

# 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:**

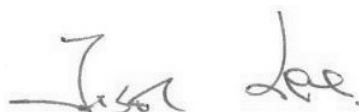
IEC 61850-3: 2013 (Ed 2.0) Clause 6.7 CISPR 22: 2008	
EN IEC 61000-3-2: 2019 + A1: 2021	
EN 61000-3-3: 2013 + A1: 2019 + A2: 2021 + AC: 2022	
IEC 61000-4-2: 2008	IEC 61000-4-11: 2020 + COR1: 2020 + COR2: 2022 (Ed. 3.0)
IEC 61000-4-3: 2020 (Ed. 4.0)	IEC 61000-4-16: 2015 (Ed. 2.0)
IEC 61000-4-4: 2012	IEC 61000-4-17: 1999 + AMD1:2001 + AMD2: 2008 (Ed. 1.2)
IEC 61000-4-5: 2014 + A1: 2017	IEC 61000-4-18: 2019 + COR1:2019
IEC 61000-4-6: 2013 + COR1: 2015	IEC 61000-4-29: 2000 (Ed. 1.0)
IEC 61000-4-8: 2009	

**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	TMXD2403001043DE	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/ modes are as the following:

#### Conduction Mode (Power port):

1	DP*2 3840*2160@60Hz
---	---------------------

#### Conduction Modes (Telecom port):

1		10Mbps
2	LAN 1	100Mbps
3		1Gbps
4	LAN 2	10Mbps
5		100Mbps
6		1Gbps

#### Radiation Mode:

1	DP*2 3840*2160@60Hz
	DP*2 3840*2160@60Hz / 1-5GHz

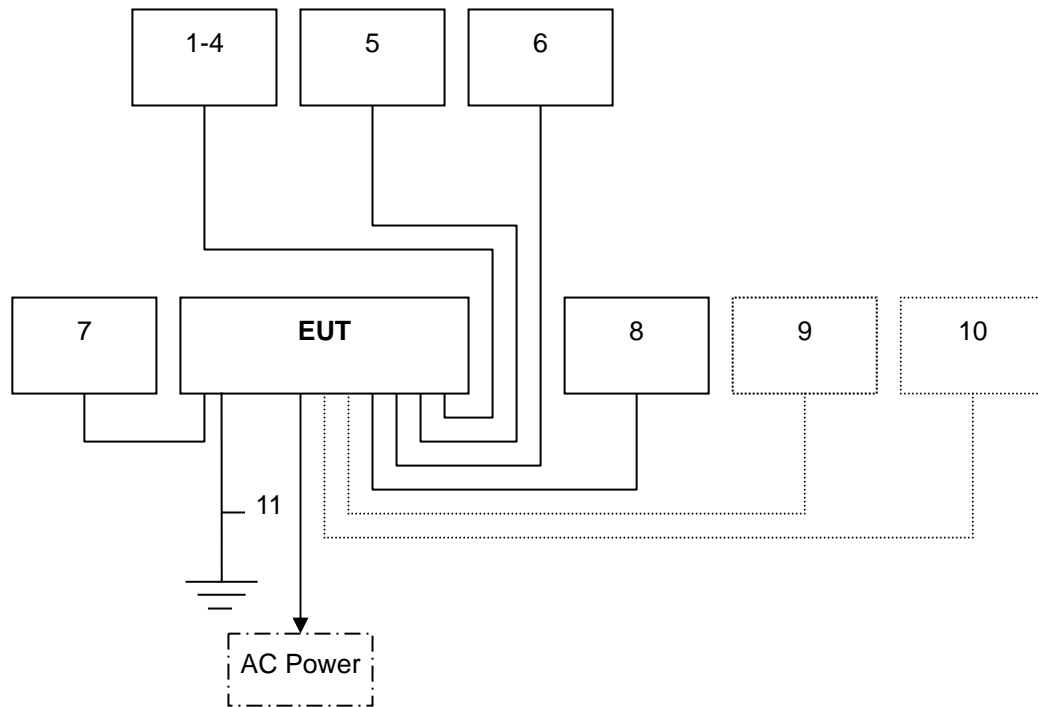
### 1.6 The Final Test Mode of the EUT

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

Final Test Mode	
Conducted Emission	Mode 1
ISN	Mode 4
Radiated Emission Below 1GHz	Mode 1
Radiated Emission Above 1GHz	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
IEC 61850-3: 2013 (Ed 2.0) Clause 6.7 CISPR 22: 2008	Conducted Emission	PASS
	ISN	PASS
	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
IEC 61000-4-2: 2008	ESD	PASS
IEC 61000-4-3: 2020 (Ed. 4.0)	RS	PASS
IEC 61000-4-4: 2012	EFT	PASS
IEC 61000-4-5: 2014 + A1: 2017	Surge	PASS
IEC 61000-4-6: 2013 + COR1: 2015	CS	PASS
IEC 61000-4-8: 2009	PFMF	PASS
IEC 61000-4-11: 2020 + COR1: 2020 + COR2: 2022 (Ed. 3.0)	DIP	PASS
IEC 61000-4-16: 2015 (Ed. 2.0)	Power frequency immunity	N/A
IEC 61000-4-17: 1999 + AMD1:2001 + AMD2: 2008 (Ed. 1.2)	Ripple on DC Power immunity	N/A
IEC 61000-4-18: 2019 + COR1:2019	Damped Oscillatory wave immunity	PASS
IEC 61000-4-29: 2000 (Ed. 1.0)	DC Input power voltage dip and interruptions	N/A

## 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

#### **Maximum permissible level of Line Conducted Emission**

FREQUENCY (MHz)	Quasi-peak	Average
0.15 - 0.5	79	66
0.50 - 5.0	73	60
5.0 - 30.0	73	60

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

#### **Maximum permissible level of Common Mode Conducted Emission (Telecommunication Ports)**

FREQUENCY (MHz)	Voltage Limit(dBuV)		Current Limit(dBuA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	97 - 87	84 - 74	53 - 43	40 - 30
0.5 - 30.0	87	74	43	30

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

#### **Maximum permissible level of Radiated Emission measured at 10 meter**

FREQUENCY (MHz)	Quasi - peak
30 - 230	40
230 - 1000	47

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

#### **Limits above 1 GHz**

#### **Limits for radiated disturbance at a measurement distance of 3m**

Frequency range (GHz)	Average Limit dB( $\mu$ V/m)	Peak Limit dB( $\mu$ V/m)
1 - 3	56	76
3 - 6	60	80

Note: The lower limit applies at the transition frequency.

## 2.2 Conducted Emission

### 2.2.1 Test Instruments

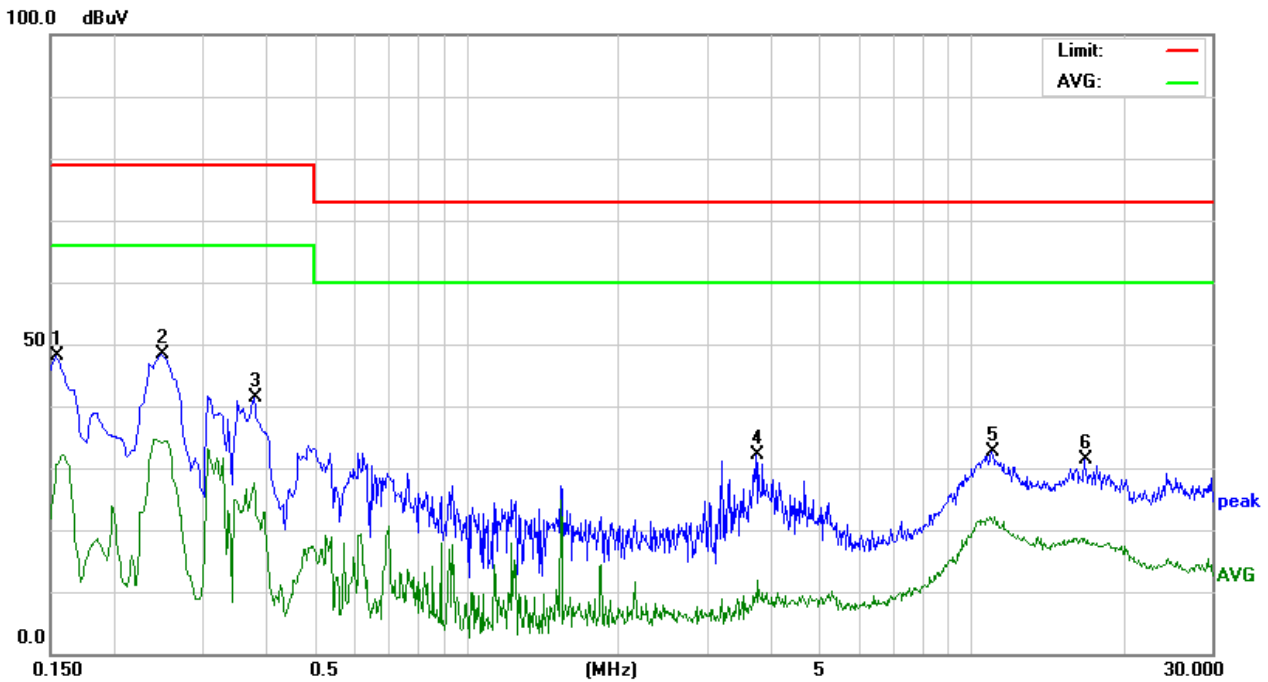
Conducted Emission Room # B					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
Attenuator	MCL	HAT-10	SD-C012	03/18/2024	03/17/2025
BNC Cable	EMEC	CFD300-NL	SD-C020	12/28/2023	12/27/2024
EMI Test Receiver	R&S	ESR3	102166	03/05/2024	03/04/2025
LISN	Schwarzbeck	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
ISN	Teseq	ISN T800	30847	03/13/2024	03/12/2025
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 U <sub>lab</sub> (k=2) of Conducted Emission is 2.8 dB.					
Expanded uncertainty U <sub>lab</sub> (k=2) of ISN Conducted Emission is 3.1 dB					
Expanded uncertainty CISPR 16-4-2:2011+A1:2014+A2:2018 (k=2) of Conducted Emission measurement is 3.8 dB.					
Expanded uncertainty CISPR 16-4-2:2011+A1:2014+A2:2018 (k=2) of ISN Conducted Emission measurement is 5.0 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)

