FS3 Series Tri-Lens
for SEOUL SEMICONDUCTOR Z-POWER P5-II™ LEDs

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

The FS3 tri-lens offers MR16 size lenses specifically designed for the Seoul Semiconductor P5-II® LEDs.

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

The high collection efficiency reaches 85% of the total flux emitted by the LEDs.

Lens holders are white 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

Z-Power® is a trademark of Seoul Semiconductor. For technical specification on LEDs please refer to the Z-Power datasheet or visit www.seoulsemiconductor.com

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General Characteristics

Lens Material	Optical Grade PMMA
Holder Material	PC, white color
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

This datasheet provides information about the following FS3 series tri-lenses.

Lens and holder (assembly):

- FS3-N1-SSP5II-H
- FS3-M1-SSP5II-H
- FS3-W1-SSP5II-H

Optical Characteristics – Beam Angle (degrees, full angle at ½ peak)

Lens Part Number	Type of lens	RGB[5]	Blue	Green	Red
FS3-N1-SSP5II-H	Narrow beam	(Note 5)	(Note 6)	(Note 6)	(Note 6)
FS3-M1-SSP5II-H	Medium beam	23	24	24	23
FS3-W1-SSP5II-H	Wide beam	39	37	36	36

(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 (candela/lumen)

Lens Part Number	Type of lens	RGB[5]	Blue	Green	Red
FS3-N1-SSP5II-H	Narrow beam	(Note 5)	(Note 6)	(Note 6)	(Note 6)
FS3-M1-SSP5II-H	Medium beam	2.3	2.6	2.7	2.1
FS3-W1-SSP5II-H	Wide beam	1.1	1.4	1.3	1.2

(2) To calculate the on-axis intensity, multiply the on-axis efficiency of the lens (cd/lm) by the total flux of the Seoul P5II LED used. See “Illumination Calculations” below. For more detail on flux binning please check the Seoul P4 LED datasheet at http://www.seoulsemicon.com/en/product/prd/zpowerLEDp5-II.asp
(3) Luminous intensity depends on the flux binning and tolerances of the LEDs. Please refer to the Seoul P5-II LED datasheet for more details on flux binning and mechanical tolerances.
(4) Typical illuminance was measured in candela per lumen with typical Seoul P5-II LED. To estimate the illuminance in lux, multiply the typical illuminance by the flux (lumens) of your LED. See “Illumination Calculations” below.
(5) Color mixing performance to be evaluated depending on the application (**only for Narrow beam**).
(6) To evaluate also for single color due to inherent misalignment of LED chips and optics axis.

Illumination Calculations

To calculate peak candela: Find the central spot “on-axis intensity” value in the table above, then multiply this value by the lumens output from your LED (refer to the P5-II LED datasheet http://www.seoulsemicon.com/en/product/prd/zpowerLEDp5-II.asp for nominal lumens values). Or for a more accurate value, refer to their .pdf spec for intensity binning.

Example calculation:
If the Fraen medium beam tri-lens **FS3-M1-SSP5II-H** is used on RGB Seoul P5-II LED at 350 mA, the typical luminous flux of each LED is 100 lumens:
The calculation is: (2.3 candela/lumen) x (100 lumens) = 230 candela peak on-axis. For three 100 lumen LEDs and a tri-lens: 230 x 3 = 690 candela peak on-axis.
The beam angle specified in the table above is 23 degrees full beam-width measured at half-peak. This means at 23 degrees off-axis (half of 23 degrees), the intensity should be half of 230 candela, or 115 candelas.
1 candela at 1-meter distance produces 1 Lux. This means the peak intensity at 1 meter will be 230 lux from each LED and lens. The intensity decreases as a function of the distance squared, so at 2 meters the peak intensity will be 230 / (2^2) = 57.5 lux. At 3 meters distance, the peak intensity will be 230 / (3^2) = 25.5 lux.

