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Rev.: 00

## CE EMC TEST REPORT

for

**UP Xtreme i11 Board; UP Xtreme i11 EDGE Computing system; AI Core X module  
MODEL: xUPXxTGLx; xUPXxEDGExTGLx; xPERxTAIXx (X-where x may be  
combination of alphanumeric characters or “-” or blank)**

Issued to:

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Issued by:

**Compliance Certification Services Inc.**

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**Issued Date: July 21, 2021**

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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

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	July 21, 2021	Initial Issue	ALL	Andrea Chen



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# 1 TEST CERTIFICATION

**Product:** UP Xtreme i11 Board; UP Xtreme i11 EDGE Computing system; AI Core X module**Model:** xUPXxTGLx; xUPXxEDGExTGLx; xPERxTAIXx (X-where x may be combination of alphanumeric characters or “-” or blank)**Brand:** AAEON**Applicant:** AAEON Technology Inc.  
5F, No.135, Lane 235, Pao Chiao Rd, Hsin-Tien Dist.,  
New Taipei City, Taiwan, R.O.C.**Manufacturer:** AAEON Technology Inc.  
5F, No.135, Lane 235, Pao Chiao Rd, Hsin-Tien Dist.,  
New Taipei City, Taiwan, R.O.C.**Tested:** June 29, 2021**Applicable Standards:** EN 55011: 2016 + A1: 2017 (Group 1, Class A) EN 61000-6-1: 2007

EN 61000-3-2: 2014

EN 61000-3-3: 2013

IEC 61000-4-2: 2008 / EN 61000-4-2: 2009

IEC 61000-4-3: 2006 + A1: 2007 + A2: 2010 /

EN 61000-4-3: 2006 + A1: 2008 + A2: 2010

IEC 61000-4-4: 2012 / EN 61000-4-4: 2012

IEC 61000-4-5: 2014 + A1: 2017 /

EN 61000-4-5: 2014 + A1: 2017

IEC 61000-4-6: 2013 + COR1: 2015 /

EN 61000-4-6: 2014 + AC: 2015

IEC 61000-4-8: 2009 / EN 61000-4-8: 2010

IEC 61000-4-11: 2004 + A1: 2017 /

EN 61000-4-11: 2004 + A1: 2017

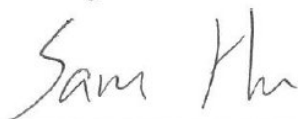
## Note

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.

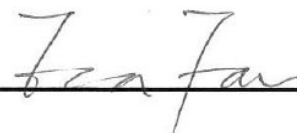
## Statements of Conformity

Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

The above equipment has been tested by Compliance Certification Services Inc., and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

**Approved by:**

Sam Hu  
Assistant Manager

**Reviewed by:**

Eva Fan  
Supervisor of report document dept.

## 2 TEST RESULT SUMMARY

EMISSION			
Standard	Item	Result	Remarks
EN 55011: 2016 + A1: 2017 (Group 1, Class A)	Conducted	PASS	Meet Class A limit
	Radiated	PASS	Meet Class A limit
EN 61000-3-2: 2014	Harmonic current emissions	PASS	Meet Class A limit
EN 61000-3-3: 2013	Voltage fluctuations & flicker	PASS	Meets the requirements

IMMUNITY 【 EN 61000-6-1: 2007 】			
Standard	Item	Result	Remarks
IEC 61000-4-2: 2008 / EN 61000-4-2: 2009	ESD	PASS	Meets the requirements of Performance Criterion B
IEC 61000-4-3: 2006 + A1: 2007 + A2: 2010 / EN 61000-4-3: 2006 + A1: 2008 + A2: 2010	RS	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-4: 2012 / EN 61000-4-4: 2012	EFT	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-5: 2014 + A1: 2017 / EN 61000-4-5: 2014 + A1: 2017	Surge	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-6: 2013 + COR1: 2015 / EN 61000-4-6: 2014 + AC: 2015	CS	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-8: 2009 / EN 61000-4-8: 2010	PFMF	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-11: 2004 + A1: 2017 / EN 61000-4-11: 2004 + A1: 2017	Voltage dips & voltage variations	PASS	Meets the requirements of <b>Voltage Dips:</b> 1) 0% residual Performance Criterion A 2) 70% residual Performance Criterion A <b>Voltage Interruptions:</b> 1) 0% residual Performance Criterion C

### 3 EUT DESCRIPTION

<b>Product</b>	UP Xtreme i11 Board; UP Xtreme i11 EDGE Computing system; AI Core X module
<b>Brand Name</b>	AAEON
<b>Model</b>	xUPXxTGLx; xUPXxEDGExTGLx; xPERxTAIXx (X-where x may be combination of alphanumeric characters or “-” or blank)
<b>Applicant</b>	AAEON Technology Inc.
<b>Housing material</b>	Metal case
<b>Identify Number</b>	T210611D13
<b>Received Date</b>	June 11, 2021
<b>EUT Power Rating</b>	12VDC from Adaptor
<b>AC Power During Test</b>	230VAC / 50Hz to Adaptor
<b>Adaptor Manufacturer</b>	FSP
<b>Adaptor Model</b>	FSP096-AHAN3
<b>Adaptor Power Rating</b>	I/P: 100-240VAC, 1.8A, 50-60Hz O/P: 12VDC, 8A
<b>DC Power Cable Type</b>	Unshielded, 1.5m (Non-detachable, with a core)

#### Model Differences

Model	Difference	Tested (Check)
UPX-TGL01	UP Xtreme i11 Board	<input checked="" type="checkbox"/>
UPX-EDGE-TGL01	UP Xtreme i11 EDGE Computing system	<input checked="" type="checkbox"/>
PER-TAIX2-A20-2280	AI Core X module	<input checked="" type="checkbox"/>
xUPXxTGLx; xUPXxEDGExTGLx; xPERxTAIXx	1. For marketing purpose only. 2. X-where x may be combination of alphanumeric characters or “-” “ ” or blank	<input type="checkbox"/>

#### I/O PORT

I/O PORT TYPES	Q'TY	TESTED WITH
1. GPIO Port	1	N/A
2. LAN Port	2	2
3. HDMI Port	1	1
4. DP Port	1	1
5. USB 3.2 Port	3	3
6. USB 2.0 Port	1	1
7. USB 4.0 Port	1	1
8. COM Port	2	2
9. Earphone Port	1	1
10. Antenna Port	2	2

**Note:** Client consigns only one model sample to test (Model Number: UPX-TGL01; UPX-EDGE-TGL01; PER-TAIX2-A20-2280).

## 4 TEST METHODOLOGY

### 4.1. DECISION OF FINAL TEST MODE

The EUT was tested together with the below additional components, and a configuration, which produced the worst emission levels, was selected and recorded in this report.

The test configuration/ mode is as the following:

#### Conduction Mode:

1	HDMI+DP 3840*2160, VF=60Hz
---	----------------------------

#### Radiation Mode:

1	HDMI+DP 3840*2160, VF=60Hz
	HDMI+DP 3840*2160, VF=60Hz / 1-6GHz

#### Worst:

**Conduction:** Mode 1

**Radiation:** Mode 1

### 4.2. EUT SYSTEM OPERATION

1. Windows 10 boots system.
2. Run Emctest.exe to activate all peripherals and display "H" pattern on monitor screen.
3. Run Winemc.exe and choose media player to play music.
4. Run Winemc.exe and choose "E:/ & F:/ & G:/" to test EUT.
5. Press the start menu, select executive and type ping 192.168.1.1&2 -t (EUT), ping 192.168.1.10&20 -t (Server PC).

**Note:** Test program is self-repeating throughout the test.

## 5 SETUP OF EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

#### EUT Devices:

No.	Equipment	Model No.	Brand Name
1	CPU (1.80GHz)	Intel® TIGER LAKE UP3 I7-1185GRE	Intel
2	Memory (4G DDR4 2666) X2	TS512MSH64V6H-I	Transcend
3	Power Supply	FSP096-AHAN3	FSP
4	2.5" SSD (128GB)	TS128GSSD420K	Transcend

#### Peripherals Devices:

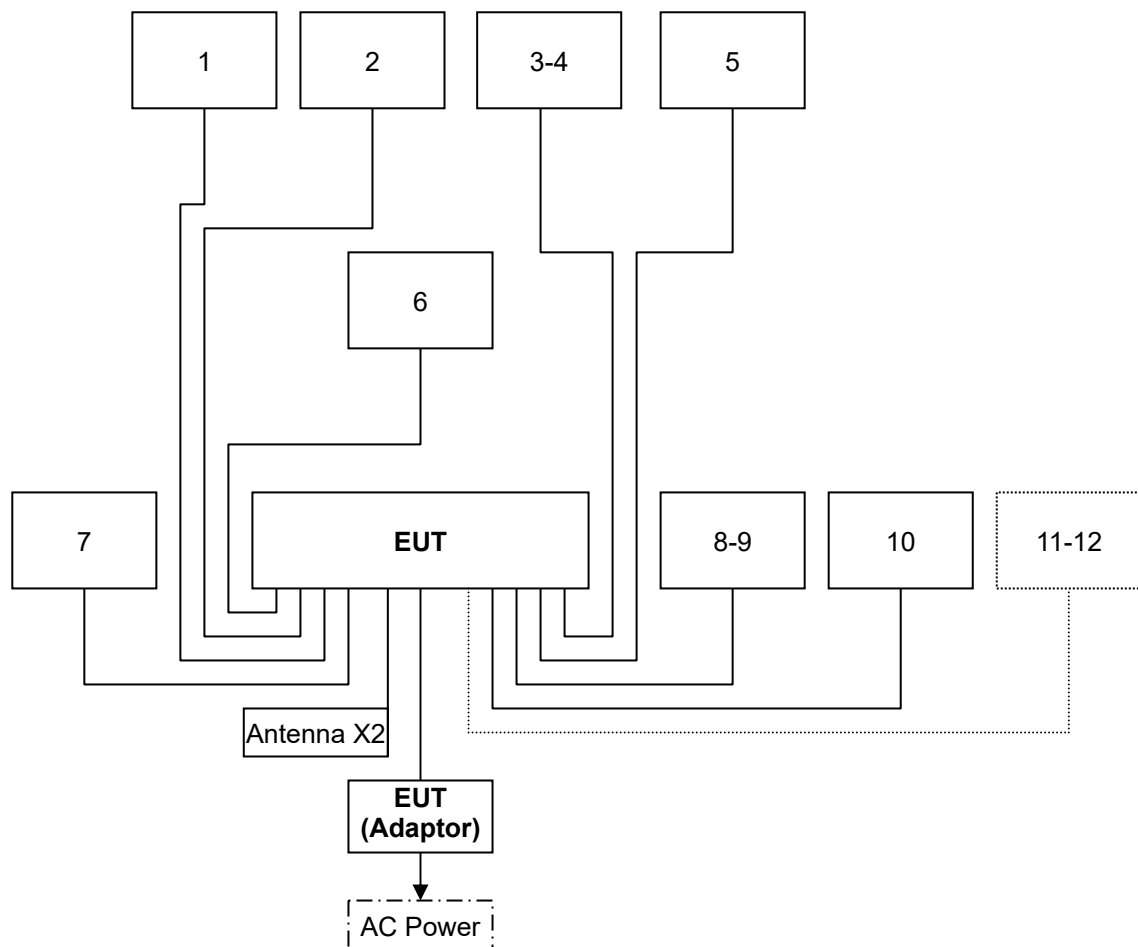
No.	Equipment	Model No.	Serial No.	FCC ID / BSMI ID	Brand Name	Data Cable	Power Cord
1	USB Mouse	M-U0026	N/A	BSMI: T41126	LOGITECH	Shielded, 1.5m	N/A
2	USB Keyboard	Y-U0011	N/A	DOC BSMI: D51160	LOGITECH	Shielded, 1.5m	N/A
3-4	USB HDD	TS1TSJ25MC	N/A	N/A	Transcend	Shielded, 1.8m	N/A
5	Earphone	X710	N/A	N/A	HAWK	Unshielded, 1.8m	N/A
6	USB HDD	ESD240C	N/A	N/A	Transcend	Shielded, 0.6m	N/A
7	Monitor	VP28U	KCLMTF168414	BSMI: R31018	ASUS	Shielded, 1.5m	Unshielded, 1.8m
8-9	Modem	AL-56EI	7MEI037A0123	N/A	GALILEO	Shielded, 1.8m	Unshielded, 1.8m
10	Monitor	U2718Qb	CN-0M5R5F-QDC00 -9CL-0CVL-A10	BSMI: R43002	DELL	Shielded, 1.5m	Unshielded, 1.8m
11	Server PC	T3500	BX36VBX	BSMI: R33002	DELL	Unshielded, 10m	Unshielded, 1.8m
12	Server PC	T3500	9X36VBX	BSMI: R33002	DELL	Unshielded, 10m	Unshielded, 1.8m

#### Note:

- 1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



## 5.2. CONFIGURATION OF SYSTEM UNDER TEST



## 6 FACILITIES AND ACCREDITATIONS

### 6.1. FACILITIES

All measurement facilities used to collect the measurement data are located at CCSrf Taiwan Xindian Lab. at No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan.

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. All receiving equipment conforms to CISPR 16-1-1, CISPR 16-1-2, CISPR 16-1-3, CISPR 16-1-4 and CISPR 16-1-5.

### 6.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

<b>Taiwan</b>	TAF
<b>USA</b>	A2LA

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

<b>Canada</b>	Industry Canada
<b>Japan</b>	VCCI
<b>Taiwan</b>	BSMI
<b>USA</b>	FCC

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.ccsrf.com>

### 6.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Uncertainty
Conducted emissions	0.15MHz ~ 30MHz	± 2.8
Radiated emissions	30MHz ~ 1000MHz	± 5.2
	1000MHz ~ 6000MHz	± 4.6

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Consistent with industry standard (e.g. CISPR 22: 2005, clause 11, Measurement Uncertainty) determining compliance with the limits shall be base on the results of the compliance measurement. Consequently the measure emissions being less than the maximum allowed emission result in this be a compliant test or passing test.

The acceptable measurement uncertainty value without requiring revision of the compliance statement is base on conducted and radiated emissions being less than  $U_{CISPR}$  which is 3.8dB(AMN); 5.2dB(OATS) and 5.5dB(1-6GHz) respectively. CCS values (called  $U_{Lab}$  in CISPR 16-4-2) is less than  $U_{CISPR}$  as shown in the table above. Therefore, MU need not be considered for compliance.

## 7 EMISSION TEST

### 7.1. CONDUCTED EMISSION MEASUREMENT AT AC MAINS PORT

#### 7.1.1. LIMITS

##### CLASS A

FREQUENCY (MHz)	Group 1 $\leq 20\text{kV}$		Group 1 $> 20\text{kV}$ / Group 2 $\leq 20\text{kV}$		Group 2 $> 20\text{kV}$	
	Quasi-peak (dBuV)	Average (dBuV)	Quasi-peak (dBuV)	Average (dBuV)	Quasi-peak (dBuV)	Average (dBuV)
0.15 - 0.5	79	66	100	90	130	120
0.50 - 5.0	73	60	86	76	125	115
5.0 - 30.0	73	60	90 Decreasing linearly with logarithm of frequency to 73	80 60	115	105

**Note:** The lower limit shall apply at the transition frequencies. Care should be taken to comply with leakage current requirements.

##### CLASS B

FREQUENCY (MHz)	Group 1 & 2	
	Quasi-peak (dBuV)	Average (dBuV)
0.15 - 0.5	66 Decreasing linearly with logarithm of frequency to 56	56 Decreasing linearly with logarithm of frequency to 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

**Note:** The lower limit shall apply at the transition frequencies. Care should be taken to comply with leakage current requirements.

#### 7.1.2. TEST INSTRUMENTS

Conducted Emission room # B				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Attenuator	MCL	HAT-10	SD-C012	03/23/2022
BNC Cable	EMCI	CFD300-NL	BNC#B5	01/04/2022
EMI Test Receiver	R&S	ESR3	102166	04/12/2022
LISN	Schwarzbeck	NSLK 8127	8127382	04/13/2022
LISN(EUT)	Schwarzbeck	NSLK 8127	8127526	04/13/2022
Thermo-Hygro Meter	Wisewind	N/A	SD-S017	09/08/2021
Test S/W	EZ-EMC			

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. N.C.R = No Calibration Request.

