EN 55032:2015

EN 55024:2010 + A1:2015

EN 61000-3-2:2014

EN 61000-3-3:2013

TEST REPORT

For

SHENZHEN TENDA TECHNOLOGY CO.,LTD.

6-8 Floor, Tower E3, No. 1001, Zhongshanyuan Road, Nanshan District, Shenzhen, China. 518052

Model: AC10

Report Type: Original Report	**Product Type:** AC1200 MU-MIMO Dual Band Gigabit WiFi Router
Report Number:	RDG171102009-01
Report Date:	2017-11-22
Reviewed By:	Jerry Zhang EMC Manager Jerry Zhang
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:		AC1200 MU-MIMO Dual Band Gigabit WiFi Router
EUT Model:		AC10
Multiple Models:		N/A
Rated Input Voltage:		DC 12V from adapter
Nominal Adapter Information	**Model:**	BN036-A1202E
	Input:	100-240V~50/60Hz 0.4A
	Output:	12V,1.0A
External Dimension:		Length (27.3cm)*Width (16.2cm)*High (5.9cm) Length (27.3cm)*Width (16.2cm)*High (22.3cm) with Antenna
Serial Number:		171102009
EUT Received Date:		2017.11.03

Objective

This report is prepared on behalf of *SHENZHEN TENDA TECHNOLOGY CO.,LTD.* in accordance with EN 55032:2015 Electromagnetic compatibility of multimedia equipment — Emission Requirements; EN 55024:2010 + A1:2015 Information technology equipment — Immunity characteristics — Limits and methods of measurement; EN 61000-3-2:2014 Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤ 16 A per phase); EN 61000-3-3:2013 Electromagnetic compatibility (EMC)Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection.

The objective is to determine the compliance of EUT with:
EN 55032:2015
EN 55024:2010 + A1:2015
EN 61000-3-2:2014
EN 61000-3-3:2013.

Test Methodology

All measurements contained in this report were conducted with EN 55032:2015 Electromagnetic compatibility of multimedia equipment — Emission Requirements; EN 55024: 2010 + A1:2015 Information technology equipment — Immunity characteristics — Limits and methods of measurement; EN 61000-3-2:2014 Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤ 16 A per phase); EN 61000-3-3:2013 Electromagnetic compatibility (EMC)Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection..

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

Bay Area Compliance Laboratories Corp. (Dongguan) has been accredited to ISO/IEC 17025 by CNAS(Lab code: L5662). And accredited to ISO/IEC 17025 by NVLAP(Test Laboratory Accreditation Certificate Number 500069-0), the FCC Designation No. CN5002 under the KDB 974614 D01.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Bay Area Compliance Laboratories Corp. (Dongguan) was registered with ISED Canada under ISED Canada Registration Number 3062D.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in Operating mode.

Equipment Modifications

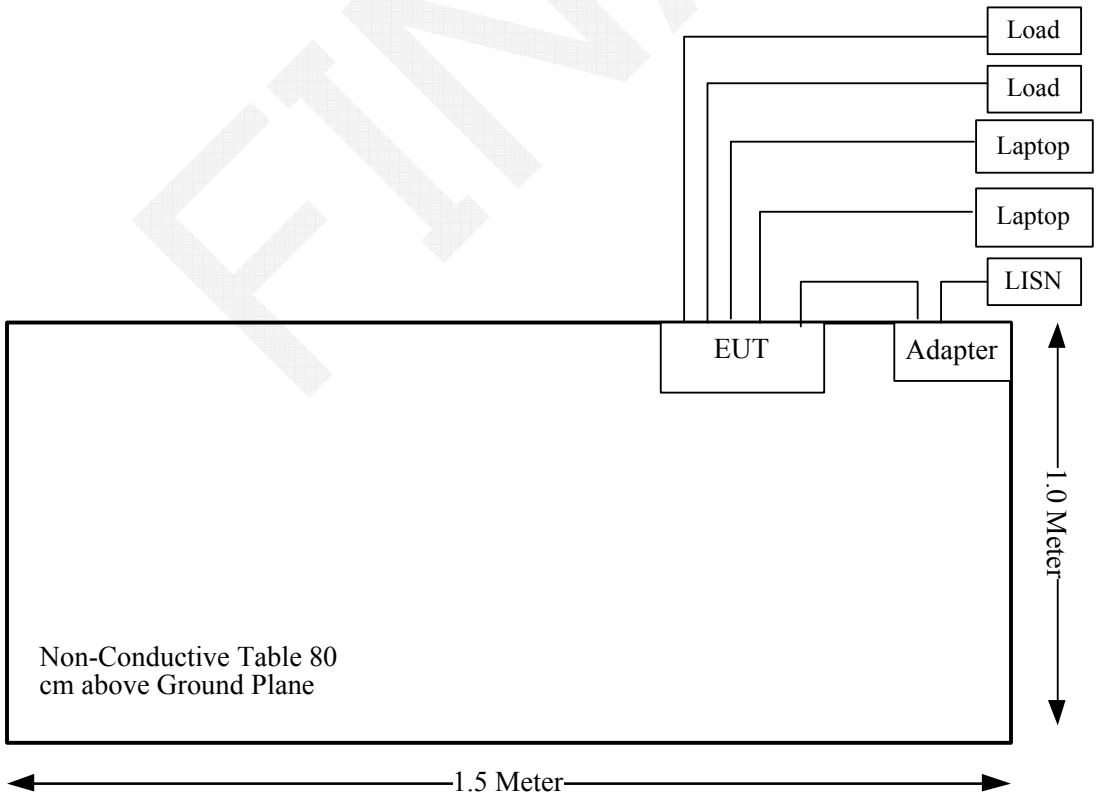
No modification was made to the EUT.

EUT Exercise Software

The EUT exercise software "Lan test.exe" was used for testing.

Test Mode	Mode Description	Test Software
Ping	Link with Wireless Router	Lan test.exe

Block Diagram of Test Setup



Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	Laptop	PP11L	QDS-BRCM1017
DELL	Laptop	PP11L	1CVM0C1

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
RJ45 Cable*2	Yes	No	5.0	RJ45 Port of EUT	Laptop
RJ45 Cable*2	Yes	No	5.0	RJ45 Port of EUT	Load

Test Equipment List

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCS 30	830245/006	2016/12/8	2017/12/8
R&S	L.I.S.N	ESH2-Z5	892107/021	2017/9/25	2018/9/25
R&S	Two-line V-network	ENV 216	3560.6550.12	2016/12/8	2017/12/8
TESEQ	ISN	T8	34379	2017/5/4	2018/5/4
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A
R&S	EMI Test Receiver	ESCI	100035	2017/7/28	2018/7/28
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
HP	Amplifier	8447F	2443A01912	2017/9/5	2018/9/5
HP	Amplifier	8447D	2727A05902	2017/9/5	2018/9/5
Agilent	Spectrum Analyzer	E4440A	SG43360054	2016/12/8	2017/12/8
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016/1/5	2019/1/4
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2017/9/5	2018/9/5
N/A	Coaxial Cable	C-SJSJ-50	C-0800-01	2017/9/5	2018/9/5
EM TEST	Harmonic & Flicker Analyzer	DPA 500	303278	2016/12/8	2017/12/8
ELGAR	AC Power Source	1751SX	5611	2017/9/25	2018/9/25
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Tektronix	Digital Phosphor Oscilloscope	TDS 3054	B015264	2017/7/18	2018/7/18
SCHAFFNER	ESD Tester	NSG435	005 101	2017/7/10	2018/7/10
HP	Signal Generator	8665B	3438A00584	2017/7/18	2018/7/18
AR	Power Amplifier	100W1000M1	13410	N/A	N/A
AR	Power Amplifier	60S1G6	348711	N/A	N/A
Sunol Sciences	Antenna	JB3	A060611-2	2017/8/25	2020/8/25
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016/1/5	2019/1/4
EM TEST	Auto Transformer	MV2616	0403-16	N/A	N/A
EM TEST	Ultra Compact Generator	UCS500-M6	V6016101357	2016/12/8	2017/12/8
EM TEST	EFT Clamp	N/A	300886	2016/12/8	2017/12/8
EM TEST	EM Test Coupling/Decoupling Network	CNV508 S1	311137	2017/8/31	2018/8/31
EM TEST	Current Transformer	MC2630	301873	N/A	N/A
EM Test	Loop Antenna	MS100	303298	N/A	N/A
PAOFN	Transformer	N/A	N/A	N/A	N/A
HP	Signal Generator	8648A	3246A00831	2016/12/8	2017/12/8
NARDA	Attenuator	769-6	2754	N/A	N/A
COM-POWER	CDN	M325E	521064	2016/12/8	2017/12/8

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Environmental Conditions

Temperature:	24.7~27.4 °C
Relative Humidity:	31~52 %*
ATM Pressure:	100.9~101.6 kPa
Tester:	Rick Chen
Test Date:	2017.11.07-2017.11.10

Note:
*ESD test environment relative humidity is 49%

SUMARY OF TEST RESULTS

SN	Rule and Clause	Descrption of Test	Test Result
1	EN 55032 Clause A.3	Conducted emissions	Compliance
2	EN 55032 Clause A.2	Radiated emissions	Compliance
3	EN 55024 Clause 4.2.1	Electrostatic discharges IEC 61000-4-2	Compliance
4	EN 55024 Clause 4.2.2	Electrical fast transients IEC 61000-4-4	Compliance
5	EN 55024 Clause 4.2.3.2	Continuous radiated disturbances IEC 61000-4-3	Compliance
6	EN 55024 Clause 4.2.3.3	Continuous conducted disturbances IEC 61000-4-6	Compliance
7	EN 55024 Clause 4.2.4	Power frequency magnetic fields IEC 61000-4-8	Compliance
8	EN 55024 Clause 4.2.5	Surges IEC 61000-4-5	Compliance
9	EN 55024 Clause 4.2.6	Voltage dips and short interruptions IEC 61000-4-11	Compliance
10	EN 61000-3-2	Harmonic current emissions	Not applicable*
11	EN 61000-3-3	Voltage fluctuations and flicker	Compliance

Note:
Not applicable*: EUT power is less than 75 w.

1 - CONDUCTED EMISSIONS

Measurement Uncertainty

Compliance or non- compliance with a disturbance limit shall be determined in the following manner:

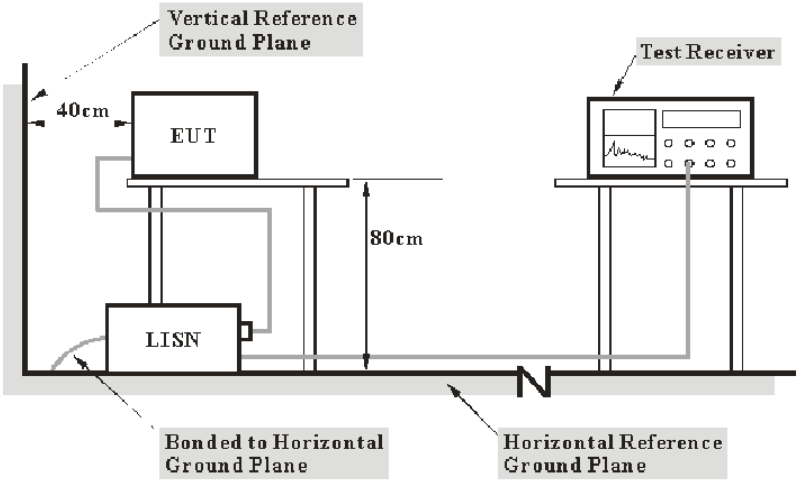
If U_{lab} is less than or equal to U_{cispr} of Table 1, then:
–compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
–non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.
If U_{lab} is greater than U_{cispr} of Table 1, then:
–compliance is deemed to occur if no measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit;
–non - compliance is deemed to occur if any measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit.

Based on CISPR 16-4-2-2011, measurement uncertainty of conducted disturbance at mains port using AMN at Bay Area Compliance Laboratories Corp. (Dongguan) is 3.12 dB (150 kHz to 30 MHz), and conducted disturbance at telecommunication port using AAN is 5.0 dB (150 kHz to 30 MHz).

Table 1 – Values of U_{cispr}

Measurement	U_{cispr}
Conducted disturbance at mains port using AMN (9 kHz to 150 kHz)	3.8 dB
(150 kHz to 30 MHz)	3.4 dB
Conducted disturbance at mains port using voltage probe (9 kHz to 30 MHz)	2.9 dB
Conducted disturbance at telecommunication port using AAN (150 kHz to 30 MHz)	5.0 dB
Conducted disturbance at telecommunication port using CVP (150 kHz to 30 MHz)	3.9 dB
Conducted disturbance at telecommunication port using CP (150 kHz to 30 MHz)	2.9 dB

Test System Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with CISPR 16-1-1:2010+A1:2010, CISPR 16-2-1:2008+A1:2010 measurement procedure. The specification used was the EN 55032 Class B limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

The EUT was connected to a 230V/50Hz AC line power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result (QuasiPeak or Average) = Meter Reading + Corr.

