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..... :	6067216.50P
Date of issue ..... :	2020-06-15
Total number of pages	52
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, JingAn District, Shanghai, P.R. China
Test specification:	
Standard ..... :	IEC TR 62778:2014 (Second Edition)
Test procedure..... :	CB Scheme
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

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

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.
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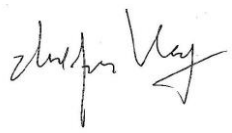
The purpose of this report is only for export activities.

Test item description ..... :	LED module
Trade Mark ..... :	LUMILEDS
Manufacturer ..... :	Lumileds (Shanghai)Management Co., Ltd. Building 1-A, No.19&20, Lane 299, Wenshui Road, JingAn District, Shanghai, P.R. China
Model/Type reference ..... :	LUXEON CX Plus COB Gen2 series (Detailed lists refer to Appendix 2: Model List)
Ratings ..... :	Type reference / I_{rated} / I_{max} L2C4 - AABBCS01F06GG / 100mA / 250mA L2C4 - AABBCM02F09GG / 200mA / 400mA L2C4 - AABBCM03F09GG / 350mA / 700mA L2C4 - AABBCL04F12GG / 450mA / 900mA L2C4 - AABBCL05F12GG / 550mA / 1100mA L2C4 - AABBCL08F14GG / 800mA / 1600mA Max voltage: 41,5 Vdc (Detailed lists refer to Appendix 2: Model List)

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).....		Zhijun Wang	
Approved by (name, function, signature).		Hanson Zhang	
☐	~~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):

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
L2C4-35803M03F0900 (700mA)
has been tested according to the IEC 62471(first edition, 2006-07) **at 200mm** and been classified as **RG 1.**
has been tested according to the EN 62471:2008 **at 200mm** and been classified as
RG 1.
has been tested according to the IEC/TR 62778:2014 and been classified as **RG 1 Unlimited for blue light hazard**.

L2C4-50802L08F1400
has been tested according to the IEC 62471(first edition, 2006-07) **at 200mm** and been classified as **RG 2 at 1600mA and RG1 at 834mA**
has been tested according to the EN 62471:2008 **at 200mm** and been classified as
RG 2 at 1600mA and RG1 at 834mA
has been tested according to the IEC/TR 62778:2014 and been classified as **RG 2 at 1600mA and RG1 Unlimited at 834mA for blue light hazard.**

L2C4-50803M03F0900
has been tested according to the IEC 62471(first edition, 2006-07) **at 200mm** and been classified as **RG 2 at 700mA and RG1 at 294mA**
has been tested according to the EN 62471:2008 **at 200mm** and been classified as
RG 2 at 700mA and RG1 at 294mA
has been tested according to the IEC/TR 62778:2014 and been classified as **RG 2 at 700mA and RG1 Unlimited at 294mA for blue light hazard.**

Testing location:

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.....:

Product evaluated.....: ☐ **LED package**
☒ **LED module**
☐ **Lamp**
☐ **Luminaire**

Rated voltage (V) .....: 41,5 Vdc

Rated current (mA) .....:

Type reference	I_{rated}	I_{max}
L2C4 - AABBCS01F06GG	100mA	250mA
L2C4 - AABBCM02F09GG	200mA	400mA
L2C4 - AABBCM03F09GG	350mA	700mA
L2C4 - AABBCL04F12GG	450mA	900mA
L2C4 - AABBCL05F12GG	550mA	1100mA
L2C4 - AABBCL08F14GG	800mA	1600mA

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 .....: 2019-11-19

Date (s) of performance of tests.....: 2019-11-19 to 2020-06-15

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

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, JingAn District, Shanghai, P.R. China

General product information:

Full tests were performed on model L2C4-35803M03F0900, L2C4-50802L08F1400 ,L2C4-50803M03F0900.

The product L2C4-50802L08F1400 and L2C4-50803M03F0900 were considered as worst case which should be evaluated at 200mm

The sample of L2C4-35803M03F0900 was tested at 200mm from the light source. The CCT of spectral irradiance was found at 3302 K.

The sample of L2C4-50802L08F1400 was tested at 200mm from the light source. The CCT of spectral irradiance was found at 4629 K.

The sample of L2C4-50803M03F0900 was tested at 200mm from the light source. The CCT of spectral irradiance was found at 5151 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 report is issued to base on original test report No. 6063339.50P dated on 2019-09-16 ,including the following modification:

1. Add new tests.
2. Update applicant, manufacturer and factory's name and address.

After review, full tests were performed on model L2C4-50803M03F0900, L2C4-35803M03F0900.

