

EN 55032:2015/A1:2020
EN 55032:2015/A11:2020
AS/NZS CISPR 32:2015 AMD 1:2020
EN 55035:2017/A11:2020
AS/NZS CISPR 24:2013
EN IEC 61000-3-2:2019/A1:2021
EN 61000-3-2:2014
AS/NZS 61000.3.2-2013
EN 61000-3-3:2013/A2:2021/AC:2022-01
EN 61000-3-3:2013
AS/NZS 61000.3.3-2012

TEST REPORT

For

LCD MONITOR

MODEL NUMBER: PN-ME652

REPORT NUMBER: 4790916331.2-2-EMC-1

ISSUE DATE: Aug. 15, 2023

Prepared for

**Guangzhou Shirui Electronics Co., Ltd.
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Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	Aug. 15, 2023	Initial Issue	\

Summary of Test Results				
EMISSION				
Standard	Test Item	Limit	Result	Remark
EN 55032:2015/A1:2020 EN 55032:2015/A11:2020 AS/NZS CISPR 32:2015 AMD 1:2020	Conducted emissions from the AC mains power ports	Class B	Pass	\
	Asymmetric mode conducted emissions	Class B	Pass	NOTE (1)
	Radiated emissions at frequencies up to 1 GHz	Class B	Pass	\
	Radiated emissions at frequencies above 1 GHz	Class B	Pass	NOTE (3)
EN IEC 61000-3-2:2019/A1:2021 EN 61000-3-2:2014 AS/NZS 61000.3.2-2013	Harmonic Current Disturbance	Class A	Pass	\
EN 61000-3-3:2013/A2:2021/AC:2022-01 EN 61000-3-3:2013 AS/NZS 61000.3.3-2012	Voltage Fluctuations & Flicker	/	Pass	\
IMMUNITY (EN 55035:2017/A11:2020, AS/NZS CISPR 24:2013)				
Basic Standard	Test Item	Test Specification	Criteria	Result
IEC 61000-4-2:2008	Electrostatic discharge	Contact ± 4 kV Air ± 2 kV, ± 4 kV, ± 8 kV	B	Pass
IEC 61000-4-3:2020	Continuous RF electromagnetic field disturbance	3V/m, 80%, 1kHz, AM 80MHz-1000MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz	A	Pass
IEC 61000-4-4:2012	Electrical fast transient/burst (AC mains power ports)	± 1.0 kV 5/50ns, 5kHz	B	Pass
	Electrical fast transient/burst (DC network power ports)	± 0.5 kV 5/50ns, 5kHz	B	N/A
	Electrical fast transient/burst (Analogue/Digital data ports)	± 0.5 kV 5/50ns, 5kHz	B	N/A
IEC 61000-4-5:2014+AMD1:2017	Surge (AC mains power ports)	± 2 kV (Common) ± 1 kV (Differential) 1.2/50us	B	Pass
	Surge (Analogue/Digital data ports) (unshielded symmetrical)	line to ground : ± 1.0 kV, 10/700us	C	N/A
	Surge (Analogue/Digital data ports)	shield to ground : ± 0.5 kV, 1.2/50us	B	N/A

	(Coaxial or shielded)			
	Surge (DC network power ports)	each individual line to reference ground : 1,2/50us (8/20 us) 0.5KV	B	N/A
IEC 61000-4-6:2013+COR1:2015	Continuous induced RF disturbances	150KHz-80MHz 80%, 1kHz 0.15MHz-10MHz:3V 10MHz-30MHz:3V~1V 30MHz-80MHz:1V	A	Pass
IEC 61000-4-8:2009	Power frequency magnetic field	50Hz, 1A/m	A	N/A (Note 5)
IEC 61000-4-11:2020	Voltage dips and interruptions	Residual < 5%:0.5 cycle	B	Pass
		Residual 70%:25 cycles	C	
		Residual < 5%:250 cycles	C	

Note:

(1) "N/A" denotes test is not applicable in this test report.

(2) Applicable to the following port only:

- a. Wired Network Ports
- b. Optical Fibre Ports with Metallic Shield or Tension Members
- c. Broadcast Receiver Tuner Ports
- d. Antenna Ports

(3) If the highest frequency of the internal sources of the EUT is less than 108MHz, the measurement shall only be made up to 1GHz. If the highest frequency of the internal sources of the EUT is between 108MHz and 500MHz, the measurement shall only be made up to 2GHz. If the highest frequency of the internal sources of the EUT is between 500MHz and 1GHz, the measurement shall only be made up to 5GHz. If the highest frequency of the internal sources of the EUT is above 1 GHz, the measurement shall be made up to 5 times the highest frequency or 6 GHz, whichever is less.

(4) If EUT rated power is less than 75W, there is no need for Harmonics test to be performed.

(5) Only applicable to EUT containing devices susceptible to magnetic fields, such as CRT monitors, Hall elements, electrodynamic microphones, magnetic field sensors.

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: Guangzhou Shirui Electronics Co., Ltd.
Address: 192 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District, Guangzhou, Guangdong, China

Manufacturer Information

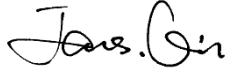
Company Name: Sharp NEC Display Solutions, Ltd.
Address: 4-28, Mita 1-chome, Minato-ku, Tokyo, 108-0073 Japan

EUT Information

EUT Name: LCD MONITOR
Model: PN-ME652
Brand: Sharp
Sample Received Date: July 23, 2023
Sample Status: Normal
Sample ID: 6275323
Date of Tested: July 24, 2023 ~ Aug. 5, 2023

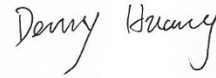
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
EN 55032:2015/A1:2020 EN 55032:2015/A11:2020 AS/NZS CISPR 32:2015 AMD 1:2020	PASS
EN 55035:2017/A11:2020 AS/NZS CISPR 24:2013	PASS
EN IEC 61000-3-2:2019/A1:2021 EN 61000-3-2:2014 AS/NZS 61000.3.2-2013	PASS
EN 61000-3-3:2013/A2:2021/AC:2022-01 EN 61000-3-3:2013 AS/NZS 61000.3.3-2012	PASS

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Operations Manager

2. TEST METHODOLOGY

All tests were performed in accordance with the standard EN 55032:2015/A1:2020, AS/NZS CISPR 32:2015 AMD 1:2020, EN 55035:2017/A11:2020, AS/NZS CISPR 24:2013, EN IEC 61000-3-2:2019/A1:2021, EN 61000-3-2:2014, AS/NZS 61000.3.2-2013, EN 61000-3-3:2013/A2:2021/AC:2022-01, EN 61000-3-3:2013, AS/NZS 61000.3.3-2012.

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	A2LA (Certificate No.: 4102.01) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA. FCC (FCC Recognized No.: CN1187) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules ISED (Company No.: 21320) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with Industry Canada. The Company Number is 21320.
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Note:

All tests measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, No. 1, Li Bin Road, Song Shan Lake Hi-Tech Development Zone Dongguan, 523808, People's Republic of China.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Measurement Frequency Range	K	U(dB)
Conducted emissions from the AC mains power ports	0.009 MHz ~ 0.15 MHz	2	4.00
Conducted emissions from the AC mains power ports	0.15 MHz ~ 30 MHz	2	3.62
Asymmetric mode conducted emissions – Asymmetric Artificial Network	0.15 MHz ~ 30 MHz	2	5.04
Asymmetric mode conducted emissions – current probe	0.15 MHz ~ 30 MHz	2	3.48
Radiated emissions	30 MHz ~ 1 GHz	2	4.00
Radiated emissions	1 GHz ~ 18 GHz	2	5.78

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

EUT Name:	LCD MONITOR
Model Name:	PN-ME652
Power Supply	100-240V~, 50/60Hz

Note:

Evaluation is both performed under 110V and 230V test voltage, the worst data is collected under 230V test voltage. Only test data collected under 230V test voltage is reported.

5.2. TEST MODE

Test Mode	Description
M01	4k video input via HDMI1 port +1kHz audio output via earphone + Data transfer via Ethernet port + Optical out port loaded + RS232C port loaded + Remote in port operated
M02	4k video input via HDMI2 port +1kHz audio output via earphone + Data transfer via Ethernet port + Optical out port loaded + RS232C port loaded + Remote in port operated
M03	4k video input via HDMI3 port +1kHz audio output via earphone + Data transfer via Ethernet port + Optical out port loaded + RS232C port loaded + Remote in port operated
M04	4k video input via HDMI1 port +1kHz audio output via internal speaker + Data transfer via Ethernet port + Optical out port loaded + RS232C port loaded + Remote in port operated
M05	4k video input via HDMI2 port +1kHz audio output via internal speaker + Data transfer via Ethernet port + Optical out port loaded + RS232C port loaded + Remote in port operated
M06	4k video input via HDMI3 port +1kHz audio output via internal speaker + Data transfer via Ethernet port + Optical out port loaded + RS232C port loaded + Remote in port operated
M07	4k video input via HDMI-C port +1kHz audio output via earphone + Data transfer via Ethernet port + Optical out port loaded + RS232C port loaded + Remote in port operated
M08	4k video input via HDMI-C port +1kHz audio output via internal speaker + Data transfer via Ethernet port + Optical out port loaded + RS232C port loaded + Remote in port operated
M09	4k video input via USB1 port +1kHz audio output via earphone + Data transfer via Ethernet port + Optical out port loaded + RS232C port loaded + Remote in port operated
M10	4k video input via USB1 port +1kHz audio output via internal speaker + Data transfer via Ethernet port + Optical out port loaded + RS232C port loaded + Remote in port operated
M11	4k video input via USB2 port +1kHz audio output via earphone + Data transfer via Ethernet port + Optical out port loaded + RS232C port loaded + Remote in port operated
M12	4k video input via USB2 port +1kHz audio output via internal speaker + Data transfer via Ethernet port + Optical out port loaded + RS232C port loaded + Remote in port operated

MONITORING OF EUT FOR ALL IMMUNITY TEST

Audio	Monitor the audio output status
Visual	Monitor the data transfer status from USB memory stick. Monitor the indicator lamp and display screen playing status. Monitor the Ethernet connection status.

5.3. EUT ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	AC Cable	\	\	1.8 m length, provided by client
2	HDMI	\	\	Ferrite Core, 3.1 m length, provided by client

5.4. SUPPORT UNITS FOR SYSTEM TEST

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

Item	Equipment	Mfr/Brand	Model/Type No.	Specification	Series No.
1	Laptop	Lenovo	ThinkPad T14 Gen 1	N/A	TP00103E
2	USB Memory Stick	SanDick	\	\	\
3	USB Memory Stick	SanDick	\	\	\
4	Earphone	Philips	\	\	\
5	RS232 dummy load	\	\	\	\
6	IR Box	\	\	\	\
7	Optical port speaker	Behringer	Ms20	\	\

The following cables were used to form a representative test configuration during the tests.

Item	Type of cable	Shielded Type	Ferrite Core	Specification
1	HDMI Cable	Yes	NO	HDMI to HDMI
2	HDMI Cable	Yes	NO	HDMI to HDMI
3	Type-C Cable	Yes	NO	Type-C to Type-C
4	Ethernet Cable	NO	NO	1.0 m
5	Optical Cable	NO	NO	1.0 m

6. MEASURING EQUIPMENT AND SOFTWARE USED

Conducted Emissions					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
EMI Test Receiver	ROHDE & SCHWARZ	ESR3	101961	Oct. 17, 2022	Oct. 16, 2023
Two-Line V-Network	ROHDE & SCHWARZ	ENV216	101983	Oct. 17, 2022	Oct. 16, 2023
Artificial Mains Networks	Schwarzbeck	NSLK 8126	8126465	Oct. 17, 2022	Oct. 16, 2023
Software					
Description			Manufacturer	Name	Version
Test Software for Conducted Emissions			Farad	EZ-EMC	Ver. UL-3A1
Radiated Emissions					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
MXE EMI Receiver	KESIGHT	N9038A	MY56400036	Oct. 17, 2022	Oct. 16, 2023
Hybrid Log Periodic Antenna	TDK	HLP-3003C	130960	Aug. 2, 2021	Aug. 1, 2024
Preamplifier	HP	8447D	2944A09099	Oct. 17, 2022	Oct. 16, 2023
EMI Measurement Receiver	ROHDE & SCHWARZ	ESR26	101377	Oct. 17, 2022	Oct. 16, 2023
Horn Antenna	TDK	HRN-0118	130940	Jul. 20, 2021	Jul. 19, 2024
Preamplifier	TDK	PA-02-0118	TRS-305-00067	Oct. 17, 2022	Oct. 16, 2023
High Pass Filter	Wi	WHKX10-2700-3000-18000-40SS	23	Oct. 17, 2022	Oct. 16, 2023
Band Reject Filter	Wainwright	WRCJV8-2350-2400-2483.5-2533.5-40SS	4	Oct. 17, 2022	Oct. 16, 2023
Band Reject Filter	Wi	WRCJV20-5120-5150-5350-5380-60SS	2	Oct. 17, 2022	Oct. 16, 2023
Band Reject Filter	Wi	WRCJV12-5695-5725-5850-5880-60SS	4	Oct. 17, 2022	Oct. 16, 2023
Software					
Description			Manufacturer	Name	Version
Test Software for Radiated Emissions			Farad	EZ-EMC	Ver. UL-3A1
Harmonic Current Disturbance / Voltage Fluctuations & Flicker					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date

Harmonic&Flicker Tester	California Instruments	PACS-1	1606A00050	Oct. 20, 2021	Oct. 19, 2023
5kAV POWER SOURCE	California Instruments	500liX-400-413	1606A00050	Oct. 18, 2021	Oct. 17, 2023
Software					
Description			Manufacturer	Name	Version
Test Software for Flicker			CTS	CTS 4	4.29
Electrostatic Discharge Immunity					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
ESD Generator	TESEQ	NSG 437	1578	Dec. 05, 2022	Dec. 04, 2023
Continuous RF eletromagnetic field disturbance					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
EPM Series Power Meter	Keysight	N1914A-CFG001	MY55316009	Oct. 18, 2022	Oct. 17, 2023
EXG Analog Signal Generator	Keysight	N5171B	MY53051396	Oct. 18, 2022	Oct. 17, 2023
Power Amplifier	AR	250W1000BM1	344582	Oct. 18, 2022	Oct. 17, 2023
Power Amplifier	AR	50S1G6	521360	Oct. 18, 2022	Oct. 17, 2023
Power Sensor	Keysight	E9304A	MY55320006	Oct. 18, 2022	Oct. 17, 2023
Power Sensor	Keysight	E9304A	MY55320007	Oct. 18, 2022	Oct. 17, 2023
Stacked Double log-periodic Antenna	SCHWARZB ECK	STLP9128D	STLP9128DS#3005	/	/
Double Ridge Broadband Horn Antenna	Schwarzbeck	BBHA9120E	654	/	/
Software					
Description		Manufacturer	Name		Version
Test Software for RS		Farad	EMC-RS		2.03
Electrical Fast Transient & Surge & Voltage Dips and Interruptions					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
Multi Function Immunity Test Host	EMCP	IMU3000	1503	Oct. 17, 2022	Oct. 16, 2023
Capacitive Coupling Clamp	EMCP	CN-EFT1000	1545	Oct. 17, 2022	Oct. 16, 2023
Software					
Description			Manufacturer	Name	Version
Test Software for Surge/EFT/Dips			EMCP	TEMA3000	2.14.0
Continuous induced RF disturbances					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date

Coupled Decoupled Network	TESEQ	CDN M016	43256	Oct. 17, 2022	Oct. 16, 2023
EXG Analog Signal Generator	Keysight	N5171B	MY53051423	Oct. 17, 2022	Oct. 16, 2023
Power Amplifier	AR	75A250W	034458	Oct. 17, 2022	Oct. 16, 2023
Electromagnetic injection Clamp	LUTHI	EM 101	P1535163090	Oct. 17, 2022	Oct. 16, 2023
Coupled Decoupled Network	TESEQ	CDN T800	39202	Oct. 17, 2022	Oct. 16, 2023
SIGNAL LINE Coupled Decoupled Network	FCC	FCC-901-T8-SRJ45	197540	Oct. 18, 2022	Oct. 17, 2023
Software					
Description		Manufacturer	Name		Version
Test Software for CS		Farad	EMC-CS		2.0.1.3

7. EMISSION TEST

7.1. CONDUCTED EMISSIONS MEASUREMENT

LIMITS

(a.) Limits of conducted emissions from the AC mains power ports of Class A equipment

Frequency range MHz	Coupling device	Detector type / bandwidth	Class A voltage limits dB(uV)
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

(b.) Limits of conducted emissions from the AC mains power ports of Class B equipment

Frequency range MHz	Coupling device	Detector type / bandwidth	Class B voltage limits dB(uV)
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

(c.) Limits of asymmetric mode conducted emissions of Class A equipment

Frequency range MHz	Coupling device	Detector type / bandwidth	Class A voltage limits dB(uV)	Class A current limits dB(uA)
0.15 - 0.5	AAN	Quasi Peak / 9 kHz	97 to 87	n/a
0.5 - 30			87	n/a
0.15 - 0.5	AAN	Average / 9 kHz	84 to 74	n/a
0.5 - 30			74	n/a
0.15 - 0.5	Current Probe	Quasi Peak / 9 kHz	N/A	53 to 43
0.5 - 30			N/A	43
0.15 - 0.5	Current Probe	Average / 9 kHz	N/A	40 to 30
0.5 - 30			N/A	30

(d.) Limits of asymmetric mode conducted emissions of Class B equipment

Frequency range MHz	Coupling device	Detector type / bandwidth	Class B voltage limits dB(uV)	Class B current limits dB(uA)
0.15 -0.5	AAN	Quasi Peak / 9 kHz	84 to 74	n/a
0.5 -30			74	n/a
0.15 -0.5	AAN	Average / 9 kHz	74 to 64	n/a
0.5 -30			64	n/a
0.15 -0.5	Current Probe	Quasi Peak / 9 kHz	n/a	40 to 30
0.5 -30			n/a	30
0.15 -0.5	Current Probe	Average / 9 kHz	n/a	30 to 20
0.5 -30			n/a	20