Note:
Corr. = Cable loss + Factor of coupling device

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the maximum limit. The equation for margin calculation is as follows:

Margin = Limit – Result

Test Procedure

During the conducted emissions test, the adapter was connected to the main outlet of the first LISN and the other support equipments were connected to the outlet of the second LISN.

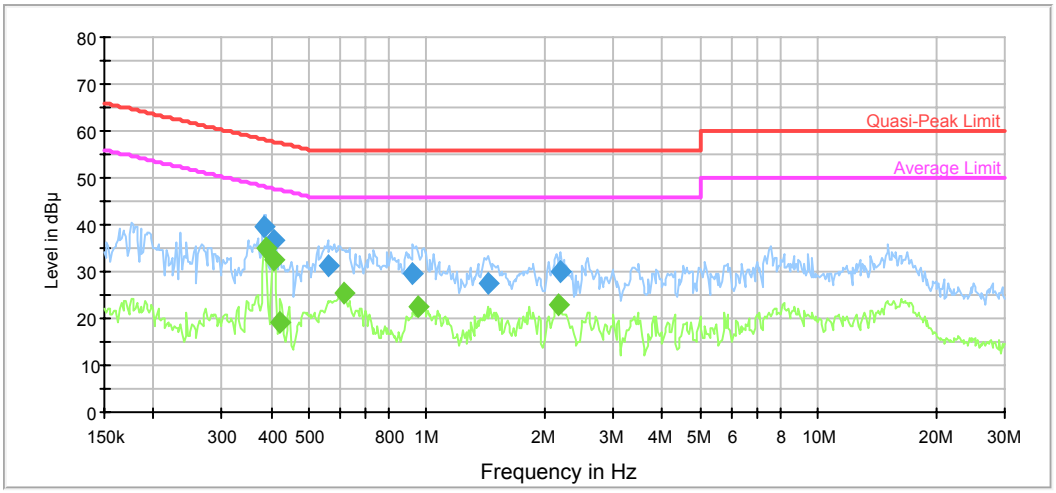
Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance using all installation combination.

All data was recorded in the Quasi-peak and average detection mode.

Test Data

Please refer to following table and plots:

Model Number:	AC10
Port:	L
Test Mode:	Operating
Power Source:	AC 230V/50Hz



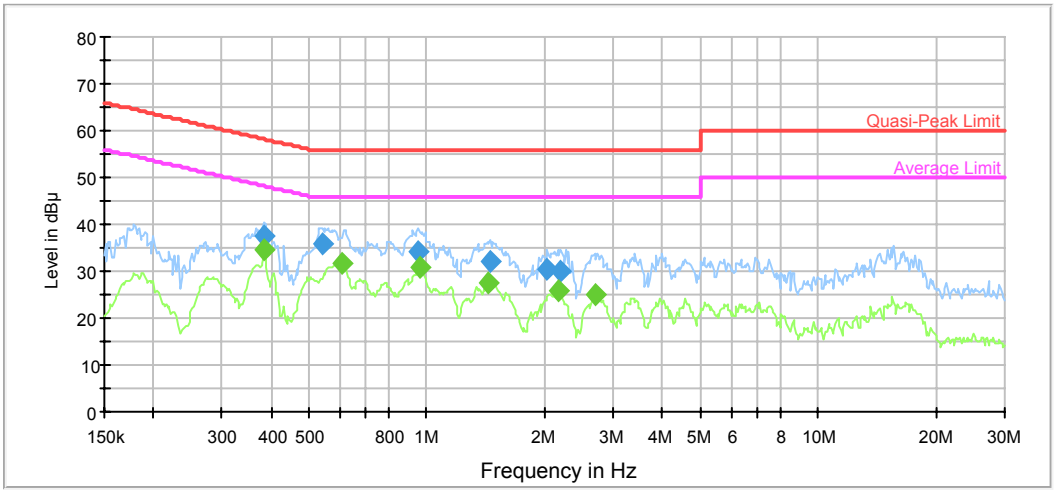
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.384091	39.5	9.000	L1	10.0	18.7	58.2
0.406123	36.7	9.000	L1	10.0	21.0	57.7
0.558572	31.3	9.000	L1	9.9	24.7	56.0
0.922769	29.4	9.000	L1	9.8	26.6	56.0
1.441726	27.4	9.000	L1	9.7	28.6	56.0
2.199332	30.0	9.000	L1	9.7	26.0	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.387164	35.1	9.000	L1	10.0	13.0	48.1
0.406123	32.6	9.000	L1	10.0	15.1	47.7
0.422630	19.0	9.000	L1	10.0	28.4	47.4
0.614619	25.4	9.000	L1	9.8	20.6	46.0
0.952654	22.4	9.000	L1	9.8	23.6	46.0
2.181877	22.7	9.000	L1	9.7	23.3	46.0

Model Number:	AC10
Port:	N
Test Mode:	Operating
Power Source:	AC 230V/50Hz



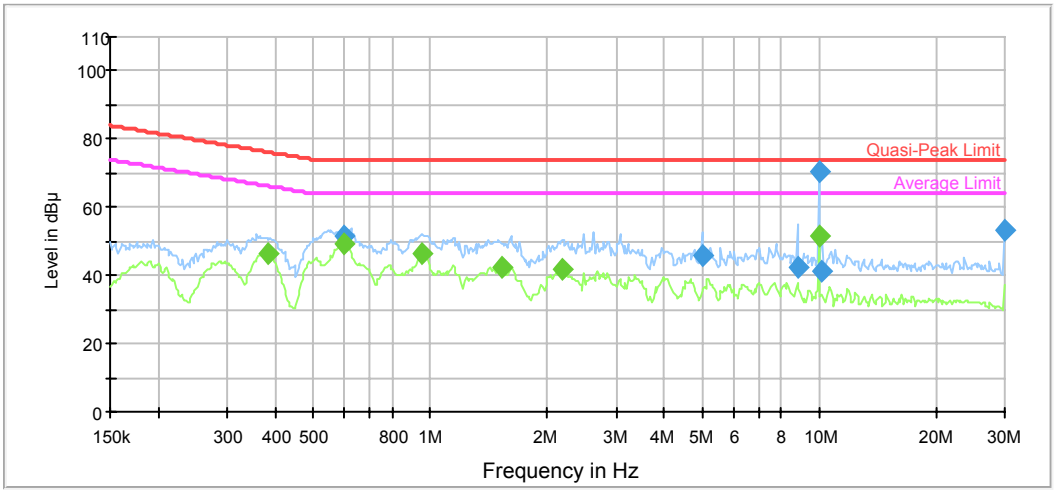
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.384091	37.6	9.000	N	10.0	20.6	58.2
0.541050	36.0	9.000	N	9.9	20.0	56.0
0.952654	34.3	9.000	N	9.8	21.7	56.0
1.453260	32.1	9.000	N	9.7	23.9	56.0
2.030886	30.5	9.000	N	9.8	25.5	56.0
2.199332	29.9	9.000	N	9.8	26.1	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.384091	34.4	9.000	N	10.0	13.8	48.2
0.604902	31.6	9.000	N	9.8	14.4	46.0
0.960275	30.7	9.000	N	9.8	15.3	46.0
1.430284	27.6	9.000	N	9.7	18.4	46.0
2.164561	25.7	9.000	N	9.8	20.3	46.0
2.684134	25.0	9.000	N	9.8	21.0	46.0

Model Number:	AC10
Port:	RJ45-10Mbps
Test Mode:	Operating
Power Source:	AC 230V/50Hz



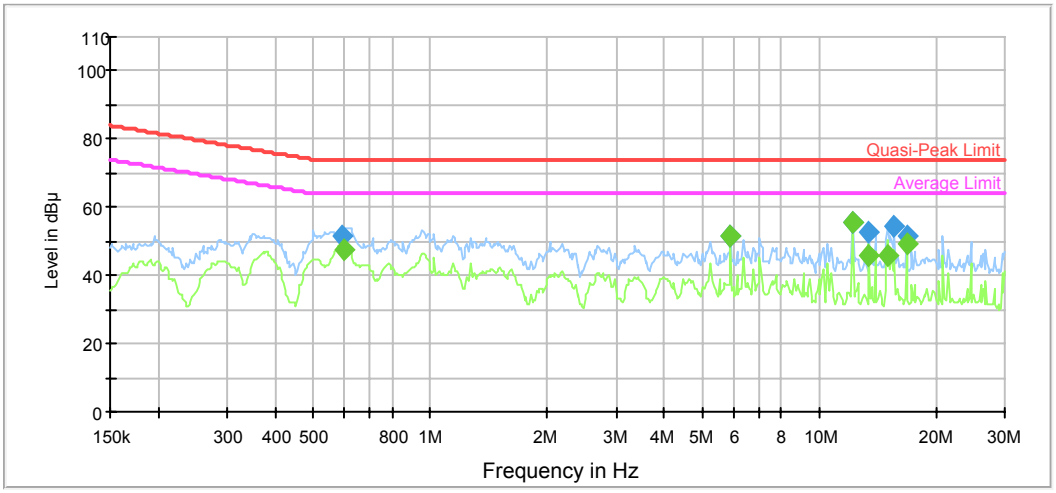
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Corr.	Margin (dB)	Limit (dBµV)
0.600100	51.6	9.000	9.7	22.4	74.0
4.997185	45.8	9.000	9.6	28.2	74.0
8.798794	42.3	9.000	9.6	31.7	74.0
9.995204	70.5	9.000	9.6	3.5	74.0
10.155767	41.1	9.000	9.6	32.9	74.0
30.000000	53.4	9.000	10.1	20.6	74.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Corr.	Margin (dB)	Limit (dBµV)
0.381043	46.1	9.000	9.9	20.2	66.3
0.600100	49.2	9.000	9.7	14.8	64.0
0.952653	46.6	9.000	9.7	17.4	64.0
1.524425	42.6	9.000	9.6	21.4	64.0
2.181876	41.7	9.000	9.6	22.3	64.0
9.995204	51.7	9.000	9.6	12.3	64.0

Model Number: AC10
Port: RJ45-100Mbps
Test Mode: Operating
Power Source: AC 230V/50Hz



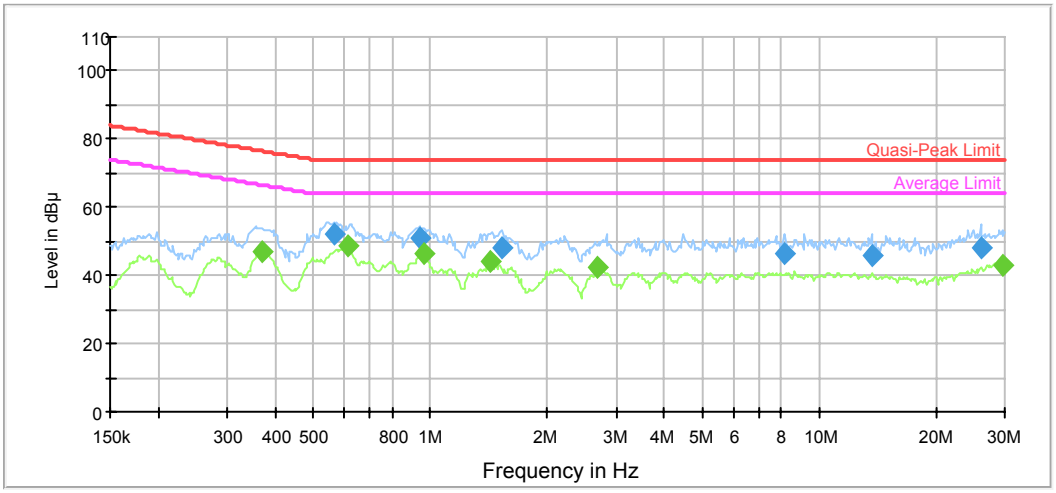
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Corr.	Margin (dB)	Limit (dBµV)
0.595338	51.7	9.000	9.8	22.3	74.0
5.907402	51.6	9.000	9.6	22.4	74.0
12.198459	55.5	9.000	9.7	18.5	74.0
13.422437	52.8	9.000	9.7	21.2	74.0
15.616420	54.5	9.000	9.7	19.5	74.0
16.777462	51.8	9.000	9.7	22.2	74.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Corr.	Margin (dB)	Limit (dBµV)
0.600100	47.7	9.000	9.7	16.3	64.0
5.907402	51.5	9.000	9.6	12.5	64.0
12.198459	55.3	9.000	9.7	8.7	64.0
13.422437	45.9	9.000	9.7	18.1	64.0
15.006479	45.6	9.000	9.7	18.4	64.0
16.777462	49.4	9.000	9.7	14.6	64.0

Model Number:	AC10
Port:	RJ45-1000Mbps
Test Mode:	Operating
Power Source:	AC 230V/50Hz



