

# **CE EMC TEST REPORT**

for

**Marker board; UP SQUARE Gateway System**

**MODEL: xUPS-APLx; xUPS-GWS01x (x - Where x may be any combination of alphanumeric characters or "-" or blank.)**

Test Report Number:  
T170329D17-E

Issued to:

**AAEON Technology Inc.**

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New Taipei City, Taiwan, R.O.C**

Issued by:

**Compliance Certification Services Inc.**

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**Issued Date: April 7, 2017**



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**Revision History**

Rev.		Issue Date		Revisions	Effect Page	Revised By
00		April 7, 2017		Initial Issue	ALL	Joy Hsiao

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# 1 TEST CERTIFICATION

**Product:** Marker board; UP SQUARE Gateway System

**Model:** xUPS-APLx; xUPS-GWS01x (x - Where x may be any 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

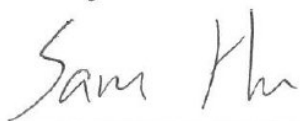
**Tested:** March 30, 2017 & April 5, 2017

<b>Applicable Standards:</b>	<b>EN 55011: 2009 + A1: 2010 (Group 1, Class A)</b>	<b>EN 61000-6-1: 2007</b>
	<b>EN 61000-3-2: 2014</b>	IEC 61000-4-2: 2008
	<b>EN 61000-3-3: 2013</b>	IEC 61000-4-3: 2006 + A1: 2007 + A2: 2010
		IEC 61000-4-4: 2012
		IEC 61000-4-5: 2014
		IEC 61000-4-6: 2013
		IEC 61000-4-8: 2009
		IEC 61000-4-11: 2004

Deviation from Applicable Standard
None

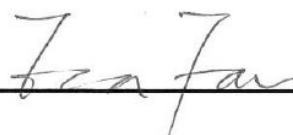
The above equipment was tested by Compliance Certification Services Inc. for compliance with the requirements of technical standards specified above under the EMC Directive 2014/30/EU. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will 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: 2009 + A1: 2010 (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 [ EN61000-6-1: 2007 ]			
Standard	Item	Result	Remarks
IEC 61000-4-2: 2008	ESD	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-3: 2006 + A1: 2007 + A2: 2010	RS	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-4: 2012	EFT	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-5: 2014	Surge	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-6: 2013	CS	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-8: 2009	PFMF	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-11: 2004	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

**Note:** 1. The statements of test result on the above are decided by the request of test standard only; the measurement uncertainties are not factored into this compliance determination.  
2. The information of measurement uncertainty is available upon the customer's request.

### 3 EUT DESCRIPTION

<b>Product</b>	Marker board; UP SQUARE Gateway System
<b>Brand Name</b>	AAEON
<b>Model</b>	xUPS-APLx; xUPS-GWS01x (x - Where x may be any combination of alphanumeric characters or "-" or blank.)
<b>Applicant</b>	AAEON Technology Inc.
<b>Housing material</b>	Marker board: N/A UP SQUARE Gateway System: Metal case
<b>Identify Number</b>	T170329D17
<b>Received Date</b>	March 29, 2017
<b>EUT Power Rating</b>	5VDC from Adaptor
<b>AC Power During Test</b>	230VAC / 50Hz to Adaptor
<b>Adaptor Manufacturer</b>	SWITCHING ADAPTER
<b>Adaptor Model</b>	FJ-SW0504000N
<b>Adaptor Power Rating</b>	I/P: 100-240VAC~ 50/60Hz, 1.5A Max O/P: 5VDC, 4000mA
<b>DC Power Cable Type</b>	Unshielded, 1.2m (Non-detachable)
<b>EUT I/O Cable Type</b>	Shielded, 0.4m (Detachable)

#### Model Differences

Product	Model Name		Tested (Checked)
Marker board	UPS-APLP4-A10-0432		<input checked="" type="checkbox"/>
Product	Model Name	Difference	Tested (Checked)
UP SQUARE Gateway System	UPS-GWS01F-A10-0432	With fan	<input checked="" type="checkbox"/>
	UPS-GWS01-A10-0432	Without fan	<input checked="" type="checkbox"/>
Model Name	Difference		Tested (Checked)
xUPS-APLx	1. x - Where x may be any combination of alphanumeric characters or "-" or blank 2. For marketing purpose only		<input type="checkbox"/>
xUPS-GWS01x			<input type="checkbox"/>

**I/O PORT**

I/O PORT TYPES	Q'TY	TESTED WITH
1. LAN Port	2	2
2. HDMI Port	1	1
3. Display Port	1	1
4. USB 3.0 Port	4	4

**Note:** None.

## 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/ modes are as the following:

**Conduction Modes:**

1	UPS-GWS01F-A10-0432; UPS-APLP4-A10-0432	Display + HDMI Mode / 1920X1200
2	UPS-GWS01-A10-0432; UPS-APLP4-A10-0432	

**Radiation Mode:**

1	UPS-GWS01F-A10-0432; UPS-APLP4-A10-0432	Display + HDMI Mode / 1920X1200
		Display + HDMI Mode / 1920X1200 / 1-5.5GHz
2	UPS-GWS01-A10-0432; UPS-APLP4-A10-0432	Display + HDMI Mode / 1920X1200

**Worst:**

**Conduction:** Mode 1

**Radiation:** Mode 1

### 4.2. EUT SYSTEM OPERATION

1. Windows 10 boots system.
2. Run Burnintest.exe to test EUT.
3. Press the start menu, select executive and type ping 192.168.0.1&2 -t (EUT), ping 192.168.0.11&12 -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 (1.10GHz)	N4200	Intel Pentium
2	Memory (4GB)	K4F8E304HB-MGCH	Samsung
3	Adaptor	FJ-SW0504000N	SWITCHING ADAPTER
4	eMMC (32GB)	EMMC32G-M525-A51	Kingston

#### Peripherals Devices:

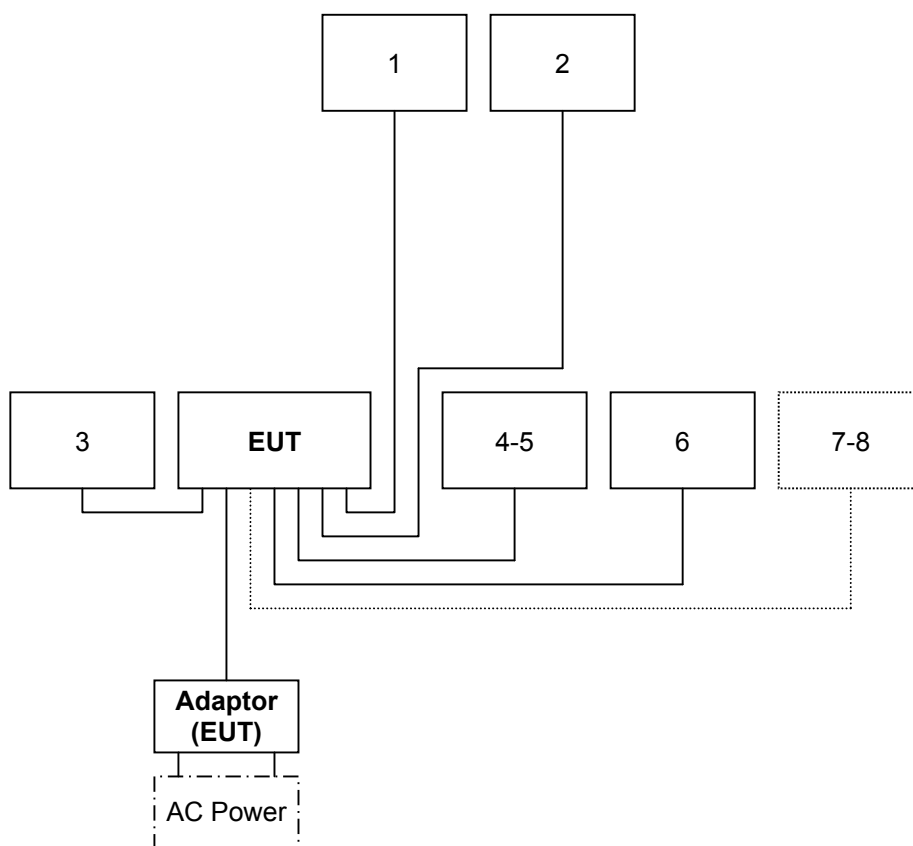
No.	Equipment	Model No.	Serial No.	FCC ID / BSMI ID	Brand Name	Data Cable	Power Cord
1	USB Mouse	M-U0026	N/A	DOC BSMI: T41126	Logitech	Shielded, 1.8m	N/A
2	USB Keyboard	Y-U0011	N/A	DOC BSMI: T51160	Logitech	Shielded, 1.8m	N/A
3	Monitor	PA248Q	G5LMQS071275	BSMI: R31018	ASUS	DP: Shielded, 1.8m	Unshielded, 1.8m
4	USB HDD	HD-EG5	N/A	DOC BSMI: D33021	SONY	Shielded, 0.6m	N/A
5	USB HDD	HD-EG5	N/A	DOC BSMI: D33021	SONY	Shielded, 1.0m	N/A
6	Monitor	PA248Q	G5LMQS071284	BSMI: R31018	ASUS	HDMI: Shielded, 1.8m	Unshielded, 1.8m
7-8	Server PC	T3500	N/A	DOC BSMI: R33002	DELL	Unshielded, 20m	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, 23151 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.

Taiwan	TAF
USA	A2LA

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

Canada	Industry Canada
Norway	Nemko
Japan	VCCI
Taiwan	BSMI
USA	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	$\pm 1.07$
Radiated emissions	30MHz ~ 1000MHz	$\pm 4.82$
	1000MHz ~ 6000MHz	$\pm 4.17$

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 3.6dB and 5.2dB 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
BNC Cable	EMCI	CFD300-NL	BNC#B4	01/08/2018
EMI Test Receiver	R&S	ESCI	100234	05/31/2017
LISN	Schwarzbeck	NSLK 8127	8127382	06/01/2017
LISN(EUT)	Schwarzbeck	NSLK 8127	8127691	06/01/2017
Pulse Limiter	R&S	ESH3-Z2	100374	01/08/2018
Thermo-Hygro Meter	Wisewind	201A	No. 05	05/31/2017
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.

