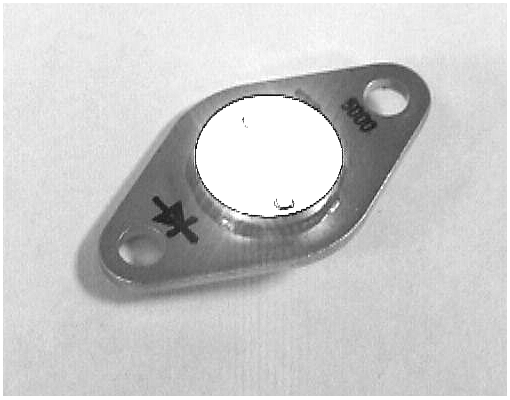
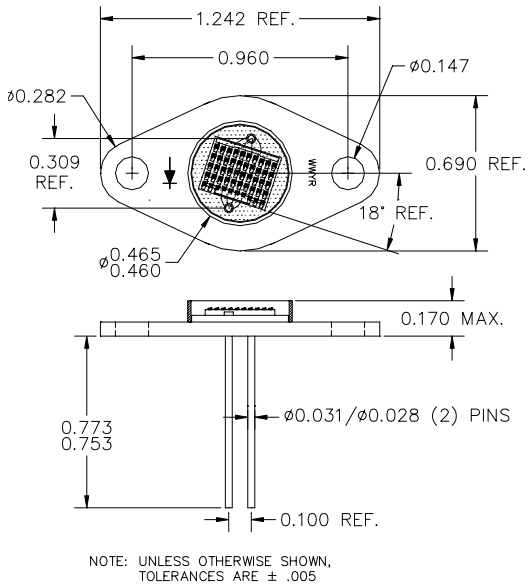
# HIGH FLUX LED ILLUMINATORS

SHARK SERIES™






NOTE: UNLESS OTHERWISE SHOWN, TOLERANCES ARE ± .005

## PRODUCT DESCRIPTION

Shark illuminators are a series of high flux LED sources with blue (470nm), green (530nm), amber (590nm), red (630nm), and white visible emission. The blue, green, and white illuminators utilize InGaN LED's and the amber and red utilize AlInGaP LED's. The LED's are mounted on a BeO substrate that is attached to a TO-66 power package to ensure high reliability through efficient heat transfer. These illuminators are intended for use in high luminous, hard to access applications such as Aerospace Lighting, Emergency & Signal Lighting, Hazardous Lighting, Electronic Signs, and General Industrial Lighting and Illumination.

## ILLUMINATOR PART NUMBER GUIDE

| PART NUMBER | COLOR | DOMINANT WAVELENGTH (TYP $\lambda_D$, nm) | TYPICAL INITIAL STATIC LUMINOUS FLUX ( TYP $\Phi_V$, lm, $T_J$ = 25° C ) |
|---|---|---|---|
| **OTLH-0010-BU** | **BLUE** | **470** | **9.5** ($I_F$ = 300 mA) |
| **OTLH-0020-GN** | **GREEN** | **530** | **42** ($I_F$ = 300 mA) |
| **OTLH-0030-AM** | **AMBER** | **590** | **53** ($I_F$ = 800 mA) |
| **OTLH-0040-RD** | **RED** | **625** | **70** ($I_F$ = 800 mA) |
| **OTLH-0050-WT** | **WHITE** | **N/A** | **42** ($I_F$ = 300 mA) |

## ABSOLUTE MAXIMUM RATINGS ($T_J$ = 25°C)

| | | |
|---|---|---|
| Power Dissipation | Red (Derate 212 mW/°C above 72°C): | 8 W |
| | Amber (Derate 300 mW/°C above 81°C): | 9 W |
| | Blue, Green, White (Derate 240 mW/°C above 76°C): | 5 W |
| Static Forward Current | Red, Amber: | 800 mA |
| | Blue, Green, White: | 300 mA |
| Peak Forward Current ( Pulse Width ≤ 10 ms and Duty Cycle ≤ 10%) | Red: | 4 A |
| | Amber: | 2.5 A |
| | Blue, Green, White: | 2 A |
| Reverse Leakage (Vr = 20 Volts) | $I_R$ ≤ 100 uA | |
| Lead Soldering Temperature | ≤ 240 °C for ≤ 10 seconds | |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## INITIAL ELECTRO-OPTICAL CHARACTERISTICS at $T_J$ = 25°C, $I_F$ = 200 mA

