

3.6.2 Slit - Based Beam Propagation Analyzer M²

NanoModeScan

For lasers with wavelengths in the UV and IR ranges which are either difficult or impossible to measure with a CCD based profiler, Photon has the Model 1740 NanoModeScan, which is also a dedicated, fully automated M² system using the NanoScan slit profiler to make the measurements according to the ISO 11146. The ISO method requires that the user input ten measurement points along the axis of propagation, five around the waist and five measurement points that are at least two Rayleigh ranges distal to the test lens. Once these have been set up, the NanoModeScan can make the entire M² measurement in as little as 20 seconds. The dedicated NanoModeScan software reports the M², the beam waist diameter and location, divergence, and the beam's Rayleigh range for each axis. The NanoModeScan's speed of analysis is due to the wide dynamic range of the NanoScan slit profiler, which does not require that the attenuation be changed during the measurement of both the waist and far-field areas of the beam propagation.

The NanoModeScan can also determine the M² using the Rayleigh Method as a fully automated process. By selecting the Rayleigh method, the ModeScan will find the waist and then the Rayleigh points for both axes. It will then report the propagation parameters as with the ISO method. This method is fully automated and requires no intervention from the operator, other than the initial set up and input of the wavelength and lens parameters. It does take longer than the ISO method to make the measurements since it must find the waist and Rayleigh points on its own. The time required for the entire measurement is dependent on the laser being measured, but is usually no more than 2 or 3 minutes. It has the advantage of being fully automated and can be left to run while the operator does some other task.

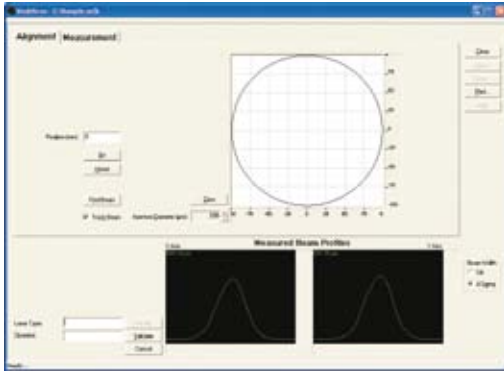
The NanoModeScan is available with the Silicon, Germanium, or Pyroelectric NanoScan profiler, making it the only system that can measure M² for lasers at any wavelength from <200nm to beyond 10.6µm.



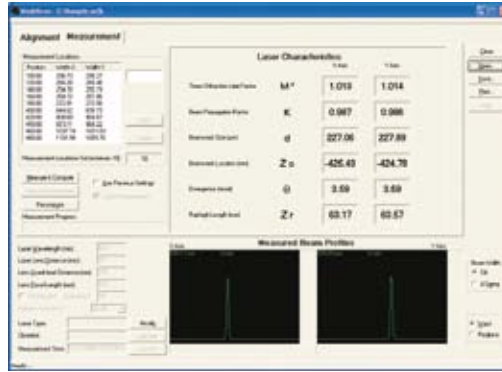
NanoModeScan

NanoModeScan Specifications

Sensor/Detector	
Scan head Travel	500mm
Optical Axis Height	140-170mm
Horizontal Fine Adjustment	19mm
Angular Fine Adjustment	±2° vertical, ±1.4° horizontal
Standard Lenses	200mm EFL, BK-7 plano-convex, Broadband AR Coated 400mm EFL, BK-7 plano-convex, Broadband AR Coated; UV through long IR lenses available
Optional Lens	200mm FL fused silica for UV coated for wavelength of use 350mm FL fused silica for UV coated for wavelength of use 190mm FL IR lens for 10.6µm wavelength
Minimum Spot Size	See scan head specifications
Computer/Electrical	
Source Power	See scan head specifications
File Saving and Data Logging	Data files, ASCII Files
AC Power	110V, 60Hz standard 220V, 50Hz optional
Communication	RS-232 Interface or USB to RS-232 adapter required
Mechanical (Dimensions in mm)	
NanoModeScan Linear Stage	812 × 102 × 78
Photon Motion Controller	273 × 89 × 57
Alignment Channel	940 × 247 × 72
Removable Light Shield	787 × 777 × 110
Weight	
NanoModeScan Linear Stage	8.4kg
Photon Motion Controller	1.5kg
Alignment Channel	4.8kg