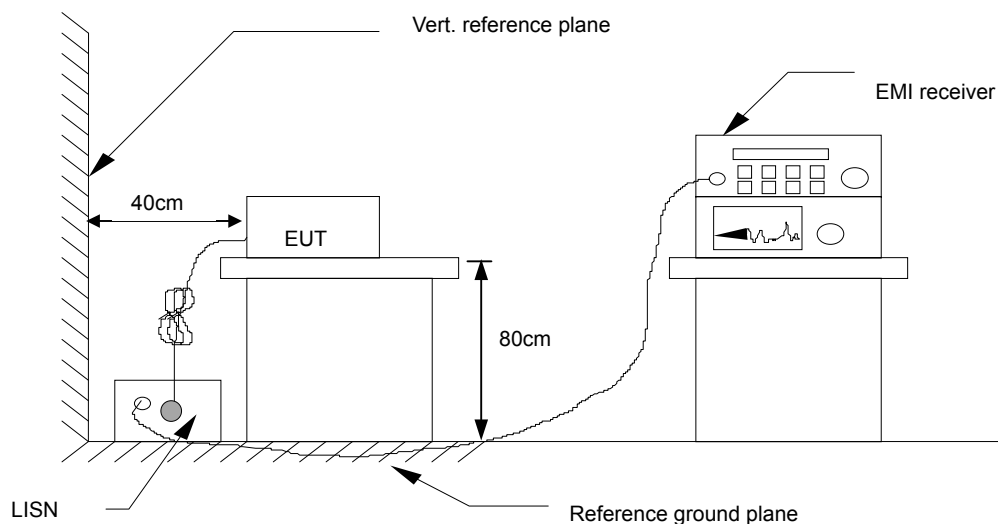
**7.1.3. TEST PROCEDURES** (please refer to measurement standard or CCS SOP PA-031)**Procedure of Preliminary Test**

- 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

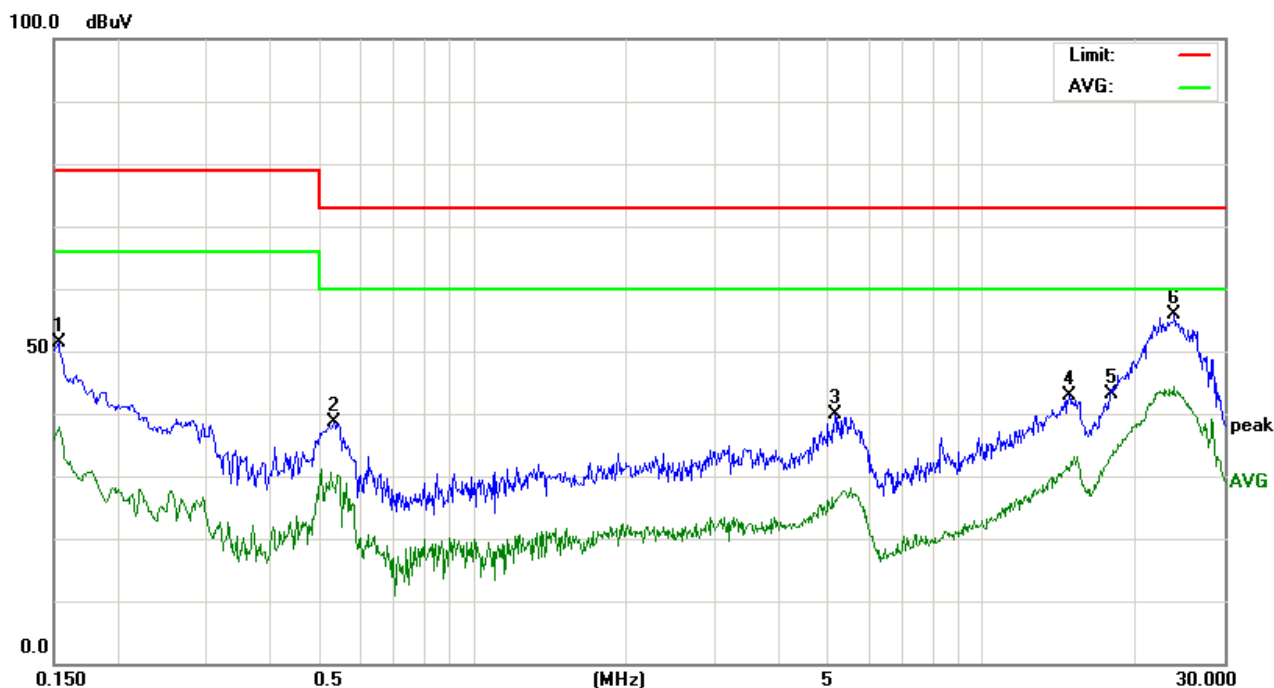
Freq.	= Emission frequency in MHz
Reading	= Uncorrected Analyzer/Receiver reading
Factor	= Insertion loss of LISN + Cable Loss + Pulse Limit
Result	= Read Level + Factor
Limit	= Limit stated in standard
Margin	= Reading in reference to limit
P	= Peak Reading
Q	= Quasi-peak Reading
A	= Average Reading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

#### Calculation Formula

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

### 7.1.6. TEST RESULTS

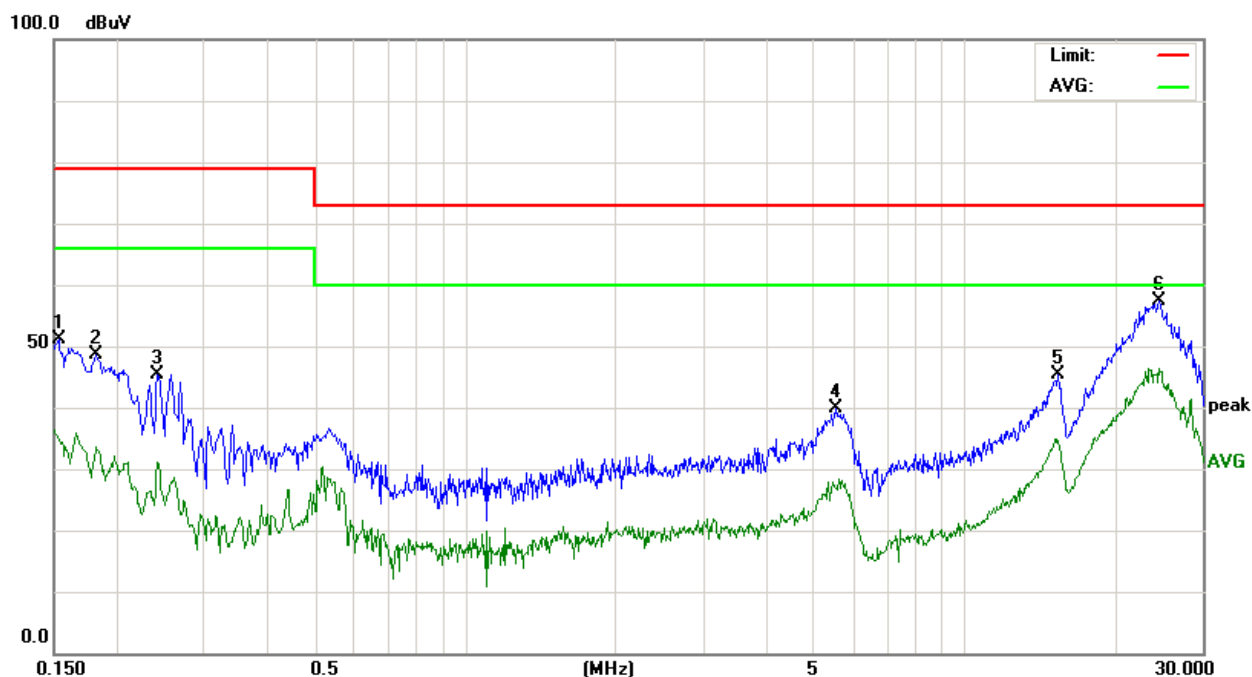
<b>Model No.</b>	UPS-GWS01F-A10-0432; UPS-APLP4-A10-0432	<b>6dB Bandwidth</b>	9 kHz
<b>Environmental Conditions</b>	20°C, 58% RH	<b>Test Mode</b>	Mode 1
<b>Tested by</b>	Bonny Tsai	<b>Phase</b>	L1
<b>Standard</b>	EN 55011 GROUP 1 CLASS A		



Conducted Emission Readings							
Frequency Range Investigated				150 kHz to 30 MHz			
Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector (P/Q/A)	Line (L1/L2)
0.1539	41.31	9.97	51.28	79.00	-27.72	P	L1
0.5340	28.55	9.97	38.52	73.00	-34.48	P	L1
5.1459	29.75	10.24	39.99	73.00	-33.01	P	L1
14.8858	32.34	10.52	42.86	73.00	-30.14	P	L1
17.8938	32.58	10.58	43.16	73.00	-29.84	P	L1
23.9740	45.13	10.73	55.86	73.00	-17.14	P	L1

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

<b>Model No.</b>	UPS-GWS01F-A10-0432; UPS-APLP4-A10-0432	<b>6dB Bandwidth</b>	9 kHz
<b>Environmental Conditions</b>	20°C, 58% RH	<b>Test Mode</b>	Mode 1
<b>Tested by</b>	Bonny Tsai	<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)
0.1539	41.05	9.97	51.02	79.00	-27.98	P	L2
0.1824	38.62	9.97	48.59	79.00	-30.41	P	L2
0.2419	35.37	9.98	45.35	79.00	-33.65	P	L2
5.5378	29.53	10.26	39.79	73.00	-33.21	P	L2
15.3899	34.86	10.53	45.39	73.00	-27.61	P	L2
24.5779	46.60	10.76	57.36	73.00	-15.64	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: 2012 / AC: 2013 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	36995	08/02/2017
Cable	EMCI	8Dr	N-Type#H10	04/07/2017
EMI Test Receiver	R&S	ESCI	101340	04/05/2017
Pre-Amplifier	HP	8447D	1937A01554	09/29/2017
Thermo-Hygro Meter	Wisewind	201A	No. 03	05/31/2017
Test S/W	EZ-EMC			
Above 1GHz Used				
Horn Antenna	ETS	3117	139062	10/12/2017
K-Type Cable x 1m (1-40GHz)	Rosnol	K1K50-UP0264-K1k 50-1M	160215-1	12/11/2017
Microflex Cable x 7m (1-18GHz)	Rosnol	A1K50-EW0630-A1k 50-700CM	SD-R028	12/12/2017
Pre-Amplifier	HP	8449B	3008A01266	12/08/2017
Signal Analyzer	Agilent	N9010A	MY53440125	01/12/2018
Spectrum Analyzer	Agilent	E4440A	MY46185957	01/10/2018
Thermo-Hygro Meter	Wisewind	N/A	SD-R027	10/17/2017
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**