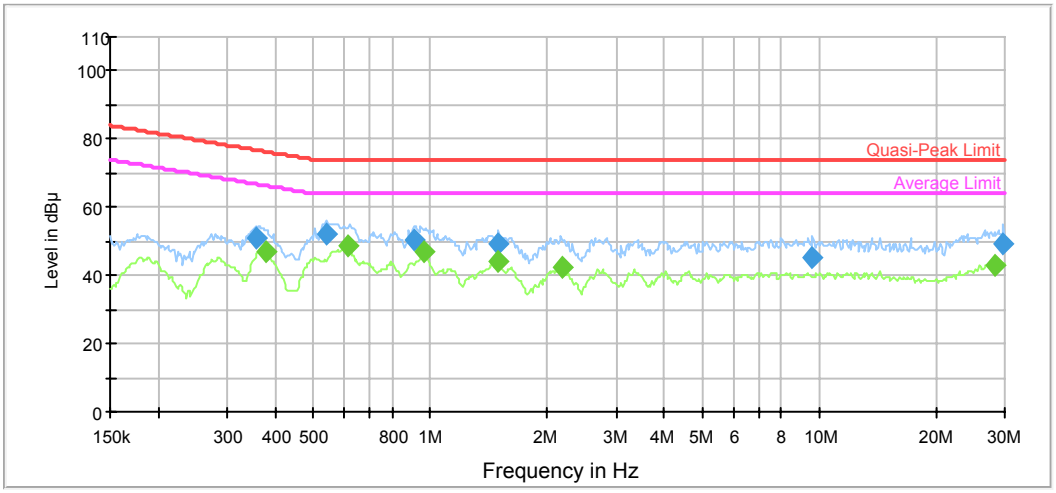
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Corr.	Margin (dB)	Limit (dBµV)
0.563040	52.3	9.000	9.8	21.7	74.0
0.937591	51.1	9.000	9.7	22.9	74.0
1.524425	48.2	9.000	9.6	25.8	74.0
8.124897	46.2	9.000	9.6	27.8	74.0
13.638055	45.9	9.000	9.7	28.1	74.0
26.004921	48.0	9.000	10.0	26.0	74.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Corr.	Margin (dB)	Limit (dBµV)
0.369089	47.3	9.000	9.9	19.2	66.5
0.614618	48.7	9.000	9.7	15.3	64.0
0.960274	46.5	9.000	9.7	17.5	64.0
1.430283	43.8	9.000	9.6	20.2	64.0
2.684132	42.2	9.000	9.6	21.8	64.0
29.540922	43.1	9.000	10.1	20.9	64.0

Model Number: AC10
Port: RJ45-WAN
Test Mode: Operating
Power Source: AC 230V/50Hz



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Corr.	Margin (dB)	Limit (dBµV)
0.354673	51.0	9.000	9.9	25.9	76.9
0.541049	52.4	9.000	9.8	21.6	74.0
0.908179	50.2	9.000	9.7	23.8	74.0
1.500324	49.2	9.000	9.6	24.8	74.0
9.604815	45.1	9.000	9.6	28.9	74.0
29.777249	49.2	9.000	10.1	24.8	74.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Corr.	Margin (dB)	Limit (dBµV)
0.378018	46.8	9.000	9.9	19.5	66.3
0.614618	48.8	9.000	9.7	15.2	64.0
0.960274	46.7	9.000	9.7	17.3	64.0
1.488417	44.4	9.000	9.6	19.6	64.0
2.181876	42.4	9.000	9.6	21.6	64.0
28.161829	43.1	9.000	10.1	20.9	64.0

2 - RADIATED EMISSIONS

Measurement Uncertainty

Compliance or non- compliance with a disturbance limit shall be determined in the following manner:

If U_{lab} is less than or equal to U_{cispr} of Table 1, then:
–compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
–non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.
If U_{lab} is greater than U_{cispr} of Table 1, then:
–compliance is deemed to occur if no measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit;
–non - compliance is deemed to occur if any measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit.

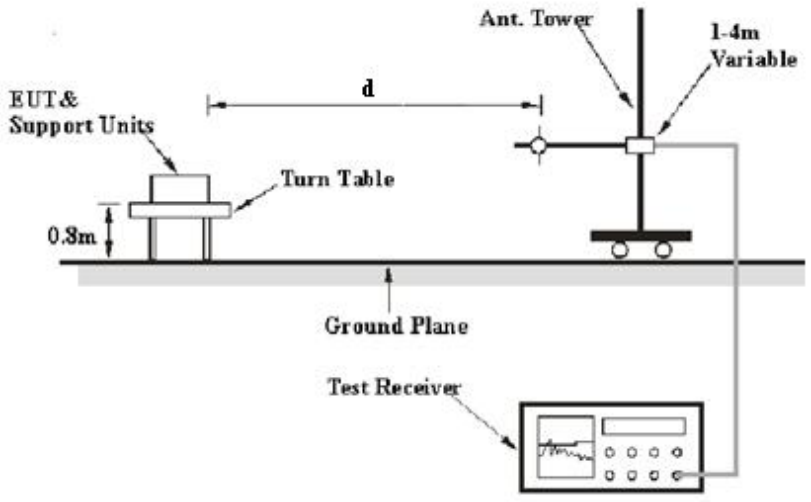
Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 10m at Bay Area Compliance Laboratories Corp. (Dongguan) is:30M~200MHz: 4.55 dB for Horizontal, 4.57 dB for Vertical; 200M~1GHz: 4.66 dB for Horizontal, 4.56 dB for Vertical; measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is:30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical; 200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical 1G~6GHz: 4.45 dB, 6G~18GHz: 5.23 dB.

Table 1 – Values of U_{cispr}

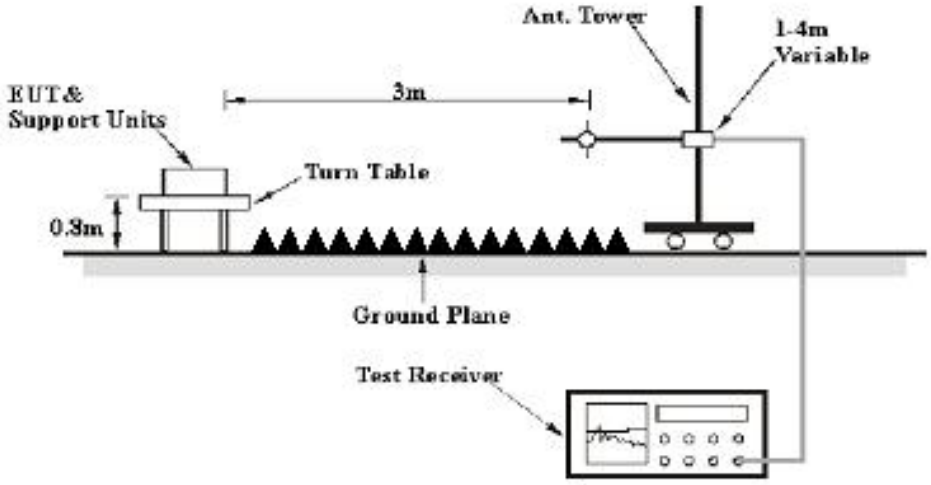
Measurement		U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC)	(30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR)	(1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR)	(6 GHz to 18 GHz)	5.5 dB

Test System Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests below 1GHz were performed in 10 meters, above 1GHz were performed in the 3 meters, using the setup accordance with the CISPR 16-1-1:2010+A1:2010, CISPR 16-1-4:2010, CISPR 16-2-3:2010. The specification used was EN 55032 Class B limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 6 GHz.

During the radiated emission test, the EMI test receiver was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	Peak
	1MHz	Reduced video bandwidth	/	Ave.

Test Procedure

During the radiated emissions, maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Meter Reading+ Corrected

Note:
Corrected = Antenna Factor + Cable Loss - Amplifier Gain
or
Corrected = Antenna Factor + Cable Loss + Insertion loss of attenuator - Amplifier Gain

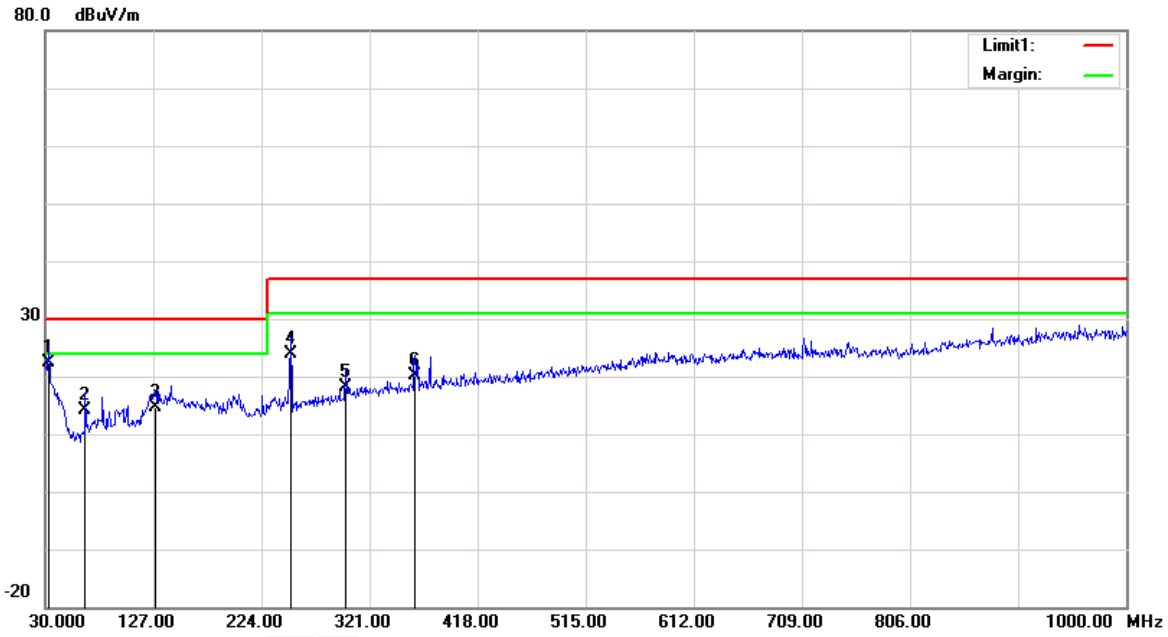
The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit for Class B. The equation for margin calculation is as follows:

Margin = Limit – Result

Test Data

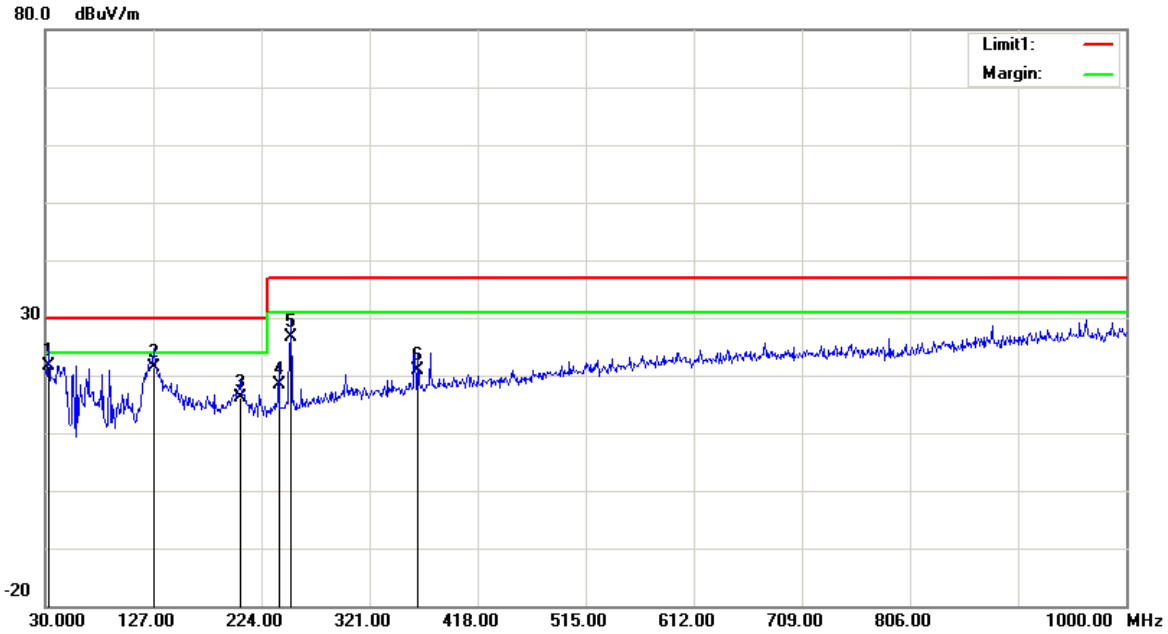
Please refer to following table and plots:

Condition:	**EN55032 ClassB 10m Radiation**	**Polarization:**	**Horizontal**
EUT:	AC1200 MU-MIMO Dual Band Gigabit WiFi Router	**Power:**	**AC 230V/50Hz**
Model:	**AC10**	**Distance:**	10m
Test Mode:	**Operating**		
Note:			



