

CE EMC Test Report

Report No. : BTL-EMC-2-2012T163
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 61000-6-4:2007+A1:2011
 BS EN 61000-6-4:2007+A1:2011
 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 IEC 61000-6-2:2019
 BS EN IEC 61000-6-2:2019

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.

CONTENTS

CONTENTS	3
REVISION HISTORY	6
1 SUMMARY OF TEST RESULTS	7
1.1 TEST FACILITY	8
1.2 MEASUREMENT UNCERTAINTY	8
1.3 TEST ENVIRONMENT CONDITIONS	9
2 GENERAL INFORMATION	10
2.1 EUT INFORMATION	10
2.2 TEST MODES	11
2.3 EUT OPERATING CONDITION	11
2.4 TESTED CONFIGURATION DIAGRAM	12
2.5 SUPPORT UNITS	12
3 EMC EMISSION TEST	13
3.1 EMISSION-ENCLOSURE PORT TEST (BELOW 1 GHZ)	13
3.1.1 LIMITS	13
3.1.2 MEASUREMENT INSTRUMENTS LIST	14
3.1.3 TEST PROCEDURE	14
3.1.4 DEVIATION FROM TEST STANDARD	14
3.1.5 TEST SETUP	15
3.1.6 TEST RESULT	16
3.2 EMISSION-ENCLOSURE PORT TEST (ABOVE 1 GHZ)	18
3.2.1 LIMITS	18
3.2.2 MEASUREMENT INSTRUMENTS LIST	19
3.2.3 TEST PROCEDURE	19
3.2.4 DEVIATION FROM TEST STANDARD	20
3.2.5 TEST SETUP	20
3.2.6 TEST RESULT	21
3.3 LOW VOLTAGE AC MAINS TEST	23
3.3.1 LIMITS	23
3.3.2 MEASUREMENT INSTRUMENTS LIST	23
3.3.3 TEST PROCEDURE	24
3.3.4 DEVIATION FROM TEST STANDARD	24
3.3.5 TEST SETUP	24
3.3.6 TEST RESULT	25
3.4 TELECOMMUNICATIONS/NETWORK TEST	27
3.4.1 LIMITS	27
3.4.2 MEASUREMENT INSTRUMENTS LIST	27
3.4.3 TEST PROCEDURE	28
3.4.4 DEVIATION FROM TEST STANDARD	28
3.4.5 TEST SETUP	29
3.4.6 TEST RESULT	31
3.5 HARMONIC CURRENT EMISSIONS TEST	33
3.5.1 LIMITS	33
3.5.2 MEASUREMENT INSTRUMENTS LIST	33
3.5.3 TEST PROCEDURE	34
3.5.4 DEVIATION FROM TEST STANDARD	34

3.5.5	TEST SETUP	34
3.5.6	TEST RESULT	35
3.6	VOLTAGE CHANGES, VOLTAGE FLUCTUATIONS AND FLICKER TEST	38
3.6.1	LIMITS	38
3.6.2	MEASUREMENT INSTRUMENTS LIST	38
3.6.3	TEST PROCEDURE	38
3.6.4	DEVIATION FROM TEST STANDARD	38
3.6.5	TEST SETUP	39
3.6.6	TEST RESULT	40
4	IMMUNITY TEST	41
4.1	STANDARD COMPLIANCE/SEVERITY LEVEL/CRITERION	41
4.2	PERFORMANCE CRITERIA	43
4.3	ELECTROSTATIC DISCHARGE TEST (ESD)	44
4.3.1	TEST SPECIFICATION	44
4.3.2	MEASUREMENT INSTRUMENTS LIST	44
4.3.3	TEST PROCEDURE	44
4.3.4	DEVIATION FROM TEST STANDARD	45
4.3.5	TEST SETUP	45
4.3.6	TEST RESULT	46
4.4	RADIO-FREQUENCY ELECTROMAGNETIC FIELD. AMPLITUDE MODULATED TEST (RS)	50
4.4.1	TEST SPECIFICATION	50
4.4.2	MEASUREMENT INSTRUMENTS LIST	50
4.4.3	TEST PROCEDURE	51
4.4.4	DEVIATION FROM TEST STANDARD	51
4.4.5	TEST SETUP	51
4.4.6	TEST RESULT	52
4.5	FAST TRANSIENTS TEST (EFT/BURST)	53
4.5.1	TEST SPECIFICATION	53
4.5.2	MEASUREMENT INSTRUMENTS LIST	53
4.5.3	TEST PROCEDURE	53
4.5.4	DEVIATION FROM TEST STANDARD	53
4.5.5	TEST SETUP	54
4.5.6	TEST RESULT	55
4.6	SURGES TEST	56
4.6.1	TEST SPECIFICATION	56
4.6.2	MEASUREMENT INSTRUMENTS LIST	56
4.6.3	TEST PROCEDURE	57
4.6.4	DEVIATION FROM TEST STANDARD	57
4.6.5	TEST SETUP	57
4.6.6	TEST RESULT	58
4.7	RADIO-FREQUENCY COMMON MODE TEST (CS)	59
4.7.1	TEST SPECIFICATION	59
4.7.2	MEASUREMENT INSTRUMENTS LIST	59
4.7.3	TEST PROCEDURE	59
4.7.4	DEVIATION FROM TEST STANDARD	59
4.7.5	TEST SETUP	60
4.7.6	TEST RESULT	61
4.8	POWER-FREQUENCY MAGNETIC FIELD TEST (PFMF)	62

4.8.1	TEST SPECIFICATION	62
4.8.2	MEASUREMENT INSTRUMENTS LIST	62
4.8.3	TEST PROCEDURE	62
4.8.4	DEVIATION FROM TEST STANDARD	62
4.8.5	TEST SETUP	63
4.8.6	TEST RESULT	64
4.9	VOLTAGE DIPS AND VOLTAGE INTERRUPTIONS TEST	65
4.9.1	TEST SPECIFICATION	65
4.9.2	MEASUREMENT INSTRUMENTS LIST	65
4.9.3	TEST PROCEDURE	65
4.9.4	DEVIATION FROM TEST STANDARD	65
4.9.5	TEST SETUP	66
4.9.6	TEST RESULT	67
5	TEST PHOTOS	69
6	EUT PHOTOS	78

REVISION HISTORY

Report No.	Version	Description	Issued Date
BTL-EMC-2-2012T163	R00	Original Report.	2021/3/9

1 SUMMARY OF TEST RESULTS

EMC emission				
Standard	Test Item		Limit	Judgment
EN 61000-6-4:2007+A1:2011 BS EN 61000-6-4:2007+A1:2011	Enclosure	30 MHz to 230 MHz 230 MHz to 1 000 MHz	Class A	PASS
		1 GHz to 3 GHz 3 GHz to 6 GHz	Class A	PASS
	Low voltage AC mains	0,15 MHz to 0,5 MHz 0,5 MHz to 30 MHz	Class A	PASS
	Telecommunications/ network	0,15 MHz to 0,5 MHz 0,5 MHz to 30 MHz	Class A	PASS

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	Environmental phenomenon	Performance Criterion Limit	Judgment
EN IEC 61000-6-2:2019 BS EN IEC 61000-6-2:2019	EN 61000-4-2:2009	Electrostatic discharge	B	PASS
	EN 61000-4-3:2006 +A1:2008+A2:2010	Radio-frequency electromagnetic field. Amplitude modulated	A	PASS
	EN 61000-4-4:2012	Fast transients	B	PASS
	EN 61000-4-5:2014 +A1:2017	Surges	B	PASS
	EN 61000-4-6:2014 +AC:2015	Radio-frequency common mode	A	PASS
	EN 61000-4-8:2010	Power-frequency magnetic field	A	PASS
	EN IEC 61000-4-11:2020+ AC:2020-06	Voltage dips and Voltage interruptions	NOTE (2)	PASS

NOTE:

- (1) "N/A" denotes test is not applicable in this Test Report.
- (2) For voltage dips residual 0 % is Criterion B.
For voltage dips residual 40 % is Criterion C.
For voltage dips residual 70 % is Criterion C.
For voltage interruptions residual 0 % is Criterion C.
- (3) 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.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_{CISPR} requirement.

A. Enclosure (Below 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. Enclosure (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. Low voltage AC mains test:

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

D. Telecommunications/network 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
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 %
SR01	EN 61000-4-6	voltage duration time(td)	10.20 %
		CDN M3 test process	1.34 dB
SR01	EN 61000-4-6	EM clamp test process	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 61000-6-4		
Enclosure (Below 1 GHz)	21°C, 67%	Loki Chiang
Enclosure (Above 1 GHz)	20°C, 62%	Duke Chen
Low voltage AC mains	25°C, 59%	Loki Chiang
Telecommunications/network	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 IEC 61000-6-2		
Electrostatic discharge	24°C, 44%, 1006hPa	Eric Wu
Radio-frequency electromagnetic field. Amplitude modulated	24°C, 55%	Roy Kang
Fast transients	24°C, 43%	Eric Wu
Surges	24°C, 43%	Eric Wu
Radio-frequency common mode	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.

Enclosure (Below 1 GHz) test	
Final Test Mode	Description
Mode 1	FULL SYSTEM HDMI 1280*800/60HZ

Enclosure (Above 1 GHz) test	
Final Test Mode	Description
Mode 1	FULL SYSTEM HDMI 1280*800/60HZ

Low voltage AC mains test	
Final Test Mode	Description
Mode 1	FULL SYSTEM HDMI 1280*800/60HZ

Telecommunications/network 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

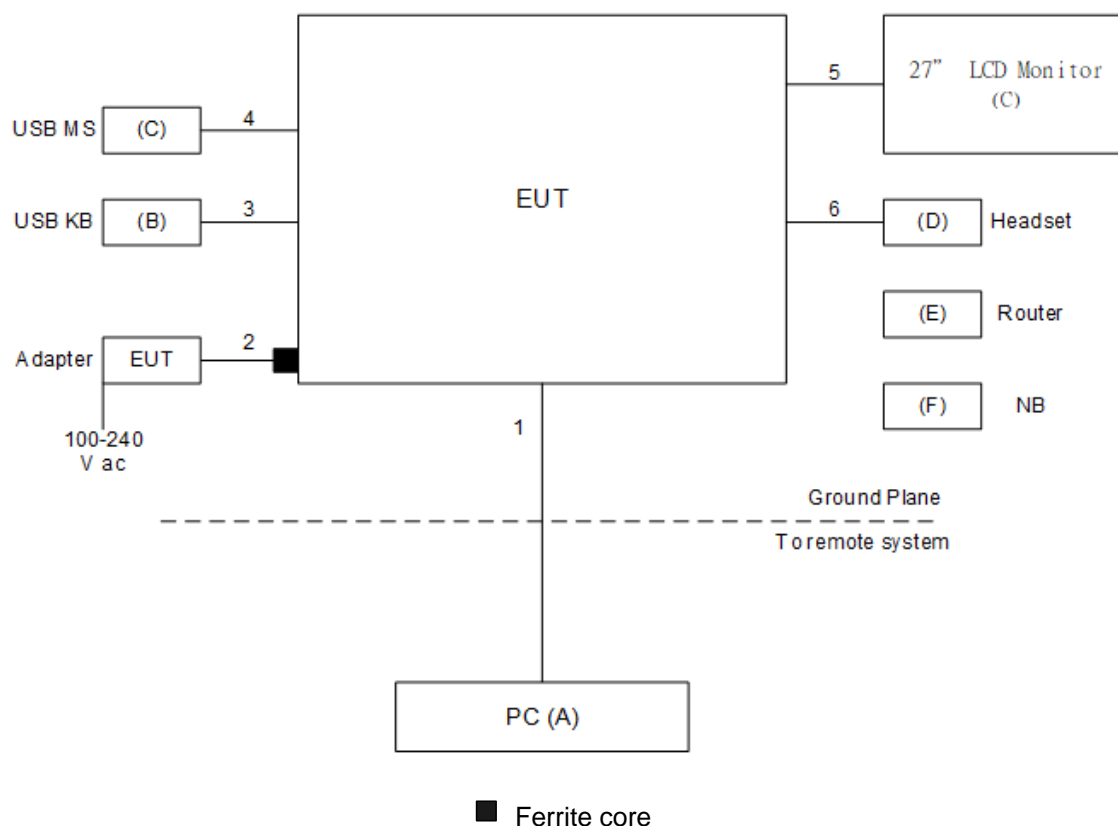
Immunity tests	
Final Test Mode	Description
Mode 1	FULL SYSTEM HDMI 1280*800/60HZ

2.3 EUT OPERATING CONDITION

The EUT exercise program (BurninTEST V9.1) 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 EMISSION-ENCLOSURE PORT TEST (BELOW 1 GHZ)

3.1.1 LIMITS

Table 1 – Emission – Enclosure port

Table Clause	Port	Frequency range	Limits	Basic standard	Applicability note	Remarks
1.1	Enclosure Test facility: OATS or SAC	30 MHz to 230 MHz 230 MHz to 1 000 MHz	40 dB(μV/m) quasi-peak at 10 m 47 dB(μV/m) quasi-peak at 10 m	The measurement instrumentation shall be as defined in 4 of CISPR 16-1-1. The measuring antennas shall be as defined in 4.4 of CISPR 16-1-4. The measuring site shall be as described in Clause 5 of CISPR 16-1-4. The measurement method shall be as specified in 7.2 of CISPR 16-2-3.	See ^{a, b and e}	May be measured at 30 m distance using the limits decreased by 10 dB. As stated in CISPR 16-2-3 the antenna height shall be varied between 1 m to 4 m. Additional guidance on the test method can be found in CISPR 16-2-3 clause 7.3 and clause 8.
1.2	Enclosure Test facility: FAR	30 MHz to 230 MHz 230 MHz to 1 000 MHz	52 dB(μV/m) to 45 dB(μV/m) quasi-peak at 3 m Limit reducing linearly with the logarithm of the frequency. 52 dB(μV/m) quasi-peak at 3 m	The measurement instrumentation shall be as defined in 4 of CISPR 16-1-1. The measuring antennas shall be as defined in 4.4 of CISPR 16-1-4. The measuring site shall be as described in Clause 5.8 of CISPR 16-1-4. The measurement method shall be as specified in 7.2.9.2 of CISPR 16-2-3.	See ^{a, b and e} Only applicable to table top equipment	May be measured at greater distances with the limits decreased by 20 dB/decade (relative to distance) The limitations on EUT size in CISPR 16-1-4 apply
1.3	Enclosure Test facility: TEM Waveguide	30 MHz to 230 MHz 230 MHz to 1 000 MHz	40 dB(μV/m) quasi-peak 47 dB(μV/m) quasi-peak The small-EUT correction factor given in A.4.3 of IEC 61000-4-20 shall be used. The limit relates to the OATS measurement distance of 10 m	IEC 61000-4-20	Only applicable to battery powered equipment not intended to have external cables attached. Restricted to equipment complying with the definition 6.2 in IEC61000-4-20. See ^{a, b and e}	
Table Clause	Port	Frequency range	Limits	Basic standard	Applicability note	Remarks
1.4	Enclosure Test facility: OATS, SAC or FAR	1 GHz to 3 GHz 3 GHz to 6 GHz	76 dB(μV/m) peak at 3 m 56 dB(μV/m) average at 3 m 80 dB(μV/m) peak at 3 m 60 dB(μV/m) average at 3 m	The measurement instrumentation shall be as defined in 5 and 6 of CISPR 16-1-1. The measuring antennas shall be as defined in 4.5 of CISPR 16-1-4. The measuring site shall be as described in Clause 8 of CISPR 16-1-4. The measurement method shall be as specified in 7.3 of CISPR 16-2-3.	See ^{a, c, d and e}	May be measured at greater distances with the limits decreased by 20 dB/decade (relative to distance) For SAC and OATS facilities absorber may be required to achieve free space conditions as defined in CISPR 16-1-4.
^a For apparatus containing devices operating at frequencies less than 9 kHz, measurements only need to be performed up to 230 MHz.						
^b The apparatus is deemed to comply with the enclosure port requirement below 1 GHz if it meets the requirements defined in one or more of the table clauses 1.1, 1.2 or 1.3.						
^c If the highest internal frequency of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz. If the highest internal frequency of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz. If the highest internal frequency of the EUT is between 500 MHz and 1 GHz, the measurement shall only be made up to 5 GHz. If the highest internal frequency of the EUT is above 1 GHz, the measurement shall be made up to 6 GHz. Where the highest internal frequency is not known, tests shall be performed up to 6 GHz.						
^d The peak detector limits shall not be applied to disturbances produced by arcs or sparks that are high voltage breakdown events. Such disturbances arise when devices contain or control mechanical switches that control current in inductors, or when devices contain or control subsystems that create static electricity (such as paper handling devices). The average limits apply to disturbances from arcs or sparks, and both peak and average limits will apply to other disturbances from such devices.						
^e At transitional frequencies, the lower limit applies.						

