



# CE EMC Test Report

Issued date: Dec. 22, 2021

Project No.: 21Q100102

**Product :** Network Attached Storage

**Model :** A3V2

**Applicant :** Datto, Inc.

**Address :** 101 Merritt 7, 7th Floor, Norwalk, CT 06851

**Report No: WD-EE-R-210364-A0**

## According to

EN 55032: 2015 + A11: 2020, Class B

BS EN 55032: 2015 + A11: 2020

CISPR 32: 2015

AS/NZS CISPR 32: 2015

EN 61000-3-2: 2014

EN 61000-3-3: 2013

BS EN 61000-3-2: 2014

BS EN 61000-3-3: 2013

EN 55035: 2017 + A11: 2020

BS EN 55035: 2017 + A11: 2020

IEC 61000-4-2: 2008

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

IEC 61000-4-4: 2012

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

IEC 61000-4-6: 2013

IEC 61000-4-8: 2009

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

Authorized Signatory :  / Ken Huang



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### History of this test report

Report No.	Issue date	Description
WD-EE-R-210364-A0	Dec. 22, 2021	Initial Issue

**Declaration**

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us.



### History of supplementary report

Report No.	Issue date	Description
WD-EE-R-210364-A0	Dec. 22, 2021	Original report

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## 1 Certification

**Product:** Network Attached Storage  
**Brand Name:** datto  
**Model:** A3V2  
**Applicant:** Datto, Inc.  
**Tested:** Oct. 22 ~ Dec. 10, 2021  
**Standard:** **EN 55032: 2015 + A11: 2020, Class B**  
**BS EN 55032: 2015 + A11: 2020**  
**CISPR 32: 2015**  
**AS/NZS CISPR 32: 2015**  
**EN 61000-3-2: 2014**  
**EN 61000-3-3: 2013**  
**BS EN 61000-3-2: 2014**  
**BS EN 61000-3-3: 2013**  
**EN 55035: 2017 + A11: 2020**  
**BS EN 55035: 2017 + A11: 2020**  
IEC 61000-4-2: 2008  
IEC 61000-4-3: 2006 + A1: 2007 + A2: 2010  
IEC 61000-4-4: 2012  
IEC 61000-4-5: 2014 + A1: 2017  
IEC 61000-4-6: 2013  
IEC 61000-4-8: 2009  
IEC 61000-4-11: 2004 + A1: 2017

The above equipment (Model: A3V2) has been tested by **Wendell EMC & RF Laboratory**, and found compliance with the requirement of the above standards. The test record, data evaluation and Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Please note that the measurement uncertainty are provided for informational purpose only and are not used in determining the Pass/Fail results.

## 1.1 Summary of Test Result

The EUT has been tested according to the following specifications:

Emission				
Standard	Test Item	Limit	Result	Remark
EN 55032 CISPR 32	Conducted disturbance at mains terminals	Class B	Pass	Meets the requirements
	Conducted disturbance at telecommunication ports test	Class B	Pass	Meets the requirements
	Radiated disturbance	Class B	Pass	Meets the requirements
EN 61000-3-2	Harmonic current emissions	Class A	Pass	The power consumption of EUT is less than 75W and no limits apply
EN 61000-3-3	Voltage fluctuations and flicker	-	Pass	Meets the requirements

Immunity			
Standard	Test Item	Result	Remark
IEC 61000-4-2	Electrostatic discharges (ESD)	Pass	Meets the requirements of Performance Criterion A
IEC 61000-4-3	Continuous radiated disturbances (RS)	Pass	Meets the requirements of Performance Criterion A
IEC 61000-4-4	Electrical fast transients (EFT)	Pass	Meets the requirements of Performance Criterion A
IEC 61000-4-5	Surges	Pass	Meets the requirements of Performance Criterion A
IEC 61000-4-6	Continuous conducted disturbances (CS)	Pass	Meets the requirements of Performance Criterion A
IEC 61000-4-8	Power-frequency magnetic fields (PFMF)	Pass	Meets the requirements of Performance Criterion A
IEC 61000-4-11	Voltage dips and interruptions	Pass	Meets the requirements of Voltage Dips: ✧ >95% reduction – Performance Criterion A ✧ 30% reduction - Performance Criterion A Voltage Interruptions: ✧ >95% reduction – Performance Criterion C

**Note:** Test record contained in the referenced test report relate only to the EUT sample and test item.



## **2 Test Configuration of Equipment Under Test**

### **2.1 Test Facility**

**Conducted disturbance at mains terminals, Conducted disturbance at telecommunication ports, Harmonics, Flicker, ESD, EFT, Surge, CS, PFMF and DIP Tests**

W01: 5F-1, No.188, Baoqiao Rd., Xindian Dist., New Taipei City 23145, Taiwan (R.O.C)

#### **RS Test**

W05: 1F-7, No.188, Baoqiao Rd., Xindian Dist., New Taipei City 23145, Taiwan (R.O.C)

**Conducted disturbance at mains terminals, Conducted disturbance at telecommunication ports and Radiated emission (9\*6\*6 Chamber) Tests**

W08: No.119, Wugong 3rd Rd., Wugu Dist., New Taipei City 248, Taiwan (R.O.C)

#### **ACCREDITATIONS**

The laboratories are accredited and approved by the TAF according to ISO/IEC 17025.

## 2.2 Measurement Uncertainty

The measurement instrumentation uncertainty is evaluated according to CISPR 16-4-2.

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

Wendell EMC & RF Laboratory  $U_{lab}$  is less than  $U_{cispr}$ , therefore compliance or non-compliance with a disturbance limit shall be determined in the following manner.

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

Please note that the measurement uncertainty ( $U_{lab}$ ) is provided for informational purpose only and is not used in determining the Pass/Fail results.

### 2.2.1 Conducted Emission test

Test Site	Measurement Freq. Range	dB ( $U_{lab}$ )	Note
W01	150 kHz ~ 30 MHz	2.72	N/A
W08	150 kHz ~ 30 MHz	2.70	N/A

### 2.2.2 Conducted emission at telecom port test

Test Site	Measurement Freq. Range	dB ( $U_{lab}$ )	Note
W01	150 kHz ~ 30 MHz	2.72	N/A
W08	150 kHz ~ 30 MHz	2.64	N/A

### 2.2.3 Radiated Emission test

Test Site	Measurement Freq. Range	Ant	dB ( $U_{lab}$ )	Note
W08	30 MHz ~ 200 MHz	V	3.68	N/A
	30 MHz ~ 200 MHz	H	2.70	N/A
	200 MHz ~ 1000 MHz	V	5.19	N/A
	200 MHz ~ 1000 MHz	H	3.26	N/A
	1 GHz ~ 6 GHz	V	4.98	N/A
	1 GHz ~ 6 GHz	H	5.07	N/A

## 2.2.4 Harmonics Current Measurement

Test Site	Expanded Uncertainty	
W01	Voltage	0.17 %
	Current	0.39 %

## 2.2.5 Voltage Fluctuation and Flicker Measurement

Test Site	Expanded Uncertainty	
W01	P <sub>st</sub>	0.87 %

## 2.2.6 Immunity Test

Test Site	Item	Expanded Uncertainty		Note
W01	Electrostatic Discharge (ESD)	Voltage	1.8%	k=2
		Timing	6.0%	
		Current	2.5%	
	Electrical fast transients (EFT)	Voltage	6.2%	k=2
		Timing	5.1%	
	Surges	Voltage	5.7%	k=2
		Current	5.2%	
		Timing	5.5%	
	Continuous conducted disturbances (CS)	CDN	1.44dB	150kHz ~ 230MHz, k=2
		EM Clamp	4.09dB	
	Power-frequency magnetic fields (PFMF)	Magnetic Field Strength	1.0%	N/A
	Voltage dips and interruptions	Voltage	5.2%	k=2
		Timing	4.7%	
W05	Continuous radiated disturbances (RS)	80MHz – 1GHz	1.41dB	80MHz - 6GHz, k=2
		1GHz – 6GHz	1.44dB	

### 3 General Information

#### 3.1 Description of EUT

<b>Product</b>	Network Attached Storage
<b>Brand</b>	datto
<b>Model</b>	A3V2
<b>Applicant</b>	Datto, Inc.
<b>Received Date</b>	Oct. 01, 2021
<b>EUT Power Rating</b>	12Vdc (from adapter)
<b>Model Differences</b>	N/A
<b>Operating System</b>	N/A
<b>Data Cable Supplied</b>	N/A
<b>Accessory Device</b>	Adapter
<b>I/O Port</b>	Please refer to the User's Manual

**Note:**

- The EUT uses the follow adapter:

Adapter (optional)	
<b>Brand</b>	FSP
<b>Model</b>	FSP036-RHBN3
<b>Input Power</b>	100-240Vac, 1.8A, 50-60Hz
<b>Output Power</b>	12Vdc, 3.0A
<b>Power line</b>	Input: 1.8m non-shielded cable Output: 1.8m non-shielded cable with 1 core

Adapter (optional)	
<b>Brand</b>	EDAC
<b>Model</b>	EA1024P3
<b>Input Power</b>	100-240Vac, 1.0A, 50-60Hz
<b>Output Power</b>	12Vdc, 3.0A, 36.0W
<b>Power line</b>	Input: 1.8m non-shielded cable Output: 1.8m non-shielded cable with 1 core

2. The EUT contains following components.

Item	Brand	Model	Spec.	Qty.
Main board	QNAP	Q05X	V1.2	1
CPU	Intel	4305UE	2.00GHz	1
RAM	Kingston	CBD26D4S9S8ME-8	DDR4 8GB	1
HDD	SEAGATE	ST1000VN002	1TB	1
HD Backplane	QNAP	Q06A	V1.0	1
System Fan	Y.S.TECH	FD125015LB	-	1

3. The EUT's highest operating frequency is 2GHz. Therefore the radiated emission is tested up to 6GHz.

### 3.2 Description of Test Modes

Test results are presented in the report as below.

Test Mode	Test Condition
<b>Conducted emission test</b>	
A	Adapter mode - FSP036-RHBN3
B	Adapter mode - EA1024P3
<b>Conducted emission test at telecom port test</b>	
A	Adapter mode - FSP036-RHBN3, LAN (10Mbps/100Mbps/1Gbps)
B	Adapter mode - EA1024P3, LAN (10Mbps/100Mbps/1Gbps)
<b>Radiated emission 30MHz ~ 1GHz test</b>	
A	Adapter mode - FSP036-RHBN3
B	Adapter mode - EA1024P3
<b>Radiated emission above 1GHz test</b>	
A	Adapter mode - FSP036-RHBN3
B	Adapter mode - EA1024P3
<b>Harmonics, Flicker and Immunity test</b>	
A	Adapter mode - FSP036-RHBN3
B	Adapter mode - EA1024P3

### 3.3 EUT Operating Condition

- Placed the EUT on the test table.
- Prepare PC to act as a communication partner and placed it outside of testing area.
- The EUT was connected to the PC with LAN cable.
- The communication partner sent data to EUT by command "ping" via LAN.
- The EUT read/write data with internal HDD and external HDD.
- The EUT sent "Color Bar ITU-R.BT471-1" signal to monitor and displayed on screen.

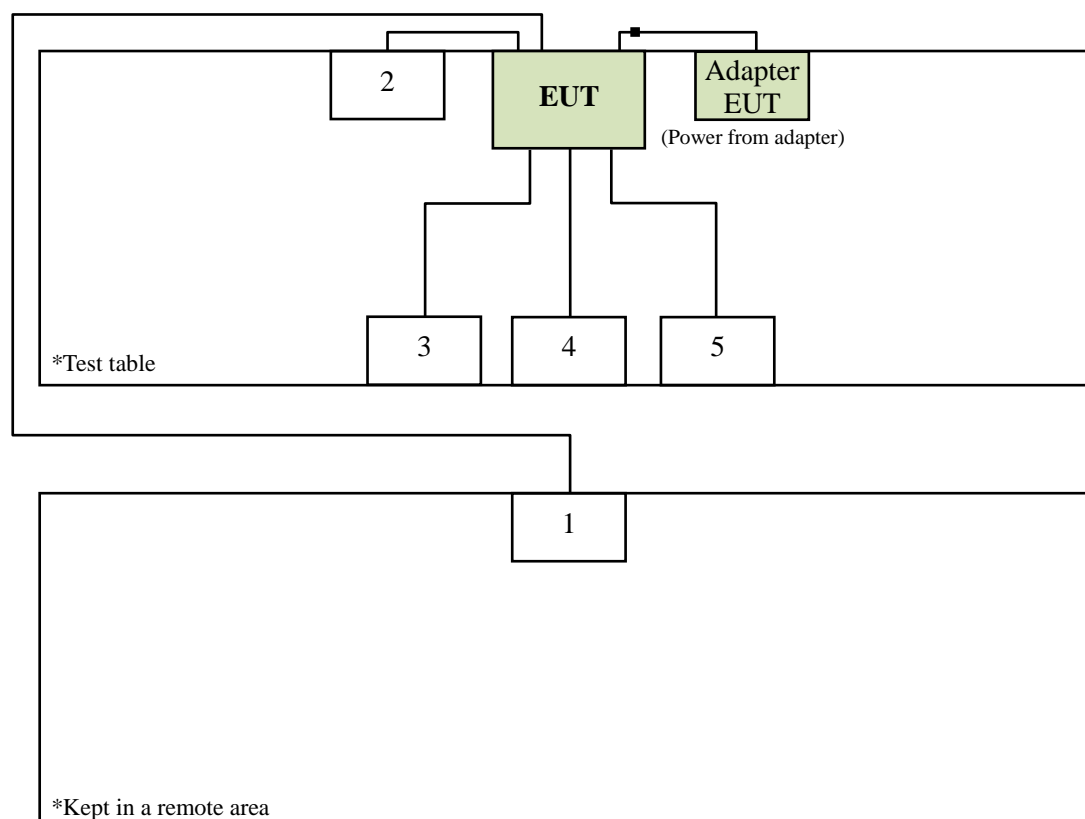
### 3.4 Description of Support Unit

The EUT has been conducted testing with other necessary accessories or support units.

Item	Equipment	Brand	Model No.	Serial No.	FCC ID	Data Cable	Power Cord	Remark
1	PC	DELL	D19M	N/A	PPD-QCN FA335	20m CAT.5E non-shielded RJ45 cable	1.8m non-shielded cable	-
2	4K Monitor	PHILIPS	276E8V	UKC19260 00441	FCC DoC Approved	1.5m shielded HDMI cable	AC: 1.8m non-shielded cable DC: 1.4m non-shielded cable with 1 core	-
3	Keyboard	DELL	KB4021	N/A	FCC DoC Approved	1.5m non-shielded cable	N/A	-
4	Mouse	DELL	MS111-L	N/A	FCC DoC Approved	1.5m non-shielded cable	N/A	-
5	External Hard Drive	Transcend	TS1TSJ25C3N	D62397-03 99	FCC DoC Approved	1m shielded cable	N/A	-

**Note:** 1. The core(s) is(are) originally attached to the cable(s).  
2. Item 1 acted as communication partners to transfer data.

### 3.5 Configuration of System Under Test



## 4 Emission Test

### 4.1 Conducted Emission Measurement

#### 4.1.1 Limit of Conducted Emission Measurement

Class A equipment:

Requirements for conducted emissions from the AC mains power ports of Class A equipment			
Frequency (MHz)	Measurement		Class A limits dB(μV)
	Coupling device	Detector type/ bandwidth	
0.15 to 0.5	AMN	Quasi Peak / 9 kHz	79
0.5 to 30			73
0.15 to 0.5	AMN	Average / 9 kHz	66
0.5 to 30			60

Class B equipment:

Requirements for conducted emissions from the AC mains power ports of Class B equipment			
Frequency (MHz)	Measurement		Class B limits dB(μV)
	Coupling device	Detector type/ bandwidth	
0.15 to 0.5	AMN	Quasi Peak / 9 kHz	66 to 56*
0.5 to 5			56
5 to 30			60
0.15 to 0.5	AMN	Average / 9 kHz	56 to 46*
0.5 to 5			46
5 to 30			50

\* Decreases with the logarithm of the frequency.

- Note:**
1. The lower limit shall apply at the transition frequencies.
  2. Detector function in the form: PK = Peak, QP = Quasi Peak, AV = Average
  3. The test result calculated as following:  
 Measurement Value = Reading Level + Correct Factor  
 Correction Factor = Insertion loss of LISN + Cable loss + Transient Limiter (If use)  
 Margin Level = Measurement Value – Limit Value



#### 4.1.2 Test Instrument

Test Site: W01-CE					
Item	Equipment	Manufacturer	Model	Meter No.	Calibration Date
1	TWO-LINE V-NETWORK	R&S	ENV216	CT-1-025-1	May 30, 2021
2	Pulse limiter	R&S®	ESH3-Z2	CT-2-015	May 27, 2021
3	EMI Test Receiver	R&S	ESCI	CT-1-024	May 24, 2021
4	V-LISN	SCHWARZBECK	NSLK8127	CT-1-104-1	May 30, 2021
5	Test Cable	Marvelous Microwave Inc	200200.400LL .500A	CT-10-048-1	May 27, 2021
6	50ohm Termination	N/A	N/A	CT-1-065-1	May 31, 2021
7	Measurement Software	EZ-EMC	Ver: EMC-CON 3A1	CT-3-012	No calibration request

**Note:** 1. The calibration interval of the above test instruments is 12 months.

Test Site: W08-CE					
Item	Equipment	Manufacturer	Model	Meter No.	Calibration Date
1	TWO-LINE V-NETWORK LISN	R&S®	ENV216	CT-1-025-2	Jun. 11, 2021
2	Test Cable	EMCI	EMCCFD300-BM-BM-5000	CT-1-107-2	Jun. 10, 2021
3	EMI Test Receiver	R&S	ESR3	CT-1-103	Jun. 08, 2021
4	LISN	SCHWARZBECK	NSLK 8127RC	CT-1-104-1RC	Jun. 11, 2021
5	Transient Limiter	EM Electronics Corporation	EM-7600	CT-1-026	Jun. 10, 2021
6	50ohm Termination	HUBER+SUHNER	N/A	CT-1-109-1	Jun. 11, 2021
7	Measurement Software	EZ-EMC	Ver: EMC-CON 3A1	CT-3-012	No calibration request

**Note:** 1. The calibration interval of the above test instruments is 12 months.

### 4.1.3 Test Procedure

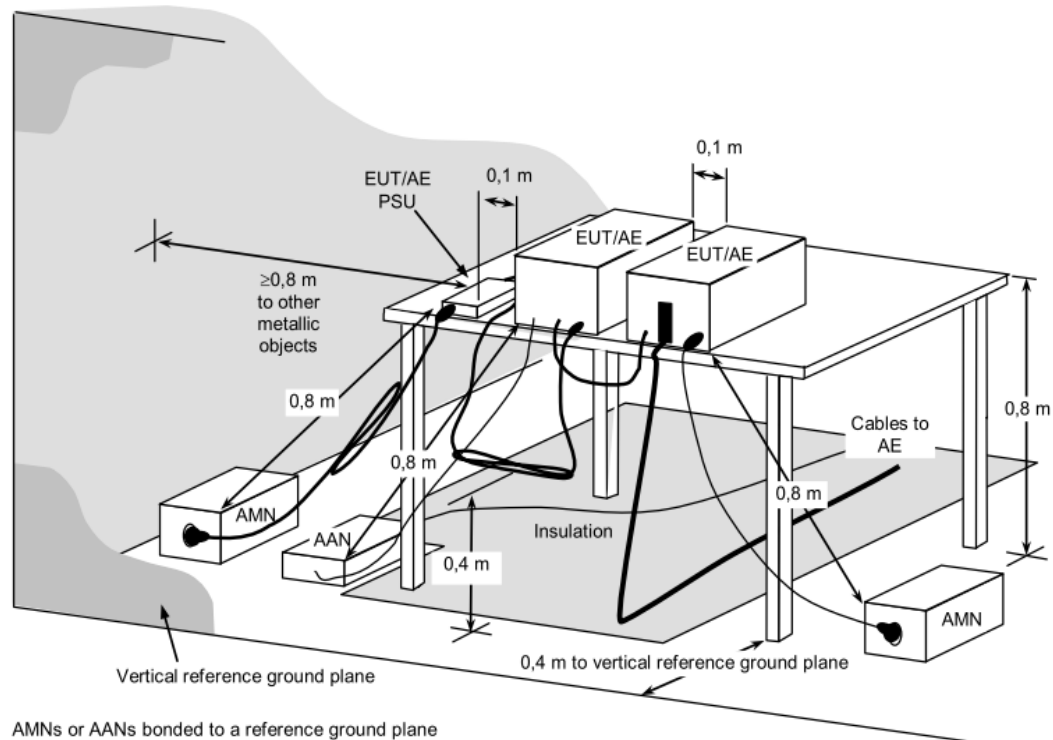
- a. The table-top EUT was placed 0.8 meter height wooden table from the horizontal ground plane with EUT being connected to power source through a line impedance stabilization network (LISN). The floor-standing EUT was placed insulation support unit from the horizontal ground plane. The LISN at least be 80 cm from nearest chassis of EUT.
- b. The line impedance stabilization network (LISN) provides 50 ohm/50uH of coupling impedance for the measuring instrument. All other support equipments powered from additional LISN(s).
- c. Interrelating cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle. All I/O cables were positioned to simulate typical usage.
- d. All I/O cables that are not connected to a peripheral shall be bundle in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- e. The EMI test receiver connected to LISN powering the EUT. The actual test configuration, please refer to EUT test photos.
- f. The receiver scanned from 150kHz to 30MHz for emissions in each of test modes. A scan was taken on both power lines, Line and Neutral, recording at least six highest emissions.
- g. The EUT and cable configuration of the above highest emission levels were recorded. The test data of the worst case was recorded.

### 4.1.4 Deviation from Test Standard

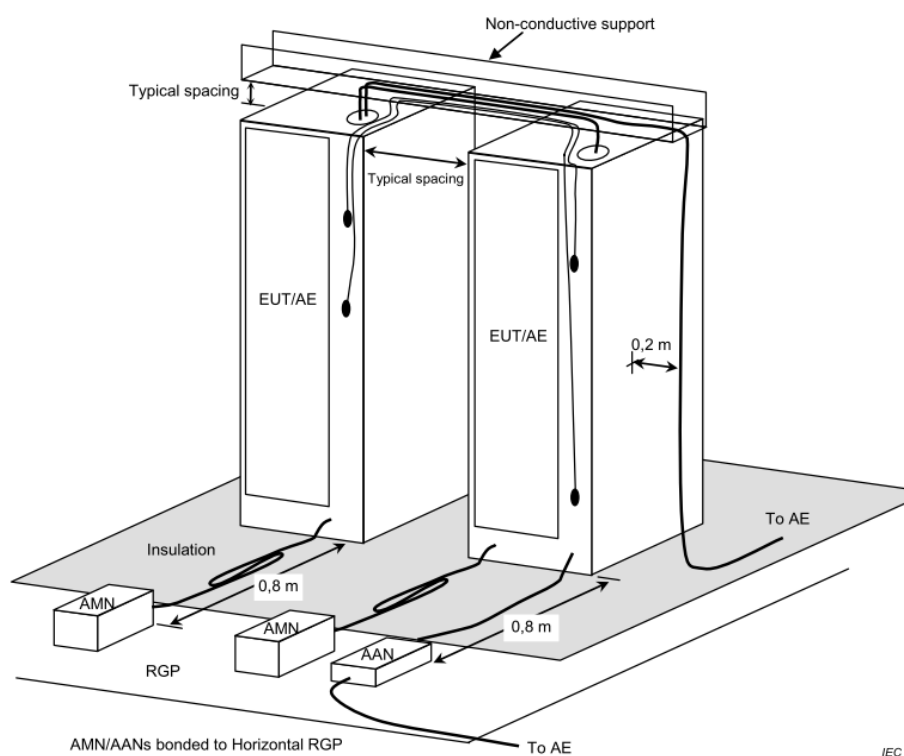
No deviation

### 4.1.5 Test Setup

### < Table-Top equipment >



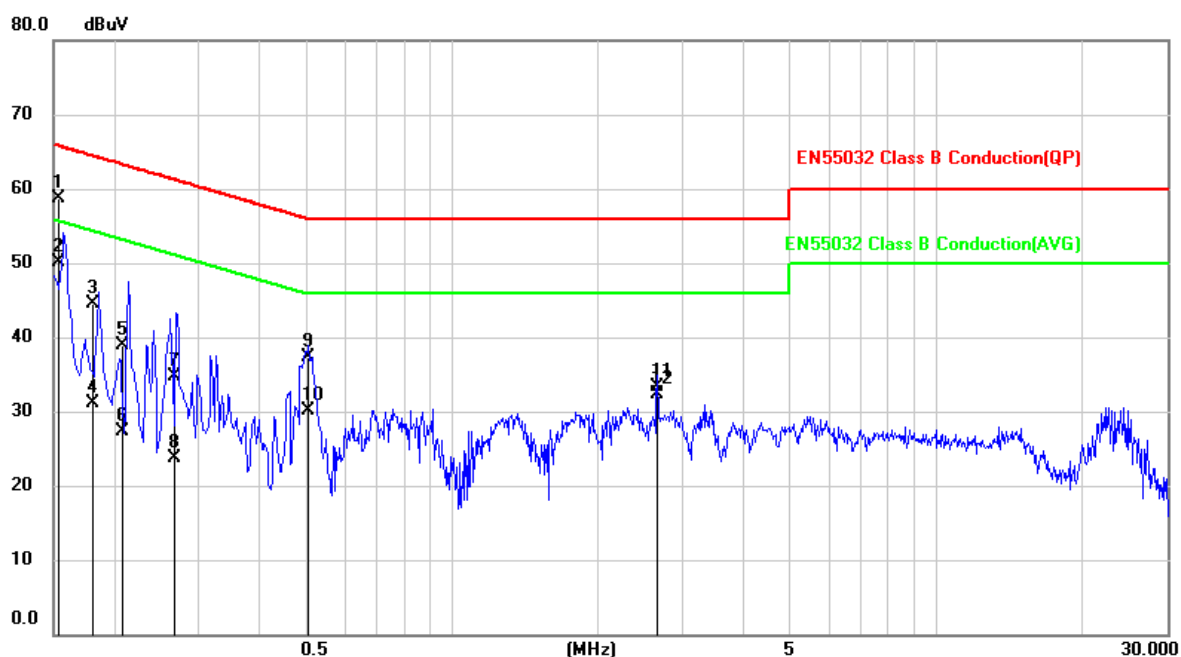
**< Floor-Standing equipment >**



**Note:** Please refer to 4.1.7 for the actual test configuration.

#### 4.1.6 Test Result

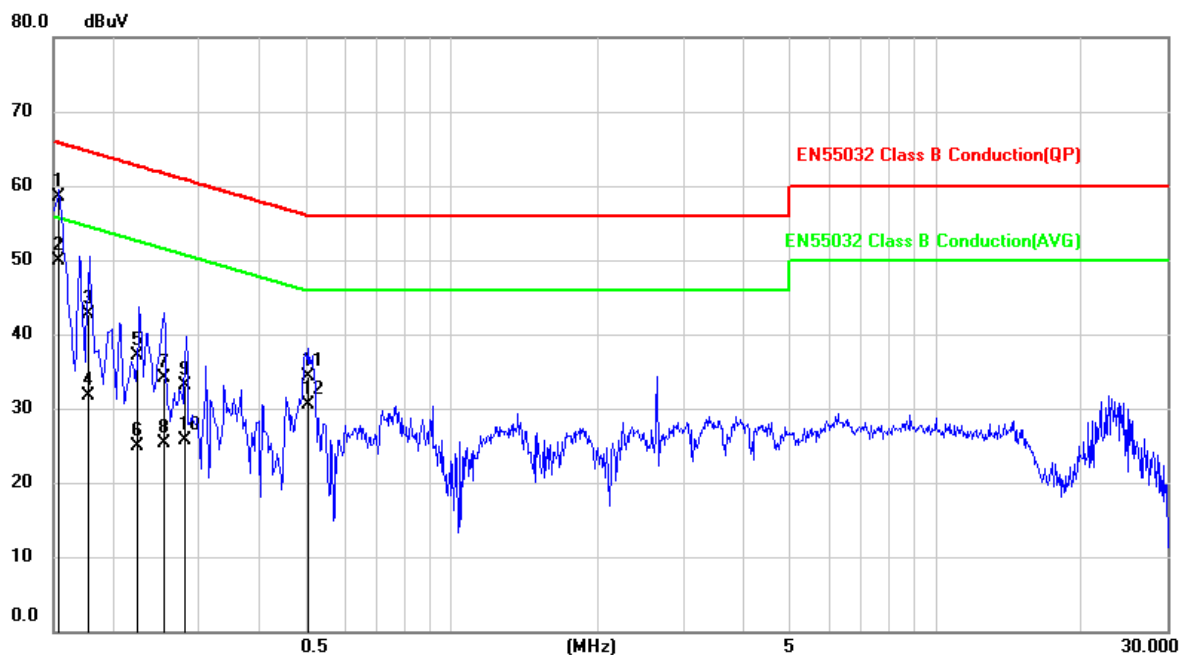
Test Voltage	230Vac, 50Hz	Frequency Range	0.15-30 MHz
Environmental Conditions	24.6°C, 50% RH	6dB Bandwidth	9 kHz
Test Date	2021/10/22	Phase	L
Tested by	Eric Hsieh	Test Site	W01
Test Mode	A		



No.	Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measurement (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.1537	48.81	9.97	58.78	65.80	-7.02	QP
2	0.1537	40.10	9.97	50.07	55.80	-5.73	AVG
3	0.1815	34.64	9.96	44.60	64.42	-19.82	QP
4	0.1815	21.06	9.96	31.02	54.42	-23.40	AVG
5	0.2095	29.04	9.96	39.00	63.23	-24.23	QP
6	0.2095	17.31	9.96	27.27	53.23	-25.96	AVG
7	0.2671	24.66	9.96	34.62	61.21	-26.59	QP
8	0.2671	13.82	9.96	23.78	51.21	-27.43	AVG
9	0.5039	27.38	9.98	37.36	56.00	-18.64	QP
10	0.5039	20.04	9.98	30.02	46.00	-15.98	AVG
11	2.6500	23.30	10.07	33.37	56.00	-22.63	QP
12	2.6500	22.16	10.07	32.23	46.00	-13.77	AVG

**Remark:** 1. QP = Quasi Peak, AVG = Average  
2. Correction Factor = Insertion loss of LISN + Cable loss + Transient Limiter (If use)  
3. Measurement Value = Reading Level + Correct Factor  
4. Margin Level = Measurement Value - Limit Value

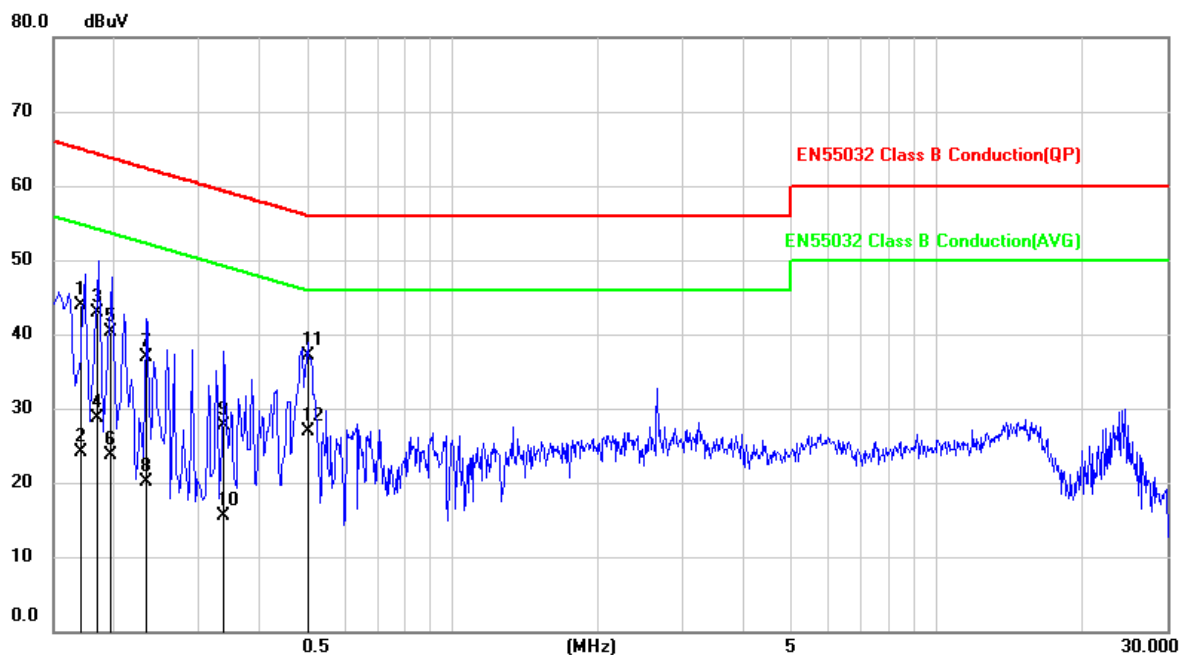
Test Voltage	230Vac, 50Hz	Frequency Range	0.15-30 MHz
Environmental Conditions	24.6°C, 50% RH	6dB Bandwidth	9 kHz
Test Date	2021/10/22	Phase	N
Tested by	Eric Hsieh	Test Site	W01
Test Mode	A		



