中国认可
国际互认
检测
TESTING
CNAS L5228

Test Report

Report No.: HB-122E-0336/20

Product	:	LED lamp
Model/Type	:	4014R
Brand Name	:	——
Applicant	:	LUMILEDS B.V.
Application No.	:	20200708001
Date of Issue	:	2020-07-08
Standards	:	EN 62471:2008

Zhongshan Bontek Compliance Testing Laboratory Co., Ltd.

Tongyi Industrial Zone Dongxing East Road, Guzhen Town
Zhongshan City, Guangdong Province, China

CONTENTS

1 Test Summary

Applicant's name	:	LUMILEDS B.V.
Address	:	NO.3, LINTANG BAYAN LEPAS 8, KAWASAN PERINDUSTRIAN BAYAN LEPAS, FASA4, MUKIM 12, 11900 PENANG, MALAYSIA.
Manufacturer	:	LUMILEDS B.V.
Address	:	NO.3, LINTANG BAYAN LEPAS 8, KAWASAN PERINDUSTRIAN BAYAN LEPAS, FASA4, MUKIM 12, 11900 PENANG, MALAYSIA.
Testing laboratory	:	Zhongshan Bontek Compliance Testing Laboratory Co., Ltd.
Address	:	Tongyi Industrial Zone Dongxing east Road, Gu Zhen Town, Zhongshan City, Guang Dong Province, P.R. China
Product	:	LED lamp
Model	:	4014R
Quantity	:	1 pc
Date of received	:	2020-07-08
Test period	:	2020-07-08
Standard	:	EN 62471: 2008
Result	:	Accept: Exempt Group

Tested by: Bing qin ***Date:*** *2020-07-08*

Checked by: Leohan Guan ***Date:*** *2020-07-08*

Approved by: ***Date:*** *2020-07-08*

Zhongshan Bontek Compliance Testing Laboratory Co., Ltd.

2 Test Item Description

Rated of the lamp ..... : DC: 60mA, 3V

Power ..... : ——

Light source ..... : LED

The lamp or lamp system ..... : ☑ continuous wave lamps ☐ pulsed lamps

Measurement distance ..... : ☑0.2m ☐500lx

Measurement condition..... : 25.7 ˚C 42% RH

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)

Notes..... : ——

3 Test Condition

3.1 Test Equipment

Name	Brand	Model	Cal. Due Date
Photobiological testing system	SENSING	SPR-5000B/MPR-16	Dec. 05, 2020

3.2 Environmental Conditions

1). Dark room

2). Draught-proof

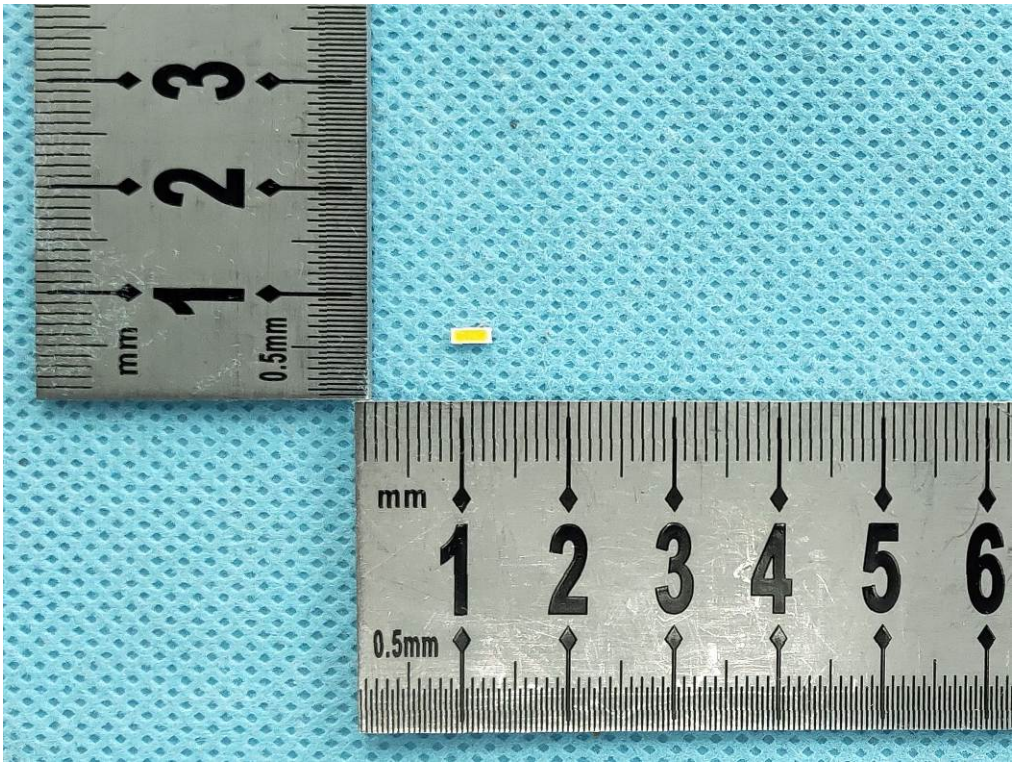
3). The ambient temperature in which measurements are taken shall be maintained in accordance with the appropriate IEC lamp standard.

