

# ASMT- Mx2x / ASMT- MxEx Moonstone® 3W Power LED Light Source



## Data Sheet



### Description

The Moonstone® 3W 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 Cool White Power LED is available in various color temperature ranging from 4000K to 10000K and Warm White Power LED ranging from 2600K to 4000K.

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
- Safety, exit and emergency sign lightings
- Specialty lighting such as task lighting and reading lights
- Retail display
- Commercial lighting
- Accent or marker lightings, strip or step lightings
- Portable lightings, bicycle head lamp, torch lights.
- Decorative lighting
- Architectural lighting
- Pathway lighting
- Street lighting
- Pedestrian street lighting
- Tunnel lighting

### 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 4 products
- Available in both electrically isolated and non-isolated metal heat slug

### Specifications

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

## Package Dimensions

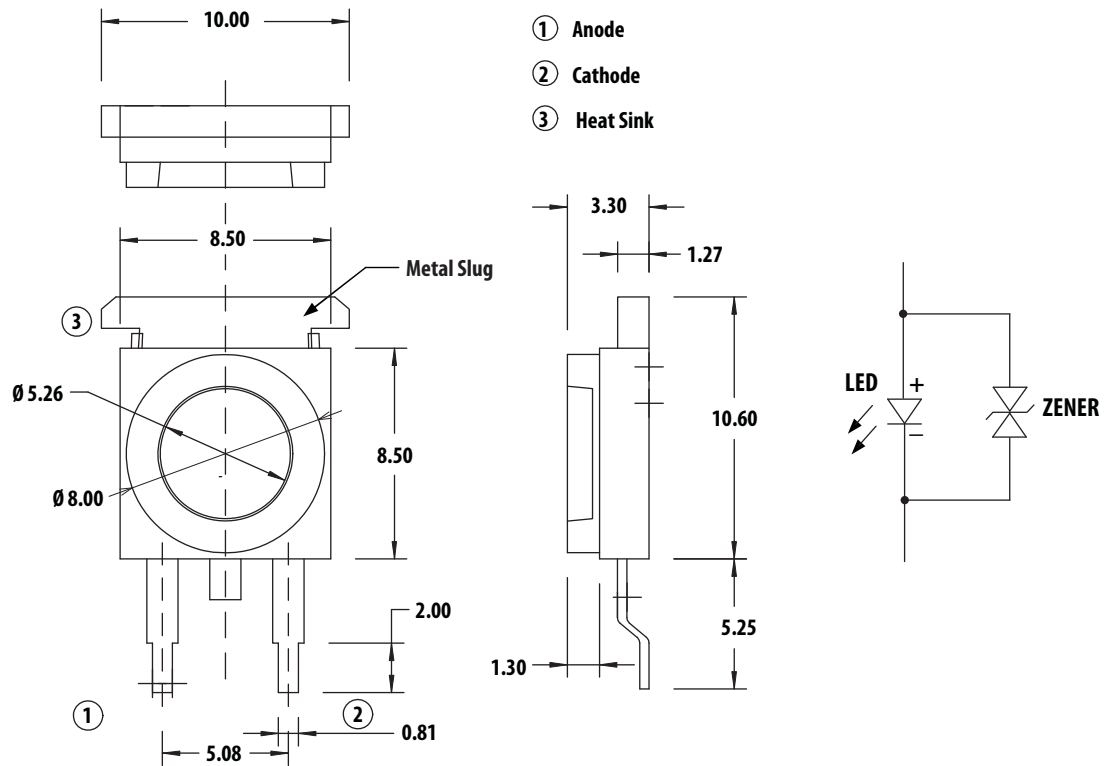
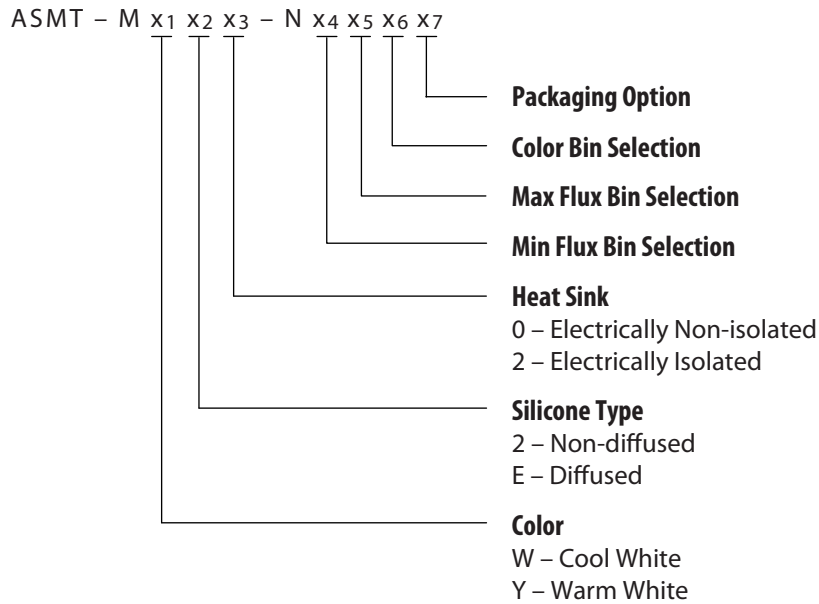


