

ASMT-Mxx4

Moonstone® 1W High Brightness Power LED Light Source



Overview

The Broadcom® Moonstone® 1W power LED light source is a high-performance energy-efficient device that 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.

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 (flashlight, bicycle head light)

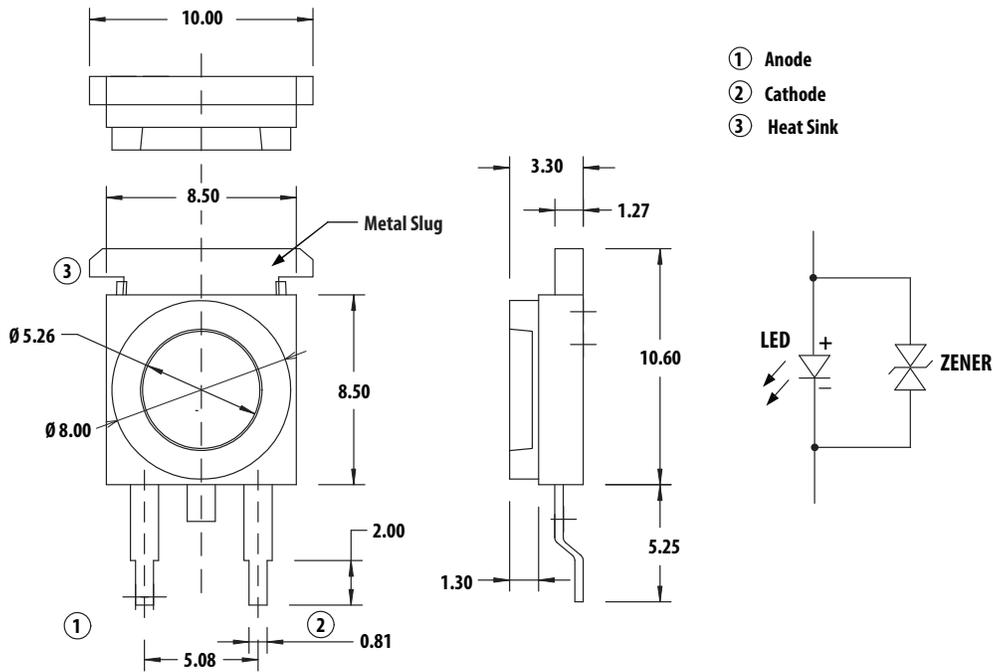
Features

- Available in cool white and warm white colors
- 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 > 16 kV)
- MSL 2a products

Specifications

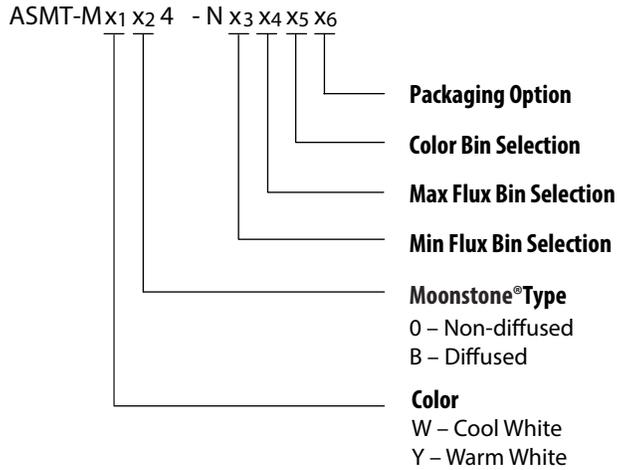
- InGaN technology
- 3.5V (max.) at 350 mA
- 110° viewing angle

Figure 1: Package Dimensions

**NOTE:**

1. All dimensions are in millimeters (mm).
2. Unless otherwise stated, the tolerance for dimension is ± 0.1 mm.
3. Terminal finish: Ag plating.

Part Numbering System



NOTE: For selection details, see [Option Selection Details](#).

