

Pump-Probe Setup

The common experiment for time-resolved measurements on ultra short time scales (ps) is an optical pump-probe setup. A sample responds to a laser pump pulse (e.g. change of reflectivity or transmission) that is probed by a second laser pulse variably time delayed with respect to the pump pulse. For fast measurement times the SaturnFastScan System uses a rapid scanning delay generator to achieve the necessary time delay. This technique allows to average 1 mill. scans within minutes. The complete system of Saturn and the mechanical environment is driven by a single clock source for maximum trigger accuracy. A typical signal to noise ratio of 10^6 to 10^9 for semiconductor pump-probe measurements is achieved.

Options for Pump-Probe Setup

- D/A converter with max. amplitude of +/- 10V and frequencies up to 100 MHz
- Self calibrating amplifier for delay generator (shaker) driving
- Variable stepping and dc-based motor system integration

Special Applications

- Optical pump-probe setup with femtosecond laser pulses for analyzing sub-ps phenomena e.g. phonon relaxation in semiconductors, liquids and other material systems
- Pump-probe, four-wave mixing and other time resolved optical measurements
- Measuring of laser damping by absorbing analytes in gas sensing applications
- Applications with high repetition rate fs laser sources ($> 1\text{GHz}$)
- Real-time autocorrelation measurements
- Quick detection of coherently generated THz-pulses for e.g. material characterization
- Analysis of doping in semiconductors
- Imaging applications in tomography or transillumination
- Analysis of biological samples (e.g. DNA)
- Sensitive analysis of humidity (e.g. in human dermis, in drying processes)

Contact

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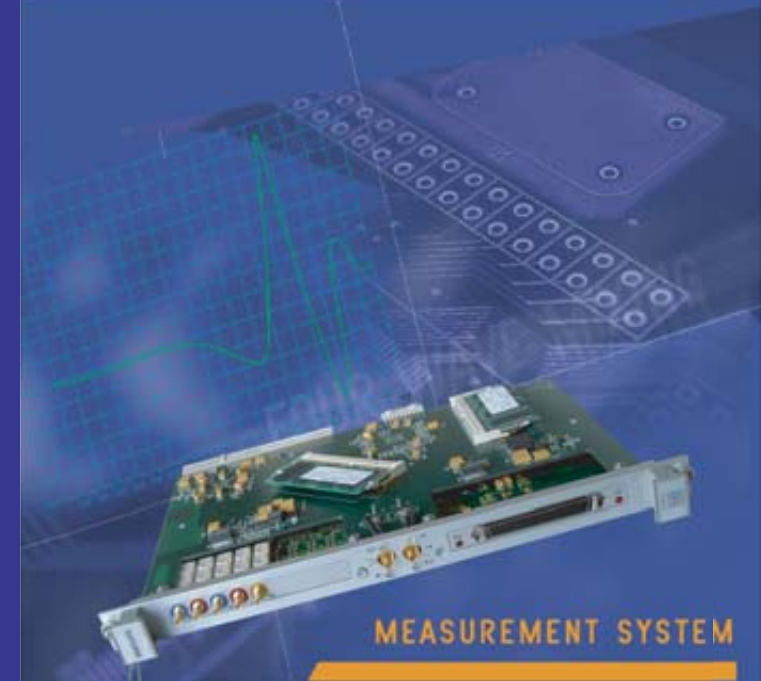
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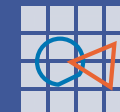


MEASUREMENT SYSTEM

SaturnFastScan

Signal Averaging System

- **18 bit Resolution @ 100 MHz**
- **Up to 1 mill. Averages**
- **108 dB SNR**
- **1GB XXL Memory for 1.28 sec. Acquisition Time at 100 MS/s**
- **No Memory Segmentation**
- **Real-time Averaging**



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Signal Averaging

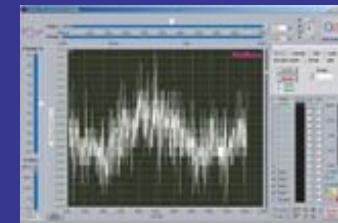
- Multiple differential channels with signal conditioning and gain / offset calibration
- 100 MS/s real-time sampling and averaging per channel
- 100% synchronous acquisition
- > 80 MHz analog bandwidth
- 12 bit dynamic range (32 bit in high precision mode)
- Averaging memory of 128 Mpoints per channel
- Averages selectable from single shot to 1 mill. scans
- Acquisition time up to 1.28 sec. per scan at 100MS/s
- Shortest repetition time (<2 μ s) between individual scans
- GHz PC with 10/100 LAN and CDRW for easiest data access
- Automatic calibration
- Saturn Studio LabView application for full environmental control
- Drivers and SW-API complete with application code examples

SaturnFastScan

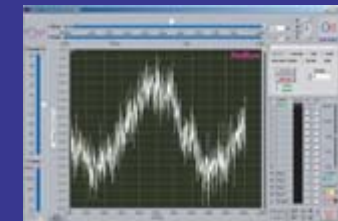
Signal averaging reduces random noise effects on repetitive signals dramatically; it improves the SNR and enhances the resolution as well as the dynamic range. The SaturnFastScan system scales the power of signal averaging to unprecedented regions of performance. Freely scalable, from a single shot up to 1 mill. scans can be averaged on multiple synchronous channels at a time, 100 MS/s each. Up to 1GB XXL memory per channel makes SaturnFastScan first choice for long acquisition times at high sample frequencies. As data processing is performed in parallelized hardware, the results of averaging are available as soon as measuring is completed.

Example

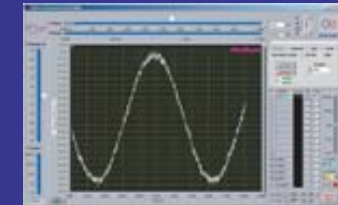
As an example the SaturnFastScan system acquires data for e.g. 10 μ s at 100 MS/s with 12 bit resolution. To achieve the 32 bit high resolution value 1 mill. scans are needed to average the precision signal. SaturnFastScan succeeds within only 12 sec., the results of different averaging stages are displayed in the screenshots.



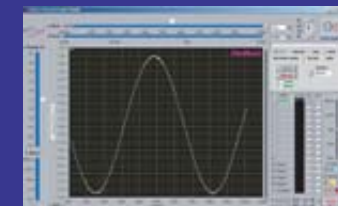
Single scan of noisy sine wave



10 FastScans



1,000 FastScans



1,000,000 FastScans

Saturn Studio screenshots of noisy sine wave measured conventionally and the process of improvement of SNR by signal averaging.