

Test Report issued under the responsibility of:



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

Report Number.....: 6097776.50P

Date of issue.....: 2021-03-01

Total number of pages 28

Name of Testing Laboratory

preparing the Report.....: DEKRA Testing and Certification (Shanghai) Ltd.
3/F, #250, Jiangchangsan Road building 16 Headquater
Economy Park Shibe 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, JinAn
District, Shanghai, 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

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Test item description :	LED package	
Trade Mark :	LUMILEDS	
Manufacturer :	Lumileds (Shanghai) Management Co., Ltd. Building 1-A. No. 19-20, Lane 299, Wenshui Road, JinAn District, Shanghai, China	
Model/Type reference :	L128-RYL1003500000; L128-GRN1003500000; L128-6570HA3500001;	
Ratings :	L128-RYL1003500000: Max current: 240mA L128-GRN1003500000: Max current: 200mA L128-6570HA3500001: Max current: 480mA (For details see Model list)	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input checked="" type="checkbox"/>	CB Testing Laboratory:	DEKRA Testing and Certification (Shanghai) Ltd.
	Testing location/ address	3/F, #250, Jiangchangsan Road building 16 Headquater Economy Park Shibe Hi-Tech Park, Jing'an District, Shanghai, P.R.C 200436
<input type="checkbox"/>	Associated CB Testing Laboratory:	
	Testing location/ address	
	Tested by (name, function, signature)	Nancy Wang 
	Approved by (name, function, signature) ..	Hanson Zhang 
<input type="checkbox"/>	Testing procedure: CTF Stage 1:	
	Testing location/ address	
	Tested by (name, function, signature)	
	Approved by (name, function, signature)	
<input type="checkbox"/>	Testing procedure: CTF Stage 2:	
	Testing location/ address	
	Tested by (name + signature)	
	Witnessed by (name, function, signature)	
	Approved by (name, function, signature)	
<input type="checkbox"/>	Testing procedure: CTF Stage 3:	
<input type="checkbox"/>	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).....		

<p>List of Attachments (including a total number of pages in each attachment):</p> <ul style="list-style-type: none"> ● 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) 	
<p>Summary of testing:</p>	
<p>Tests performed (name of test and test clause):</p> <p>These tests fulfil the requirements of standard ISO/IEC 17025. When determining the test conclusion, the Measurement Uncertainty of test has been considered.</p> <p>The tested sample of L128-RYL1003500000 L128-6570HA3500001(480mA) Have been tested according to the IEC 62471(first edition, 2006-07) at 200mm and been classified as RG 2 Have been tested according to the EN 62471:2008 at 200mm and been classified as RG 2 Have been tested according to the IEC/TR 62778:2014 and been classified as RG 2 for blue light hazard.</p> <p>The tested sample of L128-GRN1003500000 L128-6570HA3500001(290mA) Have been tested according to the IEC 62471(first edition, 2006-07) at 200mm and been classified as RG 0 Have been tested according to the EN 62471:2008 at 200mm and been classified as RG 1 Have been tested according to the IEC/TR 62778:2014 and been classified as RG 1 Unlimited for blue light hazard.</p>	<p>Testing location:</p> <p>DEKRA Testing and Certification (Shanghai) Ltd. 3/F, #250, Jiangchangsan Road building 16 Headquater Economy Park Shibe Hi-Tech Park, Jing'an District, Shanghai, P.R.C 200436</p>

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: <input checked="" type="checkbox"/> LED package <input type="checkbox"/> LED module <input type="checkbox"/> Lamp <input type="checkbox"/> Luminaire	
Rated voltage (V): --	
Rated current (mA): 200 mA or 240mA or 480mA	
Rated CCT (K): --	
Rated Luminance (Mcd/m²): --	
Component report data used: <input checked="" type="checkbox"/> Not applicable <input type="checkbox"/> LED package <input type="checkbox"/> LED module <input type="checkbox"/> 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 : 2021-02	
Date (s) of performance of tests : 2021-03	
General remarks:	
<p>"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.</p> <p>Throughout this report a <input checked="" type="checkbox"/> comma / <input type="checkbox"/> point is used as the decimal separator.</p> <p>The product complied with the following standards: <input checked="" type="checkbox"/> IEC 62471:2006 <input checked="" type="checkbox"/> EN 62471:2008 <input type="checkbox"/> IEC/TR 62471-2:2009 <input checked="" type="checkbox"/> IEC/TR 62778:2014</p> <p>Decision rules applied Procedure 2 "Accuracy Method" as stated in the IEC Guide 115:2007.</p>	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC 62471-2:	
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.....:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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,
JinAn District, Shanghai, China

