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检测
TESTING
CNAS L4595

EMC TEST REPORT

For

Guangzhou V-Solution Telecommunication Technology Co., Ltd.

GPON OLT

Test Model: V1600G1-B

Prepared for	:	Guangzhou V-Solution Telecommunication Technology Co., Ltd.
Address	:	601, Building B2, No.162, Science Avenue, Science City, Guangzhou High-tech Industrial Development Zone, Guangdong Province
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
Tel	:	+(86) 0755-82591330
Fax	:	
Web	:	www.lcs-cert.com
Mail	:	webmaster@lcs-cert.com
Date of receipt of test sample	:	July 1, 2023
Number of tested samples	:	2
Serial number	:	Prototype
Date of Test	:	July 1, 2023 to July 4, 2023
Date of Report	:	July 4, 2023

TEST REPORT

Report No.	:	**LCSA041423118E**
Date of Issue	:	July 4, 2023
Testing Laboratory Name	:	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	:	Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure.....	:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name	:	**Guangzhou V-Solution Telecommunication Technology Co., Ltd.**
Address	:	601, Building B2, No.162, Science Avenue, Science City, Guangzhou High-tech Industrial Development Zone, Guangdong Province
Test Specification		
Standard	:	EN 55032:2015/A1:2020 EN IEC 61000-3-2:2019/A1:2021 EN 61000-3-3:2013/A2:2021 EN 55035:2017/A11:2020
Test Report Form No.	:	LCSEMC-1.0
TRF Originator.....	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF.....	:	Dated 2011-03

Test Item Description.	:	**GPON OLT**
Trade Mark	:	V·SOL
Test Model	:	V1600G1-B
Result	:	**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Coco Song	Baron Wen	
Coco Song / File Administrator	Baron Wen / Technique principal	Gavin Liang / Manager

TEST REPORT

Test Report No.: LCSA041423118E	July 4, 2023 Date of issue

Test Model	:	**V1600G1-B**
EUT	:	GPON OLT
Applicant	:	**Guangzhou V-Solution Telecommunication Technology Co., Ltd.**
Address	:	601, Building B2, No.162, Science Avenue, Science City, Guangzhou High-tech Industrial Development Zone, Guangdong Province
Telephone	:	/
Fax	:	/
Manufacturer	:	**Guangzhou V-Solution Telecommunication Technology Co., Ltd.**
Address	:	601, Building B2, No.162, Science Avenue, Science City, Guangzhou High-tech Industrial Development Zone, Guangdong Province
Telephone	:	/
Fax	:	/
Factory	:	**Guangzhou V-Solution Telecommunication Technology Co., Ltd.**
Address	:	Building B, Dingxing Wisdom Valley, No.11 Huangqishan Road, Yonghe Economic Development Zone, Huangpu District, Guangzhou City, Guangdong Province, P.R.China
Telephone	:	/
Fax	:	/

Test Result	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Report Version	Issue Date	Revision Content	Revised By
000	July 4, 2023	Initial Issue	/

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Test Report Description Page

1. TEST STANDARDS

The tests were performed according to following standards:

EN 55032:2015/A1:2020: Electromagnetic compatibility of multimedia equipment - Emission requirements
EN IEC 61000-3-2:2019/A1:2021: Electromagnetic compatibility (EMC) -- Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16A per phase)
EN 61000-3-3:2013/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 ≤ 16A per phase and not subject to conditional connection
EN 55035:2017/A11:2020: Electromagnetic compatibility of multimedia equipment - Immunity requirements.

2. SUMMARY OF STANDARDS AND RESULTS

2.1 Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

Description of Test Item	Standard	Limits	Result
Conducted emissions from AC mains power ports (150kHz-30MHz)	EN 55032:2015/A1:2020	Class B	Pass
Asymmetric mode conducted emissions (150kHz-30MHz)	EN 55032:2015/A1:2020	Class B	Pass
Radiated emissions (30MHz-1GHz)	EN 55032:2015/A1:2020	Class B	Pass
Harmonic current emission	EN IEC 61000-3-2:2019/A1:2021	Class A	Pass
Voltage fluctuations and flicker	EN 61000-3-3:2013/A2:2021	EN 61000-3-3, Clause 4	Pass
Electrostatic discharges	EN 55035:2017/A11:2020	Contact Discharge: +/- 4kV Air Discharge: +/- 8kV	Pass
RF electromagnetic field disturbances	EN 55035:2017/A11:2020	3V/m, 80%, 1kHz Amp. Mod.	Pass
Electrical fast transients / burst for AC mains power ports	EN 55035:2017/A11:2020	1kV; 5/50ns Tr/Th; 5kHz Repetition Frequency	Pass
Electrical fast transients / burst for analogue/digital data ports	EN 55035:2017/A11:2020	0.5kV; 5/50ns Tr/Th; 5kHz Repetition Frequency	Pass
Surges for AC mains power ports	EN 55035:2017/A11:2020	1.2/50μs Tr/Td; 1kV Line to Line; 2kV Line to Ground	Pass
Surges for analogue/digital data ports	EN 55035:2017/A11:2020	1.2/50μs Tr/Td; 0,5 kV Shield to Ground	Pass
Continuous induced RF disturbances for AC mains power ports (150kHz-80MHz)	EN 55035:2017/A11:2020	0,15 to 10MHz 3Vrms (emf), 10 to 30MHz 3V to 1Vrms(emf), 30 to 80MHz 1Vrms(emf), 80%,1kHz Amp. Mod.	Pass
Continuous induced RF disturbances for analogue/digital data ports (150kHz-80MHz)	EN 55035:2017/A11:2020	0,15 to 10MHz 3Vrms (emf), 10 to 30MHz 3V to 1Vrms(emf), 30 to 80MHz 1Vrms(emf), 80%,1kHz Amp. Mod.	Pass
Voltage dips and interruptions	EN 55035:2017/A11:2020	<5% residual voltage for 0.5 periods: B, 70% residual voltage for 25 periods: C, <5% residual voltage for 250 periods: C	Pass

2.2 Description of Test Modes

No	Title	Description
TM1	Working(AC 230V/50Hz)	Record

2.3 Description of Performance Criteria

General Performance Criteria

Performance Criteria A

The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment is used as intended.

The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance Criteria B

During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test.

After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended.

The performance level may be replaced by a permissible loss of performance.

If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance Criteria C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

3. GENERAL INFORMATION

3.1 Description of Device (EUT)

EUT	: GPON OLT
Test Model	: V1600G1-B
Power Supply	: Input: 220-240V~, 50Hz, 600mA, 75W Output: 12V ⎓ 6250mA
Highest Internal Frequency	: f ≤ 108MHz
Classification of Equipment	: Class B

3.2 Support equipment List

The EUT was tested as an independent device.

3.3 Description of Test Facility

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

3.4 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Emission (150kHz to 30MHz)	± 2.35 dB
Radiated Emission (30MHz to 1000MHz)	± 3.48 dB
Mains Harmonic	± 0.510%
Voltage Fluctuations & Flicker	± 0.510%
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

4. MEASURING DEVICES AND TEST EQUIPMENT

Conducted emissions from AC mains power ports +Asymmetric mode conducted emissions (150kHz-30MHz)					
Equipment	**Manufacturer**	**Model No**	**Serial No.**	**Cal Date**	**Due Date**
EMI Test Software	Farad	EZ	/	/	/
Artificial Mains	R&S	ENV216	101288	2023-06-09	2024-06-08
Pulse Limiter	R&S	ESH3-Z2	102750-NB	2022-08-17	2023-08-16
Impedance Stabilization Network	TESEQ	ISN T800	45130	2022-10-29	2023-10-28
EMI Test Receiver	R&S	ESR3	102312	2023-02-25	2024-02-24

Radiated emissions (30MHz-1GHz)					
Equipment	**Manufacturer**	**Model No**	**Serial No.**	**Cal Date**	**Due Date**
EMI Test Software	AUDIX	E3	/	/	/
By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2021-09-12	2024-09-11
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2021-09-05	2024-09-04
EMI Test Receiver	R&S	ESR3	102311	2022-08-17	2023-08-16
Broadband Preamplifier	/	BP-01M18G	P190501	2023-06-09	2024-06-08

Harmonic current emission/ Voltage fluctuations and flicker					
Equipment	**Manufacturer**	**Model No**	**Serial No.**	**Cal Date**	**Due Date**
HARMONICS&FLICKER MEASUREMENT SYSTEM	EVERFINE	HFM-3000	P630850CD1411116	2023-02-25	2024-02-24
HARMONICS&FLICKER TESTING POWER SOURCE	EVERFINE	HFS-4000	P624486CD14111124	2023-02-25	2024-02-24

Electrostatic discharges					
Equipment	**Manufacturer**	**Model No**	**Serial No.**	**Cal Date**	**Due Date**
ESD Simulator	SCHLODER	SESD 230	604035	2022-07-18	2023-07-17

RF electromagnetic field disturbances					
Equipment	**Manufacturer**	**Model No**	**Serial No.**	**Cal Date**	**Due Date**
MXG Vector Signal Generator	Agilent	E4438C	MY42081396(6G)	2023-06-09	2024-06-08
RF POWER AMPLIFIER	SKET	HAP_0306G-50W	/	2023-06-09	2024-06-08
RF POWER AMPLIFIER	OPHIR	5225R	1052	2023-06-09	2024-06-08
RF POWER AMPLIFIER	OPHIR	5273F	1019	2023-06-09	2024-06-08
Stacked Broadband Log Periodic Antenna	SCHWARZBECK	STLP 9128	9128ES-145	/	/
Stacked Mikrowellen Log.-Per Antenna	SCHWARZBECK	STLP 9149	9149-484	/	/
RS Electric field probe	narda	EP601	611WX80208	2023-06-09	2024-06-08

Electrical fast transients / burst for AC mains power ports/ burst for analogue/digital data ports					
Equipment	**Manufacturer**	**Model No**	**Serial No.**	**Cal Date**	**Due Date**
Electric fast pulse group generator	3ctest	EFT-4001G	EC0461044	2022-10-31	2023-10-30
Immunity Simulative Generator	EM TEST	UCS500-M4	0101-34	2022-08-17	2023-08-16
Capacitive coupling clamp	3CTEST	EFTC	EC0441098	2023-06-09	2024-06-08

Surges for AC mains power ports /Surges for analogue/digital data ports					
Equipment	**Manufacturer**	**Model No**	**Serial No.**	**Cal Date**	**Due Date**
Immunity Simulative Generator	EM TEST	UCS500-M4	0101-34	2022-08-17	2023-08-16
Communication wave lightning generator	HTEC	HTSG 70	181701	2022-10-31	2023-10-30
Symmetrical data line coupling network	HTEC	HCN 8	182701	2022-10-31	2023-10-30
Data line decoupling network	HTEC	HDEC 8	182702	2022-10-31	2023-10-30

Continuous induced RF disturbances for AC mains power ports /analogue/digital data ports (150kHz-80MHz)					
Equipment	**Manufacturer**	**Model No**	**Serial No.**	**Cal Date**	**Due Date**
Simulator	FRANKONIA	CIT-10/75	A126A1195	2022-08-17	2023-08-16
CDN	FRANKONIA	CDN-M2+M3	A2210177	2023-06-09	2024-06-08
6dB Attenuator	FRANKONIA	DAM25W	1172040	2023-06-09	2024-06-08
Electromagnetic coupling injection clamp	ZHINAN	ZN23203	14017	2023-06-09	2024-06-08

Voltage dips and interruptions					
Equipment	**Manufacturer**	**Model No**	**Serial No.**	**Cal Date**	**Due Date**
Voltage dips and up generator	3CTEST	VDG-1105G	EC0171014	2023-06-09	2024-06-08

5. EMISSION TEST RESULTS (EMI)

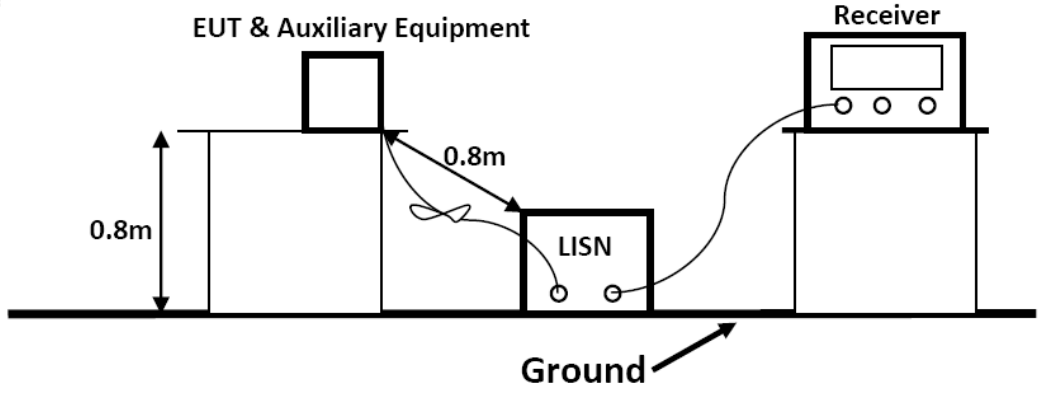
5.1 Conducted emissions from AC mains power ports (150kHz-30MHz)

