

# MPI Optical Solutions

MPI is working closely with leading optical suppliers to develop and optimize dedicated microscope solutions. This provides leading edge on-wafer observation and navigation. The selected optics are a perfect fit to the specific requirements of accurate probe placement on DC/CV, RF and mmW pads.

Single tube solution provides a large working distance at high magnification. Small form factors are ideal for RF, mmW and load-pull applications due to space restrictions inherent with the integration of test heads/tuners requiring shortest distance to DUT.

MPI also offers state of the art high-power microscopes such as Motic PSM-1000 and Mitutoyo FS70 configured to address internal-node probing or Failure Analysis application requirements.

All optics include TV ports for being used with a number of 1080p HDMI cameras. Images are displayed on the monitor without additional computer requirements:

- Image can be captured directly onto the built-in mini SD card
- Remote control and/or direct camera buttons for various settings
- All required cables are included

## MPI iMAG®

MPI iMAG® Series are unique high resolution digital imaging systems designed especially for MPI manual and automated probe systems by providing an unsurpassed color image quality and ultra-fast color frame rate video speed for an optimal and very convenient wafer navigation.

The dedicated optical design guarantees that one camera pixel is always smaller than the optical resolving power of the used objective lenses, so that the 40x zoom range is limited finally by the performance of the M Plan APO optics only.

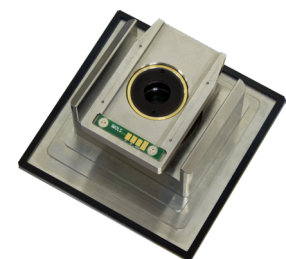
The large 1.1 inch, 6.55MP quadratic sensor delivers the maximum of optically possible field of view (FOV) without any edge shadow effects.

iMAG® and iMAG®-Pro microscopes are equipped with objective lens detection system, so that SENTIO® will recognize it automatically as soon as it is placed in. The software will memorize the corresponding objective data, and all automated features can be performed right away without the need of additional pixel-to-micrometer calibration.

The operation of MPI automated probe systems using iMAG® digital imaging systems are identified by intuitive, easy, safety and high productivity operation.

### Main Features:

- 2560 x 2560 pixel color video image (6.55MP)
- ≥ 20 fps real color frame rate
- Global shutter camera
- Large FOV: 3.94mm FOV @ 5x
- Lean design, no cables around, compatible with MPI ShieldCap™
- Easy lens exchange (front slider) with automatic lens detection
- Compatible with any M Plan lenses



Automatic objective lens detection system

**General Specification**

Microscope	Video Resolution	Color Video Frame Rate	Lens Mount		
			Z-Drive	Range	Resolution
MPI iMAG® Pro	2560 x 2560	≥ 20 fps	Yes	2 mm	0.2 μm
MPI iMAG®			No	N/A	N/A
MPI iMAG® M*			No	N/A	N/A

