
Report reference No

Compiled by (+ signature)

Approved by (+ signature)

Date of issue

Testing laboratory

Address

Testing location

Applicant

Address

Standard

Test sample(s) received.....

Test in period.....

Procedure deviation

Non-standard test method

This test report is for the customer's use only. It is not to be duplicated or used in part except in writing by the customer. BACL Corp. (Dongguan).

Type of test object

Trademark

Model/type reference

Manufacturer.....

Rating

Copy of marking plate:
None

Tested lamp: LED
 Tested lamp system: N.A.

Lamp cap: N.A.
 Bulb.....: N.A.
 Rated of the lamp: N.A.
 Furthermore marking on the lamp.....: N.A.
 Seasoning of lamps according EN standard: No seasoning
 Used measurement instrument.....: See appendix B for details
 Temperature by measurement.....: 25.0°C
 Information for safety use.....: N.A

:

-test case does not apply to the test object.....:N(.A.)
 -test object does meet the requirement.....:P(ass)
 -test object does not meet the requirement.....:F(ail)

The test results presented in this report relates 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 point is used as the decimal separator.
 List of test equipment must be kept on file and available for review.

This report consists of 15 pages and following appendixes:
 Appendix A EUT photos
 Appendix B Test equipment list

This product is a LED and manufactured by "Hongli Zhihui Group Co.,Ltd.", Test model is HL-A-5730D34W-S1-08-HR3. Rated input is 2.8-3.4Vdc, 150mA.

IEC 62471:2006			
Clause	Requirement + Test	Result - Remark	Verdict
4	EXPOSURE LIMITS		P
	Contents of the whole Clause 4 of IEC 62471: 2006 moved into a new informative Annex ZB		P
	Clause 4 replaced by the following:		P
	Limits of the Artificial Optical Radiation Directive(2006/25/EC) have been applied instead of those fixed in IEC 62471: 2006	See Table 6.1	P
Annex ZB	EXPOSURE LIMITS		P
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 cd m^{-2}	$>10^4 \text{ cd m}^{-2}$	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:	See Table 6.1	P
	$E \cdot t = \int_{200}^t E(\lambda, t) \cdot S_{uv}(\lambda) \cdot \Delta\lambda \cdot \Delta t \leq 30 \text{ J}\cdot\text{m}^{-2}$		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye or skin shall be computed by:		P
	$t_{\max} = 30/E_s$	$t_{\max} = 30/(3.9 \times 10^{-4}) = 7.69 \times 10^4 \text{ s}$	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 1000s. For exposure times greater than 1000 s (approximately 16 minutes) the UV-A irradiance for the unprotected eye, E_{UVA} , shall not exceed $10 \text{ W}\cdot\text{m}^{-2}$	See Table 6.1	P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye for time less than 1000 s, shall be computed by:		N
	$t_{\max} = 10000/E_{\text{UVA}} \text{ s}$		N

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Clause	Requirement + Test	Result - Remark	Verdict

4.3.3	Retinal blue light hazard exposure limit 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, $B(_)$, i.e., the blue-light weighted radiance, LB , shall not exceed the levels defined by:		P P
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IEC 62471:2006			
Clause	Requirement + Test	Result - Remark	Verdict
4.3.7	Infrared radiation hazard exposure limits for the eye		P
	The avoid thermal injury of the cornea and possible delayed effects upon the lens of the eye (cataractogenesis),ocular exposure to infrared radiation, EIR,over the wavelength range 780 nm to 3000 nm, for times less than 1000 s, shall not exceed:		N
	$E_{IR} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta\lambda \leq 18000 \cdot t^{-0,75} \quad \text{W}\cdot\text{m}^{-2}$		N
	For times greater than 1000 s the limit becomes:		P
	$E_{IR} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta\lambda \leq 100 \quad \text{W}\cdot\text{m}^{-2}$	See Table 6.1	P
4.3.8	Thermal hazard exposure limit for the skin		P
	Visible and infrared radiant exposure (380 nm to 3000 nm) of the skin shall be limited to:		P
	$E_H \cdot t = \sum_{380}^{3000} \sum_t E_{\lambda}(\lambda, t) \cdot \Delta t \cdot \Delta\lambda \leq 20000 \cdot t^{0,25} \quad \text{J}\cdot\text{m}^{-2}$	$E_H \cdot t = 1.6 \times 10^0 \text{W}\cdot\text{m}^{-2} \times 10 \text{s} = 16 \text{J}\cdot\text{m}^{-2}$	P
5	MEASUREMENT OF LAMPS AND LAMP SYSTEMS		P
5.1	Measurement conditions		P
	Measurement conditions shall be reported as part of the evaluation against the exposure limits and the assignment of risk classification.		P
5.1.1	Lamp ageing (seasoning)	30 min.	P
	Seasoning of lamps shall be done as stated in the Appropriate EN lamp standard.		N
5.1.2	Test environment	25.0	P
	For specific test conditions, see the appropriate EN lamp standard or in absence of such standards, the appropriate national standards or manufacturer's recommendations.		P
5.1.3	Extraneous radiation		P
	Careful checks should be made to ensure that extraneous sources of radiation and reflections do not add significantly to the measurement results.		P
5.1.4	Lamp operation		P
	Operation of the test lamp shall be provided in accordance with:		P