No.	Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measurement (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.1532	48.59	9.98	58.57	65.82	-7.25	QP
2	0.1532	39.88	9.98	49.86	55.82	-5.96	AVG
3	0.1764	32.64	9.98	42.62	64.65	-22.03	QP
4	0.1764	21.65	9.98	31.63	54.65	-23.02	AVG
5	0.2229	27.19	9.98	37.17	62.71	-25.54	QP
6	0.2229	14.99	9.98	24.97	52.71	-27.74	AVG
7	0.2540	24.04	9.98	34.02	61.63	-27.61	QP
8	0.2540	15.41	9.98	25.39	51.63	-26.24	AVG
9	0.2795	23.17	9.98	33.15	60.83	-27.68	QP
10	0.2795	15.71	9.98	25.69	50.83	-25.14	AVG
11	0.5048	24.25	9.99	34.24	56.00	-21.76	QP
12	0.5048	20.58	9.99	30.57	46.00	-15.43	AVG

**Remark:** 1. QP = Quasi Peak, AVG = Average  
2. Correction Factor = Insertion loss of LISN + Cable loss + Transient Limiter (If use)  
3. Measurement Value = Reading Level + Correct Factor  
4. Margin Level = Measurement Value - Limit Value

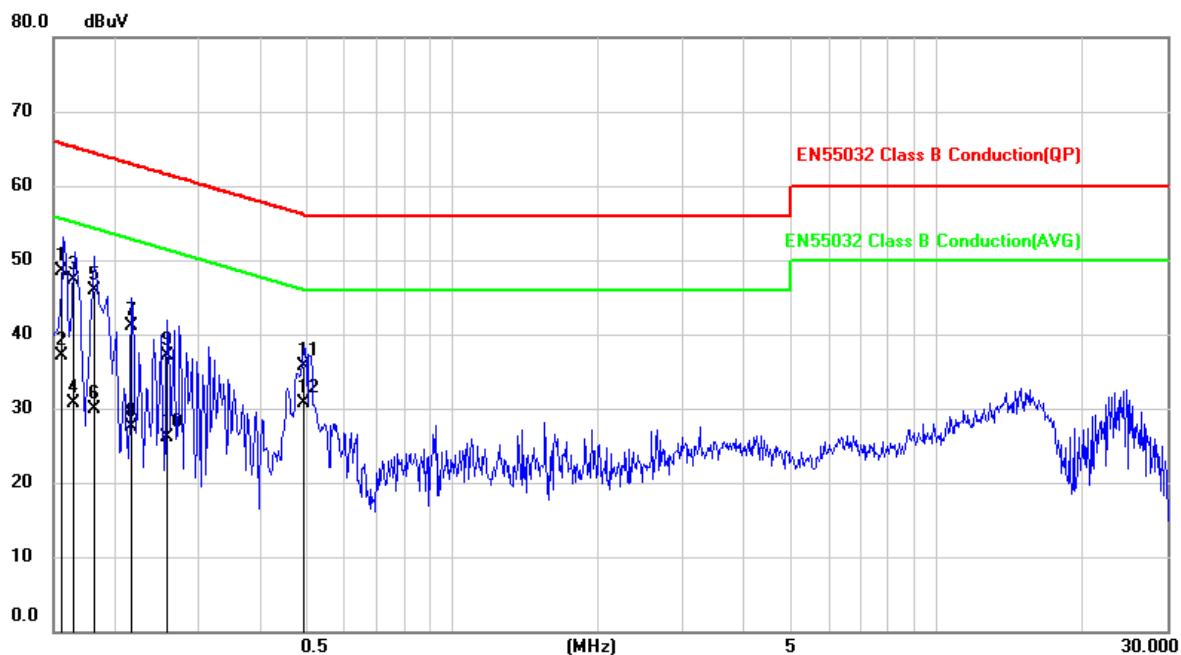
Test Voltage	110Vac, 60Hz	Frequency Range	0.15-30 MHz
Environmental Conditions	24.6°C, 50% RH	6dB Bandwidth	9 kHz
Test Date	2021/10/22	Phase	L
Tested by	Eric Hsieh	Test Site	W01
Test Mode	A		



No.	Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measurement (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.1703	34.01	9.97	43.98	64.95	-20.97	QP
2	0.1703	14.09	9.97	24.06	54.95	-30.89	AVG
3	0.1843	32.94	9.96	42.90	64.29	-21.39	QP
4	0.1843	18.74	9.96	28.70	54.29	-25.59	AVG
5	0.1964	30.40	9.96	40.36	63.76	-23.40	QP
6	0.1964	13.72	9.96	23.68	53.76	-30.08	AVG
7	0.2323	26.92	9.96	36.88	62.37	-25.49	QP
8	0.2323	10.19	9.96	20.15	52.37	-32.22	AVG
9	0.3384	17.64	9.97	27.61	59.24	-31.63	QP
10	0.3384	5.46	9.97	15.43	49.24	-33.81	AVG
11	0.5025	27.11	9.98	37.09	56.00	-18.91	QP
12	0.5025	17.00	9.98	26.98	46.00	-19.02	AVG

**Remark:** 1. QP = Quasi Peak, AVG = Average  
2. Correction Factor = Insertion loss of LISN + Cable loss + Transient Limiter (If use)  
3. Measurement Value = Reading Level + Correct Factor  
4. Margin Level = Measurement Value - Limit Value

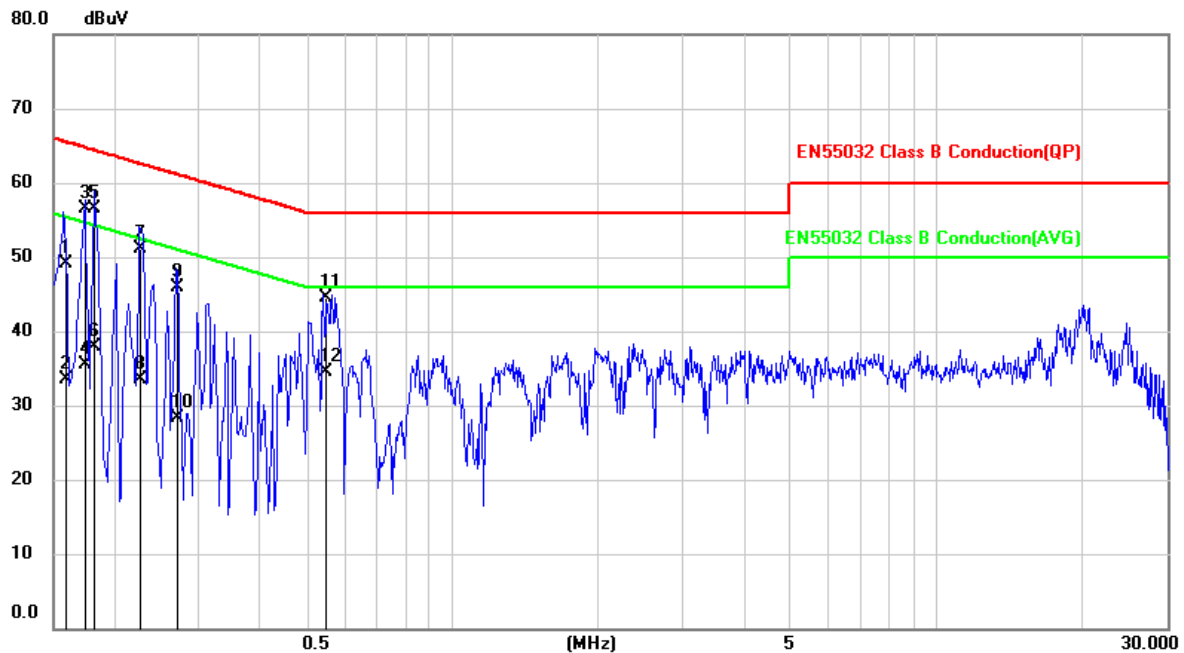
Test Voltage	110Vac, 60Hz	Frequency Range	0.15-30 MHz
Environmental Conditions	24.6°C, 50% RH	6dB Bandwidth	9 kHz
Test Date	2021/10/22	Phase	N
Tested by	Eric Hsieh	Test Site	W01
Test Mode	A		



No.	Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measurement (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.1555	38.48	9.98	48.46	65.70	-17.24	QP
2	0.1555	27.07	9.98	37.05	55.70	-18.65	AVG
3	0.1643	37.23	9.98	47.21	65.24	-18.03	QP
4	0.1643	20.69	9.98	30.67	55.24	-24.57	AVG
5	0.1819	35.86	9.98	45.84	64.40	-18.56	QP
6	0.1819	20.01	9.98	29.99	54.40	-24.41	AVG
7	0.2171	31.11	9.98	41.09	62.93	-21.84	QP
8	0.2171	17.48	9.98	27.46	52.93	-25.47	AVG
9	0.2565	27.08	9.98	37.06	61.54	-24.48	QP
10	0.2565	16.17	9.98	26.15	51.54	-25.39	AVG
11	0.4958	25.63	9.99	35.62	56.07	-20.45	QP
12	0.4958	20.78	9.99	30.77	46.07	-15.30	AVG

**Remark:** 1. QP = Quasi Peak, AVG = Average  
2. Correction Factor = Insertion loss of LISN + Cable loss + Transient Limiter (If use)  
3. Measurement Value = Reading Level + Correct Factor  
4. Margin Level = Measurement Value - Limit Value

Test Voltage	230Vac, 50Hz	Frequency Range	0.15-30 MHz
Environmental Conditions	24.6°C, 50% RH	6dB Bandwidth	9 kHz
Test Date	2021/10/22	Phase	L
Tested by	Eric Hsieh	Test Site	W01
Test Mode	B		

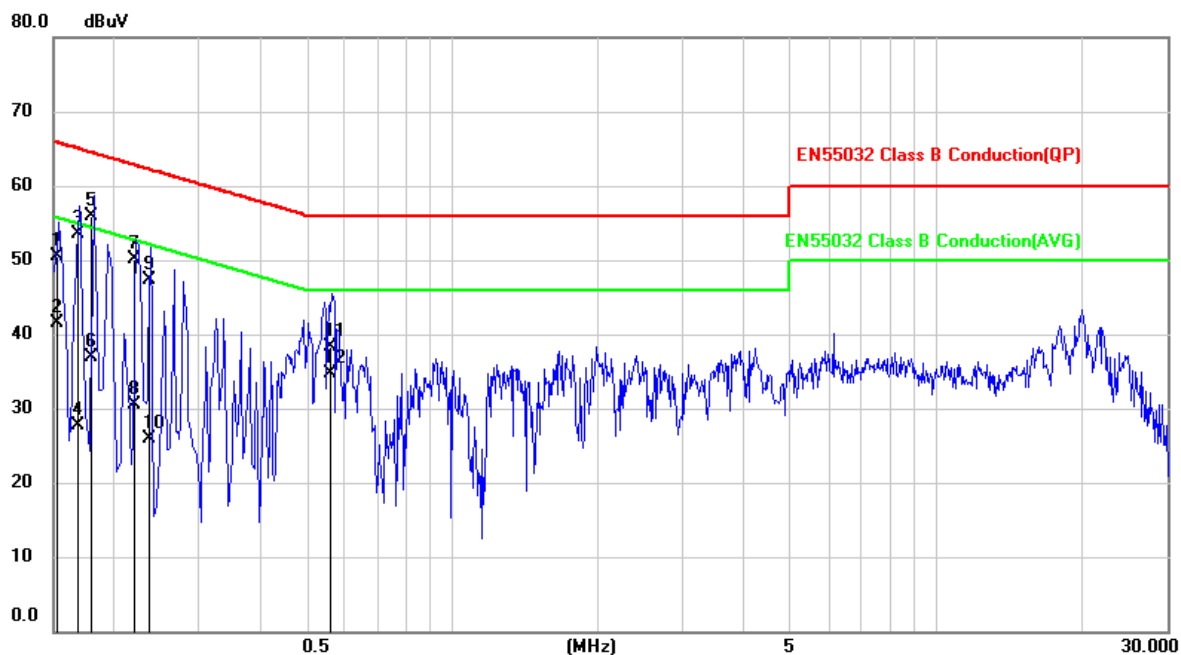


No.	Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measurement (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.1593	39.12	9.97	49.09	65.50	-16.41	QP
2	0.1593	23.59	9.97	33.56	55.50	-21.94	AVG
3	0.1743	46.44	9.97	56.41	64.75	-8.34	QP
4	0.1743	25.51	9.97	35.48	54.75	-19.27	AVG
5	0.1816	46.62	9.96	56.58	64.41	-7.83	QP
6	0.1816	27.86	9.96	37.82	54.41	-16.59	AVG
7	0.2278	41.07	9.96	51.03	62.53	-11.50	QP
8	0.2278	23.59	9.96	33.55	52.53	-18.98	AVG
9	0.2708	35.88	9.96	45.84	61.09	-15.25	QP
10	0.2708	18.26	9.96	28.22	51.09	-22.87	AVG
11	0.5503	34.62	9.98	44.60	56.00	-11.40	QP
12	0.5503	24.53	9.98	34.51	46.00	-11.49	AVG

**Remark:** 1. QP = Quasi Peak, AVG = Average  
2. Correction Factor = Insertion loss of LISN + Cable loss + Transient Limiter (If use)  
3. Measurement Value = Reading Level + Correct Factor  
4. Margin Level = Measurement Value - Limit Value



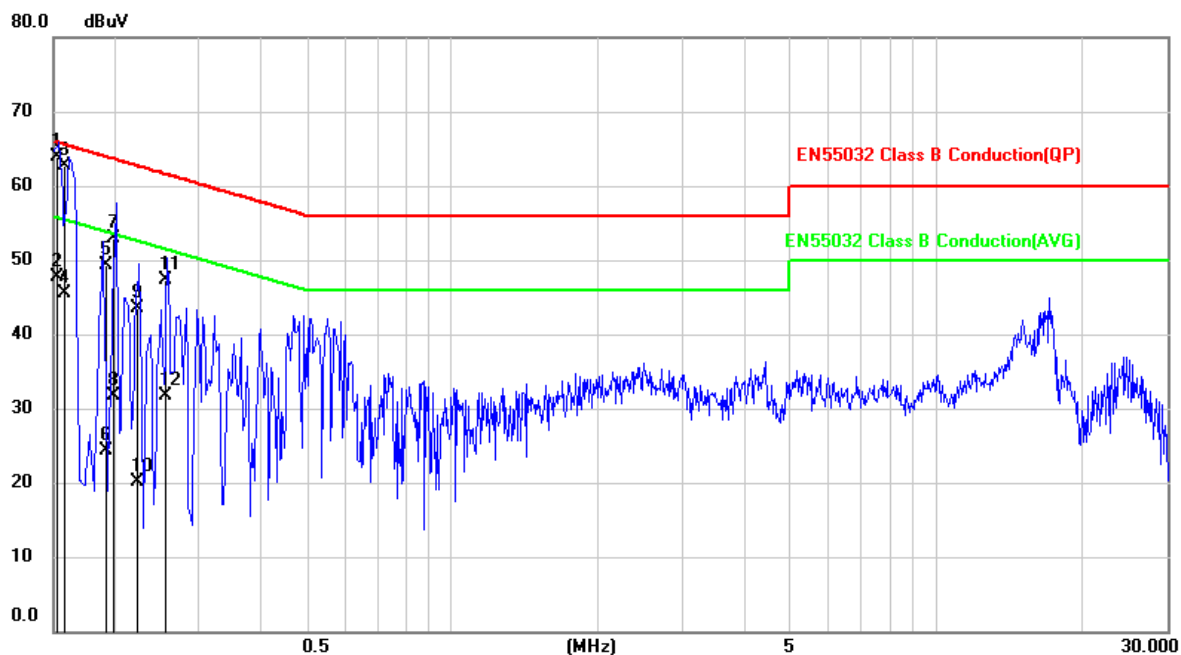
Test Voltage	230Vac, 50Hz	Frequency Range	0.15-30 MHz
Environmental Conditions	24.6°C, 50% RH	6dB Bandwidth	9 kHz
Test Date	2021/10/22	Phase	N
Tested by	Eric Hsieh	Test Site	W01
Test Mode	B		



No.	Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measurement (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.1521	40.56	9.98	50.54	65.88	-15.34	QP
2	0.1521	31.44	9.98	41.42	55.88	-14.46	AVG
3	0.1680	43.48	9.98	53.46	65.06	-11.60	QP
4	0.1680	17.69	9.98	27.67	55.06	-27.39	AVG
5	0.1788	46.02	9.98	56.00	64.54	-8.54	QP
6	0.1788	26.91	9.98	36.89	54.54	-17.65	AVG
7	0.2192	40.04	9.98	50.02	62.85	-12.83	QP
8	0.2192	20.53	9.98	30.51	52.85	-22.34	AVG
9	0.2362	37.25	9.98	47.23	62.23	-15.00	QP
10	0.2362	15.99	9.98	25.97	52.23	-26.26	AVG
11	0.5596	28.25	10.00	38.25	56.00	-17.75	QP
12	0.5596	24.77	10.00	34.77	46.00	-11.23	AVG

**Remark:** 1. QP = Quasi Peak, AVG = Average  
2. Correction Factor = Insertion loss of LISN + Cable loss + Transient Limiter (If use)  
3. Measurement Value = Reading Level + Correct Factor  
4. Margin Level = Measurement Value - Limit Value

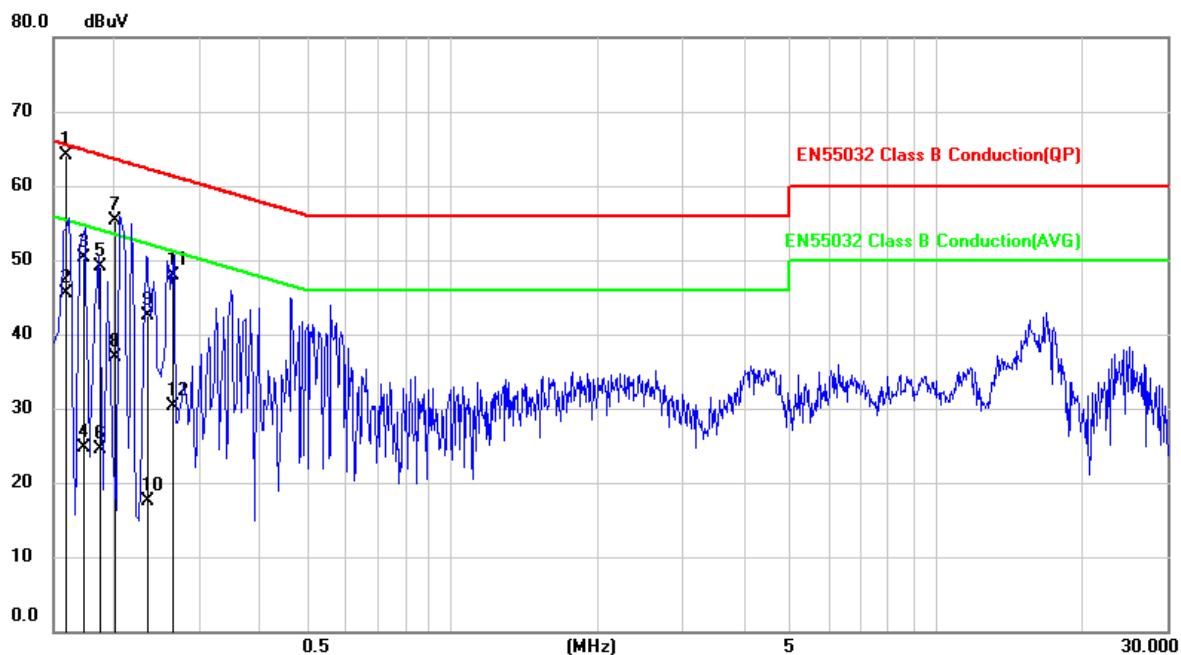
Test Voltage	110Vac, 60Hz	Frequency Range	0.15-30 MHz
Environmental Conditions	24.6°C, 50% RH	6dB Bandwidth	9 kHz
Test Date	2021/10/22	Phase	L
Tested by	Eric Hsieh	Test Site	W01
Test Mode	B		



No.	Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measurement (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.1522	53.91	9.97	63.88	65.88	-2.00	QP
2	0.1522	37.64	9.97	47.61	55.88	-8.27	AVG
3	0.1582	52.71	9.97	62.68	65.56	-2.88	QP
4	0.1582	35.56	9.97	45.53	55.56	-10.03	AVG
5	0.1923	39.43	9.96	49.39	63.94	-14.55	QP
6	0.1923	14.28	9.96	24.24	53.94	-29.70	AVG
7	0.1986	42.90	9.96	52.86	63.67	-10.81	QP
8	0.1986	21.80	9.96	31.76	53.67	-21.91	AVG
9	0.2229	33.47	9.96	43.43	62.71	-19.28	QP
10	0.2229	10.09	9.96	20.05	52.71	-32.66	AVG
11	0.2559	37.28	9.96	47.24	61.56	-14.32	QP
12	0.2559	21.77	9.96	31.73	51.56	-19.83	AVG

**Remark:** 1. QP = Quasi Peak, AVG = Average  
2. Correction Factor = Insertion loss of LISN + Cable loss + Transient Limiter (If use)  
3. Measurement Value = Reading Level + Correct Factor  
4. Margin Level = Measurement Value - Limit Value

Test Voltage	110Vac, 60Hz	Frequency Range	0.15-30 MHz
Environmental Conditions	24.6°C, 50% RH	6dB Bandwidth	9 kHz
Test Date	2021/10/22	Phase	N
Tested by	Eric Hsieh	Test Site	W01
Test Mode	B		

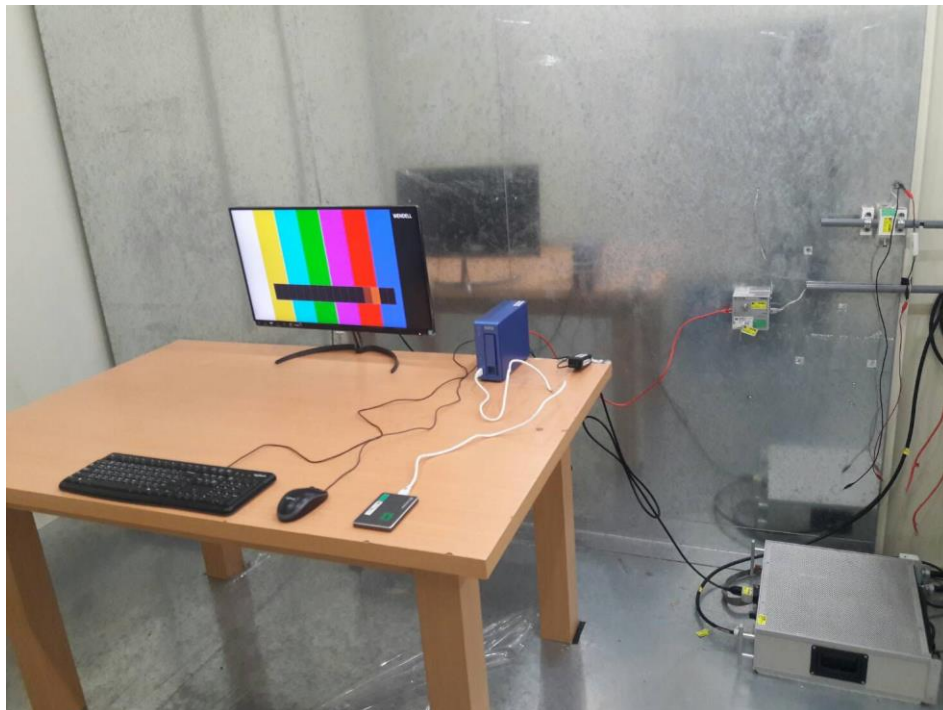


No.	Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measurement (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.1589	54.18	9.98	64.16	65.52	-1.36	QP
2	0.1589	35.53	9.98	45.51	55.52	-10.01	AVG
3	0.1725	40.23	9.98	50.21	64.84	-14.63	QP
4	0.1725	14.64	9.98	24.62	54.84	-30.22	AVG
5	0.1880	39.05	9.98	49.03	64.12	-15.09	QP
6	0.1880	14.51	9.98	24.49	54.12	-29.63	AVG
7	0.2016	45.32	9.98	55.30	63.54	-8.24	QP
8	0.2016	27.01	9.98	36.99	53.54	-16.55	AVG
9	0.2344	32.61	9.98	42.59	62.29	-19.70	QP
10	0.2344	7.48	9.98	17.46	52.29	-34.83	AVG
11	0.2640	37.88	9.98	47.86	61.30	-13.44	QP
12	0.2640	20.35	9.98	30.33	51.30	-20.97	AVG

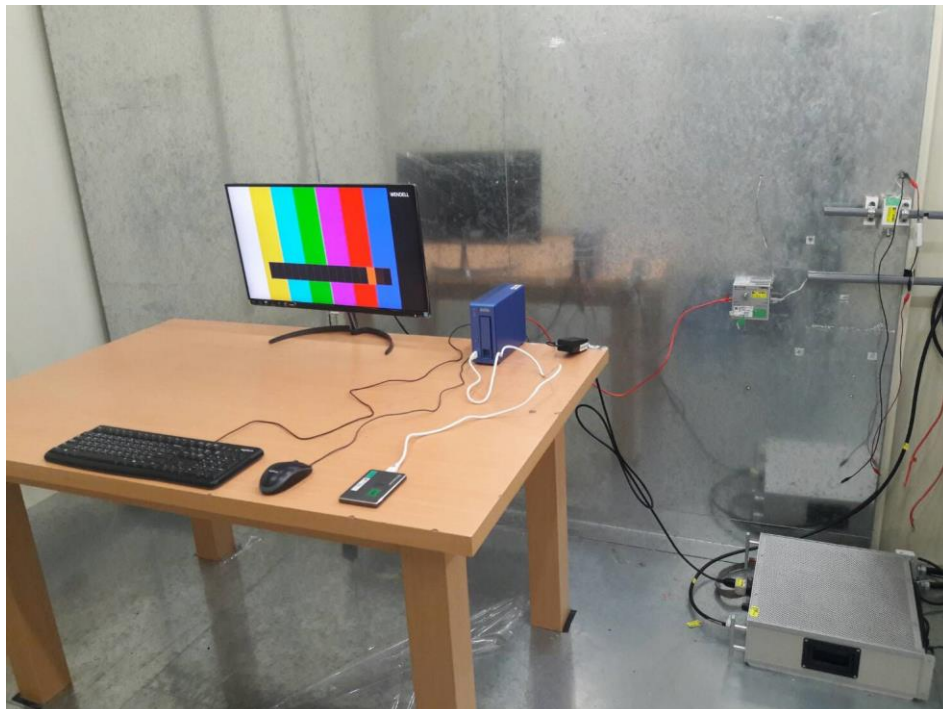
**Remark:** 1. QP = Quasi Peak, AVG = Average  
2. Correction Factor = Insertion loss of LISN + Cable loss + Transient Limiter (If use)  
3. Measurement Value = Reading Level + Correct Factor  
4. Margin Level = Measurement Value - Limit Value

#### 4.1.7 Photographs of Test Configuration

Test mode A



Test mode B



## 4.2 Conducted Emission at Telecommunication Ports Test

### 4.2.1 Limit of Conducted Emission at Telecommunication Ports Test

Class A equipment:

Requirements for asymmetric mode conducted emissions from Class A equipment			
Frequency (MHz)	Measurement		Class A limits dB(μV)
	Coupling device	Detector type/ bandwidth	
0.15 to 0.5	AAN	Quasi Peak / 9 kHz	97 to 87*
0.5 to 30			87
0.15 to 0.5	AAN	Average / 9 kHz	84 to 74*
0.5 to 30			74

\* Decreases with the logarithm of the frequency.

Class B equipment:

Requirements for asymmetric mode conducted emissions from Class B equipment			
Frequency (MHz)	Measurement		Class B limits dB(μV)
	Coupling device	Detector type/ bandwidth	
0.15 to 0.5	AAN	Quasi Peak / 9 kHz	84 to 74*
0.5 to 30			74
0.15 to 0.5	AAN	Average / 9 kHz	74 to 64*
0.5 to 30			64

\* Decreases with the logarithm of the frequency.

- Note:**
1. The lower limit shall apply at the transition frequencies.
  2. Detector function in the form: PK = Peak, QP = Quasi Peak, AV = Average
  3. The test result calculated as following:  
 Measurement Value = Reading Level + Correct Factor  
 Correction Factor = Insertion loss of ISN + Cable loss  
 Margin Level = Measurement Value – Limit Value



## 4.2.2 Test Instrument

Test Site: W01-CE					
Item	Equipment	Manufacturer	Model	Meter No.	Calibration Date
1	TWO-LINE V-NETWORK	R&S	ENV216	CT-1-025-1	May 30, 2021
2	EMI Test Receiver	R&S	ESCI	CT-1-024	May 24, 2021
3	Impedance Stabilization Network	TESEQ	T8-CAT6	CT-1-105	May 31, 2021
4	V-LISN	SCHWARZBECK	NSLK8127	CT-1-104-1	May 30, 2021
5	Test Cable	Marvelous Microwave Inc	200200.400LL. 500A	CT-10-048-1	May 27, 2021
6	50ohm Termination	N/A	N/A	CT-1-065-2	May 31, 2021
7	Measurement Software	EZ-EMC	Ver: EMC-CON 3A1	CT-3-012	No calibration request

**Note:** 1. The calibration interval of the above test instruments is 12 months.

Test Site: W08-CE					
Item	Equipment	Manufacturer	Model	Meter No.	Calibration Date
1	TWO-LINE V-NETWORK LISN	R&S®	ENV216	CT-1-025-2	Jun. 11, 2021
2	Test Cable	EMCI	EMCCFD300-BM-BM-5000	CT-1-107-2	Jun. 10, 2021
3	EMI Test Receiver	R&S	ESR3	CT-1-103	Jun. 08, 2021
4	LISN	SCHWARZBECK	NSLK 8127RC	CT-1-104-1RC	Jun. 11, 2021
5	ISN	FCC	F-071115-1057 -1-09	CT-1-027	Jun. 15, 2021
6	50ohm Termination	HUBER+SUHNER	N/A	CT-1-109-2	Jun. 11, 2021
7	Measurement Software	EZ-EMC	Ver: EMC-CON 3A1	CT-3-012	No calibration request

**Note:** 1. The calibration interval of the above test instruments is 12 months.

### 4.2.3 Test Procedure

- a. The table-top EUT was placed 0.8 meter height wooden table from the horizontal ground plane with EUT being connected to power source through a line impedance stabilization network (LISN). The floor-standing EUT was placed insulation support unit from the horizontal ground plane. The LISN at least be 80 cm from nearest chassis of EUT.
- b. The line impedance stabilization network (LISN) provides 50 ohm/50uH of coupling impedance for the measuring instrument. All other support equipments powered from additional LISN(s).
- c. Interrelating cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle. All I/O cables were positioned to simulate typical usage.
- d. All I/O cables that are not connected to a peripheral shall be bundle in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- e. ISN at least 80 cm from nearest chassis of EUT. The communication function of EUT was executed in normal condition. ISN was connected between EUT and associated equipment and ISN was connected directly to reference ground plane. The actual test configuration, please refer to EUT test photos.
- f. The receiver scanned from 150kHz to 30MHz for emissions in each of test modes. The test mode included 10Mbps, 100Mbps, 1Gbps, 10Gbps and POE mode. Emission frequency and amplitude were recorded, recording at least six highest emissions.
- g. The EUT and cable configuration of the above highest emission levels were recorded. The test data of the worst case was recorded.