Mechanical Characteristics

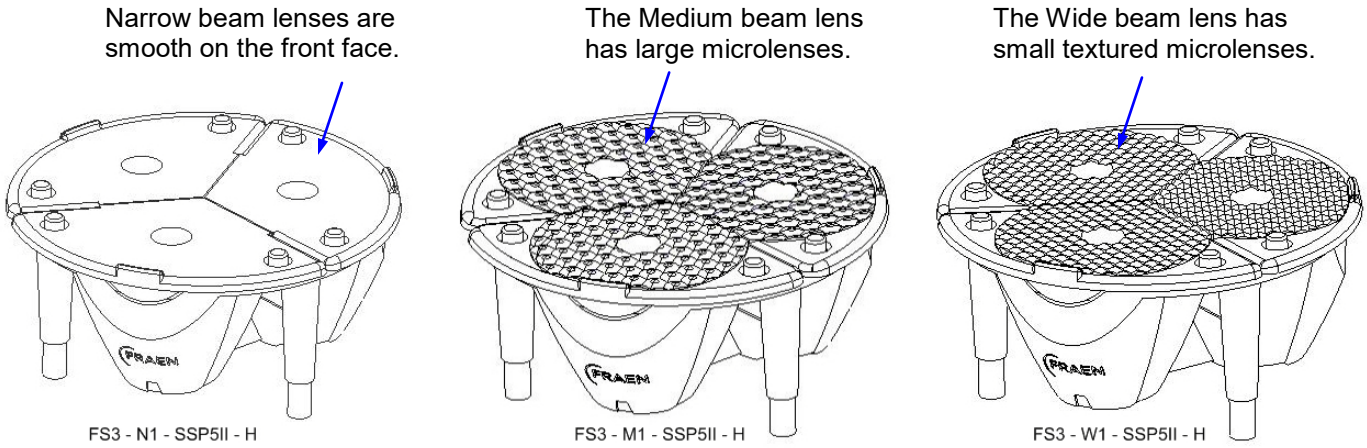


Figure 1: The tri-lens assemblies can be identified by the face surfaces of the lenses. The FS3 series tri-lenses are available only assembled to a holder. The holder provides the correct alignment of the lenses to the LEDs.

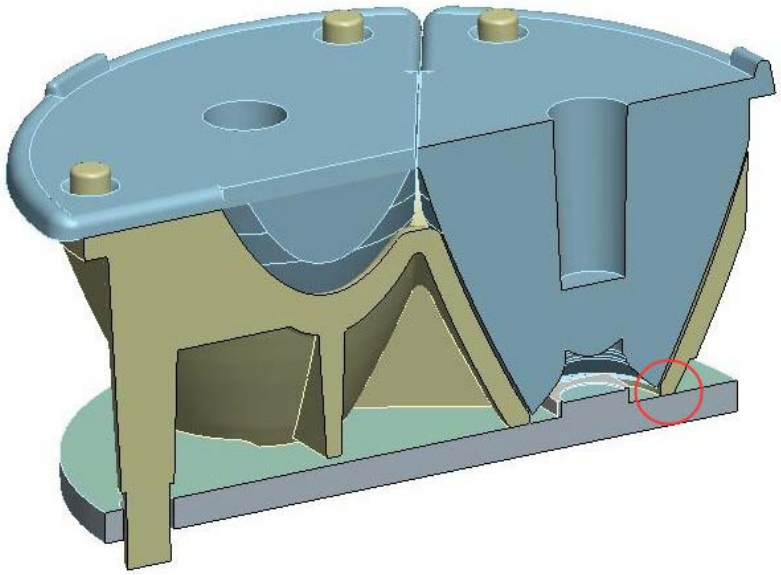


Figure 2: X-section view shows the lenses touch the PCB of the LED, and the holder aligns the lenses to the LED.

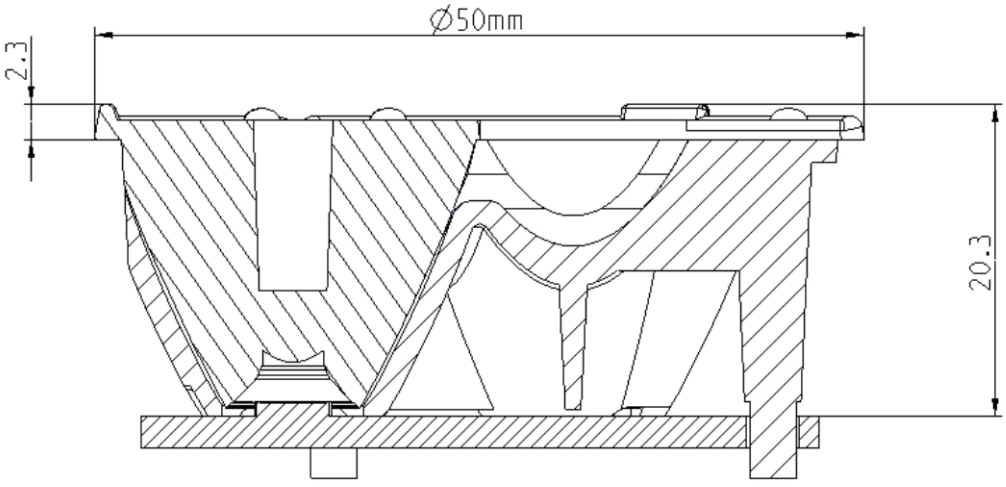


Figure 3: X-section view. The dimension “20.3 mm” represents the distance from the top of the lens holder to the bottom of the LEDs.

