3006890.50-QUA/EMC

EMC Test report for MR16 LED bulb

Model 50-32MR

Hong Kong, date of issue: 2011-03-10

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By order of Matrix Lighting Limited at Hong Kong, China

CONTENTS

1 CONCLUSION

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

The EUT is tested with a linear adaptor model WX48-25-93 which is provided by manufacturer.

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

1.1 Model description

The apparatus as supplied for the test is a MR16 LED bulb, model 50-32MR for residential use and the product is a LED bulb with build-in electronic driver.

Figure 1 model 50-32MR

The operating modes as stated in the user manual are on mode and off mode。

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**
Radiated EM Field emission	**PASS**
Harmonic current emission	**PASS**
Limitation of voltage fluctuations (flicker)	**PASS**

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	MR 16 LED bulb
Trade mark	VIRIBRIGHT
Tested Type	50-32MR
U nominal	12VAC, 12VDC
P rated	3,2W

3.2 Client Information

Applicant	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
Manufacturer	same as applicant
Factory	1) Zhong Shan Ban Fu Micami Toys Factory 2) ZhongShan Wei Heng Plastic Industry Co.,Ltd.
Address	1) Sha Guo Industrial Zone, Ban Fu Country, ZhongShan City, Guangdong Province, China 2) 172 North Banfu Road, Banfu Town, ZhongShan, Guangdong, China
Place	ZhongShan
Country	China

3.3 Test data

Location	HKSTC
Address	10 Dai Wang Street, Taipo Industrial Estate, N,T., Hong Kong
Date	February 2011
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

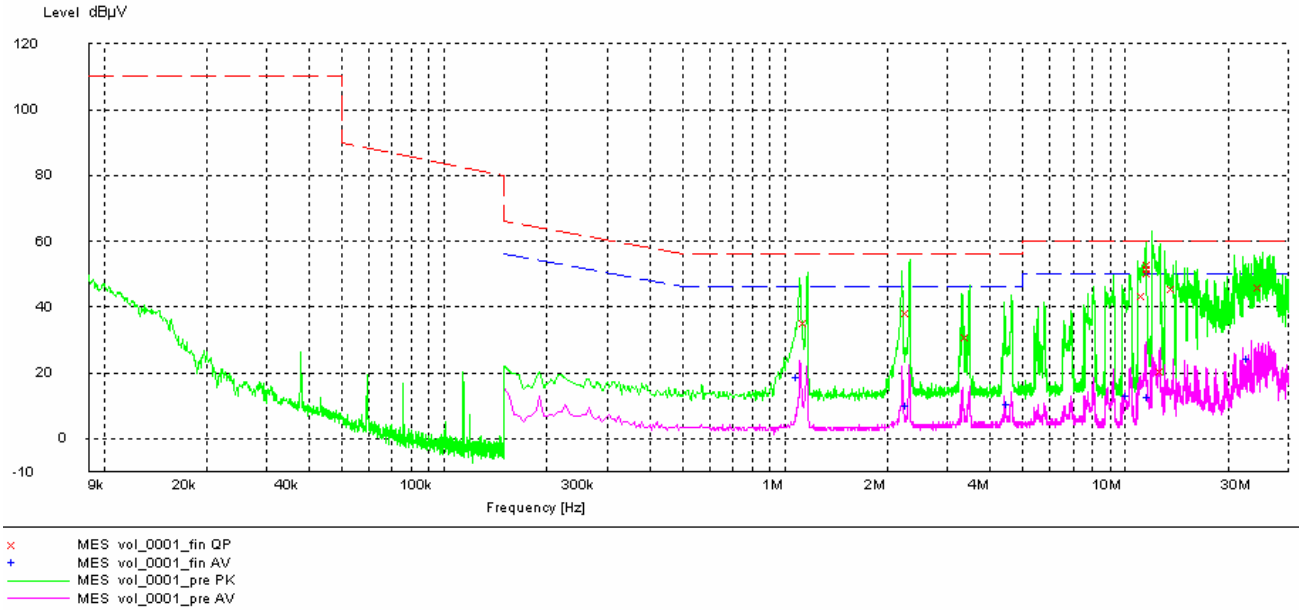
4.1 Mains conducted disturbance voltage

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 – 2,51	56	46
2,51 – 3,0	73	63
3,0 – 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	On mode

Results



MEASUREMENT RESULT: "vol_0001_fin QP"

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
1.160000	35.30	10.0	56	20.7	L1	GND
2.320000	38.40	10.0	56	17.6	L1	GND
3.475000	30.70	10.0	56	25.3	L1	GND
11.515000	43.40	10.0	60	16.6	L1	GND
11.930000	51.60	10.0	60	8.4	L1	GND
11.940000	52.80	10.0	60	7.2	L1	GND
11.950000	50.30	10.0	60	9.7	L1	GND
12.980000	20.40	10.0	60	39.6	L1	GND
14.085000	45.80	10.0	60	14.2	L1	GND
25.315000	46.10	10.0	60	13.9	L1	GND

MEASUREMENT RESULT: "vol_0001_fin AV"

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
1.105000	18.50	10.0	46	27.5	L1	GND
2.320000	9.60	10.0	46	36.4	L1	GND
4.605000	10.10	10.0	46	35.9	L1	GND
10.360000	12.70	10.0	50	37.3	L1	GND
11.940000	12.30	10.0	50	37.7	L1	GND
23.375000	24.20	10.0	50	25.8	L1	GND

Refer to chapter 6 for the test set-up.