Figure 1. ASMT-Mx2x / ASMT-MxEx package outline drawing.

### Notes:

1. All dimensions are in millimeters.
2. Unless otherwise stated, the tolerance for dimension is  $\pm 0.1$  mm.
3. Metal slug is connected to anode for electrically non-isolated option.

## Part Numbering System



Note:

1. Please refer to Page 8 for selection details.

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

Part Number	Color	Luminous Flux, $\Phi_v^{[1,2]}$ (lm)			Test Current (mA)	Die Technology	Electrically Isolated Metal Slug
		Min.	Typ.	Max.			
ASMT-MW20-NLN00	Cool White	73.0	85.0	161.0	350	InGaN	No
ASMT-MW22-NLN00							Yes
ASMT-MY20-NLM00	Warm White	73.0	75.0	124.0	350	InGaN	No
ASMT-MY22-NLM00							Yes
ASMT-MWE0-NLM00	Cool White	73.0	80.0	124.0	350	InGaN	No
ASMT-MWE2-NLM00	Diffused						Yes
ASMT-MYE0-NKM00	Warm White	56.0	70.0	124.0	350	InGaN	No
ASMT-MYE2-NKM00	Diffused						Yes

Notes:

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

## Absolute Maximum Ratings

Parameter	ASMT-Mx2x / ASMT-MxEx	Units
DC Forward Current <sup>[1]</sup>	700	mA
Peak Pulsing Current <sup>[2]</sup>	1000	mA
Power Dissipation	3010	mW
LED Junction Temperature	125	°C
Operating Metal Slug Temperature Range at 350 mA	-40 to +120	°C
Operating Metal Slug Temperature Range at 700 mA	-40 to +95	°C
Storage Temperature Range	-40 to +120	°C
Soldering Temperature	Refer to Figure 11	
Reverse Voltage <sup>[3]</sup>	Not recommended	

Note:

1. Derate linearly based on Figure 9.
2. Pulse condition: duty factor = 10%, Frequency = 1 kHz.
3. Not designed for reverse bias operation.

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

Part Number	Color	Correlated Color Temperature, CCT (Kelvin)		Viewing Angle	Luminous Efficiency
		Min.	Max.	2θ <sub>1/2</sub> <sup>[1]</sup> (°)	(lm/W)
ASMT-MW20-NLN00	Cool White	4000	10000	110	76
ASMT-MW22-NLN00					
ASMT-MY20-NLM00	Warm White	2600	4000	110	67
ASMT-MY22-NLM00					
ASMT-MWE0-NLM00	Cool White Diffused	4000	10000	110	71
ASMT-MWE2-NLM00					
ASMT-MYE0-NKM00	Warm White Diffused	2600	4000	110	63
ASMT-MYE2-NKM00					

Notes:

1. θ<sub>1/2</sub> 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)			Thermal Resistance, $R_{\theta_{j-ms}}$ ( $^\circ\text{C}/\text{W}$ ) <sup>[1]</sup>	Temperature Coefficient of Forward Voltage ( $\text{mV}/^\circ\text{C}$ ), $\Delta V_F/\Delta T_J$
	Min.	Typ.	Max.	Typ.	Typ.
InGaN	2.8	3.2	3.5	10	-1.5 to -3.5

