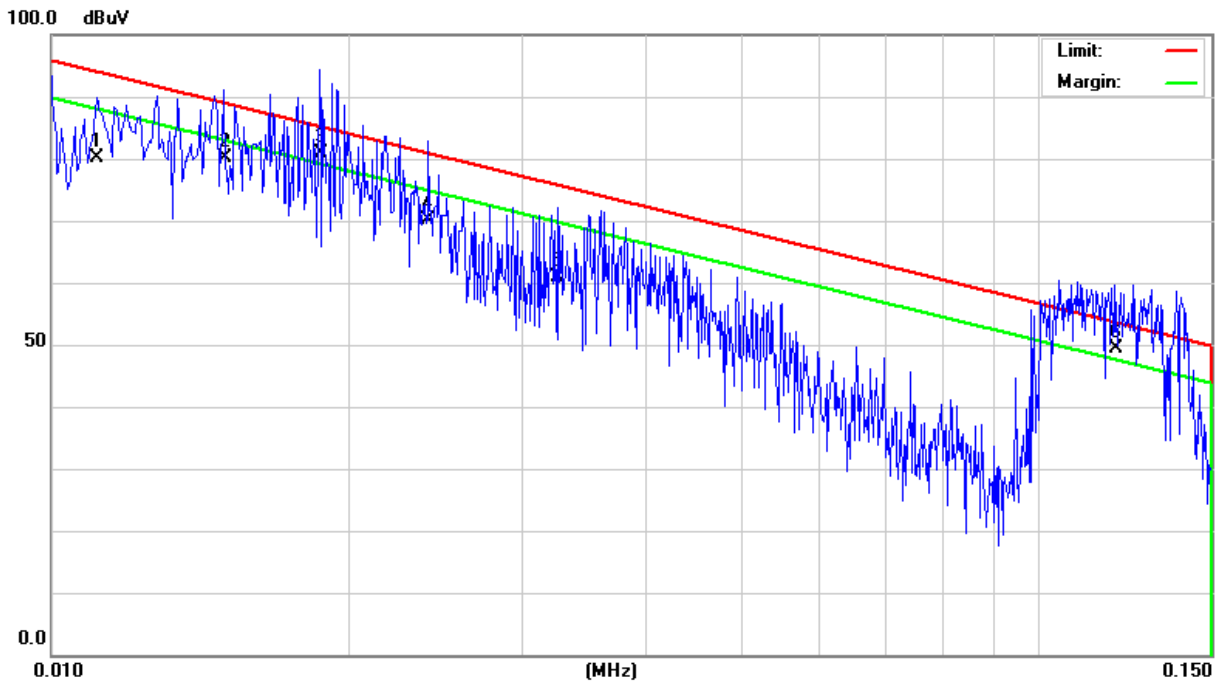
Factor = LISN insertion loss + Cable loss + Pulse Limiter insertion loss

Measurement Level = Reading Level + Factor

Over (Margin) = Measurement Level – Limit

2.2.3 Measurement Data (CE)

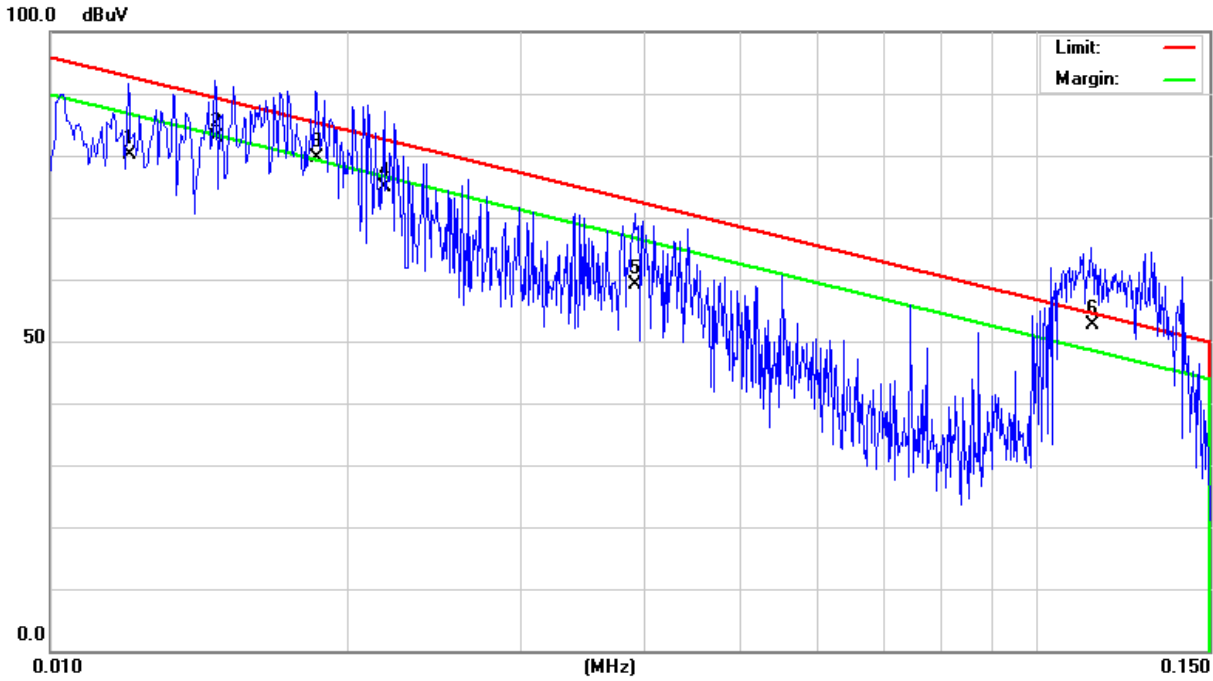
Model No.	SCH4X2-A9	6dB Bandwidth	9 kHz
Environmental Conditions	22.5°C, 61% RH	Test Mode	Mode 1
Tested by	Jacky Lin	Phase	L1
Standard	EN 60945	Test Date	2024/04/26



Conducted Emission Readings							
Frequency Range Investigated				10 kHz to 150 kHz			
Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (Q)	Line (L1/L2)
0.0111	70.07	10.14	80.21	94.23	-14.02	Q	L1
0.0150	69.65	10.37	80.02	89.11	-9.09	Q	L1
0.0187	70.15	10.61	80.76	85.36	-4.60	Q	L1
0.0241	59.62	10.55	70.17	81.05	-10.88	Q	L1
0.0326	50.63	10.30	60.93	75.92	-14.99	Q	L1
0.1200	39.40	10.07	49.47	53.78	-4.31	Q	L1

Note: 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

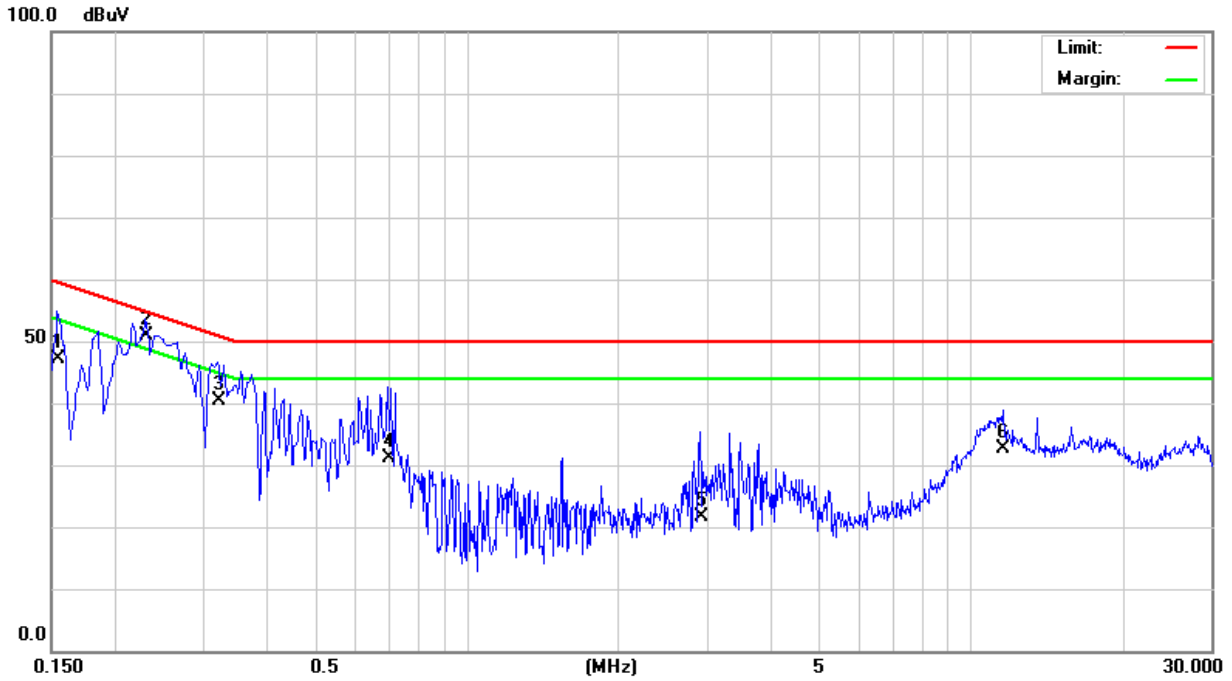
Model No.	SCH4X2-A9	6dB Bandwidth	9 kHz
Environmental Conditions	22.5°C, 61% RH	Test Mode	Mode 1
Tested by	Jacky Lin	Phase	L2
Standard	EN 60945	Test Date	2024/04/26



Conducted Emission Readings							
Frequency Range Investigated				10 kHz to 150 kHz			
Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (Q)	Line (L1/L2)
0.0120	69.96	10.19	80.15	92.90	-12.75	Q	L2
0.0147	72.57	10.33	82.90	89.45	-6.55	Q	L2
0.0186	68.97	10.54	79.51	85.46	-5.95	Q	L2
0.0218	64.41	10.57	74.98	82.76	-7.78	Q	L2
0.0392	48.77	10.25	59.02	72.79	-13.77	Q	L2
0.1139	42.56	10.08	52.64	54.67	-2.03	Q	L2

Note: 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

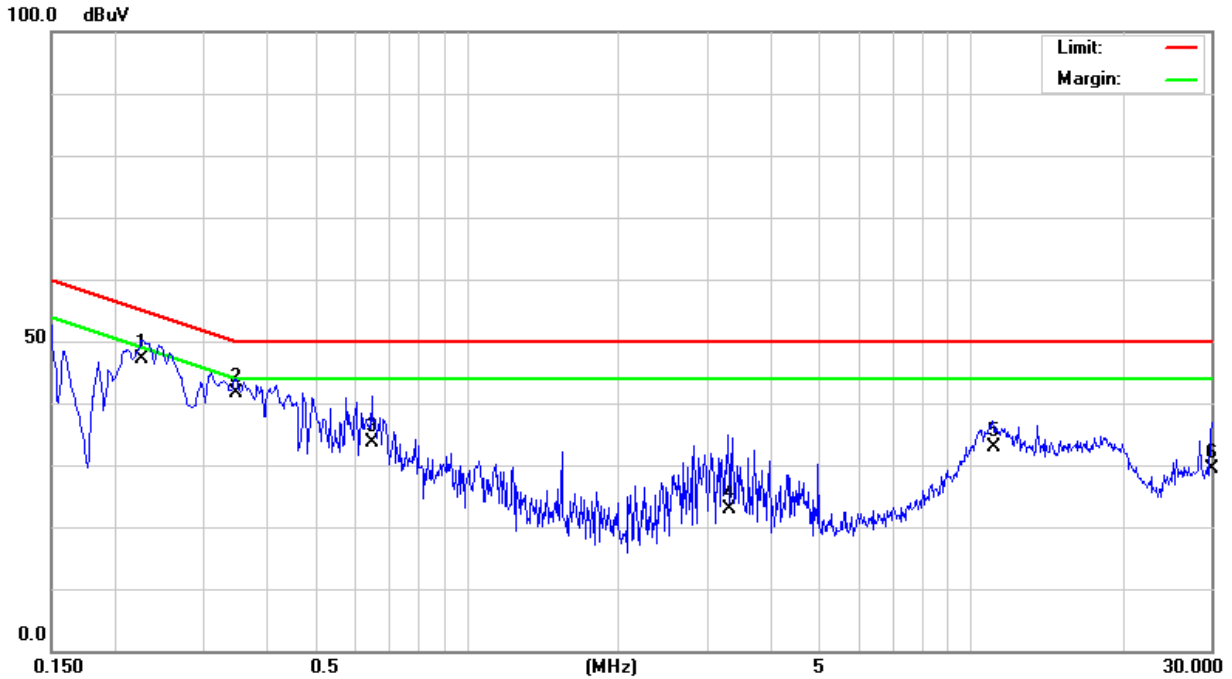
Model No.	SCH4X2-A9	6dB Bandwidth	9 kHz
Environmental Conditions	22.5°C, 61% RH	Test Mode	Mode 1
Tested by	Jacky Lin	Phase	L1
Standard	EN 60945	Test Date	2024/04/26



Conducted Emission Readings							
Frequency Range Investigated				150 kHz to 30 MHz			
Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (Q)	Line (L1/L2)
0.1545	37.13	10.05	47.18	59.64	-12.46	Q	L1
0.2310	40.93	9.99	50.92	54.90	-3.98	Q	L1
0.3209	30.49	9.99	40.48	51.02	-10.54	Q	L1
0.6990	21.01	10.02	31.03	50.00	-18.97	Q	L1
2.9085	11.35	10.23	21.58	50.00	-28.42	Q	L1
11.5980	22.06	10.62	32.68	50.00	-17.32	Q	L1

Note: 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

Model No.	SCH4X2-A9	6dB Bandwidth	9 kHz
Environmental Conditions	22.5°C, 61% RH	Test Mode	Mode 1
Tested by	Jacky Lin	Phase	L2
Standard	EN 60945	Test Date	2024/04/26



Conducted Emission Readings							
Frequency Range Investigated				150 kHz to 30 MHz			
Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (Q)	Line (L1/L2)
0.2265	37.10	9.99	47.09	55.13	-8.04	Q	L2
0.3480	31.64	9.99	41.63	50.06	-8.43	Q	L2
0.6493	23.64	10.02	33.66	50.00	-16.34	Q	L2
3.3045	12.52	10.26	22.78	50.00	-27.22	Q	L2
11.0715	22.19	10.59	32.78	50.00	-17.22	Q	L2
30.0000	17.98	11.48	29.46	50.00	-20.54	Q	L2

Note: 1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).

