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..... :	6144559.50P
Date of issue ..... :	2022-11-25
Total number of pages	34
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 ..... :	LED package	
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 ..... :	L2C4 series; L2C5 series; **L2C6 series** (Detailed lists refer to Appendix 2: Model List)	
Ratings ..... :	L2C4 series: Imax 1400 mA, Vmax 40 Vdc; L2C5 series: Imax 1350 mA, Vmax 46 Vdc; **L2C6 series: Imax 3600 mA, Vmax 58 Vdc**	
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 L2C4-57802S02F0600 Have been tested according to the IEC/TR 62778:2014 and been classified as **RG 2 for blue light hazard**. The sample of L2C4-57802S02F0600 was tested at 175mA, 350mA, 525mA and 700mA. Current at RG1 to RG2 boundary was deducted to be 131mA. (See appendix 6 for detail).	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) .....:	L2C4 series : Imax 1400 mA, Vmax 40Vdc; L2C5 series : Imax 1350 mA, Vmax 46Vdc; **L2C6 series: Imax 1620 mA, Vmax 58 Vdc**
Rated current (mA) .....:	--
Rated CCT (K).....:	--
Rated Luminance (Mcd/m²) .....:	--
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 .....:	2022-11
Date (s) of performance of tests.....:	2022-11

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 L2C4-57802S02F0600.

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

The sample of L2C4-57802S02F0600 (175mA) was tested at 200mm from the light source. The CCT of spectral irradiance was found at 4941 K.

The sample of L2C4-57802S02F0600 (350mA) was tested at 200mm from the light source. The CCT of spectral irradiance was found at 4993 K.

The sample of L2C4-57802S02F0600 (525mA) was tested at 200mm from the light source. The CCT of spectral irradiance was found at 5057 K.

The sample of L2C4-57802S02F0600 (700mA) was tested at 200mm from the light source. The CCT of spectral irradiance was found at 5142 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 6063421.50P, dated 2019-09-17 was modified to include the following additions:

- New models L2C5 series were added in model list with bold letters.

After review, no additional tests were considered necessary.

Amendment 2 report:

The original test report 6116388.50P, dated 2021-10-15 was modified to include the following additions:

- New models L2C6 series 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.....	L2C4-57802S02F0600 (175mA)	
	Test voltage (V)	35 Vdc	—
	Test current (mA)	175 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	4941	
x/y colour coordinates			0,3485/0,3701	
Blue light hazard radiance	L_B	$W/(m^2 \cdot sr^1)$	1,33E+04	@11mrad
Blue light hazard irradiance	E_B	W/m^2	--	
Luminance	L	cd/m^2	1,59E+07	@11mrad
Illuminance	E	lx	9,71E+03	

Supplementary information:

Per IEC/TR 62778:2014
Ethr= 1191 lx

Dmin= 571 mm

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE:Spectroradiometric measurement		
	Measurement performed on:	☒ **LED package** ☐ **LED module** ☐ **Lamp** ☐ **Luminaire**	
	Model number.....	L2C4-57802S02F0600 (350mA)	
	Test voltage (V)	37,8 Vdc	—
	Test current (mA)	350 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	4993	
x/y colour coordinates			0,3468/0,3684	
Blue light hazard radiance	L_B	$W/(m^2 \cdot sr^1)$	2,41E+04	@11mrad
Blue light hazard irradiance	E_B	W/m^2	--	
Luminance	L	cd/m^2	2,75E+07	@11mrad
Illuminance	E	lx	1,77E+04	

Supplementary information:

Per IEC/TR 62778:2014
Ethr= 1144 lx

Dmin= 787 mm

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE:Spectroradiometric measurement		
	Measurement performed on:	☒ **LED package** ☐ **LED module** ☐ **Lamp** ☐ **Luminaire**	
	Model number.....	L2C4-57802S02F0600 (525mA)	
	Test voltage (V)	40,2 Vdc	—
	Test current (mA)	525mA	—
	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	5057	
x/y colour coordinates			0,3448/0,3657	
Blue light hazard radiance	L_B	$W/(m^2 \cdot sr^1)$	3,38E+04	@11mrad
Blue light hazard irradiance	E_B	W/m^2	--	
Luminance	L	cd/m^2	3,67E+07	@11mrad
Illuminance	E	lx	2,40E+04	

Supplementary information:

Per IEC/TR 62778:2014
Ethr= 1086 lx

Dmin= 941 mm

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE:Spectroradiometric measurement		
	Measurement performed on:	☒ **LED package** ☐ **LED module** ☐ **Lamp** ☐ **Luminaire**	
	Model number.....	L2C4-57802S02F0600 (700mA)	
	Test voltage (V)	42,5 Vdc	—
	Test current (mA)	700mA	—
	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	5142	
x/y colour coordinates			0,3421/0,3623	
Blue light hazard radiance	L_B	$W/(m^2 \cdot sr^1)$	4,02E+04	@11mrad
Blue light hazard irradiance	E_B	W/m^2	--	
Luminance	L	cd/m^2	4,16E+07	@11mrad
Illuminance	E	lx	2,84E+04	

Supplementary information:

Per IEC/TR 62778:2014
Ethr= 1036 lx

Dmin= 1047 mm

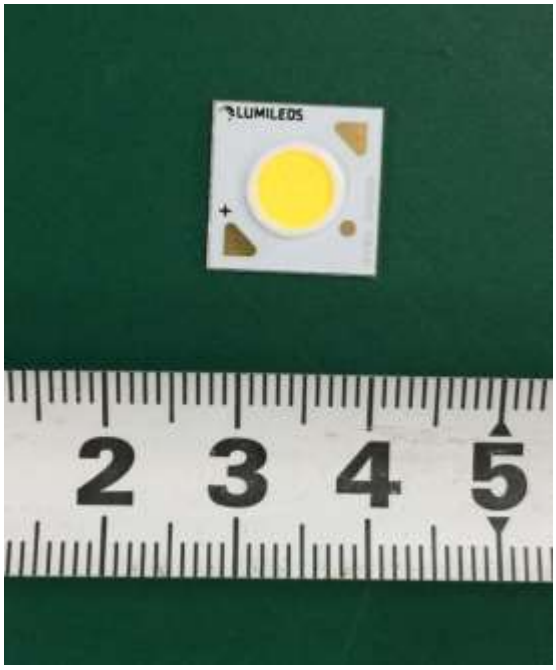
IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict
	TABLE: Angular light distribution		**N/A**

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	2021/2/25	2022/2/24
7	Irradiance measurements	CL6 Spectral irradiance standard (SH 350)	300-3000nm	2021/2/25	2022/2/24
7	Irradiance measurements	CL7 Spectral irradiance standard (SH 351)	200-400nm	2021/2/25	2022/2/24
7	Irradiance measurements	Photometric detector head (SH 359)	380nm-800nm	2021/2/26	2022/2/25
7	Irradiance measurements Radiance measurements	Wattmeter (SH030)	500V,40A	2021/10/10	2022/10/10

Appendix 1: Photo Documentation



L2C4-57802S02F0600

Appendix 2: Model List

The tested sample L2C4-57802S02F0600 is considered the worst case. Hence its rating RG2 (at 700mA) and RG1 (at 131mA) are applicable to all parts covered by the part number nomenclature mentioned below.

L 2 C 4 – A A B B C D D D E F F G G

Where:

A A : designates nominal CCT (27=2700K, 30=3000K, 35=3500K, 40=4000K, 50=5000K, **57=5700K**)

B B : designates minimum CRI (80=80CRI, 90=90CRI, 96=95CRI)

C : designates color (2=2-step, 3=3-step)

D D D : designates product configuration (example: S01, S02, S04, M02, M03, L04, L05, L08)

F F : designates light emitting surface (LES) size (04=4.5mm, 06=6mm, H6=6mm, 09=9mm, 12=12mm, 14=14mm)

G G : designates options for product specification (00=standard, B0=BBBL)

Commercial Part number	LES (mm)	Max Current (mA)	Max Voltage (V)	Nominal CCT (K)	Minimum CRI	Typical Flux (lm)	Typ Flux Density (lm/mm^2)
L2C4-2780XS01F04XX	4,5	350	46	2700	80	725	46
L2C4-3080XS01F04XX	4,5	350	46	3000	80	775	49
L2C4-3580XS01F04XX	4,5	350	46	3500	80	790	50
L2C4-4080XS01F04XX	4,5	350	46	4000	80	815	51
L2C4-5080XS01F04XX	4,5	350	46	5000	80	815	51
L2C4-5780XS01F04XX	4,5	350	46	5700	80	815	51
L2C4-2790XS01F04XX	4,5	350	46	2700	90	630	40
L2C4-3090XS01F04XX	4,5	350	46	3000	90	655	41
L2C4-3590XS01F04XX	4,5	350	46	3500	90	695	44
L2C4-4090XS01F04XX	4,5	350	46	4000	90	710	45
L2C4-5090XS01F04XX	4,5	350	46	5000	90	700	44
L2C4-2780XS01FH6XX	6	350	46	2700	80	760	27
L2C4-3080XS01FH6XX	6	350	46	3000	80	805	28
L2C4-3580XS01FH6XX	6	350	46	3500	80	815	29
L2C4-4080XS01FH6XX	6	350	46	4000	80	825	29
L2C4-5080XS01FH6XX	6	350	46	5000	80	825	29

