



## **FDG SERIES LENSES** *for OSRAM GOLDEN DRAGON™ LEDs*

- **High efficiency**
- **Available in 4 different beams**
- **Patent pending**

The FDG Series offers a complete range of lenses especially designed for the Golden Dragon <sup>(1)</sup> LEDs from Osram Optosemiconductor.

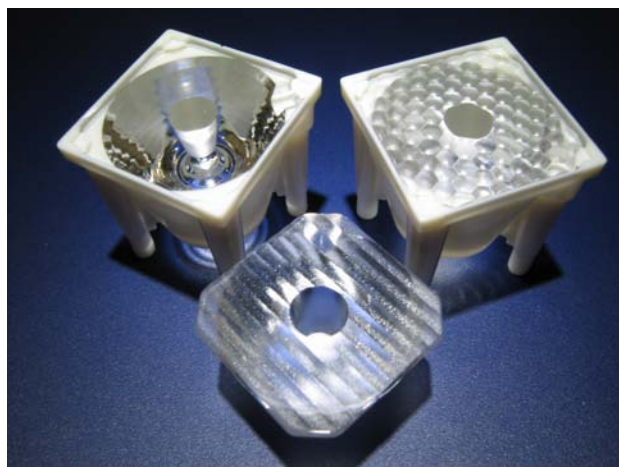
A software-optimized aspheric profile combined with front shaped micro-lens arrays enable the generation of four different lens models: narrow beam, medium beam, wide beam, and elliptical pattern (2).

The high collection efficiency reaches 85% of the total flux emitted by the LEDs. Lens holders are available either in white PC/ABS or transparent PC, and provide the proper alignment between the LEDs and the lenses. If a holder is not used, a special spacer ring must be used to assure proper alignment.

Heat staking the four legs of the holder to the customer's PCB or heat sink provides excellent optical and mechanical assembly (see Fraen Application Note FAN01-EN (at [www.fraensrl.com](http://www.fraensrl.com))).

Typical applications are:

- Reading lamps
- Signs
- Architectural Lighting
- Street Lights



- (1) Golden Dragon™ is a trademark of Osram Optosemiconductor. For technical specifications on the LEDs please refer to the Golden Dragon datasheet or visit [www.osram-os.com](http://www.osram-os.com)
- (2) Typical beam divergence may change with different color LEDs.

*For ordering instructions, please contact*

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*To find a local distributor, check the Fraen website.*

Website: [www.fraensrl.com](http://www.fraensrl.com)



## General Characteristics

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Lens Material	Optical Grade PMMA
Holder Material	PC ABS or Transparent PC
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.

## Optical Characteristics:

Typical beam total divergence (degrees)		Blue / Green Dragon 	Yellow / Red Dragon 	White Dragon 		
		ThinGaN	ThinFilm	NOTA	Volume casting	Chip coating
Lens Part Number	Type of lens	LxW5SG	LxW5SF	LWW5SG	ZWW5SG	LWW5SG
FDG-N1-D01-xx	Narrow beam	6.0	6.0	9.0	7.0	6.5
FDG-M1-D01-xx	Medium beam	21.0	21.0	22.0	21.0	20.5
FDG-W1-D01-xx	Wide beam	34.5	35.0	32.0	33.5	33.5
FDG-E1-D01-xx	Elliptical beam	11.0 * 19.5	10.0 * 19.5	13.0 * 20.0	13.0 * 20.0	10.0 * 20.0

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.

Typical on efficiency	Axis (cd/lm)	Blue Dragon 	Green Dragon 	Yellow Dragon 	Red Dragon 	White Dragon 		
		ThinGaN	ThinGaN	ThinFilm	ThinFilm	NOTA	Volume casting	Chip coating
Lens Part Number	Type of lens	LBW5SG	LGW5SG	LxW5SF	LxW5SF	LWW5SG	ZWW5SG	LWW5SG
FDG-N1-D01-xx	Narrow beam	29.2	43.3	30.5	34.2	18.9	24.7	44.5
FDG-M1-D01-xx	Medium beam	3.8	5.6	3.8	3.8	4.3	4.6	5.6
FDG-W1-D01-xx	Wide beam	1.5	2.2	1.6	1.5	2.1	2.0	2.2
FDG-E1-D01-xx	Elliptical beam	6.5	9.7	6.5	6.9	7.0	7.5	10.0

