Analog Sensors • UVA Detector
PMA1110

Measures Ultraviolet Radiation from 320 to 400nm from Sun and Artificial Sources

Applications
- Laboratory and Industrial Radiometry
- UV Curing, Printing, and Photolithography
- Skin and SPF Testing
- Clinical Studies
- Phototherapy
- Environmental Monitoring

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

The PMA1110 UVA detector provides fast and accurate irradiance measurement in the UVA region. Its spectral response covers the 320 to 400nm range (Fig.1). The Teflon diffuser assures an angular response close to a cosine function (Lambertian response) making it suitable for measuring diffused radiation or radiation from extended sources. The PMA1110 detector is ideal for measuring mercury, xenon, metal halide or fluorescent lamps, commonly used for studies in the UVA region, as well as sunlight.

The measured irradiance is displayed in mW/cm2 or W/m^2, user selectable. Consequently, the integrated dose is shown in $Joules/cm^2$ or $kJoules/m^2$. The PMA1110 has a resolution of 0.001 mW/cm^2 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.

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 radiation and its biologic effect, are shown in Figure 3. While they all sow strong dominance of UV-B effectiveness there is still fair UVA response.

Common Sources of UV-A Include:
- Low Pressure Florescent Lamps
- High Pressure Mercury and Metal Halide Lamps
- High Pressure Xenon Lamps
- Sunlight

SOLAR® LIGHT

The PMA1110 detector is calibrated spectroradiometrically for a source closely resembling solar UV radiation. A high pressure xenon arc lamp with 1mm SCHOTT WG305 filter is measured spectroradiometrically and a total power in the UV-A region is integrated. The PMA1110 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 PMA1110 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/cm^2] 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
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. 4 mW/cm^2
15W Xenon Lamp at 8"	Approx. 0.5 mW/cm^2
Solar Simulator Model 16S	50 mW/cm^2

Ordering Information

PMA1110	UV-A Detector
PMA1110	UV-A Detector, Analog version
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)

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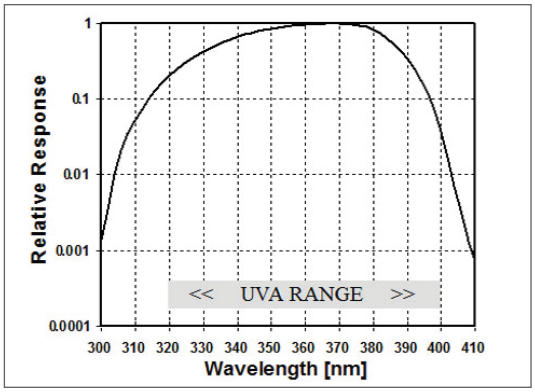

Fig. 1. PMA1110 Spectral Response

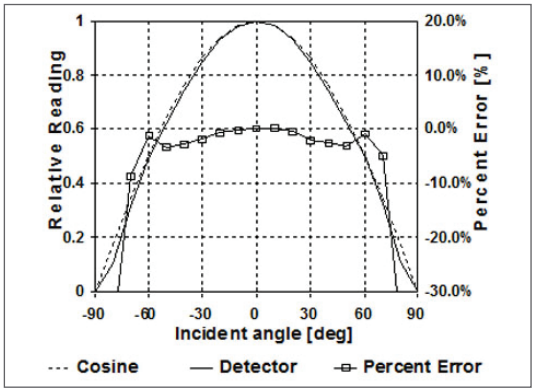

Fig. 2. PMA1110 Angular Response

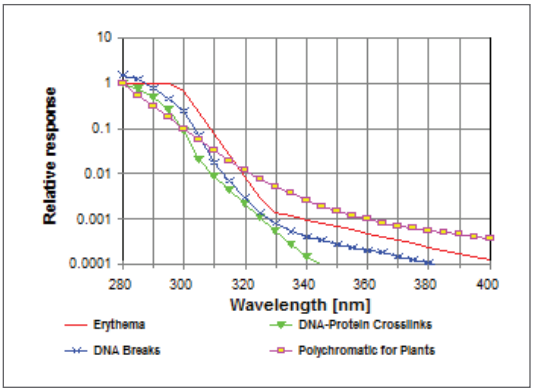

Fig.3. PMA1110 Selected Biologic Action Spectra