



## FC3 Series Tri-Lens for Cree XLamp XP-E & XP-G™ LEDs

- High efficiency
- 3 beams available
- MR-16 size tri-lens

The FC3 tri-lens offers MR16 size lenses specifically designed for the Cree XLamp XP-E & XP-G LEDs.

A software-optimized aspheric profile enables the generation of three different beam output patterns: narrow, medium, and wide beams.

Lens holders are white or clear polycarbonate, and provide the proper alignment between the LEDs and the lenses, and set the correct distance between the lens and LED.

The lens holder can be heat-staked to the PCB, to provide a secure assembly.

Typical applications are:

- MR-16 LED lamps
- Architectural lighting
- General illumination
- Street lights



XLamp is a trademark of Cree Inc. For technical specification on LEDs please refer to the XLamp datasheet or visit [www.cree.com](http://www.cree.com)

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## General Characteristics

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Lens Material	Optical Grade PMMA
Holder Material	PC, white color or PC, Clear
Operating Temperature range	-40deg C / + 80 deg C
Storage Temperature range	-40deg C / + 80 deg 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

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This datasheet provides information about the following FC3 series tri-lenses.

Lens and holder (assembly):

- FC3-N1-XP1-H
- FC3-M1-XP1-H
- FC3-W1-XP1-H

White

- FC3-N1-XP1-HT
- FC3-M1-XP1-HT
- FC3-W1-XP1-HT

Transparent



## Optical Characteristics – Beam Angle<sup>(1)</sup> (degrees, full angle at 1/2 peak)

Lens Part Number	Type of lens	XP-E White	XP-G White
FC3-N1-XP1-yy	Narrow beam	8	10.5
FC3-M1-XP1-yy	Medium beam	22	22
FC3-W1-XP1-yy	Wide beam	33	33

- (1) The typical divergence varies with LED color due to different chip size and chip position tolerance. The typical total divergence is the full angle measured where the luminous intensity is half of the peak value.

## Optical Characteristics – On-Axis Intensity<sup>(2)(3)</sup> (candela/lumen)

Lens Part Number	Type of lens	XP-E White	XP-G White
FC3-N1-XP1-yy	Narrow beam	30.8	15.8
FC3-M1-XP1-yy	Medium beam	4.9	4.5
FC3-W1-XP1-yy	Wide beam	2	1.9

- (2) To calculate the on-axis illumination, multiply the on-axis intensity of the lens (cd/lm) by the total flux of the Cree XLamp LED used. See “Illumination Calculations” below. For more detail on flux binning please check the Cree XLamp XP-E or XP-G LED datasheet at <http://www.cree.com/>
- (3) Illumination depends on the flux binning and tolerances of the LEDs. Please refer to the Cree XLamp LED datasheet for more details on flux binning and mechanical tolerances.



## Illumination Calculations

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If the Fraen FC3-N1-XPE-yy is used on a cool white Cree XP-E LED at 350 mA, the typical luminous flux of the LED is 100 lumens (Tj25°):

The calculation is: (30.8 candela/lumen) x (100 lumens) = 3080 candela on-axis intensity.

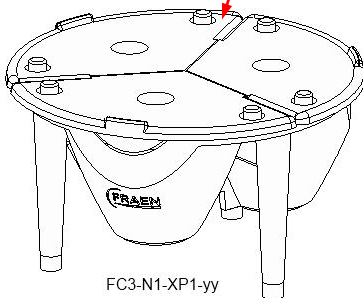
One candela at 1-meter distance produces 1 Lux. This means the peak illuminance at 1 meter will be 3080 lux. The illuminance decreases as a function of the distance squared, so at 2 meters peak illuminance will be  $3080 / (2^2) = 770$  lux. At 3 meters distance, the peak illuminance will be  $3080 / (3^2) = 342.2$  lux.

The beam angle specified in the table above is 8 degrees FWHM (full angular width measure where the beam intensity equals half the on-axis maximum intensity.) This means at + or -4 degrees off-axis (half of 8 degrees), the intensity should be half of 3080 candelas, or 1540 candelas.