4). Seasoning of lamps shall be done as stated in the appropriate IEC lamp standard.

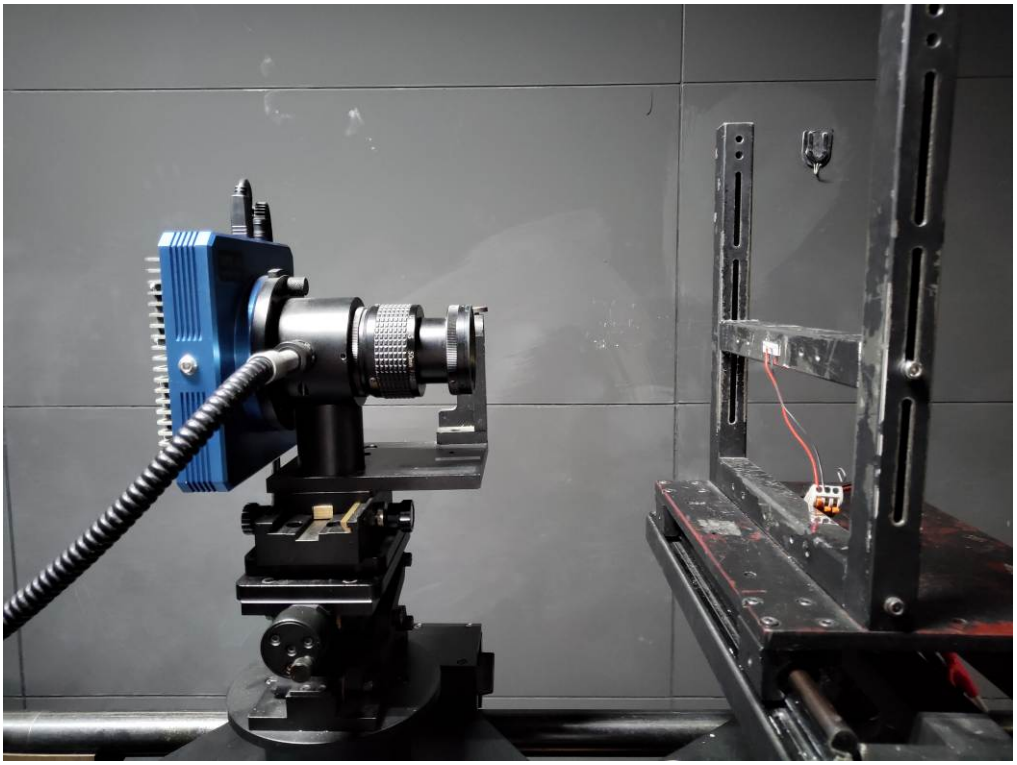
5). Test input: DC 60mA

4 Photographs

4.1 Photos of Sample



4.2 Sample Under Test



5. Standards and Requirements

EN 62471			
Clause	**Requirement - Test**	**Result – Remark**	**Verdict**
4	**EXPOSURE LIMITS (EL'S)**		**P**
4.1	**General**		**P**
	The exposure limits in this standard apply to continuous sources where the exposure duration 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
	The limits for exposure to broad-band visible and IR-A radiation for the eye require knowledge of the spectral radiance of the source and the total irradiance as measured at the position(s) of the eye of the exposed person.		P
4.3	**Hazard exposure limits**		**P**
4.3.1	Actinic UV hazard exposure limit for the skin and eye		P
	The limits for exposure to ultraviolet radiation incident upon the unprotected skin or eye apply to exposure within any 8-hour period. Continuous exposure for times greater than 8 hours in any day need not be considered. The exposure limit for effective radiant exposure is 30 $J \cdot m^{-2}$.		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_{Sr} of the light source shall not exceed the levels defined by: $E_s \cdot t = \sum_{200}^{400} \sum_{t} E_\lambda(\lambda,t) \cdot S_{UV}(\lambda) \cdot \Delta t \cdot \Delta\lambda \le 30$ $J \cdot m^{-2}$		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye or skin shall be computed by: $t_{max} = \frac{30}{E_s}$ s		P
4.3.2	Near-UV hazard exposure limit for the eye		P
	For the spectral region 315 nm to 400 nm (UV-A) the total radiant exposure to the eye shall not exceed 10000 $J \cdot m^{-2}$ 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 $W \cdot m^{-2}$.		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye for time less than 1000 s, shall be computed by: $t_{max} \le \frac{10\,000}{E_{UVA}}$ s		P
4.3.3	Retinal blue light hazard exposure limit		P

EN 62471			
