FCM Series Lens

for Luminus Devices Big Chip SST-50 and SST-90 LEDs

- **Highly efficient TIR collimation lenses**
- **Homogeneous beam**
- **Bright central spot with minimal halo**

The FCM-series lenses are specifically designed to produce a round homogeneous beam from Luminus Devices SST-50 and SST-90 Big Chip™ LEDs.

A software-optimized aspheric profile combined with front shaped micro-lens arrays and a proprietary texture provides an efficient homogeneous optical solution.

The design of the FCM series insures that almost all of the light emitted by the LED is captured and usefully directed, resulting in a lens with maximum performance and efficiency.

Typical applications are:

- Architectural lighting
- Entertainment lighting
- Wall washing
- Portable lighting
- Applications requiring excellent uniformity

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General Characteristics

Materials

Lens Material	Optical Grade PMMA
Operating Temperature range	-40° C / + 80° C
Storage Temperature range	-40° C / + 80°C

Average transmittance in visible spectrum (400 – 700nm) >90%, as measured using 3mm thick Optical Grade PMMA.

Please note that flow lines and weld lines on the external surfaces of the lenses are acceptable if the optical performance of the lens is within the specification described in the section "OPTICAL CHARACTERISTICS"

IMPORTANT NOTE – Lenses handling and cleaning*:*

- *Handling: Always use gloves to handle lenses and/or handle the lenses only by the flange. Never touch the outside surfaces of the lenses with fingers; finger oils and contamination will absorb or refract light.*
- *Cleaning: Clean lenses only if necessary. Use only soap and water to clean the surfaces and lenses. Never expose the lenses to solvents such as alcohol, as it will damage the plastic.*

Scope

This datasheet provides information about the

- FCM-N2-ST50-0 Narrow beam lens

and

- FCM-M2-ST50-0 Medium beam lens

when used on the Luminus Devices SST-50-W or SST-90-W white LEDs.

Optical Characteristics – On-axis Intensity[1], Beam Angle[2]

LED	Beam Shape	On-axis Intensity (peak)	Beam Angle (FWHM)
SST-50-W	Narrow	8.0 cd/lm	15°
	Medium	4.3 cd/lm	25°
SST-90-W	Narrow	5.4 cd/lm	20°
	Medium	3.5 cd/lm	27°

(1) To calculate the on-axis intensity (cd), multiply the on-axis value, above, of the lens (cd/lm) by the total flux (lm) of the LED used. See "Illumination Calculations" below. Luminous intensity depends on the flux binning and tolerances of the LEDs. Please refer to the LED datasheet for more details on flux binning.
(2) FWHM is the full angle where the beam intensity is half the on-axis peak intensity.

Example Calculations

To calculate intensity (cd): Find the central spot on-axis intensity (cd/lm) for the lens and then multiply this value by the luminous flux (lm) of the LED. Refer to the LED's datasheet for typical flux values; drive current versus flux ratios; color temperature and binning characteristics.

Example intensity calculations:

If a Fraen lens with an on-axis intensity of 21 candela per lumen (cd/lm) is used with an LED that produces 105 lumens of flux, the calculations are as follows:

On-axis intensity = (21 cd/lm) x (105 lumens) = 2205 candela on-axis intensity (one LED).

If 12 LEDs are used in a fixture, then the on-axis intensity = 12 LEDs x 2205 candela/LED
= 26460 cd (on-axis – 12 LEDs)

An explanation of illuminance and the effect of distance

One candela at 1-meter distance produces 1 lux. In the above example, the 12 LED fixture produced 26460 candela. If that fixture is illuminating a surface one meter distant, then the *illuminance* on that surface is 26460 lux.

Illuminance decreases with the square of the distance. If you move the fixture so that it is two meters from the surface, then the illuminance falls to 26460 lux/ $(2m)^2$ or 6615 lux. Moving the fixture three meters from the surface decreases the illuminance to 26460 lux/$(3m)^2$ or 2940 lux.

Beam Angle

Beam Angle is a methods of describing the light distribution of a lens. The Beam Angle is expressed as a FWHM value (Full angular Width of the beam where it reaches Half the Maximum intensity).

