

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:**

IEEE 1613: 2009+A1:2011 (IEEE 1613a-2011)

C 37.90.3

C 37.90.2

C 37.90.1

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	TMXD2403001044DE	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

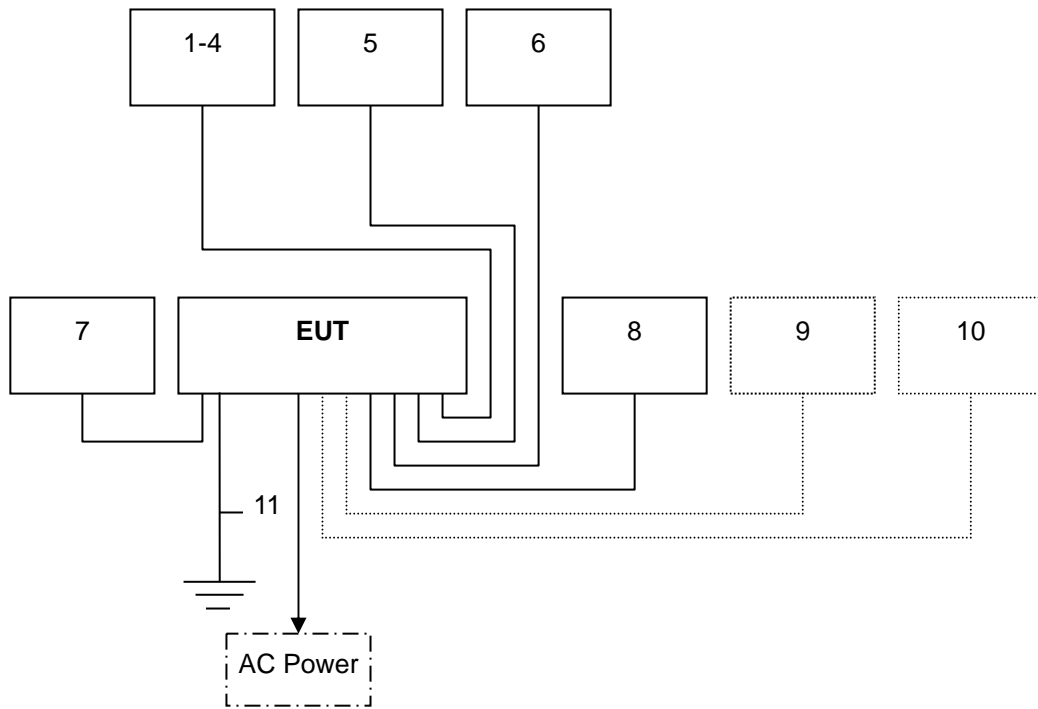
Support Equipment Used in Tested Cable

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 Configuration of Tested System



1.6 Summary of Results

Immunity	
Standard	Test Type
C37.90.3	ESD
C37.90.2	RS
C37.90.1	EFT
C37.90.1	Damped Oscillatory Wave Immunity

1.7 Reporting Statements of Conformity

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

1.8 Deviation

No deviation from the mentioned test methods and applicable standards.

2.IMMUNITY

2.1 STANDARD PERFORMANCE CRITERIA DESCRIPTION

Performance class 1 - For communications devices where temporary loss of communications and/or communications errors can be tolerated during the occurrence of radiated or conducted interference tests.

Performance class 2 - For communication devices where it is desired to have error-free, uninterrupted communications during the occurrence of the defined radiated or conducted interference.