L2C4-5780XS01FH6XX	6	350	46	5700	80	825	29
L2C4-2790XS01FH6XX	6	350	46	2700	90	645	23
L2C4-3090XS01FH6XX	6	350	46	3000	90	675	24
L2C4-3590XS01FH6XX	6	350	46	3500	90	705	25
L2C4-4090XS01FH6XX	6	350	46	4000	90	730	26
L2C4-5090XS01FH6XX	6	350	46	5000	90	725	26
L2C4-2780XS02F06XX	6	700	46	2700	80	1470	52
L2C4-3080XS02F06XX	6	700	46	3000	80	1550	55
L2C4-3580XS02F06XX	6	700	46	3500	80	1580	56
L2C4-4080XS02F06XX	6	700	46	4000	80	1650	58
L2C4-5080XS02F06XX	6	700	46	5000	80	1650	58
L2C4-5780XS02F06XX	6	700	46	5700	80	1650	58
L2C4-2790XS02F06XX	6	700	46	2700	90	1260	45
L2C4-3090XS02F06XX	6	700	46	3000	90	1335	47
L2C4-3590XS02F06XX	6	700	46	3500	90	1410	50
L2C4-4090XS02F06XX	6	700	46	4000	90	1450	51
L2C4-5090XS02F06XX	6	700	46	5000	90	1435	51
L2C4-2780XS04F09XX	9	1400	46	2700	80	3000	47
L2C4-3080XS04F09XX	9	1400	46	3000	80	3210	50
L2C4-3580XS04F09XX	9	1400	46	3500	80	3260	51
L2C4-4080XS04F09XX	9	1400	46	4000	80	3415	54
L2C4-5080XS04F09XX	9	1400	46	5000	80	3415	54
L2C4-5780XS04F09XX	9	1400	46	5700	80	3415	54
L2C4-2790XS04F09XX	9	1400	46	2700	90	2480	39
L2C4-3090XS04F09XX	9	1400	46	3000	90	2640	42
L2C4-3590XS04F09XX	9	1400	46	3500	90	2800	44
L2C4-4090XS04F09XX	9	1400	46	4000	90	2890	45
L2C4-5090XS04F09XX	9	1400	46	5000	90	2860	45
L2C4-2795XS02F04XX	4,5	350	46	2700	95	552	35

L2C4-3095XS02F04XX	4,5	350	46	3000	95	587	37
L2C4-3595XS02F04XX	4,5	350	46	3500	95	606	38
L2C4-4095XS02F04XX	4,5	350	46	4000	95	628	40
L2C4-2795XS02FH6XX	6	350	46	2700	95	578	20
L2C4-3095XS02FH6XX	6	350	46	3000	95	613	22
L2C4-3595XS02FH6XX	6	350	46	3500	95	639	23
L2C4-4095XS02FH6XX	6	350	46	4000	95	662	23
L2C4-2795XS02F06XX	6	700	46	2700	95	1145	41
L2C4-3095XS02F06XX	6	700	46	3000	95	1200	42
L2C4-3595XS02F06XX	6	700	46	3500	95	1240	44
L2C4-4095XS02F06XX	6	700	46	4000	95	1285	45
L2C4-2795XS04F09XX	9	1400	46	2700	95	2360	37
L2C4-3095XS04F09XX	9	1400	46	3000	95	2510	39
L2C4-3595XS04F09XX	9	1400	46	3500	95	2600	41
L2C4-4095XS04F09XX	9	1400	46	4000	95	2700	42

L2C5-AABBCCDDEFFGG
Where
AA: designates nominal CCT(e.g. 22=2200K,27=2700K,30=3000K,35=3500K,40=4000K, 50=5000K,57=5700K,65=6500K)

BB: designates minimum CRI(e.g. 70=70 CRI, 80=80 CRI , 90=90 CRI)

CC: designates product configuration of series (12= 12 series)

DD: designates product configuration of parallel (02= 2 parallel, 04= 4 parallel)

E: designates options for product specification

FF: designates light emitting surface(LES) diameter (H6=6.5mm, 09=9mm)

