3015615.50-QUA/EMC

EMC Test report for LED PL-C Lamp Models PLC-75GEU and PLC-75EEU

Hong Kong, date of issue: 2012-10-24

Author Otto Kwok

By order of Matrix Lighting Limited at Hong Kong, China

author : Otto Kwok reviewed : Jimmy Woo

22 pages 0 annexes

CONTENTS

page

1 CONCLUSION

The equipment under test (EUT) meets the essential requirements of the EMC Directives 2004/108/EC.

This update report is referring to report 3013414.50-QUA/EMC due to new model PLC-75EEU with E27 cap is added. No additional tests are needed.

The conclusion and results stated in this test report are based on a non-recurrent examination of sample(s) provided by the applicant.

The tests described in this report do not result in the right to use any approval mark as conferred by DEKRA. As far as the tests were based on certain specifications, these are mentioned in the report.

1.1 Model description

The apparatus as supplied for the test is LED PL-C Lamp, model PLC-75GEU for residential use and the product contains electronic control circuit but no earth connection.

It is a self-ballasted LED lamps with G24 cap and E27 cap.

Each model has three different colour temperature: 2800K, 4000K and 6000K.

Figure 1 model PLC-75GEU

Figure 2 model PLC-75EEU

1.2 Environment

The requirements and standards apply to equipment intended for use in:

√	Residential (domestic) environment
√	Commercial and light-industrial environment
	Industrial environment
	Medical environment

2 SUMMARY

This chapter presents an overview of standards and results. Refer to the next chapters for details of measured test results and applied test levels.

2.1 Applied standards

Standard	Year	Title
EN 55015	2006	Emission – Electrical lighting and similar equipment
A1	2007	
A2	2009	
EN 61547	2009	Immunity - Equipment for general lighting purposes
EN 61000-3-2	2006	Limits for harmonic currents emissions
A1	2009	
A2	2009	
EN 61000-3-3	2008	Limitation of voltage fluctuations and flicker

Other EMC standards have been found not applicable for the EUT.

2.2 Overview of results

Emission tests	Result
Mains conducted disturbance voltage	**PASS**
Radiated Magnetic Field emission	**PASS**
Common mode terminal voltage (CDN method)	**PASS**
Harmonic current emission	**PASS**
Limitation of voltage fluctuations (flicker)	**PASS**

The operating frequency of the lamp supply current is not exceeding 100 Hz.

Immunity tests	Result
Electrostatic Discharges (ESD)	**PASS**
Radiated EM Field	**PASS**
Electrical fast transient (EFT) / Burst transients	**PASS**
Surge transients	**PASS**
Conducted RF disturbances	**PASS**
Power supply voltage interruptions & dips	**PASS**

3 GENERAL INFORMATION

3.1 Product Information

Equipment under test	LED PL-C Lamp
Trade mark	VIRIBRIGHT
Tested Type	PLC-75GEU
Representative Type	PLC-75EEU
U nominal and P rated	220-240 Vac, 50 Hz, 35 mA, 7,5 W, G24/ E27

3.2 Client Information

Applicant and Manufacturer	Matrix Lighting Limited
Address	Room 223-231, 2/F., East Wing, Tsim Sha Tsui Centre, 66 Mody Road, Tsim Sha Tsui East, Kowloon
Place	Hong Kong
Country	China

3.3 Test data

Location	DEKRA Certification Hong Kong Ltd.
Address	Unit 1-14, 6/F, Fuk Shing Commercial Bldg. 28 On Lok Mun St. Fanling, N.T.
Date	July 2012
Supervised by	Jimmy Woo

3.4 Environmental conditions

Tests have been performed in a controlled laboratory environment, where the environmental conditions are maintained within the applicable ranges.