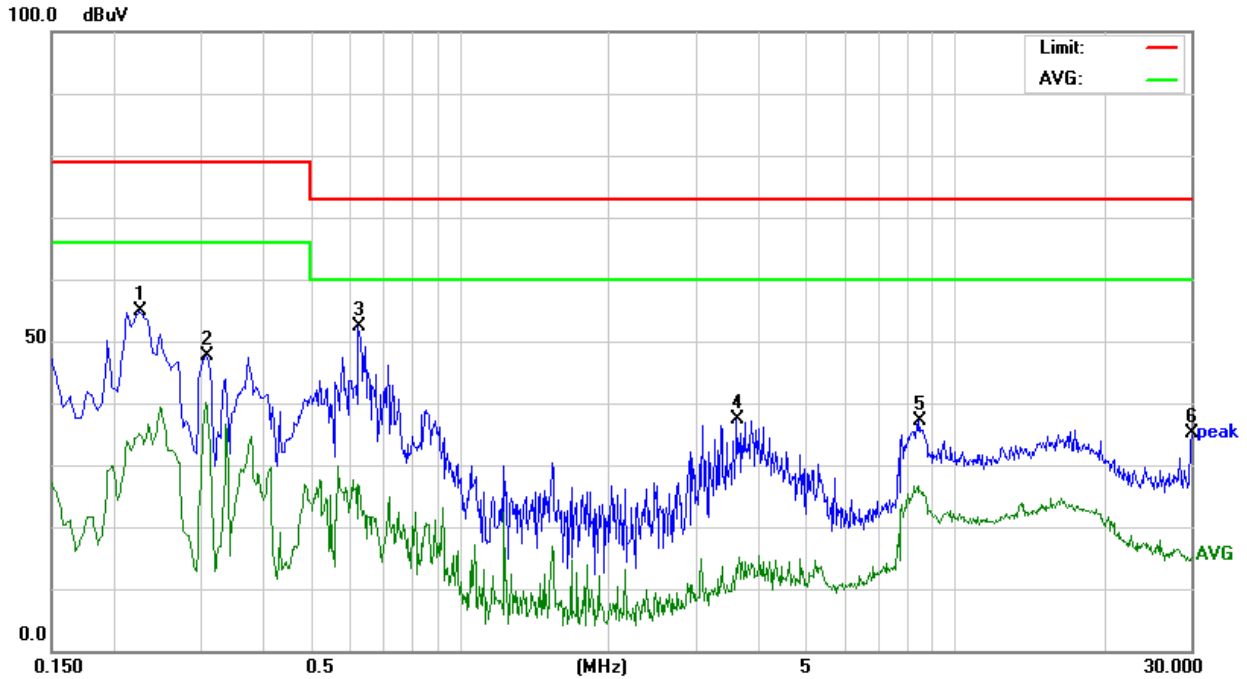
<b>Model No.</b>	SCH4X2-A9	<b>6dB Bandwidth</b>	9 kHz
<b>Environmental Conditions</b>	22.5°C, 61% RH	<b>Test Mode</b>	Mode 1
<b>Tested by</b>	Jacky Lin	<b>Phase</b>	L1
<b>Test Date</b>	2024/04/26		



Conducted Emission Readings							
Frequency Range Investigated				150 kHz to 30 MHz			
Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (P/Q/A)	Line (L1/L2)
0.1545	38.17	10.05	48.22	79.00	-30.78	P	L1
0.2490	38.39	9.99	48.38	79.00	-30.62	P	L1
0.3795	31.39	10.00	41.39	79.00	-37.61	P	L1
3.7545	21.81	10.26	32.07	73.00	-40.93	P	L1
10.9635	22.01	10.59	32.60	73.00	-40.40	P	L1
16.7730	20.40	10.87	31.27	73.00	-41.73	P	L1

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

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

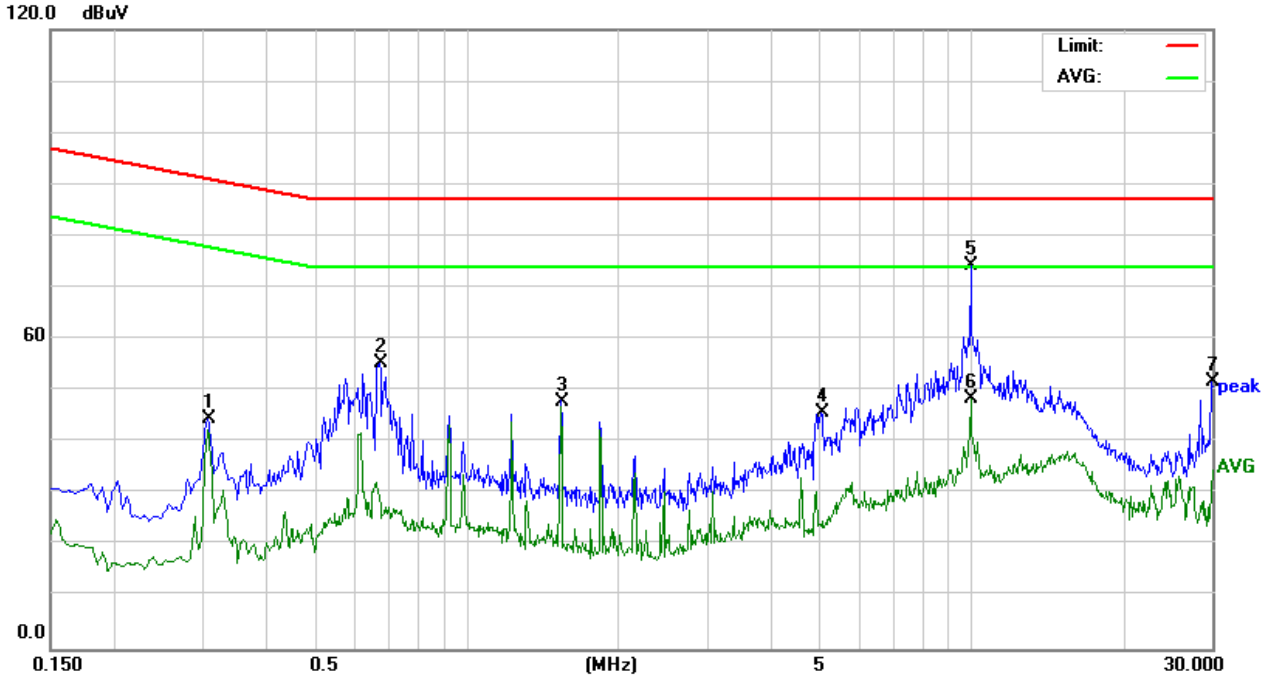


Conducted Emission Readings							
Frequency Range Investigated				150 kHz to 30 MHz			
Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (P/Q/A)	Line (L1/L2)
0.2265	44.94	9.99	54.93	79.00	-24.07	P	L2
0.3075	37.56	9.99	47.55	79.00	-31.45	P	L2
0.6270	42.42	10.01	52.43	73.00	-20.57	P	L2
3.6285	27.10	10.25	37.35	73.00	-35.65	P	L2
8.4570	26.75	10.49	37.24	73.00	-35.76	P	L2
30.0000	23.76	11.48	35.24	73.00	-37.76	P	L2

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

### 2.2.4 Measurement Data (ISN)

<b>Model No.</b>	SCH4X2-A9	<b>6dB Bandwidth</b>	9 kHz
<b>Environmental Conditions</b>	22.5°C, 61% RH	<b>Test Mode</b>	Mode 4
<b>Tested by</b>	Jacky Lin	<b>Test Date</b>	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 (P/Q/A)
0.3075	24.88	19.80	44.68	91.04	-46.36	P
0.6720	35.62	19.66	55.28	87.00	-31.72	P
1.5405	28.32	19.68	48.00	87.00	-39.00	P
5.0370	25.94	19.72	45.66	87.00	-41.34	P
10.0050	54.34	19.78	74.12	87.00	-12.88	P
10.0050	28.80	19.78	48.58	74.00	-25.42	A
29.9985	31.40	20.34	51.74	87.00	-35.26	P

## 2.3 Radiated Emission

### 2.3.1 Test Instruments

#### Below 1GHz

Open Area Test Site # H					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
Bilog Antenna	Teseq	CBL 6112D	36995	06/13/2023	06/12/2024
Cable	EMEC	CFD400E-LW	SD-R074	08/10/2023	08/09/2024
EMI Test Receiver	R&S	ESCI	101340	01/22/2024	01/21/2025
Pre-Amplifier	HP	8447D	1937A01554	09/21/2023	09/20/2024
Thermo-Hygro Meter	Wisewind	201A	No. 03	05/23/2023	05/22/2024
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 Ulab (k=2) of Radiated Emission is 5.1 dB.(30MHz-1000MHz)					
Expanded uncertainty CISPR 16-4-2:2011+A1:2014+A2:2018 (k=2) of Radiated Emission measurement is 5.2 dB.(30MHz-1000MHz)					

#### Above 1GHz

Chamber # E					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
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 (k=2) of Radiated Emission measurement is 4.6 dB.(1-6GHz)					
Expanded uncertainty CISPR 16-4-2:2011+A1:2014+A2:2018 (k=2) of Radiated Emission measurement is 5.5 dB.(1-6GHz)					