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		P
	- 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.....	L2C4-35803M03F0900	
	Test voltage (V)	41,5 Vdc	—
	Test current (mA)	700 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	3302	
x/y colour coordinates			0,4218 / 0,4081	
Blue light hazard radiance	L_B	$W/(m^2 \cdot sr^1)$	9,46E+03	@11mrad
Blue light hazard irradiance	E_B	W/m^2	--	
Luminance	L	cd/m^2	2,42E+07	@11mrad
Illuminance	E	lx	2,71E+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	L2C4-50802L08F1400	
	Test voltage (V)	41,5 Vdc	—
	Test current (mA)	400 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	4553	
x/y colour coordinates			0,3613 / 0,3761	
Blue light hazard radiance	L_B	$W/(m^2 \bullet sr^1)$	4,98E+03	@11mrad
Blue light hazard irradiance	E_B	W/m^2	--	
Luminance	L	cd/m^2	6,92E+03	@11mrad
Illuminance	E	lx	2,34E+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	L2C4-50802L08F1400	
	Test voltage (V)	41,5 Vdc	—
	Test current (mA)	800 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	4574	
x/y colour coordinates			0,3605 / 0,3755	
Blue light hazard radiance	L_B	$W/(m^2 \bullet sr^1)$	9,63E+03	@11mrad
Blue light hazard irradiance	E_B	W/m^2	--	
Luminance	L	cd/m^2	1,31E+07	@11mrad
Illuminance	E	lx	4,46E+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	L2C4-50802L08F1400	
	Test voltage (V)	41,5 Vdc	—
	Test current (mA)	834 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	4587	
x/y colour coordinates			0,3599 / 0,3748	
Blue light hazard radiance	L_B	$W/(m^2 \bullet sr^1)$	9,69E+03	@11mrad
Blue light hazard irradiance	E_B	W/m^2	--	
Luminance	L	cd/m^2	1,35E+07	@11mrad
Illuminance	E	lx	4,35E+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	L2C4-50802L08F1400	
	Test voltage (V)	41,5 Vdc	—
	Test current (mA)	1200 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	4599	
x/y colour coordinates			0,3595 / 0,3746	
Blue light hazard radiance	L_B	$W/(m^2 \bullet sr^1)$	1,39E+04	@11mrad
Blue light hazard irradiance	E_B	W/m^2	--	
Luminance	L	cd/m^2	1,85E+07	@11mrad
Illuminance	E	lx	6,39E+04	

Supplementary information:

Per IEC/TR 62778:2014
Ethr= 1327 lx

Dmin= 1388 mm

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE:Spectroradiometric measurement		
	Measurement performed on:	☐ **LED package** ☒ **LED module** ☐ **Lamp** ☐ **Luminaire**	
	Model number	L2C4-50802L08F1400	
	Test voltage (V)	41,5 Vdc	—
	Test current (mA)	1600 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	4629	
x/y colour coordinates			0,3584 / 0,3733	
Blue light hazard radiance	L_B	$W/(m^2 \cdot sr^1)$	1,75E+04	@11mrad
Blue light hazard irradiance	E_B	W/m^2	--	
Luminance	L	cd/m^2	2,25E+07	@11mrad
Illuminance	E	lx	8,05E+04	

Supplementary information:

Per IEC/TR 62778:2014
Ethr= 1287 lx

Dmin= 1582 mm

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE:Spectroradiometric measurement		
	Measurement performed on:	☐ **LED package** ☒ **LED module** ☐ **Lamp** ☐ **Luminaire**	
	Model number.....	L2C4-50803M03F0900	
	Test voltage (V)	41,5 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	4905	
x/y colour coordinates			0,3490 / 0,3653	
Blue light hazard radiance	L_B	$W/(m^2 \cdot sr^1)$	6,27E+03	@11mrad
Blue light hazard irradiance	E_B	W/m^2	--	
Luminance	L	cd/m^2	7,84E+06	@11mrad
Illuminance	E	lx	6,98E+03	

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	L2C4-50803M03F0900	
	Test voltage (V)	41,5 Vdc	—
	Test current (mA)	294 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	4913	
x/y colour coordinates			0,3488 / 0,3650	
Blue light hazard radiance	L_B	$W/(m^2 \cdot sr^1)$	9,66E+03	@11mrad
Blue light hazard irradiance	E_B	W/m^2	--	
Luminance	L	cd/m^2	1,20E+07	@11mrad
Illuminance	E	lx	1,10E+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	L2C4-50803M03F0900	
	Test voltage (V)	41,5 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	4923	
x/y colour coordinates			0,3484 / 0,3646	
Blue light hazard radiance	L_B	$W/(m^2 \cdot sr^1)$	1,20E+04	@11mrad
Blue light hazard irradiance	E_B	W/m^2	--	
Luminance	L	cd/m^2	1,46E+07	@11mrad
Illuminance	E	lx	1,30E+04	

Supplementary information:

Per IEC/TR 62778:2014
Ethr= 1217 lx

Dmin= 767 mm

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE:Spectroradiometric measurement		
	Measurement performed on:	☐ **LED package** ☒ **LED module** ☐ **Lamp** ☐ **Luminaire**	
	Model number	L2C4-50803M03F0900	
	Test voltage (V)	41,5 Vdc	—
	Test current (mA)	525 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	4953	
x/y colour coordinates			0,3475 / 0,3635	
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	2,08E+07	@11mrad
Illuminance	E	lx	1,86E+04	

