BROADCOM®

Data Sheet

HSMQ-C350

Narrow Angle SMT Green ChipLED

Description

The Broadcom® HSMQ-C350 is a surface-mount ChipLED that comes in an industrial standard footprint of 3.2 mm × 1.6 mm. This ChipLED has an integrated optical lens that narrows the viewing angle of the light beam, thereby increasing the on-axis intensity. This allows effective light coupling into secondary optics, such as a light guide and a light pipe. It offers industry-leading performance by using efficient and high-brightness InGaN LED materials.

This ChipLED is ideal for applications that require a narrow beam angle or high on-axis intensity. Examples include industrial equipment, consumer electronics, and black-and-white home appliances. It is compatible with industry-standard automatic machine placement and reflow soldering.

Features

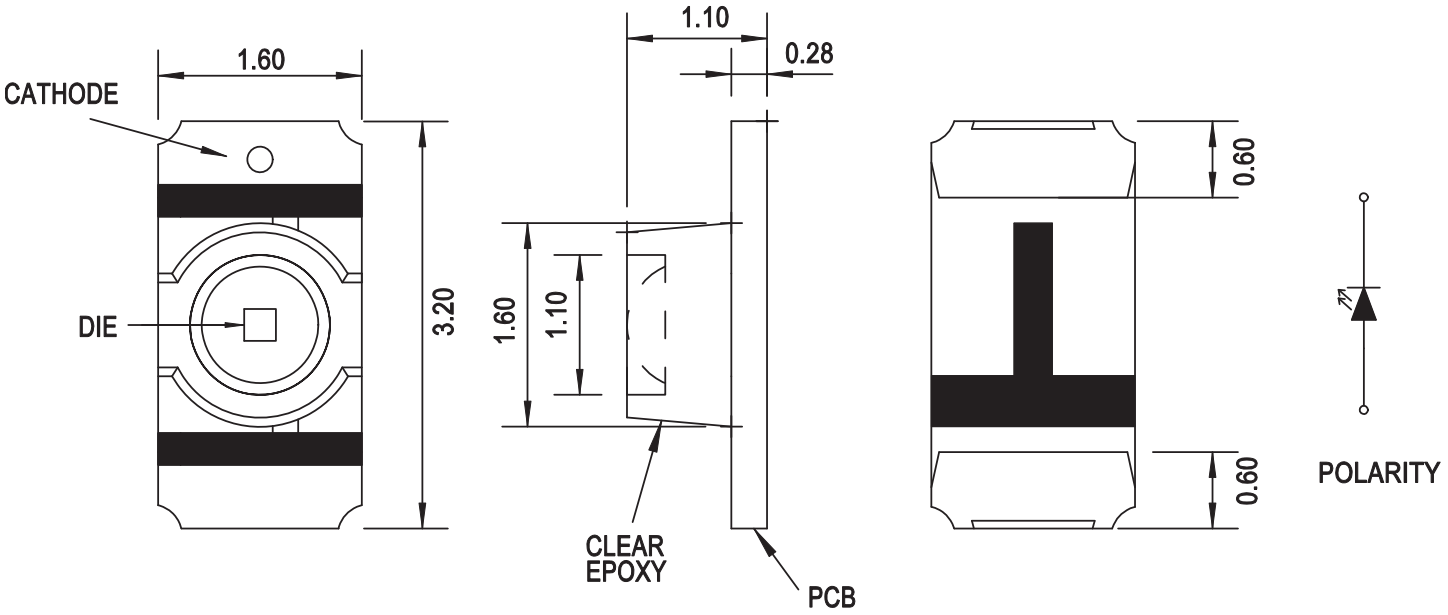
- LEDs with InGaN die
- Narrow viewing angle package with primary lens
- Surface-mount device with industrial-standard footprint
- Compatible with reflow soldering
- Tape in 8-mm carrier tape on a 7-in. diameter reel

Applications

- Push-button backlighting
- Icon backlighting
- Status indicators

CAUTION! LEDs are class 1A ESD sensitive per ANSI/ESDA/JEDEC JS-001. Please observe appropriate precautions during handling and processing. Refer to Application Note 1142 for additional details.