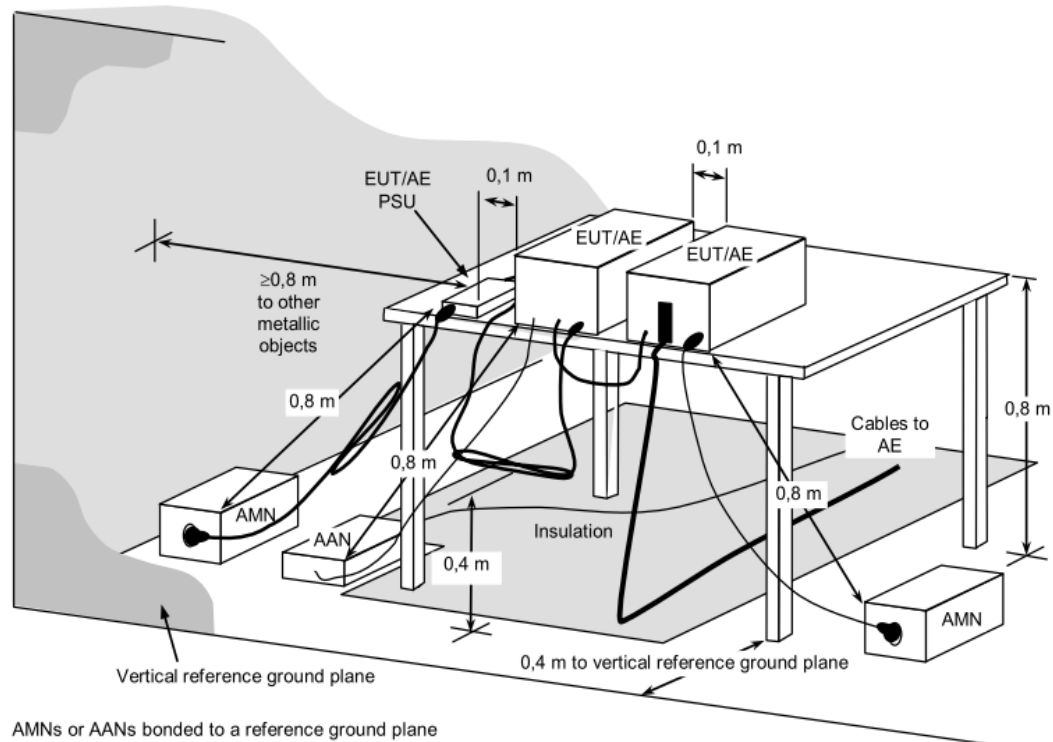
### 4.2.4 Deviation from Test Standard

No deviation

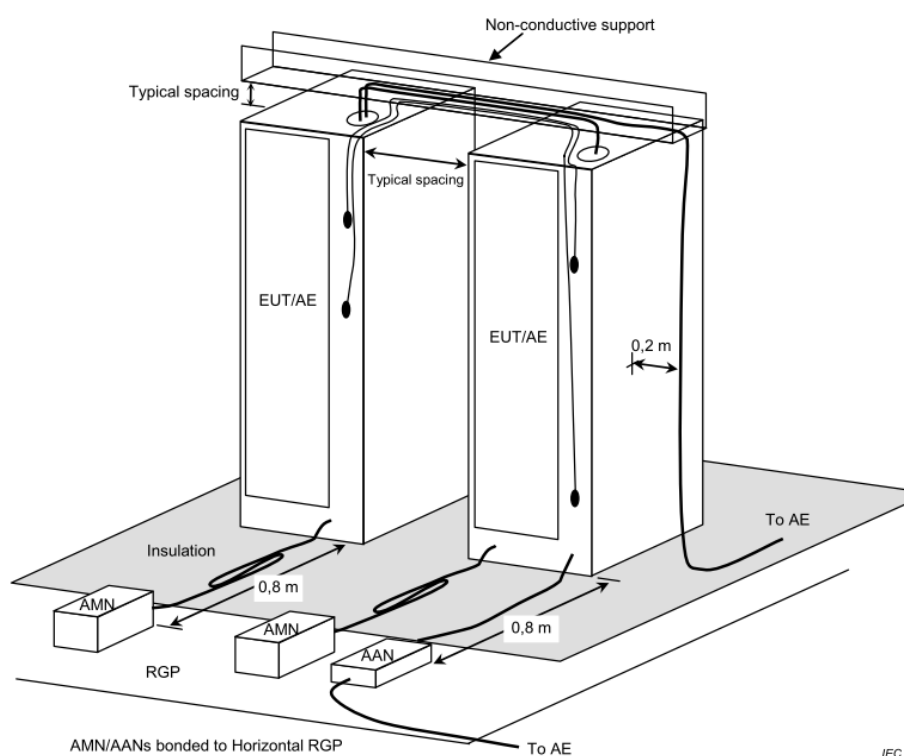


### 4.2.5 Test Setup

### < Table-Top equipment >



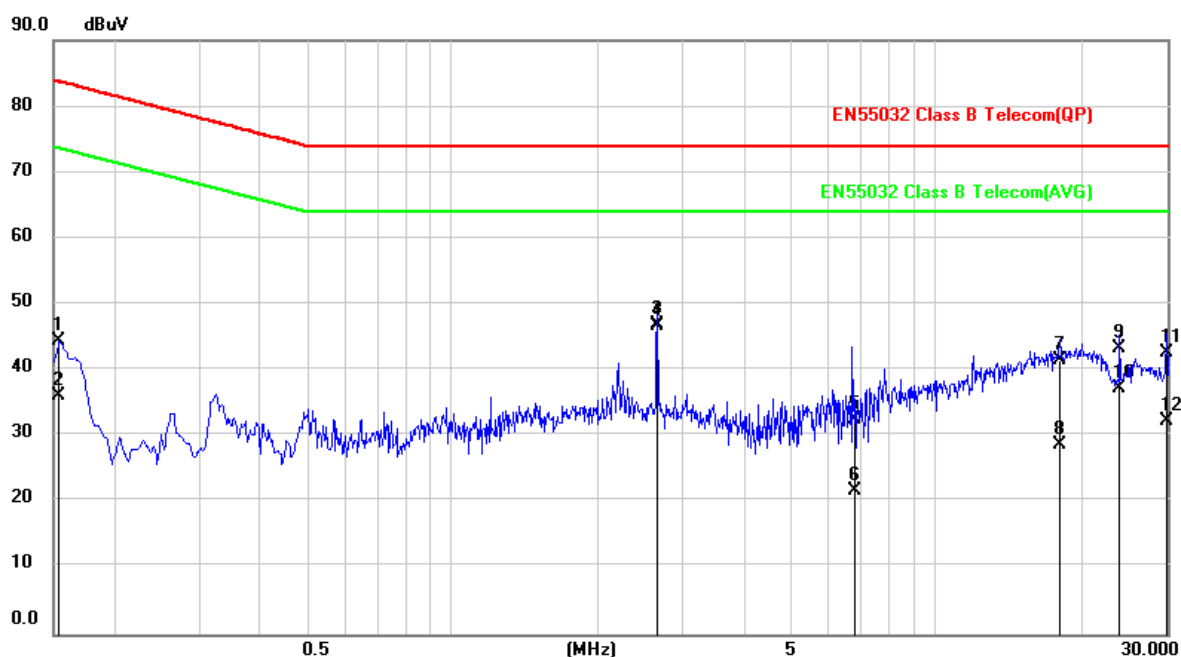
**< Floor-Standing equipment >**



**Note:** Please refer to the 4.2.7 for the actual test configuration.

## 4.2.6 Test Result

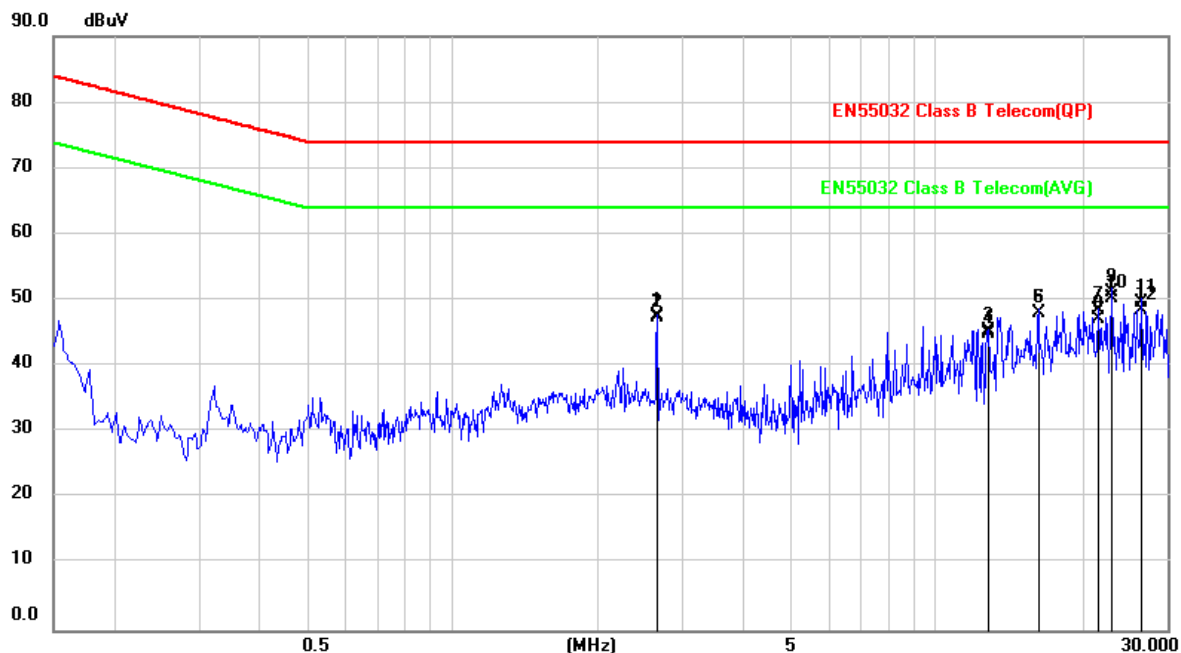
Test Voltage	230Vac, 50Hz	Frequency Range	0.15-30 MHz
Environmental Conditions	24.6°C, 50% RH	6dB Bandwidth	9 kHz
Test Date	2021/10/22	Test Condition	LAN port with ISN (10Mbps)
Tested by	Eric Hsieh	Test Site	W01
Test Mode	A		



No.	Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measurement (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.1539	24.47	19.88	44.35	83.79	-39.44	QP
2	0.1539	16.31	19.88	36.19	73.79	-37.60	AVG
3	2.6490	27.60	19.42	47.02	74.00	-26.98	QP
4	2.6490	27.30	19.42	46.72	64.00	-17.28	AVG
5	6.7995	13.08	19.46	32.54	74.00	-41.46	QP
6	6.7995	2.24	19.46	21.70	64.00	-42.30	AVG
7	17.9743	21.85	19.59	41.44	74.00	-32.56	QP
8	17.9743	9.05	19.59	28.64	64.00	-35.36	AVG
9	23.9738	23.58	19.69	43.27	74.00	-30.73	QP
10	23.9738	17.58	19.69	37.27	64.00	-26.73	AVG
11	29.9645	22.98	19.76	42.74	74.00	-31.26	QP
12	29.9645	12.56	19.76	32.32	64.00	-31.68	AVG

**Remark:** 1. QP = Quasi Peak, AVG = Average  
2. Correction Factor = Insertion loss of ISN + Cable loss  
3. Measurement Value = Reading Level + Correct Factor  
4. Margin Level = Measurement Value - Limit Value

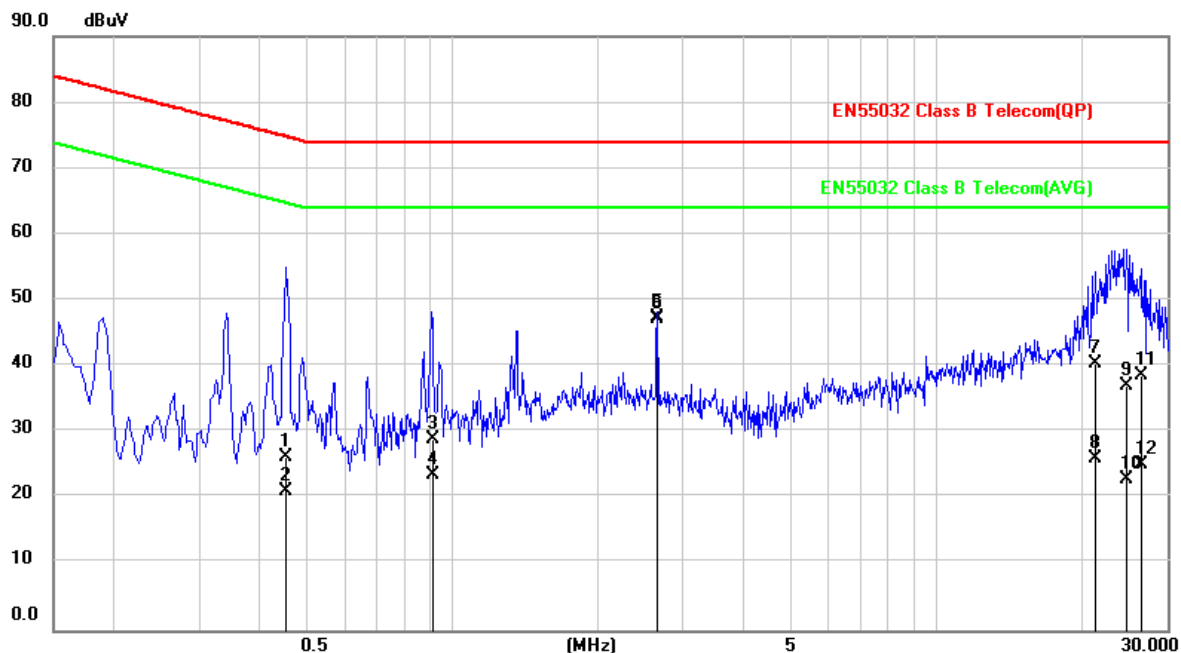
Test Voltage	230Vac, 50Hz	Frequency Range	0.15-30 MHz
Environmental Conditions	24.6°C, 50% RH	6dB Bandwidth	9 kHz
Test Date	2021/10/22	Test Condition	LAN port with ISN (100Mbps)
Tested by	Eric Hsieh	Test Site	W01
Test Mode	A		



No.	Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measurement (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	2.6507	28.23	19.42	47.65	74.00	-26.35	QP
2	2.6507	27.92	19.42	47.34	64.00	-16.66	AVG
3	12.8078	25.73	19.54	45.27	74.00	-28.73	QP
4	12.8078	25.42	19.54	44.96	64.00	-19.04	AVG
5	16.2285	28.57	19.57	48.14	74.00	-25.86	QP
6	16.2285	28.54	19.57	48.11	64.00	-15.89	AVG
7	21.6638	28.83	19.65	48.48	74.00	-25.52	QP
8	21.6638	27.46	19.65	47.11	64.00	-16.89	AVG
9	23.1286	31.63	19.67	51.30	74.00	-22.70	QP
10	23.1286	30.56	19.67	50.23	64.00	-13.77	AVG
11	26.6101	29.89	19.72	49.61	74.00	-24.39	QP
12	26.6101	28.80	19.72	48.52	64.00	-15.48	AVG

**Remark:** 1. QP = Quasi Peak, AVG = Average  
2. Correction Factor = Insertion loss of ISN + Cable loss  
3. Measurement Value = Reading Level + Correct Factor  
4. Margin Level = Measurement Value - Limit Value

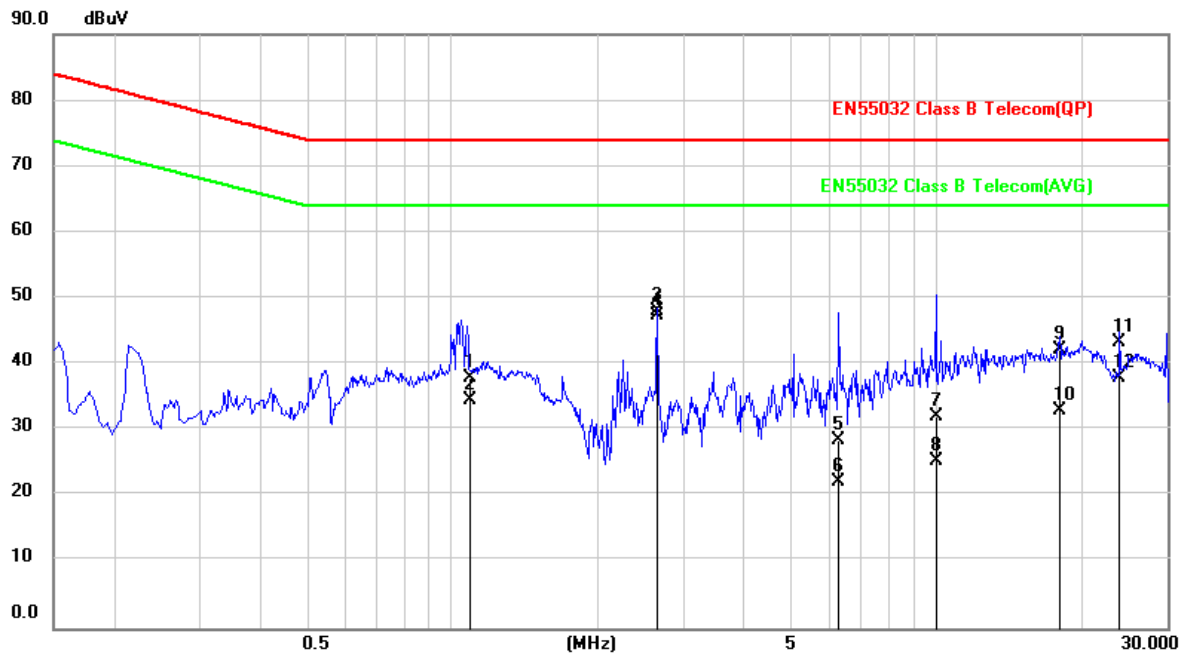
Test Voltage	230Vac, 50Hz	Frequency Range	0.15-30 MHz
Environmental Conditions	24.6°C, 50% RH	6dB Bandwidth	9 kHz
Test Date	2021/10/22	Test Condition	LAN port with ISN (1Gbps)
Tested by	Eric Hsieh	Test Site	W01
Test Mode	A		



No.	Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measurement (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.4522	6.63	19.55	26.18	74.83	-48.65	QP
2	0.4522	1.57	19.55	21.12	64.83	-43.71	AVG
3	0.9116	9.53	19.47	29.00	74.00	-45.00	QP
4	0.9116	4.11	19.47	23.58	64.00	-40.42	AVG
5	2.6514	28.01	19.42	47.43	74.00	-26.57	QP
6	2.6514	27.71	19.42	47.13	64.00	-16.87	AVG
7	21.3217	20.78	19.64	40.42	74.00	-33.58	QP
8	21.3217	6.34	19.64	25.98	64.00	-38.02	AVG
9	24.7278	17.32	19.70	37.02	74.00	-36.98	QP
10	24.7278	3.22	19.70	22.92	64.00	-41.08	AVG
11	26.4459	18.81	19.72	38.53	74.00	-35.47	QP
12	26.4459	5.34	19.72	25.06	64.00	-38.94	AVG

**Remark:** 1. QP = Quasi Peak, AVG = Average  
2. Correction Factor = Insertion loss of ISN + Cable loss  
3. Measurement Value = Reading Level + Correct Factor  
4. Margin Level = Measurement Value - Limit Value

Test Voltage	230Vac, 50Hz	Frequency Range	0.15-30 MHz
Environmental Conditions	24.6°C, 50% RH	6dB Bandwidth	9 kHz
Test Date	2021/10/22	Test Condition	LAN port with ISN (10Mbps)
Tested by	Eric Hsieh	Test Site	W01
Test Mode	B		

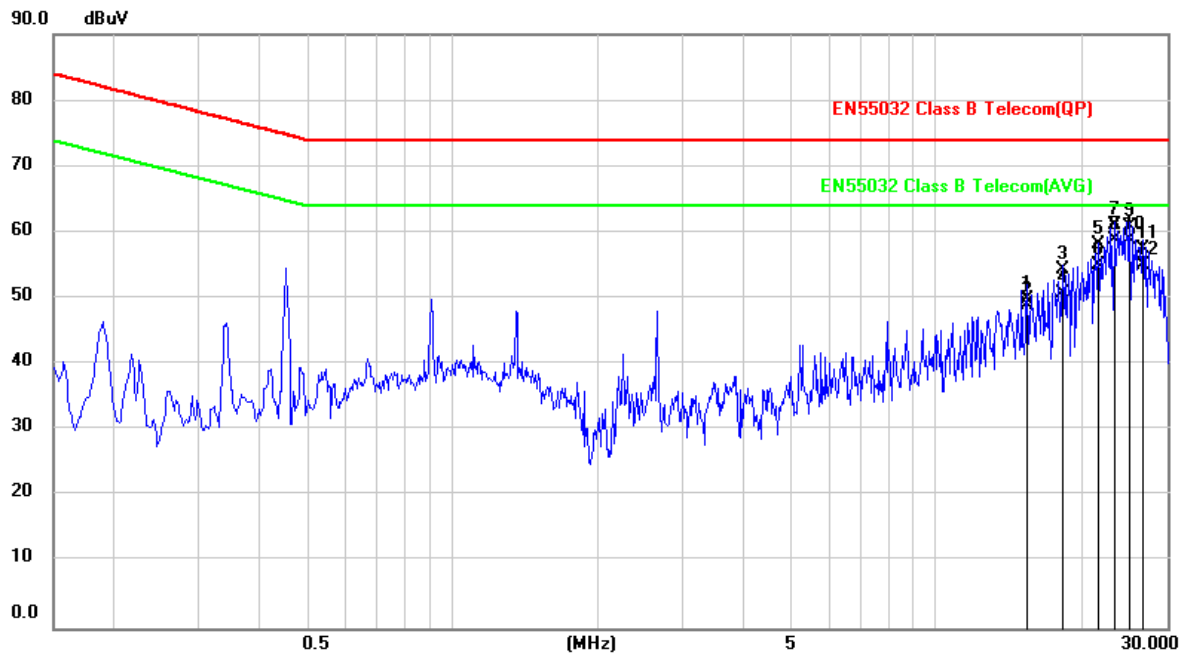


No.	Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measurement (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	1.0919	18.36	19.45	37.81	74.00	-36.19	QP
2	1.0919	15.18	19.45	34.63	64.00	-29.37	AVG
3	2.6526	28.65	19.42	48.07	74.00	-25.93	QP
4	2.6526	28.01	19.42	47.43	64.00	-16.57	AVG
5	6.2872	9.06	19.46	28.52	74.00	-45.48	QP
6	6.2872	2.76	19.46	22.22	64.00	-41.78	AVG
7	9.9975	12.59	19.51	32.10	74.00	-41.90	QP
8	9.9975	5.72	19.51	25.23	64.00	-38.77	AVG
9	17.9771	22.57	19.59	42.16	74.00	-31.84	QP
10	17.9771	13.29	19.59	32.88	64.00	-31.12	AVG
11	23.9744	23.67	19.69	43.36	74.00	-30.64	QP
12	23.9744	18.18	19.69	37.87	64.00	-26.13	AVG

**Remark:** 1. QP = Quasi Peak, AVG = Average  
2. Correction Factor = Insertion loss of ISN + Cable loss  
3. Measurement Value = Reading Level + Correct Factor  
4. Margin Level = Measurement Value - Limit Value



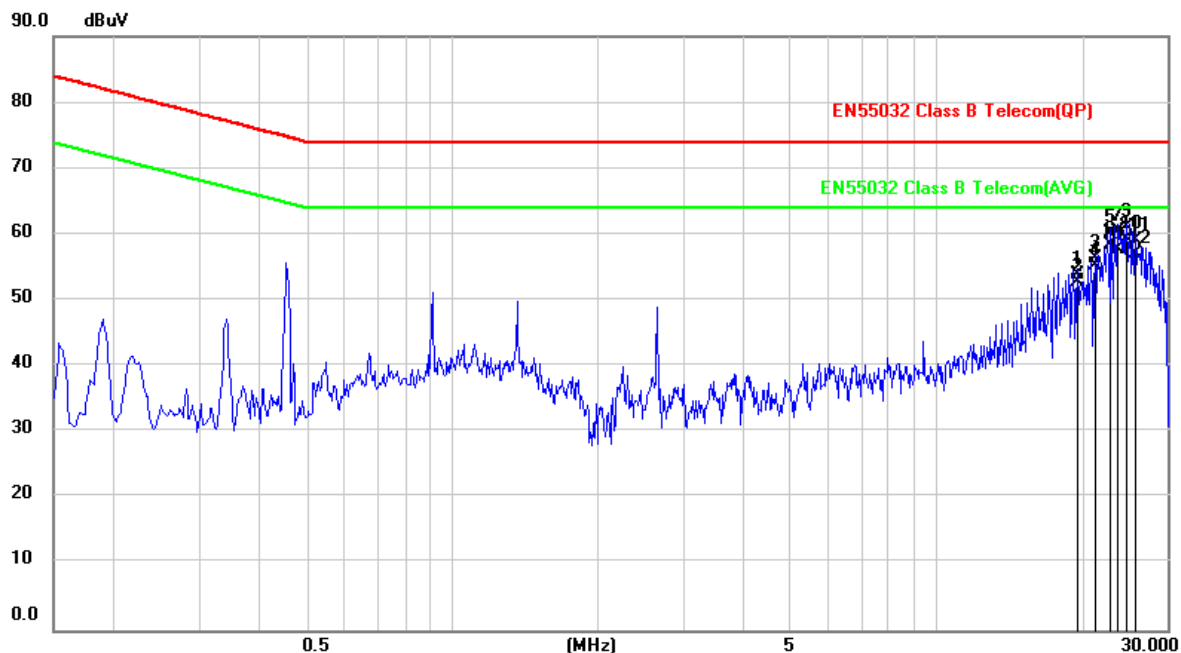
Test Voltage	230Vac, 50Hz	Frequency Range	0.15-30 MHz
Environmental Conditions	24.6°C , 50% RH	6dB Bandwidth	9 kHz
Test Date	2021/10/22	Test Condition	LAN port with ISN (100Mbps)
Tested by	Eric Hsieh	Test Site	W01
Test Mode	B		



No.	Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measurement (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	15.3888	30.27	19.57	49.84	74.00	-24.16	QP
2	15.3888	29.33	19.57	48.90	64.00	-15.10	AVG
3	18.2405	34.69	19.59	54.28	74.00	-19.72	QP
4	18.2405	31.16	19.59	50.75	64.00	-13.25	AVG
5	21.6615	38.60	19.65	58.25	74.00	-15.75	QP
6	21.6615	35.43	19.65	55.08	64.00	-8.92	AVG
7	23.3713	41.45	19.67	61.12	74.00	-12.88	QP
8	23.3713	39.26	19.67	58.93	64.00	-5.07	AVG
9	25.0779	41.16	19.71	60.87	74.00	-13.13	QP
10	25.0779	39.23	19.71	58.94	64.00	-5.06	AVG
11	26.7872	37.69	19.72	57.41	74.00	-16.59	QP
12	26.7872	35.24	19.72	54.96	64.00	-9.04	AVG

**Remark:** 1. QP = Quasi Peak, AVG = Average  
2. Correction Factor = Insertion loss of ISN + Cable loss  
3. Measurement Value = Reading Level + Correct Factor  
4. Margin Level = Measurement Value - Limit Value

Test Voltage	230Vac, 50Hz	Frequency Range	0.15-30 MHz
Environmental Conditions	24.6°C, 50% RH	6dB Bandwidth	9 kHz
Test Date	2021/10/22	Test Condition	LAN port with ISN (1Gbps)
Tested by	Eric Hsieh	Test Site	W01
Test Mode	B		

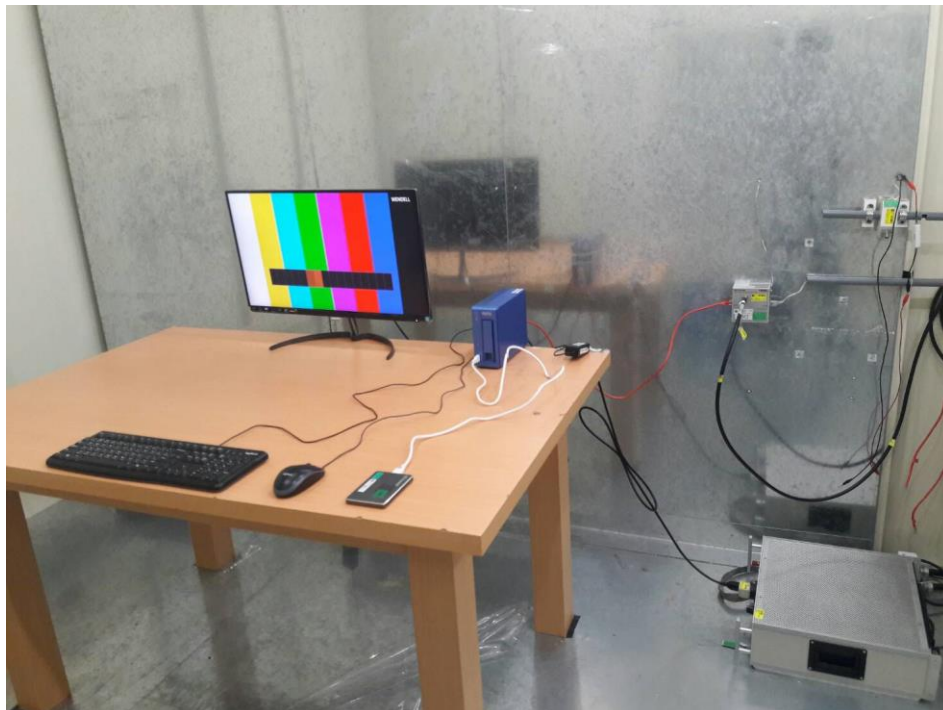


No.	Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measurement (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	19.5769	34.23	19.61	53.84	74.00	-20.16	QP
2	19.5769	33.22	19.61	52.83	64.00	-11.17	AVG
3	21.2878	36.79	19.64	56.43	74.00	-17.57	QP
4	21.2878	35.51	19.64	55.15	64.00	-8.85	AVG
5	22.9989	40.52	19.66	60.18	74.00	-13.82	QP
6	22.9989	38.73	19.66	58.39	64.00	-5.61	AVG
7	23.7529	40.81	19.69	60.50	74.00	-13.50	QP
8	23.7529	38.01	19.69	57.70	64.00	-6.30	AVG
9	24.7056	41.37	19.70	61.07	74.00	-12.93	QP
10	24.7056	39.51	19.70	59.21	64.00	-4.79	AVG
11	25.8449	39.33	19.72	59.05	74.00	-14.95	QP
12	25.8449	37.27	19.72	56.99	64.00	-7.01	AVG

**Remark:** 1. QP = Quasi Peak, AVG = Average  
2. Correction Factor = Insertion loss of ISN + Cable loss  
3. Measurement Value = Reading Level + Correct Factor  
4. Margin Level = Measurement Value - Limit Value

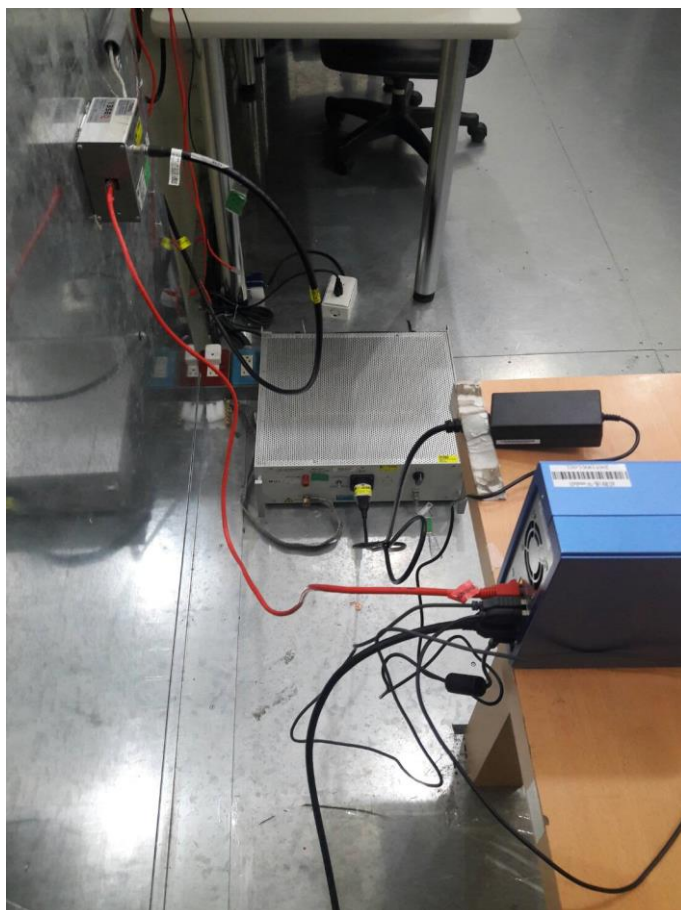
## 4.2.7 Photographs of Test Configuration

Test mode A





Test mode B



## 4.3 Radiated Emission Measurement

### 4.3.1 Limits of Radiated Emission Measurement

According to EN 55032 table1 - Required highest frequency for radiated measurement:

Highest internal frequency ( $F_x$ )	Highest measured 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

Remark:

1.  $F_x$  : highest fundamental frequency generated or used within the EUT or highest frequency at which it operates.
2. Where  $F_x$  is unknown, the radiated emission measurements shall be performed up to 6 GHz.