NOTE:

- The tighter limit applies at the band edges.
- Emission level (dBuV/m) = 20log Emission level (uV/m).
3 m Emission level = 10 m Emission level + 20log(10 m/3 m).
- 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_EMCI (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.

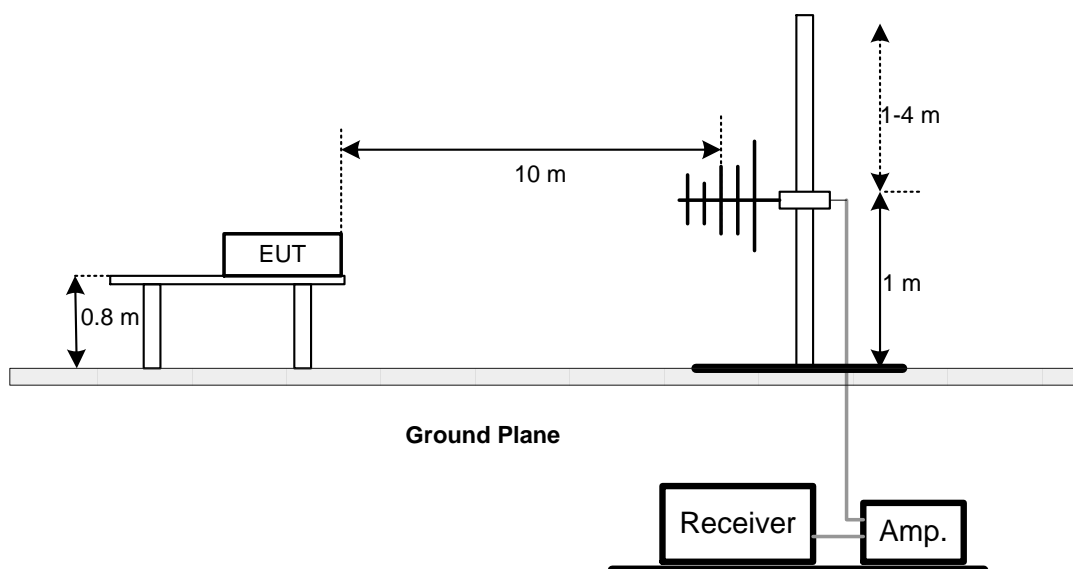
3.1.3 TEST PROCEDURE

- a. The separation distance of 10 m was used for measurements below 1 GHz.
The EUT was placed on the top of a rotating table 0.8 m above the ground in a 10 m open area test site.
- b. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the receive antenna was varied between 1 m and 4 m. Both horizontal and vertical polarizations of the antenna were checked.
- d. For each suspected emission, the EUT was arranged at its worst case and then the antenna was scanned in height to find the maximum.
- e. The EUT is scanned with the receiver using the peak detector.
Significant peaks are then marked and re-measured using the Quasi Peak detector.
- f. All readings are Peak unless otherwise stated QP or AVG in the results. For compliance the QP reading must be less than the limit.
- g. 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 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		65.3100	28.14	-1.54	26.60	40.00	-13.40	QP	100	360
2		89.0200	33.65	-5.92	27.73	40.00	-12.27	QP	100	51
3		215.8200	28.73	-3.36	25.37	40.00	-14.63	QP	100	234
4		799.3500	21.29	10.41	31.70	47.00	-15.30	QP	100	142
5		889.5300	20.64	11.61	32.25	47.00	-14.75	QP	200	159
6	*	1000.000	23.58	13.24	36.82	47.00	-10.18	QP	100	234

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		625.3400	27.21	7.66	34.87	47.00	-12.13	QP	300	359
2		712.6800	24.98	9.07	34.05	47.00	-12.95	QP	300	198
3		799.5400	28.43	10.42	38.85	47.00	-8.15	QP	300	142
4		889.4600	24.26	11.61	35.87	47.00	-11.13	QP	400	163
5		960.2500	21.59	12.65	34.24	47.00	-12.76	QP	300	211
6	*	1000.000	27.33	13.24	40.57	47.00	-6.43	QP	300	184

REMARKS:

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

3.2 EMISSION-ENCLOSURE PORT TEST (ABOVE 1 GHZ)

3.2.1 LIMITS

Table 1 – Emission – Enclosure port

Table Clause	Port	Frequency range	Limits	Basic standard	Applicability note	Remarks
1.1	Enclosure Test facility: OATS or SAC	30 MHz to 230 MHz 230 MHz to 1 000 MHz	40 dB(μV/m) quasi-peak at 10 m 47 dB(μV/m) quasi-peak at 10 m	The measurement instrumentation shall be as defined in 4 of CISPR 16-1-1. The measuring antennas shall be as defined in 4.4 of CISPR 16-1-4. The measuring site shall be as described in Clause 5 of CISPR 16-1-4. The measurement method shall be as specified in 7.2 of CISPR 16-2-3.	See ^{a, b and e}	May be measured at 30 m distance using the limits decreased by 10 dB. As stated in CISPR 16-2-3 the antenna height shall be varied between 1 m to 4 m. Additional guidance on the test method can be found in CISPR 16-2-3 clause 7.3 and clause 8.
1.2	Enclosure Test facility: FAR	30 MHz to 230 MHz 230 MHz to 1 000 MHz	52 dB(μV/m) to 45 dB(μV/m) quasi-peak at 3 m Limit reducing linearly with the logarithm of the frequency. 52 dB(μV/m) quasi-peak at 3 m	The measurement instrumentation shall be as defined in 4 of CISPR 16-1-1. The measuring antennas shall be as defined in 4.4 of CISPR 16-1-4. The measuring site shall be as described in Clause 5.8 of CISPR 16-1-4. The measurement method shall be as specified in 7.2.9.2 of CISPR 16-2-3.	See ^{a, b and e} Only applicable to table top equipment	May be measured at greater distances with the limits decreased by 20 dB/decade (relative to distance) The limitations on EUT size in CISPR 16-1-4 apply
1.3	Enclosure Test facility: TEM Waveguide	30 MHz to 230 MHz 230 MHz to 1 000 MHz	40 dB(μV/m) quasi-peak 47 dB(μV/m) quasi-peak The small-EUT correction factor given in A.4.3 of IEC 61000-4-20 shall be used. The limit relates to the OATS measurement distance of 10 m	IEC 61000-4-20	Only applicable to battery powered equipment not intended to have external cables attached. Restricted to equipment complying with the definition 6.2 in IEC61000-4-20. See ^{a, b and e}	
Table Clause	Port	Frequency range	Limits	Basic standard	Applicability note	Remarks
1.4	Enclosure Test facility: OATS, SAC or FAR	1 GHz to 3 GHz 3 GHz to 6 GHz	76 dB(μV/m) peak at 3 m 56 dB(μV/m) average at 3 m 80 dB(μV/m) peak at 3 m 60 dB(μV/m) average at 3 m	The measurement instrumentation shall be as defined in 5 and 6 of CISPR 16-1-1. The measuring antennas shall be as defined in 4.5 of CISPR 16-1-4. The measuring site shall be as described in Clause 8 of CISPR 16-1-4. The measurement method shall be as specified in 7.3 of CISPR 16-2-3.	See ^{a, c, d and e}	May be measured at greater distances with the limits decreased by 20 dB/decade (relative to distance) For SAC and OATS facilities absorber may be required to achieve free space conditions as defined in CISPR 16-1-4.
^a For apparatus containing devices operating at frequencies less than 9 kHz, measurements only need to be performed up to 230 MHz. ^b The apparatus is deemed to comply with the enclosure port requirement below 1 GHz if it meets the requirements defined in one or more of the table clauses 1.1, 1.2 or 1.3. ^c If the highest internal frequency of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz. If the highest internal frequency of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz. If the highest internal frequency of the EUT is between 500 MHz and 1 GHz, the measurement shall only be made up to 5 GHz. If the highest internal frequency of the EUT is above 1 GHz, the measurement shall be made up to 6 GHz. Where the highest internal frequency is not known, tests shall be performed up to 6 GHz. ^d The peak detector limits shall not be applied to disturbances produced by arcs or sparks that are high voltage breakdown events. Such disturbances arise when devices contain or control mechanical switches that control current in inductors, or when devices contain or control subsystems that create static electricity (such as paper handling devices). The average limits apply to disturbances from arcs or sparks, and both peak and average limits will apply to other disturbances from such devices. ^e At transitional frequencies, the lower limit applies.						

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	-	56	=	-14.88

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.

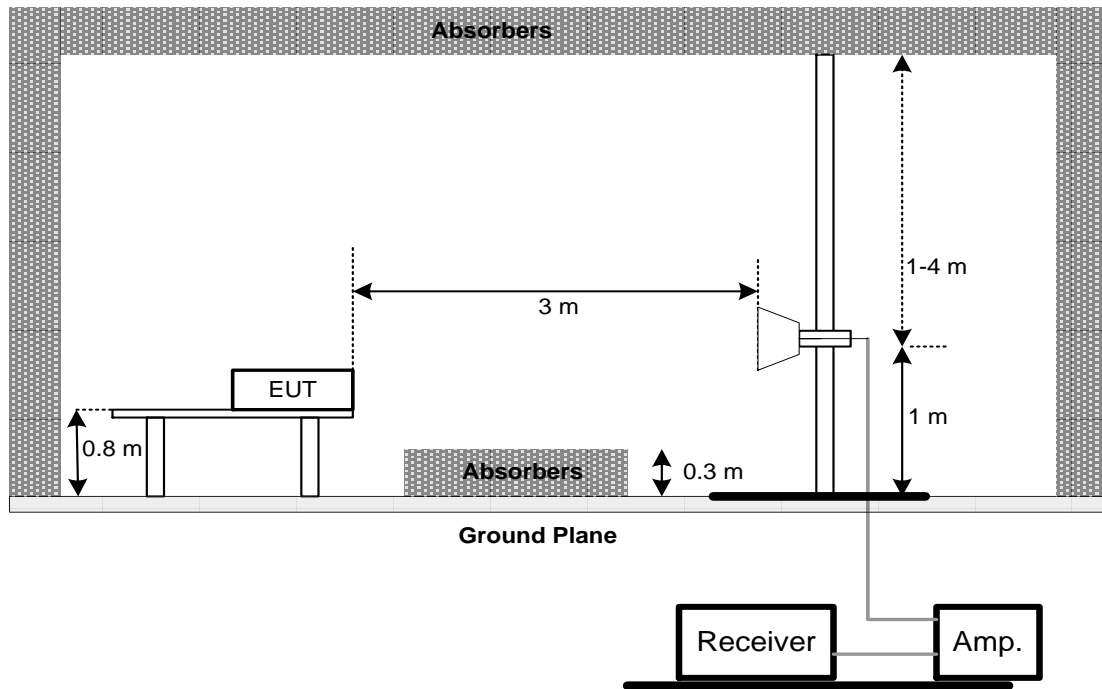
3.2.3 TEST PROCEDURE

- 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. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the receive antenna was varied between 1 m and 4 m. Both horizontal and vertical polarizations of the antenna were checked.
- d. 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.
- e. The receiver was set to use the average detector with a 1 MHz bandwidth and maximum hold mode.
- f. All readings are Peak unless otherwise stated QP or AVG in the results. For compliance the AVG reading must be less than the limit.
- g. Additionally for compliance, the peak reading is checked to insure it is less than 20 dB above the AVG limit.
- h. For the actual test configuration, please refer to the related Item - TEST PHOTOS.

3.2.4 DEVIATION FROM TEST STANDARD

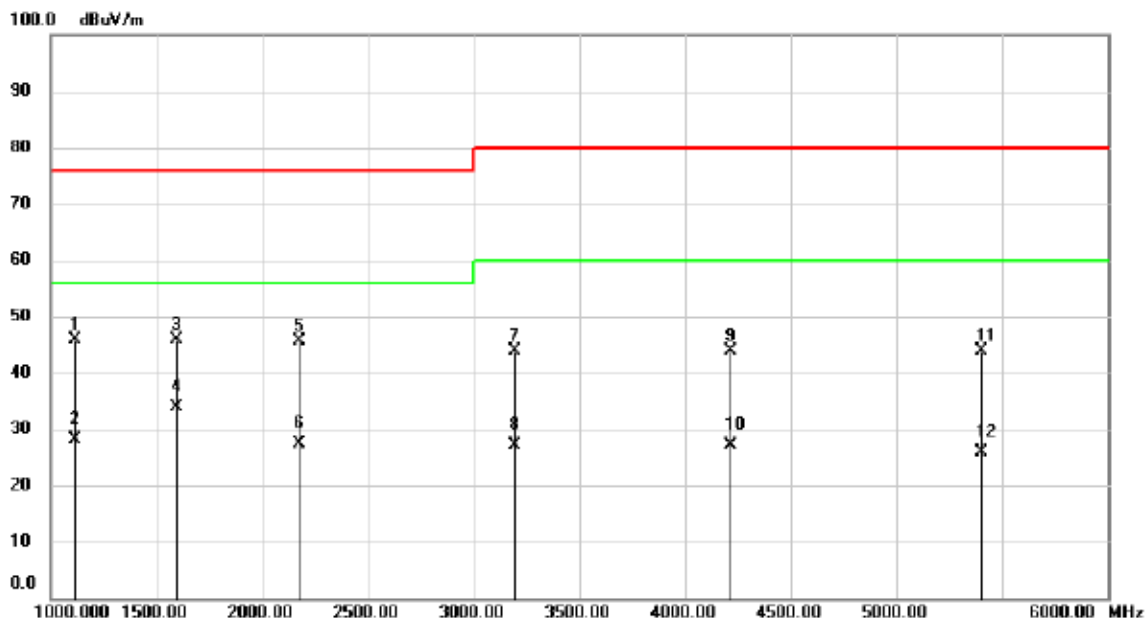
No deviation.