2.3 Radiated Emission

2.3.1 Test Instruments

Below 1GHz

Chamber # E					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
BNC Cable	EMCI	EMCCFD300-BM-B M-8000	200708	08/10/2023	08/09/2024
ARA	Loop Antenna	PLA-1030/B	1027	06/01/2022	05/31/2025
Pre-Amplifier	HP	461A	0946A04138	11/15/2023	11/14/2024
Bilog Antenna	Teseq	CBL 6112D	40529	09/21/2023	09/20/2024
EMI Test Receiver	R&S	ESCI	101202	08/01/2023	07/31/2024
N-Type Cable	EMEC	CFD400E-LW	SD-R085	04/12/2024	04/11/2025
N-Type Cable	EMEC	CFD400E-LW	SD-R086	04/12/2024	04/11/2025
Pre-Amplifier	EMEC	EMC330	060696	08/10/2023	08/09/2024
Thermo-Hygro Meter	Wisewind	201A	SD-R046	07/24/2023	07/23/2024
Horn Antenna	ETS-Lindgren	3117	00139062	06/08/2023	06/07/2024
Microflex Cable x 7m	JMT	LF01	SD-R089	06/07/2023	06/06/2024
K-Type Cable x 1m	JMT	LK01	SD-R087	06/07/2023	06/06/2024
Pre-Amplifier	Com-Power	PAM-118A	551041	06/07/2023	06/06/2024
Signal Analyzer	R&S	FSV40	101269	06/07/2023	06/06/2024
Thermo-Hygro Meter	Wisewind	201A	SD-R046	07/24/2023	07/23/2024
Test S/W	EZ-EMC Ver.CCS-03A1				
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					
Measurement Uncertainty of Radiated Emission					
Expanded uncertainty U _{lab} (k=2) of Radiated Emission is 2.8 dB.(0.009MHz-30MHz)					
Expanded uncertainty U _{lab} (k=2) of Radiated Emission is 6.2 dB.(30MHz-1000MHz)					
Expanded uncertainty U _{lab} (k=2) of Radiated Emission is 4.6 dB.(1000MHz-2000MHz)					
Expanded uncertainty CISPR 16-4-2:2011+A1:2014+A2:2018 (k=2) of Radiated Emission measurement is 3.3 dB.(0.009MHz-30MHz)					
Expanded uncertainty CISPR 16-4-2:2011+A1:2014+A2:2018 (k=2) of Radiated Emission measurement is 6.3 dB.(30MHz-1000MHz)					
Expanded uncertainty CISPR 16-4-2:2011+A1:2014+A2:2018 (k=2) of Radiated Emission measurement is 5.5 dB.(1000MHz-2000MHz)					

2.3.2 Measurement Level Calculation

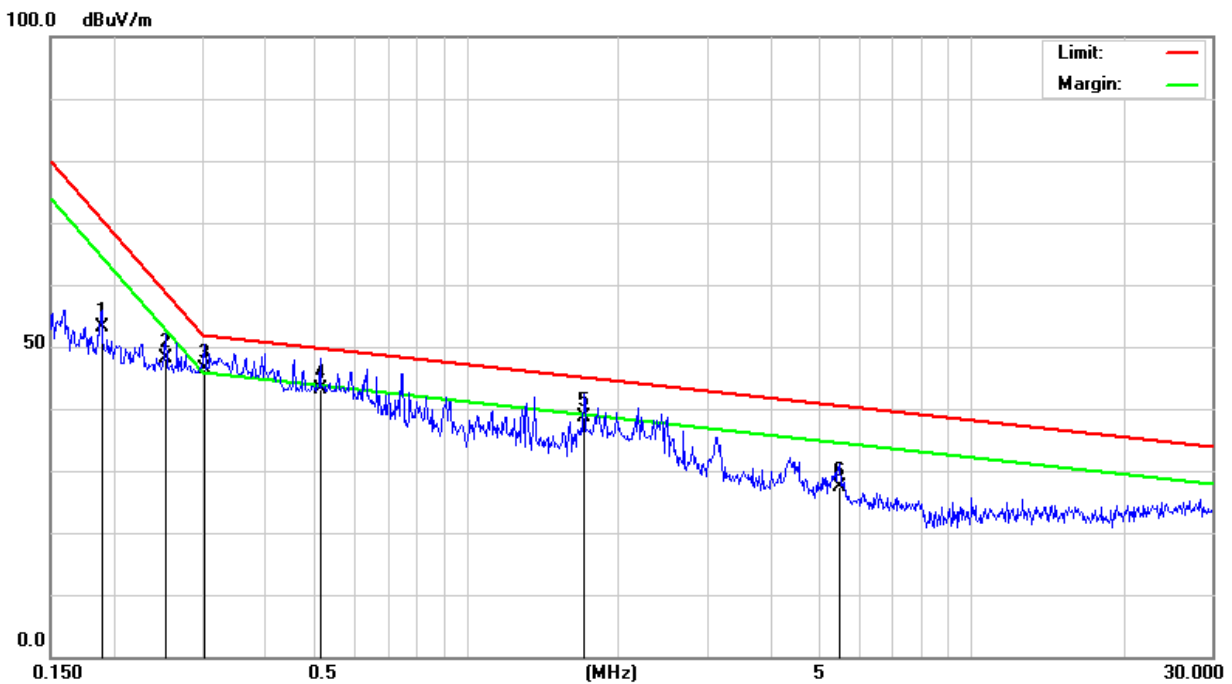
Correction Factor = Antenna Factor + Cable loss- Amplifier Gain

Measurement Level = Reading Level + Correction Factor

Over (Margin) = Measurement Level – Limit

2.3.3 Measurement Data Below 1GHz

Model No.	SCH4X2-A9	Test Mode	Mode 1
Environmental Conditions	21.5°C, 62% RH	6dB Bandwidth	9 kHz
Antenna Pole	Vertical	Antenna Distance	3m
Detector Function	Quasi-peak.	Tested by	Jacky Lin
Standard	EN 60945	Test Date	2024/04/26



Radiated Emission Readings							
Frequency Range Investigated				150kHz to 30MHz at 3m			
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (Q)	Pol. (H/V)
0.1892	34.50	18.64	53.14	70.59	-17.45	Q	V
0.2534	32.10	16.15	48.25	58.79	-10.54	Q	V
0.3017	31.80	14.47	46.27	51.98	-5.71	Q	V
0.5127	32.90	10.15	43.05	49.90	-6.85	Q	V
1.7071	37.50	1.24	38.74	45.20	-6.46	Q	V
5.4763	34.60	-7.13	27.47	40.65	-13.18	Q	V

Note: Q= Quasi-peak Reading.

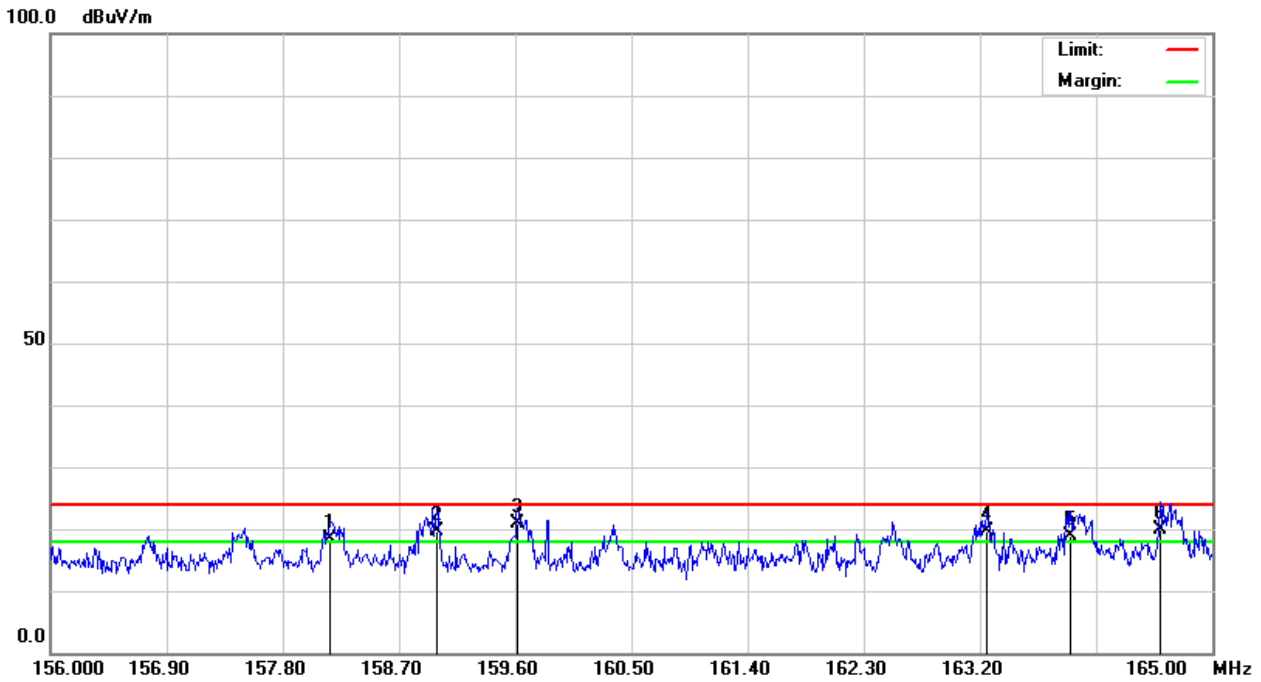
Model No.	SCH4X2-A9	Test Mode	Mode 1
Environmental Conditions	21.5°C, 62% RH	6dB Bandwidth	9 kHz
Antenna Pole	Horizontal	Antenna Distance	3m
Detector Function	Quasi-peak.	Tested by	Jacky Lin
Standard	EN 60945	Test Date	2024/04/26



Radiated Emission Readings							
Frequency Range Investigated				150kHz to 30MHz at 3m			
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (Q)	Pol. (H/V)
0.2686	34.60	15.61	50.21	56.44	-6.23	Q	H
0.3518	33.40	13.22	46.62	51.37	-4.75	Q	H
0.4965	36.10	10.40	46.50	50.03	-3.53	Q	H
0.6753	35.90	7.95	43.85	48.83	-4.98	Q	H
1.8581	40.10	0.41	40.51	44.87	-4.36	Q	H
28.6030	37.30	-8.29	29.01	34.19	-5.18	Q	H

Note: Q= Quasi-peak Reading.