2.2 Test of C37.90.3

2.2.1 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

2.2.2 EUT Operating Condition

Environment:

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

2.2.3 Results of Electrostatic Discharge Test (ESD)

Model No. : SCH4X2-A9
 Tested By : Richard Liang
 Tested Date : April 26, 2024
 Basic Standard : C37.90.3
 Discharge Impedance : 330 ohm / 150 pF
 Discharge Voltage : Air Discharge: ±2, 4, 8, 12, 15 kV
 Contact Discharge: ±2, 4, 6, 8 kV
 HCP/VCP: ±2, 4, 6, 8 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, 12, 15 (Air.)	+/-	1, 2	N/A	Class 1 / Remark 2
2, 4, 6, 8 (Cont.)	+/-	2	Class 1 / Remark 3	N/A
2, 4, 6, 8 (Cont.)	+/-	1,3~5	Class 1 / Remark 1	N/A

Remark: 1: No degradation of performance or loss of function.
 2: No discharge point
 3: During the test the transmitting was interrupted during test. It could become normal after test stop.
 N/A: Not Applicable.

B.Observations:

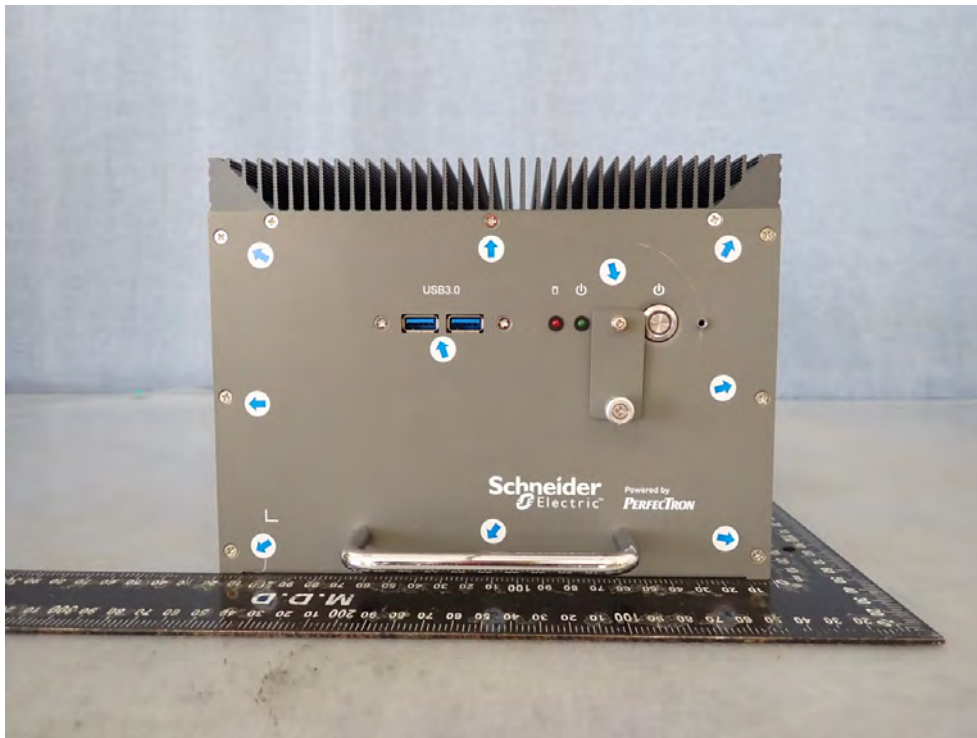
Test points: 1. Front side. 2. Back side. 3. Left side. 4. Right side.

Indirect Application			Test Results	
Discharge Level (kV)	Polarity (+/-)	Test Point	Horizontal Coupling	Vertical Coupling
2, 4, 6, 8	+/-	1~4	Class 1 / Remark 1	Class 1 / Remark 1