3.2.5 TEST SETUP



3.2.6 TEST RESULT

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



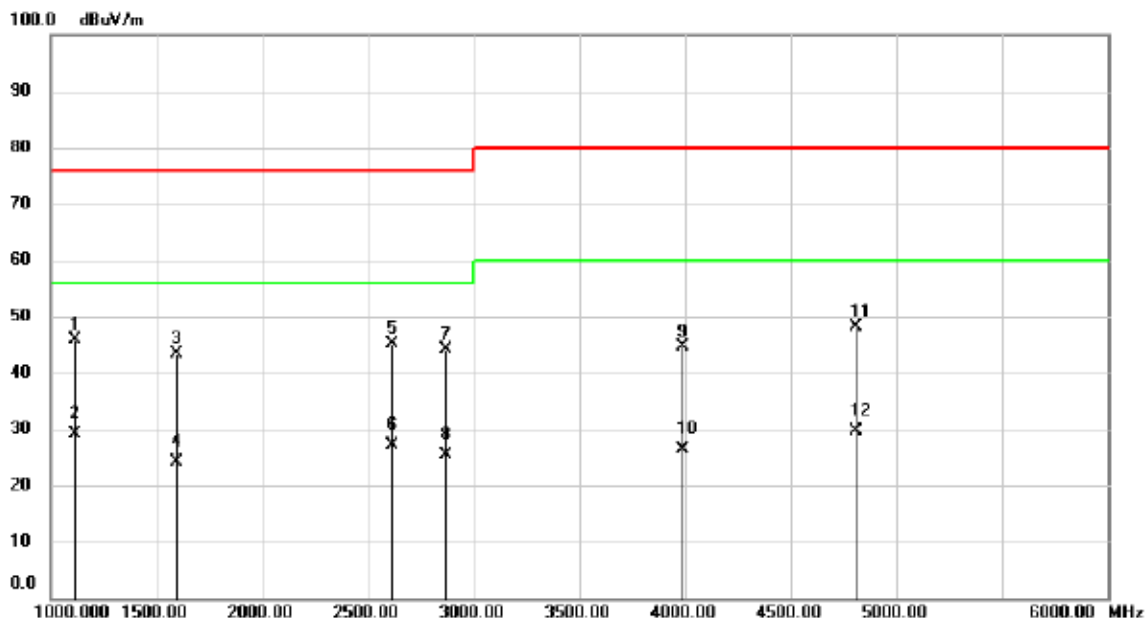
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		1119.048	67.10	-21.25	45.85	76.00	-30.15	peak	100	253
2		1119.048	49.36	-21.25	28.11	56.00	-27.89	AVG	100	253
3		1595.238	65.18	-19.38	45.80	76.00	-30.20	peak	100	142
4	*	1595.238	53.29	-19.38	33.91	56.00	-22.09	AVG	100	142
5		2173.469	60.49	-14.76	45.73	76.00	-30.27	peak	100	210
6		2173.469	42.13	-14.76	27.37	56.00	-28.63	AVG	100	210
7		3193.878	56.34	-12.55	43.79	80.00	-36.21	peak	100	139
8		3193.878	39.58	-12.55	27.03	60.00	-32.97	AVG	100	139
9		4214.286	54.66	-10.72	43.94	80.00	-36.06	peak	100	248
10		4214.286	37.82	-10.72	27.10	60.00	-32.90	AVG	100	248
11		5404.762	53.21	-9.36	43.85	80.00	-36.15	peak	100	122
12		5404.762	35.21	-9.36	25.85	60.00	-34.15	AVG	100	122

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		1119.048	67.24	-21.25	45.99	76.00	-30.01	peak	100	331
2	*	1119.048	50.39	-21.25	29.14	56.00	-26.86	AVG	100	331
3		1595.238	62.69	-19.38	43.31	76.00	-32.69	peak	200	172
4		1595.238	43.55	-19.38	24.17	56.00	-31.83	AVG	200	172
5		2615.646	59.37	-14.27	45.10	76.00	-30.90	peak	200	223
6		2615.646	41.36	-14.27	27.09	56.00	-28.91	AVG	200	223
7		2870.748	56.59	-12.55	44.04	76.00	-31.96	peak	200	151
8		2870.748	37.81	-12.55	25.26	56.00	-30.74	AVG	200	151
9		3993.197	55.62	-10.92	44.70	80.00	-35.30	peak	100	246
10		3993.197	37.28	-10.92	26.36	60.00	-33.64	AVG	100	246
11		4809.524	57.83	-9.64	48.19	80.00	-31.81	peak	100	139
12		4809.524	39.24	-9.64	29.60	60.00	-30.40	AVG	100	139

REMARKS:

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

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

3.3 LOW VOLTAGE AC MAINS TEST

3.3.1 LIMITS

Table 2 – Emission – Low voltage AC mains port

Table clause	Port	Frequency range	Limits	Basic standard	Applicability note	Remarks
2.1	Low voltage AC mains	0,15 MHz to 0,5 MHz	79 dB(μV) quasi-peak 66 dB(μV) average	The measurement instrumentation shall be as defined in 4 and 6 of CISPR 16-1-1.	See ^a and ^b	
		0,5 MHz to 30 MHz	73 dB(μV) quasi-peak 60 dB(μV) average	The measuring networks shall be as defined in 4 of CISPR 16-1-2. The measurement set up and method shall be as described in Clause 7 of CISPR 16-2-1.		
^a Impulse noise (clicks) which occur less than five times per minute is not considered. For clicks appearing more often than 30 times per minute, the limits apply. For clicks appearing between 5 and 30 times per minute, a relaxation of the limits is allowed of 20 log 30/ <i>N</i> dB (where <i>N</i> is the number of clicks per minute). Criteria for separated clicks may be found in CISPR 14-1.						
^b At transitional frequencies, the lower limit applies.						

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.

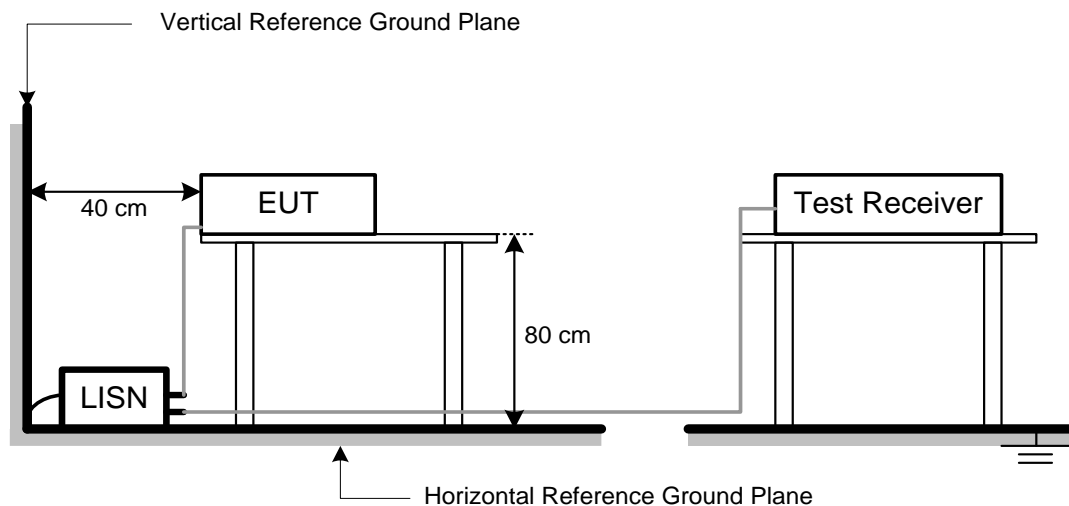
3.3.3 TEST PROCEDURE

- The EUT was placed 0.8 m above the horizontal ground plane with the EUT being connected to the power mains through a line impedance stabilization network (LISN).
All other support equipment were powered from an additional LISN(s).
The LISN 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.
- The LISN is spaced at least 80 cm from the nearest part of the EUT chassis.
- For the actual test configuration, please refer to the related Item - TEST PHOTOS.

3.3.4 DEVIATION FROM TEST STANDARD

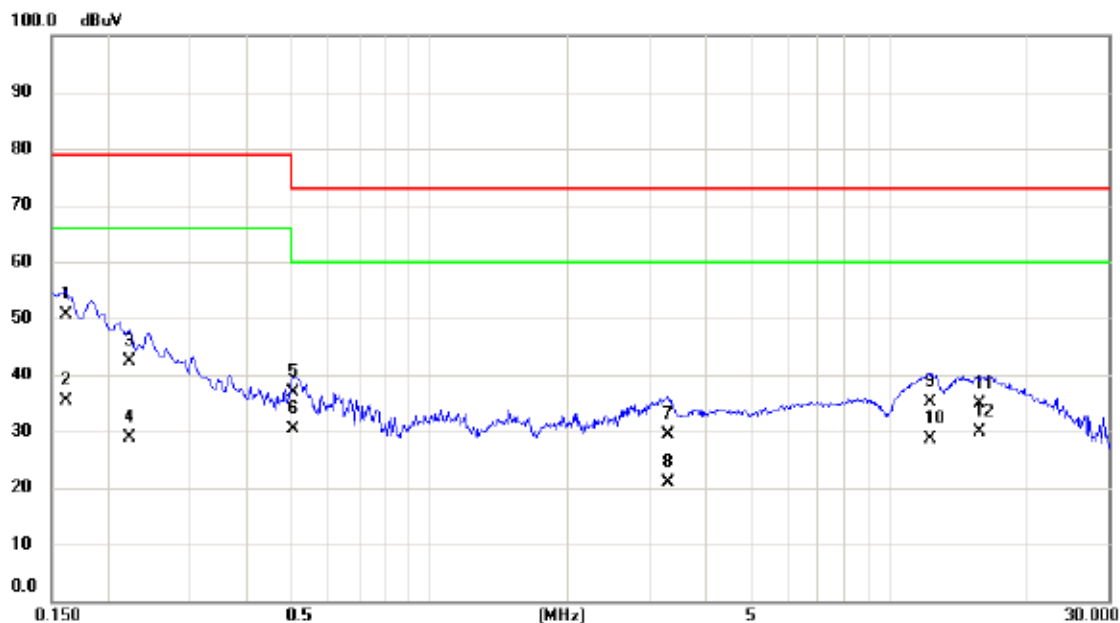
No deviation.

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



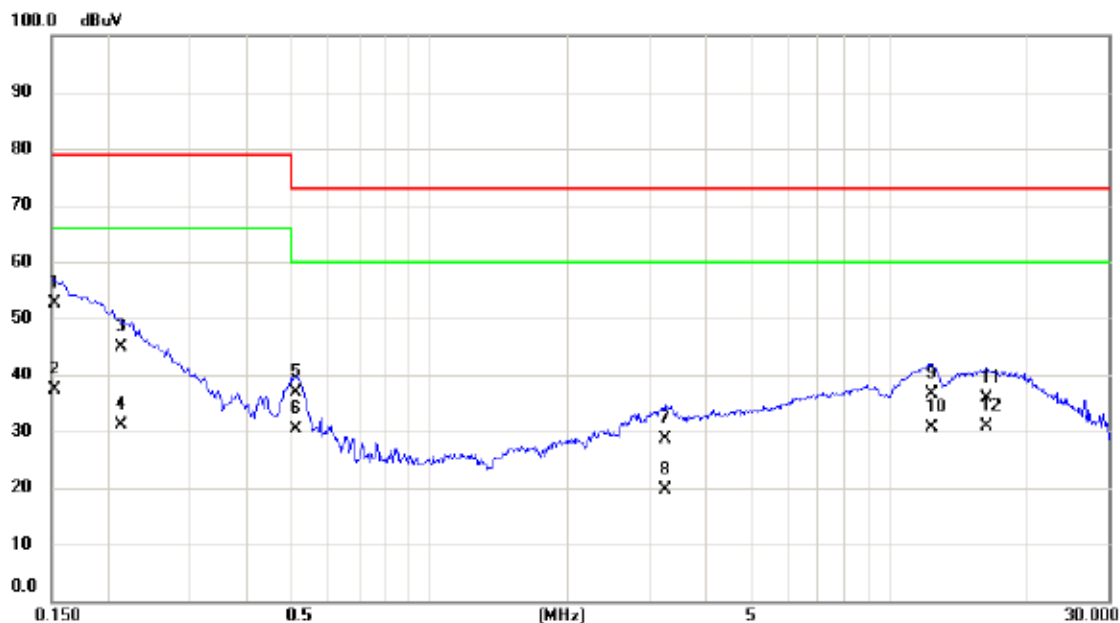
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1612	40.90	9.67	50.57	79.00	-28.43	QP	
2		0.1612	25.80	9.67	35.47	66.00	-30.53	AVG	
3		0.2220	32.60	9.66	42.26	79.00	-36.74	QP	
4		0.2220	19.30	9.66	28.96	66.00	-37.04	AVG	
5		0.5054	27.30	9.66	36.96	73.00	-36.04	QP	
6		0.5054	20.80	9.66	30.46	60.00	-29.54	AVG	
7		3.3090	19.60	9.77	29.37	73.00	-43.63	QP	
8		3.3090	11.20	9.77	20.97	60.00	-39.03	AVG	
9		12.2325	25.40	9.84	35.24	73.00	-37.76	QP	
10		12.2325	18.80	9.84	28.64	60.00	-31.36	AVG	
11		15.7425	25.00	9.83	34.83	73.00	-38.17	QP	
12		15.7425	20.10	9.83	29.93	60.00	-30.07	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	43.00	9.67	52.67	79.00	-26.33	QP	
2		0.1522	27.60	9.67	37.27	66.00	-28.73	AVG	
3		0.2130	35.20	9.66	44.86	79.00	-34.14	QP	
4		0.2130	21.50	9.66	31.16	66.00	-34.84	AVG	
5		0.5122	27.20	9.66	36.86	73.00	-36.14	QP	
6		0.5122	20.80	9.66	30.46	60.00	-29.54	AVG	
7		3.2528	18.90	9.77	28.67	73.00	-44.33	QP	
8		3.2528	9.80	9.77	19.57	60.00	-40.43	AVG	
9		12.3833	26.80	9.87	36.67	73.00	-36.33	QP	
10		12.3833	20.70	9.87	30.57	60.00	-29.43	AVG	
11		16.2623	26.00	9.90	35.90	73.00	-37.10	QP	
12		16.2623	21.00	9.90	30.90	60.00	-29.10	AVG	

REMARKS:

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

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

3.4 TELECOMMUNICATIONS/NETWORK TEST

3.4.1 LIMITS

Table 3 – Emission – Telecommunications/network port

Table clause	Port	Frequency range	Limits	Basic standard	Applicability note	Remarks
3.1	Telecommunications/ network	0,15 MHz to 0,5 MHz	97 dB(μ V) to 87 dB(μ V) quasi-peak 84 dB(μ V) to 74 dB(μ V) average 53 dB(μ A) to 43 dB(μ A) quasi-peak 40 dB(μ A) to 30 dB(μ A) average The limits decrease linearly with the logarithm of the frequency	CISPR 22	See ^a and ^b	
		0,5 MHz to 30 MHz	87 dB(μ V) quasi-peak 74 dB(μ V) average 43 dB(μ A) quasi-peak 30 dB(μ A) average			

^a The current and voltage disturbance limits are derived for use with an impedance stabilization network (ISN) which presents a common mode (asymmetric mode) impedance of 150 Ω to the telecommunication port under test (conversion factor is $20 \log_{10} 150 / 1 = 44$ dB).

