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greenTEG

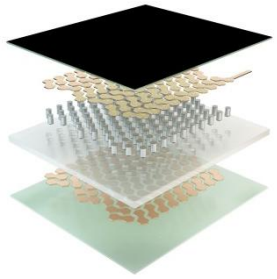
Monitoring average power of IR-Lasers – Expert feedback needed

Lasers in the mid-infrared spectral range have gained increasing importance in a diverse number of applications in industry, science, and medicine. The reason for the increasing importance in many diverse application fields is the favorable trade-off between absorption and power and the strong characteristic vibrational transitions of many important molecules (e.g. polymers) in this spectral range. In most of these applications it is crucial to precisely measure the output power of the used laser.

Detecting the power of IR-lasers can be difficult as the standard photodiode technologies work only up to 2.5 µm. For ranges 2.5µm and higher only MCTs, InAsSb diodes, and thermal sensors (pyroelectric, thermoelectric) can be used. At greenTEG, we believe that each of these technologies has its own advantages.

IR Detectors	gSKIN® Thermopile	MCT Photodiodes	Pyroelectric	Radial Thermopile
Spectrum	190nm – 15µm	2.5µm - 12µm	190nm – 25µm	190nm – 15µm
Power Range	µW – W	nW - mW	nW – mW (no CW)	mW – kW
Size (dimensions & thickness)	>2mm x 2mm x 0.6mm	>10mm x 10mm x 5mm (TO housing)	>10mm x 10mm x 5mm (TO housing)	>Diameter 12mm x 3mm
Response time	msec - sec	µsec	msec	sec
Price	$$	$$$$$	$$$	$$$$
Sensor signal	Wavelength independent	Wavelength & angle dependent	Wavelength & angle dependent	Wavelength independent
Especially suited for	Average power monitoring mid to low power	High resolution and fast response time applications	Pulse energy measurements	Full beam high power monitoring

MCT photodiodes are highly sensitive, have fast response times, and are high priced. While pyroelectric detectors are especially suited to measure pulse energies due to their fast response times, they cannot measure CW light. Radial Thermopile detectors are first choice when it comes to measuring direct beam high power laser systems in the 50 W to kW range.



The gSKIN® Laser Power Sensors are a combination of the field-tested and widely used thermopile technology and an innovative new structure. With this combination you are able resolve µW of IR power and measure with a constant sensitivity across a broad spectrum. At the same time the sensor offers a compact and cost-effective solution. You can mount the sensor by soldereing, gluing or screwing wherever you want to measure. Due to the high power resolution (<10uW) and the signal tolerance to varying beam size, angle and position, the gSKIN® enables measurement uncertainties down to 10^{-4}. If you are looking for a precise and cost-effective monitoring solution of your IR laser source or system and are able to work with 800msec of response time, the gSKIN® is probably the best choice.

A popular integration of the sensor is Thorlabs' power meter (http://www.thorlabs.de/thorcat/MTN/S401C-SpecSheet.pdf),which is mainly used for production control of Quantum Cascade Lasers (QCLs).

As the IR market is developing fast, we believe that appropriate technologies are needed to ensure the benefit and safety of these systems. Together with experts, we want to find out which parameters are most crucial. Is it resolution, price, ease of integration, response time, linearity, ...? Therefor we strive to get your input. We highly appreciate your cooperation!