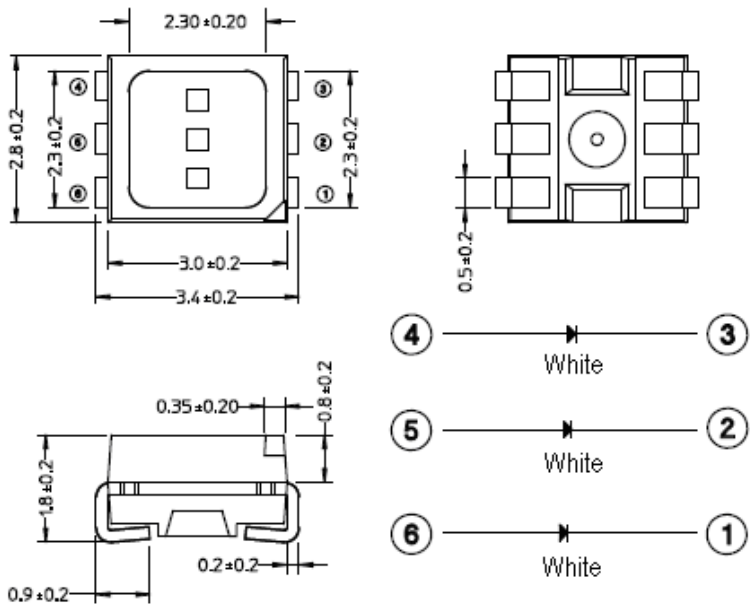
ASMT-YWB1-NGJB2
PLCC6 Cool White Surface Mount LED
Data Sheet

Lead (Pb) Free
RoHS 6 fully compliant

Package Drawing



1. All dimensions are in millimeters
2. Tolerance ±0.2 mm unless otherwise specified
3. Terminal finish: Ag plating
4. Encapsulation material: silicone resin

Device Selection Guide

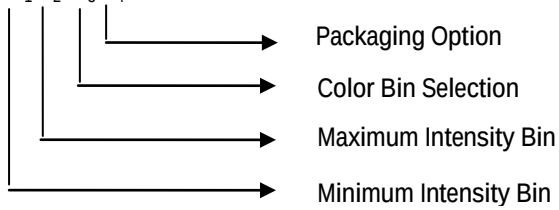
Part Number	CCT (K)	CRI	Luminous Intensity (mcd)[1]			Test Current (mA)	Chip
		Typ	Min	Typ	Max		
ASMT-YWB1-NGJB2	6500	63	6820	7600	8680	3 x 20	InGaN

1. The luminous intensity is measured at the mechanical axis of LED package and it is tested in pulsing condition. The actual peak of the spatial radiation pattern may not be aligned with the axis.

Caution: This LED is Class 1A ESD sensitive. Please observe appropriate precautions during handling and processing.
Customer is advised to keep the LED in the MBB when not in use as prolonged exposure to environment may cause the silver plated leads to tarnish and lead to difficulties in soldering.

Part Numbering System

A S M T –Y W B 1– N X_1 X_2 X_3 X_4



Absolute Maximum Ratings (T_A = 25°C)

