ALMZ-EG3E,ALMZ-EL3E, ALMZ-CM3E,ALMZ-CB3E
High Brightness SMT Round
Red, Amber Green & Blue LED Lamps

Lead (PB) Free
RoHS 6 fully compliant

Description

The new Avago ALMZ-xx3E LED series has the same or just slightly less luminous intensity than conventional high brightness, through-hole LEDs.

The new LED lamps can be assembled using common SMT assembly processes and are compatible with industrial reflow soldering processes.

The LEDs are made with an advanced optical grade epoxy for superior performance in outdoor sign applications

For easy pick and place assembly, the LEDs are shipped in tape and reel. Every reel is shipped from a single intensity and color bin– except the red color–for better uniformity

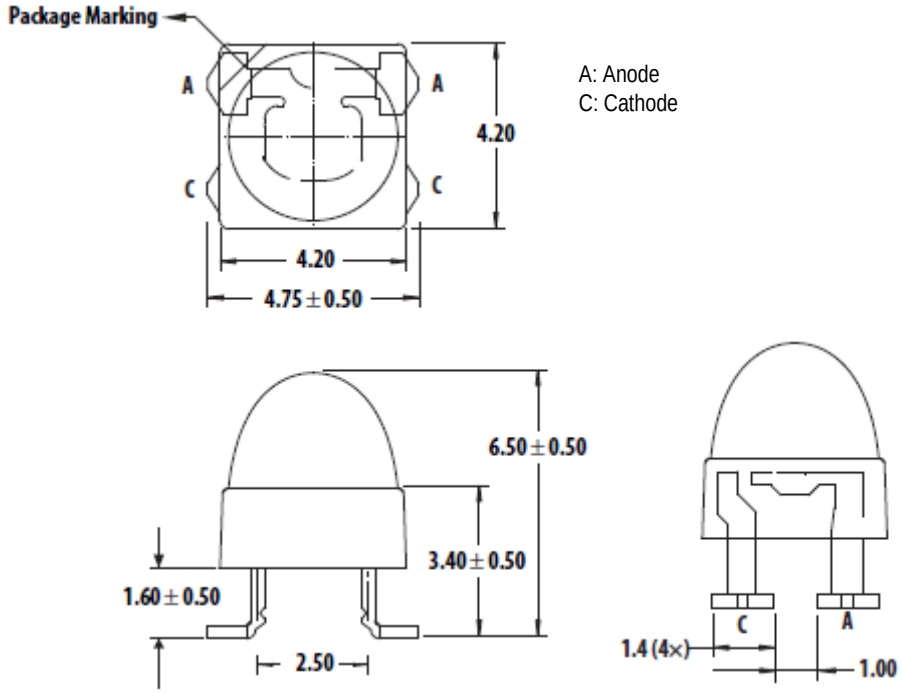
Features

- Compact form factor
- High brightness material
- Available in Red, Amber, Green and Blue Color
- Red AlInGaP 626nm
- Amber AlInGaP 590nm
- Green InGaN 525nm
- Blue InGaN 470nm
- Jedec MSL 2A
- Compatible with reflow soldering process
- Tinted lens
- Typical viewing angle: 30°

Applications

- Full Color Signs
- Mono Color Signs

Package Dimensions



A: Anode
C: Cathode

Notes:
1. All dimensions in millimeters (inches).
2. Tolerance is ± 0.20 mm unless other specified.

CAUTION: InGaN devices are Class 1C HBM ESD sensitive, AlInGaP devices are Class 1B sensitive per JEDEC Standard. Please observe appropriate precautions during handling and processing. Refer to Application Note AN-1142 for additional details.

Caution: Customer is advised to always keep the LED in the moisture barrier bag with <5%RH when not in use as prolonged exposure to environment might cause the leads to tarnish or rust, which might cause difficulties in soldering.

Device Selection Guide

Part Number	Color and Dominant Wavelength λd (nm) Typ [3]	Luminous Intensity Iv (mcd) [1,2,5]		Viewing Angle Typ (°) [4]
		Min	Max	
ALMZ-EG3E-VX002	Red 626	4200	9300	30°
ALMZ-EL3E-VX002	Amber 590	4200	9300	
ALMZ-CM3E-Y1002	Green 525	9300	21000	
ALMZ-CB3E-SU002	Blue 470	1900	4200	

Notes:
1. The luminous intensity is measured on the mechanical axis of the lamp package and it is tested with pulsing condition.
2. The optical axis is closely aligned with the package mechanical axis.
3. Dominant wavelength, λd, is derived from the CIE Chromaticity Diagram and represents the color of the lamp.
4. θ½ is the off-axis angle where the luminous intensity is half the on-axis intensity.
5. Tolerance for each bin limit is ± 15%