Clause	**Requirement - Test**	**Result – Remark**	**Verdict**
	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(λ), i.e., the blue-light weighted radiance , L_B, shall not exceed the levels defined by: $L_B \cdot t = \sum_{300}^{700} \sum_{t} L_\lambda(\lambda,t) \cdot B(\lambda) \cdot \Delta t \cdot \Delta\lambda \le 10^6$ J · m^{-2} · sr^{-1} $t \le 10^4$ s		P
	$L_B = \sum_{300}^{700} L_\lambda \cdot B(\lambda) \cdot \Delta\lambda \le 100$ W · m^{-2} · sr^{-1} $t > 10^4$ s		
4.3.4	Retinal blue light hazard exposure limit - small source		N
	For a light source subtending an angles less than 0,011 radian the limits of Clause 4.3.3 lead to a simpler equation based on the spectral irradiance. The spectral irradiance at the eye E_λ, weighted against the blue-light hazard function B(λ) shall not exceed the levels defined by:	——	N
	$E_B \cdot t = \sum_{300}^{700} \sum_{t} E_\lambda(\lambda,t) \cdot B(\lambda) \cdot \Delta t \cdot \Delta\lambda \le 100$ J · m^{-2}	——	
	$E_B = \sum_{300}^{700} E_\lambda \cdot B(\lambda) \cdot \Delta\lambda \le 1$ W · m^{-2}	——	
4.3.5	Retinal thermal hazard exposure limit		P
	To protect against retinal thermal injury, the integrated spectral radiance of the light source, L_λ, weighted by the burn hazard weighting function R(λ), i.e., the burn hazard weighted radiance, shall not exceed the levels defined by: $L_R = \sum_{380}^{1400} L_\lambda \cdot R(\lambda) \cdot \Delta\lambda \le \frac{50\,000}{\alpha \cdot t^{0,25}}$ W · m^{-2} · sr^{-1}		P
4.3.6	Retinal thermal hazard exposure limit – weak visual stimulus		P
	For an infrared heat lamp or any near-infrared source where a weak visual stimulus is inadequate to activate the aversion response, the near infrared (780 nm to 1400 nm) radiance, L_{IR}, as viewed by the eye for exposure times greater than 10 s shall be limited to: $L_{IR} = \sum_{780}^{1400} L_\lambda \cdot R(\lambda) \cdot \Delta\lambda \le \frac{6\,000}{\alpha}$ W · m^{-2} · sr^{-1}		P
4.3.7	Infrared radiation hazard exposure limits for the eye		P

