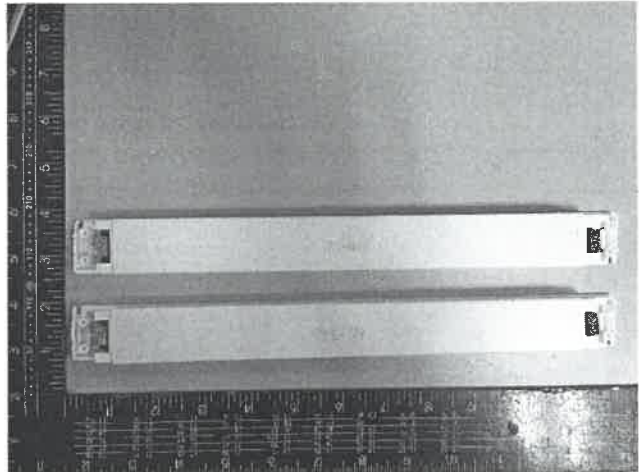




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Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	04.09.2017	
Auftraggeber: <i>Client:</i>	Ningbo Snappy Optoelectronics Co., Ltd. No.56, Keda Road National Hi-tech park of Ningbo Zhejiang 315040 P. R. China			
Prüfgegenstand: <i>Test item:</i>	LED Power Supply			
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	Refer to page 2			
Auftrags-Inhalt: <i>Order content:</i>	TÜV Rheinland – EMC Service			
Prüfgrundlage: <i>Test specification:</i>	EN 55015:2013 EN 61547:2009 EN 61000-3-3:2013 EN 61000-3-2:2014			
Wareneingangsdatum: <i>Date of receipt:</i>	05.09.2017			
Prüfmuster-Nr.: <i>Test sample No.:</i>	1160038984			
Prüfzeitraum: <i>Testing period:</i>	08.09.2017-15.09.2017			
Ort der Prüfung: <i>Place of testing:</i>	Refer to section 1.1			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland / CCIC (Ningbo) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von/ tested by:		kontrolliert von/ reviewed by:		
02.11.2017 Carrie Lei/PE 		06.11.2017 Feng Liang/TC 		
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>
Sonstiges/ Other:				
Refer to page 2 for more information.				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
*Legende: 1= Sehr gut 2 = gut 3= befriedigend 4= ausreichend 5 = mangelhaft P(ass) =entspricht o.g. Prüfgrundlage(n) F(ail)= entspricht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T =nicht getestet Legend: 1= very good 2 = good 3= satisfactory 4= sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail)= failed a.m. test specification(s) N/A = not applicable N/T = not tested				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</i>				

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- Model List:

No.	Model	Input (V, Hz)	Output Voltage (Vdc)	Output Current(A)	Rated power(W)
1	SL60-12VF	AC200-240V, 50/60Hz	12V	Max. 5A	Max. 60W
2	SL60-24VF		24V	Max. 2.5A	Max. 60W
3	SL75-12VF		12V	Max. 6.25A	Max. 75W
4	SL75-24VF		24V	Max. 3.125A	Max. 75W

Other aspects:

1. In electrical characteristics, the additional models list in the table are similar to the those models which have been approved in the test report 14712497 001. The differences among them are in the output parameters and relevant components.
2. Considering the differences among of them, additional EMC tests were performed as below table. The symbol “√” means the testing item was performed.

Model	CE	3-loop	CDN	Har	Flick	ESD	EFT	RS	Surge	CS	Dips
SL75-12VF	√		√	√					√		

3. This report is valid with the report 14712497 001.

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TEST SUMMARY

4.1.1 HARMONICS ON AC MAINS

Result:

Pass

4.1.2 VOLTAGE CHANGES, VOLTAGE FLUCTUATIONS AND FLICKER ON AC MAINS

Result:

Pass

4.1.3 MAINS TERMINAL CONTINUOUS DISTURBANCE VOLTAGE

Result:

Pass

4.2.1 RADIATED DISTURBANCE

Result:

Pass

5.1.1 SURGES TO AC POWER PORT

Result:

Pass

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1 Test Sites

1.1 Test Facilities

Laboratory: Ningbo Joysun Product Testing Service Co., Ltd.

No.66, Qingyi Road, Hi-Tech District, Ningbo, Zhejiang, China.

The used test equipment is in accordance with CISPR 16-1 series standards for measurement of radio interference.