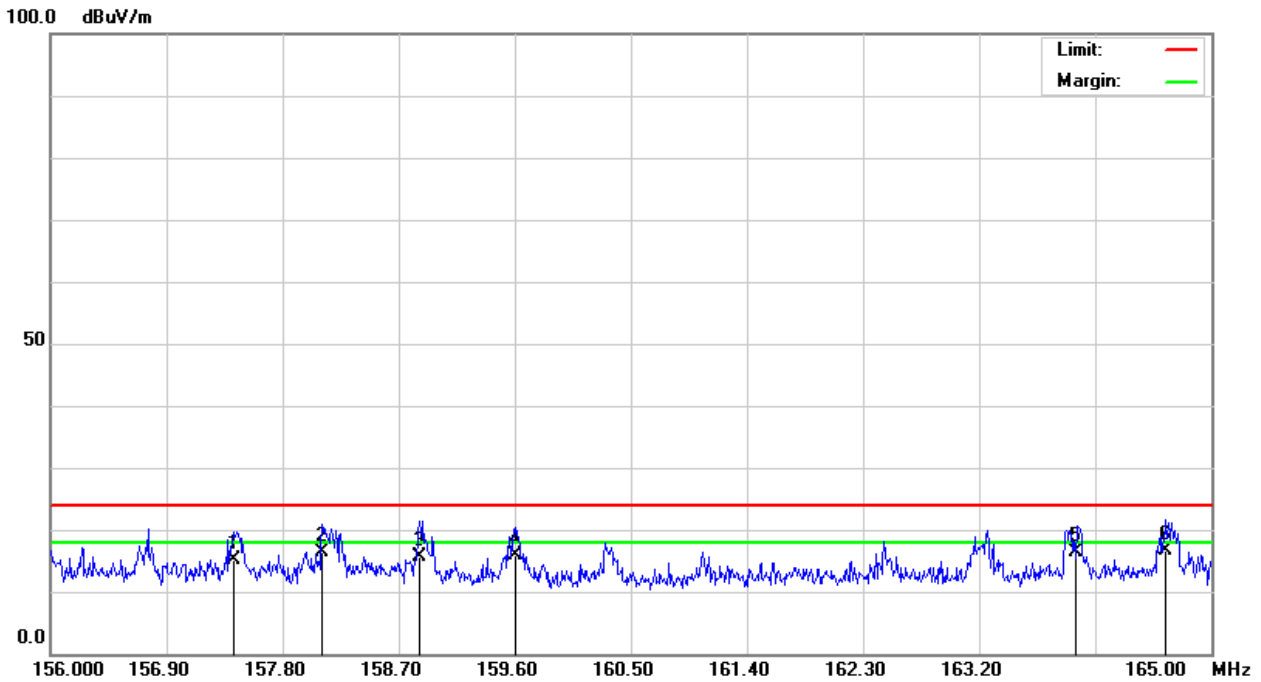
Model No.	SCH4X2-A9	Test Mode	Mode 1
Environmental Conditions	21.5°C, 62% RH	6dB Bandwidth	9 kHz
Antenna Pole	Vertical	Antenna Distance	3m
Detector Function	Quasi-peak.	Tested by	Jacky Lin
Standard	EN 60945	Test Date	2024/04/26



Radiated Emission Readings							
Frequency Range Investigated				156MHz to 165MHz at 3m			
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/Q)	Pol. (H/V)
158.1600	33.20	-14.91	18.29	24.00	-5.71	Q	V
158.9970	34.50	-14.84	19.66	24.00	-4.34	Q	V
159.6179	35.70	-14.84	20.86	24.00	-3.14	Q	V
163.2540	34.60	-15.03	19.57	24.00	-4.43	Q	V
163.9020	33.90	-15.04	18.86	24.00	-5.14	Q	V
164.5950	35.10	-15.10	20.00	24.00	-4.00	Q	V

Note: P= Peak Reading; Q= Quasi-peak Reading.

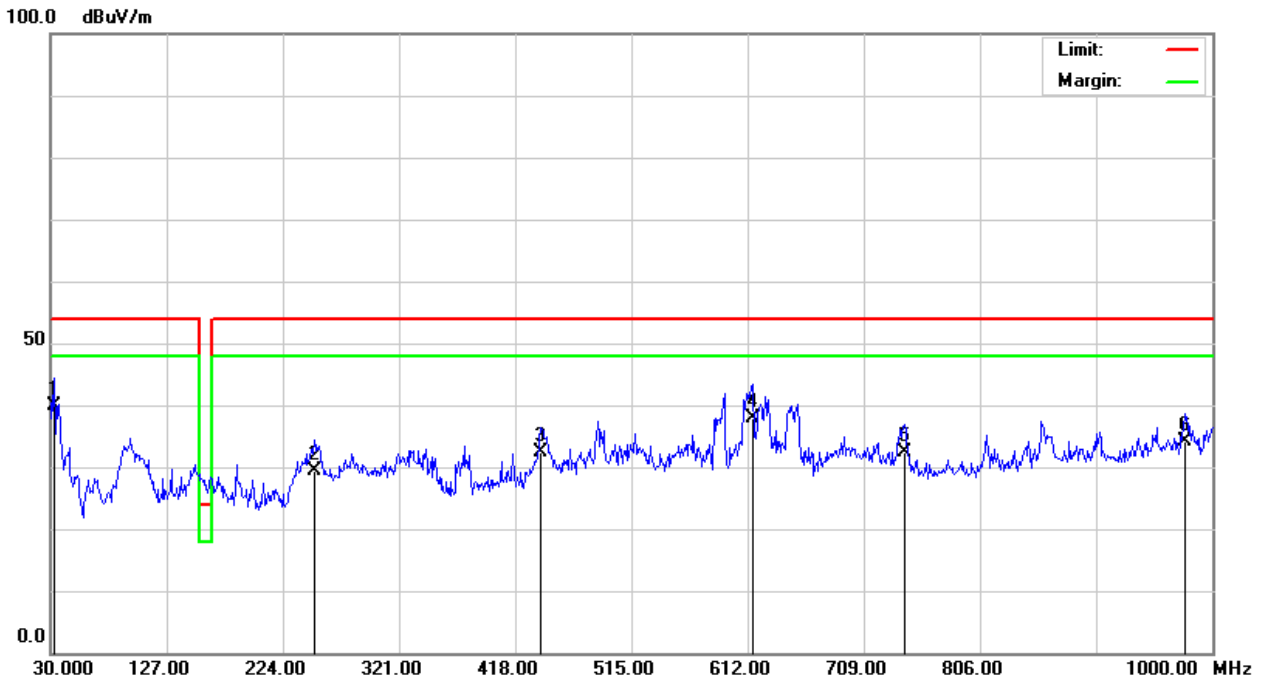
Model No.	SCH4X2-A9	Test Mode	Mode 1
Environmental Conditions	21.5°C, 62% RH	6dB Bandwidth	9 kHz
Antenna Pole	Horizontal	Antenna Distance	3m
Detector Function	Quasi-peak.	Tested by	Jacky Lin
Standard	EN 60945	Test Date	2024/04/26



Radiated Emission Readings							
Frequency Range Investigated				156MHz to 165MHz at 3m			
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/Q)	Pol. (H/V)
157.4219	30.10	-14.87	15.23	24.00	-8.77	Q	H
158.1058	31.20	-14.92	16.28	24.00	-7.72	Q	H
158.8619	30.60	-14.85	15.75	24.00	-8.25	Q	H
159.6090	30.80	-14.84	15.96	24.00	-8.04	Q	H
163.9559	31.30	-15.04	16.26	24.00	-7.74	Q	H
164.6489	31.70	-15.11	16.59	24.00	-7.41	Q	H

Note: 1. P= Peak Reading; Q= Quasi-peak Reading.

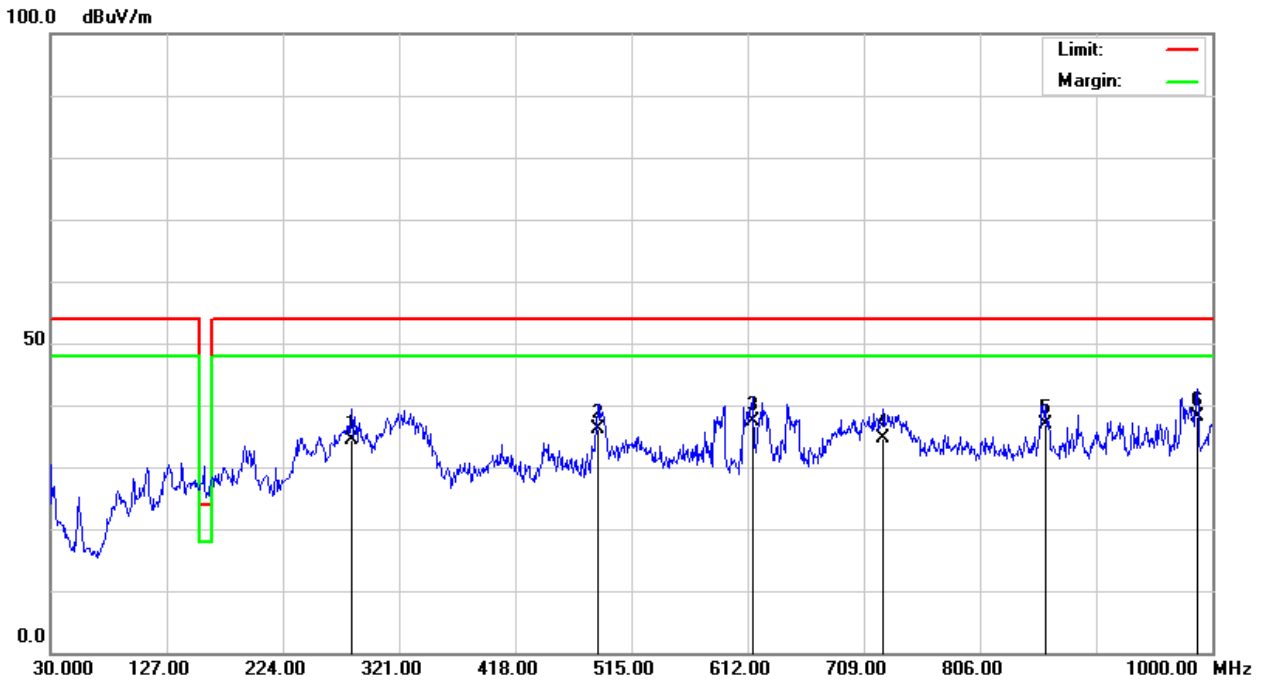
Model No.	SCH4X2-A9	Test Mode	Mode 1
Environmental Conditions	21.5°C, 62% RH	6dB Bandwidth	120 kHz
Antenna Pole	Vertical	Antenna Distance	3m
Detector Function	Quasi-peak.	Tested by	Jacky Lin
Standard	EN 60945	Test Date	2024/04/27



Radiated Emission Readings							
Frequency Range Investigated				30MHz to 1000MHz at 3m			
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (Q)	Pol. (H/V)
32.9100	48.20	-8.38	39.82	54.00	-14.18	Q	V
250.1900	41.60	-12.29	29.31	54.00	-24.69	Q	V
439.3400	40.10	-7.64	32.46	54.00	-21.54	Q	V
616.8500	42.90	-5.01	37.89	54.00	-16.11	Q	V
742.9500	36.50	-4.19	32.31	54.00	-21.69	Q	V
977.6900	36.20	-2.07	34.13	54.00	-19.87	Q	V

Note: Q= Quasi-peak Reading.

