Ultraviolet Light Emitting Diodes (UV LED)

The new generation of UV sources - high performance, reliable and affordable

Web: www.boselec.com  Tel: +1.617.566.3821
Email: uvled@boselec.com  Fax: +1.617.731.0935
91 Boylston St. Brookline, MA 02445 USA
Ultraviolet Light Emitting Diodes (UV-LED)

Nikkiso’s advantaged UV-LED products – all with high performance and reliability at an affordable cost. Along with our sglux UV sensors and probes, Boston Electronics offers the UV industry the best of breed UV detection and light sources.

Applications of UV-LED

New applications are transforming the UV-LED market, and Nikkiso Deep UV-LED devices are applicable to many important applications including:

- **Biomedicine** – Fighting infectious disease with UV-LED light offers great promise to the future of global health.

- **Purification** – With the ability to purify the air and water, plus decontaminate surfaces, UV-LED contributes to a cleaner world for us to live in.

- **Curing** – Nikkiso’s UV-LEDs are great for curing and hardening in industrial applications such as printing and manufacturing.

- **Instrumentation** – Using UV-LEDs in the laboratory paves the way for new drug discoveries, improved DNA assessment and advanced measurement.

UV-LED Products

Developed by optoelectronics pioneers Professors Akasaki and Amano, recipients of the 2014 Nobel Prize in physics, Nikkiso’s unique UV-LED technology offers:

- Industry leading performance
- Unsurpassed reliability
- Unique chip designs for high-volume, cost-effective manufacturing. Nikkiso utilizes proprietary semiconductor chip innovation customized for the deep ultra-violet regime. Leveraging industry-proven fabrication tools and large-scale sapphire substrates, these high-performance chips were specifically designed to be manufactured in high volume and at lower costs.

An ideal replacement for mercury lamps, Nikkiso UV-LEDs are earth friendly and can be custom designed for a myriad of applications.

TO46 Package

Designed for instrumentation, these reliable UV-LED packages provide significant power levels and are laboratory work horses. Devices are available from 265 to 340 nm peak wavelength.

Micro SMD Devices

These all-purpose miniature surface mount devices are small – just 3.5 mm square – but packed with power, offering 30 mW resulting in superior precision, reliability and efficiency. Devices are available from 265 to 340 nm peak wavelength.

Multi-chip Modules

These high-intensity SMD modules can be custom designed for an array of configurations and applications.
Specifications for Package Products

- **TO-46 can**
  - 1 JPY coin (20 mm dia.)

- **3.5 x 3.5 mm SMD**

### Standard TO-46 Package

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>265 nm</th>
<th>285 nm</th>
<th>300 nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward Current</td>
<td>$I_F$</td>
<td>mA</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>Forward Voltage</td>
<td>$V_F$</td>
<td>V</td>
<td>5.0 ~ 7.0</td>
<td>4.5 ~ 6.0</td>
</tr>
<tr>
<td>Emission Intensity</td>
<td>$P_o$</td>
<td>mW</td>
<td>0.4</td>
<td>1.3</td>
</tr>
<tr>
<td>Peak Wavelength</td>
<td>$\lambda_p$</td>
<td>nm</td>
<td>265 ± 5</td>
<td>285 ± 5</td>
</tr>
<tr>
<td>Full Width at Half Maximum</td>
<td>$\Delta \lambda$</td>
<td>nm</td>
<td>&lt; 15</td>
<td>&lt; 15</td>
</tr>
<tr>
<td>Directional Half Power Angle</td>
<td>$2\theta_{1/2}$</td>
<td>deg.</td>
<td>80</td>
<td>80</td>
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</tbody>
</table>

