

EN 55032:2015+A11:2020+A1:2020

EN 55035:2017+A11:2020

EN IEC 61000-3-2:2019+A1:2021

EN 61000-3-3:2013+A1:2019+A2:2021

BS EN 55032:2015+A11:2020+A1:2020

BS EN 55035:2017+A11:2020

BS EN IEC 61000-3-2:2019+A1:2021

BS EN 61000-3-3:2013+A1:2019+A2:2021

TEST REPORT

For

SHENZHEN TENDA TECHNOLOGY CO.,LTD.

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

Tested Model: TEG1110PF-8-102W

Report Type: Original Report	Product Type: 9GE+1SFP Ethernet Switch With 8-Port PoE
Report Number:	DG2220607-24921E-01
Report Date:	2022-07-20
Reviewed By:	Michael Zhang EMC Engineer
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.12, Pulong East 1 st Road, Tangxia Town, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:		9GE+1SFP Ethernet Switch With 8-Port PoE
EUT Model:		TEG1110PF-8-102W
Rated Input Voltage:		DC 51V
Adapter Information:	Model:	BN038-A10151
	Input:	100-240V~50/60Hz 1.6A
	Output:	51V=2.0A 102.0W
I/O Ports:		Refer to the manual
EUT Function:		Refer to the manual
Serial Number:		DG2220607-24921E-EM-S1,DG2220607-24921E-EM-S2, DG2220607-24921E-EM-S3
EUT Received Date:		2022.6.9
EUT Received Status:		Good

Objective

This report is prepared on behalf of **SHENZHEN TENDA TECHNOLOGY CO.,LTD.** in accordance with EN 55032:2015+A11:2020+A1:2020 and BS EN 55032:2015+A11:2020+A1:2020 Electromagnetic compatibility of multimedia equipment - Emission Requirements; EN 55035:2017+A11:2020 and BS EN 55035:2017+A11:2020 Electromagnetic compatibility of multimedia equipment - Immunity requirements; EN IEC 61000-3-2:2019+A1 and BS EN IEC 61000-3-2:2019+A1 Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase); EN 61000-3-3:2013+A1:2019+A2:2021 and BS EN 61000-3-3:2013+A1:2019+A2:2021 Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection.

The objective is to determine the compliance of EUT with:

EN 55032:2015+A11:2020+A1:2020

EN 55035:2017+A11:2020

EN IEC 61000-3-2:2019+A1:2021

EN 61000-3-3:2013+A1:2019+A2:2021

BS EN 55032:2015+A11:2020+A1:2020

BS EN 55035:2017+A11:2020

BS EN IEC 61000-3-2:2019+A1:2021

BS EN 61000-3-3:2013+A1:2019+A2:2021.

Test Methodology

All measurements contained in this report were conducted with EN 55032:2015+A11:2020+A1:2020 and BS EN 55032:2015+A11:2020+A1:2020 Electromagnetic compatibility of multimedia equipment - Emission Requirements; EN 55035:2017+A11:2020 and BS EN 55035:2017+A11:2020 Electromagnetic compatibility of multimedia equipment - Immunity requirements; EN IEC 61000-3-2:2019+A1:2021 and BS EN IEC 61000-3-2:2019+A1:2021 Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase); EN 61000-3-3:2013+A1:2019+A2:2021 and BS EN 61000-3-3:2013+A1:2019+A2:2021 Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection.

Declarations

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol“▲”. Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

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SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a typical fashion (as normally used by a typical user).

Test Mode :

Mode 1:Operating(110V)

Mode 2:Operating(230V)

Equipment Modifications

No modification was made to the EUT.

EUT Exercise Software

No EUT software is used for testing.

Support Equipment List and Details

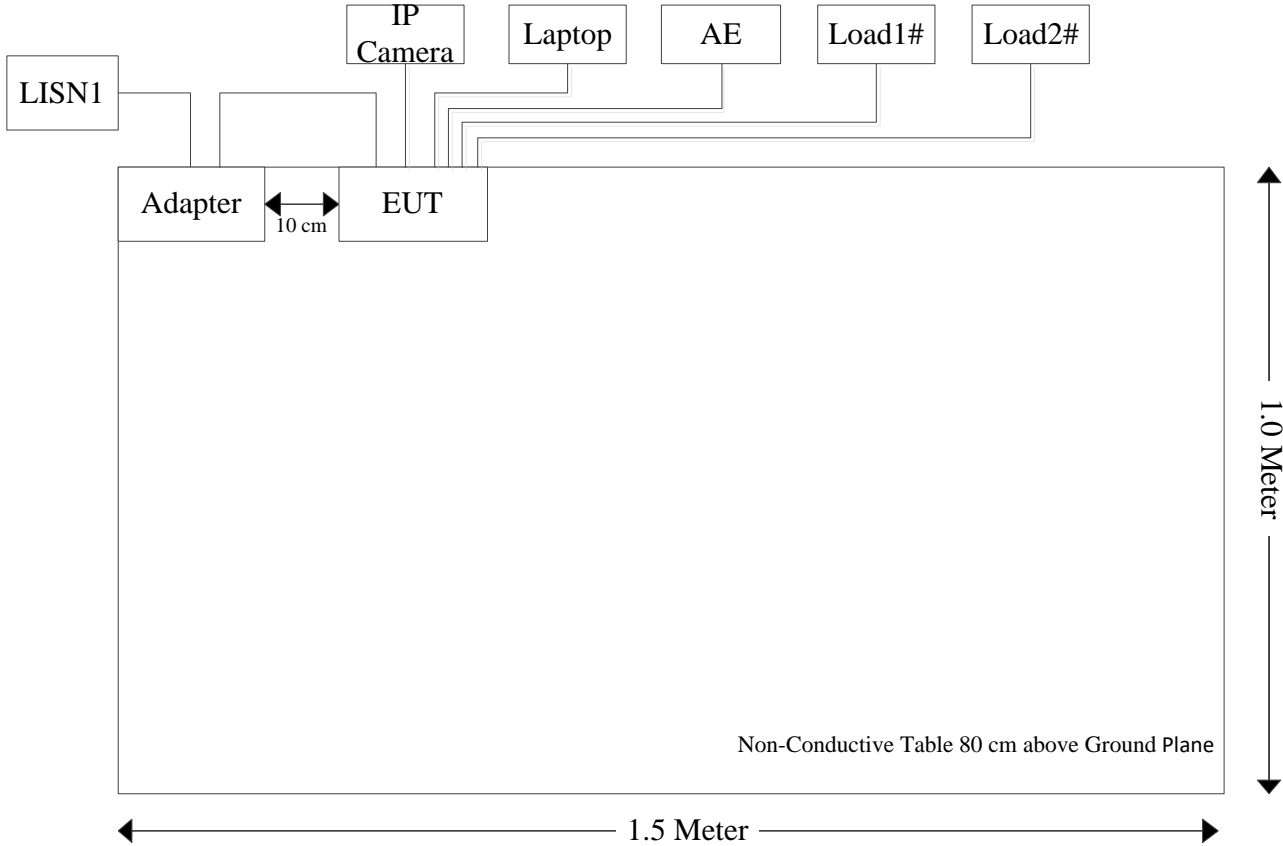
Manufacturer	Description	Model	Serial Number
Milesight	IP Camera	MS-C2973-RPC	Unknown
Lenovo	Laptop	ThinkPad T460s	PC0J92SU
Unknown	Load1#	Unknown	Unknown
Tenda	Load2#	Unknown	Unknown

Support Cable List and Details

Cable Description	Shielding Cable	Ferrite Core	Length (m)	From Port	To
RJ45 Calbe	No	No	10	EUT	IP Camera
RJ45 Calbe	No	No	10	EUT	Laptop
RJ45 Calbe	No	No	10	EUT	Load2#
RJ45 Calbe	No	No	0.4	EUT	Load1#
Optical Fiber Cable	No	No	10	EUT	AE
Earth Wire	No	No	1.2	EUT	Reference Ground

Block Diagram of Test Setup

Mode 1&2:



Test Equipment List

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted emission					
R&S	LISN	ENV 216	101614	2021-10-26	2022-10-25
TESEQ	ISN	T800	34379	2021-10-26	2022-10-25
R&S	EMI Test Receiver	ESCI	101121	2021-07-22	2022-07-21
MICRO-COAX	Coaxial Cable	C-NJNJ-50	C-0200-01	2021-09-05	2022-09-04
R&S	Test Software	EMC32	Version 9.10.00	N/A	N/A
Radiated emissions below 1GHz					
Sunol Sciences	Antenna	JB3	A060611-2	2020-08-25	2023-08-25
R&S	EMI Test Receiver	ESCI	100224	2021-09-11	2022-09-10
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2021-08-19	2022-08-18
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2021-08-19	2022-08-18
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2021-08-19	2022-08-18
Sonoma	Amplifier	310N	185914	2021-08-19	2022-08-18
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Radiated emissions above 1GHz					
ETS-Lindgren	Horn Antenna	3115	000 527 35	2021-10-12	2024-10-11
Agilent	Spectrum Analyzer	E4440A	SG43360054	2021-07-22	2022-07-21
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2021-09-04	2022-09-03
AH	Preamplifier	PAM-0118	469	2021-10-13	2022-10-12
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
EFT & Surge & Dips					
EM TEST	Ultra Compact Generator	UCS 500N5	P1406130994	2022-04-01	2023-03-31
EM TEST	Autotransformer	MV2616	P1450144859	N/A	N/A
EM TEST	CDN	CNV508 S1	311137	2022-04-01	2023-03-31
EM TEST	EFT Clamp	N/A	300886	2021-07-22	2022-07-21
Flicker& Harmonic					
EVERFINE	Harmonic & Flicker TEST ING Power Source	HFS-4000	P624486CD1411122	2022-04-01	2023-03-31
EVERFINE	Harmonic & Flicker Measurement System	HFM3000	P630850CD1411115	2022-06-07	2023-06-06
ESD					
TESEQ	ESD Generator	NSG 438	1019	2021-09-29	2022-09-28
CS					
HP	Signal Generator	8648A	3246A00831	2021-09-11	2022-09-10
R&S	Power Amplifier	15A250	12934	N/A	N/A
Werlatone	Dual Directional Coupler	C5091-10	113192	2022-02-09	2023-02-08
HP	Power Meter	HP EPM-441A	GB37481494	2021-07-22	2022-07-21
Agilent	8482A Power sensor	8482A	US37296108	2021-07-22	2022-07-21
NARDA	Attenuator	769-6	2754	N/A	N/A
COM-POWER	CDN	M325E	521064	2021-07-22	2022-07-21
COM-POWER	CDN	T8E	581607	2021-07-22	2022-07-21
PFMF					
EM TEST	Current Transformer	MC2630	301873	N/A	N/A
EM TEST	Loop Antenna	MS100	303298	N/A	N/A
PAOFN	Transformer	AC250	250003	N/A	N/A
FLUKE	Clamp Meter	317	42270435WS	2021-06-30	2022-06-29

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RS					
AR	Antenna	ATL80M1G	0351400	N/A	N/A
AR	Antenna	ATT700M12 G	0349410	N/A	N/A
HP	Signal Generator	8665B	3438a00584	2021-07-22	2022-07-21
AR	Power Amplifier	500W1000C	0353561	N/A	N/A
AR	Power Amplifier	60S1G6	0348711	N/A	N/A
PASTERNAK	Dual Directional Coupler	PE2239-30	1711	2021-07-15	2022-07-14
Agilent	EPM Series Power Meter	E4419B	MY45103907	2021-07-22	2022-07-21
Agilent	E-Series Avg Power Sensor	E9301A	MY41497625	2021-07-22	2022-07-21
Agilent	E-Series Avg Power Sensor	E9301A	MY41497628	2021-07-22	2022-07-21

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

Environmental Conditions

Test Item:	Conducted emission	Radiated emissions below 1GHz	Radiated emissions above 1GHz	EMS &Flicker	Harmonic
Temperature:	26.3~27.3 °C	26.1oC	28.8oC	23.3~26.7 °C	23.9°C
Relative Humidity:	62~63%	62%	39%	46 ~56%	51%
ATM Pressure:	100.0kPa	100.3kPa	100.5 kPa	100.0 kPa	100.0 kPa
Tester:	Walker Chen	Joe Li	Lucky Lu	Wright Lai	Wright Lai
Test Date:	2022.06.18~2022-07-18	2022.06.22	2022.06.23	2022.07.19	2022.07.18

SUMMARY OF TEST RESULTS

SN	Rule and Clause	Description of Test	Test Result
1	EN 55032 and BS EN 55032 Clause A.3	Conducted emissions	Compliant
2	EN 55032 and BS EN 55032 Clause A.2	Radiated emissions	Compliant
3	EN 55035 and BS EN 55035 Clause 4.2.1	Electrostatic discharges IEC 61000-4-2	Compliant
4	EN 55035 and BS EN 55035 Clause 4.2.2.2	Continuous radiated disturbances IEC 61000-4-3	Compliant
5	EN 55035 and BS EN 55035 Clause 4.2.2.3	Continuous conducted disturbances IEC 61000-4-6	Compliant
6	EN 55035 and BS EN 55035 Clause 4.2.3	Power frequency magnetic fields IEC 61000-4-8	Compliant
7	EN 55035 and BS EN 55035 Clause 4.2.4	Electrical fast transients/burst IEC 61000-4-4	Compliant
8	EN 55035 and BS EN 55035 Clause 4.2.5	Surges IEC 61000-4-5	Compliant
9	EN 55035 and BS EN 55035 Clause 4.2.6	Voltage dips and short interruptions IEC 61000-4-11	Compliant
10	EN IEC 61000-3-2 and BS EN IEC 61000-3-2	Harmonic current emissions	Compliant
11	EN 61000-3-3 and BS EN 61000-3-3	Voltage fluctuations and flicker	Compliant

1 - CONDUCTED EMISSIONS

Measurement Uncertainty

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

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

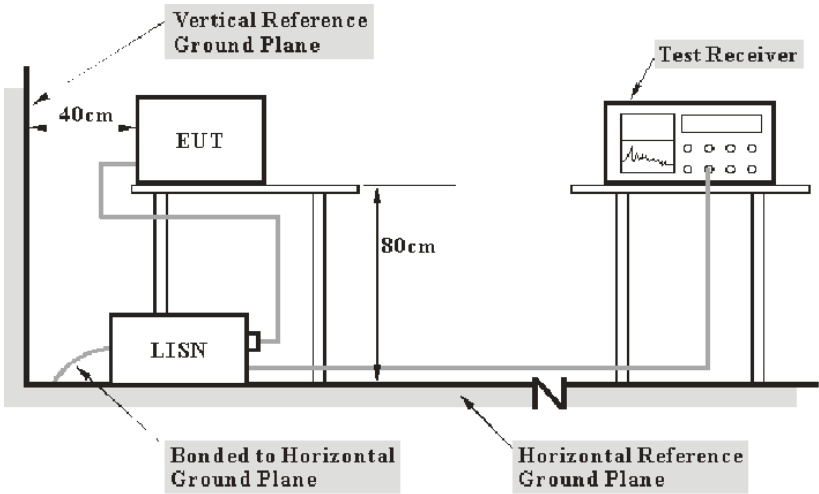
Based on CISPR 16-4-2-2011, measurement uncertainty of conducted disturbance at mains port using AMN at Bay Area Compliance Laboratories Corp. (Dongguan) is 3.12 dB (150 kHz to 30 MHz), and conducted disturbance at telecommunication port using AAN is 5.0 dB (150 kHz to 30 MHz).

Table 1 - Values of U_{cispr}

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

Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Test System Setup



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

The setup of EUT is according with CISPR 16-1-1:2010+A1:2010+A2 2014, CISPR 16-2-1:2008+A1:2010+A2 2013 measurement procedure. The specification used was the EN 55032 and BS EN 55032 Class A limits.

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

The spacing between the peripherals was 10cm.

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

EMI Test Receiver Setup

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

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

FrequencyRange	IF B/W
150 kHz - 30 MHz	9 kHz

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

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

Note:

Corr. = Cable loss + Factor of coupling device

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

Margin = Limit -Result

Test Procedure

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

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

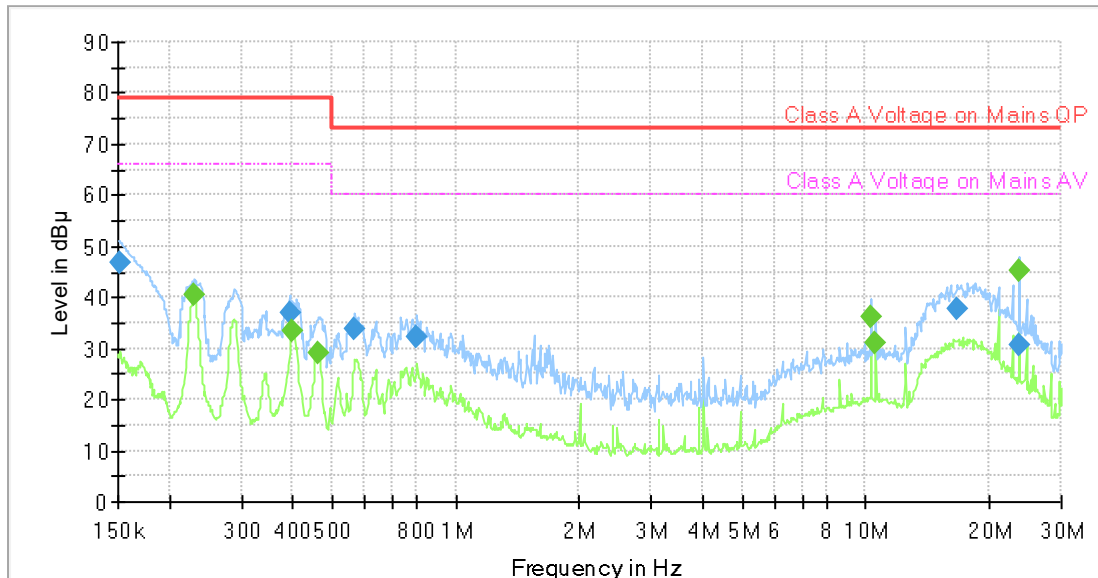
All data was recorded in the Quasi-peak and average detection mode.

Except for the recorded frequency points (no more than 6), the remaining frequency points have a margin more than 20dB.