^b When performing measurement using an ISN, the EUT shall meet the voltage limits of this table. All elements within CISPR 22 shall be followed, including but not limited to selection of test method, test configuration, cable characteristics.

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	50 Ω 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

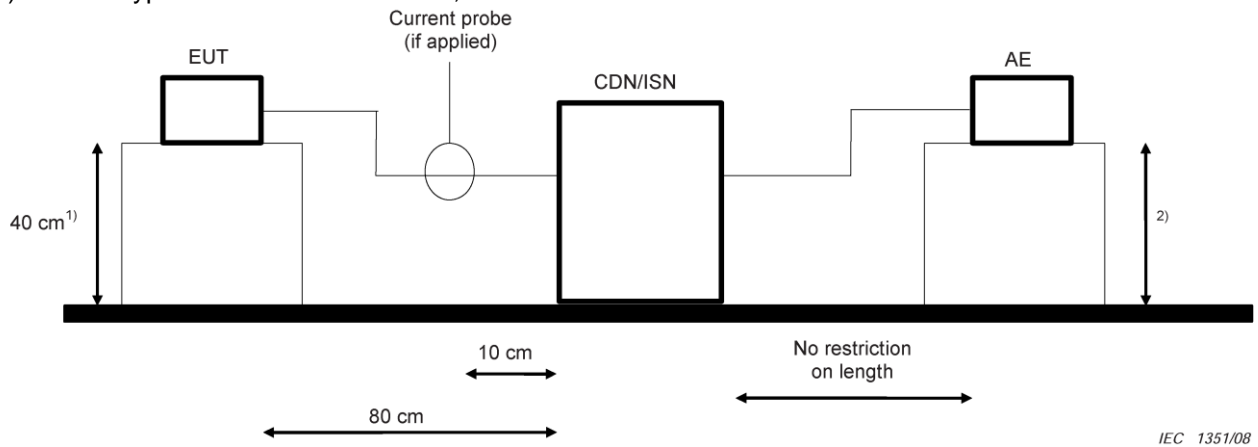
- a. The EUT was placed 0.8 m above the horizontal ground plane with the EUT being connected to the power mains through an LISN.
All other support equipment were powered from an additional LISN.
The LISN provides 50 Ohm/50uH of impedance for the measuring instrument.
- b. Interconnecting cables that 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. Method: LISN (Voltage)
 - (1) LISN 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 LISN. Other support units were connected to the power mains through another LISN.
 - (3) Voltage at the measurement port of the LISN was detected; the reading was corrected by adding the voltage division factor of the LISN, 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.
- e. Method: Current Probe (CP)
 - (1) Current probe shall be placed at 0.1 m from the LISN.
 - (2) Current at the measurement port of the LISN 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).
- a. 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.
- f. 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

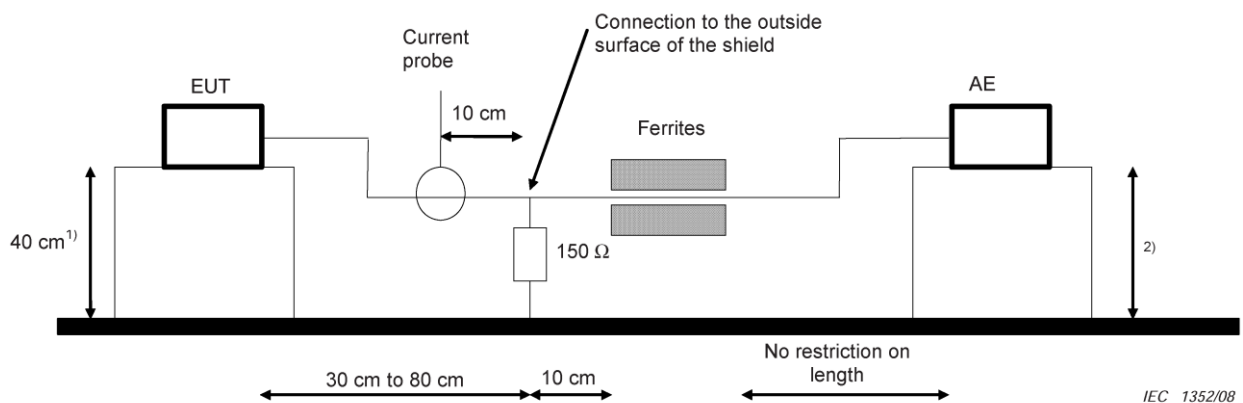


AE = Associated equipment
EUT = Equipment under test

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

Figure C.1 – Using CDNs described in IEC 61000-4-6 as CDN/ISNs

b) Cable Type: Screened or Coaxial

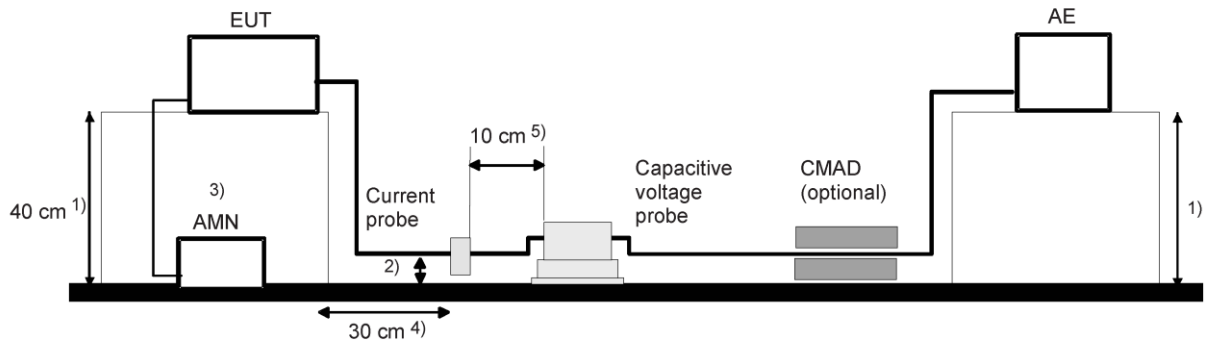


AE = Associated equipment
EUT = Equipment under test

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

Figure C.2 – Using a 150 Ω load to the outside surface of the shield ("in situ CDN/ISN")

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.

Figure C.3 – Using a combination of current probe and capacitive voltage probe with a table top EUT

3.4.6 TEST RESULT

Test Mode	Mode 1 (Lan1 ETHERNET 100M-100M)		
Test Voltage	AC 230V/50Hz	Tested Date	2021/1/6



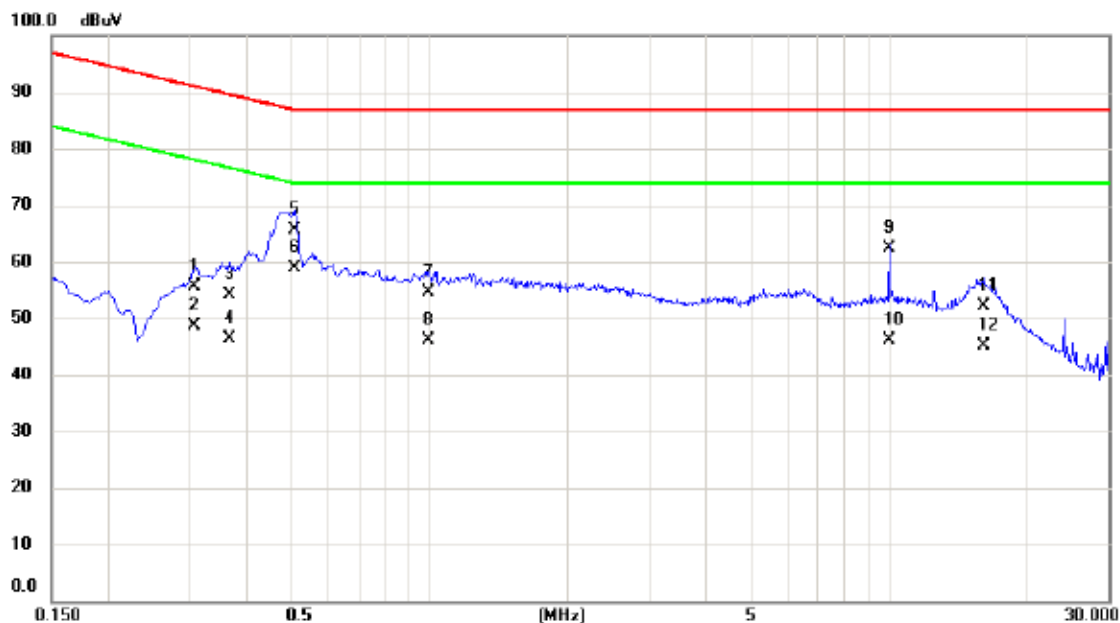
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.4110	48.10	9.96	58.06	88.63	-30.57	QP	
2		0.4110	40.00	9.96	49.96	75.63	-25.67	AVG	
3		0.5055	56.10	9.92	66.02	87.00	-20.98	QP	
4	*	0.5055	48.70	9.92	58.62	74.00	-15.38	AVG	
5		0.9915	45.10	9.83	54.93	87.00	-32.07	QP	
6		0.9915	36.80	9.83	46.63	74.00	-27.37	AVG	
7		14.2125	45.20	9.83	55.03	87.00	-31.97	QP	
8		14.2125	41.20	9.83	51.03	74.00	-22.97	AVG	
9		16.2285	48.80	9.85	58.65	87.00	-28.35	QP	
10		16.2285	45.00	9.85	54.85	74.00	-19.15	AVG	
11		23.1293	47.60	9.99	57.59	87.00	-29.41	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.

Test Mode	Mode 1 (Lan1 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		0.3075	45.50	10.03	55.53	91.04	-35.51	QP	
2		0.3075	38.50	10.03	48.53	78.04	-29.51	AVG	
3		0.3660	44.10	10.00	54.10	89.59	-35.49	QP	
4		0.3660	36.30	10.00	46.30	76.59	-30.29	AVG	
5		0.5076	55.70	9.92	65.62	87.00	-21.38	QP	
6	*	0.5076	49.00	9.92	58.92	74.00	-15.08	AVG	
7		0.9915	44.90	9.83	54.73	87.00	-32.27	QP	
8		0.9915	36.40	9.83	46.23	74.00	-27.77	AVG	
9		10.0004	52.70	9.77	62.47	87.00	-24.53	QP	
10		10.0004	36.40	9.77	46.17	74.00	-27.83	AVG	
11		16.0125	42.40	9.84	52.24	87.00	-34.76	QP	
12		16.0125	35.20	9.84	45.04	74.00	-28.96	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:

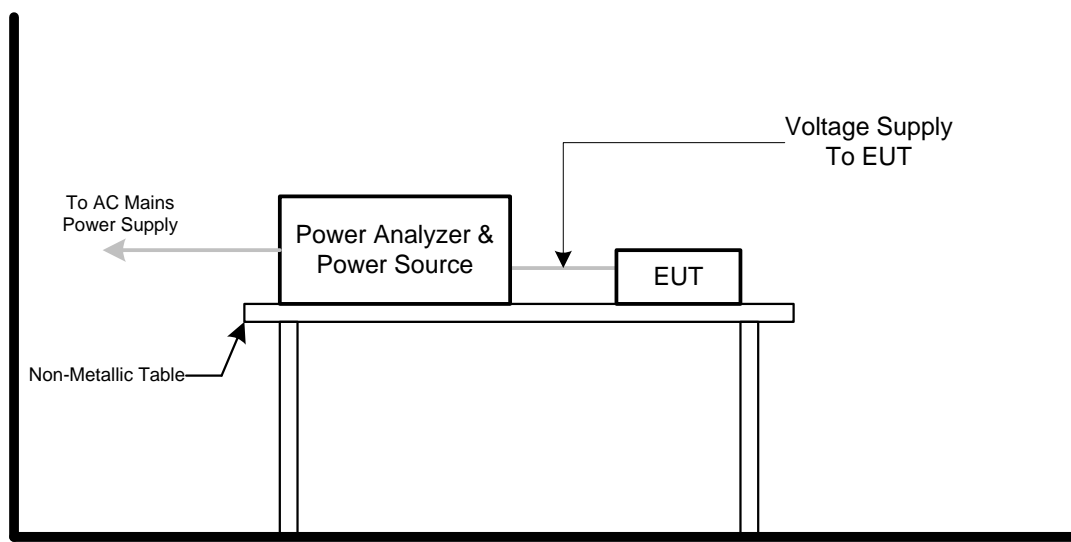
- personal computers and personal computer monitors;
- television receivers;
- refrigerators and freezers having one or more variable-speed drives to control compressor motor(s).

