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TESTING
CNAS L3163

CE EMC Test Report

Project No. : 2401C127A
Equipment : AX1500 Wi-Fi 6 5G NR Router
Brand Name : Tenda
Test Model : 5G01
Series Model : N/A
Applicant : SHENZHEN TENDA TECHNOLOGY CO.,LTD.
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Manufacturer : SHENZHEN TENDA TECHNOLOGY CO.,LTD.
Address : 6-8 Floor, Tower E3, No. 1001, Zhongshanyuan Road, Nanshan District, Shenzhen, China. 518052
Date of Receipt : Jan. 16, 2024
Date of Test : Jan. 17, 2024 ~ Feb. 04, 2024
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Report Version : R00
Test Sample : Engineering Sample No.: DG2024011643
Standard(s) : ETSI EN 301 489-1 V2.2.3 (2019-11)
ETSI EN 301 489-3 V2.3.2 (2023-01)
ETSI EN 301 489-17 V3.2.4 (2020-09)
ETSI EN 301 489-52 V1.2.1 (2021-11)

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.(Dongguan).

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Declaration

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Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

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REPORT ISSUED HISTORY

Report No.	Version	Description	Issued Date	Note
BTL-ETSE-1-2401C127A	R00	This is a copy report which referencing test data are provided from test report (BTL-ETSE-1-2401C127). The product name, brand name, model name, applicant and manufacturer information are changed which does not affect the test results, the rest are kept the same.	Apr. 09, 2024	Valid

1. SUMMARY OF TEST RESULTS

Emission		
EN 301 489-1 / EN 301 489-3 / EN 301 489-17 / EN 301 489-52		
Ref Standard(s)	Test Item	Result
EN 55032:2015+A11:2020	Radiated emissions up to 1 GHz	PASS
	Radiated emissions above 1 GHz	PASS
	Conducted emissions AC mains power port	PASS
	Conducted emissions DC power port	N/A
	Asymmetric mode conducted emissions	AAN
		Current Probe
		CP+CVP
EN IEC 61000-3-2:2019+A1:2021	Harmonic current	PASS
EN 61000-3-3:2013+A2:2021	Voltage fluctuations (Flicker)	PASS

Immunity		
EN 301 489-1 / EN 301 489-3 / EN 301 489-17 / EN 301 489-52		
Ref Standard(s)	Test Item	Result
EN 61000-4-2:2009	ESD	PASS
EN IEC 61000-4-3:2020	RS	PASS
EN 61000-4-4:2012	EFT	PASS
EN 61000-4-5:2014+A1:2017	Surge	PASS
EN 61000-4-6:2014+AC:2015	CS	PASS
EN IEC 61000-4-11:2020	Dips	PASS

NOTE:

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

1.1 TEST FACILITY

The test facilities used to collect the test data in this report:

For Conducted emissions&H&F items: Room 108,Building 2, No.1, Yile Road, Songshan Lake Zone, Dongguan, Guangdong, China.

For other items: No.3, Jinshagang 1st Road, Dalang, Dongguan, Guangdong, China.

1.2 MEASUREMENT UNCERTAINTY

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

The reported uncertainty of measurement $y \pm U$, 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 emissions up to 1 GHz measurement:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U ,(dB)
DG-CB01 (3m)	CISPR	30MHz ~ 200MHz	V	4.92
		30MHz ~ 200MHz	H	3.94
		200MHz ~ 1,000MHz	V	4.60
		200MHz ~ 1,000MHz	H	4.32

B. Radiated emissions above 1 GHz measurement:

Test Site	Method	Measurement Frequency Range	U ,(dB)
DG-CB01 (3m)	CISPR	1GHz ~ 6GHz	4.56

C. Conducted emissions AC mains power port measurement:

Test Site	Method	Measurement Frequency Range	U ,(dB)
SSL-C01	CISPR	150kHz ~ 30MHz	2.68

D. Asymmetric mode conducted emissions measurement:

Test Site	Method	Test Item	U ,(dB)
SSL-C01	CISPR	AAN Cat.5 LCL = 65 ... 50 dB	3.90

E. Harmonic current / Voltage fluctuations (Flicker) measurement:

Test Site	Method	Item	U (%)
SSL-C01	EN IEC 61000-3-2 EN 61000-3-3	Voltage	0.817
		Current	0.817

F. Immunity Measurement:

Test Site	Method	Item	U
DG-SR02	EN 61000-4-2	Rise time tr	7.00%
		Peak current Ip	6.50%
		Current at 30 ns	6.60%
		Current at 60 ns	6.80%
DG-CB05	EN IEC 61000-4-3 (80MHz~6GHz)	Electromagnetic field immunity test	2.2dB
		Error Ratios measurement, test set-up for RS 3G	2.28dB
		Throughput Percentages measurement, test set-up for RS 4G	2.28dB
		Throughput Percentages measurement, test set-up for RS 5G	2.28dB
		PER or FER measurement, test set-up for RS(WLAN 2.4G&5G, BT)	2.28dB
DG-SR05	EN 61000-4-4	Peak voltage (VP)	3.8%
		Rise time (tr)	4.4%
		Pulse width(tw)	4.2%
		Pulse Freq.(kHz)	0.7%
		Burst Duration(ms)	1.5%
		Burst Period(ms)	1.4%
		Peak voltage (VP)-with clamp	3.9%
		Rise time (tr) -with clamp	4.4%
		Pulse width(tw) -with clamp	4.2%
DG-SR05 DG-SR01	EN 61000-4-5	Open-Circuit Output Voltage (1.2/50us)	4.0%
		Open circuit front time (1.2/50us)	6.2%
		Open circuit time of half value (1.2/50us)	4.7%
DG-CB06	EN 61000-4-6 (150kHz-80MHz)	CDN	1.28dB
		Error Ratios measurement, test set-up for CS 3G	1.44dB
		Throughput Percentages measurement, test set-up for CS 4G	1.44dB
		Throughput Percentages measurement, test set-up for CS 5G NR	1.44dB
		PER or FER measurement, test set-up for CS(WLAN 2.4G&5G, BT)	1.44dB
DG-SR01	EN IEC 61000-4-11	DIP Amplitude	3.6%
		DIP Time Event	4.0%

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

1.3 TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Tested By
Radiated emissions up to 1 GHz	20°C	50%	Trey Chen
Radiated emissions above 1 GHz	20°C	50%	Trey Chen
Conducted emissions AC mains power port	23°C	50%	Atom Huang
Asymmetric mode conducted emissions	23°C	50%	Atom Huang
Harmonic current	23°C	50%	Atom Huang
Voltage fluctuations (Flicker)	23°C	50%	Atom Huang

Test Item	Temperature	Humidity	Pressure	Tested By
ESD	18°C	40%	1030hPa	Leo Liu
RS	17°C	47%	/	Hunter Xu Jolly Su
EFT	15°C	47%	/	Jensen Jiang
Surge	15-21°C	47-56%	/	Jensen Jiang Zinco Chen
CS	17°C	59%	/	Lance Chen
Dips	19°C	52%	/	Zinco Chen

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	AX1500 Wi-Fi 6 5G NR Router
Brand Name	Tenda
Test Model	5G01
Series Model	N/A
Model Difference(s)	N/A
Identification No. of EUT(S/N)	EF071011352000024
Dimensions and mass	94*118*196mm
Component unit of EUT	<input type="checkbox"/> Single unit <input checked="" type="checkbox"/> Multiple unit
Sample Status	<input checked="" type="checkbox"/> Engineering sample <input type="checkbox"/> Final shipment prototype
Power Source	DC Voltage supplied from AC adapter. 1# Model: BN026-A24012E(EU) 2# Model: BN026-A24012B(UK)
Power Rating	I/P:100-240V ~ 50/60Hz 0.7A O/P:12.0V --- 2.0A
Connecting I/O Port(s)	1* PWR port 1* LAN1 port 1* WAN/LAN2 port
Classification of EUT	Class B
Intended Operating Frequency(Fo)	WIFI: 2412-2472 MHz, 5150-5250MHz, 5725-5850MHz WCDMA Band I: 1920-1980MHz WCDMA Band V: 824-849MHz WCDMA Band VIII: 880-915MHz LTE Band 1: 1920-1980MHz, LTE Band 3: 1710-1785MHz, LTE Band 5: 824-849MHz, LTE Band 7: 2500-2570MHz, LTE Band 8: 880-915MHz, LTE Band 20: 832-862MHz, LTE Band 28: 703-748MHz, LTE Band 40: 2300-2400MHz, LTE Band 41: 2496-2690MHz 5G NR n1: 1920-1980MHz, 5G NR n3: 1710-1785MHz, 5G NR n5: 824-849MHz, 5G NR n7: 2500-2570MHz, 5G NR n8: 880-915MHz, 5G NR n20: 832-862MHz, 5G NR n28: 703-748MHz, 5G NR n38: 2570-2620MHz, 5G NR n40: 2300-2400MHz, 5G NR n41: 2496-2690MHz, 5G NR n77: 3300-4200MHz, 5G NR n78: 3300-3800MHz
Highest Internal Frequency(Fx)	5850MHz

Note:

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

2.2 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(2.4GWIFI+5GWIFI+LTE Traffic B1/B2/B3/B4/B5/B7/B8/B20/B28/B66/B38/B40/B41)
Mode 2	FULL SYSTEM(2.4GWIFI+5.8GWIFI+WCDMA Traffic B1/B2/B5B38)
Mode 3	FULL SYSTEM(2.4GWIFI+5.8GWIFI+5G NR_n1/n3/n5/n7/n8/n20/n28/n38/n40/n41/n77/n78 SA)
Mode 4	FULL SYSTEM(2.4GWIFI+5.8GWIFI+5G NR_n1/n3/n7/n38/n40/n41/n77/n78 NSA)
Mode 5	FULL SYSTEM(2.4GWIFI+5.8GWIFI+idle)

Radiated emissions up to 1 GHz Test	
Final Test Mode	Description
Mode 1	FULL SYSTEM(2.4GWIFI+5GWIFI+LTE Traffic B38)

Radiated emissions Above 1 GHz Test	
Final Test Mode	Description
Mode 1	FULL SYSTEM(2.4GWIFI+5GWIFI+LTE Traffic B38)

Conducted emissions AC mains power port Test	
Final Test Mode	Description
Mode 4	FULL SYSTEM(2.4GWIFI+5.8GWIFI+5G NR_n40 NSA)

Asymmetric mode conducted emissions Test	
Final Test Mode	Description
Mode 4	FULL SYSTEM(2.4GWIFI+5.8GWIFI+5G NR_n40 NSA) (LAN1 1Gbps / WAN/LAN2 1Gbps)

Harmonic current & Voltage fluctuations (Flicker) Test	
Final Test Mode	Description
Mode 1	FULL SYSTEM(2.4GWIFI+5GWIFI+LTE Traffic B38)

Immunity Test	
Final Test Mode	Description
Mode 1	FULL SYSTEM(2.4GWIFI+5GWIFI+LTE Traffic B1/B2/B3/B4/B5/B7/B8/B20/B28/B66/B38/B40/B41)
Mode 2	FULL SYSTEM(2.4GWIFI+5.8GWIFI+WCDMA Traffic B1/B2/B5B38)
Mode 3	FULL SYSTEM(2.4GWIFI+5.8GWIFI+5G NR_n1/n3/n5/n7/n8/n20/n28/n38/n40/n41/n77/n78 SA)
Mode 4	FULL SYSTEM(2.4GWIFI+5.8GWIFI+5G NR_n1/n3/n7/n38/n40/n41/n77/n78 NSA)
Mode 5	FULL SYSTEM(2.4GWIFI+5.8GWIFI+idle)

Note:

- Two adapters only differ in the plug, so tested the EU plug.
- For EMI: Evaluated the mode 1-5. The worst is mode 1 and recorded in this report.
- Mode 1 tested the LTE B1/B2/B3/B4/B5/B7/B8/B20/B28/B66/B38/B40/B41, the worst case is LTE B38 and recorded in this report.
Mode 4 tested the 5G NR_n1/n3/n5/n7/n8/n20/n28/n38/n40/n41/n77/n78 SA, the worst case is 5G NR_n40 and recorded in this report.
- The product supports 2.4G&5G WIFI&WCDMA<E&5G NR function.
The frequency exemptions are 2400-2483.5MHz, 5150-5250MHz, 5725-5850MHz.
- Radiated emission above 1GHz tested with 2.4G&5G filter.
- The data transfer of CS/RS was recorded the worst case.

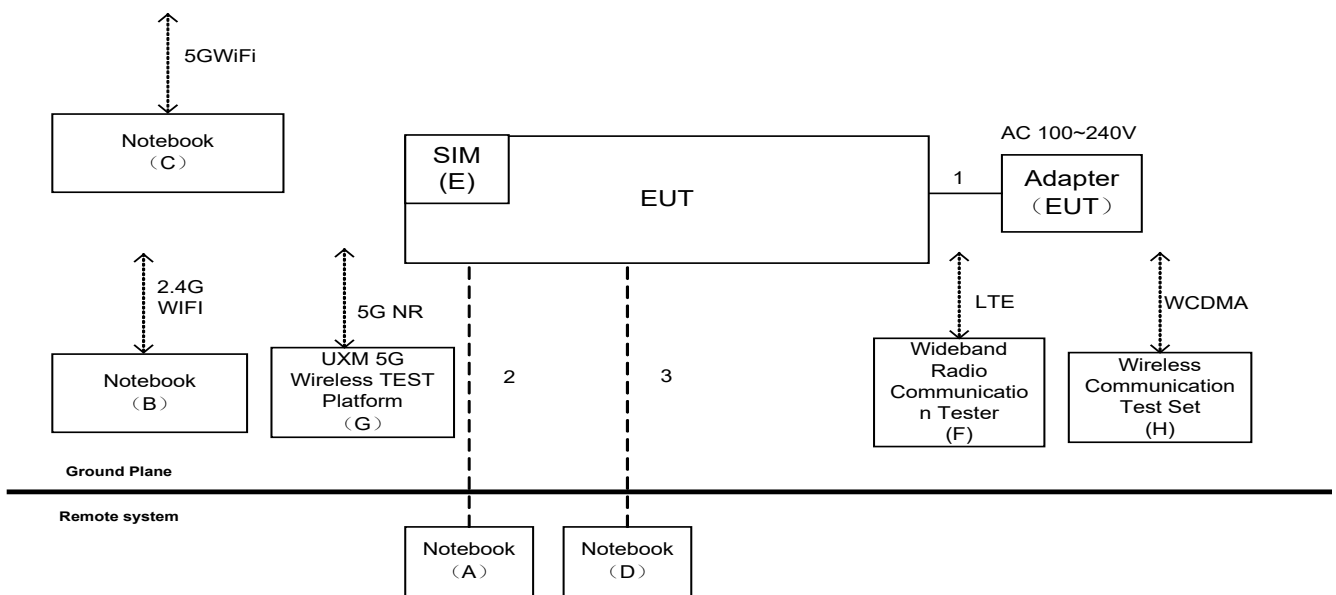
2.3 EUT OPERATING CONDITIONS

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. SIM Card is plugged to the EUT.
2. EUT connected to Notebook(A&D) via RJ45 Cable.
3. EUT connected to Adapter via DC Cable.
4. EUT connected to Notebook(C) via 5G WiFi function.
5. EUT connected to Notebook(B) via 2.4G WiFi function.
6. EUT connected to UXM 5G Wireless TEST Platform via 5G NR function.
7. EUT connected to Wideband Radio Communication Tester via LTE function.
8. EUT connected to Wireless Communication Test Set via WCDMA function.

2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



2.5 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.	Series No.
A	Notebook	Lenovo	V310-14ISK	LR07GZHC
B	Notebook	Lenovo	V310-14ISK	LR07GZNB
C	Notebook	Lenovo	V310-14ISK	LR07GZML
D	Notebook	Lenovo	V310-14IKB	LR07SH58
E	SIM	N/A	N/A	N/A
F	Wideband Radio Communication Tester	RS	CMW500	122125
G	UXM 5G Wireless TEST Platform	KEYSIGHT	E7515B	MY59110295
H	Wireless Communication Test Set	Agilent	(8960 series)E5515C	MY48364189

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

3. EMC EMISSION TEST

3.1 RADIATED EMISSIONS UP TO 1 GHZ

3.1.1 LIMITS

Class B equipment up to 1 GHz

Frequency Range MHz	Measurement			Class B limits dB(μV/m)
	Facility	Distance m	Detector type/ bandwidth	
30 - 230	SAC	3	Quasi peak / 120 kHz	40
230 - 1000				47

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

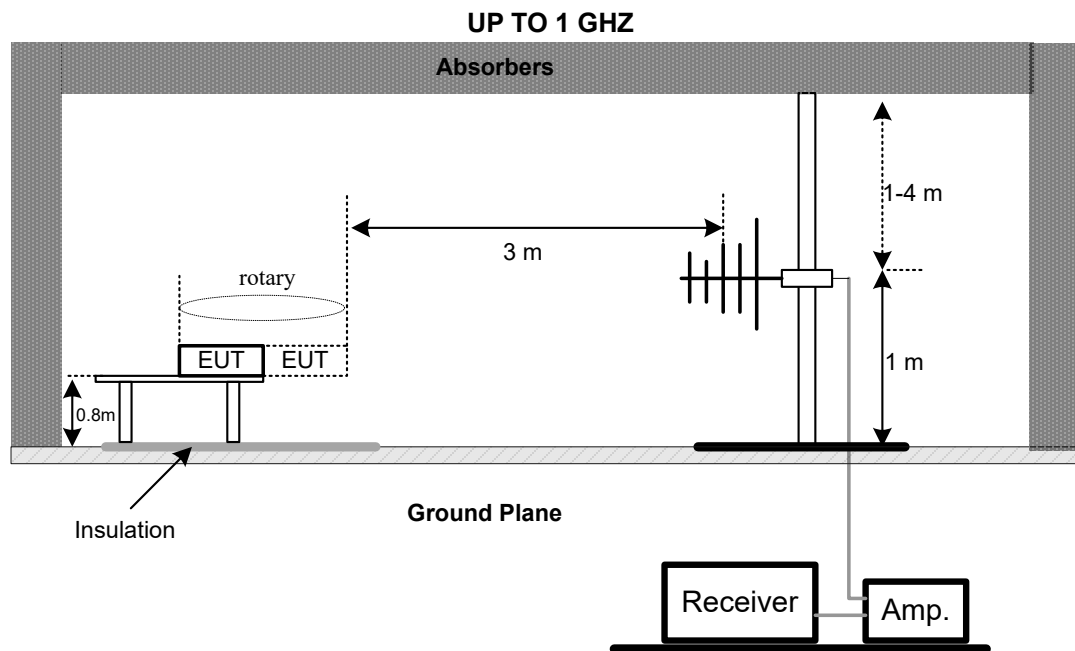
3.1.2 TEST PROCEDURE

- a. 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).
- b. 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.
- c. 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.
- d. 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)
- e. For the actual test configuration, please refer to the related Item - Block Diagram of system tested.
- f. For EN 301489-3:
 For transmitters:
 The exclusion band shall be those frequencies specified in the relevant radio standard as the operating frequency band and the Out of Band domain.
 Where this is not so specified the exclusions bands shall be as below:
 1. For transmitters operating, or intended to operate, in a channelized frequency band, the exclusion band is five times (i.e. $\pm 250\%$) the maximum operating channel width (OCW) allowed for that service, centred around the operating frequency.
 2. For wide band transmitters, i.e. transmitters in a non-channelized frequency band, the exclusion band is twice the intended operating frequency band centred around the centre frequency of the intended operating frequency band.
 The exclusion band shall only apply when the EUT is in transmit mode of operation.
- g. For EN 301489-3:
 For receivers:
 No exclusion band applies.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



3.1.5 MEASUREMENT DISTANCE

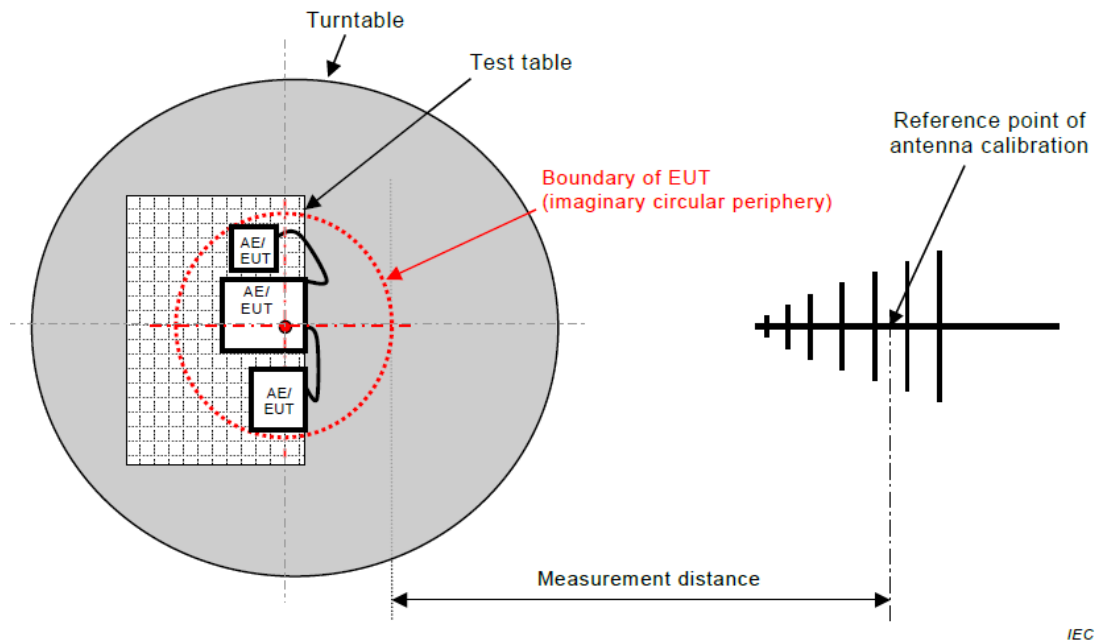


Figure C.1 – Measurement distance

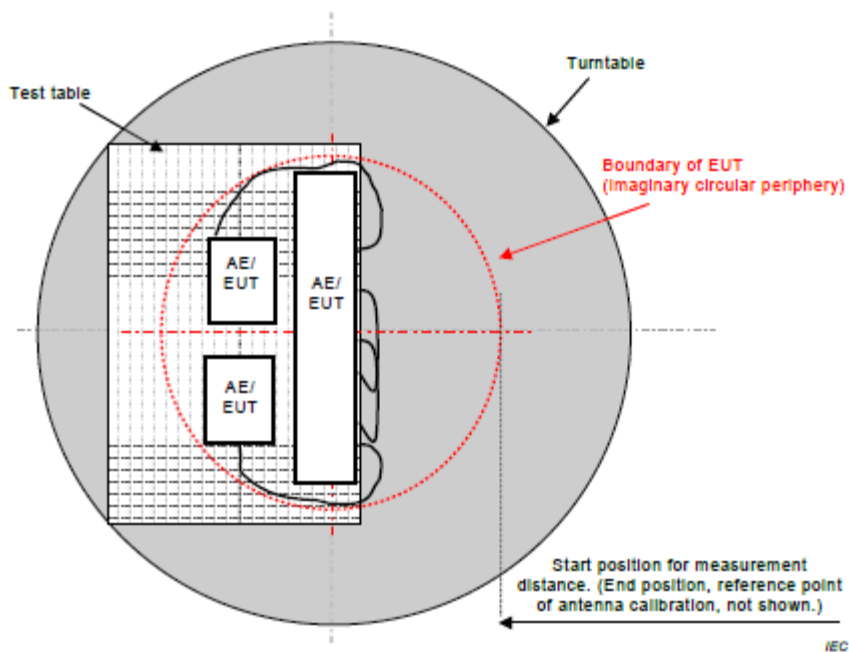


Figure C.2 – Boundary of EUT, Local AE and associated cabling

3.1.6 TEST RESULTS (UP TO 1 GHZ)

Please refer to the Appendix A.

3.2 RADIATED EMISSIONS ABOVE 1 GHZ

3.2.1 LIMITS

Class B equipment above 1 GHz

Frequency Range MHz	Measurement			Class B limits dB(μV/m)
	Facility	Distance m	Detector type/bandwidth	
1000 - 3000	FSOATS	3	Average / 1 MHz	50
3000 - 6000				54
1000 - 3000			Peak / 1 MHz	70
3000 - 6000				74

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)	Highest measured frequency
F _x ≤108 MHz	1 GHz
108<F _x ≤500 MHz	2 GHz
500<F _x ≤1000 MHz	5 GHz
F _x >1 GHz	5 x F _x up to a maximum of 6 GHz

3.2.2 TEST PROCEDURE

- a. 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).
- b. 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.
- c. 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.
- d. 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)
- e. For the actual test configuration, please refer to the related Item - Block Diagram of system tested.
- f. For EN 301489-17:
 For transmitters:
 The frequencies on which the transmitter part of the EUT is intended to operate shall be excluded from radiated emission measurements when performed in transmit mode of operation.
- g. For EN 301489-17:
 For receivers:
 There shall be no frequency exclusion band applied to emission measurements of the receiver part of transceivers or the stand alone receiver under test, and/or associated ancillary equipment.

h. For EN 301489-3:

For transmitters:

The exclusion band shall be those frequencies specified in the relevant radio standard as the operating frequency band and the Out of Band domain.

Where this is not so specified the exclusions bands shall be as below:

1. For transmitters operating, or intended to operate, in a channelized frequency band, the exclusion band is five times (i.e. $\pm 250\%$) the maximum operating channel width (OCW) allowed for that service, centred around the operating frequency.
2. For wide band transmitters, i.e. transmitters in a non-channelized frequency band, the exclusion band is twice the intended operating frequency band centred around the centre frequency of the intended operating frequency band.

The exclusion band shall only apply when the EUT is in transmit mode of operation.

i. For EN 301489-3:

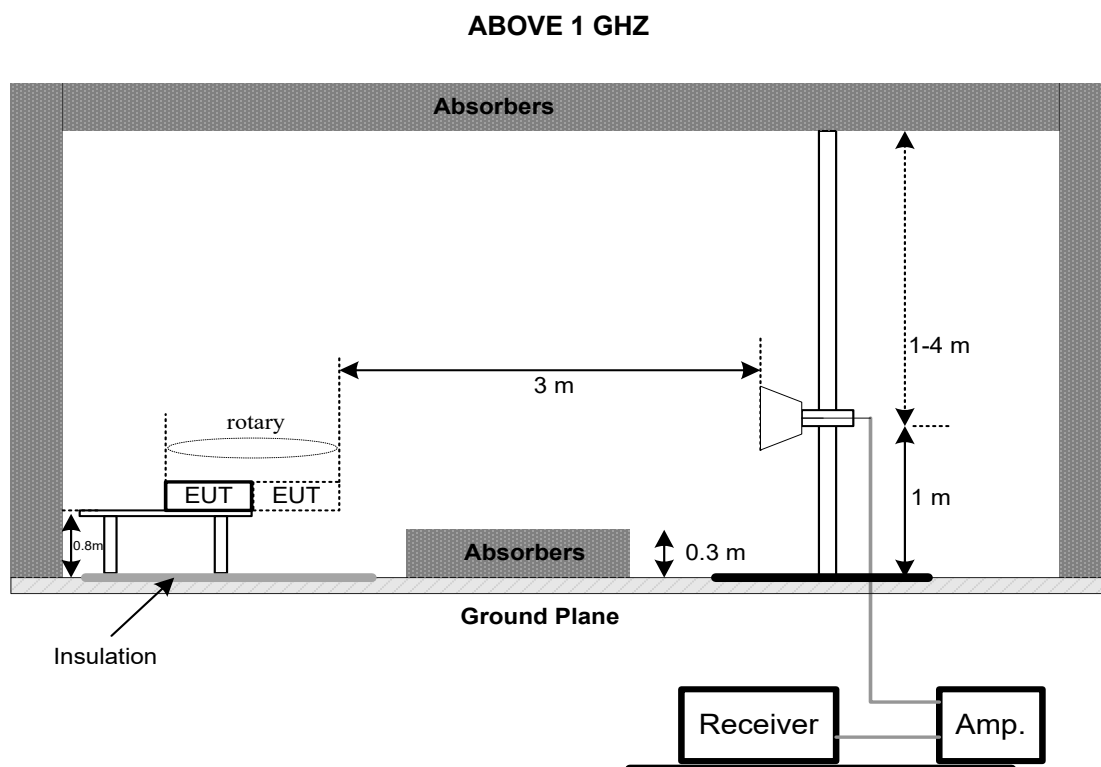
For receivers:

No exclusion band applies.

3.2.3 DEVIATION FROM TEST STANDARD

No deviation

3.2.4 TEST SETUP



3.2.5 MEASUREMENT DISTANCE

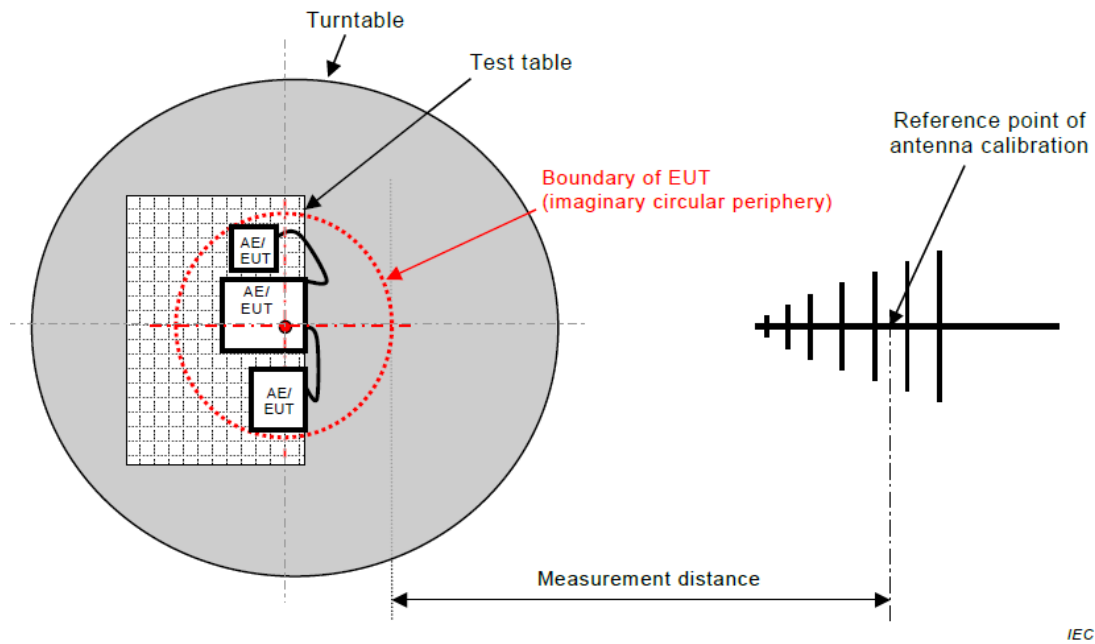


Figure C.1 – Measurement distance

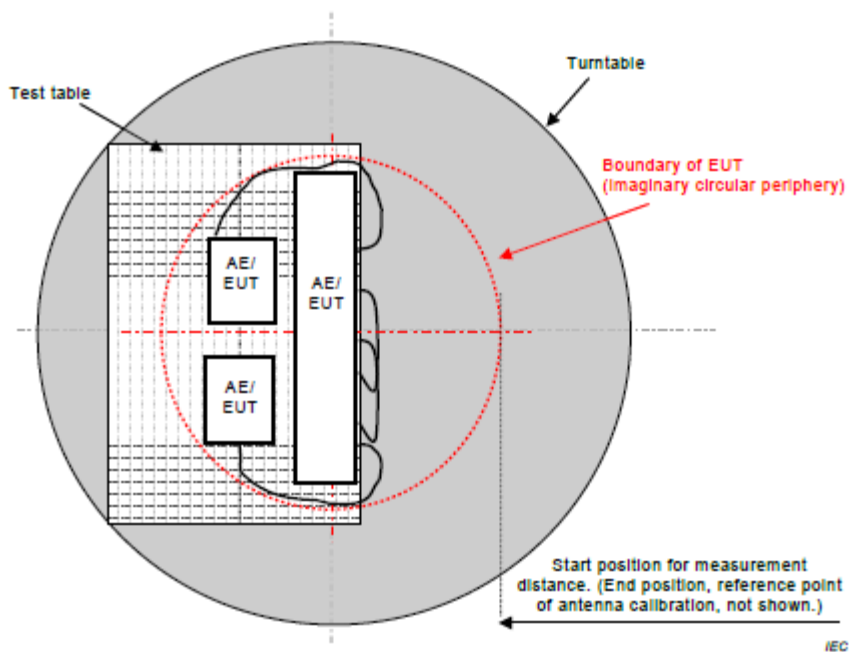


Figure C.2 – Boundary of EUT, Local AE and associated cabling

3.2.6 TEST RESULTS (ABOVE 1 GHZ)

Please refer to the Appendix B.