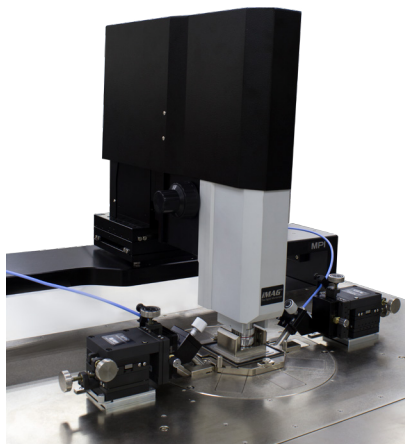
\* For MPI manual TSXXX probe systems

**Optical Specification**

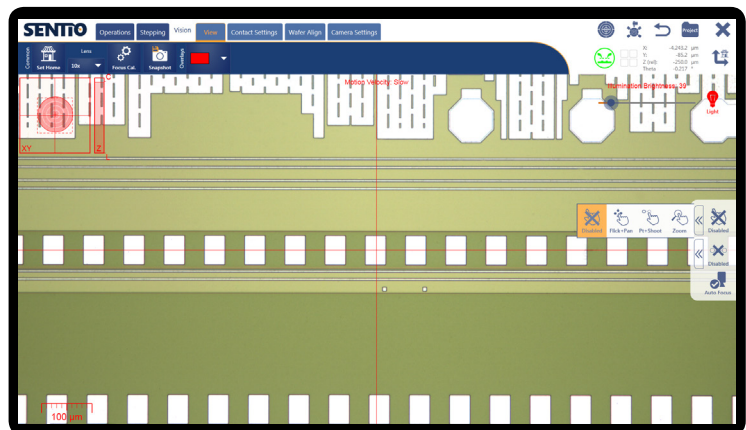
Objective Lens <sup>(1)</sup>	Optical Resolution <sup>(2)</sup> [μm]	N.A.	Working Distance [mm]	Depth of Focus <sup>(1)</sup> [± μm]	Max. FOV [μm]	
					H	V
2x	5.0 μm	0.055	34	90.91	9850	9850
5x	2.0 μm	0.14	34	14.03	3940	3940
10x	1.0 μm	0.28	33.5	3.51	1970	1970
20x	0.7 μm	0.42	20	1.56	980	980
50x	0.5 μm	0.55	13	0.91	390	390

(1) 5x lens is part of standard delivery

(2) Optical resolution and focal depth based on reference wavelength of 550 nm. The optical resolution is identical over the entire FOV (!)



iMAG®-M – the digital microscope for MPI manual probe systems



MPI iMAG® embedded within SENTIO® Software Suite

**Microscope / Movement Matrix**

Movement \ Optics	OP-A5050M-LM XYZ motorized	OP-5050M-LM XY manual, Z motorized	OP-5050ZUM-VM XY manual, Z pneumatic	OP-5050ZUM XY manual, Z pneumatic
iMAG® M	N/A	N/A	N/A	Yes
iMAG®	Yes	Yes	N/A	N/A
iMAG® Pro	Yes	Yes	N/A	N/A
AMZ12-LM	Yes	Yes	N/R*	N/A
MZ12	N/R*	N/R*	Yes	N/A
Z10/EZ10/SZ10	N/A	N/A	Yes	N/A

\*Not Recommended

## MPI Automated MegaZoom AMZ12

- The non-plus-mega, single tube microscope with 12x programmable zoom
- Unique combination of large field of view and extremely high magnification
- Max. 46.2 mm working distance for stress-free probe replacement, cable and different RF probe reconfiguration
- Up to 1.68  $\mu\text{m}$  optical resolution for excellent small pads probing and accurate placement on calibration standards
- TV port – standard c-mount
- 35 mm focus block with fine and fast movement, 90° tilting
- Dedicated for all DC/CV, RF, mmW and load pull measurements



Objective Lens	7x	15x
Optical zoom range	0.58x - 7.0x (programmable)	1.25x - 15.0x (programmable)
WD	40.6 mm	46.2 mm
Resolution	20.6 - 2.9 $\mu\text{m}$	11.18 - 1.68 $\mu\text{m}$
DOF	$\pm 1074.22 - \pm 21.54 \mu\text{m}$	$\pm 305.56 - \pm 6.88 \mu\text{m}$
N.A.	0.016 - 0.113	0.03 - 0.2
FOV (H x V) w. SENTIO®	12.19 x 9.14 - 1.01 x 0.76 mm	5.66 x 4.24 - 0.47 x 0.35 mm
LED coaxial illumination	5 W	
Power supply	110 V / 220 V, 8 W, CE, dimnable and On/Off programmable control	
Dimensions (W x D x H)	45 x 113 x 225 mm	45 x 113 x 208 mm
Weight	Approx. 1200 g	



MPI TS2000-SE with AMZ12 microscope

### MPI MegaZoom MZ12

- The non-plus-mega, single tube microscope with 12x zoom
- Unique combination of large field of view and extremely high magnification
- Max. 46.2 mm working distance for stress-free probe replacement, cable and different RF probe reconfiguration
- Up to 1.68 µm optical resolution for excellent small pads probing and accurate placement on calibration standards
- TV port – standard c-mount
- 35 mm focus block with fine and fast movement, 90° tilting
- Dedicated for all DC/CV, RF, mmW and load pull measurements



