

ETSI EN 301 489 Test Report

Report No. : BTL-ETSE-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) : ETSI EN 301 489-1 V2.2.3 (2019-11)
 ETSI EN 301 489-17 V3.2.4 (2020-09)
 EN IEC 61000-3-2:2019 Class D
 EN 61000-3-3:2013+A1:2019

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.

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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-ETSE-1-2012T163	R00	Original Report.	2021/3/9

1 SUMMARY OF TEST RESULTS

EMC emission					
Reference Clause of ETSI EN 301 489-1	Phenomenon	Application	Test Method	Limit	Judgment
8.2	Radiated emission	Enclosure of ancillary equipment	EN 55032:2015 +AC:2016	Class A	PASS
8.3	Conducted emission	DC power input/output port	CISPR 25:2002 +COR1:2004	-----	N/A
8.4	Conducted emission	AC mains input/output port	EN 55032:2015 +AC:2016	Class A	PASS
8.5	Harmonic current emissions	AC mains input port	EN IEC 61000-3-2: 2019	Class D	No Limit
8.6	Voltage fluctuations and flicker	AC mains input port	EN 61000-3-3: 2013+A1:2019	-----	PASS
8.7	Conducted emission	Wired network port	EN 55032:2015 +AC:2016	Class A	PASS

Immunity					
Reference Clause of ETSI EN 301 489-1	Phenomenon	Application	Test Method	Performance Criterion Limit	Judgment
9.2	RF electromagnetic field (80 MHz to 6000 MHz)	Enclosure port	EN 61000-4-3:2006 +A1:2008+A2:2010	A (CT/CR)	PASS
9.3	Electrostatic discharge	Enclosure	EN 61000-4-2:2009	B (TT/TR)	PASS
9.4	Fast transients common mode	Signal, wired network and control ports, DC and AC mains power ports	EN 61000-4-4:2012	B (TT/TR)	PASS
9.5	RF common mode 0.15 MHz to 80 MHz	Signal, wired network and control ports, DC and AC mains power ports	EN 61000-4-6:2009 EN 61000-4-6:2014 +AC:2015	A (CT/CR)	PASS
9.6	Transients and surges	DC power input ports	ISO 7637-2:2011 Ed 3.0	-----	N/A
9.7	Voltage dips and interruptions	AC mains power input ports	EN 61000-4-11:2004 EN 61000-4-11:2004 +A1:2017	B/CTT/TR) NOTE(4)	PASS
9.8	Surges, line to line and line to ground	AC mains power input ports, wired network ports	EN 61000-4-5:2006 EN 61000-4-5:2014 +A1:2017	B (TT/TR)	PASS

NOTE:

- (1) "N/A" denotes test is not applicable in this Test Report..
- (2) Both of specific and the latest version of the basic standard are referenced to fulfill the requirements.
- (3) The report format version is TP.1.1.1.
- (4) For voltage dips greater than or equal to 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply.

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 emission at AC mains input/output port test:

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

D. 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

E. Conducted emission at wired network port 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

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 1 GHz~6 GHz	2.10 dB 2.26 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 %
SR01	EN 61000-4-5	voltage pulse width(tw) -with clamp	13.00 %
		voltage peak value(VP)	8.99 %
		voltage rise time (Tfv)	13.25 %
SR09	EN 61000-4-6	voltage duration time(td)	10.20 %
		CDN M3 test process	1.34 dB
		EM clamp test process	2.48 dB
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
Radiated emissions up to 1 GHz	21°C, 67%	Loki Chiang
Radiated emissions above 1 GHz	20°C, 62%	Duke Chen
Conducted emission at AC mains input/output port	25°C, 59%	Loki Chiang
Harmonic current emissions	24°C, 55%	Duke Chen
Voltage fluctuations and flicker	24°C, 55%	Duke Chen
Conducted emission at wired network port	25°C, 59%	Loki Chiang
RF electromagnetic field	24°C, 55%	Roy Kang
Electrostatic discharge	24°C, 44%, 1006hPa	Eric Wu
Fast transients common mode	24°C, 43%	Eric Wu
RF common mode	24°C, 48%	Eric Wu
Voltage dips and interruptions	24°C, 43%	Eric Wu
Surges	24°C, 43%	Eric Wu

1.4 EXCLUSION BANDS

Refer to clause 4.3 of ETSI EN 301 489-17.

1.5 MINIMUM PERFORMANCE LEVEL

Ticked denotes applied: (For EN 61000-4-3 and EN 61000-4-6)

- ☐ For equipment that supports a PER or FER, the minimum performance level shall be a PER or FER less than or equal to 10 %.
- ☒ For equipment that does not support a PER or a FER, the minimum performance level shall be no loss of the wireless transmission function needed for the intended use of the equipment.

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 declared by manufacturer.

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 emission test	
Final Test Mode	Description
Mode 1	FULL SYSTEM HDMI 1280*800/60HZ

Conducted emission at AC mains input/output port test	
Final Test Mode	Description
Mode 1	FULL SYSTEM HDMI 1280*800/60HZ

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

Conducted emission at wired network port test	
Final Test Mode	Description
Mode 1	FULL SYSTEM HDMI 1280*800/60HZ+LAN (10M/100M)

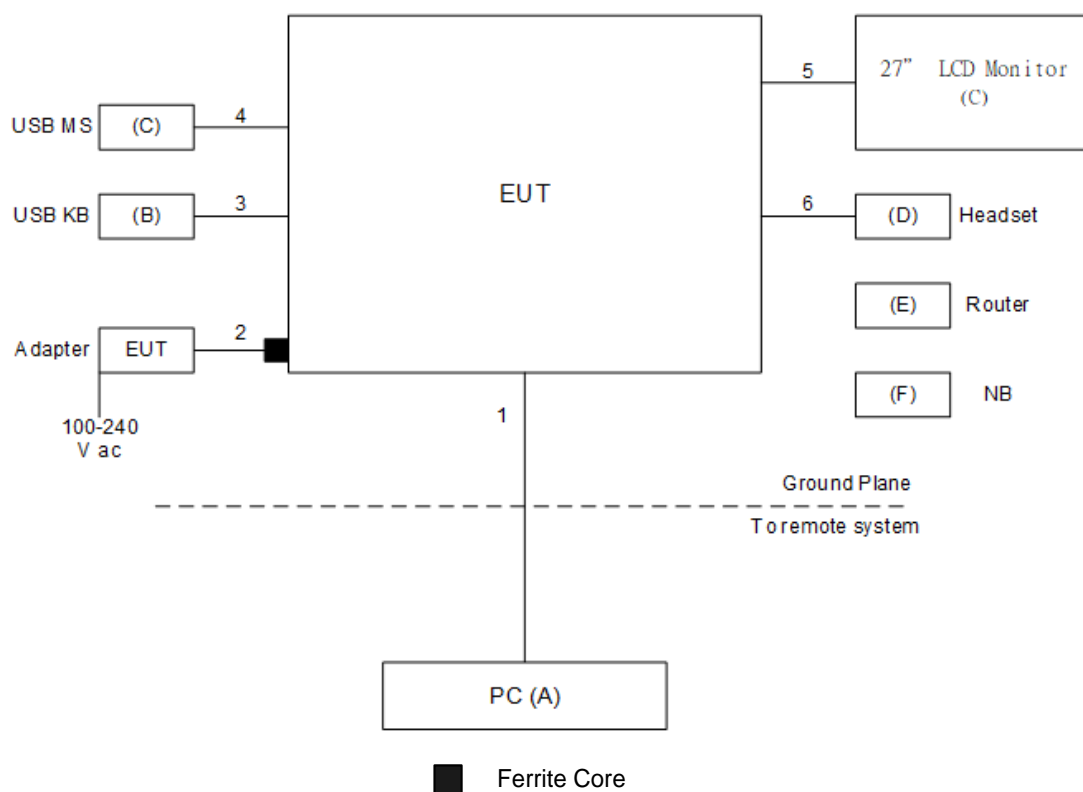
Immunity tests	
Final Test Mode	Description
Mode 1	FULL SYSTEM HDMI 1280*800/60HZ

2.3 EUT OPERATING CONDITION

The EUT exercise program (BurninTEST V9.1 and 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	64NJV BX	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) = 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
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.

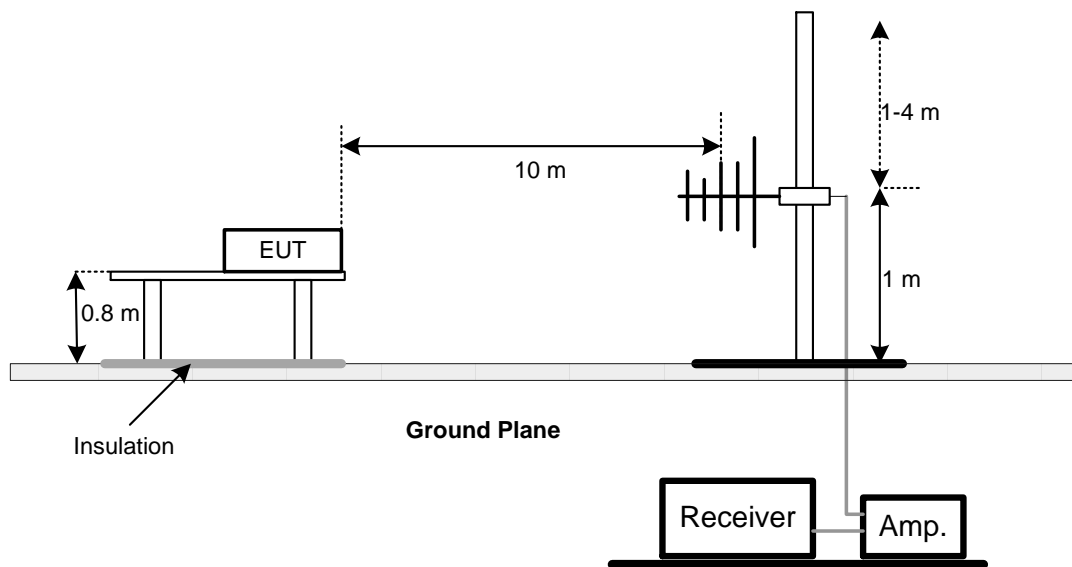
3.1.3 TEST PROCEDURE

- The separation distance of 10 m was used for measurements below 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.

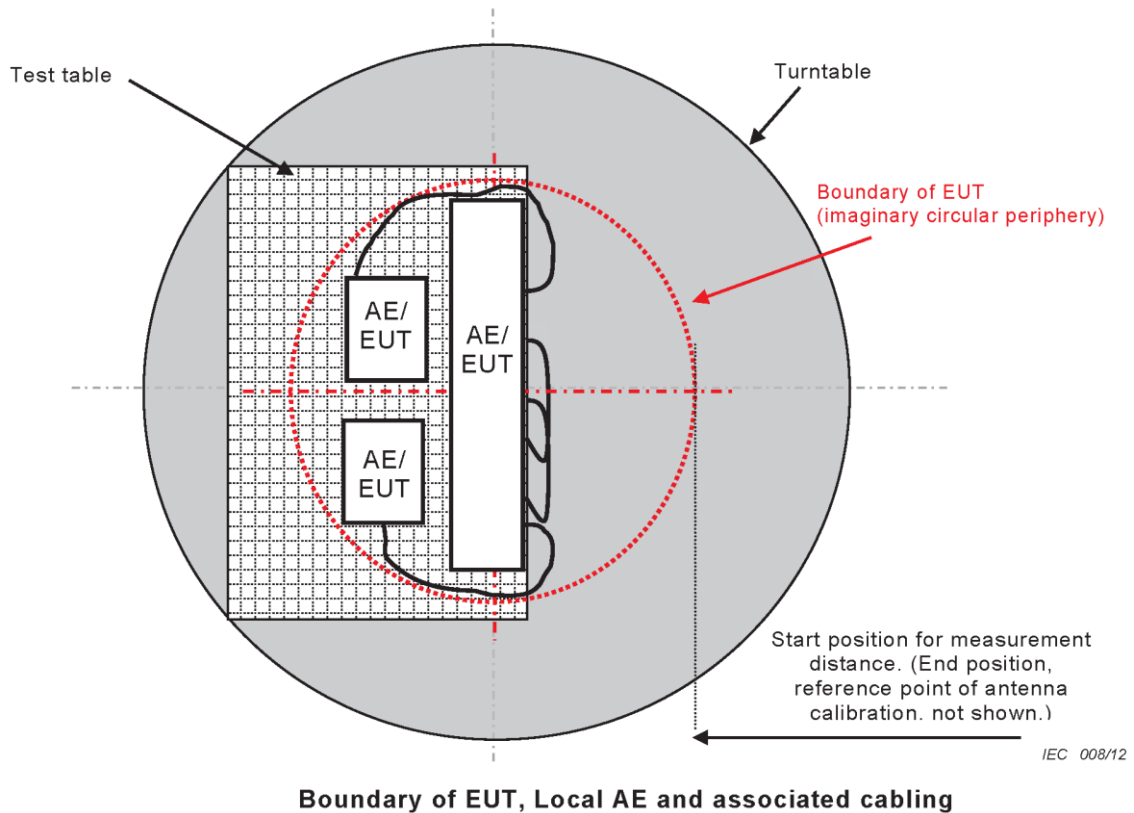
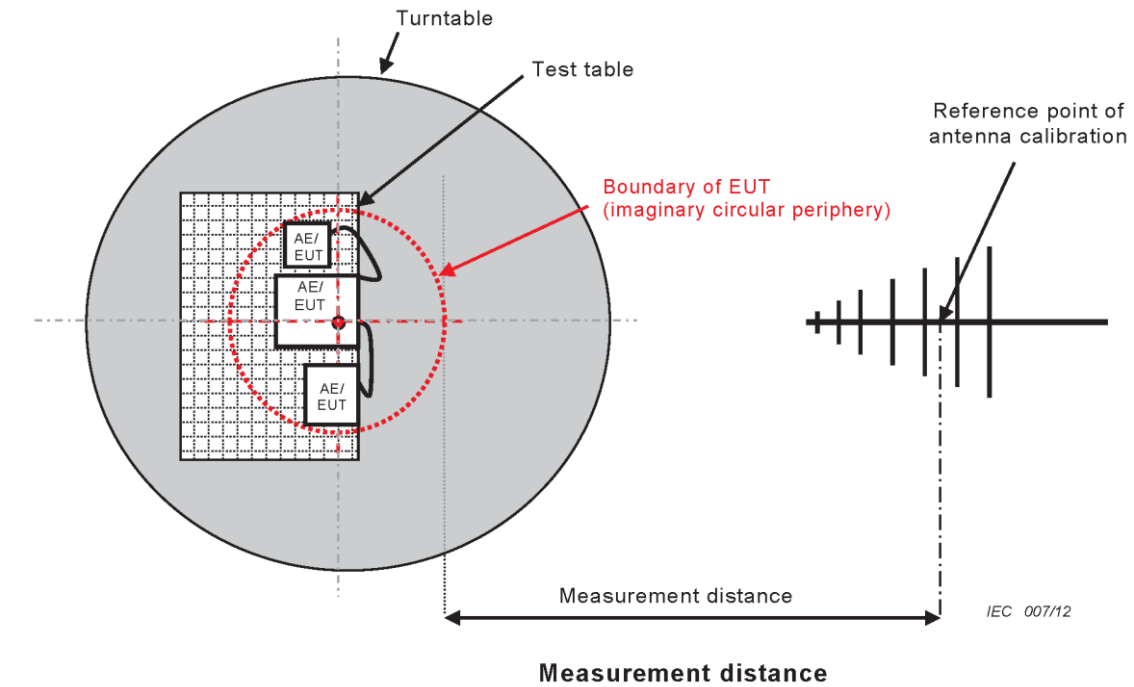
3.1.4 DEVIATION FROM TEST STANDARD

