

# GRACY UV-C LED Panel for integration - Customization

LED iBond – GRACY panel with UV-C light emitting diodes for integration into equipment

LED iBond's patent protected GRACY UV-C LED panel are based on a Aluminium Composite Plate and can be cut into any customized size and fitted with high-power UV-C light emitting diodes position in any disired configuration for specific applications requiring UV-C exposure.

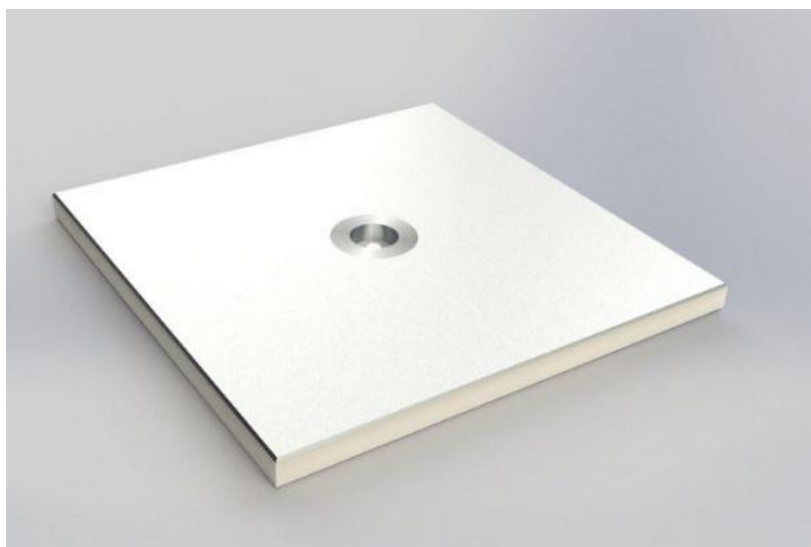


Figure: ACP panel with 1 light emitting diode in center

- Aluminium Composite Plate
- Size max. 1000x1000 mm
- Size min. 40x40 mm
- Any customized LED Configuration in 2D
- Typical 6V drive voltage

Typical applications areas:	Key features:
<ul style="list-style-type: none"> <li>• Air Purification</li> <li>• Water Purification</li> <li>• Surface Disinfection</li> <li>• Medical Device Disinfection</li> <li>• Appliance Disinfection</li> <li>• Food &amp; Beverage</li> </ul>	<ul style="list-style-type: none"> <li>• Slim construction (6 mm thickness)</li> <li>• Mercury free</li> <li>• Special option for exchangeable bulbs</li> <li>• Long service life</li> <li>• Lower TCO compared to LP bulbs</li> </ul>

**Customized size and shape of ACP panel and number of LEDs – Application specific**

The aluminum composite can be cut in any customize size and shape to fit into any customer specific application and equipment. The typical maximum size is up to 1000 x 1000 mm. Minimum size is 40 x 40 mm.

The desired number of LEDs can be arranged in any 2D configuration for desired irradiance of object to be disinfected.

Thermal management must be considered and is essential if a higher number of LEDs are to be placed closed to each other. Higher junction temperature of the LEDs will reduce the lifetime.

