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:

EN 55032: 2015 + A11: 2020 + A1: 2020, Class A CISPR 32: 2015 + A1: 2019	BS EN 55032: 2015 + A11: 2020 + A1: 2020
EN IEC 61000-3-2: 2019 + A1: 2021	BS EN IEC 61000-3-2: 2019 + A1: 2021
EN 61000-3-3: 2013 + A1: 2019 + A2: 2021 + AC: 2022	BS EN 61000-3-3: 2013 + A1: 2019 + A2: 2021
EN 55035: 2017 + A11: 2020	BS EN 55035: 2017 + A11: 2020
IEC 61000-4-2: 2008	IEC 61000-4-6: 2023
IEC 61000-4-3: 2020 (Ed. 4.0)	IEC 61000-4-8: 2009
IEC 61000-4-4: 2012	IEC 61000-4-11: 2020 + COR1: 2020 + COR2: 2022 (Ed. 3.0)
IEC 61000-4-5: 2014 + A1: 2017	

Date of Sample Receipt : March 20, 2024
Date of Test : November 13, 2024 ~ December 10, 2024
Date of Issue : January 2, 2025

Remarks:

This test report can be used for CE and UKCA marking application which is based on equivalent requirements between UK and EU. It is appropriate using designated standards to provide presumption of conformity with GB law.

This report shall not be reproduced except in full, without approval of the Compliance Certification Services Inc. in writing. This document may be altered or revised by Compliance Certification Services Inc. personnel only. The applicant should not use it to claim product endorsement by TAF or any other Government agencies.

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	TMXD2403001049DE	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 Decision of Test Mode

The test configuration modes are as the following:

Conduction Mode (Power port):

1	**DP*2 3840*2160@60Hz**	**24VDC**

Conduction Modes (Wired network ports):

1	**LAN 1**	**10Mpbs**
2		**100Mpbs**
3		**1Gbps**
4	**LAN 2**	**10Mpbs**
5		**100Mpbs**
6		**1Gbps**

Radiation Mode:

1	**DP*2 3840*2160@60Hz**	**24VDC**
	DP*2 3840*2160@60Hz / 1-5.5GHz	

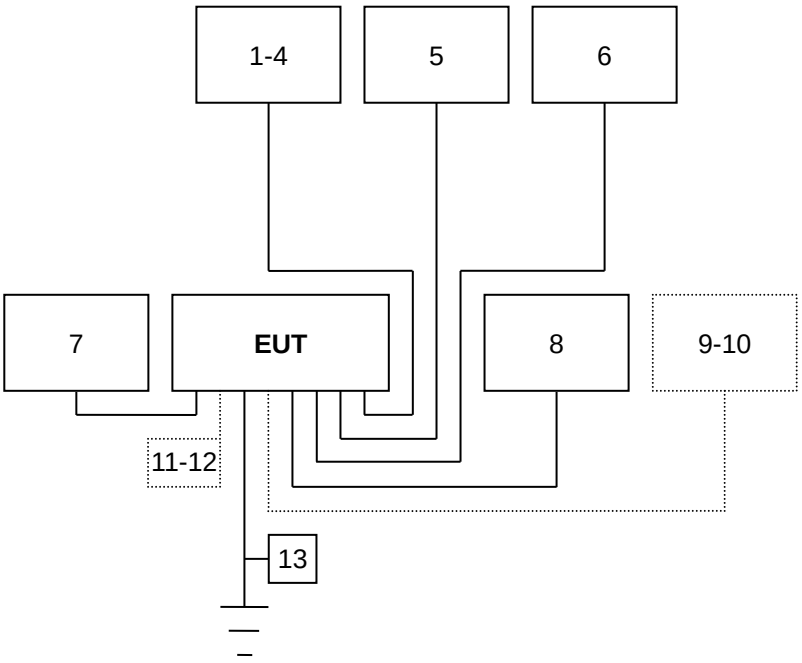
1.6 The Final Test Mode of the EUT

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	**N/A**
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 Burnin.exe to activate all peripherals to test EUT.
3. Run LANTEST.exe to ping 192.168.1.60&42 –t (EUT), ping 192.168.1.1&10 –t (Server PC).
4. Run colorbarmove.mp4 to activate all peripherals for test EUT.

1.9 Summary of Results

Emission		
Standard	**Test Type**	**Result**
EN 55032: 2015 + A11: 2020 + A1: 2020 CISPR 32: 2015 + A1: 2019 BS EN 55032: 2015 + A11: 2020 + A1: 2020	Conducted Emission	PASS
	ISN	PASS
	Radiated Emission	PASS
EN IEC 61000-3-2: 2019 + A1: 2021 BS EN IEC 61000-3-2: 2019 + A1: 2021	Harmonic current emissions	N/A
EN 61000-3-3: 2013 + A1: 2019 + A2: 2021 + AC: 2022 BS EN 61000-3-3: 2013 + A1: 2019 + A2: 2021	Voltage changes, voltage fluctuations & flicker	N/A

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: 2023	CS	PASS	A
IEC 61000-4-8: 2009	PFMF	PASS	A
IEC 61000-4-11: 2020 + COR1: 2020 + COR2: 2022 (Ed. 3.0)	DIP	N/A	C/C/B

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)	Class A(dBuV)		Class B(dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

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

Maximum permissible level of Common Mode Conducted Emission (Asymmetric Mode)

Class A

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

Class B

FREQUENCY (MHz)	Voltage Limit(dBuV)		Current Limit(dBuA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	84 - 74	74 - 64	40 - 30	30 - 20
0.5 - 30.0	74	64	30	20

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

Maximum permissible level of Radiated Emission measured at 10 meter

FREQUENCY (MHz)	Class A(dBuV/m)	Class B(dBuV/m)
	Quasi - peak	Quasi - peak
30 - 230	40	30
230 - 1000	47	37

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

Maximum permissible level of Radiated Emission measured at 3 meter

Frequency range (MHz)	Class A(dBuV/m)	Class B(dBuV/m)
	Quasi - peak	Quasi - peak
30 - 230	50	40
230 - 1000	57	47

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

Limits above 1 GHz

Limits for radiated disturbance of Class A ITE at a measurement distance of 3m

Frequency range (GHz)	Average Limit dB(μV/m)	Peak Limit dB(μV/m)
1 - 3	60	80
3 - 6	60	80

Note: The lower limit applies at the transition frequency.

Limits for radiated disturbance of Class B ITE at a measurement distance of 3m

Frequency range (GHz)	Average Limit dB(μV/m)	Peak Limit dB(μV/m)
1 - 3	54	74
3 - 6	54	74

Note: The lower limit applies at the transition frequency.

Requirements for radiated emissions from FM receivers

Frequency range (MHz)	Measurement				Class B Limit dB(μV/m)
	Facility	Distance (m)	Detector type / Bandwidth	Fundamental	Harmonics
30 - 230	OATS/SAC	10	Quasi Peak / 120 kHz	50	42
230 - 300					42
300 - 1000					46
30 - 230	OATS/SAC	3	Quasi Peak / 120 kHz	60	52
230 - 300					52
300 - 1000					56
These relaxed limits apply only to emissions at the fundamental and harmonic frequencies of the LO. Signals at all other frequencies shall be compliant with the limits					

Note: SAC: Semi Anechoic Chamber
OATS: Open Area Test Site

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
ISN	Teseq	ISN T800	30847	03/13/2024	03/12/2025
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	NDr.AV	GM-108A	SD-R100	08/19/2024	08/18/2025
Test S/W	EZ-EMC Ver.CCS-03A1				

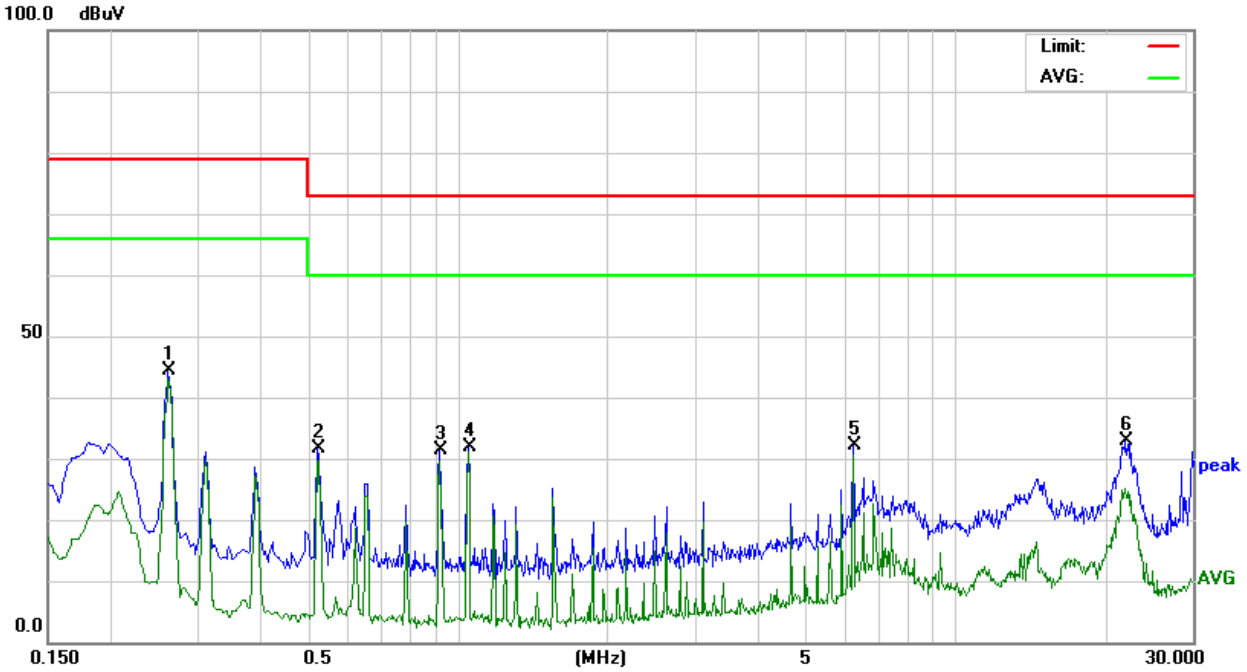
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan
Measurement Uncertainty of Conducted Emission
Expanded uncertainty Ulab (k=2) of Conducted Emission is 2.8 dB.
Expanded uncertainty Ulab (k=2) of ISN Conducted Emission is 3.1 dB.
Expanded uncertainty CISPR 16-4-2:2011+A1:2014+A2:2018 (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)

