LumiBright™ 3300B
UV-LED Illuminators for DLP® Technology

LumiBright 3300B UV-LED Illuminators are an extremely high power, highly uniform UV-LED solution providing unprecedented speed and resolution for UV DLP applications such as 3D printing, computer-to-screen and computer-to-plate printing and maskless lithography. The patented UV-LED Illuminators comprise a densely packed UV-LED array coupled to a high efficiency non-imaging collection optic integrated with a telecentric imaging optic optimized to the DLP chipset.

Two models have been developed for DLP chipsets. The 20 Watt illuminator is designed for the DLP7000 chipset and the 30 Watt illuminator design supports the DLP9500 chipset. Water-cooling allows the UV-LED array to be operated at a very high current density. Available wavelengths for the UV-LED array include 365, 385, 395 and 405 nm in single or multi-wavelength configurations.

Benefits:
- Models for DLP9500 and DLP7000 chipsets
- High radiant power
  - > 30 Watts on DLP9500
  - > 20 Watts on DLP7000
- Long-life

UltraViolet:
- \( \lambda_p \) 365 nm thru 405

Features:
- UV-LED Array (COB)
- Non-imaging and imaging optics
- Thermistor temperature monitor
- Photosensor
- High thermal conductivity metal core PCB
- Water heat exchanger
- Quick disconnect no-spill couplings
- Driver/Controller
- Cables

Options:
- Single or multi-wavelength configurations
- Inline or right-angle hose connections

Typical Applications:
- Computer-to-screen printing
- Computer-to-plate printing
- Maskless lithography
- 3-D printing
- Tissue engineering
- Digital phototherapy
- Corneal collagen cross-linking

Table of Contents
- Product Specifications.................................2
- Water Heat Exchanger Chart..........................2
- Charts.........................................................3,4
- Configuration.............................................5
- Notes..........................................................6
- Installation Control Drawings/Notes...........7,8
## Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>DLP acceptance half angle</td>
<td>12°</td>
<td>Matches DLP ± 12° micromirror tilt angle</td>
</tr>
<tr>
<td>DLP illumination overfill</td>
<td>≥ 10%</td>
<td>Both height and width of DLP active array</td>
</tr>
<tr>
<td>Illumination non-uniformity</td>
<td>≤ 10%</td>
<td>Peak-to-peak (P-P)</td>
</tr>
<tr>
<td>Drive current per channel/LED</td>
<td>Min 0.30 Amps Max 3.0 Amps</td>
<td>Continuous operation</td>
</tr>
<tr>
<td>Forward voltage</td>
<td>&lt; 5V</td>
<td>Requires constant current operation</td>
</tr>
<tr>
<td>Total drive power</td>
<td>300 Watts</td>
<td>Typical maximum</td>
</tr>
<tr>
<td>Electrical connectors</td>
<td>2 rows, 10 pin (2) for LED board drive and control</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 row, 4 pin (1) for photosensor</td>
<td></td>
</tr>
<tr>
<td>Mounting flange</td>
<td>(4) through holes on 68mm diameter 10mm depth for M4 bolts</td>
<td></td>
</tr>
<tr>
<td>Cooler fittings</td>
<td>Quick disconnect no-spill couplings Right angle or Inline</td>
<td></td>
</tr>
<tr>
<td>Water supply</td>
<td>Use inline filter on inlet Must be 20 μm rating</td>
<td></td>
</tr>
<tr>
<td>Thermistor B&lt;sub&gt;25/85&lt;/sub&gt;</td>
<td>3574 to 3646</td>
<td>For 10 kΩ</td>
</tr>
<tr>
<td>Thermistor impedance</td>
<td>10 kΩ</td>
<td>At 25°C</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>15°C to 35°C</td>
<td>5% to 85% RH, non-condensing</td>
</tr>
<tr>
<td>Lifetime (hours)</td>
<td>&gt; 3k hours</td>
<td>To 70% of initial radiant flux</td>
</tr>
</tbody>
</table>

## Water Heat Exchanger Performance Chart

### Notes on Liquid Cooling

The cold plate of the water heat exchanger on the Model 3300B contains microchannels as small as 0.1 mm in size. The inlet water supply must use an inline filter with a 30 micron rating to avoid creating obstructions within the microchannels. The minimum flow rate must be 1.5 liters/min. An ideal water flow rate is 3 liters/min. A recirculating chiller with an inlet water temperature maintained at or below 25°C is recommended.

