FCM SERIES LENSES

for SEOUL SEMICONDUCTOR Z-POWER P5™ LEDs

- **Highly efficient color mixing lens**
- **Available in 3 different beams**

The FCM lens series is a range of four lenses specifically designed for the Seoul Semiconductor LEDs : Z-Power P5 ™.
www.seoulsemiconductor.com

A software-optimized aspheric profile combined with front shaped micro-lens arrays enable the generation of four different lens models: narrow , medium and wide beam.

The high collection efficiency reaches 80% of the total flux emitted from the LED.

Typical applications are:

- Architectural Lighting
- Entertainment lighting
- Wall washing
- Applications requiring excellent uniformity of colormixing

(1) 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

For ordering instructions, please contact

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To find a local distributor, check the Fraen website.

Website: www.fraensrl.com

General Characteristics

Lens Material	Optical Grade PMMA
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 alcohol, as it will damage the plastic.

Scope

This datasheet provides information about the FCM series lenses:

- FCM-N1-SSP5-0
- FCM-M1-SSP5-0
- FCM-W1-SSP5-0

Optical Characteristics – Beam Angle (degrees, Full Angle)

Lens Part Number	Type of lens	Blue LED	Green LED	Red LED	White LED (composite)
FCM-N1-SSP5-0	Narrow beam	17	17	16	17
FCM-M1-SSP5-0	Medium beam	32	30	33	31
FCM-W1-SSP5-0	Wide beam	42	40	42	41

(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	Blue LEDs	Green LEDs	Red LEDs	White LED (composite)
FCM-N1-SSP5-0	Narrow beam	5	7.5	8	8
FCM-M1-SSP5-0	Medium beam	2	3	3	3.5
FCM-W1-SSP5-0	Wide beam	1.5	2	2	2.3

(2) To calculate the on-axis intensity, multiply the on-axis efficiency of the lens (cd/lm) by the total flux of the Seoul Semiconductor P5 LED used. See "Illumination Calculations" below. For more detail on flux ranking (binning) please check the LED datasheet at
(3) Luminous intensity depends on the flux binning and tolerances of the LEDs. Please refer to the LED datasheet for more details on flux ranking and mechanical tolerances.
(4) Typical illuminance measured in lux per lumen (E) with typical LEDs. To estimate the illuminance in lux, multiply the typical illuminance E by the flux in lumen of the LED used. See "Illumination Calculations" below.

Illumination Calculations

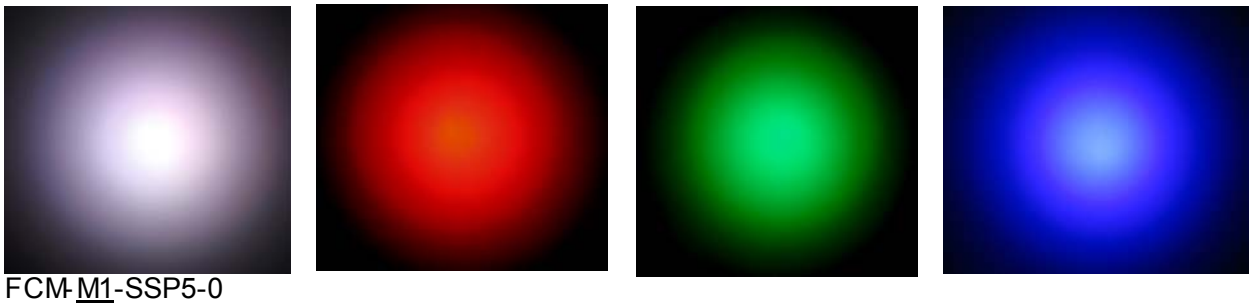
To calculate peak candela: Find the central spot "on-axis intensity" value in the table above, then multiply this value by the lumens output from your LED (refer to the Seoul F5038x LED datasheet (http://seoulsemicon.co.kr/_homepage/home_kor/product/product_P5fullcolor.asp?topCODE=2&midCODE=4) for nominal lumens values. OR for a more accurate calculation, refer to the intensity "ranking" (binning) tables on the datasheet for the specific LED.

Example calculations:

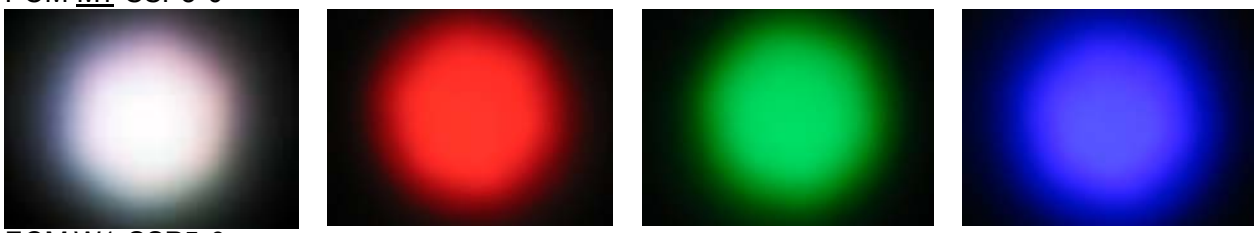
If the Fraen narrow beam lens FCM-N1-SSP5-0 is used on Seoul F5038x LED running green only at 350mA, the typical luminous flux of the LED is 38 lumens:
The calculation is: (8 candela/lumen) x (38 lumens) = 304 candela peak on-axis.
The beam angle specified in the table above is 17 degrees full beam-width measured at half-peak.
This means at 8.5 degrees off-axis (half of 17 degrees), the intensity should be half of 304 candela, or 152 candelas.
1 candela at 1-meter distance produces 1 Lux. This means the peak intensity at 1 meter will be 304lux. The intensity decreases as a function of the distance squared, so at 2 meters the peak intensity will be $304 / (2^2) = 76$ lux. At 3 meters distance, the peak intensity will be $304 / (3^2) = 33.8$ lux.

Beam Pictures

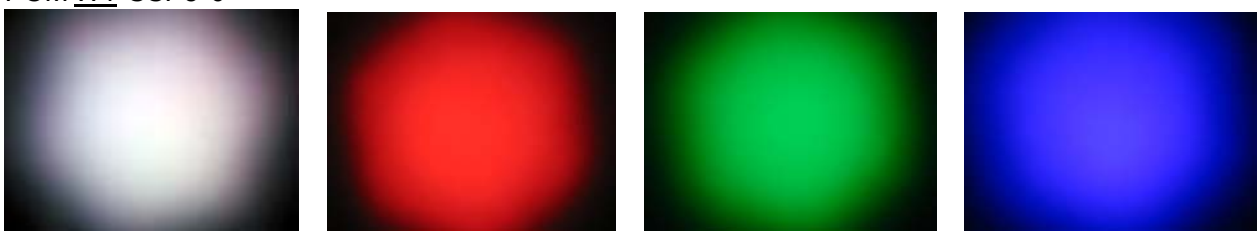
FCM-N1-SSP5-0



FCM-M1-SSP5-0



FCM-W1-SSP5-0



Mechanical Characteristics

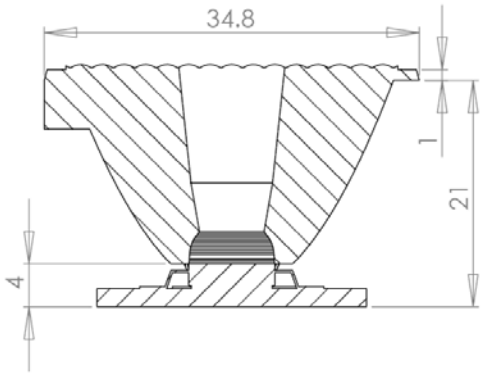
Figure 1. Identifying the lenses by their front views

FCM-N1-SSP5-0 FCM-M1-SSP5-0 FCM-W1-SSP5-0

Figure 2. Correct vertical position of the FCM lens and Seoul P5 LED

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 21.0 mm from the lens flange to the user's PC 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.

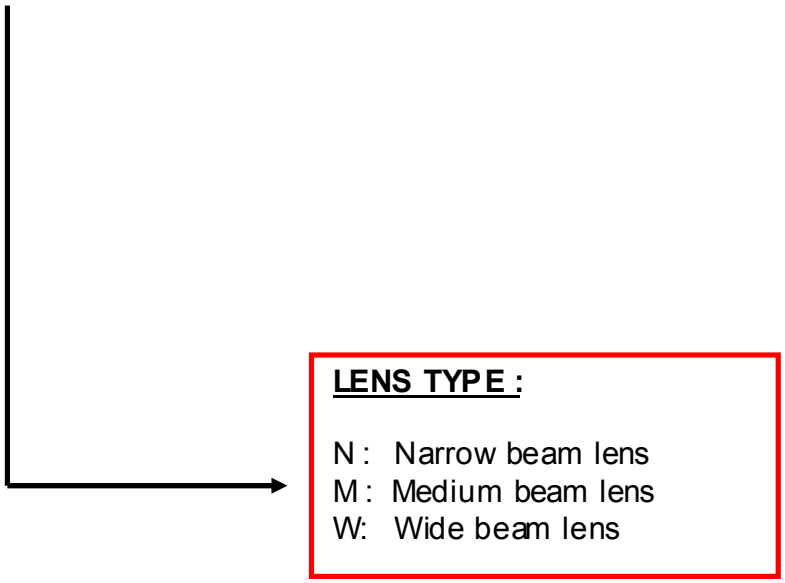
FCM-M1-SSP5-0



Tolerances: +/- 0.2 mm

Ordering part numbers

FCM-_1-SSP5-0



Document Revision Record

Rev	Date	Author	Description
00	15-Jan-08	**C. Jones**	Initial Draft