

# EN 301 489 Test Report

**Project No.** : 1711C142  
**Equipment** : AC1200 Smart Dual-Band WiFi Router  
**Test Model** : AC5  
**Series Model** : N/A  
**Applicant** : SHENZHEN TENDA TECHNOLOGY CO.,LTD  
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**Date of Receipt** : Nov. 17, 2017  
**Date of Test** : Nov. 17, 2017 ~ Dec. 06, 2017  
**Issued Date** : Dec. 07, 2017  
**Tested by** : BTL Inc.

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### REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-ETSE-1-1711C142	Original Issue.	Dec. 07, 2017

## 1. CERTIFICATION

Equipment : AC1200 Smart Dual-Band WiFi Router  
Brand Name : Tenda  
Test Model : AC5  
Series Model : N/A  
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 : Nov. 17, 2017 ~ Dec. 06, 2017  
Test Sample : Engineering Sample  
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: 2014  
EN 61000-4-6: 2014+AC: 2015  
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-1-1711C142) 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 NOTE (4)
			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: 2014+AC: 2015	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: 2014	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  $U_{\text{CISPR}}$  requirement.

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%**.

### A. Radiated emission up to 1 GHz:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)
DG-CB02 (3m)	CISPR	30MHz ~ 200MHz	V	3.83
		30MHz ~ 200MHz	H	3.79
		200MHz ~ 1,000MHz	V	4.04
		200MHz ~ 1,000MHz	H	4.02

### B. Radiated emission above 1 GHz:

Test Site	Method	Measurement Frequency Range	U, (dB)
DG-CB02 (3m)	CISPR	1 ~ 6 GHz	4.50
		6 ~ 18 GHz	5.18

### 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	Voltage	0.774
	EN 61000-3-3	Current	0.782

# F. Immunity:

Test Site	Method	Measurement Frequency Range	U, (dB)
DG-SR02	EN 61000-4-2	Rise time $t_r$	14.6 %
		Peak current $I_p$	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 ( $t_r$ )	10.4 %
		Voltage peak value( $V_P$ )	8.2 %
		Voltage pulse width( $t_w$ )	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 Smart Dual-Band WiFi Router
Brand Name	Tenda
Test Model	AC5
Series Model	N/A
Model Difference	N/A
Power Source	DC voltage supplied from AC/DC adapter. 1# Brand/ Model: BN052-A09009E(EU) 2# Brand/ Model: BN052-A09009B(UK)
Power Rating	I/P: 100-240V~ 50/60Hz 0.3A O/P:9V $\overline{\text{---}}$ 1.0A
Connecting I/O port(s)	1* WAN port 3* LAN port 1* Power 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 up to 1 GHz	
Final Test Mode	Description
Mode 1	FULL SYSTEM

Radiated emission above 1 GHz	
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

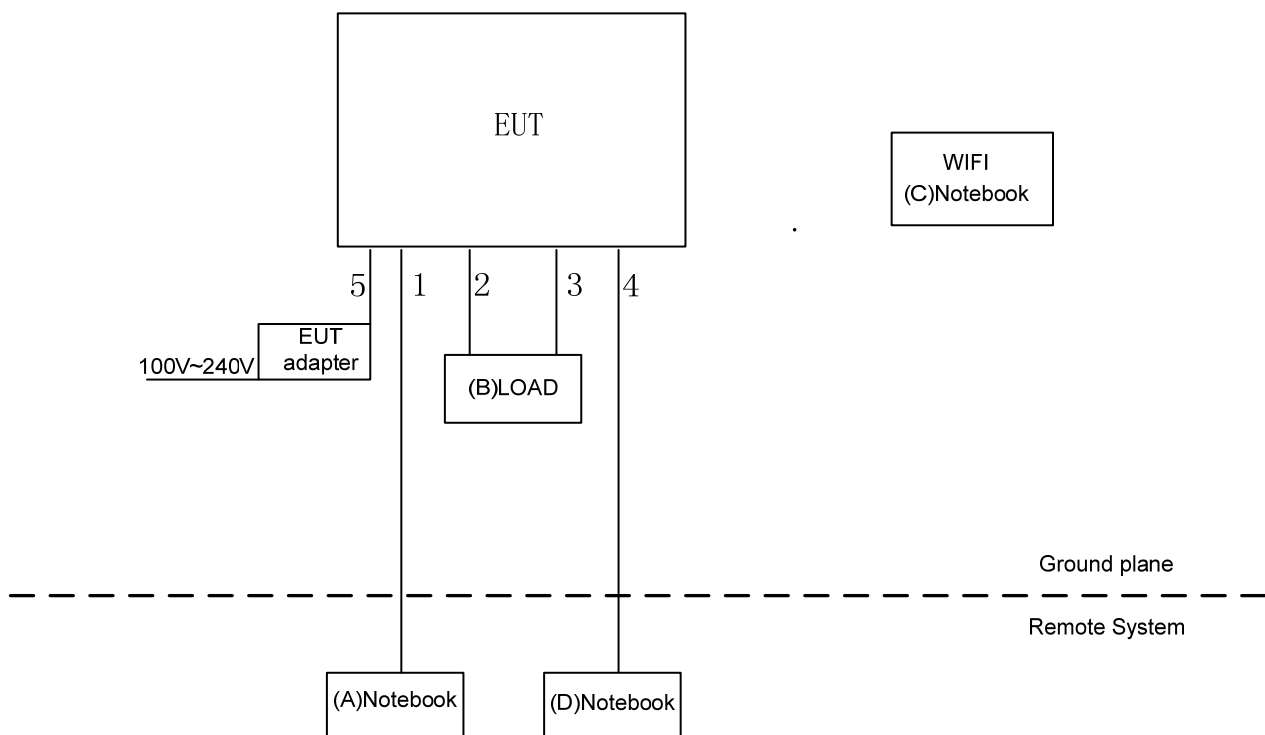
Immunity	
Final Test Mode	Description
Mode 1	FULL SYSTEM

### 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 notebook via RJ45 cable.
2. EUT connected to load via RJ45 cable.
3. EUT connected to notebook via WIFI function.

### 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	DELL	latitude E5510	DOC	N/A
B	LOAD	N/A	N/A	N/A	N/A
C	Notebook	hp	hstnn-169c-3	DOC	CNU02203XG
D	Notebook	Lenovo	E445	N/A	MP-05Y56S

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	NO	15m	RJ45 Cable
2	NO	NO	1.8m	RJ45 Cable
3	NO	NO	1.8m	RJ45 Cable
4	NO	NO	15m	RJ45 Cable
5	NO	NO	1.5m	DC 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
$F_x \leq 108$	1000
$108 < F_x \leq 500$	2000
$500 < F_x \leq 1000$	5000
$F_x > 1000$	5 <sup>th</sup> 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.

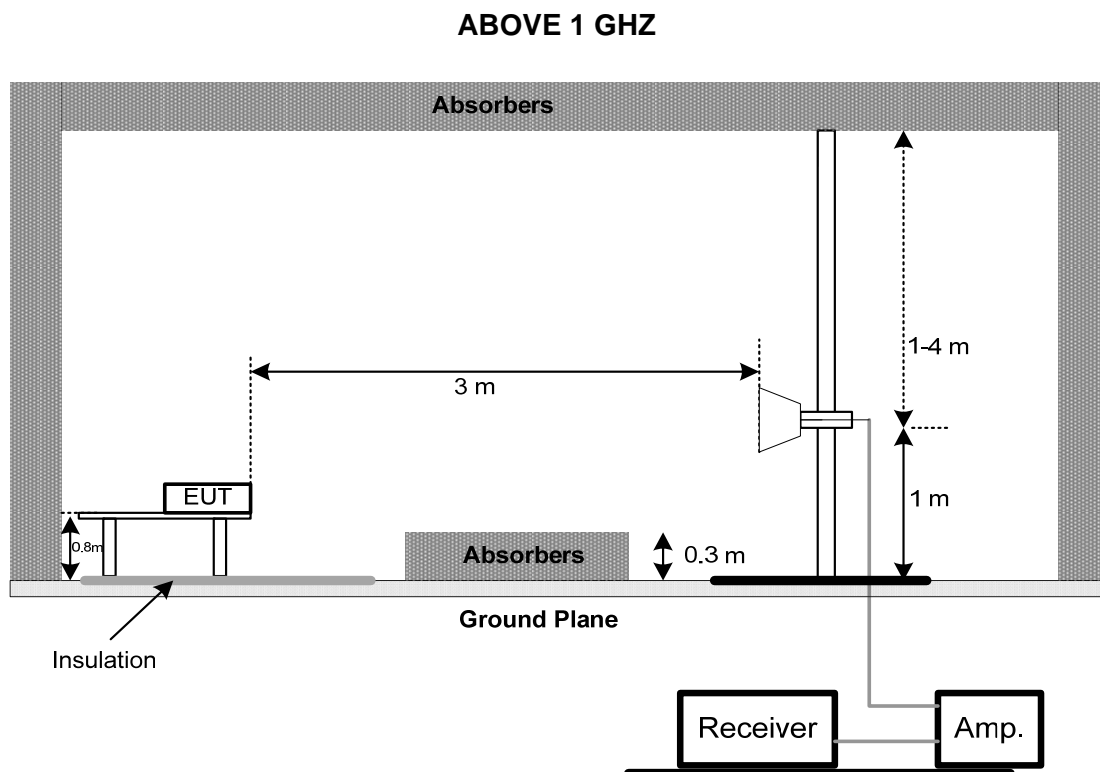
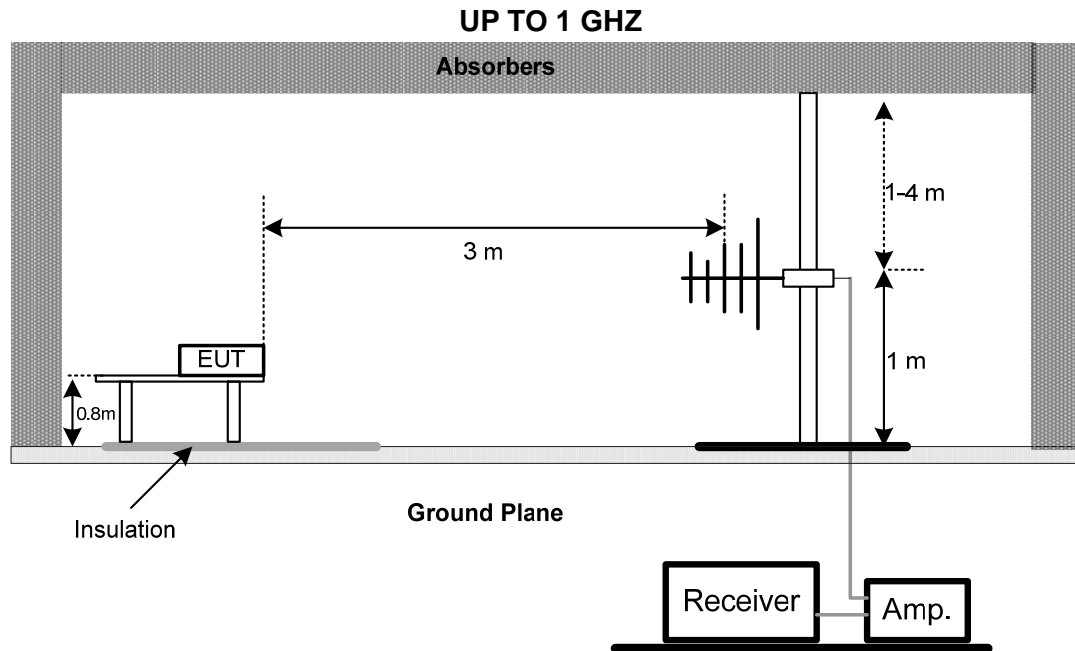
### 4.1.2 TEST PROCEDURE

- 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 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz).
- 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 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- 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.
- 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.
- 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)
- 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)
- 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

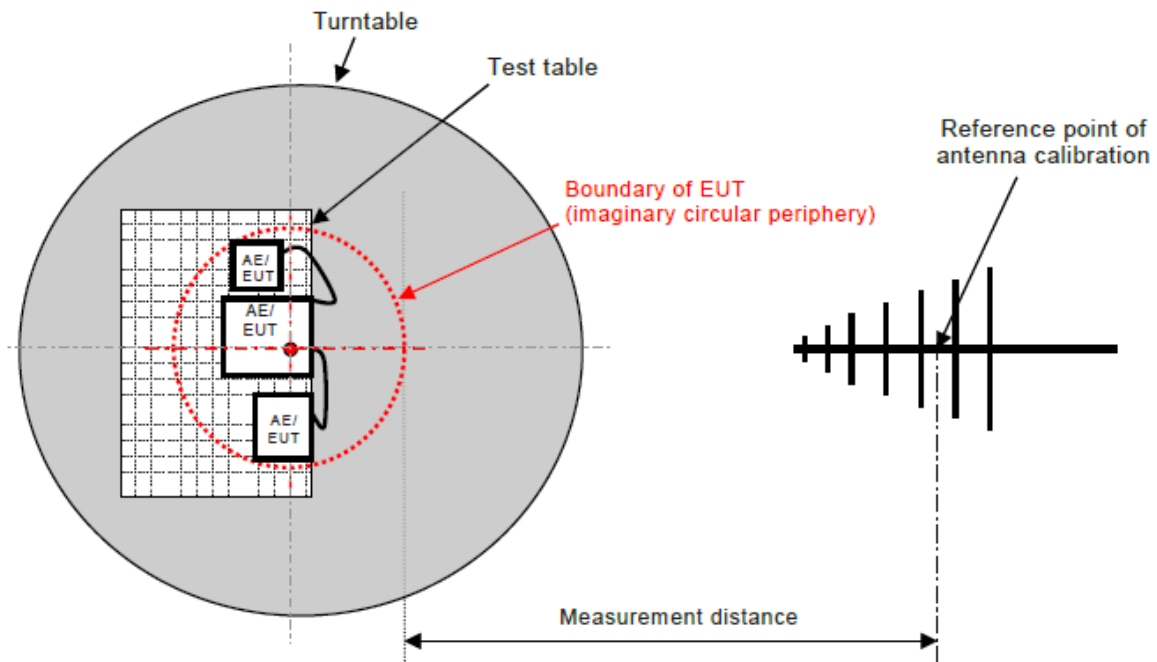
No deviation

#### 4.1.4 TEST SETUP

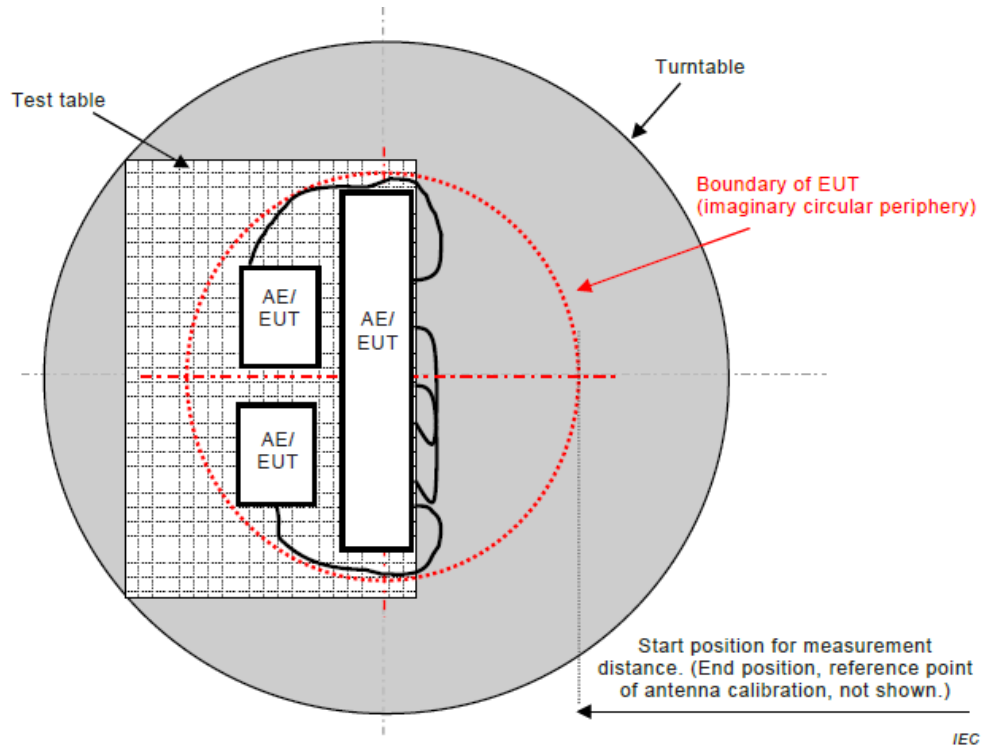


Note: The antenna can be moved between 1 to 4 meters above the ground.