GG: designates options for product specification

Commercial Part number	LES (mm)	Max Current (mA)	Max Voltage (V)	Nominal CCT (K)	Minimum CRI	Typical Flux (lm)	Typ Flux Density (lm/mm2)
L2C5-30701202EH6XX	6	700	46	3000	70	1542	55
L2C5-27801202EH6XX	6	700	46	2700	80	1378	49
L2C5-30801202EH6XX	6	700	46	3000	80	1520	54
L2C5-35801202EH6XX	6	700	46	3500	80	1562	55
L2C5-40801202EH6XX	6	700	46	4000	80	1598	57
L2C5-50801202EH6XX	6	700	46	5000	80	1583	56
L2C5-57801202EH6XX	6	700	46	5700	80	1591	56
L2C5-27901202EH6XX	6	700	46	2700	80	1260	45
L2C5-30901202EH6XX	6	700	46	3000	90	1345	48
L2C5-35901202EH6XX	6	700	46	4000	90	1359	48
L2C5-40901202EH6XX	6	700	46	5000	90	1353	48
L2C5-30701204E09XX	9	1350	46	3000	70	3207	50
L2C5-35701204E09XX	9	1350	46	3500	70	3111	49
L2C5-40701204E09XX	9	1350	46	4000	70	3345	53
L2C5-50701204E09XX	9	1350	46	5000	70	3345	53
L2C5-57701204E09XX	9	1350	46	5700	70	3185	50
L2C5-65701204E09XX	9	1350	46	6500	70	3137	49
L2C5-22801204E09XX	9	1350	46	2200	80	2378	37
L2C5-27801204E09XX	9	1350	46	2700	80	2838	45
L2C5-30801204E09XX	9	1350	46	3000	80	2987	47
L2C5-35801204E09XX	9	1350	46	3500	80	3047	48
L2C5-40801204E09XX	9	1350	46	4080	80	3167	50
L2C5-50801204E09XX	9	1350	46	5080	80	3167	50
L2C5-57801204E09XX	9	1350	46	5700	80	3212	51
L2C5-22901204E09XX	9	1350	46	2200	90	2071	33
L2C5-27901204E09XX	9	1350	46	2700	90	2430	38
L2C5-30901204E09XX	9	1350	46	3090	90	2562	40
L2C5-32901204E09XX	9	1350	46	3200	90	2600	41
L2C5-35901204E09XX	9	1350	46	3500	90	2800	44
L2C5-40901204E09XX	9	1350	46	4000	90	2834	45

LUXEON CoB Gen5 Square model nomenclature:

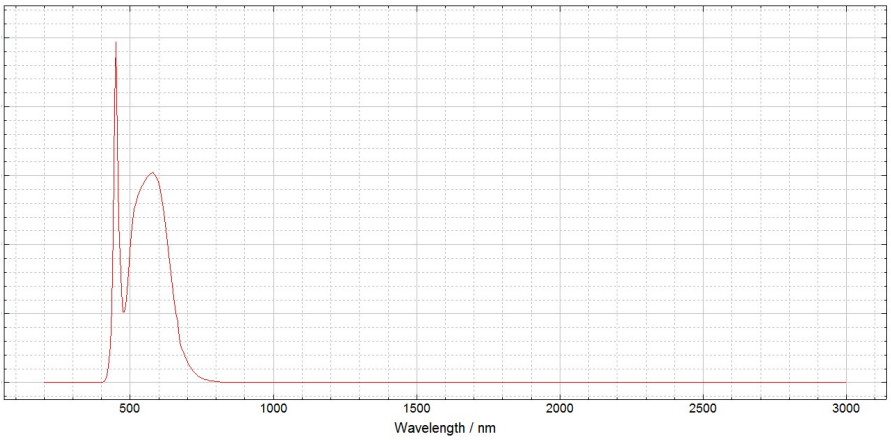
L2C6-AABBCDEEFGGHH
Where
AA: designates nominal CCT(e.g. 22=2200K,27=2700K,30=3000K,35=3500K,40=4000K, 50=5000K,57=5700K,65=6500K)
BB: designates minimum CRI(e.g. 70=70 CRI, 80=80 CRI , 90=90 CRI)
C: designates color target of SDCM (2=2 SDCM,3=3 SDCM)
D: designates product configuration of series (L= 12 series,R= 18 series)
EE: designates product configuration of parallel (02= 2 parallel, 04= 4 parallel, 06= 6 parallel ,08= 8 parallel ,10= 10 parallel,11= 11 parallel,12= 12 parallel, 13= 13 parallel, 16= 16 parallel,18=18 parallel)
F: designates options for product generation (A= Gen1 ,B= Gen1 HE)
GG: designates light emitting surface(LES) diameter (06=6.3mm, 09=9.8mm, 13=13mm,15=14.5mm, 22=22mm)
HH: designates options for product specification

