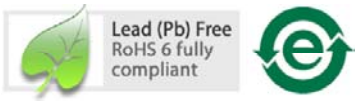
QSMW-FZGA-ZJL16

2835 Surface Mount LED

Data Sheet



Description

The QSMW-FZGA Surface Mount LEDs use InGaN chip technology with superior package design to enable them to produce higher light output with better flux performance. They can be driven at high current and are able to dissipate heat more efficiently resulting in better performance with higher reliability.

These LEDs are able to be operated under a wide range of environmental conditions making ideal for various applications including fluorescent replacement, under cabinet lighting, retail display lighting and panel lights.

To facilitate easy pick and place assembly, the LEDs are packed in tape and reel. Every reel is shipped in single flux and color bin, to provide close uniformity.

Features

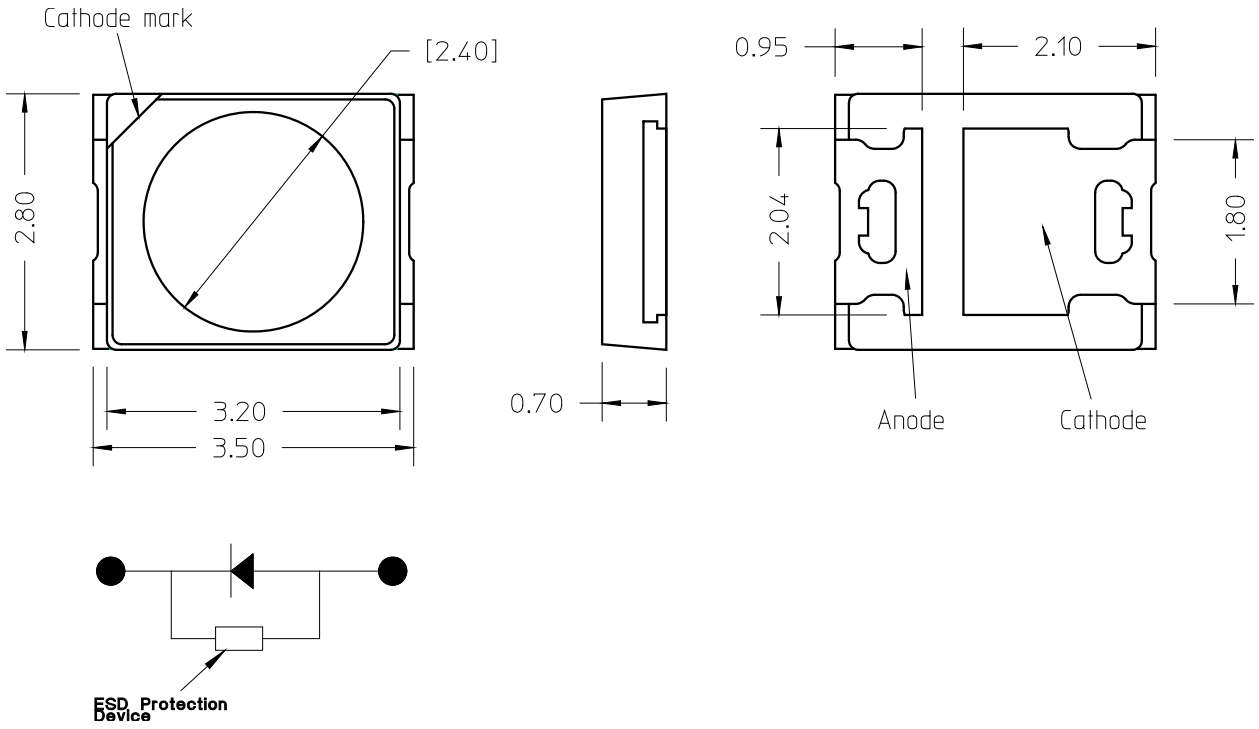
- CRI ≥85
- Moisture Sensitivity Level 3
- High reliability with silicone encapsulation
- Low package profile and large emitting area for better uniformity in linear lighting

Applications

- Indoor meat store lighting and mood lighting

CAUTION: The QSMW- FZGA LEDs are JEDEC HBM 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 dimensions in mm.
- Dimensions in brackets are for reference only
- Tolerance ±0.2mm unless otherwise specified.
- Encapsulation = silicone.
- Terminal finish = silver plating.

