EN 301 489 Test Report

Project No.	:	1803C313
Equipment	:	AC1200 Whole Home Mesh WiFi System
Test Model	:	Mesh3f
Series Model	:	MW3
Applicant	:	SHENZHEN TENDA TECHNOLOGY CO.,LTD
Address	:	6-8 Floor, Tower E3, No. 1001, Zhongshanyuan Road, Nanshan District, Shenzhen, China. 518052

Date of Receipt	:	Mar. 29, 2018
Date of Test	:	Apr. 02, 2018 ~ Apr. 09, 2018
Issued Date	:	Apr. 25, 2018
Tested by	:	BTL Inc.

Testing Engineer : Jason Yang
(Jason Yang)

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Testing Laboratory 2640

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).

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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.

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REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-ETSE-1-1803C313	Original Issue.	Apr. 25, 2018

1. CERTIFICATION

Equipment	:	AC1200 Whole Home Mesh WiFi System
Brand Name	:	Tenda
Test Model	:	Mesh3f
Series Model		MW3
Applicant	:	SHENZHEN TENDA TECHNOLOGY CO.,LTD
Manufacturer	:	SHENZHEN TENDA TECHNOLOGY CO.,LTD
Address	:	6-8 Floor, Tower E3, No. 1001, Zhongshanyuan Road, Nanshan District, Shenzhen, China. 518052
Date of Test	:	Apr. 02, 2018 ~ Apr. 09, 2018
Test Sample	:	Engineering Sample No. D180302742
Standard(s)	:	EN 301 489-1 V2.2.0 (2017-03) Draft EN 301 489-17 V3.2.0 (2017-03) Draft EN 61000-3-2: 2014 Class A EN 61000-3-3: 2013 EN 61000-4-2: 2009 EN 61000-4-3: 2006+A1: 2008+A2: 2010 EN 61000-4-4: 2012 EN 61000-4-5: 2006 EN 61000-4-6: 2009 EN 61000-4-11: 2004

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.
The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-ETSE-1-1803C313) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

2. SUMMARY OF TEST RESULTS

EN 301 489-1 / EN 301 489-17, EMC emission						
Clause	**Phenomenon**	**Application**		**Basic Standard or Test Method**	**Limit**	**Judgment**
8.2	Radiated emission up to 1 GHz	Enclosure of ancillary equipment		EN 55032:2015	Class B	PASS
	Radiated emission above 1 GHz				Class B	PASS **NOTE (2)**
8.3	Conducted emission	DC power input/output port		EN 55032:2015	-----	N/A
8.4		AC mains input/output port			Class B	PASS
8.5	Harmonic current emissions	AC mains input port		EN 61000-3-2: 2014	Class A	PASS **NOTE (3)**
8.6	Voltage fluctuations and flicker	AC mains input port		EN 61000-3-3: 2013	-----	PASS
8.7	Conducted emission	Wired network port	AAN	EN 55032:2015	Class B	PASS
			Current Probe		-----	N/A **NOTE (1)**
			CVP		-----	N/A **NOTE (1)**

NOTE:

(1) ” N/A” denotes test is not applicable to this device.

(2) The EUT’s max operating frequency is 5 GHz which does exceed 108 MHz, so the test will be performed.

(3) For equipment with a rated power of 75 W or less, limits are not specified.

(4)

Cable Type	Number of pairs	Measurement type	Procedures
Balanced Unscreened	1 (2 wire) ,2 (4 wire), 3 (6 wire) ,4 (8 wire)	Voltage	AAN
Balanced Unscreened	See a)	Voltage and Current	CP+CVP
Screened or Coaxial	n/a	Voltage	AAN
Screened or Coaxial	n/a	Voltage or Current	CP or CVP
Unbalanced cables	n/a	Voltage and Current	CP+CVP

Ports connected to cables with more than 4 balanced pairs or where the port is unable to function correctly when connected through an AAN.

(5) The requirement followed by the client’s specification.

EN 301 489-1 / EN 301 489-17, Immunity					
Clause	**Phenomenon**	**Application**	**Basic Standard or Test Method**	**Limit**	**Judgment**
9.2	Radio frequency electromagnetic field (80 MHz to 6 000 MHz)	Enclosure	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, telecommunication and control ports, DC and AC power ports	EN 61000-4-4: 2012	B (TT,TR)	PASS
9.5	Radio frequency, common mode 0.15 MHz to 80 MHz	Signal, telecommunication and control ports, DC and AC power ports	EN 61000-4-6: 2009	A (CT,CR)	PASS
9.6	Transients and surges in the vehicular environment	DC power input ports (vehicular use)	ISO 7637-2: 2011	-----	N/A
9.7	Voltage dips and interruptions	AC mains power input ports	EN 61000-4-11: 2004	B (TT,TR)/C	PASS **NOTE (2)**
9.8	Surges, line to line and line to ground	AC mains power input ports, telecommunication ports	EN 61000-4-5: 2006	B (TT,TR)	PASS

NOTE:

(1) ” N/A” denotes test is not applicable to this device.

(2) Voltage dip: 0% residual voltage for 0, 5 cycle - Criteria B (TT,TR)
Voltage dip: 0% residual voltage for 1 cycle - Criteria B (TT,TR)
Voltage dip: 70% residual voltage for 25 cycle (at 50Hz) - Criteria B (TT,TR)
Voltage Interruption: 0% residual voltage for 250 cycle (at 50Hz) - With battery back-up: Criteria B (TT,TR), without battery back-up: Criteria C

(3) For the performance criteria for Transient phenomena applied to Transmitter (TT) and Receiver (TR)

(4) For the performance criteria for Continuous phenomena applied to Transmitter (CT) and Receiver (CR).

(5) The requirement followed by the client’s specification.

2.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.

2.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. The BTL measurement uncertainty is less than the CISPR 16-4-2 U_{cispr} requirement.

The reported uncertainty of measurement **y** ± **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**%.

A. Radiated emission up to 1 GHz:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)
DG-CB08 (10m)	CISPR	30MHz ~ 200MHz	V	4.66
		30MHz ~ 200MHz	H	4.64
		200MHz ~ 1,000MHz	V	4.88
		200MHz ~ 1,000MHz	H	4.86

B. Radiated emission above 1 GHz:

Test Site	Method	Measurement Frequency Range	U, (dB)
DG-CB08 (3m)	CISPR	1 ~ 6 GHz	4.26
		6 ~18 GHz	5.30

C. Conducted emission at AC mains power port:

Test Site	Method	Measurement Frequency Range	U,(dB)
DG-C01	CISPR	150 kHz ~ 30MHz	3.16

D. Conducted disturbance at telecommunication port:

Test Site	Method	Measurement Frequency Range	U, (dB)
DG-C01	CISPR	AAN 50…40dB	3.76
		AAN 65…50dB	3.76
		AAN 75…60dB	3.76
		Capacitive Voltage Probe	3.04
		RF Current Probe	2.58

E. Harmonic current emissions & Voltage fluctuations and flicker:

Test Site	Method	Test Item	U(%)
DG-C01	EN 61000-3-2 EN 61000-3-3	Voltage	0.774
		Current	0.782

F. Immunity:

Test Site	Method	Measurement Frequency Range	U, (dB)
DG-SR02	EN 61000-4-2	Rise time tr	14.6 %
		Peak current Ip	7.70 %
		Current at 30 ns	7.72 %
		Current at 60 ns	7.72 %
DG-CB05	EN 61000-4-3	80MHz~1GHz, 1GHz~6GHz	2.175 dB
		Electrical measurements	2.267 dB
		Measuring the demodulation on analogue wired network lines	2.267 dB
DG-SR05	EN 61000-4-4	Voltage rise time (tr)	10.4 %
		Voltage peak value(V_P)	8.2 %
		Voltage pulse width(tw)	6.0 %
DG-SR05	EN 61000-4-5	Voltage front time (T_{fv})	5.8 %
		Voltage peak value(V_P)	3.9 %
		Voltage duration(t_d)	0.6 %
DG-CB06	EN 61000-4-6	CDN	3.25 dB
		EM Clamp	4.410 dB
		Electrical measurements	3.258 dB
		measuring the demodulation on analogue wired network lines	3.258 dB
DG-SR05	EN 61000-4-11	voltage fall time (T_f)	2 %

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

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	AC1200 Whole Home Mesh WiFi System
Brand Name	Tenda
Test Model	Mesh3f
Series Model	MW3
Model Difference	Only difffer in model number.
PowerSource	DC Voltage supplied from AC/DC adapter. Model1: BN052-A09009E Model2: BN052-A09009B Only differ in plug.
Power Rating	I/P: 100-240V~ 50/60Hz 0.3A O/P: 9V⎓1.0A
Connecting I/O Port	1* WAN/LAN port 1* LAN port 1* PWR port

Note:

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

3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	FULL SYSTEM
Mode 2	WAN 100Mbps
Mode 3	WAN 10Mbps
Mode 4	LAN 100Mbps
Mode 5	LAN 10Mbps

Radiated emission	
Final Test Mode	Description
Mode 1	FULL SYSTEM

Conducted emission at AC mains power port	
Final Test Mode	Description
Mode 1	FULL SYSTEM

Conducted disturbance at telecommunication port	
Final Test Mode	Description
Mode 2	WAN 100Mbps
Mode 3	WAN 10Mbps
Mode 4	LAN 100Mbps
Mode 5	LAN 10Mbps

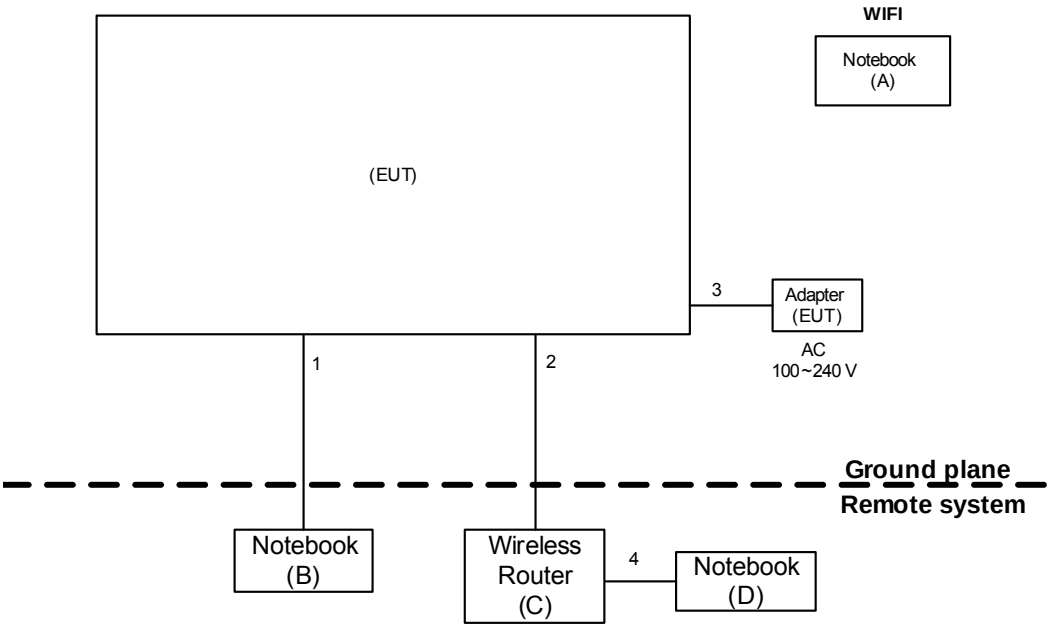
Harmonic current emissions & Voltage fluctuations and flicker	
Final Test Mode	Description
Mode 1	FULL SYSTEM

Immunity	
Final Test Mode	Description
Mode 1	FULL SYSTEM

3.3 EUT OPERATING CONDITIONS

The EUT exercise program used during radiated and/or conducted emission measurement was designed to exercise the various system components in a manner similar to a typical use. The standard test signals and output signal as following:
1. EUT connected to adapter via DC cable.
2. EUT connected to wireless router and notebook via RJ45 cable.
3. EUT connected to notebook via WIFI function.
4. Wireless router connected to notebook via RJ45 cable.

3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF RADIATION EMISSION TEST



3.5 DESCRIPTION OF SUPPORT UNITS

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

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.
A	Notebook	Lenovo	E445	DOC	MP-05Y56S
B	Notebook	HP	8460P	DOC	CNU1301BJ3
C	Wireless Router	TP-LINK	TL-WR1041N	N/A	1142123O01143
D	Notebook	Lenovo	E46L	DOC	EB22953770

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	NO	10m	RJ45 Cable
2	NO	NO	10m	RJ45 Cable
3	NO	NO	1.5m	DC Cable
4	NO	NO	1.8m	RJ45 Cable

4. EMC EMISSION TEST

4.1 RADIATED EMISSION

4.1.1 LIMITS

Class A equipment up to 1000MHz

Table clause	Frequency range MHz	Measurement			Class A limits dB(μV/m)
		Facility (see Table A.1)	Distance m	Detector type/ bandwidth	
A2.1	30-230	OATS/SAC	10	Quasi peak / 120 kHz	40
	230-1000				47
A2.2	30-230	OATS/SAC	3		50
	230-1000				57
A2.3	30-230	FAR	10	Quasi peak / 120 kHz	42 to 35
	230-1000				42
A2.4	30-230	FAR	3		52 to 45
	230-1000				52
Apply only A2.1 or A2.2 or A2.3 or A2.4 across the entire frequency range.					

Class A equipment above 1000MHz

Table clause	Frequency range MHz	Measurement			Class A limits dB(μV/m)
		Facility (see Table A.1)	Distance m	Detector type/bandwidth	
A3.1	1000-3000	FSOATS	3	Average / 1 MHz	56
	3000-6000				60
A3.2	1000-3000			Peak / 1 MHz	76
	3000-6000				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.					

Class B equipment up to 1000MHz

Table clause	Frequency range MHz	Measurement			Class B limits dB(μV/m)
		Facility (see Table A.1)	Distance m	Detector type/ bandwidth	
A4.1	30-230	OATS/SAC	10	Quasi peak / 120 kHz	30
	230-1000				37
A4.2	30-230	OATS/SAC	3		40
	230-1000				47
A4.3	30-230	FAR	10	Quasi peak / 120 kHz	32 to 25
	230-1000				32
A4.4	30-230	FAR	3		42 to 35
	230-1000				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.					

Class B equipment above 1000MHz

Table clause	Frequency range MHz	Measurement			Class B limits dB(μV/m)
		Facility (see Table A.1)	Distance m	Detector type/bandwidth	
A5.1	1000-3000	FSOATS	3	Average / 1 MHz	50
	3000-6000				54
A5.2	1000-3000			Peak / 1 MHz	70
	3000-6000				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.					

Notes:

(1) The limit for radiated test was performed according to as following: EN 55032

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

(4) The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)
Margin Level = Measurement Value - Limit Value

Required highest frequency for radiated measurement

Highest internal frequency (F_x) MHz	Highest measured frequency MHz
$F_x \leqq 108$	1000
$108 < F_x \leqq 500$	2000
$500 < F_x \leqq 1000$	5000
$F_x > 1000$	5^{th} up to a maximum 6 GHz,

Note for FM and TV broadcast receiver, F_x is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies.

4.1.2 TEST PROCEDURE

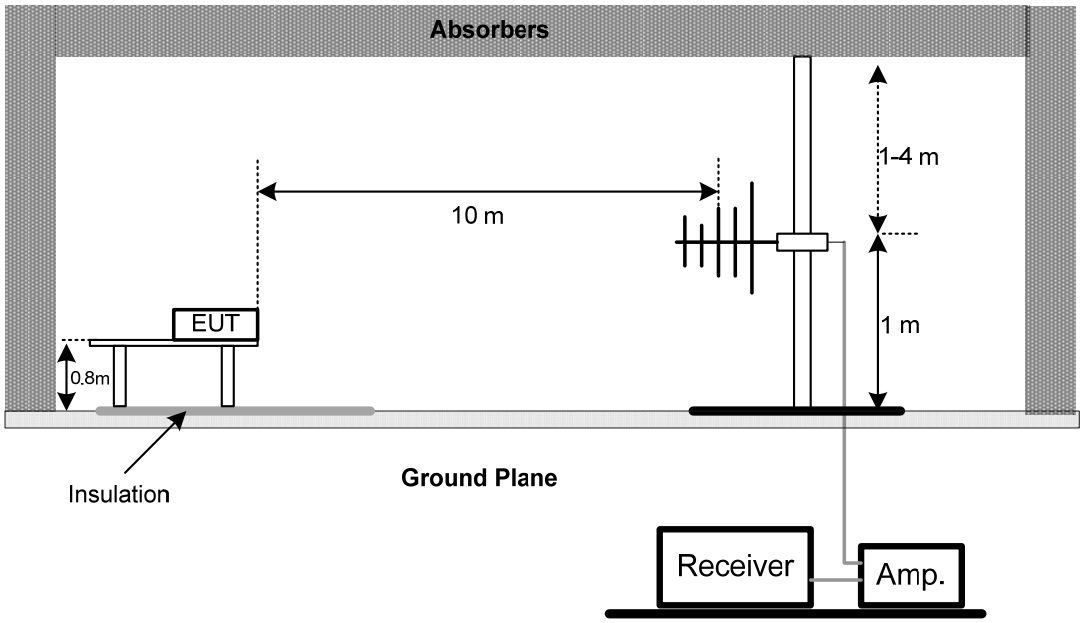
a. The measuring distance of 10 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz).
b. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
c. The height of the equipment or of the substitution antenna shall be 0.8 m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn‘t perform. (below 1GHz)
f. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn‘t perform. (above 1GHz)
g. For the actual test configuration, please refer to the related Item - Block Diagram of system tested (please refer to 3.3).

4.1.3 DEVIATION FROM TEST STANDARD

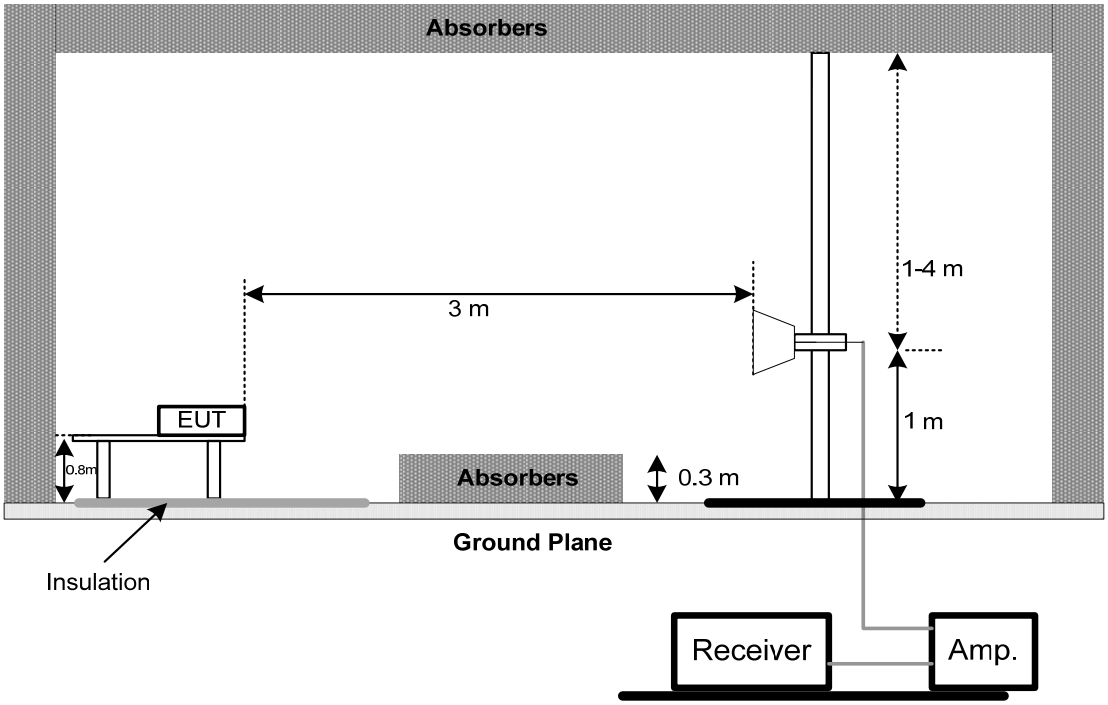
No deviation

4.1.4 TEST SETUP

UP TO 1 GHZ



ABOVE 1 GHZ



Note: The antenna can be moved between 1 to 4 meters above the ground.

4.1.5 MEASUREMENT DISTANCE

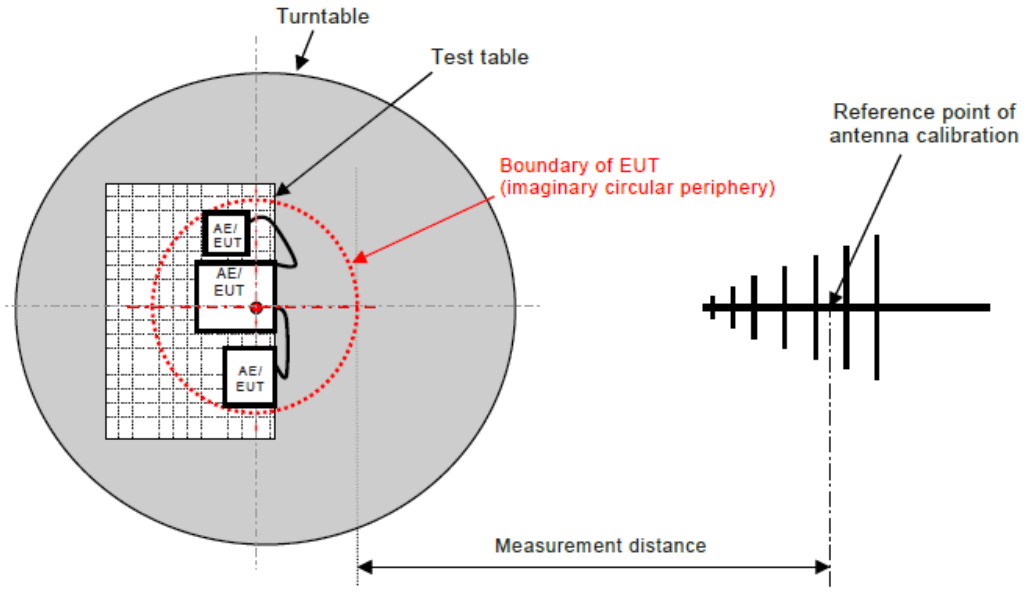


Figure C.1 – Measurement distance

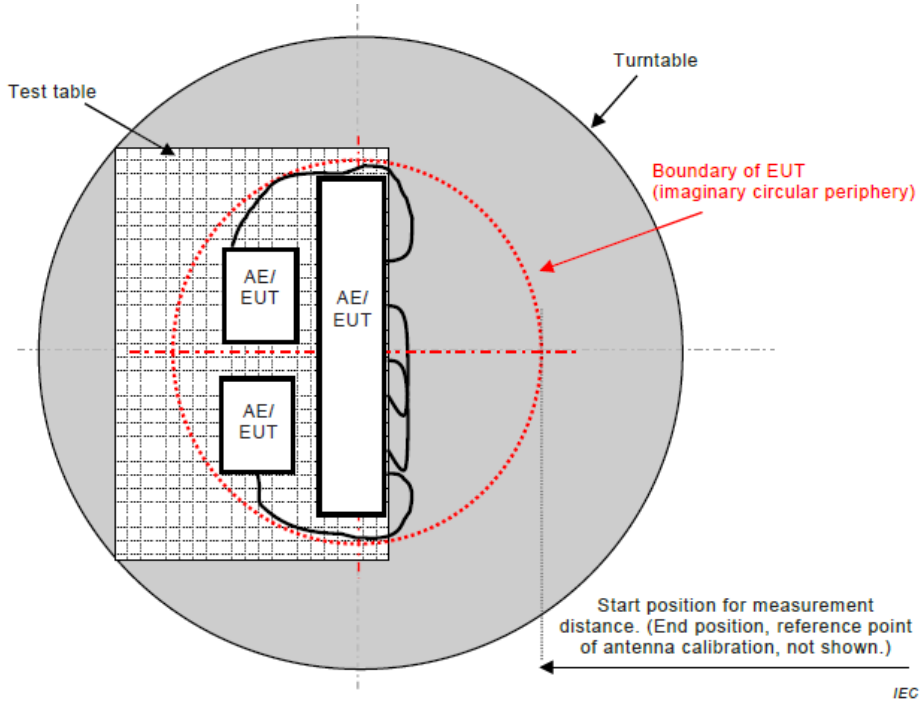


Figure C.2 – Boundary of EUT, Local AE and associated cabling

4.1.6 TEST RESULTS (UP TO 1 GHZ)

Please refer to the Attachment A.