Part Numbering System

ALMZ - x x 3 E - x x x x x

Packaging Option
02: tested 20mA, 13inch carrier tape, 8mm pitch, 16mm carrier width

Color Bin Selection
0: Full Distribution

Maximum Intensity Bin
Refer to Device Selection Guide

Minimum Intensity Bin
Refer to Device Selection Guide

Viewing Angle / Leadframe Type
3E: 30° Round/ Mild steel lead frame

Color
B: Blue
G: Red
L: Amber
M: Green

Package
C: SMT Round InGaN
E: SMT Round AlInGaP

SMT Lamps

Absolute Maximum Rating, T_J = 25°C

Parameter	Red/Amber	Green	Blue	Unit
DC Forward Current [1]	50	30	20	mA
Peak Forward Current	100[2]	100[3]	100 [3]	mA
Power Dissipation	120	114	76	mW
LED Junction Temperature	110			°C
Operating Temperature Range	-40 to +85			˚C
Storage Temperature Range	-40 to +100			˚C

Notes:

1. Derate linearly as shown in Figure 4 and Figure 9.
2. Duty Factor 30%, frequency 1kHz.
3. Duty Factor 10%, frequency 1kHz.

Electrical / Optical Characteristics, T_J = 25°C

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Forward Voltage Red Amber Green Blue	V_F	 1.8 1.8 2.8 2.8	 2.1 2.1 3.2 3.2	 2.4 2.4 3.8 3.8	V	I_F = 20 mA
Reverse Voltage [3] Red & Amber Green & blue	V_R	 5 5			V	 I_R = 100 μA I_R = 10 μA
Dominant Wavelength[1] Red Amber Green Blue	λ_d	 618.0 584.5 519.0 460.0	 626.0 590.0 525.0 470.0	 630.0 594.5 539.0 480.0		I_F = 20 mA
Peak Wavelength Red Amber Green Blue	λ_{PEAK}		 634 594 516 464		nm	Peak of Wavelength of Spectral Distribution at I_F = 20 mA
Thermal Resistance Red Amber Green Blue	$R\theta_{J\text{-}PIN}$		 270 270 270 480		°C/W	LED Junction-to-Pin
Luminous Efficacy [2] Red Amber Green Blue	η_V		 200 490 530 65		lm/W	Emitted Luminous Power/Emitted Radiant Power
Thermal coefficient of λ_d Red Amber Green Blue			 0.059 0.103 0.028 0.024		nm/°C	I_F = 20 mA ; +25°C ≤ T_J ≤ +100°C

Notes:

1. The dominant wavelength is derived from the chromaticity Diagram and represents the color of the lamp.
2. The radiant intensity, I_e in watts per steradian, may be found from the equation $I_e = I_V/\eta_V$ where I_V is the luminous intensity in candelas and η_V is the luminous efficacy in lumens/watt.
3. Indicates product final testing condition. Long term reverse bias is not recommended.

