High Power UV-C LED
Product Specifications
6060 SMD Packaged LED

V1.3 June 2019
6060 SMD Packaged LED Identification Convention

**Example:**

S6060-IF250-W270-P110-V6.0

**Interpretation:**

- **SMD6060 type package**: 6.0 x 6.0 mm packaged LED
- **Surface Mount type 6.0 x 6.0 mm packaged LED**
- **Driving current = 250 mA**
- **Peak wavelength = 270 +/- 5 nm**
- **Power output @ 250mA = 110 mW (+/- 10%)**
- **Forward voltage @ 250mA = 6.0V (+/- 0.5V)**

*Product specifications subject to change without notice*
MH design 6060 SMD

1. Cathode (-)
2. Anode (+)

All Units = mm

Electrical scheme of SMD

Drawings not exactly to scale
Specifications subject to change without notice
6060 SMD Packaged LED Diagram

K/L designs 6060 SMD

1. Anode (+)
2. Cathode (-)

All Units = mm

Recommended Solder Pattern on PCB

Bottom view

Electrical scheme of SMD

Specifications subject to change without notice

Drawings not exactly to scale

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SMD LED on Hex MCPCB

All sizes in mm

Product benefits
- Same popular MCPCB format for visible LEDs
- Eliminates reflow soldering
- Plug-n-play with 0.025” wires (AWG 24 or 25)
- Larger contact area for heat extraction
- Nomenclature example:
  Hex-S6060-W270-P150-V6.0

Connectors (x2)
0.025” wires (AWG 22 - 25)

Solder pads (x4)
3x3 mm²

Attach heatsink here
UVC LED: Electro-optical parameters

TABLE 1. Performance @ 250 mA forward current (25°C ambient, packaged)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Unit</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak Wavelength</td>
<td>( \lambda_p )</td>
<td>nm</td>
<td>265</td>
<td>270</td>
<td>277</td>
</tr>
<tr>
<td>Radiant Flux</td>
<td>( \phi_e )</td>
<td>mW</td>
<td>80</td>
<td>100</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>110</td>
<td>120</td>
<td>130</td>
</tr>
<tr>
<td>Forward Voltage</td>
<td>( V_F )</td>
<td>V</td>
<td>6.0</td>
<td>6.5</td>
<td>7.0</td>
</tr>
<tr>
<td>Spectrum Half Width</td>
<td>( \Delta \lambda )</td>
<td>nm</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>View Angle</td>
<td>( 2\theta )</td>
<td>°</td>
<td>150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermal Resistance</td>
<td>( R_{J-b} )</td>
<td>°/W</td>
<td>&lt;10 (TBD)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FIG 1. Forward Current vs. Forward Voltage
Please also check typical value and BIN structure on page 8

FIG 2. Relative Radiant Flux vs. Forward Current

Specifications may subject to change without notice
UVC LED: Electro-optical parameters (continued)

**Fig 3. Peak Wavelength vs. Forward Current**

![Peak Wavelength vs. Forward Current](image)

**Fig 4. Spectrum**

![Spectrum](image)

**Fig 5. Forward Voltage vs Ambient Temperature**

![Forward Voltage vs Ambient Temperature](image)

**Fig 6. Relative Radiant Flux vs Ambient Temperature**

![Relative Radiant Flux vs Ambient Temperature](image)

**Fig 7. Far-field Emission Pattern**

![Far-field Emission Pattern](image)
### UVC LED: Electro-optical parameters (continued)

**TABLE 2. Device lifetime (forward current =250mA, Tj < 55°C)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Unit</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>70% Power Lifetime</td>
<td>L70</td>
<td>hours</td>
<td>850*</td>
<td>1000*</td>
<td>2000*</td>
</tr>
<tr>
<td>50% Power Lifetime</td>
<td>L50</td>
<td>hours</td>
<td>1200*</td>
<td>3000*</td>
<td>5000*</td>
</tr>
</tbody>
</table>

*Values subject to change: please inquire about latest update

4-hour 65°C water immersion test passed without failure

![CAUTION: HIGH INTENSITY ULTRAVIOLET ENERGY]