Test Data

Please refer to following table and plots:

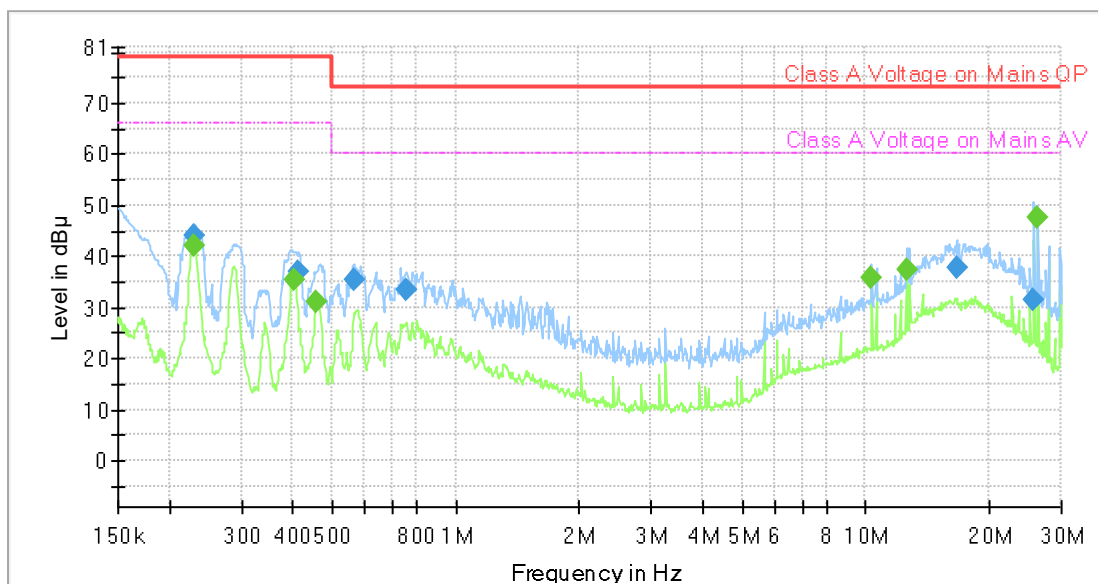
Port: L
 Test Mode: Mode 1:Operating
 Power Source: AC 110V/60Hz
 Note:



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.151504	46.83	---	79.00	32.17	9.000	L1	9.6
0.229196	---	40.30	66.00	25.70	9.000	L1	9.6
0.392773	37.01	---	79.00	41.99	9.000	L1	9.6
0.398694	---	33.54	66.00	32.46	9.000	L1	9.6
0.460739	---	29.21	66.00	36.79	9.000	L1	9.6
0.568106	33.80	---	73.00	39.20	9.000	L1	9.6
0.801471	32.19	---	73.00	40.81	9.000	L1	9.7
10.301765	---	36.04	60.00	23.96	9.000	L1	9.9
10.561897	---	31.16	60.00	28.84	9.000	L1	9.9
16.711661	37.56	---	73.00	35.44	9.000	L1	10.1
23.694303	---	45.16	60.00	14.84	9.000	L1	10.0
23.694303	30.53	---	73.00	42.47	9.000	L1	10.0

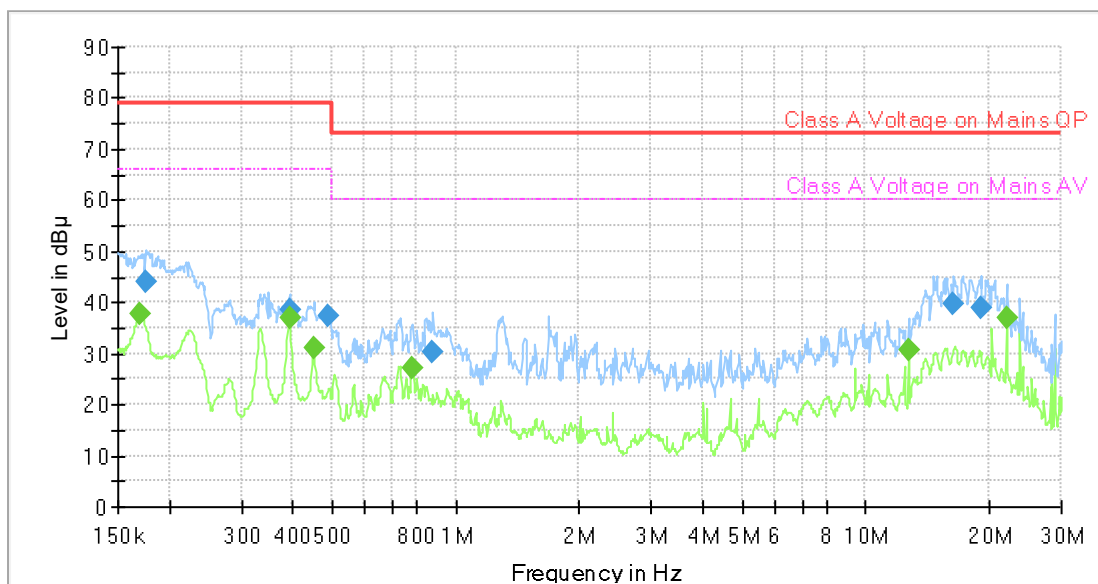
Port: N
Test Mode: Mode 1:Operating
Power Source: AC 110V/60Hz
Note:



Final_Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.230342	---	42.07	66.00	23.93	9.000	N	9.6
0.230342	43.99	---	79.00	35.01	9.000	N	9.6
0.402691	---	35.58	66.00	30.42	9.000	N	9.6
0.414923	36.87	---	79.00	42.13	9.000	N	9.6
0.458447	---	31.14	66.00	34.86	9.000	N	9.6
0.565280	35.36	---	73.00	37.64	9.000	N	9.6
0.754910	33.26	---	73.00	39.74	9.000	N	9.6
10.353274	---	35.98	60.00	24.02	9.000	N	9.7
12.576335	---	37.49	60.00	22.51	9.000	N	9.8
16.628518	37.78	---	73.00	35.22	9.000	N	9.9
25.662616	31.62	---	73.00	41.38	9.000	N	9.9
26.310629	---	47.74	60.00	12.26	9.000	N	9.9

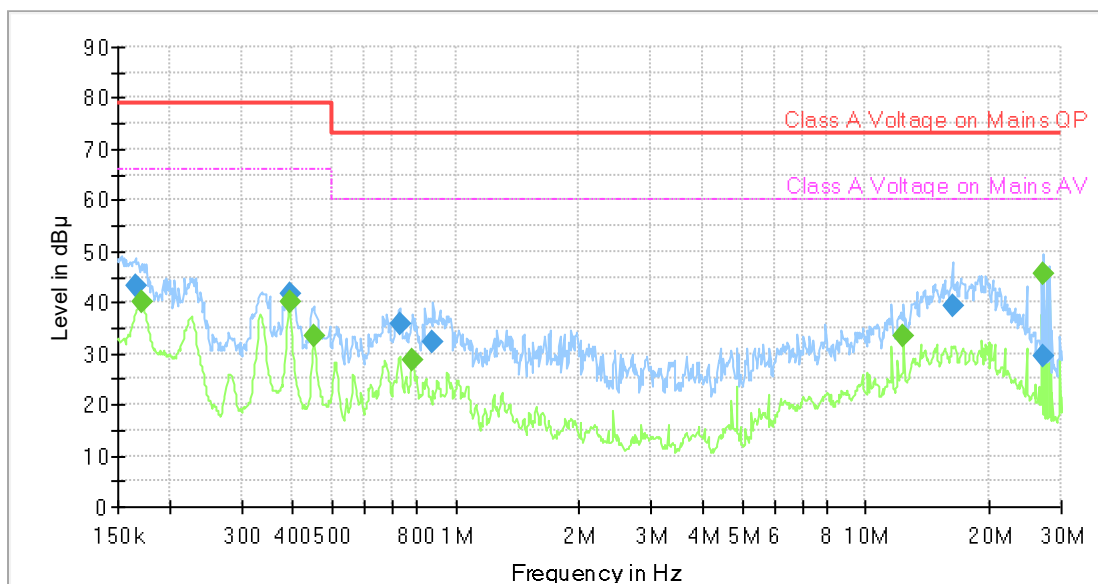
Port: L
Test Mode: Mode 2:Operating
Power Source: AC 230V/50Hz
Note:



Final_Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.169074	---	37.76	66.00	28.24	9.000	L1	9.6
0.175081	44.08	---	79.00	34.92	9.000	L1	9.6
0.392773	---	36.95	66.00	29.05	9.000	L1	9.6
0.394736	38.40	---	79.00	40.60	9.000	L1	9.6
0.449391	---	31.10	66.00	34.90	9.000	L1	9.6
0.489157	37.26	---	79.00	41.74	9.000	L1	9.6
0.785640	---	27.05	60.00	32.95	9.000	L1	9.7
0.881136	30.21	---	73.00	42.79	9.000	L1	9.7
12.702413	---	30.85	60.00	29.15	9.000	L1	10.0
16.381564	39.64	---	73.00	33.36	9.000	L1	10.1
19.120678	38.87	---	73.00	34.13	9.000	L1	10.0
22.096276	---	36.98	60.00	23.02	9.000	L1	10.0

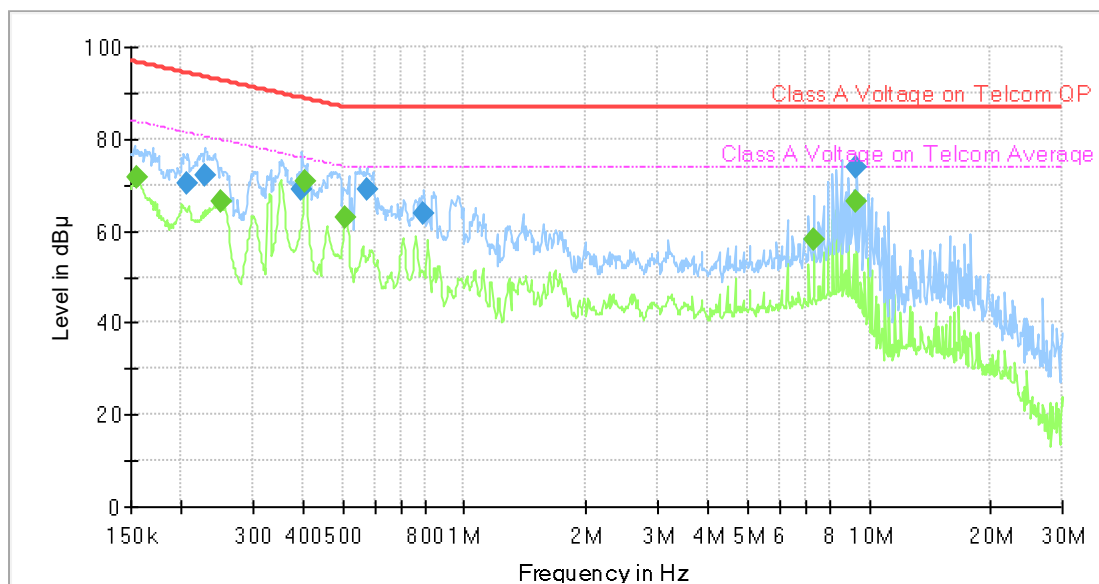
Port: N
Test Mode: Mode 2:Operating
Power Source: AC 230V/50Hz
Note:



Final_Result

Frequency (MHz)	QuasiPeak (dB μ V)	Average (dB μ V)	Limit (dB μ V)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.165734	43.32	---	79.00	35.68	9.000	N	9.6
0.170769	---	40.05	66.00	25.95	9.000	N	9.6
0.392773	---	40.03	66.00	25.97	9.000	N	9.6
0.392773	41.85	---	79.00	37.15	9.000	N	9.6
0.451638	---	33.29	66.00	32.71	9.000	N	9.6
0.729009	35.71	---	73.00	37.29	9.000	N	9.6
0.785640	---	28.79	60.00	31.21	9.000	N	9.6
0.881136	32.34	---	73.00	40.66	9.000	N	9.6
12.389561	---	33.22	60.00	26.78	9.000	N	9.8
16.300064	39.43	---	73.00	33.57	9.000	N	9.9
27.245430	---	45.69	60.00	14.31	9.000	N	9.9
27.245430	29.35	---	73.00	43.65	9.000	N	9.9

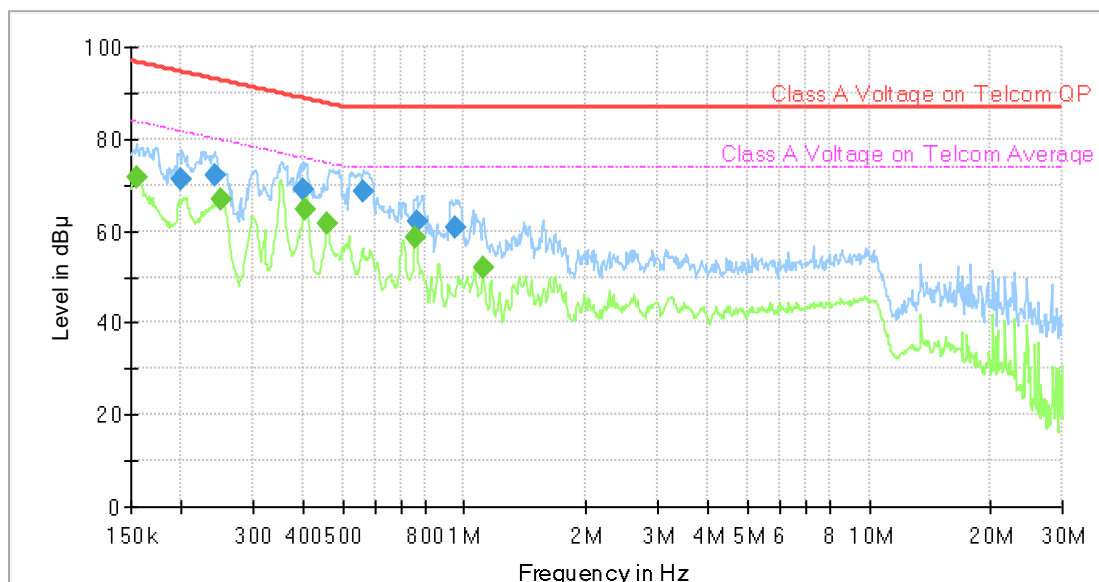
Port: LAN1
Test Mode: 10Mbps
Power Source: AC 230V/50Hz
Note:



Final_Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.155329	---	71.45	83.71	12.26	9.000	Line 1	10.2
0.207437	70.19	---	94.31	24.12	9.000	Line 1	10.0
0.228055	72.25	---	93.52	21.27	9.000	Line 1	10.0
0.249476	---	66.40	79.77	13.37	9.000	Line 1	10.0
0.396710	69.12	---	88.92	19.80	9.000	Line 1	9.8
0.404704	---	70.65	75.76	5.11	9.000	Line 1	9.8
0.509069	---	62.98	74.00	11.02	9.000	Line 1	9.8
0.573802	68.99	---	87.00	18.01	9.000	Line 1	9.8
0.793516	63.92	---	87.00	23.08	9.000	Line 1	9.7
7.302194	---	57.95	74.00	16.05	9.000	Line 1	9.6
9.323745	---	66.50	74.00	7.50	9.000	Line 1	9.6
9.323745	73.73	---	87.00	13.27	9.000	Line 1	9.6

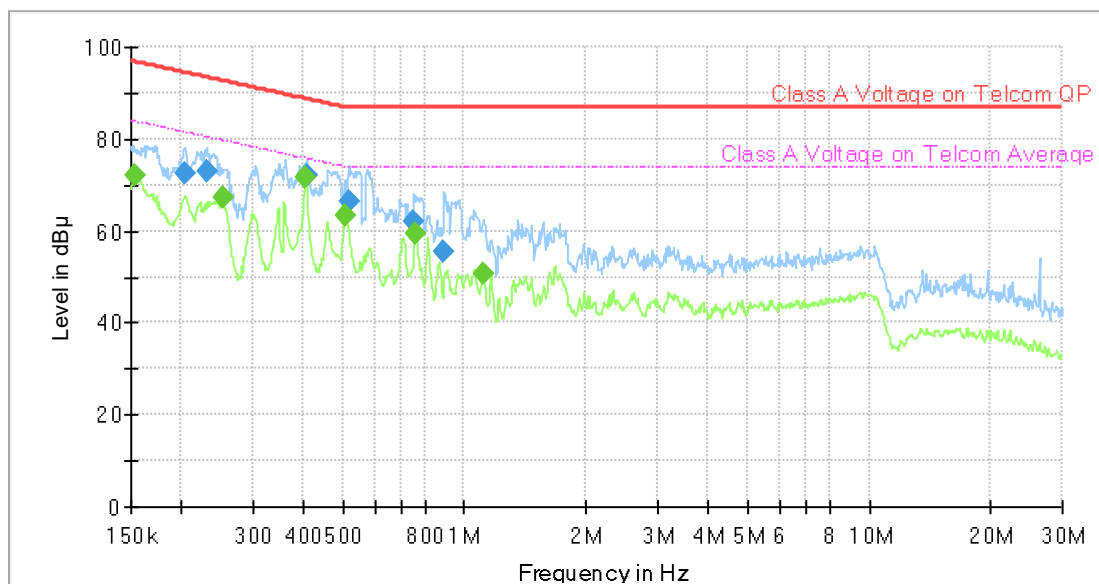
Port: LAN1
Test Mode: 100Mbps
Power Source: AC 230V/50Hz
Note:



Final_Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.154557	---	71.70	83.75	12.05	9.000	Line 1	10.2
0.200319	71.19	---	94.60	23.41	9.000	Line 1	10.0
0.240917	71.96	---	93.06	21.10	9.000	Line 1	10.0
0.250724	---	66.60	79.73	13.13	9.000	Line 1	10.0
0.398694	69.01	---	88.88	19.87	9.000	Line 1	9.8
0.404704	---	64.53	75.76	11.23	9.000	Line 1	9.8
0.458447	---	61.41	74.72	13.31	9.000	Line 1	9.8
0.565280	68.41	---	87.00	18.59	9.000	Line 1	9.8
0.754910	---	58.53	74.00	15.47	9.000	Line 1	9.7
0.762478	61.89	---	87.00	25.11	9.000	Line 1	9.7
0.954334	60.86	---	87.00	26.14	9.000	Line 1	9.7
1.108363	---	52.03	74.00	21.97	9.000	Line 1	9.7

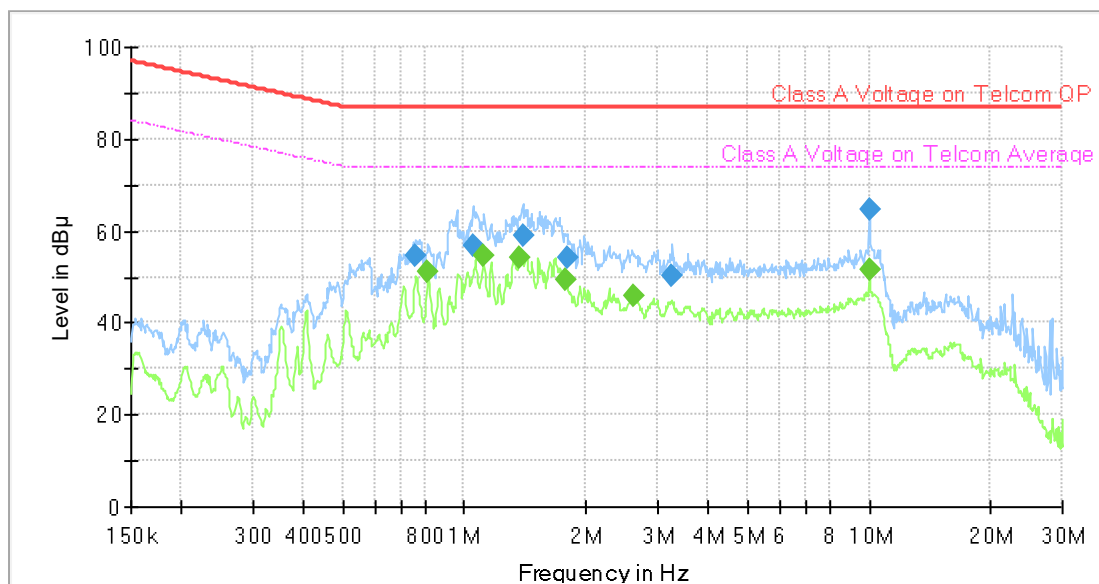
Port: LAN1
Test Mode: 1000Mbps
Power Source: AC 230V/50Hz
Note:



Final_Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.153788	---	71.85	83.79	11.94	9.000	Line 1	10.2
0.203339	72.67	---	94.47	21.80	9.000	Line 1	10.0
0.230342	73.09	---	93.44	20.35	9.000	Line 1	10.0
0.251977	---	67.07	79.69	12.62	9.000	Line 1	10.0
0.404704	---	71.72	75.76	4.04	9.000	Line 1	9.8
0.406728	72.24	---	88.71	16.47	9.000	Line 1	9.8
0.509069	---	63.38	74.00	10.62	9.000	Line 1	9.8
0.516743	66.52	---	87.00	20.48	9.000	Line 1	9.8
0.751154	61.88	---	87.00	25.12	9.000	Line 1	9.7
0.758685	---	59.54	74.00	14.46	9.000	Line 1	9.7
0.889970	55.65	---	87.00	31.35	9.000	Line 1	9.7
1.113905	---	50.52	74.00	23.48	9.000	Line 1	9.7

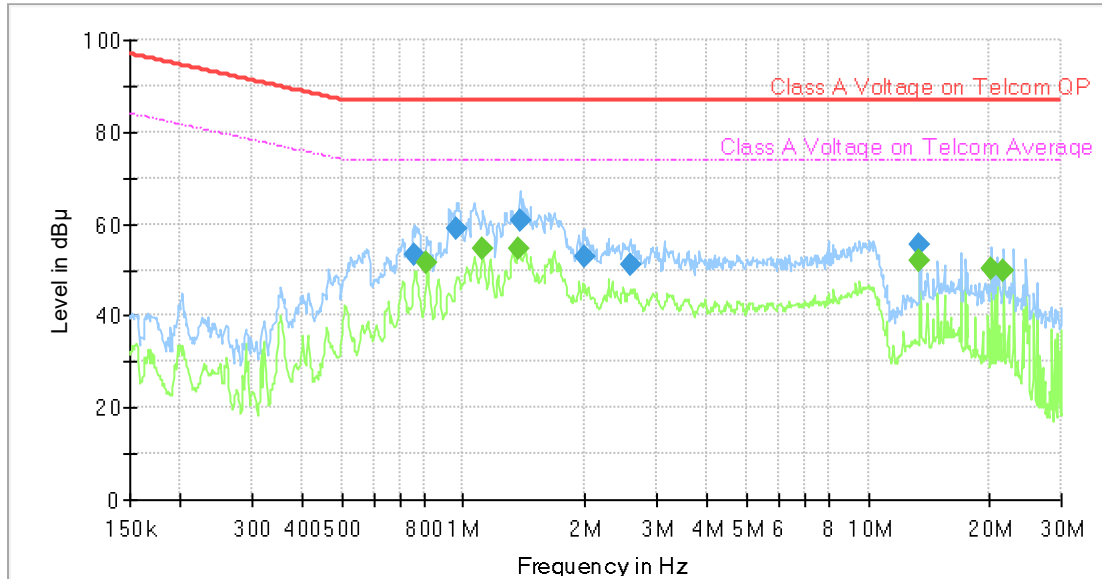
Port: LAN9
 Test Mode: 10Mbps
 Power Source: AC 230V/50Hz
 Note:



Final_Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.758685	54.70	---	87.00	32.30	9.000	Line 1	9.7
0.813554	---	50.95	74.00	23.05	9.000	Line 1	9.7
1.049193	56.78	---	87.00	30.22	9.000	Line 1	9.7
1.113905	---	54.75	74.00	19.25	9.000	Line 1	9.7
1.366648	---	54.16	74.00	19.84	9.000	Line 1	9.7
1.394186	58.99	---	87.00	28.01	9.000	Line 1	9.7
1.780155	---	49.30	74.00	24.70	9.000	Line 1	9.6
1.789056	53.98	---	87.00	33.02	9.000	Line 1	9.6
2.626701	---	45.72	74.00	28.28	9.000	Line 1	9.6
3.255003	50.22	---	87.00	36.78	9.000	Line 1	9.6
9.998049	---	51.72	74.00	22.28	9.000	Line 1	9.6
9.998049	64.44	---	87.00	22.56	9.000	Line 1	9.6

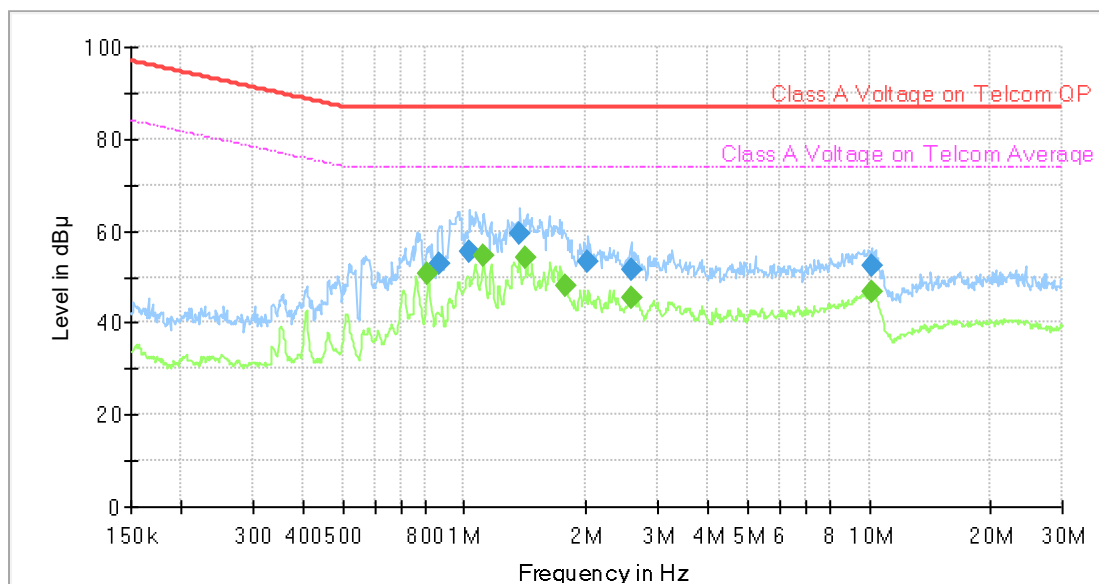
Port: LAN9
Test Mode: 100Mbps
Power Source: AC 230V/50Hz
Note:



Final_Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.754910	53.33	---	87.00	33.67	9.000	Line 1	9.7
0.813554	---	51.36	74.00	22.64	9.000	Line 1	9.7
0.963901	58.94	---	87.00	28.06	9.000	Line 1	9.7
1.113905	---	54.68	74.00	19.32	9.000	Line 1	9.7
1.373481	---	54.58	74.00	19.42	9.000	Line 1	9.7
1.380348	60.49	---	87.00	26.51	9.000	Line 1	9.7
1.986604	52.74	---	87.00	34.26	9.000	Line 1	9.6
2.574818	50.95	---	87.00	36.05	9.000	Line 1	9.6
13.418776	---	51.79	74.00	22.21	9.000	Line 1	9.6
13.418776	55.34	---	87.00	31.66	9.000	Line 1	9.6
20.199004	---	50.02	74.00	23.98	9.000	Line 1	9.7
21.659819	---	49.78	74.00	24.22	9.000	Line 1	9.7

Port: LAN9
 Test Mode: 1000Mbps
 Power Source: AC 230V/50Hz
 Note:



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.813554	---	50.65	74.00	23.35	9.000	Line 1	9.7
0.863732	53.04	---	87.00	33.96	9.000	Line 1	9.7
1.028469	55.64	---	87.00	31.36	9.000	Line 1	9.7
1.113905	---	54.65	74.00	19.35	9.000	Line 1	9.7
1.373481	59.48	---	87.00	27.52	9.000	Line 1	9.7
1.422280	---	54.13	74.00	19.87	9.000	Line 1	9.6
1.780155	---	48.14	74.00	25.86	9.000	Line 1	9.6
2.026635	53.20	---	87.00	33.80	9.000	Line 1	9.6
2.574818	51.60	---	87.00	35.40	9.000	Line 1	9.6
2.574818	---	45.53	74.00	28.47	9.000	Line 1	9.6
10.148771	---	46.64	74.00	27.36	9.000	Line 1	9.6
10.148771	52.40	---	87.00	34.60	9.000	Line 1	9.6

2 - RADIATED EMISSIONS

Measurement Uncertainty

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

If U_{lab} is less than or equal to U_{cispr} of Table 1, then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If U_{lab} is greater than U_{cispr} of Table 1, then:

- compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{lab} - U_{cispr})$, exceeds the disturbance limit.

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

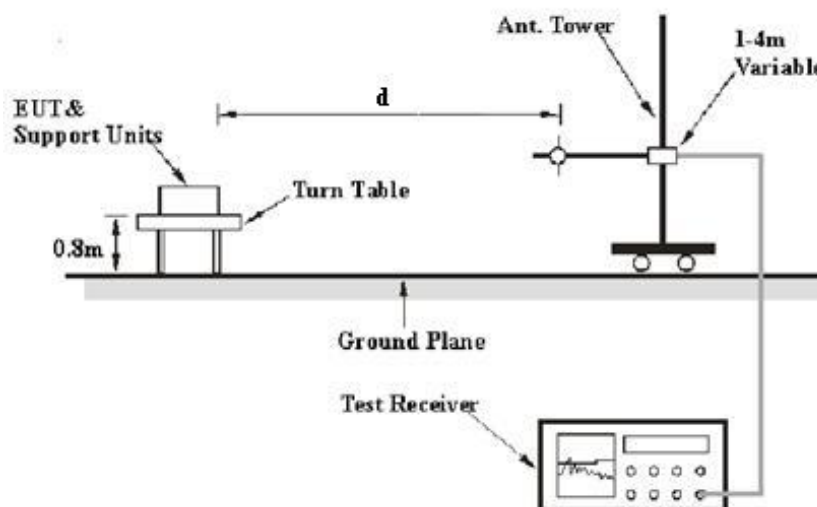
Table 1 - Values of U_{cispr}

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

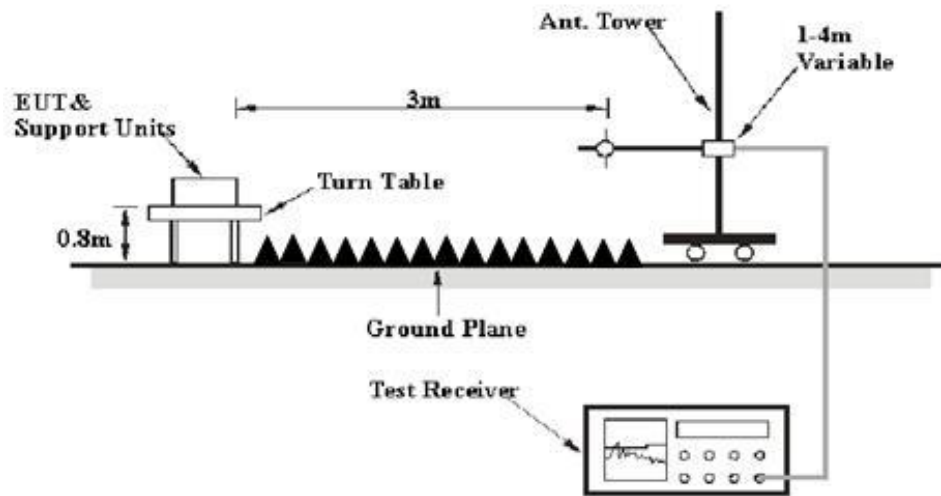
Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Test System Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests below 1GHz were performed in 3 meters, above 1GHz were performed in the 3 meters, using the setup accordance with the CISPR 16-1-1:2010+A1:2010+A2:2014, CISPR 16-1-4:2010 + A1:2012, CISPR 16-2-3:2010+A1:2010+A2:2014. The specification used was EN 55032 and BS EN 55032 Class B limits.

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

The spacing between the peripherals was 10cm.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 6 GHz.

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

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz - 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	Peak
	1 MHz	10Hz	/	Ave.

Test Procedure

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

If the maximized peak measured value complies with under the QP limit more than 6dB, then it is unnecessary to perform QP measurement.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$\text{Result} = \text{Meter Reading} + \text{Corrected}$$

Note:

$$\text{Corrected} = \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

or

$$\text{Corrected} = \text{Antenna Factor} + \text{Cable Loss} + \text{Insertion loss of attenuator} - \text{Amplifier Gain}$$

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

$$\text{Margin} = \text{Limit} - \text{Result}$$

Test Data

Please refer to following table and plots:

Condition: EN 55032 Class A 3m Radiation

Test Mode: Mode 1:Operating(110V)

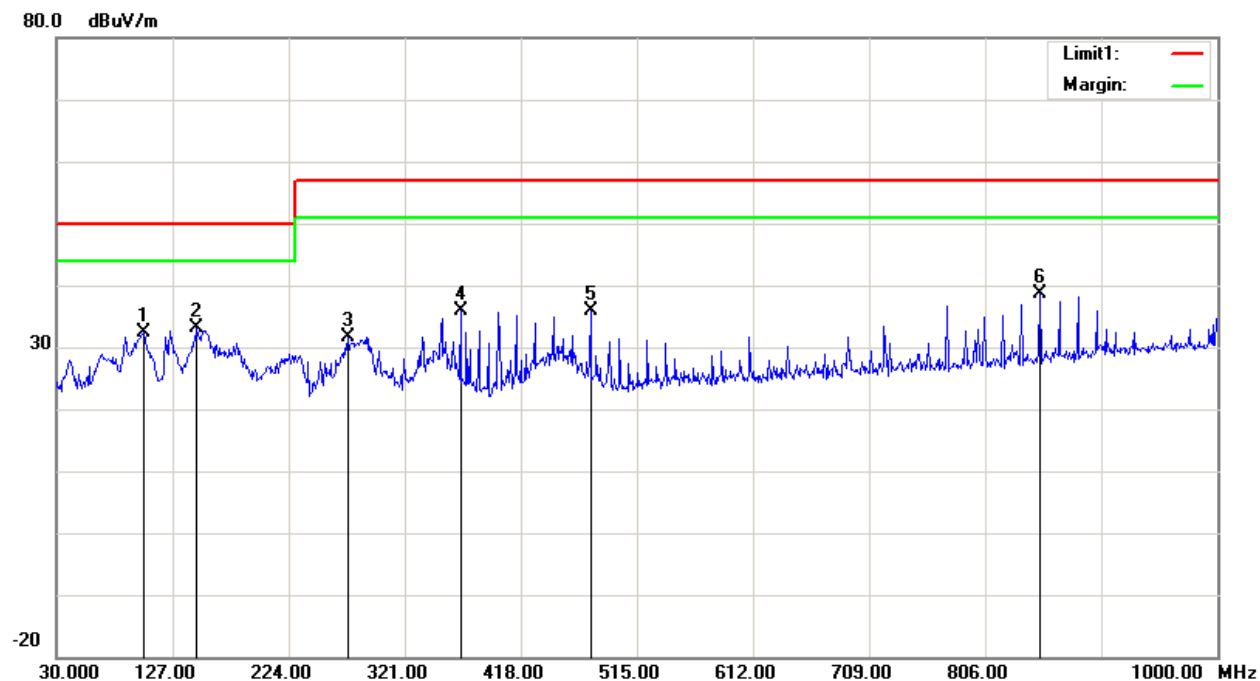
Note:

Polarization:

Horizontal

Distance:

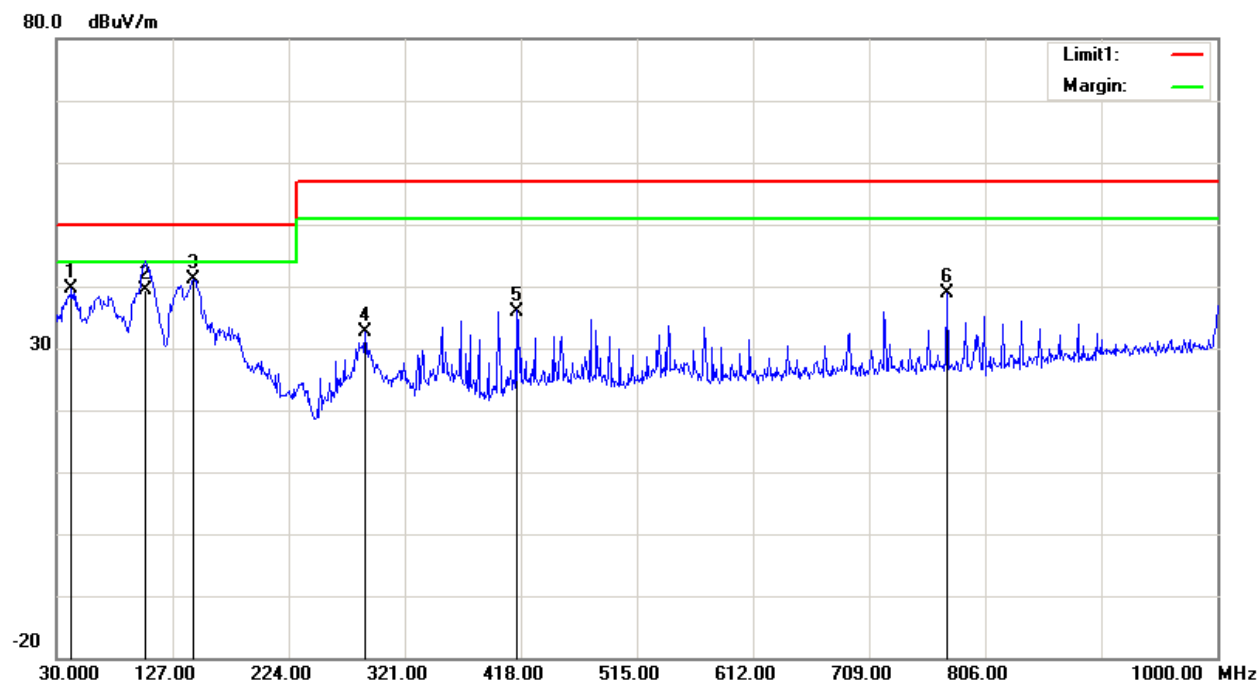
3m



No.	Frequency (MHz)	Reading (dBμV)	Detector	Corrected (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1	102.7500	46.69	peak	-14.29	32.40	50.00	17.60
2	147.3700	43.17	peak	-9.97	33.20	50.00	16.80
3	273.4700	41.15	peak	-9.49	31.66	57.00	25.34
4	367.5600	42.67	peak	-6.90	35.77	57.00	21.23
5	476.2000	40.59	peak	-4.71	35.88	57.00	21.12
6	851.5900	37.24	peak	1.43	38.67	57.00	18.33

Condition: EN 55032 Class A 3m Radiation
Test Mode: Mode 1:Operating(110V)
Note:

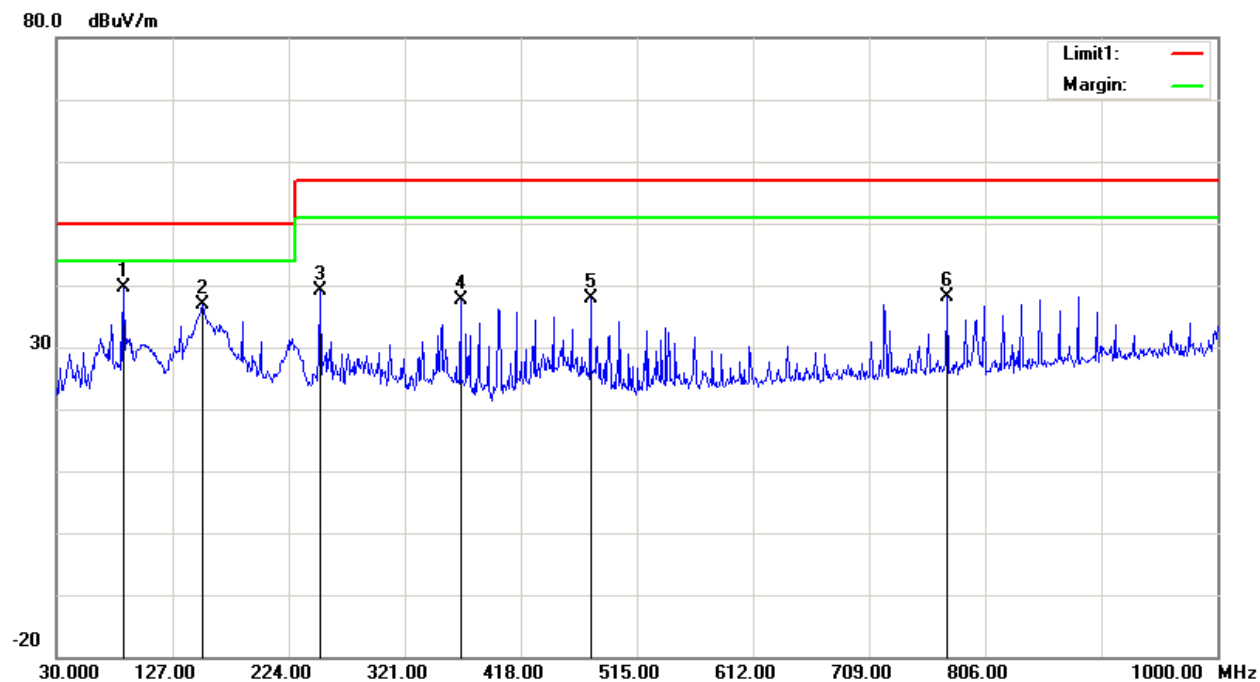
Polarization: Vertical
Distance: 3m



No.	Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1	42.6100	51.40	peak	-11.66	39.74	50.00	10.26
2	103.7200	53.58	QP	-14.18	39.40	50.00	10.60
3	144.4600	50.87	peak	-9.83	41.04	50.00	8.96
4	288.0200	41.50	peak	-8.98	32.52	57.00	24.48
5	414.1200	41.79	peak	-5.79	36.00	57.00	21.00
6	773.9900	38.58	peak	0.34	38.92	57.00	18.08

Condition: EN 55032 Class A 3m Radiation
Test Mode: Mode 2:Operating(230V)
Note:

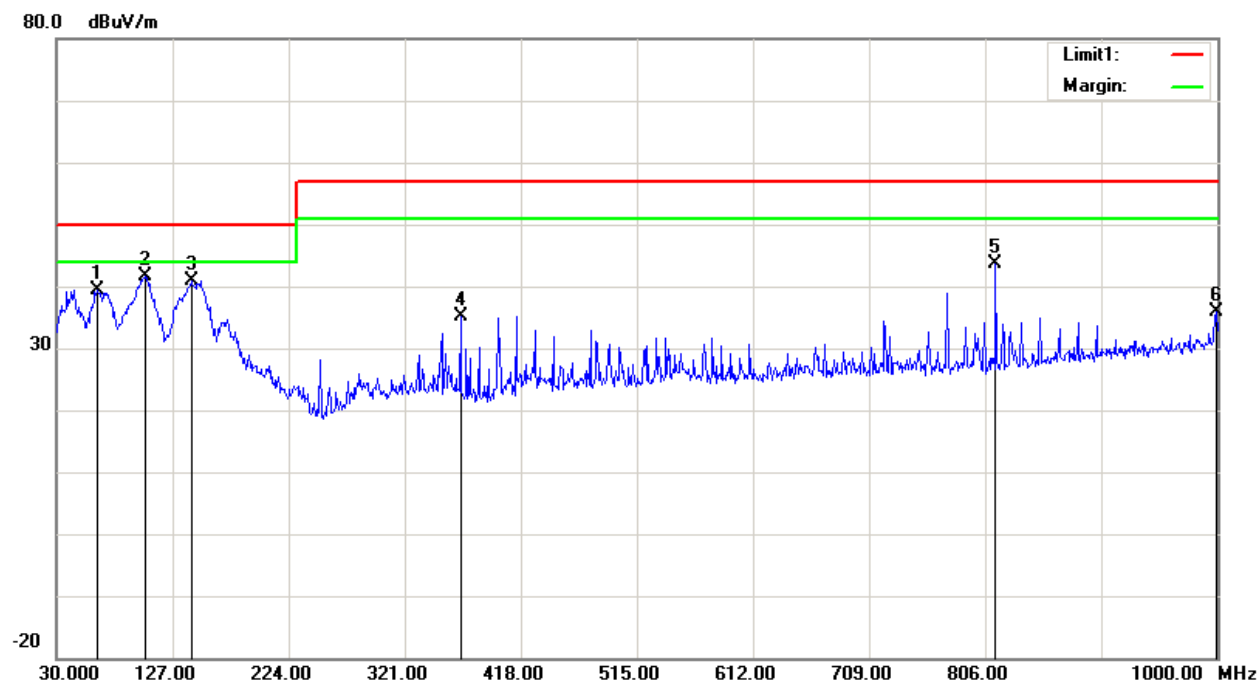
Polarization:
Distance: Horizontal
3m



No.	Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1	86.2600	55.76	peak	-16.02	39.74	50.00	10.26
2	152.2200	46.86	peak	-10.00	36.86	50.00	13.14
3	250.1900	49.69	peak	-10.66	39.03	57.00	17.97
4	367.5600	44.55	peak	-6.90	37.65	57.00	19.35
5	476.2000	42.54	peak	-4.71	37.83	57.00	19.17
6	773.9900	37.70	peak	0.34	38.04	57.00	18.96

Condition: EN 55032 Class A 3m Radiation
Test Mode: Mode 2:Operating(230V)
Note:

Polarization: Vertical
Distance: 3m

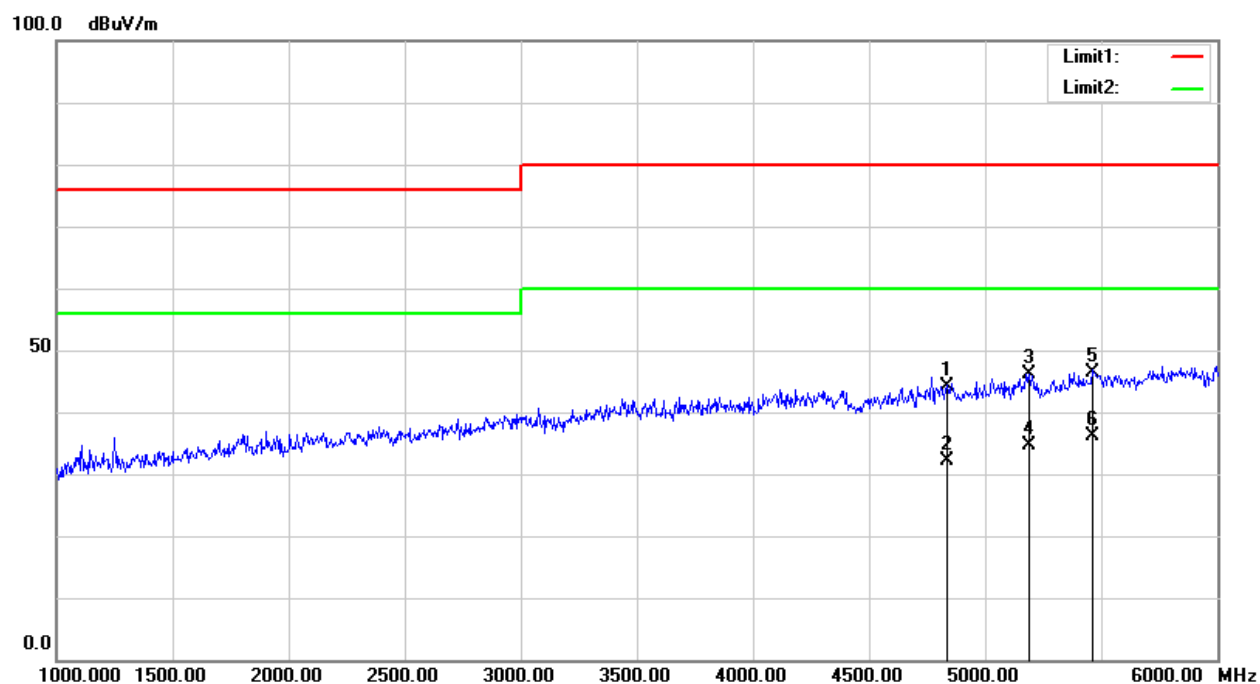


No.	Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1	63.9500	56.51	peak	-17.06	39.45	50.00	10.55
2	103.7200	55.71	peak	-14.18	41.53	50.00	8.47
3	142.5200	50.71	peak	-9.76	40.95	50.00	9.05
4	367.5600	41.98	peak	-6.90	35.08	57.00	21.92
5	814.7300	43.09	peak	0.64	43.73	57.00	13.27
6	999.0300	31.28	peak	4.63	35.91	57.00	21.09

Above 1G:

Condition: EN 55032 Class A
Test Mode: Mode 1:Operating(110V)
Note:

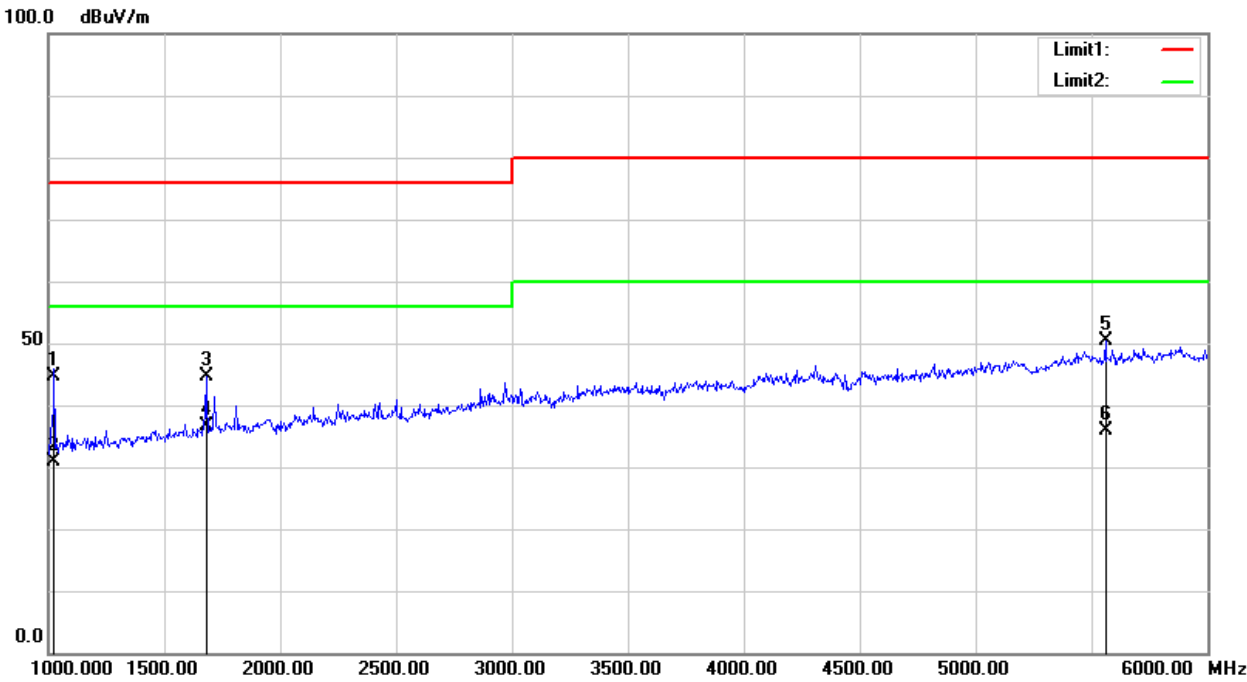
Polarization: Horizontal
Distance: 3m



No.	Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1	4835.000	47.70	peak	-3.45	44.25	80.00	35.75
2	4835.000	35.47	AVG	-3.45	32.02	60.00	27.98
3	5190.000	47.50	peak	-1.43	46.07	80.00	33.93
4	5190.000	36.18	AVG	-1.43	34.75	60.00	25.25
5	5465.000	47.35	peak	-0.85	46.50	80.00	33.50
6	5465.000	36.92	AVG	-0.85	36.07	60.00	23.93

Condition: EN 55032 Class A
Test Mode: Mode 1:Operating(110V)
Note:

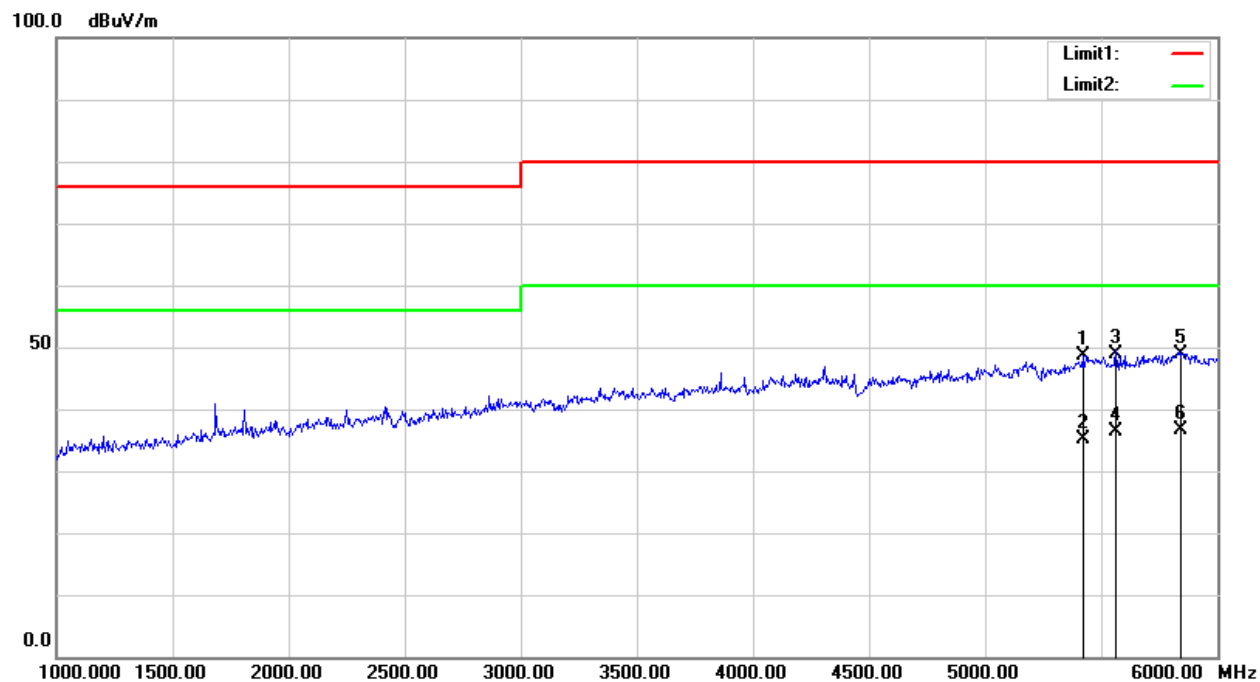
Polarization: Vertical
Distance: 3m



No.	Frequency (MHz)	Reading (dBμV)	Detector	Corrected (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1	1025.000	60.14	peak	-15.40	44.74	76.00	31.26
2	1025.000	46.28	AVG	-15.40	30.88	56.00	25.12
3	1682.500	56.76	peak	-12.07	44.69	76.00	31.31
4	1682.500	48.65	AVG	-12.07	36.58	56.00	19.42
5	5562.500	51.62	peak	-1.21	50.41	80.00	29.59
6	5562.500	37.14	AVG	-1.21	35.93	60.00	24.07

Condition: EN 55032 Class A
Test Mode: Mode 2:Operating(230V)
Note:

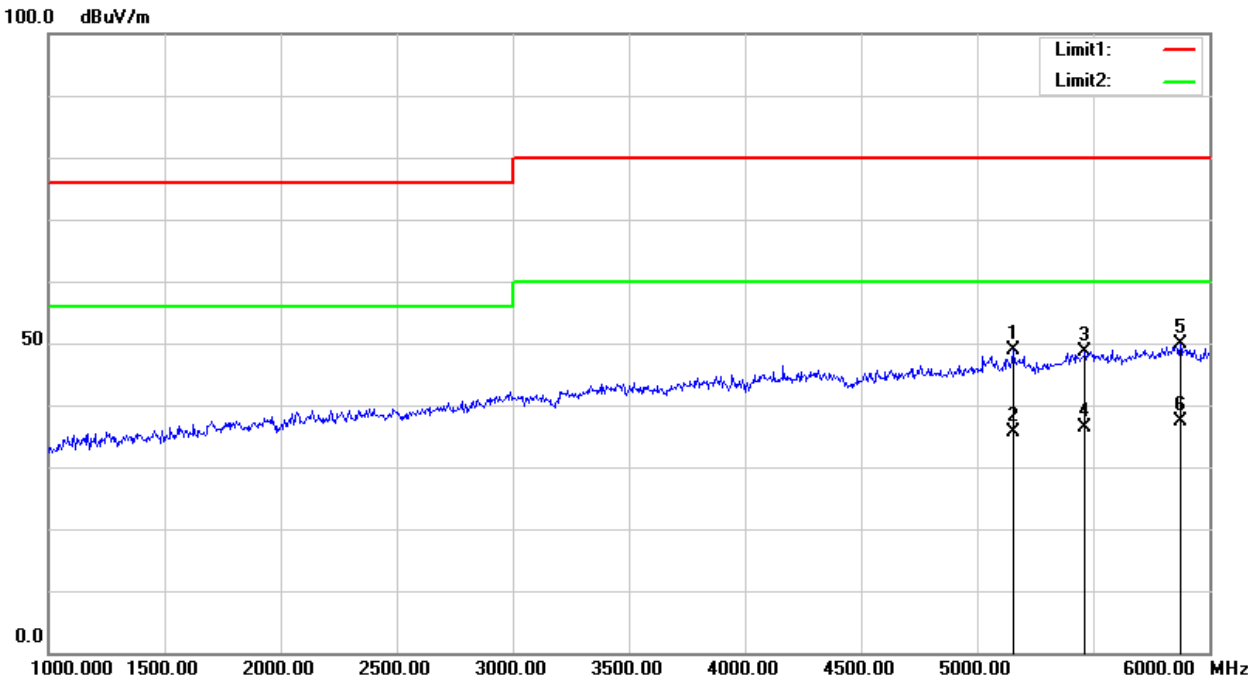
Polarization: Horizontal
Distance: 3m



No.	Frequency (MHz)	Reading (dB μ V)	Detector	Corrected (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1	5422.500	49.63	peak	-1.00	48.63	80.00	31.37
2	5422.500	36.19	AVG	-1.00	35.19	60.00	24.81
3	5567.500	49.98	peak	-1.22	48.76	80.00	31.24
4	5567.500	37.61	AVG	-1.22	36.39	60.00	23.61
5	5845.000	48.81	peak	0.15	48.96	80.00	31.04
6	5845.000	36.46	AVG	0.15	36.61	60.00	23.39

Condition: EN 55032 Class A
Test Mode: Mode 2:Operating(230V)
Note:

Polarization: Vertical
Distance: 3m



No.	Frequency (MHz)	Reading (dBμV)	Detector	Corrected (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1	5155.000	50.75	peak	-1.97	48.78	80.00	31.22
2	5155.000	37.65	AVG	-1.97	35.68	60.00	24.32
3	5467.500	49.38	peak	-0.86	48.52	80.00	31.48
4	5467.500	37.19	AVG	-0.86	36.33	60.00	23.67
5	5875.000	49.95	peak	0.04	49.99	80.00	30.01
6	5875.000	37.22	AVG	0.04	37.26	60.00	22.74

3 - ELECTROSTATIC DISCHARGES IEC 61000-4-2

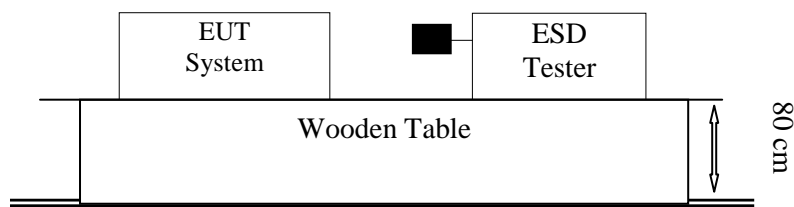
Measurement Uncertainty

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

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

Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Test System Setup



Remark:  is the tip of the electrode

IEC61000-4-2 specifies that a tabletop EUT shall be placed on a non-conducting table which is 80 centimeters above a ground reference plane and that floor mounted equipment shall be placed on a insulating support approximately 10 centimeters above a ground plane. During the tests, the EUT is positioned over a ground reference plane in conformance with this requirement.

