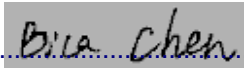
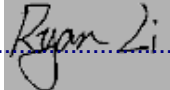




TEST REPORT IEC 62471 Photobiological safety of lamps and lamp systems	
Report Reference No.	GZES101200390931
Tested by (name + signature).....	Bica Chen 
Approved by (name + signature)	Ryan Li 
Date of issue	2010-12-20
Total number of pages	14 pages
Testing Laboratory	SGS-CSTC Standards Technical Services Co., Ltd. GuangZhou Branch Testing Center
Address	No.198, Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District, Guangzhou, Guangdong, CHINA
Applicant's name	EA SRL
Address	St Degli Angariari, 25 47891 Falciano, Rep, San Marino
Test specification:	
Standard	IEC 62471:2006 (First Edition)
Test procedure.....	SGS-CSTC
Non-standard test method.....	N/A
Test Report Form No.	IEC62471A
TRF Originator	VDE Testing and Certification Institute
Master TRF	Dated 2009-05
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Test item description	High Power LED
Trade Mark.....	--
Manufacturer.....	Guangzhou Hongli Opto-electronic Co., Ltd. West Side of Dongfeng Highway, Auto City, Huadu District, Guangzhou City, Guangdong, China
Model/Type reference	HL-LB001D20W-5B5C3 WHITE
Ratings.....	9,7-10,5 Vd.c., 500 mA

Summary of testing:

Due to the physical properties of the Lamp, this product does not contain any radiation above 800nm. Therefore the measured spectral range has been limited from 200nm up to and including 800nm.

The tests were conducted under 500 mA.

Tests performed (name of test and test clause):

These tests fulfil the requirements of standard ISO/IEC 17025.

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

Testing location:

SGS-CSTC Standards Technical Services Co., Ltd.
GuangZhou Branch Testing Center

No.198, Kezhu Road, Sciencetech Park, Guangzhou
Economic & Technology Development District,
Guangzhou, Guangdong, CHINA

Summary of compliance with National Differences:




--

Copy of marking plate:

--

Test item particulars	
Tested lamp	<input checked="" type="checkbox"/> continuous wave lamps <input type="checkbox"/> pulsed lamps
Tested lamp system	--
Lamp classification group	<input type="checkbox"/> exempt <input checked="" type="checkbox"/> risk 1 <input type="checkbox"/> risk 2 <input type="checkbox"/> risk 3
Lamp cap	--
Bulb	--
Rated of the lamp	--
Furthermore marking on the lamp.....	--
Seasoning of lamps according IEC standard	--
Used measurement instrument.....	Ref. to List of test equipment used
Temperature by measurement.....	25 ± 5 °C
Information for safety use.....	--
Possible test case verdicts:	
– test case does not apply to the test object : N (N/A)	
– test object does meet the requirement..... : P (Pass)	
– test object does not meet the requirement..... : F (Fail)	
Testing:	
Date of receipt of test item.....	: 2010-12-08
Date (s) of performance of tests.....	: 2010-12-09 – 2010-12-16
General remarks:	
<p>The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory. "(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. Throughout this report a comma is used as the decimal separator. List of test equipment must be kept on file and available for review.</p> <p>This document is issued by the Company subject to its General Conditions of Service, available on request or accessible at www.sgs.com/terms_and_conditions.htm and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm.</p> <p>Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be produced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.</p>	
General product information:	
The product can emit white light when powered.	

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Clause	Requirement + Test	Result – Remark	Verdict

4	EXPOSURE LIMITS		--
4.1	General		P
	The exposure limits in this standard is not less than 0,01 ms and not more than any 8-hour period and should be used as guides in the control of exposure		P
	Detailed spectral data of a light source are generally required only if the luminance of the source exceeds $10^4 \text{ cd}\cdot\text{m}^{-2}$	see clause 4.3	P
4.3	Hazard exposure limits		P
4.3.1	Actinic UV hazard exposure limit for the skin and eye		P
	The exposure limit for effective radiant exposure is $30 \text{ J}\cdot\text{m}^{-2}$ within any 8-hour period		P
	To protect against injury of the eye or skin from ultraviolet radiation exposure produced by a broadband source, the effective integrated spectral irradiance, E_s , of the light source shall not exceed the levels defined by:		P
			P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye or skin shall be computed by:		P
			P
4.3.2	Near-UV hazard exposure limit for eye		P
	For the spectral region 315 nm to 400 nm (UV-A) the total radiant exposure to the eye shall not exceed $10000 \text{ J}\cdot\text{m}^{-2}$ for exposure times less than 1000 s. For exposure times greater than 1000 s (approximately 16 minutes) the UV-A irradiance for the unprotected eye, E_{UVA} , shall not exceed $10 \text{ W}\cdot\text{m}^{-2}$.		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye for time less than 1000 s, shall be computed by:		P
			P
4.3.3	Retinal blue light hazard exposure limit		P