**Example 1 – Linear ACP panel with 6 LEDs**  
 (patent protected)

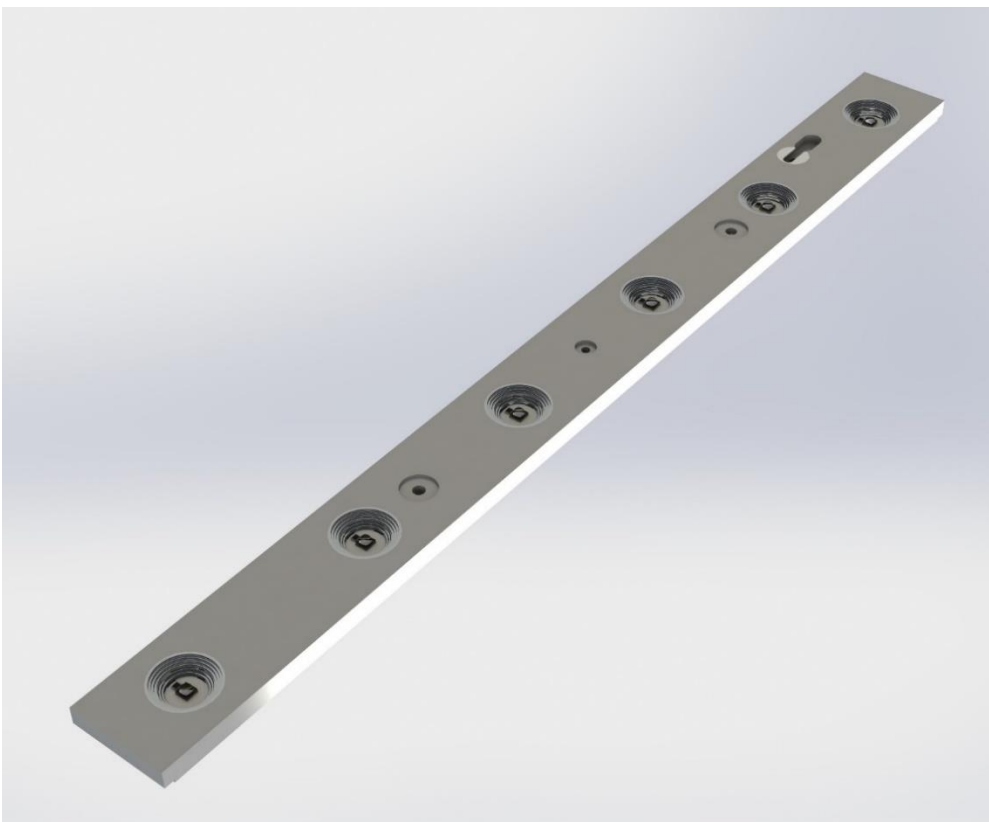
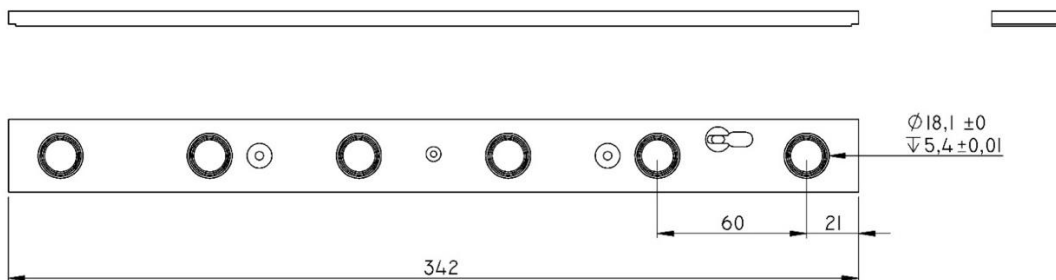
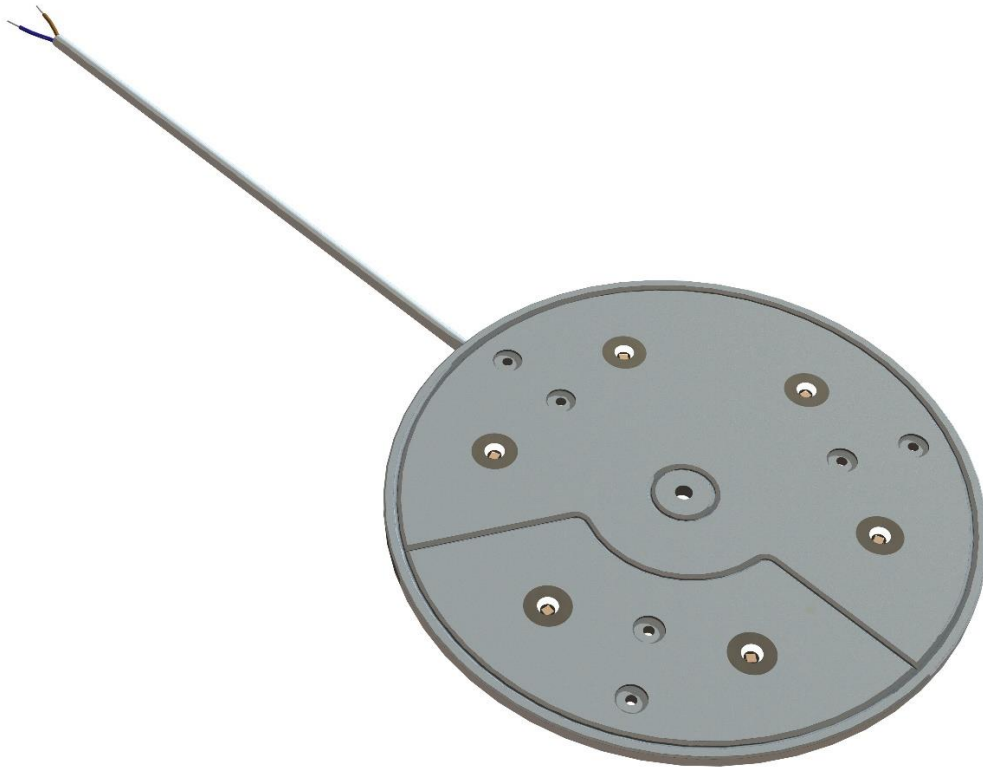