Ambient temperature	15 °C – 35 °C
Relative Humidity air	30% - 60%

4 EMISSION TEST RESULTS

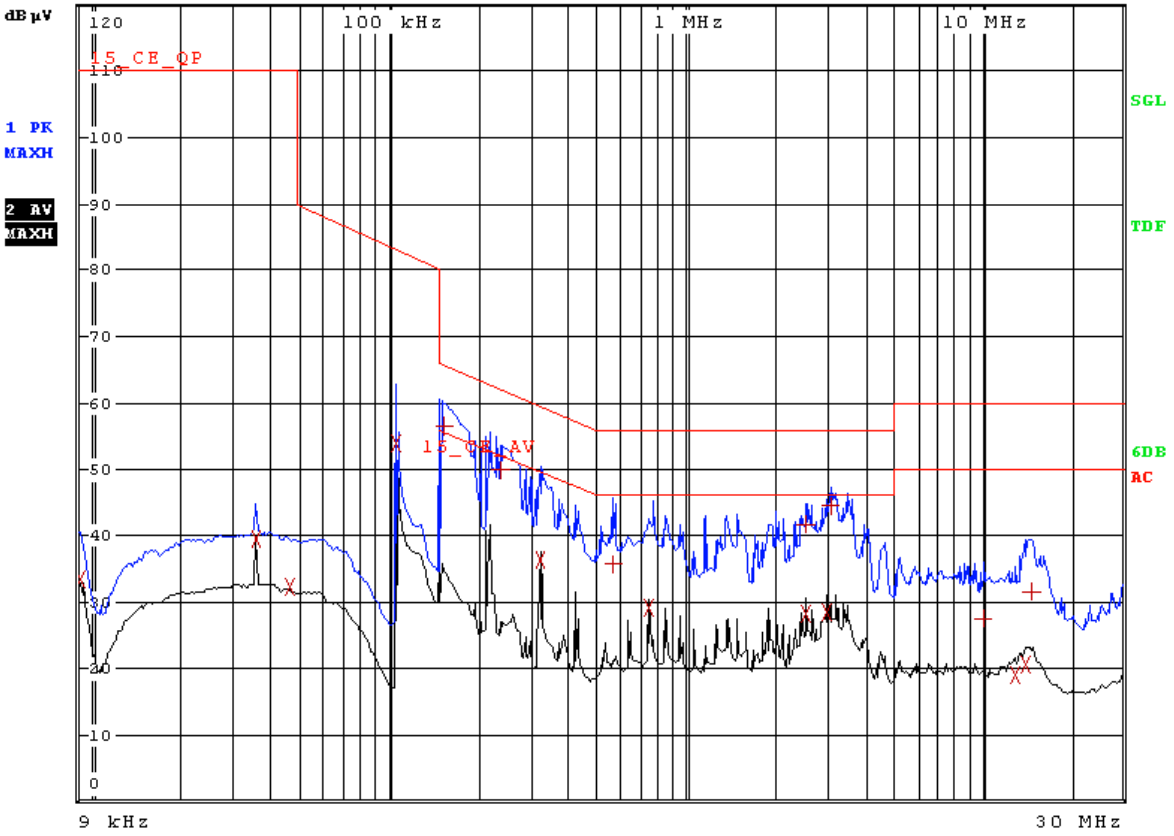
4.1 Mains conducted disturbance voltage

Standard	EN 55015	
Frequency [MHz]	QP [dB(µV)]	AV [dB(µV)]
0,009 – 0,05	110	N/A
0,05 – 0,15	90 – 80 *)	N/A
0,15 – 0,50	66 – 56 *)	56 - 46 *)
0,50 – 5,0	56	46
5,0 – 30	60	50

*) Limits decreasing linearly with the logarithm of the frequency

Port	AC mains
Test method	LISN
Mode (worst case mode)	On mode

Results



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	15_CE_QP		
Trace2:	15_CE_AV		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	9 kHz	33.23	
2 Average	35.64 kHz	39.57	
2 Average	46.92 kHz	31.81	
2 Average	107.32 kHz	55.26	
1 Quasi Peak	158 kHz	56.85	-8.71
1 Quasi Peak	234 kHz	50.72	-11.58
2 Average	326 kHz	31.64	-17.90
2 Average	754 kHz	28.71	-17.28
1 Quasi Peak	854 kHz	42.27	-13.72
2 Average	2.466 MHz	28.87	-17.12
1 Quasi Peak	2.47 MHz	42.40	-13.59
1 Quasi Peak	2.982 MHz	41.19	-14.80
2 Average	3.01 MHz	27.37	-18.62
1 Quasi Peak	6.502 MHz	31.20	-28.79
1 Quasi Peak	14.282 MHz	30.12	-29.87
2 Average	14.306 MHz	19.99	-30.00

Refer to chapter 6 for the test set-up.

