



History Sheet			
02-December-2010	Stefan Junghans	Initial Report was written	Rev. 0
17-March-2011	Stefan Junghans	Retest with modified electronics to keep class 1 with single fault	Rev. 1

Summary of testing:

1. In total four devices of the described equipment where tested according to the applicable standard.
2. The test was subcontracted, the original test report is stored at Bureau Veritas CPS Germany with number 10TH0510-External-21166121001
3. The device complies with the requirements after manufacturer modification of internal electronics to keep class 1 with single fault condition.

**Possible test case verdicts:**

- test case does not apply to the test object . : N/A
- test not ordered by customer : N/O
- test object does meet the requirement ..... : P (Pass)
- test object does not meet the requirement . : F (Fail)

**Testing** .....

Date of receipt of test item ..... : 18-February-2011

Date (s) of performance of tests..... : 18-February-2011 to 01-March 2011

**General remarks:**

**The test results presented in this report relate only to the object tested.**

**The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.**

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

"(see Annex #)" refers to additional information appended to the report.

Throughout this report a comma (point) is used as the decimal separator.

## 1. General information

### 1.1. Equipment Description

Laser illuminator
-------------------

### 1.2. Equipment Marking Plate

not provided
--------------

### 1.3. Equipment Used During Test

Use*	Product Type	Manufacturer	Model	Comments
EUT	Laser illuminator	UAB «Yukon Advanced Optics Worldwide»	PULSAR L-808	Manufacturer modified sample

**Note:**

\* Use = EUT - Equipment Under Test,  
 AE - Auxiliary/Associated Equipment, or  
 SIM - Simulator (Not Subjected to Test)

**1.4. EUT Operation Modes**

Mode #	Description
1	Continuous operation

**1.5. Description of light source**

Type	Description
General	<input type="checkbox"/> LED <input checked="" type="checkbox"/> Diode laser
Intended use	<input checked="" type="checkbox"/> General public <input type="checkbox"/> Non general public
Remark	

**1.6. Deviations from standards**

Standard	Deviation
EN 60825-1	none

## 2. Test conditions and results

### 2.1. Technical results

	<b>TEST:</b> Classification of Group	<b>P</b>
Method	Measurements were carried out according to the procedure set forth in EN 60825-1	
<b>Classification</b>		
Class	Device is laser class 1 in normal operation Device is laser class 1 with a single fault	
Remark		
Supplementary information: Testing was subcontracted, see summary of testing		

### 2.2. Marking requirements

	<b>TEST:</b> Markings	
Method	Evaluation of markings according to EN 60825-1	
<b>Classification</b>		
Markings required	The appliance or its instruction manual must be provided with the following marking: "Laser class 1 according to EN 60825-1:2007"	
Remark	The marking shall be provided in official language of the respective country	
Supplementary information:		

**Annex 5**

**Pictures of the unit**

**EUT unpacked**



**Annex 6**

**External reports**

*External test report see following pages*



Prüfbericht Nr / Test report no.: 21166121 001

**Anmerkung / Note:**

Dieser Prüfbericht bezieht sich nur auf die geprüften Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.

*This test report relates to the a. m. test sample. Without permission of the test centre this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.*

Sollte der Inhalt des Untersuchungsberichtes einer Auslegung bedürfen, so ist der deutsche Text maßgebend

*Should the content of the test report need any interpretation the German text shall be leading.*

Angaben zur Messunsicherheit sind im Prüflabor vorhanden und können auf Kundenwunsch bereitgestellt werden.

*Detailed information regarding measurement uncertainty is available in the test lab and could be shown on customer request.*

Dieser Bericht alleine – ohne zugehöriges GS-Zertifikat – berechtigt nicht zur Verwendung des Zeichens "GS-geprüfte Sicherheit".

*This test report – unless appended to the accompanying GS-Certificate – does not entitle to use the mark "GS-geprüfte Sicherheit".*

I. Beschreibung des Diodenemitters / Description of diode emitter

- |   |                                     |
|---|-------------------------------------|
| Laserdiode / diode laser                              | <input checked="" type="checkbox"/> |
| Für Laien bestimmt / intended for general public      | <input checked="" type="checkbox"/> |
| Dauerstrichlaser / continuous emission laser          | <input checked="" type="checkbox"/> |
| Impulslaser / pulsed laser                            | <input type="checkbox"/>            |
| Leistungsregelung möglich / power adjustment possible | <input checked="" type="checkbox"/> |

Zentralwellenlänge / wave length	$\lambda$	= 804 nm
Winkelausdehnung / angular subtense	$\alpha$	= 79,3mrad
(bestimmt im Abstand von 100 mm / determined in 100 mm distance)		
Grenzempfangswinkel / detection angle	$\gamma_p$	= 11 mrad,
(bestimmt aus t / calculated from t)		