EN 62471			
Clause	**Requirement - Test**	**Result – Remark**	**Verdict**
	To avoid thermal injury of the cornea and possible delayed effects upon the lens of the eye (cataractogenesis), ocular exposure to infrared radiation, E_{IR}, over the wavelength range 780 nm to 3000 nm, for times less than 1000 s, shall not exceed: $E_{IR} = \sum_{780}^{3000} E_\lambda \cdot \Delta\lambda \leq 18000 \cdot t^{-0,75}$ $W \cdot m^{-2}$		P
	For times greater than 1000 s the limit becomes: $E_{IR} = \sum_{780}^{3000} E_\lambda \cdot \Delta\lambda \leq 100$ $W \cdot m^{-2}$		
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: $E_H \cdot t = \sum_{380}^{3000} \sum_{t} E_\lambda(\lambda,t) \cdot \Delta t \cdot \Delta\lambda \leq 20000 \cdot t^{0,25}$ $J \cdot m^{-2}$ $t \leq 10$ s		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)		N
	To maintain stable output during the measurement process and provide reproducible results, lamps shall be seasoned for an appropriate period of time. Seasoning of lamps shall be done as stated in the appropriate IEC lamp standard.	Not required for LED	N
5.1.2	Test environment		P
	The accurate measurement of light sources requires a controlled environment. For specific test conditions, see the appropriate IEC 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
	- the appropriate IEC lamp standard, or		P
	- the manufacturer' s recommendation.		N
5.1.5	Lamp system operation		N
	The power source for operation of the test lamp shall be provided in accordance with:		N

EN 62471			
Clause	**Requirement - Test**	**Result – Remark**	**Verdict**
	– the appropriate IEC standard, or		N
	– the manufacturer' s recommendation		N
5.2	**Measurement procedure**		**P**
5.2.1	Irradiance measurements		P
	The description given applies both to broadband and spectral irradiance measurements. It should achieve the desired signal-to-noise ratio and, that:		P
	-- accepts radiation within a right circular cone whose centerline is normal to the plane of detector area,		P
	-- Has an angular spatial response varying as the cosine of the angle from the normal to the detector area,		P
	-- has a spectral response that is constant with position within a specified wavelength band from λ_1 to λ_2.		P
	The measurement instrument is adequate calibrated.		P
	The minimum input aperture diameter shall be within 7 mm with a maximum input aperture diameter of 50 mm.		P
5.2.2	Radiance measurements		P
5.2.2.1	Standard method		P
	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 α, the angle subtended by a source, requires the determination of the 50% emission points of the source.		P
5.2.4	Pulse width measurement for pulsed sources		N
	The determination of Δt, the nominal pulse duration of a source, requires the determination of the time during which the emission is > 50% of its peak value.		N
5.3	**Analysis methods**		**P**
5.3.1	Weighting curve interpolations		P
	To standardize interpolated values, use linear interpolation on the log of given values to obtain intermediate points at the wavelength intervals desired.		P
5.3.2	Calculations		P
	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

EN 62471			
Clause	**Requirement - Test**	**Result – Remark**	**Verdict**
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	200mm	P
	- for all other light sources, including pulsed lamp sources, the hazard values shall be reported at a distance of 200m		P
6.1	**Continuous wave lamps**		**P**
6.1.1	Exempt Group		P
	In the exempt group are lamps, which does not pose any photobiological hazard for the end points in this standard.. The requirement is met by any lamp that does not pose:		P
	- an actinic ultraviolet hazard (E_S) within 8-hours exposure (30000 s), nor		P
	- a near-UV hazard (E_{UVA}) within 1000 s, (about 16 min), nor		P
	- a retinal blue-light hazard (L_B) within 10000 s (about 2,8 h), nor		P
	- a retinal thermal hazard (L_R) within 10 s, nor		P
	- an infrared radiation hazard for the eye (E_{IR}) within 1000 s		P
6.1.2	Risk Group 1 (Low-Risk)		N
	In this group are lamps, which exceeds the limits for the Exempt Group but that does not pose:		N
	- an actinic ultraviolet hazard (E_S) within 10000 s, nor		N
	- a near ultraviolet hazard (E_{UVA}) within 300 s, nor		N
	- a retinal blue-light hazard (L_B) within 100 s, nor		N
	- a retinal thermal hazard (L_R) within 10 s, nor		N
	- 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 (Low-Risk).		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

