BROADCOM®

Data Sheet

HSMW-J430

Mono-Color Side-View White LED

Overview

The Broadcom® HSMW-J430 is a high brightness white LED in a side-emitting package. This LED uses InGaN chip technology with high light output performance. This part uses silicone encapsulation to improve product robustness and reliability, thus enabling this LED to operate under a wide range of conditions.

This LED has a thin profile and wide viewing angle. The thin profile feature makes this LED suitable for applications that require a low package height whereas the wide viewing angle delivers good uniformity for applications such as display backlighting. This LED is shipped in tape and reel and is compatible with reflow soldering and binned by both color and intensity.

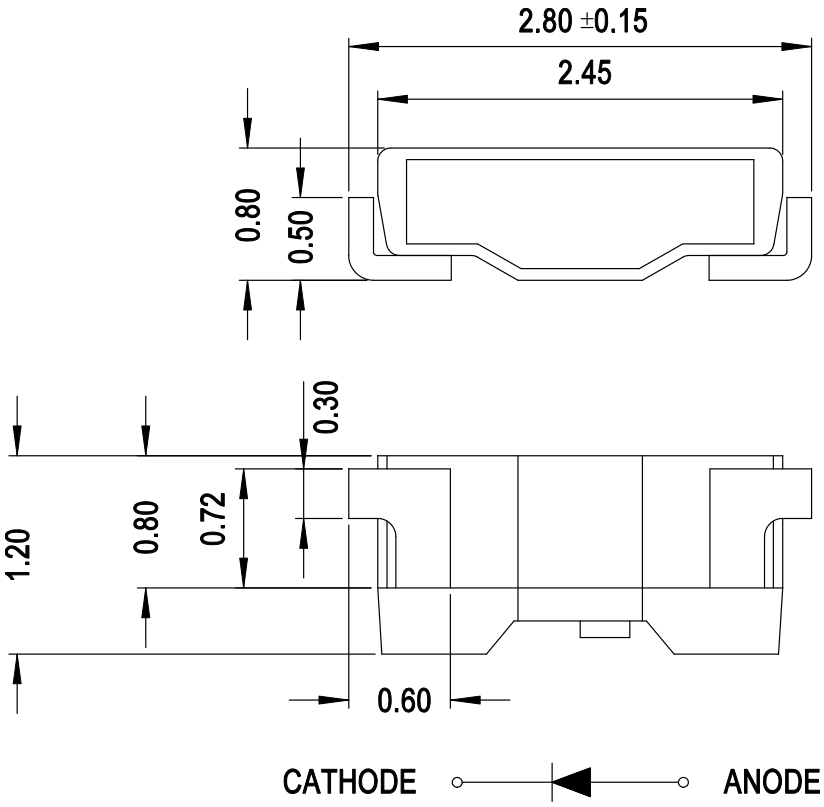
Features

- LED with InGaN die
- White emitting color
- Compatible with reflow soldering
- Available in 8-mm tape on 7-inch diameter reel

Applications

- Indicator
- Backlighting

Package Dimensions



NOTE:

- All dimensions in millimeters (mm).
- Tolerance is ±0.10 mm unless otherwise specified.
- Encapsulation = silicone.
- Terminal finish = silver plating.

CAUTION! This LED is Class 1A ESD sensitive per ANSI/ESDA/JEDEC JS-001. Observe appropriate precautions during handling and processing. Refer to Application Note AN-1142 for additional details.

Absolute Maximum Ratings

Parameter	Rating	Unit
DC Forward Current[a]	30	mA
Peak Forward Current[b]	100	mA
Power Dissipation	105	mW
LED Junction Temperature	100	°C
Operating Temperature Range	–40 to +85	°C
Storage Temperature Range	–40 to +100	°C

a. Derate linearly as shown in Figure 6.

b. Duty factor = 10%, frequency = 1 kHz, Ta = 25°C.

