TEST REPORT

Project No.: TM-2403000347P
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.: SCH3X2-D7
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 : November 14, 2024 ~ December 14, 2024
Date of Issue : January 2, 2025

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 Stanley Cheng ***Date*** **January 2, 2025**
Stanley Cheng (Supervisor of engineering dept.)

Testing Laboratory 1108

Revision History

Revision	Report Number	Description	Issue Date
00	TMXD2403001052DE	Original.	January 2, 2025

Note:

Contents

1. General Description

1.1 General Description of EUT

Name of EUT	MICRO-GRID COMPUTER
Brand Name	PERFECTRON
Model No.(s)	SCH3X2-D7
Added Model(s)	N/A
Variant Description	N/A

1.2 Details of EUT

EUT Power Rating	Rated Input: DC 16-31V Rated output: DC 12V~12.5A
Highest internal frequency	1100MHz

Accessories Cable List

Cable Type	Core	Length	Category	Shielding/Non-shielding

1.3 Description of Support Units

EUT Devices:

No.	PRODUCT	MODEL NO.	MANUFACTURER
1	MB	INS8367A	Perfectron
2	CPU (1.10GHz)	i7-13700TE	Intel
3	Memory (32GB / DDR4)	SO-DIMM	Samsung
4	Storage (128GB)	SATAIII SSD	Phison
5	Power	RSD-150B-12	Meanwell

Peripherals Devices:

No.	PRODUCT	MANUFACTURER	MODEL NO.	SERIAL NO.
1-4	USB HDD	Transcend	TS1TSJ25MC	N/A
5	USB Mouse	Logitech	M-U0026	N/A
6	USB Keyboard	Logitech	YU0036	2325SC30W728
7	Monitor	ASUS	MX27UC	K8LMR024567
8	Monitor	ASUS	PA289Q	R7LMTF011289
9	Server PC	Dell	T3610	57TT032
10	Server PC	DELL	Precision 3640 Tower	G3LLFF3
11-12	Battery	GS	GTH75DL	N/A
13	Ground Wire	N/A	N/A	N/A

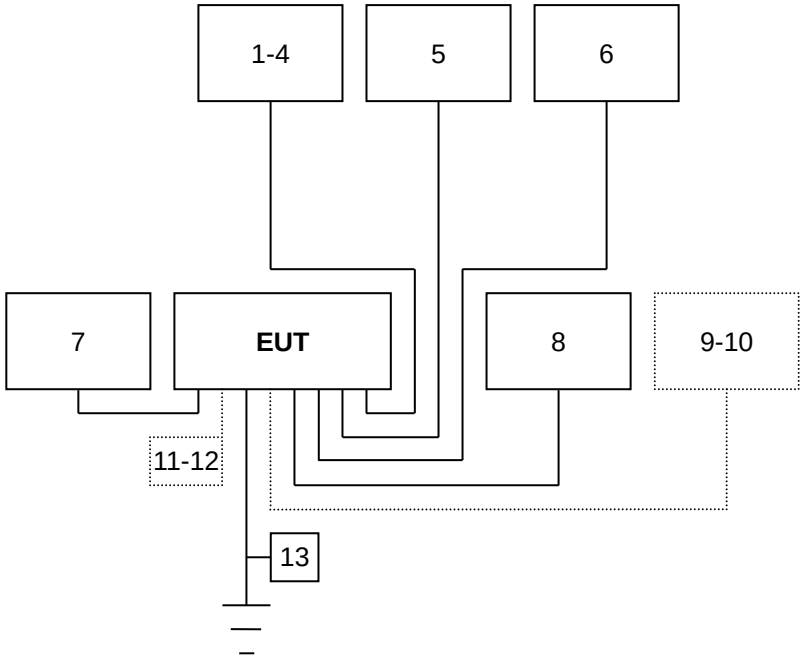
Support Equipment Used in Tested Cable

No.	Cable Type	Core	Length	Shielding/Non-shielding
1-4	USB	N/A	1.4m	Shielding
5-6	USB	N/A	1.8m	Shielding
7-8	DP	N/A	1.8m	Shielding
9-10	RJ45 (CAT 6A)	N/A	20m	Non-shielding
11-12	Power	N/A	1.8m	Non-shielding
13	Ground	N/A	1.8m	Non-shielding

