

### 3.7.1.2 1780 Instantly measure $M^2$

The ModeScan Model 1780 is a laser beam profiling instrument that measures the  $M^2$  Beam Propagation Ratio and all associated ISO 11146 parameters instantaneously in real time at video rates to over 20Hz. The measurement technique, patented by Photon Inc., uses 10 reflective surfaces to form simultaneous images of the propagating beam at 10 locations on a Model 2512 CCD array camera. With all ten measurement positions acquired at once, the instrument is suitable for measurement of both CW and pulsed lasers down to single-shot rates. Beam diameters are obtained to better than 2% using the BeamPro software. This translates to  $M^2$  measurements with accuracy to ~5%. The FireWire system operates under Photon's BeamPro in Microsoft Windows. The compactness of the system and the IEEE 1394a FireWire interface offers enhanced ease-of-use and portability. The ability to operate in any orientation allows for easy placement on any optical bench and saves valuable bench space.

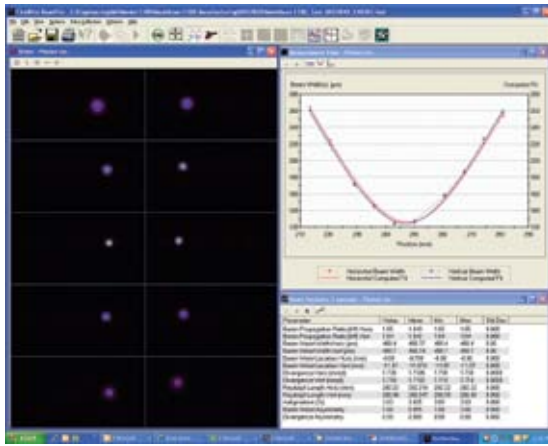
The CCD is sensitive from ~250nm to 1100nm wavelengths. The standard configuration is supplied with a glass OD 2.8 C-mount neutral density filter for wavelengths >360nm, and an OD 3.0 Fused Silica Inconel neutral density filter for wavelengths <360nm. Because of the limited usefulness of exposure control with pulsed lasers, the Photon Inc. Model ATP is recommended for use with pulsed lasers with repetition rate <~10kHz and wavelength >360nm. For pulsed lasers with wavelength <360nm, a variable UV filter or a combination of UV filters will generally be required.



ModeScan 1780

#### 3.7.1.2.1 ModeScan Model 1780 System Specifications

Optical/Sensor/Detector	
Sensor	Si CCD 1/2" Format
Wavelength	~360nm – ~1100nm (Standard with OD 2.8 filter) ~250nm – ~1100nm with UV optics
Pixel Array	780 (H) × 580 (V)
Pixel Size	8.3μm × 8.3μm
Array Dimension	6.49mm × 4.83mm
Scanning Mode	Progressive
CCD Cover Glass	Removed
Beam Splitters	Fused Silica: <20/10 Scratch Dig, I/10 Flatness
Test Lenses	
UV: ~250 – 460nm	200mm fl Fused Silica/250 – 460nm AR coated standard
Visible: 425 – 720nm	200mm fl BK7/425 – 720nm AR coated standard
VIS – NIR: 620 – 1080nm	200mm fl BK7/620 – 1080nm AR coated standard
Fixed Attenuator: Visible – NIR	OD 2.8 Absorbing Glass >360nm
UV	OD 3.0 Fused Silica Inconel 250 – 450nm
Computer/Electrical	
A / D Conversion	12 Bit
Maximum Frame Rate	35.8fps (full frame @ full resolution)
Exposure range	20μs–27.64ms (Software selectable via 1394 bus)
Gain	0–12dB (Software selectable via 1394 bus)
Trigger	Internal or External (Software selectable)
External Trigger Specifications	5V ±1V @ 10mA ±5mA (Positive transition)
Trigger Connector	10 pin RJ-45 Jack
Trigger Cable	10 pin RJ-45 to BNC 1.8m
Interface	IEEE 1394a (FireWire)
IEEE 1394 cable	1.8m
Supply Voltage	+8V – +36V DC (+12V DC nominal), <1% ripple (supplied via IEEE 1394 cable); requires external powered hub with laptop PCs
Supply Power	3.5W max @ 12V DC (typical)
Mechanical	
Filter/Lens Mount	C-mount (1" – 32 tpi)
Mounting	Gimbal Mount on ½" post; 12mm Metric post optional
Dimensions in mm	62 H × 140 W × 210 L, + Gimbal Mount
Weight	~1.4kg
Environmental	
Operating Temperature	0° – +50°C (+32° – 112F)
Humidity	20% – 80%, relative, non-condensing
Conformity	CE; FCC; RoHS and WEEE



Arrangement of Measurement Windows: Video Window Beam Propagation Mode; Beam Statistics Window; Horizontal and Vertical Caustics Window.