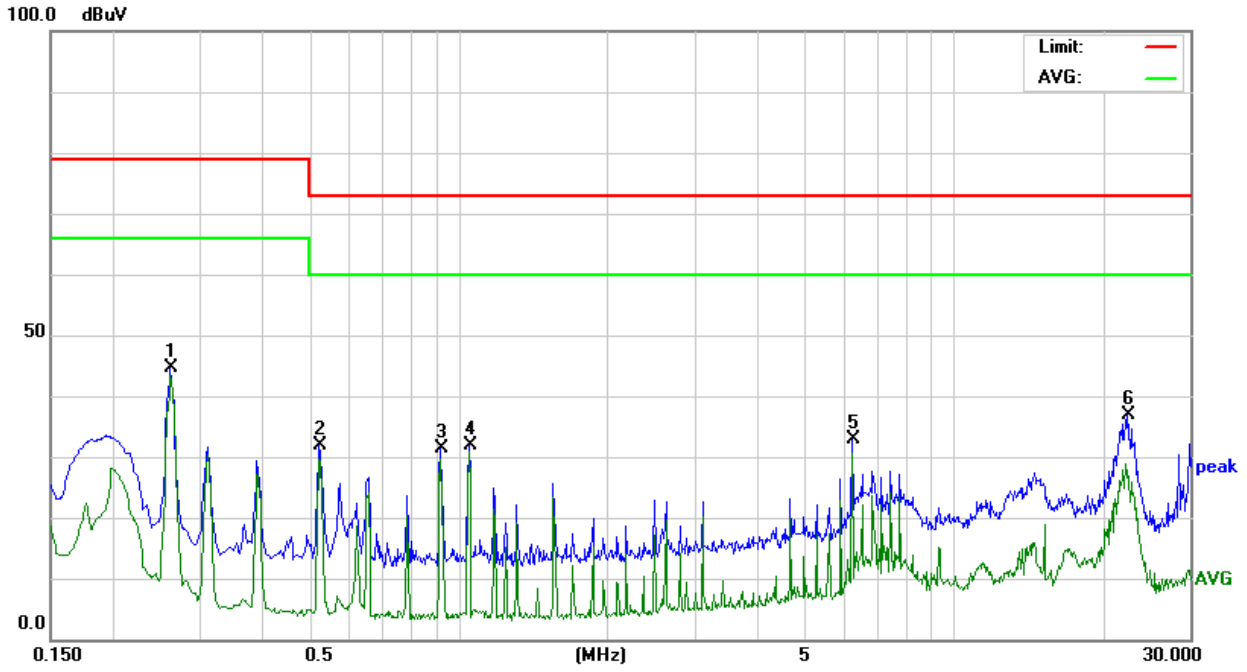
Model No.	SCH3X2-D7	6dB Bandwidth	9 kHz
Environmental Conditions	23.2°C, 57% RH	Test Mode	Mode 1
Tested by	Kevin Chang	Phase	L1
Standard	EN 55032 CLASS A	Test Date	2024/12/4



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)
0.2625	34.45	9.99	44.44	79.00	-34.56	P	L1
0.5235	21.65	9.97	31.62	73.00	-41.38	P	L1
0.9195	21.22	10.09	31.31	73.00	-41.69	P	L1
1.0500	21.73	10.10	31.83	73.00	-41.17	P	L1
6.2295	21.65	10.39	32.04	73.00	-40.96	P	L1
21.9975	21.78	11.13	32.91	73.00	-40.09	P	L1

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

Model No.	SCH3X2-D7	**6dB Bandwidth**	9 kHz
Environmental Conditions	23.2°C, 57% RH	**Test Mode**	Mode 1
Tested by	Kevin Chang	**Phase**	L2
Standard	EN 55032 CLASS A	**Test Date**	2024/12/4

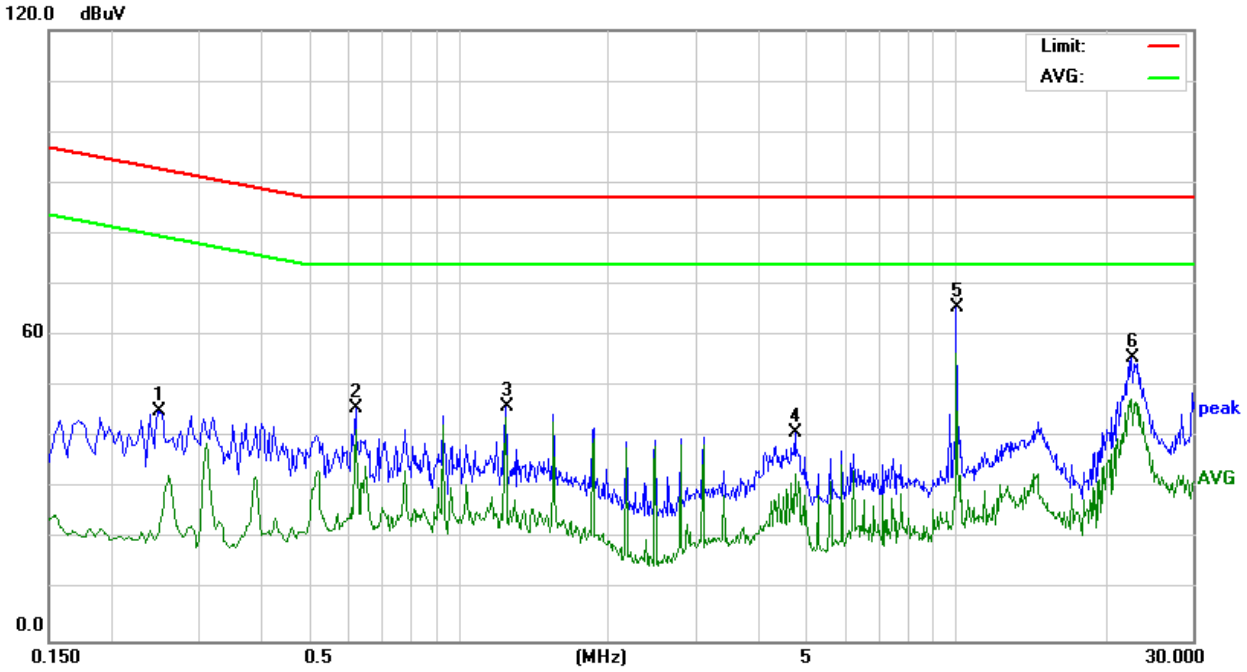


Conducted Emission Readings							
Frequency Range Investigated				**150 kHz to 30 MHz**			
Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (P/Q/A)	Line (L1/L2)
0.2625	**34.54**	**9.99**	**44.53**	**79.00**	**-34.47**	**P**	**L2**
0.5235	**21.84**	**9.97**	**31.81**	**73.00**	**-41.19**	**P**	**L2**
0.9195	**21.38**	**10.10**	**31.48**	**73.00**	**-41.52**	**P**	**L2**
1.0500	**21.79**	**10.11**	**31.90**	**73.00**	**-41.10**	**P**	**L2**
6.2340	**22.44**	**10.40**	**32.84**	**73.00**	**-40.16**	**P**	**L2**
22.4295	**25.83**	**11.06**	**36.89**	**73.00**	**-36.11**	**P**	**L2**

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

2.2.4 Measurement Data (ISN)

Model No.	SCH3X2-D7	**6dB Bandwidth**	9 kHz
Environmental Conditions	23.2°C, 57% RH	**Test Mode**	Mode 4
Tested by	Kevin Chang	**Test Date**	2024/12/4
Standard	EN 55032 CLASS A		



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)
0.2490	**25.40**	**19.88**	**45.28**	**92.79**	**-47.51**	**P**
0.6225	**26.03**	**19.66**	**45.69**	**87.00**	**-41.31**	**P**
1.2435	**26.44**	**19.68**	**46.12**	**87.00**	**-40.88**	**P**
4.7625	**21.18**	**19.71**	**40.89**	**87.00**	**-46.11**	**P**
10.0320	**45.76**	**19.78**	**65.54**	**87.00**	**-21.46**	**P**
22.6365	**35.43**	**20.08**	**55.51**	**87.00**	**-31.49**	**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	05/29/2024	05/28/2025
Cable	EMEC	CFD400E-LW	SD-R074	08/08/2024	08/07/2025
EMI Test Receiver	R&S	ESCI	101340	01/22/2024	01/21/2025
Pre-Amplifier	HP	8447D	1937A01554	09/20/2024	09/19/2025
Thermo-Hygro Meter	Wisewind	201A	No. 03	04/29/2024	04/28/2025
Test S/W	EZ-EMC Ver.CCS-03A1				
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan Measurement Uncertainty of 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	05/30/2024	05/29/2025
Microflex Cable x 7m	JMT	LF01	SD-R097	05/30/2024	05/29/2025
K-Type Cable x 1m	JMT	LK01	SD-R087	05/29/2024	05/28/2025
Pre-Amplifier	Com-Power	PAM-118A	551041	05/29/2024	05/28/2025
Signal Analyzer	R&S	FSV40	101269	05/28/2024	05/27/2025
Thermo-Hygro Meter	NDr.AV	GM-108A	SD-R099	07/15/2024	07/14/2025
Test S/W	EZ-EMC Ver.CCS-03A1				
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan Measurement Uncertainty of 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)					

