

ASMT-Mxx4

Moonstone® 1W High Brightness Power LED Light Source



Data Sheet



Lead (Pb) Free
RoHS 6 fully
compliant



Description

The Moonstone® 1W High Brightness 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. This will give more freedom and flexibility to the light source designer.

The 1W Power LED light source can be mounted onto metal core PCB enabling optimum heat dissipation and ease of installation.

Applications

- Sign backlight, billboard illumination or backlight
- Exit sign or emergency sign lightings
- Commercial lightings
- Accent and marker lightings
- Pathway lighting
- Task lighting
- Reading lights
- Decorative lighting
- Garden lighting
- Architectural lighting
- Portable (flash light, bicycle head light)

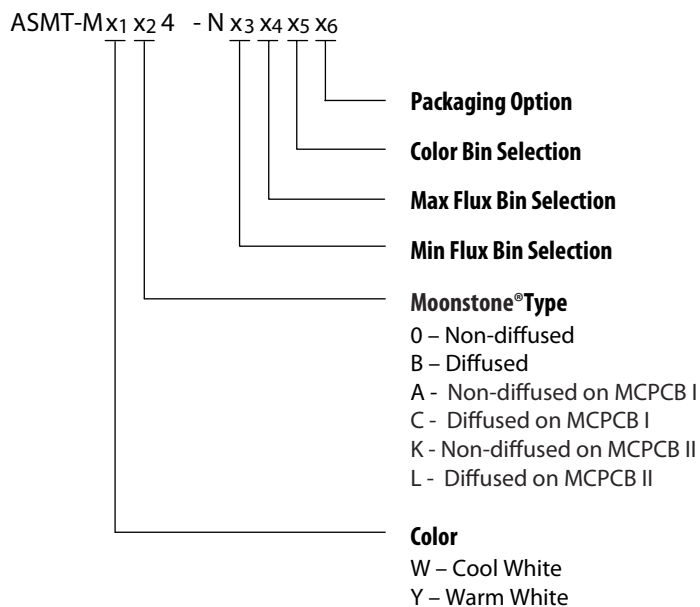
Features

- Available in Cool White & Warm White 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
- Non-ESD sensitive (threshold > 16KV)
- MSL 2a products

Specifications

- InGaN Technology
- 3.5 V (max) at 350 mA
- 110° viewing angle

Part Numbering System



Note:

1. Please refer to Page 9 for selection details.

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

| Part Number ^[3] | Color | Luminous Flux, Φ_v ^[1,2] (lm) | | | Test Current (mA) | Dice Technology | Electrically Isolated Metal Slug |
|-------------------------------|---------------------|---|-------|-------|-------------------|-----------------|----------------------------------|
| | | Min. | Typ. | Max. | | | |
| ASMT-MW _{x2} 4-NLN00 | Cool White | 73.0 | 105.0 | 125.0 | 350 | InGaN | Yes |
| ASMT-MW _{x2} 4-NMN00 | | 95.0 | 105.0 | 125.0 | 350 | | Yes |
| ASMT-MY _{x2} 4-NLM00 | Warm White | 73.0 | 100.0 | 110.0 | 350 | InGaN | Yes |
| ASMT-MW _{x2} 4-NLM00 | Cool White Diffused | 73.0 | 95.0 | 110.0 | 350 | InGaN | Yes |
| ASMT-MY _{x2} 4-NLM00 | Warm White Diffused | 73.0 | 90.0 | 110.0 | 350 | InGaN | Yes |

Notes:

1. Φ_v is the total luminous flux output as measured with an integrating sphere at 25ms mono pulse condition.
2. Flux tolerance is $\pm 10\%$.
3. Flux performance for respective part number is similar when device on MCPCB I or MCPCB II.

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

| Parameter | ASMT-Mxx4 | Units |
|---|--------------------|------------------|
| DC Forward Current ^[1] | 350 | mA |
| Peak Pulsing Current | 1000 | mA |
| Power Dissipation | 1225 | mW |
| LED Junction Temperature | 125 | $^\circ\text{C}$ |
| LED Junction Temperature for short term application | 145 | $^\circ\text{C}$ |
| Operating Ambient Temperature Range | -40 to +110 | $^\circ\text{C}$ |
| Storage Temperature Range | -40 to +120 | $^\circ\text{C}$ |
| Soldering Temperature | Refer to Figure 14 | |
| Reverse Voltage ^[2] | Not recommended | |

Notes:

1. Derate linearly based on Figure 11.
2. Not recommended for reverse bias operation.

Optical Characteristics at 350 mA ($T_J = 25^\circ\text{C}$)

| Part Number | Color | Correlated Color Temperature, CCT (Kelvin) | | Viewing Angle, $2\theta_{1/2}$ ^[2] ($^\circ$) | Luminous Efficiency (lm/W) |
|-------------------------------|---------------------|--|-------|--|----------------------------|
| | | Min. | Max. | Typ. | Typ. |
| ASMT-MWx ₂ 4-NLN00 | Cool White | 4000 | 10000 | 110 | 94 |
| ASMT-MWx ₂ 4-NMN00 | | 4000 | 10000 | 110 | 94 |
| ASMT-MYx ₂ 4-NLM00 | Warm White | 2600 | 4000 | 110 | 89 |
| ASMT-MWx ₂ 4-NLM00 | Cool White Diffused | 4000 | 10000 | 110 | 85 |
| ASMT-MYx ₂ 4-NLM00 | Warm White Diffused | 2600 | 4000 | 110 | 80 |

Notes:

1. $\theta_{1/2}$ is the off-axis angle where the luminous intensity is $1/2$ the peak intensity.

Electrical Characteristic at 350 mA ($T_J = 25^\circ\text{C}$)

| Dice type | Forward Voltage V_F (Volts) at $I_F = 350\text{mA}$ | | | Thermal Resistance $R\theta_{j-ms}$ ($^\circ\text{C/W}$) ^[1] |
|-----------|---|------|------|---|
| | Min. | Typ. | Max. | Typ. |
| InGaN | 2.8 | 3.2 | 3.5 | 10 |

Note:

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

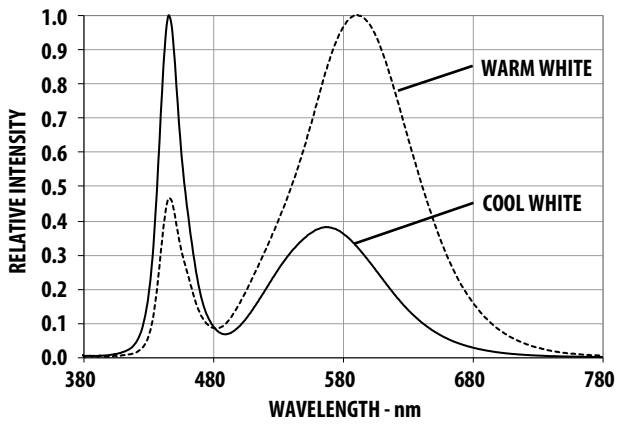


Figure 4. Relative Intensity vs. Wavelength.

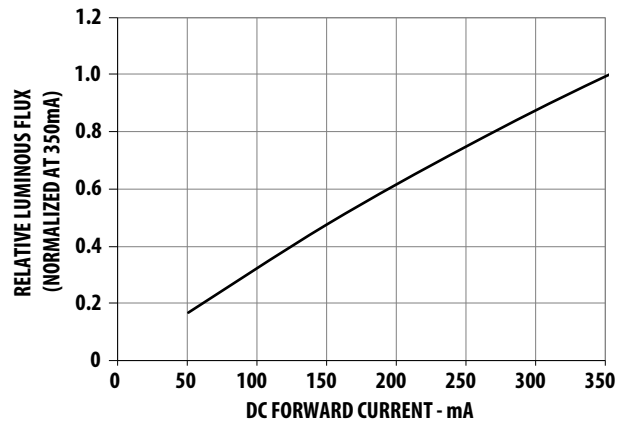


Figure 5. Relative Luminous Flux vs. Mono Pulse Current.

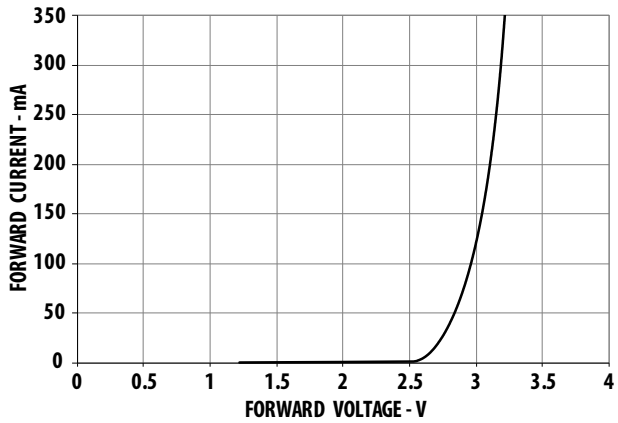


Figure 6. Forward Current vs. Forward Voltage.

