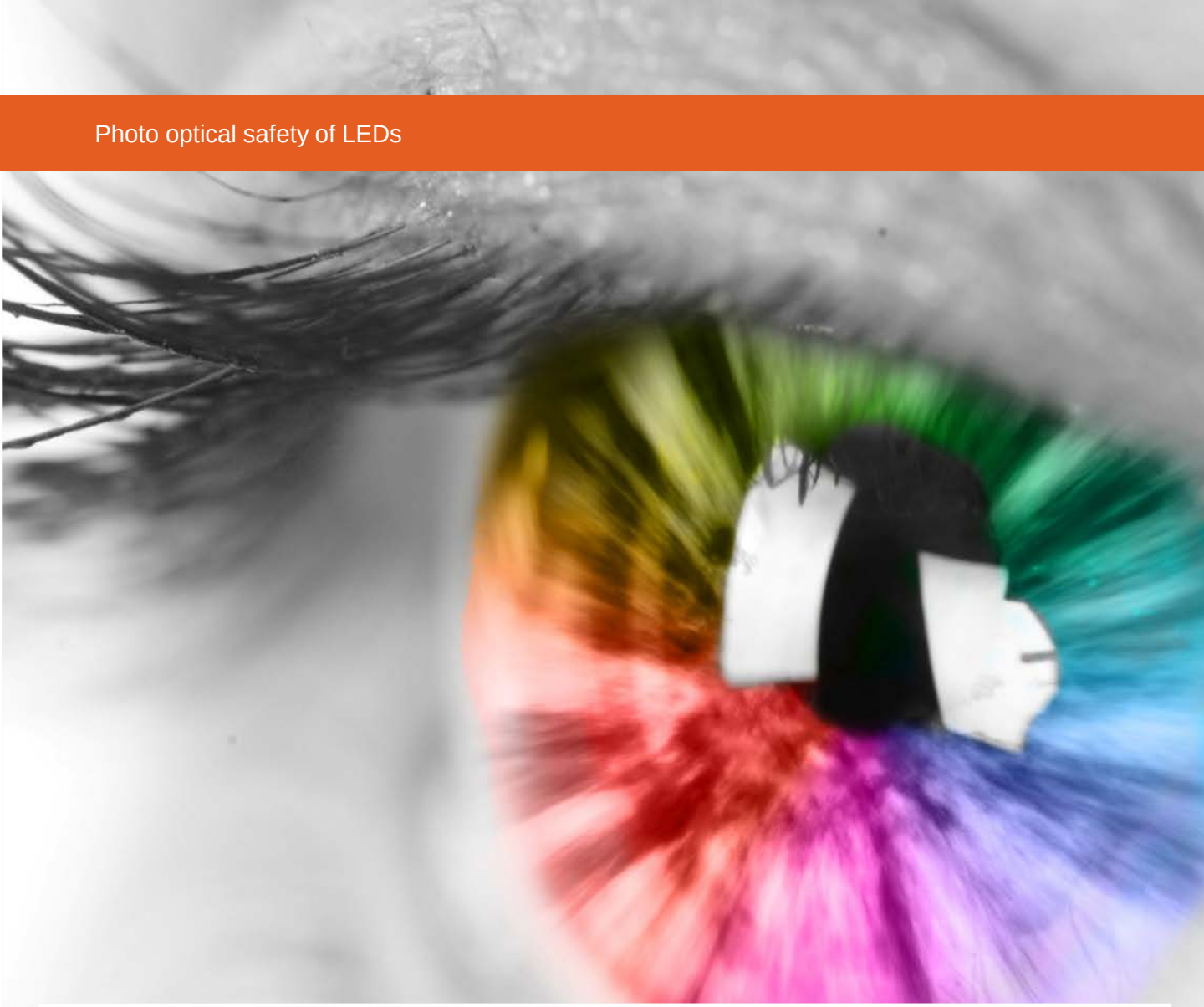

Photo biological safety test report (IEC 62778:2014)

DURIS® S 8

OSRAM
Opto Semiconductors

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Further explanations:

Information: The information provided in this document consists of the list of individual LED types which are considered in the respective LED family.

Document: The document has the purpose to list the individual LED types which are considered in the respective LED family with respect to the photo optical safety.

Conditions: The photo optical safety tests according to IEC 62778:2014 have been conducted using the worst case LED type of the LED family. Therefore the less critical LED types are also grouped into the respective highest risk group determined by the worst case LED types.