AlInGaP

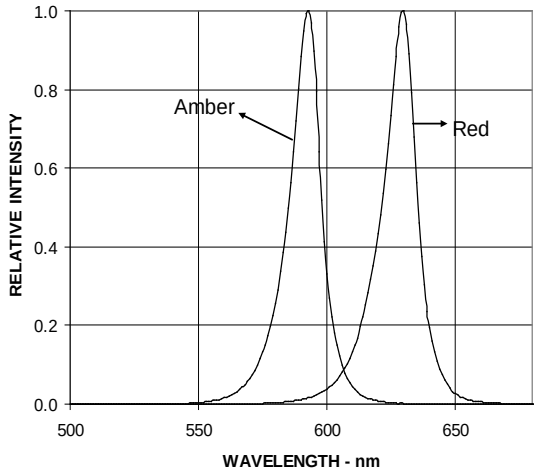


Figure 1: Relative Intensity vs Wavelength

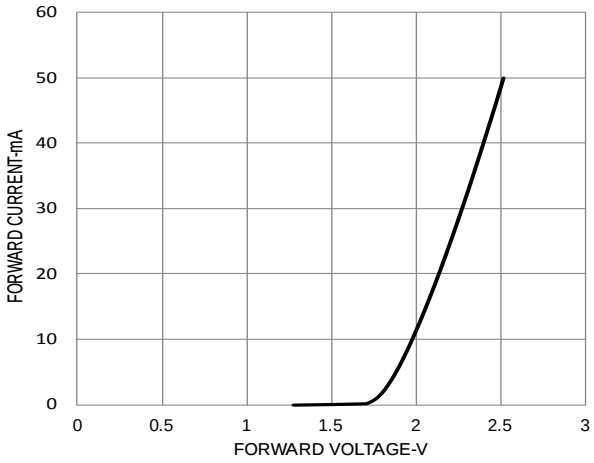


Figure 2: Forward Current vs Forward Voltage

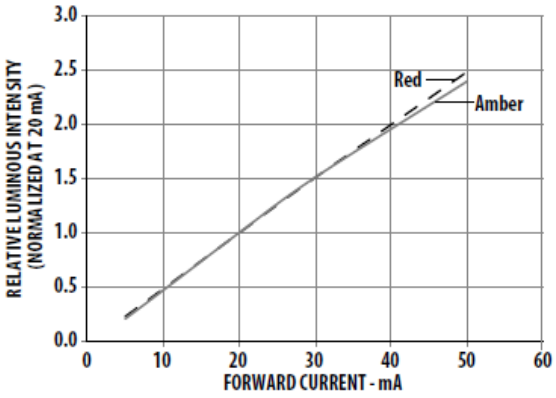


Figure 3: Relative Intensity vs Forward Current

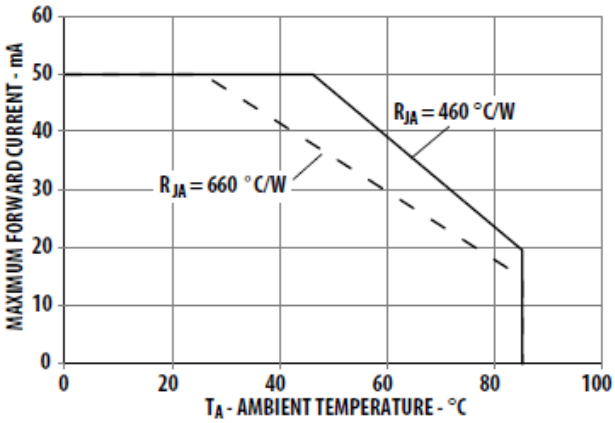


Figure 4: Maximum Forward Current vs Ambient Temperature

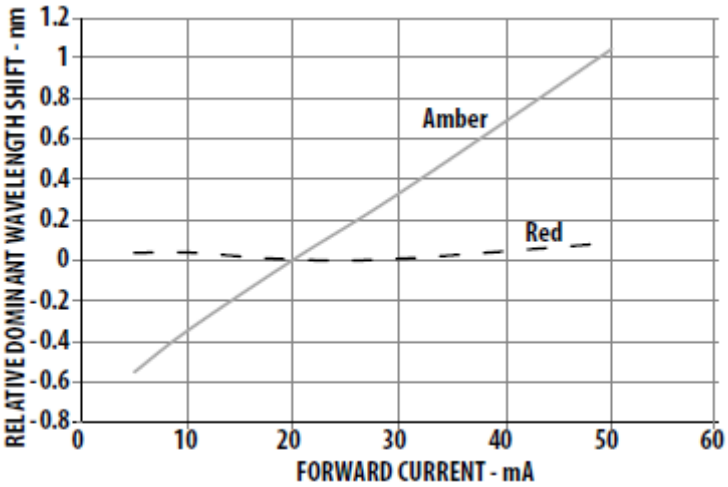


Figure 5: Relative Dominant Wavelength Shift vs Forward Current

InGaN

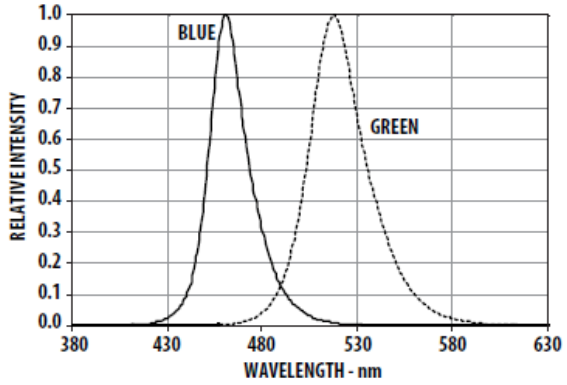


Figure 6: Relative Intensity vs Wavelength

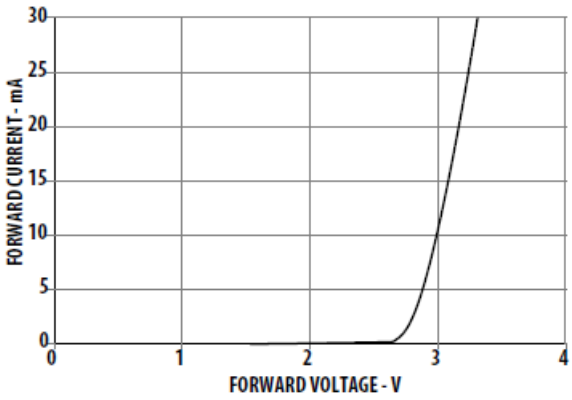


Figure 7: Forward Current vs Forward Voltage

