TEST REPORT

Product name:	**Fixed Luminaires For LED Modules**
Model and Specification：	**30897302-1**
Applicant：	**Zhongshan Zhaoliang Lighting Co., Ltd**
Factory：	**Zhongshan Zhaoliang Lighting Co., Ltd**

Guangdong Tsaint Hi-tech Co.,Ltd.

EMC TEST REPORT

EN IEC 55015: 2019/A11:2020
Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
EN 61547: 2009
Equipment for general lighting purposes - EMC immunity requirements

Report No	:	TSGK-2023-3748-E
Applicant	:	Zhongshan Zhaoliang Lighting Co., Ltd
Manufacturer	:	Zhongshan Zhaoliang Lighting Co., Ltd
EUT	:	Fixed Luminaires For LED Modules
Model No.	:	30897302-1
Input Rating	:	220VAC～,50Hz;120W

Measurement Procedure Used:

EN IEC 55015: 2019/A11:2020, EN IEC 61000-3-2: 2019/A1:2021 , EN 61000-3-3: 2013/A2:2021,EN 61547: 2009 (IEC 61000-4-2: 2008, IEC 61000-4-3:2020, IEC 61000-4-4: 2012,IEC 61000-4-5: 2014+A1: 2017, IEC 61000-4-6: 2013, IEC 61000-4-8: 2009, IEC 61000-4-11:2020)

The device described above is tested by Guangdong Tsaint Hi-tech Co.,Ltd. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Guangdong Tsaint Hi-tech Co.,Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the EN IEC 55015 and EN 61547 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Guangdong Tsaint Hi-tech Co.,Ltd.

Date of Test : Sep 25, 2023 to Oct 19, 2023

Prepared by : Charles Che / Editor

Reviewer : Ranger Peng / Supervisor

Approved & Authorized Signer : Fuyu Jiang /Manager

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Modified Information

Version	Summary	Revision Date	Report No.
Ver.1.0	Original Report	/	TSGK-2023-3748-E

1. DESCRIPTION OF STANDARDS AND RESULTS (EUT)

EMISSION			
Description of Test Item	Standard	Limits	Results
Disturbance voltages mains terminals (9kHz to 30MHz)	EN IEC 55015: 2019/A11:2020	Table 1	Pass
Radiated electromagnetic disturbances (30MHz to 1000MHz)	EN IEC 55015: 2019/A11:2020	Table 10	Pass
Radiated electromagnetic disturbances (9kHz to 30MHz)	EN IEC 55015: 2019/A11:2020	Table 8	Pass
Harmonic current emissions	EN IEC 61000-3-2: 2019/A1:2021	Class C	Pass
Voltage fluctuation and flicker	EN 61000-3-3: 2013/A2:2021	Section 5	Pass
IMMUNITY			
Description of Test Item	Basic Standard	Performance Criteria	Results
Electrostatic discharge	EN 61547: 2009 IEC 61000-4-2: 2008	B	Pass
Radio-frequency electromagnetic fields	EN 61547: 2009 IEC 61000-4-3:2020	A	Pass
Fast transientst	EN 61547: 2009 IEC 61000-4-4: 2012	B	Pass
Surges	EN 61547: 2009 IEC 61000-4-5: 2014+A1:2017	C	Pass
Injected currents (radio-frequency common mode)	EN 61547: 2009 IEC 61000-4-6: 2013	A	Pass
Power frequency magnetic fields	EN 61547: 2009 IEC 61000-4-8: 2009	A	N/A
Voltage interruptions, 100%	EN 61547: 2009 IEC 61000-4-11: 2020	B	Pass
Voltage dips, 30% Reduction		C	Pass

Note:
1. N/A is an abbreviation for Not Applicable.
2. The test result PASS and /or FAIL has no relationship with the measurement uncertainty.
3. “#” indicates the testing item(s) was(were) fulfilled by subcontracted lab.

2. GENERAL INFORMATION

2.1 Description of Device (EUT)

EUT	:	Fixed Luminaires For LED Modules
Model Number	:	30897302-1
Additional Model Number	:	30746901, 30746903, 30746905, 30746913, 30746914, 30746915, 30765302, 30765303, 30765304, 30765305, 30849610, 30849611, 30894902, 30894903, 30894904, 30895301, 30895302, 30895303, 30895304, 30895305, 30895307, 30895308, 30895311, 30895312, 30895314, 30897201, 30897202, 30897203, 30897205, 30897206, 30897207, 30897208, 30897209, 30897210, 30897212, 30897218, 30897301, 30897302, 30897303, 30897304, 30897305, 30897306, 30897307, 30897308, 30897309, 30897310, 30897311, 30907903, 30908203, 30908211, 30908212, 30910901, 30910902, 30910903, 30910904, 30910905, 30910906, 30910907, 30910908, 30910909, 30910910, 30910911, 30910912, 30910913, 30910914, 30910915, 30910916, 30910918, 30910919, 30911801, 30914701, 30914703, 30914704, 30914708, 30914709, 30914710, 30914711, 30914712, 30914713, 30914714, 30914715, 30914716, 30914717, 30915902, 30915903, 30916402, 30916403, 30916405, 30916408, 30916409, 30916410, 30916604, 30916903, 30916904, 30916905, 30916906, 30916907, 30916908, 30916910, 30917401, 30919401, 30919402, 30919403, 30919404, 30919405, 30919406, 30921201, 30921202, 30923006, 30923801, 30923802, 30923803, 30923804, 30923805, 30923806, 30923807, 30924101, 30924102, 30924103, 30924301, 30924302, 30925201, 30925202, 30925203, 30925204, 30925205, 30925206, 30925207, 30925208, 30925209, 30925210, 30925213, 30925214, 30929001, 30929201, 30929301, 30929302, 30929303, 30929304, 30931401, 30932201, 30932202, 30932701, 30932702, 30932703, 30932704, 30932705, 30932706, 30932707, 30932708, 30934001, 30934501, 30934502, 30934503, 30934801, 30934802, 30935501, 30935502, 30935503, 30935504, 30935505, 30935506, 30935507, 30935508, 30935509, 30935510, 30935511, 30935512, 30936301, 30936302, 30936401, 30936402, 50204702, 50206402, 50206405, 50209602
Trade Mark	:	N/A

Test Voltage	:	AC 230V/50Hz
Operate mode	:	ON
Applicant	:	Zhongshan Zhaoliang Lighting Co., Ltd
Address	:	7/F, No. 30 Qingji Street, Tiebian Village, Henglan Town, Zhongshan City, China
Manufacturer	:	Zhongshan Zhaoliang Lighting Co., Ltd
Address	:	7/F, No. 30 Qingji Street, Tiebian Village, Henglan Town, Zhongshan City, China
Factory	:	Zhongshan Zhaoliang Lighting Co., Ltd
Address	:	7/F, No. 30 Qingji Street, Tiebian Village, Henglan Town, Zhongshan City, China
Note	:	

2.2 Description of Test Facility

Name of Firm : Guangdong Tsaint Hi-tech Co.,Ltd.
Site Location : -1&1/F, Property 1, Area B, No.10, Lelin Road, Tongyi Industrial Park, Guzhen, Zhongshan, Guangdong, China

Site Description
EMC Lab : Accredited by CNAS, 2019.03.27
The certificate is valid until 2024.07.19
The Laboratory has been assessed and proved to be in compliance with CNAS/CL01: 2018
The Certificate Registration Number is L11197

2.3 Measurement Uncertainty

Test Item	Range	Measurement Uncertainty	Notes
Disturbance voltages	9kHz ~ 30MHz	2.7dB	(1)
Radiated electromagnetic	9kHz ~ 30MHz	2.5dB	(1)
Radiated electromagnetic	30~1000MHz	3.7dB	(1)
Test site temperature and humidity	/	0.6℃, 4%	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3. MEASURING DEVICES AND TEST EQUIPMENT

3.1 For Disturbance voltages mains terminals Measurement ☒

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Until
1.	Test Receiver	Rohde & Schwarz	ESCS	1164.6407.03	22 Dec, 2023
2.	LISN	Rohde & Schwarz	ENV216	3560.6550.15-101456-hK	22 Dec, 2023
3.	10dB Limiter	Schwarzbeck	VTSD 9561 F	#199	22 Dec, 2023
4.	Cable-CE01	HP	92227B	/	29 Dec, 2023

3.2 For Radiated electromagnetic disturbances (30 MHz to 1GHz) Measurement ☒

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Until
1.	Test Receiver	Rohde & Schwarz	ESR	1316.3003K7-102053-TK	22 Dec, 2023
2.	Antenna	Schwarzbeck	VULB 9162	00249	09 Jan, 2024
3.	966 Chamber	CRT	9m×6m×6m	/	12 Oct, 2023
4.	Cable-RE02	Times	SFT205-NMNM-2.00M	441734-0001	22 Dec, 2023
5.	Cable-RE03	Times	SFT205-NMNM-8.00M	441731-0001	22 Dec, 2023
6	CDNE	Schwarzbeck	CDNE M2	00137	29 Dec, 2023
7	CDNE	Schwarzbeck	CDNE M3	00130	29 Dec, 2023

3.3 For Radiated electromagnetic disturbances (9 kHz to 30 MHz) Measurement ☒

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Until
1.	Test Receiver	Rohde & Schwarz	ESCS	1164.6407.03	22 Dec, 2023
2.	Loop Antenna	Schwarzbeck	HXYZ9170	X9170-259	29 Dec, 2023
3.	Cable-ME	Times	LMP195-NMNM-4.00M	/	22 Dec, 2023

3.4 For Harmonic current / Flicker Measurement ☒

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Until
1.	Harmonic And Flicker Analyzer	California Instruments	CTS PACS-1	1633A03675	22 Dec, 2023
2.	AC Frequency Conversion Power	California Instruments	5000IX-CTS-400	1633A03650	22 Dec, 2023

3.5 For Electrostatic discharge Test ☒

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Until
1	ESD Tester	Noiseken	ESS2002	ESS0412432	26 Dec, 2023

3.6 For Radio-frequency electromagnetic fields Test ☒

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Until

1.	Power Meter	Boonton	4242	17199	22 Dec, 2023
2.	Field intensity meter	Narda	EP 600	711WX80880	09 Jan, 2024
3.	Antenna	Schwarzbeck	VUSLP 9111E	00037	09 Jan, 2024
4.	Power Amplifier	HTEC	HRF0810-250	MPA1810335	22 Dec, 2023
5.	Signal Generator	Keysight	N5181A	ATO-57097	22 Dec, 2023

3.7 For Fast transients Test ☒

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Until
1.	Burst Tester	Prima	EFT61004AG	PR15064529	22 Dec, 2023
2.	Coupling Clamp	Prima	/	/	22 Dec, 2023

3.8 For Surges Test ☒

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Until
1.	Surge Generator	Prima	SUG61005BG	PR15065967	22 Dec, 2023

3.9 For Injected currents (radio-frequency common mode) Test ☒

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Until
1.	Conducted Disturbances test system	Schloder	CDG 6000-75	18901827-0101	22 Dec, 2023
2.	CDN	Schloder	CDN M2+3-16A	18101727-0103	22 Dec, 2023
3.	Injection Clamp	Schloder	CDN EMCL-20	368	22 Dec, 2023
4.	Attenuator	Schloder	CDG 6050-100	3118	22 Dec, 2023

3.10 For Power frequency magnetic fields Test ☐

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Until
1	Power frequency magnetic fields test system	HTEC	HMFG 100	184201	22 Dec, 2023

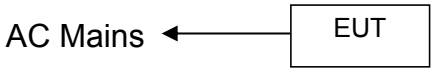
3.11 For Voltage dips and Interruptions Test ☒

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Until
1	Voltage Dips test system	Prima	DRP61011AG	PR15056304	22 Dec, 2023