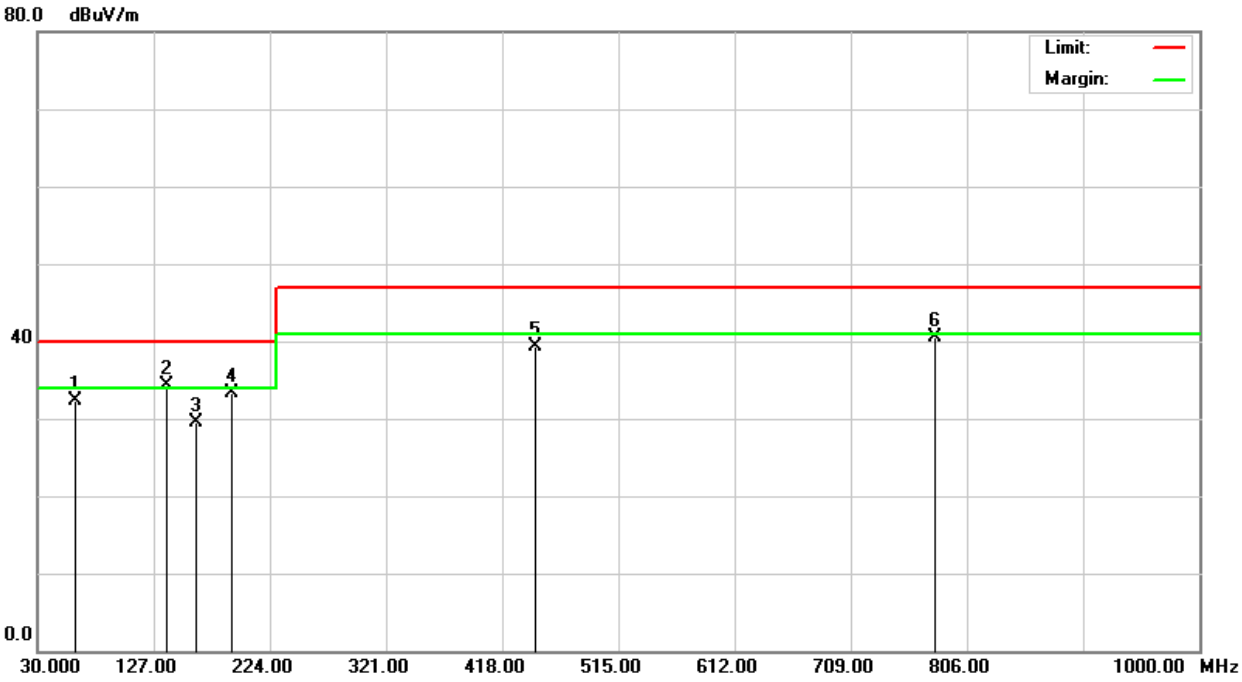
2.3.2 Measurement Level Calculation

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

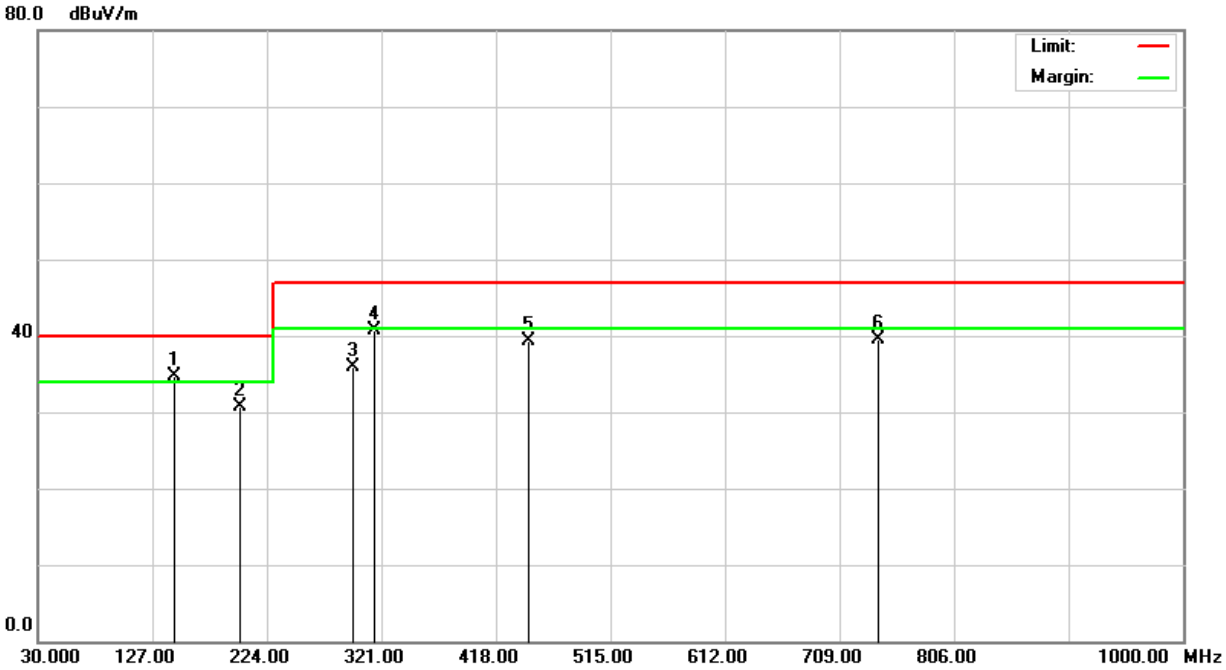
Model No.	SCH3X2-D7	**Test Mode**	Mode 1
Environmental Conditions	28.7°C, 64% RH	**6dB Bandwidth**	120 kHz
Antenna Pole	Vertical	**Antenna Distance**	10m
Detector Function	Quasi-peak.	**Tested by**	Jack Chen
Standard	EN 55032 CLASS A	**Test Date**	2024/11/13



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)
61.2500	**46.30**	**-13.96**	**32.34**	**40.00**	**-7.66**	**100**	**316**	**Q**	**V**
138.4600	**42.50**	**-8.21**	**34.29**	**40.00**	**-5.71**	**100**	**240**	**Q**	**V**
162.3900	**38.90**	**-9.48**	**29.42**	**40.00**	**-10.58**	**100**	**189**	**Q**	**V**
192.2800	**43.50**	**-10.11**	**33.39**	**40.00**	**-6.61**	**100**	**32**	**Q**	**V**
445.8900	**40.60**	**-1.26**	**39.34**	**47.00**	**-7.66**	**400**	**156**	**Q**	**V**
780.1200	**36.20**	**4.34**	**40.54**	**47.00**	**-6.46**	**400**	**65**	**Q**	**V**

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

Model No.	SCH3X2-D7	Test Mode	Mode 1
Environmental Conditions	28.7°C, 64% RH	6dB Bandwidth	120 kHz
Antenna Pole	Horizontal	Antenna Distance	10m
Detector Function	Quasi-peak.	Tested by	Jack Chen
Standard	EN 55032 CLASS A	Test Date	2024/11/13



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)
145.8900	43.50	-8.87	34.63	40.00	-5.37	400	215	Q	H
201.5399	40.50	-9.70	30.80	40.00	-9.20	400	305	Q	H
297.5600	41.20	-5.36	35.84	47.00	-11.16	400	274	Q	H
315.5200	45.60	-4.83	40.77	47.00	-6.23	400	196	Q	H
445.1900	40.50	-1.29	39.21	47.00	-7.79	100	312	Q	H
742.2600	35.40	4.03	39.43	47.00	-7.57	100	165	Q	H

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

Above 1GHz

Model No.	SCH3X2-D7	**Test Mode**	Mode 1
Environmental Conditions	22.9ºC, 61% RH	**6dB Bandwidth**	1 MHz
Antenna Pole	Vertical / Horizontal	**Antenna Distance**	3m
Highest frequency generated or used	1100MHz	**Upper frequency**	5500MHz
Detector Function	Peak and average.	**Tested by**	Jack Chen
Standard	EN 55032 CLASS A	**Test Date**	2024/11/13

Radiated Emission Readings							
Frequency Range Investigated				**Above 1GHz at 3m**			
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/A)	Pol. (H/V)
1400.000	**50.88**	**-7.75**	**43.13**	**80.00**	**-36.87**	**P**	**V**
1595.000	**53.26**	**-8.67**	**44.59**	**80.00**	**-35.41**	**P**	**V**
1875.000	**48.64**	**-4.87**	**43.77**	**80.00**	**-36.23**	**P**	**V**
2255.000	**49.04**	**-4.80**	**44.24**	**80.00**	**-35.76**	**P**	**V**
2555.000	**47.68**	**-4.26**	**43.42**	**80.00**	**-36.58**	**P**	**V**
5400.000	**49.82**	**-1.16**	**48.66**	**80.00**	**-31.34**	**P**	**V**

Radiated Emission Readings							
Frequency Range Investigated				**Above 1GHz at 3m**			
Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/A)	Pol. (H/V)
1890.000	**47.30**	**-4.72**	**42.58**	**80.00**	**-37.42**	**P**	**H**
2265.000	**50.70**	**-4.81**	**45.89**	**80.00**	**-34.11**	**P**	**H**
2440.000	**49.52**	**-4.48**	**45.04**	**80.00**	**-34.96**	**P**	**H**
2985.000	**49.15**	**-3.90**	**45.25**	**80.00**	**-34.75**	**P**	**H**
3305.000	**49.98**	**-4.02**	**45.96**	**80.00**	**-34.04**	**P**	**H**
5400.000	**51.67**	**-1.16**	**50.51**	**80.00**	**-29.49**	**P**	**H**

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

3.2 Measurement Data

Remark: N/A: The subject equipment is not intended to be connected to AC mains supply. Therefore, this test is not applicable.

4. Flicker

4.1 Test Instruments

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

4.2 Measurement Data

Remark: N/A: The subject equipment is not intended to be connected to AC mains supply. Therefore, this test is not applicable.

5. IMMUNITY

5.1 STANDARD PERFORMANCE CRITERIA DESCRIPTION

Criterion A - The apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

Criterion B - The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

Criterion C - Temporary loss of function is allowed, provided the function is self recoverable or can be restored by the operation of the controls.

5.2 SPECIAL PERFORMANCE CRITERIA DESCRIPTION

5.2.1 Performance Criteria Description for Print function

Criterion A - Apply criterion A as defined in 8.2. Additionally, the following shall not occur as a consequence of the application of the disturbance:
- change of operating state;
- unintended pausing of the print operation;
- a change of print quality or legibility, as appropriate to the test pattern;
- change of character font;
- unintended line feed;
- unintended page feed;
- paper feed failure.

Criterion B - Apply criterion B as defined in 8.3 with the following specifics and additional limitations. Paper feed failures are allowed only if, after removal of the jammed sheets, the job is automatically recovered and there is no loss of printed information. Any low-quality print output caused by the application of the disturbance shall not continue beyond the sheet of media being printed, or beyond the typical length of a finished page or sheet printed from continuous roll media. False indicators are permitted during the test provided that a normal operator response to that false indicator is simple (such as pressing a button). False indicators are not acceptable if they would cause the user to discard printing supplies such as ink, toner or paper, when those supplies are actually not empty or faulty. Any false indicator shall either clear automatically or after the operator's response. After the disturbance, the print function may print the remainder of the print job at a quality level within the manufacturer's specifications. Alternately, the print function may halt processing of a print job as a result of the disturbance, but only if the operator is capable of reprinting the job (for example, a fax printing job where the image to be printed still resides in local memory). Automatically restarting the print job from the beginning is also acceptable. In any scenario, the pairing of front and back images during double-sided printing shall be correct.

Criterion C - Temporary loss of function is allowed, provided the function is self recoverable or can be restored by the operation of the controls.

