Deep UV LED - 310nm

Custom Module

TCD1BNMA

RoHS

Product Brief

Description

TCD1BNMA is a high power module with peak emission wavelength at 310nm.

The LEDs are shielded behind a UV-transparent window to protect from moisture and dust. The module also features mounting holes for hassle-free system attachment.

TCD1BNMA is designed for medical and analytical instrumentation, chemical and biological analysis, and horticulture .Additional applications include deep UV curing of polymers, vitamin D generation, and skin care.

Features and Benefits

- Deep ultraviolet LED
- Robust materials
- WICOP
- Lead-free product
- RoHS compliant

Key Applications

- Fluorescent spectroscopy
- Chemical and biological analysis
- Horticulture
- Curing
- Vitamin D
- Skin care

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Performance Characteristics

Table 1. Electro - Optical characteristic at 200mA

(T_J=25℃, RH=30%)

Parameter	Symbol	Typical Value	Unit
Peak Wavelength [1]	λ_p	310	nm
Optical Output Power [2]	Φ_e [3]	150	mW
Forward Voltage [4]	V_F	60	V
Spectrum Half Width	$\Delta\lambda$	12	nm
View Angle	$2\Theta_{1/2}$	>135	deg.

Table 2. Projected Electro - Optical characteristic at 1.5A

(T_J [6]=25℃, RH=30%)

Parameter	Symbol	Typical Value	Unit
Peak Wavelength [1]	λ_p	310	nm
Optical Output Power [2]	Φ_e [3]	1100	mW
Forward Voltage [4]	V_F	64	V
Spectrum Half Width	$\Delta\lambda$	12	nm
View Angle	$2\Theta_{1/2}$	>135	deg.

Table 3. Absolute Maximum Ratings

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Forward Current	I_F	-	200	1500	mA
Operating Temperature [6]	T_J	- 30	-	60	ºC
Storage Temperature	T_{stg}	- 40	-	100	ºC

Notes :

1. Peak wavelength measurement tolerance: ± 3 nm
2. Optical Output Power measurement tolerance: ± 10%
3. Φ_e is the Optical Output Power as measured with an integrated sphere
4. Forward voltage measurement tolerance: ± 3%
5. Exposure to the absolute maximum rated conditions may affect device reliability
6. T_J is the junction temperature of the LED

Test Criteria

- **Table 4. Electro - Optical characteristic at 200mA - all devices are tested**

(T_J=25℃, RH=30%)

Parameter	Symbol	Value		Unit
		Min	Max	
Peak Wavelength [1]	λ_p	305	315	nm
Optical Output Power [2]	Φ_e [3]	130	-	mW
Forward Voltage [4]	V_F	40	80	V

- **Table 5. Preliminary Optical Characteristic at 1.5 A – 5% of all devices are tested**

(T_J=25℃, RH=30%)

Parameter	Symbol	Value		Unit
		Min	Max	
Peak Wavelength [1]	λ_p	305	315	nm
Optical Output Power [2]	Φ_e [3]	900	-	mW
Forward Voltage [4]	V_F	44	84	V

Selection Criteria

5% of the total order with 4 devices minimum will be selected for high current testing. Selection of devices for high-current testing will depend on low current testing results. Passing devices with upper and lower bounds of the follow test parameters will be selected:

- Radiant Flux Extremes (minimum 2 devices)
- Wavelength Extremes (minimum 2 devices)

Serialization Nomenclature

$PSX_1X_2X_3X_4X_5$

PS : Customer Abbreviation: Psoria-Shield
X_1 : PO sequential #
$X_2X_3X_4X_5$: LED sequential #

