

## LensPlate2 for Beam'R2/BeamMap2

### Applications

- Waveguide reimaging
- Lensed fiber focal spot reimaging
- Fiber end reimaging

**LensPlate2™** reimages an external beamwaist onto the zero plane of a **BeamMap2** or **Beam'R2**. It employs a pair of diffraction-limited aspheric lenses coated for the wavelengths of interest. These lenses are designed for use with the small beams typical of fiber optics and integrated optics, and are diffraction limited when used at their design distances. The resolution (Rayleigh Resolution) of a lens is defined as  $\sim 0.61\lambda/NA$ . These values are listed in the table below.

These assemblies are screwed into the 0.535"-40 (SM05) threaded aperture behind the removable crosshair target on the front plate of a Beam'R2 or low plane spacing BeamMap2.

LesnPlate2's are factory focused and aligned, & are field demountable/mountable by the user.

All units are the same price. The price includes factory alignment on the head.



The actual magnification 'M' is determined during factory or user calibration.

The magnification 'M' and the optimum centroid alignment position are and marked on the unit.

### Important:

- 1) **BeamWaist position.** Note that use of a reimaging lens assembly implies that it is necessary to focus the minimum of the reimaged beamwaist on the '0' plane of the BeamMap2. The factory established magnification is for this condition, and the lens is only diffraction limited at this setting.
- 2) **Single mode fiber divergence?** The lensed units are *not* appropriate for measuring beam divergence from a single mode fiber, since, in general, the re-imaged beamwaist is too flat for accurate far-field divergence determination based on a fitted  $M^2$  curve. DataRay sells the unlensed **BMS2-4XY500** units for fiber divergence applications.

Part #	LP2-1:1-0.55- $\lambda\lambda\lambda$ *	LP2-1:1-0.55- $\lambda\lambda\lambda$ *	LP2-1:10-0.8- $\lambda\lambda\lambda$ *
<b>Description</b>	0.55 NA 1:1 LensPlate2	0.55 NA 1:3.4 LensPlate2	0.8 NA 1:10 LensPlate2
<b>Magnification</b>	1:1	1:3.4	1:10
<b>Working Distance WD</b>	2.5 mm	2.5 mm	0.23 mm
<b>Resolution</b> (= $0.61\lambda/NA$ ) @ 675/1550 nm	0.75/1.7 $\mu\text{m}$	0.75/1.7 $\mu\text{m}$	0.5/1.2 $\mu\text{m}$
<b>Applications</b>	1:1 reimaging	Fiber end/waveguide reimaging	1:10 reimaging [Short WD, small sweetspot.]

\*  $\lambda\lambda\lambda$  = VIS, NIR or TEL      VIS is 350-700 nm; NIR is 650-1050nm, TEL is 1050-1620 nm

## Displayed Data Correction for the LensPlate™

By entering the LensPlate actual magnification, the software corrects for the following.

- ❑ **Diameter.** Consider a beam with diameter **2W** in the measurement plane. It will have a diameter **M x 2W** in the head side. **The on-screen beam diameters are multiplied by the factor 1/M.**
- ❑ **Divergence.** In the head plane, this beam diverges by a factor **1/M** less than in the measurement plane, so the if the divergence is  $\phi$  mr in the measurement plane, then it will be  $\phi / M$  mr. in the head plane.  
  
Therefore, in the measurement plane, the beam diameter increases by  $\phi \cdot z$   $\mu\text{m}$  for a distance **z** along the propagation axis. In the measurement plane. In the head plane, the beam diameter increases by only  $\phi \cdot z / M$   $\mu\text{m}$  for a distance **z** along the propagation axis. **Therefore, the Divergence and NA measurements are multiplied by a factor M.**
- ❑ **Pointing.** In the head plane, the centroid positions are a factor **M** greater than in the measurement plane. **Therefore, the Pointing measurements do not require correction.**
- ❑ **Zo.** The calculated Zo value is multiplied by a factor of **1/M.**
- ❑ **Zr.** The calculated Rayleigh range is multiplied by a factor of **1/M.**
- ❑ **M<sup>2</sup>.** Since M<sup>2</sup> is the product of beam diameter and divergence, *M<sup>2</sup> in the measurement and head planes are nominally identical.* In practise, even though an excellent lens pair is used, the measured M<sup>2</sup> is always going to be some undefinable small factor worse than the actual M<sup>2</sup> of the beam prior to reimaging. To minimize the error, ensure that the beam is well centred in terms of **Xc[abs.]** and **Yc[abs.]**. **Therefore, the M<sup>2</sup> measurements do not require correction for magnification.**
- ❑ **Xc, Yc.** These numerical and centroid display values are reversed by the lens. **The Xc, Yc values are therefore reversed.** E.g. Xc,Yc = -57, +49 would become +57, -49.

**Summary:** If the user enters the magnification value **M** marked on the LensPlate2 into the software under the **Setup** pull-down menu:

- 1) The **Beam Diameters** are divided by the magnification **M**.
- 2) The **Divergence** and **NA** are multiplied by **M**.
- 3) The **Pointing** requires no correction.
- 4) The **Zo** values are divided by **M**.
- 5) The **Zr** values are divided by **M**.
- 6) The **M<sup>2</sup>** values require no correction.
- 7) The **Xc, Yc** numerical and centroid display values are reversed.