

EMC TEST REPORT

Product Name : LED Lighting Fixtures

Trade Mark : LUMIO

Main Model : LM100

Additional Model : Additional model see the table in page 08.

Report No. : UNIA20071710ER-01

Prepared for

ZhongShan LUMIO Lighting Co., Ltd

The 4th floor, Building B, No.5, XingTai North 3rd Road, GuZhen Town, ZhongShan City, Guangdong Province, China

Prepared by

Shenzhen United Testing Technology Co., Ltd.

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TEST RESULT CERTIFICATION

Applicant.....: ZhongShan LUMIO Lighting Co., Ltd
Address.....: The 4th floor, Building B, No.5, XingTai North 3rd Road, GuZhen Town, ZhongShan City, Guangdong Province, China
Manufacturer.....: ZhongShan LUMIO Lighting Co., Ltd
Address.....: The 4th floor, Building B, No.5, XingTai North 3rd Road, GuZhen Town, ZhongShan City, Guangdong Province, China

Product description

Product Name.....: LED Lighting Fixtures
Trade Mark.....: LUMIO
Model Name.....: LM100, Additional model see the table in page 08.
 EN IEC 55015:2019/A11:2020
Test Methods.....: EN IEC 61000-3-2:2019
 EN 61000-3-3:2013/A1:2019
 EN 61547:2009

This device described above has been tested by Shenzhen United Testing Technology Co., Ltd., and the test results show that the equipment under test (EUT) is in compliance with the EMC Directive 2014/30/EU requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test.....:
Date (s) of performance of tests.....: Jul. 17, 2020 ~ Jul. 23, 2020
Date of Issue.....: Aug. 03, 2020
Test Result.....: Pass

Prepared by:

Bob Liao

Bob liao/Editor

Reviewer:

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Approved & Authorized Signer:

Liuze

Liuze/Manager

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1 TEST SUMMARY

1.1 TEST RESULTS

Test procedures according to the technical standards:

EMC Emission				
Standard	Test Item	Limit	Judgment	Remark
EN IEC 55015:2019/A11:2020	Conducted Emission	Class B	PASS	
	Radiated Emission	Class B	PASS	
EN IEC 61000-3-2:2019	Harmonic Current Emission	---	PASS	
EN 61000-3-3:2013/A1:2019	Voltage Fluctuations & Flicker	---	PASS	
EMC Immunity				
Section EN 61547:2009	Test Item	Performance Criteria	Judgment	Remark
EN 61000-4-2:2009	Electrostatic Discharge	B	PASS	
EN 61000-4-3:2006 +A1:2008+A2:2010	RF Electromagnetic Field	A	PASS	
EN 61000-4-4:2012	Fast Transients	B	PASS	
EN 61000-4-5:2014 /A1:2017	Surges	B	PASS	
EN 61000-4-6:2014 /AC:2015	Injected Current	A	PASS	
EN 61000-4-8:2010	Power Frequency Magnetic Field	A	PASS	
EN IEC 61000-4-11:2020	Volt. Interruptions Volt. Dips	B / C	PASS	NOTE (2)

Note:

- (1) "N/A" denotes test is not applicable in this test Report.
- (2) Voltage Dip: 100% reduction – Performance Criteria B
Voltage Dip: 30% reduction – Performance Criteria C
- (3) For client's request and manual description, the test will not be executed.

1.2 TEST FACTORY

Test Firm : Shenzhen United Testing Technology Co., Ltd.

Address : 2F, Annex Bldg, Jiahuangyuan Tech Park, #365 Baotian 1 Rd, Tiegang Community, Xixiang Str, Bao'an District, Shenzhen, China

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19. The testing quality system of our laboratory meets with ISO/IEC-17025 requirements. This approval result is accepted by MRA of APLAC.

Our test facility is recognized, certified, or accredited by the following organizations:

A2LA Certificate Number: 4747.01

The EMC Laboratory has been accredited by A2LA, and in compliance with ISO/IEC 17025:2017 General Requirements for testing Laboratories.

FCC Registration Number: 674885

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission.

IC Registration Number: 21947

The EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada.

1.3 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k = 2$, providing a level of confidence of approximately 95%.

A. Conducted Measurement:

Test Site	Method	Measurement Frequency Range	U, (dB)	NOTE
UNI	ANSI	9kHz ~ 150kHz	2.96	
		150kHz ~ 30MHz	2.44	

B. Radiated Measurement:

Test Site	Method	Measurement Frequency Range	U, (dB)	NOTE
UNI	ANSI	9kHz ~ 30MHz	2.50	
		30MHz ~ 1000MHz	4.80	
		1000MHz ~ 6000MHz	4.13	

2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product Name:	LED Lighting Fixtures				
Trade Mark:	LUMIO				
Main Model:	LM100				
Additional Model:	LM101, LM102, LM103, LM-3885, LM-3886, LM-3887, LM-3888, LU3000, LU3001, LU3002, LU3003, LU3004, LU3005, LU3006, LU3007, LU3008, LU3009, LU3010, LU3011, LU3012, LU3013, LU3014, LU3015, LU3016, LU3017, LU3018, LU3019, LU3020, LU3021, LU3022, LU3023, LU3024, LU3025, LU3026, LU3027, LU3028, LU3029, LU3030, LU3031				
Model Difference:	All model's the function, software and electric circuit are the same, only with a product color and model named different. Test sample model: LM100.				
Product Description:	The EUT is a LED Lighting Fixtures. <table border="1"> <tr> <td>Operating frequency:</td><td>N/A</td></tr> <tr> <td>Connecting I/O port:</td><td>N/A</td></tr> </table> Based on the application, features, or specification exhibited in User's Manual, more details of EUT technical specification, please refer to the User's Manual.	Operating frequency:	N/A	Connecting I/O port:	N/A
Operating frequency:	N/A				
Connecting I/O port:	N/A				

2.2 DESCRIPTION OF THE TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Running

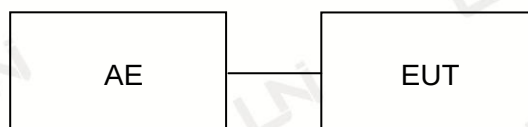
For Conducted Test	
Pretest Mode	Description
Mode 1	Running

For Radiated Test	
Pretest Mode	Description
Mode 1	Running

For EMS Test	
Pretest Mode	Description
Mode 1	Running

Note: The test modes were carried out for all operation modes (include link and idle).

2.3 DESCRIPTION OF TEST SETUP



Note: The EUT tested system was configured as upper figure, unless otherwise a special operating condition is specified in the following during the testing.

2.4 DESCRIPTION TEST PERIPHERAL AND EUT PERIPHERAL

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Note
E-1	LED Lighting Fixtures	LUMIO	LM100	EUT

Item	Shielded Type	Ferrite Core	Length	Note

Note:

1. The support equipment was authorized by Declaration of Confirmation.
2. For detachable type I/O cable should be specified the length in cm in 『Length』 column.
3. “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

2.5 MEASUREMENT INSTRUMENTS LIST

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
Conduction Emissions Measurement					
1	Conducted Emission Test Software	EZ-EMC	Ver.CCS-3A1-CE	N/A	N/A
2	AMN	Schwarzbeck	NNLK8121	8121370	2020.10.15
3	AMN	ETS	3810/2	00020199	2020.10.15
4	AAN	TESEQ	T8-Cat6	38888	2020.10.15
5	Pulse Limiter	CYBRTEK	EM5010	E115010056	2021.05.20
6	EMI Test Receiver	Rohde&Schwarz	ESCI	101210	2020.10.15
Radiated Emissions Measurement					
1	Radiated Emission Test Software	EZ-EMC	Ver.CCS-03A1	N/A	N/A
2	Horn Antenna	Sunol	DRH-118	A101415	2020.10.18
3	Broadband Hybrid Antenna	Sunol	JB1	A090215	2022.03.01
4	PREAMP	HP	8449B	3008A00160	2020.10.21
5	PREAMP	HP	8447D	2944A07999	2021.05.20
6	EMI Test Receiver	Rohde&Schwarz	ESR3	101891	2020.10.15
7	MXA Signal Analyzer	Keysight	N9020A	MY51110104	2020.10.15
8	Active Loop Antenna	Com-Power	AL-310R	10160009	2021.05.20
9	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1680	2021.05.20
10	Horn Antenna	A-INFOMW	LB-180400-KF	J211060660	2020.10.23
11	Loop Antenna	Beijing daze Technology	ZN30401	13015	2020.10.15
12	EM Clamp	Schwarzbeck	MDS21	03350	2020.10.20
Harmonic / Flicker Measurement					
1	Power Analyzer	California Instrumnets	PACS-1	X71719	2020.10.15
2	AC Power Source	California Instrumnets	5001ix	HK53570	2020.10.15
Electrostatic Discharge Test					
1	ESD Generator	EVERFINE	EMS61000-2A	P185811CA837112 1	2020.10.17
RS Test					
1	Power Meter	Agilent	E4419B	QB4331226	2020.10.10
2	Power Sensor	Agilent	8481A	MY41092622	2020.10.10
3	Power Sensor	Agilent	8481A	US37296783	2020.10.10
4	Signal Generator	Agilent	N5182A	MY46240556	2020.10.10
5	Power Amplifier	MICOTOP	MPA-80-1000-250	1711489	2020.10.10
6	Power Amplifier	MICOTOP	MPA-1000-3000-7 5	1711488	2020.10.10
7	Power Amplifier	MICOTOP	MPA-3000-6000-5 0	MPA1706275	2020.10.10
8	Bilog Antenna	TESEQ	CBL6111D	34678	2020.10.10
9	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1680	2021.05.20

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
Electrical Fast Transient / Burst Immunity Test					
1	EMS Test Control System	Shanghai Lioncel	SCU-614AS	SCU614S0160601	N/A
2	EFT/B Generator	Shanghai Lioncel	EFT-404S	EFT404S0160601	2020.10.15
Surge Test					
1	EMS Test Control System	Shanghai Lioncel	SCU-614AS	SCU614S0160601	N/A
2	Surge Generator	Shanghai Lioncel	LSG-506S	LSG506S0160601	2020.10.15
3	CDN	Shanghai Lioncel	CDN-532S	CDN532S0160601	2020.10.15
CS Test					
1	CS	SCHLODER	CDG-6000-25	126A1280/2014	2020.10.10
2	CDN	SCHLODER	CDN-M2+3	A2210275/2014	2020.10.10
3	EM Clamp	SCHLODER	EMCL-20	132A1283	2020.10.10
4	Attenuator	Nemtest	ATT-6DB-100	A100W224	2020.10.10
5	Audio Analyzer	R&S	UPL	100419	2020.10.10
6	Universal Radio Communication Tester	R&S	CMW500	117239	2020.10.10
7	Universal Radio Communication Tester	R&S	CMU200	111764	2020.10.10
8	Audio Analyzer	R&S	UPL	100689	2020.10.10
9	Audio Breakthrough Shielding Box	SKET	SB_ABT/C35	N/A	2020.10.10
10	Ear Simulator	SKET	AE_ABT/C35	N/A	2020.10.10
11	Mouth Simulator	SKET	AM_ABT/C35	N/A	2020.10.10
12	1KHz Standard Source	SKET	MSC_ABT/C35	N/A	2020.10.10
Power-frequency magnetic fields Test					
1	Magnetic Field Test System	Shanghai Lioncel	PMF801C-T	PMF801C-T0160701	2021.05.20
Voltage dips and interruptions Test					
1	Voltage SAG Simulator	Shanghai Lioncel	VDS-1101	VDS11010160601	2020.10.15
2	Adjustable Power Supply	Shanghai Lioncel	RGL-210	RGL2100151001	N/A

3 CONDUCTED EMISSIONS MEASUREMENT

3.1 CONDUCTED EMISSION LIMIT

3.1.1 POWER LINE CONDUCTED EMISSION

Frequency (MHz)	Maximum RF Line Voltage (dBμV)	
	Q.P.	Ave.
0.009~0.05	110	—
0.05~0.15	90 - 80 *	—
0.15~0.50	66 - 56 *	56 - 46 *
0.50~5.0	56	46
5.0~30.0	60	50

