

CE EMC Test Report

Report No. : BTL-EMC-1-2012T163
Equipment : Open frame Tablet PC
Model Name : OFT-10W03, OFT-10W03XXXXXXXXXX (where "X" may be any alphanumeric character, blank or "-")
Brand Name : Avalue
Applicant : AVALUE TECHNOLOGY INCORPORATION
Address : 7F, 228, Lian-cheng Road, Zhonghe Dist., New Taipei City 235, Taiwan

Standard(s) : EN 55032:2015+A11:2020 Class A
 BS EN 55032:2015+A11:2020 Class A
 AS/NZS CISPR 32:2015 Class A
 CISPR 32:2015+COR1:2016 Class A
 EN IEC 61000-3-2:2019 Class D
 BS EN IEC 61000-3-2:2019 Class D
 EN 61000-3-3:2013+A1:2019
 BS EN 61000-3-3:2013+A1:2019
 EN 55035:2017+A11:2020
 BS EN 55035:2017+A11:2020

Date of Receipt : 2020/12/30
Date of Test : 2020/12/30 ~ 2021/1/22
Issued Date : 2021/3/9

The above equipment has been tested and found in compliance with the requirement of the above standards by BTL Inc.

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Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

This report is the confidential property of the client. As a mutual protection to the clients, the public and ourselves, the test report shall not be reproduced, except in full, without our written approval.

BTL's laboratory quality assurance procedures are in compliance with the **ISO/IEC 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

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

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REVISION HISTORY

Report No.	Version	Description	Issued Date
BTL-EMC-1-2012T163	R00	Original Report.	2021/3/9

1 SUMMARY OF TEST RESULTS

EMC emission			
Standard	Test Item	Limit	Judgment
EN 55032:2015+A11:2020 BS EN 55032:2015+A11:2020 AS/NZS CISPR 32:2015 CISPR 32:2015+COR1:2016	Radiated emissions up to 1 GHz	Class A	PASS
	Radiated emissions above 1 GHz	Class A	PASS
	Radiated emissions from FM receivers	-----	N/A
	Outdoor units of home satellite receiving systems	-----	N/A
	Conducted emissions from the AC mains power ports	Class A	PASS
	Asymmetric mode conducted emissions	Class A	PASS
	Conducted differential voltage emissions	-----	N/A

Standard	Test Item	Limit	Judgment
EN IEC 61000-3-2:2019 BS EN IEC 61000-3-2:2019	Harmonic current emissions	Class D	No Limit
EN 61000-3-3:2013+A1:2019 BS EN 61000-3-3:2013+A1:2019	Voltage changes, voltage fluctuations and flicker	-----	PASS

Immunity				
Standard	Reference Standard / Clause	Environmental phenomenon	Performance Criterion Limit	Judgment
EN 55035:2017+A11:2020 BS EN 55035:2017+A11:2020	EN 61000-4-2:2009	Electrostatic discharge	B	PASS
	EN 61000-4-3:2006 +A1:2008+A2:2010	Continuous RF electromagnetic field disturbances	A	PASS
	EN 61000-4-4:2012	Electrical fast transients / burst	B	PASS
	EN 61000-4-5:2014 EN 61000-4-5:2014 +A1:2017	Surges	NOTE (4)	PASS
	EN 61000-4-6:2014 EN 61000-4-6:2014 +AC: 2015	Continuous induced RF disturbances	A	PASS
	EN 61000-4-8:2010	Power frequency magnetic field	A	PASS
	EN 61000-4-11:2004 EN IEC 61000-4-11:2020+ AC:2020-06	Voltage dips and Voltage interruptions	NOTE (5)	PASS
	4.2.7	Broadband impulse noise disturbances, repetitive	-----	N/A
	4.2.7	Broadband impulse noise disturbances, isolated	-----	N/A

NOTE:

- (1) "N/A" denotes test is not applicable in this Test Report.
- (2) For input d.c. power port and a.c. power ports is Criterion B.
For signal ports and telecommunication ports is Criterion C.
- (3) For voltage dips reduction >95 % is Criterion B.
For voltage dips reduction 30 % is Criterion C.
For voltage interruptions reduction >95 % is Criterion C.
- (4) For DC network and AC mains power ports is Criterion B.
For analogue/digital data ports:
Port type: unshielded symmetrical is Criterion C.
Port type: coaxial or shielded is Criterion B.
- (5) For voltage dips residual voltage < 5 % is Criterion B.
For voltage dips residual voltage 70 % is Criterion C.
For voltage interruptions residual voltage < 5 % is Criterion C.
- (6) Both of specific and the latest version of the basic standard are referenced to fulfill the requirements.
- (7) The report format version is TP.1.1.1.

1.1 TEST FACILITY

The test facilities used to collect the test data in this report:

No. 68-1, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

☐ C05 ☐ CB08 ☐ CB11 ☐ CB15 ☐ CB16
☐ CB17 ☐ SR01 ☐ SR02 ☐ SR09

No.132-1, Ln. 329, Sec. 2, Balian Rd., Xizhi Dist., New Taipei City 221, Taiwan

☒ OS02

No.18, Ln. 171, Sec. 2, Jiuzong Rd., Neihu Dist., Taipei City 114, Taiwan

☒ C03 ☒ CB18 ☐ CB19 ☒ CB06 ☒ SR01
☒ SR02 ☒ SR03

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k = 2$, providing a level of confidence of approximately **95 %**.

The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2. The BTL measurement uncertainty is less than the CISPR 16-4-2 $U_{\text{cisp}}^{\text{r}}$ requirement.

A. Radiated emissions up to 1 GHz test:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U (dB)
OS02 (10m)	CISPR	30 MHz ~ 200 MHz	V	3.84
		30 MHz ~ 200 MHz	H	3.34
		200 MHz ~ 1,000 MHz	V	3.74
		200 MHz ~ 1,000 MHz	H	3.06

B. Radiated emissions above 1 GHz test:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U,(dB)
CB18 (3m)	CISPR	1 GHz ~ 6 GHz	V	4.62
		1 GHz ~ 6 GHz	H	4.62
		6 GHz ~ 18 GHz	V	4.24
		6 GHz ~ 18 GHz	H	4.06

C. Conducted emissions from the AC mains power ports test:

Test Site	Method	Measurement Frequency Range	U,(dB)
C03	CISPR	150 kHz ~ 30 MHz	3.28

D. Asymmetric mode conducted emissions test:

Test Site	Method	Measurement Frequency Range	U,(dB)
C03	CISPR	AAN 50...40 dB	3.28
		AAN 65...50 dB	3.32
		AAN 75...60 dB	3.24
		RF Current Probe	3.12

E. Harmonic current emissions and Voltage changes, voltage fluctuations and flicker test:

Test Site	Method	Test Item	U(%)
SR03	EN IEC 61000-3-2	Voltage	1.28
	EN 61000-3-3	Current	0.42

F. Immunity tests:

Test Site	Method	Test Item	U
SR02	EN 61000-4-2	Rise time	≤12.5 %
		Peak Current	≤6.0 %
		Current at 30ns	≤6.0 %
		Current at 60ns	≤6.0 %
CB06	EN 61000-4-3	General test 80 MHz~1 GHz	2.10 dB
		1 GHz~6 GHz	2.26 dB
		On-ear acoustic & Acoustic 80 MHz~1 GHz	2.38 dB
		1 GHz~6 GHz	2.54 dB
SR01	EN 61000-4-4	voltage peak value(VP)	4.58 %
		voltage rise time (tr)	14.00 %
		voltage pulse width(pw)	11.40 %
		Pulse Freq.(kHz)	0.00 %
		Burst Duration(ms)	1.33 %
		Burst Period(ms)	0.07 %
		voltage peak value(VP)-with clamp	12.04 %
		voltage rise time (tr) -with clamp	2.00 %
		voltage pulse width(tw) -with clamp	13.00 %
SR01	EN 61000-4-5	voltage peak value(VP)	8.99 %
		voltage rise time (Tfv)	13.25 %
		voltage duration time(td)	10.20 %
SR01	EN 61000-4-6	CDN M3 test process	1.34 dB
		EM clamp test process	2.48 dB
		On-ear acoustic & Acoustic measurements on loudspeaker	2.48 dB
SR03	EN 61000-4-8	PFMF mG Calibration	9.30 %
SR01	EN IEC 61000-4-11	DIP Amplitude	1.55 %
		DIP Time Event	1.00 %
		DIP Phase	1.22 %

NOTE:

Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

1.3 TEST ENVIRONMENT CONDITIONS

Test Item	Environment Condition	Tested by
EN 55032		
Radiated emissions up to 1 GHz	21°C, 67%	Loki Chiang
Radiated emissions above 1 GHz	20°C, 62%	Duke Chen
Conducted emissions from the AC mains power ports	25°C, 59%	Loki Chiang
Asymmetric mode conducted emissions	25°C, 59%	Loki Chiang
EN IEC 61000-3-2 and EN 61000-3-3		
Harmonic current emissions	24°C, 55%	Duke Chen
Voltage changes, voltage fluctuations and flicker	24°C, 55%	Duke Chen
EN 55035		
Electrostatic discharge	24°C, 44%, 1006hPa	Eric Wu
Continuous RF electromagnetic field disturbances	24°C, 55%	Roy Kang
Electrical fast transients / burst	24°C, 43%	Eric Wu
Surges	24°C, 43%	Eric Wu
Continuous induced RF disturbances	24°C, 48%	Eric Wu
Power frequency magnetic field	24°C, 55%	Roy Kang
Voltage dips and Voltage interruptions	24°C, 43%	Eric Wu

2 GENERAL INFORMATION

2.1 EUT INFORMATION

Equipment	Open frame Tablet PC
Model Name	OFT-10W03, OFT-10W03XXXXXXXXXX (where "X" may be any alphanumeric character, blank or "-")
Brand Name	Avalue
Model Difference	Different model distribute to different area.
Power Source	DC Voltage supplied from AC/DC adapter. Brand / Model Name: FSP / FSP060-DHAN3
Power Rating	I/P:100-240V~, 1.8A 50-60Hz O/P:12.0V --- 5.0A 60.0W
Products Covered	1 * Adapter: FSP / FSP060-DHAN3
Test Model	OFT-10W03
Highest Internal Frequency	1.44 GHz
EUT Modification(s)	N/A

NOTE:

- (1) For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2.2 TEST MODES

The test system was pre-tested based on the consideration of all possible combinations of EUT operation modes according to test plan.

Pretest Mode	Description
Mode 1	FULL SYSTEM HDMI 1280*800/60HZ

Following mode(s) as (were) found to be the worst case(s) and selected for the final test.

Radiated emissions up to 1 GHz test	
Final Test Mode	Description
Mode 1	FULL SYSTEM HDMI 1280*800/60HZ

Radiated emissions above 1 GHz test	
Final Test Mode	Description
Mode 1	FULL SYSTEM HDMI 1280*800/60HZ

Conducted emissions from the AC mains power ports test	
Final Test Mode	Description
Mode 1	FULL SYSTEM HDMI 1280*800/60HZ

Asymmetric mode conducted emissions test	
Final Test Mode	Description
Mode 1	FULL SYSTEM HDMI 1280*800/60HZ+LAN (10M/100M)

Harmonic current emissions & Voltage changes, voltage fluctuations and flicker test	
Final Test Mode	Description
Mode 1	FULL SYSTEM HDMI 1280*800/60HZ

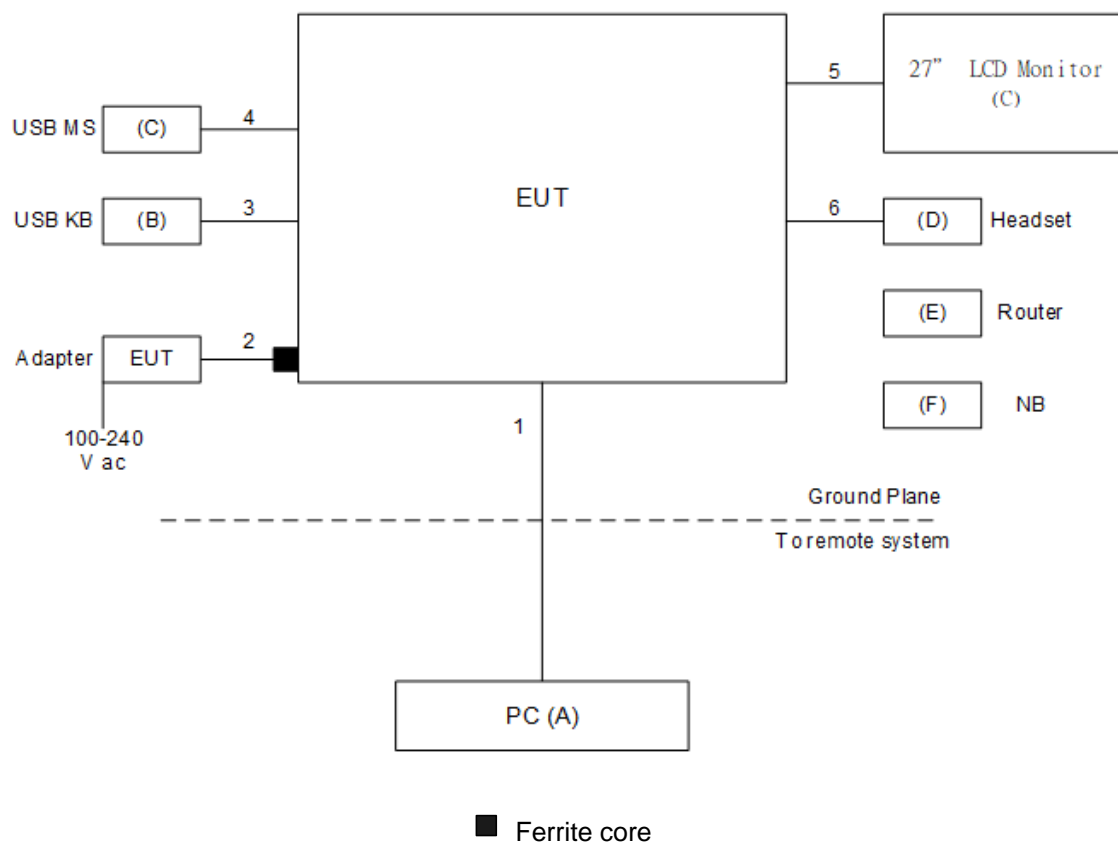
Immunity tests	
Final Test Mode	Description
Mode 1	FULL SYSTEM HDMI 1280*800/60HZ

2.3 EUT OPERATING CONDITION

The EUT exercise program (BurninTEST V9.1 + Color bar(ITU-R BT 471-1)) used during radiated and/or conducted emissions measurement was designed to exercise the various system components in a manner similar to a typical use.

2.4 TESTED CONFIGURATION DIAGRAM

Equipment letters and Cable numbers refer to item numbers described in the tables of clause 2.5.



2.5 SUPPORT UNITS

Item	Equipment	Brand	Model No.	Series No.	Remarks
A	PC	DELL	OptiPlex 790 MT	64NJVBX	Furnished by test lab.
B	USB K/B	DELL	KB216t	CN-0W33XP-L03 00-797-05TY-A03	Furnished by test lab.
C	27" 4K Monitor	ASUS	MX27U	90LM02BB-B106 D0	Furnished by test lab.
C	USB Mouse	DELL	MOCZUL	CN-049TWY-PR C00-79E-01HA	Furnished by test lab.
D	Headset	KINYO	EM-10	N/A	Furnished by test lab.
E	Router	ASUS	RT-AC66U	E11TGG000235	Furnished by test lab.
F	Notebook PC	DELL	XPS	7Z9RGH2	Furnished by test lab.

Item	Cable Type	Shielded	Ferrite Core	Length	Remarks
1	RJ-45 Cable	NO	NO	10m	Type: Cat.5e / 4-pair (8-wire) Furnished by test lab.
2	Power Cable	NO	NO	1m	Supplied by test requester
3	USB Cable	YES	NO	1.7m	Type: USB 2.0 Furnished by test lab.
4	USB Cable	YES	NO	1.7m	Type: USB 2.0 Furnished by test lab.
5	HDMI Cable	YES	NO	1.7m	Type: HDMI 1.4 Furnished by test lab.
6	Audio Cable	NO	NO	1.5m	Furnished by test lab.

3 EMC EMISSION TEST

3.1 RADIATED EMISSIONS UP TO 1 GHZ TEST

3.1.1 LIMITS

Table A.2 – Requirements for radiated emissions at frequencies up to 1 GHz for class A equipment

Table clause	Frequency range MHz	Measurement			Class A limits dB(μV/m)
		Facility (see Table A.1)	Distance m	Detector type / bandwidth	
A2.1	30 to 230	OATS/SAC	10	Quasi Peak / 120 kHz	40
	230 to 1 000				47
A2.2	30 to 230	OATS/SAC	3		50
	230 to 1 000				57
A2.3	30 to 230	FAR	10	Quasi Peak / 120 kHz	42 to 35
	230 to 1 000				42
A2.4	30 to 230	FAR	3		52 to 45
	230 to 1 000				52
Apply only A2.1 or A2.2 or A2.3 or A2.4 across the entire frequency range.					

Table A.4 – Requirements for radiated emissions at frequencies up to 1 GHz for class B equipment

Table clause	Frequency range MHz	Measurement			Class B limits dB(μV/m)
		Facility (see Table A.1)	Distance m	Detector type / bandwidth	
A4.1	30 to 230	OATS/SAC	10	Quasi Peak / 120 kHz	30
	230 to 1 000				37
A4.2	30 to 230	OATS/SAC	3		40
	230 to 1 000				47
A4.3	30 to 230	FAR	10	Quasi Peak / 120 kHz	32 to 25
	230 to 1 000				32
A4.4	30 to 230	FAR	3		42 to 35
	230 to 1 000				42

Apply only table clause A4.1 or A4.2 or A4.3 or A4.4 across the entire frequency range.

These requirements are not applicable to the local oscillator and harmonics frequencies of equipment covered by Table A.6.

Table 1 – Required highest frequency for radiated measurement

Highest internal frequency (F_x)	Highest measured frequency
$F_x \leq 108$ MHz	1 GHz
$108 \text{ MHz} < F_x \leq 500$ MHz	2 GHz
$500 \text{ MHz} < F_x \leq 1$ GHz	5 GHz
$F_x > 1$ GHz	$5 \times F_x$ up to a maximum of 6 GHz
NOTE 1 For FM and TV broadcast receivers, F_x is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies.	
NOTE 2 F_x is defined in 3.1.18.	
NOTE 3 For outdoor units of home satellite receiving systems highest measured frequency shall be 18 GHz.	

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

NOTE:

- (1) The tighter limit applies at the band edges.
- (2) Emission level (dBuV/m) = $20 \log$ Emission level (uV/m).
- (3) 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
 Calculation example:

Reading Level		Correct Factor		Measurement Value
19.11	+	2.11	=	21.22

Measurement Value		Limit Value		Margin Level
21.22	-	40	=	-18.78

3.1.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Log-Bicon Antenna	Schwarzbeck	VULB 9168	9168-364	2020/3/9	2021/3/8
2	Attenuator	Inmet	EMCI-N-6-05	AT-N0624	2020/3/9	2021/3/8
3	Pre-Amplifier	Anritsu	MH648A	M98457	2020/10/21	2021/10/20
4	Test Cable	TIMES	LMR-400	10M-OS01	2020/10/21	2021/10/20
5	Test Cable	EMCI	EMCCFD400-NM-NM-25000	171103	2020/10/21	2021/10/20
6	EMI Test Receiver	R&S	ESCI	100080	2020/6/15	2021/6/14
7	Measurement Software	Farad	EZ_EMC (Ver. NB-03A1-01)	N/A	N/A	N/A

REMARK:

- (1) "N/A" denotes no model name, no serial no. or no calibration specified.
- (2) All calibration period of equipment list is one year.

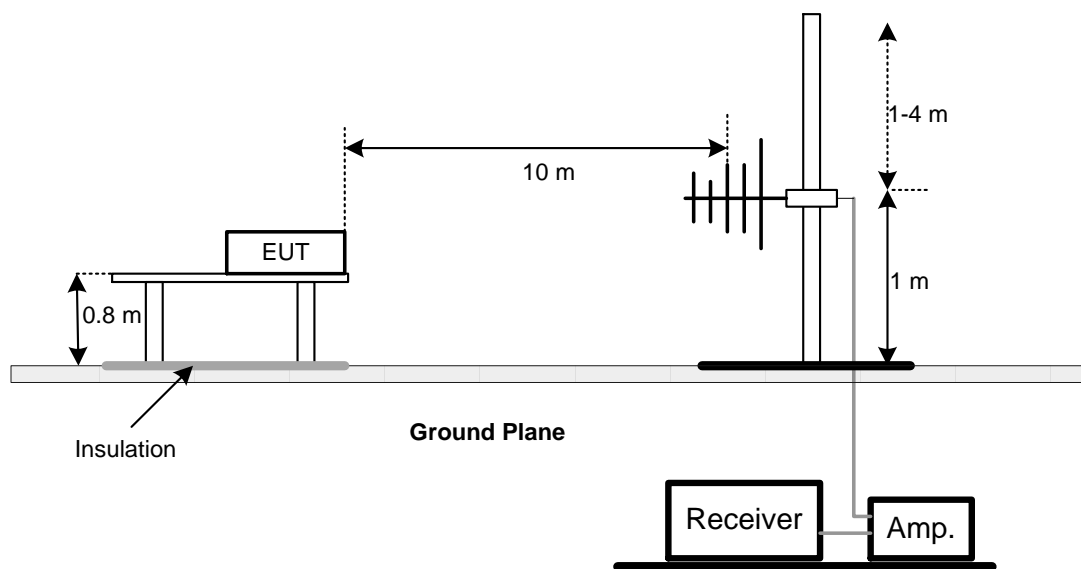
3.1.3 TEST PROCEDURE

- The separation distance of 10 m was used for measurements up to 1 GHz.
The EUT was placed on the top of a table 0.8 m above the rotating ground in a 10 m open area test site.
- Cables connecting to AE located outside the measurement area drop directly to, but be insulated from, the RGP (or turntable where applicable), and then be routed directly to the place where they leave the test site. However, cables which would normally be bonded to ground should be bonded to the RGP in accordance with normal practice or the manufacturer's recommendation.
- The rotating ground was rotated 360 degrees to determine the position of the highest radiation.
- The height of the receive antenna was varied between 1 m and 4 m. Both horizontal and vertical polarizations of the antenna were checked.
- For each suspected emission, the EUT was arranged at its worst case and then the antenna was scanned in height to find the maximum.
- The receiver was set to quasi-peak detect function and specified bandwidth with maximum hold mode.
- For the actual test configuration, please refer to the related Item - TEST PHOTOS.