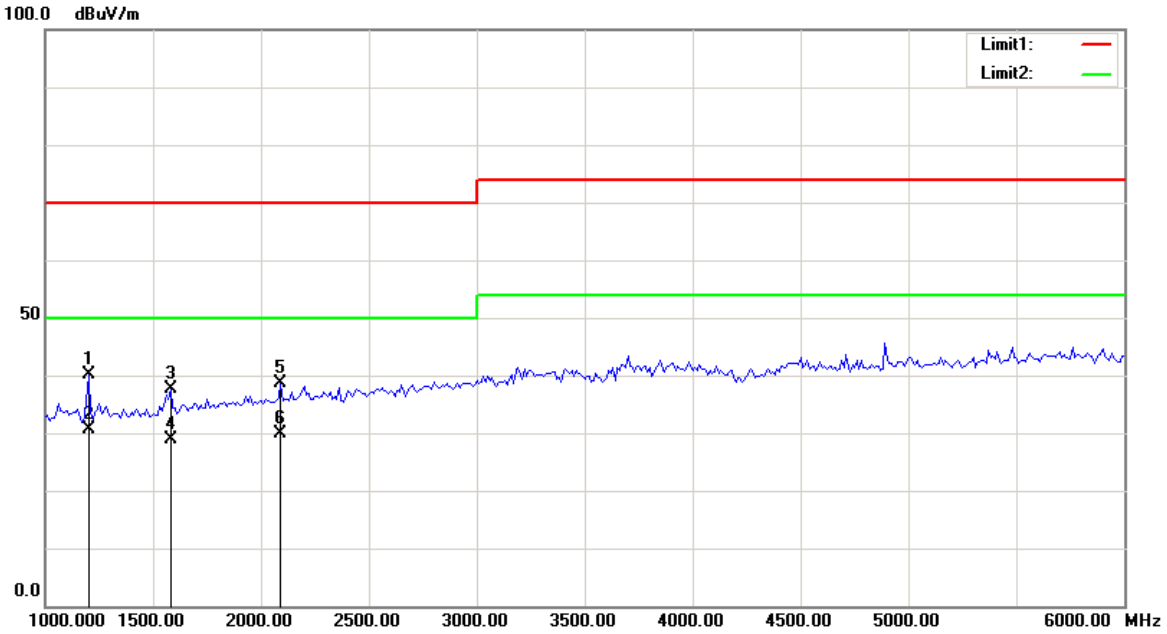
No.	Frequency (MHz)	Reading (dBµV)	Detector	Corrected dB/m	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1	32.9100	31.47	QP	-9.17	22.30	30.00	7.70
2	65.8900	33.92	QP	-19.82	14.10	30.00	15.90
3	128.9400	27.99	QP	-13.39	14.60	30.00	15.40
4	250.1900	37.12	QP	-13.12	24.00	37.00	13.00
5	299.6600	28.81	QP	-10.61	18.20	37.00	18.80
6	361.7400	29.25	QP	-9.15	20.10	37.00	16.90

Condition:	**EN55032 ClassB 10M Radiation**	**Polarization:**	**Vertical**
EUT:	AC1200 MU-MIMO Dual Band Gigabit WiFi Router	**Power:**	**AC 230V/50Hz**
Model:	**AC10**	**Distance:**	10m
Test Mode:	**Operating**		
Note:			



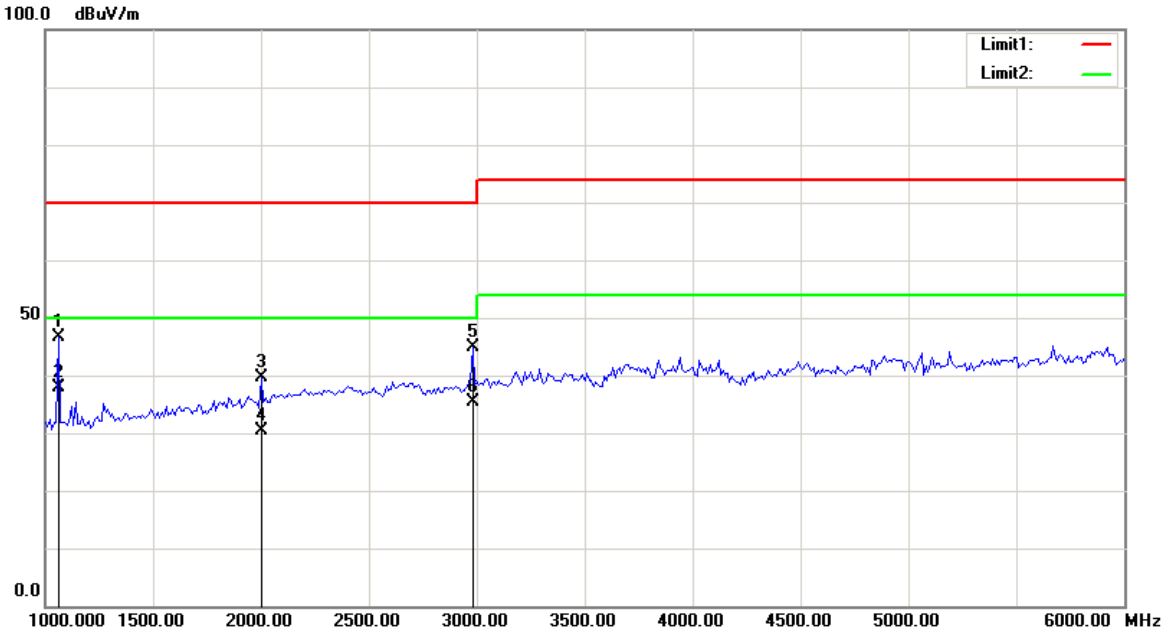
No.	Frequency (MHz)	Reading (dBµV)	Detector	Corrected dB/m	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1	32.9100	30.87	QP	-9.17	21.70	30.00	8.30
2	127.0000	35.51	QP	-14.01	21.50	30.00	8.50
3	204.6000	29.68	QP	-13.48	16.20	30.00	13.80
4	239.5200	31.57	QP	-13.27	18.30	37.00	18.70
5	250.1900	39.82	QP	-13.12	26.70	37.00	10.30
6	364.6500	29.99	QP	-9.09	20.90	37.00	16.10

Condition:	**EN 55032 Class B(Peak)**	**Polarization:**	**Horizontal**
EUT:	AC1200 MU-MIMO Dual Band Gigabit WiFi Router	**Power:**	**AC 230V/50Hz**
Model:	**AC10**	**Distance:**	3m
Test Mode:	**Operating**		
Note:			



No.	Frequency (MHz)	Reading (dBµV)	Detector	Corrected dB/m	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1	1200.000	49.98	peak	-9.96	40.02	70.00	29.98
2	1200.000	40.53	AVG	-9.96	30.57	50.00	19.43
3	1580.000	46.50	peak	-8.80	37.70	70.00	32.30
4	1580.000	37.62	AVG	-8.80	28.82	50.00	21.18
5	2090.000	45.71	peak	-7.04	38.67	70.00	31.33
6	2090.000	36.82	AVG	-7.04	29.78	50.00	20.22

Condition:	**EN 55032 Class B(Peak)**	**Polarization:**	**Vertical**
EUT:	AC1200 MU-MIMO Dual Band Gigabit WiFi Router	**Power:**	**AC 230V/50Hz**
Model:	**AC10**	**Distance:**	3m
Test Mode:	**Operating**		
Note:			



No.	Frequency (MHz)	Reading (dBµV)	Detector	Corrected dB/m	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1	1060.000	57.11	peak	-10.49	46.62	70.00	23.38
2	1060.000	48.25	AVG	-10.49	37.76	50.00	12.24
3	2000.000	46.78	peak	-7.18	39.60	70.00	30.40
4	2000.000	37.62	AVG	-7.18	30.44	50.00	19.56
5	2980.000	49.75	peak	-4.90	44.85	70.00	25.15
6	2980.000	40.38	AVG	-4.90	35.48	50.00	14.52

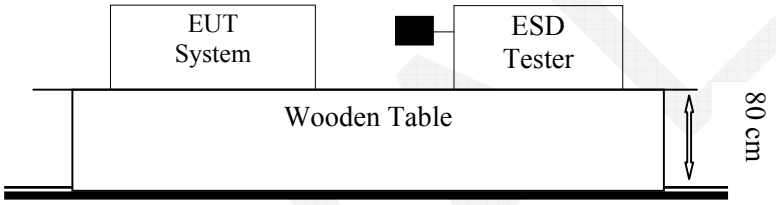
3 - ELECTROSTATIC DISCHARGES IEC 61000-4-2

Measurement Uncertainty

U_{lab} (measurement uncertainty of lab) and U_{EN} (measurement uncertainty of EN 61000-4-2) please refer to the following:

Parameter	U_{EN}	U_{lab}
Rise time t_r	≤15%	15%
Peak current I_p	≤7%	6.30%
Current at 30 ns	≤7%	6.30%
Current at 60 ns	≤7%	6.30%

Test System Setup



Remark: ■ is the tip of the electrode

IEC 61000-4-2 specifies that a tabletop EUT shall be placed on a non-conducting table which is 80 centimeters above a ground reference plane and that floor mounted equipment shall be placed on a insulating support approximately 10 centimeters above a ground plane. During the tests, the EUT is positioned over a ground reference plane in conformance with this requirement.

For tabletop equipment, a 1.6 by 0.8-meter metal sheet (HCP) is placed on the table and connected to the ground plane via a metal strap with two 470 k Ohms resistors in series. The EUT and attached cables are isolated from this metal sheet by *0.5-millimeter* thick insulating material. A Vertical Coupling Plane (VCP) grounded on the ground plane through the same configuration as in the HCP is used.

Test Standard

EN 55024:2010 + A1:2015 (IEC 61000-4-2:2008)
Test level 3 for Air Discharge at ±8 kV
Test level 2 for Contact Discharge at ±4 kV

Test Level

Level	Test Voltage Contact Discharge (±kV)	Test Voltage Air Discharge (±kV)
1.	2	2
2.	4	4
3.	6	8
4.	8	15
X.	Special	Special

Performance criteria: B

Test Procedure

Air Discharge:

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

Contact Discharge:

All the procedure shall be same as Section 8.3.1 of IEC 61000-4-2, except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

Indirect discharge for horizontal coupling plane:

At least 50 single discharges shall be applied to the horizontal coupling plane, at points on each side of the EUT. The discharge electrode positions vertically at a distance of 0.1 m from the EUT and with the discharge electrode touching the coupling plane.

Indirect discharge for vertical coupling plane:

At least 50 single discharges shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m × 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

Test Data

Please refer to following tables:

Test Mode: Operating
Note:

Table 1: Electrostatic Discharge Immunity (Air Discharge)

Test Points Location	Test Levels							
	-2 kV	+2 kV	-4 kV	+4 kV	-8 kV	+8 kV	-15 kV	+15 kV
Surface	A	A	A	A	A	A	/	/
Port	A	A	A	A	A	A	/	/
Seam	A	A	A	A	A	A	/	/
Button	A	A	A	A	A	A	/	/

Table 2: Electrostatic Discharge Immunity (Direct Contact)

Test Points Location	Test Levels							
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
/	/	/	/	/	/	/	/	/

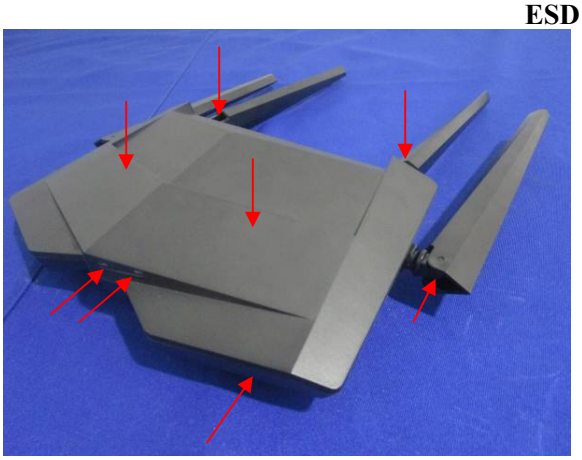
Table 3: Electrostatic Discharge Immunity (Indirect Contact HCP)

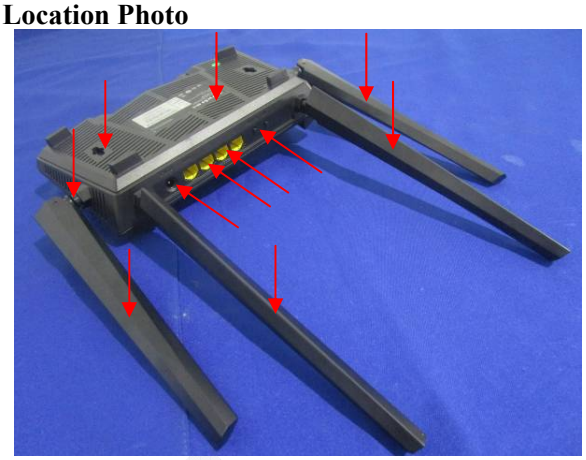
Test Points Location	Test Levels							
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
Front Side	A	A	A	A	/	/	/	/
Back Side	A	A	A	A	/	/	/	/
Left Side	A	A	A	A	/	/	/	/
Right Side	A	A	A	A	/	/	/	/

Table 4: Electrostatic Discharge Immunity (Indirect Contact VCP)

Test Points Location	Test Levels							
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
Front Side	A	A	A	A	/	/	/	/
Back Side	A	A	A	A	/	/	/	/
Left Side	A	A	A	A	/	/	/	/
Right Side	A	A	A	A	/	/	/	/