Class A equipment:

Requirements for radiated emissions at frequencies up to 1 GHz for Class A equipment			
Frequency (MHz)	Measurement		Class A limits dB(μV/m)
	Distance (m)	Detector type/ bandwidth	OATS/SAC
30 to 230	10	Quasi Peak / 120 kHz	40
230 to 1000			47
30 to 230	3		50
230 to 1000			57

Requirements for radiated emissions at frequencies above 1 GHz for Class A equipment			
Frequency (MHz)	Measurement		Class A limits dB( $\mu\text{V/m}$ )
	Distance (m)	Detector type/ bandwidth	FSOATS
1000 to 3000	3	Average / 1 MHz	56
3000 to 6000			60
1000 to 3000		Peak / 1 MHz	76
3000 to 6000			80

Class B equipment:

Requirements for radiated emissions at frequencies up to 1 GHz for Class B equipment			
Frequency (MHz)	Measurement		Class B limits dB(μV/m)
	Distance (m)	Detector type/ bandwidth	OATS/SAC
30 to 230	10	Quasi Peak / 120 kHz	30
230 to 1000			37
30 to 230	3		40
230 to 1000			47

Requirements for radiated emissions at frequencies above 1 GHz for Class B equipment			
Frequency (MHz)	Measurement		Class B limits dB( $\mu$ V/m)
	Distance (m)	Detector type/ bandwidth	FSOATS
1000 to 3000	3	Average / 1 MHz	50
3000 to 6000			54
1000 to 3000		Peak / 1 MHz	70
3000 to 6000			74

**Note:** 1. The lower limit shall apply at the transition frequency.  
2. Detector function in the form: PK = Peak, QP = Quasi Peak, AV = Average  
3. The test result calculated as following:  
Measurement Value = Reading Level + Correct Factor  
Correction Factor = Antenna factor + Cable loss (Antenna to preamplifier ) - preamplifier Gain  
+ Cable loss (preamplifier to receiver )  
Margin Level = Measurement Value - Limit Value

### 4.3.2 Test Instrument

Test Site: W08-966					
Item	Equipment	Manufacturer	Model	Meter No.	Calibration Date
1	Horn Antenna	Schwarzbeck	BBHA 9120D	CT-9-031	Aug. 05, 2021
2	Horn Antenna	Schwarzbeck	BBHA 9170	CT-9-032	Dec. 03, 2021
3	TRILOG Broadband Antenna with 5 dB Attenuator	Schwarzbeck	VULB 9168 & MVE2251-06	CT-1-096-1	Aug. 03, 2021
4	EXA Signal Analyzer	Keysight	N9010A	CT-1-093	Aug. 24, 2021
5	EMI Test Receiver	Keysight	N9038A	CT-9-007	Aug. 03, 2021
6	Preamplifier	EM	EM 330	CT-9-024	Aug. 09, 2021
7	Preamplifier	SGH & MCL	SGH118 & BW-S15W2+	CT-9-071	Aug. 09, 2021
8	Preamplifier	EMCI	EMC184045SE	CT-9-013	Aug. 24, 2021
9	Test Cable	EMCI	EMCCFD400-NM-NM-1000	CT-1-132	Aug. 09, 2021
10	Test Cable	PEWC	CFD400NL-LW-N M-NM-3000	CT-1-141	Aug. 09, 2021
11	Test Cable	EMCI	EMCCFD400-NM-NM-15000	CT-1-133	Aug. 09, 2021
12	Test Cable	EMCI	EMC104-SM-35M-600	CT-1-134	Aug. 09, 2021
13	Test Cable	MVE	280280.LL266.1400	CT-9-072	Aug. 09, 2021
14	Test Cable	EMCI	EMC102-KM-KM-600	CT-1-136	Aug. 24, 2021
15	Measurement Software	EZ-EMC	Ver : FA-03A2 RE	CT-3-012	No calibration request

**Note:** 1. The calibration interval of the above test instruments is 12 months.

### 4.3.3 Test Procedure

- a. The table-top EUT was placed on the top of a turntable 0.8 meters above the ground at 3 m 966 chamber. The floor-standing EUT was placed insulation support unit from the horizontal ground plane. The table was rotated 360 degrees to determine the position of the high radiation emissions.
- b. The height of the test antenna shall vary between 1 m to 4 m. Both vertical and horizontal polarizations of the antenna were set to make the measurement.
- c. The EUT was set up as per the test configuration to simulate typical usage per the user's manual. All I/O cables were positioned to simulate typical usage. The actual test configuration, please refer to EUT test photos.
- d. The initial step in collecting radiated emission data is a Spectrum Mode scanning the measurement frequency range.

#### **Below 1GHz:**

Reading in which marked as QP or Peak means measurements by using Spectrum Mode with detector RBW=120kHz.

If the Spectrum Mode measured peak value compliance with and lower than Quasi Peak Limit, the EUT shall be deemed to meet QP Limits.

#### **Above 1GHz:**

Reading in which marked as Peak & AVG means measurements by using Spectrum Mode with setting in RBW=1MHz.

If the Spectrum Mode measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak and AVG Limits.

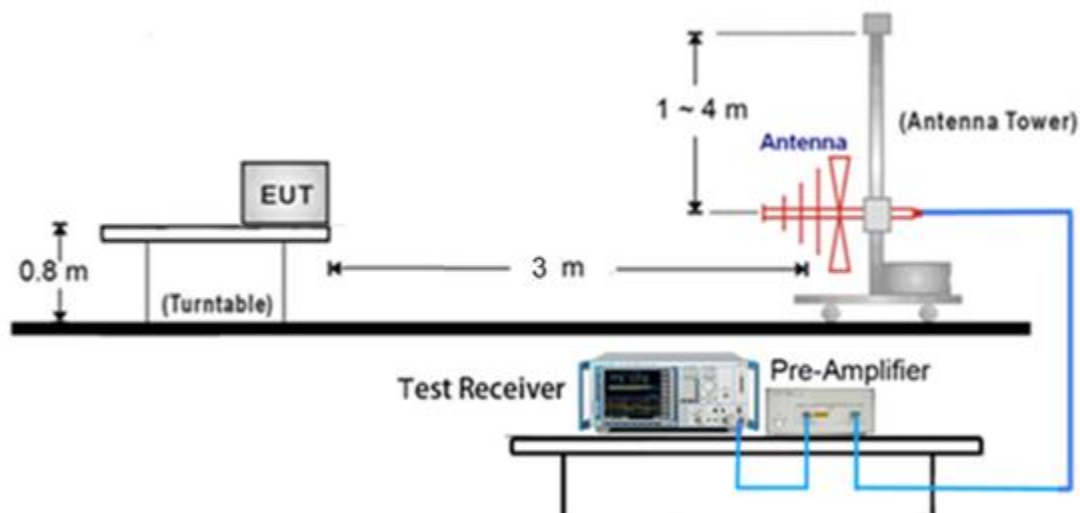
- e. Emission frequency and amplitude were recorded, recording at least six highest emissions. The EUT and cable configuration of the above highest emission levels were recorded. The test data of the worst case was recorded.

### 4.3.4 Deviation from Test Standard

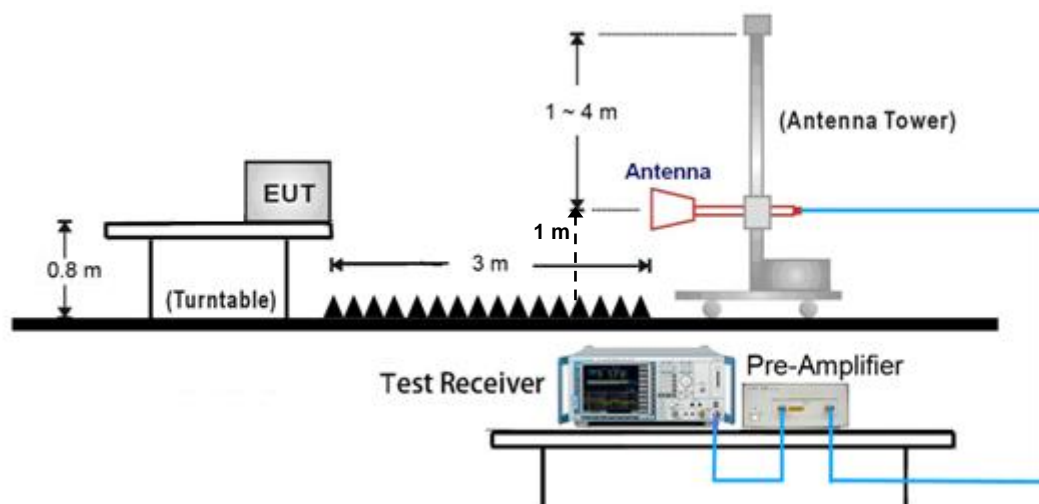
No deviation

### 4.3.5 Test Setup

< Radiated Emissions Frequency: 30 MHz to 1000 MHz >



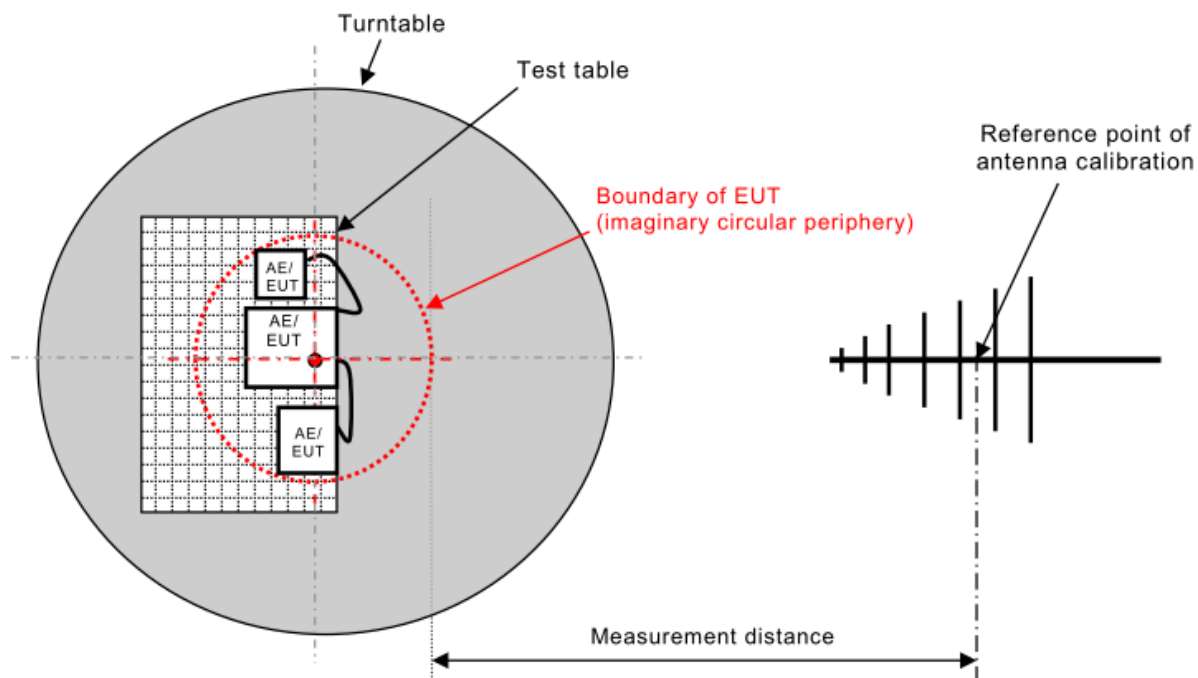
< Radiated Emissions Frequency: above 1GHz >



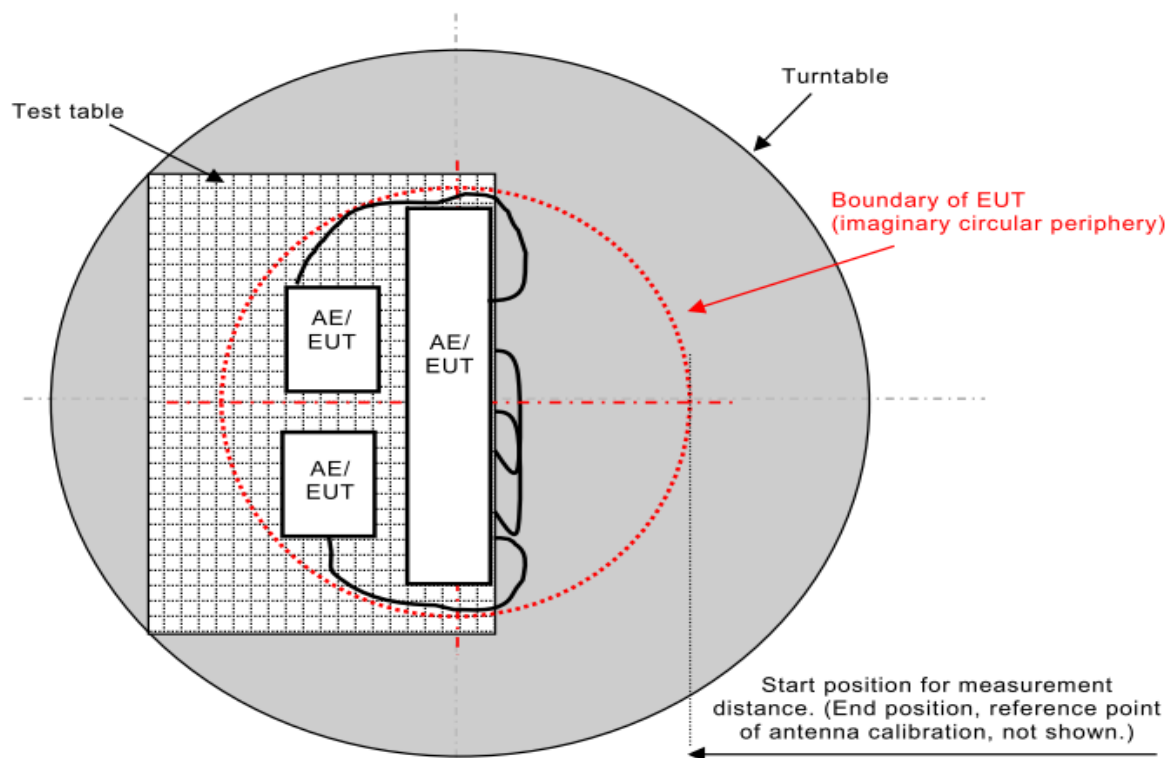
**Note:**

- (1) Please refer to the 4.3.7 for the actual test configuration.
- (2) The formula of measured value as: Test Result = Reading + Correction Factor
- (3) Detector function in the form: PK = Peak, QP = Quasi Peak, AV = Average
- (4) The test result calculated as following:  
 Measurement Value = Reading Level + Correct Factor  
 Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain (if use)  
 Margin Level = Measurement Value - Limit Value

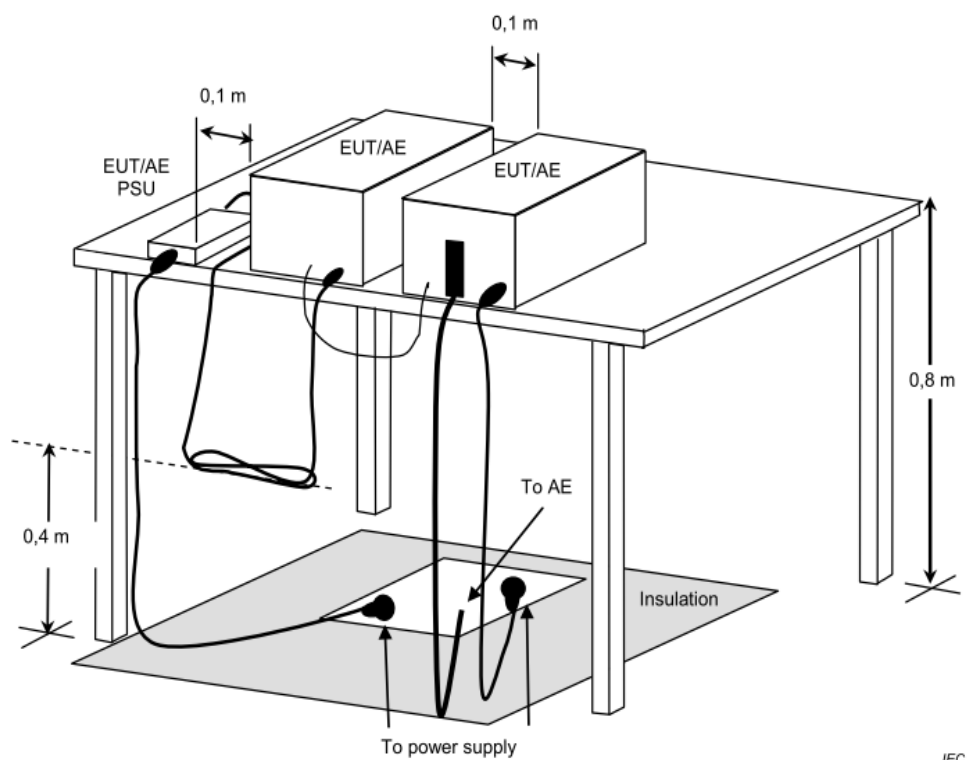
### < EUT placement top view and measurement distance >



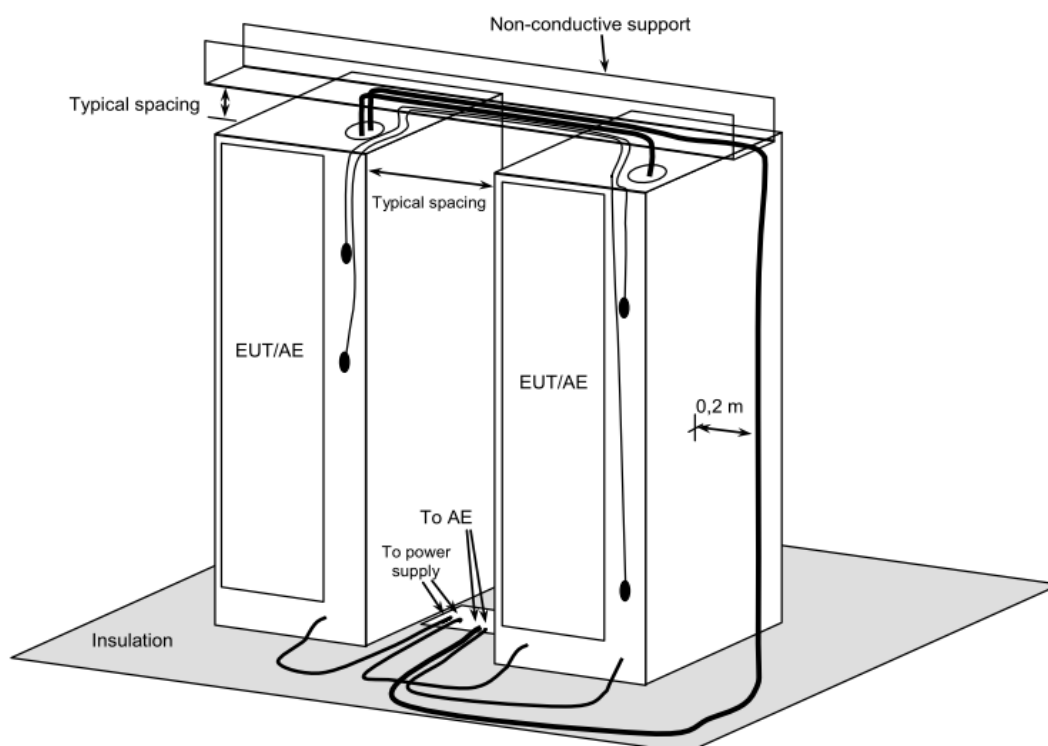
### < Boundary of EUT, Local AE and associated cabling >



### < Table-Top equipment >



### < Floor-Standing equipment >

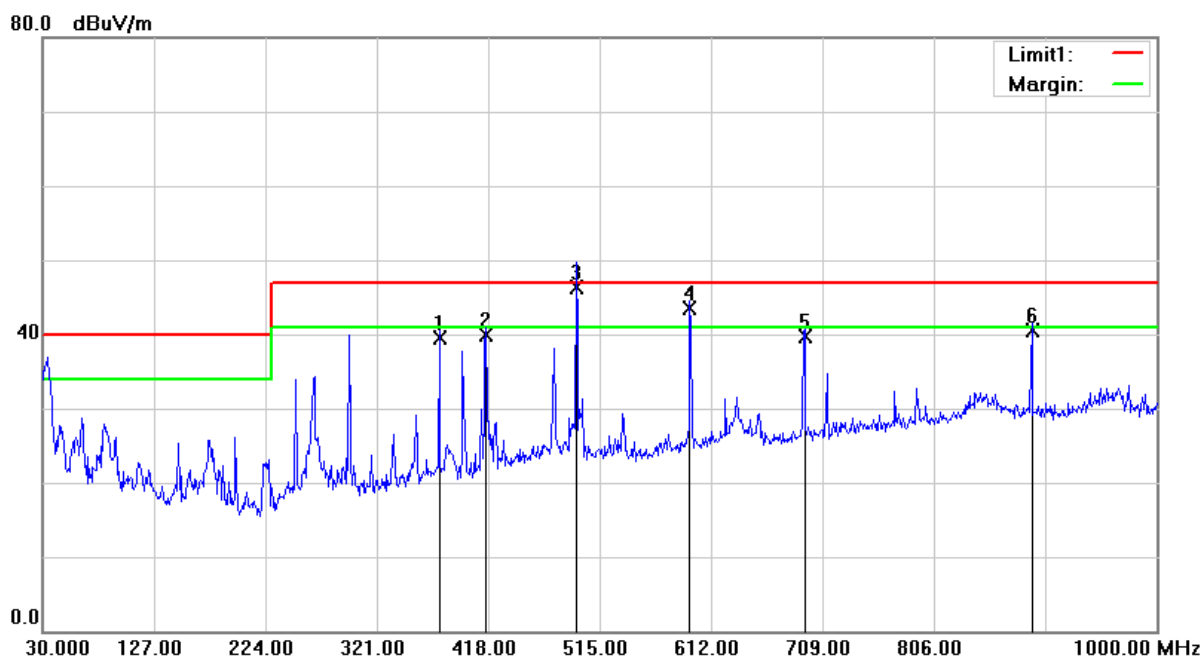


**Note:** Please refer to the 4.3.7 for the actual test configuration.



### 4.3.6 Test Result

Test Voltage	230Vac, 50Hz	Frequency Range	30 – 1000 MHz
Environmental Conditions	24°C, 50% RH	6dB Bandwidth	120 kHz
Test Date	2021/12/08	Test Distance	3m
Tested by	Karwin Kao	Polarization	Vertical
Test Site	W08	Test Mode	A

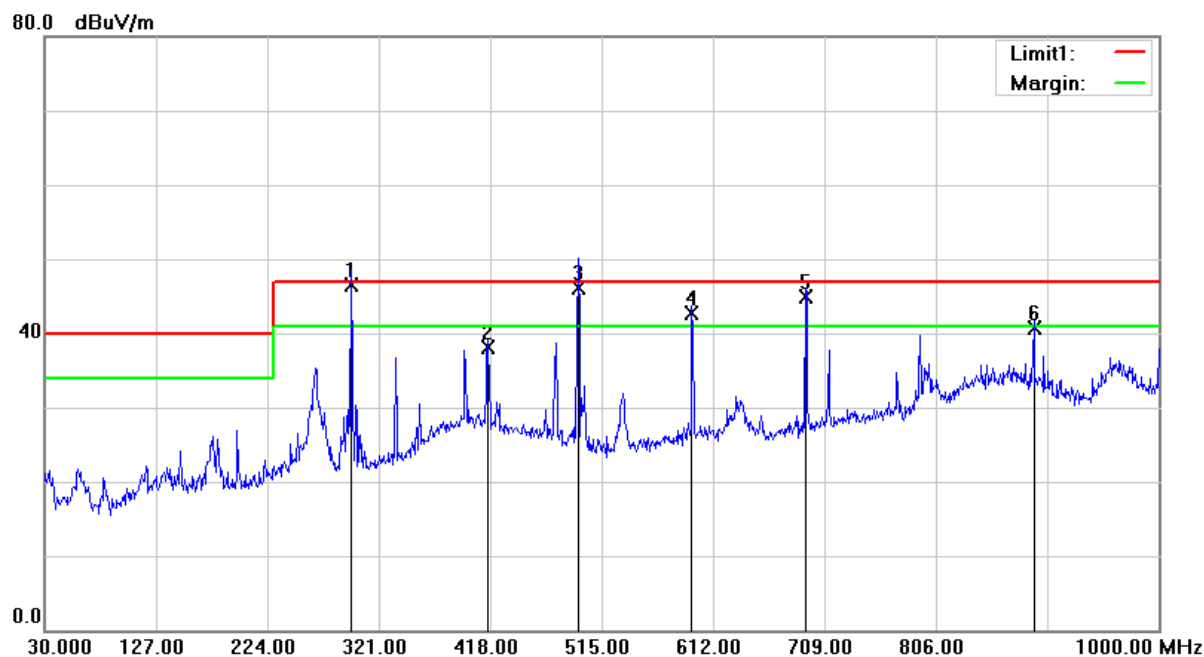


No.	Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB/m)	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Table Degree (degree)	Antenna Height (cm)	Detector
1	375.3200	47.18	-7.73	39.45	47.00	-7.55	360	100	QP
2	416.0600	46.51	-6.68	39.83	47.00	-7.17	360	200	QP
3	494.6300	51.06	-4.82	46.24	47.00	-0.76	242	200	QP
4	593.5700	45.92	-2.33	43.59	47.00	-3.41	0	113	QP
5	693.4800	40.44	-0.70	39.74	47.00	-7.26	0	143	QP
6	891.3600	38.53	1.89	40.42	47.00	-6.58	267	100	QP

**Remark:**

1. QP = Quasi Peak
2. Correction Factor = Antenna factor + Cable loss (Antenna to preamplifier ) - preamplifier Gain + Cable loss (preamplifier to receiver )
3. Measurement Value = Reading Level + Correct Factor
4. Margin Level = Measurement Value - Limit Value

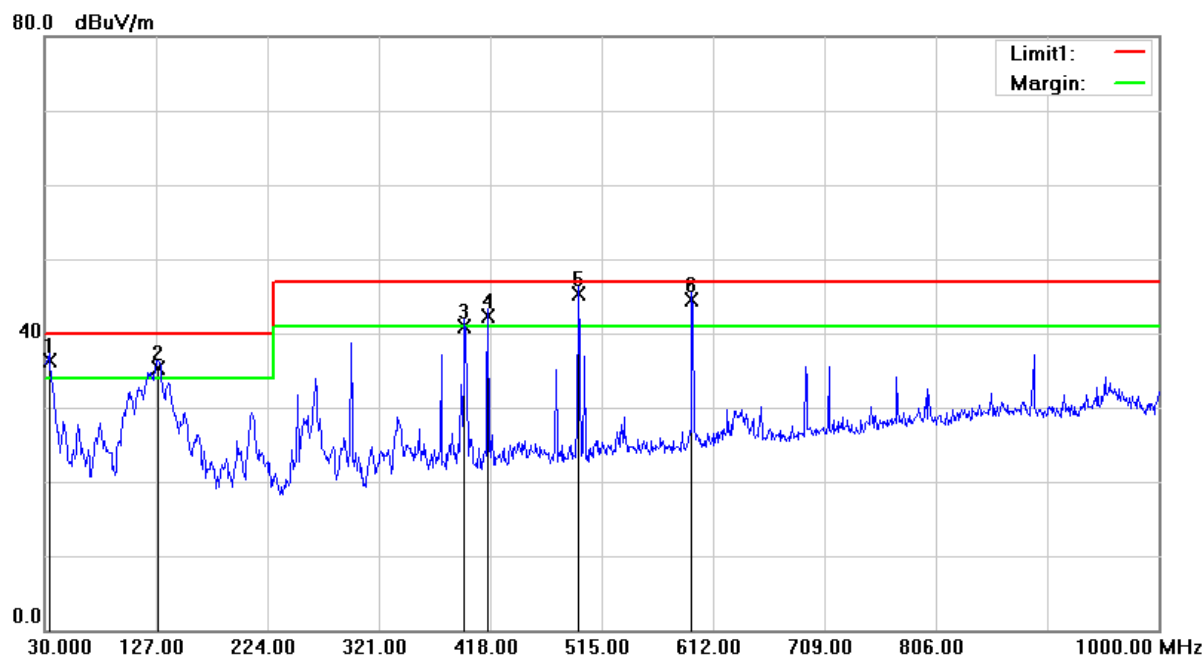
Test Voltage	230Vac, 50Hz	Frequency Range	30 – 1000 MHz
Environmental Conditions	24°C, 50% RH	6dB Bandwidth	120 kHz
Test Date	2021/12/08	Test Distance	3m
Tested by	Karwin Kao	Polarization	Horizontal
Test Site	W08	Test Mode	A



No.	Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB/m)	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Table Degree (degree)	Antenna Height (cm)	Detector
1	296.7500	56.21	-9.74	46.47	47.00	-0.53	128	100	QP
2	416.0600	44.87	-6.68	38.19	47.00	-8.81	145	100	QP
3	494.6300	51.02	-4.82	46.20	47.00	-0.80	281	200	QP
4	593.5700	45.00	-2.33	42.67	47.00	-4.33	360	200	QP
5	692.5100	45.62	-0.73	44.89	47.00	-2.11	188	100	QP
6	891.3600	38.91	1.89	40.80	47.00	-6.20	192	100	QP

**Remark:** 1. QP = Quasi Peak  
2. Correction Factor = Antenna factor + Cable loss (Antenna to preamplifier ) - preamplifier Gain + Cable loss (preamplifier to receiver )  
3. Measurement Value = Reading Level + Correct Factor  
4. Margin Level = Measurement Value - Limit Value

Test Voltage	230Vac, 50Hz	Frequency Range	30 – 1000 MHz
Environmental Conditions	24°C, 50% RH	6dB Bandwidth	120 kHz
Test Date	2021/12/07	Test Distance	3m
Tested by	Karwin Kao	Polarization	Vertical
Test Site	W08	Test Mode	B

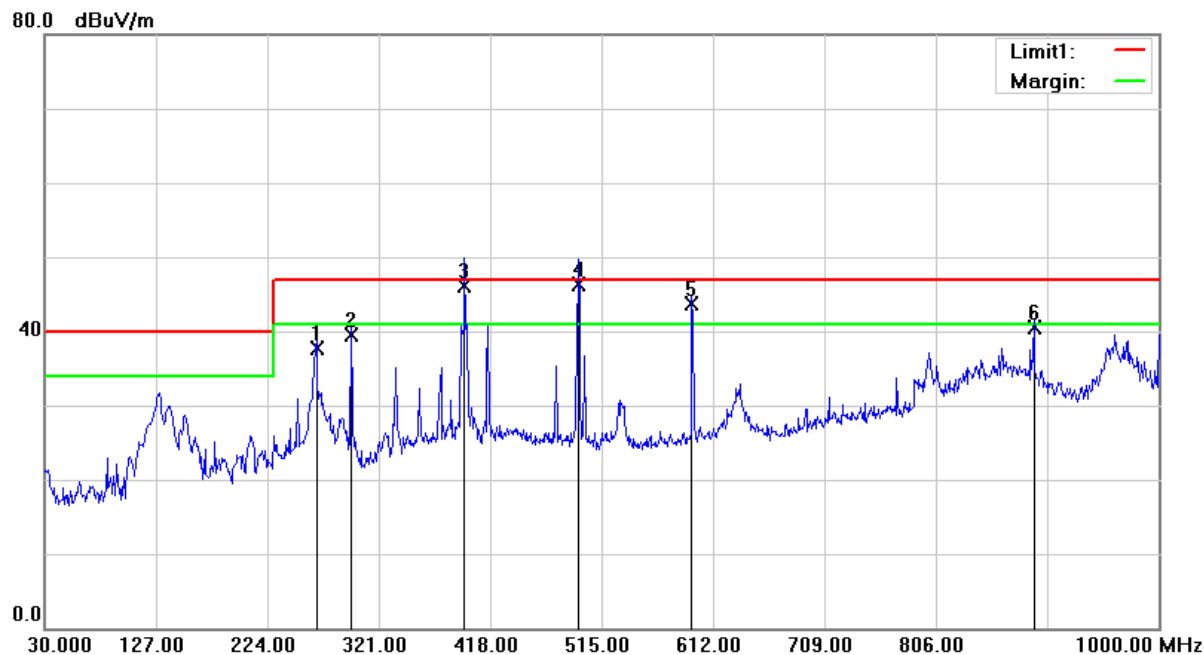


No.	Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB/m)	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Table Degree (degree)	Antenna Height (cm)	Detector
1	33.8800	47.77	-11.55	36.22	40.00	-3.78	144	100	QP
2	128.9400	47.07	-11.71	35.36	40.00	-4.64	247	100	QP
3	395.6900	47.98	-7.17	40.81	47.00	-6.19	262	200	QP
4	416.0600	49.00	-6.68	42.32	47.00	-4.68	345	200	QP
5	494.6300	50.12	-4.82	45.30	47.00	-1.70	0	184	QP
6	593.5700	46.88	-2.33	44.55	47.00	-2.45	264	100	QP

**Remark:** 1. QP = Quasi Peak  
2. Correction Factor = Antenna factor + Cable loss (Antenna to preamplifier ) - preamplifier Gain + Cable loss (preamplifier to receiver )  
3. Measurement Value = Reading Level + Correct Factor  
4. Margin Level = Measurement Value - Limit Value



