ETSI EN 301 489-1 & -17 Test Report

Product Name:	Dynamic light box
Model Number:	JCD-NW
Applicant:	Blueview Elec-optic Tech Co., Ltd.

KeySense Testing & Certification International Co., Ltd.

1-3F, Lab Building, No.29 District, ZhongKai Hi-Tech Industrial Development Park, Huizhou, Guangdong, China

Test Report of EMC				
Product name	Dynamic light box			
Model number	JCD-NW			
Series Model	JCD-RGB、Blueview-NW、Blueview-RGB (The just different model number.)			
Applicant	**Name**	Blueview Elec-optic Tech Co., Ltd.		
	Address	No.1000, Section 2, 2nd Konggang Road, Southwest Aviation Industrial Development Zone, Shuangliu District, Chengdu City, Sichuan Province, P.R.China		
Manufacturer	**Name**	Blueview Elec-optic Tech Co., Ltd.		
	Address	No.1000, Section 2, 2nd Konggang Road, Southwest Aviation Industrial Development Zone, Shuangliu District, Chengdu City, Sichuan Province, P.R.China		
Factory	**Name**	Blueview Elec-optic Tech Co., Ltd.		
	Address	No.1000, Section 2, 2nd Konggang Road, Southwest Aviation Industrial Development Zone, Shuangliu District, Chengdu City, Sichuan Province, P.R.China		
Trade Name	N/A			
Receipt date	Nov 02, 2021	**Quantity**	1	
Standard	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09)			
Test site	1F,Lab Building,No.29 District, ZhongKai Hi-Tech Industrial Development Park, Huizhou, Guangdong, China.			
Test period	Nov 02, 2021- Nov 09, 2021	**Issue Date**	Nov 15, 2021	
Test result	The device described above is tested by KeySense Testing & Certification International Co., Ltd. The measurement results were contained in this test report and KeySense Testing & Certification International Co., Ltd. was assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliance with the ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) requirements. This report applies to above tested sample only and shall not be reproduced in part without written approval of KeySense Testing & Certification International Co., Ltd.			

Tested by: Bing.He	**Sign:**	**Date:** 2021.11.15	
Reviewed by: Jack,Li	**Sign:**	**Date:** 2021.11.15	**(Stamp)**
Approved by: Tony.Xu (General Manager)	**Sign:**	**Date:** 2021.11.15	

Contents

1 SUMMARY OF STANDARDS AND RESULTS

1.1 Standard description

ETSI EN 301 489-1 V2.2.3 (2019-11): ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU. ETSI EN 301 489-17 V3.2.4 (2020-09): ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU.

1.2 Compliance with ETSI EN301 489-1 & ETSI EN301 489-17

CLAUSE	TEST PARAMETER	APPLICATION	BASIC STANDARF OR TEST METHOD	RESULTS
EMC emission				
8.2	Radiated emission	Enclosure of ancillary equipment	EN 55032:2015/A11:2020	**PASS**
8.3	Conducted emission	DC power input/output port	EN 55032:2015/A11:2020	**N/A**
8.4	Conducted emission	AC mains input/output port	EN 55032:2015/A11:2020	**PASS**
8.5	Harmonic Current Emissions	AC mains input port	EN IEC 61000-3-2:2019	**PASS**
8.6	Voltage Fluctuation & Flicker	AC mains input port	EN 61000-3-3:2013/A1:2019	**PASS**
8.7	Conducted emission	Wired network port	EN 55032:2015/A11:2020	**N/A**
Immunity				
9.2	RF electromagnetic field	Enclosure	EN IEC 61000-4-3:2020	**PASS**
9.3	Electrostatic Discharge	Enclosure	EN 61000-4-2: 2009	**PASS**
9.4	Fast transients common mode	Signal, wired network and control ports, DC and AC power ports	EN 61000-4-4: 2012	**PASS**
9.5	RF Common mode	Signal, wired network and control ports, DC and AC power ports	EN 61000-4-6: 2014+AC: 2015	**PASS**
9.7	Voltage dips and interruptions	AC mains power input ports	EN IEC 61000-4-11:2020	**PASS**
9.8	Surges, line to line and line to ground	AC mains power input ports, wired network ports	EN 61000-4-5: 2014	**PASS**

2 GENERAL INFORMATION

2.1 Description of Device(EUT)

Product Name	:	Dynamic light box
Model Number	:	JCD-NW
Series Model	：	JCD-RGB、Blueview-NW、Blueview-RGB (The just different model number.)
Modulation	:	IEEE 802.11b mode: DSSS(CCK,QPSK, BPSK) IEEE 802.11g mode: OFDM (BPSK/QPSK/16QAM/64QAM) IEEE 802.11n HT20 MHz mode: OFDM (BPSK/QPSK/16QAM/64QAM) IEEE 802.11n HT40 MHz mode: OFDM (BPSK/QPSK/16QAM/64QAM)
Operation Frequency	:	IEEE 802.11b/g: 2412 ~ 2472 MHz IEEE 802.11n HT20 : 2412 ~ 2472 MHz IEEE 802.11n HT40 : 2422 ~ 2462 MHz
Number of channel	:	IEEE 802.11b: 13 Channels IEEE 802.11g: 13 Channels IEEE 802.11n HT20: 13 Channels IEEE 802.11n HT40: 9 Channels
Antenna and Gain	:	External Antenna with 3.2dBi gain (Max)
Software Version	:	1.1.33
Hardware Version	:	15.5
Test Voltage:	:	AC 230V/50Hz、AC 120V/60Hz

2.2 EUT operating mode(s)

To achieve compliance applied standard specification, the following mode(s) were made during compliance testing:

Operating mode 1	WIFI Mode
In Emission test, a pre-test shall be made over a range of 230 V (±10 V) and 110 V (±10 V), using a frequency of 50 Hz or 60 Hz, the rated voltage in order to check the level of disturbance varies considerably with the supply voltage, compliance test at 230V/50 Hz as worse case was found.	

2.3 Tested Supporting System Details

No.	Description	KST No.	Manufacturer	Model	Serial Number
/	/	/	/	/	/

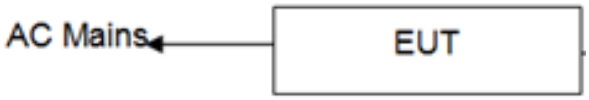
☒ Cable Description

No.	From		To		Type of Cable		
	Device	I/O Port	Device	I/O Port	Length (m)	Shielded or Unshielded	Ferrite Core [Y/N]
1		AC Mains	EUT	AC Mains	1.5	U	N

* Shielded or Unshielded : Unshielded=U, Shielded=S

2.4 Block Diagram of connection between EUT and simulators

EMI:



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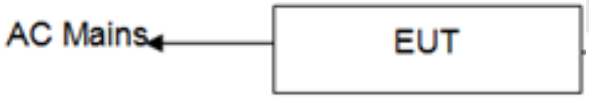


2.5 Test Facility

Site Description: 1-3F, Lab Building, No.29 District, ZhongKai Hi-Tech Industrial Development Park, Huizhou, Guangdong, China

Name of Firm: KeySense Testing & Certification International Co., Ltd.

EMC Lab: Certificated by CNAS, CHINA

Registration No.:L9678

Date of registration: Feb 07, 2017

2.6 Measurement Uncertainty(95% confidence levels, k=2)

Test Item	Uncertainty
Uncertainty for Conduction emission test in shielding room	2.5dB(150kHz to 30MHz)
Uncertainty for Radiation Emission test in 3m chamber	4.14dB(30M~1GHz,Polarize:V)
	4.25dB(30M~1GHz,Polarize:H)

2.7 Test Equipments

2.7.1 For Conducted Emission at the Mains Terminals Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal .Interval
Receiver	R&S	ESR3	102054	2020.12.15	1 year
LISN	AFJ	LS16	16011618383	2021.09.01	1 year

2.7.2 For radiated emission test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Receiver	R&S	ESR 7	101661	2020.12.15	1 year
Trilog-boardband antenna	SCHWARZBECK	VULB 9163D	9163-961	2019.05.18	3 years
Horn antenna	SCHWARZBECK	BBHA 9120D	9120D-1590	2019.04.13	3 years
Pre-amplifier	CLAVIIO	BDLNA-0118-35 2810	1600019	2019.09.02	3 year
Pre-amplifier	Claviio	BDLNA-0001-27 2007	1600015	2019.09.02	3 year

2.7.3 For Harmonics Current Emission Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Harmonic & Flicker analyzer	California Instruments	100-CTS-230	1626A00278	2021.09.07	1 year
Programmable power supply	California Instruments	5001iX-CTS-400	1629A02598	2021.09.01	1 year

2.7.4 For Voltage Fluctuations & Flicker Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Harmonic & Flicker analyzer	California Instruments	100-CTS-230	1626A00278	2021.09.07	1 year
Programmable power supply	California Instruments	5001iX-CTS-400	1629A02598	2021.09.01	1 year

2.7.5 For Electrostatic discharge Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Electrostatic discharge generator	Noiseken	ESS-L1611	ESS1643151	2021.08.28	1 year

2.7.6 For Radio-frequency Continuous radiated disturbance Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Signal generator	R&S	SMB 100A	179706	2020.12.15	1 year
Power amplifier	PRANA	MT400	1507-1746	2020.12.15	1 year
Power amplifier	RFLIGHT	NTWPA-046050 E	19069028	2021.5.12	1 year
Trilog-boardband antenna	SCHWARZBECK	STLP 9128E	9128ES-136	2019.09.02	3years
Power amplifier	PRANA	SV70	1602-1820	2020.12.15	1 year
Horn antenna	Schwarzbeck	BBHA 9120E	BBHA9120E6 98	2020.10.25	3 years

2.7.7 For Electrical fast transient Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
EFT generator	Noiseken	FNS-AX3-A16C	FNS1621762	2021.09.01	1 year

2.7.8 For Surge Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Surge generator	Noiseken	LSS-6230A	LSS1634248	2021.09.01	1 year

2.7.9 For Radio-frequency Continuous conducted disturbance Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Signal generator	R&S	SMC100A	105651	2020.12.15	1 year
CDN	TESEQ	M016	43434	2021.09.01	1 year
Power amplifier	PRANA	DR220	1602-1819	2020.12.15	1 year

2.7.10 For Power magnetic field test

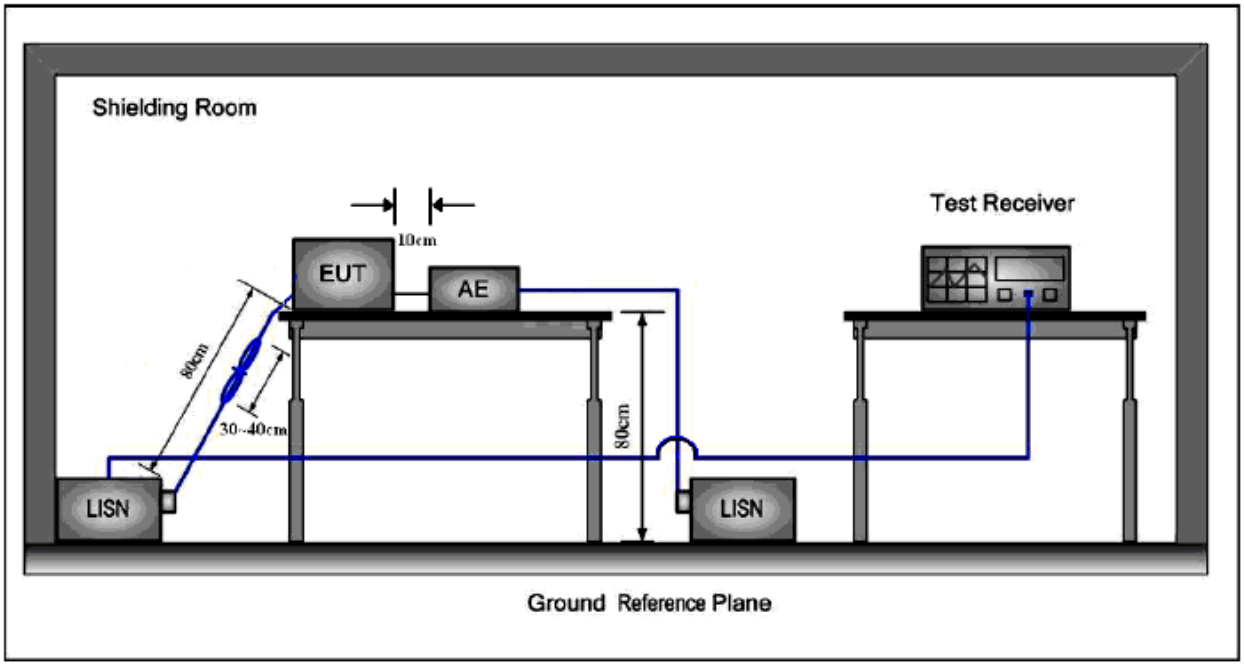
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Power magnetic field simulator	NARDA	PMM-1008	010WT60502	2021.09.01	1 year

2.7.11 For Voltage dips and interruptions Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Dips simulator	Noiseken	VDS-2002	VDS1510396	2021.09.01	1 year

3 CONDUCTED EMISSION AT THE MAINS TERMINALS TEST

3.1 Block Diagram of Test Setup



3.2 Test Standard

EN 55032:2015/A11:2020, Class A

3.3 Limits of mains terminal disturbance voltage

Frequency MHz	Limits dB(μV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	79	66
0.50 ~ 30.00	73	60

3.4 Operating Condition of EUT

Test date	Ambient temperature	Relative humidity	Atmospheric pressure
Nov 02, 2021	23°C	64%	101.4kPa