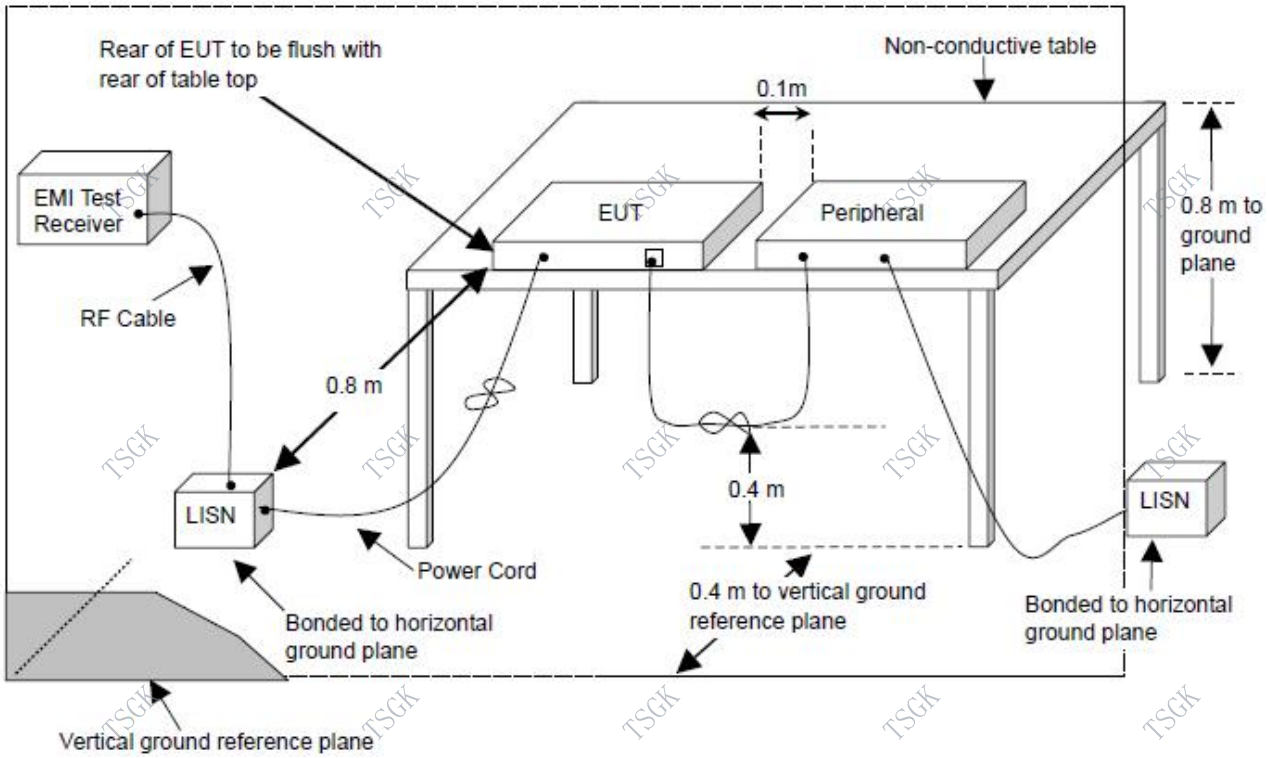
4. DISTURBANCE VOLTAGES MAINS TERMINALS MEASUREMENT

4.1 Block Diagram of Test Setup

4.1.1 Block diagram of connection between the EUT and simulators



4.1.2 Block Diagram of Test Setup



4.2 Disturbance voltages mains terminals Measurement Limits

Frequency	Limits dBμV	
	Quasi-peak Level	Average Level
9 kHz ~ 50 kHz	110	__
50 kHz ~ 150 kHz	90~80	__
150 kHz ~ 0.5 MHz	66~56	56~46
0.5 MHz ~ 5.0 MHz	56	46
5.0 MHz ~ 30 MHz	60	50
Note1-The lower limit shall apply at the transition frequencies. Note2-The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.		

4.3 Operating Condition of EUT

4.3.1 Setup the EUT as shown in Section 4.1.

4.3.2 Turn on the power of all equipments.

4.3.3 Let the EUT work in test mode (ON) and measure it.

4.4 Test Procedure

The EUT is put on the table which is 0.8 meter high above the ground and connected to the AC mains through a Line Impedance Stabilization Network (L.I.S.N.). This provided a 50ohm coupling impedance for the tested equipments. Both sides of AC line are checked to find out the maximum conducted emission according to the EN55015 regulations during conducted emission measurement. And the voltage probe had been used for the load terminals measurement according to the EN55015 standard.

The bandwidth of the test receiver (R&S ESCS) is set at 200Hz in 9kHz~150kHz range and 9kHz in 150kHz~30MHz range.

The frequency range from 9kHz to 30MHz is checked.

All the test results are listed in Section 4.5.

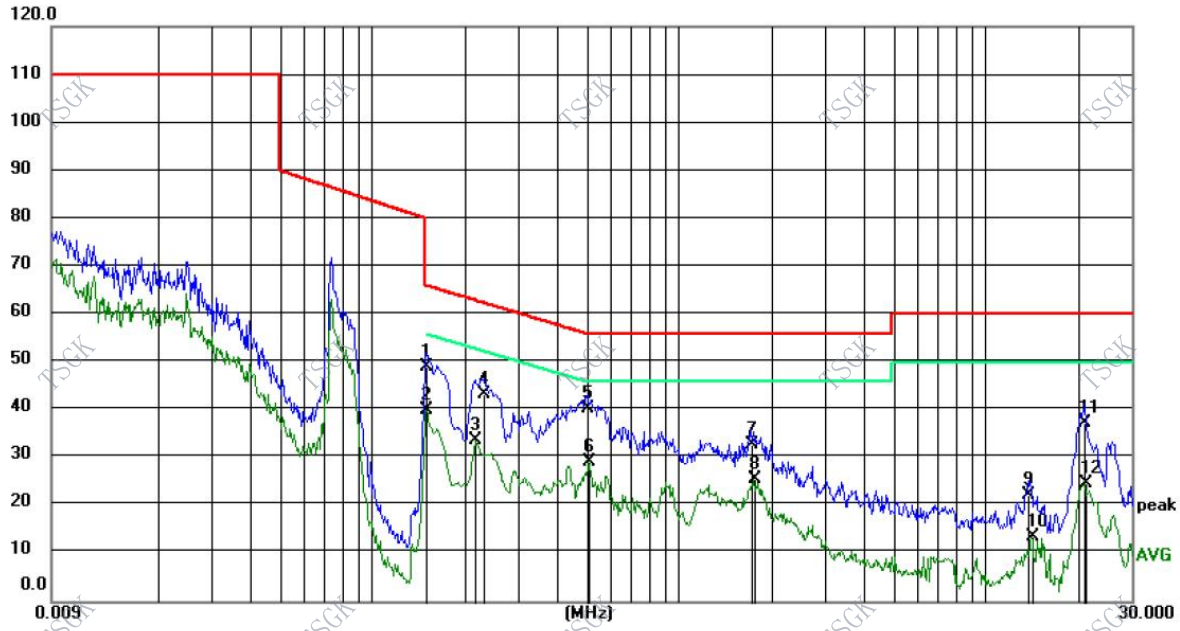
4.5 Measurement Results

PASS.

The frequency range from 9kHz to 30MHz is investigated.

The test data are attached in the following pages.

Model No.:	30897302-1



Site Shield Room 1# Phase: *L1* Temperature: 24

Limit: EN IEC 55015 QP Power: AC230V/50Hz Humidity: 54 %

EUT: Fixed Luminaires For LED Modules

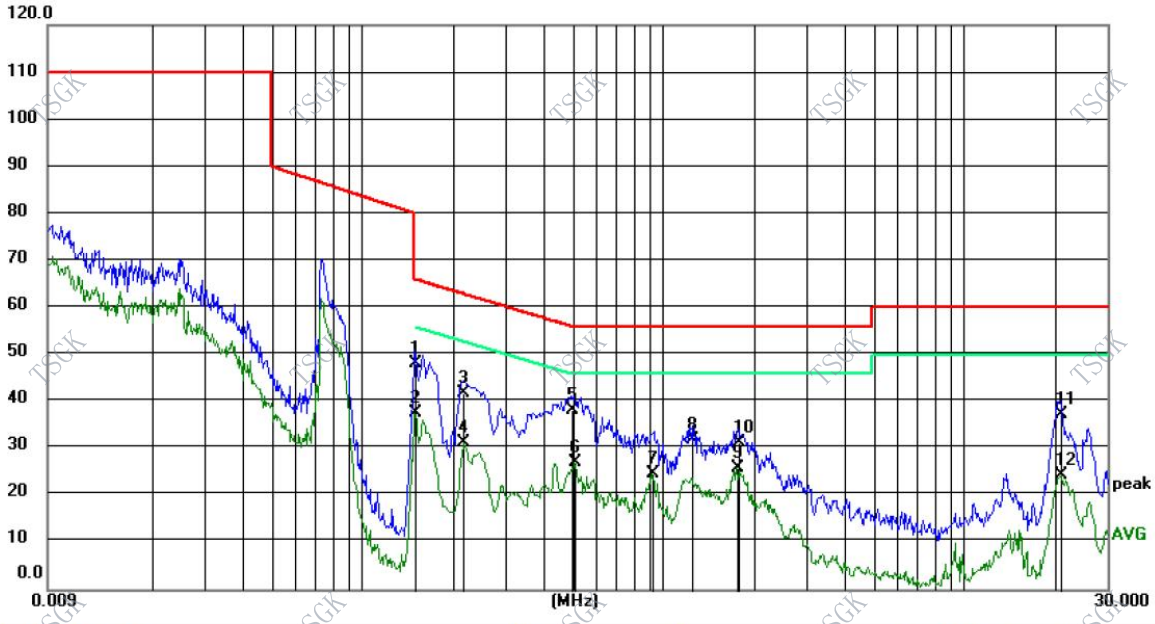
M/N: 30897302-1

Mode: ON

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz		dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	39.52	9.58	49.10	66.00	-16.90	QP	
2		0.1500	30.55	9.58	40.13	56.00	-15.87	AVG	
3		0.2176	24.32	9.51	33.83	52.91	-19.08	AVG	
4		0.2311	34.02	9.48	43.50	62.41	-18.91	QP	
5	*	0.5056	30.88	9.42	40.30	56.00	-15.70	QP	
6		0.5101	19.72	9.41	29.13	46.00	-16.87	AVG	
7		1.7161	23.46	9.34	32.80	56.00	-23.20	QP	
8		1.7656	16.45	9.33	25.78	46.00	-20.22	AVG	
9		13.7941	13.05	9.25	22.30	60.00	-37.70	QP	
10		14.1495	4.30	9.24	13.54	50.00	-36.46	AVG	
11		20.9940	27.86	9.34	37.20	60.00	-22.80	QP	
12		21.2191	15.49	9.34	24.83	50.00	-25.17	AVG	

Model No.:	30897302-1



Site Shield Room 1# Phase: N Temperature: 24

Limit: EN IEC 55015 QP Power: AC230V/50Hz Humidity: 54 %

EUT: Fixed Luminaires For LED Modules

M/N: 30897302-1

Mode: ON

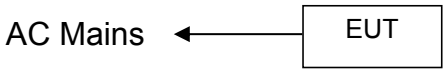
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz		dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1501	38.62	9.58	48.20	65.99	-17.79	QP	
2		0.1501	28.03	9.58	37.61	55.99	-18.38	AVG	
3		0.2176	32.19	9.51	41.70	62.91	-21.21	QP	
4		0.2176	21.79	9.51	31.30	52.91	-21.61	AVG	
5		0.4966	28.79	9.41	38.20	56.06	-17.86	QP	
6		0.5101	17.62	9.41	27.03	46.00	-18.97	AVG	
7		0.9194	15.35	9.43	24.78	46.00	-21.22	AVG	
8		1.2526	22.47	9.43	31.90	56.00	-24.10	QP	
9		1.7656	16.74	9.33	26.07	46.00	-19.93	AVG	
10		1.7744	22.07	9.33	31.40	56.00	-24.60	QP	
11		20.9536	27.96	9.34	37.30	60.00	-22.70	QP	
12		21.1156	15.23	9.34	24.57	50.00	-25.43	AVG	

