

## Datasheet



### Description

Avago Power PLCC-4 SMT LEDs are high performance SMT LEDs targeted mainly in Electronic Sign and Signals (ESS) markets. The package can be driven at higher current due to its superior package design. The product is able to dissipate heat more efficiently compared to the conventional PLCC-2 SMT LEDs. In proportion to the increase in driving current, this family of LEDs is able to produce higher light output compared to the conventional PLCC-2 SMT LEDs.

These SMT LEDs have higher reliability and better performance and are designed to work under a wide range of environmental conditions. This higher reliability makes them suitable to be used in electronic signs and signals.

To facilitate easy pick and place assembly, the LEDs are packed in EIA-compliant tape and reel. Every reel will be shipped in single intensity and color bin (except for red color), to provide close uniformity.

These LEDs are compatible with IR solder reflow process.

### Features

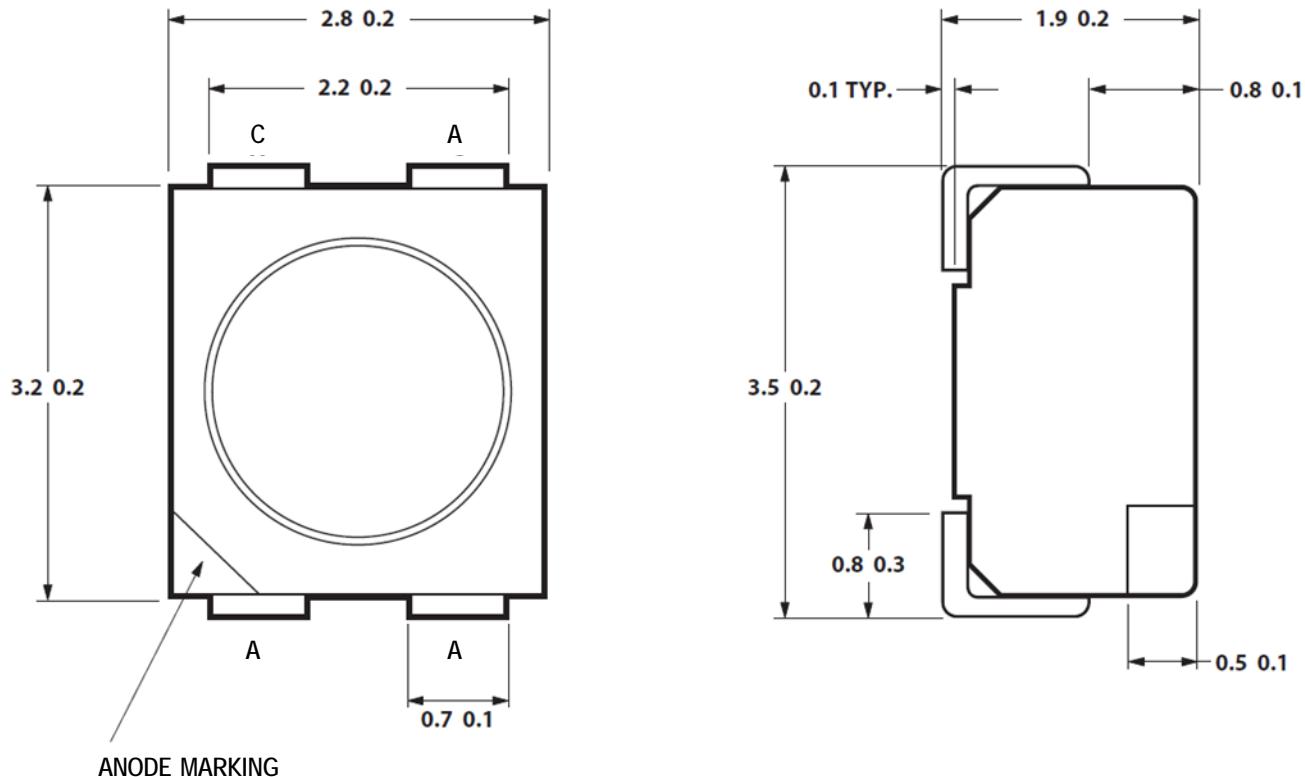
- Industry standard PLCC-4
- High reliability LED package
- High brightness using AlInGaP technologies
- High optical efficiency
- Higher ambient temperature at the same current possible compared to PLCC-2
- Super wide viewing angle at 120°
- High reliability LED package due to enhanced silicone resin material
- JEDEC MSL 2a