To protect against retinal photochemical injury from chronic blue-light exposure, the integrated spectral radiance of the light source weighted against the blue-light hazard function, $B(\lambda)$, i.e., the blue-light weighted radiance, L_B , shall not exceed the levels defined by: see table 4.2

P radianf142



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Clause	Requirement + Test	Result – Remark	Verdict

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Clause	Requirement + Test	Result – Remark	Verdict
	The measurement shall be made in that position of the beam giving the maximum reading.		P
	The measurement instrument is adequate calibrated.		P
5.2.2	Radiance measurements		P
5.2.2.1	Standard method		N
	The measurements made with an optical system.		N
	The instrument shall be calibrated to read in absolute radiant power per unit receiving area and per unit solid angle to acceptance averaged over the field of view of the instrument.		N
5.2.2.2	Alternative method		P
	Alternatively to an imaging radiance set-up, an irradiance measurement set-up with a circular field stop placed at the source can be used to perform radiance measurements.		P
5.2.3	Measurement of source size		P
	The determination of θ , the angle subtended by a source, requires the determination of the 50% emission points of the source.		P

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Clause	Requirement + Test	Result – Remark	Verdict
	– for lamps intended for general lighting service, the hazard values shall be reported as either irradiance or radiance values at a distance which produces an illuminance of 500 lux, but not at a distance less than 200 mm		N
	– for all other light sources, including pulsed lamp sources, the hazard values shall be reported at a distance of 200 mm	r = 200 mm	P
6.1	Continuous wave lamps		P
6.1.1	Exempt Group		N
	In the exempt group are lamps, which does not pose any photobiological hazard. The requirement is met by any lamp that does not pose:		N
	– an actinic ultraviolet hazard (E_S) within 8-hours exposure (30000 s), nor		N
	– a near-UV hazard (E_{UVA}) within 1000 s, (about 16 min), nor		N
	– a retinal blue-light hazard (L_B) within 10000 s (about 2,8 h), nor		N
	– a retinal thermal hazard (L_R) within 10 s, nor		N
	– an infrared radiation hazard for the eye (E_{IR}) within 1000 s		N
6.1.2	Risk Group 1 (Low-Risk)		P
	In this group are lamps, which exceeds the limits for the exempt group but that does not pose:		P
	– an actinic ultraviolet hazard (E_S) within 10000 s, nor		P
	– a near ultraviolet hazard (E_{UVA}) within 300 s, nor		P
	– a retinal blue-light hazard (L_B) within 100 s, nor		P
	– a retinal thermal hazard (L_R) within 10 s, nor		P
	– an infrared radiation hazard for the eye (E_{IR}) within 100 s		N

Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (L_{IR}), within 100 s are in Risk Group 1.

N

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Clause	Requirement + Test	Result – Remark	Verdict
	– a retinal thermal hazard (L_R) within 0,25 s (aversion response), nor		N
	– an infrared radiation hazard for the eye (E_{IR}) within 10 s		N
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (L_{IR}), within 10 s are in Risk Group 2.		N
6.1.4	Risk Group 3 (High-Risk)		N
	Lamps which exceed the limits for Risk Group 2 are in Group 3.		N
6.2	Pulsed lamps		N
	Pulse lamp criteria shall apply to a single pulse and to any group of pulses within 0,25 s.		N
	A pulsed lamp shall be evaluated at the highest nominal energy loading as specified by the manufacturer.		N
	The risk group determination of the lamp being tested shall be made as follows:		N
	– a lamp that exceeds the exposure limit shall be classified as belonging to Risk Group 3 (High-Risk)		N
	– for single pulsed lamps, a lamp whose weighted radiant exposure or weighted radiance does is below the EL shall be classified as belonging to the Exempt Group		N
	– for repetitively pulsed lamps, a lamp whose weighted radiant exposure or weighted radiance dose is below the EL, shall be evaluated using the continuous wave risk criteria discussed in clause 6.1, using time averaged values of the pulsed emission		N

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Clause	Requirement + Test	Result – Remark	Verdict

Table 4.1	Spectral weighting function for assessing ultraviolet hazards for skin and eye			P
Wavelength ¹ , nm	UV hazard function S _{uv} ()	Wavelength, nm	UV hazard function S _{uv} ()	
200	0,030	313*	0,006	
205	0,051	315	0,003	
210	0,075	316	0,0024	
215	0,095	317	0,0020	
220	0,120	318	0,0016	
225	0,150	319	0,0012	
230	0,190	320	0,0010	
235	0,240	322	0,00067	
240	0,300	323	0,00054	
245	0,360	325	0,00050	
250	0,430	328	0,00044	
254*	0,500	330	0,00041	
255	0,520	333*	0,00037	
260	0,650	335	0,00034	
265	0,810	340	0,00028	
270	1,000	345	0,00024	
275	0,960	350	0,00020	
280*	0,880	355	0,00016	
285	0,770	360	0,00013	
290	0,640	365*	0,00011	
295	0,540	370	0,000093	
297*	0,460	375	0,000077	
300	0,300	380	0,000064	
303*	0,120	385	0,000053	
305	0,060	390	0,000044	
308	0,026	395	0,000036	
310	0,015	400	0,000030	

¹ Wavelengths chosen are representative: other values should be obtained by logarithmic interpolation at intermediate wavelengths.
* Emission lines of a mercury discharge spectrum.

