

ASMT-QxB2-Fxxxx

Super 0.5 W Power PLCC-4 Surface Mount LED Indicator



Data Sheet



Lead (Pb) Free
RoHS 6 fully
compliant



Description

The Super 0.5 W Power PLCC-4 SMT LED is an extension of Power PLCC-4 SMT LEDs. The package can be driven at high current due to its superior package design. The product is able to dissipate the heat more efficiently compared to the Power PLCC-4 SMT LEDs. These LEDs produce higher light output with better flux performance compared to the Power PLCC-4 SMT LED.

The Super 0.5 W Power PLCC-4 SMT LEDs are designed for higher reliability, better performance, and operate under a wide range of environmental conditions. The performance characteristics of these new mid-power LEDs make them uniquely suitable for use in harsh conditions such as in automotive applications, and in electronics signs and signals.

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

Super 0.5 W Power PLCC-4 SMT LED is available in red, red orange and amber colors.

Features

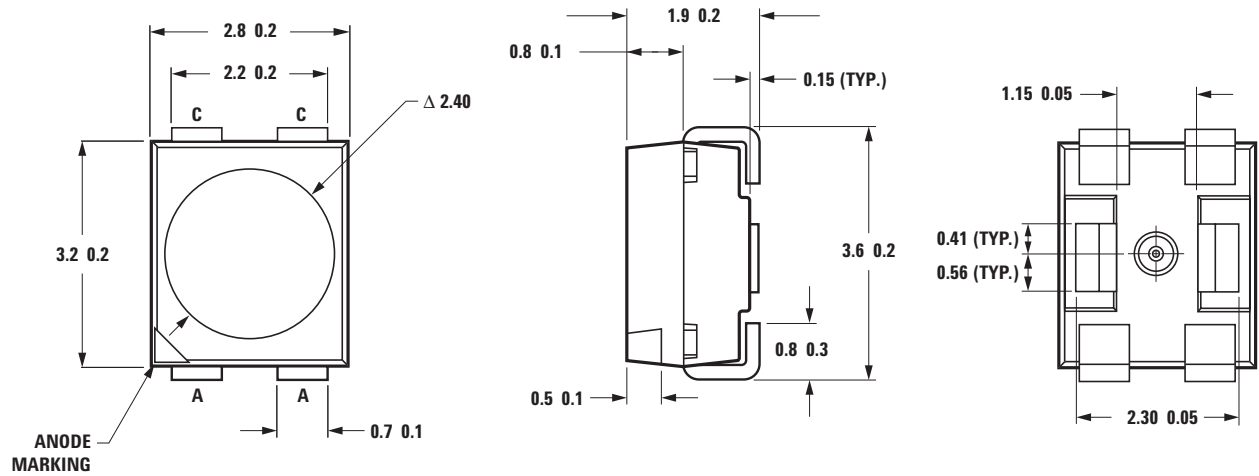
- Industry Standard PLCC 4 platform (3.2 x 2.8 x 1.9 mm)
- High reliability package with enhanced silicone resin encapsulation
- High intensity brightness with optimum flux performance using AlInGaP chip technologies
- Available in Red, Red Orange and Amber colors
- High optical efficiency
- Available in 8 mm carrier tape and 7 inch reel
- Low thermal resistance
- Super wide viewing angle at 120 degrees
- Longer life time with minimum degradation due to enhanced Silicone resin material
- JEDEC MSL 2a

Applications

- Exterior automotive
 - Turn signals
 - Side repeaters
 - CHSML
 - Rear combination lamp
 - Side markers
 - Truck clearance lamp
- Electronic signs and signals
 - Channel lettering
 - Contour lighting
 - Indoor variable message sign
- Office automation, home appliances, industrial equipment
 - Front panel backlighting
 - Push button backlighting
 - Display backlighting

CAUTION: ASMT-QxB2-Fxxxx 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 Drawing



- NOTES: 1. ALL DIMENSIONS IN MILLIMETERS.
 2. LEAD POLARITY AS SHOWN IN FIGURE 13.
 3. TERMINAL FINISH: Ag PLATING.
 4. ENCAPSULATION MATERIAL: SILICONE RESIN.