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

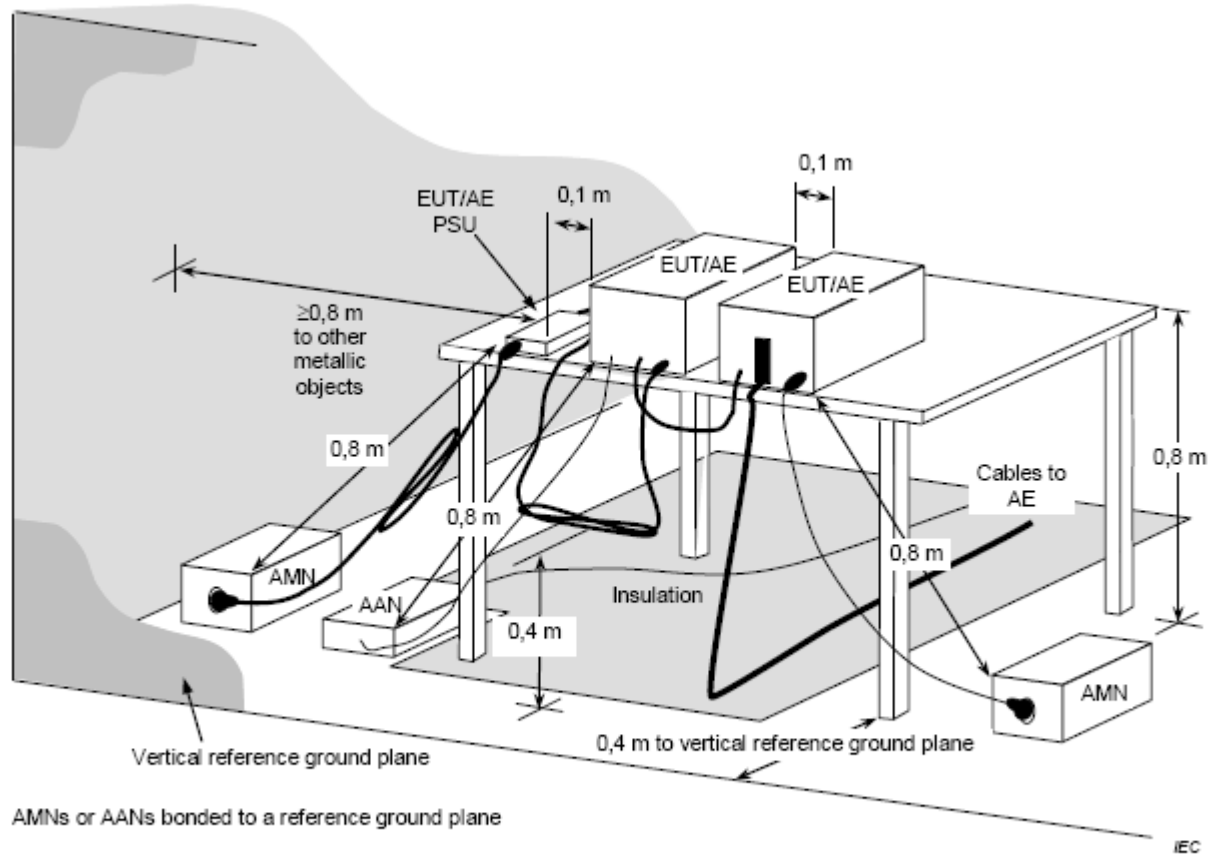
Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

TEST PROCEDURE

1. The EUT was placed on the top of a rotating table 0.8 meters above the horizontal ground plane and being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
2. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
3. I/O cables that are not connected to a peripheral shall be bundled 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.
4. Cables of hand-operated devices, such as keyboards and mice, shall be placed as for normal used.
5. LISN at least 80 cm from nearest part of EUT chassis.
6. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.

TEST SETUP

(a.) Example measurement arrangement for table-top EUT (alternative 1)



The 0,8 m distance specified between EUT/AE/PSU and AMN/AAN, is applicable only to the EUT being measured. If the device is AE then it shall be $\geq 0,8$ m.

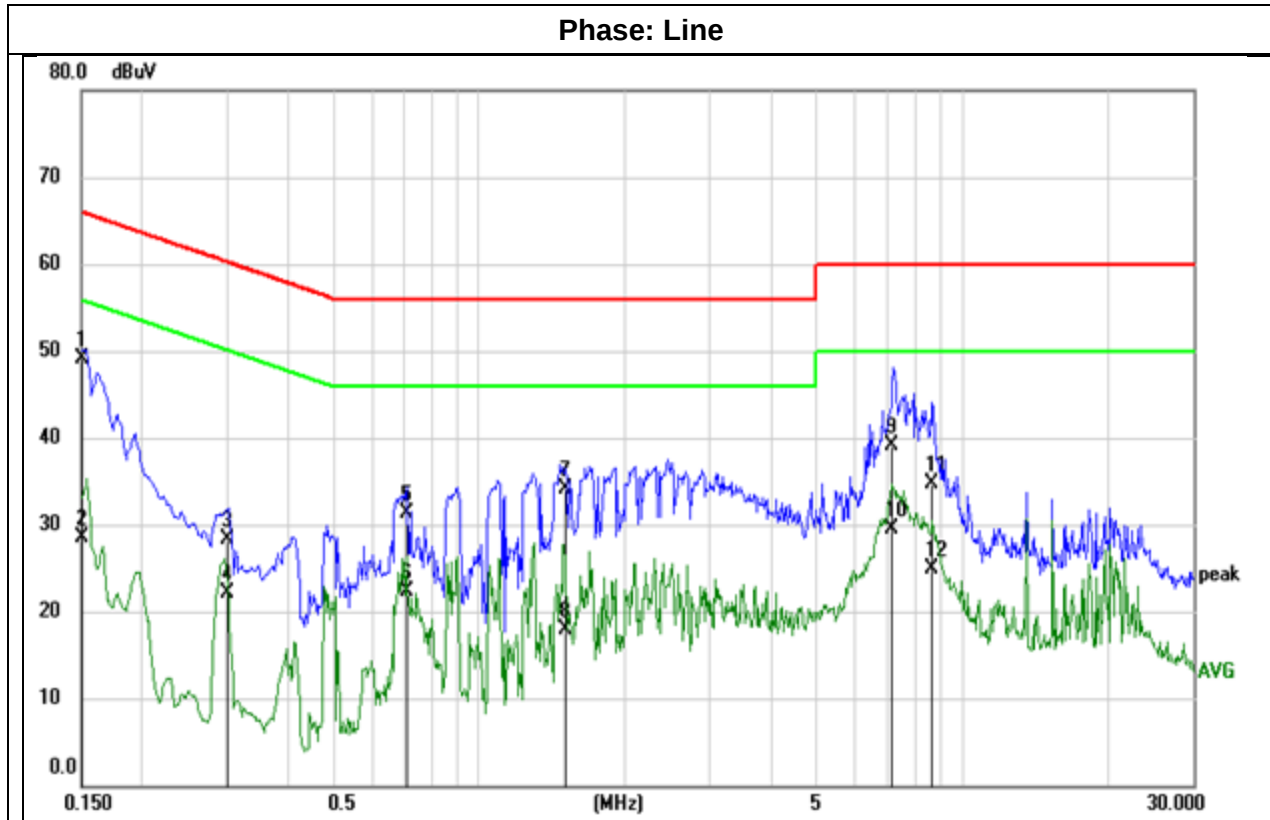
For the actual test configuration, please refer to Appendix I: Photographs of Test Configuration

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TEST RESULTS FOR AC MAINS POWER PORTS

Conducted Emissions – AC main port			
Test Mode:	Mode 3	Phase:	Line
Test Voltage:	AC 230V/50Hz		



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1502	39.65	9.49	49.14	65.99	-16.85	QP
2	0.1502	19.08	9.49	28.57	55.99	-27.42	AVG
3	0.2992	18.70	9.56	28.26	60.27	-32.01	QP
4	0.2992	12.60	9.56	22.16	50.27	-28.11	AVG
5	0.7025	21.74	9.50	31.24	56.00	-24.76	QP
6	0.7025	12.79	9.50	22.29	46.00	-23.71	AVG
7	1.5102	24.46	9.57	34.03	56.00	-21.97	QP
8	1.5102	8.35	9.57	17.92	46.00	-28.08	AVG
9	7.1601	29.52	9.62	39.14	60.00	-20.86	QP
10	7.1601	19.96	9.62	29.58	50.00	-20.42	AVG
11	8.6345	25.08	9.61	34.69	60.00	-25.31	QP
12	8.6345	15.25	9.61	24.86	50.00	-25.14	AVG

Remark:

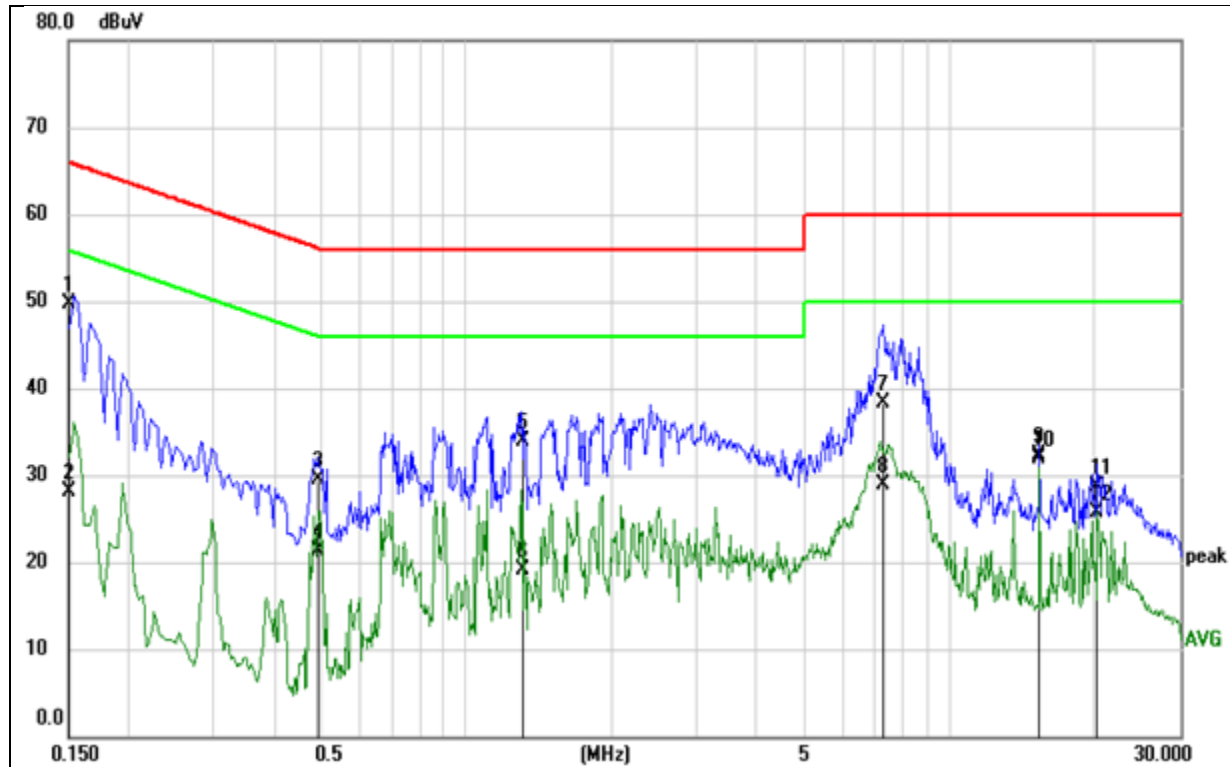
Result = Reading + Correct (Insertion Loss + Cable Loss + Attenuator Factor)

Margin = Result - Limit

Conducted Emissions – AC main port

Test Mode:	Mode 3	Phase:	Neutral
Test Voltage:	AC 230V/50Hz		

Phase: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1502	40.30	9.49	49.79	65.99	-16.20	QP
2	0.1502	18.60	9.49	28.09	55.99	-27.90	AVG
3	0.4940	19.91	9.50	29.41	56.10	-26.69	QP
4	0.4940	11.77	9.50	21.27	46.10	-24.83	AVG
5	1.3066	24.42	9.54	33.96	56.00	-22.04	QP
6	1.3066	9.63	9.54	19.17	46.00	-26.83	AVG
7	7.2736	28.67	9.62	38.29	60.00	-21.71	QP
8	7.2736	19.37	9.62	28.99	50.00	-21.01	AVG
9	15.3600	22.74	9.65	32.39	60.00	-27.61	QP
10	15.3600	22.19	9.65	31.84	50.00	-18.16	AVG
11	20.2572	18.92	9.74	28.66	60.00	-31.34	QP
12	20.2572	15.88	9.74	25.62	50.00	-24.38	AVG

Remark:

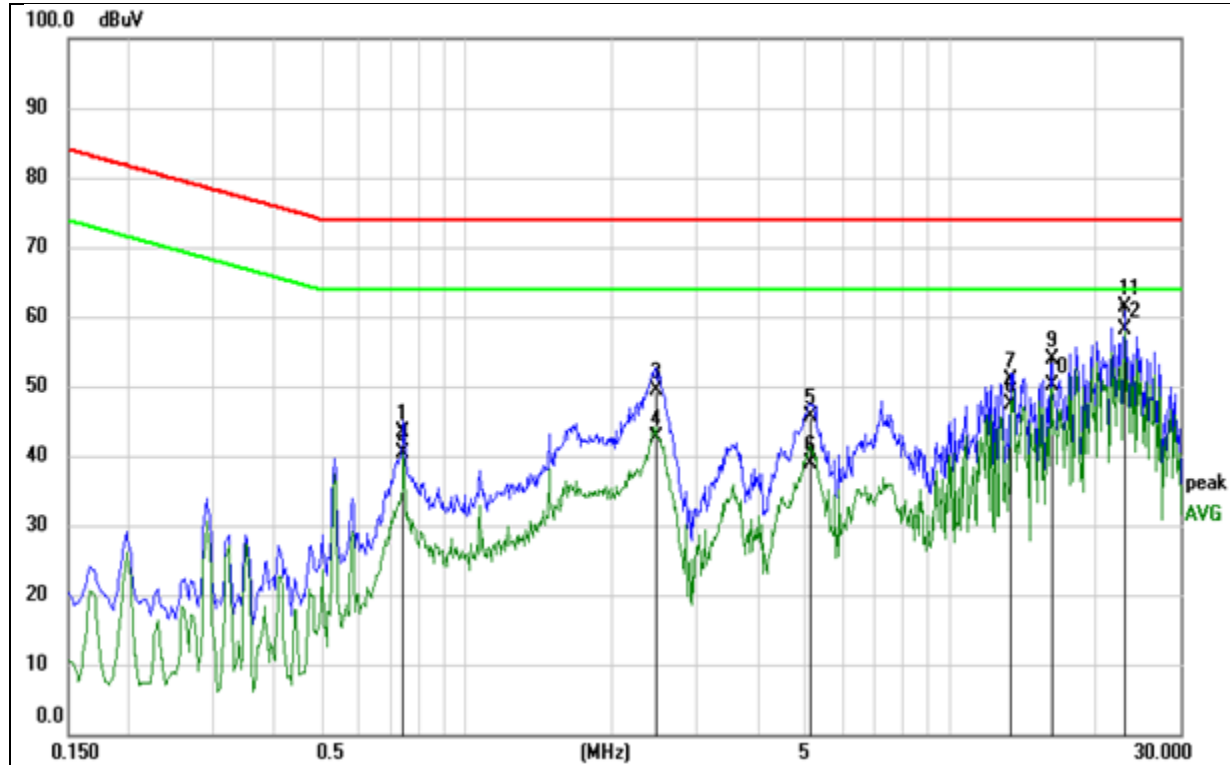
Result = Reading + Correct (Insertion Loss + Cable Loss + Attenuator Factor)

Margin = Result - Limit

Conducted Emissions – Network port

Test Mode:	Mode 3	Phase:	Neutral
Test Voltage:	AC 230V/50Hz		

Phase: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.7424	34.03	9.40	43.43	74.00	-30.57	QP
2	0.7424	30.93	9.40	40.33	64.00	-23.67	AVG
3	2.4684	40.12	9.33	49.45	74.00	-24.55	QP
4	2.4684	33.31	9.33	42.64	64.00	-21.36	AVG
5	5.1497	36.20	9.32	45.52	74.00	-28.48	QP
6	5.1497	29.52	9.32	38.84	64.00	-25.16	AVG
7	13.3586	41.57	9.36	50.93	74.00	-23.07	QP
8	13.3586	38.10	9.36	47.46	64.00	-16.54	AVG
9	16.2283	44.43	9.35	53.78	74.00	-20.22	QP
10	16.2283	40.87	9.35	50.22	64.00	-13.78	AVG
11	23.1285	51.89	9.46	61.35	74.00	-12.65	QP
12	23.1285	48.76	9.46	58.22	64.00	-5.78	AVG

Remark:

Result = Reading + Correct (Insertion Loss + Cable Loss + Attenuator Factor)

Margin = Result - Limit

7.2. RADIATED EMISSIONS MEASUREMENT

LIMITS

(a). Limits up to 1 GHz

FREQUENCY (MHz)	Class A		Class B	
	At 10 m	At 3 m	At 10 m	At 3 m
	dB μ V/m	dB μ V/m	dB μ V/m	dB μ V/m
30 – 230	40	50	30	40
230 – 1000	47	57	37	47

(b). Limits above 1 GHz

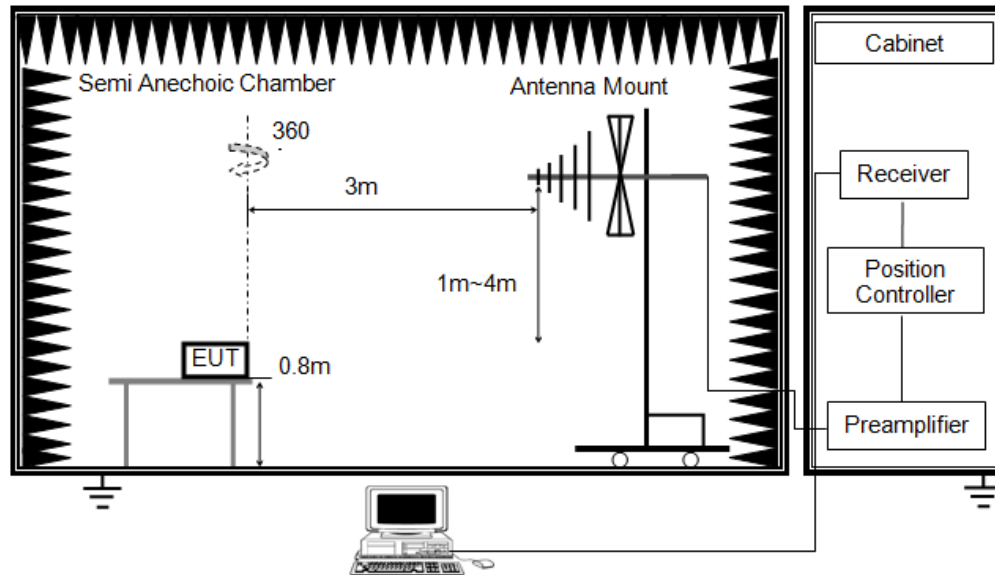
FREQUENCY (MHz)	Class A (at 3 m) dB μ V/m		Class B (at 3 m) dB μ V/m	
	Peak	Avg	Peak	Avg
1000-3000	76	56	70	50
3000-6000	80	60	74	54

Note:

- (1) The limit for radiated test was performed according to EN 55032:2015/A1:2020.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dB μ V/m)=20log Emission level (uV/m).
- (4) If the highest frequency of the internal sources of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz. If the highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz. If the highest frequency of the internal sources of the EUT is between 500 MHz and 1 GHz, the measurement shall only be made up to 5 GHz. If the highest frequency of the internal sources of the EUT is above 1 GHz, the measurement shall be made up to 5 times the highest frequency or 6 GHz, whichever is less.