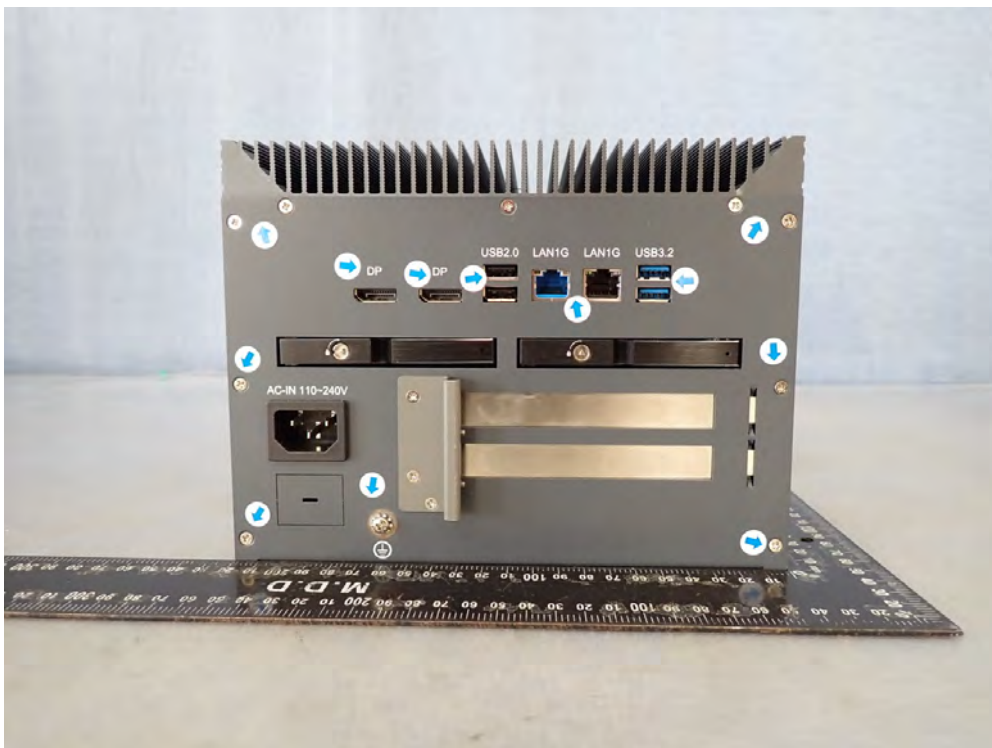
Remark: 1: No degradation of performance or loss of function.