Test Requirement:	Class B
Test Limit:	**Frequency Range** / **Limit (Quasi-Peak)** / **Limit (Average)** 0.15MHz to 0.5MHz / 66dB(μV) to 56dB(μV) / 56dB(μV) to 46dB(μV) 0.5MHz to 5MHz / 56dB(μV) / 46dB(μV) 5MHz to 30MHz / 60dB(μV) / 50dB(μV) Detector: / Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz
Test Method:	EN 55032:2015/A1:2020
Procedure:	An initial pre-scan was performed with peak detector.Quasi-Peak or Average measurement were performed at the frequencies with maximized peak emission were detected. Remark: Level= Read Level+ Cable Loss+ LISN Factor

5.1.1 E.U.T. Operation:

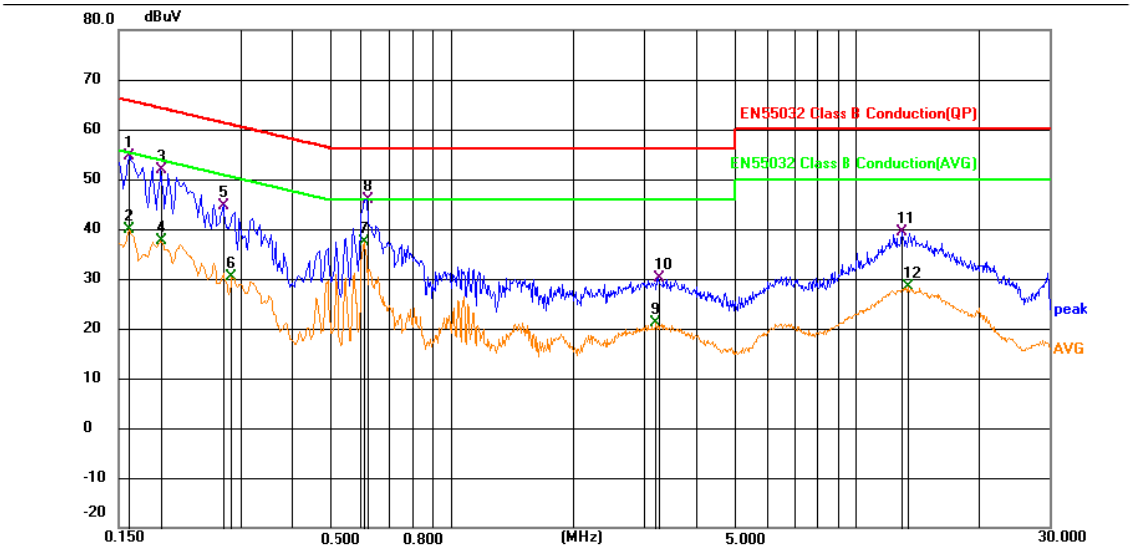
Operating Environment:					
Temperature:	23.5 °C	Humidity:	53.6 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

5.1.2 Test Setup Diagram:



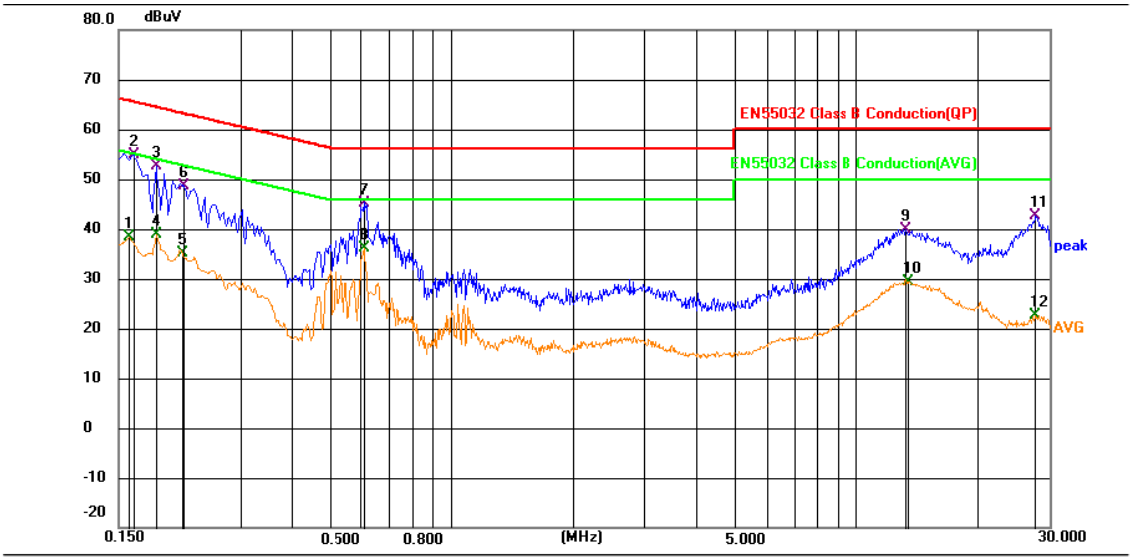
5.1.3 Test Data:

TM1 / Line: Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1590	34.95	19.63	54.58	65.52	-10.94	QP	
2		0.1590	20.13	19.63	39.76	55.52	-15.76	AVG	
3		0.1906	32.17	19.63	51.80	64.01	-12.21	QP	
4		0.1906	18.09	19.63	37.72	54.01	-16.29	AVG	
5		0.2716	25.12	19.63	44.75	61.07	-16.32	QP	
6		0.2850	10.64	19.63	30.27	50.67	-20.40	AVG	
7	*	0.6090	17.62	19.66	37.28	46.00	-8.72	AVG	
8		0.6180	26.24	19.66	45.90	56.00	-10.10	QP	
9		3.2010	1.40	19.70	21.10	46.00	-24.90	AVG	
10		3.2281	10.40	19.70	30.10	56.00	-25.90	QP	
11		13.0561	19.42	19.84	39.26	60.00	-20.74	QP	
12		13.4251	8.52	19.84	28.36	50.00	-21.64	AVG	

TM1 / Line: Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1590	18.64	19.63	38.27	55.52	-17.25	AVG	
2		0.1636	35.35	19.63	54.98	65.28	-10.30	QP	
3		0.1861	33.09	19.63	52.72	64.21	-11.49	QP	
4		0.1861	19.16	19.63	38.79	54.21	-15.42	AVG	
5		0.2151	15.57	19.63	35.20	53.01	-17.81	AVG	
6		0.2176	28.98	19.63	48.61	62.91	-14.30	QP	
7		0.6091	25.59	19.66	45.25	56.00	-10.75	QP	
8	*	0.6091	16.56	19.66	36.22	46.00	-9.78	AVG	
9		13.2766	20.14	19.84	39.98	60.00	-20.02	QP	
10		13.5376	9.65	19.84	29.49	50.00	-20.51	AVG	
11		27.7936	22.46	20.06	42.52	60.00	-17.48	QP	
12		27.7936	2.66	20.06	22.72	50.00	-27.28	AVG	

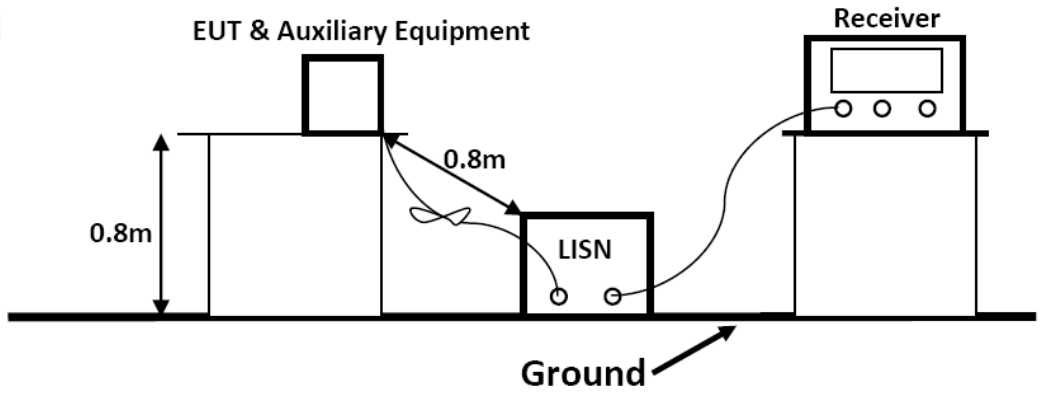
5.2 Asymmetric mode conducted emissions (150kHz-30MHz)

<table>
<tr><td>Test Requirement:</td><td>Class B</td></tr>
<tr><td>Test Limit:</td><td>ISN:
<table>
<tr><th>Frequency Range</th><th>Limit (Quasi-Peak)</th><th>Limit (Average)</th></tr>
<tr><td>0.15MHz to 0.5MHz</td><td>84dB(μV) to 74dB(μV)</td><td>74dB(μV) to 64dB(μV)</td></tr>
<tr><td>0.5MHz to 30MHz</td><td>74dB(μV)</td><td>64dB(μV)</td></tr>
<tr><td>Detector:</td><td colspan="2">Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz</td></tr>
</table></td></tr>
<tr><td>Test Method:</td><td>EN 55032:2015/A1:2020</td></tr>
<tr><td>Procedure:</td><td>An initial pre-scan was performed with peak detector.Quasi-Peak or Average measurement were performed at the frequencies with maximized peak emission were detected.
Remark: Level= Read Level+ Cable Loss+ LISN Factor</td></tr>
</table>

5.2.1 E.U.T. Operation:

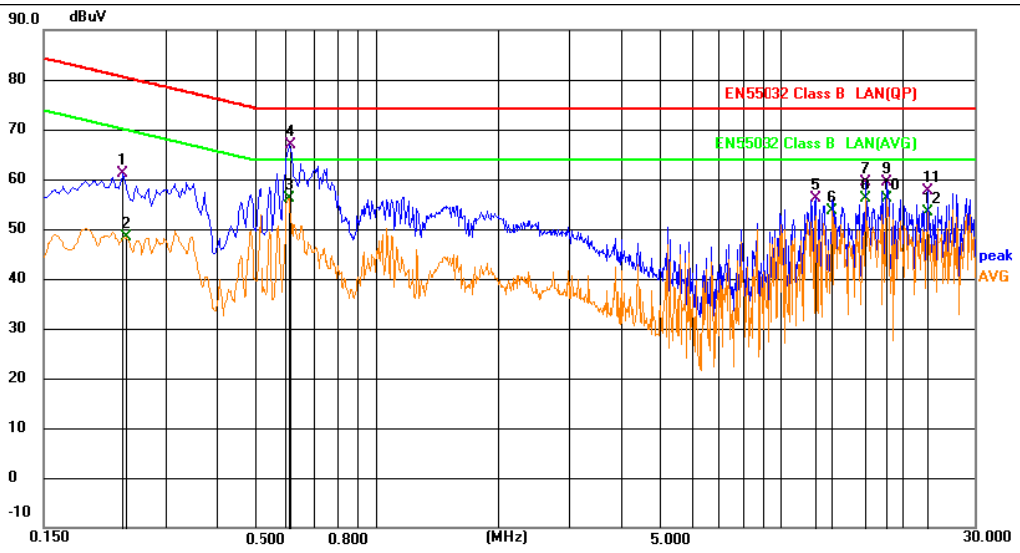
<table>
<tr><td colspan="6">Operating Environment:</td></tr>
<tr><td>Temperature:</td><td>23.5 °C</td><td>Humidity:</td><td>53.6 %</td><td>Atmospheric Pressure:</td><td>102 kPa</td></tr>
<tr><td colspan="2">Pre test mode:</td><td colspan="4">TM1</td></tr>
<tr><td colspan="2">Final test mode:</td><td colspan="4">TM1</td></tr>
</table>

5.2.2 Test Setup Diagram:



5.2.3 Test Data:

TM1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2356	41.39	19.63	61.02	80.25	-19.23	QP	
2		0.2401	28.82	19.63	48.45	70.09	-21.64	AVG	
3		0.6091	36.38	19.66	56.04	64.00	-7.96	AVG	
4	*	0.6136	47.15	19.66	66.81	74.00	-7.19	QP	
5		12.1921	36.39	19.84	56.23	74.00	-17.77	QP	
6		13.3531	33.85	19.84	53.69	64.00	-10.31	AVG	
7		16.2241	39.40	19.93	59.33	74.00	-14.67	QP	
8		16.2241	36.30	19.93	56.23	64.00	-7.77	AVG	
9		18.2400	39.27	20.16	59.43	74.00	-14.57	QP	
10		18.2400	35.96	20.16	56.12	64.00	-7.88	AVG	
11		23.1226	37.65	20.07	57.72	74.00	-16.28	QP	
12		23.1226	33.29	20.07	53.36	64.00	-10.64	AVG	

