Test Report issued under the responsibility of:

DEKRA

TEST REPORT
IEC TR 62778
Application of IEC 62471 for the assessment of blue light hazard to light sources and luminaires

Report Number..... :	6163548.51P
Date of issue ..... :	2024-01-31
Total number of pages	31
Name of Testing Laboratory preparing the Report ..... :	DEKRA Testing and Certification (Shanghai) Ltd. 3/F, #250, Jiangchangsan Road building 16 Headquater Economy Park Shibei Hi-Tech Park, Jing'an District, Shanghai, P.R.C 200436
Applicant's name ..... :	Lumileds (Shanghai) Management Co., Ltd.
Address..... :	Building 1-A, No. 19 & 20, Lane 299, Wenshui Road, Jing'an District, Shanghai, P. R. China, 200072
Test specification:	
Standard ..... :	IEC TR 62778:2014 (Second Edition)
Test procedure..... :	Type Test
Non-standard test method..... :	N/A
Test Report Form No. ..... :	IEC62778A
Test Report Form(s) Originator.... :	TÜV SÜD Product Service GmbH
Master TRF ..... :	Dated 2016-02

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

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 CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

The purpose of this report is only for export activities.

Test item description ..... :	Integral LED module		
Trade Mark ..... :	LUMILEDS		
Manufacturer ..... :	Lumileds (Shanghai) Management Co., Ltd. Building 1-A, No. 19 & 20, Lane 299, Wenshui Road, Jing'an District, Shanghai, P. R. China, 200072		
Model/Type reference ..... :	L2C6 series (Detailed lists refer to Appendix 2: Model List)		
Ratings ..... :	Imax 3600 mA, Vmax 58 Vdc; (Testing current 4050 mA)		
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**CB Testing Laboratory:**	DEKRA Testing and Certification (Shanghai) Ltd.	
Testing location/ address.....		3/F, #250, Jiangchangsan Road building 16 Headquater Economy Park Shibei Hi-Tech Park, Jing'an District, Shanghai, P.R.C 200436	
☐	~~Associated CB Testing Laboratory:~~		
~~Testing location/ address~~			
Tested by (name, function, signature).....		Nancy Wang	Nancy Wang
Approved by (name, function, signature).....		Hanson Zhang	Hanson
☐	~~Testing procedure: CTF Stage 1:~~		
~~Testing location/ address~~			
~~Tested by (name, function, signature)~~			
~~Approved by (name, function, signature)~~			
☐	~~Testing procedure: CTF Stage 2:~~		
~~Testing location/ address~~			
~~Tested by (name + signature)~~			
~~Witnessed by (name, function, signature)~~			
~~Approved by (name, function, signature)~~			
☐	~~Testing procedure: CTF Stage 3:~~		

☐	~~Testing procedure: CTF Stage 4:~~		
~~Testing location/ address .....~~			
~~Tested by (name, function, signature) .~~			
~~Witnessed by (name, function, signature) .....~~			
~~Approved by (name, function, signature) .....~~			
~~Supervised by (name, function, signature) .....~~			

List of Attachments (including a total number of pages in each attachment):

- Appendix 1: Photo Documentation
- Appendix 2: Model List
- Appendix 3: Relative Spectrum Of Tested Sample(s)
- Appendix 4: Table 6.1 Based On IEC 62471:2006
- Appendix 5: Table 6.1 Based On EN62471:2008, Attachment To IEC 62471 European Group Differences And National Differences
- Appendix 6: Blue Light Hazard-Forward Current Relationship (Non-mandatory Information)

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
These tests fulfil the requirements of standard ISO/IEC 17025. When determining the test conclusion, the Measurement Uncertainty of test has been considered. The tested sample of L2C6-65803R18A2200 Have been tested according to the IEC/TR 62778:2014 and been classified as **RG 2 for blue light hazard**. The sample of L2C6-65803R18A2200 was tested at 900mA, 1620mA, 3600mA and 4050mA. Current at RG1 to RG2 boundary was deducted to be 945mA. The tested sample of L2C6-50803R18A2200 Have been tested according to the IEC/TR 62778:2014 and been classified as **RG 2 for blue light hazard**.	DEKRA Testing and Certification (Shanghai) Ltd. 3/F, #250, Jiangchangsan Road building 16 Headquater Economy Park Shibei Hi-Tech Park, Jing'an District, Shanghai, P.R.C 200436

Summary of compliance with National Differences (List of countries addressed): EN Standards

EN 62471:2008

☒ **The product fulfills the requirements**

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

N/A

Test item particulars.....:	See below
Product evaluated.....:	☐ **LED package** ☒ **LED module** ☐ **Lamp** ☐ **Luminaire**
Rated voltage (V) .....:	Imax 3600 mA, Vmax 58 Vdc; (Testing current 4050 mA)
Rated current (mA) .....:	--
Rated CCT (K).....:	--
Rated Luminance (Mcd/m^2) .....:	--
Component report data used .....:	☒ **Not applicable** ☐ **LED package** ☐ **LED module** ☐ **Lamp** Report number: --
Possible test case verdicts:	
- test case does not apply to the test object.....:	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 .....:	2024-01
Date (s) of performance of tests.....:	2024-01

General remarks:

"(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 / ☐ point is used as the decimal separator.