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Clause	Requirement + Test	Result - Remark	Verdict
	- the appropriate EN lamp standard, or		N

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IEC 62471:2006			
Clause	Requirement + Test	Result - Remark	Verdict
	The calculation of source hazard values shall be performed by weighting the spectral scan by the appropriate function and calculating the total weighted energy.		P
5.3.3	Measurement uncertainty		P
	The quality of all measurement results must be quantified by an analysis of the uncertainty.		P
6	LAMP CLASSIFICATION		P
	For the purposes of this standard it was decided that the values shall be reported as follows:		P
	– 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	At a distance of 200mm	P
6.1	Continuous wave lamps		P
6.1.1	Exempt Group		P
	In the except group are lamps, which does not pose any photobiological hazard. The requirement is met by any lamp that does not pose:		P
	– an actinic ultraviolet hazard (ES) within 8-hours exposure (30000 s), nor		P
	– a near-UV hazard (EUVA) within 1000 s, (about 16 min), nor		P
	– a retinal blue-light hazard (LB) within 10000 s (about 2,8 h), nor		P
	– a retinal thermal hazard (LR) within 10 s, nor		P
	– an infrared radiation hazard for the eye (EIR) within 1000 s		P
6.1.2	Risk Group 1 (Low-Risk)		N
	In this group are lamps, which exceeds the limits for the except group but that does not pose:		N
	– an actinic ultraviolet hazard (ES) within 10000 s, nor		N
	– a near ultraviolet hazard (EUVA) within 300 s, nor		N
	– a retinal blue-light hazard (LB) within 100 s, nor		N
	– a retinal thermal hazard (LR) within 10 s, nor		N
	– an infrared radiation hazard for the eye (EIR) within 100 s		N
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (LIR), within 100 s are in Risk Group 1.		N
6.1.3	Risk Group 2 (Moderate-Risk)		N
	This requirement is met by any lamp that exceeds the limits for Risk Group 1, but that does not pose:		N

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Clause	Requirement + Test	Result - Remark	Verdict
	– an actinic ultraviolet hazard (ES) within 1000 s exposure, nor		N
	– a near ultraviolet hazard (EUVA) within 100 s, nor		N
	– a retinal blue-light hazard (LB) within 0,25 s (aversion response), nor		N
	– a retinal thermal hazard (LR) within 0,25 s (aversion response), nor		N
	– an infrared radiation hazard for the eye (EIR) within 10 s		N
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (LIR), 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

IEC 62471:2006			
Clause	Requirement + Test	Result - Remark	Verdict
	Spectral weighting function for assessing ultraviolet hazards for skin and eye		-
λ	λ	λ	