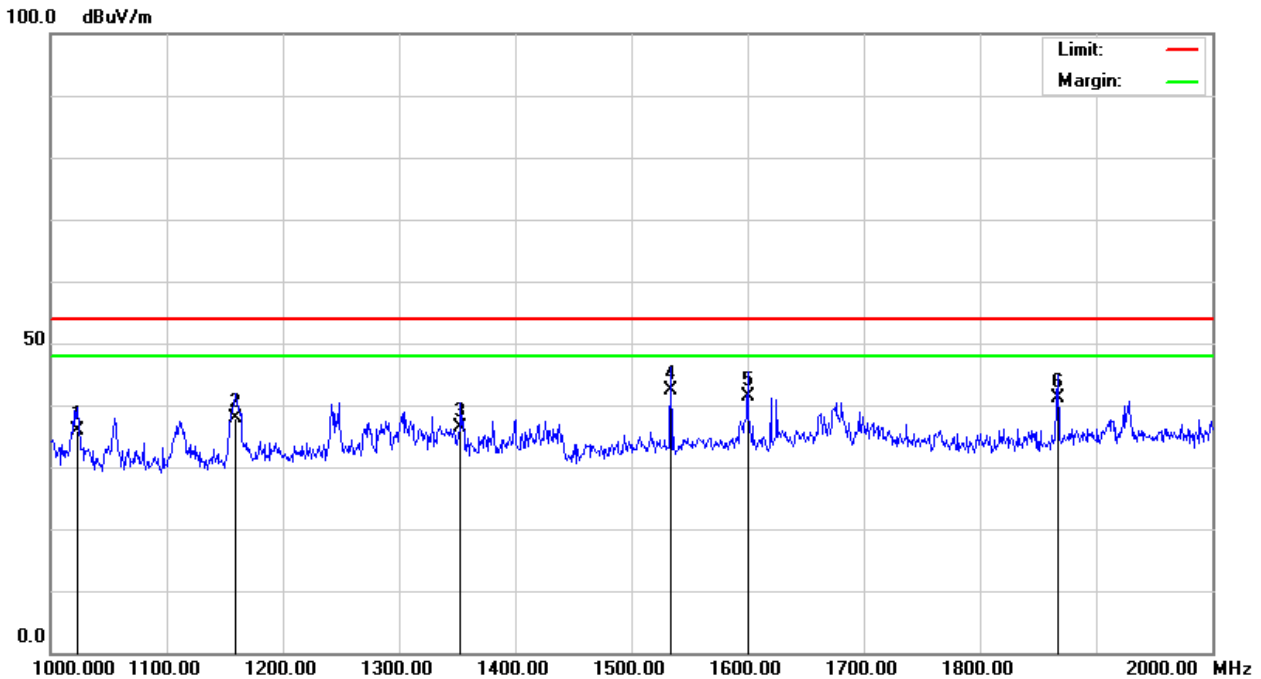
Model No.	SCH4X2-A9	Test Mode	Mode 1
Environmental Conditions	21.5°C, 62% RH	6dB Bandwidth	120 kHz
Antenna Pole	Horizontal	Antenna Distance	3m
Detector Function	Quasi-peak.	Tested by	Jacky Lin
Standard	EN 60945	Test Date	2024/04/27



Radiated Emission Readings							
Frequency Range Investigated				30MHz to 1000MHz at 3m			
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (Q)	Pol. (H/V)
281.2300	46.20	-11.76	34.44	54.00	-19.56	Q	H
486.8700	43.10	-6.92	36.18	54.00	-17.82	Q	H
615.8800	42.50	-5.05	37.45	54.00	-16.55	Q	H
725.4900	38.90	-4.39	34.51	54.00	-19.49	Q	H
860.3200	39.60	-2.79	36.81	54.00	-17.19	Q	H
987.3900	40.10	-1.86	38.24	54.00	-15.76	Q	H

Note: Q= Quasi-peak Reading.

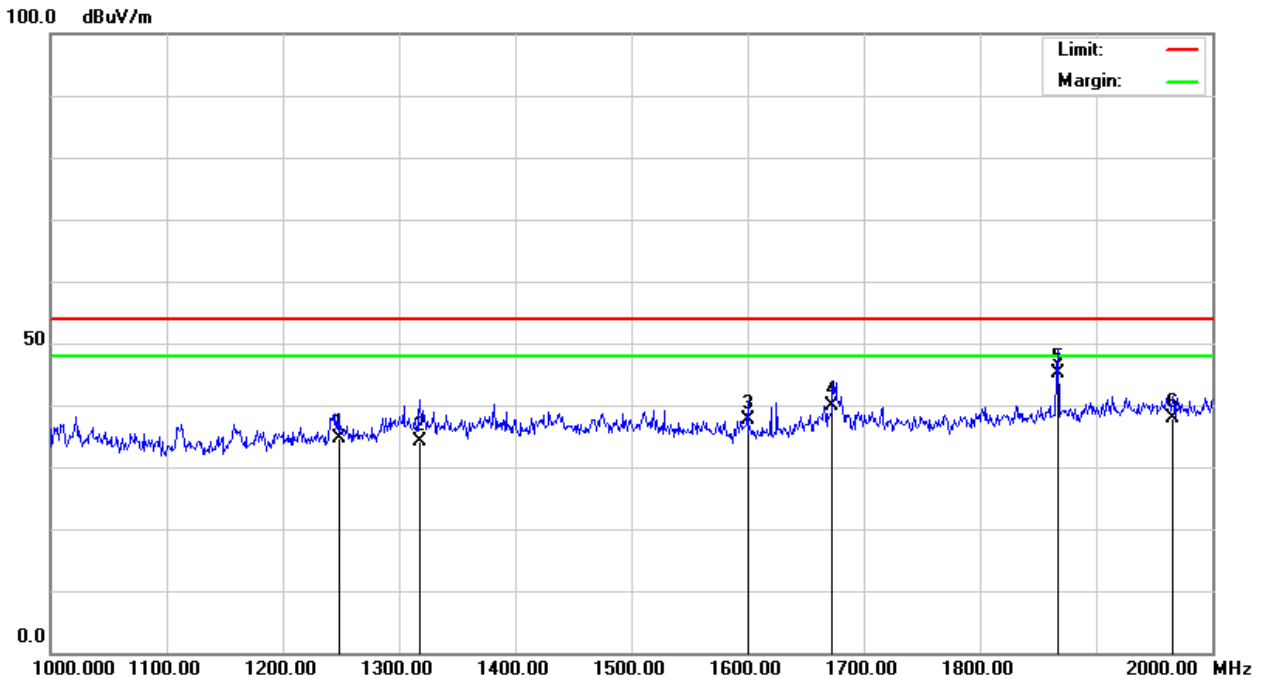
Model No.	SCH4X2-A9	Test Mode	Mode 1
Environmental Conditions	21.5°C, 62% RH	6dB Bandwidth	120 kHz
Antenna Pole	Vertical	Antenna Distance	3m
Detector Function	Quasi-peak.	Tested by	Jacky Lin
Standard	EN 60945	Test Date	2024/04/27



Radiated Emission Readings							
Frequency Range Investigated				1000MHz to 2000MHz at 3m			
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (Q)	Pol. (H/V)
1023.000	36.50	-0.60	35.90	54.00	-18.10	Q	V
1159.000	37.10	0.69	37.79	54.00	-16.21	Q	V
1353.000	35.20	1.25	36.45	54.00	-17.55	Q	V
1534.000	41.40	0.91	42.31	54.00	-11.69	Q	V
1600.000	39.70	1.64	41.34	54.00	-12.66	Q	V
1867.000	36.20	5.04	41.24	54.00	-12.76	Q	V

Note: Q= Quasi-peak Reading.

Model No.	SCH4X2-A9	Test Mode	Mode 1
Environmental Conditions	21.5°C, 62% RH	6dB Bandwidth	120 kHz
Antenna Pole	Horizontal	Antenna Distance	3m
Detector Function	Quasi-peak.	Tested by	Jacky Lin
Standard	EN 60945	Test Date	2024/04/27



Radiated Emission Readings							
Frequency Range Investigated				1000MHz to 2000MHz at 3m			
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (Q)	Pol. (H/V)
1248.000	33.40	1.12	34.52	54.00	-19.48	Q	H
1318.000	32.70	1.36	34.06	54.00	-19.94	Q	H
1600.000	36.10	1.64	37.74	54.00	-16.26	Q	H
1673.000	37.50	2.48	39.98	54.00	-14.02	Q	H
1867.000	40.20	5.04	45.24	54.00	-8.76	Q	H
1966.000	32.90	5.05	37.95	54.00	-16.05	Q	H

Note: Q= Quasi-peak Reading.

3. Harmonics

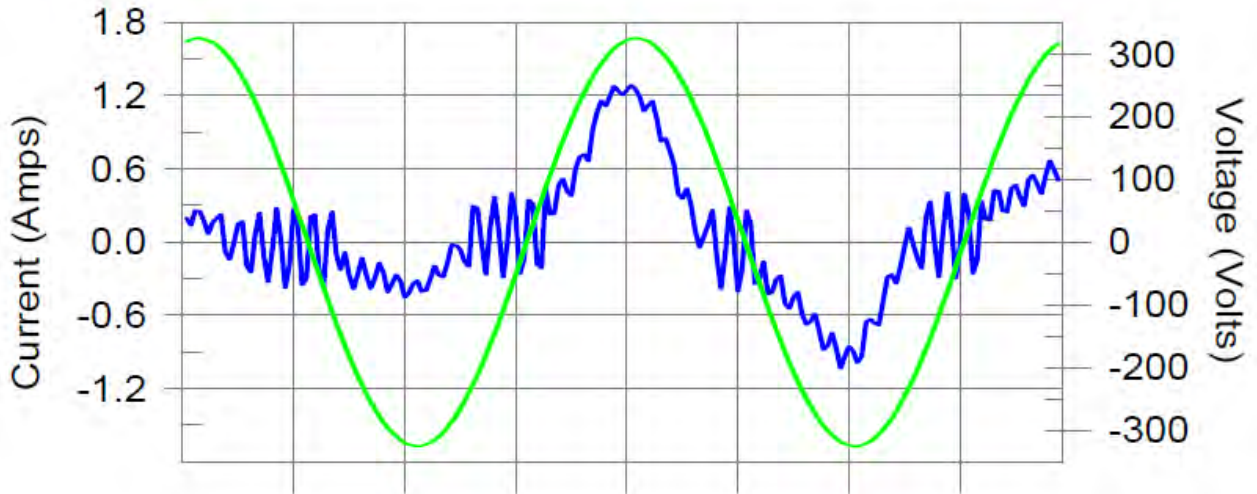
3.1 Test Instruments

Immunity A					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
5kVA Power Source	Teseq	NSG 1007-5	1537A01296	01/04/2024	01/03/2025
Signal Conditioning Unit	Teseq	CCN 1000-1	1846A01831	01/04/2024	01/03/2025
Test Software	WIN2100V4 Ver. 4.22				
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					

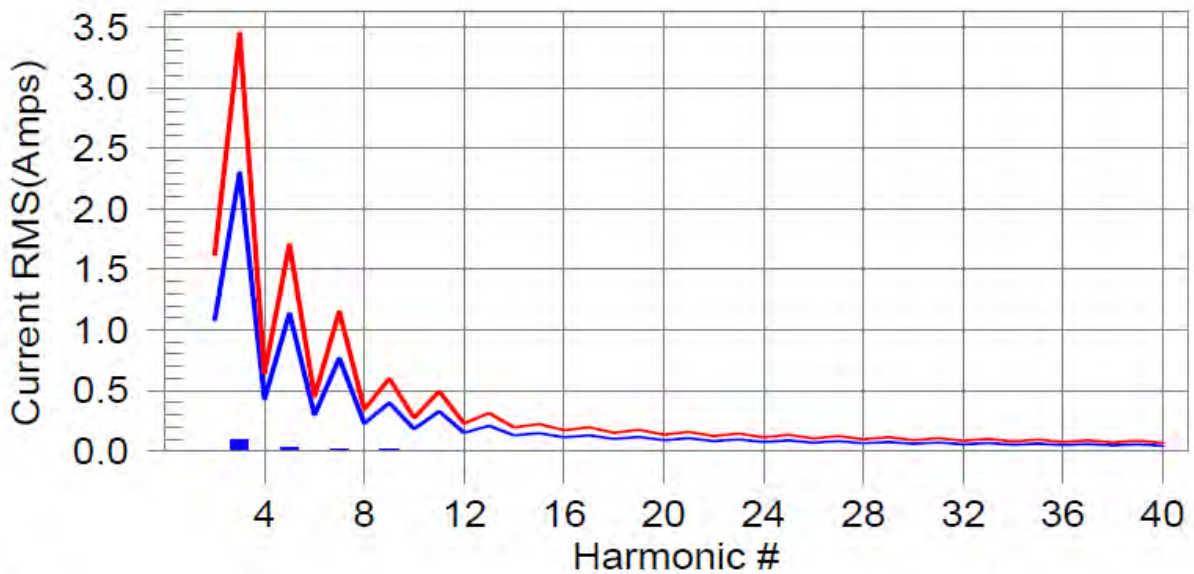
3.2 Measurement Data

Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line European Limits



Test result: Pass Worst harmonics H29-5.8% of 150% limit, H29-6.5% of 100% limit



Test Result: Pass Source qualification: Normal
THC(A): 0.102 I-THD(%): 30.6 POHC(A): 0.016 POHC Limit(A): 0.251

Highest parameter values during test:

V_RMS (Volts): 229.82 Frequency(Hz): 50.00
I_Peak (Amps): 1.389 I_RMS (Amps): 0.442
I_Fund (Amps): 0.334 Crest Factor: 4.315
Power (Watts): 71.6 Power Factor: 0.840

