

UVTOP®

# Specification

## TUD89H1B

(formerly S-T39C-H3-285-01-7-040)

SETi		Customer
Drawn	Approval	Approval

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## UV LED - 285nm



# 1. Product Brief

## Description

- TUD89H1B is a deep ultraviolet light emitting diode with peak emission wavelengths from 280nm to 290nm. The LED is hermetically sealed inside a metal-glass welded package.
- It incorporates state of the art semiconductor material, chip design and robust packaging with advanced optical characteristics.
- TUD89H1B is designed for medical and analytical instrumentation, optical sensing, chemical and biological analysis in deep UV spectral range, and horticulture.

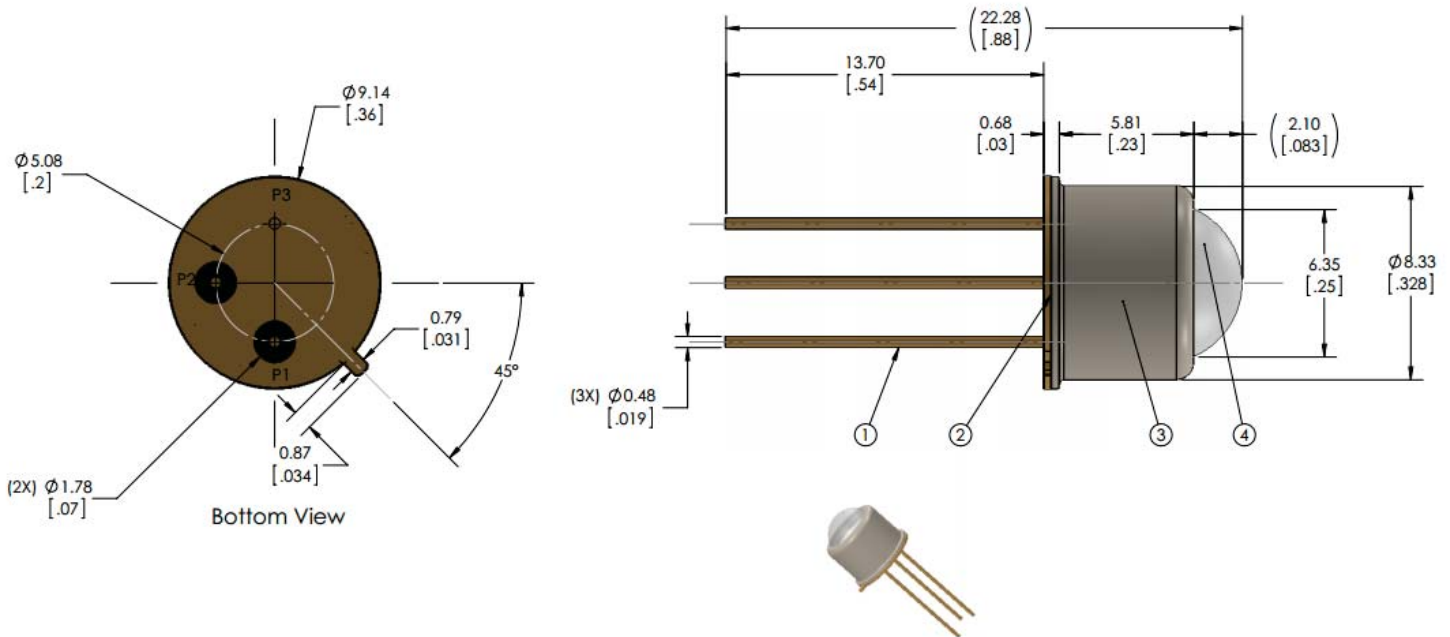
## Features and Benefits

- Ultraviolet LED
- Robust metal-glass package
- Narrow angular diagram
- Lead-free product
- RoHS compliant

## Key Applications

- Fluorescent spectroscopy
- Sensors
- Chemical and biological Analysis
- Horticulture

## 2. Mechanical Dimensions



PIN #	Connections
P1	Anode (+)
P2	Cathode (-)
P3	Case

Material Information	
1	Au Plated Kovar Leads
2	TO39 Header
3	Au or Ni Plated Kovar Cap
4	Hemispherical Lens

**Notes:**

- [1] Dimensions in mm/[in]
- [2] Not to scale
- [3] All dimensions for reference only
- [4] The appearance and specifications of the product may be modified for improvement without notice.