### Applications

- Electronic signs and signals
  - Interior full color sign
  - Variable message sign
- Office automation, home appliances, industrial equipment
  - Front panel backlighting
  - Push button backlighting
  - Display backlighting

**CAUTION:** ASMT-SxB4-Pxxxx LEDs are Class 2 ESD sensitive. Please observe appropriate precautions during handling and processing. Refer to Avago Application Note AN-1142 for additional details.

## Package Dimensions



NOTE : ALL DIMENSION IN mm

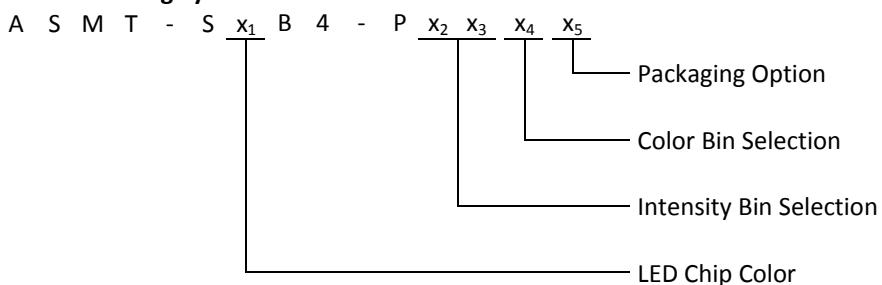
Table 1. Device Selection Guide

Color	Part Number	Luminous Intensity, IV <sup>[1]</sup> (mcd)				Dice Technology
		Min IV (mcd)	Max. IV (mcd)	Test Current (mA)		
Amber	ASMT-SAB4-PW505	1125.00	3550.00	50		AlInGaP
Red	ASMT-SRB4-PW505	1125.00	3550.00	50		AlInGaP
Red Orange	ASMT-SHB4- PW905	1400.00	4500.00	50		AlInGaP

Notes:

1. The luminous intensity IV, is measured at the mechanical axis of the lamp package. The actual peak of the spatial radiation pattern may not be aligned with this axis.
2. IV Tolerance =  $\pm 12\%$

## Part Numbering System



**Table 2. Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ )**

Parameters	ASMT-SXB4-Pxxxx
DC Forward Current <sup>[1]</sup>	70mA
Peak Forward Current <sup>[2]</sup>	200mA
Power Dissipation	240 mW
Junction Temperature	110 °C
Operating Temperature	- 40 °C to + 100 °C
Storage Temperature	- 40 °C to + 100 °C

**Notes:**

1. Derate linearly as shown in Figure 4.
2. Duty Factor = 10%, Frequency = 1kHz.
3. Driving the LED in reverse direction is suitable for short term application only.
4. Operation at currents below 5mA is not recommended.
5. Operation at reverse voltage is not recommended.