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

| Part Number | Color | Luminous Flux, $\phi_v^{a,b}$ (lm) | | | Test Current (mA) | Dice Technology | Electrically Isolated Metal Slug |
|-----------------|------------------------|------------------------------------|-------|-------|-------------------|-----------------|----------------------------------|
| | | Min. | Typ. | Max. | | | |
| ASMT-MW04-NLN00 | Cool White | 73.0 | 110.0 | 125.0 | 350 | InGaN | Yes |
| ASMT-MW04-NMN00 | | 95.0 | 110.0 | 125.0 | | | Yes |
| ASMT-MY04-NLM00 | Warm White | 73.0 | 100.0 | 110.0 | 350 | InGaN | Yes |
| ASMT-MWB4-NLM00 | Cool White | 73.0 | 95.0 | 110.0 | 350 | InGaN | Yes |
| ASMT-MWB4-NMN00 | Diffused | 95.0 | 100.0 | 125.0 | | | Yes |
| ASMT-MYB4-NLM00 | Warm White Diffused | 73.0 | 95.0 | 110.0 | 350 | InGaN | Yes |

a. ϕ_v is the total luminous flux output as measured with an integrating sphere at 25-ms mono pulse condition.

b. Flux tolerance is $\pm 10\%$.

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

| Parameter | ASMT-Mxx4 | Units |
|---|-------------------------------|------------------|
| DC Forward Current ^a | 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 | See Figure 12 | |
| Reverse Voltage ^b | Not recommended | |

a. DC forward current – derate linearly based on [Figure 10](#).

b. Not designed 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 $2\theta_{1/2}$ ^a (Degrees) | Luminous Efficiency (lm/W) |
|-----------------|---------------------|--|-------|--|----------------------------|
| | | Min. | Max. | Typ. | Typ. |
| ASMT-MW04-NLN00 | Cool White | 4000 | 10000 | 110 | 98 |
| ASMT-MW04-NMN00 | | 4000 | 10000 | 110 | 98 |
| ASMT-MY04-NLM00 | Warm White | 2600 | 4000 | 110 | 89 |
| ASMT-MWB4-NLM00 | Cool White Diffused | 4000 | 10000 | 110 | 85 |
| ASMT-MWB4-NMN00 | | 4000 | 10000 | 110 | 89 |
| ASMT-MYB4-NLM00 | Warm White Diffused | 2600 | 4000 | 110 | 85 |

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

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

| Dice Type | Forward Voltage V_F (Volts) at $I_F = 350$ mA | | | Thermal Resistance R_{θ_j-ms} ($^\circ\text{C/W}$) ^a |
|-----------|---|------|------|--|
| | Min. | Typ. | Max. | Typ. |
| InGaN | 2.8 | 3.2 | 3.5 | 10 |

a. R_{θ_j-ms} is the thermal resistance from the LED junction to the metal slug.