To estimate the on-axis intensity, multiply the on-axis efficiency of the lens (cd/lm) by the total flux of the Golden Dragon LED used. Please note that the above measurements have been taken with Dragon LEDs powered at 100mA. The efficiency can vary with the current driving the LEDs. For more detail on flux binning please check the Golden Dragon LED datasheet at [www.osram-os.com](http://www.osram-os.com)

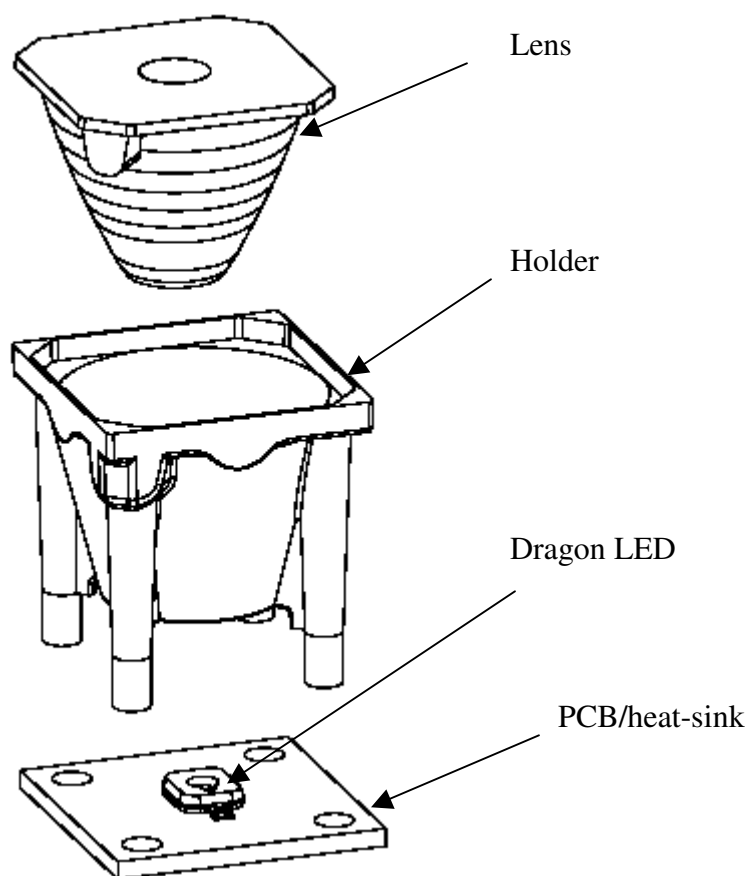
## Mechanical Characteristics

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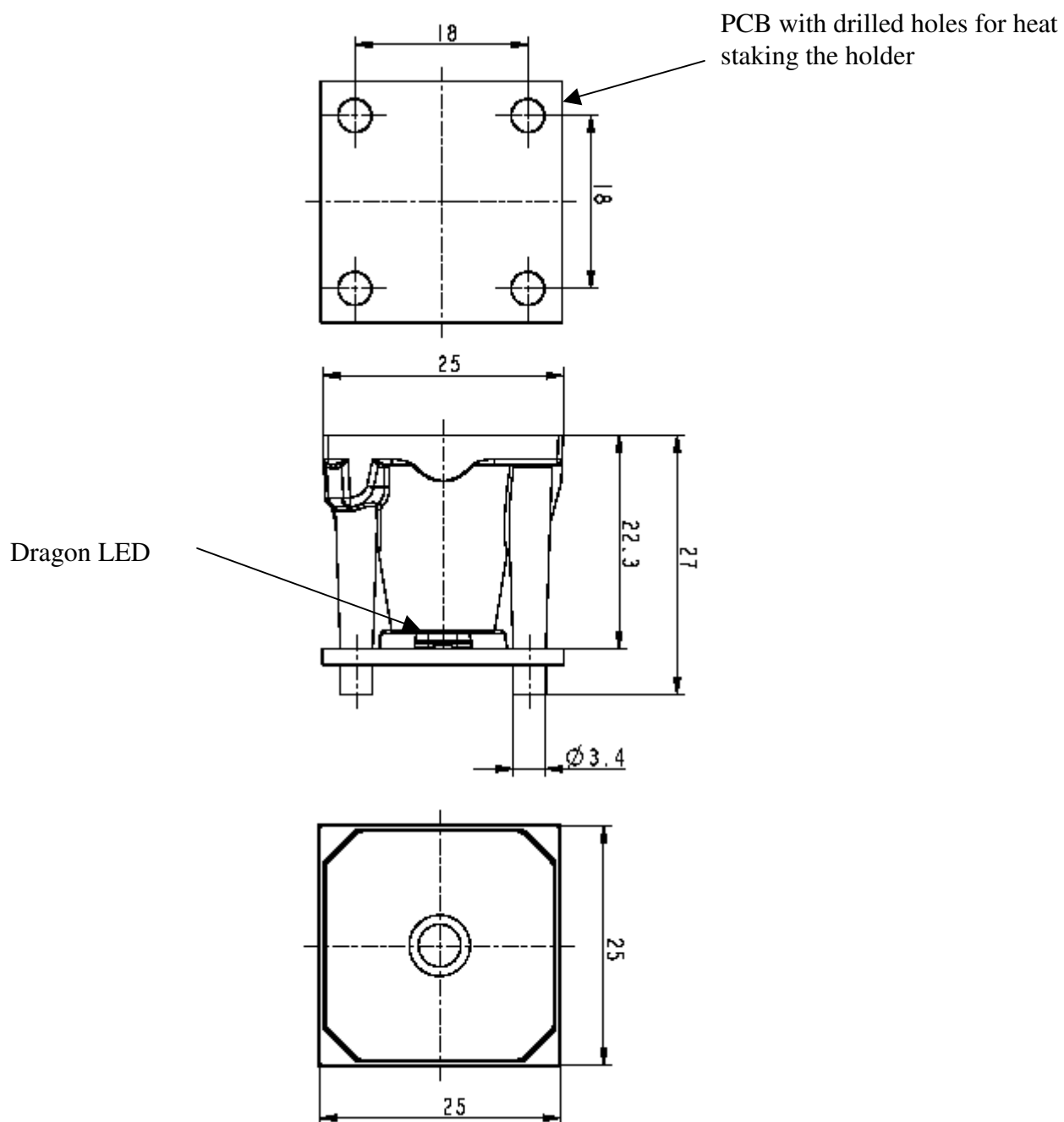
For best optical performance (shown above), correct mechanical position of the lens on the LED is critical.

To achieve correct lens position on the LED, the lens must be used either a holder, or spacer ring.

