SiTek welcomes all customers and suppliers to the Components & Electronics

Meet us in **booth 4:42** at the Swedish exhibition congress centre in Gothenburg the 2 – 5 September. We are now introducing the new SPC-PSD, a high linearity sensing detector with signal processing circuit. Take the chance to see this product and let us tell you about its unique features. With 27 years of close co-operation with our customers in design, testing and optimising we are very proud of our customized PSDs. Take this opportunity to discuss your non-contact measurement needs with us, for instance inspection, control or motion, and we will find the perfect solution for your system. You can of course also see our wide range of standard products which are used in a broad variety of applications.

komponent elektronikproduktion
components & electronics production
2003 2-5 sept

SEE us in Booth 4:42

Other Exhibitions

Country	SiTek distributor	Exhibition	Date
Germany	Laser Components www.lasercomponents.de	Laser 2003, Munich	23-26 June
Japan	Autex Inc www.autex-inc.co.jp	Inter Opt, Makuhari Messe in Chiba	15–18 July
U.K.	BFI Optilas www.bfioptilas.co.uk	Photonex Europé , Coventry	8–9 October
USA	On-Trak www.on-trak.com	Photonics West, San Jose, CA	27-29 Jan, 2004

For further information about the exhibitions please contact the distributor in your area, or us, **info@sitek.se**

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The Art of Tuning Lasers

Controlling light often means controlling very small and precise mechanical movements. This for certain holds true for Radians Innova's compact tunable laser sources used in fiber optic test and measurement instruments from leading companies all over the world. The products are made possible by a unique combination of skills in optics, electronics and fine mechanics together with 25 years experiences of building tunable lasers. And, of course, customized PSDs from SiTek.

A tunable laser plays the same role for testing a fiber optic component as a function generator plays for testing electrical components: To stimulate a response that can be detected and analyzed. The demands on the output signal are also similar: both have to be very accurate and stable in terms of power and frequency. The difference? Light is much, much harder to control.The core of Radians PICO™ family of products is an external cavity laser in which one end of a laser diode is "opened up" and replaced by a grating relatively far from the diode. This means that most of the cavity where the lasing takes place is outside the diode, hence the word external cavity. A laser diode usually emits light at a very distinct and fixed wavelength corresponding to the length of the cavity. By opening up the cavity and letting the light bounce at a well defined grating placed on a movable arm, the wavelength of the light can be tuned by just tilting the arm. Depending on the angle, the grating will allow just one specific wavelength to live at a time.

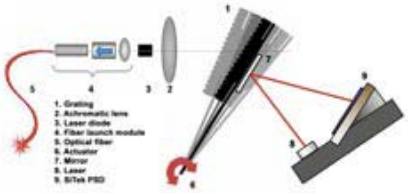


Figure 1 The principle of an external cavity based tunable laser source.

A tunable laser used for testing and measuring can span more than 100 nanometers (nm, or millionths of millimeters), typically centered at 1550 nm (infrared). This is where most fiber based telecommunication takes place. The wavelength of the laser could be either swept continuously (up to 200 nm/s) or randomly accessed, both with a very high precision. To achieve a wavelength resolution of 0.001 nm, one has to know the exact

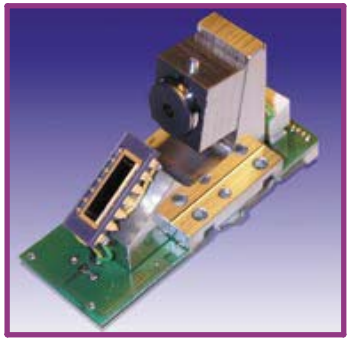


Figure 2. The triangulation unit consists of a laser unit (mounted in the "cubic" housing) and a one-dimensional position-sensing detector from SiTek. The detector is mounted directly on the mechanical support structure in order to obtain maximum stability.

position of the arm. This particular product specification can only be met by a complex control system, sensing both the angular speed of the arm carrying the grating and sensing the exact angular position of the arm. An angular displacement of the order 8 degrees, between angles corresponding to maximum and minimum wavelengths respectively, yields a wavelength tuning range of about 120 nm. The wavelength resolution of 0.001 nm can thus be expressed as a required angular resolution of about 0.00007 degrees!

The system used for measuring the position is a classical triangulation system built around a laser diode, a position-sensing detector from SiTek, and a mirror mounted on the arm, see figure 1.

Obtaining the high resolution was a demanding task. During the development phase Radians Innova have had numerous in depth discussions with SiTek concerning the physics and the processing of the PSD devices. These discussions, combined with our skills concerning clever design of the electronic circuitry and selection of the laser diode made it possible to achieve the high angular resolution. The Radians PICO™ family of tunable lasers now offers the market's best combination of wavelength and dynamic range, tuning speed, accuracy and resolution, all in compact modules.

Seminar in Stockholm

In the beginning of April the one-day seminar "Optical non-contact measuring for the manufacturing industry" was arranged by Swedoptronics in Stockholm, Sweden. The seminar session contained nine talks and SiTek presented the interesting talk "PSD – nanometer resolution and nanosecond measurement" where the possibilities and advantages of using PSD devices in manufacturing industry applications were illustrated. With its focus on high speed applications as well as applications with extreme resolution, the talk generated great interest and positive feedback from the audience. Together with the seminar, an exhibition was held showing optical products related to non-contact measuring suitable for the manufacturing industry. At this exhibition SiTek presented, for the first time, its new product, the SPC-PSD. Bearing in mind the positive response for this PSD with on-board signal processing electronics, we believe that it will be a great success.