ESD Location Photo





Air Discharge: → Direct Contact: →

Test Setup Photo

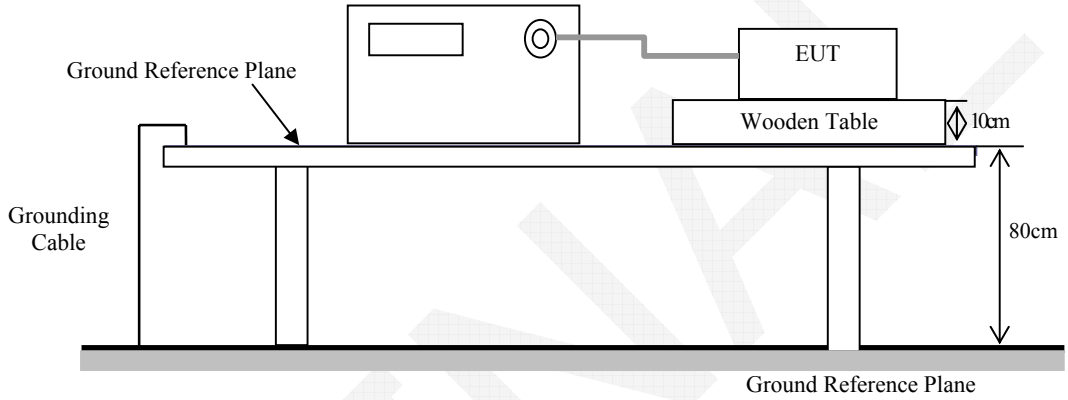
4 - ELECTRICAL FAST TRANSIENTS IEC 61000-4-4

Measurement Uncertainty

U_{lab} (measurement uncertainty of lab) and U_{EN} (measurement uncertainty of EN 61000-4-4) please refer to the following:

Parameter	U_{EN}	U_{lab}
Rise time t_r	6.20%	6.20%
Peak voltage value V_p	8.60%	8.60%
Voltage pulse width t_w	5.90%	5.90%

Test System Setup



Test Standard

EN 55024:2010 + A1:2015 (IEC 61000-4-4:2004)
AC mains: Test level 2 at 1 kV

Test Level

Open Circuit Output Test Voltage ±10%		
Level	**On Power Supply Lines**	**On I/O (Input/Output) Signal data and control lines**
1	0.5 kV	0.25 kV
2	1 kV	0.5 kV
3	2 kV	1 kV
4	4 kV	2 kV
X	Special	Special

Performance criteria: B

Test Procedure

The EUT was arranged for Power Line Coupling and for I/O Line Coupling through a capacitive clamp, where applicable. (Note: The I/O coupling test using a capacitive clamp is performed on the I/O interface cables that are longer in length than 3 meters.) A metal ground plane 2.4 meter by 2.0 meter was placed between the floor and the table and is connected to the earth by a 2.0 meter ground rod. The ground rod is connected to the test facility's electrical earth.

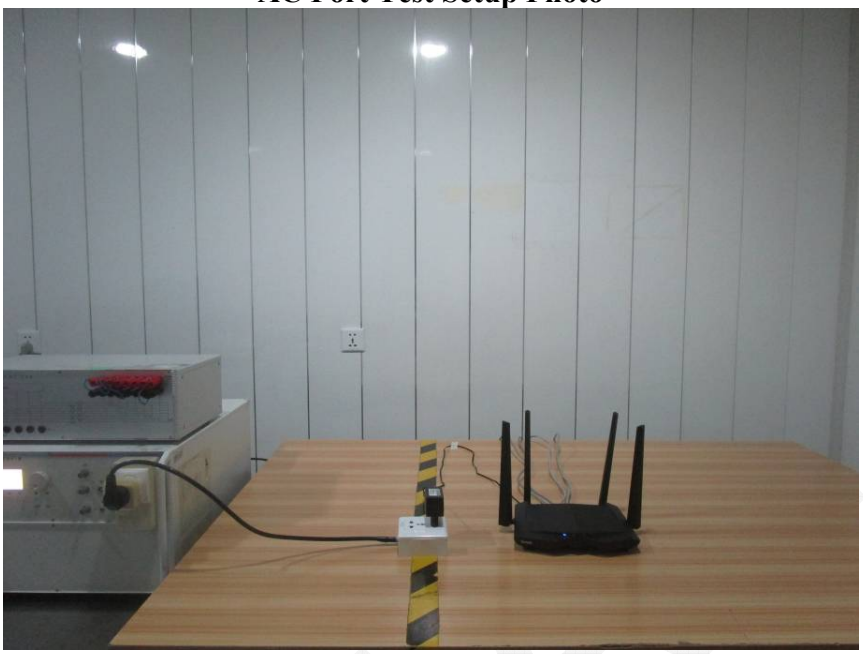
Test Data

Please refer to following tables:

Test Mode: Operating
Note:

Test Points		Test Levels (kV)							
		+0.5	-0.5	+1.0	-1.0	+2.0	-2.0	+4.0	-4.0
AC mains power input ports	L	A	A	A	A	/	/	/	/
	N	A	A	A	A	/	/	/	/
	Earth	/	/	/	/	/	/	/	/
	L+N	A	A	A	A	/	/	/	/
	L + Earth	/	/	/	/	/	/	/	/
	N + Earth	/	/	/	/	/	/	/	/
	L+N+Earth	/	/	/	/	/	/	/	/
Signal ports	RJ45	A	A	/	/	/	/	/	/

AC Port Test Setup Photo



Signal Port Test Setup Photo

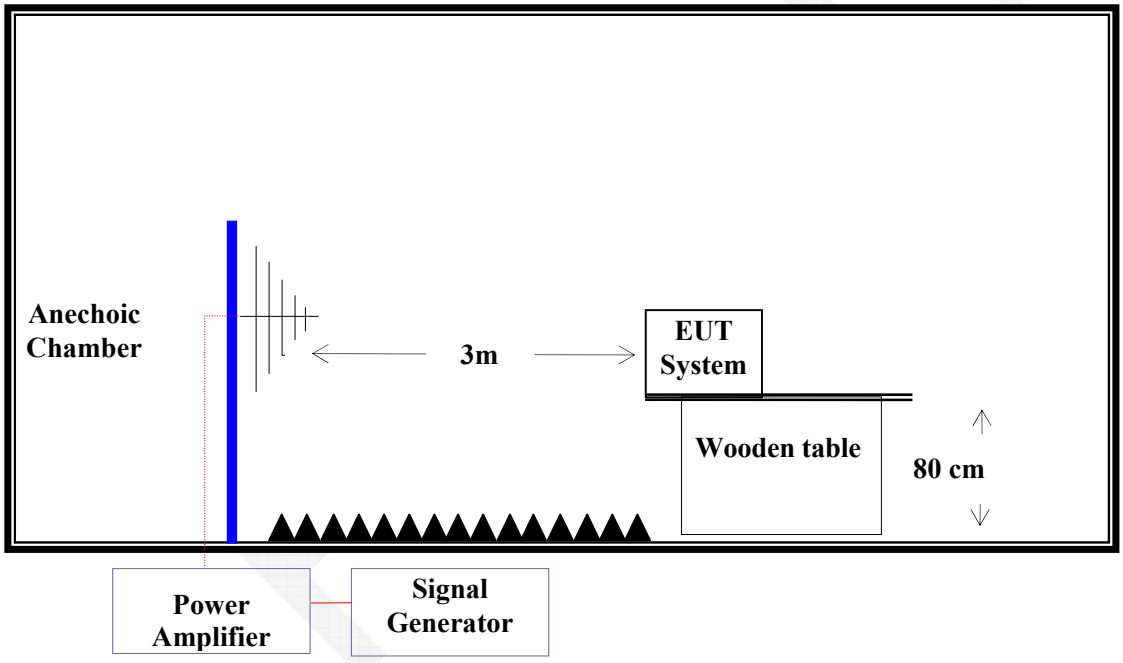
5 - CONTINUOUS RADIATED DISTURBANCES IEC 61000-4-3

Measurement Uncertainty

U_{lab} (measurement uncertainty of lab) and U_{EN} (measurement uncertainty of EN 61000-4-3) please refer to the following:

Parameter	U_{EN}	U_{lab}
Calibration process	1.88 dB	1.88 dB
Level setting	2.19 dB	2.19 dB

Test System Setup



Test Standard

EN 55024:2010 + A1:2015 (IEC 61000-4-3:2006 + A1:2007 + A2:2010)

Test Level

Level	Field Strength V/m
1.	1
2.	3
3.	10
X.	Special

Performance criteria: A

Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above the ground. The EUT is set 3 meters away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarizations of the antenna are set on test. Each of the four sides of EUT must be faced this transmitting antenna and measured individually.
In order to judge the EUT performance, a CCD camera is used to monitor the EUT.

Test Data

Please refer to following tables:

Test Mode: Operating
Note:

Condition of Test	Remarks
Field Strength	3 V/m (Test Level 2)
RF Signal	1 kHz, 80% AM, sine wave
Sweep Frequency Step	1%, logarithmic
Dwell Time	1 Sec

Frequency Range (MHz)	Front Side		Rear Side		Left Side		Right Side	
	VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI
80-1000	A	A	A	A	A	A	A	A
1000-6000	A	A	A	A	A	A	A	A

Test Setup Photo

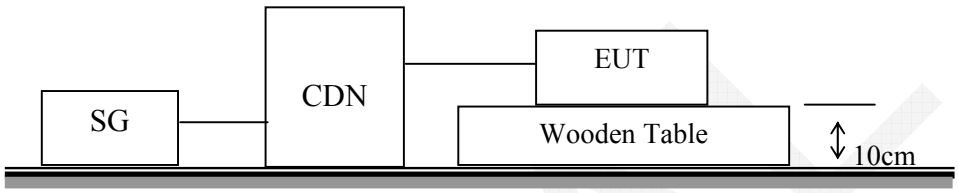
6 - CONTINUOUS CONDUCTED DISTURBANCES IEC 61000-4-6

Measurement Uncertainty

U_{lab} (measurement uncertainty of lab) and U_{EN} (measurement uncertainty of EN 61000-4-6) please refer to the following:

Parameter	U_{EN}	U_{lab}
CDN calibration process	1.27 dB	1.27 dB
CDN test process	1.36 dB	1.36 dB

Test Setup



Test Standard

EN 55024:2010 + A1:2015 (IEC 61000-4-6:2008)
Test level 2 at 3 V (r.m.s.), 0.15 MHz ~ 80 MHz,

Test Level

Level	Voltage Level (r.m.s.) (V)
1	1
2	3
3	10
X	Special

Performance criteria: A

Test Procedure

1) Let the EUT work in test mode and test it.
2) The EUT are placed on an insulating support 0.1 m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3 m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
3) The disturbance signal described below is injected to EUT through CDN.
4) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
5) The frequency range is swept from 150 kHz to 80 MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1 kHz sine wave.
6) Where the frequency is swept incrementally, the step size shall not exceed 1 % of the preceding frequency value. The dwell time of the amplitude modulated carrier at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0.5 s.
7) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

Test Data

Please refer to following tables:

Test Mode: Operating
Note:

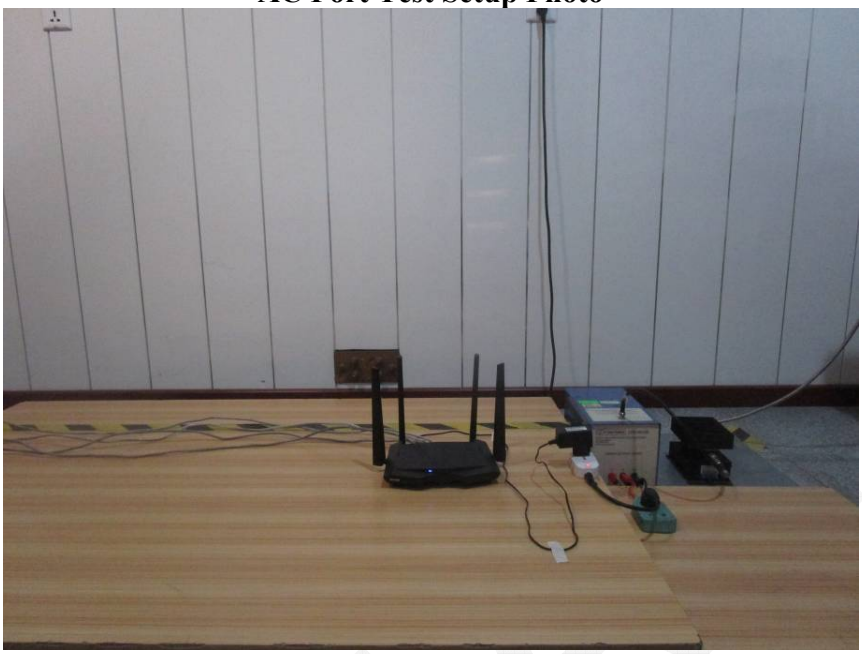
Table 1: AC mains power input port
Frequency range: 150 kHz to 80 MHz
■Modulated: Amplitude 80%, 1kHz sine wave □ Unmodulated □ Other:
Severity Level: 3 V Un modulated , r.m.s