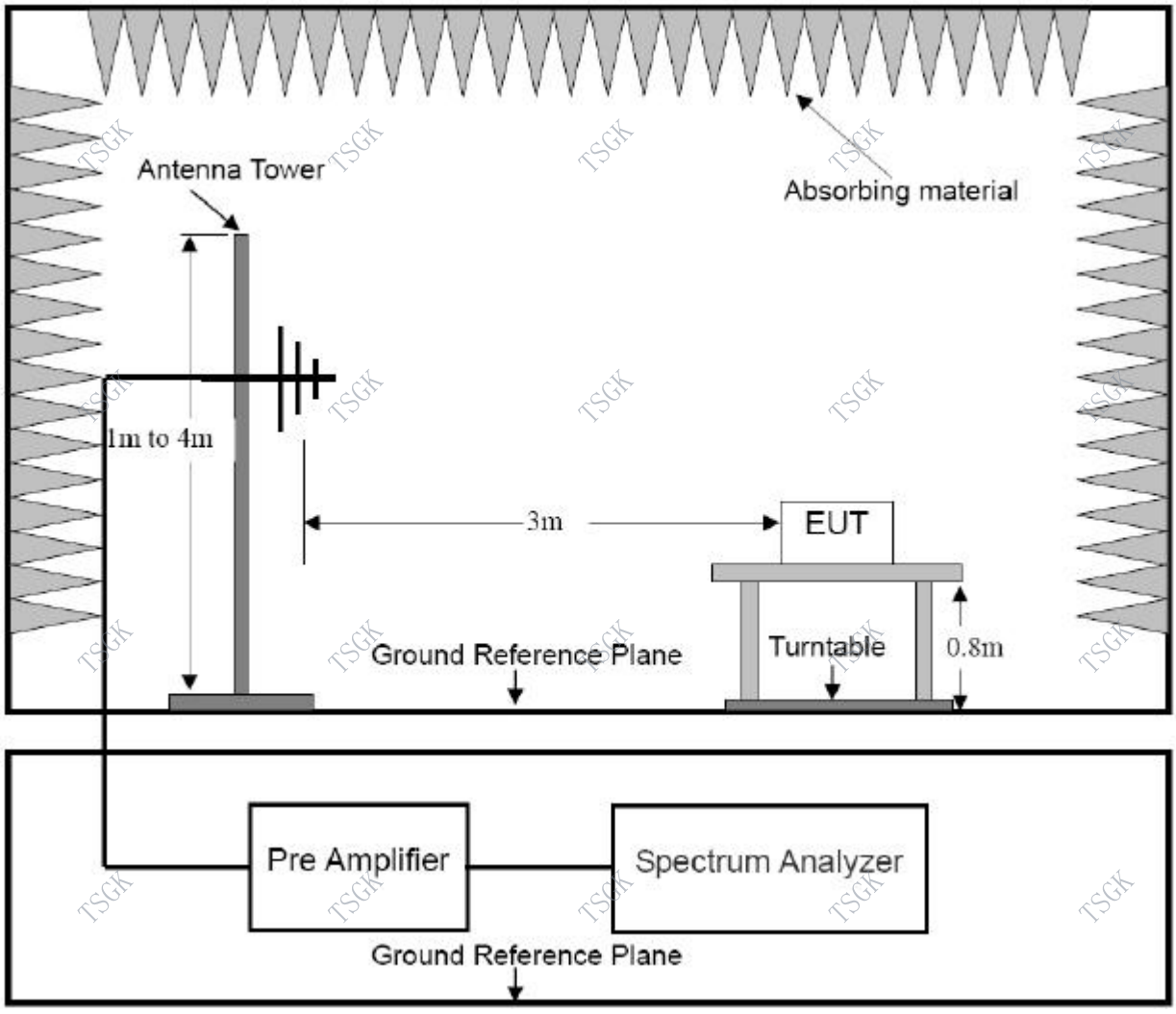
STURBANCES (30MHz To 1GHz) MEASUREMENT

5.1 Block Diagram of Test

5.1.1 Block diagram of connection between the EUT and simulators



5.1.2 Block diagram of test setup (In chamber)



5.2 Radiated electromagnetic disturbances (30MHz to 1GHz) Measurement Limits

All emanations from a device or system shall not exceed the level of field strengths specified below:

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT (dBμV/m)
30 ~ 230	3	40
230 ~ 1000	3	47

Note: (1) The smaller limit shall apply at the combination point between two frequency bands.
(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

5.3 Operating Condition of EUT

5.3.1 Setup the EUT as shown in Section 5.1.

5.3.1 Turn on the power.

5.3.2 Let the EUT work in test mode (ON) and measure it.

5.4 Test Procedure

The EUT is placed on a turn table which is 0.8 meter high above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meter to find out the maximum emission level. Bilog antenna (calibrated by Dipole Antenna) is used as a receiving antenna. Both horizontal and vertical polarizations of the antenna are set on test.

The bandwidth of the Receiver (ESR) is set at 120kHz.

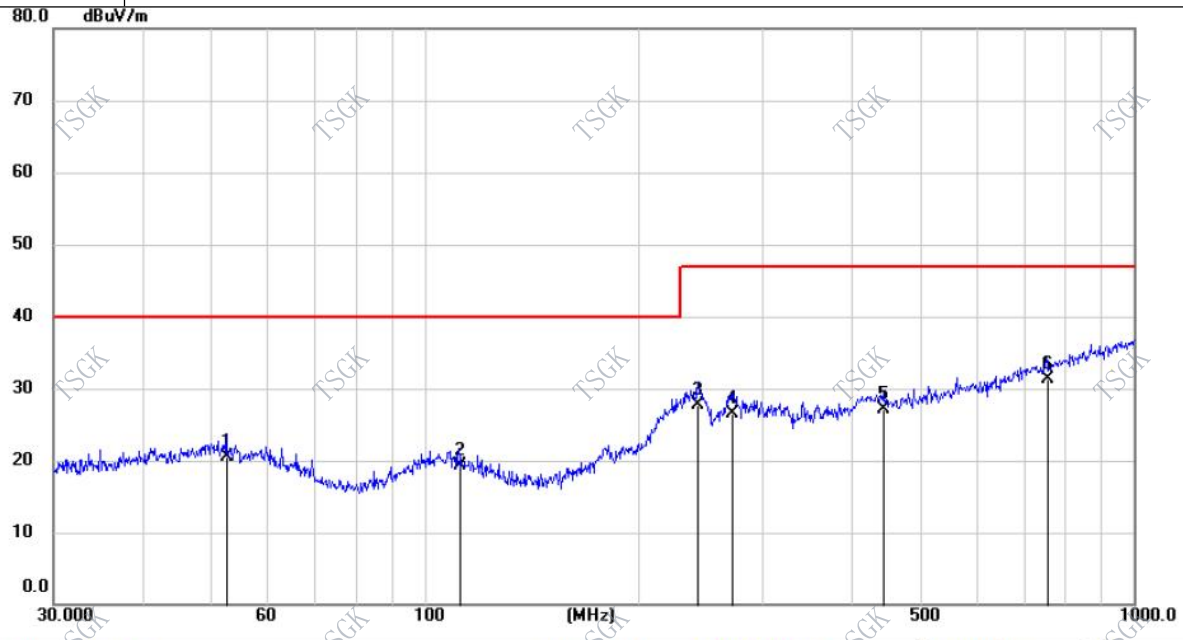
5.5 Test Results

PASS.

The frequency range from 30MHz to 1000MHz is investigated.

The test data are attached in the following pages.

Model No.:	30897302-1



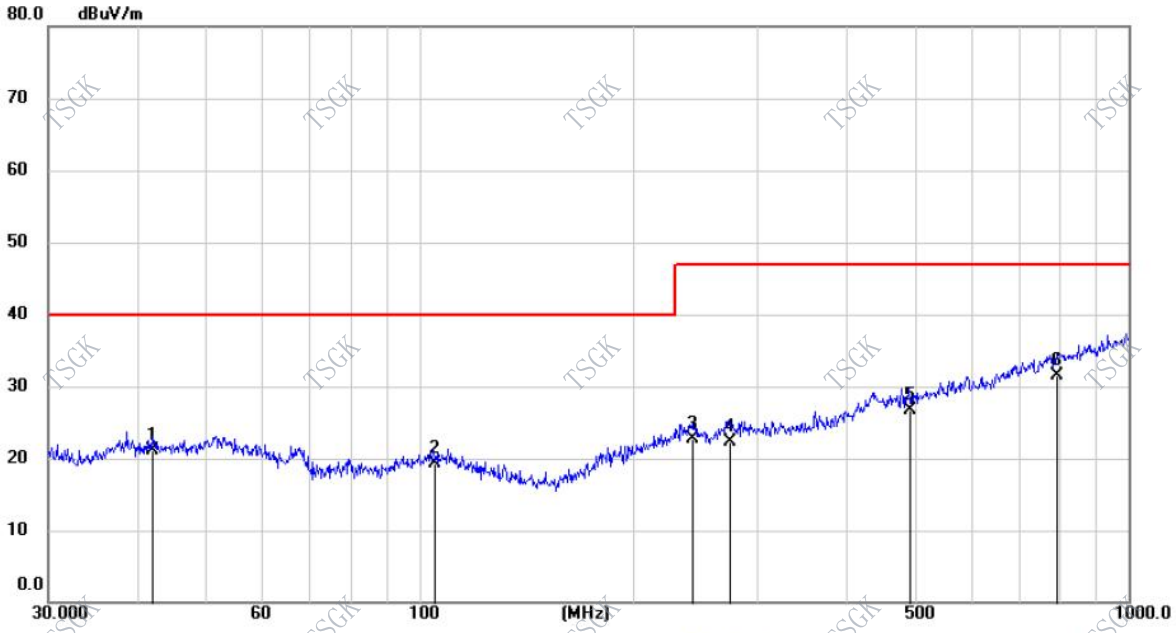
Site 966 Chamber
Limit: EN IEC 55015 Radiation (QP)
EUT: Fixed Luminaires For LED Modules
M/N: 30897302-1
Mode: ON
Note:

Polarization: *Horizontal*
Power: AC230V/50Hz
Distance: 3m

Temperature: 24
Humidity: 55 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		52.5753	6.55	13.95	20.50	40.00	-19.50	QP			
2		111.7380	8.75	10.65	19.40	40.00	-20.60	QP			
3		242.5253	14.35	13.45	27.80	47.00	-19.20	QP			
4		271.3245	12.29	14.31	26.60	47.00	-20.40	QP			
5		443.2941	9.12	17.98	27.10	47.00	-19.90	QP			
6	*	752.7432	7.95	23.35	31.30	47.00	-15.70	QP			

Model No.:	30897302-1



Site 966 Chamber
Limit: EN IEC 55015 Radiation (QP)
EUT: Fixed Luminaires For LED Modules
M/N: 30897302-1
Mode: ON
Note:

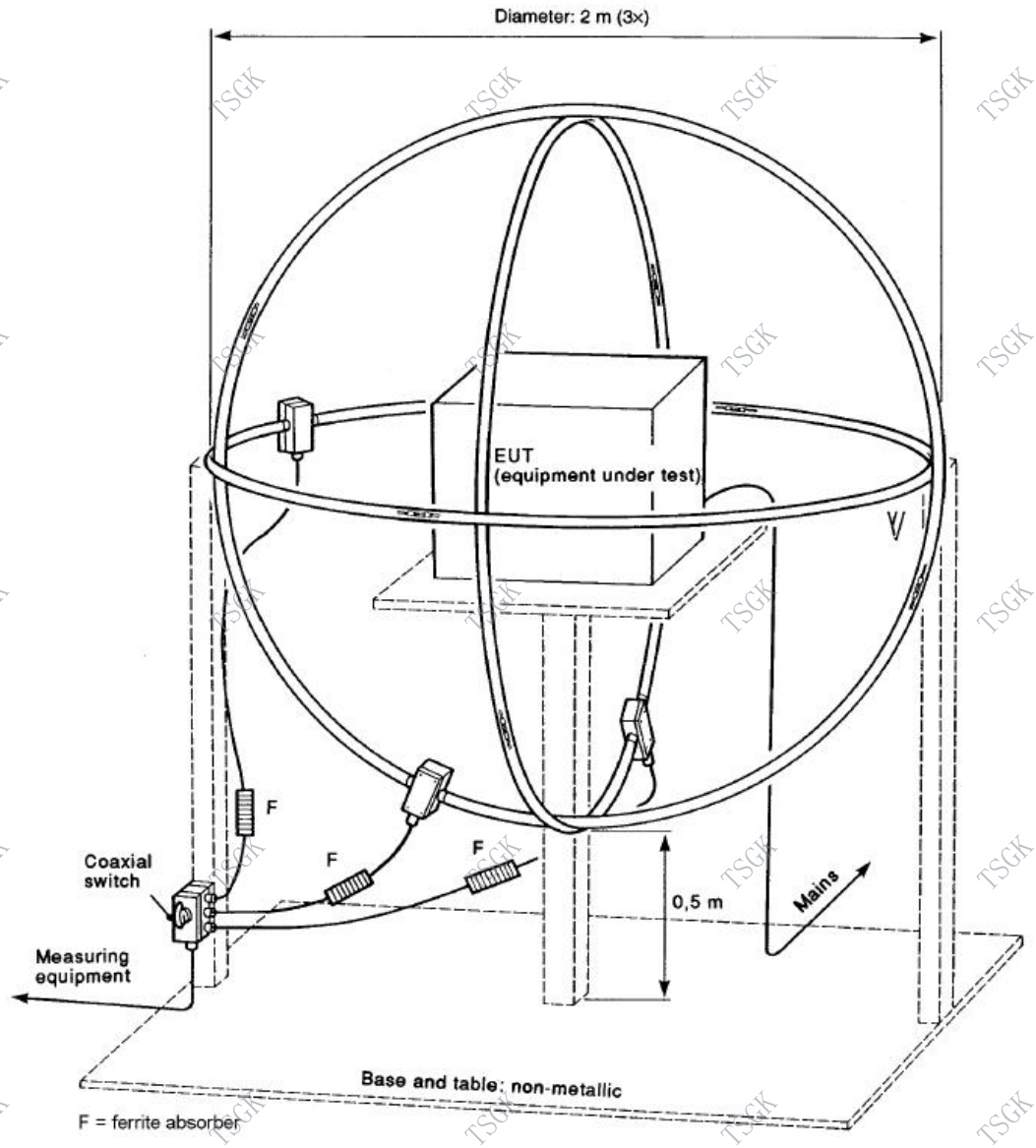
Polarization: *Vertical*
Power: AC230V/50Hz
Distance: 3m

Temperature: 24
Humidity: 55 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		42.0065	8.11	12.99	21.10	40.00	-18.90	QP			
2		104.9033	7.82	11.48	19.30	40.00	-20.70	QP			
3		242.5253	9.35	13.45	22.80	47.00	-24.20	QP			
4		273.2341	7.94	14.36	22.30	47.00	-24.70	QP			
5		490.7447	7.53	19.17	26.70	47.00	-20.30	QP			
6	*	793.3958	7.17	24.33	31.50	47.00	-15.50	QP			

6. RADIATED ELECTROMAGNETIC DISTURBANCES (9kHz To 30MHz) MEASUREMENT

6.1 Block Diagram of Test Setup



6.2 Radiated electromagnetic disturbances (9kHz to 30MHz) Measurement Limits

Frequency	Limits for loop diameter (dBμA)
	2m
9kHz ~ 70kHz	88
70kHz ~ 150kHz	88 ~ 58*
150kHz ~ 3.0MHz	58 ~ 22*
3.0MHz ~ 30MHz	22

1. At the transition frequency the lower limit applies.
2. * decreasing linearly with logarithm of the frequency.

6.3 Operating Condition of EUT

6.3.1 Setup the EUT as shown in Section 6.1.

6.3.2 Turn on the power.

6.3.3 Let the EUT work in test mode (ON) and measure it.

6.4 Test Procedure

The EUT is placed on a wood table in the center of a loop antenna. The induced current in the loop antenna is measured by means of a current probe and the test receiver.
Three field components are checked by means of a coaxial switch.

