

Fresnel Lens for LED Applications

SC1933 Fresnel Lens for LED Applications

Part Number	SC1933
Focal Length	Nonimaging ($f \approx 5\text{mm}$)
Diameter	9.0 mm
Optical Clear Aperture	9.0 mm
Thickness	1.0 mm
F-number	≈ 0.56
Design Wavelength	546 nm
Groove Structure	36 grooves, flat, constant pitch
Pitch	0.127 mm
Material	Optical Grade Acrylic

For results indicated “at detector plane”, data is reported for collected energy at a plane located 1.0 meters away from the output face of the Fresnel Lens, centered on the optical axis with dimensions of 1.06 meters wide by 0.80 meters high. This is a representative area of illumination for framing a subject to be photographed.

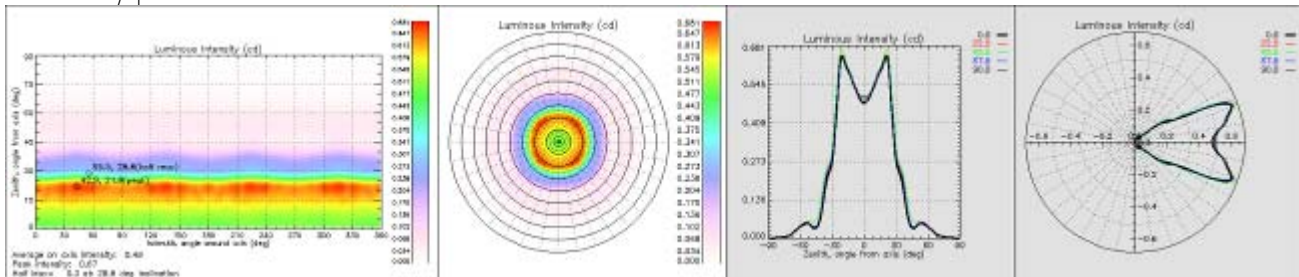
Each “Efficiency” number reported is the value of the flux collected from an emitter with a lens divided by the value of the total flux collected from an emitter without the lens, multiplied by 100%.

The “Gain” reported is the value of the intensity with the lens divided by the value of the intensity without the lens.

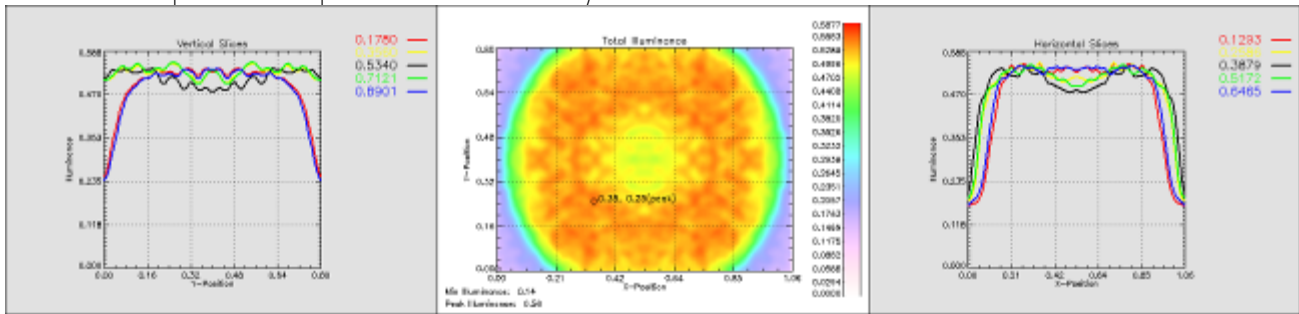
The “Illuminance Variance over detector plane” is defined as the difference between the Illuminance Maximum and the Illuminance Minimum quantity divided by the Illuminance Maximum, multiplied by 100%. The following pages indicate lens performance when coupled with the corresponding Luxeon emitter (ULD-Flash, ULD, 1 Watt White Batwing or 1 Watt White Lambertian) at the indicated die to lens distance. Note that the distance is specified from the LED die emitter to the lens. The distance between the peak height of the LED emitter and the lens is actually much closer (typically around 0.1 mm).