Note:

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

**Optical and Electrical Characteristic at 700 mA ( $T_J = 25^\circ\text{C}$ )**

Part Number	Color	Luminous Flux, $\Phi_V$ (lm)	Forward Voltage, $V_F$ (Volts)
		Typ.	Typ.
ASMT-MW20-NLN00	Cool White	155	3.6
ASMT-MW22-NLN00			
ASMT-MY20-NLM00	Warm White	135	3.6
ASMT-MY22-NLM00			
ASMT-MWE0-NLM00	Cool White Diffused	145	3.6
ASMT-MWE2-NLM00			
ASMT-MYE0-NKM00	Warm White Diffused	130	3.6
ASMT-MYE2-NKM00			

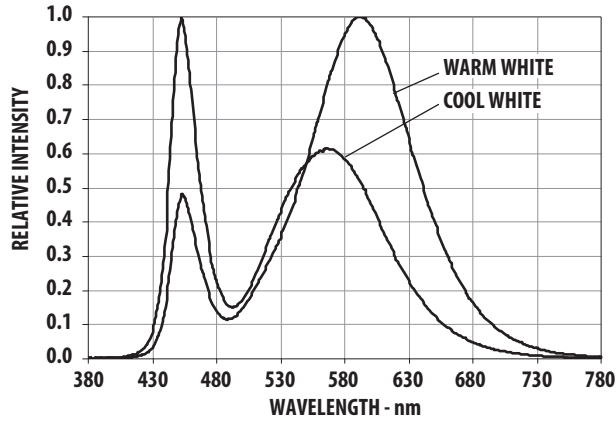


Figure 2. Relative Intensity vs. Wavelength.

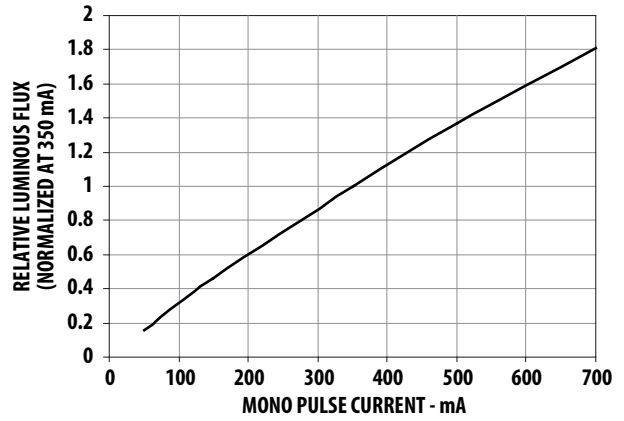


Figure 3. Relative Luminous Flux vs. Forward Current.

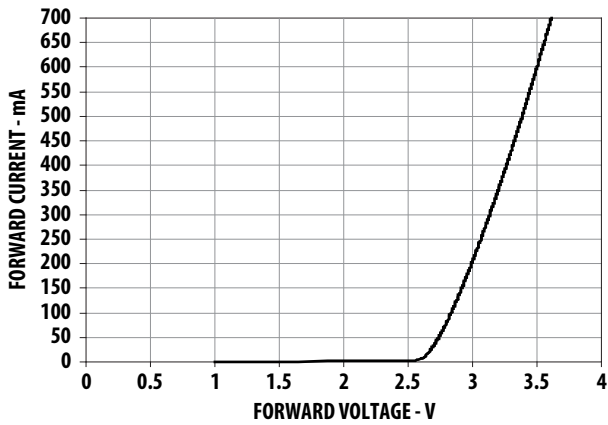


Figure 4. Forward Current vs. Forward Voltage.