4.1.7 TEST RESULTS (ABOVE 1 GHZ)

Please refer to the Attachment B.

4.2 CONDUCTED EMISSIONS AT AC MAINS POWER PORT

4.2.1 LIMITS

Requirements for conducted emissions from AC mains power ports of Class A equipment

Table clause	Frequency Range MHz	Coupling Device	Detector Type / bandwidth	Class A Limits (dB(μV))
A9.1	0.15 - 0.5	AMN	Quasi Peak / 9 kHz	79
	0.5 - 30			73
A9.2	0.15 - 0.5	AMN	Average / 9 kHz	66
	0.5 - 30			60
Apply A9.1 and A9.2 across the entire frequency range.				

Requirements for conducted emissions from AC mains power ports of Class B equipment

Table clause	Frequency Range MHz	Coupling Device	Detector Type / bandwidth	Class B Limits (dB(μV))
A10.1	0.15 - 0.5	AMN	Quasi Peak / 9 kHz	66-56
	0.5 - 5			56
	5 - 30			60
A10.2	0.15 - 0.5	AMN	Average / 9 kHz	56-46
	0.5 - 5			46
	5 - 30			50
Apply A10.1 and A10.2 across the entire frequency range.				

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

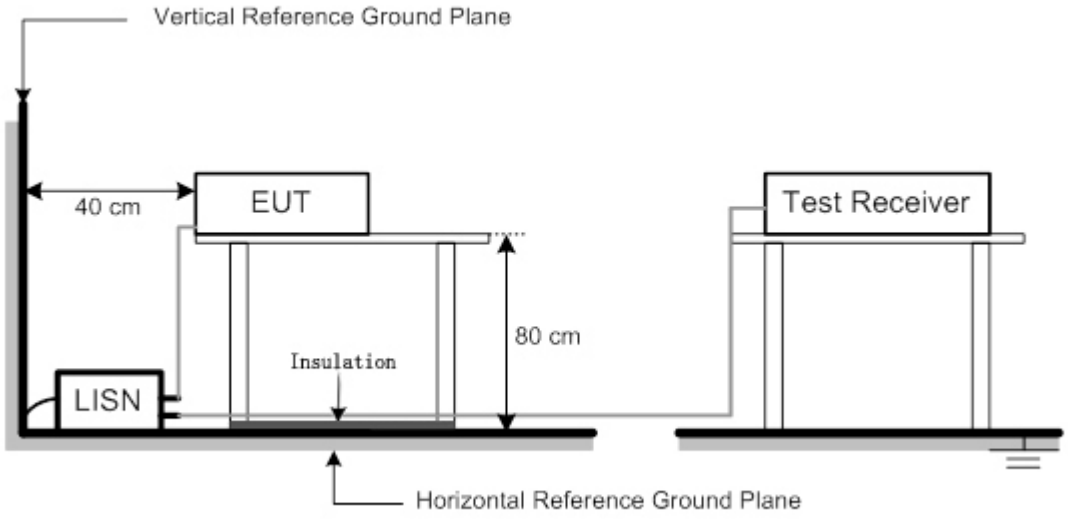
4.2.2 TEST PROCEDURE

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
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 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item - Block Diagram of system tested (please refer to 3.4).

4.2.3 DEVIATION FROM TEST STANDARD

No deviation

4.2.4 TEST SETUP



4.2.5 TEST RESULTS

Please refer to the Attachment C.

4.3 CONDUCTED EMISSION AT WIRED NETWORK PORT

4.3.1 LIMITS

Requirements for asymmetric mode conducted emissions from Class A equipment

Table clause	Frequency range MHz	Coupling device	Detector type / Bandwidth	Class A voltage limits dB(μV)	Class A current limits dB(μV)
A11.1	0.15 – 0.5	AAN	Quasi Peak / 9 kHz	97 – 87	n/a
	0.5 – 30			87	
	0.15 – 0.5	AAN	Average / kHz	84 – 74	
	0.5 – 30			7	
A11.2	0.15 – 0.5	CVP and current probe	Quasi Peak / 9 kHz	97 – 87	53 – 43
	0.5 – 30			87	43
	0.15 – 0.5	CVP and current probe	Average / 9 kHz	84 – 74	40 – 30
	0.5 – 30			74	30
A11.3	0.15 – 0.5	Current probe	Quasi Peak / 9 k z	n/a	53 – 43
	0.5 – 30				43
	0.15 – 0.5	Current probe	Average / 9 kHz		40 – 30
	0.5 – 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.

Requirements for asymmetric mode conducted emissions from Class B equipment

Table clause	Frequency range MHz	Coupling device	Detector type / Bandwidth	Class B voltage limits dB(μV)	Class B current limits dB(μV)
A12.1	0.15 – 0.5	AAN	Quasi Peak / 9 kHz	84 – 74	n/a
	0.5 – 30			74	
	0.15 – 0.5	AAN	Average / 9 kHz	74 – 64	
	0.5 – 30			64	
A12.2	0.15 – 0.5	CVP and current probe	Quasi Peak / 9 kHz	84 – 74	40 – 30
	0.5 – 30			74	30
	0.15 – 0.5	CVP and current probe	Average / 9 kHz	74 – 64	30 – 20
	0.5 – 30			64	20
A12.3	0.15 – 0.5	Current probe	Quasi Peak / 9 kHz	n/a	40 – 30
	0.5 – 30				30
	0.15 – 0.5	Current probe	Average / 9 k z		30 – 20
	0.5 – 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

4.3.2 TEST PROCEDURE

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
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 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. For the actual test configuration, please refer to the related Item –EUT Test Photos.
e. **AAN, CP or CVP** at least 80 cm from nearest part of EUT chassis.

NOTE:

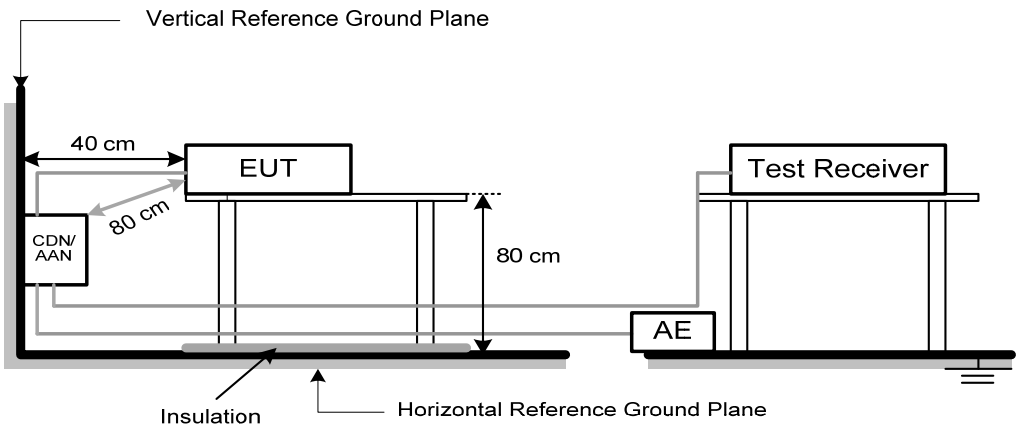
f. The communication function of EUT was executed and AAN was connected between EUT and associated equipment and the AAN was connected directly to reference ground plane.
Measure the voltage at the measurement port of the AAN
Correct the measured voltage by adding the AAN voltage division factor
Compare the corrected voltage with the limit**(For AAN)**
g Measure the current with a current probe and compare to the current limit**(For CP)**
h The current shall be measured with the current probe and the results compared with the current limits.
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.
The adjusted voltage shall be compared with the applicable voltage limit.
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.**(For CVP)**

4.3.3 DEVIATION FROM TEST STANDARD

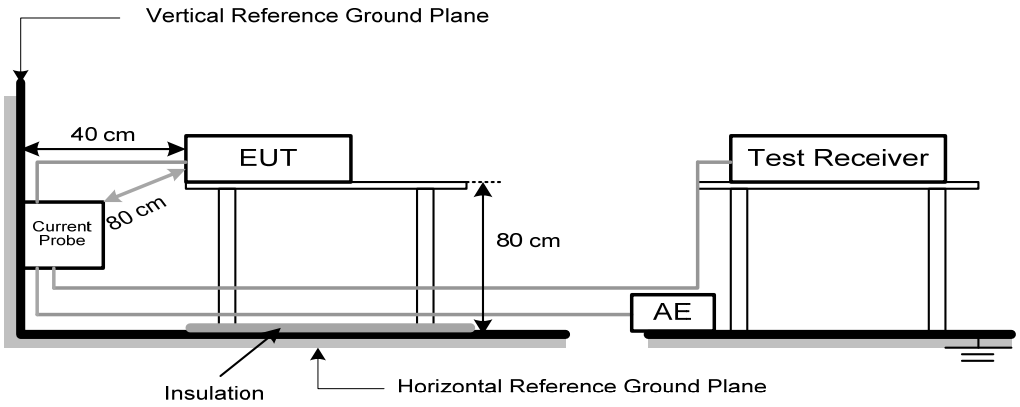
No deviation

4.3.4 TEST SETUP

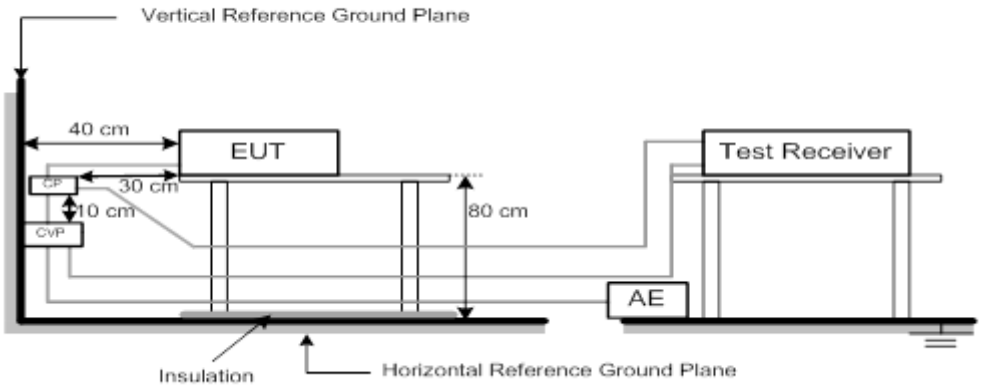
a) Cable Type: Balanced Unscreened, Screened or Coaxial



b) Cable Type: Screened or Coaxial



c) Cable Type: Balanced Unscreened, Unbalanced



4.3.5 TEST RESULTS

Please refer to the Attachment D.

4.4 HARMONICS CURRENT EMISSION

4.4.1 LIMITS OF HARMONICS CURRENT EMISSSION

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

4.4.2 TEST PROCEDURE

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

b. The classification of EUT is according to section 5 of EN 61000-3-2.
The EUT is classified as follows:

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

Class B: Portable tools. Arc welding equipment which is not professional equipment.

Class C: Lighting equipment.

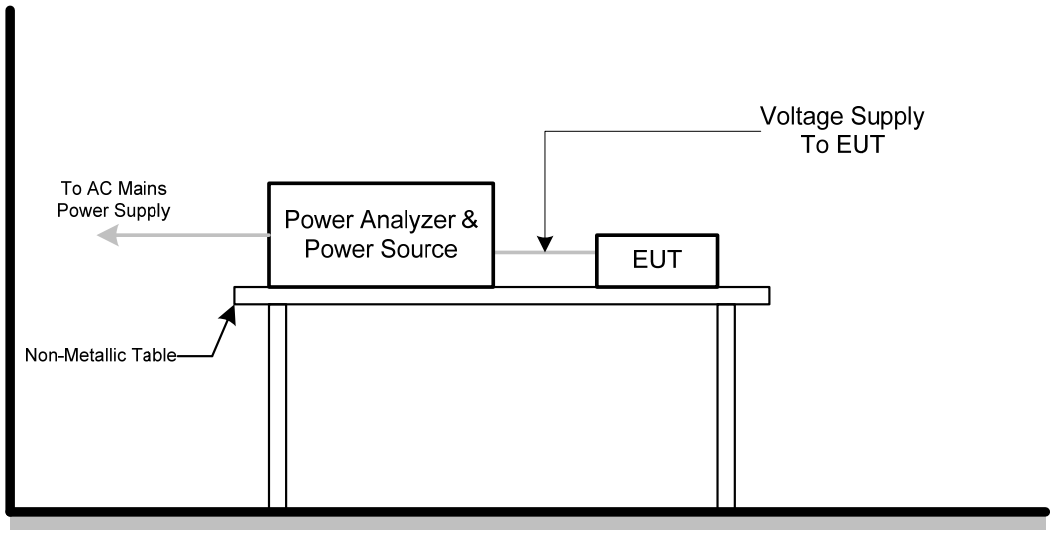
Class D: Equipment having a specified power less than or equal to 600 W of the following types: Personal computers and personal computer monitors and television receivers.

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

4.4.3 DEVIATION FROM TEST STANDARD

No deviation

4.4.4 TEST SETUP



4.4.5 TEST RESULTS

Please refer to the Attachment E.

4.5 VOLTAGE FLUCTUATIONS AND FLICKER

4.5.1 LIMITS OF VOLTAGE FLUCTUATIONS AND FLICKER

Tests	Limits	Descriptio s
	EN 61000-3-2	
Pst	≤ 1.0, Tp= 10 min.	Short Term Flicker Indicator
Plt	≤ 0.65, Tp=2 hr.	Long Term Flicker Indicator
dc	≤ 3.3 %	Relative Steady-State V-Chang
dmax	≤ 4 %	Maximum Relative V-change
d (t)	≤ 500 ms	Relative V-change characteristic

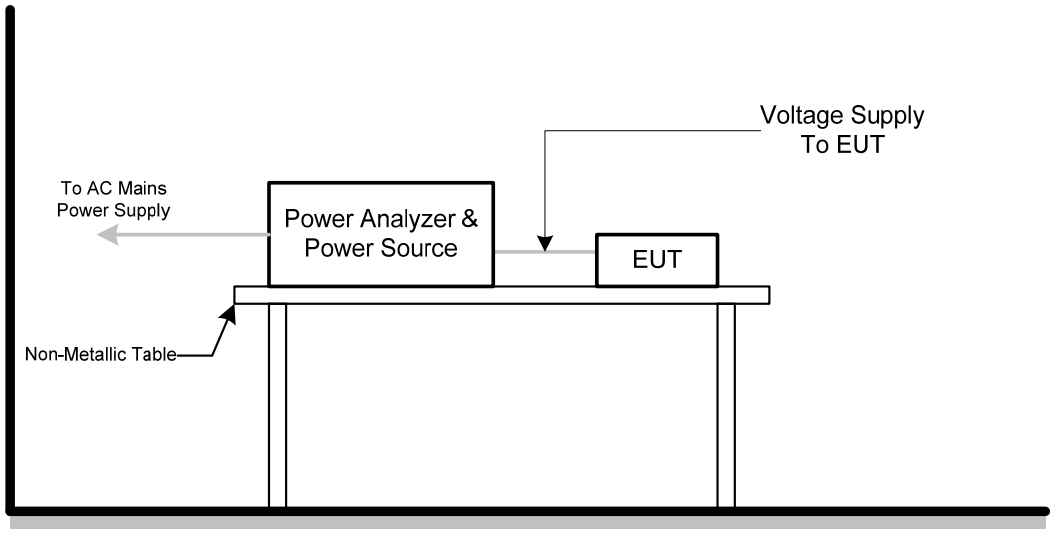
4.5.2 TEST PROCEDURE

a. Tests was performed according to the Test Conditions/Assessment of Voltage Fluctuations specified in EN 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.

4.5.3 DEVIATION FROM TEST STANDARD

No deviation

4.5.4 TESTSETUP



4.5.5 TEST RESULTS

Please refer to the Attachment F.

5. EMC IMMUNITY TEST

5.1 STANDARD COMPLIANCE/SEVERITY LEVEL/CRITERIA

Test Standard No.	Test Specification Level	Test Mode Test Port	Performance Criteria
Electrostatic discharge Clause 9.3 EN 61000-4-2 (ESD)	± 8 kV air discharge ± 4 kV contact discharge	Direct Mode	B
	± 4 kV HCP discharge ± 4 kV VCP discharge	Indirect Mode	B
Radio frequency electromagnetic Field Clause 9.2 EN 61000-4-3 (RS)	80 MHz to 6000 MHz 3 V/m (unmodulated, r.m.s), 1000 Hz or 400 Hz, 80%, AM modulated **(NOTE 1)**	Enclosure	A
Fast transients, common mode Clause 9.4 EN 61000-4-4 (EFT)	± 1 kV(peak) 5/50 ns Tr/Th 5 kHz Repetition Frequency	AC mains power port	B
	±0.5 kV(peak) 5/50ns Tr/Th 5 kHz Repetition Frequency	DC power port **(NOTE 2)**	B
	± 0.5 kV(peak) 5/50 ns Tr/Th 5 kHz Repetition Frequency	Signal port, Wired network port, Control port **(NOTE 2)**	B
Surges, line to line and line to Ground Clause 9.8 EN 61000-4-5 (Surges)	±1 kV(5P/5N) 1.2/50(8/20) Tr/Th us **(line to line)**	AC mains power port	B
	± 2 kV(5P/5N) 1.2/50(8/20) Tr/Th us **(line to earth or ground)**		B
	±1 kV (5P/5N) 10/700 (5/320)Tr/Th us **(symmetrically operated line to ground)**	wired network ports **(NOTE 3)**	B
	±0.5 kV (5P/5N) 1.2/50(8/20) Tr/Th us **(non-symmetrically line to line)**		
	±1 kV (5P/5N) 1.2/50(8/20) Tr/Th us **(non-symmetrically line to ground, or shield to ground)**		
	±0.5 kV (5P/5N) 1.2/50(8/20) Tr/Th us **(line to ground, or shield to ground)**	wired network ports **(NOTE 4)**	

Radio frequency, common mode EN 61000-4-6 Clause 9.5 (CS)	0.15 MHz to 80 MHz 3 V (unmodulated, r.m.s), 1000 Hz or 400 Hz, 80%, AM Modulated 150Ω source impedance **(NOTE 1)**	AC Power Port	A
	0.15 MHz to 80 MHz 3 V (unmodulated, r.m.s), 1000 Hz or 400 Hz, 80%, AM Modulated 150Ω source impedance **(NOTE 1)**	DC Power Port **(NOTE 2)**	A
	0.15 MHz to 80 MHz 3V (unmodulated, r.m.s), 1000 Hz or 400 Hz, 80%, AM Modulated 150Ω source impedance **(NOTE 1)**	signal ports, wired network ports, control ports **(NOTE 2)**	A
Voltage dips and interruptions EN 61000-4-11 Clause 9.7 (Dips)	Voltage dip 0% Voltage dip 0% Voltage dip 70% Voltage Interruption 0%	AC Power Port	B B B B/C **(NOTE 5)**

NOTE:

(1) If the wanted signal is modulated at 1 000 Hz, then an audio signal of 400 Hz shall be used.

(2) If the cables may be longer than 3 m.

(3) Only for directly connected to outdoor cables.

(4) Only for connected to indoor cables (longer than 30 m).

(5) With battery back-up: Criteria B (TT,TR), without battery back-up: Criteria C.

5.2 GENERAL PERFORMANCE CRITERIA

1.	Performance criteria for continuous phenomena applied to transmitters (CT)
2.	Performance criteria for transient phenomena applied to transmitters (TT)
3.	Performance criteria for continuous phenomena applied to receivers (CR)
4.	Performance criteria for transient phenomena applied to receivers (TR)

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

Criteria	During Test	After Test
A	Shall operate as intended. (see note 1). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (see note 3). Shall be no loss of function. Shall be no loss of stored data or user programmable functions.
B	May show loss of function (one or more). May show degradation of performance (see note 2). Shall be no unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3). Shall be no loss of stored data or user programmable functions.
C	May be loss of function (one or more).	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3).

NOTE 1: Operate as intended during the test allows a level of degradation not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.
NOTE 2: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.
NOTE 3: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

Performance Criteria for CT and CR:
Refer to **EN 301 489-17** subclasses 6.3 and 6.5 for the performance criteria for Continuous phenomena applied to Transmitter (CT) and Receiver (CR).

Performance Criteria for TT and TR:
Refer to **EN 301 489-17** subclasses 6.4 and 6.6 for the performance criteria for Transient phenomena applied to Transmitter (TT) and Receiver (TR).

5.3 GENERAL PERFORMANCE CRITERIA TEST SETUP

The EUT tested system was configured as the related operation mode otherwise a special operating condition is specified in the follows during the testing.

5.4 ELECTROSTATIC DISCHARGE (ESD)

5.4.1 TEST SPECIFICATION

Clause:	9.3
Test Method:	EN 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Required Performance	B
Discharge Voltage:	Air Discharge: ± 2 kV/± 4 kV/± 8 kV (Direct) Contact Discharge: ± 2 kV/± 4 kV (Indirect)
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 second minimum

5.4.2 TEST PROCEDURE

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

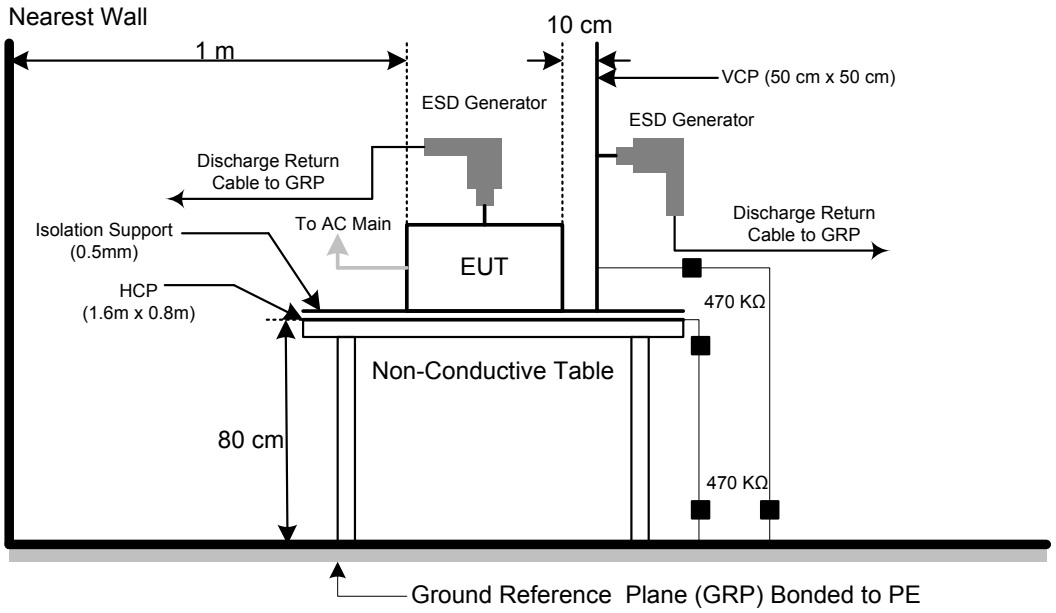
a. The test shall be performed with single discharges. On each pre-selected point at least 10 single discharges (in the most sensitive polarity) shall be applied.
NOTE 1 The minimum number of discharges applied is depending on the EUT; for products w ith synchronized
circuits the number of discharges 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 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane.
The four faces of the EUT will be performed with electrostatic discharge.
Horizontal Coupling Plane (HCP):
The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane.
The four faces of the EUT will be performed with electrostatic discharge.

b. Air discharges at insulation surfaces of the EUT.
It was at least ten single discharges with positive and negative at the same selected point.

5.4.3 DEVIATION FROM TEST STANDARD

No deviation

5.4.4 TEST SETUP



Note:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A Horizontal Coupling Plane (1.6m x 0.8m) 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 section 7 of EN 61000-4-2, and its cables were placed on the HCP and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of EN 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

5.4.5 EUT TEST CONDITIONS

Temperature: 22°C Relative Humidity: 29% Test Pressure: 1010 hPa

5.4.6 TEST RESULTS

Please refer to the Attachment G.