Device Selection Guide ($T_J = 25°C$, $I_F = 60mA$)

Part Number	Luminous Flux (lm)[1,2]			Luminous Intensity (cd)[3]
	Min.	Typ.	Max.	Typ.
QSMW- FZGA-ZJL16	12.7	16.0	21.4	5.9

Note:

1. Luminous flux is the total flux output as measured with an integrating sphere at a single current pulse condition.
2. Luminous flux tolerance = ±12%.
3. For reference only

Absolute Maximum Ratings ($T_J = 25°C$)

Parameters	Rating	Unit
DC Forward Current [1]	90	mA
Peak Forward Current [2]	100	mA
Power Dissipation	0.306	mW
Reverse Voltage	Not recommended	
Junction Temperature	110	°C
Operating Temperature	- 40 to + 85	°C
Storage Temperature	- 40 to + 100	°C

Notes:

1. Derate linearly as shown in Figure 7 and 8.
2. Duty Factor = 10%, Frequency = 1kHz.

Electrical/ Optical Characteristics ($T_J = 25° C$)

Parameter	Min.	Typ.	Max.	Unit	Remark
Viewing Angle, $2\theta_{1/2}$[1]	-	120	-	Degrees	
Forward Voltage, V_F[2]	2.8	3.1	3.4	V	I_F =60mA
Luminous Flux [3]	12.7	16.0	21.4	lm	I_F =60mA
Reverse Current, I_R	Not designed for reverse bias				
Color Rendering Index	85	-	-	-	I_F =60mA
Thermal Resistance, $R_{\theta J-S}$	-	30	-	°C/W	From LED junction to solder point
ESD Performance	Class 2 (2000 to <4000)			V	Acc. To HBM ANSI/ESDA/JEDEC JS-001

Note:

1. 2θ1/2 is the off axis angle where the luminous intensity is ½ of the peak intensity.
2. Forward voltage tolerance = ±0.1V.
3. Luminous flux is the total flux output as measured with an integrating sphere at a single current pulse condition.

Part Number System

Q S M W - F Z X1 X2 - Z X3 X4 X5 X6

Code	Description	Option	
X1 X2	Specific Customer code	G A	
X3	Minimum flux bin	J	12.7 – 15.1lm
X4	Maximum flux bin	K	15.1 – 18.0 lm
		L	18.0 – 21.4 lm
X5	Color bin	1	Bin A
X6	Test option	6	Test current = 60mA

Flux Bin (CAT)

Bin ID	Luminous Flux (lm)	
	Min.	Max.
J	12.7	15.1
K	15.1	18.0
L	18.0	21.4

Tolerance: ±12%

Forward Voltage Bin (VF)

Bin ID	Forward Voltage (V)	
	Min.	Max.
G03	2.8	2.9
G04	2.9	3.0
G05	3.0	3.1
G06	3.1	3.2
G07	3.2	3.3
G08	3.3	3.4

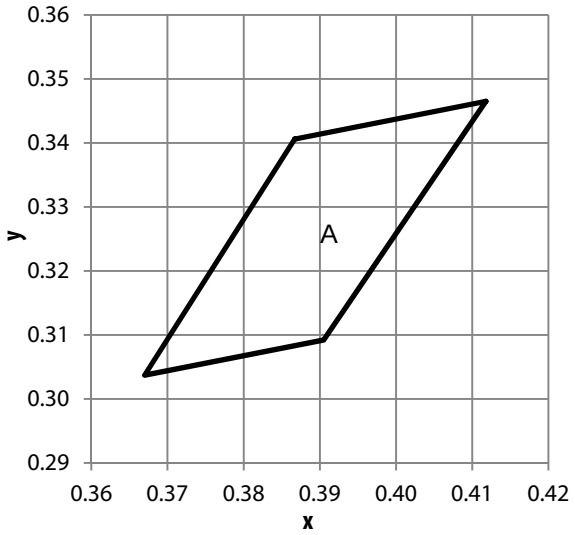
Tolerance: ±0.1V

Color Bin(BIN)