Figure 2: Relative Intensity vs. Wavelength

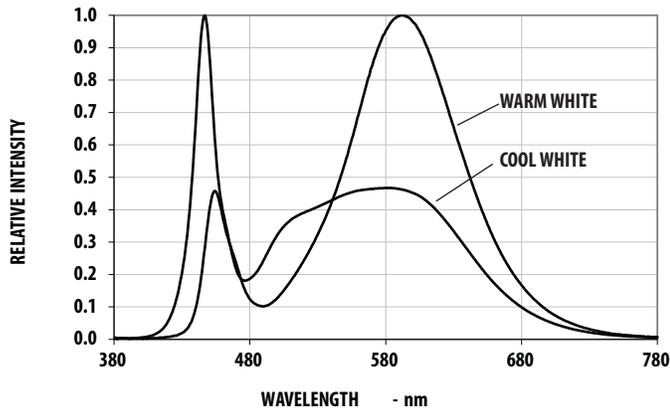


Figure 3: Relative Luminous Flux vs. Mono Pulse Current

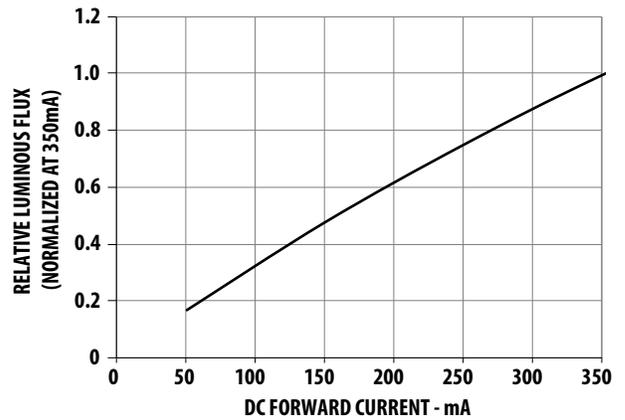


Figure 4: Forward Current vs. Forward Voltage

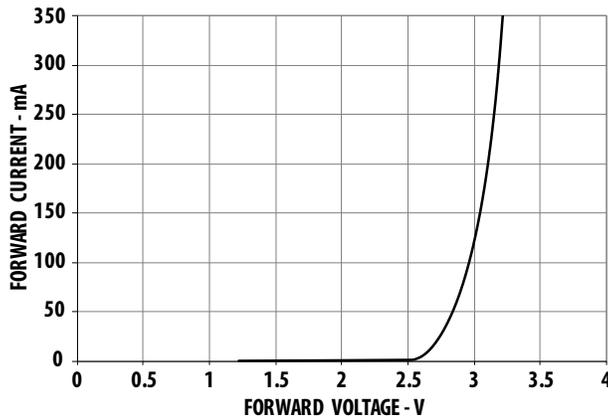


Figure 5: Radiation Pattern

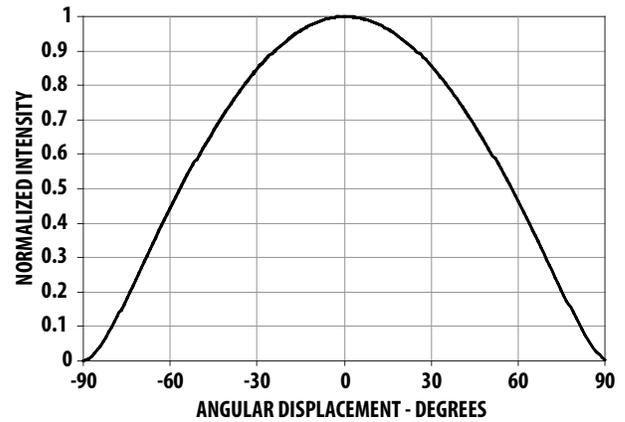


Figure 6: Maximum Pulse Current vs. Ambient Temperature. Derated based on $T_A = 25^\circ\text{C}$, $R_{\theta J-A} = 50^\circ\text{C/W}$.

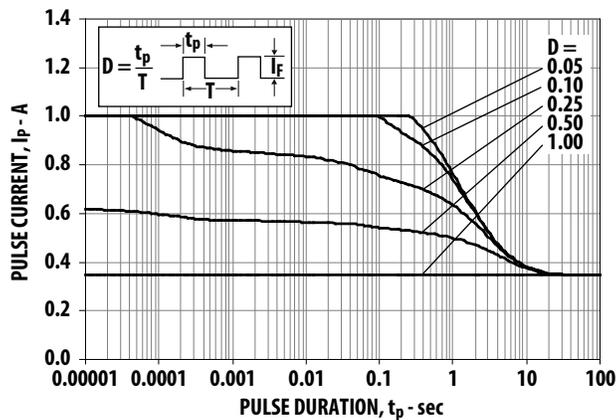


Figure 7: Maximum Pulse Current vs. Ambient Temperature. Derated based on $T_A = 85^\circ\text{C}$, $R_{\theta J-A} = 50^\circ\text{C/W}$.

