



Dansk Fundamental Metrologi A/S
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Certifikat nr. PM1203
Side 1 af 2

Calibration certificate

Optical power

<i>Client</i>	ActionSportGames A/S
<i>Address</i>	Bakkegaardsvej 304 3050 Humlebæk
<i>Telephone/Fax</i>	89 28 18 78
<i>Contact person</i>	Morten Risum
<i>Date received</i>	2012-06-18
<i>Date performed</i>	2012-06-21

<i>Item</i>	Laser mounted in holder, battery operated
<i>Identification</i>	No id number was available. A single selected product of the ActionSportGames item no. 17184 was tested
<i>Serial no.</i>	NA

The calibration results are traceable to the Danish primary standard.
If the calibration certificate is quoted partially, DFM must give written consent.

Dato: 2012-07-02

Jan C. Petersen
Ph.D.

Method

The power calibration is performed according to DFM procedure Q2KAL402.

The working standard used is the Trap#1. The working standard was most recently calibrated 2011-11-23.

The total power was measured approximately 10 mm from the source.

The calibrations were performed at a room temperature of $22\text{ °C} \pm 1\text{ °C}$.

The reported expanded uncertainty of measurement is stated as the standard uncertainty multiplied by a coverage factor $k = 2$. For a normal distribution this corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA publication EAL-R2.

Calibration parameters		Results	
Wavelength	Battery Voltage	Power	Uncertainty
nm	V	mW	mW
652	$3 \times 1,5$	0,823	$\pm 0,030$

Classification

The standard EN 60825-1: 2007 (Safety of laser products – Part 1: Equipment classification and requirements) has been used to calculate the maximum permissible exposure (MPE) and the accessible emission limit (AEL). The latter indicates the maximum accessible emission permitted within a particular class.

The output power was measured shortly after insertion of the batteries, which were supplied by DFM.

The output power is 0,823 mW ($\lambda = 652\text{ nm}$), the source is a well-collimated point source where the angular subtense $\alpha \leq 1,5\text{ mrad}$. The beam diameter and divergence angle are small and hence measurement conditions 1, 2 and 3 give the same AEL.

Beam diameter: 1,7 mm

MPE (Table A.2) = 10 W/m^2 . For a pupil opening of 7 mm this corresponds to 0,39 mW.

AEL (Table 7) = 1 mW. This value is the AEL for a Class 2 laser product. The laser under test exceeds the AEL for a Class 1 but is less than the AEL for Class 2; therefore the laser would be classified as Class 2.

A class 2 laser product is any laser product in the wavelength range 400 nm to 700 nm, which during operation does not permit human access to accessible laser radiation in excess of the accessible emission limits of Class 2 for applicable wavelengths and emission durations.