Optical and Electrical Characteristics (T_J = 25°C, I_F = 20 mA)

Parameter	Min.	Typ.	Max.	Unit
Luminous Intensity, Iv[a]	1520	—	2125	mcd
Viewing Angle $2\theta_{1/2}$[b]	—	110	—	°
Forward Voltage, V_F[c]	2.9	—	3.5	V
Reverse Current, I_R at V_R = 5V[d]	—	—	10	µA
Thermal Resistance $R\theta_{J-S}$[e]	—	—	150	°C/W

a. The luminous intensity, I_V, is measured at the mechanical axis of the package and it is tested with a single current pulse condition. The actual peak of the spatial radiation pattern may not be aligned with the axis.

b. $\theta_{1/2}$ is the off axis angle where the luminous intensity is ½ the peak intensity.

c. Forward voltage tolerance is ±0.1V.

d. Indicate product final test condition. Long term reverse bias is not recommended.

e. Thermal resistance from LED junction to solder point.

Bin Information

Intensity Bin Limits (CAT)

Bin ID	Luminous Intensity (mcd)	
	Min.	Max.
Z32	1520	1610
Z41	1610	1700
Z42	1700	1800
Z51	1800	1900
Z52	1900	2010
Z61	2010	2125

Tolerance = ±15%

Forward Voltage Bin Limits (VF)

Bin ID	Forward Voltage (V)	
	Min.	Max.
H2	2.9	3.0
H3	3.0	3.1
H4	3.1	3.2
J1	3.2	3.3
J2	3.3	3.4
J3	3.4	3.5

Tolerance = ±0.1V

Color Bin Limits (BIN)

Bin ID	Chromaticity Coordinates	
	x	y
AA2	0.270	0.240
	0.270	0.250
	0.280	0.260
	0.280	0.250
BB1	0.280	0.250
	0.280	0.260
	0.290	0.270
	0.290	0.260
BB2	0.290	0.260
	0.290	0.270
	0.300	0.280
	0.300	0.270
CC2	0.270	0.250
	0.270	0.260
	0.280	0.270
	0.280	0.260
DD1	0.280	0.260
	0.280	0.270
	0.290	0.280
	0.290	0.270
DD2	0.290	0.270
	0.290	0.280
	0.300	0.290
	0.300	0.280
EE2	0.270	0.260
	0.280	0.270
	0.280	0.280
	0.270	0.270
FF1	0.280	0.270
	0.290	0.280
	0.290	0.290
	0.280	0.280
FF2	0.290	0.280
	0.290	0.290
	0.300	0.300
	0.300	0.290