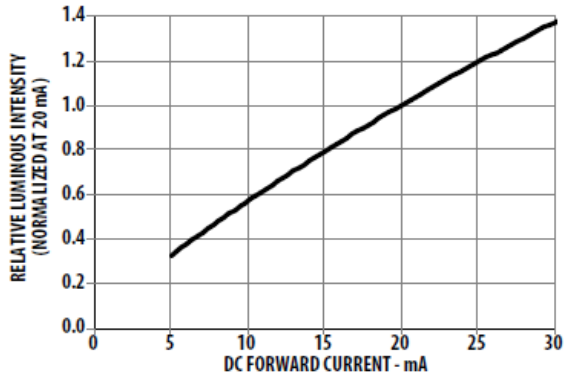


Figure 8: Relative Intensity vs Forward Current

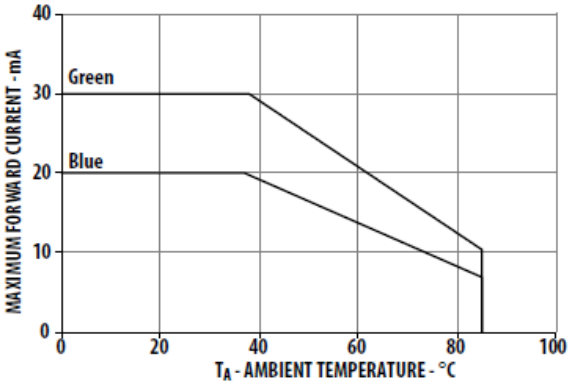


Figure 9: Maximum Forward Current vs Ambient Temperature

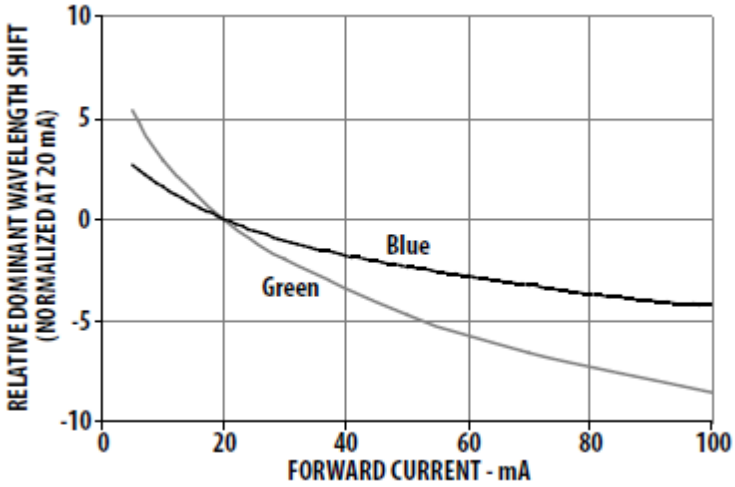


Figure 10: Dominant Wavelength Shift vs Forward Current

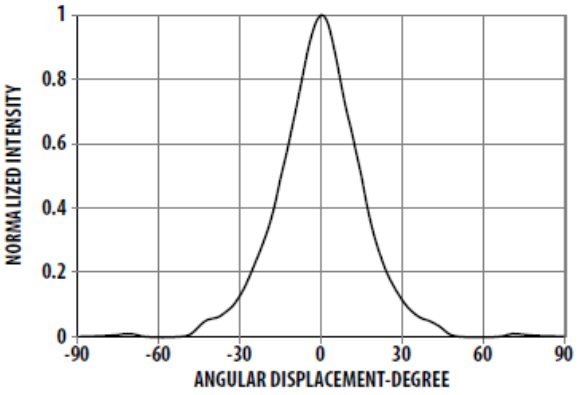


Figure 11a: Radiation Pattern for X axis

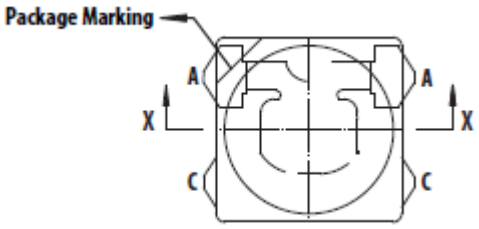


Figure 11b: Component Axis for Radiation Pattern

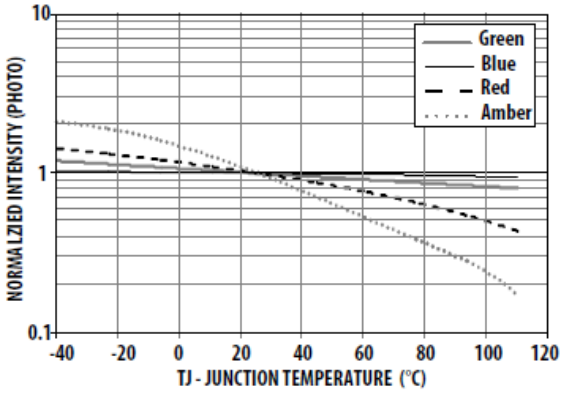


Figure 12: Relative Intensity Shift vs Junction Temperature

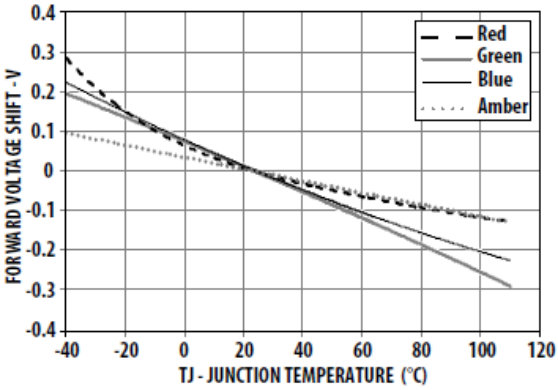


Figure 13: Forward Voltage Shift vs Junction Temperature

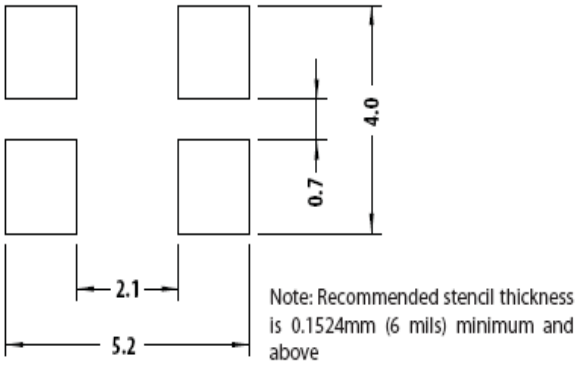