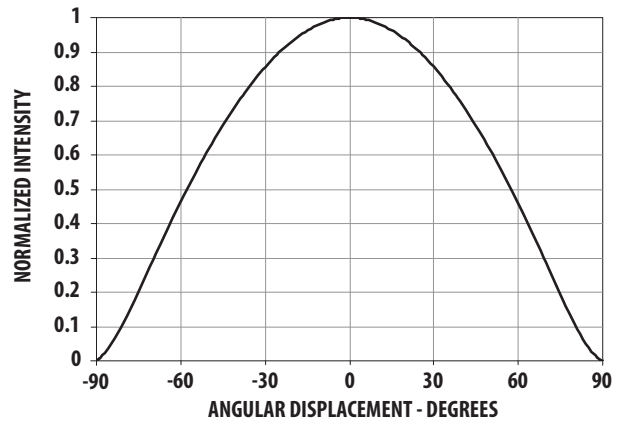


Figure 5. Radiation Pattern.

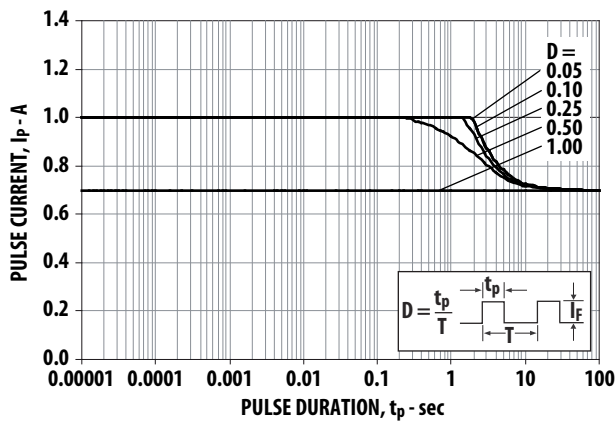


Figure 6. Maximum pulse current vs. ambient temperature. Derated based on  $T_A = 25^\circ\text{C}$ ,  $R\theta_{J-A} = 30^\circ\text{C/W}$ .

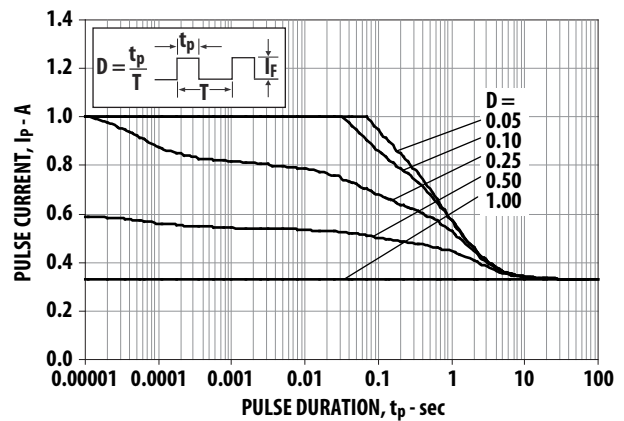


Figure 7. Maximum pulse current vs. ambient temperature. Derated based on  $T_A = 85^\circ\text{C}$ ,  $R\theta_{J-A} = 30^\circ\text{C/W}$ .

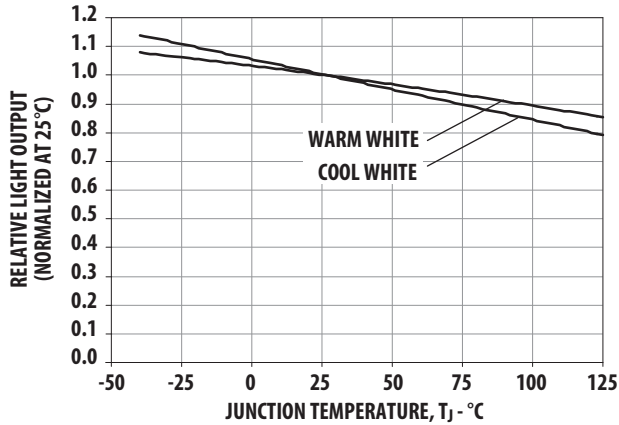


Figure 8. Relative Light Output vs. Junction Temperature.