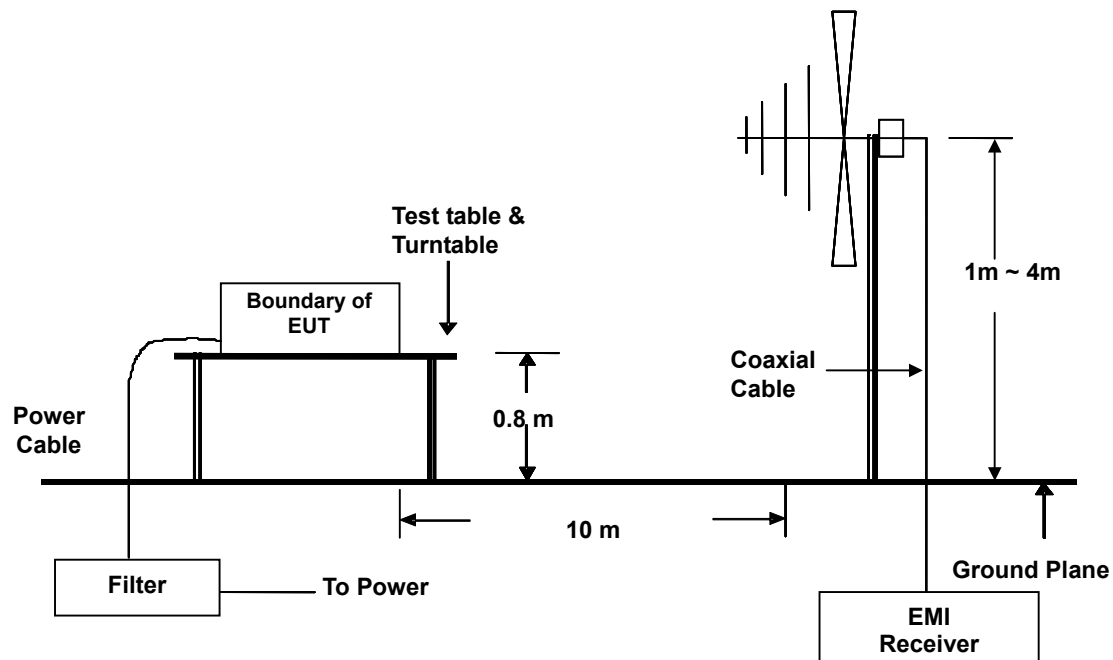
- The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is a floor standing equipment, it is placed on the ground 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**

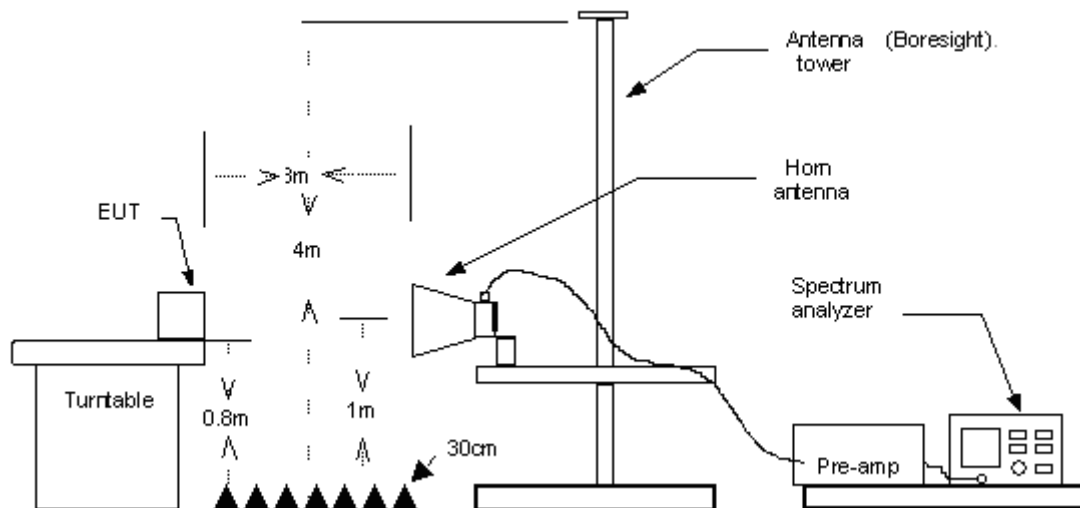
- EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test.
- The Analyzer / Receiver scanned from 30MHz to 6000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning 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

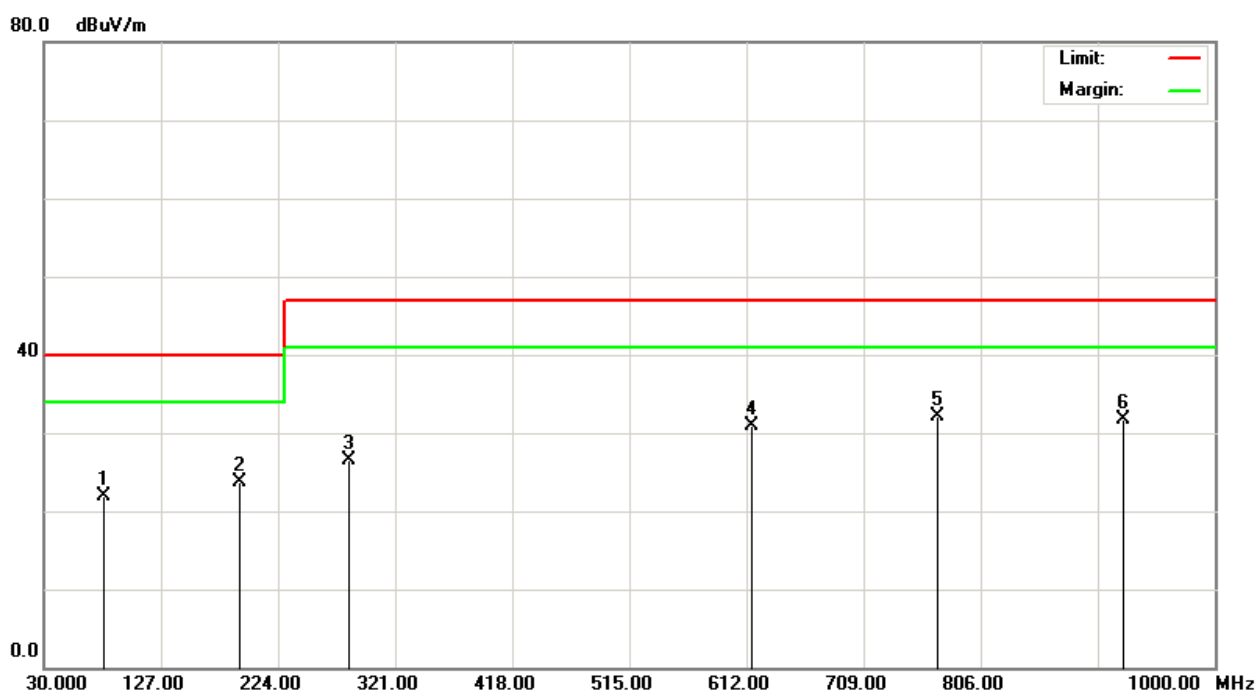
**Calculation Formula**

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

## 7.2.6. TEST RESULTS

### Below 1GHz

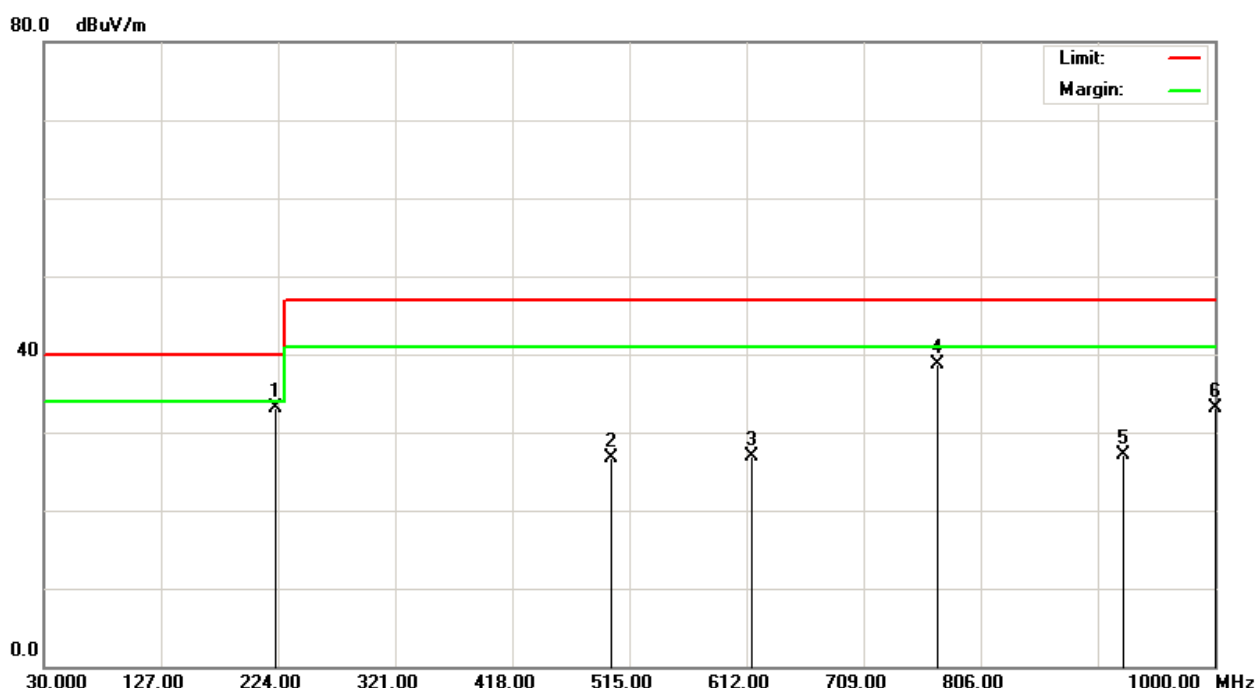
<b>Model No.</b>	UPS-GWS01F-A10-0432; UPS-APLP4-A10-0432	<b>Test Mode</b>	Mode 1
<b>Environmental Conditions</b>	20°C, 66% RH	<b>6dB Bandwidth</b>	120 kHz
<b>Antenna Pole</b>	Vertical	<b>Antenna Distance</b>	10m
<b>Detector Function</b>	Quasi-peak.	<b>Tested by</b>	Bonny Tsai
<b>Standard</b>	EN 55011 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)
80.3399	35.41	-13.54	21.87	40.00	-18.13	100	221	Q	V
192.3400	34.77	-11.02	23.75	40.00	-16.25	100	153	Q	V
283.1099	33.12	-6.70	26.42	47.00	-20.58	100	333	Q	V
616.2000	30.10	0.86	30.96	47.00	-16.04	400	241	Q	V
770.3600	29.55	2.50	32.05	47.00	-14.95	400	100	Q	V
924.1000	28.10	3.66	31.76	47.00	-15.24	400	152	Q	V

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

<b>Model No.</b>	UPS-GWS01F-A10-0432; UPS-APLP4-A10-0432	<b>Test Mode</b>	Mode 1
<b>Environmental Conditions</b>	20°C, 66% 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>	Bonny Tsai
<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)
222.3400	43.10	-9.95	33.15	40.00	-6.85	400	222	Q	H
500.0100	27.80	-1.07	26.73	47.00	-20.27	100	153	Q	H
616.3500	26.10	0.86	26.96	47.00	-20.04	100	300	Q	H
770.3600	36.22	2.50	38.72	47.00	-8.28	100	120	Q	H
924.1000	23.47	3.66	27.13	47.00	-19.87	100	142	Q	H
1000.0000	28.99	4.12	33.11	47.00	-13.89	100	222	Q	H