| TYPE | LUMINOUS FLUX ($\Phi_V$, lm) | | RADIANT FLUX (Factor,$P_e$, uW) (Calculated) | | FORWARD VOLTAGE ($V_F$, V) | | DOMINANT WAVELENGTH [PEAK] WAVELENGTH ($\lambda_D$ [$\lambda_P$], nm, CIE x,y ) | | | FULL WIDTH HALF MAXIMUM ($\Delta\lambda$, nm) |
|---|---|---|---|---|---|---|---|---|---|---|
| | MIN | TYP | Factor | TYP | TYP | MAX | MIN | TYP | MAX | TYP |
| BLUE | | 7.0 | 51.5 lm/W @ 465nm | | 16.06 | | 465 | 470/ [466] x = 0.13 y = 0.07 | 475 | 35 |
| GREEN | | 34.0 | 588 lm/W @ 530nm | | 16.6 | | 520 | 530 / [525] x = 0.19 y = 0.70 | 540 | 45 |
| AMBER | | 18.4 | 516 lm/W @ 590nm | | 9.7 | | | 590 / [592] x = 0.57 y = 0.42 | | 20 |
| RED | | 20.0 | 181 lm/W @ 630 | | 9.1 | | | 625 / [630] x = 0.69 y = 0.30 | | 20 |
| WHITE | | 31.0 | -------- | -------- | 16.06 | | | x = 0.32 y = 0.33 | | N/A |

| | |
|---|---|
| **THERMAL PARAMETERS** | |
| Operating Temperature | -40 °C to +100 °C |
| Maximum Junction Temperature | Red: 110 °C<br>Amber, Green, Blue White: 100 °C |
| Typical Junction to Still Air Thermal Resistance, $R_{THJA}$ | 65 °C/W |
| Typical Junction to Case Thermal Resistance, $R_{THJC}$ | Amber: 3.3 °C/W, Red: 4.7 °C/W<br>Blue, Green, White: 4.0 °C/W |
| **OPTICAL PARAMETERS** | |
| Viewing Angle (± θ1/2 ) | ± 54 degrees typical |
| Total Beam Width | ± 78 degrees typical |

## ELECTRICAL PARAMETERS (Typical at $T_J$ = 25°C)

| Parameter | Conditions | Red | Amber | Green | Blue / White |
|---|---|---|---|---|---|
| Capacitance, Junction $C_{j0}$ | Vd = 0 volts | 171 pF | 74 pF | 69 pF | 68 pF |
| Capacitance, Case to Pin | -- | 8 pF | 8 pF | 8 pF | 8 pF |
| Rise Time, Electrical | $R_{source}$ = 66 ohm, $I_f$ = 200 mA | 11 nSec | 10.4 nSec | 12 nSec | 9.2 nSec |
| Fall Time, Electrical | $R_{source}$ = 66 ohm, $I_f$ = 200 mA | 27 nSec | 9.6 nSec | 13 nSec | 9.4 nSec |

