

Raman Solution

NanoRam®

Handheld Raman Spectrometer



The NanoRam® is a state-of-the-art compact Raman handheld spectrometer and integrated computing system for material identification and verification within cGMP compliant facilities. Designed for use by non-specialists, the NanoRam is easy to use and operates single-handedly, weighing less than 2.2lbs. It allows rapid development of standardized and validated methods to facilitate inspection for purity and quality, making it the ideal choice for pharmaceutical, chemical, and material identification, whether in the lab, the warehouse, the loading dock or the field.

The NanoRam is the only handheld Raman device that features a temperature controlled detector, providing superior data quality and unprecedented system stability. Coupling this proprietary thermoelectric cooling with our patented CleanLaze® laser stabilization technology and high speed micro-processor, it provides laboratory performance in the palm of your hand. The first rate signal reduces the need for further testing, therefore decreasing production costs and escalating productivity, all at the same time.

B&W Tek offers a wide variety of services designed to suit your needs, including extended warranty plans, annual recertification services, assistance with method and/or new library development and other services such as support with IQ/OQ/PQ validation.

Features:

- Advanced Statistical Algorithms for Identification & Verification
- Wi-Fi & USB Communication for Data Sync & Management
- Intuitive Software for Technical & Non-technical Users
- Sampling Accessories for Almost Any Environment
- Easy Library & Data Transfer Capabilities

Why Choose Raman?

- High Selectivity With No Sample Preparation Required
- Measure Through Plastic, Glass, & Quartz Packaging
- Samples Can Be Solid or Liquid, Transparent or Opaque
- Compliant With USP, EP, JP, IP, and FDA Guidelines

Applications:

- Incoming Material Identification & Verification
- At-line Sampling and Final Inspection
- Counterfeit Drug Detection

Specifications:

Excitation Wavelength	785nm ± 0.5nm, Stability <0.5cm ⁻¹ , Linewidth <2.0cm ⁻¹
Laser Output Power	300mW Max Adjustable in 10% Increments
Spectral Range	176cm ⁻¹ to 2900cm ⁻¹ (Option to Extend Range to 3200cm ⁻¹)
Spectral Resolution	~ 9cm ⁻¹
Detector Type	TE Cooled Linear CCD Array
Display	High Visibility OLED
Bar Code Reader	Supports Linear Standards
Software	NanoRam® OS (Embedded), Nanoram® ID (PC) & iSpec™ Mobile (iPad®)
Data Formats	.txt, .csv, .spc
Connectivity	USB 2.0, WiFi
Battery	Rechargeable Li-ion, >5 hrs Operation
AC Adapter	Output: DC 12V, 2A Minimum
Weight	<2.2 lb (1.0 kg)
Size	8.8in x 3.9in x 2.0in (22cm x 10cm x 5cm)
Operating Temperature	-20°C to +40°C
Storage Temperature	-30°C to +60°C

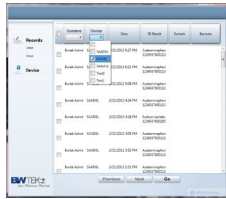
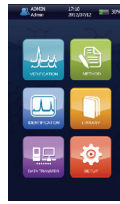


Convenient

Software

State of the Art Identification Software

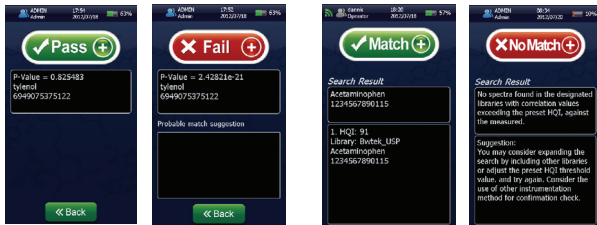
The NanoRam comes standard with B&W Tek's proprietary Nanoram OS installed within the unit, which allows for identification and verification, library and method development, and data storage/ transfer. The Nanoram ID is designed for use on PCs and the iSpec Mobile is for tablet computers (such as the iPad) for data and methods management, allowing customers to export data and generate reports. The Nanoram ID and the Nanoram OS software packages are 21CFR part 11 compliant with available IQ/OQ validation documentation for pharmaceutical customers.



Additionally, the NanoRam provides Wi-Fi synchronization capabilities with network terminals in order to optimize time and resources. Nanoram OS is also capable of real time data and report transfers to ERP/QMS systems in order to centralize information (such as libraries, method development and final reports) in general servers. Unlike any other handheld instrument, the NanoRam

is capable of transferring libraries from one unit to another utilizing proprietary algorithms to assure compatibility.

For customers that require a more detailed personalization of the user interface or method development, B&W Tek offers an optional software development kit (SDK) for software customization.



Verification

Identification

Easy Sampling

Sampling Accessories

Easy Transition Between Sample Types

These sampling accessories allow for measurement of various materials in the form of liquids, gels, powders, or solids under both lab and demanding environmental conditions. The point and shoot attachment is ideal for in-field sampling of materials and is capable of measuring through plastic and glass containers. The vial holder attachment allows for in situ measurements of liquids and powders, in either an 8mm or 15mm vial. The right angle attachment is ideal for measuring larger containers which are only accessible from the top. Additional application specific adaptors as well as detailed descriptions of each of these sampling accessories can be found on our website.



Point & Shoot



Vial Holder



Right Angle



Bottle Adapter



Polystyrene Standard

Interface

Integrated Computer

State-of-the-Art Touch Screen

The NanoRam offers unprecedented calculation power for handheld devices, employing a fast processor optimized to operate under B&W Tek's proprietary Nanoram OS. Within seconds, it is able to process data, manage libraries of any size, and accurately identify the materials analyzed with a new level of quality from portable devices. It is designed with the capability to run almost any calculation required in day-to-day operations, without the need to download data for post-processing.

Low-Light Level Sharp Resolution

Spectrometer

Optimized for Raman Spectroscopy

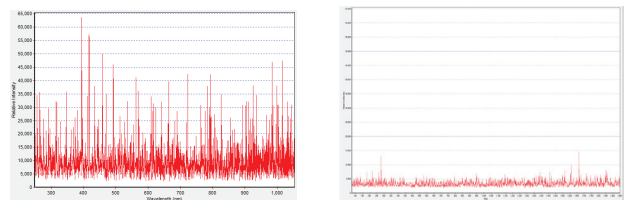
The standard configuration for the spectrometer in the NanoRam is for a 785nm laser excitation wavelength. The Crossed Czerny-Turner optical design achieves a spectral resolution of 9cm^{-1} , while simultaneously keeping the footprint of our NanoRam small. This brings an enormous advantage for field Raman applications.

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 18°C , the dark current is reduced by two 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



Room Temperature

Cooled to 18°C

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 NanoRam series spectrometer systems feature a patented CleanLaze technology with a linewidth $< 0.3\text{nm}$ 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 10 - 100%, allowing you to maximize the signal-to-noise ratio and minimize measurement time.

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