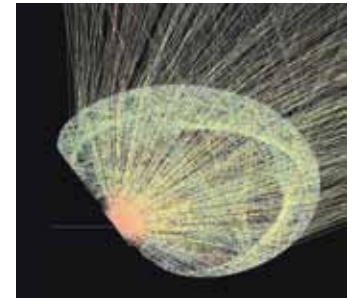
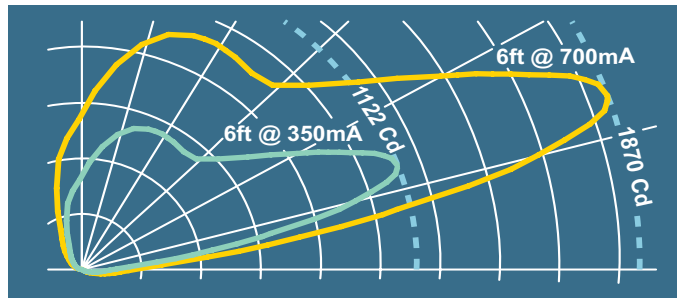




fraqtir™ LED for cove applications



Product FAQs



THE LIGHTING **QUOTIENT**

Q: What is **fraqtir**™?

A: **fraqtir** is a proprietary optic invented by The Lighting Quotient that combines principles of refraction and total internal reflection.

Q: What does the **fraqtir** do?

A: The **fraqtir** optic efficiently channels and transforms light from an array of LEDs into a highly effective asymmetric distribution ideal for illuminating surfaces evenly from one edge.

Q: What is the **fraqtir** made of?

A: The **fraqtir** is a precision molded lens made of high temperature water-clear optical acrylic.

Q: Is **fraqtir** patented?

A: U.S. and foreign patents are pending.

Q: Is there a cover lens?

A: The optical assembly is covered with an extruded impact resistant acrylic snap fit lens. The lens protects the refractor and LED components while providing a surface for easy wipe down.

Q: Why do you use a holographic diffusion film under the protective lens?

A: The holographic diffusion film enhances the lateral distribution from each LED, eliminating “socket shadows” while only slightly softening the asymmetric forward beam.

Q: Thermal management is crucial to proper operation of LEDs. How do you remove heat from the LED?

A: We use a two-piece extruded aluminum heat sink. The inner portion, or “light engine,” supports the LED board and **fraqtir** optic. It nests inside an outer extrusion, which has the proper mass and surface area for optimal heat dissipation as well as a special anodic coating to maximize thermal emissivity.

Q: Which LEDs do you use with the **fraqtir** and why?

A: We use only **Philips Lumileds LUXEON Rebels** with *Lumiramic* technology. The Lumiramic phosphor plate produces highly consistent color over all angles, avoiding color separation as light passes through the **fraqtir** optic.

Q: If an LED fails, will all of the other LEDs in the string also fail?

A: No, if an individual LED were to fail, it fails in a “closed” condition. That allows current to flow to the remaining LEDs, minimizing the overall impact on light output.

Q: What color temperatures are available?

A: Currently the **Philips Lumileds LUXEON Rebels** with Lumiramic technology are available in 2700K, 3000K and 4100K. We only catalog 3000K at this time but can provide 2700K and 4100K upon request.

Q: Can the light engine be removed for servicing or upgrade?

A: Yes, the light engine (inner heat sink, LED board and **fraqtir** optic) exists in 1 foot increments that can be removed in the unlikely event of a failure or future upgrade to a more advanced LED technology. All boards are identified to ensure proper matching of color and light output with replacement modules.

Q: How can I assure that my replacement light engine will match the others?

A: Each LED board is identified by forward voltage, light output and color bin. This information allows the end user to identify and order replacements of the same type.

Q: As LEDs continue to improve, will you continue to offer light engines with the same light output?

A: Currently we offer two choices for light output (300 lumens per foot and 500 lm/ft). We will continue to offer these two light outputs and will most likely add to them in the future. As LED technology continues to improve we will be able to use fewer LEDs to achieve the same light output. The enhanced lateral spread of the holographic film ensures that the appearance will remain the same even if fewer LEDs are used.

Q: What type of LED drivers do you use?

A: We use constant current drivers, keeping the board as simple as possible to maximize its efficiency while minimizing potential points of failure. By contrast, LED luminaires that rely on constant voltage drivers must incorporate additional current-limiting devices onto the board, reducing efficiency and adding potential points of failure.