3.3 CONDUCTED EMISSION MEASUREMENT AT AC MAINS POWER PORTS

3.3.1 LIMITS

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

Frequency Range MHz	Coupling Device	Detector Type / bandwidth	Class B Limits (dB(μV))
0.15 - 0.5	AMN	Quasi Peak / 9 kHz	66-56
0.5 - 5			56
5 - 30			60
0.15 - 0.5	AMN	Average / 9 kHz	56-46
0.5 - 5			46
5 - 30			50

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

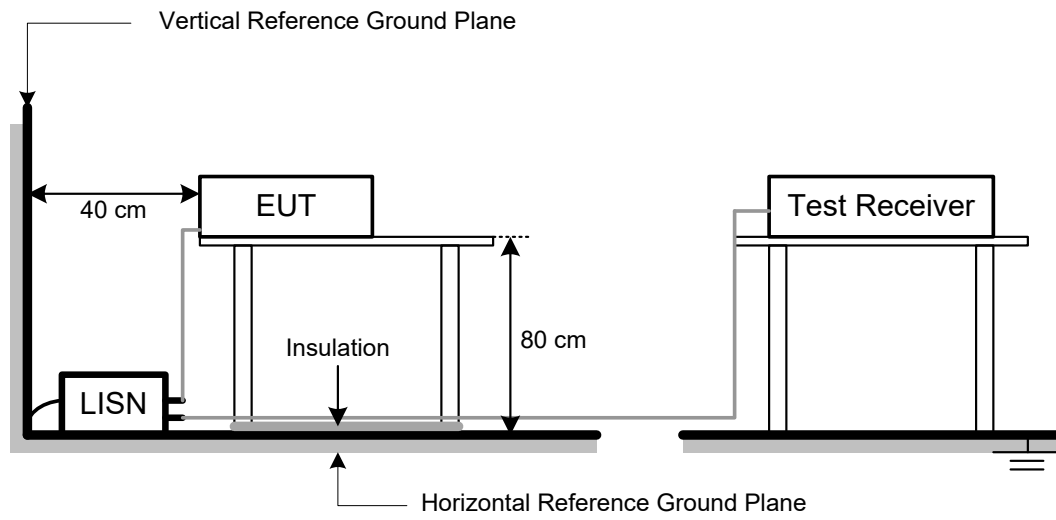
3.3.2 TEST PROCEDURE

- 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.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.
- For EN 301489-3:
For transmitters:
The exclusion band shall be those frequencies specified in the relevant radio standard as the operating frequency band and the Out of Band domain.
Where this is not so specified the exclusions bands shall be as below:
 - For transmitters operating, or intended to operate, in a channelized frequency band, the exclusion band is five times (i.e. $\pm 250\%$) the maximum operating channel width (OCW) allowed for that service, centred around the operating frequency.
 - For wide band transmitters, i.e. transmitters in a non-channelized frequency band, the exclusion band is twice the intended operating frequency band centred around the centre frequency of the intended operating frequency band.
The exclusion band shall only apply when the EUT is in transmit mode of operation.
- For EN 301489-3:
For receivers:
No exclusion band applies.

3.3.3 DEVIATION FROM TEST STANDARD

No deviation

3.3.4 TEST SETUP



3.3.5 TEST RESULTS

Please refer to the Appendix C.

3.4 ASYMMETRIC MODE CONDUCTED EMISSIONS TEST

3.4.1 LIMITS

Requirements for asymmetric mode conducted emissions from Class B equipment

Frequency Range MHz	Coupling device	Detector type / Bandwidth	Class B voltage limits dB(μV)	Class B current limits dB(μA)
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	

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

3.4.2 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.

NOTE:

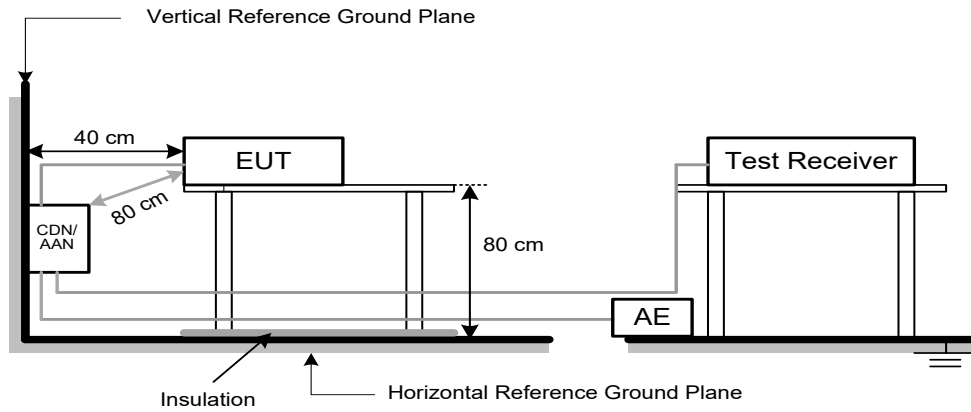
- The communication function of EUT was executed and AAN was connected between EUT and associated equipment and the AAN was connected directly to reference ground plane.
Measure the voltage at the measurement port of the AAN
Correct the measured voltage by adding the AAN voltage division factor
Compare the corrected voltage with the limit.

3.4.3 DEVIATION FROM TEST STANDARD

No deviation

3.4.4 TEST SETUP

a) Cable Type: Balanced Unscreened, Screened or Coaxial



3.4.5 TEST RESULTS

Please refer to the Appendix D.

3.5 HARMONIC CURRENT EMISSIONS TEST

3.5.1 LIMITS

The power consumption is less than 75W, there is no limit applied.

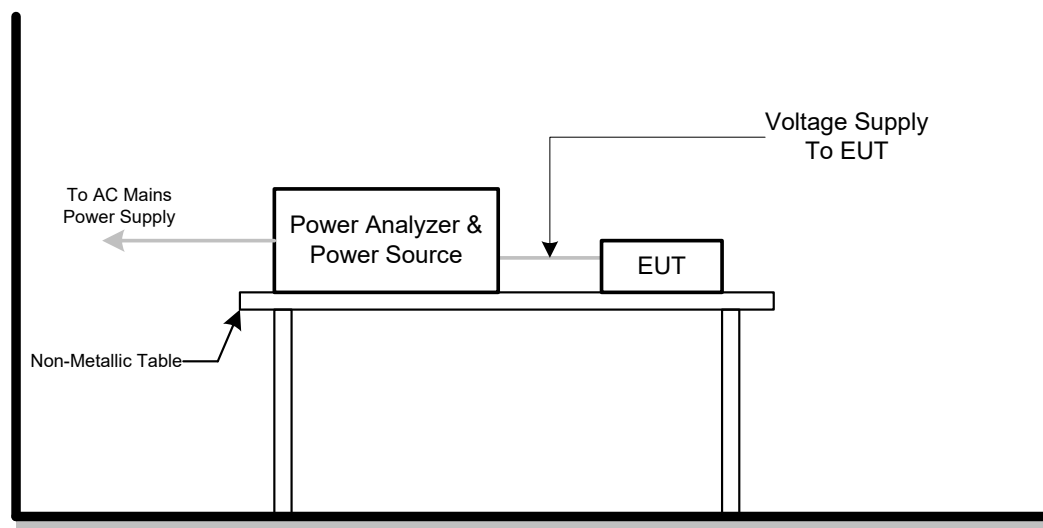
3.5.2 TEST PROCEDURE

- 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 of EN IEC 61000-3-2. The EUT is classified as Class D.
- The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.

3.5.3 DEVIATION FROM TEST STANDARD

No deviation

3.5.4 TEST SETUP



3.5.5 TEST RESULTS

Please refer to the Appendix E.

3.6 VOLTAGE FLUCTUATIONS AND FLICKER

3.6.1 LIMITS

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

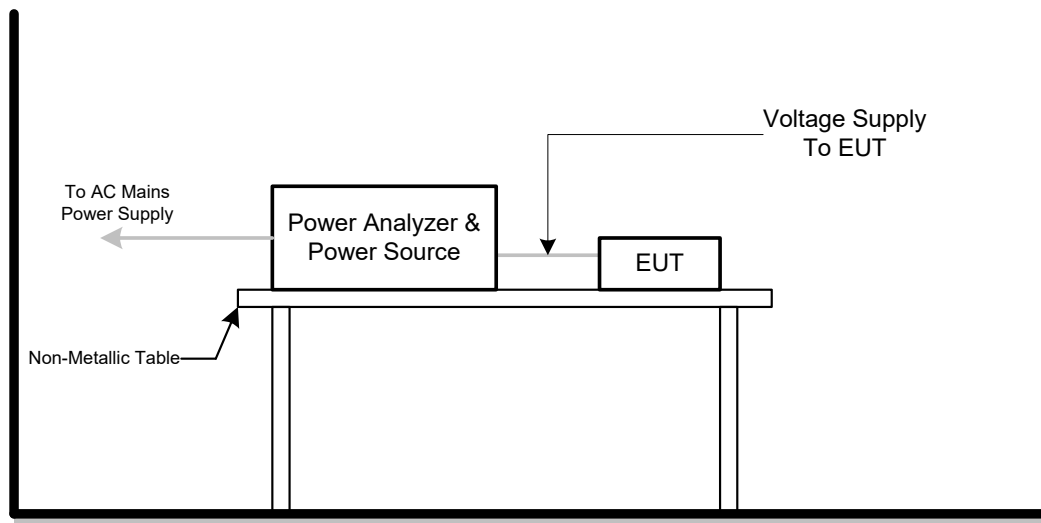
3.6.2 TEST PROCEDURE

- 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.

3.6.3 DEVIATION FROM TEST STANDARD

No deviation

3.6.4 TEST SETUP



3.6.5 TEST RESULTS

Please refer to the Appendix F.

4. EMC IMMUNITY TEST

4.1 STANDARD COMPLIANCE/SEVERITY LEVEL/CRITERIA

Equipment operating in locations other than telecommunication centres			
Test Standard No.	Test Specification Level	Test Mode Test Port	Performance Criteria
Electrostatic discharge EN 61000-4-2 (ESD)	± 8 kV air discharge	Direct Mode	B
	± 4 kV contact discharge		
	± 4 kV HCP discharge	Indirect Mode	B
	± 4 kV VCP discharge		
Radio frequency electromagnetic Field EN IEC 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 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 EN 61000-4-5 (Surge)	±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)	B

Radio frequency, common mode EN 61000-4-6 (CS)	0.15 MHz to 80 MHz 3 V (unmodulated, r.m.s), 1000 Hz or 400 Hz, 80%, AM Modulated 150Ω source impedance (NOTE 1)	AC Power Port	A
	0.15 MHz to 80 MHz 3 V (unmodulated, r.m.s), 1000 Hz or 400 Hz, 80%, AM Modulated 150Ω source impedance (NOTE 1)	DC Power Port (NOTE 2)	A
	0.15 MHz to 80 MHz 3V (unmodulated, r.m.s), 1000 Hz or 400 Hz, 80%, AM Modulated 150Ω source impedance (NOTE 1)	signal ports, wired network ports, control ports (NOTE 2)	A
Voltage dips and interruptions EN IEC 61000-4-11 (Dips)	Voltage dips: 0 % residual voltage for 0,5 cycle 0 % residual voltage for 1 cycle 70 % residual voltage for 25 cycles (at 50 Hz) Voltage interruptions: 0 % residual voltage for 250 cycles (at 50 Hz)	AC Power Port	B B C C

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).

4.2 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 301 489-3** standard, the general performance criteria as following:

Criteria	Performance Description
A	During the test, the equipment shall: <ul style="list-style-type: none"> • continue to operate as intended; • not unintentionally transmit; • not unintentionally change its operating state; • not unintentionally change critical stored data.
B	For all ports and transient phenomena with the exception described below, the following applies: <ul style="list-style-type: none"> • The application of the transient phenomena shall not result in a change of the mode of operation (e.g. unintended transmission) or the loss of critical stored data. • After application of the transient phenomena, the equipment shall operate as intended. For surges applied to symmetrically operated wired network ports intended to be connected directly to outdoor lines the following criteria applies: <ul style="list-style-type: none"> • For products with only one symmetrical port intended for connection to outdoor lines, loss of function is allowed, provided the function is self-recoverable, or can be otherwise restored. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost. • For products with more than one symmetrical port intended for connection to outdoor lines, loss of function on the port under test is allowed, provided the function is self-recoverable. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.
C	For a 70 % residual voltage dip and voltage interruption tests, <ul style="list-style-type: none"> • in the case where the equipment is powered solely from the AC mains supply (without the use of a parallel battery back-up) volatile user data may have been lost and if applicable the communication link need not to be maintained and lost functions should be recoverable by user or operator; • no unintentional responses shall occur at the end of the test, when the voltage is restored to nominal;

Note:

Criterion A applies for immunity tests with phenomena of a continuous nature. (CT, CR)

Criterion B applies for immunity tests with phenomena of a transient nature. (TT, TR)

Criterion C applies for immunity tests with power dips 70% and power interruptions exceeding a certain time where the equipment is powered solely from the AC mains supply (without the use of a parallel battery back-up).

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

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

Minimum performance level

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

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

According to **ETSI EN 301 489-52** standard, the general performance criteria as following:

UTRA / E-UTRA, E-UTRA with LAA, inband or guard band NB-IoT, Stand-alone NB-IoT / NR Performance Criteria		
1.	Performance criteria for continuous phenomena(CT/CR)	
2.	Performance criteria for Transient phenomena(TT/TR)	

Criteria		During / After Test
A	CT/CR	<p>UTRA: In the data transfer mode, the performance criteria can be one of the following: If the BER is used, it shall not exceed 0,001 during the test sequence; If the BLER is used, it shall not exceed 0,01 during the test sequence. The BLER calculation shall be based on evaluating the CRC on each transport block. When testing a voice call, the voice call performance criteria shall apply.</p> <p>E-UTRA, E-UTRA with LAA, inband or guard band NB-IoT, Stand-alone NB-IoT: In the data transfer mode, the performance criteria shall be that the throughput shall be $\geq 95\%$ of the maximum throughput. When testing a voice call, the voice call performance criteria shall apply.</p> <p>NR: In the data transfer mode, the performance criteria shall be that the throughput shall be $\geq 95\%$ of the maximum throughput. When testing a voice call, the voice call performance criteria shall apply.</p>
B	TT/TR	<p>At the conclusion of each exposure, the EUT shall operate with no user noticeable loss of the communication link.</p> <p>At the conclusion of the total test comprising the series of individual exposures, the EUT shall operate as intended with no loss of user control functions or stored data.</p> <p>In addition where the EUT supports idle mode it should be verified that the transmitter shall not unintentionally operate when transient phenomena are applied.</p>
C	See Note	<p>The user data may have been lost and if applicable the communication link need not to be maintained and lost function should be recoverable by user or operator.</p> <p>No unintentional responses shall occur at the end of the test, when the voltage is restored to nominal.</p>

Note:

Criterion A applies for immunity tests with phenomena of a continuous nature. (CT, CR)

Criterion B applies for immunity tests with phenomena of a transient nature. (TT, TR)

Criterion C applies for immunity tests with power dips 70% and power interruptions exceeding a certain time where the equipment is powered solely from the AC mains supply (without the use of a parallel battery back-up)

4.3 ELECTROSTATIC DISCHARGE (ESD)

4.3.1 TEST SPECIFICATION

Test Method	EN 61000-4-2
Discharge Impedance	330 ohm / 150 pF
Required Performance	B
Discharge Voltage	Air Discharge: ± 2 kV, ± 4 kV, ± 8 kV Contact Discharge: ± 4 kV
Polarity	Positive & Negative
Number of Discharge	20 times at each test point
Discharge Mode	Single Discharge
Discharge Period	1 second

4.3.2 TEST PROCEDURE

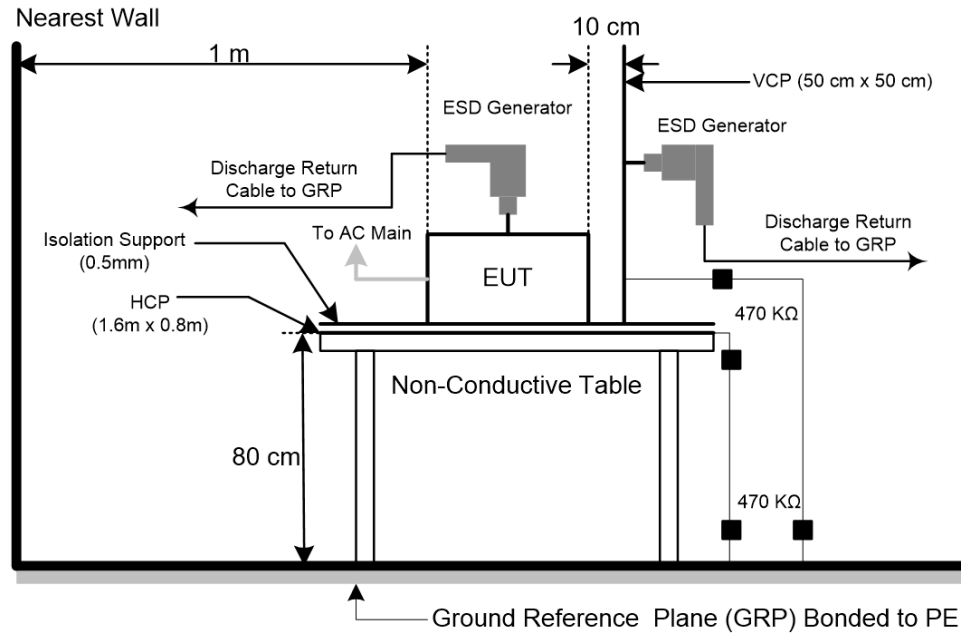
The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manner:

- a. The test shall be performed with single discharges. On each pre-selected point at least 10 single discharges (in the most sensitive polarity) shall be applied.
 NOTE 1 The minimum number of discharges applied is depending on the EUT; for products with synchronized circuits the number of discharges should be larger.
 For the time interval between successive single discharges an initial value of 1 s is recommended. Longer intervals may be necessary to determine whether a system failure has occurred.
 NOTE 2 The points to which the discharges should be applied may be selected by means of an exploration carried out at a repetition rate of 20 discharges per second, or more.
 Vertical Coupling Plane (VCP):
 The coupling plane, of dimensions 0.5m 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.
- c. For 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 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.

4.3.3 DEVIATION FROM TEST STANDARD

No deviation.

4.3.4 TEST SETUP



4.3.5 TEST RESULTS

Please refer to the Appendix G.

4.4 RADIO FREQUENCY ELECTROMAGNETIC FIELD (RS)

4.4.1 TEST SPECIFICATION

Test Method	EN IEC 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
Frequency Step	1% of the preceding frequency.
Polarity of Antenna	Horizontal and Vertical
Test Distance	3 m
Antenna Height	1.55 m
Dwell Time	3 seconds

4.4.2 TEST PROCEDURE

The EUT and support equipment are in a fully-anechoic chamber.

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

For TABLE-TOP equipment:

The EUT installed in a representative system as described in EN IEC 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.

The other condition as following manner:

- a. 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.
The test shall be performed over the frequency range 80 MHz to 6000 MHz.
For receivers and transmitters the stepped frequency increments shall be 1% of the preceding frequency.
- b. For EN 301489-17:
The exclusion band of equipment operating in the 2,4 GHz band shall be:
 - Lower limit of exclusion band = lowest allocated band edge frequency -120 MHz
 - Upper limit of exclusion band = highest allocated band edge frequency +120 MHz

The exclusion band of equipment operating in the 5 GHz Wi-Fi band shall be:

 - Lower limit of exclusion band = lowest allocated band edge frequency -320 MHz
 - Upper limit of exclusion band = highest allocated band edge frequency +320 MHz
- c. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- d. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.
- e. For EN 301489-17:
PER or FER performance monitoring:
The EUT was establish link with signaling unit, reduce power to point of link failure then increase by no more than 30 dB, Observe PER or FER test results with the Performance Monitor Device during the application of the required EMC Test Signal.
- f. For EN 301489-3:
For transmitters operating, or intended to operate, in a channelized frequency band, the exclusion band is five times (i.e. ± 250 %) the maximum operating channel width (OCW) allowed for that service, centred around the operating frequency.
- g. For EN 301489-3:
For wide band transmitters, i.e. transmitters in a non-channelized frequency band, the exclusion band is twice the intended operating frequency band centred around the centre frequency of the intended operating frequency band.

h. For EN 301489-3:

For receivers: The exclusion band is based on the lower edge (FOC_{low}) and the upper edge (FOC_{high}) and the centre (f_0) of the Operating Channel (OC). Where the OC is defined in the applicable harmonised radio standard, the values for that shall be used and f_0 shall be the centre of the OC. In all other cases, f_0 shall be the receiver operating frequency and the OC shall be $\pm 0,05\%$ around f_0 . The lower limit of exclusion band and upper limit of exclusion band is given in below table.

Lower edge of OC, FOC_{low}	Lower limit of exclusion band
< 3 MHz	0
3 MHz to < 30 MHz	$FOC_{low} - 3\text{ MHz}$
30 MHz to < 42 MHz	27 MHz
42 MHz to < 1 GHz	$FOC_{low} - 15\text{ MHz}$, or $FOC_{low} - 0,05 \times f_0$, whichever is lower
1 GHz to < 1,05 GHz	950 MHz
1,05 GHz to < 6 GHz	$FOC_{low} - 100\text{ MHz}$
6 GHz to < 6,3 GHz	5,9 GHz
$\geq 6,3\text{ GHz}$	$FOC_{low} - 0,05 \times f_0$

Upper edge of OC, FOC_{high}	Upper limit of exclusion band
< 300 kHz	$FOC_{high} + 300\text{ kHz}$
300 kHz to < 30 MHz	$FOC_{high} + 3\text{ MHz}$
30 MHz to < 42 MHz	$FOC_{high} + 5\text{ MHz}$
42 MHz to < 1 GHz	$FOC_{high} + 15\text{ MHz}$, or $FOC_{high} + 0,05 \times f_0$, whichever is higher
1 GHz to < 6 GHz	$FOC_{high} + 100\text{ MHz}$
$\geq 6\text{ GHz}$	$FOC_{high} + 0,05 \times f_0$

i. For EN 301489-52:

CDMA Direct Spread (UTRA and E-UTRA) Transmitter exclusion band:

UTRA:

The frequency bands including in band emissions and out of band emissions are covered by the RF spectral mask specification and need no further consideration.

For the purpose of EMC specifications the transmitter exclusion band this shall be as defined in clause 4.3.2.2 of ETSI EN 301 489-1.

E-UTRA:

For the purpose of EMC specifications there shall be a transmitter exclusion band as defined in clause 4.3.2.2 of ETSI EN 301 489-1 where BW Channel is the channel bandwidth as defined in ETSI TS 136 101.

j. For EN 301489-52:

CDMA Direct Spread (UTRA and E-UTRA) Receiver exclusion band:

As defined in clause 4.3.3 of ETSI EN 301 489-1 where $n=1$ and Channel Width is as follows:

- UTRA Channel Width 5 MHz.
- E-UTRA Channel Width 20 MHz (see note).

Note: For systems that support multiple channel widths, the Channel Width used should be the widest support by the EUT.

k. For EN 301489-52:

NR FR1 SA and NSA Transmitter exclusion band:

For the purpose of EMC specifications there shall be a transmitter exclusion band as defined in clause 4.3.2.2 of ETSI EN 301 489-1 where BW Channel is the channel bandwidth as defined in ETSI TS 138 101-1.

l. For EN 301489-52:

NR FR1 SA and NSA Receiver exclusion band:

As defined in clause 4.3.3 of ETSI EN 301 489-1 where $n=1$ and Channel Width is as follows:

- NR Channel Width 100 MHz.
- E-UTRA Channel Width 20 MHz.

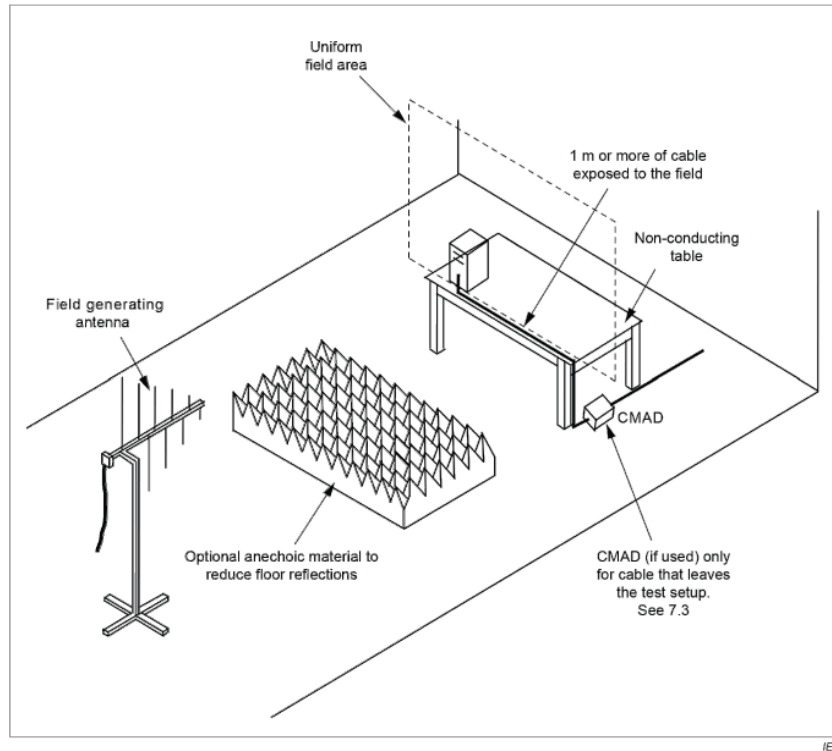
Note: For systems that support multiple channel widths, the Channel Width used should be the widest support by the EUT.

4.4.3 DEVIATION FROM TEST STANDARD

No deviation.

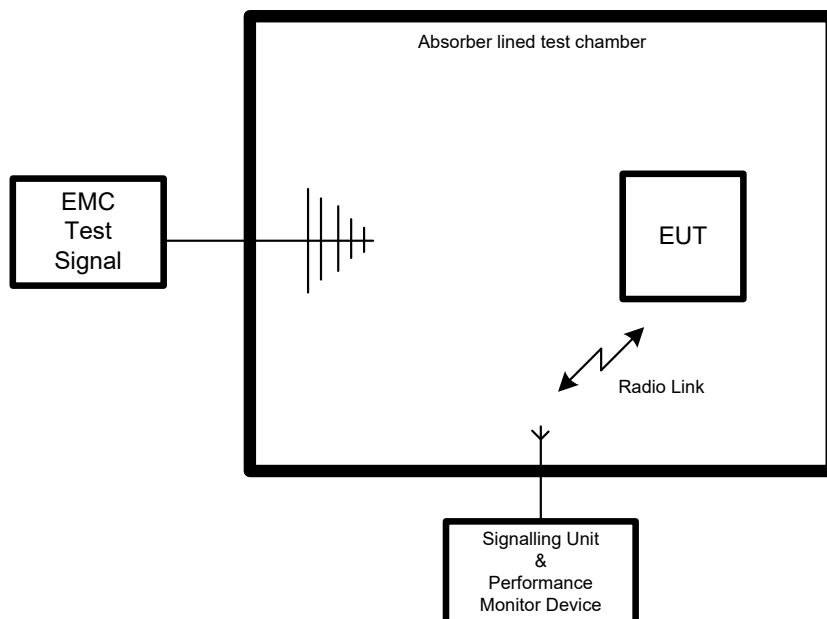
4.4.4 TEST SETUP

General



IEC

PER FOR EN 301489-17



4.4.5 TEST RESULTS

Please refer to the Appendix H.

4.5 FAST TRANSIENTS, COMMON MODE (EFT)

4.5.1 TEST SPECIFICATION

Test Method	EN 61000-4-4
Required Performance	B
Test Voltage	AC power port: ± 1 kV Signal port, Wired network port, Control port: ± 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	1 min.

4.5.2 TEST PROCEDURE

For 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.

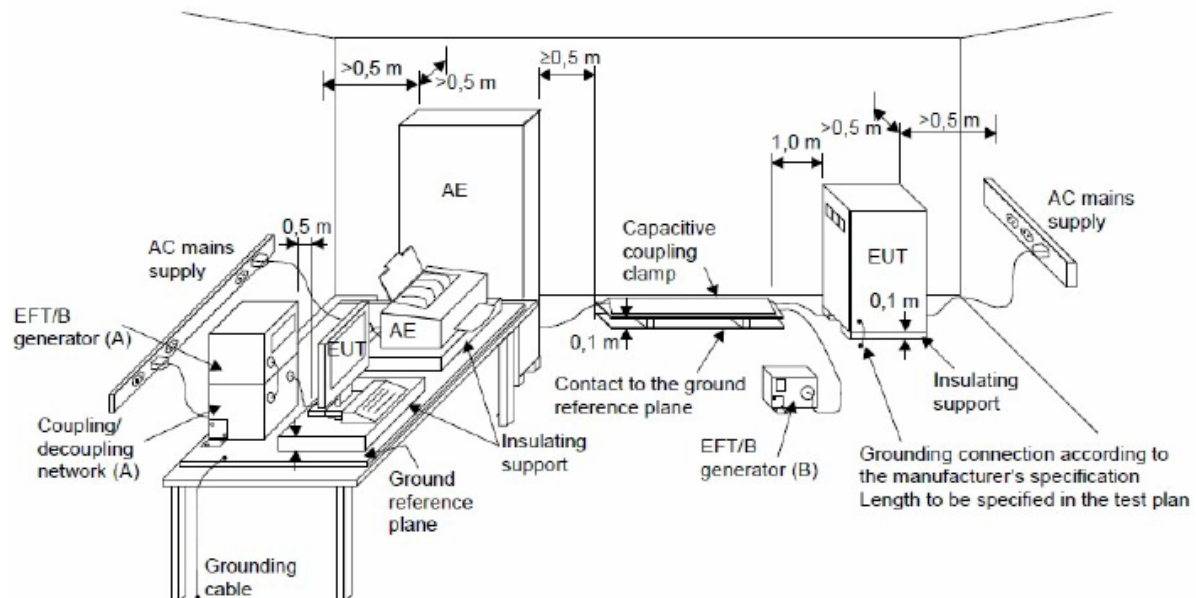
The other condition as following manner:

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

4.5.3 DEVIATION FROM TEST STANDARD

No deviation.