#### 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

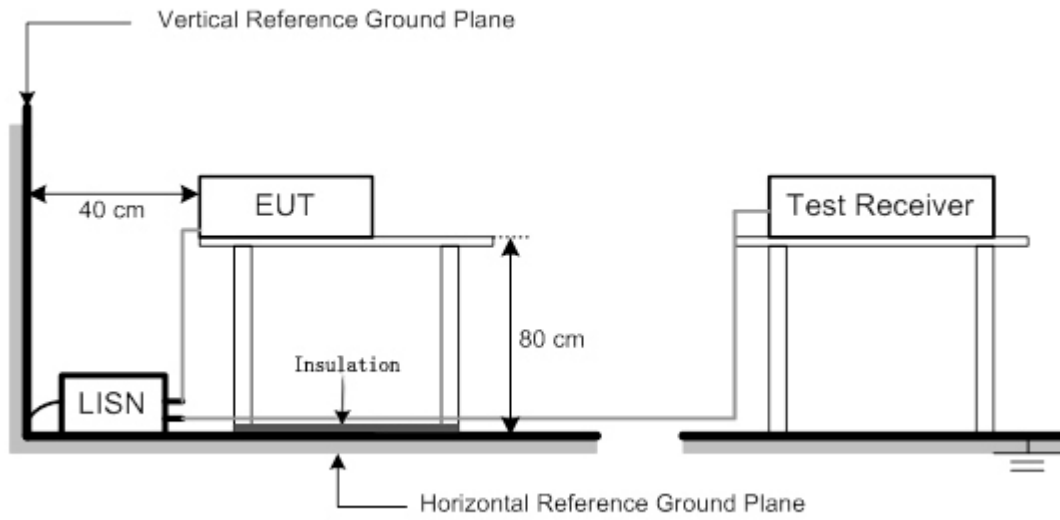
### 4.2.2 TEST PROCEDURE

- 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.
- 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.
- 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.
- LISN at least 80 cm from nearest part of EUT chassis.
- 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 / 9 kHz	84— 74	
	0.5 — 30			74	
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 kHz	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 kHz		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

- 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.
- 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.
- 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.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.
- AAN, CP or CVP** at least 80 cm from nearest part of EUT chassis.

#### NOTE:

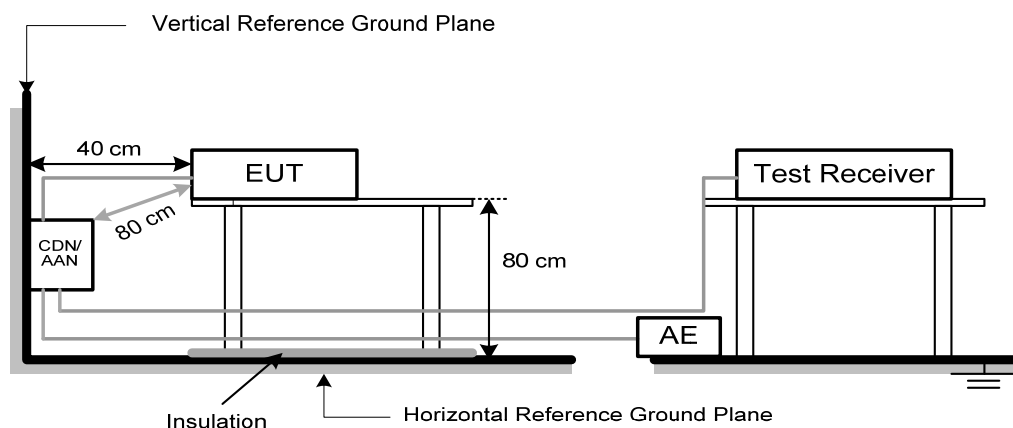
- The communication function of EUT was executed and AAN was connected between EUT and associated equipment and the AAN was connected directly to reference ground plane.  
Measure the voltage at the measurement port of the AAN  
Correct the measured voltage by adding the AAN voltage division factor  
Compare the corrected voltage with the limit(**For AAN**)
- Measure the current with a current probe and compare to the current limit(**For CP**)
- 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  $\leq 6$  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

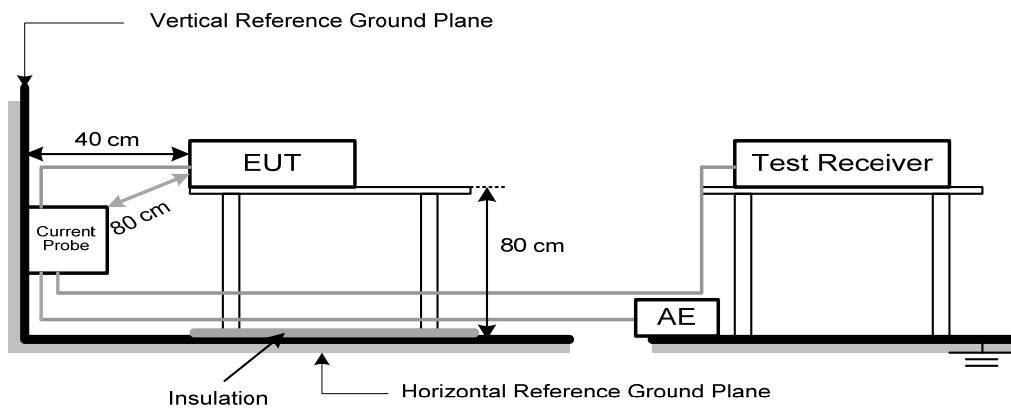
No deviation

#### 4.3.4 TEST SETUP

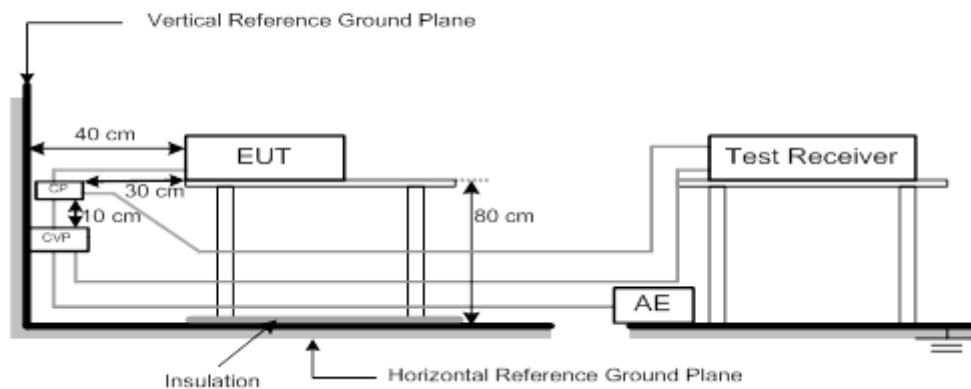
- Cable Type: Balanced Unscreened, Screened or Coaxial



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 EMISSION

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

- 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.
- 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.

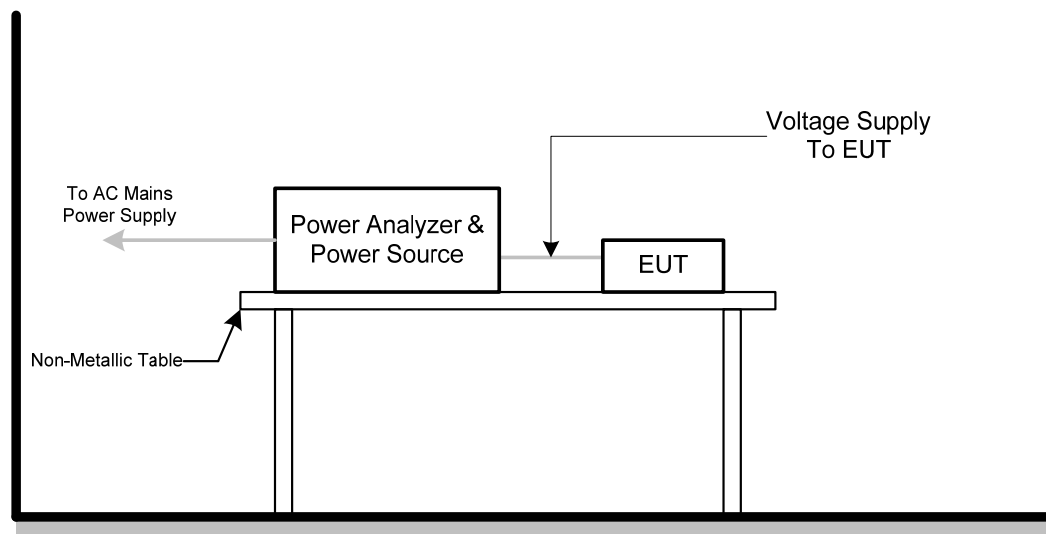
Class D: Equipment having a specified power less than or equal to 600 W of the following types: Personal computers and personal computer monitors and television receivers.

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

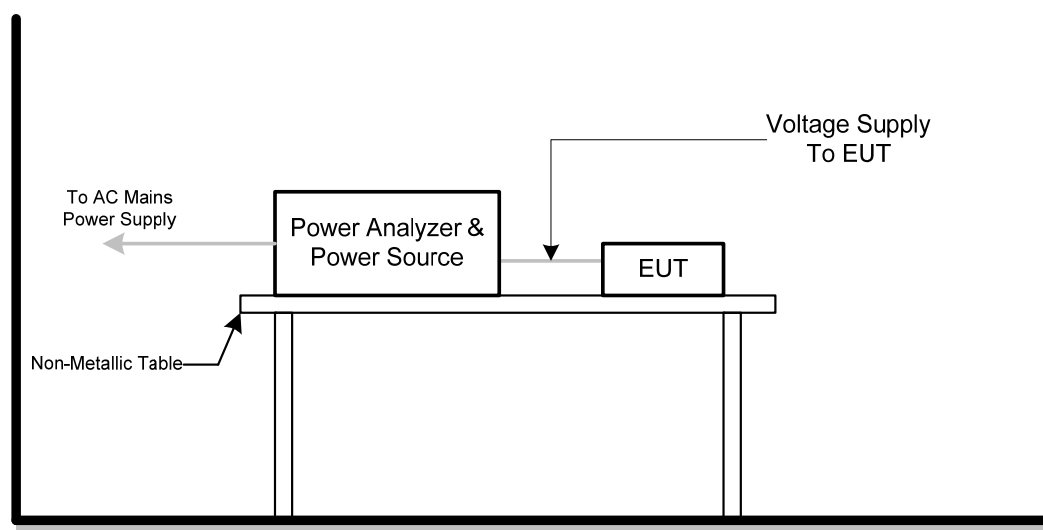
### 4.5.2 TEST PROCEDURE

- 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.
- 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 <b>(NOTE 1)</b>	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 <b>(NOTE 1)</b>	DC Power Port <b>(NOTE 2)</b>	A
	0.15 MHz to 80 MHz 3V (unmodulated, r.m.s), 1000 Hz or 400 Hz, 80%, AM Modulated 150Ω source impedance <b>(NOTE 1)</b>	signal ports, wired network ports, control ports <b>(NOTE 2)</b>	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 <b>(NOTE 5)</b>

**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
<b>A</b>	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>B</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.
<b>C</b>	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: $\pm 2$ kV/ $\pm 4$ kV/ $\pm 8$ kV (Direct) Contact Discharge: $\pm 2$ kV/ $\pm 4$ kV (Indirect)
Polarity:	Positive & Negative
Number of Discharge:	Air Discharge: min. 20 times at each test point Contact Discharge: min. 200 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. Contact discharge was applied to conductive surfaces and coupling planes of the EUT. During the test, it was performed with single discharges. For the single discharge time between successive single discharges was at least 1 second. The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. One of the test points shall be subjected to at least 50 indirect discharges to the center of the front edge of the horizontal coupling plane. The remaining three test points shall each receive at least 50 direct contact discharges.

If no direct contact test points are available, then at least 200 indirect discharges shall be applied in the indirect mode. Test shall be performed at a maximum repetition rate of one discharge per second.

Vertical Coupling Plane (VCP):

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

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

Horizontal Coupling Plane (HCP):

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

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

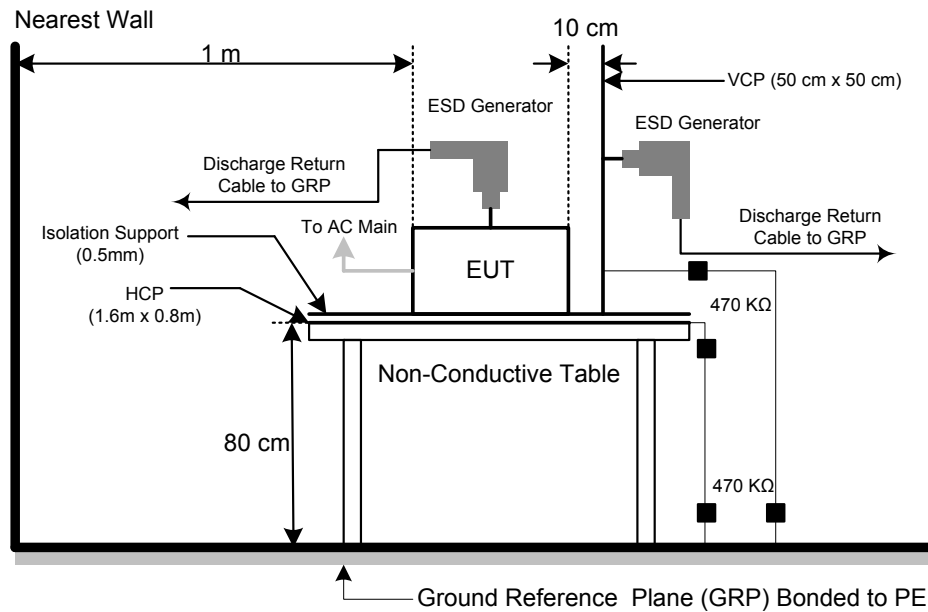
- b. Air discharges at insulation surfaces of the EUT.

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

### 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: 25°C

Relative Humidity: 45%

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.

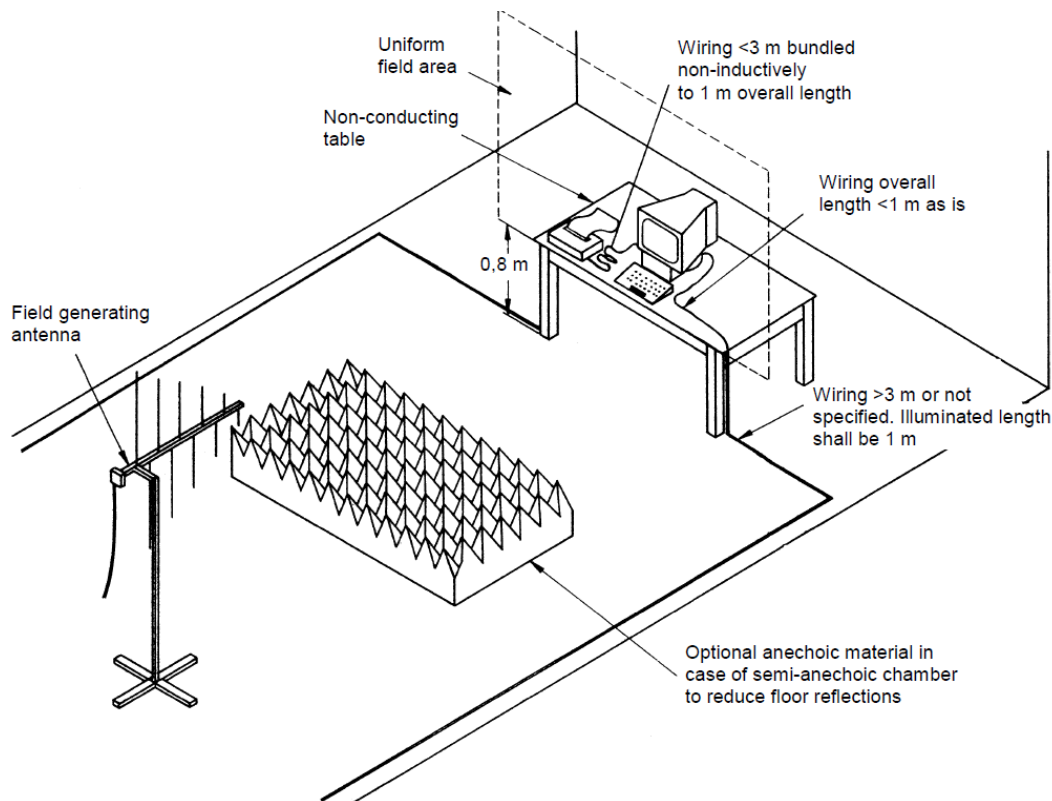
The other condition as following manner:

- 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: 50%

### 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: $\pm 1$ kV Signal/Control Line: $\pm 0.5$ kV
Polarity:	Positive & Negative
Impulse Frequency:	5 kHz
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

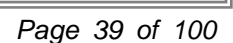
The EUT and support equipment, are placed on a table that is 0.8 meter above a metal ground plane measured 1m\*1m min. and 0.65mm thick min.

The other condition as following manner:

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

### 5.6.3 DEVIATION FROM TEST STANDARD

No deviation



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: 50%

#### 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): $\pm 0.5$ kV, $\pm 1$ kV Signal Line: $\pm 0.5$ kV, $\pm 1$ kV
Surge Input/Output:	AC mains power port, Signal Line
Generator Source Impedance	2 ohm between networks 40 ohm between network and ground
Polarity:	Positive/Negative
Phase Angle:	AC Port: $0^\circ/90^\circ/180^\circ/270^\circ$
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).