Deutsche Akkreditierungsstelle D-PL-17666-02-00

Test Report issued under the responsibility of:

OSRAM

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

Report Number. ..... :	**151-16b**
Date of issue ..... :	**04. August 2016**
Total number of pages ..... :	**11**
Name of Testing Laboratory preparing the Report ..... :	**Central Laboratory for Light Measurements** OSRAM GmbH, CI ANM CLM Berliner Allee 65; 86153 Augsburg, Germany
Applicant's name ..... :	Yeap, Sang Yee Jacqueline OS SSL AE (SSL Application Engineering)
Address ..... :	OSRAM Opto Semiconductors (M) Sdn. Bhd. Bayan Lepas Free Industr. Zone Phase 1 - Pen 3 11900 Penang Malaysia
Test specification:	
Standard ..... :	IEC TR 62778:2014 (Second Edition)
Test procedure ..... :	
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	IEC62778A
Test Report Form(s) Originator .... :	TÜV SÜD Product Service GmbH
Master TRF ..... :	Dated 2016-02

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

General disclaimer:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test item description ..... :	DURIS S8
Trade Mark ..... :	OSRAM
Manufacturer ..... :	OSRAM Opto Semiconductors
Model/Type reference ..... :	GW P9LT31.PM
Ratings ..... :	200 mA DC (max. current) – 6500K (highest available CCT)

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):

☒	**Testing Laboratory:**	**Central Laboratory for Light Measurements**
Testing location/ address.....:		OSRAM GmbH, CI ANM CLM Berliner Allee 65; 86153 Augsburg, Germany ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-17666-02-00
Tested by (name, function, signature) :		A. Gurel, Test Engineer:
Approved by (name, function, signature) :		Dr. Werner Jordan, Vice head of laboratory:
☐	**Associated Testing Laboratory:**	
Testing location/ address.....:		
Tested by (name, function, signature).....:		
Approved by (name, function, signature)...:		
☐	**Testing procedure: Elsewhere:**	
Testing location/ address.....:		
Tested by (name, function, signature).....:		
Approved by (name, function, signature)...:		

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

Attachment 1: Measurement results for DURIS S8 GW P9LT31.PM / Page 10

Summary of testing:

DURIS S8 GW P9LT31.PM:

- **RG2 (11mrad@200mm) moderate risk**
  Blue light hazard L_B = 14,5 kW•m^{-2}•sr^{-1} (11mrad@200mm)

- **RG1 (11mrad@200mm) low risk @ > 0,5m**
  or at a threshold illuminance less than 1106lx
  Blue light hazard L_B = 10,0 kW•m^{-2}•sr^{-1} (11mrad@200mm)

Tests performed (name of test and test clause):	**Testing location:**
Test was performed according to clause 5 MEASUREMENT OF LAMPS AND LAMP SYSTEMS of IEC 62471:2006 (ed.1) 5.2.2 Radiance measurements 5.2.2.1 Standard method and according to clause 7 Application OF IEC 62471 FOR THE ASSESSMENT OF BLUE LIGHT HAZARD TO LIGHT SOURCES AND LUMINAIRES of IEC TR 62778:2014 (ed. 2) 7.2 Conditions for the radiance measurement.	Central Laboratory for Light Measurements OSRAM GmbH, CI ANM CLM Berliner Allee 65; 86153 Augsburg, Germany

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

Tested products comply to the IEC TR 62778 Application of IEC 62471 for the assessment of blue light hazard to light sources and luminaires

☐ **The product fulfils the requirements of _____ (insert standard number and edition and delete the text in parenthesis, leave it blank or delete the whole sentence, if not applicable)**

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 Certification Bodies that own these marks.

object no. e663

Test item particulars .....:	DURIS S8 GW P9LT31.PM no. e663
Product evaluated .....:	☐ **LED package** ☒ **LED module** ☒ **Lamp** ☒ **Luminaire**
Rated voltage (V) .....:	32,4V
Rated current (mA).....:	200 mA DC (max. current)
Rated CCT (K) .....:	6500K (highest available CCT)
Rated Luminance (Mcd/m^2).....:	NA
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 ..... :	28.07.2016
Date (s) of performance of tests..... :	01.08.2016

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.