### 3.7.1.2.2 Ordering Information

Item	Description	P/N
<b>ModeScan 1780 M<sup>2</sup> System with Fire Wire BeamPro</b>		
MS-1780	ModeScan Model 1780, dedicated M <sup>2</sup> measurement system, with 12-bit FireWire (IEEE 1394a) CCD detector for single-shot, pulsed and CW lasers. System includes: ModeScan with gimballed mount for alignment; FireWire CCD camera; Photon FireWire BeamPro Acquisition and Analysis Software stand-alone GUI with M <sup>2</sup> Analysis; Active X automation interface; 200mm lens coated for Visible range (400-700nm); OD 2.8 glass filter for operation >360nm; Dimensions: 62mm x 140mm x 210mm; For use from 250–1100nm wavelengths - UV and NIR operation will require additional specifically coated optics.	PH00096
<b>ModeScan 1780 Accessories</b>		
UV Lens Kit (MS-UV kit)	UV lenses are all fused silica plano-convex and coated for UV wavelengths 250-400nm All lens kits contain 200mm, 250mm, 400mm, 500mm, 750mm and 1m focal length coated lens with mounting hardware and MS-Tube Kit.	PH00097
UV200	200mm focal length lens	PH00098
UV250	250mm focal length lens	PH00099
UV350	350mm focal length lens	PH00100
UV500	500mm focal length lens	PH00101
UV750	750mm focal length lens	PH00102
UV1000	1000mm focal length lens	PH00103
MS-VIS Lens Kit (MS-VIS kit)	Visible (VIS) lenses are all BK 7 plano-convex and coated for visible wavelengths 450-650nm All lens kits contain 200mm, 250mm, 400mm, 500mm, 750mm and 1m focal length coated lens with mounting hardware and MS-Tube Kit.	PH00104
VIS200	200mm focal length lens	PH00105
VIS250	250mm focal length lens	PH00106
VIS400	400mm focal length lens	PH00107
VIS500	500mm focal length lens	PH00108
VIS750	750mm focal length lens	PH00109
VIS1000	1000mm focal length lens	PH00110
MS-NIR Lens Kit (MS-NIR kit)	NIR lenses are all BK-7 Plano-convex and coated for NIR wavelengths 700-1100nm All lens kits contain 200mm, 250mm, 400mm, 500mm, 750mm and 1m focal length coated lens with mounting hardware and MS-Tube Kit.	PH00111
NIR200	200mm focal length lens	PH00112
NIR250	250mm focal length lens	PH00113
NIR400	400mm focal length lens	PH00114
NIR500	500mm focal length lens	PH00115
NIR750	750mm focal length lens	PH00116
NIR1000	1000mm focal length lens	PH00117
MS-Broadband Lens Kit	Includes: UV Lens Kit (PH00097), MS-VIS Lens Kit (PH00104) and MS-NIR Lens Kit (PH00111)	PH00118
<b>Extension and Focusing Tubes</b>		
CM-EXT100	100mm long C-Mount extension tube for mounting lenses outside ModeScan 1780 Box	PH00119
CM-EXT50	50mm long C-Mount extension tube for mounting lenses outside ModeScan 1780 Box	PH00120
CM-EXT40	40mm long C-Mount extension tube for mounting lenses outside ModeScan 1780 Box	PH00121
CM-EXT25	25mm long C-Mount extension tube for mounting lenses outside ModeScan 1780 Box	PH00122
CM-EXT10	10mm long C-Mount extension tube for mounting lenses outside ModeScan 1780 Box	PH00123
FOCTUBE20-30	C-Mount fine thread focus tube with 20-30mm adjustable length for focus of lenses mounted to extension tubes	PH00124
FOCTUBE30-50	C-Mount fine thread focus tube with 30-50mm adjustable length for focus of lenses mounted to extension tubes	PH00125
FOCTUBE50-90	C-Mount fine thread focus tube with 50-90mm adjustable length for focus of lenses mounted to extension tubes	PH00126
MS-TUBE Kit	Tube Kit for MS-1780	PH00127