ESD Test point

Front

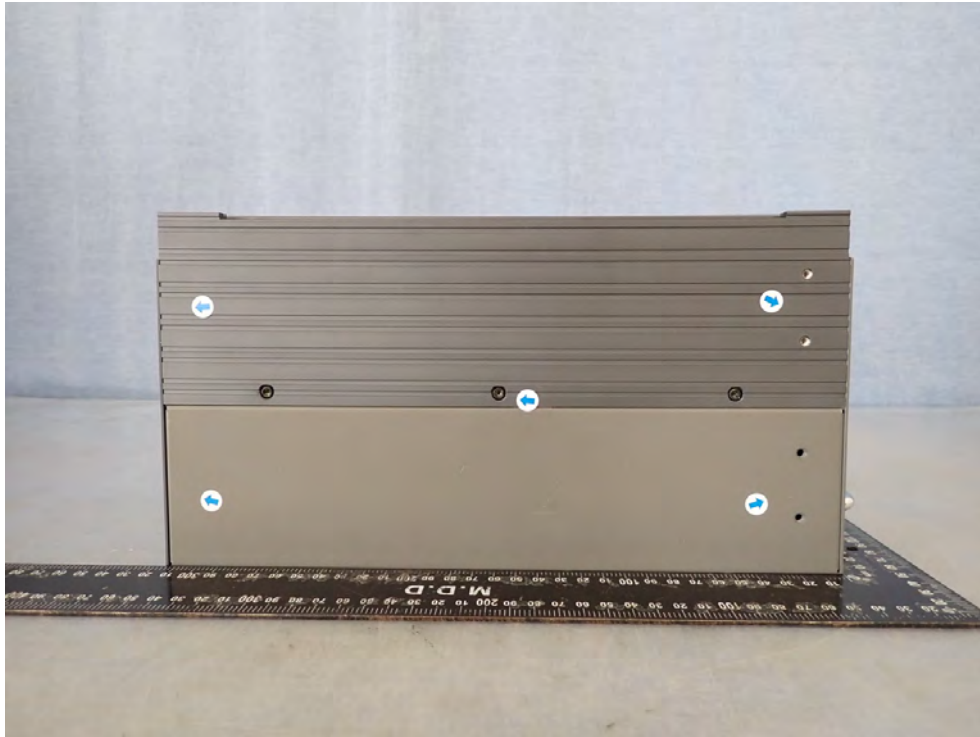


Back

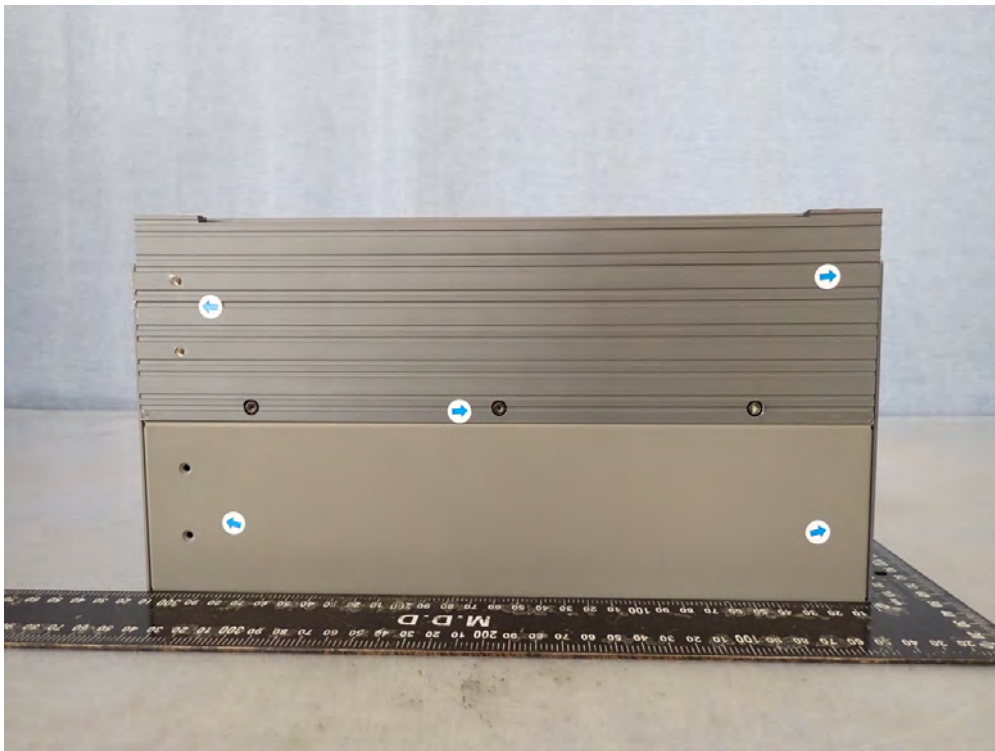


Air Discharge: ↑
Contact Discharge: ↕

Left

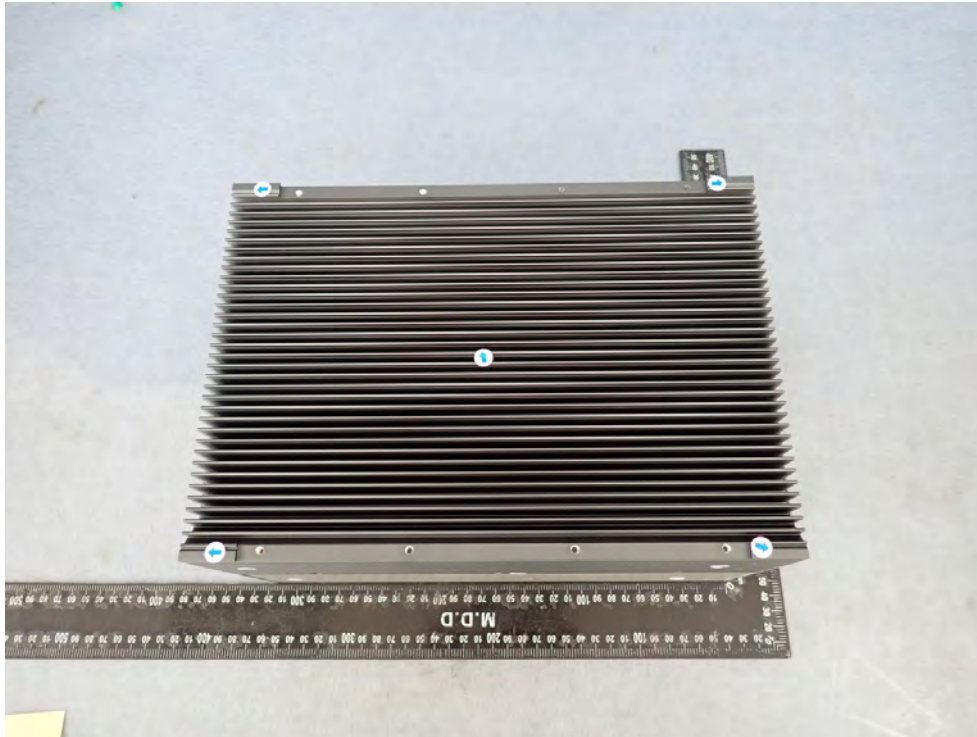


Right



Air Discharge: ↑
Contact Discharge: ↑

Top



Air Discharge: ↑
Contact Discharge: ↑

2.3 Test of C37.90.2

2.3.1 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
Test Software	EmcwareVer. 3.2				
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					

2.3.2 EUT Operating Condition

Environment:

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

2.3.3 Results of Radiated Radio Frequency Electromagnetic (RS)

Model No. : SCH4X2-A9
 Tested By : Long Liao
 Tested Date : May 24, 2024
 Basic Standard : C37.90.2
 Frequency range : 80 MHz - 1000 MHz
 : 800MHz, 160MHz, 450MHz, 900MHz
 Field strength : 20 Vrms
 Modulation : 80% AM (1kHz)
 Frequency step : 1 % of the preceding frequency
 Frequency range : 900MHz
 Field strength : 20 Vrms
 Modulation : Pulse 50% (200Hz)
 Polarity of Antenna : Horizontal and Vertical
 Dwell Time : 3 seconds
 Test distance : 3 m

No.	Frequency (MHz)	Antenna Orientation	Observation	EUT Orientation
1	80 - 1000	Vertical/Horizontal	Class 1 / Remark 1	0 degree