1.4 I/O Port Description

I/O Port Types	Q'TY
1. USB 2.0 Port	2
2. USB 3.0 Port	2
3. USB 3.2 Port	2
4. LAN Port	2
5. DP 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	07/23/2024	07/22/2025
ESD Simulator	Teseq	NSG 438	1581	07/03/2024	07/02/2025
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
18.7 °C	47 %RH	1009 hpa

2.2.3 Results of Electrostatic Discharge Test (ESD)

Model No. : SCH3X2-D7
Tested By : Jacky Lin
Tested Date : December 10, 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 1
2, 4, 6, 8 (Cont.)	+/-	1, 3~5	Class 1 / Remark 1	N/A
2, 4, 6, 8 (Cont.)	+/-	2	Class 1 / Remark 2	N/A

Remark: 1: No degradation of performance or loss of function.
2: 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.

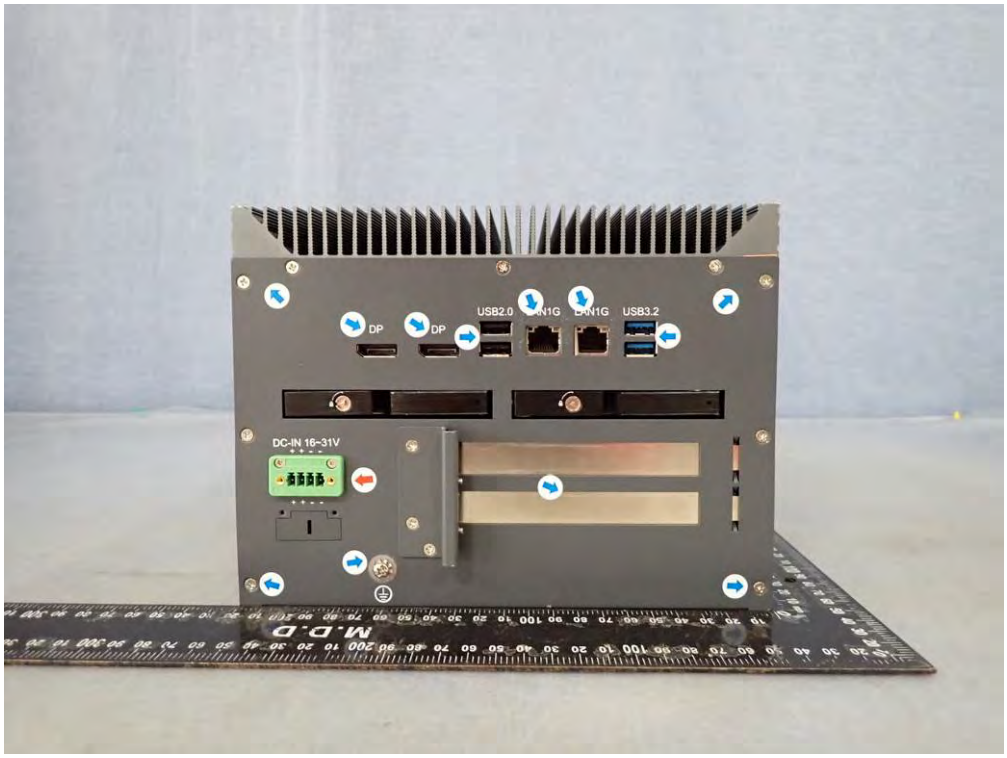
Indirect Application			Test Results	
Discharge Level (kV)	Polarity (+/-)	Test Point	Horizontal Coupling	Vertical Coupling
2, 4, 6, 8	+/-	1~4	Class 1 / Remark 1	Class 1 / Remark 1