5.2.2 Performance Criteria Description for Scan function

Criterion A - Apply criterion A as defined in 8.2. Additionally, the following shall not occur as a consequence of the application of the test:
- change of settings, such as which side(s) of the page to be scanned, colour or monochrome, and resolution;
- corruption of the image, for example stretching, compressing or change in colour;
- paper feed failures;
- errors in the reading of bar codes.

Criterion B - Apply criterion B as defined in 8.3 with the following specifics and additional limitations.
- Document feed failures are allowed only if the original documents are undamaged and, after removal of the jammed sheets, the job is automatically recovered and there is no loss of scanned information.
- During the test, the representation of the image shall not be degraded such that reading mistakes occur.

Criterion C - Temporary loss of function is allowed, provided the function is self recoverable or can be restored by the operation of the controls.

5.2.3 Performance Criteria Description for Display and display output function

Criterion A - Apply criterion A as defined in 8.2. Additionally, an increase in any degradation greater than just perceptible by observation of the image shall not occur as a consequence of the application of the test. Examples of such degradations are:
- superimposed patterning;
- positional disturbances due to synchronisation errors;
- geometric distortion;
- change of contrast or brightness;
- picture artefacts;
- freezing or disturbance of motion;
- image loss;
- video data or decoding errors.

Criterion B - The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

Criterion C - Temporary loss of function is allowed, provided the function is self recoverable or can be restored by the operation of the controls.

5.2.4 Performance Criteria Description for Musical tone generating function

Criterion A - Performance criterion A is subdivided according to the type of equipment and its use. Three subgroups corresponding to different equipment types are defined in Table E.1 and have corresponding performance criteria A1, A2 and A3. The relevant subgroup shall be selected by the manufacturer in accordance with the product specification. The description of criteria A1, A2 and A3 are presented in Table E.2.

Criterion B - During the test, degradation of performance beyond that defined in criterion A1 of Table E.2 is allowed. However, sudden amplification of tone to a level that exceeds the expected level by more than 6 dB is not allowed. After the test, normal operation of the EUT shall be self-recovered. In the case of unintended tone holding caused by a MIDI protocol communication error, the EUT can be re-initialised by the operation of the controls by the user controls in accordance with the manufacturer's instructions. Due to the nature of the MIDI protocol, it is necessary to modify the performance criterion B to allow user intervention when the unintended tone holding is caused by a missing MIDI communication error (for example missing a 'NOTE OFF' message).

Criterion C - Degradation of the performance beyond that defined in criterion A1 of Table E.2 is permitted provided that the normal operation of the EUT can be restored after the test by operator intervention. However, sudden amplification of tone to a level that exceeds the expected level by more than 6 dB is not allowed.

5.2.5 Performance Criteria Description for Networking function

Criterion A - Where relevant, during the application of the test the network function shall, as a minimum, operate ensuring that:

- established connections shall be maintained throughout the application of the test;
- no change of operational state or corruption of stored data occurs;
- no increase in error rate above the figure defined by the manufacturer occurs. The manufacturer should select the most appropriate performance measurement criteria for the product or system, for example bit error rate, block error rate;
- no request for retry above the figure defined by the manufacturer;.
- the data transmission rate does not reduce below the figure defined by the manufacturer;
- no protocol failure occurs;
- the audio noise level at a two-wire analogue interface (supporting telephony) shall satisfy the requirements of Table G.3. The audio level measurements shall be performed at the demodulated frequency of the disturbance using a narrowband filter with a 3 dB bandwidth of 100 Hz using the method defined in table clause G.1.4. See G.6.1. As described in the example given in J.3.5 the networking function is monitored during testing using direct functions specified elsewhere in this document. If needed to verify the operation of the protocol, the following functions shall be verified as described in Table H.1 when performing the additional spot frequency tests contained in Clause 5:
- ability to establish a connection,
- ability to clear a connection.

Where an EUT has supervisory functions they shall not be affected. Elements that should be monitored include, but are not limited to:

- alarms,
- signalling lamps,
- printer output errors,
- network traffic rates,
- network monitor errors,
- measured network parameters.

Criterion B - Established connections shall be maintained throughout the test, or shall self-recover in a way and timescale that is imperceptible to the user.
The error rate, request for retry and data transmission rates may be degraded during the application of the test. Degradation of the performance as described in criterion A is permitted, provided that the normal operation of the EUT is self-recoverable to the condition established prior to the application of the test. Where required, as defined in Clause 5, the acceptable operation of the function shall be verified at the completion of the test as described in Table H.1, by confirming the following:
• the EUT's ability to establish a connection,
• the EUT's ability to clear a connection.
During surge testing disconnection is allowed on the analogue/digital data port being tested. If the EUT is a supervisory equipment, it shall not impact the normal operation of the network being monitored. In addition, any supervisory functions impacted during the period of the test shall return to the state prior to the test. Elements to consider include:
• alarms,
• signalling lamps,
• printer output,
• network traffic rates,
• network monitoring. is used as intended.

Criterion C - Degradation of performance as described in criteria A and B is permitted provided that the normal operation of the EUT is self-recoverable to the condition immediately before the application of the test, or can be restored after the test by the operator.

5.2.6 Performance Criteria Description for Audio output function

Criterion A - The interference ratio (electrical or acoustic) shall meet the limits in column 3; or,
the acoustic level of the demodulated audio shall be less than the limits in column 4; or,
the digitally coded level of demodulated audio shall be less than limits in column 5; or,
the analogue level of the demodulated audio shall be less than the limits in column 6.

Criterion B - The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

Criterion C - Temporary loss of function is allowed, provided the function is self recoverable or can be restored by the operation of the controls.

5.2.7 Performance Criteria Description for Telephony function

Function to be exercised	Performance criteria		
	A	B	C
Establish new communication	At the additional spot frequency tests a, c	Performed before and after the application of the test or disturbance	Performed before and after the application of the test or disturbance
Maintain established communication	Yes In addition, the requirements of Annex G for the audio output function shall be satisfied c	Yes b	No
Terminate established communication	At the additional spot frequency tests a, c	Performed before and after the application of the test or disturbance	Performed before and after the application of the test or disturbance

Communication refers to a telephone call or other form of voice connection.
a Applicable to TTE with a dial function that provides dedicated emergency service/safety of life call capability. Where the EUT does not provide this functionality, this limitation shall be stated in the equipment user manual.
b Communication shall be established prior to the application of the disturbance, the communication shall be maintained and the quality of that communication (for example, volume setting, the level of background noise) shall be maintained after completion of the test or disturbance.
c Where defined in Clause 5 (for the tests in Table 1 to Table 4), these functional tests shall be performed during the additional spot frequency tests.

5.3 Test of IEC 61000-4-2

5.3.1 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					

5.3.2 EUT Operating Condition

Environment:

Temperature	Humidity	Air Pressure
18.7 °C	47 %RH	1009 hpa

5.3.3 Results of Electrostatic Discharge Test (ESD)

Model No. : SCH3X2-D7
Tested By : Jacky Lin
Tested Date : December 10, 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 kV
HCP/VCP: ±2, 4 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	A
2, 4 (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.

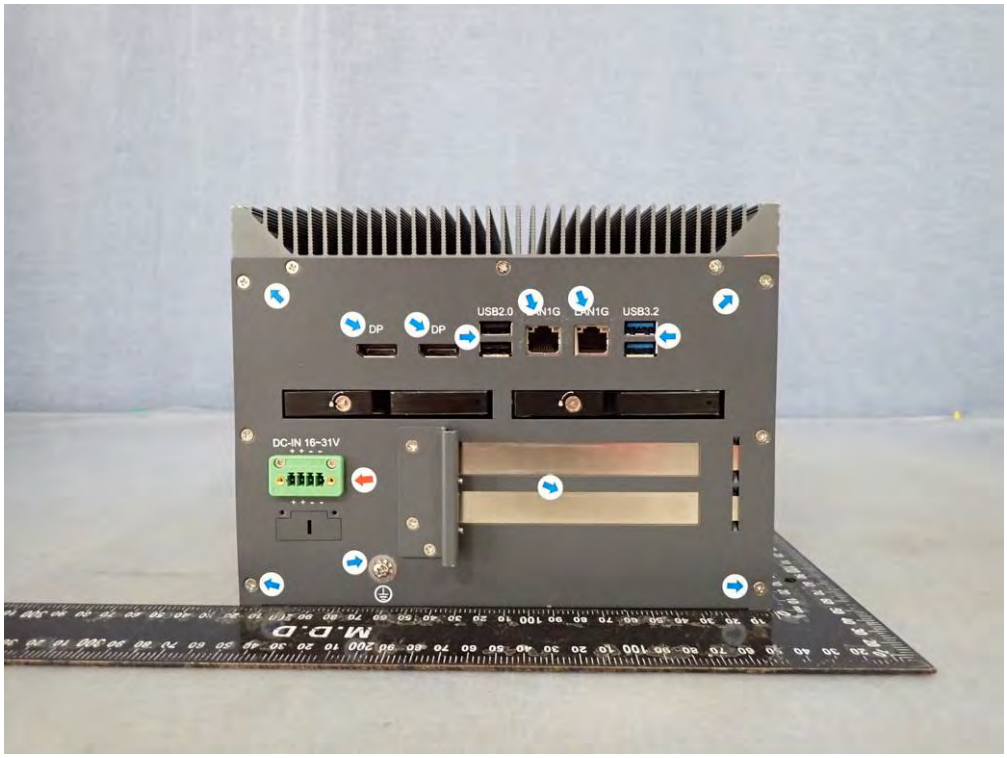
Indirect Application			Test Results	
Discharge Level (kV)	Polarity (+/-)	Test Point	Horizontal Coupling	Vertical Coupling
2, 4	+/-	1~4	A	A