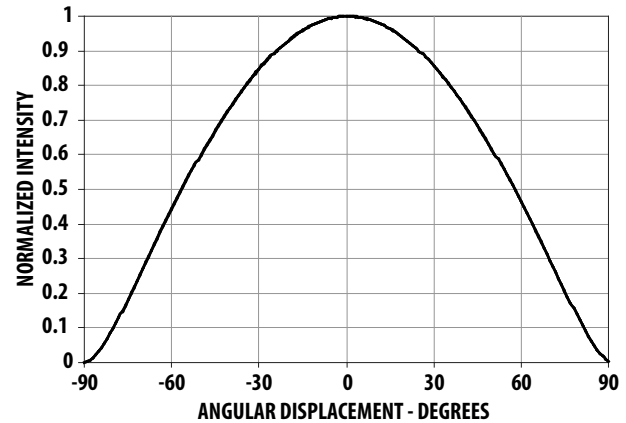


Figure 7. Radiation Pattern.

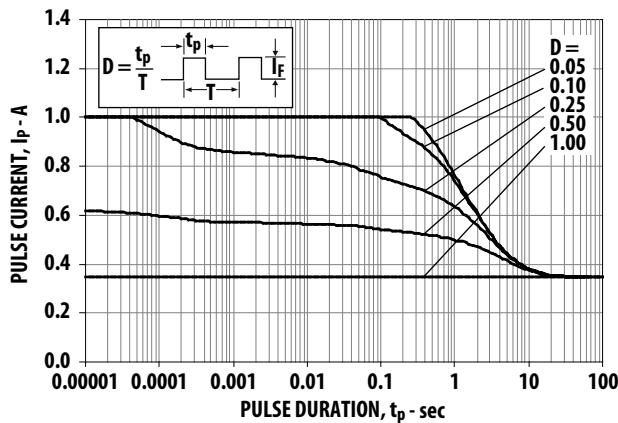


Figure 8. Maximum pulse current vs. ambient temperature. Derated based on $T_A = 25^\circ\text{C}$, $R\theta_{J-A} = 50^\circ\text{C/W}$.

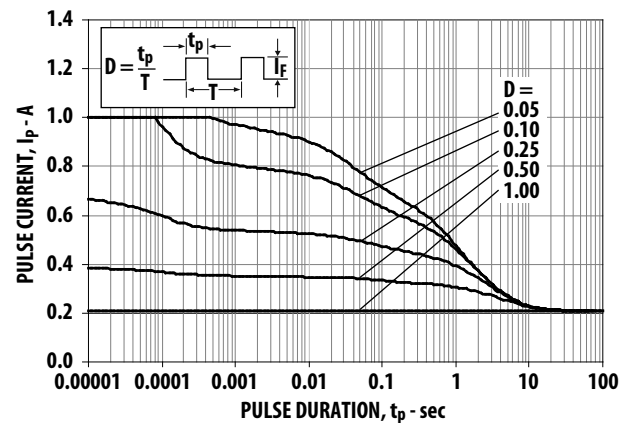


Figure 9. Maximum pulse current vs. ambient temperature. Derated based on $T_A = 85^\circ\text{C}$, $R\theta_{J-A} = 50^\circ\text{C/W}$.

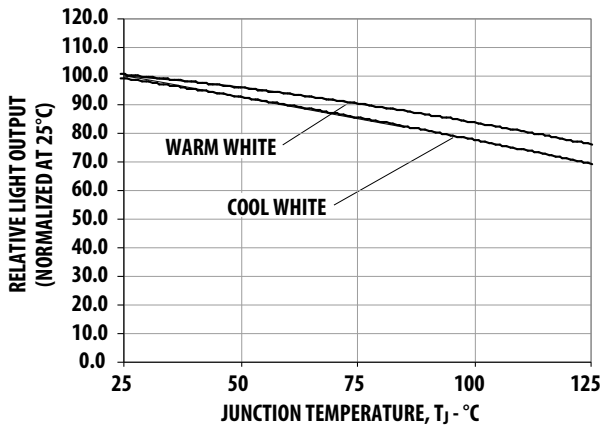


Figure 10. Relative Light Output vs. Junction Temperature.

