

## Optan™ Ball Lens by Crystal IS

OPTAN BALL LENS—UVC LEDs IN A TO-39 PACKAGE WHICH OFFERS SUPERIOR LIGHT OUTPUT, EXCELLENT SPECTRAL QUALITY AND LONG LIFETIMES. AVAILABLE IN PEAK WAVELENGTHS FROM 250 nm-280 nm AND OPTICAL OUTPUT BINS FROM 0.5 mW TO > 3 mW, THESE LEDs ARE IDEAL FOR SPECTROSCOPIC APPLICATIONS IN ANALYTICAL AND LIFE SCIENCES INSTRUMENTATION.

### Features

- > FOCUSED RADIATION PATTERN WITH A VIEWING ANGLE OF 15°
- > PEAK WAVELENGTHS FROM 250 nm - 280 nm
- > AVAILABLE IN LIGHT OUTPUT BINS FROM 0.5 mW TO > 3 mW
- > MAXIMUM DRIVE CURRENT OF 100 mA IN CONTINUOUS MODE
- > TYPICAL L50 LIFETIME OF 3000 HOURS AT 100 mA
- > HERMETIC, THROUGH-HOLE PACKAGE
- > RoHS COMPLAINT

### Benefits

- > BUILT-IN LENS PROVIDES LIGHT FOCUS, AND REDUCES ASSEMBLY COST
- > NARROW SPECTRUM ENABLES ELIMINATION OF FILTERS
- > RELATIVELY LOW SYSTEM COST
- > SUPERIOR IRRADIANCE (mW/nm/cm<sup>2</sup>)
- > ENVIRONMENT ISOLATED PACKAGE



### Product Nomenclature

Optan is binned by emission wavelength, between 250 nm and 280 nm, and by optical power.

Part Number <sup>1</sup>	Peak Wavelength			Optical Output at 100 mA <sup>2</sup>	
	Min	Typical	Max	Min	Max
OPTAN-250H-BL	245 nm	250 nm	255 nm	0.5 mW	1.0 mW
OPTAN-250J-BL	245 nm	250 nm	255 nm	1.0 mW	
OPTAN-255H-BL	250 nm	255 nm	260 nm	0.5 mW	1.0 mW
OPTAN-255J-BL	250 nm	255 nm	260 nm	1.0 mW	
OPTAN-260H-BL	255 nm	260 nm	265 nm	0.5 mW	1.0 mW
OPTAN-260J-BL	255 nm	260 nm	265 nm	1.0 mW	
OPTAN-275H-BL	270 nm		285 nm	0.5 mW	1.0 mW
OPTAN-275J-BL	270 nm	275 nm	280 nm	1.0 mW	2.0 mW
OPTAN-275K-BL	270 nm	275 nm	280 nm	2.0 mW	3.0 mW
OPTAN-275L-BL	270 nm	275 nm	280 nm	3.0 mW	
OPTAN-280J-BL	275 nm	280 nm	285 nm	1.0 mW	2.0 mW
OPTAN-280K-BL	275 nm	280 nm	285 nm	2.0 mW	3.0 mW
OPTAN-280L-BL	275 nm	280 nm	285 nm	3.0 mW	

#### Notes:

1. LEDs are produced with semiconductor technology that is subject to process variation, yielding a range of flux performance that is approximately Gaussian in nature. To provide customers with fine granularity within the overall flux distribution, Crystal IS separates LEDs into optical power bins.

2. Output power is measured using a 100 mA current pulse of < 1 s duration at an ambient temperature of 25 °C ± 5 °C with the diode inserted into an integrating sphere.



## LED Characteristics<sup>1</sup>

Characteristic	Unit	Min.	Typical	Max.
Viewing angle <sup>2</sup>	degrees		15	
Full width at half maximum	nm		11	
Forward voltage at 100 mA <sup>3</sup>	V			10
Lifetime, L50 at 100 mA <sup>4</sup>	hours		3000	
Lifetime, L50, at 20 mA <sup>4</sup>	hours		8000	
Thermal resistance, junction-to-case	°C/W		20	
Power dissipation at 100 mA	W			1.0

### Notes:

- All measurements completed at an ambient temperature of 25 °C wherever applicable.
- Viewing angle is twice of half-value angle. A half-value angle is the angle between axial direction and direction in which the light intensity value is half of the axial intensity.
- Voltage tolerance is  $\pm 5\%$ .
- L50 is the time at which light output drops to 50 % of original value during continuous operation at 25 °C.