Tolerance = ±0.02

Figure 1: Chromaticity Diagram

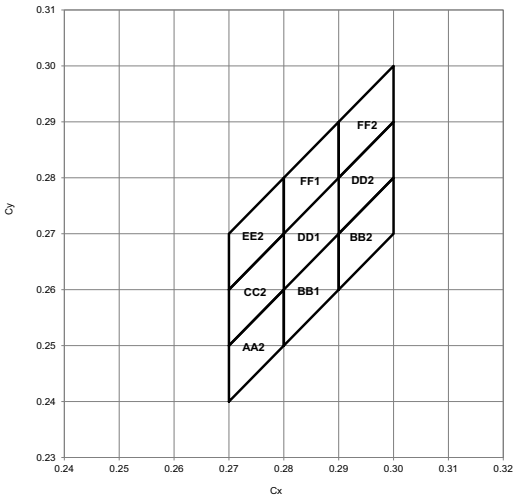


Figure 2: Spectral Power Distribution

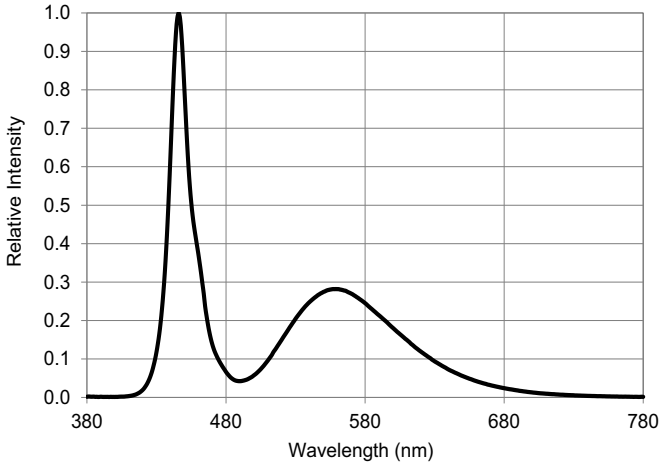


Figure 3: Forward Current vs. Forward Voltage

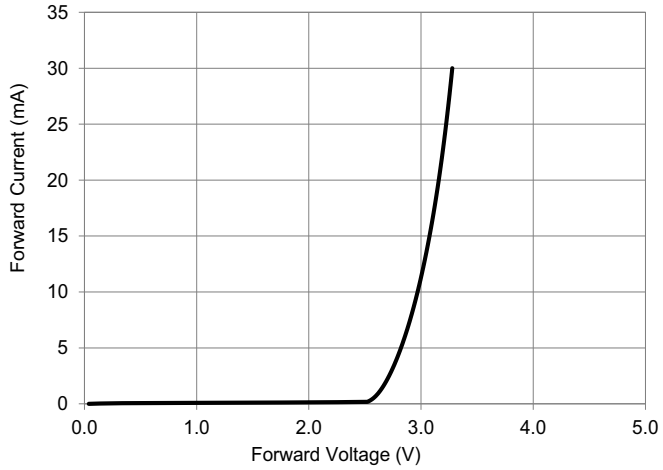