Q: Can LEDs be driven at different current levels?

A: Yes, although the standard operating current is 350mA DC (0.35 amps), it may be driven up to 700mA to achieve increased (high) light output. Doubling the drive current in this way doubles the power consumption while increasing light output by approximately 70-75%. As a result, the same fixture operated at high output experiences a lower efficacy (lumens per watt).

Q: Do you offer dimming drivers?

A: There are several dimming drivers available with different input voltages, dimming control types and dimming ranges (see table below).

Manufacturer	eldoLED	Roal	Advance	LighTech	Lutron
Model	SOLOdrive	Strato	Xitanium	LED CC	A-Series
Input	120-277V	120-277V	120V	120-277V	120-277V
Dimming Control	0-10V Analog	0-10V Analog	0-10V Analog	Reverse Phase Control (ELV)	EcoSystem or 3-Wire
Dimming Range (power)	100%-0.1%	100%-10%	100%-20%	100%-10%	100%-1%

Note: Not all fixture and row length combinations will be available for each type of driver. Consult factory for available drivers for a specific row length. In some cases, it may actually be more economical to specify dimming drivers over non-dimming if they operate more LEDs, thus using fewer drivers.

Q: When I order by row, what length fixtures will be used to make up the row?

A: The most economical row composition uses the fewest drivers and individual fixtures. The desired input voltage (120 vs. 277), drive current (350mA vs. 700mA) and dimming or non-dimming option will determine which drivers are used in the fixtures. In some cases, such as 277V non-dimming at 700mA, a driver is required for each light engine (one driver per foot). In other cases, such as 120/277V universal voltage input with 0-10V dimming by eldoLED at 350mA, we can operate 8 light engines with a single driver (one driver per 8 feet).

For non-dimming units at standard output at 350mA, 6 foot fixture lengths are preferable, since each unit requires just a single driver. At 700mA, each driver is instead limited to 2 feet of fixture length, making 8 foot units with 4 drivers an effective combination.

Example 1: S305-R24H-S-00-2-00-0-30-00, a 24 foot row driven at 700mA (500 lumens per foot), 277V input, non-dimming driver. This row would consist of (3) 8 foot fixtures, each fixture would have 8 drivers.

Example 2: S305-R16G-S-00-T-00-0-30-EL, a 16 foot row driven at 350mA (300 lumens per foot), 120V input, 0-10V eldoLED SOLOdrive 100%-0.1% dimming driver. This row would consist of (2) 8 foot fixtures, each fixture would have (1) SOLOdrive dimmable driver.

Q: Is **fraqtir** compatible with the Redwood Systems network platform?

A: Yes, our Style S301 is available with a "Redwood Ready" option. These luminaires are provided with a cord and connector to plug directly into the Redwood Adapter. All **Redwood Systems** components are supplied by others.

Q: Couldn't the fixture have been made smaller?

A: Thermal design software was used to determine the mass and surface area of the heat sink for proper thermal management of the LEDs. The elevated ambient temperatures and restricted air flow often associated with architectural coves also necessitated the heat sink size.

Q: How large is the S305 concealed?

A: The S305 linear LED concealed luminaire has the same cross-sectional dimensions as our F305 cove light (2-5/8" high x 5-5/8" wide). Unlike the F305 T5/T5HO fluorescent, the S305 is available in one-foot increments between 1 ft and 9 ft in length. Similar features include lay-in installation, end-to-end mounting, thru-wiring and optional prewired harnesses.

Q: Can I design a smaller cove if I use Style S301 with remote driver?

A: In some cases, yes; but it depends upon the application. Among the factors that influence the size of the cove are the setback from the target surface, the intended fixture aiming, anticipated sightlines and the location of the driver (within the cove's cross-section or elsewhere). Need help? Call our applications engineering department for assistance (203) 931-4455.

Q: When would I use Style S301 vs. Style S305?

A: Style S301 uses remote mounted drivers and Style S305 has the drivers integral to the fixture. In general, Style S305 should be used over the S301 due to ease of installation and wiring, but there are a few exceptions. In some situations, there is an existing cove or light shelf that only has the space for the S301 and the drivers must be remote mounted. A medical MRI room is a good example where the S301 is required over the S305 since the drivers must be remote mounted outside the MRI shielded area. Other EMI and RFI sensitive areas such as communications centers may also require that the drivers be located outside a shielded area. Another example would be the Redwood System network platform where the network provides the constant current power directly to the luminaire so a driver is not required and the S301 is the luminaire of choice.

Q: Can I expect the same attention to detail shown in **elliptipar** cove products?

A: Yes. Continuous runs of the S301 and S305 optical assemblies can be aimed as one using our patented interlocking details, and the final aiming orientation is lockable. A rotation stop on each luminaire prevents maximum candlepower from being aimed into the inside of the cove.

Q: What are the adjustable mounting feet used for on the S305?

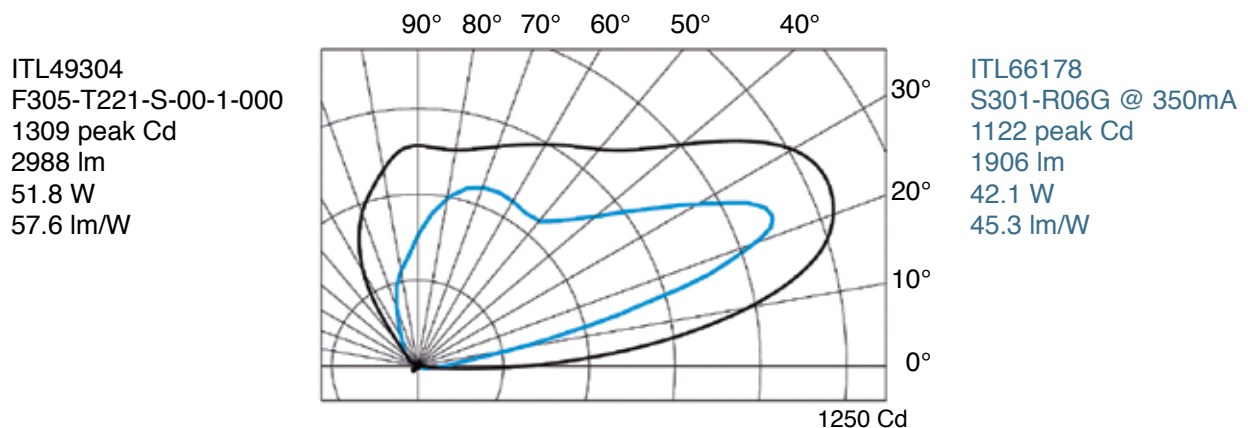
A: Both the S301 and S305 units have adjustable optical assemblies but the S305 also has adjustable mounting feet. The feet can be set to a higher position in the event that a lower aiming angle is required for the given application. The higher position is also useful if the inside lip of the cove is accidentally built too high. Rather than rebuilding the cove lip or having to shim the entire row of fixtures, you can simply use one of the higher settings to “see” over the cove lip.

Q: What is your warranty period and what does it cover?

A: We offer a 5 year warranty on our S301 and S305 products from the date of manufacture. A “failure” in an LED product occurs when the LEDs are no longer operating due to failure of the LED emitter, LED circuit board and/or LED circuit board connectors. Drivers carry a 5 year warranty by the driver manufacturer.

Q: How does LED efficiency compare to fluorescent?

A: White LEDs in warm color temperatures are still less efficient than fluorescents. However, LED technology is rapidly improving and will eventually catch and surpass fluorescent efficacy. The latest 3000K **LUXEON Rebels** from **Philips Lumileds** produce 81 lumens per watt at room temperature (less at actual operating temperatures), compared to 103 lumens per watt at 35°C for a 3000K T5 fluorescent.



Q: How does **fraqtir** compare to other LED cove luminaires?

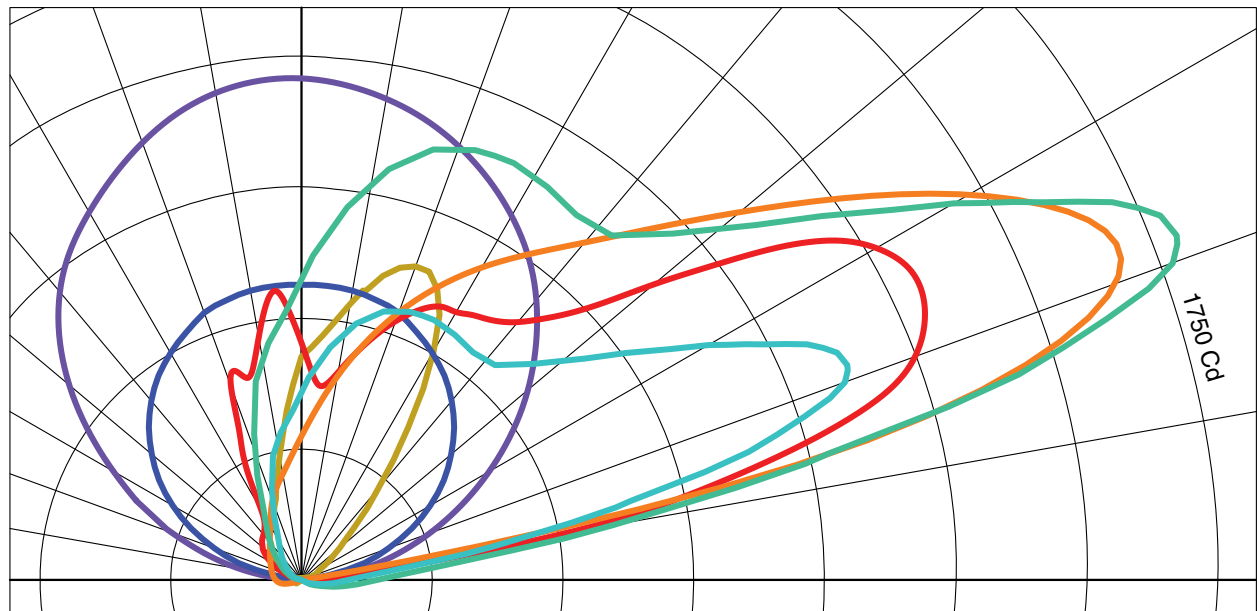
A: When comparing to other asymmetric linear LED cove luminaires, the S301 and S305 provide up to 86% more lumens per watt than the competition. When comparing to typical LED cove solutions, there are some symmetric luminaires with higher efficacy but they deliver half of their lumens to the rear of the cove.

Linear LED Cove Luminaire Comparison

LUMINAIRE	Adjustable Optics?	Test No.	Watts	Watts/ft	Lumens	Lm/ft	Lm/W	Peak Cd
fraqtir S301/S305-R06G (350mA)	YES	ITL 66178	42.1	7.0	1906	317	45.3	1122
fraqtir S301/S305-R06H (700mA)*	YES	ITL 66178*	91.0	15.1	3057	509	33.6	1799
Asymmetric Cove Light	NO	ITL 63502	71.1	11.9	2041	340	28.6	1313
Asymmetric Cove Light†	YES	BAL 15314	86.2	14.4	2090	348	24.3	1686
Asymmetric Cove Light†	NO	ITL 57981	124.8	20.8	694	116	5.5	642
Symmetric Cove Light†	NO	GE 2202	35.4	5.9	1684	280	47.6	564
Symmetric Cove Light†	NO	LSI25099	45.0	7.5	2838	473	63.1	960

*Based on reduced efficacy of 33.6 lm/W @ 700mA per ITL64873.

†Based on performance of 6 linear feet of luminaire.



Q: Why do LED qualifying programs use efficacy (lm/W) as the sole means of measuring performance?

A: While luminaire efficacy is an important metric for evaluating performance, it should not be the only means of determining whether or not a luminaire will be most effective in an application. In an excerpt from the Illuminating Engineering Society’s Position Statement PS-05-10, the IES suggests that this method of rating luminaires is not aligned with achieving the goal of quality lighting.

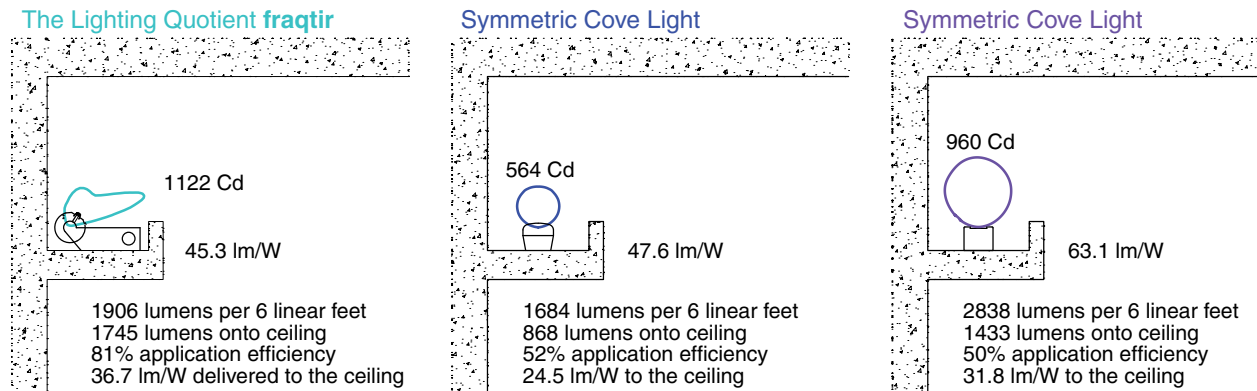
“The use of a lumens per watt rating for luminaires is not endorsed by the IES and does not necessarily achieve the goal of energy reduction while maintaining a high quality lighted environment.”