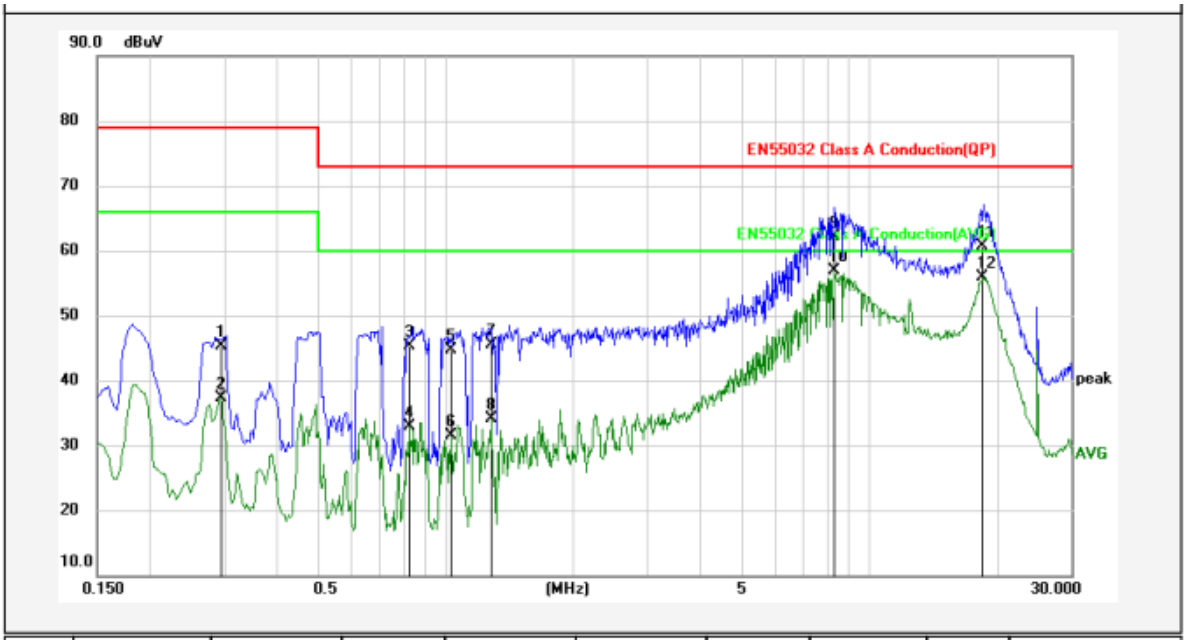
3.5 Test Procedure

The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT Power connected to the power mains through a line impedance stabilization network (L.I.S.N. #1). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N.#2).This provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). The side of power line was checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to EN 55032 Class A on conducted Disturbance test.

The bandwidth of the test receiver (R&S Test Receiver ESR) is set at 9kHz.
The frequency range from 150kHz to 30MHz is checked.

3.6 Test Data

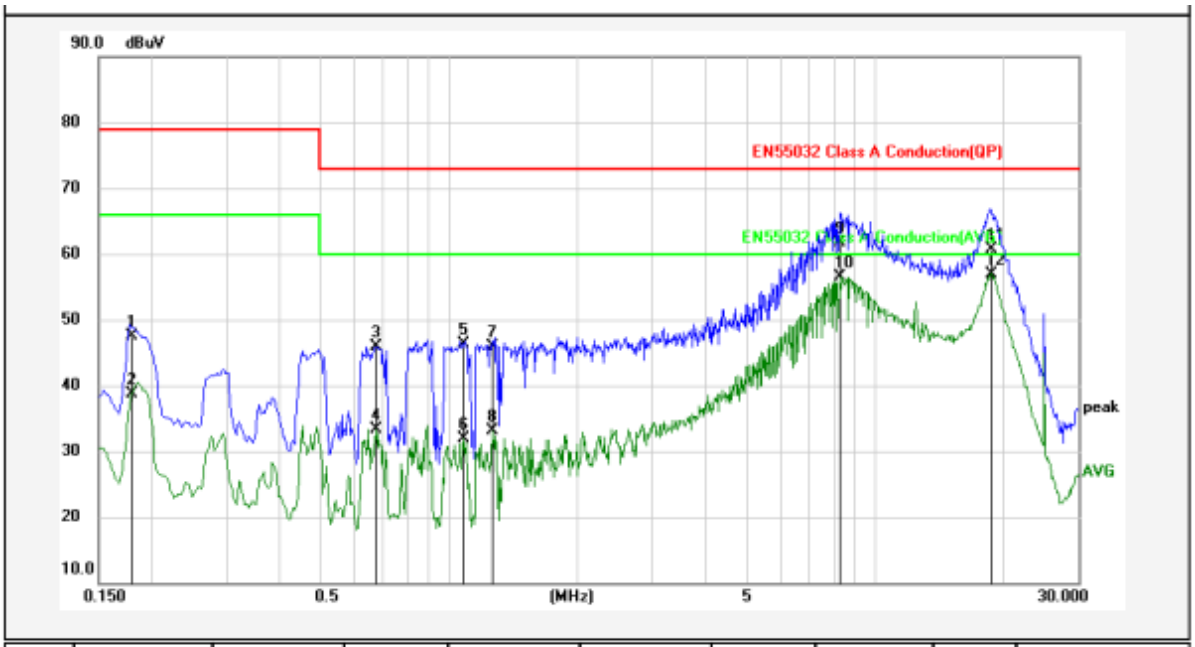
EUT:	Dynamic light box	Model Name:	JCD-NW
Test Mode:	WIFI Mode	Test Date:	2021.11.02
Phase:	Live	Test Voltage:	AC 230V /50Hz
Operator:	Bing	Note:	



No.	Frequency (MHz)	Reading (dBuV)	Lisn/Isn (dB)	Cab_L (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.2938	34.57	10.44	0.24	45.25	79.00	-33.75	QP	
2	0.2938	26.62	10.44	0.24	37.30	66.00	-28.70	AVG	
3	0.8204	34.68	10.45	0.23	45.36	73.00	-27.64	QP	
4	0.8204	22.19	10.45	0.23	32.87	60.00	-27.13	AVG	
5	1.0319	34.10	10.45	0.23	44.78	73.00	-28.22	QP	
6	1.0319	20.86	10.45	0.23	31.54	60.00	-28.46	AVG	
7	1.2794	34.74	10.46	0.22	45.42	73.00	-27.58	QP	
8	1.2794	23.36	10.46	0.22	34.04	60.00	-25.96	AVG	
9	8.3040	51.45	10.5	0.22	62.17	73.00	-10.83	QP	
10	8.3040	46.20	10.5	0.22	56.92	60.00	-3.08	AVG	
11	18.5548	49.86	10.72	0.2	60.78	73.00	-12.22	QP	
12	18.5548	44.95	10.72	0.2	55.87	60.00	-4.13	AVG	

Remarks: 1. Result=Reading+Lisn+Cab_L
2. If the average limit is met when using a quasi-peak detector.
the EUT shall be deemed to meet both limits and measurement
with average detctor is unnecessary.

EUT:	Dynamic light box	Model Name:	JCD-NW
Test Mode:	WIFI Mode	Test Date:	2021.11.02
Phase:	Neutral	Test Voltage:	AC 230V /50Hz
Operator:	Bing	Note:	

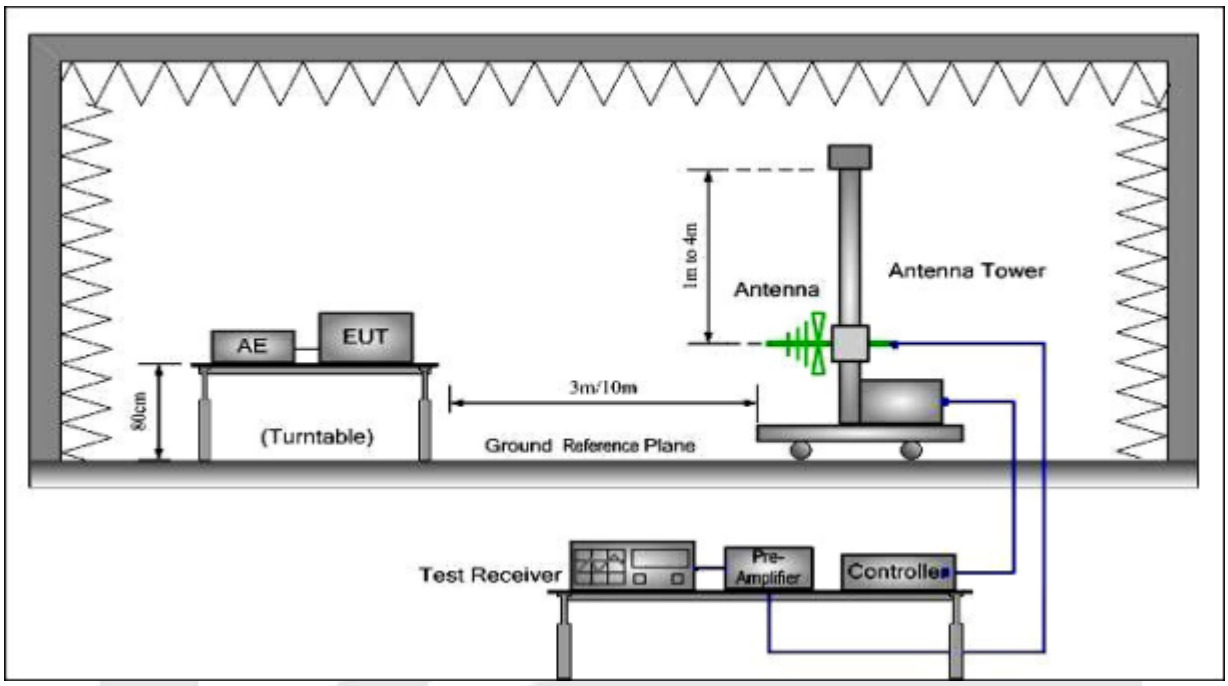


No.	Frequency (MHz)	Reading (dBuV)	Lisn/Isn (dB)	Cab_L (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1796	36.82	10.44	0.22	47.48	79.00	-31.52	QP	
2	0.1796	28.02	10.44	0.22	38.68	66.00	-27.32	AVG	
3	0.6719	35.33	10.44	0.23	46.00	73.00	-27.00	QP	
4	0.6719	22.66	10.44	0.23	33.33	60.00	-26.67	AVG	
5	1.0769	35.53	10.45	0.23	46.21	73.00	-26.79	QP	
6	1.0769	21.16	10.45	0.23	31.84	60.00	-28.16	AVG	
7	1.2659	35.25	10.46	0.22	45.93	73.00	-27.07	QP	
8	1.2659	22.48	10.46	0.22	33.16	60.00	-26.84	AVG	
9	8.3040	51.01	10.5	0.22	61.73	73.00	-11.27	QP	
10	8.3040	45.73	10.5	0.22	56.45	60.00	-3.55	AVG	
11	18.7935	49.82	10.73	0.2	60.75	73.00	-12.25	QP	
12	18.7935	46.04	10.73	0.2	56.97	60.00	-3.03	AVG	

Remarks: 1. Result=Reading+Lisn+Cab_L
2. If the average limit is met when using a quasi-peak detector.
the EUT shall be deemed to meet both limits and measurement
with average detctor is unnecessary.

4 RADIATED EMISSION TEST

4.1 Block Diagram of Test Setup



4.2 Test Standard

EN 55032:2015/A11:2020, Class A

4.3 Limits for radiated disturbance

Frequency MHz	Distance	Limits dB(μV)/m Class A
30 ~ 230	10m	40(Quasi Peak)
230 ~ 1000	10m	47(Quasi Peak)
1000~3000	3m	76 (Peak) 56 (Average)
3000~6000	3m	80 (Peak) 60 (Average)

4.4 Operating Condition of EUT

Test date	Ambient temperature	Relative humidity	Atmospheric pressure
Nov 03, 2021	20°C	60%	101.5kPa

4.5 Test Procedure

The EUT was placed on a turn table which was 0.8 m above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was set 10 m away from the receiving antenna which was mounted on an antenna tower. The measuring antenna moved up and down to find out the maximum emission level. It moved from 1 m to 4 m for both horizontal and vertical polarizations.

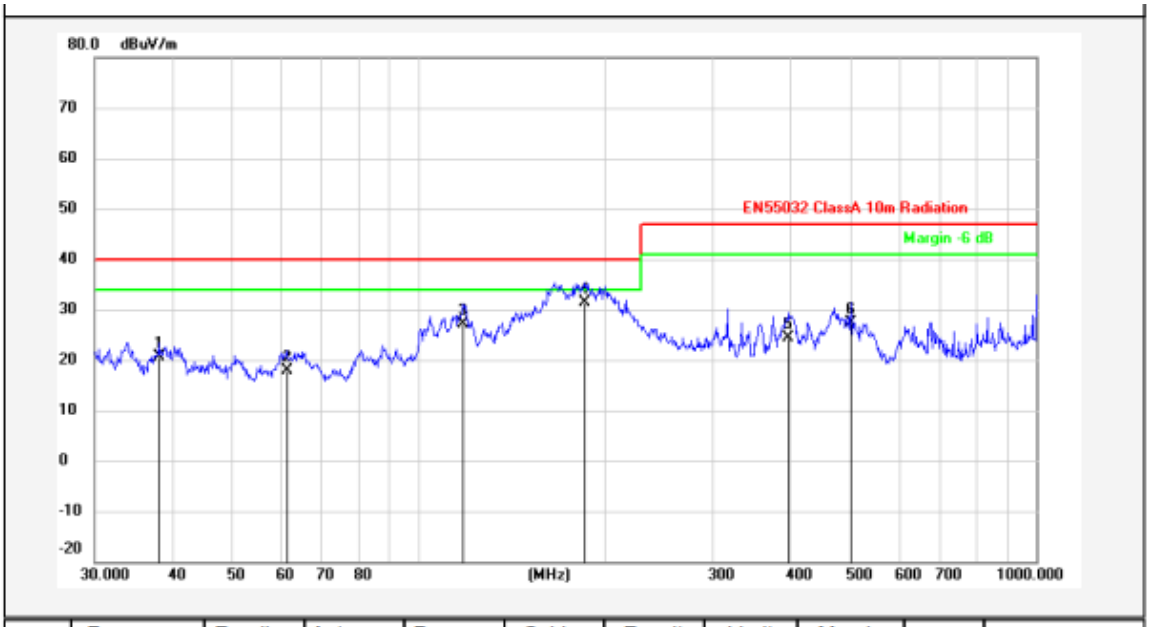
The EUT was tested in the Chamber Site. It was pre-scanned with a Peak detector from the spectrum, and all the final readings from the test receiver were measured with the Quasi-Peak detector.