Bin ID	Cx	Cy
A	0.4118	0.3465
	0.3867	0.3406
	0.3670	0.3037
	0.3905	0.3092

Tolerance: ±0.01

Chromaticity Diagram



Example of bin information on reel and packaging label:
CAT: J → Flux bin J
BIN: A → Color bin A
VF: G03 → Vf bin G03

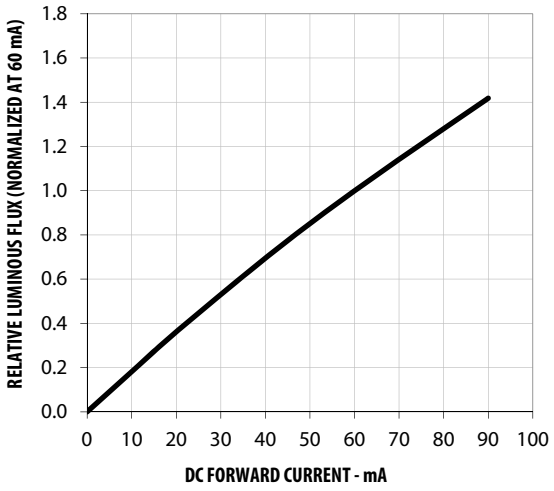


Figure 1. Relative luminous flux vs. forward current

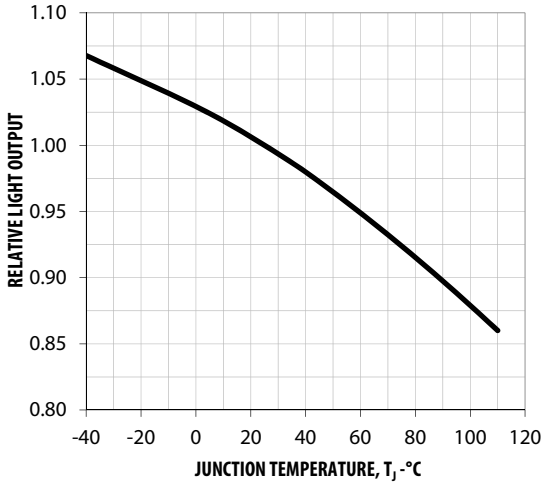


Figure 2: Relative luminous flux vs. junction temperature