Supplementary information:

Per IEC/TR 62778:2014
Ethr= 1210 lx

Dmin= 771 mm

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE:Spectroradiometric measurement		
	Measurement performed on:	☐ **LED package** ☒ **LED module** ☐ **Lamp** ☐ **Luminaire**	
	Model number	L2C4-50803M03F0900	
	Test voltage (V)	41,5 Vdc	—
	Test current (mA)	700 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	4985	
x/y colour coordinates			0,3465 / 0,3621	
Blue light hazard radiance	L_B	$W/(m^2 \cdot sr^1)$	2,46E+04	@11mrad
Blue light hazard irradiance	E_B	W/m^2	--	
Luminance	L	cd/m^2	2,62E+07	@11mrad
Illuminance	E	lx	2,33E+04	

Supplementary information:

Per IEC/TR 62778:2014
Ethr= 1062 lx

Dmin= 878 mm

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict

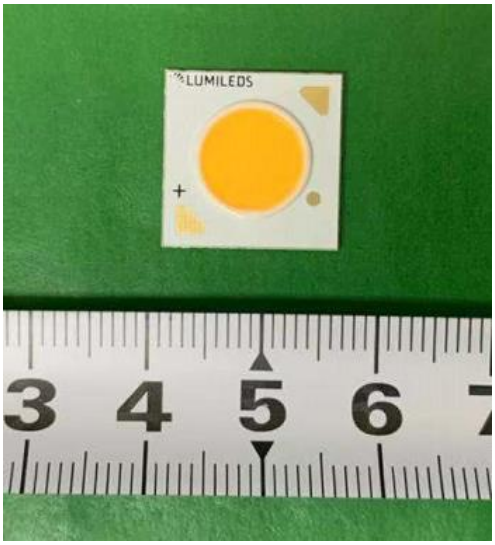
	TABLE: Angular light distribution	**N/A**

List of test equipment used:

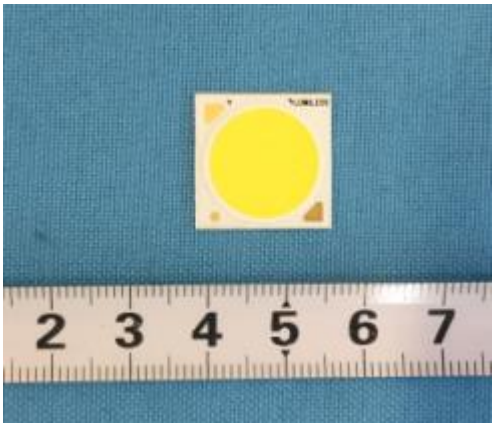
A completed list of used test equipment shall be provided in the Test Reports when a Manufacturer Testing Laboratory according to CTF stage 1 or CTF stage 2 procedure has been used.
Note: This page may be removed when CTF stage 1 CTF stage 2 are not used. See also clause 4.8 in OD 2020 for more details.

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	2020/2/25	2021/2/24
7	Irradiance measurements	CL6 Spectral irradiance standard (SH 350)	300-3000nm	2020/2/25	2021/2/24
7	Irradiance measurements	CL7 Spectral irradiance standard (SH 351)	200-400nm	2020/2/25	2021/2/24
7	Irradiance measurements	Photometric detector head (SH 359)	380nm-800nm	2020/2/26	2021/2/25
7	Irradiance measurements Radiance measurements	Wattmeter (SH030)	500V,40A	2019/10/10	2020/10/10

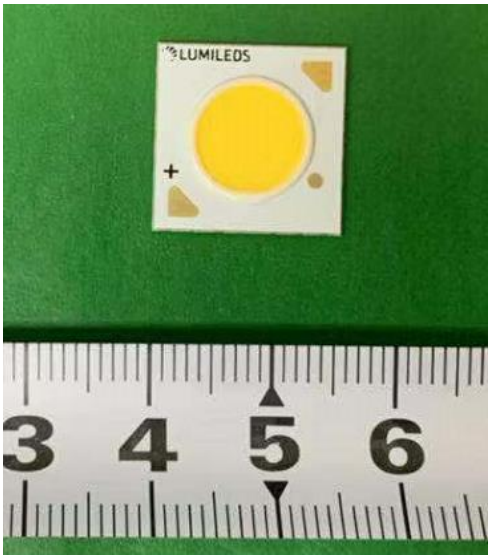
Appendix 1: Photo Documentation



L2C4-35803M03F0900



L2C4-50802L08F1400



L2C4-50803M0F3F0900

Overview

Appendix 2: Model List

L2C4-50803M03F0900, L2C4-50802L08F1400 and L2C4-35803M03F0900 are part of Lumileds LUXEON CX Plus CoB (Gen 2) product line. The samples are with 5000K, 5000K and 3500K CCT separately, and we got different hazard classifications for them at different drive current. The tested sample of L2C4-50803M03F0900 and L2C4-50802L08F1400 are with the highest CCT in that product line, the classifications are thus valid (worst case) within the LUXEON CX Plus CoB (Gen 2) product line with part number L2C4 - AABBCDDDEFFGG, where AA represents nominal ANSI CCT bins can be equal to or lower than the tested CCT values (see TR IEC62778), and BB represents CRI ranging from 80 and above, and C represents product configuration, and DDD represents options for product configuration, and FF represents for light emitting surface (LES) size, and GG represents for options for product specification. See the appendix below for an explanation of the type designation.