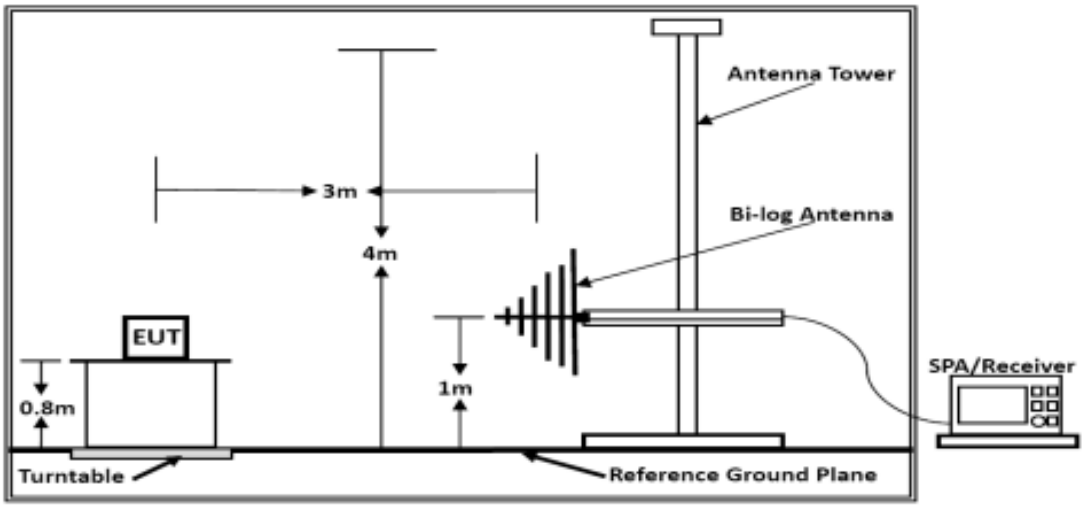
5.3 Radiated emissions (30MHz-1GHz)

Test Requirement:	Class B
Test Limit:	**Frequency (MHz)** / **Limit [dB(uV/m) at 10m]** / **Limit [dB(uV/m) at 3m]** 30 to 230 / 30 / 40 230 to 1000 / 37 / 47 Detector: / Peak for pre-scan (120kHz resolution bandwidth) 30M to 1000MHz
Test Method:	EN 55032:2015/A1:2020
Procedure:	An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities. Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

5.3.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22.3 °C	Humidity:	53 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

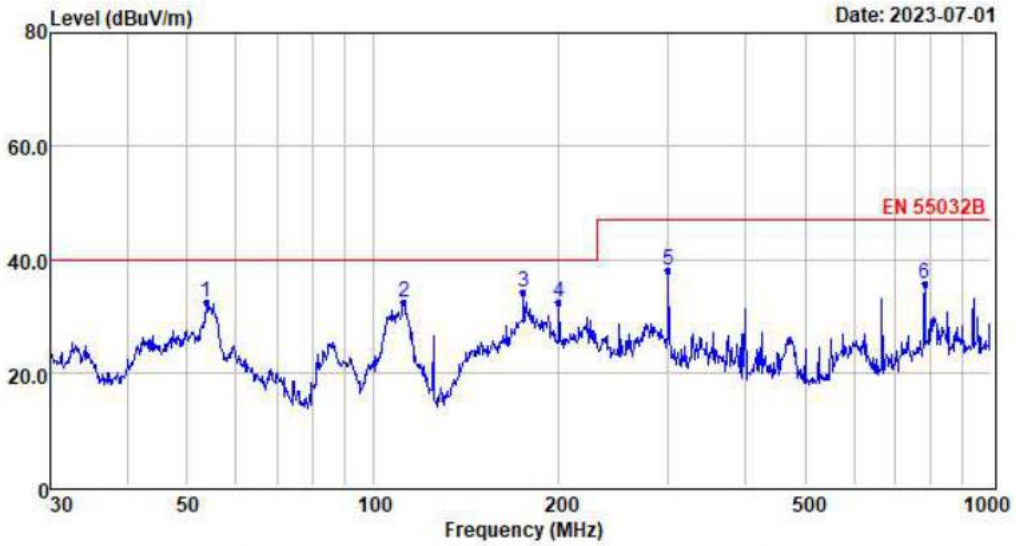
5.3.2 Test Setup Diagram:



Below 1GHz

5.3.3 Test Data:

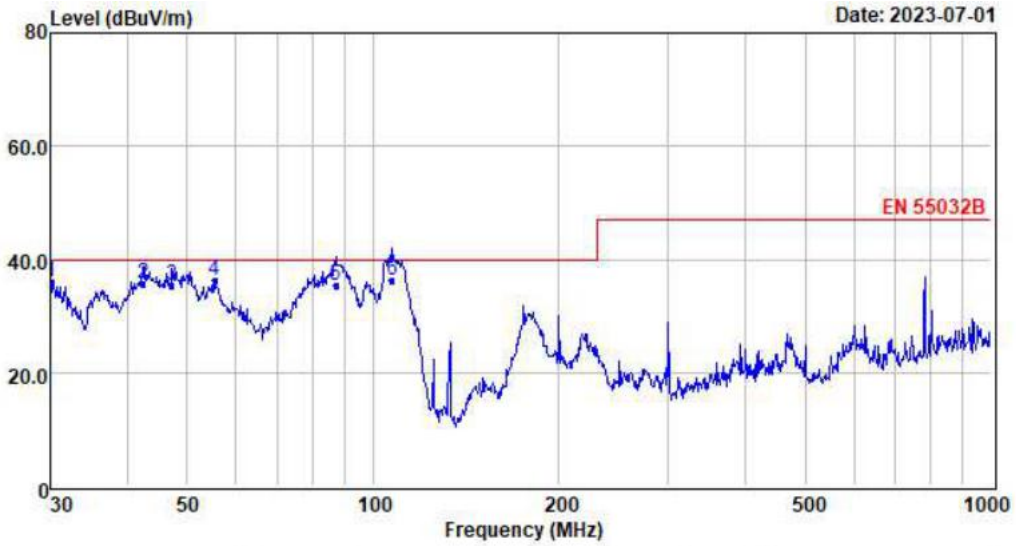
TM1 / Polarization: Horizontal



	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	53.69	19.37	0.62	12.56	32.55	40.00	-7.45	QP
2	112.13	20.22	0.87	11.22	32.31	40.00	-7.69	QP
3	175.04	23.41	1.12	9.75	34.28	40.00	-5.72	QP
4	199.99	20.40	1.20	10.80	32.40	40.00	-7.60	QP
5	300.37	23.05	1.32	13.70	38.07	47.00	-8.93	QP
6	782.35	13.89	1.97	19.77	35.63	47.00	-11.37	QP

ote: 1. All readings are Quasi-peak values.
. Measured= Reading + Antenna Factor + Cable Loss
. The emission that are 20db below the official limit are not reported

TM1 / Polarization: Vertical



	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	30.11	24.86	0.40	10.61	35.87	40.00	-4.13	QP
2	42.45	23.71	0.54	11.45	35.70	40.00	-4.30	QP
3	47.16	22.73	0.58	11.93	35.24	40.00	-4.76	QP
4	55.41	22.99	0.63	12.54	36.16	40.00	-3.84	QP
5	87.11	25.07	0.76	9.58	35.41	40.00	-4.59	QP
6	107.51	24.30	0.84	11.23	36.37	40.00	-3.63	QP

ote: 1. All readings are Quasi-peak values.
. Measured= Reading + Antenna Factor + Cable Loss
. The emission that are 20db below the official limit are not reported

5.4 Harmonic current emission

Test Requirement:	Class A
Test Limit:	

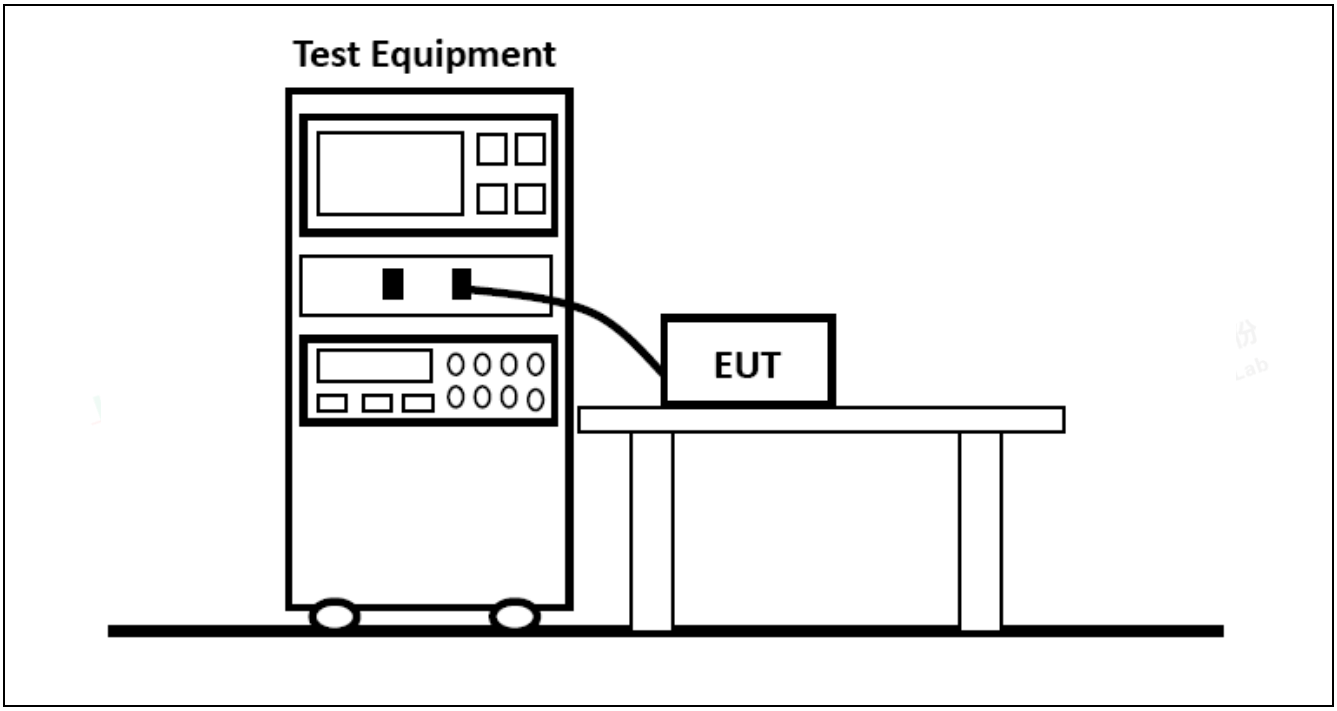
Harmonic order h	Maximum permissible harmonic current A
Odd harmonics	
3	2,30
5	1,14
7	0,77
9	0,40
11	0,33
13	0,21
$15 \le h \le 39$	$0{,}15\frac{15}{h}$
Even harmonics	
2	1,08
4	0,43
6	0,30
$8 \le h \le 40$	$0{,}23\frac{8}{h}$

Test Method:	EN IEC 61000-3-2:2019/A1:2021

5.4.1 E.U.T. Operation:

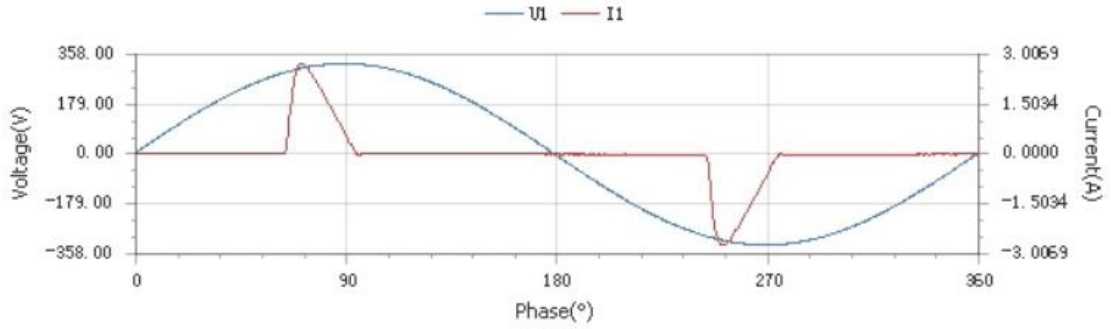
Operating Environment:					
Temperature:	25 °C	Humidity:	55 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

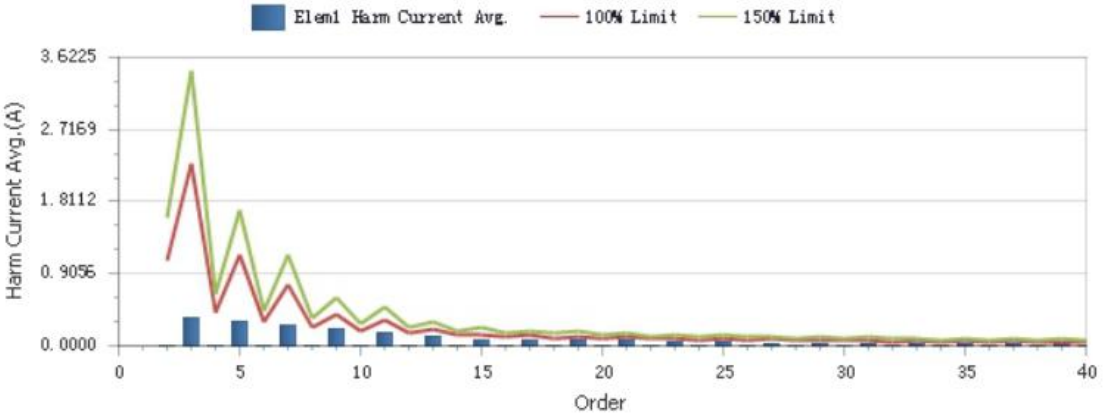
5.4.2 Test Setup Diagram:



5.4.3 Test Data:

Customer : xxx Result : Pass





Customer : xxx Result : Pass

Total Current Harmonic ans Some Odd Harmonic Parameters

THC(A)	0.6350	THD(%)	169.92	POHC(A)	0.1155	POHC Limit(A)	0.2514

Maximum Value of Relevant Parameter During Test Period

Urms(V)	229.90	Freq(Hz)	50.000
Irms(A)	0.7380	Ipeak(A)	2.7507
I1(A)	0.3741	ICF	3.7356
P(W)	83.679	λ	0.4939

Determination of Harmonics and Limits

Order(n)	Harmonics Current Avg.(A)	100% Limit(A)	Limit Percent(%)	Harmonics Current Max.(A)	150% Limit(A)	Limit Percent(%)	Result
2	0.0025	1.0800	N/A	0.0027	1.6200	N/A	Pass
3	0.3525	2.3000	15.33	0.3535	3.4500	10.25	Pass
4	0.0024	0.4300	N/A	0.0026	0.6450	N/A	Pass
5	0.3154	1.1400	27.67	0.3163	1.7100	18.50	Pass
6	0.0023	0.3000	N/A	0.0025	0.4500	N/A	Pass
7	0.2657	0.7700	34.51	0.2665	1.1550	23.07	Pass
8	0.0023	0.2300	N/A	0.0025	0.3450	N/A	Pass
9	0.2096	0.4000	52.40	0.2102	0.6000	35.03	Pass
10	0.0023	0.1840	N/A	0.0025	0.2760	N/A	Pass
11	0.1541	0.3300	46.70	0.1548	0.4950	31.27	Pass
12	0.0023	0.1533	N/A	0.0025	0.2300	N/A	Pass
13	0.1071	0.2100	51.00	0.1078	0.3150	34.22	Pass
14	0.0023	0.1314	N/A	0.0025	0.1971	N/A	Pass
15	0.0761	0.1500	50.73	0.0767	0.2250	34.09	Pass
16	0.0021	0.1150	N/A	0.0024	0.1725	N/A	Pass
17	0.0640	0.1324	48.34	0.0646	0.1985	32.54	Pass
18	0.0020	0.1022	N/A	0.0022	0.1533	N/A	Pass
19	0.0623	0.1184	52.62	0.0629	0.1776	35.42	Pass
20	0.0019	0.0920	N/A	0.0021	0.1380	N/A	Pass
21	0.0601	0.1071	56.12	0.0606	0.1607	37.71	Pass
22	0.0018	0.0836	N/A	0.0020	0.1255	N/A	Pass
23	0.0535	0.0978	54.70	0.0540	0.1467	36.81	Pass
24	0.0018	0.0767	N/A	0.0020	0.1150	N/A	Pass
25	0.0437	0.0900	48.56	0.0442	0.1350	32.74	Pass
26	0.0018	0.0708	N/A	0.0019	0.1062	N/A	Pass
27	0.0343	0.0833	41.18	0.0347	0.1250	27.76	Pass
28	0.0017	0.0657	N/A	0.0019	0.0986	N/A	Pass
29	0.0287	0.0776	36.98	0.0291	0.1164	25.00	Pass
30	0.0016	0.0613	N/A	0.0017	0.0920	N/A	Pass
31	0.0274	0.0726	37.74	0.0278	0.1089	25.53	Pass
32	0.0014	0.0575	N/A	0.0016	0.0863	N/A	Pass
33	0.0273	0.0682	40.03	0.0276	0.1023	26.98	Pass
34	0.0013	0.0541	N/A	0.0015	0.0812	N/A	Pass
35	0.0257	0.0643	39.97	0.0261	0.0964	27.07	Pass
36	0.0013	0.0511	N/A	0.0014	0.0767	N/A	Pass
37	0.0222	0.0608	36.51	0.0226	0.0912	24.78	Pass
38	0.0013	0.0484	N/A	0.0014	0.0726	N/A	Pass
39	0.0178	0.0577	30.85	0.0182	0.0865	21.04	Pass
40	0.0012	0.0460	N/A	0.0014	0.0690	N/A	Pass

Customer : xxx Result : Pass

Determination of Voltage Relevant Parameter During Test Period

Item	Nominal Value	Tested Value	Error Value	Allowable Error Value	Result
Urms(V)	230.00	229.88	0.12	±2.0%	Pass
Frequency(Hz)	50.000	49.999	0.001	±0.5%	Pass
CFU	1.4100	1.4160	0.0060	±0.01	Pass
Peak-Volt Phase	90.00	90.00	0.00	±3	Pass

Determination of Voltage Harmonics and Limits

Order(n)	Uhdf	Limit(%)	Limit Percent(%)	Result
1	100%	---	---	---
2	0.01%	0.20	6.12%	Pass
3	0.01%	0.90	1.48%	Pass
4	0.00%	0.20	0.96%	Pass
5	0.01%	0.40	3.60%	Pass
6	0.00%	0.20	1.39%	Pass
7	0.01%	0.30	2.92%	Pass
8	0.00%	0.20	0.68%	Pass
9	0.02%	0.20	9.77%	Pass
10	0.00%	0.20	2.00%	Pass
11	0.01%	0.10	10.22%	Pass
12	0.00%	0.10	3.78%	Pass
13	0.01%	0.10	9.26%	Pass
14	0.00%	0.10	1.94%	Pass
15	0.01%	0.10	10.74%	Pass
16	0.00%	0.10	1.14%	Pass
17	0.01%	0.10	5.84%	Pass
18	0.00%	0.10	0.98%	Pass
19	0.01%	0.10	9.90%	Pass
20	0.00%	0.10	0.95%	Pass
21	0.01%	0.10	14.28%	Pass
22	0.00%	0.10	0.77%	Pass
23	0.00%	0.10	1.63%	Pass
24	0.00%	0.10	0.83%	Pass
25	0.01%	0.10	13.62%	Pass
26	0.00%	0.10	1.10%	Pass
27	0.01%	0.10	9.96%	Pass
28	0.00%	0.10	0.96%	Pass
29	0.00%	0.10	3.72%	Pass
30	0.00%	0.10	1.01%	Pass
31	0.01%	0.10	11.05%	Pass
32	0.00%	0.10	0.89%	Pass
33	0.01%	0.10	6.19%	Pass
34	0.00%	0.10	1.24%	Pass
35	0.00%	0.10	4.52%	Pass
36	0.00%	0.10	1.21%	Pass
37	0.01%	0.10	8.93%	Pass
38	0.00%	0.10	1.21%	Pass
39	0.00%	0.10	1.17%	Pass
40	0.00%	0.10	1.01%	Pass

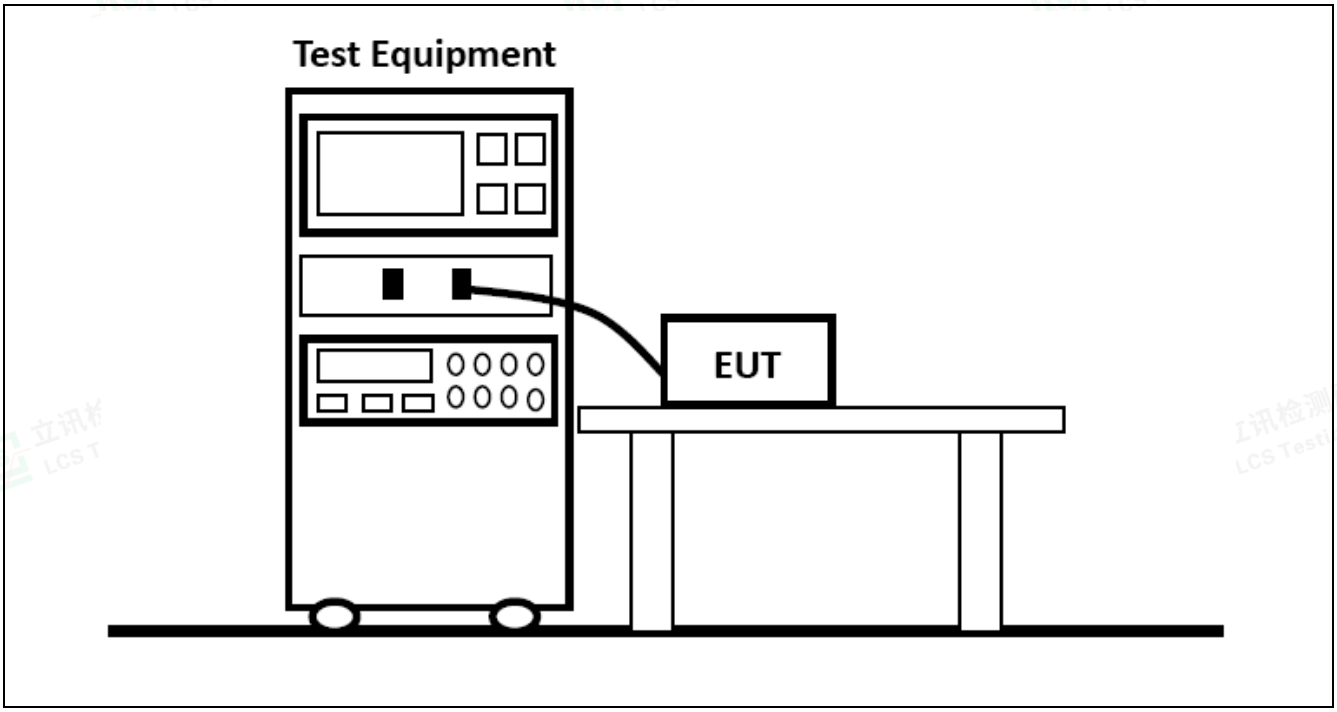
5.5 Voltage fluctuations and flicker

Test Requirement:	EN 61000-3-3, Clause 4
Test Limit:	EN 61000-3-3, Clause 5
Test Method:	EN 61000-3-3:2013/A2:2021

5.5.1 E.U.T. Operation:

Operating Environment:					
Temperature:	24.2 °C	Humidity:	52.6 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

5.5.2 Test Setup Diagram:

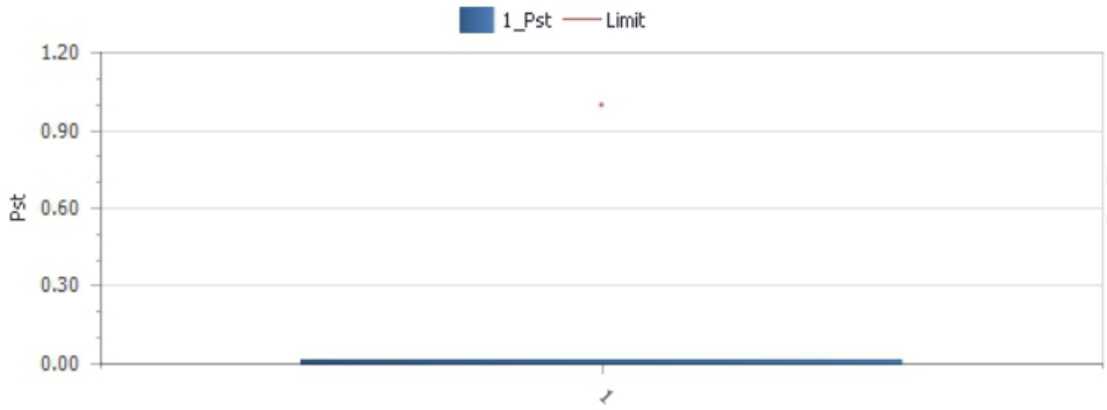


5.5.3 Test Data:

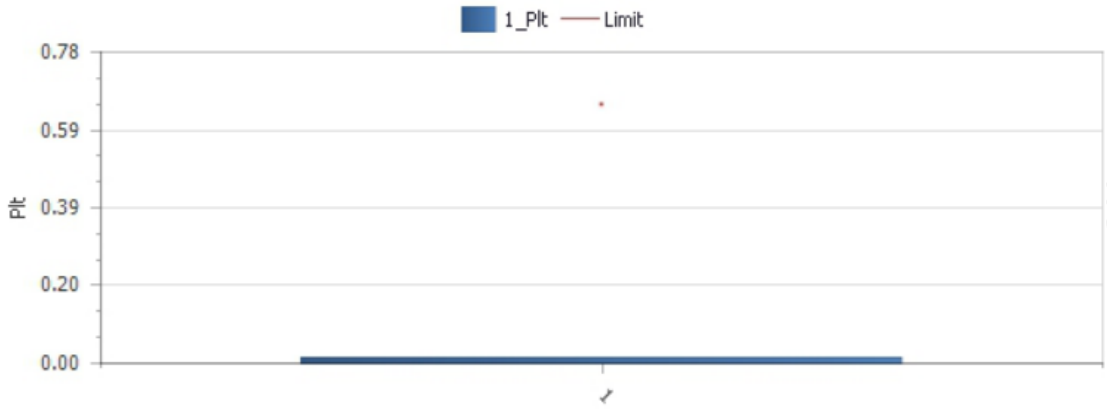
TM1

Customer : Result : PASS

Pst and Limit



Plt and Limit



Relevant Parameter and Judgement During Test Period

Vrms at the end of test(V)	229.81			
Error Max(%)		Test Limit(%)		
T-max(ms)	0.00	Test Limit(ms)	500	Pass
dc(%)	0.00	Test Limit(%)	3.30	Pass
dmax(%)	0.00	Test Limit(%)	4.00	Pass
Pst	0.015	Test Limit	1.000	Pass
Plt	0.015	Test Limit	0.650	Pass

