

# ASMT-Mx00

## Moonstone™ 1 W Power LED Light Source



### Data Sheet



#### Description

The Moonstone™ 1W Power LED Light Source is a high performance energy efficient device which can handle high thermal and high driving current. The exposed pad design has excellent heat transfer from the package to the motherboard.

The low profile package design is suitable for a wide variety of applications especially where height is a constraint.

The package is compatible with reflow soldering process. This will give more freedom and flexibility to the light source designer.

#### Applications

- Portable (flash light, bicycle head light)
- Reading light
- Architectural lighting
- Garden lighting
- Decorative lighting

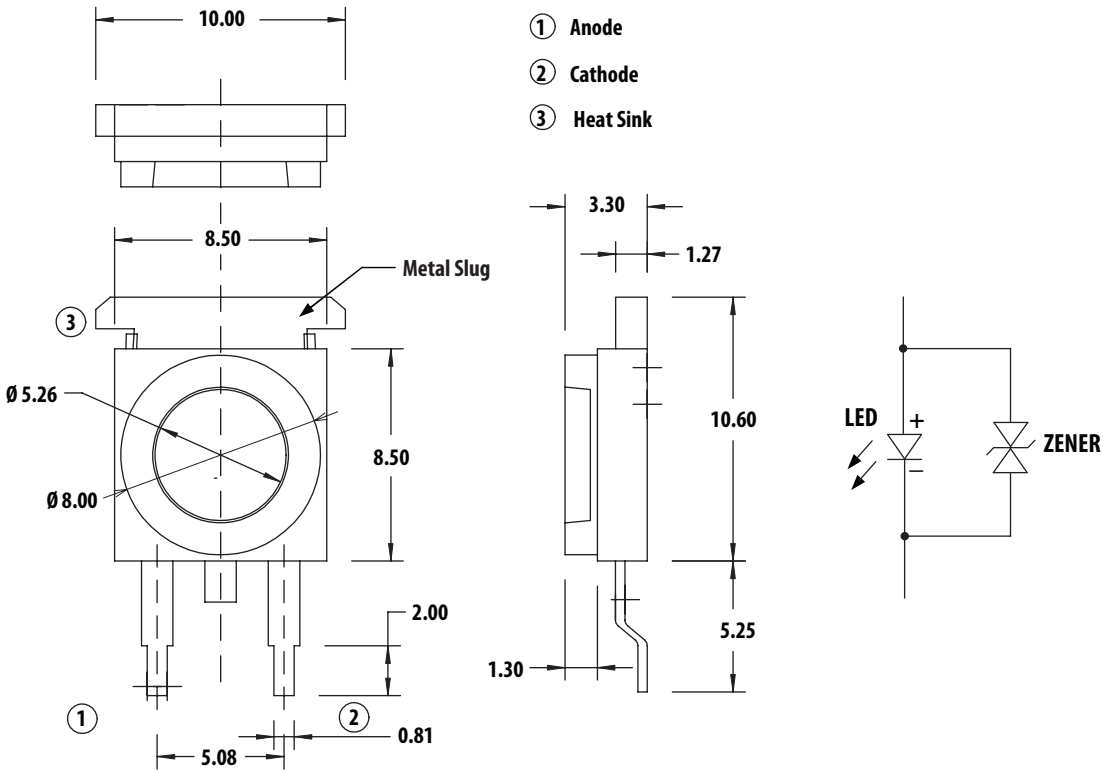
#### Features

- Available in Red, Amber, Green, and Blue color.
- Energy efficient
- Exposed pad for excellent heat transfer
- Suitable for reflow soldering process
- High current operation
- Long operation life
- Wide viewing angle
- Silicone encapsulation
- ESD Class HBM Class 3B (threshold > 8 kV)
- MSL 2A for InGaN products
- MSL 4 for AllInGaP products

#### Specifications

- AllInGaP technology for Red and Amber
- 2.1V (typ) at 350mA for AllInGaP
- InGaN technology for Green and Blue
- 3.2V (typ) at 350mA for InGaN

## Package Dimensions



### Notes:

1. All dimensions are in millimeters.
2. Tolerance is  $\pm 0.1$  mm unless otherwise specified.
3. Metal slug is connected to anode for electrically non-isolated option.

