

## ASMT-Mx22/ASMT-MxE2

### Moonstone® 3W High Brightness Power LED Light Source



## Overview

The Broadcom® Moonstone® 3W high brightness 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 cool white power LED is available in various color temperature ranging from 4000K to 10,000K 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

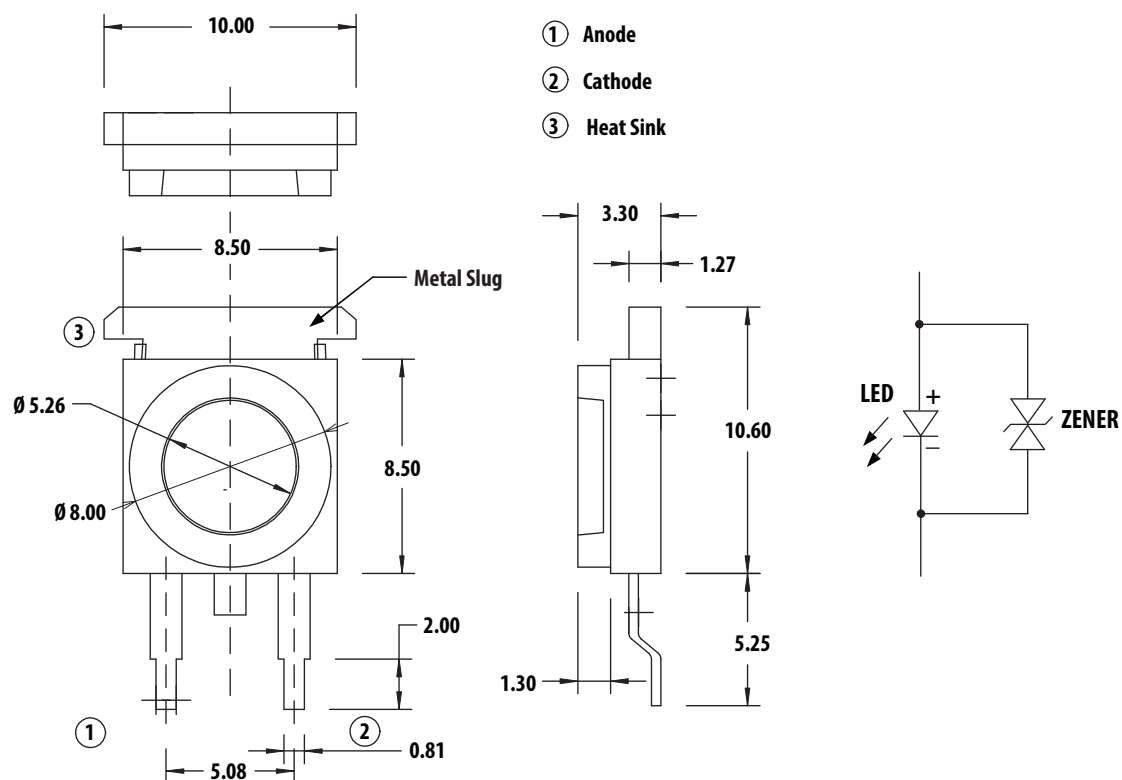
- Sign backlight
- Safety, exit, and emergency sign lightings
- Specialty lighting, such as task lighting and reading lights
- Retail display
- Commercial lighting
- Accent or marker lightings, strip or step lightings
- Portable lightings, bicycle head lamp, torch lights
- Decorative lighting
- Architectural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

## Features

- Available in cool white 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 4 products