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.009	1.080	0.8	0.024	1.620	1.5	Pass
3	0.091	2.300	3.9	0.105	3.450	3.1	Pass
4	0.006	0.430	1.4	0.013	0.645	2.0	Pass
5	0.032	1.140	2.8	0.037	1.710	2.2	Pass
6	0.004	0.300	N/A	0.009	0.450	N/A	Pass
7	0.016	0.770	2.1	0.018	1.155	1.6	Pass
8	0.003	0.230	N/A	0.006	0.345	N/A	Pass
9	0.010	0.400	2.6	0.012	0.600	2.0	Pass
10	0.003	0.184	N/A	0.006	0.276	N/A	Pass
11	0.010	0.330	3.1	0.011	0.495	2.3	Pass
12	0.003	0.153	N/A	0.005	0.230	N/A	Pass
13	0.008	0.210	3.6	0.009	0.315	2.7	Pass
14	0.003	0.131	N/A	0.004	0.197	N/A	Pass
15	0.007	0.150	4.5	0.007	0.225	3.2	Pass
16	0.003	0.115	N/A	0.004	0.173	N/A	Pass
17	0.006	0.132	4.7	0.007	0.198	3.5	Pass
18	0.003	0.102	N/A	0.004	0.153	N/A	Pass
19	0.006	0.118	4.8	0.007	0.178	3.7	Pass
20	0.003	0.092	N/A	0.004	0.138	N/A	Pass
21	0.006	0.107	5.2	0.007	0.161	4.6	Pass
22	0.003	0.084	N/A	0.004	0.125	N/A	Pass
23	0.005	0.098	5.3	0.006	0.147	4.2	Pass
24	0.003	0.077	N/A	0.004	0.115	N/A	Pass
25	0.005	0.090	5.6	0.006	0.135	4.2	Pass
26	0.003	0.071	N/A	0.004	0.107	N/A	Pass
27	0.005	0.083	6.1	0.006	0.125	4.6	Pass
28	0.004	0.066	N/A	0.005	0.099	N/A	Pass
29	0.005	0.078	6.5	0.007	0.116	5.8	Pass
30	0.004	0.061	N/A	0.004	0.092	N/A	Pass
31	0.005	0.073	N/A	0.006	0.109	N/A	Pass
32	0.004	0.058	N/A	0.005	0.086	N/A	Pass
33	0.005	0.068	N/A	0.006	0.102	N/A	Pass
34	0.004	0.054	N/A	0.004	0.081	N/A	Pass
35	0.004	0.064	N/A	0.005	0.096	N/A	Pass
36	0.003	0.051	N/A	0.004	0.077	N/A	Pass
37	0.004	0.061	N/A	0.005	0.091	N/A	Pass
38	0.003	0.048	N/A	0.004	0.073	N/A	Pass
39	0.004	0.058	N/A	0.005	0.087	N/A	Pass
40	0.002	0.046	N/A	0.003	0.069	N/A	Pass

Test Result: Pass Source qualification: Normal

Highest parameter values during test:

Voltage (Vrms):	229.82	Frequency(Hz):	50.00
I _{Peak} (Amps):	1.389	I _{RMS} (Amps):	0.442
I _{Fund} (Amps):	0.334	Crest Factor:	4.315
Power (Watts):	71.6	Power Factor:	0.840

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.046	0.460	10.08	OK
3	0.087	2.068	4.19	OK
4	0.020	0.460	4.37	OK
5	0.123	0.919	13.39	OK
6	0.029	0.460	6.25	OK
7	0.033	0.689	4.74	OK
8	0.008	0.460	1.81	OK
9	0.030	0.459	6.58	OK
10	0.010	0.460	2.11	OK
11	0.013	0.230	5.77	OK
12	0.014	0.230	6.11	OK
13	0.010	0.230	4.27	OK
14	0.005	0.230	2.27	OK
15	0.012	0.230	5.10	OK
16	0.006	0.230	2.61	OK
17	0.007	0.230	3.07	OK
18	0.012	0.230	5.04	OK
19	0.009	0.230	3.79	OK
20	0.024	0.230	10.49	OK
21	0.010	0.230	4.19	OK
22	0.004	0.230	1.78	OK
23	0.010	0.230	4.17	OK
24	0.004	0.230	1.78	OK
25	0.008	0.230	3.44	OK
26	0.004	0.230	1.83	OK
27	0.008	0.230	3.31	OK
28	0.003	0.230	1.51	OK
29	0.009	0.230	3.85	OK
30	0.006	0.230	2.45	OK
31	0.008	0.230	3.38	OK
32	0.003	0.230	1.49	OK
33	0.005	0.230	2.36	OK
34	0.003	0.230	1.30	OK
35	0.005	0.230	2.32	OK
36	0.003	0.230	1.46	OK
37	0.007	0.230	3.03	OK
38	0.003	0.230	1.41	OK
39	0.007	0.230	3.08	OK
40	0.016	0.230	6.85	OK

4. Flicker

4.1 Test Instruments

Immunity A					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
5kVA Power Source	Teseq	NSG 1007-5	1537A01296	01/04/2024	01/03/2025
Signal Conditioning Unit	Teseq	CCN 1000-1	1846A01831	01/04/2024	01/03/2025
Test Software	WIN2100V4 Ver. 4.22				
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					

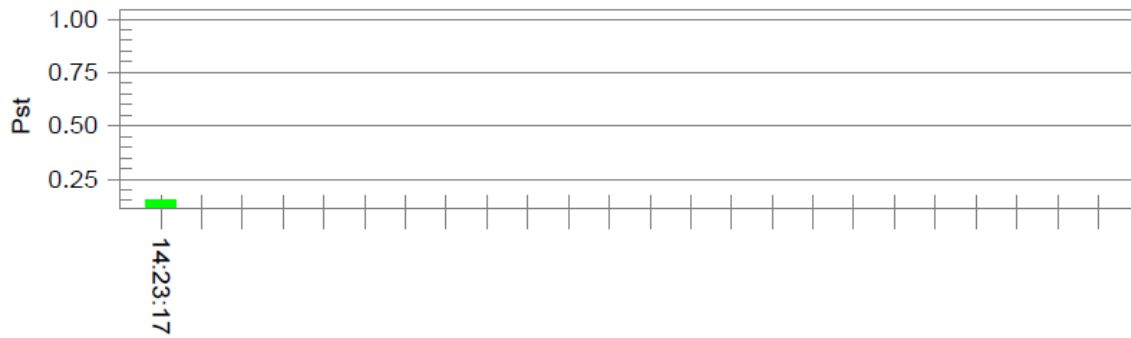
4.2 Measurement Data

Test Result: Pass

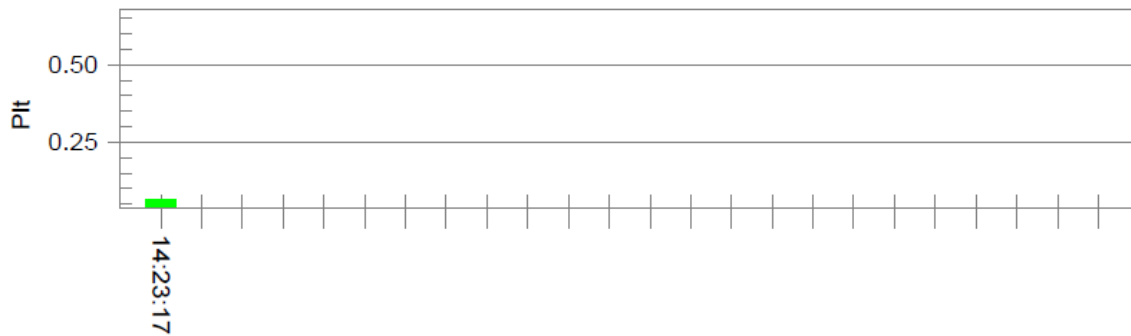
Status: Test Completed

Pst and limit line

European Limits



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt): 229.62

Highest dt (%):

T-max (mS): 0

Highest dc (%): 0.00

Highest dmax (%): 0.00

Highest Pst (10 min. period): 0.152

Highest Plt (2 hr. period): 0.067

Test limit (%):

Test limit (mS): 500.0 Pass

Test limit (%): 3.30 Pass

Test limit (%): 4.00 Pass

Test limit: 1.000 Pass

Test limit: 0.650 Pass

5. IMMUNITY

5.1 STANDARD PERFORMANCE CRITERIA DESCRIPTION

- Criterion A - The EUT shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed, as defined in the relevant equipment standard and in the technical specification published by the manufacturer.
- Criterion B - The EUT shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed, as defined in the relevant equipment standard and in the technical specification published by the manufacturer. During the test, degradation or loss of function or performance which is self-recoverable is however, allowed, but no change of actual operating state or stored data is allowed.
- Criterion C - Temporary degradation or loss of function or performance is allowed during the test, provided the function is self-recoverable, or can be restored at the end of the test by the operation of the controls, as defined in the relevant equipment standard and in the technical specification published by the manufacturer.

5.2 Test of IEC 61000-4-2

5.2.1 Test Instruments

Immunity Shielded Room					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
Aneroid Barometer	SATO	7610-20	89090	07/24/2023	07/23/2024
ESD Simulator	Teseq	NSG 438	1581	07/09/2023	07/08/2024
Thermo-Hygro Meter	Wisewind	201A	SD-S041	12/12/2023	12/11/2024

Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan

5.2.2 EUT Operating Condition

Environment:

Temperature	Humidity	Air Pressure
22.3 °C	48 %RH	1005 hpa

5.2.3 Results of Electrostatic Discharge Test (ESD)

Model No. : SCH4X2-A9
 Tested By : Richard Liang
 Tested Date : April 26, 2024
 Test Mode : Mode 1
 Basic Standard : IEC 61000-4-2
 Discharge Impedance : 330 ohm / 150 pF
 Discharge Voltage : Air Discharge: ±2, 4, 8 kV
 Contact Discharge: ±2, 4, 6 kV
 HCP/VCP: ±2, 4, 6 kV
 Polarity : Positive/Negative
 Number of Discharge : 10 times at each test point
 Discharge Mode : Single Discharge
 Discharge Period : 1 second

A. Observations:

Test points: 1. Front side. 2. Back side. 3. Left side. 4. Right side.
5. Top side. 6. Bottom side

Direct Application			Test Results	
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge
2, 4, 8 (Air.)	+/-	1, 2	N/A	No discharge point
2, 4, 6 (Cont.)	+/-	1~5	A	N/A

Remark: A: No degradation of performance or loss of function.
N/A: Not Applicable.

B. Observations:

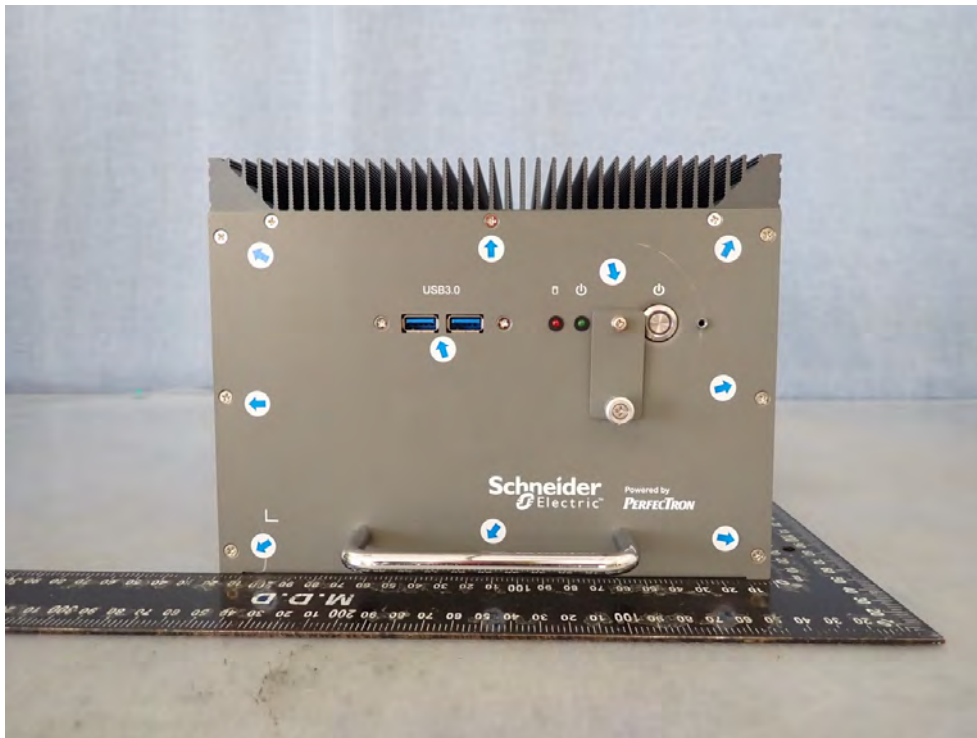
Test points: 1. Front side. 2. Back side. 3. Left side. 4. Right side.