**Table 3. Optical Characteristics ( $T_A = 25^\circ\text{C}$ )**

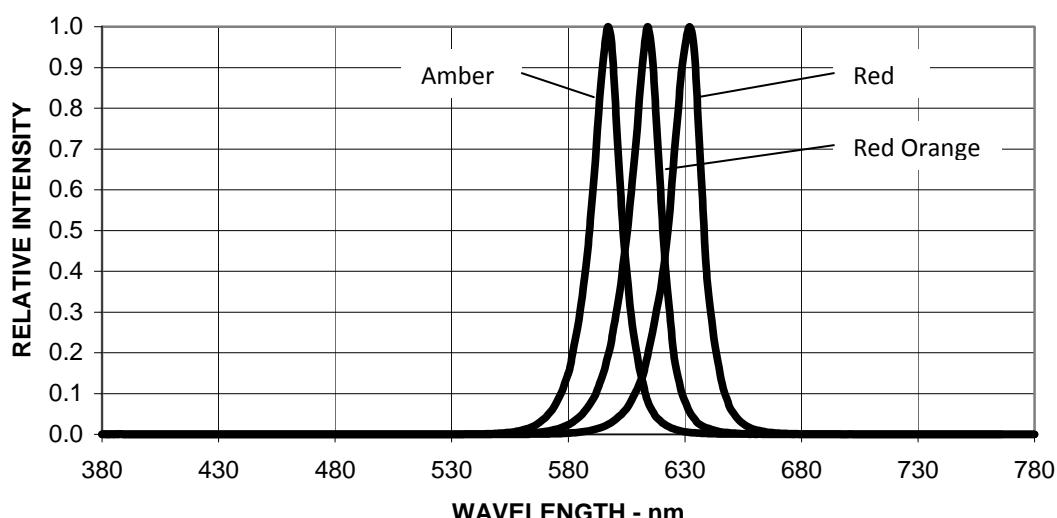
Color	Part Number	Dice Technology	Peak Wavelength	Dominant Wavelength <sup>[1]</sup> $\lambda_D$ (nm)	Viewing Angle $2\theta_{1/2}^{[2]}$ (Degrees)
			$\lambda_{\text{PEAK}}$ (nm)	Typ.	Typ.
Amber	ASMT-SAB4-Pxxxx	AlInGaP	594	589	120
Red	ASMT-SRB4-Pxxxx	AlInGaP	631	624	120
Red Orange	ASMT-SHB4-Pxxxx	AlInGaP	621	615	120

**Notes:**

1. The dominant wavelength,  $\lambda_D$ , is derived from the CIE Chromaticity diagram and represents the color of the device.
2.  $\theta_{1/2}$  is the off-axis angle where the luminous intensity is  $\frac{1}{2}$  the peak intensity.

**Table 4. Electrical Characteristics ( $T_A = 25^\circ\text{C}$ )**

Part Number	Forward Voltage $V_F$ (Volts) @ $I_F = 50$ mA	
	Typ.	Max.
ASMT-SXB4-Pxxxx	2.2	2.8