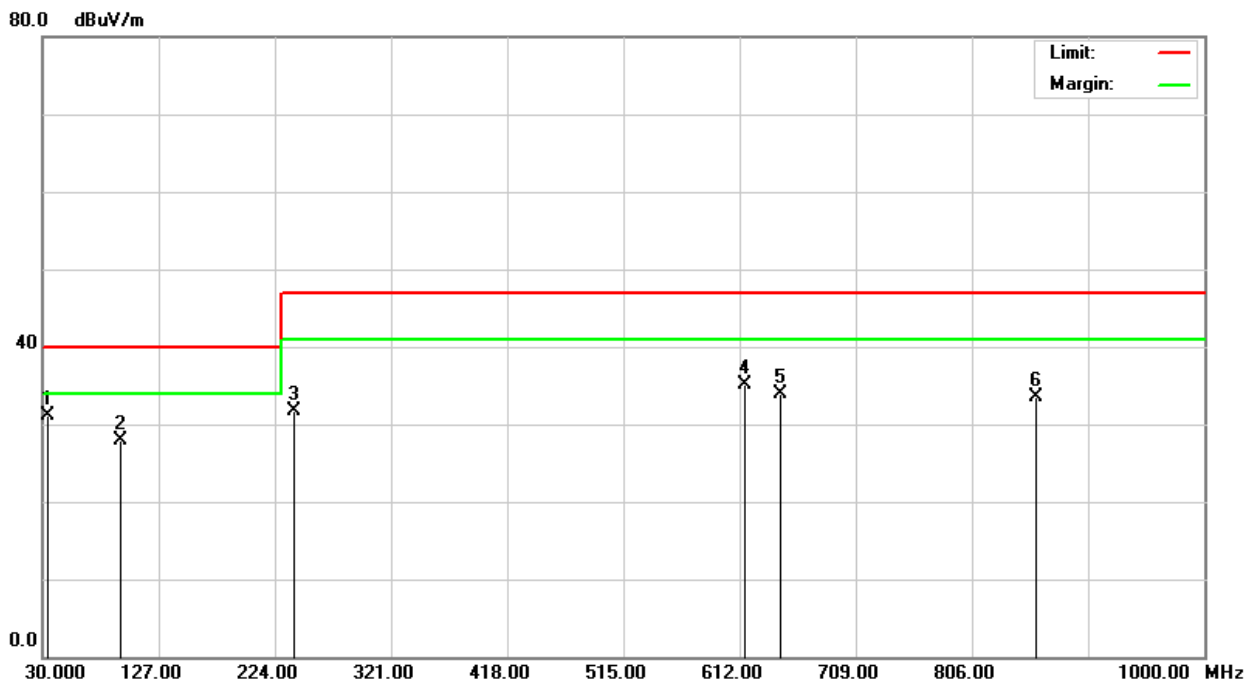
### 2.3.2 Measurement Level Calculation

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

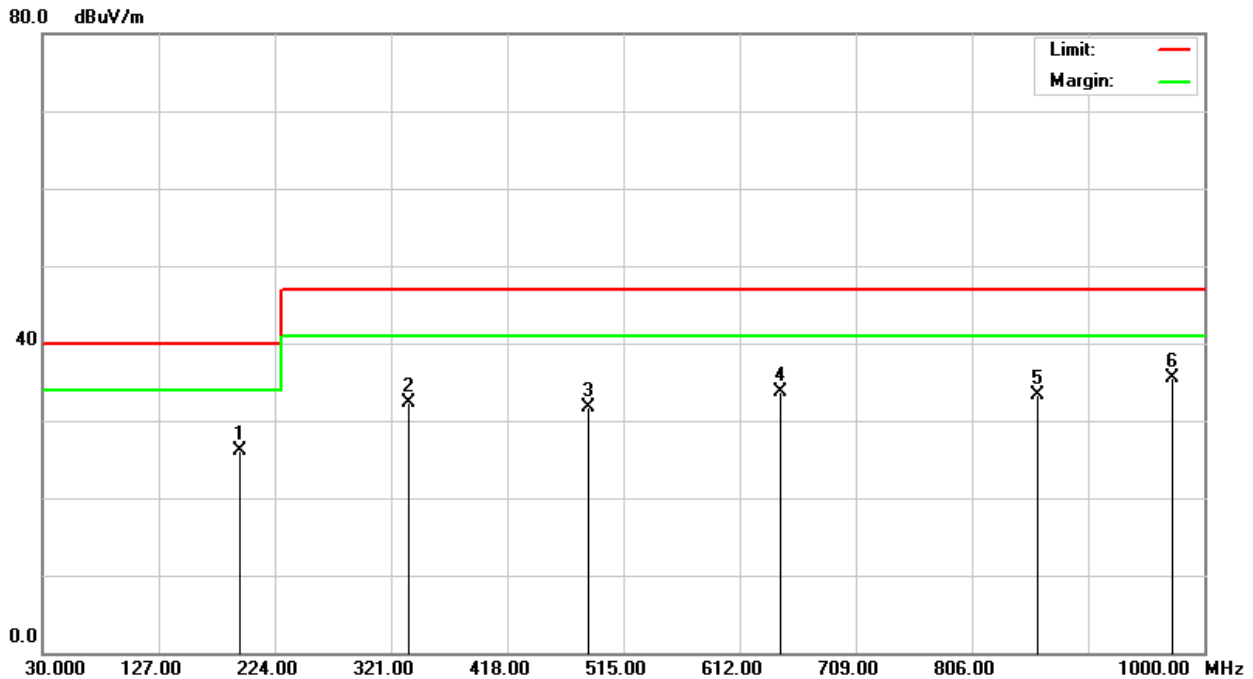
<b>Model No.</b>	SCH4X2-A9	<b>Test Mode</b>	Mode 1
<b>Environmental Conditions</b>	19.9°C, 71% RH	<b>6dB Bandwidth</b>	120 kHz
<b>Antenna Pole</b>	Vertical	<b>Antenna Distance</b>	10m
<b>Detector Function</b>	Quasi-peak.	<b>Tested by</b>	Jacky Lin
<b>Test Date</b>	2024/04/27		



Radiated Emission Readings									
Frequency Range Investigated				30 MHz to 1000 MHz at 10m					
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Detector (P/Q)	Pol. (H/V)
34.5600	35.50	-4.39	31.11	40.00	-8.89	100	128	Q	V
94.8900	38.40	-10.45	27.95	40.00	-12.05	100	25	Q	V
240.0000	39.60	-7.88	31.72	47.00	-15.28	100	33	Q	V
616.0000	33.90	1.30	35.20	47.00	-11.80	400	89	Q	V
646.7800	32.40	1.56	33.96	47.00	-13.04	400	321	Q	V
860.1300	29.00	4.47	33.47	47.00	-13.53	400	77	Q	V

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

<b>Model No.</b>	SCH4X2-A9	<b>Test Mode</b>	Mode 1
<b>Environmental Conditions</b>	19.9°C, 71% RH	<b>6dB Bandwidth</b>	120 kHz
<b>Antenna Pole</b>	Horizontal	<b>Antenna Distance</b>	10m
<b>Detector Function</b>	Quasi-peak.	<b>Tested by</b>	Jacky Lin
<b>Test Date</b>	2024/04/27		



Radiated Emission Readings									
Frequency Range Investigated				30 MHz to 1000 MHz at 10m					
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Detector (P/Q)	Pol. (H/V)
195.2400	36.50	-10.43	26.07	40.00	-13.93	400	159	Q	H
336.1800	37.20	-4.92	32.28	47.00	-14.72	400	368	Q	H
486.0500	32.60	-0.83	31.77	47.00	-15.23	100	224	Q	H
646.7100	32.10	1.56	33.66	47.00	-13.34	100	15	Q	H
860.3400	28.90	4.47	33.37	47.00	-13.63	100	328	Q	H
972.9600	30.20	5.33	35.53	47.00	-11.47	100	105	Q	H

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



**Above 1GHz**

<b>Model No.</b>	SCH4X2-A9	<b>Test Mode</b>	Mode 1
<b>Environmental Conditions</b>	21.5°C, 62% RH	<b>6dB Bandwidth</b>	1 MHz
<b>Antenna Pole</b>	Vertical / Horizontal	<b>Antenna Distance</b>	3m
<b>Highest frequency generated or used</b>	1000MHz	<b>Upper frequency</b>	5000MHz
<b>Detector Function</b>	Peak and average.	<b>Tested by</b>	Jacky Lin
<b>Test Date</b>	2024/04/27		

<b>Radiated Emission Readings</b>							
<b>Frequency Range Investigated</b>				<b>Above 1GHz at 3m</b>			
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/A)	Pol. (H/V)
<b>1160.000</b>	<b>60.92</b>	<b>-8.60</b>	<b>52.32</b>	<b>76.00</b>	<b>-23.68</b>	<b>P</b>	<b>V</b>
<b>1710.000</b>	<b>60.17</b>	<b>-7.29</b>	<b>52.88</b>	<b>76.00</b>	<b>-23.12</b>	<b>P</b>	<b>V</b>
<b>2490.000</b>	<b>53.63</b>	<b>-4.49</b>	<b>49.14</b>	<b>76.00</b>	<b>-26.86</b>	<b>P</b>	<b>V</b>
<b>2995.000</b>	<b>54.70</b>	<b>-4.05</b>	<b>50.65</b>	<b>76.00</b>	<b>-25.35</b>	<b>P</b>	<b>V</b>

<b>Radiated Emission Readings</b>							
<b>Frequency Range Investigated</b>				<b>Above 1GHz at 3m</b>			
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/A)	Pol. (H/V)
<b>1240.000</b>	<b>58.12</b>	<b>-8.49</b>	<b>49.63</b>	<b>76.00</b>	<b>-26.37</b>	<b>P</b>	<b>H</b>
<b>1675.000</b>	<b>60.62</b>	<b>-7.59</b>	<b>53.03</b>	<b>76.00</b>	<b>-22.97</b>	<b>P</b>	<b>H</b>
<b>1865.000</b>	<b>56.83</b>	<b>-5.20</b>	<b>51.63</b>	<b>76.00</b>	<b>-24.37</b>	<b>P</b>	<b>H</b>
<b>2620.000</b>	<b>56.86</b>	<b>-4.34</b>	<b>52.52</b>	<b>76.00</b>	<b>-23.48</b>	<b>P</b>	<b>H</b>
<b>3000.000</b>	<b>56.40</b>	<b>-4.05</b>	<b>52.35</b>	<b>76.00</b>	<b>-23.65</b>	<b>P</b>	<b>H</b>