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

Test Standard

EN 55035:2017+A11:2020 and BS EN 55035:2017+A11:2020 (IEC 61000-4-2:2008)

Test level 3 for Air Discharge at ± 8 kV

Test level 2 for Contact Discharge at ± 4 kV

Test Level

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

Performance criteria: B**Test Procedure****Air Discharge:**

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

Contact Discharge:

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

Indirect discharge for horizontal coupling plane:

At least 10 single discharges shall be applied to the horizontal coupling plane, at points on each side of the EUT. The discharge electrode positions vertically at a distance of 0.1m from the EUT and with the discharge electrode touching the coupling plane.

Indirect discharge for vertical coupling plane:

At least 10 single discharges shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m \times 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

Test Data

Please refer to following tables:

Test Mode: Mode 2:Operating(230V)

Note:

Table 1: Electrostatic Discharge Immunity (Air Discharge)

Test Points Location	Test Level							
	-2 kV	+2 kV	-4 kV	+4 kV	-8 kV	+8 kV	-15 kV	+15 kV
Non-metallic Shell	A	A	A	A	A	A	/	/
DC Port	A	A	A	A	A	A	/	/
RJ45 Port	A	A	A	A	A	A	/	/
AC Line	A	A	A	A	A	A	/	/
Adapter	A	A	A	A	A	A	/	/
Seam	A	A	A	A	A	A	/	/

Table 2: Electrostatic Discharge Immunity (Direct Contact)

Test Points Location	Test Level							
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
Metal shell	A	A	A	A	/	/	/	/
Screw	A	A	A	A	/	/	/	/
SFP Port	A	A	A	A	/	/	/	/

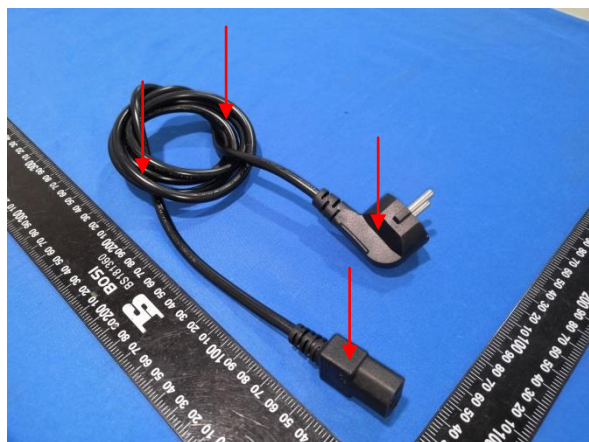
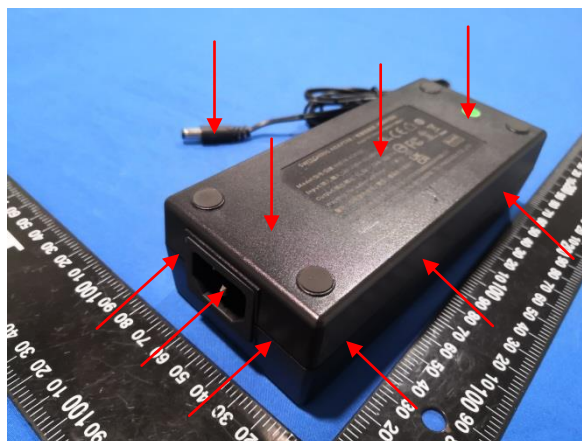
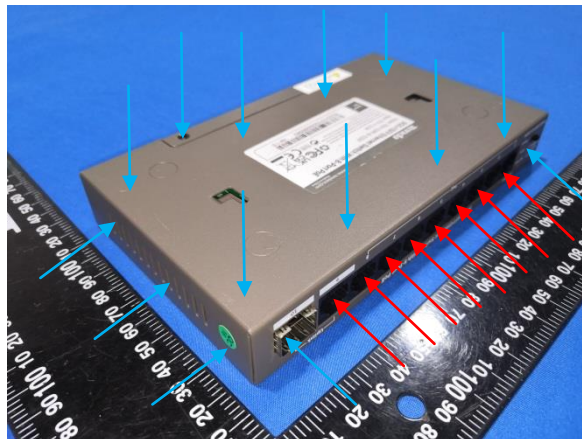
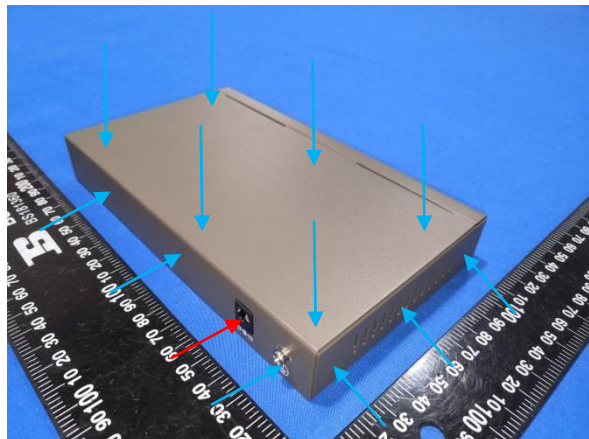
Table 3: Electrostatic Discharge Immunity (Indirect Contact HCP)

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

Table 4: Electrostatic Discharge Immunity (Indirect Contact VCP)

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

ESD Location Photo



Air Discharge:



Direct Contact:



4 - CONTINUOUS RADIATED DISTURBANCES IEC 61000-4-3

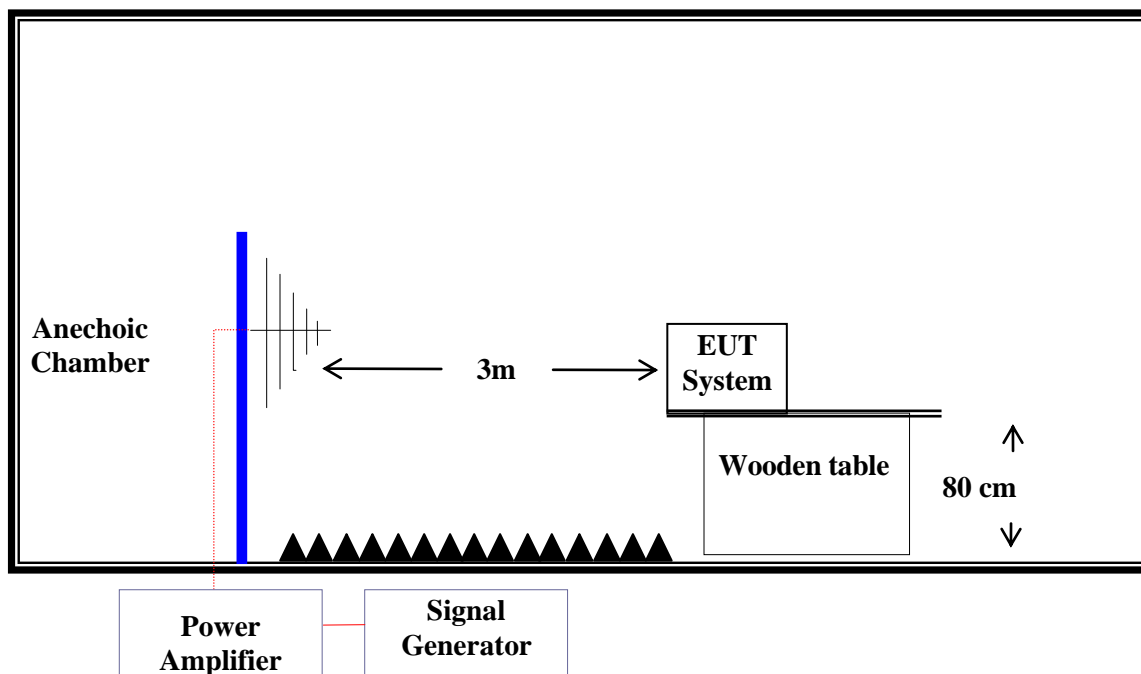
Measurement Uncertainty

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

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

Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Test System Setup



Test Standard

EN 55035:2017+A11:2020 and BS EN 55035:2017+A11:2020
(IEC 61000-4-3:2006+A1:2007+A2:2010)

Test Level

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

Performance criteria: A

- A. The apparatus shall continue to operate as intended during and after the test. The manufacturer specifies some minimum performance level. The performance level may be specified by the manufacture as a permissible loss of performance.
- B. The apparatus shall continue to operate as intended after the test. This indicates that the EUT does not need to function at normal performance levels during the test, but must recover. Again some minimal performance is defined by the manufacture. No change in operating state or loss or data is permitted.
- C. Temporary loss of function is allowed. Operation of the EUT may stop as long as it is either automatically reset or can be manually restored by operation of the controls.
- D. The apparatus is broken, cannot be normal operated.

Test Procedure

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

Test Data

Please refer to following tables:

Test Mode: Mode 2:Operating(230V)

Note:

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

Table 1: Radiated RF-Electromagnetic Field Immunity

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

Table 2: Radiated RF-Electromagnetic Field Immunity

Spot Test (MHz)	Front Side		Rear Side		Left Side		Right Side	
	VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI
1800, 2600, 3500, 5000	A	A	A	A	A	A	A	A

5 - CONTINUOUS CONDUCTED DISTURBANCES IEC 61000-4-6

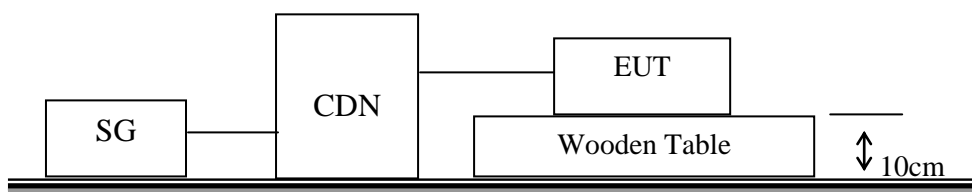
Measurement Uncertainty

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

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

Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Test Setup



Test Standard

EN 55035:2017+A11:2020 and BS EN 55035:2017+A11:2020
(IEC 61000-4-6:2008)
Test level 2 at 3 V (r.m.s.), 0.15MHz ~ 10MHz,
Test level 3-1 V (r.m.s.), 10MHz ~ 30MHz,
Test level 1 at 1 V (r.m.s.), 30MHz ~ 80MHz,

Test Level

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

Performance criteria: A

Test Procedure

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

Test Data

Please refer to following tables:

Test Mode: Mode 2:Operating(230V)

Note:

Table 1: AC mains power input port

Frequency range: 150 kHz to 80 MHz
☒ Modulated: Amplitude 80%, 1kHz sine wave ☐ Unmodulated
 Dwell Time 1 Sec

Frequency(MHz)	Voltage Level	Pass	Fail
0.15-10	3V	A	/
10-30	3V-1V		
30-80	1V		

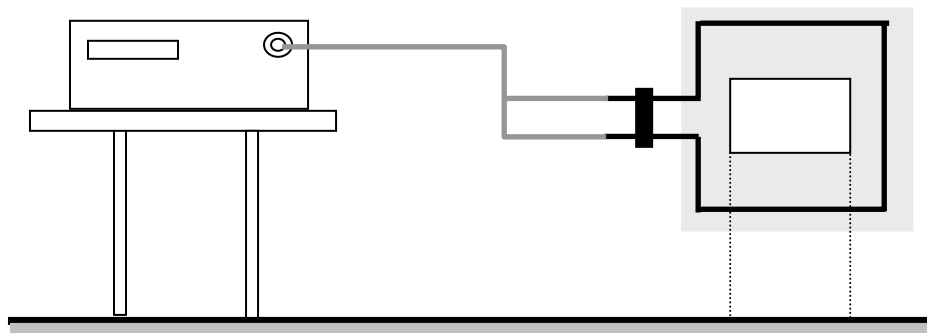
Table 2: Signal Port : RJ45

Frequency range: 150 kHz to 80 MHz
☒ Modulated: Amplitude 80%, 1kHz sine wave ☐ Unmodulated ☐ Other:
 Dwell Time 1 Sec

Frequency(MHz)	Voltage Level	Pass	Fail
0.15-10	3V	A	/
10-30	3V-1V		
30-80	1V		

6 - POWER FREQUENCY MAGNETIC FIELDS IEC 61000-4-8

Test Setup



Test Standard

EN 55035:2017+A11:2020 and BS EN 55035:2017+A11:2020
(IEC 61000-4-8:2009)

Test Level

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

Performance criteria: A

Test Procedure

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

Test Data

Please refer to following tables:

Test Mode: Mode 2:Operating(230V)

Note:

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

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

7 - ELECTRICAL FAST TRANSIENTS/BURST IEC 61000-4-4

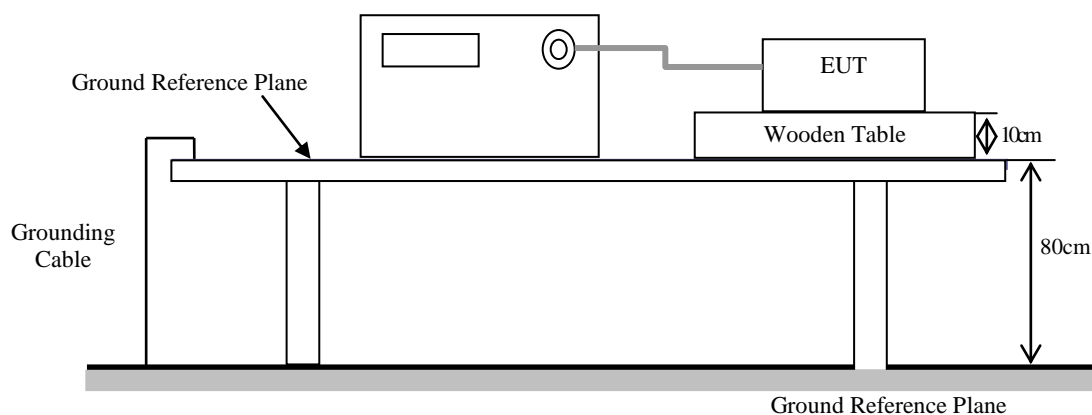
Measurement Uncertainty

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

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

Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Test System Setup



Test Standard

EN 55035:2017+A11:2020 and BS EN 55035:2017+A11:2020
 (IEC 61000-4-4:2012)
 AC mains: Test level 2 at 1 kV
 Signal port: Test level 2 at 0.5 kV

Test Level

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

Performance criteria: B

Test Procedure

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

Test Data

Please refer to following tables:

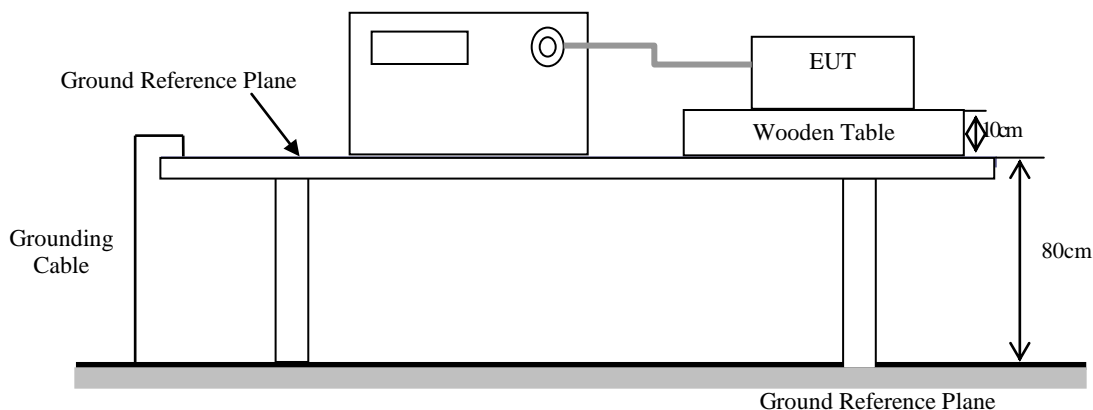
Test Mode: Mode 2:Operating(230V)

Note:

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

8 - SURGES IEC 61000-4-5

Test System Setup



Test Standard

EN 55035:2017+A11:2020 and BS EN 55035:2017+A11:2020
(IEC 61000-4-5:2005)

AC Mains: L-N: Test level 2 at 1kV

Signal port : Test level 2 at 1kV

Test Level

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

Performance criteria: B

Test Procedure

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

Test Data

Please refer to following tables:

Test Mode: Mode 2:Operating(230V)

Note:

Table 1: AC mains power input port

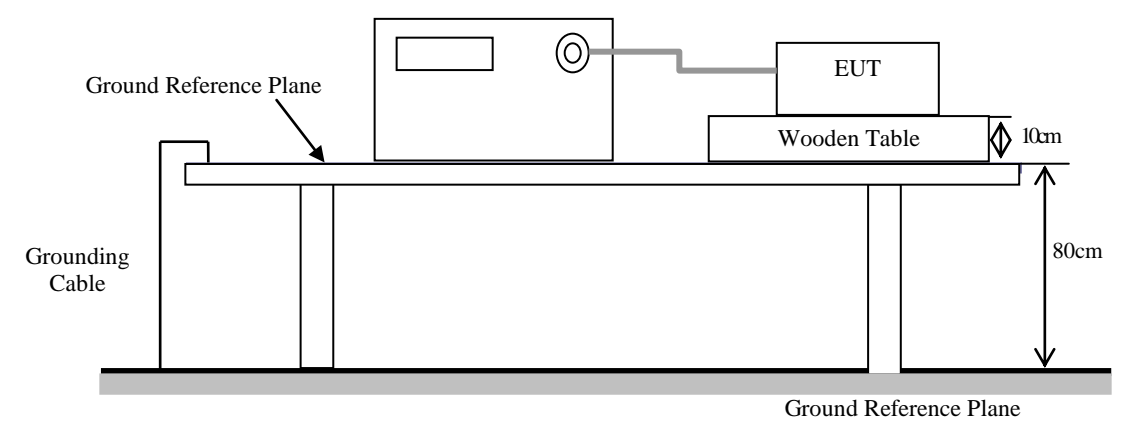
Level	Voltage	Poll	Path	Phase Angle	Pass	Fail
1	0.5kV	+	L- N, L-G	90	A	/
1	0.5kV	-	L- N, L-G	270	A	/
1	0.5kV	-	N-G	90	A	/
1	0.5kV	+	N-G	270	A	/
2	1kV	+	L- N, L-G	90	A	/
2	1kV	-	L- N, L-G	270	A	/
2	1kV	-	N-G	90	A	/
2	1kV	+	N-G	270	A	/
3	2kV	+	L-G	90	A	/
3	2kV	-	L-G	270	A	/
3	2kV	-	N-G	90	A	/
3	2kV	+	N-G	270	A	/

Table 2: RJ45 I/O Circuit and Lines

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

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

Test Setup



Test Standard

EN 55035:2017+A11:2020 and BS EN 55035:2017+A11:2020
(IEC 61000-4-11:2004)
Test levels and Performance Criterion

Test Level

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

Test Procedure

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

Test Data

Please refer to following tables:

Test Mode: **Mode 2:Operating(230V)**

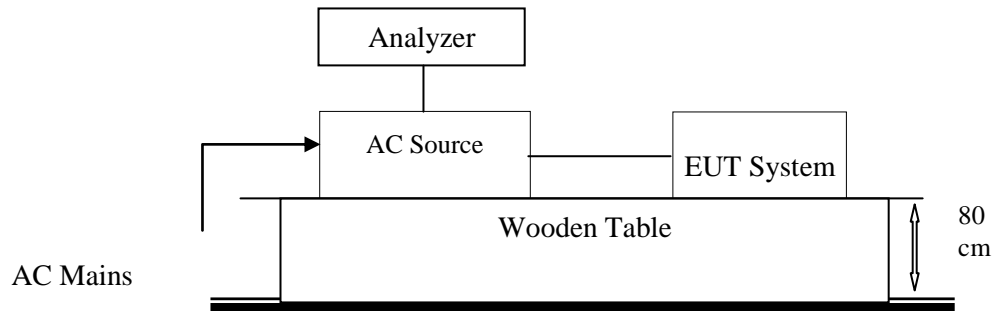
Note: B indicates that the power supply of the EUT was interrupted during the test, and the EUT was restarted. After the test, it can automatically return to normal use.