PROTECT YOUR EYES AND SKIN
### TABLE 3. Bin Structures

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>Peak Wavelength</td>
<td>270</td>
<td>265</td>
<td>270</td>
<td>275</td>
</tr>
<tr>
<td></td>
<td></td>
<td>275</td>
<td>275</td>
<td>277</td>
<td>280</td>
</tr>
<tr>
<td>P</td>
<td>Radiant Flux ($\Phi_e$)</td>
<td>80</td>
<td>75</td>
<td>80</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td></td>
<td>90</td>
<td>85</td>
<td>90</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100</td>
<td>95</td>
<td>100</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>110</td>
<td>105</td>
<td>110</td>
<td>115</td>
</tr>
<tr>
<td></td>
<td></td>
<td>120*</td>
<td>115</td>
<td>120</td>
<td>125</td>
</tr>
<tr>
<td></td>
<td></td>
<td>130*</td>
<td>125</td>
<td>130</td>
<td>135</td>
</tr>
<tr>
<td>V</td>
<td>Forward Voltage (V)</td>
<td>5.5</td>
<td>5.0</td>
<td>5.5</td>
<td>6.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.5</td>
<td>6.0</td>
<td>6.5</td>
<td>7.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.5</td>
<td>7.0</td>
<td>7.5</td>
<td>8.0</td>
</tr>
</tbody>
</table>

Note: Bin Code method

Bin Code (IF-W-P-V): Driving current = IF; Peak Wavelength = W; Radiant Flux = P; Forward Voltage = V
Soldering conditions of UVC LED

**FIG 8. Solder reflow temperature profile**

- SnBiAg alloy for lensed SMD6060

<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>Time (sec.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>120 ~ 130°C</td>
<td>Pre-Heating 120 ~ 130°C Max. Pre-Heat Time 120sec. Max.</td>
</tr>
<tr>
<td>165°C Max.</td>
<td>Peak Temperature 165°C Max.</td>
</tr>
<tr>
<td>2.5 ~ 5°C/sec.</td>
<td>Soldering Time 5sec. Max.</td>
</tr>
</tbody>
</table>

- Recommended solder composition: SnBiAg alloy or T3 soldering paste
- Recommended stencil thickness is 60~80um
- Recommended stencil solder paste area is 60~80%
- Forming gas (5%-7%H₂ in N₂) ambient recommended for best results
- After reflow soldering, Rapid cooling should be avoided
- When soldering, do not use a none calibrated hot plate. A convection type reflow oven is preferred. (Fig 9.)
  - Must not use heat gun (blower) for soldering

**FIG 9. Do not use a hot plate to mount led-package onto PCB. A reflow oven is recommended.**
Handling Precautions

ESD Protection

Workplace setup should follow the recommendations given in JEDEC standard document JESD625B “Requirements for Handling Electrostatic-Discharge-Sensitive (ESDS) Devices” or IEC 61340-5-1,2 and 3. The operators should be properly trained to handle UVC flipchips according the guidelines listed below:

- Always wear conductive wrist straps that is continuously monitored when working or handling assembled boards containing unprotected chips.
- Use an ion blower to neutralize the static discharge that may build up on the surface of the UVC flipchips during storage and handling.
- Always keep unused UVC flipchips in the protective ESD storage bag. Depending on the final application, it may be necessary to include additional ESD protection, such as a TVS protection diode on the substrate on which UVC flip chip is reflowed. Bolb Inc. includes a TVS chip inside each LED package.
- Use tweezers to pick up UVC LEDs, teflon coated tweezers would be recommended to avoid scratching UVC LEDs.
- Recommend holding the sidewalls of the LEDs (See Fig 10.)

FIG 10. incorrect handling (left) and correct handling (right) of UVC LED Package
Packing

Carrier Tape & Reel Dimensions (unit = mm)

Quantity < 3,000 units/reel
Cover tape adhesion <0.7 Newtons
Leader tape < 200 empty pockets
Trailer <60 empty pockets
General Precautions and UVC Safety

UVC LEDs emit deep ultraviolet radiation, with extremely high intensity near its surface. This allows rapid disinfection but safety precautions must be observed during assembly and testing.

By purchasing the UVC chips (bare dice) or packaged LEDs from the manufacturer, the customer hereby agrees to absolve the manufacturer’s responsibility of any bodily harm as a result of failure to observe the precautions, warnings and guidelines contained within this Specifications document.

All assembly workers, operators and bystanders must wear eye and skin protection when the UVC LEDs are energized. Bare-eye observation (including through microscopes) and bare-hand handling of a UVC LED in operation is PROHIBITED.

UVC light can be easily absorbed, so any oil or other absorbent liquid or solid substance must NOT be allowed to touch the sapphire side of the UVC chip, or the dome lens on a packaged LED.

Do not apply pressure to the dome lens on packaged LED.