**Note:** 1. P= Peak Reading; A= Average Reading.

## 3. Harmonics

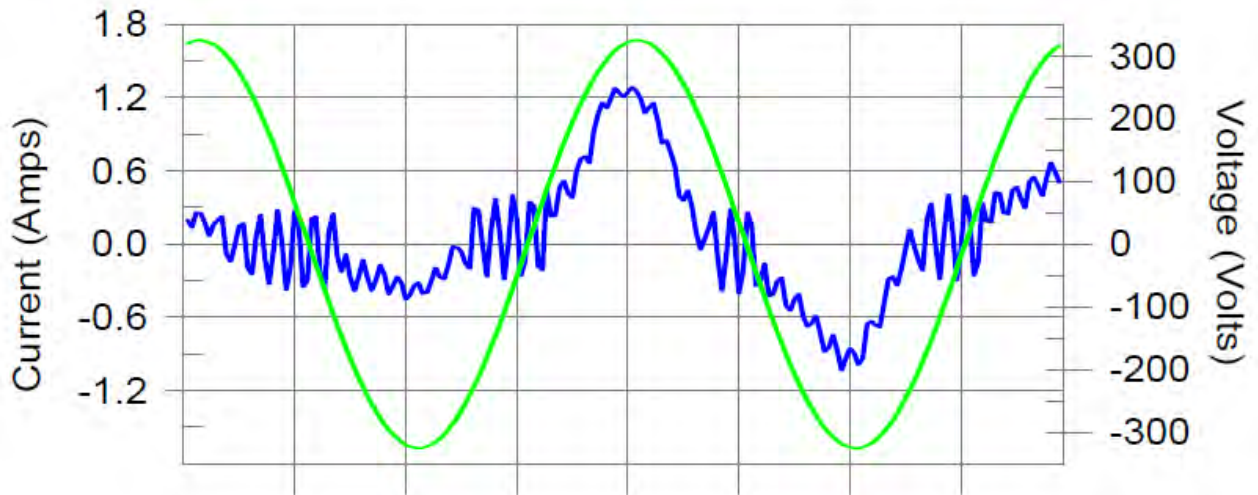
### 3.1 Test Instruments

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					

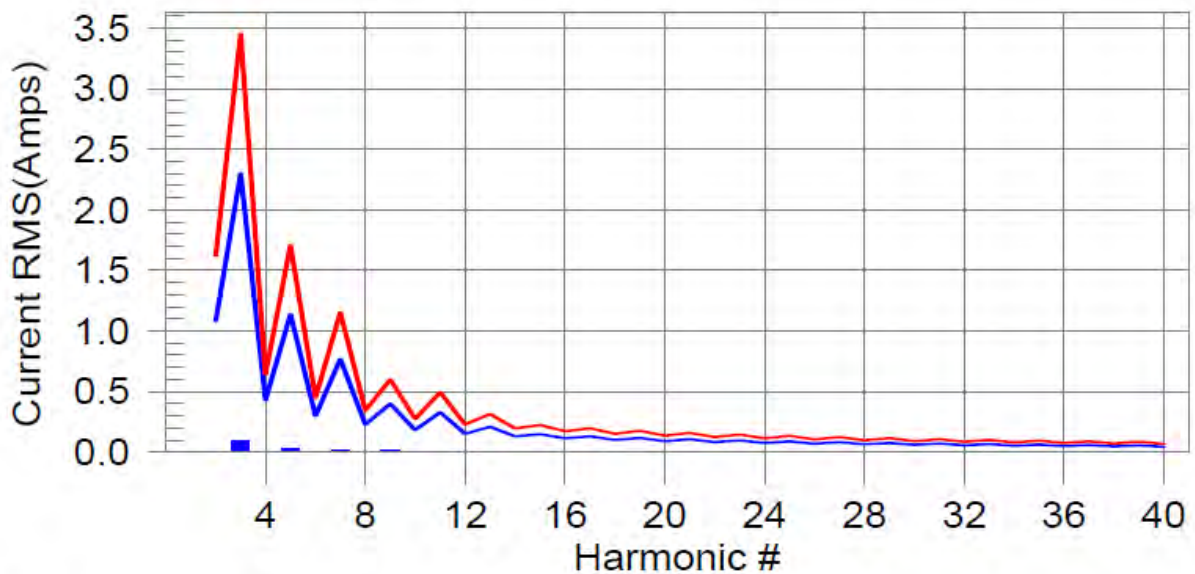
### 3.2 Measurement Data

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 <sub>Peak</sub> (Amps):	1.389	I <sub>RMS</sub> (Amps):	0.442
I <sub>Fund</sub> (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					

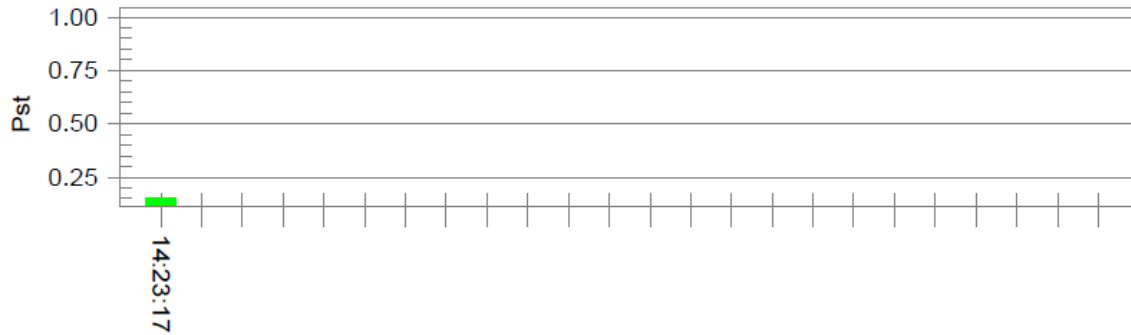
## 4.2 Measurement Data

Test Result: Pass

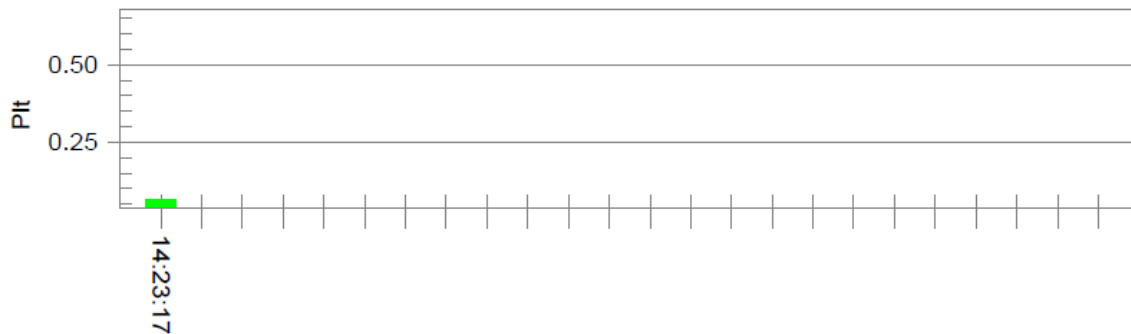
Status: Test Completed

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 CONDITIONS TO BE MET BY CLASS 1 AND CLASS 2 DEVICES

- a) No hardware damage occurs.
- b) No loss or corruption of stored memory or data, including active or stored settings, occurs.
- c) Device resets do not occur, and manual resetting is not required.
- d) No changes in the states of the electrical, mechanical, or communication status outputs occur. This includes alarms, status outputs, or targets.
- e) No erroneous, permanent change of state of the visual, audio, or message outputs results. Momentary changes of these outputs during the tests are permitted.
- f) During the tests, SCADA analog values shall not change by more than 2 % of full-scale values. After the test, accuracy shall revert to the manufacturer-claimed accuracy.

#### 5.1.1 Communication conditions during tests

For reliability class 1 equipment, the manufacturer shall declare the communications Conditions during testing. Although the bit rate and frame size of the communications conditions are not specified in this standard, there shall be communications underway in order to verify that, if disrupted, communications recover.

#### 5.1.2 Additional condition to be met by class 1 devices

Established communications in accordance with 5.1.1 may be disrupted or sustain errors during the period of the tests. If disrupted, the communications recovers within the manufacturer's specified time period.

#### 5.1.3 Additional condition to be met by class 2 devices

Established communications in accordance with 5.1.1 shall NOT be disrupted or experience errors during the period the tests are applied.



## 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

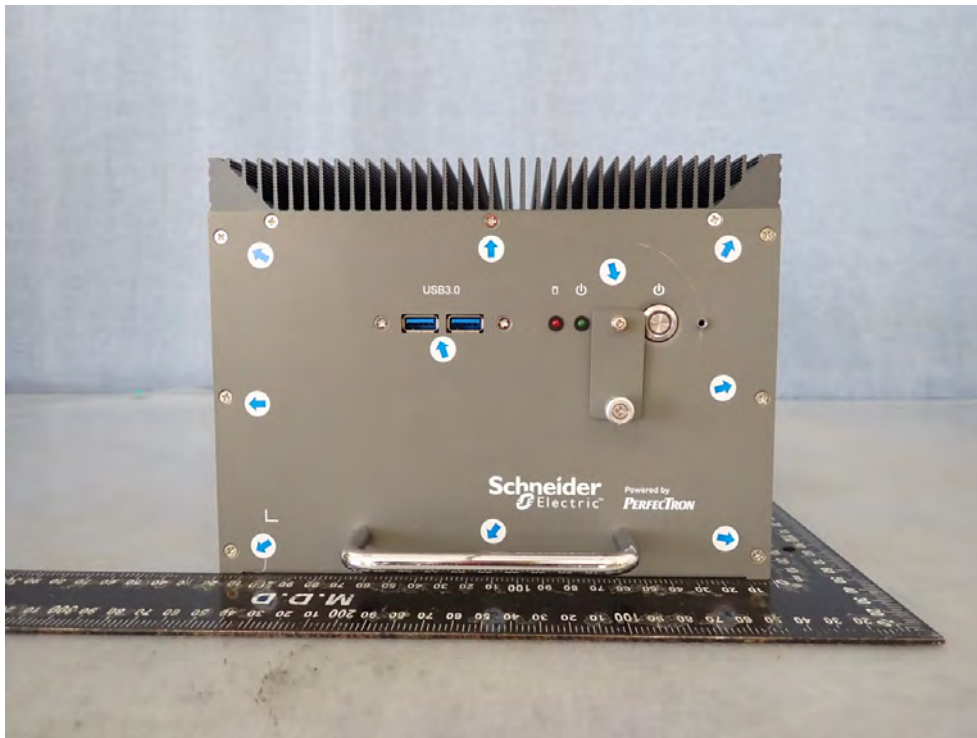
Environment:

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

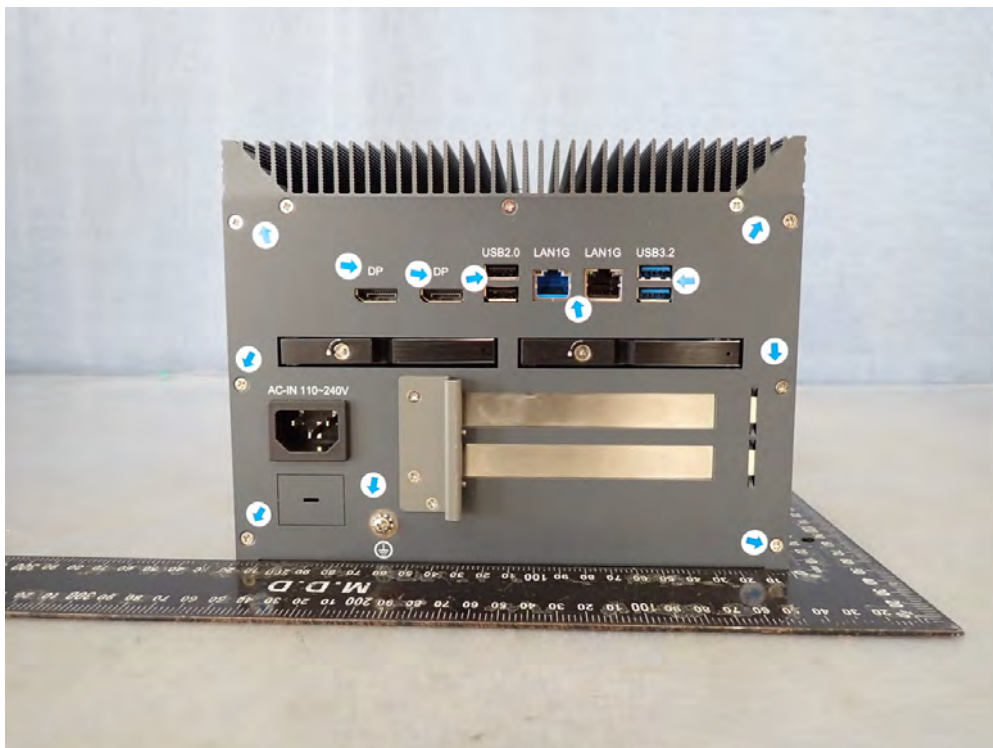


ESD Test point

Front

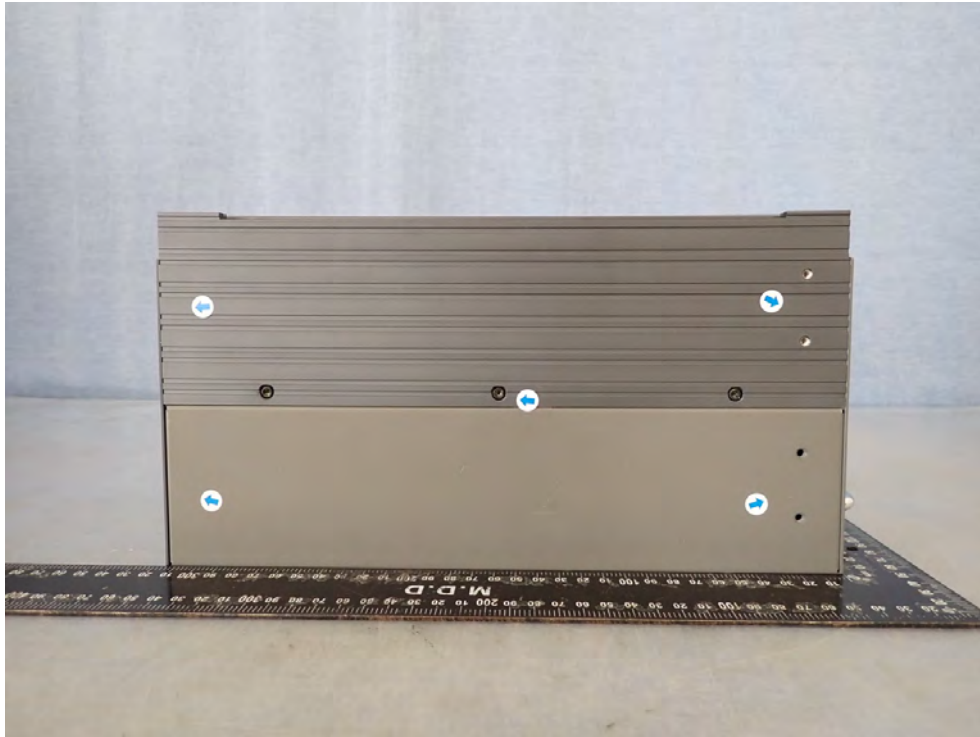


Back

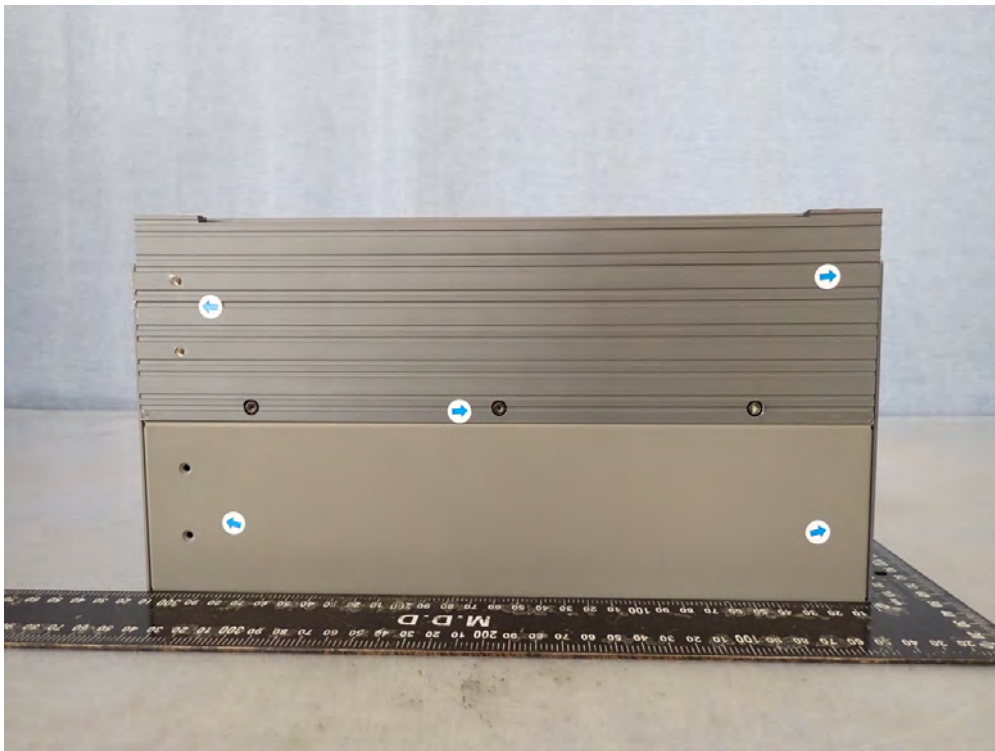


Air Discharge: ↑  
Contact Discharge: ↑

Left

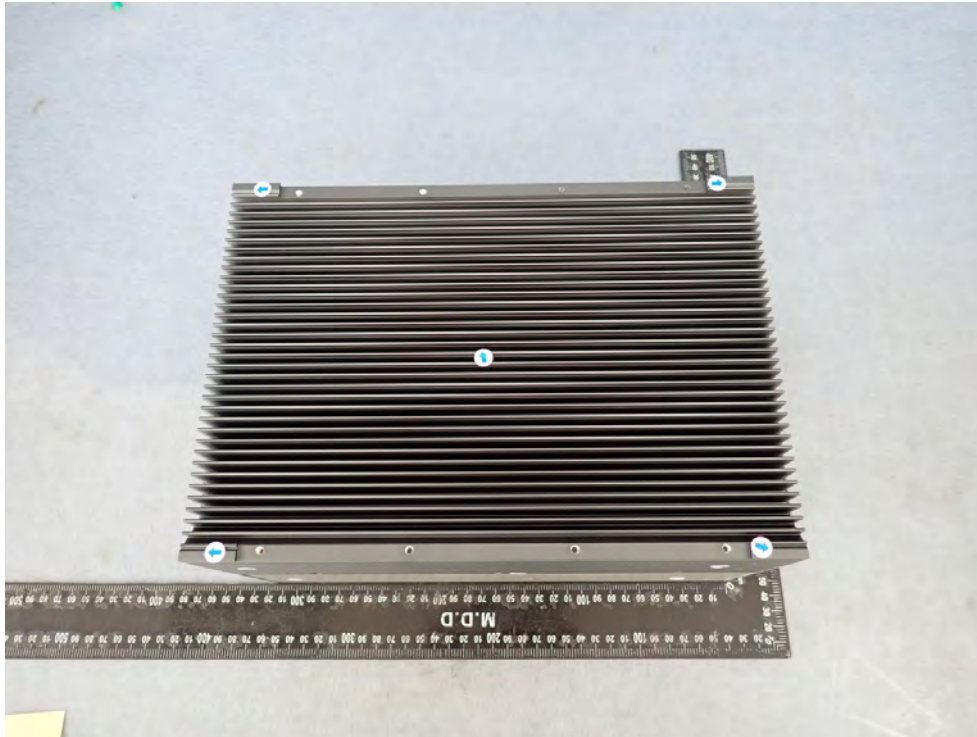


Right



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 - 3000 MHz  
 Field strength : 10 V/m  
 Modulation : 80% AM (1kHz)  
 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 - 3000	Vertical/Horizontal	Class 1 / Remark 1	0 degree
2	80 - 3000	Vertical/Horizontal	Class 1 / Remark 1	90 degree
3	80 - 3000	Vertical/Horizontal	Class 1 / Remark 1	180 degree
4	80 - 3000	Vertical/Horizontal	Class 1 / Remark 1	270 degree

**Remark:** 1: 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. : ± 4 kV  
 Earth : ± 2 kV  
 Polarity : Positive/Negative  
 Impulse Frequency : 5 kHz  
 Tr/Th : 5/50ns  
 Burst : 15ms/300ms

**Observation:**

Test Point	Polarity	Test Level (kV)	Results
L	+/-	2	Class 1 / Remark 2
N	+/-	2	Class 1 / Remark 2
L – N	+/-	2	Class 1 / Remark 2
PE	+/-	2	Class 1 / Remark 2
L – PE	+/-	2	Class 1 / Remark 2
N – E	+/-	2	Class 1 / Remark 2
L – N – PE	+/-	2	Class 1 / Remark 2
RJ45	+/-	4	Class 1 / Remark 2
Functional Earth	+/-	2	Class 1 / Remark 1

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

2: During the test there were generated flickers on the display, the data transmitting was paused, but could recover automatically afterwards.



