FGR Series 27mm Diameter Reflectors
for Seoul LEDs[1]

- **High efficiency**
- **Faceted design provides a homogeneous beam with a focused spot *and* a uniform spill light**

The FGR reflector is specifically designed for compatibility with Seoul LEDs.

A software-optimized aspheric profile combined with precision facets provides a homogeneous central spot as well as useful peripheral spilled light.

The high collection efficiency exceeds 90% of the total flux emitted by the LEDs.

Typical applications are:

- Flashlights/Torches
- General Illumination
- Reading Lamps
- Architectural Lighting
- Entertainment Lighting

SEOUL

(1) For technical information about Seoul Semiconductor LEDs please refer to the Seoul datasheet or visit:
http://www.seoulsemicon.com/en/html/main/

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General Characteristics

Materials

Reflector Material	Black polycarbonate with vacuum deposited aluminum coating and a clear lacquer protective coating
Operating Temperature range	-40° C / + 95° C
Storage Temperature range	-40° C / + 95°C

Please note that small defects in the reflective coating, and flow lines and weld lines on the surfaces of the reflectors are acceptable if the optical performance of the reflector is within the specification described in the section "OPTICAL CHARACTERISTICS"

IMPORTANT NOTE – Reflector handling and cleaning*:*

- *Handling: Always handle the reflectors by the outside surfaces or flange. Never touch the inside surfaces of the reflector with fingers; finger oils and contamination will absorb or refract light.*
- *Cleaning: Clean reflectors only if necessary. Use only soap and water to clean the surfaces and reflectors. CAUTION - Never expose the reflectors to alcohol or solvents, as they could damage the plastic.*

Scope

This datasheet provides information about the **FGR-N1-RE-0R** narrow beam reflector for Seoul LEDs.

Optical Characteristics – On-axis Intensity[2], Beam Angle[3], Field Angle[4]

LED	Beam Shape	On-axis Intensity (peak)	Beam Angle (FWHM)	Field Angle (FW10%)	Distance, D[5]
SZ5-M1-W0 Cool White ◯	Narrow	22.2 cd/lm	7°	15°	.2 mm
SZ5-M1-WW Warm White ◯	Narrow	22.7 cd/lm	7°	15°	.2 mm
Z5M2 Cool White ◯	Narrow	24.0 cd/lm	7°	14°	.7 mm
WICOP2 Y19 Cool White ◯	Narrow	20.5 cd/lm	7°	15°	.1 mm

(2) 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 "Example 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.
(3) FWHM is the full angle where the beam intensity is half the on-axis peak intensity.
(4) Field angle is the full angle where the beam intensity is 10% of the on-axis peak intensity.
(5) See Figure 1, showing part dimensions.

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 datasheet for typical flux values, drive current versus flux ratios, and color temperature and binning characteristics.

Example intensity calculations:

If a Fraen lens with an on-axis intensity of 23 candela per lumen (cd/lm) is used with an LED that produces 165 lumens of flux, the calculations are as follows:

On-axis intensity = (23 cd/lm) x (165 lumens) = 3795 candela on-axis intensity (one LED).

If 12 LEDs are used in a fixture, then the on-axis intensity = 12 LEDs x 3795 candela/LED
= 45540 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 45540 candela. If that fixture is illuminating a surface one meter distant, then the *illuminance* on that surface is 45540 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 45540 lux/ $(2m)^2$ or 11385 lux. Moving the fixture three meters from the surface decreases the illuminance to 45540 lux/$(3m)^2$ or 5060 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 7° and an on-axis intensity of 45540 cd, then at ± 3.5° (half of 7°) the intensity will drop to half of 45540 or 22770 cd. If the Field Angle for the fixture is 15°, then at ± 7.5° (half of 15°) the intensity should be 10% of 45540 or 4554 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 an 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

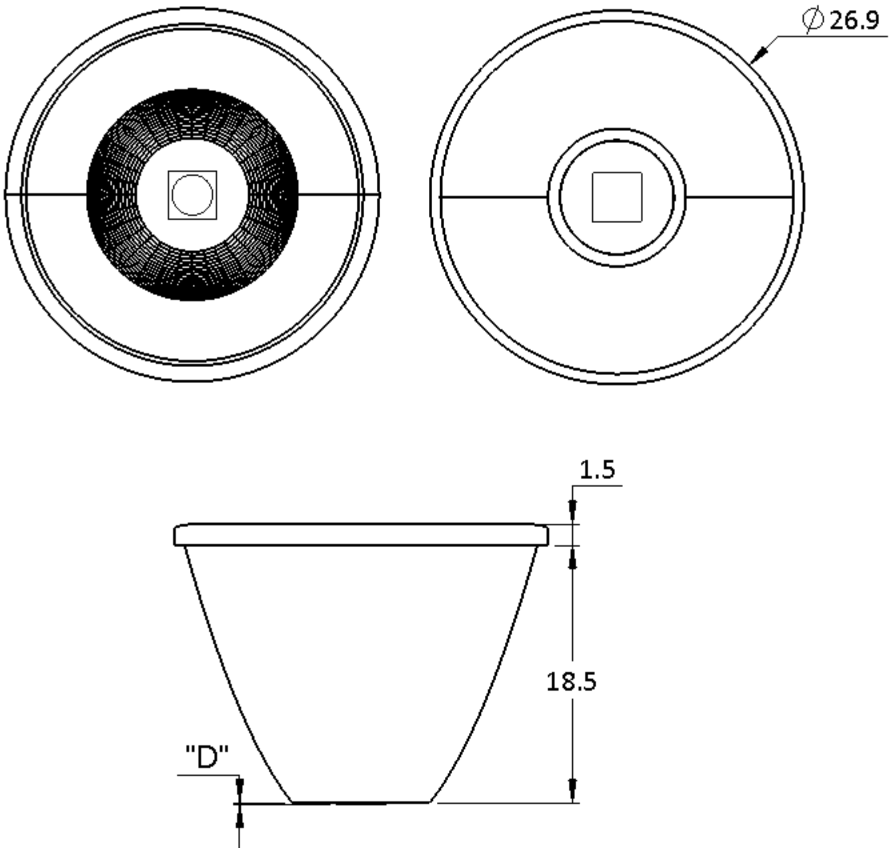

Figure 1. Front, rear and side views. Dimensions in mm.

NOTE: For the best performance and beam appearance, the FGR reflector should be positioned so that the distance between the printed circuit board (bottom of the LED as shown) and the bottom of the lens is equal to the value, "D" shown in the table above. The emitting surface or dome of the LED should be aligned/concentric with the center of the reflector cone.

The FGR reflector does not have any mechanical mounting features. It is designed with a mounting flange, allowing the designer to properly align and secure the reflector in their assembly.

Ordering Part Number

FGR-N1-RE-0R

(The last two characters are 'zero R')

For assistance, please contact Fraen http://www.fraen.com/optics/contact-us/.