4.5.4 TEST SETUP



4.5.5 TEST RESULTS

Please refer to the Appendix I.

4.6 SURGE IMMUNITY TEST (SURGE)

4.6.1 TEST SPECIFICATION

Test Method	EN 61000-4-5
Required Performance	B
Wave-Shape	1.2/50(8/20) Tr/Th μ s combination wave
Test Voltage	AC Power Line: ± 0.5 kV, ± 1 kV Wired network ports: ± 0.5 kV
Generator Source Impedance	2 Ω of the low-voltage power supply network. 42 Ω (40 Ω +2 Ω) between all other signal lines and ground when use 1.2/50(8/20) waveform
Polarity	5 positive and 5 negative at selected points
Number of Tests & Polarity	AC Power Port: 0°/90°/180°/270°
Pulse Repetition Rate	1 time / min.

4.6.2 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 2 meters 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).

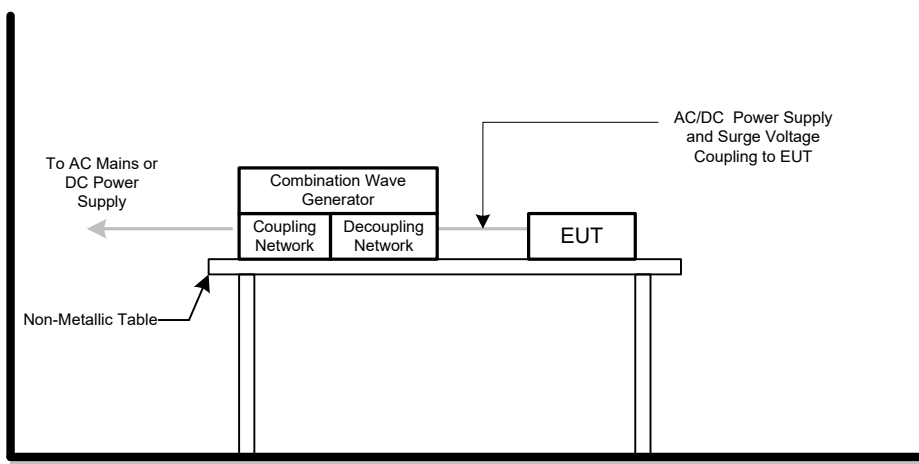
c. For test applied to unshielded symmetrically operated interconnection /telecommunication lines of EUT:

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).

4.6.3 DEVIATION FROM TEST STANDARD

No deviation.

4.6.4 TEST SETUP



4.6.5 TEST RESULTS

Please refer to the Appendix J.

4.7 RADIO FREQUENCY, COMMON MODE (CS)

4.7.1 TEST SPECIFICATION

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
Frequency Step	1% of fundamental
Dwell Time	3 seconds

4.7.2 TEST PROCEDURE

The equipment to be tested is placed on an insulating support of 0.1m height above a reference ground plane. All cables exiting the EUT shall be supported at a height of at least 30 mm above the reference ground plane. All relevant cables shall be provided with the appropriate coupling and decoupling devices at a distance between 0.1 meters and 0.3 meters from the projected geometry of the EUT on the ground reference plane.

The other condition as following manner:

- a. The test level shall be severity level 2 as given in EN 61000-4-6 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 1000 Hz.
- b. 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.
- c. 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.
- d. The injection method to be used shall be selected according to the basic standard EN 61000-4-6.
- e. 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.
- f. For EN 301489-17:
PER or FER performance monitoring:
The EUT was establish link with signaling unit, reduce power to point of link failure then increase by no more than 30 dB, Observe PER or FER test results with the Performance Monitor Device during the application of the required interference signal.
- g. For EN 301489-3:
For transmitters operating, or intended to operate, in a channelized frequency band, the exclusion band is five times (i.e. $\pm 250\%$) the maximum operating channel width (OCW) allowed for that service, centred around the operating frequency.
- h. For EN 301489-3:
For wide band transmitters, i.e. transmitters in a non-channelized frequency band, the exclusion band is twice the intended operating frequency band centred around the centre frequency of the intended operating frequency band.

i. For EN 301489-3:

For receivers: The exclusion band is based on the lower edge (FOC_{low}) and the upper edge (FOC_{high}) and the centre (f_0) of the Operating Channel (OC). Where the OC is defined in the applicable harmonised radio standard, the values for that shall be used and f_0 shall be the centre of the OC. In all other cases, f_0 shall be the receiver operating frequency and the OC shall be $\pm 0,05\%$ around f_0 . The lower limit of exclusion band and upper limit of exclusion band is given in below table.

Lower edge of OC, FOC_{low}	Lower limit of exclusion band
< 3 MHz	0
3 MHz to < 30 MHz	$FOC_{low} - 3\text{ MHz}$
30 MHz to < 42 MHz	27 MHz
42 MHz to < 1 GHz	$FOC_{low} - 15\text{ MHz}$, or $FOC_{low} - 0,05 \times f_0$, whichever is lower
1 GHz to < 1,05 GHz	950 MHz
1,05 GHz to < 6 GHz	$FOC_{low} - 100\text{ MHz}$
6 GHz to < 6,3 GHz	5,9 GHz
$\geq 6,3\text{ GHz}$	$FOC_{low} - 0,05 \times f_0$

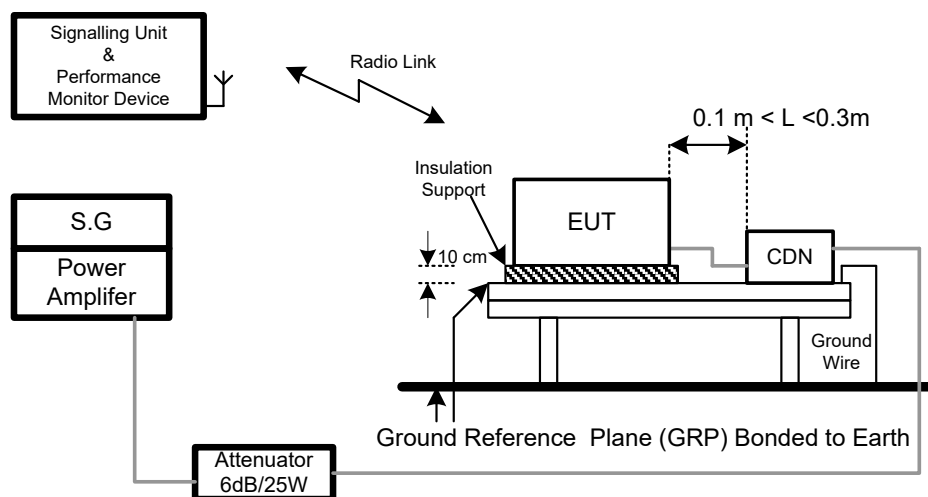
Upper edge of OC, FOC_{high}	Upper limit of exclusion band
< 300 kHz	$FOC_{high} + 300\text{ kHz}$
300 kHz to < 30 MHz	$FOC_{high} + 3\text{ MHz}$
30 MHz to < 42 MHz	$FOC_{high} + 5\text{ MHz}$
42 MHz to < 1 GHz	$FOC_{high} + 15\text{ MHz}$, or $FOC_{high} + 0,05 \times f_0$, whichever is higher
1 GHz to < 6 GHz	$FOC_{high} + 100\text{ MHz}$
$\geq 6\text{ GHz}$	$FOC_{high} + 0,05 \times f_0$

4.7.3 DEVIATION FROM TEST STANDARD

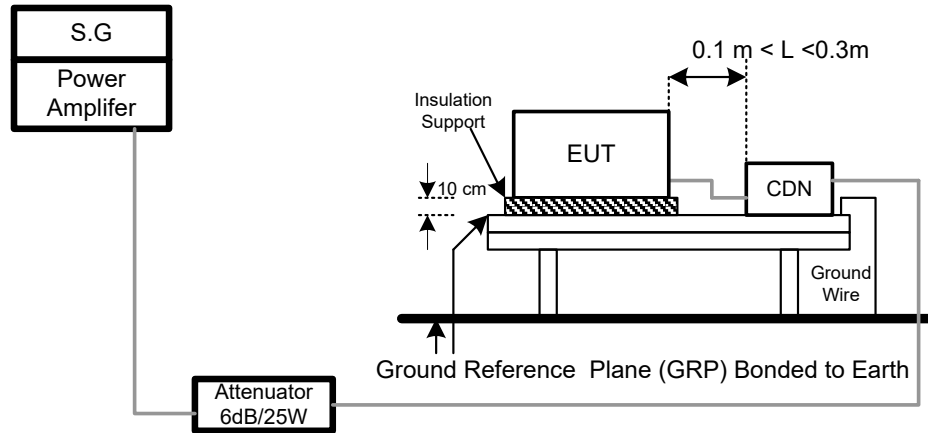
No deviation.

4.7.4 TEST SETUP

For EN 301489-17



For EN 301489-3&52



4.7.5 TEST RESULTS

Please refer to the Appendix K.

4.8 VOLTAGE DIPS AND INTERRUPTIONS (DIPS)

4.8.1 TEST SPECIFICATION

Test Method	EN IEC 61000-4-11
Required Performance	Voltage dips: B (0 % residual voltage for 0,5 cycle) B (0 % residual voltage for 1 cycle) C (70 % residual voltage for 25 cycles (at 50 Hz)) Voltage interruptions: C (0 % residual voltage for 250 cycles (at 50 Hz))
Interval between Event	ten seconds
Phase Angle	0°/180°
Test Cycle	3 times

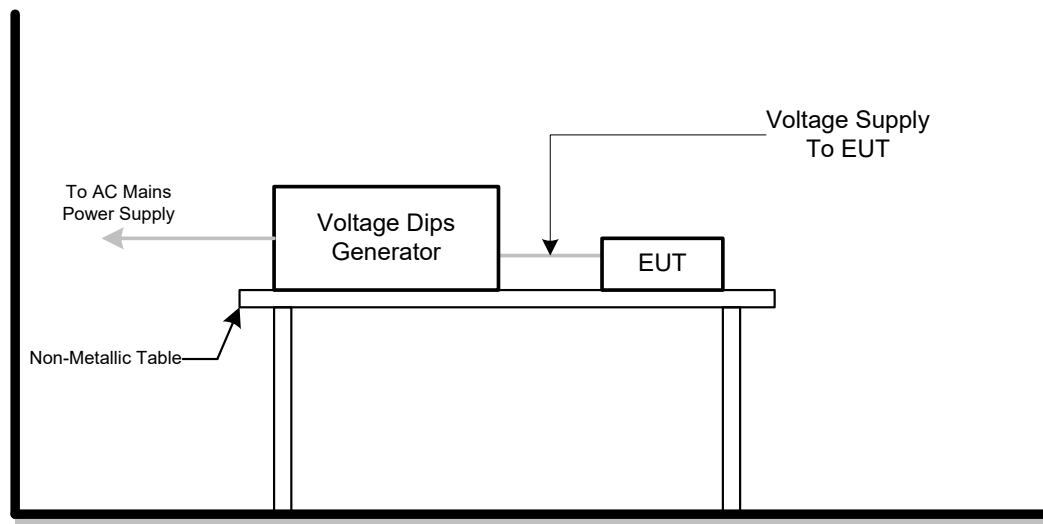
4.8.2 TEST PROCEDURE

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.

4.8.3 DEVIATION FROM TEST STANDARD

No deviation.

4.8.4 TEST SETUP



4.8.5 TEST RESULTS

Please refer to the Appendix L.

5. MEASUREMENT INSTRUMENTS LIST

Radiated emission up to 1GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	ETS	3142C	47662	Dec. 01, 2024
2	Amplifier	EMC INSTRUMENT	EMC001330	980987	Nov. 17, 2024
3	MXE EMI Receiver	Keysight	N9038A	MY56400091	Dec. 22, 2024
4	Cable	RW	LMR-400(30MHz-1GHz)(12m+9.5m+0.8M)	N/A	Nov. 27, 2024
5	Controller	ETS-Lindgren	2090	N/A	N/A
6	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Radiated emission above 1GHz					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Cable	RW	LMR-400(1GHz-18GHz)(9.5m+2.5m+1M)	N/A	Nov. 27, 2024
2	Controller	ETS-Lindgren	2090	N/A	N/A
3	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
4	Double-Ridged Waveguide Horn Antennas	ETS-LINDGREN	3117-PA	224991	Apr. 14, 2024
5	MXA Signal Analyzer	Keysight	N9020B	MY57100162	Dec. 22, 2024
6	Preamplifier	ETS-LINDGREN	3117-PA	224991	Jun. 17, 2024

Conducted emission at AC mains power port					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	TWO-LINE V-NETWORK	R&S	ENV216	102771	Sep. 24, 2024
2	EMI Test Receiver	R&S	ESCI	100895	Feb. 09, 2024
3	Cable	N/A	RG400	N/A	Mar. 06, 2024
4	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A

Asymmetric mode conducted emissions

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	IMPEDANCE STABILIZATION NETWORK	TESEQ	ISN T800	60379	Jul. 07, 2024
2	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
3	Coaxial load	SHX	TF5-3	211020254	Feb. 09, 2024
4	TWO-LINE V-NETWORK	R&S	ENV216	102771	Sep. 24, 2024
5	EMI Test Receiver	R&S	ESCI	100895	Feb. 09, 2024
6	Cable	N/A	RG400	N/A	Mar. 06, 2024

Harmonic current emissions & Voltage fluctuations and flicker

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Harmonic current/voltage wave analyzer	EMC Partner	HAR1000-1P230V	103488-0270	Sep. 21, 2024
2	Measurement Software	EMC-PARTNER	Harmonics-1000	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. 12, 2024

Radio frequency electromagnetic Field

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	ETS	3142C	66462	Mar. 25, 2024
2	Amplifier	AR	50S1G4A	326720	Dec. 22, 2024
3	MXG Analog Signal Generator	Agilent	N5181A	MY49060710	Jun. 17, 2024
4	Power amplifier	MILMEGA	AS1860-50	1064834	Dec. 22, 2024
5	Microwave Log.-Per. Antenna	Schwarzbeck	STLP 9149	9149-277	Apr. 14, 2024
6	Power amplifier	MILMEGA	80RF1000-250	1064833	Dec. 22, 2024
7	Wireless Communication Test SET	Agilent	E5515C	MY48364183	Dec. 22, 2024
8	wideband radio communication tester	R&S	CMW500	152372	Dec. 22, 2024
9	Measurement Software	Farad	(EZ-RS)V2.0.1.3	N/A	N/A
10	5G Wireless Test Platform	Starpoint	SP9500	SP9500-20335	Feb. 10, 2024

Fast transients, common mode					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Fast Transient Burst Simulator	Prima	EFT61004TA	PR190741004	Jun. 16, 2024
2	Measurement Software	Prima	EFT_Series V1.0.0 .0.20180710	N/A	N/A

Surge					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Lightning Surge Generator	Prima	SUG61005TB	PR190854067	Jun. 16, 2024
2	Measurement Software	Prima	SUG_Series V1.0.0.7.20190827	N/A	N/A
3	CDN	EMC PARTNER	CDN-UTP8	40	Dec. 22, 2024
4	Lightning Surge Generator	3ctest	CWS 1000N	ES058003022011	Dec. 22, 2024

Radio frequency, common mode					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	TEST SYSTEM FOR CONDUCTED AND RADIATED IMMUNITY	TESEQ	NSG 4070B	37513	Jun. 16, 2024
2	Attenuator	Teseq	100-SA-FFN-06	163357	Jun. 16, 2024
3	Measurement Software	Farad	EZ-CS (V2.0.1.4)	N/A	N/A
4	Power CDN	FCC	FCC-801-M2/M3-16A	100270	Dec. 22, 2024
5	Coupling Decoupling Network	Teseq GmbH	CDN M016	35834	Jun. 16, 2024
6	Coupling Decoupling Network	Teseq GmbH	CDN T8-10	40373	Jun. 16, 2024
7	wideband radio communication tester	R&S	CMW500	152372	Dec. 22, 2024
8	Wireless Communication Test SET	Agilent	E5515C	MY48364183	Dec. 22, 2024
9	5G Wireless Test Platform	Starpoint	SP9500	SP9500-20335	Feb.10.2024

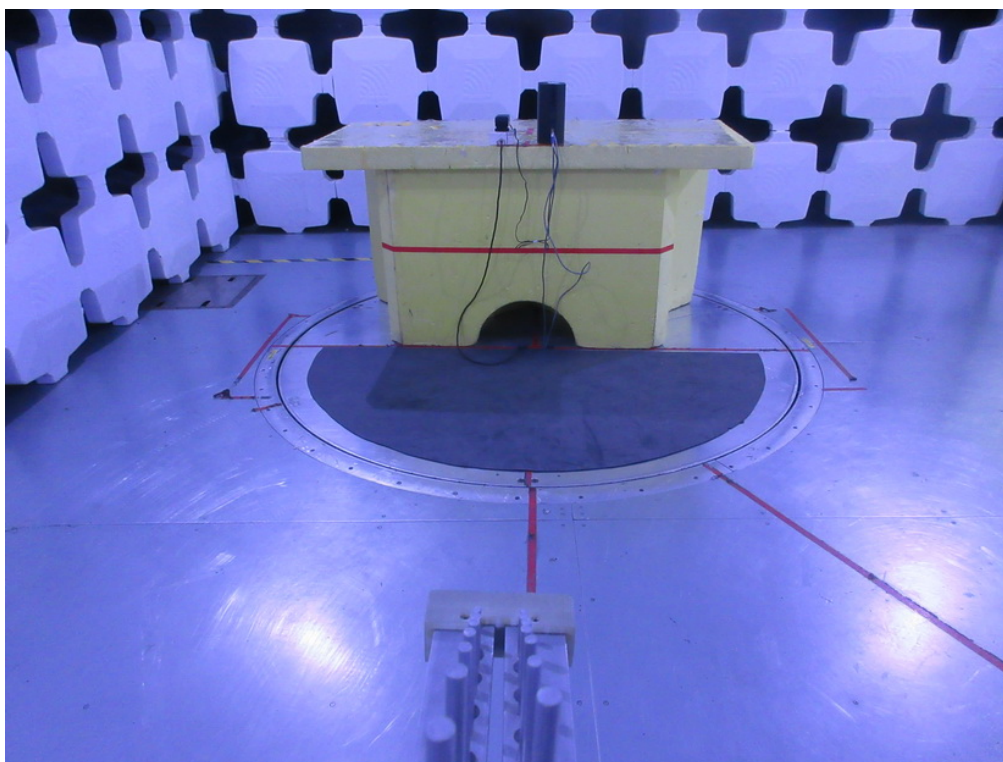
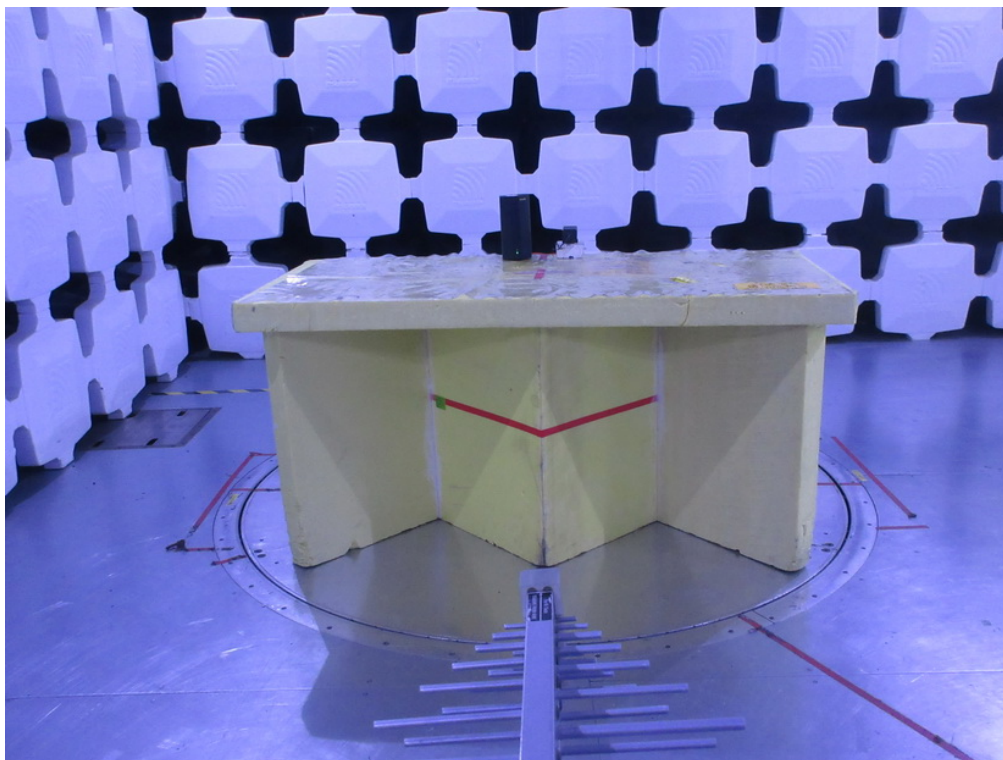
Voltage dips and interruptions					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Cycle Sag Simulator	Prima	DRP61011TA	PR19076452	Jun. 16, 2024

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

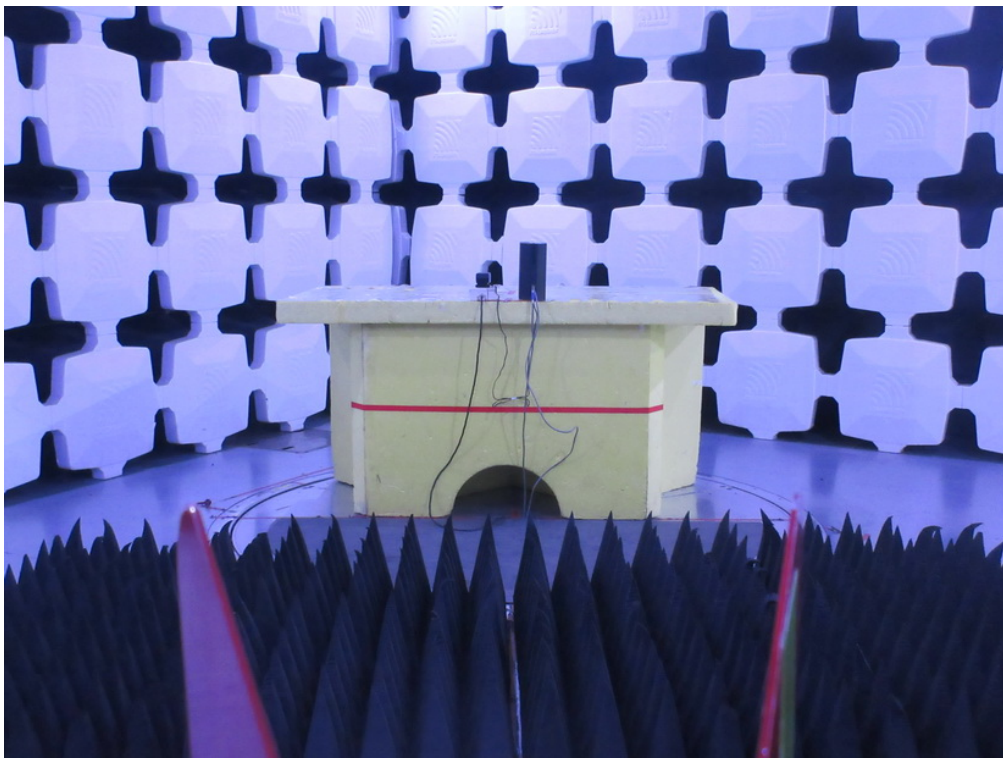
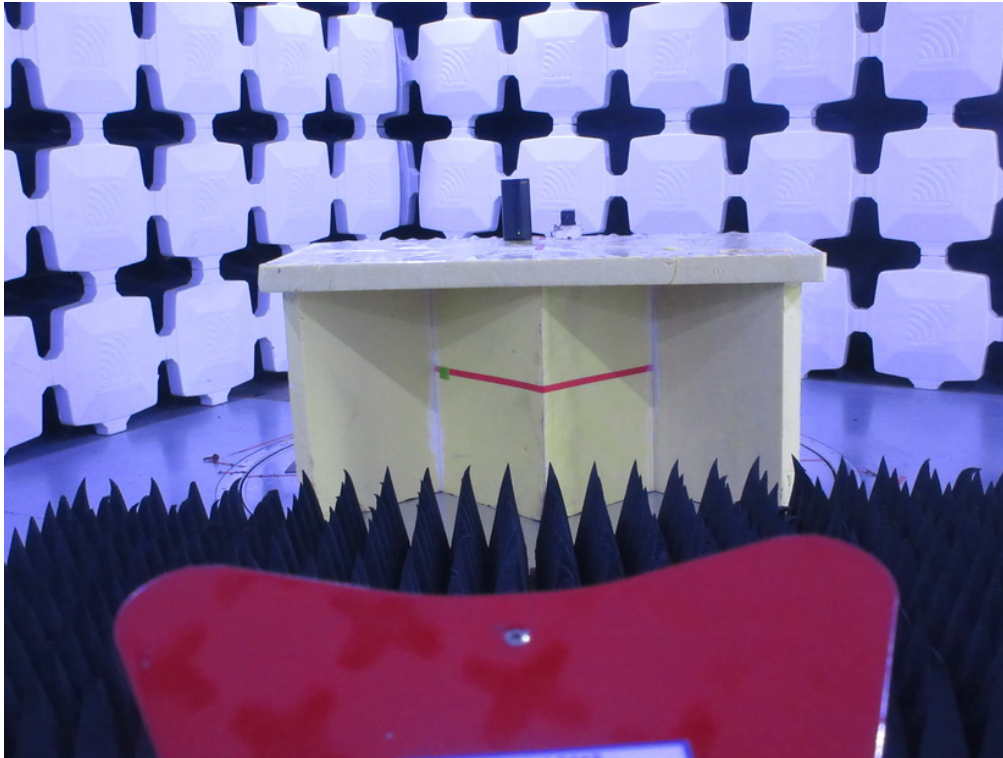
All calibration period of equipment list is one year.

6. EUT TEST PHOTO

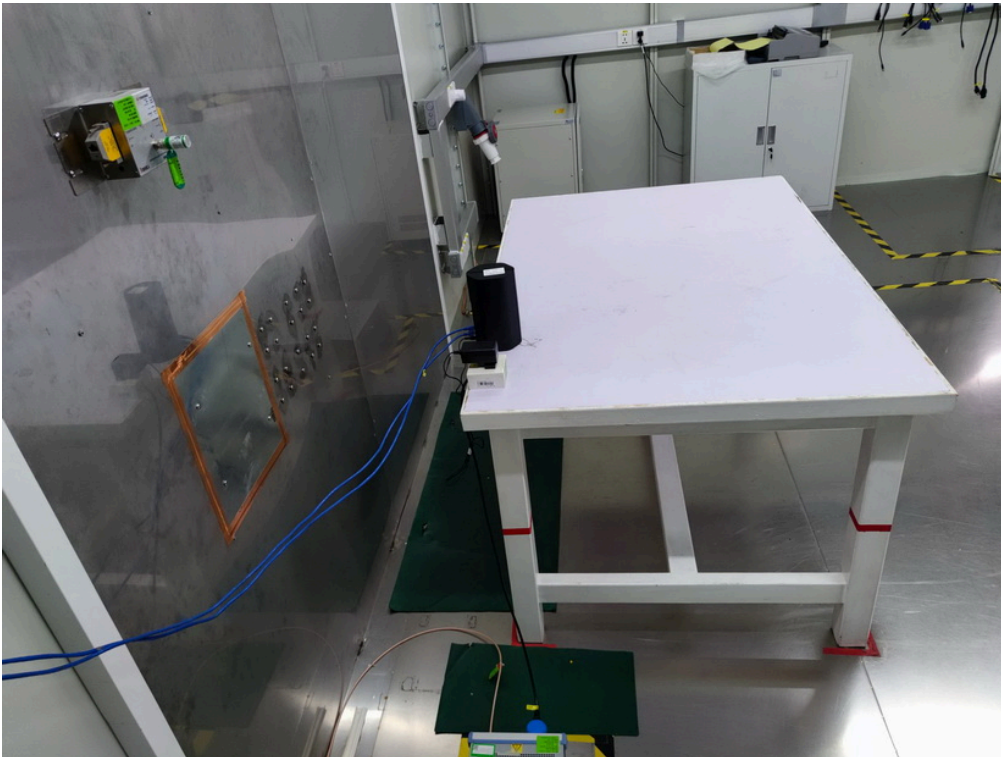
Radiated emissions up to 1 GHz



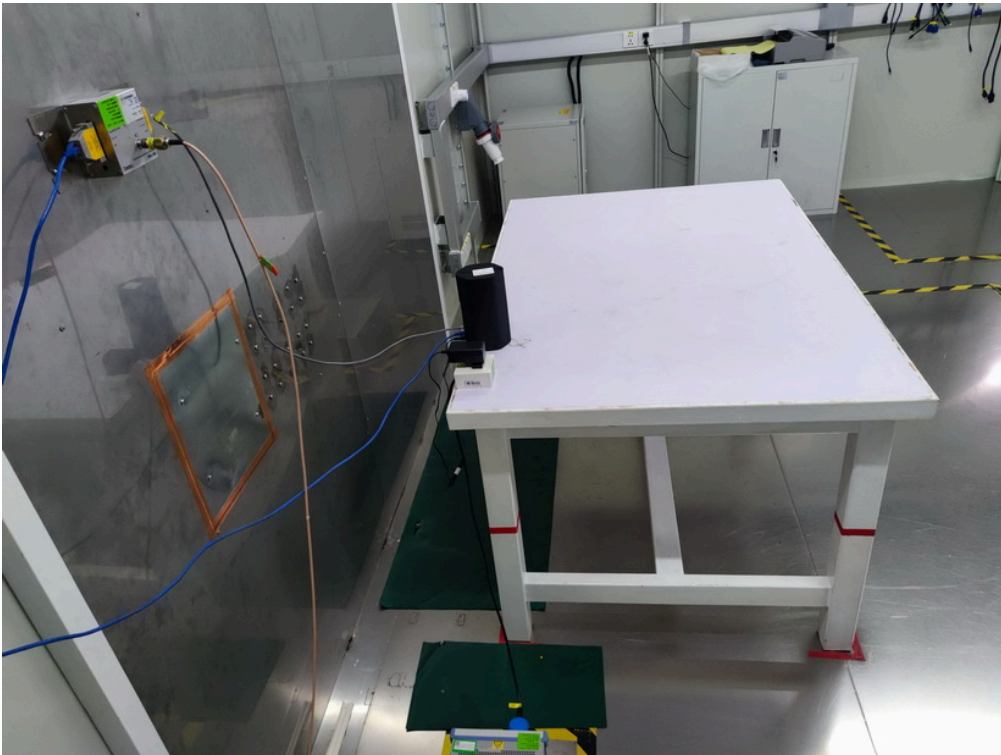
Radiated emissions above 1 GHz



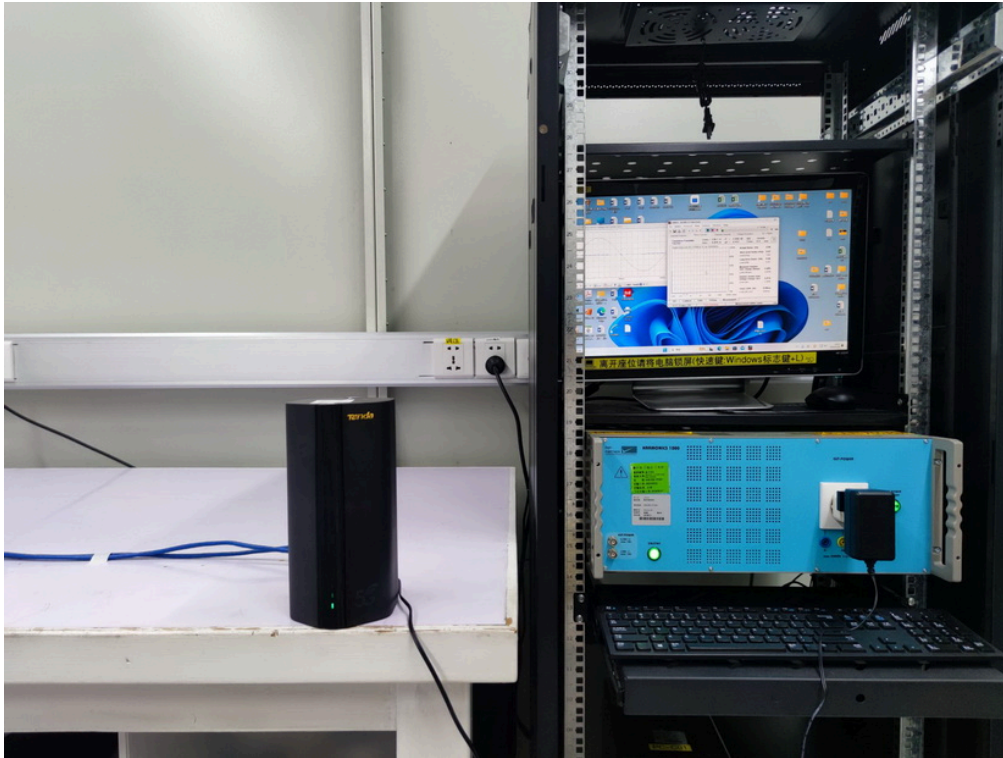
Conducted emissions AC mains power port



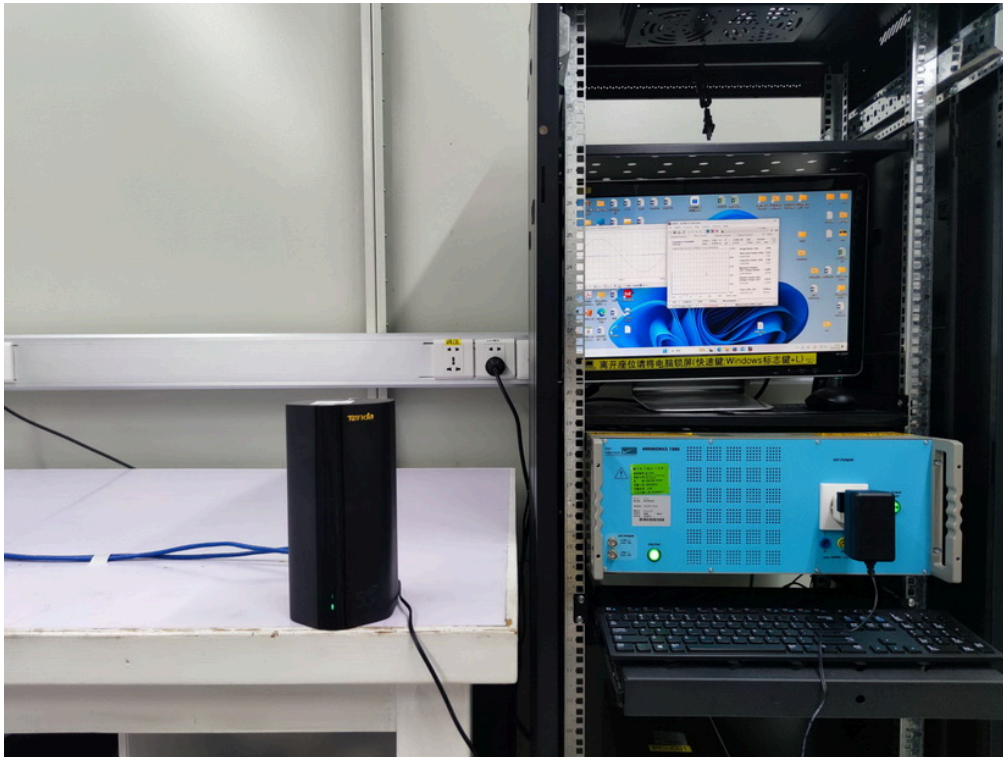
Asymmetric mode conducted emissions(RJ45)