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

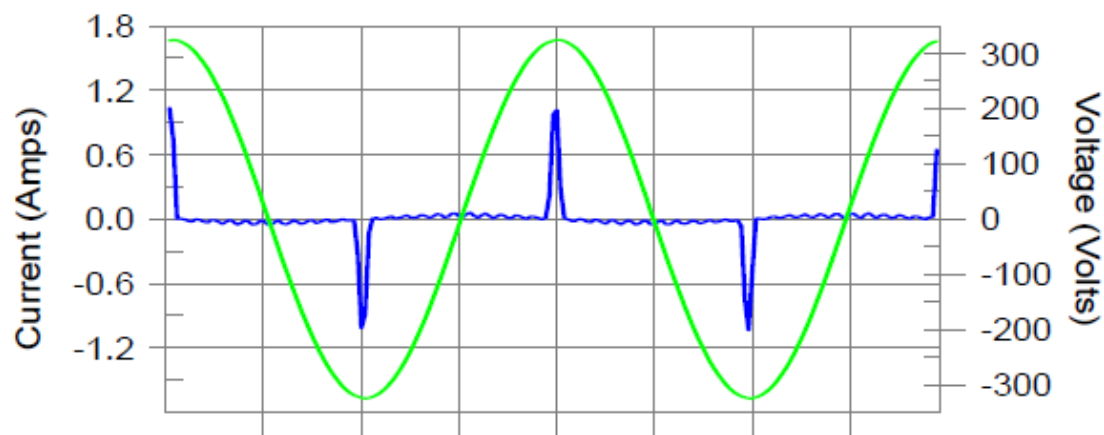


3.5.6 TEST RESULT

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

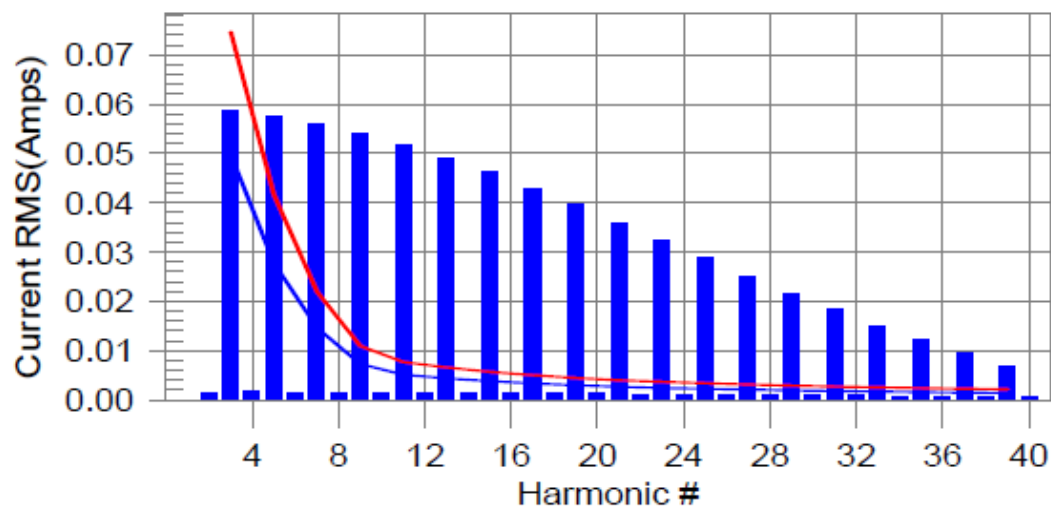
Harmonics

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	Frequency(Hz):	50.00
I _{Peak} (Amps):	1.160	I _{RMS} (Amps):	0.197
I _{Fund} (Amps):	0.069	Crest Factor:	6.191
Power (Watts):	14.6	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.

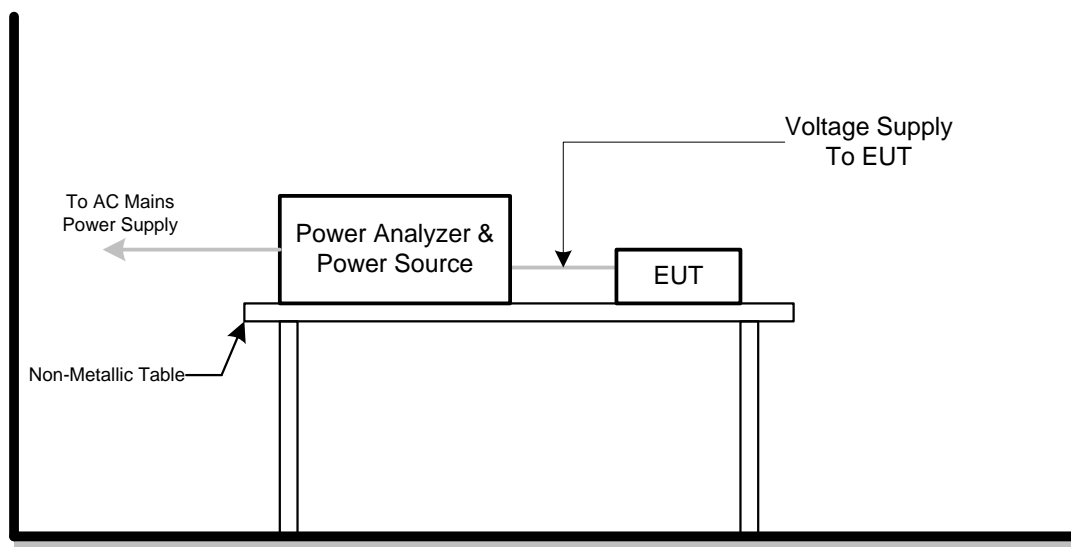
3.6.3 TEST PROCEDURE

- 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

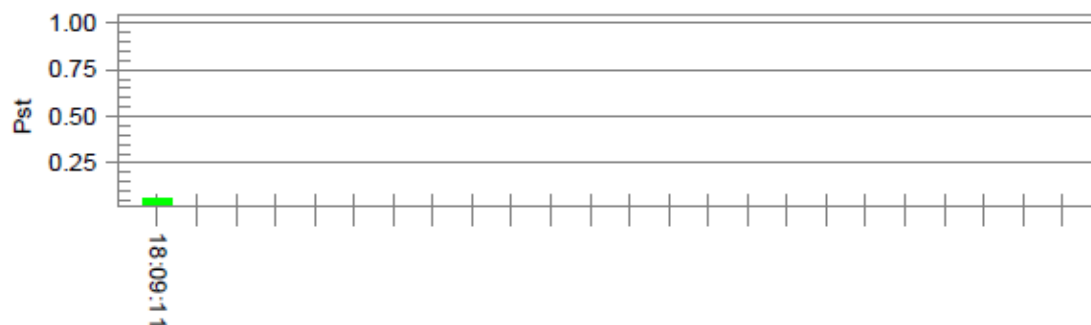


3.6.6 TEST RESULT

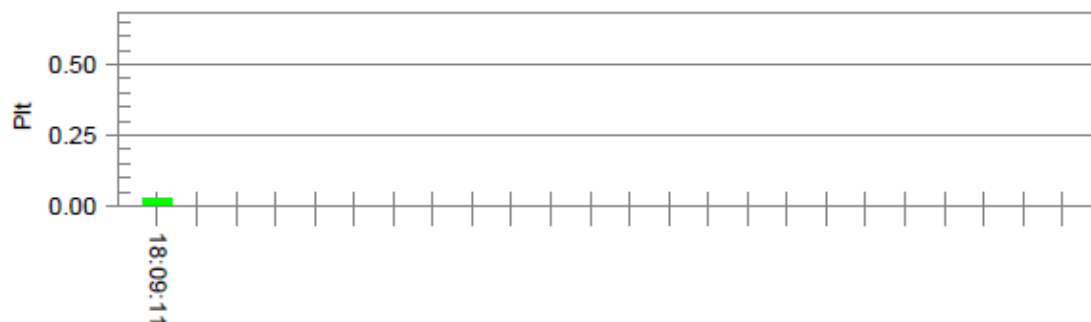
Test Mode	Mode 1		
Test Voltage	AC 230V/50Hz	Tested Date	2021/1/15

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 discharge EN 61000-4-2 IEC 61000-4-2 (ESD)	±8 kV air discharge ±4 kV contact discharge	Enclosure ports (Direct Mode)	B
	±4 kV HCP discharge ±4 kV VCP discharge	Enclosure ports (Indirect Mode)	B
Radio-frequency electromagnetic field. Amplitude modulated EN 61000-4-3 IEC 61000-4-3 (RS)	80 MHz to 1000 MHz 10 V/m (unmodulated, r.m.s.) 80 % AM (1 kHz)	Enclosure ports	A
	1.4 GHz to 6.0 GHz 3 V/m (unmodulated, r.m.s.) 80 % AM (1 kHz)		A
Fast transients EN 61000-4-4 IEC 61000-4-4 (EFT/BURST)	±1 kV (open circuit test voltage) 5/50 t_r/t_w ns Repetition frequency 5 or 100 kHz	Signal/control ports NOTE (1)(5)	B
	±1 kV (open circuit test voltage) 5/50 t_r/t_w ns Repetition frequency 5 or 100 kHz	Input and output DC power ports NOTE (5)(6)(10)(11)	B
	±2 kV (open circuit test voltage) 5/50 t_r/t_w ns Repetition frequency 5 or 100 kHz	Input and output AC power ports NOTE (5)	B
Surges EN 61000-4-5 IEC 61000-4-5	1.2/50 (8/20) T_r/T_d μ s (open circuit test voltage) Line-to-earth: ±1 kV	Signal/control ports NOTE (2)(3)(4)	B
	1.2/50 (8/20) T_r/T_d μ s (open circuit test voltage) Line-to-earth: ±1 kV Line-to-line: ±0.5 kV	Input and output DC power ports NOTE (6)(7)(8)(9)	B
	1.2/50 (8/20) T_r/T_d μ s (open circuit test voltage) Line-to-earth: ±2 kV Line-to-line: ±1 kV	Input and output AC power ports NOTE (8)	B
Radio-frequency common mode EN 61000-4-6 IEC 61000-4-6 (CS)	0.15 MHz to 80 MHz 10 V (unmodulated, r.m.s.) 80 % AM (1 kHz)	Signal/control ports NOTE (1)	A
	0.15 MHz to 80 MHz 10 V (unmodulated, r.m.s.) 80 % AM (1 kHz)	Input and output DC power ports NOTE (6)	A
	0.15 MHz to 80 MHz 10 V (unmodulated, r.m.s.) 80 % AM (1 kHz)	Input and output AC power ports	A
Power-frequency magnetic field EN 61000-4-8 IEC 61000-4-8 (PFMF)	50, 60 Hz 30 A/m	Enclosure ports	A
Voltage dips and Voltage interruptions EN IEC 61000-4-11 IEC 61000-4-11	Voltage Dips: 0 % residual – 1 cycle 40 % residual – 10/12 cycles at 50/60Hz 70 % residual – 25/30 cycles at 50/60Hz	Input and output AC power ports NOTE (12)(13)	B NOTE (14)
	Voltage Interruptions: 0 % residual – 250/300 cycles at 50/60Hz		C
			C

NOTE:

- (1) Applicable only to ports interfacing with cables whose total length according to the manufacturer's functional specification may exceed 3 m.
- (2) Applicable only to ports interfacing with long distance lines
- (3) Where normal functioning cannot be achieved because of the impact of the coupling/decoupling network (CDN) on the EUT, the test shall be done with the reduced functionality. A rationale shall be given in the test report for doing so. After the test and the removal of the CDN, the normal function shall not be affected.
- (4) Signal ports directly connected to AC power network shall be treated as AC power ports.
- (5) The test may be performed at one or at both repetition frequencies. The use of 5 kHz repetition frequency is traditional; however, 100 kHz is closer to reality.
- (6) DC ports which are not intended to be connected to a DC distribution network shall be tested as signal ports.
- (7) Applicable only to ports interfacing with long distance lines; not applicable to input ports intended for connection to a battery or a rechargeable battery which shall be removed or disconnected from the equipment for recharging.
- (8) For supply voltages where no test equipment is commercially available (e.g. CDNs), this test is not required.
- (9) Equipment with a DC power input port intended for use with an AC–DC power adaptor shall be tested on the AC power input of the AC–DC power adaptor specified by the manufacturer or, where no adaptor is specified, the test shall be done on the DC power port using the test levels of this table.
- (10) Not applicable to input ports intended for connection to a battery or a rechargeable battery which shall be removed or disconnected from the equipment for recharging.
- (11) Equipment with a DC power input port intended for use with a dedicated AC–DC power adaptor shall be tested on the AC power input of the AC–DC power adaptor specified by the manufacturer. Where no adaptor is specified, the test shall be done on the DC power port using the test level of Table 4 (EN IEC 61000-6-2). Where an adaptor is specified, the test is applicable to DC power input ports only when intended to be connected permanently to cables longer than 3 m.
- (12) Applicable only to input ports.
- (13) The test shall be carried out at the frequencies appropriate to the power supply frequency. Equipment intended to be used in regions where only one of these frequencies is applied needs to be tested at this specific frequency only.
- (14) For electronic power converters, the operation of protective devices (e.g. undervoltage protection) and the performance criterion C are allowed.

4.2 PERFORMANCE CRITERIA

According to EN 61000-6-2 standard, the performance criteria as following:

A functional description and a definition of specific performance criteria, during or as a consequence of immunity testing of equipment under test (EUT), shall be provided by the manufacturer and noted in the test report. They shall be consistent with one of the following general criteria for each test:

- a) Performance criterion A: The EUT shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the EUT is used as intended. If the performance level is not specified by the manufacturer, this may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.
- b) Performance criterion B: The EUT shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the EUT is used as intended. The performance level may be replaced by a permissible loss of performance. However, during the test degradation of performance is allowed but no change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.
- c) Performance criterion C: Temporary loss of function is allowed during the test, provided the function is self-recoverable or can be restored by the operation of the controls.

If, as a result of the application of the tests defined in this standard, the EUT becomes dangerous or unsafe, it shall be deemed to have failed the test.

4.3 ELECTROSTATIC DISCHARGE TEST (ESD)

4.3.1 TEST SPECIFICATION

Reference Standard	EN 61000-4-2 / IEC 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	Air Discharge: min. 20 times at each test point Contact Discharge: min. 20 times in total
Discharge Mode	Single Discharge
Discharge Period	1 s minimum

Customer's specification

Discharge Voltage	Contact Discharge: ± 6 kV
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4.3.2 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.

4.3.3 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 / IEC 61000-4-, 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.