The bandwidth setting on the test receiver was 120 kHz.

The bandwidth of the Spectrum's VBW is set at 1MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure above 1GHz

4.6 Test Data

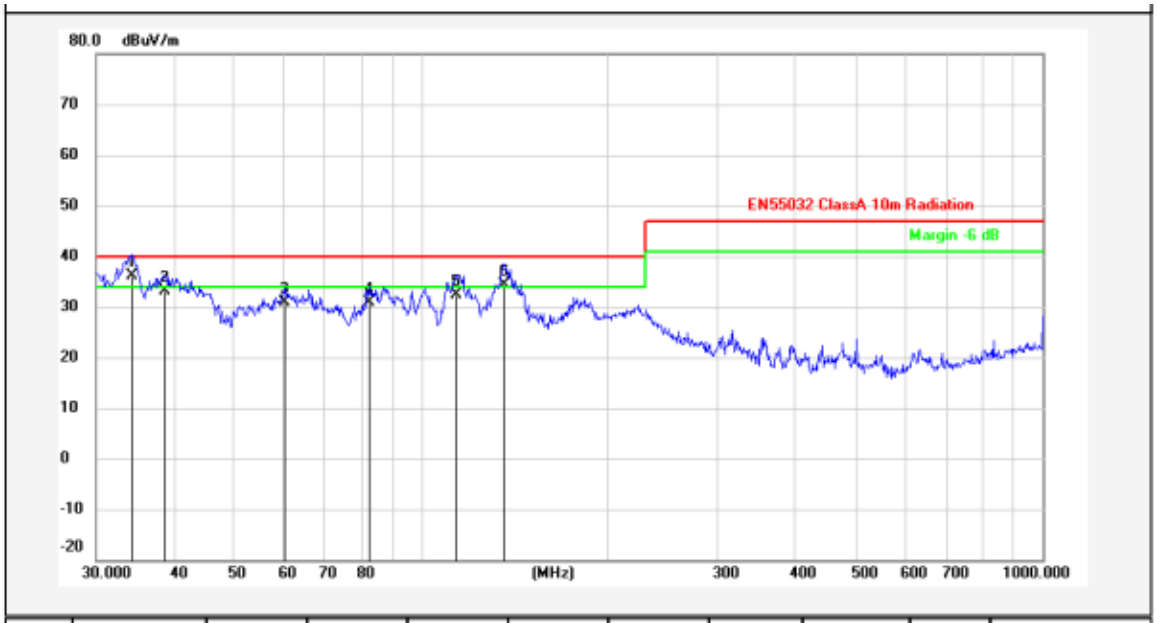
EUT:	Dynamic light box	Model Name:	JCD-NW
Test Mode:	WIFI Mode	Test Date:	2021.11.03
Polarization:	Horizontal	Test Voltage:	AC 230V /50Hz
Operator:	Bing	Note:	



No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Preamp. (dB)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m	Margin (dB)	Detector	Remark
1	38.0783	37.58	12.26	30.57	1.33	20.60	40.00	-19.40	QP	
2	61.3463	35.05	11.79	30.41	1.47	17.90	40.00	-22.10	QP	
3	118.1862	45.45	9.92	30.03	1.76	27.10	40.00	-12.90	QP	
4	186.4409	49.30	9.76	29.77	2.01	31.30	40.00	-8.70	QP	
5	397.6333	35.68	15.23	29.85	3.34	24.40	47.00	-22.60	QP	
6	501.1790	36.57	16.86	29.88	3.85	27.40	47.00	-19.60	QP	

Remarks:1. Result=Reading+Antenna-Preamp+Cable
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

EUT:	Dynamic light box	Model Name:	JCD-NW
Test Mode:	WIFI Mode	Test Date:	2021.11.03
Polarization:	Vertical	Test Voltage:	AC 230V /50Hz
Operator:	Bing	Note:	

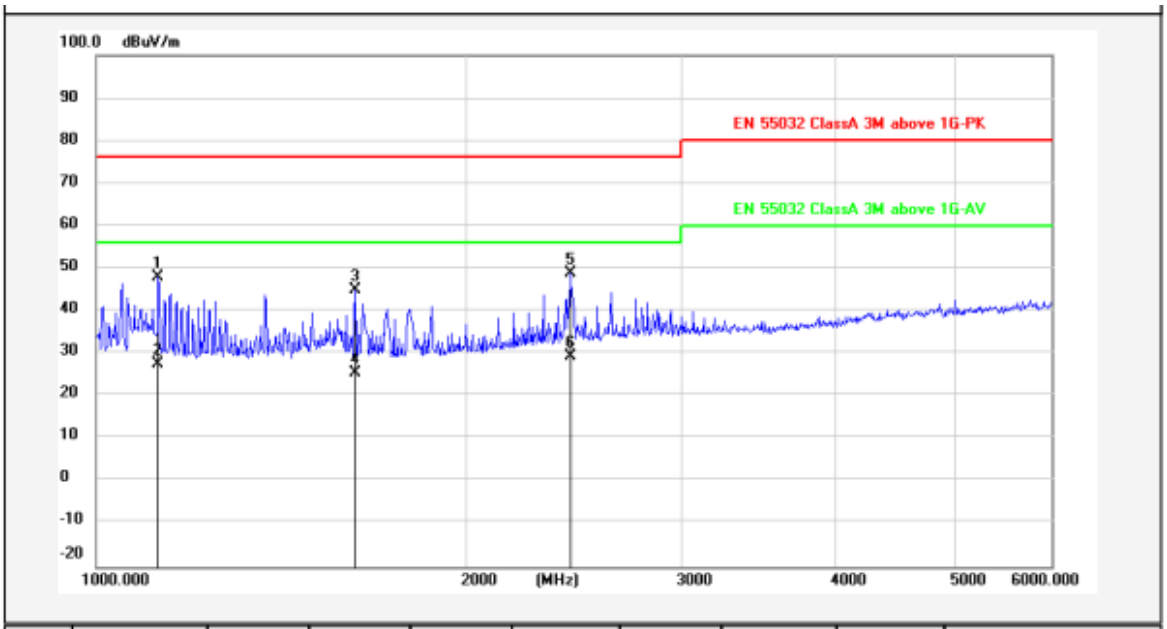


No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Preamp. (dB)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m	Margin (dB)	Detector	Remark
1	34.2760	54.66	10.89	30.6	1.25	36.20	40.00	-3.80	QP	
2	38.7518	50.02	12.4	30.56	1.34	33.20	40.00	-6.80	QP	
3	60.2800	47.79	11.96	30.42	1.47	30.80	40.00	-9.20	QP	
4	82.3588	52.07	7.78	30.3	1.45	31.00	40.00	-9.00	QP	
5	114.1136	50.16	10.65	30.06	1.75	32.50	40.00	-7.50	QP	
6	135.9822	54.77	7.72	29.92	1.83	34.40	40.00	-5.60	QP	

Remarks:1. Result=Reading+Antenna-Preamp+Cable
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

1-6GHz

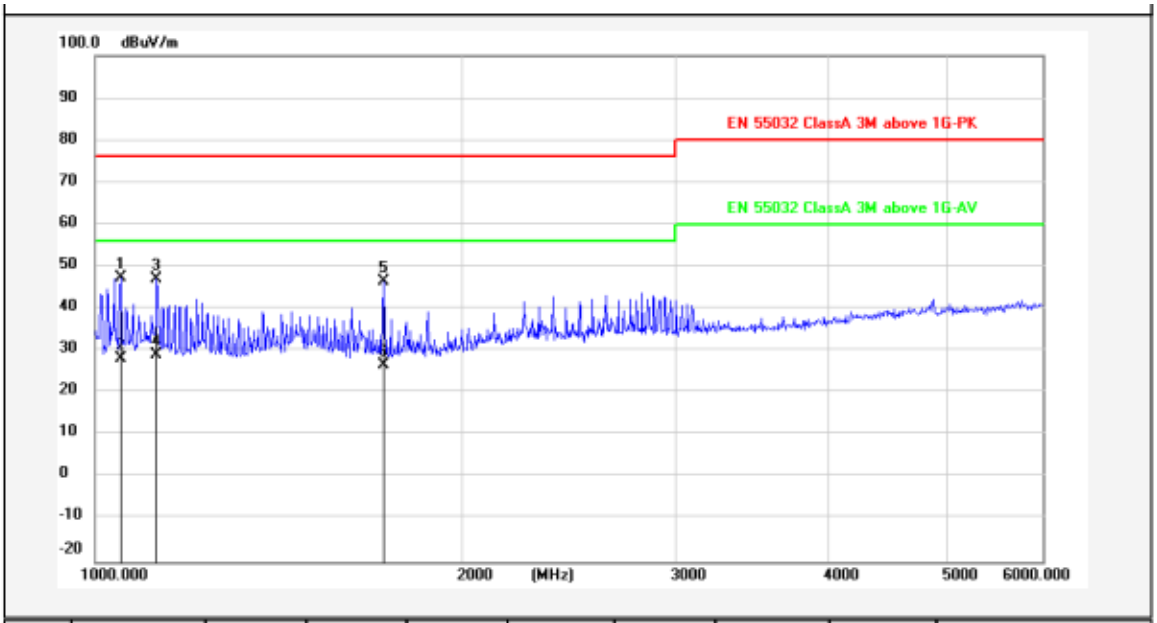
EUT:	Dynamic light box	Model Name:	JCD-NW
Test Mode:	WIFI Mode	Test Date:	2021.11.03
Polarization:	Horizontal	Test Voltage:	AC 230V /50Hz
Operator:	Bing	Note:	



No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	1123.517	59.40	24.36	-35.92	47.84	76.00	-28.16	peak	
2	1123.517	39.06	24.36	-35.92	27.50	56.00	-28.50	AVG	
3	1625.096	55.49	24.91	-35.4	45.00	76.00	-31.00	peak	
4	1625.096	36.09	24.91	-35.4	25.60	56.00	-30.40	AVG	
5	2431.997	55.56	27.37	-34.04	48.89	76.00	-27.11	peak	
6	2431.997	36.17	27.37	-34.04	29.50	56.00	-26.50	AVG	

Remarks:1. Result=Reading+Antenna+Cable

EUT:	Dynamic light box	Model Name:	JCD-NW
Test Mode:	WIFI Mode	Test Date:	2021.11.03
Polarization:	Vertical	Test Voltage:	AC 230V /50Hz
Operator:	Bing	Note:	

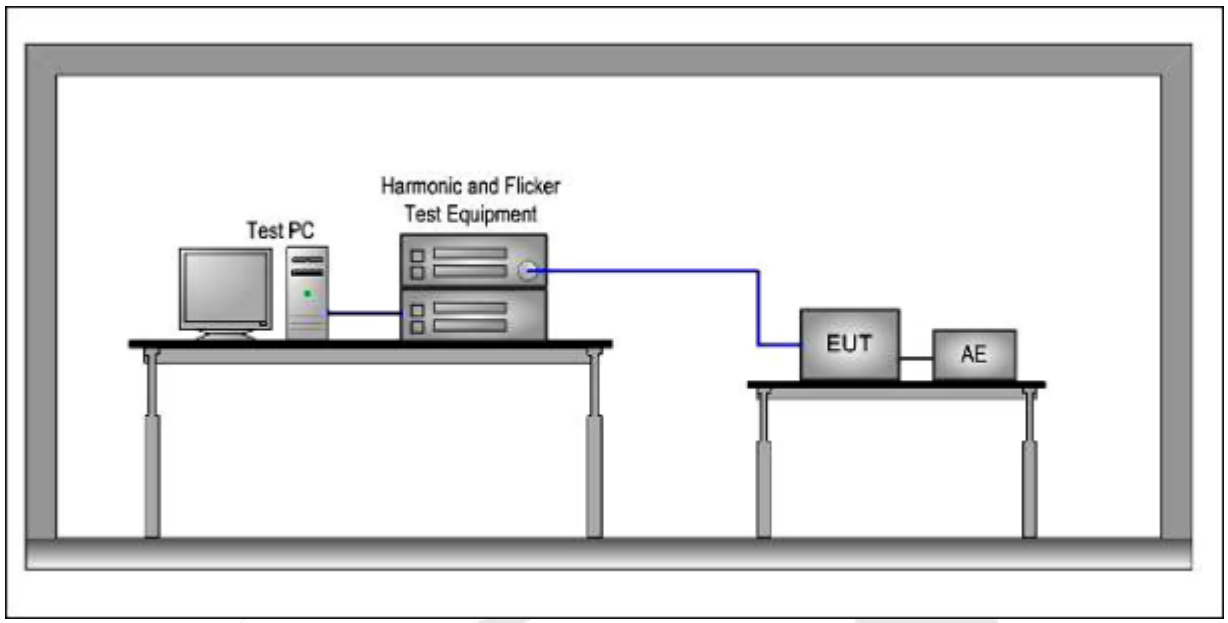


No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	1049.567	59.17	24.32	-36.04	47.45	76.00	-28.55	peak	
2	1049.567	39.82	24.32	-36.04	28.10	56.00	-27.90	AVG	
3	1123.517	58.57	24.36	-35.92	47.01	76.00	-28.99	peak	
4	1123.517	40.76	24.36	-35.92	29.20	56.00	-26.80	AVG	
5	1724.082	56.77	24.96	-35.3	46.43	76.00	-29.57	peak	
6	1724.082	37.14	24.96	-35.3	26.80	56.00	-29.20	AVG	

Remarks:1. Result=Reading+Antenna+Cable

5 HARMONIC CURRENT EMISSION TEST

5.1 Block Diagram of Test Setup



5.2 Test Standard

EN IEC 61000-3-2:2019 , Class A

5.3 Limits of Harmonic Current

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≤n≤39	0.15 15/n
Even harmonics	
2	1.08
4	0.43
6	0.30
8≤n≤40	0.23 8/n

Remark: If the EUT power level is below 75 Watts and therefore has no defined limits.