EN 62471			
Clause	**Requirement - Test**	**Result – Remark**	**Verdict**
	- an actinic ultraviolet hazard (E_S) within 1000 s exposure, nor		N
	- a near ultraviolet hazard (E_{UVA}) within 100 s, nor		N
	- a retinal blue-light hazard (L_B) within 0,25 s (aversion response), nor		N
	- 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 (Moderate-Risk).		N
6.1.4	Risk Group 3 (High-Risk)		N
	Lamps which exceed the limits for Risk Group 2 are in Group 3 (High-Risk).		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

Table 4.1	Spectral weighting function for assessing ultraviolet hazards for skin and eye	P

Wavelength[1] λ, nm	UV hazard function $S_{UV}(\lambda)$	Wavelength λ, nm	UV hazard function $S_{UV}(\lambda)$
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

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

* Emission lines of a mercury discharge spectrum.

Table 4.2	Spectral weighting functions for assessing retinal hazards from broadband optical sources	P

Wavelength nm	Blue-light hazard function B (λ)	Burn hazard function R (λ)
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

Table 4.2	Spectral weighting functions for assessing retinal hazards from broadband optical sources	P

Wavelength nm	Blue-light hazard function B (λ)	Burn hazard function R (λ)
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	--	$10^{[(700-\lambda)/500]}$
1050-1150	--	0.2
1150-1200	--	$0.2 \cdot 10^{0.02(1150-\lambda)}$
1200-1400	--	0.02

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	$E_S = \sum E_\lambda \cdot S(\lambda) \cdot \Delta\lambda$	200 – 400	< 30000	1.4 (80)	30/t
Eye UV-A	$E_{UVA} = \sum E_\lambda \cdot \Delta\lambda$	315 – 400	≤1000 >1000	1.4 (80)	10000/t 10
Blue-light small source	$E_B = \sum E_\lambda \cdot B(\lambda) \cdot \Delta\lambda$	300 – 700	≤100 >100	< 0.011	100/t 1.0
Eye IR	$E_{IR} = \sum E_\lambda \cdot \Delta\lambda$	780 –3000	≤1000 >1000	1.4 (80)	$18000/t^{0.75}$ 100
Skin thermal	$E_H = \sum E_\lambda \cdot \Delta\lambda$	380 – 3000	< 10	2π sr	$20000/t^{0.75}$

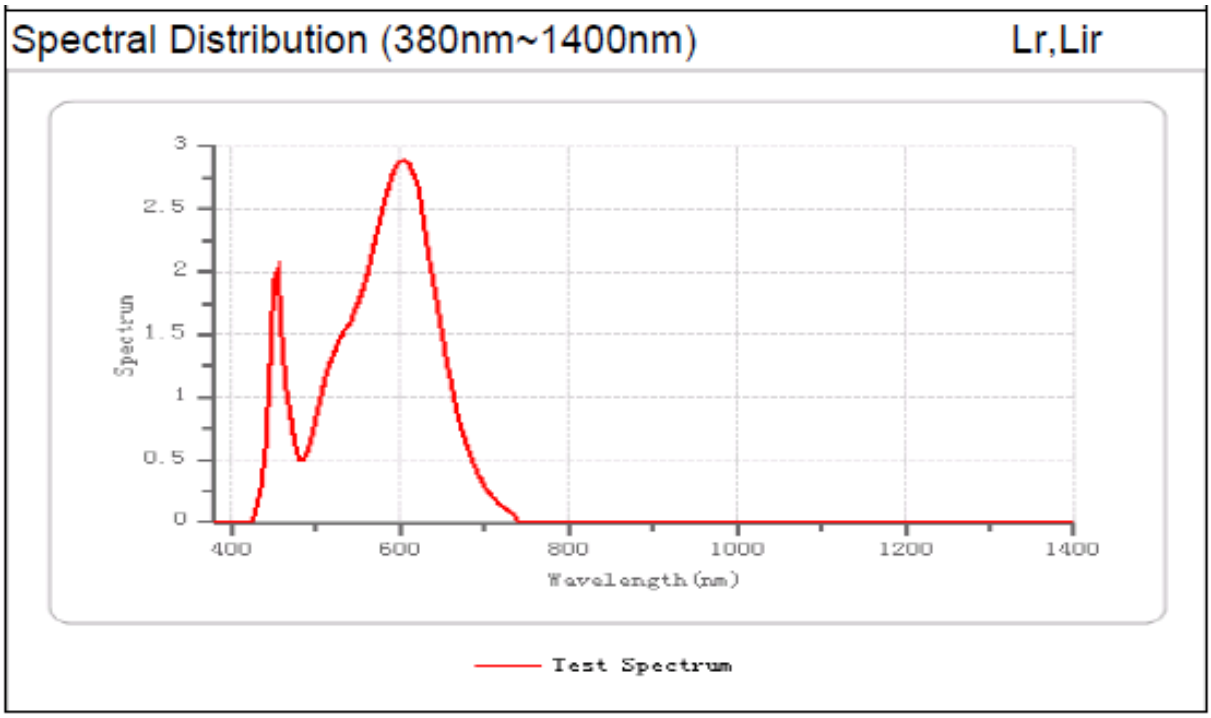
Table 5.5	Summary of the ELs for the retina (radiance based values)	P