Figure 1. Package drawing

Table 1. Device Selection Guide ($T_J = 25^\circ\text{C}$)

Color	Part Number	Luminous Flux, $\Phi_V^{[1]}$ (lm)			Test Current (mA)	Dice Technology
		Min. Flux (lm)	Typ. Flux (lm)	Max. Flux (lm)		
Amber	ASMT-QAB2-FDE0E	9.0	11.4	15.0	150	AlInGaP
Red Orange	ASMT-QHB2-FEF0E	11.5	14.0	19.5	150	AlInGaP
Red	ASMT-QRB2-FCD0E	7.0	9.8	11.5	150	AlInGaP

Notes:

1. Φ_V is the total luminous flux output as measured with an integrating sphere at mono pulse conditions.
 2. Tolerance = $\pm 12\%$.

Part Numbering System

A S M T - Q X₁ B 2 - F X₂ X₃ X₄ X₅

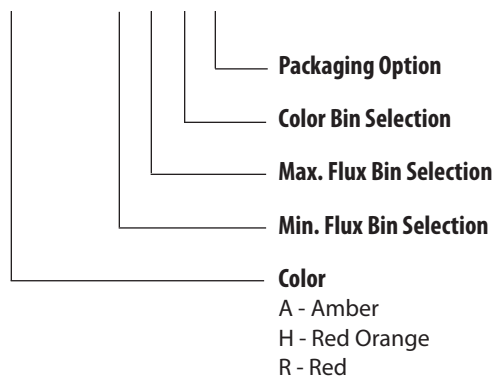


Table 2. Absolute Maximum Ratings (T_A = 25°C)

Parameters	ASMT-QxB2-Fxxxx
DC Forward Current ^[1]	150 mA
Peak Forward Current ^[2]	200 mA
Power Dissipation	470 mW
Reverse Voltage	5 V
Junction Temperature	125°C
Operating Temperature	-40°C to +110°C
Storage Temperature	-40°C to +110°C

Notes:

1. Derate I linearly as shown in Figure 6.
2. Duty Factor = 10%, Frequency = 1kHz.

Table 3. Optical Characteristics (T_J = 25°C)

Color	Part Number	Dice Technology	Dominant Wavelength λ_D ^[1] (nm)	Viewing Angle 2 $\theta_{1/2}$ ^[2] (Degrees)	Luminous Efficiency η_e (lm/W)	Total Flux / Luminous Intensity F _V (lm) / I _V (cd)
			Typ.	Typ.	Typ.	Typ.
Amber	ASMT-QAB2-Fxxxx	AlInGaP	594.5	120	28	3.3
Red Orange	ASMT-QHB2-Fxxxx	AlInGaP	617.0	120	35	3.3
Red	ASMT-QRB2-Fxxxx	AlInGaP	624.0	120	21	3.3

Notes:

1. The dominant wavelength, λ_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 1/2 the peak intensity.

Table 4. Electrical Characteristics (T_J = 25°C)

Part Number	Forward Voltage V _F (Volts) @ I _F = 150 mA		Reverse Voltage V _R @ 100 μ A	Thermal Resistance R θ_{J-P} (°C/W)
	Typ.	Max.	Min.	
ASMT-QAB2-Fxxxx	2.70	3.25	5	60
ASMT-QHB2-Fxxxx	2.70	3.25	5	60
ASMT-QRB2-Fxxxx	3.10	3.55	5	60