Name and address of factory (ies)..... :

General product information:

IEC TR 62778			
Clause	Requirement + Test	Result - Remark	Verdict

7	**MEASUREMENT INFORMATION FLOW**		
7.1	**Basic flow**		
	'Law of conservation of luminance' applied		NA
	Use of only true luminance/radiance values		NA
	In case of luminaire: The light source is operated in the luminaire under similar conditions as when tested as a component		NA
	In case E_{thr} value for RG2 was established the peak value was derived from angular light distribution		NA
7.2	**Conditions for the radiance measurement**		
	Standard condition applied (200mm distance, 0,011rad field of view)		P
	Non-standard condition applied		NA
7.3	**Special cases (I): Replacement by a lamp or LED module of another type**		
	Light source is a white light source		NA
	Evaluation done based on highest luminance		NA
	Evaluation done based on CCT value		NA
7.4	**Special cases (II): Arrays and clusters of primary light sources**		
	LED package is evaluated as ..... :	☐ RG0 unlimited ☐ RG1 unlimited	NA
	E_{thr} of LED package applies to array		NA
8	**RISK GROUP CLASSIFICATION**		
	Risk group achieved:		
	- .. Risk Group 0 unlimited		NA
	- .. Risk Group 1 unlimited		NA
	- .. Risk Group 2		P
	- E_{thr} = 1106 (lx) Distance to reach RG1 ≈ 0,5 (m)		P

	TABLE: Spectroradiometric measurement		
	Measurement performed on:	☐ **LED package** ☒ **LED module** ☐ **Lamp** ☐ **Luminaire**	
	Model number.....:	DURIS S8 GW P9LT31.PM	
	Test voltage (V) .....:	32,4V	—
	Test current (mA) .....:	200 mA (max. current)	—
	Test frequency (Hz).....:	-	—
	Ambient, t (°C) .....:	25°C	—
	Measurement distance.....:	☒ 20 cm ☐ ... cm	—
	Source size .....:	☒ Non-small ☐ Small : .... mm	—
	Field of view .....:	☐ 100 mrad ☒ 11 mrad ☐ 1,7 mrad (for small sources)	—

Item	Symbol	Units	Result	Remark
Correlated colour temperature	CCT	K	6530	complete LED
x/y colour coordinates	x/y		0,313/0,325	complete LED
Blue light hazard radiance	L_B	kW/(m^2•sr^1)	14,5	11mrad
Blue light hazard irradiance	E_B	W/m^2	6,07	200mm
Luminance	L	Mcd/m^2	13,0	11mrad
Illuminance	E	lx	6248	200mm

Supplementary information:

The measurement was performed at maximum current in steady state. The measurement result for blue light hazard is L_B = 14,5 kW•m^{-2}•sr^{-1} at a distance of 200mm (measuring aperture 11mrad).
For RG1 the distance should be more than 0,5m or at a threshold illuminance less than 1106lx.
This shall be indicated in the product information sheet.

	TABLE: Angular light distribution	NA

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
	spectral irradiance	OSRAM HLX 64361 spectral irradiance tungsten halogen lamp serial no. 009		31.05.2016	31.05.1018
	spectral radiance	OSRAM Wi 17G spectral radiance tungsten ribbon lamp serial no. 30		28.06.2016	28.06.2018
	spectral radiance	Instrument Systems Compact Array Spectrometer - CAS 140 CT serial no. 44314208			*)
	spectral radiance	Instrument Systems Radiance setup - TOP 200 serial no. 01420108			*)
	spectral irradiance	Instrument Systems Compact Array Spectrometer - CAS 140 CT serial no. 1628142			*)
	spectral irradiance	Instrument Systems Irradiance setup - EOP 7mm entrance aperture serial no. 1628142E1			*)
	radiance / luminance	TechnoTeam Radiance camera – LMK serial no. DXM2141			*)
	electrical values	Digital-Multimeter Keithley 2000 no. 1043223		03.12.2015	02.12.2016
	electrical values	Digital-Multimeter Keithley 2000 no. 1110638		04.12.2015	02.12.2016
	electrical values	High Precision Shunt Resistor 100 mΩ Burster 1282 no. 351077		14.12.2015	14.12.2017
	ambient temperature	Testo Temperature Data Logger 177-H1 serial no. 00850609		08.02.2016	08.02.2017
	distance	Steel measuring tape 20mx13mm GKl.:2 serial no. 38		31.07.2008	29.07.2016

**) instruments calibrated by standard lamps (see above)*

All standard lamps are traceable to the German NMI: Physikalisch Technische Bundesanstalt