TEST SETUP AND PROCEDURE

Below 1 GHz and above 30 MHz

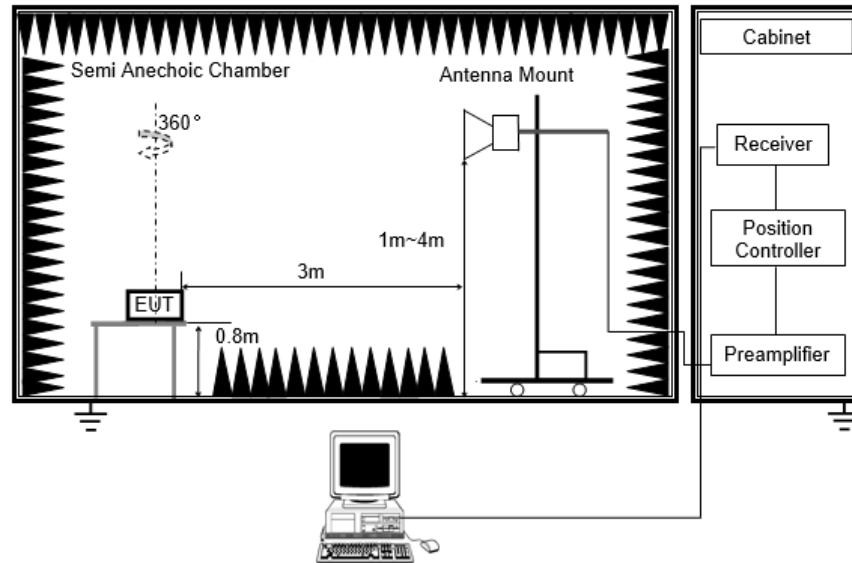


The setting of the spectrum analyzer

RBW	120 kHz
VBW	300 kHz
Sweep	Auto
Detector	Peak and QP
Trace	Max hold

1. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp was used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
2. The EUT was placed on a turntable with 80 cm above ground.
3. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
4. I/O cables that are not connected to a peripheral shall be bundled 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.
5. Cables of hand-operated devices, such as keyboards and mice, shall be placed as for normal used.
6. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
7. For measurement below 1 GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

Above 1 GHz



The setting of the spectrum analyzer

RBW	1 MHz
VBW	3 MHz
Sweep	Auto
Detector	Peak: Peak AVG: RMS
Trace	Max hold

1. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high PASS filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
2. The EUT was placed on a turntable with 80 cm above ground.
3. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
4. I/O cables that are not connected to a peripheral shall be bundled 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.
5. Cables of hand-operated devices, such as keyboards and mice, shall be placed as for normal used.
6. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
7. For measurement above 1 GHz, the peak emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the peak limit. If peak result complies with average limit, average result is deemed to comply with average limit.
9. The average emission measurement will be measured by the RMS detector and must comply with the average limit.

TEST ENVIRONMENT

Radiated Emissions - Below 1 GHz		Radiated Emissions - Above 1 GHz	
Temperature:	23.5 °C	Temperature:	24.9 °C
Humidity:	53 %	Humidity:	61 %
Atmosphere Pressure	101 kPa	Atmosphere Pressure	101 kPa

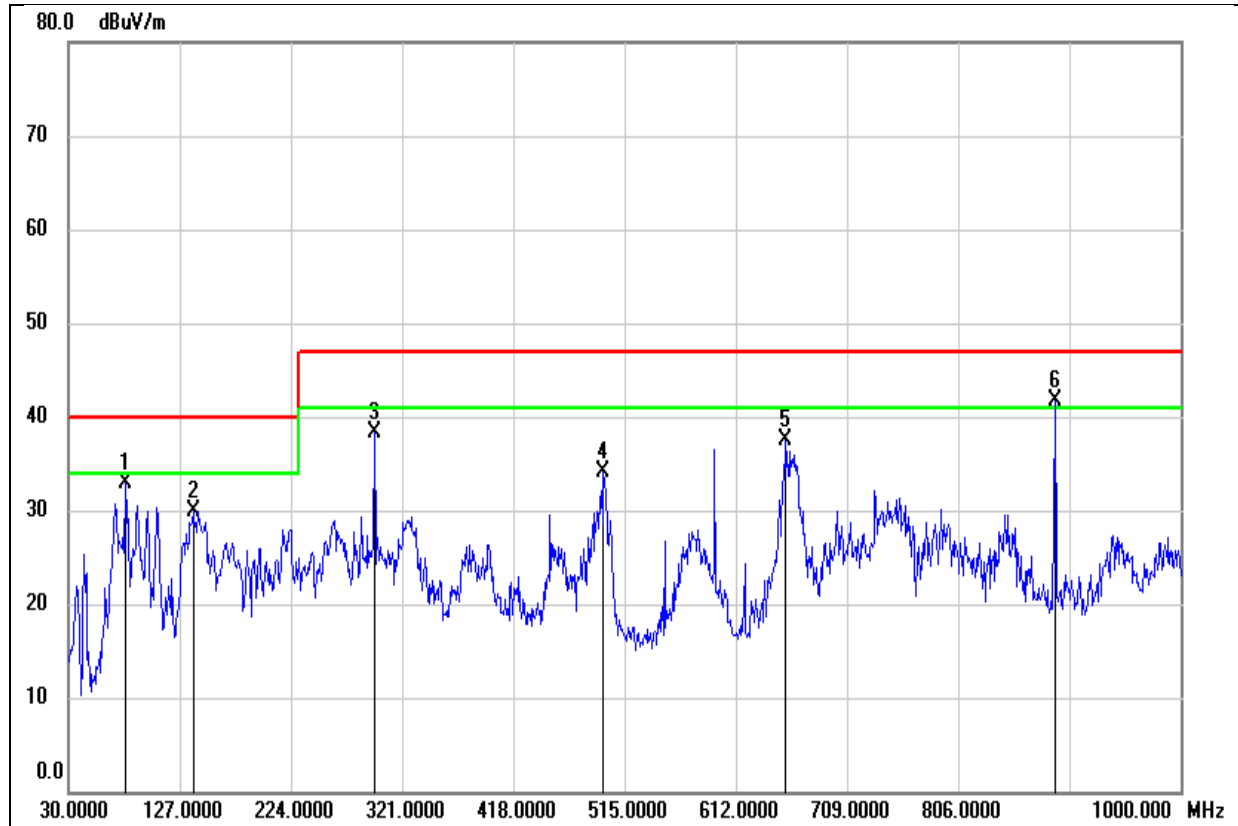
TEST MODE

Radiated Emissions - Below 1 GHz		Radiated Emissions - Above 1 GHz	
Pre-test Mode:	Mode 1 ~ Mode 12	Pre-test Mode:	Mode 1 ~ Mode 12
Final Test Mode:	Mode 3	Final Test Mode:	Mode 6

Note: All tested modes have been tested, but only the worst case data recorded in the report.

TEST RESULTS

Radiated Emissions – Below 1 GHz			
Measurement Method	Radiated	Polar:	Horizontal
Test Mode:	Mode 3	Test Voltage:	AC 230V/50Hz

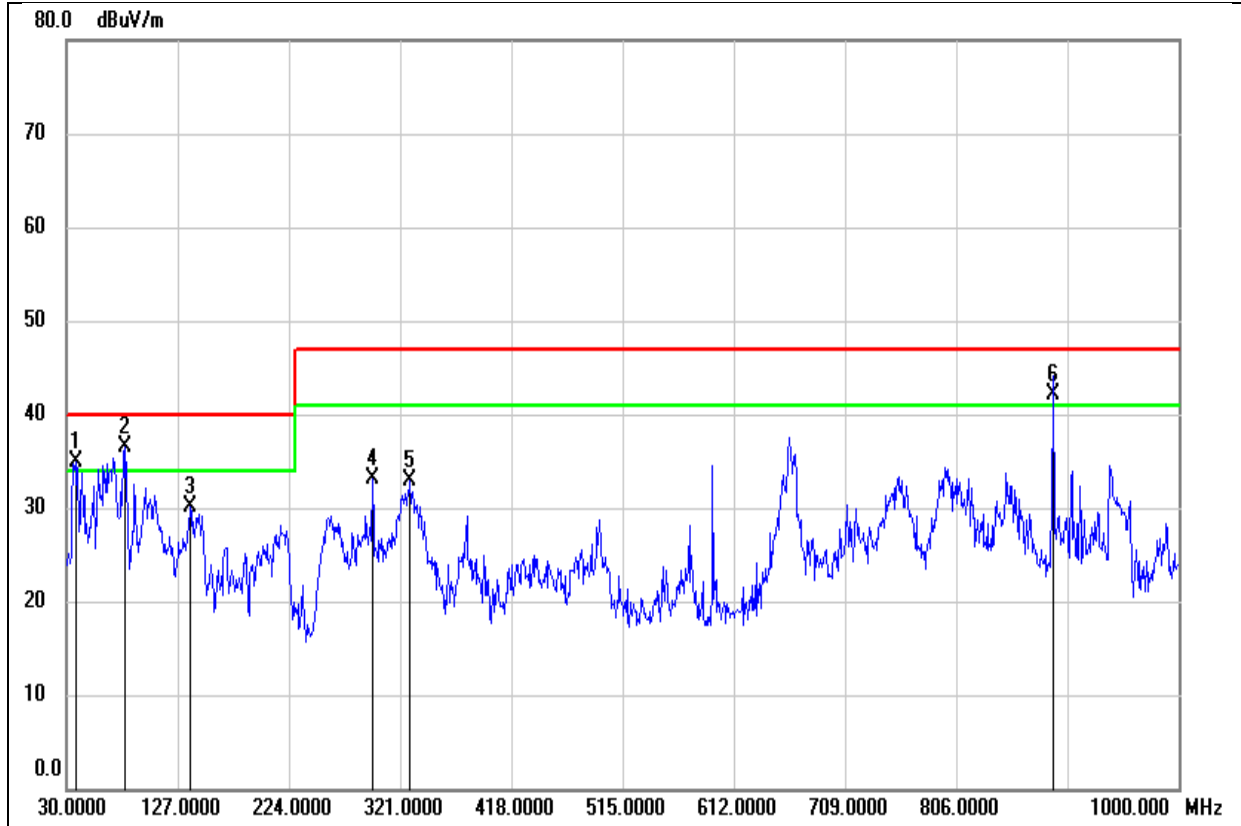


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	79.4700	54.32	-21.50	32.82	40.00	-7.18	QP
2	138.6400	48.83	-18.90	29.93	40.00	-10.07	QP
3	296.7500	53.78	-15.48	38.30	47.00	-8.70	QP
4	496.5700	44.89	-10.76	34.13	47.00	-12.87	QP
5	655.6500	46.84	-9.29	37.55	47.00	-9.45	QP
6	890.3900	46.61	-4.92	41.69	47.00	-5.31	QP

Note: 1. Reading +Correct (Amplifier Factor + Cable Loss + Antenna Factor)

2. Margin = Result - Limit

Radiated Emissions – Below 1 GHz			
Measurement Method	Radiated	Polar:	Vertical
Test Mode:	Mode 3	Test Voltage:	AC 230V/50Hz

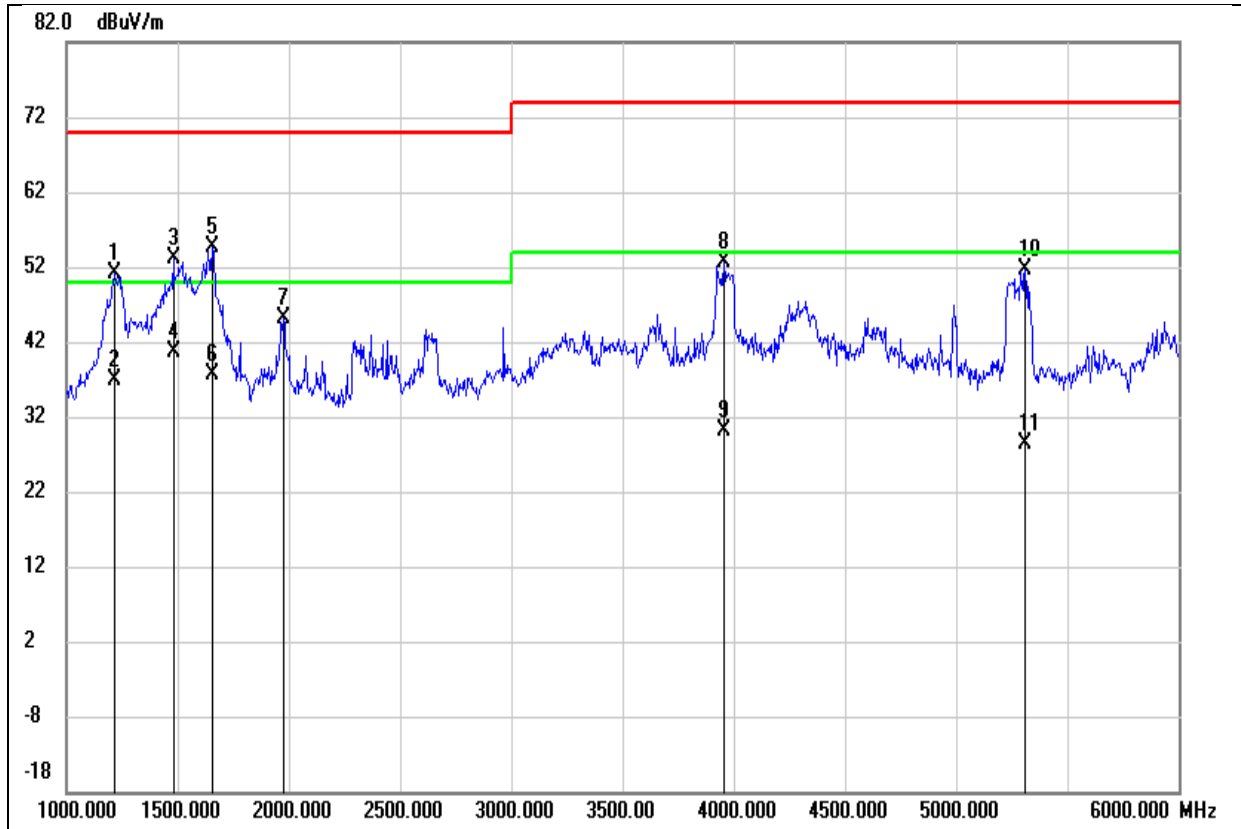


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	37.7599	54.34	-19.44	34.90	40.00	-5.10	QP
2	81.4100	58.20	-21.64	36.56	40.00	-3.44	QP
3	137.6700	49.13	-18.94	30.19	40.00	-9.81	QP
4	296.7500	48.57	-15.48	33.09	47.00	-13.91	QP
5	329.7300	46.76	-13.88	32.88	47.00	-14.12	QP
6	890.3900	46.97	-4.92	42.05	47.00	-4.95	QP

Note: 1. Reading +Correct (Amplifier Factor + Cable Loss + Antenna Factor)