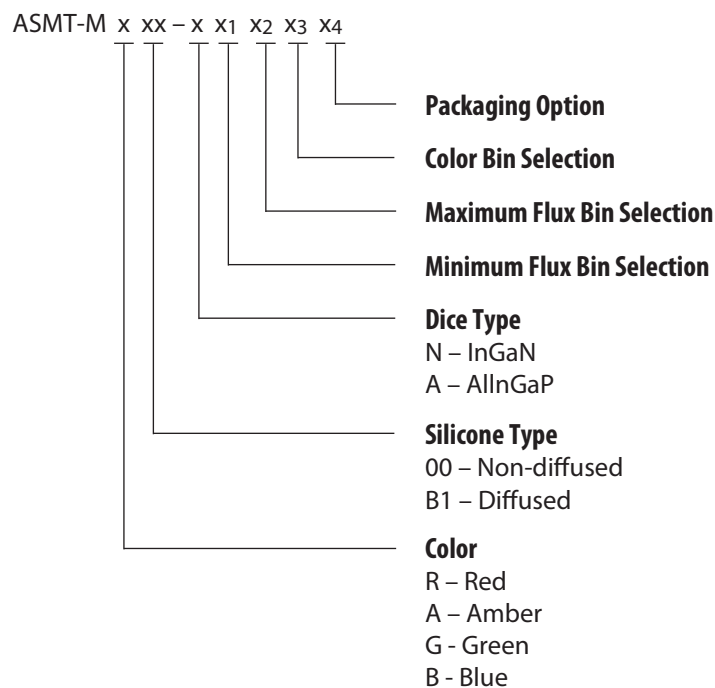
## Device Selection Guide ( $T_j = 25^\circ\text{C}$ )

| Part Number     | Color | Luminous Flux, $\phi_v^{[1,2]}$ (lm) |      |      | Test Current (mA) | Dice Technology |
|-----------------|-------|--------------------------------------|------|------|-------------------|-----------------|
|                 |       | Min.                                 | Typ. | Max. |                   |                 |
| ASMT-MR00-AGH00 | Red   | 25.5                                 | 35.0 | 43.0 | 350               | AllInGaP        |
| ASMT-MR00-AHJ00 |       | 33.0                                 | 40.0 | 56.0 | 350               | AllInGaP        |
| ASMT-MA00-AGH00 | Amber | 25.5                                 | 35.0 | 43.0 | 350               | AllInGaP        |
| ASMT-MG00       | Green | 43.0                                 | 60.0 | 73.0 | 350               | InGaN           |
| ASMT-MB00       | Blue  | 11.5                                 | 15.0 | 25.5 | 350               | InGaN           |

### Notes

1.  $\phi_v$  is the total luminous flux output as measured with an integrating sphere at 25 ms mono pulse condition.
2. Flux tolerance is  $\pm 10\%$ .

## Part Numbering System



Note:

1. Please refer to Page 8 for selection details.

## Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ )

| Parameter                            | ASMT-Mx00/      | Units |
|--------------------------------------|-----------------|-------|
| DC Forward Current <sup>[1]</sup>    | 350             | mA    |
| Peak Pulsing Current <sup>[2]</sup>  | 1000            | mA    |
| Power Dissipation for AllnGaP        | 805             | mW    |
| Power Dissipation for InGaN          | 1225            | mW    |
| LED Junction Temperature for AllnGaP | 125             | °C    |
| LED Junction Temperature for InGaN   | 110             | °C    |
| Operating Ambient Temperature Range  | -40 to +100     | °C    |
| Storage Temperature Range            | -40 to +120     | °C    |
| Reverse Voltage <sup>[3]</sup>       | Not recommended |       |

Notes:

1. DC forward current – derate linearly based on Figure 5 for AllnGaP & Figure 11 for InGaN.
2. Pulse condition duty factor = 10%, Frequency = 1kHz.
3. Not recommended for reverse bias operation.

### Optical Characteristics at 350 mA (T<sub>J</sub> = 25°C)

| Part Number     | Color | Peak Wavelength,<br>$\lambda_{PEAK}$ (nm) | Dominant Wave-<br>length, $\lambda_D^{[1]}$ (nm) | Viewing Angle,<br>$2\theta_{1/2}^{[2]}$ (°) | Luminous Efficiency<br>(lm/W) |
|-----------------|-------|---|--|---|-------------------------------|
|                 |       | Typ                                       | Typ  | Typ   | Typ                           |
| ASMT-MR00-AGH00 | Red   | 635                                       | 625  | 120   | 48                            |
| ASMT-MR00-AHJ00 | Red   | 635                                       | 625  | 120   | 54                            |
| ASMT-MA00-AGH00 | Amber | 598                                       | 590  | 120   | 48                            |
| ASMT-MG00       | Green | 519                                       | 525  | 120   | 54                            |
| ASMT-MB00       | Blue  | 454                                       | 460  | 120   | 13                            |

### Electrical Characteristic at 350 mA (T<sub>J</sub> = 25°C)

| Dice type | Forward Voltage V <sub>F</sub> (Volts) at I <sub>F</sub> = 350mA |      |      | Thermal Resistance<br>R $\theta_{j-ms}$ (°C/W) <sup>[1]</sup> |
|-----------|--|------|------|---|
|           | Min.   | Typ. | Max. | Typ.  |
| AllnGaP   | 1.7  | 2.1  | 2.3  | 12  |
| InGaN     | 2.8  | 3.2  | 3.5  | 10  |

Notes:

1. R $\theta_{j-ms}$  is Thermal Resistance from LED junction to metal slug.

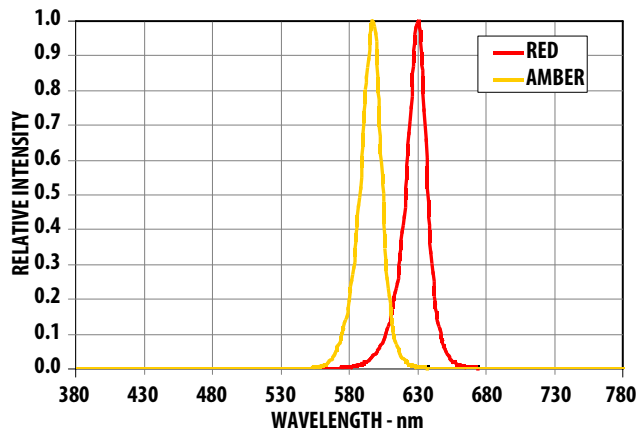


Figure 1. Relative Intensity vs. Wavelength for AllnGaP

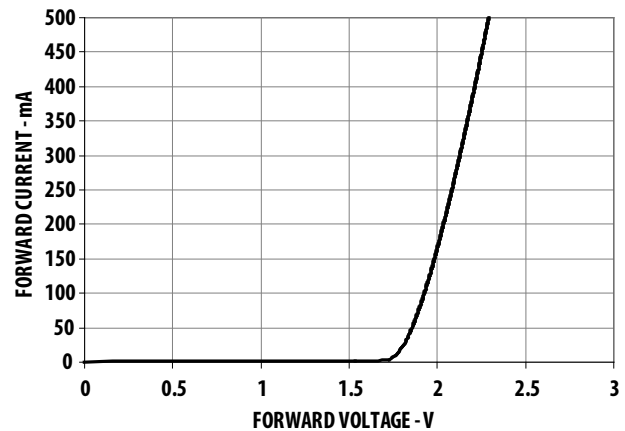


Figure 2. Forward Current vs Forward Voltage for AllnGaP

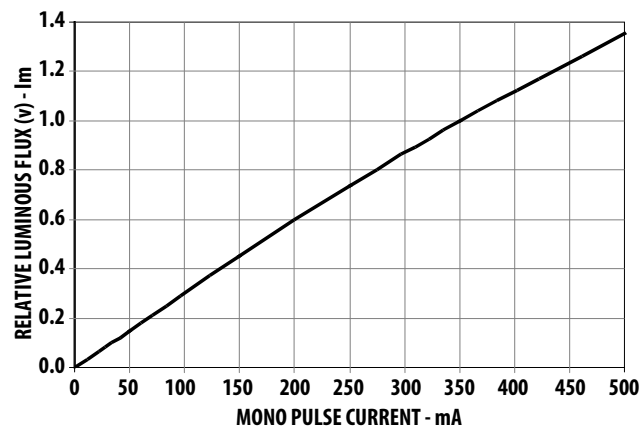


Figure 3. Relative Luminous Flux vs. Mono Pulse Current for AllnGaP

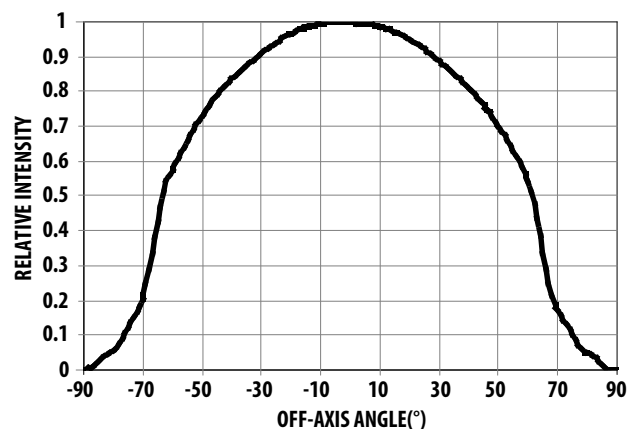


Figure 4. Radiation Pattern for AllnGaP

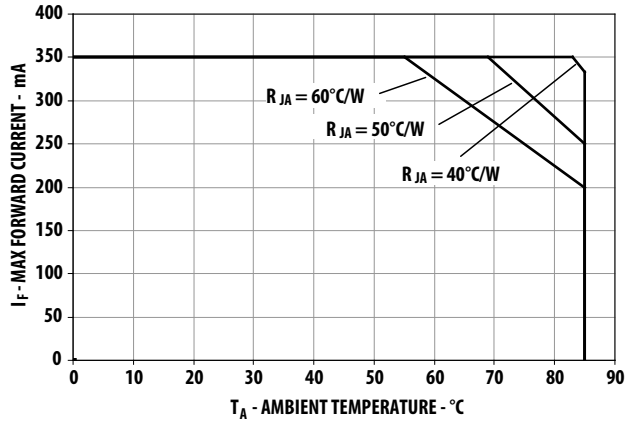


Figure 5. Maximum forward current vs. ambient temperature for AlInGaP Derated based on  $T_{J,MAX} = 125^{\circ}C$ ,  $R_{\theta_{JA}} = 40^{\circ}C/W / 50^{\circ}C/W$  and  $60^{\circ}C/W$