5.5 RADIO FREQUENCY ELECTROMAGNETIC FIELD (RS)

5.5.1 TEST SPECIFICATION

Clause:	9.2
Test Method:	EN 61000-4-3
Required Performance	A
Frequency Range:	80 MHz - 6000 MHz
Field Strength:	3 V/m (unmodulated, r.m.s)
Modulation:	1000 Hz Sine Wave, 80%, AM Modulation If the wanted signal is modulated at 1000 Hz, then an audio signal of 400 Hz shall be used.
Frequency Step:	1% of fundamental
Polarity of Antenna:	Horizontal and Vertical
Test Distance:	3 m
Antenna Height:	1.5 m
Dwell Time:	at least 3 seconds

5.5.2 TEST PROCEDURE

The EUT and support equipment, which are placed on a table that is 0.8 meter above ground and the testing was performed in a fully-anechoic chamber.
The testing distance from antenna to the EUT was 3 meters.
The other condition as following manner:

a. The field strength level was 3 V/m (unmodulated, r.m.s).

b. The test level shall be 3 V/m (measured unmodulated). The test signal shall be amplitude modulated to a depth of 80 % by a sinusoidal audio signal of 1000 Hz. If the wanted signal is modulated at 1000 Hz, then an audio signal of 400 Hz shall be used,
The test shall be performed over the frequency range 80 MHz to 6000 MHz with the exception of the exclusion band for transmitters, receivers and duplex transceivers (see clause 4), as appropriate,
For receivers and transmitters the stepped frequency increments shall be 1 % frequency increment of the momentary used frequency, unless specified otherwise in the part of EN 301 489 series [i.13] dealing with the relevant type of radio equipment.

c. The exclusion band for immunity testing of equipment operating in the 2,4 GHz band shall be:
• Lower limit of exclusion band = lowest allocated band edge frequency -120 MHz, i.e. 2280MHz;
• Upper limit of exclusion band = highest allocated band edge frequency +120 MHz, i.e. 2603.5 MHz.
The exclusion band for immunity testing of equipment operating in the 5 GHz Wi-Fi band shall be:
• Lower limit of exclusion band = lowest allocated band edge frequency -270 MHz, i.e. 4880MHz;
• Upper limit of exclusion band = highest allocated band edge frequency +270 MHz, i.e. 5995MHz.
The exclusion band for immunity testing of equipment operating in the 5,8 GHz band shall be:
• Lower limit of exclusion band = lowest allocated band edge frequency -270 MHz, i.e. 5455 MHz;
• As the immunity requirements have an upper frequency range of 6 GHz and any upper edge exclusion band Would be greater than this for the 5,8 GHz band. The above frequency shall also be regarded as the upper end of the test range.

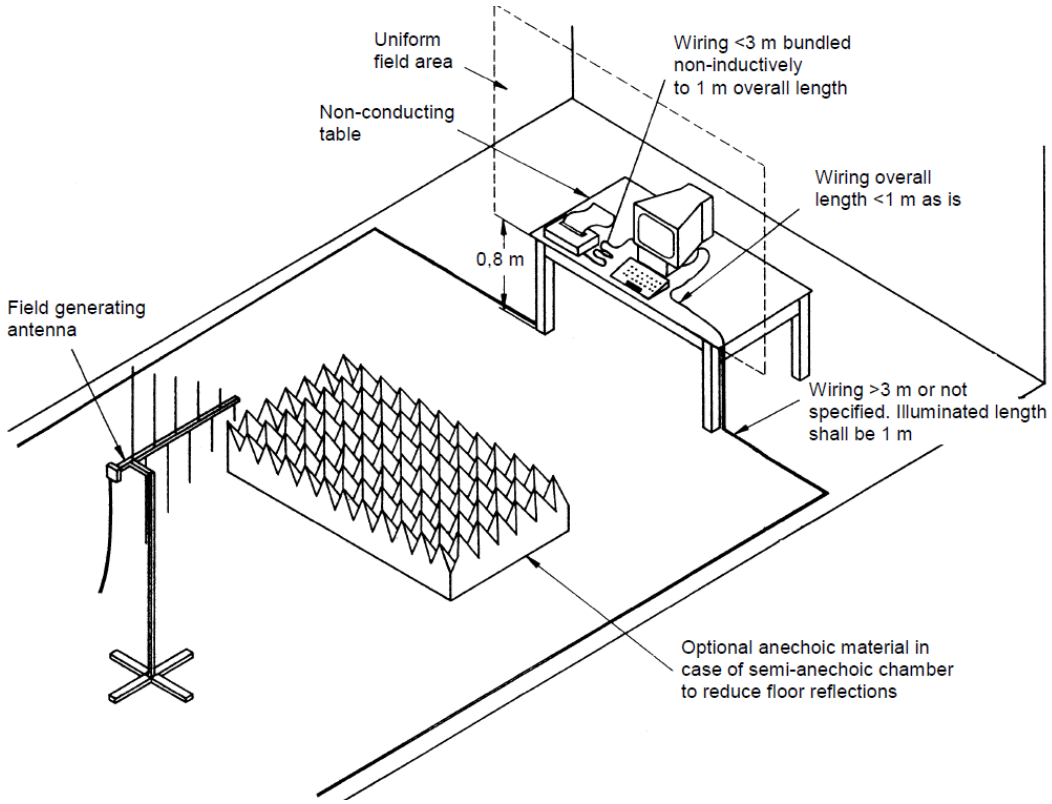
d. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.

e. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

5.5.3 DEVIATION FROM TEST STANDARD

No deviation

5.5.4 TEST SETUP



Note:

TABLE-TOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of EN 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

FLOOR-STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of EN 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

5.5.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 56%

5.5.6 TEST RESULTS

Please refer to the Attachment H.

5.6 FAST TRANSIENTS, COMMON MODE (EFT)

5.6.1 TEST SPECIFICATION

Clause:	9.4
Test Method:	EN 61000-4-4
Required Performance	B
Test Voltage :	AC mains power port: ±1 kV Signal/Control Line: ±0.5 kV
Polarity:	Positive & Negative
Impulse Frequency:	5 kHz: except for xDSL equipment 100 kHz: only for single lines of xDSL equipment.
Impulse Wave shape :	5/50 ns
Burst Duration:	15 ms
Burst Period:	300 ms
Test Duration:	Not less than 1 min.

5.6.2 TEST PROCEDURE

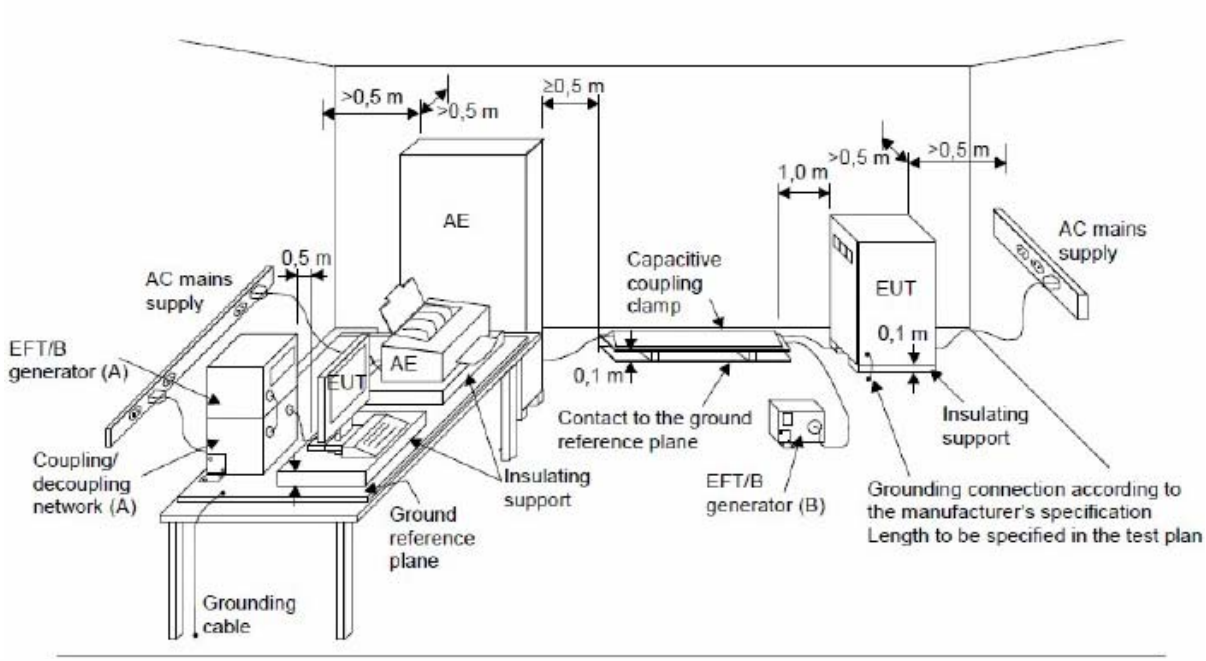
The EUT and support equipment, are placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m min. and 0.65mm thick min.
The other condition as following manner:

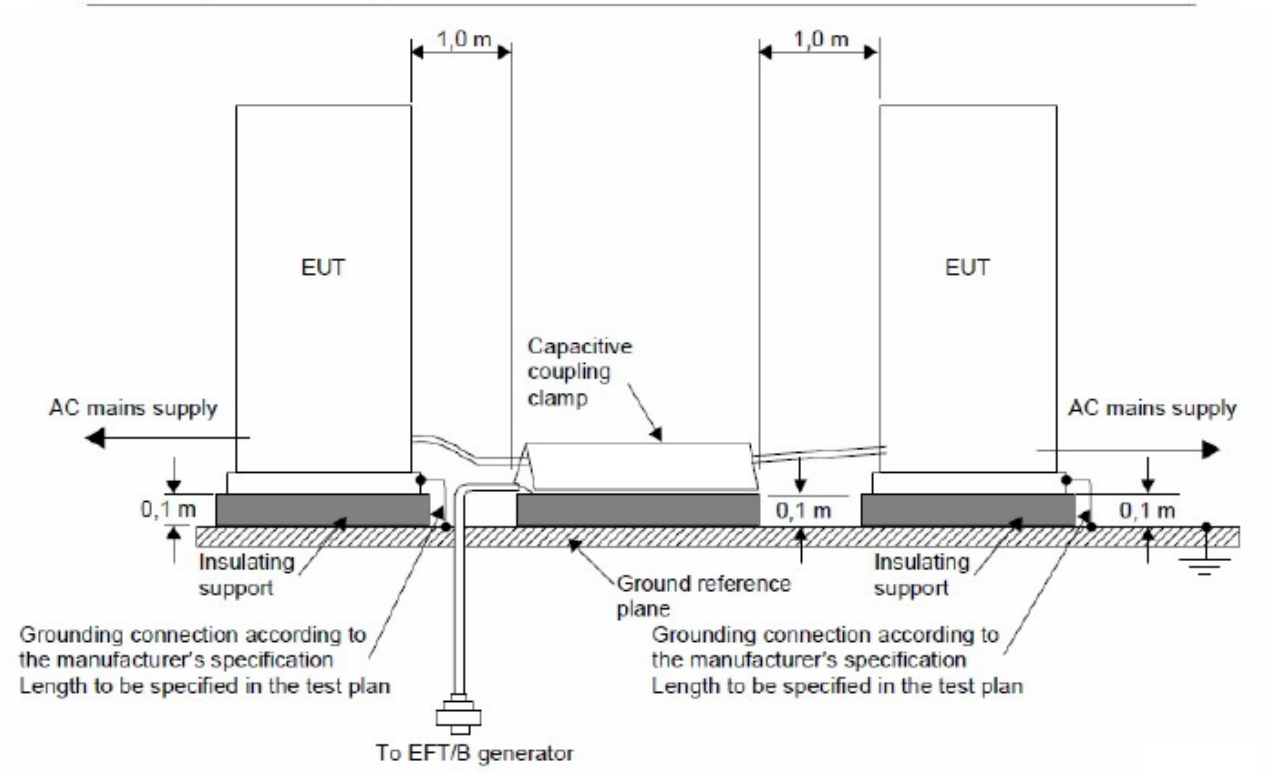
a. The length of power cord between the coupling device and the EUT should not exceed 1 meter.
b. Both positive and negative polarity discharges were applied.
c. The duration time of each test sequential was 1 minute

5.6.3 DEVIATION FROM TEST STANDARD

No deviation

5.6.4 TEST SETUP





Note:

TABLE-TOP EQUIPMENT

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

FLOOR-STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of EN 61000-4-4 and its cables, were isolated from the Ground Reference Plane by an insulating support that is 0.1-meter thick. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system.

5.6.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 56%

5.6.6 TEST RESULTS

Please refer to the Attachment I.

5.7 SURGES

5.7.1 TEST SPECIFICATION

Clause:	9.8
Test Method:	EN 61000-4-5
Required Performance	B
Wave-Shape:	Combination Wave 1.2/50 us Open Circuit Voltage 8 /20 us Short Circuit Current 10/700 us Open Circuit Voltage
Test Voltage :	AC mains power port(L-N): ±0.5 kV, ± 1 kV Signal/Control Line: ±0.5 kV, ± 1 kV
Surge Input/Output:	AC mains power port
Generator Source Impedance	2 ohm between networks 40 ohm between network and ground 42 ohm between network and ground
Polarity:	Positive/Negative
Phase Angle:	AC Port: 0°/90°/180°/270°
Pulse Repetition Rate:	1 time / min. (maximum)
Number of Tests:	5 positive and 5 negative at selected points

5.7.2 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 2meters 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 meters in length (or shorter).

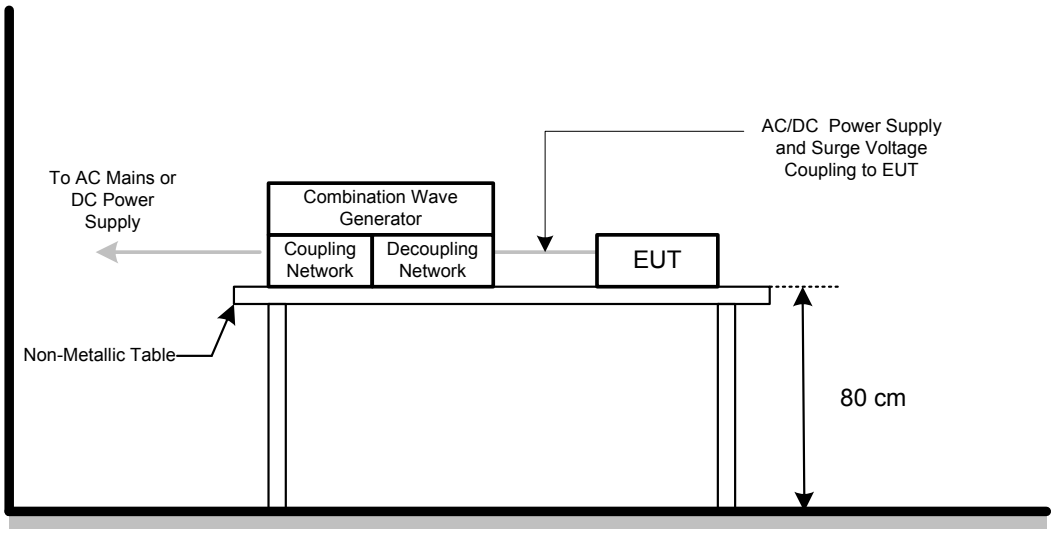
c. For test applied to unshielded symmetrically operated interconnection /telecommunication lines of EUT:

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 meters in length (or shorter).

5.7.3 DEVIATION FROM TEST STANDARD

The requirement followed by the client's specification.

5.7.4 TEST SETUP



5.7.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 56%

5.7.6 TEST RESULTS

Please refer to the Attachment J.

5.8 RADIO FREQUENCY, COMMON MODE (CS)

5.8.1 TEST SPECIFICATION

Clause:	9.5
Test Method:	EN 61000-4-6
Required Performance	A
Frequency Range:	0.15 MHz - 80 MHz
Field Strength:	3 V (unmodulated, r.m.s)
Modulation:	1000 Hz Sine Wave, 80%, AM Modulation If the wanted signal is modulated at 1 000 Hz, then the test signal of 400 Hz shall be used.
Frequency Step:	1% of fundamental
Dwell Time:	at least 3 seconds

5.8.2 TEST PROCEDURE

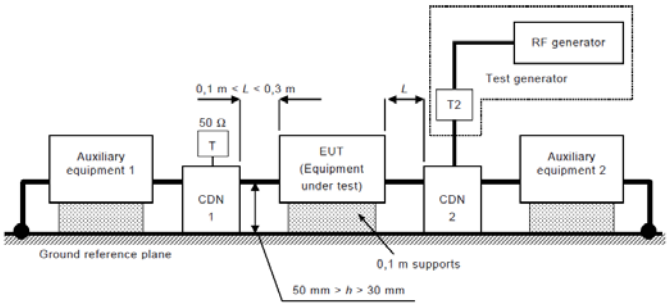
The EUT and support equipment, are placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m min. and 0.65mm thick min.
The other condition as following manner:

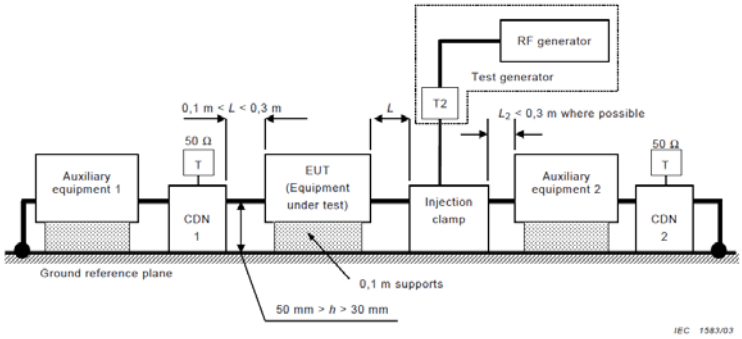
a. • The test level shall be severity level 2 as given in CENELEC EN 61000-4-6 [6] corresponding to 3 V (unmodulated, r.m.s). The test signal shall then be amplitude modulated to a depth of 80 % by a sinusoidal audio signal of 1 000 Hz. If the wanted signal is modulated at 1 000 Hz, then the test signal of 400 Hz shall be used,
• The test shall be performed over the frequency range 150 kHz to 80 MHz with the exception of an exclusion band for transmitters, and for receivers and duplex transceivers.
• For receivers and transmitters the stepped frequency increments shall be 1 % frequency increment of the momentary frequency in the frequency range 150 kHz to 80 MHz, unless specified otherwise in the part of ETSI EN 301 489 series [i.13] dealing with the particular type of radio equipment,
• The injection method to be used shall be selected according to the basic standard CENELEC EN 61000-4-6 [6],
• responses on receivers or receiver parts of transceivers occurring at discrete frequencies which are narrow band responses (spurious responses), are disregarded from the test, (see clause 4), the dwell time of the test phenomena at each frequency shall not be less than the time necessary for the EUT to be exercised and to be able to respond,

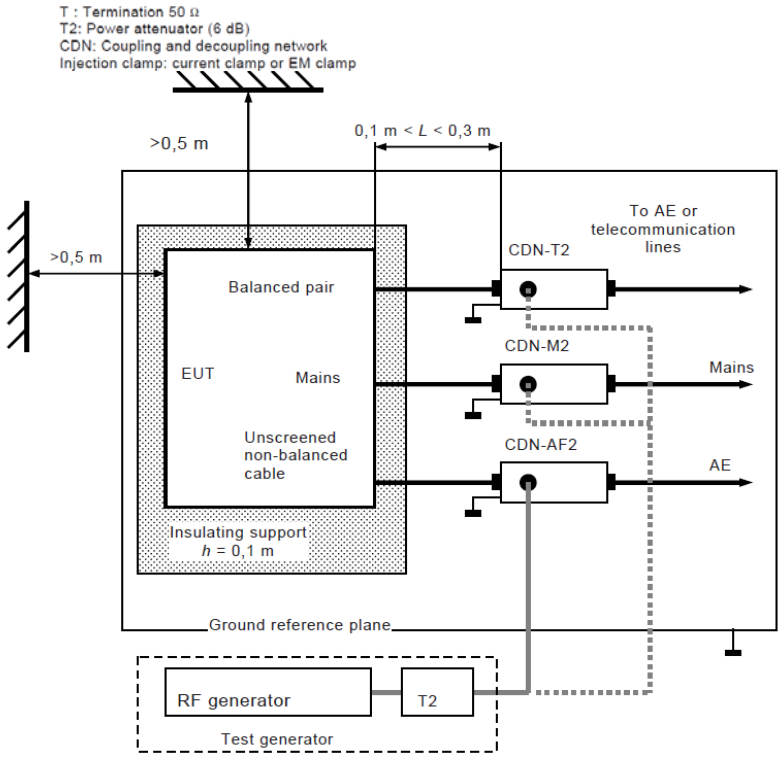
5.8.3 DEVIATION FROM TEST STANDARD

No deviation

5.8.4 TEST SETUP







The EUT clearance from any metallic objects shall be at least 0.5 m.

5.8.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 56%

5.8.6 TEST RESULTS

Please refer to the Attachment K.

5.9 VOLTAGE DIPS AND INTERRUPTIONS (DIPS)

5.9.1 TEST SPECIFICATION

Clause:	9.7
Test Method:	EN 61000-4-11
Required Performance	B (0 % residual voltage for 0,5 cycle) B (0 % residual voltage for 1 cycle) B (70 % residual voltage for 25 cycles (at 50 Hz)) C (0 % residual voltage for 250 cycles (at 50 Hz))
Test Duration Time:	Minimum three test events in sequence
Interval between Event:	Minimum ten seconds
Phase Angle:	0°/45°/90°/135°/180°/225°/270°/315°/360°
Test Cycle:	3 times

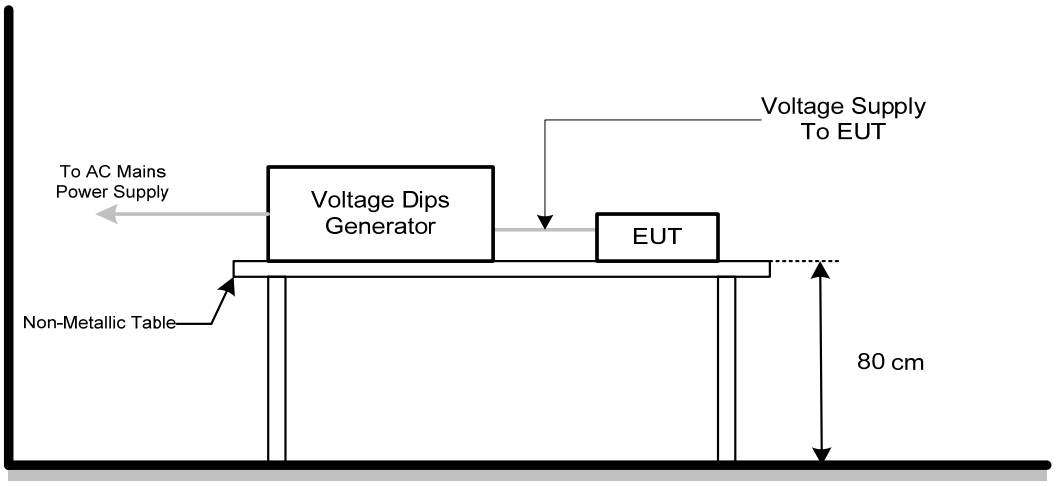
5.9.2 TEST PROCEDURE

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.

5.9.3 DEVIATION FROM TEST STANDARD

No deviation

5.9.4 TEST SETUP



5.9.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 56%

5.9.6 TEST RESULTS

Please refer to the Attachment L.