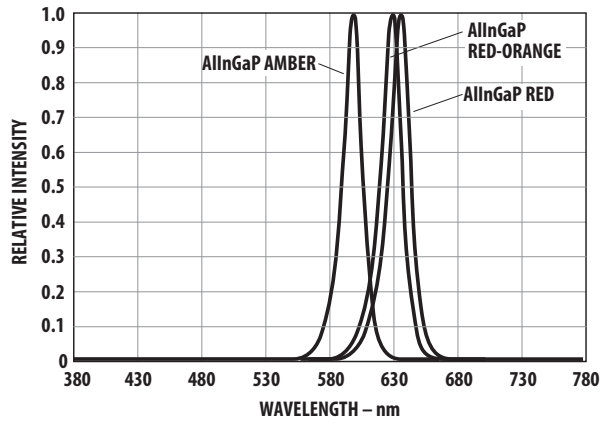


Figure 2. Relative intensity vs. wavelength

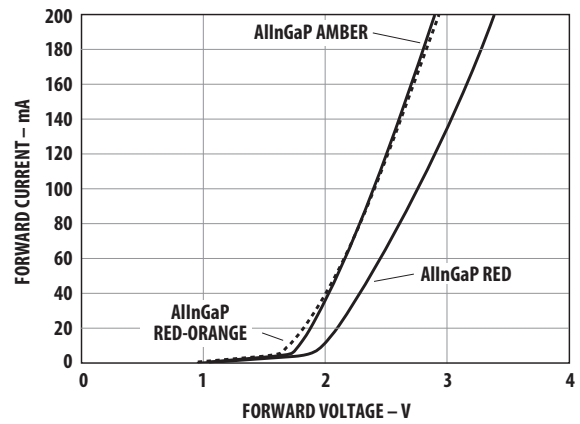


Figure 3. Forward current vs. forward voltage

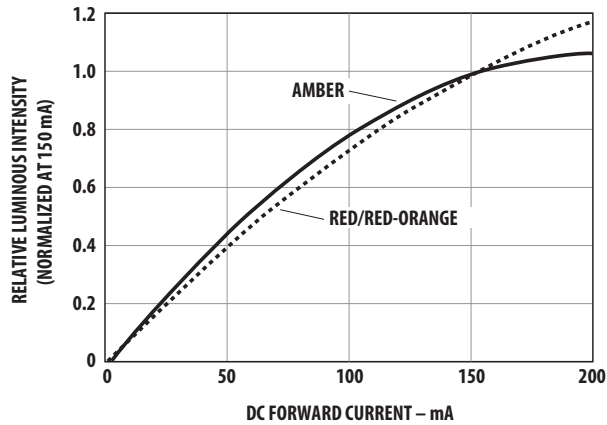


Figure 4. Relative intensity vs. forward current

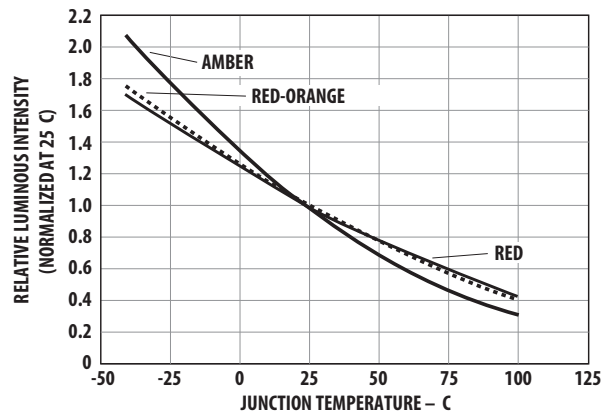


Figure 5. Relative intensity vs. temperature

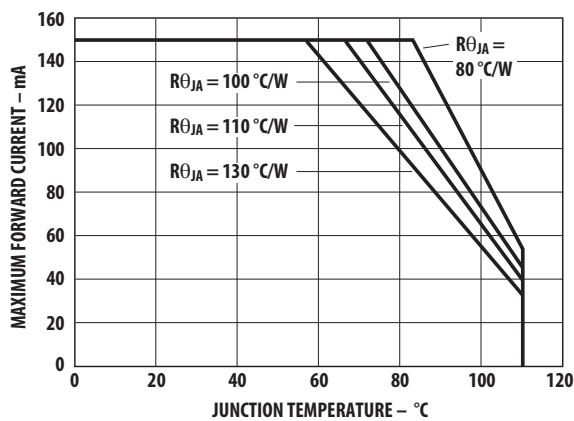


Figure 6a. Maximum forward current vs. ambient temperature. Derated based on $T_{JMAX} = 125^{\circ}\text{C}$, $R_{\theta JA} = 130^{\circ}\text{C/W}$, 110°C/W , 100°C/W and 80°C/W .