Table 1: Voltage Dips/Interruptions Test

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

10 - HARMONIC CURRENT EMISSIONS

Test System Setup



Test Standard

EN IEC 61000-3-2:2019+A1:2021 and BS EN IEC 61000-3-2:2019+A1:2021

Test product class

Class A: - Balanced three-phase equipment

- Household appliances excluding equipment identified as class D
- Tools excluding portable tools
- Dimmers for incandescent lamps
- Audio equipment

Class B: - Portable tools

- Arc welding equipment, which is not professional equipment

Class C: - Lighting equipment

Class D: Equipment having a specified power less than or equal to 600w, of the following type:

- Personal computer and personal computer monitors
- Television receivers

Table 1 – Limits for Class A equipment

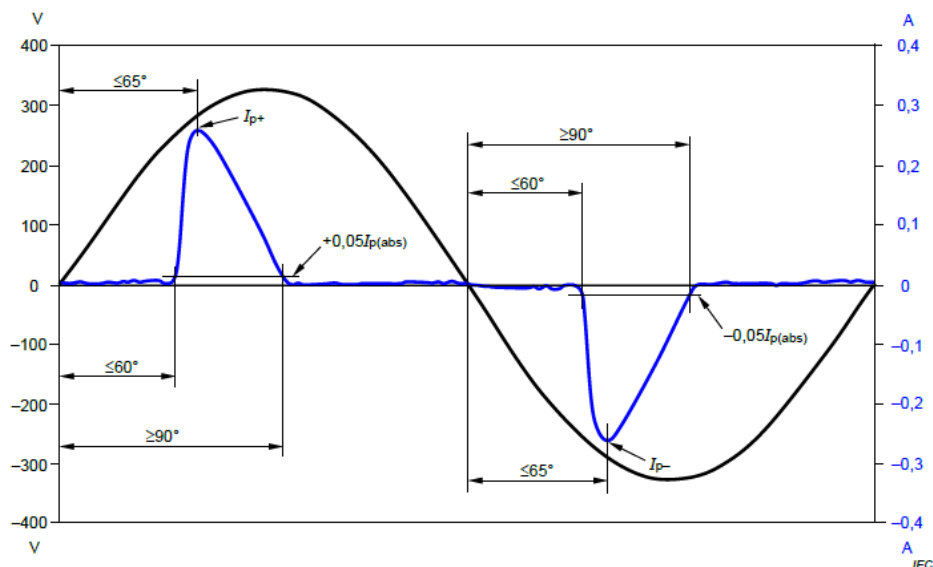
Harmonic order n	Maximum permissible harmonic current A
Odd harmonics	
3	2,30
5	1,14
7	0,77
9	0,40
11	0,33
13	0,21
$15 \leq n \leq 39$	$0,15 \frac{15}{n}$
Even harmonics	
2	1,08
4	0,43
6	0,30
$8 \leq n \leq 40$	$0,23 \frac{8}{n}$

Table 2 – Limits for Class C equipment ^a

Harmonic order h	Maximum permissible harmonic current expressed as a percentage of the input current at the fundamental frequency %
2	2
3	$\langle A_1 \rangle 27^b \langle A_1 \rangle$
5	10
7	7
9	5
$11 \leq h \leq 39$ (odd harmonics only)	3

^a For some Class C products, other emission limits apply (see 7.4).

$\langle A_1 \rangle$ ^b The limit is determined based on the assumption of modern lighting technologies having power factors of 0,90 or higher. $\langle A_1 \rangle$

7.4.3 Rated power ≥ 5 W and ≤ 25 W

NOTE $I_{p(abs)}$ is the higher absolute value of I_{p+} and I_{p-} .

Figure 2 – Illustration of the relative phase angle and current parameters described in 7.4.3

Lighting equipment having a rated power greater than or equal to 5 W and less than or equal to 25 W shall comply with one of the following three sets of requirements:

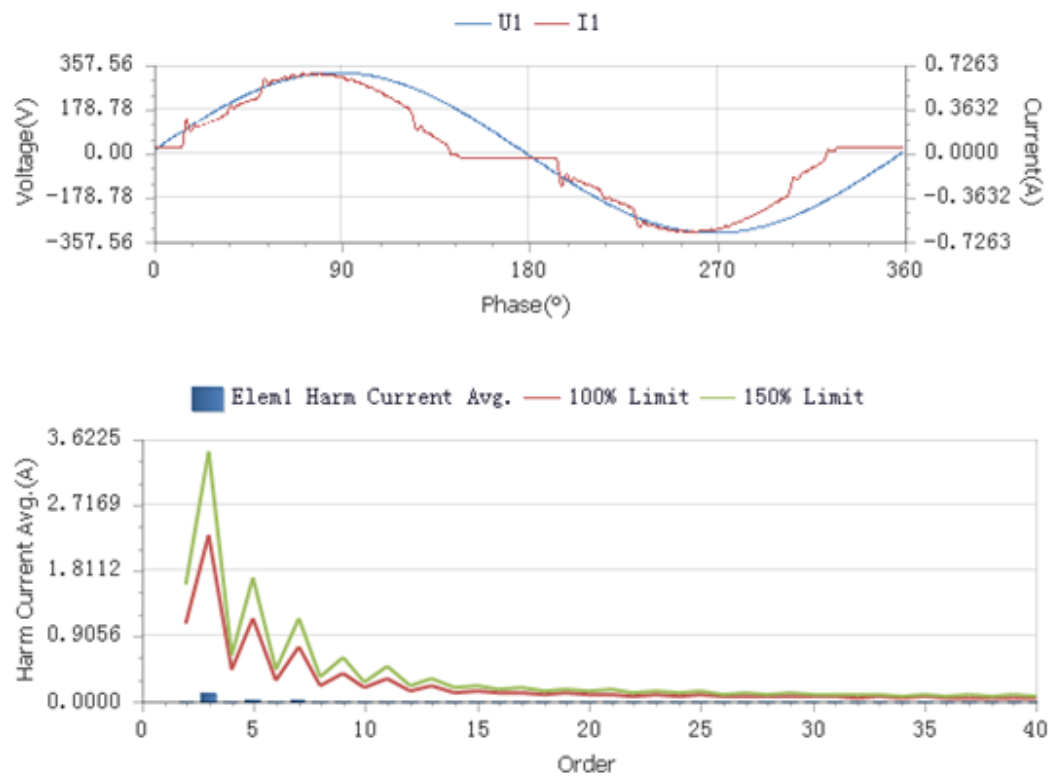
- the harmonic currents shall not exceed the power-related limits of Table 3, column 2;
- the third harmonic current, expressed as a percentage of the fundamental current, shall not exceed 86 % and the fifth harmonic current shall not exceed 61 %. In addition, the waveform of the input current shall be such that it reaches the 5 % current threshold before or at 60°, has its peak value before or at 65° and does not fall below the 5 % current threshold before 90°, referenced to any zero crossing of the fundamental supply voltage. The current threshold is 5 % of the highest absolute peak value that occurs in the measurement window, and the phase angle measurements are made on the cycle that includes this absolute peak value (see Figure 2). Components of current with frequencies above 9 kHz shall not influence this evaluation (a filter similar to the one described in 5.3 of IEC 61000-4-7:2002 and IEC 61000-4-7:2002/AMD1:2008 may be used);
- the THD shall not exceed 70 %. The third order harmonic current, expressed as a percentage of the fundamental current, shall not exceed 35 %, the fifth order current shall not exceed 25 %, the seventh order current shall not exceed 30 %, the ninth and eleventh order currents shall not exceed 20 % and the second order current shall not exceed 5 %.

Table 3 – Limits for Class D equipment

Harmonic order	Maximum permissible harmonic current per watt mA/W	Maximum permissible harmonic current A
n		
3	3,4	2,30
5	1,9	1,14
7	1,0	0,77
9	0,5	0,40
11	0,35	0,33
$13 \leq n \leq 39$ (odd harmonics only)	$\frac{3,85}{n}$	See Table 1

Test Data

Please refer to following tables:



Total Current Harmonics and Some Odd Harmonic Parameters⁴

THC(A) ..	0.1079 ..	THD (%) ..	26.97 ..	POHC(A) ..	0.0125 ..	POHC Limit(A)	0.2514 ..
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Maximum Value of Relevant Parameter During Test Period⁴

U _{rms} (V) ..	229.68 ..	Freq(Hz) ..	50.000 ..
I _{rms} (A) ..	0.4172 ..	I _{peak} (A) ..	0.7297 ..
I _L (A) ..	0.4557 ..	ICF ..	2.1102 ..
P(W) ..	101.22 ..	A ..	0.9421 ..

Determination of Harmonics and Limits⁴

Order(n) ..	Harmonics Current Avg. (A) ..	100% Limit(A)	Limit Percent (%) ..	Harmonics Current Max. (A) ..	150% Limit(A)	Limit Percent (%) ..	Result ..
2 ..	0.0017 ..	1.0800 ..	0.16 ..	0.0088 ..	1.6200 ..	0.54 ..	Pass ..
3 ..	0.0998 ..	2.3000 ..	4.34 ..	0.1008 ..	3.4500 ..	2.92 ..	Pass ..
4 ..	0.0005 ..	0.4300 ..	0.12 ..	0.0024 ..	0.6450 ..	0.37 ..	Pass ..
5 ..	0.0266 ..	1.1400 ..	2.33 ..	0.0329 ..	1.7100 ..	1.92 ..	Pass ..
6 ..	0.0003 ..	0.3000 ..	0.10 ..	0.0010 ..	0.4500 ..	0.22 ..	Pass ..
7 ..	0.0134 ..	0.7700 ..	1.74 ..	0.0136 ..	1.1550 ..	1.18 ..	Pass ..
8 ..	0.0002 ..	0.2300 ..	0.09 ..	0.0012 ..	0.3450 ..	0.35 ..	Pass ..
9 ..	0.0046 ..	0.4000 ..	1.15 ..	0.0065 ..	0.6000 ..	1.08 ..	Pass ..
10 ..	0.0002 ..	0.1840 ..	0.11 ..	0.0006 ..	0.2760 ..	0.22 ..	Pass ..
11 ..	0.0082 ..	0.3300 ..	2.48 ..	0.0094 ..	0.4950 ..	1.90 ..	Pass ..
12 ..	0.0002 ..	0.1533 ..	0.13 ..	0.0008 ..	0.2300 ..	0.35 ..	Pass ..
13 ..	0.0040 ..	0.2100 ..	1.90 ..	0.0055 ..	0.3150 ..	1.75 ..	Pass ..
14 ..	0.0002 ..	0.1314 ..	0.15 ..	0.0011 ..	0.1971 ..	0.56 ..	Pass ..
15 ..	0.0055 ..	0.1500 ..	3.67 ..	0.0063 ..	0.2250 ..	2.80 ..	Pass ..
16 ..	0.0003 ..	0.1150 ..	0.26 ..	0.0012 ..	0.1725 ..	0.70 ..	Pass ..
17 ..	0.0065 ..	0.1324 ..	4.91 ..	0.0071 ..	0.1985 ..	3.58 ..	Pass ..
18 ..	0.0004 ..	0.1022 ..	0.39 ..	0.0017 ..	0.1533 ..	1.11 ..	Pass ..
19 ..	0.0063 ..	0.1184 ..	5.32 ..	0.0090 ..	0.1776 ..	5.07 ..	Pass ..
20 ..	0.0004 ..	0.0920 ..	0.43 ..	0.0015 ..	0.1380 ..	1.09 ..	Pass ..
21 ..	0.0084 ..	0.1071 ..	7.84 ..	0.0093 ..	0.1607 ..	5.79 ..	Pass ..
22 ..	0.0004 ..	0.0836 ..	0.48 ..	0.0017 ..	0.1255 ..	1.35 ..	Pass ..
23 ..	0.0013 ..	0.0978 ..	1.33 ..	0.0056 ..	0.1467 ..	3.82 ..	Pass ..
24 ..	0.0003 ..	0.0767 ..	0.39 ..	0.0011 ..	0.1150 ..	0.96 ..	Pass ..
25 ..	0.0023 ..	0.0900 ..	2.56 ..	0.0037 ..	0.1350 ..	2.74 ..	Pass ..
26 ..	0.0003 ..	0.0708 ..	0.42 ..	0.0012 ..	0.1062 ..	1.13 ..	Pass ..
27 ..	0.0044 ..	0.0833 ..	5.28 ..	0.0049 ..	0.1250 ..	3.92 ..	Pass ..
28 ..	0.0003 ..	0.0657 ..	0.46 ..	0.0009 ..	0.0986 ..	0.91 ..	Pass ..
29 ..	0.0030 ..	0.0776 ..	3.87 ..	0.0041 ..	0.1164 ..	3.52 ..	Pass ..
30 ..	0.0003 ..	0.0613 ..	0.49 ..	0.0009 ..	0.0920 ..	0.98 ..	Pass ..
31 ..	0.0041 ..	0.0726 ..	5.65 ..	0.0042 ..	0.1089 ..	3.86 ..	Pass ..
32 ..	0.0003 ..	0.0575 ..	0.52 ..	0.0011 ..	0.0863 ..	1.27 ..	Pass ..
33 ..	0.0013 ..	0.0682 ..	1.91 ..	0.0034 ..	0.1023 ..	3.32 ..	Pass ..
34 ..	0.0002 ..	0.0541 ..	0.37 ..	0.0011 ..	0.0812 ..	1.35 ..	Pass ..
35 ..	0.0023 ..	0.0643 ..	3.58 ..	0.0039 ..	0.0964 ..	4.05 ..	Pass ..
36 ..	0.0003 ..	0.0511 ..	0.59 ..	0.0015 ..	0.0767 ..	1.96 ..	Pass ..
37 ..	0.0042 ..	0.0608 ..	6.91 ..	0.0046 ..	0.0912 ..	5.04 ..	Pass ..
38 ..	0.0004 ..	0.0484 ..	0.83 ..	0.0015 ..	0.0726 ..	2.07 ..	Pass ..
39 ..	0.0022 ..	0.0577 ..	3.81 ..	0.0038 ..	0.0865 ..	4.39 ..	Pass ..
40 ..	0.0004 ..	0.0460 ..	0.87 ..	0.0015 ..	0.0690 ..	2.17 ..	Pass ..

Determination of Voltage Relevant Parameter During Test Period⁴⁾

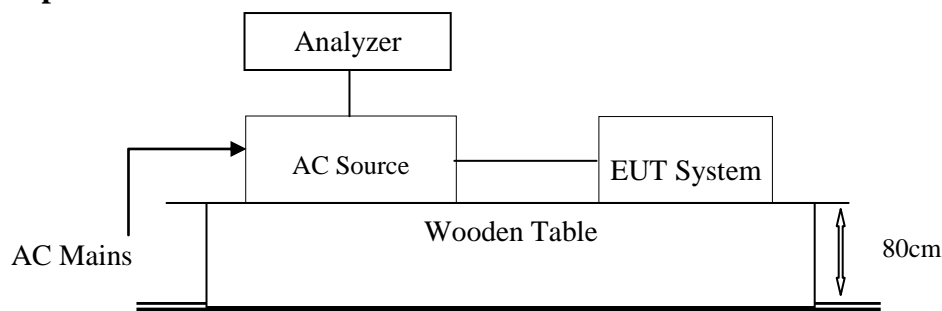
Item.	Nominal Value.	Tested Value.	Error Value.	Allowable Error Value.	Result.
Urms(V).	230.00.	229.63.	0.37.	±2.0%.	Pass.
Frequency(Hz).	50.000.	50.002.	0.002.	±0.5%.	Pass.
CFU.	1.4100.	1.4161.	0.0061.	±0.01.	Pass.
Peak-Volt Phase.	90.00.	89.65.	0.35.	±3.	Pass.

Determination of Voltage Harmonics and Limits⁴⁾

Order(n).	Uhdf.	Limit(%)	Limit Percent(%)	Result.
1.	100%.	---	---	---
2.	0.01%.	0.20.	5.54%.	Pass.
3.	0.04%.	0.90.	4.50%.	Pass.
4.	0.00%.	0.20.	1.40%.	Pass.
5.	0.01%.	0.40.	3.19%.	Pass.
6.	0.00%.	0.20.	1.01%.	Pass.
7.	0.01%.	0.30.	3.11%.	Pass.
8.	0.00%.	0.20.	0.89%.	Pass.
9.	0.01%.	0.20.	2.74%.	Pass.
10.	0.00%.	0.20.	1.95%.	Pass.
11.	0.01%.	0.10.	9.31%.	Pass.
12.	0.00%.	0.10.	3.59%.	Pass.
13.	0.01%.	0.10.	7.87%.	Pass.
14.	0.00%.	0.10.	2.00%.	Pass.
15.	0.01%.	0.10.	9.58%.	Pass.
16.	0.00%.	0.10.	0.99%.	Pass.
17.	0.01%.	0.10.	9.69%.	Pass.
18.	0.00%.	0.10.	1.11%.	Pass.
19.	0.01%.	0.10.	13.23%.	Pass.
20.	0.00%.	0.10.	1.22%.	Pass.
21.	0.02%.	0.10.	18.15%.	Pass.
22.	0.00%.	0.10.	1.14%.	Pass.
23.	0.00%.	0.10.	2.81%.	Pass.
24.	0.00%.	0.10.	0.92%.	Pass.
25.	0.00%.	0.10.	3.52%.	Pass.
26.	0.00%.	0.10.	0.95%.	Pass.
27.	0.01%.	0.10.	12.00%.	Pass.
28.	0.00%.	0.10.	0.84%.	Pass.
29.	0.01%.	0.10.	6.74%.	Pass.
30.	0.00%.	0.10.	1.21%.	Pass.
31.	0.01%.	0.10.	11.18%.	Pass.
32.	0.00%.	0.10.	1.11%.	Pass.
33.	0.00%.	0.10.	3.30%.	Pass.
34.	0.00%.	0.10.	1.01%.	Pass.
35.	0.01%.	0.10.	7.79%.	Pass.
36.	0.00%.	0.10.	1.46%.	Pass.
37.	0.01%.	0.10.	14.10%.	Pass.
38.	0.00%.	0.10.	1.16%.	Pass.
39.	0.01%.	0.10.	11.44%.	Pass.
40.	0.00%.	0.10.	1.33%.	Pass.

