PART # 8J06005. REV 02

User Notes

WIDE BEAM IMAGER

WB-I VIS

UV / VIS / NIR VERSION

P/N SP90612

WB-I SWIR

SWIR VERSION

P/N SP90605

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1. OPERATION PRINCIPLE

Ophir® Wide Beam Imager (WB-I) provides a way to measure both the size and power distribution of large diameter beams or divergent beams from LED, VCSEL sources, as well as parallel beams in the UV/VIS/NIR range (350-1100nm) or SWIR range (900-1700nm). The laser beam or light source is projected onto a diffusive plate in the WB-I that has an effective aperture of 45mm. The image is then reduced by 8 times (depending on the model) and is reimaged onto the camera focal plane. The WB-I is provided without a beam profiling camera. A CMOS or InGaAs cameras are sold separately or as a complete solution including the BeamGage® Professional imaging and analysis software. WB-I devices enable the measurement of divergent or large beams with moderate spatial resolution.

The light pattern on the front surface of the diffuser is imaged on a high-resolution camera and yields a complete mapping of the light intensity distribution. The magnification factor used is factory gauged, calibrated, and marked on the label. The projected beam is analyzed and displayed in the BeamGage software.

The cylindrical enclosure can be mounted with industry-standard support posts with ¼”-20 tpi and/or 6mm threaded screws.

High power/energy beams must be attenuated before they impinge onto the system's diffuser. Besides the iris control, image intensity can be adjusted by reducing or increasing the camera exposure time.

Warning

Some portion of the light is scattered backward from the diffuser surface thus, safety precautions must be made when using WB-I with high-power light sources.

At SWIR about 50% and at UV/VIS/NIR, about 20% of incident light is scattered backward.

IMPORTANT

The WB-I SWIR accessory (SP90605) is adjusted to work with C-mount InGaAs cameras, SP1203, SP1201 and XC-130 without any additional filters.

The WB-I VIA for UV/VIS/NIR (SP90612) is designed to operate with 2 ND filters and use any combination of ND1 and ND3 filters that are included in the product package.

2. SETUP

The device is factory calibrated and is ready to be attached to the camera (the camera is sold separately). Refer to Figure 1 for steps 1–4.

1. Mount the camera to the WB-I using the C-mount thread.
   - For Si sensor cameras, add the supplied ND1 filter (red) to the filter mounted on the camera (two filters total).
   - For InGaAs cameras, no additional filters are added.
2. Mount the WB-I device onto the support post (1).
3. Tighten the thumbscrew (2) so that the WB-I does not rotate freely.
4. Rotate iris adjusting ring (3) to the "C" position (closed).

Figure 1: Completed physical setup

5. Open the BeamGage software and modify the **Optical scaling** (located in the **Computations** ribbon) to the value indicated on label.
   - For WB-I VIS, Si sensor cameras (SP90612), set the value to 8.15 (Figure 2).

Figure 2: Optical scaling setting for WB-I with Si sensor cameras

   - For WB-I SWIR, InGaAs cameras (SP90605), set the value to 8.3 (Figure 3).

Figure 3: Optical scaling setting for WB-I with InGaAs cameras

6. Use the iris control ring in tandem with the **Exposure Time** setting in BeamGage to adjust the intensity for an optimal image.
7. Use BeamGage software tools like **Binning**, **Aperture** (Manual or Automatic), **Ultracal**, etc. to achieve stable and reproducible results.

3. OPERATION

The WB-I device is designed to measure beams with diameters and divergence angles too large to work directly with standard camera systems. A successful operation, like with other beam profiling systems, is based on sufficient attenuation and correct alignment. Users can modify attenuation by adjusting iris control ring, and with an Si sensor camera, replacing one or both ND filters using the supplied ND1 and ND3 filters.

NOTE

Optical systems are calibrated at the factory. Disassembling or adjusting the system optics, including changing the lens focus or iris internal settings, invalidates the factory calibration and may render the system unusable.

For intensity optimization, use the Iris control ring and the BeamGage Exposure Time control. If the Iris aperture is set to the minimum value, it may increase image noise. Whenever possible, we recommend using the iris control ring at maximum opening and compensating with a shorter Exposure Time setting.

Beam Size

To accurately measure beam widths or the size of the light source, direct the laser or light source onto the diffuse surface. Ensure the beam power is at the safe range of fluence the system is designed for. If necessary, attenuate the incoming beam using front surface reflections wedged beam splitters. Optical attenuation systems are available from Ophir for this purpose.

Refer to the BeamGage User Guide for installation instructions.

According to the light source and beam geometry, the user should choose the measurement parameters which will yield most suitable results for the application, e.g., D4σ is the best for gaussian fit at M2 = ~ 1, 50% of peak value (FWHM) for "Top-hat".

For reproducible results, use the **UltraCal** and **Aperture** features.

Divergence Calculation

For accurate divergence angle measurements, the distance from the source to the imaging screen must be measured. The screen is 0.5mm inside cylindrical enclosure from end surface.

