

Guideline for eye safety measurements

A short step by step guide

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Beam profile measurement with hemisphere

1) Mounting

Module^{**}: fixed, reproducible position of the VCSEL in the focal point of the hemisphere

Fish-eye camera^{**}: global shutter, fixed focal length, as close as possible to module

2) Measurement

Imager configuration 1^{*}:
ToF module: active illumination on
fisheye camera: 25 frames
exposure time: no saturation

Imager configuration 2^{*}:
ToF module: active illumination off
fisheye camera: 25 frames
exposure time: same as configuration 1

3) Analysis

1) Create limits for validation^{***}:
statistics of 'good' devices
→ define intensity limits

2) Create background subtracted image, define field of illumination (FoI) and noise region

3) Further analysis: hot spot detection in noise region, calculation of hot spot factor for FoI, ...

4) Apply limits^{***} to result in a pass/fail decision

* provided by pmdtechnologies ag

** provided by ODM

*** initial values provided by pmdtechnologies ag

Optical power measurement with integrating sphere

1) Mounting

Module** in fixed, reproducible position
in the aperture of the integration
sphere

2) Measurement

Imager configuration 1*:
Standard use case

Measurement of the mean
optical power with integrating
sphere

Imager configuration 2*:
Reduced exposure time (40% of
standard), 100% duty cycle

Test of peak power limiting circuit

Imager configuration 3*:
Increased exposure time (110%
of standard), 25% duty cycle

Test of average power protection
circuit (step 1)

Imager configuration 4*:
Increased exposure time > eye
safety threshold

Test of average power protection
circuit (step 2)

3) Analysis

Imager configuration 1*:
Measured optical power value
within limits***?

Imager configuration 2*:
Measured optical power value
within limits***?

Imager configuration 3*:
Increased exposure time leads to
more optical power compared to
standard configuration?

Imager configuration 4*:
Active illumination switches off?

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