

MiniRam[®]

Portability with Optimum Performance



The MiniRam[®] is an ideal instrument for conducting feasibility studies and teaching Raman methods of materials analysis. By combining CleanLaze[®] technology with our TE-cooled spectrometers, the MiniRam[®] provides the best accuracy and repeatability in its class. It is available with a choice of a 532nm or 785nm excitation laser. Its small footprint and light weight design allow easy portability.

Features:

- Spectral Resolution of 10cm⁻¹
- 175cm⁻¹ of the Rayleigh Line (65cm⁻¹ Option Available)
- Small Footprint and Lightweight
- Patented CleanLaze[®] Technology for Laser Stabilization
- TE Cooled 2048 pixel CCD Detector
- Fiber Optic Interface for Convenient Sampling

Why Choose Raman?

- No sample preparation required
- Measure through glass, quartz, plastic (non-contact)
- Samples can be solid, liquid or gas, transparent or opaque
- Small sample size to reduce cost
- Wide spectral coverage for diversity of applications
- Spectra that is more clean and precise than FTIR or NIR

Specifications:

Lasers	
532nm Excitation	> 50mW*
785nm Excitation	> 300mW*
Laser Power Control	532nm, 785nm
Spectrometer	
Spectral Range (532nm)	175cm ⁻¹ - 4000cm ⁻¹
Spectral Resolution (532nm)	15cm ⁻¹ @ 614nm**
Spectral Range (785nm)	175cm ⁻¹ - 3150cm ⁻¹
Spectral Resolution (785nm)	10cm ⁻¹ @ 912nm**
Detector	
Detector Type	TE Cooled Linear Array
Pixel Number	2048
Pixel Size	14µm x 200µm
TE Cooling Temperature	10°C
Dynamic Range	300:1 (typical)
Digitization Resolution	16-bit or 65,535:1
Readout Speed	500 kHz
Integration Time	5ms - 2 minutes
Electronics	
Compute Interface	USB 2.0 / 1.1
Power Consumption	15W
Power Options	
DC (Standard)	5V DC
Battery	Optional
AC (100 - 240V AC, 50 - 60Hz)	Optional
Physical	
Dimensions	22.6 x 16.3 x 8.4cm (8.9 x 6.4 x 3.3in)
Weight	~1.95 kg (~4.3 lbs)
Operating Temperature	10°C - 35°C
Storage Temperature	-10°C - 60°C
Humidity	10% - 85%

Accessories:

Raman Probes
Cuvette Holders
Probe Holders
Video Microscope
Microscope Adaptor
Raman Flow Cells
Laser Safety Goggles

Applications:

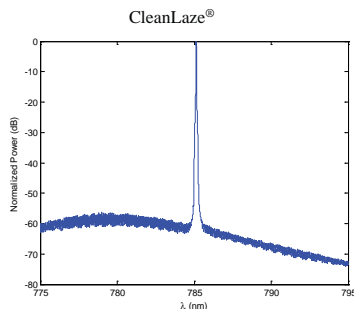
Bioscience and Medical Diagnosis
Pharmaceutical Industry
Raman Microscopy
Polymers and Chemical Processes
Environmental Science
Forensic Analysis
Gemology
Geology and Mineralogy
Food & Agriculture Industry
Semiconductor & Solar Industry

Excitation Wavelength

Laser

Creating Raman Scatter

In Raman spectroscopy it is essential to utilize a clean, narrow bandwidth laser due to the fact that the quality of the Raman peaks are directly affected by the sharpness and stability of the delivered light source. The MiniRam® series spectrometer systems feature a patented CleanLaze® technology with a linewidth < 0.3nm when equipped with our 785nm laser. This technology results in the correct center wavelength and avoids the phenomenon of "mode hopping." In addition, the laser output power can be adjusted in the software from 0 - 100%, allowing you to maximize the signal-to-noise ratio and minimize integration time.



Laser lifetime of 10,000 hours ensures quality data for years to come!