The frequency range from 9kHz to 30MHz is investigated. The receiver is measured with the quasi-peak detector. For frequency band 9kHz to 150kHz, the bandwidth of the field strength meter (R&S test receiver ESCS) is set at 200Hz. For frequency band 150kHz to 30MHz, the bandwidth is set at 9kHz.

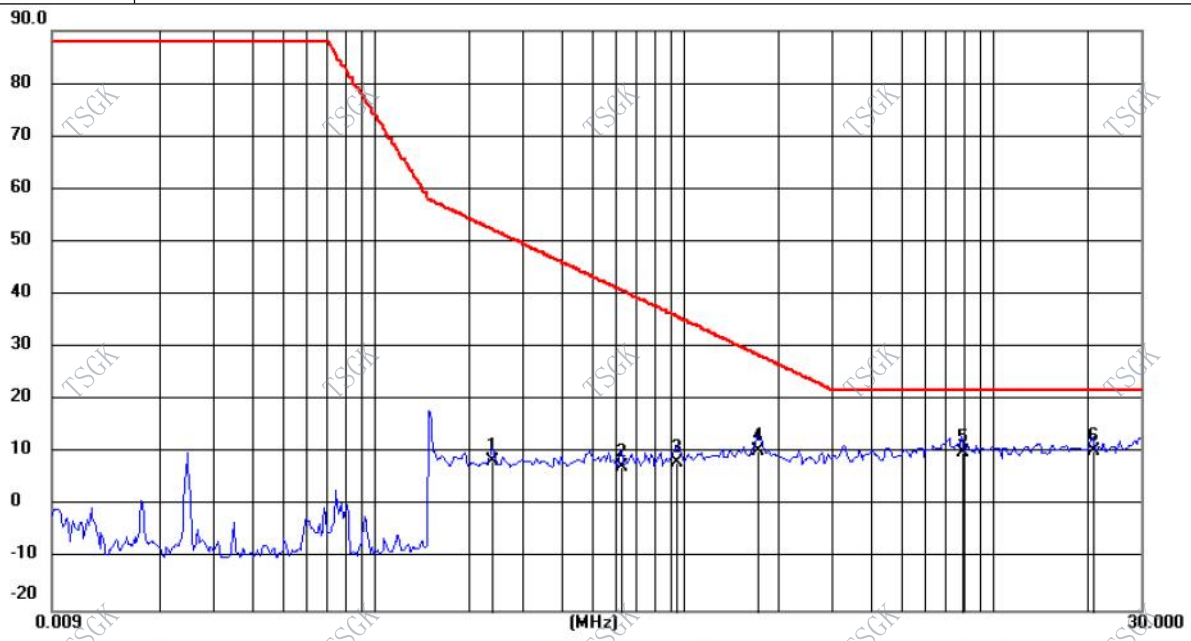
6.5 Test Results

PASS.

The frequency range from 9kHz to 30MHz is investigated.

The test data are attached in the following pages.

Model No.:	30897302-1



Site Shield Room 1# Polarization: X Temperature: 24

Limit: EN55015 ME Power: AC230V/50Hz Humidity: 54 %

EUT: Fixed Luminaires For LED Modules Distance:

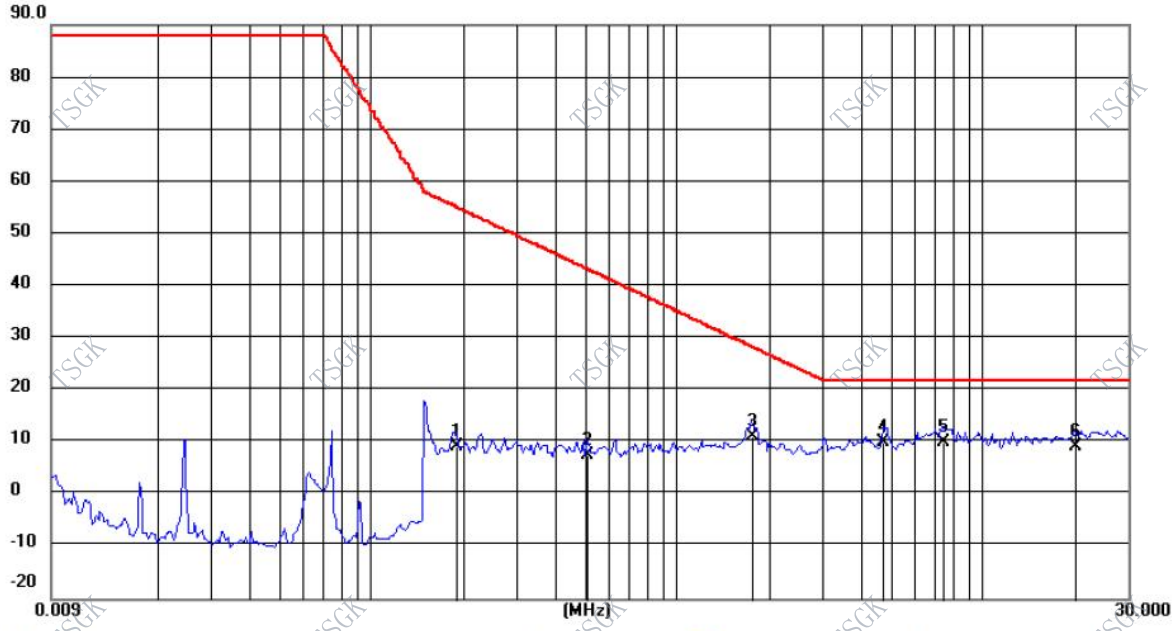
M/N: 30897302-1

Mode: ON

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuA	dBuA	dB	Detector	cm	degree	Comment
1		0.2400	8.35	0.05	8.40	52.35	-43.95	QP			
2		0.6250	7.42	0.08	7.50	40.85	-33.35	QP			
3		0.9450	8.19	0.11	8.30	35.88	-27.58	QP			
4		1.7200	10.15	0.15	10.30	28.68	-18.38	QP			
5		7.8900	10.05	0.15	10.20	22.00	-11.80	QP			
6	*	21.0000	10.09	0.31	10.40	22.00	-11.60	QP			

Model No.:	30897302-1



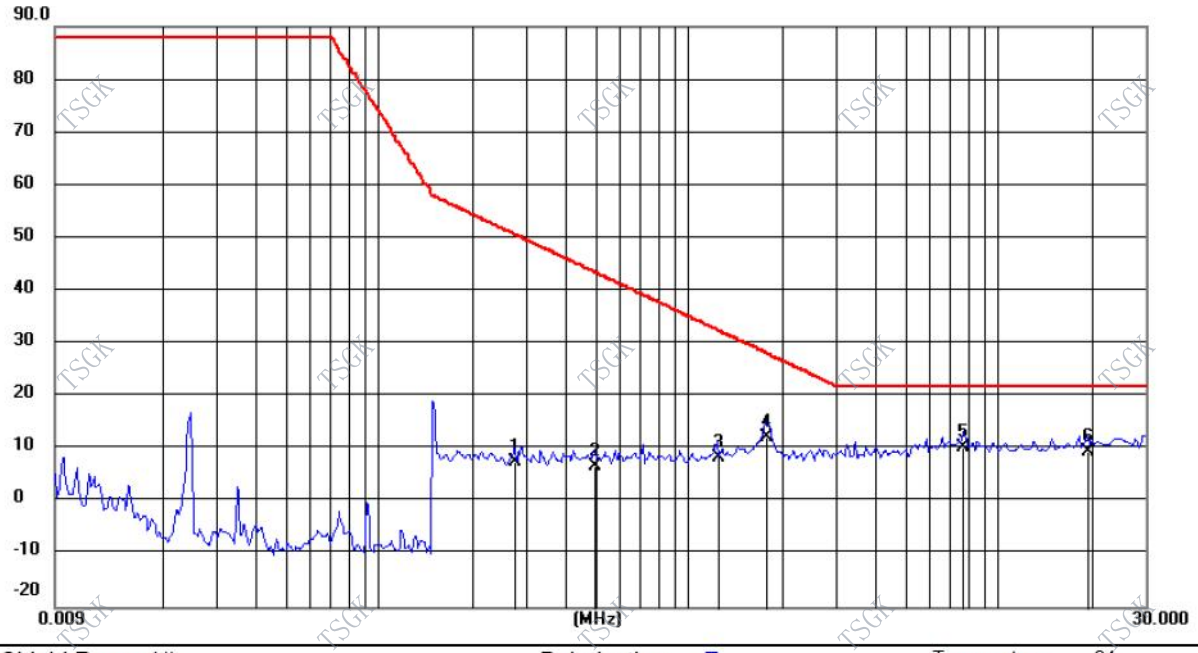
Site Shield Room 1#
Limit: EN55015 ME
EUT: Fixed Luminaires For LED Modules
M/N: 30897302-1
Mode: ON
Note:

Polarization: Y
Power: AC230V/50Hz
Distance:

Temperature: 24
Humidity: 54 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuA	dBuA	dB	Detector	cm	degree	Comment
1		0.1900	9.15	0.05	9.20	55.16	-45.96	QP			
2		0.5100	7.63	0.07	7.70	43.29	-35.59	QP			
3		1.7550	11.04	0.16	11.20	28.44	-17.24	QP			
4		4.7500	9.93	0.07	10.00	22.00	-12.00	QP			
5	*	7.4200	9.94	0.16	10.10	22.00	-11.90	QP			
6		20.0500	8.99	0.31	9.30	22.00	-12.70	QP			

Model No.:	30897302-1



Site Shield Room 1#
Limit: EN55015 ME
EUT: Fixed Luminaires For LED Modules
M/N: 30897302-1
Mode: ON
Note:

Polarization: Z
Power: AC230V/50Hz
Distance:

Temperature: 24
Humidity: 54 %

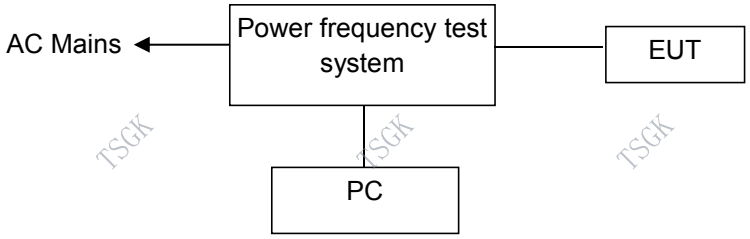
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuA	dBuA	dB	Detector	cm	degree	Comment
1		0.2750	7.65	0.05	7.70	50.72	-43.02	QP			
2		0.4950	6.83	0.07	6.90	43.65	-36.75	QP			
3		1.2400	8.38	0.12	8.50	32.62	-24.12	QP			
4		1.7700	12.14	0.16	12.30	28.34	-16.04	QP			
5	*	7.7100	10.24	0.16	10.40	22.00	-11.60	QP			
6		19.5000	9.18	0.32	9.50	22.00	-12.50	QP			