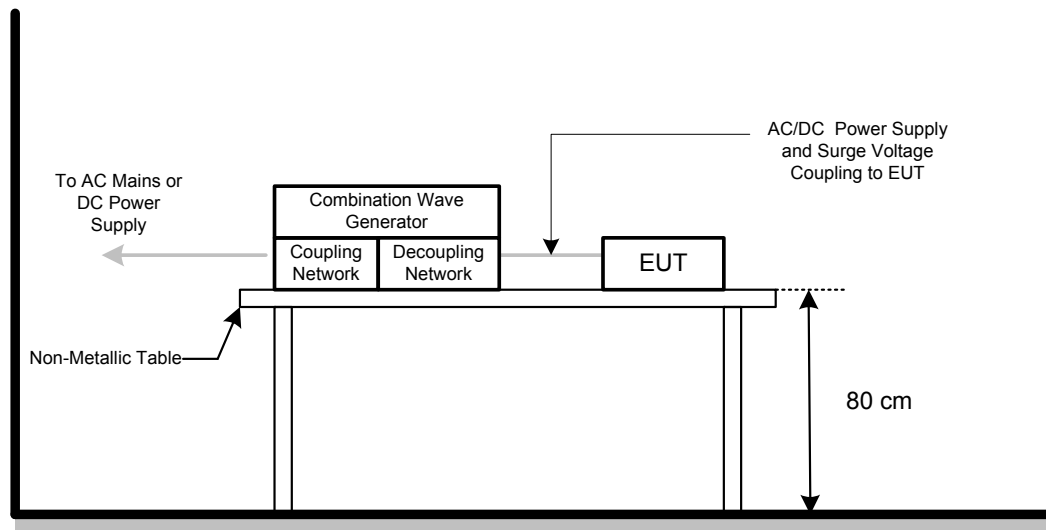
c. For test applied to unshielded symmetrically operated interconnection /telecommunication lines of EUT:

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

No deviation

#### 5.7.4 TEST SETUP



#### 5.7.5 EUT TEST CONDITIONS

Temperature: 25°C

Relative Humidity: 50%

#### 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.

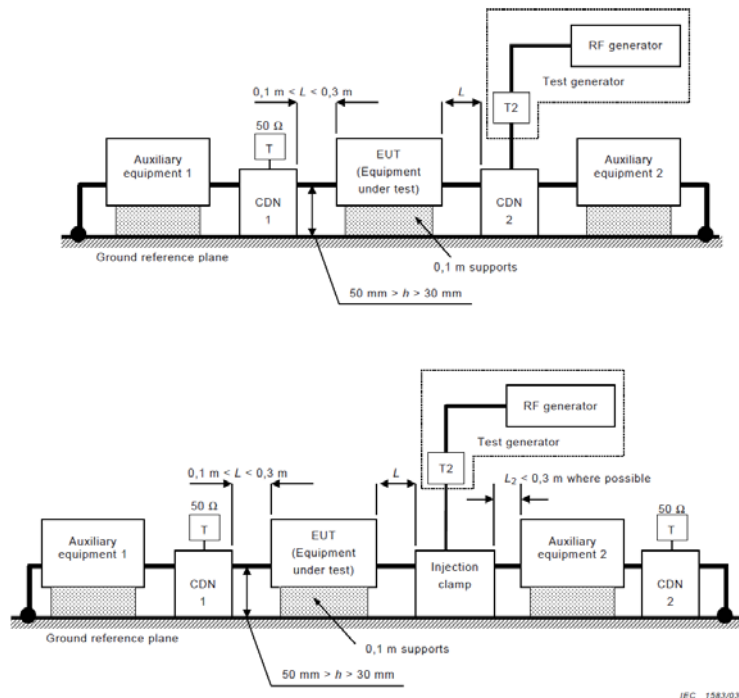
The other condition as following manner:

- 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,

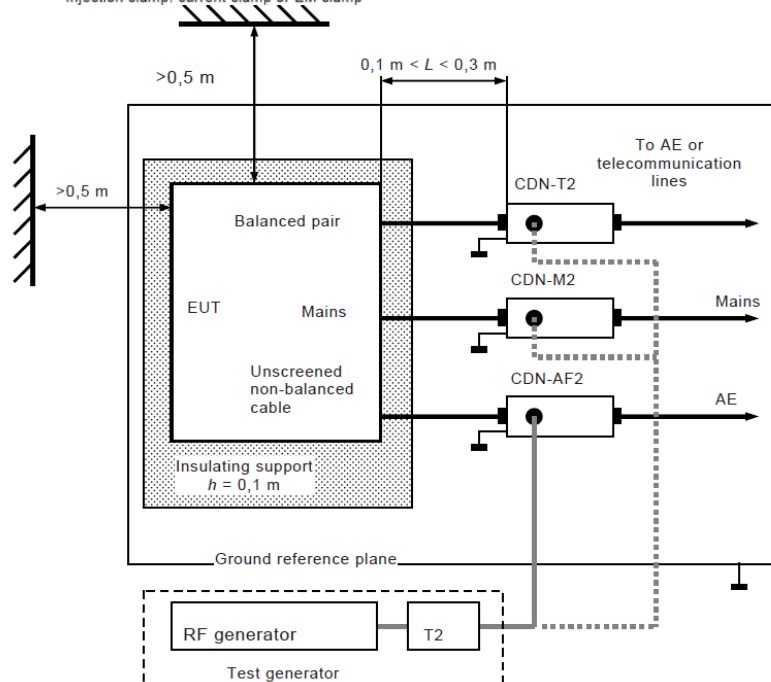
### 5.8.3 DEVIATION FROM TEST STANDARD

No deviation

## 5.8.4 TEST SETUP



T : Termination 50  $\Omega$   
 T2: Power attenuator (6 dB)  
 CDN: Coupling and decoupling network  
 Injection clamp: current clamp or EM clamp



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: 50%

## 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

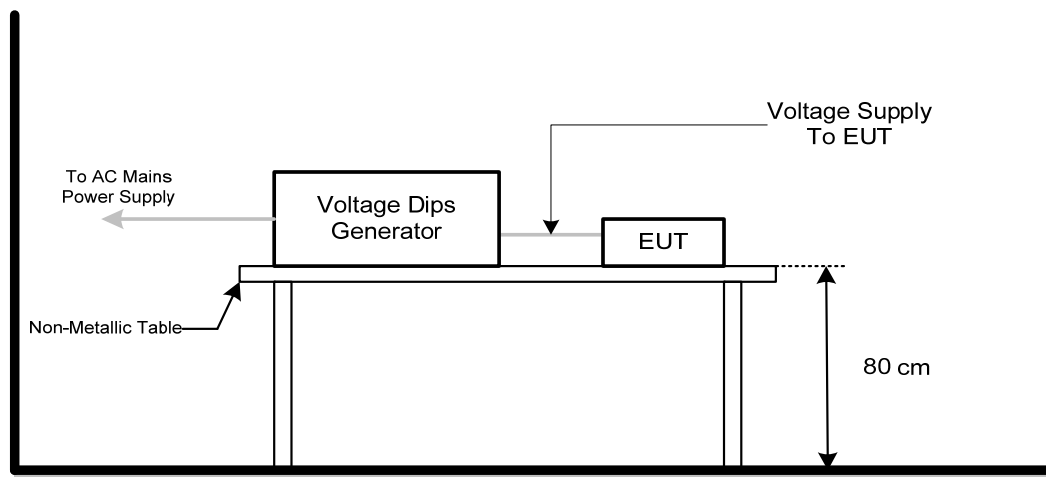
### 5.9.2 TEST PROCEDURE

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: 50%

### 5.9.6 TEST RESULTS

Please refer to the Attachment L.

## 6. MEASUREMENT INSTRUMENTS LIST

Radiated emission					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	Schwarbeck	VULB9160	9160-3232	Mar. 26, 2018
2	Double Ridged Horn Antenna	ARA	DRG-118A	16554	Mar. 26, 2018
3	Amplifier	Agilent	8449B	3008A02274	May. 16, 2018
4	Amplifier	HP	8447D	1937A02847	Feb. 22, 2018
5	Cable	emci	LMR-400(30MHz-1GHz)(10m+2.5m)	N/A	Jun. 26, 2018
6	Cable	emci	EMC104-SM-SM-10000 (1GHz—26.5GHz)(10m)	N/A	Jun. 26, 2018
7	Controller	CT	SC100	N/A	N/A
8	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
9	EMI Test Receiver	Keysight	N9038A	N/A	Mar. 26, 2018

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. 26, 2018
3	TWO-LINE V-NETWORK	R&S	ENV216	100526	Mar. 26, 2018
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. 07, 2018

Conducted emission at Wired network 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. 26, 2018
3	TWO-LINE V-NETWORK	R&S	ENV216	100526	Mar. 26, 2018
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. 07, 2018
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. 26, 2018
2	Amplifier	AR	50S1G4A	326720	Mar. 28, 2018
3	Power amplifier	MILMEGA	AS1860-50	1064834	Aug. 20, 2020
4	Microwave Log.-Per. Antenna	TESEQ	STLP 9149	9149-277	Mar. 27, 2019
5	Power amplifier	MILMEGA	80RF1000-250	1064833	Aug. 20, 2020
6	Measurement Software	TOYO	IM5/R Ver 3.8.050	N/A	N/A
7	MXG Analog Signal Generator	Agilent	N5181A	MY49060710	Aug. 20, 2018

### Fast transients, common mode

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Capacitor Clamp	Thermo KeyTek	CCL	0502215	Feb. 24, 2018
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. 26, 2018
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	Measurement Software	Farad	EZ-CS?(V2.0.1.2)	N/A	N/A
2	Power CDN	FCC	FCC-801-M2/M3-16A	100270	Mar. 26, 2018
3	Power Amplifier	Teseq	CBA230M-080	T43748	Mar. 26, 2018
4	Signal Generator	HP	8648A	3636A02964	Mar. 26, 2018
5	Signal Line CDN	FCC	FCC-801-T2-RJ11	100269	Mar. 26, 2018
6	Signal Line CDN	FCC	F-090407-1004-1	100518	Mar. 26, 2018

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

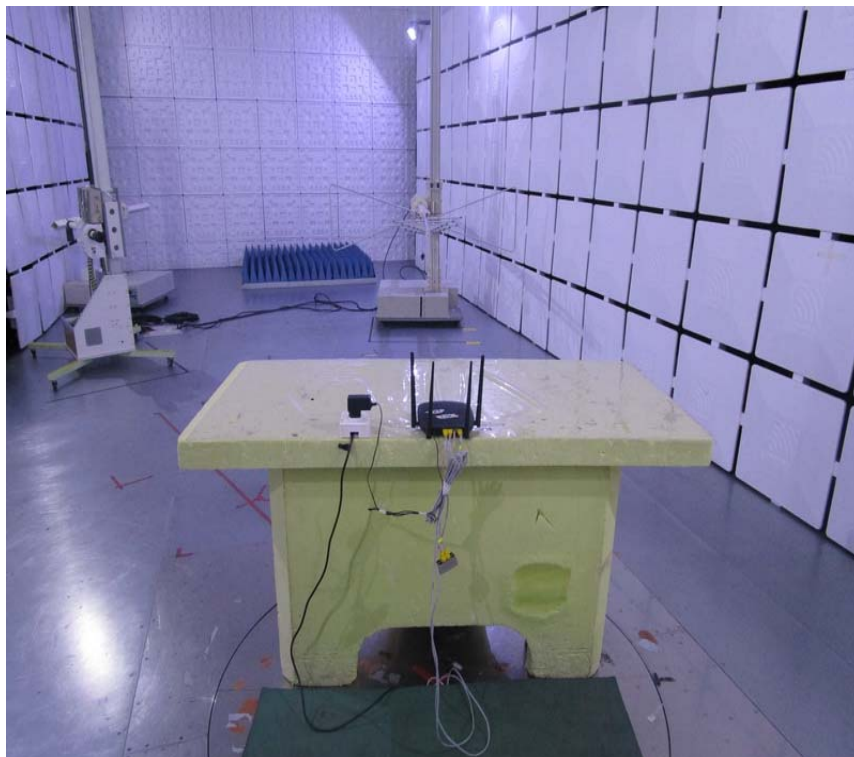
Remark: "N/A" denotes no model name, serial no. or calibration specified.

All calibration period of equipment list is one year.

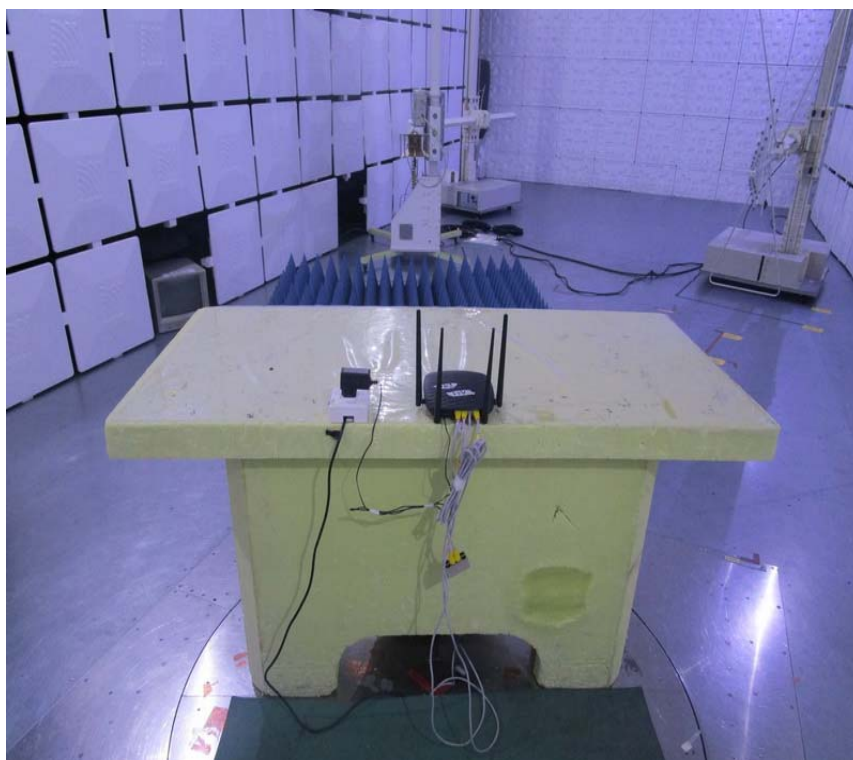
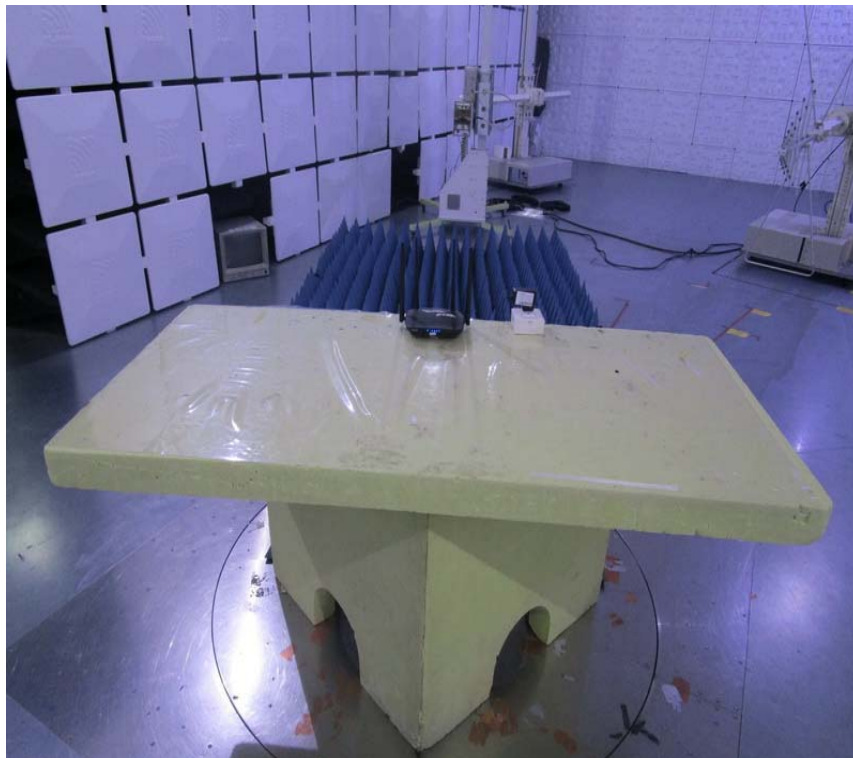


## 7. EUT TEST PHOTO

Radiated emissions up to 1 GHz



# Radiated emissions above 1 GHz



# Conducted emissions AC mains power port

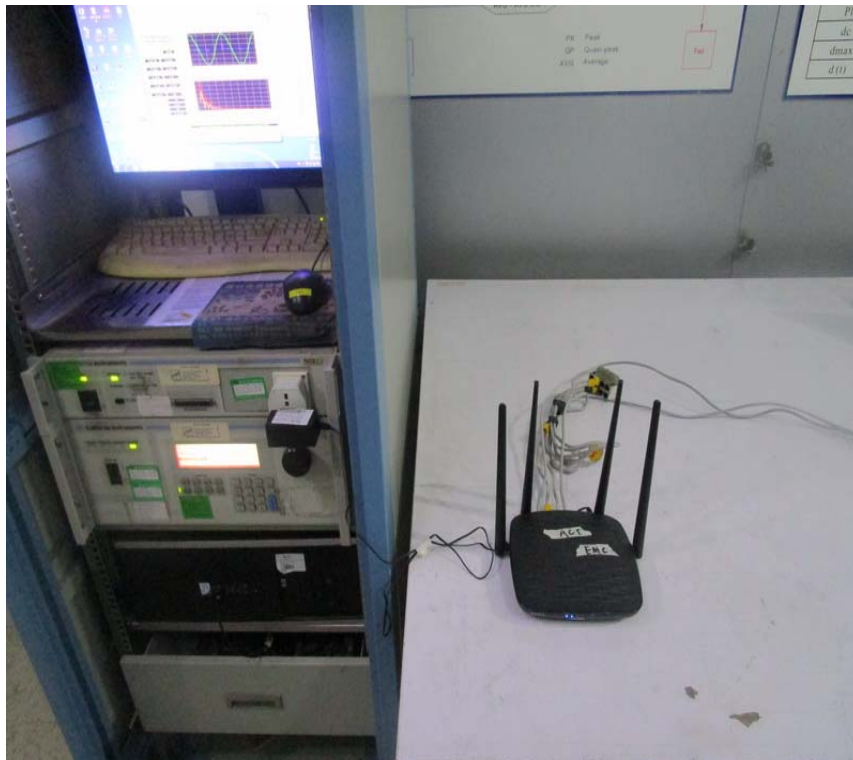




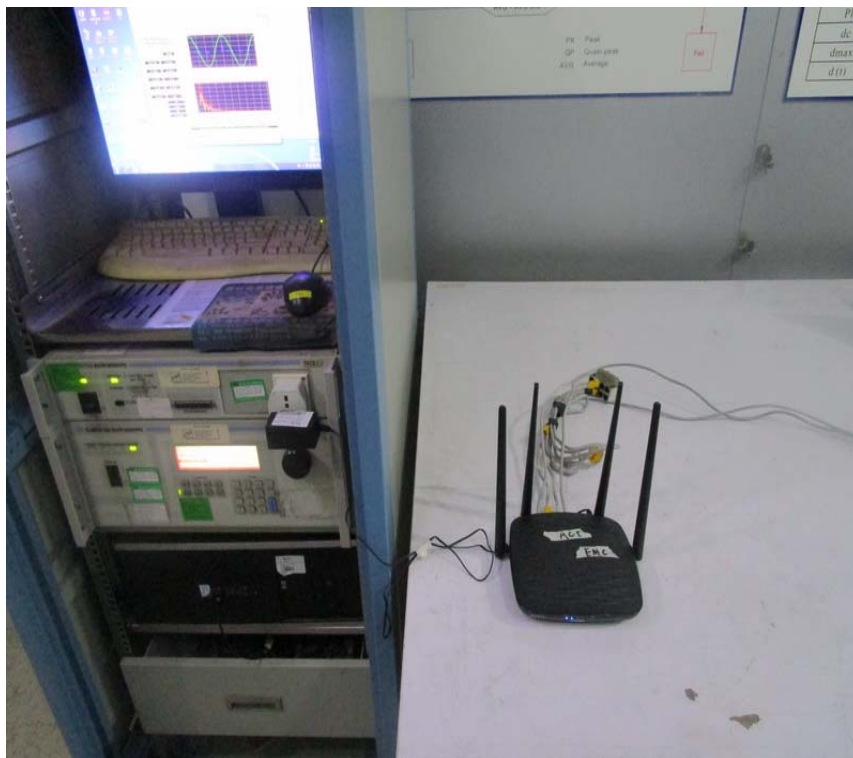
# Asymmetric mode conducted emissions\_AAN