Emitter: Luxeon ULD-Flash Die to Input Plane of Lens Distance = 1.7 mm		
	Emitter (no lens)	Emitter w/ Lens
Total Flux over the hemisphere	0.86	0.71
Efficiency		83%
Total flux in 55° full angle cone	0.15	0.41
Efficiency (w.r.t. Total Flux of emitter)		48%
Total Flux at detector plane	0.15	0.39
Efficiency (w.r.t. Total Flux of emitter)		45%
On axis intensity	0.15 cd	0.49 cd
On axis Gain		3.3
Peak Intensity (at angle)	0.28 cd (at 37°)	0.67 cd (at 22°)
Full Width at Half Maximum	±64°	±29°
Illuminance Maximum at detector plane	0.19 lx	0.56 lx
Illuminance Minimum at detector plane	0.14 lx	0.14 lx
Illuminance Variance over detector plane	26%	75%

Intensity pattern of SC1933 used with Luxeon ULD-Flash:

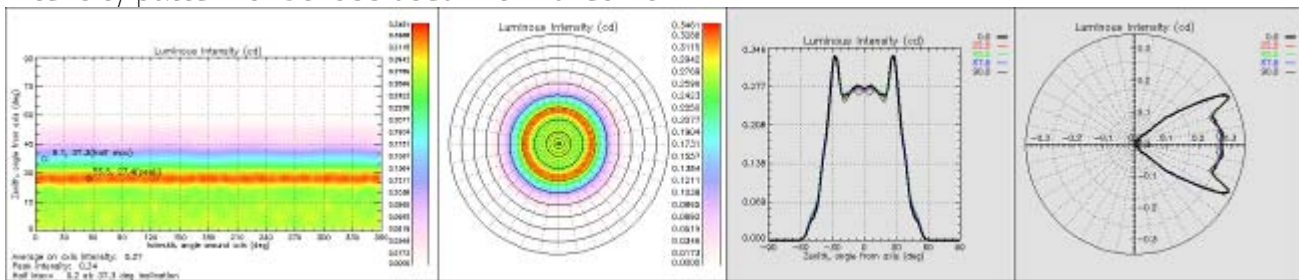


Illuminance pattern at plane 1-meter away from Luxeon ULD-Flash used with SC1933:

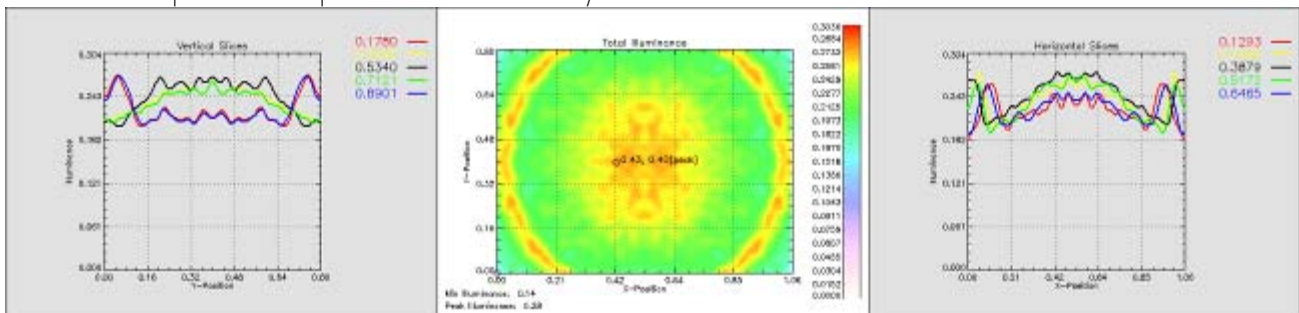


Emitter: Luxeon ULD		
Die to Input Plane of Lens Distance = 1.7 mm		
	Emitter (no lens)	Emitter w/ Lens
Total Flux over the hemisphere	0.56	0.44
Efficiency		79%
Total flux in 55° full angle cone	0.09	0.20
Efficiency (w.r.t. Total Flux of emitter)		36%
Total Flux at detector plane	0.09	0.19
Efficiency (w.r.t. Total Flux of emitter)		34%
On axis intensity	0.13 cd	0.27 cd
On axis Gain		2.1
Peak Intensity (at angle)	0.14 cd (at 2.1°)	0.34 cd (at 27°)
Full Width at Half Maximum	±75°	±37°
Illuminance Maximum at detector plane	0.14 lx	0.28 lx
Illuminance Minimum at detector plane	0.07 lx	0.14 lx
Illuminance Variance over detector plane	50%	50%