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

ESD Test point

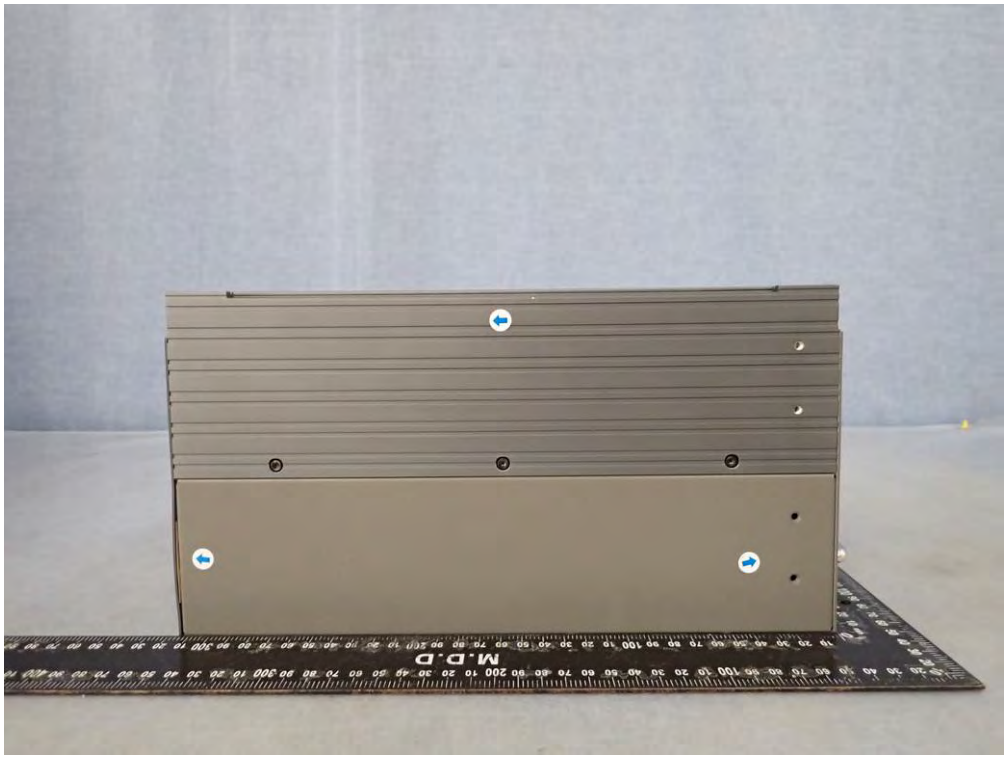
Front

Back

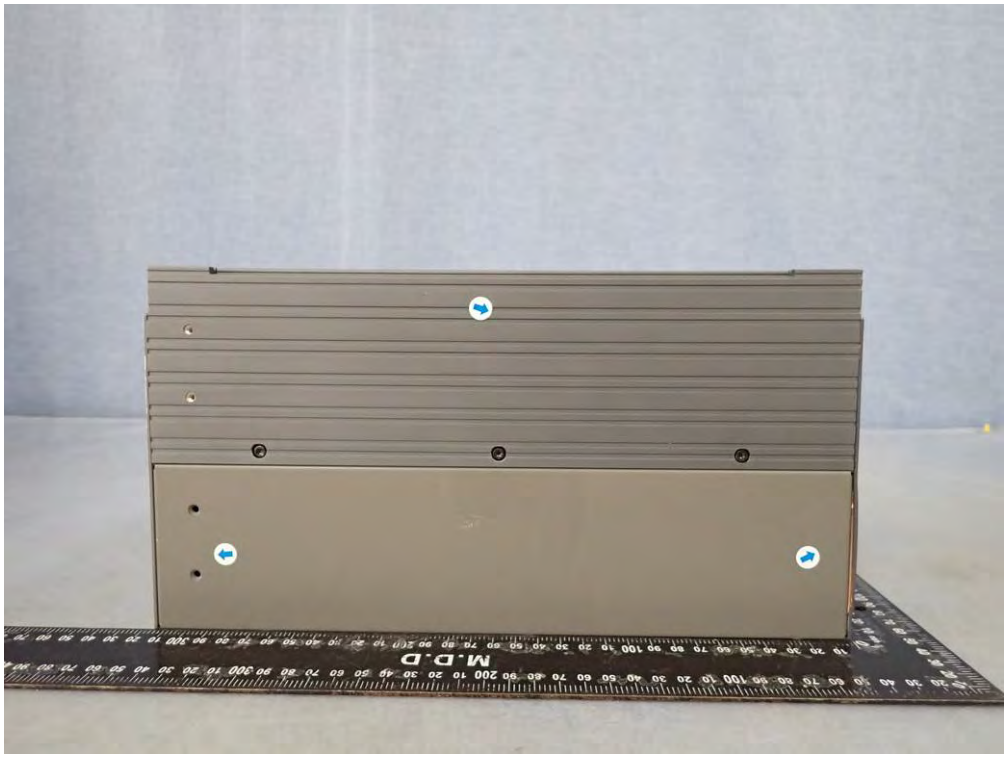


Air Discharge:
Contact Discharge:

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	201A	SD-S019	09/10/2024	09/09/2025
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	05/28/2024	05/27/2025
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
23.6 °C	56 %RH	1009 hpa

2.3.3 Results of Radiated Radio Frequency Electromagnetic (RS)

Model No. : SCH3X2-D7
Tested By : Kevin Chang
Tested Date : November 14, 2024
Basic Standard : C37.90.2
Frequency range : 80 MHz - 1000 MHz
: 80 MHz, 160 MHz, 450 MHz, 900 MHz
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	80	Vertical/Horizontal	Class 1 / Remark 1	0 degree
6	80	Vertical/Horizontal	Class 1 / Remark 1	90 degree
7	80	Vertical/Horizontal	Class 1 / Remark 1	180 degree
8	80	Vertical/Horizontal	Class 1 / Remark 1	270 degree
9	160	Vertical/Horizontal	Class 1 / Remark 1	0 degree
10	160	Vertical/Horizontal	Class 1 / Remark 1	90 degree
11	160	Vertical/Horizontal	Class 1 / Remark 1	180 degree
12	160	Vertical/Horizontal	Class 1 / Remark 1	270 degree
13	450	Vertical/Horizontal	Class 1 / Remark 1	0 degree
14	450	Vertical/Horizontal	Class 1 / Remark 1	90 degree
15	450	Vertical/Horizontal	Class 1 / Remark 1	180 degree