### Standard SMD Package

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>265 nm</th>
<th>285 nm</th>
<th>300 nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward Current</td>
<td>$I_F$</td>
<td>mA</td>
<td>350</td>
<td>350</td>
</tr>
<tr>
<td>Forward Voltage</td>
<td>$V_F$</td>
<td>V</td>
<td>5.0 ~ 8.0</td>
<td>4.5 ~ 7.0</td>
</tr>
<tr>
<td>Emission Intensity</td>
<td>$P_o$</td>
<td>mW</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>Peak Wavelength</td>
<td>$\lambda_p$</td>
<td>nm</td>
<td>265 ± 5</td>
<td>285 ± 5</td>
</tr>
<tr>
<td>Full Width at Half Maximum</td>
<td>$\Delta \lambda$</td>
<td>nm</td>
<td>&lt; 13</td>
<td>&lt; 15</td>
</tr>
<tr>
<td>Directional Half Power Angle</td>
<td>$2\theta_{1/2}$</td>
<td>deg.</td>
<td>130</td>
<td>130</td>
</tr>
</tbody>
</table>

**Additional wavelengths available**

**High quality process: High optical power, long lifetime, low voltage**

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SMD Package DUV-LED

2nd Generation High Power SMD

Key Features
- High Power Output 45 mW
- Standard 3.5 mm x 3.5 mm SMD
- Expected Lifetime >10,000 hours (ongoing)
- Excellent Heat Dissipation with AlN Package 7 °C/W

Applications
- Disinfection, Analytical, Medical, Curing

Key Features
- View the chart for Relative Radiant Intensity [a.u.]
- View the graph for Relative Light Output vs. Drive Current [mA]

Specification

<table>
<thead>
<tr>
<th>Part Number</th>
<th>VPS173</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Output</td>
<td>45 mW</td>
</tr>
<tr>
<td>Driving Current</td>
<td>350 mA</td>
</tr>
<tr>
<td>Forward Voltage</td>
<td>6.0 V</td>
</tr>
<tr>
<td>Viewing Angle</td>
<td>120°</td>
</tr>
</tbody>
</table>

CONTACT INFORMATION

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SMD Package DUV-LED

High Power SMD

Key Features
- High Power Output 30 mW (285 nm, 300 nm)
- Standard 3.5 mm x 3.5 mm SMD
- Expected Lifetime >10,000 hours (L70 / 285 nm, 300 nm)

Applications
- Disinfection, Analytical, Medical

Specification

<table>
<thead>
<tr>
<th></th>
<th>265 nm</th>
<th>280 nm</th>
<th>285 nm</th>
<th>300 nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part Number</td>
<td>VPS131</td>
<td>VPS161</td>
<td>VPS171</td>
<td>VPS1A1</td>
</tr>
<tr>
<td>Po (Typ.)</td>
<td>12 mW</td>
<td>25 mW</td>
<td>30 mW</td>
<td>30 mW</td>
</tr>
<tr>
<td>If (Typ.)</td>
<td>350 mA</td>
<td>350 mA</td>
<td>350 mA</td>
<td>350 mA</td>
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<tr>
<td>Vf (Typ.)</td>
<td>6.3 V</td>
<td>5.6 V</td>
<td>6.0 V</td>
<td>6.0 V</td>
</tr>
<tr>
<td>Viewing Angle</td>
<td>130°</td>
<td>130°</td>
<td>130°</td>
<td>130°</td>
</tr>
</tbody>
</table>

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9. Outline Dimensions, Main Materials and Electric Circuit

<table>
<thead>
<tr>
<th>Items</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Window</td>
<td>Synthetic Quartz</td>
</tr>
<tr>
<td>Package</td>
<td>Ceramics</td>
</tr>
<tr>
<td>Electrodes</td>
<td>Au-plated</td>
</tr>
</tbody>
</table>

NOTE: This product should be operated in forward bias.
SMD mounted on metal core board - convenient mounting and connecting

There are two solder pads for connectors. Can be provide with or without connectors.