1.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment of Laboratory

No.	Equipment	Model	Serial no.	Cal. due date
1.	EMI test receiver	ESCI	100708	2018.02.24
2.	Artificial mains network	ENV216	101022	2018.02.24
3.	Dip Surge Burst Test System	UCS500-M6B	V0746103125	2018.02.24
4.	booster	MV2616	V0746103126	2018.02.24
5.	CDN	FCC-801-M2/M3-16A	7079	2018.02.24
6.	6 dB Attenuator	75-A-FFN-06	141733	2018.02.24
7.	Harmonic and flicker test system(3phase)	DPA503	V0828104013	2018.02.24
8.	AC Power Source	61705	617050000124	2018.02.24

2 General Product Information

2.1 Product Function and Intended Use

The EUT (equipment under test) is an ordinary LED Power Supply for Lighting and similar use. For the further information, refer to the user's manual.

2.2 Ratings and System Details

Input voltage	: Refer to page 2	For all models
Frequency	: Refer to page 2	For all models
Rated Power	: Refer to page 2	For all models
Protection Class	: Class II	For all models

Refer to the User Manual for further information.

2.3 Independent Operation Modes

The basic operation modes are: "On" or "Off", without power regulation means.

Refer to the User Manual for further information.

2.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram for further information.

2.5 Submitted Documents

Circuit diagram, label, user manual etc.

3 Test Set-up and Operation Modes

3.1 Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test conditions were adapted accordingly in reference to the instructions for use.

Refer to the related paragraph of this report.

Immunity: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test conditions were adapted accordingly in reference to the instructions for use.

Refer to the related paragraph of this report.

3.2 Physical Configuration for Testing

Refer to the related paragraph of this report.

3.3 Test Operation and Test Software

Refer to the related paragraph of this report. No software was used.

3.4 Special Accessories and Auxiliary Equipment

None.

3.5 Countermeasures to achieve EMC Compliance

The tested sample contained noise suppression components as specified in the circuit diagram. No special measure is employed to achieve the requirement.

4 Test Results EMISSION

4.1 Emission in the Frequency Range up to 30 MHz

4.1.1 Harmonics on AC Mains

Result:

Pass

Date of testing : 2017.09.15
Test procedure : EN 61000-3-2:2014
Test duration : 2.5min
Harmonic order : 2 – 40th
Frequency range : 0 – 2kHz
Test voltage : 230V, 50Hz

The harmonics on AC Mains in the frequency from 0 to 2kHz were measured in accordance with EN 61000-3-2:2014.

The measurement was conducted with an automatic current harmonic analyzing system. This equipment is in compliance with the requirements of EN 61000-3-2:2014.

The results indicated in the following tables and figures were those measured and recorded by an automatic measuring system.

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Table 2: Harmonic currents measurement result

Equipment category: Class C;

Power factor: 0.960; Rated power: 80.94W.

Average harmonic current results

Hn	I _{eff} [A]	I _{eff} [%]	Limit [%]	Result
1	362.241E-3	99.757	28.80	PASS
2	677.655E-6	0.187		
3	49.139E-3	13.532		
4	749.694E-6	0.206		
5	3.036E-3	0.836		
6	698.024E-6	0.192		
7	4.645E-3	1.279		
8	693.426E-6	0.191		
9	4.540E-3	1.250		
10	671.457E-6	0.185		
11	4.138E-3	1.140		
12	661.281E-6	0.182		
13	2.316E-3	0.638		
14	653.132E-6	0.180		
15	2.219E-3	0.611		
16	664.535E-6	0.183		
17	2.336E-3	0.643		
18	650.532E-6	0.179		
19	1.997E-3	0.550		
20	661.740E-6	0.182		
21	2.546E-3	0.701		
22	657.904E-6	0.181		
23	2.938E-3	0.809		
24	655.241E-6	0.180		
25	1.455E-3	0.401		
26	687.304E-6	0.189		
27	1.167E-3	0.321		
28	689.520E-6	0.190		
29	749.067E-6	0.206		
30	672.257E-6	0.185		
31	735.998E-6	0.203		
32	667.975E-6	0.184		
33	925.247E-6	0.255		
34	677.627E-6	0.187		
35	1.169E-3	0.322		
36	686.881E-6	0.189		
37	879.503E-6	0.242		
38	677.365E-6	0.187		
39	2.116E-3	0.583		
40	669.344E-6	0.184		

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

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Maximum harmonic current results