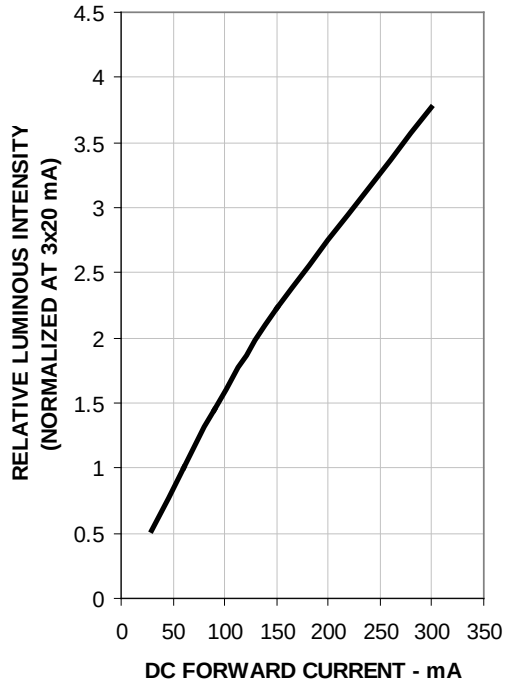
Parameter	Rating	Unit
DC forward current	3 x 20	mA
Peak forward current [1]	3 x 100	mA
Power dissipation	3 x 68	mW
Reverse voltage	Not recommended for reverse bias	V
Junction temperature	100	°C
Operating temperature	-40 to +85	°C
Storage temperature	-40 to +85	°C

1. 10% duty factor; f = 1KHz

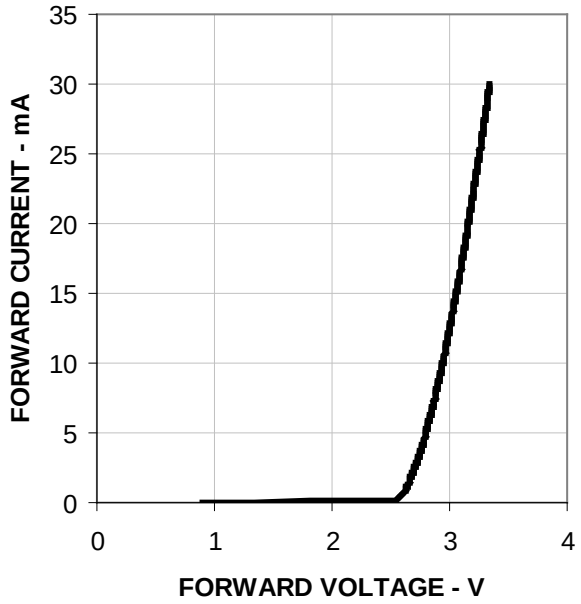
Optical / Electrical Characteristics (T_J = 25°C)

Parameter	Test Condition	Min	Typ	Max	Unit
Viewing Angle $2\theta_{1/2}$[1]	I_F = 3 x 20mA		120		Degree
Forward Voltage V_F	I_F = 20mA	2.8	3.2	3.4	V
Thermal Resistance $R\theta_{J-S}$[2]	I_F = 3 x 20mA		50		°C/W

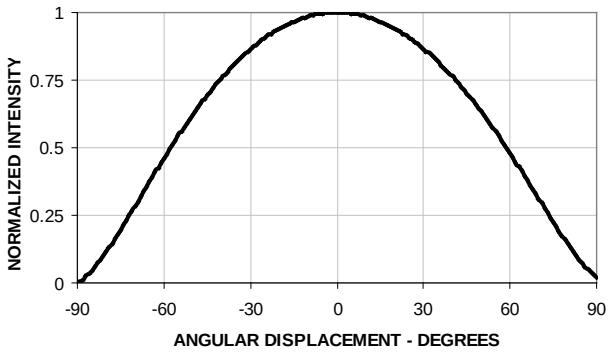
1. $\theta_{1/2}$ is the off axis angle where the luminous intensity is ½ the peak intensity
2. 3 chips on thermal resistance



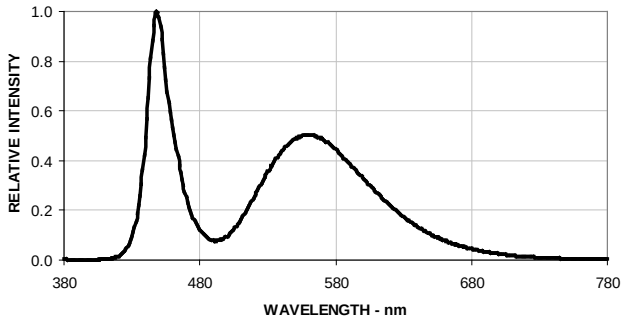
Relative Luminous Intensity vs. Forward Current