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

Nearest Wall

1 m

10 cm

ESD Generator

ESD Generator

VCP (50 cm x 50 cm)

Discharge Return Cable to GRP

Discharge Return Cable to GRP

To AC Main

EUT

Isolation Support (0.5mm)

HCP (1.6m x 0.8m)

80 cm

Non-Conductive Table

470 K Ω

470 K Ω

Ground Reference Plane (GRP) Bonded to PE

4.3.6 TEST RESULT

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

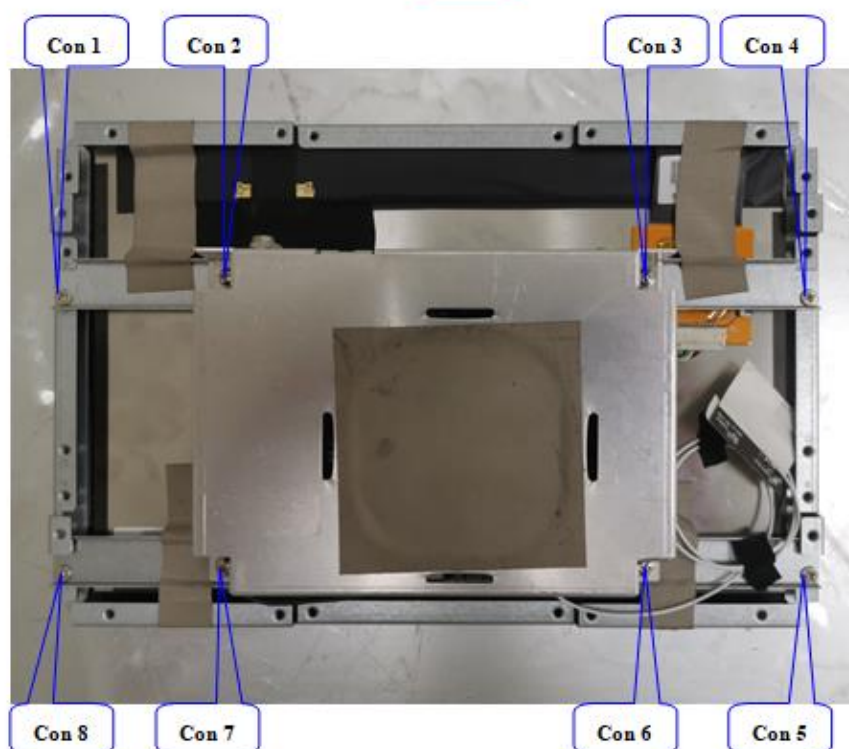
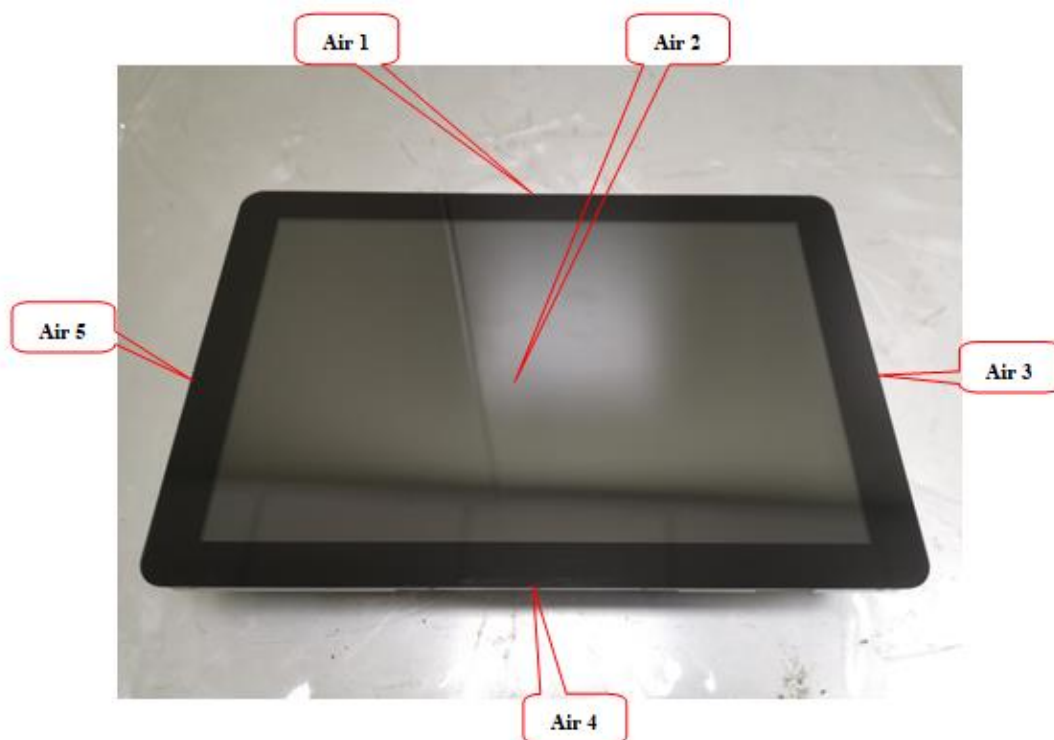
Mode	Air Discharge								Contact Discharge							
Level	2 kV		4 kV		8 kV		15 kV		2 kV		4 kV		6 kV		8 kV	
Location	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
1~11	A	A	A	A	A	A	-	-	A	A	A	A	A	A	-	-
12~16	A	A	A	A	A	A	-	-	-	-	-	-	-	-	-	-
Perform Criterion	B						-		B						-	
Result	A						-		A						-	
Judgment	PASS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

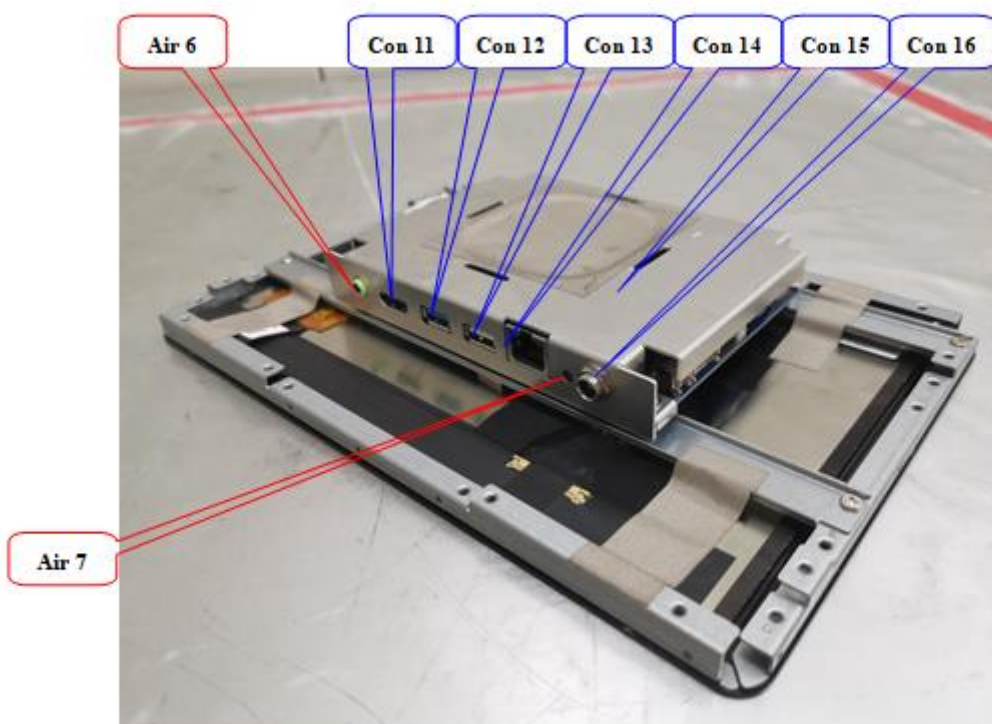
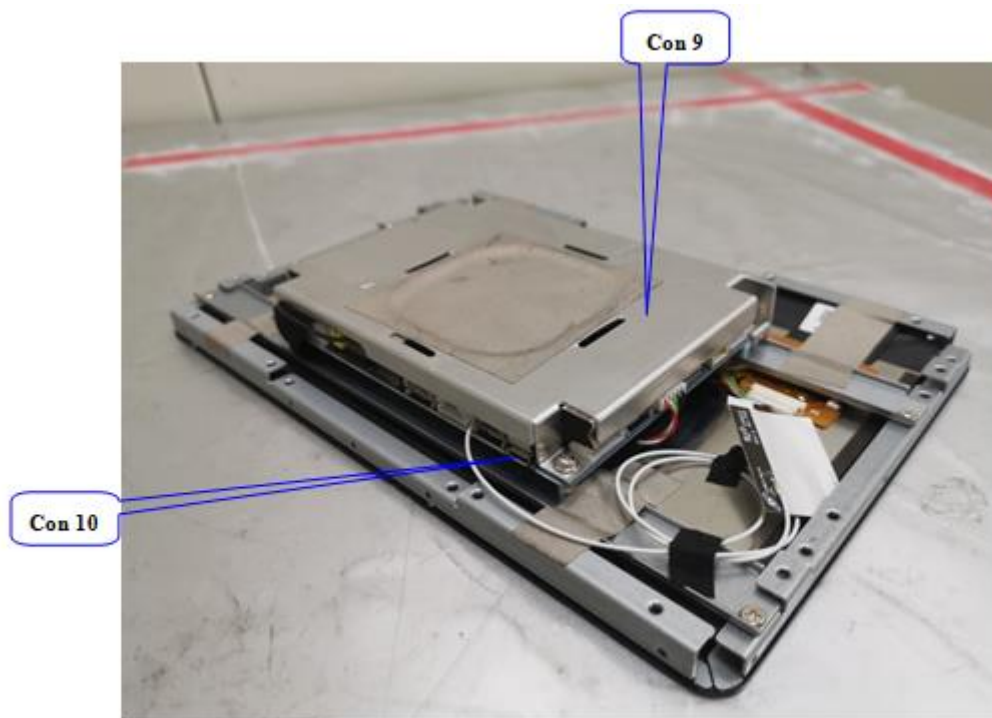
NOTE:

- (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



4.4 RADIO-FREQUENCY ELECTROMAGNETIC FIELD. AMPLITUDE MODULATED TEST (RS)

4.4.1 TEST SPECIFICATION

Reference Standard	EN 61000-4-3 / IEC 61000-4-3
Required Performance Criterion	A
Frequency Range	80 MHz to 1000 MHz 1.4 GHz to 6.0 GHz
Field Strength	10 V/m, 3 V/m (unmodulated, r.m.s.)
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

4.4.2 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.

4.4.3 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.

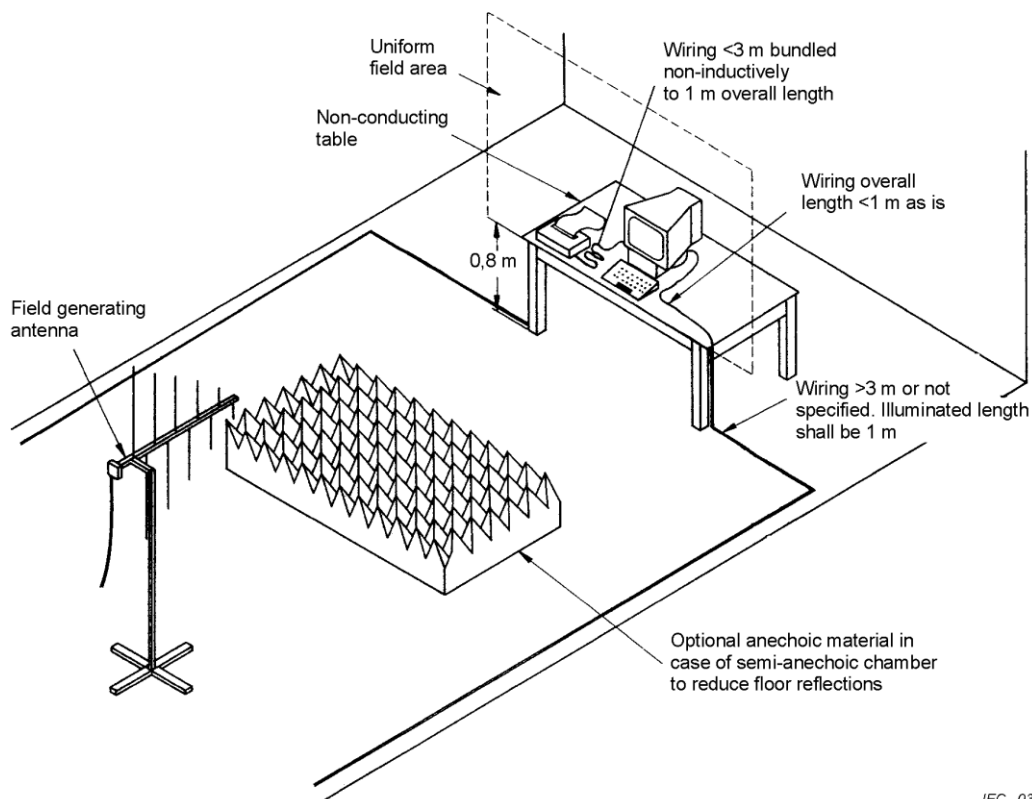
The other condition as following manner:

- The field strength is 10 V/m, 3 V/m (unmodulated, r.m.s.).
- The frequency range is swept from 80 MHz to 1000 MHz and 1.4 GHz to 6.0 GHz 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.
- 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.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 TEST SETUP



IEC 034/06

4.4.6 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
80~1000	10	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
1400~6000	3	V & H	Rear	A	A	PASS
			Front		A	
			Left		A	
			Right		A	

NOTE:

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

4.5 FAST TRANSIENTS TEST (EFT/BURST)

4.5.1 TEST SPECIFICATION

Reference Standard	EN 61000-4-4 / IEC 61000-4-4
Required Performance Criterion	B
Test Voltage	Signal/control ports: ± 1 kV (open circuit test voltage) Input and output AC power ports: ± 2 kV (open circuit test voltage)
Polarity	Positive & Negative
Impulse Frequency	Repetition frequency 5 or 100 kHz
Impulse Wave shape	5/50 t_r/t_w 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.