Hn	I _{eff} [A]	I _{eff} [%]	Limit [%]	Result
1	363.124E-3	100.000	43.20	PASS
2	789.214E-6	0.217		
3	49.364E-3	13.594		
4	859.622E-6	0.237		
5	3.175E-3	0.874		
6	821.195E-6	0.226		
7	4.780E-3	1.316		
8	782.135E-6	0.215		
9	4.725E-3	1.301		
10	734.389E-6	0.202		
11	4.309E-3	1.187		
12	735.542E-6	0.203		
13	2.523E-3	0.695		
14	729.123E-6	0.201		
15	2.398E-3	0.661		
16	740.892E-6	0.204		
17	2.562E-3	0.705		
18	721.966E-6	0.199		
19	2.351E-3	0.647		
20	751.432E-6	0.207		
21	2.823E-3	0.778		
22	721.104E-6	0.199		
23	3.092E-3	0.851		
24	716.846E-6	0.197		
25	1.617E-3	0.445		
26	786.728E-6	0.217		
27	1.587E-3	0.437		
28	764.533E-6	0.211		
29	957.938E-6	0.264		
30	735.321E-6	0.202		
31	819.511E-6	0.226		
32	752.915E-6	0.207		
33	1.106E-3	0.305		
34	755.761E-6	0.208		
35	1.348E-3	0.371		
36	763.934E-6	0.210		
37	1.059E-3	0.292		
38	754.339E-6	0.208		
39	2.297E-3	0.633		
40	742.846E-6	0.205		

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

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4.1.2 Voltage changes, voltage fluctuations and flicker on AC mains

Result:	Pass
----------------	-------------

Test procedure : EN 61000-3-3:2013

According to the low power of the sample, it will not produce voltage fluctuation and flicker, which might exceed the related limits.

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4.1.3 Mains Terminal Continuous Disturbance Voltage

Result:

Pass

Date of testing : 2017.09.08
Kind of test site : EMC Shielding Room
Port : Mains
Basic Standard : EN 55015:2013
Frequency Range : 9kHz – 30MHz
Limit : EN 55015:2013, Clause 4.3

Test Setup

Input Voltage : AC 200-240V, 50/60Hz
Operational mode : ON
Earthing : No
Ambient Temp. : 20-25°C
Test Setup : According to Clause 8 of EN 55015:2013

The measurement setup was made according to EN 55015:2013 in an EMC shielding room.

The measurement equipment like test receiver, quasi-peak detector and Artificial Mains Network (AMN) are in compliance with CISPR 16-1 series standards and EN 55015:2013. The tested object was operated under its rated voltage and its rated frequency.

Furthermore an internal calibration with the test receiver was conducted prior to and after each measurement.

The tested object was set-up on a wooden table and 0.8m away from the AMN. The length of the extension power cord of the tested object was about 0.8m.

The Disturbance Voltage was determined according to clause 8 of EN 55015:2013 while measuring the line and neutral conductor by turns.