L 2 C 4 - A A B B C D D D E F F G G
Where
A A: designates nominal CCT (e.g. 27=2700K, 30=3000K, 35=3500K, 40=4000K, 50=5000K or any nominal CCT less than 5000K)
B B: designates minimum CRI (e.g. 80=80CRI, 90=90CRI or any CRI greater than min 80)
C: designates SDCM (2=2-step MacAdam ellipse, 3=3-step MacAdam ellipse)
D D D: designates product configuration (e.g. S01, M02, M03, L04, L05, L08)
E: designates options for product specification
F F: designates light emitting surface (LES) size (06=6mm, 09=9mm, 12=12mm, 14=14mm)
G G: designates options for product specification

Model No.	Drive current (mA)/% of max current	CCT				
		2700K	3000K	3500K	4000K	5000K
L2C4 - AABBCS01F06GG	250 / 100%	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG2	RG2
	105 / 42.0%	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited
L2C4 - AABBCM02F09GG	400 / 100%	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG2	RG2
	168 / 42.0%	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited
L2C4 - AABBCM03F09GG	700 / 100%	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG2	RG2
	294 / 42.0%	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited
L2C4 - AABBCL04F12GG	900 / 100%	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG2	RG2
	378 / 42.0%	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited
L2C4 - AABBCL05F12GG	1100 / 100%	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG2	RG2
	462 / 42.0%	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited
L2C4 - AABBCL08F14GG	1600 / 100%	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG2	RG2
	834 / 52.1%	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited	RG1 Unlimited

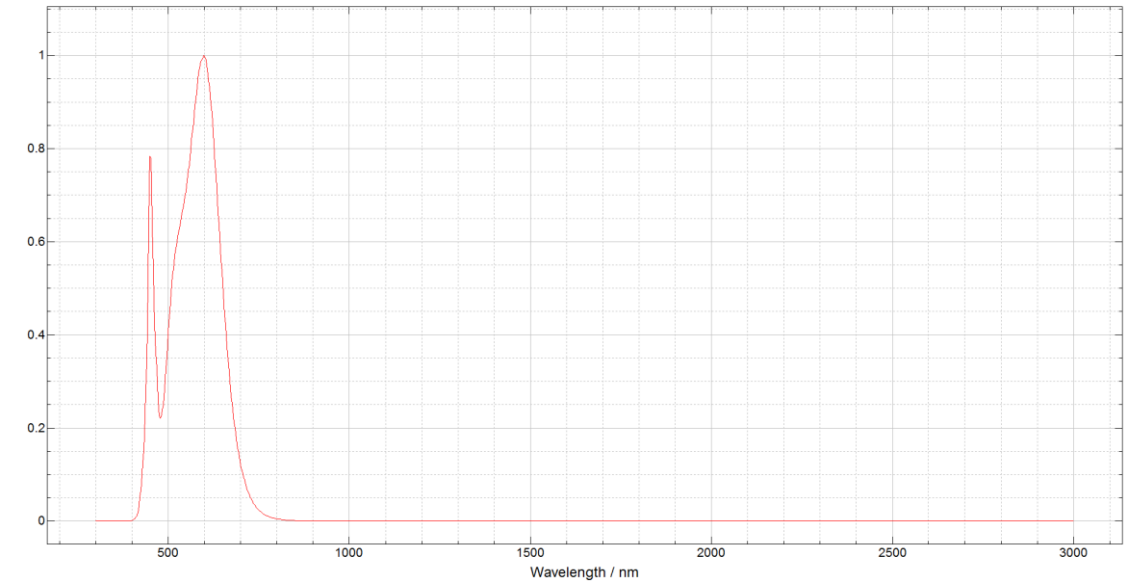
Supplementary information:
Per IEC/TR 62778:2014, the estimated Ethr and Dmin values for different part numbers are listed below:
These values are conservative in regards to margin of safety.
Ethr (lx):

Model No.	CCT	
	4000K	5000K
L2C4-AABBCL08F14GG	1287	1287
All other models other than L2C4-AABBCL08F14GG	1062	1062