7. HARMONIC CURRENT MEASUREMENT

7.1Block Diagram of Test Setup

7.1.1 Block diagram of connection between the EUT and simulators

7.1.2 Block Diagram of Test Setup



7.2 Measuring Standard

EN IEC 61000-3-2: 2019/A1:2021 Class C

7.3 Operating Condition of EUT

7.3.1 Setup the EUT as shown in Section 7.1.

7.3.2 Turn on the power of all equipments.

7.3.3 Let the EUT work in test mode (ON) and measure it.

7.4 Test Results

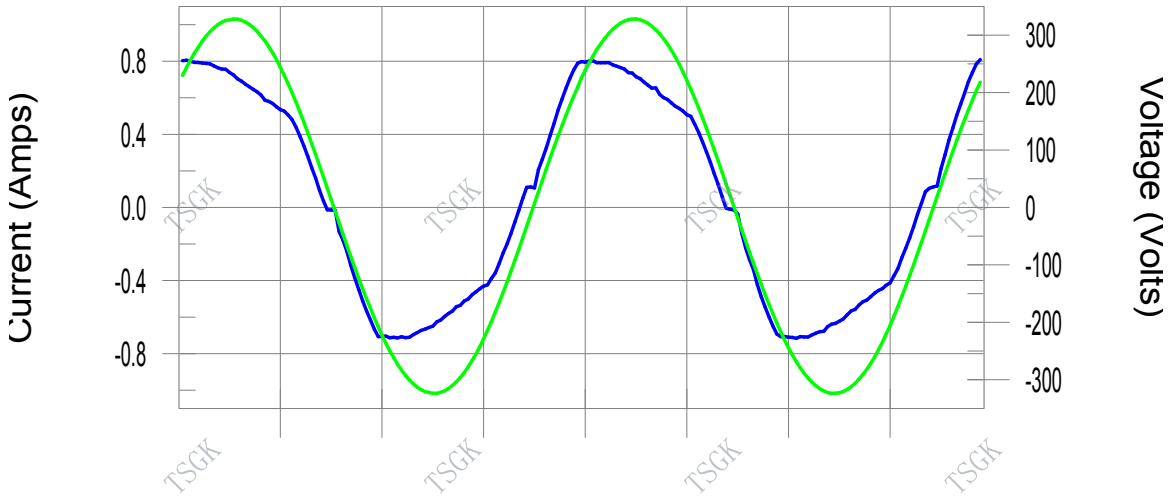
PASS.

Please refer to the following pages.

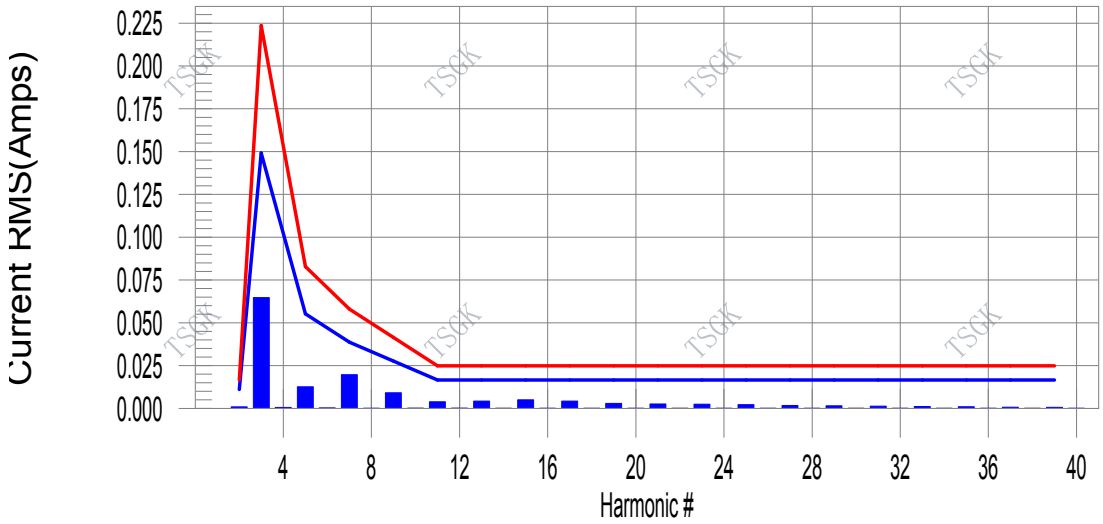
Harmonics – Class-C per IEC 61000-3-2:2018/AMD1:2020(Run time)

Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class C limit line European Limits



Test result: Pass Worst harmonics H7-34.2% of 150% limit, H7-51% of 100% limit

Current Test Result Summary (Run time)

Test Result: Pass Source qualification: Normal
THC(A): 0.070 I-THD(%): 12.7 POHC(A): 0.005 POHC Limit(A): 0.052

Highest parameter values during test:

V_RMS (Volts):	230.59	Frequency(Hz):	50.00
I_Peak (Amps):	0.869	I_RMS (Amps):	0.559
I_Fund (Amps):	0.552	Crest Factor:	1.560
Power (Watts):	125.0	Power Factor:	0.971

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	0.011	N/A	0.001	0.017	N/A	Pass
3	0.065	0.149	43.4	0.068	0.224	30.2	Pass
4	0.001	0.000	N/A	0.001	0.000	N/A	Pass
5	0.013	0.055	22.8	0.013	0.083	16.2	Pass
6	0.000	0.000	N/A	0.000	0.000	N/A	Pass
7	0.020	0.039	51.0	0.020	0.058	34.2	Pass
8	0.000	0.000	N/A	0.000	0.000	N/A	Pass
9	0.009	0.028	33.1	0.009	0.041	22.5	Pass
10	0.000	0.000	N/A	0.000	0.000	N/A	Pass
11	0.004	0.017	N/A	0.004	0.025	N/A	Pass
12	0.000	0.000	N/A	0.000	0.000	N/A	Pass
13	0.004	0.017	N/A	0.004	0.025	N/A	Pass
14	0.000	0.000	N/A	0.000	0.000	N/A	Pass
15	0.005	0.017	30.5	0.005	0.025	20.8	Pass
16	0.000	0.000	N/A	0.000	0.000	N/A	Pass
17	0.004	0.017	N/A	0.004	0.025	N/A	Pass
18	0.000	0.000	N/A	0.000	0.000	N/A	Pass
19	0.003	0.017	N/A	0.003	0.025	N/A	Pass
20	0.000	0.000	N/A	0.000	0.000	N/A	Pass
21	0.003	0.017	N/A	0.003	0.025	N/A	Pass
22	0.000	0.000	N/A	0.000	0.000	N/A	Pass
23	0.002	0.017	N/A	0.003	0.025	N/A	Pass
24	0.000	0.000	N/A	0.000	0.000	N/A	Pass
25	0.002	0.017	N/A	0.002	0.025	N/A	Pass
26	0.000	0.000	N/A	0.000	0.000	N/A	Pass
27	0.002	0.017	N/A	0.002	0.025	N/A	Pass
28	0.000	0.000	N/A	0.000	0.000	N/A	Pass
29	0.002	0.017	N/A	0.002	0.025	N/A	Pass
30	0.000	0.000	N/A	0.000	0.000	N/A	Pass
31	0.001	0.017	N/A	0.001	0.025	N/A	Pass
32	0.000	0.000	N/A	0.000	0.000	N/A	Pass
33	0.001	0.017	N/A	0.001	0.025	N/A	Pass
34	0.000	0.000	N/A	0.000	0.000	N/A	Pass
35	0.001	0.017	N/A	0.001	0.025	N/A	Pass
36	0.000	0.000	N/A	0.000	0.000	N/A	Pass
37	0.001	0.017	N/A	0.001	0.025	N/A	Pass
38	0.000	0.000	N/A	0.000	0.000	N/A	Pass
39	0.001	0.017	N/A	0.001	0.025	N/A	Pass
40	0.000	0.000	N/A	0.000	0.000	N/A	Pass

Note: Dynamic limits were applied for this test. The highest harmonics values in the above table may not occur at the same window as the maximum harmonics/limit ratio.

Voltage Source Verification Data (Run time)

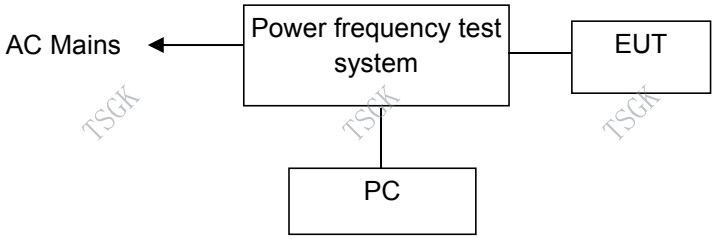
Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.051	0.461	11.02	OK
3	0.397	2.075	19.15	OK
4	0.033	0.461	7.08	OK
5	0.028	0.922	3.01	OK
6	0.020	0.461	4.27	OK
7	0.027	0.692	3.95	OK
8	0.008	0.461	1.81	OK
9	0.017	0.461	3.73	OK
10	0.011	0.461	2.45	OK
11	0.016	0.231	7.14	OK
12	0.016	0.231	6.75	OK
13	0.013	0.231	5.67	OK
14	0.008	0.231	3.29	OK
15	0.014	0.231	5.88	OK
16	0.009	0.231	3.79	OK
17	0.009	0.231	3.96	OK
18	0.009	0.231	4.07	OK
19	0.008	0.231	3.33	OK
20	0.010	0.231	4.18	OK
21	0.007	0.231	2.90	OK
22	0.007	0.231	2.93	OK
23	0.008	0.231	3.35	OK
24	0.006	0.231	2.57	OK
25	0.006	0.231	2.79	OK
26	0.007	0.231	3.04	OK
27	0.007	0.231	2.85	OK
28	0.006	0.231	2.67	OK
29	0.007	0.231	2.94	OK
30	0.006	0.231	2.75	OK
31	0.006	0.231	2.72	OK
32	0.006	0.231	2.72	OK
33	0.007	0.231	2.83	OK
34	0.006	0.231	2.61	OK
35	0.007	0.231	2.87	OK
36	0.007	0.231	3.22	OK
37	0.006	0.231	2.57	OK
38	0.006	0.231	2.70	OK
39	0.008	0.231	3.27	OK
40	0.009	0.231	3.85	OK

8. VOLTAGE FLUCTUATIONS & FLICKER MEASUREMENT

8.1 Block Diagram of Test Setup

8.1.1 Block diagram of connection between the EUT and simulators

8.1.2 Block Diagram of Test Setup



8.2 Measuring Standard

EN 61000-3-3: 2013/A2:2021

8.3 Operating Condition of EUT

8.3.1 Setup the EUT as shown in Section 8.1.

8.3.2 Turn on the power of all equipments.

8.3.3 Let the EUT work in test mode (ON) and measure it.

8.4 Test Results

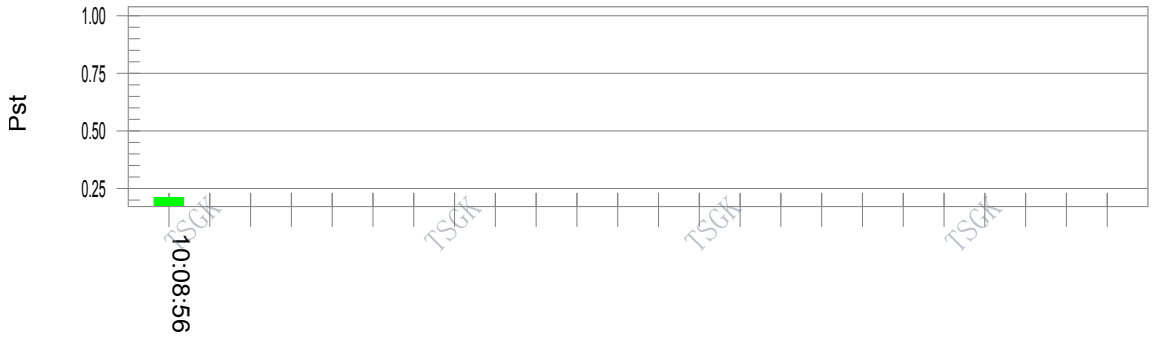
PASS.

Please refer to the following pages.