2. Margin = Result - Limit

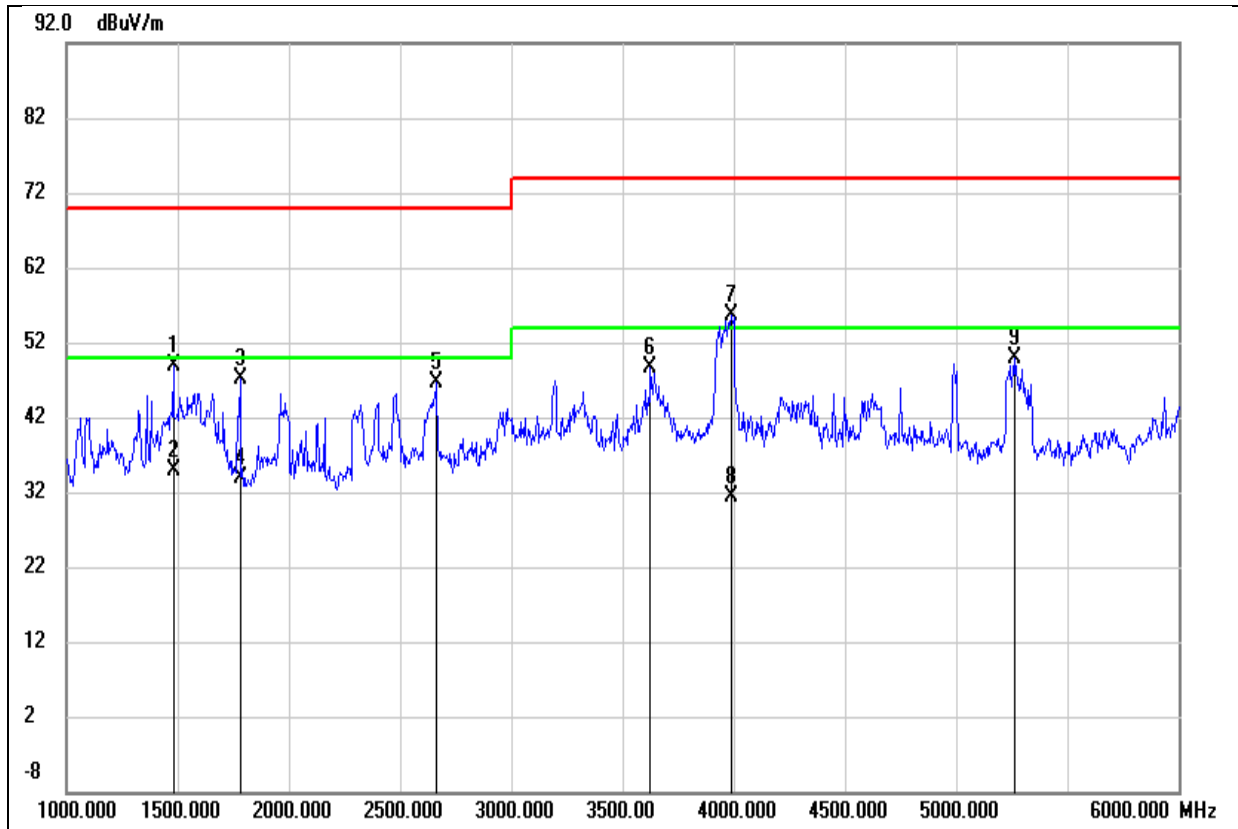
Radiated Emissions – Above 1GHz			
Measurement Method	Radiated	Polar:	Horizontal
Test Mode:	Mode 6	Test Voltage:	AC 230V/50Hz



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1215.000	65.04	-14.03	51.01	70.00	-18.99	peak
2	1215.000	51.03	-14.03	37.00	50.00	-13.00	AVG
3	1480.000	65.95	-12.80	53.15	70.00	-16.85	peak
4	1480.000	53.50	-12.80	40.70	50.00	-9.30	AVG
5	1655.000	66.80	-12.20	54.60	70.00	-15.40	peak
6	1655.000	49.90	-12.20	37.70	50.00	-12.30	AVG
7	1975.000	56.24	-11.14	45.10	70.00	-24.90	peak
8	3955.000	57.14	-4.60	52.54	74.00	-21.46	peak
9	3955.000	34.80	-4.60	30.20	54.00	-23.80	AVG
10	5310.000	51.42	0.20	51.62	74.00	-22.38	peak
11	5310.000	28.10	0.20	28.30	54.00	-25.70	AVG

Note: 1. Reading +Correct (Amplifier Factor + Cable Loss + Antenna Factor)
2. Margin = Result - Limit
3. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
4. Peak: Peak detector.
5. AVG: RMS detector.
6. All the frequencies between mark 3 and mark 4 are the fundamental frequency which were transmitted by wireless module from EUT.

Radiated Emissions – Above 1GHz			
Measurement Method	Radiated	Polar:	Vertical
Test Mode:	Mode 6	Test Voltage:	AC 230V/50Hz



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1480.000	61.63	-12.80	48.83	70.00	-21.17	peak
2	1480.000	47.60	-12.80	34.80	50.00	-15.20	AVG
3	1780.000	58.92	-11.79	47.13	70.00	-22.87	peak
4	1780.000	45.79	-11.79	34.00	50.00	-16.00	AVG
5	2665.000	54.50	-7.98	46.52	70.00	-23.48	peak
6	3625.000	54.26	-5.51	48.75	74.00	-25.25	peak
7	3990.000	60.04	-4.51	55.53	74.00	-18.47	peak
8	3990.000	36.01	-4.51	31.50	54.00	-22.50	AVG
9	5265.000	49.63	0.16	49.79	74.00	-24.21	peak

Note: 1. Reading +Correct (Amplifier Factor + Cable Loss + Antenna Factor)
2. Margin = Result - Limit
3. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
4. Peak: Peak detector.
5. AVG: RMS detector.
6. All the frequencies between mark 3 and mark 4 are the fundamental frequency which were transmitted by wireless module from EUT.

7.3. HARMONIC CURRENT DISTURBANCE MEASUREMENT

LIMITS

EN IEC 61000-3-2:2019/A1:2021						
Equipment Category	Harmonic Order n	Max. Permissible Harmonic Current A	Equipment Category	Harmonic Order n	Max. Permissible Harmonic Current A mA/w	
Class A	Odd Harmonics		Class D	Odd Harmonics only		
	3	2.30		3	2.30	3.4
	5	1.14		5	1.14	1.9
	7	0.77		7	0.77	1.0
	9	0.40		9	0.40	0.5
	11	0.33		11	0.33	0.35
	13	0.21		13	0.21	0.30
	15≤n≤39	0.15 x 15/n		15≤n≤39	0.15 x 15/n	3.85/n
	Even Harmonics					
	2	1.08				
	4	0.43				
	6	0.30				
	8≤n≤40	0.23 x 8/n				

TEST PROCEDURE

- a. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating Condition.
- b. The classification of EUT is according to EN IEC 61000-3-2:2019/A1:2021. The EUT is classified as follows:

Class A:

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

Class B:

Portable tools. Arc welding equipment which is not professional equipment.

Class C:

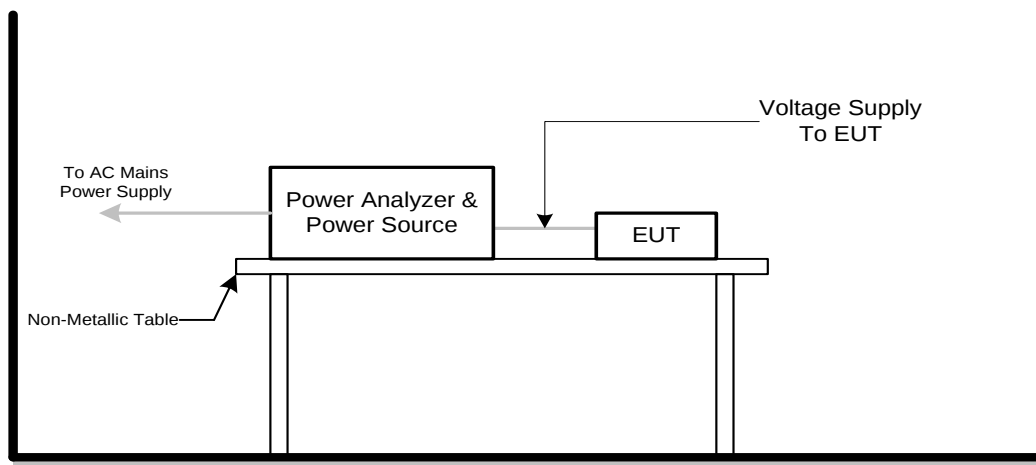
Lighting equipment.

Class D:

Equipment having a specified power less than or equal to 600W of the following types: Personal computers and personal computer monitors and television receivers.

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

TEST SETUP



For the actual test configuration, please refer to Appendix I: Photographs of Test Configuration.

TEST ENVIRONMENT

Temperature	24.2 °C	Relative Humidity	51 %
Atmosphere Pressure	101 kPa		

TEST MODE

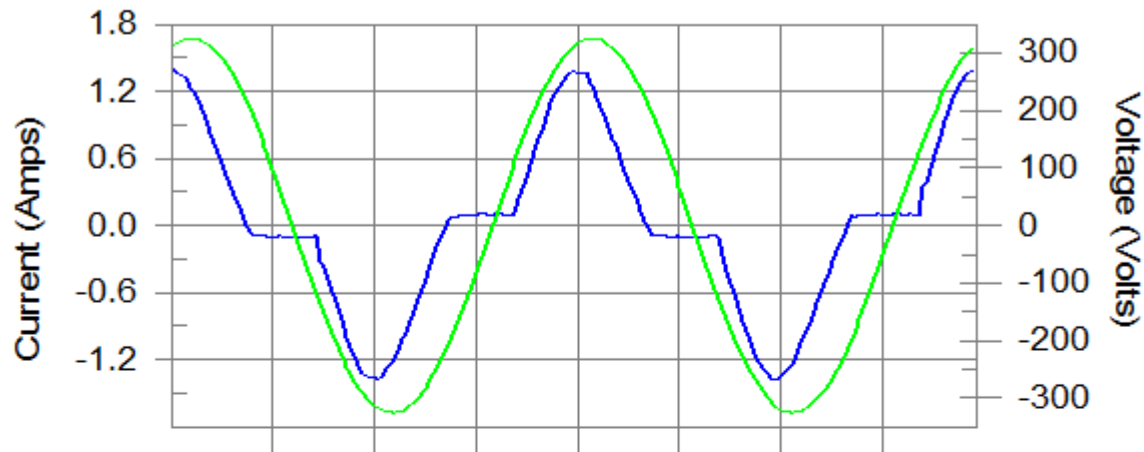
Pre-test Mode:	Mode 1 ~ 12
Final Test Mode:	Mode 8

Note: All test modes have been tested, but only the worst case data recorded in the report.

TEST RESULTS

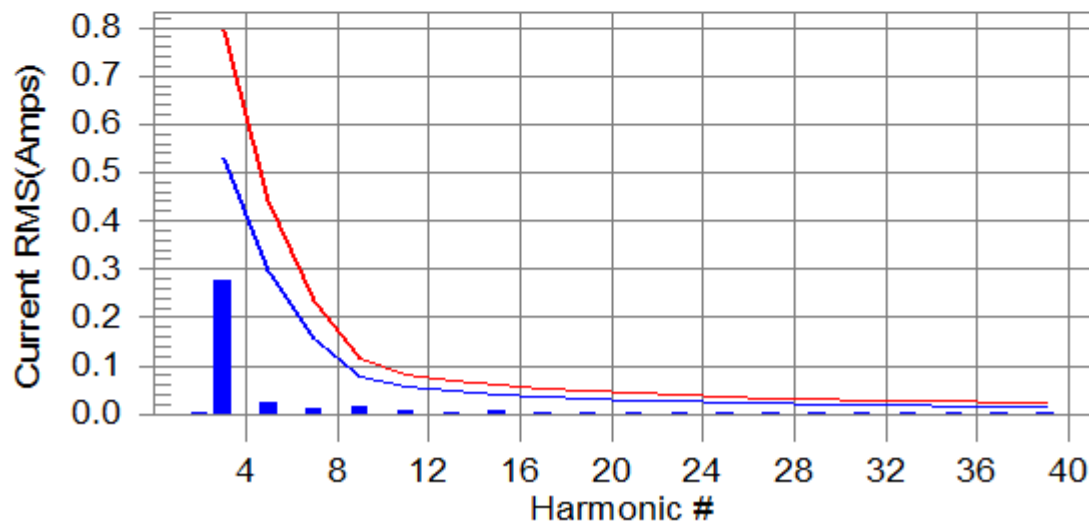
Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class D limit line

European Limits



Test result: Pass Worst harmonics H3-35.2% of 150% limit, H3-52.3% of 100% limit

7.4. VOLTAGE FLUCTUATION AND FLICK MEASUREMENT

LIMITS

Test items	Limits (EN 61000-3-3:2013/A2:2021/AC:2022-01)	Descriptions
P_{st}	≤ 1.0 , $T_p=10\text{min}$	short-term flicker indicator
P_{lt}	≤ 0.65 , $T_p=2\text{h}$	long-term flicker indicator
d_c	$\leq 3.3\%$	relative steady-state voltage change
d_{max}	$\leq 4\%$ (or 6% ^{Note(1)} , 7% ^{Note(2)})	maximum relative voltage change:
d_(t)	$\leq 3.3\%$, more than 500ms	relative voltage change characteristic

Note:

(1) 6 % for equipment which is:

- a. switched manually, or
- b. switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.

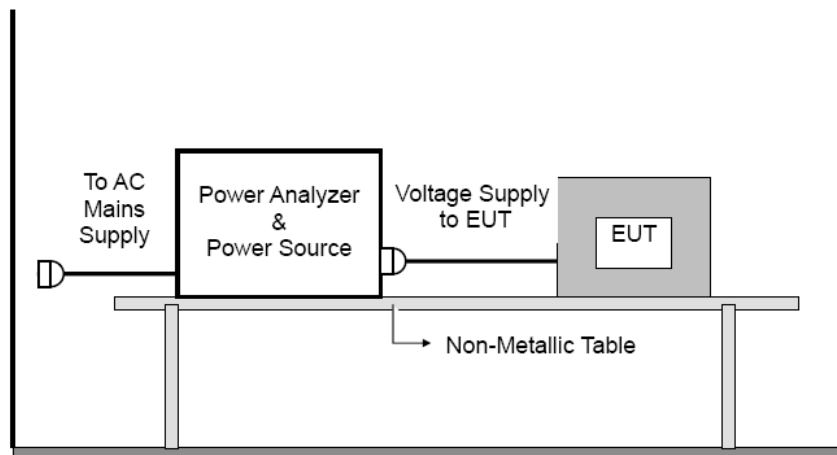
(2) 7 % for equipment which is

- a. attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or
- b. switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

TEST PROCEDURE

- The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal Condition
- During the flick measurement, the measure time shall include that part of whole operation changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.
- Tests was performed according to the Test Condition/Assessment of Voltage Fluctuations specified in Clause 6.0/4.0 of EN 61000-3-3:2013/A2:2021/AC:2022-01 depend on which standard adopted for compliance measurement.
- All types of harmonic current and/or voltage fluctuation in this report are assessed by direct measurement using flicker-meter.

TEST SETUP



For the actual test configuration, please refer to Appendix I: Photographs of Test Configuration.

TEST ENVIRONMENT

Temperature	24.3 °C	Relative Humidity	54.1 %
Atmosphere Pressure	101kPa		

TEST MODE

Pre-test Mode:	Mode 1 ~ 12
Final Test Mode:	Mode 8

Note: All tested modes have been tested, but only the worst case data recorded in the report.

TEST RESULTS

Voltage Fluctuation and Flick	
Test Mode:	Mode 8

Test Result: Pass

Status: Test Completed

Pst_i and limit line

European Limits



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt): 229.46

Highest dt (%):

T-max (mS): 0

Highest dc (%): 0.00

Highest dmax (%): 0.00

Highest Pst (10 min. period): 0.112

Highest Plt (2 hr. period): 0.049

Test limit (%):

Test limit (mS): 500.0 Pass

Test limit (%): 3.30 Pass

Test limit (%): 4.00 Pass

Test limit: 1.000 Pass

Test limit: 0.650 Pass

8. IMMUNITY TEST

8.1. PERFORMANCE CRITERIA

GENERAL PERFORMANCE CRITERIA

According to EN 55035:2017/A11:2020 standard, the general performance criteria as following:

Criteria A	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.
Criteria B	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. 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.
Criteria C	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. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

PERFORMANCE CRITERIA FOR BROADCAST RECEPTION FUNCTION

The broadcast reception function shall comply with the general performance criteria given in Clause 8 and any relevant annex with the deviations defined in Table A.2.

Table A.2 – Modified test levels for performance criterion A for the broadcast reception function			
Performance criteria	Test type table clause	Group 1	Group 2
Criterion A	1.2 1.3	The disturbance level is reduced to 1 V/m for in-band frequencies.	No test requirements apply
	2.1 3.1 4.1	The disturbance level is reduced to 1 V for in-band frequencies.	
In-band is defined as the entire tuneable operating range of the selected broadcast reception function. The tuned channel ±0,5 MHz (lower edge frequency – 0,5 MHz up to the upper edge frequency + 0,5 MHz of the tuned channel) is excluded from testing. Note: In some countries, there is a requirement to test the tuned channels. Refer to the relevant regional requirements for guidance.			