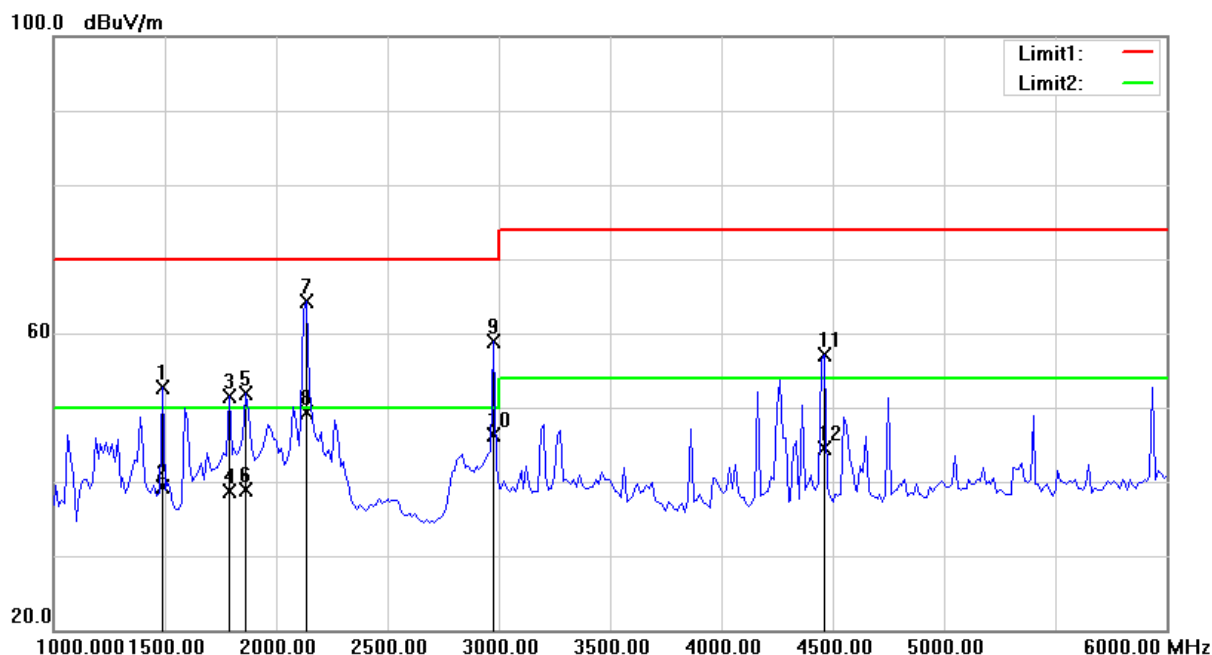
Test Voltage	230Vac, 50Hz	Frequency Range	30 – 1000 MHz
Environmental Conditions	24°C, 50% RH	6dB Bandwidth	120 kHz
Test Date	2021/12/07	Test Distance	3m
Tested by	Karwin Kao	Polarization	Horizontal
Test Site	W08	Test Mode	B



No.	Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB/m)	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Table Degree (degree)	Antenna Height (cm)	Detector
1	266.6800	48.50	-10.87	37.63	47.00	-9.37	278	100	QP
2	296.7500	49.16	-9.74	39.42	47.00	-7.58	242	100	QP
3	395.6900	53.37	-7.17	46.20	47.00	-0.80	278	100	QP
4	494.6300	51.05	-4.82	46.23	47.00	-0.77	298	100	QP
5	593.5700	46.09	-2.33	43.76	47.00	-3.24	117	200	QP
6	891.3600	38.58	1.89	40.47	47.00	-6.53	225	100	QP

**Remark:** 1. QP = Quasi Peak  
2. Correction Factor = Antenna factor + Cable loss (Antenna to preamplifier) - preamplifier Gain + Cable loss (preamplifier to receiver)  
3. Measurement Value = Reading Level + Correct Factor  
4. Margin Level = Measurement Value - Limit Value

Test Voltage	230Vac, 50Hz	Frequency Range	1 – 6GHz
Environmental Conditions	24°C, 50% RH	6dB Bandwidth	1MHz
Test Date	2021/12/08	Test Distance	3m
Tested by	Karwin Kao	Polarization	Vertical
Test Site	W08	Test Mode	A

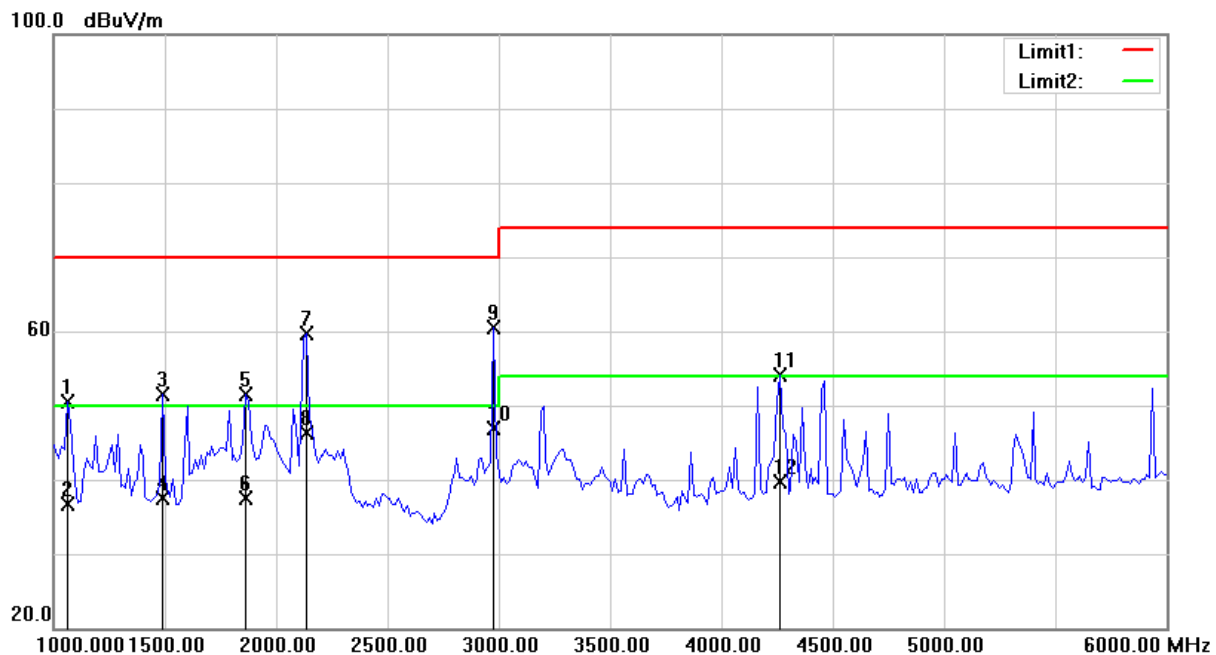


No.	Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB/m)	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Table Degree (degree)	Antenna Height (cm)	Detector
1	1487.500	69.57	-16.91	52.66	70.00	-17.34	151	100	peak
2	1487.500	56.28	-16.91	39.37	50.00	-10.63	151	100	AVG
3	1787.500	68.57	-17.16	51.41	70.00	-18.59	220	100	peak
4	1787.500	55.77	-17.16	38.61	50.00	-11.39	220	100	AVG
5	1862.500	68.38	-16.53	51.85	70.00	-18.15	360	100	peak
6	1862.500	55.36	-16.53	38.83	50.00	-11.17	360	100	AVG
7	2137.500	79.04	-14.65	64.39	70.00	-5.61	148	100	peak
8	2137.500	63.97	-14.65	49.32	50.00	-0.68	148	100	AVG
9	2975.000	71.43	-12.47	58.96	70.00	-11.04	305	100	peak
10	2975.000	58.82	-12.47	46.35	50.00	-3.65	305	100	AVG
11	4462.500	66.28	-9.26	57.02	74.00	-16.98	69	100	peak
12	4462.500	53.77	-9.26	44.51	54.00	-9.49	69	100	AVG

**Remark:** 1. peak = Peak, AVG = Average  
2. Correction Factor = Antenna factor + Cable loss (Antenna to preamplifier ) - preamplifier Gain + Cable loss (preamplifier to receiver )  
3. Measurement Value = Reading Level + Correct Factor  
4. Margin Level = Measurement Value - Limit Value



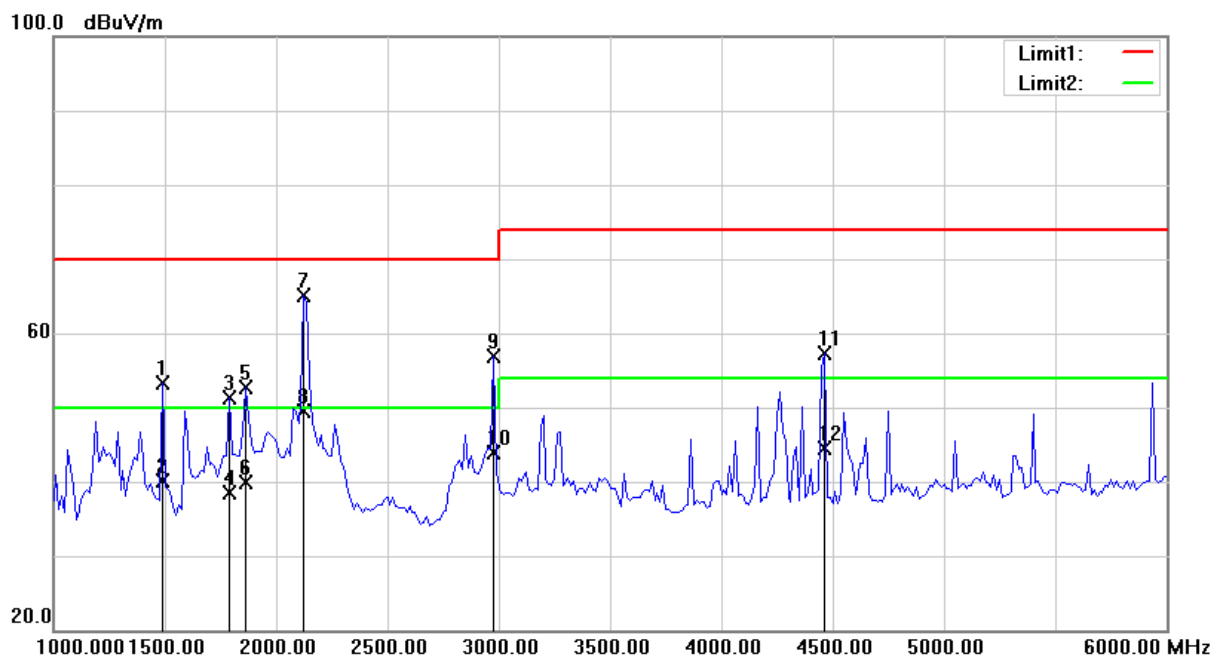
Test Voltage	230Vac, 50Hz	Frequency Range	1 – 6GHz
Environmental Conditions	24°C, 50% RH	6dB Bandwidth	1MHz
Test Date	2021/12/08	Test Distance	3m
Tested by	Karwin Kao	Polarization	Horizontal
Test Site	W08	Test Mode	A



No.	Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB/m)	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Table Degree (degree)	Antenna Height (cm)	Detector
1	1062.500	69.36	-18.84	50.52	70.00	-19.48	1	100	peak
2	1062.500	55.51	-18.84	36.67	50.00	-13.33	1	100	AVG
3	1487.500	68.38	-16.91	51.47	70.00	-18.53	152	100	peak
4	1487.500	54.39	-16.91	37.48	50.00	-12.52	152	100	AVG
5	1862.500	68.04	-16.53	51.51	70.00	-18.49	348	100	peak
6	1862.500	54.09	-16.53	37.56	50.00	-12.44	348	100	AVG
7	2137.500	74.38	-14.65	59.73	70.00	-10.27	137	100	peak
8	2137.500	60.87	-14.65	46.22	50.00	-3.78	137	100	AVG
9	2975.000	73.03	-12.47	60.56	70.00	-9.44	152	100	peak
10	2975.000	59.33	-12.47	46.86	50.00	-3.14	152	100	AVG
11	4262.500	63.91	-9.89	54.02	74.00	-19.98	17	100	peak
12	4262.500	49.64	-9.89	39.75	54.00	-14.25	17	100	AVG

**Remark:** 1. peak = Peak, AVG = Average  
2. Correction Factor = Antenna factor + Cable loss (Antenna to preamplifier ) - preamplifier Gain + Cable loss (preamplifier to receiver )  
3. Measurement Value = Reading Level + Correct Factor  
4. Margin Level = Measurement Value - Limit Value

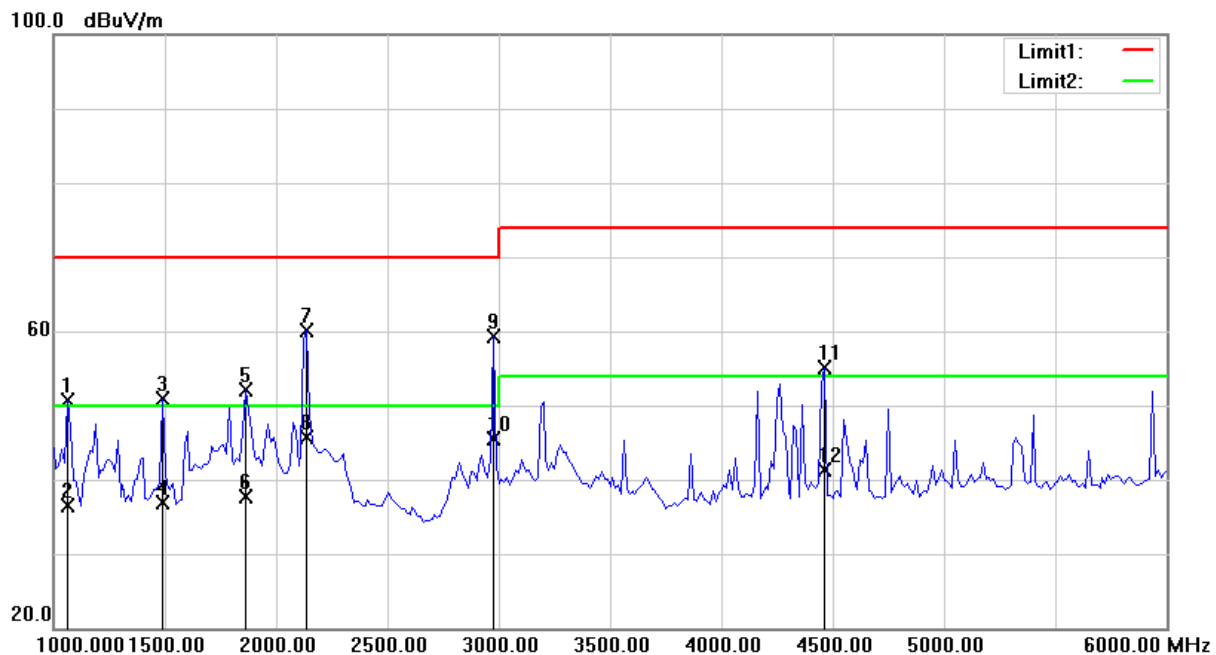
Test Voltage	230Vac, 50Hz	Frequency Range	1 – 6GHz
Environmental Conditions	24°C, 50% RH	6dB Bandwidth	1MHz
Test Date	2021/12/08	Test Distance	3m
Tested by	Karwin Kao	Polarization	Vertical
Test Site	W08	Test Mode	B



No.	Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB/m)	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Table Degree (degree)	Antenna Height (cm)	Detector
1	1487.500	70.13	-16.91	53.22	70.00	-16.78	195	100	peak
2	1487.500	57.09	-16.91	40.18	50.00	-9.82	195	100	AVG
3	1787.500	68.42	-17.16	51.26	70.00	-18.74	223	100	peak
4	1787.500	55.66	-17.16	38.50	50.00	-11.50	223	100	AVG
5	1862.500	69.18	-16.53	52.65	70.00	-17.35	101	100	peak
6	1862.500	56.39	-16.53	39.86	50.00	-10.14	101	100	AVG
7	2125.000	79.94	-14.82	65.12	70.00	-4.88	138	100	peak
8	2125.000	64.31	-14.82	49.49	50.00	-0.51	138	100	AVG
9	2975.000	69.28	-12.47	56.81	70.00	-13.19	305	100	peak
10	2975.000	56.39	-12.47	43.92	50.00	-6.08	305	100	AVG
11	4462.500	66.60	-9.26	57.34	74.00	-16.66	73	100	peak
12	4462.500	53.74	-9.26	44.48	54.00	-9.52	73	100	AVG

**Remark:** 1. peak = Peak, AVG = Average  
2. Correction Factor = Antenna factor + Cable loss (Antenna to preamplifier ) - preamplifier Gain + Cable loss (preamplifier to receiver )  
3. Measurement Value = Reading Level + Correct Factor  
4. Margin Level = Measurement Value - Limit Value

Test Voltage	230Vac, 50Hz	Frequency Range	1 – 6GHz
Environmental Conditions	24°C, 50% RH	6dB Bandwidth	1MHz
Test Date	2021/12/08	Test Distance	3m
Tested by	Karwin Kao	Polarization	Horizontal
Test Site	W08	Test Mode	B



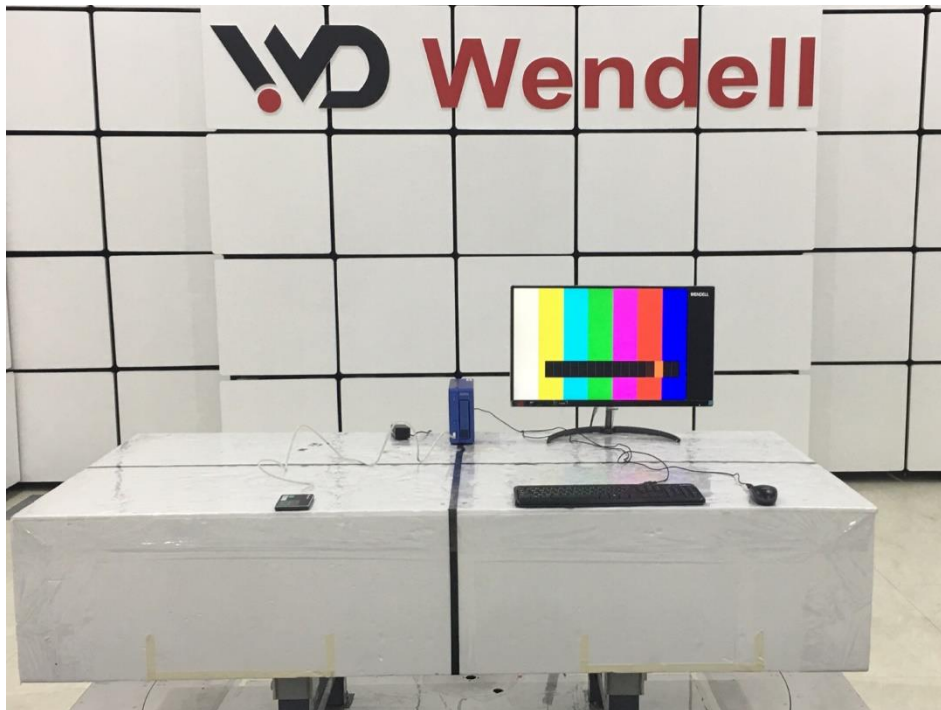
No.	Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB/m)	Measurement (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Table Degree (degree)	Antenna Height (cm)	Detector
1	1062.500	69.47	-18.84	50.63	70.00	-19.37	0	100	peak
2	1062.500	55.33	-18.84	36.49	50.00	-13.51	0	100	AVG
3	1487.500	67.87	-16.91	50.96	70.00	-19.04	130	100	peak
4	1487.500	53.79	-16.91	36.88	50.00	-13.12	130	100	AVG
5	1862.500	68.67	-16.53	52.14	70.00	-17.86	347	100	peak
6	1862.500	54.22	-16.53	37.69	50.00	-12.31	347	100	AVG
7	2137.500	74.67	-14.65	60.02	70.00	-9.98	139	100	peak
8	2137.500	60.39	-14.65	45.74	50.00	-4.26	139	100	AVG
9	2975.000	71.69	-12.47	59.22	70.00	-10.78	240	100	peak
10	2975.000	57.89	-12.47	45.42	50.00	-4.58	240	100	AVG
11	4462.500	64.39	-9.26	55.13	74.00	-18.87	360	100	peak
12	4462.500	50.66	-9.26	41.40	54.00	-12.60	360	100	AVG

**Remark:** 1. peak = Peak, AVG = Average  
2. Correction Factor = Antenna factor + Cable loss (Antenna to preamplifier ) - preamplifier Gain + Cable loss (preamplifier to receiver )  
3. Measurement Value = Reading Level + Correct Factor  
4. Margin Level = Measurement Value - Limit Value

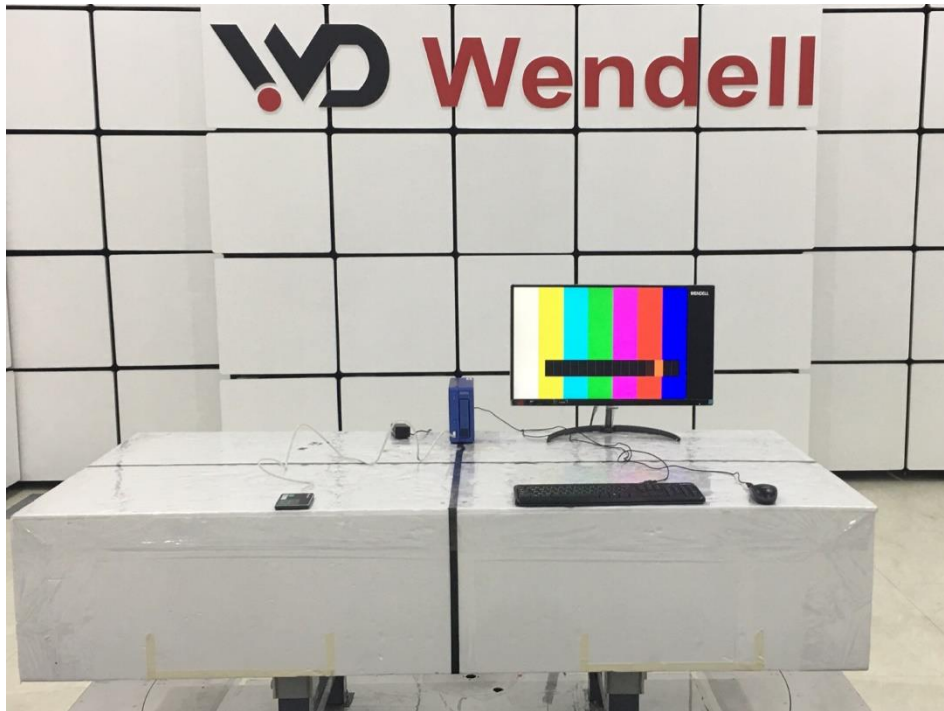


#### 4.3.7 Photographs of Test Configuration

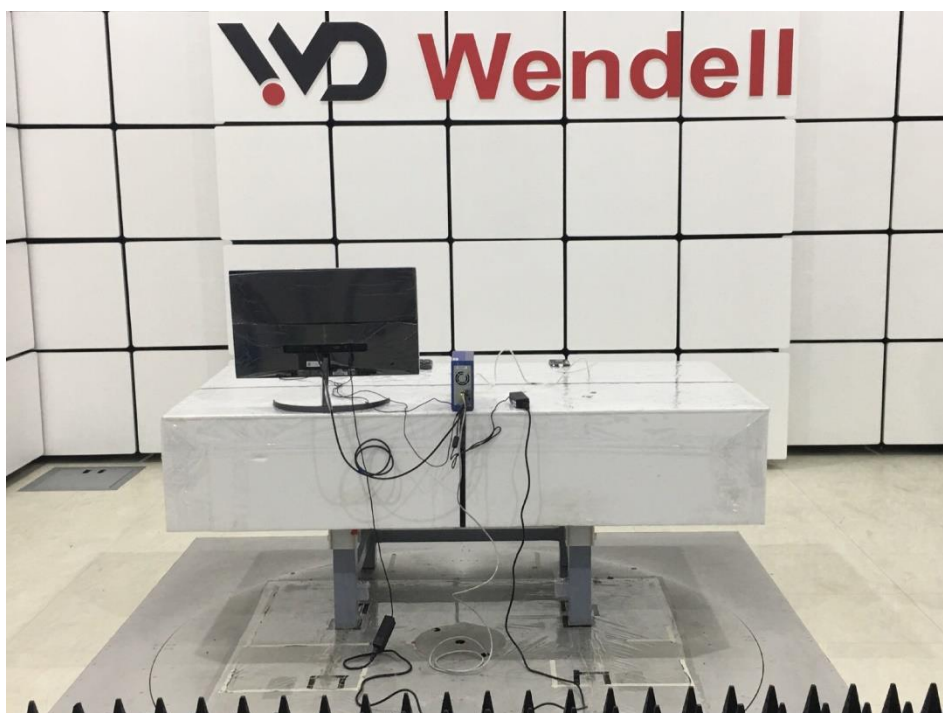
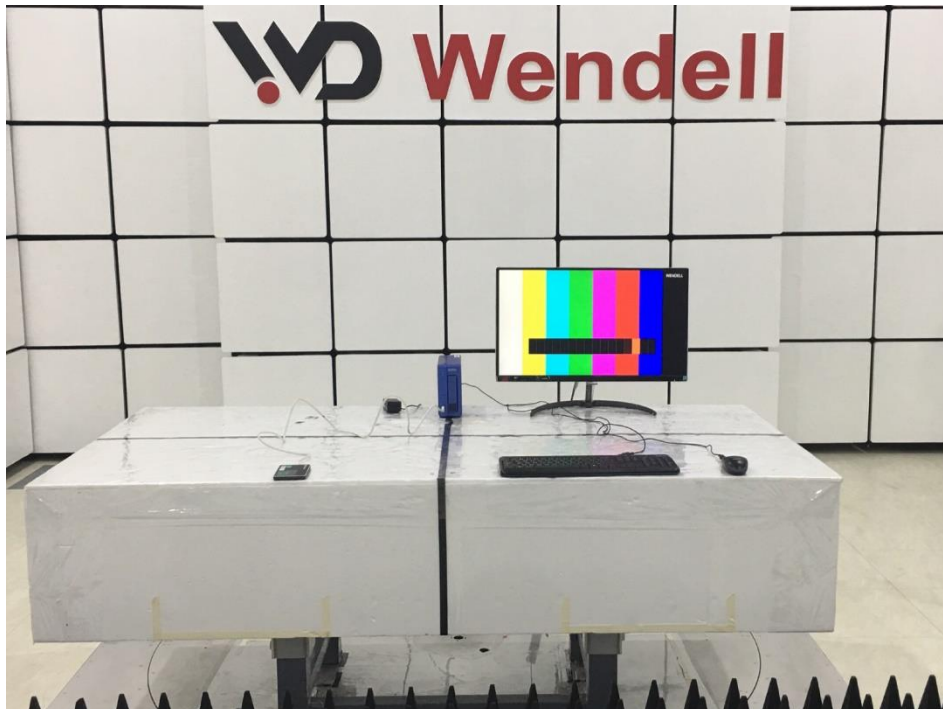
##### Radiated Emission Test (30MHz~1GHz) Test mode A



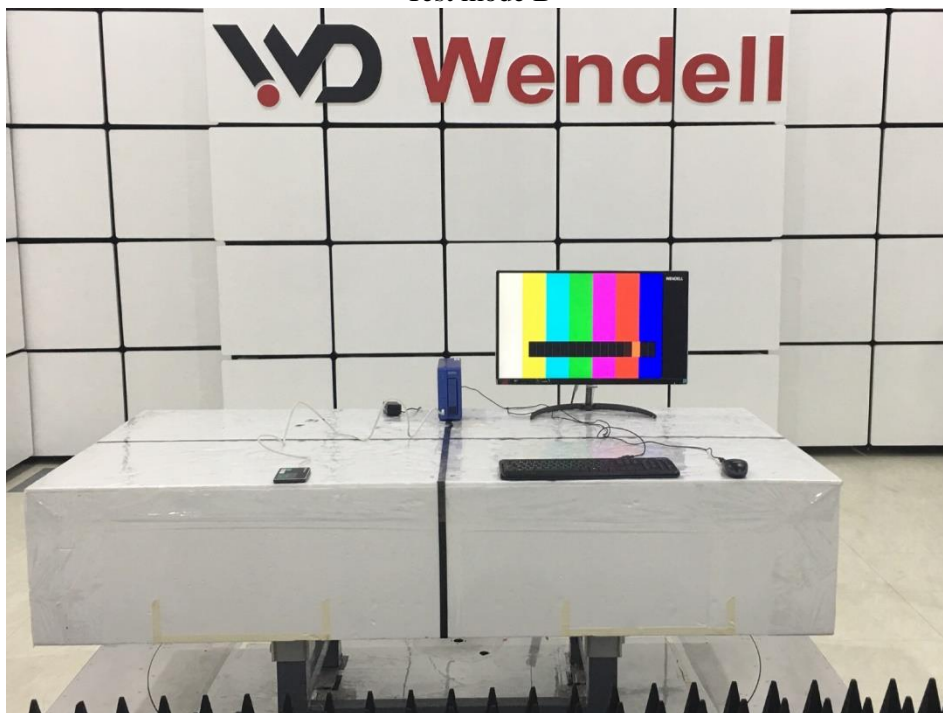
Test mode B



**Radiated Emission Test (Above 1GHz)**  
Test mode A



Test mode B





## 4.4 Harmonics Current Measurement

### 4.4.1 Limits of Harmonics Current Measurement

The limits ensure that harmonic disturbance levels do not exceed the compatibility levels defined in IEC 61000-3-2.

Limits for Class A equipment	
Harmonics Order n	Max. permissible harmonics current A
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
15<=n<=39	0.15x15/n
Even harmonics	
2	1.08
4	0.43
6	0.30
8<=n<=40	0.23x8/n

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

- Note:** 1. Class A and Class D are classified according to item section 5 of EN 61000-3-2.  
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.

### 4.4.2 Test Instrument

Item	Equipment	Manufacturer	Model	Meter No.	Calibration Date
1	Harmonics & Flicker Analyser	EMC PARTNER	HAR-1000-1P	CT-1-090(1)	Sep. 06, 2021
2	Power Source	EMC PARTNER	PS3-1	CT-1-090a1	Sep. 06, 2021

- Note:** 1. The calibration interval of the above test instruments is 12 months.

### 4.4.3 Test Procedure

The table-top EUT was placed on the top of a wooden table 0.8 meter above the ground and operated to produce the maximum harmonic under normal operating conditions for each successive harmonic component in turn. The floor-standing EUT was placed insulation support unit from the horizontal ground plane.

The classification of EUT is according to section 5 of EN 61000-3-2.

The EUT classified as follows:

Class A:

- Balanced three-phase equipment;
- Household appliances excluding equipment identified as Class D;
- Tools excluding portable tools;
- Dimmers for incandescent lamps;
- Audio equipment.

Equipment not specified in one of the three other classes should be considered as Class A equipment.

Note 1: Equipment that can be shown to have a significant effect on the supply system may be reclassified in a future edition of the standard. Factors to be taken into account include:

- Number in use;
- Duration of use;
- Simultaneity of use;
- Power consumption;
- Harmonic spectrum, including phase.

Class B:

- Portable tools;
- Arc welding equipment, which is not professional equipment.

Class C:

- Lighting equipment;

Class D:

Equipment having a specified power according to 6.2.2 less than or equal to 600W, of the following types:

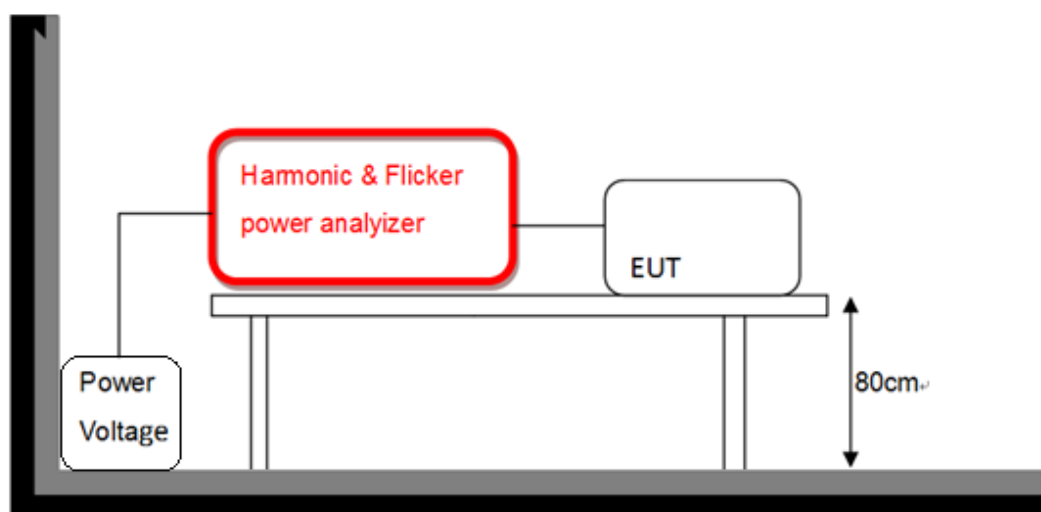
- Personal computers and personal computer monitors;
- Television receivers.
- Refrigerators and freezers having one or more variable-speed drives to control compressor motor(s).