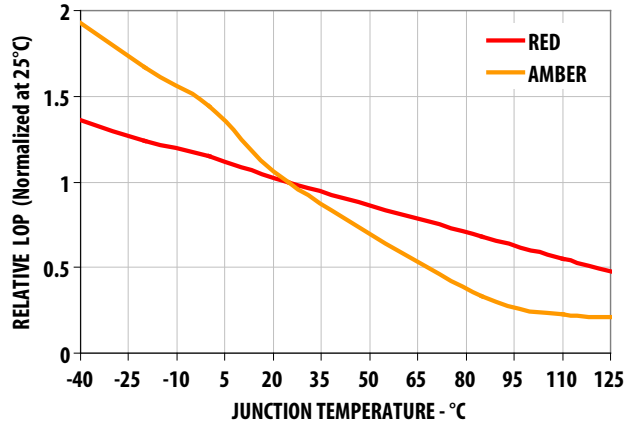


Figure 6. Relative LOP (Normalized at 25°C) vs. junction temperature for AlInGaP

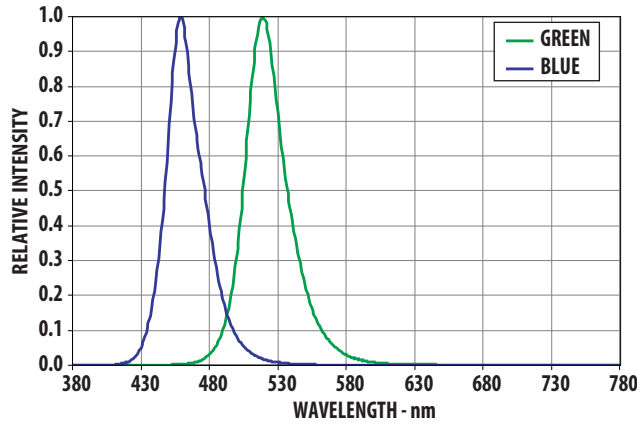


Figure 7. Relative Intensity vs. Wavelength for InGaN

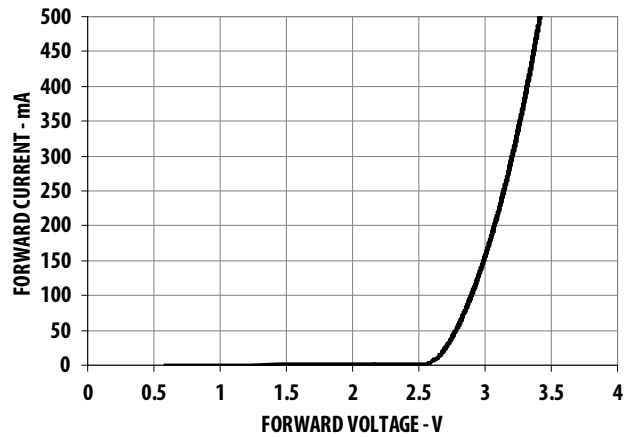


Figure 8. Forward Current vs. Forward Voltage for InGaN

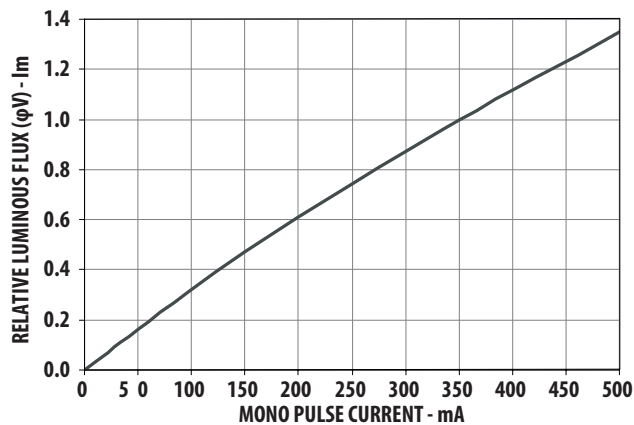


Figure 9. Relative Luminous Flux vs. Mono Pulse Current for InGaN

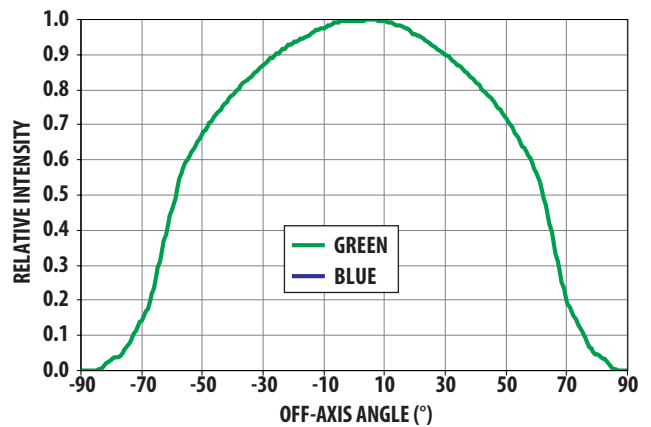