General product information:

Full tests were performed on model L128-RYL1003500000, L128-GRN1003500000 and L128-6570HA3500001.

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

The sample of L128-RYL1003500000 was tested at 200mm from the light source.

The sample of L128-GRN1003500000 was tested at 200mm from the light source.

The sample of L128-6570HA3500001 was tested at 200mm from the light source. CCT of spectral irradiance was found at 6918 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.

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	<input type="checkbox"/> RG0 unlimited <input type="checkbox"/> 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:	<input checked="" type="checkbox"/> LED package <input type="checkbox"/> LED module <input type="checkbox"/> Lamp <input type="checkbox"/> Luminaire		
	Model number	L128-RYL1003500000		
	Test voltage (V)	3,1 Vdc		—
	Test current (mA)	240mA		—
	Test frequency (Hz)	--		—
	Ambient, t(°C).....	25°C		—
	Measurement distance.....	<input checked="" type="checkbox"/> 20 cm <input type="checkbox"/> ... cm		—
	Source size	<input type="checkbox"/> Non-small <input checked="" type="checkbox"/> Small :		—
	Field of view	<input type="checkbox"/> 100 mrad <input checked="" type="checkbox"/> 11 mrad <input type="checkbox"/> 1,7 mrad (for small sources)		—
Item	Symb ol	Units	Result	Remark
Correlated colour temperature	CCT	K	--	
x/y colour coordinates			--	
Blue light hazard radiance	L _B	W/(m ² ·sr ¹)	--	@11mrad
Blue light hazard irradiance	E _B	W/m ²	2,54E+00	
Luminance	L	cd/m ²	9,51E+05	@11mrad
Illuminance	E	lx	9,67E+01	
Supplementary information: Per IEC/TR 62778:2014 E _{thr} = 36 lx D _{min} = 328 mm				

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE: Spectroradiometric measurement				
	Measurement performed on:	<input checked="" type="checkbox"/> LED package <input type="checkbox"/> LED module <input type="checkbox"/> Lamp <input type="checkbox"/> Luminaire		
	Model number	L128-GRN1003500000		
	Test voltage (V)	3,15 Vdc		—
	Test current (mA)	200mA		—
	Test frequency (Hz)	--		—
	Ambient, t(°C).....	25°C		—
	Measurement distance.....	<input checked="" type="checkbox"/> 20 cm <input type="checkbox"/> ... cm		—
	Source size	<input type="checkbox"/> Non-small <input checked="" type="checkbox"/> Small :		—
	Field of view	<input type="checkbox"/> 100 mrad <input checked="" type="checkbox"/> 11 mrad <input type="checkbox"/> 1,7 mrad (for small sources)		—
Item	Symb ol	Units	Result	Remark
Correlated colour temperature	CCT	K	--	
x/y colour coordinates			--	
Blue light hazard radiance	L _B	W/(m ² ·sr ¹)	--	@11mrad
Blue light hazard irradiance	E _B	W/m ²	0,06E+00	
Luminance	L	cd/m ²	3,53E+06	@11mrad
Illuminance	E	lx	4,85E+02	
Supplementary information: N/A				