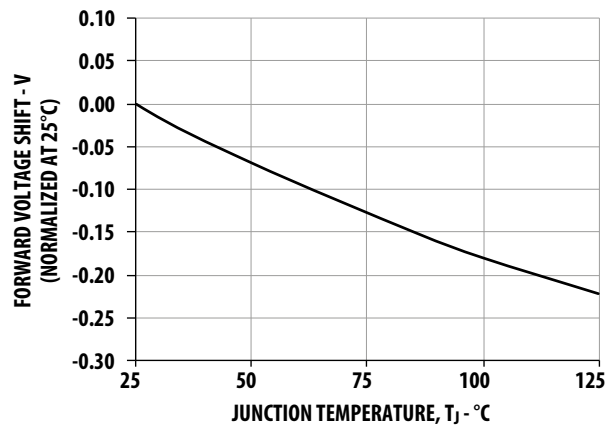


Figure 11. Forward Voltage Shift vs. Junction Temperature.

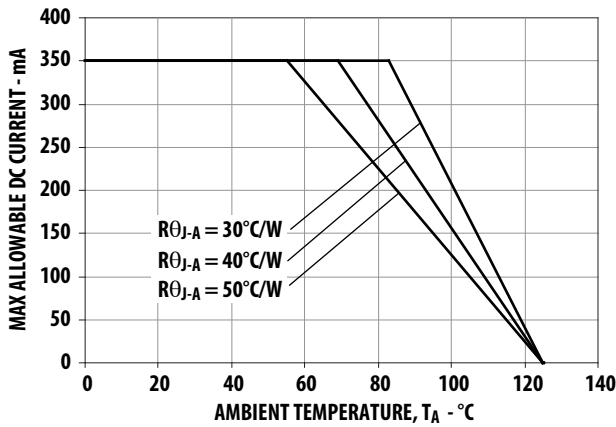


Figure 12. Maximum Forward Current vs. Ambient Temperature. Derated based on $T_{JMAX} = 125^{\circ}C$, $R_{\theta J-A} = 30^{\circ}C/W$, $40^{\circ}C/W$ and $50^{\circ}C/W$.

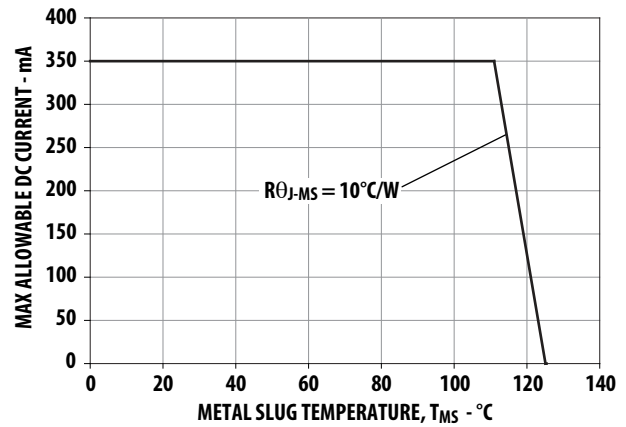


Figure 13. Maximum Forward Current vs. Metal Slug Temperature. Derated based on $T_{JMAX} = 125^{\circ}C$, $R_{\theta J-MS} = 10^{\circ}C/W$.

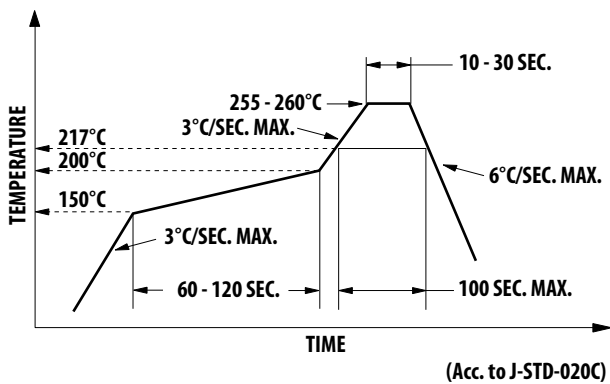


Figure 14. Recommended Reflow Soldering.

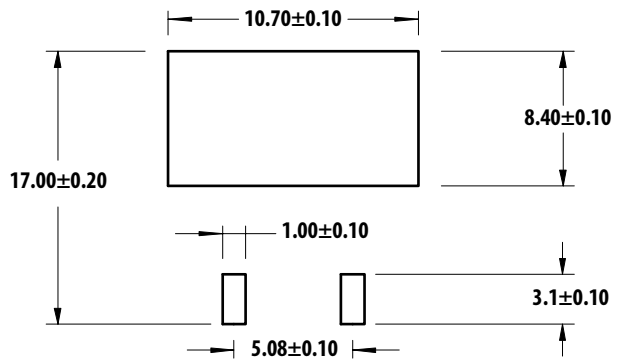


Figure 15. Recommended soldering land pattern.