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

ESD Test point

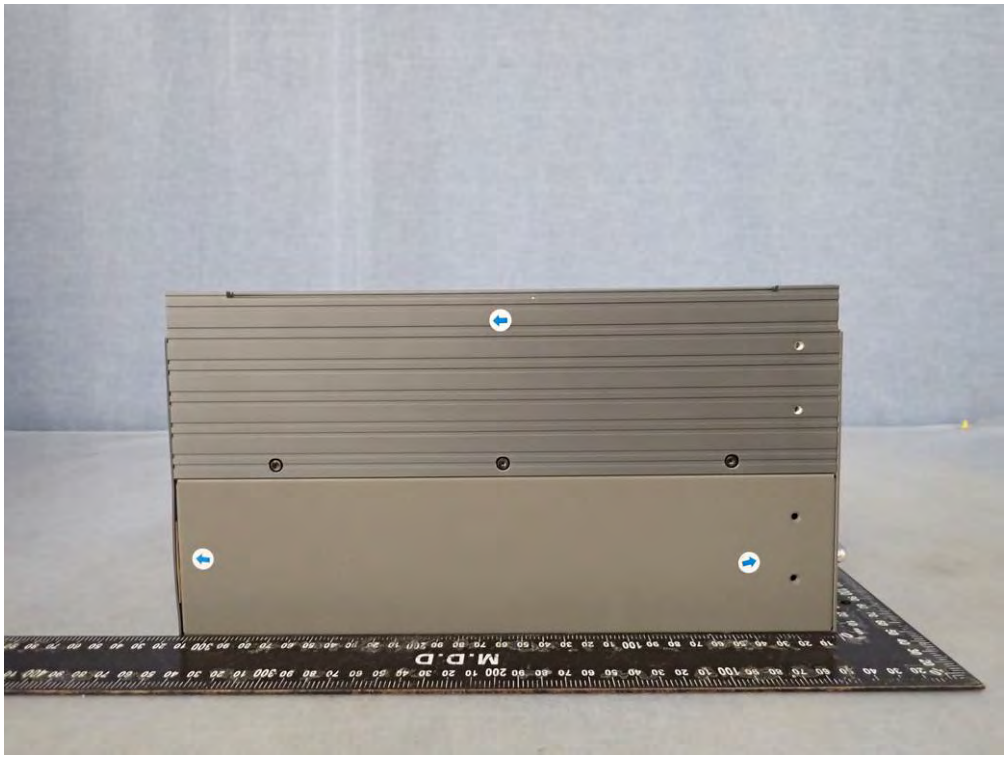
Front

Back

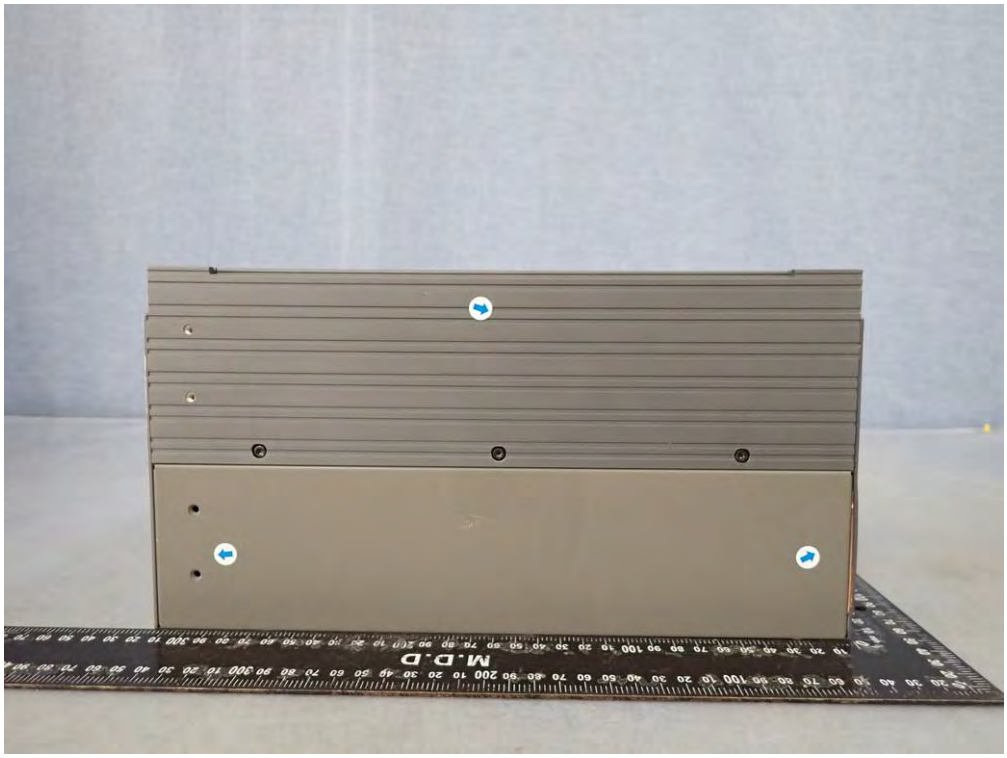


Air Discharge:
Contact Discharge:

Left



Right



Air Discharge:
Contact Discharge:

Top

Air Discharge:
Contact Discharge:

5.4 Test of IEC 61000-4-3

5.4.1 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
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					

5.4.2 EUT Operating Condition

Environment:

Temperature	Humidity	Air Pressure
23.6 °C	56 %RH	1009 hpa

5.4.3 Results of Radiated Radio Frequency Electromagnetic (RS)

Model No. : SCH3X2-D7
Tested By : Kevin Chang
Tested Date : November 14, 2024
Test Mode : Mode 1
Basic Standard : IEC 61000-4-3
Frequency range : 80 MHz - 1000 MHz
Frequency range : 1800 MHz, 2600 MHz, 3500 MHz, 5000 MHz (±1%)
Field strength : 3 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 - 1000	Vertical/Horizontal	A	0 degree
2	80 - 1000	Vertical/Horizontal	A	90 degree
3	80 - 1000	Vertical/Horizontal	A	180 degree
4	80 - 1000	Vertical/Horizontal	A	270 degree

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

No.	Frequency (MHz)	Antenna Orientation	Observation	EUT Orientation
1	1800, 2600, 3500, 5000 (±1%)	Vertical/Horizontal	A	0 degree
2	1800, 2600, 3500, 5000 (±1%)	Vertical/Horizontal	A	90 degree
3	1800, 2600, 3500, 5000 (±1%)	Vertical/Horizontal	A	180 degree
4	1800, 2600, 3500, 5000 (±1%)	Vertical/Horizontal	A	270 degree

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

5.5 Test of IEC 61000-4-4

5.5.1 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					

5.5.2 EUT Operating Condition

Environment:

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

5.5.3 Results of Electrical Fast Transient (EFT)

Model No. : SCH3X2-D7
Tested By : Jacky Lin
Tested Date : November 14, 2024
Test Mode : Mode 1
Basic Standard : IEC 61000-4-4
Test Voltage : DC Input: ± 0.5 kV
Signal/Comm. : ± 0.5 kV
Polarity : Positive/Negative
Impulse Frequency : 5 kHz
Tr/Th : 5/50ns
Burst : 15ms/300ms

Observation:

Test Point	Polarity	Test Level (kV)	Results
L	+/-	0.5	A
N	+/-	0.5	A
PE	+/-	0.5	A
L-N	+/-	0.5	A
L-PE	+/-	0.5	A
N-PE	+/-	0.5	A
L-N-PE	+/-	0.5	A
RJ45	+/-	0.5	A

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

5.6 Test of IEC 61000-4-5

5.6.1 Test Instruments

Immunity Shield Room					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
CDN	EMC-Partner	CDN-UTP8	1505	11/23/2023	11/22/2024
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					

5.6.2 EUT Operating Condition

Environment:

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

5.6.3 Results of Surge Test

Model No. : SCH3X2-D7
Tested By : Jacky Lin
Tested Date : November 14, 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 Description

DC input line:

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

Remark: A: 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 : 10/700μs (5/320μs)

Observation Description

Signal line:

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

Remark: B: The transmitting was interrupted during test. It could become normal after test stop.

5.7 Test of IEC 61000-4-6

5.7.1 Test Instruments

CS Room					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
Attenuator	EMCI	SA3NL	10006F	N.C.R	N.C.R
CDN	Teseq	CDN M016	35820	11/30/2023	11/29/2024
CDN	SCHAFFNER	CDN M325	17457	11/30/2023	11/29/2024
CDN	Teseq	CDN T8-10	40378	07/15/2024	07/14/2025
Compact Immunity Test System	Teseq	NSG 4070B-35	39581	09/19/2024	09/18/2025
Test Software	NSG 4070 Control Program Version: V1.2.0				
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					

5.7.2 EUT Operating Condition

Environment:

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

5.7.3 Results of Immunity to Conducted Disturbances (CS)

Model No. : SCH3X2-D7
Tested By : Kevin Chang
Tested Date : November 14, 2024
Test Mode : Mode 1
Basic Standard : IEC 61000-4-6
Frequency range : 0.15 MHz -10 MHz
Field strength : 3 Vrms
Frequency range : 10 MHz - 30 MHz
Field strength : 3 V to 1Vrms
Frequency range : 30 MHz - 80 MHz
Field strength : 1 Vrms
Modulation : 80% AM, 1 kHz Sinewave
Frequency step : 1 % of the preceding frequency
Dwell Time : 3 seconds
Coupling Method : CDN-M2; CDN-T8

Cable Description	Frequency (MHz)	Observation
DC input	0.15 – 80	A

Signal Ports

Cable Description	Frequency (MHz)	Observation
RJ45	0.15 – 80	A

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

5.8 Test of IEC 61000-4-8

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	09/19/2024	09/18/2026
AC/DC Clamp Meter	Fluke	353	33360025	06/03/2024	06/02/2025
Magnetic Field Coil	Teseq	INA 703 W/ 2141	1976 / 1413	02/23/2024	02/22/2025
Magnetic Field Meter	AARONIA	NF-5035	01879	12/08/2023	12/07/2024
Test Software	Win2120Ver. 5.0				
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					

5.8.2 EUT Operating Condition

Environment:

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

5.8.3 Result of Immunity to Power Frequency Magnetic Field

Model No. : SCH3X2-D7
Tested By : Jim Lian
Tested Date : November 14, 2024
Test Mode : Mode 1
Basic Standard : IEC 61000-4-8
Power Frequency : 50 Hz
Magnetic Field : 1 A/m(r.m.s)
Coil Orientation : X, Y, Z Axis
Observation : A

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

5.9 Test of IEC 61000-4-11

5.9.1 Test Instruments

Immunity Shielded 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					

5.9.2 EUT Operating Condition

Environment:

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

5.9.3 Results of Voltage Dips Immunity Test

Model No. : SCH3X2-D7
Tested By : N/A
Tested Date : N/A
Test Mode : N/A
Basic Standard : IEC 61000-4-11
EUT Rated Voltage : 230 Volts.
Reduction Voltage : 30, >95 % Ut
Phase Angle : 0,180 degree
Total events : 3 dropouts
Event interval : 10 seconds

Test Power: 230Vac, 50Hz			
Environmental phenomena	**Test specification (% reduction)**	**Duration (in periods of the rated frequency)**	**Observation**
Voltage Interruptions	>95	250	N/A
Voltage dips	30	25	N/A
	>95	0.5	N/A

