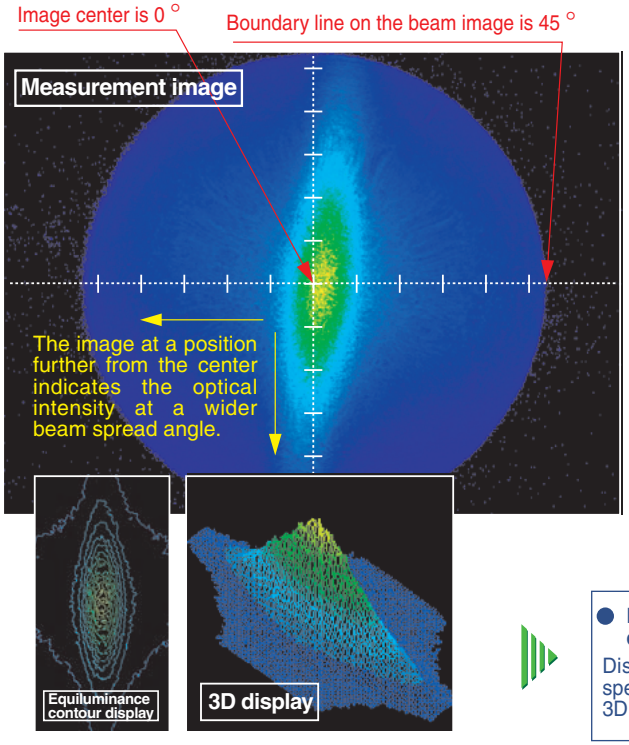
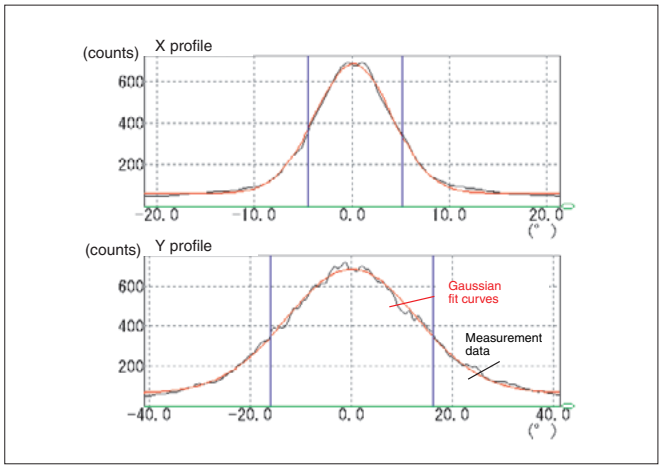

# Semiconductor laser FFP measurement system

**This system measures FFP (Far Field Pattern) of a semiconductor laser. The beam spread angle, N. A. and other parameters of a semiconductor laser can be analyzed at high speeds in two dimensions.**

The semiconductor laser FFP measurement system uses a dedicated optical system and a digital CCD camera to acquire a 2D image of the beam spread angle of a semiconductor laser. The center of the acquired image represents the optical intensity at 0° versus the optics axis. The image at a position nearer the edge indicates the optical intensity at a wider beam spread angle.

**FFP :** An abbreviation for Far Field Pattern. The FFP represents the optical intensity distribution on a plane sufficiently distant from the photocathode a semiconductor laser. This is expressed in degrees (°) and ranges from ±10 ℃ to ±30 ℃ (FWHM) for typical semiconductor lasers.




### ● Equiluminance display and 3D display

Displays a 2D or 3D profile of a specified region in pseudocolor. The 3D display viewing angle is adjustable.

### ● XY profile display

Displays an XY profile of a specified region. Overlays not only measurement data but also gaussian fit curves (red line). XY profire can be zoomed by mouse operation. The cursors appear on graph , and data can be read directly at any desired postion.