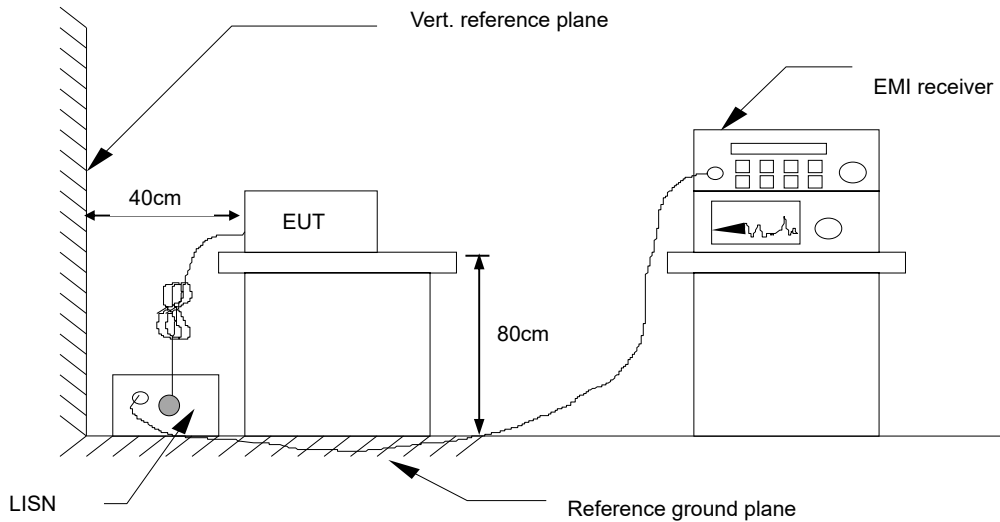
**7.1.3. TEST PROCEDURES** (please refer to measurement standard or CCS SOP PA-031)**Procedure of Preliminary Test**

- The EUT and Support equipment, if needed, was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per EN 55011 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor standing equipment, it is placed on the ground plane, which has a 15 cm non-conductive covering to insulate the EUT from the ground plane.
- All I/O cables were positioned to simulate typical actual usage as per EN 55011.
- The test equipment EUT installed received AC main power, through a Line Impedance Stabilization Network (LISN), which supplied power source and was grounded to the ground plane.
- All support equipment power received from a second LISN.
- The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
- The Receiver scanned from 150kHz to 30MHz for emissions in each of the test modes.
- During the above scans, the emissions were maximized by cable manipulation.
- The test mode(s) described in Item 4.1 were scanned during the preliminary test.
- After the preliminary scan, we found the test mode described in Item 4.1 producing the highest emission level.
- The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

**Procedure of Final Test**

- EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.
- A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.
- The test data of the worst-case condition(s) was recorded.

## 7.1.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

## 7.1.5. DATA SAMPLE

Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (P/Q/A)	Line (L1/L2)
x.xx	42.95	0.55	43.50	73	-29.50	Q	L1

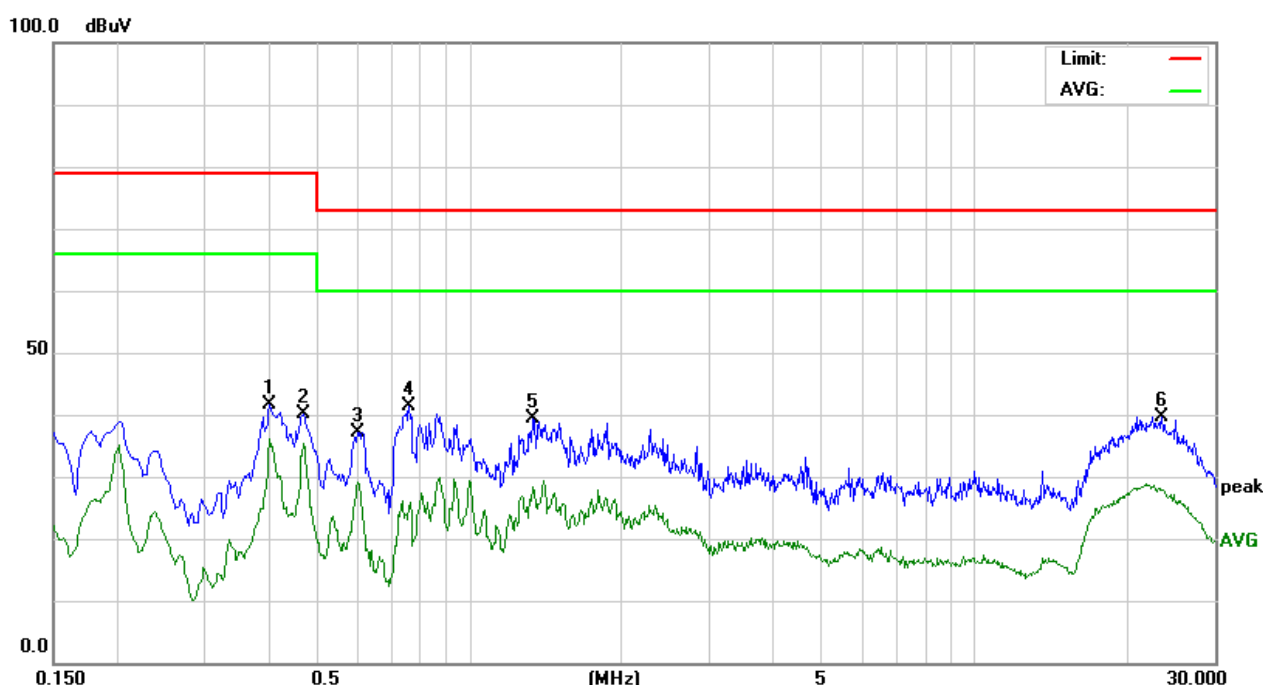
Freq. = Emission frequency in MHz  
 Reading = Uncorrected Analyzer/Receiver reading  
 Factor = Insertion loss of LISN + Cable Loss + Pulse Limit  
 Result = Read Level + Factor  
 Limit = Limit stated in standard  
 Margin = Reading in reference to limit  
 P = Peak Reading  
 Q = Quasi-peak Reading  
 A = Average Reading  
 L1 = Hot side  
 L2 = Neutral side

### Calculation Formula

Margin (dB) = Result (dBuV) – Limit (dBuV)

### 7.1.6. TEST RESULTS

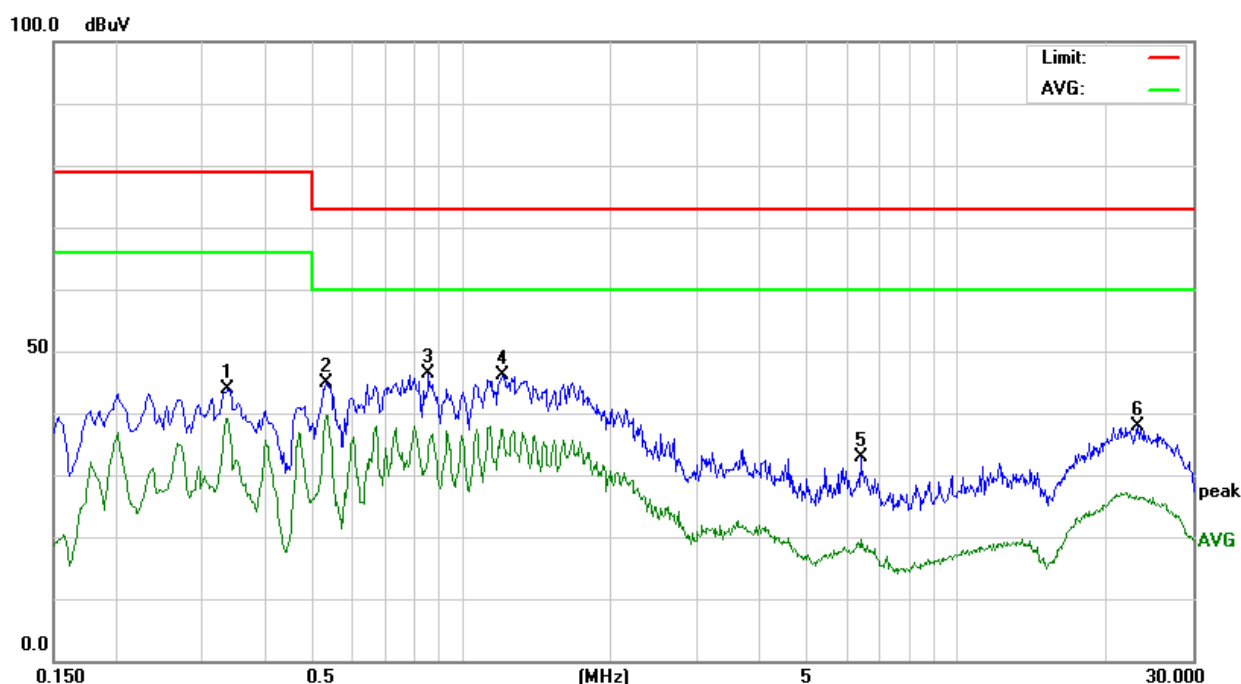
<b>Model No.</b>	UPX-TGL01; UPX-EDGE-TGL01; PER-TAIX2-A20-2280	<b>6dB Bandwidth</b>	9 kHz
<b>Environmental Conditions</b>	26°C, 66% RH	<b>Test Mode</b>	Mode 1
<b>Tested by</b>	Lion Lee	<b>Phase</b>	L1
<b>Standard</b>	EN 55011 GROUP 1 CLASS A		



Conducted Emission Readings							
Frequency Range Investigated				150 kHz to 30 MHz			
Freq. (MHz)	Reading (dBμV)	Factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector (P/Q/A)	Line (L1/L2)
0.4020	31.63	10.09	41.72	79.00	-37.28	P	L1
0.4700	29.94	10.10	40.04	79.00	-38.96	P	L1
0.6020	27.11	10.12	37.23	73.00	-35.77	P	L1
0.7620	31.13	10.14	41.27	73.00	-31.73	P	L1
1.3420	29.16	10.20	39.36	73.00	-33.64	P	L1
23.5220	28.70	10.95	39.65	73.00	-33.35	P	L1

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

<b>Model No.</b>	UPX-TGL01; UPX-EDGE-TGL01; PER-TAIX2-A20-2280	<b>6dB Bandwidth</b>	9 kHz
<b>Environmental Conditions</b>	26°C, 66% RH	<b>Test Mode</b>	Mode 1
<b>Tested by</b>	Lion Lee	<b>Phase</b>	L2
<b>Standard</b>	EN 55011 GROUP 1 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)	Line (L1/L2)
0.3379	33.84	10.09	43.93	79.00	-35.07	P	L2
0.5340	34.81	10.10	44.91	73.00	-28.09	P	L2
0.8580	36.13	10.15	46.28	73.00	-26.72	P	L2
1.2100	35.96	10.17	46.13	73.00	-26.87	P	L2
6.4020	22.38	10.47	32.85	73.00	-40.15	P	L2
23.2099	27.04	10.87	37.91	73.00	-35.09	P	L2

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

## 7.2. RADIATED EMISSION MEASUREMENT

### 7.2.1. LIMITS

#### Below 1GHz

FREQUENCY (MHz)	Measured on a test site		
	Group 1, class A $\leq 20\text{kV}$	Group 1, class A $> 20\text{kV}$	Group 1, class B
	Quasi-peak (dBuV/m)	Quasi-peak (dBuV/m)	Quasi-peak (dBuV/m)
0.15 - 30	Under consideration	Under consideration	Under consideration
30 - 230	40	50	30
230 - 1000	47	57	37

**Note:** The lower limit shall apply at the transition frequencies.

#### Above 1GHz

Frequency (MHz)	Class A (dBuV/m) (At 3m)		Class B (dBuV/m) (At 3m)	
	Average	Peak	Average	Peak
1000 ~ 3000	56	76	50	70
3000 ~ 6000	60	80	54	74

**Note:** The lower limit shall apply at the transition frequencies.

According to EN 55032: 2015 / A11: 2020 Table 1 the measurement frequency range shown in the following table:

Table 1 – Required highest frequency for radiated measurement

Highest internal frequency ( $F_x$ )	Highest internal frequency
$F_x \leq 108 \text{ MHz}$	1 GHz
$108 \text{ MHz} < F_x \leq 500 \text{ MHz}$	2 GHz
$500 \text{ MHz} < F_x \leq 1 \text{ GHz}$	5 GHz
$F_x > 1 \text{ GHz}$	$5 \times F_x$ up to a maximum of 6 GHz
NOTE 1 For FM and TV broadcast receivers, $F_x$ is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies.	
NOTE 2 $F_x$ is defined in 3.1.19.	

Where  $F_x$  is unknown, the radiated emission measurements shall be performed up to 6 GHz.



## 7.2.2. TEST INSTRUMENTS

Open Area Test Site # H				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Bilog Antenna	Teseq	CBL 6112D	40529	08/23/2021
Cable	EMEC	CFD400NL-LW	N-Type#H11	08/13/2021
EMI Test Receiver	R&S	ESCI	101340	02/25/2022
Pre-Amplifier	HP	8447D	1937A01554	09/25/2021
Thermo-Hygro Meter	Wisewind	201A	No. 03	05/19/2022
Test S/W	EZ-EMC			
Chamber #E (Above 1GHz Used)				
Horn Antenna	ETS	3117	00139062	07/21/2021
Microflex Cable	EMCI	EMC107-NM-NM-7000	200701	07/19/2021
K-Type Cable	EMCI	EMC101G-KM-KM-1000	200702	07/19/2021
Pre-Amplifier	Com-Power	PAM-118A	551041	07/19/2021
Signal Analyzer	R&S	FSV40	101269	07/19/2021
Thermo-Hygro Meter	Wisewind	201A	SD-R046	08/12/2021
Test S/W	EZ-EMC			

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. N.C.R = No Calibration Request.