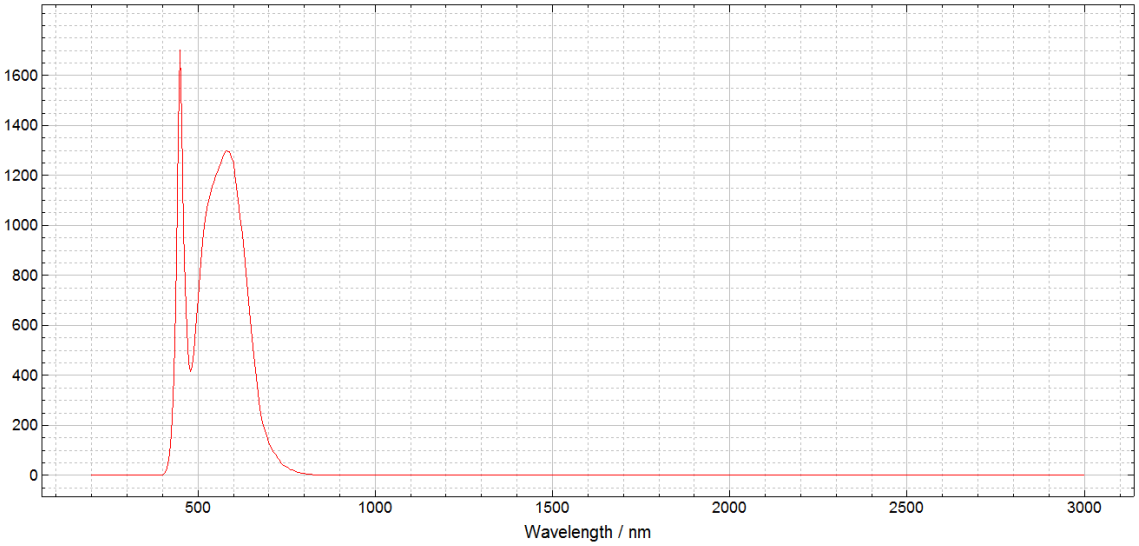
Dmin (mm):

Model No.	CCT	
	4000K	5000K
L2C4 - AABBCS01F06GG	466	466
L2C4 - AABBCM02F09GG	658	658
L2C4 - AABBCM03F09GG	878	878
L2C4 - AABBCL04F12GG	1002	1002
L2C4 - AABBCL05F12GG	1109	1109
L2C4 - AABBCL08F14GG	1582	1582

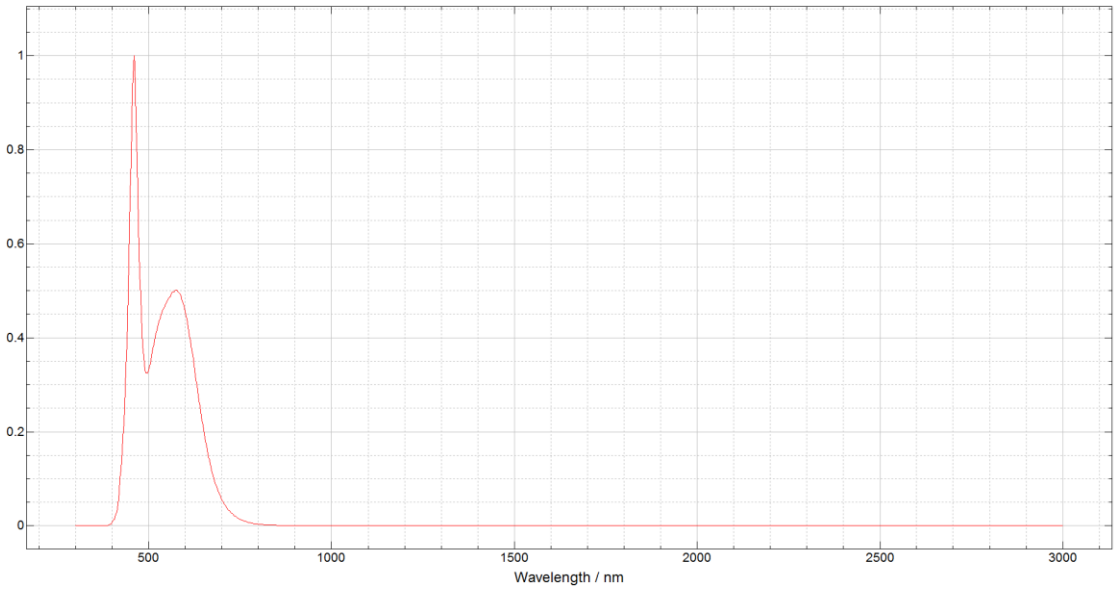
Appendix 3: Relative Spectrum Of Tested Sample(s)



L2C4-35803M03F0900



L2C4-50802L08F1400



L2C4-50803M0F3F0900

Appendix 4: Table 6.1 Based On IEC 62471:2006

DUT: L2C4-35803M03F0900, Evaluation Distance: 200mm, Test current: 300mA, Angular subtense of the apparent source α: 45 mrad