6. MEASUREMENT INSTRUMENTS LIST

Radiated emission up to 1GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Pre-Amplifier	Mini-Circuits	EMC 9135	980284	Mar. 11, 2019
2	Pre-Amplifier	Mini-Circuits	EMC 9135	980283	Mar. 11, 2019
3	Trilog-Broadband Antenna	Schwarzbeck	VULB9168	586	Nov. 09, 2018
4	Trilog-Broadband Antenna	Schwarzbeck	VULB9168	587	Jan. 04, 2019
5	Cable	emci	LMR-400(5m+11 m+15m)	N/A	Jan. 11, 2019
6	Cable	emci	LMR-400(5m+8m +15m)	N/A	Jan. 11, 2019
7	Measurement Software	Farad	EZ-EMC Ver.BTL-2ANT-1	N/A	N/A
8	Multi-Device Controller	ETS-Lindgren	2090	N/A	N/A
9	Attenuator	N/A	SA18N-06	6dB	Apr. 14, 2018
10	Attenuator	N/A	SA18N-06	6dB	Apr. 14, 2018
11	Receiver	Keysight	N9038A	MY54450004	Aug. 15, 2018
12	MXE EMI Receiver	Agilent	N9038A	MY53220133	Mar. 11, 2019

Radiated emission above 1GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Measurement Software	Farad	EZ-EMC Ver.BTL-2ANT-1	N/A	N/A
2	Cable	emci	SUCOFLEX_15m _5m(0.01GHz－ 26.5GHz)	N/A	Dec. 26, 2018
3	Multi-Device Controller	ETS-Lindgren	2090	N/A	N/A
4	Controller	MF	MF-7802	MF780208159	N/A
5	Horn Antenna	EMCO	3115	9605-4803	Mar. 11, 2019
6	Amplifier	Agilent	8449B	3008A02584	Aug. 20, 2018
7	MXE EMI Receiver	Agilent	N9038A	MY53220133	Mar. 11, 2019

Conducted emission at AC mains power port					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
2	50Ω Terminator	SHX	TF2-3G-A	08122901	Mar. 11, 2019
3	TWO-LINE V-NETWORK	R&S	ENV216	100526	Mar. 11, 2019
4	EMI Test Receiver	R&S	ESR3	101862	Aug. 15, 2018
5	Artificial-Mains Network	SCHWARZBECK	NSLK 8127	8127685	Aug. 20, 2018
6	Cable	N/A	RG400 12m	N/A	Mar. 06, 2019

Conducted disturbance at telecommunication port					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
2	50Ω Terminator	SHX	TF2-3G-A	08122901	Mar. 11, 2019
3	TWO-LINE V-NETWORK	R&S	ENV216	100526	Mar. 11, 2019
4	EMI Test Receiver	R&S	ESR3	101862	Aug. 15, 2018
5	Artificial-Mains Network	SCHWARZBECK	NSLK 8127	8127685	Aug. 20, 2018
6	Cable	N/A	RG400 12m	N/A	Mar. 06, 2019
7	ISN	Teseq GmbH	ISN T8	30833	Aug. 20, 2018

Harmonic current emissions & Voltage fluctuations and flicker					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Harmonics and Flicker Analyzer	California Instruments	PACS-1	72344	Aug. 15, 2018
2	3KVA AC Power source	California Instruments	3001ix	56309	Aug. 15, 2018
3	Measurement Software	California	CTS4.0 Version 4.9	N/A	N/A

Electrostatic discharge					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	ESD Generator	TESEQ AG	NSG 437	450	Nov. 01, 2018

Radio frequency electromagnetic Field					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	ETS	3142C	47662	Mar. 11, 2019
2	MXG Analog Signal Generator	Agilent	N5181A	MY49060710	Aug. 20, 2018
3	Amplifier	AR	50S1G4A	326720	Mar. 27, 2019
4	Power amplifier	MILMEGA	AS1860-50	1064834	Aug. 20, 2020
5	Microwave Log.-Per. Antenna	TESEQ	STLP 9149	9149-277	Mar. 11, 2021
6	Power amplifier	MILMEGA	80RF1000-250	1064833	Aug. 20, 2020
7	Measurement Software	TOYO	IM5/RS Ver 3.8.050	N/A	N/A

Fast transients, common mode					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Capacitor Clamp	Thermo KeyTek	CCL	0502215	Feb. 23, 2019
2	THE MODULAR SOLUTION FOR 6 KV APPLICATIONS	Teseq	NSG 3060	1423	Aug. 20, 2018
3	Measurement Software	Teseq	Win 3000 Version 1.2.0	N/A	N/A

Surges					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	THE MODULAR SOLUTION FOR 6 KV APPLICATIONS	Teseq	NSG 3060	1423	Aug. 20, 2018
2	CDN	EMC PARTNER	CDN-UTP8	040	Mar. 11, 2019
3	Measurement Software	Teseq	Win 3000 Version 1.2.0	N/A	N/A

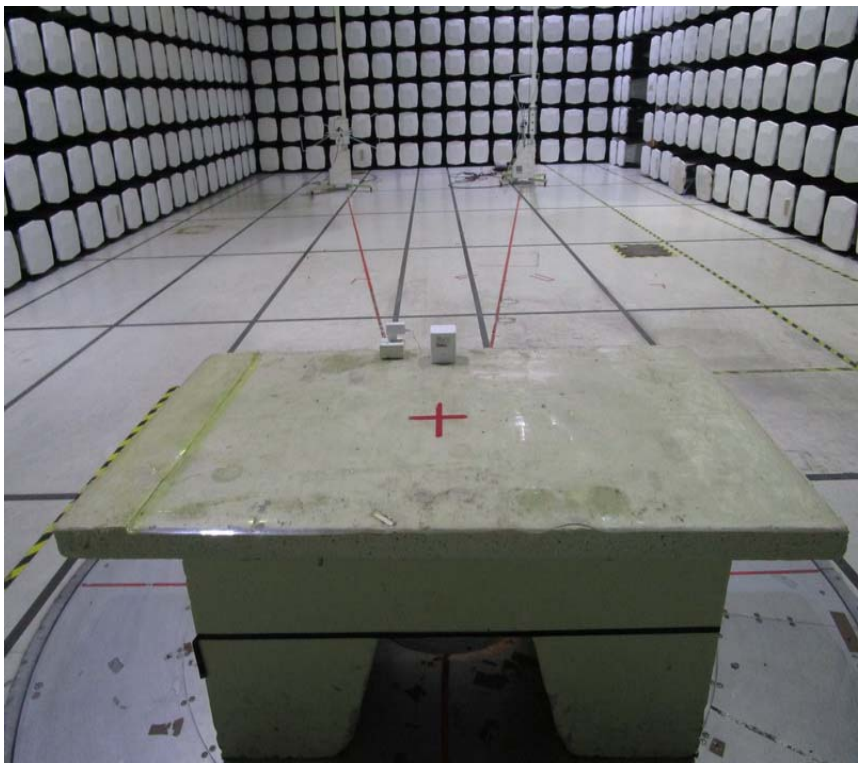
Radio frequency, common mode					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Signal Generator	HP	8648A	3636A02964	Mar. 11, 2019
2	Power Amplifier	Teseq	CBA230M-080	T43748	Mar. 11, 2019
3	Power CDN	FCC	FCC-801-M2/M3 -16A	100270	Mar. 11, 2019
4	Power CDN	FCC	FCC-801-M2/M3 -16A	100271	Mar. 11, 2019
5	Measurement Software	Farad	EZ-CS(V2.0.1.2)	N/A	N/A

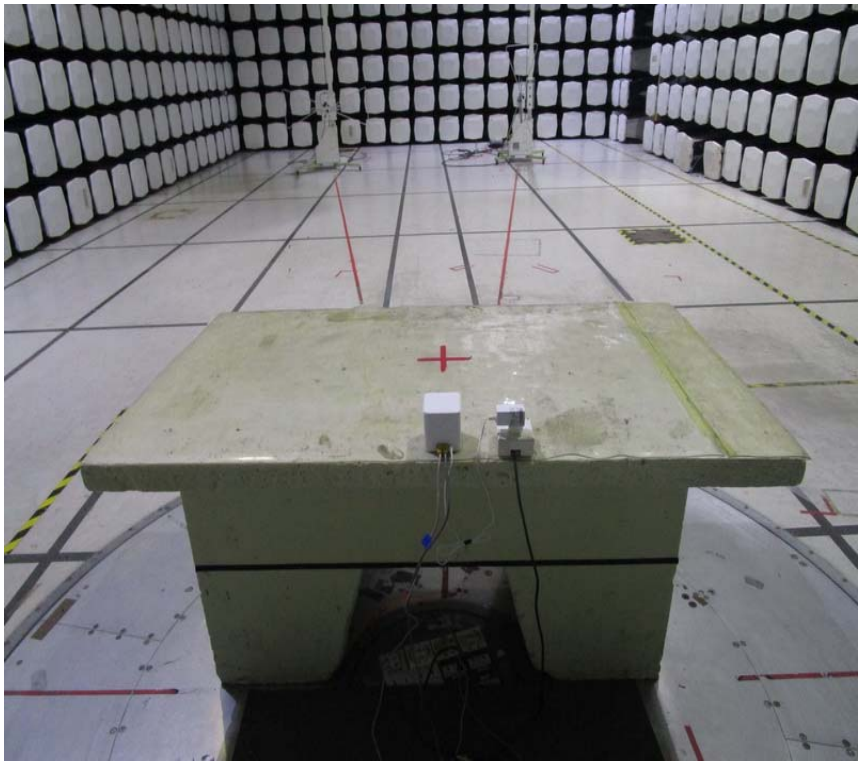
Voltage dips and interruptions					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	THE MODULAR SOLUTION FOR 6 KV APPLICATIONS	Teseq	NSG 3060	1423	Aug. 20, 2018
2	Measurement Software	Teseq	Win 3000 Version 1.2.0	N/A	N/A

Remark: "N/A" denotes no model name, serial no. or calibration specified.
All calibration period of equipment list is one year.