2	80 - 1000	Vertical/Horizontal	Class 1 / Remark 1	90 degree
3	80 - 1000	Vertical/Horizontal	Class 1 / Remark 1	180 degree
4	80 - 1000	Vertical/Horizontal	Class 1 / Remark 1	270 degree
5	80MHz	Vertical/Horizontal	Class 1 / Remark 1	0 degree
6	80MHz	Vertical/Horizontal	Class 1 / Remark 1	90 degree
7	80MHz	Vertical/Horizontal	Class 1 / Remark 1	180 degree
8	80MHz	Vertical/Horizontal	Class 1 / Remark 1	270 degree
9	160MHz	Vertical/Horizontal	Class 1 / Remark 1	0 degree
10	160MHz	Vertical/Horizontal	Class 1 / Remark 1	90 degree
11	160MHz	Vertical/Horizontal	Class 1 / Remark 1	180 degree
12	160MHz	Vertical/Horizontal	Class 1 / Remark 1	270 degree
13	450MHz	Vertical/Horizontal	Class 1 / Remark 1	0 degree
14	450MHz	Vertical/Horizontal	Class 1 / Remark 1	90 degree
15	450MHz	Vertical/Horizontal	Class 1 / Remark 1	180 degree
16	450MHz	Vertical/Horizontal	Class 1 / Remark 1	270 degree
17	900MHz	Vertical/Horizontal	Class 1 / Remark 1	0 degree
18	900MHz	Vertical/Horizontal	Class 1 / Remark 1	90 degree
19	900MHz	Vertical/Horizontal	Class 1 / Remark 1	180 degree
20	900MHz	Vertical/Horizontal	Class 1 / Remark 1	270 degree

Remark: 1: No degradation of performance or loss of function.