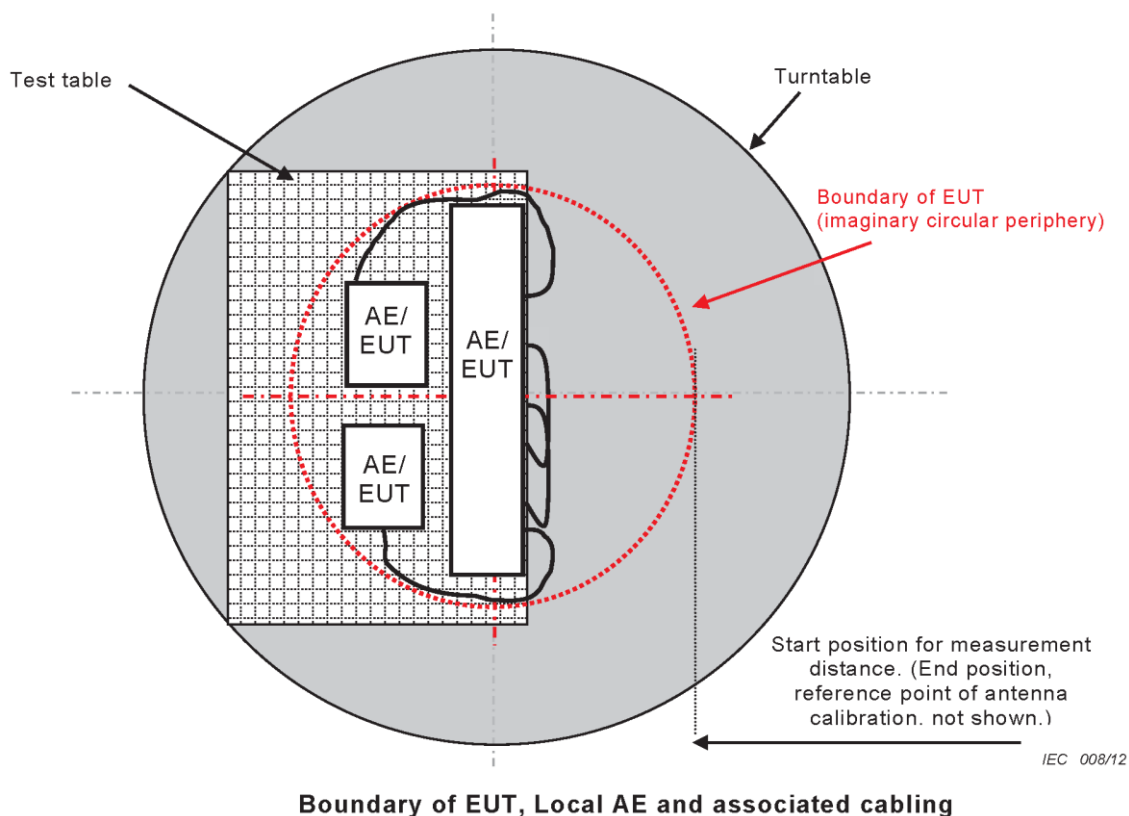
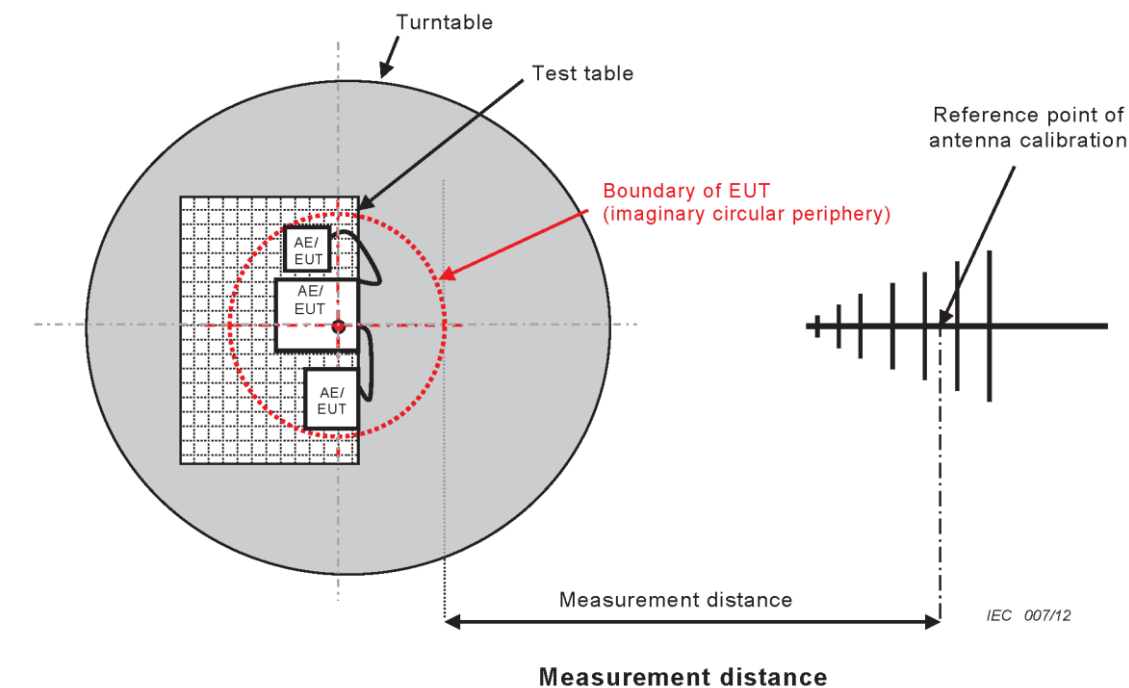
3.1.4 DEVIATION FROM TEST STANDARD

No deviation.

3.1.5 TEST SETUP



3.1.6 MEASUREMENT DISTANCE



3.1.7 TEST RESULT

Test Mode	Mode 1	Tested Date	2021/1/18
Test Voltage	AC 230V/50Hz	Polarization	Vertical

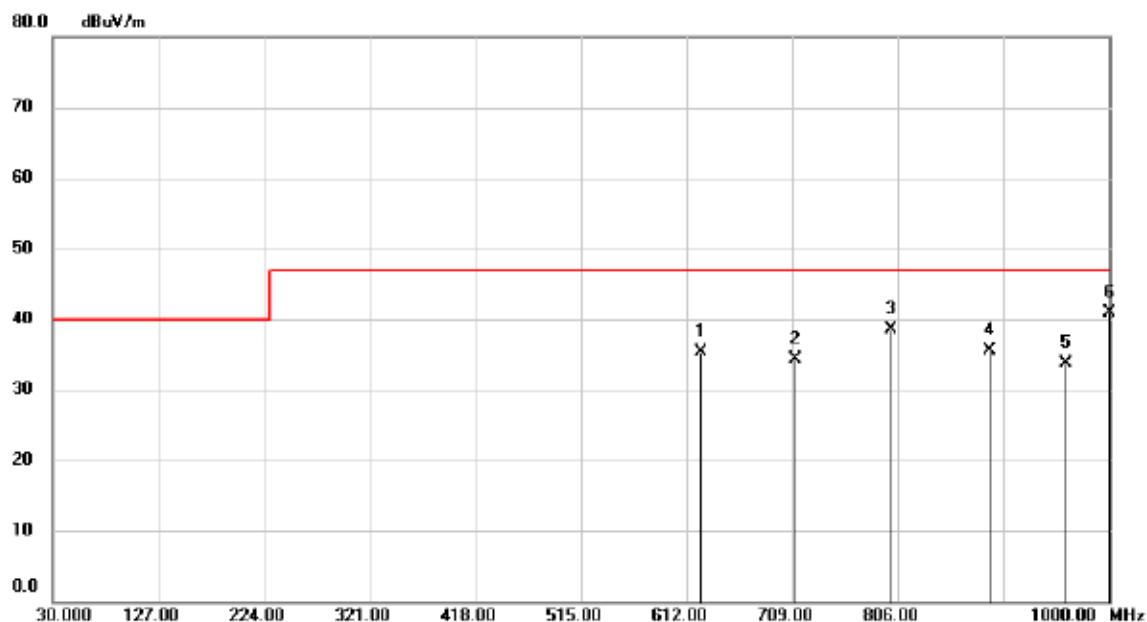


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		65.2400	28.05	-1.53	26.52	40.00	-13.48	QP	100	354
2		88.2500	33.40	-5.84	27.56	40.00	-12.44	QP	100	37
3		214.6500	28.70	-3.37	25.33	40.00	-14.67	QP	100	256
4		800.1100	21.13	10.41	31.54	47.00	-15.46	QP	100	149
5		890.0200	20.50	11.62	32.12	47.00	-14.88	QP	100	155
6	*	1000.000	22.33	13.24	35.57	47.00	-11.43	QP	100	216

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode	Mode 1	Tested Date	2021/1/18
Test Voltage	AC 230V/50Hz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		625.1000	27.67	7.66	35.33	47.00	-11.67	QP	300	351
2		712.5900	25.17	9.07	34.24	47.00	-12.76	QP	300	216
3		800.3200	28.09	10.42	38.51	47.00	-8.49	QP	300	147
4		890.1600	23.93	11.62	35.55	47.00	-11.45	QP	400	155
5		960.5800	20.97	12.65	33.62	47.00	-13.38	QP	300	233
6	*	1000.000	27.65	13.24	40.89	47.00	-6.11	QP	300	198

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

3.2 RADIATED EMISSIONS ABOVE 1 GHz TEST

3.2.1 LIMITS

Table A.3 – Requirements for radiated emissions at frequencies above 1 GHz for class A equipment

Table clause	Frequency range MHz	Measurement			Class A limits dB(μV/m)
		Facility (see Table A.1)	Distance m	Detector type / bandwidth	
A3.1	1 000 to 3 000	FSOATS	3	Average / 1 MHz	56
	3 000 to 6 000				60
A3.2	1 000 to 3 000			Peak / 1 MHz	76
	3 000 to 6 000				80

Apply A3.1 and A3.2 across the frequency range from 1 000 MHz to the highest required frequency of measurement derived from Table 1.

Table A.5 – Requirements for radiated emissions at frequencies above 1 GHz for class B equipment

Table clause	Frequency range MHz	Measurement			Class B limits dB(μV/m)
		Facility (see Table A.1)	Distance m	Detector type/ bandwidth	
A5.1	1 000 to 3 000	FSOATS	3	Average/ 1 MHz	50
	3 000 to 6 000				54
A5.2	1 000 to 3 000			Peak/ 1 MHz	70
	3 000 to 6 000				74

Apply A5.1 and A5.2 across the frequency range from 1 000 MHz to the highest required frequency of measurement derived from Table 1.

Table 1 – Required highest frequency for radiated measurement

Highest internal frequency (F_x)	Highest measured frequency
$F_x \leq 108$ MHz	1 GHz
$108 \text{ MHz} < F_x \leq 500$ MHz	2 GHz
$500 \text{ MHz} < F_x \leq 1$ GHz	5 GHz
$F_x > 1$ GHz	$5 \times F_x$ up to a maximum of 6 GHz

NOTE 1 For FM and TV broadcast receivers, F_x is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies.

NOTE 2 F_x is defined in 3.1.18.

NOTE 3 For outdoor units of home satellite receiving systems highest measured frequency shall be 18 GHz.

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

NOTE:

- (1) The tighter limit applies at the band edges.
- (2) Emission level (dBuV/m) = 20log Emission level (uV/m).
- (3) 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
 Calculation example:

Reading Level		Correct Factor		Measurement Value
36.89	+	4.23	=	41.12

Measurement Value		Limit Value		Margin Level
41.12	-	54	=	-12.88

3.2.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Horn Antenna	Schwarzbeck	BBHA 9120 D	1297	2020/12/1	2021/11/30
2	Pre-Amplifier	EMCI	EMC012645SE	980410	2020/9/23	2021/9/22
3	Test Cable	EMCI	EMC104-SM-SM-1000	170816	2020/9/23	2021/9/22
4	Test Cable	EMCI	EMC104-SM-SM-7000	170205	2020/9/23	2021/9/22
5	Test Cable	EMCI	EMC104-SM-SM-3000	170204	2020/9/23	2021/9/22
6	Spectrum Analyzer	Agilent	N9020A	MY51160196	2020/6/29	2021/6/28
7	Measurement Software	Farad	EZ_EMC (Ver. NB-03A1-01)	N/A	N/A	N/A

REMARK:

- (1) "N/A" denotes no model name, no serial no. or no calibration specified.
- (2) All calibration period of equipment list is one year.

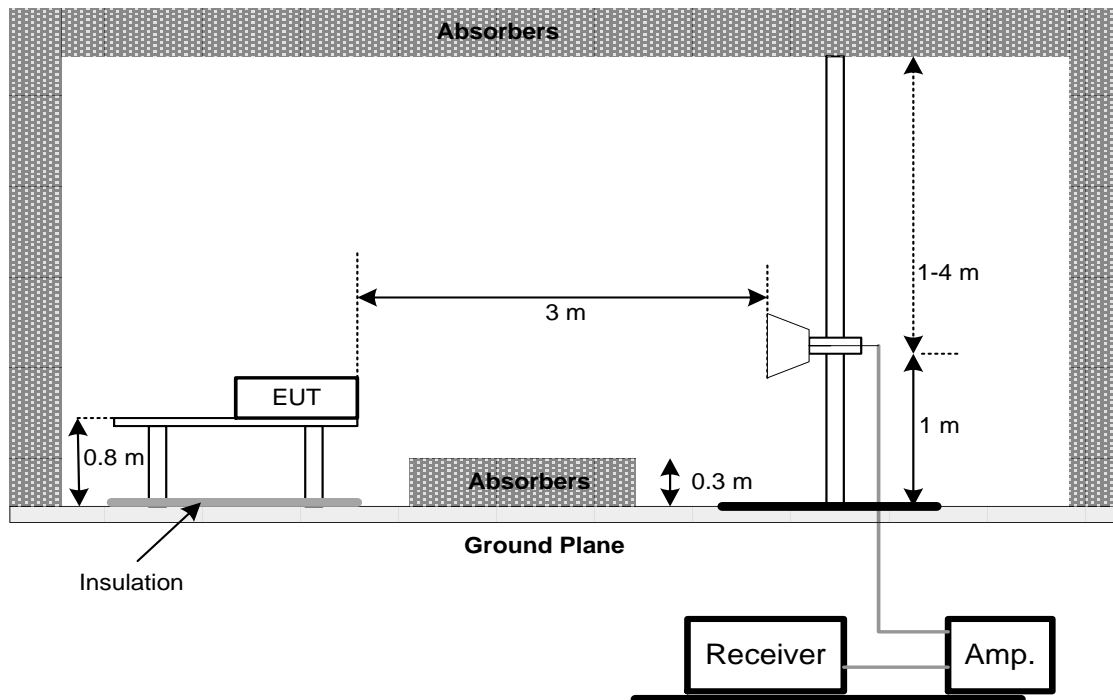
3.2.3 TEST PROCEDURE

- a. The separation distance of 3 m was used for measurements above 1 GHz.
 The test limits were altered using the 20 dB/decade extrapolation factor.
 The EUT was placed on the top of a rotating table 0.8 m above the ground in a 3 m semi-anechoic chamber.
- b. Cables connecting to AE located outside the measurement area drop directly to, but be insulated from, the RGP (or turntable where applicable), and then be routed directly to the place where they leave the test site. However, cables which would normally be bonded to ground should be bonded to the RGP in accordance with normal practice or the manufacturer's recommendation.
- c. The rotating ground was rotated 360 degrees to determine the position of the highest radiation.
- d. The height of the receive antenna was varied between 1 m and 4 m. Both horizontal and vertical polarizations of the antenna were checked.
- e. For each suspected emission, the EUT was arranged at its worst case and then the antenna was scanned in height to find the maximum. The tower Bore sight function was used.
- f. The receiver/spectrum analyzer was set to peak and average detect function and specified bandwidth with maximum hold mode.
- g. For the actual test configuration, please refer to the related Item - TEST PHOTOS.

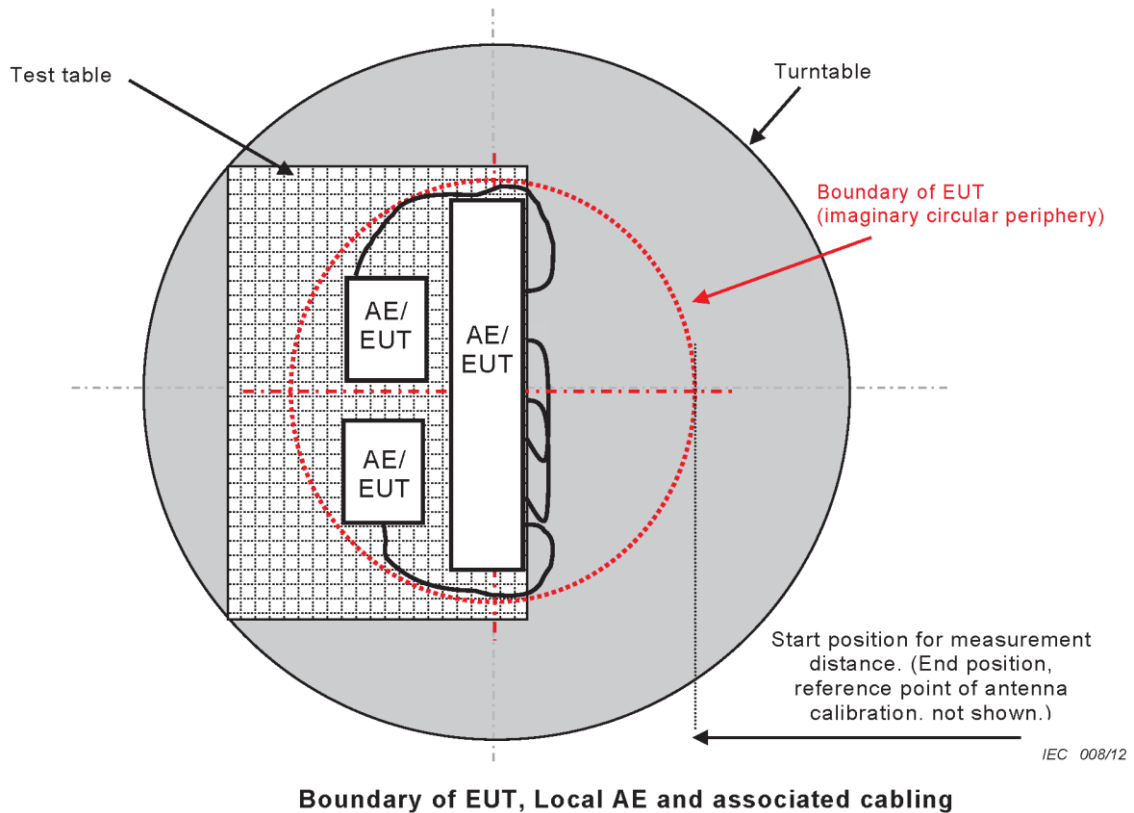
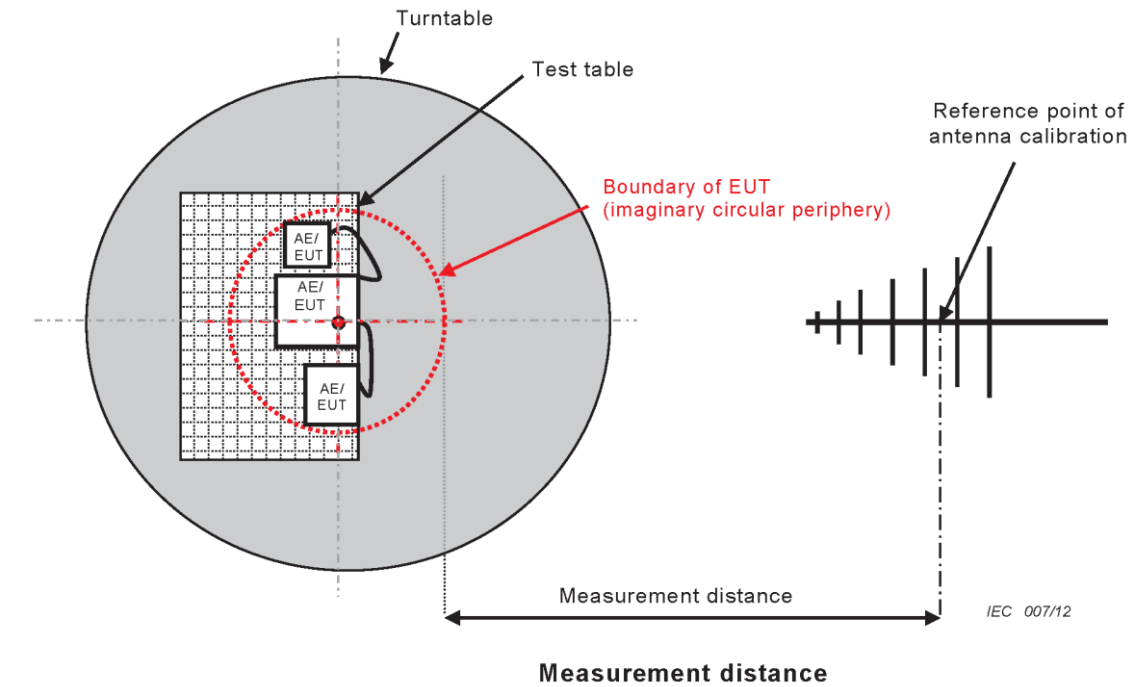
3.2.4 DEVIATION FROM TEST STANDARD

No deviation.

3.2.5 TEST SETUP

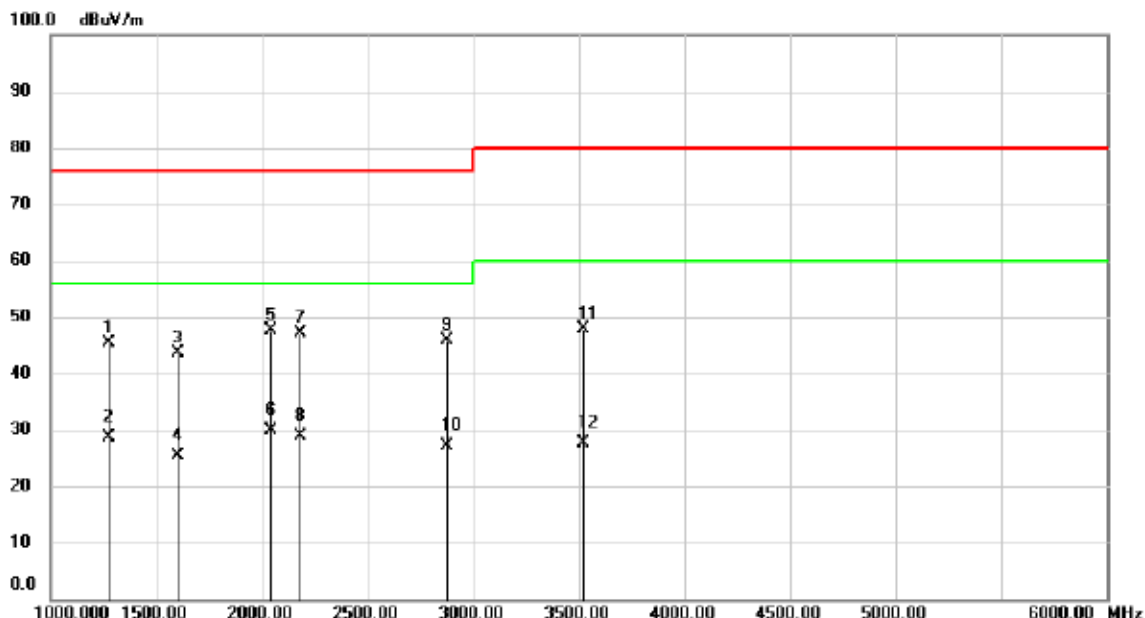


3.2.6 MEASUREMENT DISTANCE



3.2.7 TEST RESULT

Test Mode	Mode 1	Tested Date	2021/1/8
Test Voltage	AC 230V/50Hz	Polarization	Vertical



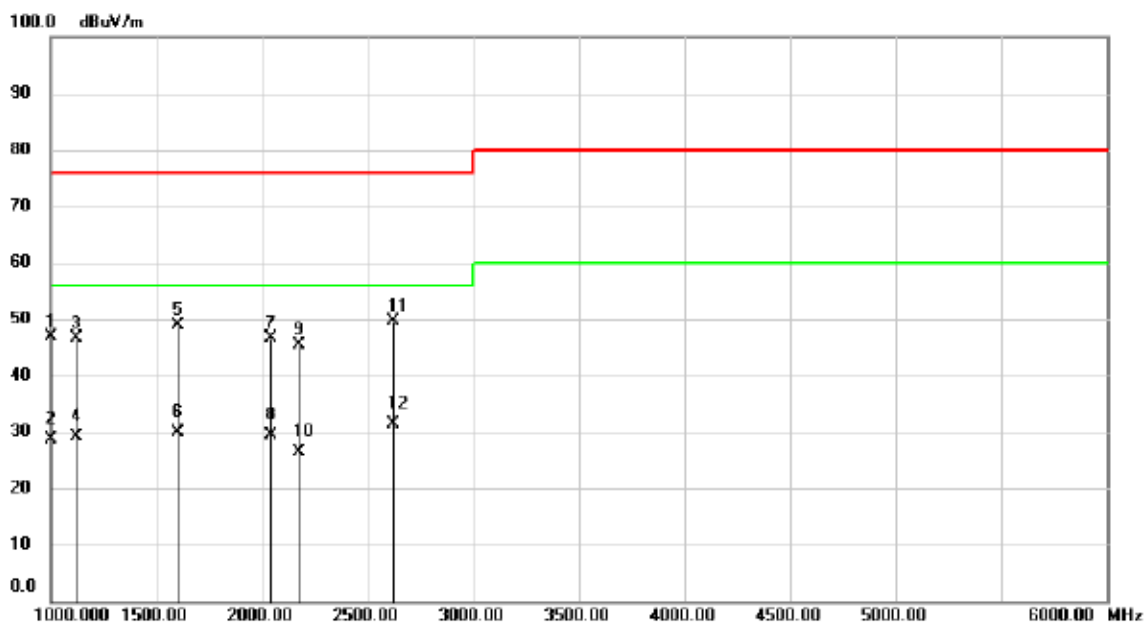
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		1275.000	65.52	-20.05	45.47	76.00	-30.53	peak	200	183
2		1275.000	48.64	-20.05	28.59	56.00	-27.41	AVG	200	183
3		1600.000	63.06	-19.39	43.67	76.00	-32.33	peak	200	186
4		1600.000	44.69	-19.39	25.30	56.00	-30.70	AVG	200	186
5		2040.000	63.73	-15.99	47.74	76.00	-28.26	peak	200	202
6	*	2040.000	45.81	-15.99	29.82	56.00	-26.18	AVG	200	202
7		2180.000	61.90	-14.69	47.21	76.00	-28.79	peak	100	209
8		2180.000	43.52	-14.69	28.83	56.00	-27.17	AVG	100	209
9		2875.000	58.44	-12.54	45.90	76.00	-30.10	peak	100	193
10		2875.000	39.63	-12.54	27.09	56.00	-28.91	AVG	100	193
11		3525.000	60.91	-13.06	47.85	80.00	-32.15	peak	100	180
12		3525.000	40.65	-13.06	27.59	60.00	-32.41	AVG	100	180

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	Mode 1	Tested Date	2021/1/8
Test Voltage	AC 230V/50Hz	Polarization	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		1000.000	68.64	-21.64	47.00	76.00	-29.00	peak	200	145
2		1000.000	50.33	-21.64	28.69	56.00	-27.31	AVG	200	145
3		1125.000	67.89	-21.22	46.67	76.00	-29.33	peak	100	243
4		1125.000	50.36	-21.22	29.14	56.00	-26.86	AVG	100	243
5		1600.000	68.28	-19.39	48.89	76.00	-27.11	peak	100	185
6		1600.000	49.32	-19.39	29.93	56.00	-26.07	AVG	100	185
7		2040.000	62.50	-15.99	46.51	76.00	-29.49	peak	200	225
8		2040.000	45.38	-15.99	29.39	56.00	-26.61	AVG	200	225
9		2175.000	60.07	-14.74	45.33	76.00	-30.67	peak	100	220
10		2175.000	41.16	-14.74	26.42	56.00	-29.58	AVG	100	220
11		2620.000	63.82	-14.25	49.57	76.00	-26.43	peak	200	196
12	*	2620.000	45.62	-14.25	31.37	56.00	-24.63	AVG	200	196

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

3.3 CONDUCTED EMISSIONS MEASUREMENT AT AC MAINS POWER PORTS TEST

3.3.1 LIMITS

Table A.9 – Requirements for conducted emissions from the AC mains power ports of Class A equipment

Applicable to				
1. AC mains power ports (3.1.1)				
Table clause	Frequency range MHz	Coupling device (see Table A.8)	Detector type / bandwidth	Class A limits dB(μV)
A9.1	0,15 to 0,5	AMN	Quasi Peak / 9 kHz	79
	0,5 to 30			73
A9.2	0,15 to 0,5	AMN	Average / 9 kHz	66
	0,5 to 30			60
Apply A9.1 and A9.2 across the entire frequency range.				