Conclusion:

PASS

4.2 Radiated EM Field emission

Standard	EN 55015
Measuring distance	10 meters

Frequency [MHz]			QP [dB(µV/m)]
30	–	230	30
230	–	300	37

Port	Enclosure
Mode (worst case mode)	On mode

Results

Polarization	Frequency [MHz]	QP [dB(µV/m)] 10m distance	
		Level	Limit
V	65,3	21,6	30
V	87,2	23,7	30
V	145,4	15,6	30
V	173,1	15,5	30
V	206,0	15,3	30
V	208,3	17,3	30

"QP" are levels and limits referring to measurements with the quasi-peak detector. For Radiated emission measurement only the QP value is measured.

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

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
Mode	On mode

	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, 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	230Vac
Mode	On mode

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 voltage and power rating, the EUT is unlikely to produce significant voltage fluctuations or flicker, no test need to be made on it in this clause.

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	23 °C							
Relative Humidity air	37%							

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 µs0,5
Peak Voltage; Port	0,5kV; AC input power port (line to line)

Performed tests

Tested Voltage; Port	0,5kV; 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 output power port

Performed tests

Tested level; Port	3V; AC input power port			
Mode	On mode			
Frequency range	0,15 – 80 MHz			
Dwell time	2 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)
	C	U_{NOM} – 100% (0,5 period)

Performed tests

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

Observations

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.

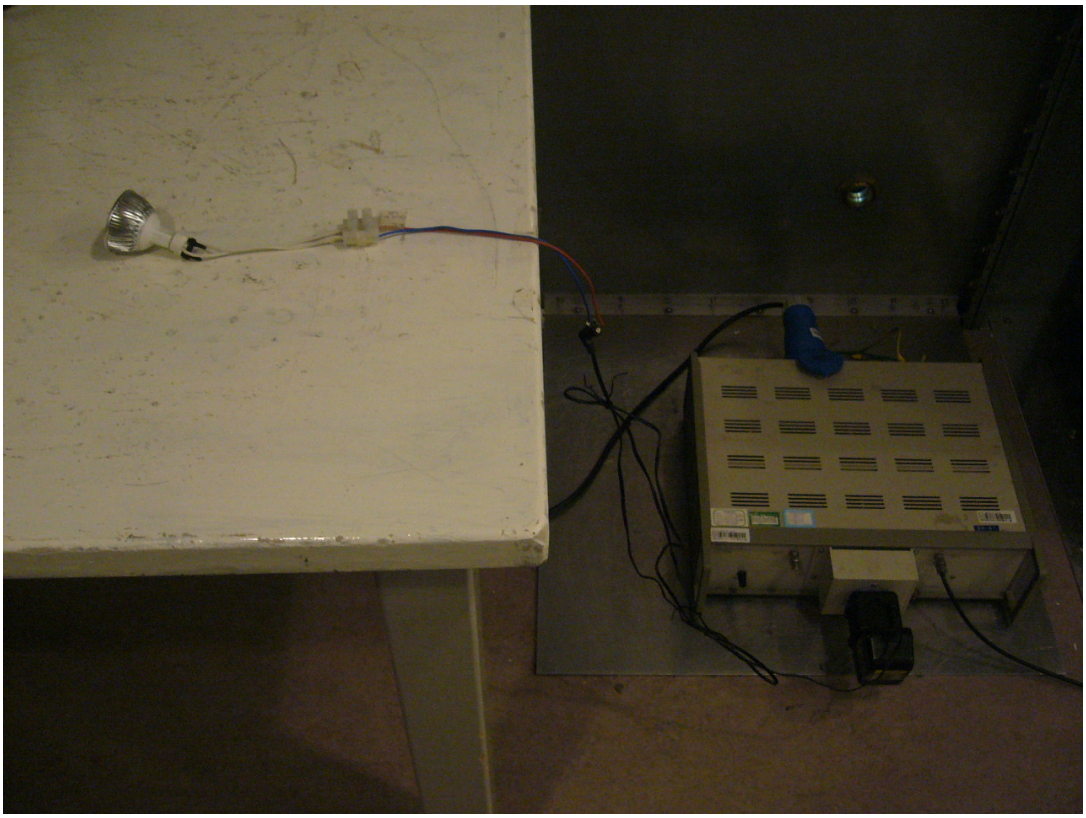


Figure 2 Conducted emission test setup