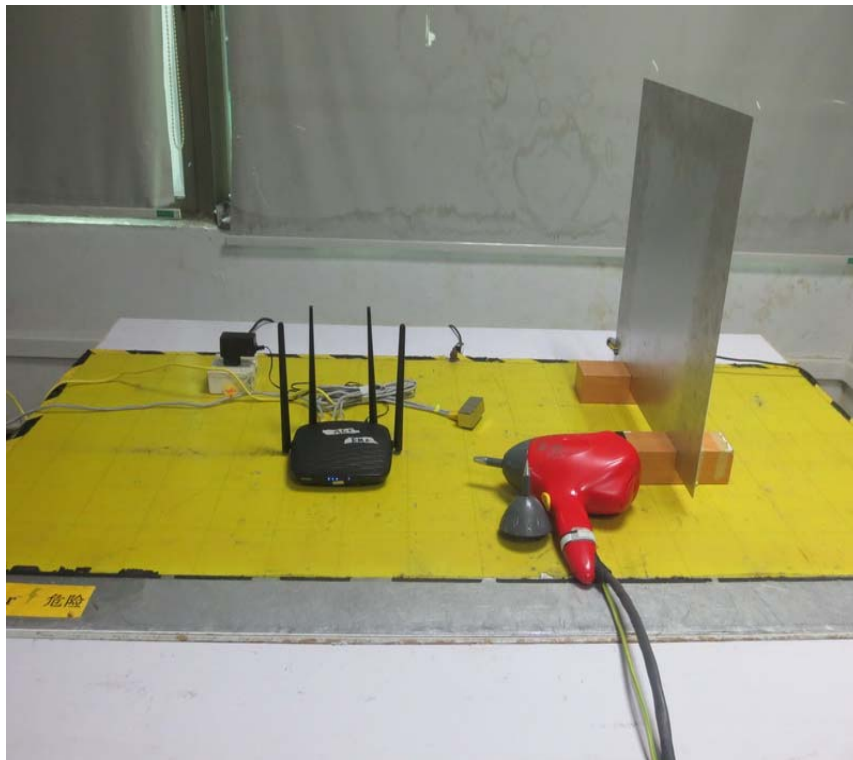
### Harmonic current emissions



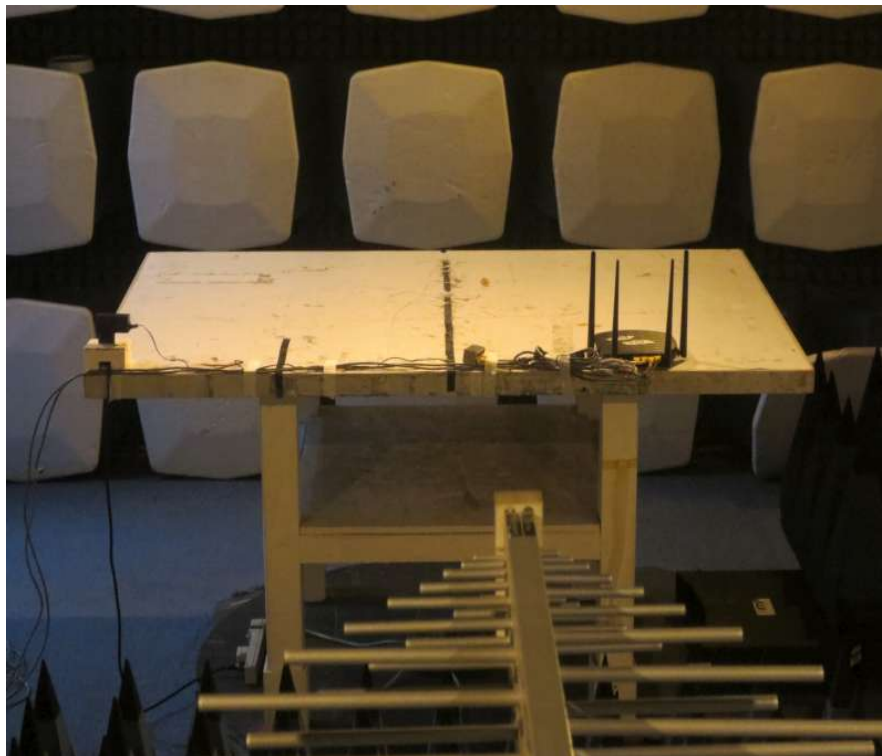
### Voltage changes, voltage fluctuations and flicker



### Electrostatic discharge immunity



Radiated, radio-frequency, electromagnetic field immunity-L



Radiated, radio-frequency, electromagnetic field immunity-H

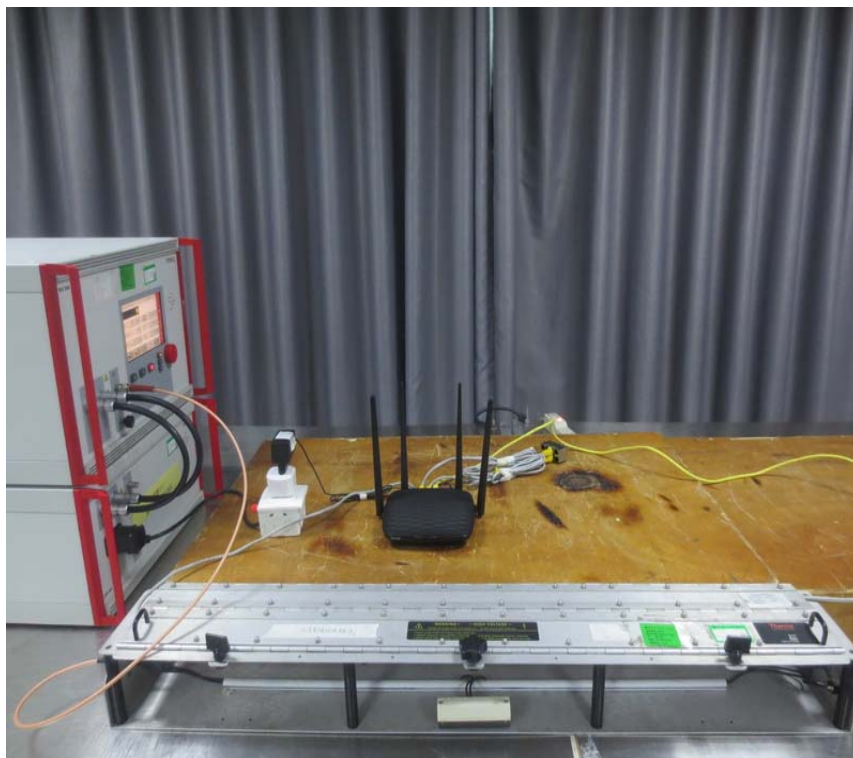




### Electrical fast transient/burst immunity-AC



### Electrical fast transient/burst immunity-RJ45





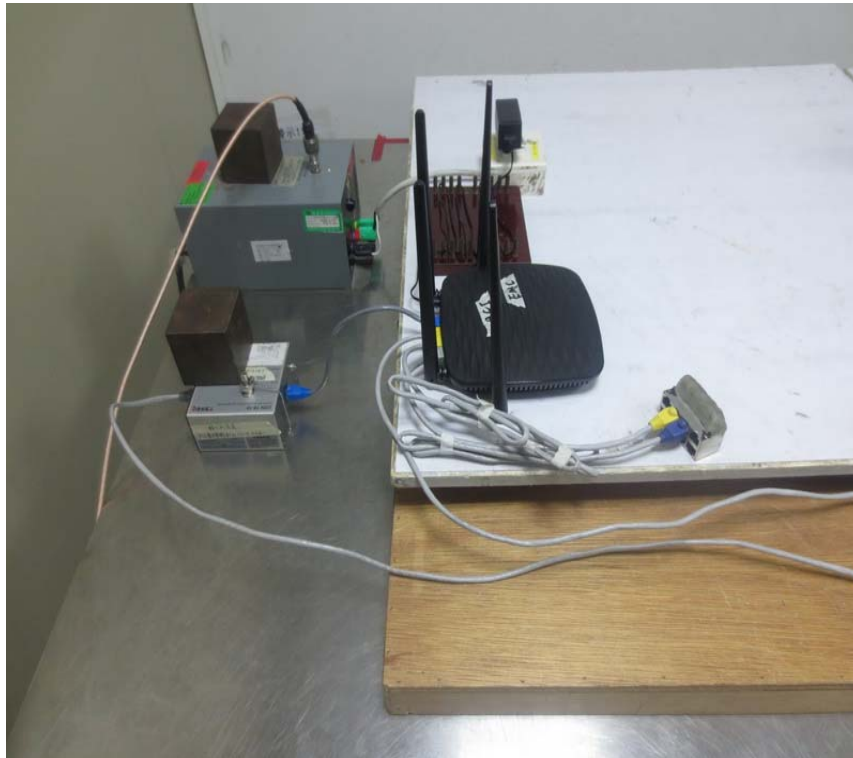
Surge immunity-AC



Surge immunity-RJ45



Immunity to conducted disturbances, induced by radio-frequency fields-AC



Immunity to conducted disturbances, induced by radio-frequency fields-LAN

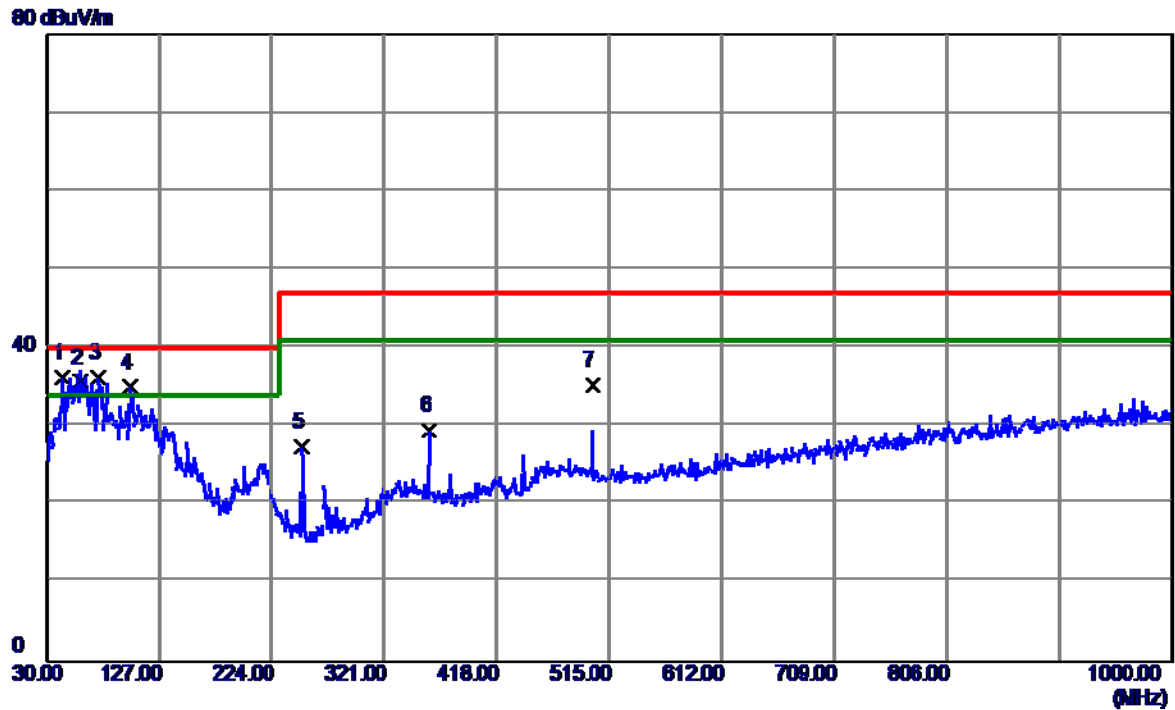


### Voltage dips, short interruptions and voltage variations immunity



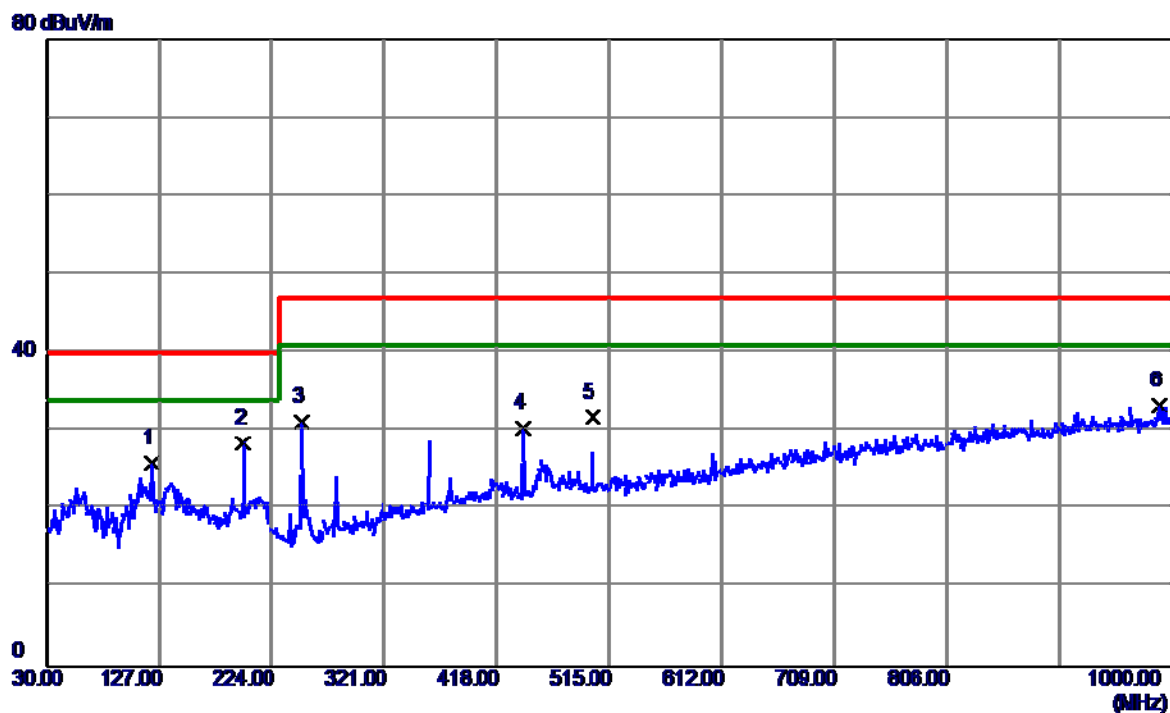
## ATTACHMENT A - RADIATED EMISSION UP TO 1GHZ

EUT	AC1200 Smart Dual-Band WiFi Router	Model Name	AC5
Temperature	25°C	Relative Humidity	60%
Test Voltage	AC 230V/50Hz	Polarization	Vertical
Test Mode	FULL SYSTEM		
Test Engineer	Sam Wang		