11 -VOLTAGE FLUCTUATIONS AND FLICKER

Test System Setup



Test Standard

EN 61000-3-3:2013+A1:2019+A2:2021 and BS EN 61000-3-3:2013+A1:2019+A2:2021

Flicker Test Limits :

The limits shall be applicable to voltage fluctuations and flicker at the supply terminals of the equipment under test, measured or calculated according to clause 4 under test conditions described in clause 6 and annex A. Tests made to prove compliance with the limits are considered to be type tests.

The following limits apply:

- the value of P_{st} shall not be greater than 1,0;
- the value of P_{lt} shall not be greater than 0,65;
- the value of $d(t)$ during a voltage change shall not exceed 3,3 % for more than 500 ms;
- the relative steady-state voltage change, d_c , shall not exceed 3,3 %;
- the maximum relative voltage change d_{max} , shall not exceed
 - a) 4 % without additional conditions;
 - b) 6 % for equipment which is:
 - switched manually, or
 - switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.

Note: The cycling frequency will be further limited by the P_{st} and P_{lt} limit. For example: a d_{max} of 6 % producing a rectangular voltage change characteristic twice per hour will give a P_{lt} of about 0,65.

- c) 7 % for equipment which is
 - attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or
 - switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

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

Test Data

Please refer to following tables:

Short time (Pst): 10 min
Observation time: 10 min (1 Flicker measurement)
Test Mode: Mode 2:Operating(230V)
Power Source: AC 230V/50Hz
Test Result PASS

Maximum Flicker results

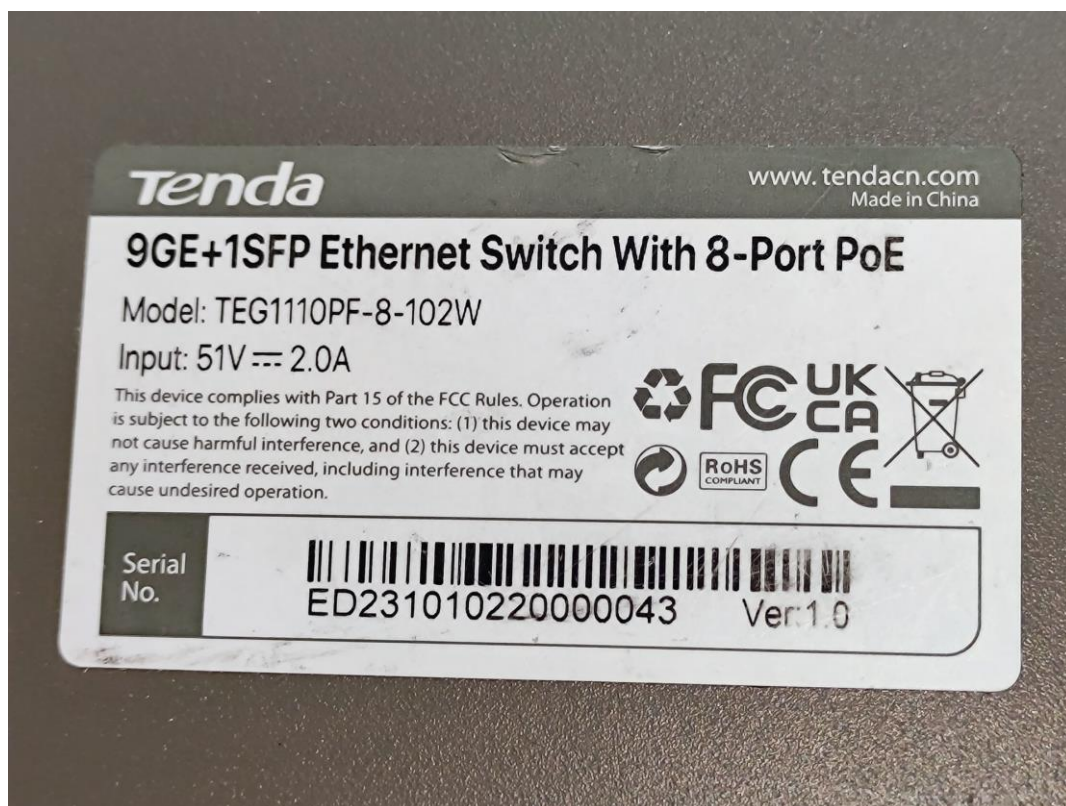
	EUT values	Limit	Result
Pst	0.028	1.00	PASS
Plt	0.028	0.65	PASS
dc [%]	0.006	3.30	PASS
dmax [%]	0.324	4.00	PASS
dt [s]	0.000	0.50	PASS