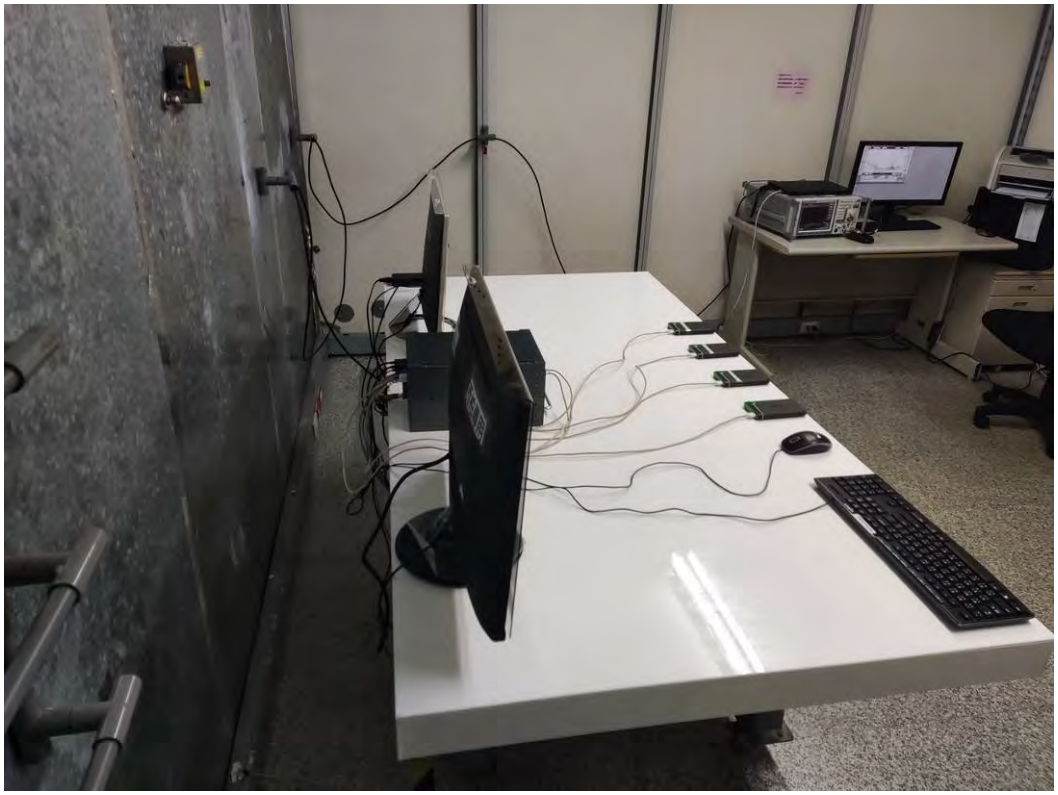
Test Power: 230Vac, 60Hz			
Environmental phenomena	**Test specification (% reduction)**	**Duration (in periods of the rated frequency)**	**Observation**
Voltage Interruptions	>95	300	N/A
Voltage dips	30	30	N/A

Remark: N/A: The subject equipment is not intended to be connected to AC mains supply. Therefore, this test is not applicable.