5.4 Operating Condition of EUT

Test date	Ambient temperature	Relative humidity	Atmospheric pressure
Nov 04, 2021	24°C	55%	101.3kPa

The details of test modes are as follows：

No.	Test Mode
1.	WIFI Mode

5.5 Test Procedure

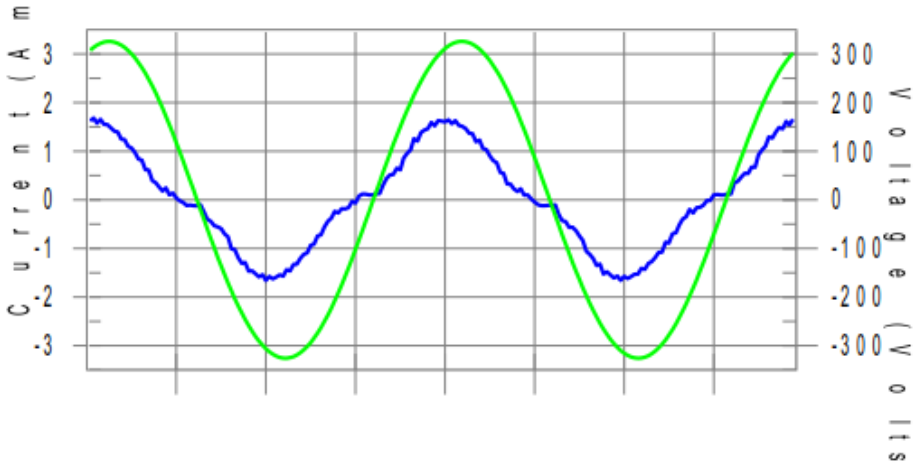
The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.

The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the necessary for the EUT to be exercised.

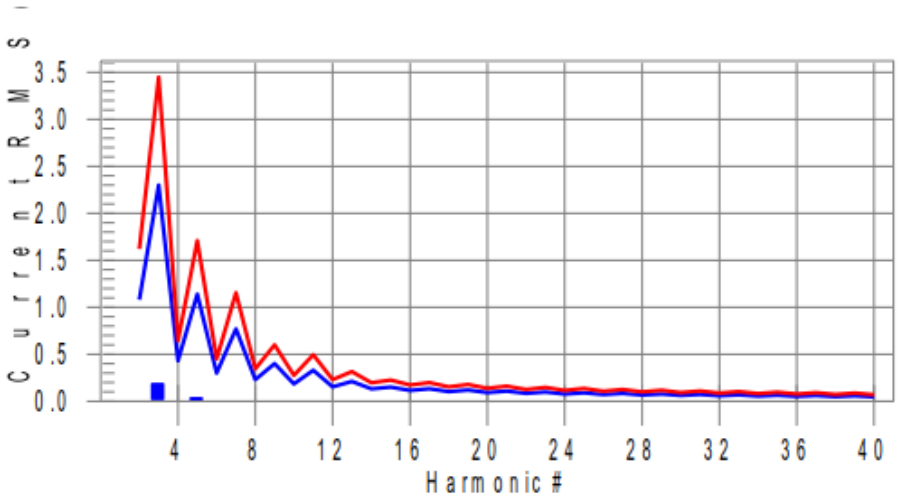
5.6 Test Data

Test Result: Pass **Source qualification: Normal**

Current & voltage waveforms



Harmonics and Class A limit line **European Limits**



Test result: Pass **Worst harmonics H13-6.6% of 150% limit, H13-9.9% of 100% limit**

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Test Result: Pass **Source qualification: Normal**
THC(A): 0.188 **I-THD(%): 19.0** **POHC(A): 0.009** **POHC Limit(A): 0.251**

Highest parameter values during test:

V_RMS (Volts):	230.57	Frequency(Hz):	50.00
I_Peak (Amps):	1.710	I_RMS (Amps):	1.009
I_Fund (Amps):	0.990	Crest Factor:	1.698
Power (Watts):	220.8	Power Factor:	0.950

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.002	1.080	N/A	0.003	1.620	N/A	Pass
3	0.183	2.300	7.9	0.184	3.450	5.3	Pass
4	0.002	0.430	N/A	0.003	0.645	N/A	Pass
5	0.028	1.140	2.5	0.029	1.710	1.7	Pass
6	0.001	0.300	N/A	0.001	0.450	N/A	Pass
7	0.007	0.770	0.9	0.007	1.155	0.6	Pass
8	0.001	0.230	N/A	0.001	0.345	N/A	Pass
9	0.002	0.400	N/A	0.002	0.600	N/A	Pass
10	0.001	0.184	N/A	0.001	0.276	N/A	Pass
11	0.016	0.330	5.0	0.016	0.495	3.3	Pass
12	0.001	0.153	N/A	0.001	0.230	N/A	Pass
13	0.021	0.210	9.9	0.021	0.315	6.6	Pass
14	0.001	0.131	N/A	0.001	0.197	N/A	Pass
15	0.012	0.150	8.0	0.012	0.225	5.4	Pass
16	0.000	0.115	N/A	0.000	0.173	N/A	Pass
17	0.006	0.132	4.8	0.006	0.198	3.2	Pass
18	0.000	0.102	N/A	0.000	0.153	N/A	Pass
19	0.005	0.118	N/A	0.005	0.178	N/A	Pass
20	0.000	0.092	N/A	0.000	0.138	N/A	Pass
21	0.002	0.107	N/A	0.002	0.161	N/A	Pass
22	0.000	0.084	N/A	0.000	0.125	N/A	Pass
23	0.001	0.098	N/A	0.001	0.147	N/A	Pass
24	0.000	0.077	N/A	0.000	0.115	N/A	Pass
25	0.001	0.090	N/A	0.001	0.135	N/A	Pass
26	0.000	0.071	N/A	0.000	0.107	N/A	Pass
27	0.004	0.083	N/A	0.004	0.125	N/A	Pass
28	0.001	0.066	N/A	0.001	0.099	N/A	Pass
29	0.004	0.078	N/A	0.005	0.116	N/A	Pass
30	0.001	0.061	N/A	0.001	0.092	N/A	Pass
31	0.004	0.073	N/A	0.004	0.109	N/A	Pass
32	0.001	0.058	N/A	0.001	0.086	N/A	Pass
33	0.004	0.068	N/A	0.004	0.102	N/A	Pass
34	0.000	0.054	N/A	0.000	0.081	N/A	Pass
35	0.002	0.064	N/A	0.003	0.096	N/A	Pass
36	0.000	0.051	N/A	0.000	0.077	N/A	Pass
37	0.001	0.061	N/A	0.001	0.091	N/A	Pass
38	0.000	0.048	N/A	0.000	0.073	N/A	Pass
39	0.001	0.058	N/A	0.001	0.087	N/A	Pass
40	0.000	0.046	N/A	0.000	0.069	N/A	Pass

Test Result: Pass **Source qualification: Normal**

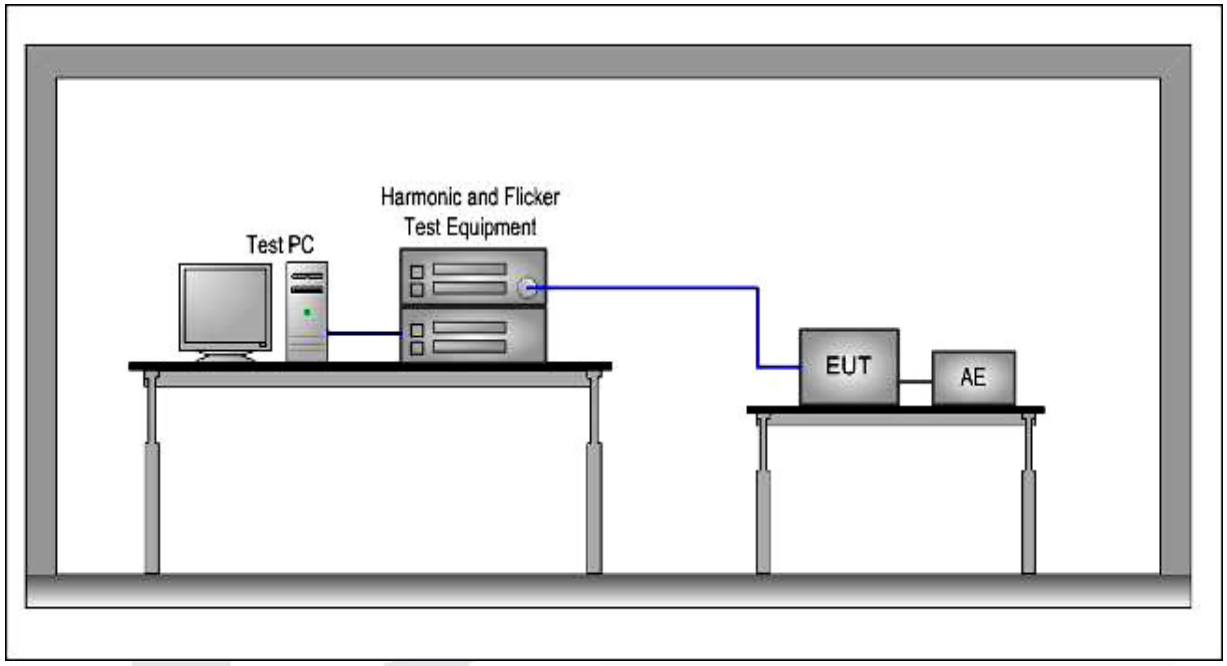
Highest parameter values during test:

Voltage (Vrms):	230.57	Frequency(Hz):	50.00
I_Peak (Amps):	1.710	I_RMS (Amps):	1.009
I_Fund (Amps):	0.990	Crest Factor:	1.698
Power (Watts):	220.8	Power Factor:	0.950

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.070	0.461	15.21	OK
3	0.452	2.074	21.80	OK
4	0.038	0.461	8.21	OK
5	0.034	0.922	3.68	OK
6	0.020	0.461	4.31	OK
7	0.067	0.691	9.70	OK
8	0.009	0.461	1.99	OK
9	0.042	0.461	9.19	OK
10	0.010	0.461	2.24	OK
11	0.030	0.230	13.12	OK
12	0.011	0.231	4.93	OK
13	0.015	0.230	6.45	OK
14	0.006	0.231	2.55	OK
15	0.005	0.230	2.19	OK
16	0.005	0.230	2.11	OK
17	0.007	0.231	2.93	OK
18	0.006	0.230	2.63	OK
19	0.008	0.230	3.34	OK
20	0.009	0.230	4.02	OK
21	0.005	0.231	2.10	OK
22	0.003	0.231	1.27	OK
23	0.004	0.231	1.88	OK
24	0.002	0.231	0.87	OK
25	0.003	0.231	1.38	OK
26	0.002	0.230	0.79	OK
27	0.005	0.230	2.15	OK
28	0.002	0.231	0.93	OK
29	0.007	0.230	2.92	OK
30	0.002	0.230	0.69	OK
31	0.004	0.231	1.93	OK
32	0.002	0.231	0.67	OK
33	0.006	0.230	2.65	OK
34	0.002	0.231	0.70	OK
35	0.002	0.230	1.06	OK
36	0.002	0.230	0.76	OK
37	0.004	0.231	1.84	OK
38	0.002	0.230	0.73	OK
39	0.003	0.231	1.12	OK
40	0.006	0.231	2.54	OK

6 VOLTAGE FLUCTUATIONS & FLICKER TEST

6.1 Block Diagram of Test Setup



6.2 Test Standard

EN 61000-3-3:2013/A1:2019

6.3 Limits of Voltage Fluctuation and Flick

Test Item	Limit	Note
Pst	1.0	Pst means Short-term flicker indicator
Plt	0.65	Plt means long-term flicker indicator
Tmax	500ms	Tmax means maximum time that d(t) exceeds 3.3%
dmax(%)	4%	dmax means maximum relative voltage change.
dc(%)	3.3%	dc means relative steady-state voltage change.