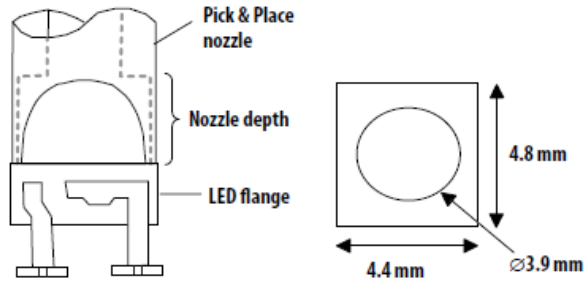


Figure 14: Recommended Soldering Land Pattern



Note:

1. Nozzle depth should be touching LED flange during pick and place.
2. Nozzle width should be able to fit into LED carrier tape.

Figure 15: Recommended Pick and Place Nozzle Tip (Urethane PAD Tip)

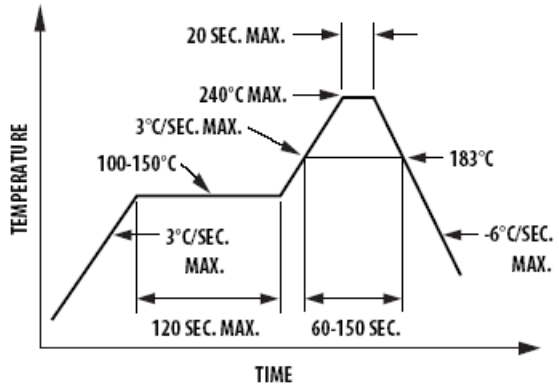


Figure 16: Recommended Leaded Reflow Soldering Profile

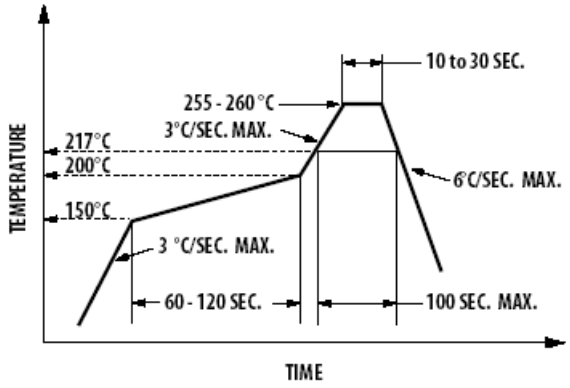


Figure 17: Recommended Pb- Free Reflow Soldering Profile

Note: For detail information on reflow soldering of Avago Surface Mount LED, do refer to Avago Application Note AN1060 Surface Mounting SMT LED Indicator Components.