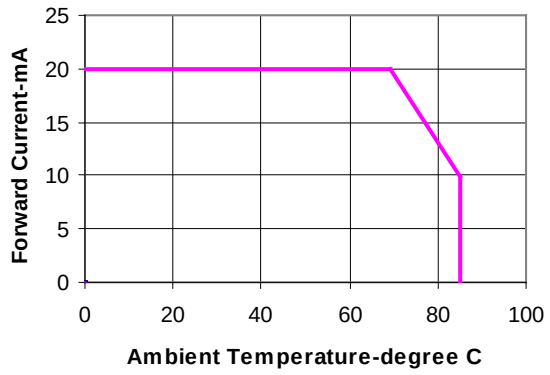
Forward Current vs. Forward Voltage



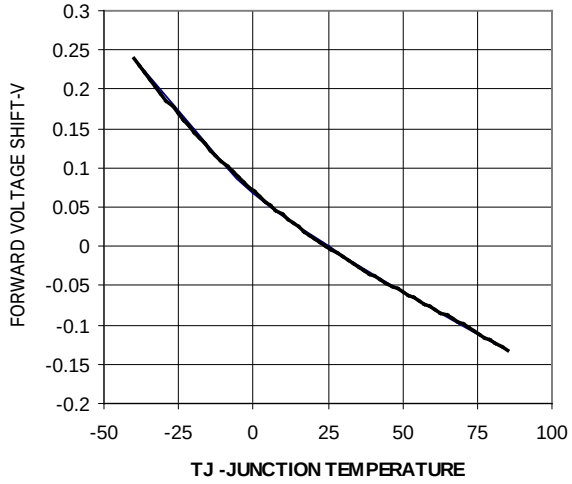
Radiation Pattern



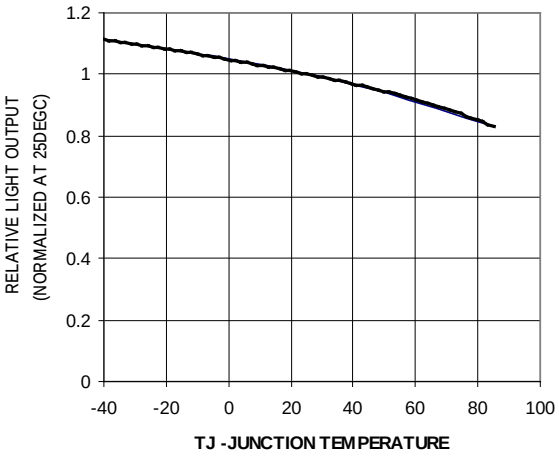
Spectrum Distribution (CCT 6500K)



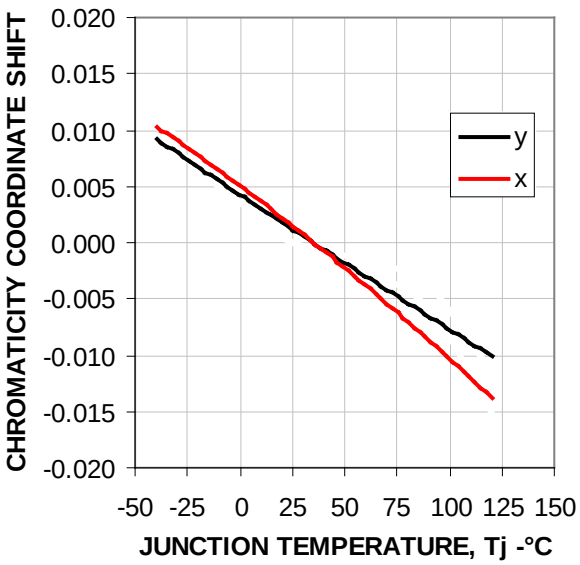
Forward Current Derating Curve. Rth_{ja} = 450°C/W.



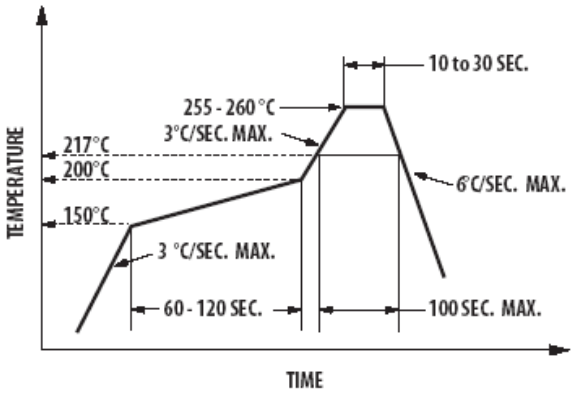
Relative Forward Voltage vs. Junction Temperature



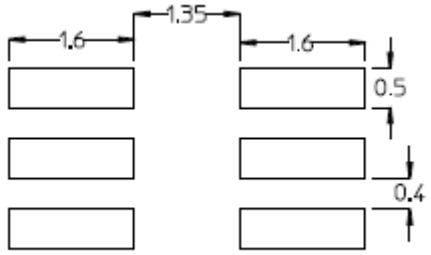
Relative Light Output vs. Junction Temperature



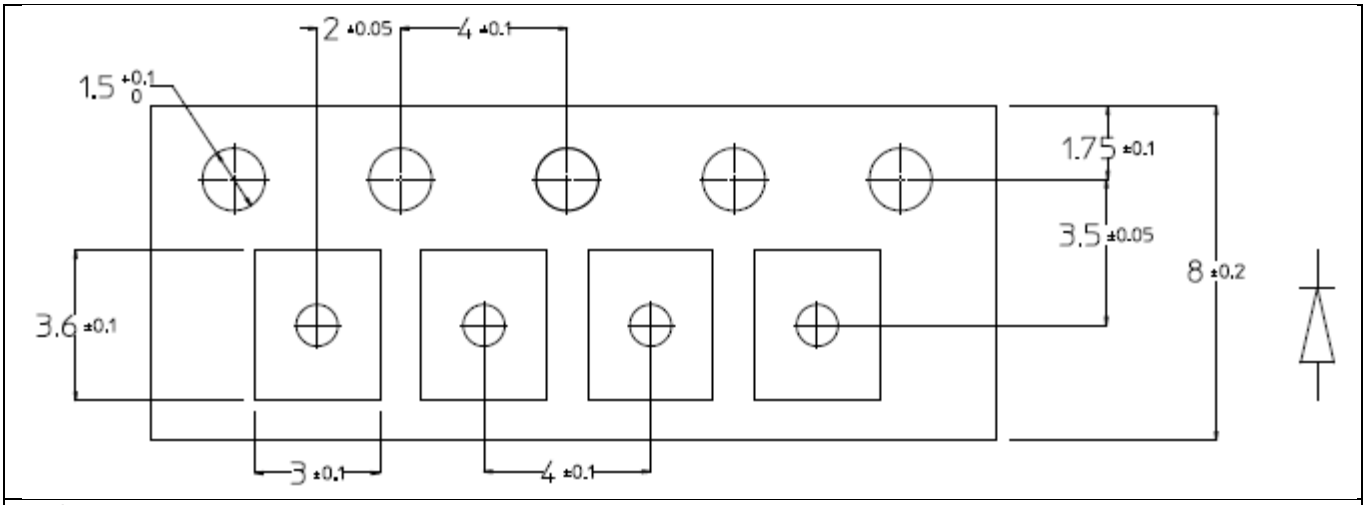
Relative Chromaticity Coordinate vs. Junction Temperature



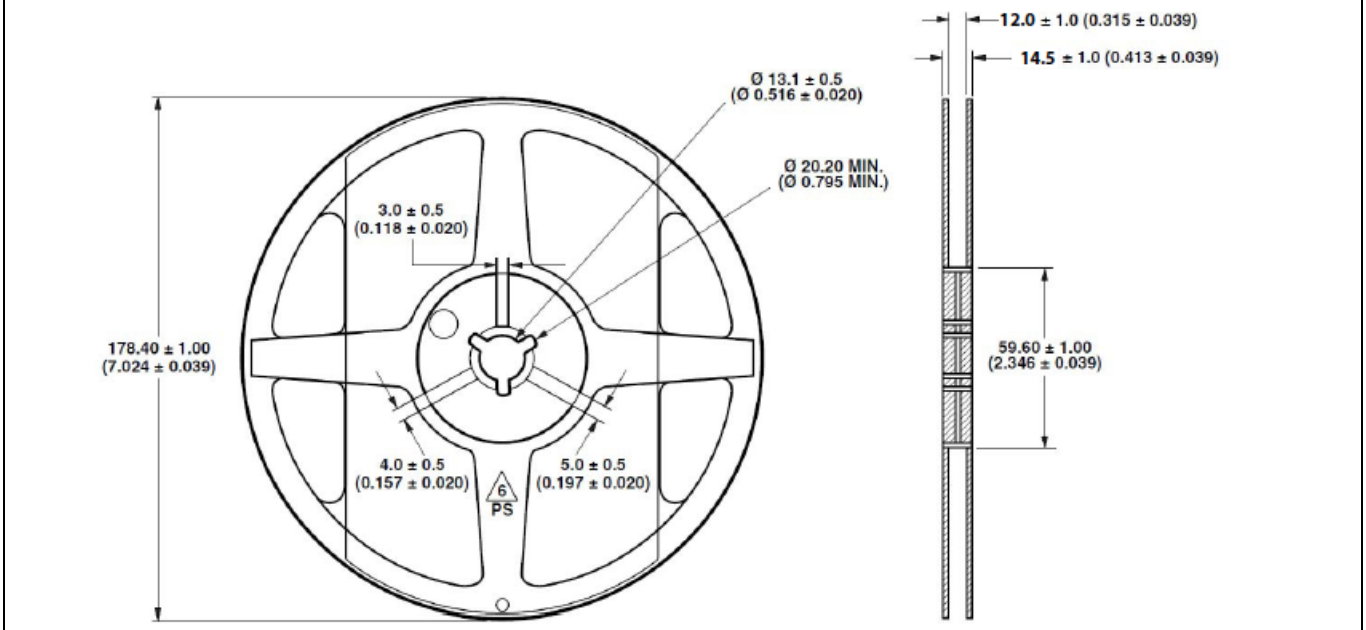
Recommended Pb free Reflow Soldering Profile



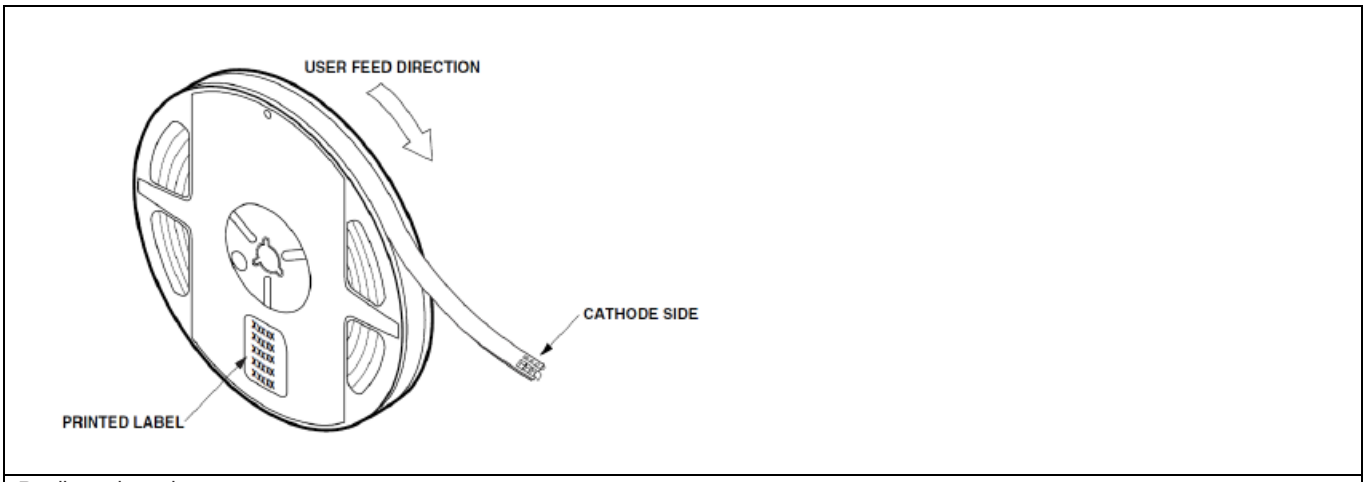
Recommended Soldering Pad Pattern



Carrier Tape



Carrier tape dimensions



Reeling orientation

X_1 minimum intensity bin
X_2 maximum intensity bin

Intensity bin selection

Bin	Luminous Intensity (mcd)		Estimated Luminous Flux (lm)	
	Min	Max	Min	Max
F	6200	6820	20	22
G	6820	7440	22	24
H	7440	8060	24	26
J	8060	8680	26	28
K	8680	9300	28	30
L	9300	10540	30	34
M	10540	11780	34	38
N	11780	13020	38	42

Tolerance = ±12%

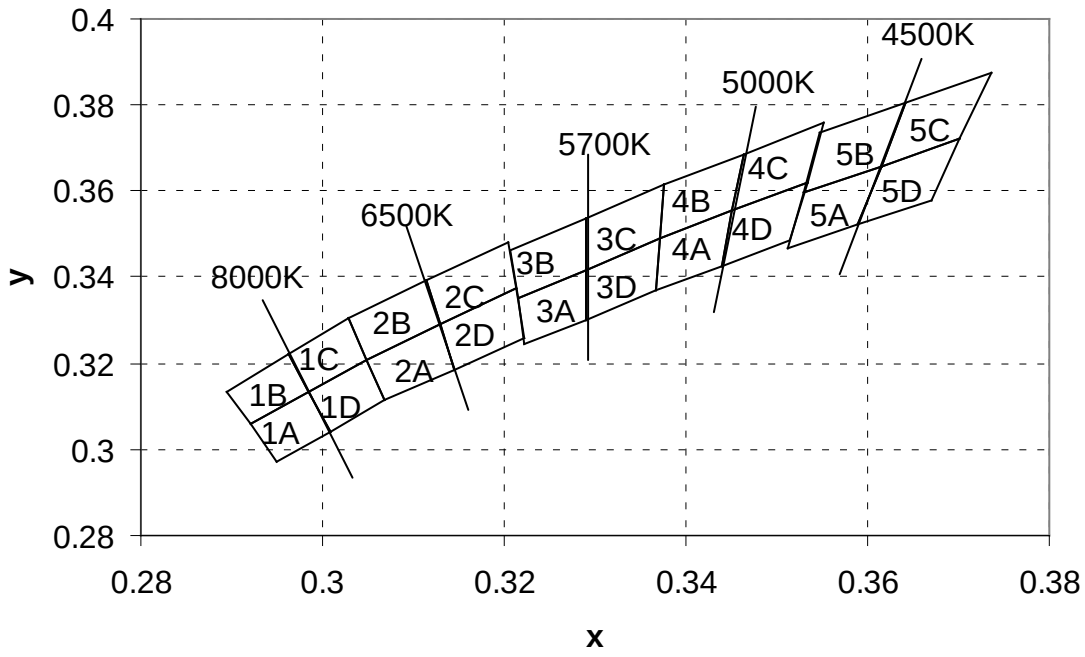
X_3 color bin selection

Bin	Sub Bin
A	1A, 1B, 1C, 1D
B	2A, 2B, 2C, 2D
C	3A, 3B, 3C, 3D
D	4A, 4B, 4C, 4D
E	5A, 5B, 5C, 5D
K	1A, 1B, 1C, 1D, 2A, 2B, 2C, 2D
L	2A, 2B, 2C, 2D, 3A, 3B, 3C, 3D
M	3A, 3B, 3C, 3D, 4A, 4B, 4C, 4D
N	4A, 4B, 4C, 4D, 5A, 5B, 5C, 5D
0	1A, 1B, 1C, 1D, 2A, 2B, 2C, 2D, 3A, 3B, 3C, 3D, 4A, 4B, 4C, 4D, 5A, 5B, 5C, 5D

Sub Bin	Chromaticity Coordinates				
1A	x	0.2950	0.2920	0.2984	0.3009
	y	0.2970	0.3060	0.3133	0.3042
1B	x	0.2920	0.2895	0.2962	0.2984
	y	0.3060	0.3135	0.3220	0.3133
1C	x	0.2984	0.2962	0.3028	0.3048
	y	0.3133	0.3220	0.3304	0.3207
1D	x	0.2984	0.3048	0.3068	0.3009
	y	0.3133	0.3207	0.3113	0.3042
2A	x	0.3048	0.3130	0.3144	0.3068
	y	0.3207	0.3290	0.3186	0.3113
2B	x	0.3028	0.3115	0.3130	0.3048
	y	0.3304	0.3391	0.3290	0.3207
2C	x	0.3115	0.3205	0.3213	0.3130
	y	0.3391	0.3481	0.3373	0.3290
2D	x	0.3130	0.3213	0.3221	0.3144
	y	0.3290	0.3373	0.3261	0.3186
3A	x	0.3215	0.3290	0.3290	0.3222
	y	0.3350	0.3417	0.3300	0.3243
3B	x	0.3207	0.3290	0.3290	0.3215
	y	0.3462	0.3538	0.3417	0.3350
3C	x	0.3290	0.3376	0.3371	0.3290
	y	0.3538	0.3616	0.3490	0.3417
3D	x	0.3290	0.3371	0.3366	0.3290
	y	0.3417	0.3490	0.3369	0.3300
4A	x	0.3371	0.3451	0.3440	0.3366
	y	0.3490	0.3554	0.3427	0.3369

4B	x	0.3376	0.3463	0.3451	0.3371
	y	0.3616	0.3687	0.3554	0.3490
4C	x	0.3463	0.3551	0.3533	0.3451
	y	0.3687	0.3760	0.3620	0.3554
4D	x	0.3451	0.3533	0.3515	0.3440
	y	0.3554	0.3620	0.3487	0.3427
5A	x	0.3530	0.3615	0.3590	0.3512
	y	0.3597	0.3659	0.3521	0.3465
5B	x	0.3548	0.3641	0.3615	0.3530
	y	0.3736	0.3804	0.3659	0.3597
5C	x	0.3641	0.3736	0.3702	0.3615
	y	0.3804	0.3874	0.3722	0.3659
5D	x	0.3615	0.3702	0.3670	0.3590
	y	0.3659	0.3722	0.3578	0.3521

Tolerance ± 0.01



Chromaticity Diagram

X_4 packaging option

Option	**Test Current**	**Package Type**	**Reel Size**
2	3 x 20mA	Top Mount	7 inch

Forward Voltage Bin

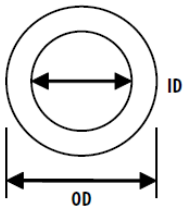
Bin	Min (V)	Max (V)
F12	2.8	2.9
F13	2.9	3.0
F14	3.0	3.1
F15	3.1	3.2
F16	3.2	3.3
F17	3.3	3.4

Tolerance ± 0.1V

1. 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 need to be observed during assembly of silicone encapsulated LED products. Failure to comply might lead to damage and premature failure of the LED. Do refer to Application Note AN5288, *Silicone Encapsulation for LED: Advantages and Handling Precautions* for more information.