Note:

1. The tighter limit applies at the band edges.
2. The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

3.1.2 LOAD TERMINAL CONDUCTED EMISSION

Frequency (MHz)	Maximum RF Line Voltage (dBμV)	
	Q.P.	Ave.
0.15~0.50	80	70
0.50~30.0	74	64

Note:

1. The tighter limit applies at the band edges.

3.1.3 CONTROL TERMINAL CONDUCTED EMISSION

Frequency (MHz)	Maximum RF Line Voltage (dBμV)	
	Q.P.	Ave.
0.15~0.50	84 - 74*	74 - 64*
0.50~30.0	74	64

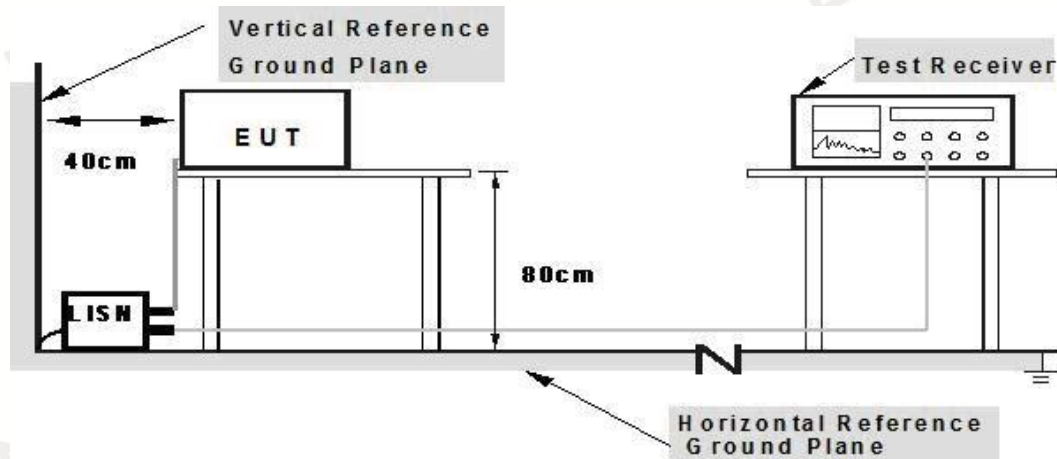
Note:

1. The tighter limit applies at the band edges.

The following table is the setting of the receiver:

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.009 MHz
Stop Frequency	30 MHz
IF Bandwidth	200Hz and 9 kHz

3.2 TEST SETUP



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

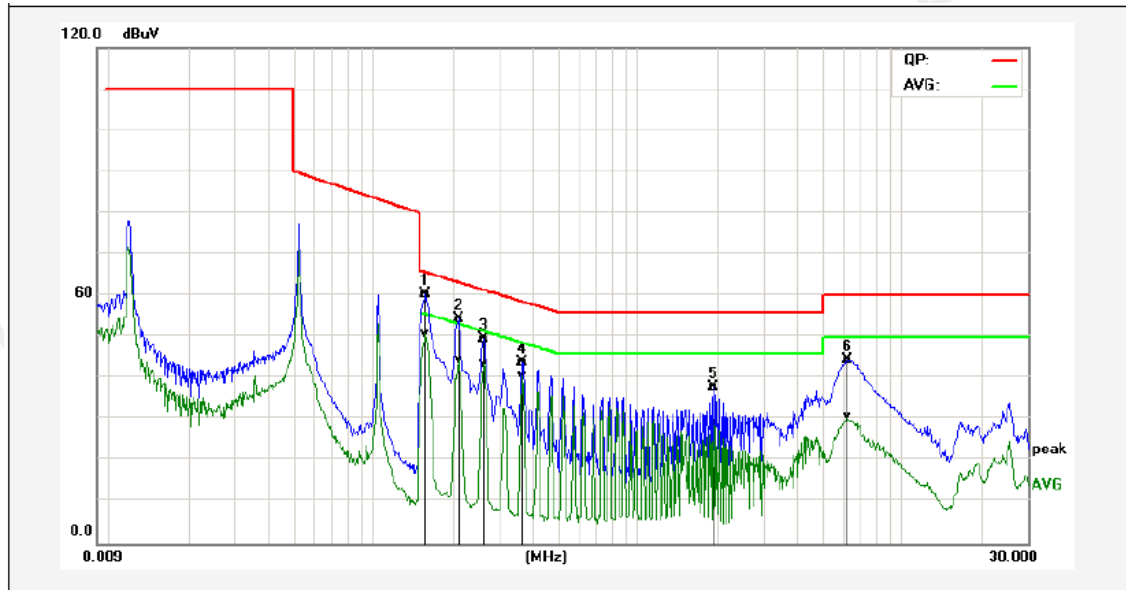
3.3 TEST PROCEDURE

1. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
2. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
3. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
4. For the actual test configuration, please refer to the related Item EUT Test Photos.

3.4 TEST RESULT

PASS

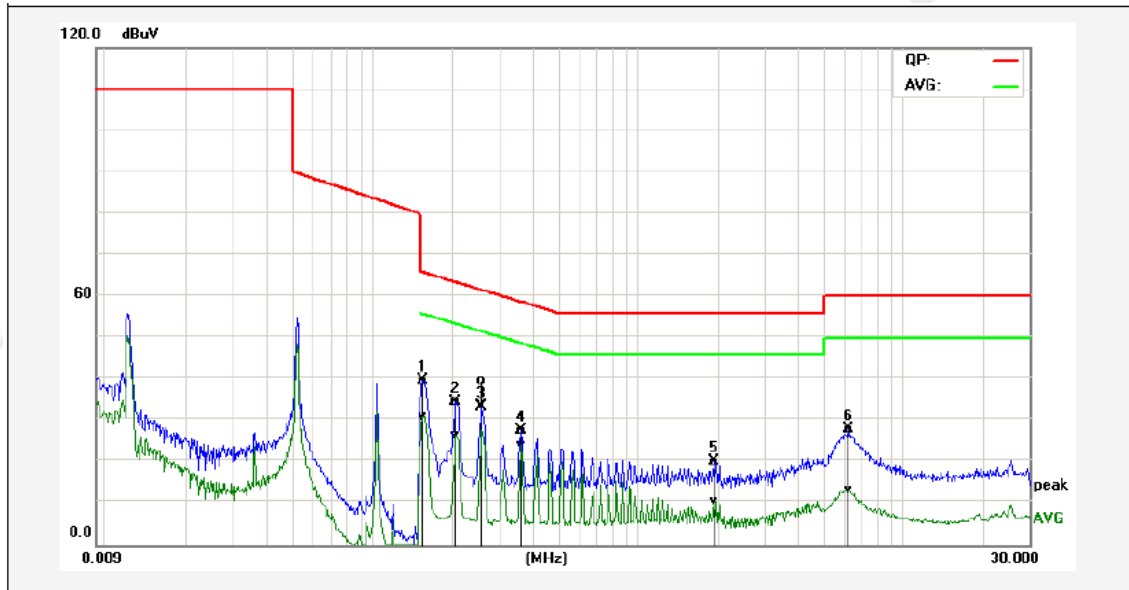
Temperature:	24°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa
Phase:	Line		



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1*	0.1580	50.77	41.34	9.65	60.42	50.99	65.56	55.57	-5.14	-4.58	Pass
2P	0.2100	44.76	34.86	9.74	54.50	44.60	63.20	53.21	-8.70	-8.61	Pass
3P	0.2620	39.96	33.88	9.78	49.74	43.66	61.36	51.37	-11.62	-7.71	Pass
4P	0.3660	34.20	30.77	9.82	44.02	40.59	58.59	48.59	-14.57	-8.00	Pass
5P	1.9340	28.03	18.68	9.88	37.91	28.56	56.00	46.00	-18.09	-17.44	Pass
6P	6.2460	34.51	20.71	9.94	44.45	30.65	60.00	50.00	-15.55	-19.35	Pass

Remark: Factor = Insertion Loss + Cable Loss, Result = Reading + Factor, Margin = Result – Limit.

Temperature:	24°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa
Phase:	Neutral		



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1P	0.1540	30.17	21.53	9.65	39.82	31.18	65.78	55.78	-25.96	-24.60	Pass
2P	0.2060	24.90	16.78	9.74	34.64	26.52	63.37	53.37	-28.73	-26.85	Pass
3*	0.2587	30.11	24.18	9.79	39.90	33.97	61.47	51.47	-21.57	-17.50	Pass
4P	0.3620	17.88	14.38	9.83	27.71	24.21	58.68	48.68	-30.97	-24.47	Pass
5P	1.9340	10.44	0.89	9.88	20.32	10.77	56.00	46.00	-35.68	-35.23	Pass
6P	6.2500	17.99	3.52	9.94	27.93	13.46	60.00	50.00	-32.07	-36.54	Pass

Remark: Factor = Insertion Loss + Cable Loss, Result = Reading + Factor, Margin = Result – Limit.

4 RADIATED EMISSIONS MEASUREMENT

4.1 RADIATION EMISSION LIMIT

Frequency (MHz)	☒ 2m	□ 3m	□ 4m
	dB(μA)	dB(μA)	dB(μA)
0.009~0.07	88	81	75
0.07~0.15	88 - 58 *	81 - 51 *	75 - 45 *
0.15~3.0	58 - 22 *	51 - 15 *	45 - 9 *
3.0~30.0	22	15 - 16 *	9 - 12 *

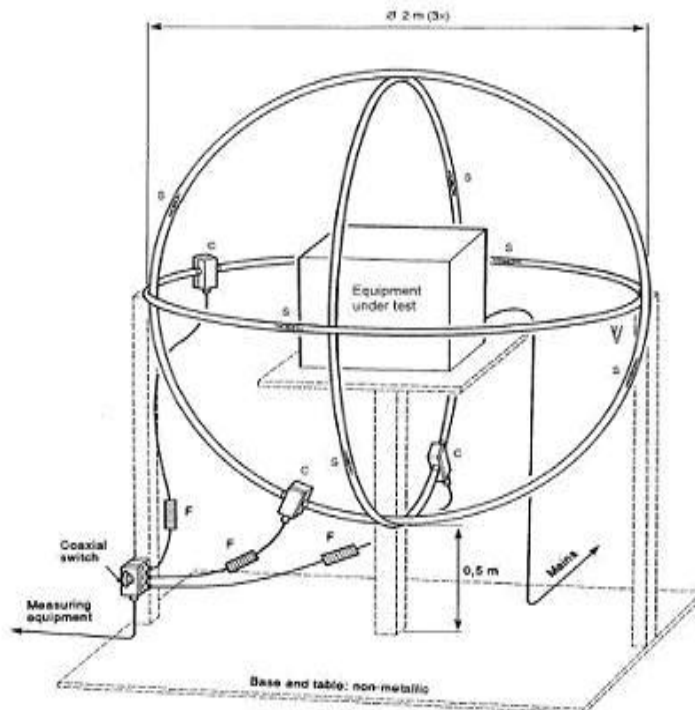
Frequency (MHz)	10m	3m
	dBuV/m	dBuV/m
30~230	30	40
230~300	37	47

Note:

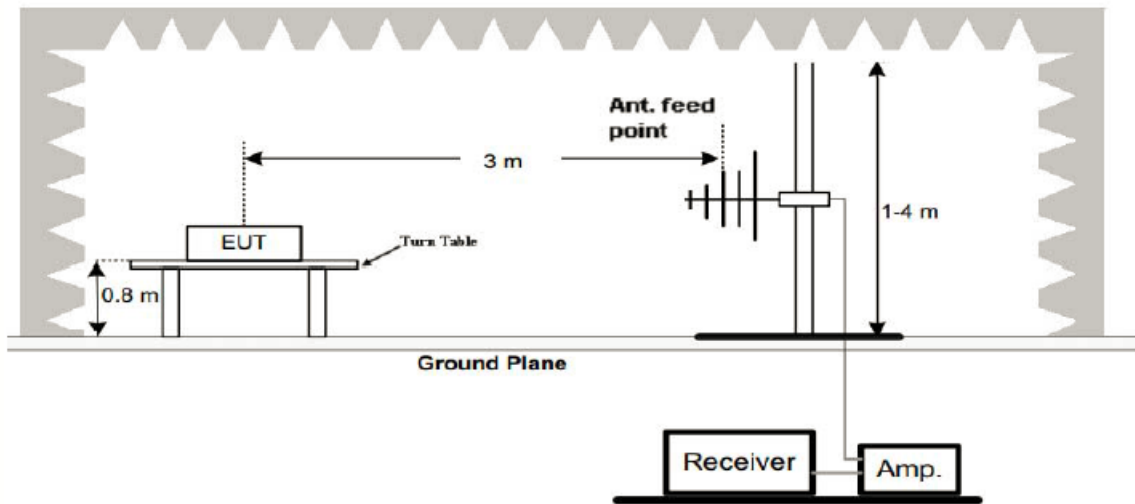
1. The limit for radiated test was performed according to as following: CISPR 15.
2. The tighter limit applies at the band edges.
2. Emission level (dBuV/m) = 20log Emission level (uV/m).