## 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 : 1.2/50 $\mu$ s (8/20 $\mu$ s)

#### Observation Description

AC input line:

Test Point	Phase Angle (degree)	Polarity (+/-)	Test Level (kV)	Observation
L – N	0, 90, 180, 270	+/-	1	Class 1 / Remark 1
L – PE	0, 90, 180, 270	+/-	2	Class 1 / Remark 1
N – PE	0, 90, 180, 270	+/-	2	Class 1 / Remark 1

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

Signal line:

Test Rate : 1 pulse every minute  
 No. of Tests : 5 positive and 5 negative pulses  
 Waveform : 1.2/50 $\mu$ s (8/20 $\mu$ s)

#### Observation Description

Signal line:

Test Point	Phase Angle (degree)	Polarity (+/-)	Test Level (kV)	Observation
RJ45	No phase angle (degree)	+/-	1	Class 1 / Remark 2

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

2: As signal test, the data tramming of LAN was paused, but It could become normal after test stop.

## 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
EM Clamp	Schaffner	KEMZ 801	19227	11/30/2023	11/29/2024
Test Software	NSG 4070 Control Program V1.2.0				
Testing Site : No.163-1, Zhongsheng 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 : 10 Vrms  
 Modulation : 80% AM, 1 kHz Sinewave  
 Frequency step : 1 % of the preceding frequency  
 Dwell Time : 3 seconds  
 Coupling Method : CDN-M3; CDN-T8; EM-Clamp

Cable Description	Frequency (MHz)	Observation
AC input	0.15 – 80	Class 1 / Remark 1

Signal Ports

Cable Description	Frequency (MHz)	Observation
RJ45	0.15 – 80	Class 1 / Remark 1
Functional Earth	0.15 – 80	Class 1 / Remark 1

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

## 5.7 Test of IEC 61000-4-8

### 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
AC/DC Clamp Meter	Fluke	353	33360025	06/09/2023	06/08/2024
Magnetic Field Coil	Teseq	INA 703 W/ 2141	1976 / 1413	02/23/2024	02/22/2025
Magnetic Field Meter	Sypris	4080	0247	11/14/2023	11/13/2024
Test Software	Win2120Ver. 5.0				
Testing Site : No.163-1, Zhongsheng 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 : IEC 61000-4-8  
 Power Frequency : 50 Hz / 60Hz  
 Field Strength : 100A/m at Continuous; 1000A/m 1s  
 Inductance Coil : Rectangular type, 1mx1m

Direction	Field Strength (A/m)	Observation
X	100	Class 1 / Remark 1
	1000	Class 1 / Remark 1
Y	100	Class 1 / Remark 1
	1000	Class 1 / Remark 1
Z	100	Class 1 / Remark 1
	1000	Class 1 / Remark 1

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

## 5.8 Test of IEC 61000-4-11

### 5.8.1 Test Instruments

Immunity Shielded Room					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
AC/DC Clamp Meter	Lutron	CM-9930R	I.200121	03/08/2024	03/07/2025
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					

### 5.8.2 EUT Operating Condition

Environment:

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

### 5.8.3 Results of Voltage Dips Immunity

Model No. : SCH4X2-A9  
 Tested By : Jacky Lin  
 Tested Date : May 24, 2024  
 Test Mode : Mode 1  
 Basic Standard : IEC 61000-4-11  
 Reduction Voltage : 30, 60, 100 % Ut  
 Phase Angle : 0, 180 degree  
 Test cycle : 3 times

Environmental phenomena	Test specification (% reduction)	Duration (Cycle)	Observation
Voltage Interruptions	100	50	Class 1 / Remark 2
Voltage dips	30	1	Class 1 / Remark 1
	60	50	Class 1 / Remark 2
	100	5	Class 1 / Remark 2

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

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

## 5.9 Test of IEC 61000-4-16

### 5.9.1 Test Instruments

Immunity Shield Room					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
Software					
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					

### 5.9.2 EUT Operating Condition

Environment:

Temperature	Humidity	Air Pressure
N/A	N/A	N/A

### 5.9.3 Result of Power Frequency Immunity

Model No. : N/A  
 Tested By : N/A  
 Tested Date : N/A  
 Test Mode : N/A  
 Basic Standard : IEC 61000-4-16  
 Main frequency : 0Hz; 16.7Hz; 50Hz; 60Hz  
 Continuous disturbance : 30 V  
 Short duration disturbance : 300 V

Main frequency	Voltage Applied dBuV(V)	Observation
0Hz	30V	Remark 1
	300V	Remark 1
16.7Hz	30V	Remark 1
	300V	Remark 1
50Hz	30V	Remark 1
	300V	Remark 1
60Hz	30V	Remark 1
	300V	Remark 1

**Remark:** 1: The subject equipment is not intended to be connected to DC mains supply. Therefore, this test is not applicable.

## 5.10 Test of IEC 61000-4-17

### 5.10.1 Test Instruments

Immunity Shield Room					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
Software					
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					

### 5.10.2 EUT Operating Condition

Environment:

Temperature	Humidity	Air Pressure
N/A	N/A	N/A

### 5.10.3 Result of Ripple on DC Power Immunity

Model No. : N/A  
 Tested By : N/A  
 Tested Date : N/A  
 Test Mode : N/A  
 Basic Standard : IEC 61000-4-17  
 DC input Power : 10% normal DC Voltage  
 Observation : N/A

**Remark:** 1: The subject equipment is not intended to be connected to DC mains supply. Therefore, this test is not applicable.





## 5.12 Test of IEC 61000-4-29

### 5.12.1 Test Instruments

Immunity Shield Room					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					

### 5.12.2 EUT Operating Condition

Environment:

Temperature	Humidity	Air Pressure
N/A	N/A	N/A

### 5.12.3 Result of DC Input Power Voltage Dip and Interruptions

Model No. : N/A  
 Tested By : N/A  
 Tested Date : N/A  
 Test Mode : N/A  
 Basic Standard : IEC 61000-4-29  
 Test cycle : 3 times

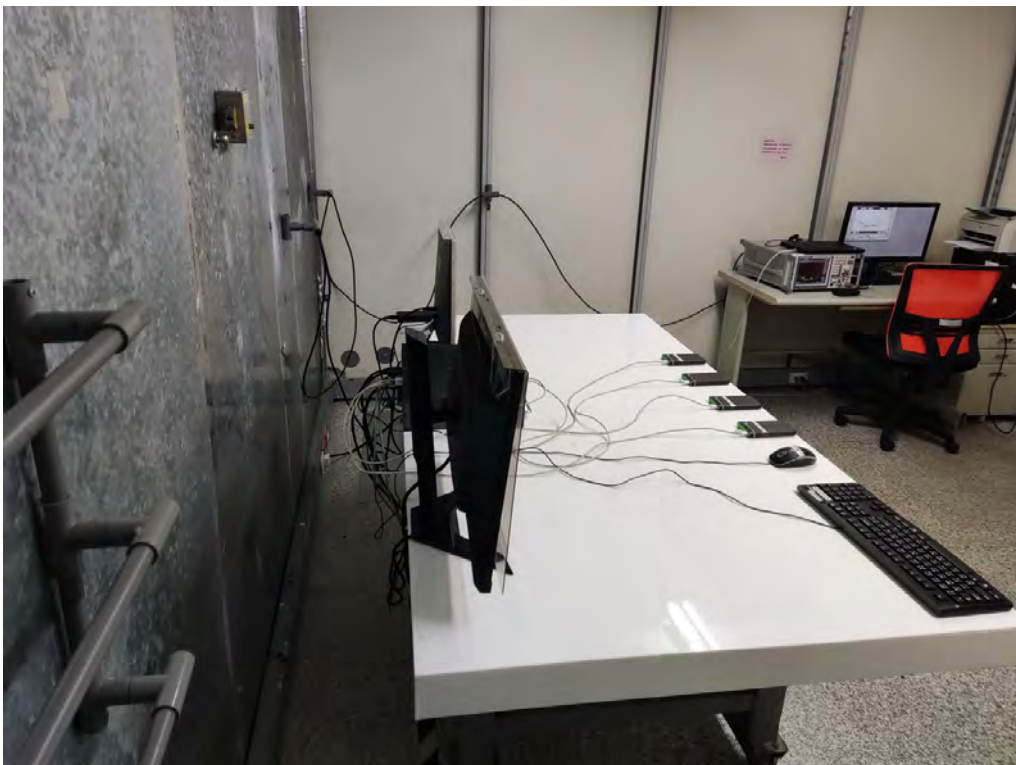
Test specification (% reduction)	Duration (Sec)	Observation
30	0.1	Remark 1
60	0.1	Remark 1
100	0.05	Remark 1

**Remark:** 1: The subject equipment is not intended to be connected to DC mains supply. Therefore, this test is not applicable.