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IEC 62471:2006

Clause	Requirement + Test	Result - Remark	Verdict
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Spectral weighting functions for assessing retinal hazards from broadband optical sources		-
300	0.01	-
305	0.01	-
310	0.01	-
315	0.01	-
320	0.01	-
325	0.01	-
330	0.01	-
335	0.01	-
340	0.01	-
345	0.01	-
350	0.01	-
355	0.01	-
360	0.01	-
365	0.01	-
370	0.01	-
375	0.01	-
380	0.01	0.1
385	0.013	0.13
390	0.025	0.25
395	0.05	0.5
400	0.10	1.0
405	0.20	2.0
410	0.40	4.0
415	0.80	8.0
420	0.90	9.0
425	0.95	9.5
430	0.98	9.8
435	1.00	10.0
440	1.00	10.0
445	0.97	9.7
450	0.94	9.4
455	0.90	9.0
460	0.80	8.0
465	0.70	7.0
470	0.62	6.2
475	0.55	5.5
480	0.45	4.5
485	0.40	4.0
490	0.22	2.2
495	0.16	1.6
500-600	$10^{[(450-\lambda)/50]}$	1.0
600-700	0.001	1.0
700-1050	0.013	$10^{[(700-\lambda)/500]}$
1050-1150	0.025	0.2
1150-1200	0.05	$0.2^{100.02(1150-\lambda)}$
1200-1400	0.10	0.02

* 1 Wavelengths chosen are representative: other values should be obtained by logarithmic interpolation at intermediate wavelengths.

* Emission lines of a mercury discharge spectrum.

IEC 62471:2006			
Clause	Requirement + Test	Result - Remark	Verdict

Summary of the ELs for the surface of the skin or cornea (irradiance based values)					
Actinic UV skin & eye	$E_S = E \cdot S(\cdot)$	200 – 400	< 30000	1.4 (80)	30/t
Eye UV-A	$E_{UVA} = E \cdot \bullet$	315 – 400	1000 >1000	1.4 (80)	10000/t 10
Blue-light small source	$E_B = E \cdot B(\cdot)$	300 – 700	100 >100	< 0.011	100/t 1,0
Eye IR	$E_{IR} = E \cdot \bullet$	780 – 3000	1000 >1000	1.4 (80)	18000/t ^{0.75} 100
Skin thermal	$E_H = E \cdot \bullet$	380 – 3000	< 10	2 sr	20000/t ^{0.75}

Summary of the ELs for the retina (radiance based values)					
Blue light	$L_B = L \cdot B(\cdot)$	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	$L_R = L \cdot R(\cdot)$	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)	$L_{IR} = L \cdot R(\cdot)$	780 – 1400	> 10	0.011	6000/