4.2 TEST SETUP

1. Radiated Emission Test-Up Frequency Below 30MHz



2. Radiated Emission Test-Up Frequency Above 30MHz



4.3 TEST PROCEDURE

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The height of antenna is varied from 1 meter to 4 meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1GHz.
6. For the actual test configuration, please refer to the related Item EUT Test Photos.

4.4 TEST RESULT

PASS

Below 30MHz Test Results:

Note: The peak value is too low against the limit, so the test data is not record.

Above 30MHz Test Results:

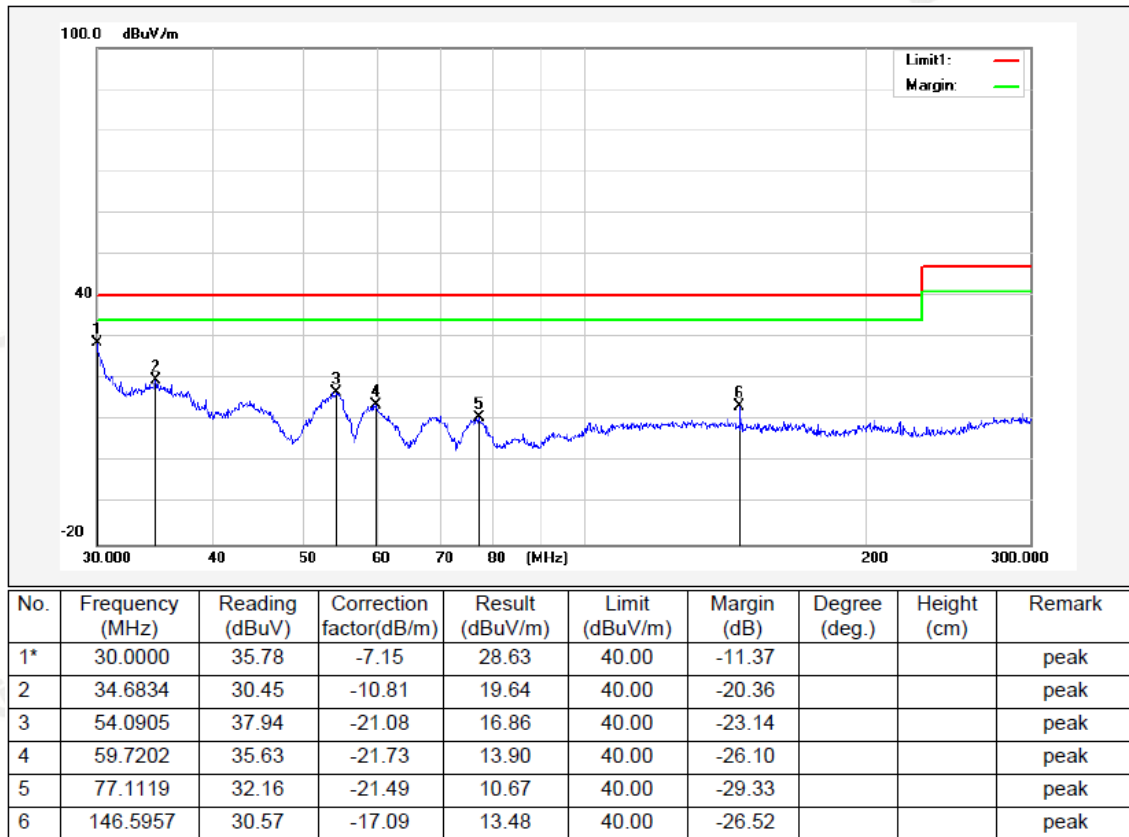
Temperature:	24°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa
Polarization:	Horizontal		



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	30.0000	35.30	-7.15	28.15	40.00	-11.85			peak
2	37.6809	36.31	-13.05	23.26	40.00	-16.74			peak
3	54.3402	40.18	-21.11	19.07	40.00	-20.93			peak
4	109.1745	36.26	-17.27	18.99	40.00	-21.01			peak
5	129.4557	34.35	-16.32	18.03	40.00	-21.97			peak
6	207.0719	35.93	-17.47	18.46	40.00	-21.54			peak

Remark: Absolute Level = Reading Level + Factor, Margin = Absolute Level – Limit
Factor = Ant. Factor + Cable Loss – Pre-amplifier

Temperature:	24°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa
Polarization:	Vertical		



Remark: Absolute Level = Reading Level + Factor, Margin = Absolute Level – Limit
Factor = Ant. Factor + Cable Loss – Pre-amplifier

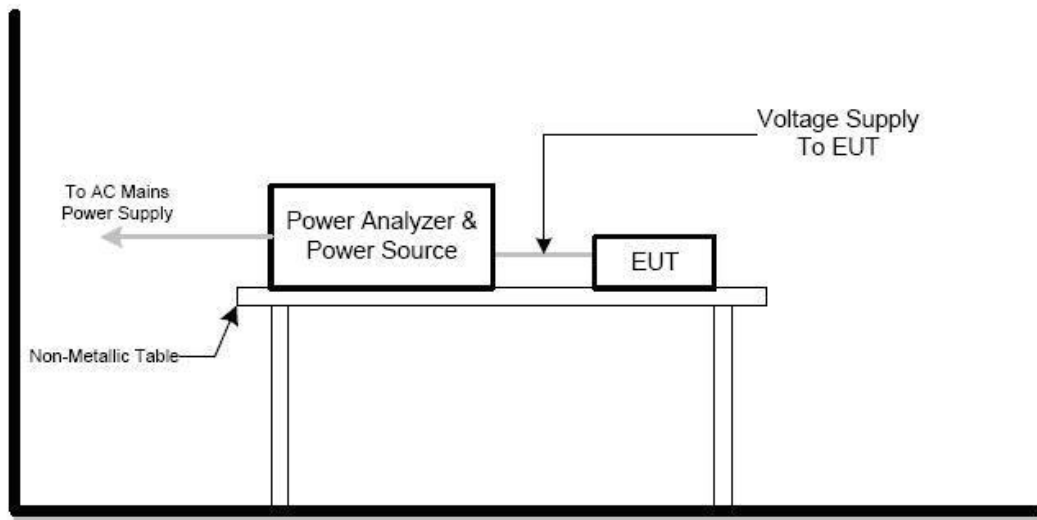
5 HARMONICS CURRENT

5.1 HARMONICS CURRENT LIMIT

Harmonic Current Test Limit(C)

Frequency (MHz)	Maximum permissible harmonic current Expressed as a percentage of the input Current at the fundamental frequency %
2	2
3	$30.\lambda$
5	10
7	7
9	5
$15 \leq n \leq 39$ (odd harmonics only)	3
Remark: λ is the circuit power factor	

5.2 TEST SETUP



5.3 TEST PROCEDURE

1. 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.
2. The classification of EUT is according to section 5 of EN 61000-3-2. The EUT is classified as follows:
 Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.
 Class B: Portable tools. Portable tools.; Arc welding equipment which is not professional equipment.
 Class C: Lighting equipment.
 Class D: Equipment having a specified power less than or equal to 600W of the following types: Personal computers and personal computer monitors and television receivers.
3. The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.

5.4 TEST RESULT

PASS

Harmonics – Class-C per Ed. 4.0 (2014)(Run time)

Test category: Class-C per Ed. 4.0 (2014) (European limits) Test Margin: 100

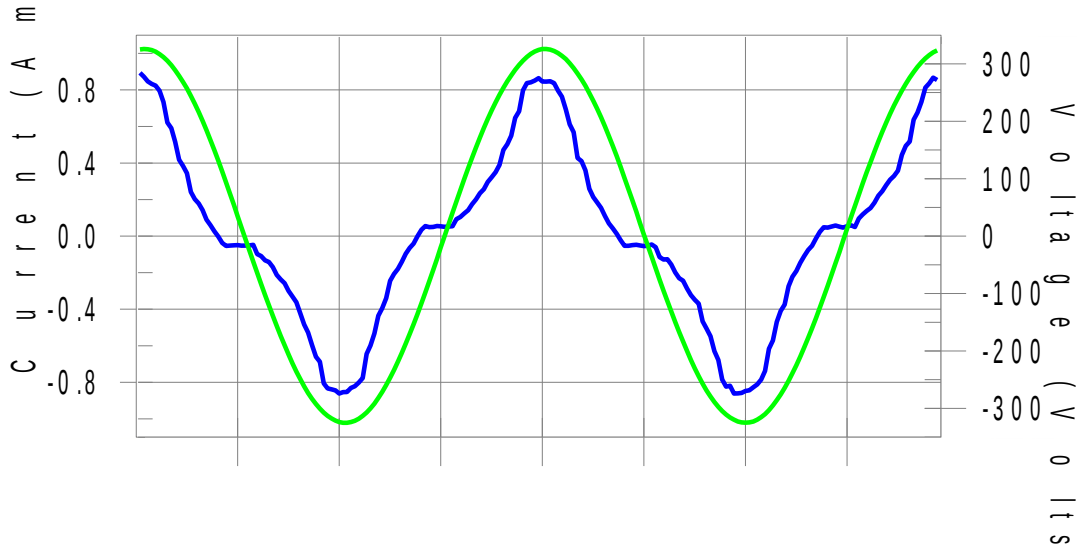
Test duration (min): 2.5

Data file name: H-000038.cts_data

Test Result: Pass

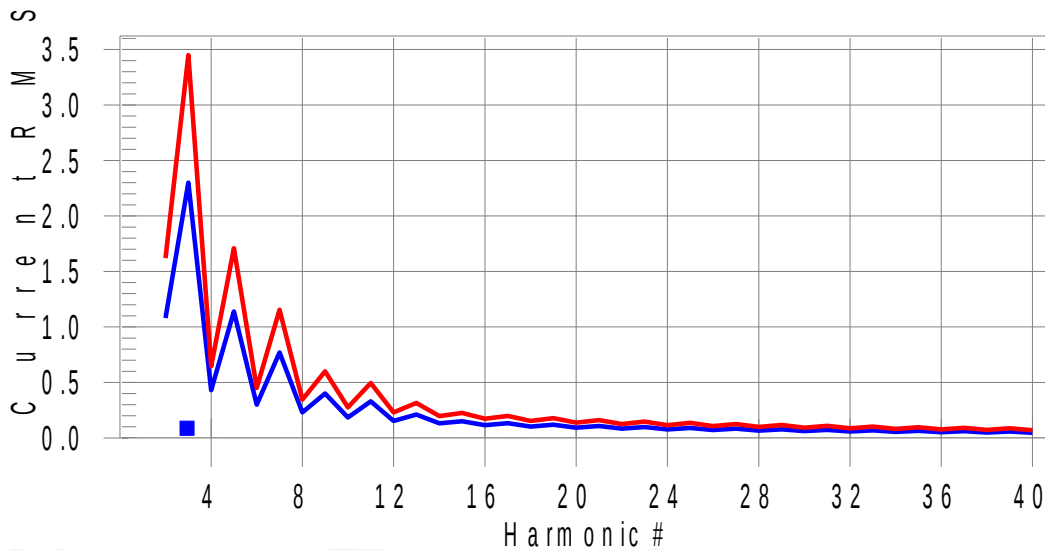
Source qualification: Normal

Current & voltage waveforms



Harmonics and Class C limit line

European Limits



Test result: Pass Worst harmonics H35-5.6% of 150% limit, H35-8% of 100% limit

Current Test Result Summary (Run time)