Table A.10 – Requirements for conducted emissions from the AC mains power ports of Class B equipment

Applicable to				
1. AC mains power ports (3.1.1)				
Table clause	Frequency range MHz	Coupling device (see Table A.8)	Detector type / bandwidth	Class B limits dB(μV)
A10.1	0,15 to 0,5	AMN	Quasi Peak / 9 kHz	66 to 56
	0,5 to 5			56
	5 to 30			60
A10.2	0,15 to 0,5	AMN	Average / 9 kHz	56 to 46
	0,5 to 5			46
	5 to 30			50
Apply A10.1 and A10.2 across the entire frequency range.				

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.
- (3) The test result calculated as following:
 Measurement Value = Reading Level + Correct Factor
 Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor (if use)
 Margin Level = Measurement Value – Limit Value
 Calculation example:

Reading Level		Correct Factor		Measurement Value
38.22	+	3.45	=	41.67

Measurement Value		Limit Value		Margin Level
41.67	-	60	=	-18.33

3.3.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	TWO-LINE V-NETWORK	R&S	ENV216	101339	2020/4/7	2021/4/6
2	Test Cable	EMCI	EMCCFD300-BM -BM-5000	160621	2020/5/25	2021/5/24
3	EMI Test Receiver	R&S	ESR	101854	2020/12/23	2021/12/22
4	Measurement Software	Farad	EZ EMC (Ver. NB-03A1-01)	N/A	N/A	N/A

REMARK:

(1) "N/A" denotes no model name, no serial no. or no calibration specified.

(2) All calibration period of equipment list is one year.

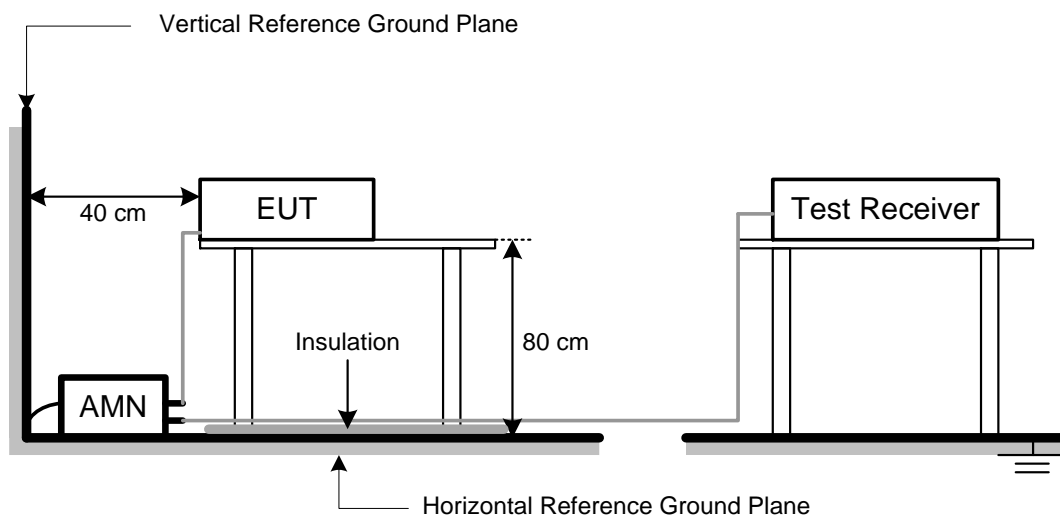
3.3.3 TEST PROCEDURE

- The EUT was placed 0.8 m above the horizontal ground plane with the EUT being connected to the power mains through an AMN.
All other support equipment were powered from an additional AMN.
The AMN provides 50 Ohm/50uH of impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle to keep the cable above 40 cm.
- Excess I/O cables that are not connected to a peripheral shall be bundled in the center.
The end of the cable will be terminated, using the correct terminating impedance.
The overall length shall not exceed 1 m.
- Cables connecting to AE located outside the measurement area drop directly to, but be insulated from, the RGP (or turntable where applicable), and then be routed directly to the place where they leave the test site. However, cables which would normally be bonded to ground should be bonded to the RGP in accordance with normal practice or the manufacturer's recommendation.
- The AMN is spaced at least 80 cm from the nearest part of the EUT chassis.
- The receiver was set to quasi-peak and average detect function and specified bandwidth with maximum hold mode.
- For the actual test configuration, please refer to the related Item - TEST PHOTOS.

3.3.4 DEVIATION FROM TEST STANDARD

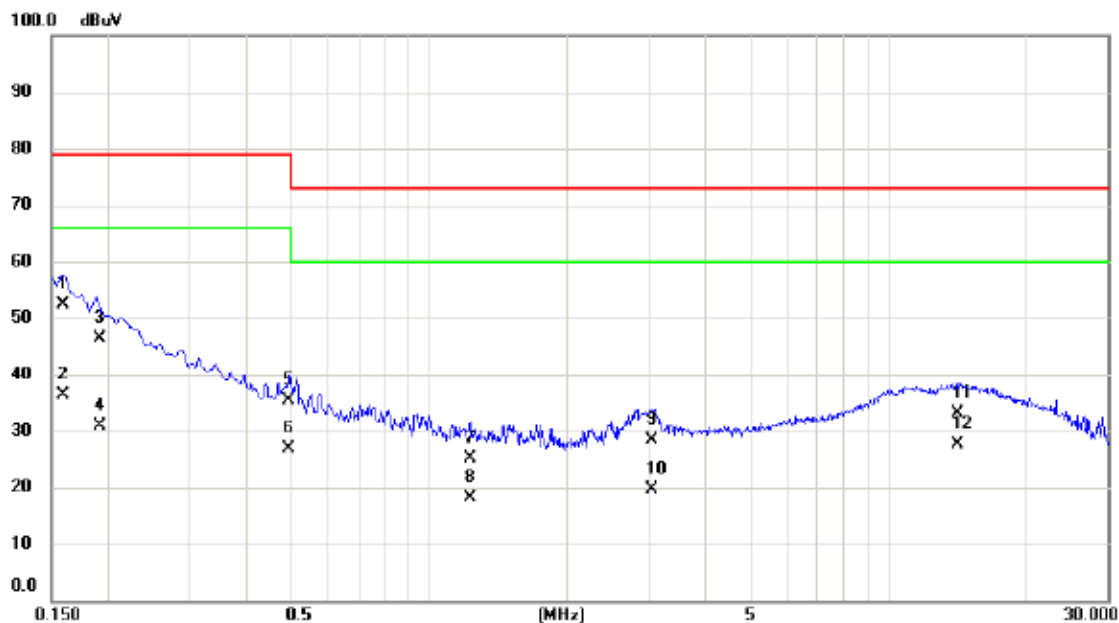
No deviation.

3.3.5 TEST SETUP



3.3.6 TEST RESULT

Test Mode	Mode 1	Tested Date	2021/1/6
Test Voltage	AC 230V/50Hz	Phase	Line



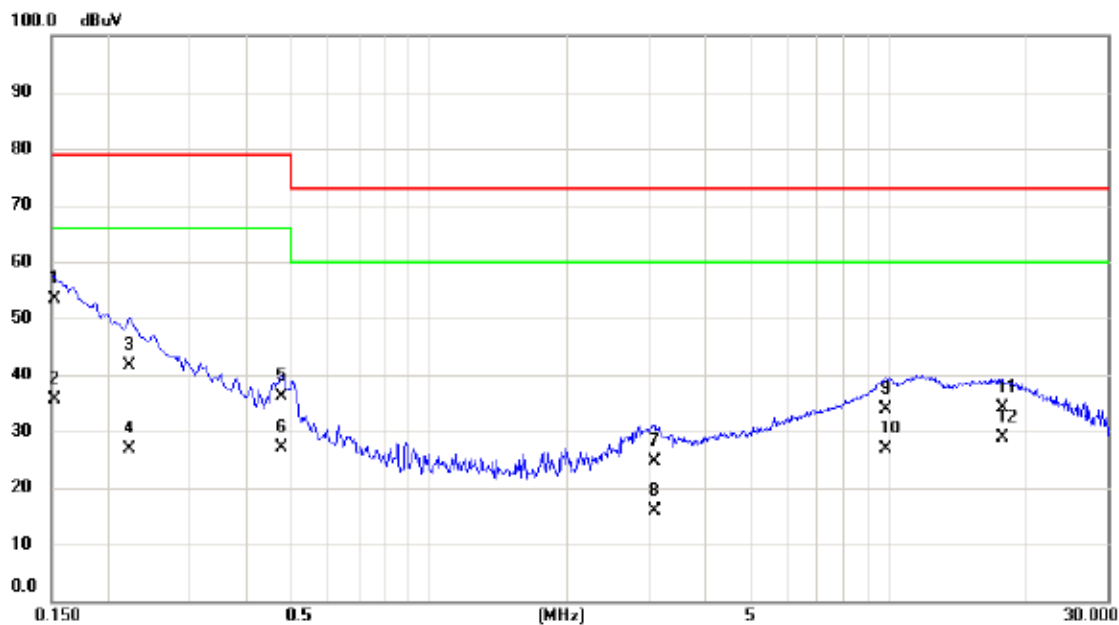
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1590	42.60	9.67	52.27	79.00	-26.73	QP	
2		0.1590	26.60	9.67	36.27	66.00	-29.73	AVG	
3		0.1914	36.80	9.66	46.46	79.00	-32.54	QP	
4		0.1914	21.20	9.66	30.86	66.00	-35.14	AVG	
5		0.4942	25.70	9.66	35.36	79.00	-43.64	QP	
6		0.4942	17.20	9.66	26.86	66.00	-39.14	AVG	
7		1.2232	15.50	9.70	25.20	73.00	-47.80	QP	
8		1.2232	8.50	9.70	18.20	60.00	-41.80	AVG	
9		3.0435	18.50	9.76	28.26	73.00	-44.74	QP	
10		3.0435	9.80	9.76	19.56	60.00	-40.44	AVG	
11		14.0955	23.40	9.84	33.24	73.00	-39.76	QP	
12		14.0955	17.80	9.84	27.64	60.00	-32.36	AVG	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	Mode 1	Tested Date	2021/1/6
Test Voltage	AC 230V/50Hz	Phase	Neutral



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1522	43.70	9.67	53.37	79.00	-25.63	QP	
2		0.1522	25.90	9.67	35.57	66.00	-30.43	AVG	
3		0.2220	32.00	9.66	41.66	79.00	-37.34	QP	
4		0.2220	17.30	9.66	26.96	66.00	-39.04	AVG	
5		0.4762	26.40	9.66	36.06	79.00	-42.94	QP	
6		0.4762	17.50	9.66	27.16	66.00	-38.84	AVG	
7		3.0975	14.90	9.76	24.66	73.00	-48.34	QP	
8		3.0975	6.10	9.76	15.86	60.00	-44.14	AVG	
9		9.8543	24.00	9.86	33.86	73.00	-39.14	QP	
10		9.8543	17.00	9.86	26.86	60.00	-33.14	AVG	
11		17.6933	24.30	9.91	34.21	73.00	-38.79	QP	
12		17.6933	18.90	9.91	28.81	60.00	-31.19	AVG	

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

3.4 ASYMMETRIC MODE CONDUCTED EMISSIONS TEST

3.4.1 LIMITS

Table A.11 – Requirements for asymmetric mode conducted emissions from Class A equipment

Applicable to					
1. wired network ports (3.1.32) 2. optical fibre ports (3.1.25) with metallic shield or tension members 3. antenna ports (3.1.3)					
Table clause	Frequency range MHz	Coupling device (see Table A.8)	Detector type / bandwidth	Class A voltage limits dB(μV)	Class A current limits dB(μA)
A11.1	0,15 to 0,5	AAN	Quasi Peak / 9 kHz	97 to 87	n/a
	0,5 to 30			87	
	0,15 to 0,5	AAN	Average / 9 kHz	84 to 74	
	0,5 to 30			74	
A11.2	0,15 to 0,5	CVP and current probe	Quasi Peak / 9 kHz	97 to 87	53 to 43
	0,5 to 30			87	43
	0,15 to 0,5	CVP and current probe	Average / 9 kHz	84 to 74	40 to 30
	0,5 to 30			74	30
A11.3	0,15 to 0,5	Current Probe	Quasi Peak / 9 kHz	n/a	53 to 43
	0,5 to 30				43
	0,15 to 0,5	Current Probe	Average / 9 kHz		40 to 30
	0,5 to 30				30

The choice of coupling device and measurement procedure is defined in Annex C.

AC mains ports that also have the function of a wired network port shall meet the limits given in Table A.9.

The measurement shall cover the entire frequency range.

The application of the voltage and/or current limits is dependent on the measurement procedure used. Refer to Table C.1 for applicability.

Testing is required at only one EUT supply voltage and frequency.

Applicable to ports listed above and intended to connect to cables longer than 3 m.

**Table A.12 – Requirements for asymmetric mode conducted emissions
from Class B equipment**

Applicable to					
1. wired network ports (3.1.32) 2. optical fibre ports (3.1.25) with metallic shield or tension members 3. broadcast receiver tuner ports (3.1.8) 4. antenna ports (3.1.3)					
Table clause	Frequency range MHz	Coupling device (see Table A.8)	Detector type / bandwidth	Class B voltage limits dB(μV)	Class B current limits dB(μA)
A12.1	0,15 to 0,5	AAN	Quasi Peak / 9 kHz	84 to 74	n/a
	0,5 to 30			74	
	0,15 to 0,5	AAN	Average / 9 kHz	74 to 64	
	0,5 to 30			64	
A12.2	0,15 to 0,5	CVP and current probe	Quasi Peak / 9 kHz	84 to 74	40 to 30
	0,5 to 30			74	30
	0,15 to 0,5	CVP and current probe	Average / 9 kHz	74 to 64	30 to 20
	0,5 to 30			64	20
A12.3	0,15 to 0,5	Current Probe	Quasi Peak / 9 kHz	n/a	40 to 30
	0,5 to 30				30
	0,15 to 0,5	Current Probe	Average / 9 kHz		30 to 20
	0,5 to 30				20
The choice of coupling device and measurement procedure is defined in Annex C.					
Screened ports including TV broadcast receiver tuner ports are measured with a common-mode impedance of 150 Ω. This is typically accomplished with the screen terminated by 150 Ω to earth.					
AC mains ports that also have the function of a wired network port shall meet the limits given in Table A.10.					
The measurement shall cover the entire frequency range.					
The application of the voltage and/or current limits is dependent on the measurement procedure used. Refer to Table C.1 for applicability.					
Measurement is required at only one EUT supply voltage and frequency.					
Applicable to ports listed above and intended to connect to cables longer than 3 m.					

NOTE:

(1) The test result calculated as following:

Measurement Value = Reading Level + Correct Factor

Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor (if use)

Margin Level = Measurement Value – Limit Value

Calculation example:

Reading Level		Correct Factor		Measurement Value
43.15	+	9.56	=	52.71

Measurement Value		Limit Value		Margin Level
52.71	-	74	=	-21.29

3.4.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	TWO-LINE V-NETWORK	R&S	ENV216	101339	2020/4/7	2021/4/6
2	Test Cable	EMCI	EMCCFD300-BM -BM-5000	160621	2020/5/25	2021/5/24
3	EMI Test Receiver	R&S	ESR	101854	2020/12/23	2021/12/22
4	50Ω BNC TYPE Terminal	EMCI	N/A	13	2020/6/15	2021/6/14
5	ISN	TESEQ	ISN T800	30841	2020/10/30	2021/10/29
6	Measurement Software	Farad	EZ_EMC (Ver. NB-03A1-01)	N/A	N/A	N/A

REMARK:

- (1) "N/A" denotes no model name, no serial no. or no calibration specified.
- (2) All calibration period of equipment list is one year.

3.4.3 TEST PROCEDURE

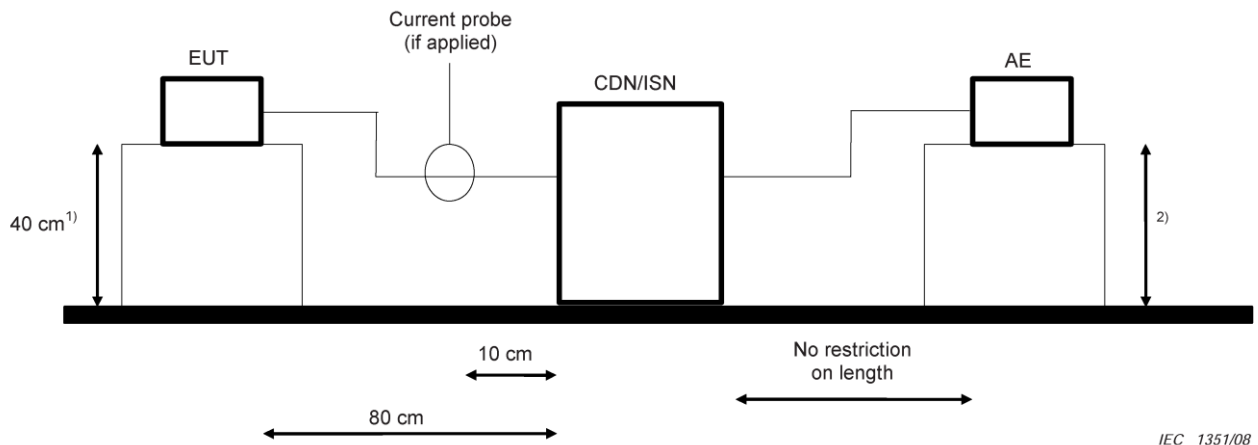
- a. The EUT was placed 0.8 m above the horizontal ground plane with the EUT being connected to the power mains through an AMN.
All other support equipment were powered from an additional AMN.
The AMN provides 50 Ohm/50uH of impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle to keep the cable above 40 cm.
- c. Excess I/O cables that are not connected to a peripheral shall be bundled in the center.
The end of the cable will be terminated, using the correct terminating impedance.
The overall length shall not exceed 1 m.
- d. Cables connecting to AE located outside the measurement area drop directly to, but be insulated from, the RGP (or turntable where applicable), and then be routed directly to the place where they leave the test site. However, cables which would normally be bonded to ground should be bonded to the RGP in accordance with normal practice or the manufacturer's recommendation.
- e. Method: AAN
 - (1) AAN at least 80 cm from nearest part of EUT chassis.
 - (2) The EUT was placed 0.4 m from the conducting wall of the shielded room and connected to the power mains through an AMN. Other support units were connected to the power mains through another AMN.
 - (3) Voltage at the measurement port of the AAN was detected; the reading was corrected by adding the voltage division factor of the AAN, and was compared to the voltage limits.
 - (4) The disturbance levels and the frequencies of at least six highest disturbances were recorded from each telecommunication port, which comprises the EUT.
- f. Method: Current Probe (CP)
 - (1) Current probe shall be placed at 0.1 m from the AAN.
 - (2) Current at the measurement port of the AAN was detected; the reading was corrected by adding the current division factor of the current probe, and was compared to the current limits.
 - (3) The disturbance levels and the frequencies of at least six highest disturbances were recorded from each telecommunication port, which comprises the EUT.
 - (4) Break the insulation and connect a 150 Ohm resistor from the outside surface of the shield to ground and apply a clamp between 150 Ohm connection and associated equipment (For STP LAN only).
- g. Method: Current Probe (CVP)
 - (1) The current shall be measured with the current probe and the results compared with the current limits.
 - (2) The voltage measured shall be corrected at each frequency of interest as follows:
 - if the current margin with respect to the current limit is ≤ 6 dB, the actual current margin shall be subtracted from the measured voltage;
 - if the current margin with respect to the current limit is > 6 dB, 6 dB shall be subtracted from the measured voltage.
 - (3) The adjusted voltage shall be compared with the applicable voltage limit.
 - (4) Both the measured current and the corrected voltage shall be below the applicable current and voltage limits at all frequencies for the EUT to be deemed compliant with this publication.
- h. The receiver was set to quasi-peak and average detect function and specified bandwidth with maximum hold mode.
- i. For the actual test configuration, please refer to the related Item - TEST PHOTOS.

3.4.4 DEVIATION FROM TEST STANDARD

No deviation.