6. IMMUNITY TEST RESULTS (EMS)

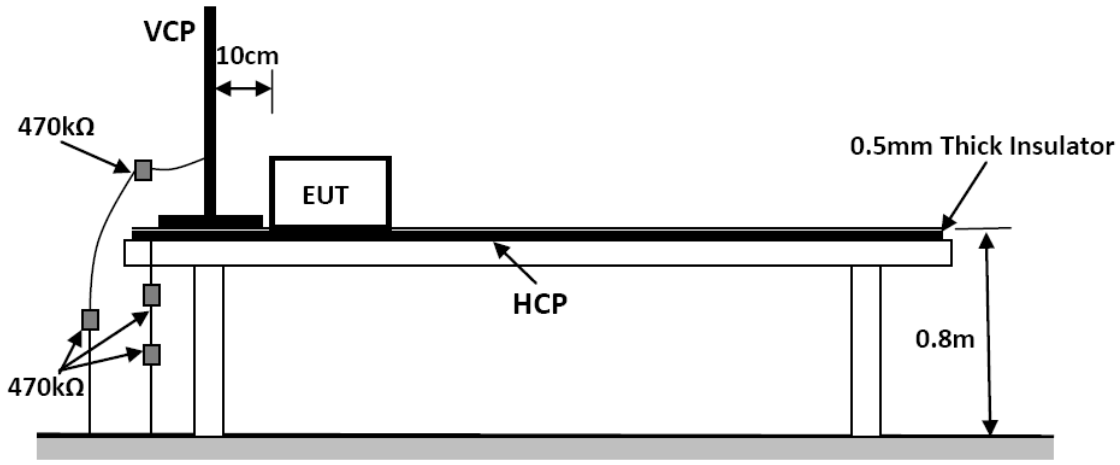
6.1 Electrostatic discharges

Test Requirement:	Contact Discharge: +/- 4kV Air Discharge: +/- 8kV
Test Method:	EN 61000-4-2: 2009
Procedure:	Discharge Impedance: 330Ω/150pF Number of Discharge: Minimum 10 times at each test point Discharge Mode: Single Discharge Discharge Period: 1 second minimum
Performance Criteria:	B

6.1.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.2 °C	Humidity:	51 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

6.1.2 Test Setup Diagram:



6.1.3 Test Data:

Discharge type	Volt (kV)	Polarity	Test Point	Result/ Observations
Air discharge	2,4,8	+	10	B
Air discharge	2,4,8	-	10	B
Contact discharge	4	+	10	B
Contact discharge	4	-	10	B
Horizontal Coupling	4	+	10	B
Horizontal Coupling	4	-	10	B
Vertical Coupling	4	+	10	B
Vertical Coupling	4	-	10	B

A: No degradation in the performance of the EUT was observed.

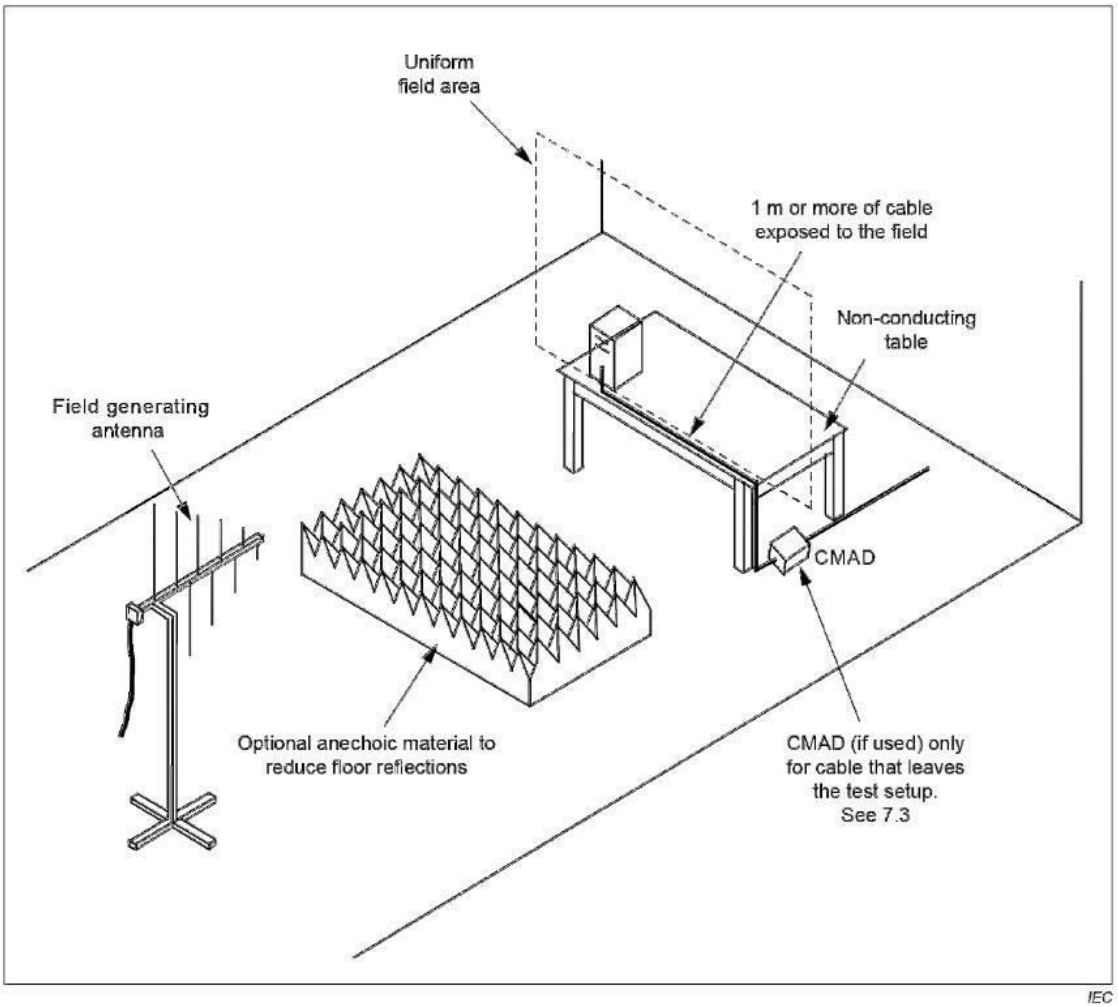
6.2 RF electromagnetic field disturbances

Test Requirement:	3V/m, 80%, 1kHz Amp. Mod.
Test Method:	EN IEC 61000-4-3: 2020
Procedure:	Frequency Range: 80MHz to 1GHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz Antenna Polarisation: Vertical and Horizontal Modulation: 1kHz,80% Amp. Mod,1% increment
Performance Criteria:	A

6.2.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.2 °C	Humidity:	51 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

6.2.2 Test Setup Diagram:



6.2.3 Test Data:

Frequency	Field Strength (V/m)	EUT face	Dwell time	Result/ Observations
80MHz-1GHz	3	Front, Back, Left, Right, Top, Bottom	3s	A
1800MHz	3	Front, Back, Left, Right, Top, Bottom	3s	A
2600MHz	3	Front, Back, Left, Right, Top, Bottom	3s	A
3500MHz	3	Front, Back, Left, Right, Top, Bottom	3s	A
5000MHz	3	Front, Back, Left, Right, Top, Bottom	3s	A

A: No degradation in the performance of the EUT was observed.

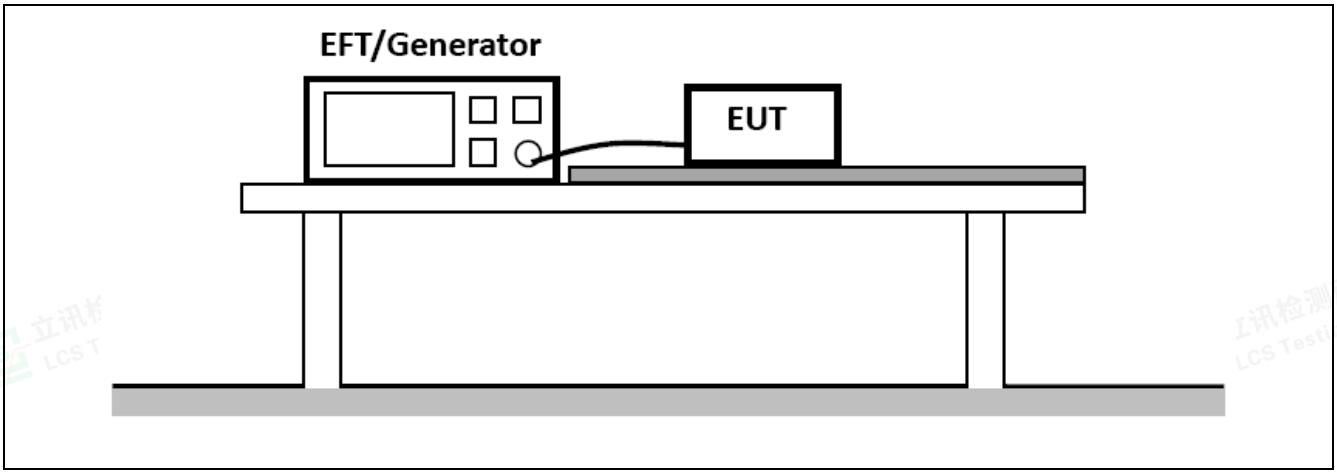
6.3 Electrical fast transients / burst for AC mains power ports

Test Requirement:	1kV; 5/50ns Tr/Th; 5kHz Repetition Frequency
Test Method:	EN 61000-4-4: 2012
Procedure:	Repetition Frequency: 5kHz Burst Period: 300ms Test Duration: 2 minute per level & polarity
Performance Criteria:	B

6.3.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.2 °C	Humidity:	51 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

6.3.2 Test Setup Diagram:



6.3.3 Test Data:

Port	Volt (kV)	Polarity	CDN/ Clamp	Result/ Observations
AC power port	1	+	CDN	B
AC power port	1	-	CDN	B

A: No degradation in the performance of the EUT was observed.

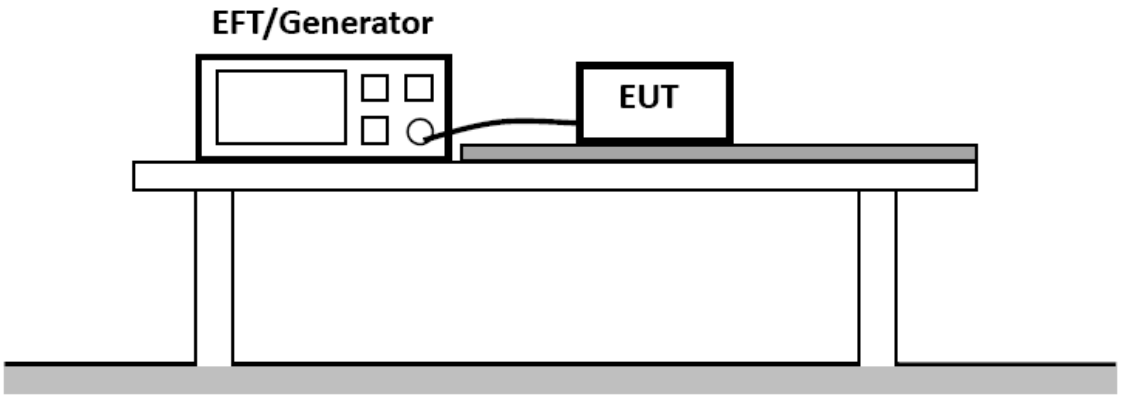
6.4 Electrical fast transients / burst for analogue/digital data ports

Test Requirement:	0.5kV; 5/50ns Tr/Th; 5kHz Repetition Frequency
Test Method:	EN 61000-4-4: 2012
Procedure:	Repetition Frequency: 5kHz Burst Period: 300ms Test Duration: 2 minute per level & polarity
Performance Criteria:	B

6.4.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.2 °C	Humidity:	51 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

6.4.2 Test Setup Diagram:



6.4.3 Test Data:

Port	Volt (kV)	Polarity	CDN/ Clamp	Result/ Observations
Signal port	0.5	+	Clamp	B
Signal port	0.5	-	Clamp	B

A: No degradation in the performance of the EUT was observed.

