

3.5 Near Field Profilers

3.5.1 Camera Based Near-Field Profiler

Near field profiling can also be used with camera profilers to analyze small beams, and involves a microscope objective lens to image the beam onto a camera detector array. This technique expands the measurement range of the camera to include smaller beams, which could not be ordinarily measured due to the pixel size of the detector array. Near field profiling is performed in fiber and waveguide analysis, lens characterization, and other applications where beams 50 microns or smaller are analyzed. While there are more accurate techniques to measure these beam sizes, the camera provides two-dimensional information that cannot always be obtained through knife-edge or scanning slit methods. This camera accessory includes a ATP-K continuously variable attenuator, bracket and 60X magnification microscope objective lens, with broadband AR coating. Optional accessories include an optical rail and 3-axis manual stage. Other magnification lenses are also available. Camera and BeamGage must be purchased separately.

The near field of the test beam or sample is imaged with the microscope objective lens and relayed to the camera. The bracket mounting fixture holds both the lens and camera, which itself can be mounting on a positioner or optical rail. This complete system provides everything necessary to perform near-field measurements right out of the box.



Camera NFP with ATP-K Variable Attenuator

3.5.2 Slit-Based NanoScan Near-Field Profiler

Measuring the near field of sources such as laser diodes, VCSELs, optical fiber, and/or waveguides can be a difficult task. Accurate measurement of such small sources to the micron level requires high precision in the optical and mechanical design. To simplify this task and to fill this requirement, Photon offers several models of Near-Field Profilers (NFPs) covering a wide range of wavelengths and power levels. Another important application of these instruments is to extend the focused laser spot size measurement range of the NanoScan profiler. By expanding the size of a focused spot it is possible to reduce the power density and make possible the measurement of beams that are too powerful to be measured without attenuation, as well as those that are too small to be accurately measured with the standard scanhead. The NanoScan NFPs are easy-to-use turnkey systems that can be used either as a stand-alone instrument or integrated into manufacturing inspection systems. For NanoScan users who want to extend the measurement capability of their present systems, the optical and mechanical components are also available as accessories.

The NFP-980 with 60:1 magnification and 1 μ m resolution, specifically designed for measurement of 980nm pump lasers, is also ideal for other applications in the wavelength range between 700nm–1100 nm. The NFP-1550, with 40:1 magnification and 2.6 μ m resolution, is designed for use in characterizing sources in the 1300-1600nm telecommunications wavelength band. Both models come with a NanoScan GE/9/5 scanhead and the magnifying objective lens, which can be rigidly mounted to an optional precision XYZ translation stage, which in turn is mounted to an optical rail. They also include the NanoScan Control and Data Acquisition Card and NanoScan Acquisition and Analysis Software. The system has all the standard Windows file saving, printing, communication and ActiveX capability.

For visible wavelengths, the NFP-VIS is equipped with the NanoScan SI/9/5 scanhead and the 60:1 microscope objective, AR coated for the 400–700nm wavelength range. UV Wavelengths below 360nm can also be accommodated with an optional UV corrected microscope objective. For higher power and longer wavelength beams the NFP-Pyro is available. These systems can measure spot sizes from 5 μ m at any wavelength from 190nm to 20 μ m. This instrument configuration naturally reduces the power density incident on the instrument by one over the square of the magnification. The system can be supplied with a lens for the user-specified wavelength of use.

For viewing VCSEL junctions, single-mode fibers and large long wavelength LD junctions there is an optional 100:1 objective lens option, producing diffraction limited performance from 400–700nm with a working distance of approximately 0.25-0.35mm and Numerical Aperture is 0.90. From 700–1600nm, this lens produces near diffraction-limited performance.

NanoScan Near-Field Profiler Systems

Parameter	NFP-VIS	NFP-980	NFP-1550	NFP-Pyro
Tester Wavelength Range	400-700nm <360nm optional	700-1100nm	1300-1700nm	190->20 μ m
Lens Spread Function	0.49 μ m	1.1 μ m	2.6 μ m	Wavelength and application dependent for these parameters
Maximum Source	140 μ m	140 μ m	200 μ m	
Objective Focal Length	3mm	3mm	5.1mm	
Objective Rear Focal Distance	160mm	160mm	207mm	
Objective Numerical Aperture	0.85	0.85	0.48	
Objective Magnification	60:01:00	60:01:00	40:01:00	
NanoScan Model	NSSI/9/5	NSGE/9/5	NSGE/9/5	NSPyro/9/5
Aperture Size	9mm	9mm	9mm	9mm
Slit Width	5 μ m	5 μ m	5 μ m	5 μ m
3 Axis Stage Travel				
X (across rail)	13mm micrometer adjust			
Y (normal to rail)	6.5mm fine pitch actuator			
Z (along rail)	13mm micrometer adjust			



Ordering Information

Item	Description	P/N
Model USB NFP-1550(NS)	Model NFP-1550 NanoScan system with Germanium Detector 9mm Aperture 5 μ m Slits. High-resolution 63.5mm diameter head with rotation mount. Use from 700nm to 1.8microns	PH00229
Model USB NFP-980(NS)	Model NFP-980 NanoScan Germanium Detector 9mm Aperture 5.0micron Slits. High-resolution 63.5mm diameter head with rotation mount. Microscope Objective Lens Mount with 60:1 optics for 700-1100nm	PH00230
Model USB NFP-VIS(NS)	Model NFP-VIS NanoScan Silicon Detector 9mm aperture 5 μ m slits. High-resolution 63.5mm diameter head with rotation mount. Microscope Objective Lens Mount Bracket with 60:1 optics for 400-700nm	PH00231
Model USB NFP-Pyro	NFP-NS-Pyro NanoScan pyroelectric detector with 9mm entrance 5 μ m slits. Use for wavelengths from 190nm to 20 microns (specify wavelengths of use when ordering). Lens Mount bracket with well-corrected aspheric high-energy 60:1 lens with a 0.68 NA. Available in wavelengths 400nm-1100nm	PH00232