The product complied with the following standards:

☒IEC 62471:2006
☒EN 62471:2008
☐IEC/TR 62471-2:2009
☒IEC/TR 62778:2014

Decision rules applied Procedure 2 “Accuracy Method” as stated in the IEC Guide 115:2007.

Manufacturer’s Declaration per sub-clause 4.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... :	☐ **Yes** ☒ **Not applicable**

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies) ..... :	Lumileds (Shanghai) Management Co., Ltd. Building 1-A, No. 19 & 20, Lane 299, Wenshui Road, Jing'an District, Shanghai, P. R. China, 200072

General product information:

Full tests were performed on model L2C6-65803R18A2200 and L2C6-50803R18A2200.

The product was considered as worst case which should be evaluated at 200mm.

The sample of L2C6-65803R18A2200 (4050mA) was tested at 200mm from the light source. The CCT of spectral irradiance was found at 6743 K.

The sample of L2C6-65803R18A2200 (3600mA) was tested at 200mm from the light source. The CCT of spectral irradiance was found at 6658 K.

The sample of L2C6-65803R18A2200 (1620mA) was tested at 200mm from the light source. The CCT of spectral irradiance was found at 6445 K.

The sample of L2C6-65803R18A2200 (900mA) was tested at 200mm from the light source. The CCT of spectral irradiance was found at 6324 K.

The sample of L2C6-50803R18A2200 (4050mA) was tested at 200mm from the light source. The CCT of spectral irradiance was found at 5098 K.

Base on the Model list which listed on the appendix 2, The tested sample can be considered as
☐ typical product ☒ worst product
Which the results can be reference used for the other models.

Type test was performed according to IEC 62471:2006 procedure.

Amendment 1 report:

The original test report 6163548.50P, dated 2023-07-17 was modified to include the following additions:

- New models were added in Model list with bold letters.

After review, no additional tests were considered necessary.

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict

7	**MEASUREMENT INFORMATION FLOW**		**P**
7.1	**Basic flow**		**P**
	'Law of conservation of luminance' applied		N/A
	Use of only true luminance/radiance values		P
	In case of luminaire: The light source is operated in the luminaire under similar conditions as when tested as a component		N/A
	In case E_{thr} value for RG2 was established the peak value was derived from angular light distribution		N/A
7.2	**Conditions for the radiance measurement**		**P**
	Standard condition applied (200mm distance, 0,011rad field of view)		P
	Non-standard condition applied		N/A
7.3	**Special cases (I): Replacement by a lamp or LED module of another type**		**N/A**
	Light source is a white light source		N/A
	Evaluation done based on highest luminance		N/A
	Evaluation done based on CCT value		N/A
7.4	**Special cases (II): Arrays and clusters of primary light sources**		**N/A**
	LED package is evaluated as ..... :	☐ RG0 unlimited ☐ RG1 unlimited	N/A
	E_{thr} of LED package applies to array		N/A
8	**RISK GROUP CLASSIFICATION**		**P**
	Risk group achieved:		P
	- .. Risk Group 0 unlimited		N/A
	- .. Risk Group 1 unlimited		N/A
	- E_{thr} ..... (lx) : Distance to reach RG1 ..... (m) :	Refer to the Supplementary information of **TABLE:Spectroradiometric measurement** as following	P

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE:Spectroradiometric measurement		
	Measurement performed on:	☐ **LED package** ☒ **LED module** ☐ **Lamp** ☐ **Luminaire**	
	Model number.....	L2C6-65803R18A2200 (4050mA)	
	Test voltage (V)	58 Vdc	—
	Test current (mA)	4050 mA	—
	Test frequency (Hz).....	--	—
	Ambient, t(°C)	25**°C**	—
	Measurement distance.....	☒ 20 cm ☐ ... cm	—
	Source size	☒ Non-small ☐ Small :	—
	Field of view	☐ 100 mrad ☒ 11 mrad ☐ 1,7 mrad (for small sources)	—

Item	Symbol	Units	Result	Remark
Correlated colour temperature	CCT	K	6743	
x/y colour coordinates			0,3091/0,3250	
Blue light hazard radiance	L_B	$W/(m^2 \cdot sr^1)$	3,52E+04	@11mrad
Blue light hazard irradiance	E_B	W/m^2	--	
Luminance	L	cd/m^2	3,41E+07	@11mrad
Illuminance	E	lx	5,55E+04	

Supplementary information:

Per IEC/TR 62778:2014
Ethr= 968 lx

Dmin= 1527 mm

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE:Spectroradiometric measurement		
	Measurement performed on:	☐ **LED package** ☒ **LED module** ☐ **Lamp** ☐ **Luminaire**	
	Model number.....	L2C6-65803R18A2200 (3600mA)	
	Test voltage (V)	58 Vdc	—
	Test current (mA)	3600 mA	—
	Test frequency (Hz).....	--	—
	Ambient, t(°C)	25**°C**	—
	Measurement distance.....	☒ 20 cm ☐ ... cm	—
	Source size	☒ Non-small ☐ Small :	—
	Field of view	☐ 100 mrad ☒ 11 mrad ☐ 1,7 mrad (for small sources)	—

