APPLICATION NOTE

PHOTODIODE VS PYROELECTRIC DETECTOR FOR MEASURING PULSED UV LASERS? CHOOSE WISELY!

If you have pulse energy in excess of 500 nJ, a Pyroelectric detector is likely the right choice for energy measurements, no matter the pulse width or wavelength of the laser. If you are working with a DUV laser (193 to 308 nm), at this energy level, then you definitely want to use a Pyroelectric detector instead of a Photodiode. Why? Because pyroelectric detectors don't suffer from UV degradation and silicon photodiodes do!

Our Pyroelectric detectors are fast, AC coupled, broadband, sensitive, stable and rugged.

SILICON PHOTODIODES IN THE UV	QS PYROELECTRIC DETECTORS
DUV degradation • The semiconductor materials, like silicon, can't handle much ultraviolet radiation • When exposed over a relatively short period of time, i.e. hours, the optical properties can change and the quantum efficiency be reduced • Attenuators used to avoid exposure also degrade in UV light • The net result? Calibration of the energy detector constantly drifts.	✓ **No UV degradation**
Photo current saturation • Photodiodes can only push out so much current, usually a few milliamps • This equates to about 1 mW of average power or 1 µJ of pulse energy • Once they reach their current limit, the output becomes non-linear in a hurry and is ultimately saturated	✓ **No photocurrent saturation**
DC coupled • Photodiodes respond to background light as well as pulsed • The DC voltage offset produced can be very large and swamp out the pulse voltage	✓ **Fast, AC coupled response that ignores the DC background light**
Non-uniform spectral response over their useful wavelength range • They require accurate, point to point, spectral calibration and correction for accurate measurements	✓ **Broad, flat spectral response, from 0.19 to 15 µm**
Temperature coefficient • Can vary tremendously based on wavelength. Example: 0.1 %/°C at 532 nm, and 1 %/°C at 1064 nm	✓ **Low temperature coefficient over the full spectrum 0.2%/°C**
Optical filters • Neutral density and notch filters are often used to try to minimize the saturation problems • Filters introduce additional issues like: spatial non-uniformity, angle sensitivity, a second temperature coefficient, and UV degradation	✓ **High damage threshold, typically 50 mJ/cm² for a 10 ns pulse, therefore, there is no need to use filters**

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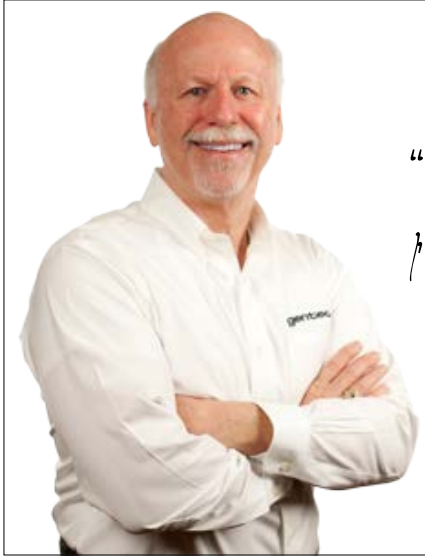
APPLICATION NOTE

IN ADDITION TO ALL THESE ADVANTAGES, OUR QS HYBRID PYROELECTRIC DETECTORS ARE:

- ✓ **Miniature in size (TO5 or TO8 packages)**
- ✓ **Linear response over 6 decades of laser energy**
- ✓ **Low back reflectance from black absorbing surface**
- ✓ **Includes a versatile, hybrid preamplifier**

Pyroelectric detectors are used in many pulsed laser applications in the medical, semiconductor processing, industrial, and military industries. They are an especially good choice when having to measure pulsed UV lasers !



"Just call me,
I'll be glad to help!"

Don Dooley
General Manager
Gentec-EO, USA

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