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

**Above 1GHz**

<b>Model No.</b>	UPS-GWS01F-A10-0432; UPS-APLP4-A10-0432	<b>Test Mode</b>	Mode 1
<b>Environmental Conditions</b>	26°C, 60% 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>	1100MHz	<b>Upper frequency</b>	5500MHz
<b>Detector Function</b>	Peak and average.	<b>Tested by</b>	Bonny Tsai
<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)
2091.667	50.70	-2.87	47.83	76.00	-28.17	P	V
2266.667	46.61	-2.65	43.96	76.00	-32.04	P	V
2833.333	47.01	-1.99	45.02	76.00	-30.98	P	V
3291.667	45.62	-1.47	44.15	80.00	-35.85	P	V
4491.667	44.77	0.46	45.23	80.00	-34.77	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)
1791.667	48.87	-4.88	43.99	76.00	-32.01	P	H
1950.000	50.20	-3.44	46.76	76.00	-29.24	P	H
2375.000	53.00	-2.53	50.47	76.00	-25.53	P	H
2491.667	46.97	-2.37	44.60	76.00	-31.40	P	H
3266.667	52.08	-1.49	50.59	80.00	-29.41	P	H

**Note:** 1. 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 7.3.3.

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	5001IX-208-TSQ	1537A01296	11/03/2017
H/F Measurement System	EMC Partner	HAR1000-1P	189	11/03/2017
Software	HARCS V4.19			

**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:

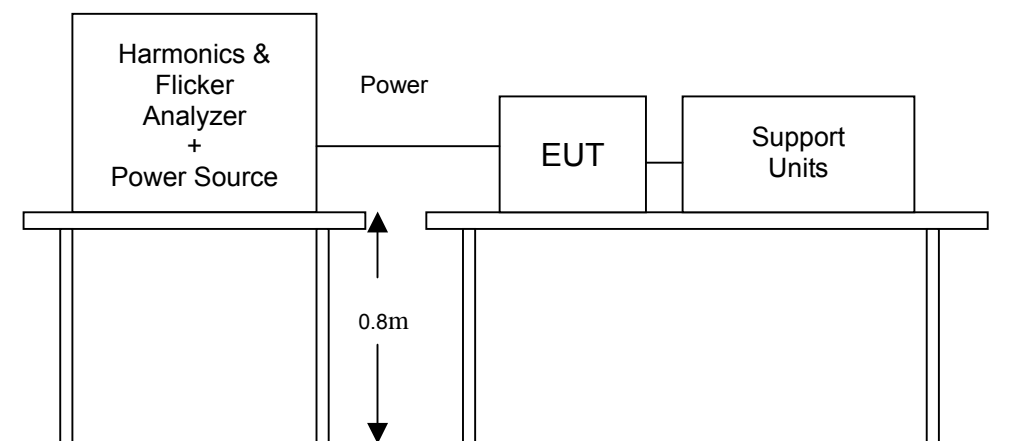
Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.

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**

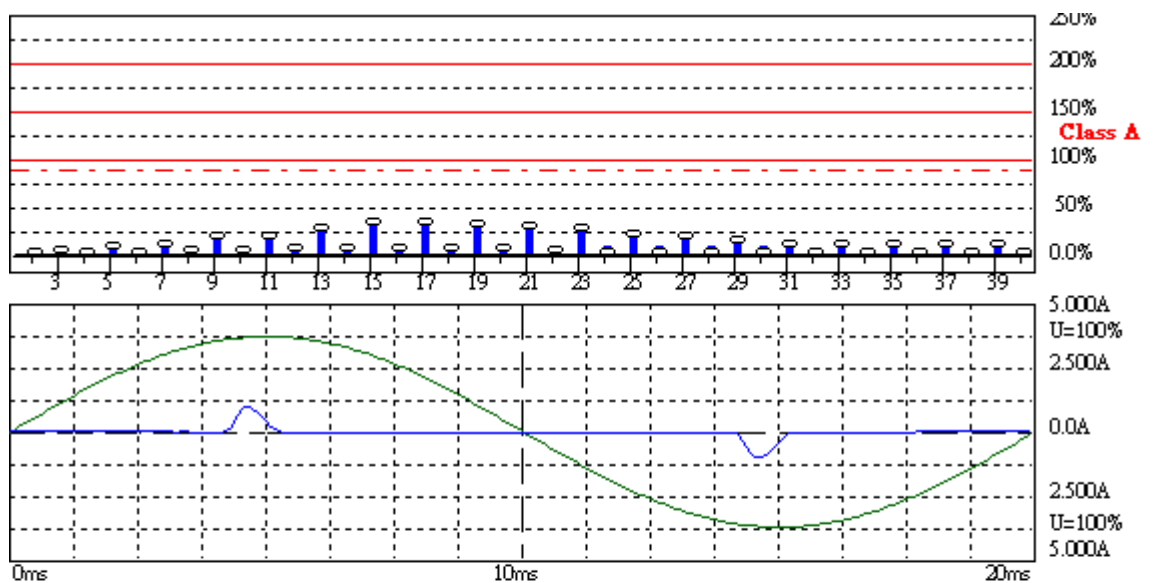
- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

## 7.3.5. TEST RESULTS

Power Consumption	18.77W	Test Results	PASS
Environmental Conditions	21°C, 60% RH, 1009mbar	Limits	Class <input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D
Test Mode	Operating	Tested by	Bonny Tsai

NOTE: Limits classified according to item 7.3.1.

## Test result of EN 61000-3-2



Harmonic Emission - IEC 61000-3-2, EN 61000-3-2, (EN60555-2)

2017/3/30 21:13:53

U<sub>rms</sub> = 229.9 V P = 18.77 W THC = 0.189 A  
I<sub>rms</sub> = 0.205 A pf = 0.398

Range: 5 A  
V<sub>nom</sub>: 230 V  
TestTime: 5 min (100%)

Test completed, Result: PASSED

HAR-1000 EMC-Retnet

Urms = 229.9V Freq = 50.013 Range: 5 A  
 Irms = 0.205A Ipk = 1.113A cf = 5.429  
 P = 18.77W S = 47.15VA pf = 0.398  
 THDi = 221 % THDu = 0.10 % Class A

Test - Time : 5min ( 100 %)

Test completed, Result: PASSED

Order	Freq. [Hz]	Iavg [A]	Irms [A]	Irms% [%]	Irms%L [%]	Imax [A]	Imax% [%]	Imax%L [%]	Limit [A]	Status
1	50	0.0851	0.0864	42.113		0.0876	42.708			
2	100	0.0074	0.0070	3.4226	0.6499	0.0089	4.3155	0.8195	1.0800	
3	150	0.0749	0.0760	37.054	3.3039	0.0772	37.649	3.3569	2.3000	
4	200	0.0075	0.0073	3.5714	1.7033	0.0089	4.3155	2.0582	0.4300	
5	250	0.0729	0.0739	36.012	6.4783	0.0751	36.607	6.5854	1.1400	
6	300	0.0074	0.0073	3.5714	2.4414	0.0089	4.3155	2.9500	0.3000	
7	350	0.0697	0.0708	34.524	9.1949	0.0720	35.119	9.3534	0.7700	
8	400	0.0073	0.0070	3.4226	3.0518	0.0085	4.1667	3.7152	0.2300	
9	450	0.0656	0.0665	32.440	16.632	0.0674	32.887	16.861	0.4000	
10	500	0.0071	0.0070	3.4226	3.8147	0.0085	4.1667	4.6440	0.1840	
11	550	0.0606	0.0613	29.911	18.588	0.0623	30.357	18.865	0.3300	
12	600	0.0069	0.0067	3.2738	4.3786	0.0082	4.0179	5.3737	0.1533	
13	650	0.0549	0.0558	27.232	26.594	0.0562	27.381	26.739	0.2100	
14	700	0.0065	0.0064	3.1250	4.8762	0.0076	3.7202	5.8050	0.1314	
15	750	0.0488	0.0494	24.107	32.959	0.0500	24.405	33.366	0.1500	
16	800	0.0061	0.0061	2.9762	5.3074	0.0073	3.5714	6.3689	0.1150	
17	850	0.0424	0.0430	20.982	32.511	0.0433	21.131	32.742	0.1324	
18	900	0.0057	0.0058	2.8274	5.6723	0.0067	3.2738	6.5679	0.1022	
19	950	0.0361	0.0366	17.857	30.924	0.0366	17.857	30.924	0.1184	
20	1000	0.0045	0.0052	2.5298	5.6391	0.0061	2.9762	6.6343	0.0920	
21	1050	0.0298	0.0302	14.732	28.198	0.0302	14.732	28.198	0.1071	
22	1100	0.0029	0.0049	2.3810	5.8381	0.0058	2.8274	6.9328	0.0836	
23	1150	0.0240	0.0241	11.756	24.645	0.0241	11.756	24.645	0.0978	
24	1200	0.0007	0.0043	2.0833	5.5728	0.0052	2.5298	6.7669	0.0767	
25	1250	0.0186	0.0189	9.2262	21.023	0.0186	9.0774	20.684	0.0900	
26	1300	0.0000	0.0037	1.7857	5.1747	0.0046	2.2321	6.4684	0.0708	
27	1350	0.0140	0.0140	6.8452	16.846	0.0140	6.8452	16.846	0.0833	
28	1400	0.0000	0.0034	1.6369	5.1084	0.0040	1.9345	6.0372	0.0657	
29	1450	0.0101	0.0101	4.9107	12.980	0.0104	5.0595	13.373	0.0776	
30	1500	0.0000	0.0031	1.4881	4.9757	0.0037	1.7857	5.9708	0.0613	
31	1550	0.0074	0.0076	3.7202	10.512	0.0076	3.7202	10.512	0.0726	
32	1600	0.0000	0.0027	1.3393	4.7767	0.0031	1.4881	5.3074	0.0575	
33	1650	0.0059	0.0061	2.9762	8.9518	0.0061	2.9762	8.9518	0.0682	
34	1700	0.0000	0.0024	1.1905	4.5113	0.0027	1.3393	5.0752	0.0541	
35	1750	0.0056	0.0058	2.8274	9.0196	0.0061	2.9762	9.4944	0.0643	
36	1800	0.0000	0.0021	1.0417	4.1796	0.0027	1.3393	5.3737	0.0511	
37	1850	0.0057	0.0058	2.8274	9.5350	0.0061	2.9762	10.037	0.0608	
38	1900	0.0000	0.0021	1.0417	4.4118	0.0024	1.1905	5.0420	0.0484	
39	1950	0.0059	0.0061	2.9762	10.579	0.0064	3.1250	11.108	0.0577	
40	2000	0.0000	0.0018	0.8929	3.9806	0.0021	1.0417	4.6440	0.0460	