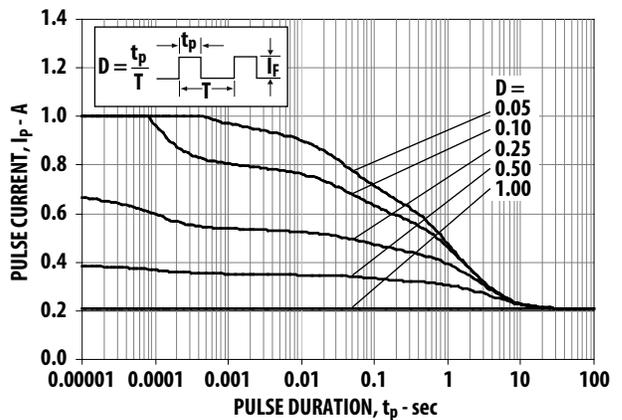


Figure 8: Relative Light Output vs. Junction Temperature

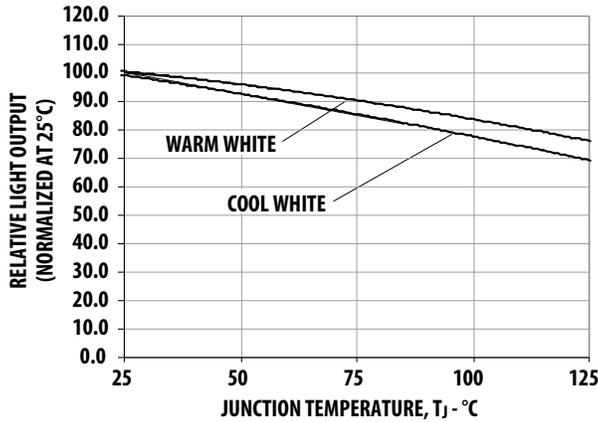


Figure 9: Forward Voltage Shift vs. Junction Temperature

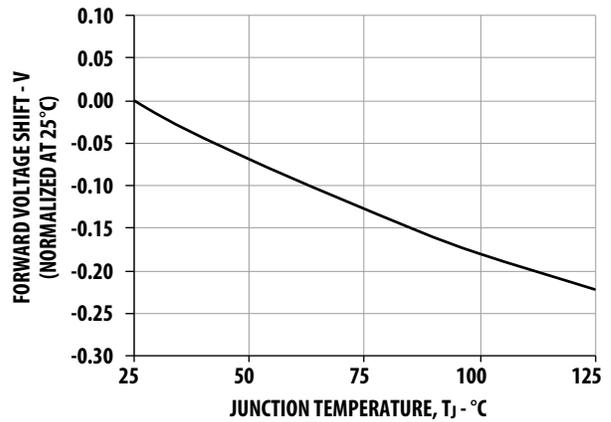


Figure 10: Maximum Forward Current vs. Ambient Temperature. Derated based on T_{JMAX} = 125°C, R_{θJ-A} = 30°C/W, 40°C/W, and 50°C/W.

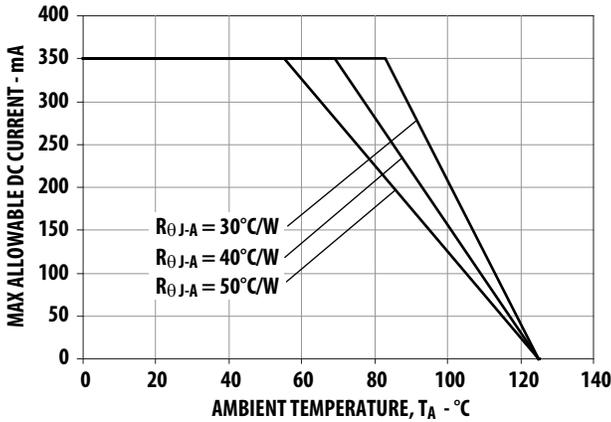


Figure 11: Maximum Forward Current vs. Metal Slug Temperature. Derated based on T_{JMAX} = 125°C, R_{θJ-MS} = 10°C/W.