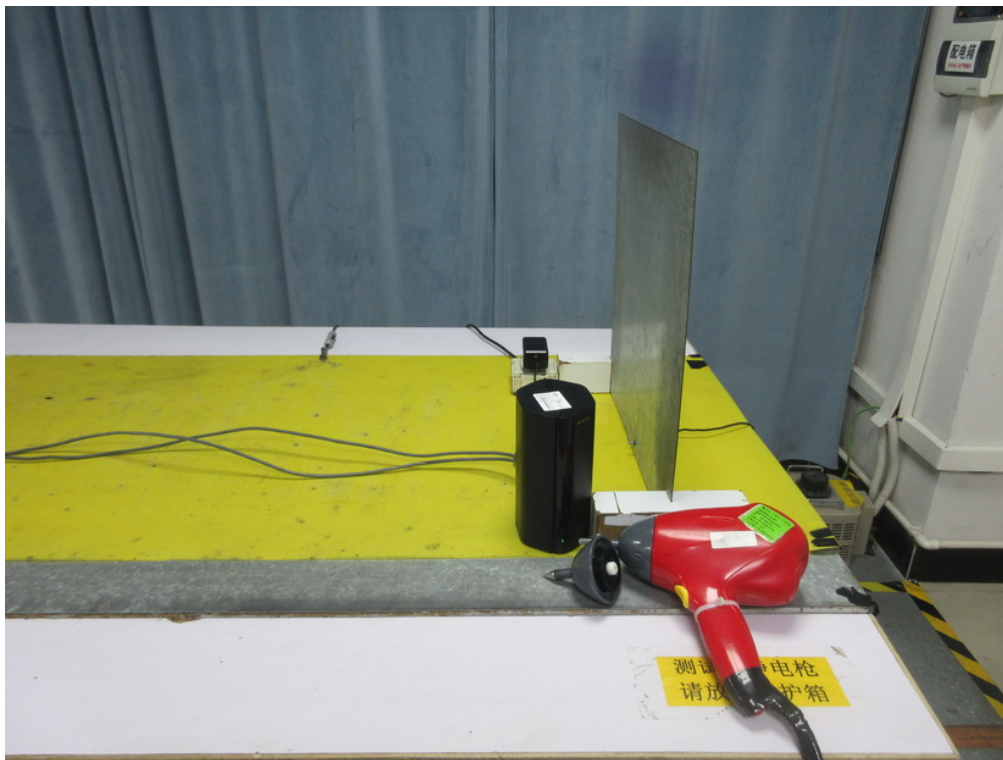
Harmonic current



Voltage fluctuations (Flicker)



Electrostatic discharge immunity



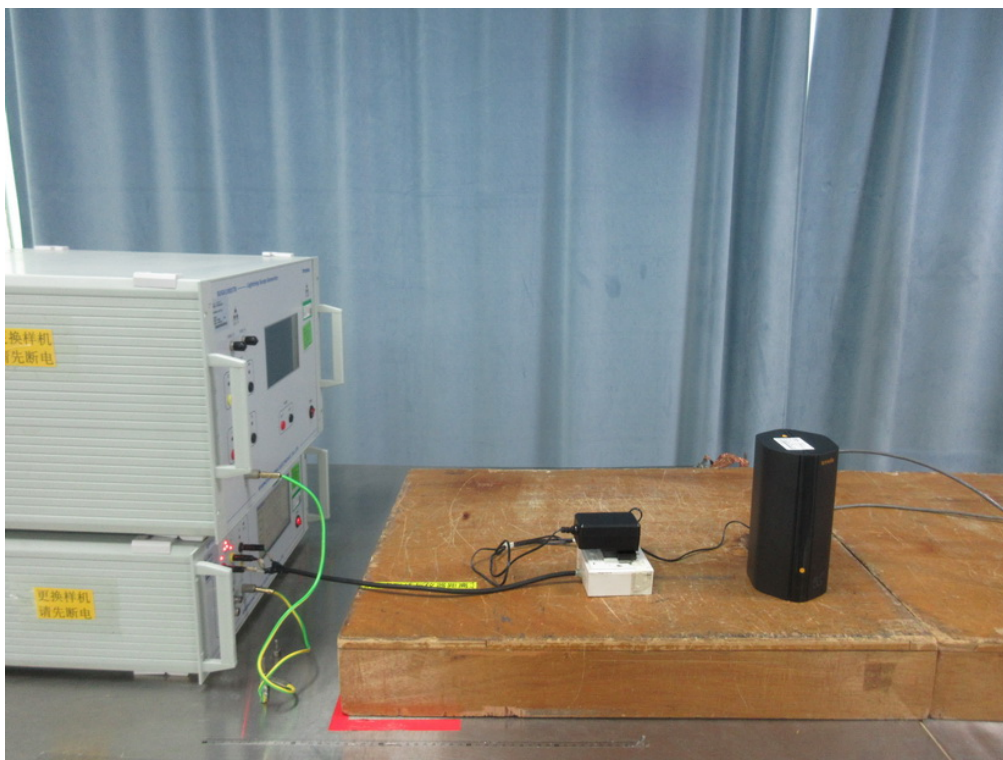
Immunity to radiated electromagnetic fields – Up to 1GHz



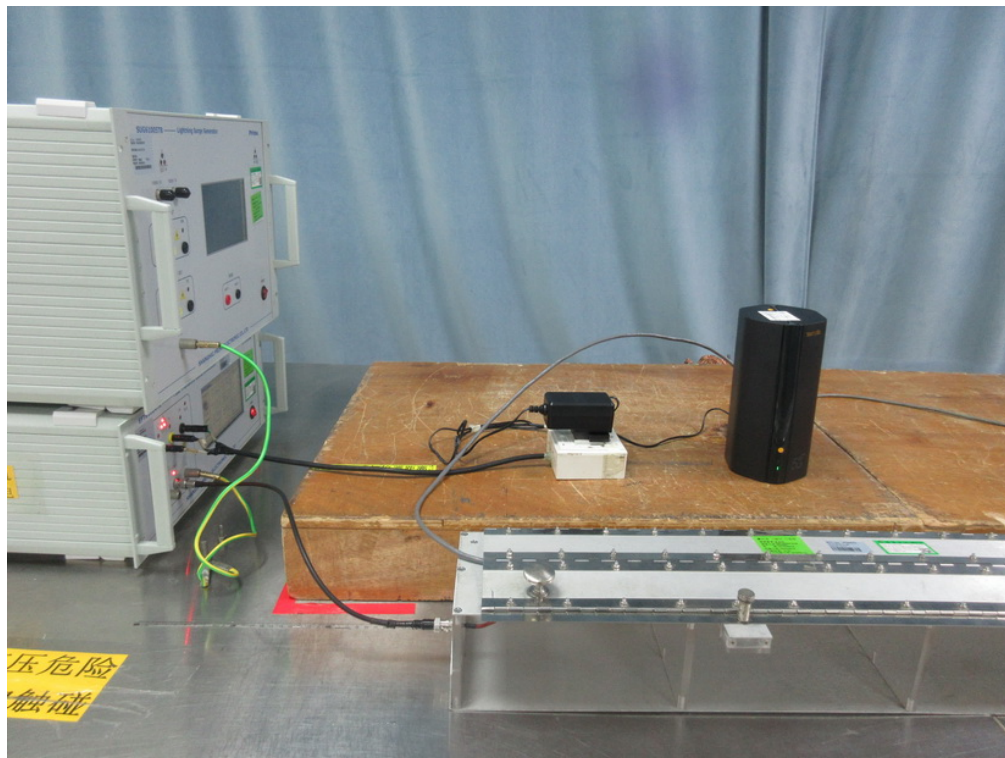
Immunity to radiated electromagnetic fields – Above 1GHz



Electrical fast transient/burst - AC



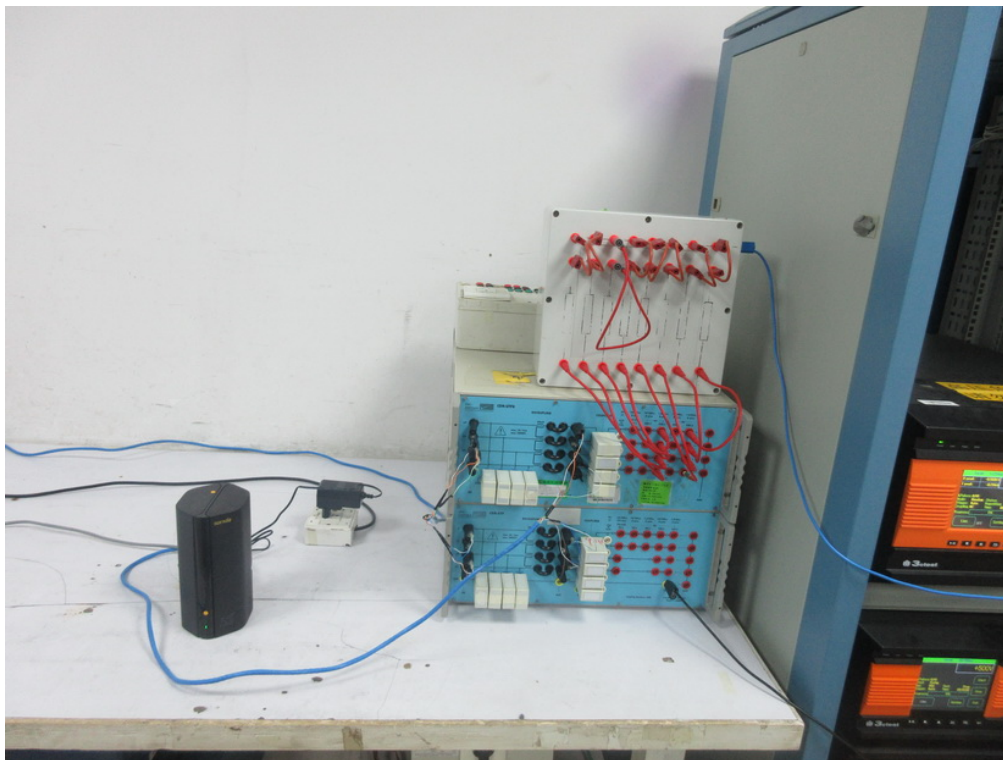
Electrical fast transient/burst(RJ45)



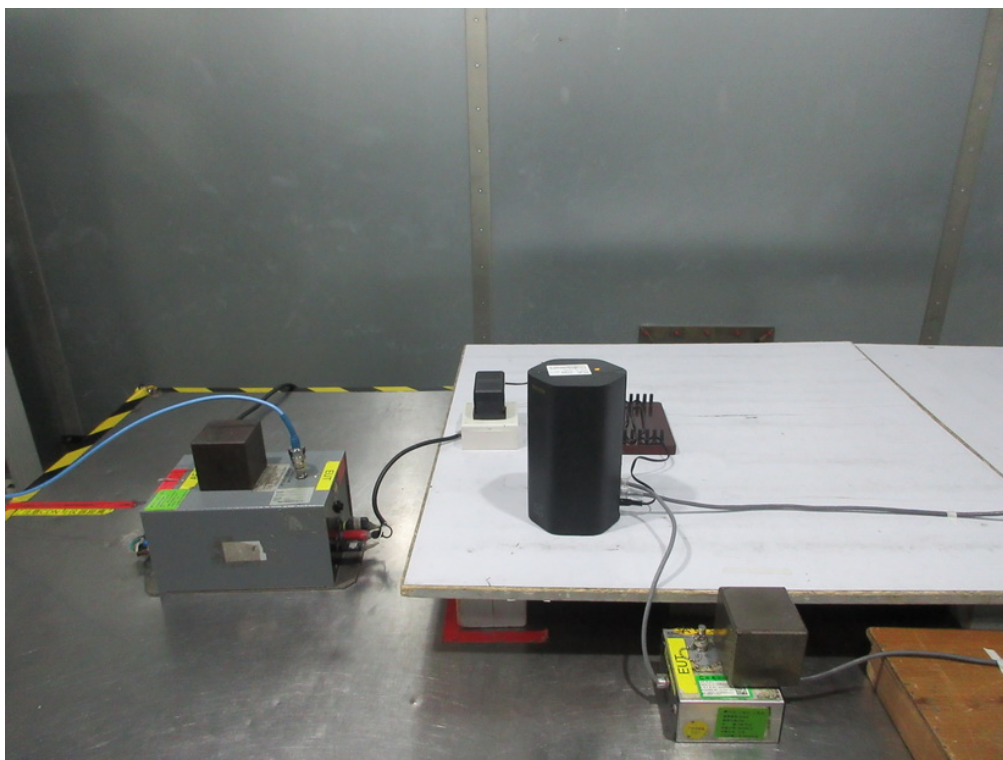
Surge immunity - AC



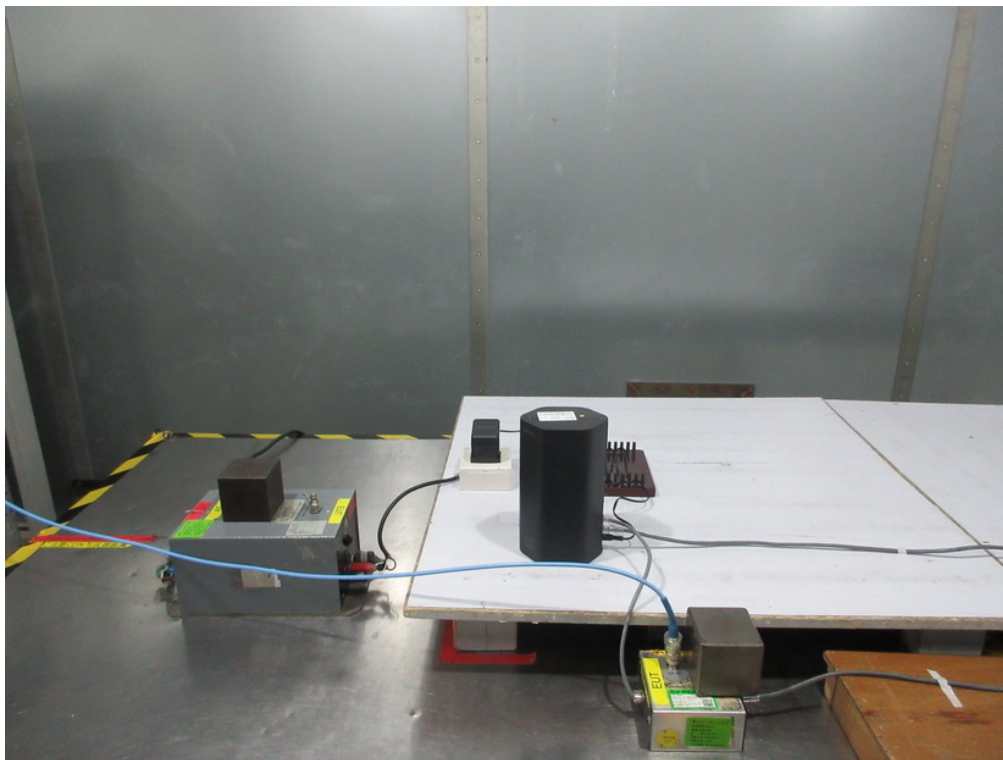
Surge immunity(RJ45)



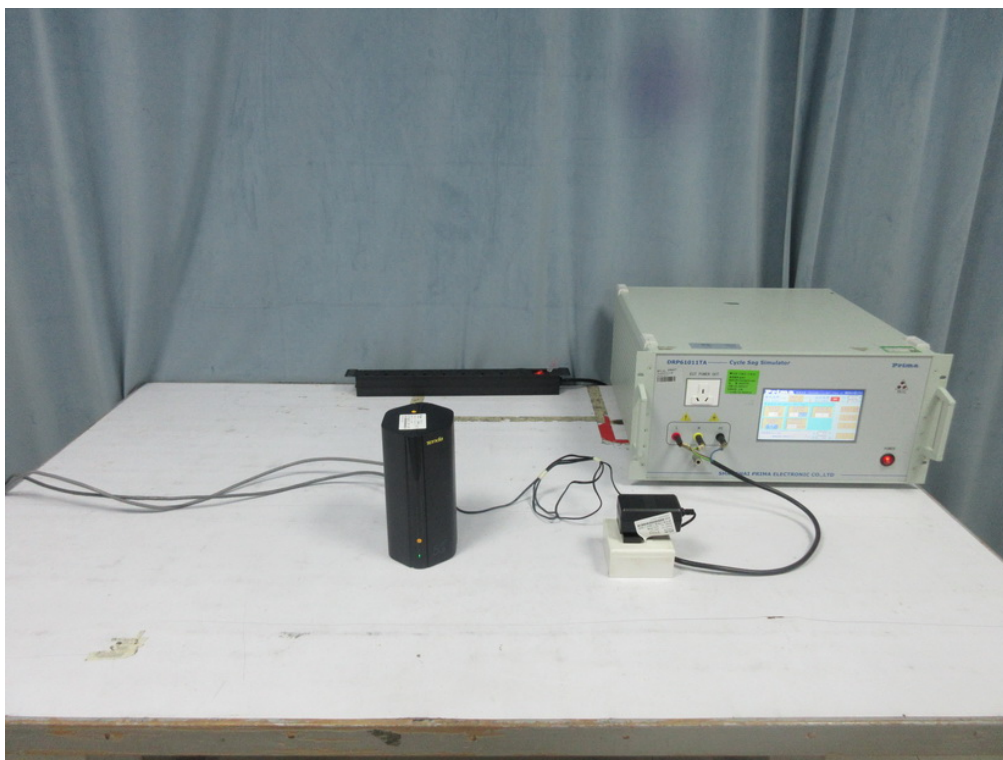
Immunity to conducted disturbances, induced by radio-frequency fields- AC



Immunity to conducted disturbances, induced by radio-frequency fields(RJ45)

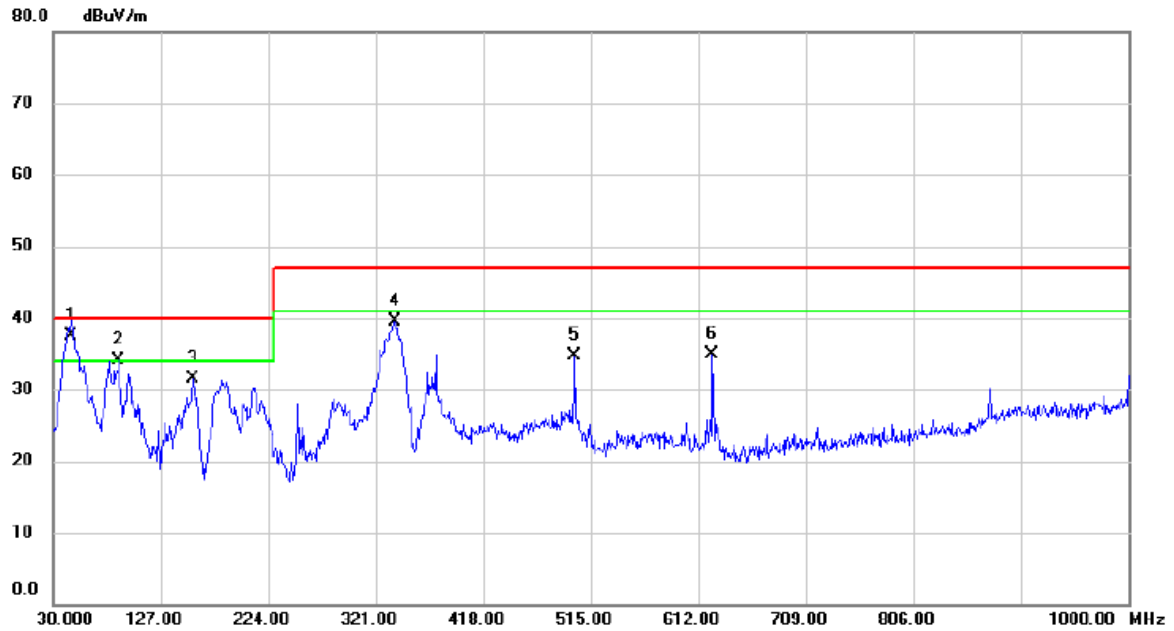


Voltage dips, short interruptions and voltage variations immunity



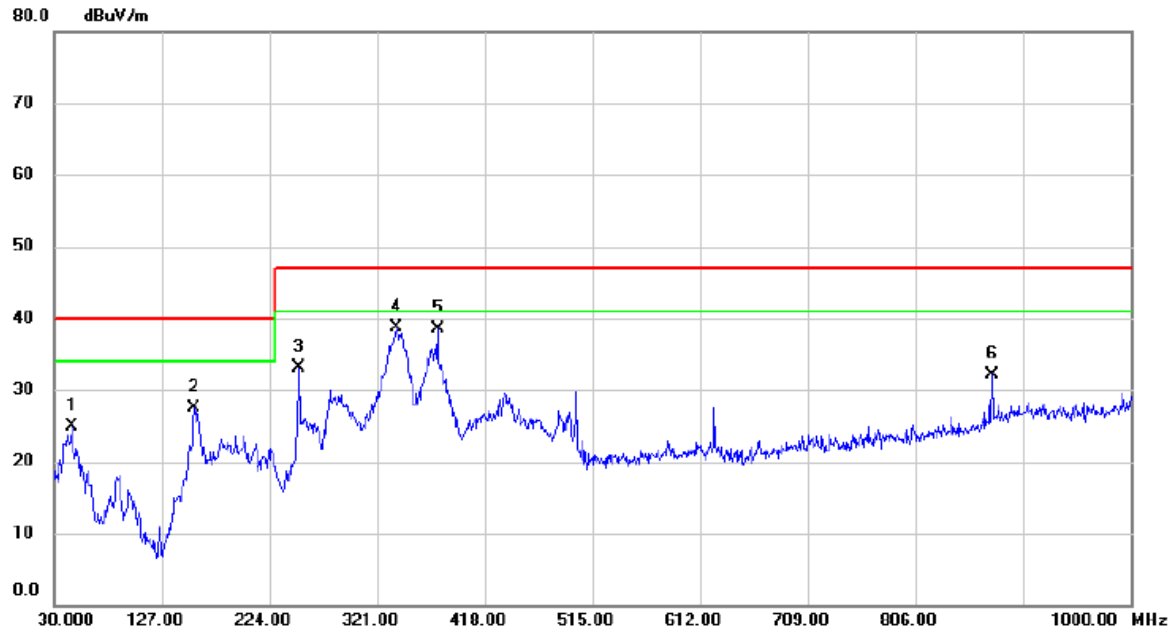
APPENDIX A - RADIATED EMISSION UP TO 1GHZ

Test Voltage	AC 230V/50Hz	Polarization	Vertical
Test Mode	Mode 1		



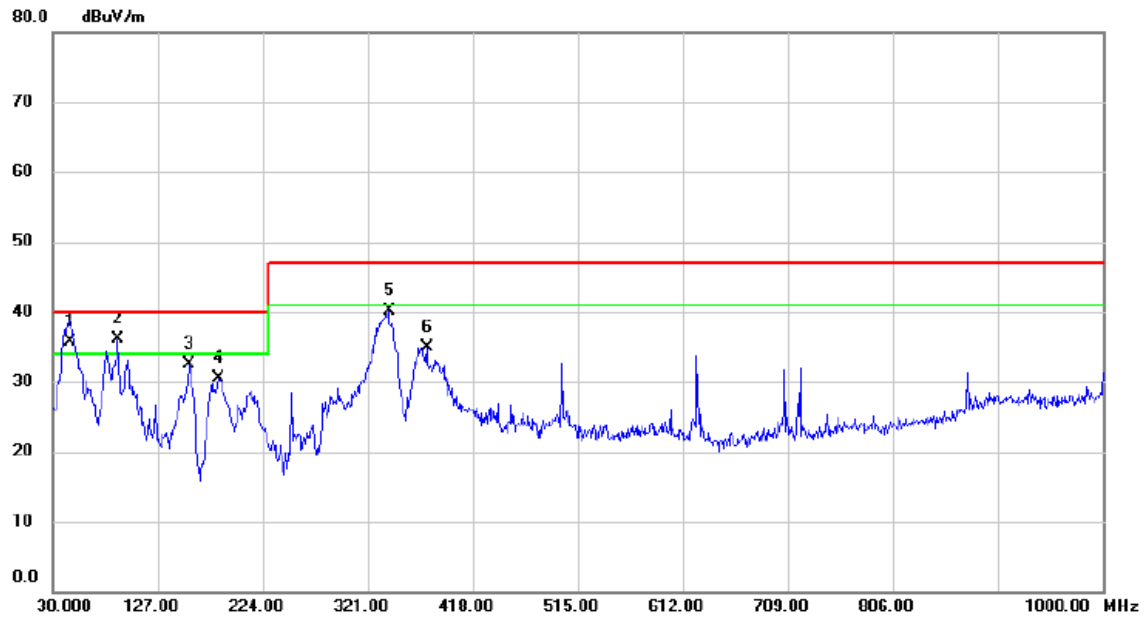
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	45.5200	58.21	-20.69	37.52	40.00	-2.48	QP	
2	!	89.1700	56.98	-22.97	34.01	40.00	-5.99	QP	
3		156.1000	52.06	-20.61	31.45	40.00	-8.55	QP	
4		338.4600	54.39	-14.88	39.51	47.00	-7.49	QP	
5		500.4500	45.55	-10.89	34.66	47.00	-12.34	QP	
6		624.6100	43.24	-8.34	34.90	47.00	-12.10	QP	

Test Voltage	AC 230V/50Hz	Polarization	Horizontal
Test Mode	Mode 1		



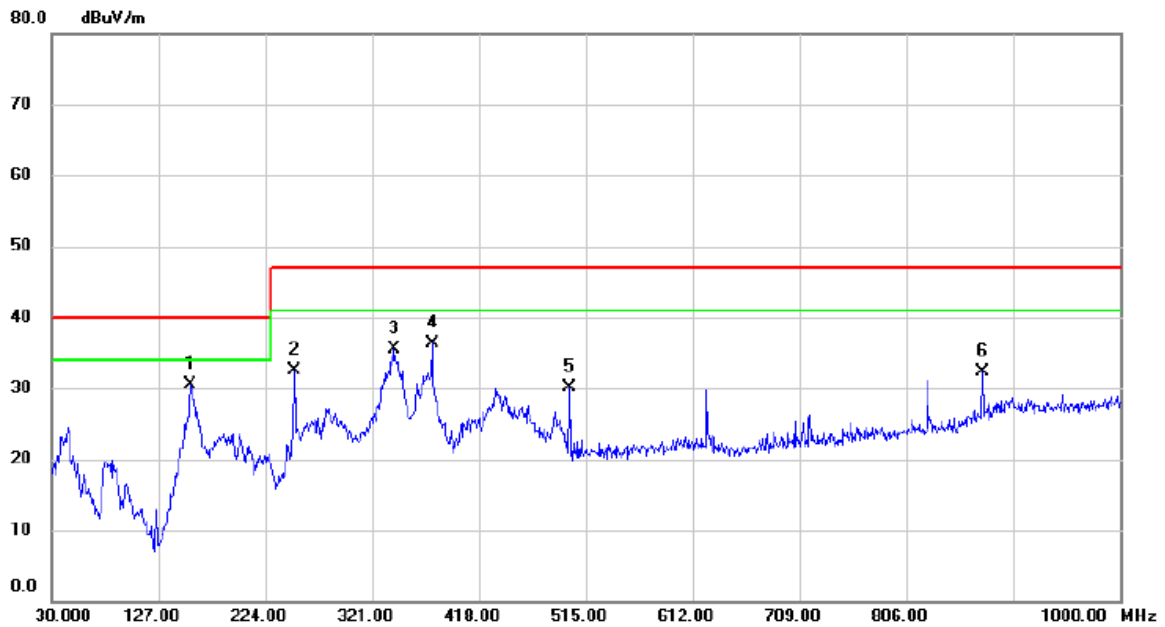
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		45.5200	45.63	-20.69	24.94	40.00	-15.06	QP	
2		156.1000	48.13	-20.61	27.52	40.00	-12.48	QP	
3		250.1900	49.95	-16.78	33.17	47.00	-13.83	QP	
4	*	338.4600	53.61	-14.88	38.73	47.00	-8.27	QP	
5		375.3200	51.83	-13.26	38.57	47.00	-8.43	QP	
6		874.8700	36.19	-4.10	32.09	47.00	-14.91	QP	