Central Laboratory for Light Measurements

OSRAM

enclosure 1 to report **151-16b**

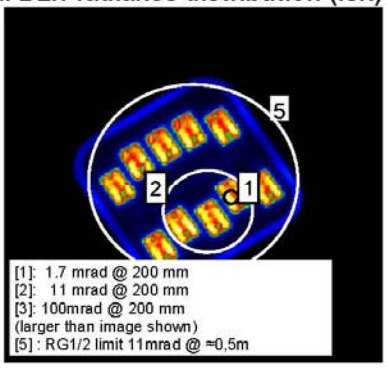
Blue Light / Retinal Thermal Hazard classification of **DURIS S8 GW P9LT31 PM no. e663**

Test information and classification		
measured system voltage		32,4 V DC
measured current		0,20 A
measured system power		6,48 W
temperature 25°C		thermally stabilized
burning position		as depicted
CCT	(11mrad@200mm)	7411 K
BLH	(11 mrad @ 200 mm)	**14,5 kW/(m²sr)**
BLH	(100 mrad @ 200mm)	**0,72 kW/(m²sr)**
emission limits according to EN 62471		
BLH emission limit RG2	4.0	MW/m²sr

risk group classification	RG 0	RG 1	RG 2	RG 3
			x	

RG1 for a distance larger than 0,5m

Local BLH radiance distribution (left) and relevant region of the test object (right)

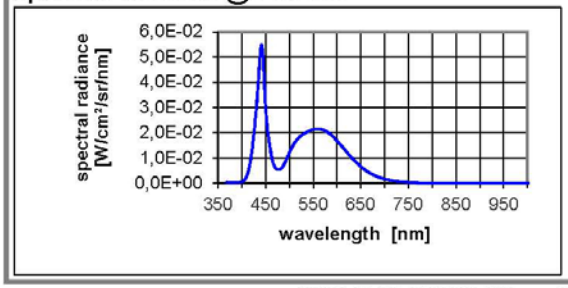


The corresponding blue light/retinal thermal effective radiance values and exposure limits are given below.
maximum permissible BLH dose (EN 62471): 1 MJ/(m²sr)

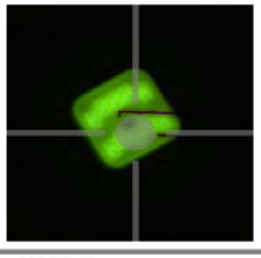
region no. and field of view α	distance d	condition	diameter D	luminance L_V	**blue light radiance L_B**	exp. limit t_{max}
[1]: 1,7 mrad @	200 mm		0,34 mm	16,5 Mcd/m²	**32,7 kW/m²sr**	**31 s**
[2]: 11 mrad @	200 mm		2,2 mm	13,0 Mcd/m²	**14,5 kW/m²sr**	**69 s**
[3]: 100 mrad @	200 mm		20 mm	0,78 Mcd/m²	**0,72 kW/m²sr**	**1380 s**
[5]: RG1/2 limit 11mrad @	≈ 0,5 m	E_thr = 1106 lx	5,2 mm	10,8 Mcd/m²	**10,0 kW/m²sr**	**100 s**

RTH: The maximum exposure time in 1,7 mrad (region [1]) is longer than 10 s. The retinal thermal hazard is negligible.

Spectral radiance @ 11mrad



position of the spectral measurement:
(see crosshairs)



DURIS S8 GW P9LT31 PM no. e663 200mA 200mm 62778.xlsx

LED Family:
DURIS® S 8
Corresponding photo biological safety report:
151-16b

LED	Test Status	Highest Brightness	Risk Group 0	Risk Group 1	Risk Group 2
GW P9LT31.PM	Tested Device	976lm			x
GW P9LT31.EM	Covered Device	908lm			x
GW P9LT31.CM	Covered Device	720lm			x
GW P9LT32.EM	Covered Device	720lm			x
GW P9LM31.EM	Covered Device	576lm			x
GW P9LM31.CM	Covered Device	423lm			x
GW P9LM32.EM	Covered Device	576lm			x
GW P9LR32.EM	Covered Device	700lm			x
GW P9LR31.EM	Covered Device	780lm			x
GW P9LR31,CM	Covered Device	530lm			x
GW P9LR31.PM	Covered Device	780lm			x
GW P9LR33.CM	Covered Device	576lm			x
GW P9LT32.PM	Covered Device	976lm			x

This Risk group assessment shall only be used in combination with the eye safety report according to IEC 62778:2014.

END OF DOCUMENT