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	Result – Remark	Verdict
Functions for assessing retinal hazards from broadband optical		P
Blue-light hazard function B ()	Burn hazard function R ()	
0,01	--	
0,01	--	
0,01	--	
0,01	--	
0,01	--	
0,01	--	
0,01	--	
0,01	--	
0,01	--	
0,01	--	
0,01	--	
0,01	--	
0,01	--	
0,01	--	
0,01	--	
0,01	--	
0,01	--	
0,01	0,1	
0,013	0,13	
0,025	0,25	
0,05	0,5	
0,10	1,0	
0,20	2,0	
0,40	4,0	
0,80	8,0	
0,90	9,0	
0,95	9,5	
0,98	9,8	
1,00	10,0	
1,00	10,0	
0,97	9,7	
0,94	9,4	
0,90	9,0	
0,80	8,0	
0,70	7,0	

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Clause	Requirement + Test	Result – Remark	Verdict

Table 5.4 Summary of the ELs for the surface of the skin or cornea (irradiance based values)						P
Hazard Name	Relevant equation	Wavelength range nm	Exposure duration sec	Limiting aperture rad (deg)	EL in terms of constant irradiance $W \cdot m^{-2}$	
Actinic UV skin & eye	$E_S = E \cdot S(\lambda) \cdot$	200 – 400	< 30000	1,4 (80)	30/t	
Eye UV-A	$E_{UVA} = E \cdot$	315 – 400	1000 >1000	1,4 (80)	10000/t 10	
Blue-light small source	$E_B = E \cdot B(\lambda) \cdot$	300 – 700	100 >100	< 0,011	100/t 1,0	
Eye IR	$E_{IR} = E \cdot$	780 – 3000	1000 >1000	1,4 (80)	18000/t ^{0,75} 100	
Skin thermal	$E_H = E \cdot$	380 – 3000	< 10	2 sr	20000/t ^{0,75}	

Table 5.5 Summary of the ELs for the retina (radiance based values)						P
Hazard Name	Relevant equation	Wavelength range nm	Exposure duration sec	Field of view radians	EL in terms of constant radiance $W \cdot m^{-2} \cdot sr^{-1}$	
Blue light	$L_B = L \cdot B(\lambda) \cdot$	300 – 700	0,25 – 10 10-100 100-10000 10000	0,011 • (t/10) 0,011 0,0011 • t 0,1	10 ⁶ /t 10 ⁶ /t 10 ⁶ /t 100	
Retinal thermal	$L_R = L \cdot R(\lambda) \cdot$	380 – 1400	< 0,25 0,25 – 10	0,0017 0,011 • (t/10)	50000/(t ^{0,25}) 50000/(t ^{0,25})	
Retinal thermal (weak visual stimulus)	$L_{IR} = L \cdot R(\lambda) \cdot$	780 – 1400	> 10	0,011	6000/	

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Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1		Emission limits for risk groups of continuous wave lamps								P
Risk	Action spectrum	Symbol	Units	Emission Measurement						
				Exempt		Low risk		Mod risk		
				Limit	Result	Limit	Result	Limit	Result	
Actinic UV	$S_{UV}(\)$	E_s	$W \cdot m^{-2}$	0,001	0,0003	0,003	--	0,03	--	
Near UV	--	E_{UVA}	$W \cdot m^{-2}$	10	0,0017	33	--	100	--	
Blue light	$B(\)$	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	363,9	10000	2724,6	4000000	--	
Blue light, small source	$B(\)$	E_B	$W \cdot m^{-2}$	1,0*	--	1,0	--	400	--	
Retinal thermal	$R(\)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/	30053,8	28000/	--	71000/	--	
Retinal thermal, weak visual stimulus**	$R(\)$	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	6000/	--	6000/	--	6000/	--	
IR radiation, eye	--	E_{IR}	$W \cdot m^{-2}$	100	--	570	--	3200	--	

* Small source defined as one with $\omega < 0,011$ radian. Averaging field of view at 10000 s is 0,1 radian.
 ** Involves evaluation of non-GLS source

List of test equipment used:

Clause	Measurement / testing	Testing / measuring equipment / material used	Range used	Calibration date
5	Irradiance and Radiance measurements	Spectroradiometer	200 – 800 nm	Last cal. date: 2010-04-08 Next cal. date: 2011-04-08
5	Irradiance and Radiance measurements	HP 34401A multimeter	--	Last cal. date: 2010-09-09 Next cal. date: 2011-09-09

Photo documentation

Details of:

<p>View:</p> <p><input checked="" type="checkbox"/> general</p> <p><input type="checkbox"/> front</p> <p><input type="checkbox"/> rear</p> <p><input type="checkbox"/> right</p> <p><input type="checkbox"/> left</p> <p><input type="checkbox"/> top</p> <p><input type="checkbox"/> bottom</p> <p><input type="checkbox"/> Internal</p>	
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