Part numbering:
**VPBxxx** - SMD on board, solder pads only
**VPCxxx** - SMD on board with connector (Mac8 HH-1 style)
TO-46 Package UV-LED

Standard TO-46 Package

Key Features
- 80° Medium viewing angle with flat window
- Standard TO-46 package
- Expected Life time >10,000 hours (L70)

Applications
- Analytical

Specification

<table>
<thead>
<tr>
<th></th>
<th>265 nm</th>
<th>280 nm</th>
<th>285 nm</th>
<th>300 nm</th>
<th>340 nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part Number</td>
<td>VPT632</td>
<td>VPT662</td>
<td>VPT672</td>
<td>VPT6A2</td>
<td>VPT6J2</td>
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<tr>
<td>Po (Typ.)</td>
<td>0.4 mW</td>
<td>1.6 mW</td>
<td>1.6 mW</td>
<td>1.5 mW</td>
<td>1.6 mW</td>
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<tr>
<td>If (Typ.)</td>
<td>15 mA</td>
<td>20 mA</td>
<td>20 mA</td>
<td>20 mA</td>
<td>20 mA</td>
</tr>
<tr>
<td>Vf (Typ.)</td>
<td>5.7 V</td>
<td>5.0 V</td>
<td>5.1 V</td>
<td>5.6 V</td>
<td>3.9 V</td>
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<tr>
<td>Viewing Angle</td>
<td>80°</td>
<td>80°</td>
<td>80°</td>
<td>80°</td>
<td>80°</td>
</tr>
</tbody>
</table>

Specifications subject to change

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91 Boylston St. Brookline, MA 02445 USA
8. Outline Drawing and Main Materials

<table>
<thead>
<tr>
<th>No.</th>
<th>Part Name</th>
<th>Material</th>
<th>Q'TY</th>
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<tbody>
<tr>
<td>1</td>
<td>Flat Window</td>
<td>Quartz</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Cap</td>
<td>Kovar</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Header</td>
<td>SPC</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Lead</td>
<td>A: Fe-Ni</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C: Kovar</td>
<td></td>
</tr>
</tbody>
</table>
TO-46 with Lens DUV-LED

Narrow Beam with Quartz Lens

■ Key Features
  - 7° Narrow viewing angle with quartz lens
  - Standard TO-46 package
  - Expected Life time >10,000 hours (L70)

■ Applications
  - Analytical

■ Specification

<table>
<thead>
<tr>
<th>Part Number</th>
<th>265 nm</th>
<th>280 nm</th>
<th>285 nm</th>
<th>300 nm</th>
<th>340 nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Po (Typ.)</td>
<td>0.6 mW</td>
<td>1.6 mW</td>
<td>1.9 mW</td>
<td>2.0 mW</td>
<td>2.3 mW</td>
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<tr>
<td>If (Typ.)</td>
<td>15 mA</td>
<td>20 mA</td>
<td>20 mA</td>
<td>20 mA</td>
<td>20 mA</td>
</tr>
<tr>
<td>Vf (Typ.)</td>
<td>5.7 V</td>
<td>5.0 V</td>
<td>5.1 V</td>
<td>5.6 V</td>
<td>3.9 V</td>
</tr>
<tr>
<td>Viewing Angle</td>
<td>7°</td>
<td>7°</td>
<td>7°</td>
<td>7°</td>
<td>7°</td>
</tr>
</tbody>
</table>

Specifications subject to change

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<table>
<thead>
<tr>
<th>No.</th>
<th>Part Name</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Lenz</td>
<td>UV glass</td>
</tr>
<tr>
<td>②</td>
<td>Cap</td>
<td>Kovar</td>
</tr>
<tr>
<td>③</td>
<td>Header</td>
<td>SPC</td>
</tr>
<tr>
<td>④</td>
<td>Lead</td>
<td>A:Fe·Ni K:Kovar Au plated</td>
</tr>
</tbody>
</table>

- Electrostatic Discharge Protection Device: Built-in
- RoHS Compliant
## 3x3 SQUARE ARRAY [VM0303]