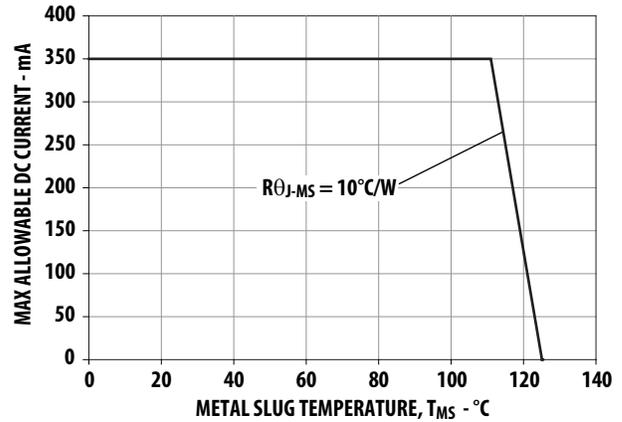


Figure 12: Recommended Reflow Soldering

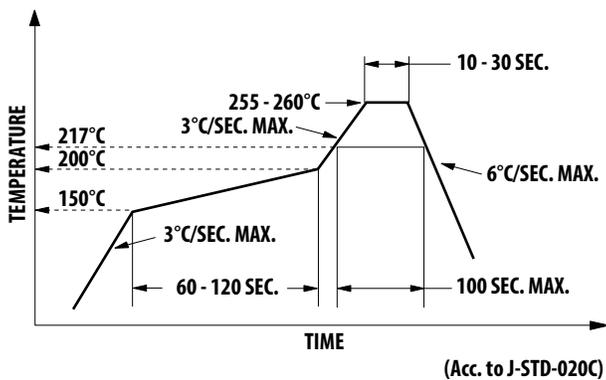
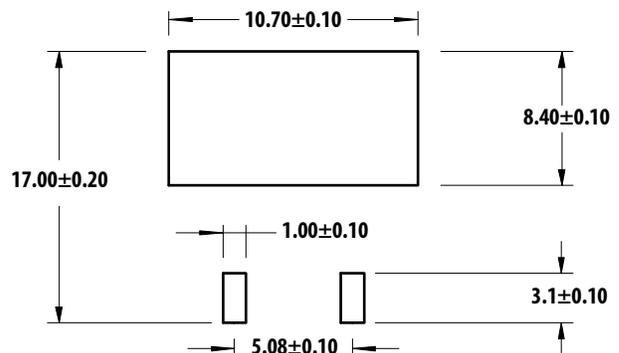


Figure 13: Recommended Soldering Land Pattern



NOTE: For detailed information on reflow soldering of Broadcom surface mount LEDs, refer to Broadcom Application Note AN1060, *Surface Mounting SMT LED Indicator Components*.

Option Selection Details

ASMT – M x₁ x₂ 4 – N x₃ x₄ x₅ x₆

x₃ – Minimum Flux Bin

x₄ – Maximum Flux Bin

x₅ – Color Bin Selection

x₆ – Packaging Option

Flux Bin Limit [x₃x₄]

| Bin | Flux (lm) at 150mA | |
|-----|--------------------|-------|
| | Min | Max |
| L | 73.0 | 95.0 |
| M | 95.0 | 110.0 |
| N | 110.0 | 125.0 |

Tolerance for each bin limits is ±10%.

Color Bin Selections [x₅]

Individual reel will contain parts from one color bin selection only.

Cool White

| Selection | Bin ID |
|-----------|---------------------|
| 0 | 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 |

Warm White

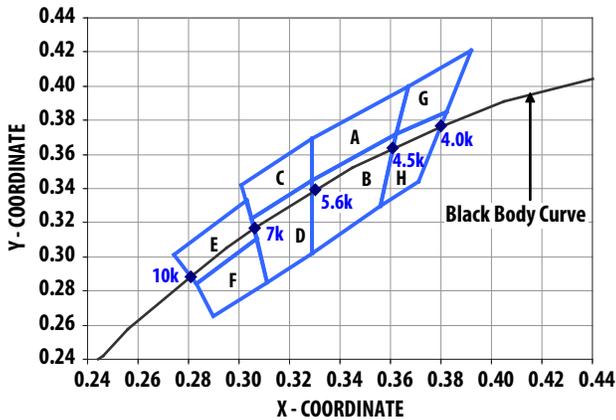
| Selection | Bin |
|-----------|---------------------|
| 0 | Full Distribution |
| A | A only |
| B | B only |
| C | C only |
| D | D only |
| E | E only |
| F | F only |
| N | A and C only |
| P | B and D only |
| Q | E and C only |
| R | F and D only |
| U | E and F only |
| W | C and D only |
| Z | 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) | | | | |
|------------|---|-------|-------|-------|-------|
| 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 14: Color Bins (Cool White)