R & D Manager Mr Lundgren speaks about using SiTek PSDs in nano range measuring

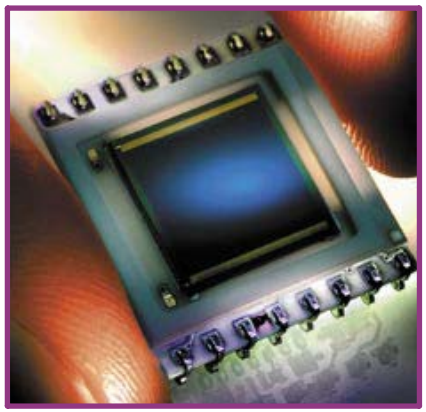
Worthy of Credit

SiTek is proud to announce that for the 4th year running, it has been awarded the Dun & Bradstreet AAA certificate for highest credit worthiness. Our financial strength and liquidity have been recognised once again by D&B, who hold information on the creditworthiness of 70 million companies worldwide. Less than 5% of the 260 000 incorporated companies in Sweden receive the award and SiTek is one of them. The D&B Credit Rating is built up around an estimate of the 4 following fields: **Fundamental Data, Ownership, Economy, Payments.** Under each of the above mentioned fields a number of partial-elements are valued. This determines the final credit rating and the maximum credit recommended. To achieve an AAA-credit rating, SiTek showed that it has a solid economy, stable managment and a good ability to comply with actual payment obligations. Only a few companies go through the eye of the needle!

The Summer Holidays are here !!

SiTek wish all Non-Contact readers a nice, warm and relaxing summer holiday. The office is closed from 14/7 - 25/7.

Introducing the SiTek SPC-PSD



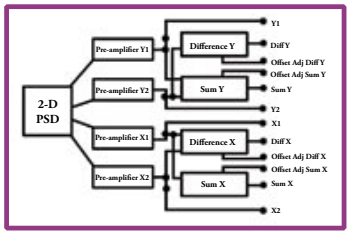
SiTek's 2L10_SU65_SPC_01

When using a PSD there is usually the need for some analog signal processing of the PSD signals.
In order to facilitate this task, SiTek has designed an analog signal processing circuit (SPC) that converts the output photocurrents from the PSD to voltages. These bipolar voltages are processed and output as difference- and sum-signals and represent the position and intensity of the centroid of a light spot on the PSD.

The differential signal is directly proportional to the current difference between the photocurrents from one electrode pair on the PSD and thus, for constant light intensity, represents the position of the impinging light spot between the electrodes. For a one-dimensional PSD there is only one differential signal to keep track of. The two-dimensional detector has two electrode pairs and hence there are two sets of differential signals.
If light intensity is not constant the differential signal will vary proportional to the light intensity making it impossible to get the desired position information. The remedy is to divide the differential signal with a signal proportional to the intensity of the impinging light. Such a signal is the sum signal, which is proportional to the sum of the photocurrents from an electrode pair and thus to the total photocurrents. As for the differential signal there are one or two sets of sum signals – one for each electrode pair. It may seem unnecessary to have two sets of sum signal for the two-dimensional case as in theory both the two sets should equal the total photocurrent. But in many instances it is practical to have access to both the pairs of sum signals as they have opposite polarity. Also from an accuracy point of view it is advantageous to use the same currents as were used to form the difference signal to form the sum signal. By doing this the influence of any deviations in amplification in the different steps will be minimized.

The SiTek SPC uses FET current to voltage converters (transimpedance amplifiers) that simply consists of just a FET op-amp and a feedback resistor of 100 k ohms. Provisions are made for bias supply to the PSD by means of a resistor and a voltage divider on the op-amp positive input that restores zero voltage output for zero photocurrent input.
Field effect (FET) op amps are used because of their high input impedance, low noise and small op-amp input currents.
All the outputs of the transimpedance amplifiers are available on the SPC pins.
The difference signals are formed in a couple of differential op-amps. The all over amplification in these stages is set to 1. In order to satisfy the most demanding applications, there is also an offset adjustment input for both differential amplifiers.

The same goes for the two summation amplifiers where offset also can be adjusted. The sum signal (intensity signal) is intended for compensation of the position signal intensity dependence. This can be accomplished by dividing this signal by the intensity signal or by using the intensity information in a feedback loop for regulating the light source to give a constant illumination on the PSD.



Block Schematics

The dynamic properties of the SPC are excellent with a 400 kHz bandwidth and a slew rate of 13 V/µs.
In order to obtain maximum precision, high reliability and small size the SPC is built using thick film technology and laser trimmed resistors on a 20,5 x 20,5 mm² ceramic substrate. The SPC is delivered with surface mount leads, but these can upon request be changed for DIL leads.
Normally the SPC comes complete with a 2L10 or 2L4 PSD or any of our one-dimensional PSDs. But of course, the signal processing circuit can also be used as a stand-alone front-end together with any of our PSDs.

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