

SHAKTI PR-1000 RAMAN ANALYZER

The latest in spectrometer, probe and diode laser design and technology is combined to produce this affordably priced, high performance, process ready Raman spectrometer system.

Applications in the Pharmaceutical Industry

- Raw material ID
- Coating content
- Polymorph screening
- Determine amorphous content
- Track process-induced transformations
- Measure drug concentration in dissolution medium and quantitate solid phase transformations in situ
- Determination of hydration mechanisms in situ
- Analyze solid phase transformations during fluidized bed drying

System Features

- ✓ High resolution
- ✓ Wide spectral range
- ✓ High sensitivity
- ✓ Short integration times
- ✓ Back thinned 2DCCD
- ✓ Auto-calibrating
- ✓ Adjustable spot size
- ✓ Adjustable working distance
- ✓ Focusing not required
- ✓ Large sample volume
- ✓ Non-invasive
- ✓ Non-destructive (low to no sample heating)
- ✓ Fiber coupled
- ✓ Narrow line-width, stable excitation source

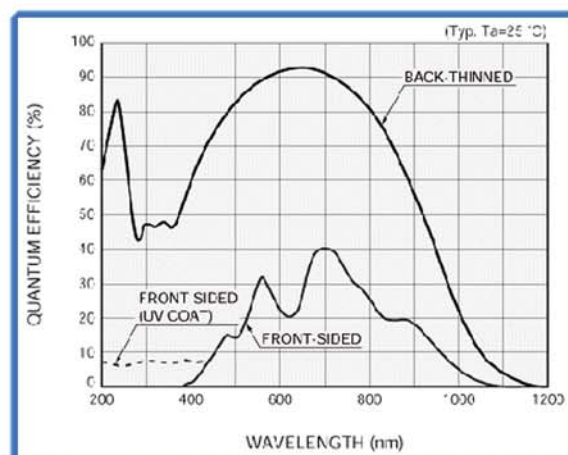


Spectrometer

The spectrometer is based on a patented, retro-reflective concentric configuration – an innovative, high reciprocal dispersion design. This optical design yields high optical efficiency and imaging resulting in superior resolution, photometric accuracy, and improved quantitative analysis across extended spectral ranges. Each spectrometer has an original convex, aberration-corrected, very high efficiency holographic diffraction grating which uniquely controls all diffracted rays to dramatically reduce stray light. High throughput, f/2.4 optics ensure high spectral resolution across extended spectral ranges while achieving high signal to noise ratios. This enables detection of weak signals or reduced integration times. The spectrometer is rugged, with no moving parts.

Detector

- ✓ Thinned, back illuminated, full frame transfer
- ✓ 2DCCD
- ✓ 1024 x 256 element CCD (24 micron pitch) or
- ✓ High Quantum Efficiency in the NIR region
- ✓ Ideal for low light applications
- ✓ Good linearity





Fiber Optic Probe

Our fiber optic probe, with an adjustable spot size and working distance, is very user friendly. You can sample a large area or volume, non-destructively, without heating the sample. No focusing required. The probe is compact and rugged. A NIST traceable wavelength calibration source and white reference is built into the probe head. All calibrations can be done with the probe in use, without taking the probe off of the vessel.

High Performance Diode Laser

Our laser features high output power with narrow spectral bandwidth. The laser's stabilized peak wavelength remains "locked" regardless of case temperature (-10°C to +55°C). These lasers feature high side mode suppression ratios, providing extremely high signal to noise ratios.



Specifications:

Spectrometer

- Effective f/#: f/2.4
- Spectral Coverage: 130 cm⁻¹ to 2400 cm⁻¹
- Spectral Resolution
 - 4 to 5 cm⁻¹ FWHM with 1024 x 256 element detector, 24 micron pitch
- Holographic Grating: High efficiency, aberration corrected original
- Maximum stray light: 10⁻⁴

Probe

- 90 fiber bundle pickup, resulting in ~ 6mm tall image
- Variable spot (sample) size, with interchangeable lenses
- 200 micron laser coupling fiber
- > 10⁻⁸ Laser rejection, option for additional filter and greater rejection

Detector

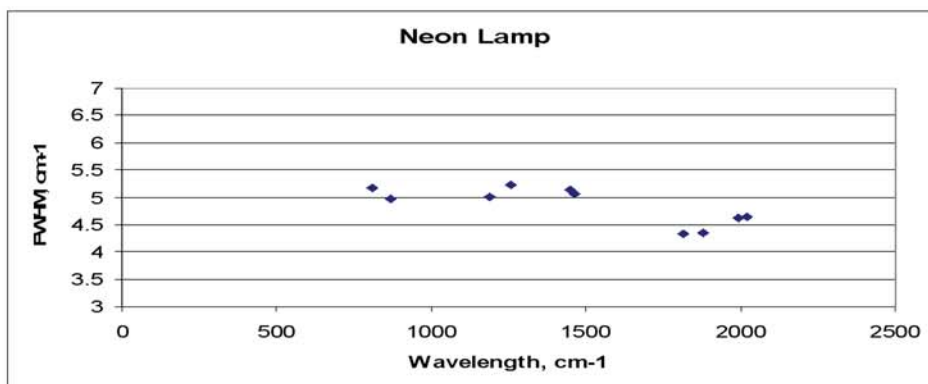
- Array 1024 X 256 (24 micron pitch)
- Pixel binning
- Low read out noise ~8 electron rms
- Dark current @ 0°C ~200 e⁻/pixel/s*
- Wide dynamic range ~50,000:1**
- Cooled operation One stage T.E. cooler (optional 2 stage)
- Full well capacity Vertical: 300,000 electrons
Horizontal: 600,000 electrons

Laser

- 785 nm excitation wavelength
- Up to 400 mW coupled output power
- Spectral line width < 0.07nm (1 cm⁻¹)
- Temperature stabilized spectrum (<0.007 nm/°C)
- Low power consumption (<5.5W)
- 40 dB SMSR typical

*Dark current nearly doubles for every 5 to 7°C increase in temperature

** Dynamic range = Full Well/Readout noise



Resolution of Spectrometer with 1024 X 256 element array