Figure 4: Relative Luminous Intensity vs. Forward Current

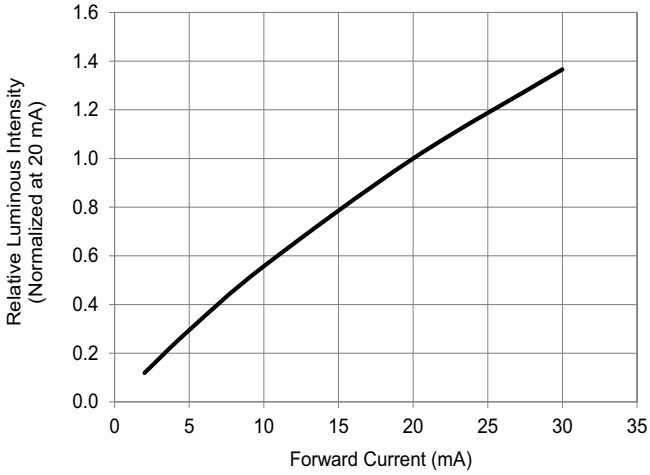


Figure 5: Radiation Pattern

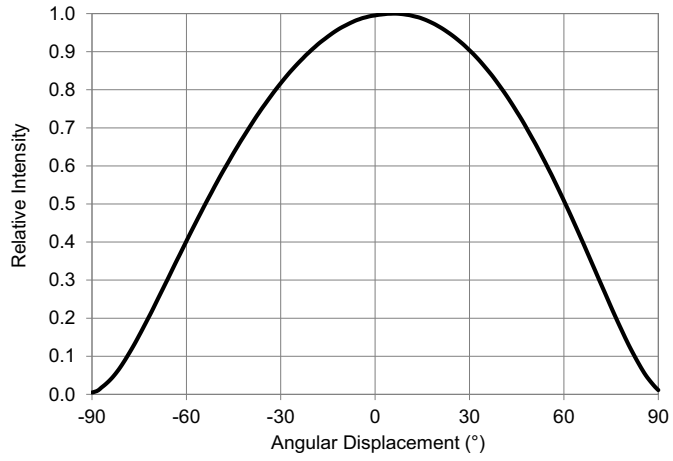


Figure 6: Derating Curve

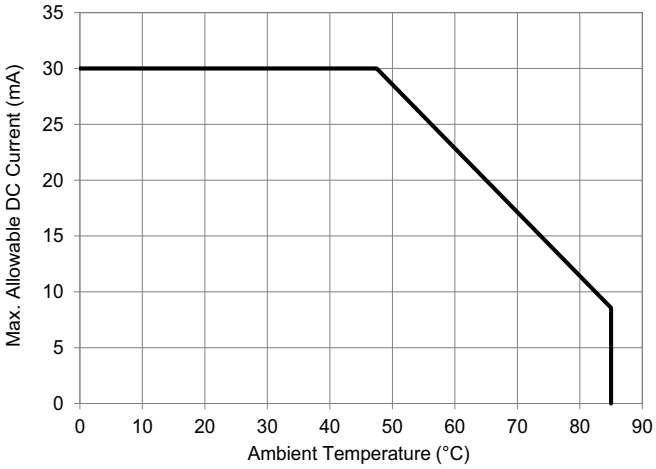
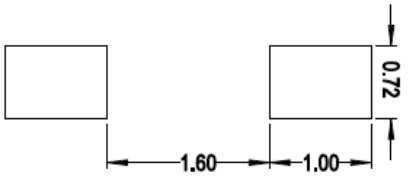
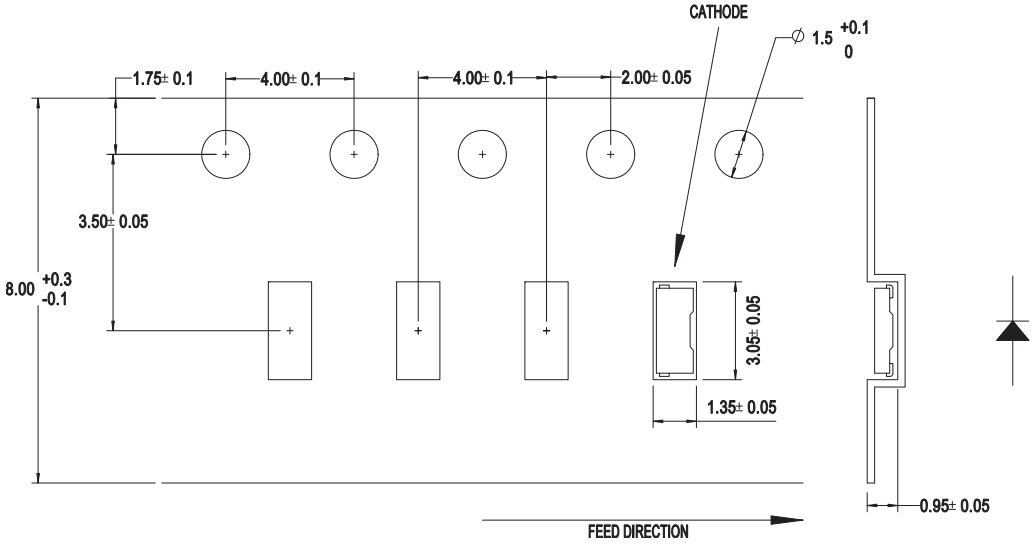