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

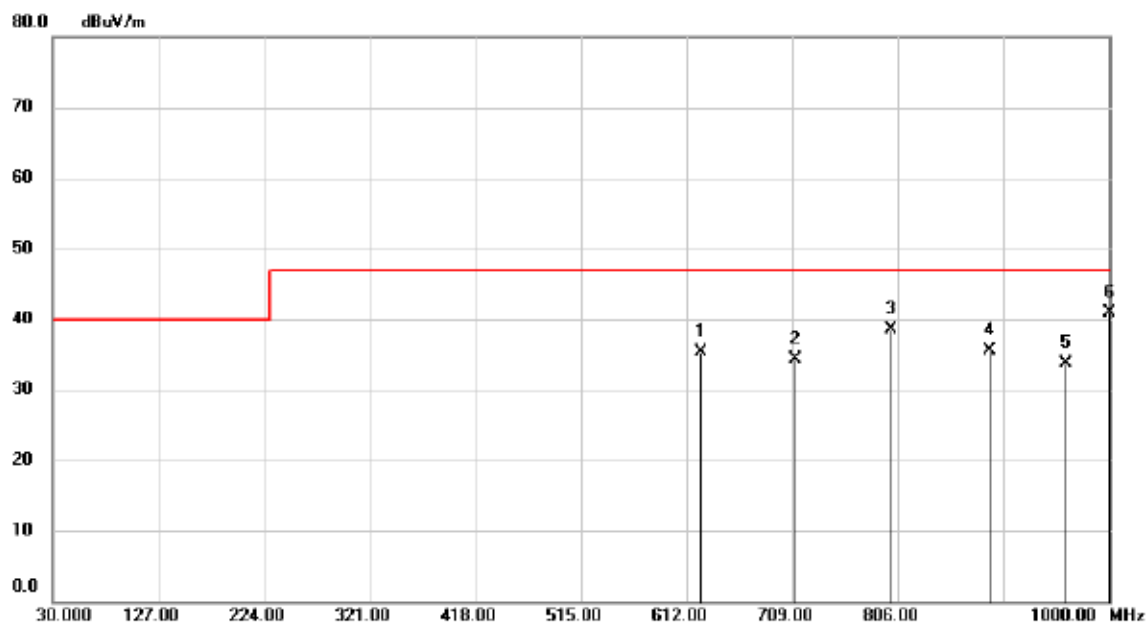


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		65.2400	28.05	-1.53	26.52	40.00	-13.48	QP	100	354
2		88.2500	33.40	-5.84	27.56	40.00	-12.44	QP	100	37
3		214.6500	28.70	-3.37	25.33	40.00	-14.67	QP	100	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(μ V/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(μ V/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.

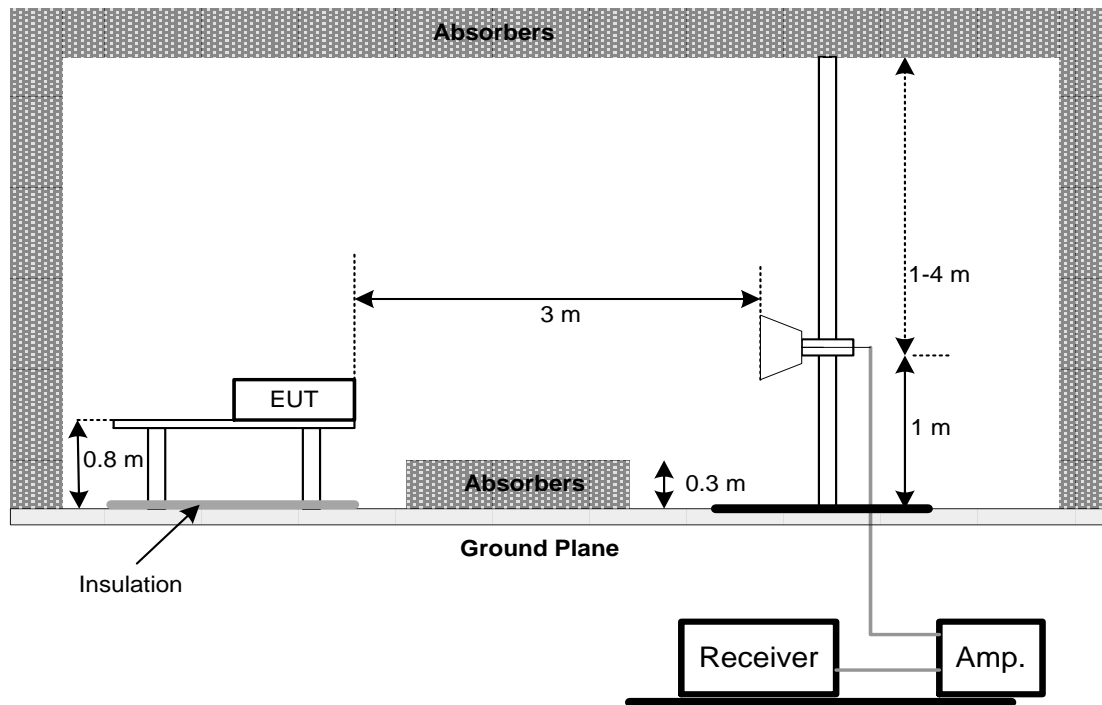
3.2.3 TEST PROCEDURE

- 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.

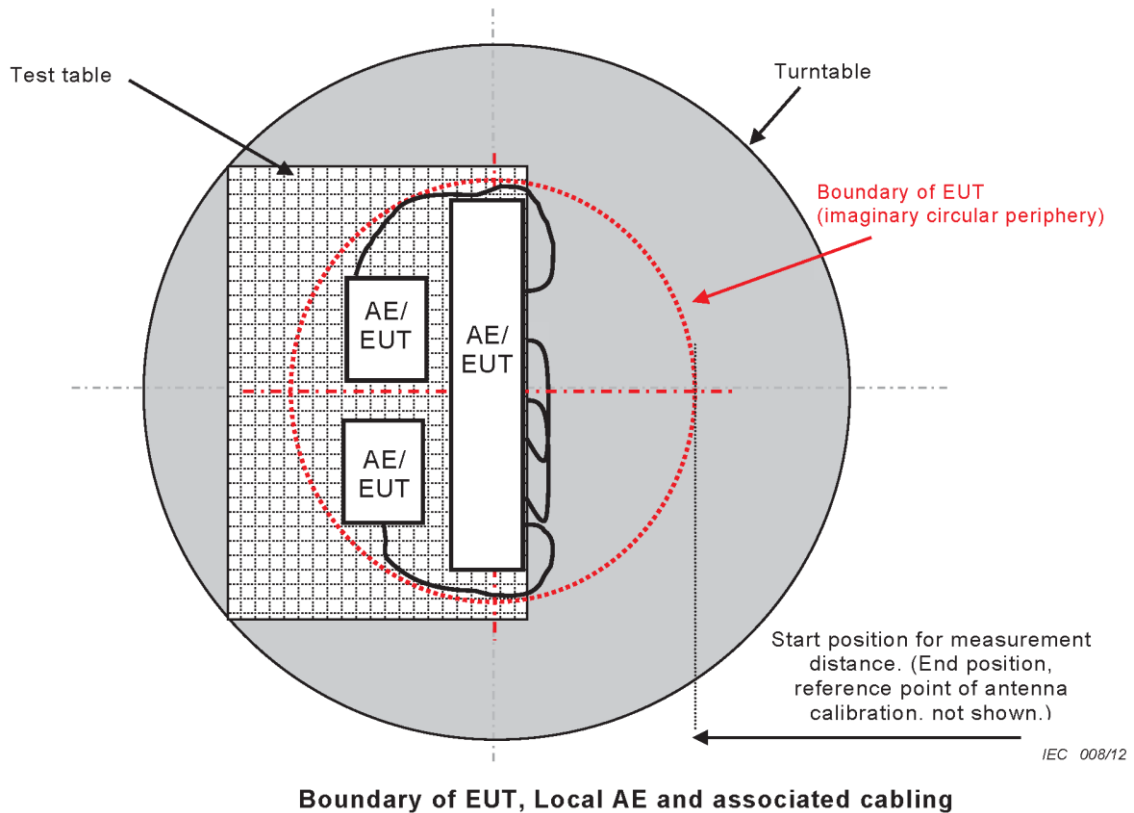
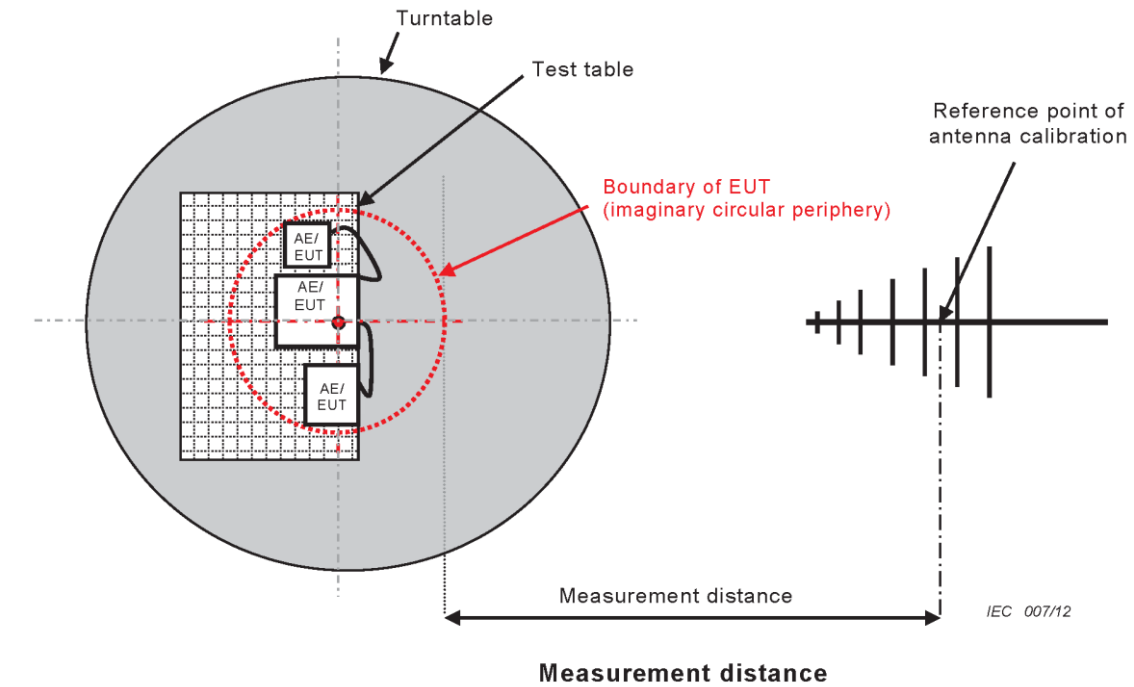
3.2.4 DEVIATION FROM TEST STANDARD

No deviation.

3.2.5 TEST SETUP

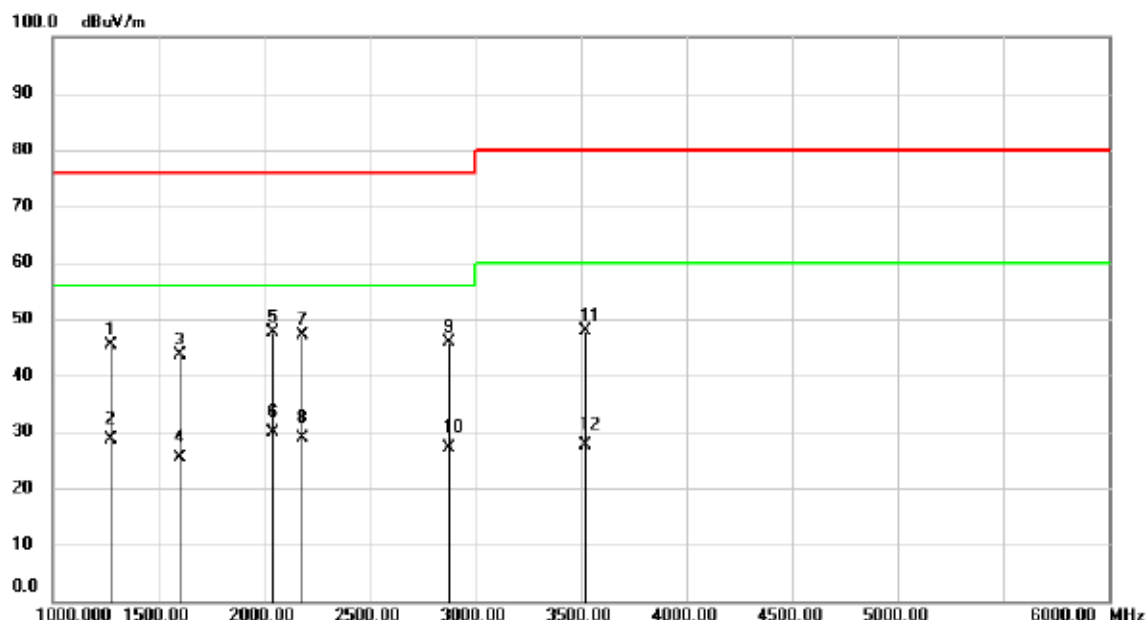


3.2.6 MEASUREMENT DISTANCE



3.2.7 TEST RESULT

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



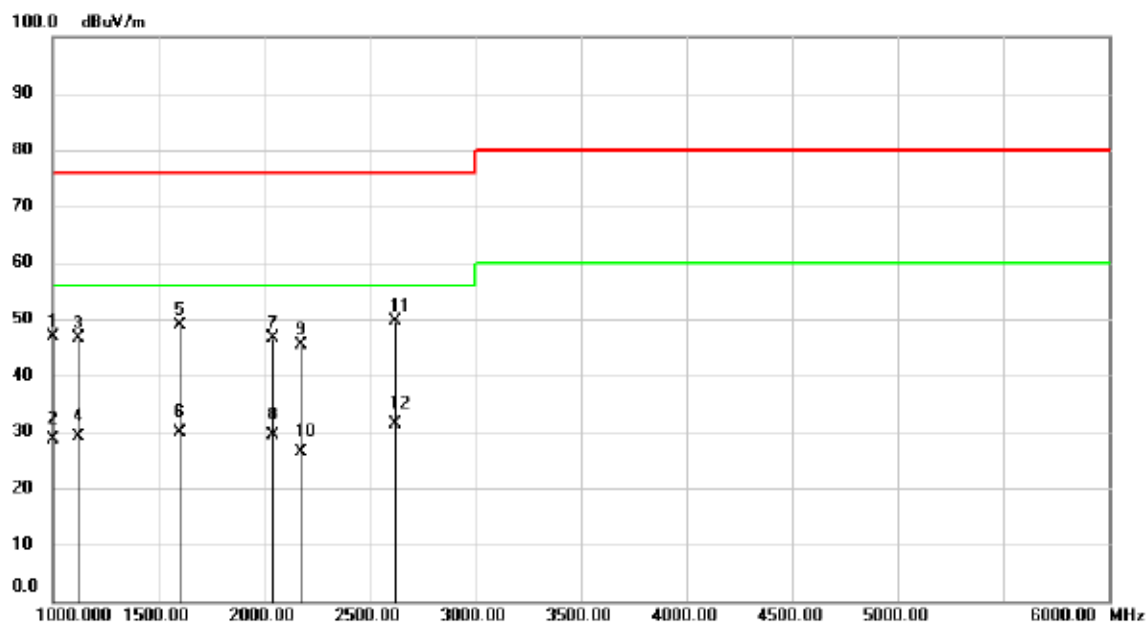
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		1275.000	65.52	-20.05	45.47	76.00	-30.53	peak	200	183
2		1275.000	48.64	-20.05	28.59	56.00	-27.41	AVG	200	183
3		1600.000	63.06	-19.39	43.67	76.00	-32.33	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	Detector	cm	degree
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 EMISSION AT AC MAINS INPUT/OUTPUT PORT 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.