Serialization Example

Module Topside

Module Backside

Sample Test Report Template

EXAMPLE ONLY – NOT REAL DATA

Test Report										
	Test Date:			PN:	TCD18BNMA		Tested By:			
Current: 200mA						Current: 1.5A				
Module	Vf	Cwl	Pwl	P,W	P,mw	Vf	Cwl	Pwl	P,W	P,mw
PS0005	44.645	309.483	309.535	0.148	147.722	46.645	309.683	309.735	0.590888	590.8884
PS0006	44.943	309.902	310.107	0.159	158.577					
PS0007	45.016	310.284	310.107	0.163	162.964					
PS0008	44.833	309.543	309.535	0.155	154.887					
PS0009	44.873	309.747	309.714	0.151	148.327					
PS0010	44.766	310.168	309.865	0.161	148.619					
PS0011	44.652	309.502	309.770	0.150	161.675					
PS0012	44.694	309.644	309.982	0.160	150.538					
PS0013	44.822	309.491	309.560	0.153	151.659					
PS0014	44.947	310.114	310.056	0.152	148.383					
PS0015	44.822	309.807	309.854	0.149	151.751					
PS0016	44.695	309.718	309.560	0.153	150.809	46.695	309.918	309.760	0.612	603.236
PS0017	44.904	310.269	309.941	0.156	158.864					
PS0018	44.870	309.940	310.042	0.149	150.952					
PS0019	44.820	309.963	309.643	0.162	160.663					
PS0020	44.841	310.061	309.977	0.159	154.656					
PS0021	44.654	309.760	309.764	0.162	162.869					
PS0022	44.806	309.631	309.884	0.149	150.601					
PS0023	44.973	310.242	309.620	0.152	154.543					
PS0024	44.683	309.606	309.794	0.153	150.093					
PS0025	44.874	309.750	309.625	0.159	150.512					

Characteristics Graph

Fig 1. Spectrum, T_J=25℃, I_F=200mA

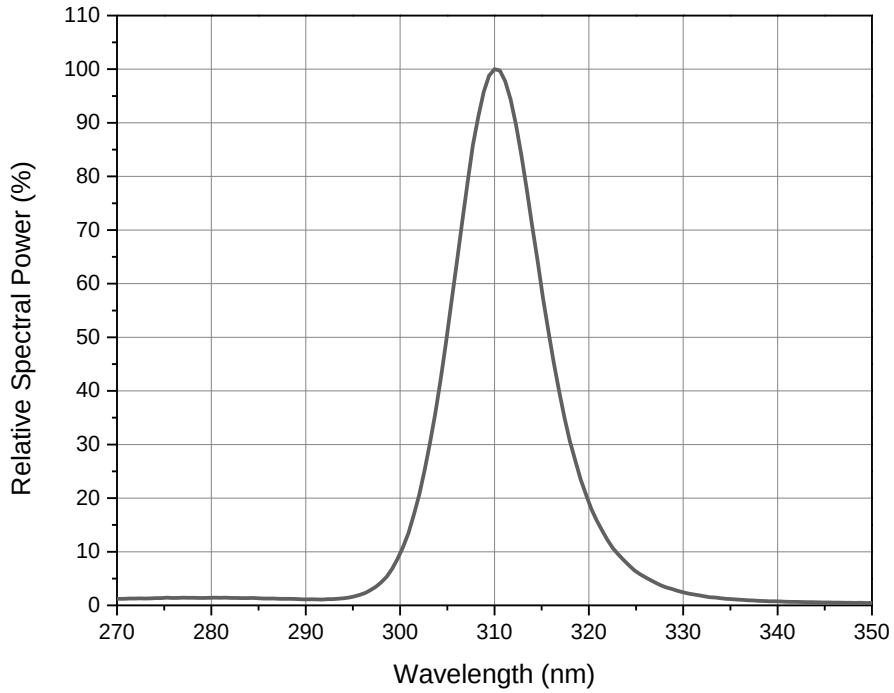
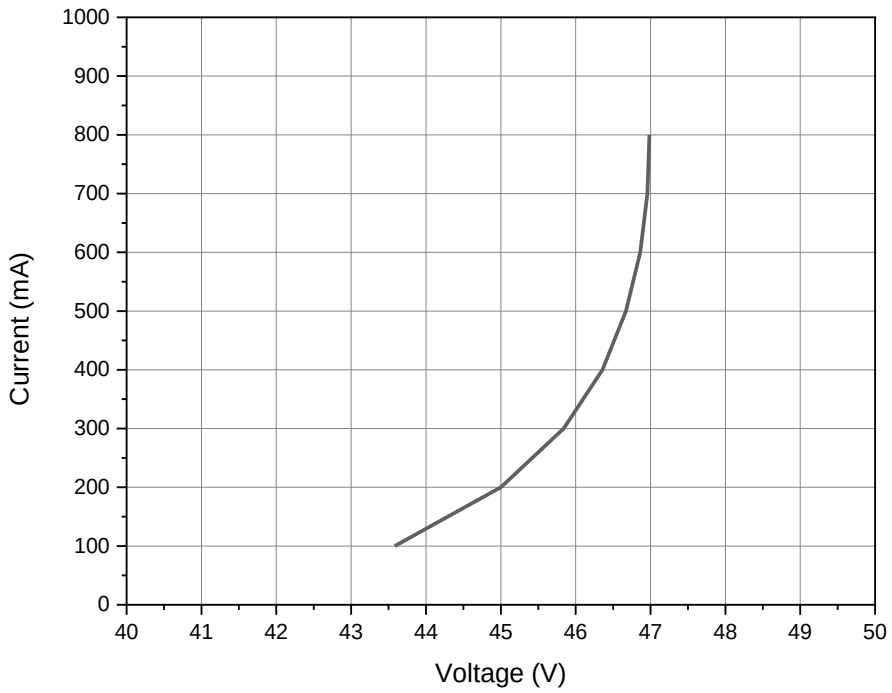