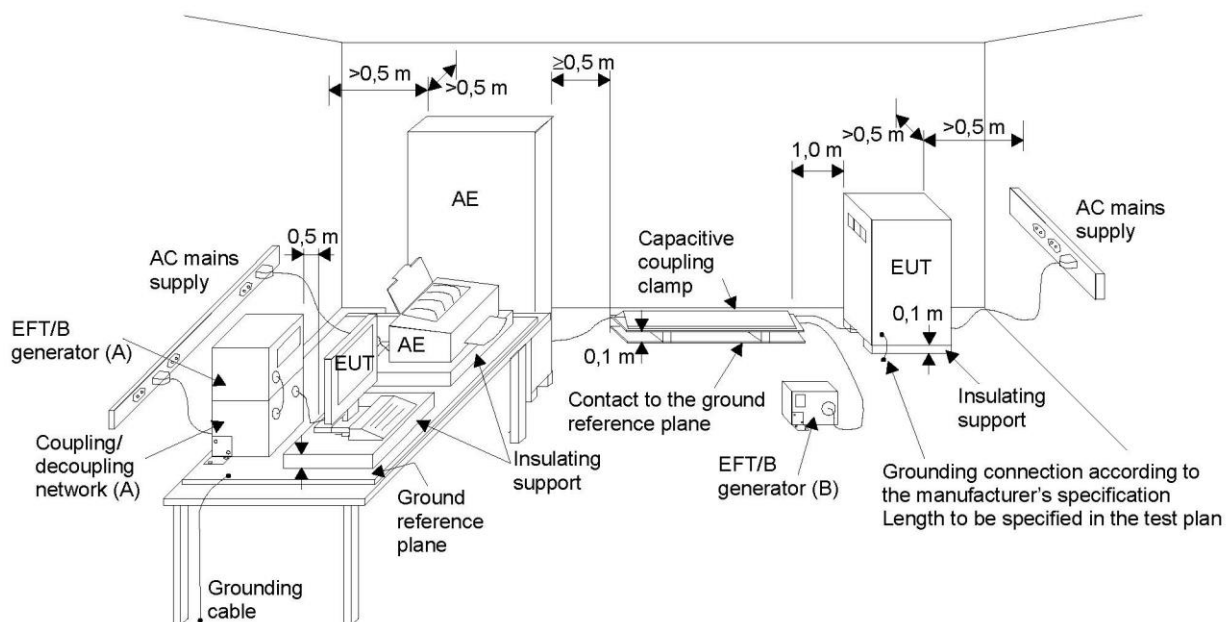
The other condition as following manner:

- a. The length of power cord between the coupling device and the EUT should not exceed 1 m.
- b. Both positive and negative polarity discharges were applied.
- c. 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
Situation	B: The drawn lines are abnormal and can recover automatically. LAN during test, network is disconnected and can recover automatically.		

AC Power Ports –5/50Tr/Th ns						
Tested on	Test Voltage(kV)		Pulse Rate	Criterion	Observation	Result
L	+/-	2	5kHz	B	A	PASS
N	+/-	2	5kHz	B	A	
PE	+/-	2	5kHz	B	B	
L+N+PE	+/-	2	5kHz	B	B	

I/O Signal, Data and Control line Ports – 5/50Tr/Th ns						
Tested on	Test Voltage(kV)		Pulse Rate	Criterion	Observation	Result
RJ-45	+/-	1	5kHz	B	B	PASS

AC Power Ports –5/50Tr/Th ns						
Tested on	Test Voltage(kV)		Pulse Rate	Criterion	Observation	Result
L	+/-	2	100 kHz	B	B	PASS
N	+/-	2	100 kHz	B	B	
PE	+/-	2	100 kHz	B	B	
L+N+PE	+/-	2	100 kHz	B	B	

I/O Signal, Data and Control line Ports – 5/50Tr/Th ns						
Tested on	Test Voltage(kV)		Pulse Rate	Criterion	Observation	Result
RJ-45	+/-	1	100 kHz	B	B	PASS

NOTE:

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

4.6 SURGES TEST

4.6.1 TEST SPECIFICATION

Reference Standard	EN 61000-4-5 / IEC 61000-4-5
Required Performance Criterion	B
Waveform	1.2/50 (8/20) T_r/T_d μ s
Test Voltage (EN 61000-6-2)	Signal/control ports: ± 0.5 kV, ± 1 kV (open circuit test voltage) Input and output AC power ports: ± 0.5 kV, ± 1 kV, ± 2 kV (open circuit test voltage)
Generator Source Impedance	2Ω between line-to-line of a.c./d.c. lines. 12Ω between line-to-ground of a.c./d.c. lines. 40Ω ($15\Omega+25\Omega$) b between lines-to-ground of unshielded symmetrical interconnection lines when use 10/700 μ s waveform. 42Ω ($40\Omega+2\Omega$) between lines-to-ground of unshielded symmetrical interconnection lines when use 1.2/50 μ s waveform.
Polarity	Positive/Negative
Phase Angle	AC Port: $0^\circ/90^\circ/180^\circ/270^\circ$ Signal Port: N/A
Pulse Repetition Rate	1 time / minute (maximum)
Number of Tests	5 positive and 5 negative at selected points

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	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.

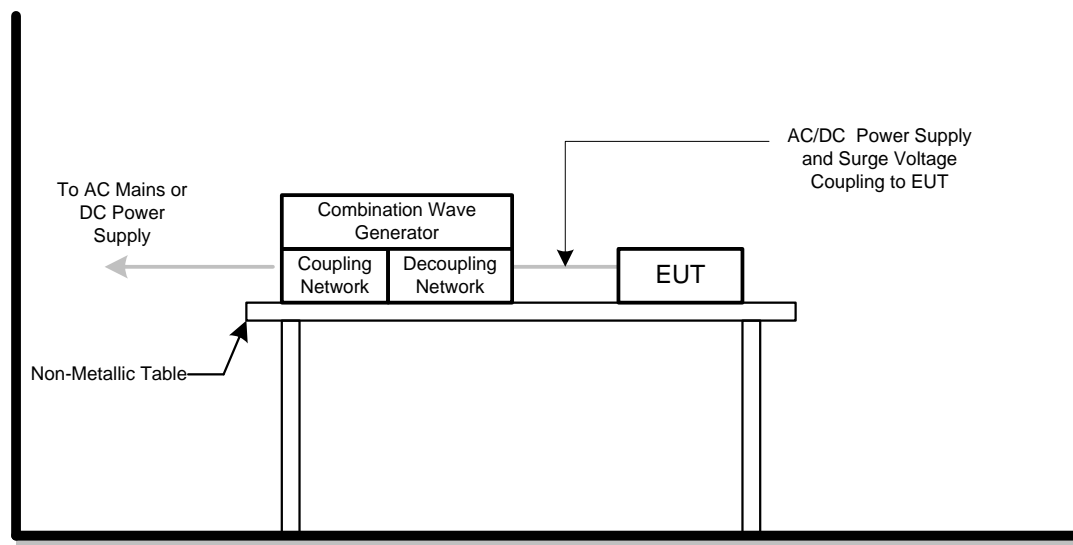
4.6.3 TEST PROCEDURE

- 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).

4.6.4 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	2021/1/9

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								
Tested on	Polarity	Test Voltage(kV)				Criterion	Observation	Result
		0.5	1	-	-			
RJ-45 (L-PE)	+/-	A	A			B	A	PASS

NOTE:

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

4.7 RADIO-FREQUENCY COMMON MODE TEST (CS)

4.7.1 TEST SPECIFICATION

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

4.7.2 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.

4.7.3 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.

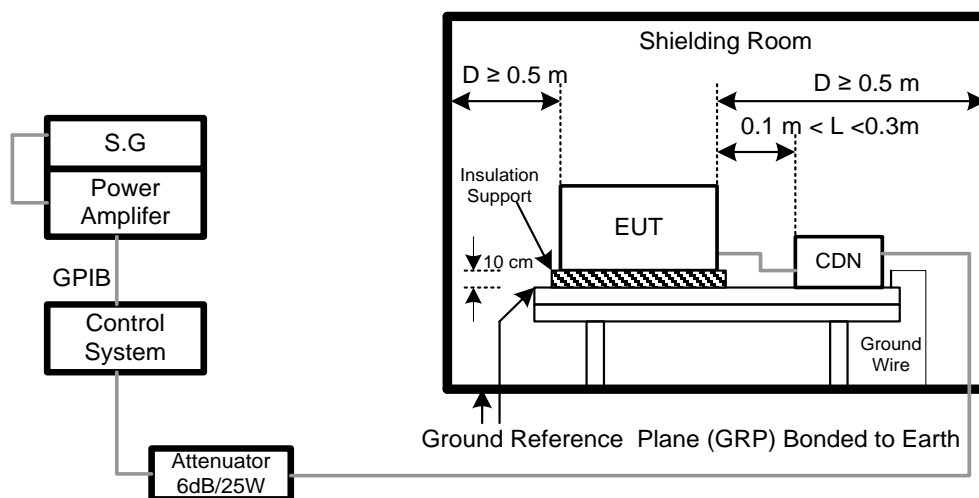
The other condition as following manner:

- a. The field strength is 10 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 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.

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	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	10	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	10	A	A	PASS

NOTE:

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

4.8 POWER-FREQUENCY MAGNETIC FIELD TEST (PFMF)

4.8.1 TEST SPECIFICATION

Reference Standard	EN 61000-4-8 / IEC 61000-4-8
Required Performance Criterion	A
Frequency Range	50, 60 Hz
Field Strength	30 A/m
Observation Time	1 minute
Inductance Coil	Rectangular type, 1 m x 1 m

4.8.2 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.

4.8.3 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.

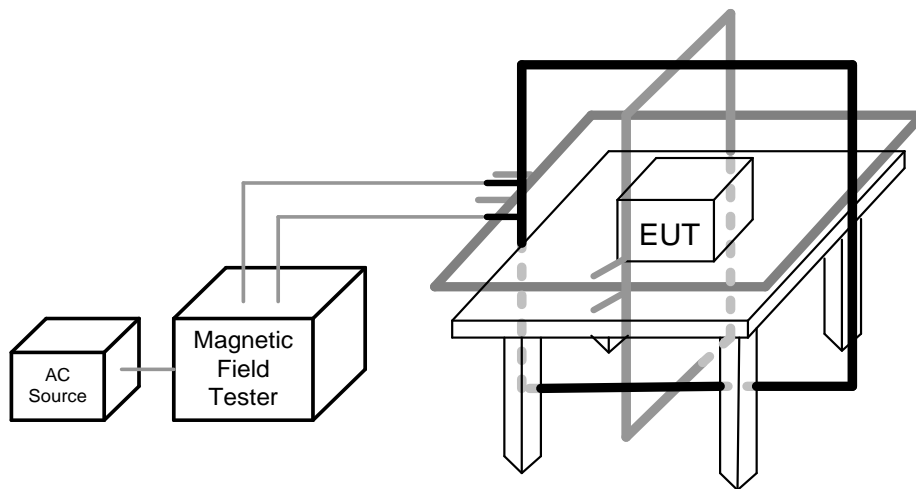
The other condition as following manner:

- 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.

4.8.4 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	2021/1/18

Test Frequency (Hz)	Magnetic Field (A/m)	Direction	Criterion	Observation	Result
50	30	X Y Z	A	A	PASS
60	30	X Y Z	A	A	PASS

NOTE:

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

4.9 VOLTAGE DIPS AND VOLTAGE INTERRUPTIONS TEST

4.9.1 TEST SPECIFICATION

Reference Standard	EN IEC 61000-4-11 / IEC 61000-4-11
Required Performance Criterion	Voltage Dips: Criterion B for 0 % residual – 1 cycle Criterion C for 40 % residual – 10/12 cycles at 50/60Hz Criterion C for 70 % residual – 25/30 cycles at 50/60Hz Voltage Interruptions: Criterion C for 0 % residual – 250/300 cycles at 50/60Hz
Test Duration Time	Minimum three test events in sequence
Interval between Event	10 s minimum
Phase Angle	0°/180°
Test Cycle	3 times

4.9.2 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.

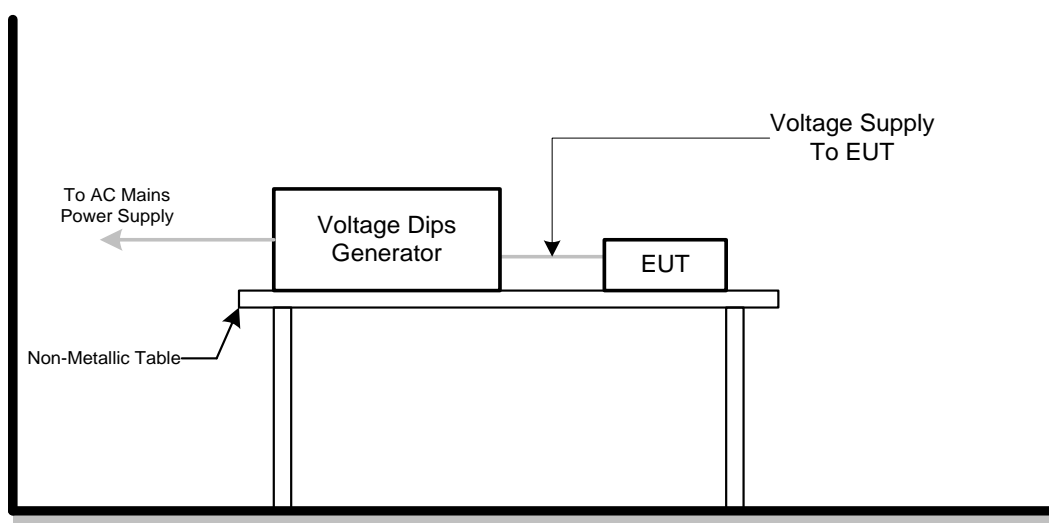
4.9.3 TEST PROCEDURE

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.

4.9.4 DEVIATION FROM TEST STANDARD

No deviation.

4.9.5 TEST SETUP



4.9.6 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%	1	B _{see note(2)}	A	PASS
30%	25	C	A	
60%	10	C	C	
100%	250	C	C	

230Vac/50Hz				
Voltage Reduction	Periods	Criterion	Observation	Result
100%	1	B _{see note(2)}	A	PASS
30%	25	C	A	
60%	10	C	A	
100%	250	C	C	

240Vac/50Hz				
Voltage Reduction	Periods	Criterion	Observation	Result
100%	1	B _{see note(2)}	A	PASS
30%	25	C	A	
60%	10	C	A	
100%	250	C	C	

NOTE:

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

(2) For electronic power converters, the operation of protective devices (e.g. undervoltage protection) and the performance criterion C are allowed.