Commercial Part number	LES (mm)	Max Current (mA)	Max Voltage (V)	Nominal CCT (K)	Minimum CRI	Typical Flux (lm)	Typ Flux Density (lm/mm2)
L2C6-27803L02A06xx	6,3	450	40	2700	80	890	28,6
L2C6-30803L02A06xx	6,3	450	40	3000	80	927	29,8
L2C6-35803L02A06xx	6,3	450	40	3500	80	950	30,5
L2C6-40803L02A06xx	6,3	450	40	4000	80	973	31,2
L2C6-50803L02A06xx	6,3	450	40	5000	80	973	31,2
L2C6-57803L02A06xx	6,3	450	40	5700	80	964	30,9
L2C6-65803L02A06xx	6,3	450	40	6500	80	955	30,6
L2C6-27803L02A09xx	9,8	450	40	2700	80	942	12,5
L2C6-30803L02A09xx	9,8	450	40	3000	80	976	12,9
L2C6-35803L02A09xx	9,8	450	40	3500	80	996	13,2
L2C6-40803L02A09xx	9,8	450	40	4000	80	1032	13,7
L2C6-50803L02A09xx	9,8	450	40	5000	80	1033	13,7
L2C6-57803L02A09xx	9,8	450	40	5700	80	1023	13,6
L2C6-65803L02A09xx	9,8	450	40	6500	80	1012	13,4
L2C6-27803L04A09xx	9,8	900	40	2700	80	1881	24,9
L2C6-30803L04A09xx	9,8	900	40	3000	80	1943	25,8
L2C6-35803L04A09xx	9,8	900	40	3500	80	1972	26,2
L2C6-40803L04A09xx	9,8	900	40	4000	80	2037	27,0
L2C6-50803L04A09xx	9,8	900	40	5000	80	2037	27,0
L2C6-57803L04A09xx	9,8	900	40	5700	80	2017	26,7
L2C6-65803L04A09xx	9,8	900	40	6500	80	1996	26,5
L2C6-27803L06A13xx	13	1350	40	2700	80	2849	21,5
L2C6-30803L06A13xx	13	1350	40	3000	80	2961	22,3
L2C6-35803L06A13xx	13	1350	40	3500	80	3029	22,8
L2C6-40803L06A13xx	13	1350	40	4000	80	3096	23,3
L2C6-50803L06A13xx	13	1350	40	5000	80	3097	23,3
L2C6-57803L06A13xx	13	1350	40	5700	80	3088	23,3
L2C6-65803L06A13xx	13	1350	40	6500	80	3011	22,7
L2C6-27803L08A15xx	14,5	1800	40	2700	80	3795	23,0
L2C6-30803L08A15xx	14,5	1800	40	3000	80	3954	24,0