Indirect Application			Test Results	
Discharge Level (kV)	Polarity (+/-)	Test Point	Horizontal Coupling	Vertical Coupling
2, 4, 6	+/-	1~4	A	A

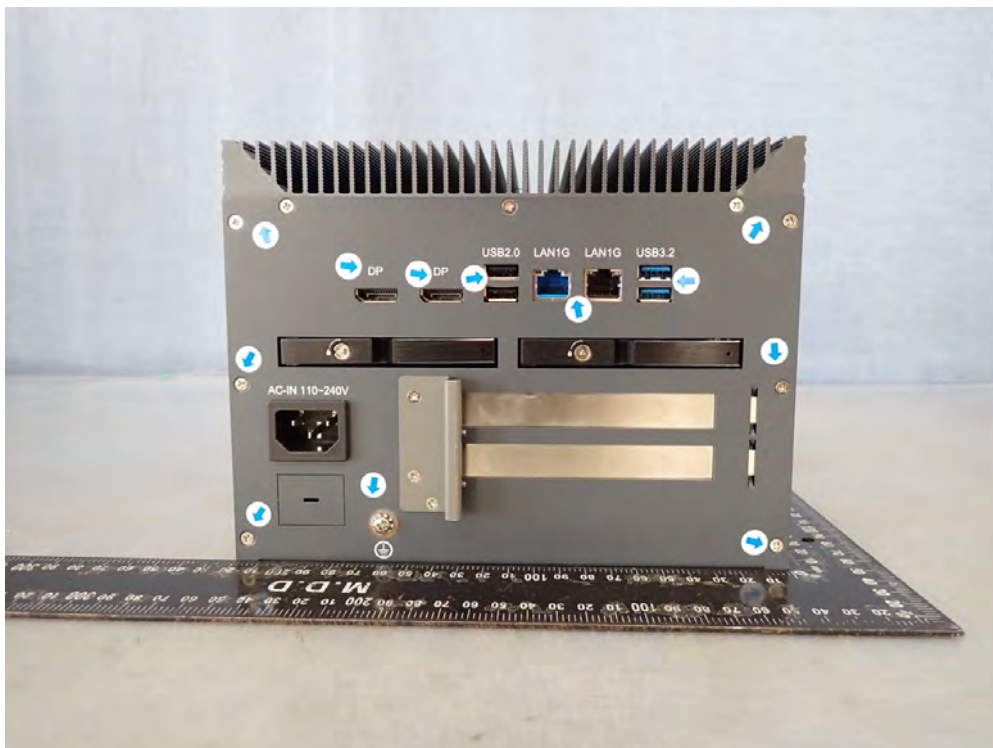
Remark: A: No degradation of performance or loss of function.

ESD Test point

Front

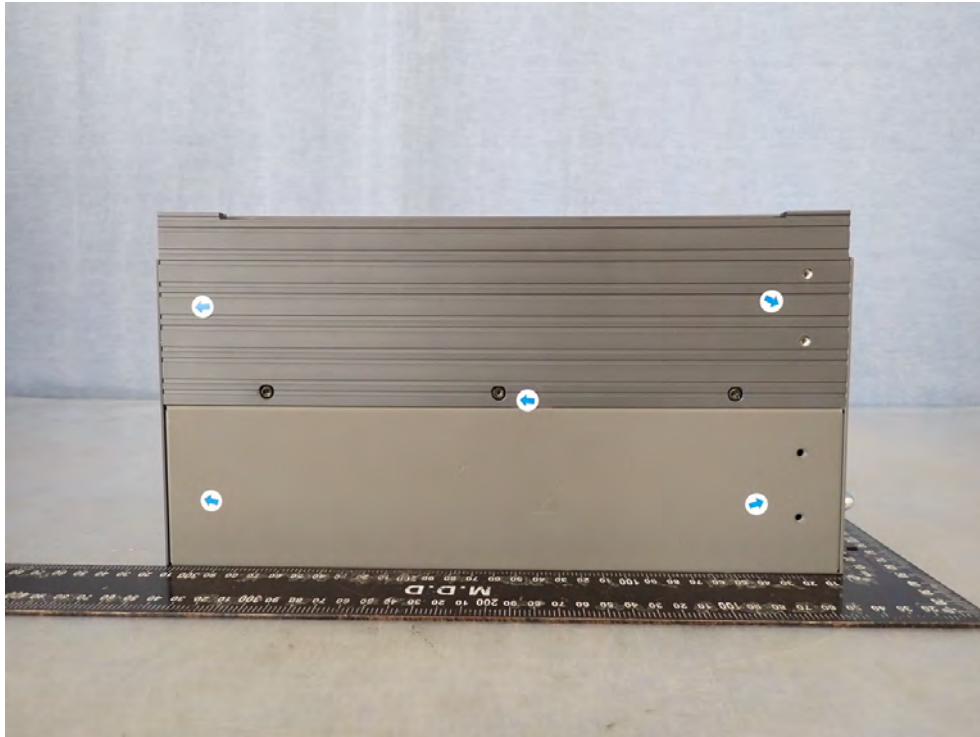


Back

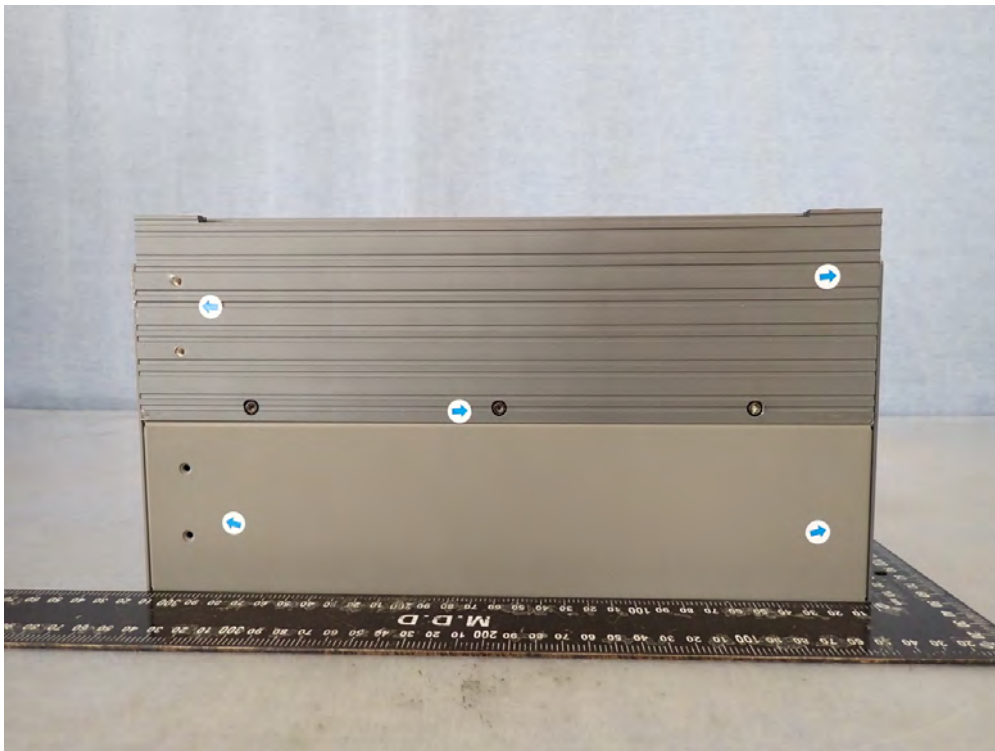


Air Discharge: ↑
Contact Discharge: ↑

Left

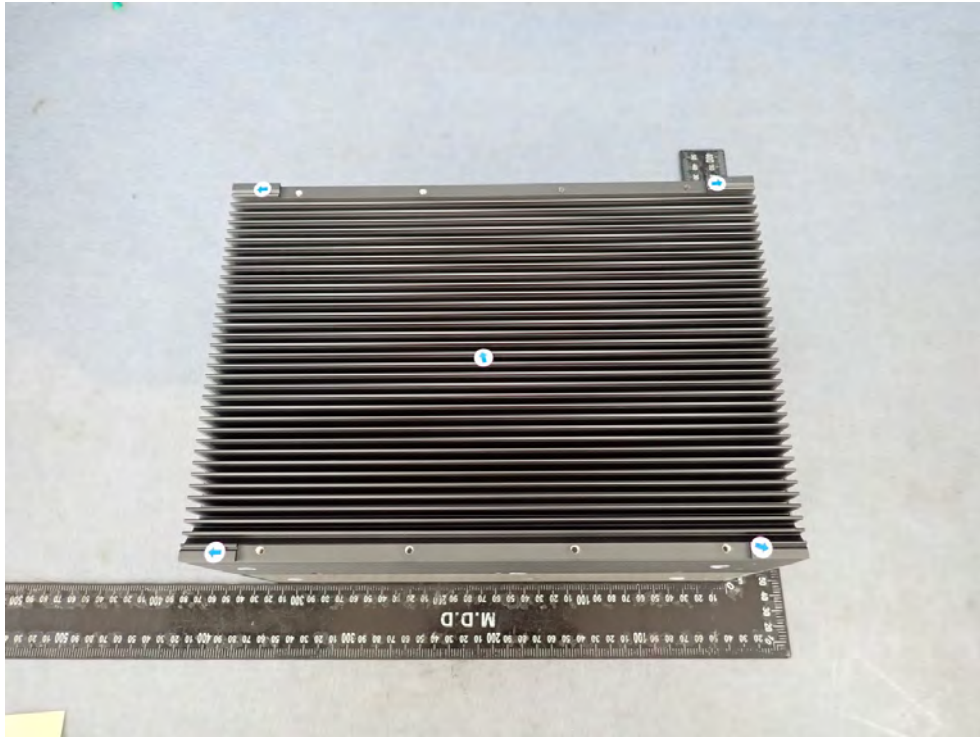


Right



Air Discharge: ↑
Contact Discharge: ↑

Top



Air Discharge: ↑
Contact Discharge: ↑

5.3 Test of IEC 61000-4-3

5.3.1 Test Instruments

844 RS Chamber					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
Electric Field Probe	AR	FL7006	0356656	03/06/2024	03/07/2025
Field of Calibration	CCS	Chamber#RS	80-1000MHz	02/16/2024	02/15/2025
RF Power Meter	Boonton	4242	17419	01/29/2024	01/28/2025
Power Sensor	Boonton	51011A-EMC	36833	01/29/2024	01/28/2025
Power Sensor	Boonton	51011A-EMC	36834	01/29/2024	01/28/2025
Thermo-Hygro Meter	Wisewind	N/A	SD-S019	09/21/2023	09/20/2024
Broadband Antenna	AR	AT1080	311819	N.C.R	N.C.R
Power Amplifier	Teseq	CBA1G-600D	1098099	N.C.R	N.C.R
Analog Signal Generator	Agilent	E8257D	MY48051214	06/05/2023	06/04/2024
Field of Calibration	CCS	Chamber#RS	1000-6000MHz	02/15/2024	02/14/2025
Microwave Antenna	Schwarzbeck	STLP 9149	767	N.C.R	N.C.R
Power Amplifier	Teseq	CBA6G-100D	1087370	N.C.R	N.C.R
Test Software	EmcwareVer. 3.2				
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					

5.3.2 EUT Operating Condition

Environment:

Temperature	Humidity	Air Pressure
23.7 °C	56 %RH	1009 hpa

5.3.3 Results of Radiated Radio Frequency Electromagnetic (RS)

Model No. : SCH4X2-A9
 Tested By : Jacky Lin
 Tested Date : May 24, 2024
 Test Mode : Mode 1
 Basic Standard : IEC 61000-4-3
 Frequency range : 80 MHz - 2000 MHz
 Field strength : 10 Vrms
 Modulation : 400Hz ± 10% Sine Wave, 80% ± 10%, AM Modulation
 Frequency step : 1 % of the preceding frequency
 Polarity of Antenna : Horizontal and Vertical
 Dwell Time : 3 seconds
 Test distance : 3 m

No.	Frequency (MHz)	Antenna Orientation	Observation	EUT Orientation
1	80 - 2000	Vertical/Horizontal	A	0 degree
2	80 - 2000	Vertical/Horizontal	A	90 degree
3	80 - 2000	Vertical/Horizontal	A	180 degree
4	80 - 2000	Vertical/Horizontal	A	270 degree

Remark: A: No degradation of performance or loss of function.