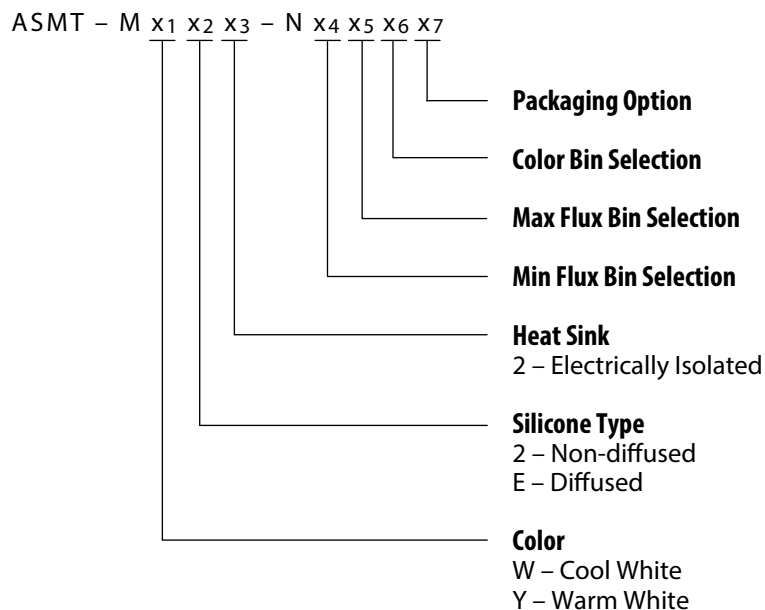
## Specifications

- 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  $\pm 0.1$  mm.
3. Metal slug is connected to anode for electrically non-isolated option.

## 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-MW22-NNP00	Cool White	110	120	140	350	InGaN	Yes
ASMT-MY22-NMP00	Warm White	95	100	140	350	InGaN	Yes
ASMT-MWE2-NNP00	Cool White Diffused	110	115	140	350	InGaN	Yes
ASMT-MYE2-NMP00	Warm White Diffused	95	98	140	350	InGaN	Yes

a.  $\phi_v$  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

Parameter	ASMT-Mx22/ASMT-MxE2	Units
DC Forward Current <sup>a</sup>	700	mA
Peak Pulsing Current	2400	mA
Power Dissipation	2730	mW
LED Junction Temperature	125	°C
Operating Metal Slug Temperature Range at 350 mA	–40 to +110	°C
Operating Metal Slug Temperature Range at 700 mA	–40 to +95	°C
Storage Temperature Range	–40 to +120	°C
Soldering Temperature	See <a href="#">Figure 11</a>	
Reverse Voltage <sup>b</sup>	Not recommended	

a. Derate linearly based on [Figure 9](#).

b. 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 2θ <sub>1/2</sub> <sup>a</sup> (Degrees)	Luminous Efficiency (lm/W)
		Min.	Max.	Typ.	Typ.
ASMT-MW22-NNP00	Cool White	4000	10000	110	107
ASMT-MY22-NMP00	Warm White	2600	4000	110	89
ASMT-MWE2-NNP00	Cool White Diffused	4000	10000	110	103
ASMT-MYE2-NMP00	Warm White Diffused	2600	4000	110	88

a. θ<sub>1/2</sub> 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)			Thermal Resistance $R_{\theta j-ms}$ ( $^\circ\text{C/W}$ ) <sup>a</sup>	Temperature Coefficient of Forward Voltage (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

a.  $R_{\theta j-ms}$  is the thermal resistance from the LED junction to the metal slug.

## Typical 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-MW22-NNP00	Cool White	205	3.6
ASMT-MY22-NMP00	Warm White	170	3.6
ASMT-MWE2-NNP00	Cool White Diffused	196	3.6
ASMT-MYE2-NMP00	Warm White Diffused	167	3.6

Figure 2: Relative Intensity vs. Wavelength

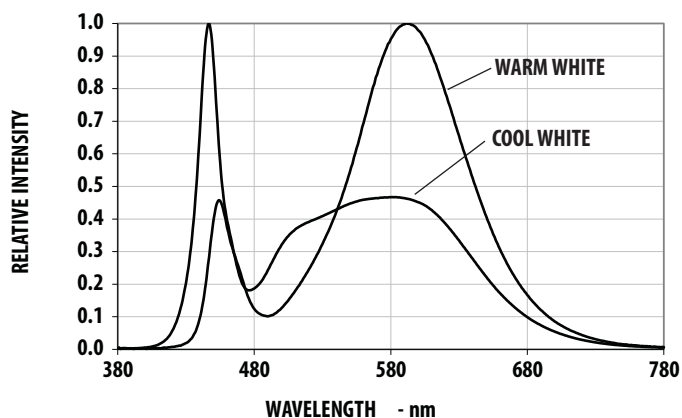


Figure 3: Relative Luminous Flux vs. Forward Current

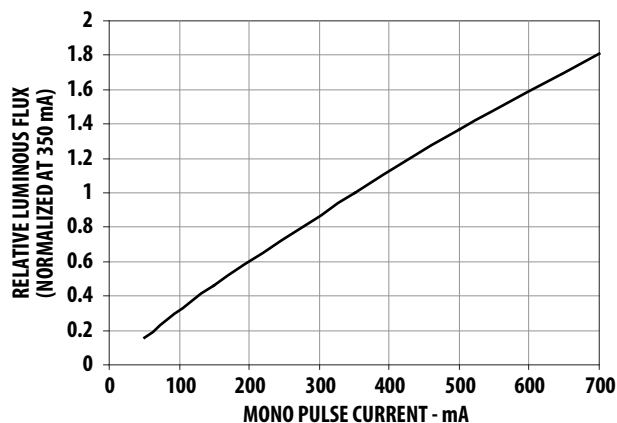


Figure 4: Forward Current vs. Forward Voltage

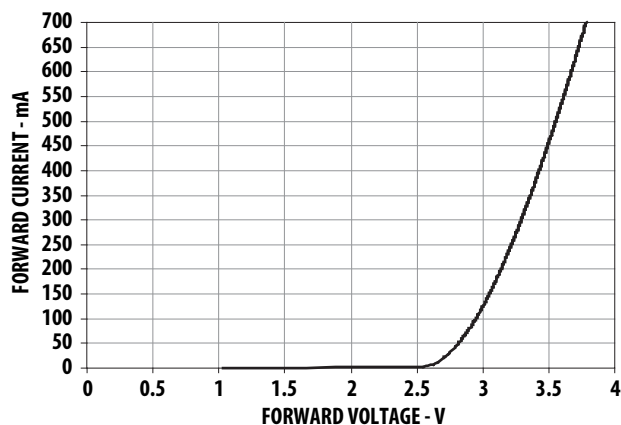


Figure 5: Radiation Pattern

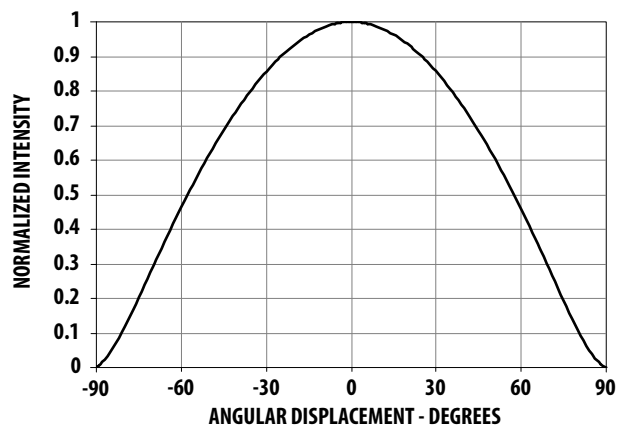
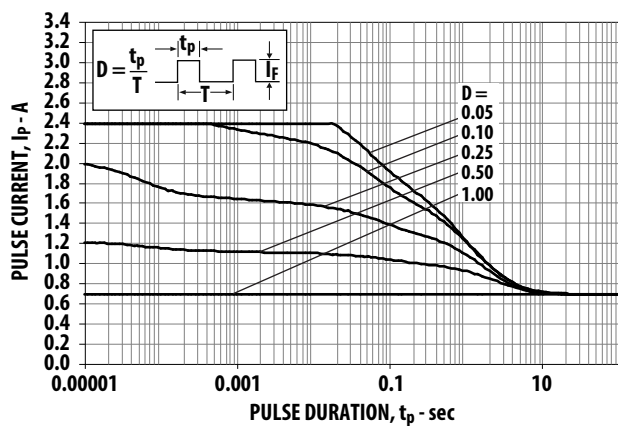
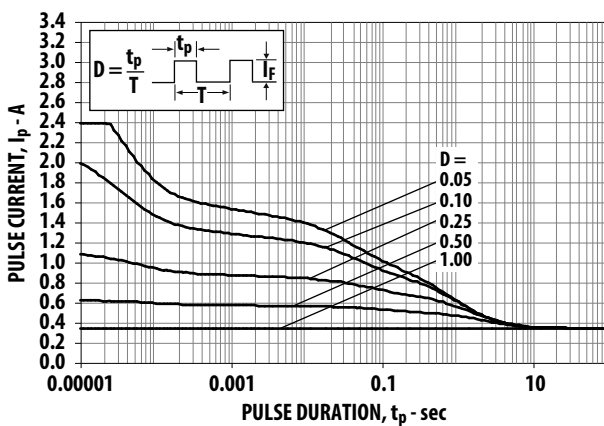
Figure 6: Maximum Pulse Current vs. Pulse Duration. Derated based on  $T_A = 25^\circ\text{C}$ ,  $R_{\theta\text{J-A}} = 30^\circ\text{C/W}$ .Figure 7: Maximum Pulse Current vs. Pulse Duration. Derated based on  $T_A = 85^\circ\text{C}$ ,  $R_{\theta\text{J-A}} = 30^\circ\text{C/W}$ .

Figure 8: Relative Light Output vs. Junction Temperature.

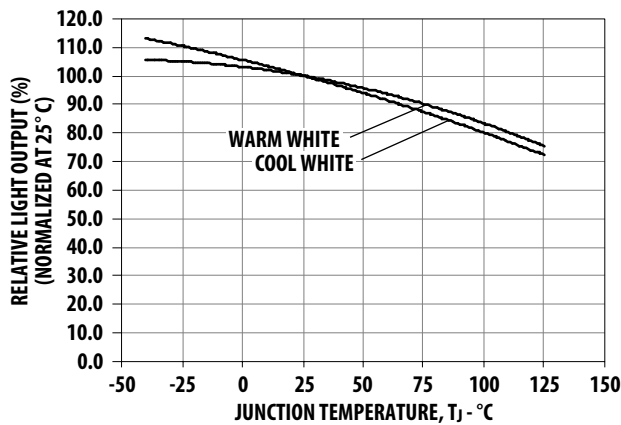
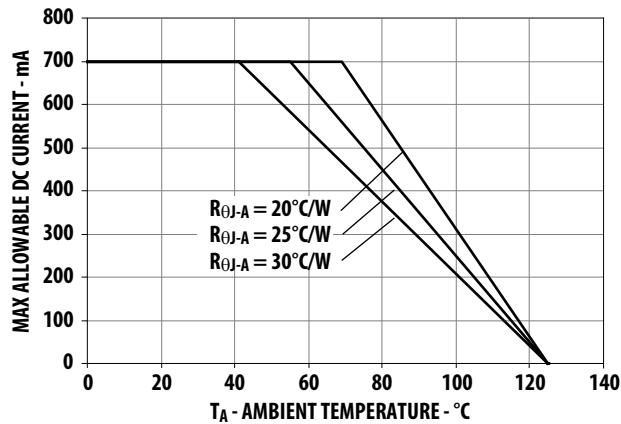
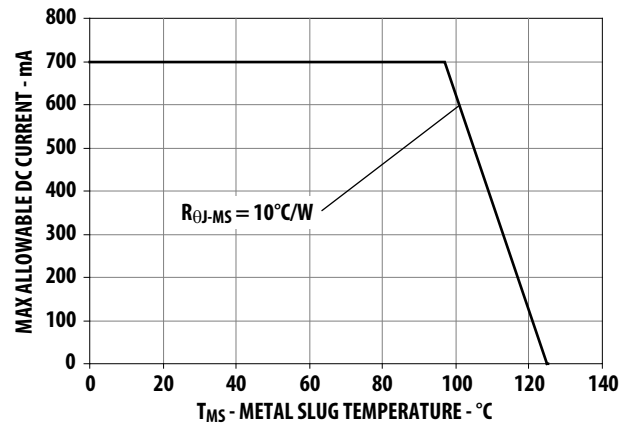
Figure 9: Maximum Forward Current vs. Ambient Temperature. Derated based on  $T_{JMAX} = 125^\circ\text{C}$ ,  $R_{\theta J-A} = 20^\circ\text{C/W}$ ,  $25^\circ\text{C/W}$ , and  $30^\circ\text{C/W}$ .Figure 10: Maximum Forward Current vs. Metal Slug Temperature. Derated based on  $T_{JMAX} = 125^\circ\text{C}$ ,  $R_{\theta J-MS} = 10^\circ\text{C/W}$ .

Figure 11: Recommended Reflow Soldering

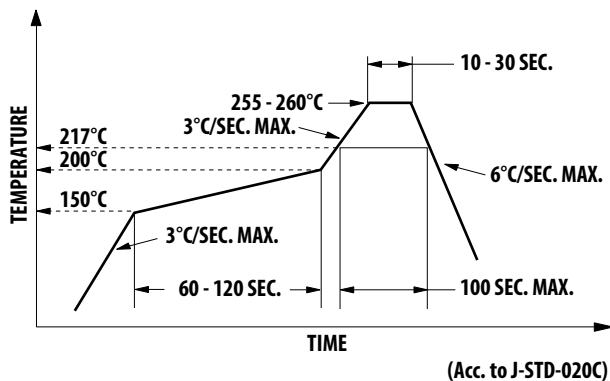
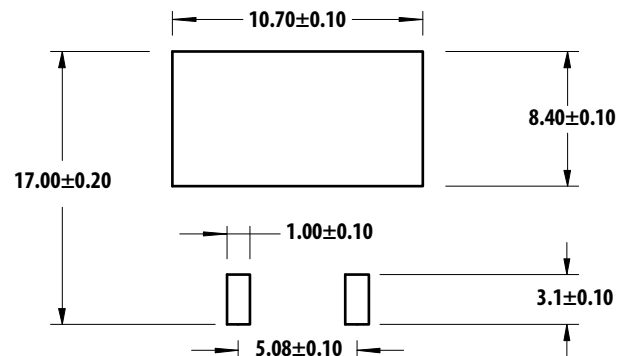


Figure 12: Recommended Soldering Land Pattern



**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 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	Flux (lm) at 150mA	
	Min	Max
K	56.0	73.0
L	73.0	95.0
M	95.0	110.0
N	110.0	125.0
P	125.0	140.0

**NOTE:** Tolerance for each bin limits is ±10%.

## Color Bin Selection [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
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

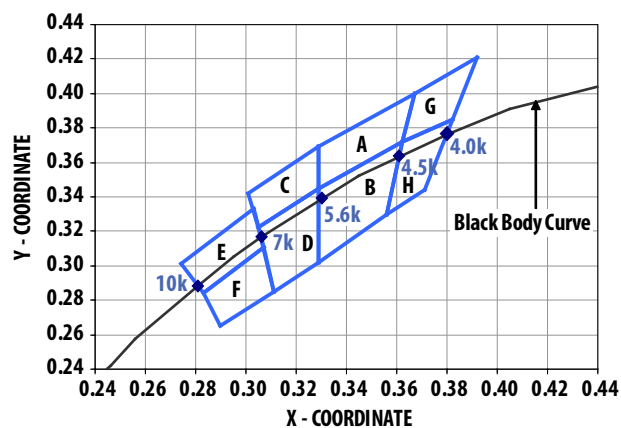


## Color Bin Limit

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)



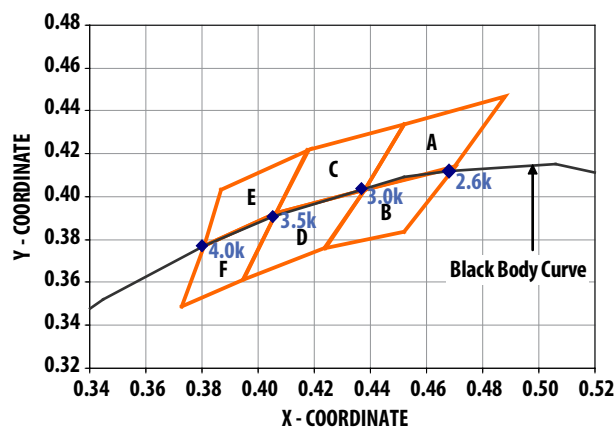
## Packaging Option [x7]

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)



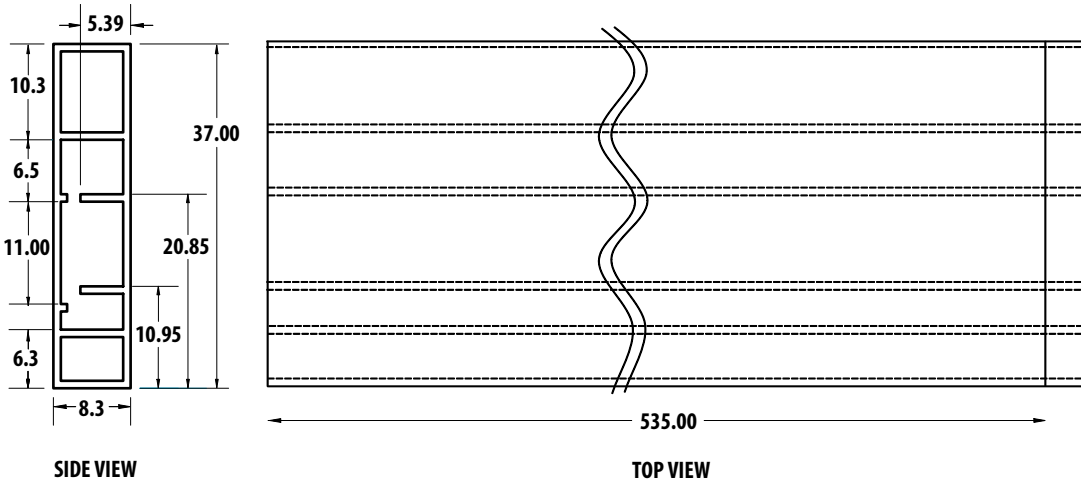
## Example

### ASMT-MW20-NLNZ0

- 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

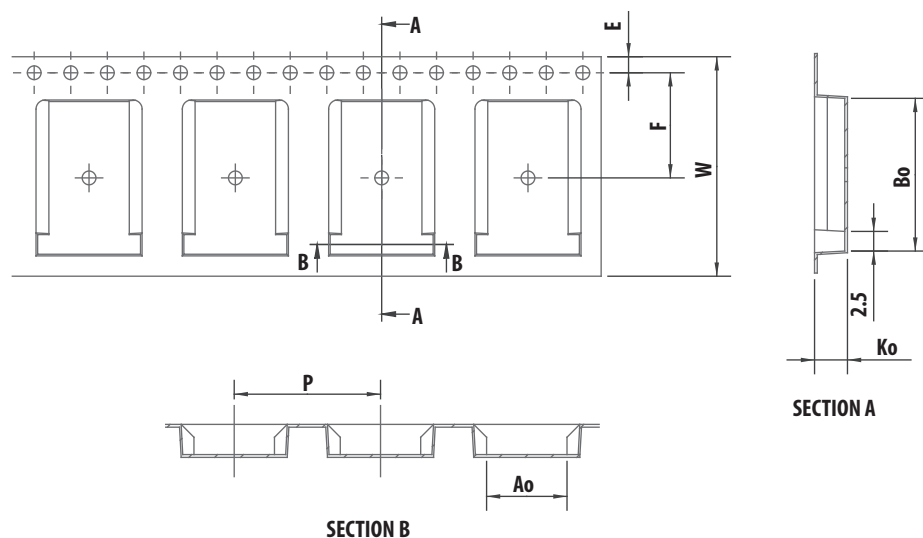
# Packing Tube – Option 0

Figure 15: Tube Dimensions



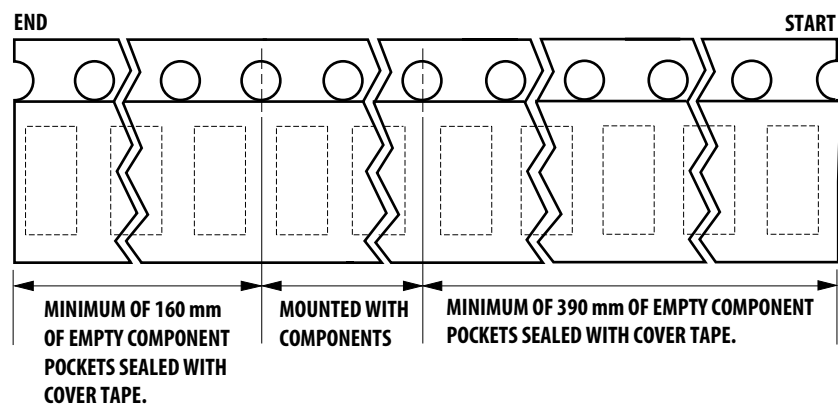
## Tape and Reel – Option 1

Figure 16: Carrier Tape Dimensions



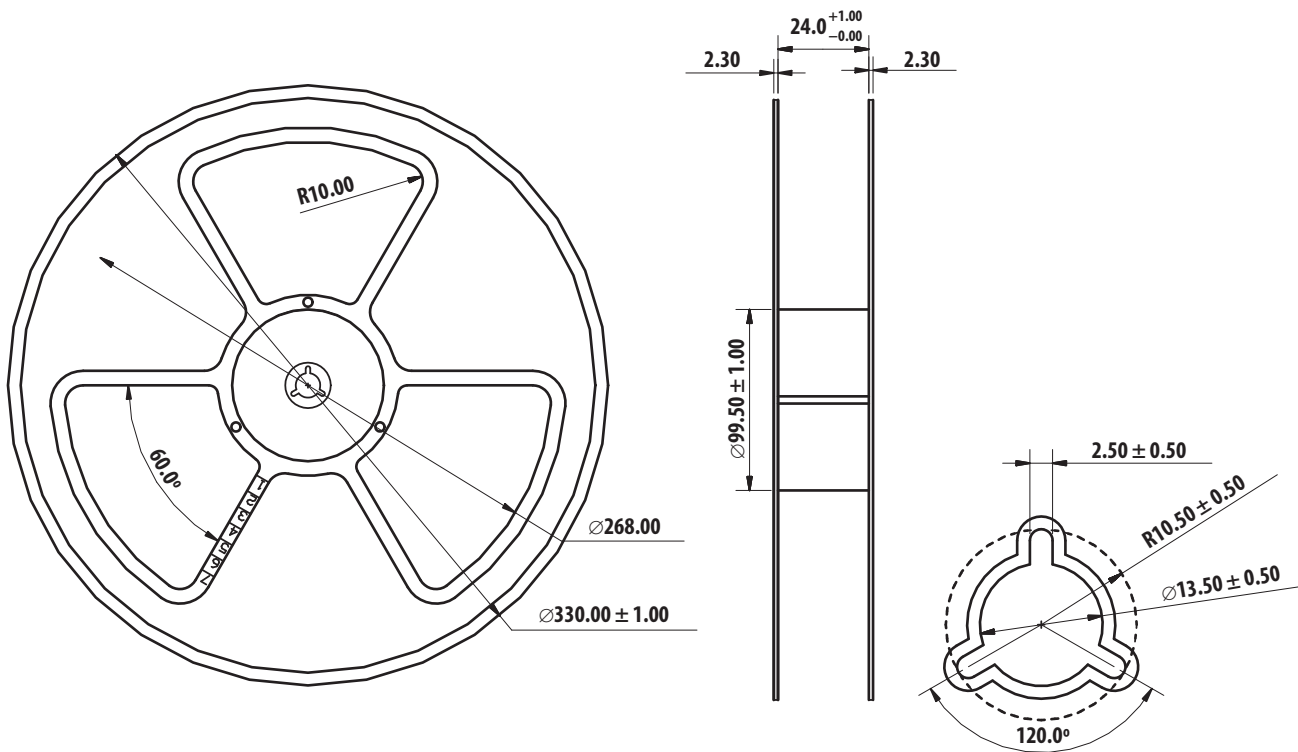
Dimension	Value (in mm)
A <sub>0</sub>	8.80 ±0.10
B <sub>0</sub>	16.45 ±0.10
K <sub>0</sub>	3.60 ±0.10
E	1.75 ±0.10
F	11.50 ±0.10
W	24.0 ±0.10
P	16.0 ±0.10
Quantity/Reel	250 units

Figure 17: Carrier Tape Leader and Trailer Dimensions



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

Figure 18: 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 4 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 <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, 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 <30°C/60% RH at all times and all high temperature-related processes, including soldering, curing, or rework, must be completed within 72 hours.
- Control for unfinished reel
 

For any unused LEDs, they must be stored in a sealed MBB with desiccant or desiccator at <5% RH.
- 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 <5% RH to ensure that no LEDs have exceeded their floor life of 72 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  $>30^{\circ}\text{C}/60\%$  RH at any time.
  - The LEDs' floor life exceeded 72 hours.

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

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