Objective Lens	7x	15x
Optical zoom range	0.58x - 7.0x	1.25x - 15.0x
WD	40.6 mm	46.2 mm
Optical resolving power	20.6 - 2.9 µm	11.18 - 1.68 µm
DOF	± 1074.22 - ± 21.54 µm	±305.56 - ±6.88 µm
N.A.	0.016 - 0.113	0.03 - 0.2
FOV (H x V) w. ST-HD2MP	9.38 x 5.33 - 0.78 x 0.44 mm	4.35 x 2.47 mm - 0.36 x 0.21 mm
FOV (H x V) w. MPI 1080	9.10 x 5.12 - 0.75 x 0.42 mm	4.22 x 2.38 - 0.35 x 0.20 mm
FOV (H x V) w. MOTICAM 1080	9.66 x 5.43 - 0.80 x 0.45 mm	4.48 x 2.52 - 0.37 x 0.21 mm
FOV (H x V) w. SENTIO®	12.19 x 9.14 - 1.01 x 0.76 mm	5.66 x 4.24 - 0.47 x 0.35 mm
LED coaxial illumination	5 W	
Power supply	110 V / 220 V, 8 W, CE, manually dimmable and On/Off remote control	
Dimensions (W x D x H)	45 x 80 x 225 mm	45 x 80 x 208 mm
Weight	Approx. 1000 g	

### MPI SuperZoom SZ10

- 10x zoom single tube microscope
- Incredible 95 mm working distance for stress-free probe replacement and test heads/tuner integration
- 2.5 µm optical resolution for small pads probing and accurate placement on calibration standards
- TV port – standard c-mount
- 35 mm focus block with fine and fast movement, 90° tilting
- Dedicated for all DC/CV, RF, mmW and load pull measurements



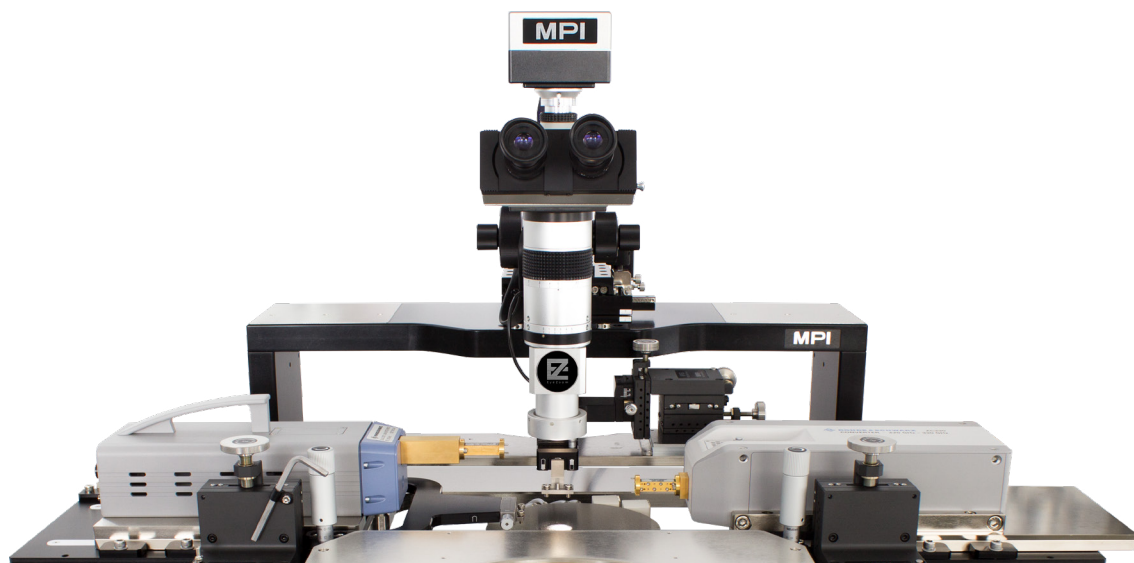
Optical zoom range	1.0x - 10.0x
WD	95 mm
Optical resolving power	8.8 - 2.5 µm
DOF	± 190.44 - ± 14.87 µm
N.A.	0.038 - 0.136
FOV (H x V) w. ST-HD2MP	5.44 x 3.09 - 0.54 x 0.31 mm
FOV (H x V) w. MPI 1080	5.28 x 2.97 - 0.53 x 0.30 mm
FOV (H x V) w. MOTICAM 1080	5.6 x 3.15 - 0.56 x 0.32 mm
FOV (H x V) w. SENTIO®	7.07 x 5.30 - 0.71 x 0.53 mm
LED coaxial illumination	5 W
Power supply	110 V / 220 V, 8 W, CE, manually dimmable
Dimensions (W x D x H)	46 x 85 x 300 mm
Weight	Approx. 940 g