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### 3. Performance Characteristics <sup>[1]</sup>

#### A. Electro-Optical Characteristics at 20mA

Parameter	Symbol	Min	Typical	Max	Unit
Peak Wavelength <sup>[2]</sup>	$\lambda_p$	280		290	nm
Optical Output Power <sup>[3]</sup>	$P_{opt}$	0.4	0.7		mW
Forward Voltage <sup>[4]</sup>	$V_F$		6.0	7.0	V
FWHM	$\Delta\lambda$		11	15	nm
Viewing Angle	$2\theta_{1/2}$		7		°
Thermal Resistance ( $T_j - T_{case}$ ) <sup>[5]</sup>	$R_{th}$		50		°C/W

#### B. Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Forward Current	$I_F$	30	mA
Power Dissipation	$P_d$	180	mW
Case Temperature <sup>[6,8]</sup>	$T_{case}$	-30 to 55	°C
Storage Temperature <sup>[6,8]</sup>	$T_{stg}$	-30 to 100	°C

**Notes:**

[1] Devices rated under operating conditions:  $T_a = 25^\circ\text{C}$

[2] Peak wavelength measurement accuracy is  $\pm 3$  nm

[3]  $P_{opt}$  is the Optical Output Power as measured by an integrated sphere with accuracy  $\pm 10\%$

[4] Forward voltage measurement accuracy is  $\pm 3\%$

[5] Thermal Resistance is measured between case & junction temperatures at operational conditions

[6] The exposure to the absolute maximum rated conditions may affect device reliability

[7] The stresses beyond those listed above absolute maximum rating may cause permanent damage to the device

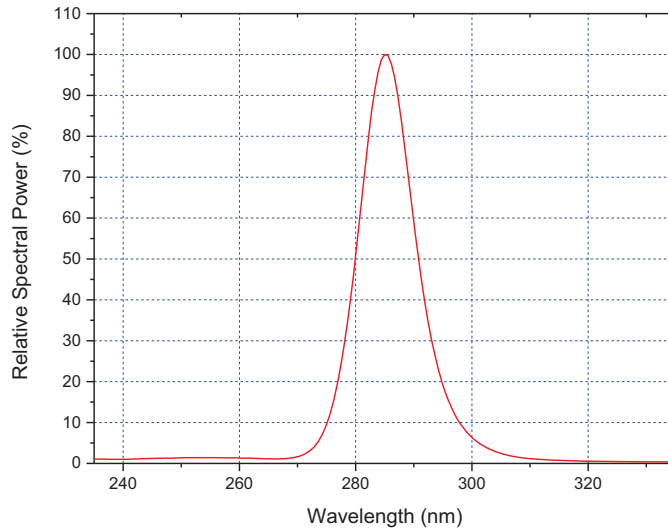
[8] At extreme temperatures - extra care must be taken to keep devices free from moisture

[9] The appearance and specifications of the product may be modified for improvement without notice

## 4. Characteristic Diagrams

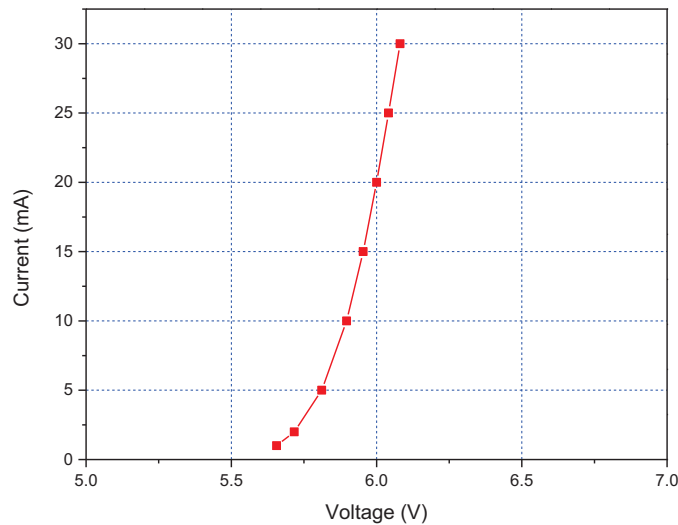
### A. Relative Spectral Power Distribution