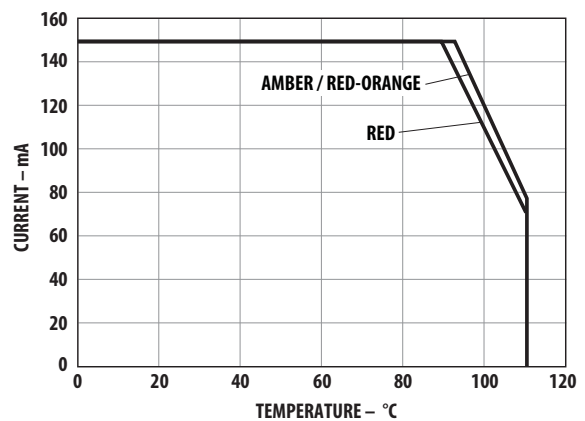


Figure 6b. Maximum forward current vs. solder point temperature. Derated based on $T_{JMAX} = 125^{\circ}\text{C}$, $R_{JP} = 60^{\circ}\text{C/W}$.

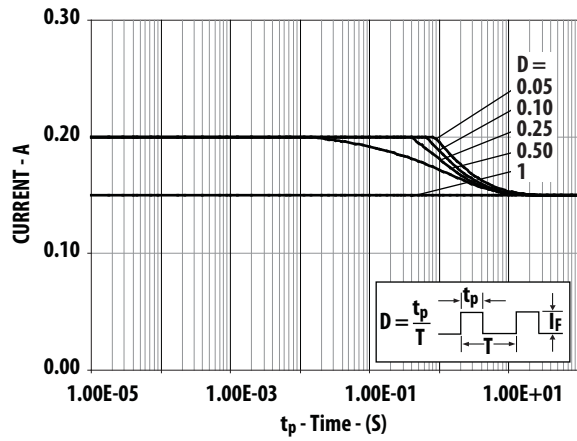


Figure 7a. Maximum pulse current vs. ambient temperature. Derated based on $T_A = 25^\circ\text{C}$, $R(\theta)_{J-A} = 110^\circ\text{C/W}$.

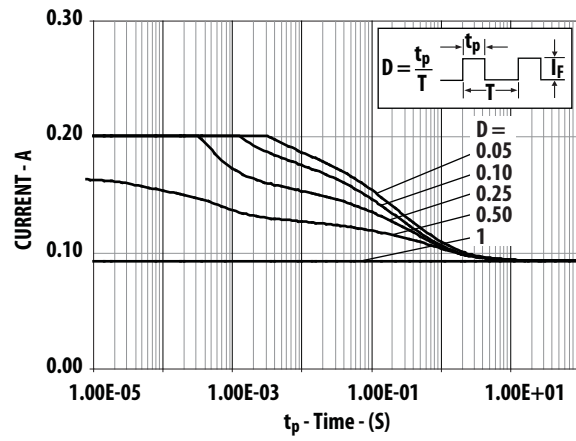


Figure 7b. Maximum pulse current vs. ambient temperature. Derated based on $T_A = 85^\circ\text{C}$, $R(\theta)_{J-P} = 110^\circ\text{C/W}$.