Figure 7: Recommended Soldering Land Pattern



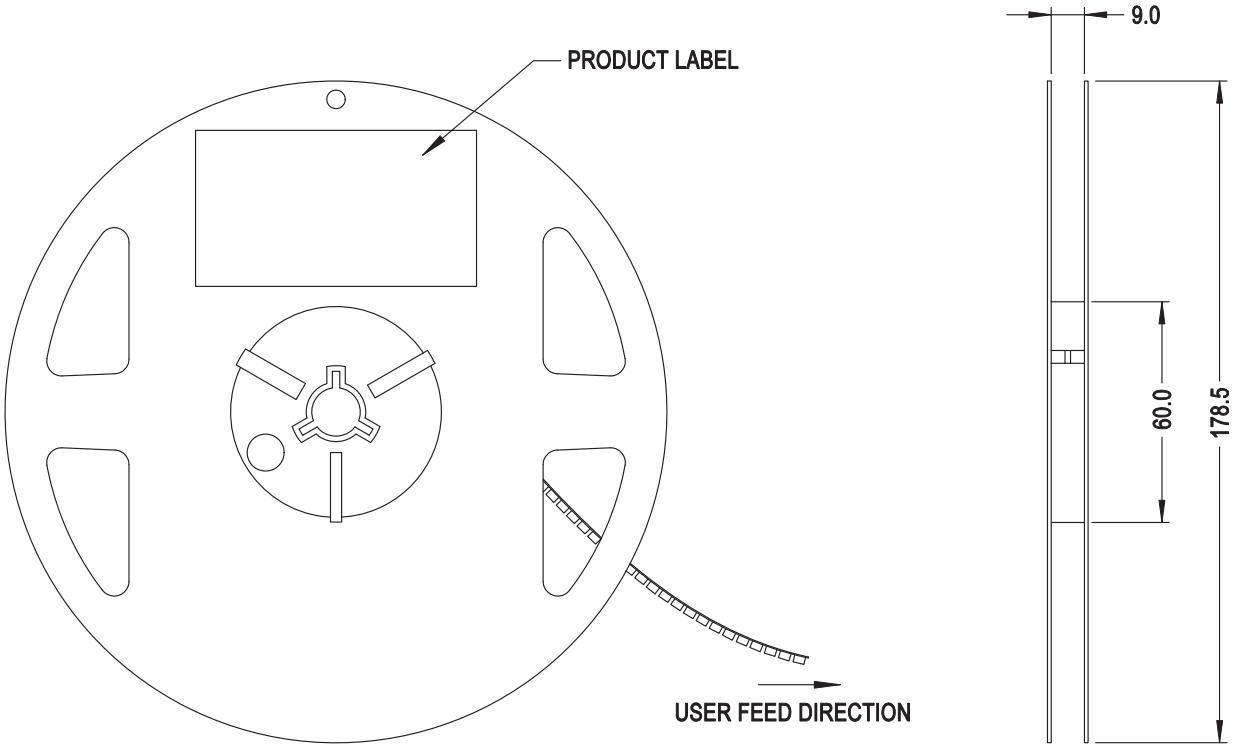
Tolerance is ±0.10 mm unless otherwise specified.
Units: millimeters.

Figure 8: Carrier Tape Dimensions



NOTE: Units in millimeters.

Figure 9: Reel Dimensions



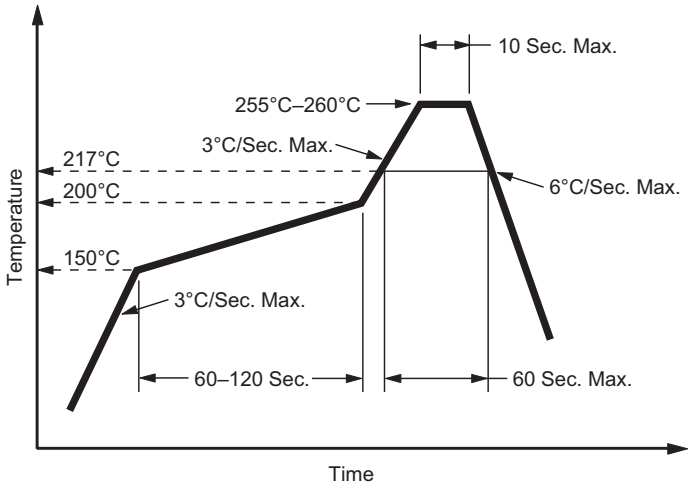
NOTE: Units in millimeters.

Precautionary Notes

Soldering

- Do not perform reflow soldering more than twice. Observe the necessary precautions of handling moisture sensitive devices, as stated in the following section.
- Do not apply any pressure or force on the LED during reflow or after reflow when the LED is still hot.
- Use reflow soldering to solder the LED. Hand soldering shall only be used for rework if unavoidable, but must be strictly controlled to the conditions below:
  - Soldering iron tip temperature = 310°C max.
  - Soldering duration = 2 sec. max.
  - Number of cycle = 1 only
  - Power of soldering iron = 50W max.
- Do not touch the LED package body with the soldering iron except for the soldering terminals as it may cause damage to the LED.
- Confirm beforehand whether the functionality and performance of the LED is affected by hand soldering.