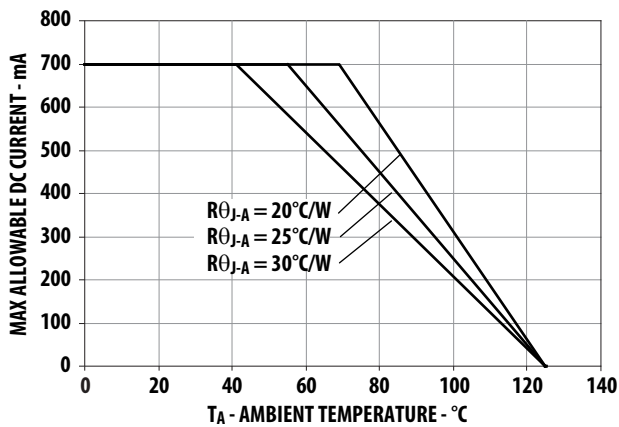


Figure 9. Maximum Forward Current vs. Ambient Temperature. Derated based on  $T_{JMAX} = 125^{\circ}\text{C}$ ,  $R_{\theta JA} = 20^{\circ}\text{C/W}$ ,  $25^{\circ}\text{C/W}$  and  $30^{\circ}\text{C/W}$ .

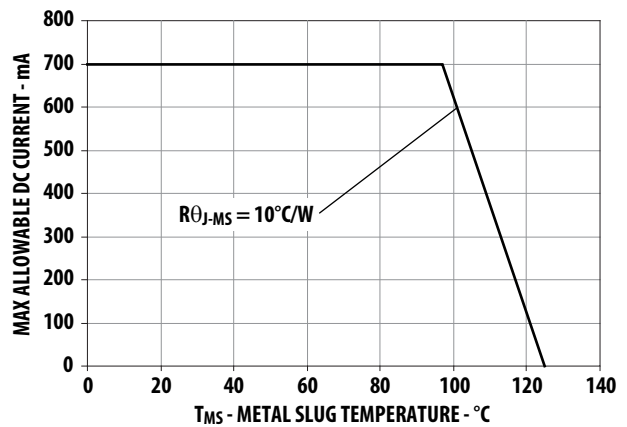


Figure 10. Maximum Forward Current vs. Metal Slug Temperature. Derated based on  $T_{JMAX} = 125^{\circ}\text{C}$ ,  $R_{\theta MS} = 10^{\circ}\text{C/W}$ .

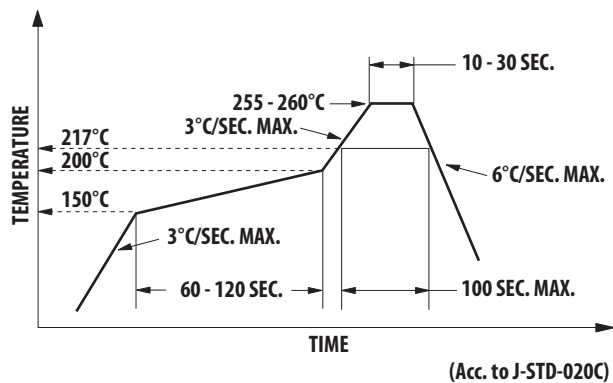


Figure 11. Recommended Reflow Soldering.

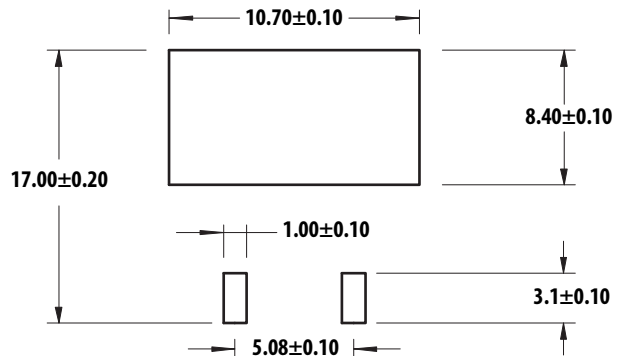


Figure 12. Recommended soldering land pattern.

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 – M x<sub>1</sub> x<sub>2</sub> x<sub>3</sub> – N x<sub>4</sub> x<sub>5</sub> x<sub>6</sub> x<sub>7</sub>

x<sub>4</sub> – Minimum Flux Bin

x<sub>5</sub> – Maximum Flux Bin

x<sub>6</sub> – Color Bin Selection

x<sub>7</sub> – Packaging Option

## Flux Bin Limit [x<sub>4</sub>, x<sub>5</sub>]

Bin	Luminous Flux (lm) at I <sub>F</sub> = 350mA	
	Min.	Max.
K	56.0	73.0
L	73.0	95.0
M	95.0	124.0
N	124.0	161.0

Tolerance for each bin limits is ±10%.