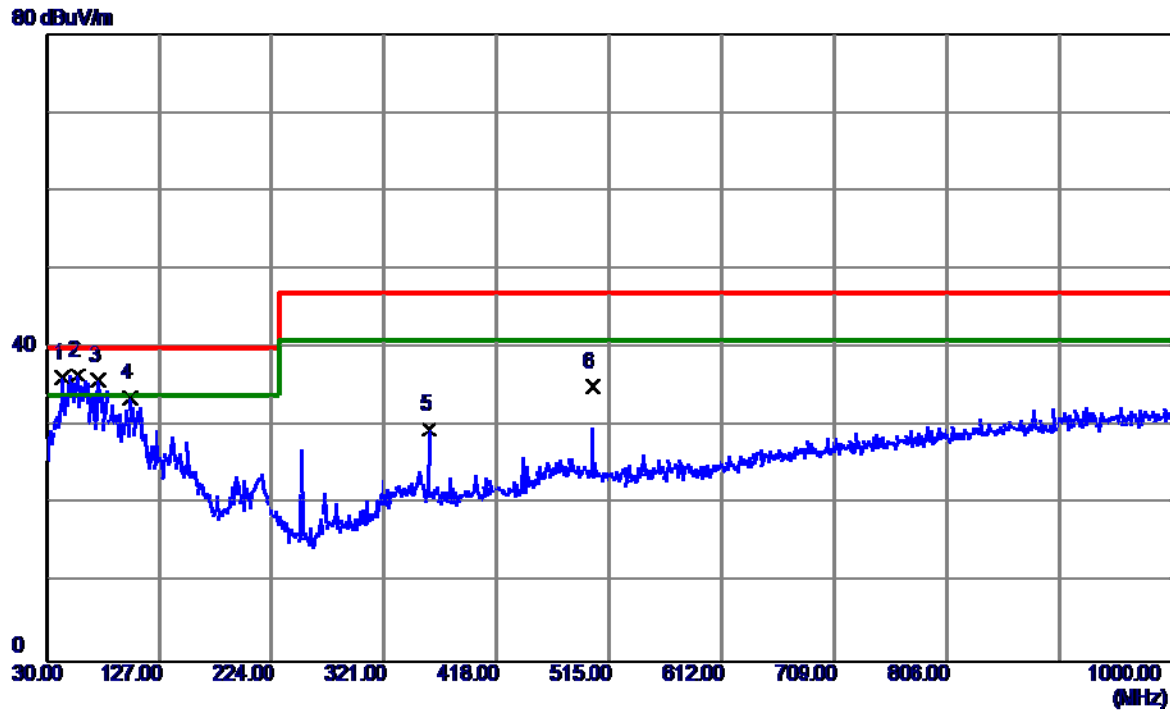
No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector
1	43.5800	48.29	-12.12	36.17	40.00	-3.83	QP
2	59.1000	48.59	-12.99	35.60	40.00	-4.40	QP
3 *	74.6200	51.83	-15.61	36.22	40.00	-3.78	QP
4	101.7800	51.54	-16.58	34.96	40.00	-5.04	QP
5	359.8000	38.62	-9.17	29.45	47.00	-17.55	QP
6	500.4500	40.92	-5.73	35.19	47.00	-11.81	QP

EUT	AC1200 Smart Dual-Band WiFi Router	Model Name	AC5
Temperature	25°C	Relative Humidity	60%
Test Voltage	AC 230V/50Hz	Polarization	Horizontal
Test Mode	FULL SYSTEM		
Test Engineer	Sam Wang		



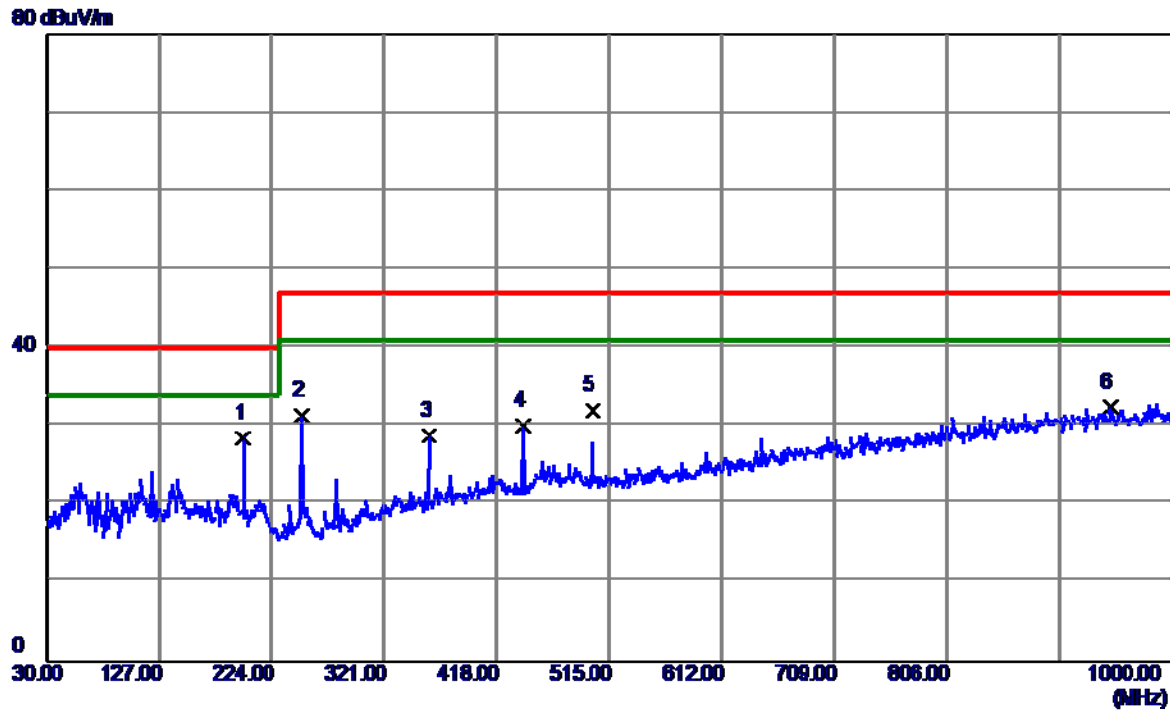
No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector
1	120.2100	39.57	-13.66	25.91	40.00	-14.09	QP
2 *	199.7500	40.54	-12.10	28.44	40.00	-11.56	QP
3	250.1900	44.44	-13.22	31.22	47.00	-15.78	QP
4	440.3100	37.53	-7.11	30.42	47.00	-16.58	QP
5	500.4500	37.49	-5.73	31.76	47.00	-15.24	QP
6	989.3300	29.27	4.07	33.34	47.00	-13.66	QP

EUT	AC1200 Smart Dual-Band WiFi Router	Model Name	AC5
Temperature	25°C	Relative Humidity	60%
Test Voltage	AC 110V/60Hz	Polarization	Vertical
Test Mode	FULL SYSTEM		
Test Engineer	Sam Wang		



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector
1	43.5800	48.31	-12.12	36.19	40.00	-3.81	QP
2 *	57.1600	48.95	-12.54	36.41	40.00	-3.59	QP
3	74.6200	51.41	-15.61	35.80	40.00	-4.20	QP
4	101.7800	50.15	-16.58	33.57	40.00	-6.43	QP
5	359.8000	38.77	-9.17	29.60	47.00	-17.40	QP
6	500.4500	40.84	-5.73	35.11	47.00	-11.89	QP

EUT	AC1200 Smart Dual-Band WiFi Router	Model Name	AC5
Temperature	25°C	Relative Humidity	60%
Test Voltage	AC 110V/60Hz	Polarization	Horizontal
Test Mode	FULL SYSTEM		
Test Engineer	Sam Wang		

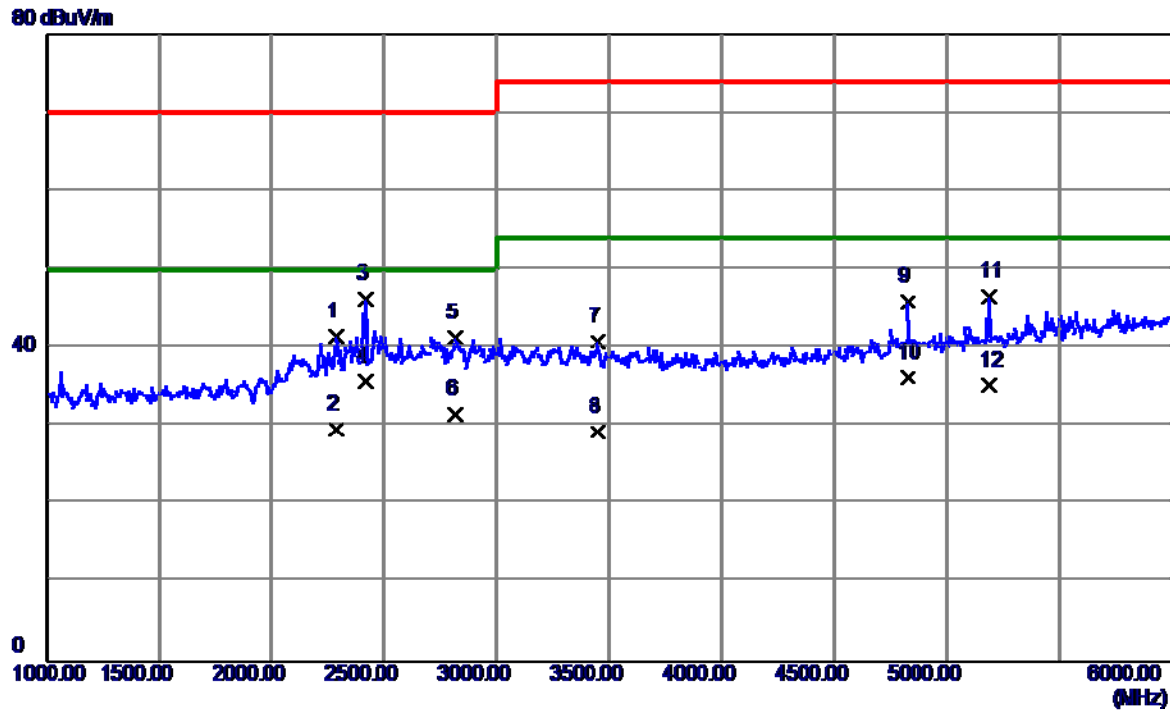


No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector
1 *	199.7500	40.57	-12.10	28.47	40.00	-11.53	QP
2	250.1900	44.61	-13.22	31.39	47.00	-15.61	QP
3	359.8000	38.02	-9.17	28.85	47.00	-18.15	QP
4	440.3100	37.14	-7.11	30.03	47.00	-16.97	QP
5	500.4500	37.75	-5.73	32.02	47.00	-14.98	QP
6	946.6500	28.92	3.48	32.40	47.00	-14.60	QP



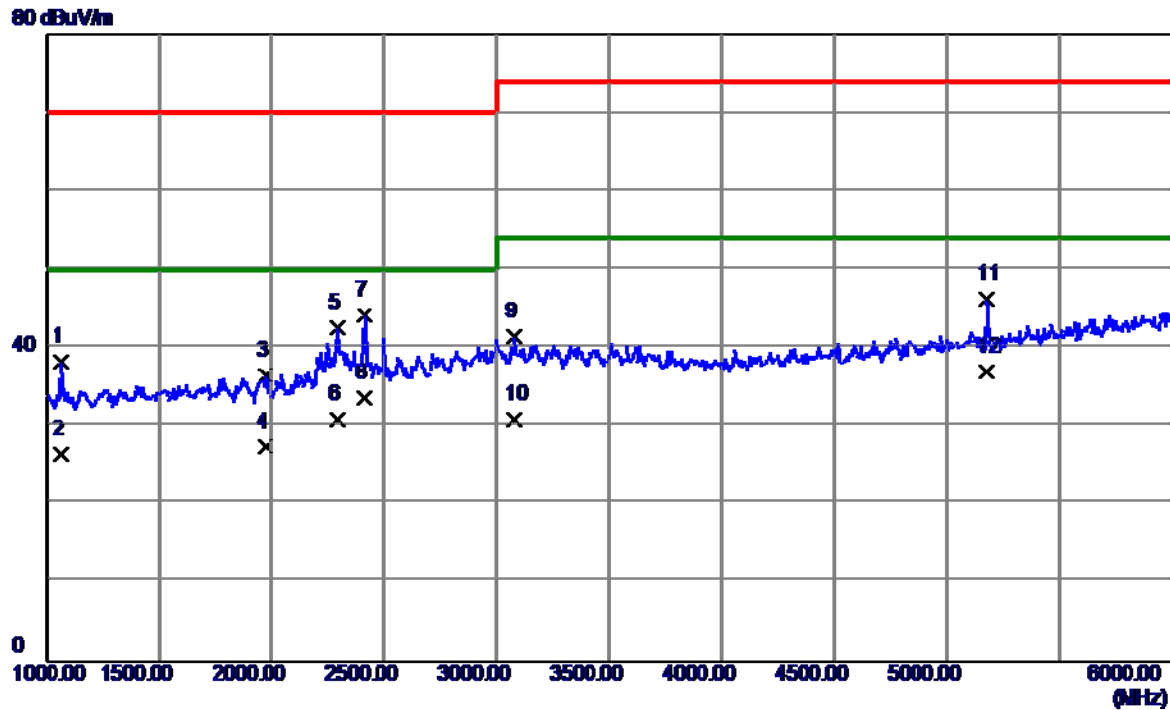
## ATTACHMENT B - RADIATED EMISSION ABOVE 1GHZ

EUT	AC1200 Smart Dual-Band WiFi Router	Model Name	AC5
Temperature	25°C	Relative Humidity	60%
Test Voltage	AC 230V/50Hz	Polarization	Vertical
Test Mode	FULL SYSTEM		
Test Engineer	Sam Wang		



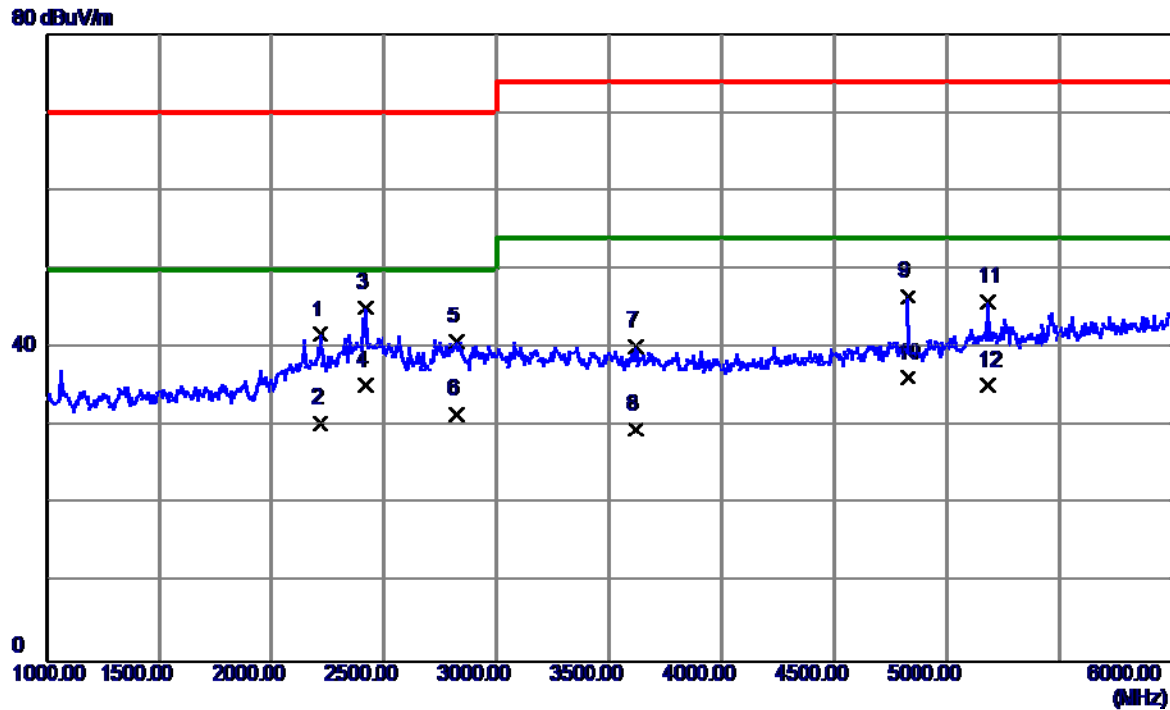
No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector
1	2290.0000	42.97	-1.51	41.46	70.00	-28.54	Peak
2	2290.0000	31.10	-1.51	29.59	50.00	-20.41	AVG
3	2415.0000	47.08	-0.89	46.19	70.00	-23.81	Peak
4 *	2415.0000	36.50	-0.89	35.61	50.00	-14.39	AVG
5	2815.0000	39.98	1.35	41.33	70.00	-28.67	Peak
6	2815.0000	30.10	1.35	31.45	50.00	-18.55	AVG
7	3450.0000	37.87	3.00	40.87	74.00	-33.13	Peak
8	3450.0000	26.31	3.00	29.31	54.00	-24.69	AVG
9	4825.0000	40.33	5.64	45.97	74.00	-28.03	Peak
10	4825.0000	30.50	5.64	36.14	54.00	-17.86	AVG
11	5190.0000	39.71	6.90	46.61	74.00	-27.39	Peak
12	5190.0000	28.30	6.90	35.20	54.00	-18.80	AVG

EUT	AC1200 Smart Dual-Band WiFi Router	Model Name	AC5
Temperature	25°C	Relative Humidity	60%
Test Voltage	AC 230V/50Hz	Polarization	Horizontal
Test Mode	FULL SYSTEM		
Test Engineer	Sam Wang		