5.4 Test of IEC 61000-4-4

5.4.1 Test Instruments

Immunity Shield Room					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
Capacitive Clamp	EMC-Partner	CN-EFT1000	589	02/20/2024	02/19/2025
EMC Immunity Tester	EMC Partner	TRANSINT 2000	1117	02/20/2024	02/19/2025
Test Software	GenecsVer. 3.27				
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					

5.4.2 EUT Operating Condition

Environment:

Temperature	Humidity	Air Pressure
22.9 °C	52 %RH	1009 hpa

5.4.3 Results of Electrical Fast Transient (EFT)

Model No. : SCH4X2-A9
 Tested By : James Chou
 Tested Date : May 24, 2024
 Test Mode : Mode 1
 Basic Standard : IEC 61000-4-4
 Test Voltage : AC Input: ± 2 kV
 Signal/Comm. : ± 1 kV
 Polarity : Positive/Negative
 Impulse Frequency : 5 kHz at 1kV
 Tr/Th : 5/50ns
 Burst : 15ms/300ms

Observation:

Test Point	Polarity	Test Level (kV)	Results
L	+/-	2	B
N	+/-	2	B
PE	+/-	2	B
L-N	+/-	2	B
L-PE	+/-	2	B
N-PE	+/-	2	B
L-N-PE	+/-	2	B
RJ45	+/-	1	A

Remark: A: No degradation of performance or loss of function

B: During the test there were generated flickers on the display. It could become normal after test stop.

5.5 Test of IEC 61000-4-5

5.5.1 Test Instruments

Immunity Shield Room					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
CDN	EMC-Partner	CDN-UTP8	1502	02/20/2024	02/19/2025
EMC Immunity Tester	EMC Partner	TRANSINT 2000	1117	02/20/2024	02/19/2025
Test Software	GenecsVer. 3.27				
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					

5.5.2 EUT Operating Condition

Environment:

Temperature	Humidity	Air Pressure
22.9 °C	52 %RH	1009 hpa

5.5.3 Results of Surge Test

Model No. : SCH4X2-A9
 Tested By : Jacky Lin
 Tested Date : May 24, 2024
 Test Mode : Mode 1
 Basic Standard : IEC 61000-4-5
 Test Rate : 1 pulse every minute
 No. of Tests : 5 positive and 5 negative pulses
 Waveform : 1.2/50µs (8/20µs)

Observation:

Test Point	Phase Angle (degree)	Polarity (+/-)	Test Level (kV)	Observation
L – N	0, 90, 180, 270	+/-	0.5	A
L – PE	0, 90, 180, 270	+/-	1	A
N – PE	0, 90, 180, 270	+/-	1	A

Remark: A: No degradation of performance or loss of function.

5.6 Test of IEC 61000-4-6

5.6.1 Test Instruments

CS Room					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
CDN	Teseq	CDN S751A	46649	10/13/2023	10/12/2024
CDN	Teseq	CDN M016	35821	10/13/2023	10/12/2024
CDN	TESEQ	CDN T400A	28547	10/13/2023	10/12/2024
CDN	FCC	FCC-801-M3-25A	9973	10/13/2023	10/12/2024
CDN	Teseq	CDN T8A-10	57182	06/07/2023	06/06/2024
Compact Immunity Test System	TESEQ	NSG 4070B-35	39581	10/12/2023	10/11/2024
Test Software	NSG 4070 Control Program V1.2.0				
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					

5.6.2 EUT Operating Condition

Environment:

Temperature	Humidity	Air Pressure
23.2 °C	53 %RH	1009 hpa

5.6.3 Results of Immunity to Conducted Disturbances (CS)

Model No. : SCH4X2-A9
 Tested By : Jim Lian
 Tested Date : May 24, 2024
 Test Mode : Mode 1
 Basic Standard : IEC 61000-4-6
 Frequency range : 0.15 MHz - 80 MHz
 Field strength : 3 Vrms
 Frequency range : 2MHz, 3MHz, 4MHz, 6.2MHz, 8.2MHz, 12.6MHz, 16.5MHz, 18.8MHz, 22MHz, 25MHz
 Field strength : 10 Vrms
 Modulation : 400Hz ± 10% Sine Wave, 80% ± 10%, AM Modulation
 Frequency step : 1 % of the preceding frequency
 Dwell Time : 3 seconds
 Coupling Method : CDN-M3; CDN-T8

Cable Description	Frequency (MHz)	Observation
AC input	0.15 – 80	A
AC input	2	A
AC input	3	A
AC input	4	A
AC input	6.2	A
AC input	8.2	A
AC input	12.6	A
AC input	16.5	A
AC input	18.8	A
AC input	22	A
AC input	25	A

Signal Ports

Cable Description	Frequency (MHz)	Observation
RJ45	0.15 – 80	A
RJ45	2	A
RJ45	3	A
RJ45	4	A
RJ45	6.2	A
RJ45	8.2	A
RJ45	12.6	A
RJ45	16.5	A
RJ45	18.8	A
RJ45	22	A
RJ45	25	A

Remark: A: No degradation of performance or loss of function.

5.7 Test of POWER SUPPLY SHORT-TERM VARIATION

5.7.1 Test Instruments

Immunity Shield Room					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
5kVA Power Source	Teseq	5001IX-208-SCH	1207A03643	02/23/2024	02/22/2025
Oscilloscope	Tektronix	TDS 3054C	C013600	04/23/2024	04/22/2025
Software	Win2110.exe				
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					

5.7.2 EUT Operating Condition

Environment:

Temperature	Humidity	Air Pressure
23.2 °C	53 %RH	1009 hpa

5.7.3 Result of Immunity to Power Frequency Magnetic Field

Model No. : SCH4X2-A9
 Tested By : Jim Lian
 Tested Date : May 24, 2024
 Test Mode : Mode 1
 Basic Standard : POWER SUPPLY SHORT-TERM VARIATION
 Test duration time : Minimum three test events in sequence
 Interval between event : 1/10 min
 Voltage variation rise and decay : nominal $\pm (20 \pm 1) \%$, duration 1,5 s $\pm 0,2$ s
 Frequency variation rise and decay : nominal $\pm (10 \pm 0,5) \%$, duration 5 s $\pm 0,5$ s, superimposed

Observation:

POWER	Duration (Sec)	Observation
276/55	1.5/5	A
184/45	1.5/5	A

Remark: A: No degradation of performance or loss of function.

5.8 Test of POWER SUPPLY FAILURE

5.8.1 Test Instruments

Immunity Shield Room					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
5kVA Power Source	Teseq	5001IX-208-SCH	1207A03643	02/23/2024	02/22/2025
Oscilloscope	Tektronix	TDS 3054C	C013600	04/23/2024	04/22/2025
Software	Win2110.exe				
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					

5.8.2 EUT Operating Condition

Environment:

Temperature	Humidity	Air Pressure
23.2 °C	53 %RH	1009 hpa

5.8.3 Result of Immunity to Power Frequency Magnetic Field

Model No. : SCH4X2-A9
 Tested By : Jim Lian
 Tested Date : May 24, 2024
 Test Mode : Mode 1
 Basic Standard : POWER SUPPLY FAILURE
 Test duration time : 60 Sec
 Requirement : 3 TIMES

Observation:

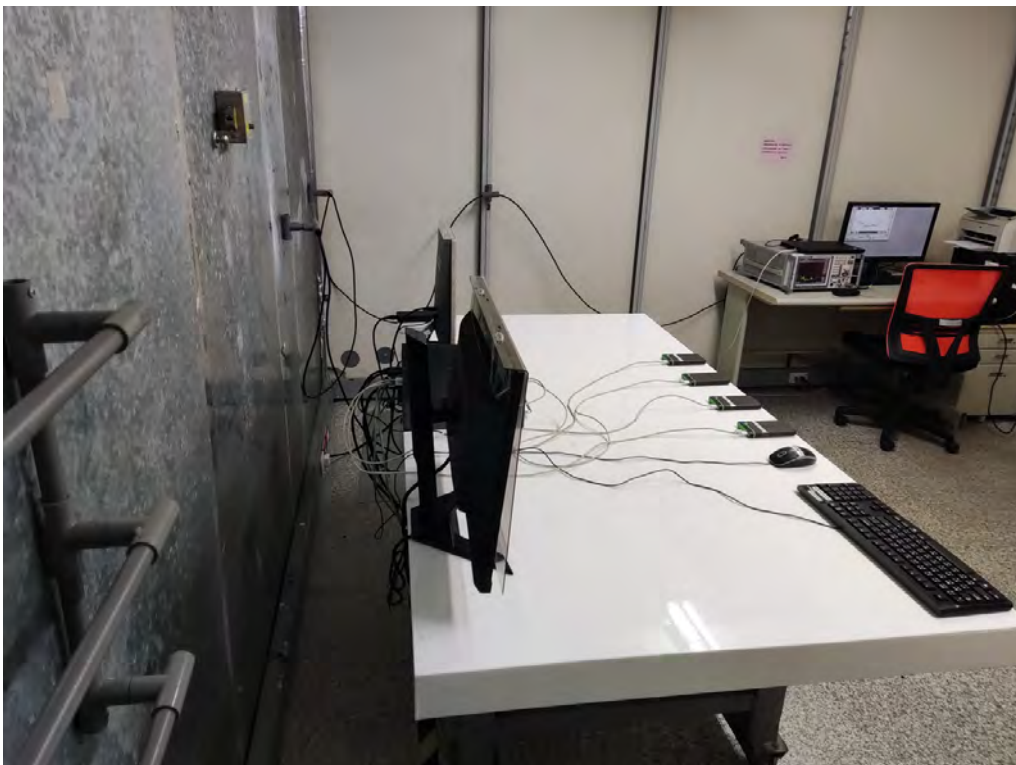
Test Power: 230Vac, 50Hz		
Test specification (% reduction)	Duration (Sec)	Observation
100	60	C

Remark: C: EUT shut down, it could not become normal except reinstalled by operator.