3.4.5 TEST SETUP

a) Cable Type: Balanced Unscreened, Screened or Coaxial

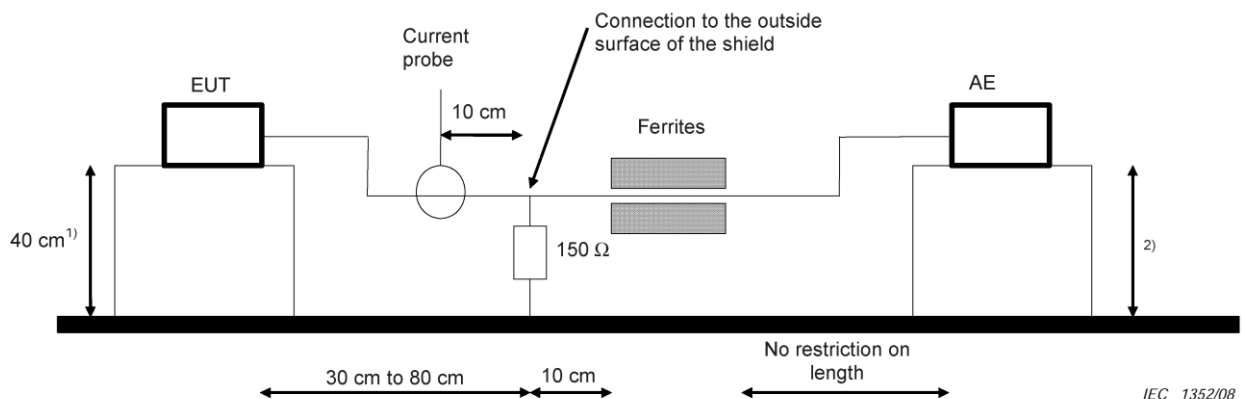


IEC 1351/08

AE = Associated equipment
EUT = Equipment under test

- 1) Distance to the reference groundplane (vertical or horizontal).
- 2) Distance to the reference groundplane is not critical.

b) Cable Type: Screened or Coaxial

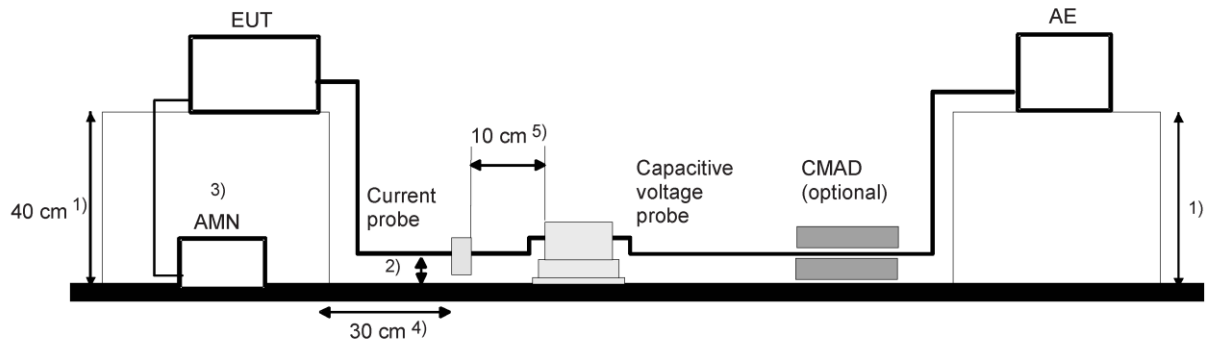


IEC 1352/08

AE = Associated equipment
EUT = Equipment under test

- 1) Distance to the reference groundplane (vertical or horizontal).
- 2) Distance to the reference groundplane is not critical.

c) Cable Type: Balanced Unscreened, Unbalanced



IEC 1353/08

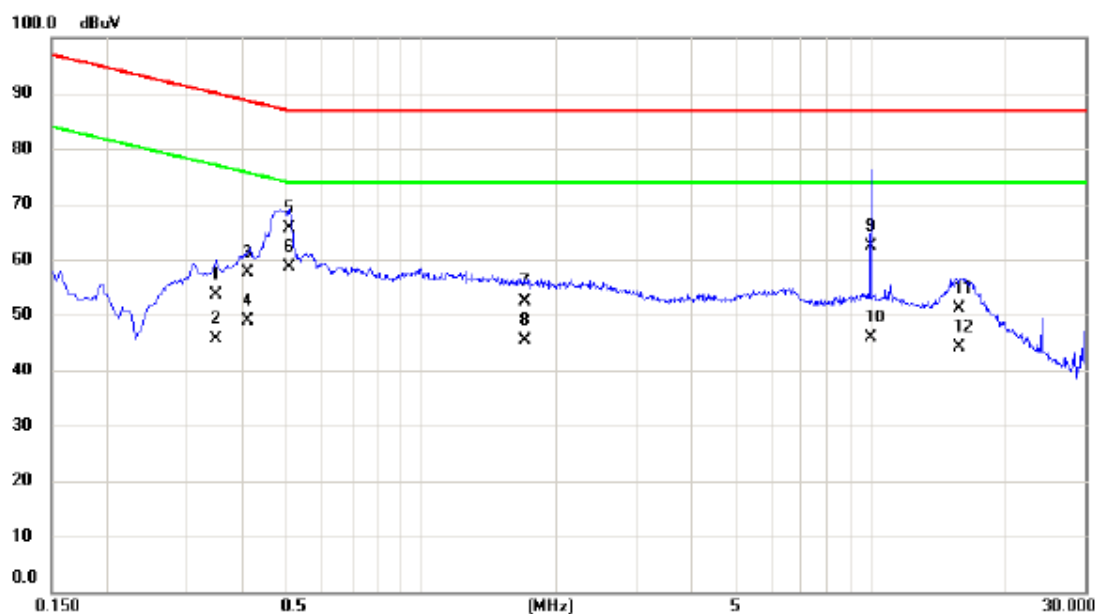
AE = Associated equipment
EUT = Equipment under test
CMAD = Common mode Absorbing Device

It is not required to place both the current probe and the capacitive voltage probe in the measurement set up at the same time unless simultaneous current and voltage measurements are to be made.

- 1) The EUT and AE shall be placed on non-conductive tables 40 ± 1 cm from the reference groundplane (horizontal or vertical).
- 2) The cable used in testing shall drop directly from the EUT to a position 4 ± 1 cm from the reference groundplane and run at this position between the EUT and AE tables. This restriction does not apply to the section of the cable passing through the voltage probe.
- 3) Unless battery operated, the EUT shall be powered using an AMN placed on the reference groundplane > 10 cm from the nearest edge of the groundplane. The EUT power cord shall be routed away from the cable used in testing to minimize coupling or crosstalk effects.
- 4) The horizontal projection of the EUT to the measurement device shall be 30 ± 1 cm.
- 5) When used for simultaneous current and voltage measurements (or for other reasons), the current and voltage probes shall be separated by 10 ± 1 cm. Either the current probe (as shown) or the capacitive voltage probe may be placed on the EUT side.

3.4.6 TEST RESULT

Test Mode	Mode 1 (Lan 1 ETHERNET 100M-100M)		
Test Voltage	AC 230V/50Hz	Tested Date	2021/1/6



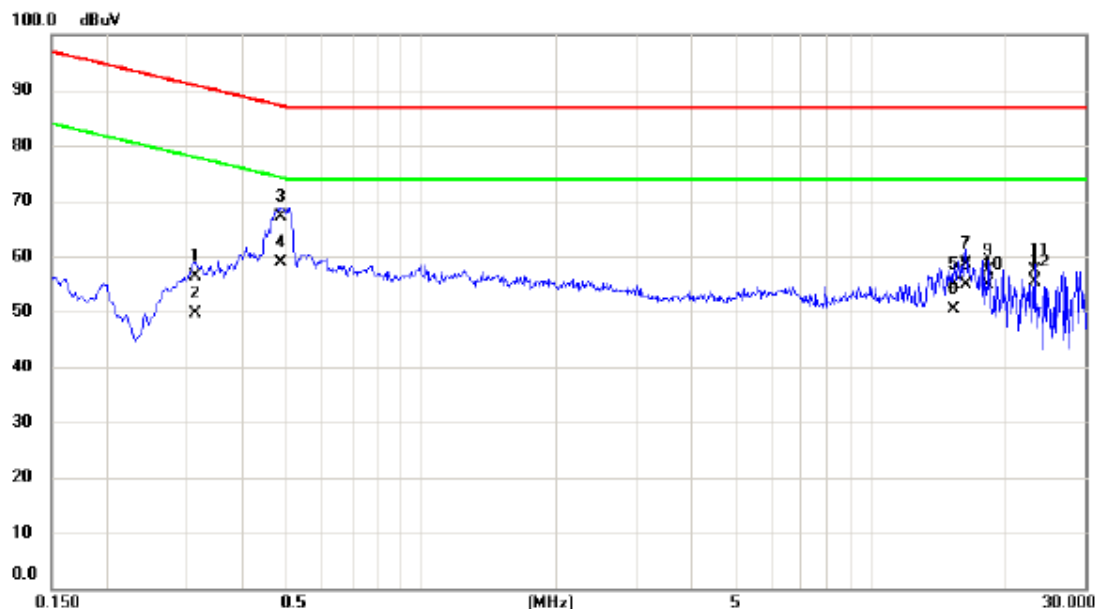
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.3480	43.70	10.00	53.70	90.01	-36.31	QP	
2		0.3480	35.60	10.00	45.60	77.01	-31.41	AVG	
3		0.4110	47.60	9.96	57.56	88.63	-31.07	QP	
4		0.4110	39.00	9.96	48.96	75.63	-26.67	AVG	
5		0.5076	55.70	9.92	65.62	87.00	-21.38	QP	
6	*	0.5076	48.80	9.92	58.72	74.00	-15.28	AVG	
7		1.6958	42.70	9.79	52.49	87.00	-34.51	QP	
8		1.6958	35.70	9.79	45.49	74.00	-28.51	AVG	
9		10.0004	52.70	9.77	62.47	87.00	-24.53	QP	
10		10.0004	36.20	9.77	45.97	74.00	-28.03	AVG	
11		15.6885	41.40	9.84	51.24	87.00	-35.76	QP	
12		15.6885	34.40	9.84	44.24	74.00	-29.76	AVG	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	Mode 1 (Lan 1 ETHERNET 10M-10M)		
Test Voltage	AC 230V/50Hz	Tested Date	2021/1/6



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.3141	46.30	10.03	56.33	90.86	-34.53	QP	
2		0.3141	39.60	10.03	49.63	77.86	-28.23	AVG	
3		0.4852	57.30	9.93	67.23	87.25	-20.02	QP	
4	*	0.4852	49.00	9.93	58.93	74.25	-15.32	AVG	
5		15.2520	45.00	9.84	54.84	87.00	-32.16	QP	
6		15.2520	40.50	9.84	50.34	74.00	-23.66	AVG	
7		16.2285	48.90	9.85	58.75	87.00	-28.25	QP	
8		16.2285	45.10	9.85	54.95	74.00	-19.05	AVG	
9		18.2445	47.60	9.87	57.47	87.00	-29.53	QP	
10		18.2445	44.90	9.87	54.77	74.00	-19.23	AVG	
11		23.1293	47.50	9.99	57.49	87.00	-29.51	QP	
12		23.1293	45.40	9.99	55.39	74.00	-18.61	AVG	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

3.5 HARMONIC CURRENT EMISSIONS TEST

3.5.1 LIMITS

EN IEC 61000-3-2 / IEC 61000-3-2						
Equipment Category	Harmonic Order	Maximum Permissible Harmonic Current	Equipment Category	Harmonic Order	Maximum Permissible Harmonic Current	
	n	A		n	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				

If the rated power of EUT is less than 75 W, limits are not specified.

3.5.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Signal conditioning unit	TESEQ	CCN 1000-1	1723A00517	2020/9/16	2021/9/15
2	Power Source	TESEQ	NSG 1007	1726A00004	2020/9/16	2021/9/15
3	Measurement Software	TESEQ	CTS 4 (Version 4.23.0)	N/A	N/A	N/A

REMARK:

- (1) "N/A" denotes no model name, no serial no. or no calibration specified.
- (2) All calibration period of equipment list is one year.

3.5.3 TEST PROCEDURE

a. The EUT was placed on the top of a wooden table 0.8 m above the ground and operated to produce the maximum harmonic components under normal operating conditions.

b. The classification of EUT is according to of EN IEC 61000-3-2 / IEC 61000-3-2. The EUT is 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 shall be considered as Class A equipment.

Class B:

- portable tools;
- arc welding equipment which is not professional equipment.

Class C:

- lighting equipment.

Class D:

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

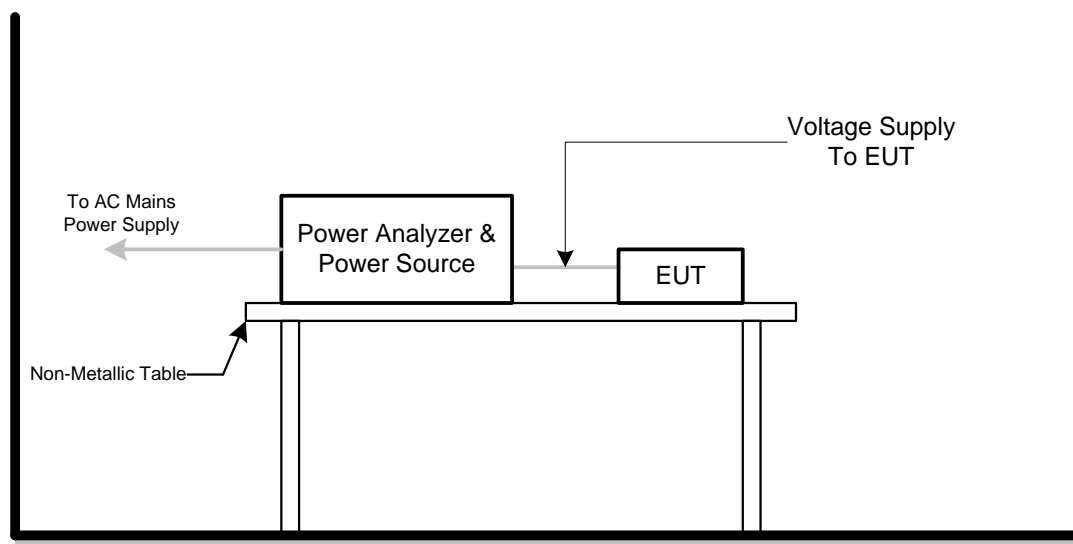
- personal computers and personal computer monitors;
- television receivers;
- refrigerators and freezers having one or more variable-speed drives to control compressor motor(s).

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.

3.5.4 DEVIATION FROM TEST STANDARD

No deviation.

3.5.5 TEST SETUP

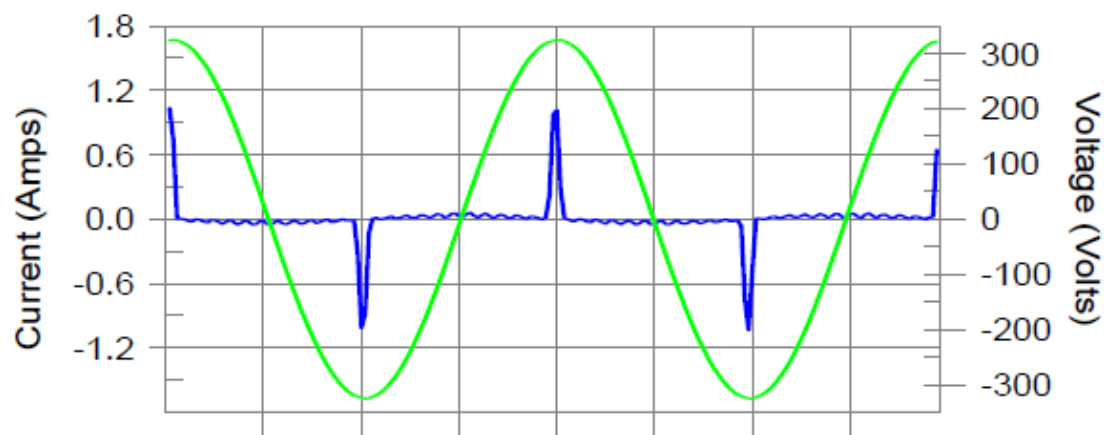


3.5.6 TEST RESULT

Test Mode	Mode 1		
Test Voltage	AC 230V/50Hz	Tested Date	2021/1/15

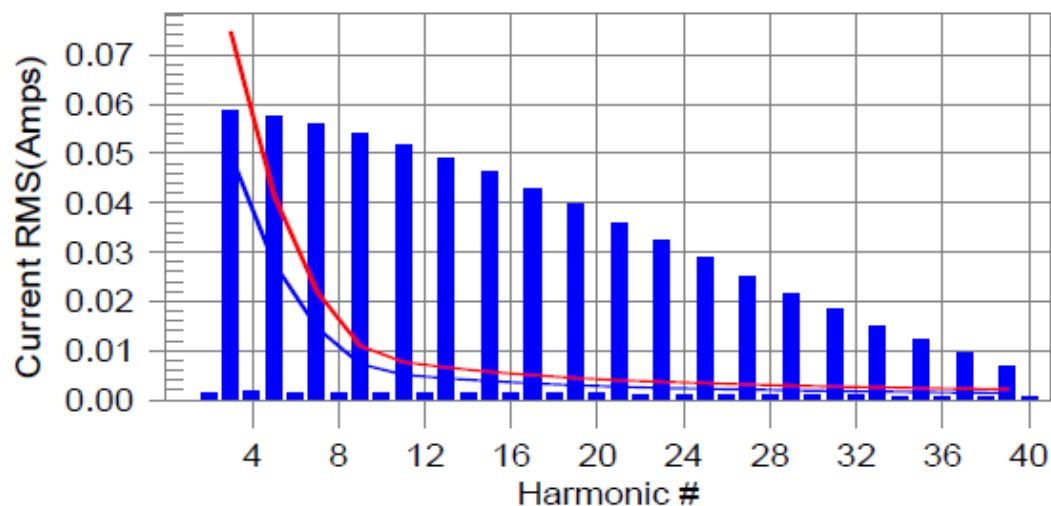
Harmonics

Current & voltage waveforms



Harmonics and Class D limit line

European Limits



Test result: N/L Worst harmonics H0-0.0% of 150% limit, H0-0% of 100% limit

Next page continued.

Current Test Result Summary (Run time)

THC(A): 0.169 I-THD(%): 244.9 POHC(A): 0.072 POHC Limit(A): 0.006

Highest parameter values during test:

V_{RMS} (Volts): 229.41

I_{Peak} (Amps): 1.160

I_{Fund} (Amps): 0.069

Power (Watts): 14.6

Frequency(Hz): 50.00

I_{RMS} (Amps): 0.197

Crest Factor: 6.191

Power Factor: 0.331

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	0.000	N/A	0.002	0.000	N/A	N/L
3	0.059	0.050	N/A	0.063	0.075	N/A	N/L
4	0.002	0.000	N/A	0.003	0.000	N/A	N/L
5	0.057	0.028	N/A	0.062	0.042	N/A	N/L
6	0.002	0.000	N/A	0.003	0.000	N/A	N/L
7	0.056	0.015	N/A	0.060	0.022	N/A	N/L
8	0.002	0.000	N/A	0.003	0.000	N/A	N/L
9	0.054	0.007	N/A	0.058	0.011	N/A	N/L
10	0.001	0.000	N/A	0.002	0.000	N/A	N/L
11	0.052	0.005	N/A	0.056	0.008	N/A	N/L
12	0.001	0.000	N/A	0.002	0.000	N/A	N/L
13	0.049	0.004	N/A	0.053	0.007	N/A	N/L
14	0.001	0.000	N/A	0.002	0.000	N/A	N/L
15	0.046	0.004	N/A	0.049	0.006	N/A	N/L
16	0.001	0.000	N/A	0.002	0.000	N/A	N/L
17	0.043	0.003	N/A	0.046	0.005	N/A	N/L
18	0.001	0.000	N/A	0.002	0.000	N/A	N/L
19	0.040	0.003	N/A	0.042	0.004	N/A	N/L
20	0.001	0.000	N/A	0.002	0.000	N/A	N/L
21	0.036	0.003	N/A	0.038	0.004	N/A	N/L
22	0.001	0.000	N/A	0.002	0.000	N/A	N/L
23	0.032	0.002	N/A	0.034	0.004	N/A	N/L
24	0.001	0.000	N/A	0.002	0.000	N/A	N/L
25	0.029	0.002	N/A	0.030	0.003	N/A	N/L
26	0.001	0.000	N/A	0.002	0.000	N/A	N/L
27	0.025	0.002	N/A	0.026	0.003	N/A	N/L
28	0.001	0.000	N/A	0.001	0.000	N/A	N/L
29	0.022	0.002	N/A	0.022	0.003	N/A	N/L
30	0.001	0.000	N/A	0.001	0.000	N/A	N/L
31	0.018	0.002	N/A	0.019	0.003	N/A	N/L
32	0.001	0.000	N/A	0.001	0.000	N/A	N/L
33	0.015	0.002	N/A	0.015	0.003	N/A	N/L
34	0.001	0.000	N/A	0.001	0.000	N/A	N/L
35	0.012	0.002	N/A	0.012	0.002	N/A	N/L
36	0.001	0.000	N/A	0.001	0.000	N/A	N/L
37	0.009	0.002	N/A	0.010	0.002	N/A	N/L
38	0.001	0.000	N/A	0.001	0.000	N/A	N/L
39	0.007	0.001	N/A	0.007	0.002	N/A	N/L
40	0.000	0.000	N/A	0.001	0.000	N/A	N/L

Note: The EUT power level is below 75.0 Watts and therefore has no defined limits

Next page continued.

Voltage Source Verification Data (Run time)

Highest parameter values during test:

Voltage (Vrms): 229.41

I_{Peak} (Amps): 1.160

I_{Fund} (Amps): 0.069

Power (Watts): 14.6

Frequency(Hz): 50.00

I_{RMS} (Amps): 0.197

Crest Factor: 6.191

Power Factor: 0.331

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.027	0.459	5.93	OK
3	0.327	2.064	15.85	OK
4	0.012	0.459	2.64	OK
5	0.019	0.917	2.06	OK
6	0.012	0.459	2.61	OK
7	0.026	0.688	3.76	OK
8	0.011	0.459	2.46	OK
9	0.018	0.459	3.82	OK
10	0.008	0.459	1.68	OK
11	0.024	0.229	10.37	OK
12	0.010	0.229	4.46	OK
13	0.028	0.229	12.30	OK
14	0.003	0.229	1.37	OK
15	0.025	0.229	10.84	OK
16	0.005	0.229	2.16	OK
17	0.028	0.229	12.28	OK
18	0.010	0.229	4.55	OK
19	0.032	0.229	13.93	OK
20	0.011	0.229	4.65	OK
21	0.032	0.229	14.14	OK
22	0.003	0.229	1.45	OK
23	0.029	0.229	12.82	OK
24	0.004	0.229	1.82	OK
25	0.030	0.229	12.93	OK
26	0.002	0.229	0.80	OK
27	0.025	0.229	10.73	OK
28	0.003	0.229	1.16	OK
29	0.027	0.229	11.84	OK
30	0.005	0.229	2.36	OK
31	0.024	0.229	10.36	OK
32	0.003	0.229	1.21	OK
33	0.021	0.229	9.13	OK
34	0.002	0.229	0.86	OK
35	0.018	0.229	8.00	OK
36	0.002	0.229	0.82	OK
37	0.016	0.229	7.08	OK
38	0.001	0.229	0.65	OK
39	0.014	0.229	6.10	OK
40	0.006	0.229	2.69	OK

3.6 VOLTAGE CHANGES, VOLTAGE FLUCTUATIONS AND FLICKER TEST

3.6.1 LIMITS

EN 61000-3-3 / IEC 61000-3-3		
Tests	Limits	Descriptions
Pst	≤ 1.0 , $T_p = 10$ minute	Short Term Flicker Indicator
Plt	≤ 0.65 , $T_p = 2$ hr.	Long Term Flicker Indicator
dc	$\leq 3.3\%$	Relative Steady-State V-change
dmax	$\leq 4\%$	Maximum Relative V-change
d (t)	$\leq 3.3\%$ for > 500 ms	Relative V-change characteristic

3.6.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Signal conditioning unit	TESEQ	CCN 1000-1	1723A00517	2020/9/16	2021/9/15
2	Power Source	TESEQ	NSG 1007	1726A00004	2020/9/16	2021/9/15
3	Measurement Software	TESEQ	CTS 4 (Version 4.23.0)	N/A	N/A	N/A

REMARK:

- (1) "N/A" denotes no model name, no serial no. or no calibration specified.
- (2) All calibration period of equipment list is one year.

