LED SPECIFICATION

560LB7D

Features
- Single color
- High bright output
- Low power consumption
- High reliability and long life

Descriptions:
- Dice material: InGaN
- Emitting Color: Super Bright Blue
- Device Outline: Φ5mm Round Type/5mm
- Lens Type: Blue Diffused

Directivity:
1. All dimensions are millimeters
2. Tolerance is +/-0.25mm unless otherwise noted
### Absolute maximum ratings \( (T_a = 25^\circ C) \)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Test Condition</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Min.</td>
<td>Max.</td>
</tr>
<tr>
<td>Reverse Voltage</td>
<td>( V_R )</td>
<td>( I_R = 30 \mu A )</td>
<td>5</td>
<td>--</td>
</tr>
<tr>
<td>Forward Current</td>
<td>( I_F )</td>
<td>----</td>
<td>----</td>
<td>30</td>
</tr>
<tr>
<td>Power Dissipation</td>
<td>( P_d )</td>
<td>----</td>
<td>----</td>
<td>105</td>
</tr>
<tr>
<td>Pulse Current</td>
<td>( I_{peak} )</td>
<td>Duty=0.1mS, 1kHz</td>
<td>----</td>
<td>100</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>( T_{opr} )</td>
<td>----</td>
<td>-20</td>
<td>+85</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>( T_{str} )</td>
<td>----</td>
<td>-25</td>
<td>+100</td>
</tr>
</tbody>
</table>

### Electrical and optical characteristics \( (T_a = 25^\circ C) \)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Test Condition</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Min.</td>
<td>Typ.</td>
</tr>
<tr>
<td>Forward Voltage</td>
<td>( V_F )</td>
<td>( I_F = 20mA )</td>
<td>V7~V9</td>
<td></td>
</tr>
<tr>
<td>Reverse Current</td>
<td>( I_R )</td>
<td>( V_R = 5V )</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Dominate Wavelength</td>
<td>( \lambda_d )</td>
<td>( I_F = 20mA )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spectral Line half-width</td>
<td>( \Delta \lambda )</td>
<td>( I_F = 20mA )</td>
<td>----</td>
<td>22</td>
</tr>
<tr>
<td>Luminous Intensity</td>
<td>( I_V )</td>
<td>( I_F = 20mA )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viewing Angle</td>
<td>( 2 \theta 1/2 )</td>
<td>( I_F = 20mA )</td>
<td>60</td>
<td>70</td>
</tr>
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</table>
### BRIGHTNESS BIN

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0-5.0</td>
<td>H</td>
<td>37.2-52.0</td>
<td>Q</td>
<td>390-550</td>
<td>X</td>
<td>4180-5860</td>
</tr>
<tr>
<td>B</td>
<td>5.0-7.0</td>
<td>J</td>
<td>52.0-72.8</td>
<td>R</td>
<td>550-770</td>
<td>Y</td>
<td>5860-8200</td>
</tr>
<tr>
<td>C</td>
<td>7.0-9.8</td>
<td>K</td>
<td>72.8-102</td>
<td>S</td>
<td>770-1100</td>
<td>Z</td>
<td>8-10cd</td>
</tr>
<tr>
<td>D</td>
<td>9.8-13.7</td>
<td>L</td>
<td>102-145</td>
<td>T</td>
<td>1100-1520</td>
<td>Z1</td>
<td>10-12cd</td>
</tr>
<tr>
<td>E</td>
<td>13.7-19.0</td>
<td>M</td>
<td>145-200</td>
<td>U</td>
<td>1520-2130</td>
<td>Z2</td>
<td>12-14cd</td>
</tr>
<tr>
<td>F</td>
<td>19.0-26.6</td>
<td>N</td>
<td>200-280</td>
<td>V</td>
<td>2130-3000</td>
<td>Z4</td>
<td>14-16cd</td>
</tr>
<tr>
<td>G</td>
<td>26.6-37.2</td>
<td>P</td>
<td>280-390</td>
<td>W</td>
<td>3000-4180</td>
<td>Z5</td>
<td>16-18cd</td>
</tr>
</tbody>
</table>