If the lenses in our example fixture, above, have a Beam Angle of 10° and an on-axis intensity of 26460 cd, then at ± 5° (half of 10°) the intensity will drop to half of 26460 or 13230 cd. If the Field Angle for the fixture is 19°, then at ± 9.5° (half of 19°) the intensity should be 10% of 26460 or 2646 cd.

Most lenses have Beam Angles that are rotationally symmetrical about the center axis of the lens. Lenses with an elliptical beam profile or optics with specifically shaped beam profiles are the exception.

Intensity, illuminance and Beam Angle characteristics are all important factors to be considered in a fixture design.

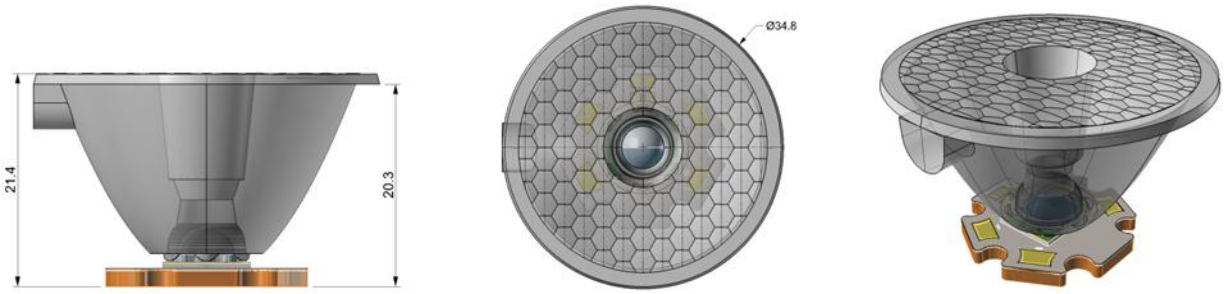
Beam Appearance

FCM-N2-ST50-0 lens on SST-50-W LED

FCM-M2-ST50-0 lens on SST-50-W LED

Figure 1: Beam appearance photos

Mechanical Characteristics

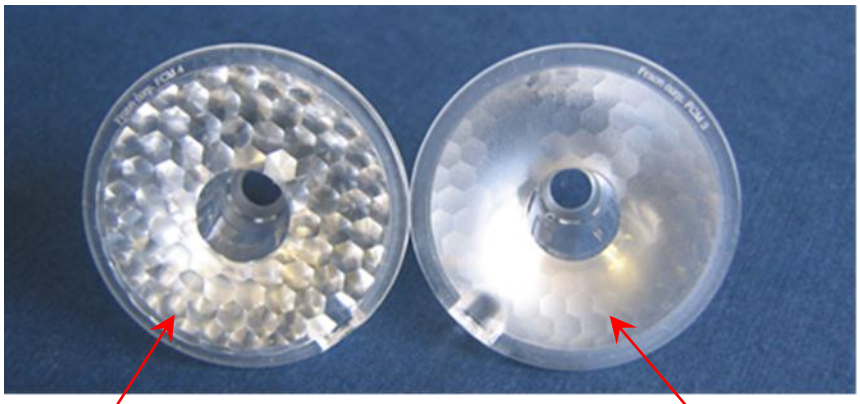


FCM-N2-ST50-0 shown (FCM-M2-ST50-0 similar)
Tolerances: +/- 0.2 mm (based on nominal LED dimensions)

Figure 2. Dimensions of lens on SST-50-W Star LED.
Bottom of Fraen lens touches flat perimeter of LED lens.

NOTE: The user must provide a mechanical method to set the correct position of the FCM lens on the LED. For example, the lens flange can be located in the lamp housing to center the lens to the LED and establish 21.0mm from the lens flange to the user's printed circuit board. When the lens is positioned correctly, the bottom of the lens touches the LED. There are features on the lens that help to center the lens to the LED.

Identification of Lenses by Appearance



The FCM-M2-ST50-0 medium beam lens has higher hexagonal microlenses and no texture.

The FCM-N2-ST50-0 narrow beam lens has lower hexagonal microlenses with texture.

Ordering Part Numbers

FCM-_2-ST50-0

NOTE: Last character is a zero (0)

N2 = Narrow Beam
M2 = Medium Beam