$T_a = 25\text{ }^\circ\text{C}$



### B. Forward Current vs. Forward Voltage

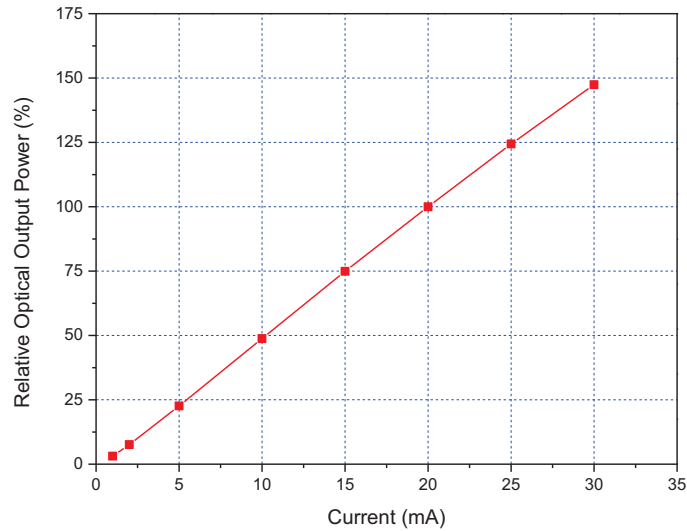
$T_a = 25\text{ }^\circ\text{C}$



## 4. Characteristic Diagrams - Continued

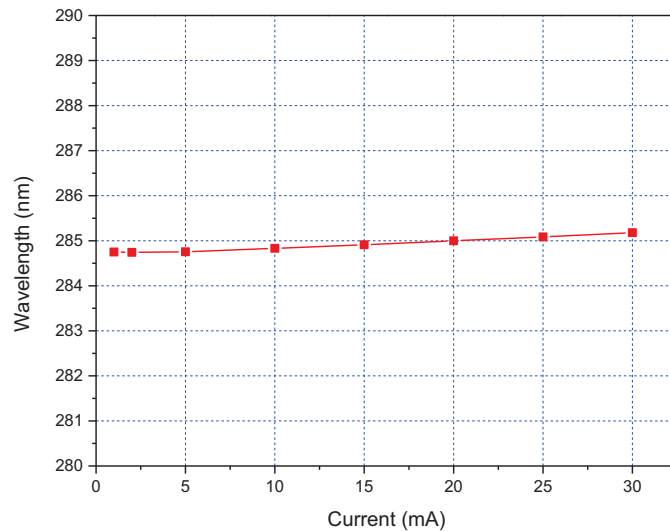
### C. Relative Optical Output Power vs. Forward Current

$T_a = 25\text{ }^\circ\text{C}$



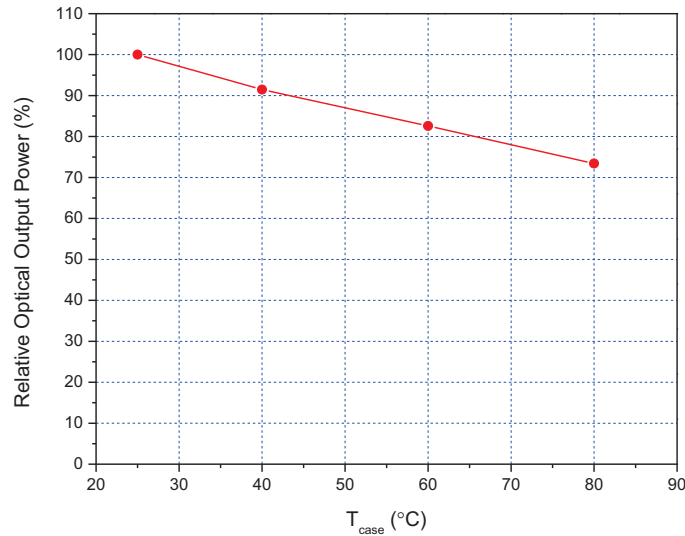
### D. Peak Wavelength vs. Forward Current