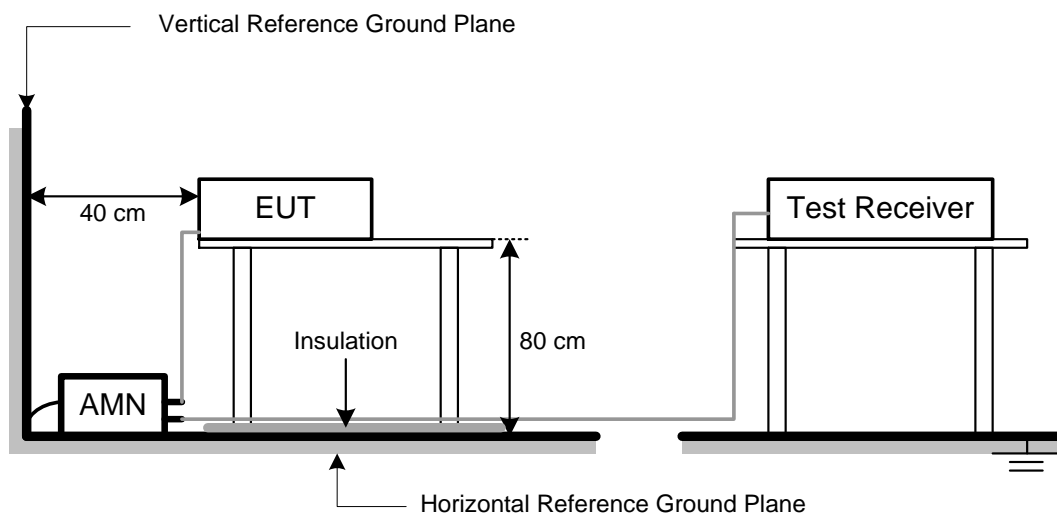
3.3.3 TEST PROCEDURE

- 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

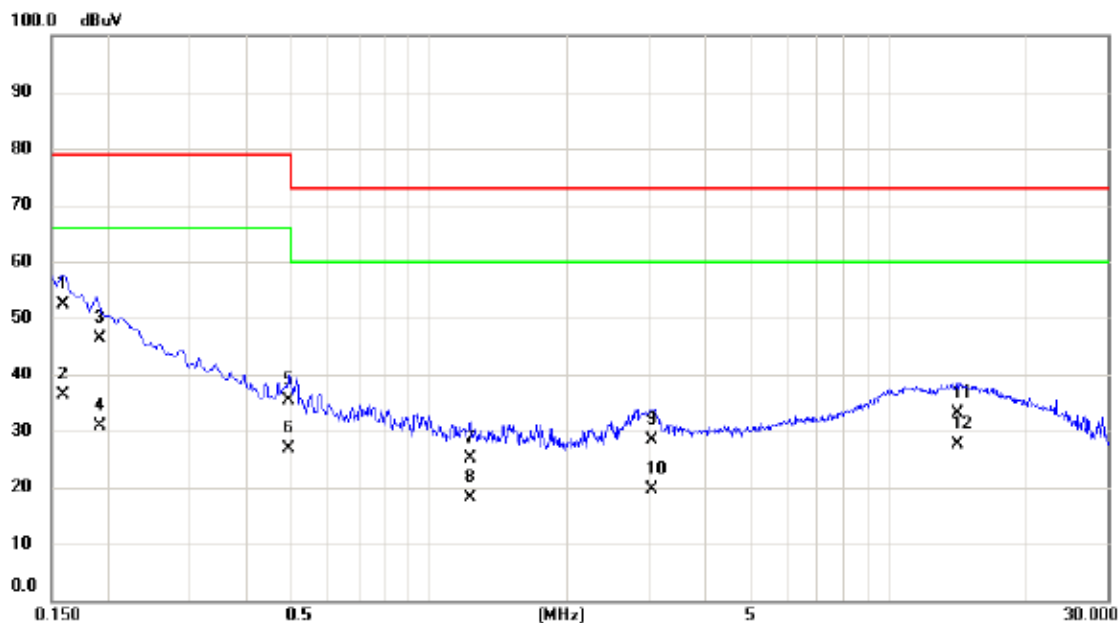
No deviation.

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



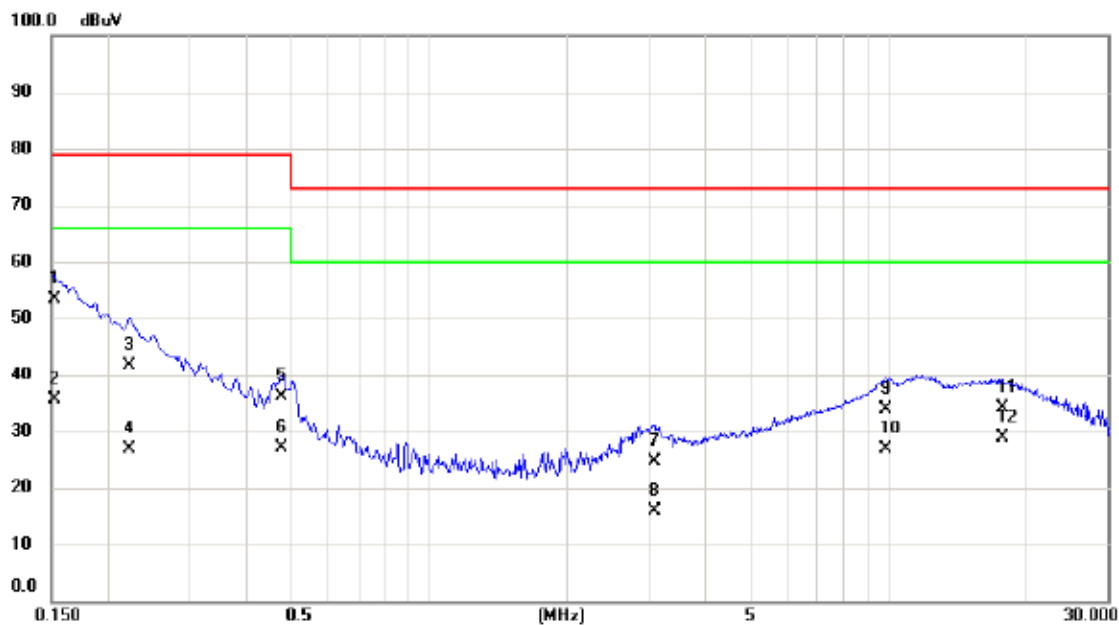
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1590	42.60	9.67	52.27	79.00	-26.73	QP	
2		0.1590	26.60	9.67	36.27	66.00	-29.73	AVG	
3		0.1914	36.80	9.66	46.46	79.00	-32.54	QP	
4		0.1914	21.20	9.66	30.86	66.00	-35.14	AVG	
5		0.4942	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.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	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 HARMONIC CURRENT EMISSIONS TEST

3.4.1 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.

3.4.2 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.

3.4.3 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:

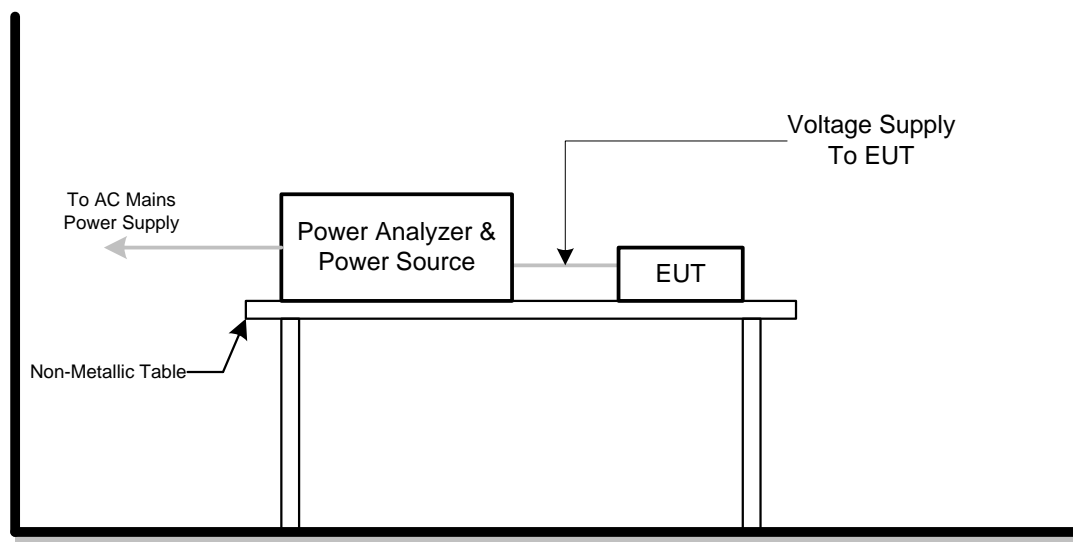
- personal computers and personal computer monitors;
- television receivers;
- refrigerators and freezers having one or more variable-speed drives to control compressor motor(s).

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.

3.4.4 DEVIATION FROM TEST STANDARD

No deviation.

3.4.5 TEST SETUP

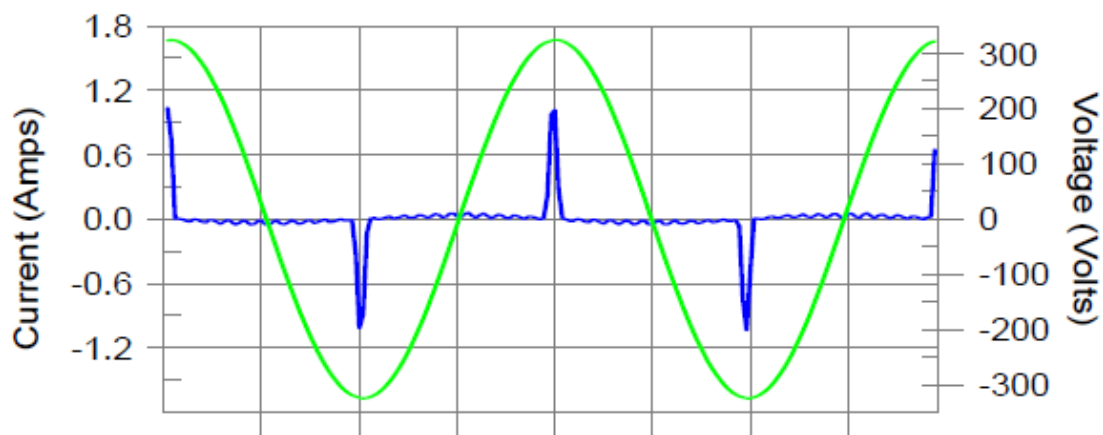


3.4.6 TEST RESULT

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

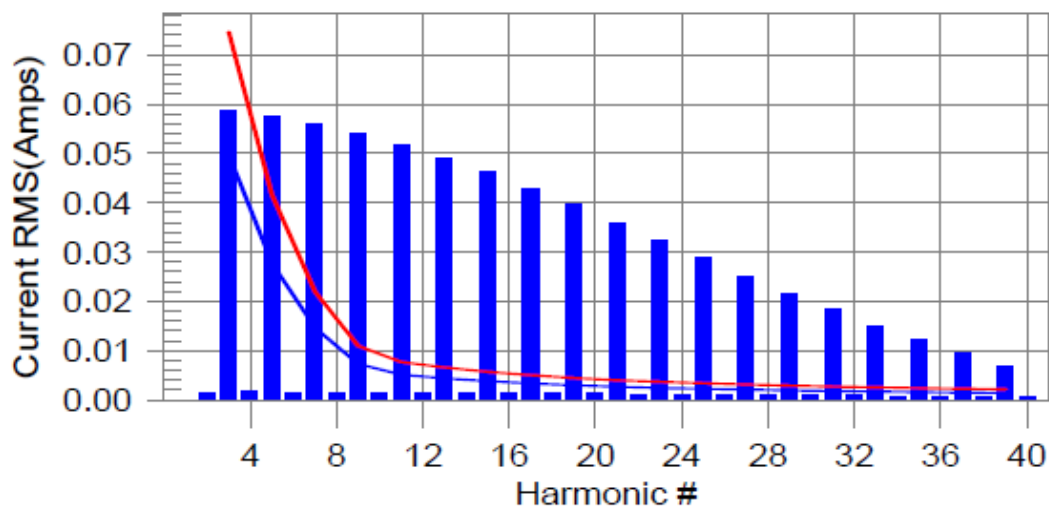
Harmonics

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

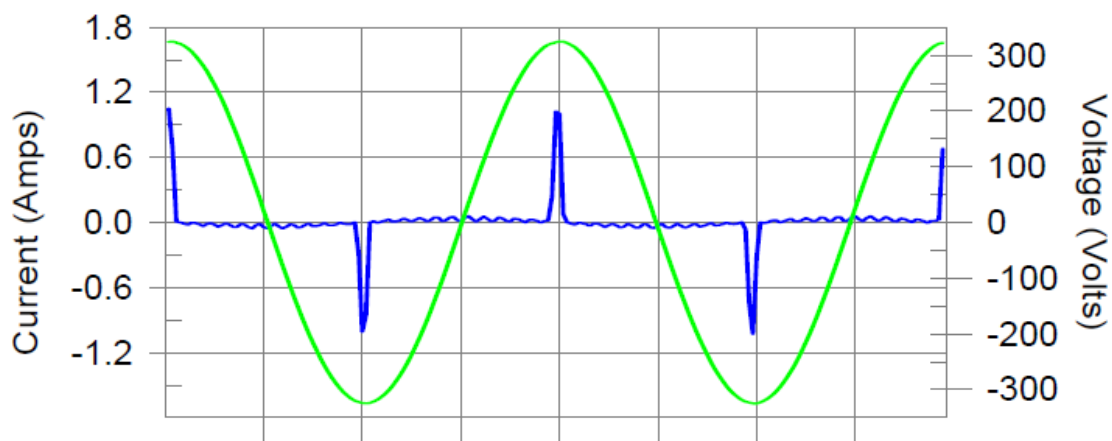
Power Factor: 0.331

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

Test Mode	Mode 2		
Test Voltage	AC 230V/50Hz	Tested Date	2020/12/18

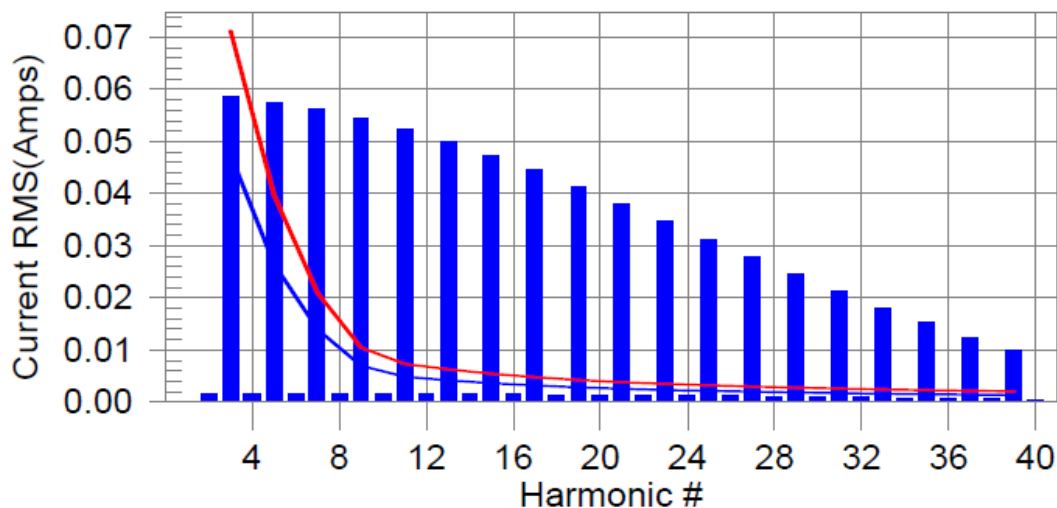
Harmonics

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): 0.174 I-THD(%): 262.8 POHC(A): 0.079 POHC Limit(A): 0.006