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/60Hz				
Voltage Reduction	Periods	Criterion	Observation	Result
100%	1	B _{see note(2)}	A	PASS
30%	30	C	A	
60%	12	C	C	
100%	300	C	C	

230Vac/60Hz				
Voltage Reduction	Periods	Criterion	Observation	Result
100%	1	B _{see note(2)}	A	PASS
30%	30	C	A	
60%	12	C	A	
100%	300	C	C	

240Vac/60Hz				
Voltage Reduction	Periods	Criterion	Observation	Result
100%	1	B _{see note(2)}	A	PASS
30%	30	C	A	
60%	12	C	A	
100%	300	C	C	

NOTE:

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

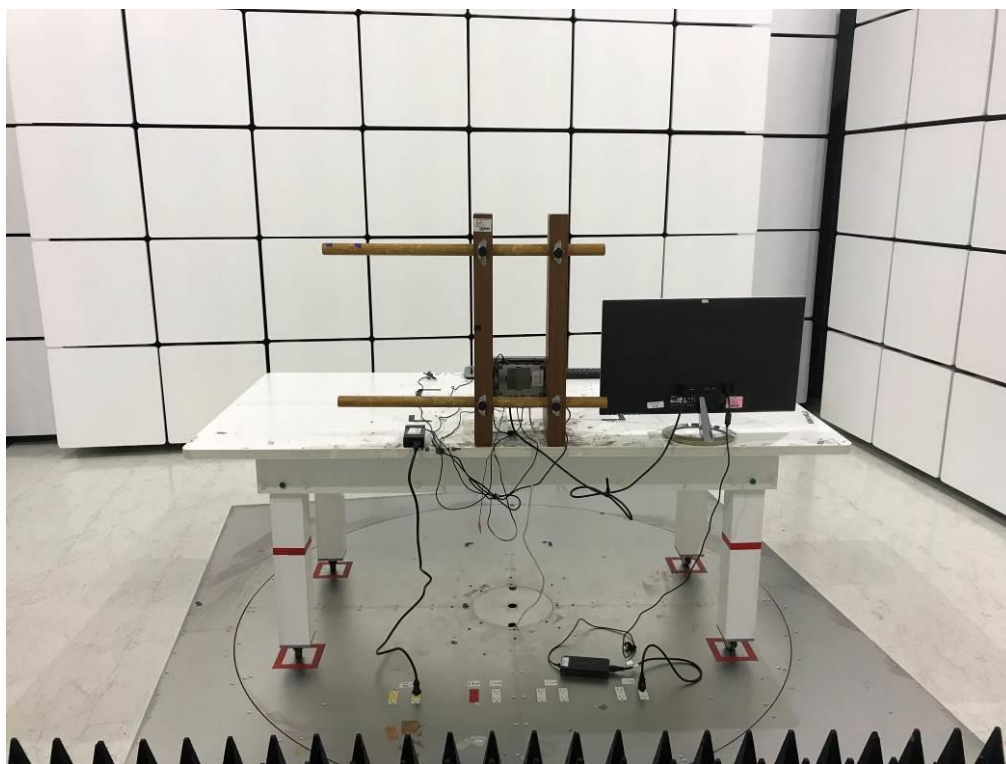
(2) For electronic power converters, the operation of protective devices (e.g. undervoltage protection) and the performance criterion C are allowed.

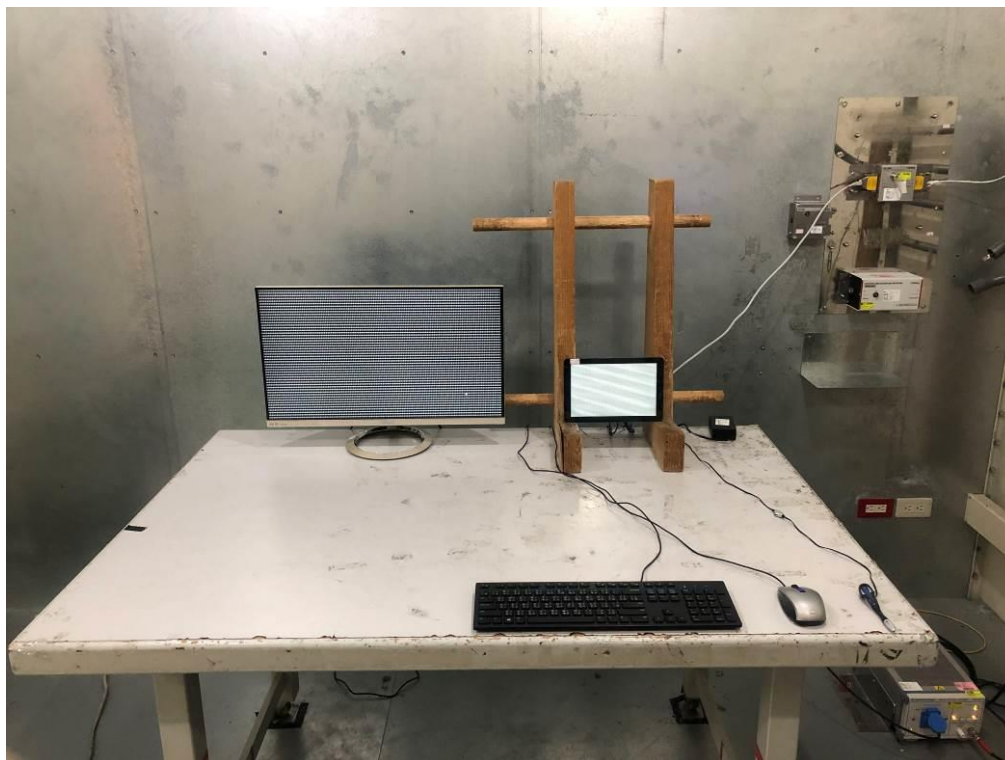
5 TEST PHOTOS

Enclosure (Below 1 GHz) test photos



Enclosure (Above 1 GHz) test photos

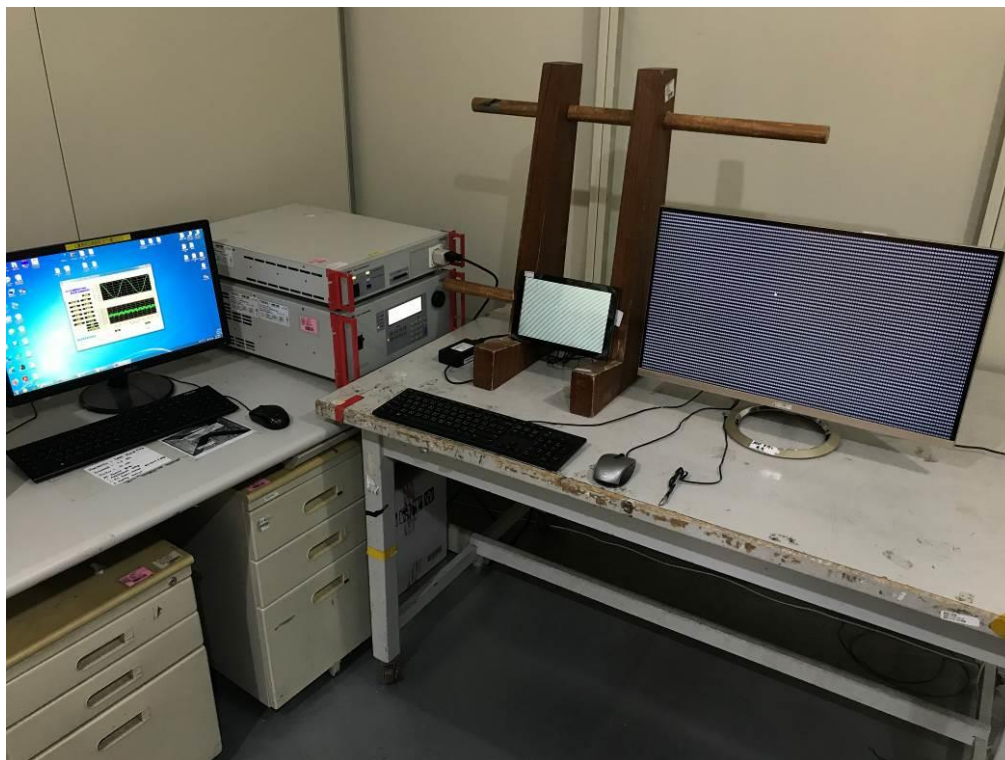


Low voltage AC mains test photos

Telecommunications/network test photos

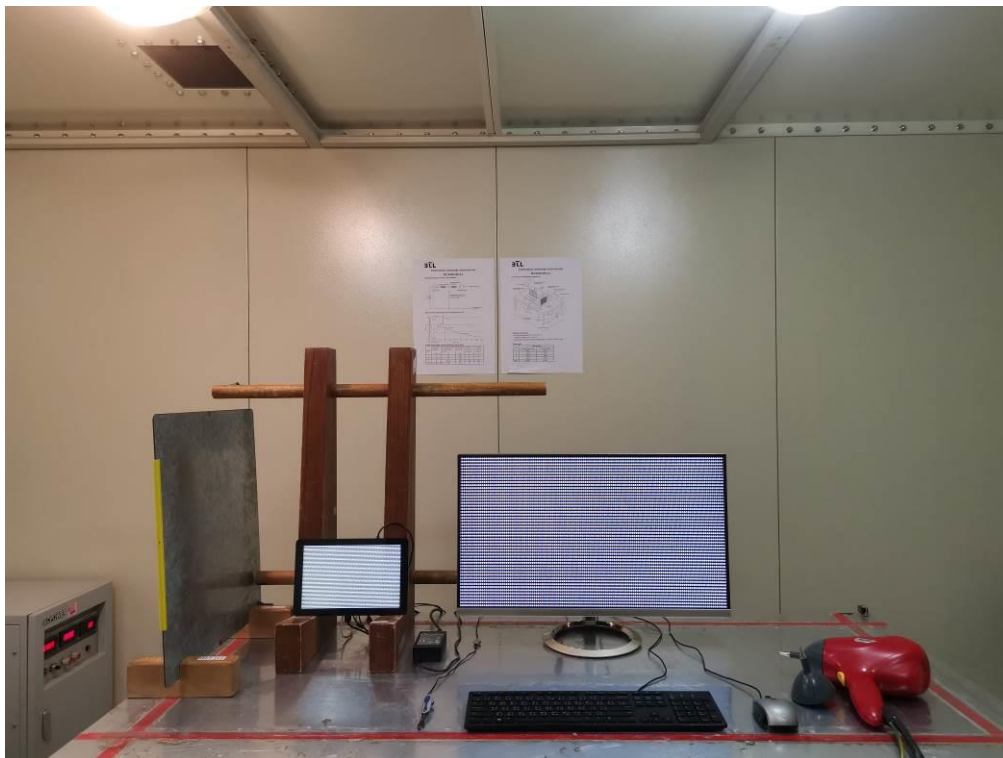


Harmonic current emissions & Voltage changes, voltage fluctuations and flicker test photos

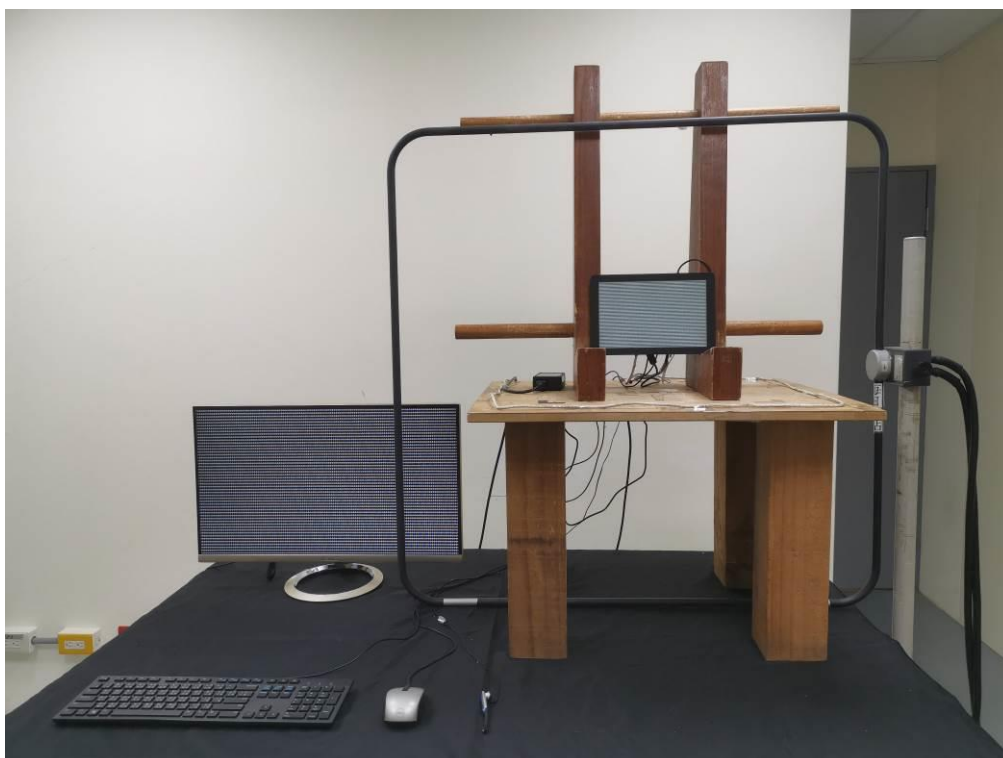


Immunity test photos

Electrostatic discharge immunity



Radiated, radio-frequency, electromagnetic field immunity



Electrical fast transient/burst immunity



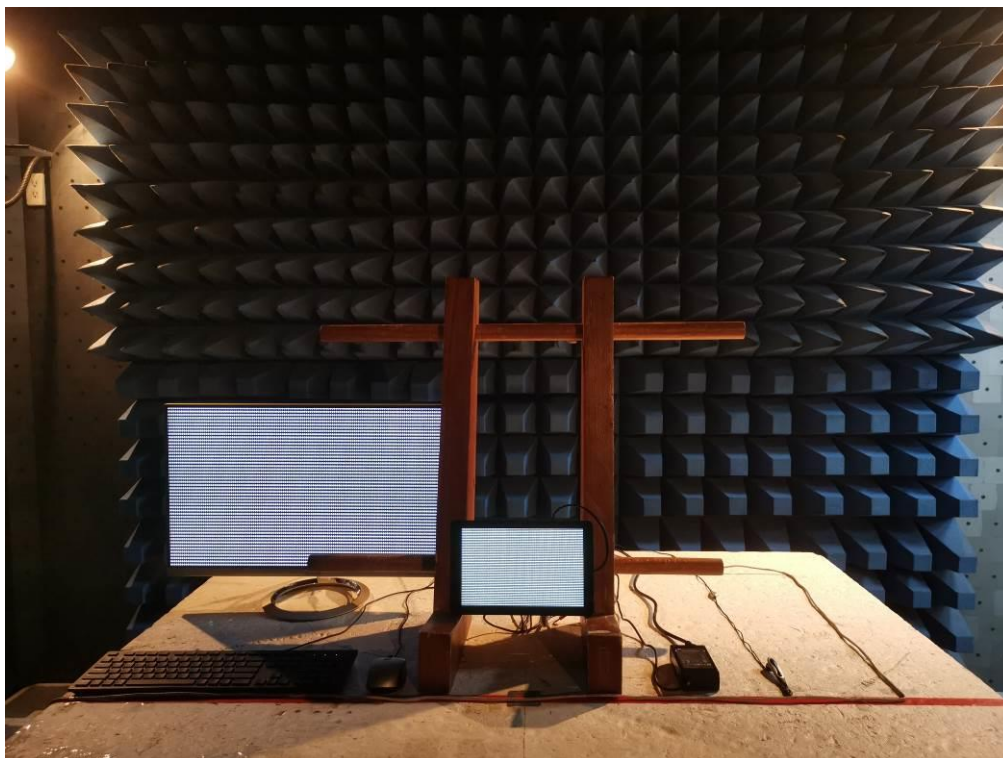
Surge immunity



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