Level	Voltage Level (e.m.f.) U_0	Pass	Fail
1	1	/	/
2	3	A	/
3	10	/	/
X	Special	/	/

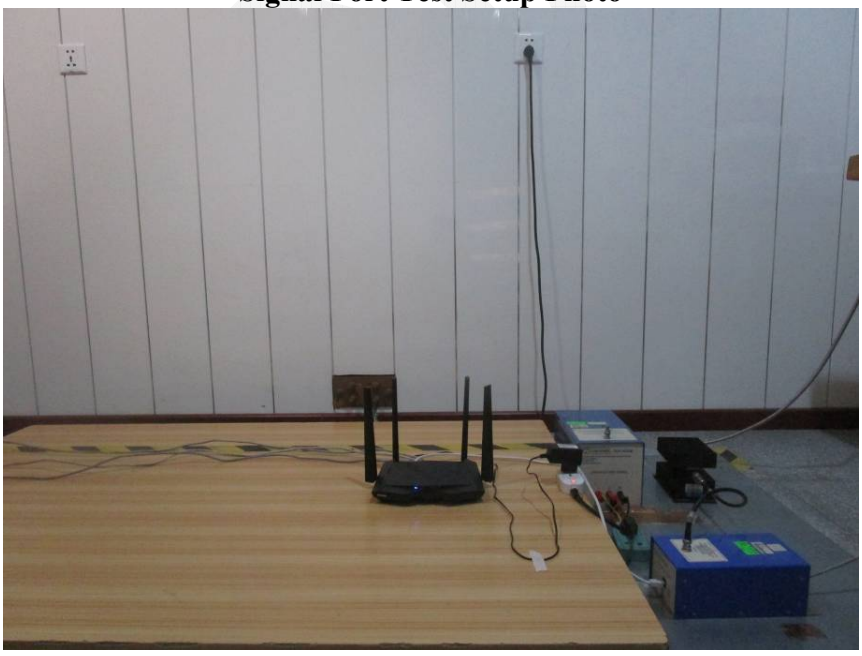
Table 2: Signal Port : RJ45
Frequency range: 150 kHz to 80 MHz
■Modulated: Amplitude 80%, 1kHz sine wave □Unmodulated □ Other:
Severity Level: 3 V Un modulated , r.m.s

Level	Voltage Level (e.m.f.) U_0	Pass	Fail
1	1	/	/
2	3	A	/
3	10	/	/
X	Special	/	/

AC Port Test Setup Photo

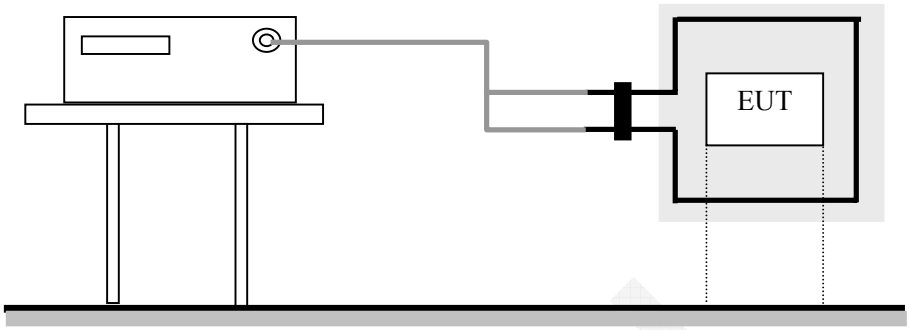


Signal Port Test Setup Photo



10 – POWER FREQUENCY MAGNETIC FIELDS IEC 61000-4-8

Test Setup



Test Standard

EN55024:2010+A1:2015 (IEC 61000-4-8:2009)

Test Level

Level	Magnetic Field Strength A/m
1	1
2	3
3	10
4	30
5	100
X.	Special

Performance criteria: A

Test Procedure

The EUT shall be subjected to the test magnetic field by using the induction coil of standard dimensions (1 m*1 m). The induction coil shall then be rotated by 90°in order to expose the EUT to the test field with different orientations.

Test Data

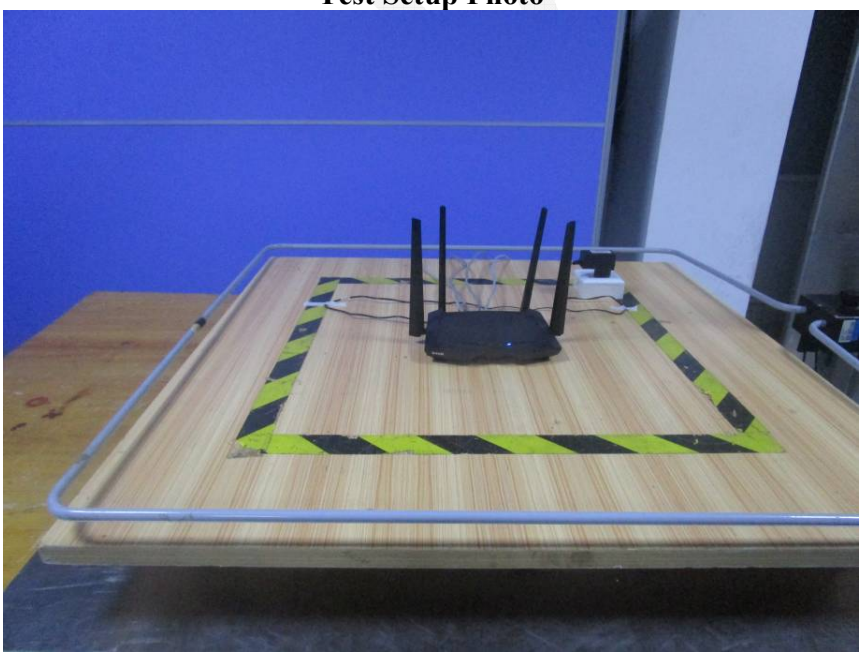
Please refer to following tables:

Test Mode: Operating
Note:

Severity Level: 1 A/m(r. m. s)

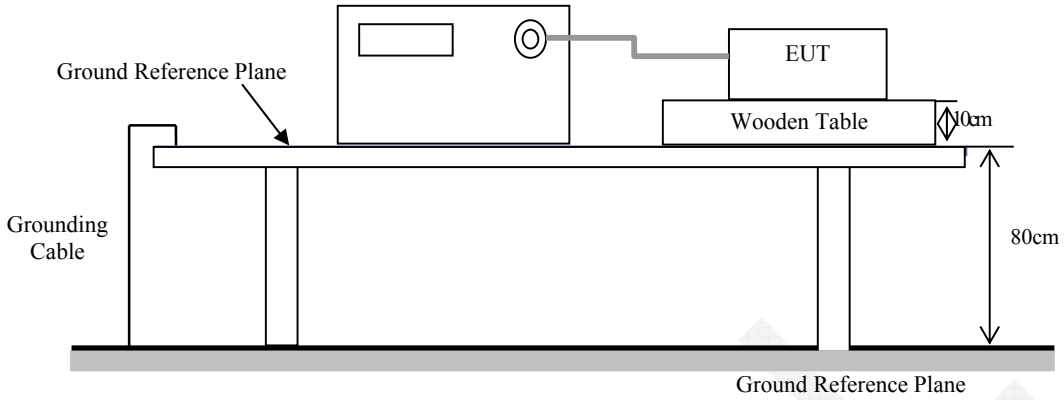
Level	Magnetic Field Strength A/M	X (Horizontal)	Y (Vertical)	Z (Special)
1	1	A	A	A
2	3	/	/	/
3	10	/	/	/
4	30	/	/	/
5	100	/	/	/
X	Special	/	/	/

Test Setup Photo



8 - SURGES IEC 61000-4-5

Test System Setup



Test Standard

EN 55024:2010 + A1:2015 (IEC 61000-4-5:2005)
AC Mains: L-N: Test level 2 at 1 kV

Test Level

Level	Open Circuit Output Test Voltage ±10%
1	0.5 kV
2	1 kV
3	2 kV
4	4 kV
X	Special

Performance criteria: B

Test Procedure

1) Provide disturbance signal described below is injected to EUT.
2) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
3) Different phase angles are done individually.
4) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

Test Data

Please refer to following tables:

Test Mode: Operating
Note:

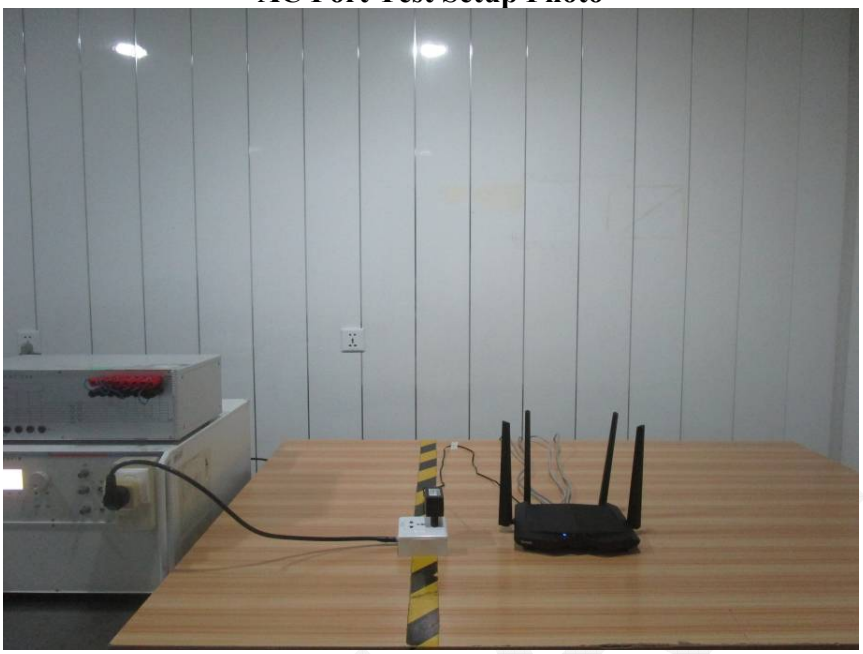
Table 1: AC mains power input port

Level	Voltage	Poll	Path	Pass	Fail
1	0.5kV	±	Line-Line	A	/
2	1kV	±	Line-Line	A	/
3	2kV	±	/	/	/
4	4kV	±	/	/	/

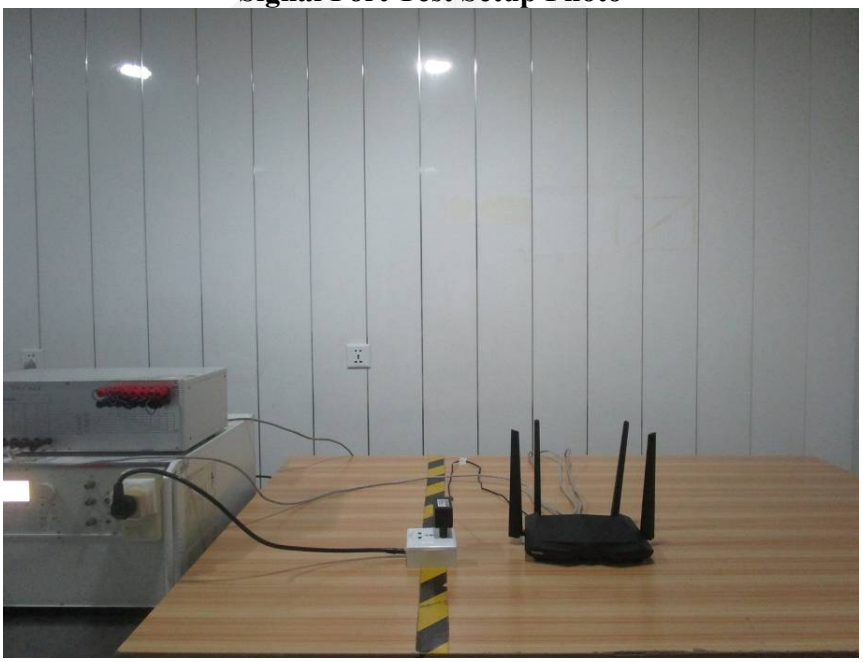
Table 2: **RJ45** I/O Circuit and Lines

Level	Voltage	Poll	Path	Pass	Fail
1	0.5kV	±	Line-Ground	A	/
2	1kV	±	Line-Ground	A	/
3	2kV	±	/	/	/

AC Port Test Setup Photo

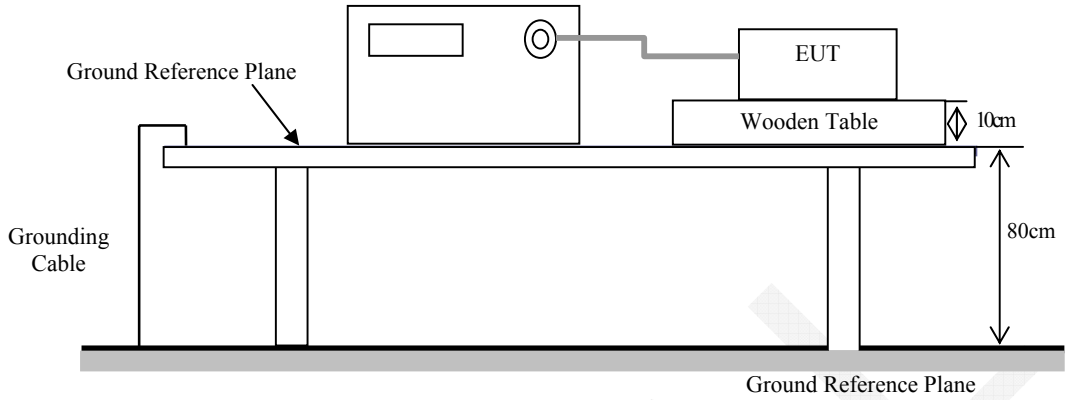


Signal Port Test Setup Photo



9 - VOLTAGE DIPS AND SHORT INTERRUPTIONS IEC 61000-4-11

Test Setup



Test Standard

EN 55024:2010 + A1:2015 (IEC 61000-4-11:2004)
Test levels and Performance Criterion

Test Level

Test Level	U2 (% Reduction)	Duration (Periods)	Performance Criteria
1	>95	0.5	B
2	30	25	C
3	>95	250	C

Test Procedure

1)The interruption is introduced at selected phase angles with specified duration.
2)Record any degradation of performance.