### WAVELENGTH BIN

#### LIGHT Col. Bin Code Wavel. (nm) LIGHT Col. Bin Code Wavel. (nm)

- **B1**: 450-455 YG1: 555-558
- **B2**: 455-460 YG2: 558-561
- **B3**: 460-465 YG3: 561-564
- **B4**: 465-470 YG4: 564-567
- **B5**: 470-475 YG5: 567-570
- **B6**: 475-480 YG6: 570-573
- **G1**: 491-494 YG7: 573-576
- **G2**: 494-497 Y1: 582-585
- **G3**: 497-500 Y2: 585-588
- **G4**: 500-503 Y3: 588-591
- **G5**: 503-506 Y4: 591-594
- **G6**: 506-509 Y5: 594-597
- **G7**: 509-512 YO1: 597-600
- **G8**: 512-515 YO2: 600-603
- **G9**: 515-518 YO3: 603-606
- **G10**: 518-521 YO4: 606-609
- **G11**: 521-524 O1: 609-612
- **G12**: 524-527 O2: 612-615
- **G13**: 527-530 O3: 615-618
- **G14**: 530-533 R1: 618-621
- **G15**: 533-536 R2: 621-624
- **G16**: 536-539 R3: 624-627
- **G17**: 539-542 R4: 627-630
- **G18**: 542-545 R5: 630-633
- **G19**: 545-548 R6: 633-636

### FORWARD VOLTAGE (VF) BIN

<table>
<thead>
<tr>
<th>Bin Code</th>
<th>VF (V)</th>
<th>Bin Code</th>
<th>VF (V)</th>
<th>Bin Code</th>
<th>VF (V)</th>
<th>Bin Code</th>
<th>VF (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1</td>
<td>1.6-1.8</td>
<td>V5</td>
<td>2.4-2.6</td>
<td>V9</td>
<td>3.2-3.4</td>
<td>V13</td>
<td>4.0-4.2</td>
</tr>
<tr>
<td>V2</td>
<td>1.8-2.0</td>
<td>V6</td>
<td>2.6-2.8</td>
<td>V10</td>
<td>3.4-3.6</td>
<td>V14</td>
<td>4.2-4.4</td>
</tr>
<tr>
<td>V3</td>
<td>2.0-2.2</td>
<td>V7</td>
<td>2.8-3.0</td>
<td>V11</td>
<td>3.6-3.8</td>
<td>V15</td>
<td>4.4-4.6</td>
</tr>
<tr>
<td>V4</td>
<td>2.2-2.4</td>
<td>V8</td>
<td>3.0-3.2</td>
<td>V12</td>
<td>3.8-4.0</td>
<td>V16</td>
<td>4.6-4.8</td>
</tr>
</tbody>
</table>

Page: 3
Typical electrical/optical characteristic curves:

1. **Forward Current Vs Forward Voltage**
   - Forward Current (mA) vs Forward Voltage (V)
   - Typical curves showing the relationship between current and voltage.

2. **Luminous Intensity Vs Forward Current**
   - Luminous Intensity (Relative Value at IF=20mA) vs Forward Current (mA)
   - Graph illustrating the intensity variation with current.

3. **Forward Current Derating Curve**
   - Forward Current (mA) vs Ambient Temperature (°C)
   - Derating curve showing how current decreases with increasing temperature.

4. **Luminous Intensity Vs Ambient Temperature**
   - Luminous Intensity (Relative Value at IF=20mA) vs Ambient Temperature (°C)
   - Graph showing intensity decrease with temperature rise.

5. **Wavelength vs Relative Luminous Intensity**
   - Wavelength (nm) vs Relative Luminous Intensity
   - Graph displaying luminous intensity variation with wavelength.
### LED LAMP APPLICATION

#### SOLDERING

<table>
<thead>
<tr>
<th>METHOD</th>
<th>SOLDERING CONDITIONS</th>
<th>REMARK</th>
</tr>
</thead>
</table>
| DIP SOLDERING    | Bath temperature: 260±5 °C  
Immersion time: with 5 sec                                                                | • Solder no closer than 3mm from the base of the package  
• Using soldering flux," RESIN FLUX” is recommended.                                                                                   |
| SOLDERING IRON   | Soldering iron: 30W or smaller  
Temperature at tip of iron: 260 °C or lower  
Soldering time: within 5 sec.                                                              | • During soldering, take care not to press the tip of iron against the lead.  
(To prevent heat from being transferred directly to the lead, hold the lead with a pair of tweezers while soldering)         |

1) When soldering the lead of LED in a condition that the package is fixed with a panel (See Fig.1), be careful not to stress the leads with iron tip.

![Fig.1](image)

2) When soldering wire to the lead, work with a Fig (See Fig.2) to avoid stressing the package.

![Fig.2](image)
3) Similarly, when a jig is used to solder the LED to PC board, take care as much as possible to avoid steering the leads (See Fig.3).

4) Repositioning after soldering should be avoided as much as possible. If inevitable, be sure to preserve the soldering conditions with irons stated above: select a best-suited method that assures the least stress to the LED.

5) Lead cutting after soldering should be performed only after the LED temperature has returned to normal temperature.