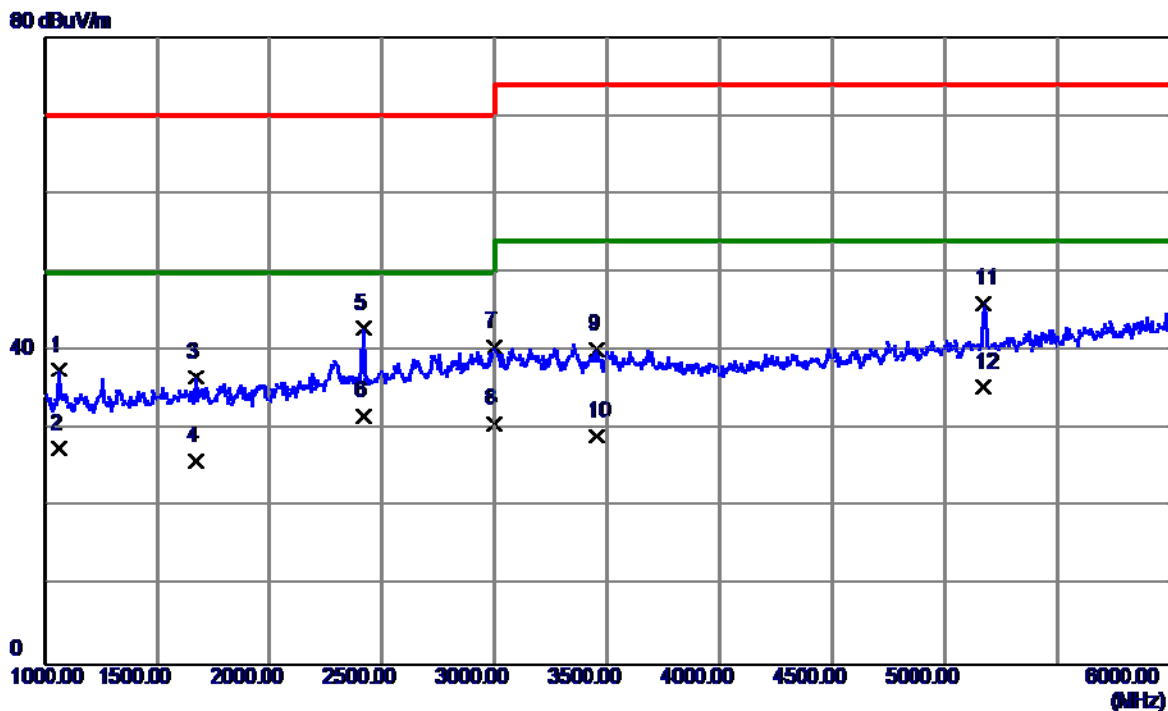
No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector
1	1065.0000	44.95	-6.71	38.24	70.00	-31.76	Peak
2	1065.0000	33.10	-6.71	26.39	50.00	-23.61	AVG
3	1970.0000	39.54	-3.08	36.46	70.00	-33.54	Peak
4	1970.0000	30.49	-3.08	27.41	50.00	-22.59	AVG
5	2295.0000	44.02	-1.49	42.53	70.00	-27.47	Peak
6	2295.0000	32.30	-1.49	30.81	50.00	-19.19	AVG
7	2410.0000	45.00	-0.91	44.09	70.00	-25.91	Peak
8 *	2410.0000	34.50	-0.91	33.59	50.00	-16.41	AVG
9	3080.0000	38.89	2.52	41.41	74.00	-32.59	Peak
10	3080.0000	28.31	2.52	30.83	54.00	-23.17	AVG
11	5180.0000	39.41	6.87	46.28	74.00	-27.72	Peak
12	5180.0000	30.09	6.87	36.96	54.00	-17.04	AVG

EUT	AC1200 Smart Dual-Band WiFi Router	Model Name	AC5
Temperature	25°C	Relative Humidity	60%
Test Voltage	AC 110V/60Hz	Polarization	Vertical
Test Mode	FULL SYSTEM		
Test Engineer	Sam Wang		



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector
1	2215.0000	43.57	-1.89	41.68	70.00	-28.32	Peak
2	2215.0000	32.30	-1.89	30.41	50.00	-19.59	AVG
3	2415.0000	46.08	-0.89	45.19	70.00	-24.81	Peak
4 *	2415.0000	36.10	-0.89	35.21	50.00	-14.79	AVG
5	2820.0000	39.37	1.38	40.75	70.00	-29.25	Peak
6	2820.0000	30.11	1.38	31.49	50.00	-18.51	AVG
7	3615.0000	37.05	3.06	40.11	74.00	-33.89	Peak
8	3615.0000	26.50	3.06	29.56	54.00	-24.44	AVG
9	4825.0000	40.86	5.64	46.50	74.00	-27.50	Peak
10	4825.0000	30.50	5.64	36.14	54.00	-17.86	AVG
11	5185.0000	38.96	6.88	45.84	74.00	-28.16	Peak
12	5185.0000	28.31	6.88	35.19	54.00	-18.81	AVG

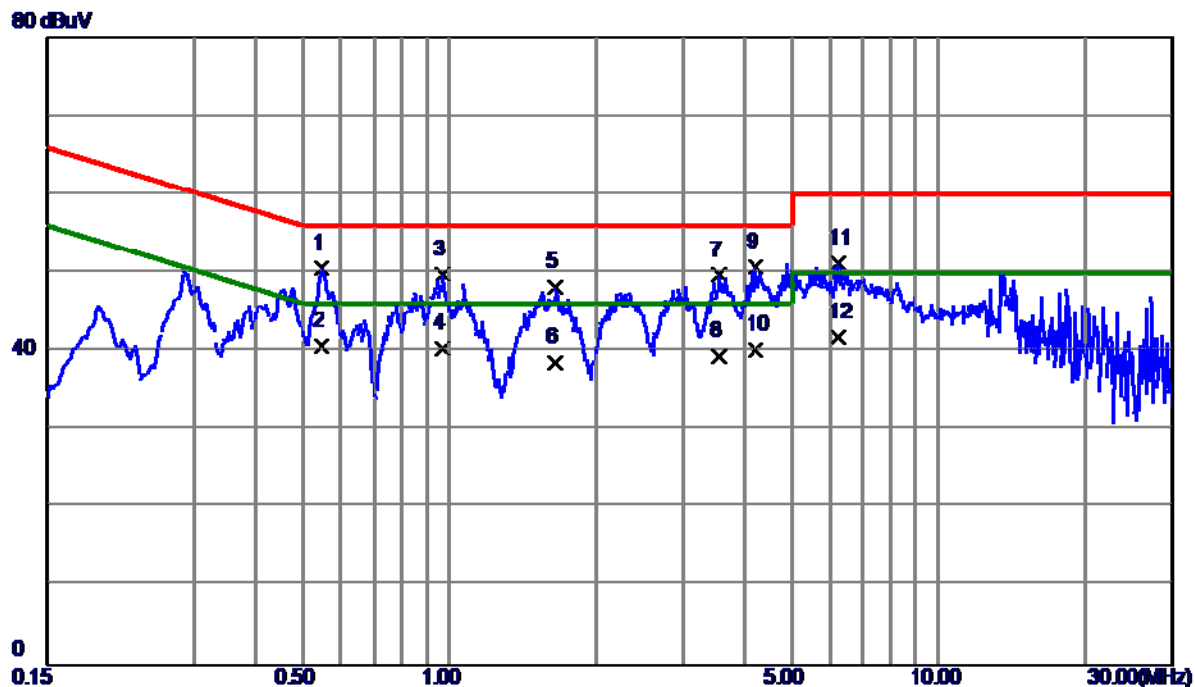
EUT	AC1200 Smart Dual-Band WiFi Router	Model Name	AC5
Temperature	25°C	Relative Humidity	60%
Test Voltage	AC 110V/60Hz	Polarization	Horizontal
Test Mode	FULL SYSTEM		
Test Engineer	Sam Wang		



No.	Freq. MHz	Reading Level dBuV/m	Correct Factor dB	Measure ment dBuV/m	Limit dBuV/m	Margin dB	Detector
1	1065.0000	44.23	-6.71	37.52	70.00	-32.48	Peak
2	1065.0000	34.30	-6.71	27.59	50.00	-22.41	AVG
3	1670.0000	40.88	-4.23	36.65	70.00	-33.35	Peak
4	1670.0000	30.10	-4.23	25.87	50.00	-24.13	AVG
5	2415.0000	43.83	-0.89	42.94	70.00	-27.06	Peak
6 *	2415.0000	32.50	-0.89	31.61	50.00	-18.39	AVG
7	3000.0000	38.09	2.42	40.51	70.00	-29.49	Peak
8	3000.0000	28.30	2.42	30.72	50.00	-19.28	AVG
9	3455.0000	37.14	3.01	40.15	74.00	-33.85	Peak
10	3455.0000	26.10	3.01	29.11	54.00	-24.89	AVG
11	5175.0000	39.28	6.85	46.13	74.00	-27.87	Peak
12	5175.0000	28.49	6.85	35.34	54.00	-18.66	AVG

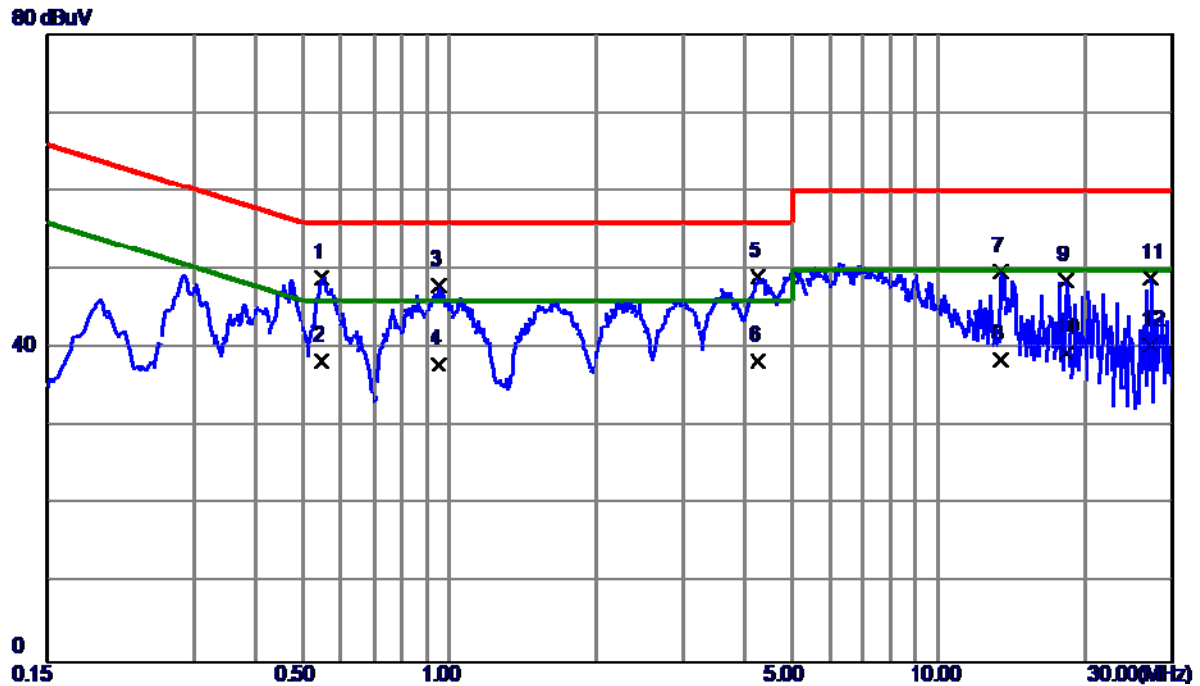
## ATTACHMENT C - CONDUCTED EMISSION AT AC MAINS POWER PORT

EUT	AC1200 Smart Dual-Band WiFi Router	Model Name	AC5
Temperature	25°C	Relative Humidity	53%
Test Voltage	AC 230V/50Hz	Phase	Line
Test Mode	FULL SYSTEM		
Test Engineer	Sam Wang		



No.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure ment dBuV	Limit dBuV	Margin dB	Detector
1	0.5482	40.77	9.74	50.51	56.00	-5.49	QP
2	0.5482	30.85	9.74	40.59	46.00	-5.41	AVG
3	0.9712	40.02	9.77	49.79	56.00	-6.21	QP
4	0.9712	30.58	9.77	40.35	46.00	-5.65	AVG
5	1.6508	38.28	9.82	48.10	56.00	-7.90	QP
6	1.6508	28.70	9.82	38.52	46.00	-7.48	AVG
7	3.5678	39.74	9.94	49.68	56.00	-6.32	QP
8	3.5678	29.45	9.94	39.39	46.00	-6.61	AVG
9 *	4.2338	40.74	9.98	50.72	56.00	-5.28	QP
10	4.2338	30.24	9.98	40.22	46.00	-5.78	AVG
11	6.2183	41.15	10.11	51.26	60.00	-8.74	QP
12	6.2183	31.69	10.11	41.80	50.00	-8.20	AVG

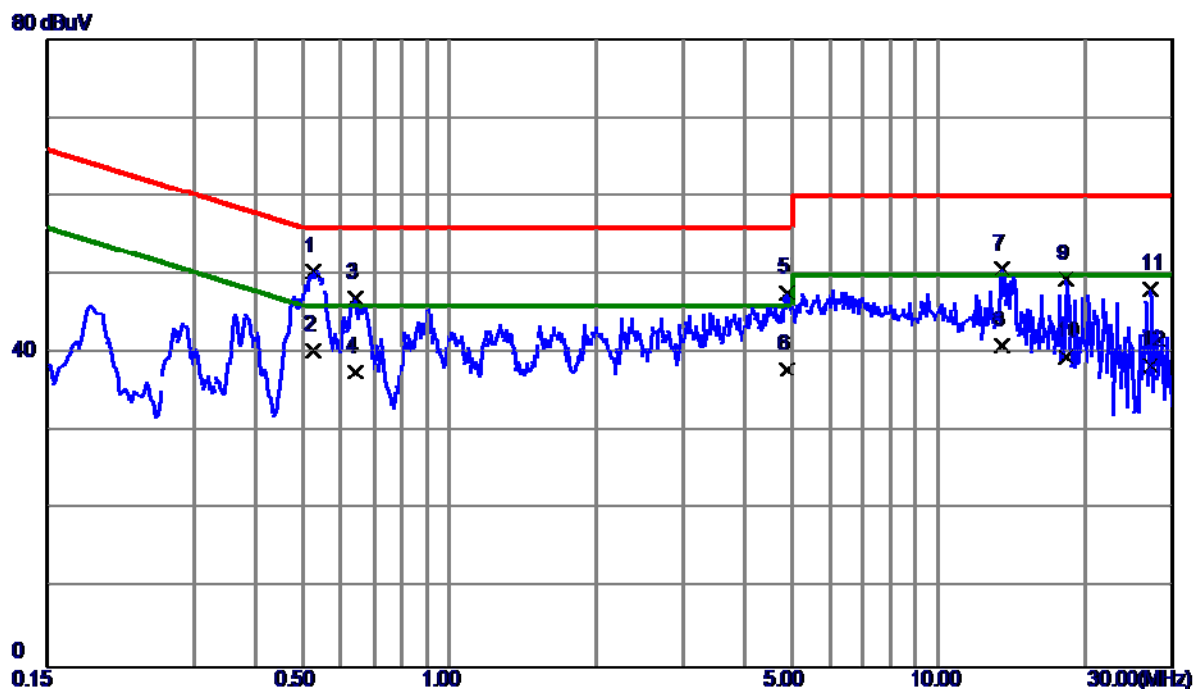
EUT	AC1200 Smart Dual-Band WiFi Router	Model Name	AC5
Temperature	25°C	Relative Humidity	53%
Test Voltage	AC 230V/50Hz	Phase	Neutral
Test Mode	FULL SYSTEM		
Test Engineer	Sam Wang		



No.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure ment dBuV	Limit dBuV	Margin dB	Detector
1	0.5482	39.28	9.72	49.00	56.00	-7.00	QP
2	0.5482	28.69	9.72	38.41	46.00	-7.59	AVG
3	0.9532	38.32	9.75	48.07	56.00	-7.93	QP
4	0.9532	28.11	9.75	37.86	46.00	-8.14	AVG
5 *	4.2697	39.10	9.99	49.09	56.00	-6.91	QP
6	4.2697	28.36	9.99	38.35	46.00	-7.65	AVG
7	13.4182	39.21	10.49	49.70	60.00	-10.30	QP
8	13.4182	28.06	10.49	38.55	50.00	-11.45	AVG
9	18.2422	37.94	10.73	48.67	60.00	-11.33	QP
10	18.2422	28.68	10.73	39.41	50.00	-10.59	AVG
11	27.1590	37.71	11.21	48.92	60.00	-11.08	QP
12	27.1590	29.13	11.21	40.34	50.00	-9.66	AVG

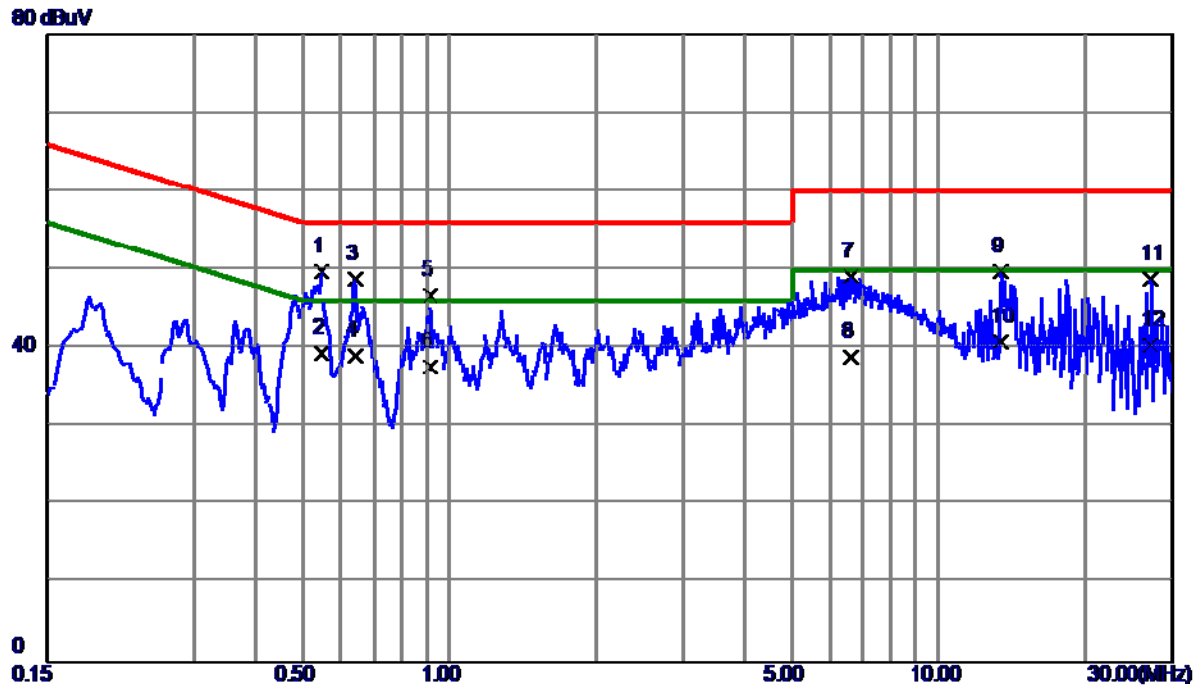


EUT	AC1200 Smart Dual-Band WiFi Router	Model Name	AC5
Temperature	25°C	Relative Humidity	53%
Test Voltage	AC 110V/60Hz	Phase	Line
Test Mode	FULL SYSTEM		
Test Engineer	Sam Wang		