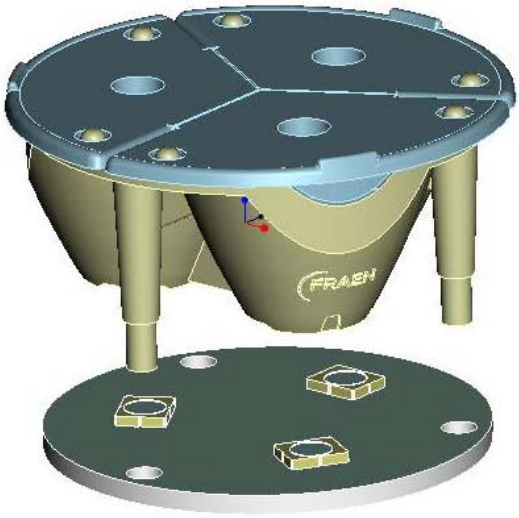


Figure 4: The 3 legs on the tri-lens require clearance holes in the circuit board. The holder has a ring feature around each lens, to align the holder to the LEDs.

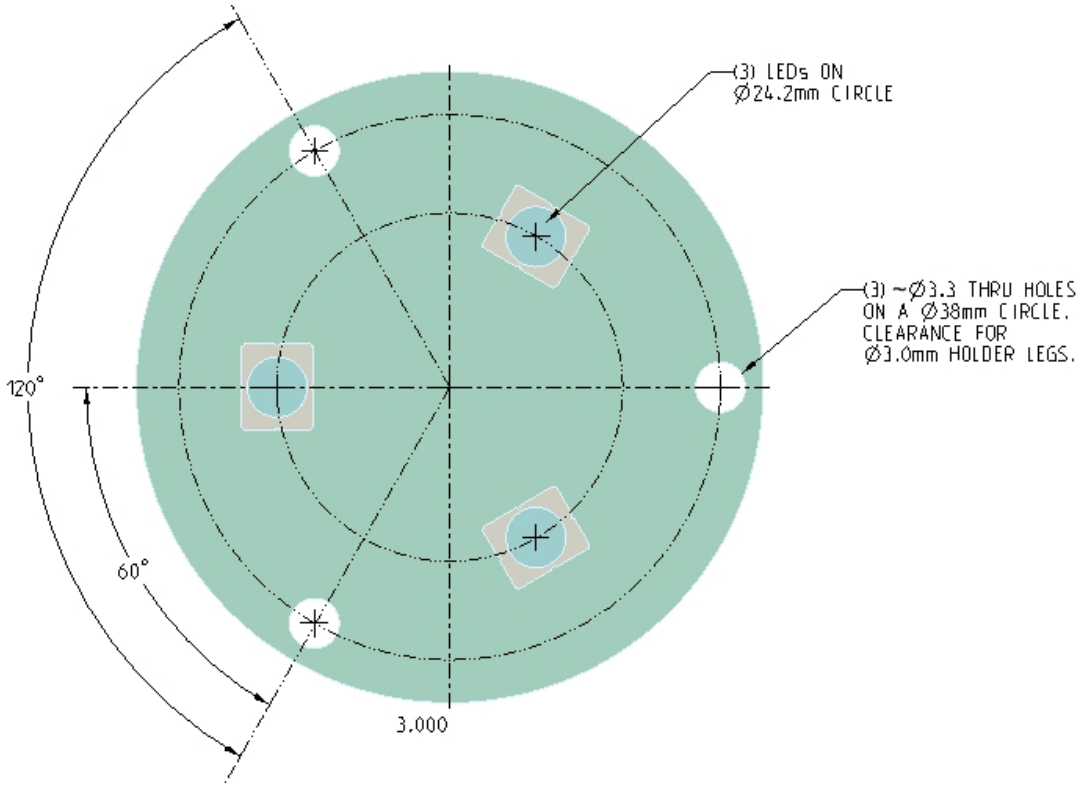
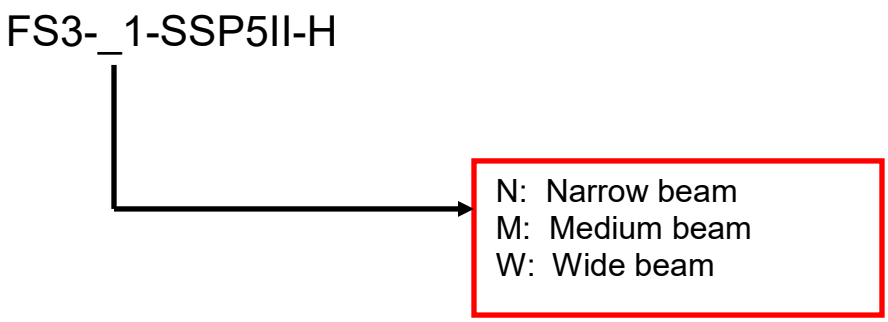


Figure 5: For best fit to the FS3 tri-lens, the PCB should have thru holes and LEDs located as shown above. The rotation/orientation of the LEDs should to be as shown, for the LED wires to align with the clearance slots in the lens holder. This is also shown in Figure 2.

Ordering part numbers



Rev	Date	Author	Description
00	13-April-2010	Baraldo/Daniele	Released