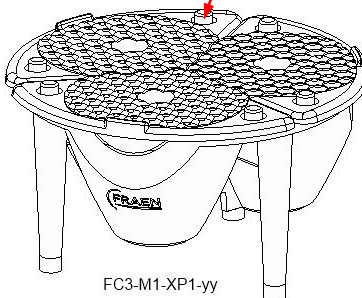
## Mechanical Characteristics

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Narrow beam lenses are smooth on the front face.



The Medium beam lens has large microlenses.



The Wide beam lens has small textured microlenses.

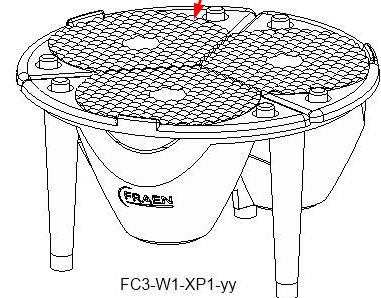


Figure 1: The tri-lens assemblies can be identified by the face surfaces of the lenses. The FC3 series tri-lenses are available only assembled to a holder. The holder provides the correct alignment of the lenses to the LEDs.

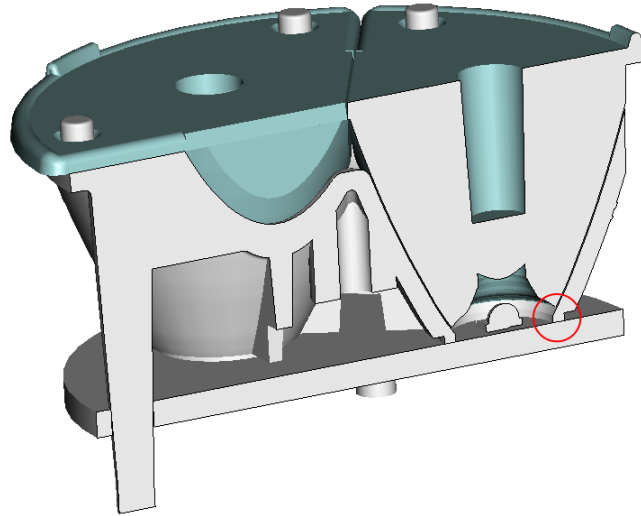
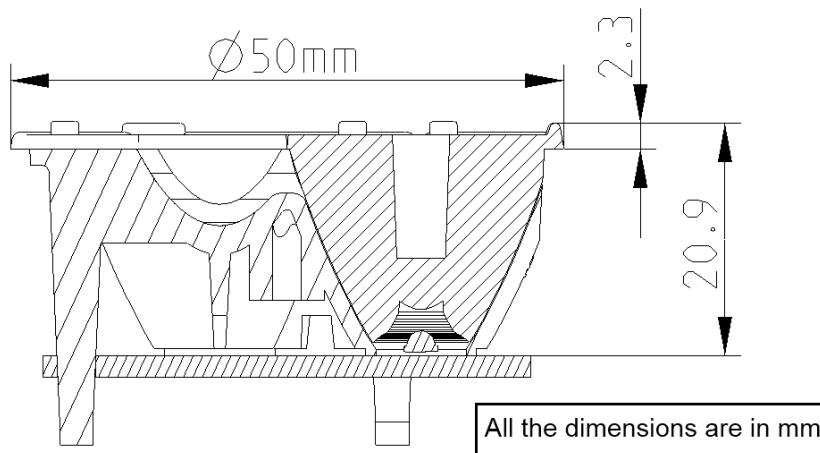


Figure 2: X-section view shows the lenses touch the PCB of the LED, and the holder aligns the lenses to the LED.



Dimension tolerance: +/- 0.2 mm

Figure 3: X-section view. The dimension “20.9 mm” represents the distance from the top of the lens holder to the bottom of the LEDs.