Highest parameter values during test:

V_RMS (Volts):	229.42	Frequency(Hz):	50.00
I_Peak (Amps):	1.172	I_RMS (Amps):	0.194
I_Fund (Amps):	0.066	Crest Factor:	6.285
Power (Watts):	14.0	Power Factor:	0.319

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.002	0.000	N/A	0.002	0.000	N/A	N/L
3	0.059	0.048	N/A	0.061	0.071	N/A	N/L
4	0.002	0.000	N/A	0.003	0.000	N/A	N/L
5	0.058	0.027	N/A	0.060	0.040	N/A	N/L
6	0.002	0.000	N/A	0.003	0.000	N/A	N/L
7	0.056	0.014	N/A	0.058	0.021	N/A	N/L
8	0.002	0.000	N/A	0.003	0.000	N/A	N/L
9	0.055	0.007	N/A	0.056	0.010	N/A	N/L
10	0.002	0.000	N/A	0.003	0.000	N/A	N/L
11	0.052	0.005	N/A	0.054	0.007	N/A	N/L
12	0.002	0.000	N/A	0.002	0.000	N/A	N/L
13	0.050	0.004	N/A	0.052	0.006	N/A	N/L
14	0.002	0.000	N/A	0.002	0.000	N/A	N/L
15	0.047	0.004	N/A	0.049	0.005	N/A	N/L
16	0.001	0.000	N/A	0.002	0.000	N/A	N/L
17	0.044	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	0.041	0.003	N/A	0.043	0.004	N/A	N/L
20	0.001	0.000	N/A	0.002	0.000	N/A	N/L
21	0.038	0.003	N/A	0.039	0.004	N/A	N/L
22	0.001	0.000	N/A	0.002	0.000	N/A	N/L
23	0.035	0.002	N/A	0.036	0.004	N/A	N/L
24	0.001	0.000	N/A	0.002	0.000	N/A	N/L
25	0.031	0.002	N/A	0.032	0.003	N/A	N/L
26	0.001	0.000	N/A	0.002	0.000	N/A	N/L
27	0.028	0.002	N/A	0.029	0.003	N/A	N/L
28	0.001	0.000	N/A	0.002	0.000	N/A	N/L
29	0.025	0.002	N/A	0.025	0.003	N/A	N/L
30	0.001	0.000	N/A	0.002	0.000	N/A	N/L
31	0.021	0.002	N/A	0.022	0.003	N/A	N/L
32	0.001	0.000	N/A	0.001	0.000	N/A	N/L
33	0.018	0.002	N/A	0.018	0.002	N/A	N/L
34	0.001	0.000	N/A	0.001	0.000	N/A	N/L
35	0.015	0.002	N/A	0.015	0.002	N/A	N/L
36	0.001	0.000	N/A	0.001	0.000	N/A	N/L
37	0.012	0.001	N/A	0.013	0.002	N/A	N/L
38	0.001	0.000	N/A	0.001	0.000	N/A	N/L
39	0.010	0.001	N/A	0.010	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): 229.42

I_Peak (Amps): 1.172

I_Fund (Amps): 0.066

Power (Watts): 14.0

Frequency(Hz): 50.00

I_RMS (Amps): 0.194

Crest Factor: 6.285

Power Factor: 0.319

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.022	0.459	4.70	OK
3	0.324	2.064	15.71	OK
4	0.012	0.459	2.66	OK
5	0.019	0.918	2.10	OK
6	0.013	0.459	2.81	OK
7	0.026	0.688	3.77	OK
8	0.010	0.459	2.28	OK
9	0.018	0.459	3.84	OK
10	0.008	0.459	1.72	OK
11	0.024	0.229	10.47	OK
12	0.009	0.229	3.98	OK
13	0.029	0.229	12.60	OK
14	0.003	0.229	1.53	OK
15	0.024	0.229	10.64	OK
16	0.004	0.229	1.71	OK
17	0.030	0.229	12.97	OK
18	0.009	0.229	3.72	OK
19	0.033	0.229	14.31	OK
20	0.011	0.229	4.92	OK
21	0.033	0.229	14.24	OK
22	0.003	0.229	1.34	OK
23	0.031	0.229	13.55	OK
24	0.005	0.229	2.28	OK
25	0.032	0.229	13.95	OK
26	0.003	0.229	1.39	OK
27	0.027	0.229	11.69	OK
28	0.002	0.229	0.92	OK
29	0.030	0.229	13.25	OK
30	0.006	0.229	2.43	OK
31	0.027	0.229	11.79	OK
32	0.003	0.229	1.43	OK
33	0.024	0.229	10.66	OK
34	0.002	0.229	0.73	OK
35	0.022	0.229	9.64	OK
36	0.002	0.229	0.82	OK
37	0.020	0.229	8.56	OK
38	0.002	0.229	1.00	OK
39	0.018	0.229	7.95	OK
40	0.007	0.229	3.01	OK

3.5 VOLTAGE CHANGES, VOLTAGE FLUCTUATIONS AND FLICKER TEST

3.5.1 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

3.5.2 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.

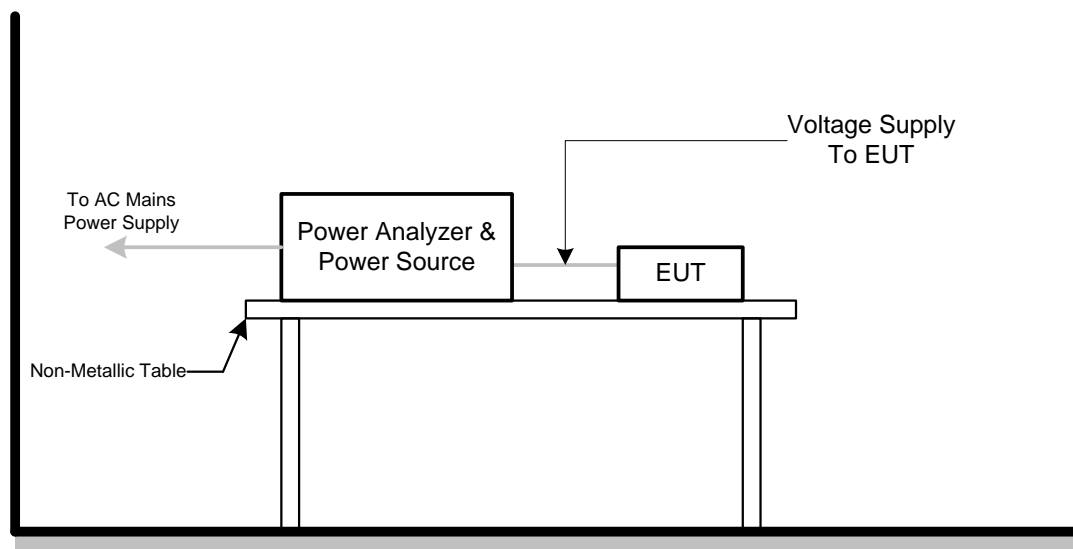
3.5.3 TEST PROCEDURE

- a. 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.

3.5.4 DEVIATION FROM TEST STANDARD

No deviation.

3.5.5 TEST SETUP

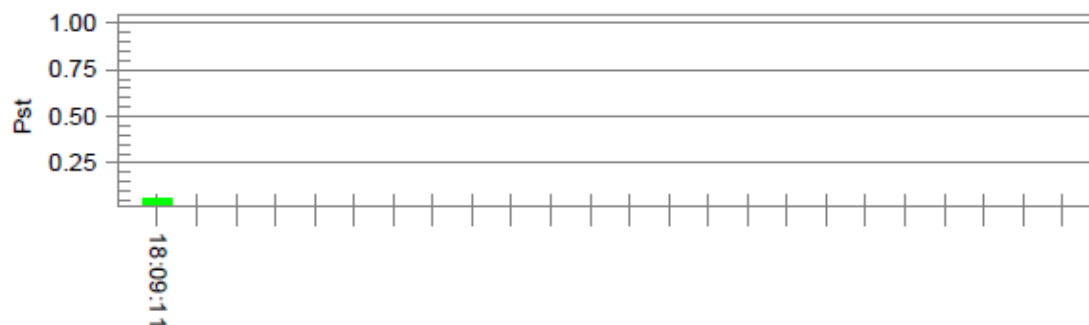


3.5.6 TEST RESULT

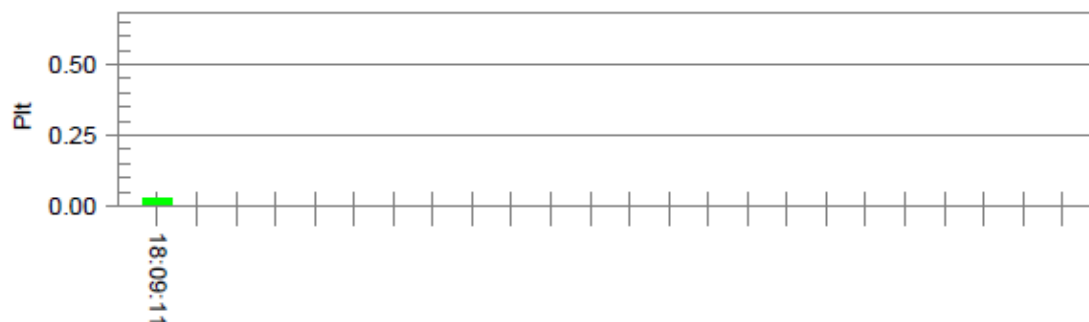
Test Mode	Mode 1		
Test Voltage	AC 230V/50Hz	Tested Date	2021/1/15

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	Test limit (mS):	500.0	Pass
T-max (mS):	0	Test limit (%):	3.30	Pass
Highest dc (%):	0.00	Test limit (%):	4.00	Pass
Highest dmax (%):	0.00	Test limit:	1.000	Pass
Highest Pst (10 min. period):	0.064	Test limit:	0.650	Pass
Highest Plt (2 hr. period):	0.028			

3.6 CONDUCTED EMISSION AT WIRED NETWORK PORT TEST

3.6.1 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

3.6.2 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.

3.6.3 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.

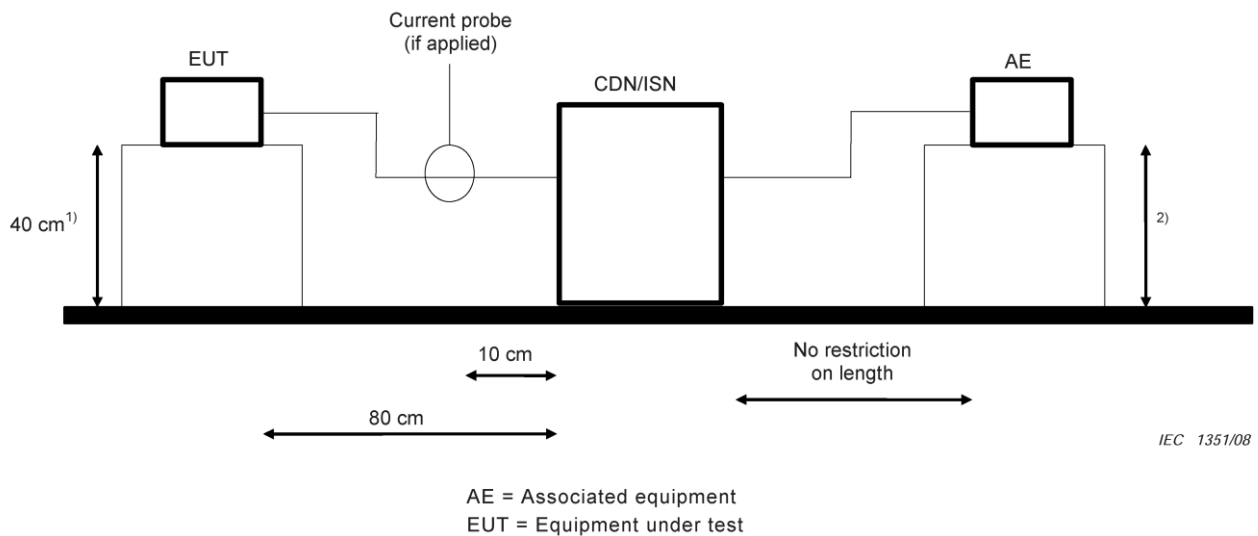
- (3) The adjusted voltage shall be compared with the applicable voltage limit.
- (4) Both the measured current and the corrected voltage shall be below the applicable current and voltage limits at all frequencies for the EUT to be deemed compliant with this publication.
- h. The receiver was set to 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.

3.6.4 DEVIATION FROM TEST STANDARD

No deviation.

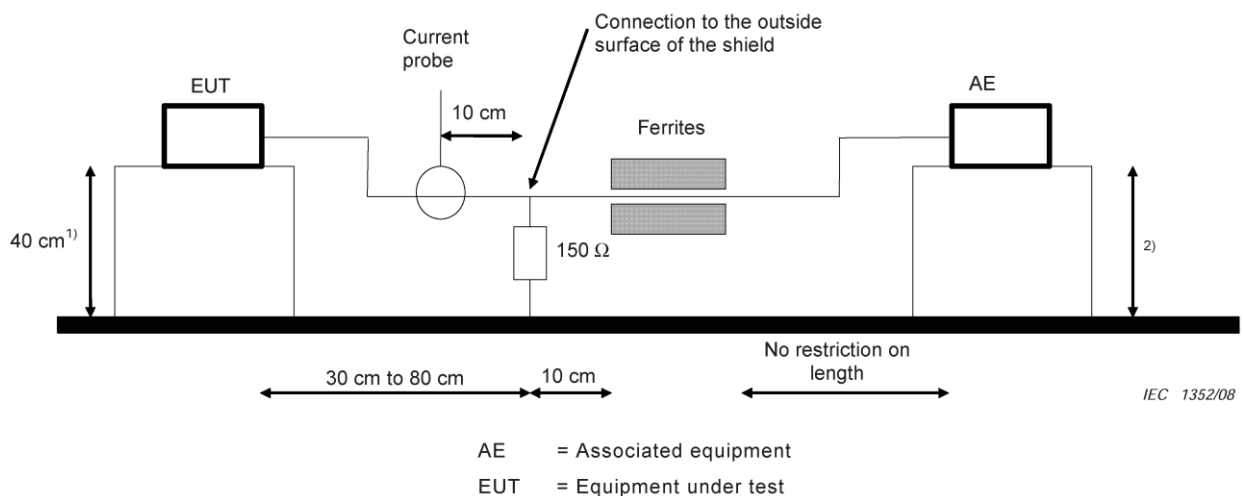
3.6.5 TEST SETUP

- a) Cable Type: Balanced Unscreened, Screened or Coaxial



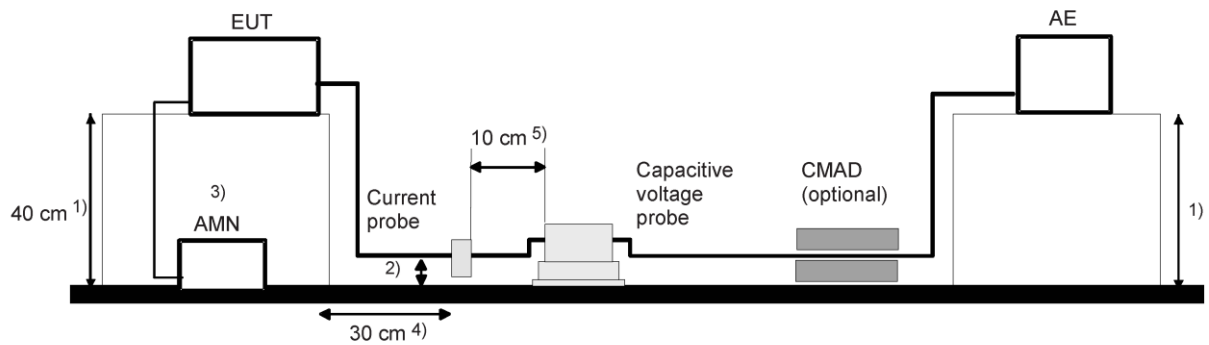
- 1) Distance to the reference groundplane (vertical or horizontal).
- 2) Distance to the reference groundplane is not critical.