**Definitions of Abbreviations**

Urms	***	Actual total Voltage in Volt RMS
Irms	***	Actual total Current in Ampere RMS
Ipk	***	Actual Peak value of the Current in Ampere
cf	***	Actual Crest Factor (Ipk/Irms)
P	***	Actual Active Power in Watt
S	***	Actual Apparent Power in VA (Urms*Irms)
pf	***	Actual Power Factor (P/S)
THDi	***	Actual Total Harmonic Current Distortion in %
THDu	***	Actual Total Harmonic Voltage Distortion in %
THC	***	Actual Total Harmonic Current in Ampere
PHC	***	Actual Partial Harmonic Current in Ampere

Individual measurements for 2nd to 40th order:

Iavg		Average value of the Individual Harmonic Current in Ampere RMS
Irms	***	Actual Individual Harmonic Current in Ampere RMS
Irms%	***	Actual Individual Harmonic Current in percentage of the actual total RMS Current
Irms%L	***	Actual Individual Harmonic Current in percentage of the applicable Limit
I <sub>max</sub>		Maximum Individual Harmonic Current in Ampere RMS
I <sub>max</sub> %		Maximum Individual Harmonic Current in percentage of the actual total RMS Current
I <sub>max</sub> %lim		Maximum Individual Harmonic Current in percentage of the applicable Limit
Limit Irms		Individual Limit (100%) for the selected Class in Ampere RMS

## 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

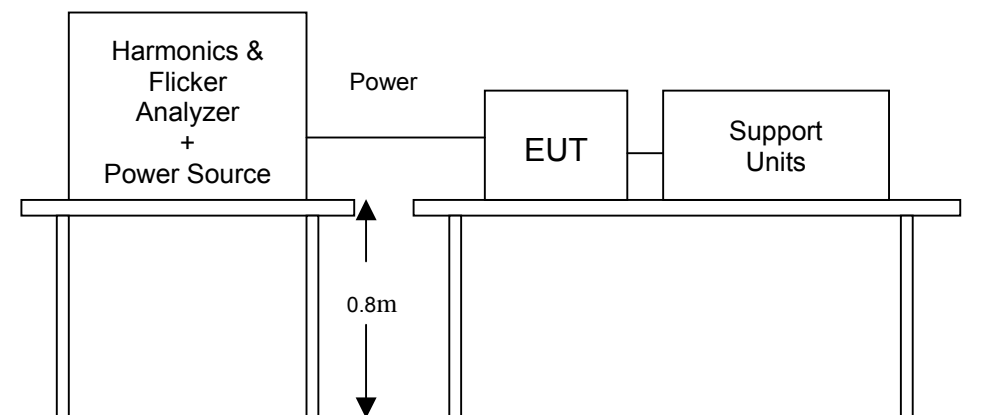
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
5kVA Power Source	Teseq	5001IX-208-TSQ	1537A01296	11/03/2017
H/F Measurement System	EMC Partner	HAR1000-1P	189	11/03/2017
Software	HARCS V4.19			

**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.

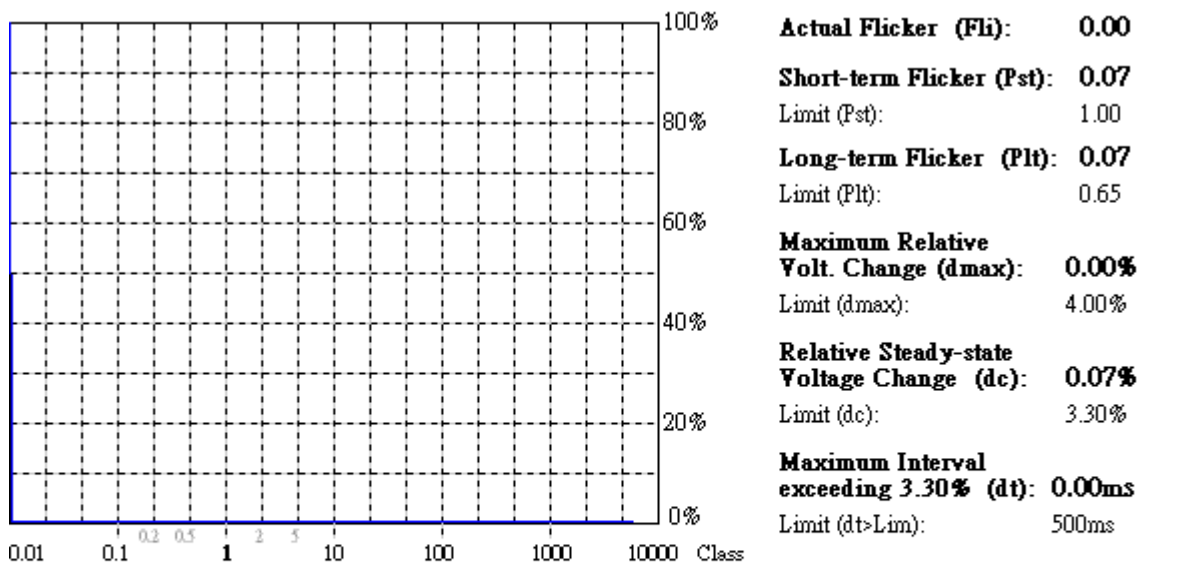
## 7.4.5. TEST RESULTS

Observation Period (Tp)	30mins	Test Mode	Operating
Environmental Conditions	21°C, 60% RH, 1009mbar	Tested by	Bonny Tsai

TEST PARAMETER	MEASUREMENT VALUE	LIMIT	REMARK
P <sub>st</sub>	0.07	1.0	PASS
P <sub>lt</sub>	0.07	0.65	PASS
T <sub>dt</sub> (ms)	0	500	PASS
d <sub>max</sub> (%)	0	4%	PASS
dc (%)	0.07	3.3%	PASS

Note: None.

## Test result of EN 61000-3-3



Flicker Emission - IEC 61000-3-3, EN 61000-3-3

2017/3/30 21:01:39

U<sub>rms</sub> = 229.9 V P = 19.14 W  
I<sub>rms</sub> = 0.198 A pf = 0.421

Range: 5 A  
V<sub>nom</sub>: 230 V  
TestTime: 30 min (100%)

**Test completed, Result: PASSED**

HAR-1000 EMC-Retester

## 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 61000-4-2	Electrostatic Discharge – ESD: 8kV air discharge, 4kV Contact discharge, Performance Criterion B
	IEC 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 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 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 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 61000-4-8	Power frequency magnetic field immunity test 50/60Hz, 3A/m Performance Criterion A
	IEC 61000-4-11	Voltage Dips: 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 Voltage Interruptions: 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 61000-4-2
<b>Discharge Impedance:</b>	330 ohm / 150 pF
<b>Discharge Voltage:</b>	Air Discharge: 2 ; 4 ; 8 kV (Direct) Contact Discharge: 2 ; 4 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	10/12/2017
ESD Generator	Teseq	NSG 437	249	12/06/2017
Thermo-Hygro Meter	Tecpel	DTM-303	80269	04/14/2017

**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)

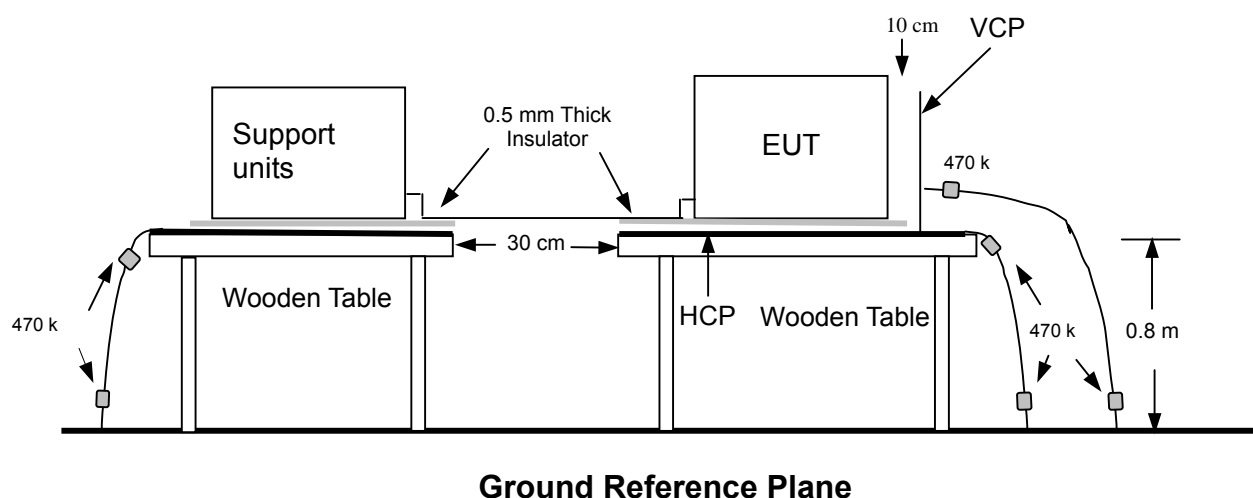
The discharges shall be applied in two ways:

- 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 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 total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC 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 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

UPS-GWS01F-A10-0432; UPS-APLP4-A10-0432

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

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

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

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

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

NOTE: 1. There was no change compared with initial operation during the test.  
 2. Not applicable (Metal case).