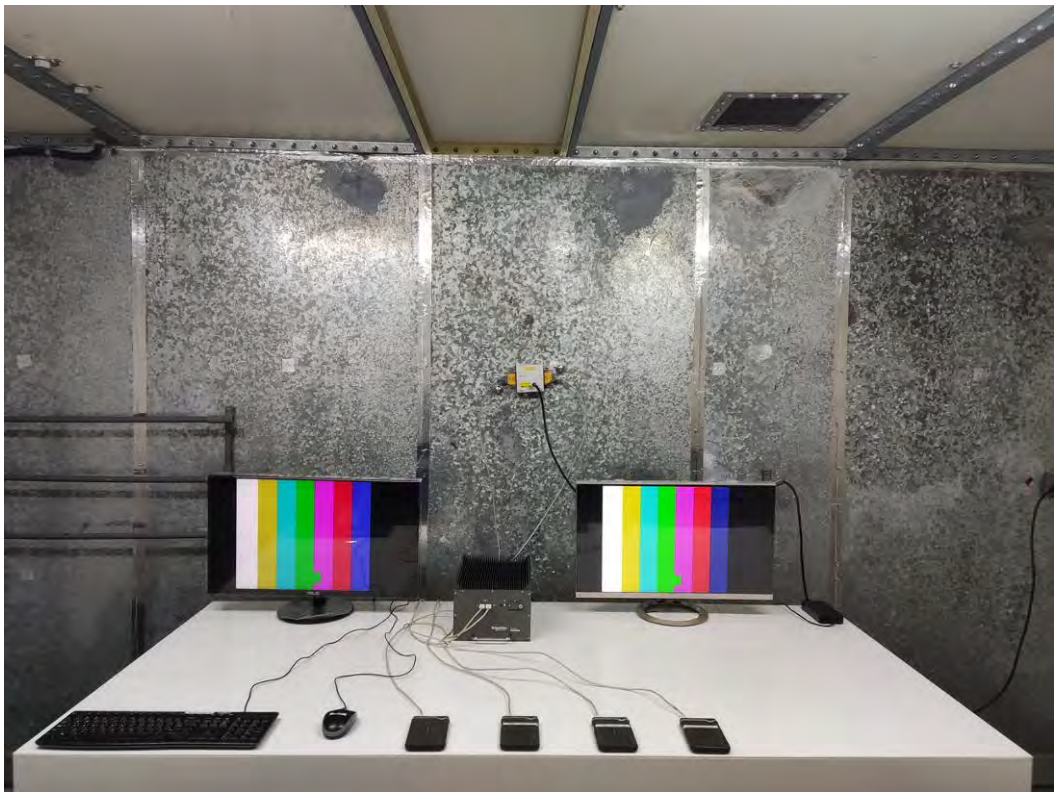
APPENDIX

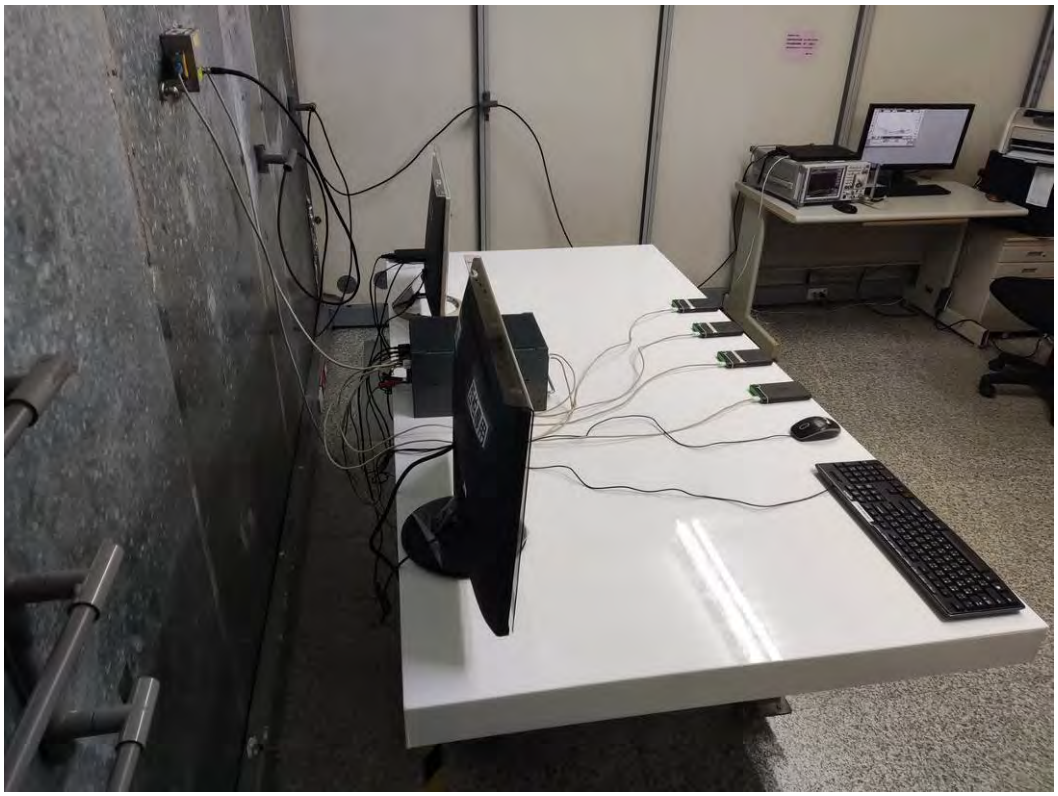
Photograph of Testing General Set-up

CE Testing Set-up



ISN Testing Set-up

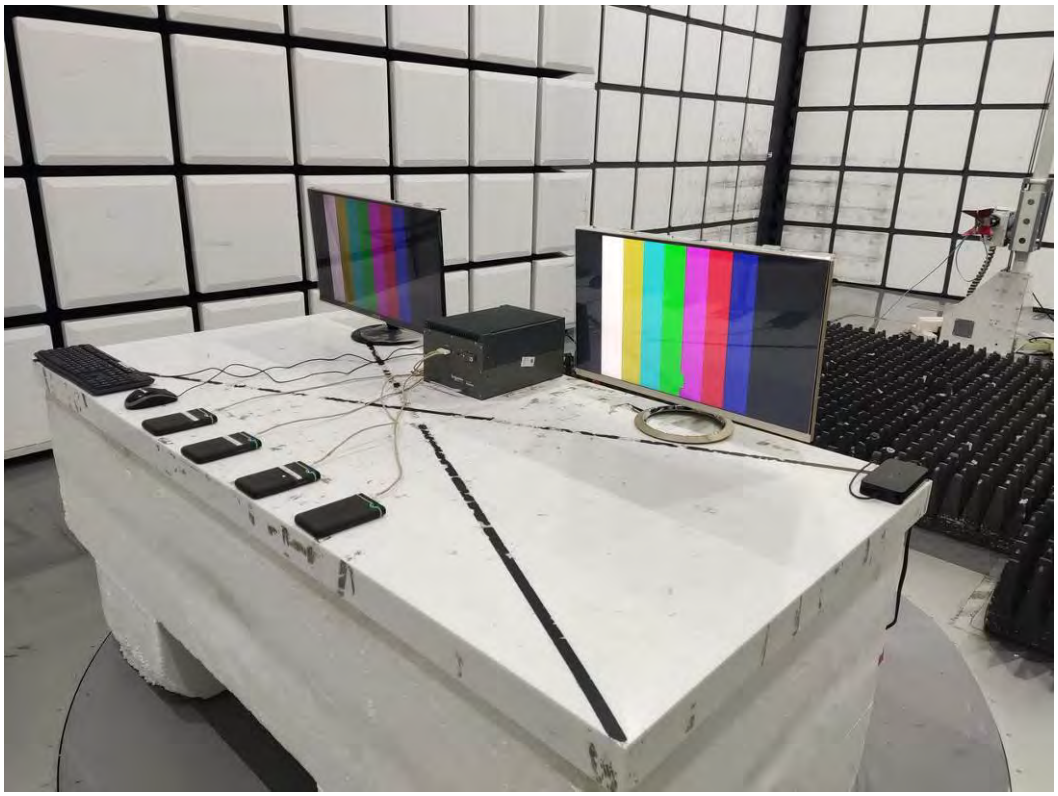


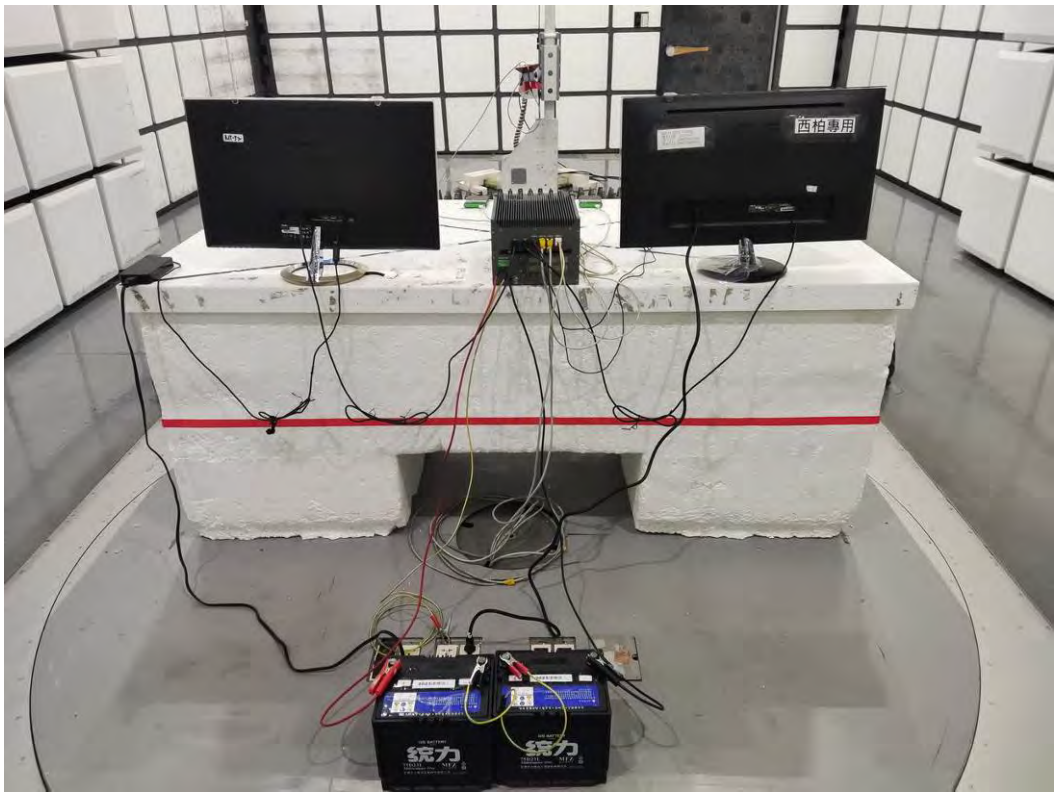


RE Testing Set-up

Below 1GHz

Above 1GHz





ESD Testing Set-up

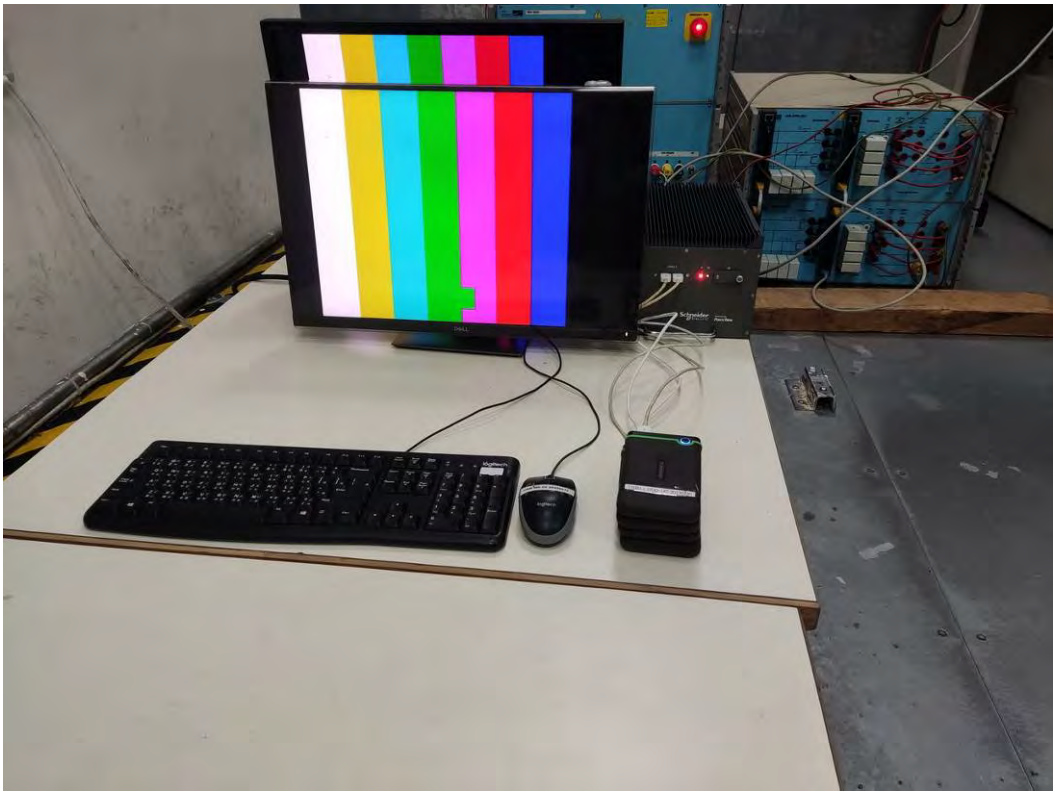
RS Testing Set-up

EFT Testing Set-up