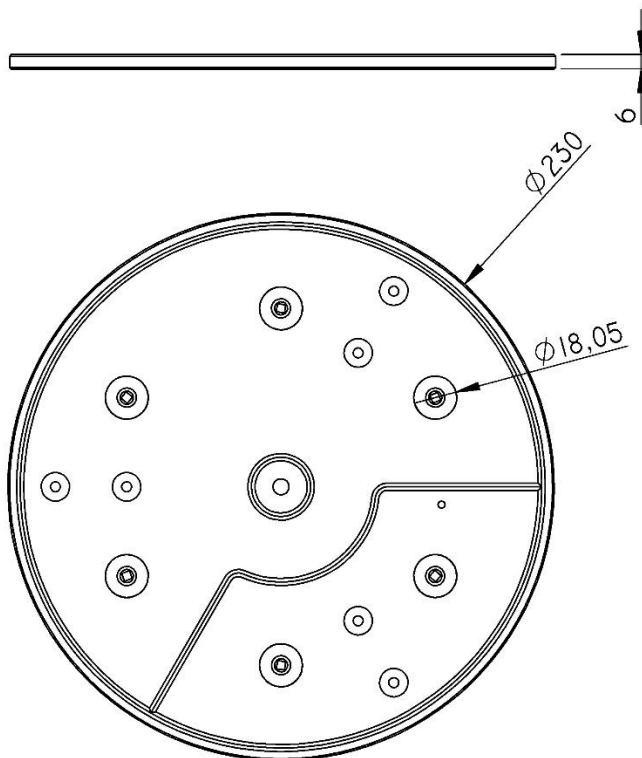
Figure: Final ACP panel with 6 mounted UV-C LEDs



*Example 2 – Circular ACP panel with 7 LEDs*  
(patent protected)



**Figure:** Final circular ACP panel with 7 mounted UV-C LEDs and power cable.



**Specification example – Panel with 1 LED:**

LEDs are tested at a drive current of 350 mA, 20 ms single pulse at 25 °C (junction) and placed into BINs

Type Flux BIN	Min. Flux (mW) 350 mA, 25 °C	Max. Flux (mW) 350 mA, 25 °C	Min. Flux (mW) 500 mA, 25 °C	Min. Flux (mW) 650 mA, 25 °C	Min. Flux (mW) 800 mA, 25 °C
CE	40	45	56	74	90
(Luminus XST- 3535-UV)					