### SPECIFICATIONS
- Light source size: 16.5 mm x 12.5 mm
- Number of LEDs: 9 pcs (3x3)
- Driving voltage: 54 V
- Driving current: 350 mA
- Cooling system: FAN (Option)

### IRRADIANCE
- Center illuminance: 45 mW/cm²

## 8x8 SQUARE ARRAY [VM0808]

### SPECIFICATIONS
- Light source size: 35 mm x 35 mm
- Number of LEDs: 64 pcs (8x8)
- Driving voltage: 48 V
- Driving current: 2.8 A
- Cooling system: None

### IRRADIANCE
- Center illuminance: 80 mW/cm²

## HIGH IRRADIATION MODULE [VM1818]

### SPECIFICATIONS
- Light source size: 80 mm x 80 mm
- Number of LEDs: 324 pcs (18x18)
- Driving voltage: 36 V
- Driving current: 10 A
- Cooling system: Water Cooling

### IRRADIANCE
- Center illuminance: 80 mW/cm²
■ AREA-CHANGEABLE MODULE

■ MODEL: VM0815
■ SPECIFICATIONS (SINGLE UNIT)
  - Light source size: 72 mm x 36 mm
  - Number of LEDs: 120 pcs (15x8)
  - Driving voltage: 48 V
  - Driving current: 5 A
  - Cooling system: Water cooling

■ IRRDIANCE
  - Center illuminance: 80 mW/cm²
  - Condition: WD = 5 mm, If = 200 mA, λp = 285 nm

※ 8 units are connected
### SMALL SIZE TYPE

<table>
<thead>
<tr>
<th>PRODUCTS</th>
<th>IRRADIATION AREA</th>
<th>CENTER LUMINANCE</th>
<th>VOLTAGE</th>
<th>CURRENT</th>
<th>COOLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>3x3 SQUARE ARRAY</td>
<td>Φ20 mm (WD=10 mm)</td>
<td>45 mW/cm²</td>
<td>18 V</td>
<td>1.15 A</td>
<td>FAN (Option)</td>
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<tr>
<td>8x8 SQUARE ARRAY</td>
<td>Φ25 mm (WD=10 mm)</td>
<td>80 mW/cm²</td>
<td>48 V</td>
<td>1.6 A</td>
<td>N/A</td>
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<tr>
<td>18x18 SQUARE ARRAY</td>
<td>50x50 mm (WD=10 mm)</td>
<td>80 mW/cm²</td>
<td>36 V</td>
<td>10 A</td>
<td>NA</td>
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### SIZE-CHANGEABLE TYPE

<table>
<thead>
<tr>
<th>PRODUCTS</th>
<th>IRRADIATION AREA</th>
<th>CENTER LUMINANCE</th>
<th>VOLTAGE</th>
<th>CURRENT</th>
<th>COOLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINE SHAPE 2x22 LINE ARRAY</td>
<td>75x10 mm (WD=10 mm)</td>
<td>60 mW/cm²</td>
<td>132 V</td>
<td>700 mA</td>
<td>WATER</td>
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<tr>
<td>AREA CHANGEABLE 8x15 RECTANGLE ARRAY</td>
<td>50x25 mm (WD=10 mm)</td>
<td>80 mW/cm²</td>
<td>48 V</td>
<td>5 A</td>
<td>WATER</td>
</tr>
</tbody>
</table>

※ The specifications described in this catalog are subject to change without prior notice.
LINE SHAPE MODULE [VM0222]

SPECIFICATIONS (SINGLE UNIT)
- Light source size: 100 mm x 8 mm
- Number of LEDs: 44 pcs (22x2)
- Driving voltage: 132 V
- Driving current: 700 mA
- Cooling system: Water cooling

IRRDIANCE
- Center illuminance: 60 mW/cm²

※ 4 units are connected

LENGTH AND WIDTH — CHANGEABLE

8mm

Single unit

8mm

16mm

Ph: (617)-566-3821  www.boselec.com  boselec@boselec.com
Features

- Easy to use
- Low cost
- Simple, flexible control using dedicated software
- Adjustable voltage driving the source
- CW or pulsed operation—MHz to DC
- Nanosecond to seconds repetition rate
- Current and voltage monitor
- powered from USB (<0.5A) or DC supply

