

LED Fundamentals

Primary and Secondary Optics

03/01/2014

OSRAM
Opto Semiconductors

Welcome to this presentation on Primary and Secondary Optics, part of OSRAM Opto Semiconductors' LED Fundamentals series.

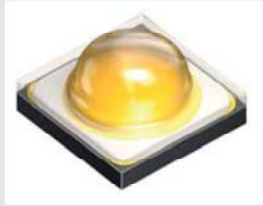
In this presentation we will review various primary optic designs for OSRAM Opto Semiconductors' Solid State LEDs and discuss resources for choosing primary optics.

Primary and Secondary Optics

Definition of terms

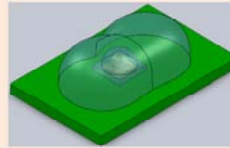
Primary Optics

- Lens integrated into LED package
- Optimized for...
 - Light extraction
 - General beam shaping
 - Or both



Secondary Optics

- Optical element separate from LED package
- Typically separated from LED by an air gap
 - Gap could also be filled by index matching material to reduce Fresnel loss



In this context, a primary optic is one integrated onto the LED package, while a secondary optic is separate from the LED. Since a primary optic is limited on the amount of beam control it can achieve, secondary optics are often required to meet the objectives of a particular application.

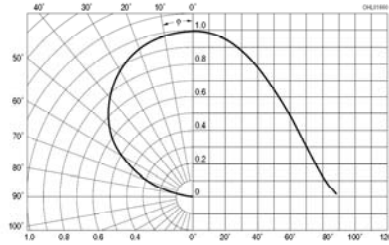
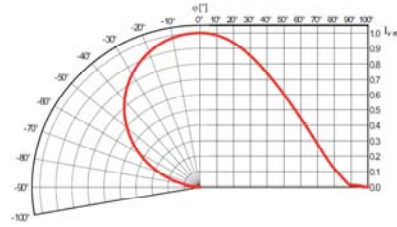
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DURIS E 3



DURIS E 5



Both the DURIS E 3 and DURIS E 5 have nearly Lambertian distributions which are well suited for both reflectors and lenses.

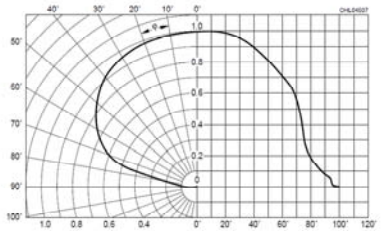
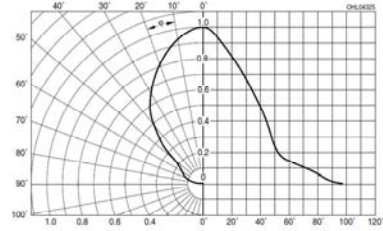
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OSRON SSL 80°

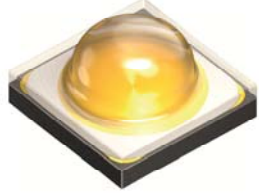


OSRON SSL 150°



The OSRON SSL 80° has a tight beam pattern designed for downlighting and for use with small secondary optics. The wide beam angle of the OSRON SSL 150 is well suited to work with reflectors.

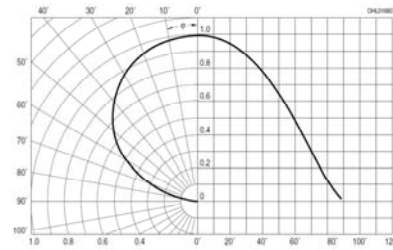
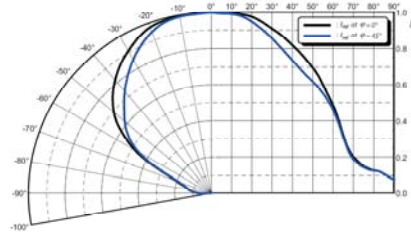
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OSRON Square



SOLERIQ S and E



The primary optics of the OSRON Square strike a balance between extraction efficiency and secondary optic match. The SOLERIQ products are best suited for reflectors due to their large source size.

Standard Secondary Optics



LED Light for you Optics Partners

- Ledil
- Gaggione
- Showin
- Baikang
- Ledlink
- Fraen
- Polymer Optics

Output Beams

- Round
 - Narrow (< 20°)
 - Medium (20° → 40°)
 - Wide (> 40°)
- Oval
- Specialty
 - Streetlight
 - Beacon
 - Other

LED Type

- OSLO Square
- OSLO SSL 150°
- OSLO SSL 80°
- DURIS S 5
- DURIS S 8
- SOLERIQ S
- SOLERIQ P
- SOLERIQ E

Supporting Data

- Datasheet
- IES & Eulumdat file
- CAD file or mechanical drawing





Numerous off-the-shelf secondary optics have been designed for use with OSRAM Opto Semiconductors LEDs. While most of the optics are designed to produce a circular beam pattern of a certain beam angle, a number of specialized lenses are also available. All of OSRAM's LED Light for you optics partners are also capable of producing custom optics.

Optic Selector Tool at ledlight.osram-os.com

The screenshot shows the OSRAM LED Light Site's Optic Selector Tool. The page header includes the OSRAM logo, 'LED Light Site', and navigation links for 'Company', 'Contact', 'Subscribe', and social media icons. A main navigation bar contains 'SSL LEDs', 'Applications', 'Learn & Tools', 'News & Events', and 'PASS Services'. The breadcrumb trail shows 'Home > Tools > LED Optic Selector Tool'. The tool interface prompts the user to 'Choose a filter to narrow your search' and features four filter dropdowns: 'LED Type' (set to 'OSLON 80°'), 'Beam Angle (FWHM)' (set to '--Any--'), 'Vendor' (set to 'Ledli'), and '# of LEDs per Optic' (set to '4'). Below the filters are 'Reset Search' and 'Search' buttons. A row of icons provides links to 'Datasheet', 'Link to IES', 'Link to LDT', and 'Mechanical Data'. The results table below has columns for LED Type, Photo, Vendor, FWHM (°), # of LEDs, Diameter (mm), Height (mm), Attachment Method, Lens Material, Holder Method, Part #, and Tech Info. One result is shown: 'Diamond DRAGON OSLON 80°' with a photo of the optic, vendor 'Ledli', FWHM of 11°, 4 LEDs, 35mm diameter, 9mm height, 'Glue' attachment, 'PMMA' lens material, 'None' holder method, and part number 'C10921_GT4-S'. A 'Buy this OSRAM Component Now' link is present. The footer contains '7 LED Fundamentals | Primary and Secondary Optics' and the OSRAM logo.






This website has a tool for selecting a stock optic from one of our LED Light for you partners. You can search by LED type, beam angle, vendor, and number of LEDs per lens. There are also links to supporting files such as datasheets and IES files.

The LED and Your Application

	LED	Lumen Output	Apparent Source Size	Intensity Distribution	Preferred Applications & Advantages
	DURIS E 3 and E 5	Low to Medium	Small to Medium	Medium	Linear, signage and A-lamp applications. Combine with reflector or lens.
	DURIS P 5	Medium	Medium	Medium	Linear and signage in harsh environments. Combine with reflector or lenses.
	DURIS S 5	Medium	Medium	Medium	Linear, omnidirectional and downlight applications.
	DURIS S 8	Medium	Medium	Medium	Spot lights, downlights, directional and omnidirectional retrofits and high bay applications.

These next slides provide a summary of OSRAM Opto Semiconductors' LEDs for Solid State Lighting, listing their advantages and preferred applications. This table lists the low and medium power LEDs. These LEDs tend to be used in arrays with both reflectors and lenses.

The LED and Your Application

	LED	Lumen Output	Apparent Source Size	Intensity Distribution	Preferred Applications & Advantages
	OSLON SSL 80°	High	Medium	Narrow	Narrow beam applications. Combine with TIR optics. Can be packaged in tight clusters.
	OSLON SSL 150°	High	Medium	Wide	Wide beam applications. Combine with reflector or TIR optics. Can be packaged in tight clusters.
	OSLON Square	High	Medium	Medium	Applications where high source lumens are required. Combine with reflector or TIR optics.
	SOLERIQ S	Very High	Large	Medium	Spot and downlight applications. High luminance sources. Combine with reflectors.
	SOLERIQ E	Very High	Very Large	Medium	Spot and downlight applications. High luminance sources. Combine with reflectors.

This table lists the high power and chip-on-board packages from OSRAM Opto Semiconductors. The OSLON SSL 80 degree LED has a narrow beam and designed to be used without secondary optics either singly or in clusters, or with TIR optics. In complement to the OSLON 80, the OSLON 150 degree LED has a wide beam and is designed to work with reflectors. The medium width distribution of the OSLON Square is suitable for both reflectors and lenses. The larger sizes of the SOLERIQ S and E and chip-on-board packages tend to lead to reflector solutions.

OSRAM Opto Semiconductors offers products suited for a wide range of applications and optical systems. Please contact your OSRAM Opto Semiconductors' sales representative for assistance with your application.

Many Thanks

Thank you for viewing this presentation by OSRAM Opto Semiconductors.