Test Data

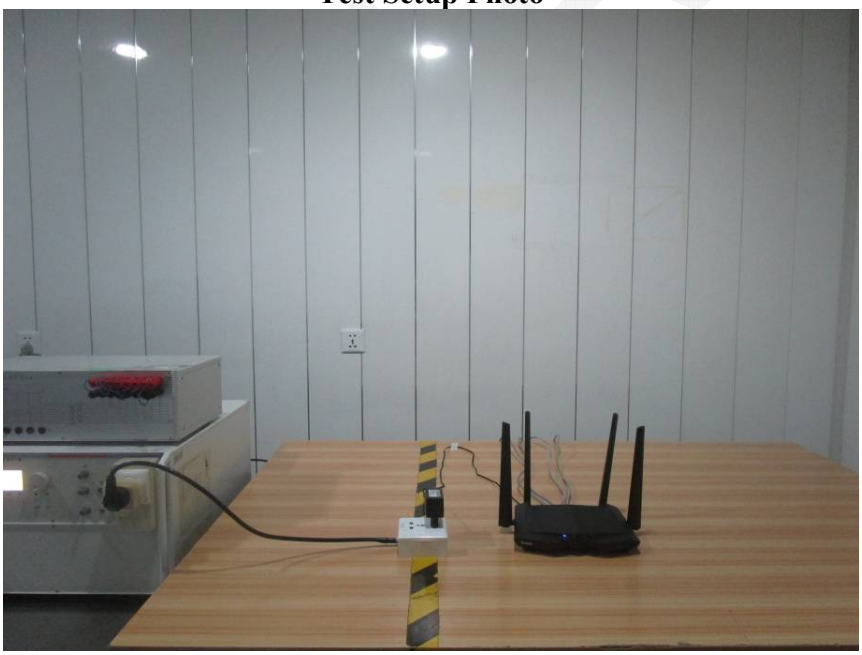
Please refer to following tables:

Test Mode: Operating
Note:

Table 1: Voltage Dips/Interruptions Test

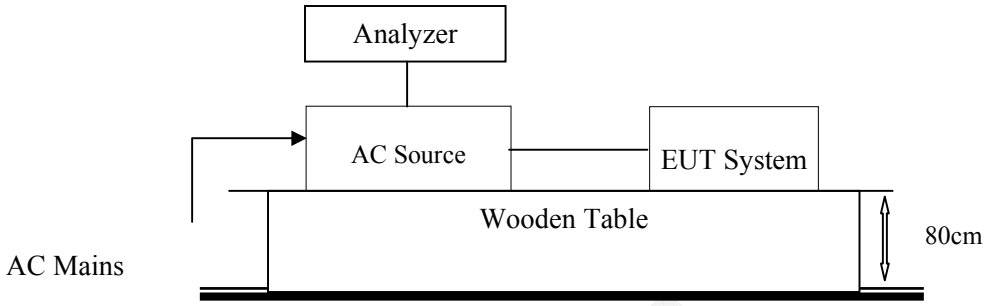
Level	U2 (% Reduction)	Td (Periods)	Phase Angle	N	Result
1	>95	0.5P	0/90/180/270	3	A
3	30	25P	0/90/180/270	3	A
4	>95	250P	0/90/180/270	3	B

Test Setup Photo



11 – VOLTAGE FLUCTUATIONS AND FLICKER

Test System Setup



Test Standard

EN 61000-3-3:2013

Flicker Test Limits :

The limits shall be applicable to voltage fluctuations and flicker at the supply terminals of the equipment under test, measured or calculated according to clause 4 under test conditions described in clause 6 and annex A. Tests made to prove compliance with the limits are considered to be type tests.
The following limits apply:
– the value of Pst shall not be greater than 1,0;
– the value of Plt shall not be greater than 0,65;
– the value of d(t) during a voltage change shall not exceed 3,3 % for more than 500 ms;
– the relative steady-state voltage change, dc, shall not exceed 3,3 %;
– the maximum relative voltage change dmax, shall not exceed
a) 4 % without additional conditions;
b) 6 % for equipment which is:

– switched manually, or
– switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.

Note: The cycling frequency will be further limited by the Pst and Plt limit. For example: a dmax of 6 % producing a rectangular voltage change characteristic twice per hour will give a Plt of about 0,65.

c) 7 % for equipment which is
– attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or
– switched on automatically, or is intended to be switched on manually, no more than twice per day, and also

has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

In the case of equipment having several separately controlled circuits in accordance with 6.6, limits b) and c) shall apply only if there is delayed or manual restart after a power supply interruption; for all equipment with automatic switching which is energized immediately on restoration of supply after a power supply interruption, limits a) shall apply; for all equipment with manual switching, limits b) or c) shall apply depending on the rate of switching. Pst and Plt requirements shall not be applied to voltage changes caused by manual switching. The limits shall not be applied to voltage changes associated with emergency switching or emergency interruptions.

Test Data

Please refer to following tables:

Short time (Pst):	10 min
Observation time:	10 min (1 Flicker measurement)
Test Mode:	Operating
Power Source:	AC 230V/50Hz
Test Result	PASS

Maximum Flicker results

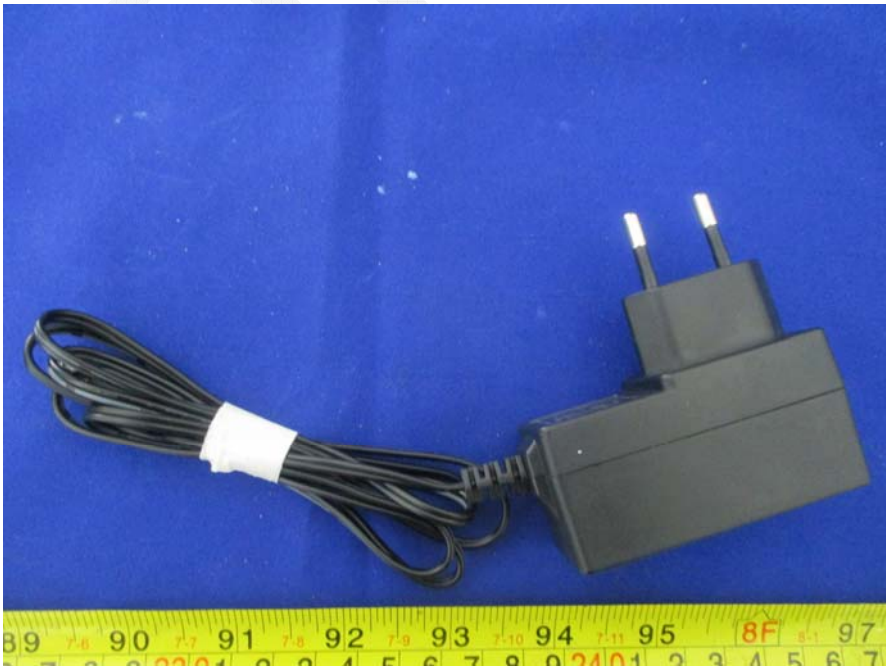
	EUT values	Limit	Result
Pst	0.028	1.00	PASS
Plt	0.028	0.65	PASS
dc [%]	0.011	3.30	PASS
dmax [%]	0.309	4.00	PASS
dt [s]	0.000	0.50	PASS