## MPI EyeZoom EZ10

- The unique microscope with ergonomically constructed trinocular eyepiece tube and 10x optical zoom
- Excellent optical resolving power down to 2µm
- 90 mm working distance for stress-free probe replacement, cable and different RF probe reconfiguration
- Optional ring-light illumination (in addition to the coaxial light) for outstanding visibility on different materials, such as calibration standards and different wafer pads
- Dedicated for all RF, mmW and load pull measurements



Trinocular head	Widefield trinocular tube, 20° optical observation angle
Eyepiece	WF 20x, incl. collapsible rubber eye-guards
Optical pass ratio	Eyepiece : Camera C-mount = 0% : 100% or 100% : 0%
Optical magnification (eyepiece)	17x - 170x
IPD (inter-pupillary distance)	Adjustable range from 55 – 70 mm
Optical zoom range	0.85x - 8.5x (10:1)
Aperture diaphragm	Adjustable field of depth and contrast, in 5 steps
WD	90 mm
Optical resolving power	2.0 µm
FOV (D)	10.6 – 1.06 mm (20x eyepiece)
FOV (H x V) w. ST-HD2MP	6.40 x 3.64 – 0.64 x 0.36 mm
FOV (H x V) w. MPI 1080	6.21 x 3.49 - 0.62 x 0.35 mm
FOV (H x V) w. MOTICAM 1080	6.59 x 3.71 – 0.66 x 0.37 mm
FOV (H x V) w. SENTIO®	8.32 x 6.24 - 0.83 x 0.62 mm
TV port (C-mount)	1x
LED coaxial illumination	5 W
LED ring illumination (option)	24 pcs., 53 mm outer diameter
Power supply	100 - 240 V, 7.2 W, CE
Dimensions (W x D x H)	126 – 145 (eyepiece), 60 / 38 (tube / lens) x 195 x 305 mm
Weight	Approx. 2.5 kg



MPI TS150-THZ with EZ10 microscope

## MPI Zoom Z10

- Single tube microscope with 10x zoom
- Excellent optical resolving power down to 2µm
- 90 mm working distance for stress-free probe replacement, cable and different RF probe reconfiguration
- Optional ring-light illumination (in addition to the coaxial light) for outstanding visibility on different materials, such as calibration standards and different wafer pads
- Dedicated for all RF, mmW and load pull measurements



Optical zoom range	0.85x - 8.5x (10:1)
Aperture diaphragm	Adjustable field of depth and contrast, in 5 steps
WD	90 mm
Optical resolving power	2.0 µm
FOV (D)	10.6 – 1.06 mm (20x eyepiece)
FOV (H x V) w. ST-HD2MP	6.40 x 3.64 – 0.64 x 0.36 mm
FOV (H x V) w. MPI 1080	6.21 x 3.49 - 0.62 x 0.35 mm
FOV (H x V) w. MOTICAM 1080	6.59 x 3.71 – 0.66 x 0.37 mm
FOV (H x V) w. SENTIO®	8.32 x 6.24 - 0.83 x 0.62 mm
TV port (C-mount)	1x
LED coaxial illumination	5 W
LED ring illumination (option)	24 pcs., 53 mm outer diameter
Power supply	100 - 240 V, 7.2 W, CE
Dimensions (W x D x H)	60 / 38 x 195 x 305 mm
Weight	Approx. 2.0 kg