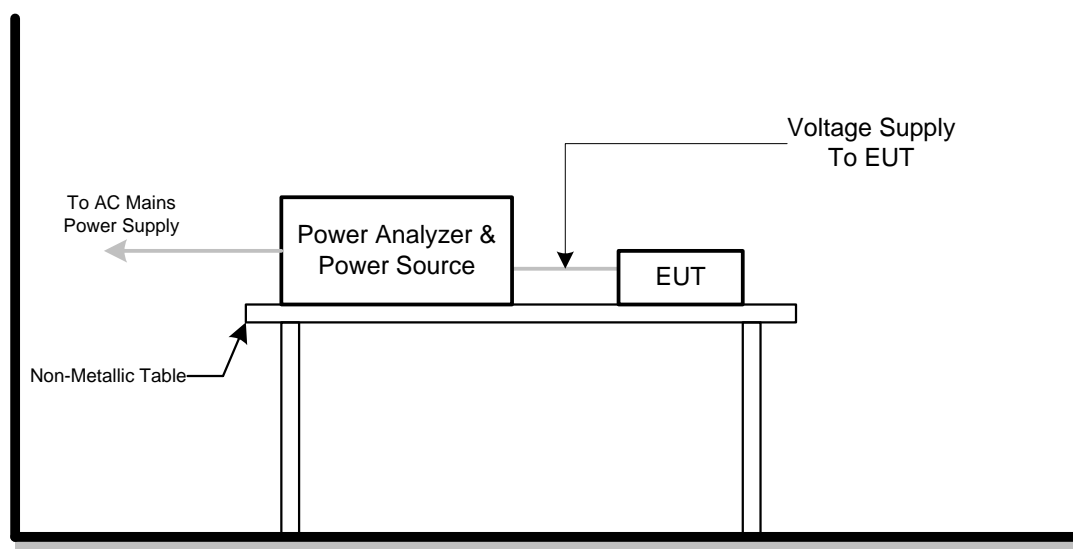
3.6.3 TEST PROCEDURE

- a. Tests was performed according to the Test Conditions/Assessment of Voltage Fluctuations specified in EN 61000-3-3 / IEC 61000-3-3 depend on which standard adopted for compliance measurement.
- b. All types of harmonic current and/or voltage fluctuation in this report are assessed by direct measurement using flicker-meter.

3.6.4 DEVIATION FROM TEST STANDARD

No deviation.

3.6.5 TEST SETUP

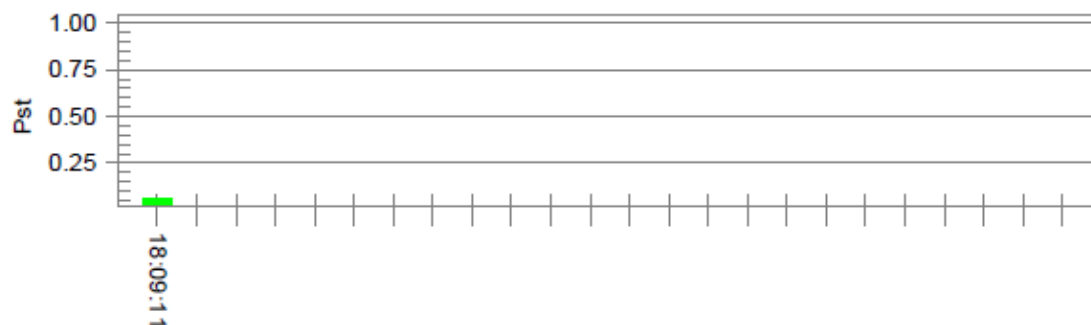


3.6.6 TEST RESULT

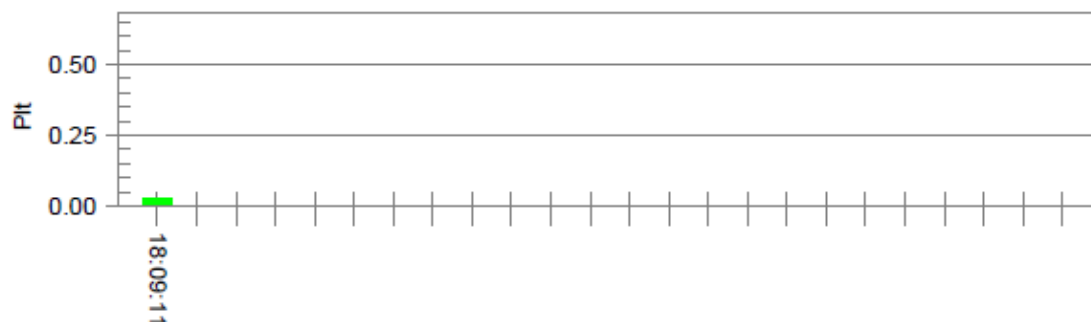
Test Mode	Mode 1		
Test Voltage	AC 230V/50Hz	Tested Date	2021/1/15

Pst_i and limit line

European Limits



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt): 229.38

T-max (mS): 0

Highest dc (%): 0.00

Highest dmax (%): 0.00

Highest Pst (10 min. period): 0.064

Highest Plt (2 hr. period): 0.028

Test limit (mS): 500.0 Pass

Test limit (%): 3.30 Pass

Test limit (%): 4.00 Pass

Test limit: 1.000 Pass

Test limit: 0.650 Pass

4 IMMUNITY TEST

4.1 STANDARD COMPLIANCE/SEVERITY LEVEL/CRITERION

Environmental phenomenon and Reference Standard	Test Specification	Test Ports	Performance Criteria
Electrostatic discharges EN 61000-4-2 IEC 61000-4-2 (ESD)	±8 kV air discharge	Enclosure ports (Direct Mode)	B
	±4 kV contact discharge	Enclosure ports (Indirect Mode)	B
Continuous RF electromagnetic field disturbances, swept test EN 61000-4-3 IEC 61000-4-3 (RS)	80 MHz to 1000 MHz 3 V/m (unmodulated, rms), 1 kHz, 80 %, AM modulated	Enclosure ports	A
Continuous RF electromagnetic field disturbances, spot test EN 61000-4-3 IEC 61000-4-3 (RS)	1800 MHz ±1 % MHz, 2600 MHz ±1 % MHz, 3500 MHz ±1 % MHz, 5000MHz ±1 % MHz 3 V/m (unmodulated, rms), 1 kHz, 80 %, AM modulated	Enclosure ports	A
Electrical fast transients / burst EN 61000-4-4 IEC 61000-4-4 (EFT/BURST)	±0.5 kV(peak), 5/50 ns Tr/Th 5 kHz Repetition Frequency For CPE xDSL ports repetition frequency is 100 kHz.	Analogue/digital data ports NOTE (1)	B
	±0.5 kV(peak), 5/50 ns Tr/Th 5 kHz Repetition Frequency	DC network power ports	B
	±1 kV(peak), 5/50 ns Tr/Th 5 kHz Repetition Frequency	AC mains power ports	B
Surges EN 61000-4-5 IEC 61000-4-5	Port type: unshielded symmetrical Apply: lines to ground		
	Apply where primary protection is intended ±1 kV and ±4 kV, 10/700 (5/320) µs Tr/Th	Analogue/digital data ports NOTE (1)(3)	C
	Apply where primary protection is not intended ±1 kV, 10/700 (5/320) µs Tr/Th	Analogue/digital data ports NOTE (1)(3)	C
	Port type: coaxial or shielded Apply: shield to ground		
	±0.5 kV, 1.2/50 (8/20) µs Tr/Th	Analogue/digital data ports NOTE(1)	B
	Surges are applied line to reference ground for each individual line ±0.5 kV, 1.2/50 (8/20) µs Tr/Th	DC network power ports NOTE (1)(2)	B
	Apply between line and line ±1 kV, 1.2/50 (8/20) µs Tr/Th Apply between line and earth (ground) ±2 kV, 1.2/50 (8/20) µs Tr/Th	AC mains power ports	B

Environmental phenomenon and Reference Standard or Clause	Test Specification	Test Ports	Performance Criteria
Continuous induced RF disturbances EN 61000-4-6 IEC 61000-4-6 (CS)	0.15 MHz to 10 MHz, 3 V 10 MHz to 30 MHz, 3 V to 1 V 30 MHz to 80 MHz, 1 V (unmodulated, rms.), 80 % AM (1 kHz)	Analogue/digital data ports NOTE (1)	A
	0.15 MHz to 10 MHz, 3 V 10 MHz to 30 MHz, 3 V to 1 V 30 MHz to 80 MHz, 1 V (unmodulated, rms.), 80 % AM (1 kHz)	DC network power ports NOTE (1)	A
	0.15 MHz to 10 MHz, 3 V 10 MHz to 30 MHz, 3 V to 1 V 30 MHz to 80 MHz, 1 V (unmodulated, rms.), 80 % AM (1 kHz)	AC mains power ports	A
Power frequency magnetic field EN 61000-4-8 IEC 61000-4-8 (PFMF)	50, 60 Hz, 1 A/m	Enclosure ports	A
Voltage dips and Voltage interruptions EN IEC 61000-4-11 IEC 61000-4-11	Voltage dips Residual voltage <5 %, 0.5 cycles	AC mains power ports	B
	Voltage dips Residual voltage 70 %, 25 cycles for 50 Hz, 30 cycles for 60 Hz	AC mains power ports NOTE (4)	C
	Voltage interruptions Residual voltage <5 %, 250 cycles for 50 Hz, 300 cycles for 60 Hz	AC mains power ports NOTE (4)	C
Broadband impulse noise disturbances, repetitive 4.2.7	Impulse frequency and Test Level 0.15 MHz to 0.5 MHz, 107 dB μ V 0.5 MHz to 10.5 MHz, 107 dB μ V to 36 dB μ V 10 MHz to 30 MHz, 36 dB μ V to 30 dB μ V	Analogue/digital data ports NOTE (1)(5)(6)	A
	Burst duration and Burst period 0.70 ms 8.3 ms (for 60 Hz) 10 ms (for 50 Hz)		
Broadband impulse noise disturbances, isolated 4.2.7	Impulse frequency and Test Level 0.15 MHz to 30 MHz, 110 dB μ V	Analogue/digital data ports NOTE (1)(5)(7)	B
	Burst duration 0.24 ms, 10 ms, 300 ms		

NOTE:

- (1) Applicable only to ports which, according to the manufacturer's specification, support cable lengths greater than 3 m.
- (2) Applicable only to ports which, according to the manufacturer's specification, may connect directly to outdoor cables.
- (3) Where the surge coupling network for the 10/700 (5/320) μ s waveform affects the functioning of high speed data ports, the test shall be carried out using a 1,2/50 (8/20) μ s waveform and appropriate coupling network.
- (4) Apply at only one supply frequency of the MME.
- (5) Applicable only to CPE xDSL ports.
- (6) Apply period based on the AC mains frequency.
- (7) Apply all burst durations.

4.2 GENERAL PERFORMANCE CRITERIA

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

Criterion A (Clause 8.2)	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.
Criterion B (Clause 8.3)	<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.</p> <p>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>
Criterion C (Clause 8.4)	<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>

4.3 PARTICULAR PERFORMANCE CRITERIA FOR NETWORKING FUNCTIONS

General requirements for network functions	
Criterion A	Refer to clause F.3.3.1 of CISPR 35.
Criterion B	Refer to clause F.3.3.2 of CISPR 35.
Criterion C	Refer to clause F.3.3.3 of CISPR 35.

4.4 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)

4.4.1 TEST SPECIFICATION

Reference Standard	EN 61000-4-2
Discharge Impedance	330 ohm / 150 pF
Required Performance Criterion	B
Discharge Voltage	Air Discharge: ± 2 kV, ± 4 kV, ± 8 kV Contact Discharge: ± 4 kV
Polarity	Positive & Negative
Number of Discharge	Minimum 20 times at each test point
Discharge Mode	Single Discharge
Discharge Period	1 s minimum

Customer's specification

Discharge Voltage	Contact Discharge: ± 6 kV
-------------------	-------------------------------

4.4.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	ESD Simulator	TESEQ	NSG 437	1446	2020/9/26	2021/9/25

REMARK:

- (1) "N/A" denotes no model name, no serial no. or no calibration specified.
- (2) All calibration period of equipment list is one year.

4.4.3 TEST PROCEDURE

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

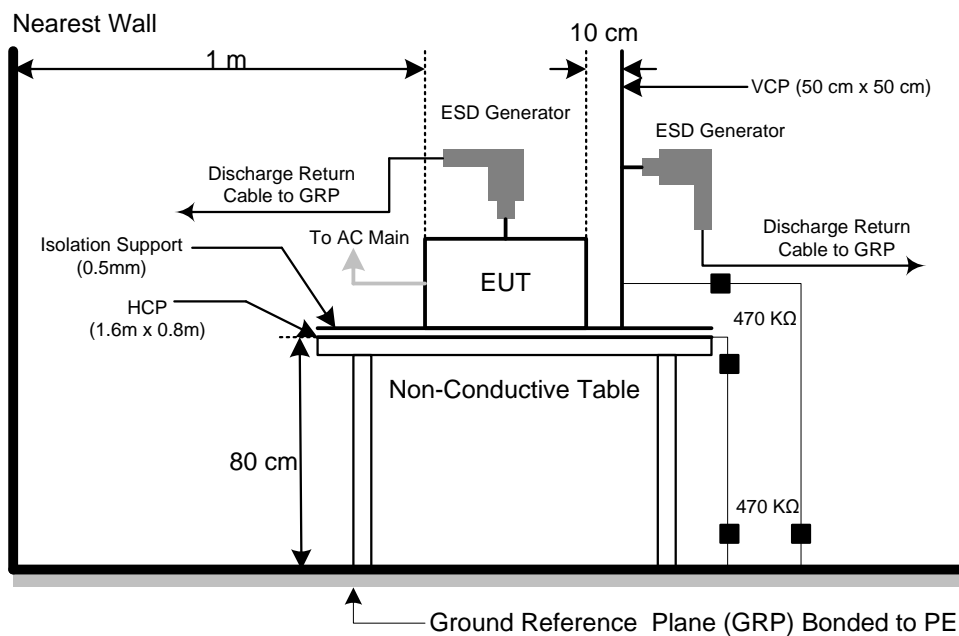
The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manner:

- a. The test shall be performed with single discharges. On each pre-selected point at least 10 single discharges (in the most sensitive polarity) shall be applied.
NOTE 1 The minimum number of discharges applied is depending on the EUT; for products with synchronized circuits the number of discharges should be larger.
For the time interval between successive single discharges an initial value of 1 s is recommended. Longer intervals may be necessary to determine whether a system failure has occurred.
NOTE 2 The points to which the discharges should be applied may be selected by means of an exploration carried out at a repetition rate of 20 discharges per second, or more.
Vertical Coupling Plane (VCP):
The coupling plane, of dimensions 0.5 m x 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 is placed under to the EUT. The generator shall be positioned vertically at 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 discharges at insulation surfaces of the EUT.
It was at least ten single discharges with positive and negative at the same selected point.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 TEST SETUP



4.4.6 TEST RESULT

Test Mode	Mode 1		
Test Voltage	AC 230V/50Hz	Test Date	2021/1/14

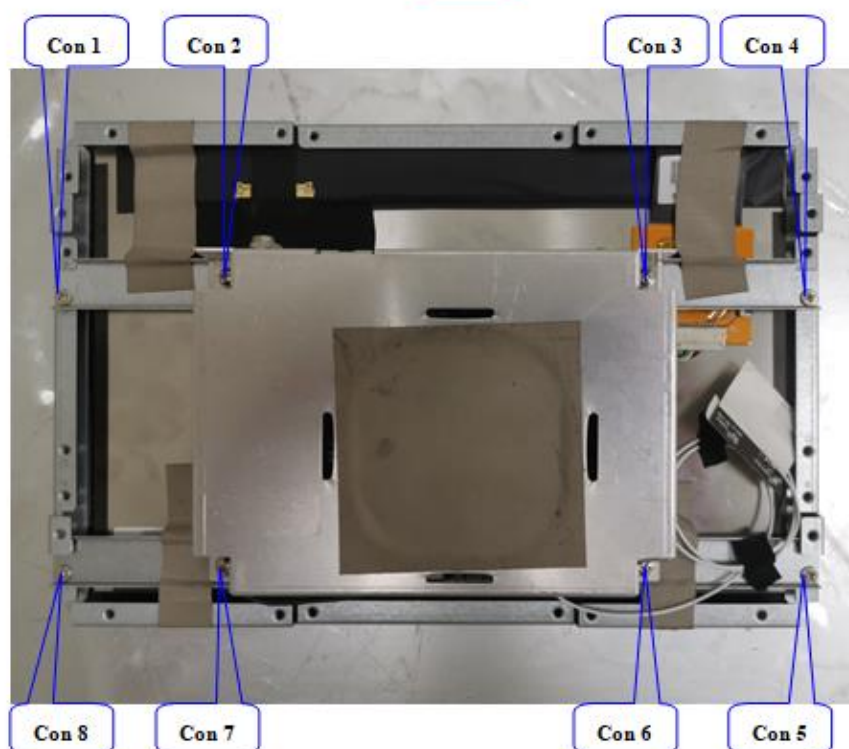
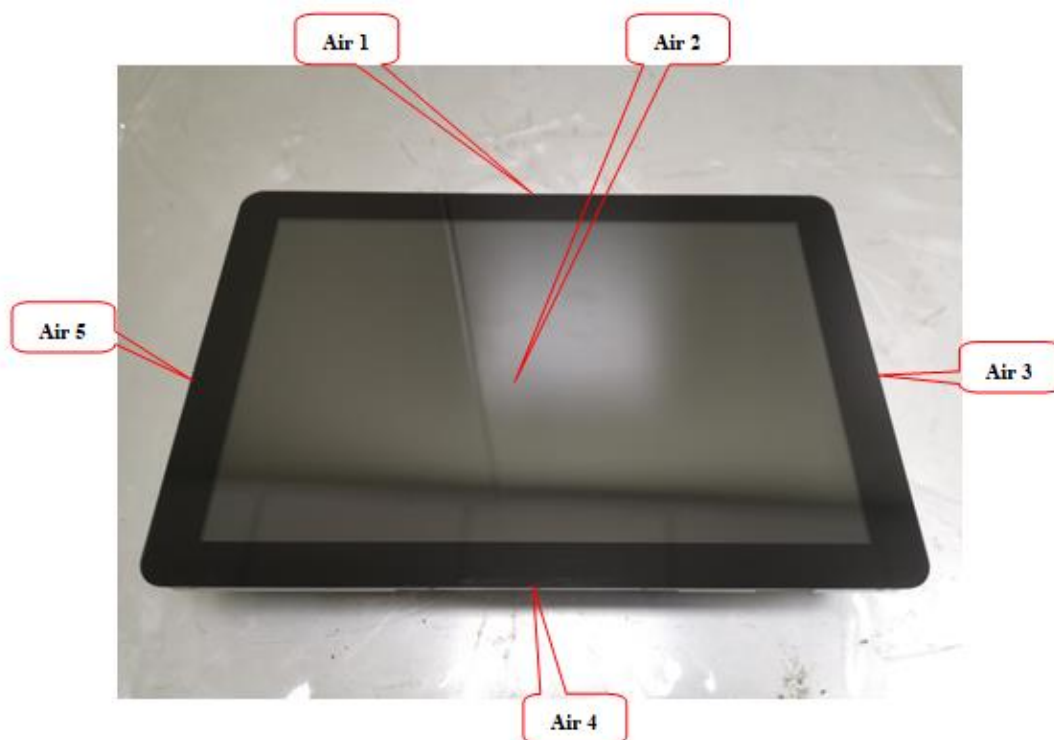
Mode	Air Discharge								Contact Discharge							
Level	2 kV		4 kV		8 kV		15 kV		4 kV		6 kV		8 kV		10 kV	
Location	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
1~11	A	A	A	A	A	A	-	-	A	A	A	A	-	-	-	-
12~16	A	A	A	A	A	A	-	-	-	-	-	-	-	-	-	-
Perform Criterion	B						-		B		B					
Result	A						-		A		A					
Judgment	PASS						-		PASS		PASS					

Mode	HCP Discharge								VCP Discharge							
Level	4 kV		6 kV		8 kV		10 kV		4 kV		6 kV		8 kV		10 kV	
Location	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
1	A	A	A	A	-	-	-	-	A	A	A	A	-	-	-	-
2	A	A	A	A	-	-	-	-	A	A	A	A	-	-	-	-
3	A	A	A	A	-	-	-	-	A	A	A	A	-	-	-	-
4	A	A	A	A	-	-	-	-	A	A	A	A	-	-	-	-
Perform Criterion	B		B						B		B					
Result	A		A						A		A					
Judgment	PASS		PASS						PASS		PASS					

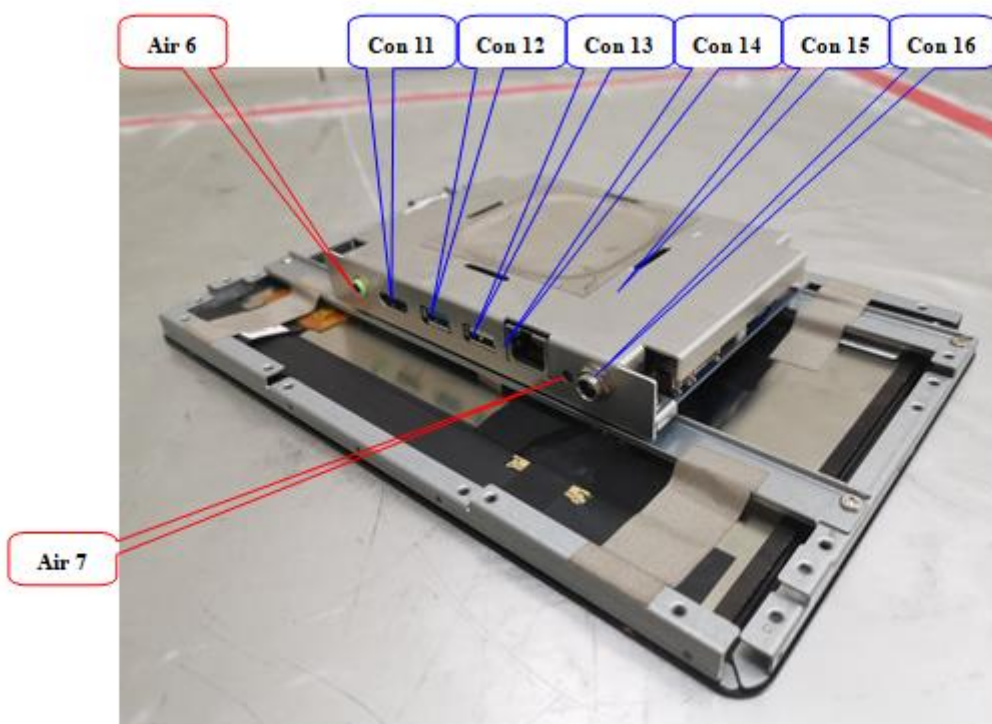
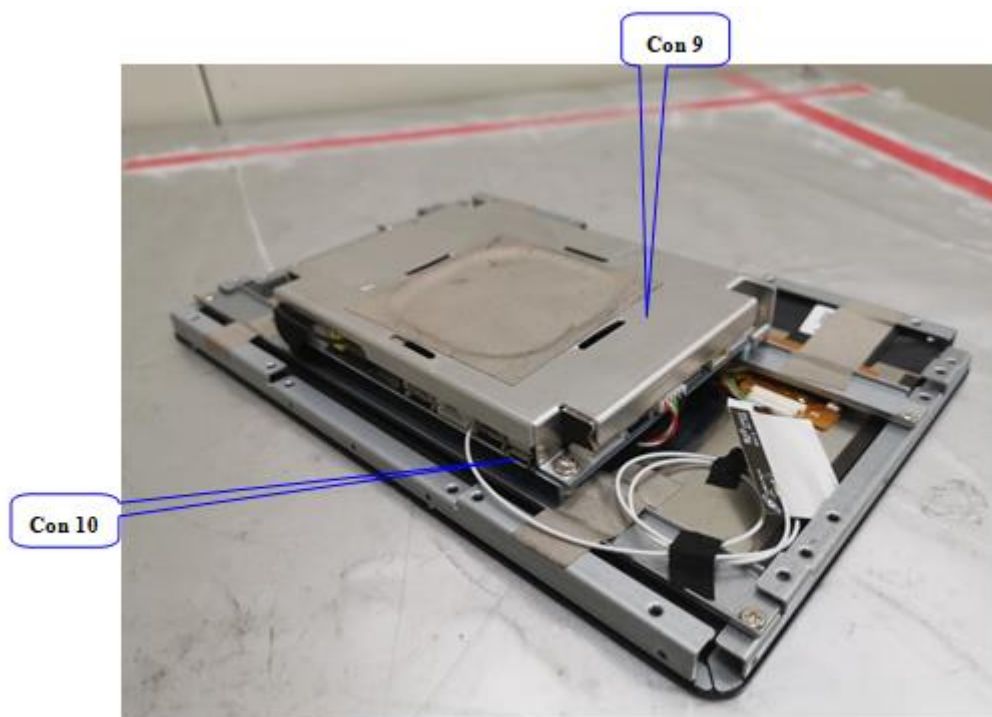
NOTE:

- (1) "P/N" denotes the Positive (P) or Negative (N) polarity of the output voltage.
- (2) The Indirect (HCP/VCP) discharges description of test point as following:
 1. left side; 2.right side; 3.front side; 4.rear side.
- (3) "N/A" denotes test is not applicable in device.
- (4) Test location(s) in which discharge (Air and contact discharge) to be applied illustrated by photos shown in next page(s).