Example of NanoModeScan Alignment Screen



Example of NanoModeScan Measurement Screen

Ordering Information - NanoModeScan M² Systems

All NanoModeScan Systems include (unless otherwise noted):

- High-resolution scanhead with rotation mount.
- Two BK 7 lenses and mounts. Standard are 200 and 400mm focal length.
- Lens coating Choices:
 - VIS Visible: 430–700nm (not for use with Germanium detector)
 - NIR Near IR: 650–1000nm
 - LIR Long IR: 1000–1550nm (not for use with Silicon detector)
- VLIR: Very long infrared >1550nm. The two glass lenses will not be included but instead credited toward the very long wavelength IR lens or lenses that will require an optional charge (for use with MSP-NS-Pyro/9/5 only).
- OPTIONAL UV: If ultraviolet application, the two glass lenses will not be included; instead we will send one 200 mm focal length lens coated for wavelength of use.

Be sure to specify XXX wavelength when ordering.

Item	Description	P/N
NanoModeScan M² Systems		
USB MSP-NS-Si/9/5	Model 1740 ModeScan with NanoScan Silicon (Si) Detector 9mm aperture 5µm slits Si detector, 63.5mm diameter head, 9mm entrance aperture, and matched pair of 5.0µm wide slits. Use from 190 to 1000nm wavelengths.	PH00233
USB MSP-NS-Ge/9/5	Model 1740 ModeScan with NanoScan Germanium (GE) Detector 9mm aperture 5.0µm slits. Germanium detector, 63.5mm diameter head, 9mm entrance aperture, and matched pair of 5.0µm wide slits. Use from 700nm to 1.8µm wavelength.	PH00234
USB MSP-NS-Pyro/9/5	Model 1740 ModeScan with NanoScan Pyroelectric Detector 9.0mm aperture 5µm slits. Pyroelectric detector, 63.5mm diameter head, 9mm entrance aperture, and matched pair of 5µm wide slits.	PH00235
MSP-NS-Pyro/20/25	Model 1740 ModeScan with HP NanoScan scanhead with 9mm Pyroelectric Detector 5µm slits, 100mm diameter head, 9 mm entrance aperture, and matched pair of 5µm wide slits; scanhead is fan cooled.	PH00218
USB MSP-HPNS/10/5	Model 1740 ModeScan with HP NanoScan scanhead with 9mm Pyroelectric Detector 5µm slits, 100mm diameter head, 9 mm entrance aperture, and matched pair of 5µm wide slits; scanhead is fancooled.	PH00236
NanoModeScan Accessories		
LENS 200 UV-XXX	Optional 200mm quartz lens for use between 190–400nm wavelengths.	PH00090
LENS 400 UV-XXX	Optional 400mm quartz lens for use between 190–400nm wavelengths.	PH00091
LENS 190 10.6	Optional 7.5-inch focal length lens for use at 10.6µm wavelength.	PH00092
LENS 100 VIS	Optional 100 mm focal length lens for use 400–700nm wavelength.	PH00093
LENS 100 NIR	Optional 100 mm focal length lens for use 650–1000 nm wavelength.	PH00094
LENS 100 LIR	Optional 100 mm focal length lens for use 1000–1550nm wavelength.	PH00095
1740 LENS MNT	Lens mount for users wanting to use their own 25mm diameter lens.	PH00075
CUSTOM LENS	Specify wavelength, focal length	PH00088
Model 1740	ModeScan Rail w/o scan head	PH00074
1740 LENS PREP	ModeScan custom lens	PH00076
1740 TRNG	ModeScan onsite operation training	PH00077
Lens 400 2um	Optional 400mm focal length lens for use at @2µm wavelength	PH00224
Lens 200mm VIS	Optional 200mm focal length lens for use 400-700nm wavelength	PH00237
Lens 400mm VIS	Optional 400mm focal length lens for use 400-700nm wavelength	PH00238
Lens 200mm NIR	Optional 200mm focal length lens for use 650-1000nm wavelength	PH00239
Lens 400mm NIR	Optional 400mm focal length lens for use at 650-1000nm wavelength	PH00240
Lens 200mm LIR	Optional 200mm focal length lens for use at 1000-1550nm wavelength	PH00241
lens 400mm LIR	Optional 400mm focal length lens for use at 1000-1550nm wavelength	PH00242