Fig 2. Forward Current vs. Forward Voltage, T_J=25℃



Characteristics Graph

Fig 3. Projected Relative Optical Output Power vs. Forward Current, T_J=25℃

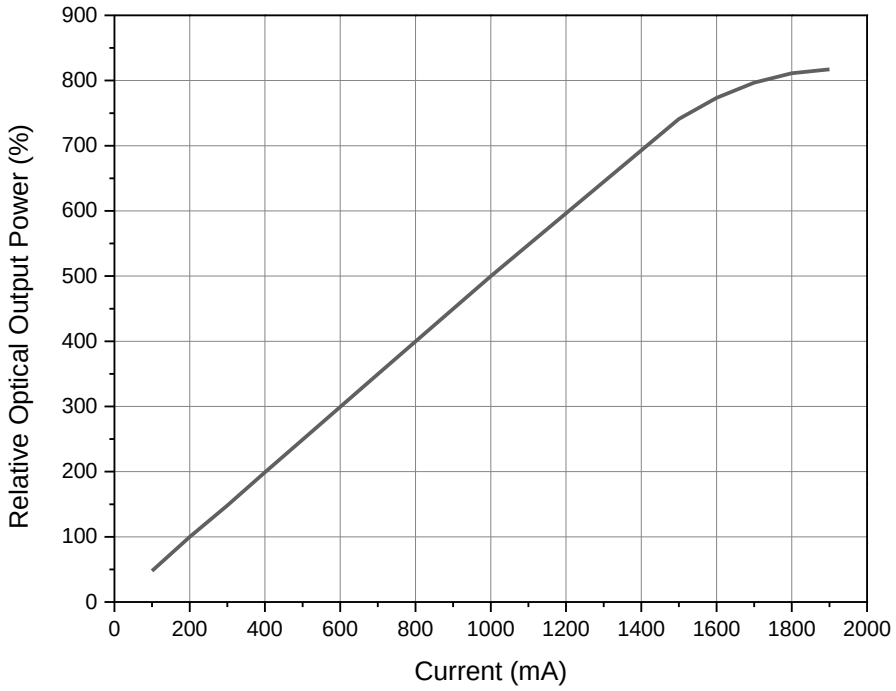
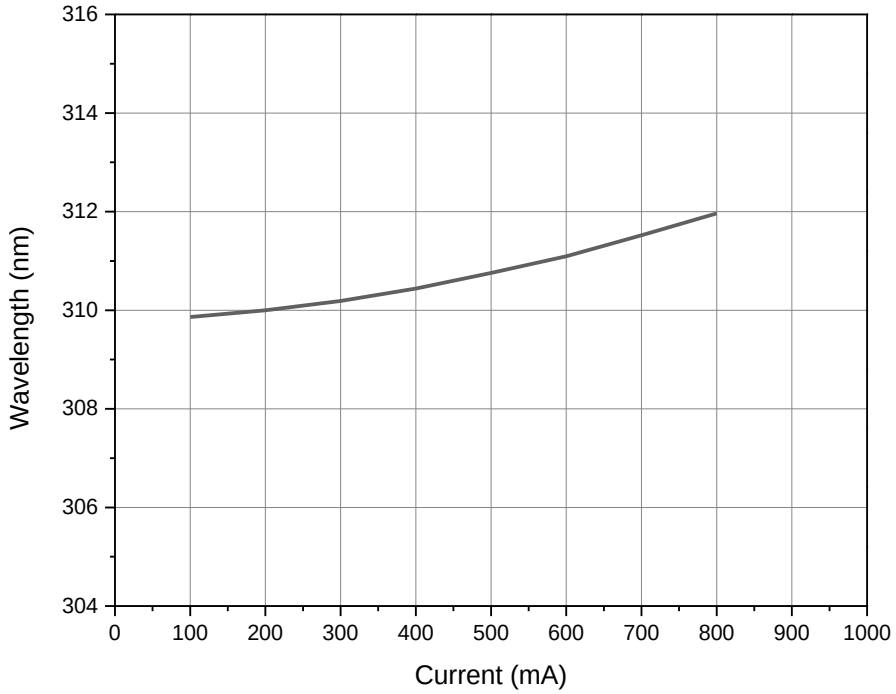
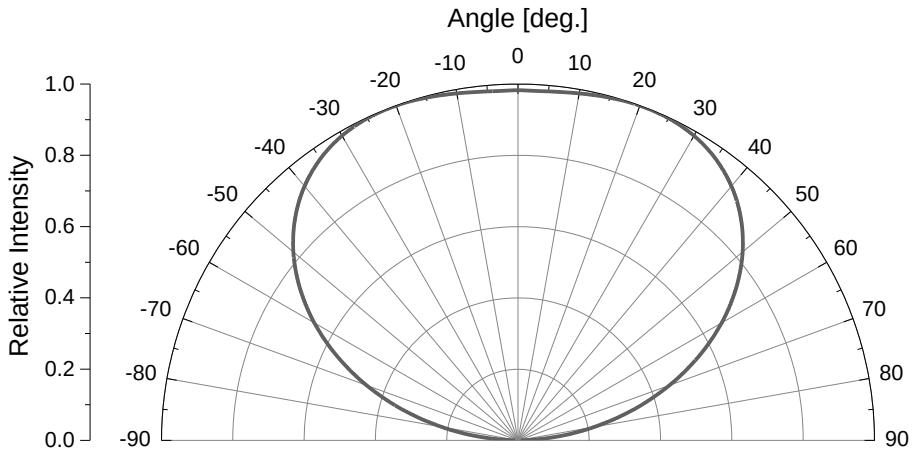


