

EU Requirements for LED Optical Safety

Products containing light emitting diodes which are for sale in the European Union are subject to the requirements of the Low Voltage Directive. Conformity to the optical safety requirements of this Directive can be claimed by conforming to EN 60825-1 which requires light emitting diodes (LEDs) to be classified according to the optical hazard they present. Most light emitting diodes (NOT TO BE CONFUSED WITH EITHER LASER DIODES OR VCSELs), fall into class 1 and no action need be taken. In general surface emitting diodes are unlikely to exceed the accessible emission limit for class 1. Products using other LEDs may need to be tested and classified. Note that classification takes place under worst case reasonably foreseeable single fault conditions and that most LEDs will emit significantly more than the manufacturer's "absolute maximum" figure.

Single LEDs and multiple LED arrays with centre-to-centre spacing of more than 3 mm can be quickly assessed as follows: Use a single LED, run with the fault which will allow the maximum power output, place 7 mm aperture 14 mm from the emitting surface, measure the power passing through the aperture as the current is increased to maximum. If the highest recorded power is less than the AEL for class 1 when $C_6 = 1$, the product is class 1. If the manufacturer has provided the physical size ($d \mu\text{m}$) of the emitting surface in the data sheet, provided the size is $>150 \mu\text{m}$, a value of $C_6 = d/150$ can be used. This is a worst case assessment.

If the above procedure gives an unsatisfactory classification then specialist advice is needed. The "apparent source size" and position are key to these measurements. "Apparent source sizes" of 1 mm and more are commonplace, giving relaxations which can be a factor of 100 and more for some products.

The hazard from LED arrays with a spacing less than about 3 mm may be more hazardous than a single LED and must be assessed differently. In this case, only those LEDs which are visible within a 10 mm diameter circle (worst case) need be assessed. The assessment must be done for each LED separately, then two at a time, three ... etc and the worst case combination found. C_6 assessment is based on the apparent source size of each combination considered.

AP Technologies can provide information on the characteristics of the discrete LEDs we sell. We are not experts in the EU regulations relating to the qualification and classification of products incorporating high power LEDs and recommend that customers contact Lasermet Limited who specialise in laser and high power LED eye safety issues.

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¹ BS EN 60825-1 (1994 incorporating amendments 1, 2 and 3) Safety of Laser Products – Part 1.

² This is not strictly correct but will suffice for this measurement.

³ Not to be confused with the beam diameter, LED size etc. Apparent source size and position are both modified by the LED lens and must be determined for a full assessment of the AEL.