The **Divergence Angle** measurements can be enabled in the **Results** area in BeamGage:

Navigate to **Computation** > **Divergence** > **Far Field Wide Angle** settings to set distance from source to WB-I screen (Figure 4):

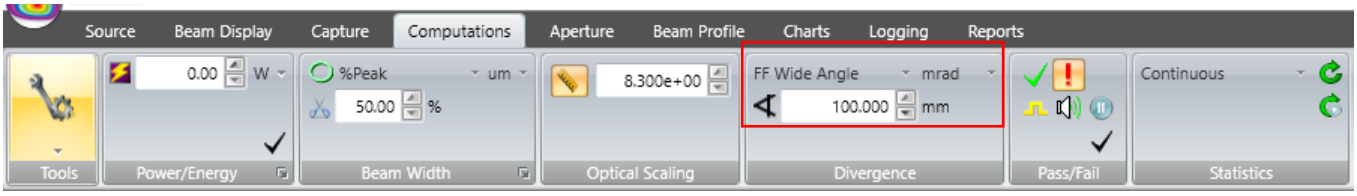
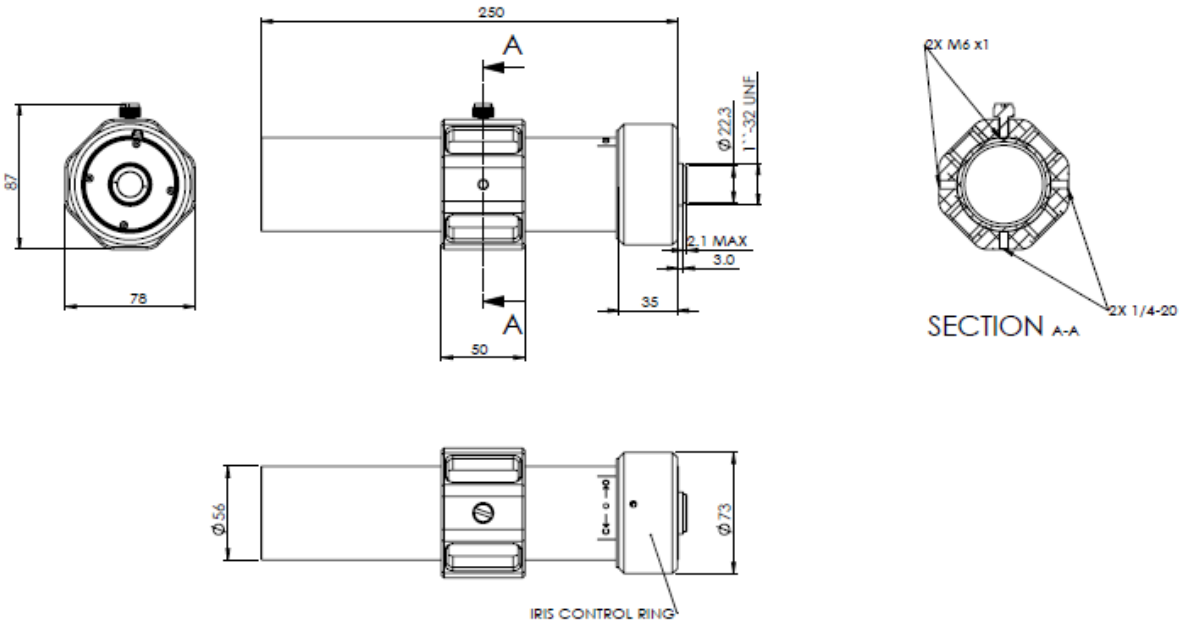


Figure 4: Example of a Top-hat light source Divergence measurement. Far Field (FF) Wide angle 100mm from source to WB-I diffuser. 50% of Peak Energy (FWHM).

4. DIMENSIONS (WITHOUT CAMERA)



5. SPECIFICATIONS

Model (PN)	Wide Beam Imager - VIS (SP90612)	Wide Beam Imager - SWIR (SP90605)
Active area	Ø45mm (43mm in Y direction)	
Beam sizes	10-45mm (5mm possible with reduced accuracy)	
Angle of incidence	<70°	
Minimum detail	0.5mm, (0.8mm for low contrast artefacts)	
Lowest measurable signal	100µW/cm^2, with two ND1 filters	3µW/cm^2 (Iris fully opened at 1550nm)
Maximum power (CW)	200W unlimited, 1000W for 1 min.	50W unlimited time
Maximum energy exposure	ns pulses @1064 nm 1.5J/cm2 below 900nm 0.6 J/cm2	N/A
CCD recess supported	4.5mm CCD recess camera	17.5 mm (C-Mount)
Attenuation	up to 10000 (ND1 and ND3 filters) Up to 100 via Iris	Up to 100 (ND2) via Iris
Dimensions	L=265mm X Ø53mm (Ø73mm at iris)	
Weight (with camera and support)	0.6 kg (0.8 kg)	
Camera Model (PN) required	SP932U (SP90607 or SP90606)	SP1203 (SP90523)

NOTES:

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