Fig 4. Peak Wavelength vs. Forward Current, T_J=25℃

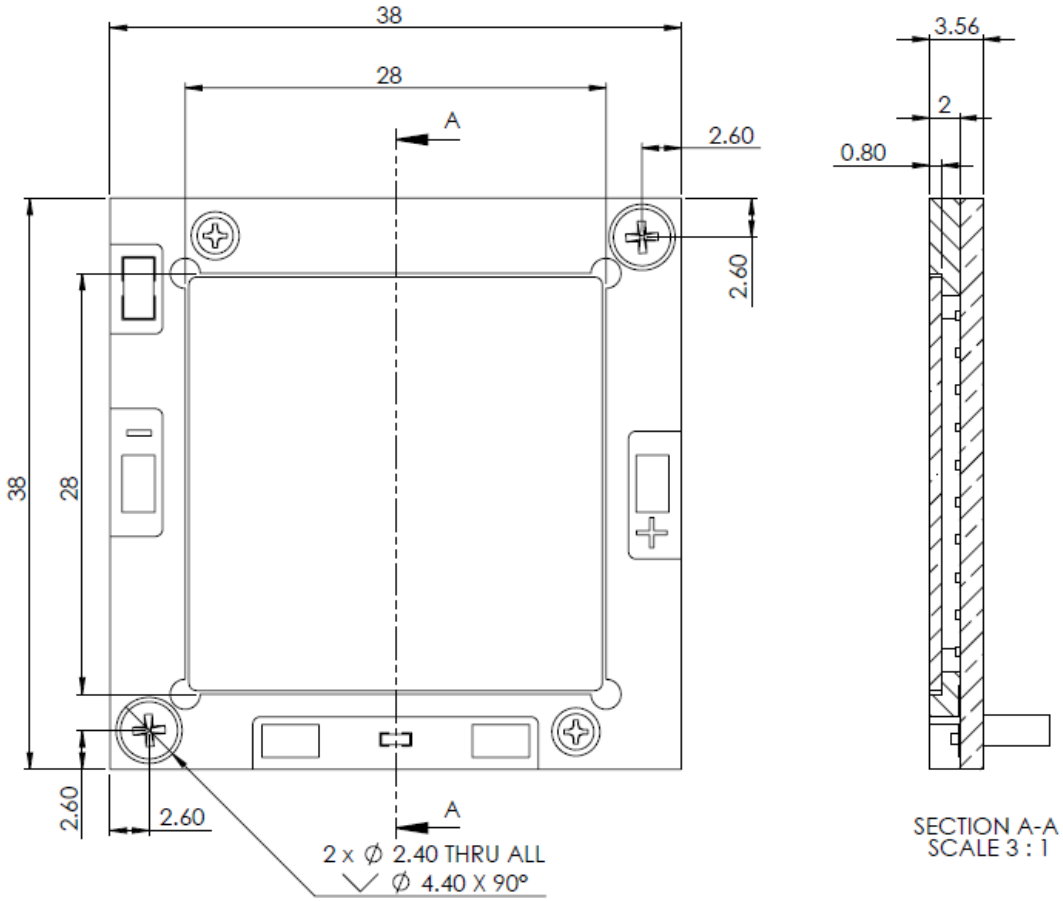


Characteristics Graph

Fig 5. Typical Spatial Distribution, I_F=200mA



Mechanical Dimensions



Notes :

[1] All dimensions are in millimeters
[2] Not to scale
[3] For reference only

Part List

Part	Quantity	Description
DY9560 LED	100	310nm
Zener Diode	1	100V
NTC	1	10kOhm
Window	1	Quartz
Window Frame	1	Aluminum
MCPCB	1	Copper
WIRE	4	22Ga Red,Black,2x Green
M2 Flat Head Screw	2	Assembly Mounting
M1.6 Pan Head Screw	2	Window Frame Mounting

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

- Electrostatic discharge (ESD) is the defined as the release of static electricity when two objects come into contact. While most ESD events are considered harmless, it can be an expensive problem in many industrial environments during production and storage. The damage from ESD to an LEDs may cause the product to demonstrate unusual characteristics such as:

  - Increase in reverse leakage current lowered turn-on voltage

  - Abnormal emissions from the LED at low current

- The following recommendations are suggested to help minimize the potential for an ESD event.
- One or more recommended work area suggestions:

  - Ionizing fan setup

  - ESD table/shelf mat made of conductive materials

  - ESD safe storage containers

- One or more personnel suggestion options:

  - Antistatic wrist-strap

  - Antistatic material shoes

  - Antistatic clothes

- Environmental controls:

  - Humidity control (ESD gets worse in a dry environment)

Precaution for Use

C. Operating Conditions

- In order to ensure the correct functioning of these LEDs, compliance to the maximum electrical specifications is paramount. These LEDs are particularly 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.
- 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.
- EOS (Electrical Over Stress) – EOS is defined as damage that may occur when an electronic device is subjected to a current or voltage that is beyond the maximum specification limits of the device. The effects from an EOS event can be noticed through product performance like:
    - Changes to the performance of the LED package (If the damage is around the bond pad area and since the package is completely encapsulated the package may turn on but flicker or show severe performance degradation.)
    - Changes to the light output of the luminaire from component failure
    - Components on the board not operating at determined drive power