Figure 10. Radiation Pattern for InGaN

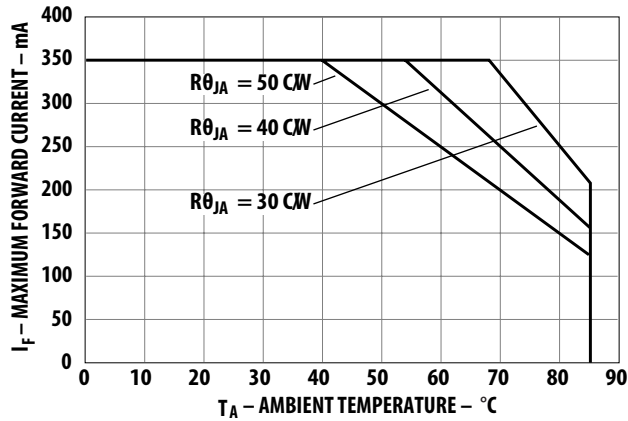


Figure 11. Maximum Forward Current vs. Ambient Temperature for InGaN Derated based on  $T_{J,MAX} = 110^{\circ}C$ ,  $R_{\theta_{JA}} = 30^{\circ}C/W$ ,  $40^{\circ}C/W$  and  $50^{\circ}C/W$

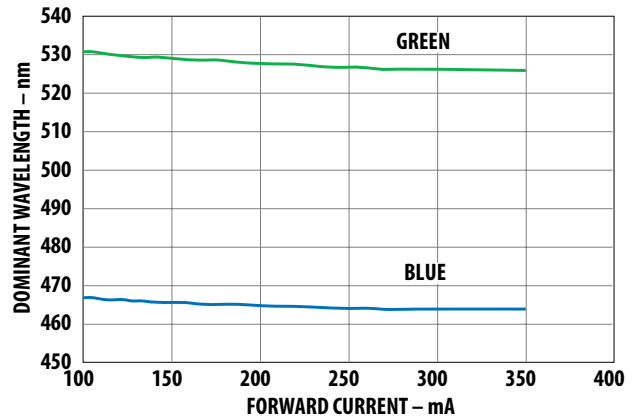
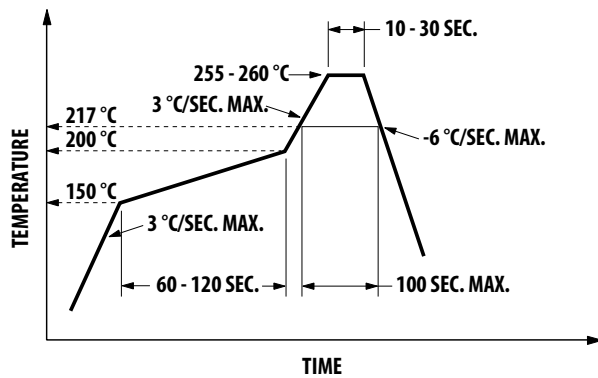


Figure 12. Dominant wavelength vs. forward current – InGaN devices



(Acc. to J-STD-020C)