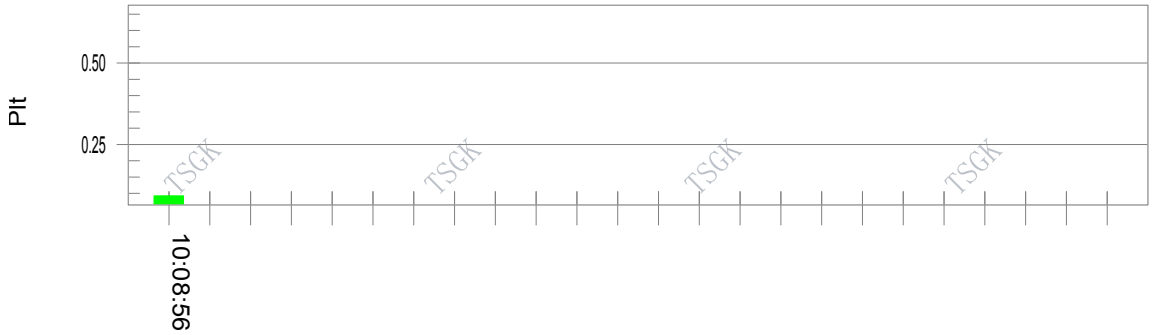
Flicker Test Summary per IEC61000-3-3:2013/AMD1:2017 (Run time)

Test Result: Pass Status: Test Completed

Pst_i and limit line European Limits



Plt and limit line



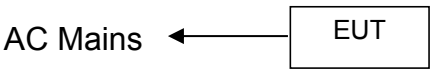
Parameter values recorded during the test:

Vrms at the end of test (Volt):	230.47			
Highest dt (%):		Test limit (%):		
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):	0.211	Test limit:	1.000	Pass
Highest Plt (2 hr. period):	0.092	Test limit:	0.650	Pass

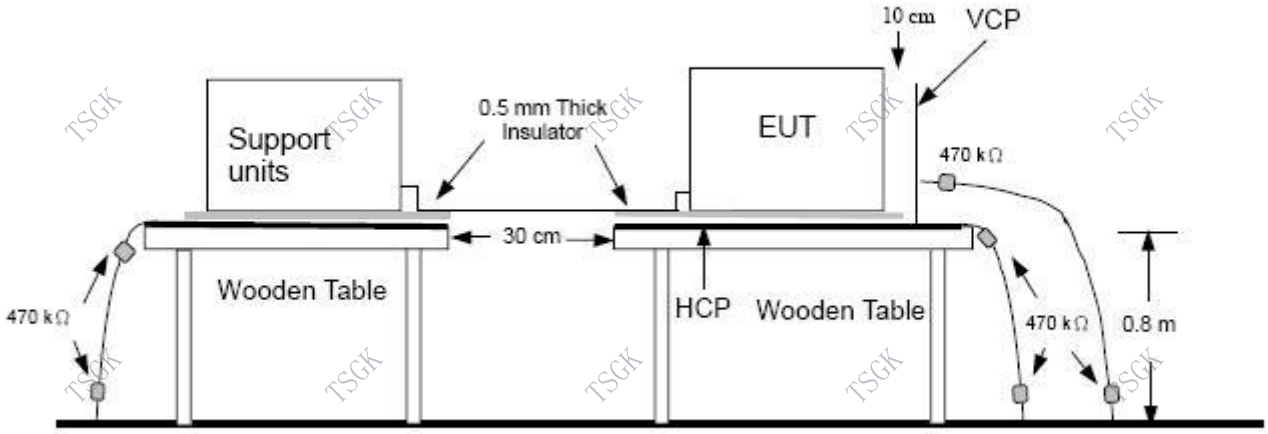
9. ELECTROSTATIC DISCHARGE TEST

9.1 Block Diagram of Test Setup

9.1.1 Block Diagram of the EUT



9.1.2 Block Diagram of ESD Test Setup



9.2 Test Standard

EN 61547: 2009 (IEC 61000-4-2: 2008)

9.3 Severity Levels and Performance Criterion

9.3.1 Severity level

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

9.3.2 Performance criterion: **B**

9.4 Operating Condition of EUT

9.4.1 Setup the EUT as shown in Section 9.1.

9.4.2 Turn on the power of all equipments.

9.4.3 Let the EUT work in test mode (ON) and measure it.

9.5 Test Procedure

9.5.1 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.

9.5.2 Contact Discharge**:**

All the procedure shall be same as Section 9.5.1 except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

9.5.3 Indirect discharge for horizontal coupling plane**:**

At least 20 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.

9.5.4 Indirect discharge for vertical coupling plane**:**

At least 20 single discharge shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 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.

9.6 Test Results

PASS.

Please refer to the following page.

Electrostatic discharge Test Results

Test Date :	Sep 26, 2023	Temperature:	24℃
Power Supply:	AC 230V/50Hz	Humidity :	55%
Test Mode :	ON	Air pressure:	101kPa
Test Engineer:	Charles	Criterion :	B

Air Discharge: ±2, 4, 8KV

Contact Discharge: ±2, 4KV

For each point positive 10 times and negative 10 times

Location	Kind Air Discharge C-Contact Discharge	Result
Slot of EUT	A	PASS
Metal	C	PASS
Bolts	C	PASS
HCP	C	PASS
VCP	C	PASS

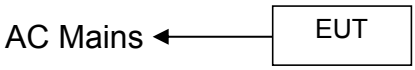
Remark :

Discharge should be considered on Contact and Air and Horizontal Coupling Plane (HCP) and Vertical Coupling Plane (VCP).

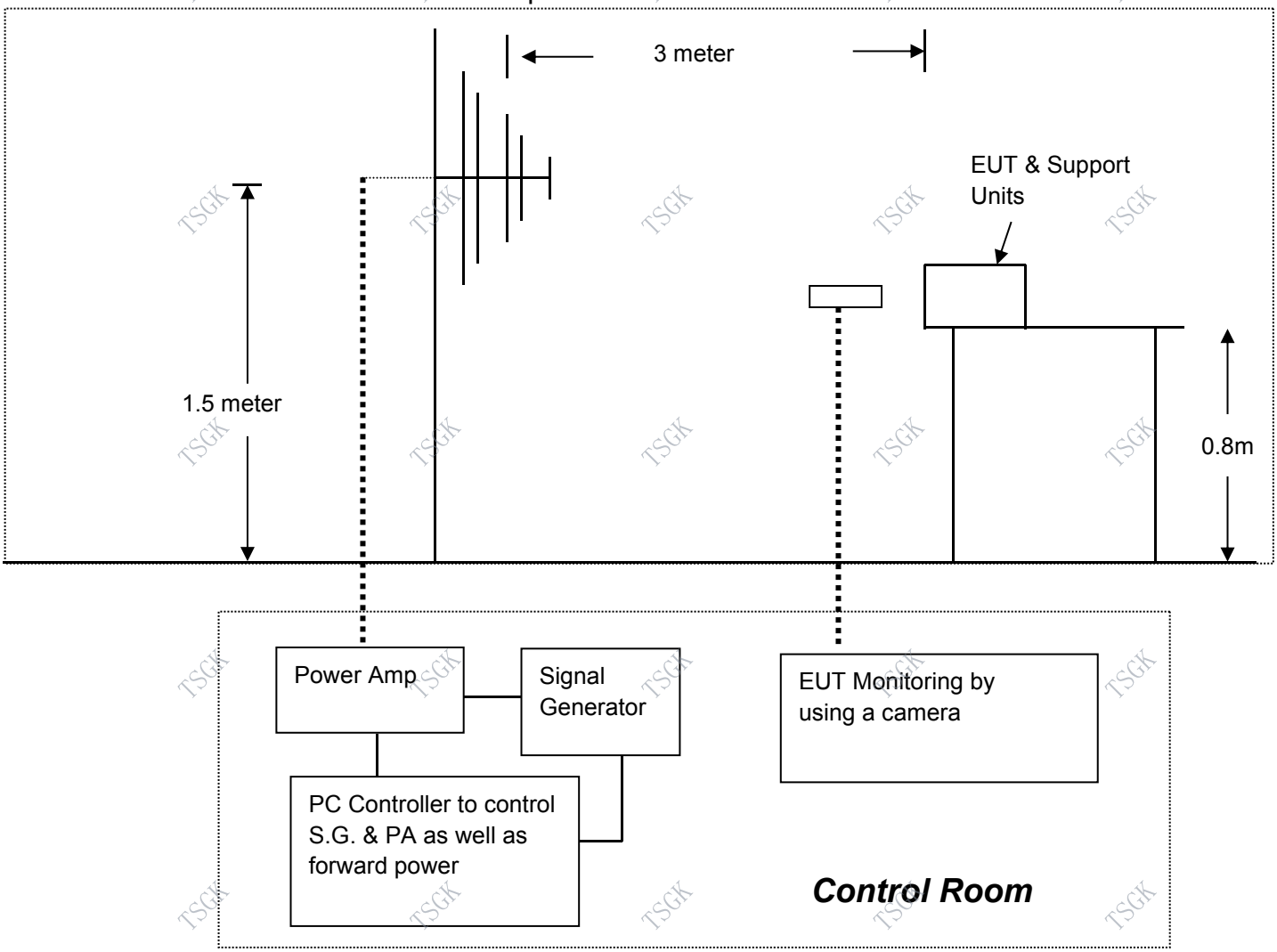
10. RADIO-FREQUENCY ELECTROMAGNETIC FIELDS TEST

10.1 Block Diagram of Test Setup

10.1.1 Block Diagram of the EUT and the simulators



10.1.2 R/S Test Setup



10.2 Test Standard

EN 61547: 2009 (IEC 61000-4-3:2020)

10.3 Severity Levels and Performance Criterion

10.3.1 Severity level

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

10.3.2 Performance criterion**: A**

10.4 Operating Condition of EUT

10.4.1 Setup the EUT as shown in Section 10.1.

10.4.2 Turn on the power of all equipments.

10.4.3 Let the EUT work in test mode (ON) and measure it.

10.5 Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. EUT is set 3 meter 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 EUT screen. All the scanning conditions are as follows**:**

Condition of Test	Remarks
1. Fielded Strength	3 V/m (Severity Level 2)
2. Radiated Signal	Modulated
3. Scanning Frequency	80 - 1000 MHz
4. Dwell time of radiated	0.0015 decade/s
5. Waiting Time	3 Sec.

10.6 Test Results

PASS.

Please refer to the following page.

Radio-frequency electromagnetic fields Test Results

Test Date :	Sep 26, 2023	Temperature:	24℃
Power Supply:	AC 230V/50Hz	Humidity :	55%
Test Mode :	ON	Air pressure:	101kPa
Test Engineer:	Charles	Criterion :	A

Modulation: ☑ AM ☐ Pulse ☐none 1 KHz 80 %

Frequency Range : 80-1000MHz

1 % with 3s dwell time

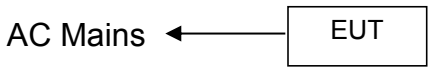
	Horizontal	Vertical
Front	PASS	PASS
Right	PASS	PASS
Rear	PASS	PASS
Left	PASS	PASS

Remark :

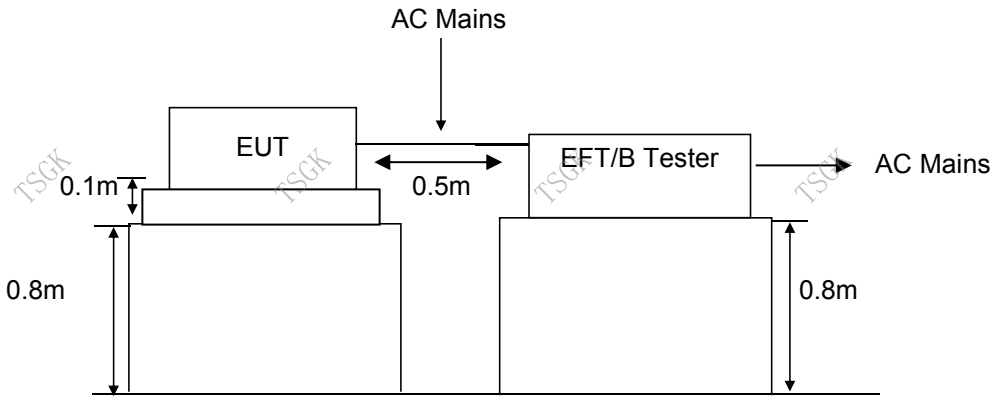
11. FAST TRANSIENTS TEST

11.1 Block Diagram of Test Setup

11.1.1 Block Diagram of the EUT and the simulators



11.1.2 Block Diagram of Test Setup



11.2 Test Standard

EN 61547: 2009 (IEC 61000-4-4: 2012)

11.3 Severity Levels and Performance Criterion

11.3.1 Severity level

Open circuit output test voltage and repetition rate of the impulses				
Level	On power port, PE		On I/O (Input/Output) Signal data and control ports	
	Voltage peak kV	Repetition rate kHz	Voltage peak kV	Repetition rate kHz
1.	0.5 kV	5 or 100	0.25 kV	5 or 100
2.	1 kV	5 or 100	0.5 kV	5 or 100
3.	2 kV	5 or 100	1 kV	5 or 100
4.	4 kV	5 or 100	2 kV	5 or 100
X	Special	Special	Special	Special
NOTE 1 Use of 5 kHz repetition rates is traditional; however, 100 kHz is closer to reality. Product committees should determine which frequencies are relevant for specific products or product types. NOTE 2 With some products, there may be no clear distinction, between power ports and I/O ports, in which case it is up to product committees to make this determination for test purposes.				
"X" is an open level. The level has to be specified in the dedicated equipment specification.				