Test category: Class-C per Ed. 4.0 (2014) (European limits) Test Margin: 100

Test duration (min): 2.5 Data file name: H-000038.cts_data

Test Result: Pass Source qualification: Normal

THC(A): 0.154 I-THD(%): 111.2 POHC(A): 0.030 POHC Limit(A): 0.251

Highest parameter values during test:

V_RMS (Volts): 230.18

Frequency(Hz): 50.00

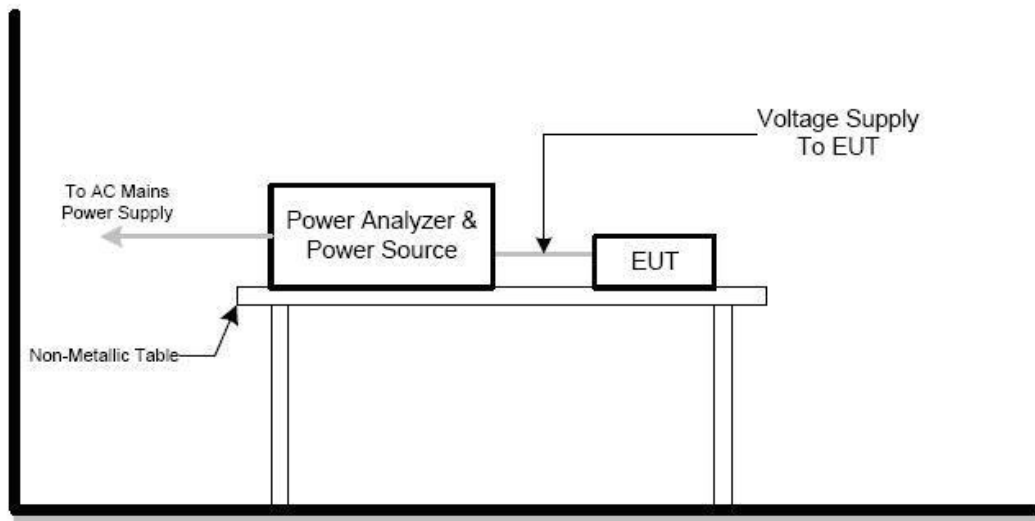
Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	1.080	N/A	0.002	1.620	N/A	Pass
3	0.151	2.300	6.6	0.152	3.450	4.4	Pass
4	0.001	0.430	N/A	0.002	0.645	N/A	Pass
5	0.019	1.140	1.6	0.019	1.710	1.1	Pass
6	0.001	0.300	N/A	0.002	0.450	N/A	Pass
7	0.006	0.770	0.8	0.006	1.155	0.6	Pass
8	0.001	0.230	N/A	0.001	0.345	N/A	Pass
9	0.012	0.400	3.0	0.013	0.600	2.1	Pass
10	0.000	0.184	N/A	0.001	0.276	N/A	Pass
11	0.006	0.330	1.9	0.006	0.495	1.3	Pass
12	0.000	0.153	N/A	0.001	0.230	N/A	Pass
13	0.004	0.210	N/A	0.004	0.315	N/A	Pass
14	0.000	0.131	N/A	0.001	0.197	N/A	Pass
15	0.003	0.150	N/A	0.003	0.225	N/A	Pass
16	0.000	0.115	N/A	0.000	0.173	N/A	Pass
17	0.002	0.132	N/A	0.003	0.198	N/A	Pass
18	0.000	0.102	N/A	0.000	0.153	N/A	Pass
19	0.003	0.118	N/A	0.003	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	0.003	0.161	N/A	Pass
22	0.000	0.084	N/A	0.001	0.125	N/A	Pass
23	0.002	0.098	N/A	0.002	0.147	N/A	Pass
24	0.000	0.077	N/A	0.001	0.115	N/A	Pass
25	0.001	0.090	N/A	0.002	0.135	N/A	Pass
26	0.000	0.071	N/A	0.001	0.107	N/A	Pass
27	0.001	0.083	N/A	0.002	0.125	N/A	Pass
28	0.000	0.066	N/A	0.001	0.099	N/A	Pass
29	0.003	0.078	N/A	0.003	0.116	N/A	Pass
30	0.000	0.061	N/A	0.001	0.092	N/A	Pass
31	0.001	0.073	N/A	0.001	0.109	N/A	Pass
32	0.000	0.058	N/A	0.001	0.086	N/A	Pass
33	0.003	0.068	N/A	0.004	0.102	N/A	Pass
34	0.000	0.054	N/A	0.001	0.081	N/A	Pass
35	0.005	0.064	8.0	0.005	0.096	5.6	Pass
36	0.000	0.051	N/A	0.001	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	0.001	0.073	N/A	Pass
39	0.003	0.058	N/A	0.003	0.087	N/A	Pass
40	0.000	0.046	N/A	0.001	0.069	N/A	Pass

6 VOLTAGE FLUCTUATION AND FLICKERS

6.1 VOLTAGE FLUCTUATION AND FLICKERS LIMIT

Tests	Measurement Value	Limit	Descriptions
	IEC555-3	IEC/EN 61000-3-3	
Pst	≤ 1.0 , Tp= 10 min.	≤ 1.0 , Tp= 10 min.	Short Term Flicker Indicator
Plt	N/A	≤ 0.65 , Tp= 2 hr.	Long Term Flicker Indicator
Tdt(s)	$\leq 3\%$	$\leq 3.3\%$	Relative Steady-State V-Chang
dmax(%)	$\leq 4\%$	$\leq 4\%$	Maximum Relative V-Chang
dc(%)	N/A	$\leq 3.3\%$ for > 500 ms	Relative V-change Characteristic

6.2 TEST SETUP



6.3 TEST PROCEDURE

1. Fluctuation and Flickers Test:

Tests was performed according to the Test Conditions/Assessment of Voltage Fluctuations specified in Clause 5.0/6.0 of IEC555-3 and/or Clause 6.0/4.0 of IEC/EN 61000-3-3 depend on which standard adopted for compliance measurement.

2. All types of voltage fluctuation in this report are assessed by direct measurement using flicker-meter.

6.4 TEST RESULT

Temperature:	24°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa

Test Parameter	Measurement Value	Limit	Result
Pst	0.00	1.0	Pass
Plt	--	0.65	--
Tdt(s)	0.00	0.5	Pass
dmax(%)	0.00%	4%	Pass
dc(%)	0.00%	3.3%	Pass

7 EMC IMMUNITY TEST

7.1 STANDARD COMPLIANCE/SERVIRITY LEVEL/CRITERIA

Tests Standard No.	TEST SPECIFICATION	Test Mode Test Ports	Perform Criteria
ESD IEC/EN 61000-4-2	8kV air discharge 4kV contact discharge	Direct Mode	B
	4kV HCP discharge 4kV VCP discharge	Indirect Mode	B
RS IEC/EN 61000-4-3	80 MHz to 1000 MHz, 1000Hz, 80%, AM modulated	Enclosure	A
EFT/Burst IEC/EN 61000-4-4	5/50ns Tr/Th 5KHz Repetition Freq.	Power Supply Port	B
	5/50ns Tr/Th 5KHz Repetition Freq.	CTL/Signal Data Line Port	B
Surges IEC/EN 61000-4-5	1.2/50(8/20) Tr/Th us	L-N	B
	1.2/50(8/20) Tr/Th us	L-PE N-PE	B
Injected Current IEC/EN 61000-4-6	0.15 MHz to 80 MHz, 1000Hz 80%, AM Modulated 150Ω source impedance	CTL/Signal Port	A
	0.15 MHz to 80 MHz, 1000Hz 80%, AM Modulated 150Ω source impedance	AC Power Port	A
	0.15 MHz to 80 MHz, 1000Hz 80%, AM Modulated 150Ω source impedance	DC Power Port	A
Power Frequency Magnetic Field IEC/EN 61000-4-8	50/60 Hz	Enclosure	A
Volt. Interruptions Volt. Dips IEC/EN 61000-4-11	Voltage dip 100% Voltage dip 30%	AC Power Port	B C

7.2 GENERAL PERFORMANCE CRITERIA

According to EN 61547 standard, the general performance criteria as following:

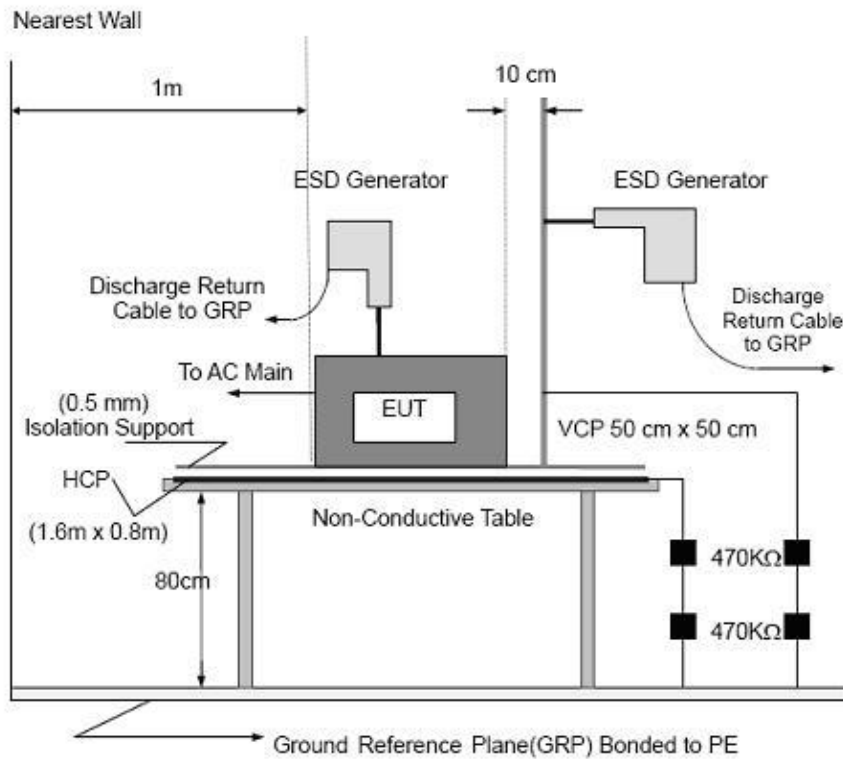
Criterion A	During the test, no change of the luminous intensity shall be observed and the regulating control, if any, shall operate during the test as intended.
Criterion B	During the test, the luminous intensity may change to any value. After the test, the luminous intensity shall be restored to its initial value within 1 min. Regulating controls need not function during the test, but after the test, the mode of the control shall be the same as before the test provided that during the test no mode changing commands were given.
Criterion C	During and after the test, any change of the luminous intensity is allowed and the lamp(s) may be extinguished. After the test, within 30 min, all functions shall return to normal, if necessary by temporary interruption of the mains supply and/or operating the regulating control. Additional requirement for lighting equipment incorporating a starting device: After the test, the lighting equipment is switched off. After half an hour, it is switched on again. The lighting equipment shall start and operate as intended.