**7.2.3. TEST PROCEDURE** (please refer to measurement standard or CCS SOP PA-031)**Procedure of Preliminary Test**

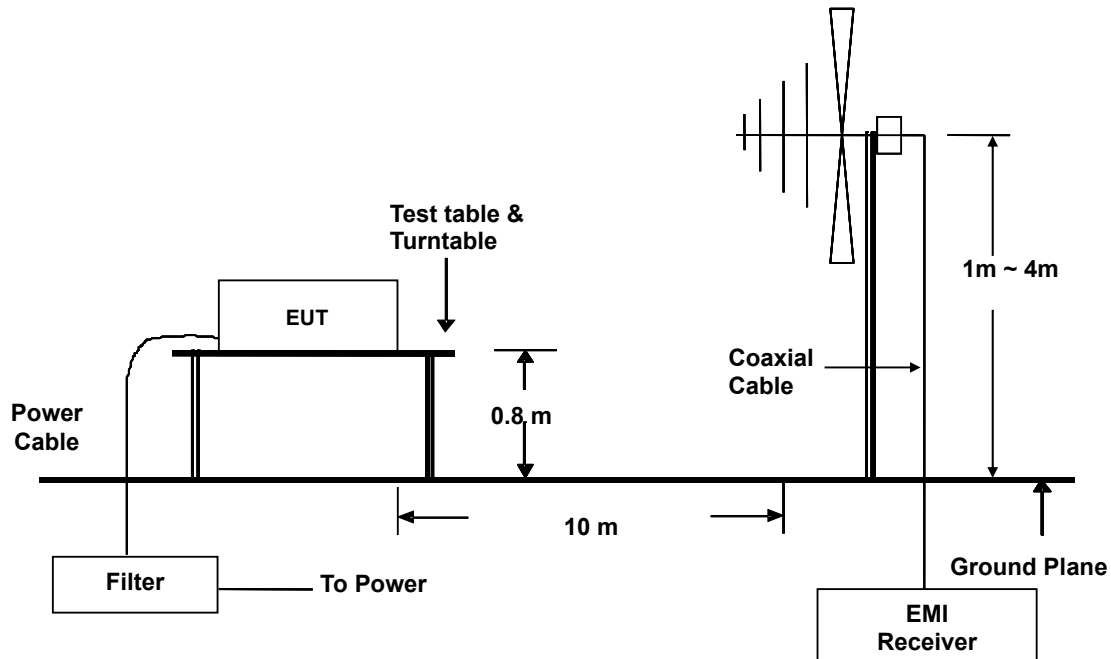
- The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is a floor standing equipment, it is placed on the ground plane which has a 15 cm non-conductive covering to insulate the EUT from the ground plane.
- Support equipment, if needed, was placed as per EN 55011.
- All I/O cables were positioned to simulate typical usage as per EN 55011.
- The EUT received AC power source from the outlet socket under the turntable. All support equipment power received from another socket under the turntable.
- The antenna was placed at 3 or 10 meter away from the EUT as stated in EN 55011. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.
- The Analyzer / Receiver quickly scanned from 30MHz to 6000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- The test mode(s) described in Item 4.1 were scanned during the preliminary test:
- After the preliminary scan, we found the test mode described in Item 4.1 producing the highest emission level.
- The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

**Procedure of Final Test**

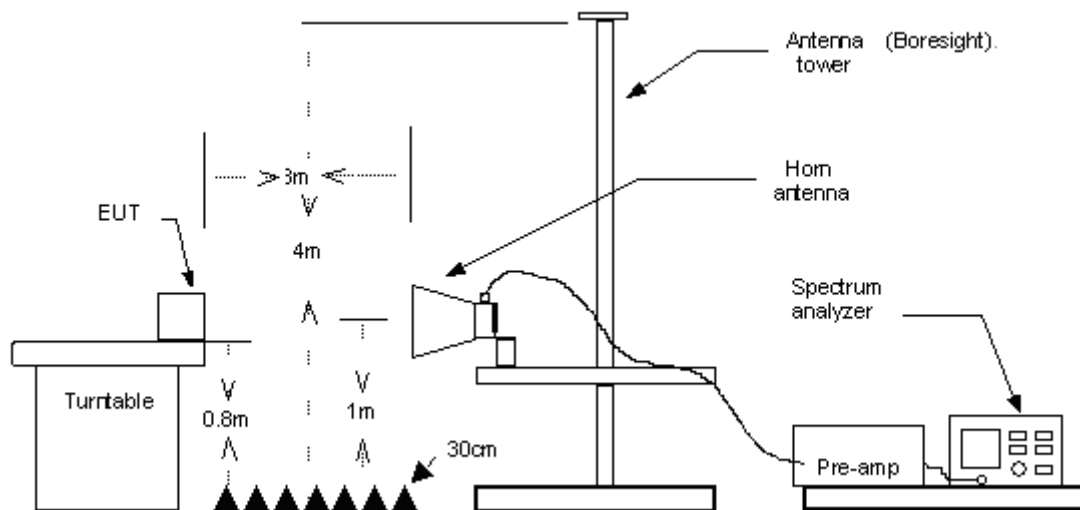
- EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test.
- The Analyzer / Receiver scanned from 30MHz to 6000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- Recording at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. Below 1GHz the Q.P. reading and above 1GHz the Peak and Average reading are presented.
- The test data of the worst-case condition(s) was recorded.

## 7.2.4. TEST SETUP

### Below 1GHz



### Above 1GHz



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

**7.2.5. DATA SAMPLE****Below 1GHz**

Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/Q)	Pol. (H/V)
x.xx	14.0	12.2	26.2	40	-13.8	Q	H

**Above 1GHz**

Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector (P/A)	Pol. (H/V)
x.xx	42.95	0.55	43.50	60	-16.50	A	H

Freq. = Emission frequency in MHz  
 Reading = Uncorrected Analyzer/Receiver reading  
 Factor = Antenna Factor + Cable Loss - Amplifier Gain  
 Result = Reading + Factor  
 Limit = Limit stated in standard  
 Margin = Reading in reference to limit  
 P = Peak Reading  
 Q = Quasi-peak Reading  
 A = Average Reading  
 H = Antenna Polarization: Horizontal  
 V = Antenna Polarization: Vertical

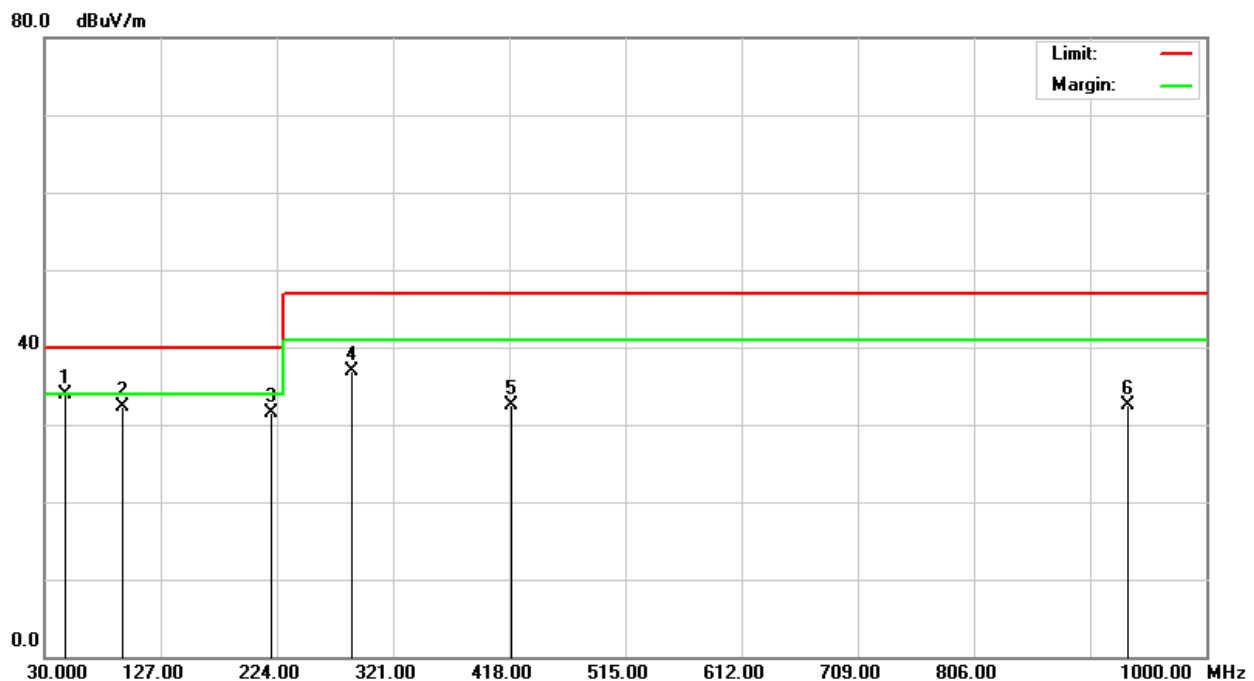
**Calculation Formula**

Margin (dB) = Result (dBuV/m) – Limit (dBuV/m)

## 7.2.6. TEST RESULTS

### Below 1GHz

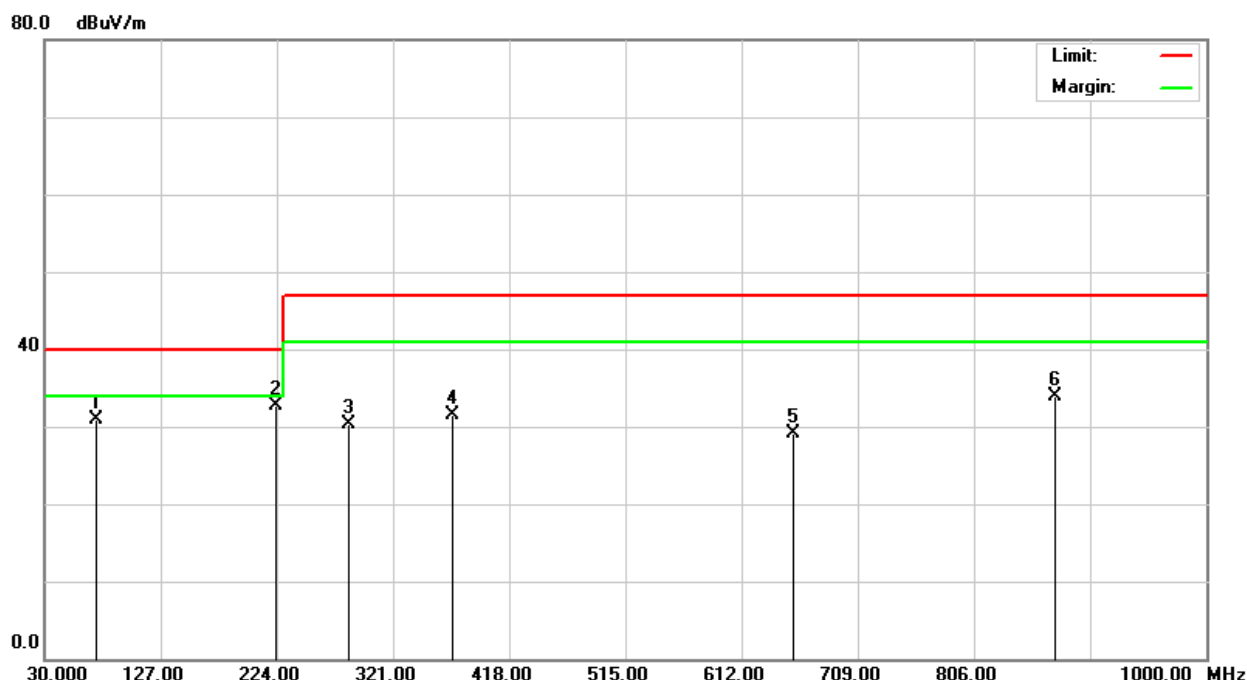
<b>Model No.</b>	UPX-TGL01; UPX-EDGE-TGL01; PER-TAIX2-A20-2280	<b>Test Mode</b>	Mode 1
<b>Environmental Conditions</b>	26°C, 64% RH	<b>6dB Bandwidth</b>	120 kHz
<b>Antenna Pole</b>	Vertical	<b>Antenna Distance</b>	10m
<b>Detector Function</b>	Quasi-peak.	<b>Tested by</b>	Lion Lee
<b>Standard</b>	EN 55011 GROUP 1 CLASS A		



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)
47.2200	45.20	-11.29	33.91	40.00	-6.09	100	202	Q	V
94.8200	42.70	-10.30	32.40	40.00	-7.60	100	263	Q	V
219.6400	41.30	-9.81	31.49	40.00	-8.51	100	118	Q	V
287.3200	42.80	-5.87	36.93	47.00	-10.07	100	158	Q	V
420.1940	34.20	-1.79	32.41	47.00	-14.59	400	243	Q	V
934.2800	26.90	5.51	32.41	47.00	-14.59	400	184	Q	V

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

<b>Model No.</b>	UPX-TGL01; UPX-EDGE-TGL01; PER-TAIX2-A20-2280	<b>Test Mode</b>	Mode 1
<b>Environmental Conditions</b>	26°C, 64% 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>	Lion Lee
<b>Standard</b>	EN 55011 GROUP 1 CLASS A		



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)
73.1660	45.10	-14.25	30.85	40.00	-9.15	400	198	Q	H
223.4200	42.30	-9.55	32.75	40.00	-7.25	400	103	Q	H
284.3720	36.20	-5.94	30.26	47.00	-16.74	400	327	Q	H
371.3940	34.90	-3.48	31.42	47.00	-15.58	400	184	Q	H
655.2839	27.30	1.89	29.19	47.00	-17.81	100	196	Q	H
874.2500	29.20	4.77	33.97	47.00	-13.03	100	297	Q	H

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

### Above 1GHz

<b>Model No.</b>	UPX-TGL01; UPX-EDGE-TGL01; PER-TAIX2-A20-2280	<b>Test Mode</b>	Mode 1
<b>Environmental Conditions</b>	23°C, 61% 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>	1800MHz	<b>Upper frequency</b>	6000MHz
<b>Detector Function</b>	Peak and average.	<b>Tested by</b>	Lion Lee
<b>Standard</b>	Above 1GHz test is Applicable EN 55032 standard.		

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)
1075.000	60.85	-8.16	52.69	76.00	-23.31	P	V
1675.000	61.72	-7.52	54.20	76.00	-21.80	P	V
2400.000	57.50	-4.73	52.77	76.00	-23.23	P	V
2945.000	58.69	-4.37	54.32	76.00	-21.68	P	V
4995.000	56.40	-1.72	54.68	80.00	-25.32	P	V
5885.000	54.56	-0.47	54.09	80.00	-25.91	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)
1495.000	63.64	-8.69	54.95	76.00	-21.05	P	H
1725.000	59.47	-6.97	52.50	76.00	-23.50	P	H
1920.000	55.72	-5.52	50.20	76.00	-25.80	P	H
2480.000	55.77	-4.69	51.08	76.00	-24.92	P	H
2940.000	58.51	-4.36	54.15	76.00	-21.85	P	H
4855.000	57.44	-1.99	55.45	80.00	-24.55	P	H

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

## 7.3. HARMONICS CURRENT MEASUREMENT

### 7.3.1. LIMITS OF HARMONICS CURRENT MEASUREMENT

Limits for Class A equipment		Limits for Class D equipment		
Harmonics Order n	Max. permissible harmonics current A	Harmonics Order n	Max. permissible harmonics current per watt mA/W	Max. permissible harmonics current A
Odd harmonics		Odd Harmonics only		
3	2.30	3	3.4	2.30
5	1.14	5	1.9	1.14
7	0.77	7	1.0	0.77
9	0.40	9	0.5	0.40
11	0.33	11	0.35	0.33
13	0.21	13	0.30	0.21
15<=n<=39	0.15x15/n	15<=n<=39	3.85/n	0.15x15/n
Even harmonics				
2	1.08			
4	0.43			
6	0.30			
8<=n<=40	0.23x8/n			

**NOTE:** 1. Class A and Class D are classified according to item 7.4.3.  
2. According to section 7 of EN 61000-3-2, the above limits for all equipment except for lighting equipment having an active input power > 75 W and no limits apply for equipment with an active input power up to and including 75 W.

### 7.3.2. TEST INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
5kVA Power Source	Teseq	NSG 1007-5	1537A01296	03/09/2022
Signal Conditioning Unit	Teseq	NSG 1000-1	1846A01831	03/09/2022
Software	CTS 4 Ver. 4.2			

**NOTE:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.



**7.3.3. TEST PROCEDURE** (please refer to measurement standard or CCS SOP PA-029)

- The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.
- The classification of EUT is according to section 5 of EN 61000-3-2.
- The EUT is classified as follows:

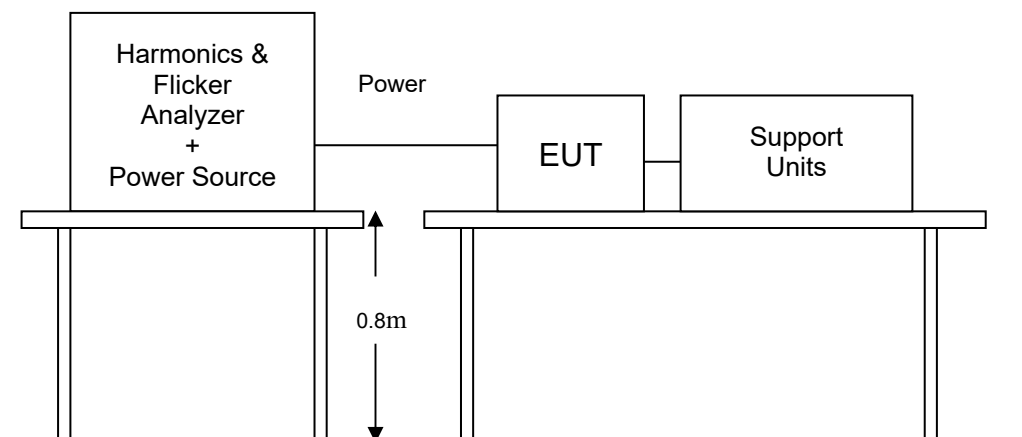
Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.

Class B: Portable tools; Arc welding equipment which is not professional equipment.

Class C: Lighting equipment.

Class D: Equipment having a specified power less than or equal to 600 W of the following types: Personal computers and personal computer monitors; television receivers and refrigerators and freezers having one or more variable-speed drives to control compressor motor(s).

- The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.