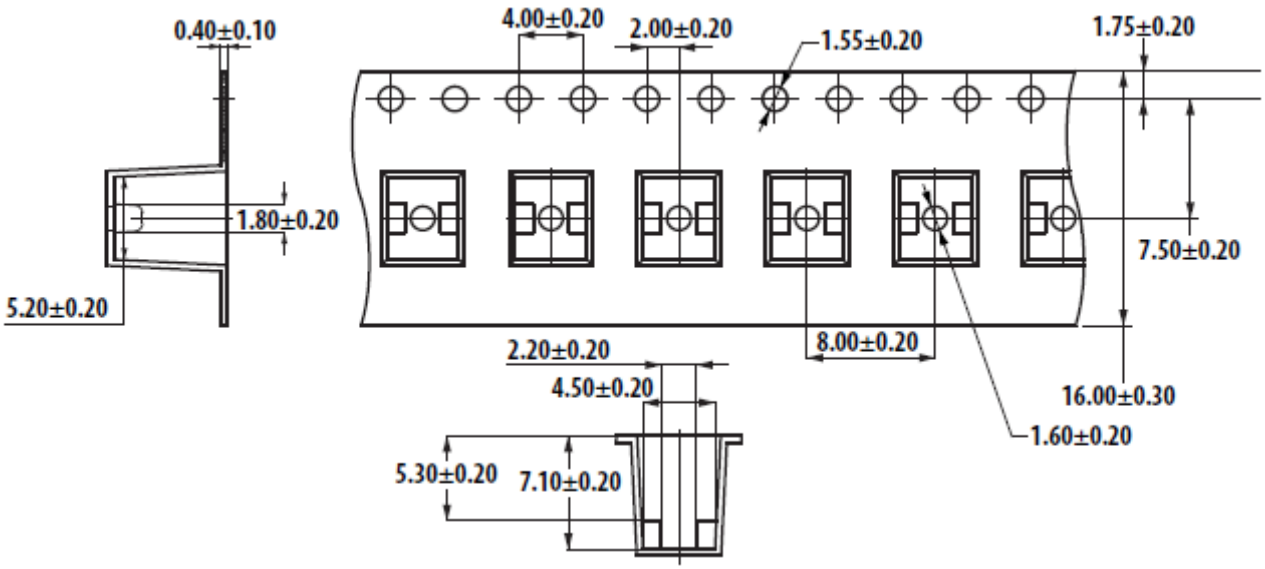


Figure 18: Carrier Tape Dimension

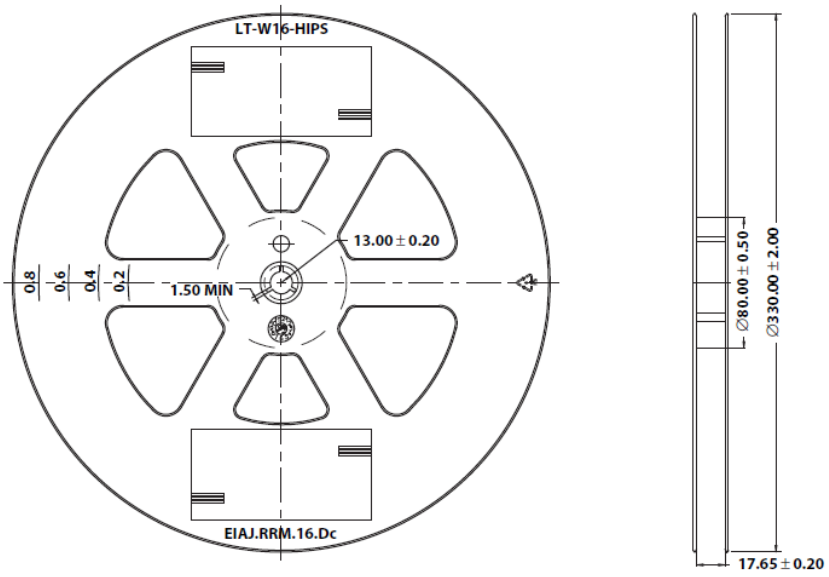


Figure 19: Reel Dimension

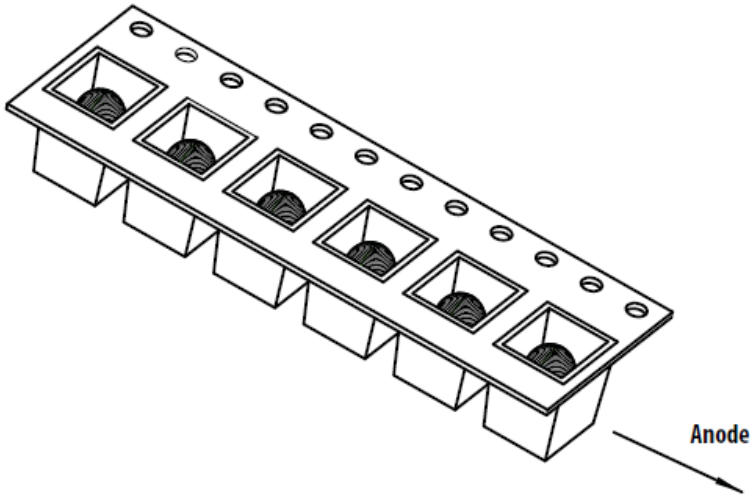


Figure 20: Unit Orientation From Reel

Intensity Bin Limit Table (1.3:1 Iv bin ratio)