IEC TR 62778				
Clause	Requirement + Test		Result - Remark	Verdict
	TABLE: Spectroradiometric measurement			
	Measurement performed on:	<input checked="" type="checkbox"/> LED package <input type="checkbox"/> LED module <input type="checkbox"/> Lamp <input type="checkbox"/> Luminaire		
	Model number	L128-6570HA3500001		
	Test voltage (V)	3,4 Vdc		—
	Test current (mA)	480 mA		—
	Test frequency (Hz)	--		—
	Ambient, t(°C).....	25°C		—
	Measurement distance.....	<input checked="" type="checkbox"/> 20 cm <input type="checkbox"/> ... cm		—
	Source size	<input type="checkbox"/> Non-small <input checked="" type="checkbox"/> Small :		—
	Field of view	<input type="checkbox"/> 100 mrad <input checked="" type="checkbox"/> 11 mrad <input type="checkbox"/> 1,7 mrad (for small sources)		—
Item	Symb ol	Units	Result	Remark
Correlated colour temperature	CCT	K	6918	
x/y colour coordinates			0,3188 / 0,3357	
Blue light hazard radiance	L _B	W/(m ² ·sr ¹)	--	@11mrad
Blue light hazard irradiance	E _B	W/m ²	1,55E+00	
Luminance	L	cd/m ²	1,73E+07	@11mrad
Illuminance	E	lx	1,57E+03	
Supplementary information: Per IEC/TR 62778:2014 E _{thr} = 1021 lx D _{min} = 249 mm				

IEC TR 62778				
Clause	Requirement + Test		Result - Remark	Verdict
	TABLE: Spectroradiometric measurement			
	Measurement performed on:	<input checked="" type="checkbox"/> LED package <input type="checkbox"/> LED module <input type="checkbox"/> Lamp <input type="checkbox"/> Luminaire		
	Model number	L128-6570HA3500001		
	Test voltage (V)	3,1 Vdc		—
	Test current (mA)	290 mA		—
	Test frequency (Hz)	--		—
	Ambient, t(°C).....	25°C		—
	Measurement distance.....	<input checked="" type="checkbox"/> 20 cm <input type="checkbox"/> ... cm		—
	Source size	<input type="checkbox"/> Non-small <input checked="" type="checkbox"/> Small :		—
	Field of view	<input type="checkbox"/> 100 mrad <input checked="" type="checkbox"/> 11 mrad <input type="checkbox"/> 1,7 mrad (for small sources)		—
Item	Symb ol	Units	Result	Remark
Correlated colour temperature	CCT	K	6757	
x/y colour coordinates			0,3095 / 0,3212	
Blue light hazard radiance	L _B	W/(m ² ·sr ¹)	--	@11mrad
Blue light hazard irradiance	E _B	W/m ²	0,98E+00	
Luminance	L	cd/m ²	1,15E+07	@11mrad
Illuminance	E	lx	1,04+03	
Supplementary information:				
N/A				

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE: Angular light distribution	N/A

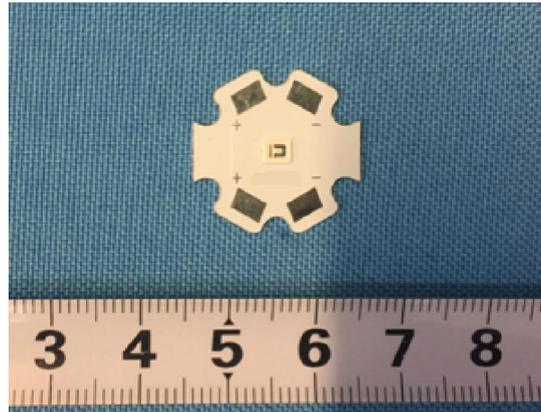
List of test equipment used:

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.

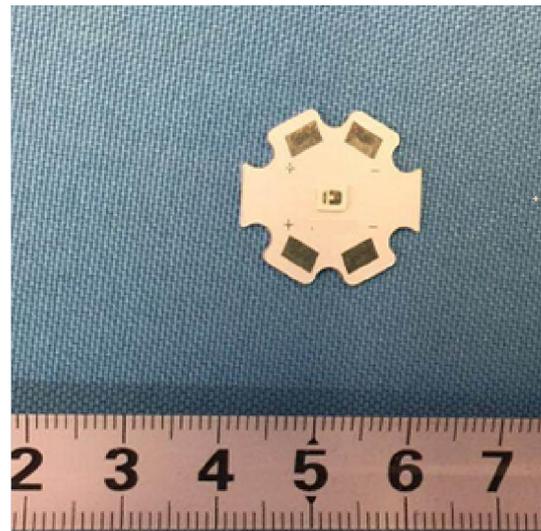
Note: This page may be removed when CTF stage 1 CTF stage 2 are not used. See also clause 4.8 in OD 2020 for more details.