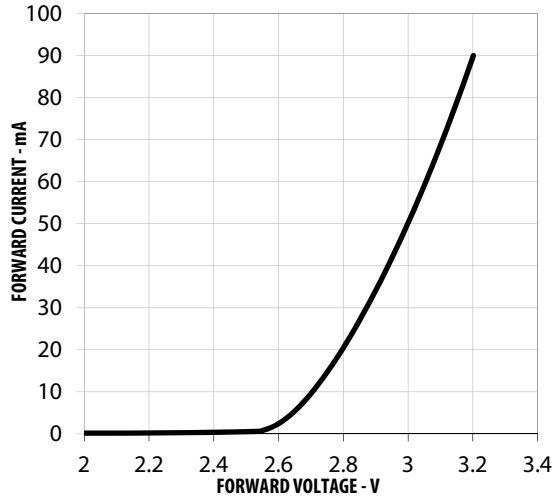


Figure 3. Forward current vs. forward voltage

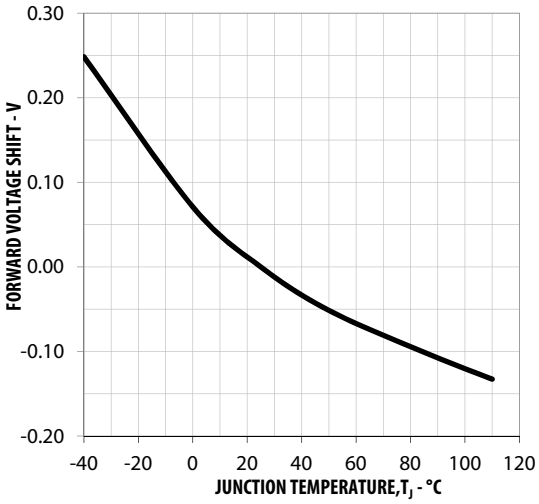


Figure 4: Forward voltage shift vs. junction temperature

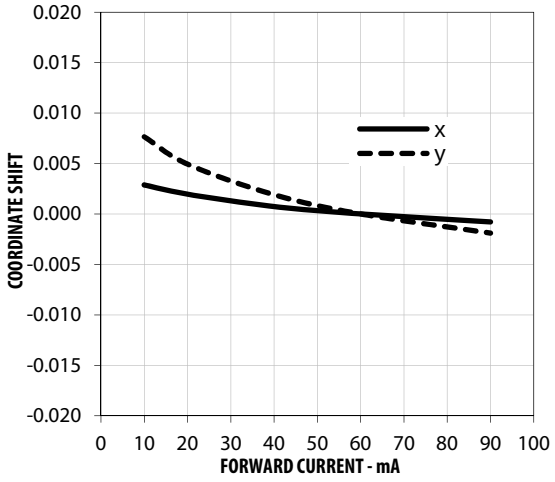


Figure 5. Chromaticity coordinate shift vs. forward current

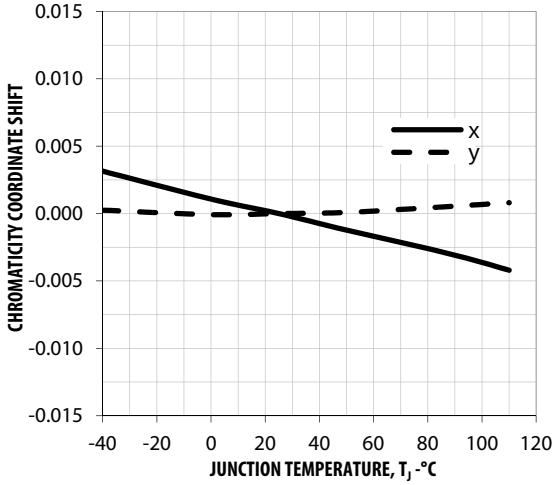


Figure 6: Chromaticity coordinate shift vs. junction temperature