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-Mx₁ x₂ 4 - N x₃ x₄ x₅ x₆

x₃ – Minimum Flux Bin

x₄ – Maximum Flux Bin

x₅ – Color Bin Selection

x₆ – Packaging Option

Color Bin Selections [x₅]

Individual reel will contain parts from one full bin only.

Cool White

| O | Full Distribution |
|---|--------------------|
| A | A only |
| B | B only |
| C | C only |
| D | D only |
| E | E only |
| F | F only |
| G | G only |
| H | H only |
| L | A and G only |
| M | B and H only |
| N | A and C only |
| P | B and D only |
| Q | E and C only |
| R | F and D only |
| S | G and H only |
| U | E and F only |
| W | C and D only |
| Z | A and B only |
| 1 | A, B, C and D only |
| 2 | G, H, A and B only |
| 4 | C, D, E and F only |

Flux Bin Limit [x₃, x₄]

| Bin | Luminous Flux (lm) at I _F = 350mA | |
|-----|--|-------|
| | Min. | Max. |
| L | 73.0 | 95.0 |
| M | 95.0 | 110.0 |
| N | 110.0 | 125.0 |

Tolerance for each bin limits is ±10%.

Warm White

| O | Full Distribution |
|---|--------------------|
| A | A only |
| B | B only |
| C | C only |
| D | D only |
| E | E only |
| F | F only |
| N | A and C only |
| P | B and D only |
| Q | E and C only |
| R | F and D only |
| U | E and F only |
| W | C and D only |
| Z | A and B only |
| 1 | A, B, C and D only |
| 4 | C, D, E and F only |

Color Bin Limit

| Cool White | Color Limits (Chromaticity Coordinates) | | | | |
|------------|---|-------|-------|-------|-------|
| | | X | Y | X | Y |
| Bin A | X | 0.367 | 0.362 | 0.329 | 0.329 |
| | Y | 0.400 | 0.372 | 0.345 | 0.369 |
| Bin B | X | 0.362 | 0.356 | 0.329 | 0.329 |
| | Y | 0.372 | 0.330 | 0.302 | 0.345 |
| Bin C | X | 0.329 | 0.329 | 0.305 | 0.301 |
| | Y | 0.369 | 0.345 | 0.322 | 0.342 |
| Bin D | X | 0.329 | 0.329 | 0.311 | 0.305 |
| | Y | 0.345 | 0.302 | 0.285 | 0.322 |
| Bin E | X | 0.303 | 0.307 | 0.283 | 0.274 |
| | Y | 0.333 | 0.311 | 0.284 | 0.301 |
| Bin F | X | 0.307 | 0.311 | 0.290 | 0.283 |
| | Y | 0.311 | 0.285 | 0.265 | 0.284 |
| Bin G | X | 0.388 | 0.379 | 0.362 | 0.367 |
| | Y | 0.417 | 0.383 | 0.372 | 0.400 |
| Bin H | X | 0.379 | 0.369 | 0.356 | 0.362 |
| | Y | 0.383 | 0.343 | 0.330 | 0.372 |

Tolerance: ± 0.01

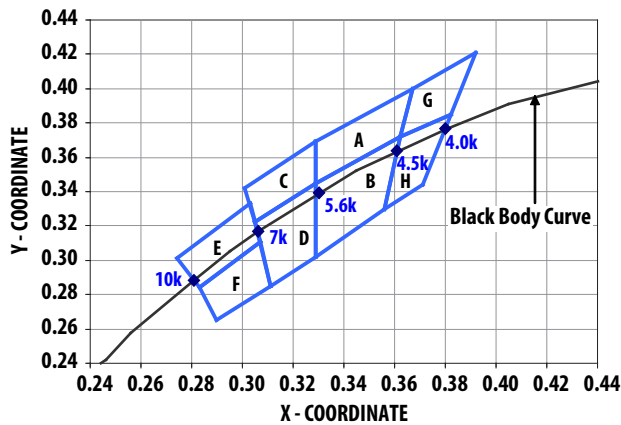


Figure 16. Color bins (Cool White)

Packaging Option [x₆]

| Selection | Option |
|-----------|---|
| 0 | Tube (for Moonstone® only) Tray (for Moonstone® on MCPCB only) |
| 1 | Tape and Reel |