**Figure 1. Relative intensity vs. wavelength**

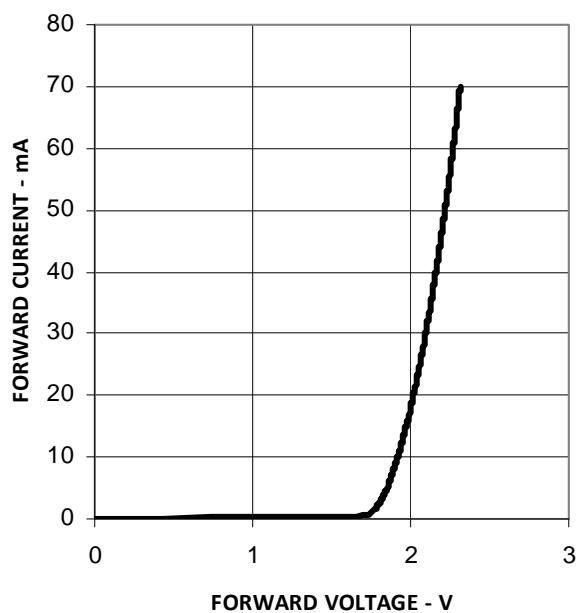


Figure 2. Forward current vs. forward voltage

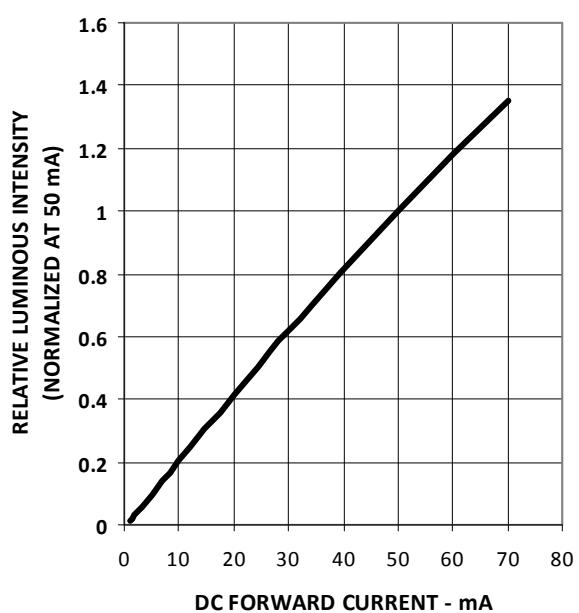


Figure 3. Relative intensity vs. forward current

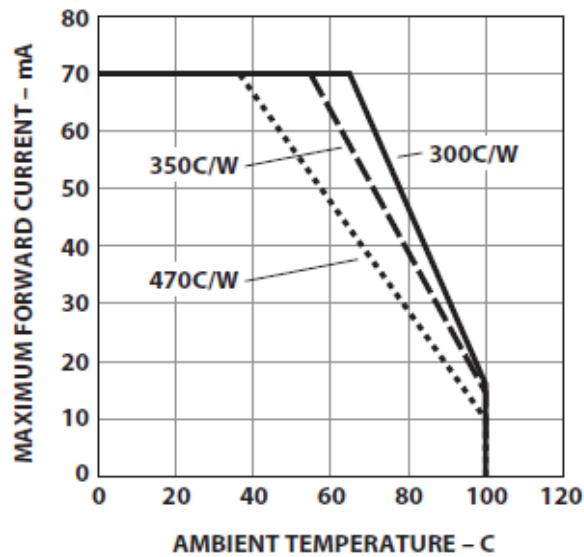


Figure 4. Maximum forward current vs. ambient temperature. Derated based on  $T_{JMAX} = 110^\circ\text{C}$