Test Voltage	AC 110V/60Hz	Polarization	Vertical
Test Mode	Mode 1		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	!	45.5200	56.41	-20.69	35.72	40.00	-4.28	QP	
2	*	90.1400	59.00	-22.90	36.10	40.00	-3.90	QP	
3		156.1000	53.14	-20.61	32.53	40.00	-7.47	QP	
4		183.2600	50.05	-19.53	30.52	40.00	-9.48	QP	
5		340.4000	54.90	-14.81	40.09	47.00	-6.91	QP	
6		375.3200	48.24	-13.26	34.98	47.00	-12.02	QP	

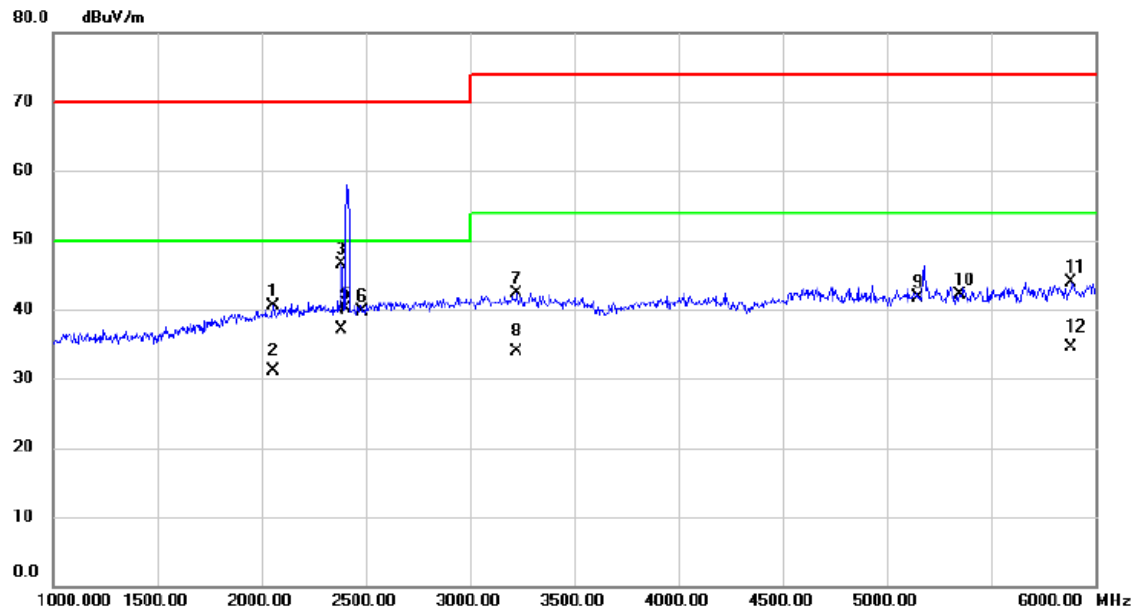
Test Voltage	AC 110V/60Hz	Polarization	Horizontal
Test Mode	Mode 1		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1	*	156.1000	51.15	-20.61	30.54	40.00	-9.46	QP	
2		250.1900	49.31	-16.78	32.53	47.00	-14.47	QP	
3		341.3700	50.33	-14.75	35.58	47.00	-11.42	QP	
4		375.3200	49.55	-13.26	36.29	47.00	-10.71	QP	
5		500.4500	41.02	-10.89	30.13	47.00	-16.87	QP	
6		874.8700	36.41	-4.10	32.31	47.00	-14.69	QP	

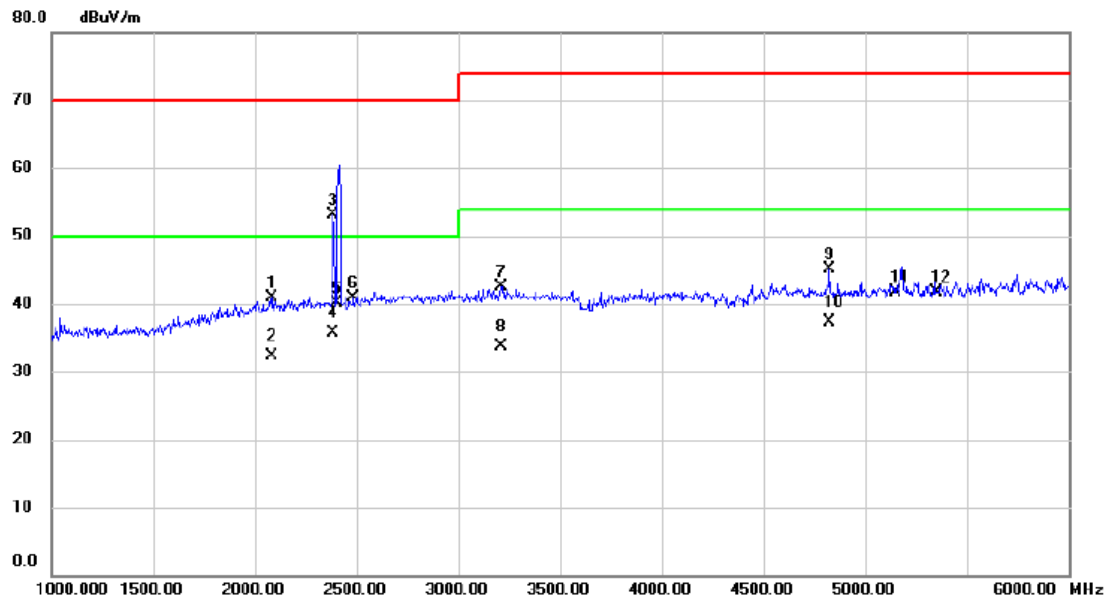
APPENDIX B - RADIATED EMISSION ABOVE 1GHZ

Test Voltage	AC 230V/50Hz	Polarization	Vertical
Test Mode	Mode 1		
Note	2.4G WIFI (2400-2483.5MHz) and 5G WIFI (5150-5350MHz) are intentional transmissions, which are not applicable to the radiation emission requirements in this standard.		



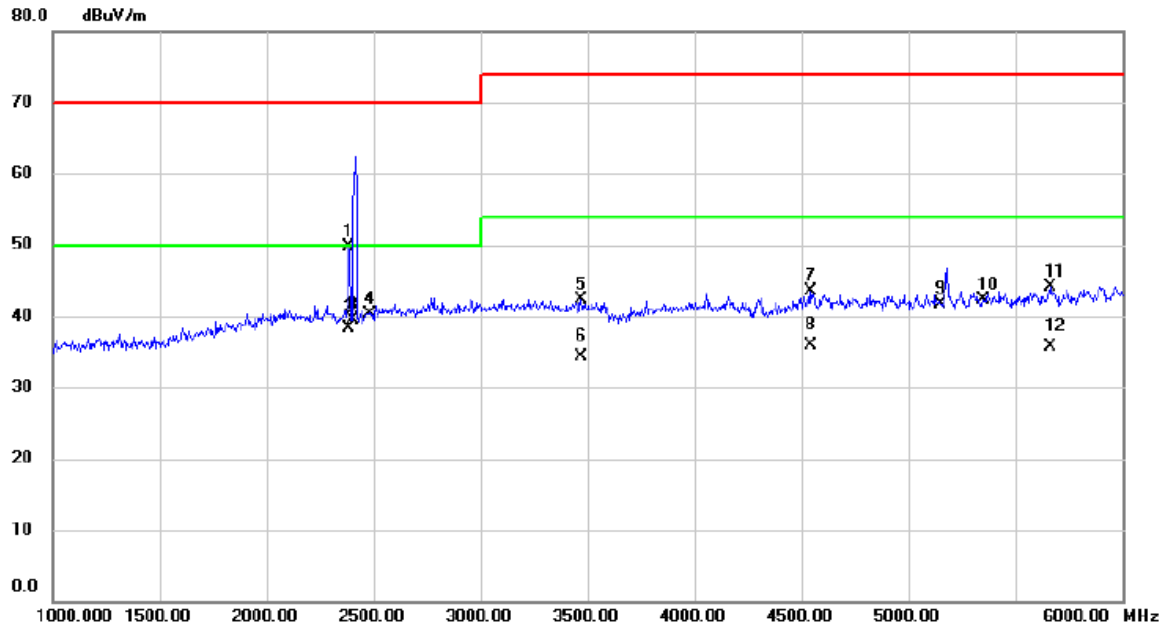
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2055.000	51.81	-11.27	40.54	70.00	-29.46	peak	
2		2055.000	42.36	-11.27	31.09	50.00	-18.91	AVG	
3		2385.000	56.61	-10.08	46.53	70.00	-23.47	peak	
4	*	2385.000	47.25	-10.08	37.17	50.00	-12.83	AVG	
5		2400.000	50.11	-10.03	40.08	70.00	-29.92	peak	
6		2483.500	49.49	-9.73	39.76	70.00	-30.24	peak	
7		3225.000	50.32	-7.96	42.36	74.00	-31.64	peak	
8		3225.000	41.95	-7.96	33.99	54.00	-20.01	AVG	
9		5150.000	46.66	-4.86	41.80	74.00	-32.20	peak	
10		5350.000	47.01	-4.92	42.09	74.00	-31.91	peak	
11		5885.000	47.91	-4.00	43.91	74.00	-30.09	peak	
12		5885.000	38.54	-4.00	34.54	54.00	-19.46	AVG	

Test Voltage	AC 230V/50Hz	Polarization	Horizontal
Test Mode	Mode 1		
Note	2.4G WIFI (2400-2483.5MHz) and 5G WIFI (5150-5350MHz) are intentional transmissions, which are not applicable to the radiation emission requirements in this standard.		



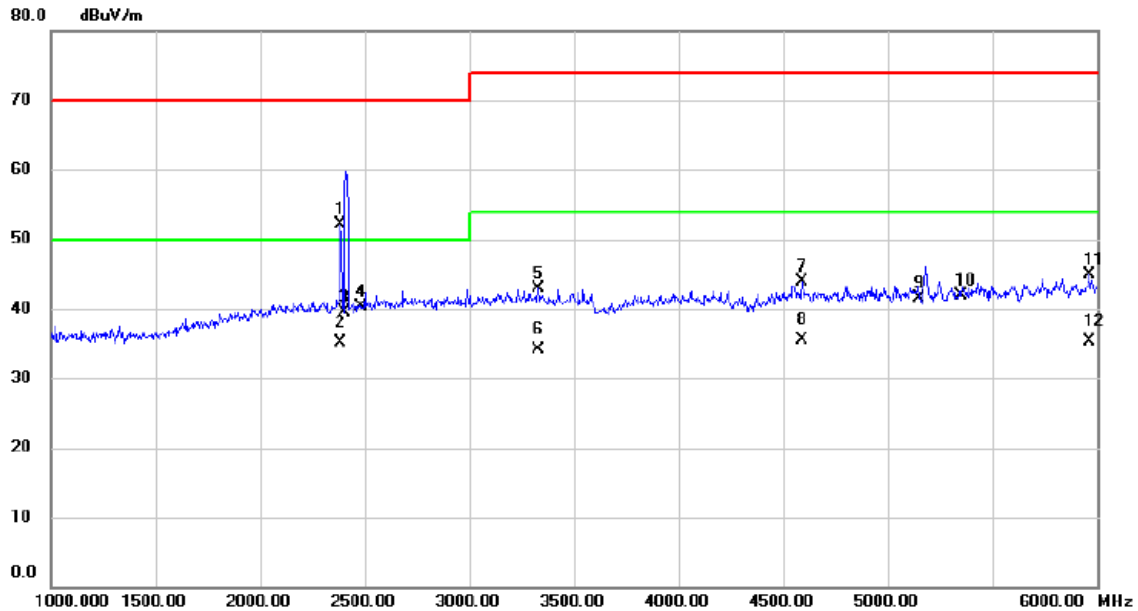
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2085.000	52.12	-11.16	40.96	70.00	-29.04	peak	
2		2085.000	43.51	-11.16	32.35	50.00	-17.65	AVG	
3		2385.000	63.25	-10.08	53.17	70.00	-16.83	peak	
4	*	2385.000	45.69	-10.08	35.61	50.00	-14.39	AVG	
5		2400.000	50.23	-10.03	40.20	70.00	-29.80	peak	
6		2483.500	50.67	-9.73	40.94	70.00	-29.06	peak	
7		3210.000	50.55	-7.98	42.57	74.00	-31.43	peak	
8		3210.000	41.74	-7.98	33.76	54.00	-20.24	AVG	
9		4825.000	50.23	-5.06	45.17	74.00	-28.83	peak	
10		4825.000	42.36	-5.06	37.30	54.00	-16.70	AVG	
11		5150.000	46.56	-4.86	41.70	74.00	-32.30	peak	
12		5350.000	46.72	-4.92	41.80	74.00	-32.20	peak	

Test Voltage	AC 110V/60Hz	Polarization	Vertical
Test Mode	Mode 1		
Note	2.4G WIFI (2400-2483.5MHz) and 5G WIFI (5150-5350MHz) are intentional transmissions, which are not applicable to the radiation emission requirements in this standard.		



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin		
		MHz	Level	Factor	ment				
			dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2385.000	59.75	-10.08	49.67	70.00	-20.33	peak	
2	*	2385.000	48.31	-10.08	38.23	50.00	-11.77	AVG	
3		2400.000	49.55	-10.03	39.52	70.00	-30.48	peak	
4		2483.500	50.00	-9.73	40.27	70.00	-29.73	peak	
5		3470.000	50.02	-7.63	42.39	74.00	-31.61	peak	
6		3470.000	41.87	-7.63	34.24	54.00	-19.76	AVG	
7		4540.000	48.93	-5.45	43.48	74.00	-30.52	peak	
8		4540.000	41.36	-5.45	35.91	54.00	-18.09	AVG	
9		5150.000	46.55	-4.86	41.69	74.00	-32.31	peak	
10		5350.000	47.32	-4.92	42.40	74.00	-31.60	peak	
11		5665.000	48.71	-4.54	44.17	74.00	-29.83	peak	
12		5665.000	40.25	-4.54	35.71	54.00	-18.29	AVG	

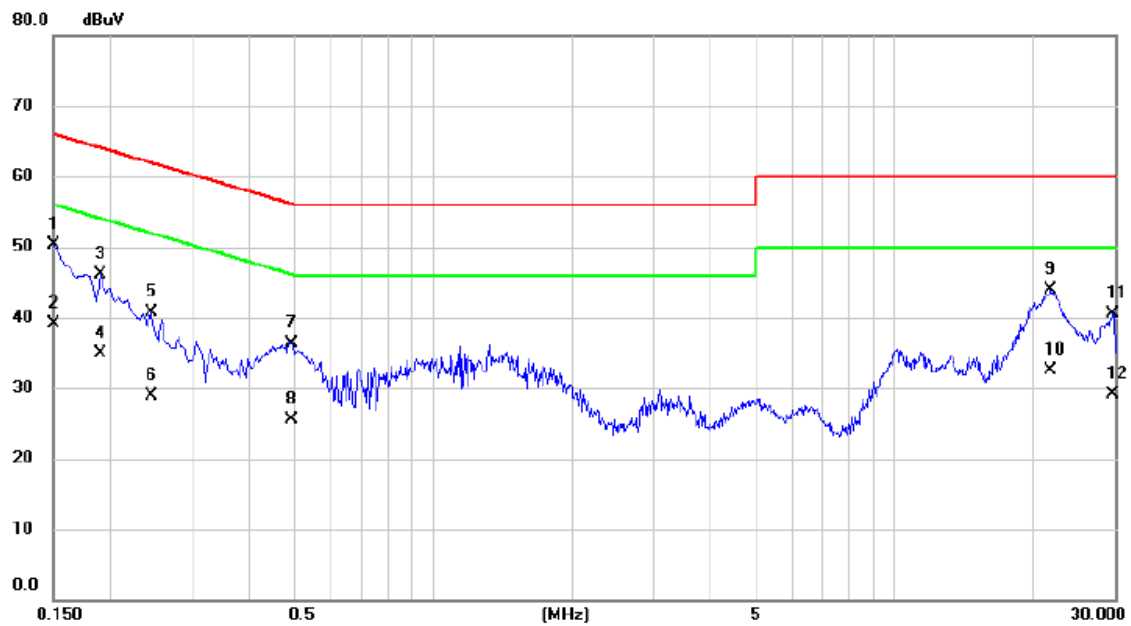
Test Voltage	AC 110V/60Hz	Polarization	Horizontal
Test Mode	Mode 1		
Note	2.4G WIFI (2400-2483.5MHz) and 5G WIFI (5150-5350MHz) are intentional transmissions, which are not applicable to the radiation emission requirements in this standard.		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
1		2385.000	62.26	-10.08	52.18	70.00	-17.82	peak	
2	*	2385.000	45.26	-10.08	35.18	50.00	-14.82	AVG	
3		2400.000	49.61	-10.03	39.58	70.00	-30.42	peak	
4		2483.500	50.02	-9.73	40.29	70.00	-29.71	peak	
5		3330.000	50.81	-7.82	42.99	74.00	-31.01	peak	
6		3330.000	41.85	-7.82	34.03	54.00	-19.97	AVG	
7		4590.000	49.21	-5.38	43.83	74.00	-30.17	peak	
8		4590.000	40.95	-5.38	35.57	54.00	-18.43	AVG	
9		5150.000	46.46	-4.86	41.60	74.00	-32.40	peak	
10		5350.000	46.92	-4.92	42.00	74.00	-32.00	peak	
11		5965.000	48.79	-3.81	44.98	74.00	-29.02	peak	
12		5965.000	39.17	-3.81	35.36	54.00	-18.64	AVG	

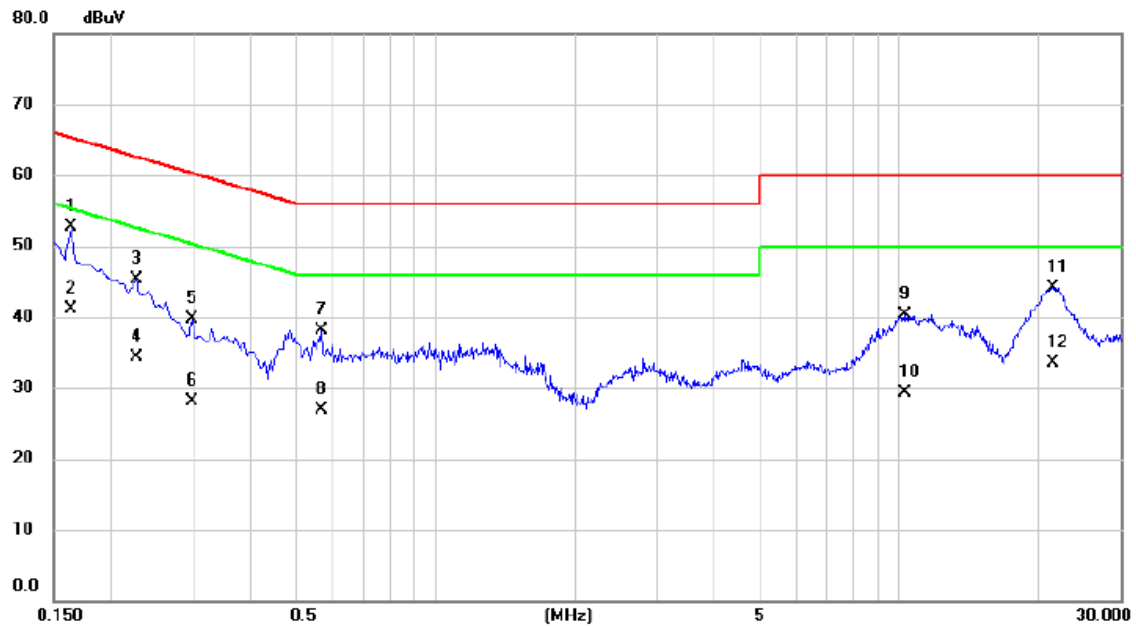
APPENDIX C - CONDUCTED EMISSION AT AC MAINS POWER PORT

Test Voltage	AC 230V/50Hz	Phase	Line
Test Mode	Mode 4		



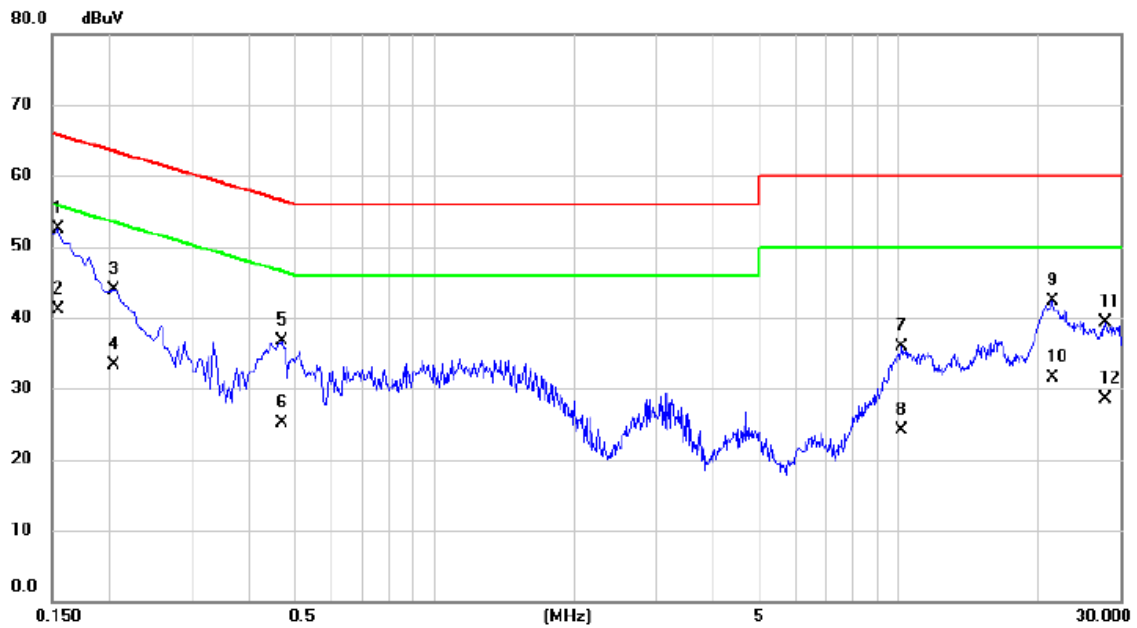
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1500	40.62	9.77	50.39	66.00	-15.61	QP	
2		0.1500	29.30	9.77	39.07	56.00	-16.93	AVG	
3		0.1905	36.28	9.81	46.09	64.01	-17.92	QP	
4		0.1905	25.10	9.81	34.91	54.01	-19.10	AVG	
5		0.2445	30.92	9.79	40.71	61.94	-21.23	QP	
6		0.2445	19.20	9.79	28.99	51.94	-22.95	AVG	
7		0.4920	26.52	9.84	36.36	56.13	-19.77	QP	
8		0.4920	15.60	9.84	25.44	46.13	-20.69	AVG	
9		21.7545	29.88	14.05	43.93	60.00	-16.07	QP	
10		21.7545	18.40	14.05	32.45	50.00	-17.55	AVG	
11		29.7870	24.95	15.60	40.55	60.00	-19.45	QP	
12		29.7870	13.50	15.60	29.10	50.00	-20.90	AVG	

Test Voltage	AC 230V/50Hz	Phase	Neutral
Test Mode	Mode 4		



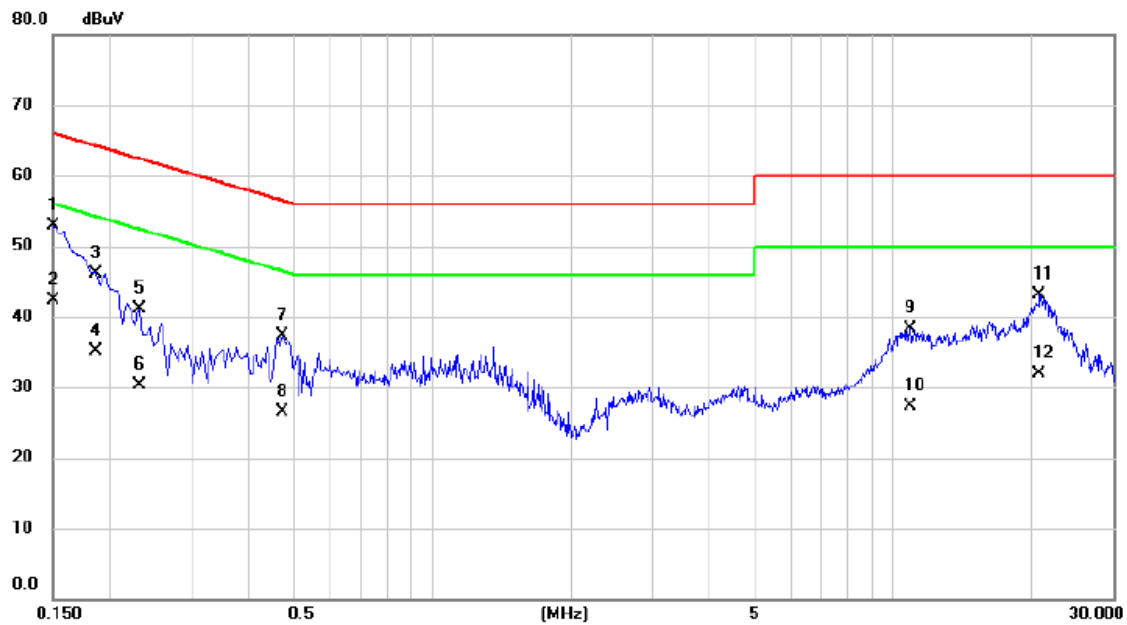
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1635	42.98	9.77	52.75	65.28	-12.53	QP	
2		0.1635	31.40	9.77	41.17	55.28	-14.11	AVG	
3		0.2265	35.56	9.80	45.36	62.58	-17.22	QP	
4		0.2265	24.50	9.80	34.30	52.58	-18.28	AVG	
5		0.2985	29.88	9.82	39.70	60.28	-20.58	QP	
6		0.2985	18.30	9.82	28.12	50.28	-22.16	AVG	
7		0.5685	28.23	9.87	38.10	56.00	-17.90	QP	
8		0.5685	17.10	9.87	26.97	46.00	-19.03	AVG	
9		10.3065	28.18	12.05	40.23	60.00	-19.77	QP	
10		10.3065	17.20	12.05	29.25	50.00	-20.75	AVG	
11		21.5160	30.23	13.93	44.16	60.00	-15.84	QP	
12		21.5160	19.60	13.93	33.53	50.00	-16.47	AVG	

Test Voltage	AC 110V/60Hz	Phase	Line
Test Mode	Mode 4		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1545	42.64	9.77	52.41	65.75	-13.34	QP	
2		0.1545	31.40	9.77	41.17	55.75	-14.58	AVG	
3		0.2040	34.10	9.83	43.93	63.45	-19.52	QP	
4		0.2040	23.50	9.83	33.33	53.45	-20.12	AVG	
5		0.4695	26.77	9.84	36.61	56.52	-19.91	QP	
6		0.4695	15.30	9.84	25.14	46.52	-21.38	AVG	
7		10.1580	23.84	11.97	35.81	60.00	-24.19	QP	
8		10.1580	12.10	11.97	24.07	50.00	-25.93	AVG	
9		21.4665	28.38	13.99	42.37	60.00	-17.63	QP	
10		21.4665	17.60	13.99	31.59	50.00	-18.41	AVG	
11		27.7710	24.01	15.22	39.23	60.00	-20.77	QP	
12		27.7710	13.20	15.22	28.42	50.00	-21.58	AVG	

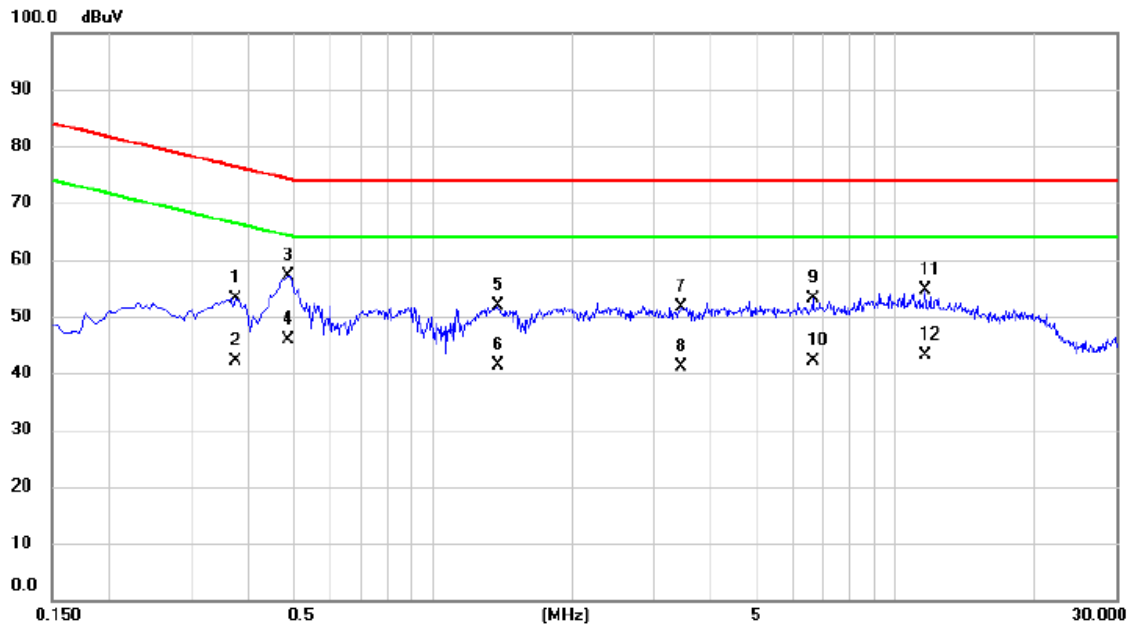
Test Voltage	AC 110V/60Hz	Phase	Neutral
Test Mode	Mode 4		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1500	43.20	9.77	52.97	66.00	-13.03	QP	
2		0.1500	32.50	9.77	42.27	56.00	-13.73	AVG	
3		0.1864	36.39	9.79	46.18	64.20	-18.02	QP	
4		0.1864	25.40	9.79	35.19	54.20	-19.01	AVG	
5		0.2310	31.33	9.80	41.13	62.41	-21.28	QP	
6		0.2310	20.60	9.80	30.40	52.41	-22.01	AVG	
7		0.4740	27.51	9.85	37.36	56.44	-19.08	QP	
8		0.4740	16.70	9.85	26.55	46.44	-19.89	AVG	
9		10.8600	26.15	12.15	38.30	60.00	-21.70	QP	
10		10.8600	15.10	12.15	27.25	50.00	-22.75	AVG	
11		20.7240	29.32	13.77	43.09	60.00	-16.91	QP	
12		20.7240	18.20	13.77	31.97	50.00	-18.03	AVG	