Test Setup Photo

EXHIBIT A – EUT PHOTOGRAPHS

EUT – All View

EUT – Adapter Top View



EUT – Adapter Bottom View

EUT – Adapter Label View

EUT – Top View

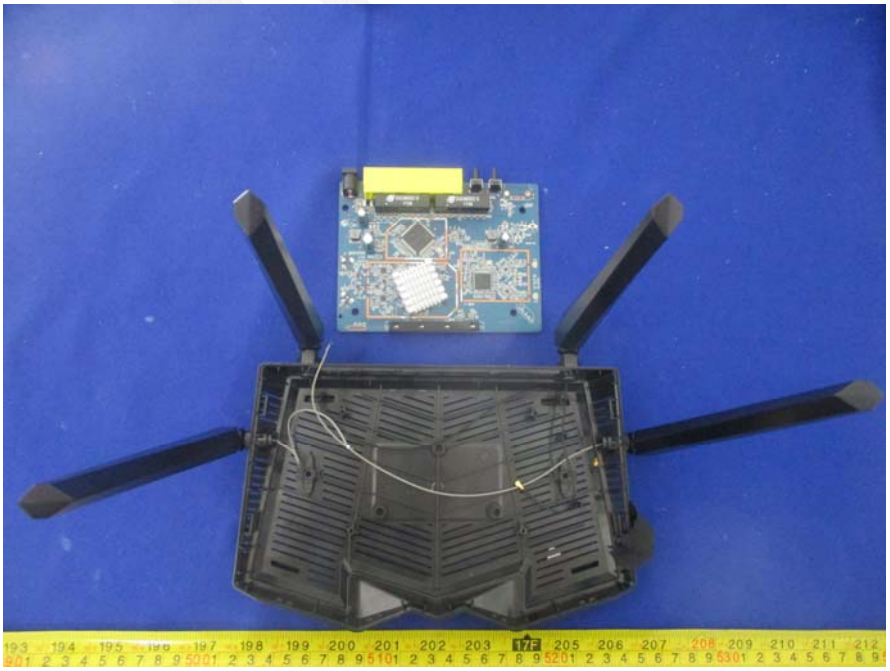
EUT – Bottom View

EUT – Port View

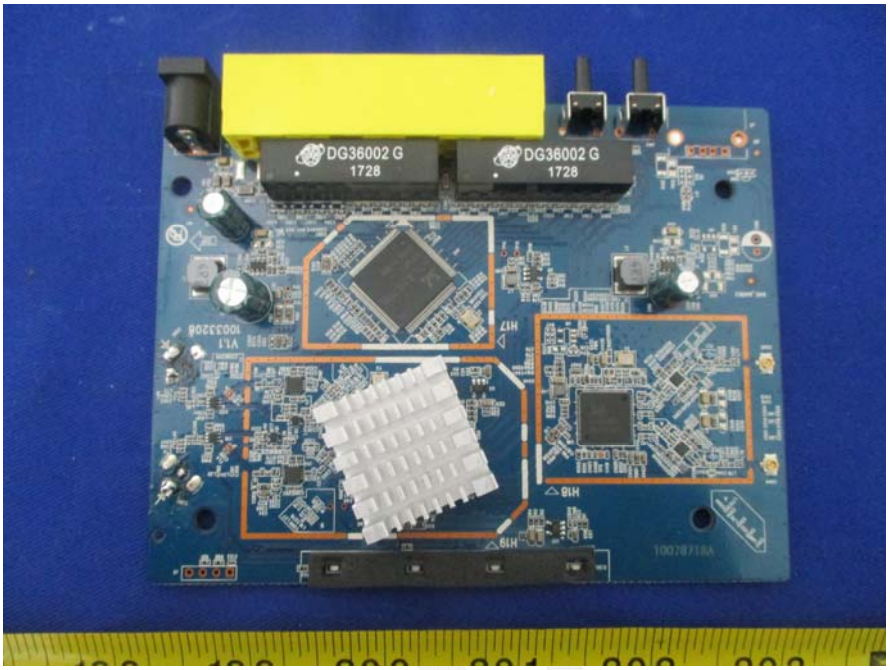
EUT – ANT View

EUT – Uncover View

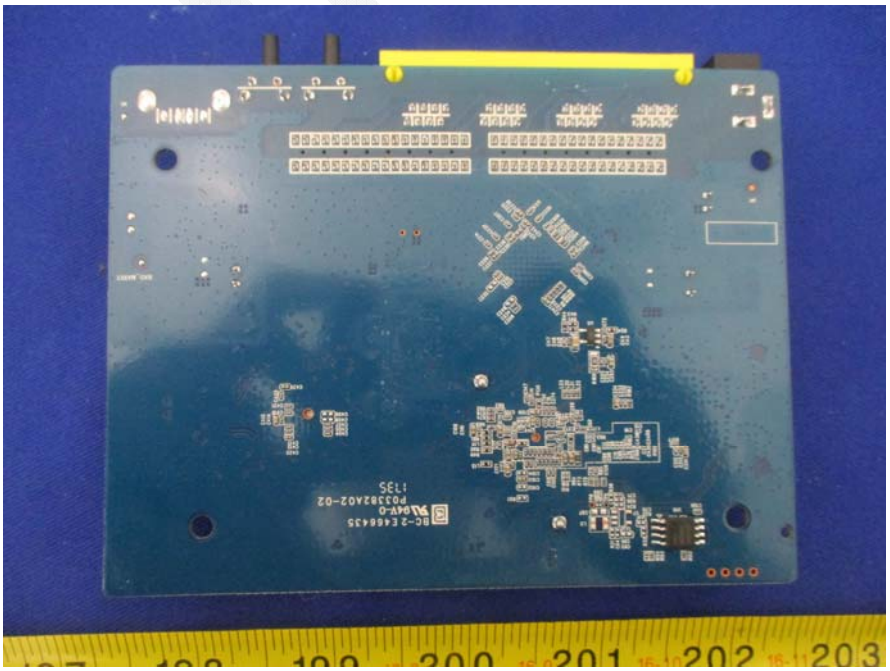
EUT – Uncover View



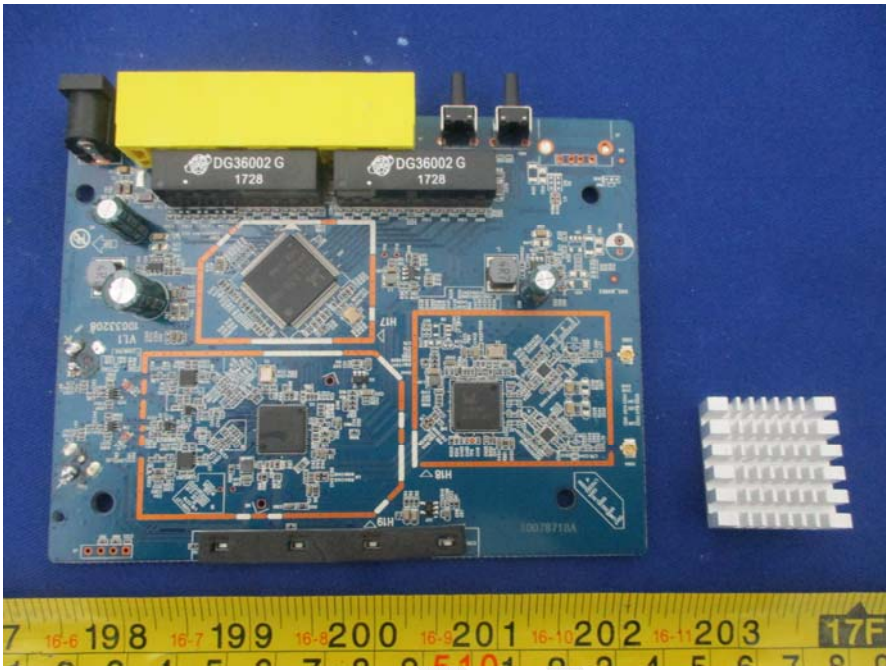
EUT – PCB Top View



EUT – PCB Bottom View

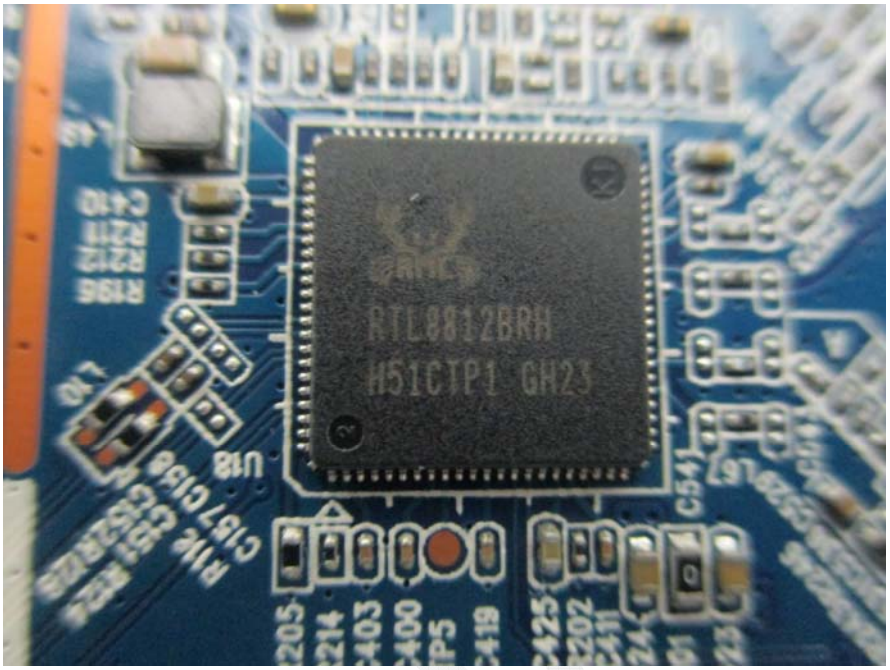


EUT – Uncover View



EUT – Main Chip View

EUT – 5G Chip View



EUT – 2.4G Chip View

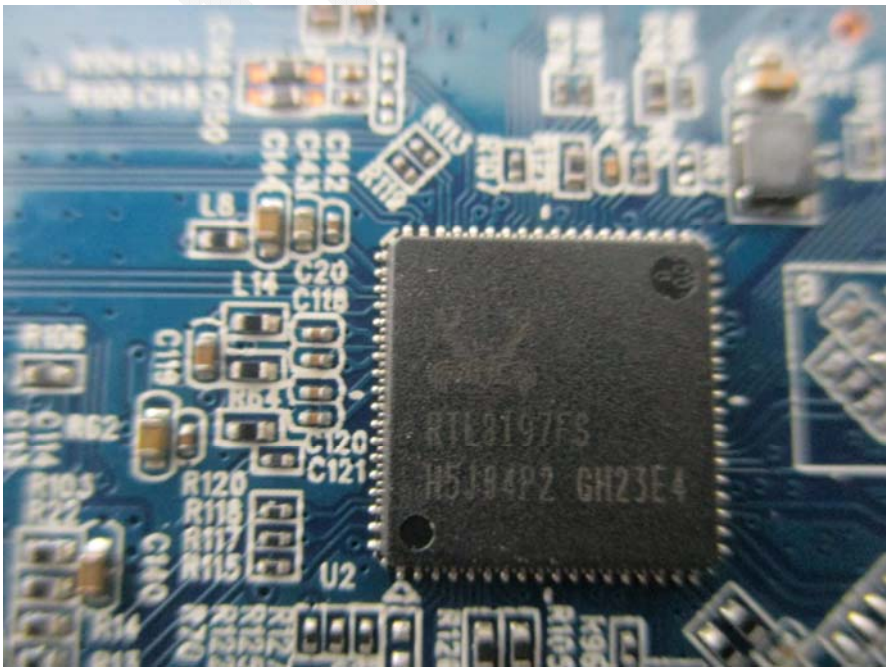


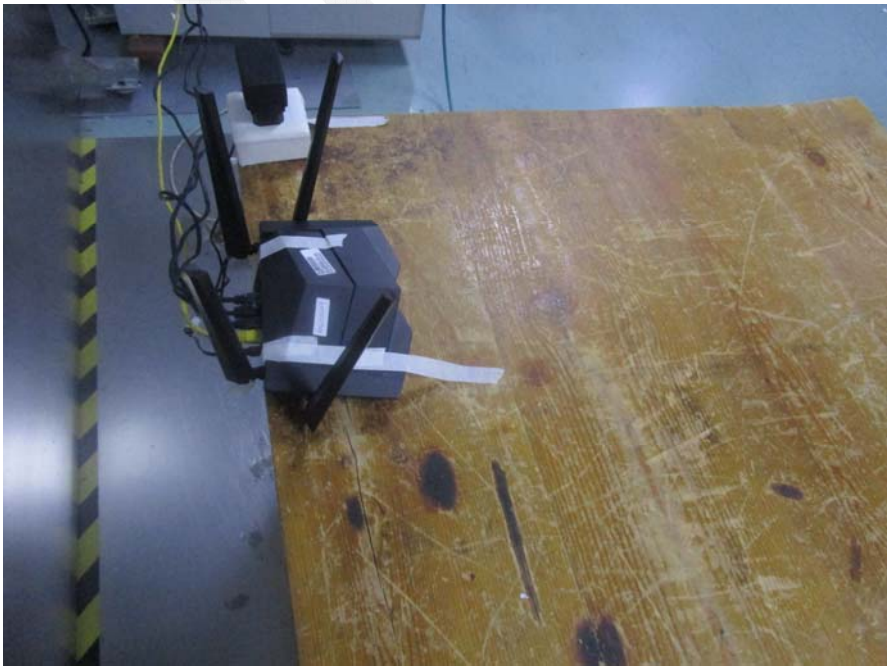
EXHIBIT B – TEST SETUP PHOTOGRAPHS

CE Front View

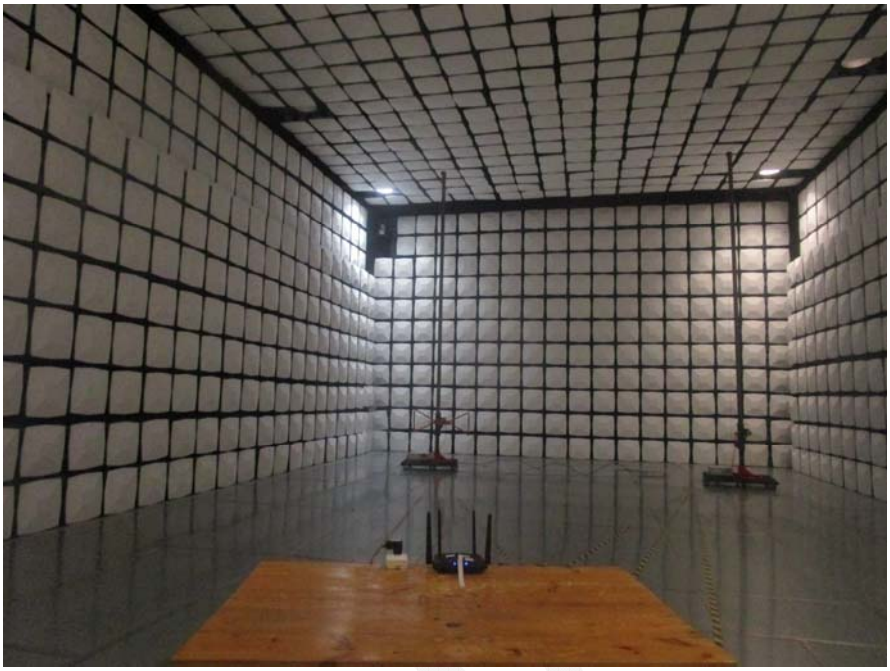
CE Side View

CE ISN Front View

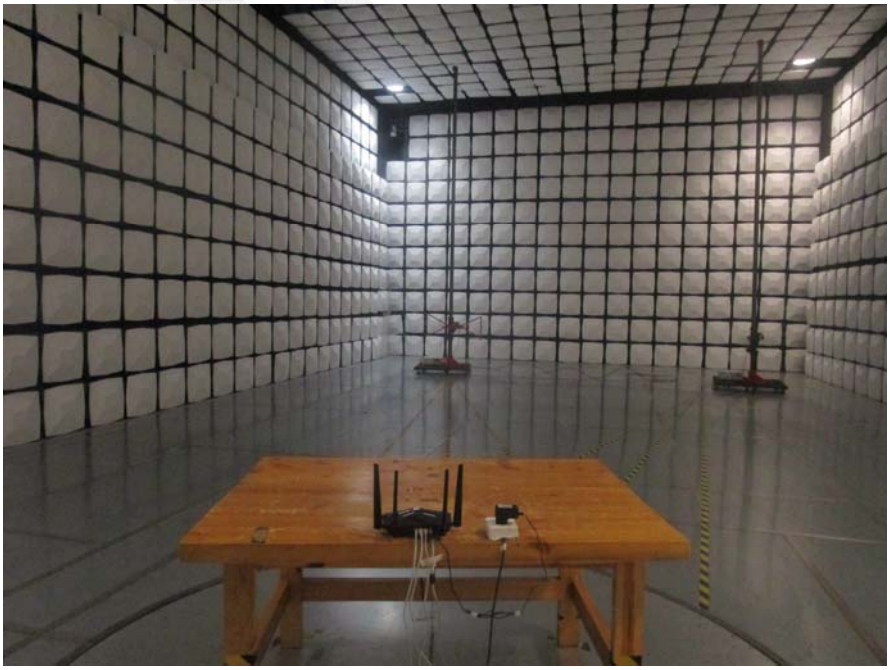
CE ISN Side View



RE Below 1G Front View



RE Below 1G Rear View



RE Above 1G Front View

RE Above 1G Rear View

*******END OF REPORT*******