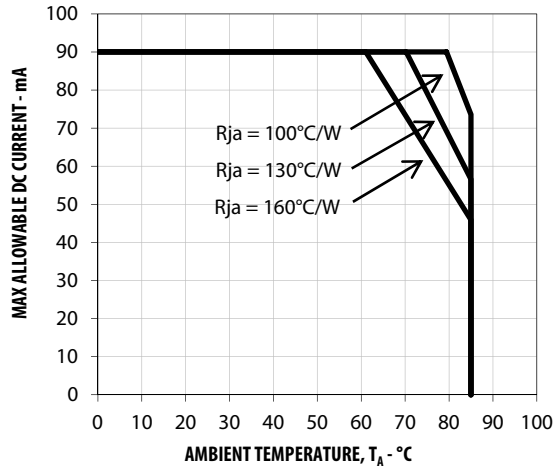


Figure 7: Maximum allowable current vs ambient temperature – Ta

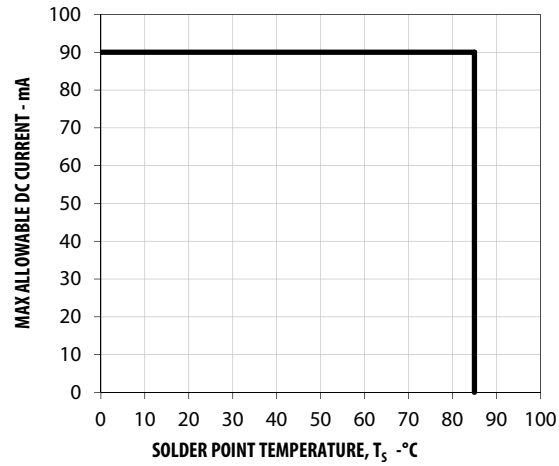


Figure 8: Maximum allowable current vs solder point temperature – Ts

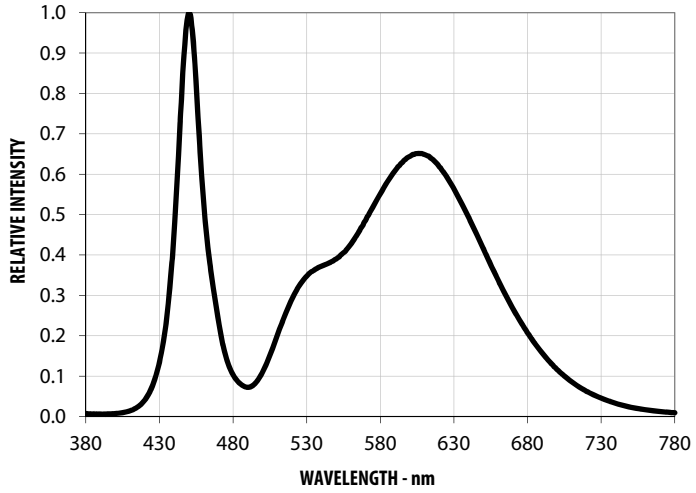


Figure 9: Relative spectral emission

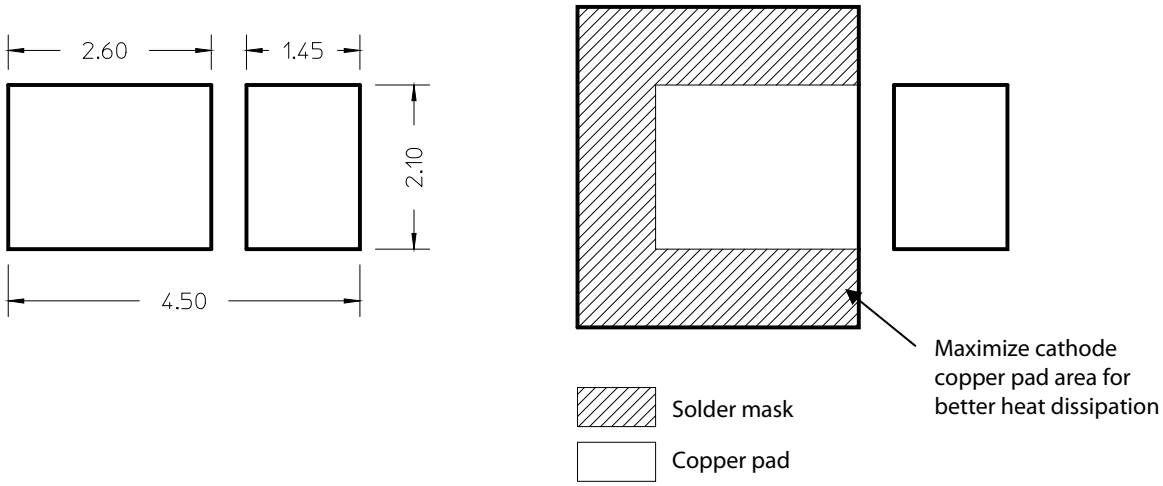
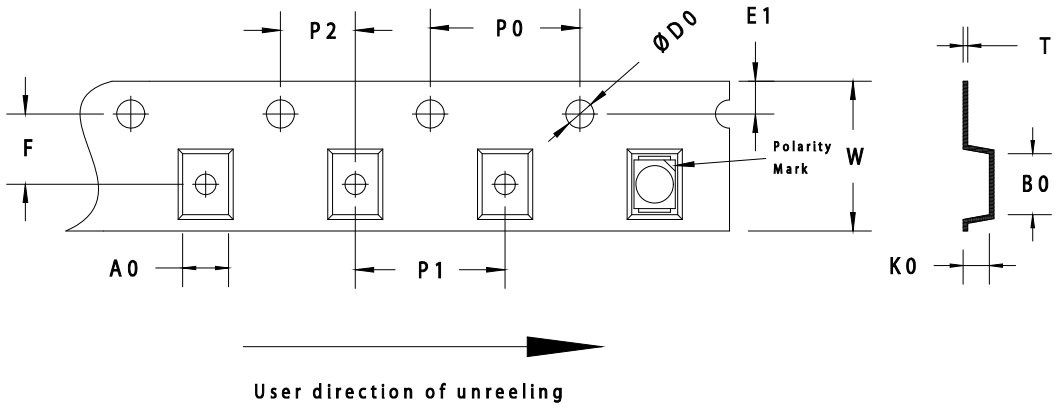


Figure 10: Recommended soldering land pattern (in mm)



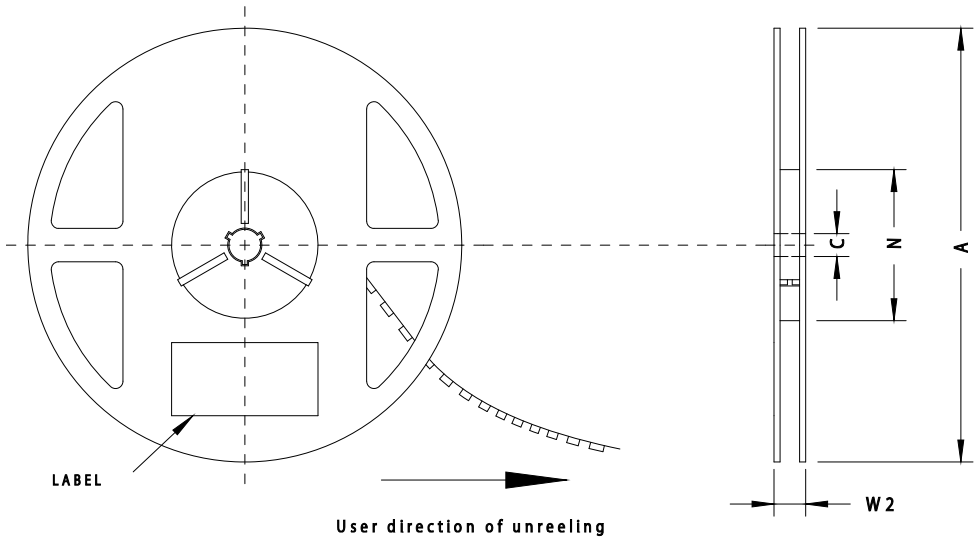
F	P0	P1	P2	D0	E1	W
3.5±0.05	4.0±0.1	4.0±0.1	2.0±0.05	1.55±0.05	1.75±0.1	8.0±0.2