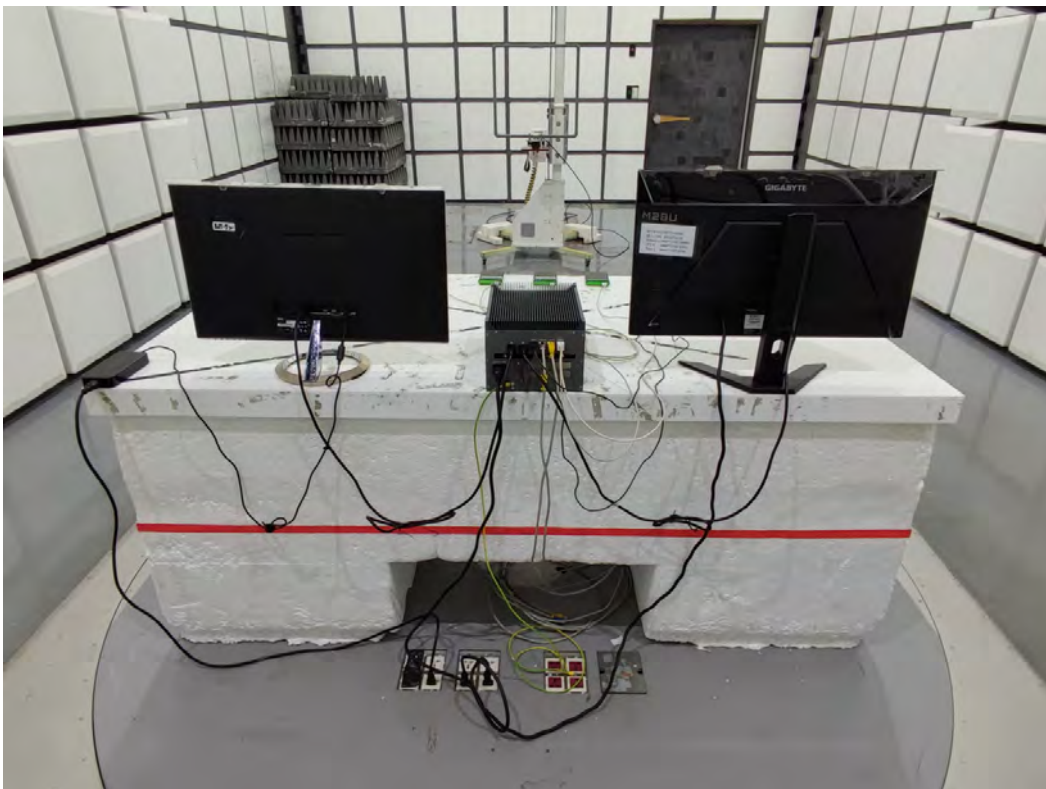
APPENDIX

Photograph of Testing General Set-up

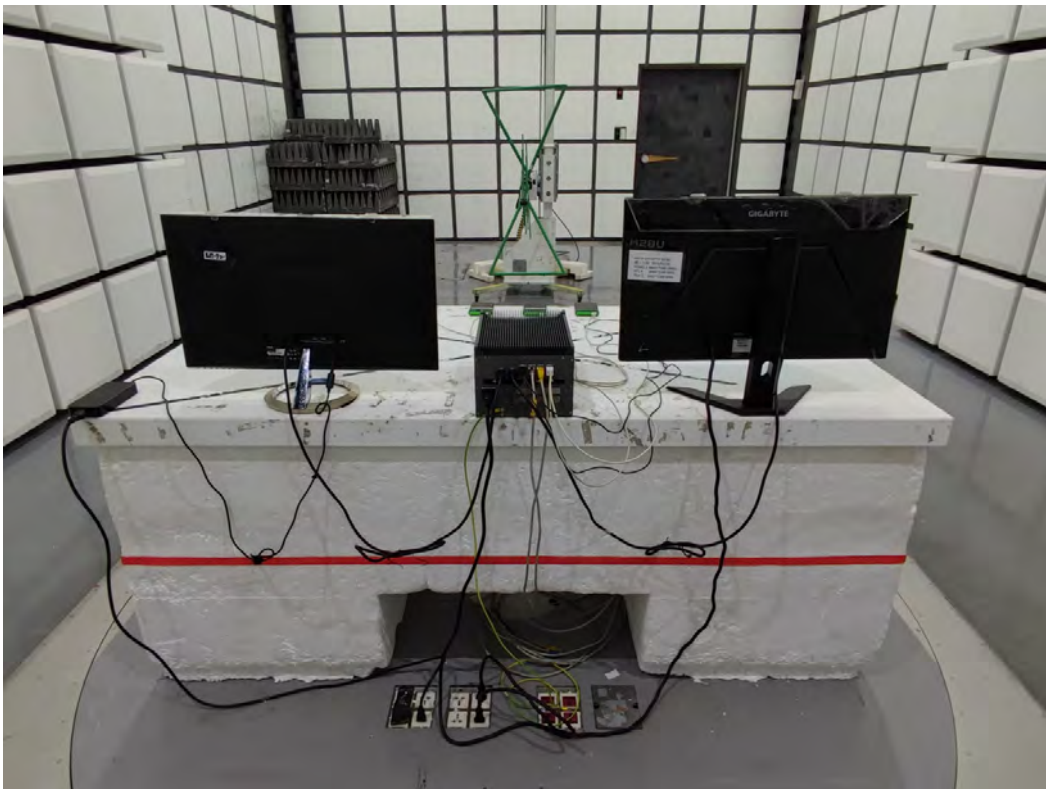
CE Testing Set-up



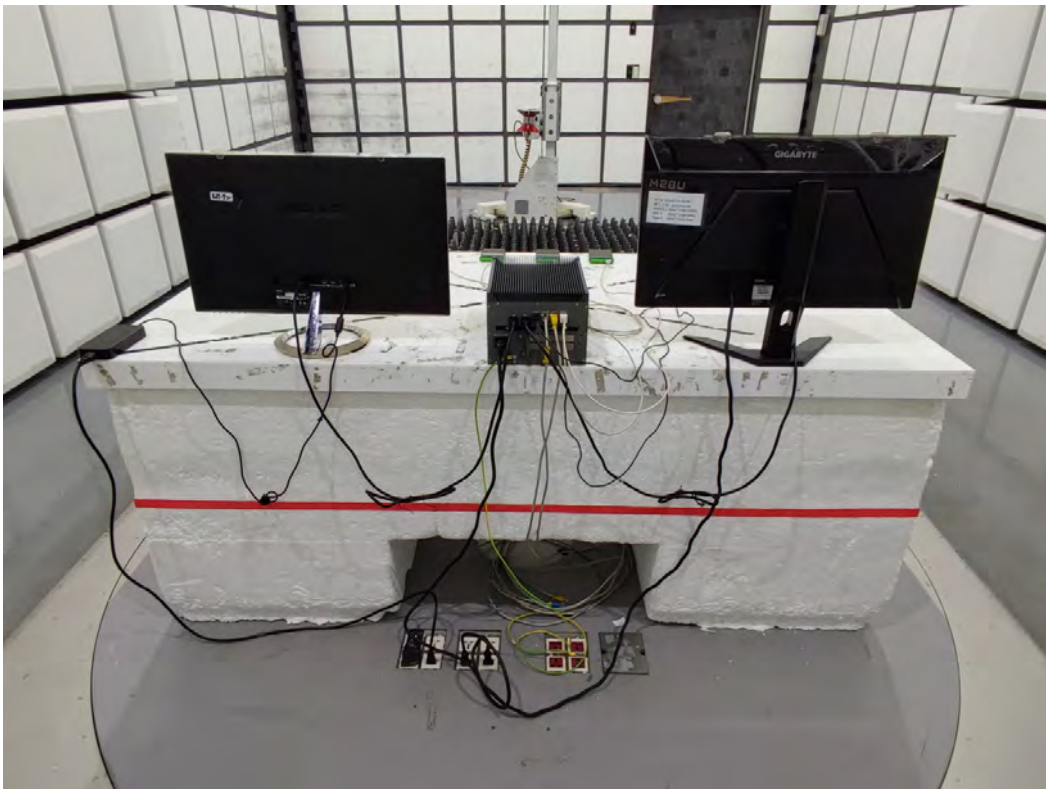
RE Testing Set-up
150kHz ~ 30MHz



30MHz ~ 1GHz



1GHz ~ 2GHz



HARMONIC & FLICKER Testing Set-up



ESD Testing Set-up



RS Testing Set-up



EFT Testing Set-up



EFT For I/O Testing Set-up



Surge Testing Set-up



CS Testing Set-up



CS For I/O Testing Set-up



Power Supply Short-Term Variation Testing Set-up

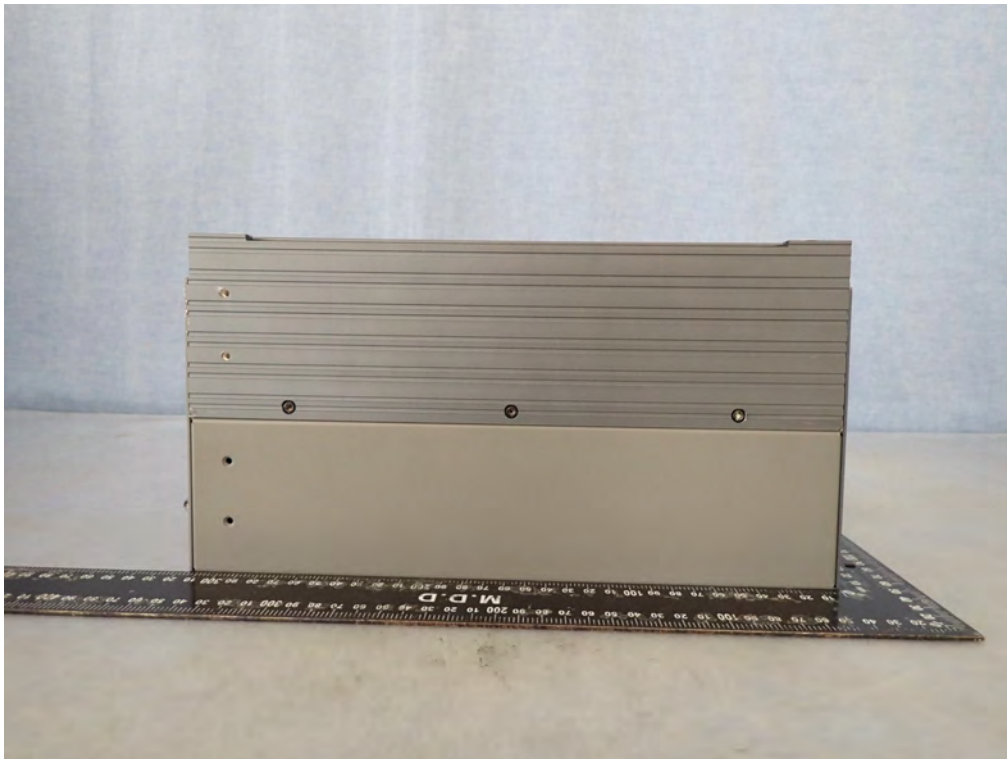


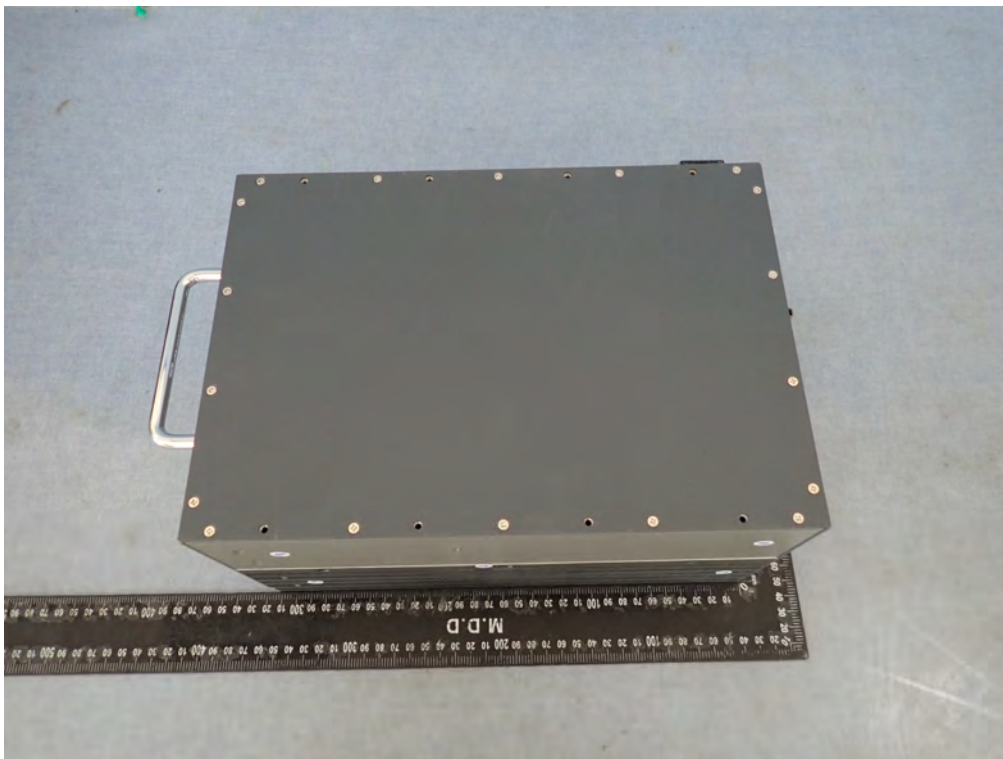
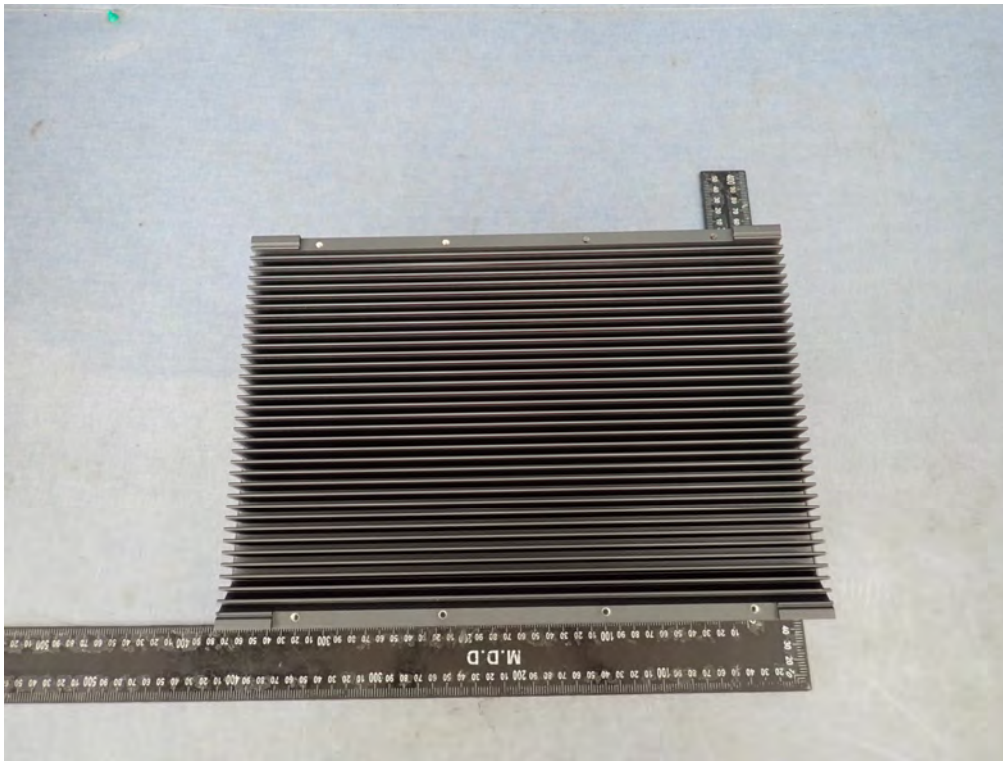
Power Supply Failure Testing Set-up



Photographs of EUT Unit Exterior







**** End of Report ****