6.4 Operating Condition of EUT

Test date	Ambient temperature	Relative humidity	Atmospheric pressure
Nov 04, 2021	24°C	55%	101.3kPa

The details of test modes are as follows：

No.	Test Mode
1.	WIFI Mode

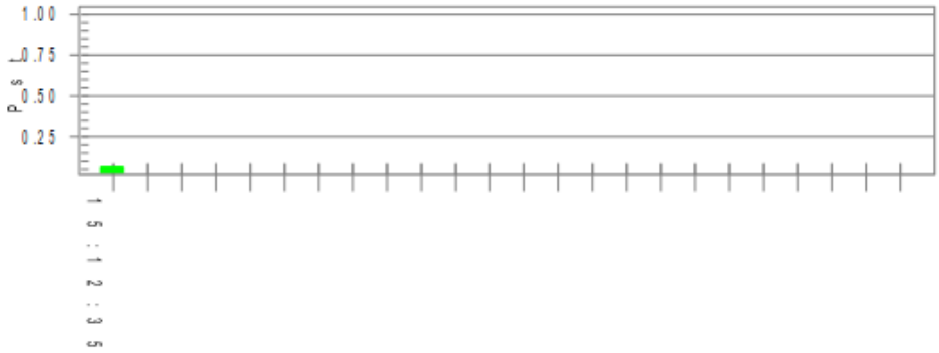
6.5 Test Procedure

The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal conditions During the flick measurement, the measure time shall include that part of whole operation changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

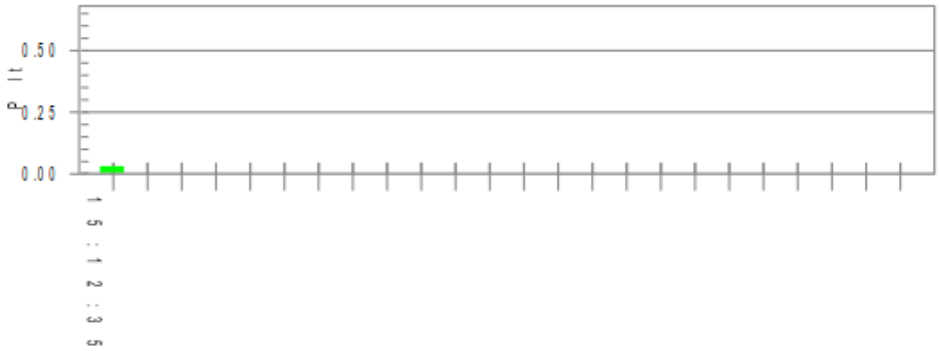
6.6 Test Data

Test Result: Pass **Status: Test Completed**

Pst_i and limit line **European Limits**



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt):	**230.19**			
T-max (mS):	**0**	**Test limit (mS):**	**500.0**	**Pass**
Highest dc (%):	**0.00**	**Test limit (%):**	**3.30**	**Pass**
Highest dmax (%):	**0.00**	**Test limit (%):**	**4.00**	**Pass**
Highest Pst (10 min. period):	**0.064**	**Test limit:**	**1.000**	**Pass**
Highest Plt (2 hr. period):	**0.028**	**Test limit:**	**0.650**	**Pass**

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7 IMMUNITY TEST RESULT

Description of 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.

For audio output device: The measured acoustic interference ratio and/or the measured electrical interference during the test shall be -20dB or better(see note1)

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

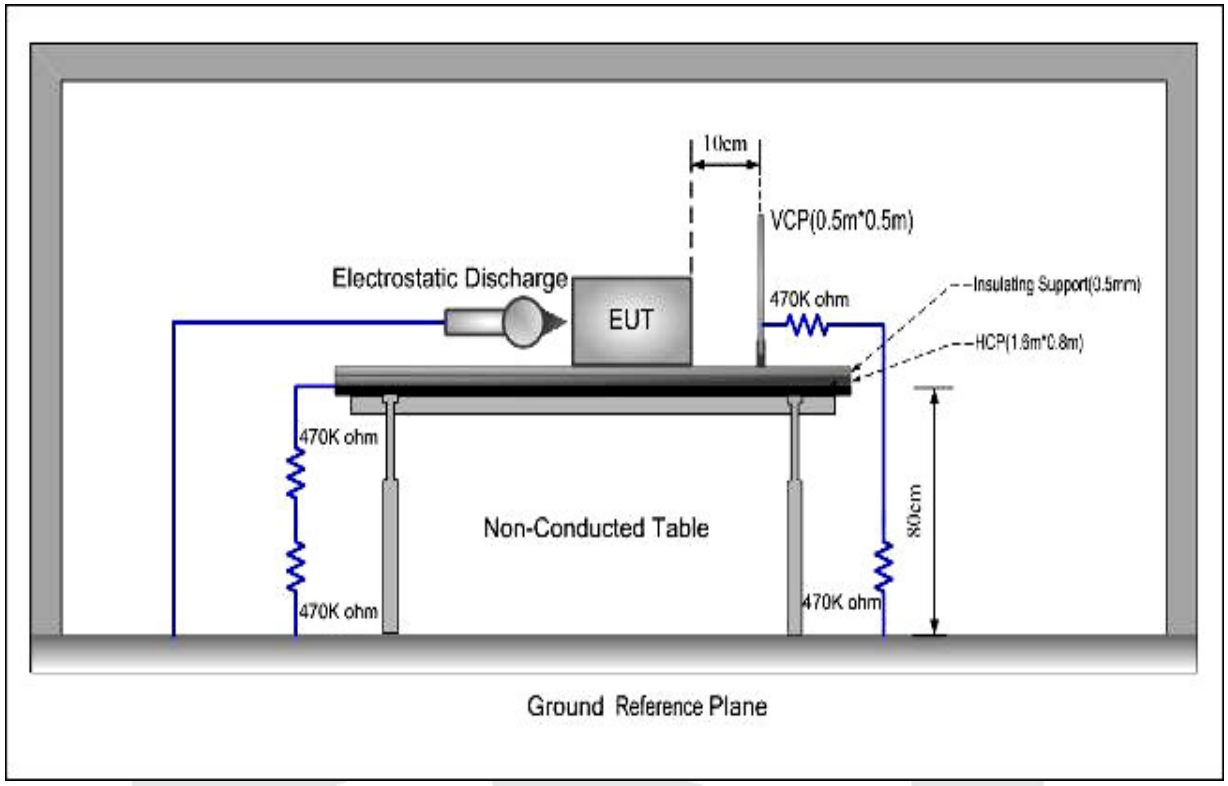
Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer’s instructions. A reboot or re-start operation is allowed.

Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

Note 1: This performance criterion only using for Continuous inducted RF disturbances and Continuous RF electromagnetic field disturbances item.

8 ELECTROSTATIC DISCHARGE TEST

8.1 Block Diagram of Test Setup



8.2 Test Standard

EN 61000-4-2: 2009

(Severity Level 1&2&3 for Air Discharge at 2kV 4kV 8kV;

Severity Level 1&2 for Contact Discharge at 2kV 4kV)

8.3 Severity Levels and Performance Criterion

Severity Levels	Test Voltage Contact Discharge (kV)	Test Voltage Air Discharge (kV)	Performance criterion
1.	2	2	B
2.	4	4	
3.	6	8	
4.	8	15	
x	Special	Special	

8.4 Operating Condition of EUT

The details of test modes are as follows：

No.	Test Mode
1.	WIFI Mode

8.5 Test Procedure

8.5.1 Air Discharge:

The test was applied on non-conductive surfaces of EUT. The round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT. After each discharge, the discharge electrode was removed from the EUT. The generator was re-triggered for a new single discharge and repeated 20 times for each pre-selected test point. This procedure was repeated until all the air discharge completed.

8.5.2 Contact Discharge:

All the procedure was same as Section 8.5.1. except that the generator was re-triggered for a new single discharge and repearted 50 times for each pre-selected test point. The tip of the discharge electrode was touch the EUT before the discharge switch was operated.

8.5.3 Indirect discharge for horizontal coupling plane

At least 20 single discharges were 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.

8.5.4 Indirect discharge for vertical coupling plane

At least 20 single discharge were applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, was placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges were applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

8.6 Test Data

Electrostatic Discharge Test Results

EUT	:	Dynamic light box	Temperature	:	24℃
M/N	:	JCD-NW	Humidity	:	56%
Test Voltage	:	AC 230V/50Hz	Test Date	:	2021.11.05
Test Engineer	:	Bing	Pressure	:	101.0kPa
Required Performance	:	B	Actual Performance	:	A

Air Discharge: ±2kV ±4kV ±8kV	# For Air Discharge each Point Positive ＞25 times and negative ＞25 times discharge
Contact Discharge: ±2kV ±4kV	# For Contact Discharge each point positive ＞25 times and negative ＞25 times discharge

For the time interval between successive single discharges an initial value of one second.
After discharge to the ungrounded part of EUT, it needs the bleeder resistor to remove the charge prior to next ESD pulse

Discharge Voltage (kV)	Type of discharge	Dischargeable Points	Performance		Result (Pass/Fail)
			Required	Observation	
±2	Contact	Center of VCP	B	A	**Pass**
±4	Contact	Center of HCP	B	A	**Pass**
±2	Contact	1,2,	B	A	**Pass**
±4	Contact	1,2,	B	A	**Pass**
±2	Air	3,4	B	A	**Pass**
±4	Air	3,4	B	A	**Pass**
±8	Air	3,4	B	B	**Pass**

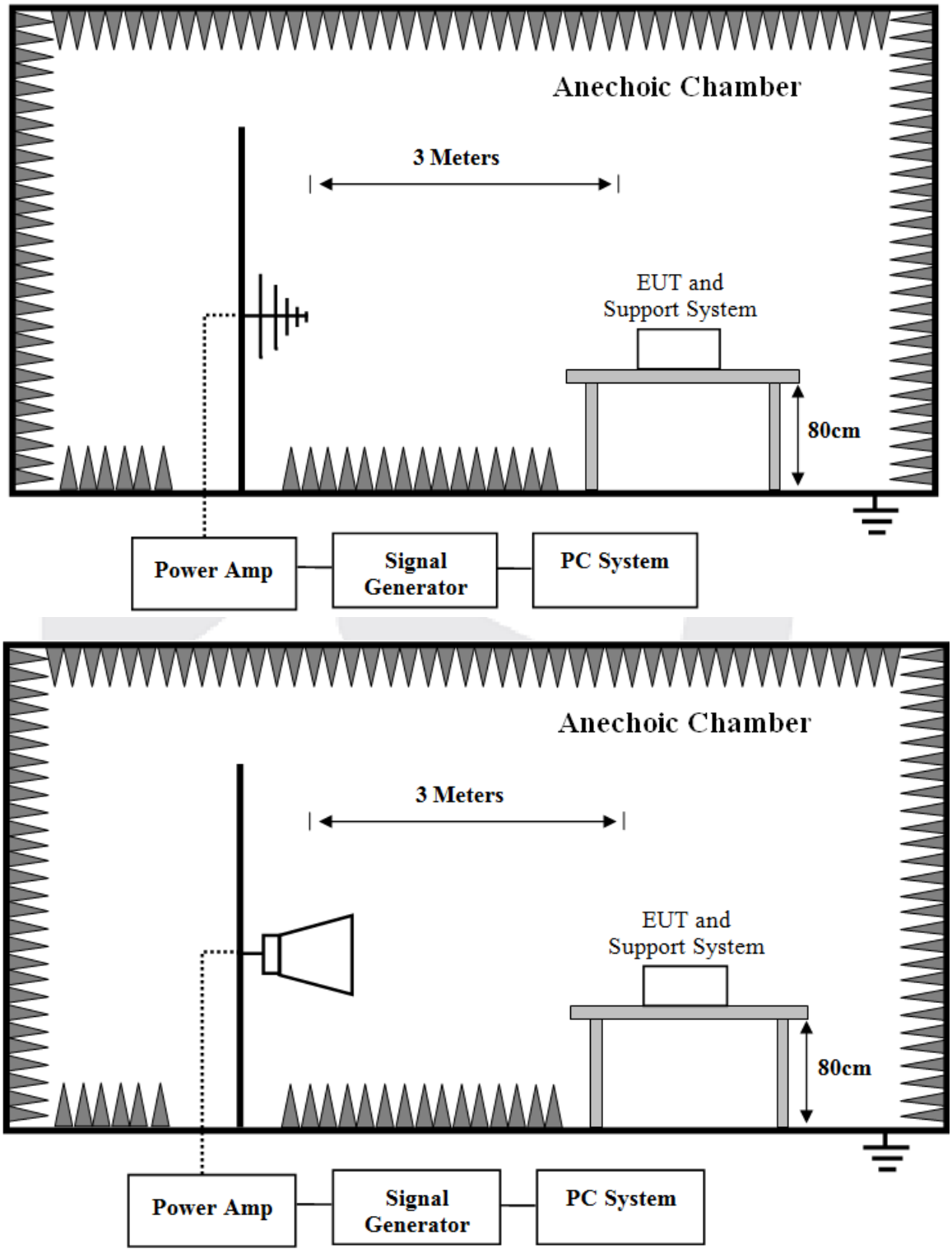
1	Screw	8	/
2	Metal surface	9	/
3	Slot	10	/
4	Display	11	/
5		12	/
6		13	/
7		14	/

Performance:

The screen was flashing during the test, but self-recoverable after the test Criteria : B

9 Radio Frequency Electromagnetic Field Immunity Test

9.1 Block Diagram of Test Setup



9.2 Test Standard

EN IEC 61000-4-3:2020

Frequency Range：80-1000MHz,1000- 6000MHz

Severity Level 2 at 3V/m

Radio Frequency Electromagnetic Field Immunity Test levels

Level	Test field strength V/m
1	1
2	3
3	10
4	30
X	Special
Note: X is an opoen test level and the associated field strength may be any value. This level may be given in the product standard.	

9.3 Operating Condition of EUT

The details of test modes are as follows：

No.	Test Mode
1.	WIFI Mode

9.4 Test Procedure

The field sensor is placed on the EUT table (0.8 meter above the ground) which is 3 meters away from the transmitting antenna. Through the signal generator, power amplifier and transmitting antenna to produce a uniformity field strength (3V/m measured by field sensor) around the EUT table from frequency range specified and records the signal generator‘s output level at the same time for whole measured frequency range. Then, put EUT and its simulators on the EUT turn table and keep them 3 meters away from the transmitting antenna which is mounted on an antenna tower and fixes at 1 meter height above the ground. Using the recorded signal generator’s output level to measure the EUT from frequency range specified and both horizontal & vertical polarization of antenna must be set and measured. Each of the four sides of EUT must be faced this transmitting antenna and measures individually.