8 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)

8.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Required Performance:	B
Discharge Voltage:	Air Discharge: 2kV/4kV/8kV (Direct) Contact Discharge: 2kV/4kV (Direct/Indirect)
Polarity:	Positive & Negative
Number of Discharge:	Air Discharge: min. 20 times at each test point Contact Discharge: min. 200 times in total
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum

8.2 TEST SETUP



Note:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum at least 0.25mm thick. A Horizontal Coupling Plane (1.6m x 0.8m) was placed on the table and attached to the GRP by means of a cable with 940k total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC /EN 61000-4-2, and its cables were placed on the HCP and isolated by an insulating support of 0.5mm thickness. A distance of 0.8-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of IEC/EN 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1 meter thickness. The GRP was consisted of a sheet of aluminum that is at least 0.25mm thick, and extended at least 0.5 meters from the EUT on all sides.

8.3 TEST PROCEDURE

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

1. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.

The time interval between two successive single discharges was at least 1 second.

The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the EUT.

Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.

Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.

Vertical Coupling Plane (VCP):

The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge.

Horizontal Coupling Plane (HCP):

The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge.

2. Air discharges at insulation surfaces of the EUT.

It was at least ten single discharges with positive and negative at the same selected point.

8.4 TEST RESULT

Temperature:	24°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa

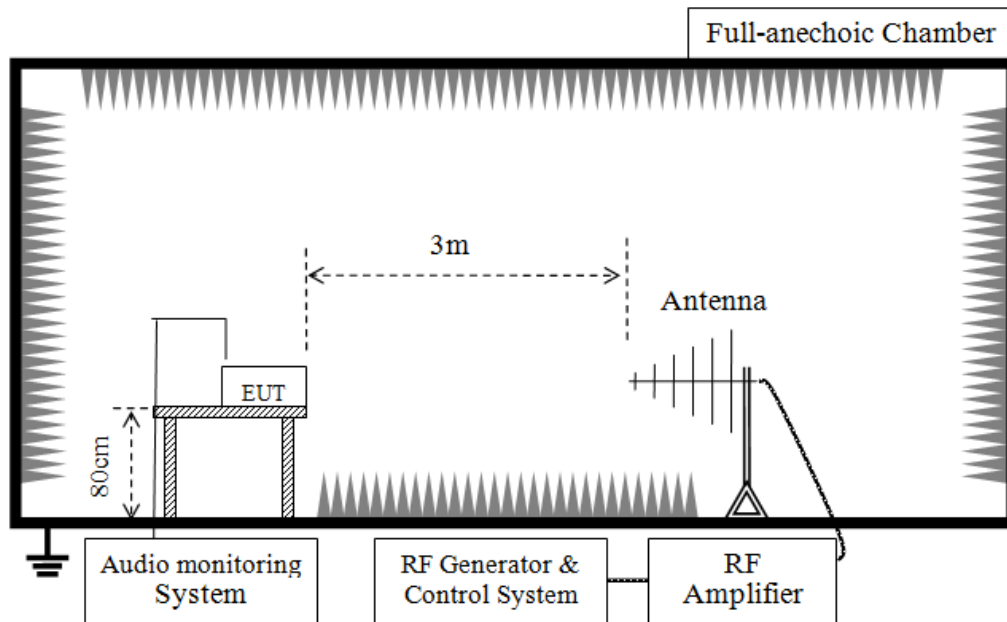
Mode	Air Discharge								Contact Discharge								Perform Criteria	Result
Test level (kV)	4		8		10		15		2		4		6		8			
Test Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-		
HCP									A	A	A	A					B	PASS
VCP									A	A	A	A						PASS
Slots	A	A	A	A														PASS
Surface	A	A	A	A														PASS

9 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS)

9.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-3
Required Performance:	A
Frequency Range:	80 MHz ~ 1000 MHz
Field Strength:	3 V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Polarity of Antenna:	Horizontal and Vertical
Test Distance:	3 m
Antenna Height:	1.5 m
Dwell Time:	1.5×10^{-3} decade/s

9.2 TEST SETUP



Note:

TABLE-TOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

FLOOR-STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

9.3 TEST PROCEDURE

The EUT and support equipment, which are placed on a table that is 0.8 meter above ground and the testing was performed in a fully-anechoic chamber.

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

The other condition need as following manners:

1. The frequency range is swept from 80 MHz to 1000 MHz with the signal 80% amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5×10^{-3} decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.
2. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
3. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

9.4 TEST RESULT

Temperature:	24°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa

Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Azimuth	Perform Criteria	Result
80~1000	H / V	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	A	PASS
			Rear		
			Left		
			Right		

Note: "A" stand for, during test, operate as intended no loss of function, no degradation of performance, no unintentional transmissions and after test, no degradation of performance, no loss of function, no loss of stored data or user programmable functions.

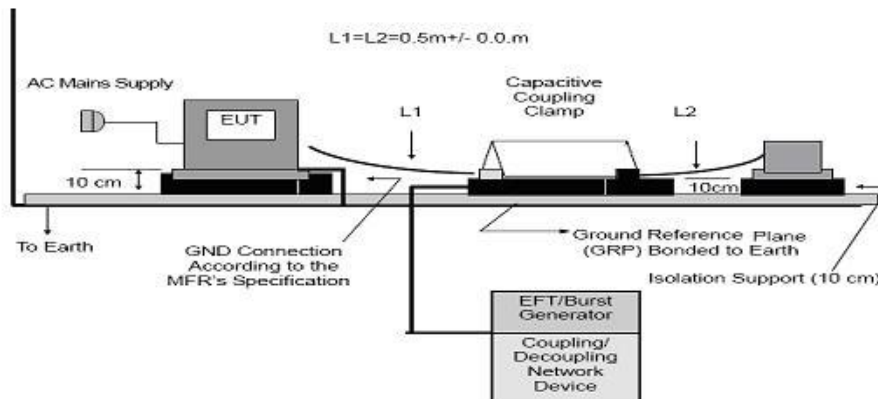
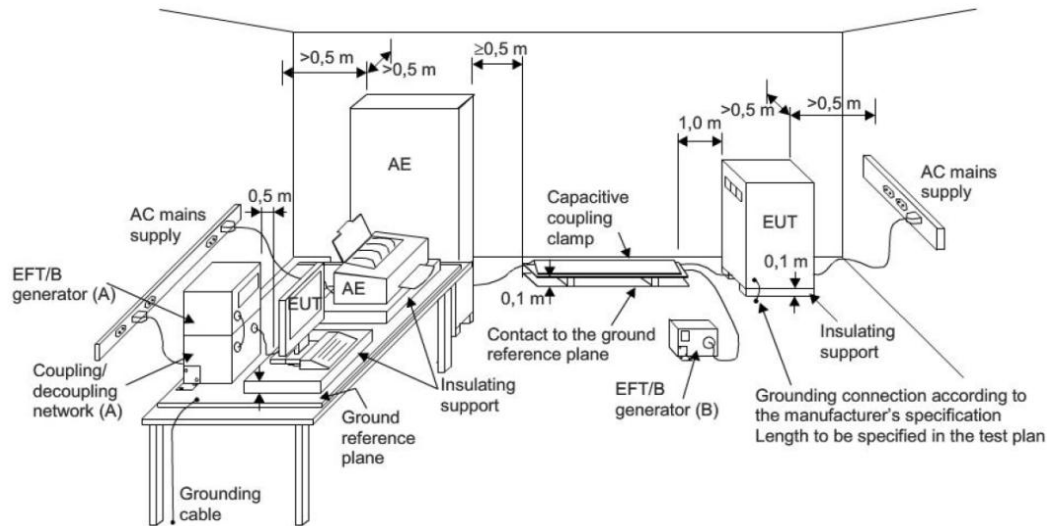
- 1) N/A - denotes test is not applicable in this test report.
- 2) Criteria A: There was no change operated with initial operating during the test.
- 3) Criteria B: The EUT function loss during the test, but self-recoverable after the test.
- 4) Criteria C: The system shut down during the test.

10 ELECTRICAL FAST TRANSIENT IMMUNITY TEST (EFT)

10.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-4
Required Performance:	B
Test Voltage:	Power Line: 1 KV Signal/Control Line: 0.5 KV
Polarity:	Positive & Negative
Impulse Frequency:	5 kHz
Impulse Wave shape:	5/50 ns
Burst Duration:	15 ms
Burst Period:	300 ms
Test Duration:	Not less than 2 min.

10.2 TEST SETUP



Note:

TABLE-TOP EQUIPMENT

Table-top equipment and equipment normally mounted on ceilings or walls as well as built-in equipment shall be tested with the EUT located (0.1 ± 0.01) m above the ground reference plane.

Testing of large table-top equipment or multiple systems can be performed on the floor; maintaining the same distances as for the test setup of table-top equipment.

The test generator and the coupling/decoupling network shall be bonded to the ground reference plane.

The ground reference plane shall be a metallic sheet (copper or aluminium) of 0.25 mm minimum thickness; other metallic materials may be used, but they shall have at least 0.65 mm minimum thickness.

The minimum size of the ground reference plane is 0.8 m x 1 m. The actual size depends on the dimensions of the EUT.

The ground reference plane shall project beyond the EUT by at least 0.1 m on all sides.

The ground reference plane shall be connected to protective earth (PE) for safety reasons.

The EUT shall be arranged and connected to satisfy its functional requirements, according to the equipment installation specifications.

The minimum distance between the EUT and all other conductive structures (including the generator, AE and the walls of a shielded room), except the ground reference plane, shall be more than 0.5 m.

All cables to The EUT shall be placed on The insulation support 0.1 m above The ground reference plane.

Cables not subject to electrical fast transients shall be routed as far as possible from the cable under test to minimize the coupling between the cables.

The EUT shall be connected to the earthing system in accordance with the manufacturer's installation specifications; no additional earthing connections are allowed.

The connection impedance of the coupling/decoupling network earth cables to the ground reference plane and all bondings shall provide a low inductance.

Either a direct coupling network or a capacitive clamp shall be used for the application of the test voltages. The test voltages shall be coupled to all of the EUT ports in turn including those between two units of equipment involved in the test, unless the length of the interconnecting cable makes it impossible to test.

FLOOR-STANDING EQUIPMENT

When using the coupling clamp, the minimum distance between the coupling plates and all other conductive surfaces (including the generator), except the ground reference plane beneath the coupling clamp and beneath the EUT, shall be at least 0.5m.

The distance between any coupling devices and the EUT shall be (0.5 - 0/+0.1) m for tabletop equipment testing, and (1.0±0.1) m for floor standing equipment, unless otherwise specified in product standards. When it is not physically possible to apply the distances mentioned above, other distances can be used and shall be recorded in the test report.

The cable between the EUT and the coupling device, if detachable, shall be as short as possible to comply with the requirements of this clause. If the manufacturer provides a cable exceeding the distance between the coupling device and the point of entry of the EUT, the excess length of this cable shall be bundled and situated at a distance of 0.1 m above the ground reference plane. When a capacitive clamp is used as a coupling device, the excess cable length shall be bundled at the AE side.

Parts of the EUT with interconnecting cables of a length less than 3 m, which are not tested, shall be placed on the insulating support. The parts of the EUT shall have a distance of 0.5 m between them. Excess cable length shall be bundled.

10.3 TEST PROCEDURE

The EUT and support equipment, are placed on a table that is 0.8 meter±0.1 meter above a metal ground plane measured 1m*1m min.

The ground reference plane shall be a metallic sheet (copper or aluminium) of 0.25 mm minimum thickness; other metallic materials may be used, but they shall have at least 0.65 mm minimum thickness.

The other conditions need as following manners:

1. The length of power cord between the coupling device and the EUT should not exceed 1 meter.
2. Both positive and negative polarity discharges were applied.
3. The duration time of each test sequential was 2 minute.