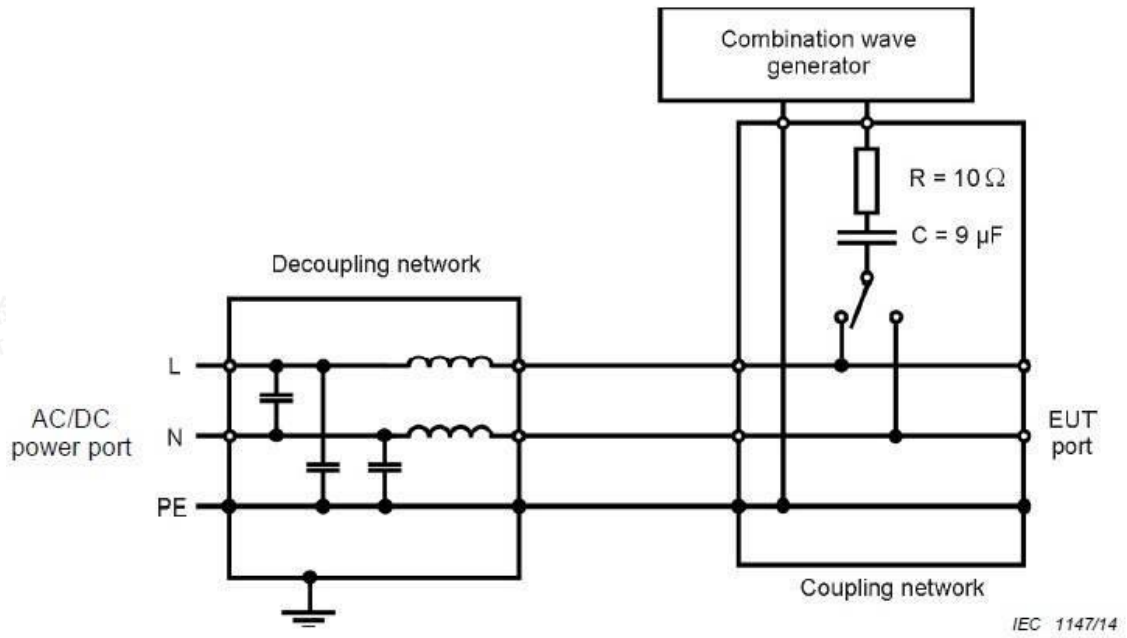
6.5 Surges for AC mains power ports

Test Requirement:	1.2/50μs Tr/Td; 1kV Line to Line; 2kV Line to Ground
Test Method:	EN 61000-4-5: 2014 +A1: 2017
Procedure:	Interval: 60s between each surge No. of surges: 5 positive, 5 negative at 90°, 270°
Performance Criteria:	B

6.5.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.2 °C	Humidity:	51 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

6.5.2 Test Setup Diagram:



6.5.3 Test Data:

Port	Volt (kV)	Polarity	Phase(degree)	Result/ Observations
L-N	1	+	90°	B
L-N	1	-	270°	B
L-PE	2	+	90°	B
L-PE	2	-	270°	B
N-PE	2	-	90°	B
N-PE	2	+	270°	B

A: No degradation in the performance of the EUT was observed.

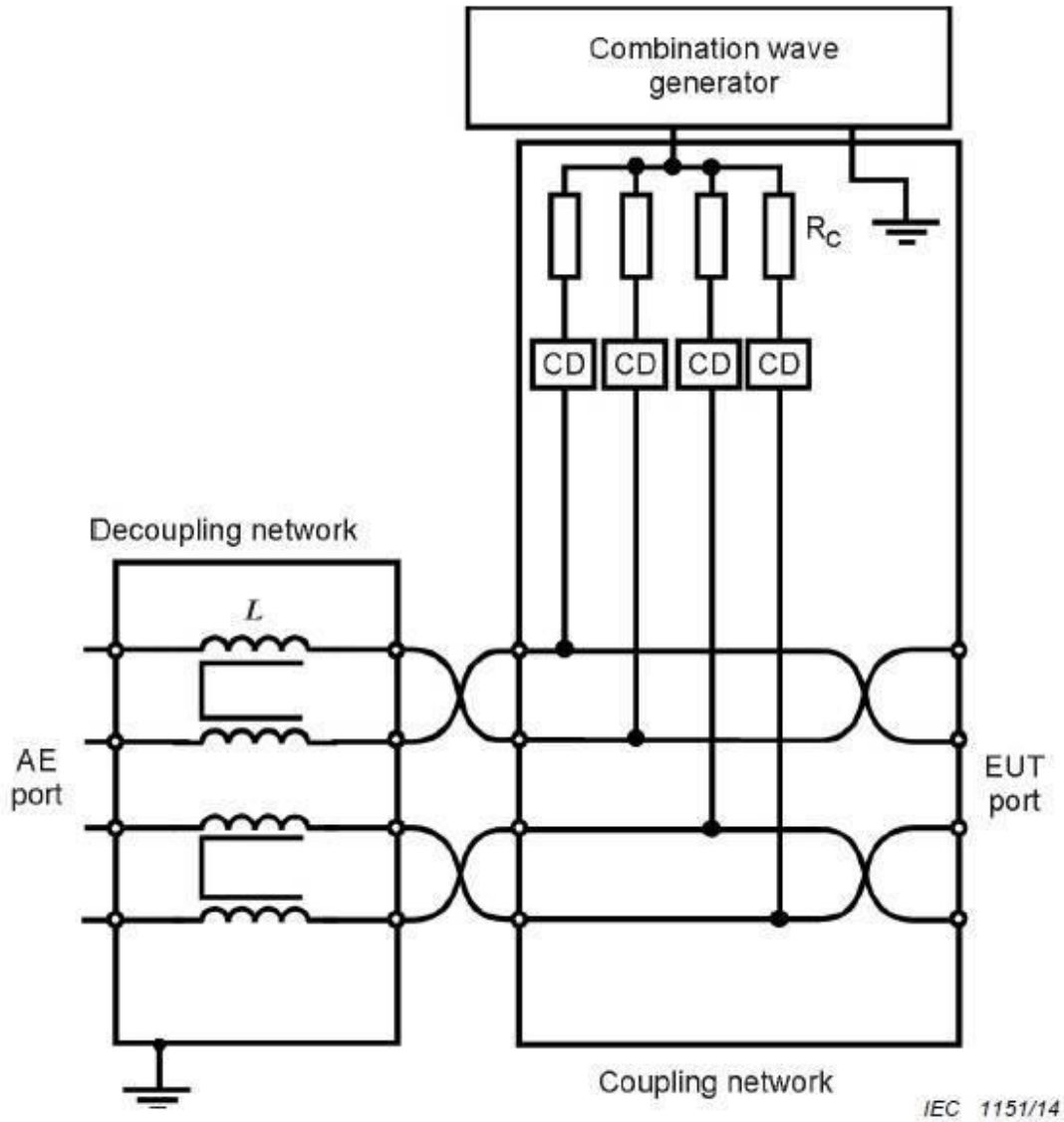
6.6 Surges for analogue/digital data ports

Test Requirement:	1.2/50μs Tr/Td; 0,5 kV Shield to Ground
Test Method:	EN 61000-4-5: 2014 +A1: 2017
Procedure:	Interval: 60s between each surge
Performance Criteria:	B

6.6.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.2 °C	Humidity:	51 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

6.6.2 Test Setup Diagram:



6.6.3 Test Data:

Port	Line	Waveform(μs)	Volt (kV)	Polarity	Result/ Observations
Signal port	Shield-Ground	1,2/50 (8/20)	0.5	+	B
Signal port	Shield-Ground	1,2/50 (8/20)	0.5	-	B

A: No degradation in the performance of the EUT was observed.

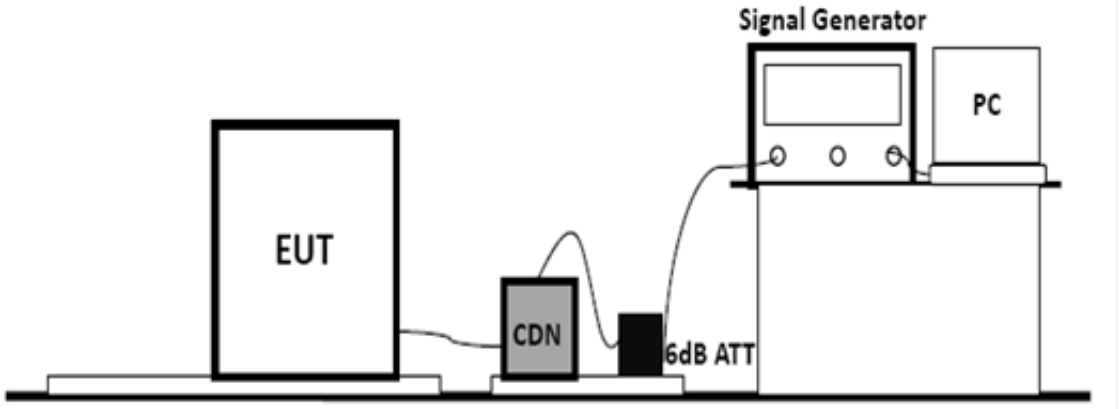
6.7 Continuous induced RF disturbances for AC mains power ports (150kHz-80MHz)

Test Requirement:	0,15 to 10MHz 3Vrms (emf), 10 to 30MHz 3V to 1Vrms(emf), 30 to 80MHz 1Vrms(emf), 80%,1kHz Amp. Mod.
Test Method:	EN 61000-4-6: 2014
Procedure:	Frequency Range: 0.15MHz to 80MHz Modulation: 80%, 1kHz Amplitude Modulation Step Size: 1%
Performance Criteria:	A

6.7.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.2 °C	Humidity:	51 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

6.7.2 Test Setup Diagram:



6.7.3 Test Data:

Port	Strength (Vrms)	CDN/Clamp	Dwell time	Result/ Observations
AC power port	3(0.15MHz-10MHz)	CDN	3s	A
AC power port	3 to 1(10MHz-30MHz, Lines)	CDN	3s	A
AC power port	1(30MHz-80MHz)	CDN	3s	A

A: No degradation in the performance of the EUT was observed.

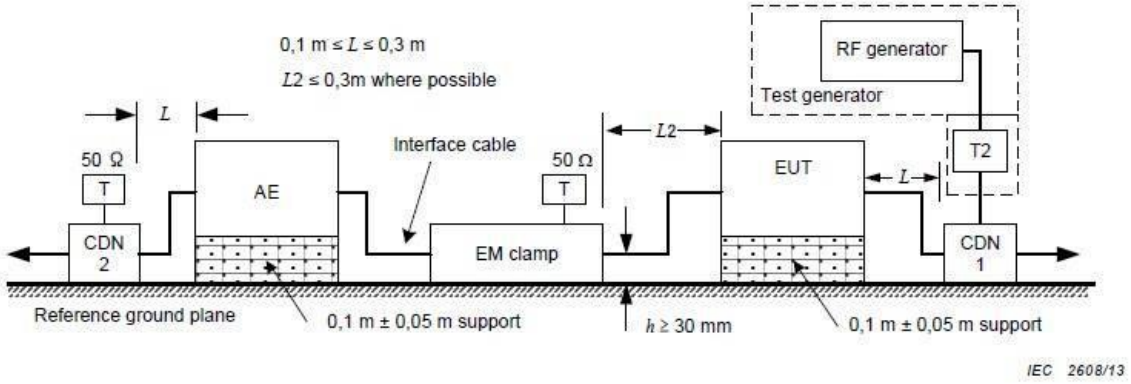
6.8 Continuous induced RF disturbances for analogue/digital data ports (150kHz-80MHz)

Test Requirement:	0,15 to 10MHz 3Vrms (emf), 10 to 30MHz 3V to 1Vrms(emf), 30 to 80MHz 1Vrms(emf), 80%,1kHz Amp. Mod.
Test Method:	EN 61000-4-6: 2014
Procedure:	Frequency Range: 0.15MHz to 80MHz Modulation: 80%, 1kHz Amplitude Modulation Step Size: 1%
Performance Criteria:	A

6.8.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.2 °C	Humidity:	51 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

6.8.2 Test Setup Diagram:



6.8.3 Test Data:

Port	Strength (Vrms)	CDN/ Clamp	Dwell time	Result/ Observations
Signal port	3(0.15MHz-10MHz)	Clamp	3s	A
Signal port	3 to 1(10MHz-30MHz, Lines)	Clamp	3s	A
Signal port	1(30MHz-80MHz)	Clamp	3s	A

A: No degradation in the performance of the EUT was observed.