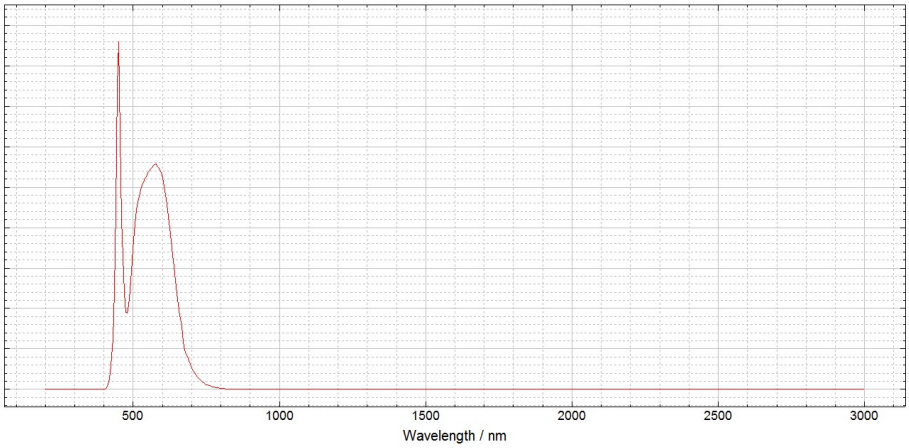
L2C6-35803L08A15xx	**14,5**	**1800**	**40**	**3500**	**80**	**4042**	**24,5**
L2C6-40803L08A15xx	**14,5**	**1800**	**40**	**4000**	**80**	**4121**	**25,0**
L2C6-50803L08A15xx	**14,5**	**1800**	**40**	**5000**	**80**	**4122**	**25,0**
L2C6-57803L08A15xx	**14,5**	**1800**	**40**	**5700**	**80**	**4110**	**24,9**
L2C6-65803L08A15xx	**14,5**	**1800**	**40**	**6500**	**80**	**4009**	**24,3**
L2C6-27803L10A15xx	**14,5**	**2250**	**40**	**2700**	**80**	**4664**	**28,3**
L2C6-30803L10A15xx	**14,5**	**2250**	**40**	**3000**	**80**	**4859**	**29,4**
L2C6-35803L10A15xx	**14,5**	**2250**	**40**	**3500**	**80**	**4956**	**30,0**
L2C6-40803L10A15xx	**14,5**	**2250**	**40**	**4000**	**80**	**5138**	**31,1**
L2C6-50803L10A15xx	**14,5**	**2250**	**40**	**5000**	**80**	**5138**	**31,1**
L2C6-57803L10A15xx	**14,5**	**2250**	**40**	**5700**	**80**	**5053**	**30,6**
L2C6-65803L10A15xx	**14,5**	**2250**	**40**	**6500**	**80**	**5005**	**30,3**
L2C6-27803L13A22xx	**22**	**2925**	**40**	**2700**	**80**	**6184**	**16,3**
L2C6-30803L13A22xx	**22**	**2925**	**40**	**3000**	**80**	**6442**	**17,0**
L2C6-35803L13A22xx	**22**	**2925**	**40**	**3500**	**80**	**6603**	**17,4**
L2C6-40803L13A22xx	**22**	**2925**	**40**	**4000**	**80**	**6836**	**18,0**
L2C6-50803L13A22xx	**22**	**2925**	**40**	**5000**	**80**	**6836**	**18,0**
L2C6-57803L13A22xx	**22**	**2925**	**40**	**5700**	**80**	**6768**	**17,8**
L2C6-65803L13A22xx	**22**	**2925**	**40**	**6500**	**80**	**6700**	**17,6**
L2C6-27803L16A22xx	**22**	**3600**	**40**	**2700**	**80**	**7636**	**20,1**
L2C6-30803L16A22xx	**22**	**3600**	**40**	**3000**	**80**	**7816**	**20,6**
L2C6-35803L16A22xx	**22**	**3600**	**40**	**3500**	**80**	**7981**	**21,0**
L2C6-40803L16A22xx	**22**	**3600**	**40**	**4000**	**80**	**8283**	**21,8**
L2C6-50803L16A22xx	**22**	**3600**	**40**	**5000**	**80**	**8283**	**21,8**
L2C6-57803L16A22xx	**22**	**3600**	**40**	**5700**	**80**	**8259**	**21,7**
L2C6-65803L16A22xx	**22**	**3600**	**40**	**6500**	**80**	**8135**	**21,4**
L2C6-27803R12A22xx	**22**	**2400**	**58**	**2700**	**80**	**8376**	**22,0**
L2C6-30803R12A22xx	**22**	**2400**	**58**	**3000**	**80**	**8725**	**23,0**
L2C6-35803R12A22xx	**22**	**2400**	**58**	**3500**	**80**	**8943**	**23,5**
L2C6-40803R12A22xx	**22**	**2400**	**58**	**4000**	**80**	**9235**	**24,3**
L2C6-50803R12A22xx	**22**	**2400**	**58**	**5000**	**80**	**9366**	**24,7**
L2C6-57803R12A22xx	**22**	**2400**	**58**	**5700**	**80**	**9074**	**23,9**
L2C6-65803R12A22xx	**22**	**2400**	**58**	**6500**	**80**	**8987**	**23,7**
L2C6-27803R18A22xx	**22**	**3600**	**58**	**2700**	**80**	**12324**	**32,4**
L2C6-30803R18A22xx	**22**	**3600**	**58**	**3000**	**80**	**12838**	**33,8**
L2C6-35803R18A22xx	**22**	**3600**	**58**	**3500**	**80**	**13159**	**34,6**
L2C6-40803R18A22xx	**22**	**3600**	**58**	**4000**	**80**	**13480**	**35,5**
L2C6-50803R18A22xx	**22**	**3600**	**58**	**5000**	**80**	**13480**	**35,5**
L2C6-57803R18A22xx	**22**	**3600**	**58**	**5700**	**80**	**13352**	**35,1**
L2C6-65803R18A22xx	**22**	**3600**	**58**	**6500**	**80**	**13223**	**34,8**
L2C6-27803L08B15xx	**14,5**	**1800**	**40**	**2700**	**80**	**3758**	**22,8**
L2C6-30803L08B15xx	**14,5**	**1800**	**40**	**3000**	**80**	**3915**	**23,7**
L2C6-35803L08B15xx	**14,5**	**1800**	**40**	**3500**	**80**	**4003**	**24,3**
L2C6-40803L08B15xx	**14,5**	**1800**	**40**	**4000**	**80**	**4081**	**24,7**
L2C6-50803L08B15xx	**14,5**	**1800**	**40**	**5000**	**80**	**4082**	**24,7**

L2C6-57803L08B15xx	**14,5**	**1800**	**40**	**5700**	**80**	**4071**	**24,7**
L2C6-27803L11B22xx	**22**	**2475**	**40**	**2700**	**80**	**5234**	**13,8**
L2C6-30803L11B22xx	**22**	**2475**	**40**	**3000**	**80**	**5452**	**14,3**
L2C6-35803L11B22xx	**22**	**2475**	**40**	**3500**	**80**	**5581**	**14,7**
L2C6-40803L11B22xx	**22**	**2475**	**40**	**4000**	**80**	**5766**	**15,2**