Bin	Intensity (mcd) at 20mA	
	Min	Max
S	1900	2500
T	2500	3200
U	3200	4200
V	4200	5500
W	5500	7200
X	7200	9300
Y	9300	12000
Z	12000	16000
1	16000	21000

Tolerance for each bin limit is ± 15%

VF Bin Table (V at 20mA) for Red and Amber only

Bin ID	Min	Max
VD	1.8	2.0
VA	2.0	2.2
VB	2.2	2.4

Tolerance for each bin limit is ± 0.05V

Red Color Range

Min Dom	Max Dom	Chromaticity Coordinate				
618.0	630.0	x	0.6873	0.6696	0.6892	0.7079
		y	0.3126	0.3136	0.2941	0.2920

Tolerance for each bin limit is ± 0.5nm

Amber Color Range

Bin	Min Dom	Max Dom	Chromaticity Coordinate				
1	584.5	587.0	x	0.5420	0.5370	0.5530	0.5570
			y	0.4580	0.4550	0.4400	0.4420
2	587.0	589.5	x	0.5570	0.5530	0.5670	0.5720
			y	0.4420	0.4400	0.4250	0.4270
4	589.5	592.0	x	0.5720	0.5670	0.5820	0.5870
			y	0.4270	0.4250	0.4110	0.4130
6	592.0	594.5	x	0.5870	0.5820	0.5950	0.6000
			y	0.4130	0.4110	0.3980	0.3990

Tolerance for each bin limit is ± 0.5nm

Green Color Range

Bin	Min Dom	Max Dom	Chromaticity Coordinate				
1	519.0	523.0	x	0.0667	0.1200	0.1450	0.0979
			y	0.8323	0.7375	0.7319	0.8316
2	523.0	527.0	x	0.0979	0.1450	0.1711	0.1305
			y	0.8316	0.7319	0.7218	0.8189
3	527.0	531.0	x	0.1305	0.1711	0.1967	0.1625
			y	0.8189	0.7218	0.7077	0.8012
4	531.0	535.0	x	0.1625	0.1967	0.2210	0.1929
			y	0.8012	0.7077	0.6920	0.7816
5	535.0	539.0	x	0.0667	0.1200	0.1450	0.0979
			y	0.8323	0.7375	0.7319	0.8316