Intensity pattern of SC1933 used with Luxeon ULD:



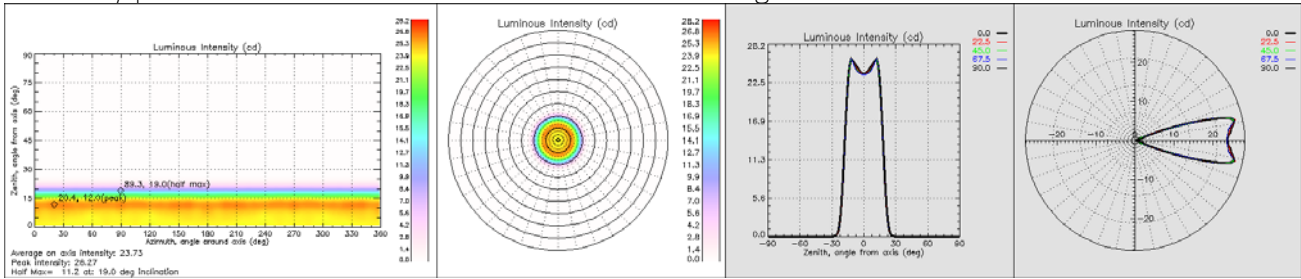
Illuminance pattern at plane 1-meter away from Luxeon ULD used with SC1933:



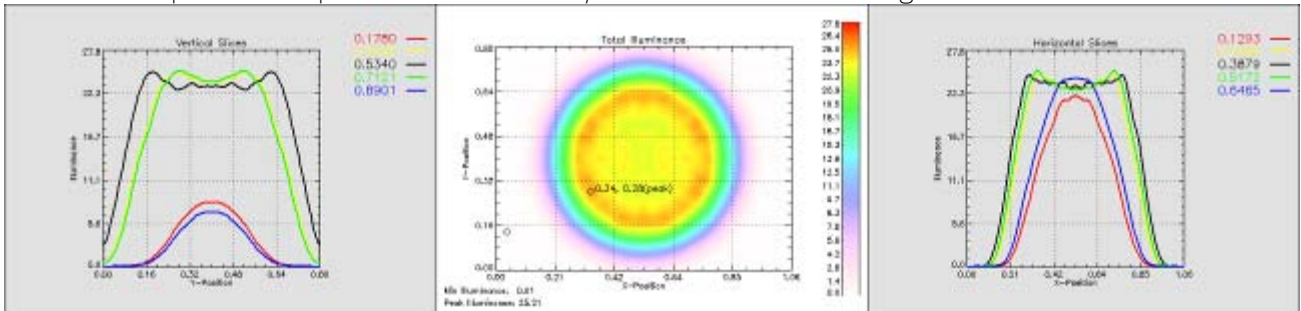
Emitter: Luxeon I Batwing White
 Die to Input Plane of Lens Distance = 2.7 mm

	Emitter (no lens)	Emitter w/ Lens
Total Flux over the hemisphere	12.10	8.47
Efficiency		70%
Total flux in 55° full angle cone	2.09	8.40
Efficiency (w.r.t. Total Flux of emitter)		69%
Total Flux at detector plane	2.05	8.39
Efficiency (w.r.t. Total Flux of emitter)		69%
On axis intensity	2.63 cd	23.73 cd
On axis Gain		9.0
Peak Intensity (at angle)	3.95 cd (at 44°)	26.27 cd (at 12°)
Full Width at Half Maximum	±60°	±19°
Illuminance Maximum at detector plane	2.76 lx	25.21 lx
Illuminance Minimum at detector plane	2.01 lx	0.01 lx
Illuminance Variance over detector plane	27%	100%

Intensity pattern of SC1933 used with Luxeon I Batwing White:



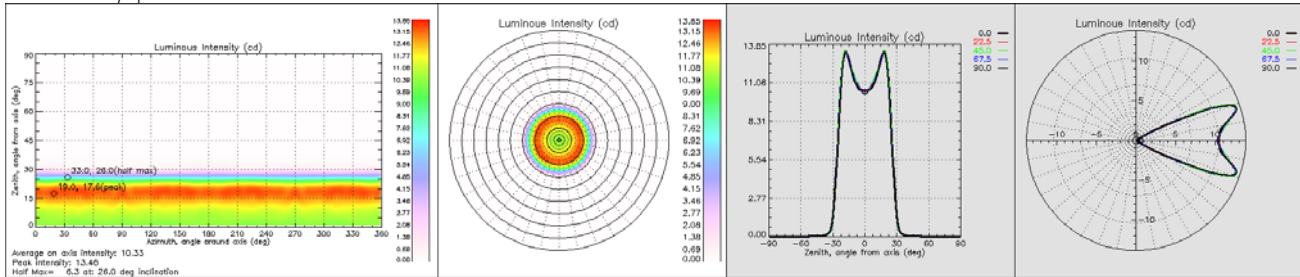
Illuminance pattern at plane 1-meter away from Luxeon I Batwing White used with SC1933:



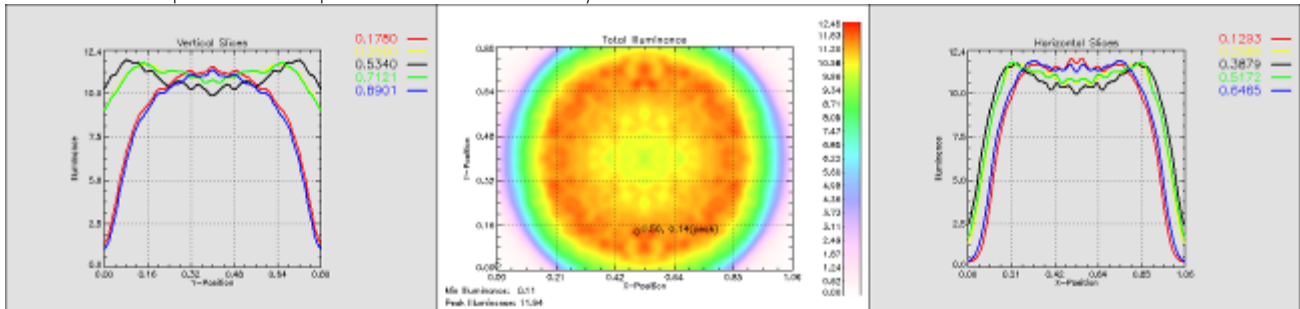
Emitter: Luxeon I Lambertian White
 Die to Input Plane of Lens Distance = 2.7 mm

	Emitter (no lens)	Emitter w/ Lens
Total Flux over the hemisphere	12.08	8.13
Efficiency		67%
Total flux in 55° full angle cone	2.33	7.79
Efficiency (w.r.t. Total Flux of emitter)		64%
Total Flux at detector plane	2.29	7.25
Efficiency (w.r.t. Total Flux of emitter)		60%
On axis intensity	3.24 cd	10.33 cd
On axis Gain		3.2
Peak Intensity (at angle)	3.35 cd (at 12°)	13.46 cd (at 18°)
Full Width at Half Maximum	±64°	±26°
Illuminance Maximum at detector plane	3.33 lx	11.94 lx
Illuminance Minimum at detector plane	1.79 lx	0.11 lx
Illuminance Variance over detector plane	46%	99%

Intensity pattern of SC1933 used with Luxeon I Lambertian White:

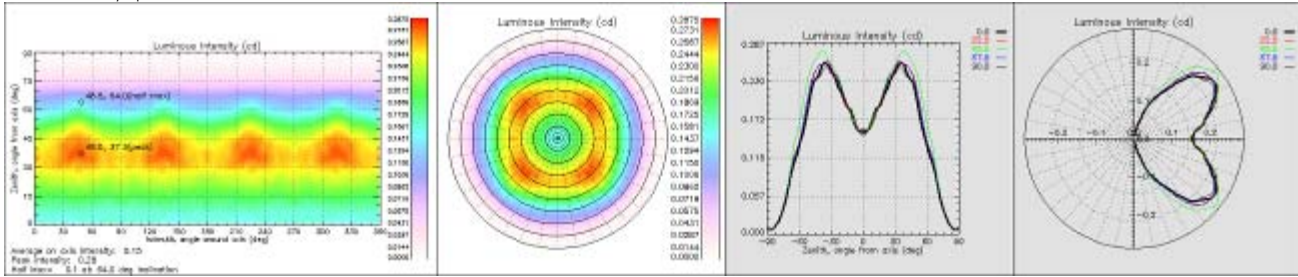


Illuminance pattern at plane 1-meter away from Luxeon I Lambertian White used with SC1933:

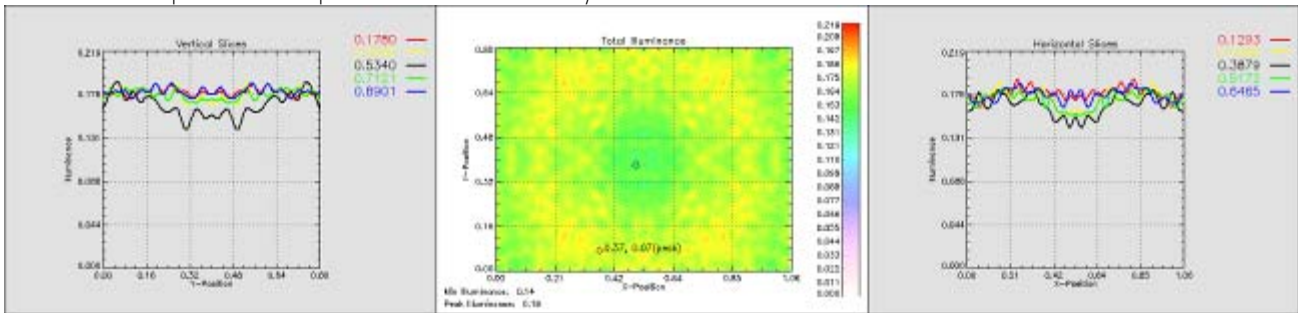


Appendix For reference, included here are plots of emitter performance without any lens.

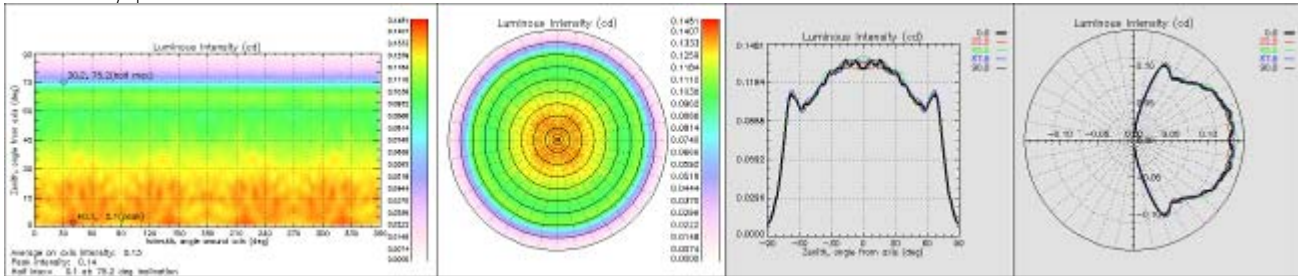
Luxeon ULD-Flash Intensity pattern with no lens



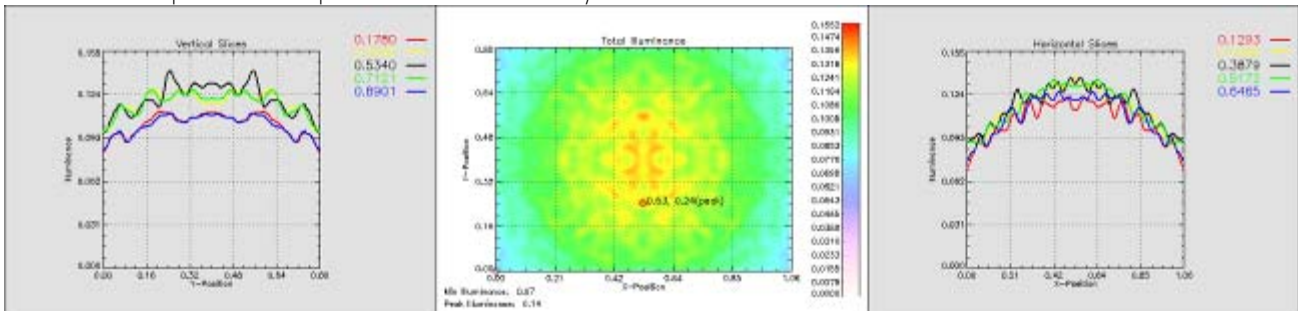
Illuminance pattern at plane 1-meter away with no lens