## MPI Stereo Microscope ST45

- Entry level stereo microscope
- 25x eyepiece for max. magnification
- TV port – standard c-mount
- 50 mm focus block (for pivot or tilt mount)
- Dedicated for DC/CV measurements
- A TV port for higher magnification or other optics is recommended for RF measurements



Trinocular head	45° inclined
Zoom objective lens	0.67x - 4.5x (6.7:1)
Eyepiece	25x
Auxiliary lens	1.0x
Optical magnification	16.8x - 112.5x
FOV (D)	13.4 - 2.0 mm
WD	100 mm
TV port (C-mount)	1x
LED ring illumination	72 pcs., 4 independent sectors selectable
Power supply	100 - 240 V, 7.2 W, CE
Dimensions (W x D x H)	45 x 85.5 x 269 mm
Weight	Approx. 550 g

**Digital HDMI Cameras**

**ST-HD2MP**

- Small form factor 1080p HDMI camera
- No requirement of a computer for standard operation
- 2 m HDMI cable included
- Wired control for white balance and other settings



**MPI1080**

- Versatile 1080p HDMI camera
- Does not require a computer for standard operation
- Mouse control and GUI w/o. computer
- Image can be captured directly onto the build-in mini SD card at 2.0 MP, 8 MB included.
- Ideal for documentation on the MPI manual probe systems series
- Remote control over the mouse
- All cables and Bluetooth mouse included