Item	Symbol	Units	Result	Remark
Correlated colour temperature	CCT	K	6658	
x/y colour coordinates			0,3103/0,3267	
Blue light hazard radiance	L_B	$W/(m^2 \cdot sr^1)$	3,39E+04	@11mrad
Blue light hazard irradiance	E_B	W/m^2	--	
Luminance	L	cd/m^2	3,50E+07	@11mrad
Illuminance	E	lx	5,01E+04	

Supplementary information:

Per IEC/TR 62778:2014
Ethr= 1031 lx
Dmin= 1394 mm

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE:Spectroradiometric measurement		
	Measurement performed on:	☐ **LED package** ☒ **LED module** ☐ **Lamp** ☐ **Luminaire**	
	Model number.....	L2C6-65803R18A2200 (1620mA)	
	Test voltage (V)	58 Vdc	—
	Test current (mA)	1620 mA	—
	Test frequency (Hz).....	--	—
	Ambient, t(°C)	25**°C**	—
	Measurement distance.....	☒ 20 cm ☐ ... cm	—
	Source size	☒ Non-small ☐ Small :	—
	Field of view	☐ 100 mrad ☒ 11 mrad ☐ 1,7 mrad (for small sources)	—

Item	Symbol	Units	Result	Remark
Correlated colour temperature	CCT	K	6445	
x/y colour coordinates			0,3135/0,3318	
Blue light hazard radiance	L_B	$W/(m^2 \cdot sr^1)$	1,72E+04	@11mrad
Blue light hazard irradiance	E_B	W/m^2	--	
Luminance	L	cd/m^2	1,90E+07	@11mrad
Illuminance	E	lx	2,92E+04	

Supplementary information:

Per IEC/TR 62778:2014
Ethr= 1107 lx
Dmin= 1028 mm

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE:Spectroradiometric measurement		
	Measurement performed on:	☐ **LED package** ☒ **LED module** ☐ **Lamp** ☐ **Luminaire**	
	Model number.....	L2C6-65803R18A2200 (900mA)	
	Test voltage (V)	58 Vdc	—
	Test current (mA)	900 mA	—
	Test frequency (Hz).....	--	—
	Ambient, t(°C)	25**°C**	—
	Measurement distance.....	☒ 20 cm ☐ ... cm	—
	Source size	☒ Non-small ☐ Small :	—
	Field of view	☐ 100 mrad ☒ 11 mrad ☐ 1,7 mrad (for small sources)	—

Item	Symbol	Units	Result	Remark
Correlated colour temperature	CCT	K	6324	
x/y colour coordinates			0,3154/0,3350	
Blue light hazard radiance	L_B	$W/(m^2 \cdot sr^1)$	9,93E+03	@11mrad
Blue light hazard irradiance	E_B	W/m^2	--	
Luminance	L	cd/m^2	1,11E+07	@11mrad
Illuminance	E	lx	1,72E+04	

Supplementary information:
N/A

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE:Spectroradiometric measurement		
	Measurement performed on:	☐ **LED package** ☒ **LED module** ☐ **Lamp** ☐ **Luminaire**	
	Model number.....	L2C6-50803R18A2200 (4050mA)	
	Test voltage (V)	58 Vdc	—
	Test current (mA)	4050 mA	—
	Test frequency (Hz).....	--	—
	Ambient, t(°C)	25**°C**	—
	Measurement distance.....	☒ 20 cm ☐ ... cm	—
	Source size	☒ Non-small ☐ Small :	—
	Field of view	☐ 100 mrad ☒ 11 mrad ☐ 1,7 mrad (for small sources)	—

Item	Symbol	Units	Result	Remark
Correlated colour temperature	CCT	K	5098	
x/y colour coordinates			0,3428/0,3547	
Blue light hazard radiance	L_B	$W/(m^2 \cdot sr^1)$	2,52E+04	@11mrad
Blue light hazard irradiance	E_B	W/m^2	--	
Luminance	L	cd/m^2	2,63E+07	@11mrad
Illuminance	E	lx	4,45E+04	

Supplementary information:

Per IEC/TR 62778:2014
Ethr= 1044 lx
Dmin= 1306 mm

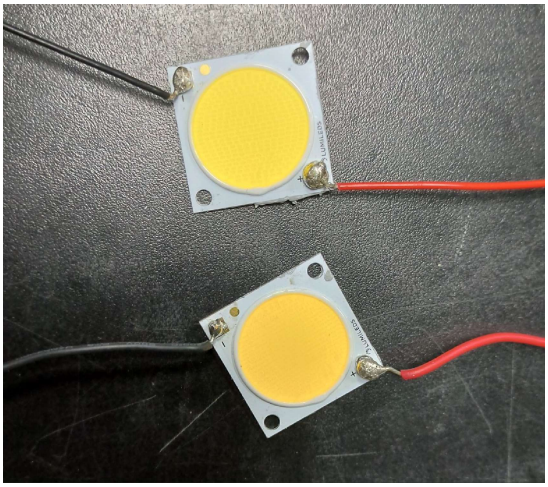
IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict
	TABLE: Angular light distribution		**N/A**

List of test equipment used:

A completed list of used test equipment shall be provided in the Test Reports when a Manufacturer Testing Laboratory according to CTF stage 1 or CTF stage 2 procedure has been used.
Note: This page may be removed when CTF stage 1 CTF stage 2 are not used. See also clause 4.8 in OD 2020 for more details.