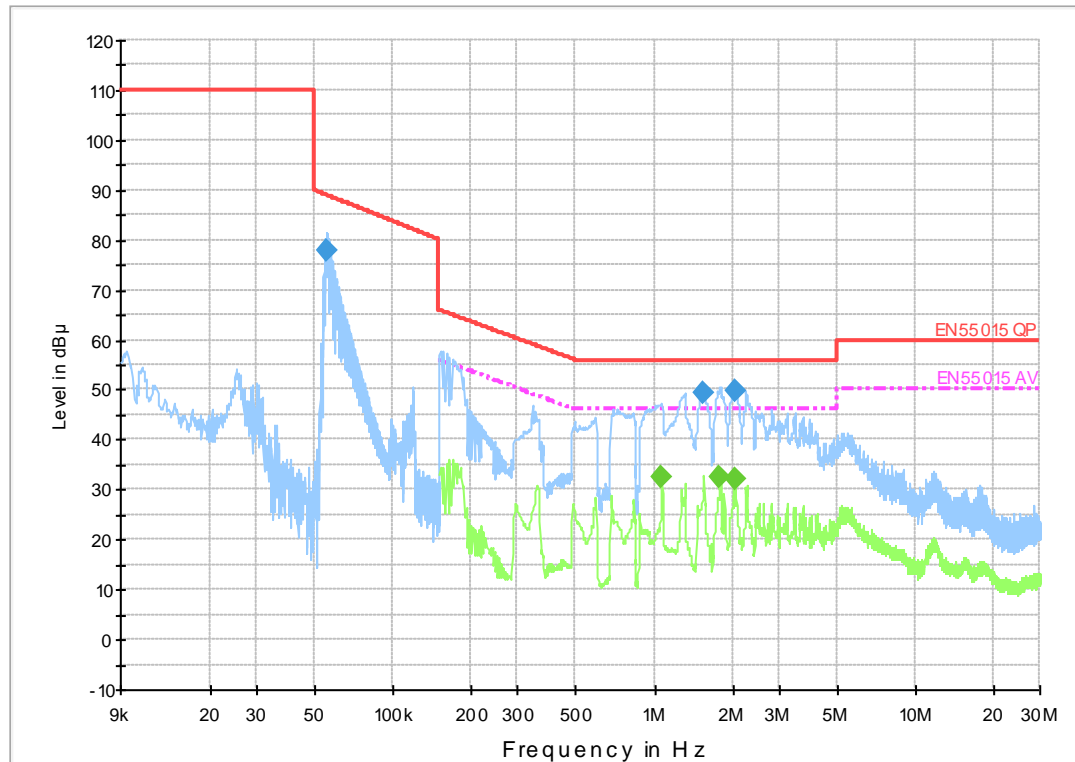
The following figures were those measured by an automatic measuring system. The disturbance voltage was scanned firstly with both Peak and Average detector and then a final measurement was performed with both Quasi-peak and Average detector at the frequencies which showed the Max. in a designated frequency sub-range. In the figures below, the higher curve is that of peak-value and the lower one is average-value. “◆” refers to Quasi-peak value and the Average value which were measured in the final measurement.

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Figure 1: Spectral Diagrams of disturbance voltage, 0.009-30MHz, L

9K-30M-Voltage with 2-Line-LISN



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.055380	77.8	1000.0	0.200	Off	L1	10.8	11.3	89.1	
1.551000	49.3	1000.0	9.000	Off	L1	10.7	6.7	56.0	
2.038000	49.6	1000.0	9.000	Off	L1	10.8	6.4	56.0	

Final Result 2

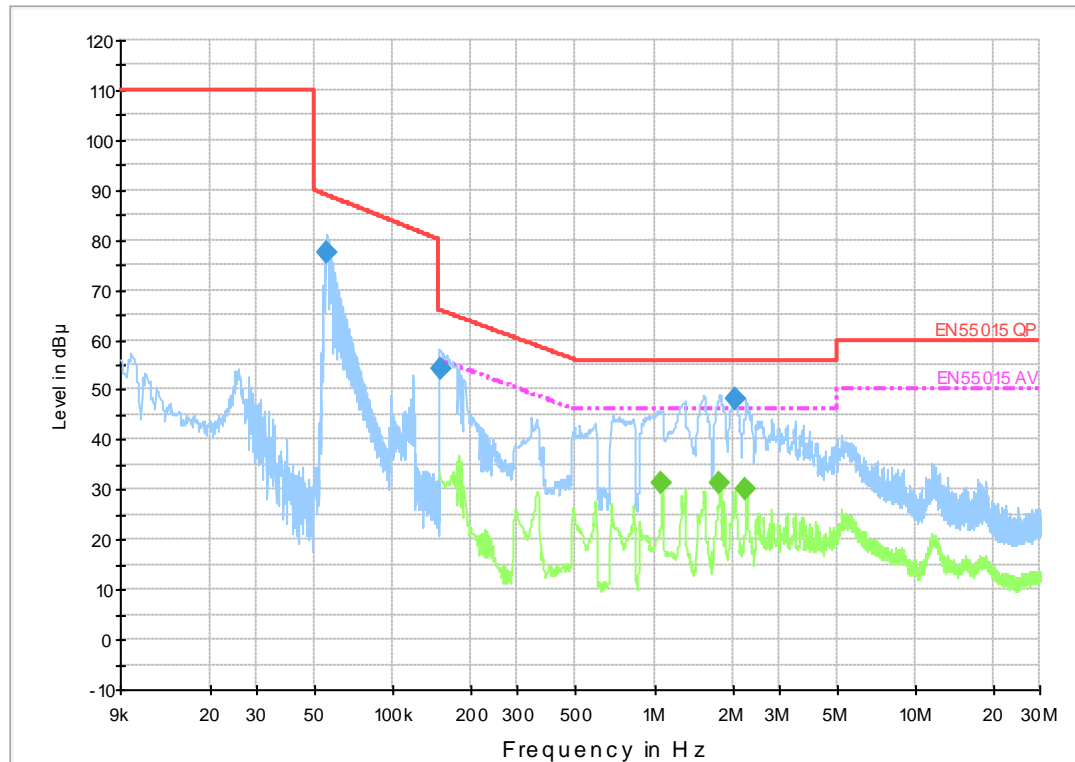
Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
1.072000	32.5	1000.0	9.000	Off	L1	10.8	13.5	46.0	
1.788000	32.4	1000.0	9.000	Off	L1	10.7	13.6	46.0	
2.042000	32.2	1000.0	9.000	Off	L1	10.8	13.8	46.0	