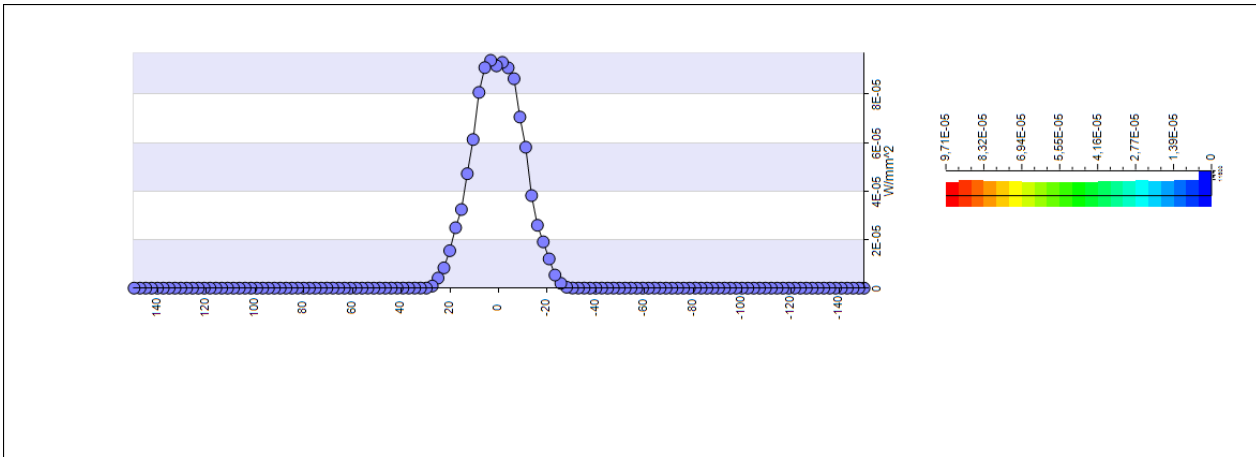
Module with 1 LEDS:	Typical data
Wavelength	270-280 nm
FWHM spectrum	10 nm
UV-C radiation power	32mW (at 500 mA, Tj app 60 °C) 50mW (at 500 mA, Tj app 25 °C)
Radiation angle of each LED	60 degrees (circular)
Number of LEDs pr. module	Any ( Min. 1 pcs)
Power consumption total	3 W (1 pcs)
Electrical drive current	500 mA
Voltage across panel	6V
Panel material	Aluminium + Composite
RoHS and REACH	compliant
Expected Life time	Typical +12.000 hours

Note 1 – Regardless the application specifications attention needs to be on thermal management including ambient and surface temperature. It is essential to remove the dissipated heat (e.g. using cooling fan) to limit temperature of the panel and junction of the light emitting diodes. Each module with 5 LEDs typically generates 15 Watt that must be conducted away.

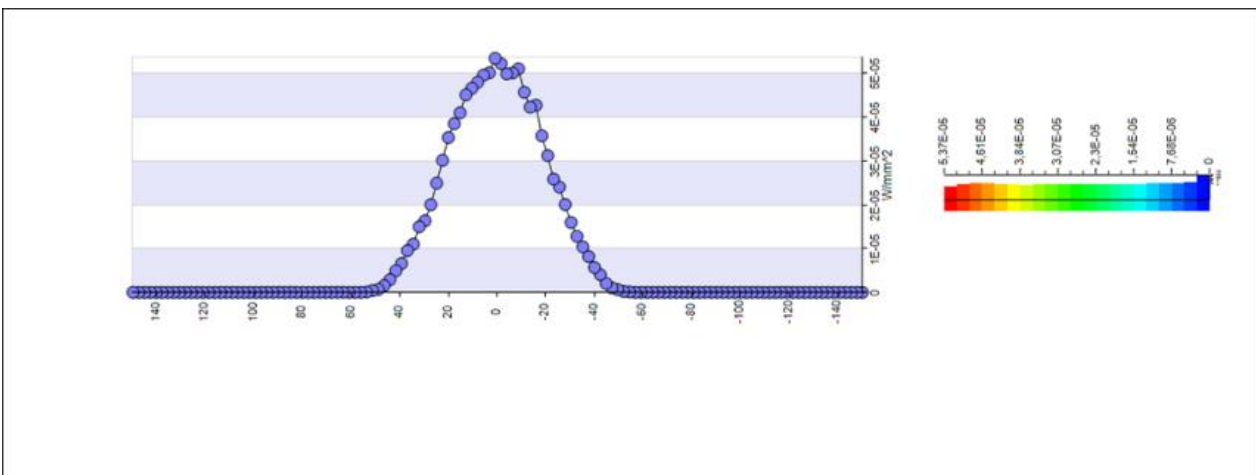
Note 2: Light emitting diode lifetime is a function of drive current. Sustained operation at absolute maximum current of 800 mA will result in a reduction of device lifetime compared to typical forward drive currents (350 mA-500 mA). Actual device lifetimes will also depend on junction temperature.

Note 3: The LEDs can without harming the lifetime be turned on/off indefinitely which can result in a significantly extended service lifetime depending on the actual use pattern.