10.4 TEST RESULT

Temperature:	24°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa

Coupling Line		Test level (kV)								Perform Criteria	Result
		0.5		1		2		4			
		+	-	+	-	+	-	+	-		
AC line	L	A	A	A	A					B	PASS
	N	A	A	A	A						PASS
	PE										
	L+N	A	A	A	A						PASS
	L+PE										
	N+PE										
	L+N+PE										
DC Line											
Signal Line											

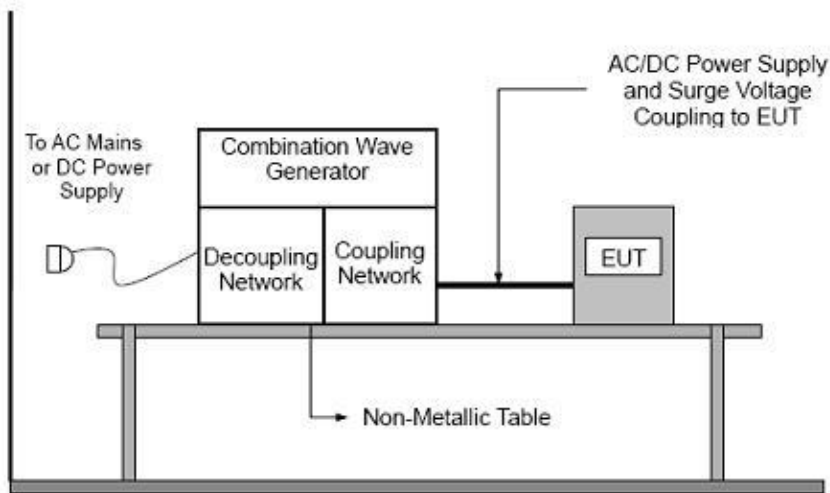
11 SURGE IMMUNITY TEST (SURGE)

11.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-5
Required Performance:	B
Wave-Shape:	Combination Wave 1.2/50 μ s Open Circuit Voltage 8 /20 μ s Short Circuit Current
Test Voltage:	See below Table
Surge Input/Output:	L-N, L-PE, N-PE
Generator Source:	(L-N)2 ohm between networks
Impedance:	(L-PE, N-PE)12 ohm between network and ground
Polarity:	Positive/Negative
Phase Angle:	0 /90/180/270°
Pulse Repetition Rate:	1 time / min. (maximum)
Number of Tests:	5 positive and 5 negative at selected points

Characteristics	Test levels		
	Device		
	Self-ballasted lamps and semi-luminaires	Luminaires and independent auxiliaries	
		Input power	
		$\leq 25W$	$> 25W$
Wave-shape data	1,2/50	1,2/50 μ s	1,2/50 μ s
Test levels line to line	± 0.5 kV	± 0.5 kV	± 1.0 kV
Line to ground	± 1.0 kV	± 1.0 kV	± 2.0 kV

11.2 TEST SETUP



11.3 TEST PROCEDURE

1. For EUT power supply:
2. The surge is to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks shall be 2meters in length (or shorter).
3. For test applied to unshielded unsymmetrically operated interconnection lines of EUT:
4. The surge is applied to the lines via the capacitive coupling. The coupling /decoupling networks shall not influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

11.4 TEST RESULT

Temperature:	24°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa

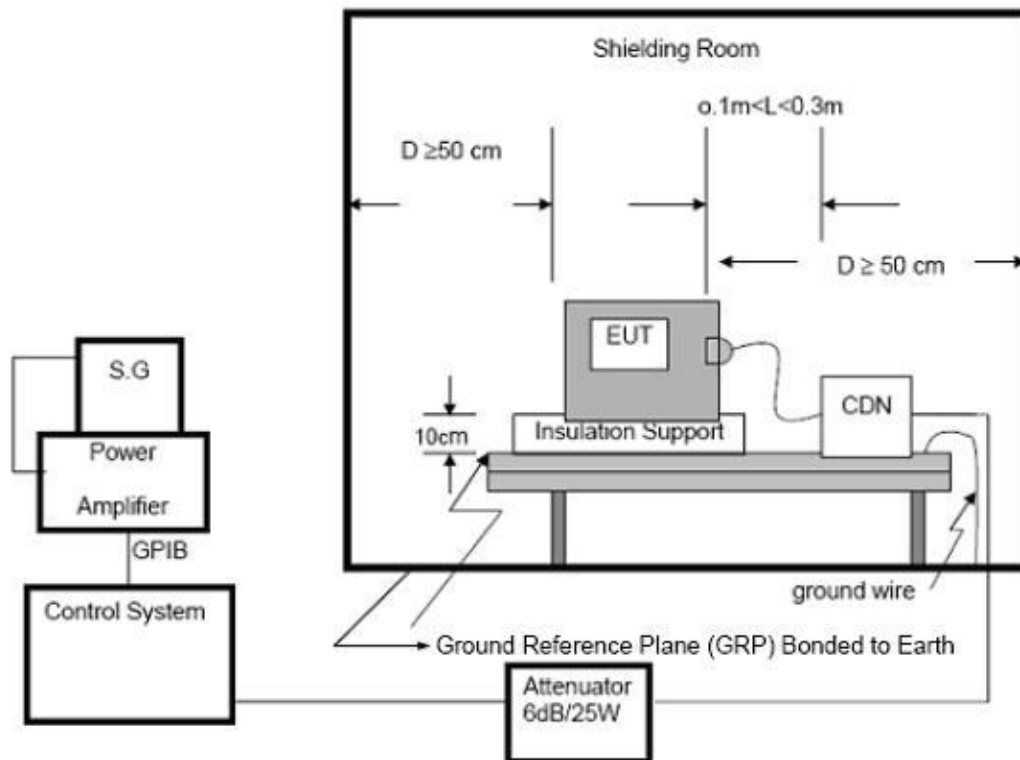
Coupling Line			Test level								Perform Criteria	Result
			0.5 kV		1 kV		2 kV		4 kV			
			+	-	+	-	+	-	+	-		
AC line	L-N	0°	A	A	A	A					B	PASS
		90°	A	A	A	A						
		180°	A	A	A	A						
		270°	A	A	A	A						
	L-PE	0°										
		90°										
		180°										
		270°										
	N-PE	0°										
		90°										
		180°										
		270°										
DC Line												
Signal Line												

12 CONDUCTED RADIO FREQUENCY DISTURBANCES IMMUNITY TEST (CS)

12.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-6
Required Performance:	A
Frequency Range:	0.15 MHz ~ 80 MHz
Field Strength:	3V (rms)
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Dwell Time:	at least 3 seconds

12.2 TEST SETUP



Note:

FLOOR-STANDING EQUIPMENT

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

12.3 TEST PROCEDURE

The EUT and support equipment, are placed on a table that is 0.8 meter&0.1 meter above a metal ground plane measured 1m*1m min.

The other condition need as following manners:

1. The EUT shall be tested within its intended operating and climatic conditions.
2. An artificial hand was placed on the hand-held accessory and connected to the ground reference plane.
3. One of the CDNs not used for injection was terminated with 50Ω, providing only one return path. All other CDNs were coupled as decoupling networks.
4. The frequency range is swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal is modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. Where the frequency is swept incrementally, the step size shall not exceed 1% of the preceding frequency value.
5. The dwell time of the amplitude modulated carrier at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0.5 s. The sensitive frequencies (e.g. clock frequencies) shall be analyzed separately.
6. Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.

12.4 TEST RESULT

Temperature:	24°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa

Test Ports (Mode)	Freq. Range MHz)	Field Strength	Perform Criteria	Result
Input/ Output AC. Power Port	0.15 ~ 80	3V (rms) AM Modulated 1000Hz, 80%	A	PASS
Input/ Output DC. Power Port	0.15 ~ 80		N/A	N/A
Signal Line	0.15 ~ 80		N/A	N/A

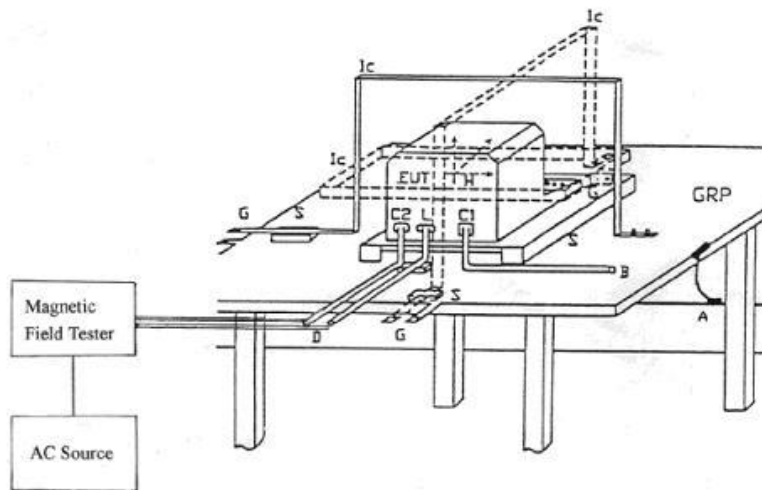
Note: "A" stand for, during test, operate as intended no loss of function, no degradation of performance, no unintentional transmissions and after test, no degradation of performance, no loss of function, no loss of stored data or user programmable functions.

13 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST (PFMF)

13.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-8
Required Performance:	A
Frequency Range:	50Hz
Field Strength:	3 A/m
Observation Time:	1 minute
Inductance Coil:	Rectangular type, 1mx1m

13.2 TEST SETUP



Note:

TABLE-TOP EQUIPMENT

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

FLOOR-STANDING EQUIPMENT

The equipment shall be subjected to the test magnetic field by using induction coils of suitable dimensions. The test shall be repeated by moving and shifting the induction coils, in order to test the whole volume of the EUT for each orthogonal direction. The test shall be repeated with the coil shifted to different positions along the side of the EUT, in steps corresponding to 50 % of the shortest side of the coil. The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

13.3 TEST PROCEDURE

The EUT and support equipment, are placed on a table that is 0.8 meter&0.1 meter above a metal ground plane measured 1m*1m min.

The other condition need as following manners:

1. The equipment cabinets shall be connected to the safety earth directly on the GRP via the earth terminal of the EUT.
2. The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables used shall be exposed to the magnetic field.

13.4 TEST RESULT

Temperature:	24°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa

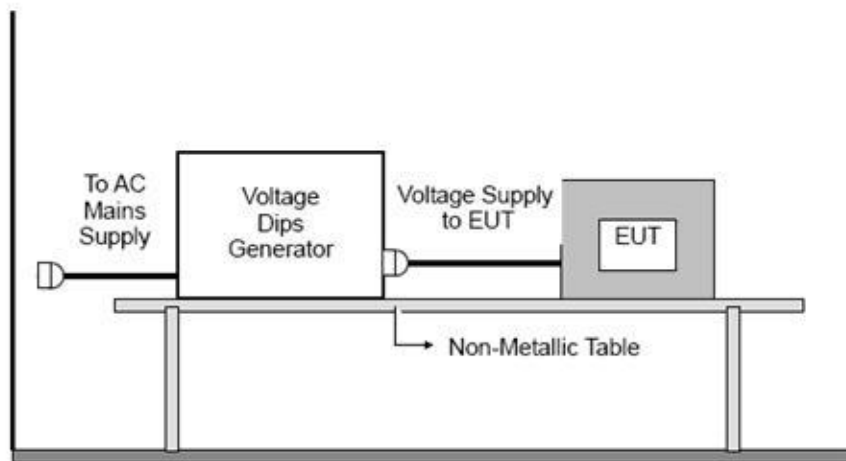
Test Level (A/m)	Inductive Coil	Duration (s)	Perform Criteria	Result
3	X	60	A	PASS
3	Y	60	A	PASS
3	Z	60	A	PASS

14 VOLTAGE INTERRUPTION/DIPS IMMUNITY TEST (DIPS)

14.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-11
Required Performance:	B (For 100% Voltage Dips, 0.5 Cycle) C (For 30% Voltage Dips, 10 Cycles)
Test Duration Time:	Minimum three test events in sequence
Interval between Event:	Minimum ten seconds
Phase Angle:	0°/45°/90°/135°/180°/225°/270°/315°/360°
Test Cycle:	3 times

14.2 TEST SETUP



14.3 TEST PROCEDURE

The EUT shall be tested for each selected combination of test levels and duration with a sequence of three dips/interruptions with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested. Abrupt changes in supply voltage shall occur at zero crossings of the voltage waveform.

