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Motivation

- Challenging applications need better S/N ratio
  - Low exposure Dielectric Etch and Ion Beam Etch
  - Advanced Process Control and Fault Detection
  - Any process that is S/N challenged

- Verity wants to continue to lead the industry

- The SD1024FH represents a significant step in that direction
Maximize Signal to Noise ratio for:

- Improved Endpoint capability
- Increased dynamic range for APC (advanced process control) and fault detection applications

Accomplished with:

- ~75% greater optical throughput
- Proprietary data acquisition scheme
- Novel signal processing methods
- Superior system noise control
SD1024FH Features

- Spectral range: 200 - 800 nm
- Scientific grade CCD – back-thinned, TE cooled, and deep well
- Optimized UV response
- Resolution < 2nm
- Background Noise ~ 1-2 counts
- Signal to Noise Ratio > 1000 at Full Scale
- Readout Time 7msec
- Single or multi-fiber input
- Interface to SpectraView™ software
  - Including PHD™ for APC\FDC
Comparison: Low-Light Trend Resolution

The SD1024F and SD1024FH see the same light source at the same time.

A small change of 15 counts on a signal of 500 counts is clearly seen with the SD1024FH, and very hard to resolve with the SD1024F.

Conditions: a stable LED at 387nm is monitored at a ½ nm region at 100 ms.
Sample Low-Light Spectrum

The low noise capability of the SD1024FH provides much improved dynamic range as shown by the data at left.

This data is from a side by side test using a Xe flashlamp at very low intensity. It represents a single spectrum with each instrument collected at 13ms integration time.
Trend Line Comparison

Notes:
- 5 sample data smoothing is used with both sets of data
- The S1024D run had higher power setting and different wafers
Summary

- The SD1024FH offers significant improvement in S/N ratio compared to the SD1024F and SD1024D
- The improvement is most dramatic at “low” signal levels
- All signal levels show some improvement due to increased signal intensity
Appendix

SD1024FL

Line Array Spectrometer
Overview

- The SD1024FL is a replacement for the SD1024DL
  - RoHS-Compliant
  - Incorporates back-thinned CCD for superior UV performance
  - 200-800 nm spectral range (optionally to 1100 nm)
  - Lower noise than the SD1024DL
  - Better sensitivity than SD1024DL at most wavelengths
Summary

- The SD1024FL includes some of the same improvements as the SD1024FH

- The Signal to Noise ratio of the SD1024FL is 3.5 – 8x times better than the SD1024DL due to:
  - Lower noise of the SD1024FL
  - Better sensitivity of the SD1024FL vs. the SD1024DL