![Water Heat Exchanger Performance](image)

**Figure 1**

**3300B UV DLP Illuminators for DLP9500**

**Water Heat Exchanger Performance**

- **LED PC Board Temp (°C)**
- **Water Outlet-Inlet Pressure Drop (PSI)**

**Water Inlet Temp:** 20°C  
**Heat Load:** 181 Watts  
**Total Drive Current:** 54 Amps  
**Minimum Flow Rate:** 1.5 l/min
3300B UV DLP Illuminators for DLP9500
Single Wavelength Configurations

- 365 nm
- 385 nm
- 405 nm

Figure 2

3300B UV DLP Illuminators for DLP7000
Single Wavelength Configurations

- 365 nm
- 385 nm
- 405 nm

Figure 3

3300B UV DLP Illuminators for DLP9500
Dual Wavelength Configuration

- 365 nm Active
- 385 nm Active
- Both Active

Figure 4

UV Die Bins: Spectral Power Distribution (at equal current density)

- 365 nm: Integrated Power = 71.9 %
- 385 nm: Integrated Power = 100 %
- 395 nm: Integrated Power = 99.0 %
- 405 nm: Integrated Power = 87.2 %

Figure 5

Dual Wavelength Configuration: Spectral Power Distribution
365 nm and 405 nm

Figure 6

Triple Wavelength Configuration: Spectral Power Distribution
365 nm, 385 nm and 405 nm

Figure 7
Figure 8

Image Dimensions at Plane of DLP9500 (normal incidence in air)
3300B UV DLP Illuminator

Figure 9

Detector Image: Incoherent Irradiance

12/6/2016
Detector S5, NSCG Surface 1: DMD Plane
Size 22.000 W X 18.000 H Millimeters, Pixels 400 W X 200 H, Total Hits = 36291591
Peak Irradiance : 9.25mW*00 Watts/cm^2
Total Power : 2.5269E+01 Watts
**LUMIBRIGHT UV 3300B CONFIGURATIONS**

**BASELINE CONFIGURATIONS:**

<table>
<thead>
<tr>
<th>Model Number</th>
<th>DLP Chipset</th>
<th>LED Array Die Count</th>
<th>Cooler Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>3300B-620</td>
<td>DLP9500</td>
<td>18</td>
<td>Right Angle</td>
</tr>
<tr>
<td>3300B-621</td>
<td>DLP9500</td>
<td>18</td>
<td>Inline</td>
</tr>
<tr>
<td>3300B-650</td>
<td>DLP7000</td>
<td>12</td>
<td>Right Angle</td>
</tr>
<tr>
<td>3300B-651</td>
<td>DLP7000</td>
<td>12</td>
<td>Inline</td>
</tr>
</tbody>
</table>

**DRIVER/CONTROLLER**

**Multi-Channel:**

The IOI Model 5500A is a multi-channel OEM Driver/Controller with Ethernet and USB. The driver provides independent current control to each of the LED die to achieve optimal performance and lifetime.

Up to 18-die in the UV-LED array can be driven and modulated independently for precise exposure control in direct imaging systems. A command set is provided for user programming.

The 5500A has been specially designed to ensure maximum output and lifetime from Innovations in Optics’ LumiBright 3300B UV-LED Illuminators by ensuring uniform current density through the entire LED array.

**OPTIONS:** (Please contact IOI to specify a final configuration and for pricing)

**Wavelengths:**

Four different center wavelengths are available with nominal spectral power distributions as plotted in Figure 5. The center wavelengths are within 5 nm of the following: 365 nm, 385 nm, 395 nm, 405 nm. Single or multiple wavelength configurations can be arranged.