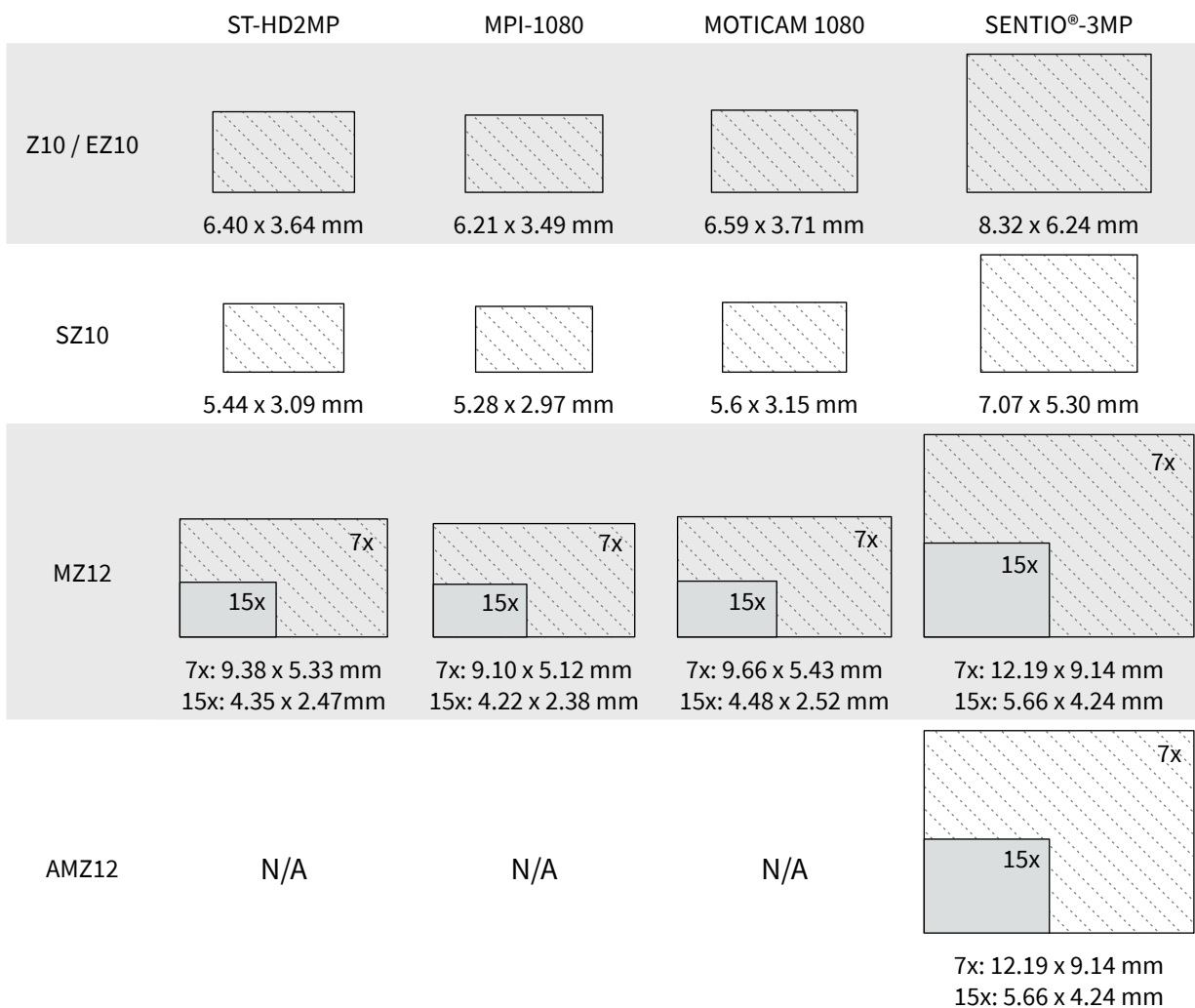
**Moticam1080**

- Versatile 1080p HDMI camera
- Does not require a computer for standard operation
- Mouse control and GUI w/o. computer
- Image can be captured directly onto the build-in mini SD card at 2.0 MP
- USB 2.0 interface allows using the provided software: includes measurement, annotation and reporting tool
- Ideal for documentation on the MPI manual probe systems series by using Motic Image Plus for PC & Mac
- Remote control over the mouse and direct camera buttons for various settings
- All cables and Bluetooth mouse included

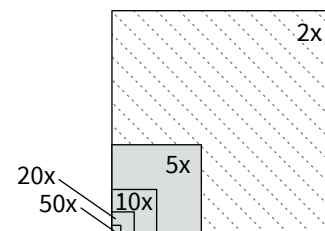


MPI Product Name		ST-HD2MP	MPI CCD-1080	MOTICAM 1080
Sensor type		CMOS	CMOS	CMOS
Sensor size		1/2.8 in	1/2.8 in	1/2.8 in
Active resolution (Total pixel)		1920 x 1080 (2 MP)	1920 x 1080 (2 MP)	1920 x 1080 (2 MP)
Pixel size		2.8 x 2.8 μm	2.75 x 2.75 μm	2.2 x 2.2 μm
USB		N/A		1080P
Software		N/A	N/A	Motic Image Plus
SD card (included)	Capture mode	N/A	1080P	N/A
	Recording mode	N/A	1080P	N/A
HDMI screen live show	Frame rates	60 fps		60 fps
	Capture mode	N/A		1080P
	Recording mode	N/A		1080P
White balance		Automatic	Automatic, manual	
Remote control		Wired RC-HD133	Over the mouse (Bluetooth mouse included)	
Simultaneous USB & HDMI output		N/A	Yes	
Screen control & operation		N/A	Yes, mouse control with screen UI	
Power supply		DC 12V AC Adapter, 110V/220V, CE	DC 12V AC Adapter, 110V/220V, CE, FCC, UL, PSE	
Dimension (W x D x H)		40 x 40x 51.1 mm	84 x 79 x 69 mm	80 x 88.8 x 61.8 mm
Weight		Approx. 120 g	Approx. 335 g	Approx. 275 g

Maximal Field of View (FOV) Overview



iMAG®	
2x	9.85 x 9.85 mm
5x	3.94 x 3.94 mm
10x	1.97 x 1.97 mm
20x	0.98 x 0.98 mm
50x	0.39 x 0.39 mm



See MPI Corporation's Terms and Conditions of Sale for more details.

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