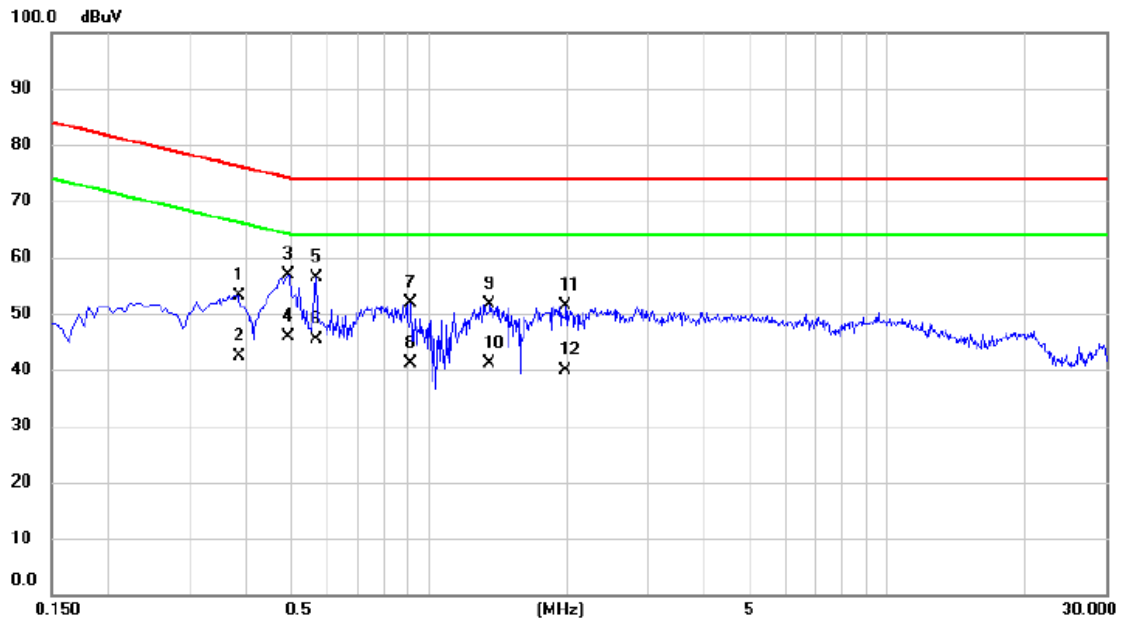
APPENDIX D - ASYMMETRIC MODE CONDUCTED EMISSIONS TEST

Test Voltage	AC 230V/50Hz
Test Mode	Mode 4(LAN1 1Gbps)



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.3750	43.34	9.72	53.06	76.39	-23.33	QP	
2		0.3750	32.30	9.72	42.02	66.39	-24.37	AVG	
3	*	0.4875	47.41	9.68	57.09	74.21	-17.12	QP	
4		0.4875	36.10	9.68	45.78	64.21	-18.43	AVG	
5		1.3830	42.16	9.61	51.77	74.00	-22.23	QP	
6		1.3830	31.80	9.61	41.41	64.00	-22.59	AVG	
7		3.4395	42.06	9.64	51.70	74.00	-22.30	QP	
8		3.4395	31.50	9.64	41.14	64.00	-22.86	AVG	
9		6.6165	43.32	9.75	53.07	74.00	-20.93	QP	
10		6.6165	32.40	9.75	42.15	64.00	-21.85	AVG	
11		11.5980	44.70	9.88	54.58	74.00	-19.42	QP	
12		11.5980	33.20	9.88	43.08	64.00	-20.92	AVG	

Test Voltage	AC 230V/50Hz
Test Mode	Mode 4(WAN/LAN2 1Gbps)

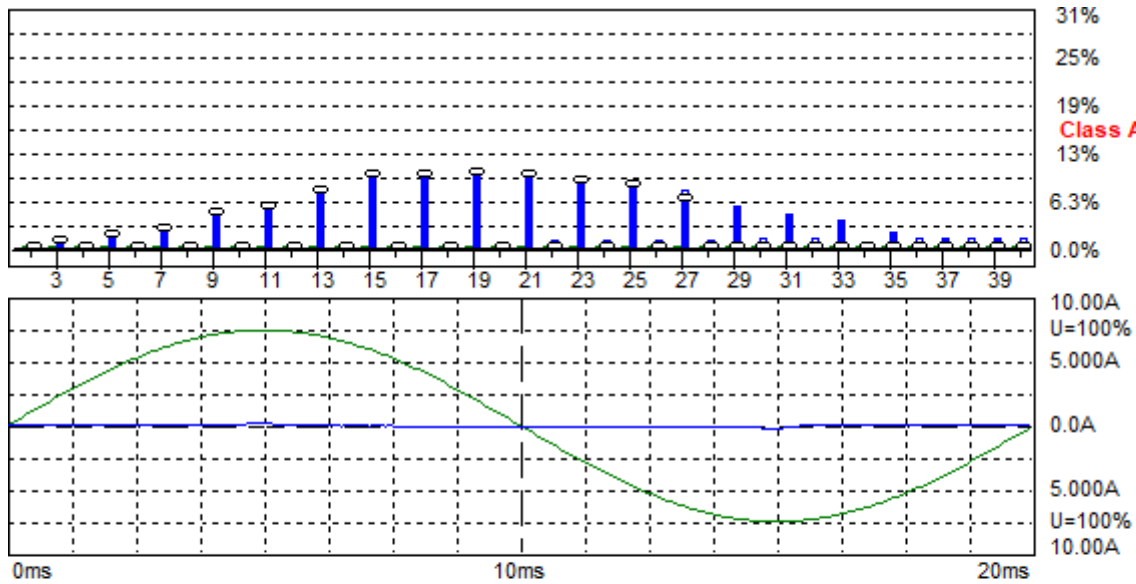


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.3840	43.52	9.71	53.23	76.19	-22.96	QP	
2		0.3840	32.60	9.71	42.31	66.19	-23.88	AVG	
3	*	0.4920	47.28	9.67	56.95	74.13	-17.18	QP	
4		0.4920	36.10	9.67	45.77	64.13	-18.36	AVG	
5		0.5685	46.78	9.67	56.45	74.00	-17.55	QP	
6		0.5685	35.70	9.67	45.37	64.00	-18.63	AVG	
7		0.9150	42.34	9.63	51.97	74.00	-22.03	QP	
8		0.9150	31.50	9.63	41.13	64.00	-22.87	AVG	
9		1.3560	42.01	9.61	51.62	74.00	-22.38	QP	
10		1.3560	31.40	9.61	41.01	64.00	-22.99	AVG	
11		1.9815	41.89	9.59	51.48	74.00	-22.52	QP	
12		1.9815	30.20	9.59	39.79	64.00	-24.21	AVG	

APPENDIX E - HARMONIC CURRENT EMISSION

Harmonics – Class A

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



Harmonic Emission - IEC 61000-3-2, EN 61000-3-2, (EN60555-2)

2024/1/20 14:36:48

Urms = 230.1 V P = 6.136 W THC = 0.053 A
Irms = 0.063 A pf = 0.420

Range: 10 A
V-nom: 230 V
TestTime: 3 min (100%)

Test completed, Result: PASSED

HAR-1000 EMC-Partner

Current Test Result Summary (Run time)

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

Urms = 230.1V Freq = 49.987 Range: 10 A
 Irms = 0.063A Ipk = 0.332A cf = 5.231
 P = 6.136W S = 14.61VA pf = 0.420
 THDi = 171 % THDu = 0.10 % Class A
 Test - Time : 3min (100 %)

Test completed, Result: PASSED

Order	Freq. [Hz]	Iavg [A]	Irms [A]	Imax [A]	Limit [A]	Status	Vrms [V]	Vmax [V]	Limit [V]
1	50	0.0316	0.0317	0.0323			230.16	230.28	0.0000
2	100	0.0000	0.0006	0.0006	1.0800		0.1963	0.2209	0.4663
3	150	0.0196	0.0195	0.0201	2.3000		0.0736	0.0982	2.0615
4	200	0.0000	0.0006	0.0006	0.4300		0.0491	0.0491	0.4663
5	250	0.0194	0.0195	0.0201	1.1400		0.0491	0.0491	0.9081
6	300	0.0000	0.0006	0.0006	0.3000		0.0245	0.0491	0.4663
7	350	0.0190	0.0195	0.0195	0.7700		0.0245	0.0736	0.6872
8	400	0.0000	0.0006	0.0006	0.2300		0.0245	0.0245	0.4663
9	450	0.0184	0.0189	0.0189	0.4000		0.0245	0.0736	0.4663
10	500	0.0000	0.0006	0.0006	0.1840		0.0245	0.0245	0.4663
11	550	0.0178	0.0177	0.0183	0.3300		0.0245	0.0736	0.2209
12	600	0.0000	0.0006	0.0006	0.1533		0.0245	0.0245	0.2209
13	650	0.0154	0.0159	0.0159	0.2100		0.0245	0.0736	0.2209
14	700	0.0000	0.0006	0.0006	0.1314		0.0000	0.0245	0.2209
15	750	0.0140	0.0140	0.0146	0.1500		0.0000	0.0736	0.2209
16	800	0.0000	0.0006	0.0006	0.1150		0.0000	0.0245	0.2209
17	850	0.0129	0.0128	0.0134	0.1324		0.0245	0.0982	0.2209
18	900	0.0000	0.0006	0.0006	0.1022		0.0000	0.0245	0.2209
19	950	0.0115	0.0116	0.0116	0.1184		0.0245	0.0982	0.2209
20	1000	0.0000	0.0006	0.0006	0.0920		0.0000	0.0000	0.2209
21	1050	0.0102	0.0098	0.0104	0.1071		0.0245	0.0982	0.2209
22	1100	0.0000	0.0000	0.0006	0.0836		0.0000	0.0000	0.2209
23	1150	0.0085	0.0085	0.0085	0.0978		0.0000	0.0982	0.2209
24	1200	0.0000	0.0000	0.0006	0.0767		0.0000	0.0000	0.2209
25	1250	0.0073	0.0073	0.0073	0.0900		0.0000	0.0982	0.2209
26	1300	0.0000	0.0000	0.0006	0.0708		0.0000	0.0000	0.2209
27	1350	0.0055	0.0055	0.0061	0.0833		0.0000	0.0982	0.2209
28	1400	0.0000	0.0000	0.0006	0.0657		0.0000	0.0000	0.2209
29	1450	0.0000	0.0043	0.0043	0.0776		0.0000	0.0982	0.2209
30	1500	0.0000	0.0000	0.0006	0.0613		0.0000	0.0000	0.2209
31	1550	0.0000	0.0031	0.0031	0.0726		0.0000	0.0736	0.2209
32	1600	0.0000	0.0000	0.0006	0.0575		0.0000	0.0000	0.2209
33	1650	0.0000	0.0024	0.0024	0.0682		0.0000	0.0736	0.2209
34	1700	0.0000	0.0000	0.0000	0.0541		0.0000	0.0245	0.2209
35	1750	0.0000	0.0012	0.0012	0.0643		0.0000	0.0736	0.2209
36	1800	0.0000	0.0000	0.0006	0.0511		0.0000	0.0000	0.2209
37	1850	0.0000	0.0006	0.0006	0.0608		0.0000	0.0736	0.2209
38	1900	0.0000	0.0000	0.0006	0.0484		0.0000	0.0245	0.2209
39	1950	0.0000	0.0006	0.0006	0.0577		0.0245	0.0491	0.2209
40	2000	0.0000	0.0000	0.0006	0.0460		0.0000	0.0245	0.2209

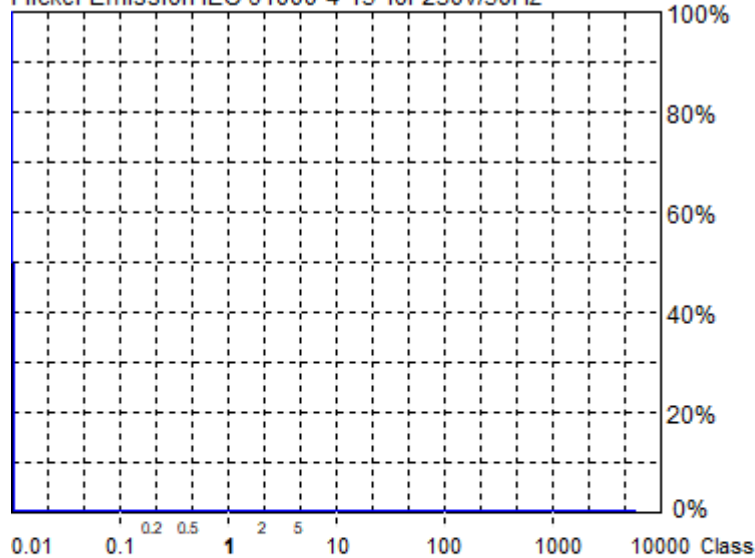
Voltage Source Verification Data (Run time)	
Test Voltage	AC 230V/50Hz
Test Mode	Mode 1

Order	Limits in Ampere			
	90%	100%	150%	200%
2	0.9717	1.0797	1.6196	2.1594
3	2.0698	2.2998	3.4497	4.5996
4	0.3873	0.4303	0.6454	0.8606
5	1.0261	1.1401	1.7102	2.2803
6	0.2703	0.3003	0.4504	0.6006
7	0.6932	0.7703	1.1554	1.5405
8	0.2071	0.2301	0.3452	0.4602
9	0.3598	0.3998	0.5997	0.7996
10	0.1653	0.1837	0.2756	0.3674
11	0.2972	0.3302	0.4953	0.6604
12	0.1379	0.1532	0.2298	0.3064
13	0.1890	0.2100	0.3149	0.4199
14	0.1181	0.1312	0.1968	0.2625
15	0.1351	0.1501	0.2252	0.3003
16	0.1033	0.1147	0.1721	0.2295
17	0.1192	0.1324	0.1987	0.2649
18	0.0917	0.1019	0.1529	0.2039
19	0.1066	0.1184	0.1776	0.2368
20	0.0829	0.0922	0.1382	0.1843
21 *	0.0967	0.1074	0.1611	0.2148
22	0.0753	0.0836	0.1254	0.1672
23 *	0.0879	0.0977	0.1465	0.1953
24	0.0692	0.0769	0.1154	0.1538
25 *	0.0807	0.0897	0.1346	0.1794
26	0.0637	0.0708	0.1062	0.1416
27 *	0.0753	0.0836	0.1254	0.1672
28	0.0593	0.0659	0.0989	0.1318
29 *	0.0698	0.0775	0.1163	0.1550
30	0.0549	0.0610	0.0916	0.1221
31 *	0.0654	0.0726	0.1089	0.1453
32	0.0516	0.0574	0.0861	0.1147
33 *	0.0615	0.0684	0.1025	0.1367
34	0.0489	0.0543	0.0815	0.1086
35 *	0.0577	0.0641	0.0961	0.1282
36	0.0461	0.0513	0.0769	0.1025
37 *	0.0549	0.0610	0.0916	0.1221
38	0.0434	0.0482	0.0723	0.0964
39 *	0.0522	0.0580	0.0870	0.1160
40	0.0412	0.0458	0.0687	0.0916

APPENDIX F - VOLTAGE FLUCTUATIONS AND FLICKER

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

Flicker Emission IEC 61000-4-15 for 230V/50Hz



Actual Flicker (Fli):	0.00
Short-term Flicker (Pst):	0.07
Limit (Pst):	1.00
Long-term Flicker (Plt):	0.07
Limit (Plt):	0.65
Maximum Relative Volt. Change (dmax):	0.00%
Limit (dmax):	4.00%
Relative Steady-state Voltage Change (dc):	0.01%
Limit (dc):	3.30%
Tmax 3.00% (dt):	0.00ms
Limit (dt>Lim):	500ms

Flicker Emission - IEC 61000-3-3, EN 61000-3-3

2024/1/20 14:32:22

Urms = 230.1 V P = 6.136 W
Irms = 0.063 A pf = 0.420

Range: 10 A
V-nom: 230 V
TestTime: 10 min (100%)

Test completed, Result: PASSED

HAR-1000 EMC-Partner

Urms = 230.1V Freq = 50.039 Range: 10 A
Irms = 0.063A Ipk = 0.327A cf = 5.154
P = 6.136W S = 14.61VA pf = 0.420

Test - Time : 1 x 10min = 10min (100 %)

LIN (Line Impedance Network) : L: 0.24ohm +j0.15ohm N: 0.16ohm +j0.10ohm

Limits : Plt : 0.65 Pst : 1.00
dmax : 4.00 % dc : 3.30 %
dtLim: 3.00 % dt>Lim: 500ms

Test completed, Result: PASSED

	Pst	P3s	Fli	dmax
				[%]
1	0.072	0.010	0.000	0.000

APPENDIX G - ELECTROSTATIC DISCHARGE

Test Voltage	AC 230V/50Hz
Test Mode	Mode 1-5

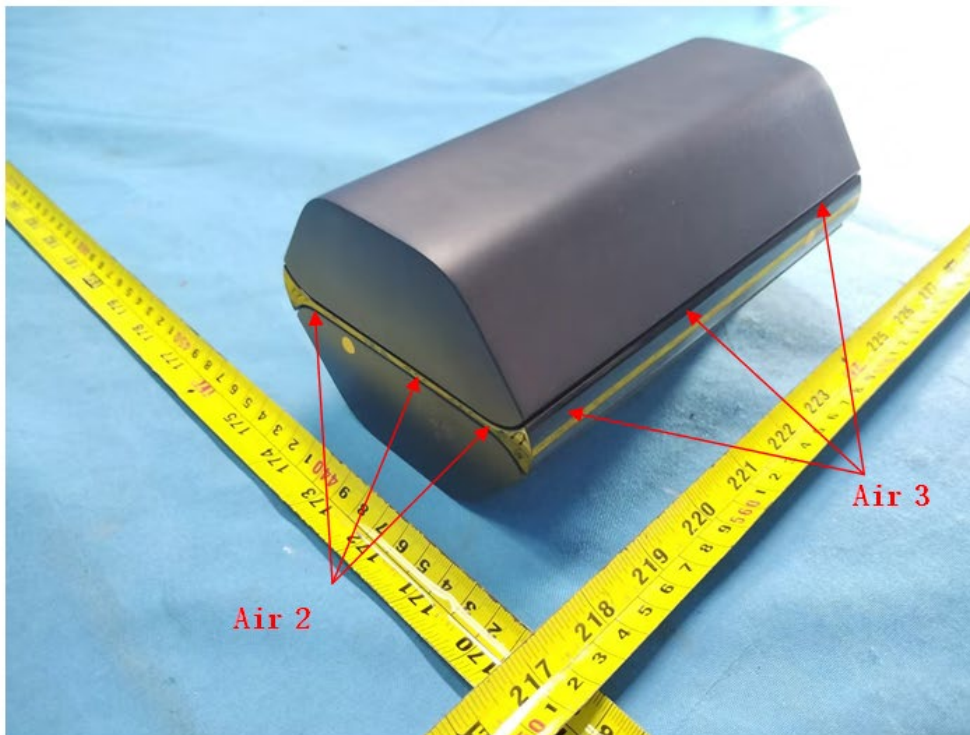
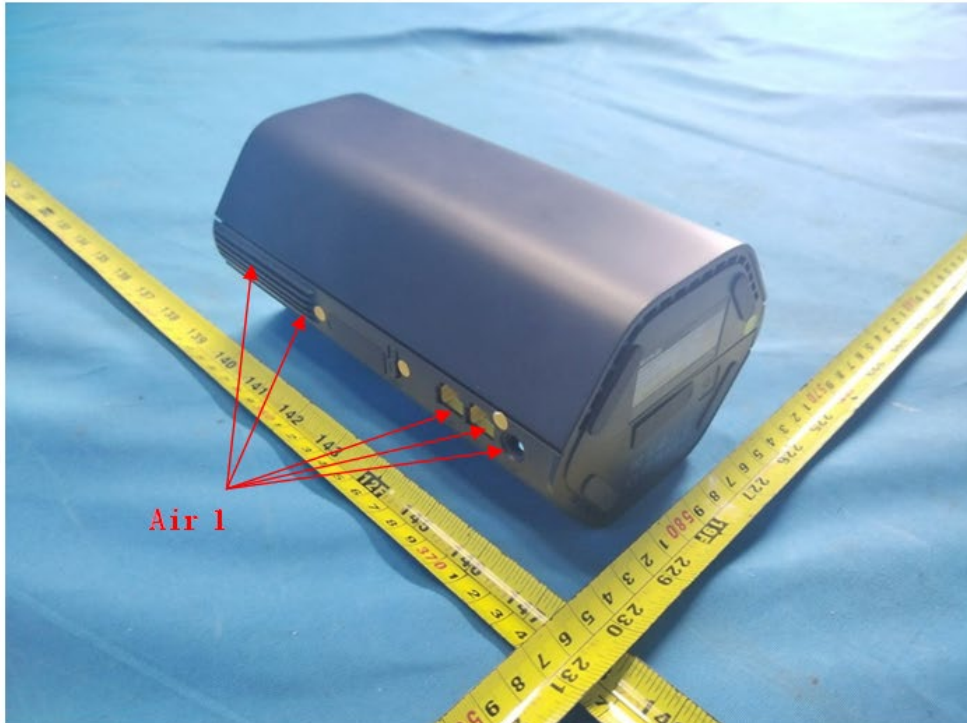
Mode	Air Discharge								Contact Discharge					
Test Level	2kV		4kV		8kV		- kV		- kV		- kV		- kV	
Location	P	N	P	N	P	N	P	N	P	N	P	N	P	N
1	A	A	A	A	A	A	-	-	-	-	-	-	-	-
2	A	A	A	A	A	A	-	-	-	-	-	-	-	-
3	A	A	A	A	A	A	-	-	-	-	-	-	-	-
4	A	A	A	A	A	A	-	-	-	-	-	-	-	-
5	A	A	A	A	A	A	-	-	-	-	-	-	-	-
Criteria	B								B					
Result	A								N/A					

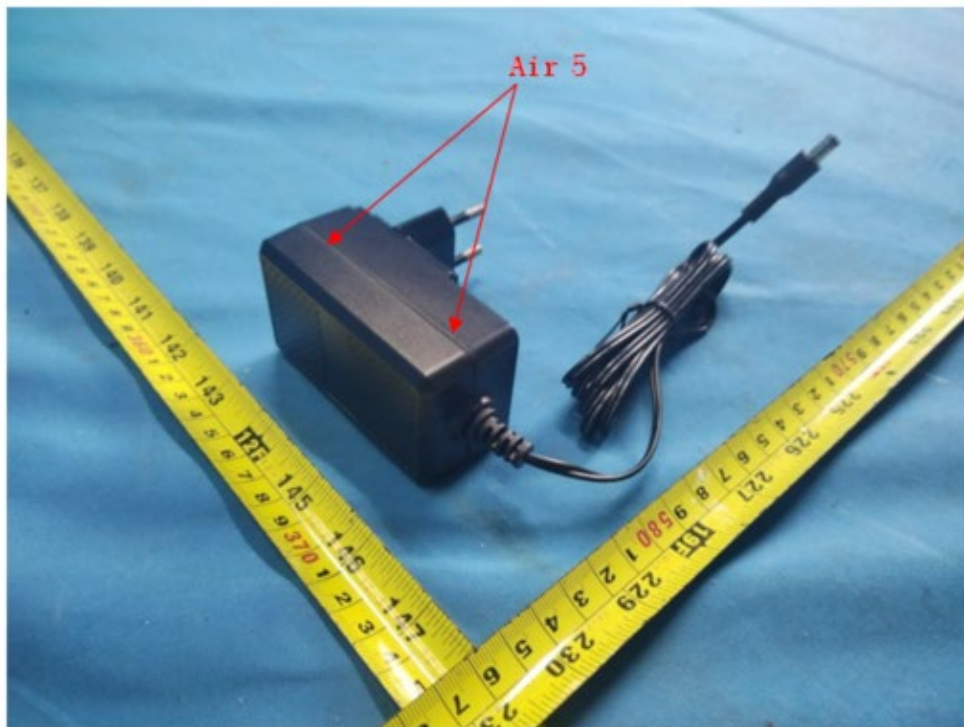
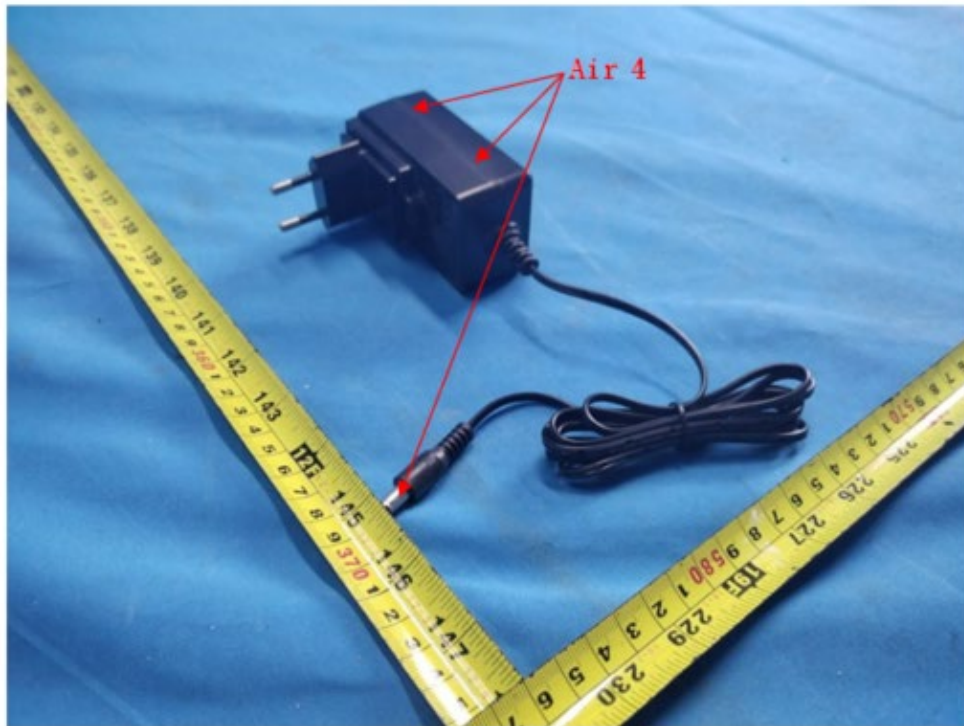
Mode	HCP Contact Discharge						VCP Contact Discharge					
Test Level	4kV		- kV		- kV		4kV		- kV		- kV	
Location	P	N	P	N	P	N	P	N	P	N	P	N
Left side	B	B	-	-	-	-	B	B	-	-	-	-
Right side	B	B	-	-	-	-	B	B	-	-	-	-
Front side	B	B	-	-	-	-	B	B	-	-	-	-
Rear side	B	B	-	-	-	-	B	B	-	-	-	-
Criteria	B						B					
Result	B						B					

Note:

- 1) P/N denotes the Positive/Negative polarity of the output voltage.
- 2) N/A - denotes test is not applicable in this test report

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





APPENDIX H - RF ELECTROMAGNETIC FIELD

Test Voltage	AC 230V/50Hz
Test Mode	Mode 1-5

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

For EN 301489-17:

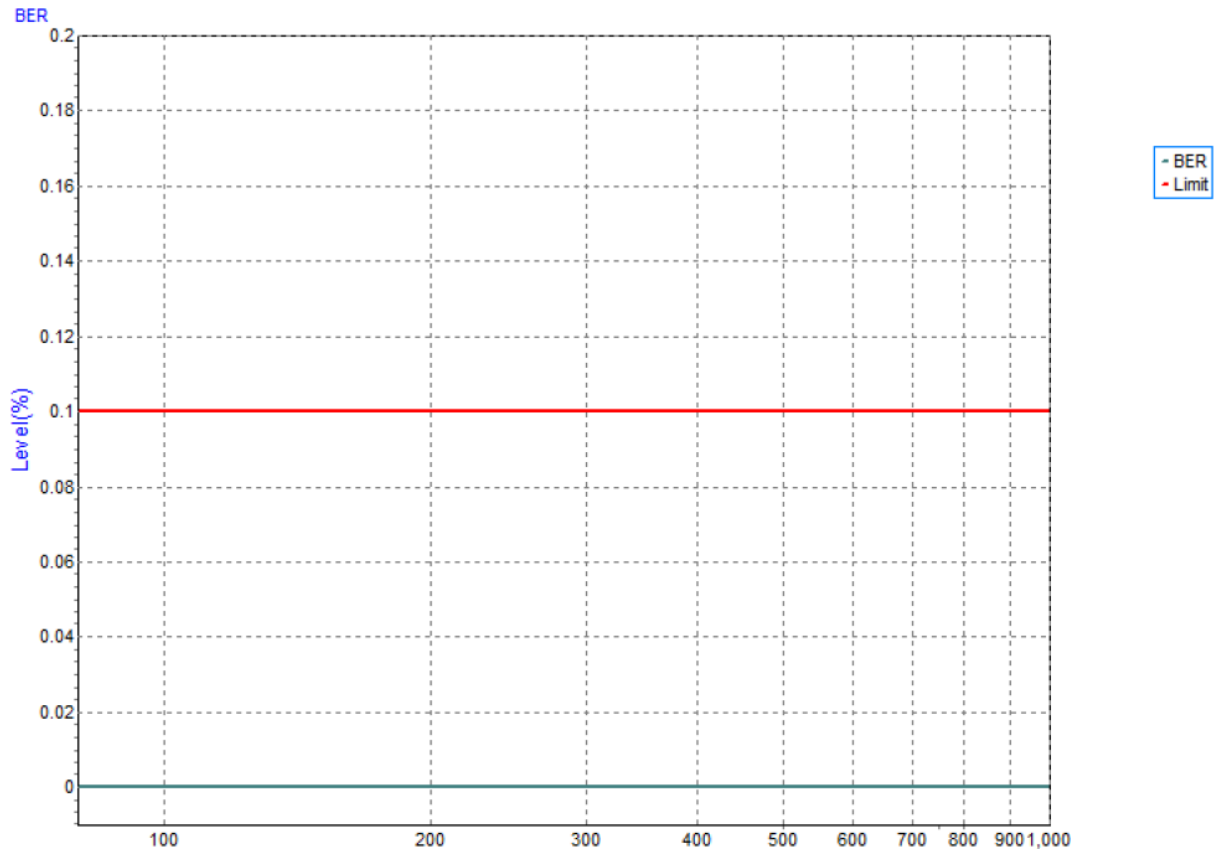
Freq. Range (MHz)	Operating Mode	Field Strength	Orientation (Side of EUT)	Polarity	Perform Criteria	PER		Judgment
						During test	Limit	
80 - 1000	Wi-Fi 2.4G	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	H / V	A	2.35%	10%	PASS
			Right	H / V	A	2.27%	10%	PASS
			Left	H / V	A	2.29%	10%	PASS
			Rear	H / V	A	2.93%	10%	PASS
1000 - 3000	Wi-Fi 2.4G	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	H / V	A	/	10%	/
			Right	H / V	A	/	10%	/
			Left	H / V	A	/	10%	/
			Rear	H / V	A	2.45%	10%	PASS
3000 - 6000	Wi-Fi 2.4G	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	H / V	A	/	10%	/
			Right	H / V	A	/	10%	/
			Left	H / V	A	/	10%	/
			Rear	H / V	A	1.92%	10%	PASS