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	2020/10/10	2021/10/10

Appendix 1: Photo Documentation



L128-RYL100350000



L128-GRN100350000



L128-6570HA3500001

Appendix 2: Model List

The tested sample L128-6570HA3500001 (6500K) is considered the worst case in the above group. The risk group classification is applicable to all parts covered by the part number nomenclature below.

L 1 2 8 – aabbcc35eeee

Where:

aa: designates nominal ANSI CCT (e.g. 18 =1800K, 27 =2700K, 30=3000K, where valid for CCT equal to or less than 6500K)

bb : designates minimum CRI (e.g. 70 = 70CRI or higher CRI, HG=High Gamut)

cc: designates white marketing subgroups (HA = LUXEON 2835 HE 3V, HB = LUXEON 2835 HE 6V, CA = LUXEON 2835C 3V / LUXEON 2835C 3V TVS / LUXEON 2835 with CrispColor Technology, CB = LUXEON 2835C 6V, EA = LUXEON 2835E 3V, EB= LUXEON 2835E 6V, EC = LUXEON 2835E 9V, 00 = LUXEON 2835 White, NA=LUXEON 2835N 3V)

eeee: designates Lumileds internal code for marketing purpose

The tested sample L128-6570HA3500001 (6500K) has RG1 classification when operating below 290mA (RG1 threshold current) and applicable to all CCTs and CRIs combinations of as described in the part number nomenclature above for cc=HA/NA/00.

Above 290mA, it is RG2 where Ethr=1021lx and Dmin=249mm for all CCTs and CRI combinations.

Part number and RG1 threshold current are listed in below table.

Part number	RG1 threshold current
L128-aabbHA35eeee	290mA
L128-aabbNA35eeee	290mA
L128-aabb0035eeee	290mA
L128-aabbHB35eeee	145mA
L128-aabbCB35eeee	145mA

L 1 2 8 - A A 0 0 C A 3 5 e e e e e

Where:

A A: designates product type (PR=Produce, RM=Red Meat, MM=Marbled Meat, FS=Fish, BD=Bread)

C: designates binning current (C=120mA)

A: designates voltage of the part (A=3V)

e e e e e: designates any customer or project code

The tested samples L128-RYL1003500000 and L128-GRN1003500000 are considered the worst case in their respective part groups. Hence their respective rating RG2 and RG1 are applicable to all parts covered by the part number nomenclatures mentioned below.

L 1 2 8 – A A A 1 0 0 3 5 e e e e e

Where:

A A A: designates color (FRD=Far Red, DRD=Deep Red, RED=Red, RNG=Red Orange, PCA=PC Amber, MNT=Mint, LME=Lime, GRN=Green, CYN=Cyan, BLU=Blue, RYL=Royal Blue)

e e e e e: designates any customer or project code

L 1 S P - A A A B B 0 C C e e e e e

Where:

A A A: designates color (FRD=Far Red, DRD=Deep Red, PRP=Purple, RYL=Royal Blue, LME=Lime and PNK=Horticultural White)

B B: designates typical percentage of PPF in the blue spectrum (420 to 480nm) vs. the total PPF in the Photosynthetic Active Radiation (PAR) region (400 to 700nm), which applies only to purple LEDs (00=2.5%, 10=12.5% and 20=25%)

C C: designates package size (28=2835)

e e e e: designates any customer or project code

L 1 2 8 - A A A B C D 3 5 e e e e e

Where:

A A A: designates color (CYN=Cyan, BLU=Blue, RED=Red, LBL=Long Blue, GRN=Green)

B: designates minimum CRI (8=80CRI and 9=90CRI)

C: designates binning current (C=120mA, and E=60mA, and H=65mA)

D: designates voltage of the part (A=3V, B=6V and C=9V)

e e e e: designates any customer or project code

L 1 2 8 - A B C C D F 3 5 e e e e e

Where:

A: designates color (B=Blue, R=Red, G=Green)

B: designates minimum CRI (8=80CRI and 9=90CRI)

C C: designates product line (FS=Fusion)

D: designates binning current (C=120mA, and E=60mA, and H=65mA)

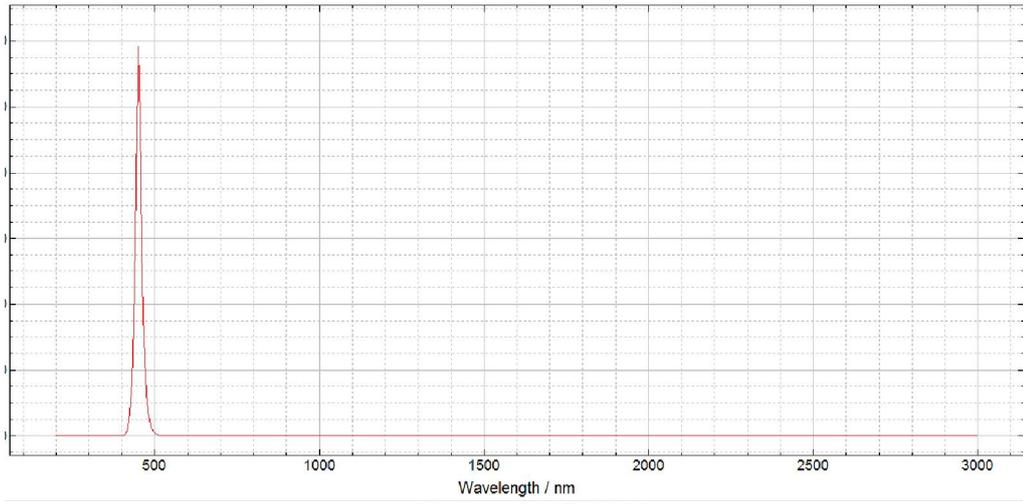
F: designates voltage of the part (A=3V, B=6V and C=9V)

e e e e: designates any customer or project code

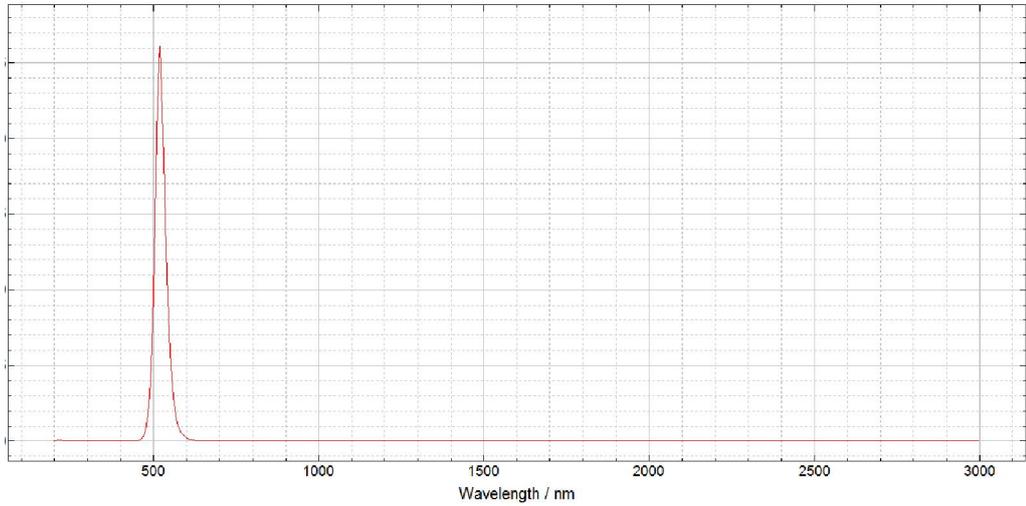
Part Number	Color designation	Risk Group (RG) Classification
L128-RYL10035e e e e e	royal blue	RG2
L1SP-RYL0028e e e e e	royal blue	RG2
L128-BLU10035e e e e e	blue	RG2
L128-BLU9CA35e e e e e	blue	RG2
L128-LBL9CA35e e e e e	blue	RG2
L128-BLU9HA35e e e e e	blue	RG2
L128-B9FSCA35e e e e e	blue	RG2
L128-CYN10035e e e e e	cyan	RG2
L128-CYN9CA35e e e e e	cyan	RG2
L1SP-PNK10028e e e e e	horticulture (pinkish) white	RG2
L1SP-PRP20028e e e e e	purple	RG2
L1SP-PRP10028e e e e e	purple	RG2
L1SP-PRP00028e e e e e	purple	RG2
L128-GRN10035e e e e e	green	RG1
L128-GRN9HA35e e e e e	green	RG1
L128-GRN8HA35e e e e e	green	RG1
L128-G9FSCA35e e e e e	green	RG1
L128-G8FSCA35e e e e e	green	RG1