Conclusion:

PASS

4.2 Common mode terminal voltage (CDN method)

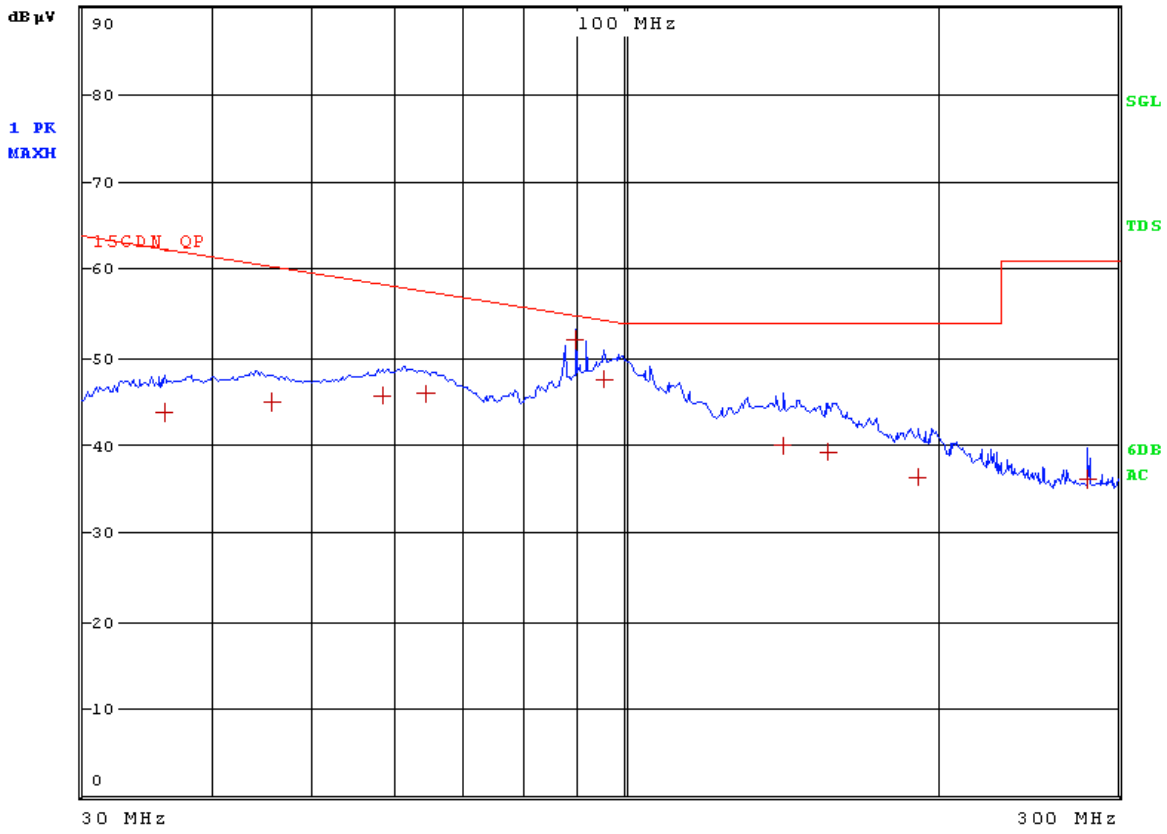
Standard	EN 55015

Frequency [MHz]			QP [dB(µV)]
30	–	100	64 to 54 *)
100	–	230	54
230	–	300	61

*) Limits decreasing linearly with the logarithm of the frequency

Port	AC mains
Mode (worst case mode)	On mode

Results



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	15CDN_QP		
Trace2:	---		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1 Quasi Peak	35.94 MHz	43.73	-18.76
1 Quasi Peak	45.84 MHz	45.05	-15.42
1 Quasi Peak	58.56 MHz	45.71	-12.73
1 Quasi Peak	64.26 MHz	45.86	-11.80
1 Quasi Peak	89.76 MHz	52.11	-2.78
1 Quasi Peak	95.82 MHz	47.59	-6.75
1 Quasi Peak	142.5 MHz	40.00	-13.99
1 Quasi Peak	157.26 MHz	39.33	-14.66
1 Quasi Peak	191.82 MHz	36.43	-17.56
1 Quasi Peak	280.56 MHz	36.30	-24.69

Conclusion:

PASS

4.3 Radiated Magnetic Field emission

Standard	EN 55015
Port	Enclosure with cabling
Mode / Set-up	Van Veen loop with 2 meter diameter
Mode (worst case mode)	On mode

Frequency [MHz]	QP [dB(μA)]
0,009 – 0,07	88
0,07 – 0,15	88 – 58 *)
0,15 – 3,0	58 – 22 *)
3,0 – 30,0	22

*) Limits decreasing linearly with the logarithm of the frequency

Results

Direction	X- Axis, Y- Axis and Z- Axis	
Frequency [MHz]	QP [dB(μA)]	
	Level	Limit
0,009 – 30,0	More than 20 dB below the limits	

No significant emissions were measured at the frequency range of interest employing the QP detector.