### Lens + Holder assembly view:

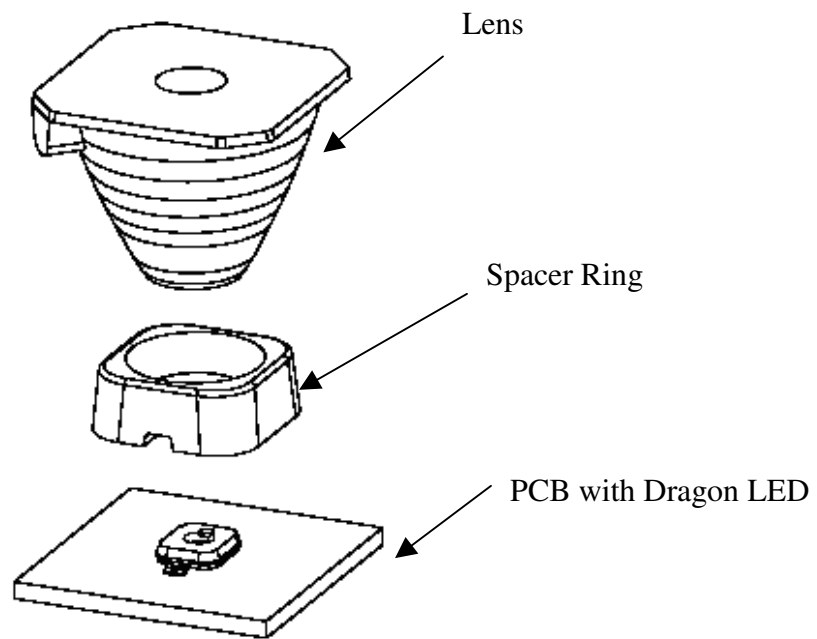


**Lens + holder assembly dimensions on a PCB:**



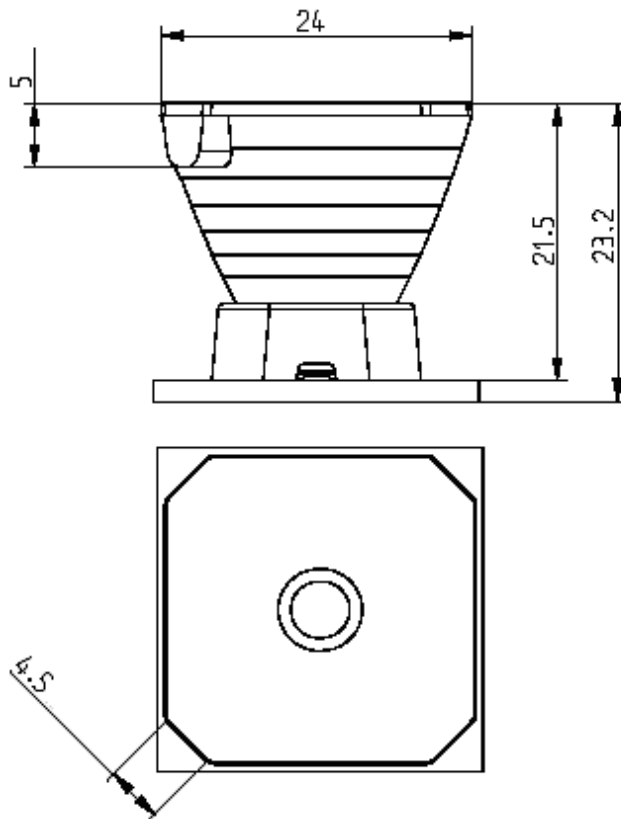
Tolerances:  $\pm 0.2$ mm where not specified

**Lens + spacer ring assembly view:**





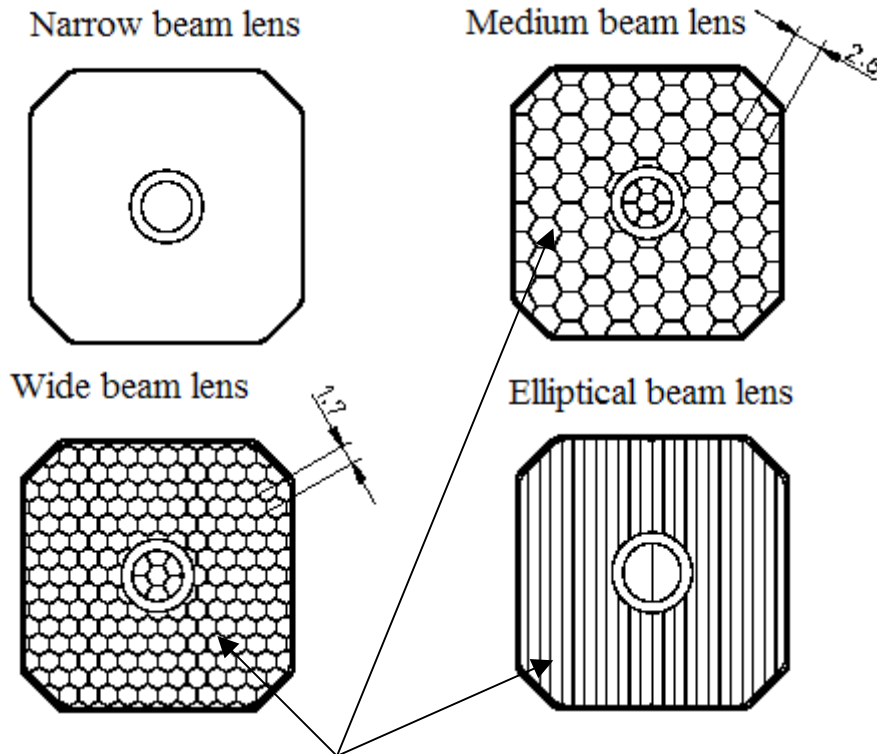
**Lens + spacer ring assembly dimensions:** Tolerances: +/- 0.2mm where not specified.



The outside mechanical dimensions of the lenses (Narrow, Medium, Wide, and Elliptical beam) are the same, except the height and top surface pattern of the lens.

The lens can be recognized by the top view:

**Top Lens views:**



*Light texture on the micro-lenses improves evenness of the beam.*





## Ordering part numbers

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FDG-xx-D01-zz

0S square flange with ring  
HS square flange with PC ABS holder  
HST square flange with transparent PC holder

N1 Narrow beam  
M1 Medium beam  
W1 Wide beam  
E1 Elliptical beam

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### Document Revision Record

Rev	Date	Author	Description