Photo(s) shown the location(s) of ESD evaluated



Photo(s) shown the location(s) of ESD evaluated



Photo(s) shown the location(s) of ESD evaluated



4.5 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS)

4.5.1 TEST SPECIFICATION

Reference Standard	EN 61000-4-3
Required Performance Criterion	A
Frequency Range	80 MHz to 1000 MHz 1800 MHz ± 1 % MHz, 2600 MHz ± 1 % MHz, 3500 MHz ± 1 % MHz, 5000 MHz ± 1 % MHz
Field Strength	3 V/m (unmodulated, rms)
Modulation	1 kHz Sine Wave, 80 %, AM Modulation
Frequency Step	1 % of fundamental
Polarity of Antenna	Horizontal and Vertical
Test Distance	3 m
Antenna Height	1.15 m
Dwell Time	at least 3 s

4.5.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Log-Periodic Antenna	AR	AT1080	320290	N/A	N/A
2	Readout Unit	WAVECONTROL	SMP2	19SN1139	2021/1/1	2021/12/31
3	E-Field Probe	WAVECONTROL	WPF8	19WP041003	2021/1/1	2021/12/31
4	Measurement Software	AUDIX	i2(Version 5.161006)	N/A	N/A	N/A
5	Audio Analyzer	R&S	UPV	100828	2020/3/11	2021/3/10
6	Signal Generator	R&S	SMT06	832080/007	2020/6/20	2021/6/19
7	Power Amplifier	AR	150W1000M1	320946	N/A	N/A
8	Horn Antenna	SCHWARZBECK	STLP 9149	413	N/A	N/A
9	Power Amplifier	MILMEGA	AS0860B-50/50	1079824	N/A	N/A
10	Power Meter	TESEQ	PM6006	75634	2020/9/3	2021/9/2
11	Power Meter	TESEQ	PM6006	75635	2020/7/30	2021/7/29
12	Measurement Software	AUDIX	i2(Version 5.161006)	N/A	N/A	N/A

REMARK:

- (1) "N/A" denotes no model name, no serial no. or no calibration specified.
- (2) All calibration period of equipment list is one year.

4.5.3 TEST PROCEDURE

The testing was performed in a fully-anechoic chamber.
The testing distance from antenna to the EUT was 3 m.

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

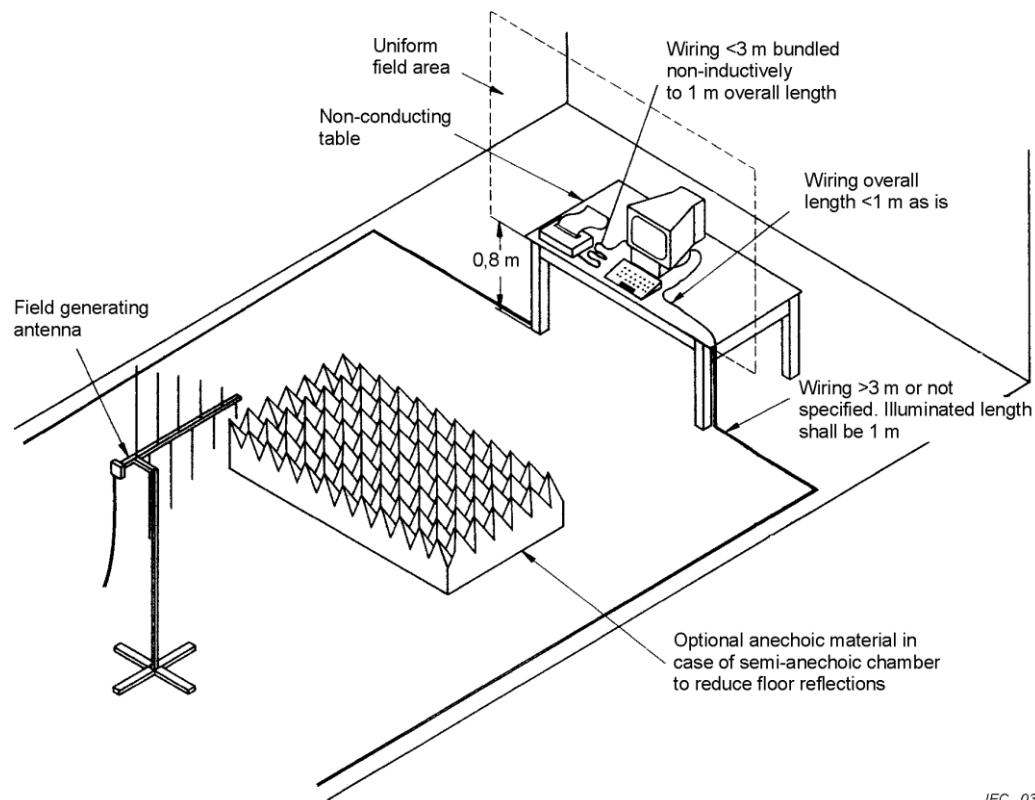
The other condition as following manner:

- a. The field strength is 3 V/m (unmodulated, rms).
- b. The frequency ranges are swept from 80 MHz to 1000 MHz, 1800 MHz ± 1 % MHz, 2600 MHz ± 1 % MHz, 3500 MHz ± 1 % MHz and 5000 MHz ± 1 % MHz with the signal 80 % amplitude modulated with a 1 kHz sine wave. The rate of sweep did not exceed 1.5×10^{-3} decade/s. Where the frequency range is swept incrementally, the step size was 1 % of fundamental.
- c. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- d. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.
- e. For audio output function, refer to clause G.6 and G.7 of CISPR 35.

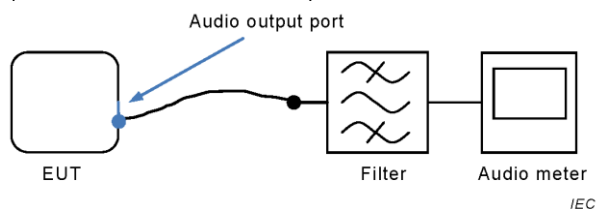
4.5.4 DEVIATION FROM TEST STANDARD

No deviation.

4.5.5 TEST SETUP



For electrical measurements (direct connection to EUT)



The filter is the audio filter specified in G.6.1 and is typically incorporated into the audio meter. Additional filtering might be necessary to ensure that the RF disturbance signal does not interfere with the measurement.

4.5.6 TEST RESULT

Test Mode	Mode 1		
Test Voltage	AC 230V/50Hz	Test Date	2021/1/18

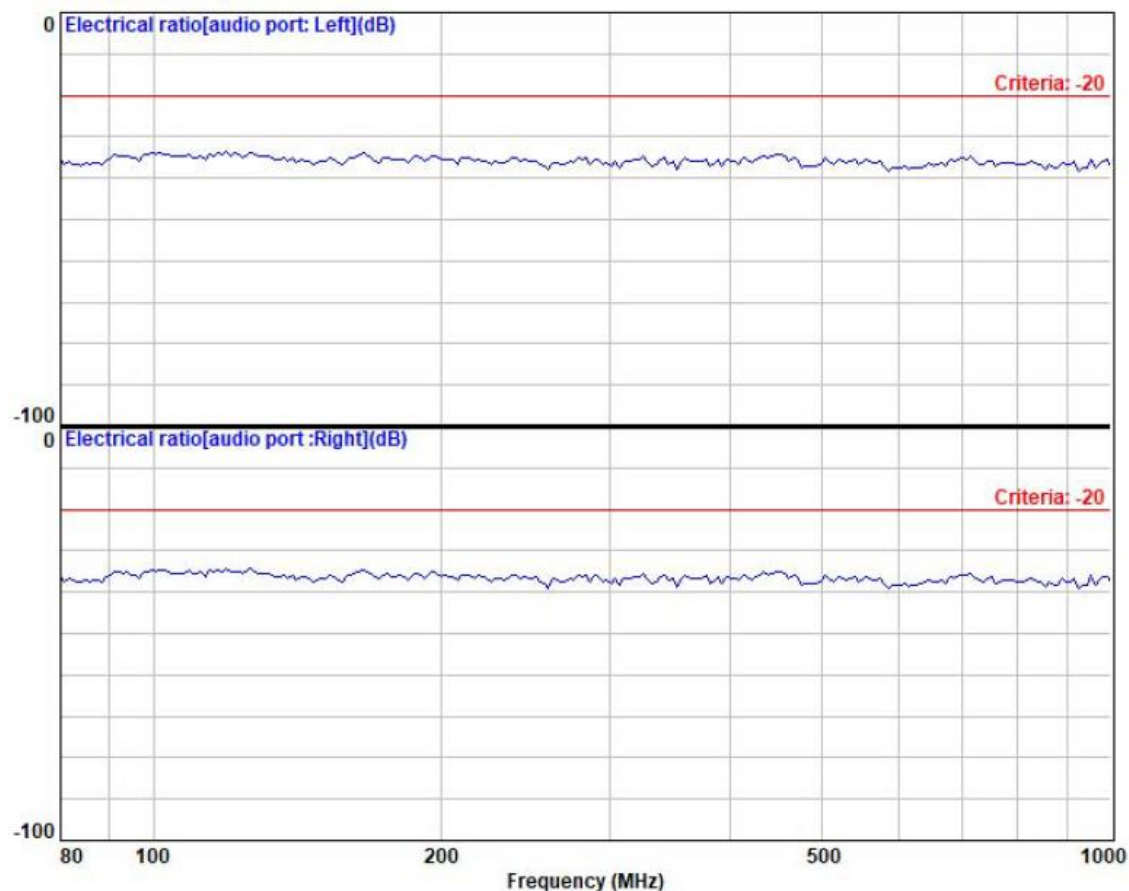
Frequency (MHz)	Applied Voltage(V/m) – 80% AM 1kHz	Polarity	Azimuth	Criterion	Observation	Result
80~1000	3	V & H	Rear	A	A	PASS
			Front		A	
			Left		A	
			Right		A	

Frequency (MHz)	Applied Voltage(V/m) – 80% AM 1kHz	Polarity	Azimuth	Criterion	Observation	Result
1800±1%	3	V & H	Rear	A	A	PASS
2600±1%			Front		A	
3500±1%			Left		A	
5000±1%			Right		A	

NOTE:

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

Test Mode	Mode 1		
Test Voltage	AC 230V/50Hz	Tested Date	2021/1/20

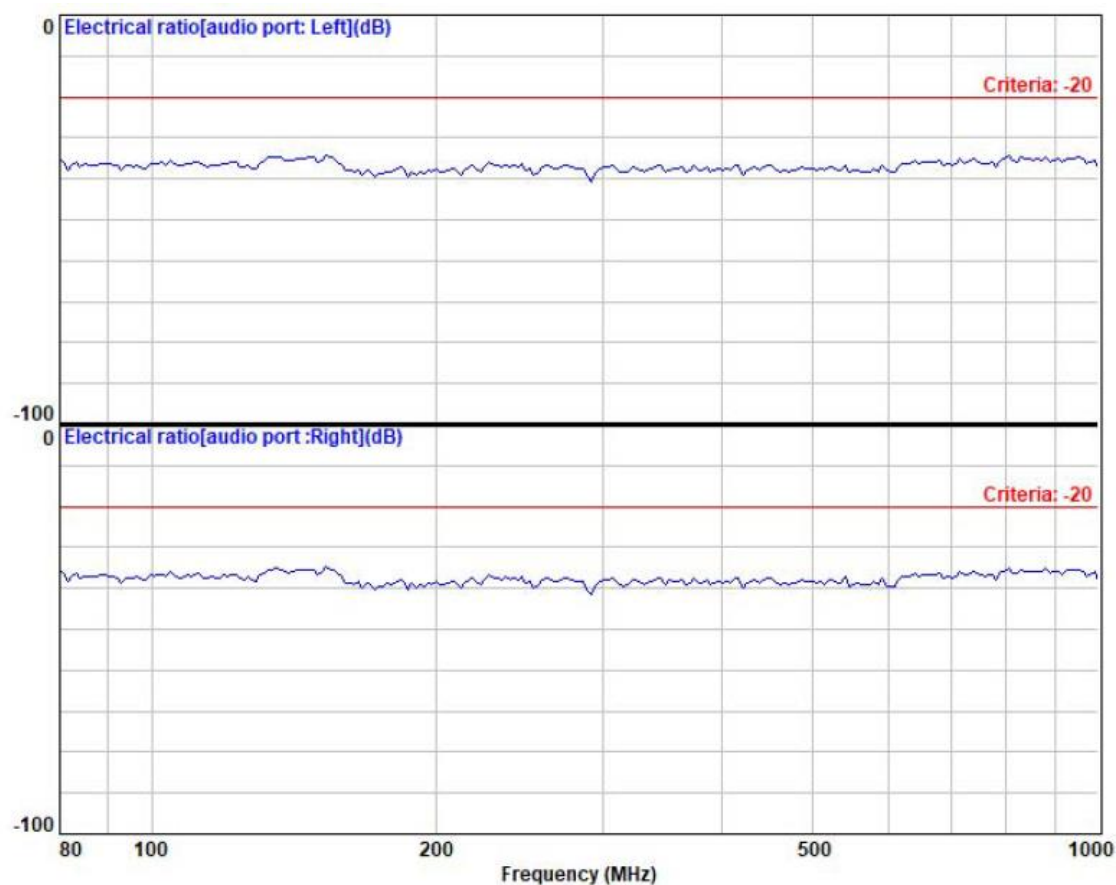


Condition : vertical 3m
: Sampling:1/2sec Dwell:3sec Modulation:AM 1KHz 80%
Standard : EN/IEC61000-4-3
Model Name : OFT-10W03
Field Strength: 3V/m
Side : Rear
Audio port : Left&Right
: reference level 72.613 dBSPL

NOTE:

- (1) "N/A" denotes test is not applicable in device.
- (2) The Front, Rear, Left and Right were evaluated.

Test Mode	Mode 1		
Test Voltage	AC 230V/50Hz	Tested Date	2021/1/20



Condition : horizontal 3m
 : Sampling:1/2sec Dwell:3sec Modulation:AM 1KHz 80%
 Standard : EN/IEC61000-4-3
 Model Name : OFT-10W03
 Field Strength: 3V/m
 Side : Rear
 Audio port : Left&Right
 : reference level 72.613 dB SPL

NOTE:

- (1) "N/A" denotes test is not applicable in device.
- (2) The Front, Rear, Left and Right were evaluated.

4.6 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST (EFT/BURST)

4.6.1 TEST SPECIFICATION

Reference Standard	EN 61000-4-4
Required Performance Criterion	B
Test Voltage	AC mains power ports: ± 1 kV Analogue/digital data ports: ± 0.5 kV
Polarity	Positive & Negative
Impulse Frequency	Repetition frequency 5 kHz. For CPE xDSL ports repetition frequency is 100 kHz.
Impulse Wave shape	5/50 ns
Burst Duration	15 ms
Burst Period	300 ms
Test Duration	Not less than 1 minute

4.6.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	EMC Immunity Test System	TESEQ	NSG 3060	1558	2020/4/1	2021/3/31
2	EMC Immunity Test System	TESEQ	CDN 3061	1452	2020/4/1	2021/3/31
3	Single motor driven variable transformer	TESEQ	VAR 3005-S16	844	2020/4/1	2021/3/31
4	Capacitive Clamp	TESEQ	CDN 3425	1958	2020/4/1	2021/3/31
5	Measurement Software	TESEQ	SUI 3000(V02.31)	N/A	N/A	N/A

REMARK:

- (1) "N/A" denotes no model name, no serial no. or no calibration specified.
- (2) All calibration period of equipment list is one year.

4.6.3 TEST PROCEDURE

The configuration consisted of a wooden table (0.8m high) standing on the Ground Reference Plane and should be located $0.1 \text{ m} \pm 0.01 \text{ m}$ above the Ground Reference Plane. The GRP consisted of a sheet of aluminum (at least 0.25 mm thick and 2.5 m square) connected to the protective grounding system. A minimum distance of 0.5 m was provided between the EUT and the walls of the laboratory or any other metallic structure.

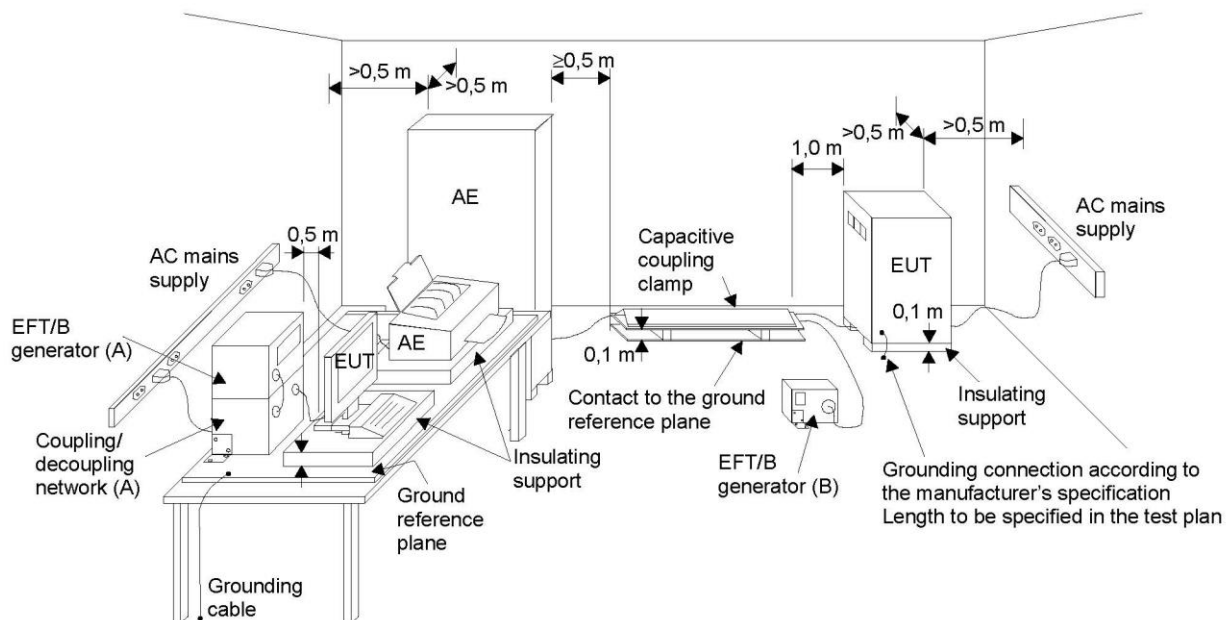
The other condition as following manner:

- a. Both positive and negative polarity discharges were applied.
- b. The duration time of each test sequential was 1 minute

4.6.4 DEVIATION FROM TEST STANDARD

No deviation.

4.6.5 TEST SETUP



IEC 645/12

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

4.6.6 TEST RESULT

Test Mode	Mode 1		
Test Voltage	AC 230V/50Hz	Test Date	2021/1/9

AC Power Ports –5/50Tr/Th ns						
Tested on	Test Voltage(kV)		Pulse Rate	Criterion	Observation	Result
L	+/-	1	5kHz	B	A	PASS
N	+/-	1	5kHz	B	A	
PE	+/-	1	5kHz	B	A	
L+N+PE	+/-	1	5kHz	B	A	

I/O Signal,Data and Control line Ports – 5/50Tr/Th ns						
Tested on	Test Voltage(kV)		Pulse Rate	Criterion	Observation	Result
RJ-45	+/-	0.5	5kHz	B	A	PASS

NOTE:

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

4.7 SURGE IMMUNITY TEST

4.7.1 TEST SPECIFICATION

Reference Standard	EN 61000-4-5
Required Performance Criterion	B for AC mains power ports C for analogue/digital data ports
Waveform	Combination Wave for power lines 1.2/50 μ s Open Circuit Voltage 8 /20 μ s Short Circuit Current
Test Voltage	AC mains power ports: ± 0.5 kV, ± 1 kV, ± 2 kV Analogue/digital data ports: ± 0.5 kV, ± 1 kV (primary protection is not intended)
Generator Source Impedance	2 Ω of the low-voltage power supply network. 12 Ω (10 Ω +2 Ω) of the low-voltage power supply network and ground. 42 Ω (40 Ω +2 Ω) between all other lines and ground when use 1.2/50 μ s waveform.
Phase Angle and Polarity	Five positive pulses line-to-neutral at 90° phase Five negative pulses line-to-neutral at 270° phase Five positive pulses line-to-earth at 90° phase Five negative pulses line-to-earth at 270° phase Five negative pulses neutral-to-earth at 90° phase Five positive pulses neutral-to-earth at 270° phase
Pulse Repetition Rate	1 time / minute (maximum)
Number of Tests	5 positive and 5 negative at selected points

4.7.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	EMC Immunity Test System	TESEQ	NSG 3060	1558	2020/4/1	2021/3/31
2	EMC Immunity Test System	TESEQ	CDN 3061	1452	2020/4/1	2021/3/31
3	Single motor driven variable transformer	TESEQ	VAR 3005-S16	844	2020/4/1	2021/3/31
4	CDN for unshielded symmetrical high speed communication lines	TESEQ	CDN HSS-2	43966	2020/4/1	2021/3/31
5	Measurement Software	TESEQ	WIN 3000 (Version 1.2)	N/A	N/A	N/A

REMARK:

- (1) "N/A" denotes no model name, no serial no. or no calibration specified.
- (2) All calibration period of equipment list is one year.

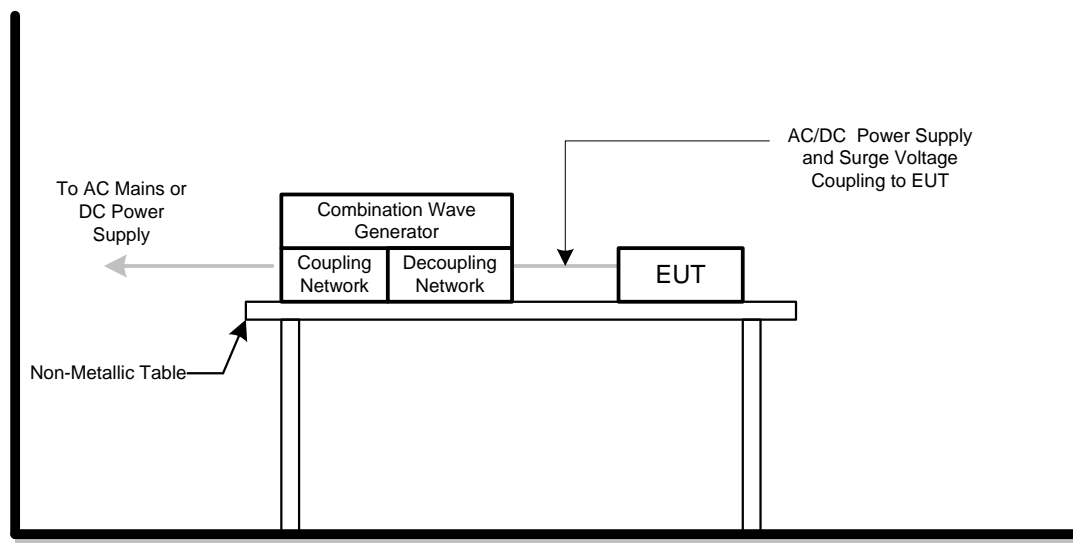
4.7.3 TEST PROCEDURE

- a. For EUT power supply:
The surge is to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks shall be 2 m in length (or shorter).
- b. For test applied to unshielded unsymmetrically operated interconnection lines of EUT:
The surge is applied to the lines via the capacitive coupling. The coupling /decoupling networks shall not influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 m in length (or shorter).
- c. For test applied to unshielded symmetrically operated interconnection /telecommunication lines of EUT:
The surge is applied to the lines via gas arrestors coupling. Test levels below the ignition point of the coupling arrestor cannot be specified. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 m in length (or shorter).