**Hose Connections:**

The standard configuration uses hose connections aligned at a right-angle to the illuminator body as shown in the Interface Control Drawings. An optional configuration features hose connections that are in line with the illuminator body.

*Failure to use the 5500A Driver/Controller or an inline water filter would void our warranty.*
KINEMATIC MOUNTING FLANGE DESIGN

All 3300B illuminators provide a kinematic type interface for accurate positional and angular registration to the DLP chipset. The mounting flange features a flat surface, a hole and a slot. The flange must mate to a flat surface on the DLP chipset housing which also must include two pins for the hole and slot. This ensures that the illuminator and housing always mate correctly. The pin-to-hole locks position and the pin-to-slot locks rotation.

In addition, when using the mounting flange, illumination overfill of the DLP active area designed into the telecentric optics relaxes positional and transverse tolerances along the optical axis.

TIR PRISMS

Adding a TIR prism to the telecentric illumination enables a compact, on-axis design that minimizes field size and ensures a high degree of uniformity across the entire field. In addition, a TIR prism separates the illumination and projection axes so that the telecentric condition also produces uniform distribution of angles of incidence across the antireflection (AR) coated surfaces of the DLP chipset window to avoid spatial non-uniformities in projected brightness due to coating-performance variation with angle of incidence.

A TIR prism behaves optically as a thick, flat glass plate that elongates the optical path length (OPL) to the illumination plane. The ICD drawings specify the optical path length for a fused silica TIR prism with a refractive index of 1.46 and an OPL of 44.8 mm.

DLP® and the DLP logo are registered trademarks of Texas Instruments.
NOTES:
1. CONTENT FOR REFERENCE ONLY AND SUBJECT TO CHANGE
2. FUSED SILICA TIR PRISM WITH EQUIVALENT 44.8 THICKNESS
3. INCLUDES EFFECT OF DMD WINDOW

INSTALLATION CONTROL DRAWING

REVISIONS

REV ECO NO DESCRIPTION DATE ENG
2 E-00010 REDESIGNED & REDRAWN 6/21/2016 BG
3 E-00034 A) ADDED MISSING DIMENSIONS 12/1/2016 SFS
4 E-00050 A) PICTORIAL UPDATE
B) DELETE J1 & J2 CONN DETAIL 1/20/2017 BG
5 E-00077 A) 272 MAX WAS 281 MAX
B) PICTORIAL UPDATE 5/13/2017 BG

DATE
9/6/2015
9/6/2015
9/6/2015
9/6/2015
9/6/2015

TITLE
ILLUMINATOR ASSY, TYPE 6

SIZE
3300B-651-ICD

C
SHEET 1 of 1

REVDWG. NO.

FINISH:

MATERIAL:

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS
TOLERANCES:
1 PLACE DECIMAL: 0.2
2 PLACE DECIMALS: 0.10
3 PLACE DECIMALS: 0.050
ANGLE:
1

THIS DRAWING AND SPECIFICATIONS HEREIN ARE THE PROPERTY OF INNOVATIONS IN OPTICS, INC. AND SHALL NOT BE REPRODUCED NOR COPIED NOR USED IN WHOLE OR IN PART AS THE BASIS FOR THE MANUFACTURE OR SALE OF ITEMS WITHOUT THE EXPRESS WRITTEN PERMISSION OF INNOVATIONS IN OPTICS, INC.

TEL: (781) 933-4477       FAX: (781) 933-0007
82 Cummings Park
Woburn, MA 01801
Innovations in Optics, Inc.

SCALE:      1:1

ILLUMINATOR ASSY, TYPE 6

Plot Date: Thursday, May 18, 2017  Last Saved Thursday, May 18, 2017 2:10:44 PM by: 7510-1

Plot Date: Friday, January 20, 2017  Last Saved Friday, January 20, 2017 7:11:05 PM by: 7510-1