FLP Lens Series

for Cree XLamp[1] XM-L™ LEDs

- **High efficiency**
- **Available in 5 different beams**
- **Easy assembly**

The FLP lens series offers five lenses specifically designed for the Cree XLamp XM-L LED.

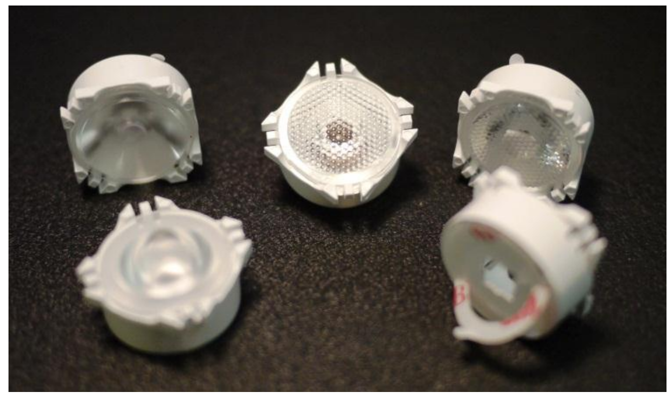
The software-optimized aspheric profile combined with shaped front surfaces and micro-lenses provides several different output patterns: Narrow1, Narrow2, Medium, Wide, Flood beams[2].

The high collection efficiency reaches up to 85% of the total flux emitted from the LED.

The FLP lenses are provided in holders fitted with double-sided peel and stick tape. These assemblies are design to insure proper alignment of the lens to the LED and allow for rapid assembly of your lighting fixture.

Typical applications are:

- Reading lamps
- Architectural lighting
- Entertainment lighting
- Interior lighting
- Bay lighting



1. XLamp XM-L is a trademark of Cree Inc. For technical specification on LEDs please refer to the datasheet or visit http://www.cree.com/
2. Beam angles may vary with LED color, LED binning and LED position

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General Characteristics

Materials

Lens Material	Optical Grade PMMA
Holder Material	Polycarbonate: White
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 FLP for Cree XM-L series.

FLP-N1LL-SPL-HSSAW	Narrow lens in a square white holder with tape
FLP-N2LL- SPL-HSSAW	Narrow lens in a square white holder with tape
FLP-M1LL- SPL-HSSAW	Medium lens in a square white holder with tape
FLP-W1LL- SPL-HSSAW	Wide lens in a square white holder with tape
FLP-F1LL- SPL-HSSAW	Flood lens in a square white holder with tape

Optical Characteristics – On-axis Intensity[1], Beam Angle[2], Field Angle[3]

LED	Beam Shape	On-axis Intensity (peak)	Beam Angle (FWHM)	Field Angle (FW10%)
XML Standard	Narrow1‡	4.8 cd/lm	15°	28°
XML Standard	Narrow2‡	4.6 cd/lm	18°	32°
XML Standard	Medium	2.0 cd/lm	32°	52°
XML Standard	Wide	0.8 cd/lm	52°	78°
XML Standard	Flood	0.8 cd/lm	45°	90°
XML Standard	Elliptical	2.0 cd/lm	28° x 33°	42° x 65°
XML EZ White	Narrow1‡	3.2 cd/lm	23°	37°
XML EZ White	Narrow2‡	3.4 cd/lm	23°	37°
XML EZ White	Medium	1.5 cd/lm	37°	61°
XML EZ White	Wide	0.7 cd/lm	60°	77°
XML EZ White	Flood	0.7 cd/lm	63°	100°
XML EZ White	Elliptical	2.0 cd/lm	30° x 35°	48° x 70°

(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
(3) Field angle is the full angle where the beam intensity is 10% of the on-axis peak intensity

‡ The Narrow1provides a very tight central spot with little spill. The Narrow2 has slightly more spill.

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 and Field Angles

Beam and Field Angles are 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). The Field Angle is a similar concept, sometimes expressed as FW10%, and represents the Full Width angle where the beam reaches 10% of 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 and Field 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, Beam and Field Angle are all important factors to be considered in a fixture design. Some applications may require specific ratios between the Beam and Field Angle values.

Mechanical Characteristics

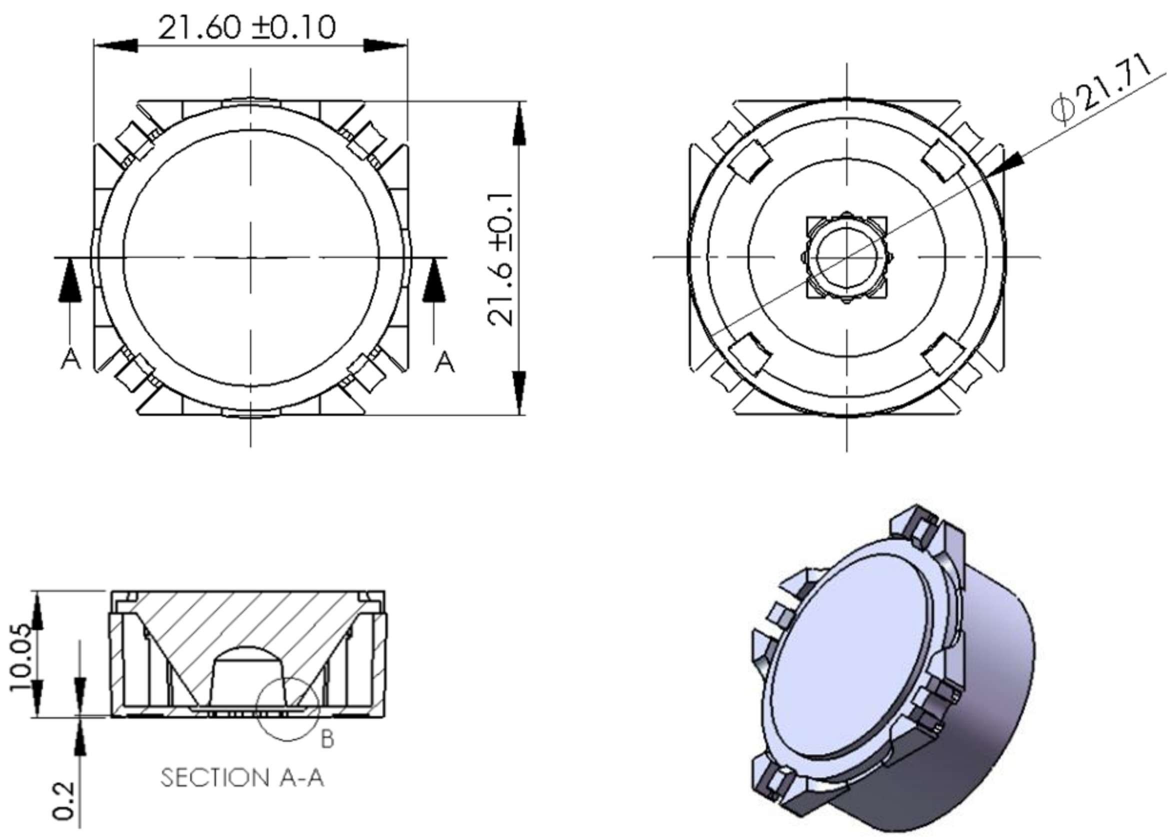

Figure 1: Mechanical Dimensions

Ordering Part Numbers

FLP-N1LL- SPL-HSSAW
FLP-N2LL- SPL-HSSAW
FLP-M1LL- SPL-HSSAW
FLP-W1LL- SPL-HSSAW
FLP-F1LL- SPL-HSSAW