**The Photo for Discharge Points of EUT**  
**Front**



**Back**



Red Dot —Air Discharged  
Blue Dot —Contact Discharged

Left

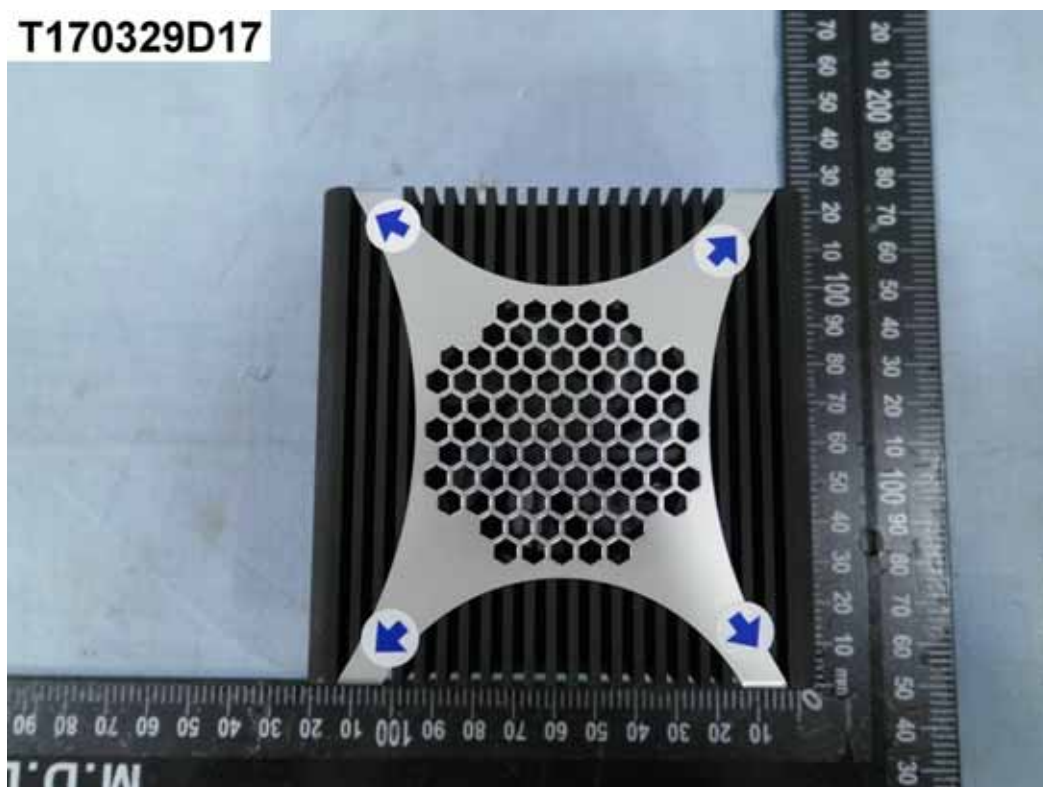


Right



Red Dot —Air Discharged  
Blue Dot —Contact Discharged

Top



Red Dot —Air Discharged  
Blue Dot —Contact Discharged

**UPS-GWS01-A10-0432; UPS-APLP4-A10-0432**

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

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

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

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

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

**NOTE:** 1. There was no change compared with initial operation during the test.  
2. Not applicable (Metal case).



**The Photo for Discharge Points of EUT**  
**Front**



**Back**



Red Dot —Air Discharged  
Blue Dot —Contact Discharged

**Left**

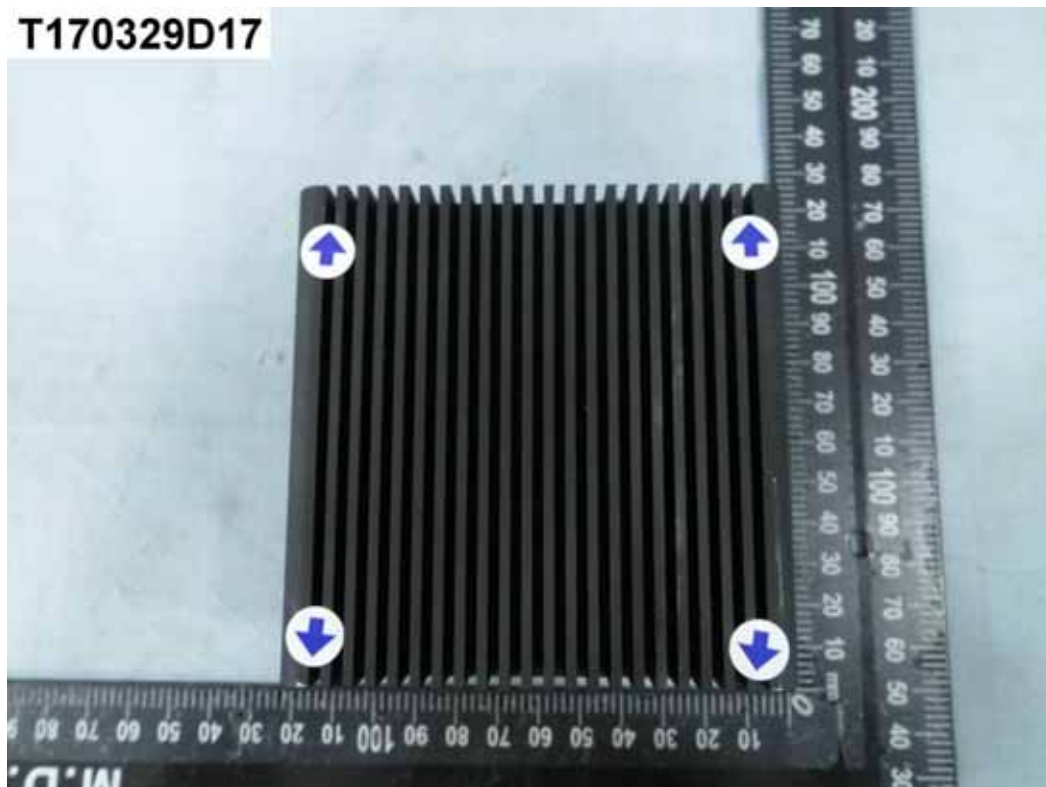


**Right**



Red Dot —Air Discharged  
Blue Dot —Contact Discharged

Top



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 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

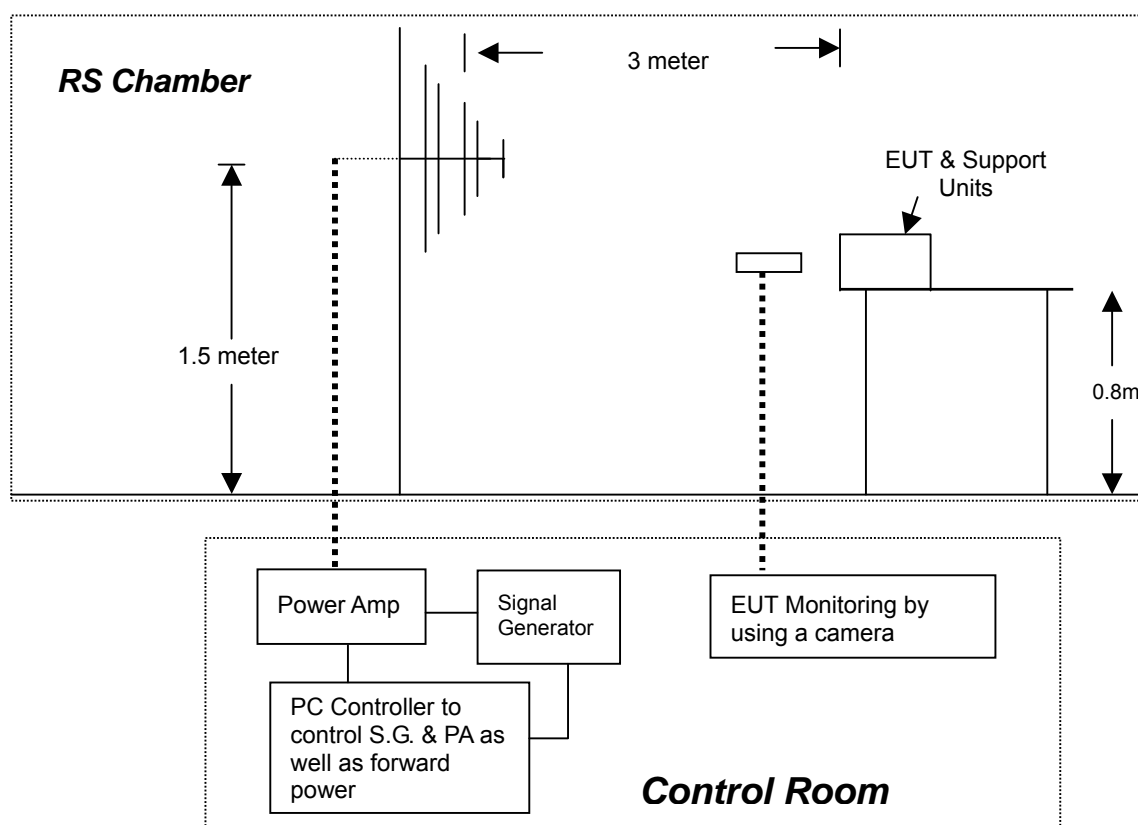
844 RS Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Broadband Antenna	AR	AT1080	311819	N.C.R
Direction Coupler	AR	DC6180A	312189	N.C.R
Electric Field Probe	AR	FL7006	338955	05/30/2017
Field of Calibration	CCS	Chamber#RS	80-1000MHz	04/03/2018
Power Amplifier	AR	500W1000A	320994	N.C.R
Power Sensor	Boonton	51013-4E	35811	02/13/2018
Power Sensor	Boonton	51013-4E	35812	02/13/2018
RF Power Meter	Boonton	4242/1/2	14357	02/13/2018
Signal Generator	Agilent	N5181A	MY47421336	12/04/2017
Thermo-Hygro Meter	TFA	N/A	NO.6	10/17/2017
Field of Calibration	CCS	Chamber#RS	1-3GHz	04/01/2018
Direction Coupler	AR	DC7200	0343647	N.C.R
Horn Antenna	EMCO	3115	5761	N.C.R
Power Amplifier	AR	60S1G3	302728	N.C.R
Software	Emcware Ver. 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 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 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 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****UPS-GWS01F-A10-0432; UPS-APLP4-A10-0432**

<b>Temperature</b>	23°C	<b>Humidity</b>	60% RH
<b>Pressure</b>	1010mbar	<b>Dwell Time</b>	3 sec.
<b>Tested By</b>	Bonny Tsai	<b>Required Passing Performance</b>	<b>Criterion A</b>

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.

## UPS-GWS01-A10-0432; UPS-APLP4-A10-0432

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

Frequency (MHz)	Polarity	Azimuth	Field Strength (A/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 61000-4-4

**Test Voltage:** 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	07/20/2017
EMC Immunity Tester	EMC Partner	TRANSINT 2000	1117	03/07/2018
Software	GenecsVer. 3.27			