Near-Excitation Raman

Filter

Collects Data within 175cm⁻¹ of the Rayleigh Line

The center wavelength of the laser line is precisely maintained even when the peak power is increased by utilizing a series of high end filters. A laser line filter is used to clean up any side bands and ensure a narrow excitation is delivered to the sample by removing all secondary excitation lines before exciting the sample. The light collected from the sample is then filtered via a notch filter. Finally, an ultra steep long pass filter further removes lingering laser line to allow accurate measurement of Raman peaks as close as 175cm⁻¹ from the Rayleigh line. An E-grade Filter upgrade is available allowing the measurement of Raman peaks as close as 65cm⁻¹ from the Rayleigh line.

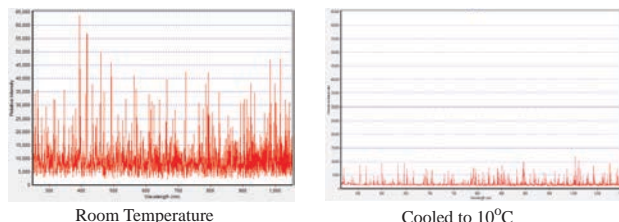
Low-Light Level

Detector

Cooled Detector for Low-Light Level Detection

Cooling an array detector with a built-in thermoelectric cooler (TEC) is an effective way to reduce dark current and noise to enhance the dynamic range and detection limit. The graphs below show the dark current and noise for an uncooled versus cooled CCD detector at an integration time of 30 seconds. Operating at room temperature, the dark current nearly saturates the uncooled CCD. When the CCD is cooled to 10°C, the dark current is reduced by four times. This allows the spectrometer to operate at long integration times and detect weak optical signals.

Dark Current: Uncooled vs. Cooled CCD Detectors at 30 Seconds

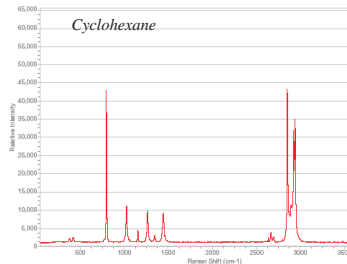


Sharp Resolution

Spectrometer

Optimized for Raman Spectroscopy

The standard configurations for the spectrometer in the MiniRam® are for 532nm and 785nm laser excitation wavelengths. The Crossed Czerny-Turner optical design achieves a spectral resolution of 10cm⁻¹, while simultaneously keeping the footprint of our MiniRam® small. This brings an enormous advantage for field Raman applications.



Easy Sampling

Probe

Easy Transition Between Sample Types

The probe allows for measurement of various materials in the form of liquids, gels, powders, or solids under both lab conditions (Lab Grade) or demanding environmental conditions (Industrial Grade). Constructed with state-of-the-art telecom packaging techniques, the probe has a flexible fiber coupling encased in a durable protective jacketing material which delivers Rayleigh scatter rejection as high as 10 photons per billion. Wavelength excitation probes come in 532nm or 785nm.

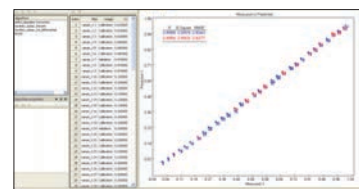
Custom wavelength excitation probes available.

Convenient

Software

State of the Art Chemometric Software

B&W Tek offers comprehensive software packages that provide solutions all application needs. Powerful calculations, easy data management, and user friendly easy-to-follow work flow!



BWSpec™ is the foundation for all B&W Tek software platforms and come standard with every spectrometer. Built on the proven BWSpec™ platform, BWID™ is optimized for identification and verification of materials. For industrial Raman applications that require federal compliance: BWID™-Pharma supports all requirements for FDA 21 CFR Part 11 Compliance.

The most recent addition to B&W Tek's software portfolio, BWIQ™ chemometrics software for use with the MiniRam® and other high resolution Raman products. BWIQ™ is a multivariate analysis software package which can analyze spectral data and discover internal relationships between spectra and response data or spectra and sample classes. By coupling new and transitional chemometric methods with cutting edge computer science technology such as sparse linear algebra algorithms, BWIQ™ represents the next generation in speed, accuracy, and performance.