16	450	Vertical/Horizontal	Class 1 / Remark 1	270 degree
17	900	Vertical/Horizontal	Class 1 / Remark 1	0 degree
18	900	Vertical/Horizontal	Class 1 / Remark 1	90 degree
19	900	Vertical/Horizontal	Class 1 / Remark 1	180 degree
20	900	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 Test System	EMC-Partner	IMU-MGE	109937-1545	05/27/2024	05/26/2025
DIP	EMC-Partner	VAR-EXT1000	103470-1724	05/27/2024	05/26/2025
Test Software	TEMA3000 v4.7.3				
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					

2.4.2 EUT Operating Condition

Environment:

Temperature	Humidity	Air Pressure
22.7 °C	52 %RH	1009 hpa

2.4.3 Results of Electrical Fast Transient (EFT)

Model No. : SCH3X2-D7
Tested By : James Chou
Tested Date : December 14, 2024
Basic Standard : C37.90.1
Test Voltage : DC 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 2
N	+/-	4	Class 1 / Remark 2
PE	+/-	4	Class 1 / Remark 2
L-N	+/-	4	Class 1 / Remark 2
L-PE	+/-	4	Class 1 / Remark 2
N-PE	+/-	4	Class 1 / Remark 2
L-N-PE	+/-	4	Class 1 / Remark 2
RJ45	+/-	4	Class 1 / Remark 3

Remark: 1: No degradation of performance or loss of function.
2: The screen of monitor was flickered and the transmitting was interrupted during test. It could become normal after test stop.
3: The transmitting was interrupted during test. It could become normal after test stop.