Conclusion:

PASS

4.4 Harmonic currents

Standard	EN 61000-3-2
Port	AC Mains supply
Rated power	7,5 W

	Class A	All apparatus not classified as Class B, C or D
	Class B	Portable tools
√	Class C	Lighting equipment
	Class D	Personal computers, television receivers

Results and limits

According to EN 61000-3-2 :2006+ A1:2009 + A2:2009, equipment with rated power less than or equal to 25W other than discharge lighting equipment, the requirement and limited for this case is not yet considered. Hence, the product is deemed to comply with the standard without any measurements.

Conclusion:

PASS

4.5 Voltage fluctuations (Flicker)

Standard	EN 61000-3-3
Port	AC Mains supply
Voltage	230 V, 50Hz

Equipment intended to be connected to 230/400 V, 50 Hz supply systems may not produce voltage fluctuations in the supply systems due to variation of the input current above the limits as stated below.

Results

Because of the low power rating, the EUT is unlikely to produce significant voltage fluctuations or flicker, the flicker testing is not necessary.

Conclusion:

PASS

5 IMMUNITY TEST RESULTS

5.1 Electrostatic discharge immunity

Electrostatic discharges (ESD) are the result of persons or objects that accumulate static electricity due to for instance walking on synthetic carpets. The ESD can influence the operation of equipment or damage its electronics, either by a direct discharge or indirectly by coupling or radiation. Both effects are simulated during the tests.

Requirements

Standard	EN 61547
Basic standard	EN 61000-4-2
Port	Enclosure
Performance criterion	B; During the test degradation is allowed. No change of operating state or stored data is allowed.
Air discharges	8 kV
Contact discharges	4 kV
Mode	On mode

Performed tests

Air discharges		4 kV	√	8 kV		15 kV		xx kV
Contact discharges		2 kV	√	4 kV		8 kV		xx kV
Via coupling planes	√	Horizontal			√	Vertical		
Polarity	√	Positive			√	Negative		
Set-up	√	Table-top				Floor standing		
Ambient temperature	22 °C							
Relative Humidity air	55 %							

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.

Conclusion:

PASS

5.2 Radiated EM field immunity

During the test it is verified if the equipment under test has sufficient immunity against radiated electromagnetic fields. Walkie-talkies, radio transmitters, television transmitters, and telecommunication equipment including cellular telephones and other emitting devices, like industrial electromagnetic sources can generate these fields

Requirements

Standard	EN 61547
Basic standard	EN 61000-4-3
Port	Enclosure
Performance criterion	A; Operation as intended
Frequency range	80 - 1000 MHz
Modulation	1 kHz – 80% AM
Fieldstrength	3 V/m

Performed tests

Frequency range	80 - 1000 MHz
Tested Fieldstrength	3 V/m
Dwell time	1 second
Test set-up	Full Anechoic Chamber
Mode	On mode

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.

Conclusion:

PASS

5.3 Electrical Fast Transient immunity

The EFT immunity test simulates disturbances by bursts of very short transients caused for example by switching off loads such as an AC motor or bouncing relay contacts. The transients are likely to disturb electronics but less likely to cause damage.

Requirements

Standard	EN 61547			
Basic standard	EN 61000-4-4			
Performance criterion	B; During the test degradation is allowed. No change of operating state or stored data is allowed.			
Pulse characteristics	5/50 ns			
Peak Voltage; Port	1kV; AC input power port			
Repetition frequency	√	5 kHz		2,5 kHz

Performed tests

Tested Voltage; Port	1kV; AC input power port			
Mode	On mode			
Injection method	√	CDN		Capacitive clamp
Polarity	√	Positive	√	Negative
Set-up	√	Table-top		Floor standing

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.

Conclusion:

PASS

5.4 Surge transient immunity

The surge transient immunity test simulates the surges that are caused by overvoltages due to indirect (induced) lightning transients. The pulse is a slow transient with high-energy contents and due to its long duration may cause damage to an unprotected EUT.