2.4 Test of C37.90.1

2.4.1 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					

2.4.2 EUT Operating Condition

Environment:

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

2.4.3 Results of Electrical Fast Transient (EFT)

Model No. : SCH4X2-A9
 Tested By : Jacky Lin
 Tested Date : May 24, 2024
 Basic Standard : C37.90.1
 Test Voltage : AC Input: ± 4 kV
 Signal/Comm. : ± 4 kV
 Polarity : Positive/Negative
 Impulse Frequency : 2.5 kHz
 Tr/Th : 5/50ns
 Burst : 15ms/300ms

Observation:

Test Point	Polarity	Test Level (kV)	Results
L	+/-	4	Class 1 / Remark 1
N	+/-	4	Class 1 / Remark 1
PE	+/-	4	Class 1 / Remark 1
L-N	+/-	4	Class 1 / Remark 1
L-PE	+/-	4	Class 1 / Remark 1
N-PE	+/-	4	Class 1 / Remark 1
L-N-PE	+/-	4	Class 1 / Remark 1
RJ45	+/-	4	Class 1 / Remark 1

Remark: 1: No degradation of performance or loss of function

APPENDIX

Photograph of Testing General Set-up

ESD Testing Set-up



RS Testing Set-up



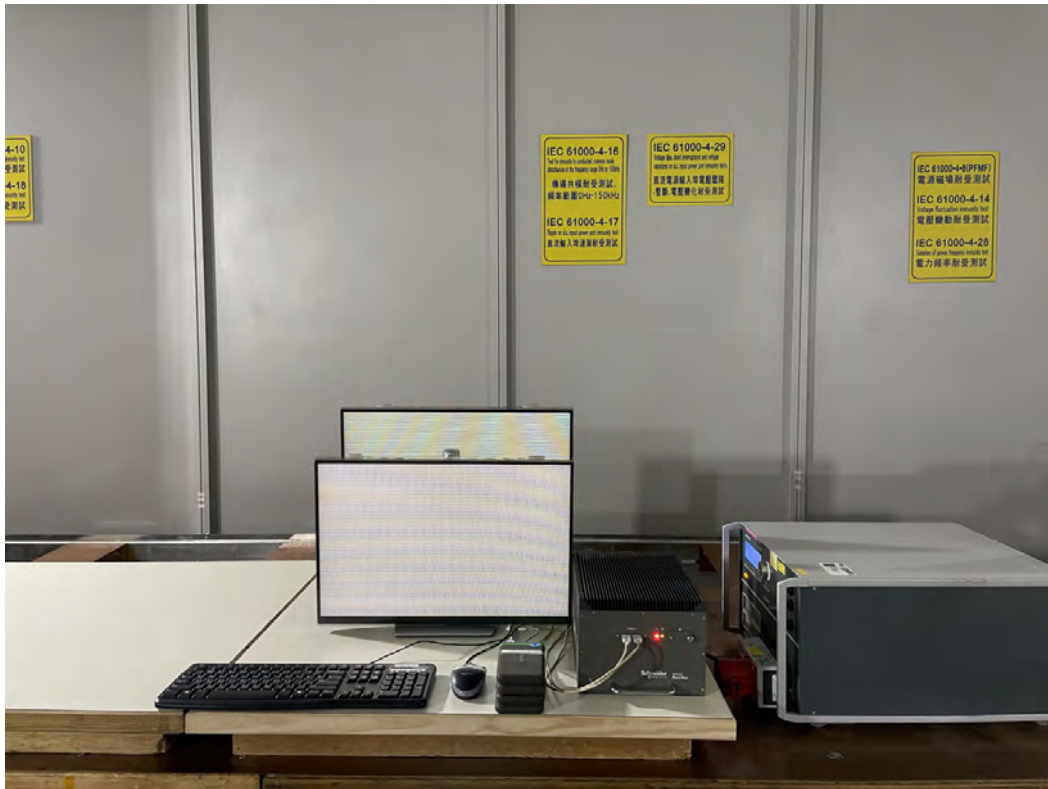
EFT Testing Set-up



EFT For RJ45 Testing Set-up



Damped Oscillatory Wave Testing Set-up

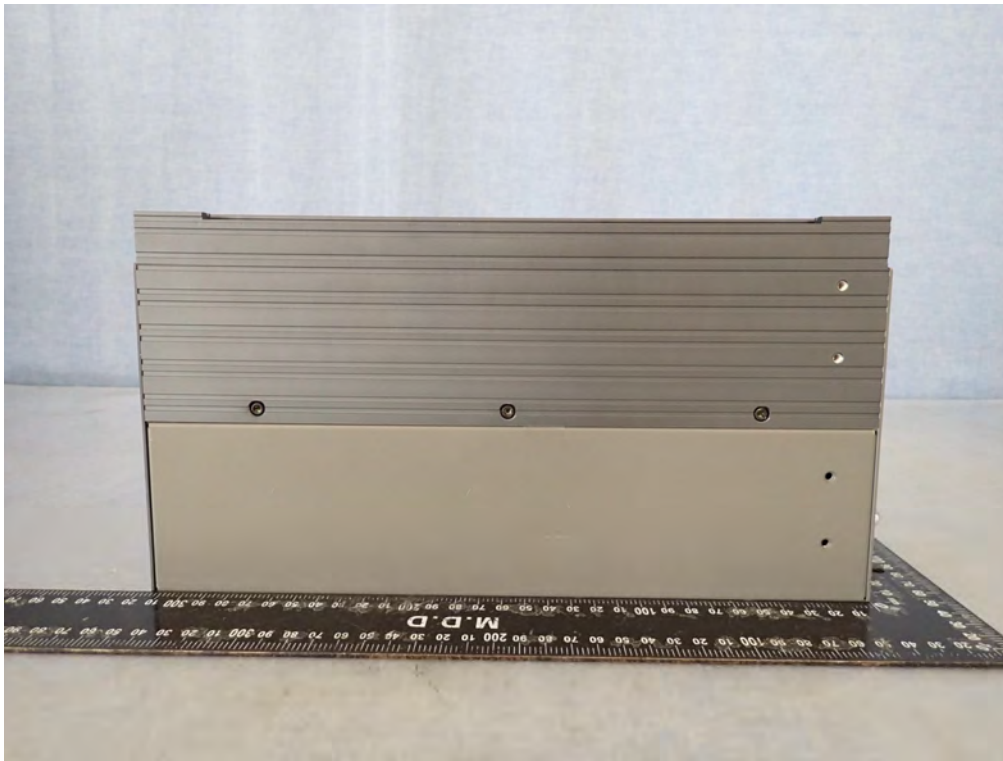


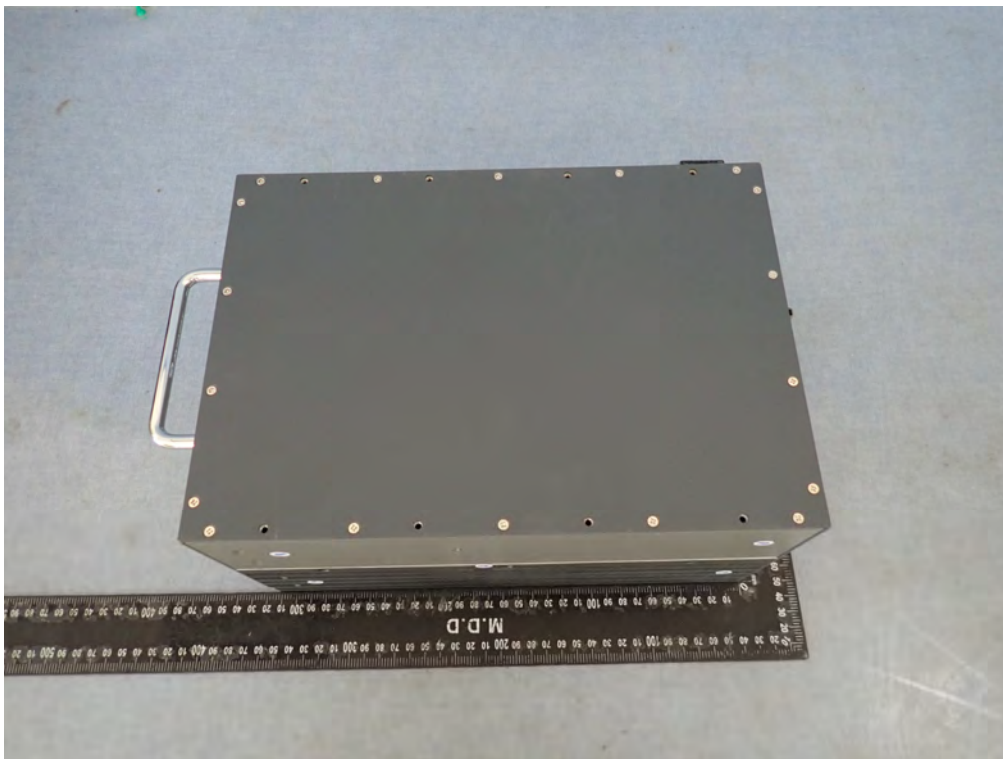
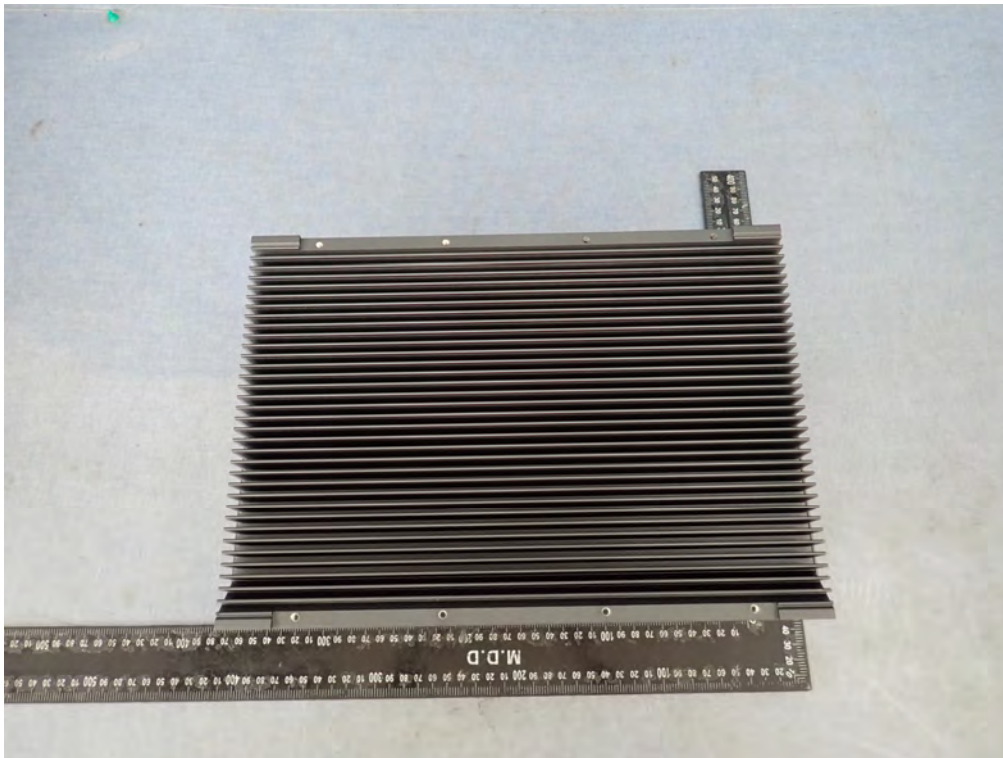
Damped Oscillatory Wave For I/O Testing Set-up



Photographs of EUT Unit Exterior







**** End of Report ****