**7.3.4. TEST SETUP**

- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

**7.3.5. TEST RESULTS**

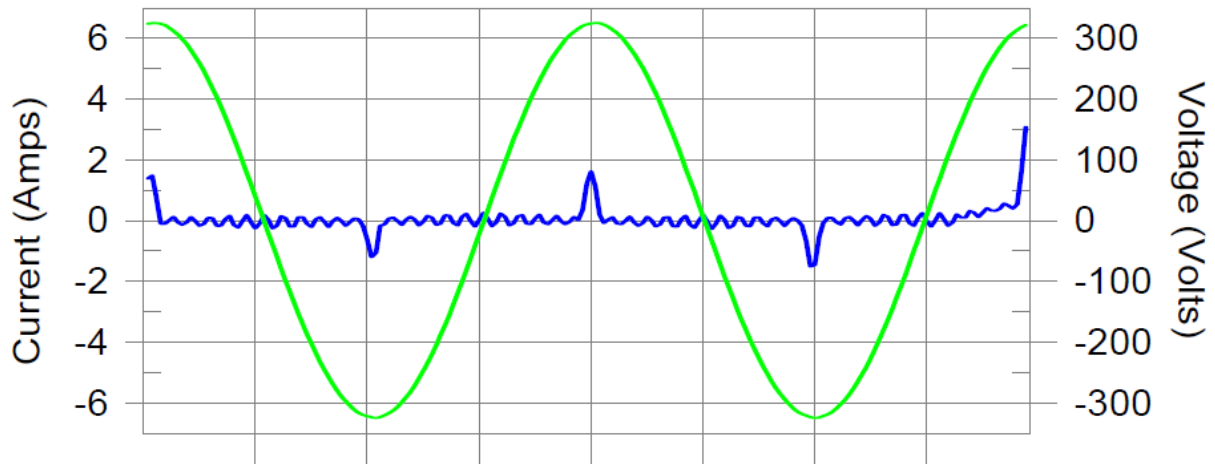
<b>Power Consumption</b>	82.0W	<b>Test Results</b>	PASS
<b>Environmental Conditions</b>	21°C, 60% RH, 1009mbar	<b>Limits</b>	Class <input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
<b>Test Mode</b>	Operating	<b>Tested by</b>	Mike Xie

**NOTE:** Limits classified according to item 7.3.1.

## Test result of EN 61000-3-2

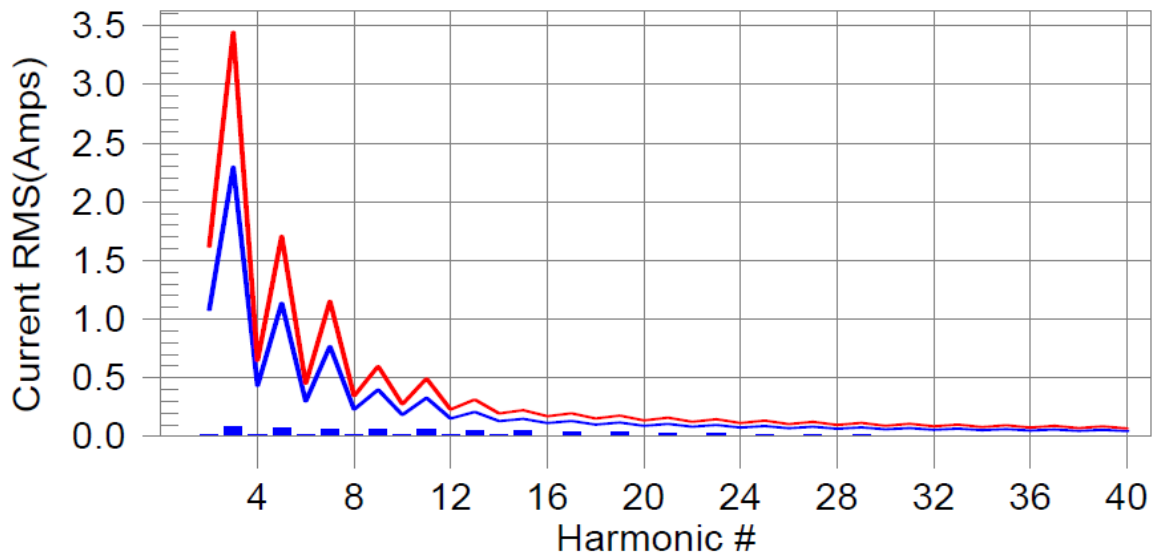
Test Result: Pass      Source qualification: Normal

### Current & voltage waveforms



### Harmonics and Class A limit line

### European Limits



Test result: Pass      Worst harmonics H15-37.1% of 150% limit, H17-30.8% of 100% limit

Test Result: Pass      Source qualification: Normal  
 THCA(A): 0.188      I-THD(%): 50.5      POHC(A): 0.051      POHC Limit(A): 0.251

Highest parameter values during test:

V_RMS (Volts):	229.83	Frequency(Hz):	50.00
I_Peak (Amps):	3.619	I_RMS (Amps):	0.496
I_Fund (Amps):	0.373	Crest Factor:	13.844
Power (Watts):	82.0	Power Factor:	0.874

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.013	1.080	1.2	0.019	1.620	1.2	Pass
3	0.088	2.300	3.8	0.135	3.450	3.9	Pass
4	0.013	0.430	3.0	0.020	0.645	3.1	Pass
5	0.069	1.140	6.1	0.127	1.710	7.4	Pass
6	0.012	0.300	4.1	0.019	0.450	4.3	Pass
7	0.066	0.770	8.6	0.122	1.155	10.5	Pass
8	0.012	0.230	5.2	0.018	0.345	5.2	Pass
9	0.061	0.400	15.1	0.113	0.600	18.9	Pass
10	0.012	0.184	6.3	0.018	0.276	6.4	Pass
11	0.056	0.330	17.0	0.104	0.495	21.1	Pass
12	0.011	0.153	7.2	0.017	0.230	7.2	Pass
13	0.051	0.210	24.4	0.094	0.315	29.9	Pass
14	0.010	0.131	8.0	0.016	0.197	8.0	Pass
15	0.046	0.150	30.6	0.083	0.225	37.1	Pass
16	0.010	0.115	8.6	0.015	0.173	8.6	Pass
17	0.041	0.132	30.8	0.072	0.198	36.6	Pass
18	0.009	0.102	9.0	0.014	0.153	8.8	Pass
19	0.035	0.118	29.9	0.061	0.178	34.6	Pass
20	0.008	0.092	9.2	0.012	0.138	9.0	Pass
21	0.030	0.107	28.1	0.051	0.161	31.7	Pass
22	0.008	0.084	9.2	0.011	0.125	8.8	Pass
23	0.025	0.098	25.8	0.041	0.147	27.8	Pass
24	0.007	0.077	8.9	0.010	0.115	8.4	Pass
25	0.021	0.090	23.0	0.032	0.135	23.8	Pass
26	0.006	0.071	8.4	0.008	0.107	7.8	Pass
27	0.016	0.083	19.7	0.025	0.125	19.7	Pass
28	0.005	0.066	7.6	0.007	0.099	7.1	Pass
29	0.013	0.078	16.4	0.018	0.116	15.7	Pass
30	0.004	0.061	N/A	0.006	0.092	N/A	Pass
31	0.010	0.073	13.3	0.013	0.109	12.0	Pass
32	0.004	0.058	N/A	0.005	0.086	N/A	Pass
33	0.007	0.068	10.4	0.009	0.102	9.2	Pass
34	0.003	0.054	N/A	0.004	0.081	N/A	Pass
35	0.005	0.064	7.9	0.007	0.096	7.0	Pass
36	0.002	0.051	N/A	0.003	0.077	N/A	Pass
37	0.004	0.061	N/A	0.005	0.091	N/A	Pass
38	0.002	0.048	N/A	0.004	0.073	N/A	Pass
39	0.004	0.058	N/A	0.006	0.087	N/A	Pass
40	0.001	0.046	N/A	0.004	0.069	N/A	Pass

Test Result: Pass      Source qualification: Normal

## Highest parameter values during test:

Voltage (Vrms):	229.83	Frequency(Hz):	50.00
I_Peak (Amps):	3.619	I_RMS (Amps):	0.496
I_Fund (Amps):	0.373	Crest Factor:	13.844
Power (Watts):	82.0	Power Factor:	0.874

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.043	0.460	9.45	OK
3	0.293	2.068	14.14	OK
4	0.022	0.459	4.84	OK
5	0.085	0.919	9.26	OK
6	0.027	0.459	5.86	OK
7	0.038	0.689	5.44	OK
8	0.008	0.460	1.84	OK
9	0.046	0.460	10.09	OK
10	0.013	0.460	2.89	OK
11	0.052	0.230	22.57	OK
12	0.018	0.230	7.91	OK
13	0.053	0.230	22.95	OK
14	0.009	0.230	4.12	OK
15	0.048	0.230	20.97	OK
16	0.010	0.230	4.28	OK
17	0.050	0.230	21.77	OK
18	0.016	0.230	7.01	OK
19	0.050	0.230	21.61	OK
20	0.029	0.230	12.48	OK
21	0.048	0.230	20.72	OK
22	0.011	0.230	4.91	OK
23	0.042	0.230	18.44	OK
24	0.012	0.230	5.09	OK
25	0.032	0.230	14.14	OK
26	0.009	0.230	3.76	OK
27	0.023	0.230	10.20	OK
28	0.008	0.230	3.64	OK
29	0.023	0.230	9.97	OK
30	0.006	0.230	2.82	OK
31	0.016	0.230	6.89	OK
32	0.006	0.230	2.63	OK
33	0.012	0.230	5.18	OK
34	0.005	0.230	2.18	OK
35	0.009	0.230	3.96	OK
36	0.004	0.230	1.68	OK
37	0.007	0.230	2.95	OK
38	0.004	0.230	1.59	OK
39	0.008	0.230	3.47	OK
40	0.017	0.230	7.39	OK

## 7.4. VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

### 7.4.1. LIMITS OF VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

TEST ITEM	LIMIT	REMARK
$P_{st}$	1.0	$P_{st}$ means short-term flicker indicator.
$P_{lt}$	0.65	$P_{lt}$ means long-term flicker indicator.
$T_{dt}$ (ms)	500	$T_{dt}$ means maximum time that $dt$ exceeds 3 %.
$d_{max}$ (%)	4%	$d_{max}$ means maximum relative voltage change.
$dc$ (%)	3.3%	$dc$ means relative steady-state voltage change

### 7.4.2. TEST INSTRUMENTS

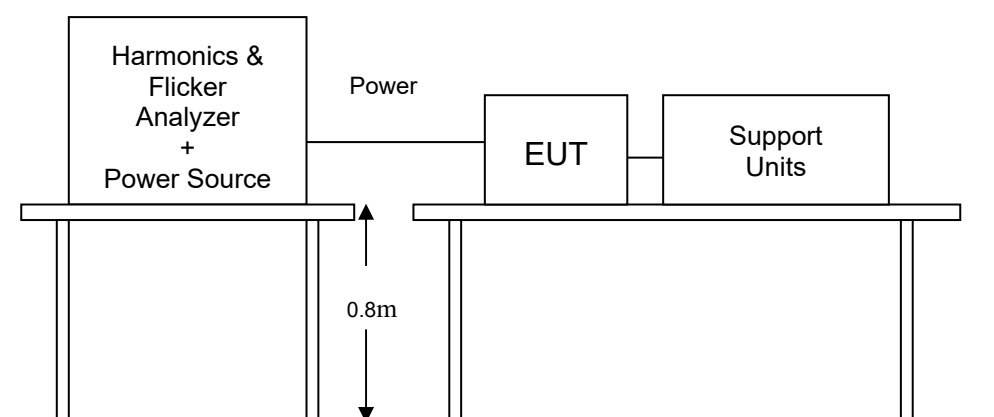
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
5kVA Power Source	Teseq	NSG 1007-5	1537A01296	03/09/2022
Signal Conditioning Unit	Teseq	NSG 1000-1	1846A01831	03/09/2022
Software	CTS 4 Ver. 4.2			

**NOTE:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 7.4.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-030)

- The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal operating conditions.
- During the flick measurement, the measure time shall include that part of whole operation cycle in which the EUT produce the most unfavorable sequence of voltage changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

### 7.4.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.



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#### 7.4.5. TEST RESULTS

Observation Period (Tp)	10mins	Test Mode	Operating
Environmental Conditions	21°C, 60% RH, 1009mbar	Tested by	Mike Xie

TEST PARAMETER	MEASUREMENT VALUE	LIMIT	REMARK
P <sub>st</sub>	0.064	1.0	PASS
P <sub>lt</sub>	0.028	0.65	PASS
T <sub>dt</sub> (ms)	0	500	PASS
d <sub>max</sub> (%)	0	4%	PASS
dc (%)	0	3.3%	PASS

**Note:** None.



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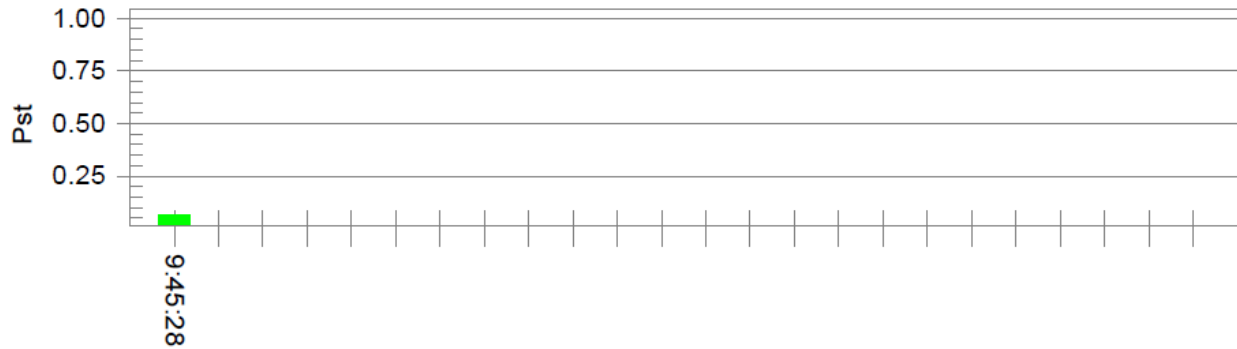
## Test result of EN 61000-3-3

Test Result: Pass

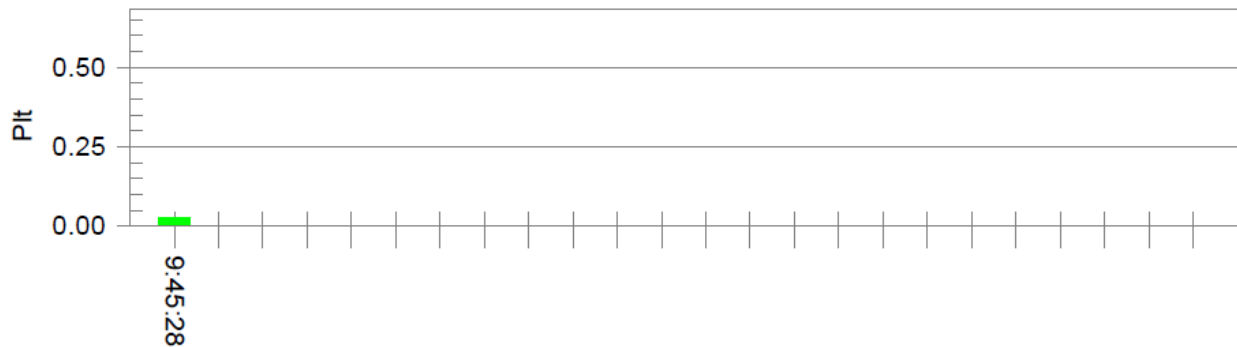
Status: Test Completed

### Pst<sub>i</sub> and limit line

### European Limits



### Plt and limit line



### Parameter values recorded during the test:

Vrms at the end of test (Volt): 229.63

T-max (mS): 0

Highest dc (%): 0.00

Highest dmax (%): 0.00

Highest Pst (10 min. period): 0.064

Highest Plt (2 hr. period): 0.028

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



## 8 IMMUNITY TEST

### 8.1. GENERAL DESCRIPTION

Product Standard	EN 61000-6-1: 2007	
	Test Type	Minimum Requirement
<b>Basic Standard, Specification, and Performance Criterion required</b>	IEC/EN 61000-4-2	Electrostatic Discharge - ESD: 8kV air discharge, 4kV Contact discharge, Performance Criterion B  According to special request by client: 12kV air discharge, 8kV Contact discharge
	IEC/EN 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test - RS: 80 ~ 1000 MHz, 3V/m with 80% AM. 1kHz Modulation 1400 ~ 2000 MHz, 3V/m with 80% AM. 1kHz Modulation 2000 ~ 2700 MHz, 1V/m with 80% AM. 1kHz Modulation Performance Criterion A
	IEC/EN 61000-4-4	Electrical Fast Transient/Burst - EFT, AC Power port: 1kV, DC Power Port: 0.5kV, Signal port: 0.5kV, Performance Criterion B
	IEC/EN 61000-4-5	Surge Immunity Test: 1.2/50 $\mu$ s Open Circuit Voltage, 8 /20 $\mu$ s Short Circuit Current, AC Power Port ~ line to line: 1kV, line to earth: 2kV DC Power Port ~ line to line and line to earth: 0.5kV Performance Criterion B
	IEC/EN 61000-4-6	Conducted Radio Frequency Disturbances Test - CS: AC Power Port; DC Power Port; Signal Ports and Telecommunication Ports: 0.15 ~ 80MHz, 3Vrms, 80% AM, 1kHz Performance Criterion A
	IEC/EN 61000-4-8	Power frequency magnetic field immunity test 50/60Hz, 3A/m Performance Criterion A
	IEC/EN 61000-4-11	<u>Voltage Dips:</u> i) 0% residual for 0.5 at 50Hz cycle 0% residual for 1 at 50Hz cycle Performance Criterion B ii) 70% residual for 25/30 at 50/60Hz cycles Performance Criterion C <u>Voltage Interruptions:</u> 0% residual for 250/300 at 50/60Hz cycles Performance Criterion C