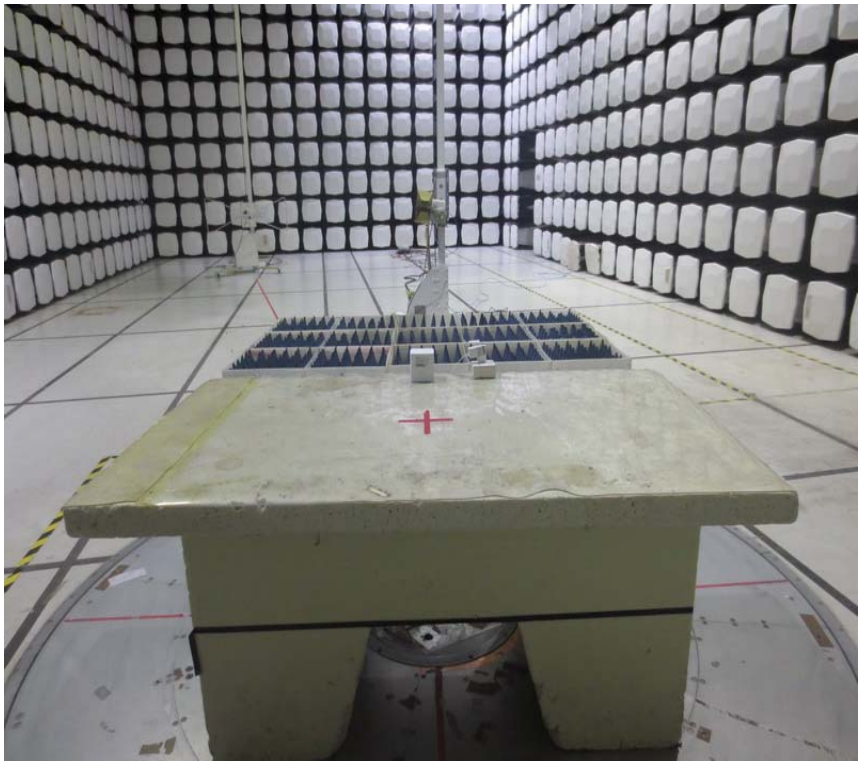
7. EUT TEST PHOTO

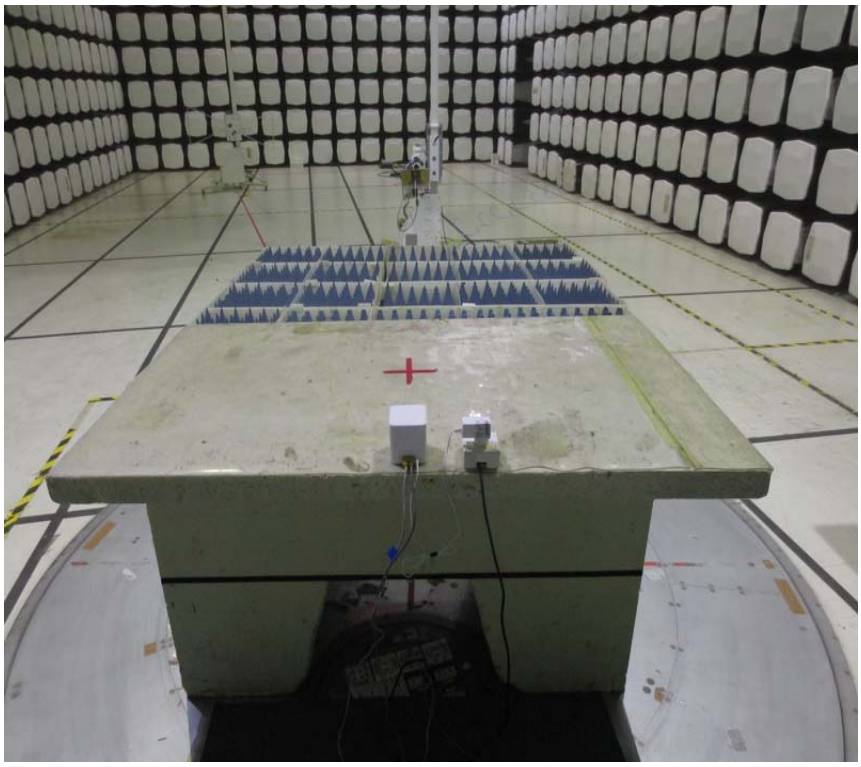
Radiated emissions up to 1 GHz



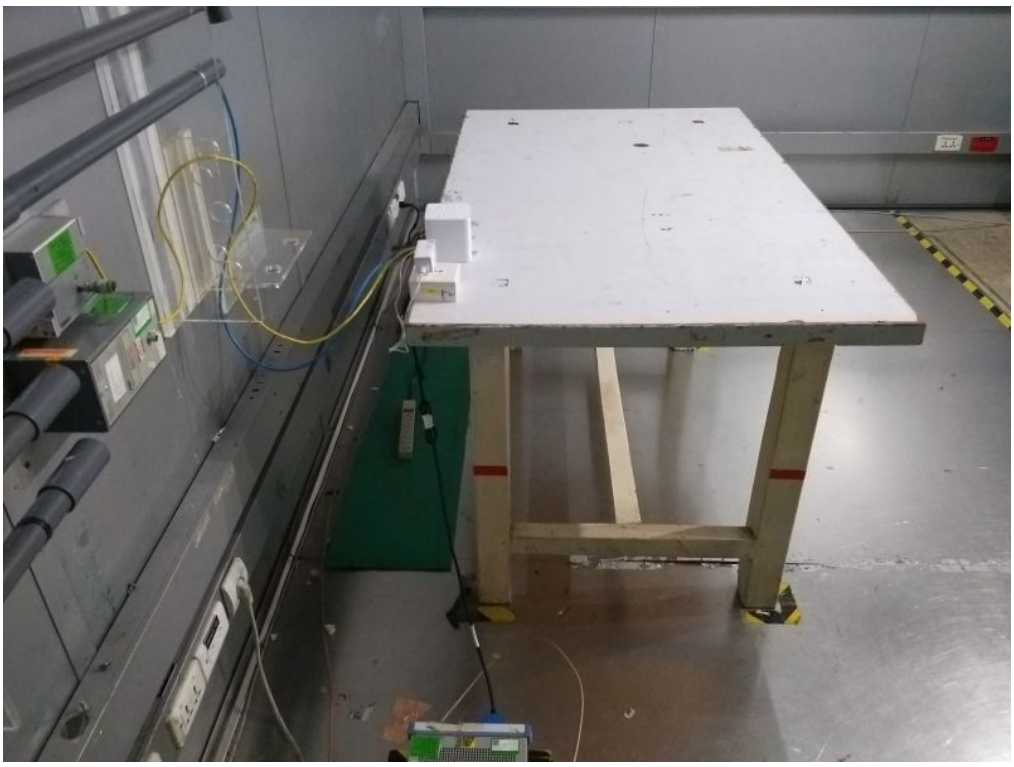


Radiated emissions above 1 GHz

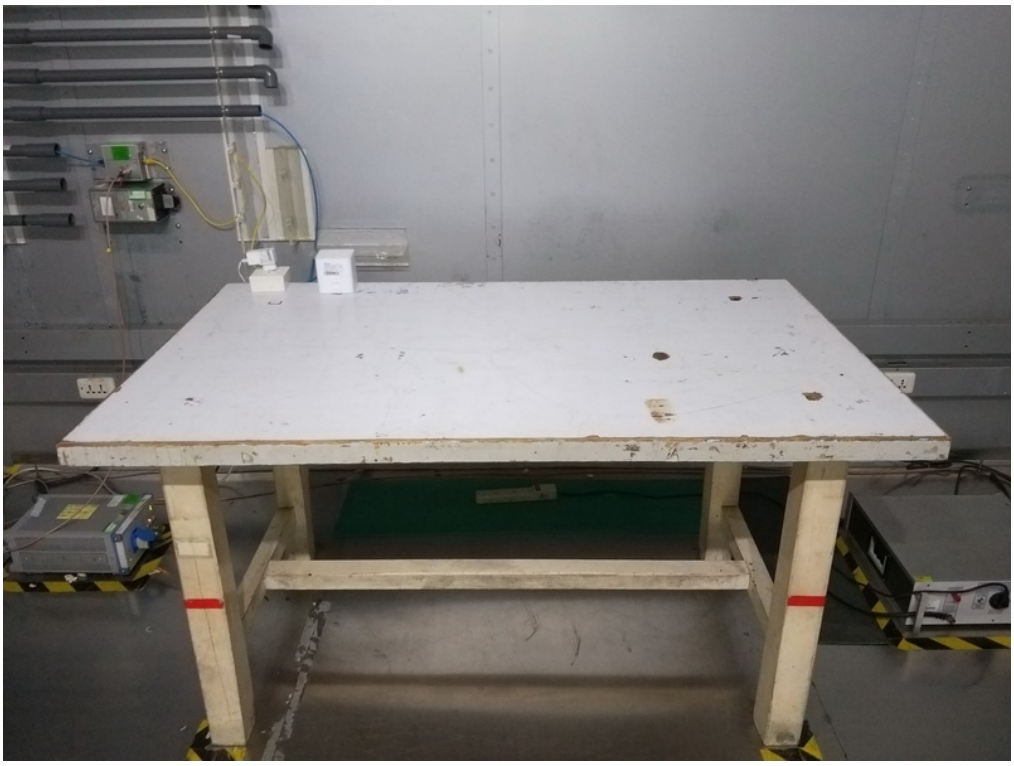




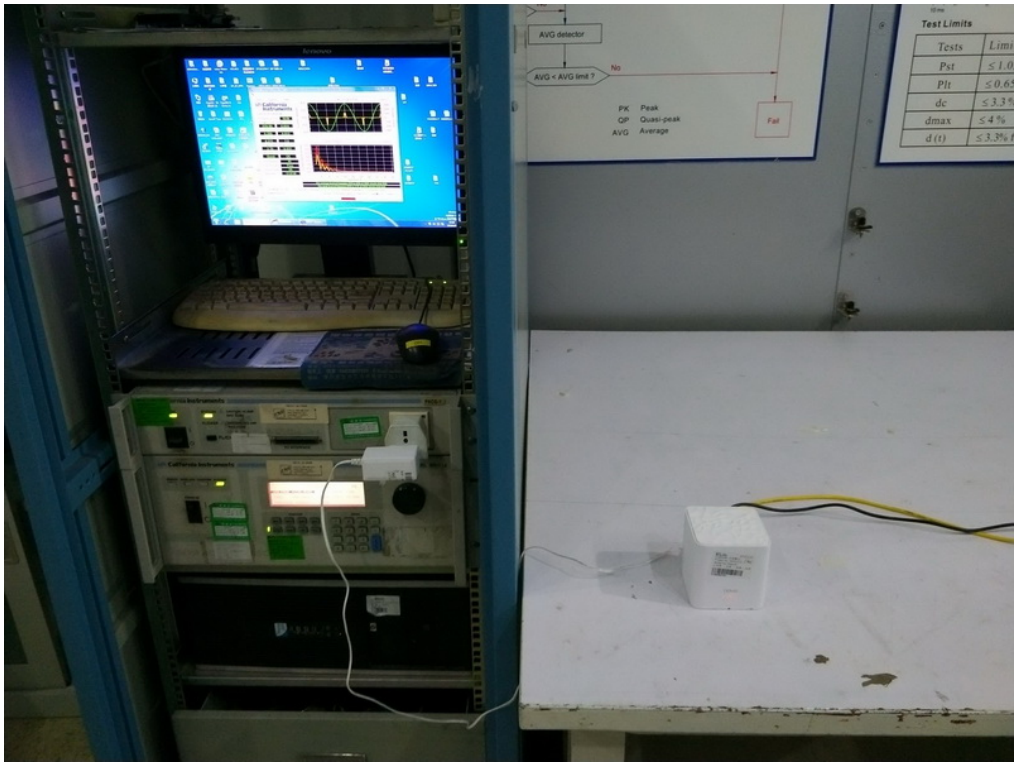
Conducted emissions AC mains power port



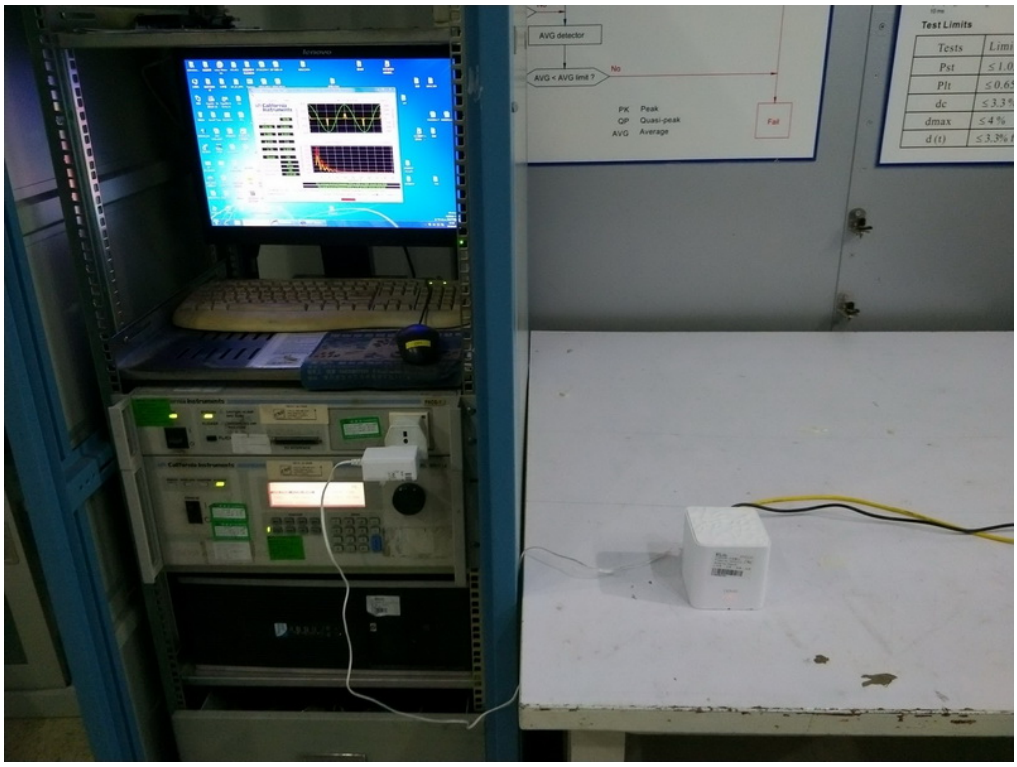
Asymmetric mode conducted emissions_AAN



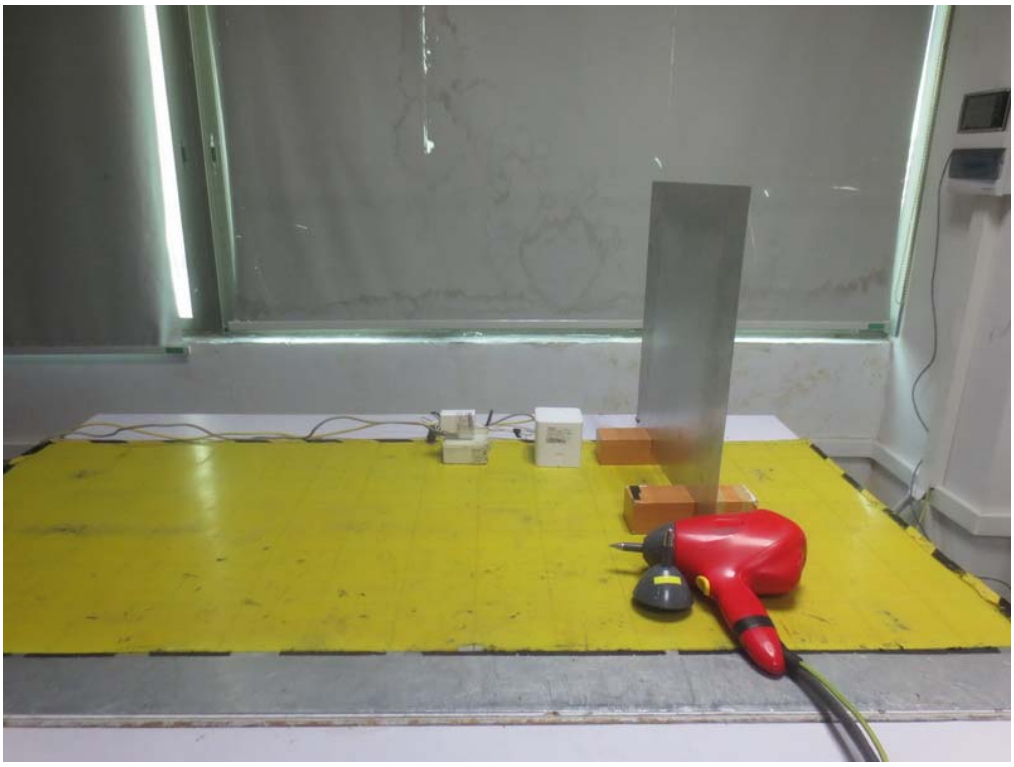
Harmonic current emissions



Voltage changes, voltage fluctuations and flicker



ESD

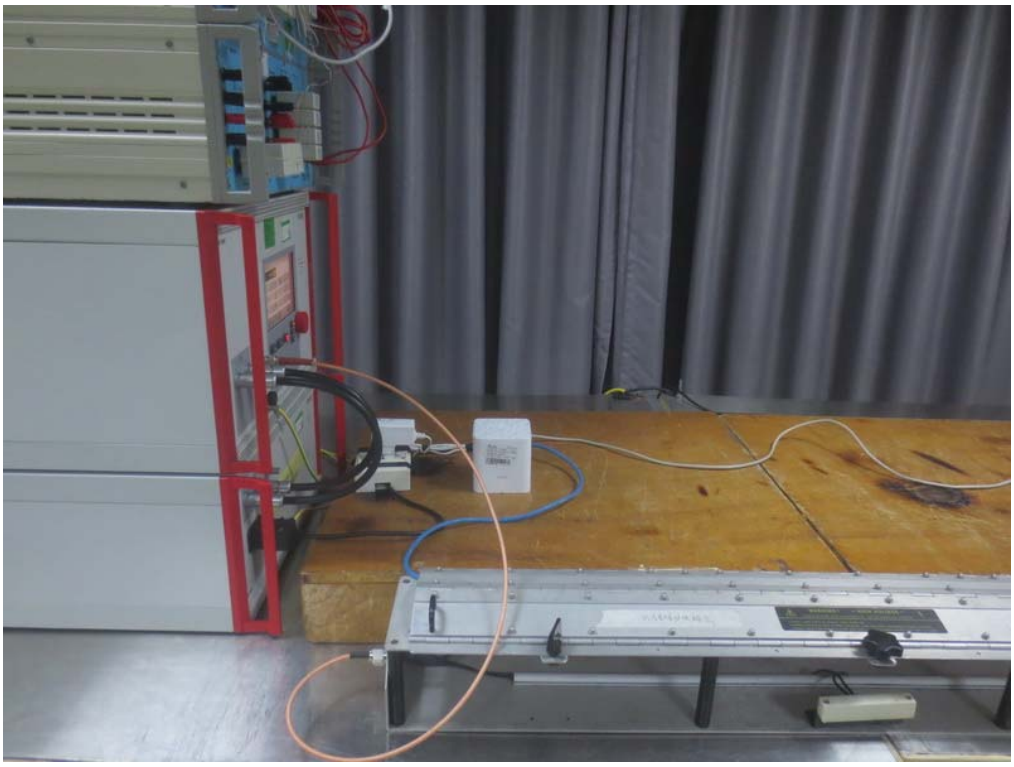


RS_Below 1G

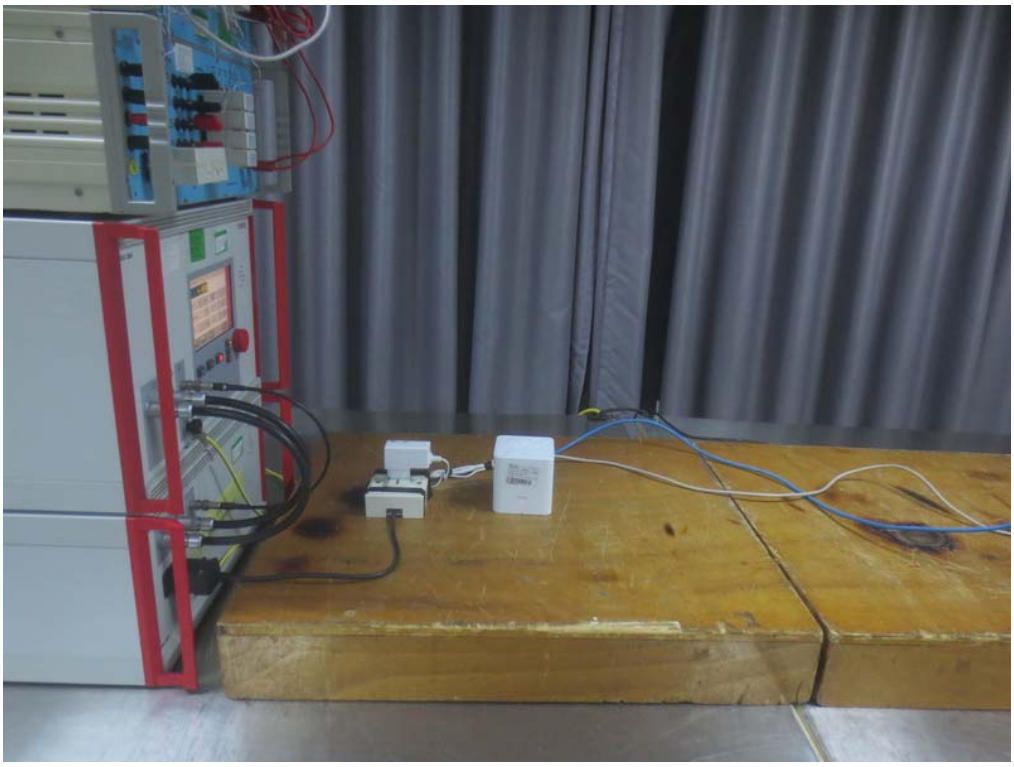
RS_Above 1G

EFT - AC

EFT –RJ45

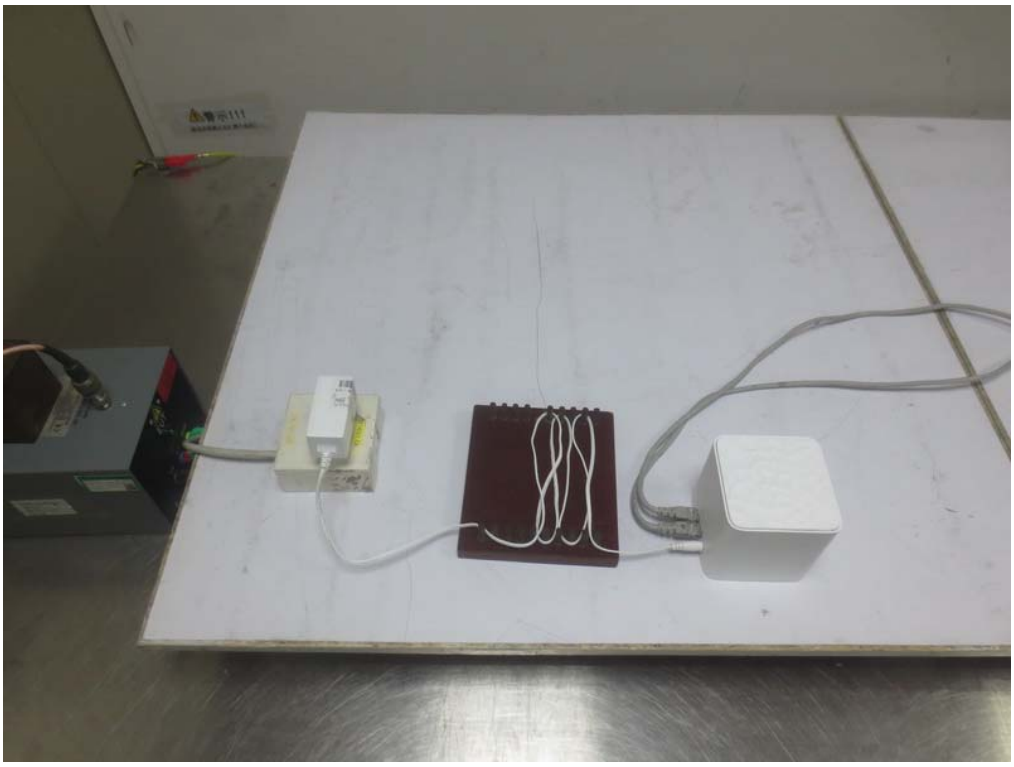


Surge - AC

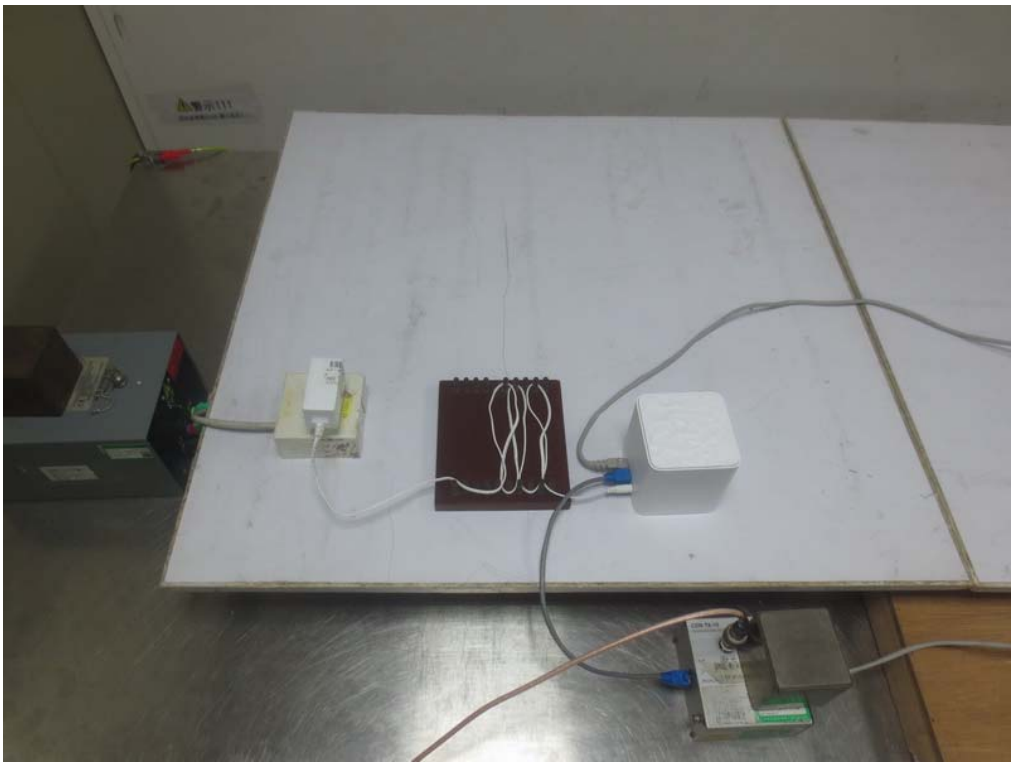


Surge–RJ45

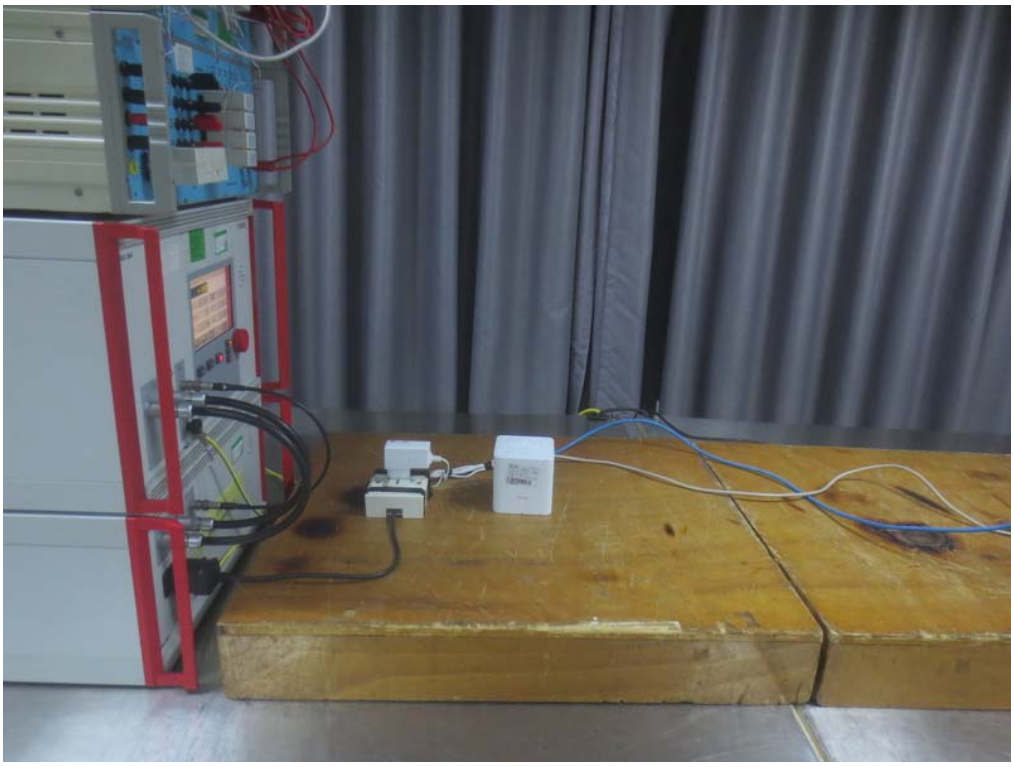
CS - AC



CS– RJ45

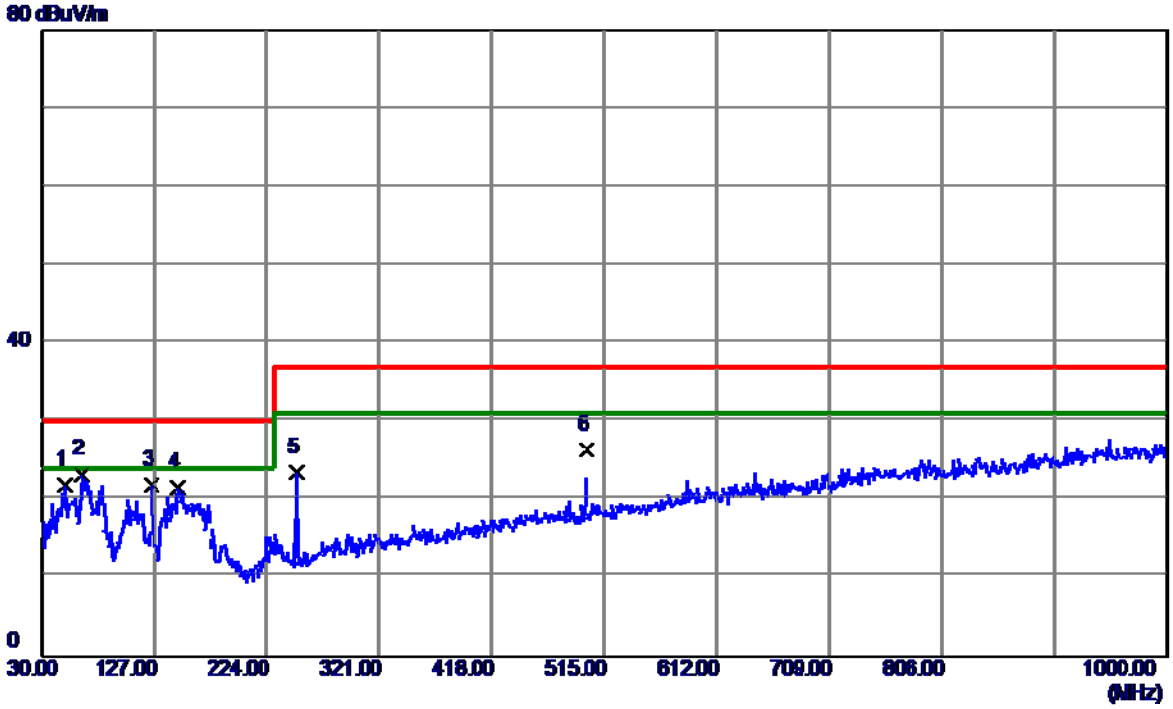


DIP



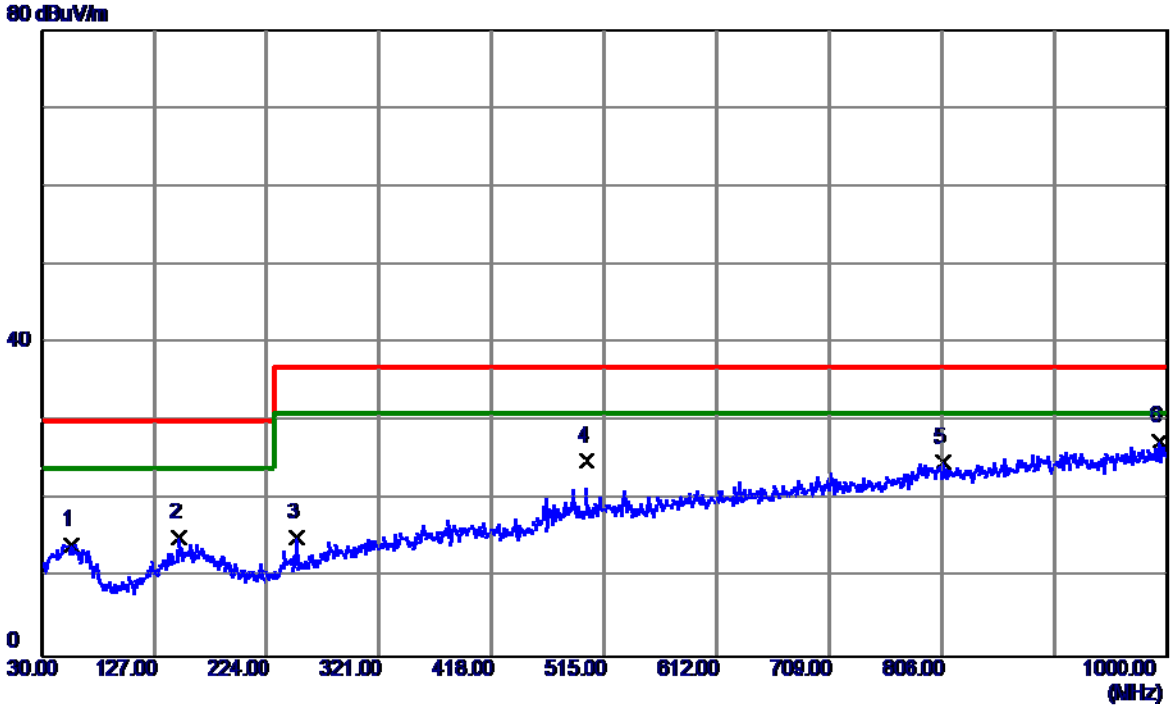
ATTACHMENT A - RADIATED EMISSION UP TO 1GHZ

EUT	AC1200 Whole Home Mesh WiFi System	Model Name	Mesh3f
Temperature	25°C	Relative Humidity	60%
Test Voltage	AC 230V/50Hz	Polarization	Vertical
Test Mode	FULL SYSTEM		
Test Engineer	Jason Yang		



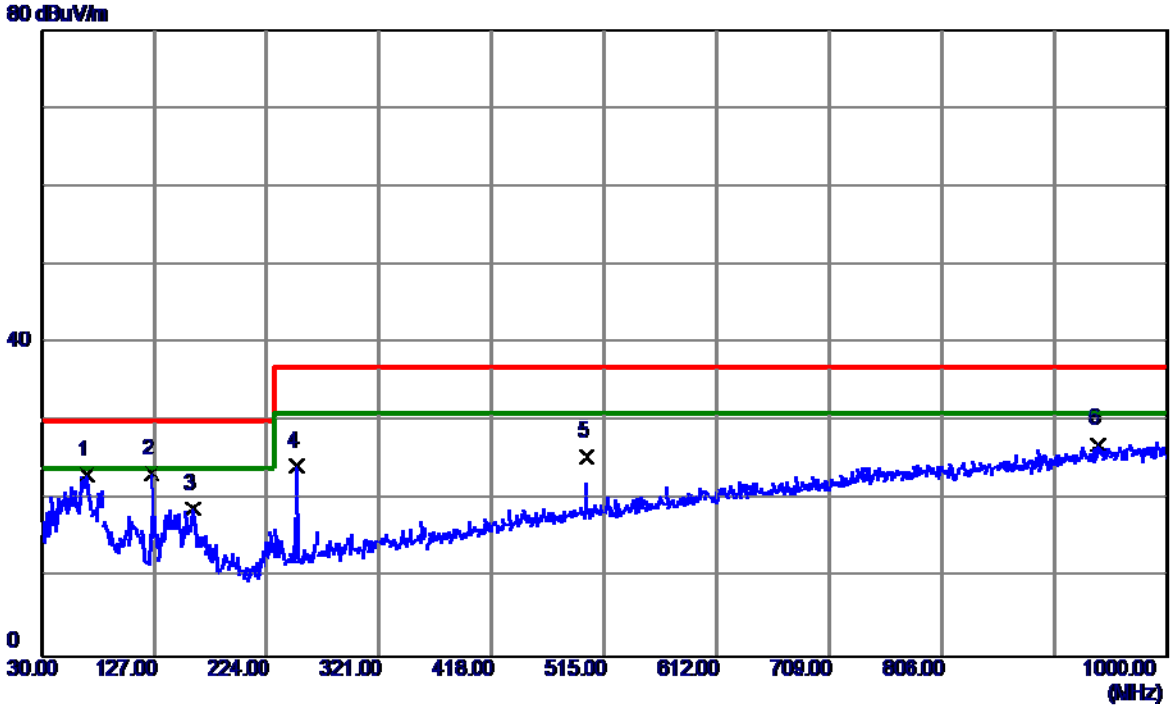
No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin	
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector
1	50.3700	44.31	-22.46	21.85	30.00	-8.15	QP
2 *	64.9200	46.94	-23.66	23.28	30.00	-6.72	QP
3	125.0600	45.77	-23.88	21.89	30.00	-8.11	QP
4	147.8550	43.82	-22.17	21.65	30.00	-8.35	QP
5	250.1900	46.51	-22.96	23.55	37.00	-13.45	QP
6	499.9650	43.32	-16.98	26.34	37.00	-10.66	QP

EUT	AC1200 Whole Home Mesh WiFi System	Model Name	Mesh3f
Temperature	25°C	Relative Humidity	60%
Test Voltage	AC 230V/50Hz	Polarization	Horizontal
Test Mode	FULL SYSTEM		
Test Engineer	Jason Yang		



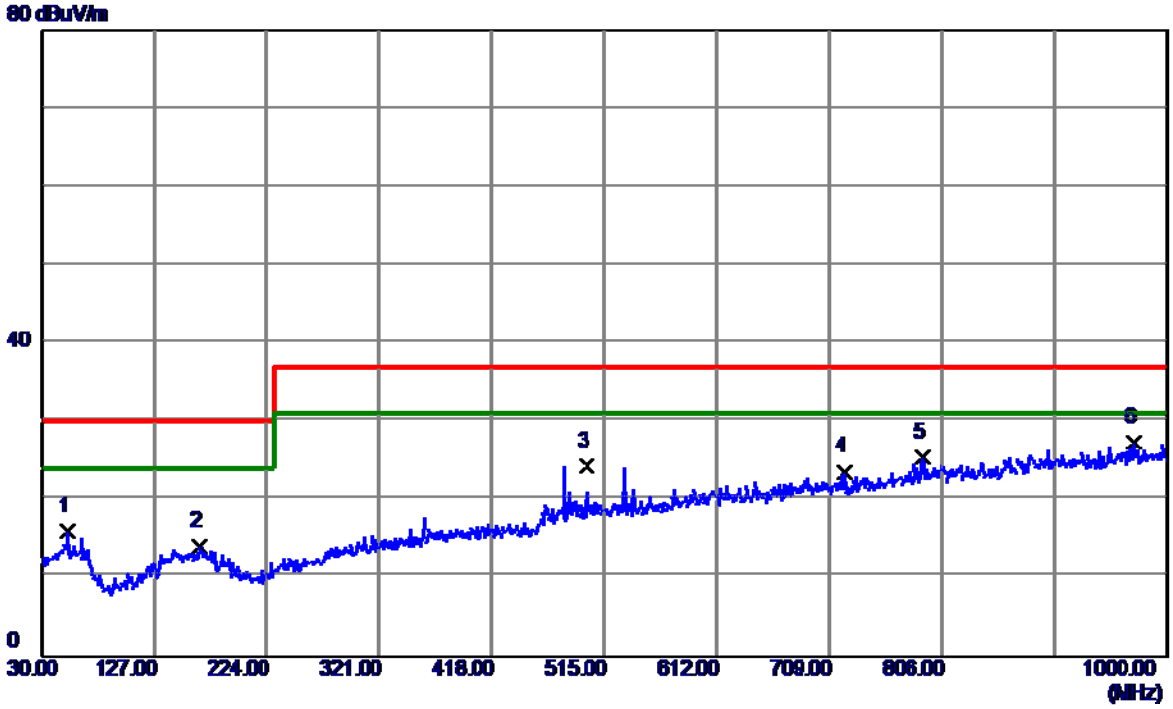
No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin	
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector
1	56.1900	31.17	-16.98	14.19	30.00	-15.81	QP
2	148.3400	32.04	-16.82	15.22	30.00	-14.78	QP
3	250.1900	32.54	-17.36	15.18	37.00	-21.82	QP
4	499.4800	35.56	-10.59	24.97	37.00	-12.03	QP
5	806.9699	30.74	-5.89	24.85	37.00	-12.15	QP
6 *	993.2100	31.02	-3.57	27.45	37.00	-9.55	QP