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Figure 2: Spectral Diagrams of disturbance voltage, 0.009-30MHz, N

9K-30M-Voltage with 2-Line-LISN



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.055540	77.4	1000.0	0.200	Off	N	10.8	11.7	89.0	
0.151000	54.2	1000.0	9.000	Off	N	10.8	11.8	65.9	
2.038000	48.3	1000.0	9.000	Off	N	10.8	7.7	56.0	

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
1.072000	31.4	1000.0	9.000	Off	N	10.8	14.6	46.0	
1.790000	31.2	1000.0	9.000	Off	N	10.7	14.8	46.0	
2.238000	30.2	1000.0	9.000	Off	N	10.8	15.8	46.0	

4.2 Emission in the Frequency Range above 30 MHz

4.2.1 Radiated disturbance

Result:	Pass
Date of testing	: 2017.09.22
Test procedure	: EN 55015:2013 Annex B CDN method
Frequency range	: 30-300MHz
Kind of test site	: Shielding Room
Limit	: EN 55015:2013 Table B.1
	Quasi-peak limits:
	30-100MHz, 64-54dB μ V; 100-230MHz, 54 dB μ V;
	230-300MHz, 61dB μ V

Test Setup

Input voltage	: AC 200-240V, 50/60Hz
Operational mode	: ON
Temperature	: 20-25°C
Relative humidity	: 45-55%

Measuring configuration and description

If the EUT complies with the requirements of Annex B of EN 55015:2013, it is deemed to comply with the radiated disturbances requirements in the frequency range 30MHz to 300MHz specified in 4.4.2 of EN 55015:2013.

The Conducted RF emission test was measured in the frequency range from 30MHz to 300MHz according to EN 55015:2013. The measurement was performed in accordance with the method specified in Annex B of EN 55015:2013.

The Conducted RF emission test was performed in a shielding room with a CDN FCC-801-M2/M3-16A. The EUT is placed on one non-conducting block with a height of (10 \pm 0.2) cm which in turn are placed on an earthed metal plate with dimensions at least 20 cm larger than the lighting equipment.

The EUT is connected via a mains supply cable with a length of (20 \pm 10) cm to the CDN. The distance of the cable to the metal plate should be (4 \pm 1) cm. The CDN is mounted on the metal plate.

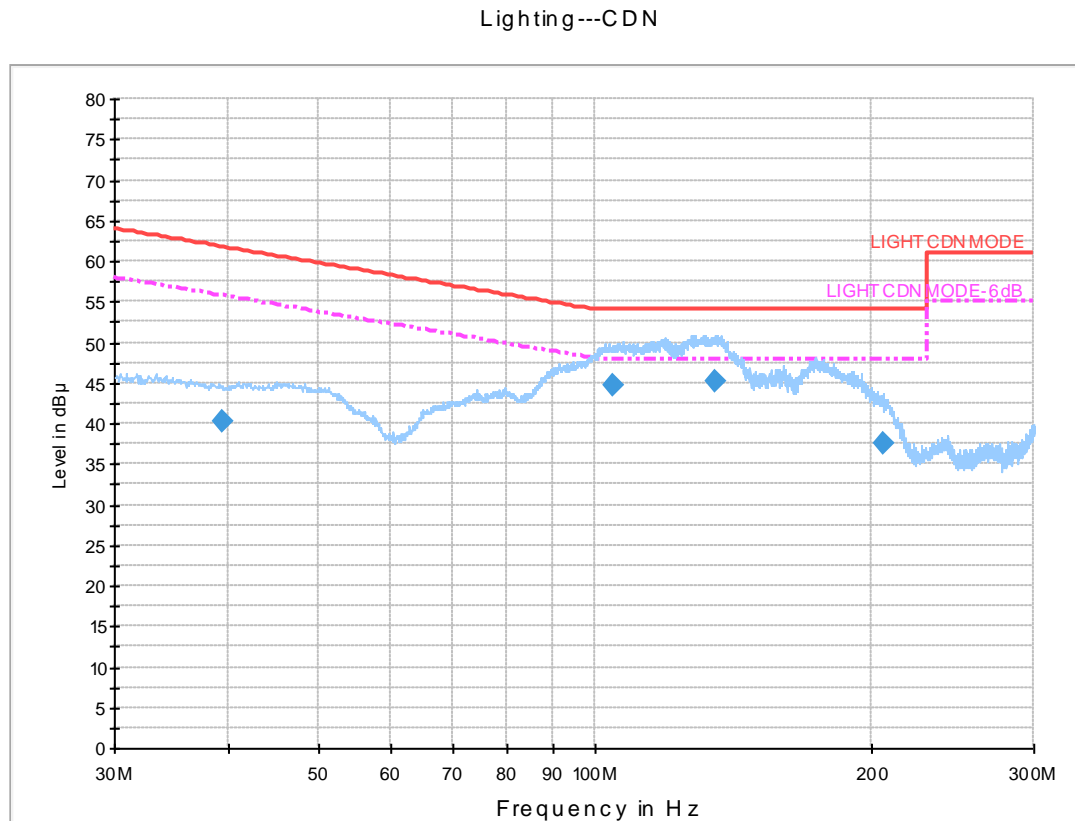
Each tested EUT was operated for at least 30min before test.