## 8.2. GENERAL PERFORMANCE CRITERIA DESCRIPTION

<b>Criteria A:</b>	The apparatus shall continue to operate as intended during and 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. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.
<b>Criteria B:</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. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.
<b>Criteria C:</b>	Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

### 8.3. ELECTROSTATIC DISCHARGE (ESD)

#### 8.3.1. TEST SPECIFICATION

<b>Basic Standard:</b>	IEC/EN 61000-4-2
<b>Discharge Impedance:</b>	330 ohm / 150 pF
<b>Discharge Voltage:</b>	Air Discharge: 2 ; 4 ; 8; 12 kV (Direct) Contact Discharge: 2 ; 4 ; 6 ; 8 kV (Direct/Indirect)
<b>Polarity:</b>	Positive & Negative
<b>Number of Discharge:</b>	Minimum 10 times at each test point
<b>Discharge Mode:</b>	Single Discharge 1 second minimum

#### 8.3.2. TEST INSTRUMENT

IMMUNITY SHIELDED ROOM				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Aneroid Barometer	SATO	7610-20	89090	08/31/2021
ESD Simulator	Teseq	NSG 437	1189	04/18/2022
Thermo-Hygro Meter	Wisewind	201A	No. 04	01/05/2022

**NOTE:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

**8.3.3. TEST PROCEDURE** (please refer to measurement standard or CCS SOP PA-022)

The discharges shall be applied in two ways:

a) Contact discharges to the conductive surfaces and coupling planes:

The EUT shall be exposed to at least 20 discharges, 10 each at negative and positive polarity, at a minimum of four test points. One of the test points shall be subjected to at least 10 indirect discharges to the center of the front edge of the Horizontal Coupling Plane (HCP). The remaining three test points shall each receive at least 10 direct contact discharges. If no direct contact test points are available, then at least 20 indirect discharges shall be applied in the indirect mode. Test shall be performed at a maximum repetition rate of one discharge per second.

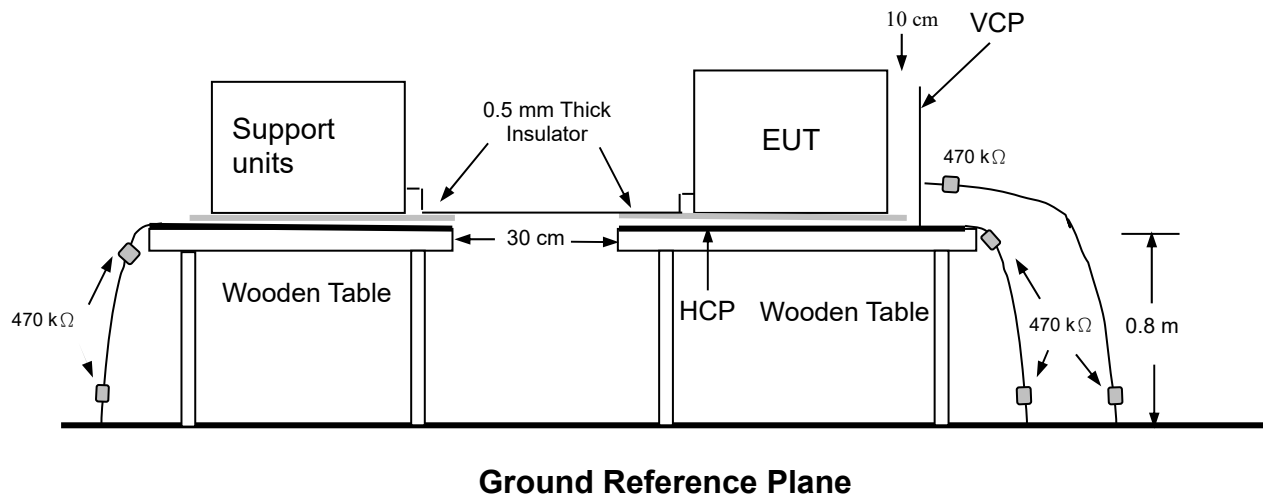
b) Air discharges at slots and apertures and insulating surfaces:

On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur. Such points are tested using the air discharge method. This investigation should be restricted to those area normally handled by the user. A minimum of 10 single air discharges shall be applied to the selected test point for each such area.

The basic test procedure was in accordance with IEC/EN 61000-4-2:

- a) The EUT was located 0.1 m minimum from all side of the HCP (dimensions 1.6m x 0.8m).
- b) The support units were located another table 30 cm away from the EUT, but direct support unit was/were located at same location as EUT on the HCP and keep at a distance of 10 cm with EUT.
- c) The time interval between two successive single discharges was at least 1 second.
- d) Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- e) Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.
- f) At least ten single discharges (in the most sensitive polarity) were applied at the front edge of each HCP opposite the center point of each unit of the EUT and 0.1 meters from the front of the EUT. The long axis of the discharge electrode was in the plane of the HCP and perpendicular to its front edge during the discharge.
- g) At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the Vertical Coupling Plane (VCP) in sufficiently different positions that the four faces of the EUT were completely illuminated. The VCP (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the EUT.

### 8.3.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### NOTE:

##### TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A Horizontal Coupling Plane (1.6m x 0.8m) was placed on the table and attached to the GRP by means of a cable with 940k ohm total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC/EN 61000-4-2, and its cables were placed on the HCP and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

##### FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of IEC/EN 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

## 8.3.5. TEST RESULTS

Temperature	19°C	Humidity	43% RH
Pressure	1010mbar	Tested By	Mike Xie
Required Passing Performance		Criterion B	

Air Discharge								
Test Points	Test Levels				Results			
	± 2 kV	± 4 kV	± 8 kV	± 12 kV	Pass	Fail	Performance Criterion	Observation
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B	Note <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3

Contact Discharge								
Test Points	Test Levels				Results			
	± 2 kV	± 4 kV	± 6kV	± 8 kV	Pass	Fail	Performance Criterion	Observation
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B	Note <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B	Note <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B	Note <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B	Note <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3
Top	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B	Note <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3
Bottom	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> A <input checked="" type="checkbox"/> B	Note <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3

Discharge To Horizontal Coupling Plane								
Side of EUT	Test Levels				Results			
	± 2 kV	± 4 kV	± 6kV	± 8 kV	Pass	Fail	Performance Criterion	Observation
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3

Discharge To Vertical Coupling Plane								
Side of EUT	Test Levels				Results			
	± 2 kV	± 4 kV	± 6kV	± 8 kV	Pass	Fail	Performance Criterion	Observation
Front	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3
Back	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3
Left	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3
Right	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3

**NOTE:** 1. There was no change compared with initial operation during the test.

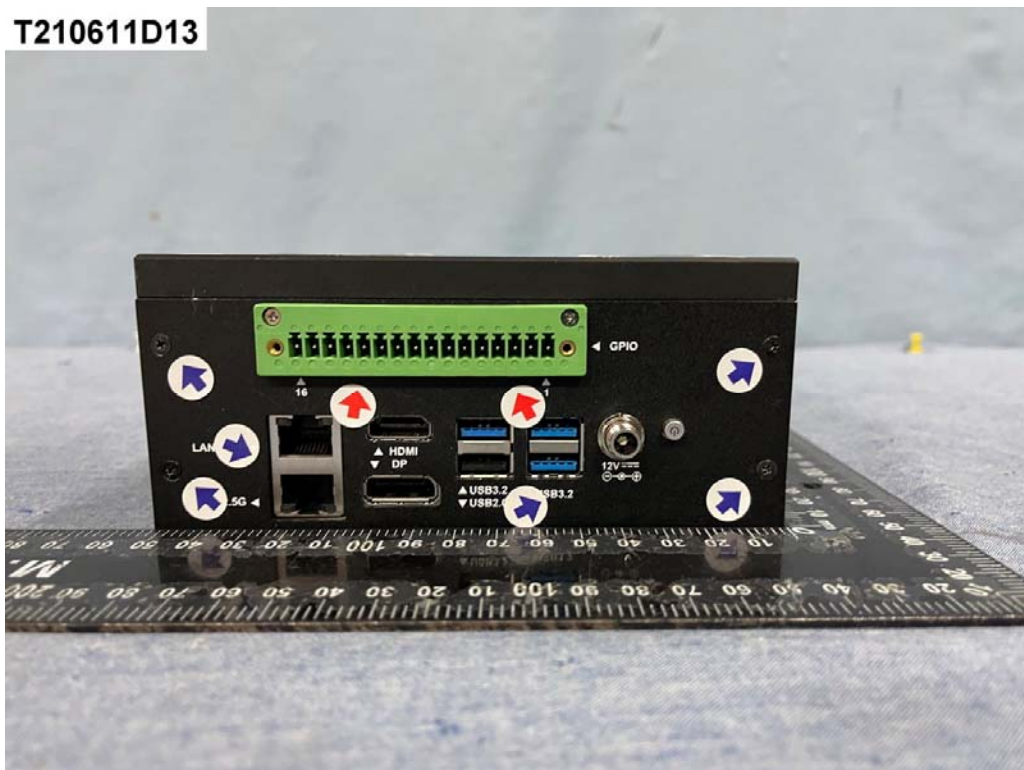
2. No Discharge point.

3. During ± 12 kV Air Discharge and ± 8 kV Contact Discharge test applied to test point, the screen of monitor flicker. It could become normal after test stop.