### ● Beam parameter display

Analyzes and displays various beam parameters of a specified region.
The slicing levels used for analysis are FWHM, 1/e, 1/e$^2$, and any other two points specified by the user.

| | FWHM | 1/e | 1/e$^2$ |
|---|---|---|---|
| Peak position (°) | | 0.40, -2.60 | |
| Gravity position (°) | 1.33, 0.00 | 1.33, 0.00 | 1.50, 0.33 |
| Beam angle (°) | 9.46, 32.56 | 12.01, 38.03 | 21.20, 63.95 |
| Beam gauss angle (°) | 9.59, 31.30 | 11.75, 38.49 | 18.88, 61.39 |
| Numericl apature | 0.0824, 0.2803 | 0.1046, 0.3258 | 0.1839, 0.5295 |

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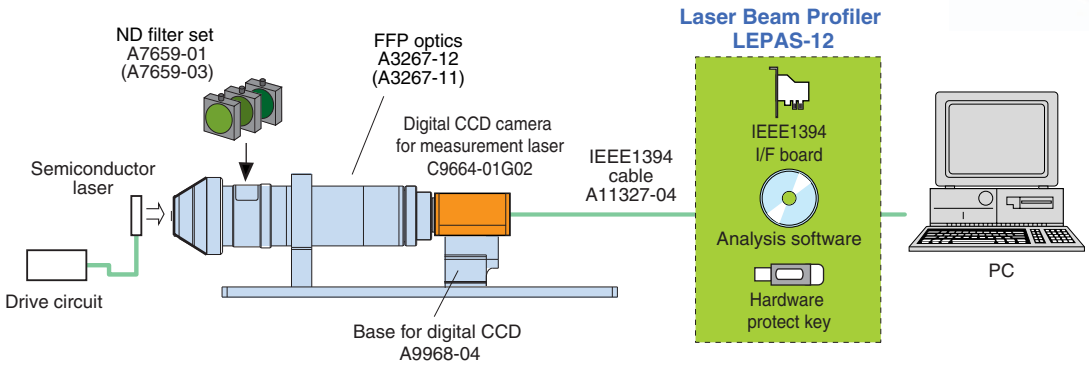
## System configuration




*Adding an optional item to the FFP measurement system upgrades it to the NFP measurement system.

## Specifications

### ■ Optics specifications

| Optics type | A3267-11 | A3267-12 |
|---|---|---|
| Wavelength range | 400 nm to 800 nm | 635 nm to 1100 nm |
| Aperture size | ϕ1.5 mm | |
| Measurement angular range | ±45 ° | |
| Anguler resolution | 0.1 ° | |
| Working distance | 2.8 mm | |
| Applicable reducing fillter | A7659-03 | A7659-01 |

*Please consult us if you need other specifications than shown above.

### ● Reducing filter set

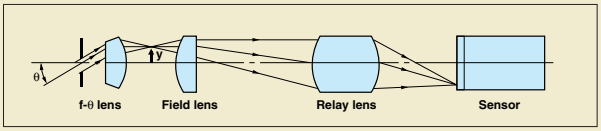
| Optics type | A7659-01 | A7659-03 |
|---|---|---|
| Wavelength | 600 nm to 1100 nm | 400 nm to 650 nm |
| Transmittance (1) | 1/10, 1/25, 1/50, 1/100, 1/250, 1/500, 1/1000, 1/2500, 1/5000<br>1/10 000, 1/25 000, 1/50 000, 1/100 000 | |

(1) In terms of transmittance, the A7659-01 shows an approximate value in the wavelength range from 650 nm to 850 nm, and the A7659-03 an approximate value from 460 nm to 650 nm.

### ● Operating principle of the FFP optics

The FFP optics is configured of three types of lenses: an f-θ lens, a field lens, and a relay lens. The f-θ lens forms the nucleus of the FFP optics and serves to convert the angle q of the incident beam to positional information y (= f-θ). Consequently, the illumination distribution on the focal surface of the f-θ lens (the camera imaging surface) serves as the angle distribution of the light source, and the FFP itself of the light source is formed of the focal surface. Images formed with FFP optics have a radiative angle distribution similar to that of an image projected on a semi-spherical screen with a light-emitting point at its center and are equivalent to the two-dimensional form of conventional mechanical scanning using a photodiode.

Patent: No. 1639209 Light Source Two-Dimensional Light Distribution Measurement Device



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