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Philips Lighting B.V.
Lighting Test Center Europe
Photobiological safety & Irradiance
High Tech Campus 48, 5656 AE Eindhoven

E-mail: henk.jan.van.aalderen@philips.com

Report nr : JM10596
 Date of report : 20-Aug-2015
 Testfacility : VarOptr
 Operator : J.Marinus
 Responsible : H.J.v.Aalderen
 Meas type : PhotoBiological

Photobiological safety evaluation report according to IEC 62471

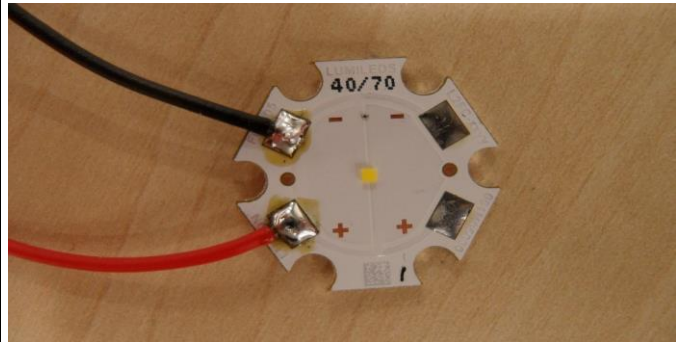
Customer : Lumileds LLC
 Address : 370 West Trimble Road | San Jose CA
 95131USA
 Organisation : LumiLeds
 Invoice Id :

Measuring Conditions

Spectral Range [nm] : 200-3004
 Period of measurements : 11-Aug-2015 to 18-Aug-2015
 Burning position : Horizontal
 Meas.dist. Irradiance [mm] : 200
 Meas.dist. Radiance [mm] : 200
 Temperatures [°C] : ambient:25.3 heatsink:60.0

Lamp Data

Lamp type : LUXEON FlipChip White 05
 Lamp nr : 4070-1
 Life time [h] : 0
 Gear :
 Description : Lumileds LLC
 Reporting distance : 200 mm (at 810.6 lx)



Risk Categories Found (at reporting distance)

Actinic UV : Exempt
 Near UV : Exempt
 Retinal Blue small source : Exempt
 Retinal thermal : Exempt
 InfraRed Eye : Exempt
 Thermal Skin : pass
 :
 :

Summary of evaluated Hazards : The product classified as Exempt based on the reported Photobiological safety tests

Remarks : LxF2-4070050000000, with ANSI bin 4000K, is part of the LUXEON FlipChip White product family. The present classification is thus valid (worst case) for all LUXEON FlipChip White LxF2-xxxx050000000 from ANSI bins equal to 4000K or lower CCT (see TR IEC627)

Tested By: J.Marinus

Signatures:

Technical assistant

Approved By: H.J.v.Aalderen

Head of Photobiological safety & Irradiance

notes:

(1) RVA declaration of accreditation available at:

http://www.rva.nl/uri/?uri=AMGATE_10218_1_TICH_R11753221190060



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 Software Version : 1.7.0.0

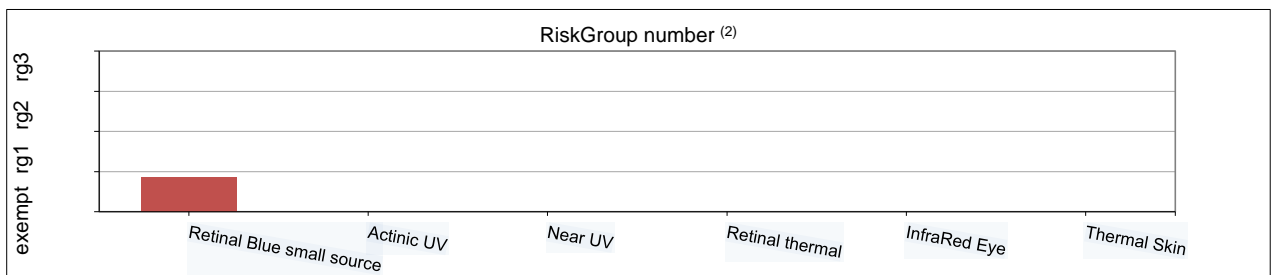
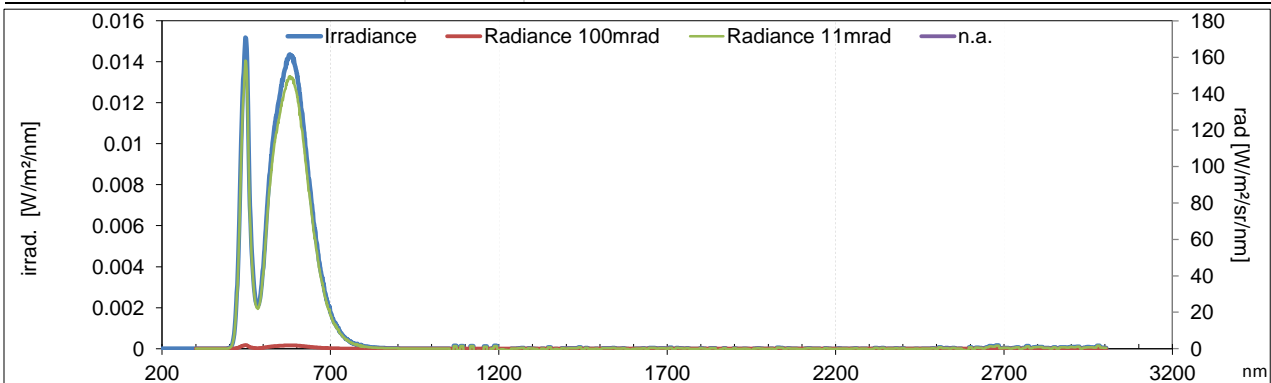
Photobiological safety evaluation report according to IEC 62471