Unit: mm

T	B0	K0	A0
0.20±0.05	3.80±0.1	1.05±0.1	3.1±0.1

Unit: mm

Figure 11: Carrier tape dimensions



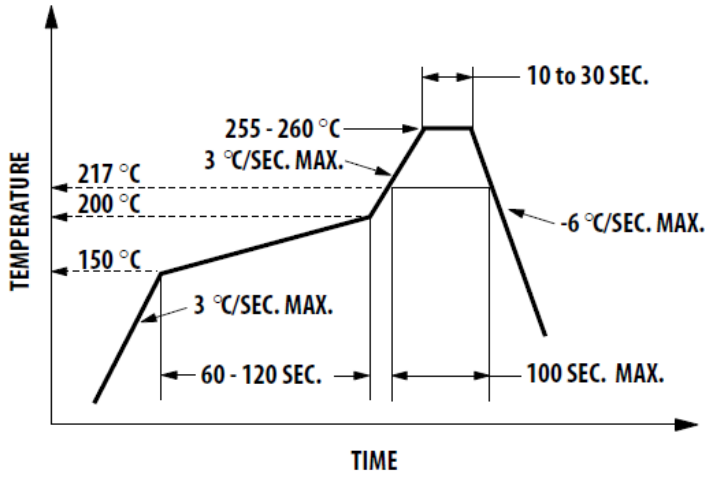
A	C	N	W2
178.5±0.5	13.3±0.3	57.5±0.5	12.0±1.0

Unit: mm

Figure 12: Reel dimension

Soldering

Recommended Lead Free reflow soldering condition:



(a) Reflow soldering must not be done more than 2 times.

(b) Do not apply any pressure or force on the LED during reflow and after reflow when the LED is still hot.

(c) It is preferred to use reflow soldering to solder the LED. Hand soldering shall only be used for rework if unavoidable but it must be strictly controlled to conditions below:

- Solder iron tip temperature = 315°C max
- Solder duration = 3sec max
- After hand soldering, the LED must be allowed to cool down prior to touch up soldering.

(d) User is advised to confirm beforehand whether the functionality and performance of the LED is affected by hand soldering.

Precautionary Notes

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.

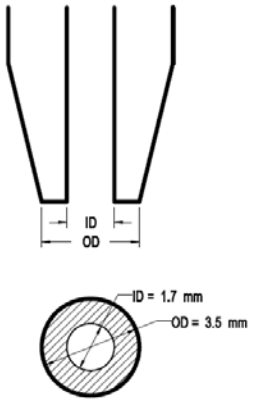
(a) Do not poke sharp objects into the silicone encapsulant. Sharp object like tweezers or syringes might apply excessive force or even pierce through the silicone and induce failures to the LED die or wire bond.

(f) 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.

(e) Do no stack assembled PCBs together. Use an appropriate rack to hold the PCBs.

(f) 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.

(g) 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.



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 desiccators 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 desiccators 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±5°C for 20hrs
Baking should only be done once.

(f) Storage
- The soldering terminals of these Avago LEDs are silver plated. If the LEDs are being exposed in ambient environment for too long, the silver plating might be oxidized and thus affecting its solderability performance. As such, unused LEDs must be kept in sealed MBB with desiccant or in desiccators 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, in environment of high gaseous sulfur compound and corrosive elements. 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 but not limited to 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.

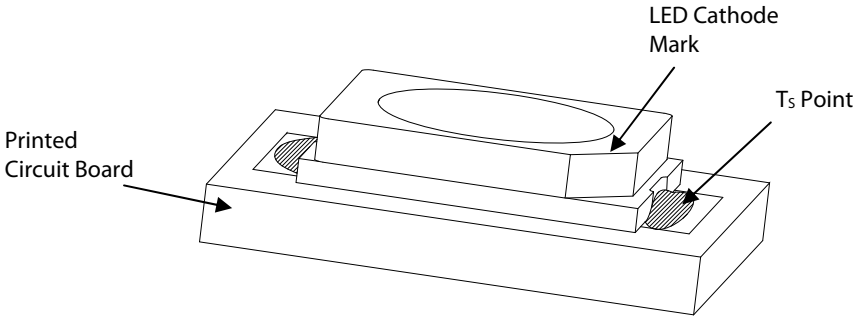
(f) If the LED is intended to be used in harsh environment, the LED must be protected against damages caused by water, dust, oil, corrosive gases, external mechanical stress etc.

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 times. T_J 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]



To measure the soldering point temperature, a thermocouple can be mounted on the T_S point as shown in illustration above. User is advised to verify the T_S of the LED in the final product to ensure that the LEDs are operated within all maximum ratings stated in the datasheet.

5. 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 equipments.

6. Disclaimer

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