All the scanning conditions are as follows **:**

Test Level	
Frequency	80-1000MHz,1000MHz-6000MHz
Test level	3V/m (Severity Level 2)
Antenna polarization	Horizontal & Vertical
Modulation	80%, 1kHz Amplitude Modulation
Steps increment	1%

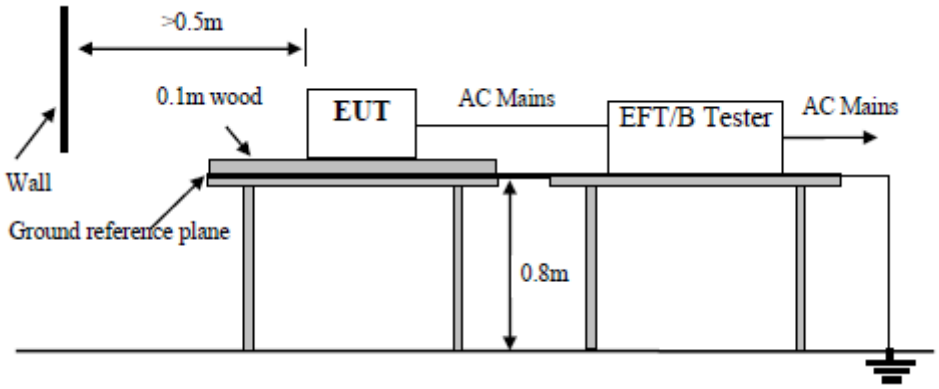
9.5 Test Data

Radio-frequency Continuous radiated disturbance Test Results

Required Performance: A			Actual Performance: A		
Frequency Rage : 80 MHz -1000MHz ,1000-6000MHz			Test Level: 3V/m		
Modulation: ☑ AM ☐ Pulse ☐ none 1 kHz 80%					
EUT Position	Polarization: Horizontal		Polarization: Vertical		Result
	Required	Observation	Required	Observation	(Pass / Fail)
Front	A	A	A	A	Pass
Right	A	A	A	A	Pass
Rear	A	A	A	A	Pass
Left	A	A	A	A	Pass
Performance: The EUT was no change compared with initial operation during the test.					

10 ELECTRICAL FAST TRANSIENT/BURST TEST

10.1 . Block Diagram of Test Setup



10.2 Test Standard

EN 61000-4-4: 2012

10.3 Severity Levels and Performance Criterion

Open Circuit Output Test Voltage ±10%			
Severity Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines	Performance criterion
1.	0.5KV	0.25KV	B
2.	1KV	0.5KV	
3.	2KV	1KV	
4.	4KV	2KV	
X	Special	Special	
The use of 5 kHz repetition frequency is traditional, however, 100 kHz is closer to reality. Product committees should determine which frequencies are relevant for specific products or product types. With some products, there may be no clear distinction between power ports and signal ports, in which case it is up to product committees to make this determination for test purposes.			
a "X" can be any level, above, below or in between the others. The level shall be specified in the dedicated equipment specification.			

10.4 Operating Condition of EUT

The details of test modes are as follows：

No.	Test Mode
1.	WIFI Mode

10.5 Test Procedure

The EUT and its simulators were placed on a ground reference plane and were insulated from it by a wood support 0.1m + 0.01m thick. The ground reference plane was 1m*1m metallic sheet with 0.65mm minimum thickness. This reference ground plane was project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane was more than 0.5m. The length of signal and power cable between EUT and EFT generator was 0.5m. All cables to the EUT was placed on the wood support, cables not subject to EFT/B was routed as far as possible from the cable under test to minimize the coupling between the cables.

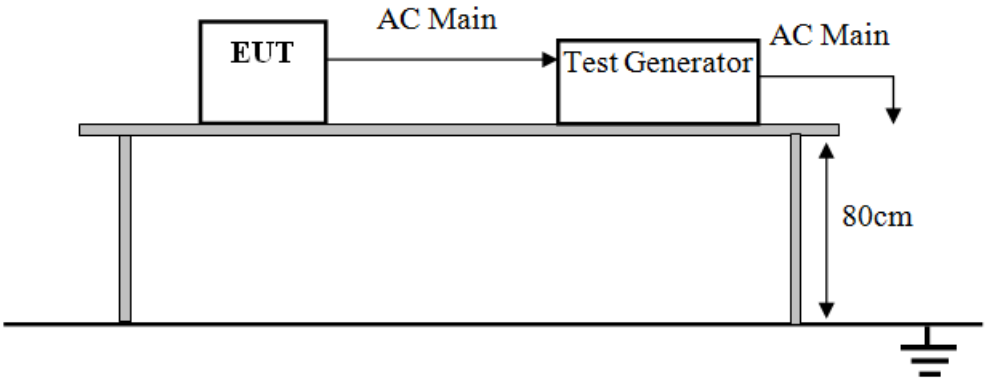
10.6 Test Data

Electrical fast transient Test Results

Coupling Ports		Coupling Voltage	Inject Method	Result
AC Power Ports	L	±1 kV	Direct	Pass
	N	±1 kV	Direct	Pass
	PE	±1 kV	Direct	Pass
	L-N	±1 kV	Direct	Pass
	L-PE	±1 kV	Direct	Pass
	N-PE	±1 kV	Direct	Pass
	L-N-PE	±1 kV	Direct	Pass
Remark: The screen was flashing during the test ,but self-recoverable after the test . Criteria : B				

11 SURGE TEST

11.1 Block Diagram of Test Setup



11.2 Test Standard

EN 61000-4-5: 2014

11.3 Severity Levels and Performance Criterion

Severity Level	Open-Circuit Test Voltage kV
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

11.4 Operating Condition of EUT

The details of test modes are as follows：

No.	Test Mode
1.	WIFI Mode

11.5 Test Procedure

2Ω effective output impedance of the generator was used for L-N test.12Ω effective output impedance of the generator was used for L-PE,N-PE test.

5 positive and 5 negative (polarity) tests were applied successively synchronized to the voltage phase, 90°, 270° to L-N respectively. The repetition rate was 1 per minute during test.

(1). For input and AC power ports:
The EUT was connected to the power mains by using a coupling device which coupled the surge interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration was 1 minute.
(2). For signal lines and control lines ports:
None.
(3). For DC input and DC output power ports:
None.

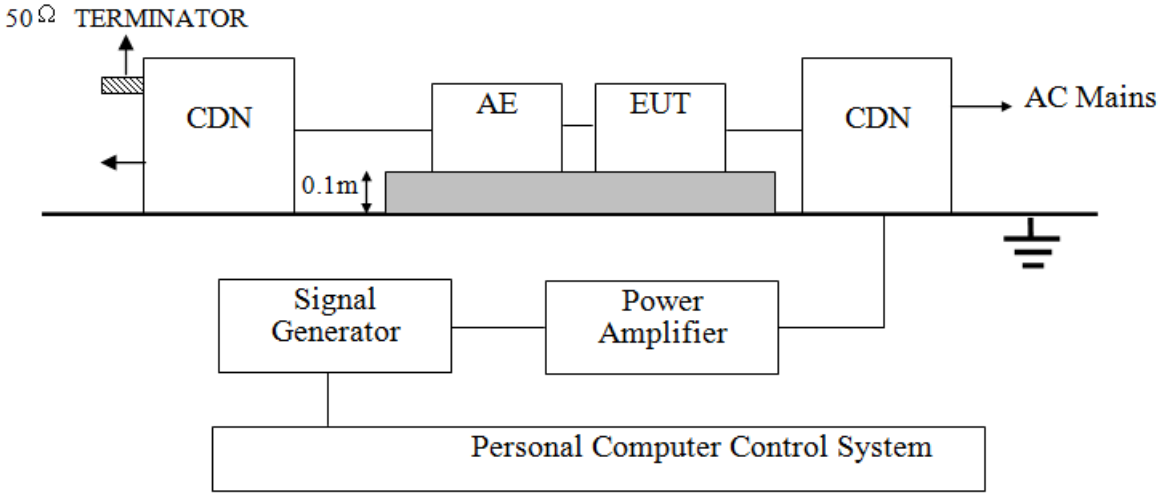
11.6 Test Data

Surge Immunity Test Results

Coupling Ports		Coupling Voltage	Coupling Phase / Result			
			0°	90°	180°	270°
AC power ports	L-N	+/-1kV Direct	Pass	Pass	Pass	Pass
	L-PE	+/-2kV Direct	Pass	Pass	Pass	Pass
	N-PE	+/-2kV Direct	Pass	Pass	Pass	Pass
Tuner Port		+/-0.5kV	N/A			
Remark: There was no change compared with initial operation during the test.						

12 RADIO-FREQUENCY CONTINUOUS CONDUCTED DISTURBANCE TEST

12.1 Block Diagram of Test Setup



12.2 Test Standard

EN 61000-4-6: 2014+AC: 2015

12.3 Severity Levels and Performance Criterion

Level	Voltage Level (e.m.f.) V
1.	1
2.	3
3.	10
X	Special

12.4 Operating Condition of EUT

The details of test modes are as follows：

No.	Test Mode
1.	WIFI Mode

12.5 Test Procedure

The EUT were placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) was placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT were as short as possible, and their height above the ground reference plane were between 30 and 50 mm (where possible).

The frequency range was swept from 0.15 MHz - 10 MHz, 10 MHz – 30 MHz and 30 MHz – 80MHz using 3V, 3 V - 1V, 1V signal level, and with the disturbance signal 80% amplitude modulated with a 1KHz sine wave.

The rate of sweep shall not exceed 1.5*10-3decades/s.Where the frequency was swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.

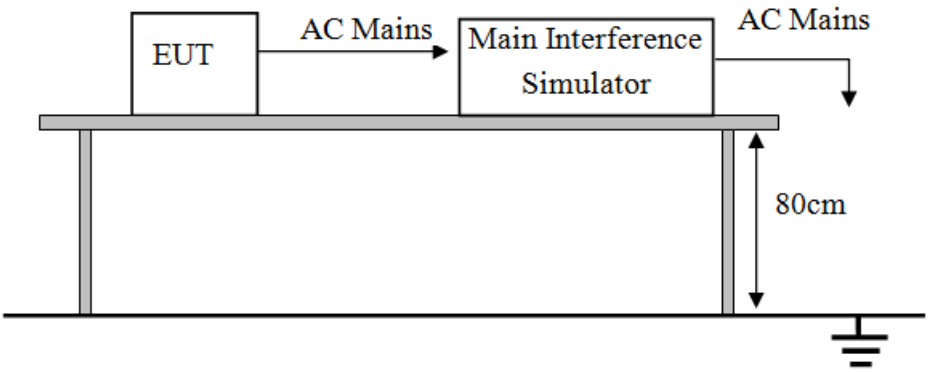
12.6 Test Data

Radio-frequency Continuous conducted disturbance Test Results

Required Performance: A			Actual Performance: A		
Modulation Signal: 1kHz, 80% AM					
Frequency Range (MHz)	Injected Position	Voltage Level (r.m.s)	Required	Observation	Result (Pass / Fail)
0.15 - 80	AC mains	3V	A	A	PASS
/	/	/	/	/	/
/	/	/	/	/	/
/	/	/	/	/	/
/	/	/	/	/	/
/	/	/	/	/	/
Performance: There was no change compared with initial operation during the test.					

13 VOLTAGE DIPS AND INTERRUPTIONS TEST

13.1 Block Diagram of Test Setup



13.2 Test Standard

EN IEC 61000-4-11:2020

13.3 Severity Levels and Performance Criterion

Test category	reduction	Periods	Performance criterion
Voltage dips	＞95%	0.5P	B
Voltage dips	30%	25P/30P	C
Voltage interruptions	＞95%	250P/300P	C

13.4 Operating Condition of EUT

The details of test modes are as follows:

No.	Test Mode
1.	WIFI Mode

13.5 Test Procedure

1) The EUT and test generator were setup as shown on Section 13.1.
2) The interruptions are introduced at selected phase angles with specified duration.
3) Record any degradation of performance.

13.6 Test Data

Voltage Dips and Short Interruptions Immunity Test Result AC 230V/50Hz

Test Level % UT	Voltage Dips & Short Interruptions % UT	Duration (in period)	Criterion	Result
0	100	0.5P	B	PASS
70	30	25P	C	PASS
0	100	250P	C	PASS

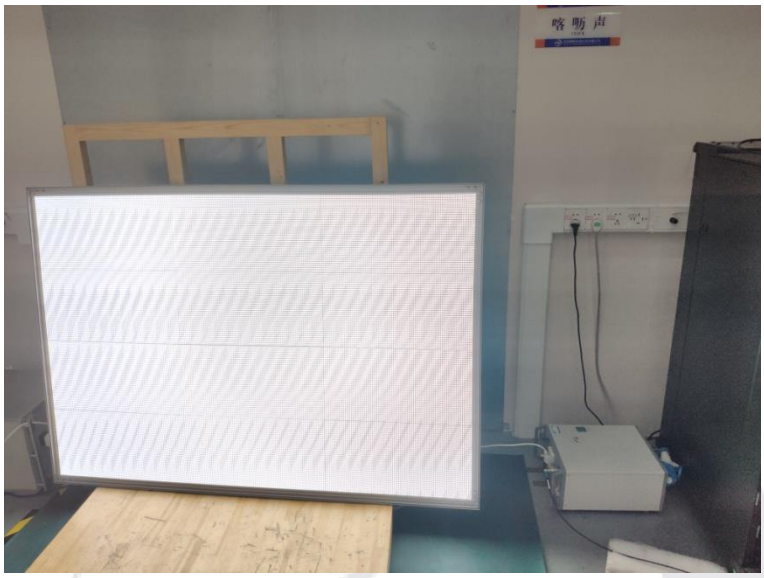
Performance:

Dips: The EUT was no change compared with initial operation during the test. Criteria : A

Interruptions: The EUT appeared shut down during the test, but self-recoverable after the test Criteria : B