- b) Cable Type: Screened or Coaxial



- 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

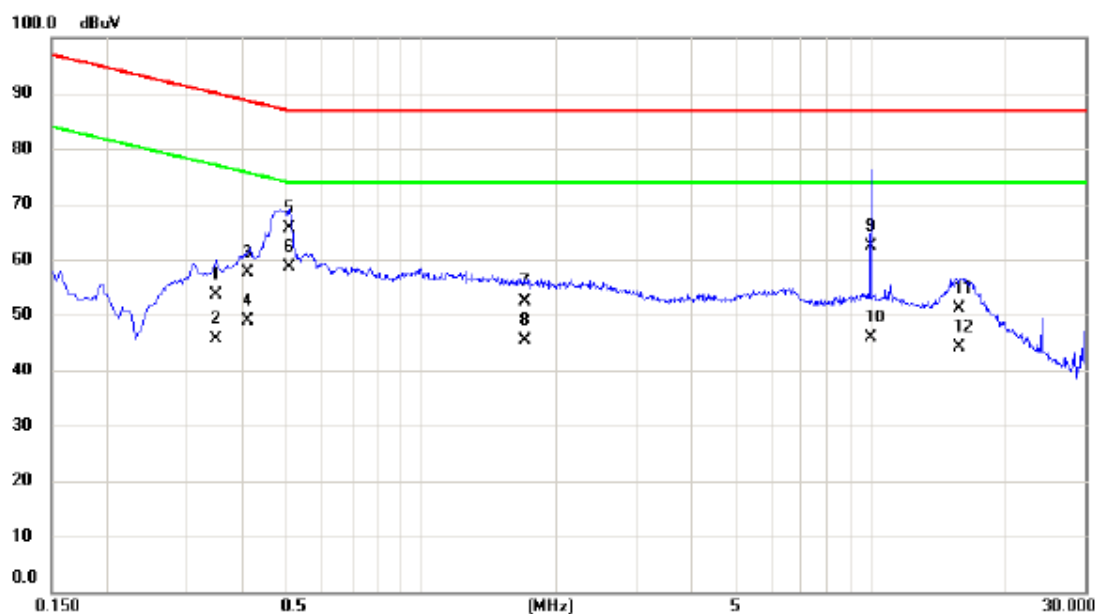
AE = Associated equipment
EUT = Equipment under test
CMAD = Common mode Absorbing Device

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.

3.6.6 TEST RESULT

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



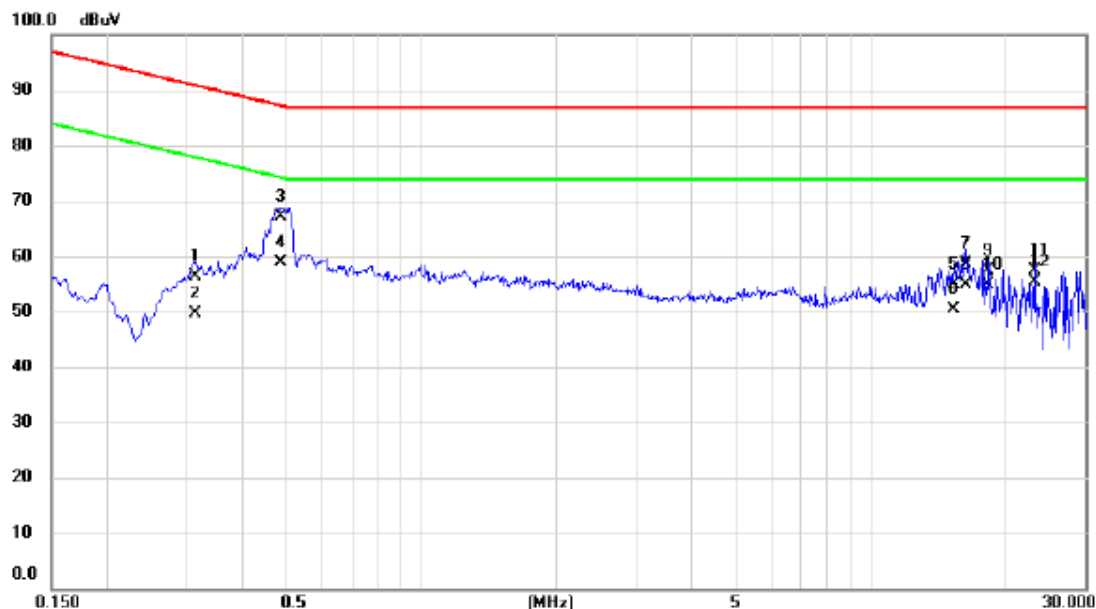
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.3480	43.70	10.00	53.70	90.01	-36.31	QP	
2		0.3480	35.60	10.00	45.60	77.01	-31.41	AVG	
3		0.4110	47.60	9.96	57.56	88.63	-31.07	QP	
4		0.4110	39.00	9.96	48.96	75.63	-26.67	AVG	
5		0.5076	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.

4 IMMUNITY TEST

4.1 STANDARD COMPLIANCE/SEVERITY LEVEL/CRITERION

Reference Clause of ETSI EN 301 489-1 and phenomenon	Test Specification	Test Ports	Performance Criteria
9.2 RF electromagnetic field (RS)	80 MHz to 6000 MHz 3 V/m (unmodulated, r.m.s.), 80 % AM Modulation, Sinusoidal audio signal 1000 Hz or 400 Hz. NOTE (1)	Enclosure port	A (CT/CR)
9.3 Electrostatic discharge (ESD)	±8 kV air discharge	Enclosure (Direct Mode)	B (TT/TR)
	±4 kV contact discharge ±4 kV HCP discharge ±4 kV VCP discharge	Enclosure (Indirect Mode)	B (TT/TR)
9.4 Fast transients common mode (EFT/BURST)	±0.5 kV, 5/50 Tr/Th ns, Repetition frequency 5kHz For xDSL wired network ports shall be at a repetition rate of 100 kHz.	Signal, wired network and control ports (longer than 3 m)	B (TT/TR)
	±0.5 kV (peak), 5/50ns Tr/Th Repetition frequency 5 kHz	DC power ports (longer than 3 m)	B (TT/TR)
	±1 kV (peak), 5/50ns Tr/Th Repetition frequency 5 kHz	AC power ports	B (TT/TR)
9.5 RF common mode (CS)	0.15 MHz to 80 MHz 3 V (unmodulated, r.m.s.), 80 % AM (1000 Hz or 400 Hz) NOTE (1)	Signal, wired network and control ports (longer than 3 m)	A (CT/CR)
	0.15 MHz to 80 MHz 3 V (unmodulated, r.m.s.), 80 % AM (1000 Hz or 400 Hz) NOTE (1)	DC power ports (longer than 3 m)	A (CT/CR)
	0.15 MHz to 80 MHz 3 V (unmodulated, r.m.s.), 80 % AM (1000 Hz or 400 Hz) NOTE (1)	AC power ports	A (CT/CR)
9.7 Voltage dips and interruptions	Voltage dip: 0 % residual voltage for 0.5 cycle 0 % residual voltage for 1 cycle	AC mains power input ports	B (TT/TR)
	70 % residual voltage for 25 cycles (at 50 Hz) NOTE (2)		C (TT/TR)
	Voltage interruption: 0 % residual voltage for 250 cycles (at 50 Hz) NOTE (2)	AC mains power input ports	C (TT/TR)

Reference Clause of ETSI EN 301 489-1 and phenomenon	Test Specification	Test Ports	Performance Criteria
9.8 Surges	Line to line: ± 1 kV Line to ground: ± 2 kV 1.2/50 (8/20) Tr/Th μ s, In telecom centres below shall be used: Line to line: ± 0.5 kV Line to ground: ± 1 kV	AC mains power input ports	B (TT/TR)
	Directly connected to outdoor cables: symmetrically operated: Line to ground: ± 1 kV 10/700 (5/320) Tr/Th μ s Non-symmetrically operated: Line to line: ± 0.5 kV Line to ground or shield to ground: ± 1 kV 1.2/50 (8/20) Tr/Th μ s, Connected to indoor cables (longer than 30 m): Line to ground or shield to ground: ± 0.5 kV 1.2/50 (8/20) Tr/Th μ s,	Wired network ports	B (TT/TR)

NOTE:

- (1) If the wanted signal is modulated at 1000 Hz, then an audio signal of 400 Hz shall be used.
- (2) For voltage dips greater than or equal to 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply.

4.2 PERFORMANCE CRITERIA

According to ETSI EN 301 489-17 standard, the performance criteria as following:

(Clause 6.1) General performance criteria

- performance criteria A for immunity tests with phenomena of a continuous nature;
- performance criteria B for immunity tests with phenomena of a transient nature;
- performance criteria C for immunity tests with power interruptions exceeding a certain time.

(Clause 6.2) Performance table

(Clause 6.2.1) Performance criteria overview

Table 1: Performance criteria

Criteria	During test	After test (i.e. as a result of the application of the test)
A	Shall operate as intended. (see note). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance. Shall be no loss of function. Shall be no loss of critical stored data.
B	May be loss of function.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no loss of critical stored data.
C	May be loss of function.	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no loss of critical stored data.
NOTE: Operate as intended during the test allows a level of degradation in accordance with clause 6.2.2.		

(Clause 6.2.2) Minimum performance level

For equipment that supports a PER or FER, the minimum performance level shall be a PER or FER less than or equal to 10 %.

For equipment that does not support a PER or a FER, the minimum performance level shall be no loss of the wireless transmission function needed for the intended use of the equipment.

(Clause 6.3) Performance criteria for Continuous phenomena

The performance criteria A shall apply.

Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur during the test.

Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur during the test.

(Clause 6.4) Performance criteria for Transient phenomena

The performance criteria B shall apply, except for voltage dips greater than or equal to 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply.

Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur as a result of the application of the test.

Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur as a result of the application of the test.

4.3 RF ELECTROMAGNETIC FIELD TEST (RS)

4.3.1 TEST SPECIFICATION

Reference Standard	EN 61000-4-3
Required Performance Criterion	A
Frequency Range	80 MHz to 6000 MHz
Field Strength	3 V/m (unmodulated, r.m.s.)
Modulation	80 %, AM Modulation Sinusoidal audio signal 1000 Hz..
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

4.3.2 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	Signal Generator	R&S	SMT06	832080/007	2020/6/20	2021/6/19
5	Power Amplifier	AR	150W1000M1	320946	N/A	N/A
6	Horn Antenna	SCHWARZBECK	STLP 9149	413	N/A	N/A
7	Power Amplifier	MILMEGA	AS0860B-50/50	1079824	N/A	N/A
8	Power Meter	TESEQ	PM6006	75634	2020/9/3	2021/9/2
9	Power Meter	TESEQ	PM6006	75635	2020/7/30	2021/7/29
10	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.

4.3.3 TEST PROCEDURE

The testing was performed in a fully-anechoic chamber.

The testing distance from antenna to the EUT was 3 m.

The EUT and support equipment are installed in a representative system as described in EN 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.

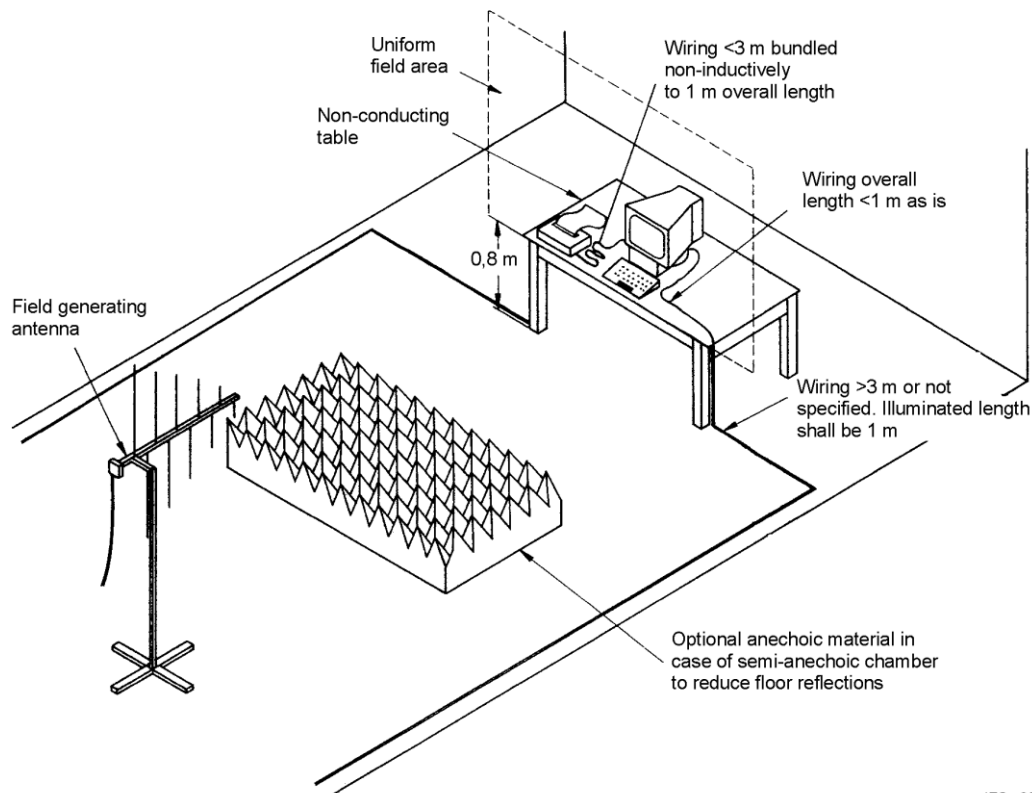
The other condition as following manner:

- The field strength is 3 V/m (unmodulated, r.m.s.).
- The frequency range is swept from 80 MHz to 6000 MHz with the signal 80 % amplitude modulated with a 1000 Hz sinusoidal audio signal. 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.
- The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation.

4.3.5 TEST SETUP



IEC 034/06

4.3.6 TEST RESULT

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

Frequency (MHz)	Applied Voltage(V/m) – 80% AM 1kHz	Polarity	Azimuth	Criterion	Observation	Result
80~6000	3	V & H	Rear	A	A	PASS
			Front		A	
			Left		A	
			Right		A	

NOTE:

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

4.4 ELECTROSTATIC DISCHARGE 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: ± 2 kV, ± 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
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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.