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

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 ID
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:  $\pm 0.01$

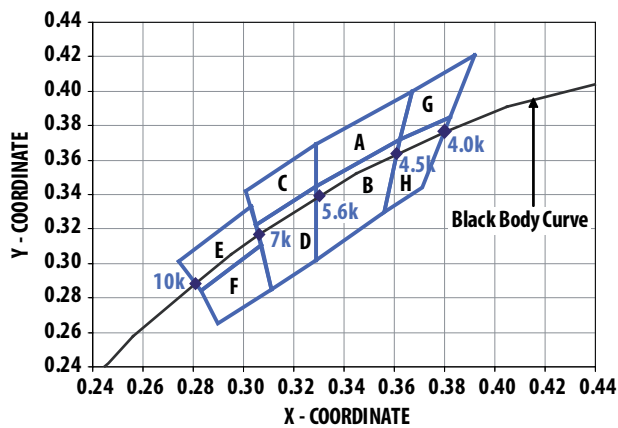


Figure 13. Color bins (Cool White).

### Packaging Option [x<sub>7</sub>]

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:  $\pm 0.01$

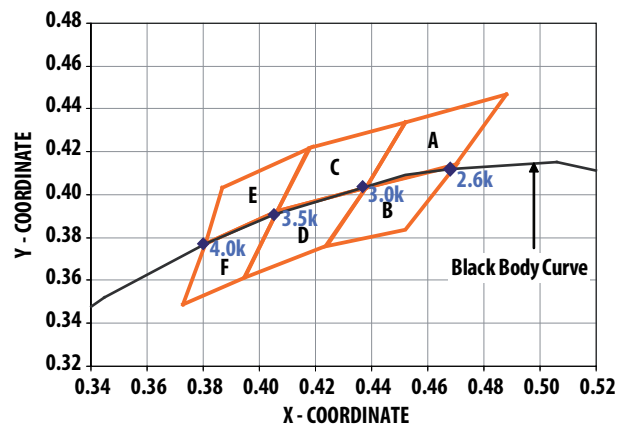


Figure 14. Color bins (Warm White).

### Example

#### ASMT-MW20-NLNZO

ASMT-MW20-Nxxxx – Cool White, Electrically Non-isolated  
Heat Sink, Non-diffused

- x<sub>4</sub> = L – Minimum Flux Bin L
- x<sub>5</sub> = N – Maximum Flux Bin N
- x<sub>6</sub> = Z – Color Bin A and B only
- x<sub>7</sub> = 0 – Tube Option