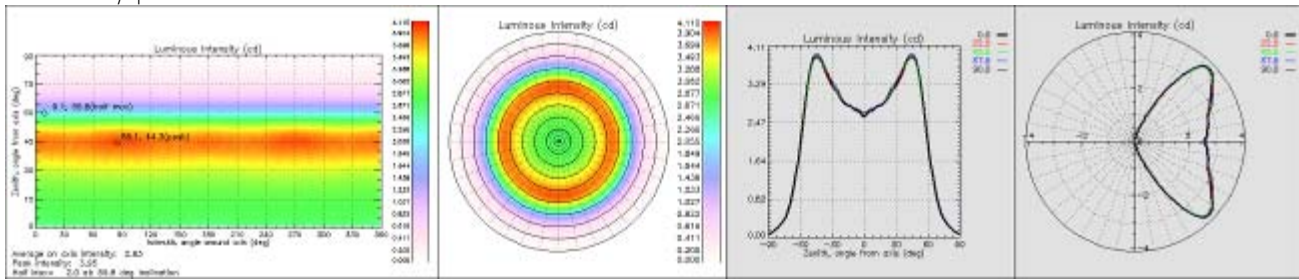
Luxeon ULD Intensity pattern with no lens



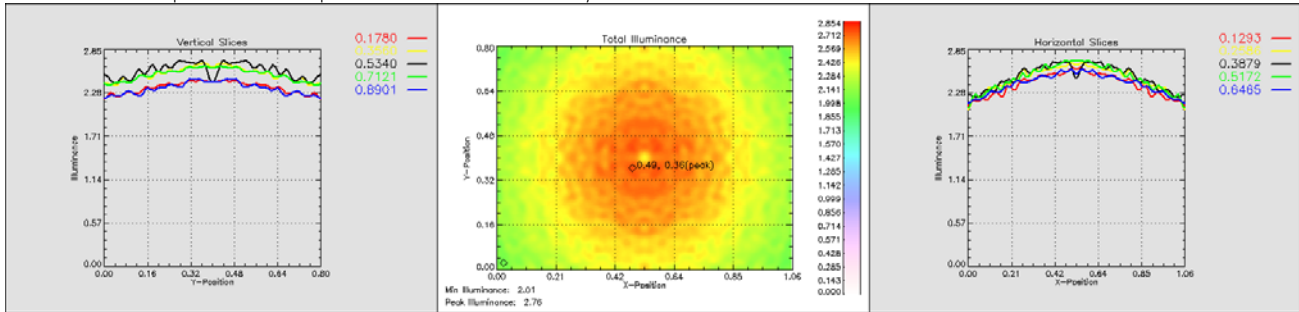
Illuminance pattern at plane 1-meter away with no lens



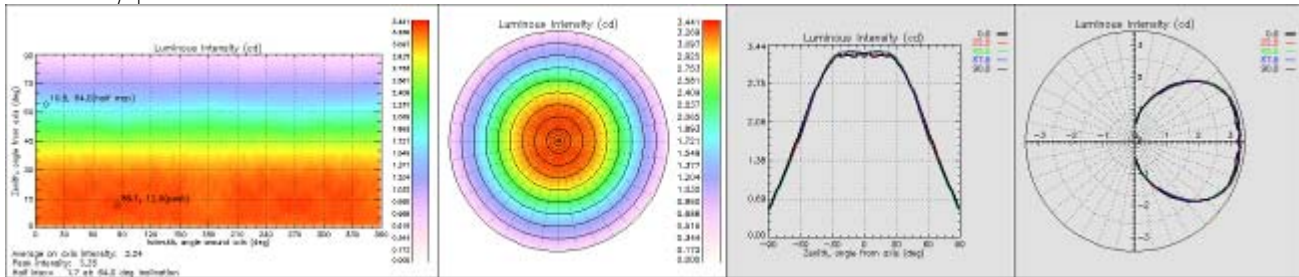
Luxeon I Batwing White Intensity pattern with no lens



Illuminance pattern at plane 1-meter away with no lens



Luxeon I Lambertian White Intensity pattern with no lens



Illuminance pattern at plane 1-meter away with no lens

