

Optical module lens ratio



Summary of Content

The lens ratio in an optical module is typically expressed as the focal ratio (f-number), such as f/2.4, which defines the light-gathering ability and brightness of the system.

Understanding Lens Ratio (Focal Ratio)

The lens ratio, also known as the focal ratio or f-number, is defined as the ratio of the lens's focal length to the diameter of its entrance pupil (aperture). It is expressed as: $f\text{-number (f/N)} = \text{Focal Length} / \text{Aperture Diameter}$. A lower f-number (e.g., f/1.8) indicates a larger aperture, allowing more light to enter the optical module, which improves brightness and low-light performance. Conversely, a higher f-number (e.g., f/4) reduces light intake but increases depth of field and sharpness across the image.

Lens Ratio in Optical Modules

In optical modules used for compact cameras, projectors, or DLP systems, the lens ratio affects several key parameters:

- **Brightness and Illumination Efficiency:** A lower f-number allows more light from the source (LED, laser, or lamp) to reach the sensor or DMD, enhancing image brightness.
- **Field of View (FOV):** The lens ratio, combined with focal length, determines the angular coverage of the module. For example, a compact camera module with a 7.0 mm focal length and f/2.4 ratio achieves a nominal FOV of 36°.
- **Module Size and Design Trade-offs:** Shorter throw ratios and higher image offsets often require larger lenses, which influence the f-number and overall optical module dimensions.

Article Content

High-efficiency concentrated optical module

For optical modules with a high concentrating ratio, concentrating lens designs mostly adopt a Fresnel lens or a

Designing Cell phone Camera Lenses Part 1: Optics

This article is part of a four-series articles that will discuss the challenge of smartphone lens modules, from the conception and

M12 Lens Manufacturer Since 2009

Shenzhen JSD Optoelectronics Co., Ltd. is optical lens designer and manufacturer since 2009, providing optical solutions for face

Matching lens & sensor MTF for resolution | Opto Engineering

Properly matching a camera and lens is paramount, especially in applications where the defects to be detected are minuscule

Tips for Designing Manufacturable Lenses and Assemblies

One common technique optical manufacturers use when machining glass or other materials to the final specification is to oversize

Understanding Optical Specifications

Knowing the value of the radius of curvature allows one to determine the optical path length of rays passing through the lens or

Detailed explanation of optical lens parameters

Discover the details of Detailed explanation of optical lens parameters at Shenzhen Sinoseen Technology Co., Ltd, a

TI DLP® System Design: Optical Module Specifications

Optical zoom allows the optical module to adjust the throw ratio by mechanically repositioning a component of the projection lens.

The Most Comprehensive Guide Of Optical Modules

Explore the ultimate guide to optical modules. Learn types, functions, performance metrics & how to choose the right

Understanding Optical Specifications

Compute the locations and focal lengths of these modules (and the reduction ratios) to change the magnification to 2x. Note that the

Use of Lens Modules in Lens Design

Compute the locations and focal lengths of these modules (and the reduction ratios) to change the magnification to $2\times$. Note that the

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