11.3.2 Performance criterion**: B**

11.4 Operating Condition of EUT

11.4.1 Setup the EUT as shown in Section 11.1.

11.4.2 Turn on the power of all equipments.

11.4.3 Let the EUT work in test mode (ON) and measure it.

11.5 Test Procedure

The EUT is put on the table which is 0.8 meter high above the ground. This reference ground plane shall 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 beneath the EUT, shall be more than 0.5m.

11.5.1 For input and output AC power ports**:**

The EUT is connected to the power mains by using a coupling device which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 mins.

11.5.2 For signal lines and control lines ports**:**

No I/O ports. It's unnecessary to test.

11.5.3 For DC output line ports**:**

No I/O ports. It's unnecessary to test.

11.6 Test Results

PASS.

Please refer to the following page.

Fast transients Test Results

Test Date :	Sep 26, 2023	Temperature:	24℃
Power Supply:	AC 230V/50Hz	Humidity :	55%
Test Mode :	ON	Air pressure:	101kPa
Test Engineer:	Charles	Criterion :	B

Line : ☒ AC Mains ☐ Signal ☐ I/O Cable

Coupling : ☒ Direct ☐ Capacitive

Test Time : 120s

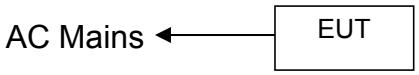
Line	Test Voltage	Result (+)	Result (-)
L	1kV	PASS	PASS
N	1kV	PASS	PASS
PE	1kV	PASS	PASS
L、N	1kV	PASS	PASS
L、PE	1kV	PASS	PASS
N、PE	1kV	PASS	PASS
L、N、PE	1kV	PASS	PASS
Signal Line			
DC Line			

Remark :

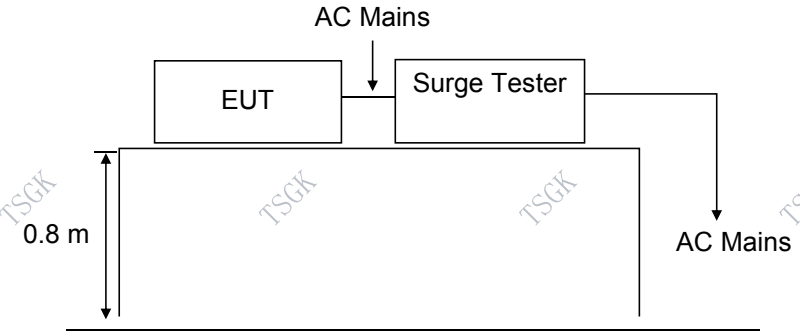
12. SURGES TEST

12.1 Block Diagram of Test Setup

12.1.1 Block Diagram of the EUT



12.1.2 Surge Test Setup



12.2 Test Standard

EN 61547: 2009 (IEC 61000-4-5: 2014+A1:2017)

12.3 Severity Levels and Performance Criterion

12.3.1 Severity level

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

12.3.2 Performance criterion: **C**

12.4 Operating Condition of EUT

12.4.1 Setup the EUT as shown in Section 12.1.

12.4.2 Turn on the power of all equipments.

12.4.3 Let the EUT work in test mode (ON) and measure it.

12.5 Test Procedure

1) Set up the EUT and test generator as shown on Section 12.1.2.

2) For line to line coupling mode, provide a 1.0kV, 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.
3) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
4) Different phase angles are done individually.
5) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

12.6 Test Results

PASS.

Please refer to the following page.

Surges Test Results

Test Date :	Sep 26, 2023	Temperature:	24℃
Power Supply:	AC 230V/50Hz	Humidity :	55%
Test Mode :	ON	Air pressure:	101kPa
Test Engineer:	Charles	Criterion :	C

Interval：60 seconds

Location	Polarity	Phase Angle	No of Pulse	Pulse Voltage (kV)	Result
L-N	+	90^0	5	0.5,1.0	PASS
	-	270^0	5	0.5,1.0	PASS
L-PE	+	90^0	5	0.5,1.0,2.0	PASS
	-	270^0	5	0.5,1.0,2.0	PASS
N-PE	+	90^0	5	0.5,1.0,2.0	PASS
	-	270^0	5	0.5,1.0,2.0	PASS

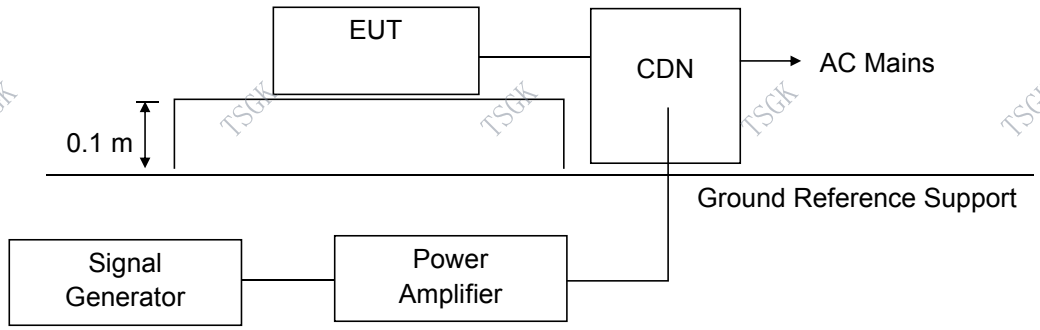
Remark :

13. INJECTED CURRENTS (RADIO-FREQUENCY COMMON MODE) TEST

13.1 Block Diagram of Test Setup

13.1.1 Block Diagram of the EUT

13.1.2 Block Diagram of Test Setup



13.2 Test Standard

EN 61547: 2009 (IEC 61000-4-6: 2013)

13.3 Severity Levels and Performance Criterion

13.3.1 Severity level

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

13.3.2 Performance criterion: **A**

13.4 Operating Condition of EUT

13.4.1 Setup the EUT as shown in Section 13.1.

13.4.2 Turn on the power of all equipments.

13.4.3 Let the EUT work in test mode (ON) and measure it.

13.5 Test Procedure

1) Set up the EUT, CDN and test generators as shown on Section13.1.2.
2) Let the EUT work in test mode and measure it.
3) 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).
4) The disturbance signal described below is injected to EUT through CDN.
5) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
6) The frequency range is swept from 150kHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1KHz sine wave.
7) The rate of sweep shall not exceed 1.5*10-3decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
8) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

13.6 Test Results

PASS.

Please refer to the following page.

Injected currents (radio-frequency common mode) Test Results

Test Date :	Sep 26, 2023	Temperature:	24℃
Power Supply:	AC 230V/50Hz	Humidity :	55%
Test Mode :	ON	Air pressure:	101kPa
Test Engineer:	Charles	Criterion :	A

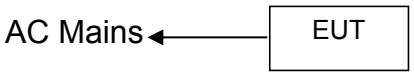
Frequency Range (MHz)	Injected Position	Strength	Criterion	Result
0.15 ~ 80	AC Mains	3V	A	PASS

Remark :

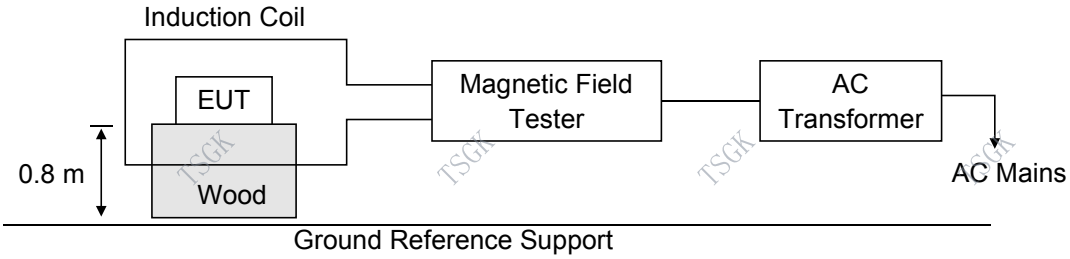
14. POWER FREQUENCY MAGNETIC FIELD TEST

14.1 Block Diagram of Test Setup

14.1.1 Block Diagram of the EUT



14.1.2 Block Diagram of Test Setup



14.2 Test Standard

EN 61547: 2009 (IEC 61000-4-8: 2009)

14.3 Severity Levels and Performance Criterion

14.3.1 Severity level

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

14.3.2 Performance criterion**: A**

14.4 Operating Condition of EUT

14.4.1 Setup the EUT as shown in Section 14.1.

14.4.2 Turn on the power of all equipments.

14.4.3 Let the EUT work in test mode (ON) and measure it.

14.5 Test Procedure

The EUT is placed in the middle of a induction coil (1*1m), under which is a 1*1*0.1m (high) table, this small table is also placed on a larger table, 0.8 m above the ground. X, Y and Z polarization of the induction coil are set on test, so that each side of the EUT is affected by the magnetic field. Also it can reach the same aim by changing the position of the EUT.

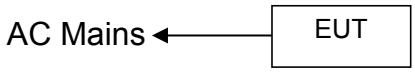
14.6 Test Results

The test is not applicable.

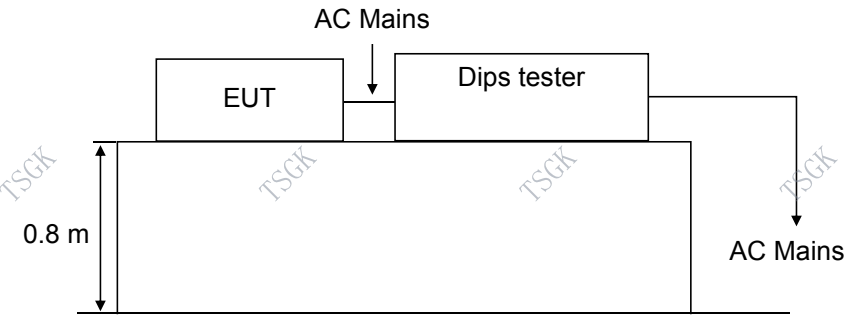
15. VOLTAGE DIPS AND INTERRUPTIONS TEST

15.1 Block Diagram of Test Setup

15.1.1 Block Diagram of the EUT



15.1.2 Dips Test Setup



15.2 Test Standard

EN 61547: 2009 (IEC 61000-4-11: 2020)

15.3 Severity Levels and Performance Criterion

15.3.1 Severity level

Test Level %UT	Voltage dip and short interruptions %UT	Duration (in period)
0	100	0.5 1 5 10 25 50 *
40	60	
70	30	

15.3.2 Performance criterion: **B, C**

15.4 Operating Condition of EUT

15.4.1 Setup the EUT as shown in Section 15.1.
15.4.2 Turn on the power of all equipments.
15.4.3 Let the EUT work in test mode (ON) and measure it.

15.5 Test Procedure

Set up the EUT and test generator as shown on Section 15.1.2.
The interruption is introduced at selected phase angles with specified duration.
Record any degradation of performance.

15.6 Test Results

PASS.

Please refer to the following page.

Voltage Dips And Interruptions Test Results

Test Date :	Sep 26, 2023	Temperature:	24℃
Power Supply:	AC 230V/50Hz	Humidity :	55%
Test Engineer:	Charles	Air pressure:	101kPa

Test Mode: ON

Test Level % U_T	Voltage Dips & Short Interruptions % U_T	Duration (in period)	Criterion ☐ A ☒ B ☒ C ☐ D	Result
70	30	10P	C	PASS
0	100	0.5P	B	PASS

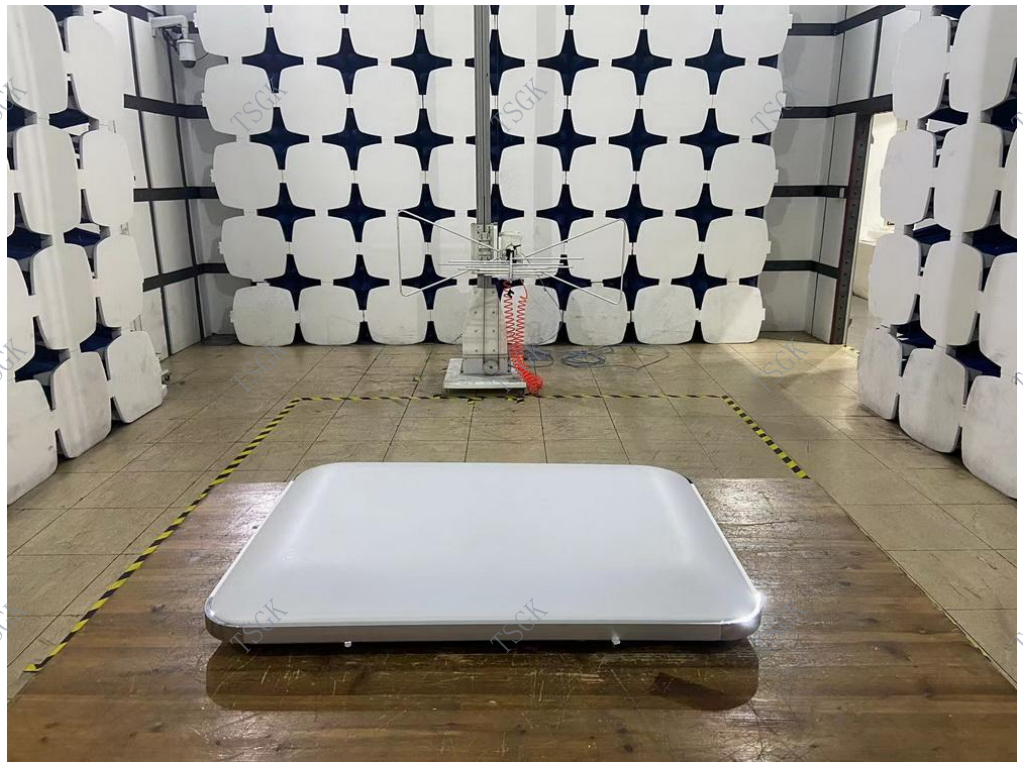
Test Mode:

Remark : U_T is the rated voltage for the equipment.