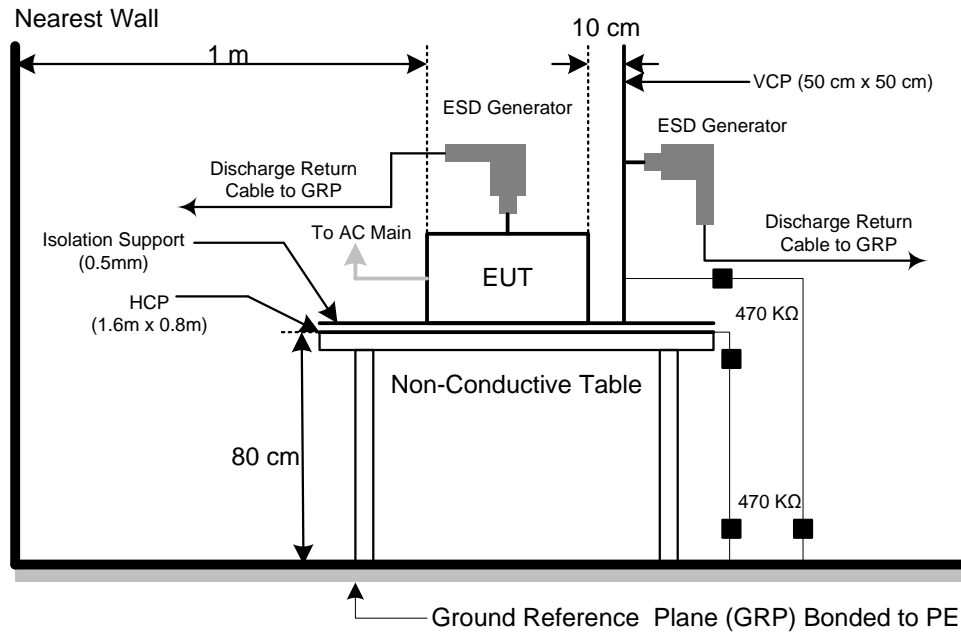
The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manner:

- 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

Yes. The requirement followed by the client's specification.

4.4.5 TEST SETUP



4.4.6 TEST RESULT

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

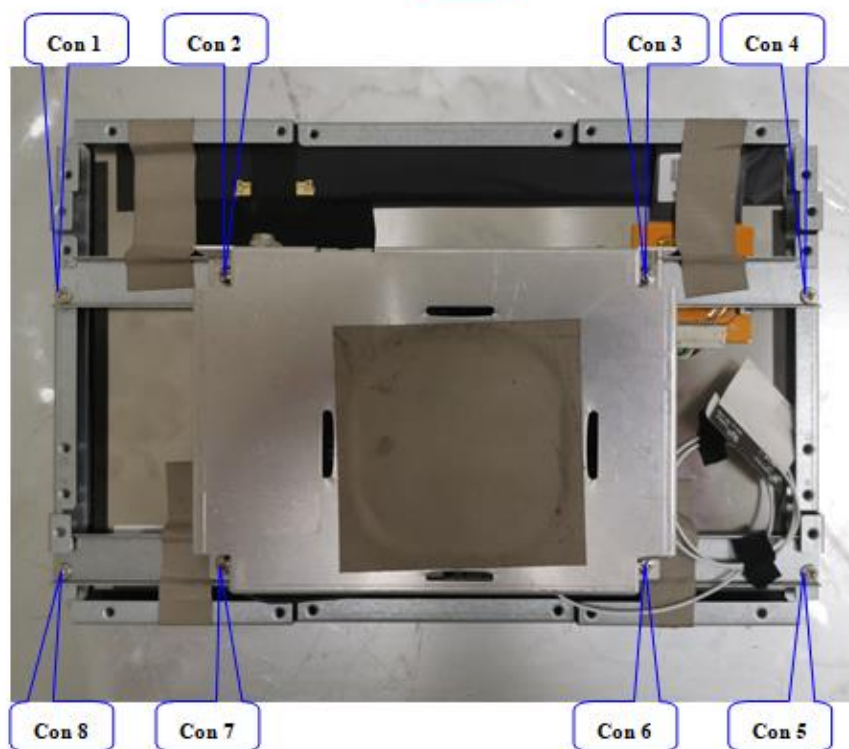
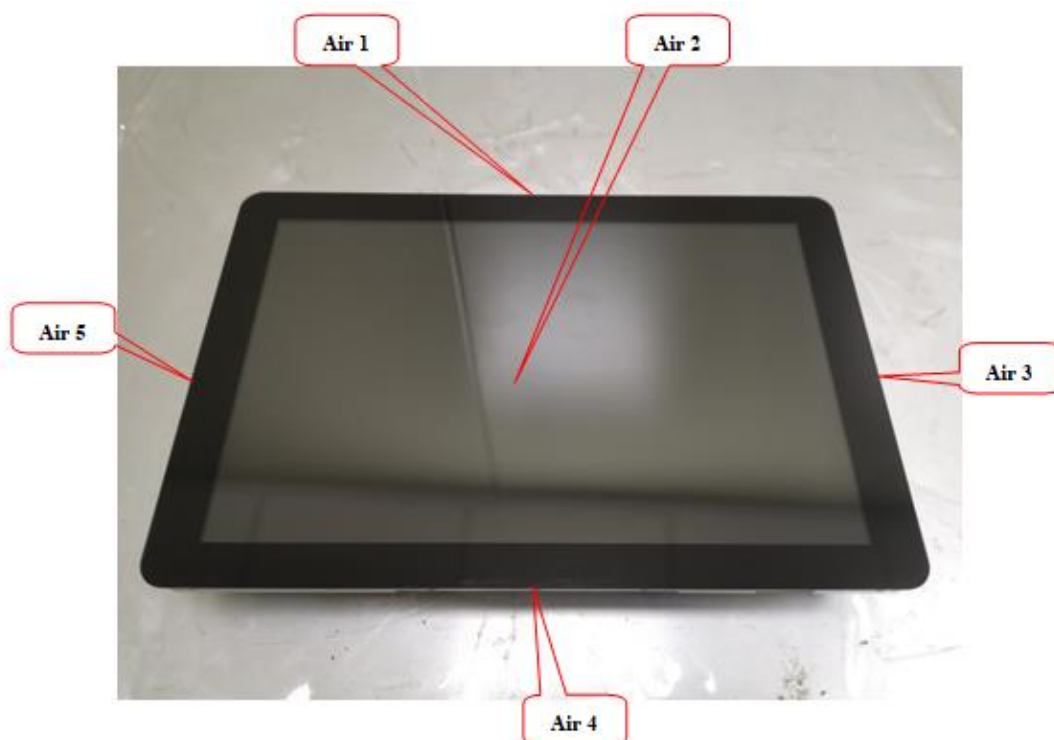
Mode	Air Discharge								Contact Discharge							
Level	2 kV		4 kV		8 kV		15 kV		2 kV		4 kV		6 kV		8 kV	
Location	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
1~11	A	A	A	A	A	A	-	-	A	A	A	A	A	A	-	-
12~16	A	A	A	A	A	A	-	-	-	-	-	-	-	-	-	-
Perform Criterion	B						-		B				B			
Result	A						-		A				A			
Judgment	PASS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

Mode	HCP Discharge								VCP Discharge							
Level	2 kV		4 kV		6 kV		8 kV		2 kV		4 kV		6 kV		8 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	A	A	A	A	-	-
2	A	A	A	A	A	A	-	-	A	A	A	A	-	-	-	-
3	A	A	A	A	A	A	-	-	A	A	A	A	-	-	-	-
4	A	A	A	A	A	A	-	-	A	A	A	A	-	-	-	-
Perform Criterion	B				B				B				B			
Result	A				A				A				A			
Judgment	PASS				PASS				PASS				PASS			

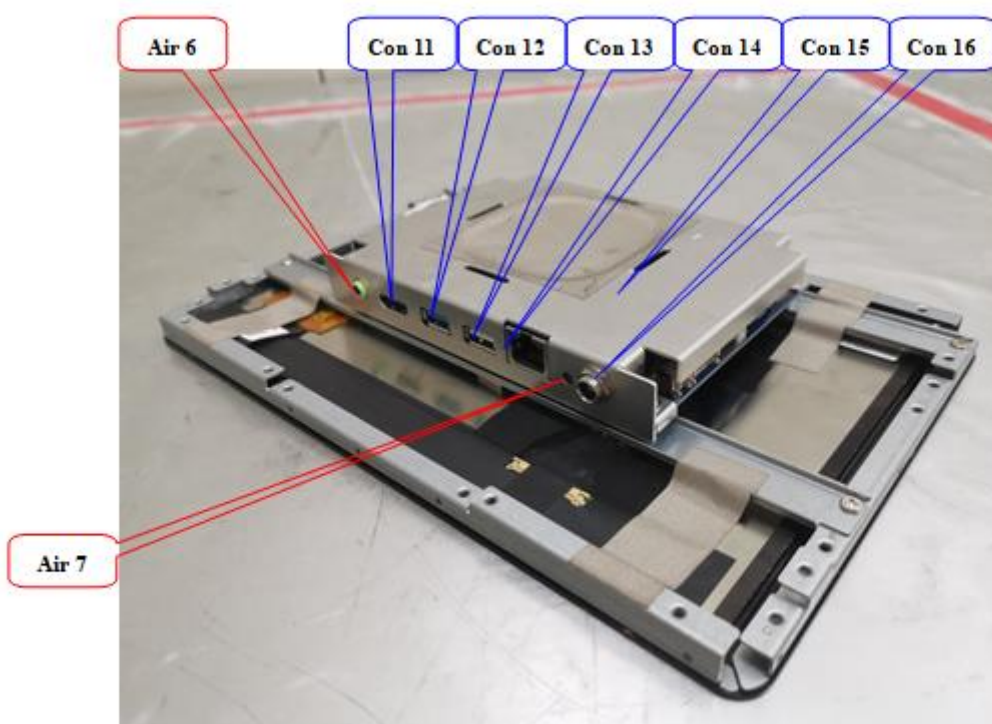
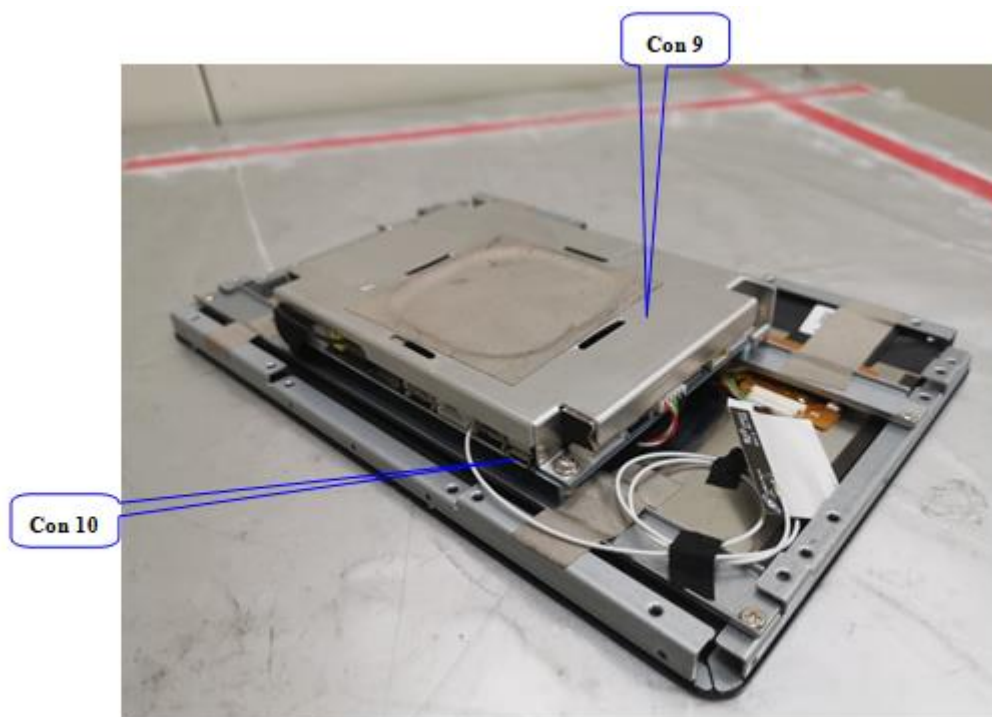
NOTE:

- (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 FAST TRANSIENTS COMMON MODE TEST (EFT/BURST)

4.5.1 TEST SPECIFICATION

Reference Standard	EN 61000-4-4
Required Performance Criterion	B
Test Voltage	Signal, wired network and control ports (longer than 3 m): ± 0.5 kV AC power ports: ± 1 kV
Polarity	Positive & Negative
Impulse Frequency	xDSL wired network ports: Repetition frequency 100 kHz others: Repetition frequency 5 kHz
Impulse Wave shape	5/50 ns
Burst Duration	15 ms
Burst Period	300 ms
Test Duration	Not less than 1 minute

4.5.2 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.

4.5.3 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.

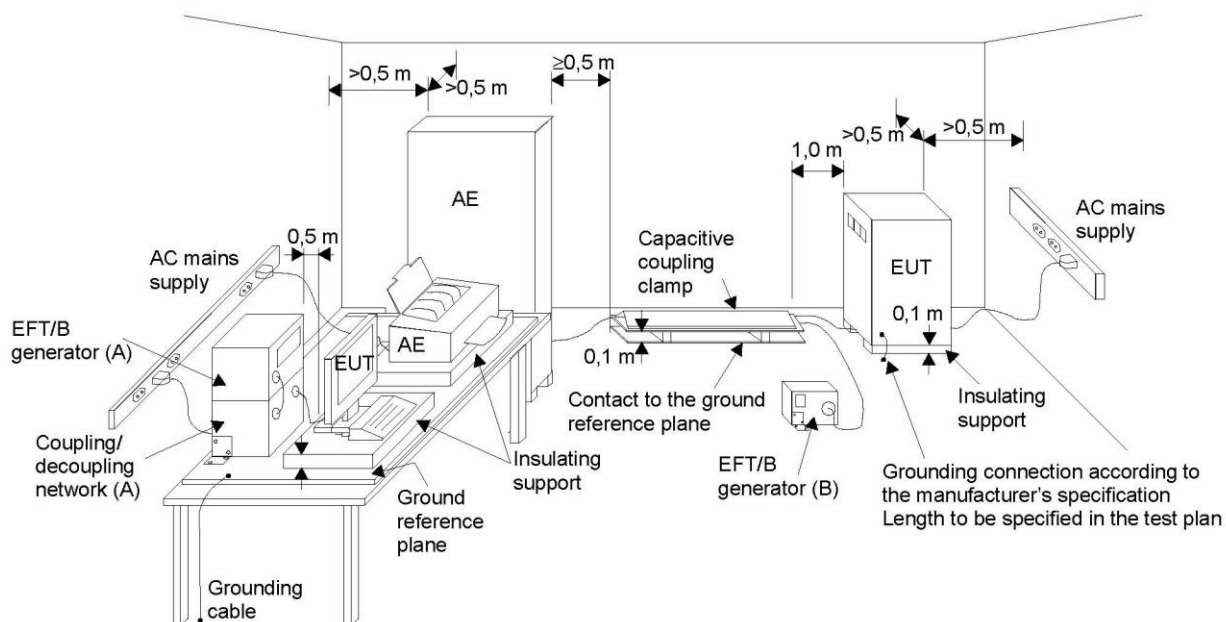
The other condition as following manner:

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

4.5.4 DEVIATION FROM TEST STANDARD

No deviation.

4.5.5 TEST SETUP



IEC 645/12

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

4.5.6 TEST RESULT

Test Mode	Mode 1		
Test Voltage	AC 230V/50Hz	Tested 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.

4.6 RF COMMON MODE TEST (CS)

4.6.1 TEST SPECIFICATION

Reference Standard	EN 61000-4-6
Required Performance Criterion	A
Frequency Range	0.15 MHz to 80 MHz
Field Strength	3 V (unmodulated, r.m.s.)
Modulation	80 %, AM Modulation Sinusoidal audio signal 1000 Hz.
Frequency Step	1 % of fundamental
Dwell Time	at least 3 s

4.6.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Test System for Conducted and Radiated Immunity	TESEQ	NSG 4070	34511	2020/8/26	2021/8/25
2	CDN(M3)	FCC	FCC-801-M2/M3-16A	06043	2020/2/23	2021/2/22
3	Coupling Decoupling Network	TESEQ	CDN T8-10	47559	2020/12/23	2021/12/22
4	50Ω BNC TYPE Terminal	EMCI	N/A	10	2020/8/12	2021/8/11
5	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.

4.6.3 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.