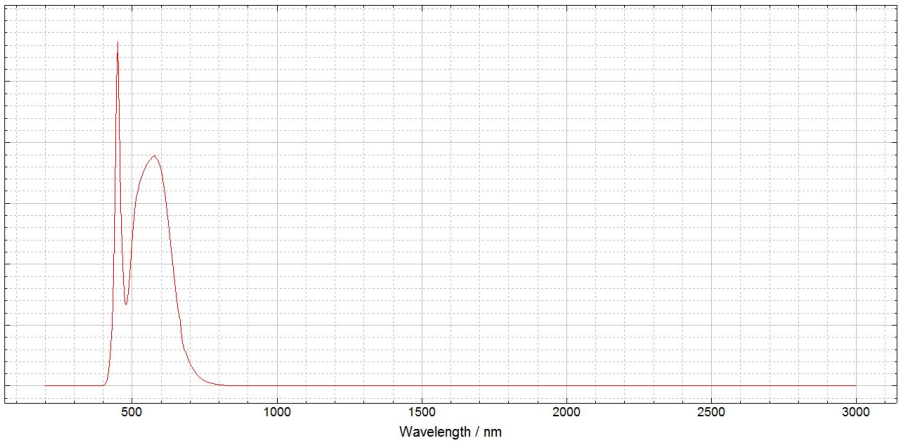
Appendix 3: Relative Spectrum Of Tested Sample(s)



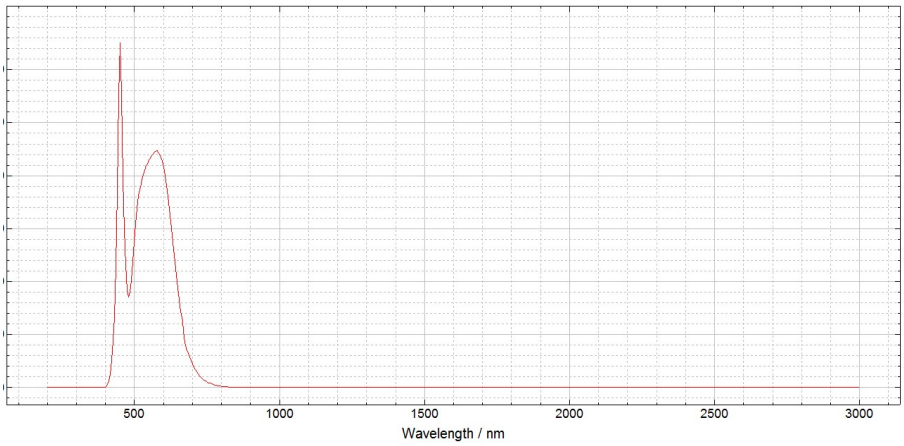
L2C4-57802S02F0600 (175mA)



L2C4-57802S02F0600 (350mA)



L2C4-57802S02F0600 (525mA)



L2C4-57802S02F0600 (700mA)

Appendix 4: Table 6.1 Based On IEC 62471:2006
DUT: L2C4-57802S02F0600 (175mA) Evaluation Distance: 200mm, Angular subtense of the apparent source α: 30 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	7,33E+02	10000	1,33E+04	4000000	1,38E+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	1,63E+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	0,09	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: L2C4-57802S02F0600 (350mA) Evaluation Distance: 200mm, Angular subtense of the apparent source α: 30 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	1,37E+03	10000	2,41E+04	4000000	2,56E+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	2,92E+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	0,11	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: L2C4-57802S02F0600 (525mA) Evaluation Distance: 200mm, Angular subtense of the apparent source α: 30 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	1,91E+03	10000	3,38E+04	4000000	4,20E+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	4,06E+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	0,15	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: L2C4-57802S02F0600 (700mA) Evaluation Distance: 200mm, Angular subtense of the apparent source α: 30 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	2,33E+03	10000	4,02E+04	4000000	4,75E+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	4,79E+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	0,18	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: L2C4-57802S02F0600 (175mA), 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	7,33E+02	10000	1,33E+04	4000000	1,38E+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	1,63E+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	0,09	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: L2C4-57802S02F0600 (350mA), 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	1,37E+03	10000	2,41E+04	4000000	2,56E+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	2,92E+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	0,11	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: L2C4-57802S02F0600 (525mA), 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	1,91E+03	10000	3,38E+04	4000000	4,20E+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	4,06E+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	0,15	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: L2C4-57802S02F0600 (700mA), Evaluation Distance: 200mm, Angular subtense of the apparent source α: 30 mrad