14.4 TEST RESULT

Temperature:	24°C	Relative Humidity:	48%
Test Mode:	Running	Pressure:	1010hPa

Voltage Reduction	Duration (cycle)	Perform Criteria	Result
Voltage dip 100%	0.5	B	PASS
Voltage dip 30%	10	C	PASS

15 PHOTO OF EUT

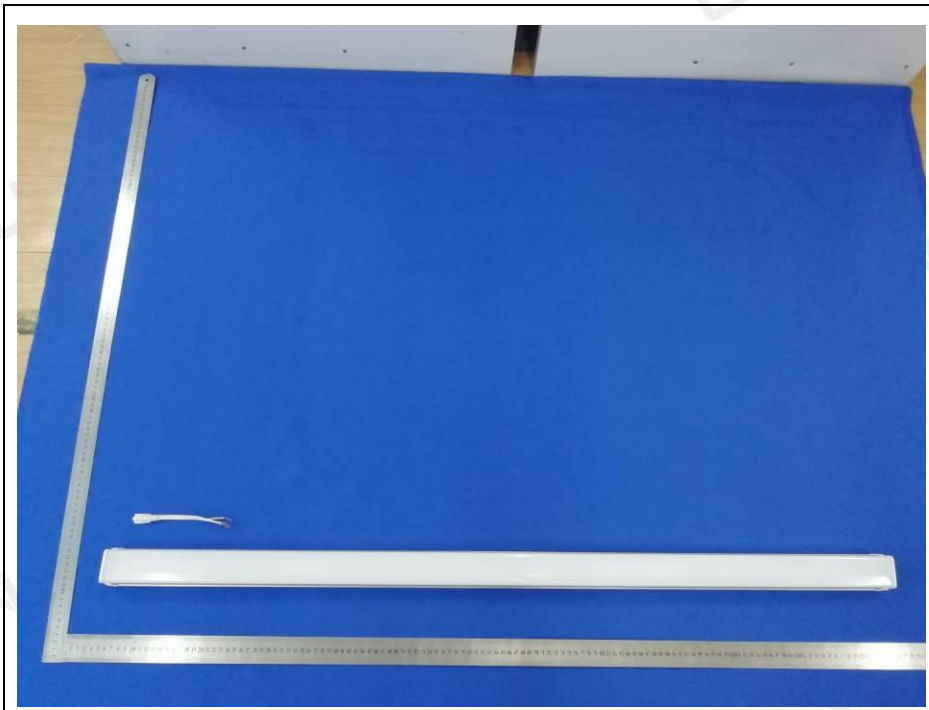


PHOTO 01



PHOTO 02

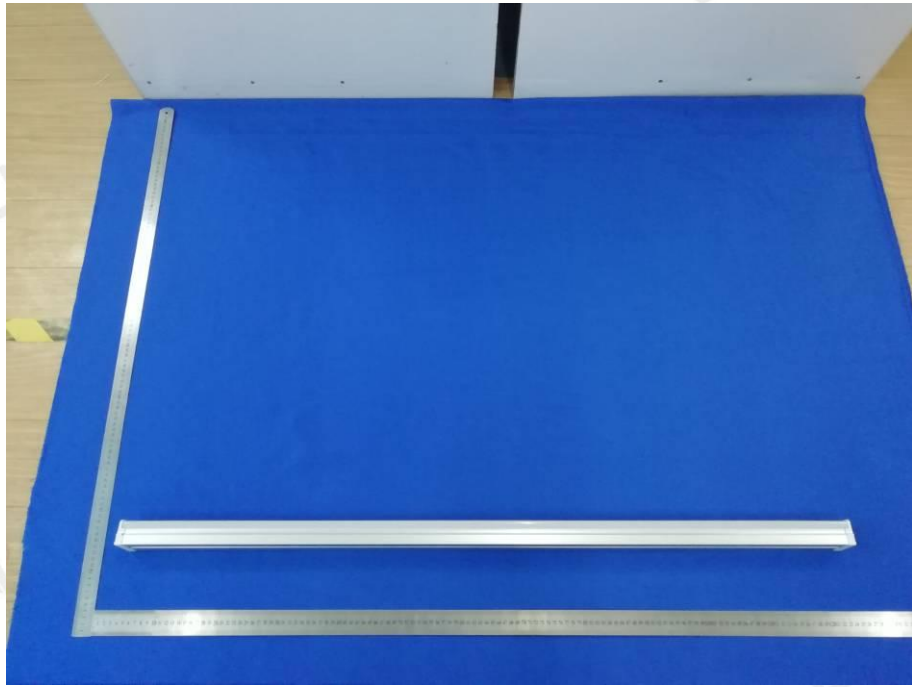


PHOTO 03

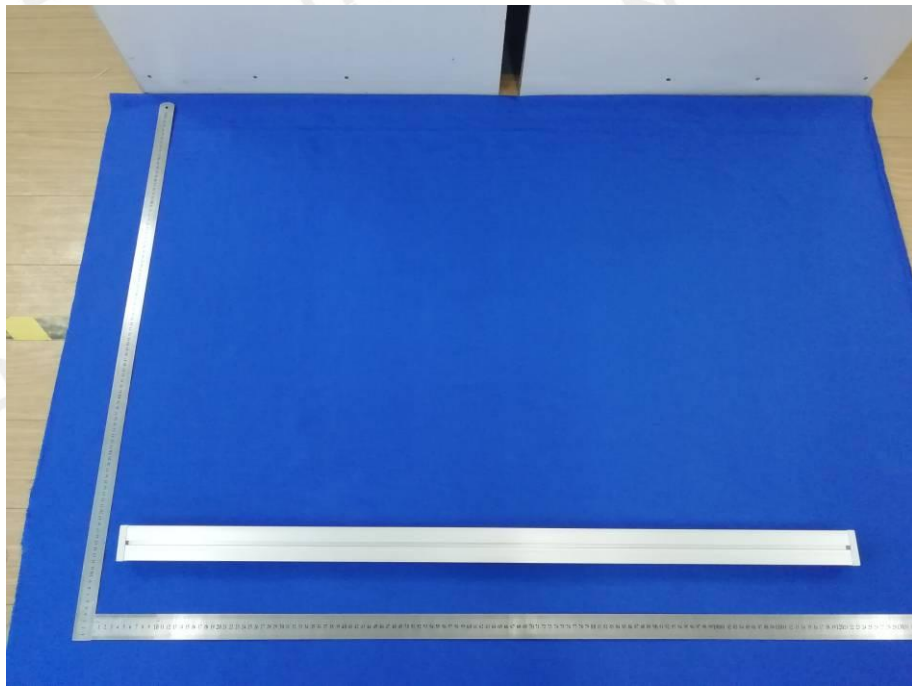


PHOTO 04

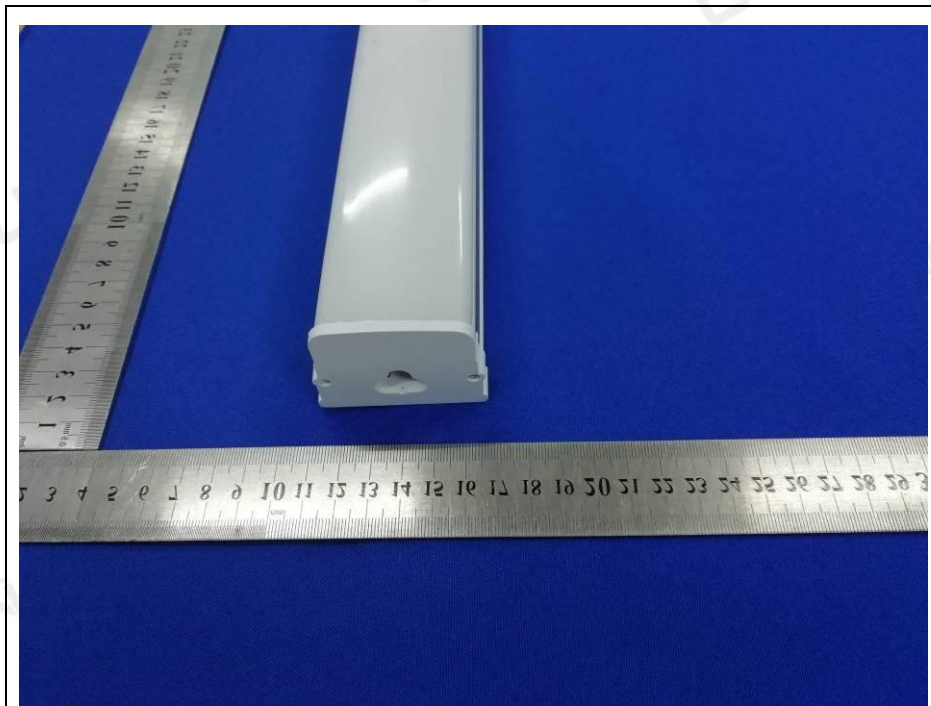