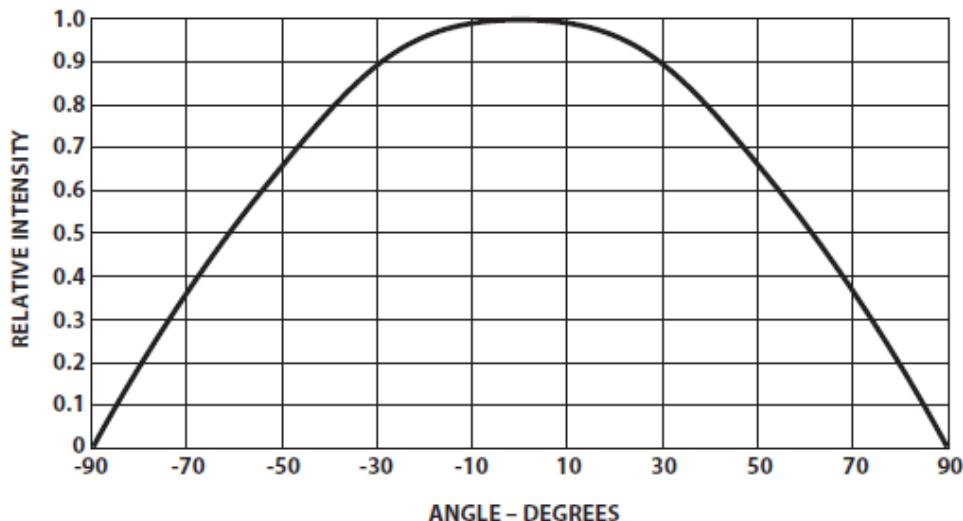


Figure 5. Radiation Pattern

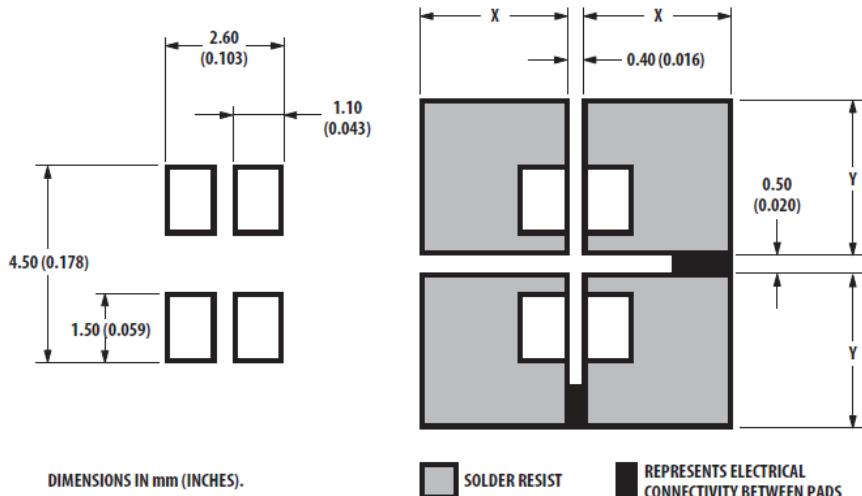


Figure 6. Recommended soldering pad pattern

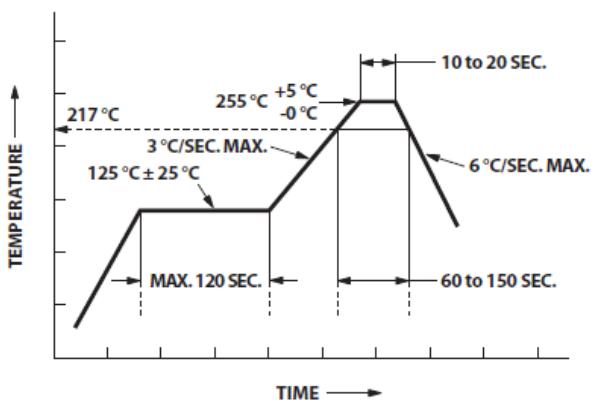


Figure 7. Recommended Pb-free reflow soldering profile.

**Note:** For detailed information on reflow soldering of Avago surface mount LEDs, refer to Avago Application Note AN 1060 *Surface Mounting SMT LED Indicator Components*.