UPS Driver™
Universal Photon Source (UPS) Driver Board

The Boston Electronics Universal Photon Source (UPS) Driver delivers! It is a flexible, compact, low cost, configurable board, including power supply, that drives a wide range of light sources. The driver can control pulsed and CW sources, which makes it suitable for driving ultraviolet (UV), visible and infrared (IR) sources, light emitting diodes (LEDs) and lasers over a frequency range of MHz to DC.

Control is provided by easy to use PC software. The last used drive parameters are stored in the non-volatile EEPROM memory; thus, the configuration is remembered. The UPS Driver is equipped with voltage and current monitors, trigger output, power and communication inputs and anode/cathode connections for the sources.

The UPS Driver is compatible with UV, visible and IR sources, LEDs and lasers.
## UPS Driver Specifications

**Electrical parameters:**
- Power supply: - USB from computer or +5 ... +6 V, connected to the DC Jack connector
- Average power sources
  - max. 1.5W, for the power supply from USB
  - max. 10W, for the power supply connected to the DC Jack connector
- Adjustable voltage supply, in the range 0.5 – 25V, 4095 steps
- Maximum current: 10 A (tested with QCL at 20 V and 100 ns pulse width)
- Monitor for the supply voltage source (ADC)
- Master clock period / frequency:
  - **main clock period / frequency** | **output signal max. period / min. frequency**
    | 25 ns / 40 MHz | 1.638 ms / 610 Hz |
    | 50 ns / 20 MHz | 3.27 ms / 305 Hz  |
    | 100 ns / 10 MHz| 6.55 ms / 152 Hz  |
    | 200 ns / 5 MHz | 13.1 ms / 76.3 Hz |
    | 1600 ns / 0.625 MHz | 104 ms / 9.54 Hz |
    | 6.4 μs / 156.25 kHz | 420 ms / 2.38 Hz |
    | 25.6 μs / 39,0625 kHz | 1.677 ms / 0.594 Hz |
- Pulse repetition period - adjustable in the range 1 ... 65535 times the period of the master clock
- Pulse duration - adjustable in the range 1 ... 65535 times the period of the master clock
  - if pulse duration is higher than the period, source stays on – CW operation
- Driving signal rise / fall times < 3 ns.
- Pulse jitter: 6 ns pp
- Trigger output starts 50 ns before the IR pulse
  - adjustable duration time in the range 1 ... 65535 times the period of the master clock
- Power supply monitor
- Source average current monitor - time constant 100 ms
- All parameters have their equivalent – minimum/maximum to provide for safe operation
- Anode of the source is connected to ground, cathode below ground potential

**Software**
- The UPS Driver is configured using PC software, or text protocols.

**Connections:**
- trigger output—SMA connector
  - output impedance 50 Ω
  - standard LVTTL: logic 0 - 0 V, logic 1 – 3.3 V @ Hi-imp, 1.65 V @ 50 Ω
- output current monitor—SMA connector
  - DC offset ~ 100 mV @ 50 Ω
  - current sensitivity 0.1 V/A @ 50 Ω / can be modified
  - 100 MHz BW
- output voltage monitor—SMA connector
  - DC offset ~ 100 mV @ 50 Ω
  - voltage sensitivity 50mV/V @ 50 Ω / can be modified
  - 100 MHz bandwidth
- micro-USB connector
  - communication with PC, virtual COM port
  - power supply, if current consumption of the driver does not exceed 0.5 A (USB 2.0 standard)
- DC power jack 2.5/5.5
  - power supply, if driver requires more than 0.5A (USB 2.0 standard), or if the PC is not used (configuration is restored from the memory)

**Size:**
- PCB dimensions 60x50x15mm (width×height×depth), including connectors