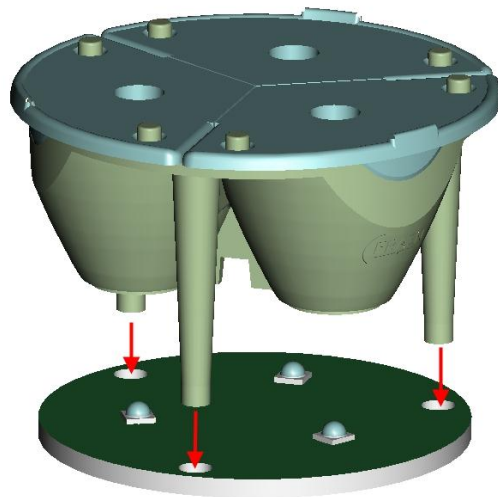


Figure 4: The three legs on the tri-lens require clearance holes in the circuit board. The legs have stepped diameters. The smaller diameter allows the leg to fit into the holes on the PCB. The larger diameter is intended to contact the top of the PCB and provide proper height alignment of the lens to the LED.

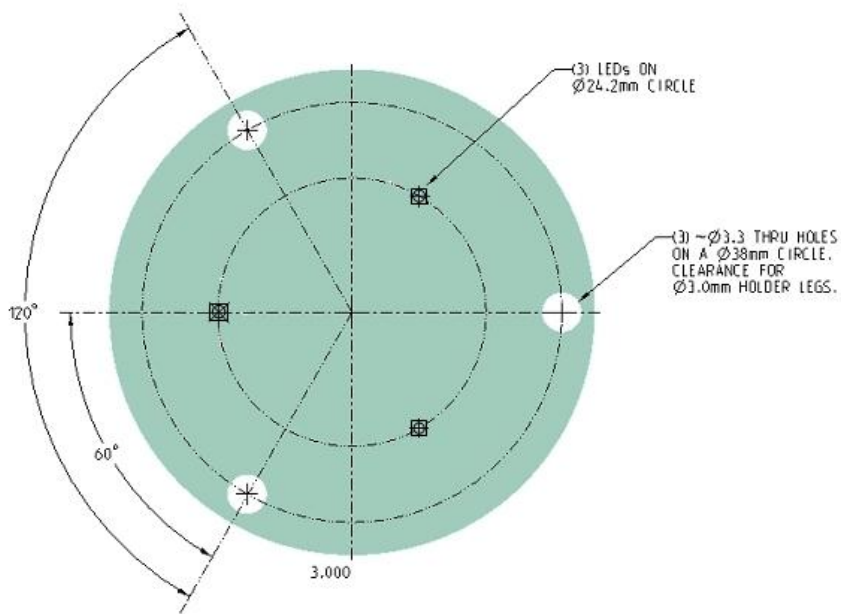


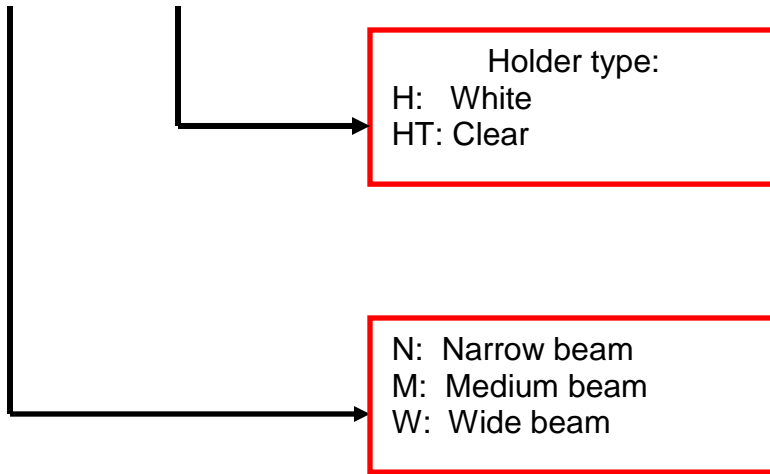
Figure 5: For best fit to the FC3 tri-lens, the PCB should have thru holes and LEDs located as shown above. The rotation/orientation of the LEDs should be as shown. This positioning aligns the electrical contacts of the LEDs with the clearance channels of the lens holders. This is also shown in Figure 2.



## Ordering part numbers

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FC3-\_1-XP1-yy



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Rev	Date	Author	Description
00	23/09/2011	D.Omma	Initial Release