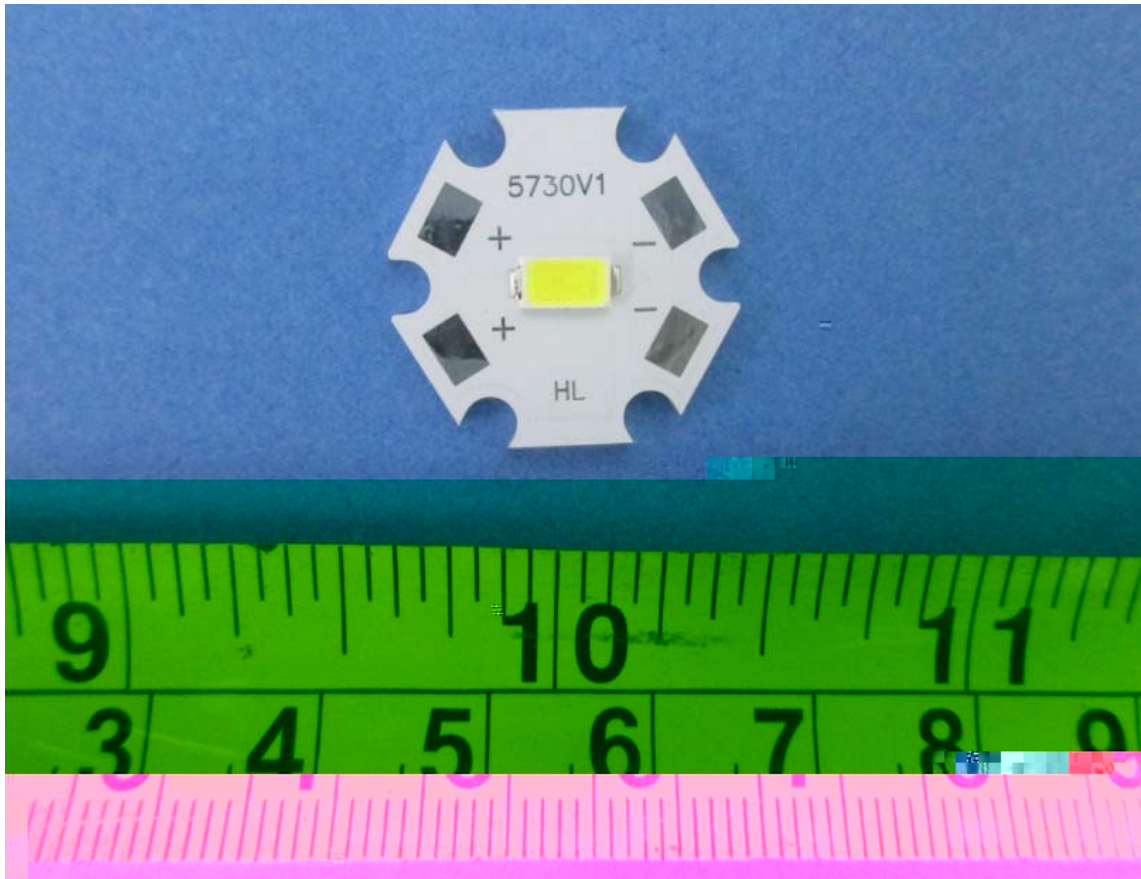
IEC 62471:2006

Clause	Requirement + Test	Result - Remark	Verdict
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Table 6.1	Emission limits for risk groups of continuous wave lamps base on Directive(2006/25/EC)								P
Risk	Action spectrum	Units	Symbol	Exempt		Low risk		Mod risk	
				Limit	Result	Limit	Result	Limit	Result
Actinic UV	$S_{uv}(\lambda)$	$W.m^{-2}$	E_S	0.001	3.9×10^{-4}	0.003	--	0.03	--
Near UV		$W.m^{-2}$	E_{UVA}	10	2.7×10^{-4}	33	--	100	--
Blue light	$B(\lambda)$	$W.m^{-2}.sr^{-1}$	L_B	100	78.4	10000	--	4000000	--
Blue light,small source	$B(\lambda)$	$W.m^{-2}$	E_B	1	0.45	1	--	400	--
Retinal thermal	$R(\lambda)$	$W.m^{-2}.sr^{-1}$	L_R	$\frac{28000}{\alpha}$ ($\alpha = 0.0035$)	4.8×10^4	$\frac{28000}{\alpha}$ ($\alpha = 0.0035$)	--	$\frac{71000}{\alpha}$ ($\alpha = 0.0035$)	--
Retinal thermal, Weak visual stimulus**	$R(\lambda)$	$W.m^{-2}.sr^{-1}$	L_{IR}	$\frac{6000}{\alpha}$ ($\alpha = 0.0035$)	39	$\frac{6000}{\alpha}$ ($\alpha = 0.0035$)	--	$\frac{28000}{\alpha}$ ($\alpha = 0.0035$)	--
IR radiation Eye		$W.m^{-2}$	E_{IR}	100	0	570	--	3200	--

* Small source defined as one with $< 0,011$ radian. Averaging field of view at 10000 s is 0,1 radian.
 ** Involves evaluation of non-GLS source
 NOTE The action functions: see Table 4.1 and Table 4.2
 The appliance apertuer diameters: see 4.2.1
 The limitations for the angular subtenses: see 4.2.2
 The related measurement condition 5.2.3 and the range of acceptance angles: see Table 5.5

Appendix A –EUT Photos



Appendix B Test equipment list

UV-VIS-near IR Spectrophotocolorimeter	PMS-2000	T-08-SF213	EVERFINE	2016-08-08	2017-08-08
Imaging luminance meter	CX-2K	T-08-SF140-1	EVERFINE	2016-08-08	2018-08-08
Radiation illuminance meter	RD-2000	T-08-SF140-2	EVERFINE	2016-08-08	2018-08-08
Radiation illuminance meter	RD-2000	T-08-SF140-3	EVERFINE	2016-08-08	2018-08-08
High Accuracy Array	HAAS-2000	T-08-SF140-4	EVERFINE	2016-08-08	2018-08-08
Hygrothermograph	PWS280	T-08-QA026	N/A	2016-03-21	2017-03-21
Standard power spectral UV radiation-specific	UVS-8003	T-08-EE048	EVERFINE	2016-03-21	2017-03-21
80mm sample integrating sphere	SMS-300	F-08-SF130	EVERFINE	2016-12-25	2018-12-24
Steel tape	HILOCK-19	T-08-SF100	TAJIMA	2013-4-18	2018-4-17