PERFORMANCE CRITERIA FOR PRINT FUNCTION

Criterion A	Refer to chapter B.3.1 of EN 55035:2017/A11:2020
Criterion B	Refer to chapter B.3.2 of EN 55035:2017/A11:2020
Criterion C	Refer to chapter B.3.3 of EN EN 55035:2017/A11:2020

PERFORMANCE CRITERIA FOR SCAN FUNCTION

Criterion A	Refer to chapter C.3.1 of EN 55035:2017/A11:2020
Criterion B	Refer to chapter C.3.2 of EN 55035:2017/A11:2020
Criterion C	Refer to chapter C.3.3 of EN 55035:2017/A11:2020

PERFORMANCE CRITERIA FOR DISPLAY AND DISPLAY OUTPUT FUNCTION

Criterion A	Refer to chapter D.3.1 and D.3.2 of EN 55035:2017/A11:2020
Criterion B	Refer to chapter D.3.3 of EN 55035:2017/A11:2020
Criterion C	Refer to chapter D.3.4 of EN 55035:2017/A11:2020

PERFORMANCE CRITERIA FOR MUSICAL TONE GENERATING FUNCTION

Criterion A	Refer to chapter E.3.2 of EN 55035:2017/A11:2020
Criterion B	Refer to chapter E.3.3 of EN 55035:2017/A11:2020
Criterion C	Refer to chapter E.3.4 of EN 55035:2017/A11:2020

PERFORMANCE CRITERIA FOR NETWORKING FUNCTION

General requirements for network functions	
Criterion A	Refer to chapter F.3.3.1 of EN 55035:2017/A11:2020
Criterion B	Refer to chapter F.3.3.2 of EN 55035:2017/A11:2020
Criterion C	Refer to chapter F.3.3.3 of EN 55035:2017/A11:2020

Requirements for CPE containing xDSL ports	
Criterion A	Refer to chapter F.4.2 of EN 55035:2017/A11:2020
Criterion B	Refer to chapter F.4.3 of EN 55035:2017/A11:2020
Criterion C	Refer to chapter F.4.4 of EN 55035:2017/A11:2020

PERFORMANCE CRITERIA FOR AUDIO OUTPUT FUNCTION

Criterion A	Refer to chapter G.7.1 of EN 55035:2017/A11:2020
Criterion B	Refer to chapter G.7.2 of EN 55035:2017/A11:2020
Criterion C	Refer to chapter G.7.3 of EN 55035:2017/A11:2020

PERFORMANCE CRITERIA FOR TELEPHONY FUNCTION

Criterion A	Refer to chapter H.4 Table H.1 of EN 55035:2017/A11:2020
Criterion B	Refer to chapter H.4 Table H.1 of EN 55035:2017/A11:2020
Criterion C	Refer to chapter H.4 Table H.1 of EN 55035:2017/A11:2020

8.2. ELECTROSTATIC DISCHARGE IMMUNITY TEST

TEST SPECIFICATION

Standard:	EN 55035:2017/A11:2020 (refer to IEC 61000-4-2:2008)
Discharge Impedance:	330(1±10%) Ω / 150(1±10%) pF
Discharge Voltage:	Air Discharge: 2kV, 4kV, 8kV (Direct) Contact Discharge: 4kV (Direct/Indirect)
Polarity:	Positive and Negative
Discharge mode of operation:	Single discharge
Discharge Period:	1 second minimum

TEST PROCEDURE

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

- a. Contact discharge was applied to conductive surfaces and coupling planes of the EUT.

During the test, it was performed with single discharges. For the single discharge time between successive single discharges was at least 1 second.

Vertical Coupling Plane (VCP):

The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m 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 is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge.

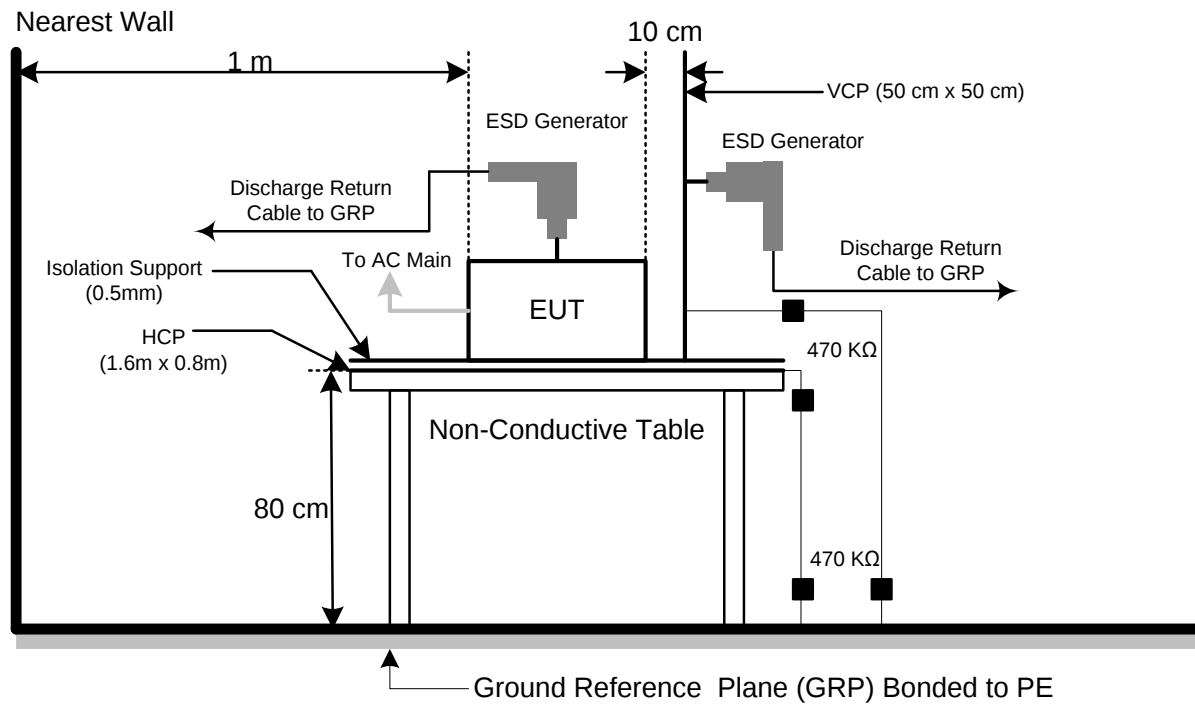
- b. Air discharges at insulation surfaces of the EUT.

It was at least ten single discharges with positive and negative at the same selected point.

- c. For air discharge testing, the test shall be applied at all test levels 2kV, 4kV and 8kV.

- d. For the actual test configuration, please refer to the related Item: EUT Test Photos.

TEST SETUP



For the actual test configuration, please refer to Appendix I: Photographs of Test Configuration.

TEST ENVIRONMENT

Temperature	24.3 °C	Relative Humidity	55.8 %
Atmosphere Pressure	101kPa		

TEST MODE

Test Mode:	Mode 1 ~ Mode 12
------------	------------------

TEST RESULTS

Test Mode:	Mode 1 ~ Mode 12
------------	------------------

Mode	Air Discharge								Contact Discharge							
	2kV		4kV		8kV		-kV		2kV		4kV		-kV		-kV	
Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
All Slot	A	A	A	A	A	A	/	/	/	/	/	/	/	/	/	/
All Metal							/	/	/	/	A	A	/	/	/	/
Criteria	B						/		B				/			
Result	A						/		A				/			
Judgment	PASS						/		PASS				/			

Mode	HCP Discharge								VCP Discharge							
	2kV		4kV		-kV		-kV		2kV		4kV		-kV		-kV	
Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
front	/	/	A	A	/	/	/	/	/	/	A	A	/	/	/	/
rear	/	/	A	A	/	/	/	/	/	/	A	A	/	/	/	/
left	/	/	A	A	/	/	/	/	/	/	A	A	/	/	/	/
right	/	/	A	A	/	/	/	/	/	/	A	A	/	/	/	/
Criteria	B				/				B				/			
Result	A				/				A				/			
Judgment	PASS				/				PASS				/			

Note:

A: No degradation in the performance of the EUT was observed.

8.3. RADIO FREQUENCY ELECTROMAGNETIC FIELD IMMUNITY TEST

TEST SPECIFICATION

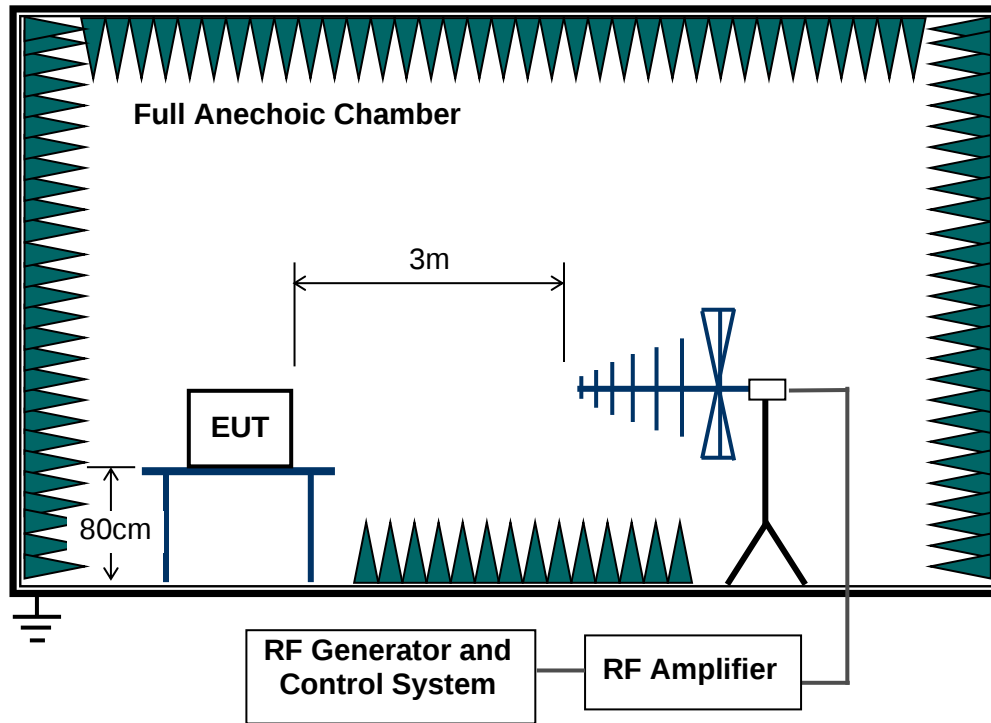
Standard:	EN 55035:2017/A11:2020 (refer to IEC 61000-4-3:2020)
Modulation:	80%, AM
Frequency Step:	1% of fundamental
Polarity of Antenna	Vertical or Horizontal
Test Distance:	3 meters
Antenna Height:	1.5 meters
Dwell Time:	2 s

TEST PROCEDURE

The test procedure was in accordance with IEC 61000-4-3:2020.

- a. The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.
- b. The disturbance test signal shall be 80% amplitude modulated by a sine wave, preferably having a frequency of 1kHz. A frequency other than 1kHz may be used where permitted within EN 55035:2017/A11:2020 (for example Clause G.3).
- c. 1% step size is preferred, the frequency range can be swept incrementally with a step size not exceeding 4% of the previous frequency with a test level of twice the value of the specified test level.
- d. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to be able to respond. However, the dwell time should not exceed 5 s at each of the frequencies during the scan.
- e. The test was performed with the EUT exposed to both vertically and horizontally polarized fields.

TEST SETUP



Note 1: For the 1000MHz to 6000MHz tests, the antenna will change to horn antenna.

Note 2: For the actual test configuration, please refer to Appendix I: Photographs of Test Configuration.

TEST ENVIRONMENT

Temperature	22.4 °C	Relative Humidity	54.7 %
Atmosphere Pressure	101kPa		

TEST MODE

Test Mode:	Mode 1 ~ Mode 12
------------	------------------

TEST RESULTS

Test Mode:	Mode 1 ~ Mode 12
------------	------------------

Freq. Range (MHz)	Position (Face)	Polarity (H or V)	Field Strength (V/m) (unmodulated, r.m.s.)	Criterion	Results	Judgment
80-1000 1800 2600 3500 5000	0°	H&V	3V/m	A	A	Pass
80-1000 1800 2600 3500 5000	90°	H&V	3V/m	A	A	Pass
80-1000 1800 2600 3500 5000	180°	H&V	3V/m	A	A	Pass
80-1000 1800 2600 3500 5000	270°	H&V	3V/m	A	A	Pass

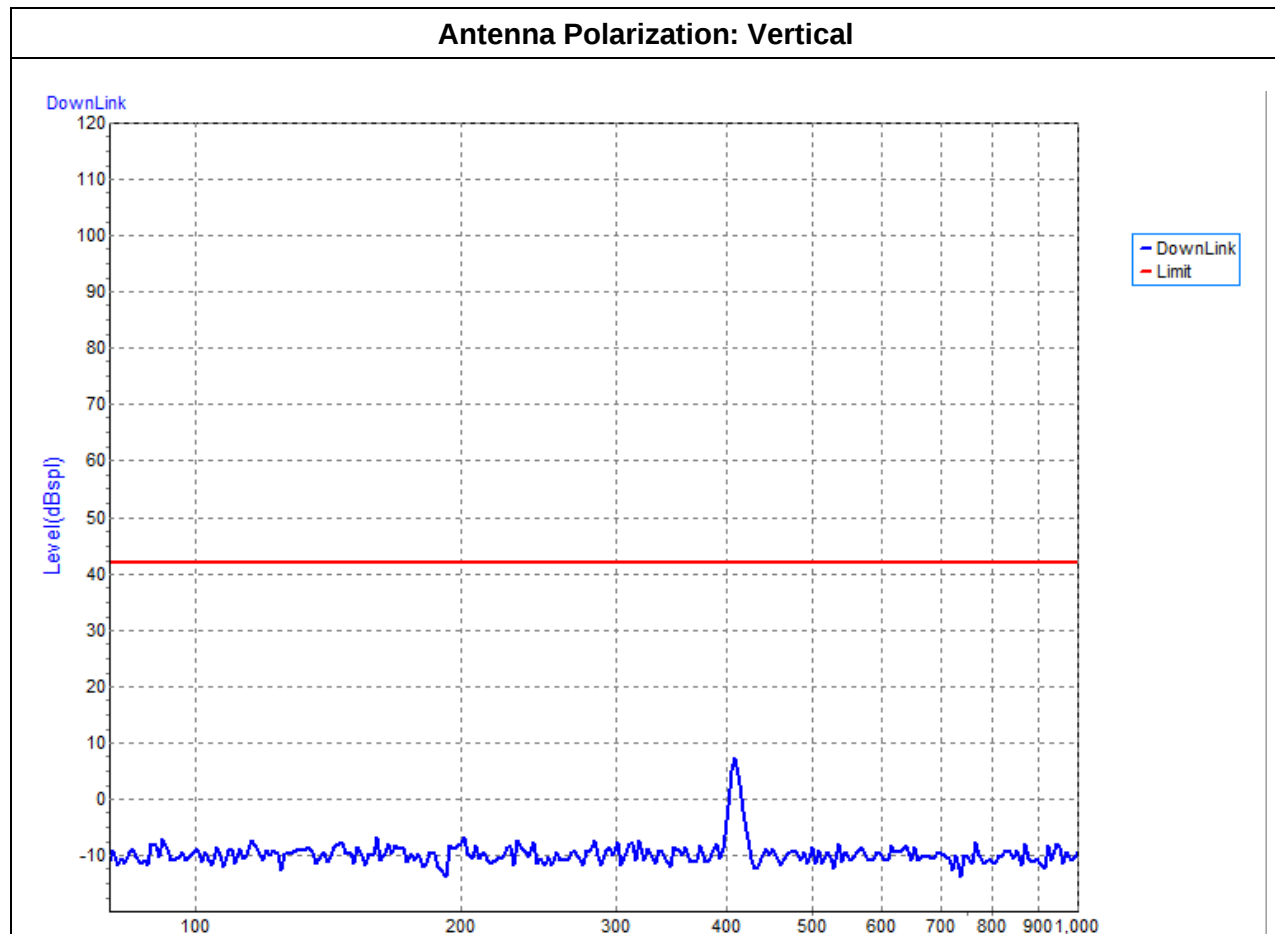
Note:

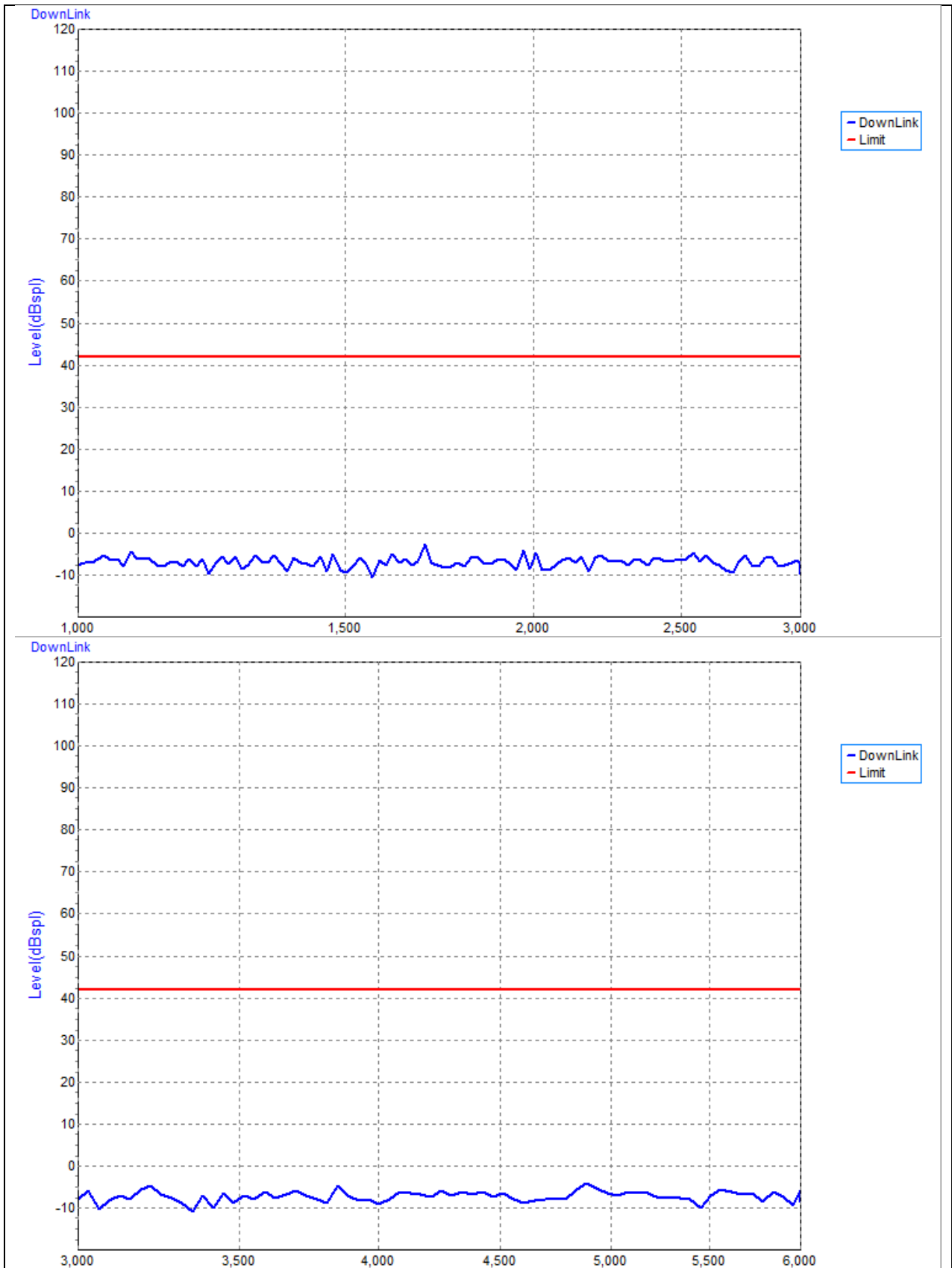
A: No degradation in the performance of the EUT was observed.