EUT	AC1200 Whole Home Mesh WiFi System	Model Name	Mesh3f
Temperature	25°C	Relative Humidity	60%
Test Voltage	AC 110V/60Hz	Polarization	Vertical
Test Mode	FULL SYSTEM		
Test Engineer	Jason Yang		



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin	
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector
1	69.2850	47.47	-24.31	23.16	30.00	-6.84	QP
2 *	125.0600	47.21	-23.88	23.33	30.00	-6.67	QP
3	160.4650	41.00	-22.04	18.96	30.00	-11.04	QP
4	250.1900	47.21	-22.96	24.25	37.00	-12.75	QP
5	499.9650	42.50	-16.98	25.52	37.00	-11.48	QP
6	940.3450	36.78	-9.66	27.12	37.00	-9.88	QP

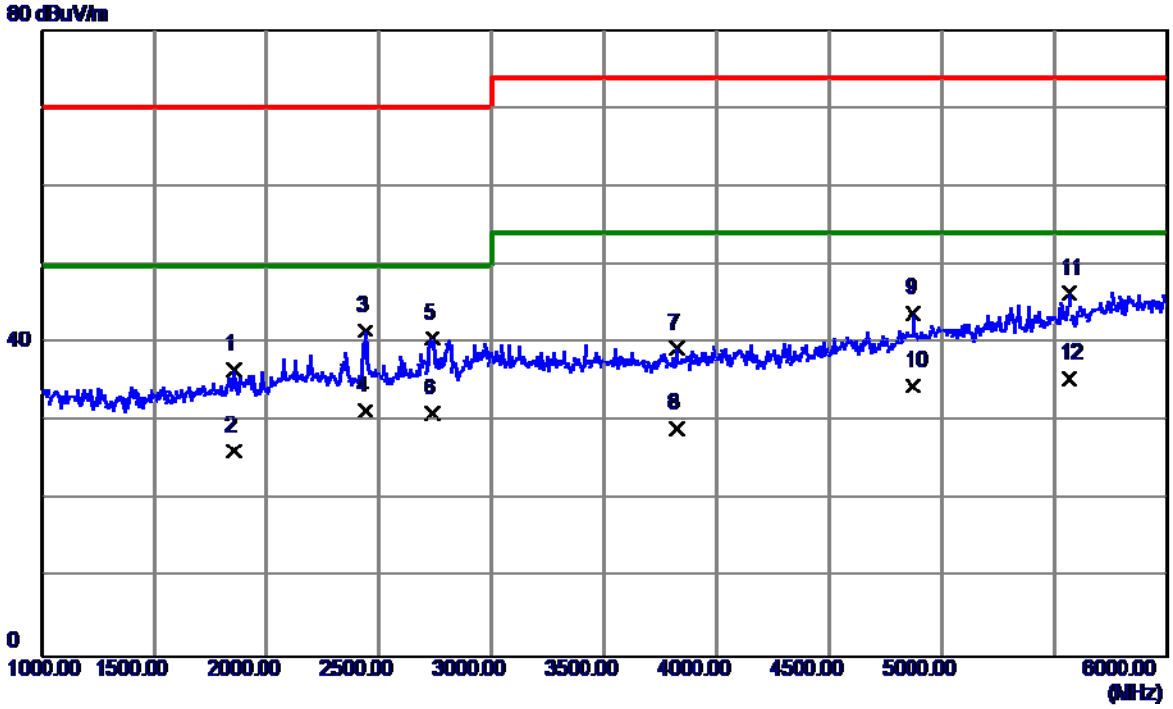
EUT	AC1200 Whole Home Mesh WiFi System	Model Name	Mesh3f
Temperature	25°C	Relative Humidity	60%
Test Voltage	AC 110V/60Hz	Polarization	Horizontal
Test Mode	FULL SYSTEM		
Test Engineer	Jason Yang		



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin	
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector
1	52.3100	32.90	-16.84	16.06	30.00	-13.94	QP
2	165.8000	30.30	-16.29	14.01	30.00	-15.99	QP
3	499.4800	34.94	-10.59	24.35	37.00	-12.65	QP
4	721.6100	31.20	-7.60	23.60	37.00	-13.40	QP
5	789.5100	31.68	-6.25	25.43	37.00	-11.57	QP
6 *	971.8700	31.32	-4.02	27.30	37.00	-9.70	QP

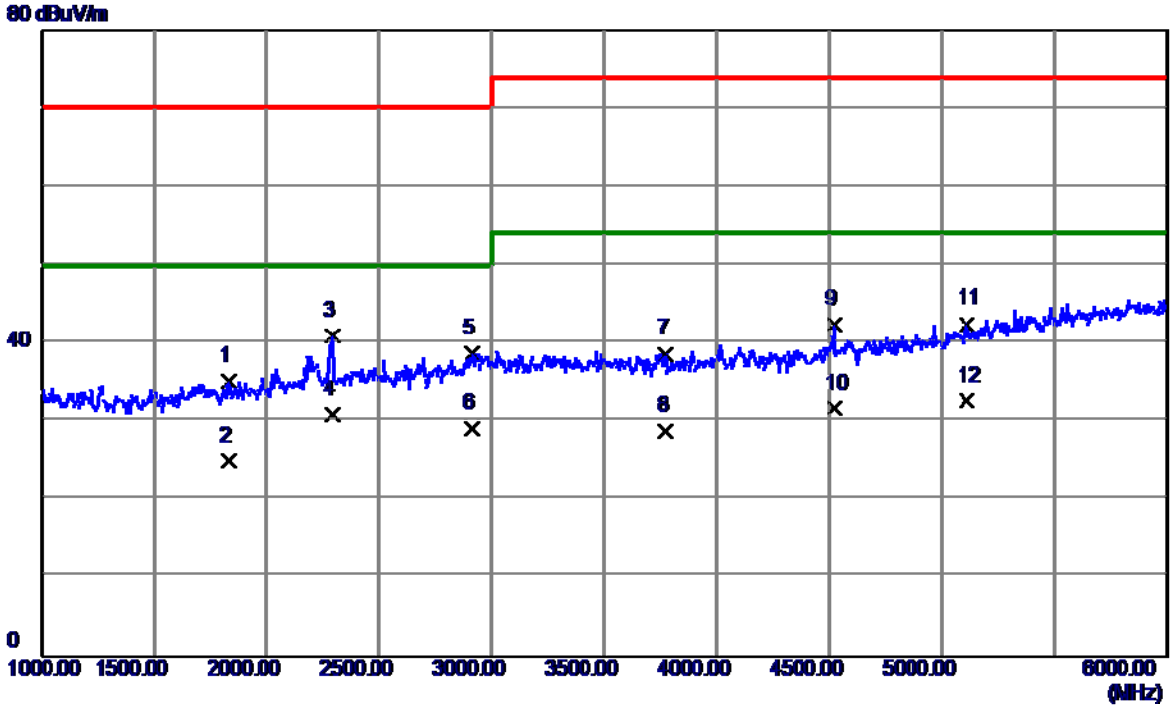
ATTACHMENT B - RADIATED EMISSION ABOVE 1GHZ

EUT	AC1200 Whole Home Mesh WiFi System	Model Name	Mesh3f
Temperature	25°C	Relative Humidity	60%
Test Voltage	AC 230V/50Hz	Polarization	Vertical
Test Mode	FULL SYSTEM		
Test Engineer	Jason Yang		



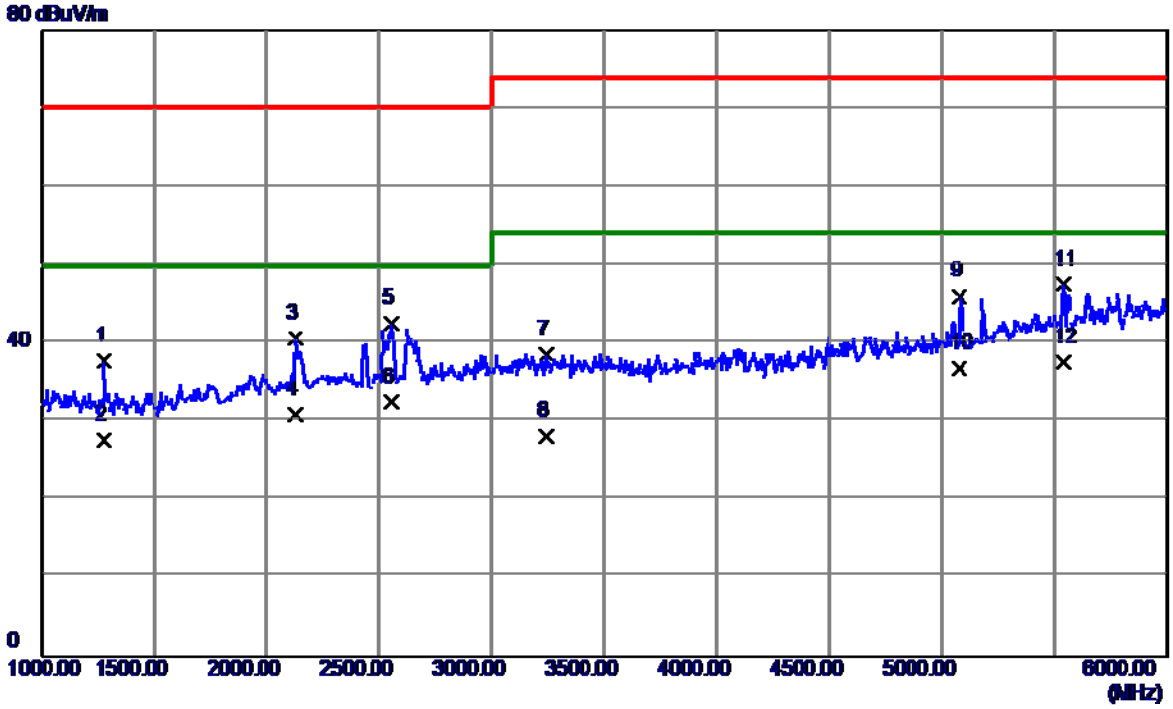
No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin	
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector
1	1855.0000	39.95	-3.32	36.63	70.00	-33.37	Peak
2	1855.0000	29.63	-3.32	26.31	50.00	-23.69	AVG
3	2440.0000	42.29	-0.68	41.61	70.00	-28.39	Peak
4	2440.0000	32.04	-0.68	31.36	50.00	-18.64	AVG
5	2740.0000	40.18	0.50	40.68	70.00	-29.32	Peak
6	2740.0000	30.57	0.50	31.07	50.00	-18.93	AVG
7	3820.0000	35.88	3.43	39.31	74.00	-34.69	Peak
8	3820.0000	25.74	3.43	29.17	54.00	-24.83	AVG
9	4875.0000	37.00	6.84	43.84	74.00	-30.16	Peak
10	4875.0000	27.68	6.84	34.52	54.00	-19.48	AVG
11	5565.0000	35.87	10.56	46.43	74.00	-27.57	Peak
12 *	5565.0000	25.01	10.56	35.57	54.00	-18.43	AVG

EUT	AC1200 Whole Home Mesh WiFi System	Model Name	Mesh3f
Temperature	25°C	Relative Humidity	60%
Test Voltage	AC 230V/50Hz	Polarization	Horizontal
Test Mode	FULL SYSTEM		
Test Engineer	Jason Yang		



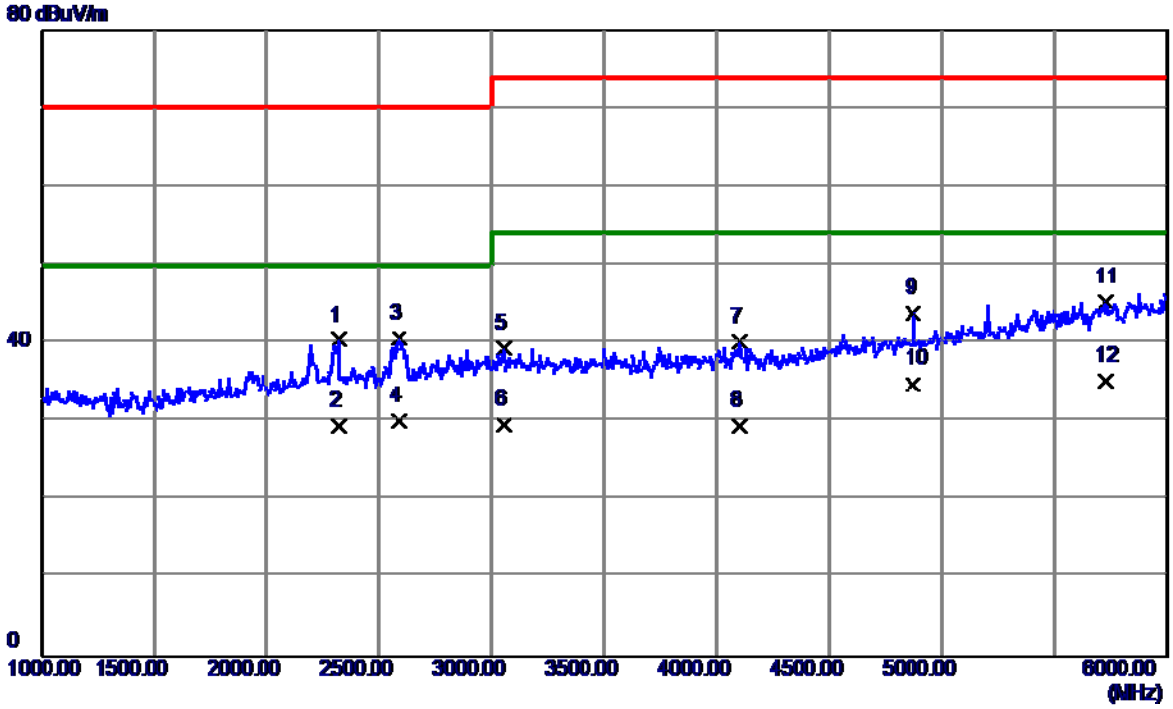
No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin	
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector
1	1835.0000	38.68	-3.46	35.22	70.00	-34.78	Peak
2	1835.0000	28.36	-3.46	24.90	50.00	-25.10	AVG
3	2295.0000	42.18	-1.22	40.96	70.00	-29.04	Peak
4 *	2295.0000	32.09	-1.22	30.87	50.00	-19.13	AVG
5	2910.0000	37.60	1.17	38.77	70.00	-31.23	Peak
6	2910.0000	27.90	1.17	29.07	50.00	-20.93	AVG
7	3775.0000	35.31	3.33	38.64	74.00	-35.36	Peak
8	3775.0000	25.40	3.33	28.73	54.00	-25.27	AVG
9	4520.0000	36.90	5.57	42.47	74.00	-31.53	Peak
10	4520.0000	26.11	5.57	31.68	54.00	-22.32	AVG
11	5110.0000	34.53	7.95	42.48	74.00	-31.52	Peak
12	5110.0000	24.72	7.95	32.67	54.00	-21.33	AVG

EUT	AC1200 Whole Home Mesh WiFi System	Model Name	Mesh3f
Temperature	25°C	Relative Humidity	60%
Test Voltage	AC 110V/60Hz	Polarization	Vertical
Test Mode	FULL SYSTEM		
Test Engineer	Jason Yang		



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin	
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector
1	1280.0000	44.15	-6.37	37.78	70.00	-32.22	Peak
2	1280.0000	34.05	-6.37	27.68	50.00	-22.32	AVG
3	2130.0000	42.52	-1.83	40.69	70.00	-29.31	Peak
4	2130.0000	32.69	-1.83	30.86	50.00	-19.14	AVG
5	2555.0000	42.76	-0.24	42.52	70.00	-27.48	Peak
6	2555.0000	32.74	-0.24	32.50	50.00	-17.50	AVG
7	3245.0000	36.44	2.12	38.56	74.00	-35.44	Peak
8	3245.0000	26.00	2.12	28.12	54.00	-25.88	AVG
9	5080.0000	38.23	7.77	46.00	74.00	-28.00	Peak
10	5080.0000	28.98	7.77	36.75	54.00	-17.25	AVG
11	5540.0000	37.07	10.46	47.53	74.00	-26.47	Peak
12 *	5540.0000	27.14	10.46	37.60	54.00	-16.40	AVG

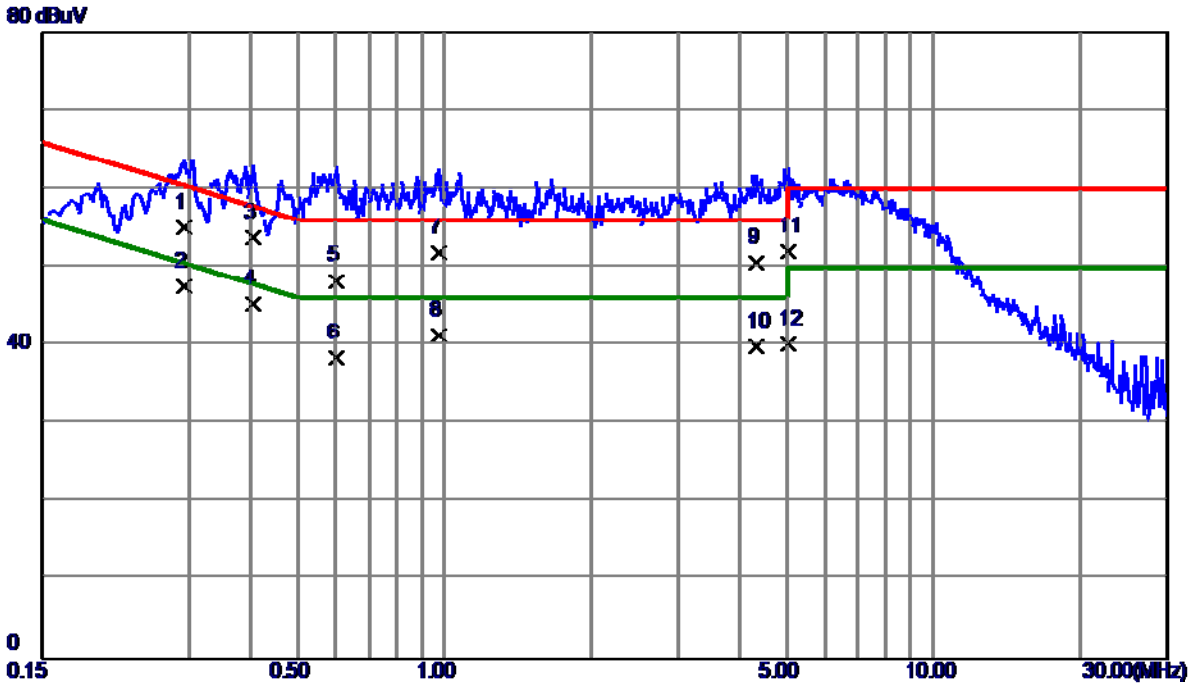
EUT	AC1200 Whole Home Mesh WiFi System	Model Name	Mesh3f
Temperature	25°C	Relative Humidity	60%
Test Voltage	AC 110V/60Hz	Polarization	Horizontal
Test Mode	FULL SYSTEM		
Test Engineer	Jason Yang		



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin	
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector
1	2320.0000	41.52	-1.12	40.40	70.00	-29.60	Peak
2	2320.0000	30.56	-1.12	29.44	50.00	-20.56	AVG
3	2590.0000	40.74	-0.10	40.64	70.00	-29.36	Peak
4	2590.0000	30.14	-0.10	30.04	50.00	-19.96	AVG
5	3055.0000	37.67	1.66	39.33	74.00	-34.67	Peak
6	3055.0000	27.98	1.66	29.64	54.00	-24.36	AVG
7	4100.0000	35.95	4.16	40.11	74.00	-33.89	Peak
8	4100.0000	25.31	4.16	29.47	54.00	-24.53	AVG
9	4875.0000	37.04	6.84	43.88	74.00	-30.12	Peak
10	4875.0000	27.96	6.84	34.80	54.00	-19.20	AVG
11	5725.0000	34.04	11.20	45.24	74.00	-28.76	Peak
12 *	5725.0000	24.02	11.20	35.22	54.00	-18.78	AVG

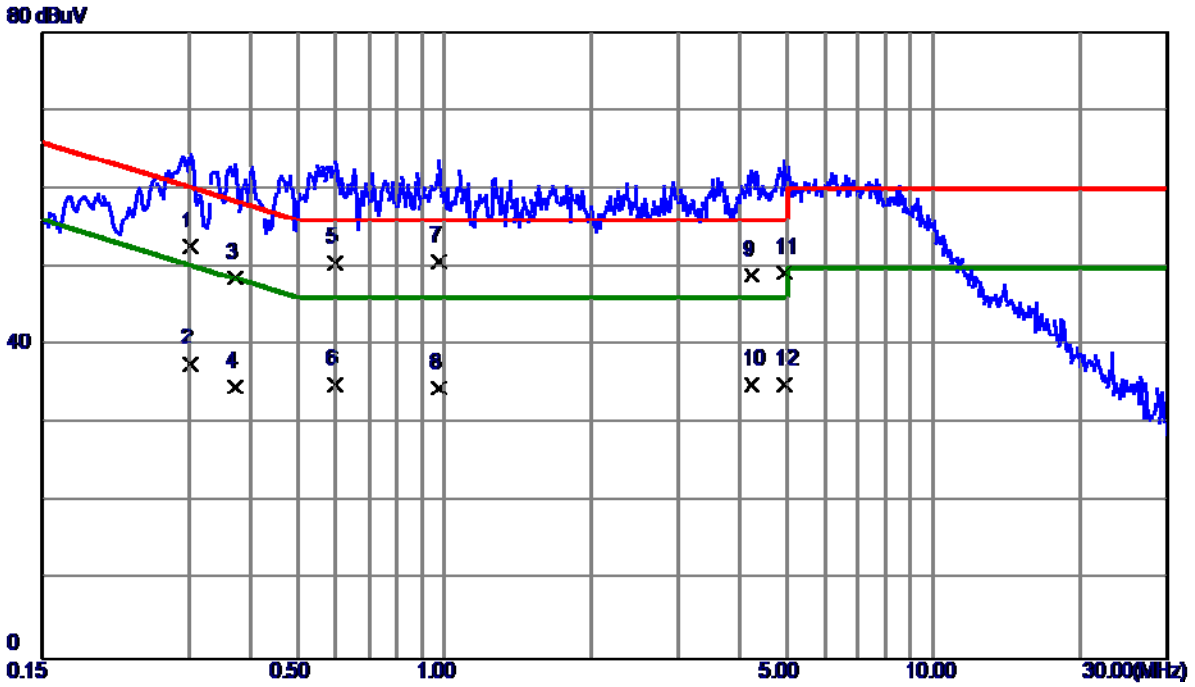
ATTACHMENT C - CONDUCTED EMISSION AT AC MAINS POWER PORT

EUT	AC1200 Whole Home Mesh WiFi System	Model Name	Mesh3f
Temperature	25°C	Relative Humidity	53%
Test Voltage	AC 230V/50Hz	Phase	Line
Test Mode	FULL SYSTEM		
Test Engineer	Jason Yang		