#### 4.4.4 Deviation from Test Standard

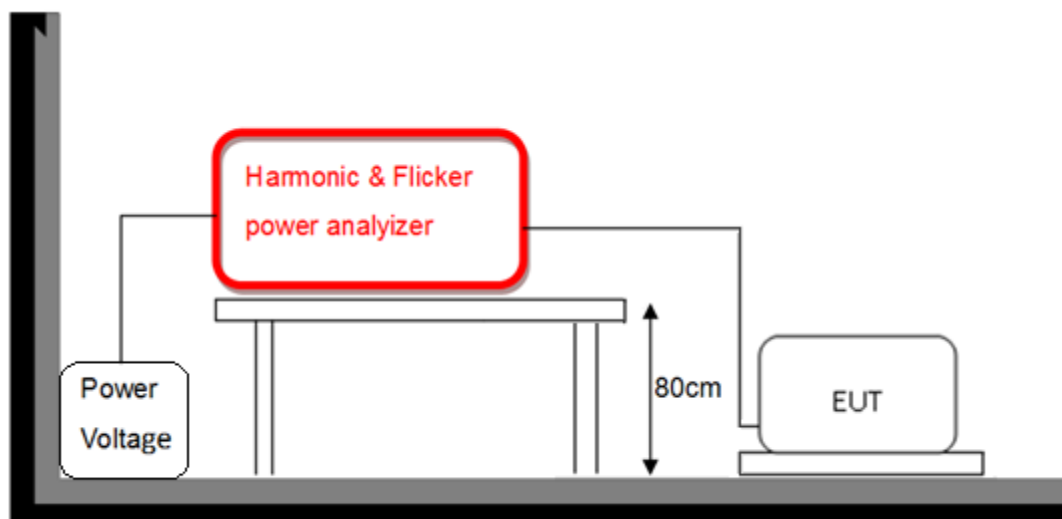
No deviation

#### 4.4.5 Test Setup

< Table-Top equipment >



< Floor-Standing equipment >



#### 4.4.6 Test Result

<b>Supply Voltage / Ampere</b>	229.7 Vrms / 0.291 Arms	<b>Test Date</b>	2021/10/22
<b>Test Duration</b>	5 min	<b>Power Consumption</b>	24.66W
<b>Power Frequency</b>	49.935Hz	<b>Power Factor</b>	0.370
<b>Environmental Conditions</b>	22°C, 53% RH	<b>Tested by</b>	Eric Hsieh
<b>Test Mode</b>	A		

**Note:**

1. Limits are not specified for equipment with a rated power of 75W or less (other than lighting equipment).
2. According to EN 61000-3-2 the manufacturer shall specify the power of the apparatus. This value shall be used for establishing limits. The specified power shall be within +/-10% of the measured power.

<b>Supply Voltage / Ampere</b>	229.7 Vrms / 0.149 Arms	<b>Test Date</b>	2021/10/22
<b>Test Duration</b>	5 min	<b>Power Consumption</b>	11.53W
<b>Power Frequency</b>	49.935Hz	<b>Power Factor</b>	0.337
<b>Environmental Conditions</b>	22°C, 53% RH	<b>Tested by</b>	Eric Hsieh
<b>Test Mode</b>	B		

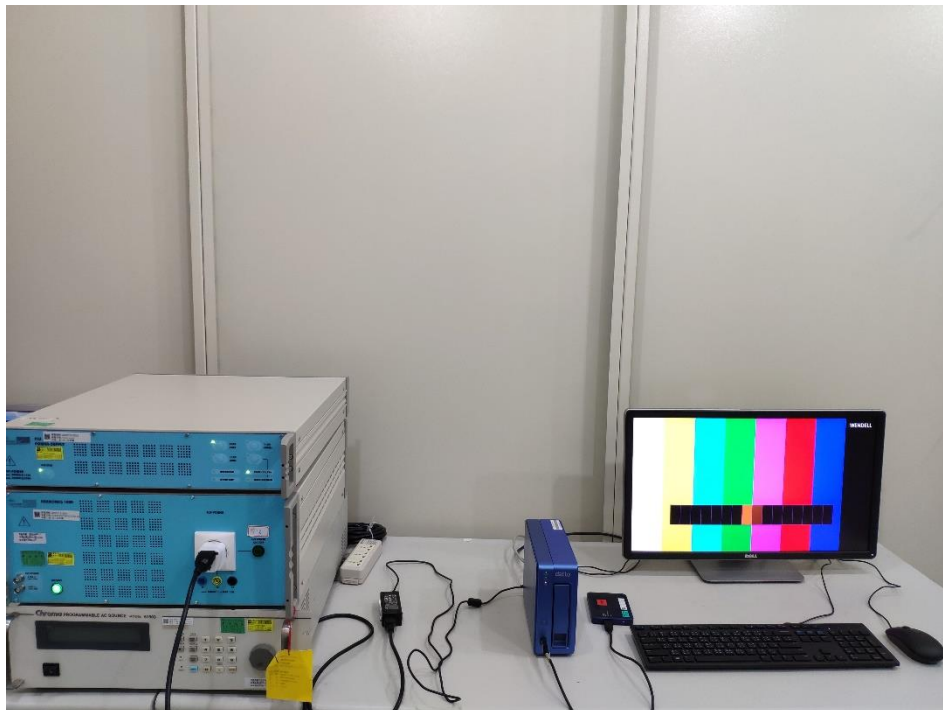
**Note:**

1. Limits are not specified for equipment with a rated power of 75W or less (other than lighting equipment).
2. According to EN 61000-3-2 the manufacturer shall specify the power of the apparatus. This value shall be used for establishing limits. The specified power shall be within +/-10% of the measured power.

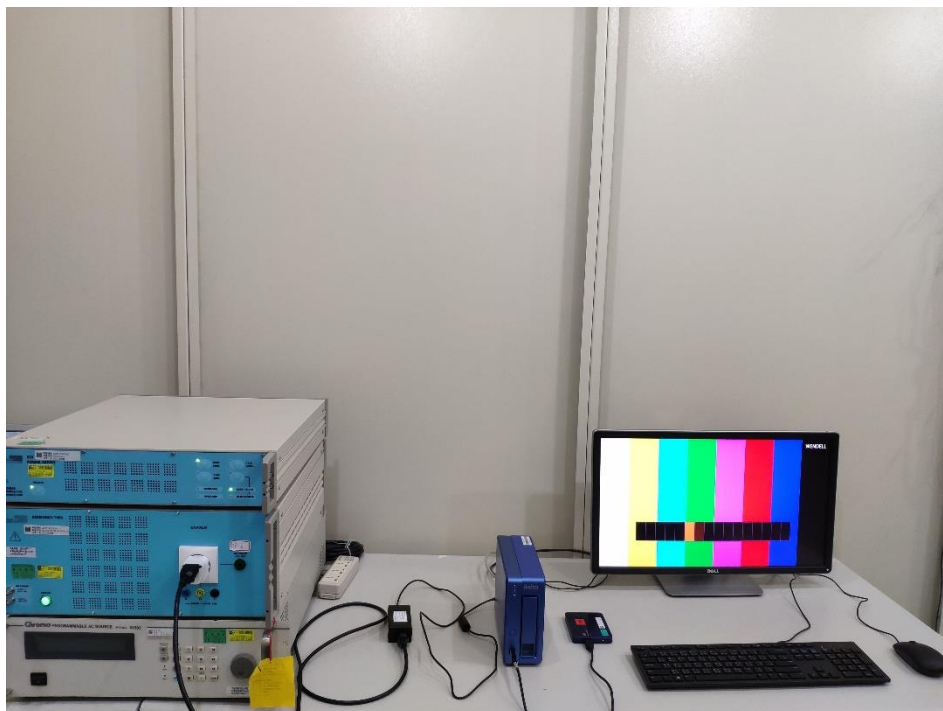


#### 4.4.7 Photographs of Test Configuration

Test mode A



Test mode B



## 4.5 Voltage Fluctuation and Flicker Measurement

### 4.5.1 Limit for Voltage Function and Flicker Measurement

Tests Item	Limits	Remark
	IEC/EN 61000-3-3	
P <sub>st</sub>	1.0, T <sub>p</sub> = 10 min.	P <sub>st</sub> means short-term flicker
P <sub>lt</sub>	0.65, T <sub>p</sub> =2 hr.	P <sub>lt</sub> means long-term flicker
D <sub>c</sub> (%)	3.3%	d <sub>c</sub> means relative steady-state voltage change
D <sub>max</sub> (%)	4%	d <sub>max</sub> means maximum relative voltage change.
T <sub>d</sub> (t)	3.3% / 500 ms	T <sub>d</sub> t means maximum time that d <sub>t</sub> exceeds 3.3 %.

### 4.5.2 Test Instrument

Item	Equipment	Manufacturer	Model	Meter No.	Calibration Date
1	Harmonics & Flicker Analyser	EMC PARTNER	HAR-1000-1P	CT-1-090(1)	Sep. 06, 2021
2	Power Source	EMC PARTNER	PS3-1	CT-1-090a1	Sep. 06, 2021

**Note:** 1. The calibration interval of the above test instruments is 12 months.

### 4.5.3 Test Procedure

The table-top EUT was placed on the top of a wooden table 0.8 meter above the ground and operated to produce the most unfavorable sequence of voltage changes under normal operating condition. The floor-standing EUT was placed insulation support unit from the horizontal ground plane.

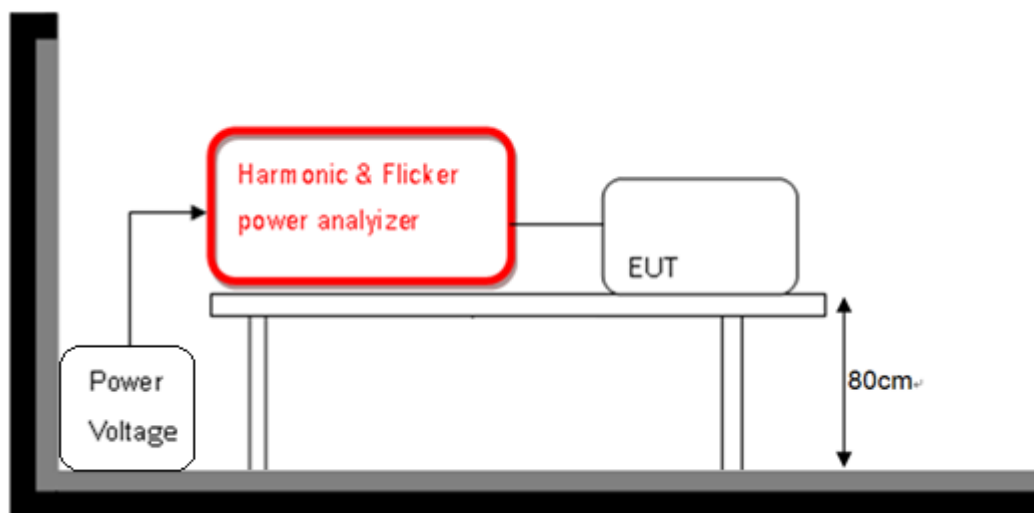
During the flick measurement, the measure time shall include that part of whole operation cycle in which the EUT produce the most unfavorable sequence of voltage changes. The observation period for short-term flicker indicator is 10 min and the observation period for long-term flicker indicator is 2 hours.

### 4.5.4 Deviation from Test Standard

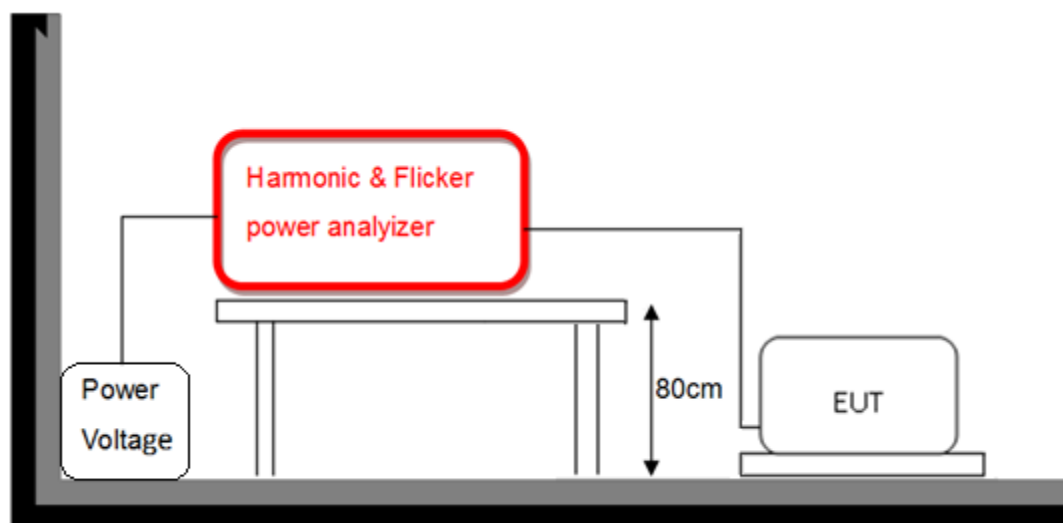
No deviation

### 4.5.5 Test Setup

#### < Table-Top equipment >



#### < Floor-Standing equipment >



#### 4.5.6 Test Result

Supply Voltage / Ampere	229.7 Vrms / 0.264 Arms	Test Date	2021/10/22
Observation (Tp)	30 min	Environmental Conditions	22°C, 53% RH
Power Frequency	49.935Hz	Tested by	Eric Hsieh
Test Mode	A		

Test Parameter	Measurement Value	Test Limit	Remarks
P <sub>st</sub>	0.07	1.00	Pass
P <sub>lt</sub>	0.07	0.65	Pass
T <sub>dt</sub> (ms)	0.00	500	Pass
d <sub>max</sub> (%)	0.00	4%	Pass
dc (%)	0.05	3.3%	Pass

- Note:**
1. P<sub>st</sub> means short-term flicker indicator.
  2. P<sub>lt</sub> means long-term flicker indicator.
  3. T<sub>dt</sub> means maximum time that dt exceeds 3.3 %.
  4. d<sub>max</sub> means maximum relative voltage change.
  5. dc means relative steady-state voltage change.

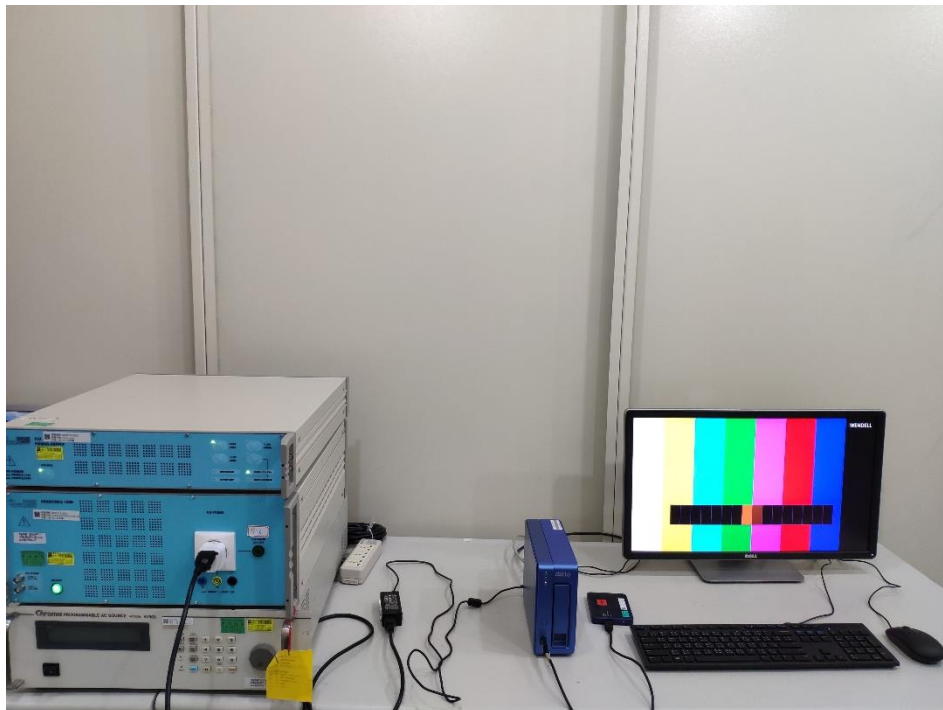
Supply Voltage / Ampere	229.7 Vrms / 0.257 Arms	Test Date	2021/10/22
Observation (Tp)	30 min	Environmental Conditions	22°C, 53% RH
Power Frequency	49.935Hz	Tested by	Eric Hsieh
Test Mode	B		

Test Parameter	Measurement Value	Test Limit	Remarks
P <sub>st</sub>	0.07	1.00	Pass
P <sub>lt</sub>	0.07	0.65	Pass
T <sub>dt</sub> (ms)	0.00	500	Pass
d <sub>max</sub> (%)	0.00	4%	Pass
dc (%)	0.04	3.3%	Pass

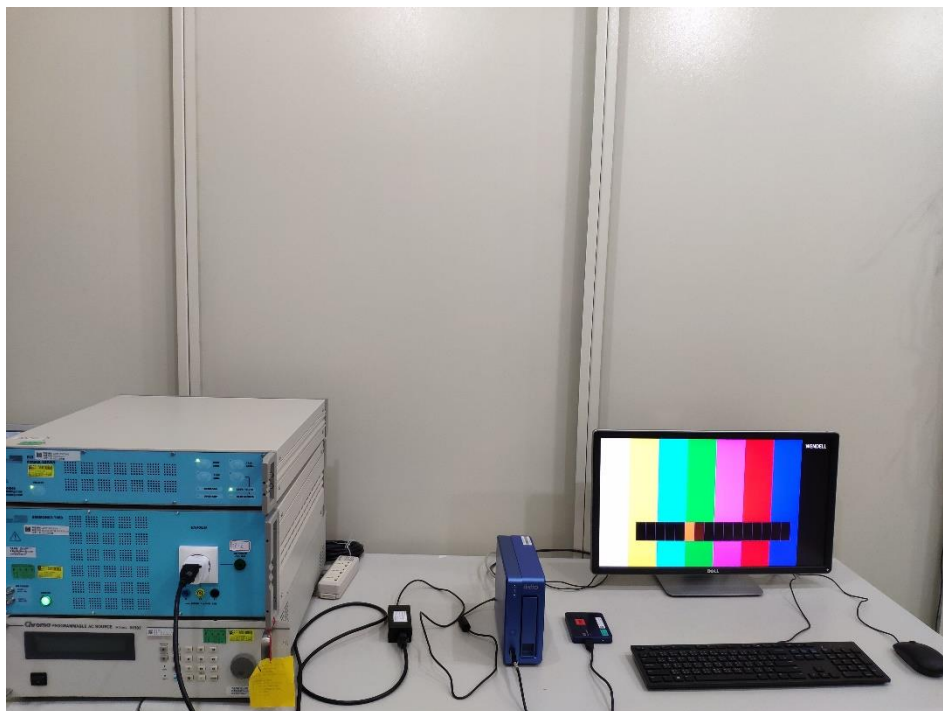
- Note:**
1. P<sub>st</sub> means short-term flicker indicator.
  2. P<sub>lt</sub> means long-term flicker indicator.
  3. T<sub>dt</sub> means maximum time that dt exceeds 3.3 %.
  4. d<sub>max</sub> means maximum relative voltage change.
  5. dc means relative steady-state voltage change.

#### 4.5.7 Photographs of Test Configuration

Test mode A



Test mode B



## 5 Immunity Test

### 5.1 Standard Description

Product standard	EN 55035	
Basic Standard and Performance Criterion required	IEC 61000-4-2 (ESD)	±4 kV Contact discharge, ±8 kV Air discharge, Performance Criterion B
	IEC 61000-4-3 (RS)	80 M ~ 1000 MHz, 3V/m(rms) , 80% AM (1kHz), 1800 MHz, 2600 MHz, 3500 MHz, 5000 MHz for spot test (Wireless communication device), 3V/m(rms), 80% AM (1kHz), Performance Criterion A
	IEC 61000-4-4 (EFT)	AC Main Power Port: ±1kV, DC Network Power Port (cable length > 3m): ±0.5 kV, Analogue/Digital Data Ports (cable length > 3m): ±0.5 kV, Performance Criterion B
	IEC 61000-4-5 (Surge)	AC Main Power Port: line to line ±1 kV, line to ground ±2 kV, DC Network Power Port (cable length > 3m): line to ground ±0.5 kV, Performance Criteria B Analogue/Digital Data Ports (unshielded symmetrical):line to ground Primary Protection: Intended, ±1 kV and ±4 kV, Primary Protection: Not Intended, ±1 kV, Performance Criteria C Analogue/Digital Data Ports (coaxial or shielded): shielded to ground, ±0.5 kV, Performance Criteria B
	IEC 61000-4-6 (CS)	AC Main Power Port, DC Network Power Port (cable length > 3m), Analogue/Digital Data Ports (cable length > 3m), 0.15 M ~ 10 MHz, 3Vrms, 80% AM, 1kHz, 10 M ~ 30 MHz, 3 - 1Vrms, 80% AM, 1kHz, 30 M ~ 80 MHz, 1Vrms, 80% AM, 1kHz, Performance Criterion A
	IEC 61000-4-8 (PFMF)	50Hz or 60Hz, 1 A/m, Performance Criterion A
	IEC 61000-4-11 (Dips)	Voltage Dips: >95% reduction, 0.5 period, Performance Criterion B 30% reduction, 25 period, Performance Criterion C Voltage Interruptions: >95% reduction, 250 period, Performance Criterion C

## 5.2 Performance Criteria

According to Clause 8 of EN 55035 standard, the general performance criteria as following:

<b>Criteria A</b>	The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment 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, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
<b>Criteria B</b>	<p>During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test.</p> <p>After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment 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), or recovery time is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.</p>
<b>Criteria C</b>	<p>Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed.</p> <p>Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</p>

### 5.3 Electrostatic Discharge (ESD)

#### 5.3.1 Test Specification

<b>Standard</b>	IEC/EN 61000-4-2
<b>Discharge Impedance</b>	330 ohm / 150 pF
<b>Discharge Voltage</b>	Air Discharge: $\pm 2, \pm 4, \pm 8$ kV (Direct) Contact Discharge: $\pm 4$ kV (Direct/Indirect)
<b>Number of Discharge</b>	Air: Minimum 10 times at each point. Contact: Minimum 10 times at each points
<b>Discharge Mode</b>	Single Discharge
<b>Discharge Period</b>	1 second minimum

#### 5.3.2 Test Instrument

Item	Equipment	Manufacturer	Model	Meter No.	Calibration Date
1	ESD Generator	TESEQ	NSG 437	CT-1-140	Sep. 22, 2021
2	ESD Generator	NoiseKen	ESS-B3011	CT-1-089	Aug. 06, 2021
3	ESD Simulator/ Discharge Gun	NoiseKen	ESS-2002 & TC-815R	CT-1-010(1)	Sep. 02, 2021
4	Digital Thermo-Hygro Meter	N/A	HTC-8	CT-2-047	Jun. 01, 2021
5	Atmosphere pressure meter	TES	TES-1161	CT-5-094	Aug. 10, 2021

**Note:** 1. The calibration interval of the test instruments is 12 months.  
2. The calibration interval of thermo hygrometer/ Atmosphere pressure meter is 24 months.



### 5.3.3 Test Procedure

The test generator necessary to perform direct and indirect application of discharge to the EUT in following methods:

a. Contact discharges to the conductive surface and coupling planes:

For table-top equipment one of the test points shall be the centre front edge of the horizontal coupling plane, which shall be subjected to at least 20 indirect discharges (10 of each polarity). All other test points shall each receive at least 20 direct contact discharges (10 of each polarity). All areas normally touched by the user should be tested. Test shall be performed at a maximum repetition rate of one discharge per second.

**Vertical Coupling Plane (VCP):**

The coupling plane, of dimensions 0.5 m × 0.5 m, is placed parallel to, and positioned at a distance 0.1 m from, the EUT, with the discharge electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.

**Horizontal Coupling Plane (HCP):**

The coupling plane, of dimensions 1.6 m × 0.8 m, is placed under the EUT. The generator shall be positioned vertically a distance of 0.1 m from the EUT, with the discharge electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.

b. Air discharge at apertures and slots and insulating surface:

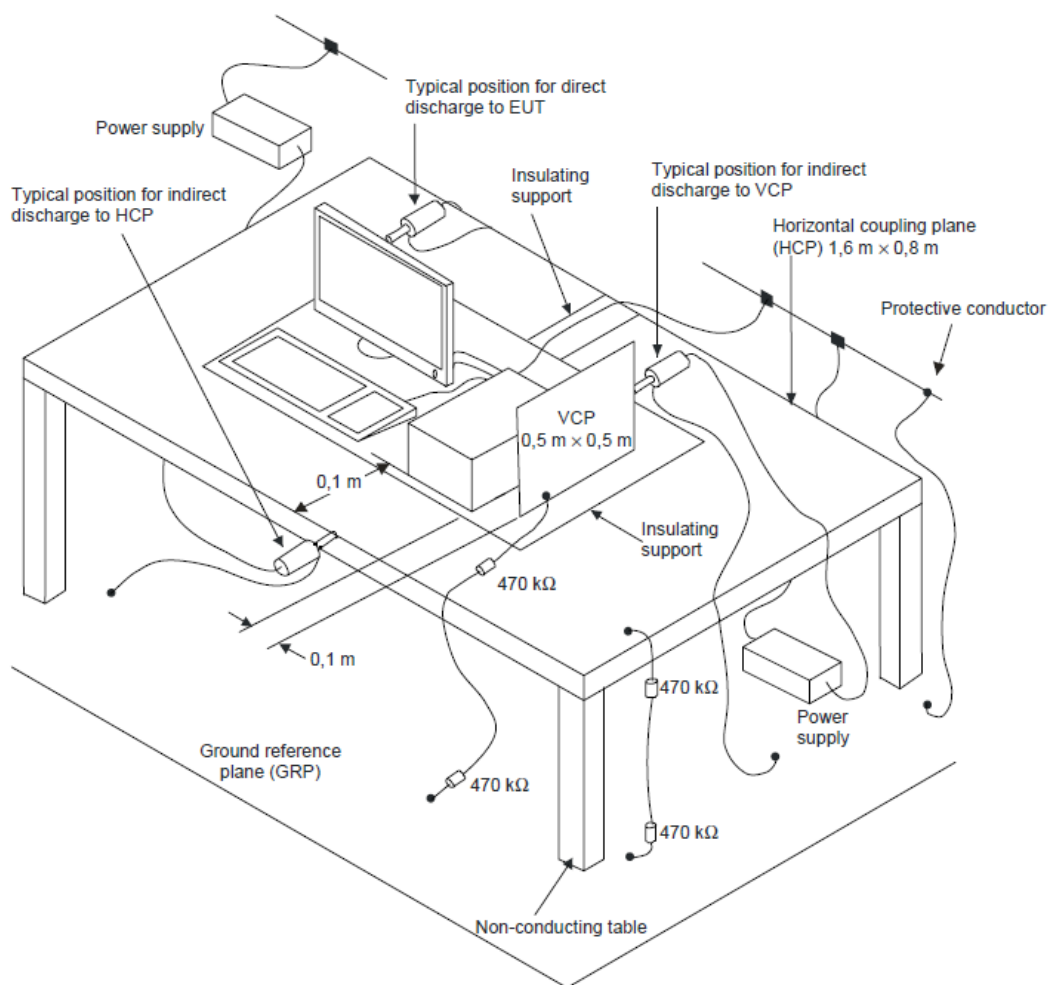
On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur. Such points are tested using the air discharge method. This investigation should be restricted to those area normally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

### 5.3.4 Deviation from Test Standard

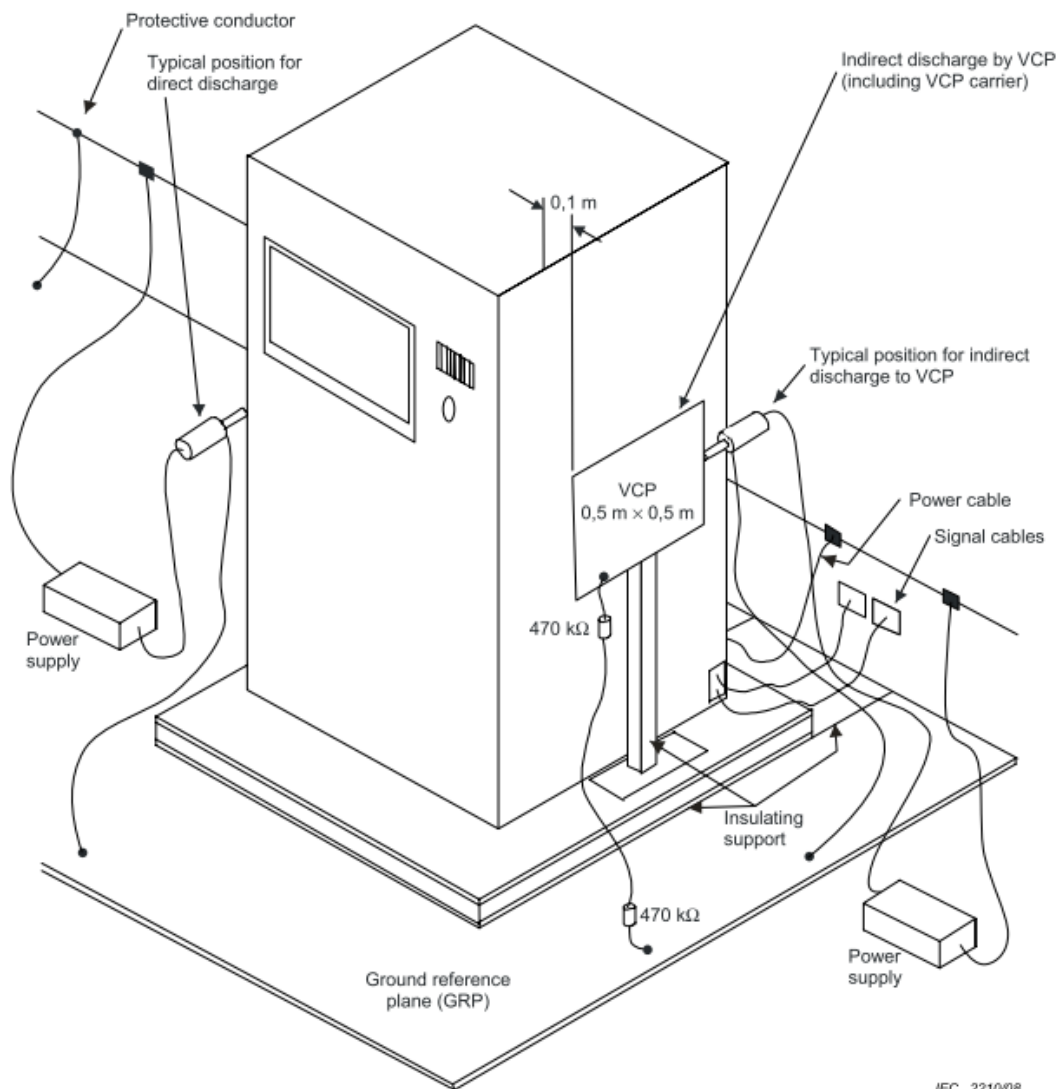
No deviation

### 5.3.5 Test Setup

< Table-Top equipment >



### < Floor-Standing equipment >



IEC 2210/08

### 5.3.6 Test Result

<b>Test Voltage</b>	230Vac, 50Hz	<b>Test Date</b>	2021/12/10
<b>Environmental Conditions</b>	22°C, 54% RH	<b>Pressure</b>	1010 mbar
<b>Tested by</b>	Guanwei Liao	<b>Test Mode</b>	A, B

#### Test Results of Direct Application

Air Discharge				
Test Point	Discharge Level (kV)			Result
	±2	±4	±8	
Front	A	A	A	A
Back	A	A	A	A
Left	A	A	A	A
Right	A	A	A	A
Top	A	A	A	A
Bottom	A	A	A	A
Other	A	A	A	A

\* Test location(s) in which discharge to be applied illustrated by photos shown in next page(s).

Contact Discharge		
Test Point	Discharge Level (kV)	
	±4	
Front	N/A	
Back	A	
Left	N/A	
Right	N/A	
Top	N/A	
Bottom	N/A	
Other	N/A	

\* Test location(s) in which discharge to be applied illustrated by photos shown in next page(s).

**Test Results of Indirect Application**

HCP Discharge		
Test Point	Discharge Level (kV)	Result
	$\pm 4$	
Front	A	A
Back	A	A
Left	A	A
Right	A	A

VCP Discharge		
Test Point	Discharge Level (kV)	Result
	$\pm 4$	
Front	A	A
Back	A	A
Left	A	A
Right	A	A

**Note:**

N/A: Not applicable

Criteria A: The EUT function was correct during the test.

Criteria A: (#1) No discharge point.