The following figures were those measured and recorded by a test receiver. The curves in the figure were those measured with a Peak detector. The symbol “♦” refers to Quasi-peak values which were measured in the final measurement.

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Figure 3: Spectral Diagrams, RF Emission



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Marg in (dB)	Limit (dBμV)	Comment
39.330000	40.3	1000.0	120.000		16.0	21.4	61.8	
104.810000	44.7	1000.0	120.000		16.8	9.3	54.0	
135.130000	45.3	1000.0	120.000		17.2	8.7	54.0	
205.900000	37.6	1000.0	120.000		17.7	16.4	54.0	

5 Test Results I M M U N I T Y

During the immunity tests, the EUT was operated under conditions specified by clause 3.1 of this report.

Performance 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.

Performance 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.

Performance 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.

The EMC immunity performances of the EUT were tested according to EN 61547:2009.

Testing date: 2017.09.15

Room temperature: 20-25°C

Relative Humidity: 45-50%

5.1 Input and Output AC Power Ports

5.1.1 Surges to AC Power Port

Result:	Pass
----------------	-------------

The immunity against surges to AC power port was tested in accordance to IEC 61000-4-5 which is specified by clause 5.7 in EN 61547:2009.

Test setup and the Combination Wave Generator (CWG) was according to IEC 61000-4-5. The decoupling network is incorporated in the CWG.

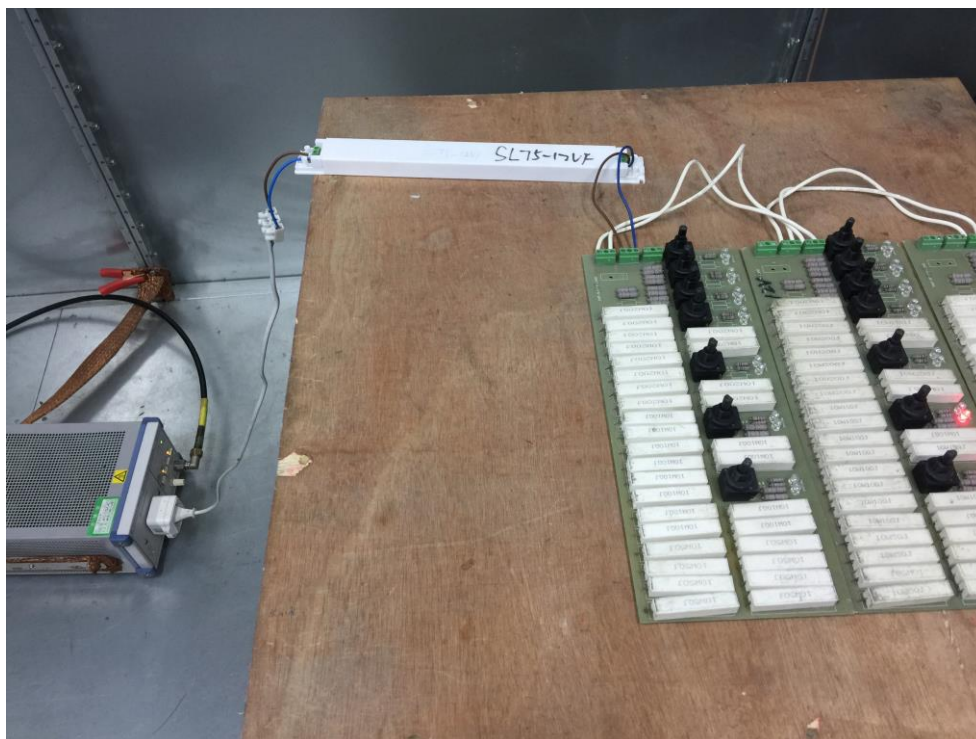
Test Level	: phase to neutral	$\pm 1.0\text{kV}$
Tr/Tn	: 1.2/50 μs (open-circuit voltage)	8/20 μs (short-circuit current)
Test numbers	: 5 positive and 5 negative pulses at phases of $\pm\pi/2$	
Repetition rate	: 1/min	
Performance criteria	: C	