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date
7	Irradiance measurements Radiance measurements	IDR 300 Monochromator (SH 344)	200-3000nm	/	/
7	Radiance measurements	S009 Telescope (SH 345)	300-1400nm	/	/
7	Radiance measurements	SRS 12 Radiance Standard (SH 348)	300-1400nm	2023/2/25	2024/2/24
7	Irradiance measurements	CL6 Spectral irradiance standard (SH 350)	300-3000nm	2023/2/25	2024/2/24
7	Irradiance measurements	CL7 Spectral irradiance standard (SH 351)	200-400nm	2023/2/25	2024/2/24
7	Irradiance measurements	Photometric detector head (SH 359)	380nm-800nm	2023/2/26	2024/2/25
7	Irradiance measurements Radiance measurements	Wattmeter (SH030)	500V,40A	2023/10/10	2024/10/10

Appendix 1: Photo Documentation



L2C6-50803R18A2200 and L2C6-65803R18A2200

Appendix 2: Model List

The tested sample L2C6-65803R18A2200 is considered the worst case. Hence its rating RG2 (at 4050mA) and RG1 (at 900mA) are applicable to all parts covered by the part number nomenclature mentioned below.

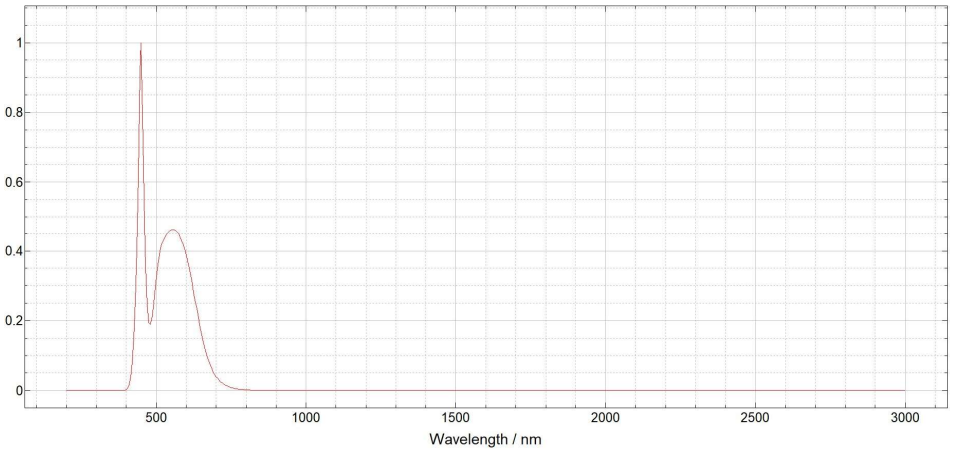
LXUEON CoB CS Range model nomenclature:

L2C6-AABBCDEEFGGHH
Where
AA – can be any alphanumeric characters, designate nominal ANSI CCT (eg: 22=2200K, 27=2700K, 30=3000K,35=3500K, 40=4000K, 50=5000K, 56=5600K, 57=5700K, 65=6500K)
BB – can be any alphanumeric characters, designates minimum CRI (eg: 80=80CRI, 90=90CRI, 95=95CRI)
C – can be any alphanumeric characters, designates color target of SDCM (eg: 2=2 SDCM)
D – can be any alphanumeric characters, designates product configuration of series (eg: L=12 series)
EE – can be any alphanumeric characters, designates product configuration of parallel (eg: 02= 2 parallel, 03= 3 parallel, 04= 4 parallel, 05= 5 parallel, 06= 6 parallel ,08= 8 parallel ,10= 10 parallel,11= 11 parallel,12= 12 parallel, 13= 13 parallel, 16= 16 parallel）
F – can be any alphanumeric characters, designates options for product generation (eg: A= Gen1, C= Gen2)
GG – can be any alphanumeric characters, designates light emitting surface(LES)size (eg: 06=6.3mm, 09=9.8mm, 13=13mm, 15=14.5mm, 22=22mm)
HH – can be any alphanumeric characters, designates options for product specification. (eg: 00= On BBL, X0= Core Pro)