Figure 13. Recommended reflow soldering profile

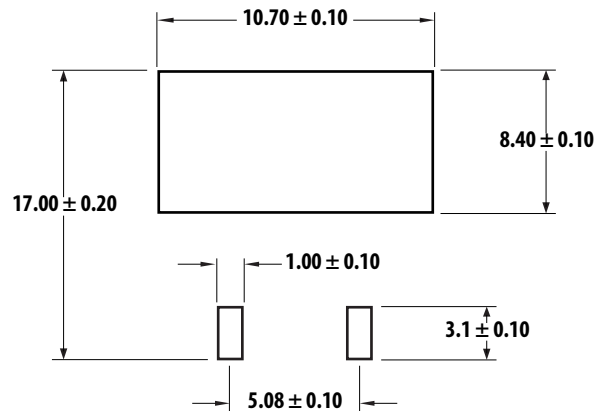


Figure 14. Recommended soldering land pattern

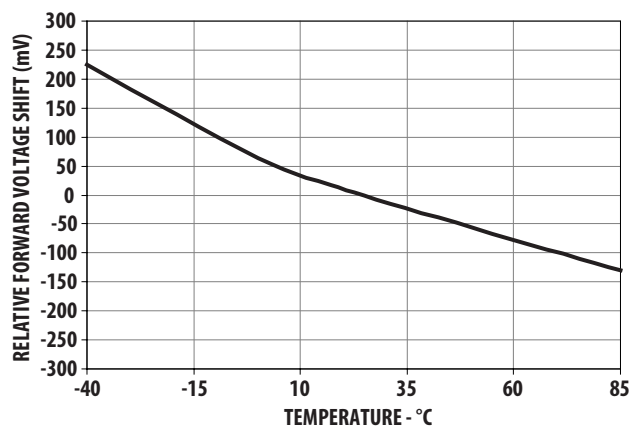


Figure 15. Temperature vs. relative forward voltage shift

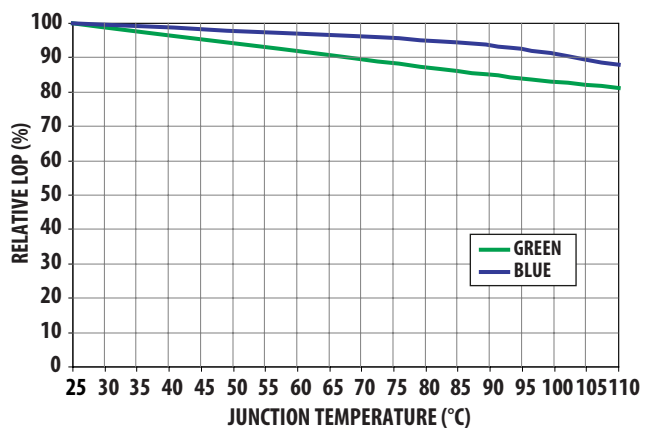


Figure 16. Relative LOP vs Junction Temperature for InGaN Devices

Note:

For detail information on reflow soldering of Avago surface mount LEDs, do refer to Avago Application Note AN1060 Surface Mounting SMT LED Indicator Components.

## Option Selection Details

ASMT-Mxxx – x x<sub>1</sub> x<sub>2</sub> x<sub>3</sub> x<sub>4</sub>

x<sub>1</sub> – Minimum Flux Bin Selection

x<sub>2</sub> – Maximum Flux Bin Selection

x<sub>3</sub> – Color Bin Selection

x<sub>4</sub> – Packaging Option

## Color Bin Selection [x<sub>3</sub>]

Individual reel will contain parts from one full bin only.

### Other Colors

|   |                   |
|---|-------------------|
| 0 | Full Distribution |
| Z | A and B           |
| Y | B and C           |
| W | C and D           |
| V | D and E           |
| Q | A, B and C        |
| P | B, C and D        |
| N | C, D and E        |

## Flux Bin Limit [x<sub>1</sub> x<sub>2</sub>]

| Bin | Luminous Flux (lm) at I <sub>F</sub> = 350mA |      |
|-----|--|------|
|     | Min.   | Max. |
| D   | 11.5   | 15.0 |
| E   | 15.0   | 19.5 |
| F   | 19.5   | 25.5 |
| G   | 25.5   | 33.0 |
| H   | 33.0   | 43.0 |
| J   | 43.0   | 56.0 |
| K   | 56.0   | 73.0 |

Tolerance for each bin limits is ±10%

### Color Bin Limits

| Color | Bin               | Min.  | Max.  |       |
|-------|-------------------|-------|-------|-------|
| Red   | Full Distribution | 620.0 | 635.0 |       |
|       | Amber             | A     | 582.0 | 584.5 |
|       |                   | B     | 584.5 | 587.0 |
|       |                   | C     | 587.0 | 589.5 |
|       |                   | D     | 589.5 | 592.0 |
| Blue  | E                 | 592.0 | 594.5 |       |
|       | A                 | 455.0 | 460.0 |       |
|       | B                 | 460.0 | 465.0 |       |
|       | C                 | 465.0 | 470.0 |       |
|       | D                 | 470.0 | 475.0 |       |
| Green | A                 | 515.0 | 520.0 |       |
|       | B                 | 520.0 | 525.0 |       |
|       | C                 | 525.0 | 530.0 |       |
|       | D                 | 530.0 | 535.0 |       |

Tolerance: ± 1 nm

### Packaging option [x<sub>4</sub>]

| Selection | Option      |
|-----------|-------------|
| 0         | Tube        |
| 1         | Tape & Reel |

### Example

#### ASMT-MR00-AHJ00

- ASMT-MR00-Axxxx – AlInGaP Red, Non-diffused
- x<sub>1</sub> = H – Minimum Flux Bin H
- x<sub>2</sub> = J – Maximum Flux Bin J
- x<sub>3</sub> = 0 – Full Distribution
- x<sub>4</sub> = 0 – Tube Option