PHOTO 05

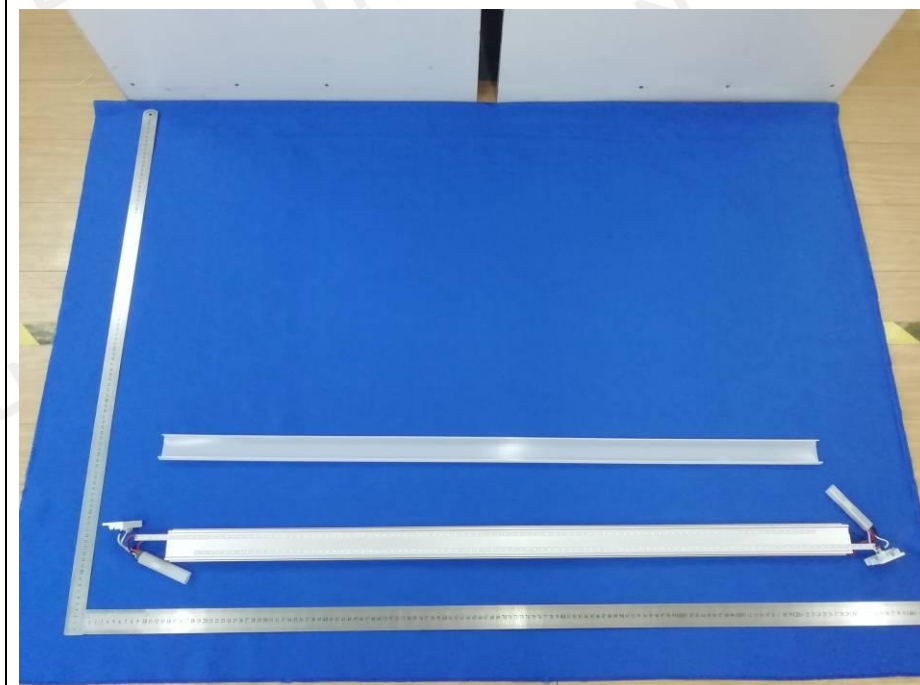


PHOTO 06

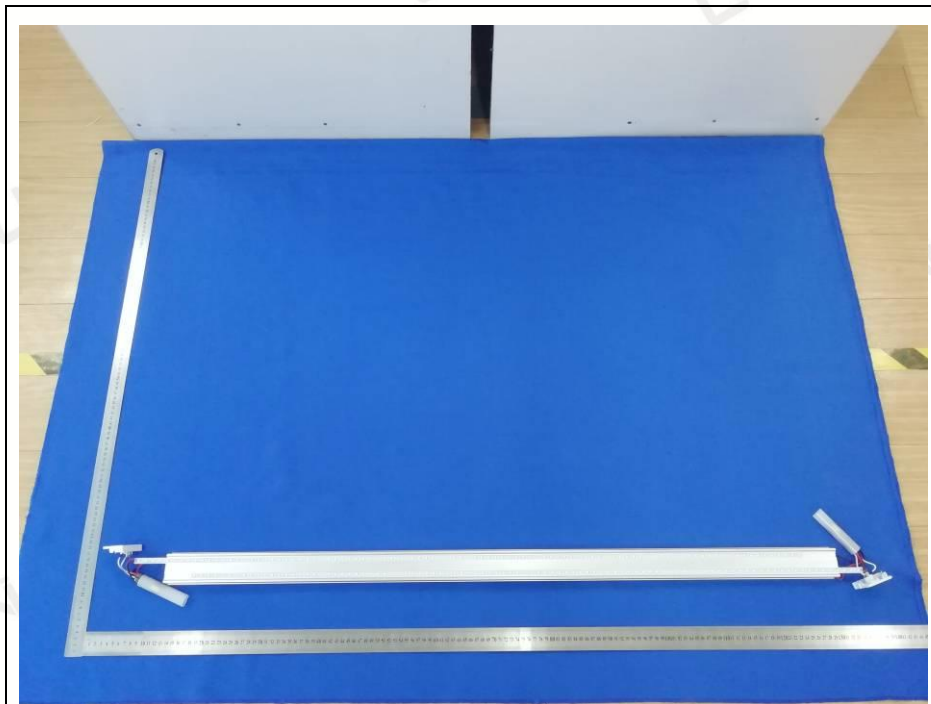


PHOTO 07

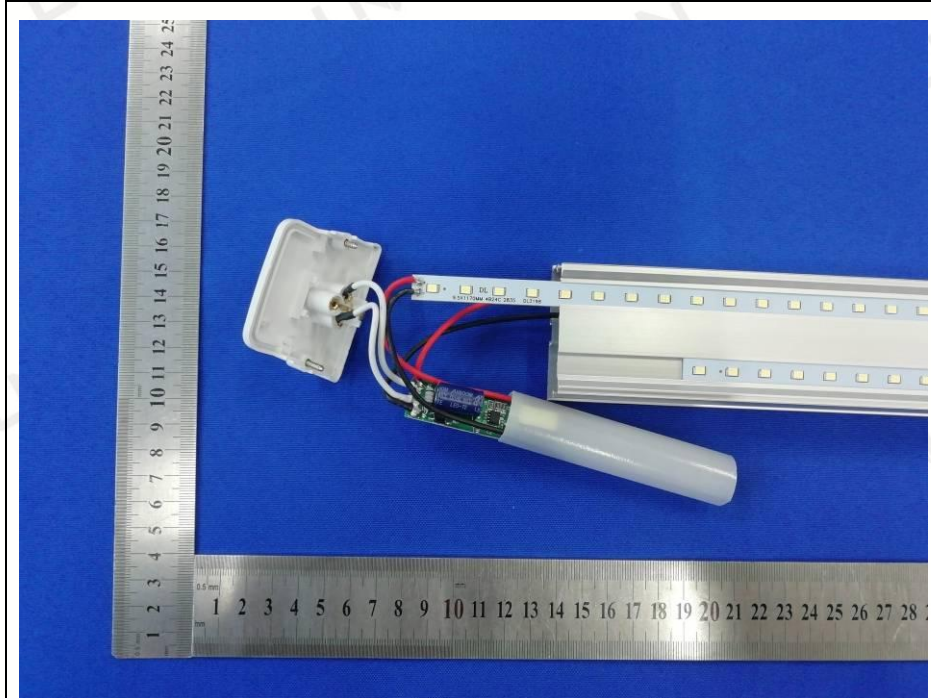


PHOTO 08

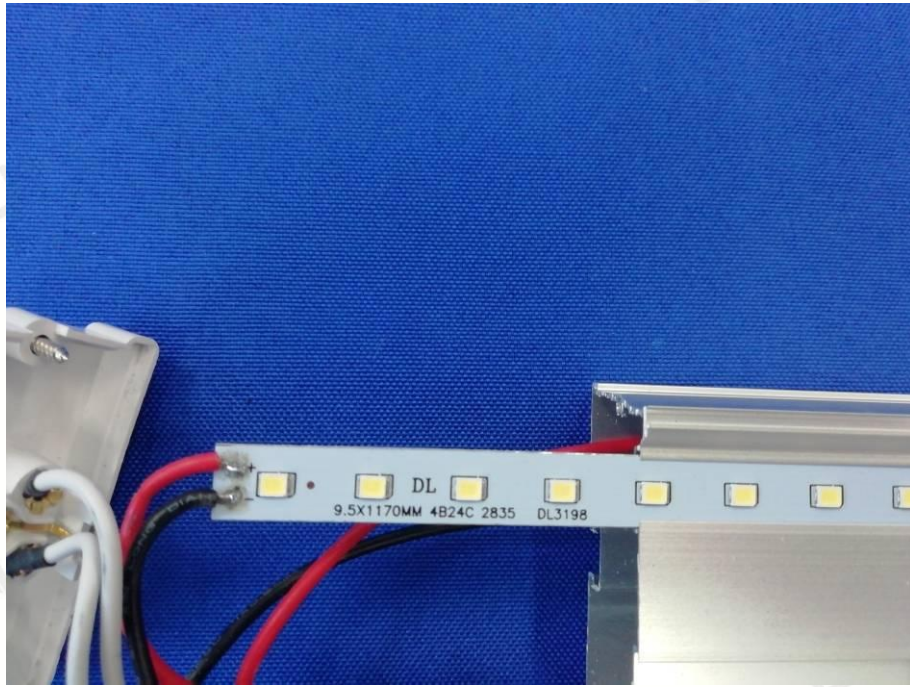


PHOTO 09

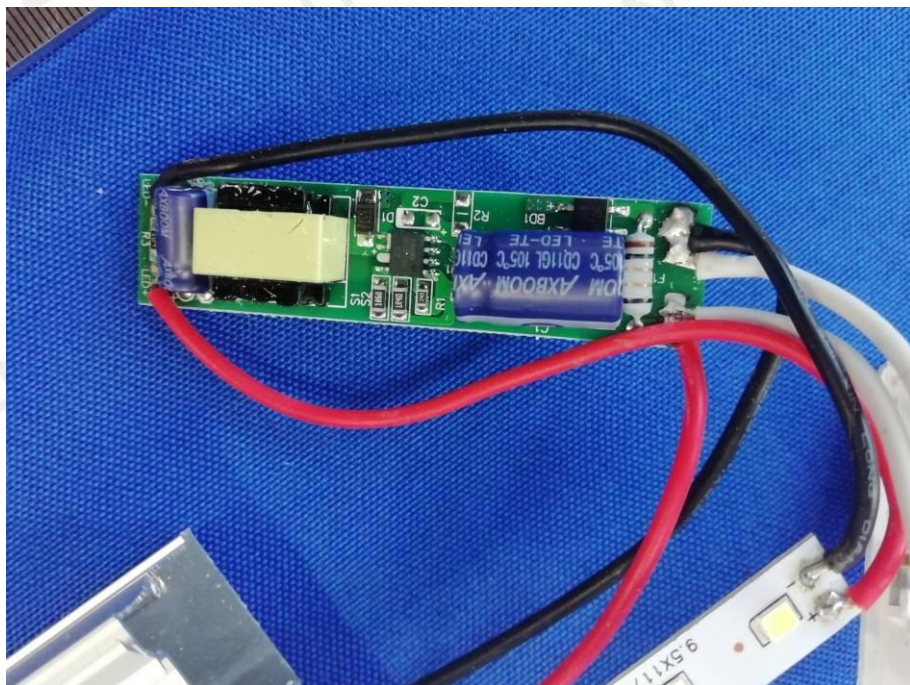


PHOTO 10

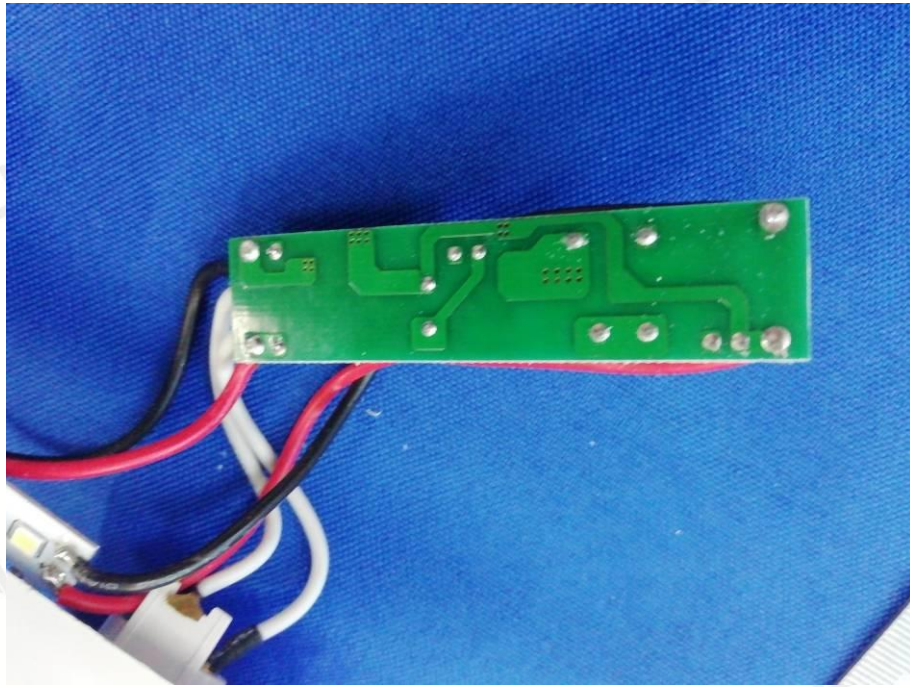
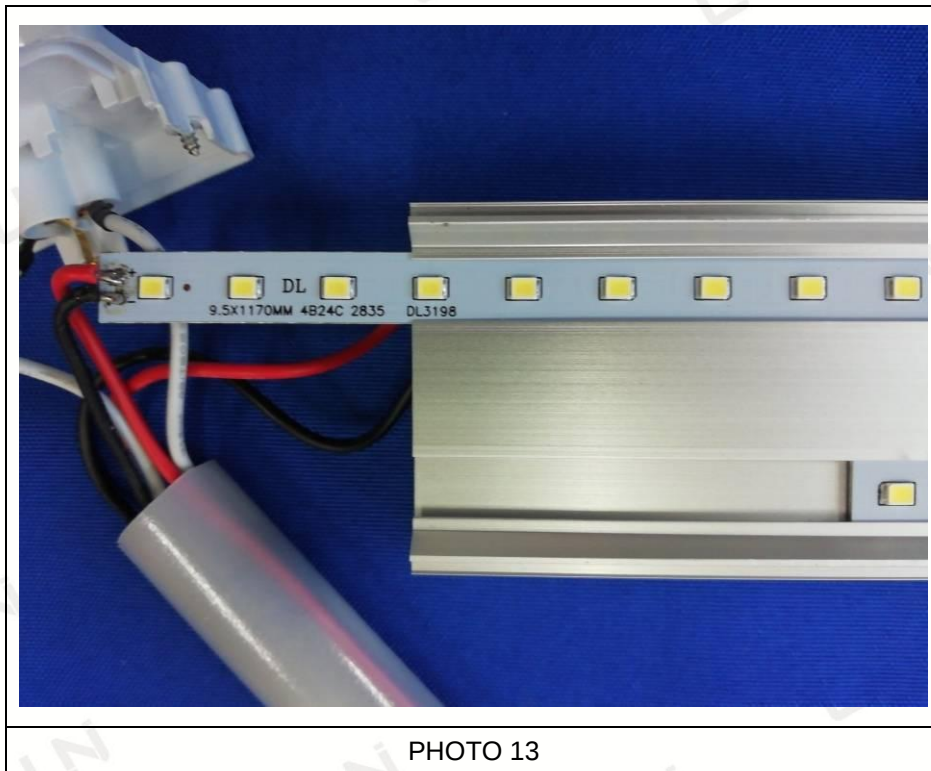


PHOTO 11



PHOTO 12



16 PHOTO OF TEST



PHOTO 01



PHOTO 02



End of Report