## The Photo for Discharge Points of EUT Front



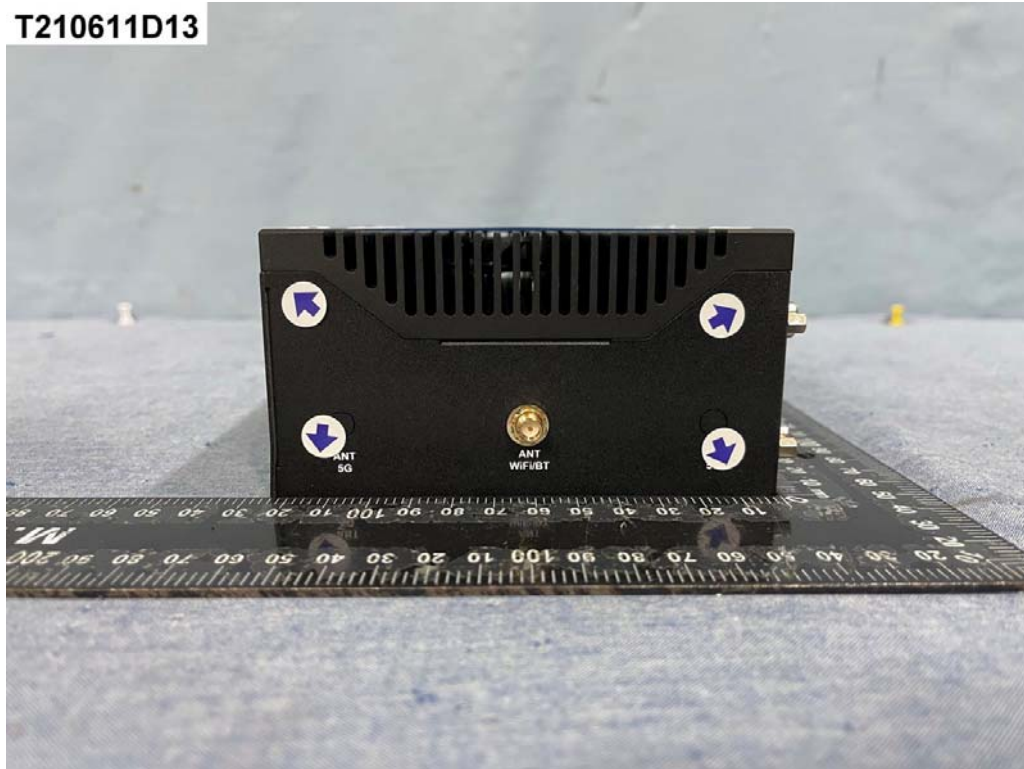
## Back



Red Dot —Air Discharged  
Blue Dot —Contact Discharged



## Left

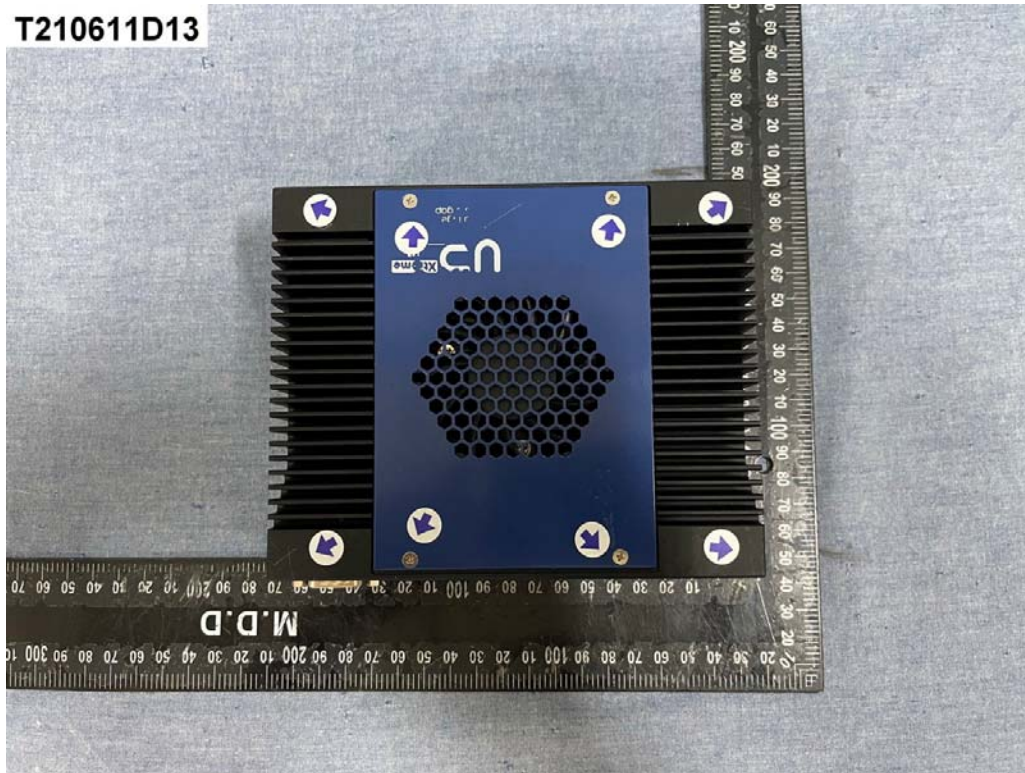


## Right

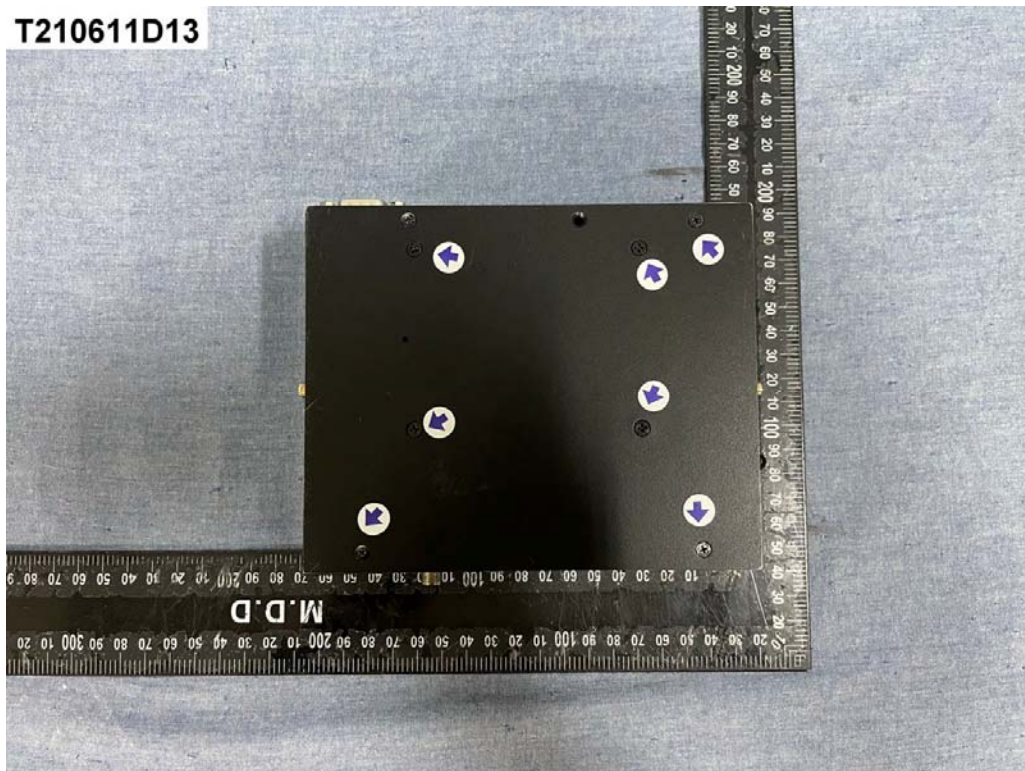


Red Dot —Air Discharged  
Blue Dot —Contact Discharged

## Top



## Bottom



Red Dot —Air Discharged  
Blue Dot —Contact Discharged



## 8.4. RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD (RS)

### 8.4.1. TEST SPECIFICATION

<b>Basic Standard:</b>	IEC/EN 61000-4-3
<b>Frequency Range:</b>	80-1000MHz, 1400-2000MHz, 2000-2700MHz
<b>Field Strength:</b>	3V/m, 3V/m, 1V/m
<b>Modulation:</b>	1kHz sine Wave, 80%, AM Modulation.
<b>Frequency Step:</b>	1 % of preceding frequency value
<b>Polarity of Antenna:</b>	Horizontal and Vertical
<b>Test Distance:</b>	3 m
<b>Antenna Height:</b>	1.5 m

### 8.4.2. TEST INSTRUMENT

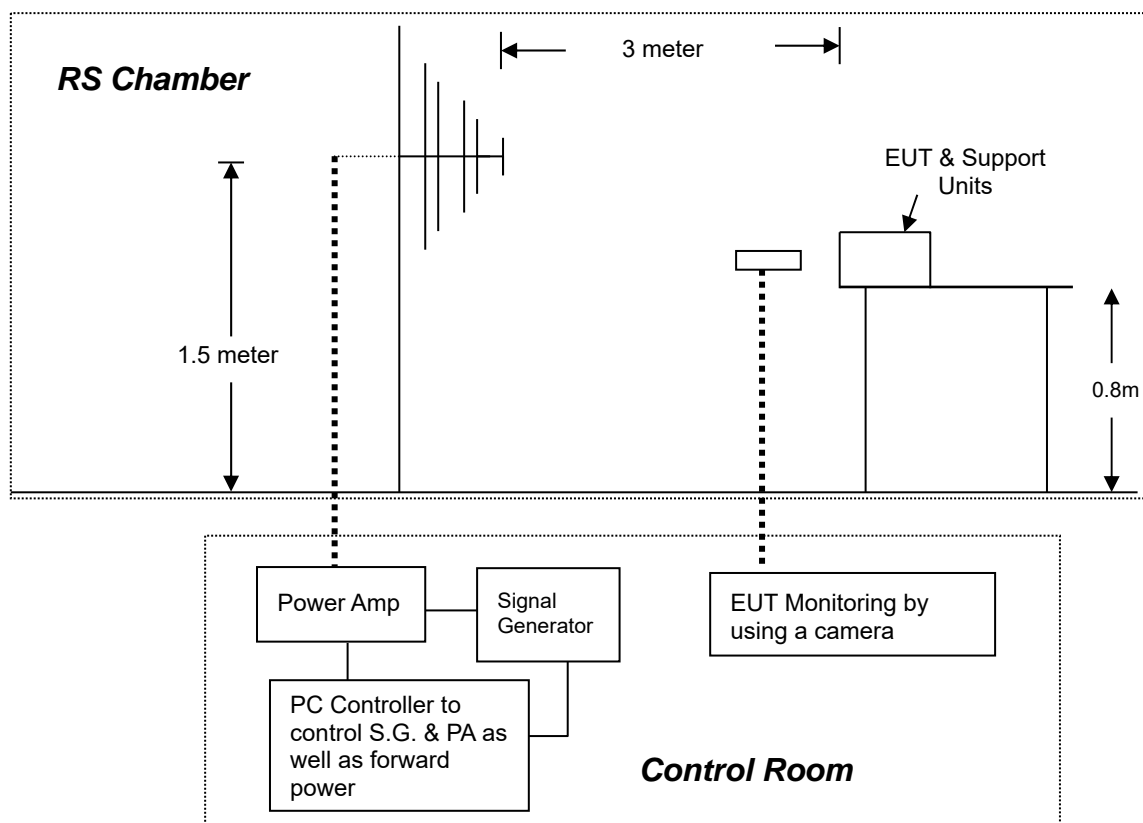
844 RS Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Electric Field Probe	AR	FL7006	0356656	10/13/2021
Field of Calibration	CCS	Chamber#RS	80-1000MHz	02/25/2022
RF Power Meter	Boonton	4242	17419	03/16/2022
Power Sensor	Boonton	51011A-EMC	36833	03/16/2022
Power Sensor	Boonton	51011A-EMC	36834	03/16/2022
Thermo-Hygro Meter	Wisewind	N/A	SD-S019	10/18/2021
Broadband Antenna	Schwarzbeck	VUSLP 9111E	D-69250	N.C.R
Power Amplifier	Milmega	80RF1000-600	1079361	N.C.R
Signal Generator	Agilent	N5181A	MY47421336	11/14/2021
Field of Calibration	CCS	Chamber#RS	1000-6000M	02/24/2022
Direction Coupler	AR	DC7144A	306217	N.C.R
Microwave Antenna	Schwarzbeck	STLP 9149	767	N.C.R
Power Amplifier	AR	60S1G3	302728	N.C.R
Power Amplifier	Milmega	AS1860-100	1075832	N.C.R
Power Amplifier	Teseq	CBA6G-100D	1087370	N.C.R
Software	EmcwareVer. 2.6.0.16			

**Note:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. N.C.R.= No Calibration required.

**8.4.3. TEST PROCEDURE** (please refer to measurement standard or CCS SOP PA-023)

The test procedure was in accordance with IEC/EN 61000-4-3

- The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.
- The frequency range is swept from 80 MHz to 2700 MHz with the signal 80% amplitude modulated with a 1kHz sine-wave. The rate of sweep did not exceed  $1.5 \times 10^{-3}$  decade/s, where the frequency range is swept incrementally, the step size was 1% of preceding frequency value.
- The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

**8.4.4. TEST SETUP**

- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

**NOTE:****TABLETOP EQUIPMENT**

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

**FLOOR STANDING EQUIPMENT**

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

### 8.4.5. TEST RESULTS

Temperature	23°C	Humidity	60% RH
Pressure	1010mbar	Dwell Time	3 sec.
Tested By	Mike Xie	Required Passing Performance	Criterion A

Frequency (MHz)	Polarity	Azimuth	Field Strength (V/m)	Performance Criterion	Observation	Result
80 ~ 1000	V&H	0	3	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
80 ~ 1000	V&H	90	3	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
80 ~ 1000	V&H	180	3	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
80 ~ 1000	V&H	270	3	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
1400 ~ 2000	V&H	0	3	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
1400 ~ 2000	V&H	90	3	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
1400 ~ 2000	V&H	180	3	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
1400 ~ 2000	V&H	270	3	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
2000 ~ 2700	V&H	0	1	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
2000 ~ 2700	V&H	90	1	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
2000 ~ 2700	V&H	180	1	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
2000 ~ 2700	V&H	270	1	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS

**NOTE:** 1. There was no change compared with the initial operation during the test.

## 8.5. ELECTRICAL FAST TRANSIENT (EFT)

### 8.5.1. TEST SPECIFICATION

**Basic Standard:** IEC/EN 61000-4-4

**Test Voltage:** AC Power Line: 1kV  
Signal Ports and Telecommunication Ports: 0.5kV

**Polarity:** Positive & Negative

**Impulse Frequency:** 5 kHz

**Impulse Wave-shape:** 5/50 ns

**Burst Duration:** 15 ms

**Burst Period:** 300 ms

**Test Duration:** Not less than 1 min.

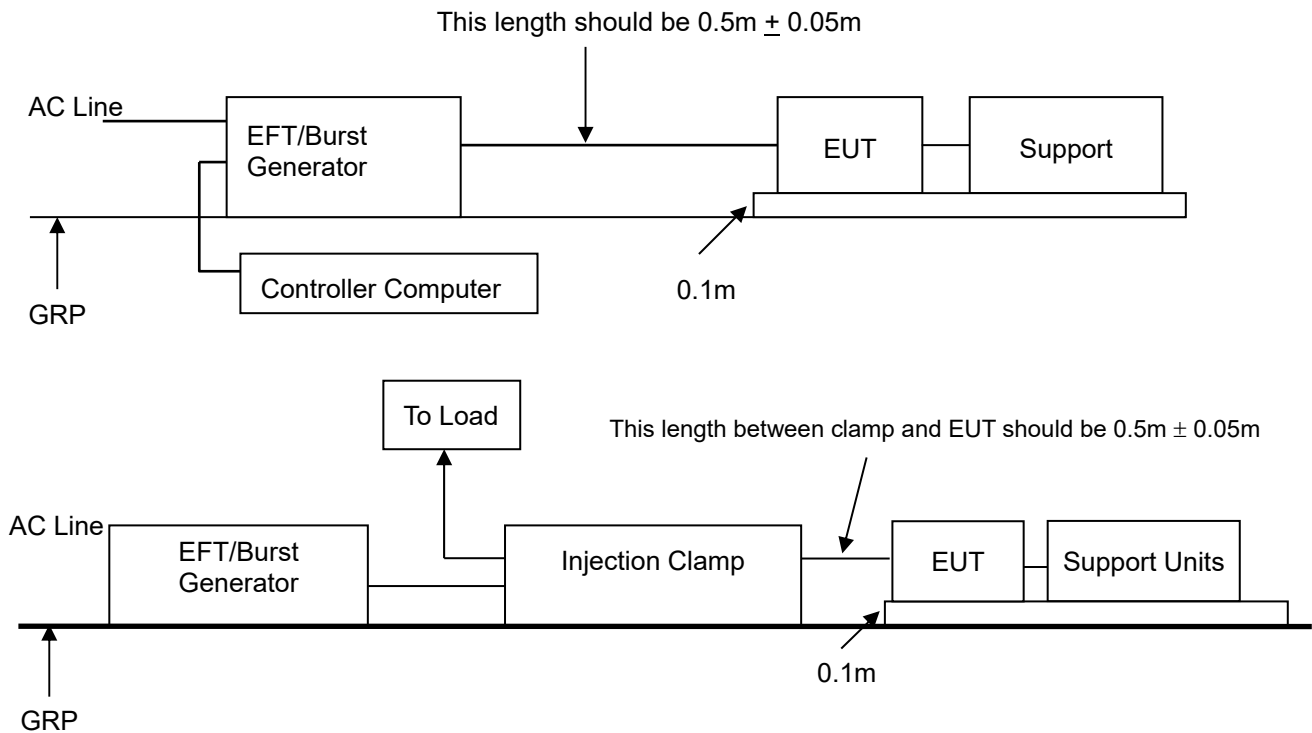
### 8.5.2. TEST INSTRUMENT

Immunity Shield Room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Capacitive Clamp	EMC-Partner	CN-EFT1000	589	06/06/2022
EMC Test System	Teseq	NSG 3060	1718	12/14/2021
Software	WIN 3000Ver. 1.3.2			

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. N.C.R.= No Calibration required.

### 8.5.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-024)

- All types of cables, including their length, and the interface port of the EUT to which they were connected.
- Both positive and negative polarity discharges were applied.
- The length of the “hot wire” from the coaxial output of the EFT generator to the terminals on the EUT should not exceed 0.5 meter.
- The duration time of each test sequential was 1 minute.
- The transient/burst waveform was in accordance with IEC/EN 61000-4-4, 5/50ns.

**8.5.4. TEST SETUP**

- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

**NOTE:****TABLETOP EQUIPMENT**

The configuration consisted of a wooden table (0.1m high) standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system. A minimum distance of 0.5m was provided between the EUT and the walls of the laboratory or any other metallic structure.

**FLOOR STANDING EQUIPMENT**

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-4 and its cables, were isolated from the Ground Reference Plane by an insulating support that is 0.1-meter thick. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system.

### 8.5.5. TEST RESULTS

Temperature	20°C	Humidity	50% RH
Pressure	1010mbar	Tested By	Mike Xie
Required Passing Performance		Criterion B	

Test Point	Polarity	Test Level (kV)	Performance Criterion	Observation	Result
L	+/-	1	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
N	+/-	1	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
L - N	+/-	1	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
PE	+/-	1	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
L – PE	+/-	1	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
N – PE	+/-	1	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
L – N – PE	+/-	1	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
RJ45	+/-	0.5	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
RJ45 (2.5Gbps)	+/-	0.5	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS

**NOTE:** 1. There was no change compared with initial operation during the test.

## 8.6. SURGE IMMUNITY TEST

### 8.6.1. TEST SPECIFICATION

<b>Basic Standard:</b>	IEC/EN 61000-4-5
<b>Wave-Shape:</b>	Combination Wave 1.2/50 $\mu$ s Open Circuit Voltage 8/20 $\mu$ s Short Circuit Current
<b>Test Voltage:</b>	AC Power Port~ line to line: 1kV, line to ground: 2kV
<b>Surge Input/Output:</b>	AC Power Line: L-N / L-PE / N-PE
<b>Generator Source Impedance:</b>	2 ohm between networks 12 ohm between network and ground
<b>Polarity:</b>	Positive/Negative
<b>Phase Angle:</b>	0° / 90° / 180° / 270°
<b>Pulse Repetition Rate:</b>	1 time / min. (maximum)
<b>Number of Tests:</b>	5 positive and 5 negative at selected points

### 8.6.2. TEST INSTRUMENT

Immunity Shield Room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
CDN	EMC-Partner	CDN-UTP8	1505	12/14/2021
EMC Test System	Teseq	NSG 3060	1718	12/14/2021
Software	WIN 3000Ver. 1.3.2			

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. N.C.R.= No Calibration required.

