Sensors • UVA Detector with LLG Adaptor

PMA2113

Measures Ultraviolet Radiation from 320 to 400nm from Solar UV Simulators Model 16S and 601 Equipped with Liquid Light Guides

Applications

- Laboratory and Industrial Radiometry
- UV Curing, Printing and Photolithography
- Skin and SPF Testing
- Clinical Studies
- Phototherapy
- Environmental Monitoring
- Material Testing
- UV-A Transmission Measurements

Features and Benefits

- High Sensitivity
- Dynamic Range $2*10^5$
- Excellent Long-Term Stability
- Cosine Corrected
- NIST Traceable Calibration
- Radiometric Units

The PMA2113 UVA detector provides fast and accurate irradiance measurement in the UVA region from Solar Simulators manufactured by Solar Light Co. Special mounting hardware allows direct coupling with 9mm Liquid Light Guides (LLG's). Its spectral response covers the 320 to 400nm range (Fig. 1).

The measured irradiance is displayed in mW/cm^2 or W/m^2, user selectable. Consequently, the integrated dose is shown in Joules/cm2 or kJoules/m2. The PMA2113 has a resolution of 0.001 mW/cm2 and a full scale of $200mW/cm^2$ allowing measurement of very week and very strong signals with the same detector. The effect of stray light is negligible.

In conjunction with the Solar Simulator and XPS200 Xenon Lamp Power Supply the PMA2100 with the PMA2103 detector can operate as a smart dose controller/monitor substantially enhancing the functionality of the Solar Simulator.

UVA is less biologically effective than UV-B (280-320nm). However, because of its much greater intensity in sunlight as well as in many artificial sources, and the greater period of the day in which sunlight UVA remains at high intensities, UVA can have significant biological effect. The UV-A radiation can also penetrate deeply into human living tissue through the skin.

Commonly Known Effects of UV-A Include:

Photosensitization of various chemicals, pigmentation of the skin, induction of polymerization. The UVA can also cause erythema or DNA damage in humans or animals, however large doses of UV-A are needed and the damage mechanisms are different than these of UV-B[1].

Several biologic action spectra, functions relating wavelength of the radiation and its biologic effect, are shown in Fig. 3. While they all sow strong dominance of UV-B effectiveness there is still fair UVA response.

SOLAR®
LIGHT

Calibration

The PMA2113 detector is calibrated spectroradiometrically. The output of a Solar UV Simulator Model 16S is measured spectroradiometrically and a total power in the UV-A region is integrated. The PMA2113 detector is then exposed to the same source and adjusted to read the same power as the spectroradiometric measurement. Since the spectral response of the PMA2113 detector differs from an ideal UV-A response (step function from 320 to 400nm) the reading of a source with substantially different spectral power distribution would have to be corrected with a multiplicative factor[2]. This correction factor can be calculated knowing the relative spectral power distribution of the source and the original detector calibration method.Yearly re-calibration of the detector is required.

Specifications	
Spectral Response	320-400nm, Figure 1
Angular Response	5% for Angles <60°, Figure 2
Range	200 [mW/cm2] or 2000 [W/m^2]
Display Resolution	0.001 [MED/Hr], 0.01[µW/cm^2]
Operating Environment	32 to 120 °F (0 to +50 °C) No Precipitation
Temperature Coefficient	<0.1% /°C for Solar Radiation
Cable	6 ft. Straight Cable (1.82m)
Diameter	1.6" (40.6mm)
Height	1.8" (45.8mm)
Weight	7.1 oz. (200 grams)
Irradiance from Typical Sources	Solar Radiation, 30°. SZA, 3mm Ozone Clear Sky: Approx. 4m µW/cm^2 (4.3 MED/Hr)
15W Xenon Lamp at 8"	Approx. 0.05 µW/cm^2 (1MED/Hr)
Solar Simulator Model 16S	50 µW/m^2 (250 MED/Hr)
Ordering Information	
PMA2113	UV-A Detector with LLG Adaptor
See list of accessories for mounting hardware available	

References

[1] The biological effects of UV-A radiation - Edited by F. Urbach and R.W. Gange, Praeger Publishers, New York, 1986
[2] Nichodemus F., "Self study manual on optical radiation measurements", NBS Technical Note 910-1 (1976)

SL/Sensors/PMA2113_09/2014

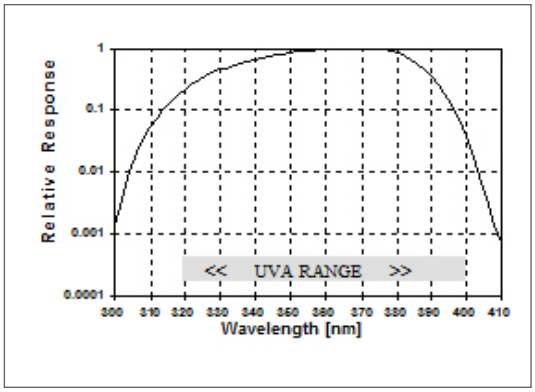

Fig. 1. PMA2113 Spectral Response

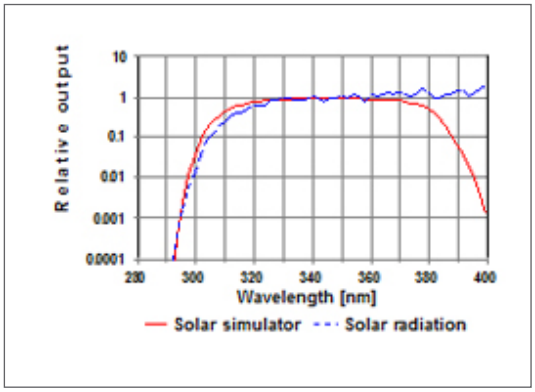

Fig. 2. PMA2113 Solar Simulator Spectral Output

Maintenance

The product in test can come in contact with the optical input area of the detector and cause a reduced reading of the sensor.

Clean the optical input area daily using a cotton-tipped swab with a small amount of Methanol to gently clean the inside of the LLG or homogenizer adapter. Take care not to completely soak the swab with the alcohol. A soaked swab may cause alcohol to seep inside the detector affecting performance and may cause damage. After swabbing, dry the adapter with compressed air.

Common Sources of UV-A Include:

- Low Pressure Florescent Lamps
- High Pressure Mercury and Metal Halide Lamps
- High Pressure Xenon Lamps
- Sunlight