L128-LME10035e	lime	RG1
L1SP-LME00028e	lime	RG1
L128-MNT10035e	mint	RG1
L128-PCA10035e	amber	RG1
L128-AMB10035e	amber	RG1
L128-RNG10035e	red orange	RG1
L128-RED10035e	red	RG1
L128-RED9CA35e	red	RG1
L128-RED9HA35e	red	RG1
L128-RED8HA35e	red	RG1
L128-R9FSCA35e	red	RG1
L128-R8FSCA35e	red	RG1
L128-DRD10035e	deep red	RG1
L1SP-DRD00028e	deep red	RG1
L128-FRD10035e	far red	RG1
L1SP-FRD00028e	far red	RG1

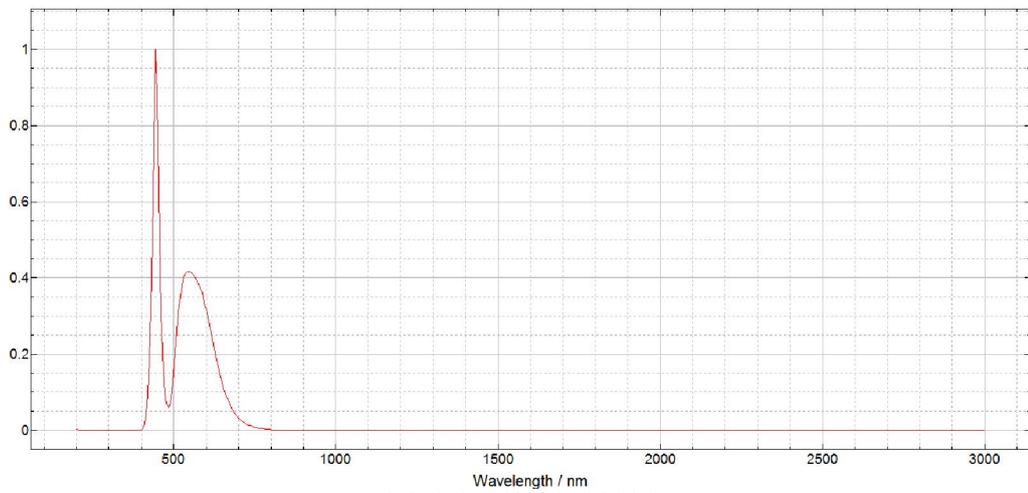
Appendix 3: Relative Spectrum Of Tested Sample(s)



L128-RYL1003500000



L128-GRN1003500000



L128-6570HA3500001

Appendix 4: Table 6.1 Based On IEC 62471:2006

DUT: L128-RYL1003500000, Evaluation Distance: 200mm, Angular subtense of the apparent source α : 3.62 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	$B(\lambda)$	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	--	10000		4000000	
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	1,0*	2,54E+00	1,0	2,54E+00	400	2,54E+00
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/ α	2,63E+05	28000/ α		71000/ α	
Retinal thermal, weak visual stimulus**	$R(\lambda)$	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 $\alpha < 0,011$ radian. Averaging field of view at 10000 s is 0,1 radian.									
** Involves evaluation of non-GLS source									