No.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure ment dBuV	Limit dBuV	Margin dB	Detector
1 *	0.5257	40.74	9.74	50.48	56.00	-5.52	QP
2	0.5257	30.65	9.74	40.39	46.00	-5.61	AVG
3	0.6405	37.24	9.74	46.98	56.00	-9.02	QP
4	0.6405	27.89	9.74	37.63	46.00	-8.37	AVG
5	4.8863	37.58	10.03	47.61	56.00	-8.39	QP
6	4.8863	27.96	10.03	37.99	46.00	-8.01	AVG
7	13.4790	40.39	10.41	50.80	60.00	-9.20	QP
8	13.4790	30.59	10.41	41.00	50.00	-9.00	AVG
9	18.2423	38.83	10.59	49.42	60.00	-10.58	QP
10	18.2423	28.98	10.59	39.57	50.00	-10.43	AVG
11	27.1590	37.18	10.98	48.16	60.00	-11.84	QP
12	27.1590	27.35	10.98	38.33	50.00	-11.67	AVG

EUT	AC1200 Smart Dual-Band WiFi Router	Model Name	AC5
Temperature	25°C	Relative Humidity	53%
Test Voltage	AC 110V/60Hz	Phase	Neutral
Test Mode	FULL SYSTEM		
Test Engineer	Sam Wang		

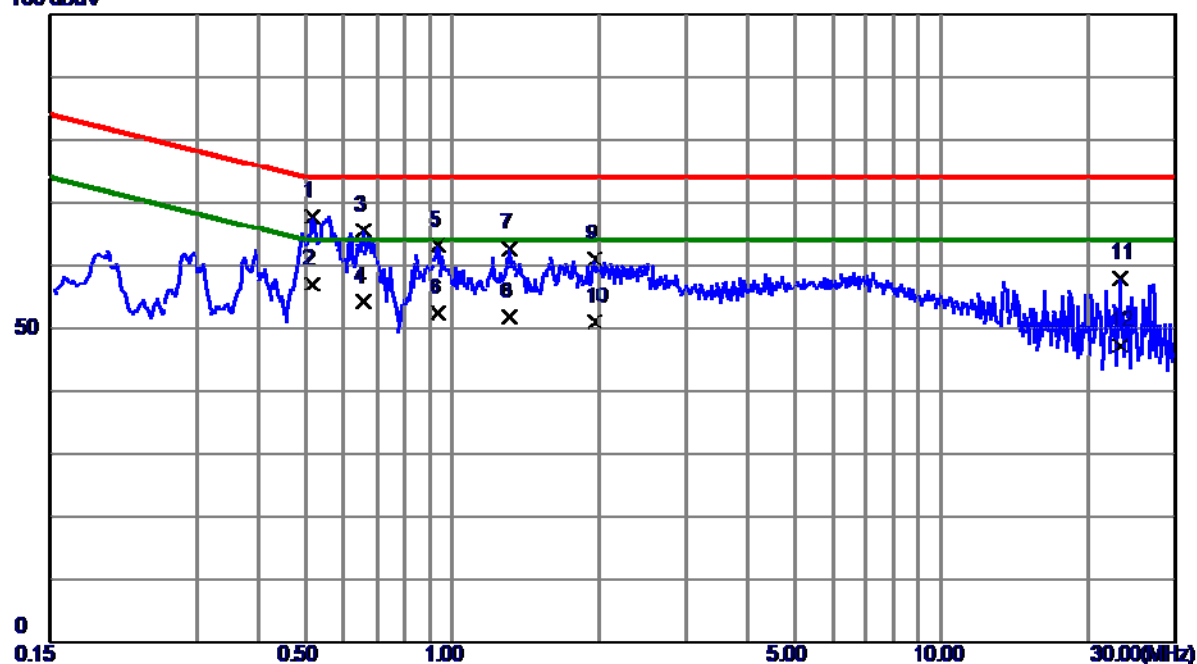


No.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure ment dBuV	Limit dBuV	Margin dB	Detector
1 *	0.5482	39.99	9.72	49.71	56.00	-6.29	QP
2	0.5482	29.65	9.72	39.37	46.00	-6.63	AVG
3	0.6405	39.02	9.73	48.75	56.00	-7.25	QP
4	0.6405	29.34	9.73	39.07	46.00	-6.93	AVG
5	0.9150	37.01	9.74	46.75	56.00	-9.25	QP
6	0.9150	27.86	9.74	37.60	46.00	-8.40	AVG
7	6.6053	38.97	10.15	49.12	60.00	-10.88	QP
8	6.6053	28.66	10.15	38.81	50.00	-11.19	AVG
9	13.4183	39.27	10.49	49.76	60.00	-10.24	QP
10	13.4183	30.36	10.49	40.85	50.00	-9.15	AVG
11	27.1590	37.55	11.21	48.76	60.00	-11.24	QP
12	27.1590	29.13	11.21	40.34	50.00	-9.66	AVG

## ATTACHMENT D - CONDUCTED EMISSION AT WIRED NETWORK PORT

EUT	AC1200 Smart Dual-Band WiFi Router	Model Name	AC5
Temperature	25°C	Relative Humidity	53%
Test Voltage	AC 230V/50Hz		
Test Mode	WAN 100Mbps		
Test Engineer	Sam Wang		

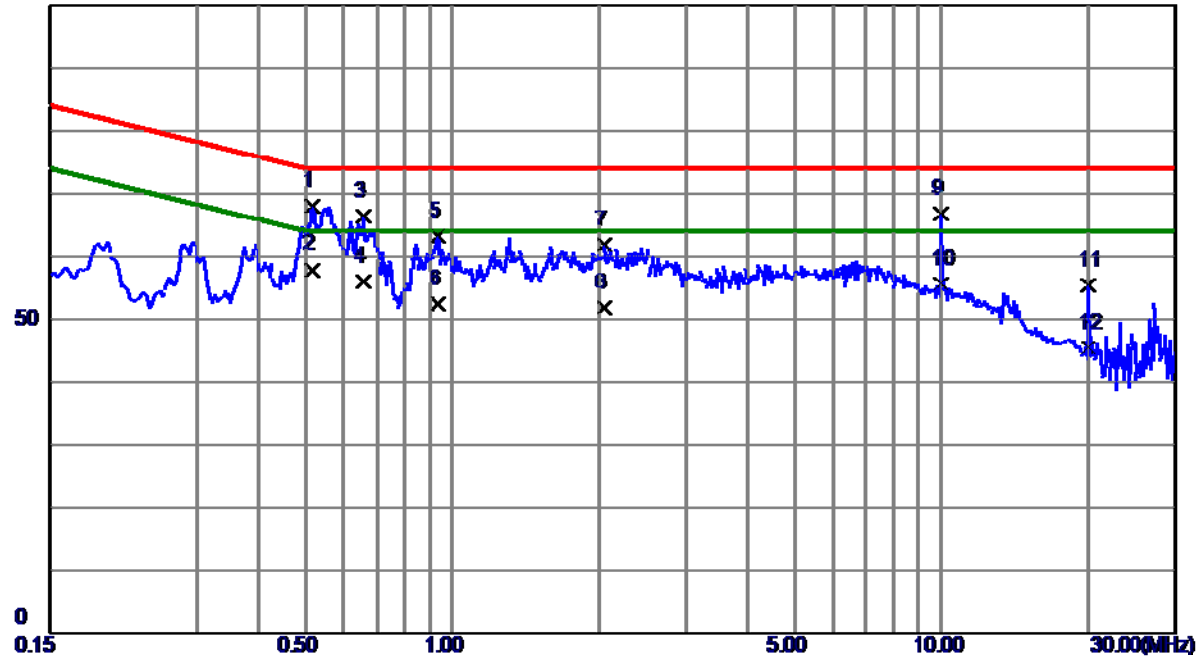
100 dBuV



No.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure ment dBuV	Limit dBuV	Margin dB	Detector
1 *	0.5167	58.00	9.76	67.76	74.00	-6.24	QP
2	0.5167	47.15	9.76	56.91	64.00	-7.09	AVG
3	0.6561	55.88	9.75	65.63	74.00	-8.37	QP
4	0.6561	44.37	9.75	54.12	64.00	-9.88	AVG
5	0.9352	53.52	9.73	63.25	74.00	-10.75	QP
6	0.9352	42.69	9.73	52.42	64.00	-11.58	AVG
7	1.3110	52.97	9.73	62.70	74.00	-11.30	QP
8	1.3110	42.10	9.73	51.83	64.00	-12.17	AVG
9	1.9500	51.33	9.74	61.07	74.00	-12.93	QP
10	1.9500	41.21	9.74	50.95	64.00	-13.05	AVG
11	23.1293	47.68	10.32	58.00	74.00	-16.00	QP
12	23.1293	36.97	10.32	47.29	64.00	-16.71	AVG

EUT	AC1200 Smart Dual-Band WiFi Router	Model Name	AC5
Temperature	25°C	Relative Humidity	53%
Test Voltage	AC 230V/50Hz		
Test Mode	WAN 10Mbps		
Test Engineer	Sam Wang		

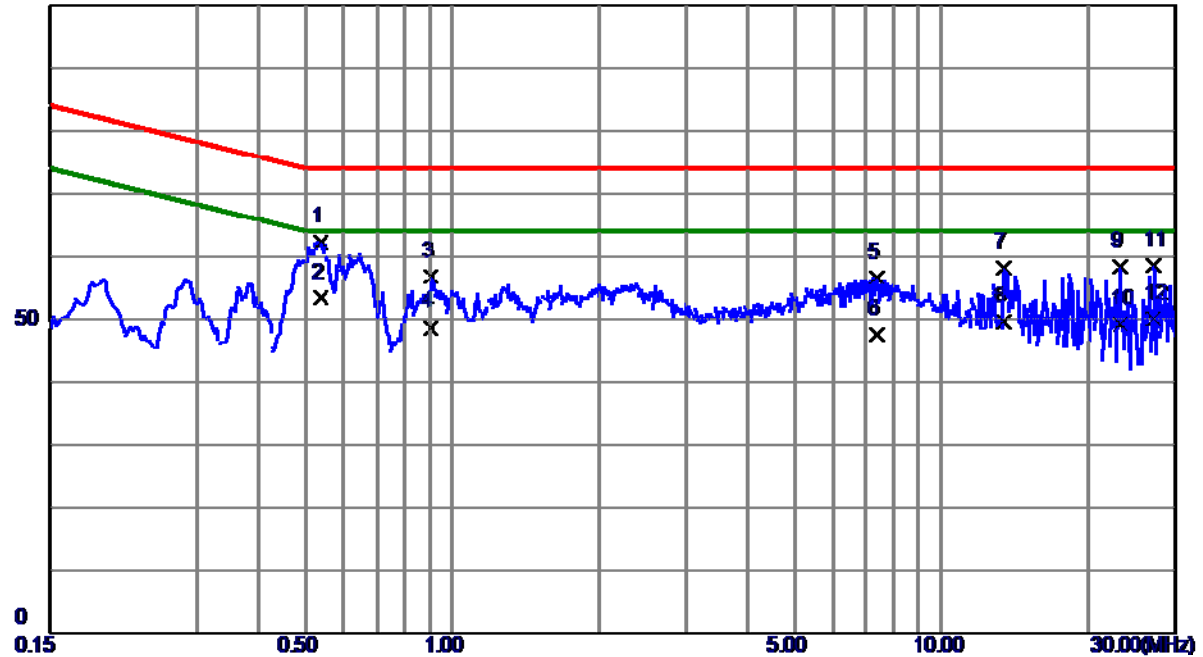
100 dBuV



No.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure ment dBuV	Limit dBuV	Margin dB	Detector
1 *	0.5167	58.25	9.76	68.01	74.00	-5.99	QP
2	0.5167	48.14	9.76	57.90	64.00	-6.10	AVG
3	0.6561	56.56	9.75	66.31	74.00	-7.69	QP
4	0.6561	46.34	9.75	56.09	64.00	-7.91	AVG
5	0.9375	53.47	9.73	63.20	74.00	-10.80	QP
6	0.9375	42.69	9.73	52.42	64.00	-11.58	AVG
7	2.0490	52.01	9.74	61.75	74.00	-12.25	QP
8	2.0490	42.14	9.74	51.88	64.00	-12.12	AVG
9	10.0000	56.80	9.99	66.79	74.00	-7.21	QP
10	10.0000	45.66	9.99	55.65	64.00	-8.35	AVG
11	20.0018	45.22	10.23	55.45	74.00	-18.55	QP
12	20.0018	35.14	10.23	45.37	64.00	-18.63	AVG

EUT	AC1200 Smart Dual-Band WiFi Router	Model Name	AC5
Temperature	25°C	Relative Humidity	53%
Test Voltage	AC 230V/50Hz		
Test Mode	LAN 100Mbps		
Test Engineer	Sam Wang		

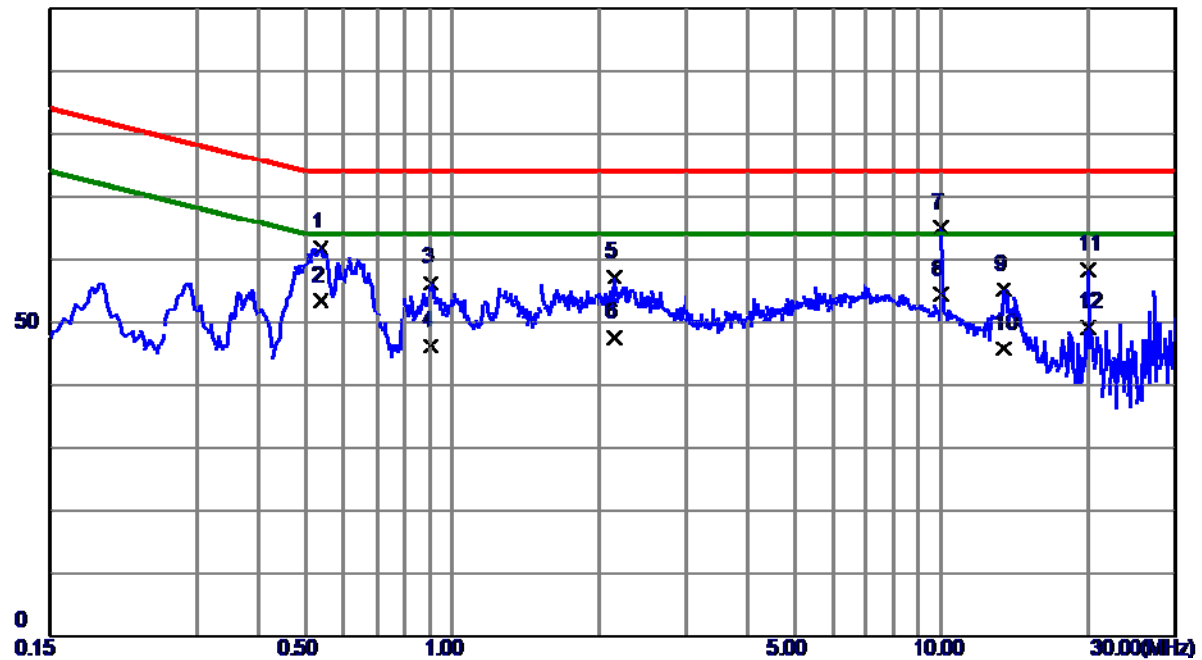
100 dBuV



No.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure ment dBuV	Limit dBuV	Margin dB	Detector
1	0.5370	52.54	9.76	62.30	74.00	-11.70	QP
2 *	0.5370	43.68	9.76	53.44	64.00	-10.56	AVG
3	0.9014	47.08	9.73	56.81	74.00	-17.19	QP
4	0.9014	38.97	9.73	48.70	64.00	-15.30	AVG
5	7.3747	46.73	9.91	56.64	74.00	-17.36	QP
6	7.3747	37.66	9.91	47.57	64.00	-16.43	AVG
7	13.4182	48.15	10.06	58.21	74.00	-15.79	QP
8	13.4182	39.45	10.06	49.51	64.00	-14.49	AVG
9	23.1292	48.08	10.32	58.40	74.00	-15.60	QP
10	23.1292	38.95	10.32	49.27	64.00	-14.73	AVG
11	27.1590	48.14	10.43	58.57	74.00	-15.43	QP
12	27.1590	39.52	10.43	49.95	64.00	-14.05	AVG

EUT	AC1200 Smart Dual-Band WiFi Router	Model Name	AC5
Temperature	25°C	Relative Humidity	53%
Test Voltage	AC 230V/50Hz		
Test Mode	LAN 10Mbps		
Test Engineer	Sam Wang		