Prüfbericht Nr / Test report no.: 21166121 001

II. Grenzwert der zugänglichen Strahlung (GZS) / Limit of accessible radiation

**II.a) GZS-Werte, Bestimmungsformeln / Calculation of limits**

Wellenlänge Wave length [nm]	Laserklasse 1, 1M Laser class 1, 1M (t = 100s)	Laserklasse 2, 2M Laser class 2, 2M (t ≥ 0,25s)	Laserklasse 3R Laser class 3R (0,25s ≤ t ≤ 100s)
400 bis / to 600	<input type="checkbox"/> $3,9 \times 10^{-5} C_3 W$ (photochemischer Grenzwert / photochemical limit)		
400 bis / to 700	<input checked="" type="checkbox"/> $\alpha \leq 1,5 \text{ mrad}$ : $3,9 \times 10^{-4} W$ $\alpha > 1,5 \text{ mrad}$ : $7 \times 10^{-4} C_6 T_2^{-0,25} W$	<input checked="" type="checkbox"/> $10^{-3} C_6 W$	<input checked="" type="checkbox"/> $5 \times 10^{-3} C_6 W$
	<input type="checkbox"/> $7 \times 10^{-4} t^{0,75} C_6 J$		
700 bis / to 1050	<input type="checkbox"/> $3,9 \times 10^{-4} C_4 C_7 W$	—	<input type="checkbox"/> $\alpha \leq 1,5 \text{ mrad}$ : $2 \times 10^{-3} C_4 C_7 W$ $\alpha > 1,5 \text{ mrad}$ : $3,5 \times 10^{-3} C_4 C_6 C_7 T_2^{-0,25} W$

**II.b) Konstanten zur Bestimmung der GZS-Werte / Factors for determination of limits**

- Zeitbasis / time base  t = 0,25 s [ 400nm ≤ λ < 700nm (Klasse / class 2, 2M, 3R) ]  
 t = 100 s [ 400nm ≤ λ < 1050nm Klasse / class 1, 1M;  
700nm ≤ λ < 1050nm für Klasse / class 3R) ]

- alpha min.   $\alpha_{\min} = 1,5 \text{ mrad}$

- alpha max.   $\alpha_{\max} = 100 \text{ mrad}$

- Konstanten / factors

$T_2$	= 10 s
$C_3$	= ---
$C_4$	= ---
$C_6$	= 52,59
$C_7$	= ---

Prüfbericht Nr / Test report no.: 21166121 001

### III. Bestimmung der Strahlung durch Messung / Measurement of radiation

#### III.a) Messung der Strahlungsleistung [W] für thermischen Grenzwert / measurement of radiation for thermal limit

##### - Messaufbau / Test setup

	Winkelausdehnung Angular subtense	Durchmesser der Messblende Diameter of measuring aperture	Messabstand Measuring distance
	$\alpha$	d	r
<input type="checkbox"/>	$\alpha \leq 1,5\text{mrad}$	50mm	2000mm
<input checked="" type="checkbox"/>	$1,5\text{mrad} < \alpha \leq 100 \text{ mrad}$	7mm	70 mm
<input type="checkbox"/>	$\alpha > 100\text{mrad}$	7mm	100mm

##### - Messergebnisse a = 70 mm / Test results a = 70 mm

	Messergebnis/ test result	GZS Klasse / class 1	GZS Klasse / class 2	GZS Klasse / class 3R
Muster 5 / sample 5 Normalbetrieb / normal operation	10,80 mW	21,72 mW	---	108,6 mW
Muster 6 / sample 6 Einzelfehler 1 / single fault 1	15,78 mW	21,72 mW	---	108,6 mW
Muster 6 / sample 6 Einzelfehler 2 / single fault 2	11,50 mW	21,72 mW	---	108,6 mW
Muster 6 / sample 6 Einzelfehler 3 / single fault 3	11,90 mW	21,72 mW	---	108,6 mW

- Einzelfehler 1 / single fault 1: Anschluss1 und Anschluss 8 von iC-WKN überbrückt / Pin1 and Pin 8 of iC-WKN shorted

- Einzelfehler 2 / single fault 2: Anschluss1 und Anschluss 5 von iC-WKN überbrückt / Pin1 and Pin 5 of iC-WKN shorted

- Einzelfehler 3 / single fault 3: Zusätzlicher Chipwiderstand 6,8 Ohm in Zuleitung Laserdiode überbrückt / additional chip resistor 6,8 Ohm in supply lead of laser diode shorted.

Prüfbericht Nr / Test report no.: 21166121 001

#### IV. Zusammenfassung / Summary

Strahlung von Diodenemittern für Laien darf maximal der **Laserklasse 2M** entsprechen. Das gilt auch bei einem Einzelfehler / *The radiation of diode emitters for the general public must comply at max with Laser class 2M. This applies also with a single fault.*

Der untersuchte Diodenemitter entspricht / *the diode emitter under test complies with*

- **Laserklasse 1 / Laser class 1** (im Normalbetrieb / *in normal operation*)
- **Laserklasse 1 / Laser class 1** (mit Einzelfehler / *with a single fault*)

Die Anforderung wird erfüllt / *the requirement is being fulfilled.*

#### V. Kennzeichnungsaufgaben / Marking requirements

Das Gerät oder seine Gebrauchsanleitung müssen mit folgendem Hinweis versehen werden:

Laser Klasse 1 nach EN60825-1:2007

Dieser Hinweis muss nicht farbig ausgeführt werden.

*The appliance or its instruction manual must be provided with the following marking:*

*Laser class 1 according to EN 60825-1:2007*

*This marking is not required in color.*