Table 3: Surges to AC Power lines, positive/negative

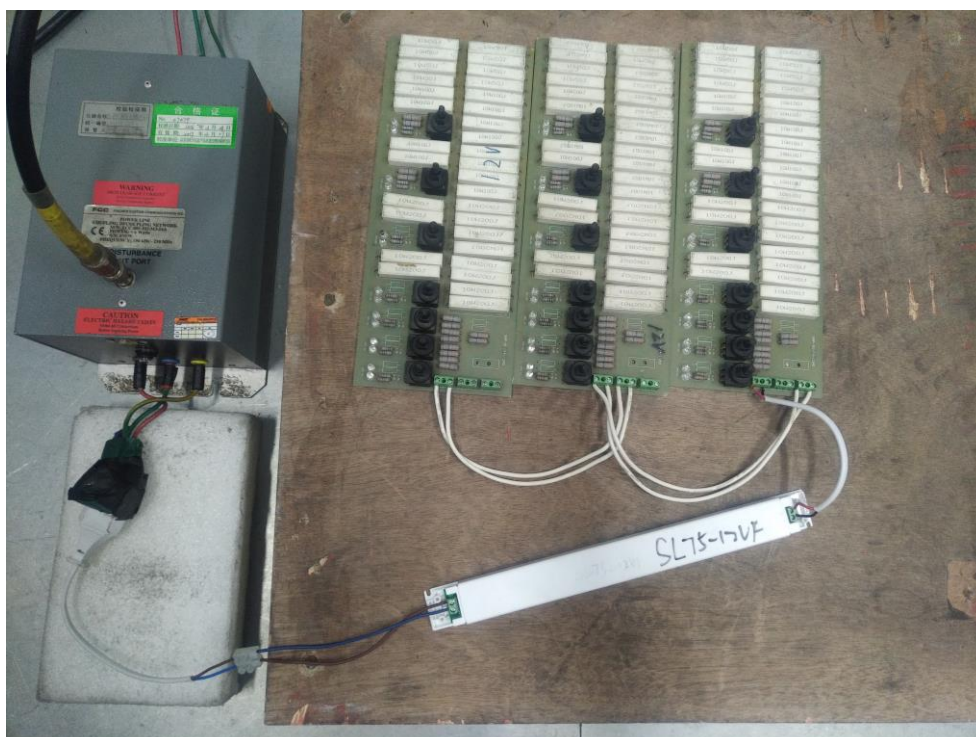
Line	Tested Voltage/coupling phase	Observation	Result
Phase to neutral	+1.0kV, $+\pi/2$ (5 times)	No change of output parameter	Pass
	-1.0kV, $-\pi/2$ (5 times)	No change of output parameter	Pass