2.5 Test of C37.90.1

2.5.1 Test Instruments

Immunity Shield Room					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
Damped Oscillatory Generator	EM Test	OCS 500N6.14	P1637183852	09/18/2024	09/17/2026
CDN	EM Test	CNV 504N5.1	P1615178440	09/18/2024	09/17/2026
Capacitive Clamp	Haefely	CCL-4/S	080421-13	01/31/2024	01/30/2025
Software	IEC Control Ver.6.0.1				
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					

2.5.2 EUT Operating Condition

Environment:

Temperature	Humidity	Air Pressure
23.1 °C	53 %RH	1009 hpa

2.5.3 Results of Damped Oscillatory Wave Immunity

Model No. : SCH3X2-D7
Tested By : Jacky Lin
Tested Date : November 14, 2024
Basic Standard : C37.90.1
Voltage Rise Time : 75 ns ± 20 %
Voltage Oscillation Frequencies: 1 MHz ± 10 %
Damped Oscillatory Wave : AC Input~ Transverse mode: 2.5kV
Common mode: 2.5kV
Signal~ Common mode: 2.5kV

Observation:

Power

Test Point	Test Level (kV)	Results
Transverse	2.5	Class 1 / Remark 1
Common	2.5	Class 1 / Remark 1

Signal

Test Point	Test Level (kV)	Results
Common	2.5	Class 1 / Remark 1

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

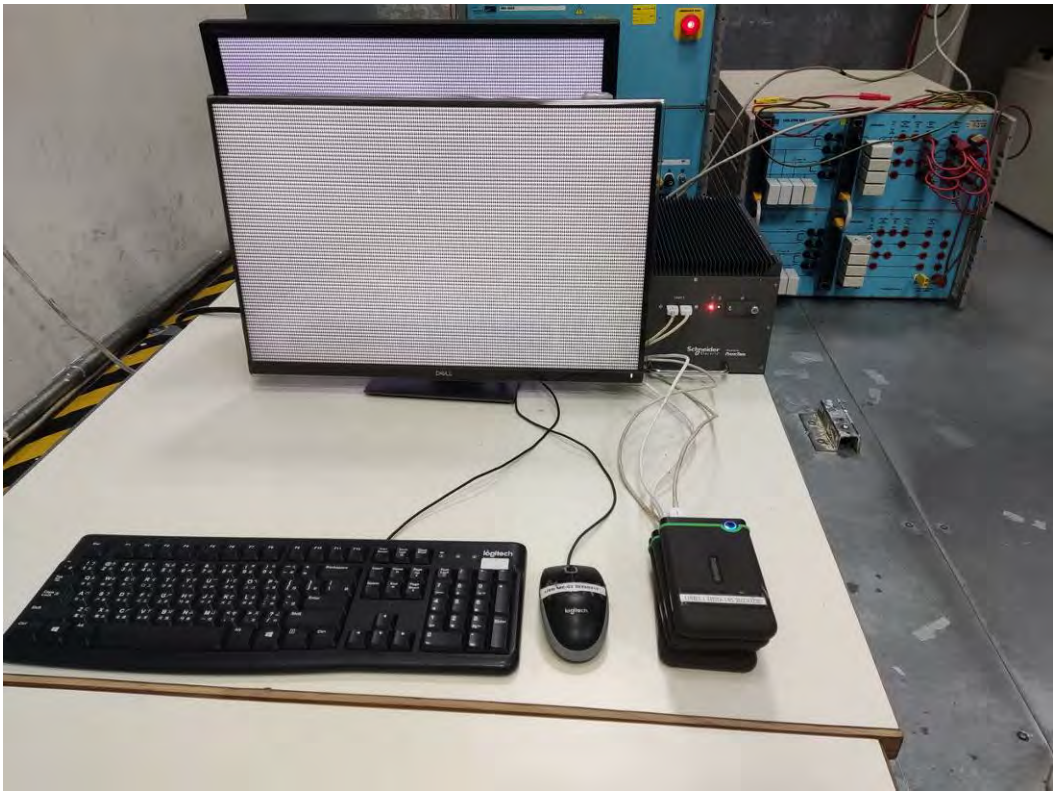
APPENDIX

Photograph of Testing General Set-up

ESD Testing Set-up

RS Testing Set-up

EFT Testing Set-up



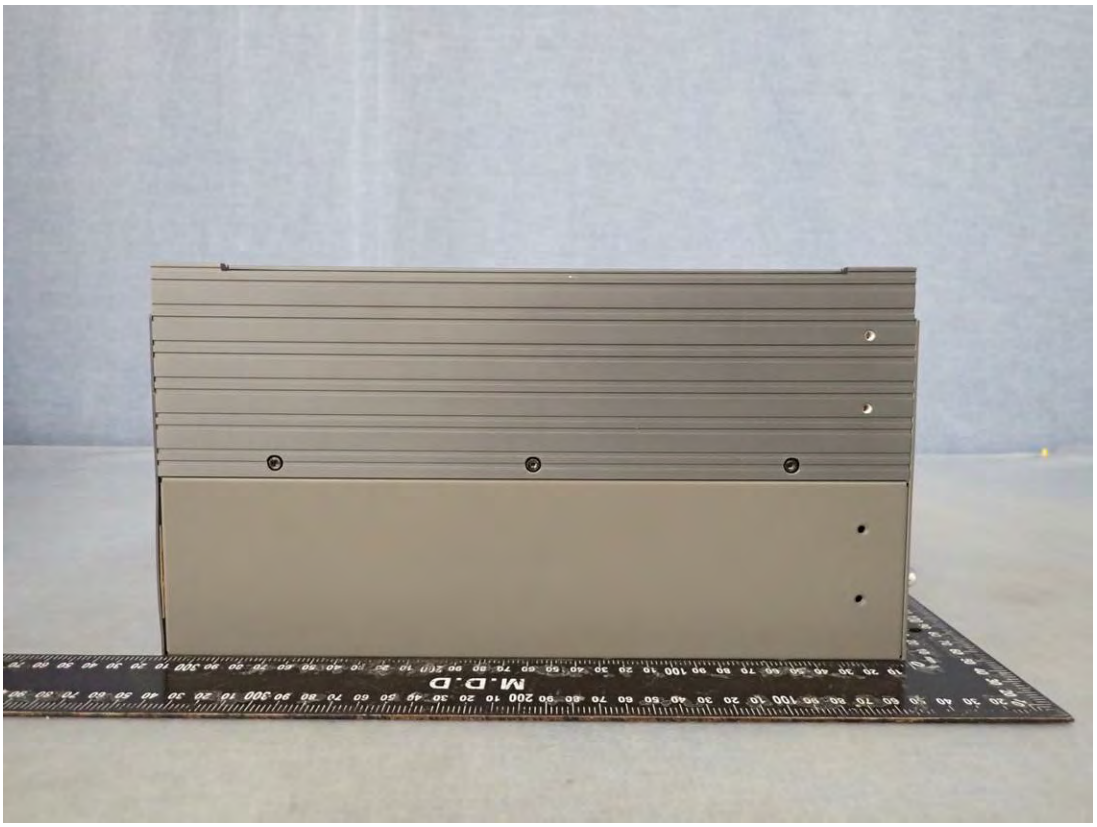
EFT For I/O Testing Set-up

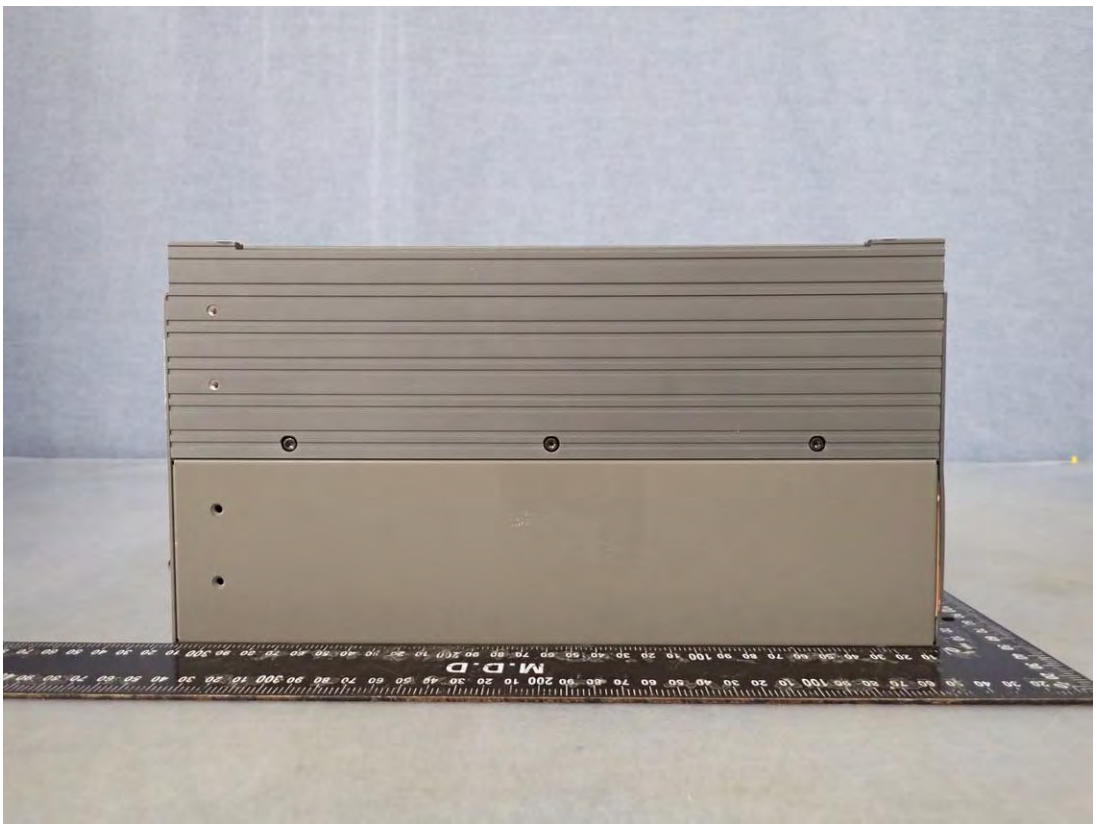
Damped Oscillatory Wave Testing Set-up

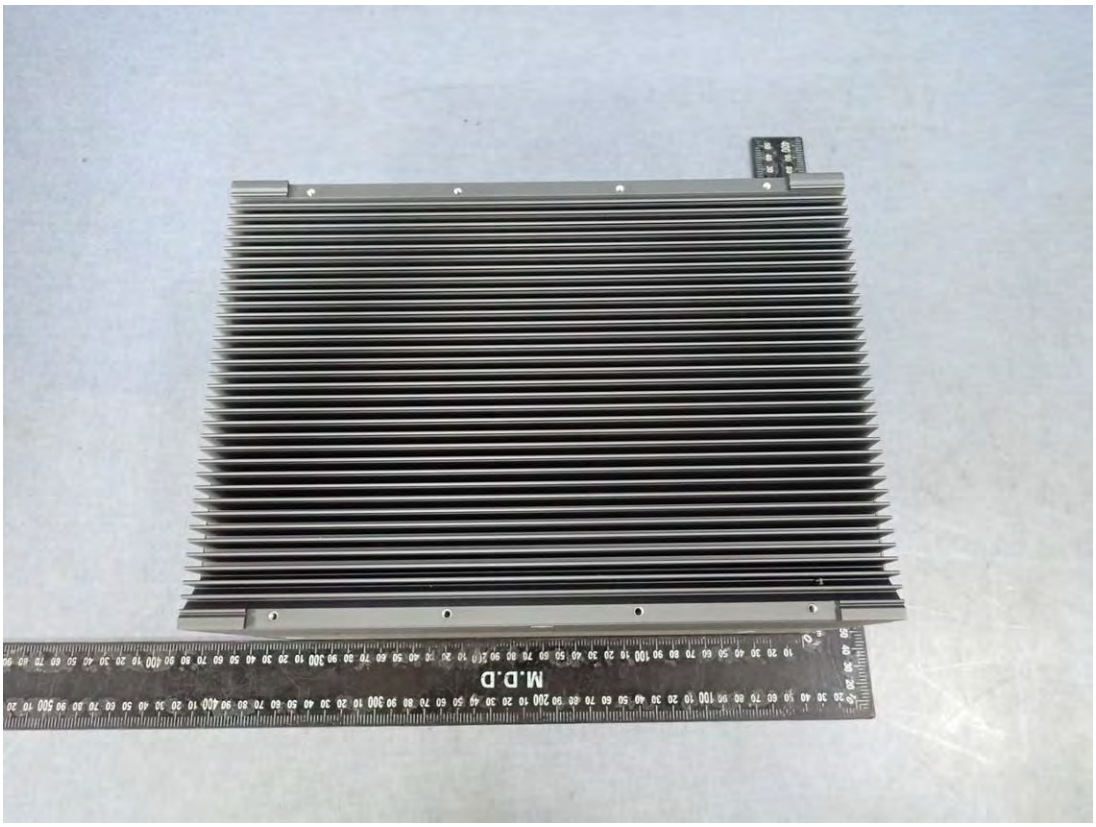
Damped Oscillatory Wave For I/O Testing Set-up