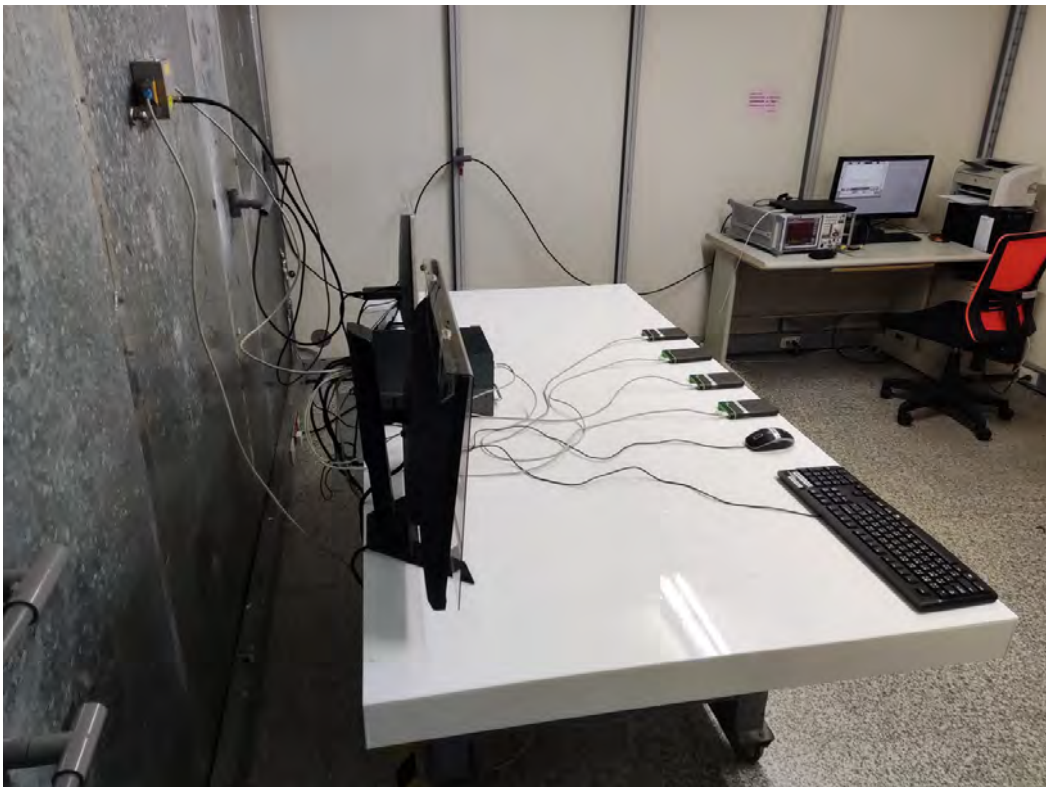
# APPENDIX

## Photograph of Testing General Set-up

### CE Testing Set-up



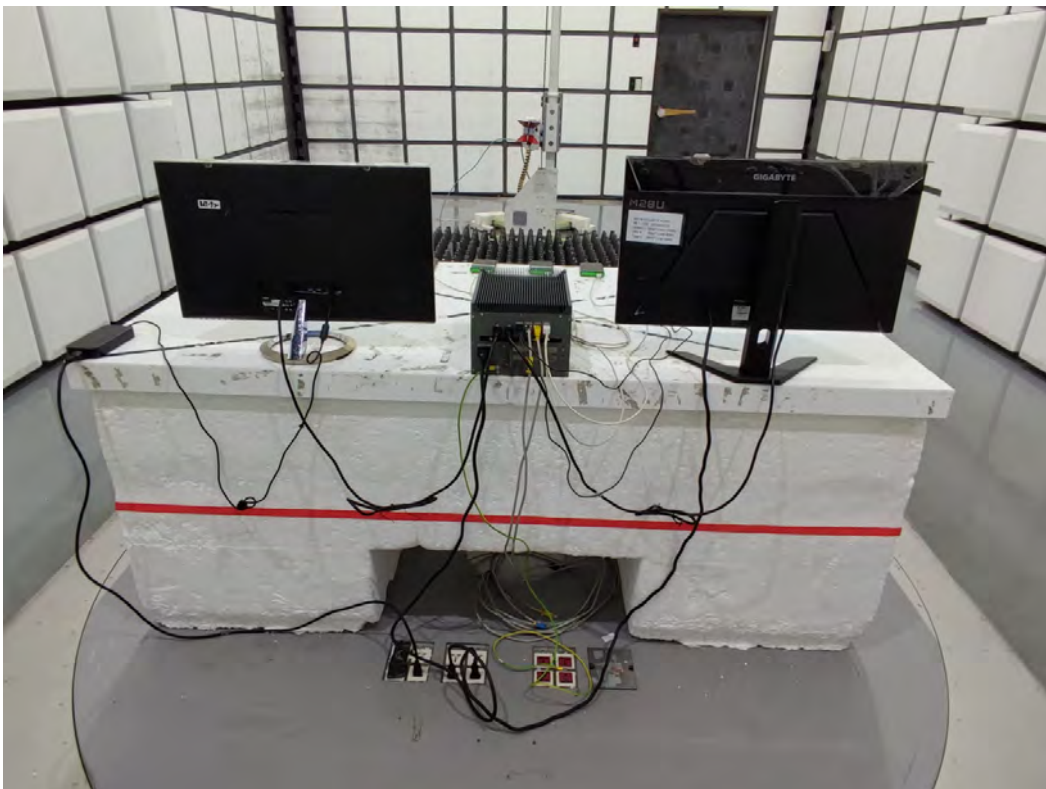
## ISN Testing Set-up



## RE Testing Set-up Below 1GHz



Above 1GHz



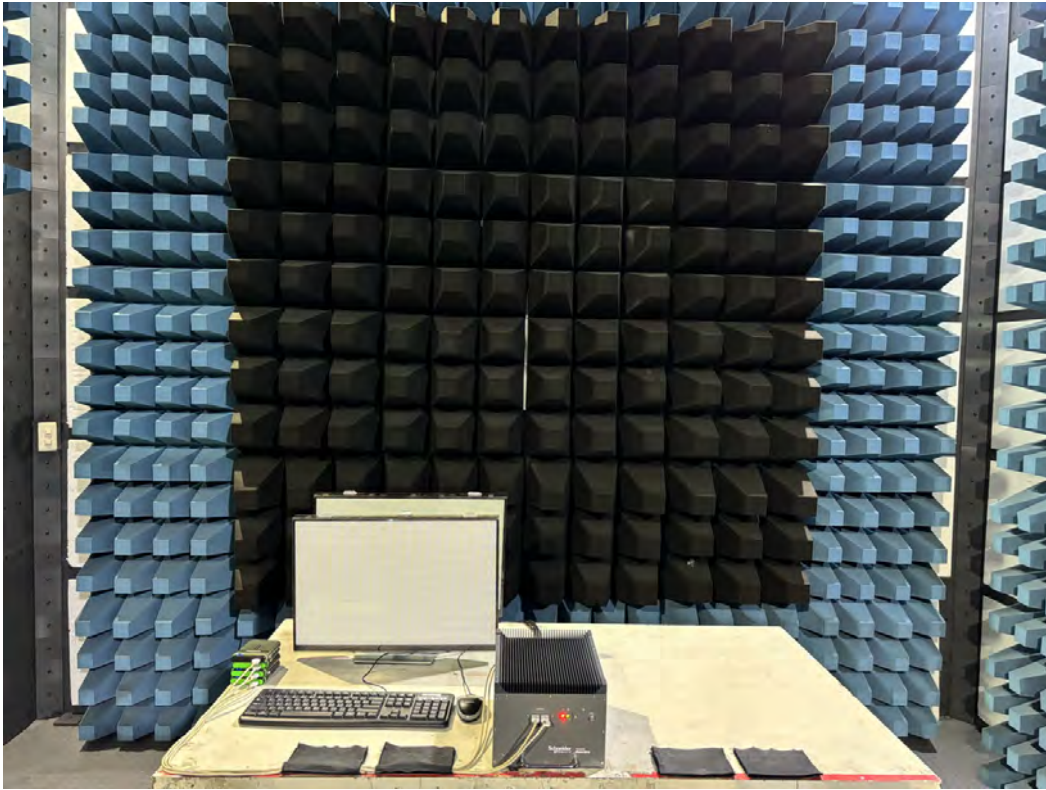
## HARMONIC & FLICKER Testing Set-up



## ESD Testing Set-up



## RS Testing Set-up



## EFT Testing Set-up



## EFT For RJ45 Testing Set-up



## EFT For Functional Earth Testing Set-up





## Surge Testing Set-up



## Surge For RJ45 Testing Set-up



### CS