Lamp Data		Measuring Conditions	
Lamp type	: LUXEON FlipChip White 05	Spectral Range [nm]	: 200-3004
Lamp nr	: 4070-1	Period Of Measurements	: 11-Aug-2015 to 18-Aug-2015
Life time [h]	: 0	Ambient, Heatsink temperature [°C]	: 25.3 , 60.0
Gear	:	Reference plane	: optical radiating center
Description	: Lumileds LLC	Azimuth, Elevation [deg]	: 0 , 0
Source subtense α [rad]	: 0.0046	Electrical setting parameter	: Lamp Current DC
Appar.Src.Size [mm]	: 0.92	Meas.dist. Irradiance [mm]	: 200
Reporting distance	: 200 mm (at 810.6 lx)	Meas.dist. Radiance [mm]	: 200

Remarks

Measured electrical quantities		Rated		Calculated photometric quantities ⁽¹⁾	
U lamp	: 3.024	n/a	V	illuminance	: 810.6 lx (± 5.8 %)
I lamp	: 0.500	0.500	A	Chromaticity x,y	: 0.373 0.368
P lamp	: 1.513	n/a	W	Colour temperature	: 4146 K
	:			Colour rendition avg8	: 73

Hazards at viewing		Emission Limit for Exempt	Uncertainty Emission Level (k=2) [%]	Emission Level Unit	RiskGroup number ⁽²⁾	RiskGroup	RG certainty ⁽⁴⁾ [%]	Emission Hazard Value ⁽³⁾
distance								
Retinal Blue small source	: 0.474	1	5.9	W/m ²	0.87	Exempt	100	0.47
Actinic UV	: 4.88e-9	0.001	22.2	W/m ²	0	Exempt	100	0.00
Near UV	: 1.28e-4	10	6.6	W/m ²	0	Exempt	100	0.00
Retinal thermal	: 6.70e+4	6087000	6.1	W/m ² /sr	0	Exempt	100	0.01
InfraRed Eye	: 0.0181	100	47.1	W/m ²	0	Exempt	100	0.00
Thermal Skin	: 2.44	3556.6	6.0	W/m ²	0	pass	100	0.00



- notes :
- (1) from irradiance spectrum, for information only
 - (2) logarithmic interpolated inter Riskgroup number
 - (3) ratio 'Emission Level' / 'Emission Limit'
 - (4) Probability the Riskgroup classification is at most as indicated
 - (5) Signal below detection limit, emission level is below given value with uncertainty 3%



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Photobiological safety IEC 62471 results summary

Clause	Requirement + Test		Result - Remark						Verdict
Table 6.1	Emission limits for risk groups of continuous wave lamps							Pass	
Risk	Action spectrum	Symbol	Units	Exempt		Emission-Measurement		Mod.risk	
				Result	Limit	Result	Limit	Result	Limit
Actinic UV	Suv(λ)	E _s	W/m ²	4.88e-9	0.001		0.003		0.03
Near UV		E _{UVA}	W/m ²	1.28e-4	10		33		100
Retinal Blue small source	B(λ)	E _B	W/m ²	0.474	1.0*		1.0		400
Retinal thermal	R(λ)	L _R	W/m ² /sr		6086967	6.70e+4	6086967		15434810
InfraRed Eye		E _{IR}	W/m ²	0.0181	100		570		3200
Thermal Skin		E _H	W/m ²	2.44	35566				
* 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. *** Signal below detection limit, emission level is below given value with uncertainty 3%									