Quality lighting requires more than just high lumens per watt – those lumens need to go to a good use.

Q: What is “application efficiency” and how does it help to characterize the effectiveness of a luminaire?

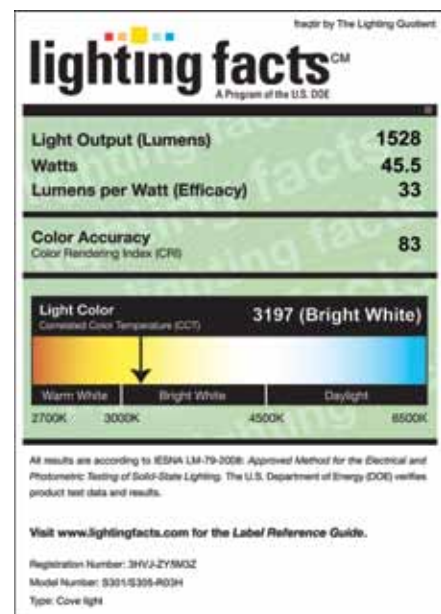
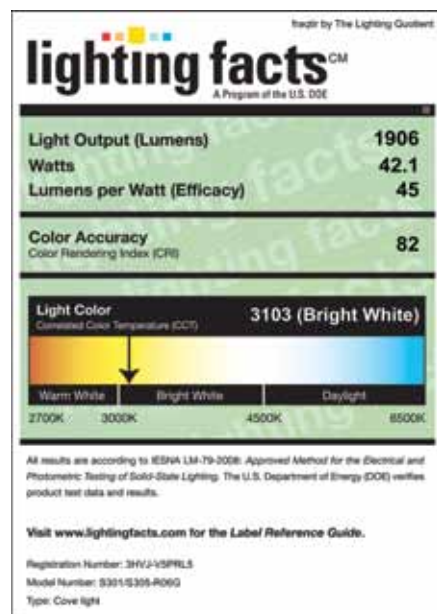
A: Application efficiency describes the ratio of lumens that exit the luminaire to the lumens that arrive on the intended surface(s). In the case of a linear LED cove luminaire, one measure of effectiveness would be the percent of total lumens from the luminaire that are directed to the ceiling. The following example shows how **fraqtir** compares to high-efficacy symmetric cove lights. Although these units have a higher luminaire efficacy rating, the percentage of lumens delivered to the intended target are less. The result: **fraqtir** with its higher application efficiency produces more lumens delivered to the intended surface per watt.

Comparison with Symmetric Cove Lights



Q: Do you have a Lighting Facts label?

A: We have two Lighting Facts labels to show the difference in performance when operating at 300 lm/ft (350mA) and 500 lm/ft (700mA). The labels apply to both the S301 and S305 units.



Q: What is Cradle to Cradle® certification?



A: Both the S301 and S305 luminaires have achieved MBDC's Cradle to Cradle SILVER certification. Cradle to Cradle® certification assesses a product's safety to humans and the environment and design for future life cycles. The materials and manufacturing practices of each product are assessed in five categories: Material Health, Material Reutilization, Renewable Energy Use, Water Stewardship, and Social Responsibility.

Cradle to Cradle Certified^{CM} is a certification mark licensed by the Cradle to Cradle Products Innovation Institute.

Q: Do you have ENERGY STAR® certification?



A: **fraqtir** has received ENERGY STAR® certification for operation at 300 lm/ft (350mA). Products that earn the ENERGY STAR® prevent greenhouse gas emissions by meeting strict energy efficiency guidelines set by the U.S. Environmental Protection Agency and the U.S. Department of Energy.
www.energystar.gov