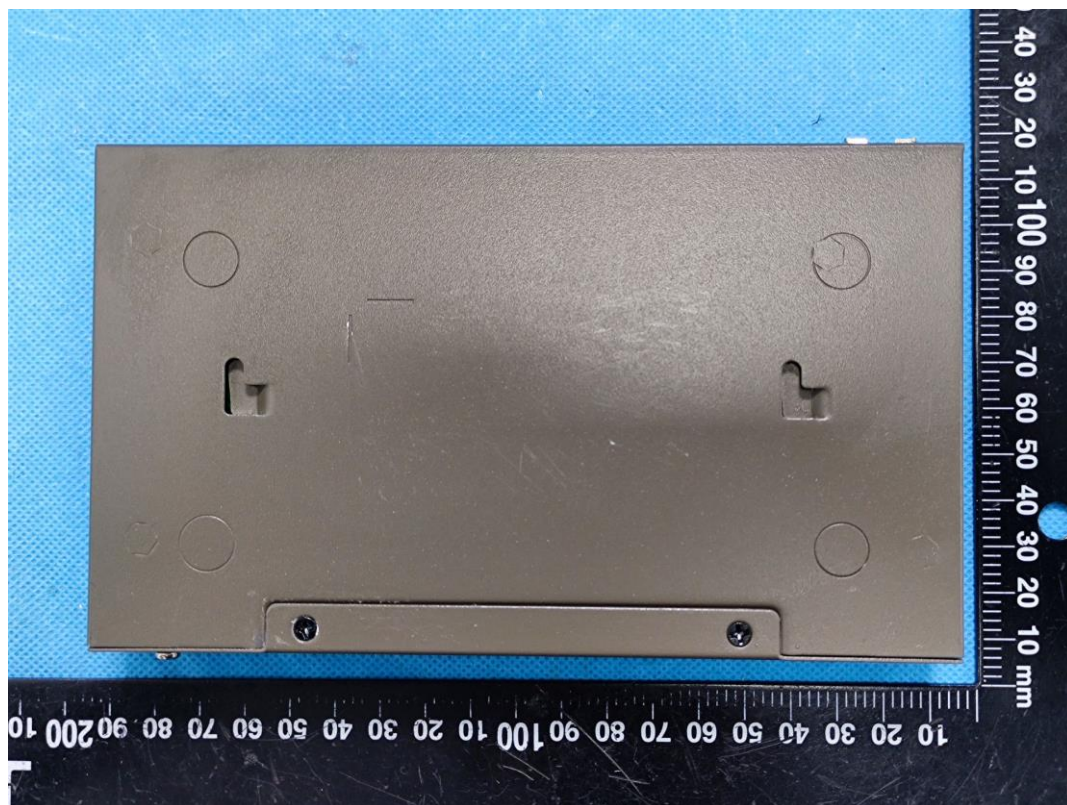
EXHIBITA - EUT PHOTOGRAPHS





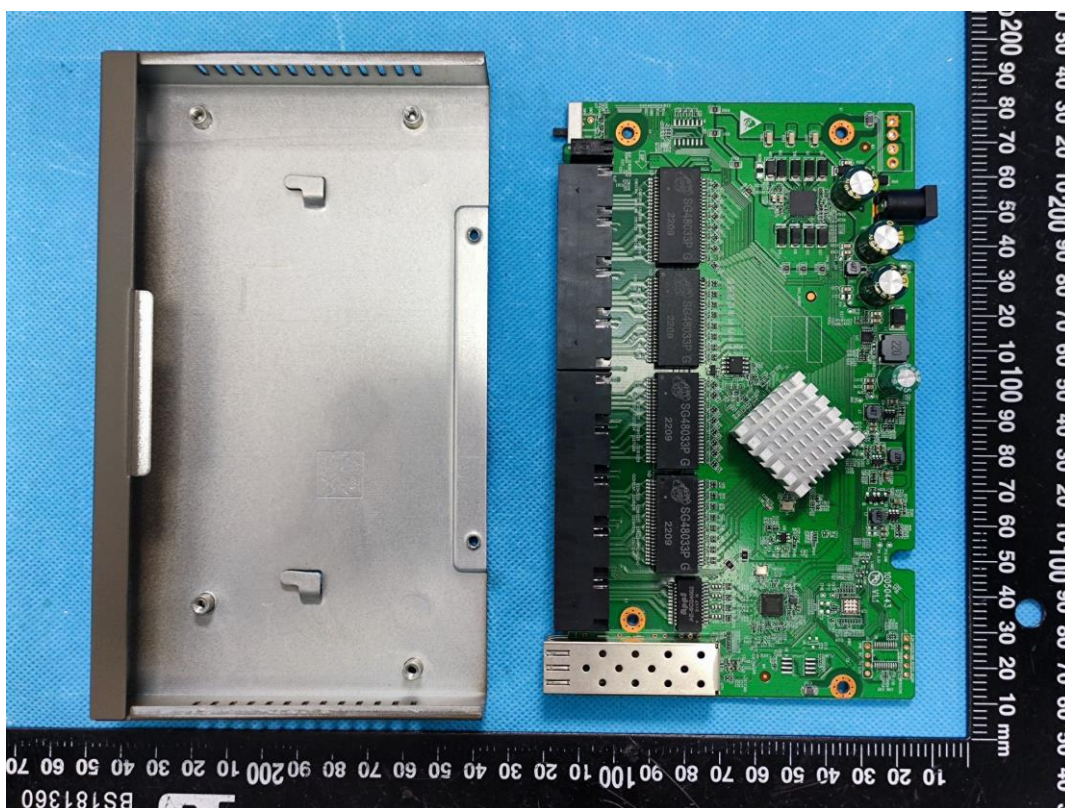


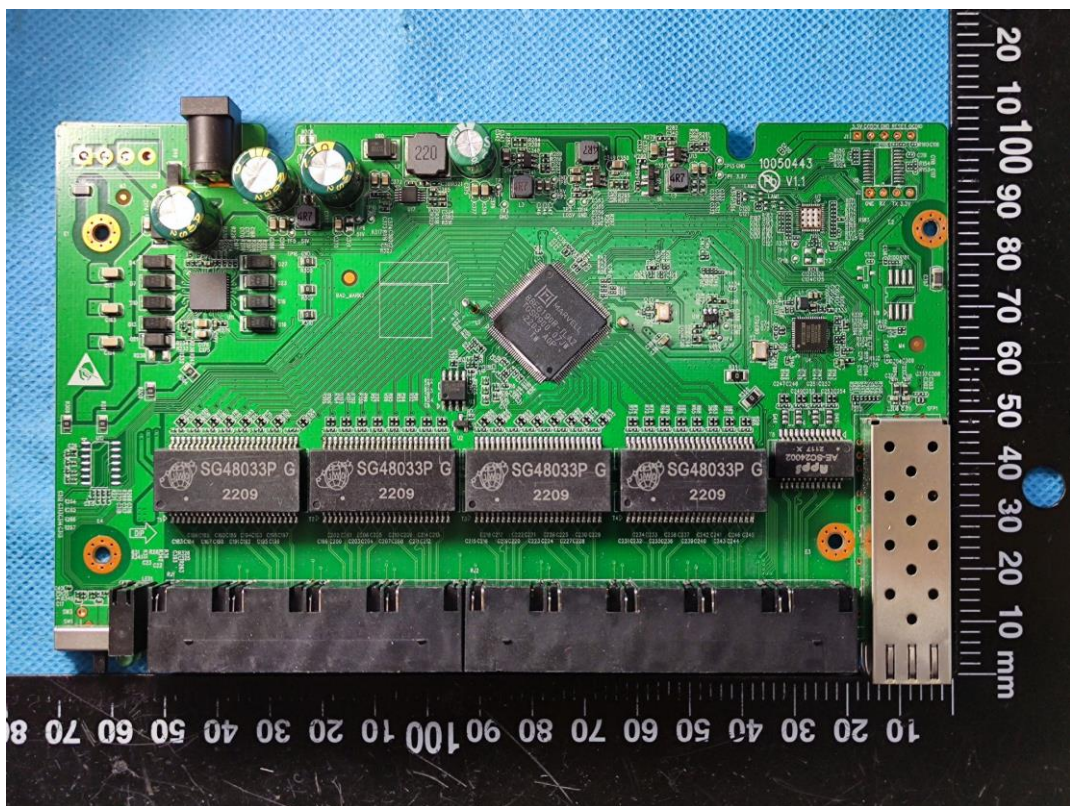


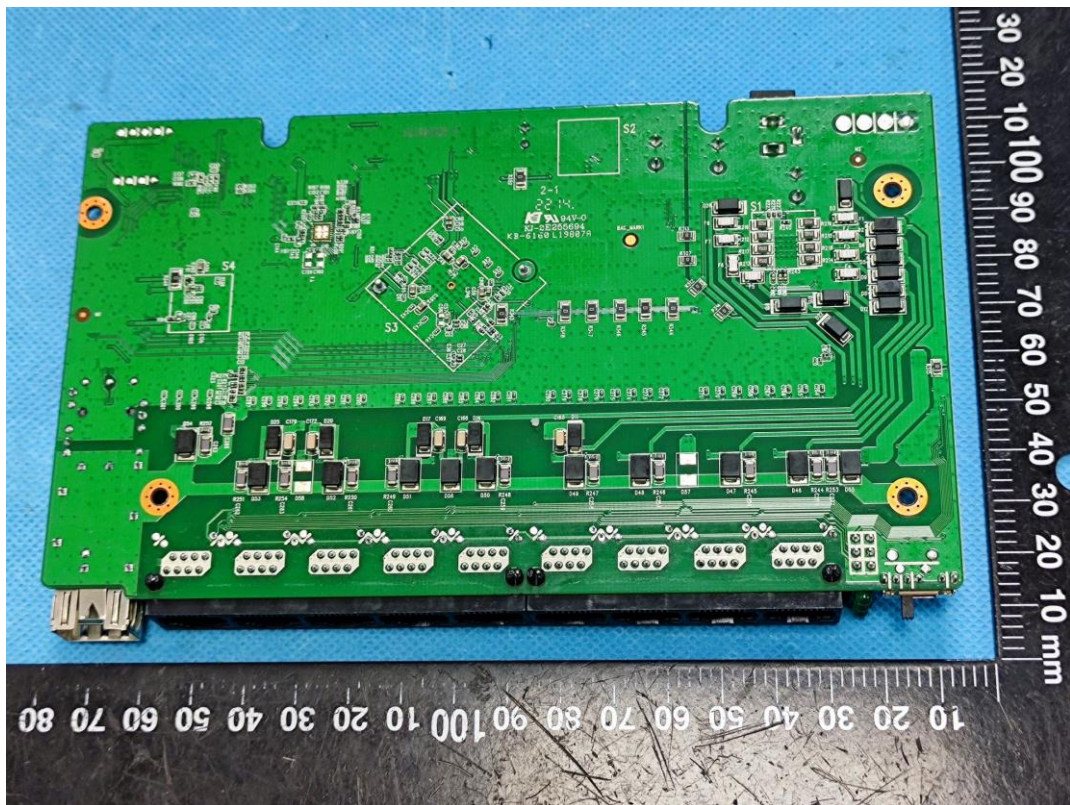


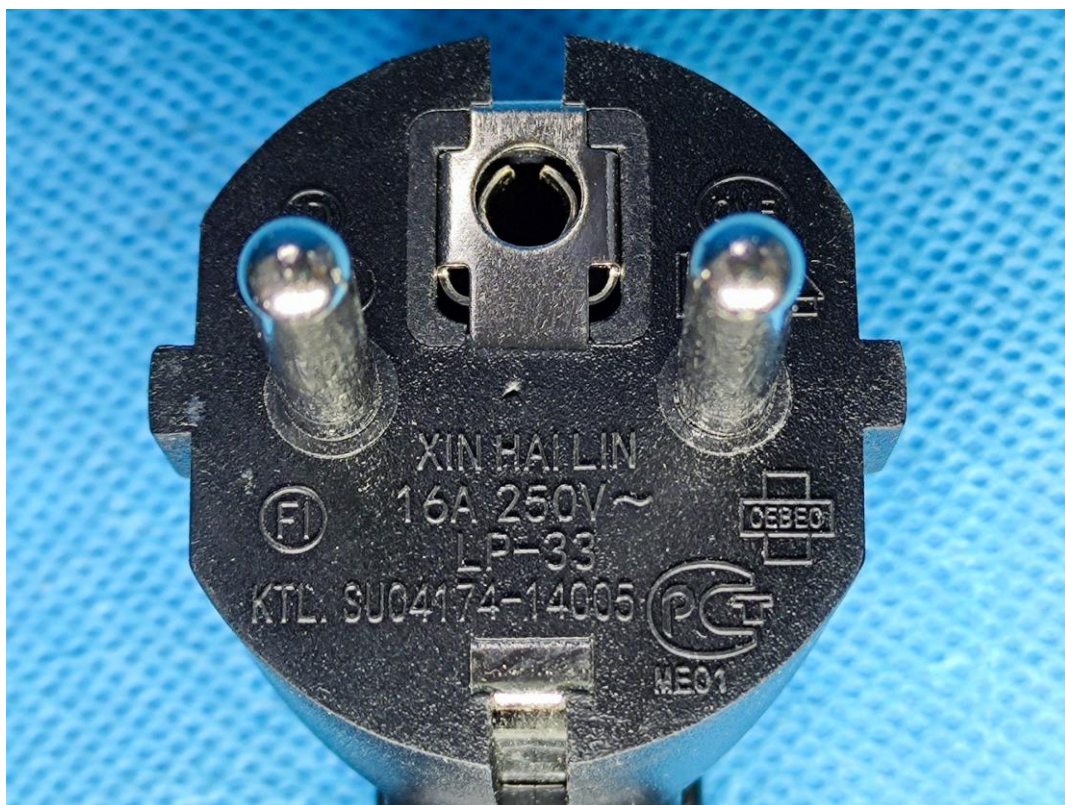


Uncover

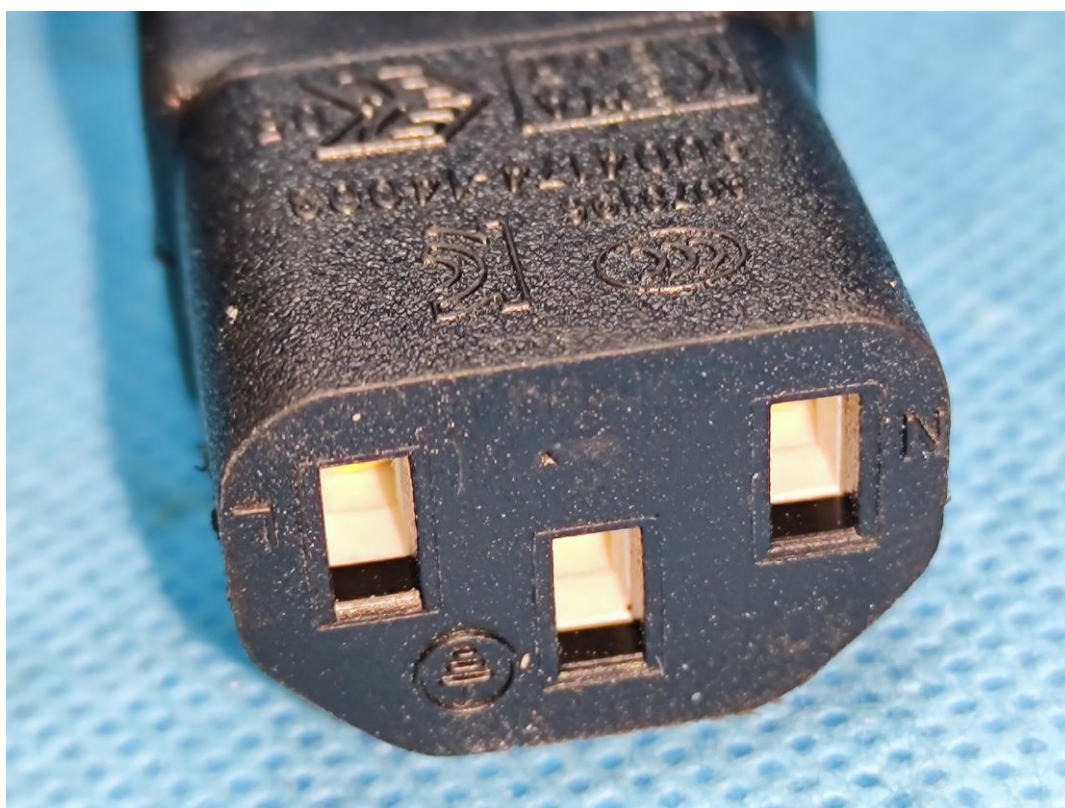




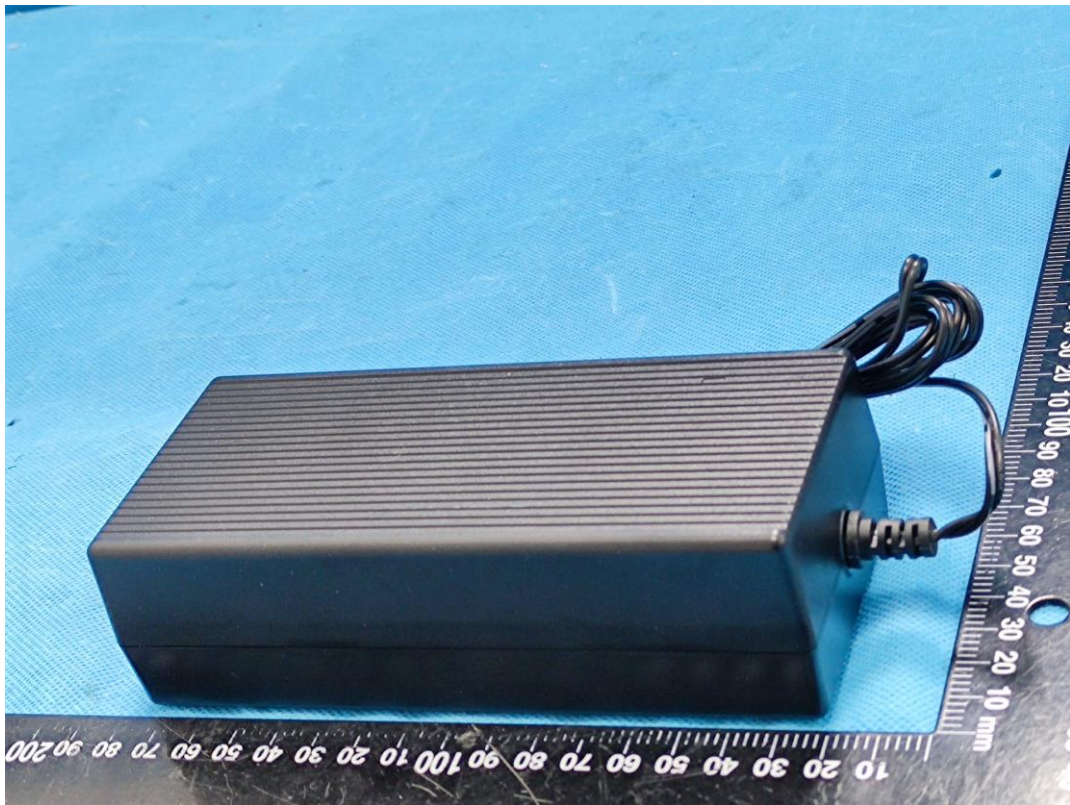




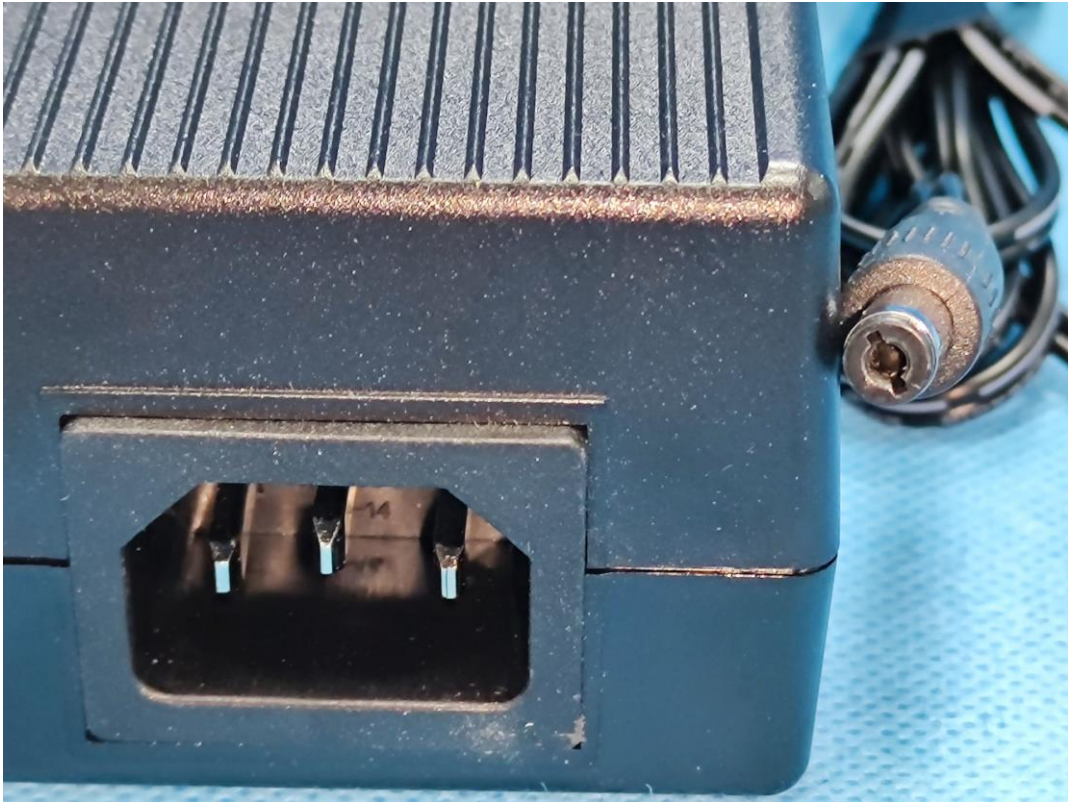
Port







Port



EXHIBITB - TEST SETUP PHOTOGRAPHS

Conducted emissions

Conducted emissions front View



Conducted emissions side View



Conducted emissions front View-ISN

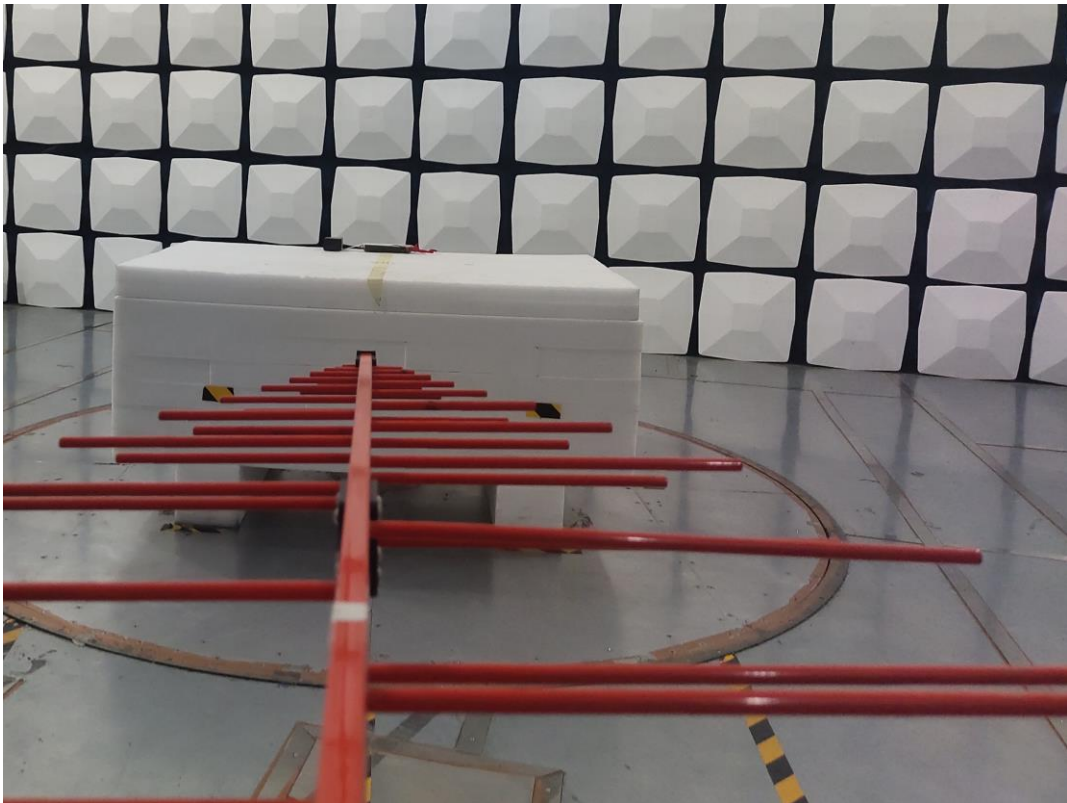


Conducted emissions side View-ISN



Radiated Emissions

Radiated Emissions Below 1GHz front View



Radiated Emissions Below 1GHz rear View



Radiated Emissions Above 1GHz front View



Radiated Emissions Above 1GHz rear View



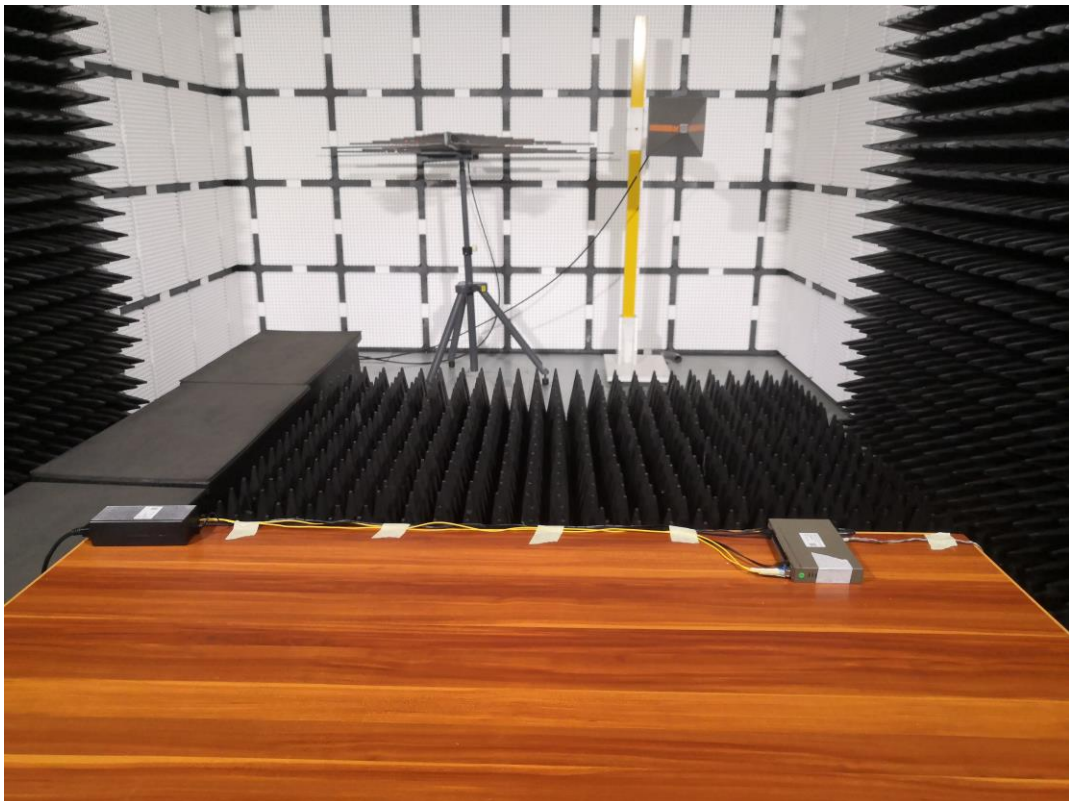
ESD

Test Setup Photo View



RS

Test Setup Photo View

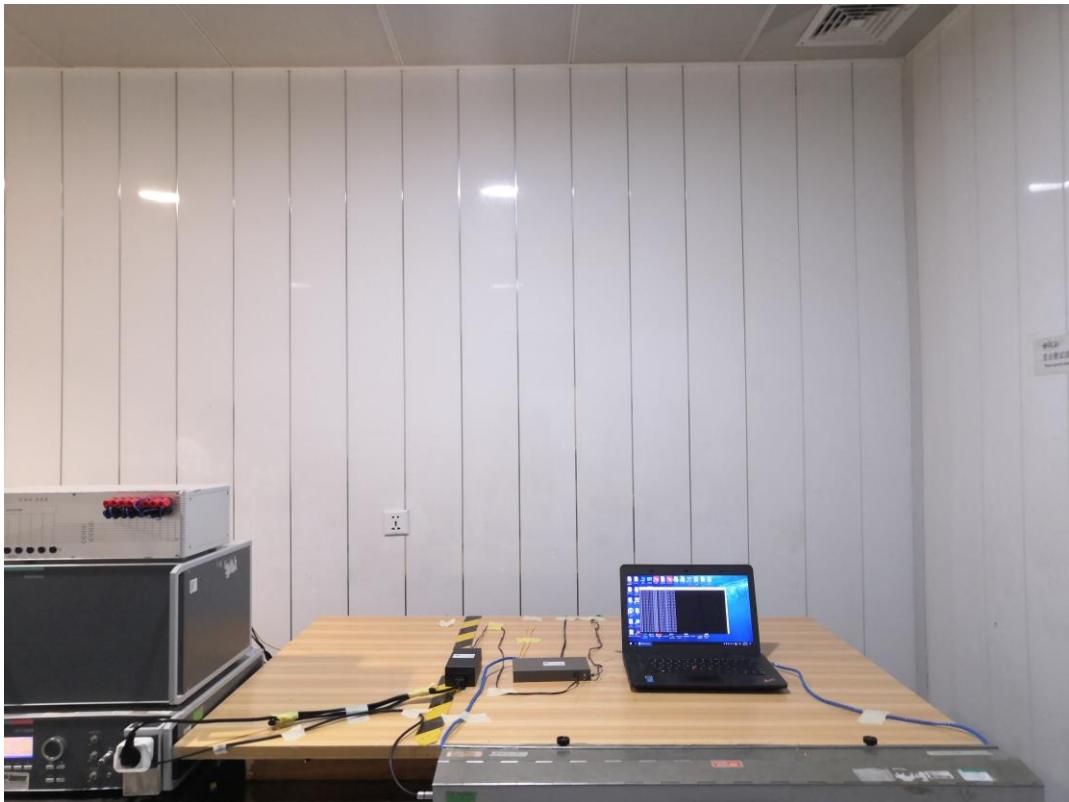


EFT

AC Port Test Setup Photo



RJ45 Port Test Setup Photo



Dips

Test Setup Photo View



AC Port Test Setup Photo



Flicker

Test Setup Photo View



Surge

AC Port Test Setup Photo

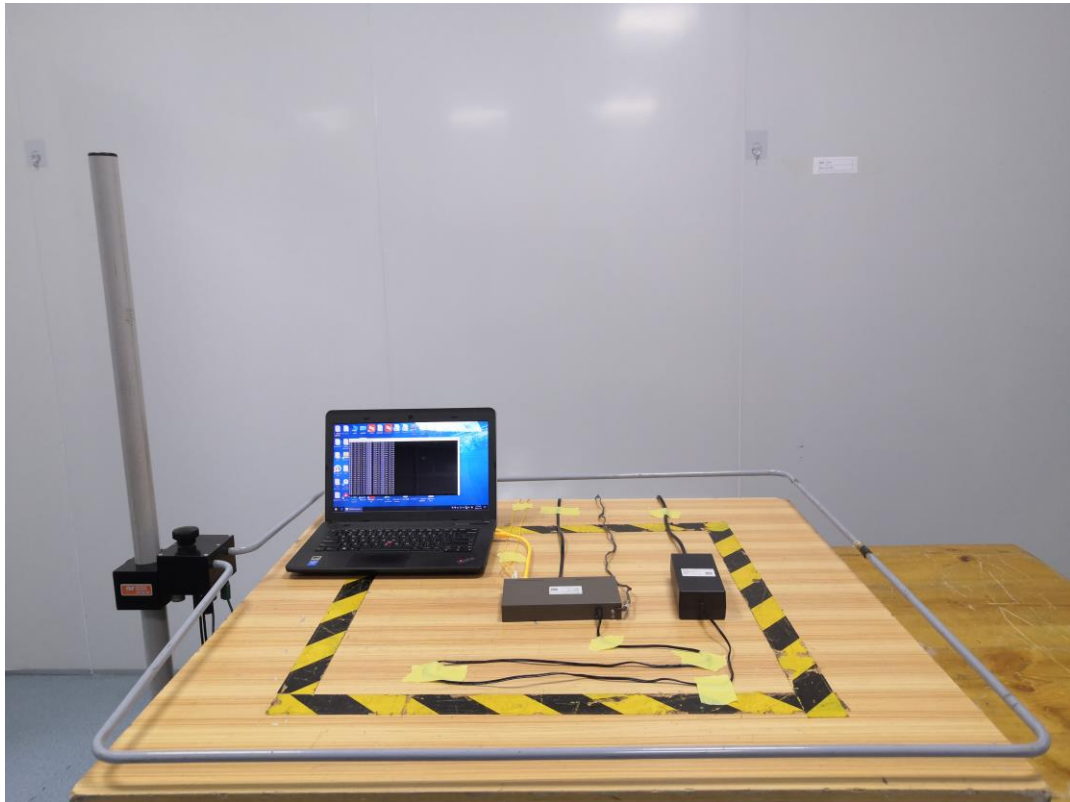


RJ45 Port Test Setup Photo



PFMF

Test Setup Photo View



Harmonic

Test Setup Photo View



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