4.7.4 DEVIATION FROM TEST STANDARD

No deviation.

4.7.5 TEST SETUP



4.7.6 TEST RESULT

Test Mode	Mode 1		
Test Voltage	AC 230V/50Hz	Test Date	2021/1/9

Test Result for AC Power – 1.2/50(8/20)Tr/Thµs								
Tested on	Polarity	Test Voltage(kV)				Criterion	Observation	Result
		0.5	1	2	4			
L+N	+/-	A	A	-	-	B	A	PASS
L+PE	+/-	A	A	A	-	B	A	PASS
N+PE	+/-	A	A	A	-	B	A	

Test Result for Signal – 1.2/50(8/20)Tr/Thµs								
Tested on	Polarity	Test Voltage(kV)				Criterion	Observation	Result
		0.5	1	-	-			
RJ-45 (L-PE)	+/-	A	A			C	A	PASS

NOTE:

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

4.8 IMMUNITY TO CONDUCTED DISTURBANCES, INDUCED BY RADIO-FREQUENCY FIELDS TEST (CS)

4.8.1 TEST SPECIFICATION

Reference Standard	EN 61000-4-6
Required Performance Criterion	A
Frequency Range & Field Strength	0.15 MHz to 10 MHz, 3 V 10 MHz to 30 MHz, 3 V to 1 V 30 MHz to 80 MHz, 1 V (unmodulated, rms)
Modulation	1 kHz Sine Wave, 80 %, AM Modulation
Frequency Step	1 % of fundamental
Dwell Time	at least 3 s

4.8.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Measurement Software	AUDIX	i2(Version 5.161006)	N/A	N/A	N/A
2	Audio Analyzer	R&S	UPV	100828	2020/3/11	2021/3/10
3	Test System for Conducted and Radiated Immunity	TESEQ	NSG 4070	34511	2020/8/26	2021/8/25
4	CDN(M3)	FCC	FCC-801-M2/M3-16A	06043	2020/2/23	2021/2/22
5	Coupling Decoupling Network	TESEQ	CDN T8-10	47559	2020/12/23	2021/12/22
6	50Ω BNC TYPE Terminal	EMCI	N/A	10	2020/8/12	2021/8/11
7	Measurement Software	TESEQ	NSG 4070 Control Program (Version 1.2)	N/A	N/A	N/A

REMARK:

- (1) "N/A" denotes no model name, no serial no. or no calibration specified.
- (2) All calibration period of equipment list is one year.

4.8.3 TEST PROCEDURE

The EUT and support equipment, are placed on a table that is 0.8 m above a metal ground plane measured 1 m x 1 m minimum and 0.65 mm thick minimum.

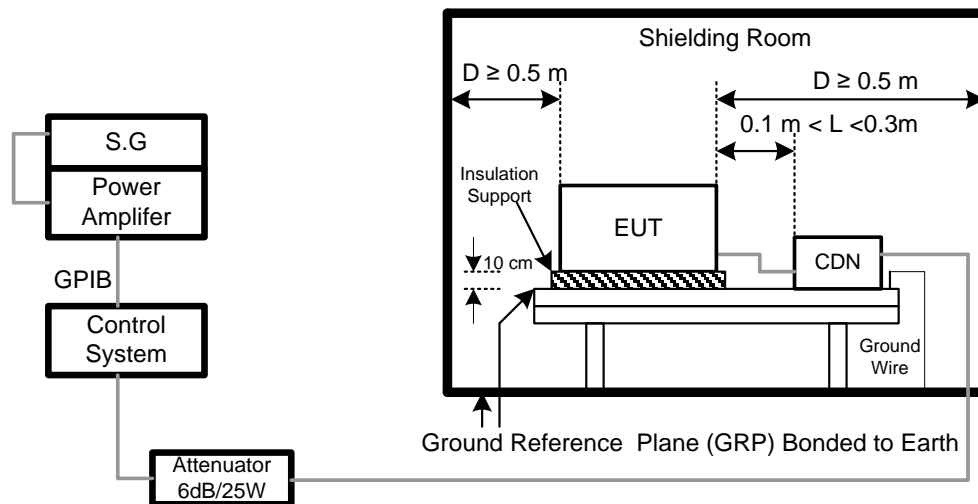
The other condition as following manner:

- a. The field strength is 3 V. The test level specified is the rms voltage level of the unmodulated signal.
- b. The frequency range is swept from 0.15 MHz to 80 MHz, with the signal 80 % amplitude modulated with a 1 kHz sine wave. The rate of sweep did not exceed 1.5×10^{-3} decade/s. Where the frequency range is swept incrementally, the step size was 1 % of fundamental.
- c. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- d. For audio output function, refer to clause G.6 and G.7 of CISPR 35.

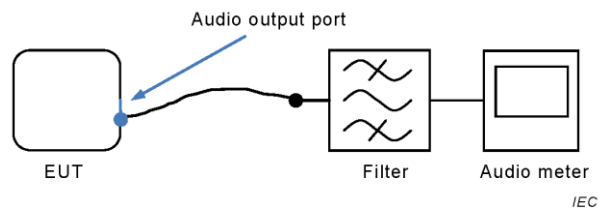
4.8.4 DEVIATION FROM TEST STANDARD

No deviation.

4.8.5 TEST SETUP



For electrical measurements (direct connection to EUT)



The filter is the audio filter specified in G.6.1 and is typically incorporated into the audio meter. Additional filtering might be necessary to ensure that the RF disturbance signal does not interfere with the measurement.

4.8.6 TEST RESULT

Test Mode	Mode 1		
Test Voltage	AC 230V/50Hz	Test Date	2021/1/12

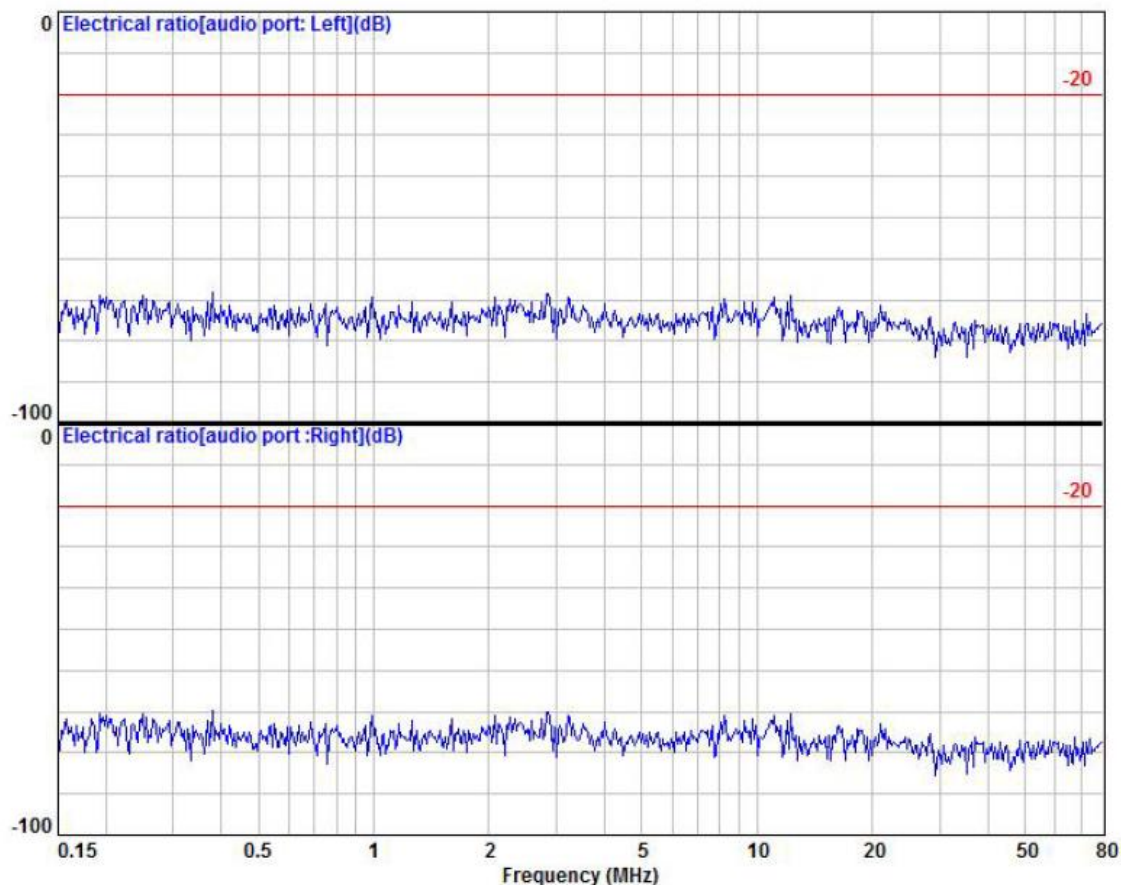
Test Result for Power – 80% AM 1kHz					
Tested on	Frequency (MHz)	Applied Voltage (V (unmodulated, r.m.s))	Criterion	Observation	Result
AC	0.15~10	3	A	A	PASS
	10~30	3~1			
	30~80	1			

Test Result for Signal – 80% AM 1kHz					
Tested on	Frequency (MHz)	Applied Voltage (V (unmodulated, r.m.s))	Criterion	Observation	Result
RJ-45	0.15~10	3	A	A	PASS
	10~30	3~1			
	30~80	1			

NOTE:

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

Test Mode	Mode 1		
Test Voltage	AC 230V/50Hz	Tested Date	2021/1/20

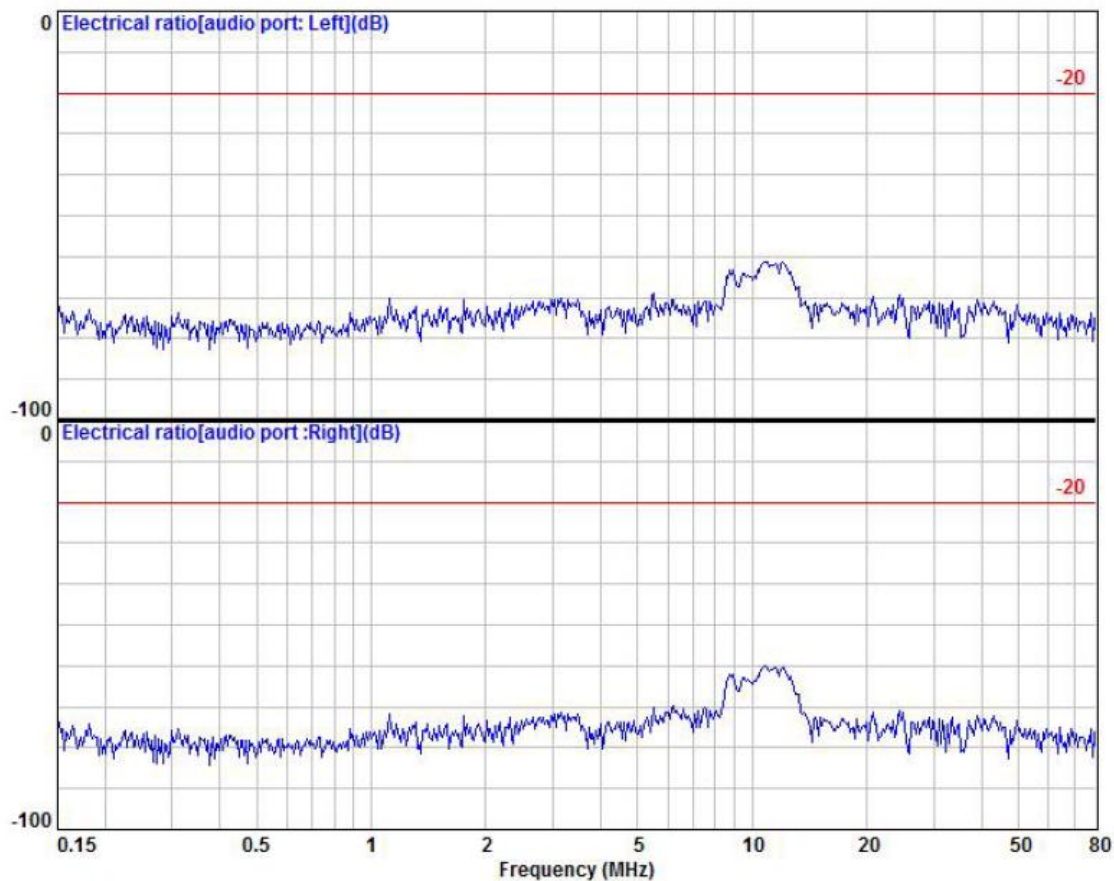


Condition :
: Sampling:1/2sec Dwell:3sec Modulation:AM 1KHz 80%
Standard : EN/IEC61000-4-6
Model Name: OFT-10W03
Mode : 1
POWER :
Audio port: Left&Right
: reference level 78.877 dBSPL

NOTE:

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

Test Mode	Mode 1		
Test Voltage	AC 230V/50Hz	Tested Date	2021/1/20



Condition :
: Sampling:1/2sec Dwell:3sec Modulation:AM 1KHz 80%
Standard : EN/IEC61000-4-6
Model Name: OFT-10W03
Mode : 1
Signal : LAN
Audio port: Left&Right
: reference level 78.877 dBSPL

NOTE:

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

4.9 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST (PFMF)

4.9.1 TEST SPECIFICATION

Reference Standard	EN 61000-4-8
Required Performance Criterion	A
Frequency Range	50 or 60 Hz
Field Strength	1 A/m
Observation Time	1 minute
Inductance Coil	Rectangular type, 1 m x 1 m

4.9.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Magnetic Field Test Generator	FCC	F-1000-4-8-G-12 5A	04029	N/A	N/A
2	Magnetic Field Immunity Loop	FCC	F-1000-4-8/9/10- L-1M	04018	N/A	N/A
3	EMF Tester	TES	TES-1390	190405289	2020/6/23	2021/6/22

REMARK:

- (1) "N/A" denotes no model name, no serial no. or no calibration specified.
- (2) All calibration period of equipment list is one year.

4.9.3 TEST PROCEDURE

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.

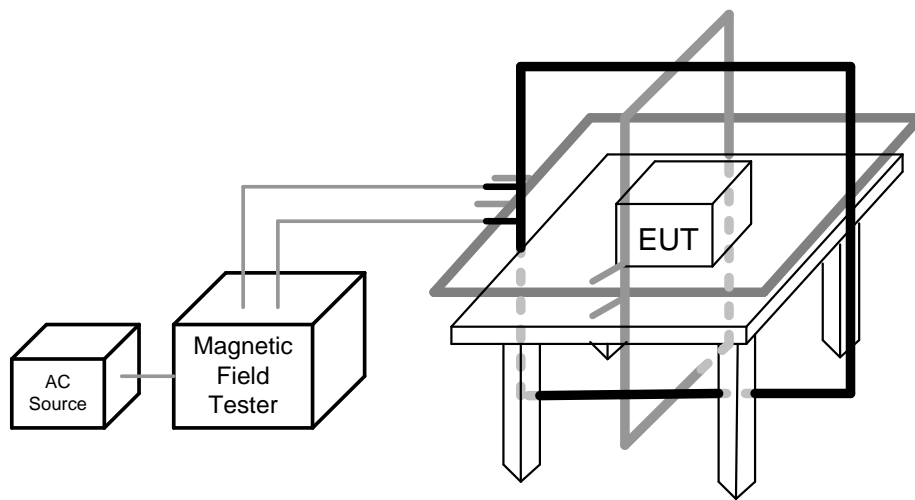
The other condition as following manner:

- a. The equipment cabinets shall be connected to the safety earth directly on the GRP via the earth terminal of the EUT.
- b. The cables supplied or recommended by the equipment manufacturer shall be used. 1 m of all cables used shall be exposed to the magnetic field.

4.9.4 DEVIATION FROM TEST STANDARD

No deviation.

4.9.5 TEST SETUP



4.9.6 TEST RESULT

Test Mode	Mode 1		
Test Voltage	AC 230V/50Hz	Test Date	2021/1/18

Test Frequency (Hz)	Magnetic Field (A/m)	Direction	Criterion	Observation	Result
50	1	X Y Z	A	A	PASS
60	1	X Y Z	A	A	PASS

NOTE:

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

4.10 VOLTAGE DIPS, SHORT INTERRUPTIONS AND VOLTAGE VARIATIONS IMMUNITY TEST

4.10.1 TEST SPECIFICATION

Reference Standard	EN IEC 61000-4-11
Required Performance Criterion	Voltage Dips: Criterion B for Residual voltage <5 %, 0.5 cycles Criterion C for Residual voltage 70 %, 25 cycles for 50 Hz, 30 cycles for 60 Hz Voltage Interruptions: Criterion C for Residual voltage <5 %, 250 cycles for 50 Hz, 300 cycles for 60 Hz
Test Duration Time	Minimum three test events in sequence
Interval between Event	10 s minimum
Phase Angle	0°/180°
Test Cycle	3 times

4.10.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	EMC Immunity Test System	TESEQ	NSG 3060	1558	2020/4/1	2021/3/31
2	EMC Immunity Test System	TESEQ	CDN 3061	1452	2020/4/1	2021/3/31
3	Single motor driven variable transformer	TESEQ	VAR 3005-S16	844	2020/4/1	2021/3/31
4	Measurement Software	TESEQ	SUI 3000(V02.31)	N/A	N/A	N/A

REMARK:

- (1) "N/A" denotes no model name, no serial no. or no calibration specified.
- (2) All calibration period of equipment list is one year.

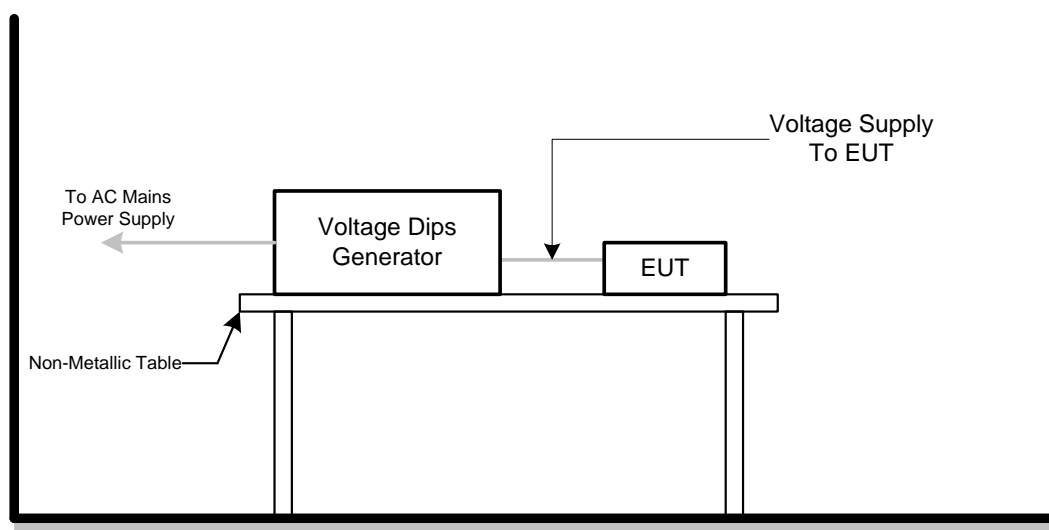
4.10.3 TEST PROCEDURE

The EUT shall be tested for each selected combination of test levels and duration with a sequence of three dips/interruptions with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested. Abrupt changes in supply voltage shall occur at zero crossings of the voltage waveform.

4.10.4 DEVIATION FROM TEST STANDARD

No deviation.

4.10.5 TEST SETUP



4.10.6 TEST RESULT

Test Mode	Mode 1		
Test Voltage	Refer to below data.	Test Date	2021/1/9
Situation	C: System restart can recover automatically.		

100Vac/50Hz				
Voltage Reduction	Periods	Criterion	Observation	Result
>95%	0.5	B	A	PASS
30%	25	C	A	
>95%	250	C	C	

230Vac/50Hz				
Voltage Reduction	Periods	Criterion	Observation	Result
>95%	0.5	B	A	PASS
30%	25	C	A	
>95%	250	C	C	

240Vac/50Hz				
Voltage Reduction	Periods	Criterion	Observation	Result
>95%	0.5	B	A	PASS
30%	25	C	A	
>95%	250	C	C	

NOTE:

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

Test Mode	Mode 1		
Test Voltage	Refer to below data.	Test Date	2021/1/9
Situation	C: System restart can recover automatically.		

100Vac/60Hz				
Voltage Reduction	Periods	Criterion	Observation	Result
>95%	0.5	B	A	PASS
30%	30	C	A	
>95%	300	C	C	

230Vac/60Hz				
Voltage Reduction	Periods	Criterion	Observation	Result
>95%	0.5	B	A	PASS
30%	30	C	A	
>95%	300	C	C	

240Vac/60Hz				
Voltage Reduction	Periods	Criterion	Observation	Result
>95%	0.5	B	A	PASS
30%	30	C	A	
>95%	300	C	C	

NOTE:

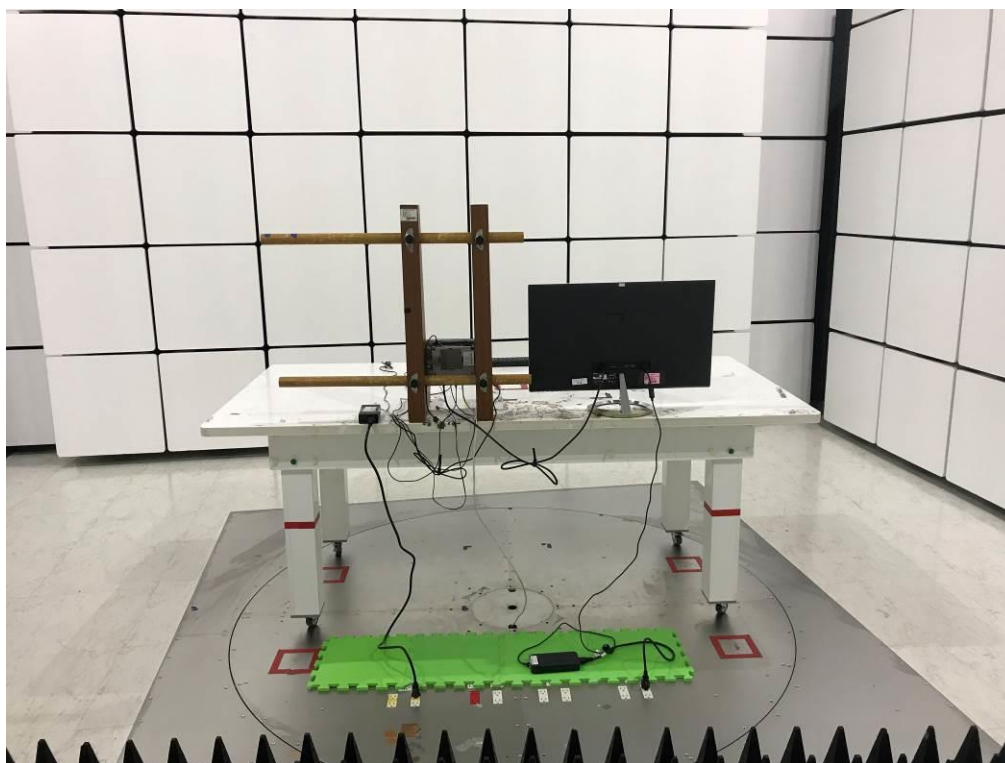
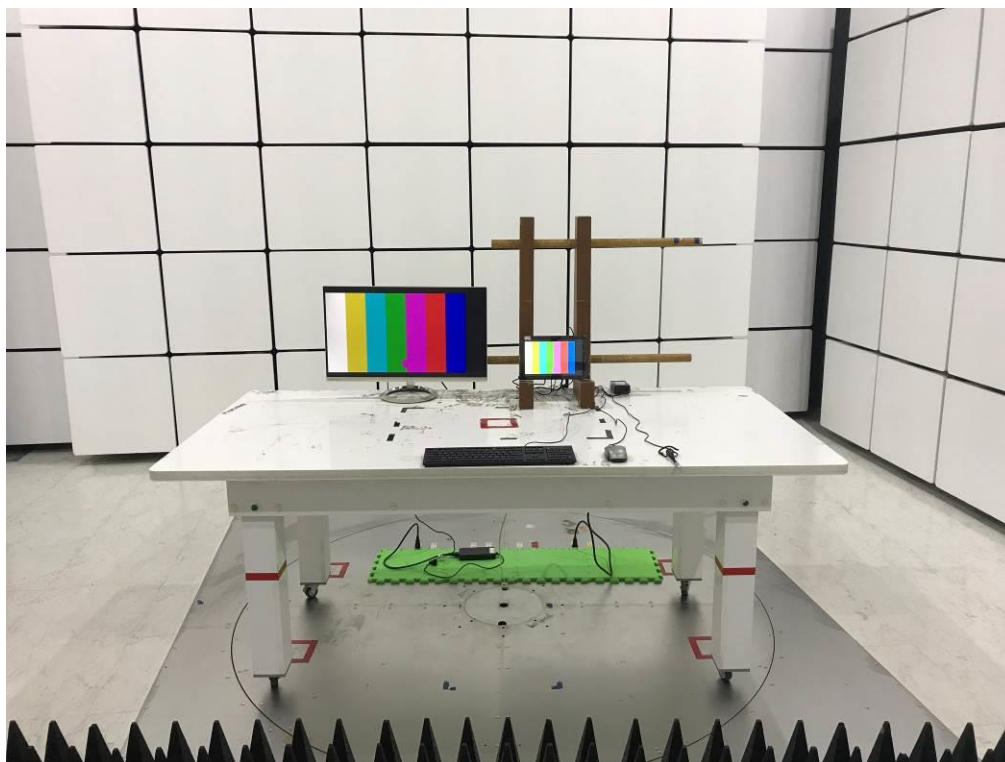
(1) "N/A" denotes test is not applicable in device.