100 dBuV



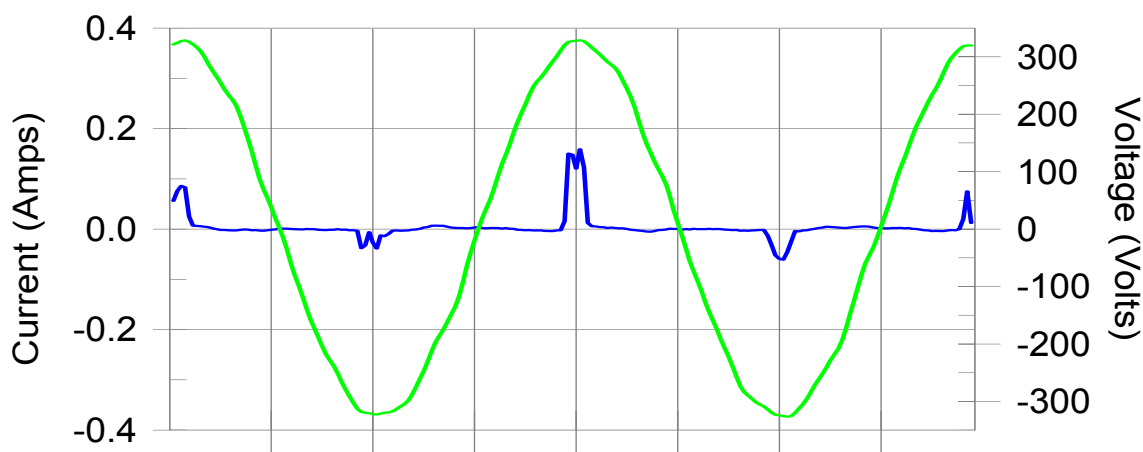
No.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure ment dBuV	Limit dBuV	Margin dB	Detector
1	0.5392	52.14	9.76	61.90	74.00	-12.10	QP
2	0.5392	43.57	9.76	53.33	64.00	-10.67	AVG
3	0.9014	46.57	9.73	56.30	74.00	-17.70	QP
4	0.9014	36.56	9.73	46.29	64.00	-17.71	AVG
5	2.1435	47.38	9.74	57.12	74.00	-16.88	QP
6	2.1435	37.90	9.74	47.64	64.00	-16.36	AVG
7 *	10.0004	55.04	9.99	65.03	74.00	-8.97	QP
8	10.0004	44.36	9.99	54.35	64.00	-9.65	AVG
9	13.4182	45.14	10.06	55.20	74.00	-18.80	QP
10	13.4182	35.69	10.06	45.75	64.00	-18.25	AVG
11	19.9995	48.17	10.23	58.40	74.00	-15.60	QP
12	19.9995	38.94	10.23	49.17	64.00	-14.83	AVG

## ATTACHMENT E - HARMONIC CURRENT EMISSION

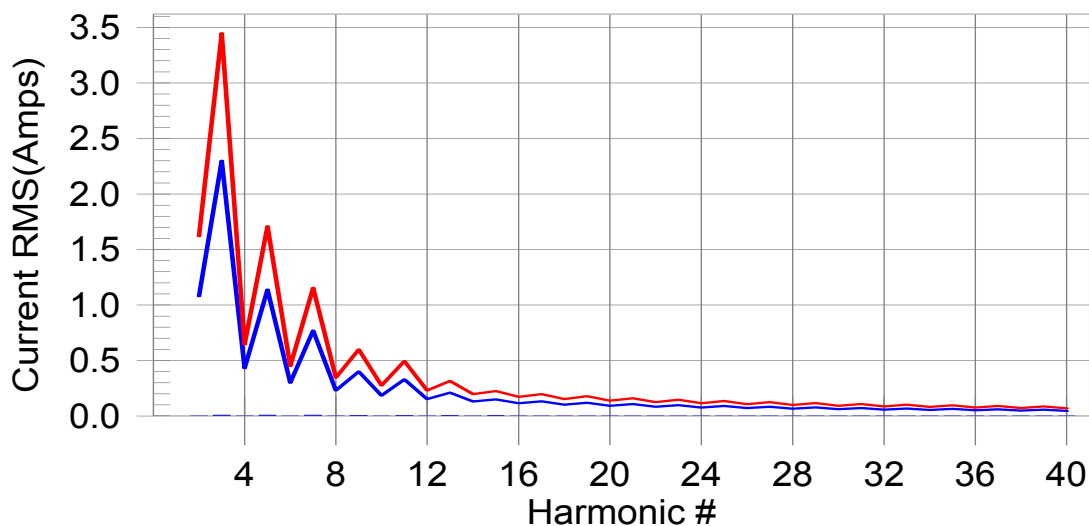


Harmonic - Class A			
EUT	AC1200 Smart Dual-Band WiFi Router	Model Name	AC5
Temperature	25°C	Relative Humidity	55%
Test Voltage	AC 230V/50Hz		
Test Mode	FULL SYSTEM		

Current & voltage waveforms



Harmonics and Class A limit line European Limits



Test result: Pass Worst harmonic was #9 with 1.2% of the limit.

Current Test Result Summary (Run time)			
EUT	AC1200 Smart Dual-Band WiFi Router	Model Name	AC5
Temperature	25°C	Relative Humidity	55%
Test Voltage	AC 230V/50Hz		
Test Mode	FULL SYSTEM		

Highest parameter values during test:

V\_RMS (Volts): 230.03

I\_Peak (Amps): 0.286

I\_Fund (Amps): 0.012

Power (Watts): 2.7

Frequency(Hz): 50.00

I\_RMS (Amps): 0.031

Crest Factor: 10.836

Power Factor: 0.392

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	1.080	N/A	0.001	1.620	N/A	Pass
3	0.009	2.300	0.4	0.011	3.450	0.3	Pass
4	0.001	0.430	N/A	0.002	0.645	N/A	Pass
5	0.008	1.140	0.7	0.010	1.710	0.6	Pass
6	0.001	0.300	N/A	0.001	0.450	N/A	Pass
7	0.007	0.770	0.9	0.008	1.155	0.7	Pass
8	0.001	0.230	N/A	0.001	0.345	N/A	Pass
9	0.006	0.400	1.5	0.007	0.600	1.2	Pass
10	0.001	0.184	N/A	0.001	0.276	N/A	Pass
11	0.005	0.330	1.5	0.006	0.495	1.1	Pass
12	0.001	0.153	N/A	0.001	0.230	N/A	Pass
13	0.004	0.210	N/A	0.004	0.315	N/A	Pass
14	0.000	0.131	N/A	0.001	0.197	N/A	Pass
15	0.003	0.150	N/A	0.003	0.225	N/A	Pass
16	0.000	0.115	N/A	0.000	0.173	N/A	Pass
17	0.002	0.132	N/A	0.002	0.198	N/A	Pass
18	0.000	0.102	N/A	0.000	0.153	N/A	Pass
19	0.001	0.118	N/A	0.001	0.178	N/A	Pass
20	0.000	0.092	N/A	0.000	0.138	N/A	Pass
21	0.001	0.107	N/A	0.001	0.161	N/A	Pass
22	0.000	0.084	N/A	0.000	0.125	N/A	Pass
23	0.000	0.098	N/A	0.001	0.147	N/A	Pass
24	0.000	0.077	N/A	0.000	0.115	N/A	Pass
25	0.000	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	0.000	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	0.000	0.078	N/A	0.000	0.116	N/A	Pass
30	0.000	0.061	N/A	0.000	0.092	N/A	Pass
31	0.000	0.073	N/A	0.000	0.109	N/A	Pass
32	0.000	0.058	N/A	0.000	0.086	N/A	Pass
33	0.000	0.068	N/A	0.000	0.102	N/A	Pass
34	0.000	0.054	N/A	0.000	0.081	N/A	Pass
35	0.000	0.064	N/A	0.000	0.096	N/A	Pass
36	0.000	0.051	N/A	0.000	0.077	N/A	Pass
37	0.000	0.061	N/A	0.000	0.091	N/A	Pass
38	0.000	0.048	N/A	0.000	0.073	N/A	Pass
39	0.000	0.058	N/A	0.000	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 Smart Dual-Band WiFi Router	Model Name	AC5
Temperature	25°C	Relative Humidity	55%
Test Voltage	AC 230V/50Hz		
Test Mode	FULL SYSTEM		

Highest parameter values during test:

Voltage (Vrms):230.03

Frequency(Hz): 50.00

I<sub>Peak</sub> (Amps):0.286

I<sub>RMS</sub> (Amps): 0.031

I<sub>Fund</sub> (Amps):0.012

Crest Factor: 10.836

Power (Watts): 2.7

Power Factor: 0.392

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.174	0.460	37.75	OK
3	0.178	2.070	8.60	OK
4	0.156	0.460	33.81	OK
5	0.209	0.920	22.72	OK
6	0.160	0.460	34.88	OK
7	0.172	0.690	24.94	OK
8	0.417	0.460	90.65	OK
9	0.256	0.460	55.68	OK
10	0.151	0.460	32.81	OK
11	0.146	0.230	63.36	OK
12	0.148	0.230	64.24	OK
13	0.127	0.230	55.06	OK
14	0.091	0.230	39.44	OK
15	0.070	0.230	30.48	OK
16	0.055	0.230	24.10	OK
17	0.057	0.230	24.86	OK
18	0.044	0.230	19.23	OK
19	0.040	0.230	17.28	OK
20	0.037	0.230	16.13	OK
21	0.028	0.230	11.99	OK
22	0.027	0.230	11.85	OK
23	0.030	0.230	13.21	OK
24	0.030	0.230	13.00	OK
25	0.025	0.230	10.91	OK
26	0.023	0.230	10.19	OK
27	0.022	0.230	9.58	OK
28	0.023	0.230	9.82	OK
29	0.019	0.230	8.43	OK
30	0.019	0.230	8.45	OK
31	0.019	0.230	8.18	OK
32	0.018	0.230	8.02	OK
33	0.018	0.230	7.94	OK
34	0.016	0.230	7.16	OK
35	0.016	0.230	7.15	OK
36	0.015	0.230	6.67	OK
37	0.016	0.230	6.94	OK
38	0.015	0.230	6.56	OK
39	0.015	0.230	6.52	OK
40	0.014	0.230	6.21	OK

## ATTACHMENT F - VOLTAGE FLUCTUATIONS AND FLICKER

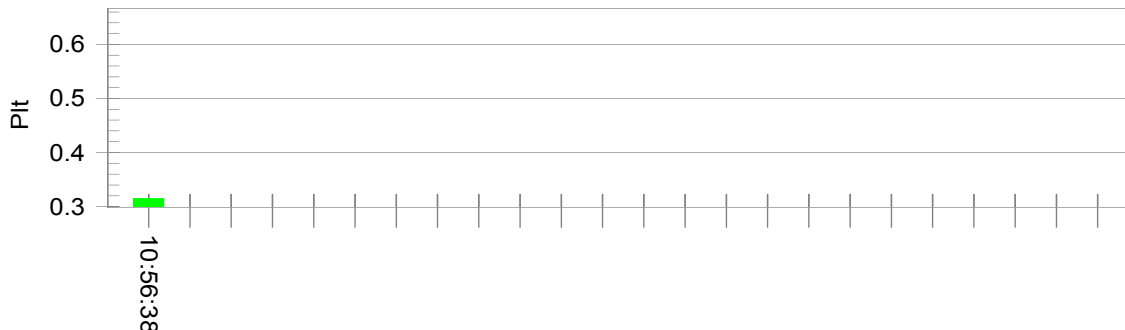
EUT	AC1200 Smart Dual-Band WiFi Router	Model Name	AC5
Temperature	25°C	Relative Humidity	55%
Test Voltage	AC 230V/50Hz		
Test Mode	FULL SYSTEM		

Psti and limit line

European Limits



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt):230.13

Highest dt (%): 0.74

T-max (mS): 0

Highest dc (%): 0.52

Highest dmax (%): -0.78

Highest Pst (10 min. period): 0.721

Highest Plt (2 hr. period): 0.315

Test limit (%): N/A N/A

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

## 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	B	B	-	-	-	-	-	-	-	-
4	A	A	A	A	A	A	-	-	-	-	-	-	-	-
5	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					

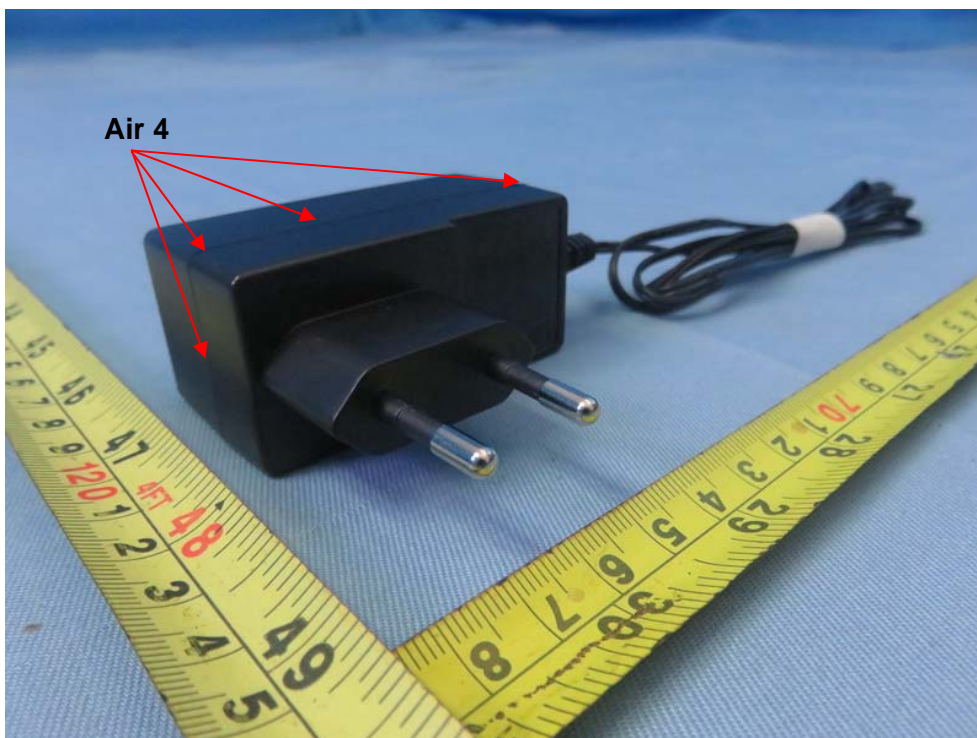
Note:

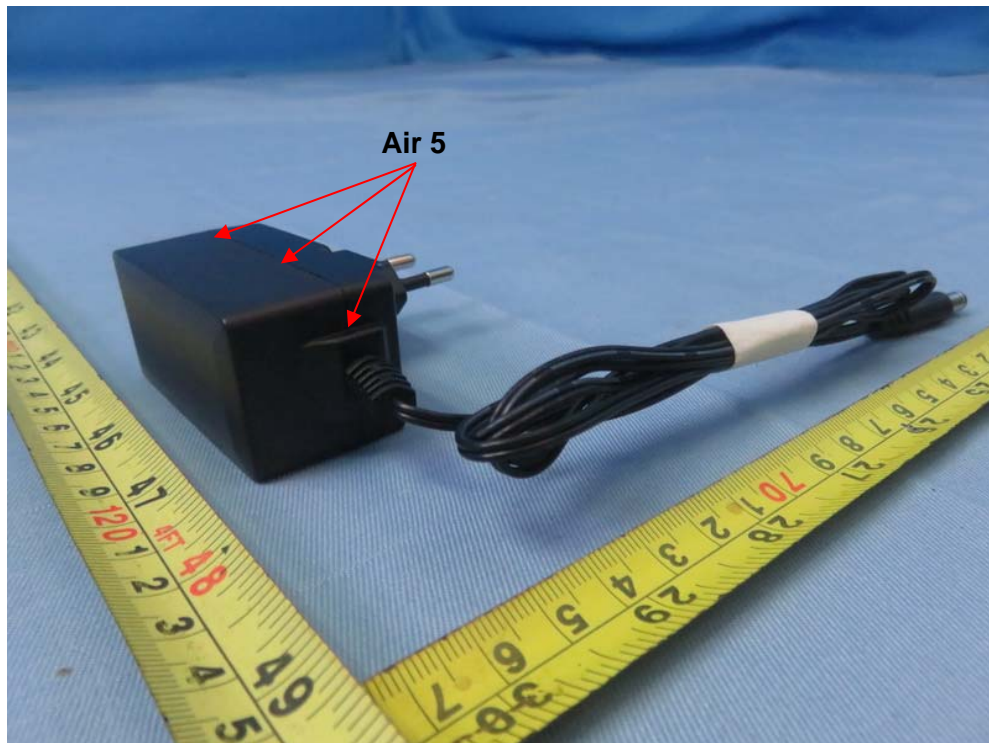
- 1) P/N denotes the Positive/Negative polarity of the output voltage.
- 2) Test condition:  
Direct/Indirect(HCP/VCP) discharges: Minimum 50 times (Positive/Negative) at eachpoint.  
Air discharges: Minimum 20 times (Positive/Negative) at each point.
- 3) Test location(s) in which discharge (Air and 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









## 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 1 kV	Criterion	Result	Judgment
AC Power Port	Line (L)	+	5 kHz	A	B	A	PASS
		-	5 kHz	A			
	Neutral (N)	+	5 kHz	A	B	A	PASS
		-	5 kHz	A			
	Ground (PE)	+	5 kHz	N/A	B	N/A	N/A
		-	5 kHz	N/A			

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

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/Th $\mu$ s						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		10/700(5/320)Ti/Th us					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
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.