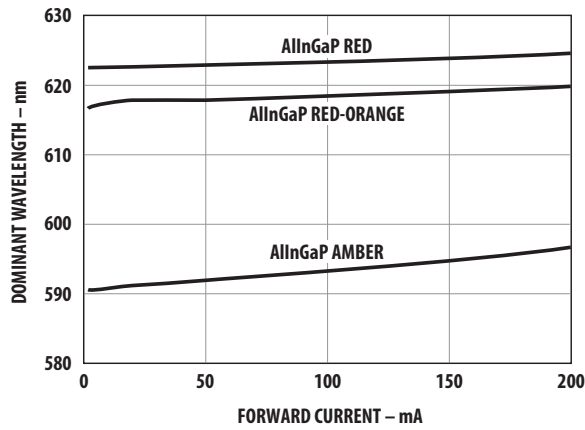


Figure 8. Dominant wavelength vs. forward current – AllnGaP devices

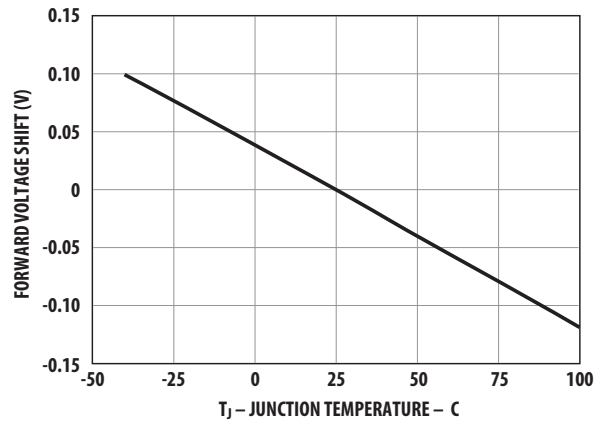


Figure 9. Forward voltage shift vs. temperature

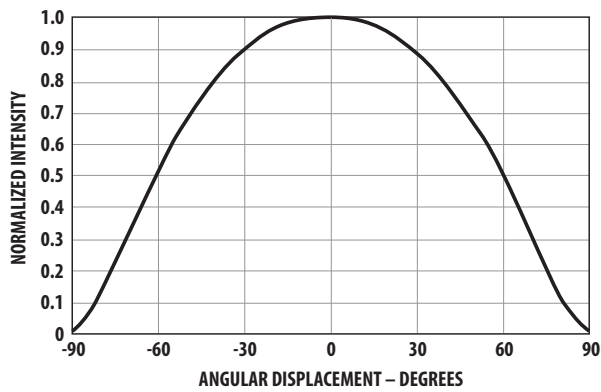
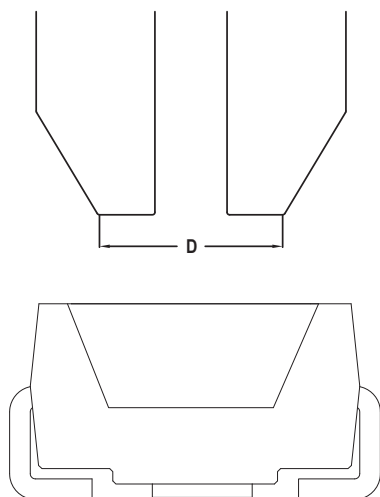