5 TEST PHOTOS

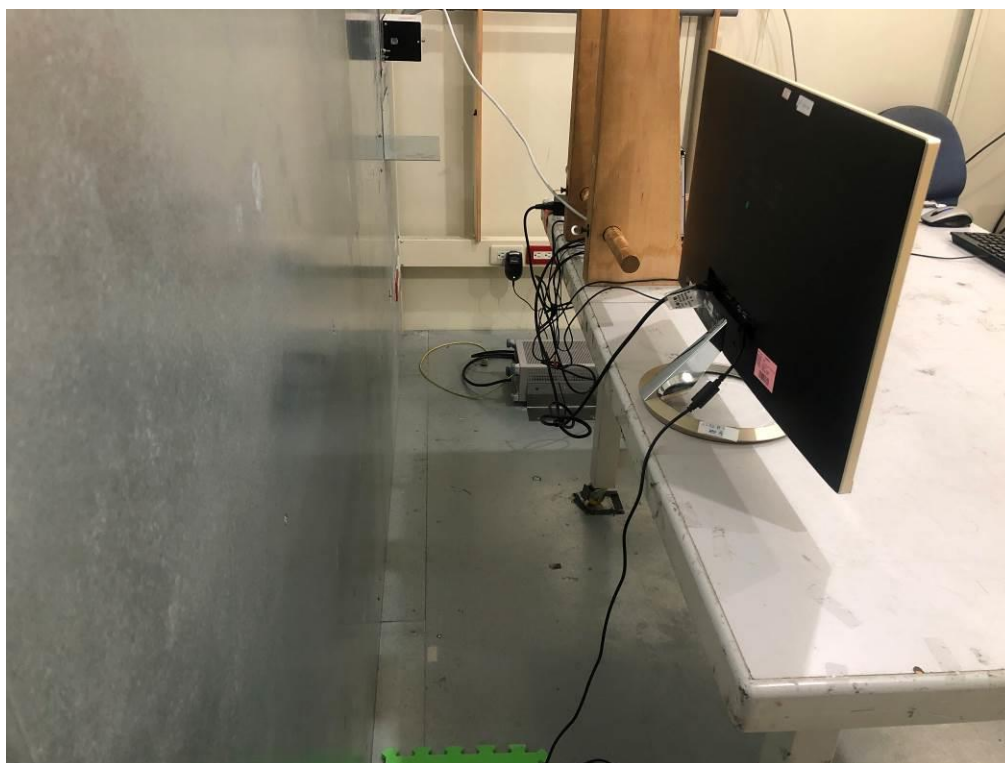
Radiated emissions up to 1 GHz test photos



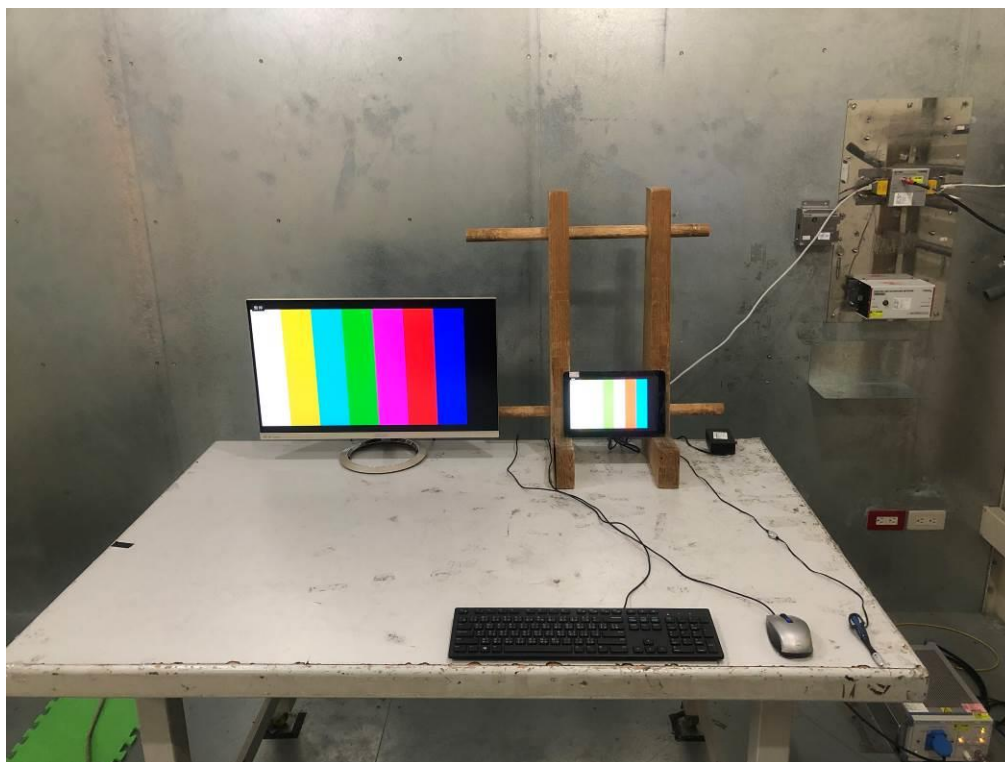
Radiated emissions above 1 GHz test photos



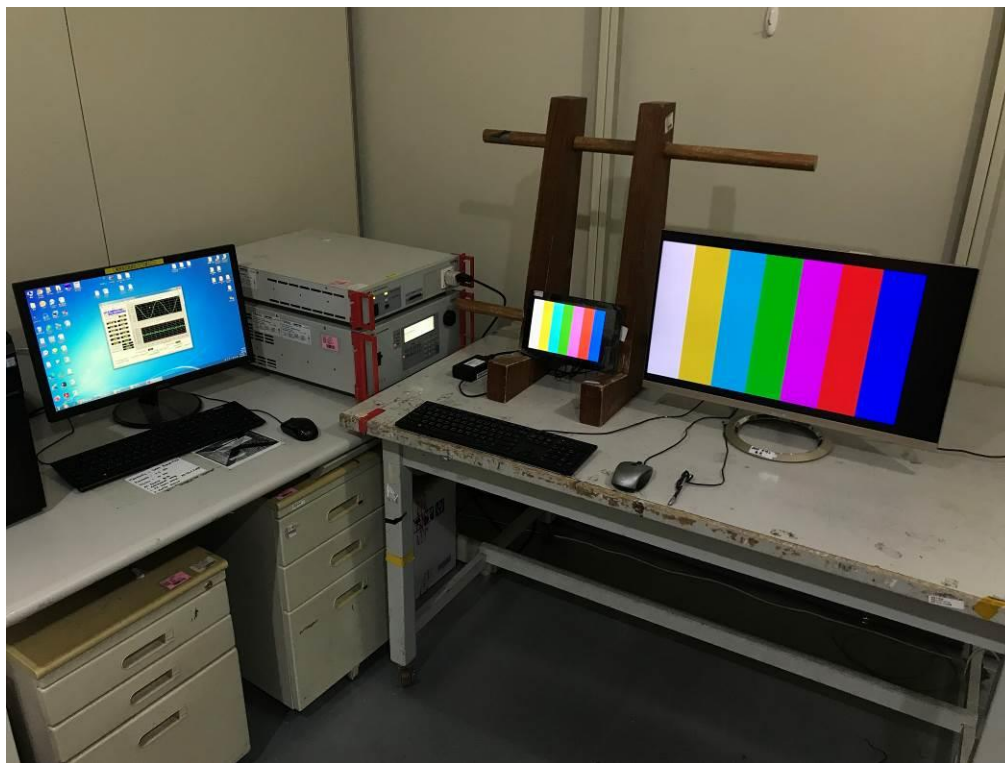
Conducted emissions AC mains power port test photos



Asymmetric mode conducted emissions test photos



Harmonic current emissions & Voltage changes, voltage fluctuations and flicker test photos

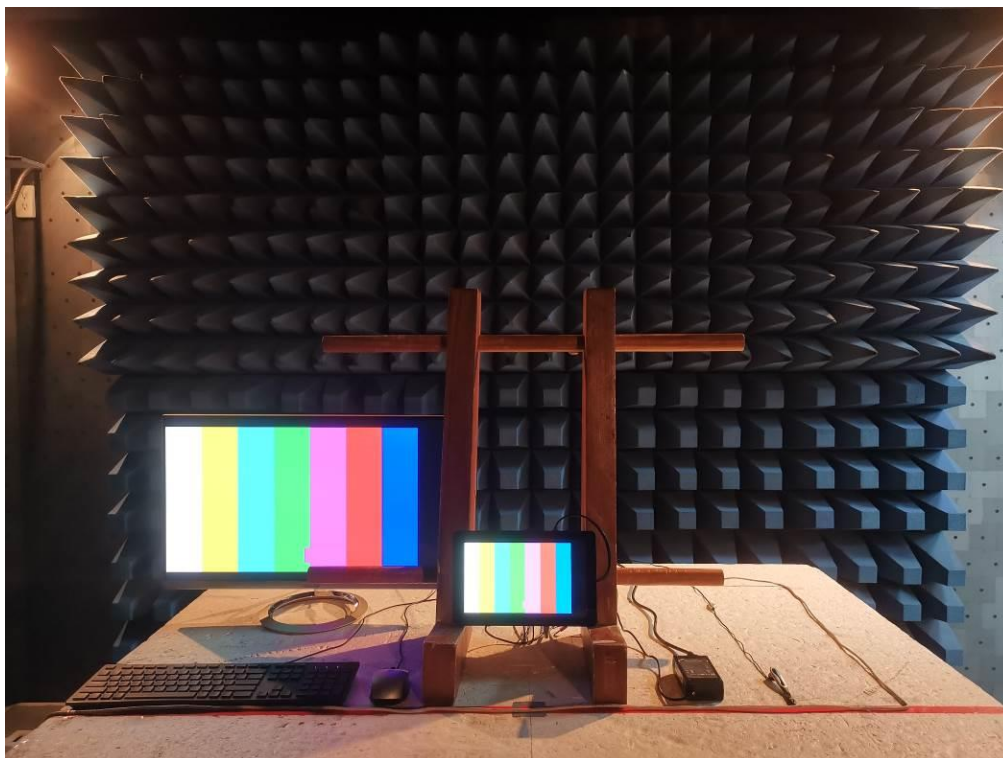


Immunity test photos

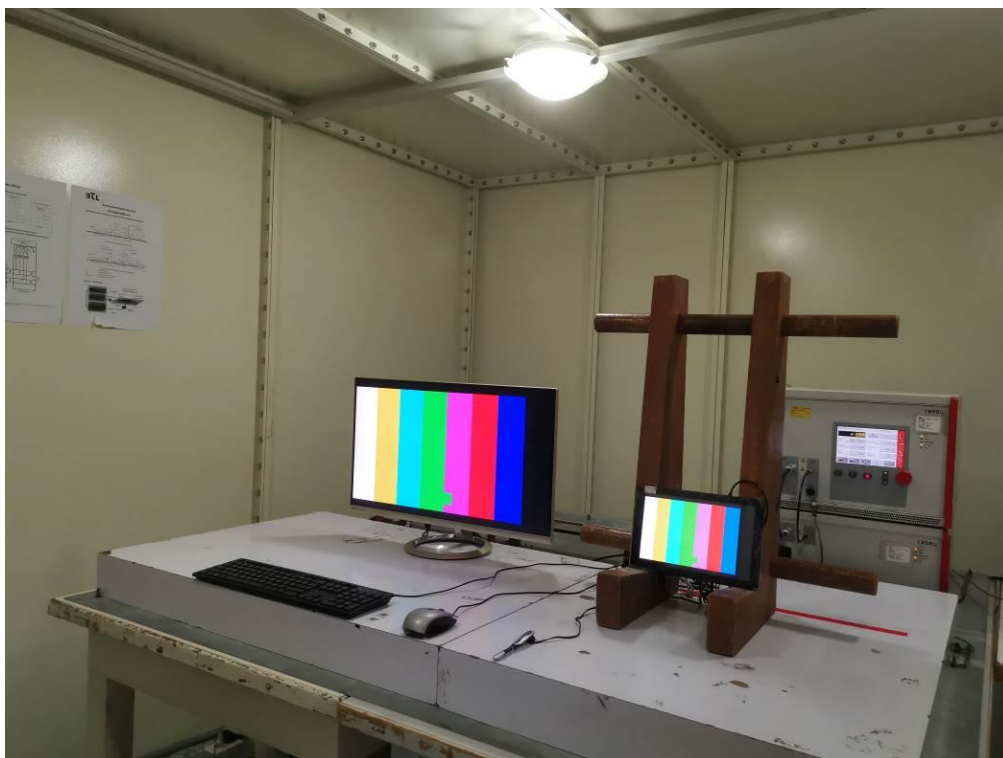
Electrostatic discharge immunity



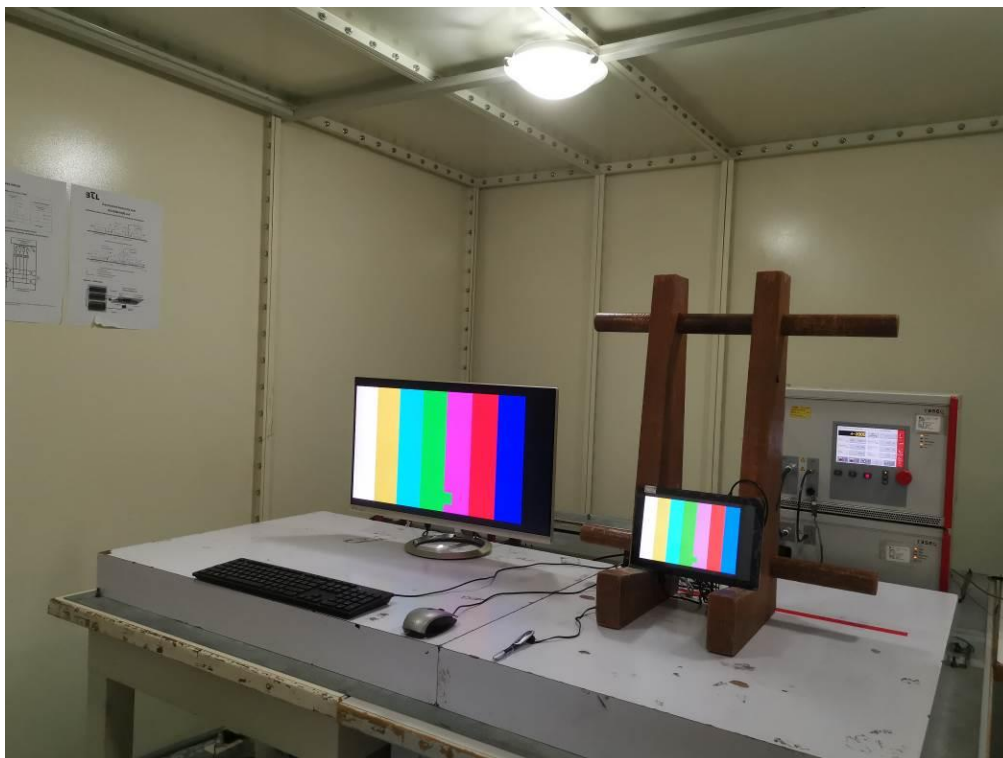
Radiated, radio-frequency, electromagnetic field immunity



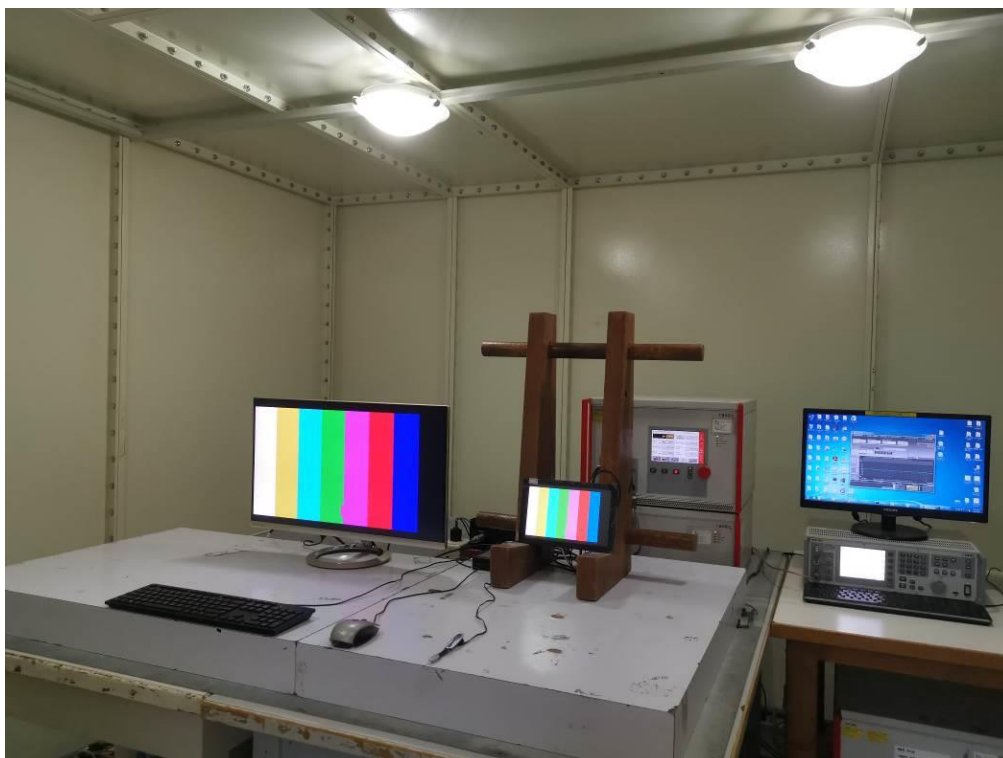
Electrical fast transient/burst immunity



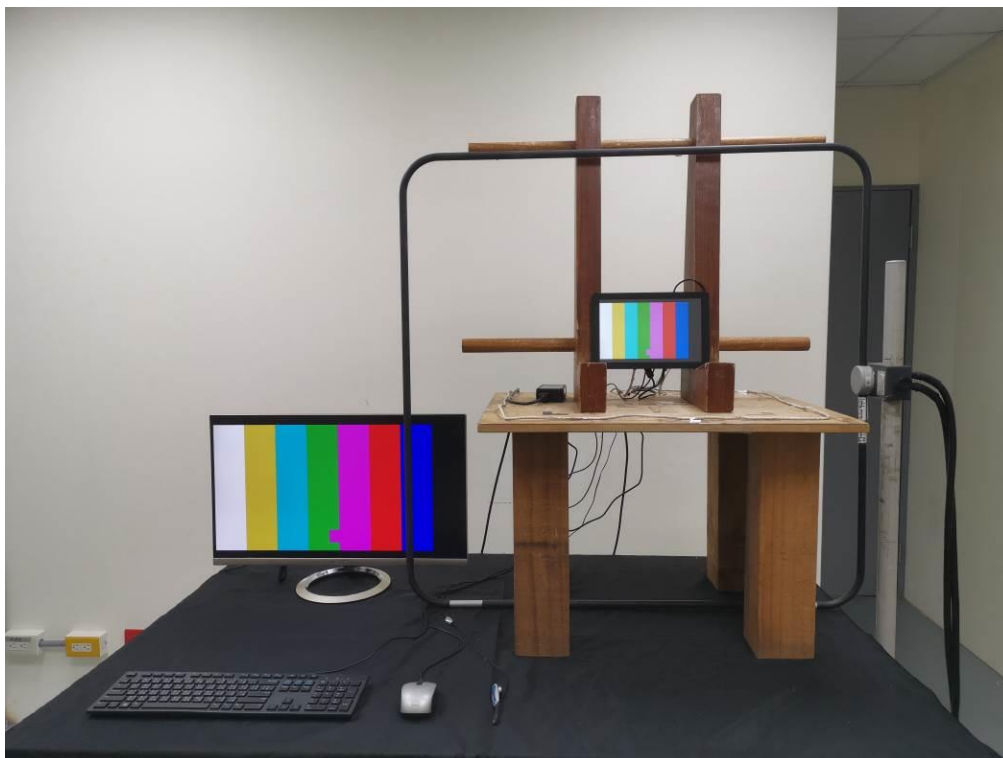
Surge immunity



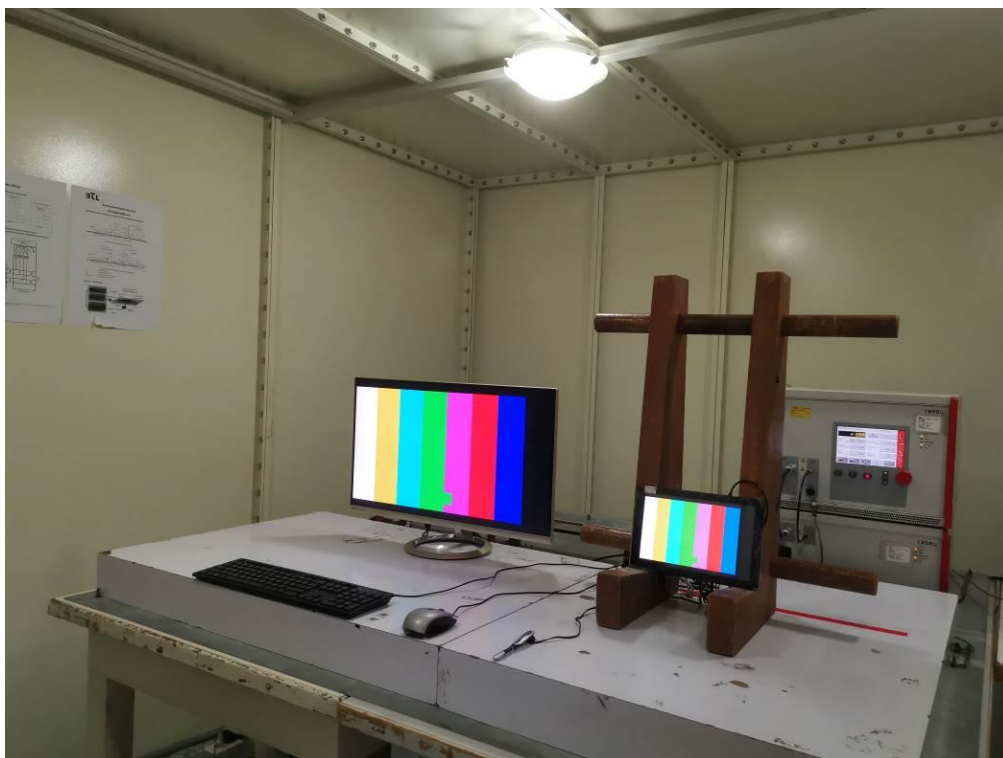
Immunity to conducted disturbances, induced by radio-frequency fields



Power frequency magnetic field immunity



Voltage dips, short interruptions and voltage variations immunity



6 EUT PHOTOS

Please refer to document Appendix No.: EP-2012T163-1 (APPENDIX-EUT PHOTOS).

End of Test Report