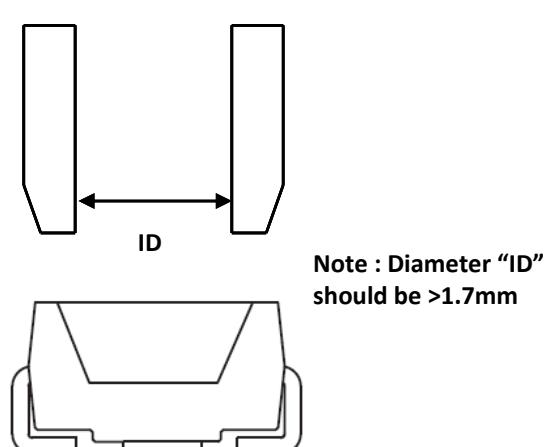
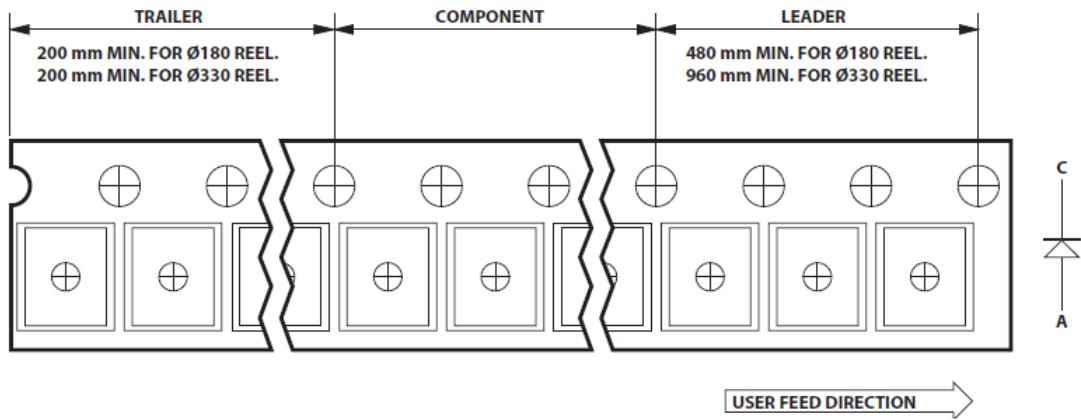
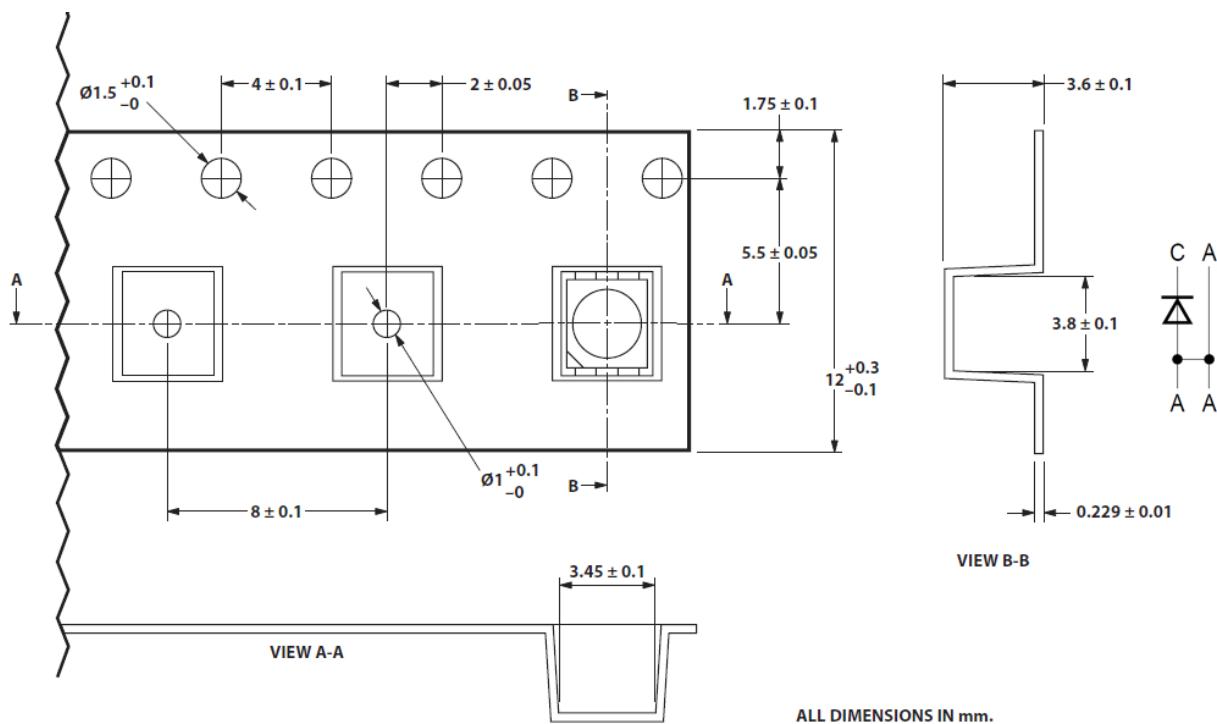