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	$L_B = \sum L_\lambda \cdot B(\lambda) \cdot \Delta\lambda$	300 – 700	0.25 – 10 10-100 100-10000 ≥ 10000	$0.011 \cdot \sqrt{(t/10)}$ 0.011 $0.0011 \cdot \sqrt{t}$ 0.1	$10^6/t$ $10^6/t$ $10^6/t$ 100
Retinal thermal	$L_R = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$	380 – 1400	< 0.25 0.25 – 10	0.0017 $0.011 \cdot \sqrt{(t/10)}$	$50000/(\alpha \cdot t^{0.25})$ $50000/(\alpha \cdot t^{0.25})$
Retinal thermal (weak visual stimulus)	$L_{IR} = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$	780 – 1400	> 10	0.011	6000/α

Table 5	Emission limits for risk groups of continuous wave lamps	P

Classification: Exempt Group (RG0)

Test Results							
Emission Limits for Risk Group of Continuous Wave Lamps							
Risk	Units	Exempt		Low Risk		Mod Risk	
		Limit	Result	Limit	Result	Limit	Result
Actinic UV, Es	W·m-2	0.001	4.069E-07	0.003	4.069E-07	0.03	4.069E-07
Near UV, Euva	W·m-2	0.33	8.806E-03	33	8.806E-03	100	8.806E-03
Blue light, Lb	W·m-2·sr-1	100	1.257E+01	10000	8.996E+01	4000000	1.305E+02
Blue light, small source, Eb	W·m-2	-	-	-	-	-	-
Retinal thermal, Lr	W·m-2·sr-1	1.875E+06	9.942E+02	1.875E+06	9.942E+02	4.755E+06	1.443E+03
Retinal thermal, weak visual stimulus, Lir	W·m-2·sr-1	4.018E+05	0.000E+00	4.018E+05	0.000E+00	4.018E+05	0.000E+00
IR radiation, eye, Eir	W·m-2	100	7.151E-04	570	7.151E-04	3200	7.151E-04
IR radiation, skin, Eh	W·m-2	3556.56	5.762E-01	NA	NA	NA	NA
Angular subtense of apparent source				α=14.93mrad			



Announcement

1. This report cannot be reproduced in any form without prior written approval of Huayi Lighting Technology Services Co., Ltd.
2. The report is invalid if there is any alteration or loss of page.
3. Bontek Compliance Testing Laboratory Co., Ltd. assumes full responsibility to the test result presented in this report only to the item tested.
4. Please feel free to contact us if any query . Service certer information as below:

Tested by: Zhongshan Bontek Compliance Testing Laboratory Co., Ltd.

Address: Tongyi Industrial Zone Dongxing east Road, Gu Zhen Town, Zhongshan City, Guang Dong Province, P.R. China

Tel：0760- 22386277

Mail： bontek01@zslts.com

Code：528421

Web: www.drlts.cn