## Description of Test Points

Front



Back



\*Red Dot - Contact Discharged  
Blue Dot - Air Discharged

Left



Right



\*Red Dot - Contact Discharged  
Blue Dot - Air Discharged



Top



Bottom



\*Red Dot - Contact Discharged  
Blue Dot - Air Discharged



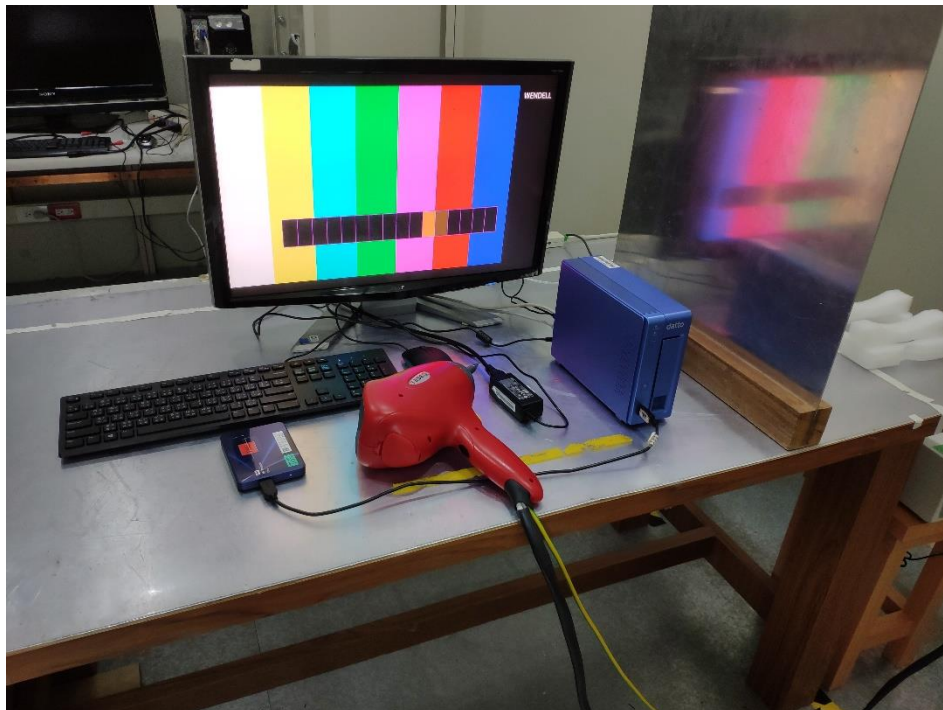
Other



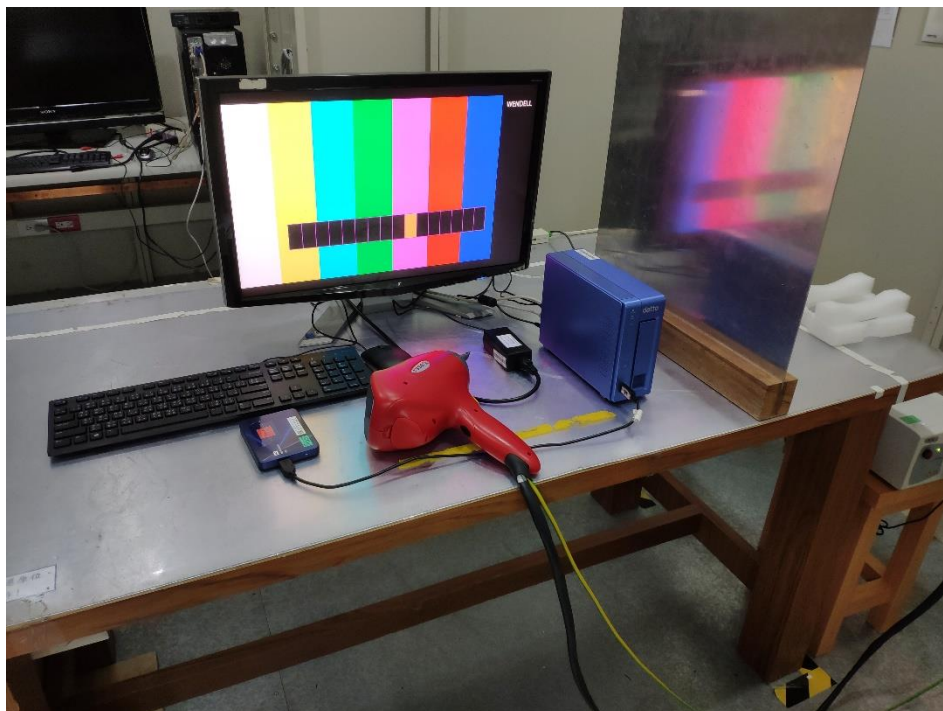
\*Red Dot - Contact Discharged  
Blue Dot - Air Discharged

### 5.3.7 Photographs of Test Configuration

Test mode A



Test mode B



## 5.4 Radiated, Radio-frequency, Electromagnetic Field Immunity Test (RS)

### 5.4.1 Test Specification

<b>Standard</b>	IEC/EN 61000-4-3
<b>Frequency Range</b>	80MHz - 1000MHz 1800MHz, 2600MHz, 3500MHz, 5000MHz for spot test
<b>Field Strength</b>	3 V/m
<b>Modulation</b>	80%, AM Modulation 1 kHz Sine Wave
<b>Frequency Step</b>	1%
<b>Polarity of Antenna</b>	Horizontal and Vertical
<b>Test Distance</b>	3 m
<b>Antenna Height</b>	1.5 m
<b>Dwell Time</b>	3 seconds or not exceed 5 seconds

### 5.4.2 Test Instrument

Item	Equipment	Manufacturer	Model	Meter No.	Calibration Date
1	RadiCentre ® Modular EMC Test Systems	DARE	CTR1004B	CT-1-080	No calibration request
2	RF Signal Generator	DARE	RGN6000B	CT-1-080	Aug. 11, 2021
3	LINEAR POWER RF AMPLIFIER	TESEQ	CBA1G-300 D	CT-1-163	Jul. 18, 2021
4	LINEAR POWER RF AMPLIFIER	OPHIR	5193	CT-1-083	Aug. 11, 2021
5	LINEAR POWER RF AMPLIFIER	OPHIR	5022A	CT-1-084	Aug. 11, 2021
6	Periodic Test-Antenna	Schwarzbeck Mess - Elektronik	STLP 9128 E	CT-1-085	No calibration request
7	Stacked Microwave Log.-Per. Antenna	Schwarzbeck Mess - Elektronik	STLP 9149	CT-1-086	No calibration request
8	Electric Field Probe	FRANKONIA	EFS-10	CT-1-060a1	Aug. 27, 2021
9	Measurement Software	EMC-RS	Ver: 2.02	N/A	No calibration request

**Note:** 1. The calibration interval of the above test instruments is 12 months.

### 5.4.3 Test Procedure

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

The table-top EUT and load, which are placed on a table that is 0.8 meter above ground, are placed with one coincident with the calibration plane such that the distance from antenna to the EUT was 3 meters.

Both horizontal and vertical polarization of the antenna and four sides of the EUT are set on measurement.

The EUT shall be positioned so that the four sides of the EUT shall be exposed to the electromagnetic field in sequence. In each position the performance of the EUT will be investigated.

In the case where the most sensitive surface side of the EUT is known throughout the frequency range (for example, via preliminary tests), testing may be restricted to that surface side only. Where it is not possible to determine the most sensitive face with any certainty (for example where different faces are sensitive at different frequencies) all four faces shall be tested.

If the EUT is too large such that it cannot be fully illuminated by the radiating antenna, or exceeds the size of the Uniform Field Area (UFA) then partial illumination shall be used. The EUT can be repositioned so that the front surface remains within the UFA in order to illuminate those sections of the EUT that were previously outside the UFA.

In order to judge the EUT performance, a CCD camera is used to monitor EUT screen.

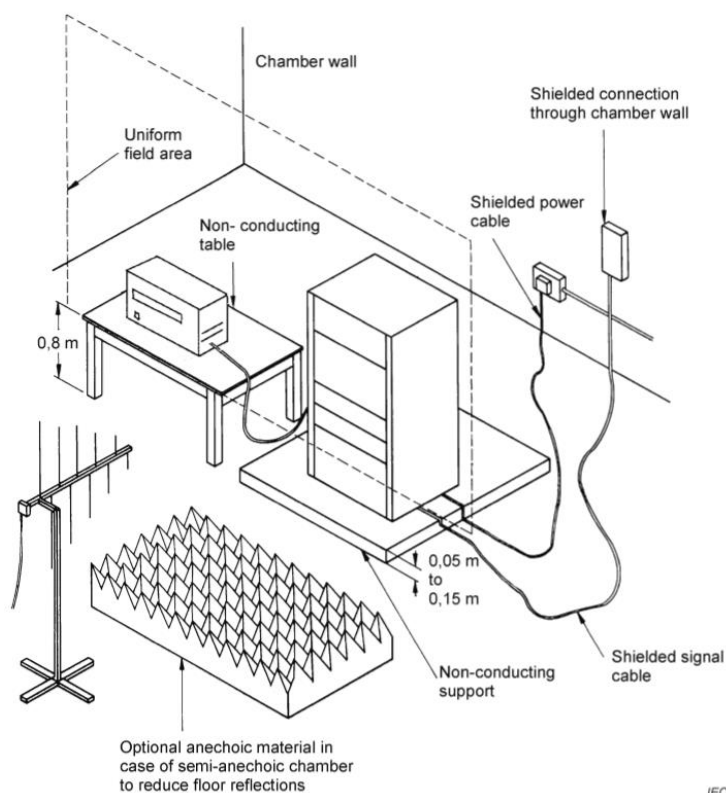
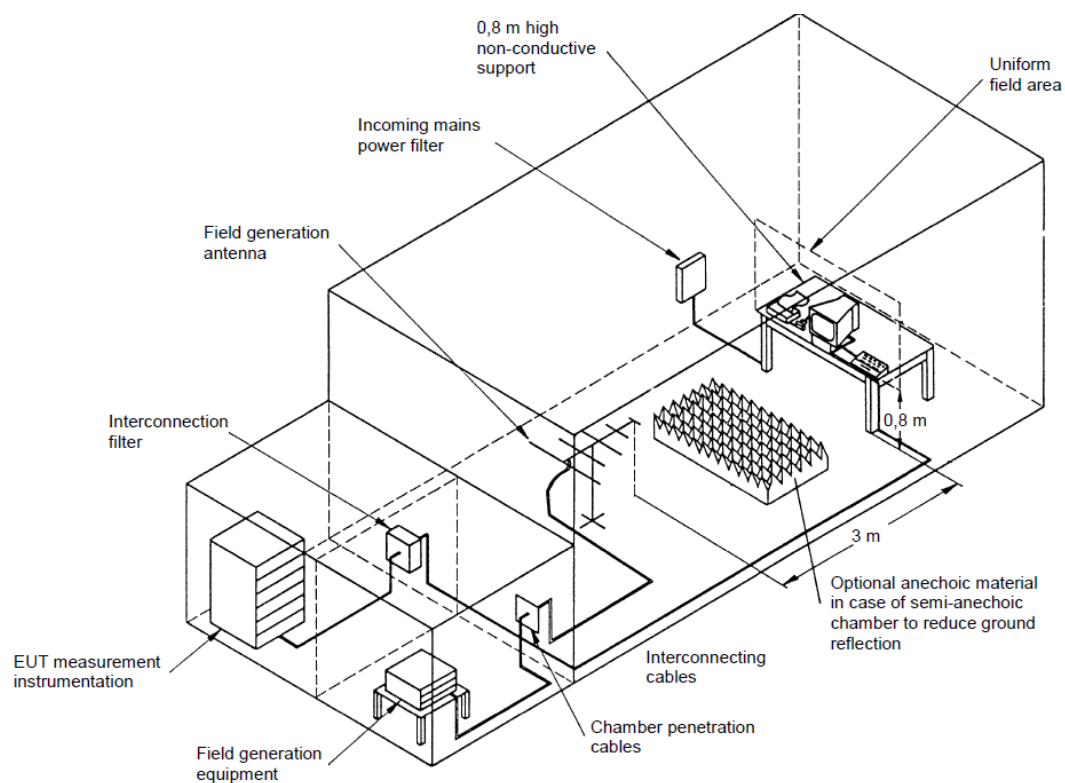
All the scanning conditions are as follows:

	Condition of Test	Remarks
1	Field Strength	3V/m
2	Radiated Signal	AM 80% Modulated with 1kHz
3	Scanning Frequency	80M - 1000MHz
4	Spot Frequency for Wireless communication device	1800MHz, 2600MHz, 3500MHz, 5000MHz
5	Dwell Time	3.0 seconds or not exceed 5 seconds
6	Frequency Step Size $\Delta f$	1%

### 5.4.4 Deviation from Test Standard

No deviation

## 5.4.5 Test Setup



IEC 033/06



### 5.4.6 Test Result

Test Voltage	230Vac, 50Hz	Environmental Conditions	21°C, 51% RH
Tested by	Guanwei Liao	Test Date	2021/10/29
Test Mode	A, B		

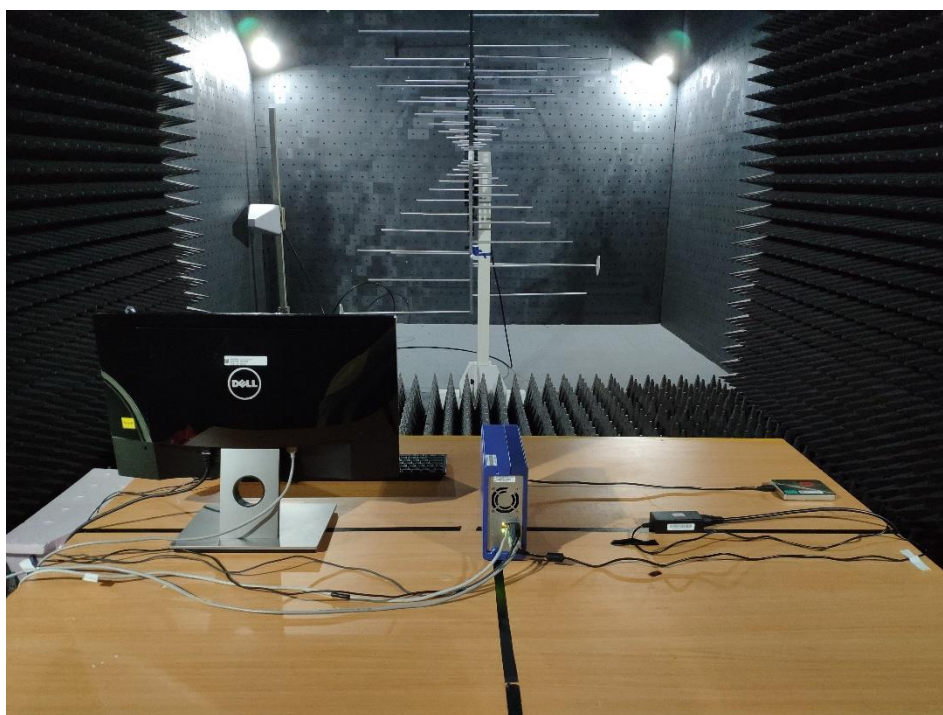
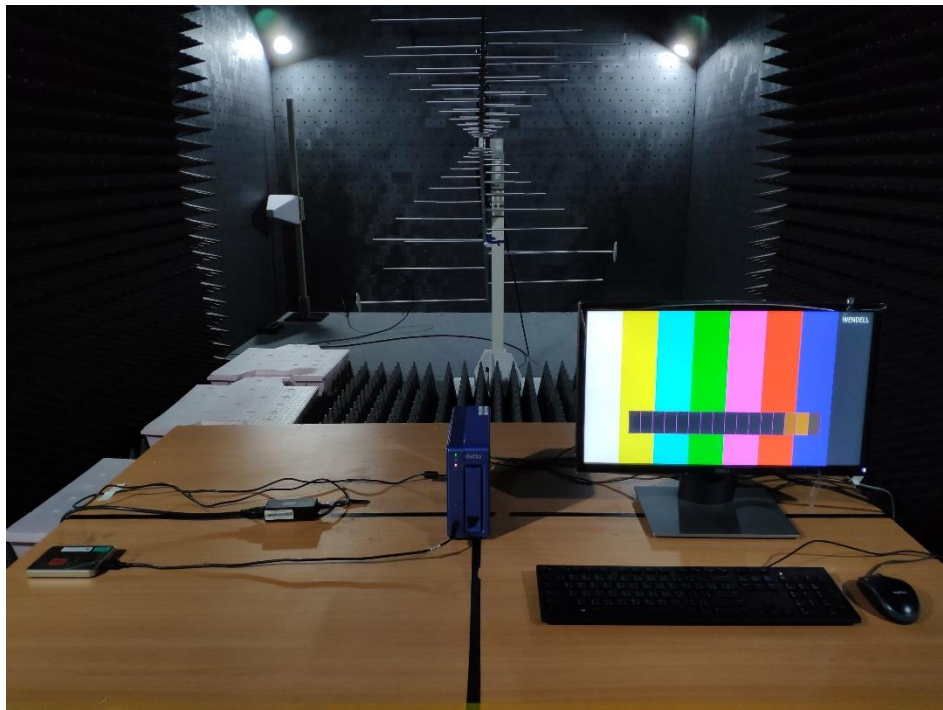
Frequency Range (MHz)	Azimuth	Polarity	Field Strength (V/m)	Modulation	Result
80-1000	0, 90, 180, 270	H/V	3	80% AM (1kHz)	A
1800	0, 90, 180, 270	H/V	3	80% AM (1kHz)	A
2600	0, 90, 180, 270	H/V	3	80% AM (1kHz)	A
3500	0, 90, 180, 270	H/V	3	80% AM (1kHz)	A
5000	0, 90, 180, 270	H/V	3	80% AM (1kHz)	A

**Note:**

Criteria A: The EUT function was correct during the test.

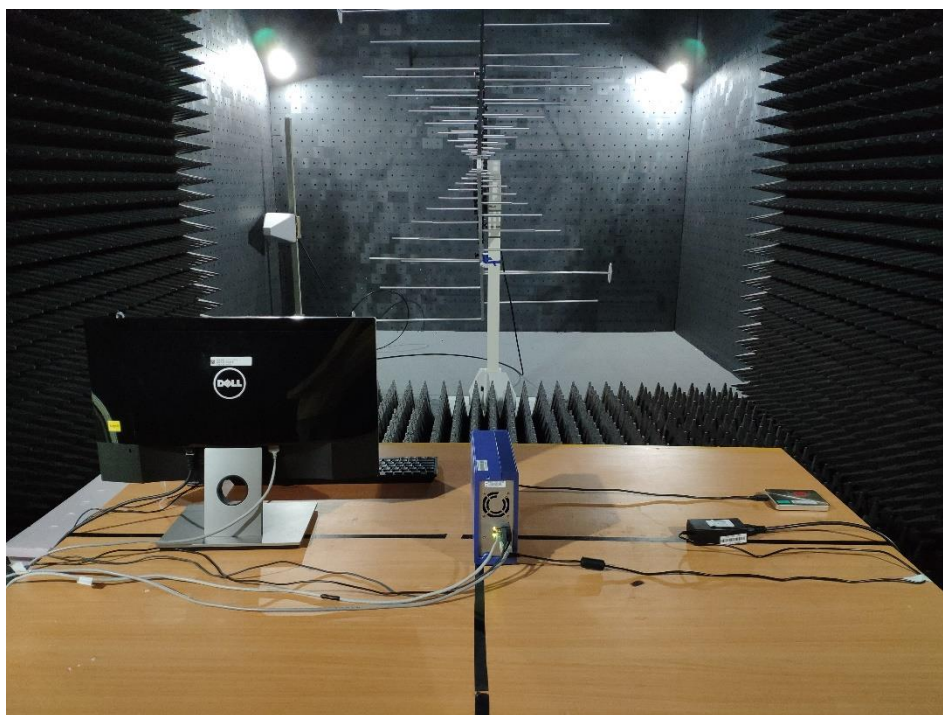
## 5.4.7 Photographs of Test Configuration

Test mode A





Test mode B



## 5.5 Electrical Fast Transient /Burst Immunity Test (EFT)

### 5.5.1 Test Specification

<b>Standard</b>	IEC/EN 61000-4-4
<b>Test Voltage</b>	AC Main Power Port: $\pm 1\text{ kV}$ , DC Network Power Port <sup>(Note 1)</sup> (cable length > 3m): $\pm 0.5\text{ kV}$ , Analogue/Digital Data Ports (cable length > 3m): $\pm 0.5\text{ kV}$ ,
<b>Polarity</b>	Positive & Negative
<b>Impulse Frequency</b>	CPE xDSL Ports: 100kHz Other: 5kHz
<b>Impulse Wave</b>	5/50 ns
<b>Burst Duration</b>	15 ms
<b>Burst Period</b>	300 ms
<b>Test Duration</b>	Not less than 1 min.

**Note:** 1. Applicable only to port which, according to the manufacturer's specification, support cabled lengths greater than 3m.

### 5.5.2 Test Instrument

Item	Equipment	Manufacturer	Model	Meter No.	Calibration Date
1	EFT Generator	3ctest	EFT500S	CT-1-165	Sep. 22, 2021
2	Clamp	3ctest	CCC100	CT-1-166	Sep. 22, 2021

**Note:** 1. The calibration interval of the above test instruments is 12 months.

### **5.5.3 Test Procedure**

The table-top EUT was placed on a table that is 0.8 meter height. A ground reference plane is placed on the table, and uses 0.1m insulation between the EUT and ground reference plane. The floor-standing EUT was placed on 0.1m insulation support unit between the EUT and ground reference plane.

The minimum area of the ground reference plane is  $1\text{m} \times 1\text{m}$ , and 0.65mm thick min, and projected beyond the EUT by at least 0.1m on all sides.

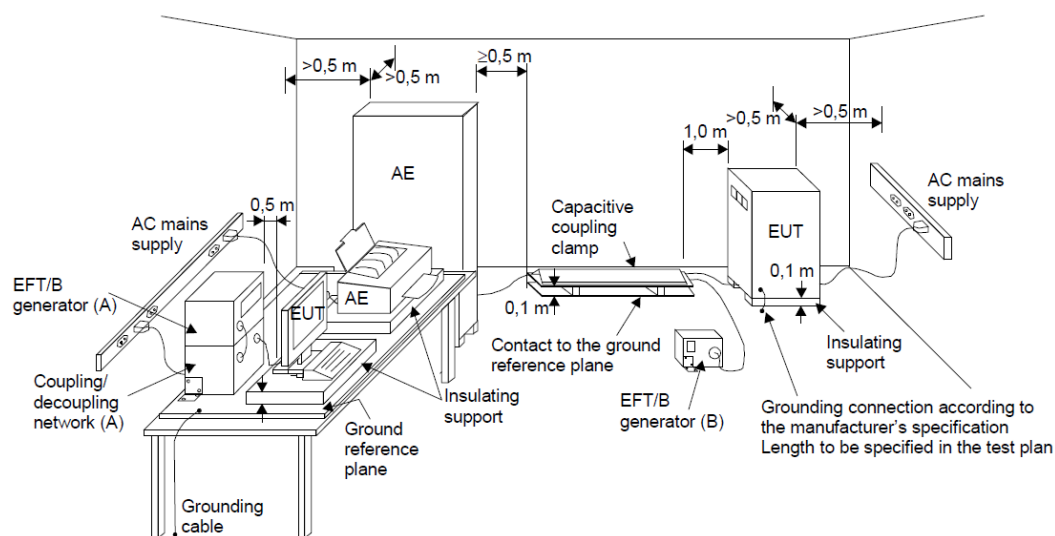
For input AC power ports:

The EUT is connected to the power mains through a coupling device that directly couples the EFT/B interference signal. Each of the line conductors is impressed with burst noise for 1 minute. The length of the power lines between the coupling device and the EUT is 0.5m.

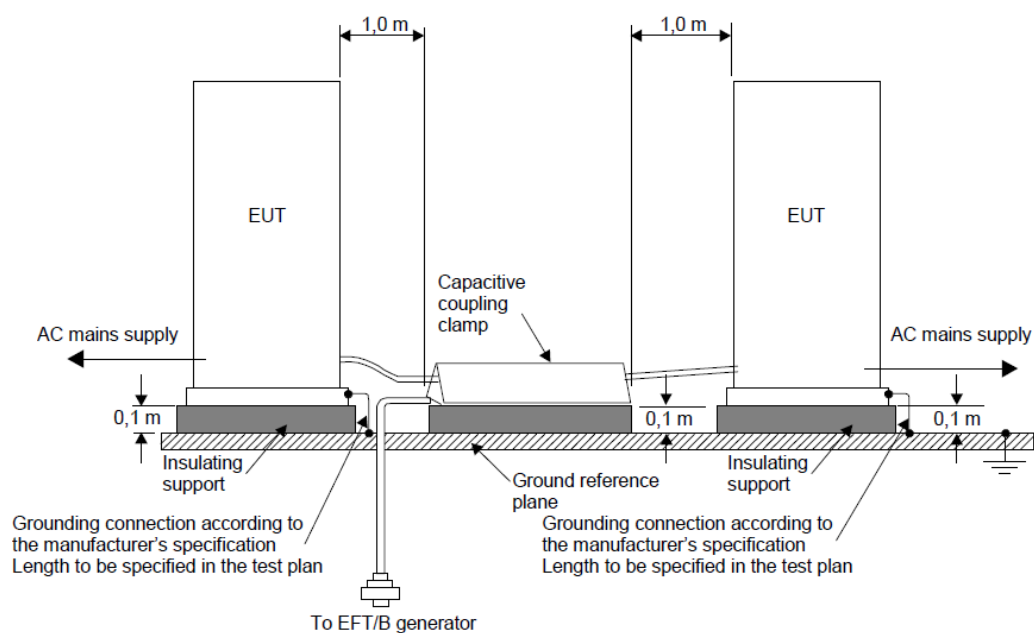
### **5.5.4 Deviation from Test Standard**

No deviation

## 5.5.5 Test Setup



- (A) location for supply line coupling
- (B) location for signal lines coupling





### 5.5.6 Test Result

Test Voltage	230Vac, 50Hz	Environmental Conditions	22°C, 54% RH
Tested by	Guanwei Liao	Test Date	2021/10/25
Test Mode	A, B		

Test Point		Test Level (kV)	Polarity (+/-)	Result
AC Power Port	L	1	+/-	A
	N	1	+/-	A
	PE	1	+/-	A
	L + N	1	+/-	A
	L + PE	1	+/-	A
	N + PE	1	+/-	A
	L + N + PE	1	+/-	A
Signal Ports Telecommunication Ports	RJ45	0.5	+/-	A

**Note:**

Criteria A: The EUT function was correct during the test.

### 5.5.7 Photographs of Test Configuration

Test mode A

Power



Signal





Test mode B

Power



Signal



## 5.6 Surge Immunity Test

### 5.6.1 Test Specification

<b>Standard</b>	IEC/EN 61000-4-5
<b>Wave- Shape</b>	AC Main Power Port: 1.2/50 $\mu$ s Open Circuit Voltage, 8/20 $\mu$ s Short Circuit Current DC Network Power Port <sup>(Note 1)</sup> : 1.2/50 $\mu$ s Open Circuit Voltage, 8/20 $\mu$ s Short Circuit Current Analogue/Digital Data Ports (unshielded symmetrical) (Direct to outdoor cables <sup>(Note 2, 3)</sup> ): 10/700 $\mu$ s Open Circuit Voltage, 5/320 $\mu$ s Short Circuit Current Analogue/Digital Data Ports (coaxial or shielded) (Direct to outdoor cables <sup>(Note 2, 3)</sup> ): 1.2/50 $\mu$ s Open Circuit Voltage, 8/20 $\mu$ s Short Circuit Current
<b>Test Voltage</b>	AC Main Power Port: line to line $\pm 1$ kV, line to ground $\pm 2$ kV, DC Network Power Port (cable length > 3m): line to ground $\pm 0.5$ kV, Analogue/Digital Data Ports (unshielded symmetrical):line to ground Primary Protection: Intended $\pm 1$ kV and $\pm 4$ kV, Primary Protection: Not Intended $\pm 1$ kV, Analogue/Digital Data Ports (coaxial or shielded): shielded to ground $\pm 0.5$ kV
<b>Surge Input / Output</b>	L1-L2, L1-PE, L2-PE
<b>Polarity</b>	Positive/Negative
<b>Phase Angle</b>	0°/90°/180°/270°
<b>Pulse Repetition Rate</b>	1 time / min. (maximum)
<b>Times</b>	5 Positive and 5 Negative at selected points

- Note:**
1. Applicable only to port which, according to the manufacturer's specification, support cabled lengths greater than 3 m.
  2. Surges are applied with primary protection fitted. Where possible, use the actual primary protector intended to be use in the installation. Where the surge coupling network for the 10/700 (5/320)  $\mu$ s wave affects the functioning of high speed data ports, the test shall be carried out using 1.2/50 (8/20)  $\mu$ s wave and appropriate coupling network.
  3. Surges are applicable to ports which satisfy all the following conditions:  
May connect directly to cables that leave the building structure.  
Defined as an antenna port, a wired network, or a broadcast receiver tuner port.  
Typical port covered include xDSL, PSTN, CATV, antenna and similar. Exclude ports are LAN and similar.



### 5.6.2 Test Instrument

Item	Equipment	Manufacturer	Model	Meter No.	Calibration Date
1	Surge Generator	HAEFELY	AXOS8	CT-1-059(1)	Aug. 06, 2021
2	Surge CDN	3cTest	CDN-405T8A1	CT-1-074(5)	May 25, 2021

**Note:** 1. The calibration interval of the above test instruments is 12 months.

### 5.6.3 Test Procedure

The EUT is placed on a table that is 0.8 meter above a metal ground plane measured 1m × 1m minimum and 0.65mm thick minimum and projected beyond the EUT by at least 0.1m on all sides. The length of power cord between the coupling device and the EUT shall be 2m or less.

For input AC power ports:

The EUT is connected to the power mains through a coupling device that directly couples the surge interference signal.

The surge noise shall be applied synchronized to the voltage phase at 0°, 90°, 180°, 270° and the peak value of the AC voltage wave. (Positive and negative)

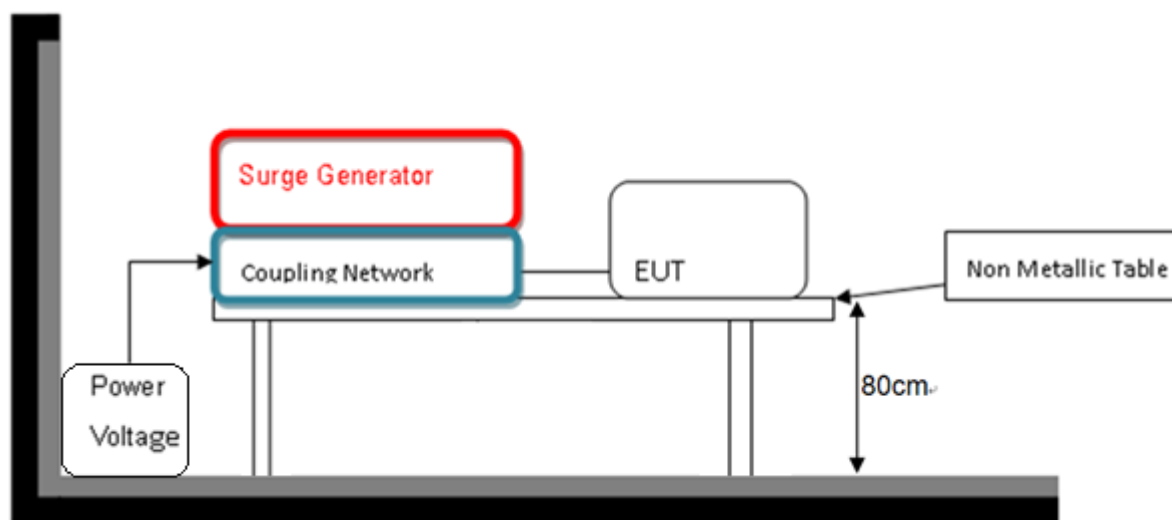
Each of Line to Earth and Line to Line is impressed with a sequence of five surge voltages with interval of 1 minute.