Audio output function result:

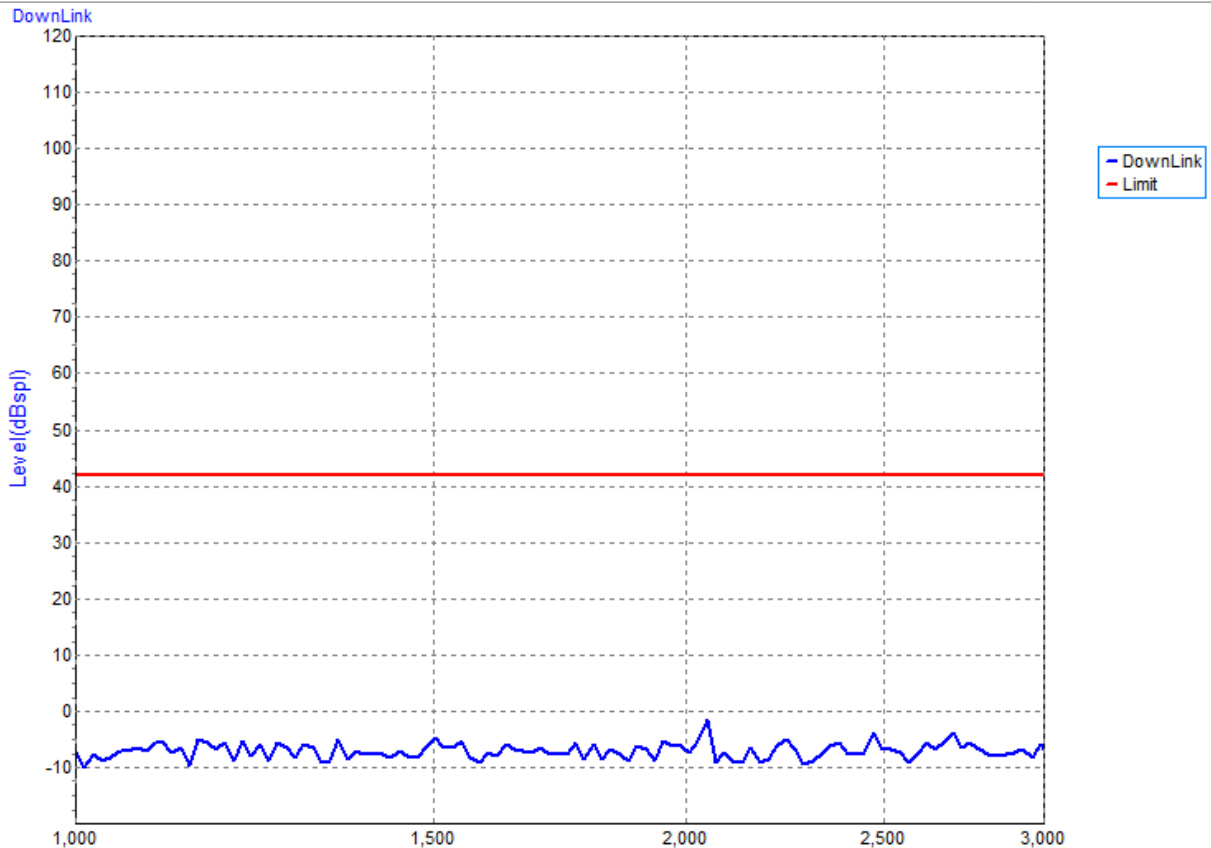
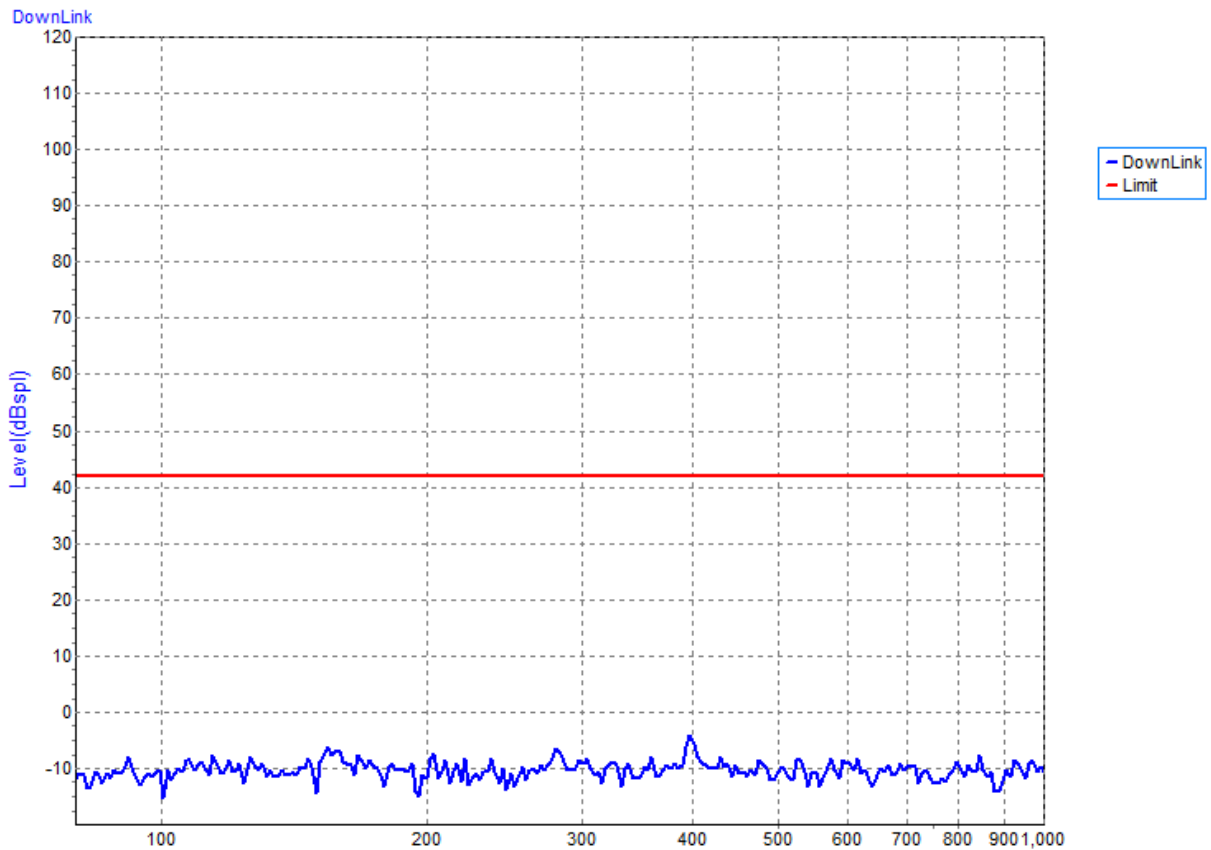
Worst case data:

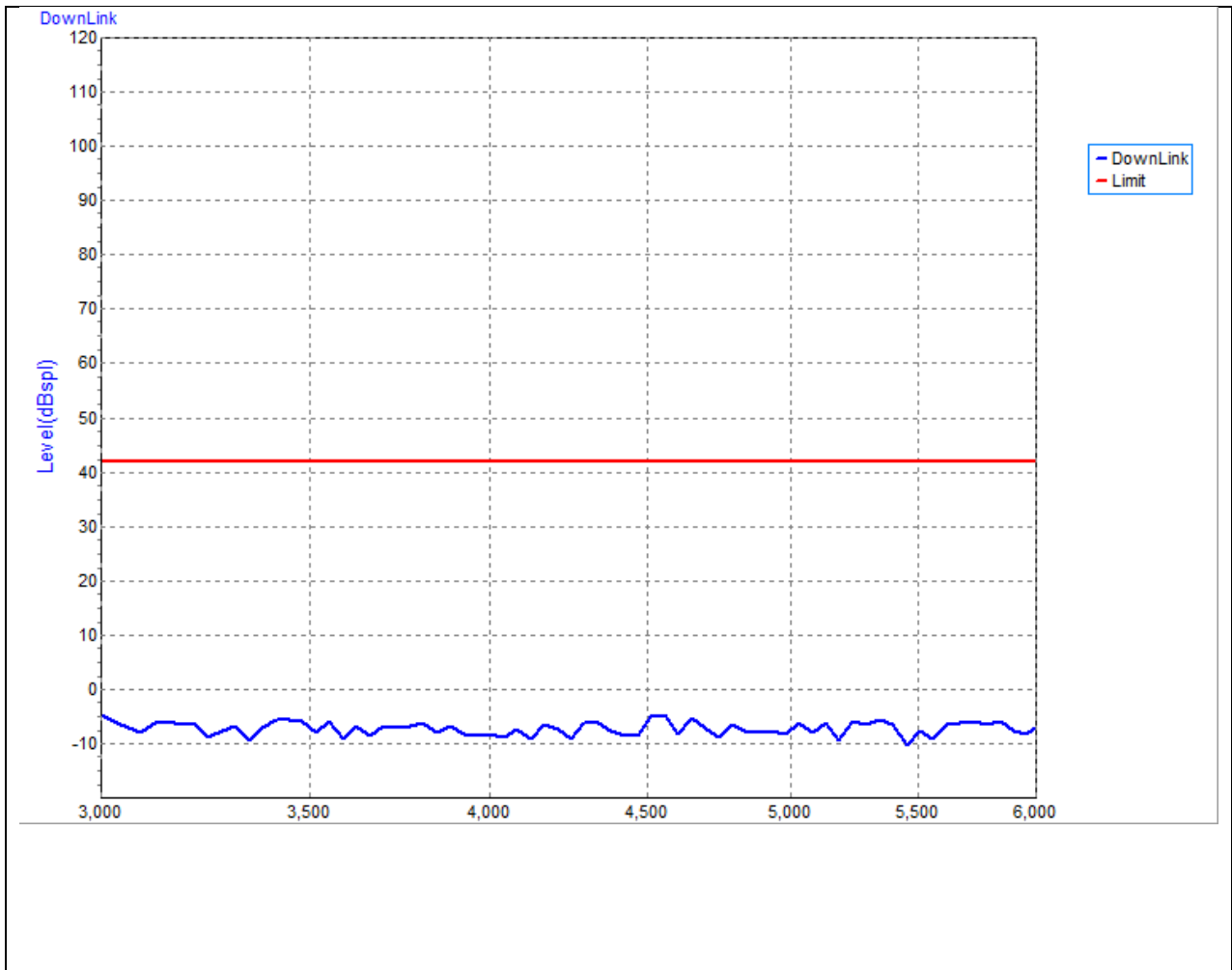
Test Mode:	Mode 9
Test Voltage:	AC 230V/50Hz
Test Audio Output Port:	Earphone
Test Method:	Acoustic
EUT Exposed face:	Back
The limit setting:	reference audio level minus 20dB





Antenna Polarization: Horizontal





8.4. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

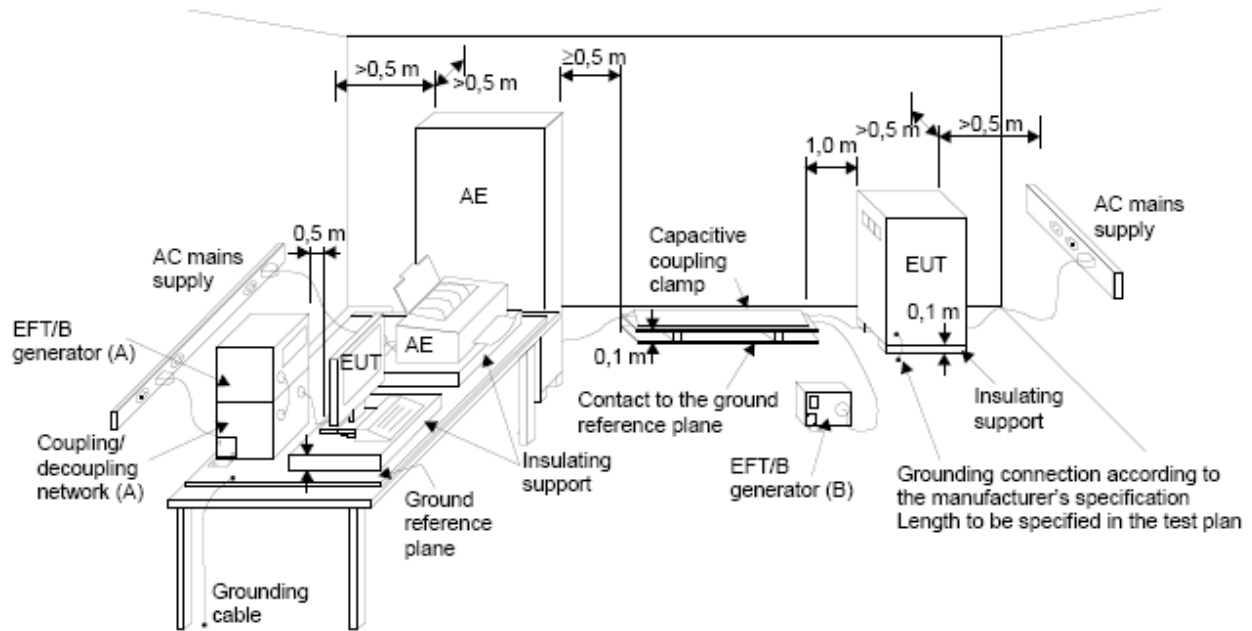
TEST SPECIFICATION

Standard:	EN 55035:2017/A11:2020 (refer to IEC 61000-4-4:2012)
Test Voltage:	0.5kV / 1kV (Peak)
Polarity:	Positive and Negative
Impulse Frequency:	5 KHz
Impulse wave shape:	5/50 Tr/Th ns
Burst Duration:	15ms
Burst Period:	300ms
Test Duration:	1 Minute

TEST PROCEDURE

- Both positive and negative polarity discharges were applied.
- The duration time of each test sequential was 1 minute.
- The transient/burst waveform was in accordance with IEC 61000-4-4:2012, 5/50ns.
- Multi conductor cables shall be tested as a single cable. Cables shall not be split or divided into groups of conductors for this test.

TEST SETUP



For the actual test configuration, please refer to Appendix I: Photographs of Test Configuration.

TEST ENVIRONMENT

Temperature	23.6 °C	Relative Humidity	55.4 %
Atmosphere Pressure	101kPa		

TEST MODE

Test Mode:	Mode 1~12
------------	-----------

TEST RESULTS

Test Mode:	Mode 1~12
------------	-----------

Test Ports		Test Levels (kV)						Criteria	Results	Judgement
		+0.5	-0.5	+1	-1	+2	-2			
AC mains power input ports	L	/	/	B	B	/	/	B	A	Pass
	N	/	/	B	B	/	/			
	PE	/	/	B	B	/	/			
	L + N	/	/	B	B	/	/			
	L1 + PE	/	/	B	B	/	/			
	N + PE	/	/	B	B	/	/			
	L1+N+PE	/	/	B	B	/	/			
Ethernet port		A	A	/	/	/	/	B	A	Pass

Note:

A: No degradation in the performance of the EUT was observed.