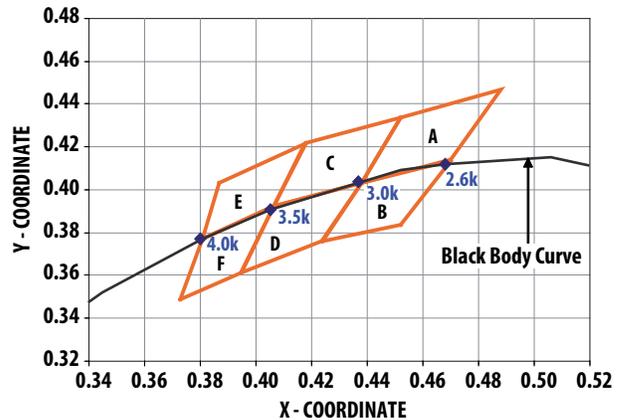
Packaging Option [x6]

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

| Warm White | Color Limits (Chromaticity Coordinates) | | | | |
|------------|---|-------|-------|-------|-------|
| 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 15: Color Bins (Warm White)



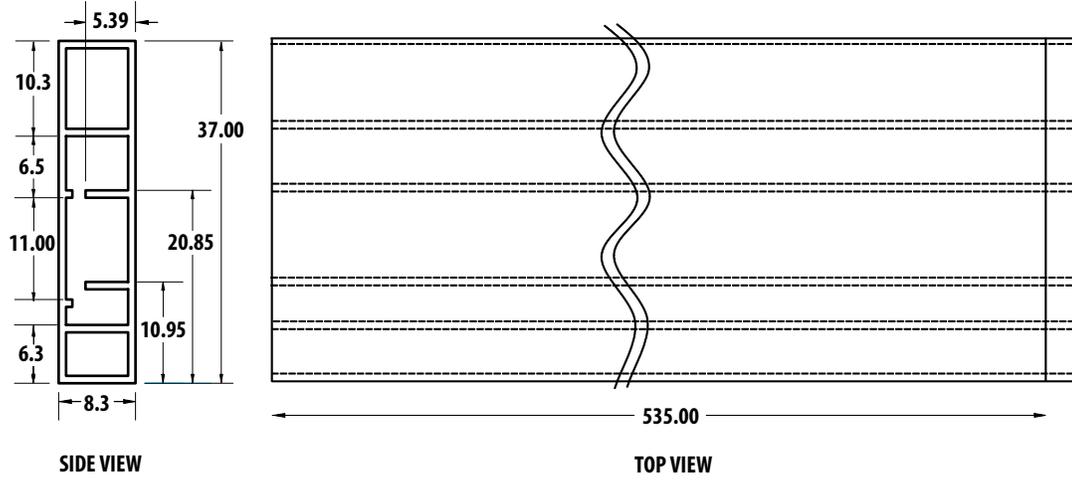
Example

ASMT-MW04-NLNZ1

- ASMT-MW04-Nxxxx – Cool White, Non-diffused
- x₃ = L – Minimum Flux Bin L
- x₄ = N – Maximum Flux Bin N
- x₅ = Z – Color Bin A and B only
- x₆ = 1 – Tape and Reel Option