### Packing Tube – Option 0

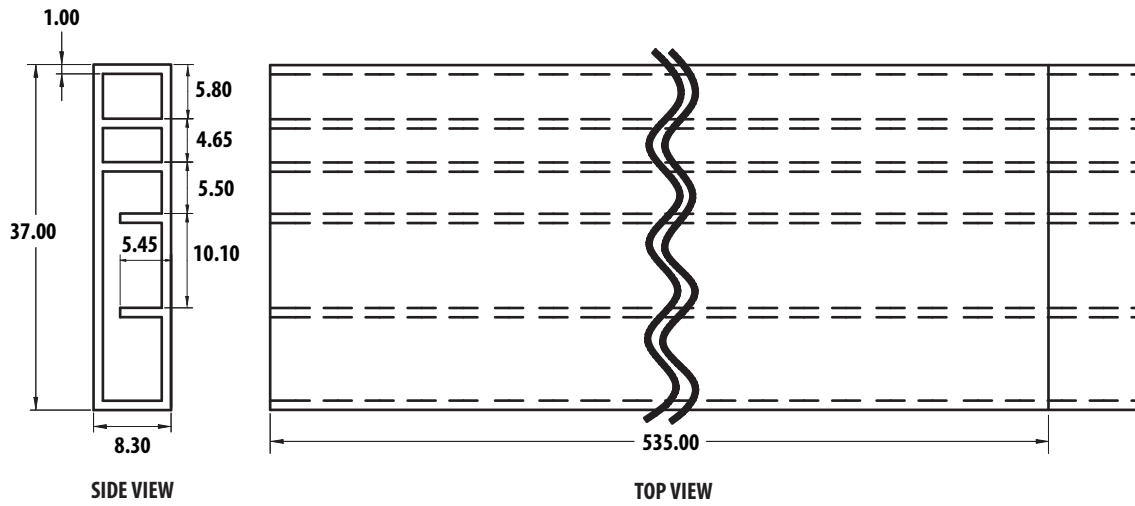


Figure 15. Tube dimensions

### Tape & Reel – Option 1

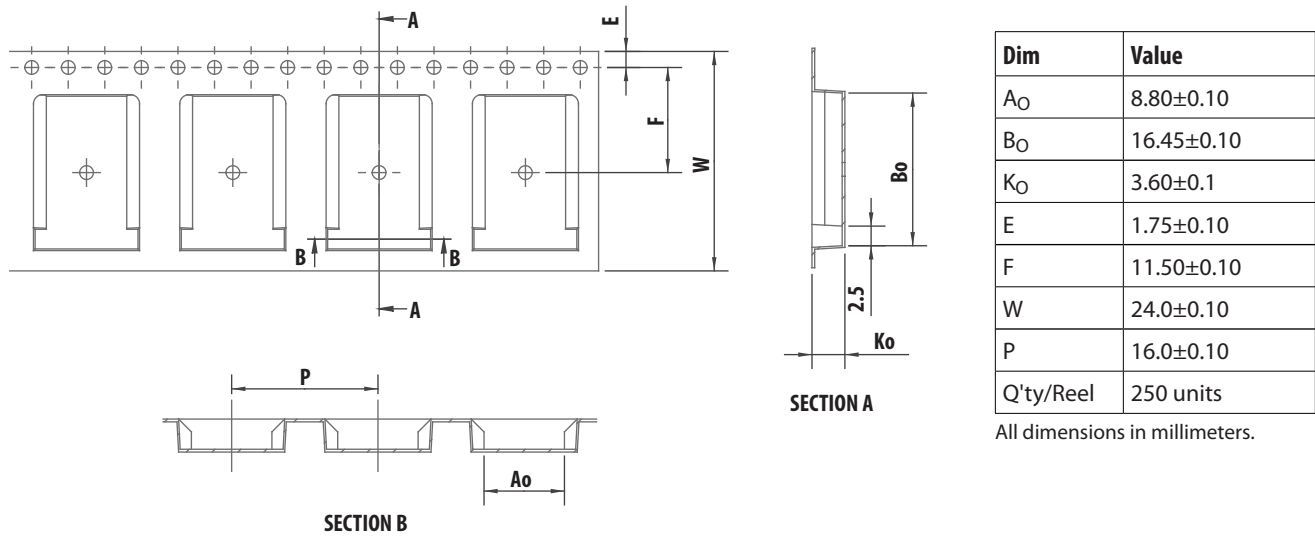


Figure 16. Carrier tape dimensions

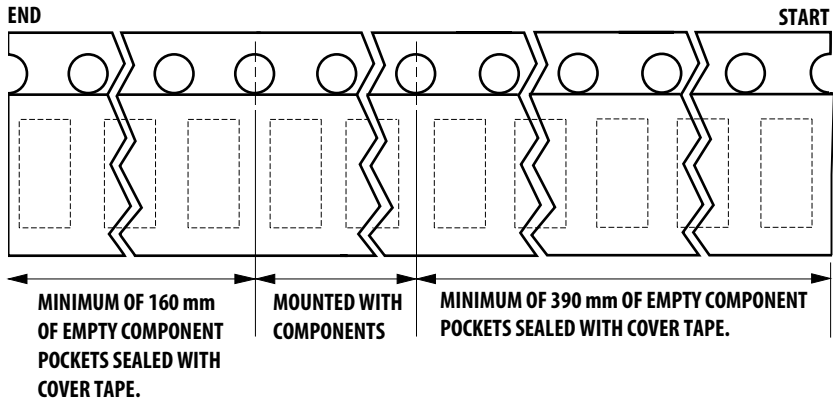


Figure 17. Carrier tape leader and trailer dimensions.