8.5. SURGE IMMUNITY TEST

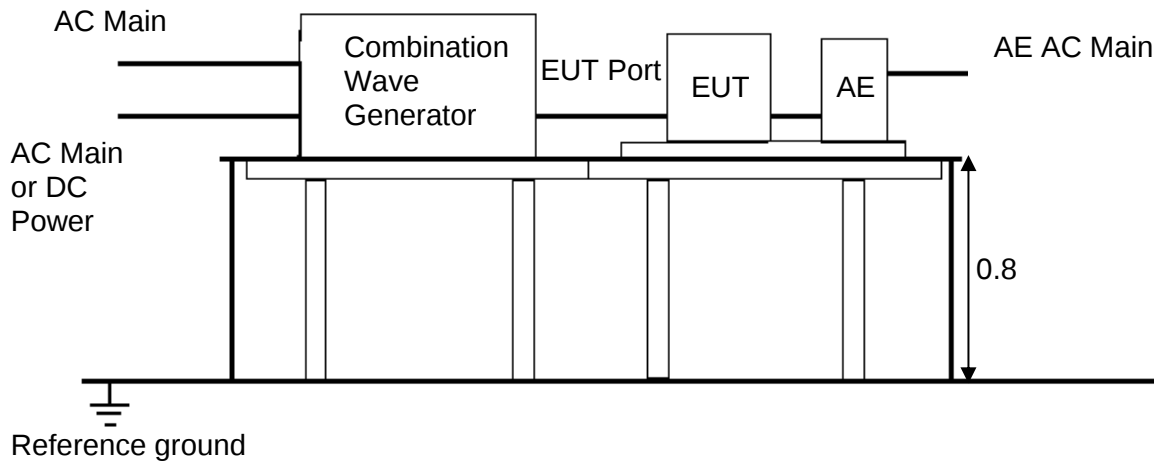
TEST SPECIFICATION

Standard:	EN 55035:2017/A11:2020 (refer to IEC 61000-4-5:2014+AMD1:2017)
Waveform:	Tr/Th 1.2/50 μ s or 10/700 μ s
Test Voltage:	1kV (Line to Line for AC mains power ports) 2kV (Line to Ground for AC mains power ports) 1kV (Lines to Ground for Analogue/Digital data ports) 0.5kV (shield to ground for coaxial/shielded cable on Analogue/Digital data ports) 0.5kV (each individual line to reference ground for DC network power ports)
Polarity:	Positive and Negative
Phase Angle:	90°/270°
Repetition Rate:	1 per minute
Times:	10

TEST PROCEDURE

- d. The EUT and the auxiliary equipment were placed on a table of 0.8m heights above a metal ground reference plane. The size of ground plane is greater than 1m×1m and project beyond the EUT by at least 0.1m on all sides. The ground plane is connected to the protective earth. The length of power cord between the coupling device and the EUT was less than 2 meters (provided by the manufacturer).
- e. The EUT was connected to the power mains through a coupling device that directly couples the surge interference signal. The surge noise was applied synchronized to the voltage phase at the zero crossing and the peak value of the AC voltage wave (positive and negative).
- f. The surges were applied line to line and line(s) to earth. When testing line to earth the test voltage was applied successively between each of the lines and earth. Steps up to the test level specified increased the test voltage. All lower levels including the selected test level were tested. The polarity of each surge level included positive and negative test pulses.

TEST SETUP



For the actual test configuration, please refer to Appendix I: Photographs of Test Configuration.

TEST ENVIRONMENT

Temperature	24.4 °C	Relative Humidity	55.7 %
Atmosphere Pressure	101kPa		

TEST MODE

Test Mode:	Mode 1 ~ 12
------------	-------------

TEST RESULTS

Test Mode:		Mode 1 ~ 12							
Wave Form EUT Ports Tested	1.2/50(8/20)Ti/Th us						Criteria	Results	Judgement
	Polarity	Phase	Voltage						
			0.5kV	1kV	1.5kV	2kV			
L - N	+	0°	/	/	/	/	B	A	Pass
	-		/	/	/	/			
	+	90°	/	A	/	/			
	-		/	A	/	/			
	+	180°	/	/	/	/			
	-		/	/	/	/			
	+	270°	/	A	/	/			
	-		/	A	/	/			
L - PE	+	0°	/	/	/	/	B	A	Pass
	-		/	/	/	/			
	+	90°	/	/	/	A			
	-		/	/	/	A			
	+	180°	/	/	/	/			
	-		/	/	/	/			
	+	270°	/	/	/	A			
	-		/	/	/	A			
N - PE	+	0°	/	/	/	/	B	A	Pass
	-		/	/	/	/			
	+	90°	/	/	/	A			
	-		/	/	/	A			
	+	180°	/	/	/	/			
	-		/	/	/	/			
	+	270°	/	/	/	A			
	-		/	/	/	A			

Note:

A: No degradation in the performance of the EUT was observed.

8.6. IMMUNITY TO CONDUCTED DISTURBANCES INDUCED BY RF FIELDS

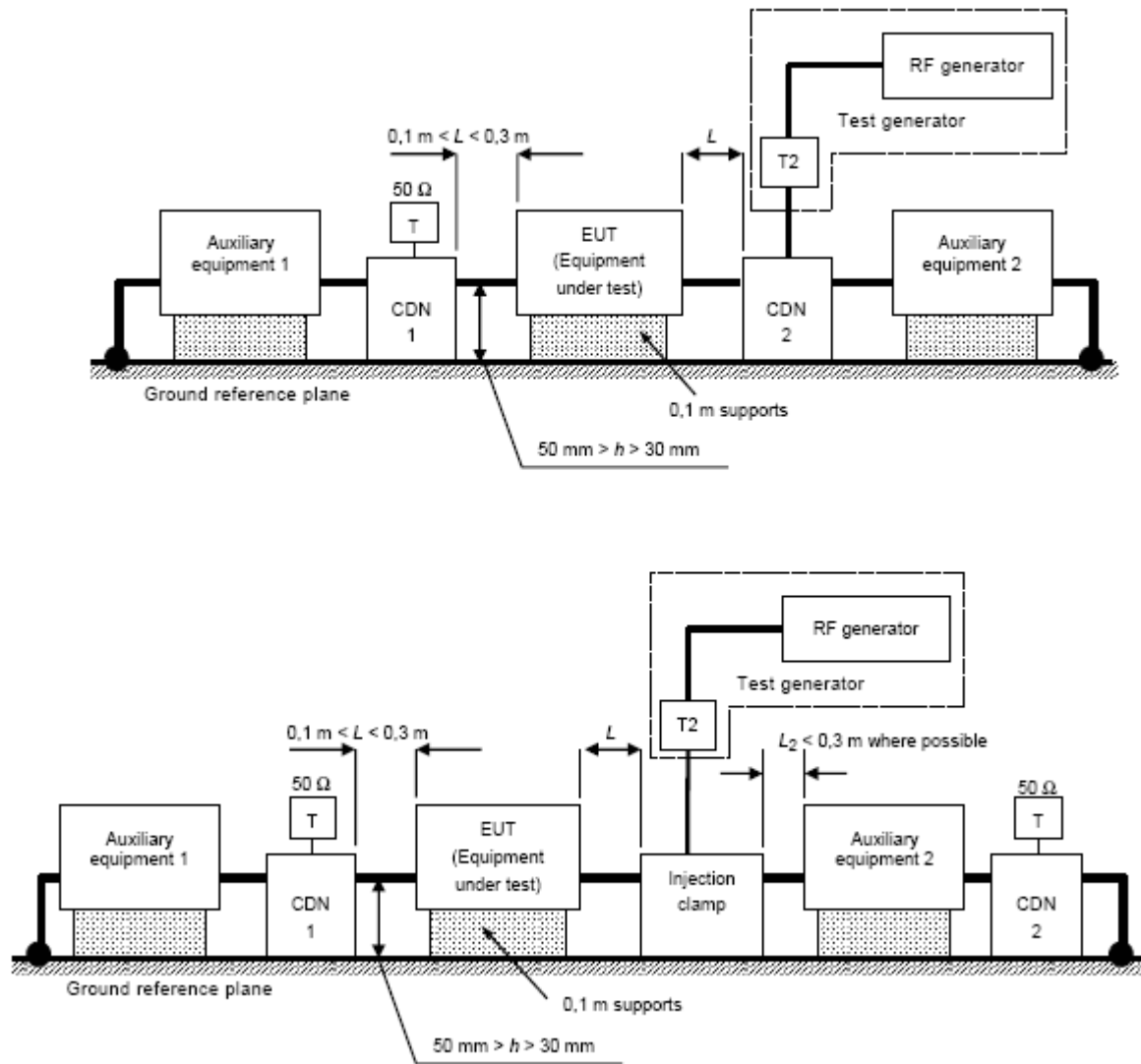
TEST SPECIFICATION

Standard:	EN 55035:2017/A11:2020 (refer to IEC 61000-4-6:2013+COR1:2015)
Frequency Range:	0.15-80MHz
Field Strength:	0.15 MHz - 10 MHz - 3V (unmodulated, r.m.s.) 10 MHz - 30 MHz - 3V to 1V (unmodulated, r.m.s.) 30 MHz - 80 MHz - 1V (unmodulated, r.m.s.)
Modulation:	80% AM (1 kHz)
Frequency Step:	1% of fundamental

TEST PROCEDURE

- The EUT shall be tested within its intended operating and climatic Condition.
- The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.
- The frequency range is swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80% amplitude. The signal is modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. The sweep rate shall not exceed 1.5×10^{-3} decades/s. The step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value where the frequency is swept incrementally.
- The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies such as clock frequencies and harmonics or frequencies of dominant interest, shall be analyzed separately.
- Attempts should be made to fully exercise the EUT during test, and to fully interrogate all exercise modes selected for susceptibility.

TEST SETUP



For the actual test configuration, please refer to Appendix I: Photographs of Test Configuration.

TEST ENVIRONMENT

Temperature	23.8 °C	Relative Humidity	53.6 %
Atmosphere Pressure	101kPa		

TEST MODE

Test Mode:	Mode 1 ~ 12
------------	-------------

TEST RESULTS

Test Mode:	Mode 1 ~ 12
------------	-------------

Test Ports (Mode)	Freq.Range (MHz)	Field Strength (unmodulated, r.m.s.)	Criteria	Results	Judgment
AC mains power ports	0.15 - 10	3V	A	A	Pass
	10 - 30	3V to 1V			
	30 - 80	1V			
DC network power ports	0.15 - 10	3V	A	/	/
	10 - 30	3V to 1V			
	30 - 80	1V			
Analogue/digital data ports	0.15 - 10	3V	A	A	Pass
	10 - 30	3V to 1V			
	30 - 80	1V			

Note:

A: No degradation in the performance of the EUT was observed.

8.7. POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST

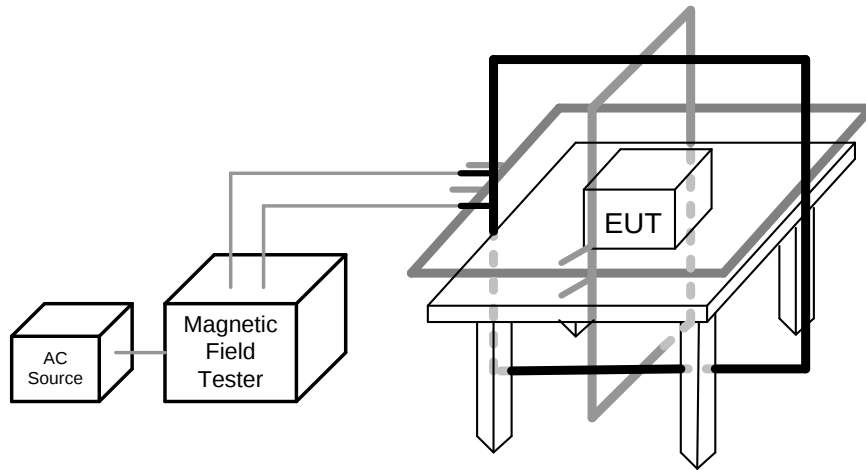
TEST SPECIFICATION

Standard:	EN 55035:2017/A11:2020 (refer to IEC 61000-4-8:2009)
Test Frequency:	50/60Hz
Field Strength:	1 A/m
Observation Time:	1 minute
Inductance Coil:	Rectangular type, 1mx1m

TEST PROCEDURE

- a. The equipment cabinets which can be earthed shall be connected to the safety earth directly on the GRP or via the earth terminal to PE.
- b. The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.
- c. The cables supplied or recommended by the equipment manufacturer shall be used. In absence of any recommendation, unshielded cables shall be adopted, of a type appropriate for the signals involved. All cables shall be exposed to the magnetic field for 1 m of their length.
- d. The back filters, if any, shall be inserted in the circuits at 1 m cable length from the EUT and connected to the ground plane.
- e. The communication lines (data lines) shall be connected to the EUT by the cables given in the technical specification or standard for this application.

TEST SETUP



For the actual test configuration, please refer to Appendix I: Photographs of Test Configuration.

TABLE-TOP 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.

TEST RESULTS

Not applicable

Note: Applicable only to EUT containing devices susceptible to magnetic fields, such as CRT monitors, Hall elements, electrodynamic microphones, magnetic field sensors.

8.8. VOLTAGE DIPS AND SHORT INTERRUPTIONS IMMUNITY TEST

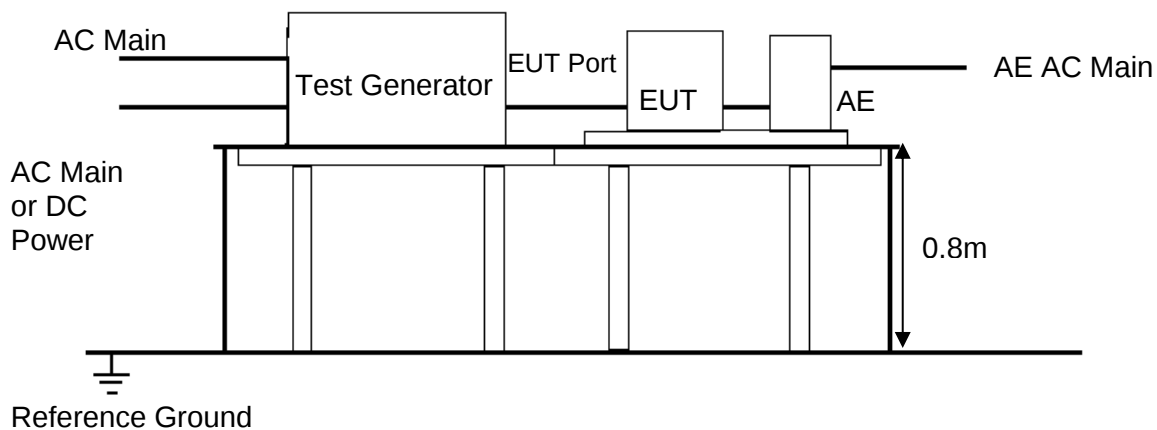
TEST SPECIFICATION

Standard:	EN 55035:2017/A11:2020 (refer to IEC 61000-4-11:2020)
Voltage Dips:	>95 % reduction; 30% reduction
Voltage Interruptions:	>95 % reduction
Voltage Phase Angle:	0°

TEST PROCEDURE

- The power cord was used as supplied by the manufacturer. The EUT was connected to the line output of the Voltage Dips and Interruption Generator.
- Voltage reductions occur at 0 degree crossover point of the voltage waveform. The performance of the EUT was checked after the voltage dip or interruption.

TEST SETUP



For the actual test configuration, please refer to Appendix I: Photographs of Test Configuration.

TEST ENVIRONMENT

Temperature	23.2 °C	Relative Humidity	54.1 %
Atmosphere Pressure	101kPa		

TEST MODE

Test Mode:	Mode 1 ~ 12
------------	-------------

TEST RESULTS

Test Mode:	Mode 1 ~ 12
Test Voltage:	AC 230V/50Hz

Interruption & Dips	Durations	Voltage Reduction	Perform Criteria	Results	Judgment
Voltage dips	0.5 cycle	>95%	B	A	Pass
	25 cycles	30%	C	A	
Voltage interruptions	250 cycles	>95%	C	C	

Test Mode:	Mode 1 ~ 12
Test Voltage:	AC 100V/60Hz

Interruption & Dips	Duration	Voltage Reduction	Perform Criteria	Results	Judgment
Voltage dips	0.5 cycle	>95%	B	A	Pass
	30 cycles	30%	C	A	
Voltage interruptions	300 cycles	>95%	C	C	

Note:

A: No degradation in the performance of the EUT was observed.