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps									P
Risk	Action spectrum	Symbol	Units	Emission Measurement						
				Exempt		Low risk		Mod risk		
				Limit	Result	Limit	Result	Limit	Result	
Actinic UV	$S_{UV}(\lambda)$	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	1,13E+03	10000	9,46E+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	1,48E+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	0,21	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: L2C4-50802L08F1400, Evaluation Distance: 200mm, Test current: 400mA, Angular subtense of the apparent source α: 70 mrad

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps									P
Risk	Action spectrum	Symbol	Units	Emission Measurement						
				Exempt		Low risk		Mod risk		
				Limit	Result	Limit	Result	Limit	Result	
Actinic UV	$S_{UV}(\lambda)$	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	1,60E+03	10000	4,98E+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	6,34E+04	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	0,32	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: L2C4-50802L08F1400, Evaluation Distance: 200mm, Test current: 800mA, Angular subtense of the apparent source α: 70 mrad

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps									P
Risk	Action spectrum	Symbol	Units	Emission Measurement						
				Exempt		Low risk		Mod risk		
				Limit	Result	Limit	Result	Limit	Result	
Actinic UV	$S_{UV}(\lambda)$	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	3,11E+03	10000	9,63E+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	1,22E+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	0,41	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: L2C4-50802L08F1400, Evaluation Distance: 200mm, Test current: 834mA, Angular subtense of the apparent source α: 70 mrad

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps									P
Risk	Action spectrum	Symbol	Units	Emission Measurement						
				Exempt		Low risk		Mod risk		
				Limit	Result	Limit	Result	Limit	Result	
Actinic UV	$S_{UV}(\lambda)$	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	3,05E+03	10000	9,69E+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	1,23E+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	0,45	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: L2C4-50802L08F1400, Evaluation Distance: 200mm, Test current: 1200mA, Angular subtense of the apparent source α: 70 mrad

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps									P
Risk	Action spectrum	Symbol	Units	Emission Measurement						
				Exempt		Low risk		Mod risk		
				Limit	Result	Limit	Result	Limit	Result	
Actinic UV	$S_{UV}(\lambda)$	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	4,53E+03	10000	1,39E+04	4000000	1,56E+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	1,75E+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	0,54	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: L2C4-50802L08F1400, Evaluation Distance: 200mm, Test current: 1600mA, Angular subtense of the apparent source α: 70 mrad

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps									P
Risk	Action spectrum	Symbol	Units	Emission Measurement						
				Exempt		Low risk		Mod risk		
				Limit	Result	Limit	Result	Limit	Result	
Actinic UV	$S_{UV}(\lambda)$	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	5,81E+03	10000	1,75E+04	4000000	3,03E+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	2,19E+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	0,64	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: L2C4-50803M03F0900, Evaluation Distance: 200mm, Test current: 175mA, Angular subtense of the apparent source α: 45 mrad

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps									P
Risk	Action spectrum	Symbol	Units	Emission Measurement						
				Exempt		Low risk		Mod risk		
				Limit	Result	Limit	Result	Limit	Result	
Actinic UV	$S_{UV}(\lambda)$	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	5,39E+02	10000	6,27E+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	7,78E+04	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	0,12	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: L2C4-50803M03F0900, Evaluation Distance: 200mm, Test current: 294mA, Angular subtense of the apparent source α: 45 mrad

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps									P
Risk	Action spectrum	Symbol	Units	Emission Measurement						
				Exempt		Low risk		Mod risk		
				Limit	Result	Limit	Result	Limit	Result	
Actinic UV	$S_{UV}(\lambda)$	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	8,55E+02	10000	9,66E+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	0,15	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: L2C4-50803M03F0900, Evaluation Distance: 200mm, Test current: 350mA, Angular subtense of the apparent source α: 45 mrad

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps									P
Risk	Action spectrum	Symbol	Units	Emission Measurement						
				Exempt		Low risk		Mod risk		
				Limit	Result	Limit	Result	Limit	Result	
Actinic UV	$S_{UV}(\lambda)$	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	1,02E+03	10000	1,20E+04	4000000	2,16E+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	1,48E+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: L2C4-50803M03F0900, Evaluation Distance: 200mm, Test current: 525mA, Angular subtense of the apparent source α: 45 mrad

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps									P
Risk	Action spectrum	Symbol	Units	Emission Measurement						
				Exempt		Low risk		Mod risk		
				Limit	Result	Limit	Result	Limit	Result	
Actinic UV	$S_{UV}(\lambda)$	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	1,49E+03	10000	1,72E+04	4000000	1,82E+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	2,12E+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

DUT: L2C4-50803M03F0900, Evaluation Distance: 200mm, Test current: 700mA, Angular subtense of the apparent source α: 45 mrad