Figure 10: Recommended Lead-Free Reflow Soldering Profile



Handling Precautions

The encapsulation material of the LED is made of silicone for better product reliability. Compared to epoxy encapsulant that is hard and brittle, silicone is softer and flexible. Special handling precautions must be observed during the assembly of silicone encapsulated LED products. Failure to comply may lead to damage and premature failure of the LED. Refer to Application Note AN5288, Silicone Encapsulation for LED: Advantages and Handling Precautions for additional information.

- Do not poke sharp objects into the silicone encapsulant. Sharp object like tweezers or syringes might apply excessive force or even pierce through the silicone and induce failures to the LED die or wire bond.
- Do not touch the silicone encapsulant. Uncontrolled force acting on the silicone encapsulant might result in excessive stress on the wire bond. The LED should only be held by the body.
- Do not stack assembled PCBs together. Use an appropriate rack to hold the PCBs.
- The surface of silicone material attracts dusk and dirt easier than epoxy due to its surface tackiness. To remove foreign particles on the surface of silicone, a cotton bud can be used with isopropyl alcohol (IPA). During cleaning, rub the surface gently without putting too much pressure on the silicone. Ultrasonic cleaning is not recommended.
- For automated pick and place, Broadcom has tested nozzle size with O/D 1mm to be working fine with this LED. However, due to the possibility of variations in other parameters such as pick and place machine maker/model and other settings of the machine, verify that the nozzle selected will not cause damage to the LED.

Handling of Moisture Sensitive Device

This product has a Moisture Sensitive Level 2a rating per JEDEC J-STD-020. Refer to Application Note AN5305, Handling of Moisture Sensitive Surface Mount Devices, for additional details and a review of proper handling procedures.

- 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, then it is safe to reflow the LEDs per the original MSL rating.
  - It is recommended that the MBB not be opened prior to assembly (for IQC, as an example).
- 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 times and all high temperature related processes including soldering, curing or rework need to be completed within 672 hours.
- Control for unfinished reel: Unused LEDs must be stored in a sealed MBB with desiccant or desiccator at <5% RH.
- Control of assembled boards: If the PCB soldered with the LEDs is to be subjected to other high-temperature processes, the PCB must be stored in sealed MBB with desiccant or desiccator at <5% RH to ensure that all LEDs have not exceeded their floor life of 672 hours.
- Baking is required if:
  - The HIC indicator is indicating a change in color for 10% and 5% as stated on the HIC.
  - The LEDs are exposed to a condition of >30°C/60% RH at any time.
  - The LED floor life exceeded 672 hrs.

  The recommended baking condition is: 60°C ±5°C for 20 hrs. Baking should only be done once.
- Storage: The soldering terminals of these Broadcom LEDs are silver plated. If the LEDs are exposed in ambient environment for too long, the silver plating might be oxidized, thus affecting its solderability performance. As such, keep unused LEDs in a sealed MBB with desiccant or in a desiccator at <5% RH.

Application Precautions

- Drive current of the LED must not exceed the maximum allowable limit across temperature as stated in the datasheet. Constant current driving is recommended to ensure consistent performance.
- Circuit design must cater to the whole range of the forward voltage of the LEDs to ensure the intended drive current can always be achieved.
- LEDs do exhibit slightly different characteristics at different drive current which might result in larger variation of their performance (meaning intensity, wavelength and forward voltage). User is recommended to set the application current as close as possible to the test current in order to minimize these variations.
- If the LED is intended to be used along with the LED of other color to achieve color mixing, Broadcom does not guarantee the consistency of the resultant color. Contact Broadcom Sale Representative for such application.
- LEDs are not intended for reverse bias. Use other appropriate components for such purpose. When driving the LED in matrix form, it is crucial to ensure that the reverse bias voltage is not exceeding the allowable limit of the LED.
- Avoid rapid change in ambient temperature especially in high humidity environment as this will cause condensation on the LED.
- If the LED is intended to be used in harsh environment, the LED must be protected against damages caused by rain water, dust, oil, corrosive gases, external mechanical stress, and so on.

Eye Safety and Precautions

LEDs may pose optical hazards when in operation. It is not advisable to view directly at operating LEDs as it may be harmful to the eyes. For safety reasons, use appropriate shielding or personnel protection equipment.

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