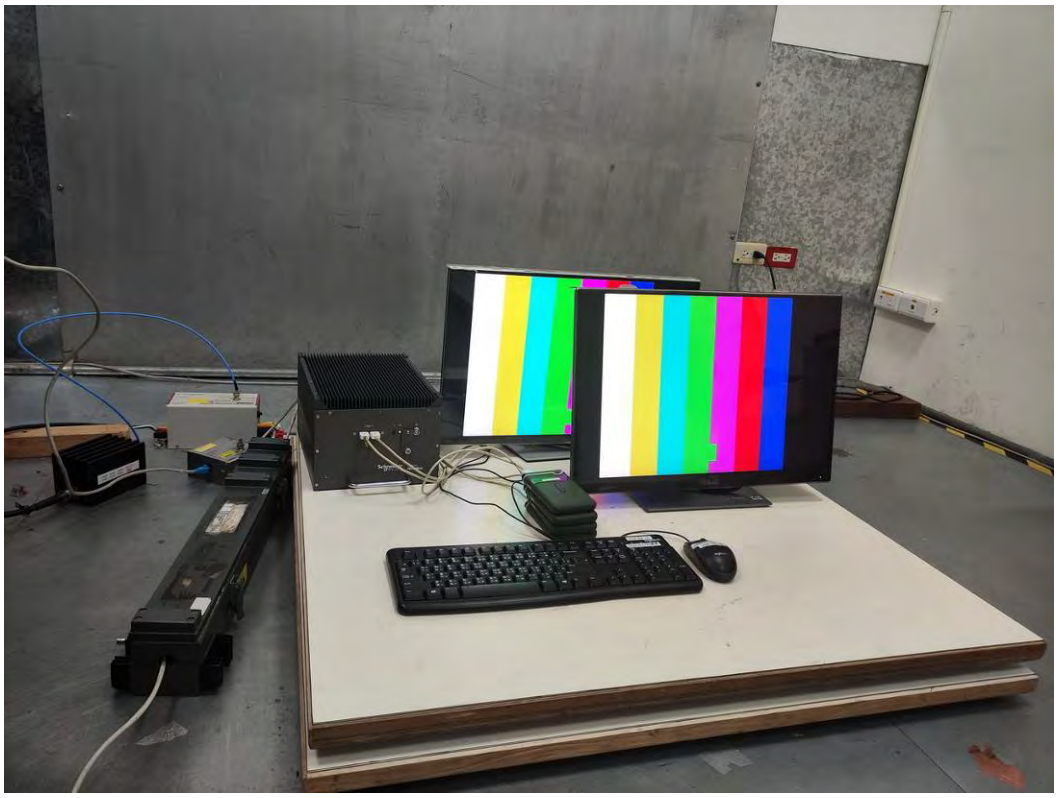
EFT For I/O Testing Set-up

Surge Testing Set-up

Surge For I/O Testing Set-up



CS Testing Set-up

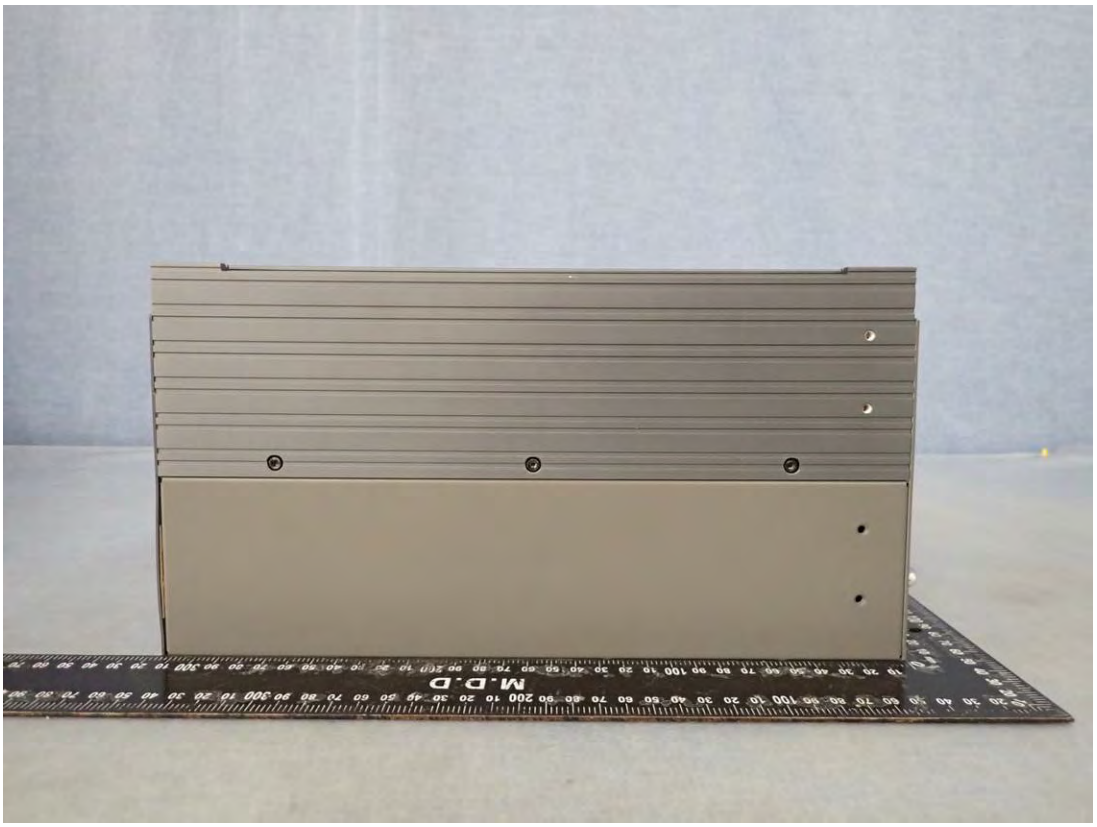


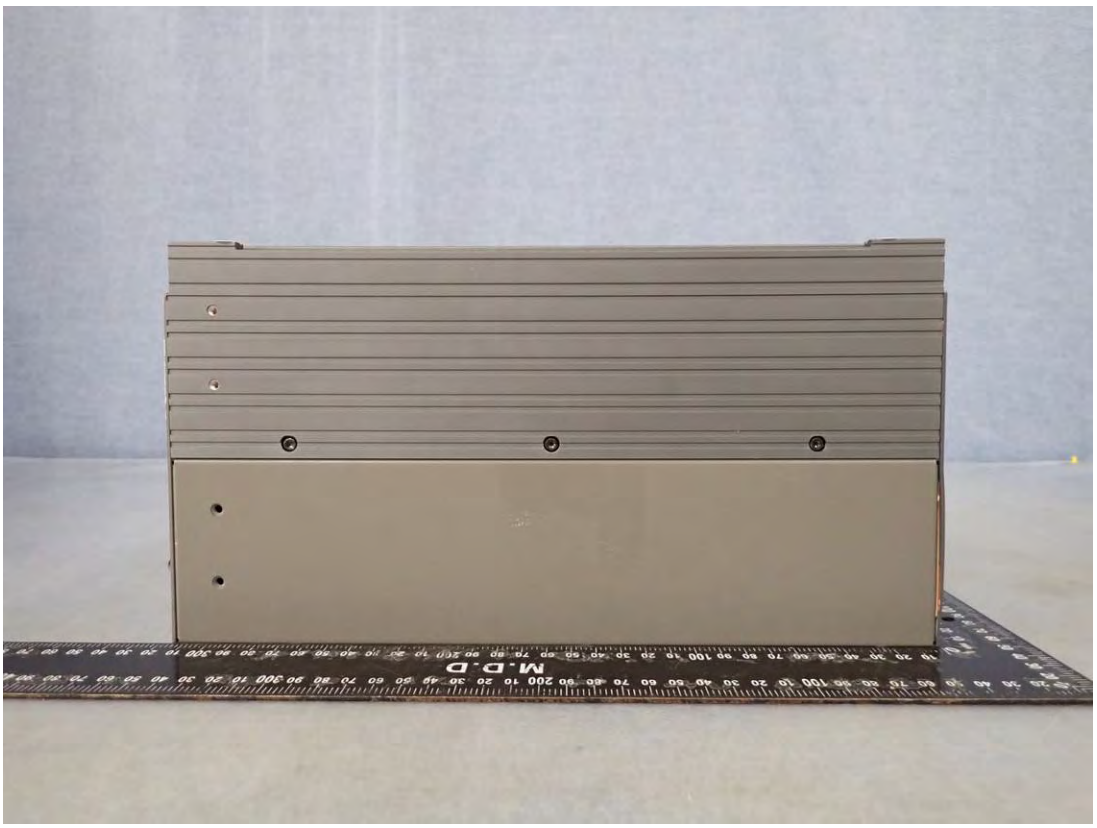
CS For I/O Testing Set-up

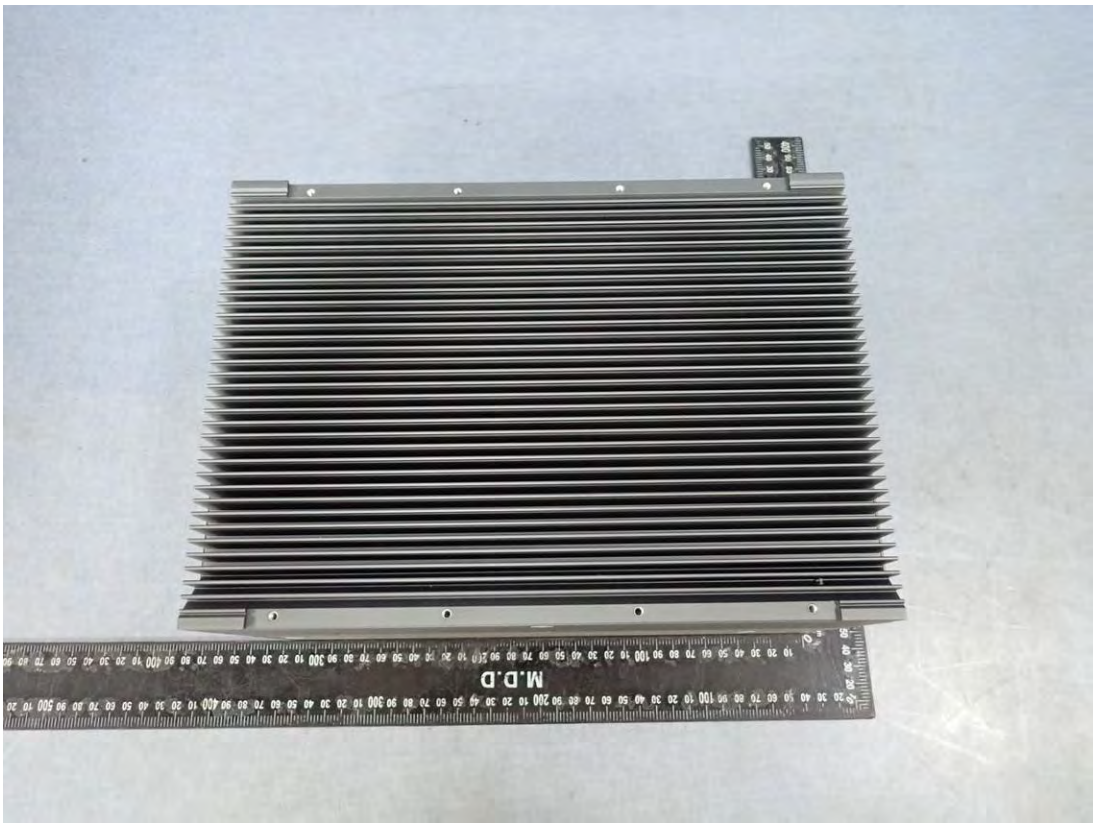
PFMF Testing Set-up

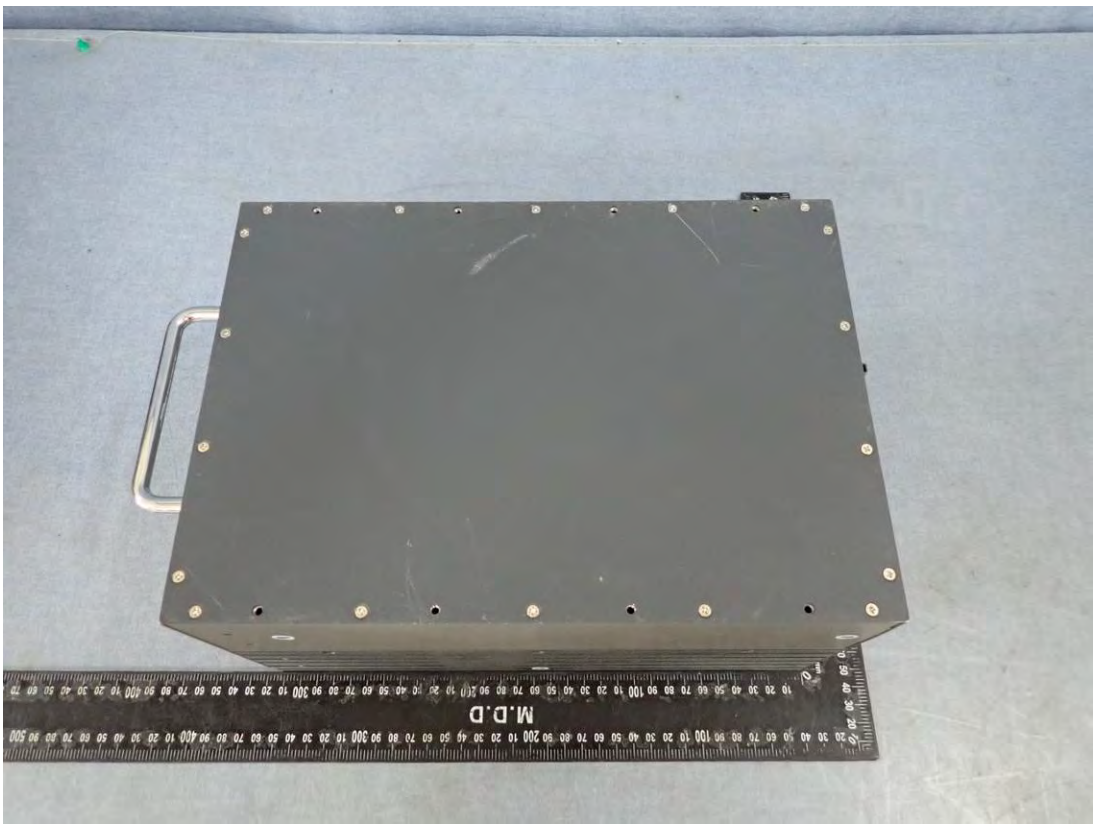
Photographs of EUT Unit

Exterior









** End of Report **