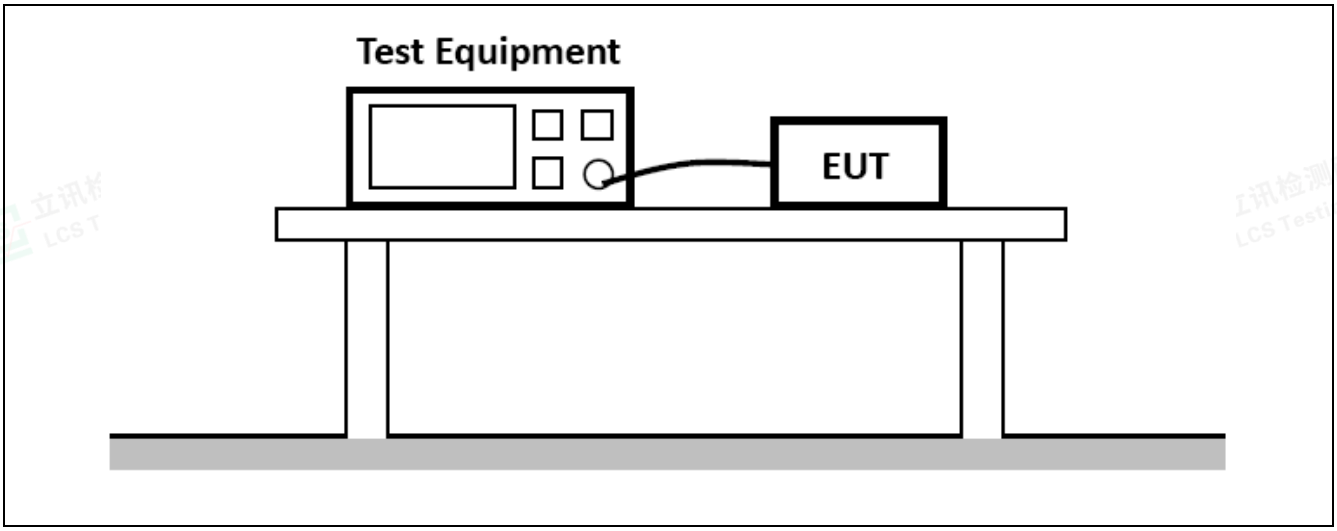
6.9 Voltage dips and interruptions

Test Requirement:	<5% residual voltage for 0.5 periods 70% residual voltage for 25 periods <5% residual voltage for 250 periods
Test Method:	EN IEC 61000-4-11:2020
Procedure:	<5% residual voltage for 0.5 period 70% residual voltage for 25 period <5% residual voltage for 250 period No. of Dips / Interruptions: 3 per Level Time between dropout: 10s
Performance Criteria:	B, C

6.9.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.2 °C	Humidity:	51 %	Atmospheric Pressure:	102 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

6.9.2 Test Setup Diagram:



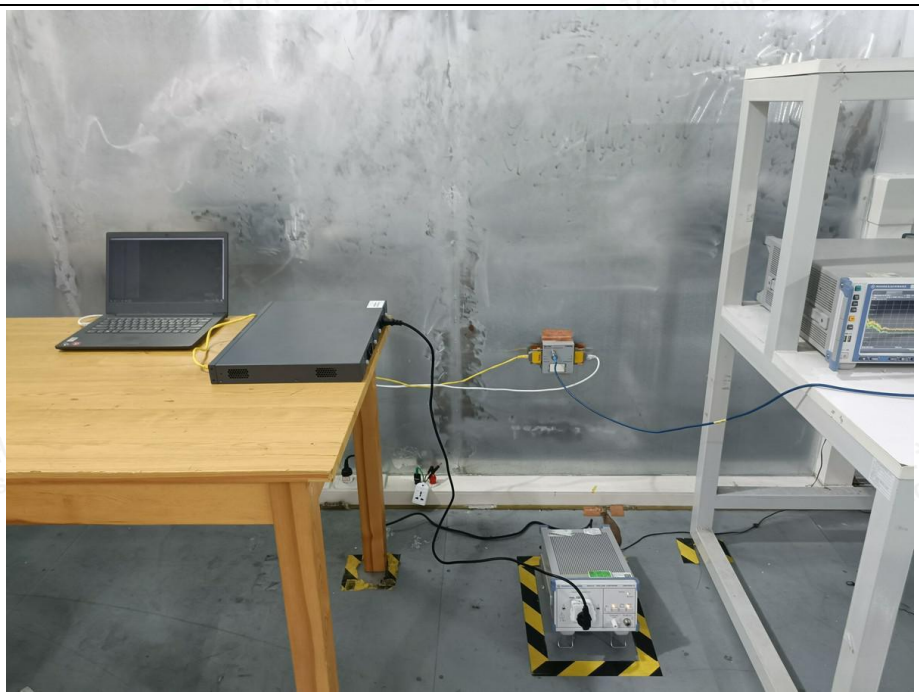
6.9.3 Test Data:

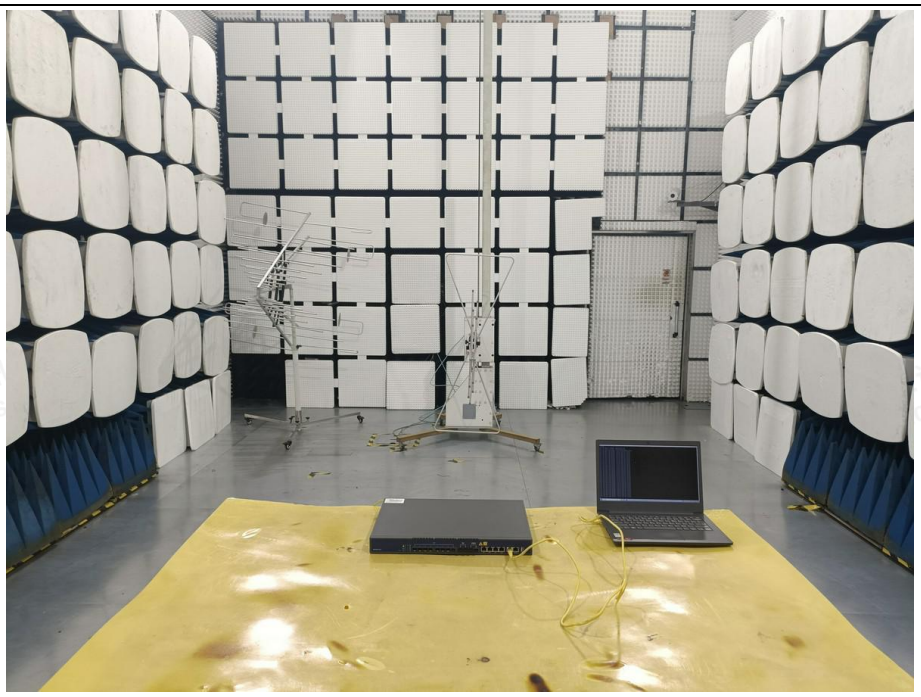
Level %UT	Phase (degree)	Duration	No. of Dips/ Interruptions	Result/ Observations
0	0°	0.5 Cycles	3	B
0	0°	250 Cycles	3	C
70	0°	25 Cycles	3	C

A: No degradation in the performance of the EUT was observed.

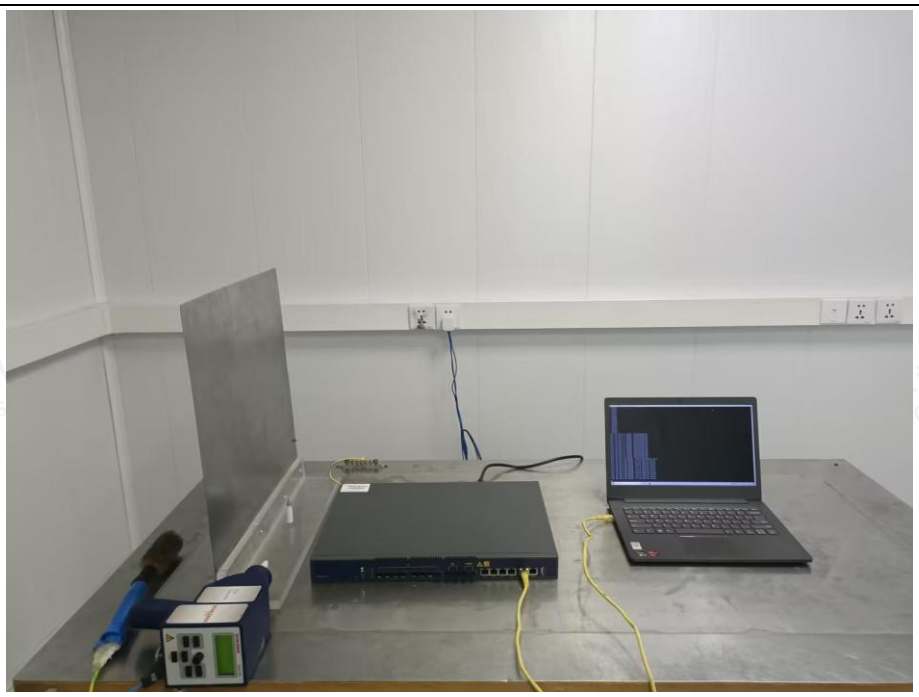
7. TEST SETUP PHOTOS

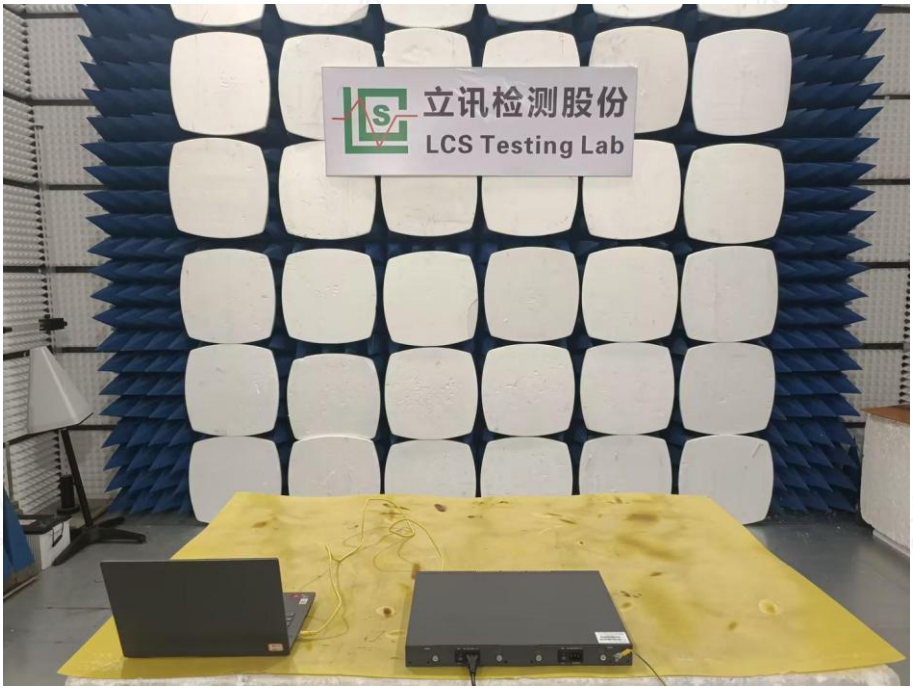
Conducted emissions from AC mains power ports (150kHz-30MHz)


Asymmetric mode conducted emissions (150kHz-30MHz)


Radiated emissions (30MHz-1GHz)


Harmonic current emission Voltage fluctuations and flicker


Electrostatic discharges


RF electromagnetic field disturbances


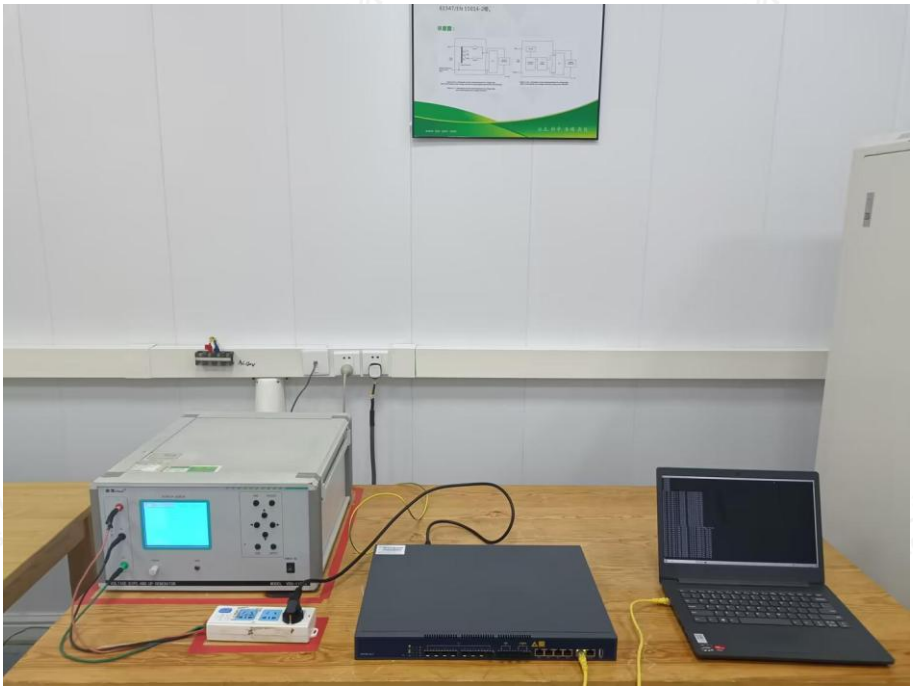
Electrical fast transients / burst for AC mains power ports Surges for AC mains power ports