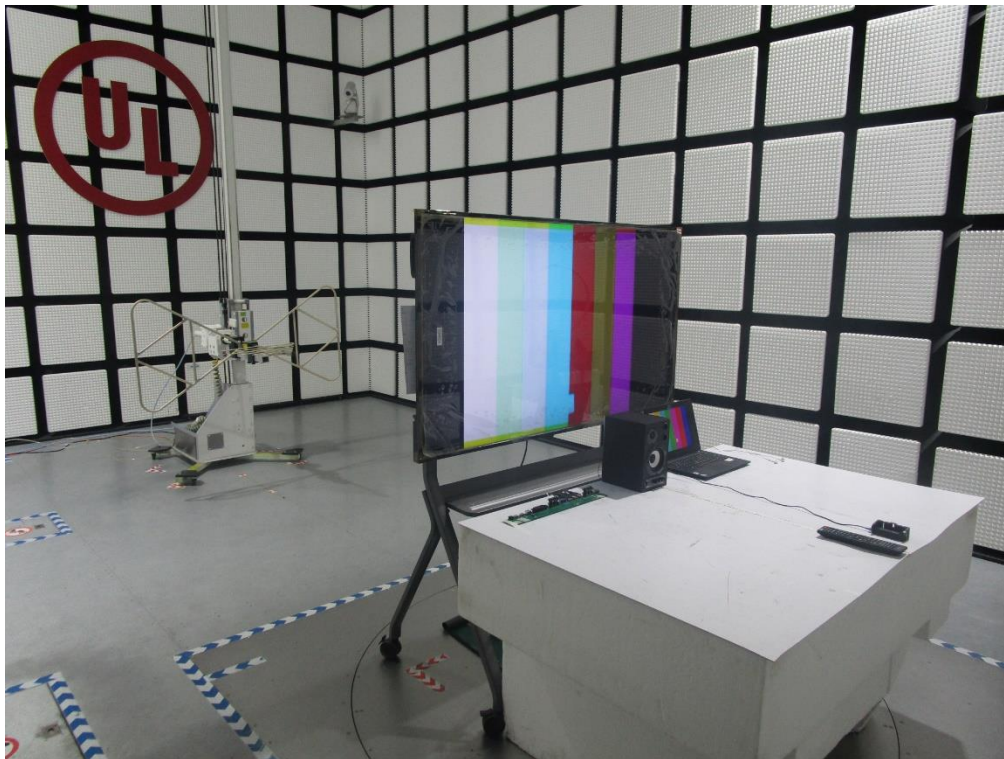
B: Stop charging during the test and returns to normal after the test

APPENDIX I: PHOTOGRAPHS OF TEST CONFIGURATION

Conducted Emissions – AC main port



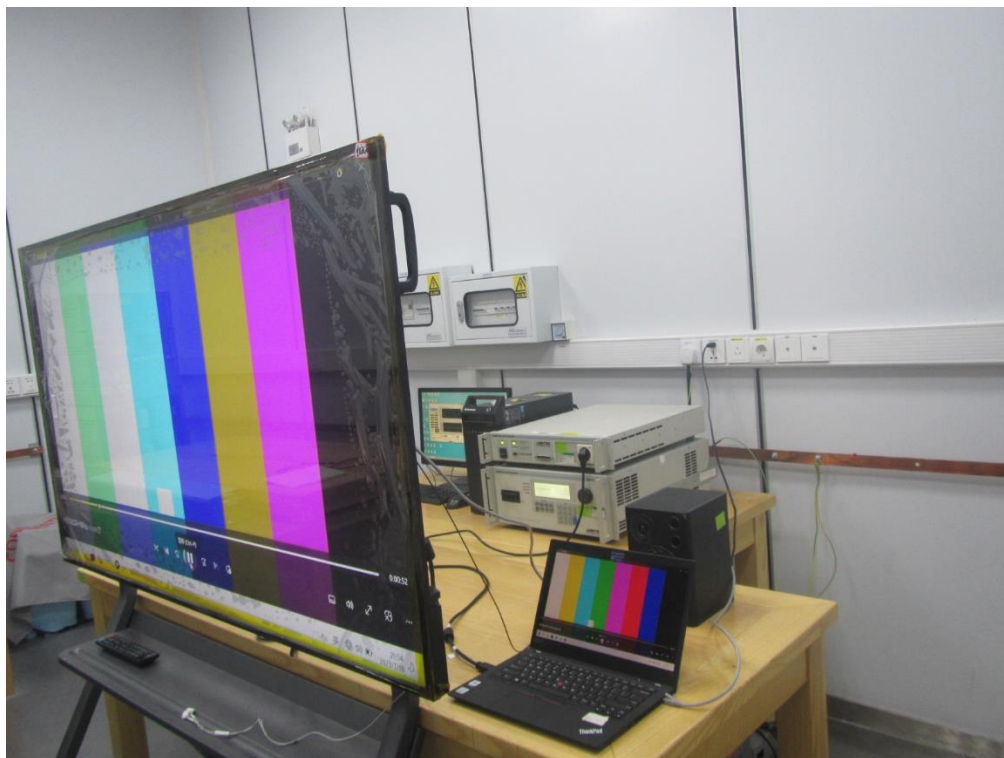
Radiated Emissions up to 1GHz



Radiated Emissions above 1GHz



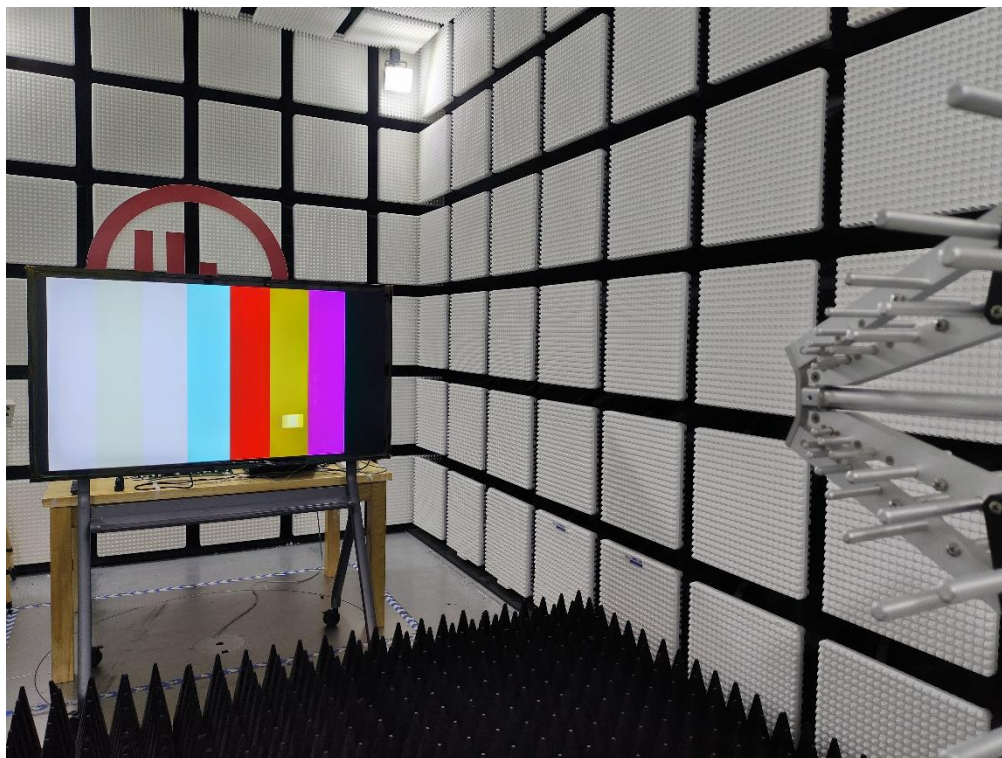
Harmonic Current Disturbance / Voltage Fluctuations & Flicker

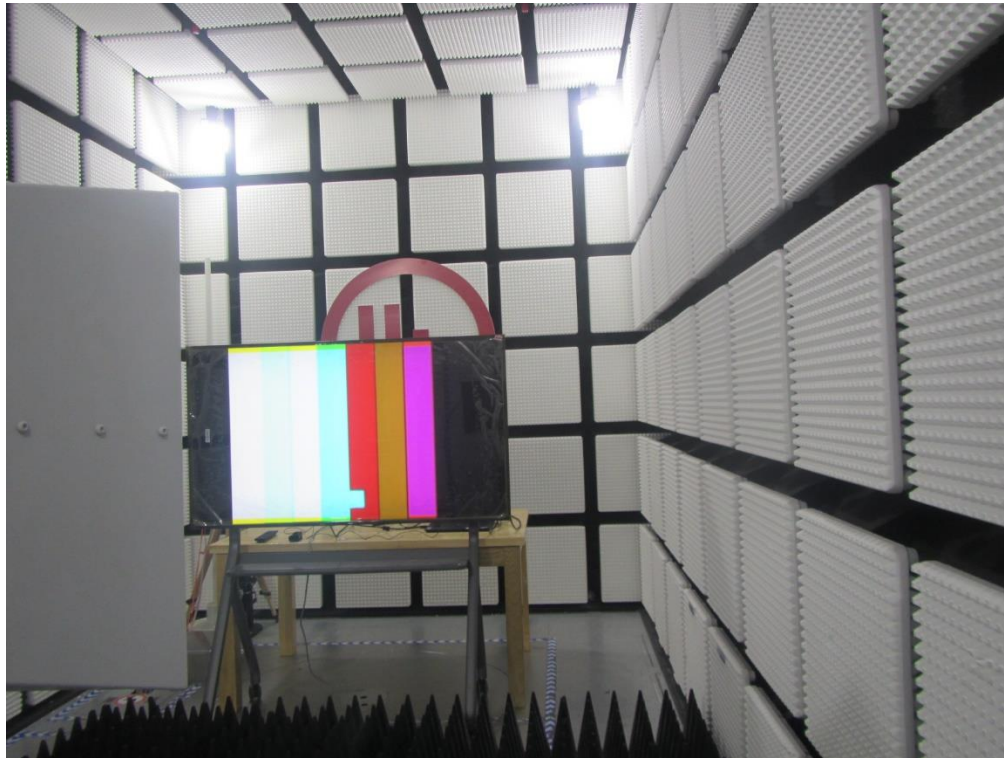


Electrostatic Discharge Immunity

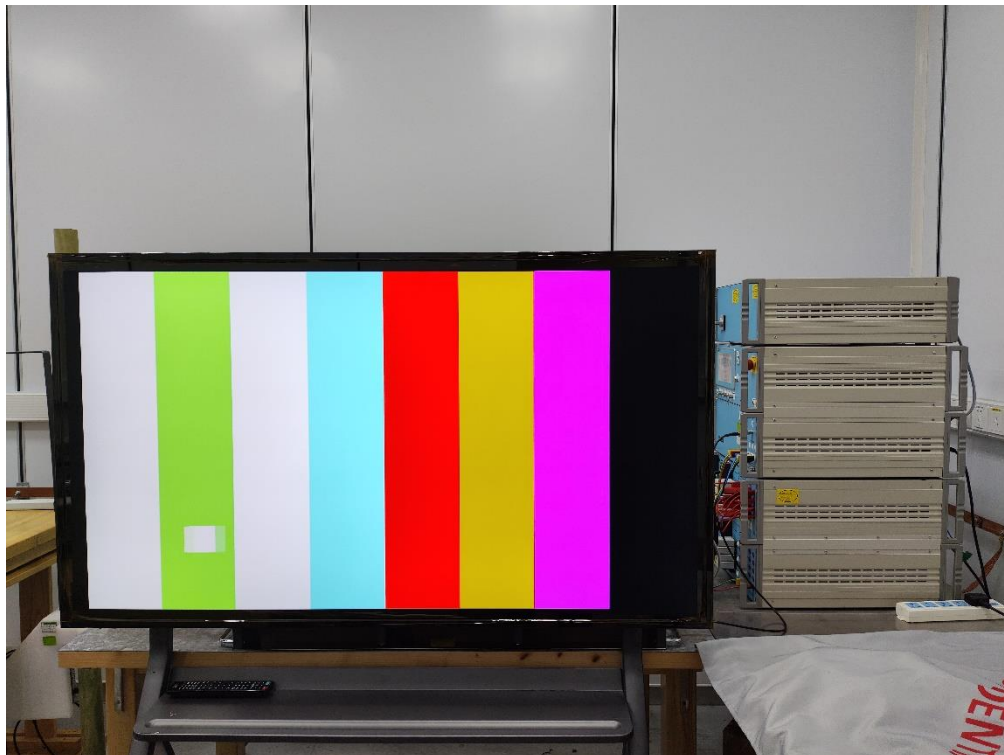


Radio Frequency Electromagnetic Field Immunity





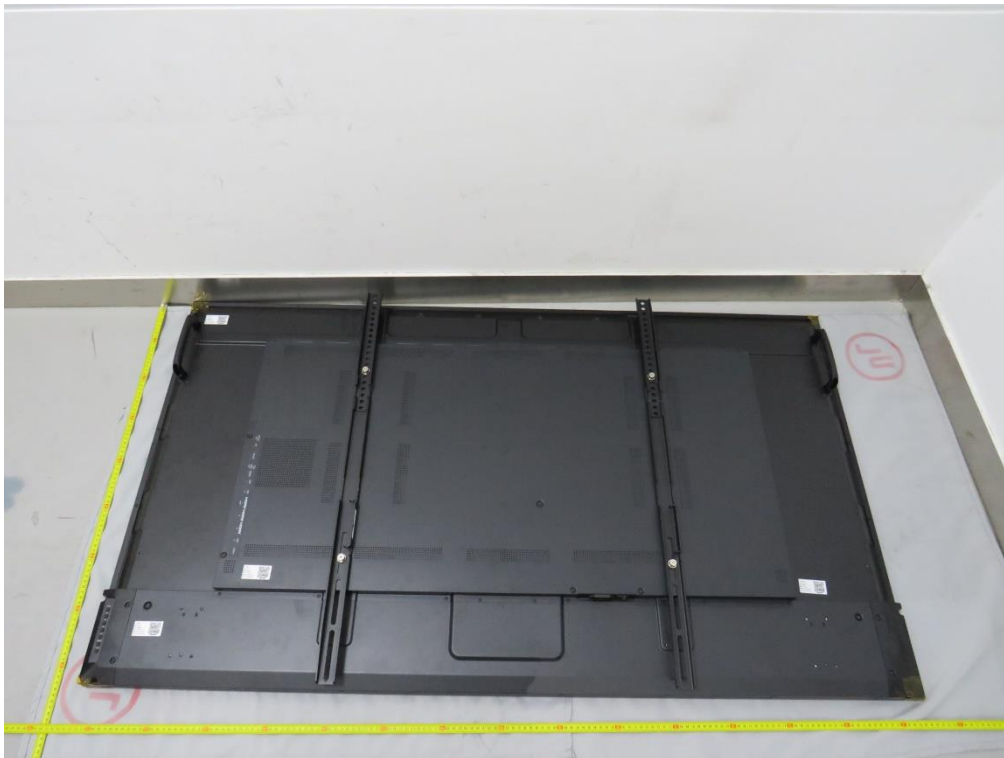
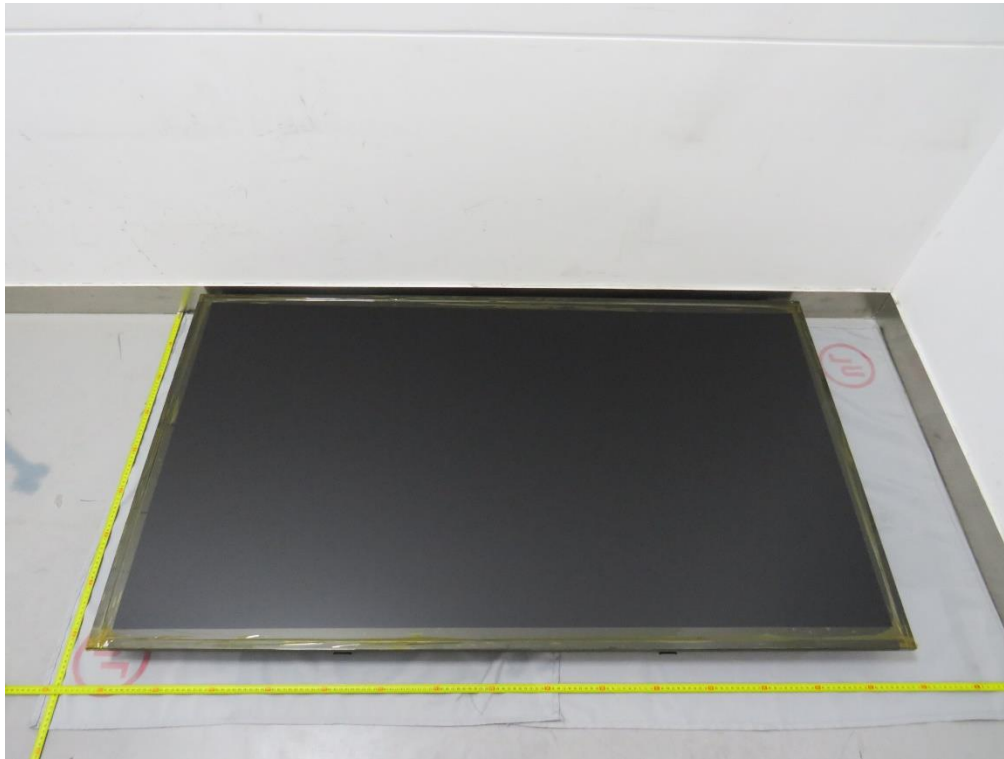
Electrical Fast Transient/Burst/ Surge/ Voltage Dips and Short Interruptions Immunity



Conducted Disturbances Induced By RF Fields Immunity



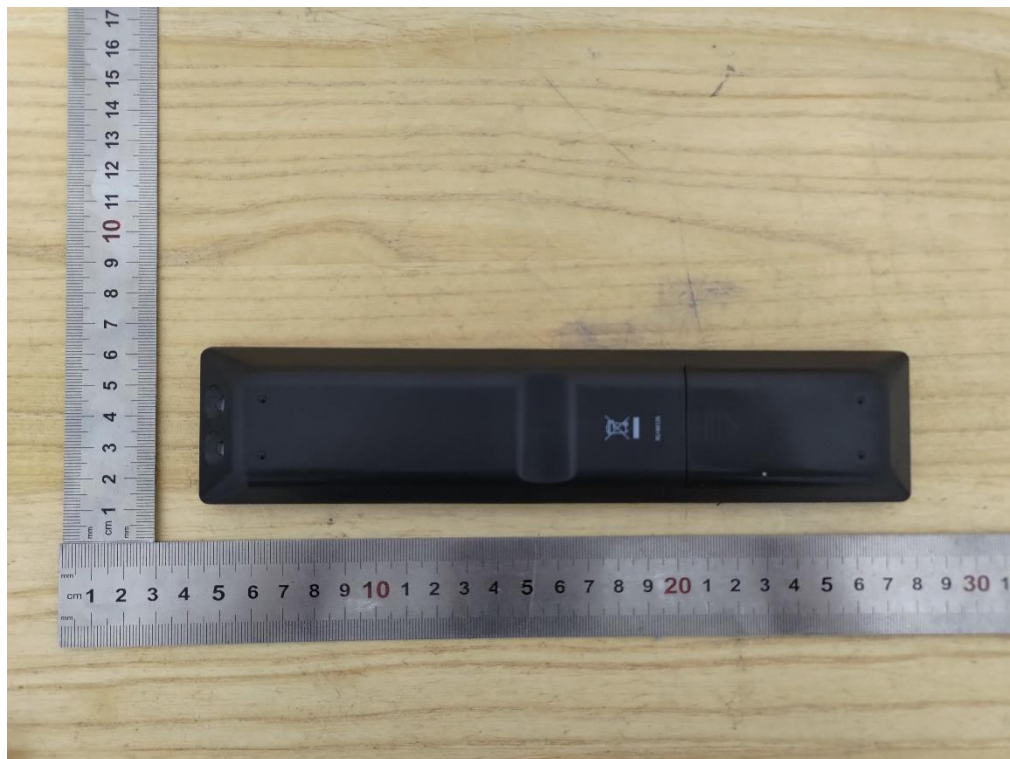
APPENDIX II: EXTERNAL PHOTOGRAPHS OF THE EUT











Internal photo can be found in 4790916331.2-2-EMC-1_INTERNAL PHOTOGRAPHS OF THE EUT.

END OF REPORT