Color Bin Limit

| Warm White | Color Limits (Chromaticity Coordinates) | | | | |
|------------|---|-------|-------|-------|-------|
| | | X | Y | X | Y |
| Bin A | X | 0.452 | 0.488 | 0.470 | 0.438 |
| | Y | 0.434 | 0.447 | 0.414 | 0.403 |
| Bin B | X | 0.438 | 0.470 | 0.452 | 0.424 |
| | Y | 0.403 | 0.414 | 0.384 | 0.376 |
| Bin C | X | 0.407 | 0.418 | 0.452 | 0.438 |
| | Y | 0.393 | 0.422 | 0.434 | 0.403 |
| Bin D | X | 0.395 | 0.407 | 0.438 | 0.424 |
| | Y | 0.362 | 0.393 | 0.403 | 0.376 |
| Bin E | X | 0.381 | 0.387 | 0.418 | 0.407 |
| | Y | 0.377 | 0.404 | 0.422 | 0.393 |
| Bin F | X | 0.373 | 0.381 | 0.407 | 0.395 |
| | Y | 0.349 | 0.377 | 0.393 | 0.362 |

Tolerance: ± 0.01

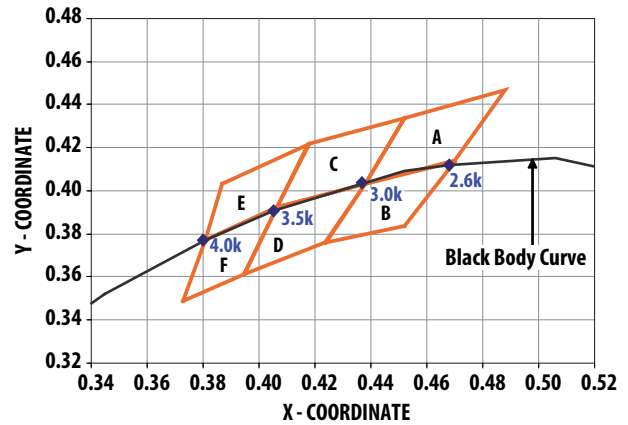


Figure 17. Color bins (Warm White).

Example

ASMT-MW04-NKLZ1

- ASMT-MW04-Nxxxx – Cool White, Non-diffused
- X₃ = K – Minimum Flux Bin K
- X₄ = L – Maximum Flux Bin L
- X₅ = Z – Color Bin A and B only
- X₆ = 1 – Tape and Reel Option

Packing Tube – Option 0

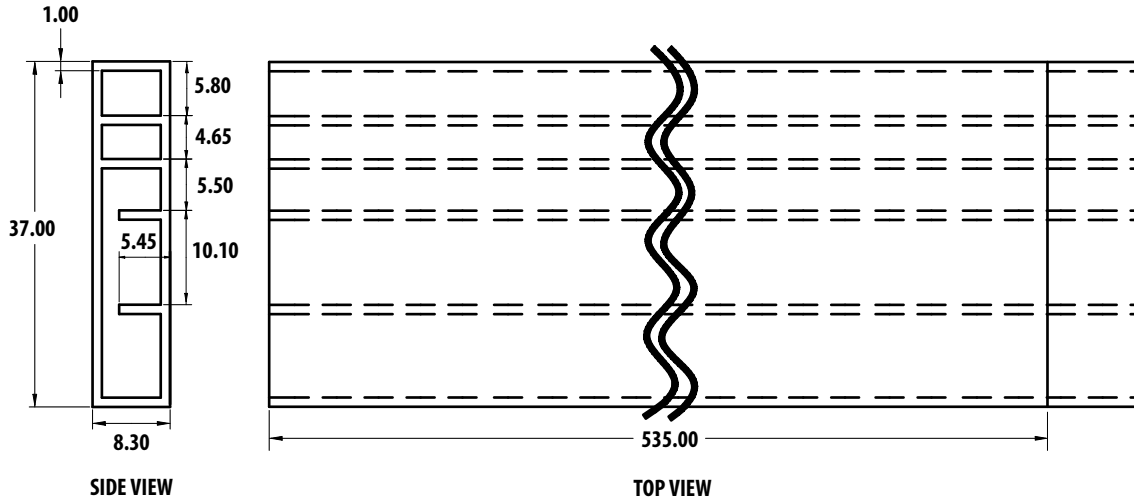
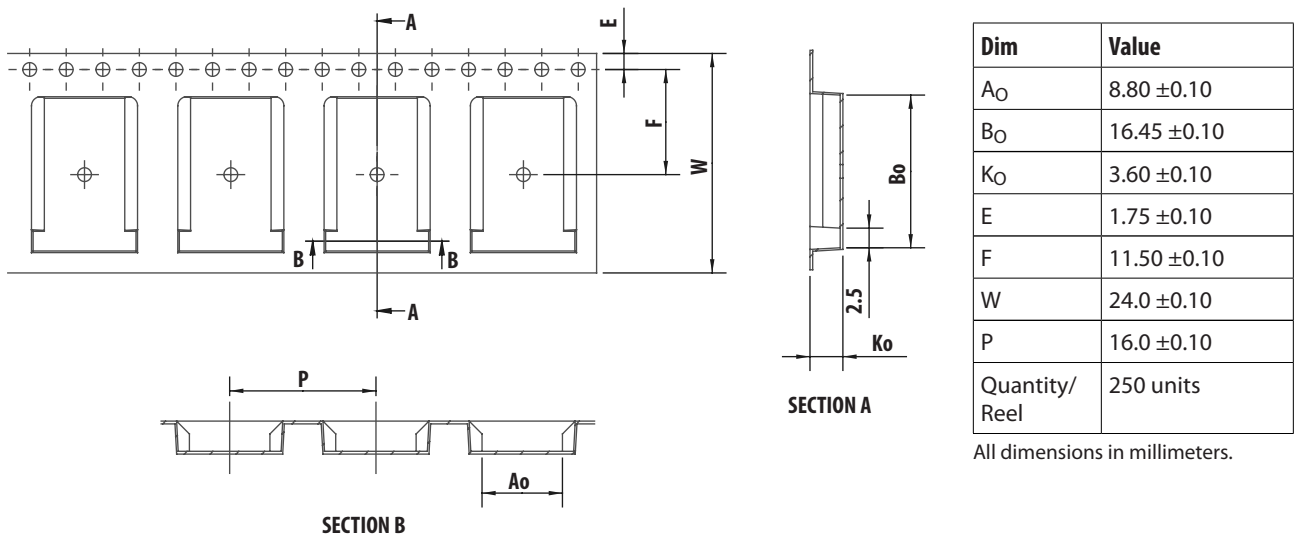