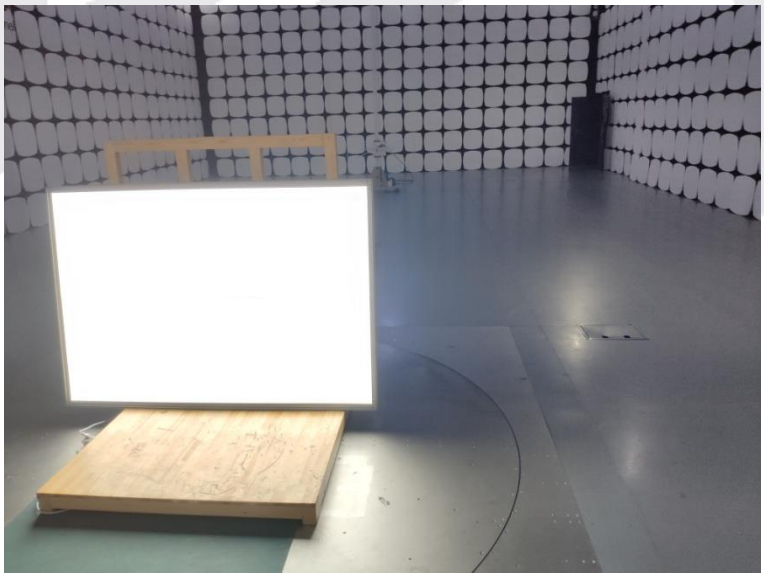
14 Test setup photo

Conducted disturbance at mains terminals Test

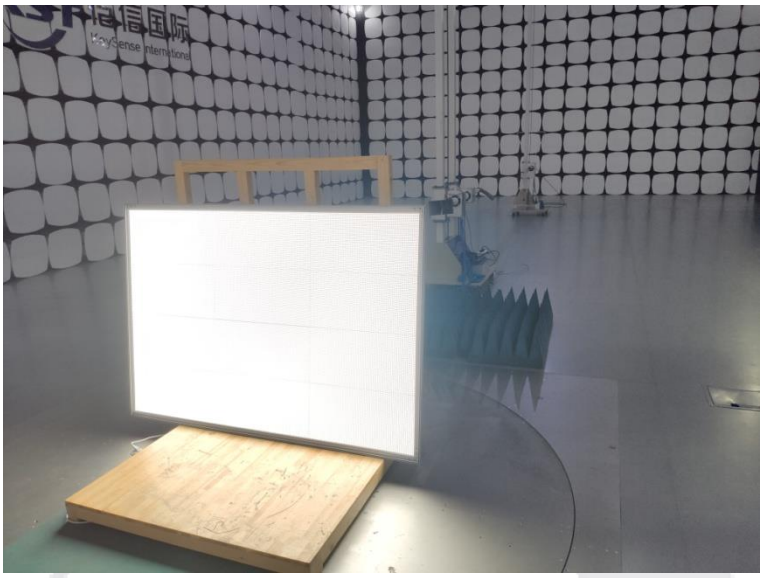


Radiated Disturbance Test

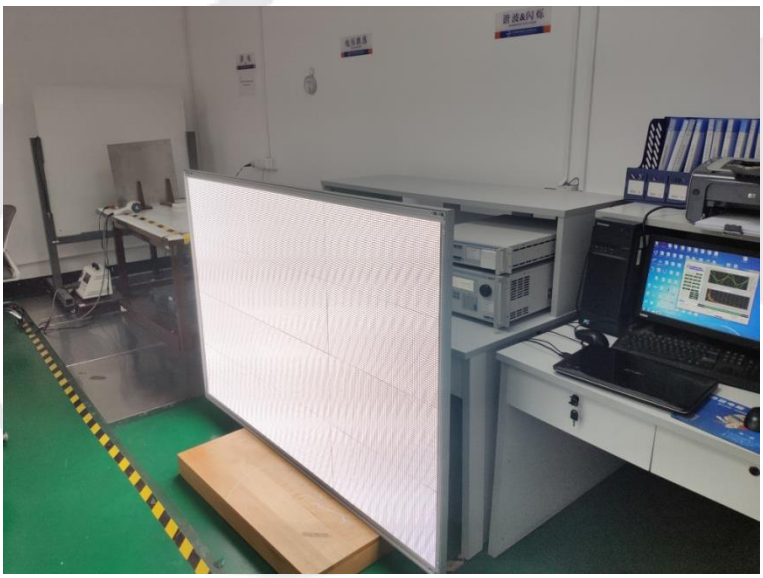
30-1000MHz



1-6GHz

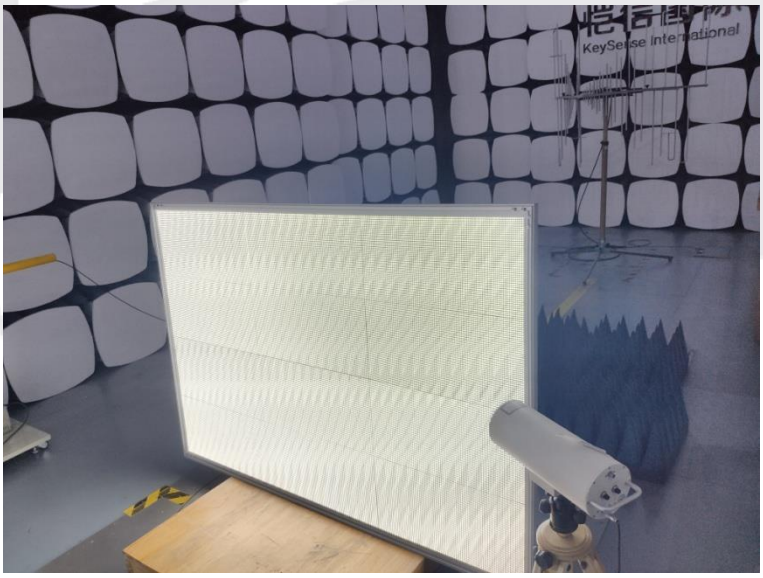


Harmonic current emission & Voltage fluctuations &flicker Test

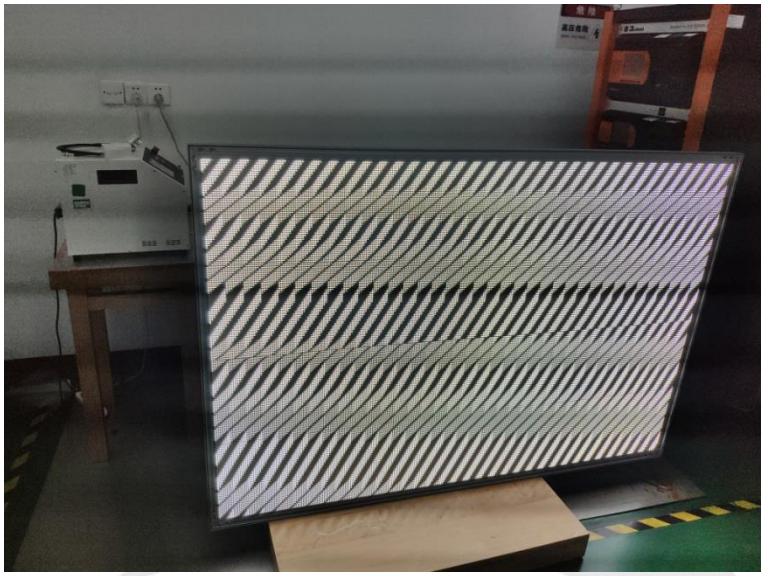


Electrostatic discharge Test

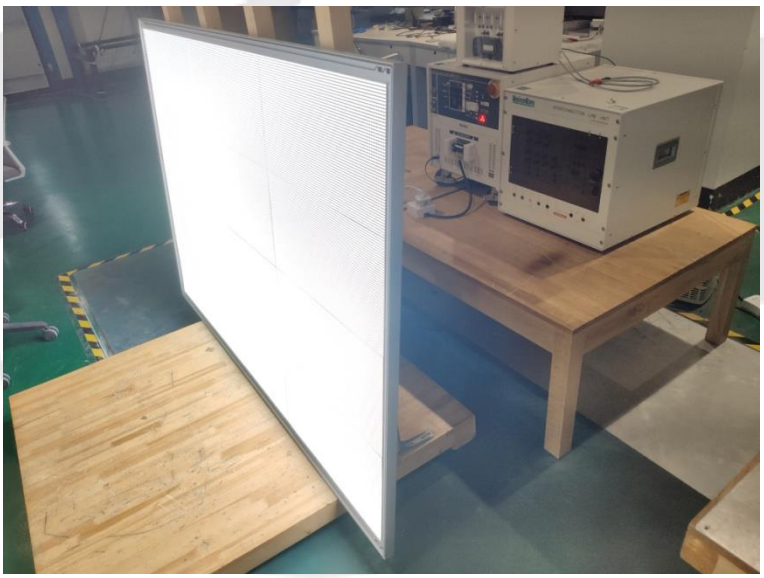
Radio-frequency Continuous radiated disturbance Test