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps									P
Risk	Action spectrum	Symbol	Units	Emission Measurement						
				Exempt		Low risk		Mod risk		
				Limit	Result	Limit	Result	Limit	Result	
Actinic UV	$S_{UV}(\lambda)$	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	1,89E+03	10000	2,46E+04	4000000	3,84E+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	2,96E+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	0,21	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: L2C4-35803M03F0900, Evaluation Distance: 200mm, Test current: 700mA, Angular subtense of the apparent source α: 45 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)									P
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	1,13E+03	10000	9,46E+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	1,48E+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	0,21	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: L2C4-50802L08F1400, Evaluation Distance: 200mm, Test current: 400mA, Angular subtense of the apparent source α: 70 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)									P
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	1,60E+03	10000	4,98E+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	6,34E+04	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	0,32	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: L2C4-50802L08F1400, Evaluation Distance: 200mm, Test current: 800mA, Angular subtense of the apparent source α: 70 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)									P
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	3,11E+03	10000	9,63E+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	1,22E+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	0,41	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: L2C4-50802L08F1400, Evaluation Distance: 200mm, Test current: 834mA, Angular subtense of the apparent source α: 70 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)									P
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	3,05E+03	10000	9,69E+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	1,23E+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	0,45	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: L2C4-50802L08F1400, Evaluation Distance: 200mm, Test current: 1200mA, Angular subtense of the apparent source α: 70 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)									P
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	4,53E+03	10000	1,39E+04	4000000	1,56E+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	1,75E+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	0,54	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: L2C4-50802L08F1400, Evaluation Distance: 200mm, Test current: 1600mA, Angular subtense of the apparent source α: 70 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)									P
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	5,81E+03	10000	1,75E+04	4000000	3,03E+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	2,19E+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	0,64	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: L2C4-50803M03F0900, Evaluation Distance: 200mm, Test current: 175mA, Angular subtense of the apparent source α: 45 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)									P
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	5,39E+02	10000	6,27E+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	7,78E+04	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	0,12	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: L2C4-50803M03F0900, Evaluation Distance: 200mm, Test current: 294mA, Angular subtense of the apparent source α: 45 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)									P
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	8,55E+02	10000	9,66E+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	0,15	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: L2C4-50803M03F0900, Evaluation Distance: 200mm, Test current: 350mA, Angular subtense of the apparent source α: 45 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)									P
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	1,02E+03	10000	1,20E+04	4000000	2,16E+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	1,48E+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: L2C4-50803M03F0900, Evaluation Distance: 200mm, Test current: 525mA, Angular subtense of the apparent source α: 45 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)									P
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	1,49E+03	10000	1,72E+04	4000000	1,82E+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	2,12E+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.

DUT: L2C4-50803M03F0900, Evaluation Distance: 200mm, Test current: 700mA, Angular subtense of the apparent source α: 45 mrad

EN 62471			
Clause	Requirement + Test	Result – Remark	Verdict

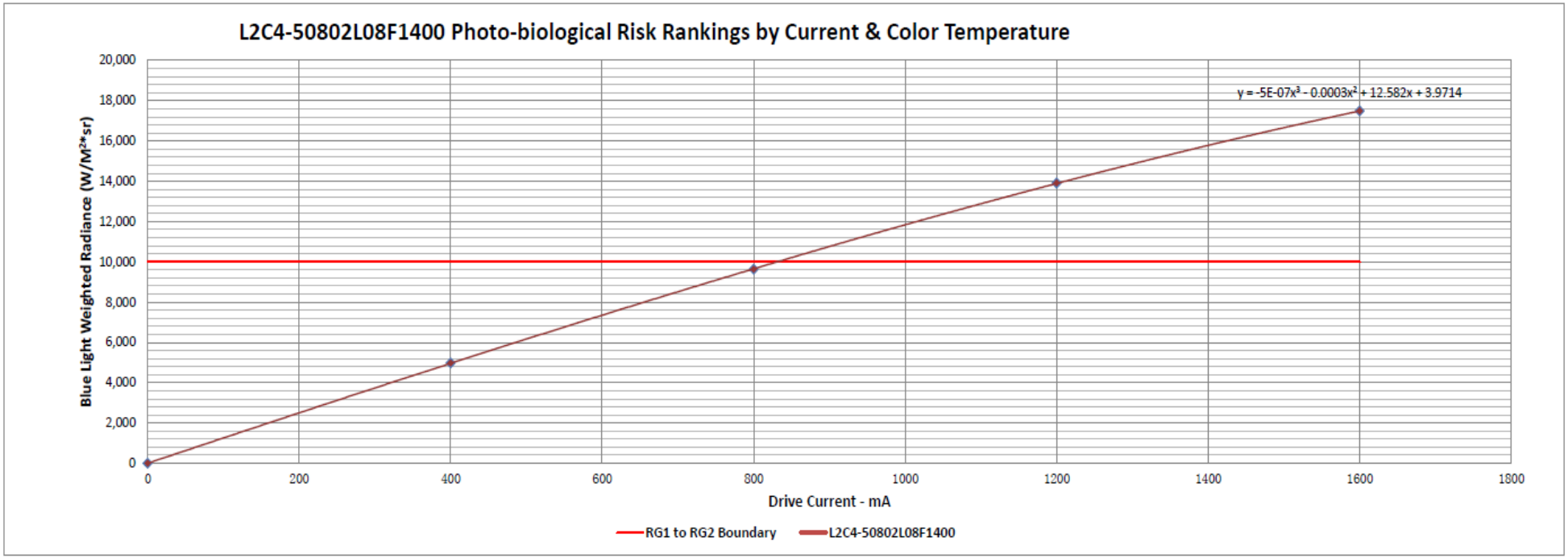
Table 6.1	Emission limits for risk groups of continuous wave lamps (based on EU Directive 2006/25/EC)									P
Risk	Action spectrum	Symbol	Units	Emission Measurement						
				Exempt		Low risk		Mod risk		
				Limit	Result	Limit	Result	Limit	Result	
Actinic UV	$S_{UV}(\lambda)$	E_s	$W \cdot m^{-2}$	0,001	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	1,89E+03	10000	2,46E+04	4000000	3,84E+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	2,96E+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	0,21	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