### Packing Tube - Option 0

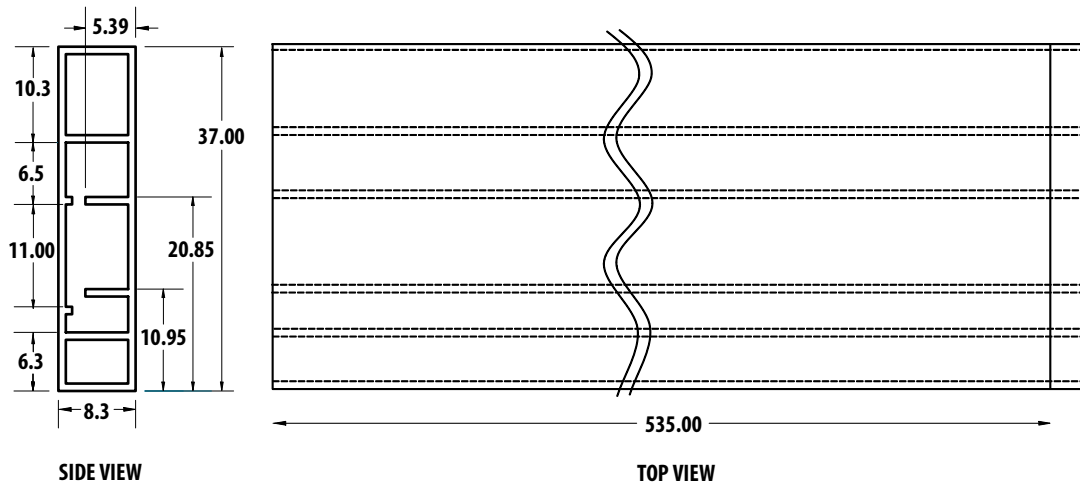


Figure 17. Tube dimensions

### Tape & Reel - Option 1

#### Tape Dimension

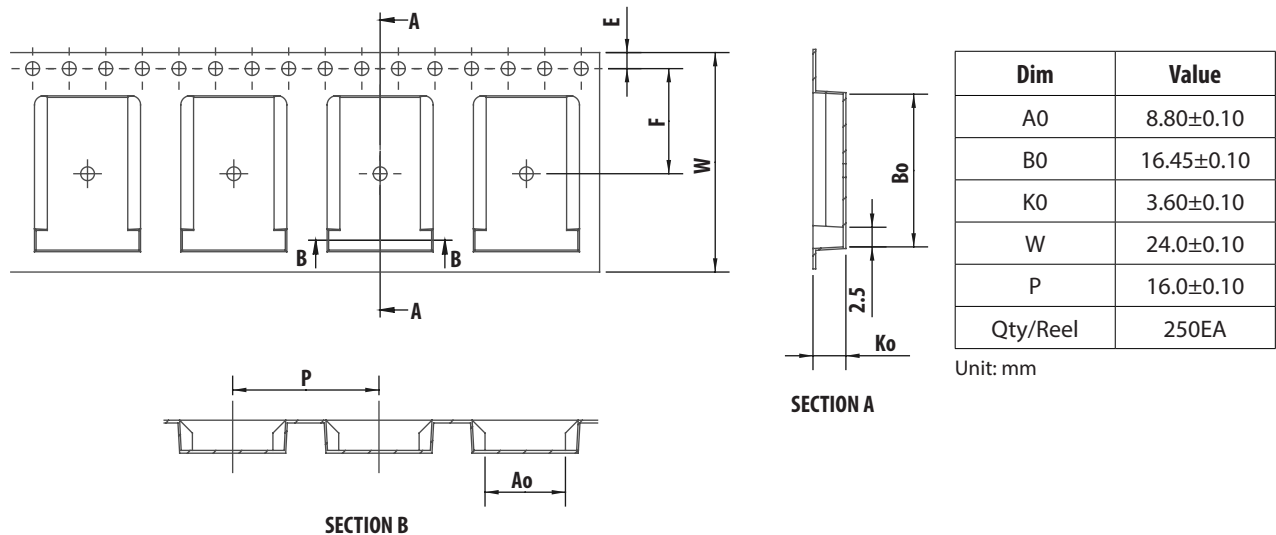


Figure 18. Carrier tape dimensions



## Tape & Reel - Option 1 (Cont.)

### Tape Dimension

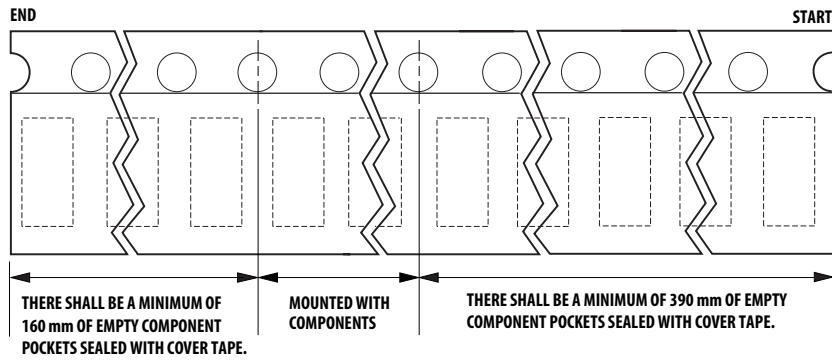


Figure 19. Carrier tape leader and trailer dimensions

### Reel Dimensions

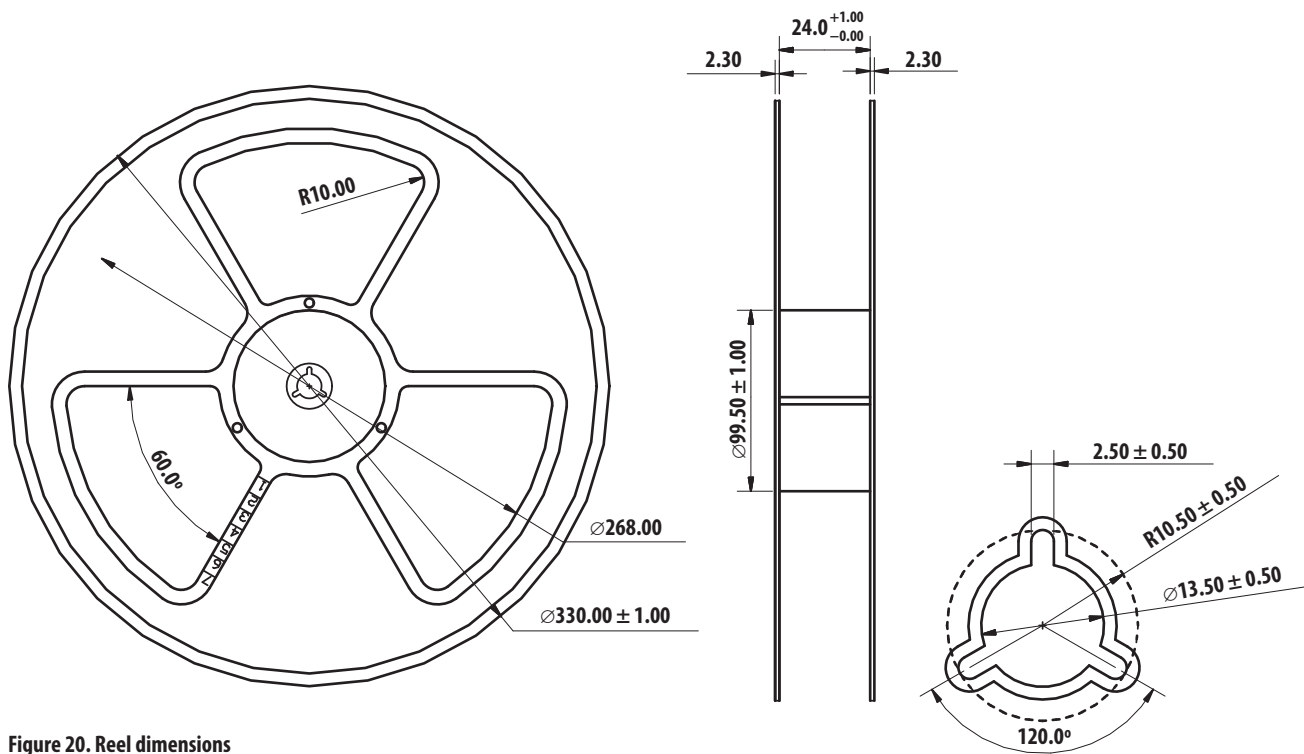


Figure 20. Reel dimensions

## Handling Precaution

The encapsulation material of the product is made of silicone for better reliability of the product. As silicone is a soft material, please do not press on the silicone or poke a sharp object onto the silicone. These might damage the product and cause premature failure. During assembly or handling, the unit should be held on the body only. Please refer to Avago Application Note AN5288 for detail information.

## Moisture Sensitivity

This product is qualified as Moisture Sensitive Level 2a for InGaN devices and MSL 4 for AlInGaP devices per Jedec J-STD-020. Precautions when handling this moisture sensitive product is important to ensure the reliability of the product. Do refer to Avago Application Note AN5305 Handling of Moisture Sensitive Surface Mount Devices for details.