Figure 10. Radiation pattern



Note: Diameter "D" should be smaller than 2.2mm

Figure11. Recommended pick and place nozzle size

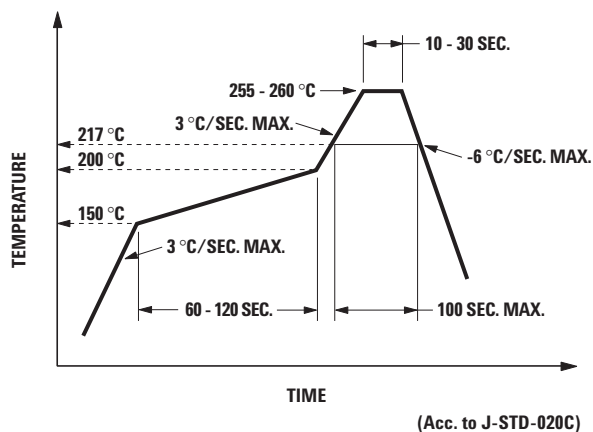


Figure 12. Recommended Pb-free reflow soldering profile

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

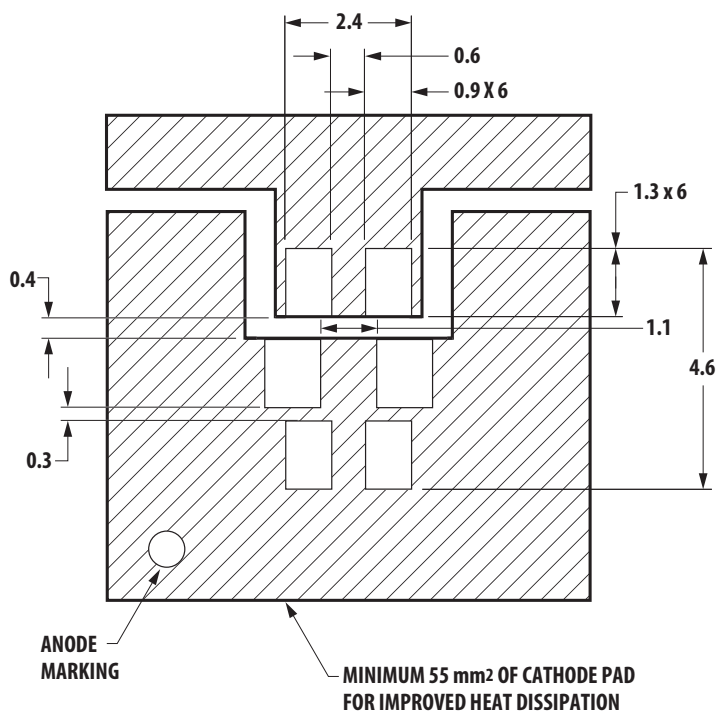
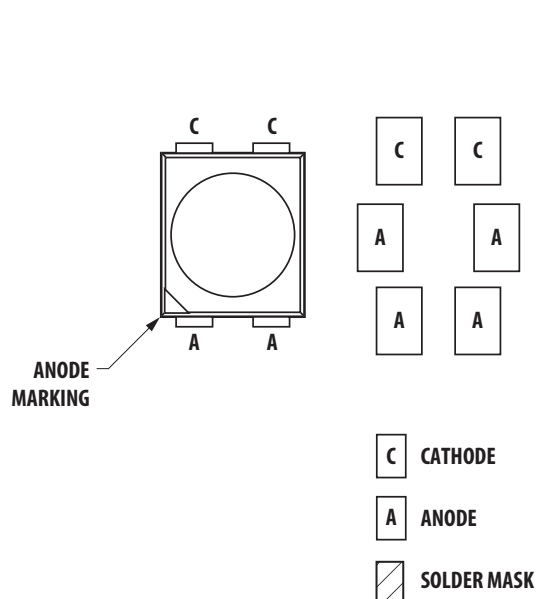


Figure 13. Recommended soldering pad pattern

Device Color (X₁)

A	Amber
H	Red Orange
R	Red

Flux Bin Select (X₂X₃)

Individual reel will contain parts from one bin only.

X ₂	Min Flux Bin
X ₃	Max Flux Bin

Flux Bin Limits

Bin ID	Min. (lm)	Max. (lm)
A	4.30	5.50
B	5.50	7.00
C	7.00	9.00
D	9.00	11.50
E	11.50	15.00
F	15.00	19.50
G	19.50	25.50
H	25.50	33.00
J	33.00	43.00
K	43.00	56.00
L	56.00	73.00

Tolerance of each bin limit = $\pm 12\%$.

Color Bin Select (X₄)

Individual reel will contain parts from one full bin only.

X ₄	
0	Full Distribution
A	1 and 2 only
B	2 and 3 only
C	3 and 4 only
D	4 and 5 only
E	5 and 6 only
G	1, 2 and 3 only
H	2, 3 and 4 only
J	3, 4 and 5 only
K	4, 5 and 6 only
M	1, 2, 3 and 4 only
N	2, 3, 4 and 5 only
P	3, 4, 5 and 6 only
R	1, 2, 3, 4 and 5 only
S	2, 3, 4, 5 and 6 only
Z	Special Color Bin

Color Bin Limits

Amber/Yellow	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 Orange	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	620.0	635.0

Tolerance of each bin limit = ± 1 nm.

V_F Binning

Bin	Min.	Max.
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
2J	3.10	3.25
2K	3.25	3.40
2L	3.40	3.55

Tolerance of each bin = ± 0.1 V.

Packaging Option (X₅)

Option	Test Current	Package Type	Reel Size
E	150 mA	Top Mount	7 Inch

Handling Precaution

The encapsulation 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. This 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 detailed information.

Moisture Sensitivity

This product is qualified as Moisture Sensitive Level 2a per Jedec J-STD-020. Precaution 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.

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 times and all high temperature related processes, including soldering, curing or rework, need to be completed within 672 hours.

C. Control for unfinished reel

- For any unused 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 needs 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 is 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 website: www.avagotech.com

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