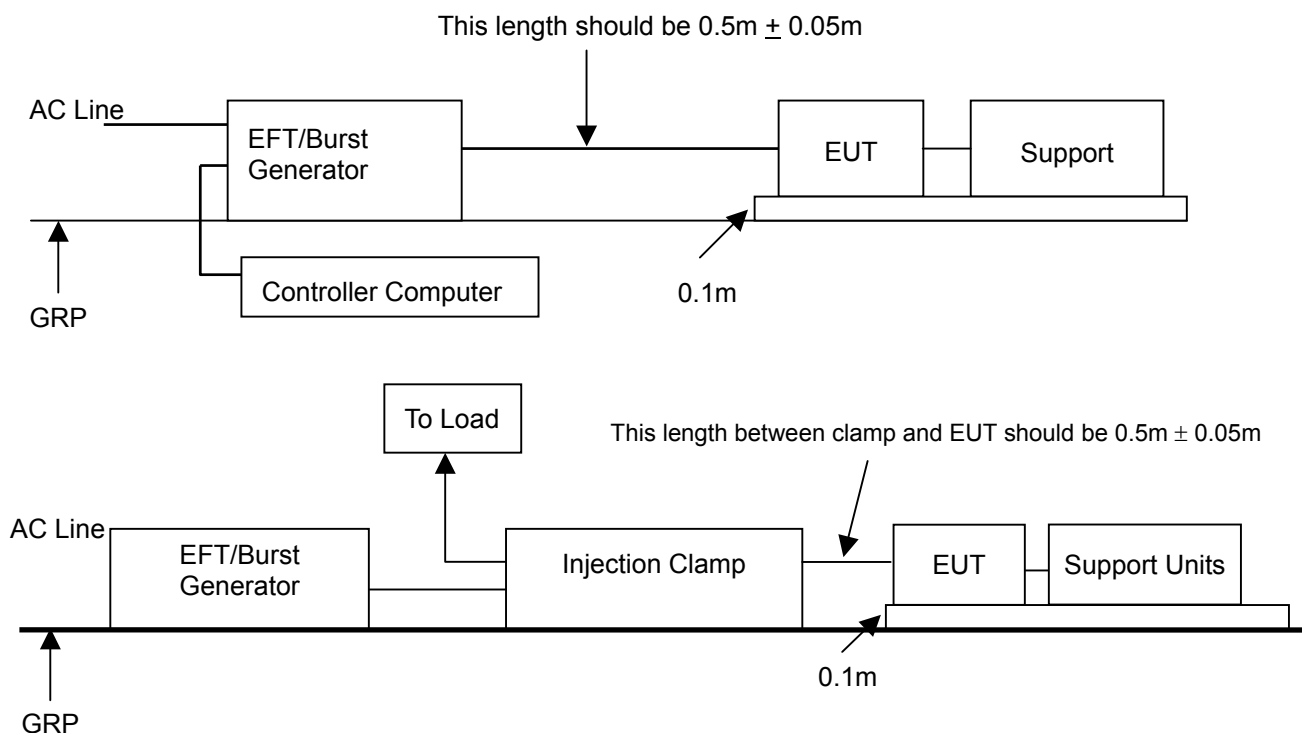
**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. N.C.R.= No Calibration required.

### 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 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 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

UPS-GWS01F-A10-0432; UPS-APLP4-A10-0432

Temperature	20°C	Humidity	50% RH
Pressure	1010mbar	Tested By	Bonny Tsai
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
RJ45	+/-	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 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
<b>Surge Input/Output:</b>	AC Power Line: L-N
<b>Generator Source Impedance:</b>	2 ohm between networks
<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	02/22/2018
EMC Immunity Tester	EMC Partner	TRANSINT 2000	1117	03/07/2018
Software	GenecsVer. 3.27			

**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:

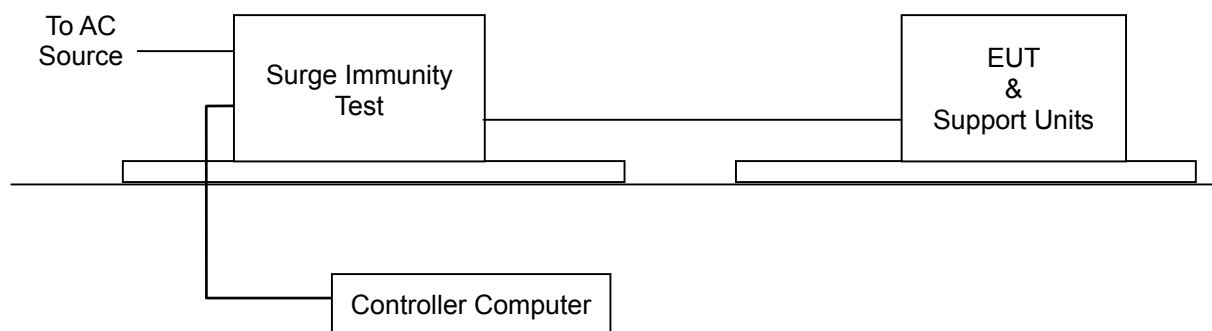
The surge is applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave.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

UPS-GWS01F-A10-0432; UPS-APLP4-A10-0432

Temperature	20°C	Humidity	50% RH
Pressure	1010mbar	Tested By	Bonny Tsai
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

**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

**Basic Standard:** IEC 61000-4-6

**Frequency Range:** 0.15 MHz - 80 MHz

**Field Strength:** 3 Vrms

**Modulation:** 1kHz Sine Wave, 80%, AM Modulation

**Frequency Step:** 1 % of preceding frequency value

**Coupled cable:** Power Mains, Unshielded; RJ45 Line, Unshielded

**Coupling device:** CDN-M2 (2 wires); CDN-T8

### 8.7.2. TEST INSTRUMENT

CS Room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Attenuator	EMCI	SA3NL	10006F	01/16/2018
CDN	Teseq	CDN M016	35820	02/13/2018
CDN	Teseq	CDN M016	35821	01/16/2018
CDN	Teseq	CDN T400A	25674	02/13/2018
CDN	Teseq	CDN T8-10	40369	02/14/2018
Continuous Wave Simulator	EM Test	CWS 500N1.4	P1446143188	02/13/2018
Software	icd.control Ver. 5.1.9			

**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.

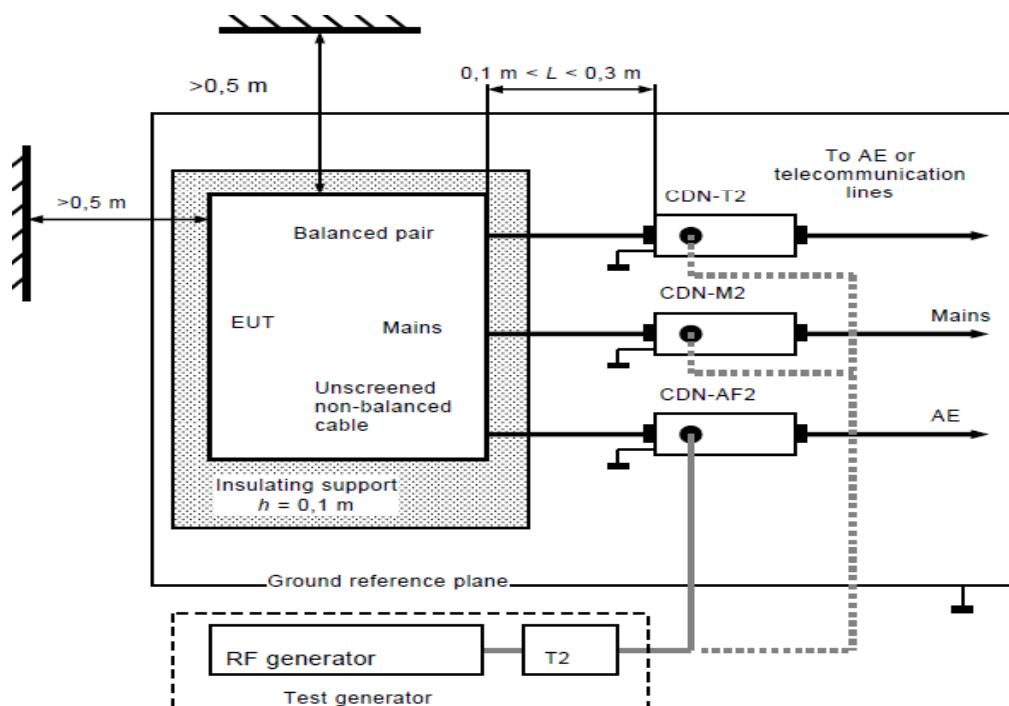
The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.

The frequency range was swept from 150 kHz to 80 MHz, 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

**UPS-GWS01F-A10-0432; UPS-APLP4-A10-0432**

<b>Temperature</b>	21°C	<b>Humidity</b>	60% RH
<b>Pressure</b>	1009mbar	<b>Tested By</b>	Bonny Tsai
<b>Required Passing Performance</b>		<b>Criterion A</b>	

Frequency Band (MHz)	Field Strength (Vrms)	Cable	Injection Method	Performance Criterion	Observation	Result
0.15 ~ 80	3	AC Power Line (0.3m)	CDN-M2	<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

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

## 8.8. POWER FREQUENCY MAGNETIC FIELD

### 8.8.1. TEST SPECIFICATION

<b>Basic Standard:</b>	IEC 61000-4-8
<b>Frequency Range:</b>	50Hz / 60Hz
<b>Field Strength:</b>	3A/m
<b>Observation Time:</b>	1 minute
<b>Inductance Coil:</b>	Rectangular type, 1mx1m

### 8.8.2. TEST INSTRUMENT

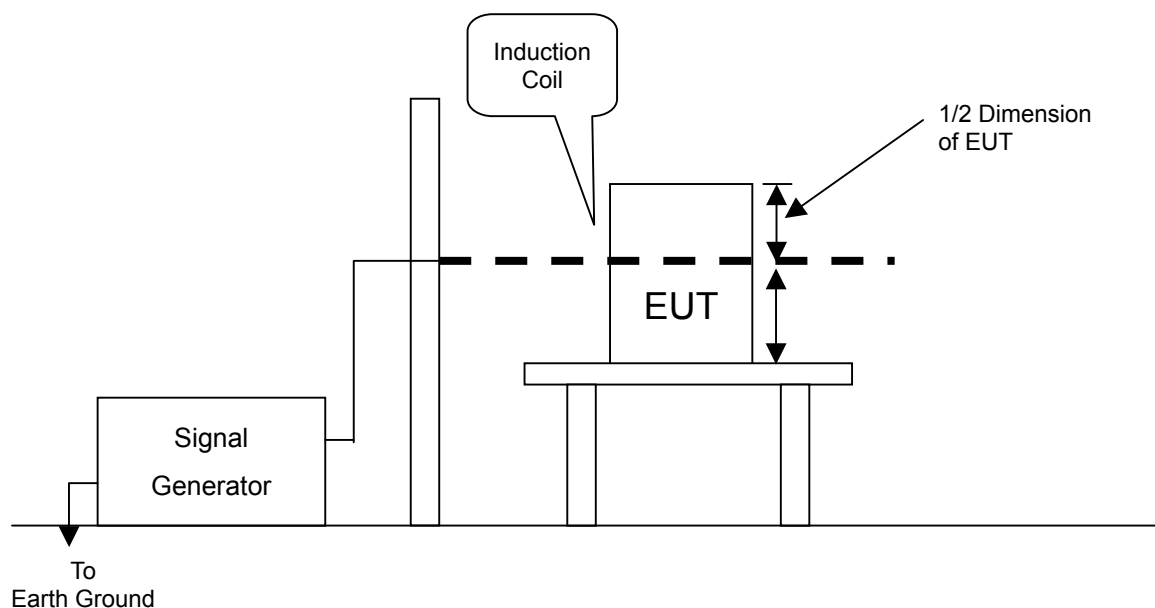
Immunity Shield Room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
AC/DC Clamp Meter	Fluke	353	33360025	07/06/2017
Magnetic Field Coil	Teseq	INA 703 W/ 2141	1976 / 1413	04/21/2017
Magnetic Field Meter	Sypris	4080	0247	04/24/2017
5kVA Power Source	Teseq	5001IX-208-TSQ	1207A03643	N.C.R
Software	Win2120Ver. 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