$T_a = 25\text{ }^\circ\text{C}$

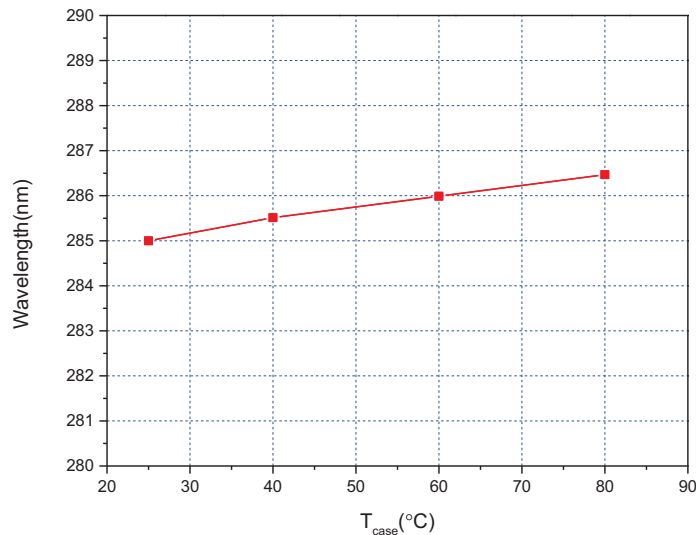


## 4. Characteristic Diagrams - Continued

### E. Relative Optical Output Power vs. Case Temperature



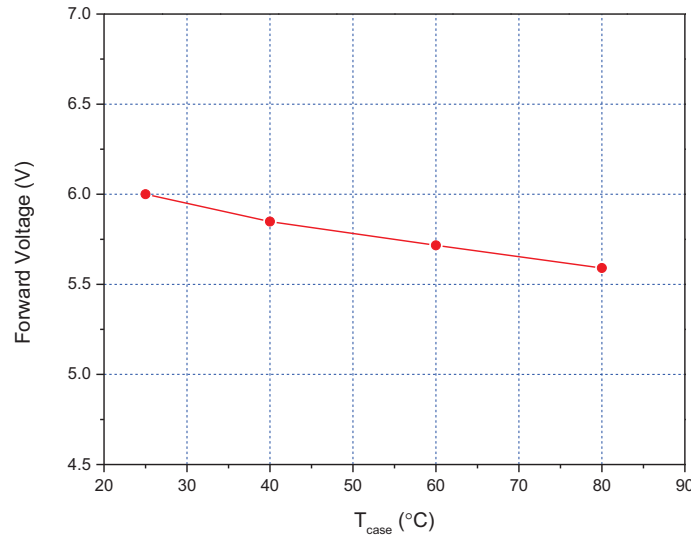
### F. Peak Wavelength vs. Case Temperature





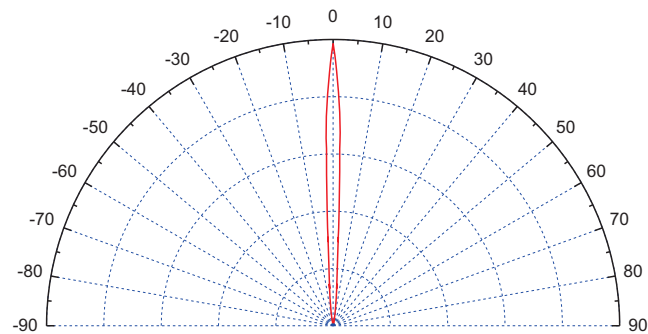
## 4. Characteristic Diagrams - Continued

### G. Forward Voltage vs. Case Temperature



### H. Typical Angular Diagram

T<sub>a</sub> = 25 °C



## 5. Soldering Information

### A. Soldering Conditions

- The following conditions must be avoided during soldering: overheating, ESD, mechanical shock, vibration, ultrasonic shock, mechanical damage and contamination.
- Solder no closer than 3mm from the base of the header.
- Only solder to the package leads. Soldering to the LED header or the cap will result in damage to the device.
- If clamping the LED is required, mechanical stress on the LED should be minimized.
- Do not mount the LED directly on the PCB or heat sink by soldering directly to the LED header or cap.
- Only use non-corrosive flux.
- Only cut device leads at room temperature using an ESD protected tool. Do not apply stress to the leads while hot.
- Do not apply current to the device until it has cooled down to room temperature after soldering.
- When forming leads, the leads should be bent at a point at least 3mm from the base of the header.
- Form leads prior to soldering.
- Do not use header or can of LED to form leads.