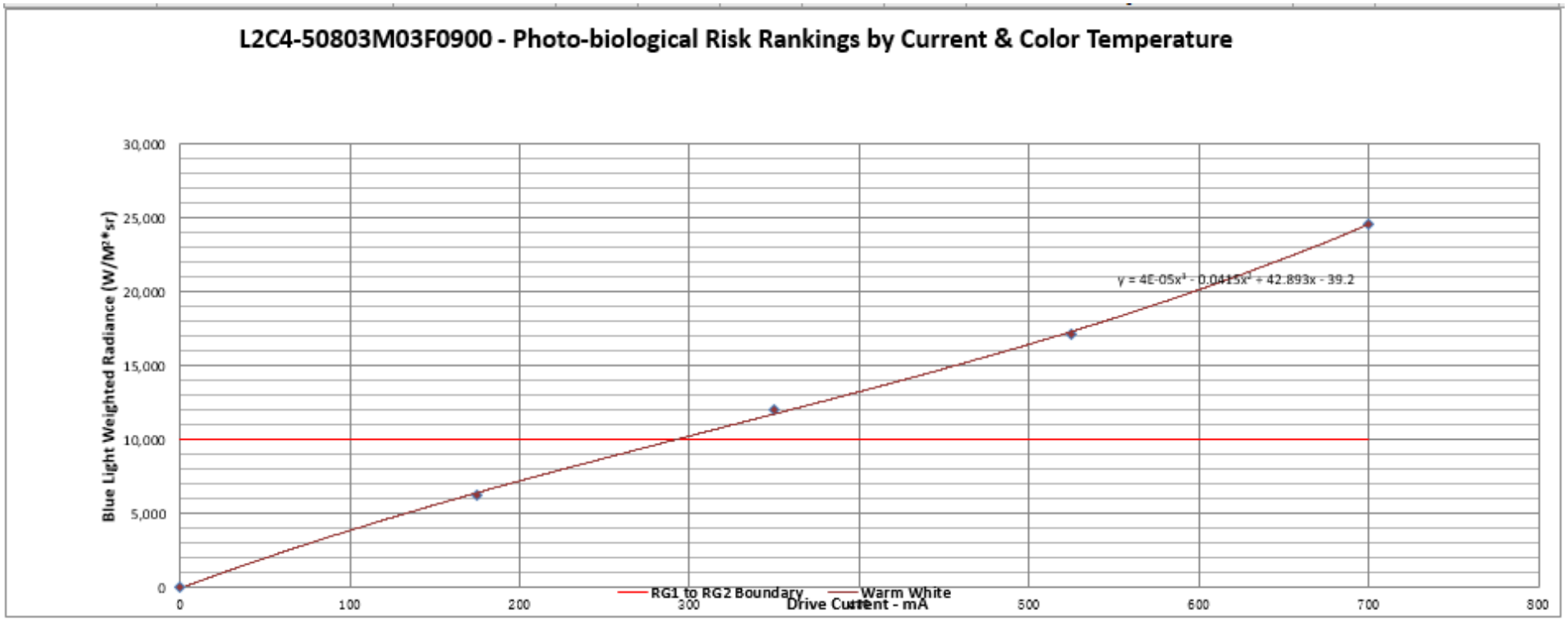
NOTE The action functions: see Table 4.1 and Table 4.2
The applicable aperture diameters: see 4.2.1
The limitations for the angular subtenses: see 4.2.2
The related measurement condition 5.2.3 and the range of acceptance angles: see Table 5.5.

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	400	800	1200	1600	Regression Formula:	Fit to RG2 Line:	Current @ RG-1 to RG-2 Boundary, mA:
L2C4-50802L08F1400	4629	0	4980	9632	13910	17490	y =-5E-07x3 - 0.0003x2 + 12.582x + 3.9714	10000	834



		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:
L2C4-50803M03F0900	4985K	0	6272	11990	17184	24628	$y = 4E-05x^3 - 0.0415x^2 + 42.893x - 39.2$	10000	294