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TOTAL LUMINOUS FLUX (TLF) MEASUREMENTS OF LEDS AND OLEDS

Application Note: A20 Jan 2019

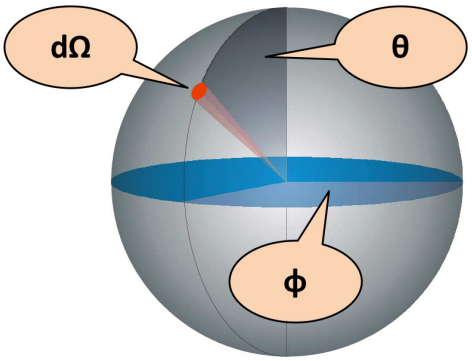
WHAT AND WHY

Total luminous flux *(TLF)* measurements are arguably one of the most common types of measurements used for characterizing light output from single die and multi-LED arrays, OLEDs and many other types of sources, such as incandescent, fluorescent, metal halide lamps, etc.

There are several different ways to present data from measured sources - radiometrically, photometrically, or spectroradiometrically. TLF is simply a photopically weighted measurement of the total energy emitted *(Watts)* from a device over the wavelength range 380 – 780 nm, referred to as the visible spectrum. The weighting factors are defined by the V(λ) function, which describes the response of the human eye in the visible region of the spectrum. Multiplying the radiometric (watts) measurement by the V(λ) function yields a measurement result in lumens (lm) and is most commonly referred to as TLF.

HOW

There are two generally accepted methods of obtaining the total luminous flux of sources, goniometrically or using an integrating sphere. Each of these methods has their pros and cons.



GONIOMETRIC MEASUREMENTS

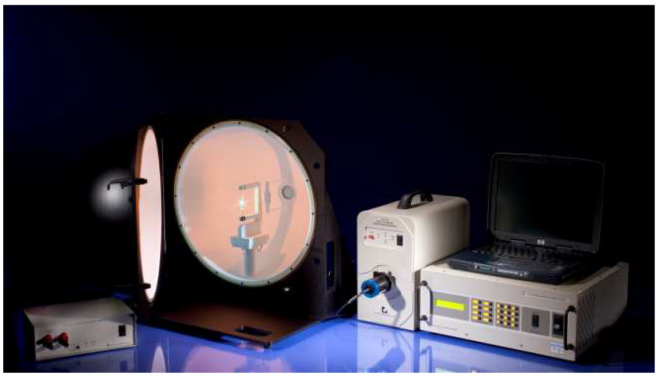
- Are very time consuming.
- Requires data to be taken 360° in both the θ and ϕ directions.
- Equipment is costly, especially for large sources.
- A dedicated room is needed.
- Calibration can be tricky.

INTEGRATING SPHERE

- Easy to use.
- Most widely accepted method for measuring TLF.
- Very fast, samples are placed at the center and data is acquired in a single scan.
- Simple to calibrate using OL 770's integrated calibration routine and aux lamp.

SPECS/FEATURES:

- Convenient USB interface
- 25+ spectral scans/second
- Meets CIE 127 guidelines, Conditions A & B, TLF
- Auxiliary lamp for absorption correction and system throughput changes
- Low stray light performance
- High spectral resolution
- High sensitivity
- High dynamic range
- 0.5 nm wavelength accuracy
- Research-grade precision
- Compact, lightweight, portable enclosure
- Rugged strain relief and self-centering adapter



IN SUMMARY:

- To make TSF measurements, either a sphere or a goniometer coupled to a spectroradiometer can be used, though the sphere is more efficient and is less susceptible to alignment and calibration errors.
- The DUT is placed inside the sphere or at the sphere wall *(i.e. the OL IS-1800 or OL IS-670-LED 6" Integrating Sphere)* and the OL 770 Spectroradiometer performs a system response calibration to compensate changes in throughput of the sphere due to the presence of DUT, holder, etc.
- The OL 770 Spectroradiometer records the Total Luminous Flux value and automatically calculates key parameters, such as Chromaticity, Lab/Luv, Peak Wavelength, Half Bandwidth, etc.

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