Figure 18. Tube dimensions.

Tape and Reel – Option 1



All dimensions in millimeters.

Figure 19. Carrier tape dimensions.

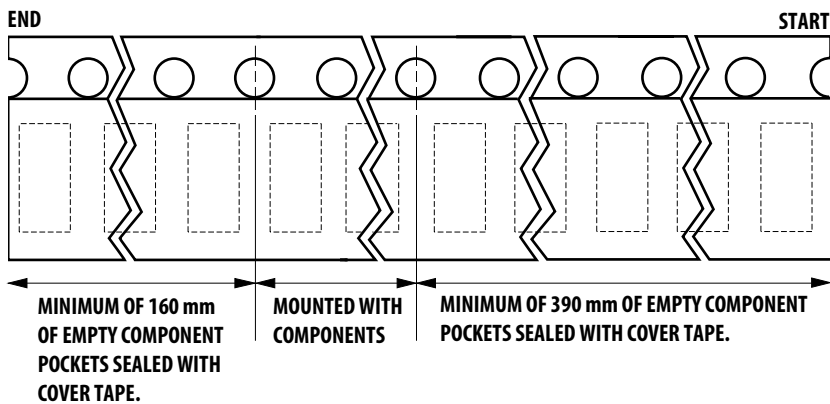


Figure 20. Carrier tape leader and trailer dimensions.