**8.6.3. TEST PROCEDURE** (please refer to measurement standard or CCS SOP PA-025)

## a) For EUT power supply:

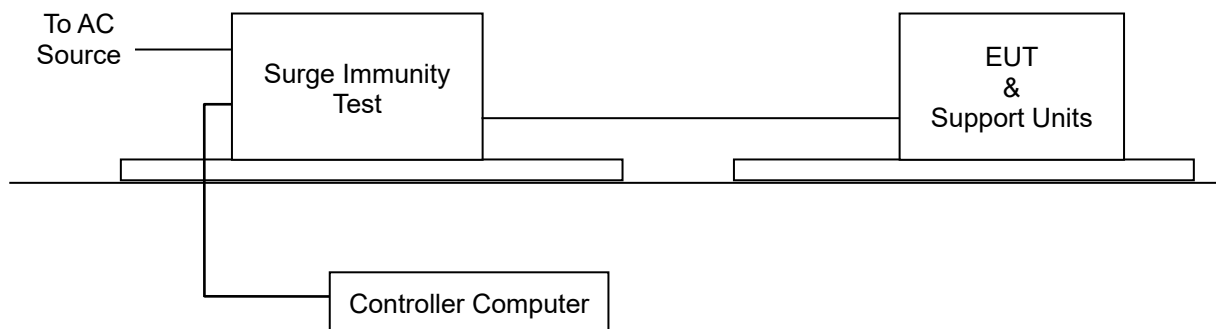
The surge is applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks was shorter than 2 meters in length.

## b) For test applied to unshielded un-symmetrically operated interconnection lines of EUT:

The surge was applied to the lines via the capacitive coupling. The coupling / decoupling networks didn't influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks was shorter than 2 meters in length.

## c) For test applied to unshielded symmetrically operated interconnection / telecommunication lines of EUT:

The surge was applied to the lines via gas arrestors coupling. Test levels below the ignition point of the coupling arrestor were not specified. The interconnection line between the EUT and the coupling/decoupling networks was shorter than 2 meters in length.

**8.6.4. TEST SETUP**

- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

**8.6.5. TEST RESULTS**

Temperature	20°C	Humidity	50% RH
Pressure	1010mbar	Tested By	Mike Xie
Required Passing Performance		Criterion B	

Test Point	Polarity	Test Level (KV)	Performance Criterion	Observation	Result
L - N	+/-	1	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
L - PE	+/-	2	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
N - PE	+/-	2	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS

**NOTE:** 1. There was no change compared with initial operation during the test.



## 8.7. CONDUCTED RADIO FREQUENCY DISTURBANCES (CS)

### 8.7.1. TEST SPECIFICATION

<b>Basic Standard:</b>	IEC/EN 61000-4-6
<b>Frequency Range:</b>	0.15 MHz - 80 MHz
<b>Field Strength:</b>	3 Vrms
<b>Modulation:</b>	1kHz Sine Wave, 80%, AM Modulation
<b>Frequency Step:</b>	1 % of preceding frequency value
<b>Coupled cable:</b>	Power Mains, Unshielded; RJ45 Line, Unshielded; RJ45 (2.5Gbps) Line, Unshielded
<b>Coupling device:</b>	CDN-M3 (3 wires); CDN-T8; EM-Clamp

### 8.7.2. TEST INSTRUMENT

CS Room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
CDN	Teseq	CDN S751A	46649	11/15/2021
CDN	Teseq	CDN M016	35821	11/15/2021
CDN	TESEQ	CDN T400A	28547	11/15/2021
CDN	FCC	FCC-801-M3-25A	9973	11/15/2021
CDN	Teseq	CDN T8A-10	57182	05/25/2022
Compact Immunity Test System	TESEQ	NSG 4070	39581	11/19/2021
EM Clamp	SCHAFFNER	KEMZ 801	19239	11/16/2021
Software	NSG 4070 Control Program V1.2.0			

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. N.C.R.= No Calibration required.

### 8.7.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-026)

The EUT shall be tested within its intended operating and climatic conditions.

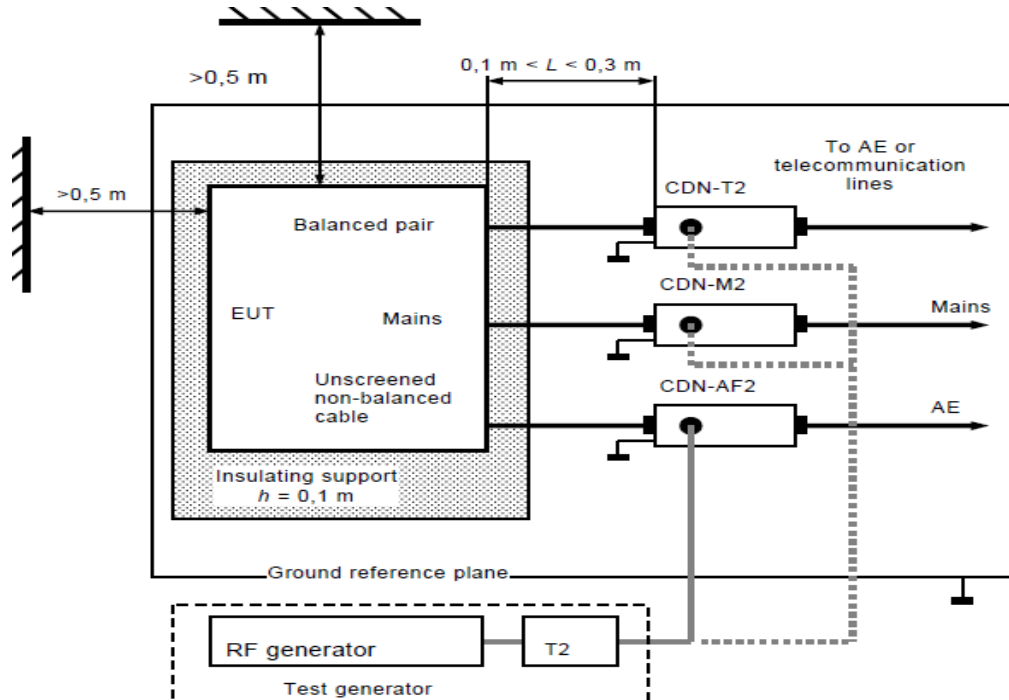
The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.

The frequency range was swept from 150 kHz to 80MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal was modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. The sweep rate was  $1.5 \times 10^{-3}$  decades/s. Where the frequency range is swept incrementally, the step size was 1 % of preceding frequency value from 150 kHz to 80 MHz.

The dwell time at each frequency was less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies such as clock frequency(ies) and harmonics or frequencies of dominant interest, was analyzed separately.

Attempts were made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.

## 8.7.4. TEST SETUP



**Note:** 1. The CDNs and / or EM clamp used for real test depends on ports and cables configuration of EUT.  
2. The EUT clearance from any metallic obstacles shall be at least 0.5m

- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

**NOTE:****TABLE-TOP AND FLOOR-STANDING EQUIPMENT**

The equipment to be tested is placed on an insulating support of 0.1 meters height above a ground reference plane. All relevant cables shall be provided with the appropriate coupling and decoupling devices at a distance between 0.1 meters and 0.3 meters from the projected geometry of the EUT on the ground reference plane.

## 8.7.5. TEST RESULTS

Temperature	21°C	Humidity	60% RH
Pressure	1009mbar	Dwell Time	3 sec.
Tested By	Mike Xie	Required Passing Performance	Criterion A

Frequency Band (MHz)	Field Strength (Vrms)	Cable	Injection Method	Performance Criterion	Observation	Result
0.15 ~ 80	3	AC Power Line (0.3m)	CDN-M3	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
0.15 ~ 80	3	RJ45 Line (0.3m)	CDN-T8	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
0.15 ~ 80	3	RJ45 (2.5Gbps) Line (0.3m)	EM-Clamp	<input checked="" type="checkbox"/> A <input type="checkbox"/> B	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS

**NOTE:** 1. There was no change compared with initial operation during the test.

## 8.8. POWER FREQUENCY MAGNETIC FIELD

### 8.8.1. TEST SPECIFICATION

**Basic Standard:** IEC/EN 61000-4-8

**Frequency Range:** 50Hz / 60Hz

**Field Strength:** 3A/m

**Observation Time:** 1 minute

**Inductance Coil:** Rectangular type, 1mx1m

### 8.8.2. TEST INSTRUMENT

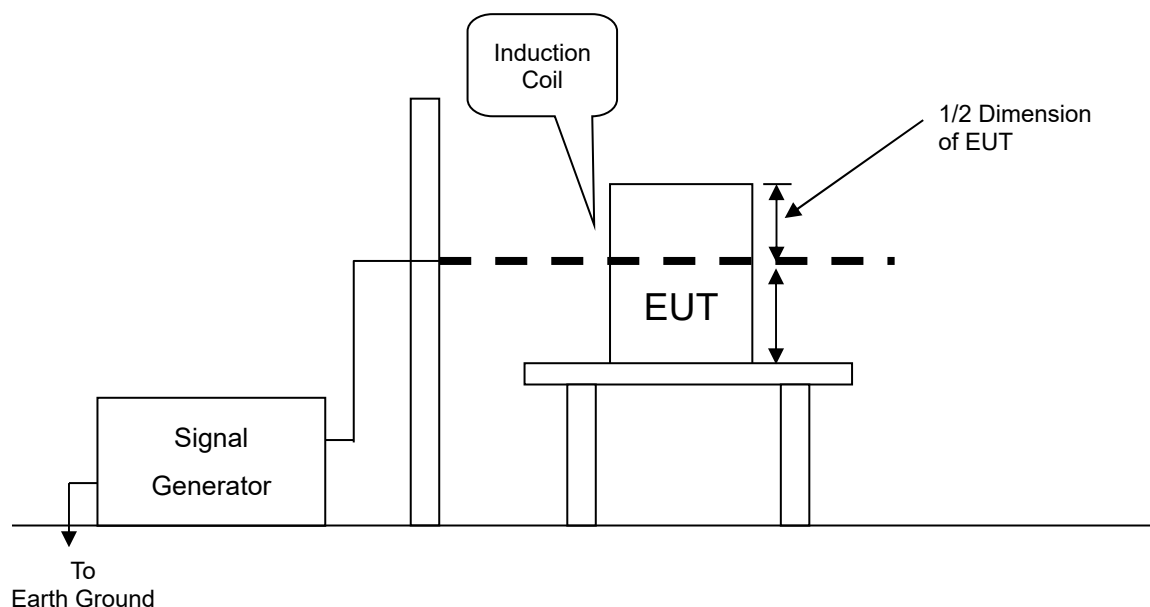
Immunity Shield Room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
5kVA Power Source	Teseq	5001IX-208-TSQ	1207A03643	02/25/2022
AC/DC Clamp Meter	Fluke	353	33360025	06/28/2022
Magnetic Field Coil	Teseq	INA 703 W/ 2141	1976 / 1413	02/25/2022
Magnetic Field Meter	Sypris	4080	0247	05/10/2022
Software	Win2120 Ver. 5.0			

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. N.C.R.= No Calibration required.

### 8.8.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-027)

- The equipment is configured and connected to satisfy its functional requirements. It shall be placed on the GRP with the interposition of a 0.1m-thick insulating support.
- The equipment cabinets shall be connected to the safety earth directly on the GRP via the earth terminal of the EUT.
- The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.
- The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables used shall be exposed to the magnetic field.

#### 8.8.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### NOTE:

##### TABLETOP EQUIPMENT

The equipment shall be subjected to the test magnetic field by using the induction coil of standard dimension (1 m x 1 m). The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

##### FLOOR-STANDING EQUIPMENT

The equipment shall be subjected to the test magnetic field by using induction coils of suitable dimensions. The test shall be repeated by moving and shifting the induction coils, in order to test the whole volume of the EUT for each orthogonal direction. The test shall be repeated with the coil shifted to different positions along the side of the EUT, in steps corresponding to 50 % of the shortest side of the coil. The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

#### 8.8.5. TEST RESULTS

Temperature	21°C	Humidity	60% RH
Pressure	1009mbar	Tested By	Mike Xie
Required Passing Performance		Criterion A	

Direction	Field Strength (A/m)	Performance Criterion	Observation	Results
X	3	A	Note	PASS
Y	3	A	Note	PASS
Z	3	A	Note	PASS

**NOTE:** There was no change compared with the initial operation during the test.

## 8.9. VOLTAGE DIP & VOLTAGE INTERRUPTIONS

### 8.9.1. TEST SPECIFICATION

**Basic Standard:** IEC/EN 61000-4-11

**Test duration time:** Minimum three test events in sequence

**Interval between event:** Minimum 10 seconds

**Phase Angle:** 0° / 180°

**Test cycle:** 3 times

### 8.9.2. TEST INSTRUMENT

Immunity shielded room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
AC/DC Clamp Meter	Lutron	CM-9930R	I.200121	05/01/2022
EMC Test System	Teseq	NSG 3060	1718	12/14/2021
Software	WIN 3000Ver. 1.3.2			

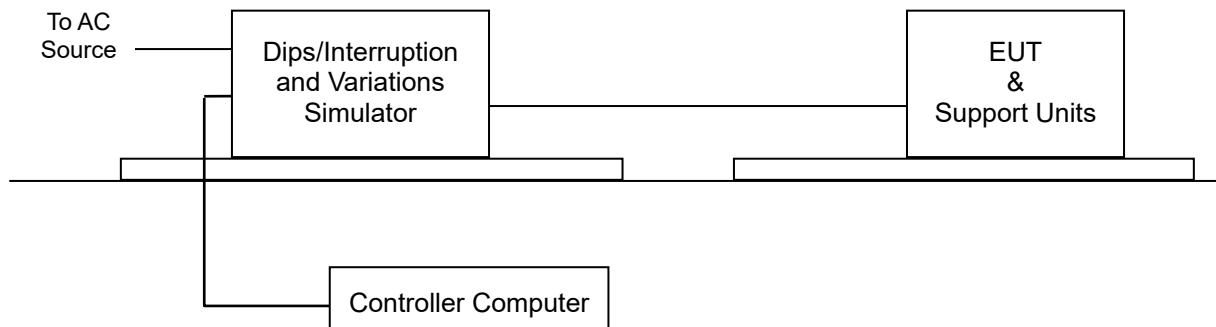
**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. N.C.R.= No Calibration required.

### 8.9.3. TEST PROCEDURE (please refer to measurement standard or CCS SOP PA-028)

1. The EUT and support units were located on a wooden table, 0.8 m away from ground floor.
2. Setting the parameter of tests and then perform the test software of test simulator.
3. Conditions changes to occur at 0 degree crossover point of the voltage waveform.
4. Recording the test result in test record form.

## 8.9.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

## 8.9.5. TEST RESULTS

Temperature	20°C	Humidity	59% RH
Pressure	1010mbar	Tested By	Mike Xie
Required Passing Performance	<b>Criterion B: i) 0% residual 0.5 Cycle at 50Hz</b> <b>0% residual 1 Cycle at 50Hz</b> <b>Criterion C: ii) 70% residual 25/30 Cycles at 50/60Hz</b> <b>iii) 0% residual for 250/300 Cycles at 50/60Hz</b>		

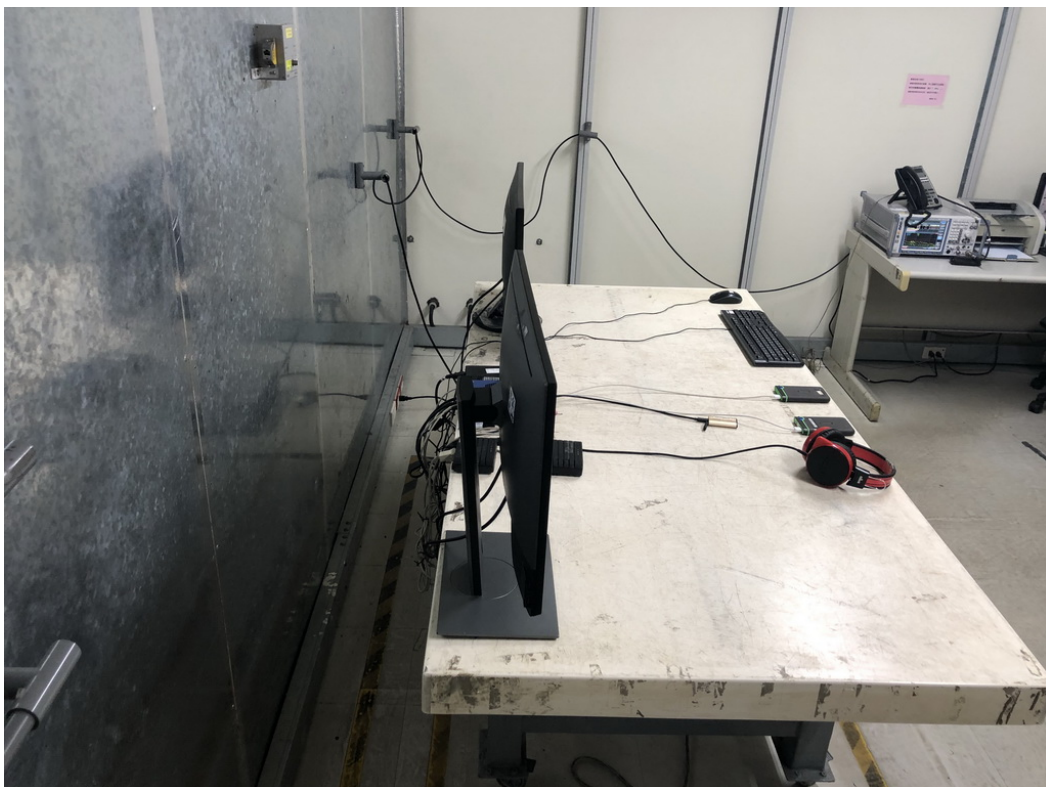
Test Power: 230Vac, 50Hz				
Voltage (% Residual)	Duration (Cycle)	Performance Criterion	Observation	Test Result
0	0.5	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
0	1	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
70	25	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
0	250	<input type="checkbox"/> A <input type="checkbox"/> B <input checked="" type="checkbox"/> C	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2	PASS

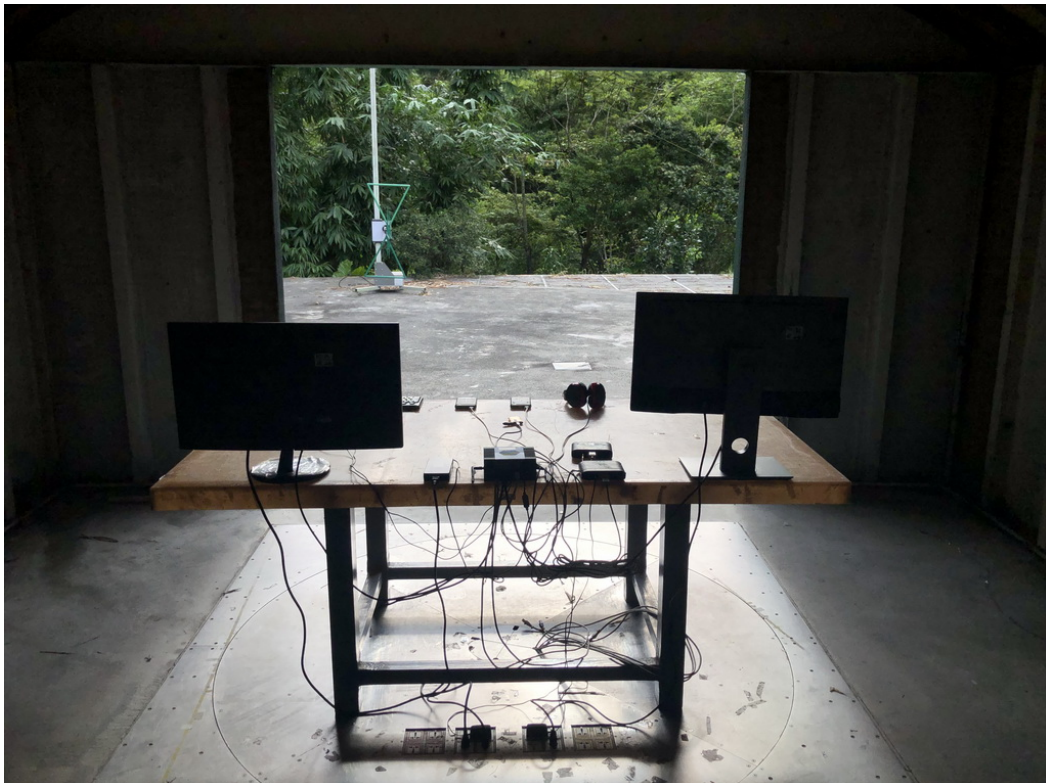
Test Power: 230Vac, 60Hz				
Voltage (% Residual)	Duration (Cycle)	Performance Criterion	Observation	Test Result
70	30	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
0	300	<input type="checkbox"/> A <input type="checkbox"/> B <input checked="" type="checkbox"/> C	Note <input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2	PASS

- NOTE:** 1. There was no change compared with initial operation during and after the test. No unintentional response was found during the test.
2. EUT shut down, it could not become normal except reinstalled by operator.

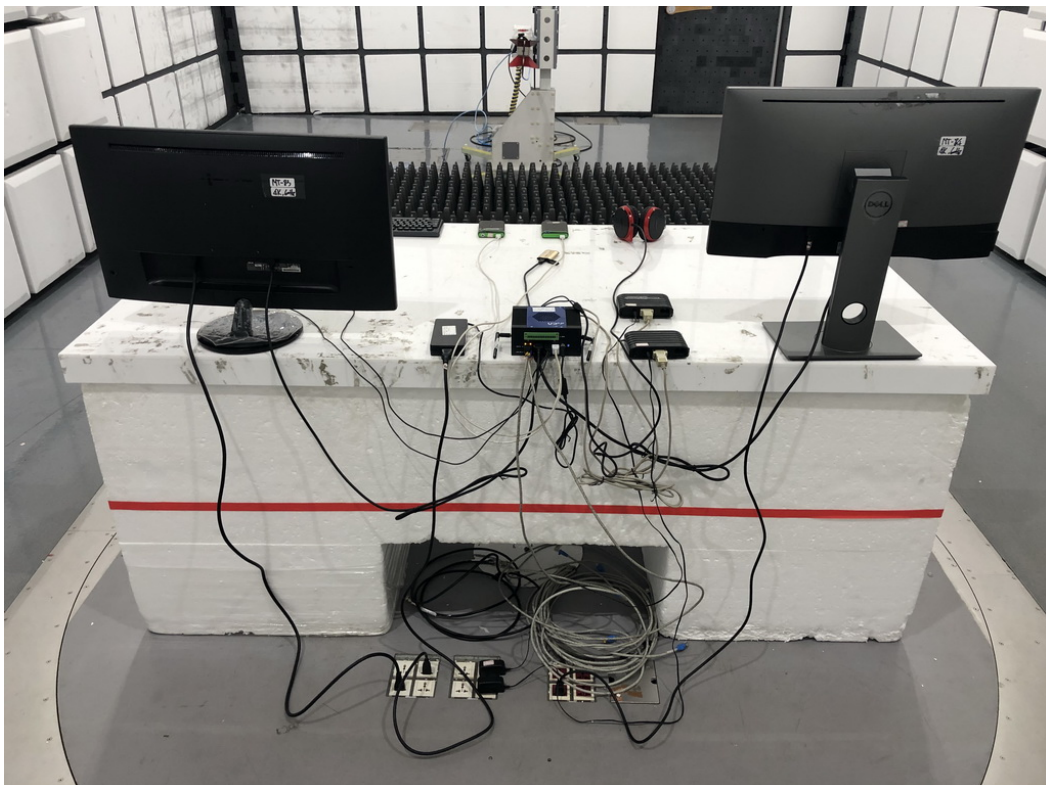
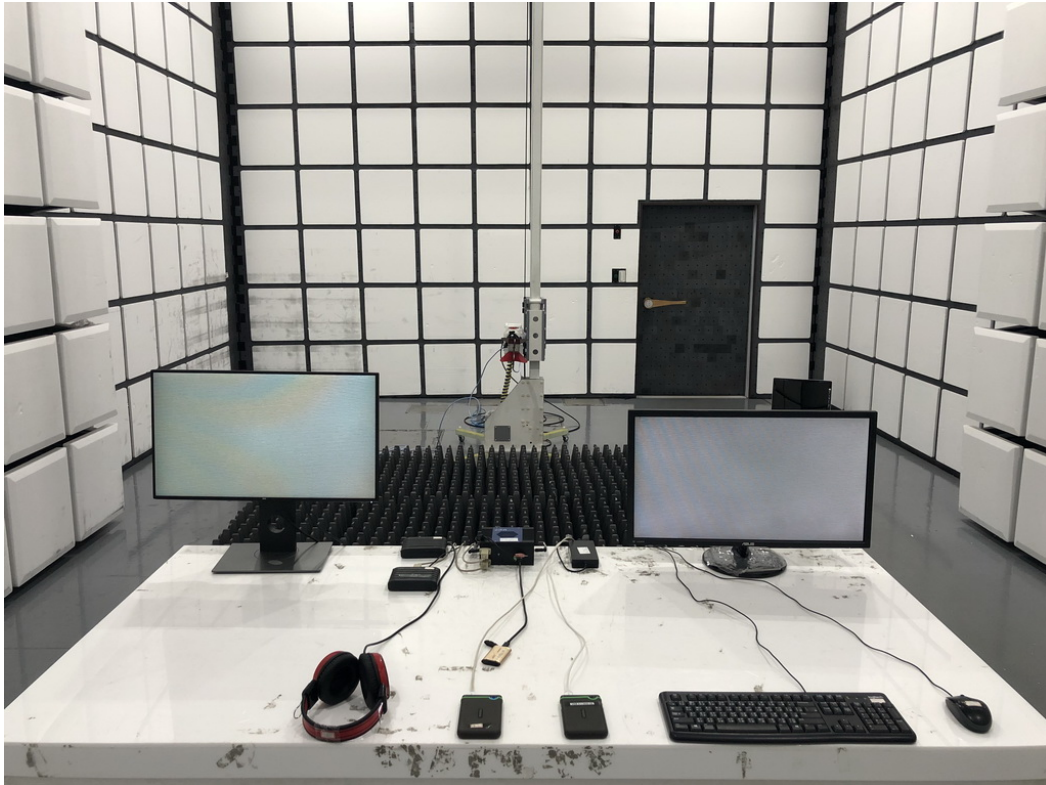


## 9 PHOTOGRAPHS OF THE TEST CONFIGURATION CONDUCTED EMISSION TEST



**RADIATED EMISSION TEST (Below 1GHz)**



**RADIATED EMISSION TEST (Above 1GHz)**

## Harmonic & Flicker Test

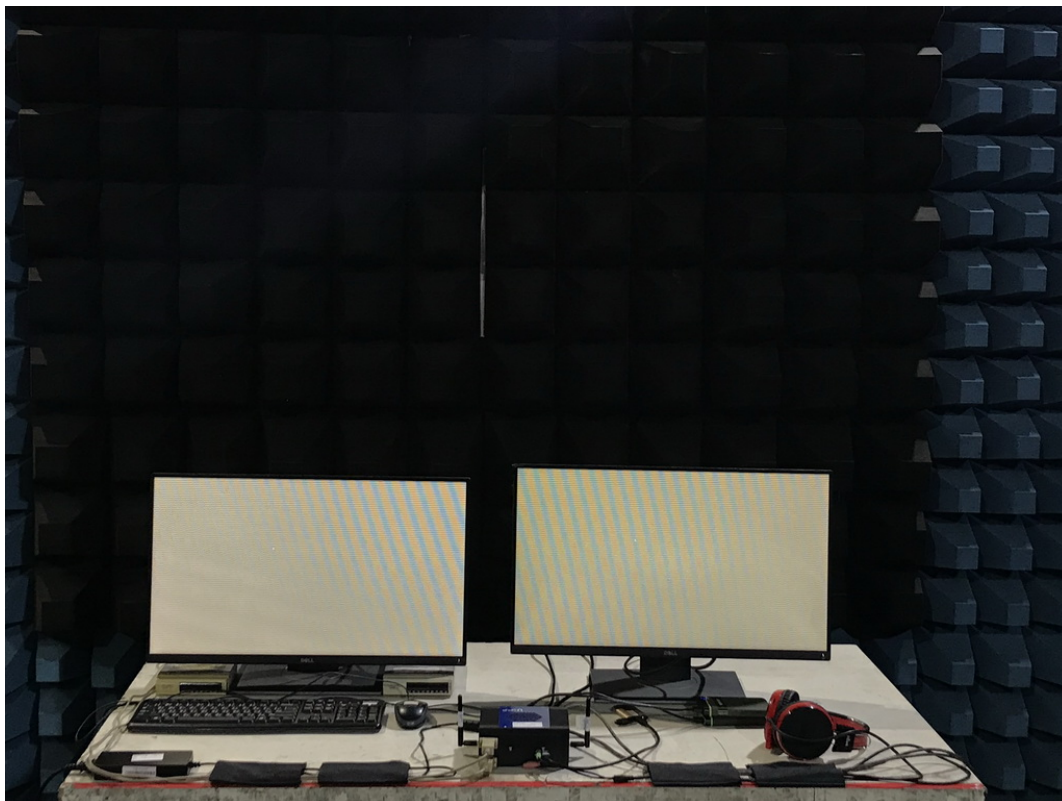


## ESD Test





## RS Test



## EFT Test



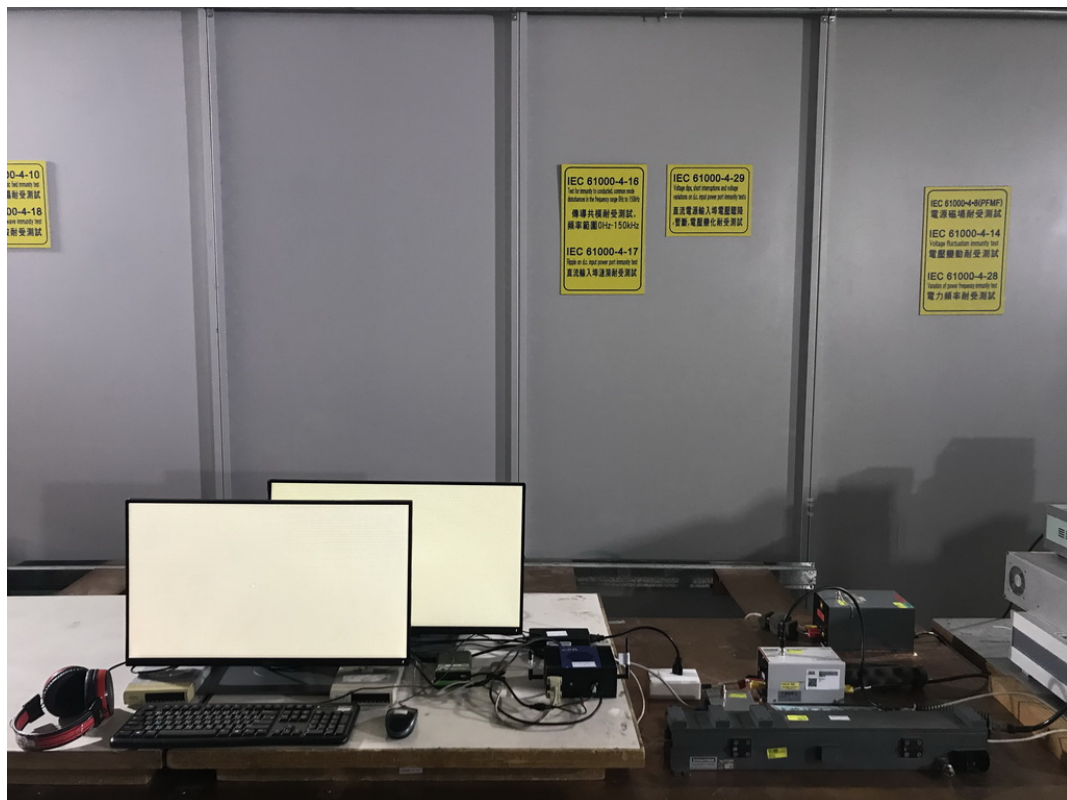
**EFT For RJ45 Test****EFT For RJ45 (2.5Gbps) Test**



## Surge Test



## CS Test



## CS For RJ45 Test



## CS For RJ45 (2.5Gbps) Test





## PFMF Test



## Voltage Dips / Interruptions Test