Electrical fast transients / burst for analogue/digital data ports


Surges for analogue/digital data ports

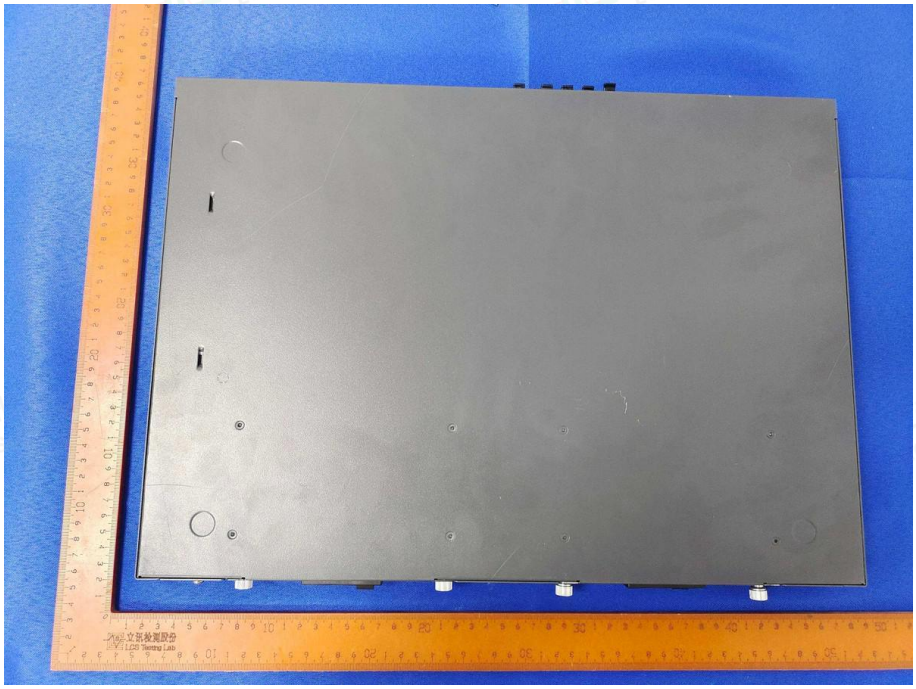

Continuous induced RF disturbances for AC mains power ports (150kHz-80MHz)


Continuous induced RF disturbances for analogue/digital data ports (150kHz-80MHz)

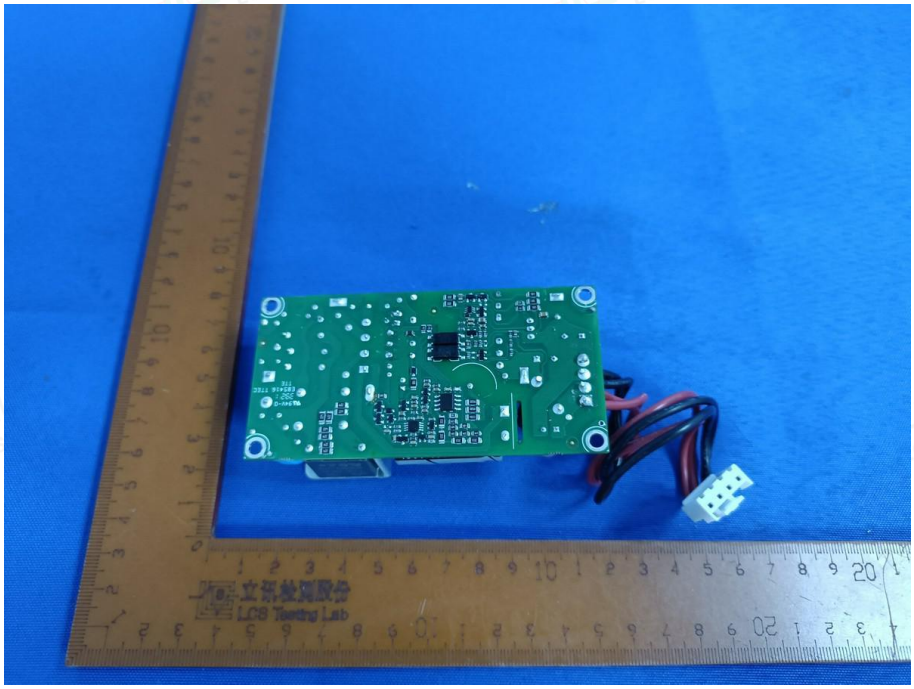

Voltage dips and interruptions


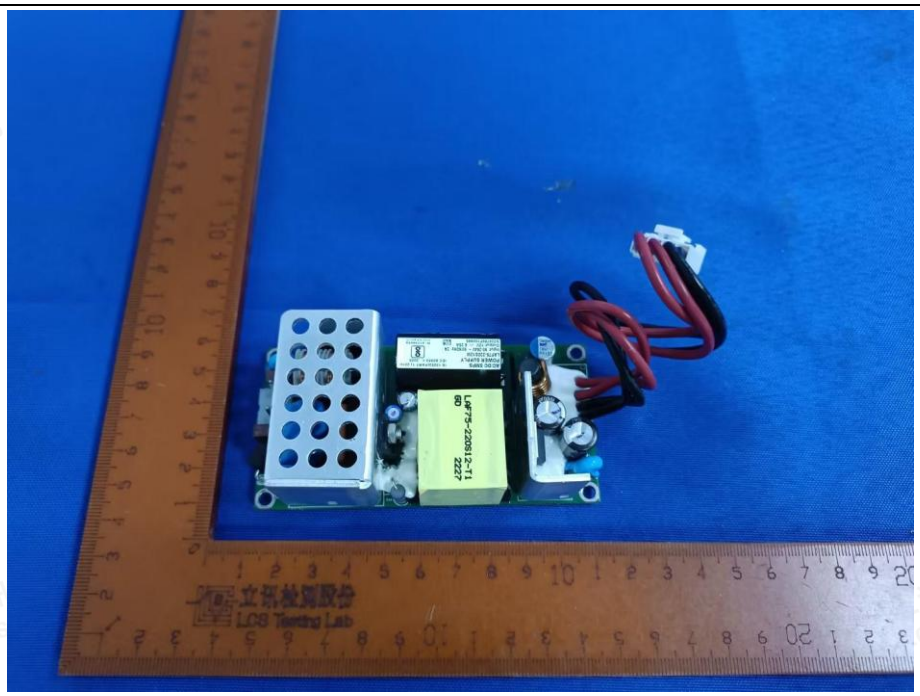
8. EUT CONSTRUCTIONAL DETAILS (EUT PHOTOS)

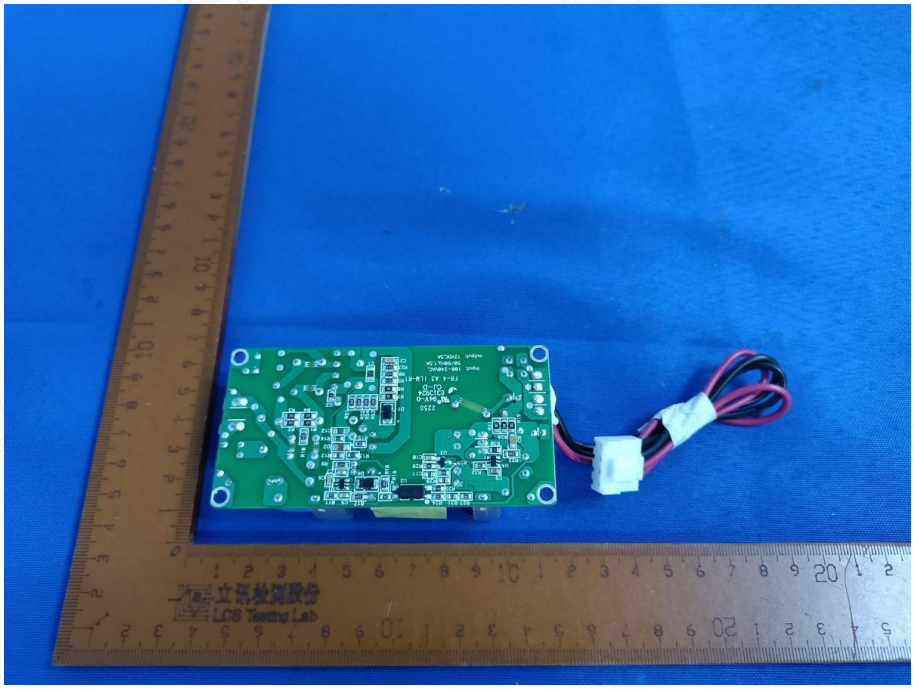
External

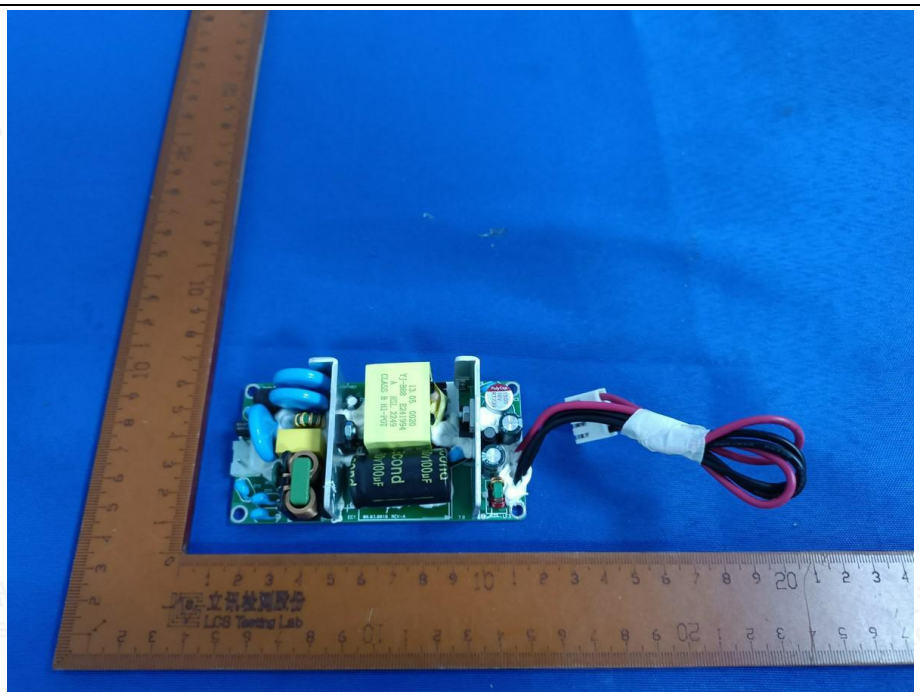


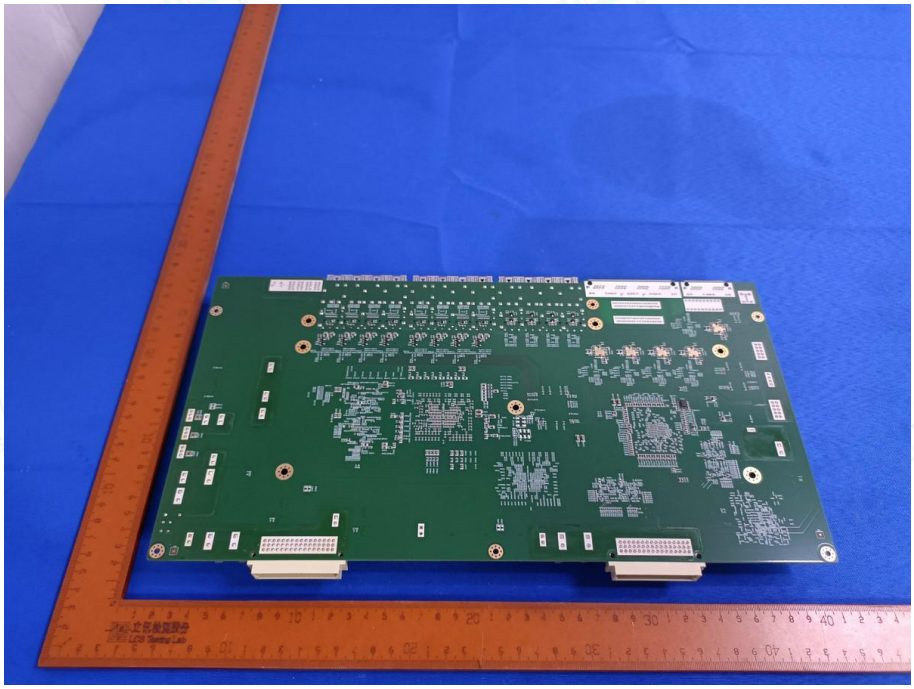
Internal









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