Tolerance for each bin limit is ± 0.5nm

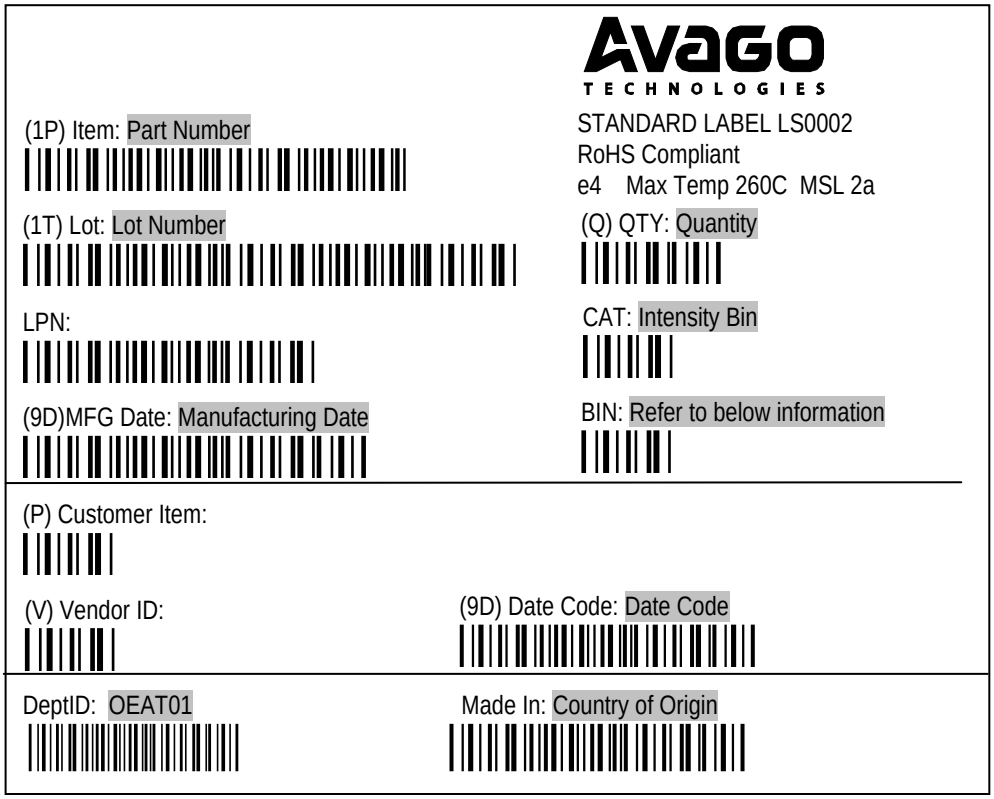
Blue Color Range

Bin	Min Dom	Max Dom	Chromaticity Coordinate				
1	460.0	464.0	x	0.1440	0.1818	0.1766	0.1374
			y	0.0297	0.0904	0.0966	0.0374
2	464.0	468.0	x	0.1374	0.1766	0.1699	0.1291
			y	0.0374	0.0966	0.1062	0.0495
3	468.0	472.0	x	0.1291	0.1699	0.1616	0.1187
			y	0.0495	0.1062	0.1209	0.0671
4	472.0	476.0	x	0.1187	0.1616	0.1517	0.1063
			y	0.0671	0.1209	0.1423	0.0945
5	476.0	480.0	x	0.1063	0.1517	0.1397	0.0913
			y	0.0945	0.1423	0.1728	0.1327

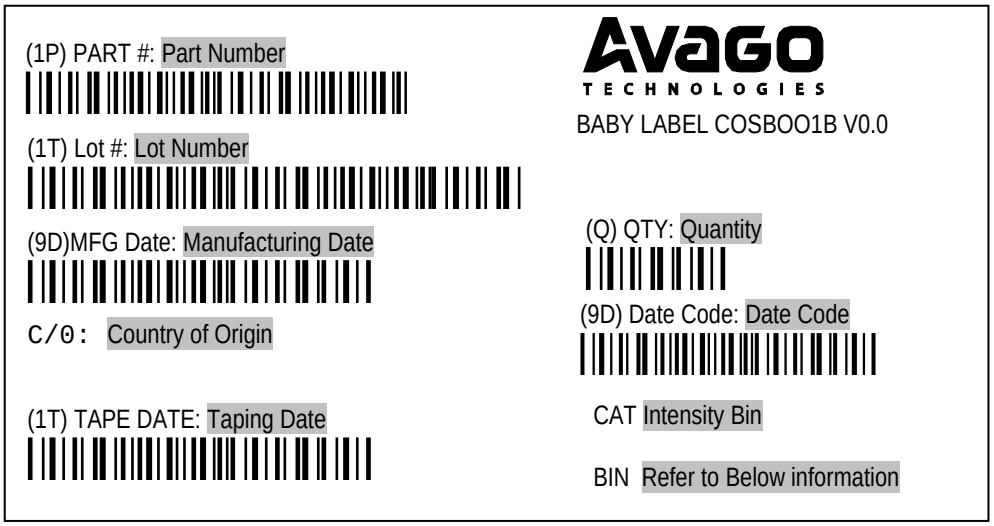
Tolerance for each bin limit is ± 0.5nm

Packaging Label

(i) Mother Label (Available on MBB bag)



(ii) Baby Label (Available on Plastic Reel)



Note: Acronyms and Definition:

BIN: (i) Color bin only or VF bin only

(Applicable for part number with color bins but without VF bin OR part number with VF bins and no color bin)

(ii) Color bin incorporated with VF bin

Applicable for part number that have both color bin and VF bin

Example:

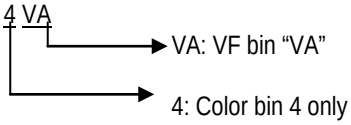
a. Color bin only or VF bin only

BIN: 4 (represent color bin 4 only)

BIN: VA (represent VF bin "VA" only)

b. Color bin incorporate with VF bin

BIN: 4 VA



Handling of Moisture Sensitive Device

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

A. 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, 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 (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°C / 60%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

- Unused LEDs must be stored in a sealed MBB with desiccant or desiccator at <5%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%RH to ensure that all LEDs have not exceeded their floor life of 672 hours.

E. Baking is required if:

- The HIC indicator is not BROWN at 10% and is AZURE at 5%.
- The LEDs are exposed to condition of >30°C / 60% RH at any time.
- The Led floor life exceeded 672hrs.

The recommended baking condition is: 60±5ºC for 20hrs