Requirements

Standard	EN 61547
Basic standard	EN 61000-4-5
Performance criterion	B; During the test degradation is allowed. No change of operating state or stored data is allowed. C; Temporary, self-recoverable loss of function is allowed.
Pulse characteristics	1,2/50 µs
Peak Voltage; Port	0,5 kV; AC input power port (line to line)

Performed tests

Tested Voltage; Port	0,5 kV; AC input power port (line to line)			
Mode	On mode			
Polarity	√	Positive	√	Negative

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.

Conclusion:

PASS

5.5 RF Conducted immunity

During this test the immunity of the equipment for induced or conducted electromagnetic fields is checked. Fields generated by radio and other transmitters cause RF voltages in long cables like the mains network. This test reproduces these induced disturbing voltages by injecting them to the EUT via the cabling.

Requirements

Standard	EN 61547
Basic standard	EN 61000-4-6
Performance criterion	A; Operation as intended
Frequency range	0,15 – 80 MHz
Modulation	1 kHz – 80% AM
Test level; Port	3V; AC input power port

Performed tests

Tested level; Port	3V; AC input power port			
Mode	On mode			
Frequency range	0,15 – 80 MHz			
Dwell time	1 second			
Injection method	√	CDN-M2		EM clamp

Observations

During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.

Conclusion:

PASS

5.6 Power supply interruptions and dips

Requirements

Basic standard	EN 61000-4-11
Performance criterion	B; During the test degradation is allowed. No change of operating state or stored data is allowed. C; Temporary, self-recoverable loss of function is allowed.

Standard	EN 61547	
AC input power port	C	U_{NOM} – 30% (10 periods)
	B	U_{NOM} – 100% (0,5 period)

Performed tests

Tested voltage	AC input power port, 240V
On mode	On mode
AC input power port	U_{NOM} – 30% (10 periods)
	U_{NOM} – 100% (0,5 period)

Observations

The light was flashed during the test. After the test the EUT functioned as intended. No unacceptable loss of performance was observed.

Conclusion:

PASS

6 IDENTIFICATION OF THE EQUIPMENT UNDER TEST

The photograph shows the tested device. (Representative for all models)

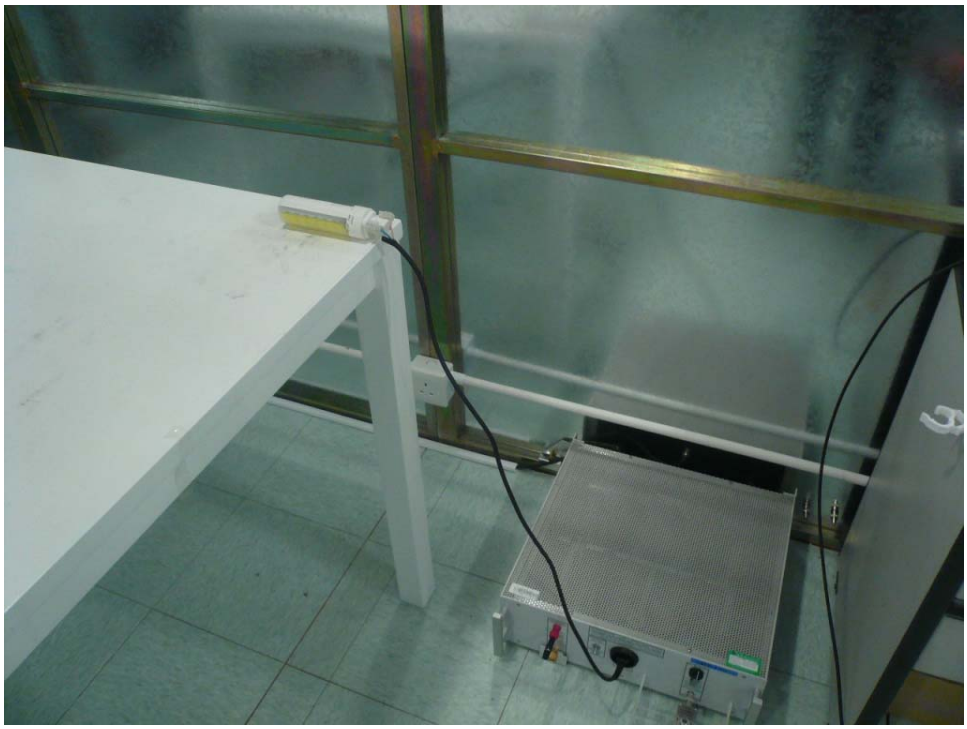


Figure 3 Conducted emission test setup