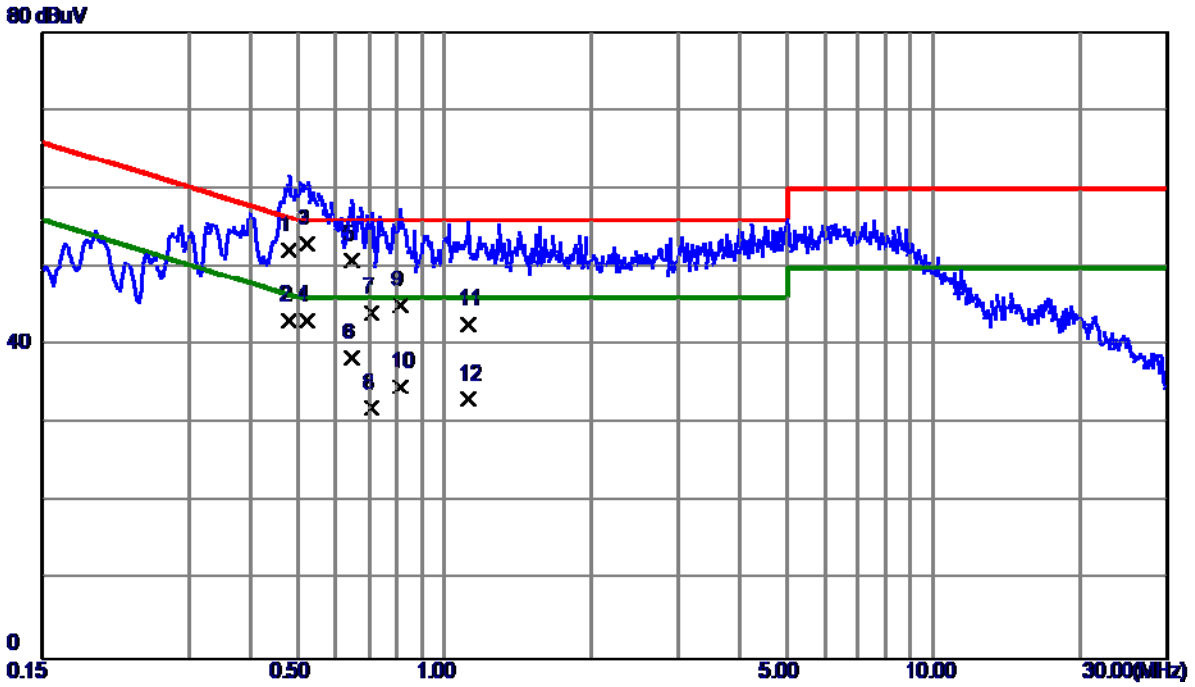
No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin	
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	0.2940	45.30	9.69	54.99	60.41	-5.42	QP
2	0.2940	37.80	9.69	47.49	50.41	-2.92	AVG
3	0.4065	44.00	9.71	53.71	57.72	-4.01	QP
4 *	0.4065	35.50	9.71	45.21	47.72	-2.51	AVG
5	0.6022	38.50	9.74	48.24	56.00	-7.76	QP
6	0.6022	28.60	9.74	38.34	46.00	-7.66	AVG
7	0.9780	42.10	9.78	51.88	56.00	-4.12	QP
8	0.9780	31.50	9.78	41.28	46.00	-4.72	AVG
9	4.3620	40.49	10.00	50.49	56.00	-5.51	QP
10	4.3620	29.79	10.00	39.79	46.00	-6.21	AVG
11	5.0460	42.00	10.04	52.04	60.00	-7.96	QP
12	5.0460	30.10	10.04	40.14	50.00	-9.86	AVG

EUT	AC1200 Whole Home Mesh WiFi System	Model Name	Mesh3f
Temperature	25°C	Relative Humidity	53%
Test Voltage	AC 230V/50Hz	Phase	Neutral
Test Mode	FULL SYSTEM		
Test Engineer	Jason Yang		



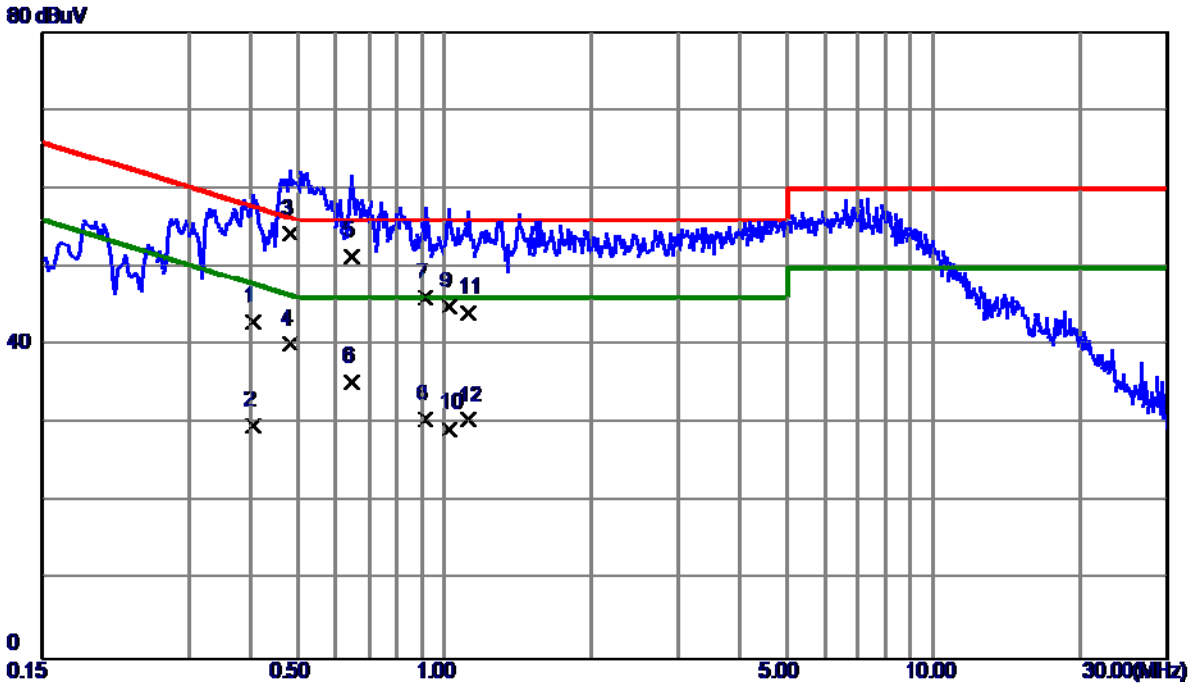
No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin	
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	0.3030	43.00	9.68	52.68	60.16	-7.48	QP
2	0.3030	28.00	9.68	37.68	50.16	-12.48	AVG
3	0.3727	39.00	9.69	48.69	58.44	-9.75	QP
4	0.3727	25.00	9.69	34.69	48.44	-13.75	AVG
5	0.6000	40.80	9.73	50.53	56.00	-5.47	QP
6	0.6000	25.35	9.73	35.08	46.00	-10.92	AVG
7 *	0.9757	40.90	9.76	50.66	56.00	-5.34	QP
8	0.9757	24.80	9.76	34.56	46.00	-11.44	AVG
9	4.2563	39.00	9.99	48.99	56.00	-7.01	QP
10	4.2563	25.00	9.99	34.99	46.00	-11.01	AVG
11	4.9425	39.30	10.02	49.32	56.00	-6.68	QP
12	4.9425	25.00	10.02	35.02	46.00	-10.98	AVG

EUT	AC1200 Whole Home Mesh WiFi System	Model Name	Mesh3f
Temperature	25°C	Relative Humidity	53%
Test Voltage	AC 110V/60Hz	Phase	Line
Test Mode	FULL SYSTEM		
Test Engineer	Jason Yang		



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin	
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	0.4807	42.41	9.73	52.14	56.33	-4.19	QP
2	0.4807	33.51	9.73	43.24	46.33	-3.09	AVG
3	0.5235	43.20	9.74	52.94	56.00	-3.06	QP
4 *	0.5235	33.50	9.74	43.24	46.00	-2.76	AVG
5	0.6472	41.10	9.74	50.84	56.00	-5.16	QP
6	0.6472	28.70	9.74	38.44	46.00	-7.56	AVG
7	0.7102	34.40	9.75	44.15	56.00	-11.85	QP
8	0.7102	22.30	9.75	32.05	46.00	-13.95	AVG
9	0.8115	35.30	9.75	45.05	56.00	-10.95	QP
10	0.8115	25.00	9.75	34.75	46.00	-11.25	AVG
11	1.1152	32.91	9.79	42.70	56.00	-13.30	QP
12	1.1152	23.31	9.79	33.10	46.00	-12.90	AVG

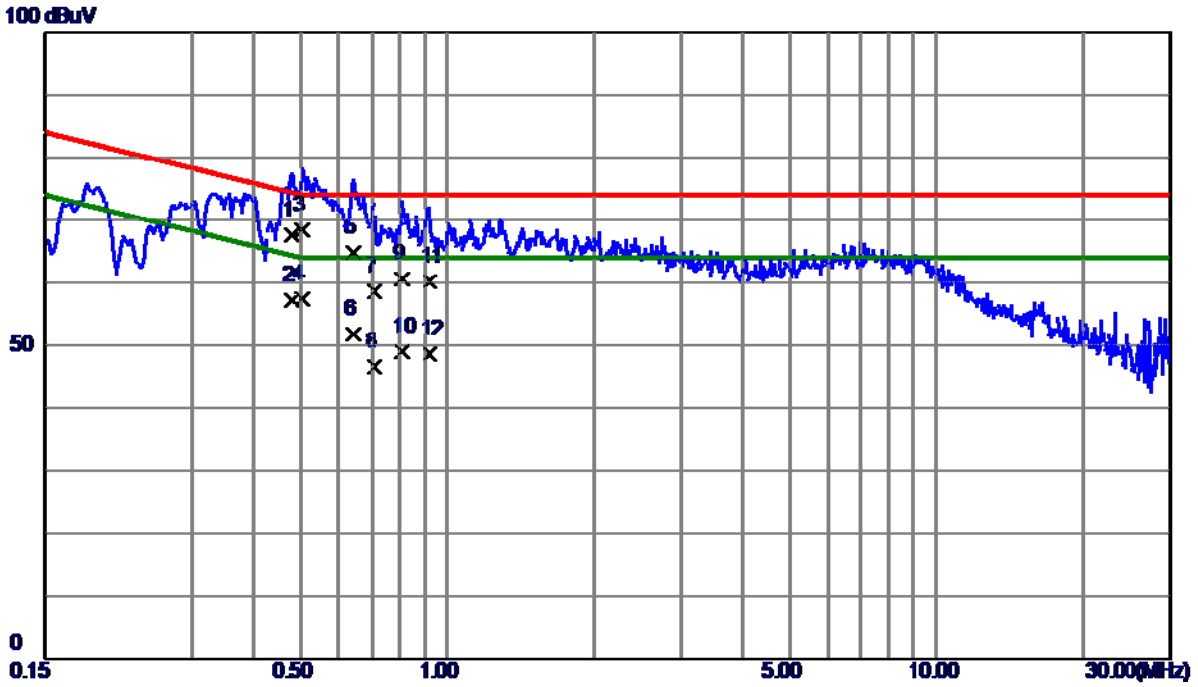
EUT	AC1200 Whole Home Mesh WiFi System	Model Name	Mesh3f
Temperature	25°C	Relative Humidity	53%
Test Voltage	AC 110V/60Hz	Phase	Neutral
Test Mode	FULL SYSTEM		
Test Engineer	Jason Yang		



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin	
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	0.4065	33.41	9.70	43.11	57.72	-14.61	QP
2	0.4065	20.00	9.70	29.70	47.72	-18.02	AVG
3 *	0.4830	44.50	9.72	54.22	56.29	-2.07	QP
4	0.4830	30.50	9.72	40.22	46.29	-6.07	AVG
5	0.6450	41.70	9.73	51.43	56.00	-4.57	QP
6	0.6450	25.70	9.73	35.43	46.00	-10.57	AVG
7	0.9150	36.30	9.74	46.04	56.00	-9.96	QP
8	0.9150	20.80	9.74	30.54	46.00	-15.46	AVG
9	1.0207	35.20	9.76	44.96	56.00	-11.04	QP
10	1.0207	19.60	9.76	29.36	46.00	-16.64	AVG
11	1.1174	34.40	9.78	44.18	56.00	-11.82	QP
12	1.1174	20.70	9.78	30.48	46.00	-15.52	AVG

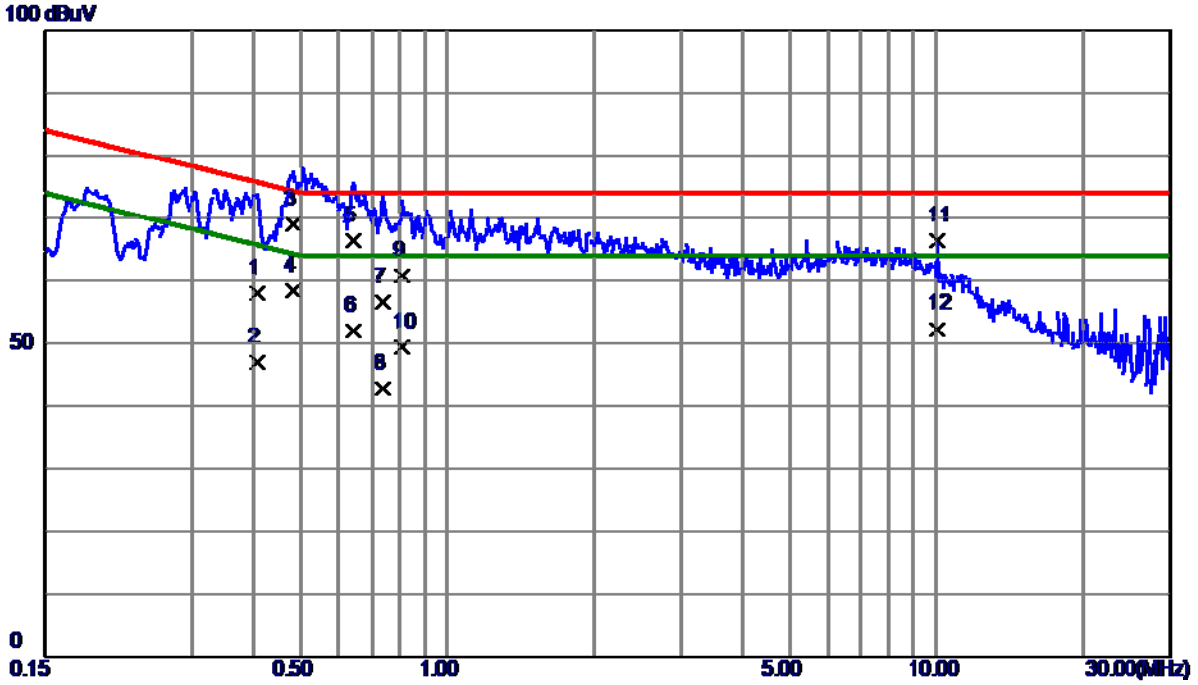
ATTACHMENT D - CONDUCTED EMISSION AT WIRED NETWORK PORT

EUT	AC1200 Whole Home Mesh WiFi System	Model Name	Mesh3f
Temperature	25°C	Relative Humidity	53%
Test Voltage	AC 230V/50Hz		
Test Mode	WAN 100Mbps		
Test Engineer	Jason Yang		



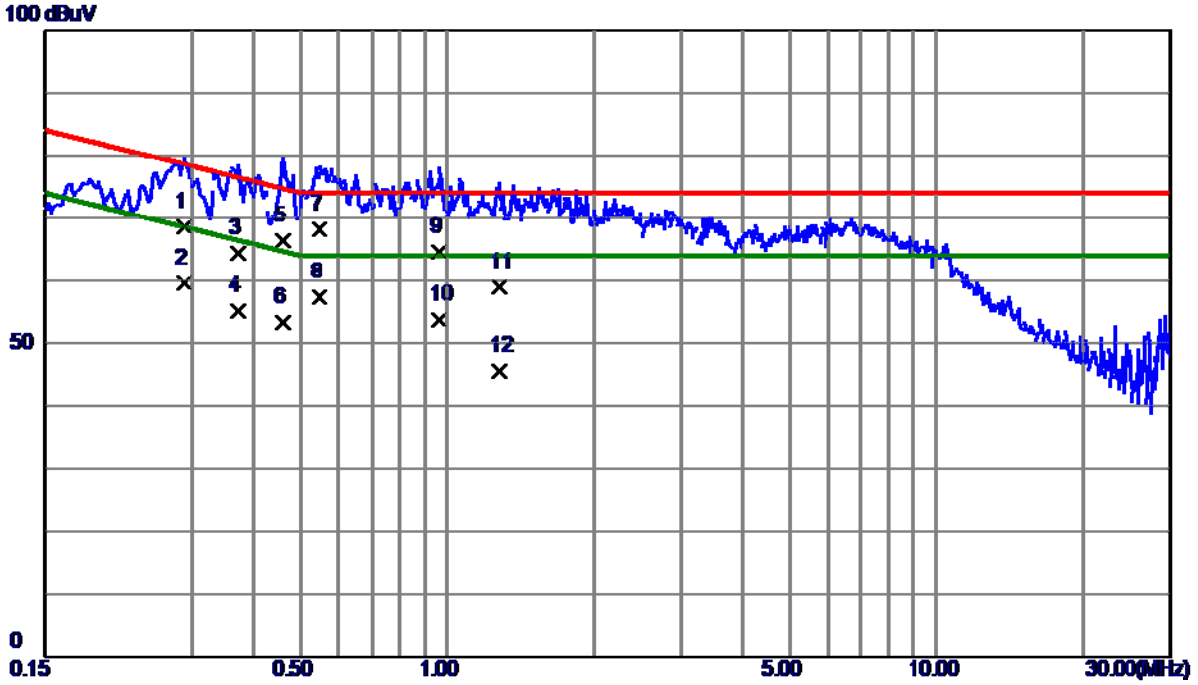
No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin	
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	0.4807	57.90	9.77	67.67	74.33	-6.66	QP
2	0.4807	47.50	9.77	57.27	64.33	-7.06	AVG
3 *	0.5055	58.70	9.76	68.46	74.00	-5.54	QP
4	0.5055	47.60	9.76	57.36	64.00	-6.64	AVG
5	0.6427	55.09	9.76	64.85	74.00	-9.15	QP
6	0.6427	42.09	9.76	51.85	64.00	-12.15	AVG
7	0.7080	48.90	9.74	58.64	74.00	-15.36	QP
8	0.7080	36.90	9.74	46.64	64.00	-17.36	AVG
9	0.8092	50.80	9.74	60.54	74.00	-13.46	QP
10	0.8092	39.20	9.74	48.94	64.00	-15.06	AVG
11	0.9172	50.50	9.74	60.24	74.00	-13.76	QP
12	0.9172	38.90	9.74	48.64	64.00	-15.36	AVG

EUT	AC1200 Whole Home Mesh WiFi System	Model Name	Mesh3f
Temperature	25°C	Relative Humidity	53%
Test Voltage	AC 230V/50Hz		
Test Mode	WAN 10Mbps		
Test Engineer	Jason Yang		



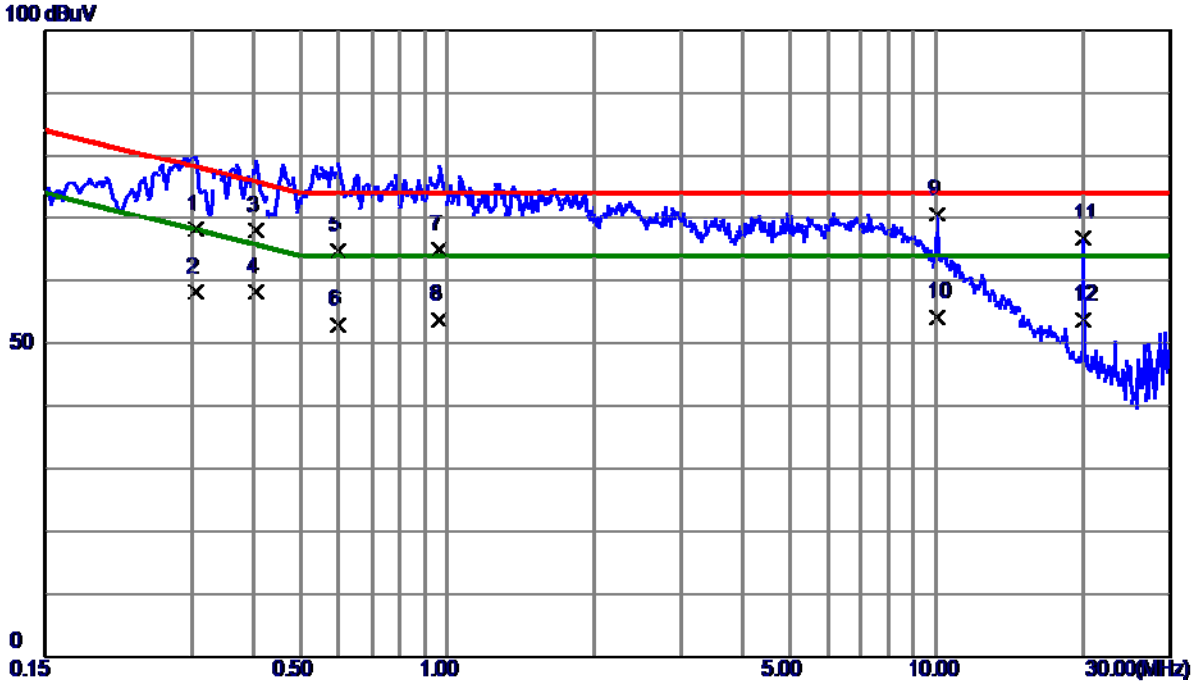
No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin	
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	0.4087	48.20	9.79	57.99	75.67	-17.68	QP
2	0.4087	37.20	9.79	46.99	65.67	-18.68	AVG
3 *	0.4852	59.31	9.76	69.07	74.25	-5.18	QP
4	0.4852	48.71	9.76	58.47	64.25	-5.78	AVG
5	0.6427	56.69	9.76	66.45	74.00	-7.55	QP
6	0.6427	42.29	9.76	52.05	64.00	-11.95	AVG
7	0.7394	46.80	9.74	56.54	74.00	-17.46	QP
8	0.7394	33.00	9.74	42.74	64.00	-21.26	AVG
9	0.8092	51.00	9.74	60.74	74.00	-13.26	QP
10	0.8092	39.60	9.74	49.34	64.00	-14.66	AVG
11	10.0387	56.45	9.94	66.39	74.00	-7.61	QP
12	10.0387	42.36	9.94	52.30	64.00	-11.70	AVG

EUT	AC1200 Whole Home Mesh WiFi System	Model Name	Mesh3f
Temperature	25°C	Relative Humidity	53%
Test Voltage	AC 230V/50Hz		
Test Mode	LAN 100Mbps		
Test Engineer	Jason Yang		



No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin	
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	0.2895	58.80	9.85	68.65	78.54	-9.89	QP
2	0.2895	49.80	9.85	59.65	68.54	-8.89	AVG
3	0.3727	54.51	9.80	64.31	76.44	-12.13	QP
4	0.3727	45.41	9.80	55.21	66.44	-11.23	AVG
5	0.4627	56.60	9.77	66.37	74.64	-8.27	QP
6	0.4627	43.70	9.77	53.47	64.64	-11.17	AVG
7 *	0.5482	58.49	9.76	68.25	74.00	-5.75	QP
8	0.5482	47.69	9.76	57.45	64.00	-6.55	AVG
9	0.9645	54.90	9.73	64.63	74.00	-9.37	QP
10	0.9645	44.00	9.73	53.73	64.00	-10.27	AVG
11	1.2750	49.30	9.73	59.03	74.00	-14.97	QP
12	1.2750	35.80	9.73	45.53	64.00	-18.47	AVG

EUT	AC1200 Whole Home Mesh WiFi System	Model Name	Mesh3f
Temperature	25°C	Relative Humidity	53%
Test Voltage	AC 230V/50Hz		
Test Mode	LAN 10Mbps		
Test Engineer	Jason Yang		