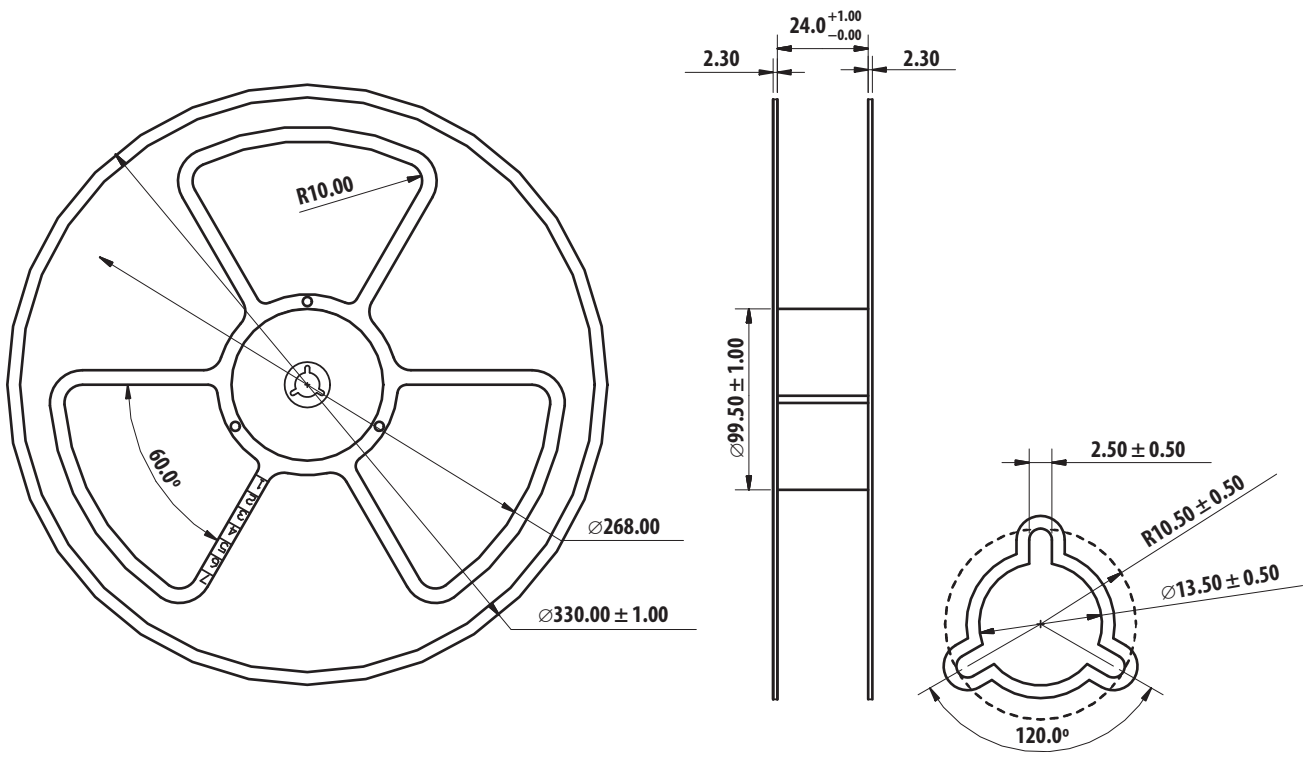


Figure 21. Reel dimensions.

Packing Tray – Option 0 (for Moonstone® on MCPCB only)

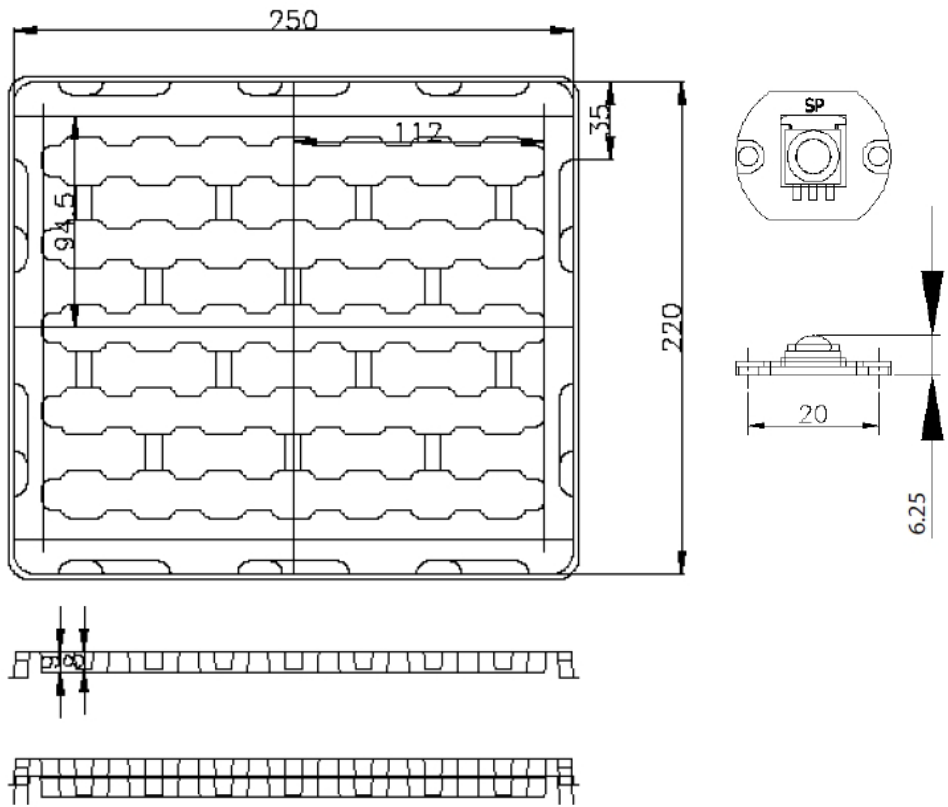


Figure 22. Tray dimensions.

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 AN 5288 for detail information.

Moisture Sensitivity

This product is qualified as Moisture Sensitive Level 2a 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.

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.

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 LED floor life exceeded 672hrs.

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

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