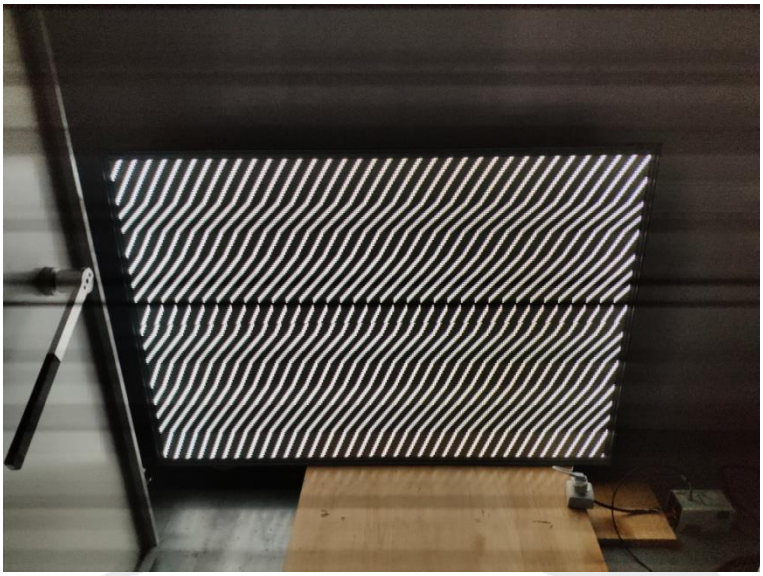
Electrical fast transient Test



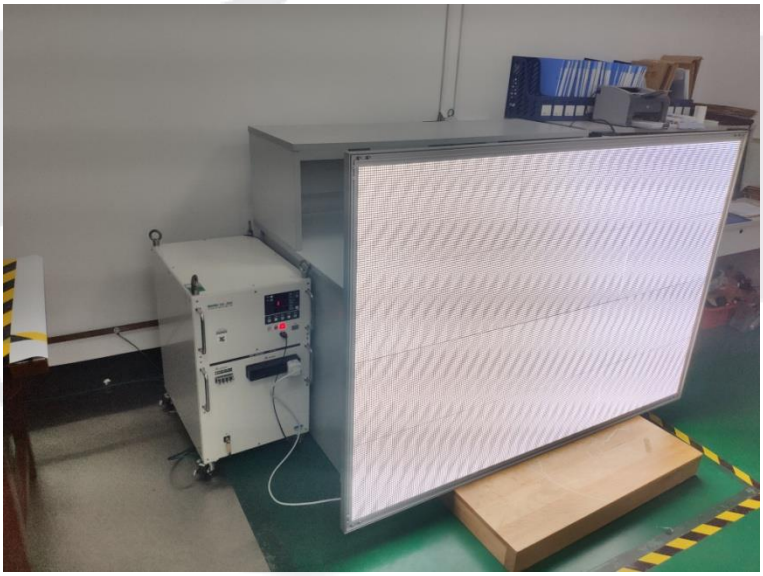
Surge Test



Radio-frequency, Continuous conducted disturbance Test



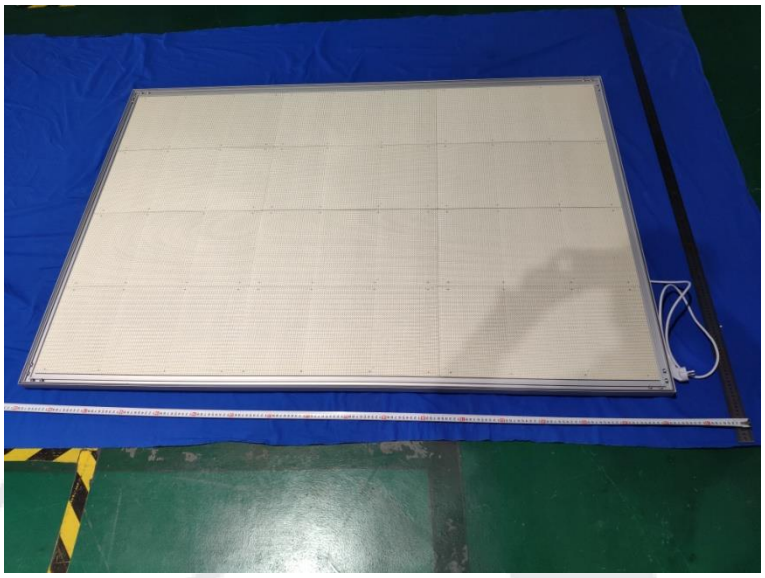
Voltage dips & interruption Test

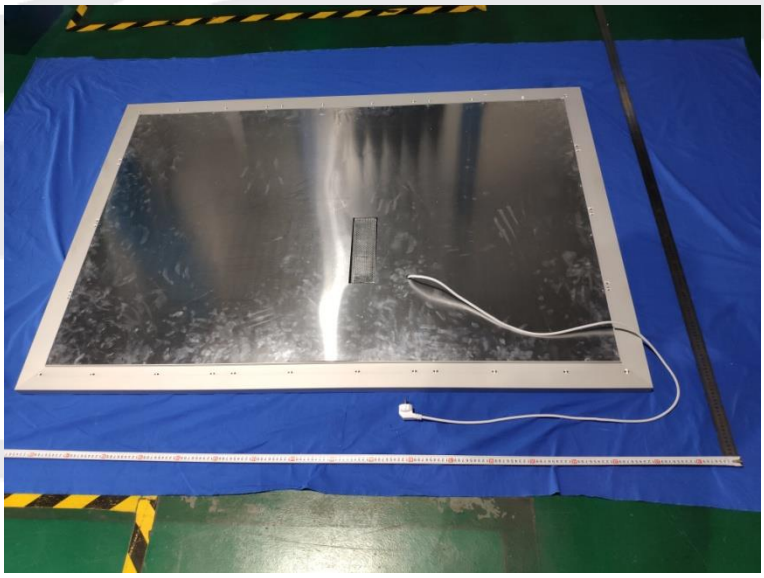


15 PHOTOS OF THE EUT

External Photos

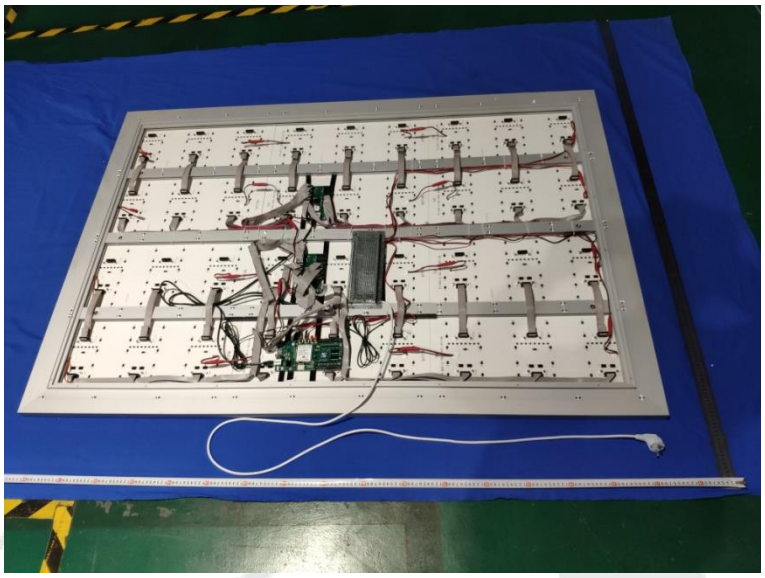
Model: JCD-NW





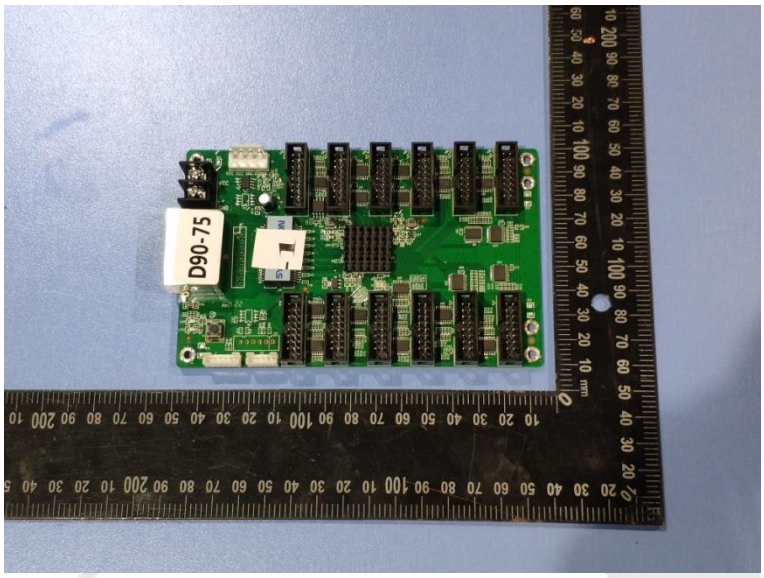
Internal Photos

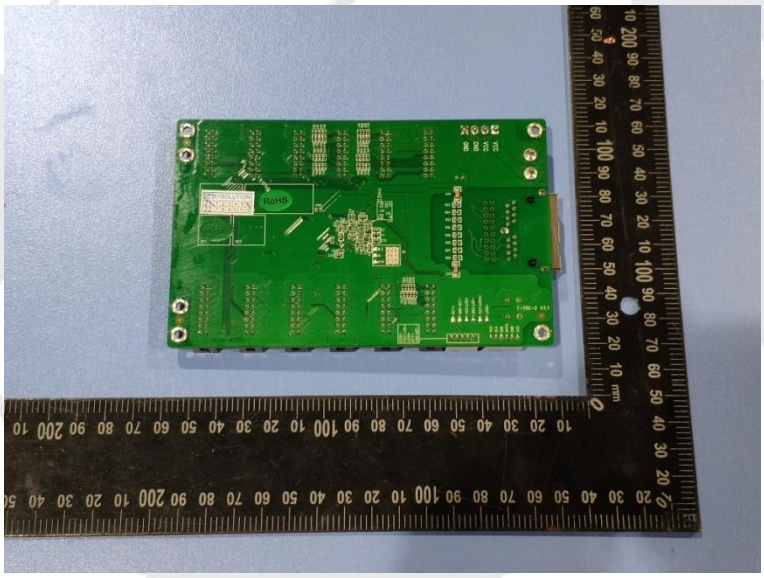
M/N: JCD-NW



Internal Photos

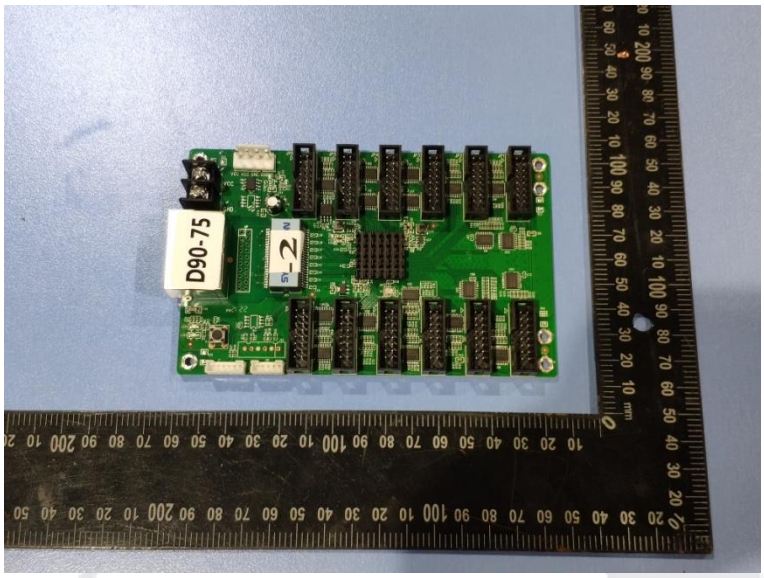
M/N: JCD-NW

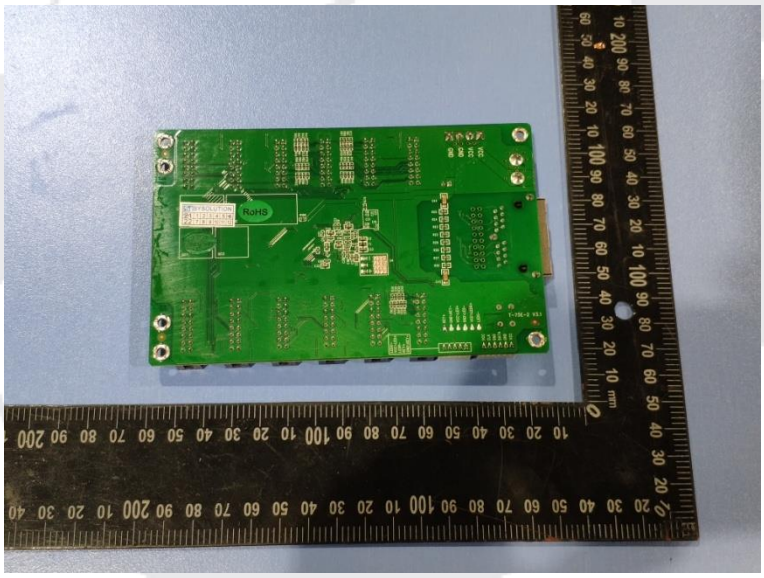




Internal Photos

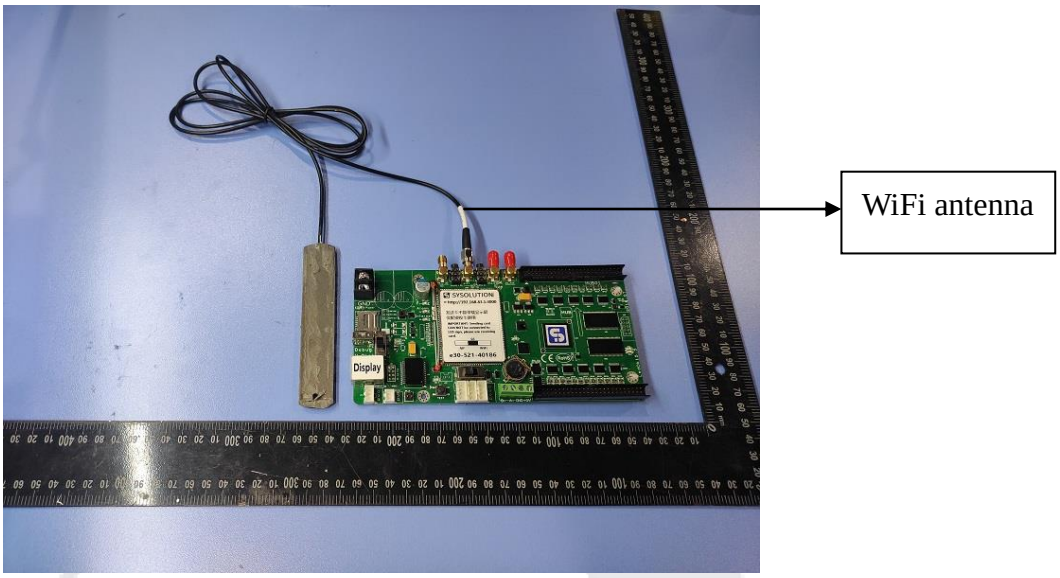
M/N: JCD-NW

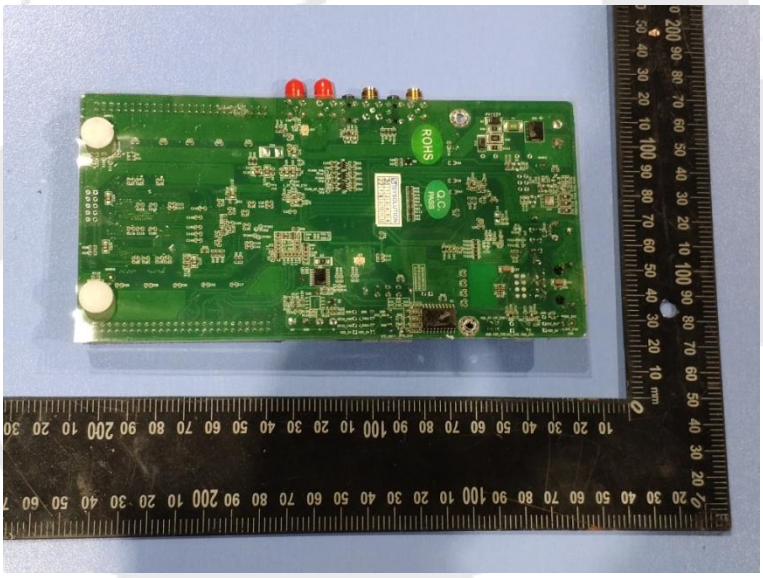




Internal Photos

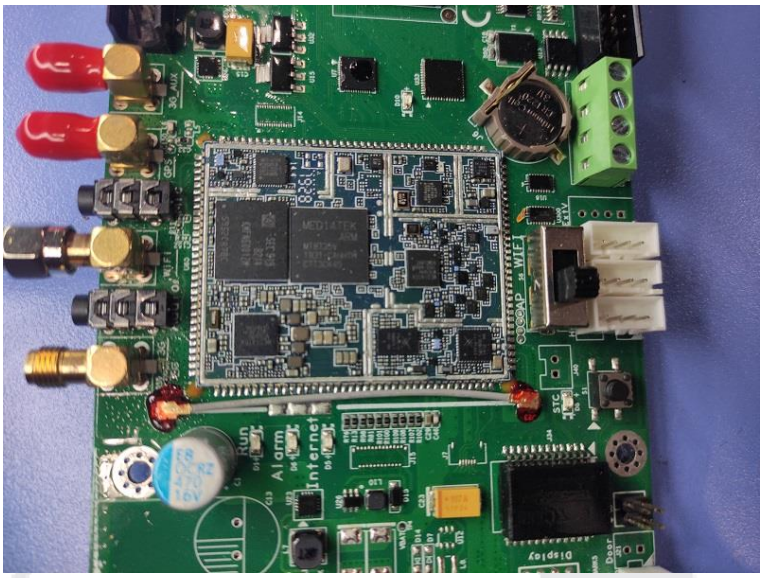
M/N: JCD-NW





Internal Photos

M/N: JCD-NW



End of Report

Statement

1. The calibration and measurement of test equipments used in our laboratory are traceable to National primary standard of measurement and BIPM.
2. The report is invalid without the special test seal of the company.
3. The test report is invalid without the signature of main tester,examiner and approver.
4. The report is invalid if altered and added or deleted.
5. The test results in this report only apply to the tested samples.
6. This test report shall not be reproduced except in full, without the written approval of our laboratory.
7. “☆”item cannot be Accredited by CNAS.
8. Any objections must be raised to KeySense within 15days since the date when report is received.

Test Laboratory: KeySense Testing & Certification International Co., Ltd.

Address: 1-3F,Lab Building,No.29 District,ZhongKai Hi-Tech Industrial Development Park,Huizhou,Guangdong,China

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