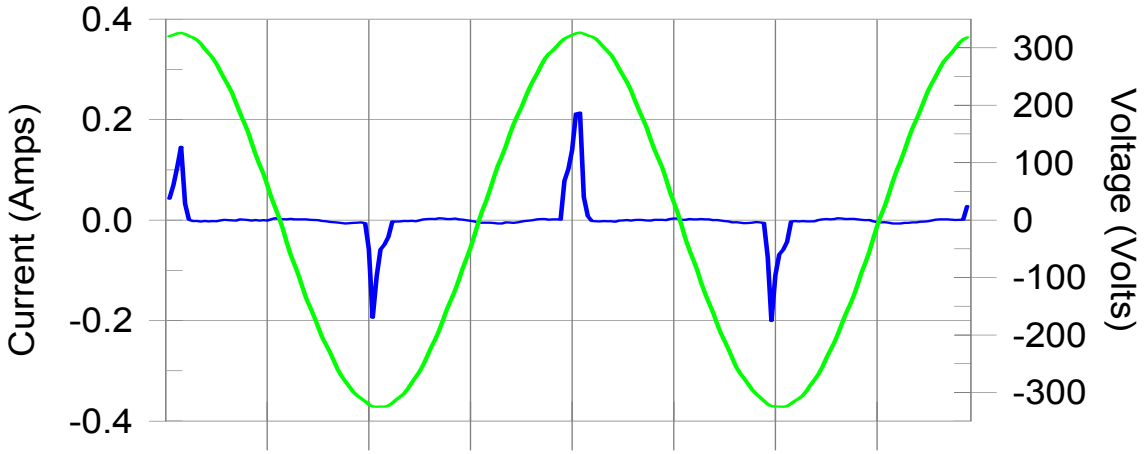


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin	
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	0.3052	58.30	9.84	68.14	78.10	-9.96	QP
2	0.3052	48.40	9.84	58.24	68.10	-9.86	AVG
3	0.4065	58.30	9.79	68.09	75.72	-7.63	QP
4	0.4065	48.50	9.79	58.29	65.72	-7.43	AVG
5	0.6000	55.00	9.76	64.76	74.00	-9.24	QP
6	0.6000	43.20	9.76	52.96	64.00	-11.04	AVG
7	0.9645	55.20	9.73	64.93	74.00	-9.07	QP
8	0.9645	44.00	9.73	53.73	64.00	-10.27	AVG
9 *	10.0522	60.61	9.94	70.55	74.00	-3.45	QP
10	10.0522	44.32	9.94	54.26	64.00	-9.74	AVG
11	19.9995	56.49	10.23	66.72	74.00	-7.28	QP
12	19.9995	43.65	10.23	53.88	64.00	-10.12	AVG

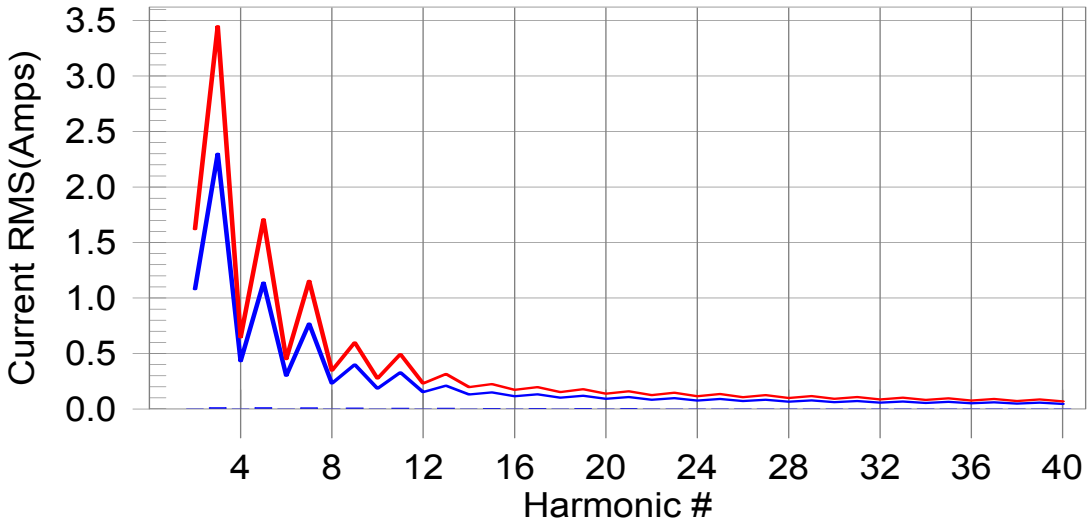
ATTACHMENT E - HARMONIC CURRENT EMISSION

Harmonic - Class A			
EUT	AC1200 Whole Home Mesh WiFi System	Model Name	Mesh3f
Temperature	25°C	Relative Humidity	55%
Test Voltage	AC 230V/50Hz		
Test Mode	FULL SYSTEM		

Current & voltage waveforms



Harmonics and Class A limit line Japanese Limits



Test result: Pass Worst harmonics H15-2.7% of 150% limit, H15-4% of 100% limit

Current Test Result Summary (Run time)			
EUT	AC1200 Whole Home Mesh WiFi System	Model Name	Mesh3f
Temperature	25°C	Relative Humidity	55%
Test Voltage	AC 230V/50Hz		
Test Mode	FULL SYSTEM		

Highest parameter values during test:

V_RMS (Volts): 229.99 Frequency(Hz): 50.00
I_Peak (Amps): 0.306 I_RMS (Amps): 0.036
I_Fund (Amps): 0.014 Crest Factor: 9.109
Power (Watts): 3.2 Power Factor: 0.425

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.002	1.080	N/A	0.002	1.620	N/A	Pass
3	0.013	2.300	0.6	0.014	3.450	0.4	Pass
4	0.001	0.430	N/A	0.002	0.645	N/A	Pass
5	0.012	1.140	1.0	0.013	1.710	0.8	Pass
6	0.001	0.300	N/A	0.001	0.450	N/A	Pass
7	0.011	0.770	1.4	0.012	1.155	1.0	Pass
8	0.001	0.230	N/A	0.001	0.345	N/A	Pass
9	0.010	0.400	2.5	0.010	0.600	1.7	Pass
10	0.001	0.184	N/A	0.001	0.276	N/A	Pass
11	0.009	0.330	2.6	0.009	0.495	1.8	Pass
12	0.001	0.153	N/A	0.001	0.230	N/A	Pass
13	0.007	0.210	3.5	0.008	0.315	2.4	Pass
14	0.001	0.131	N/A	0.001	0.197	N/A	Pass
15	0.006	0.150	4.0	0.006	0.225	2.7	Pass
16	0.001	0.115	N/A	0.001	0.173	N/A	Pass
17	0.005	0.132	N/A	0.005	0.198	N/A	Pass
18	0.001	0.102	N/A	0.001	0.153	N/A	Pass
19	0.004	0.118	N/A	0.004	0.178	N/A	Pass
20	0.000	0.092	N/A	0.001	0.138	N/A	Pass
21	0.003	0.107	N/A	0.003	0.161	N/A	Pass
22	0.000	0.084	N/A	0.000	0.125	N/A	Pass
23	0.002	0.098	N/A	0.002	0.147	N/A	Pass
24	0.000	0.077	N/A	0.000	0.115	N/A	Pass
25	0.001	0.090	N/A	0.001	0.135	N/A	Pass
26	0.000	0.071	N/A	0.000	0.107	N/A	Pass
27	0.001	0.083	N/A	0.001	0.125	N/A	Pass
28	0.000	0.066	N/A	0.000	0.099	N/A	Pass
29	0.001	0.078	N/A	0.001	0.116	N/A	Pass
30	0.000	0.061	N/A	0.000	0.092	N/A	Pass
31	0.001	0.073	N/A	0.001	0.109	N/A	Pass
32	0.000	0.058	N/A	0.000	0.086	N/A	Pass
33	0.001	0.068	N/A	0.001	0.102	N/A	Pass
34	0.000	0.054	N/A	0.000	0.081	N/A	Pass
35	0.001	0.064	N/A	0.001	0.096	N/A	Pass
36	0.000	0.051	N/A	0.000	0.077	N/A	Pass
37	0.001	0.061	N/A	0.001	0.091	N/A	Pass
38	0.000	0.048	N/A	0.000	0.073	N/A	Pass
39	0.001	0.058	N/A	0.001	0.087	N/A	Pass
40	0.000	0.046	N/A	0.000	0.069	N/A	Pass

Voltage Source Verification Data (Run time)			
EUT	AC1200 Whole Home Mesh WiFi System	Model Name	Mesh3f
Temperature	25°C	Relative Humidity	55%
Test Voltage	AC 230V/50Hz		
Test Mode	FULL SYSTEM		

Highest parameter values during test:

Voltage (Vrms):229.99 Frequency(Hz): 50.00
I_Peak (Amps):0.306 I_RMS (Amps): 0.036
I_Fund (Amps):0.014 Crest Factor: 9.109
Power (Watts): 3.2 Power Factor: 0.425

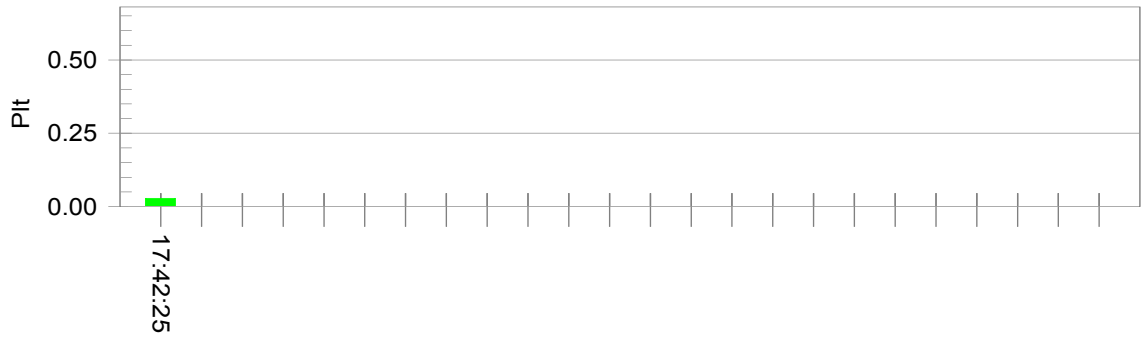
Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.141	0.460	30.77	OK
3	0.180	2.069	8.69	OK
4	0.069	0.460	15.01	OK
5	0.221	0.920	23.98	OK
6	0.042	0.460	9.09	OK
7	0.063	0.690	9.14	OK
8	0.054	0.460	11.83	OK
9	0.104	0.460	22.70	OK
10	0.062	0.460	13.47	OK
11	0.025	0.230	10.96	OK
12	0.027	0.230	11.62	OK
13	0.046	0.230	19.81	OK
14	0.029	0.230	12.68	OK
15	0.027	0.230	11.79	OK
16	0.023	0.230	9.79	OK
17	0.016	0.230	7.03	OK
18	0.014	0.230	6.26	OK
19	0.011	0.230	4.82	OK
20	0.015	0.230	6.49	OK
21	0.011	0.230	4.58	OK
22	0.011	0.230	5.00	OK
23	0.011	0.230	4.70	OK
24	0.006	0.230	2.60	OK
25	0.006	0.230	2.82	OK
26	0.007	0.230	3.03	OK
27	0.007	0.230	3.11	OK
28	0.006	0.230	2.53	OK
29	0.006	0.230	2.68	OK
30	0.006	0.230	2.48	OK
31	0.005	0.230	2.36	OK
32	0.006	0.230	2.60	OK
33	0.006	0.230	2.44	OK
34	0.004	0.230	1.69	OK
35	0.004	0.230	1.63	OK
36	0.004	0.230	1.56	OK
37	0.005	0.230	2.02	OK
38	0.003	0.230	1.36	OK
39	0.004	0.230	1.66	OK
40	0.005	0.230	2.30	OK

ATTACHMENT F - VOLLTAGE FLUCTUATIONS ANG FLIKER

EUT	AC1200 Whole Home Mesh WiFi System	Model Name	Mesh3f
Temperature	25°C	Relative Humidity	55%
Test Voltage	AC 230V/50Hz		
Test Mode	FULL SYSTEM		

Psti and limit line European Limits

Plt and limit line



Parameter values recorded during the test:
Vrms at the end of test (Volt):229.90

T-max (mS):	0	Test limit (mS):	500.0	Pass
Highest dc (%):	0.00	Test limit (%):	3.30	Pass
Highest dmax (%):	0.27	Test limit (%):	4.00	Pass
Highest Pst (10 min. period):	0.064	Test limit:	1.000	Pass
Highest Plt (2 hr. period):	0.028	Test limit:	0.650	Pass

ATTACHMENT G - ELECTROSTATIC DISCHARGE

Test Power :	AC 230V/50Hz
Test Mode:	FULL SYSTEM

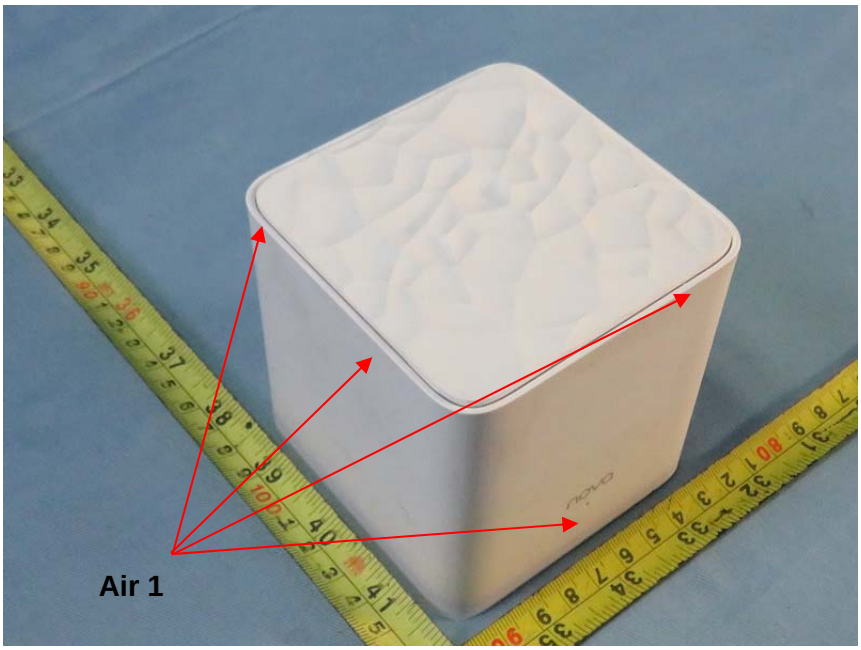
Mode	Air Discharge								Contact Discharge					
	2kV		4kV		8kV		- kV		2kV		4kV		- kV	
Location	P	N	P	N	P	N	P	N	P	N	P	N	P	N
1	A	A	A	A	A	A	-	-	-	-	-	-	-	-
2	A	A	A	A	A	A	-	-	-	-	-	-	-	-
3	A	A	A	A	A	A	-	-	-	-	-	-	-	-
4	A	A	A	A	A	A	-	-	-	-	-	-	-	-
Criteria	B						-		B				-	
Result	B						-		N/A				-	
Judgment	PASS						-		N/A				-	

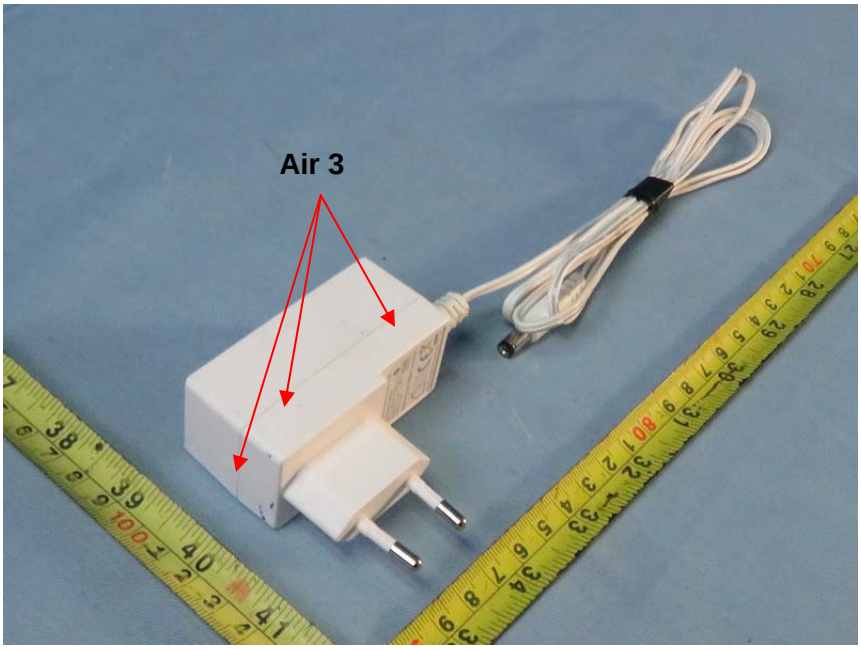
Mode	HCP Contact Discharge						VCP Contact Discharge					
	2kV		4kV		- kV		2kV		4kV		- kV	
Location	P	N	P	N	P	N	P	N	P	N	P	N
1	A	A	A	A	-	-	A	A	A	A	-	-
2	A	A	A	A	-	-	A	A	A	A	-	-
3	A	A	A	A	-	-	A	A	A	A	-	-
4	A	A	A	A	-	-	A	A	A	A	-	-
Criteria	B				-		B				-	
Result	A				-		A				-	
Judgment	PASS				-		PASS				-	

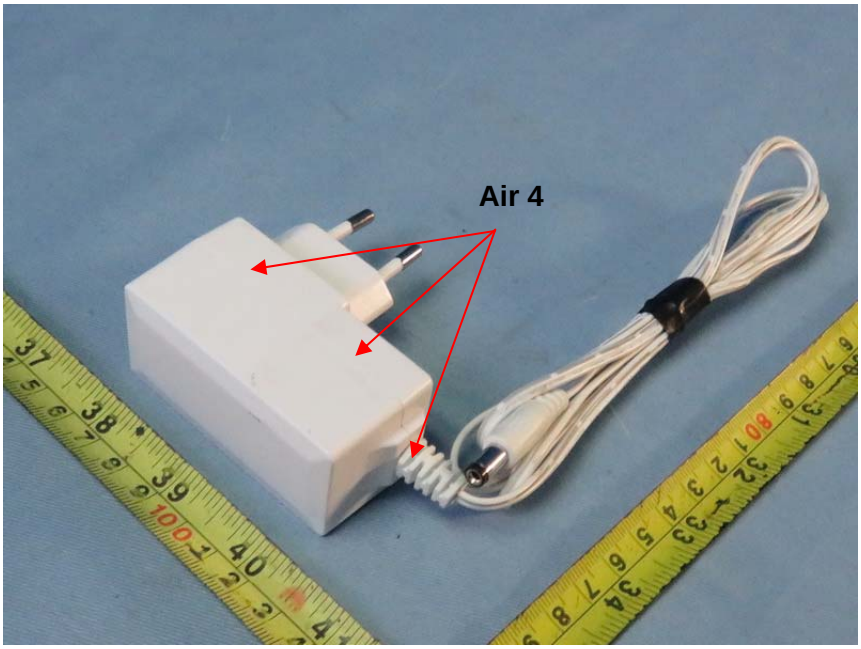
Note:

1) P/N denotes the Positive/Negative polarity of the output voltage.
2) Test condition:
   Direct/Indirect(HCP/VCP) discharges: Minimum 50 times (Positive/Negative) at eachpoint.
   Air discharges: Minimum 20 times (Positive/Negative) at each point.
3) Test location(s) in which discharge (Air and contact discharge) to be applied illustrated by photos shown in next page(s)
4) The Indirect (HCP/VCP) discharges description of test point as following:
   1.left side; 2.right side; 3.front side; 4.rear side.
5) N/A - denotes test is not applicable in this test report
6) Criterion A: No observation of any performance degradation.
7) Criterion B: Some degradation of performance is observed but the equipment continues to operate as intended.
8) Criterion C: Loss of functionality, but self-recoverable by user, without loss of information or settings.

PHOTO(S) SHOWN THE LOCATION(S) OF ESD EVALUATED




Air 3


Air 4

ATTACHMENT H - RF ELECTROMAGNETIC FIELD

Test Voltage :	AC 230V/50Hz
Test Mode:	FULL SYSTEM

Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Azimuth	Criteria	Results	Judgment
80 - 1000	V/H	3 V/m (unmodulated, r.m.s) AM Modulated 1000 Hz, 80%	0	A	A	PASS
			90			
			180			
			270			
1000 - 3000	V/H	3 V/m (unmodulated, r.m.s) AM Modulated 1000 Hz, 80%	0	A	A	PASS
			90			
			180			
			270			
3000 - 6000	V/H	3 V/m (unmodulated, r.m.s) AM Modulated 1000 Hz, 80%	0	A	A	PASS
			90			
			180			
			270			

Note:

1) N/A - denotes test is not applicable to this device.
2) Performance Criteria please refer to clause 5.2.

ATTACHMENT I - FAST TRANSIENTS COMMON MODE

Test Voltage :	AC 230V/50Hz
Test Mode:	FULL SYSTEM

EUT Ports Tested		Polarity	Repetition Frequency	Test Level	Criterion	Result	Judgment
				1 kV			
AC Power Port	Line (L)	+	5 kHz	B	B	B	PASS
		-	5 kHz	B			
	Neutral (N)	+	5 kHz	B	B	B	PASS
		-	5 kHz	B			
	Ground (PE)	+	5 kHz	-	B	N/A	N/A
		-	5 kHz	-			

EUT Ports Tested		Polarity	Repetition Frequency	Test Level	Criterion	Result	Judgment
				0.5 kV			
Signal/Data/ Control Port	RJ45	+	5 kHz	A	B	A	PASS
		-	5 kHz	A			

Note:

1) N/A - denotes test is not applicable to this device.
2) Performance Criteria please refer to clause 5.2.

ATTACHMENT J - SURGES

Test Voltage :	AC 230V/50Hz
Test Mode:	FULL SYSTEM

Wave Form EUT Ports Tested		1.2/50(8/20)Tr/Thμs						Criterion	Result	Judgment
		Polarity	Phase	Voltage						
				0.5 kV	1 kV	- kV	- kV			
AC	L - N (2 ohm)	+/-	0°	A	A	-	-	B	A	PASS
		+/-	90°	A	A	-	-			
		+/-	180°	A	A	-	-			
		+/-	270°	A	A	-	-			

Wave Form EUT Ports Tested		1.2/50(8/20)Tr/Thμs					Criterion	Result	Judgment
		Polarity	Voltage						
			0.5kV	1kV	-- kV	-- kV			
Signal Line	RJ45 (42 ohm)	+/-	A	A	-	-	B	A	PASS

Wave Form EUT Ports Tested		10/700Ti/Thus					Criterion	Result	Judgment
		Polarity	Voltage						
			0.5kV	1kV	-- kV	-- kV			
Signal Line	RJ45 (40 ohm)	+/-	A	A	-	-	B	A	PASS

Note:

1) N/A - denotes test is not applicable to this device.
2) Performance Criteria please refer to clause 5.2.

ATTACHMENT K - RADIO FREQUENCY COMMON MODE

Test Voltage :	AC 230V/50Hz
Test Mode:	FULL SYSTEM

Test Ports (Mode)	Freq. Range MHz)	Field Strength	Criteria	Results	Judgment
Input/ Output AC. Power Port	0.15 ---80	3 V (unmodulated, r.m.s) AM Modulated 1000 Hz, 80%	A	A	PASS
Input/ Output DC. Power Port	0.15 --- 80		A	N/A	N/A
Signal Line (RJ45)	0.15 --- 80		A	A	PASS

Note:

1) N/A - denotes test is not applicable to this device.
2) Performance Criteria please refer to clause 5.2.

ATTACHMENT L - VOLTAGE DIPS AND INTERRUPTIONS

Test Voltage :	AC 230V/50Hz/ AC 240V/50Hz/ AC 100V/50Hz
Test Mode:	FULL SYSTEM

AC 230V/50Hz				
Voltage Residual	Cycles	Criteria	Results	Judgment
Voltage dip 0%	0.5	B	A	PASS
Voltage dip 0%	1	B	A	PASS
Voltage dip 70%	25	B	A	PASS
Voltage Interruption 0%	250	C	C	PASS

AC 240V/50Hz				
Voltage Residual	Cycles	Criteria	Results	Judgment
Voltage dip 0%	0.5	B	A	PASS
Voltage dip 0%	1	B	A	PASS
Voltage dip 70%	25	B	A	PASS
Voltage Interruption 0%	250	C	C	PASS

AC 100V/50Hz				
Voltage Residual	Cycles	Criteria	Results	Judgment
Voltage dip 0%	0.5	B	A	PASS
Voltage dip 0%	1	B	A	PASS
Voltage dip 70%	25	B	A	PASS
Voltage Interruption 0%	250	C	C	PASS

Note:

1). N/A - denotes test is applicable to this device.

2) Performance Criteria please refer to clause 5.2.