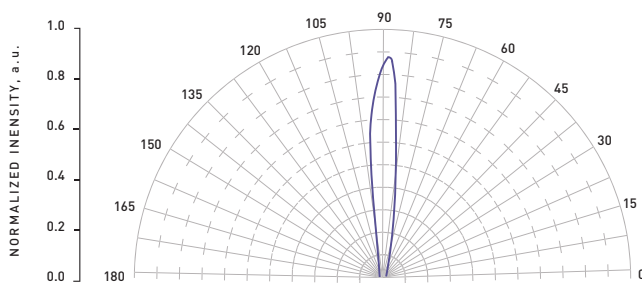
## Absolute Maximum Ratings

Characteristic	Unit	Min.	Typical	Max.
Forward current (continuous or CW)	mA			100
Reverse voltage	V			-5
Operating temperature range	°C	-5		55
Storage temperature	°C	-40		100
Junction temperature	°C			85

## Typical Radiation Pattern

Optan LEDs with a ball lens have a nominal viewing angle of 15°.

### RADIATION PATTERN

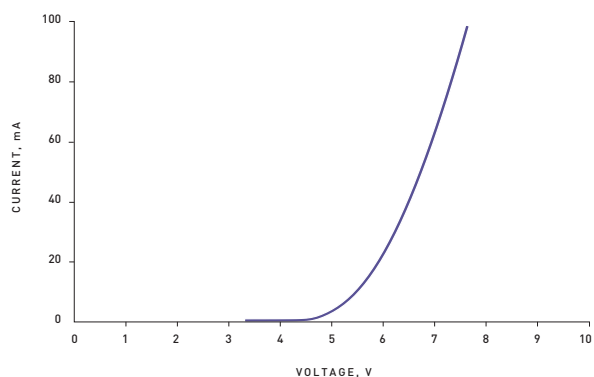


Test Conditions:  $I$  (CW) = 100 mA, CW = Continuous Wave Mode

## Typical Electrical Characteristics

The typical forward voltage is less than 10 V at an operating current of 100 mA.

### TYPICAL ELECTRICAL CHARACTERISTICS



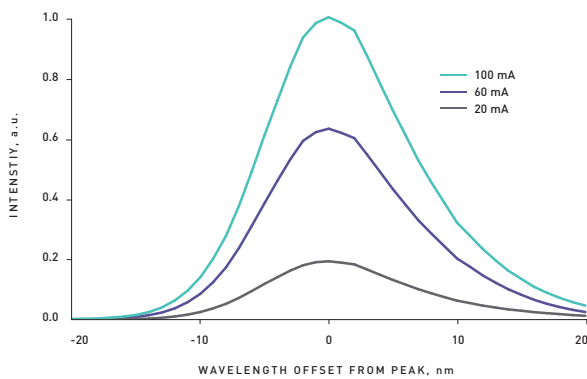
Test Conditions:  $I$  (Pulsed mode) = 1 to 100 mA; Case Temperature ( $T_c$ ) = 25 °C



## Typical Spectral Characteristics Over Current

The plot below shows the stability of the peak wavelength with various applied currents. No shift is typically observed in the peak wavelength with change in drive current from 100 mA to 20 mA.

### SPECTRUM VS. CURRENT

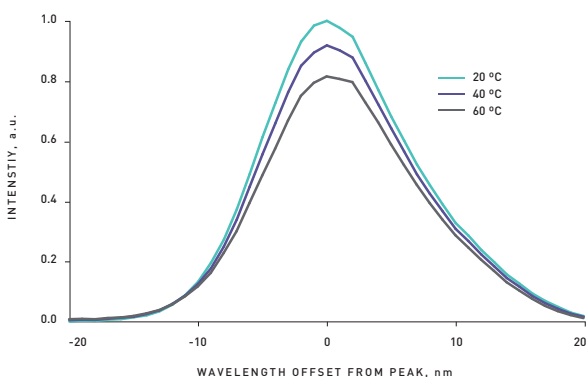


Test Conditions: Case Temperature ( $T_C$ ) = 25 °C

## Typical Spectral Characteristics Over Temperature

The plot below illustrates the stability of the spectral characteristics with change in temperature. No shift is typically observed in the peak wavelength with change in case temperature from 20 °C to 60 °C.

### SPECTRUM VS. TEMPERATURE

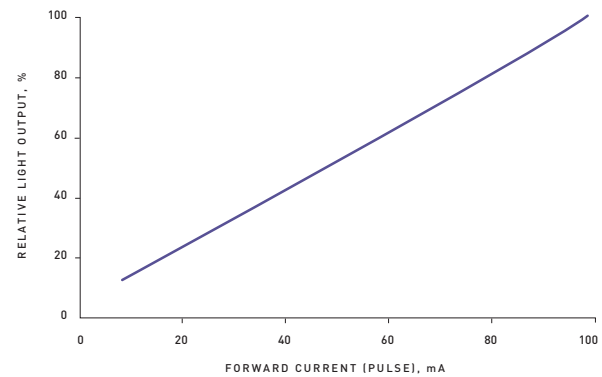


Test Conditions:  $I$  (Pulsed Mode) = 100 mA

## Typical Light Output Characteristics Over Current

The plot below shows the typical variation in light output with forward current. The light output data is normalized to the light output at 100 mA.