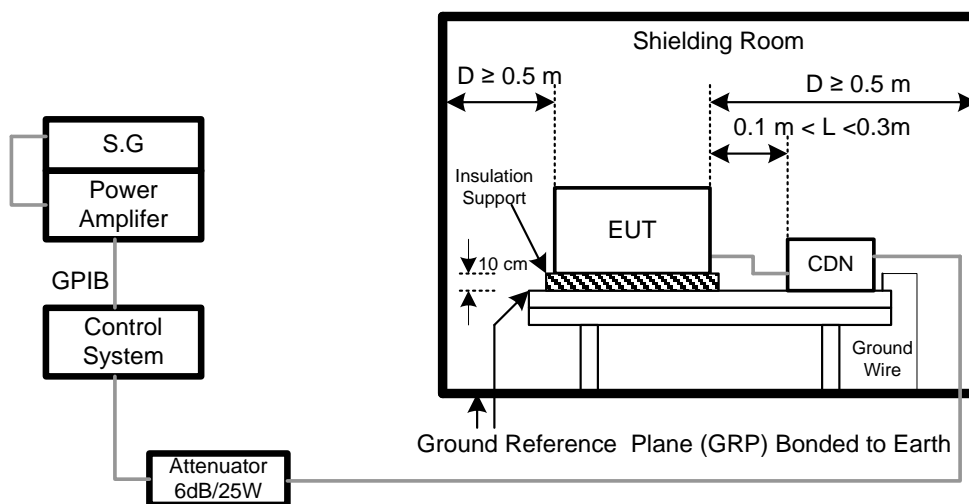
The other condition as following manner:

- a. The field strength is 3 V (unmodulated, r.m.s.).
- b. The frequency range is swept from 0.15 MHz to 80 MHz, with the signal 80 % amplitude modulated with a 1000 Hz sinusoidal audio signal. 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.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation.

4.6.5 TEST SETUP



4.6.6 TEST RESULT

Test Mode	Mode 1		
Test Voltage	AC 230V/50Hz	Tested 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	0.15~80	3	A	A	PASS

Test Result for Signal – 80% AM 1kHz

Tested on	Frequency (MHz)	Applied Voltage (V (unmodulated, r.m.s))	Criterion	Observation	Result
RJ-45	0.15~80	3	A	A	PASS

NOTE:

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

4.7 VOLTAGE DIPS AND INTERRUPTIONS TEST

4.7.1 TEST SPECIFICATION

Reference Standard	EN 61000-4-11
Required Performance Criterion	Voltage dip: B 0 % residual voltage for 0.5 cycle 0 % residual voltage for 1 cycle Voltage dip: C 70 % residual voltage for 25 cycles (at 50 Hz) Voltage interruption: C 0 % residual voltage for 250 cycles (at 50 Hz)
Interval between Event	10 s minimum
Phase Angle	0°/180°
Test Cycle	3 times

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	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.

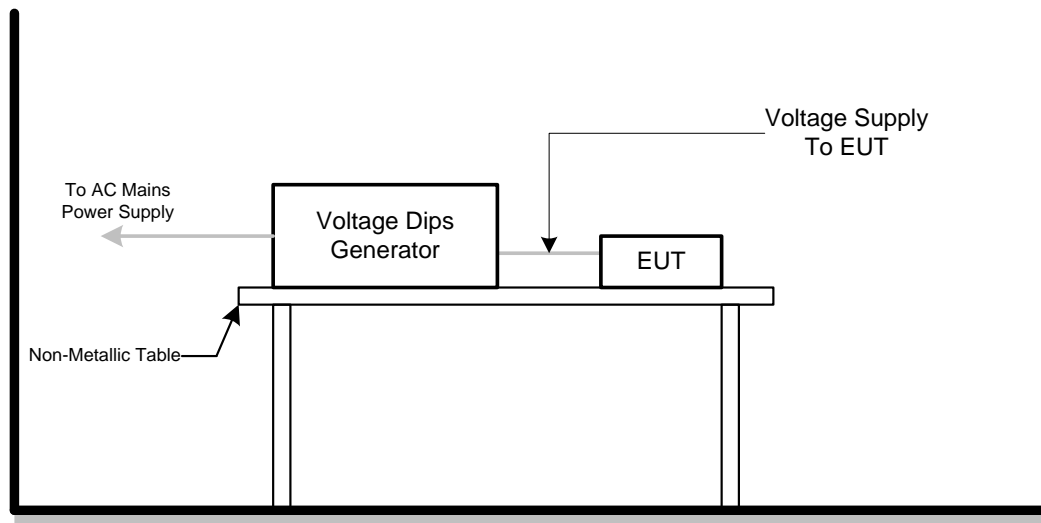
4.7.3 TEST PROCEDURE

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.

4.7.4 DEVIATION FROM TEST STANDARD

No deviation.

4.7.5 TEST SETUP



4.7.6 TEST RESULT

Test Mode	Mode 1		
Test Voltage	Refer to below data.	Tested Date	2021/1/9
Situation	C : The system restart and require manual recover.		

100Vac/50Hz				
Voltage Reduction	Periods	Criterion	Observation	Result
100%	0.5	B	A	PASS
100%	1	B	A	
30%	25	C	A	
100%	250	C	C	

230Vac/50Hz				
Voltage Reduction	Periods	Criterion	Observation	Result
100%	0.5	B	A	PASS
100%	1	B	A	
30%	25	C	A	
100%	250	C	C	

240Vac/50Hz				
Voltage Reduction	Periods	Criterion	Observation	Result
100%	0.5	B	A	PASS
100%	1	B	A	
30%	25	C	A	
100%	250	C	C	

NOTE:

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

4.8 SURGES TEST

4.8.1 TEST SPECIFICATION

Reference Standard	EN 61000-4-5
Required Performance Criterion	B
Waveform	1.2/50 (8/20) Tr/Th μ s combination wave 10/700 (5/320) Tr/Th μ s combination wave
Test Voltage	AC mains power input ports: ± 0.5 kV, ± 1 kV, ± 2 kV Wired network ports: ± 0.5 kV
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 signal lines and ground when use 1.2/50(8/20) waveform. 40 Ω (15 Ω +25 Ω) between outdoor unscreened symmetrical interconnection line and ground when use 10/700(5/320) waveform.
Number of Tests and Polarity	5 positive and 5 negative at selected points
Phase Angle	AC Port: 0°/90°/180°/270° Signal Port: N/A
Pulse Repetition Rate	1 time / minute (maximum)

4.8.2 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.

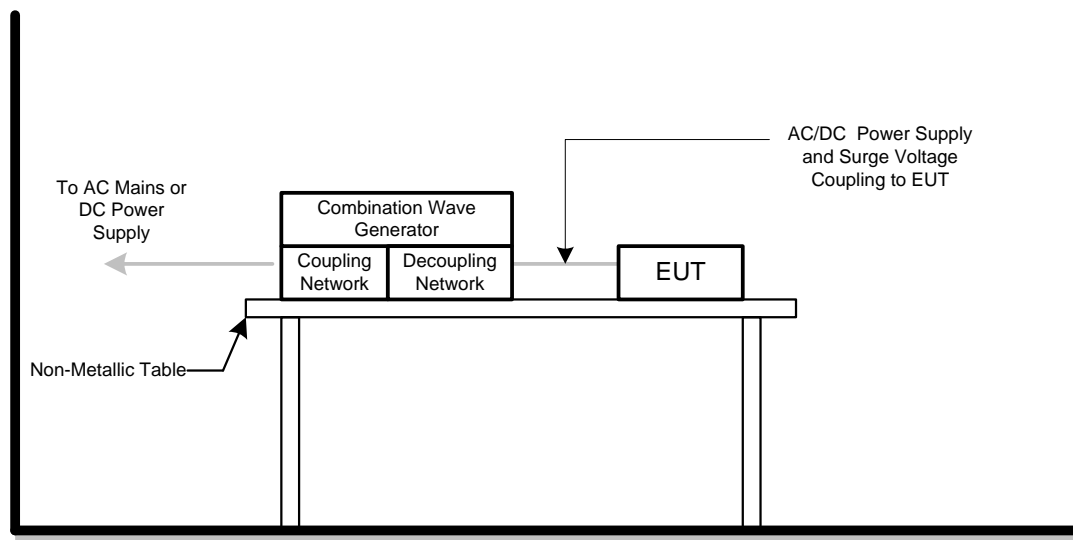
4.8.3 TEST PROCEDURE

- 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).

4.8.4 DEVIATION FROM TEST STANDARD

No deviation.

4.8.5 TEST SETUP



4.8.6 TEST RESULT

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

Test Result for AC Power – 1.2/50(8/20)Tr/Th μ s								
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/Th μ s								
Indoor Signal lines								
Tested on	Polarity	Test Voltage(kV)				Criterion	Observation	Result
		0.5	-	-	-			
RJ-45 (L-PE)	+/-	A				B	A	PASS

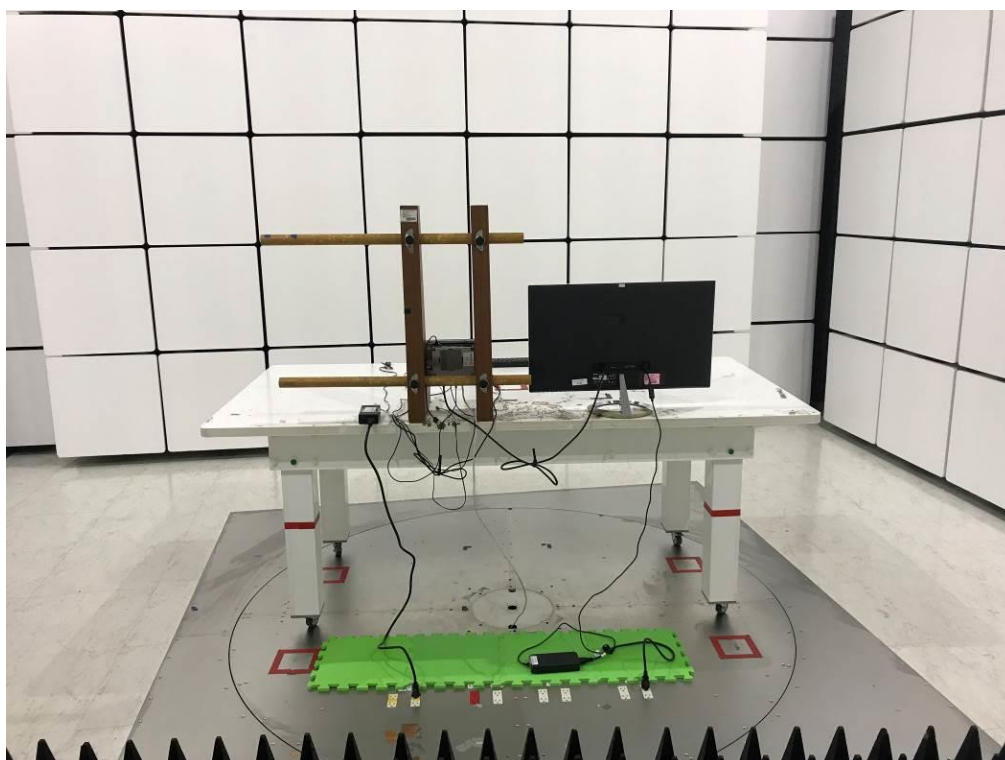
NOTE:

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

5 TEST PHOTOS

Radiated emissions up to 1 GHz test photos

Mode 1



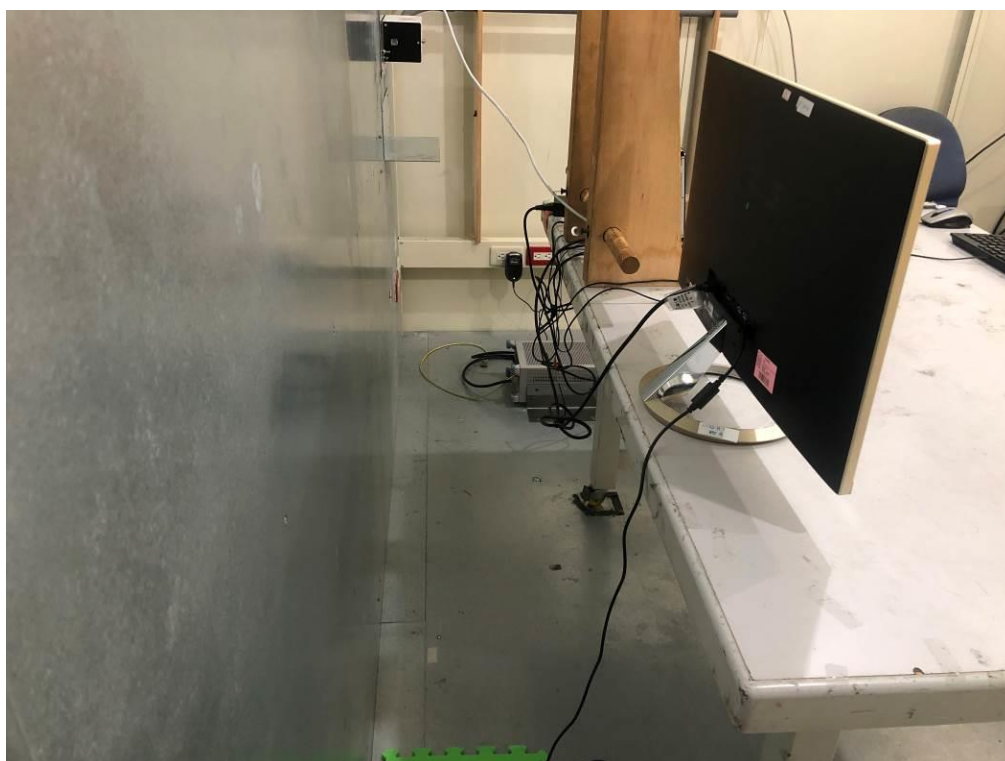
Radiated emissions above 1 GHz test photos

Mode 1



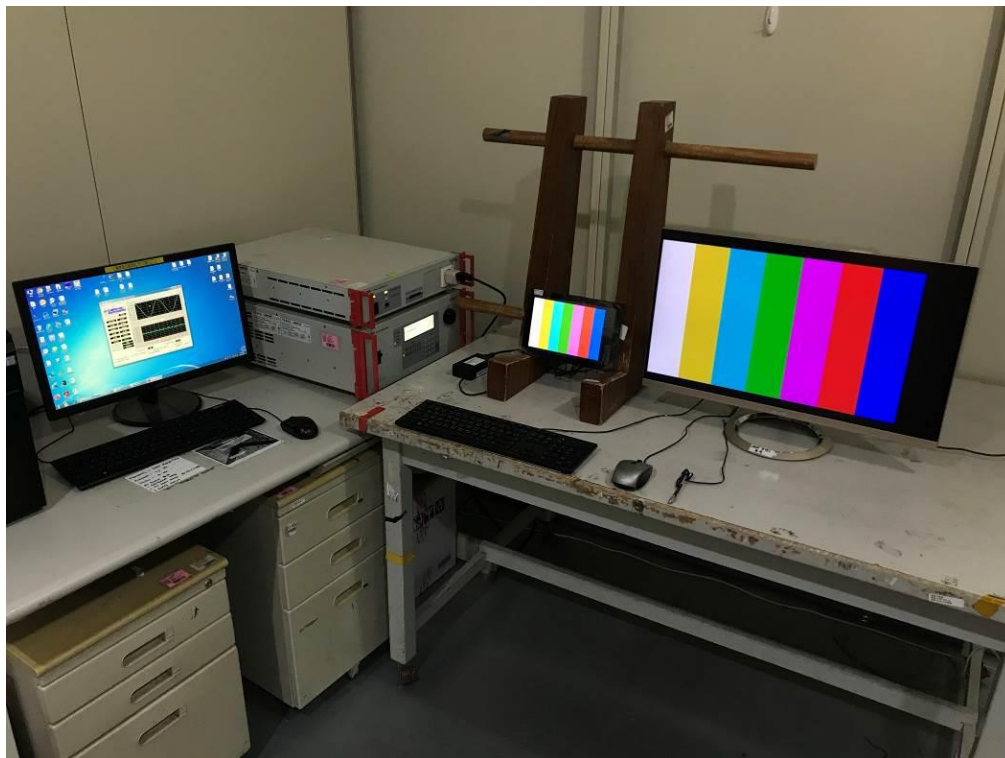
Conducted emission at AC mains input/output port test photos