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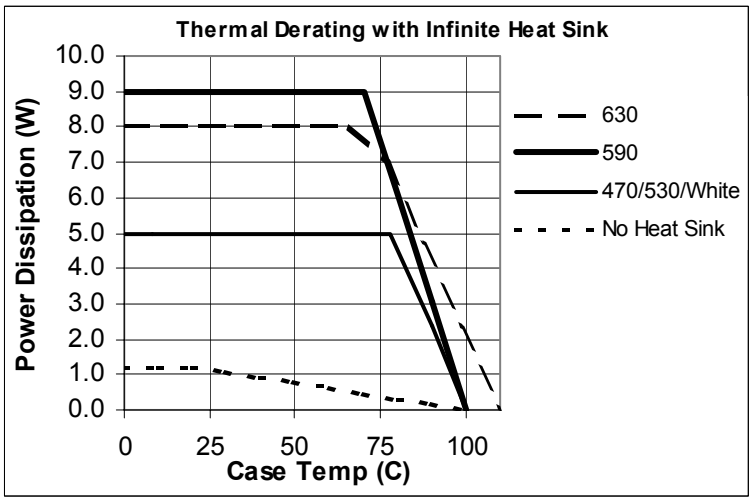
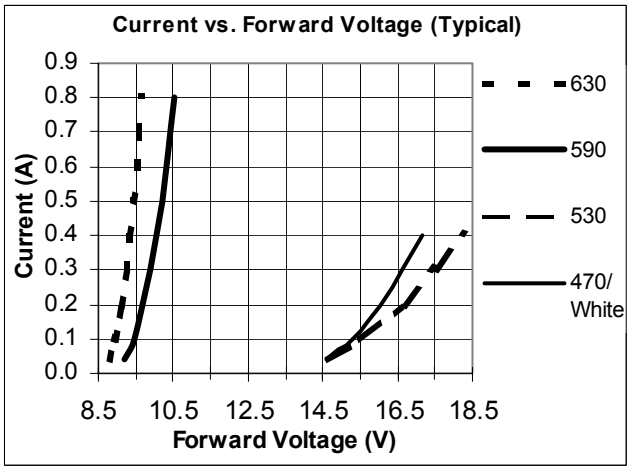
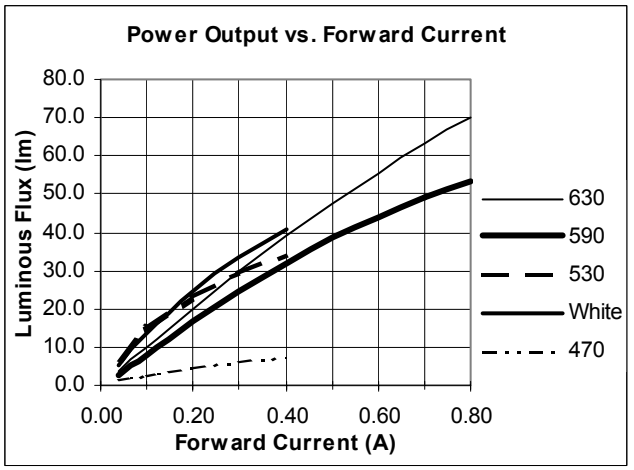
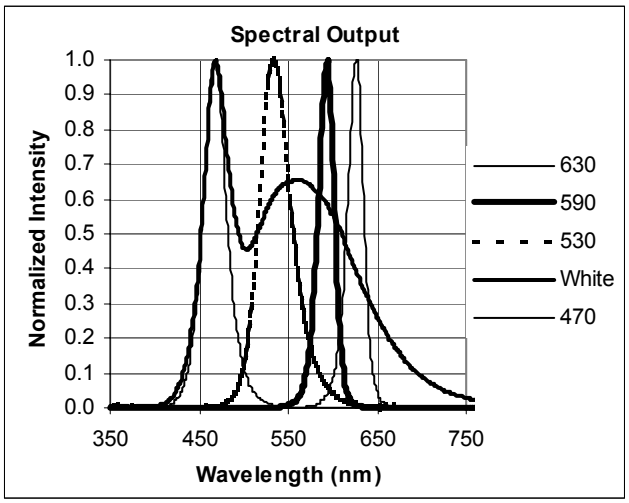
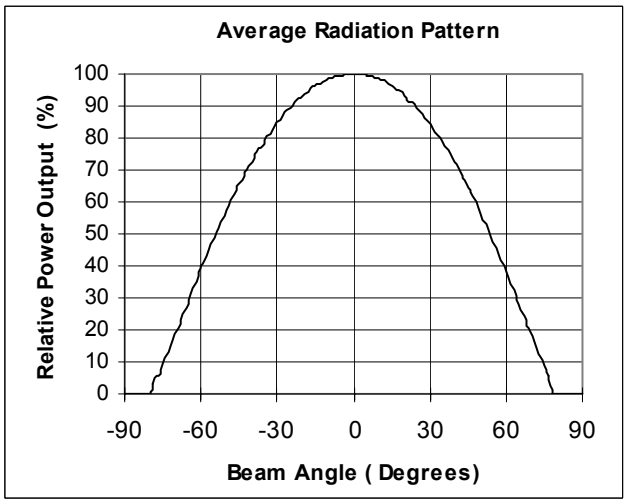