## UPS-GWS01F-A10-0432; UPS-APLP4-A10-0432

Temperature	18°C	Humidity	48% RH
Pressure	1009mbar	Tested By	Bonny Tsai
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 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

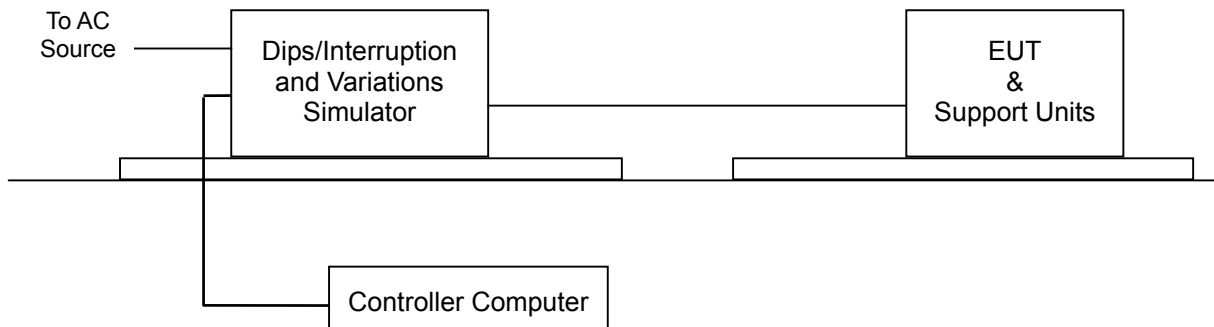
Immunity shielded room				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
AC/DC Clamp Meter	Fluke	353	33360025	07/06/2017
EMC Immunity Tester	EMC Partner	TRANSINT 2000	1117	03/07/2018
Software	GenecsVer. 3.27			

**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

UPS-GWS01F-A10-0432; UPS-APLP4-A10-0432

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

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

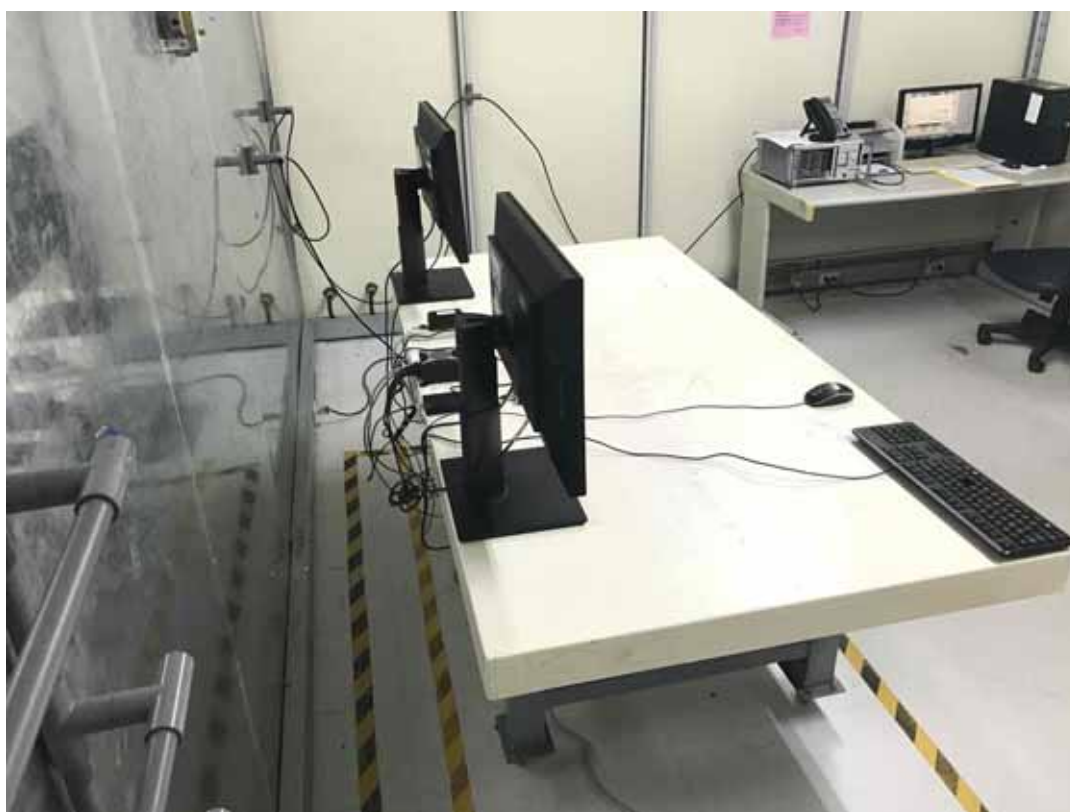
Test Power: 230Vac, 60Hz				
Voltage (% Residual)	Duration (Cycle)	Performance Criterion	Observation	Test Result
70	30	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C	Note <input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2	PASS
0	300	<input type="checkbox"/>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

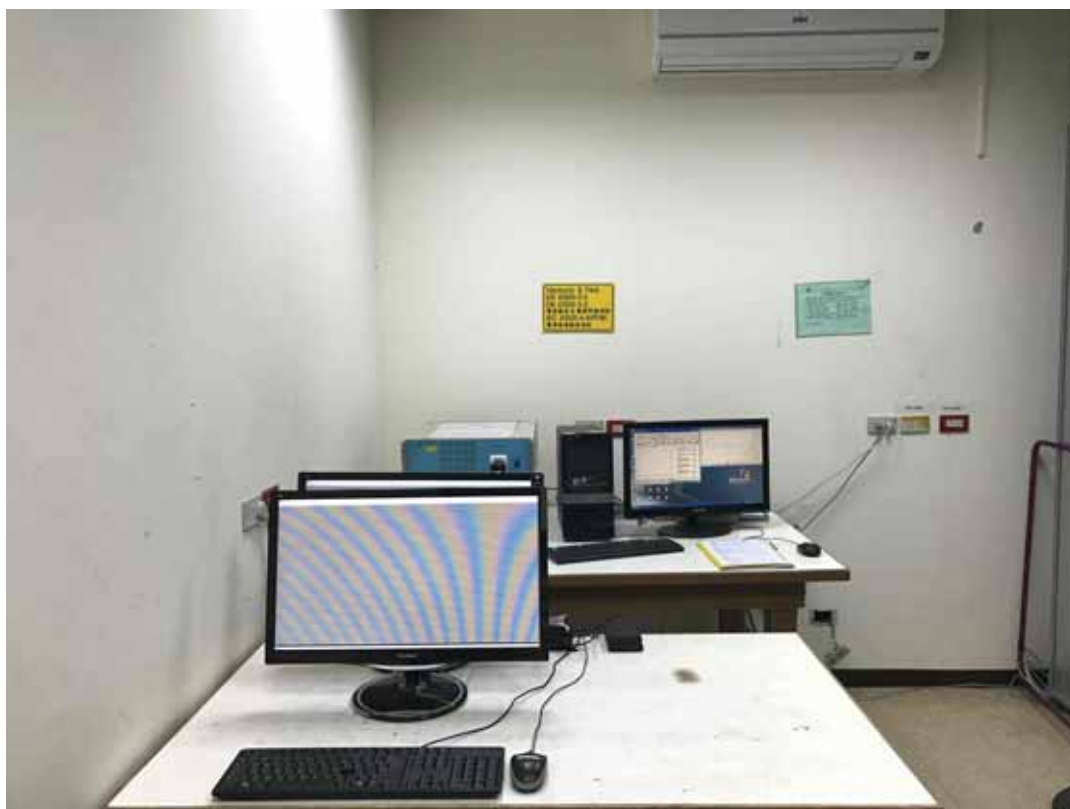
### CONDUCTED EMISSION TEST



## **RADIATED EMISSION TEST**



## Harmonic & Flicker Test

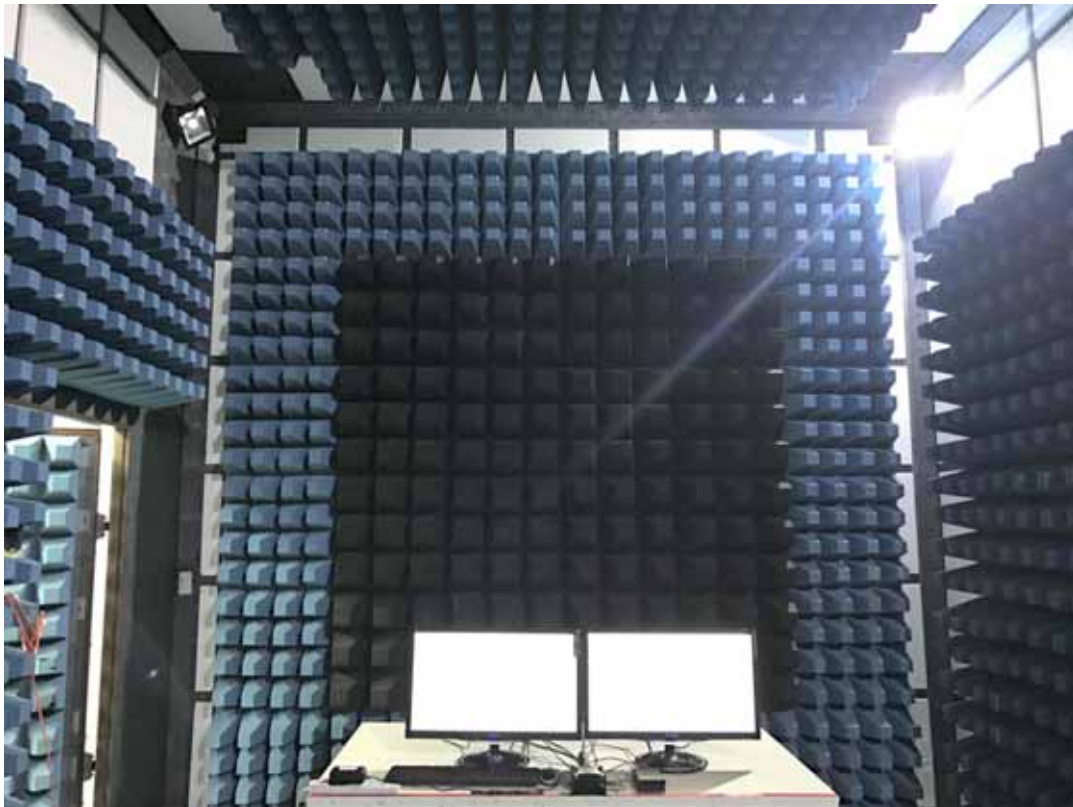


## ESD Test





## RS Test



## EFT Test



### EFT For I/O Test



### Surge Test



## CS Test



## CS For I/O Test





### **PFMF Test**



### **Voltage Dips / Interruptions Test**