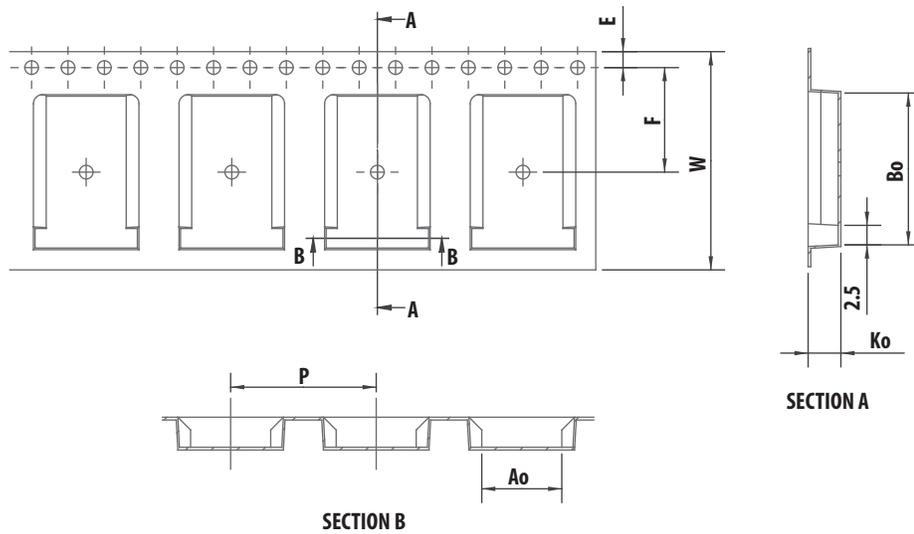
Packing Tube – Option 0

Figure 16: Tube Dimensions



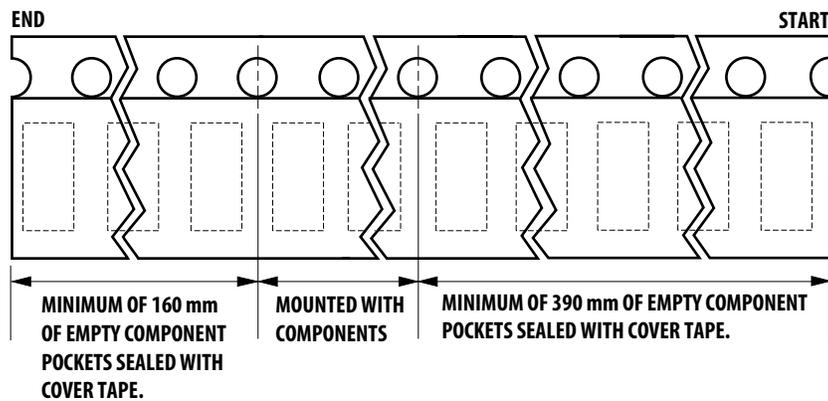
Tape and Reel – Option 1

Figure 17: Carrier Tape Dimensions



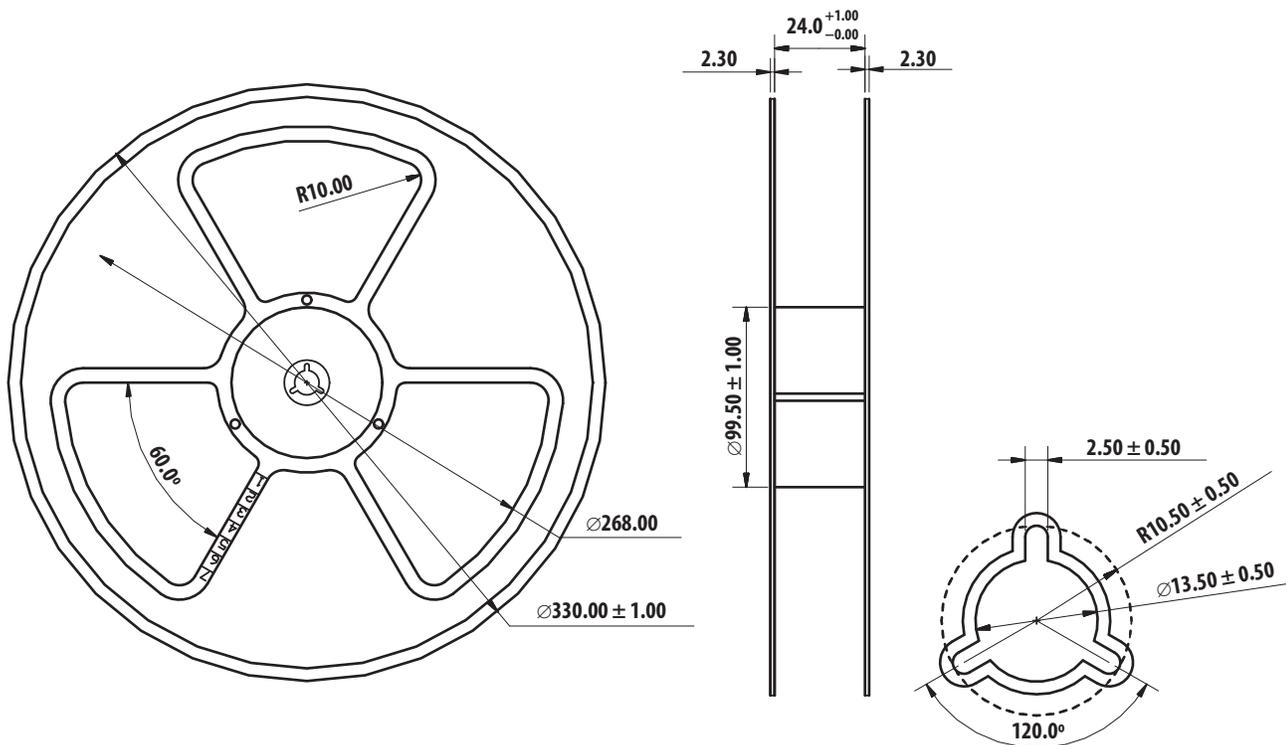
| Dimension | Value (in mm) |
|----------------|---------------|
| A ₀ | 8.80 ±0.10 |
| B ₀ | 16.45 ±0.10 |
| K ₀ | 3.60 ±0.10 |
| E | 1.75 ±0.10 |
| F | 11.50 ±0.10 |
| W | 24.0 ±0.10 |
| P | 16.0 ±0.10 |
| Quantity/Reel | 250 units |

Figure 18: Carrier Tape Leader and Trailer Dimensions



*Note: Tape & Reel Packaging only applicable as per this data sheet only.

Figure 19: Reel Dimensions



Handling Precautions

The encapsulation material of the product is made of silicone for better reliability of the product. As silicone is a soft material, do not press on the silicone or poke a sharp object onto the silicone. These actions might damage the product and cause premature failure. During assembly or handling, hold the unit only on the body. Refer to Broadcom Application Note AN 5288 for detailed information.

Moisture Sensitivity

This product is qualified as Moisture Sensitive Level 2a per JEDEC J-STD-020. Take precautions when handling this moisture-sensitive product to ensure the reliability of the product. Refer to Broadcom Application Note AN 5305 *Handling of Moisture Sensitive Surface Mount Devices* for details.

- Storage before use
 - An unopened moisture barrier bag (MBB) can be stored at <math><40^{\circ}\text{C}/90\% \text{RH}</math> for 12 months. If the actual shelf life has exceeded 12 months and the humidity indicator card (HIC) indicates that baking is not required, it is safe to reflow the LEDs per the original MSL rating.
 - Do not open the MBB prior to assembly (for example, for IQC).
- Control after opening the MBB
 - Read the HIC immediately upon opening the MBB.
 - The LEDs must be kept at <math><30^{\circ}\text{C}/60\% \text{RH}</math> at all times and all high temperature-related processes, including soldering, curing, or rework, must be completed within 672 hours.
- Control for unfinished reel

For any unused LEDs, they must be stored in a sealed MBB with desiccant or desiccator at <math><5\% \text{RH}</math>.
- 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 a sealed MBB with desiccant or desiccator at <math><5\% \text{RH}</math> to ensure that no LEDs have exceeded their floor life of 672 hours.

- Baking is required if:
 - The HIC 10% indicator is not blue and the 5% indicator is pink.
 - The LEDs are exposed to conditions of >30°C/60% RH at any time.
 - The LEDs' floor life exceeded 672 hours.

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

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