Figure 8. Recommended Pick and Place Nozzle Size



**Figure 9. Tape leader and trailer dimensions**



**Figure 10. Tape dimensions**

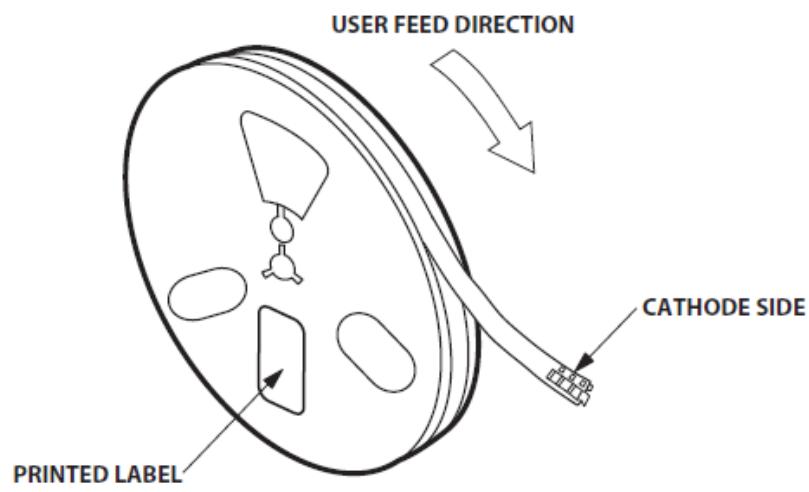


Figure 11. Reeling Orientation

**Intensity Bin Select (X<sub>2</sub>X<sub>3</sub>)**

Individual reel will contain parts from one half bin only

X <sub>5</sub>	Min I <sub>v</sub> Bin
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X <sub>6</sub>	
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0	Full Distribution
A	1 half bins starting from X <sub>5</sub> 1
2	2 half bins starting from X <sub>5</sub> 1
3	3 half bins starting from X <sub>5</sub> 1
4	4 half bins starting from X <sub>5</sub> 1
5	5 half bins starting from X <sub>5</sub> 1
B	1 half bins starting from X <sub>5</sub> 2
6	2 half bins starting from X <sub>5</sub> 2
7	3 half bins starting from X <sub>5</sub> 2
8	4 half bins starting from X <sub>5</sub> 2
9	5 half bins starting from X <sub>5</sub> 2

**Intensity Bin Limits**

Bin ID	Min. (mcd)	Max. (mcd)
R1	112.50	140.00
R2	140.00	180.00
S1	180.00	224.00
S2	224.00	285.00
T1	285.00	355.00
T2	355.00	450.00
U1	450.00	560.00
U2	560.00	715.00
V1	715.00	900.00
V2	900.00	1125.00
W1	1125.00	1400.00
W2	1400.00	1800.00
X1	1800.00	2240.00
X2	2240.00	2850.00
Y1	2850.00	3550.00
Y2	3550.00	4500.00
Z1	4500.00	5600.00
Z2	5600.00	7150.00
11	7150.00	9000.00
12	9000.00	11250.00
21	11250.00	14000.00
22	14000.00	18000.00
31	18000.00	22400.00
32	22400.00	28500.00
41	28500.00	35500.00
42	35500.00	45000.00
51	45000.00	56000.00
52	56000.00	71500.00
61	71500.00	90000.00
62	90000.00	112500.00

Tolerance of each bin limit = ± 12%

**VF Bin Limits**

Bin ID	Min (nm)	Max (nm)
2A	1.90	2.05
2B	2.05	2.20
2C	2.20	2.35
2D	2.35	2.50
2E	2.50	2.65
2F	2.65	2.80
2G	2.80	2.95
2H	2.95	3.10

Tolerance of each bin limit = ±0.1V

Amber	Min (nm)	Max (nm)
2	583.0	586.0
3	586.0	589.0
4	589.0	592.0
5	592.0	595.0
6	595.0	598.0

Red	Min (nm)	Max (nm)
1	611.0	616.0
2	616.0	620.0
3	620.0	625.0

Red	Min (nm)	Max (nm)
Full Distribution		
Tolerance of each bin limit = ±1nm		

**Packaging Option (X<sub>5</sub>)**

Option	Test Current	Package Type	Reel Size
5	50mA	Top Mount	7 Inch

## 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 2a per Jecel 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  $<40^{\circ}\text{C}/90\%\text{RH}$  for 12 months. If the actual shelf life has exceeded 12 months and the 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  $<30^{\circ}\text{C} / 60\%\text{RH}$  at all time and all high temperature related process including soldering, curing or rework need to be completed within 672 hours.

### C. Control for unfinished reel

- For any unuse LEDs, they need to be stored in sealed MBB with desiccant or desiccator at  $<5\%\text{RH}$ .

### D. Control of assembled 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  $<5\%\text{RH}$  to ensure no LEDs have exceeded their floor life of 672 hours.

### E. Baking is required if:

- “10%” is Not Green and “5%” HIC indicator turns Azure.
- The LEDs are exposed to condition of  $>30^{\circ}\text{C} / 60\%\text{RH}$  at any time.
- The LEDs floor life exceeded 672 hours.

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

For product information and a complete list of distributors, please go to our web site: [www.avagotech.com](http://www.avagotech.com)

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