Mode 1



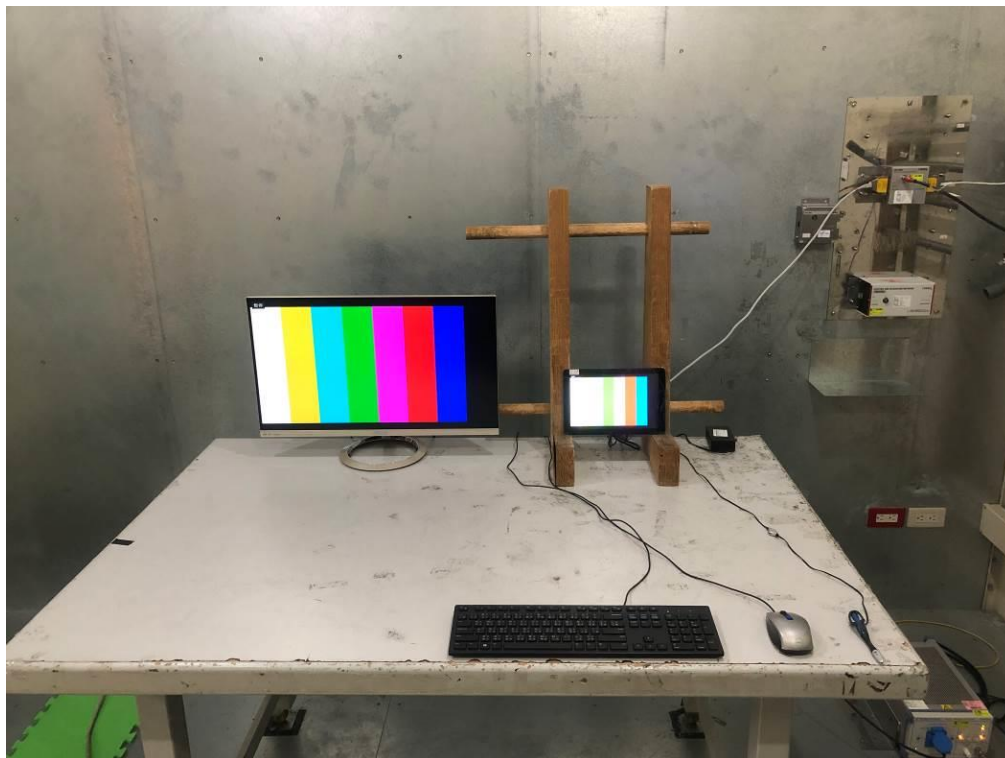
Harmonic current emissions & Voltage fluctuations and flicker test photos

Mode 1



Conducted emission at wired network port test photos

Mode 1

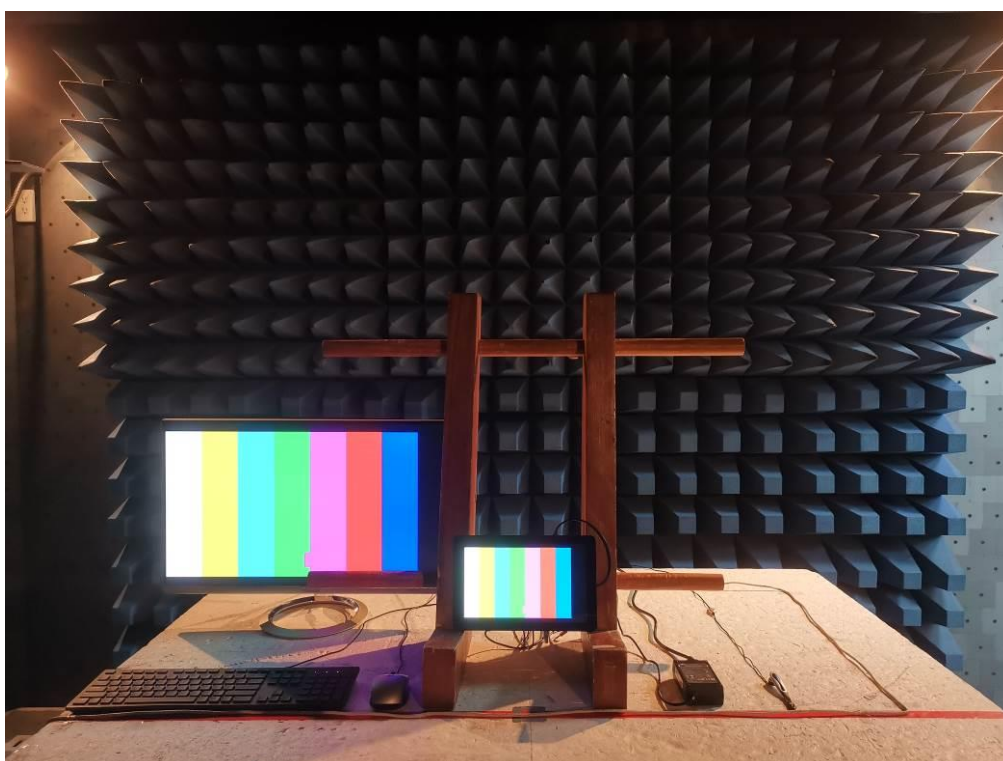


Immunity test photos

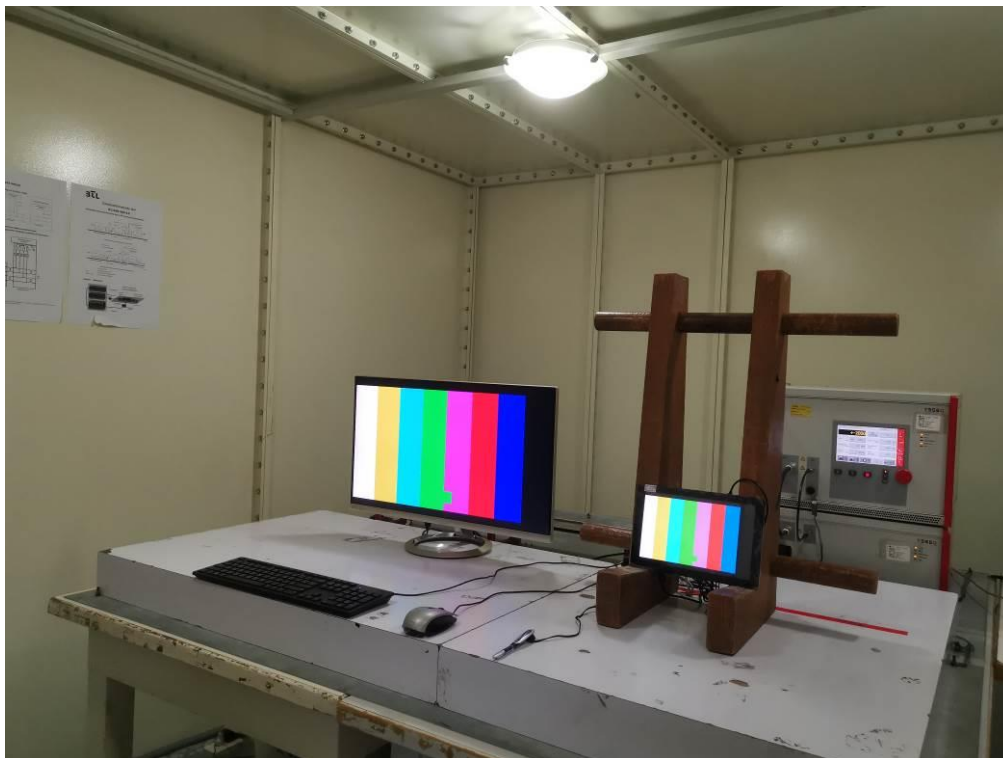
RF electromagnetic field Mode 1



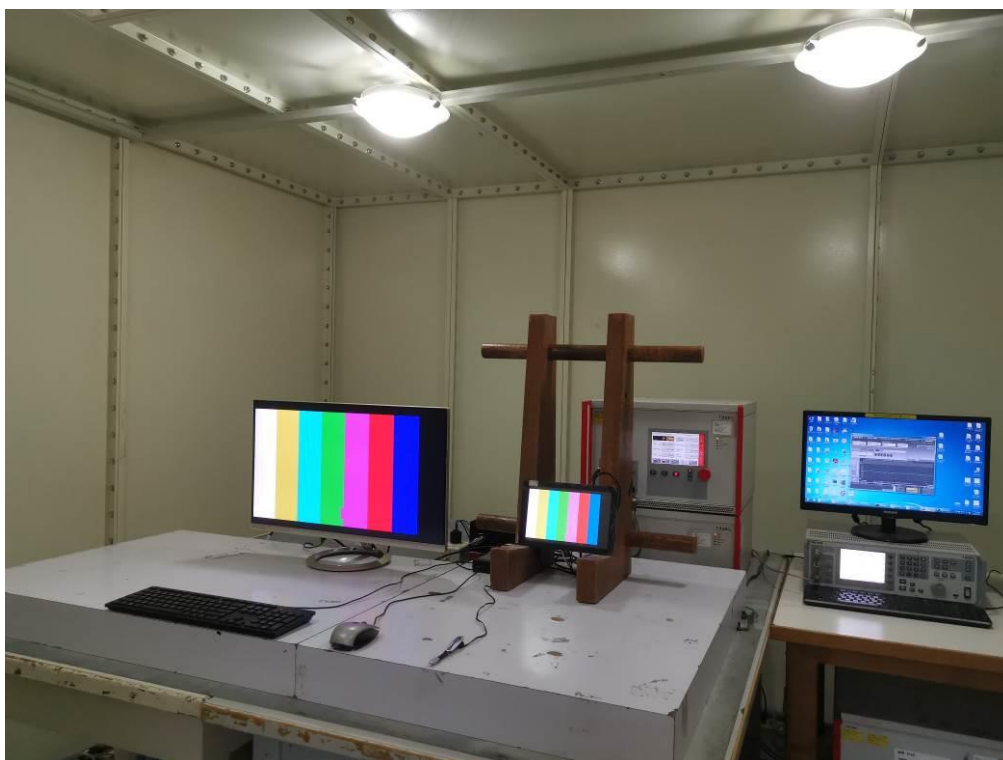
Electrostatic discharge Mode 1



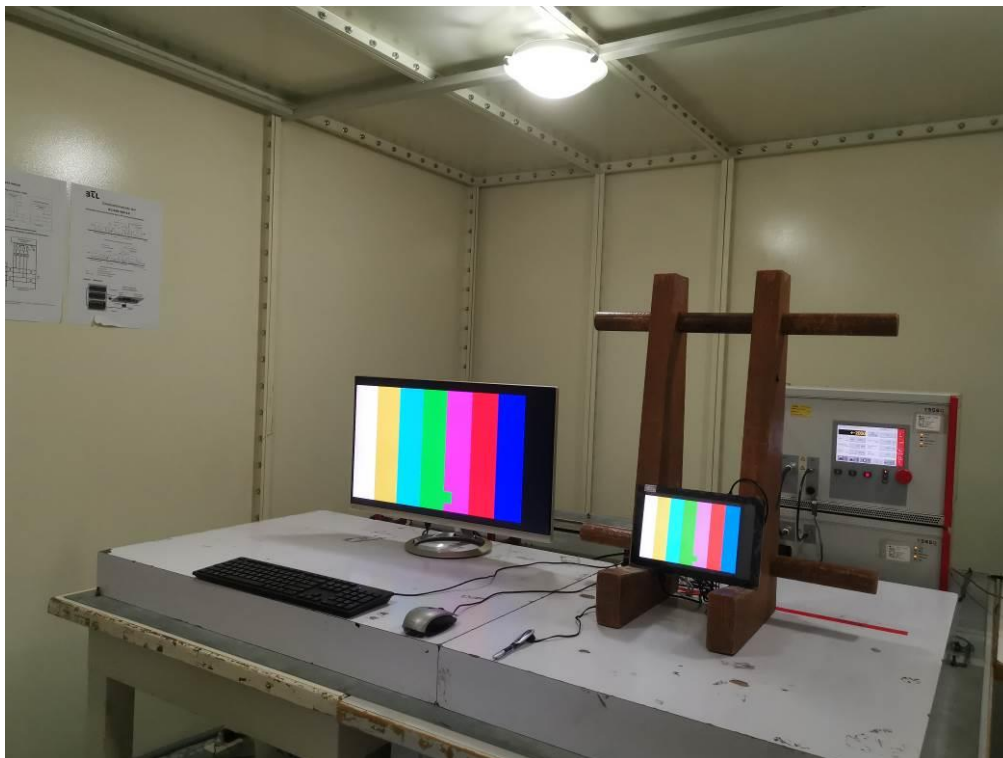
Fast transients common mode Mode 1



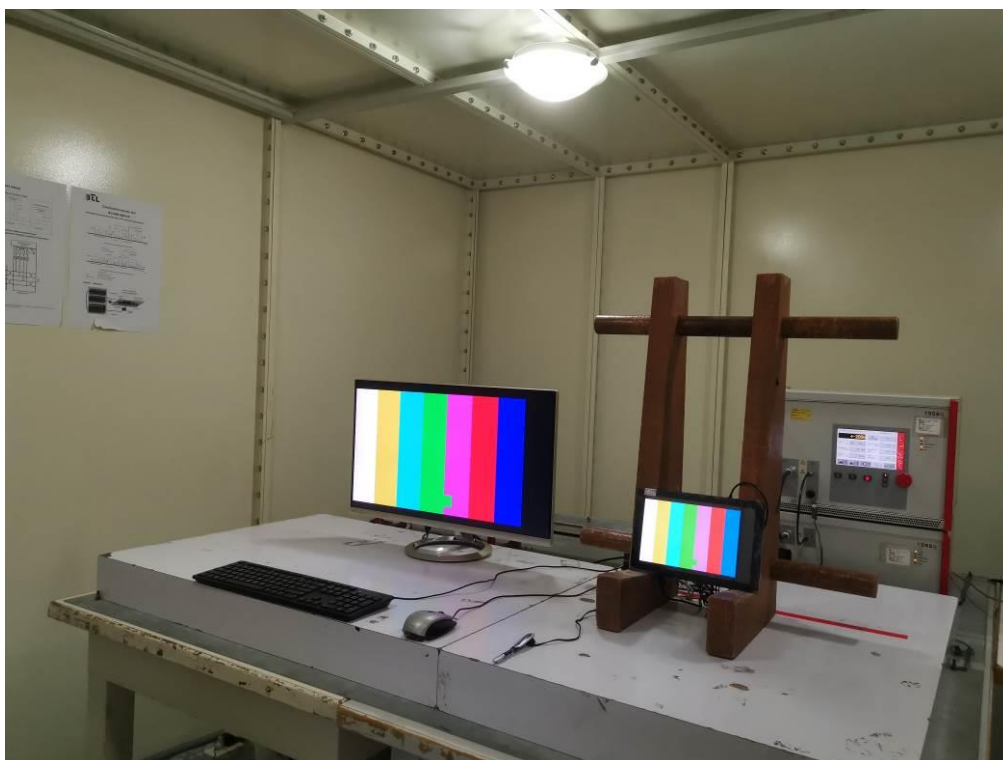
RF common mode Mode 1



Voltage dips and interruptions Mode 1



Surges Mode 1



6 EUT PHOTOS

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

End of Test Report