### A. Storage before use

- Unopen moisture barrier bag (MBB) can be stored at <40°C/90%RH for 12 months. If the actual shelf life has exceeded 12 months and the humidity indicator card (HIC) indicates that baking is not required, then it is safe to reflow the LEDs per the original MSL rating.
- It is not recommended to open the MBB prior to assembly (e.g. for IQC).

### B. Control after opening the MBB

- The humidity indicator card (HIC) shall be read immediately upon opening of MBB.
- The LEDs must be kept at <30°C/60%RH at all time and all high temperature related process including soldering, curing or rework need to be completed within 672 hours for MSL 2a and 72 hours for MSL 4.

### C. Control for unfinished reel

- For any unused LEDs, they need to be stored in sealed MBB with desiccant or desiccator at <5%RH.

### D. Control of assembly boards

- If the PCB soldered with the LEDs is to be subjected to other high temperature processes, the PCB need to be stored in sealed MBB with desiccant or desiccator at <5%RH to ensure no LEDs have exceeded their floor life of 672 hours for MSL 2a and 72 hours for MSL 4.

### E. Baking is required if

- HIC "10%" indicator is not blue and "5%" indicator is pink. - The LEDs are exposed to condition of >30°C/60% RH at any time.
- The LEDs floor life exceeded 672 hours for MSL 2a and 72 hours for MSL 4.

Recommended baking condition: 60±5°C for 20hrs.

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