    - Failure of performance from an entire fixture due to changes in circuit voltage and current across total circuit causing trickle down failures.
- It is impossible to predict the failure mode of every LED exposed to electrical overstress as the failure modes vary significantly, but there are some common signs that will indicate an EOS event has occurred:
    - Damaged may be noticed to the bond wires (appearing similar to a blown fuse)
    - Damage to the bond pads located on the emission surface of the LED package (shadowing can be noticed around the bond pads while viewing through a microscope)
    - Anomalies noticed in the encapsulation and phosphor around the bond wires.This damage usually appears due to the thermal stress produced during the EOS event.

Precaution for Use

C. Operating Conditions - Continued

- To help minimize the damage from an EOS event Seoul Viosys recommends utilizing:
    - A surge protection circuit
    - An appropriately rated over voltage protection device
    - A current limiting device

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 5ºC and 30ºC 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±5ºC.
- The conditions of resealing should be as follows: Temperature between 5 and 40ºC 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.
- Do not apply mechanical force or excess vibration during the cooling process to normal temperature after soldering.

F. Cleaning

- In the event that the surface of the LED requires cleaning, a compressed gas duster or an air gun with 20 psi at nozzle at a distance of 6” away will be sufficient to remove the dust and debris

Company Information

Published by

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Seoul Viosys (www.seoulviosys.com) manufactures light emitting diodes (LEDs) with a full range of UV wavelengths from UVC to UVA (under 400nm) for Industrial Curing, Air/Water Purification, Disinfection and Home appliance.

The company is one of the world leading UV LED supplier, holding more than 4,000 patents globally, while offering various kinds of LED technologies and application-solutions in High power UV LED, UV sensor, UV LED Lamp and variety of UV LED sourced Applications.

The company's broad product portfolio includes hybrid modules for unique applications such as UV disinfection, deodorization, UV purification as well as customized modules for your Application.

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