EN 62471			
Clause	Requirement + Test	Result – Remark	Verdict

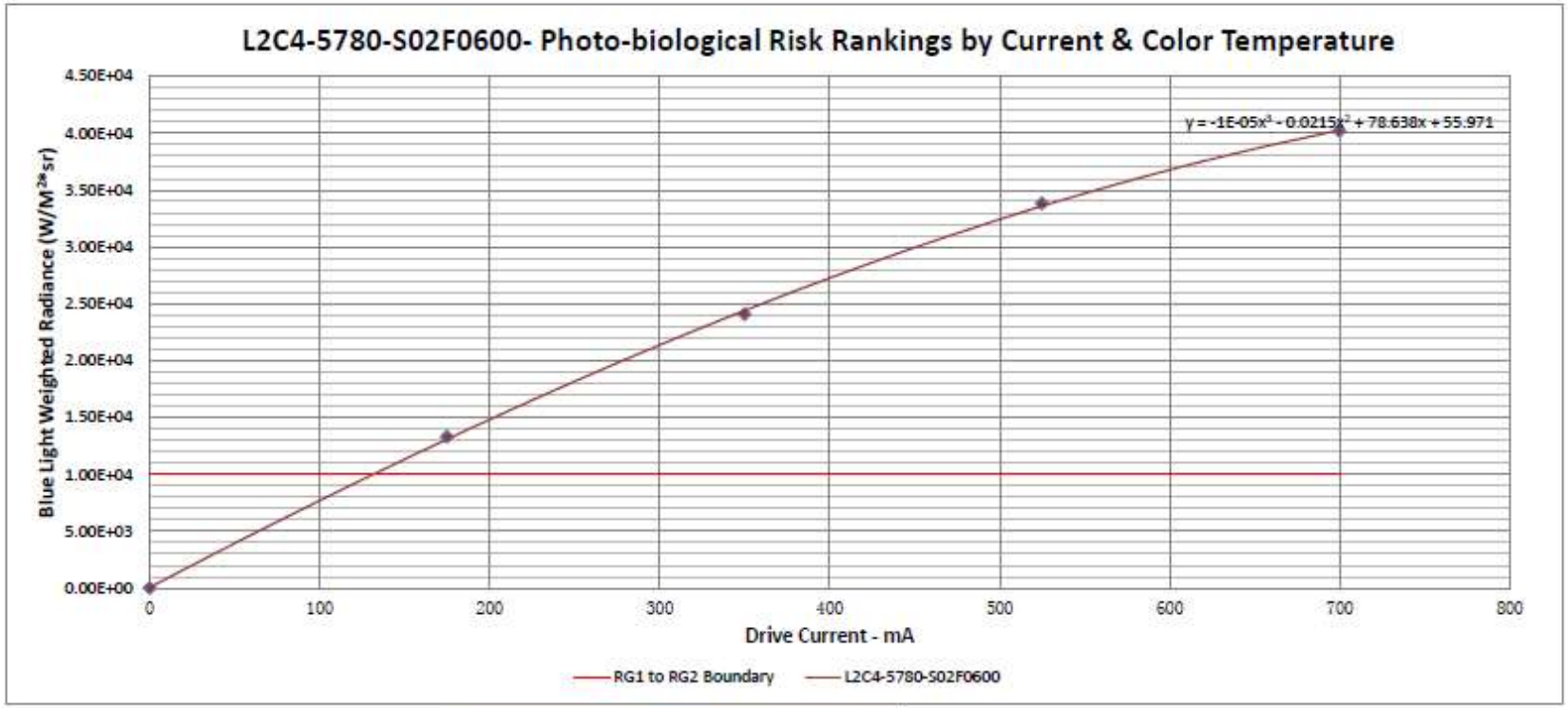
Table 6.1	Emission limits for risk groups of continuous wave lamps (based on EU Directive 2006/25/EC)									
Risk	Action spectrum	Symbol	Units	Emission Measurement					
				Exempt		Low risk		Mod risk	
				Limit	Result	Limit	Result	Limit	Result
Actinic UV	$S_{UV}(\lambda)$	E_s	$W \cdot m^{-2}$	0,001	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	2,33E+03	10000	4,02E+04	4000000	4,75E+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	4,79E+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	0,18	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)							
Product ID:	Measured CCT:	0	175	350	525	700	Regression Formula:	Fit to RG2 Line:	Current @ RG-1 to RG-2 Boundary, mA:
L2C4-5780-S02F0600	5142	0	13315	24068	33814	40190	y =-1E-05x3 - 0.0215x2 + 78.638x +55.971	10000	131

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