### LIGHT OUTPUT OVER CURRENT

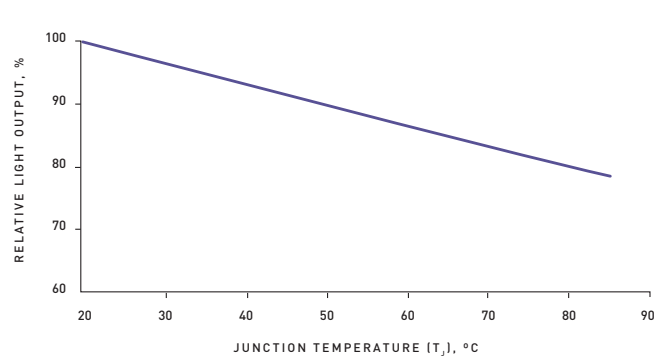


Test Conditions: Case Temperature ( $T_C$ ) = 25 °C

## Typical Light Output Characteristics Over Temperature

Output power is very sensitive to junction temperature, so proper thermal management techniques are suggested to control junction temperature. Lower junction temperatures will ensure the optimal performance and lifetime of the LED. The plot below shows the change in optical power with increase in junction temperature. A typical drop of 5 % in light output is noticed for a 10 °C rise in temperature.

### LIGHT OUTPUT OVER TEMPERATURE



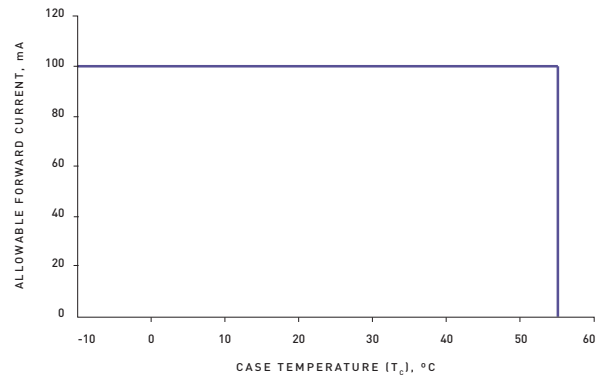
Test Conditions:  $I$  (Pulsed Mode) = 100 mA



## Recommended Operation

Crystal IS LEDs should be operated at currents below 100 mA and mounted on a heat sink to keep the case temperature below 55 °C. Please refer to the Crystal IS thermal management note AN003 for heat sink recommendations. Circuits should be designed for constant current.

## CURRENT DERATING CURVE

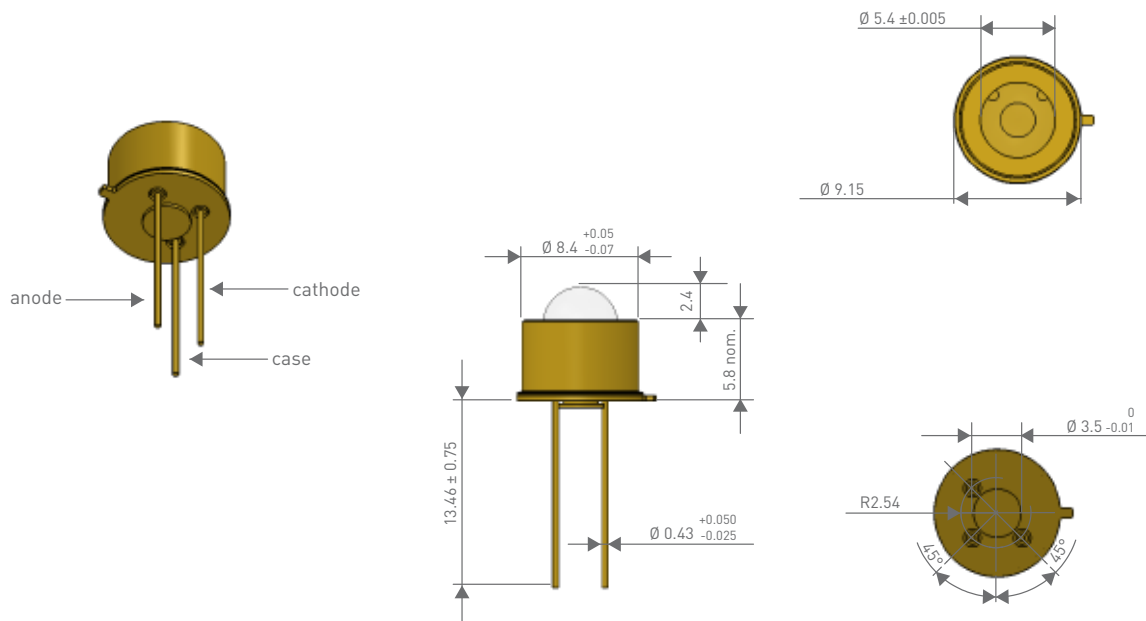


Test Conditions: CW

## Mechanical Dimensions

The Optan package is comprised of a header with a copper slug and a Kovar cap that is welded to the header to provide hermetic sealing. The cap contains a fused silica ball lens which provides the nominal viewing angle of 15°.

### OPTAN TO-39 PACKAGE WITH BALL LENS



All dimensions are in millimeters. Unless noted otherwise, all dimensions have a tolerance of  $\pm 0.05$  mm.



## Recommended Soldering Guidelines

1. The pitch of the LED lead should match the pitch of the mounting holes on the PCB during component placement.
2. The tip of the soldering iron should never touch the lens.
3. Recommended soldering pattern is illustrated in Figure 1. In addition, please ensure that the central copper slug in the header is thermally connected to the board with thermal paste or grease. A heat sink should be used to keep the case temperature of the LED below 55 °C at a forward current of 100 mA. Please refer to the Crystal IS thermal management note AN003 for heat sink recommendations.
4. After soldering, avoid applying external force, stress, and excessive vibration until the product has returned to ambient temperature.

## Recommended Soldering Conditions

Distance between melted solder sides to bottom of LED should be 3 mm or longer.

Parameter	Dip Soldering (Lead Free Solder)	Hand Soldering (Lead Free Solder)
Pre Heat	90 °C max. (Backside of PCB)	--
Pre Heat Time	60 seconds max.	--
Temperature	260 °C max. (Solder Bath)	300 °C max. (Soldering Iron Tip)
Soldering Time	5 seconds max.	3 seconds max.

## Recommended Cleaning

- > Cleaning with isopropyl alcohol is recommended. Propanol and ethyl alcohol may also be used.
- > DO NOT use ultrasonic cleaners with Crystal IS LEDs.
- > DO NOT use acetone or trichloroethylene to clean Crystal IS LEDs.

Problems with LEDs such as reduction in light output, opens, or shorts can be prevented as long as the LEDs are soldered under these conditions.

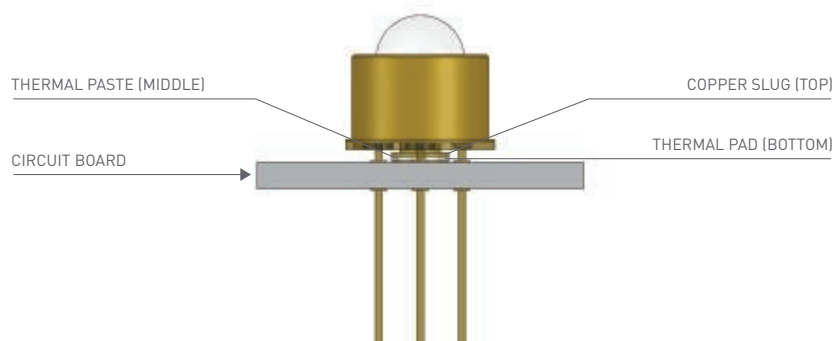
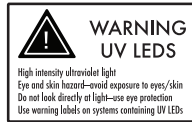


Figure 1

## Eye Safety Guidelines

During operation, the LED emits high intensity ultraviolet (UV) light, which is harmful to skin and eyes. UV light is hazardous to skin and may cause cancer. Avoid exposure to UV light when LED is operational. Precautions must be taken to avoid looking directly at the UV light without the use of UV light protective glasses. Do not look directly at the front of the LED or at the LED's lens when LED is operational.

Attach the following warning labels on products/systems that use UV LEDs.



## RoHS Compliance

The levels of environmentally sensitive, persistent biologically toxic (PBT), persistent organic pollutants (POP), or otherwise restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS), as amended through April 21, 2006.



## Handling Precautions

LEDs are sensitive to static electricity. When handling, proper ESD protection is required, including:

- Eliminating static charge
- Using grounded wriststrap, ESD footwear, clothes, and floors
- Grounded workstation and tools.



## Disclaimer

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We invite you to learn more about our UVC LEDs.



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