6 Photographs of the Test Set-Up

Photograph 1: Set-up for Conducted Emission



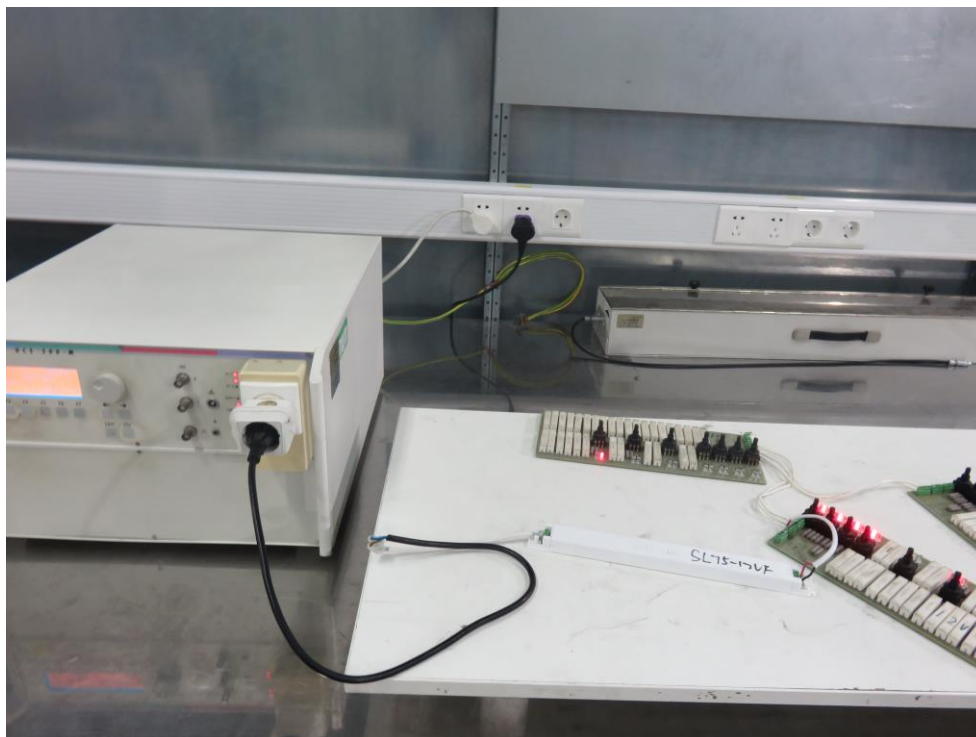
Photograph 2: Set-up for Radiated Emission (CDN Method)



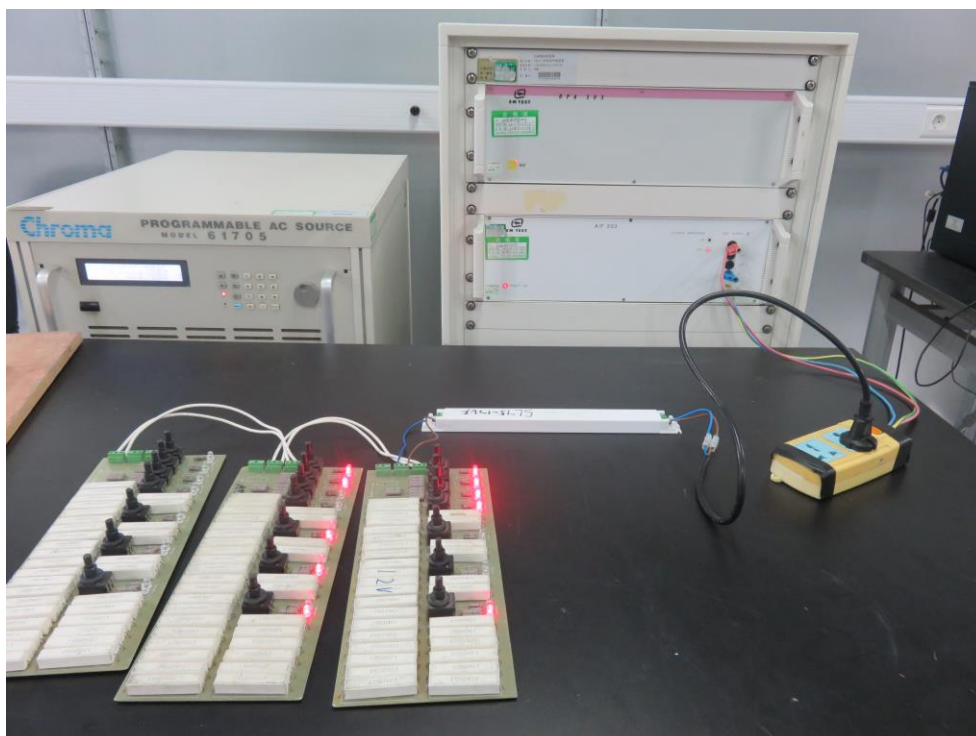
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Photograph 3: Set-up for Surges



Photograph 4: Set-up for Harmonics



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