Freq. Range (MHz)	Operating Mode	Field Strength	Orientation (Side of EUT)	Polarity	Perform Criteria	PER		Judgment
						During test	Limit	
80 - 1000	Wi-Fi 5G	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	H / V	A	1.56%	10%	PASS
			Right	H / V	A	1.32%	10%	PASS
			Left	H / V	A	1.47%	10%	PASS
			Rear	H / V	A	1.82%	10%	PASS
1000 - 3000	Wi-Fi 5G	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	H / V	A	/	10%	/
			Right	H / V	A	/	10%	/
			Left	H / V	A	/	10%	/
			Rear	H / V	A	1.73%	10%	PASS
3000 - 6000	Wi-Fi 5G	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	H / V	A	/	10%	/
			Right	H / V	A	/	10%	/
			Left	H / V	A	/	10%	/
			Rear	H / V	A	1.32%	10%	PASS

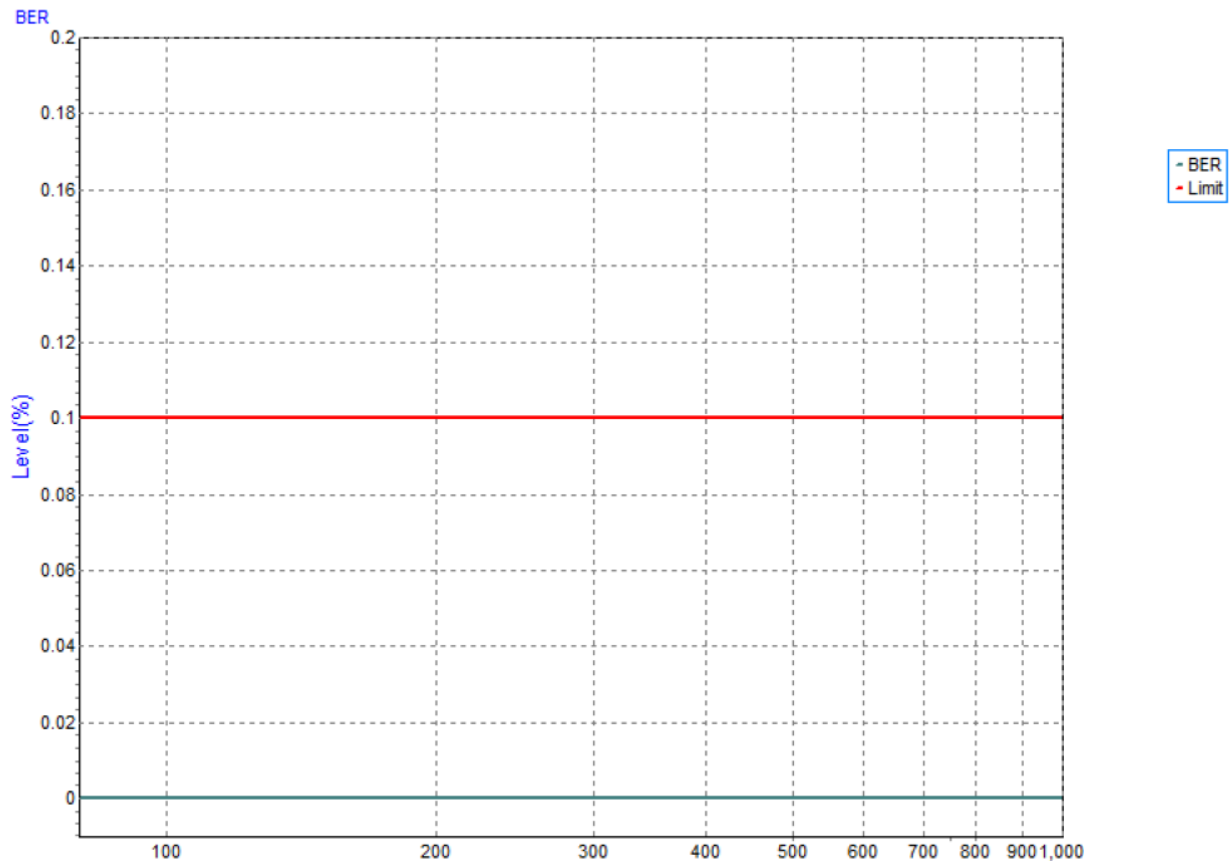
For EN 301489-52:

The data transfer:

Test Voltage	AC 230V/50Hz
Test Mode	Mode 2_ (80 – 1000MHz) WCDMA_Verical _Rear



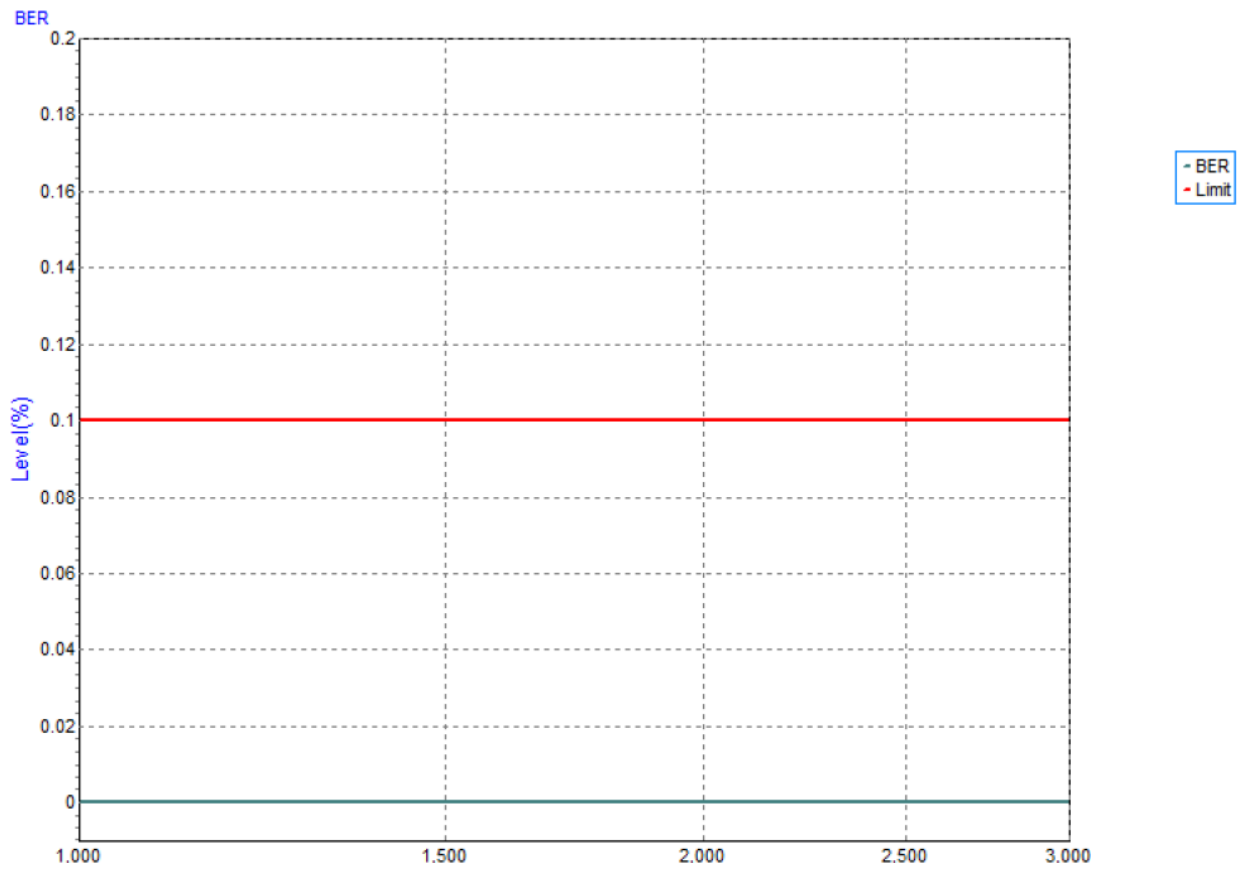
Test Voltage	AC 230V/50Hz
Test Mode	Mode 2_ (80 – 1000MHz) WCDMA_Horizontal_Rear



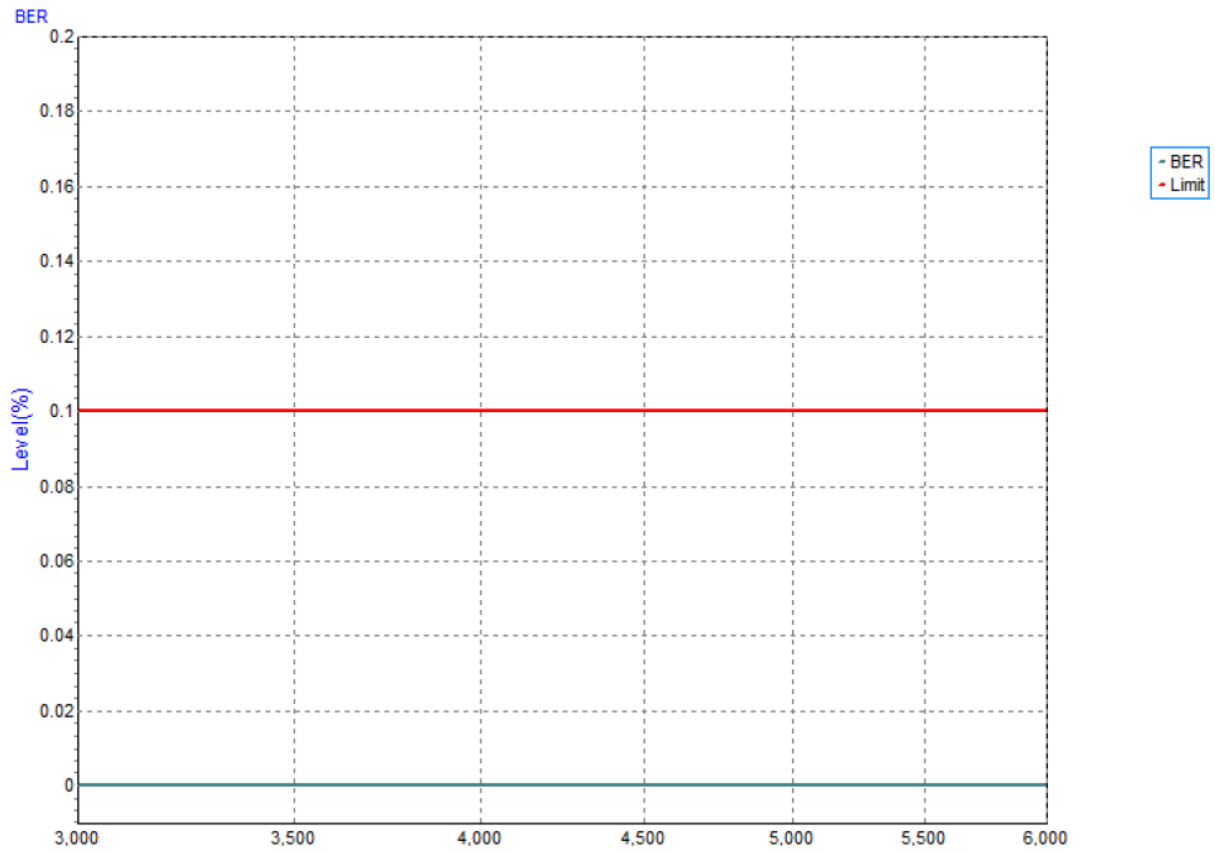
Test Voltage	AC 230V/50Hz
Test Mode	Mode 2_ (1000 – 3000MHz) WCDMA_Vertical _Rear



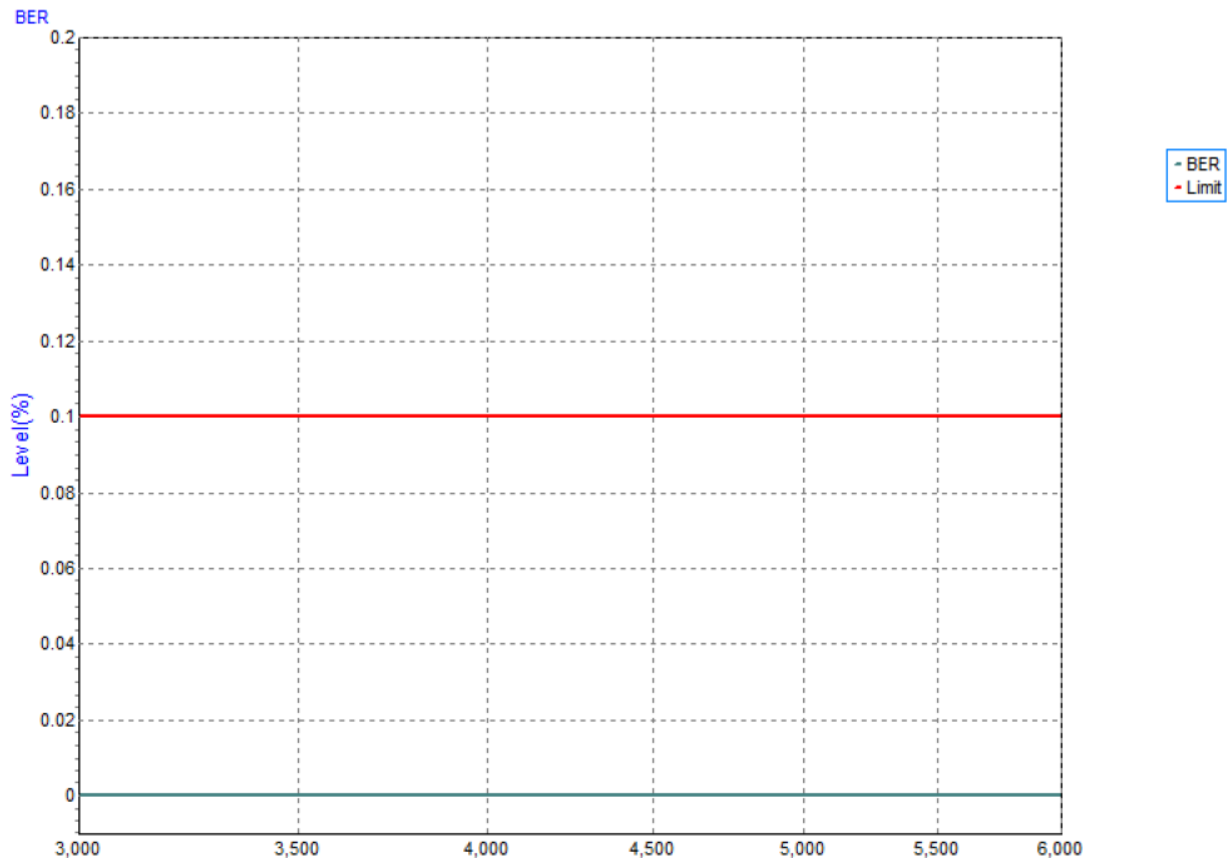
Test Voltage	AC 230V/50Hz
Test Mode	Mode 2_ (1000 – 3000MHz) WCDMA_Horizontal_Rear



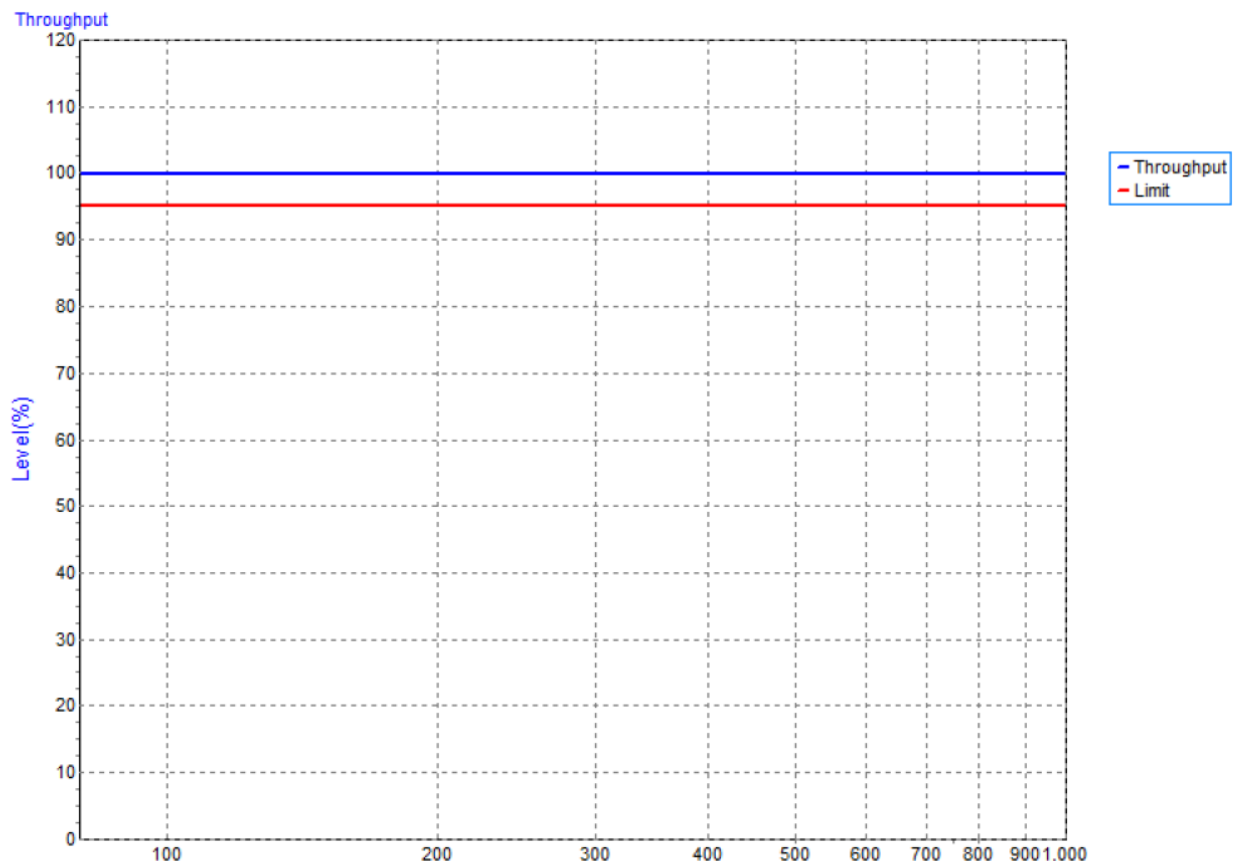
Test Voltage	AC 230V/50Hz
Test Mode	Mode 2_ (3000 – 6000MHz) WCDMA_Vertical_Rear



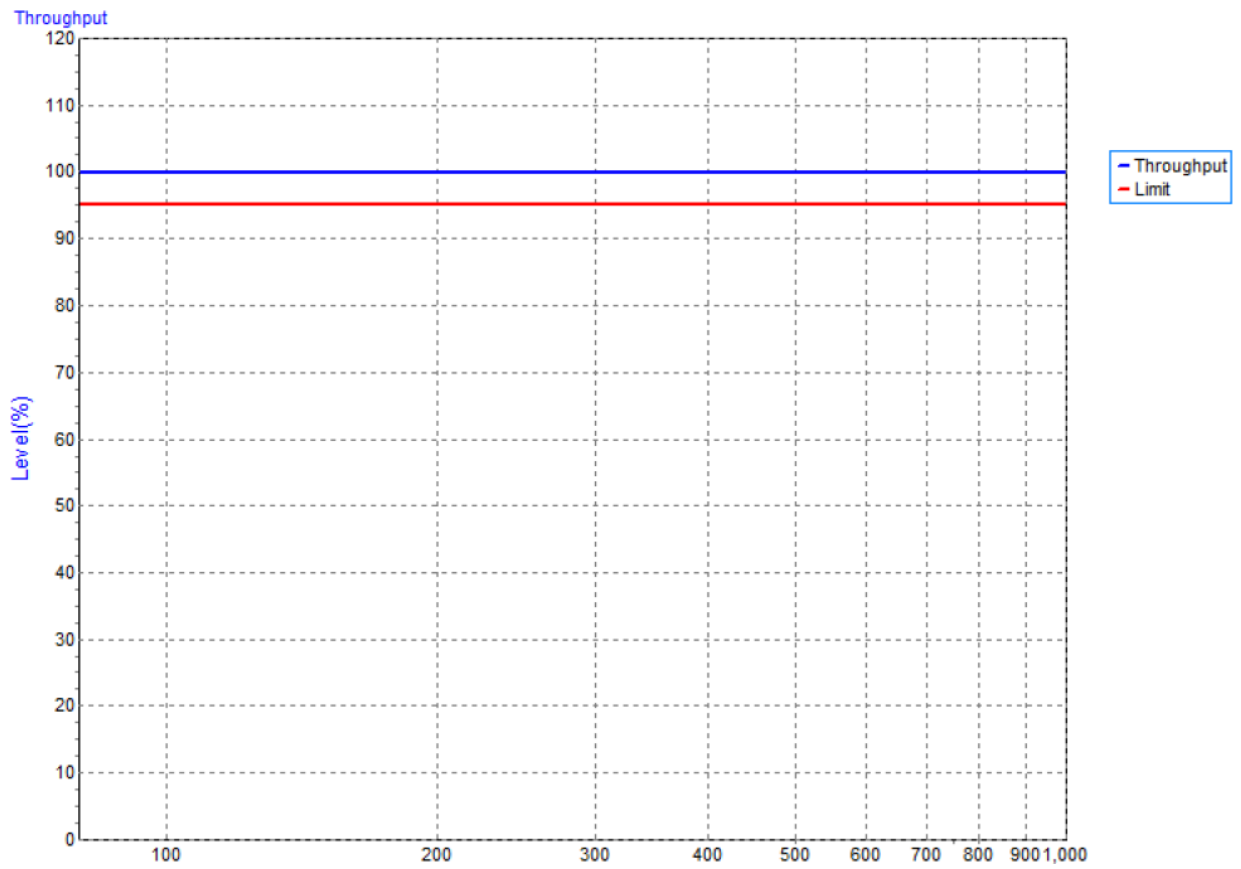
Test Voltage	AC 230V/50Hz
Test Mode	Mode 2_ (3000 – 6000MHz) WCDMA_Horizontal_Rear



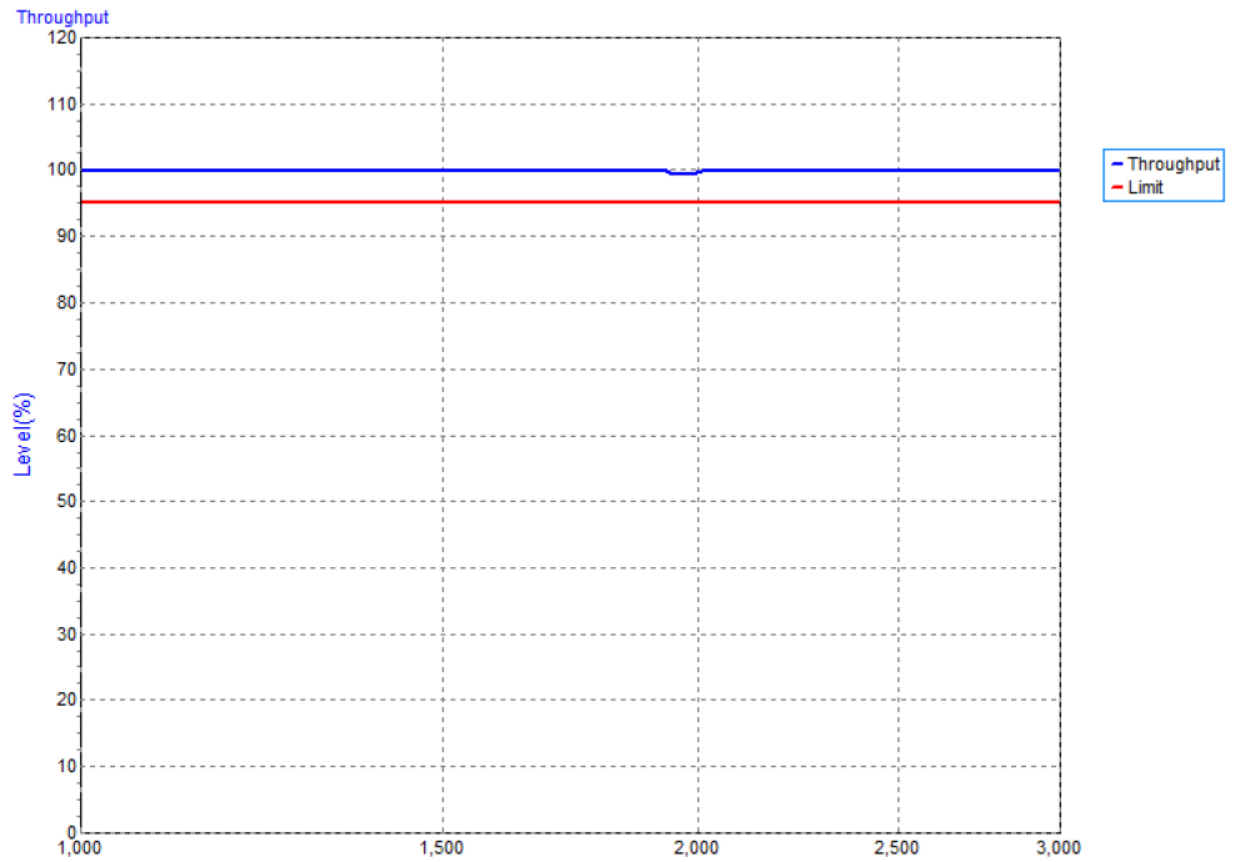
Test Voltage	AC 230V/50Hz
Test Mode	Mode 1_ (80 – 1000MHz) LTE_Vertical _Rear



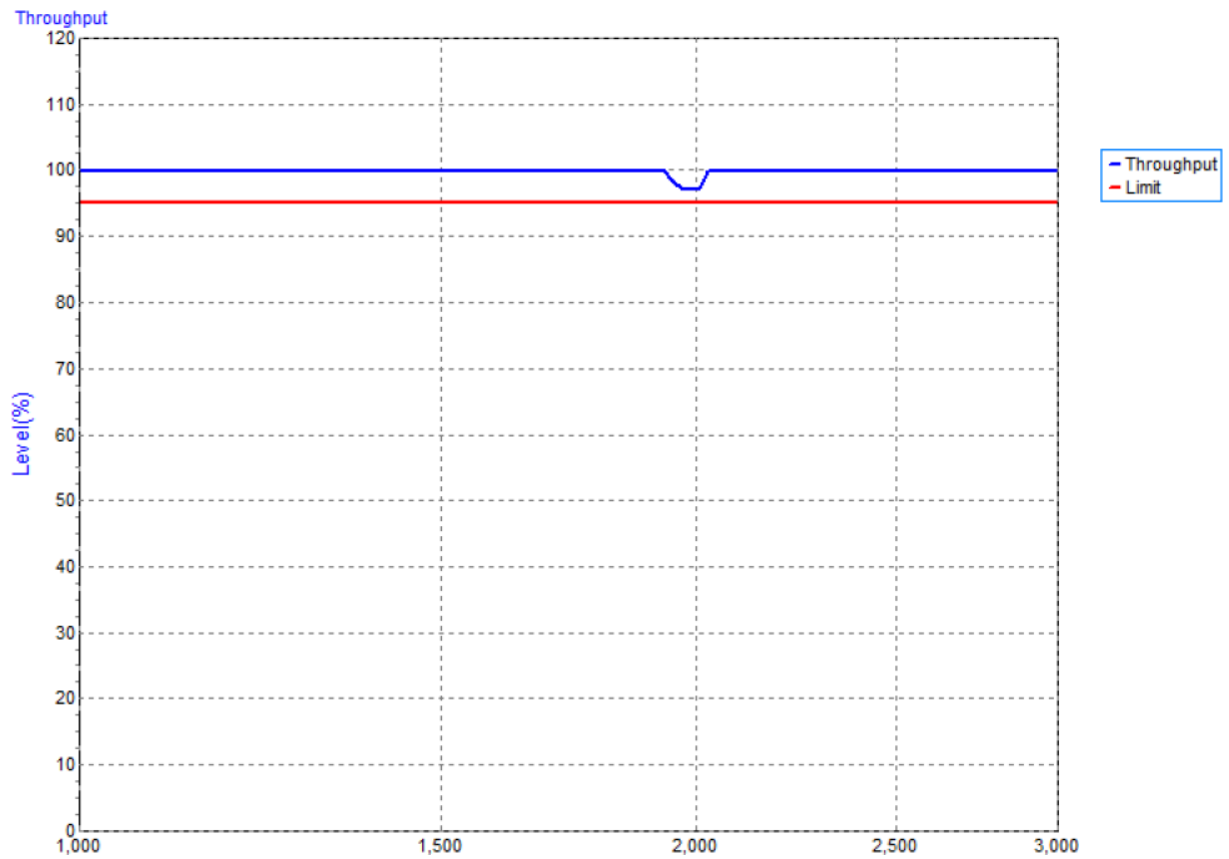
Test Voltage	AC 230V/50Hz
Test Mode	Mode 1_ (80 – 1000MHz) LTE_Horizontal_Rear



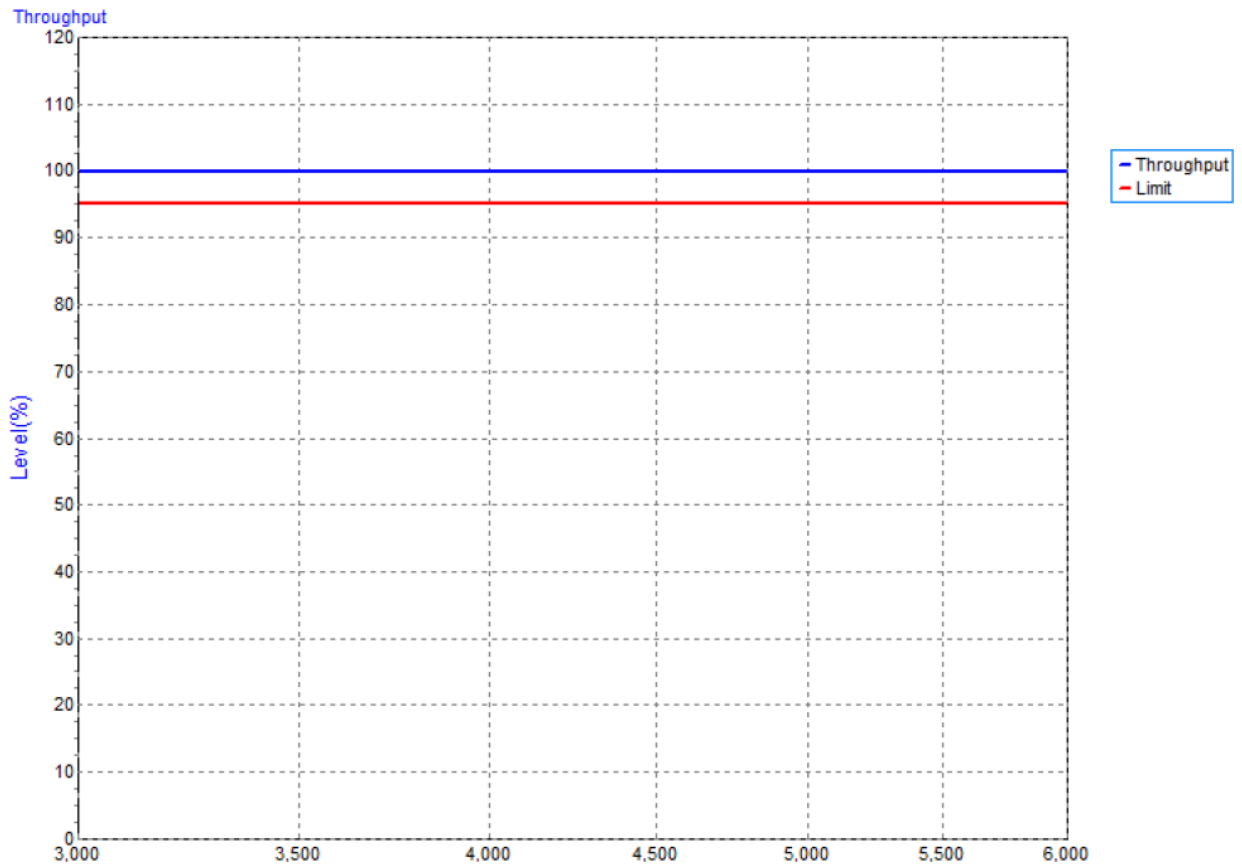
Test Voltage	AC 230V/50Hz
Test Mode	Mode 1_ (1000 – 3000MHz) LTE_Vertical _ Rear



