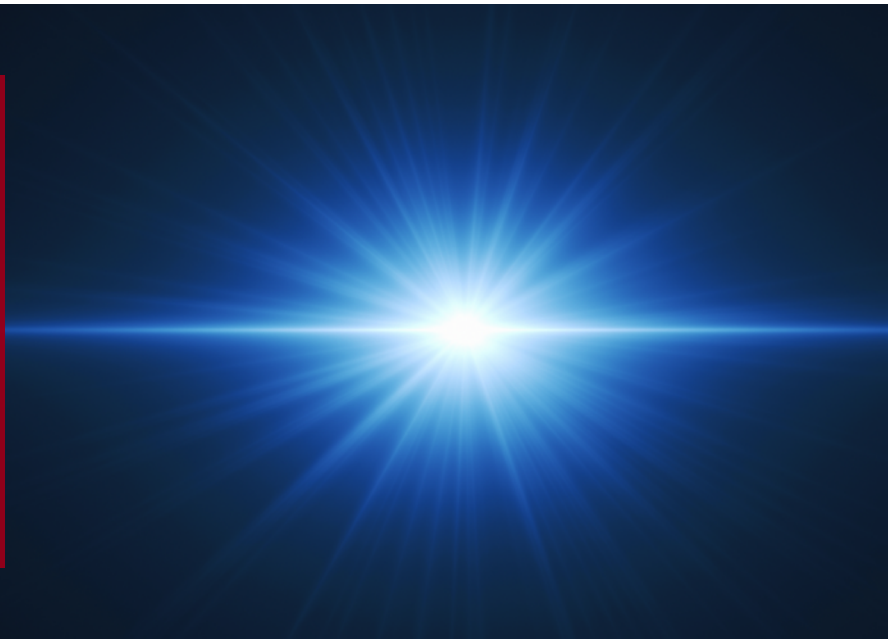
Ultraviolet luminaire performance testing



Interest in ultraviolet (UV) and shortwave UVC products designed with germicidal and disinfection properties in mind have increased awareness of this technology in the marketplace. But questions about product effectiveness, safety, field measurement and assessment remain.

Recent publications, such as the Lighting Research Center (LRC) report on UV Disinfection Products[1], discuss the different dosages[2] for air and surfaces needed to inactivate different pathogens including viruses like the coronavirus responsible for COVID-19. As noted in the report, in practice it can be difficult to ensure dosage in a real-life setting due to environmental factors that can affect the optical radiation.

A main advantage of UVC technology is that the lighting industry can provide a method to disinfect air, surfaces and water without chemicals. With the application of photobiological testing, the risks to humans can be managed. The question remains: how can UV effectiveness be best verified in the field?

UVC characteristics to measure

Measuring and documenting the spectral irradiance at various distances from the source allows verification of specific manufacturers' claims that they wish to relate to dosage rates. Wavelength and power measurements are ways UV lamp and luminaire manufacturers can verify UVC performance output.

- UL Solutions performance testing is conducted according to relevant UL Standards, EN standards and IEC guidelines, with certification resulting in a UL Verified Mark.
- Tests and reports document peak UVC wavelength and maximum irradiance at specified distances.
- Photobiological risk assessment is performed and risk group defined according to IEC 62471.

UL Verified Marketing Claim

The marketplace is filled with millions of brands and innumerable choices. The UL Verified Mark delivers the confidence you need to declare a brand's marketing claim is accurate, truthful and credible.

UL Verification is an objective, science-based assessment that confirms the accuracy of manufacturer's marketing claims. Our independent Marketing Claim Verification process scrutinizes the validity of specific advertising or promotional statements, giving you a way to separate verified fact from fiction.

UL Solutions

UV-C peak wavelength of 254nm±2 and a max irradiance of 83.1µW/m² at 1" 237.1µW/m² at 1'

Figure 2: Example of the approved UL Verified Mark measuring irradiance

Mounting Height: 8 feet

The luminaire was tested with the long axis of the luminaire oriented along the y-axis of the plot.

0.5	1.0	2.0	3.0	4.0	5.0	4.0	3.0	2.0	1.0	0.5	2.5FT
1.0	2.0	3.0	4.0	5.0	6.0	5.0	4.0	3.0	2.0	1.0	2
2.0	3.0	4.0	5.0	6.0	7.0	6.0	5.0	4.0	3.0	2.0	1.5
3.0	4.0	5.0	6.0	7.0	8.0	7.0	6.0	5.0	4.0	3.0	1
4.0	5.0	6.0	7.0	8.0	9.0	8.0	7.0	6.0	5.0	4.0	0.5
5.0	6.0	7.0	8.0	9.0	10.0	9.0	8.0	7.0	6.0	5.0	0
4.0	5.0	6.0	7.0	8.0	9.0	8.0	7.0	6.0	5.0	4.0	0.5
3.0	4.0	5.0	6.0	7.0	8.0	7.0	6.0	5.0	4.0	3.0	1
2.0	3.0	4.0	5.0	6.0	7.0	6.0	5.0	4.0	3.0	2.0	1.5
1.0	2.0	3.0	4.0	5.0	6.0	5.0	4.0	3.0	2.0	1.0	2
0.5	1.0	2.0	3.0	4.0	5.0	4.0	3.0	2.0	1.0	0.5	2.5FT
2.5FT	2	1.5	1	0.5	0	0.5	1	1.5	2	2.5FT	

Maximum Irradiance:	10.0 mW/m²	**Uniformity (min/max):**	0.05
Minimum Irradiance:	0.5 mW/m²	**Uniformity (min/ave):**	0.11
Average Irradiance:	4.6 mW/m²		

Figure 1: Example of a spectral irradiance plot

Specifiers and purchasers increasingly look for products with key performance characteristics independently evaluated and verified. Manufacturers rely on the UL Verified Mark to instill confidence in purchasers of their products and to differentiate their product from those of competitors.

The UL Verified Mark (Figure 2) can to be used on your product and in its marketing. For more information, visit https://Verify.UL.com/why-get-verified.

[1] *https://www.lrc.rpi.edu/programs/nlpip/publicationDetails.asp?id=949&type=2*

[2] *Dosage is the density of optical radiation energy: the product of irradiance and the duration of exposure at the wavelength effective for inactivation of a virus, bacterium or fungus, measured in units of joules per square meter (J m-2).*

Visit us at UL.com/uvlighting to start your irradiance testing and to learn more about other services we can provide for your UVC germicidal products.

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Safety. Science. Transformation.™