## 5.6.4 Deviation from Test Standard

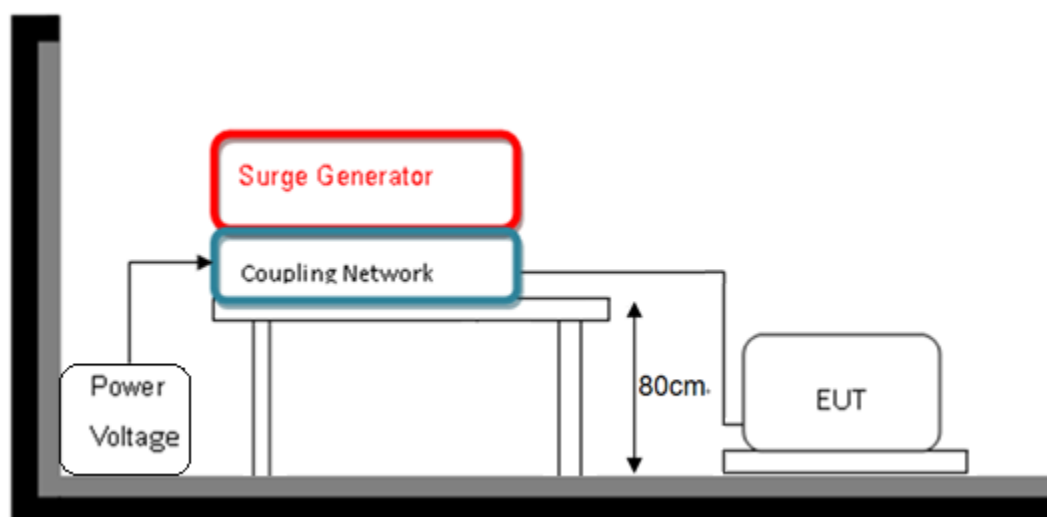
No deviation

## 5.6.5 Test Setup

< Table-Top equipment >



< Floor-Standing equipment >



### 5.6.6 Test Result

Test Voltage	230Vac, 50Hz	Environmental Conditions	22°C, 52% RH
Tested by	Guanwei Liao	Test Date	2021/11/01
Test Mode	A, B		

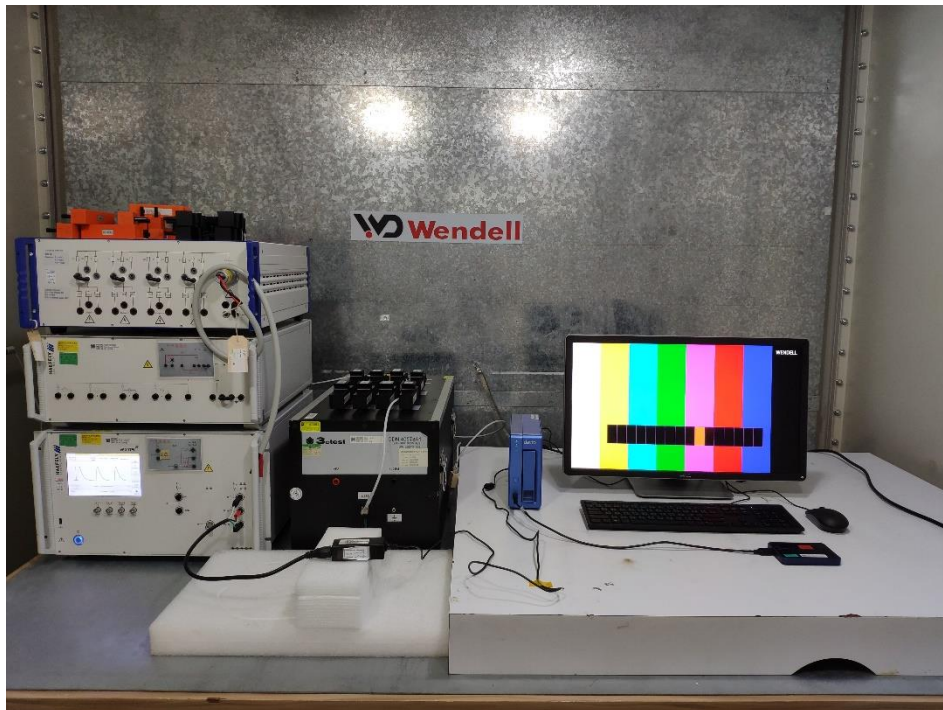
AC Power Port						
Test Point	Phase	Polarity (+/-)	Test Voltage (kV)			Result
			0.5	1	2	
L to N	0°	+/-	A	A	-	A
	90°	+/-	A	A	-	
	180°	+/-	A	A	-	
	270°	+/-	A	A	-	
L to PE	0°	+/-	A	A	A	A
	90°	+/-	A	A	A	
	180°	+/-	A	A	A	
	270°	+/-	A	A	A	
N to PE	0°	+/-	A	A	A	A
	90°	+/-	A	A	A	
	180°	+/-	A	A	A	
	270°	+/-	A	A	A	

**Note:**

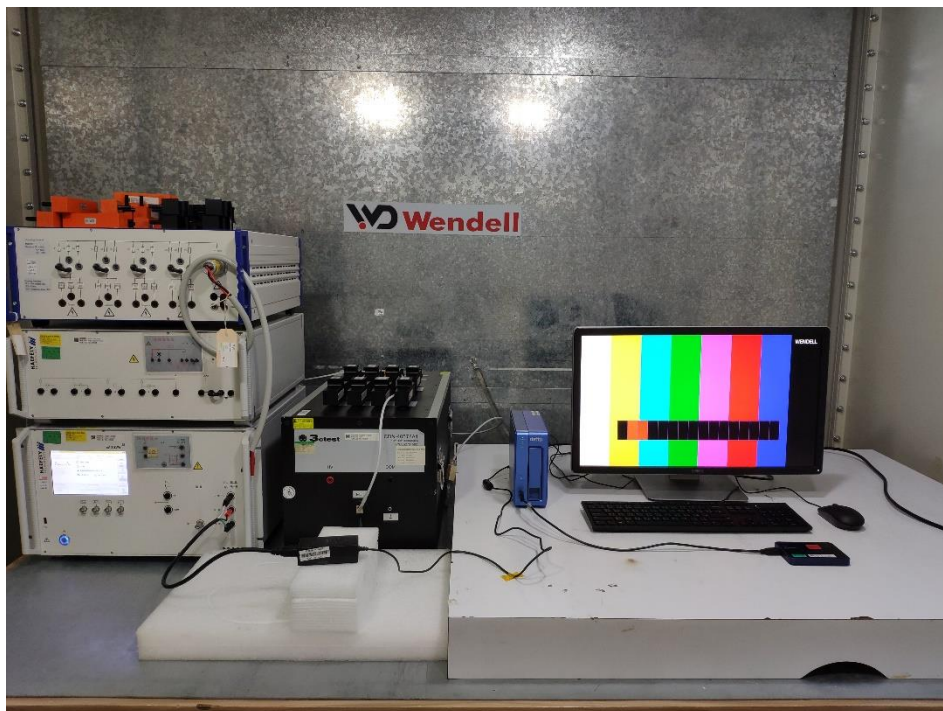
Criteria A: The EUT function was correct during the test.

## 5.6.7 Photographs of Test Configuration

Test mode A



Test mode B



## 5.7 Continuous Conducted Disturbances (CS)

### 5.7.1 Test Specification

<b>Standard</b>	IEC/EN 61000-4-6
<b>Frequency Range</b>	0.15 ~ 10 MHz, 10 ~ 30 MHz, 30 ~ 80 MHz,
<b>Voltage Level</b>	3 V(rms), 3 - 1 V(rms), 1 V(rms)
<b>Modulation</b>	AM Modulation, 80%, 1 kHz Sine Wave
<b>Frequency Step</b>	1% of fundamental
<b>Dwell Time</b>	3 seconds

### 5.7.2 Test Instrument

Item	Equipment	Manufacturer	Model	Meter No.	Calibration Date
1	Coupling clamp according to IEC 6100-4-6	FRANKONIA	EMCL-20	CT-1-049	May 31, 2021
2	CDN for power supply lines	FRANKONIA	CDN M2+M3	CT-1-054	May 30, 2021
3	6 dB Attenuator	BIRD	75-A-FFN-06	CT-1-056	May 27, 2021
4	Compact Immunity Test System acc	FRANKONIA	CIT-10/75	CT-1-057	May 27, 2021
5	CDN for screened lines	FRANKONIA	RJ45S	CT-1-052(1)	May 30, 2021
6	50ohm Termination	N/A	N/A	CT-1-065-2	May 31, 2021
7	Measurement Software	HUBERT	Ver: 1.1.2	N/A	No calibration request

**Note:** 1. The calibration interval of the above test instruments is 12 months.

### 5.7.3 Test Procedure

The EUT is placed on 0.1m insulation support unit between the EUT and ground reference plane.

#### For input AC power ports:

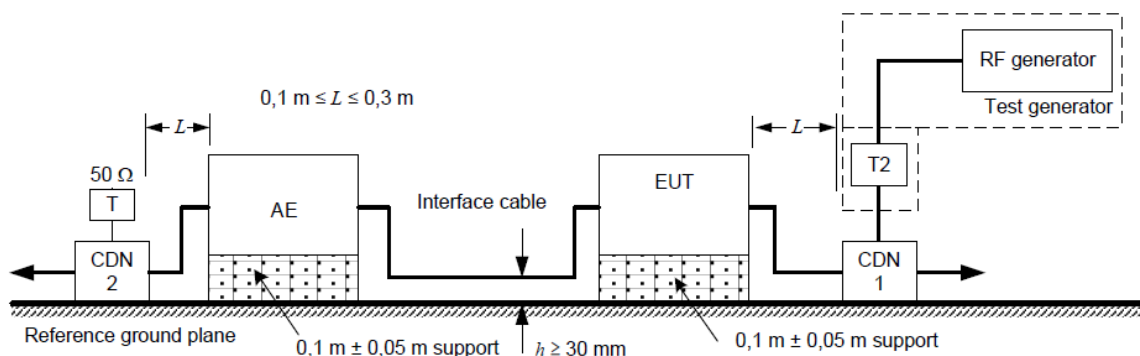
The EUT is connected to the power mains through a coupling and decoupling networks for power supply lines. And directly couples the disturbances signal into EUT.

Auxiliary equipment (AE) required for the defined operation of the EUT according to the specifications of the product committee.

## 5.7.4 Deviation from Test Standard

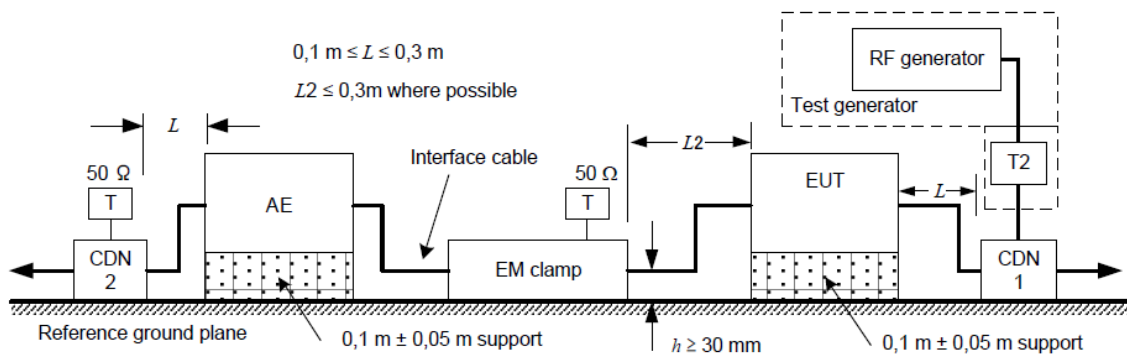
No deviation

## 5.7.5 Test Setup



The interface cable is set at 1 m if possible.

a) Schematic setup for a 2-port EUT connected to only 1 CDN



### Note:

T: Termination 50 Ω

T2: Power attenuator (6 dB)

CDN: Coupling and decoupling network

Injection clamp: current clamp or EM clamp



### 5.7.6 Test Result

Test Voltage	230Vac, 50Hz	Environmental Conditions	23°C, 44% RH
Tested by	Vincent Lin	Test Date	2021/10/25
Test Mode	A, B		

Frequency Range (MHz)	Tested Port	Injection Method	Test Level (V <sub>r.m.s.</sub> )	Modulation	Result
0.15 - 10	AC Power	CDN-M2 +M3 (M3)	3	80% AM, 1kHz	A
10 - 30	AC Power	CDN-M2 +M3 (M3)	3 - 1	80% AM, 1kHz	A
30 - 80	AC Power	CDN-M2 +M3 (M3)	1	80% AM, 1kHz	A
0.15 - 10	RJ45	CLAMP	3	80% AM, 1kHz	A
10 - 30	RJ45	CLAMP	3 - 1	80% AM, 1kHz	A
30 - 80	RJ45	CLAMP	1	80% AM, 1kHz	A

**Note:**

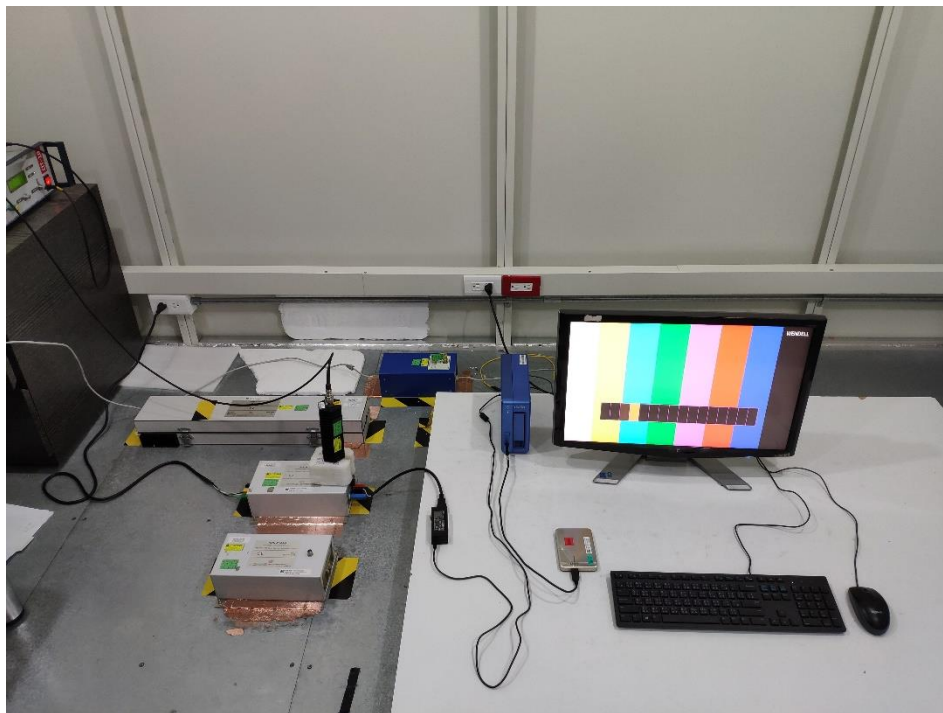
Criteria A: The EUT function was correct during the test.



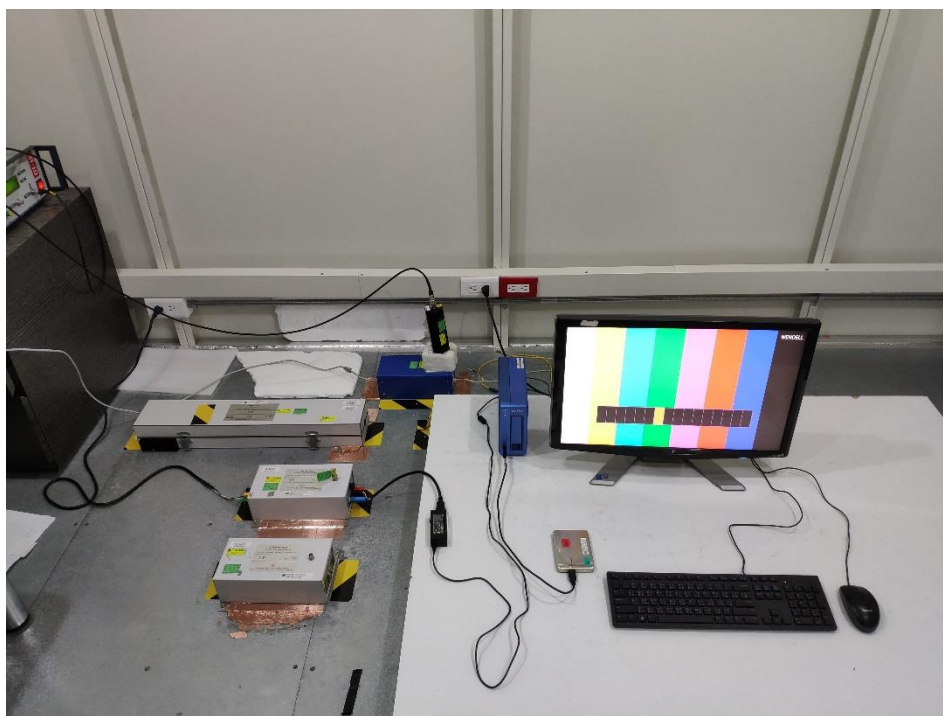
### 5.7.7 Photographs of Test Configuration

Test mode A

Power



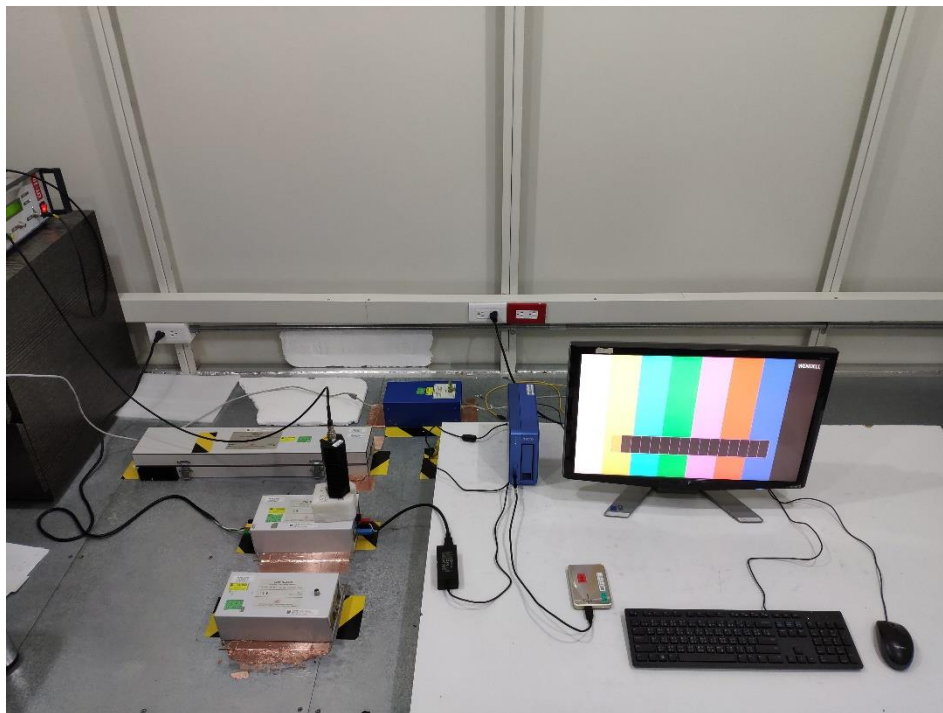
Signal



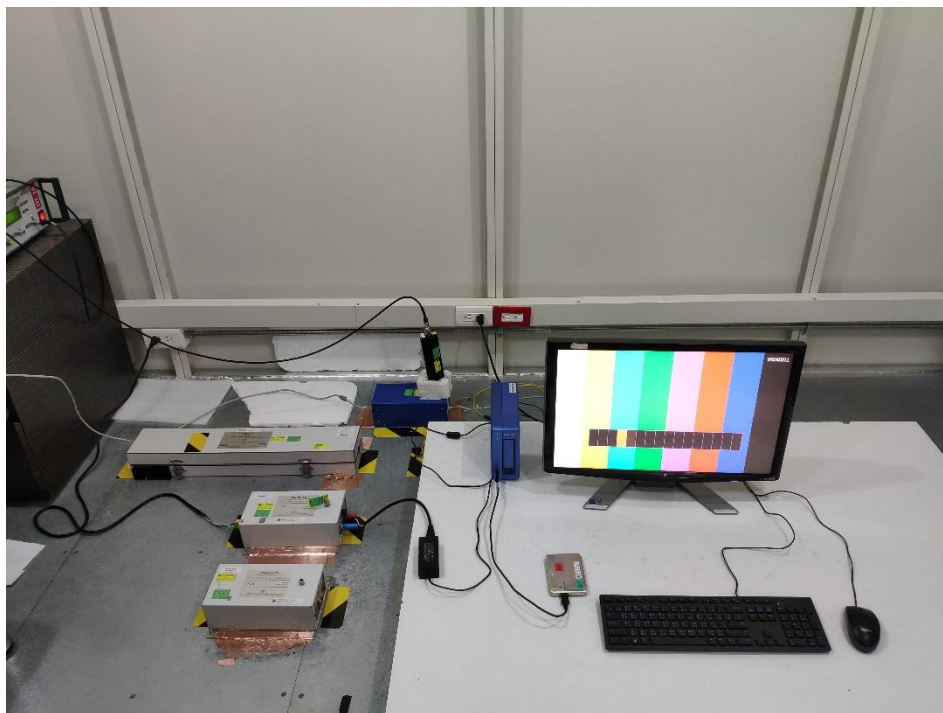


# Test mode B

## Power



## Signal



## 5.8 Power Frequency Magnetic Field Immunity Test

### 5.8.1 Test Specification

Standard	IEC/EN 61000-4-8
Frequency Range	50/60Hz
Field Strength	1 A/m
Observation Time	1 minute
Inductance Coil	Rectangular type, 1mx1m

**Note:** 1. Applicable only to equipment containing devices intrinsically susceptible to magnetic field, such as CRT monitors, Hall effect elements, electron-dynamic microphones, magnetic field sensors or audio frequency transformers.

### 5.8.2 Test Instrument

Item	Equipment	Manufacturer	Model	Meter No.	Calibration Date
1	PFMF	SGH	MG-1000_DC	CT-1-164	Sep. 30, 2021

**Note:** 1. The calibration interval of the above test instruments is 24 months.

### 5.8.3 Test Procedure

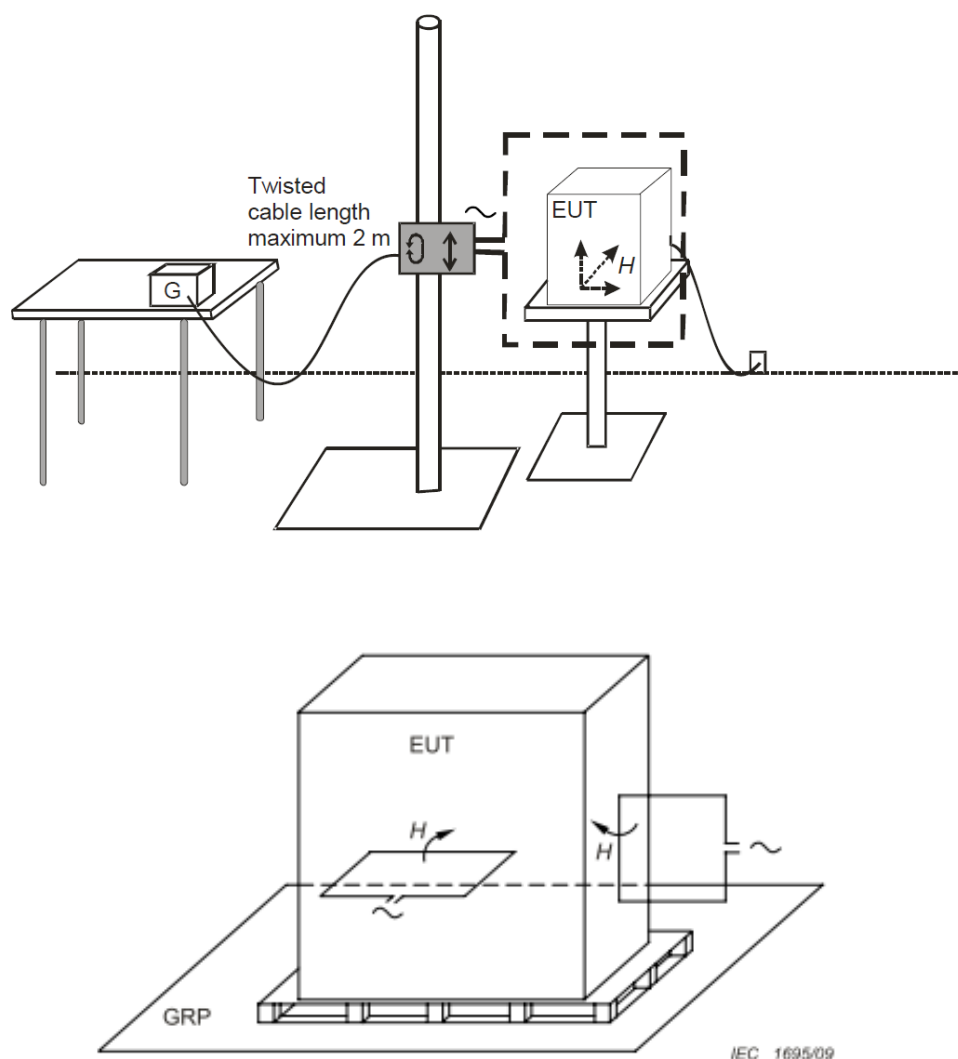
The table-top EUT was placed on a table which is 0.8 meter above a metal ground plane measured at least 1m × 1m minimum. The test magnetic field shall be placed at central of the induction coil. The floor-standing EUT was placed on 0.1m insulation support unit between the EUT and ground reference plane.

The test magnetic Field shall be applied 10 minutes by the immersion method to the table-top EUT, and the induction coil shall be rotated by 90° in order to expose the EUT to the test field with different orientation (X, Y, Z Orientations). The test magnetic Field shall be applied 10 minutes by the proximity method to the floor-standing EUT, and the induction coil shall be rotated by 90° in order to expose the EUT to the test field with different orientation (X, Y, Z Orientations).

### 5.8.4 Deviation from Test Standard

No deviation

### 5.8.5 Test Setup



For the actual test configuration, please refer to 5.8.7.

#### 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.

### 5.8.6 Test Result

Test Voltage	230Vac, 50Hz	Environmental Conditions	21°C, 49% RH
Tested by	Guanwei Liao	Test Date	2021/10/22
Test Mode	A, B		

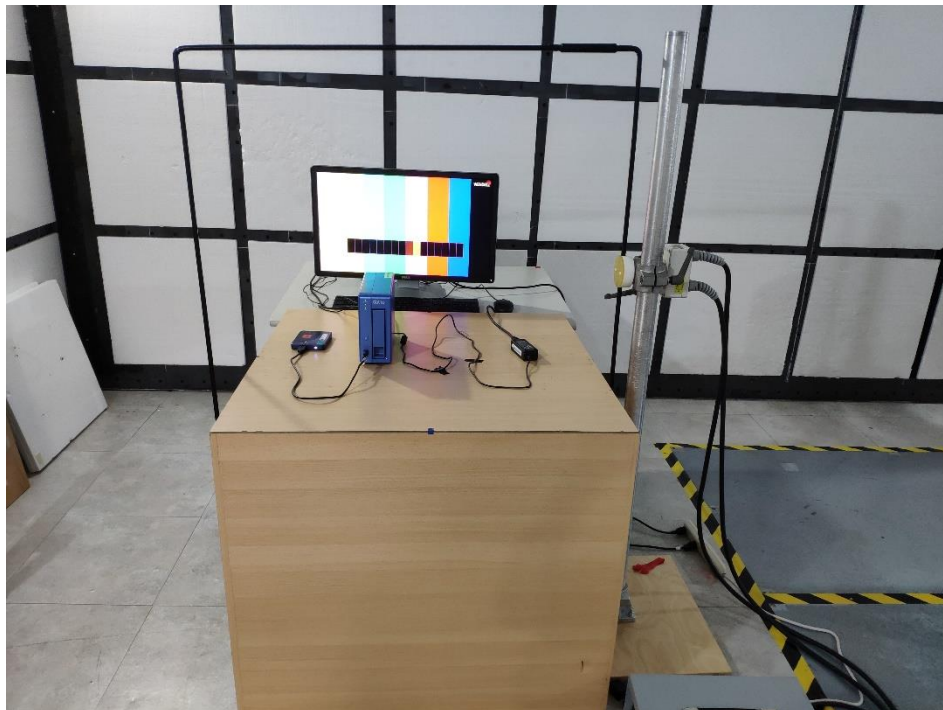
Test Coil Position	Frequency (Hz)	Magnetic Strength (A/m)	Result
X - Axis	50/60	1	A
Y - Axis	50/60	1	A
Z - Axis	50/60	1	A

**Note:**

Criteria A: The EUT function was correct during the test.

### 5.8.7 Photographs of Test Configuration

Test mode A



Test mode B



## 5.9 Voltage Dips & Short Interruptions

### 5.9.1 Test Specification

<b>Basic Standard</b>	IEC/EN 61000-4-11
<b>Test Level</b>	Voltage Dips: >95% reduction - 0.5 period 30% reduction - 25 period Voltage Interruptions: >95% reduction - 250 period
<b>Test Duration Time</b>	Minimum 3 test events in sequence
<b>Interval between Event</b>	Minimum 10 seconds
<b>Phase Angle</b>	0° / 180°
<b>Test Cycle</b>	3 times

**Note:** 1. Changes to occur at 0 degree crossover point of the voltage waveform. If the EUT does not demonstrate compliance when tested with 0 degree switching, the test shall be repeated with the switching occurring at both 90 degrees and 270 degrees. If the EUT satisfies these alternative requirements, then it fulfils the requirements. This condition shall be recorded in the test report.

### 5.9.2 Test Instrument

Item	Equipment	Manufacturer	Model	Meter No.	Calibration Date
1	DIP Simulator	3ctest	PFS2216S	CT-1-167	Sep. 23, 2021

**Note:** 1. The calibration interval of the above test instruments is 12 months.

### 5.9.3 Test Procedure

Before starting the test of a given EUT, a test plan shall be prepared.

The test plan should be representative of the way the system is actually used.

Systems may require a precise pre-analysis to define which system configurations must be tested to reproduce field situations.

Test cases must be explained and indicated in the Test report.

It is recommended that the test plan include the following items:

- the type designation of the EUT;
- information on possible connections (plugs, terminals, etc.) and corresponding cables, and peripherals;
- input power port of equipment to be tested;
- representative operational modes of the EUT for the test;
- performance criteria used and defined in the technical specifications;
- operational mode(s) of equipment;
- description of the test set-up.

If the actual operating signal sources are not available to the EUT, they may be simulated.

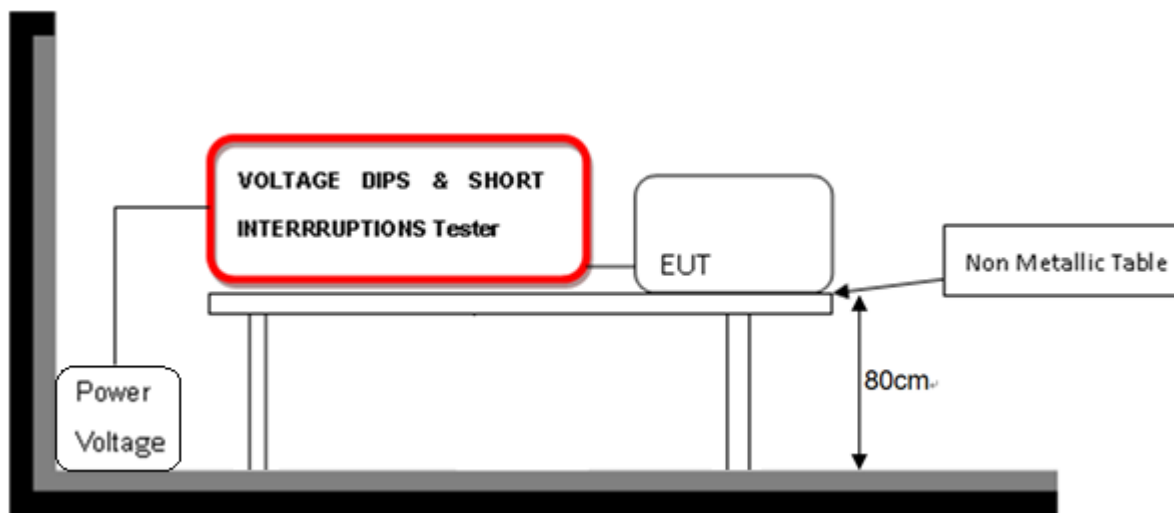
For each test, any degradation of performance shall be recorded. The monitoring equipment should be capable of displaying the status of the operational mode of the EUT during and after the tests. After each group of tests, a full functional check shall be performed.

### 5.9.4 Deviation from Test Standard

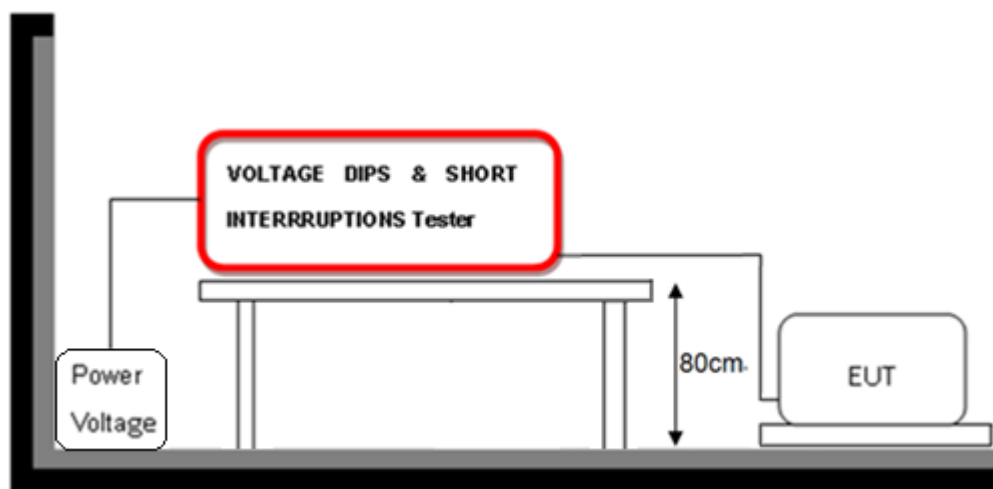
No deviation

### 5.9.5 Test Setup

#### < Table-Top equipment >



#### < Floor-Standing equipment >





### 5.9.6 Test Result

Test Voltage	100-240Vac, 50Hz	Environmental Conditions	22°C, 53% RH
Tested by	Guanwei Liao	Test Date	2021/10/25
Test Mode	A, B		

230Vac, 50Hz			
Test Item	% Reduction	Duration (Period)	Result
Voltage Dips	>95	0.5	A
	30	25	A
Voltage interruptions	>95	250	C (#1)

240Vac, 50Hz			
Test Item	% Reduction	Duration (Period)	Result
Voltage Dips	>95	0.5	A
	30	25	A
Voltage interruptions	>95	250	C (#1)

100Vac, 50Hz			
Test Item	% Reduction	Duration (Period)	Result
Voltage Dips	>95	0.5	A
	30	25	A
Voltage interruptions	>95	250	C (#1)

**Note:**

Criteria A: The EUT function was correct during the test.

Criteria C: (#1) The EUT was interrupted during the test, and must be recovered manually.

### 5.9.7 Photographs of Test Configuration

Test mode A



Test mode B



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