### B. Recommended Soldering Parameters

Dip Soldering		Hand Soldering	
Pre-Heat Time	30 seconds, max.	Temperature at Case	190° C
Solder Bath Temperature	190° C	Soldering Time	5 seconds, max.
Dipping Time	5 seconds, max.		

## 6. Precaution for Use

### A. UV Light

- These devices are ultraviolet LEDs. During operation, the LED emits high intensity ultraviolet (UV) light, which is harmful to skin and eyes. Do not look directly into the UV light and wear protective equipment during operation.
- 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.**



### B. Static Electricity

- These products are ESD (electrostatic discharge) sensitive; static electricity and surge voltages seriously damage UV LEDs and can result in complete failure of the device. Precautions must be taken against ESD when handling or operating these devices.

### C. Operating Conditions

- In order to ensure the correct functioning of these LEDs, compliance to the maximum electrical specifications is paramount. These LEDs are sensitive to any current value that exceeds the absolute maximum rating of the product. Any applied current in excess of the maximum specification will cause damage and possible complete failure of the product.
- The current flowing in a LED is an exponential function of the voltage across it. A small change in voltage can produce a very large change in current and lead to complete failure of the LED. The use of current regulated drive circuits are recommended for these products.
- **Any attempt to drive these UV LEDs with a voltage source instead of a current source will cause damage and possible complete failure of the product.**
- These devices are not designed to be used under negative bias.
- This device is not to be used in any type of fluid such as water, oil, organic solvent, etc.

## 6. Precaution for Use - Continued

### C. Operating Conditions - continued

- These LEDs are susceptible to heat generation. Use care to design end product with adequate thermal management to ensure that LEDs do not exceed maximum recommended temperatures. Operating LEDs at temperatures in excess of specification will result in damage and possible complete failure of the product. When the LEDs are in operation the maximum current should be decided after measuring the package temperature.
- The driving circuit must be designed to allow forward voltage only when it is ON or OFF. If the reverse voltage is applied to LED, migration can be generated resulting in LED damage.

### D. Storage

- To avoid moisture penetration, we recommend storing UV LEDs in a dry box with a desiccant. The recommended temperature and relative humidity are between 5°C and 30°C and below 50% respectively.
- LEDs must be stored properly to maintain the device. If the LEDs are stored for 3 months or more after being shipped from SETI, a sealed container with a nitrogen atmosphere should be used for storage.
- Replace the remained LEDs into the moisture-proof bag and reseal the bag after work to avoid those LEDs being exposed to moisture. Prolonged exposure to moisture can adversely affect the performance of the LEDs.
- If the package has been open for more than 168hr or the color of the desiccant changes, components should be dried for 10-12hr at 60±5°C.
- The conditions of resealing should be as follows: Temperature between 5 and 40°C and relative humidity less than 30%

### E. Handling Precautions

- VOCs (Volatile organic compounds) emitted from materials used in the construction of fixtures can penetrate the LED packages and affect LED performance and lifetime. Knowledge of the properties of the materials selected to be used in the construction of fixtures can help prevent these issues.
- When attaching LEDs, do not use adhesives that outgas organic vapor.
- Soldering should be done as soon as possible after opening the moisture-proof bag.

## 8. Precaution for Use - Continued


### E. Handling Precautions - Continued

- Do not rapidly cool device after soldering.
- Do not apply mechanical force or excess vibration during the cooling process to normal temperature after soldering.
- Components should not be mounted on warped (non coplanar) portions of a PCB.
- The UV LED is protected by a lens which requires careful handling
  - Avoid touching glass lens parts especially with sharp tools such as tweezers
  - Avoid leaving fingerprints on glass lens parts.
- Do not handle this product with acid or sulfur material in sealed space.

### F. Cleaning

- If cleaning is required, isopropyl alcohol or water with immediate drying is recommended
- Do not use ultrasonic cleaning.

## 8. Revision History

Revision	Change Date	Authorized Signature
01	4-28-2016	
02	5-18-2017	<p><i>Ahmad Heidari, Quality Assurance Manager</i></p>  <p>Digitally signed by Ahmad Heidari Date: 2017.05.19 12:35:55 -04'00'</p>