Thermal Derating with Infinite Heat Sink
Power Dissipation (W)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
25
50
75
100
Case Temp (C)
630
590
470/530/White
No Heat Sink


Current vs. Forward Voltage (Typical)
Current (A)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
8.5
10.5
12.5
14.5
16.5
18.5
Forward Voltage (V)
630
590
530
470/
White


Power Output vs. Forward Current
Luminous Flux (lm)
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
0.00
0.20
0.40
0.60
0.80
Forward Current (A)
630
590
530
White
470


Spectral Output
Normalized Intensity
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
350
450
550
650
750
Wavelength (nm)
630
590
530
White
470


Average Radiation Pattern
Relative Power Output (%)
100
90
80
70
60
50
40
30
20
10
0
-90
-60
-30
0
30
60
90
Beam Angle ( Degrees)

**EYE SAFETY ISSUES**

Currently, the LED industry has no universally agreed upon standard to cover eye safety issues associated with the use of LED products. The closest is CEI/IEC 60825-1, used in Europe, which was originally developed for lasers. It was later amended to include LED's, but some in the industry have reservations as to the applicability of this standard to LED's. Under this standard, the OTLH-0010-BU (470nm) and OTLH-0020-GN (530nm) are class 2 LED products and carry the warning:

**LED RADIATION**
**DO NOT STARE INTO BEAM (for 470nm and 530nm Sharks)**
**CLASS 2 LED PRODUCT**

For the OTLH-0030-AM (590nm) and the OTLH-0040-RD (630nm), the standard rates them as a class 1 LED product and requires the explanatory label: **CLASS 1 LED PRODUCT (for 590nm and 630nm Sharks)**

**Handling and Other Precautions**

These parts are high power devices and as such are intended to be used with a heatsink. Devices operated without proper heat sink conditions, or proper current limiting will reach hazardous temperatures very quickly. Do not operate devices under these conditions under any circumstances.

These parts contain a Beryllia ceramic substrate. Beryllia ceramic, in solid form and as contained in finished products presents no special health risks. **Warning:** Overexposure to beryllium by inhalation may cause chronic beryllium disease, a chronic lung disease, and cancer. Therefore; processing or recycling using (for example) grinding, melting, welding, or sawing, of this device or as contained in a final assembly may produce airborne dust, fumes, or mists and therefore the use of exhaust ventilation or other controls should be used to prevent exposure to workers.

**Electro-Static-Discharge**

Any semiconductor circuit can be damaged by ESD. OPTO TECHNOLOGY INC. recommends that all LED circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage to the component. ESD damage can range from subtle performance degradation to complete device failure.

**Silicone Overcoat**

The OTLH-00xx-xx series components have a silicone overcoat, which is soft and flexible (40 durometer, Shore A) and should not be immersed or cleaned with water, alcohol, or other chemical solvents or agents. The overcoat material should not be removed, scraped, touched, pressed, or pulled to avoid stress damage and possible breakage of delicate wire bonds.

Surface dust can be carefully removed with a soft brush, or canned air such as those used for cleaning photographic lenses.

The silicone overcoat material has a flammability classification of 94 V-1 and a temperature rating of 130° C.

**Mechanical Stress**

This component is not suitable for SMT / solder reflow operations. Refrain from twisting leads or unconstrained crimp or lead cut forces, which could break the glass seals of the leads and break internal wire bonds.

**Life Support**

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