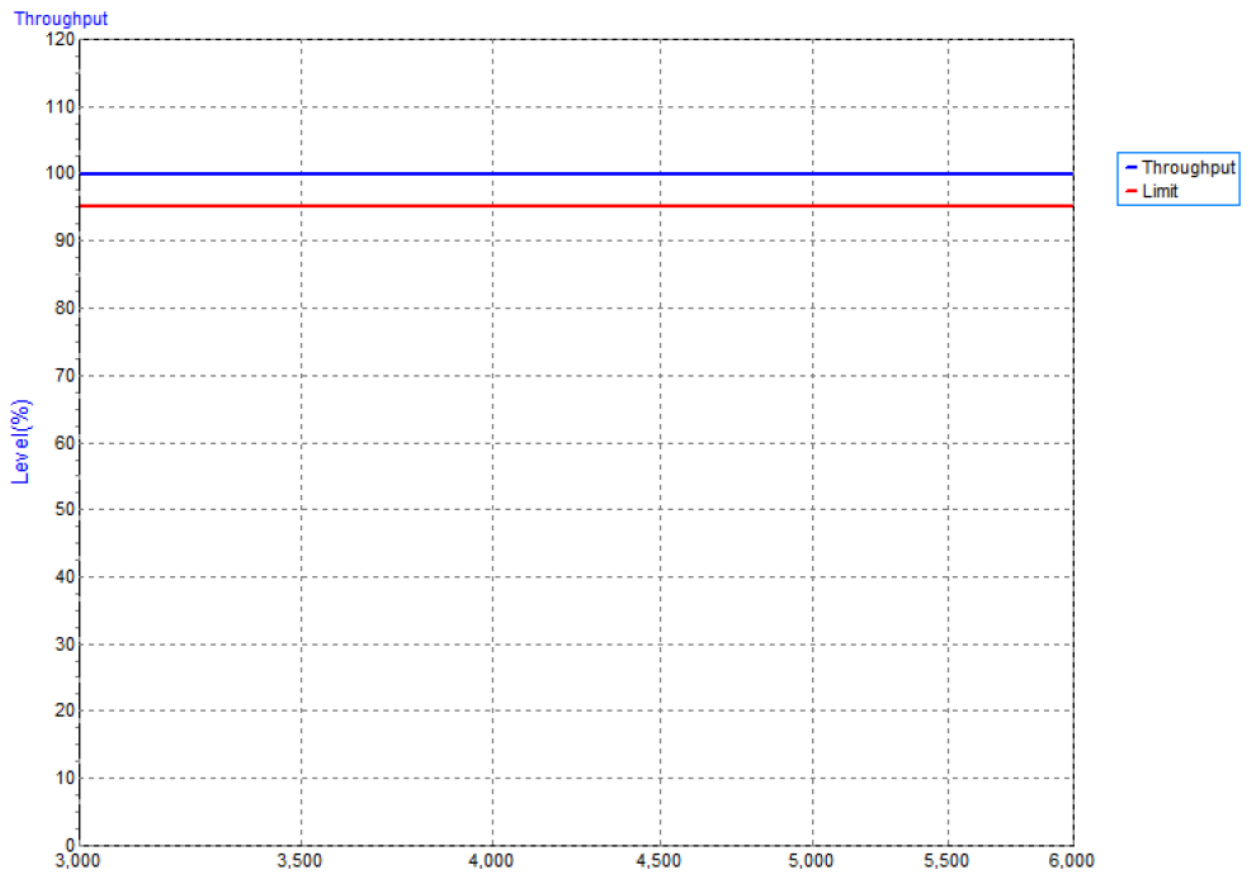
Test Voltage	AC 230V/50Hz
Test Mode	Mode 1_ (1000 – 3000MHz) LTE_Horizontal _ Rear



Test Voltage	AC 230V/50Hz
Test Mode	Mode 1_ (3000 – 6000MHz)LTE_Vertical _ Rear



Test Voltage	AC 230V/50Hz
Test Mode	Mode 1_(3000 – 6000MHz) LTE_Horizontal _ Rear



The data transfer of 5G NR throughput:

Test Voltage	AC 230V/50Hz
Test Mode	Mode 3

Frequency Range (MHz)	Field Strength	RF Field Position	Azimuth	Limit	Results	Judgment
80 - 1000	3 V/m (rms) AM Modulated 1000Hz, 80%	V	Front	95%	98.96%	PASS
			Rear		99.52%	
			Left		99.13%	
			Right		98.32%	
	3 V/m (rms) AM Modulated 1000Hz, 80%	H	Front	95%	99.38%	PASS
			Rear		99.65%	
			Left		99.24%	
			Right		99.17%	
1000 - 3000	3 V/m (rms) AM Modulated 1000Hz, 80%	V	Front	95%	99.47%	PASS
			Rear		99.52%	
			Left		99.49%	
			Right		99.51%	
	3 V/m (rms) AM Modulated 1000Hz, 80%	H	Front	95%	99.45%	PASS
			Rear		99.17%	
			Left		99.19%	
			Right		99.24%	
3000 - 6000	3 V/m (rms) AM Modulated 1000Hz, 80%	V	Front	95%	99.82%	PASS
			Rear		99.72%	
			Left		99.43%	
			Right		99.12%	
	3 V/m (rms) AM Modulated 1000Hz, 80%	H	Front	95%	99.47%	PASS
			Rear		99.22%	
			Left		99.63%	
			Right		99.21%	

APPENDIX I - FAST TRANSIENTS COMMON MODE

Test Voltage	AC 230V/50Hz
Test Mode	Mode 1-5

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

EUT Ports Tested		Polarity	Repetition Frequency	Test Level 0.5 kV	Criterion	Result
Signal port, Wired network port, Control port	LAN1	+	5 kHz	B	B	B
		-	5 kHz	B		
	WAN/LAN2	+	5 kHz	B	B	B
		-	5 kHz	B		

APPENDIX J - SURGE

Test Voltage	AC 230V/50Hz
Test Mode	Mode 1-5

Wave Form EUT Ports Tested		1.2/50(8/20)Tr/Th μs						Criterion	Result
		Polarity	Phase	Voltage					
				0.5kV	1kV	-- kV	-- kV		
AC	L – N	+/-	0°	B	B	-	-	B	B
		+/-	90°	B	B	-	-		
		+/-	180°	B	B	-	-		
		+/-	270°	B	B	-	-		

Wave Form EUT Ports Tested		1.2/50(8/20)Tr/Th μ s					Criterion	Result
		Polarity	Voltage					
			0.5kV	-- kV	-- kV	-- kV		
Wired network ports	LAN1	+/-	B	-	-	-	B	B
Wired network ports	WAN/LAN2	+/-	B	-	-	-	B	B

APPENDIX K - RADIO FREQUENCY COMMON MODE

Test Voltage	AC 230V/50Hz
Test Mode	Mode 1-5

Test Ports (Mode)	Freq. Range (MHz)	Field Strength	Modulation	Criteria	Results
Input/ Output AC. Power Port	0.15 ---80	3 V	AM Modulated 1000 Hz, 80%	A	A
Signal ports, wired network ports, control ports (LAN1)				A	A
Signal ports, wired network ports, control ports (WAN/LAN2)				A	A

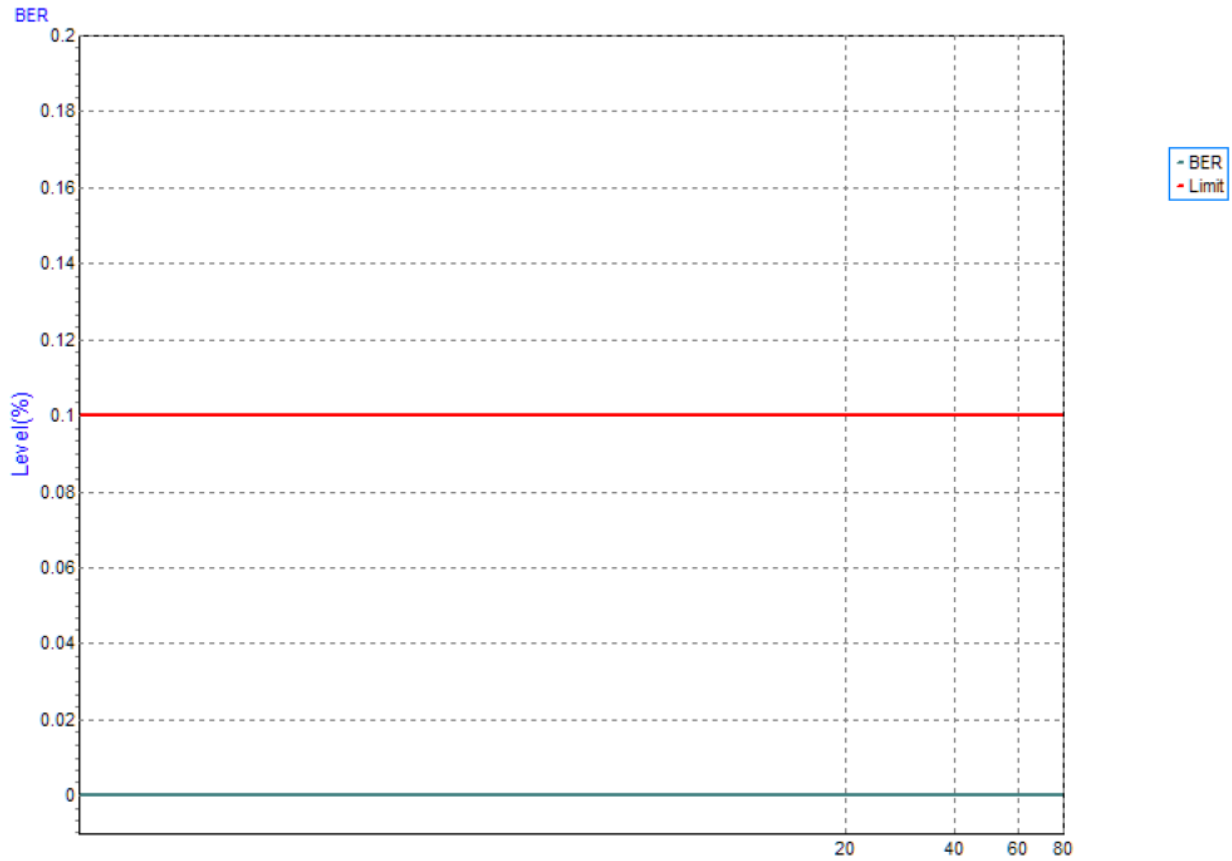
For EN 301489-17:

Test Ports (Mode)	Freq. Range (MHz)	Field Strength Modulation	Criteria	Operating Mode	PER		Judgement
					During Test	Limit	
Input/ Output AC. Power Port	0.15 ---80	3 V AM Modulated 1000 Hz, 80%	A	Wi-Fi 2.4G	3.59%	10%	PASS
				Wi-Fi 5G	3.21%	10%	PASS
A			Wi-Fi 2.4G	4.12%	10%	PASS	
			Wi-Fi 5G	4.36%	10%	PASS	
Signal ports, wired network ports, control ports (LAN1)			A	Wi-Fi 2.4G	4.05%	10%	PASS
				Wi-Fi 5G	4.16%	10%	PASS
Signal ports, wired network ports, control ports (WAN/LAN2)	A	Wi-Fi 2.4G	4.05%	10%	PASS		
		Wi-Fi 5G	4.16%	10%	PASS		

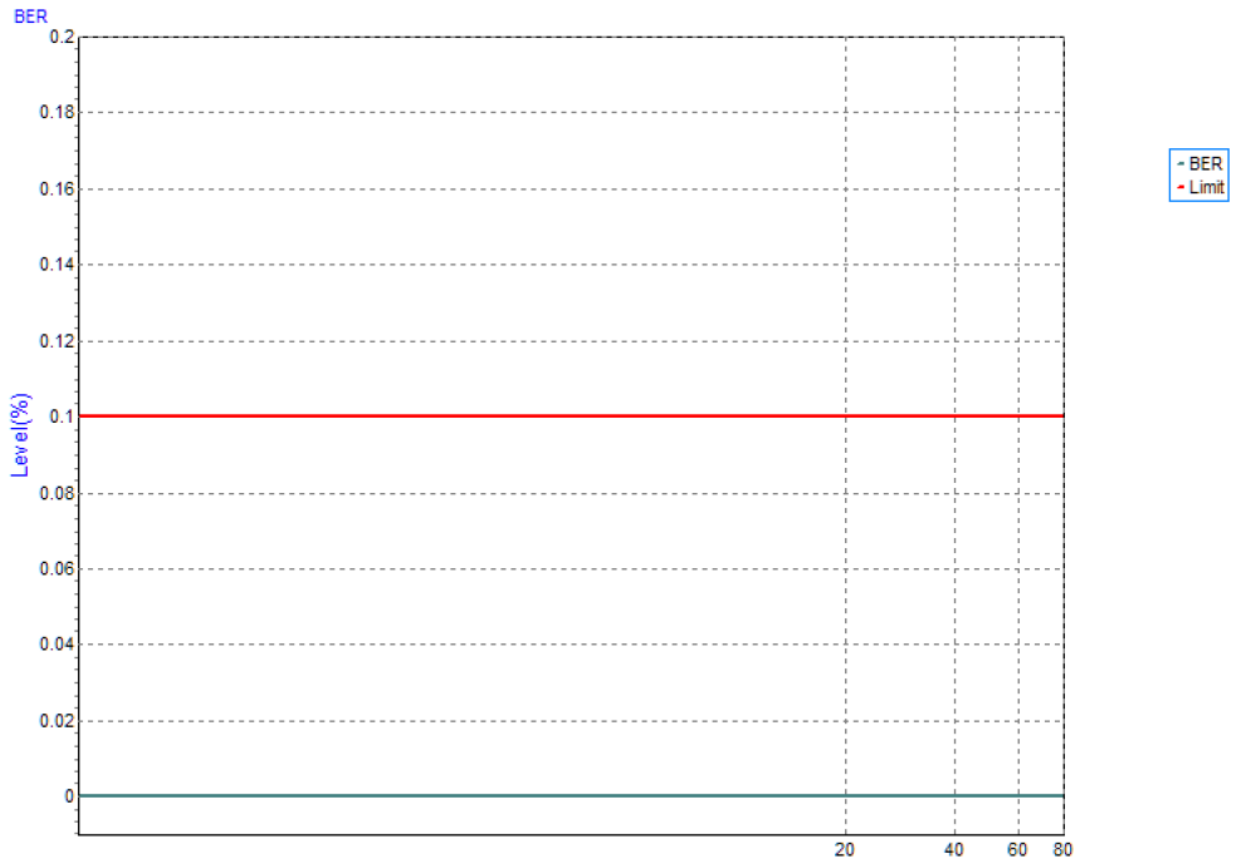
For EN 301489-52:

The data transfer:

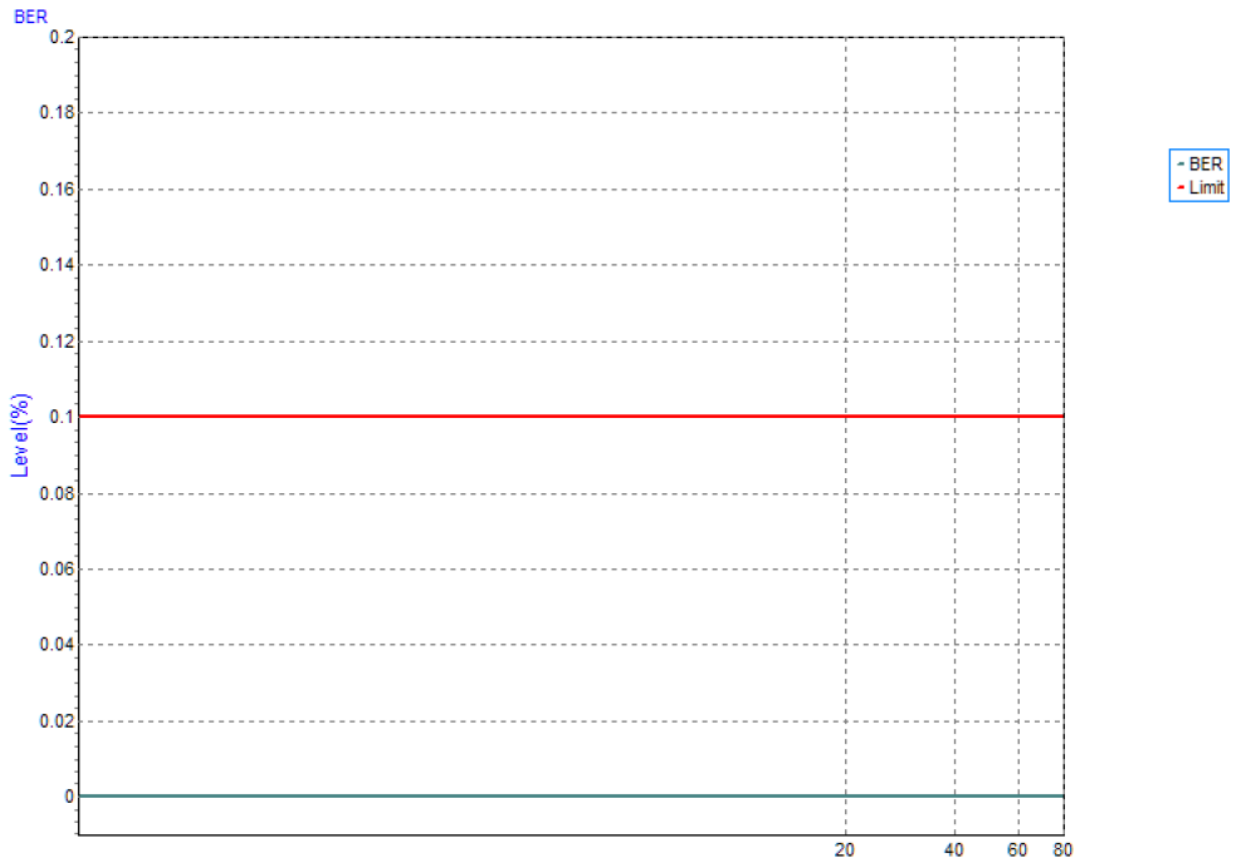
Test Voltage	AC 230V/50Hz
Test Mode	Mode 2_WCDMA_CDN M2



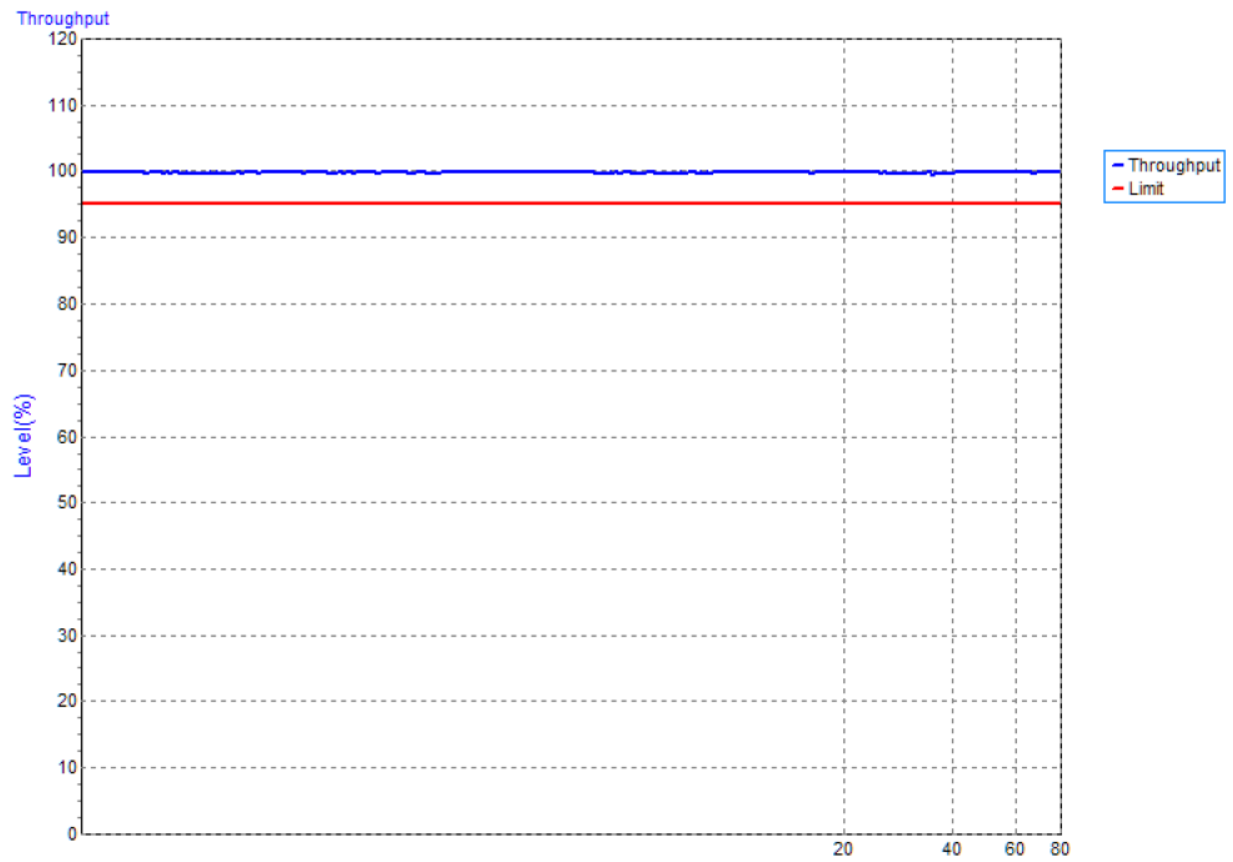
Test Voltage	AC 230V/50Hz
Test Mode	Mode 2_WCDMA_LAN1 T8



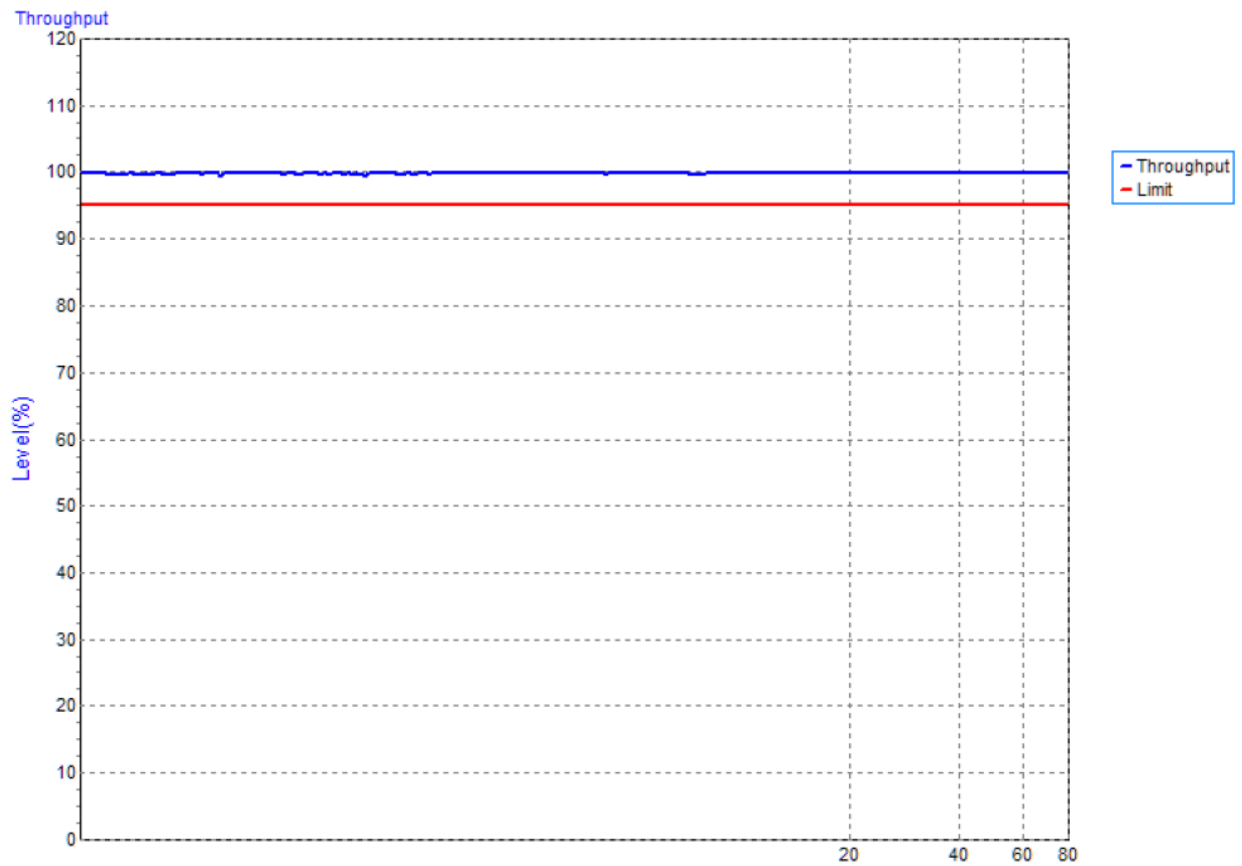
Test Voltage	AC 230V/50Hz
Test Mode	Mode 2_WCDMA_WAN/LAN2 T8



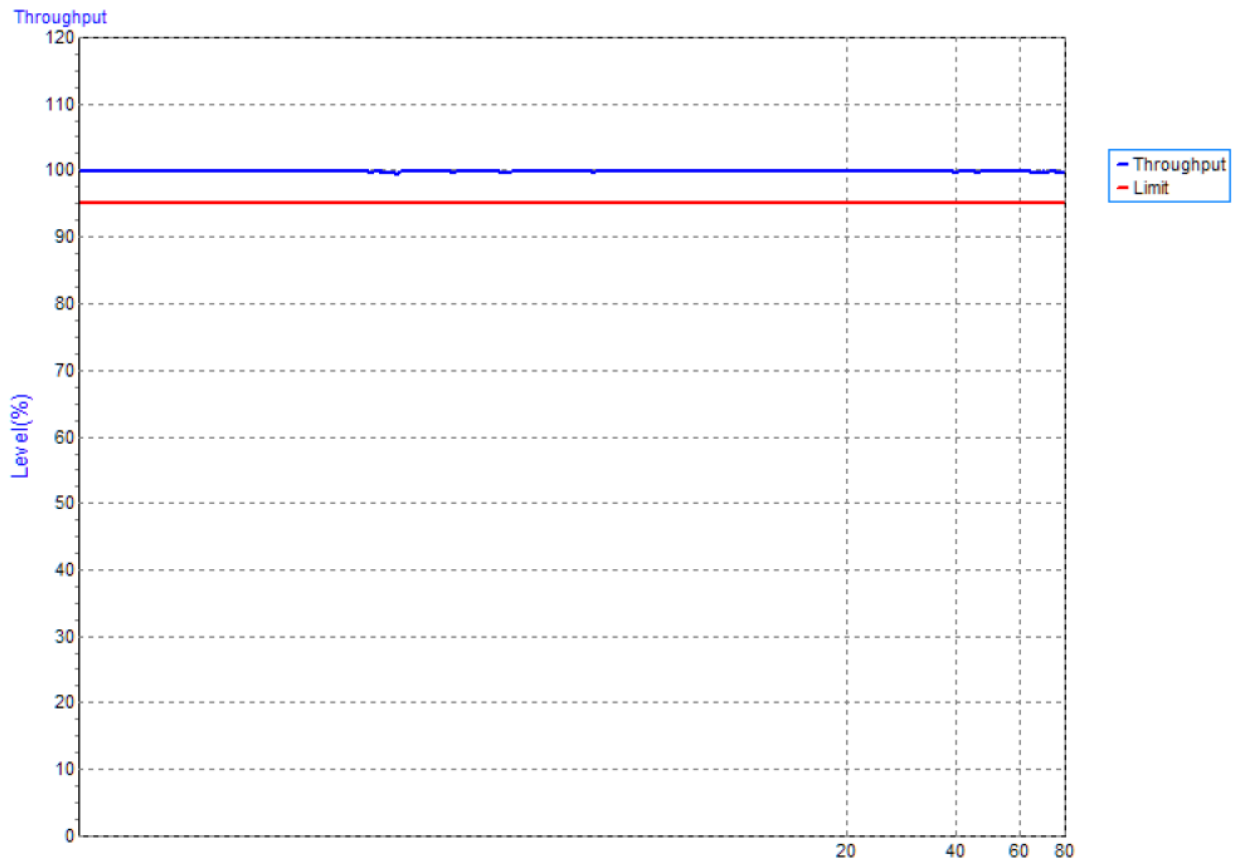
Test Voltage	AC 230V/50Hz
Test Mode	Mode 1_LTE_CDN M2



Test Voltage	AC 230V/50Hz
Test Mode	Mode 1_LTE_LAN1 T8



Test Voltage	AC 230V/50Hz
Test Mode	Mode 1_LTE_WAN/LAN2 T8



The data transfer of 5G NR throughput:

Test Voltage :	AC 230V/50Hz
Test Mode :	Mode 3

Interference signal injection	Freq. Range (MHz)	Field Strength	Limit	Results	Judgment
Input/ Output AC. Power Port	0.15 --- 80	3V(rms) AM Modulated 1000Hz, 80%	95%	98.96%	PASS
Signal Line (LAN1)			95%	99.37%	PASS
Signal Line (WAN/LAN2)			95%	99.48%	PASS

APPENDIX L - VOLTAGE DIPS AND INTERRUPTIONS

Test Voltage	AC 100V/50Hz, AC 230V/50Hz, AC 240V/50Hz
Test Mode	Mode 1-5

AC 100V/50Hz				
Item	Residual Voltage	Cycle	Perform Criteria	Results
Voltage dips	0%	0.5	B	A
Voltage dips	0%	1	B	A
Voltage dips	70%	25	C	A
Voltage interruptions	0%	250	C	C

AC 230V/50Hz				
Item	Residual Voltage	Cycle	Perform Criteria	Results
Voltage dips	0%	0.5	B	A
Voltage dips	0%	1	B	A
Voltage dips	70%	25	C	A
Voltage interruptions	0%	250	C	C

AC 240V/50Hz				
Item	Residual Voltage	Cycle	Perform Criteria	Results
Voltage dips	0%	0.5	B	A
Voltage dips	0%	1	B	A
Voltage dips	70%	25	C	A
Voltage interruptions	0%	250	C	C

End of Test Report