### Reel Dimension

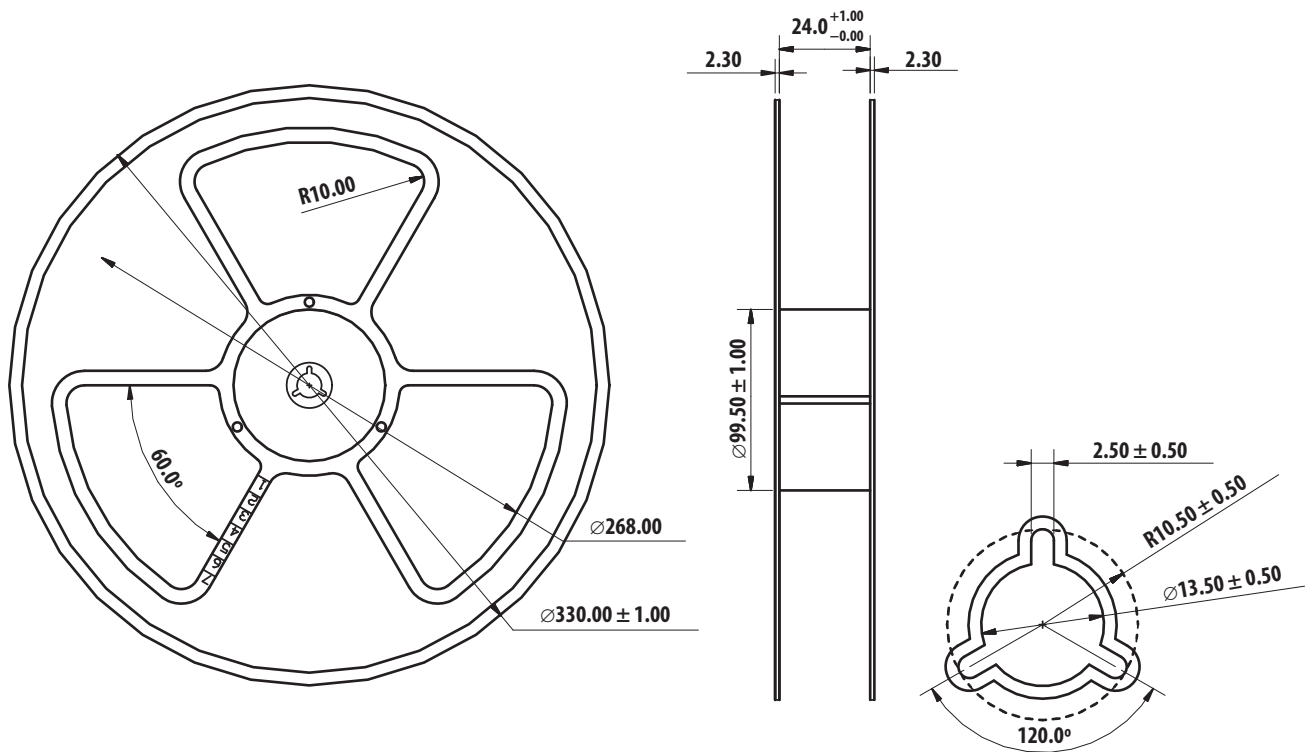


Figure 18. Reel dimensions.

## 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 AN 5288 for detail information.

## Moisture Sensitivity

This product is qualified as Moisture Sensitive Level 4 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 <math>40^{\circ}\text{C}/90\%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, 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 <math>30^{\circ}\text{C}/60\%RH</math> at all time and all high temperature related process including soldering, curing or rework need to be completed within 72 hours.

### C. Control for unfinished reel

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

### 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 <math>5\%RH</math> to ensure no LEDs have exceeded their floor life of 72 hours.

### E. Baking is required if

- HIC "10%" indicator is not blue and "5%" indicator is pink.
- The LEDs are exposed to condition of <math>30^{\circ}\text{C}/60\%RH</math> at any time.
- The LEDs floor life exceeded 72hrs.

Recommended baking condition:  $60\pm 5^{\circ}\text{C}$  for 20hrs.

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