16. TEST SETUP PHOTOS OF THE EUT

16.1 Photo of Disturbance voltages mains terminals Measurement

16.2 Photo of Radiated electromagnetic disturbances (30MHz to 1GHz) Measurement

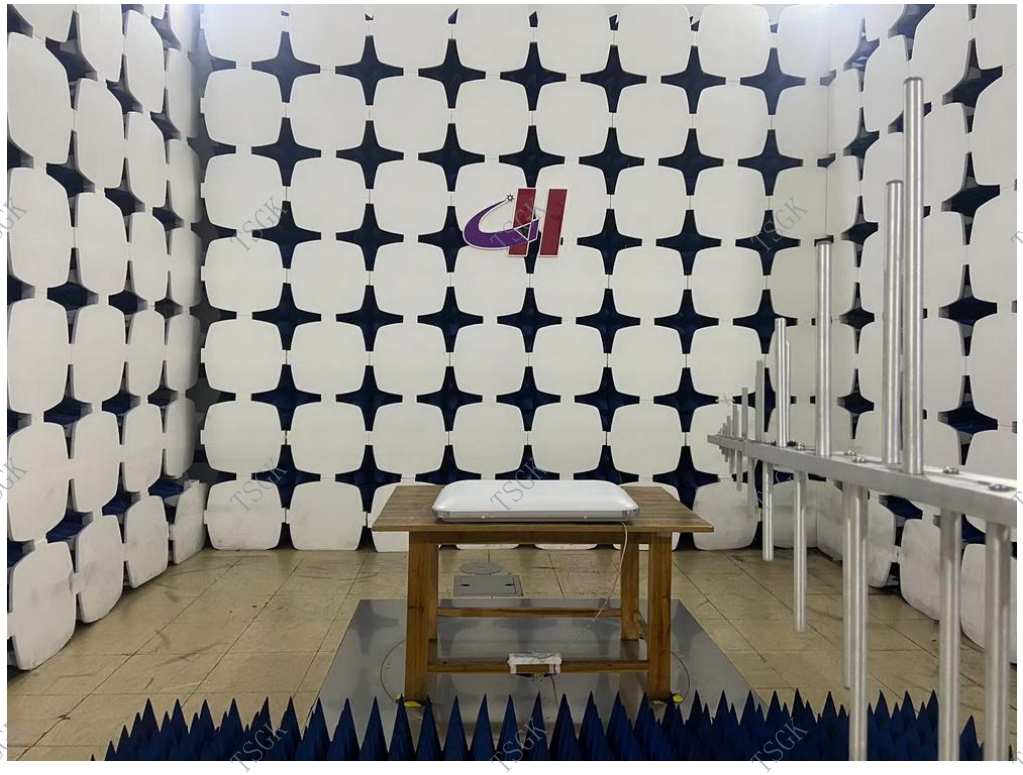


16.3 Photo of Radiated electromagnetic disturbances (9kHz to 30MHz) Measurement

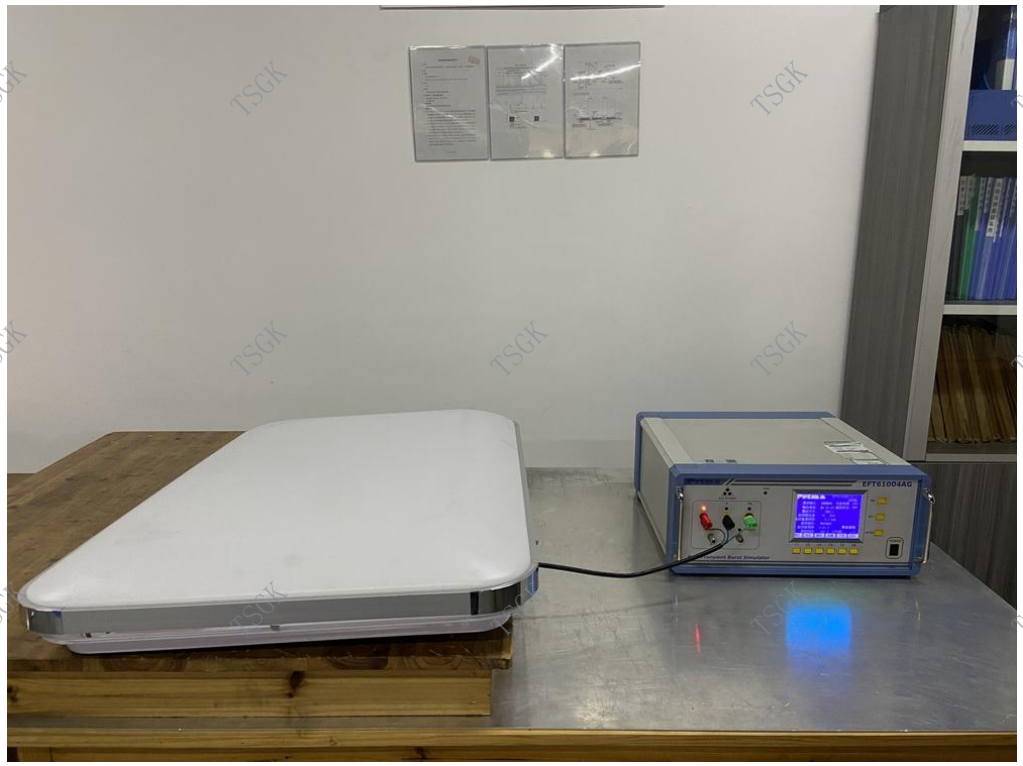
16.4 Photo of Harmonic / Flicker Measurement

16.5 Photo of Electrostatic discharge Test

16.6 Photo of Radio-frequency electromagnetic fields Test



16.7 Photo of Fast transients Test

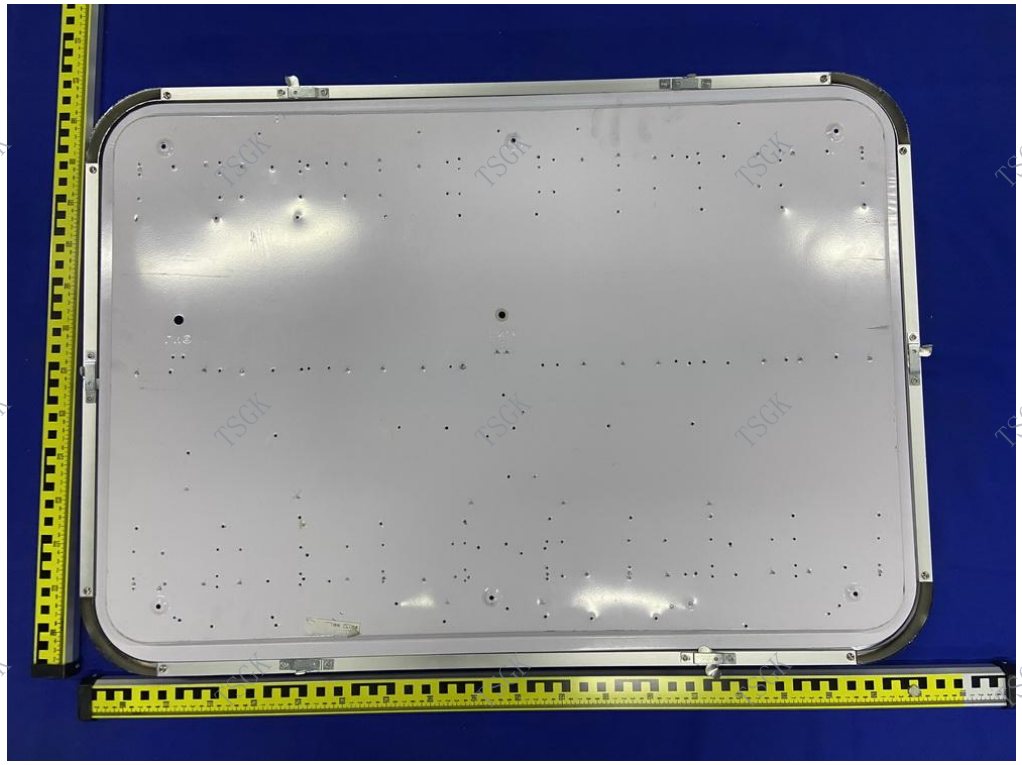


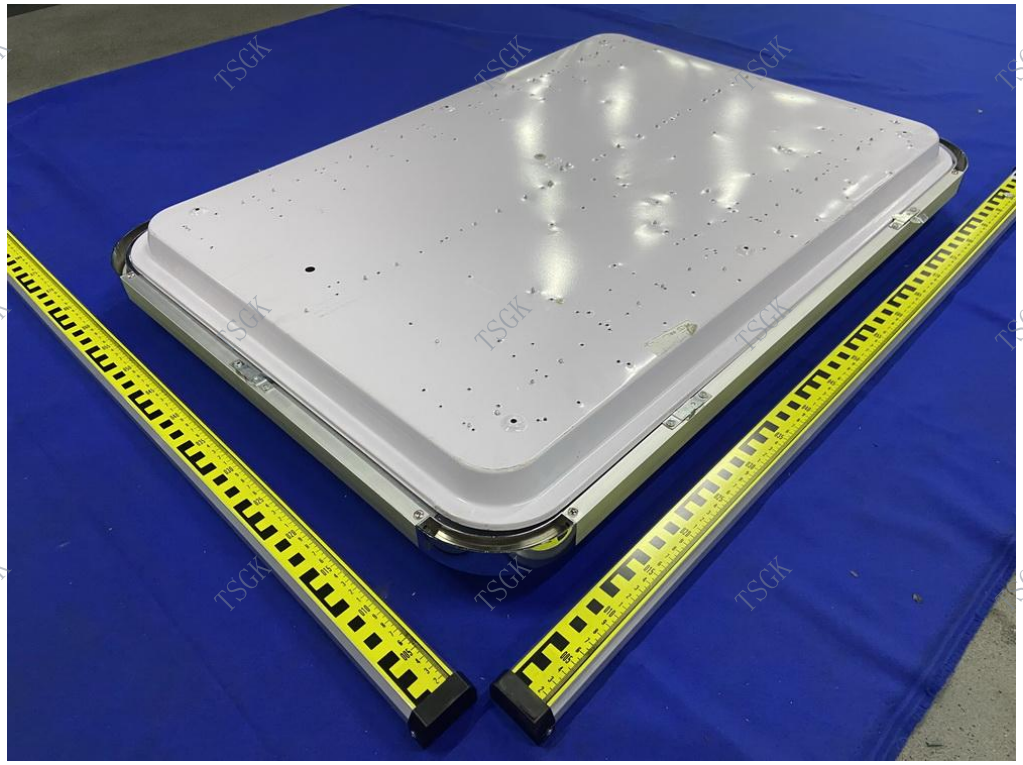
16.8 Photo of Surges Test

16.9 Photo of Injected currents (radio-frequency common mode) Test

16.10 Photo of Voltage dips and Interruption Test

17. PHOTOS OF THE EUT





.....End of Report.....

Declaration

1.The test report is invalid without the signatures of Chief Tester, Reviewer and Approver.

2.The test report is invalid without the official testing stamp of TSGK.

3.The test results presented in this report relate only to the object tested.

4.This report cannot be partially copied without permission.

5.The test report is invalid if altered.

6.Objections to the test report must be submitted to TSGK within 15 days.

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