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ATTACHMENT TO TEST REPORT IEC 62471
EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES.
Differences according to EN 62471:2008

Clause	Requirement + Test		Result - Remark						Verdict	
Table 6.1	Emission limits for risk groups of continuous wave lamps									Pass
Risk	Action spectrum	Symbol	Units	Emission-Measurement						RG
				Exempt		Low-risk		Mod.risk		
				Result	Limit	Result	Limit	Result	Limit	
Actinic UV	Suv(λ)	E _s	W/m ²	4.88e-9	0.001		0.003		0.03	0
Near UV		E _{UVA}	W/m ²	1.28e-4	10		33.333		100	0
Retinal Blue small source*	B(λ)	E _B	W/m ²		0.01****	0.474	1.000		400	1
Retinal thermal	R(λ)	L _R	W/m ² /sr		6112416	6.70e+4	6112416		15371914	0
InfraRed Eye		E _{IR}	W/m ²	0.0181	101.2		569.2		3200.9	0
Thermal Skin		E _H	W/m ²	2.44	35566					0
* 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.										
*** Signal below detection limit, emission level is below given value with uncertainty 3%										
**** Limit for steady fixation of very small sources with angular subtense < 11 mrad. Due to eye movements during normal visual task the limit without eye stabilization is rather 1 W/m ²										

Summary of evaluated Hazards : The product classified as Riskgroup 1 based on Photobiological safety tests according to EN 62471



Assumptions, anomalies and warnings

Possible product label text

Assumptions

Spatially uniform irradiance distribution (not a beam)

Continuous wave Lamp (not pulsed)

High Luminance of source (> 10000 cd/m²)

Anomalies (may cause unreliable results). Results are only for information if items are listed

Remarks



Terms and Conditions

This evaluation report has been executed in accordance with the measurements standards as provided in the international standard CEI IEC 62471:2006 and Technical report IEC/TR 62471-2.

Deviation from the methods that are described in the standard CEI IEC 62471 will be expressed clearly in this report

On request of the customer, the reported parameters that are not defined in the standard CEI IEC 62471, will be explained by the test laboratory

This evaluation report is applicable only to the product which is unambiguously identified in the report

If the product has no identification, the test laboratory will compute and report an unique identification for the specimen tested.

The customer is at all times responsible for the (technical) information, such as optical properties, provided by him

Reproduction of the complete report is allowed. Parts of the report may only be reproduced with written approval of the test laboratory.

The test laboratory (LTCE) is owner of the report and keeps the original in its archive. The customer gets a copy of the original report and LTCE is not responsible for any changes made to the copy.

The test laboratory shall not hand over measurement data and evaluation report to other parties than the customer unless there is written approval of the customer

This evaluation report is issued under the restriction that the test laboratory will not be held liable for any (direct and/or consequential) damage resulting directly or indirectly from the test activities

The Raad voor Accreditatie (RvA) is a member of the European Co-operation for Accreditation (EA) and is one of the signatories to the EA multilateral Agreement and to the ILAC Mutual Recognition Arrangements (MRA) for the mutual recognition of test reports



The Dutch Accreditation Council RvA, by law appointed as
the national accreditation body for The Netherlands,
hereby declares that accreditation has been granted to:

**Philips Lighting B.V.
Optical Calibrations and Measurements
Eindhoven**

The organisation has demonstrated to be able to generate technical valid results in a
competent way and work according to a management system.

This accreditation is based on an assessment against the requirements
as laid down in ISO/IEC 17025:2005.

The accreditation covers the activities as specified in the authorized
annex bearing the registration number.

The accreditation is valid provided that the organisation
continues to meet the requirements.

The accreditation with registration number:

L 533

is granted on 29 August 2012

This declaration is valid until
1 September 2016

The accreditation has been granted for the first time on
29 August 2012

The Chief Executive

Ir. J.C. van der Poel

Annex to ISO/IEC 17025 declaration of accreditation
for registration number: L 533



of **Philips Lighting B.V.**
Optical Calibrations and Measurements
Eindhoven

This annex is valid from: **29-08-2012** to **01-09-2016**

Replaces annex dated: **n.a.**

Premises: **Eindhoven**

No.	Material or product	Type of activity	Internal reference number
1	Lamps and lamp systems	Spectral, optical measurements in the wavelength range from 200 nm through 3000 nm for the evaluation of photo biological safety.	WI04 in accordance with CEI IEC 62471 and IEC/TR 62471-2 ¹

IEC/TR 62471-2¹: with the exception of pulsed lamps and lamps systems (par. 6.2)

This annex has been approved by:

A handwritten signature in blue ink, appearing to read "J.C. van der Poel", is written over a dotted rectangular box.

Ir. J.C. van der Poel
Chief Executive