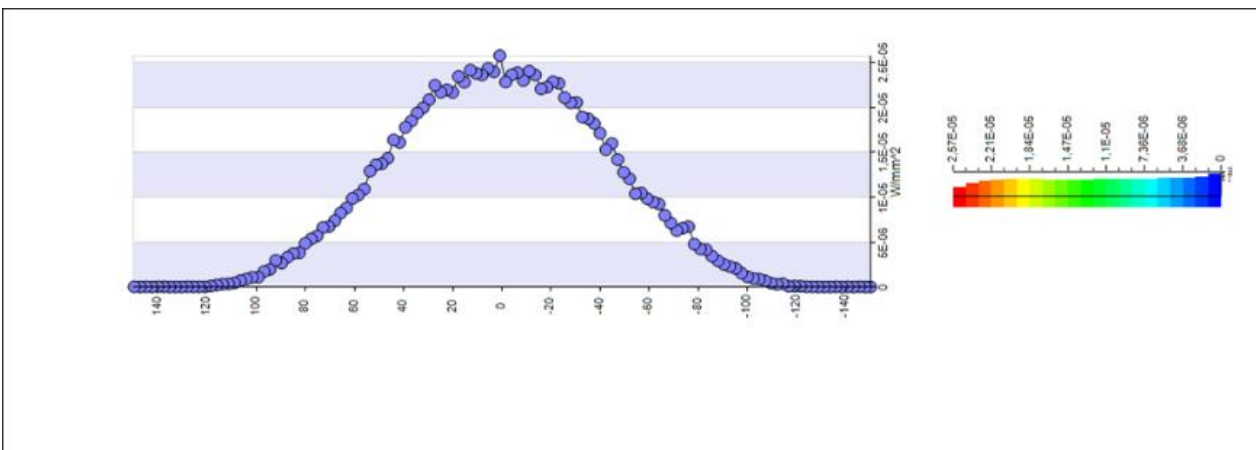
Radiation pattern from panel with 1 LED – 3D simulation (averaged data) 12 mm above panel installation:



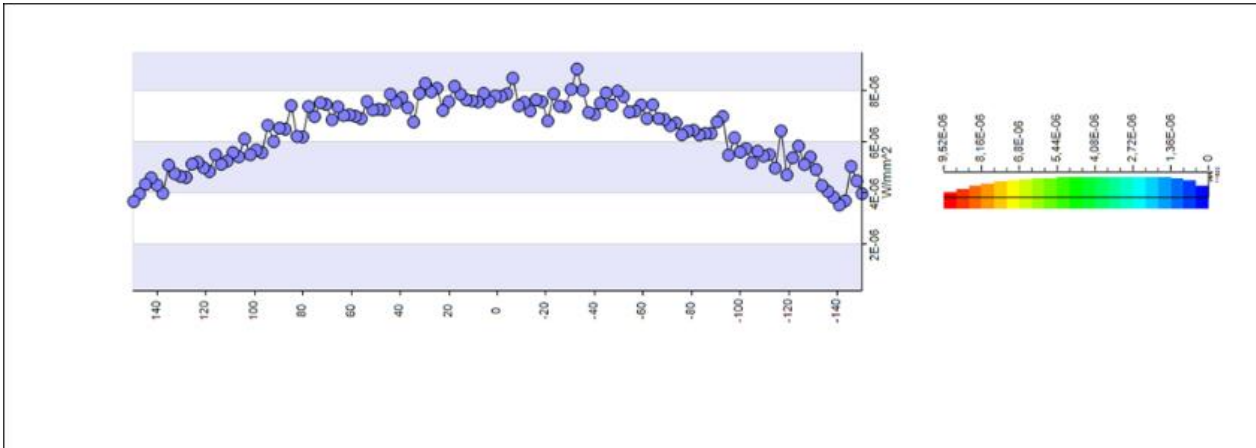
Radiation pattern from panel with 1 LED – 3D simulation (averaged data) 36 mm above panel installation:



Radiation pattern from panel with 1 LED – 3D simulation (averaged data) 100 mm above panel installation:



Radiation pattern from panel with 1 LED – 3D simulation (averaged data) 200 mm above panel installation:



Radiation pattern from panel with 1 LED – 3D simulation (averaged data) 300 mm above panel installation:

