BROADCOM®

Data Sheet

ASMT-Mx00

Moonstone™ 1W Power LED Light Source

Description

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 the reflow soldering process, which gives more freedom and flexibility to the light source designer.

Applications

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

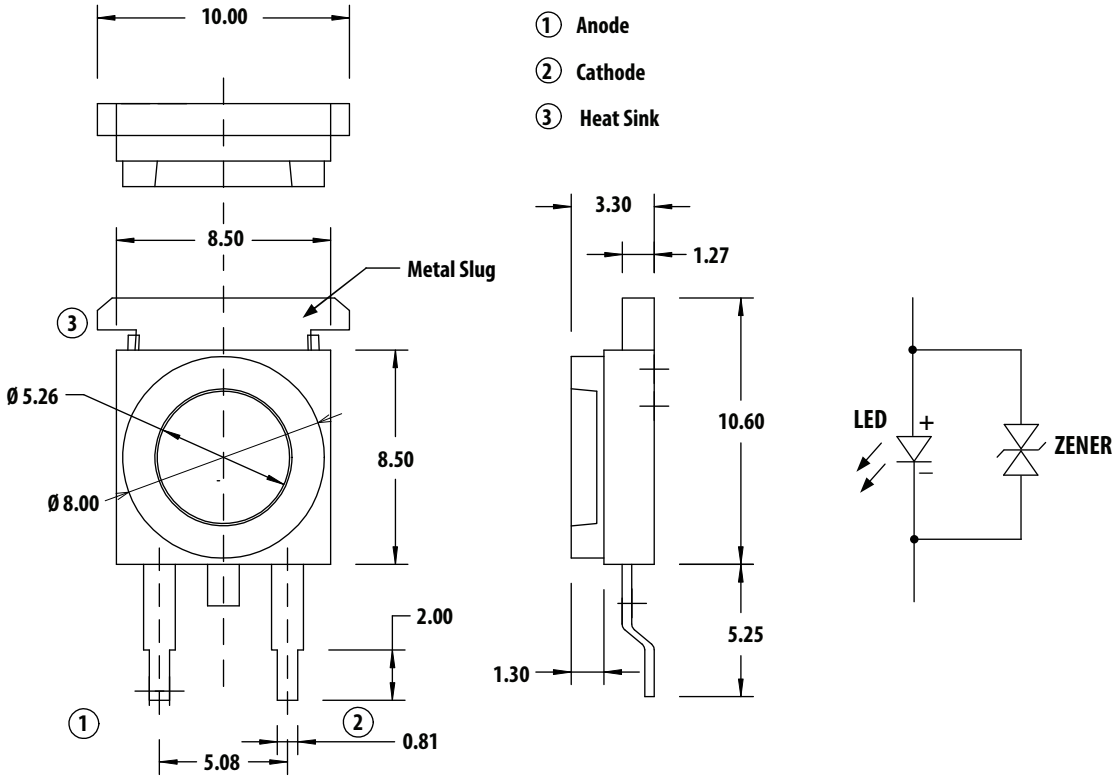
Features

- Available in Red, Amber, Green, and Blue 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
- ESD Class HBM Class 3B (threshold > 8 kV)
- MSL 2A for InGaN products
- MSL 4 for AlInGaP products

Specifications

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

Package Dimensions



NOTE:

1. All dimensions are in millimeters.
2. Tolerance is ± 0.1 mm, unless otherwise specified.
3. Metal slug is connected to anode for electrically nonisolated option.

Device Selection Guide (T_J = 25°C)

Part Number	Color	Luminous Flux, Φ_V[a, b] (lm)			Test Current (mA)	Dice Technology
		Min.	Typ.	Max.		
ASMT-MR00-AHJ00	Red	33.0	40.0	56.0	350	AlInGaP
ASMT-MA00-AGH00	Amber	25.5	35.0	43.0	350	AlInGaP
ASMT-MA00-AHJ00		33.0	40.0	56.0	350	AlInGaP
ASMT-MG00-NLM00	Green	73.0	85.0	124.0	350	InGaN
ASMT-MB00-NDF00	Blue	11.5	15.0	25.5	350	InGaN

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 ± 10%.

Part Numbering System

A	S	M	T	-	M	x_1	x_2	x_3	-	x_4	x_5	x_6	x_7	x_8

Code	Description	Option	
x_1	LED Chip Color	A	Amber
		B	Blue
		G	Green
		R	Red
x_2 x_3	Silicone Type	00	Non Diffused
x_4	Dice Type	A	AlInGaP
		N	InGaN
x_5	Minimum Flux Bin Selection	Refer to Flux Bin Limit [x_5 x_6]	
x_6	Maximum Flux Bin Selection		
x_7	Color Bin Selection	Refer to Color Bin Selection [x_7]	
x_8	Packaging Option	0	Tube
		1	Tape and Reel

Absolute Maximum Ratings (T_A = 25°C)

Parameter	AlInGaP	InGaN	Units
DC Forward Current[a]	350	350	mA
Peak Pulsing Current[b]	1000	1000	mA
Power Dissipation	805	1225	mW
LED Junction Temperature	125	110	°C
Operating Ambient Temperature Range at 350 mA	–40 to +115	–40 to +100	°C
Storage Temperature Range	–40 to +120	–40 to +120	°C
Reverse Voltage[c]	Not recommended		

a. DC forward current – derate linearly based on Figure 5 for AlInGaP and Figure 14 for InGaN.

b. Pulse condition duty factor = 10%, frequency = 1 kHz.

c. Not recommended for reverse bias operation.

Optical Characteristics at 350 mA (T_J = 25°C)

Part Number	Color	Peak Wavelength, λ_{PEAK} (nm)	Dominant Wavelength, λ_D[a] (nm)	Viewing Angle, $2\theta_{1/2}$[b] (°)	Luminous Efficiency (lm/W)
		Typ.	Typ.	Typ.	Typ.
ASMT-MR00-AHJ00	Red	635	625	120	54
ASMT-MA00-AGH00	Amber	598	590	120	48
ASMT-MA00-AHJ00		598	590	120	54
ASMT-MG00-NLM00	Green	519	525	120	76
ASMT-MB00-NDF00	Blue	454	460	120	13

a. The dominant wavelength, λ_D, is derived from the CIE Chromaticity Diagram and represents the color of the device.

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

Electrical Characteristics at 350 mA (T_J = 25°C)

Dice Type	Forward Voltage V_F (V) at I_F = 350 mA			Thermal Resistance $R\theta_{j\text{-}ms}$ (°C/W)[a]
	Min.	Typ.	Max.	Typ.
AlInGaP	1.7	2.1	2.3	10
InGaN	2.8	3.2	3.5	10

a. $R\theta_{j\text{-}ms}$ is the thermal resistance from the LED junction to the metal slug.

AlInGaP

Figure 1: Relative Intensity vs. Wavelength for AlInGaP

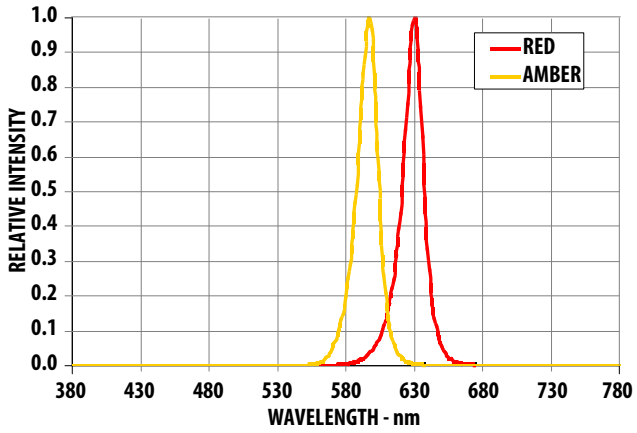


Figure 2: Forward Current vs. Forward Voltage for AlInGaP

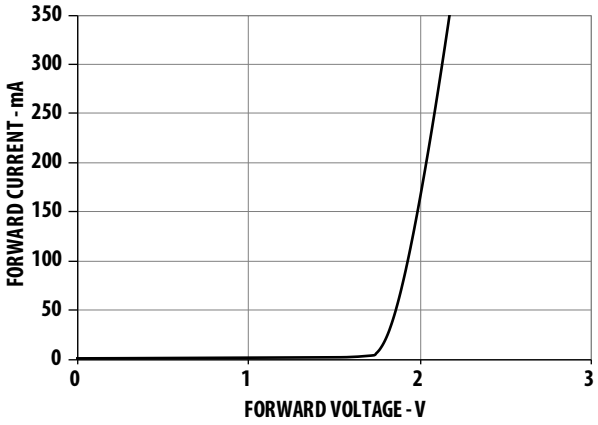


Figure 3: Relative Luminous Flux vs. Mono Pulse Current for AlInGaP

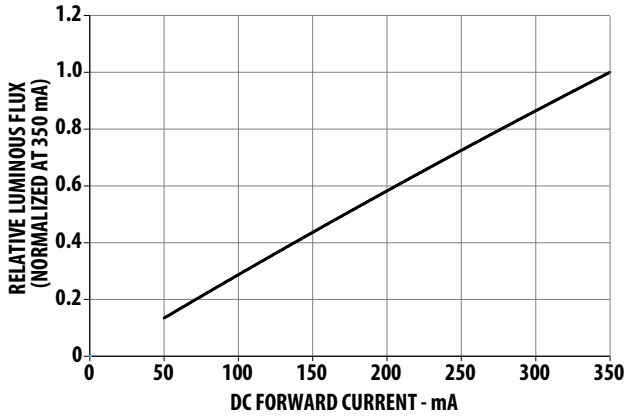
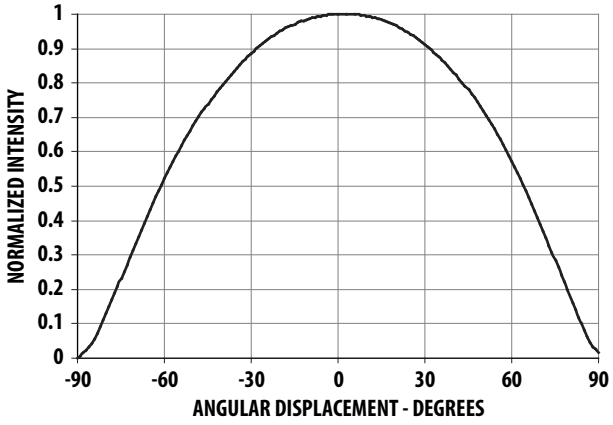


Figure 4: Radiation Pattern for AlInGaP



AlInGaP

Figure 5: Maximum Forward Current vs. Ambient Temperature for AlInGaP. Derated based on T_{JMAX} = 125°C, $R\theta_{J-A}$ = 30°C/W, 40°C/W and 50°C/W.

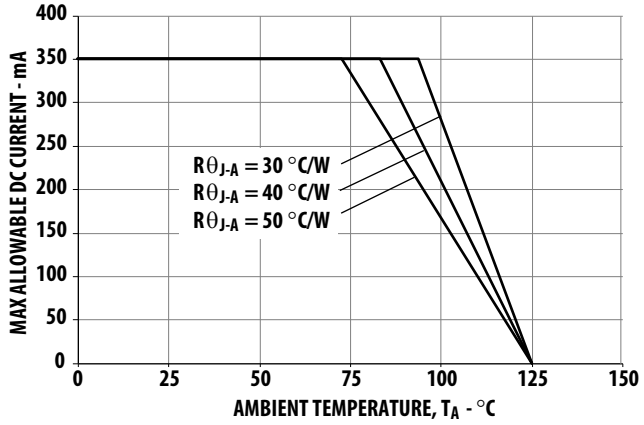


Figure 6: Maximum Forward Current vs. Metal Slug Temperature for AlInGaP. Derated based on T_{JMAX} = 125°C, $R\theta_{J-MS}$ = 10°C/W.

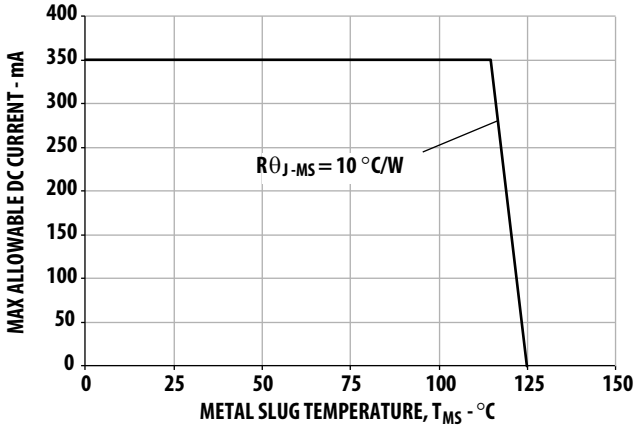


Figure 7: Forward Voltage Shift vs. Junction Temperature for AlInGaP

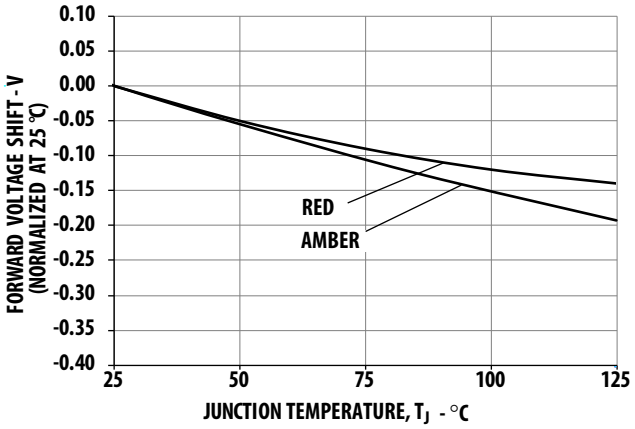
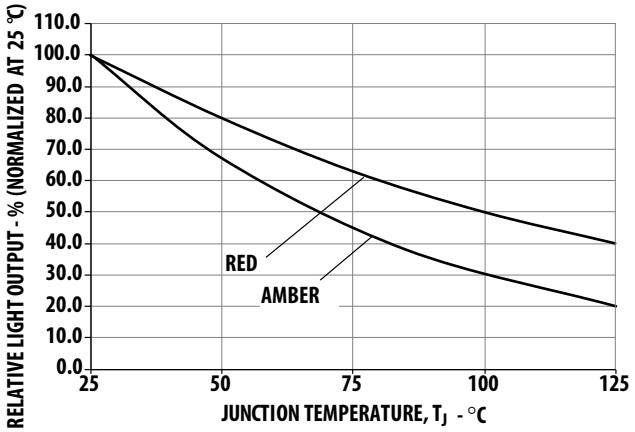


Figure 8: Relative Light Output vs. Junction Temperature for AlInGaP



InGaN

Figure 9: Relative Intensity vs. Wavelength for InGaN

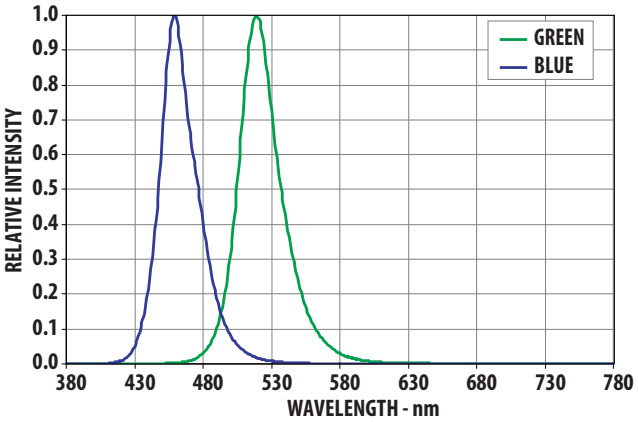


Figure 10: Forward Current vs. Forward Voltage for InGaN Blue

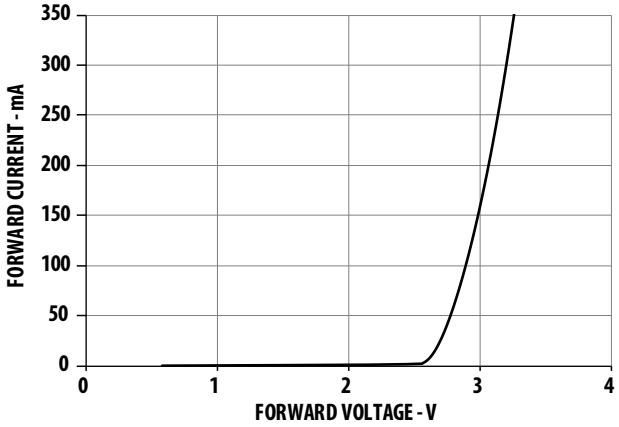


Figure 11: Forward Current vs. Forward Voltage for InGaN Green

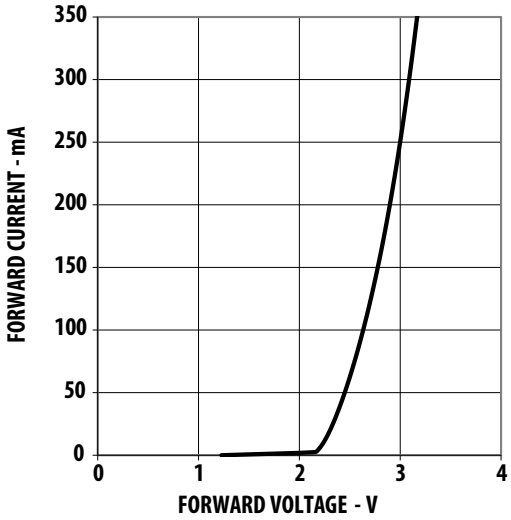
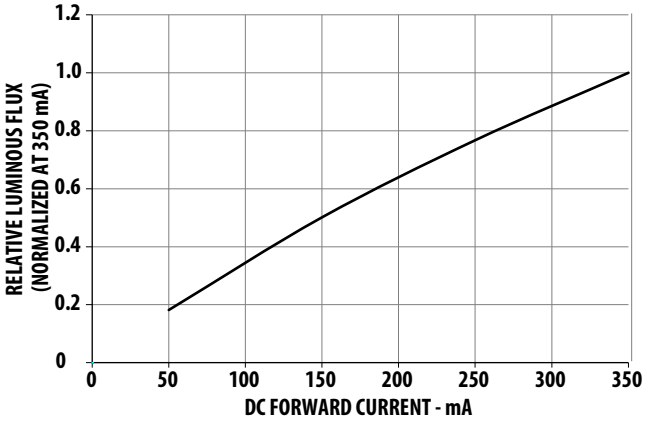


Figure 12: Relative Luminous Flux vs. Mono Pulse Current for InGaN



InGaN

Figure 13: Radiation Pattern for InGaN

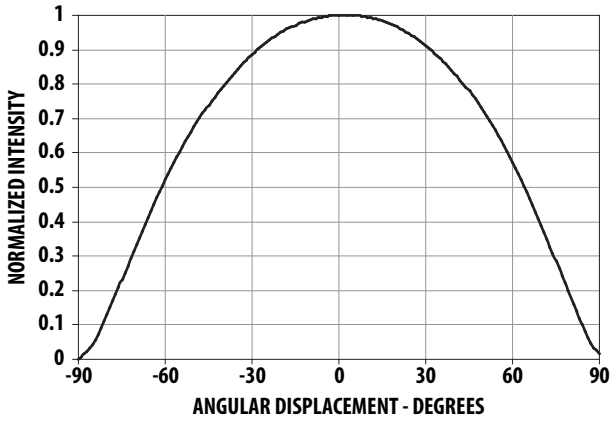


Figure 14: Maximum Forward Current vs. Ambient Temperature for InGaN. Derated based on T_{JMAX} = 110°C, $R\theta_{J-A}$ = 30°C/W, 40°C/W and 50°C/W

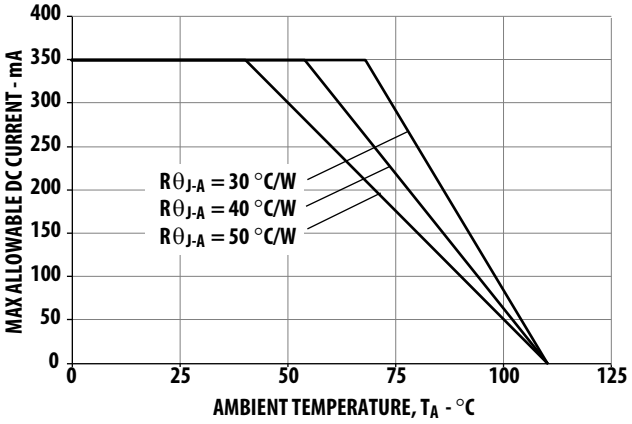


Figure 15: Maximum Forward Current vs. Metal Slug Temperature for InGaN. Derated based on T_{JMAX} = 110°C, $R\theta_{J-MS}$ = 10°C/W

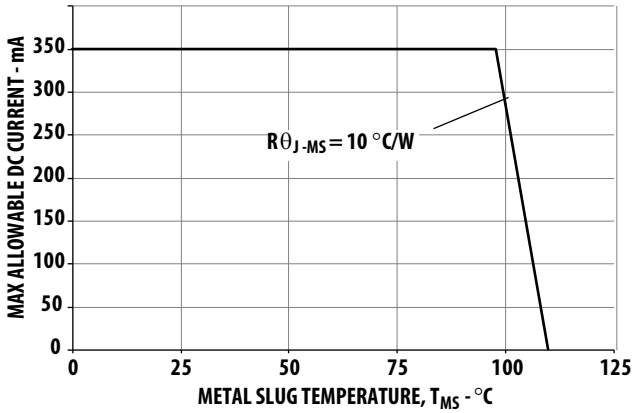


Figure 16: Forward Voltage Shift vs. Junction Temperature for InGaN

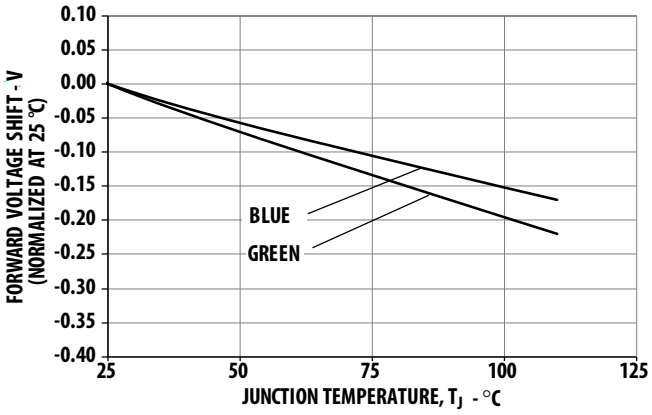
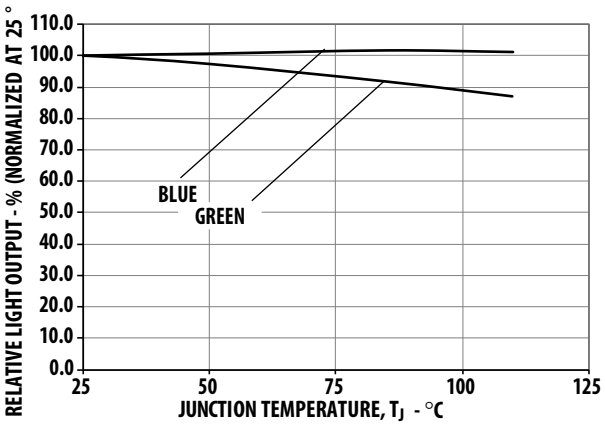


Figure 17: Relative Light Output vs. Junction Temperature for InGaN



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

Figure 18: Recommended Reflow Soldering Profile

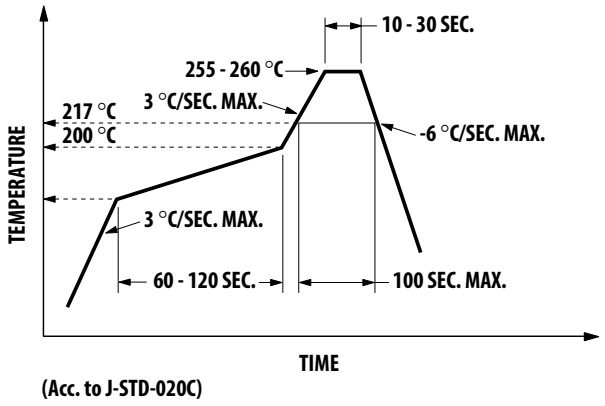
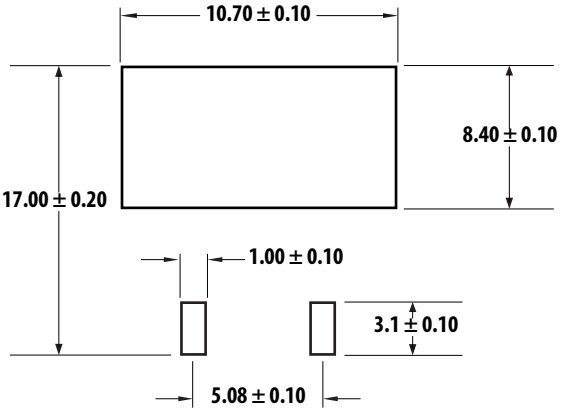


Figure 19: Recommended Soldering Land Pattern



Option Selection Details

ASMT-Mxxx - x x_5 x_6 x_7 x_8

x_5 – Minimum Flux Bin Selection
x_6 – Maximum Flux Bin Selection
x_7 – Color Bin Selection
x_8 – Packaging Option

Flux Bin Limit [x_5 x_6]

Bin	Luminous Flux (lm) at I_F = 350 mA	
	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
L	73.0	95.0
M	95.0	124.0

Tolerance for each bin limits is ± 10%.

Color Bin Selection [x_7]

The individual reel contains 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

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
	E	592.0	594.5
Blue	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_8]

Selection	Option
0	Tube
1	Tape and Reel

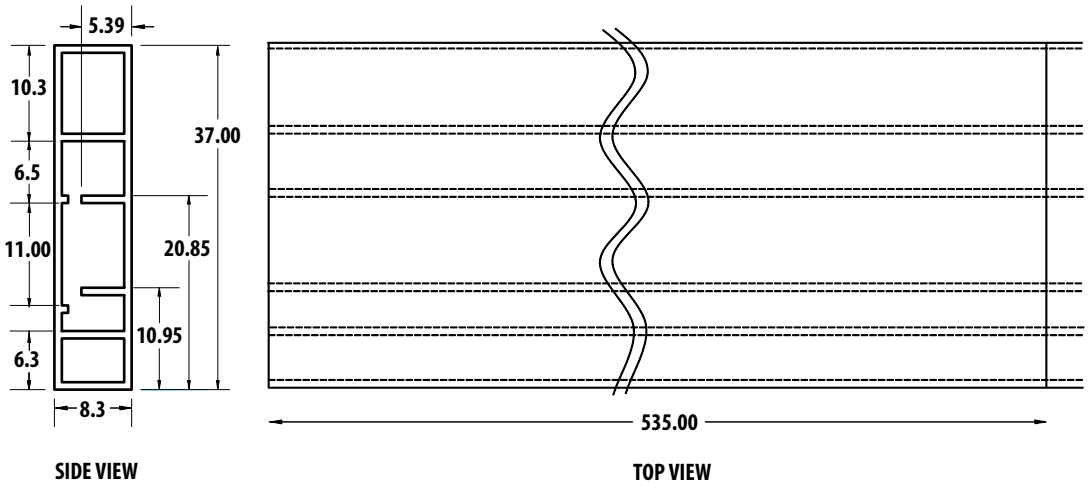
Example

ASMT-MR00-AHJ00

ASMT-MR00-Axxxx – AlInGaP Red, Non Diffused
x_5 = H – Minimum Flux Bin H
x_6 = J – Maximum Flux Bin J
x_7 = 0 – Full Distribution
x_8 = 0 – Tube Option

Packing Tube – Option 0

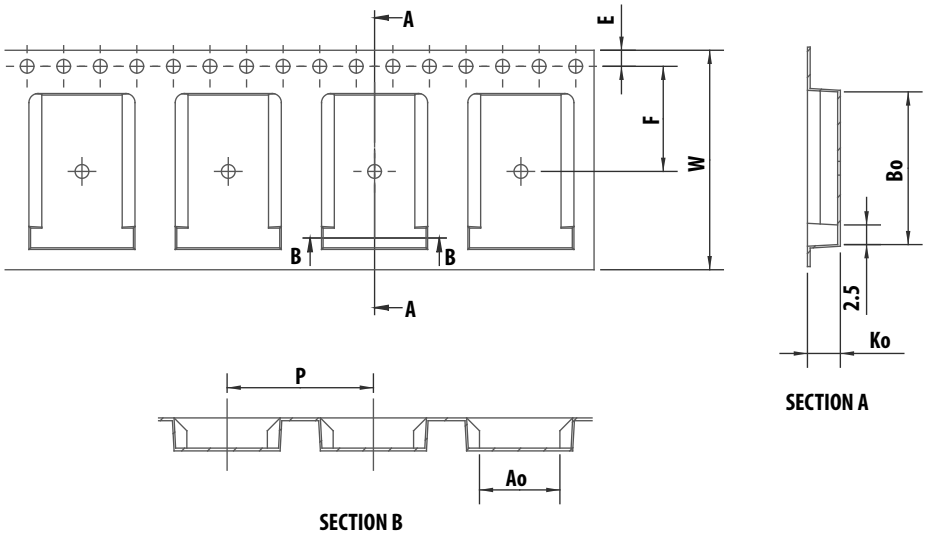
Figure 20: Tube Dimension



Tape and Reel – Option 1

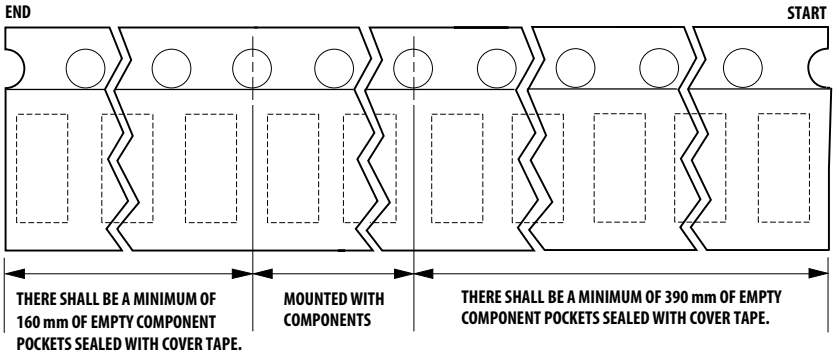
Tape Dimensions

Figure 21: Carrier Tape Dimensions



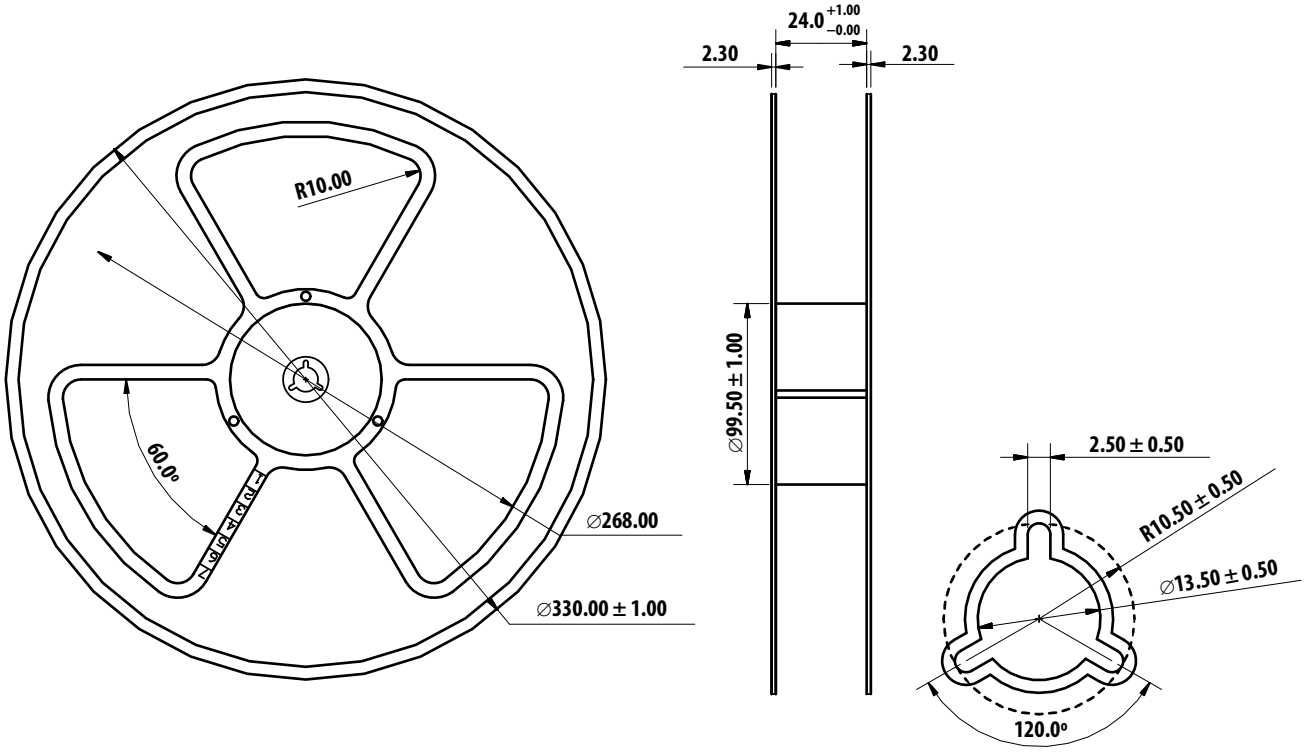
Dimension	Value (mm)
A0	8.80 ± 0.10
B0	16.45 ± 0.10
K0	3.60 ± 0.10
W	24.0 ± 0.10
P	16.0 ± 0.10
Quantity/reel	250 each

Figure 22: Carrier Tape Leader and Trailer Dimensions



Reel Dimensions

Figure 23: Reel Dimensions



Handling Precautions

The encapsulation material of the product is made of silicone for better reliability of the product. Because silicone is a soft material, do not press on the silicone or poke a sharp object into the silicone. These actions might damage the product and cause premature failure. During assembly or handling, hold the unit by the body only. Refer to Broadcom Application Note AN5288 for detailed 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. Take precautions when handling this moisture-sensitive product to ensure the reliability of the product. Refer to Broadcom Application Note AN5305, *Handling of Moisture Sensitive Surface Mount Devices*, for details.

Storage before use

- Store the unopened moisture barrier bag (MBB) 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 of the MBB.
- Keep the LEDs at < 30°C/60% RH at all times and all high-temperature-related processes, including soldering, curing, or rework, must be completed within 672 hours for MSL 2a and 72 hours for MSL 4.

Control for unfinished reel

Store any unused LEDs 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, store the PCB in a 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.

Baking is required if the following conditions exist

- 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 for MSL 2a and 72 hours for MSL 4.

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

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