(a) 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.
(b) 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.
(c) Do no stack assembled PCBs together. Use an appropriate rack to hold the PCBs.
(d) 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 much pressure on the silicone. Ultrasonic cleaning is not recommended.
(e) For automated pick and place, Avago has tested nozzle size below 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, customer is recommended to verify the nozzle selected will not cause damage to the LED.



ID = 1.7mm
OD = 3.5mm

2. Handling of moisture sensitive device

This product has a Moisture Sensitive Level 3 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) 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 168 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 168 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 168hrs.

The recommended baking condition is: 60±5ºC for 20hrs
Baking should only be done once.

(f) Storage
- The soldering terminal of these Avago LEDs is silver plated. If the LEDs are being exposed in ambient environment for too long, the silver plating might be oxidized and thus affecting the solderability of the parts. As such, unused LEDs must be kept in sealed MBB with desiccant or in desiccator at <5%RH.

3. Application precautions

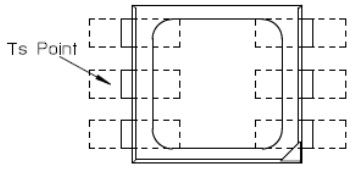
(a) Drive current of the LED must not exceed the maximum allowable limit across temperature as stated in the datasheet. Constant current driving is recommended to ensure consistent performance.
(b) LED is not intended for reverse bias. Do use other appropriate components for such purpose. When driving the LED in matrix form, it is crucial to ensure that the reverse bias voltage is not exceeding the allowable limit of the LED.
(c) Do not use the LED in the vicinity of material with sulfur content as well as in environment of high gaseous sulfur compound. Examples of material that may contain sulfur are rubber gasket, RTV (room temperature vulcanizing) silicone rubber, rubber gloves etc. Prolonged exposure to such environment may affect the optical characteristics and product life.
(d) White LED must not be exposed to acidic environment and must not be used in the vicinity of compound that may have acidic outgas such as acrylate adhesive. It will have adverse effect on the LED performance.
(e) Avoid rapid change in ambient temperature especially in high humidity environment as this will cause condensation on the LED.
(f) If the LED is intended to be used at outdoor environment, it is recommended to have a cover over the LED to protect it from rain water, dust, oil, corrosive gases, external mechanical stress etc.

4. Thermal management

Optical, electrical and reliability characteristics of LED are affected by temperature. The junction temperature (T_J) of the LED must be kept below allowable limit at all time. Tj can be calculated as below:

$T_J = T_S + R_{\theta JS} \times I_F \times V_{Fmax}$

where T_S = LED solder point temperature as shown in illustration below [°C]
$R_{\theta JS}$ = thermal resistance from junction to solder point [°C/W]
I_F = forward current [A]
V_{Fmax} = maximum forward voltage [V]



5. Eye safety precautions

This LED is tested in accordance to *IEC 62471:2006 Photobiological safety of lamps and lamp systems* and is classified under Exempt Group. This classification is intended for manufacturer to review the component level safety and risks.

IEC specifies that LED within this risk group does not pose photobiological hazard.

Nonetheless, it is not recommended to view directly at operating LEDs. If it is unavoidable, appropriate shielding or personal protective equipment should be used. The manufacturer is responsible to assess the photobiological safety of their end products in accordance to relevant regulatory requirements.

6. Disclaimer

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