DUT: L128-GRN1003500000, Evaluation Distance: 200mm, Angular subtense of the apparent source α : 3.62 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	$B(\lambda)$	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	--	10000		4000000	
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	1,0*	0,06E+00	1,0		400	
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/ α	8,83E+03	28000/ α		71000/ α	
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	6000/ α	--	6000/ α		6000/ α	
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0,20	570		3200	

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

DUT: L128-6570HA3500001(480mA), Evaluation Distance: 200mm, Angular subtense of the apparent source α : 3.62 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	$B(\lambda)$	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	--	10000		4000000	
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	1,0*	1,55E+00	1,0	1,55E+00	400	1,55E+00
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/ α	3,02E+05	28000/ α		71000/ α	
Retinal thermal, weak visual stimulus**	$R(\lambda)$	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	0,10	570		3200	

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

DUT: L128-6570HA3500001(290mA), Evaluation Distance: 200mm, Angular subtense of the apparent source α : 3.62 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	$B(\lambda)$	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	--	10000		4000000	
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	1,0*	0,98E+00	1,0		400	
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/ α	1,96E+05	28000/ α		71000/ α	
Retinal thermal, weak visual stimulus**	$R(\lambda)$	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 $\alpha < 0,011$ 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: L128-RYL1003500000, Evaluation Distance: 200mm, Angular subtense of the apparent source α : 3,62 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	$B(\lambda)$	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	--	10000		4000000	
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	0,01*	2,54E+00	1,0	2,54E+00	400	2,54E+00
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/ α	2,63E+05	28000/ α		71000/ α	
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	545000 0,0017 $\leq \alpha \leq$ 0,011	--				
				6000/ α 0,011 $\leq \alpha \leq$ 0,1	--				
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0,21	570		3200	
<p>* Small source defined as one with $\alpha < 0,011$ 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.</p>									

DUT: L128-GRN1003500000, Evaluation Distance: 200mm, Angular subtense of the apparent source α : 3.62 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	$B(\lambda)$	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	--	10000		4000000	
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	0,01*	0,06E+00	1,0	0,06E+00	400	
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/ α	8,83E+03	28000/ α		71000/ α	
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	545000 0,0017 $\leq \alpha \leq$ 0,011	--				
				6000/ α 0,011 $\leq \alpha \leq$ 0,1	--				
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0,20	570		3200	
<p>* Small source defined as one with $\alpha < 0,011$ radian. Averaging field of view at 10000 s is 0,1 radian.</p> <p>** Involves evaluation of non-GLS source</p> <p>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.</p>									

DUT: L128-6570HA3500001(480mA), Evaluation Distance: 200mm, Angular subtense of the apparent source α : 3,62 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	$B(\lambda)$	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	--	10000		4000000	
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	0,01*	1,55E+00	1,0	1,55E+00	400	1,55E+00
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/ α	3,02E+05	28000/ α		71000/ α	
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	545000 0,0017 $\leq \alpha \leq$ 0,011	--				
				6000/ α 0,011 $\leq \alpha \leq$ 0,1	--				
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0,10	570		3200	
<p>* Small source defined as one with $\alpha < 0,011$ radian. Averaging field of view at 10000 s is 0,1 radian.</p> <p>** Involves evaluation of non-GLS source</p> <p>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.</p>									

DUT: L128-6570HA3500001(290mA), Evaluation Distance: 200mm, Angular subtense of the apparent source α : 3.62 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	$B(\lambda)$	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	--	10000		4000000	
Blue light, small source	$B(\lambda)$	E_B	$W \cdot m^{-2}$	0,01*	0,98E+00	1,0	0,98E+00	400	
Retinal thermal	$R(\lambda)$	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/ α	1,96E+05	28000/ α		71000/ α	
Retinal thermal, weak visual stimulus**	$R(\lambda)$	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	545000 0,0017 $\leq \alpha \leq$ 0,011	--				
				6000/ α 0,011 $\leq \alpha \leq$ 0,1	--				
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	0,09	570		3200	
<p>* Small source defined as one with $\alpha < 0,011$ radian. Averaging field of view at 10000 s is 0,1 radian.</p> <p>** Involves evaluation of non-GLS source</p> <p>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.</p>									