Testing Set-up



### CS For RJ45 Testing Set-up



## CS For Functional Earth Testing Set-up



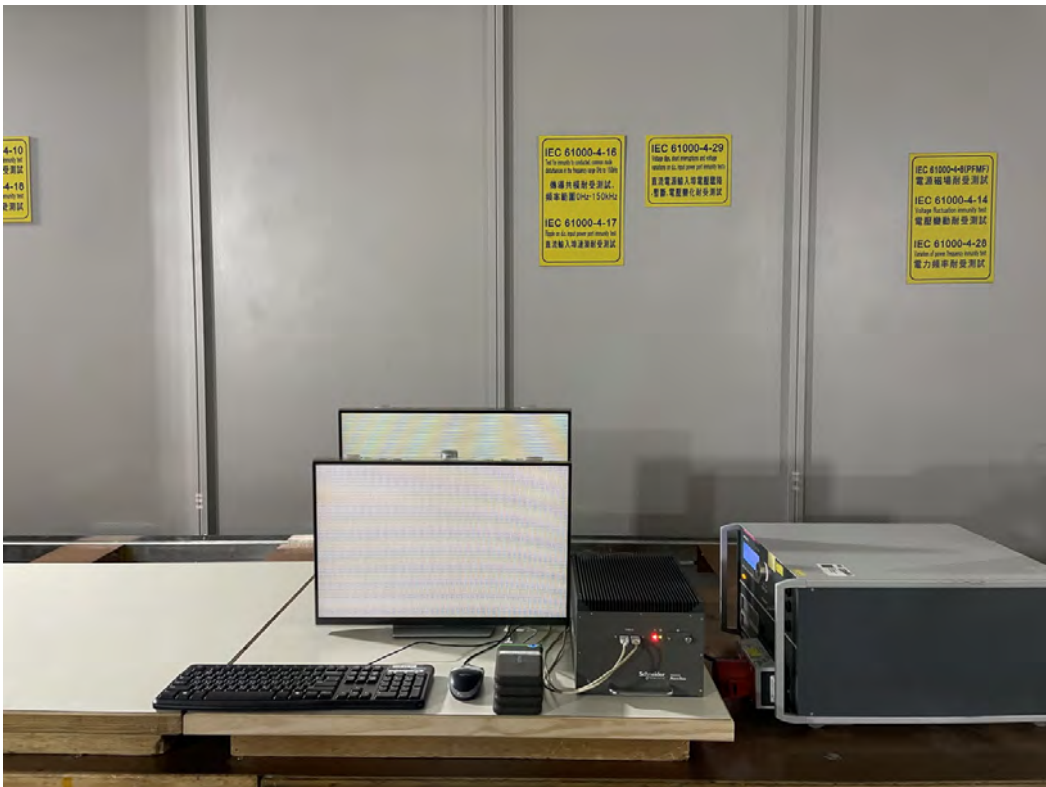
## PFMF Testing Set-up



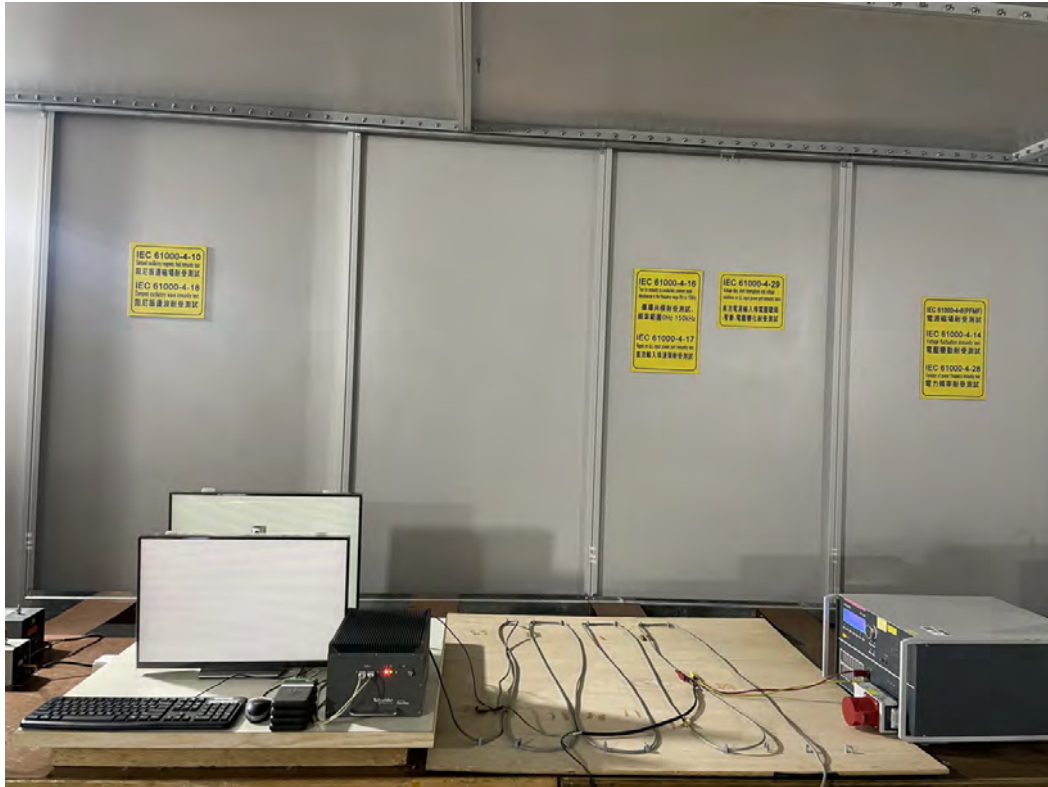
## DIP Testing Set-up



## Damped Oscillatory Wave Immunity Testing Set-up

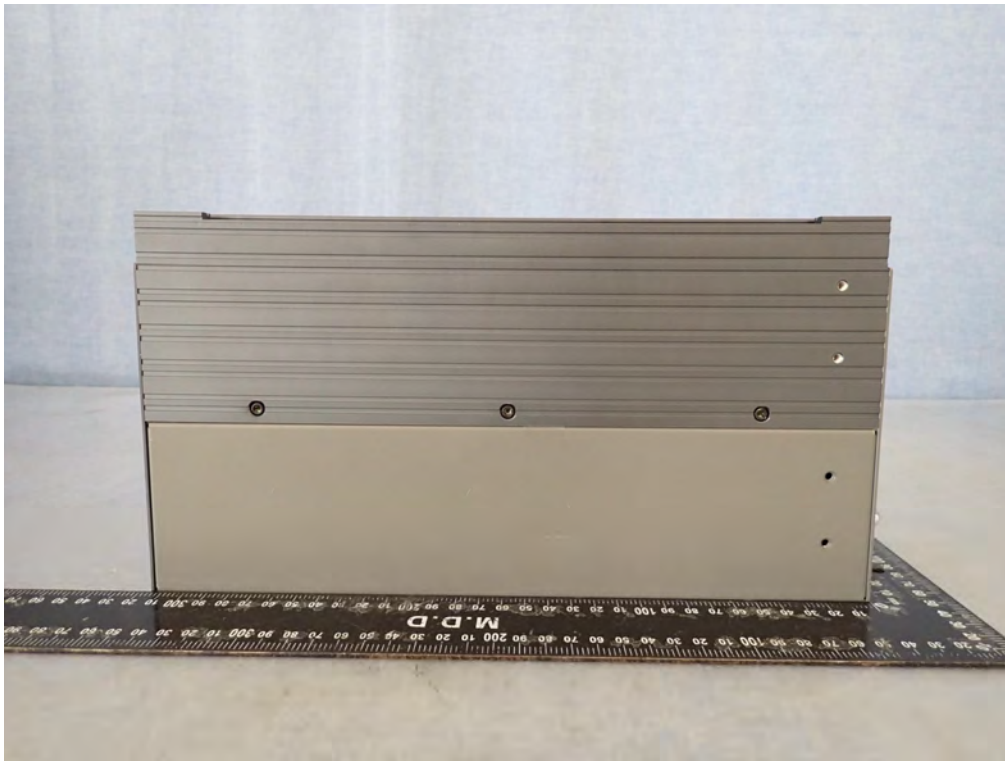


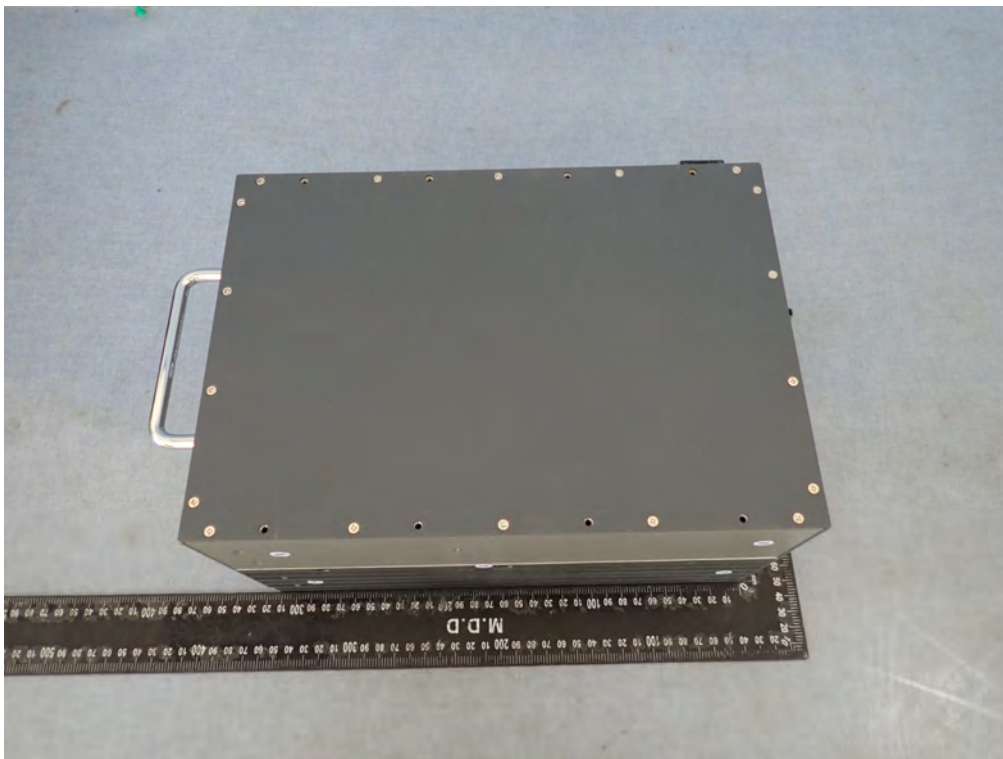
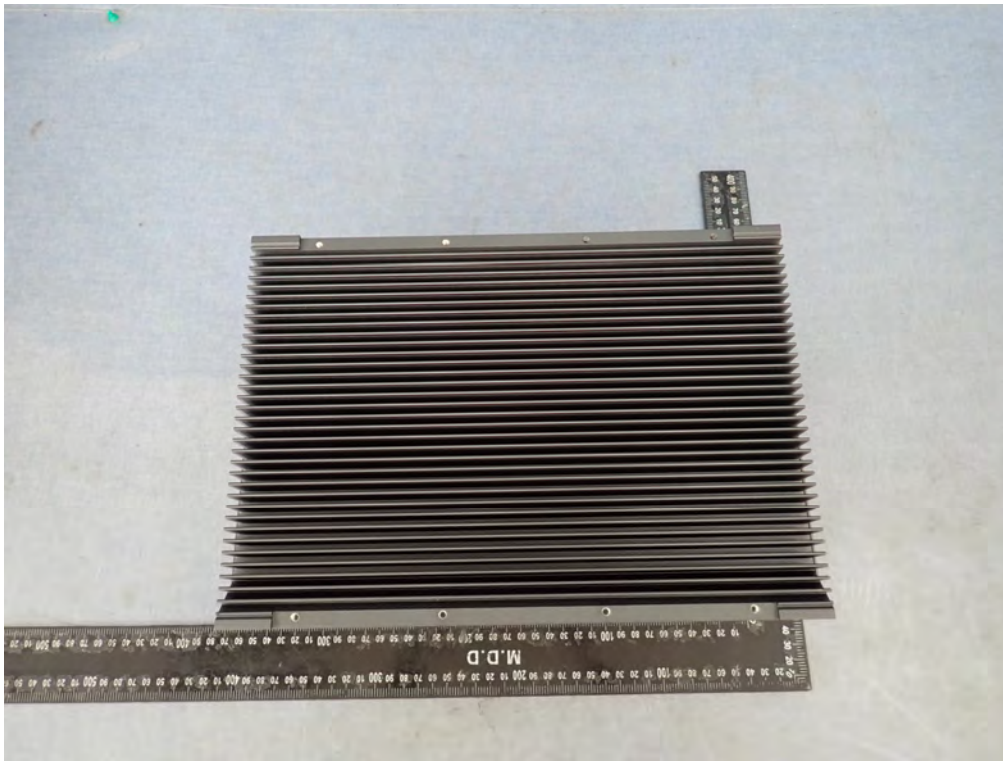
## Damped Oscillatory Wave Immunity For RJ45 Testing Set-up



## Photographs of EUT Unit Exterior







**\*\* End of Report \*\***