•LED MOUNTING METHOD

1) When mounting the LED by using a case, as shown Fig.4, ensure that the mounting holds on the PC board match the pitch of the leads correctly-tolerance of dimensions of the respective components including the LED should be taken into account especially when designing the case, PC board, etc. to prevent pitch misalignment between the leads and board holes, the diameter of the board holes should be slightly larger than the size of the lead. Alternatively, the shape of the holes should be made oval. (See Fig.4)
2) Use LEDs with stand-off (Fig.5) or the tube or spacer made of resin (Fig.6) to position the LEDs.

![Fig.5](image)

![Fig.6](image)

**FORMED LEAD**

1) The lead should be bent at a point located at least 2mm away from the package. Bending should be performed with base fixed means of a jig or pliers (Fig.7)

![Fig.7](image)

2) Forming lead should be carried out prior to soldering and never during or after soldering.

3) Form the lead to ensure alignment between the leads and the hole on board, so that stress against the LED is prevented. (Fig.8)

![Fig.8](image)
**LEAD STRENGTH**

1) Bend strength
   Do not bend the lead more than twice. (Fig.9)

![Fig.9](image)

2) Tensile strength (@Room Temperature)
   If the force is 1kg or less, there will be no problem. (Fig.10)

![Fig.10](image)

**HANDLING PRECAUTIONS**

Although rigid against vibration, the LEDs may damaged or scratched if dropped. So take care when handling.

**CHEMICAL RESISTANCE**

1) Avoid exposure to chemicals as it may attack the LED surface and cause discoloration.
2) When washing is required, refer to the following table for the proper chemical to be sued.
   (Immersion time: within 3 minutes at room temperature.)

<table>
<thead>
<tr>
<th>SOLVENT</th>
<th>ADAPTABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freon TE</td>
<td>⊙</td>
</tr>
<tr>
<td>Chlorothene</td>
<td>×</td>
</tr>
<tr>
<td>Isopropyl Alcohol</td>
<td>⊙</td>
</tr>
<tr>
<td>Thinner</td>
<td>×</td>
</tr>
<tr>
<td>Acetone</td>
<td>×</td>
</tr>
<tr>
<td>Trichloroethylene</td>
<td>×</td>
</tr>
</tbody>
</table>

⊙--Usable  ×--Do not use.

**NOTE:** Influences of ultrasonic cleaning of the LED resin body differ depending on such factors as the oscillator output, size of the PC board and the way in which the LED is mounted. Therefore, ultrasonic cleaning should only be performed after confirming there is no problem by conducting a test under practical.
LED LAMP PASSED TESTS

Experiment Item:

<table>
<thead>
<tr>
<th>Item</th>
<th>Test Condition</th>
<th>Reference Standard</th>
</tr>
</thead>
</table>
| **Lamp & IR**         | **Ta**: 25±5°C  
IF= 20mA  
RH : <=60%RH  
① DYNAMIC:100mA 1ms 1/10 duty  
② STATIC STATE: IF=20mA  
TEST TIME:  
168HRS (-24HRS , +24HRS)  
500HRS (-24HRS , +24HRS)  
1000HRS (-24HRS , +72HRS) | MIL-STD-750 : 1026  
MIL-STD-883 : 1005  
JIS C 7021 : B-1 |
| **OPERATION LIFE**    | **Ta**: 65°C±5°C  
RH : 90〜95%RH  
TEST TIME : 240HRS±2HRS | MIL-STD-202 : 103B  
JIS C 7021 : B-1 |
| **HIGH TEMPERATURE**  | **Ta**: 105°C〜25°C〜-55°C〜25°C  
30min 5min 30min 5min  
10CYCLES | MIL-STD-202 : 107D  
MIL-STD-750 : 1051  
MIL-STD-883 : 1010  
JIS C 7021 : A-4 |
| **HIGH HUMIDITY**     | **Ta**: 105°C±5°C  
10min 10min  
10CYCLES | MIL-STD-202 : 107D  
MIL-STD-750 : 1051  
MIL-SYD-883 : 1011 |
| **STORAGE**           | **T , sol**: 260°C±5°C  
DWELL TIME : 10±1sec | MIL-STD-202 : 210A  
MIL-STD-750-2031  
JIS C 7021 : A-1 |
| **SOLDER RESISTANCE** | **T , sol**: 230°C±5°C  
DWELL TIME : 5±1sec | MIL-STD-202 : 208D  
MIL-STD-750 : 2026  
JIS C 7021 : A-2 |
| **SOLDERABILITY**     | **T , sol**: 260°C±5°C  
DWELL TIME : 10±1sec | MIL-STD-202 : 210A  
MIL-STD-750-2031  
JIS C 7021 : A-1 |

Drive Method

- **Circuit model A**
- **Circuit model B**

(A)Recommended circuit.

(B)The difference of brightness between LED’s could be found due to the Vf-If characteristics of LED.