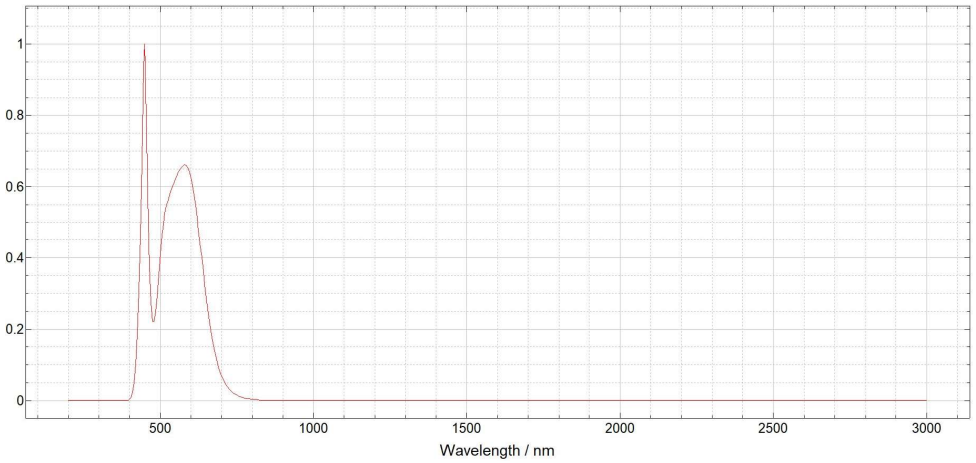
Model No	Test Current (mA)	2700K	3000K	3500K	4000K	5000K	5700K	6500K
L2C6-AABBCL02F06HH	106	RG1	RG1	RG1	RG1	RG1	RG1	RG1
	180	RG1	RG1	RG1	RG1	RG2	RG2	RG2
	450	RG1	RG2	RG2	RG2	RG2	RG2	RG2
L2C6-AABBCL02F09HH	106	RG1	RG1	RG1	RG1	RG1	RG1	RG1
	180	RG1	RG1	RG1	RG1	RG2	RG2	RG2
	450	RG1	RG2	RG2	RG2	RG2	RG2	RG2
L2C6-AABBCL03F09HH	159	RG1	RG1	RG1	RG1	RG1	RG1	RG1
	270	RG1	RG1	RG1	RG1	RG2	RG2	RG2
	675	RG1	RG2	RG2	RG2	RG2	RG2	RG2
L2C6-AABBCL04F09HH	212	RG1	RG1	RG1	RG1	RG1	RG1	RG1
	360	RG1	RG1	RG1	RG1	RG2	RG2	RG2
	900	RG1	RG2	RG2	RG2	RG2	RG2	RG2
L2C6-AABBCL05F13HH	265	RG1	RG1	RG1	RG1	RG1	RG1	RG1
	450	RG1	RG1	RG1	RG1	RG2	RG2	RG2
	1125	RG1	RG2	RG2	RG2	RG2	RG2	RG2
L2C6-AABBCL06F13HH	318	RG1	RG1	RG1	RG1	RG1	RG1	RG1
	540	RG1	RG1	RG1	RG1	RG2	RG2	RG2
	1350	RG1	RG2	RG2	RG2	RG2	RG2	RG2
L2C6-AABBCL08F15HH	424	RG1	RG1	RG1	RG1	RG1	RG1	RG1
	720	RG1	RG1	RG1	RG1	RG2	RG2	RG2
	1800	RG1	RG2	RG2	RG2	RG2	RG2	RG2
L2C6-AABBCL10F15HH	530	RG1	RG1	RG1	RG1	RG1	RG1	RG1
	900	RG1	RG1	RG1	RG1	RG2	RG2	RG2
	2250	RG1	RG2	RG2	RG2	RG2	RG2	RG2
L2C6-AABBCL13F22HH	689	RG1	RG1	RG1	RG1	RG1	RG1	RG1
	1170	RG1	RG1	RG1	RG1	RG2	RG2	RG2
	2925	RG1	RG2	RG2	RG2	RG2	RG2	RG2

L2C6-AABBCL16F22HH	848	RG1	RG1	RG1	RG1	RG1	RG1	RG1
	1440	RG1	RG1	RG1	RG1	RG2	RG2	RG2
	3600	RG1	RG2	RG2	RG2	RG2	RG2	RG2
L2C6-AABBCR12F22HH	636	RG1	RG1	RG1	RG1	RG1	RG1	RG1
	1080	RG1	RG1	RG1	RG1	RG2	RG2	RG2
	2400	RG1	RG2	RG2	RG2	RG2	RG2	RG2
L2C6-AABBCR18F22HH	900	RG1	RG1	RG1	RG1	RG1	RG1	RG1
	954	RG1	RG1	RG1	RG1	RG1	RG1	RG1
	1620	RG1	RG1	RG1	RG1	RG2	RG2	RG2
	3600	RG1	RG2	RG2	RG2	RG2	RG2	RG2
	4050	RG1	RG2	RG2	RG2	RG2	RG2	RG2
L2C6-AABBCL08F15HH	424	RG1	RG1	RG1	RG1	RG1	RG1	RG1
	720	RG1	RG1	RG1	RG1	RG2	RG2	RG2
	1800	RG1	RG2	RG2	RG2	RG2	RG2	RG2
L2C6-AABBCL11F22HH	583	RG1	RG1	RG1	RG1	RG1	RG1	RG1
	990	RG1	RG1	RG1	RG1	RG2	RG2	RG2
	2475	RG1	RG2	RG2	RG2	RG2	RG2	RG2

Appendix 3: Relative Spectrum Of Tested Sample(s)



L2C6-65803R18A2200



L2C6-50803R18A2200

Appendix 4: Table 6.1 Based On IEC 62471:2006
DUT: L2C6-65803R18A2200 (4050mA), Evaluation Distance: 200mm, Angular subtense of the apparent source α: 100 mrad

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps									
Risk	Action spectrum	Symbol	Units	Emission Measurement					
				Exempt		Low risk		Mod risk	
				Limit	Result	Limit	Result	Limit	Result
Actinic UV	$S_{UV}(\lambda)$	E_s	$W \cdot m^{-2}$	0,001	0,0000	0,003		0,03	
Near UV		E_{UVA}	$W \cdot m^{-2}$	10	0,0000	33		100	
Blue light	B(λ)	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	6,53E+03	10000	3,52E+04	4000000	3,69E+04
Blue light, small source	B(λ)	E_B	$W \cdot m^{-2}$	1,0*	--	1,0		400	
Retinal thermal	R(λ)	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/α	3,88E+05	28000/α		71000/α	
Retinal thermal, weak visual stimulus**	R(λ)	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	6000/α	--	6000/α		6000/α	
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0,23	570		3200	

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

DUT: L2C6-65803R18A2200 (3600mA) Evaluation Distance: 200mm, Angular subtense of the apparent source α: 100 mrad

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps									
Risk	Action spectrum	Symbol	Units	Emission Measurement					
				Exempt		Low risk		Mod risk	
				Limit	Result	Limit	Result	Limit	Result
Actinic UV	$S_{UV}(\lambda)$	E_s	$W \cdot m^{-2}$	0,001	0,0000	0,003		0,03	
Near UV		E_{UVA}	$W \cdot m^{-2}$	10	0,0000	33		100	
Blue light	B(λ)	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	5,70E+03	10000	3,39E+04	4000000	3,50E+04
Blue light, small source	B(λ)	E_B	$W \cdot m^{-2}$	1,0*	--	1,0		400	
Retinal thermal	R(λ)	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/α	4,03E+05	28000/α		71000/α	
Retinal thermal, weak visual stimulus**	R(λ)	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	6000/α	--	6000/α		6000/α	
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0,19	570		3200	

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

DUT: L2C6-65803R18A2200 (1620mA) Evaluation Distance: 200mm, Angular subtense of the apparent source α: 100 mrad

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps									
Risk	Action spectrum	Symbol	Units	Emission Measurement					
				Exempt		Low risk		Mod risk	
				Limit	Result	Limit	Result	Limit	Result
Actinic UV	$S_{UV}(\lambda)$	E_s	$W \cdot m^{-2}$	0,001	0,0000	0,003		0,03	
Near UV		E_{UVA}	$W \cdot m^{-2}$	10	0,0000	33		100	
Blue light	B(λ)	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	3,18E+03	10000	1,72E+04	4000000	1,76E+04
Blue light, small source	B(λ)	E_B	$W \cdot m^{-2}$	1,0*	--	1,0		400	
Retinal thermal	R(λ)	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/α	2,06E+05	28000/α		71000/α	
Retinal thermal, weak visual stimulus**	R(λ)	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	6000/α	--	6000/α		6000/α	
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0,07	570		3200	

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

DUT: L2C6-65803R18A2200 (900mA) Evaluation Distance: 200mm, Angular subtense of the apparent source α: 100 mrad

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps									
Risk	Action spectrum	Symbol	Units	Emission Measurement					
				Exempt		Low risk		Mod risk	
				Limit	Result	Limit	Result	Limit	Result
Actinic UV	$S_{UV}(\lambda)$	E_s	$W \cdot m^{-2}$	0,001	0,0000	0,003		0,03	
Near UV		E_{UVA}	$W \cdot m^{-2}$	10	0,0000	33		100	
Blue light	B(λ)	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	1,81E+03	10000	9,93E+03	4000000	
Blue light, small source	B(λ)	E_B	$W \cdot m^{-2}$	1,0*	--	1,0		400	
Retinal thermal	R(λ)	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/α	1,20E+05	28000/α		71000/α	
Retinal thermal, weak visual stimulus**	R(λ)	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	6000/α	--	6000/α		6000/α	
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0,02	570		3200	

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

DUT: L2C6-50803R18A2200 (4050mA) Evaluation Distance: 200mm, Angular subtense of the apparent source α: 100 mrad

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps									
Risk	Action spectrum	Symbol	Units	Emission Measurement					
				Exempt		Low risk		Mod risk	
				Limit	Result	Limit	Result	Limit	Result
Actinic UV	$S_{UV}(\lambda)$	E_s	$W \cdot m^{-2}$	0,001	0,0000	0,003		0,03	
Near UV		E_{UVA}	$W \cdot m^{-2}$	10	0,0000	33		100	
Blue light	B(λ)	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	3,92E+03	10000	2,52E+04	4000000	2,65E+04
Blue light, small source	B(λ)	E_B	$W \cdot m^{-2}$	1,0*	--	1,0		400	
Retinal thermal	R(λ)	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/α	3,01E+05	28000/α		71000/α	
Retinal thermal, weak visual stimulus**	R(λ)	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	6000/α	--	6000/α		6000/α	
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0,20	570		3200	

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

Appendix 5: Table 6.1 Based On EN62471:2008, Attachment To IEC 62471 European Group Differences And National Differences
DUT: L2C6-65803R18A2200 (4050mA), Evaluation Distance: 200mm, Angular subtense of the apparent source α: 30 mrad

EN 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps (based on EU Directive 2006/25/EC)									
Risk	Action spectrum	Symbol	Units	Emission Measurement					
				Exempt		Low risk		Mod risk	
				Limit	Result	Limit	Result	Limit	Result
Actinic UV	$S_{UV}(\lambda)$	E_s	$W \cdot m^{-2}$	0,001	0,0000	--	--	--	--
Near UV		E_{UVA}	$W \cdot m^{-2}$	0,33	0,0000	--	--	--	--
Blue light	B(λ)	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	6,53E+03	10000	3,52E+04	4000000	3,69E+04
Blue light, small source	B(λ)	E_B	$W \cdot m^{-2}$	0,01*	--	1,0		400	
Retinal thermal	R(λ)	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/α	3,88E+05	28000/α		71000/α	
Retinal thermal, weak visual stimulus**	R(λ)	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	545000 0,0017≤ α ≤ 0,011	--				
				6000/α 0,011≤ α ≤ 0,1	--				
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0,23	570		3200	

* Small source defined as one with α < 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 applicable aperture 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.

DUT: L2C6-65803R18A2200 (3600mA), Evaluation Distance: 200mm, Angular subtense of the apparent source α: 30 mrad

EN 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps (based on EU Directive 2006/25/EC)									
Risk	Action spectrum	Symbol	Units	Emission Measurement					
				Exempt		Low risk		Mod risk	
				Limit	Result	Limit	Result	Limit	Result
Actinic UV	$S_{UV}(\lambda)$	E_s	$W \cdot m^{-2}$	0,001	0,0000	--	--	--	--
Near UV		E_{UVA}	$W \cdot m^{-2}$	0,33	0,0000	--	--	--	--
Blue light	B(λ)	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	5,70E+03	10000	3,39E+04	4000000	3,50E+04
Blue light, small source	B(λ)	E_B	$W \cdot m^{-2}$	0,01*	--	1,0		400	
Retinal thermal	R(λ)	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/α	4,03E+05	28000/α		71000/α	
Retinal thermal, weak visual stimulus**	R(λ)	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	545000 0,0017≤ α ≤ 0,011	--				
				6000/α 0,011≤ α ≤ 0,1	--				
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0,19	570		3200	

* Small source defined as one with α < 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 applicable aperture 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.

DUT: L2C6-65803R18A2200 (1620mA), Evaluation Distance: 200mm, Angular subtense of the apparent source α: 30 mrad

EN 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps (based on EU Directive 2006/25/EC)									
Risk	Action spectrum	Symbol	Units	Emission Measurement					
				Exempt		Low risk		Mod risk	
				Limit	Result	Limit	Result	Limit	Result
Actinic UV	$S_{UV}(\lambda)$	E_s	$W•m^{-2}$	0,001	0,0000	--	--	--	--
Near UV		E_{UVA}	$W•m^{-2}$	0,33	0,0000	--	--	--	--
Blue light	B(λ)	L_B	$W•m^{-2}•sr^{-1}$	100	3,18E+03	10000	1,72E+04	4000000	1,76E+04
Blue light, small source	B(λ)	E_B	$W•m^{-2}$	0,01*	--	1,0		400	
Retinal thermal	R(λ)	L_R	$W•m^{-2}•sr^{-1}$	28000/α	2,06E+05	28000/α		71000/α	
Retinal thermal, weak visual stimulus**	R(λ)	L_{IR}	$W•m^{-2}•sr^{-1}$	545000 0,0017≤ α ≤ 0,011	--				
				6000/α 0,011≤ α ≤ 0,1	--				
IR radiation, eye		E_{IR}	$W•m^{-2}$	100	0,07	570		3200	

* Small source defined as one with α < 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 applicable aperture 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.

DUT: L2C6-65803R18A2200 (900mA), Evaluation Distance: 200mm, Angular subtense of the apparent source α: 30 mrad

EN 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1 Emission limits for risk groups of continuous wave lamps (based on EU Directive 2006/25/EC)

Risk	Action spectrum	Symbol	Units	Emission Measurement					
				Exempt		Low risk		Mod risk	
				Limit	Result	Limit	Result	Limit	Result
Actinic UV	$S_{UV}(\lambda)$	E_s	$W \cdot m^{-2}$	0,001	0,0000	--	--	--	--
Near UV		E_{UVA}	$W \cdot m^{-2}$	0,33	0,0000	--	--	--	--
Blue light	B(λ)	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	1,81E+03	10000	9,93E+03	4000000	
Blue light, small source	B(λ)	E_B	$W \cdot m^{-2}$	0,01*	--	1,0		400	
Retinal thermal	R(λ)	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/α	1,20E+05	28000/α		71000/α	
Retinal thermal, weak visual stimulus**	R(λ)	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	545000 0,0017≤ α ≤ 0,011	--				
				6000/α 0,011≤ α ≤ 0,1	--				
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0,02	570		3200	

* Small source defined as one with α < 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 applicable aperture 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.

DUT: L2C6-50803R18A2200 (4050mA), Evaluation Distance: 200mm, Angular subtense of the apparent source α: 30 mrad

EN 62471			
Clause	Requirement + Test	Result – Remark	Verdict

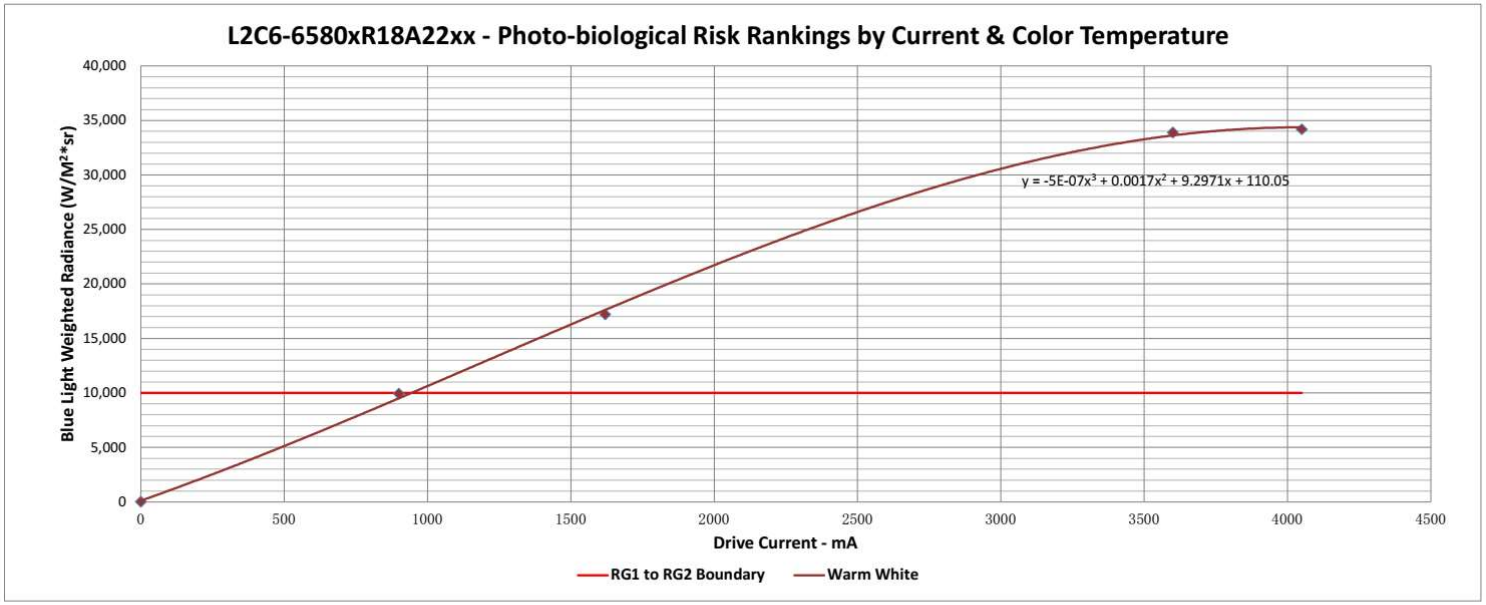
Table 6.1	Emission limits for risk groups of continuous wave lamps (based on EU Directive 2006/25/EC)									
Risk	Action spectrum	Symbol	Units	Emission Measurement					
				Exempt		Low risk		Mod risk	
				Limit	Result	Limit	Result	Limit	Result
Actinic UV	$S_{UV}(\lambda)$	E_s	$W \cdot m^{-2}$	0,001	0,0000	--	--	--	--
Near UV		E_{UVA}	$W \cdot m^{-2}$	0,33	0,0000	--	--	--	--
Blue light	B(λ)	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	3,92E+03	10000	2,52E+04	4000000	2,65E+04
Blue light, small source	B(λ)	E_B	$W \cdot m^{-2}$	0,01*	--	1,0		400	
Retinal thermal	R(λ)	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/α	3,01E+05	28000/α		71000/α	
Retinal thermal, weak visual stimulus**	R(λ)	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	545000 0,0017≤ α ≤ 0,011	--				
				6000/α 0,011≤ α ≤ 0,1	--				
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0,20	570		3200	

* Small source defined as one with α < 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 applicable aperture 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 6: Blue Light Hazard-Forward Current Relationship (Non-mandatory Information)

The diagram below shows the different blue light hazards against different forward currents. It is additional information for reference only.



			Drive Currents (mA)							
CCT Group:	Product ID:	Measured CCT:	0	900	1620	3600	4050	Regression Formula:	Fit to RG2 Line:	Current @ RG-1 to RG-2 Boundary, mA:
Cool White	L2C6-6580xR18A22xx	6743K	0	9.93E+03	1.72E+04	3.39E+04	3.42E+04	=-5E-07x³ + 0.0017x² + 9.2971x + 110.0	9992	945

-----The End-----