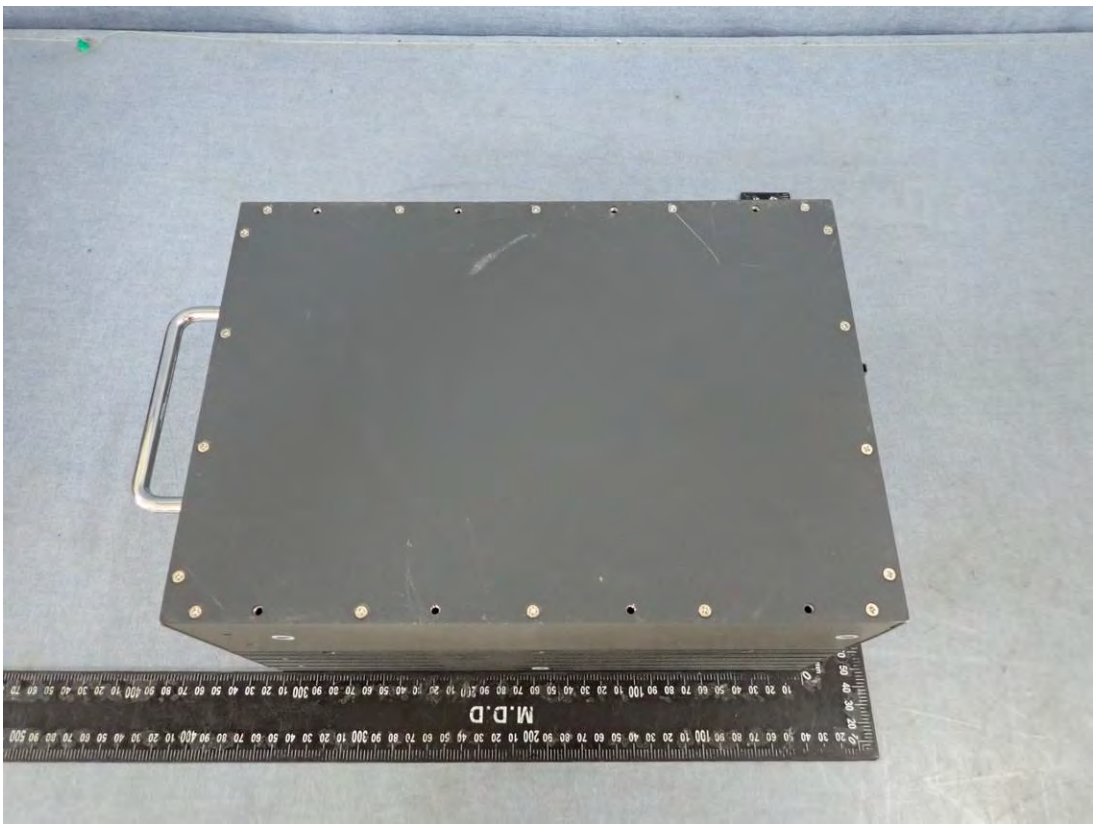
Photographs of EUT Unit

Exterior









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