Figure 1: Package Dimensions



NOTE:

1. All dimensions are in millimeters.
2. The tolerance is ±0.1 mm unless otherwise specified.

Absolute Maximum Value at T_J = 25°C

Parameter	Rating	Units
DC Forward Current[a]	20	mA
Power Dissipation	78	mW
LED Junction Temperature	95	°C
Operating Temperature Range	–40 to +85	°C
Storage Temperature Range	–40 to +85	°C

a. Derate as shown in Figure 10.

Optical/Electrical Characteristics at T_J = 25°C, I_F = 20 mA

Parameter	Min.	Typ.	Max.	Units
Luminous Intensity, Iv[a]	1125	—	—	mcd
Dominant Wavelength, λ_d[b]	—	520	—	nm
Peak Wavelength, λ_p	—	515	—	nm
Viewing Angle, $2\theta_{1/2}$[c]	—	50	—	degree
Forward Voltage, V_F	2.9	—	3.9	V
Reverse Current, I_R (at V_R = 5V)[d]	—	—	100	µA
Thermal Resistance, $R\theta_{J-S}$	—	250	—	°C/W

a. The luminous intensity is measured at the mechanical axis of the LED package. The actual peak of the spatial radiation pattern may not be aligned with the axis.

b. The dominant wavelength is derived from the CIE chromaticity diagram and represents the perceived color of the device.

c. The viewing angle is the off-axis angle where the luminous intensity is ½ the peak intensity.

d. Indicates the product final test condition. Long-term reverse bias is not recommended.

Bin Information

Intensity Bin (CAT)

Bin ID	Luminous Intensity (mcd)	
	Min.	Max.
W	1125.00	1800.00
X	1800.00	2850.00
Y	2850.00	4500.00
Z	4500.00	7150.00
1	7150.00	11250.00
2	11250.00	18000.00

Tolerance ±15%.

Color Bin (BIN) Green

Bin ID	Dominant Wavelength (nm)	
	Min.	Max.
A	515	520
B	520	525
C	525	530
D	530	535

Tolerance ±1 nm.

Forward Voltage Bin

Bin ID	Forward Voltage (V)	
	Min.	Max.
1	2.9	3.1
2	3.1	3.3
3	3.3	3.5
4	3.5	3.7
5	3.7	3.9

Tolerance ± 0.1V.

Figure 2: Spectrum

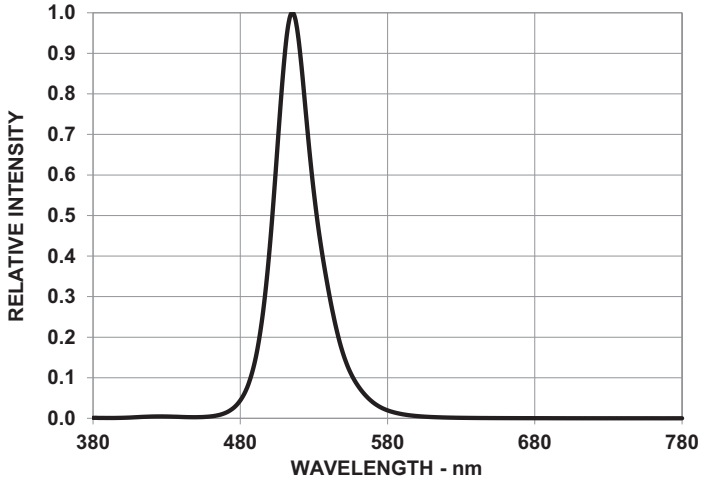


Figure 3: Relative Intensity vs. Forward Current

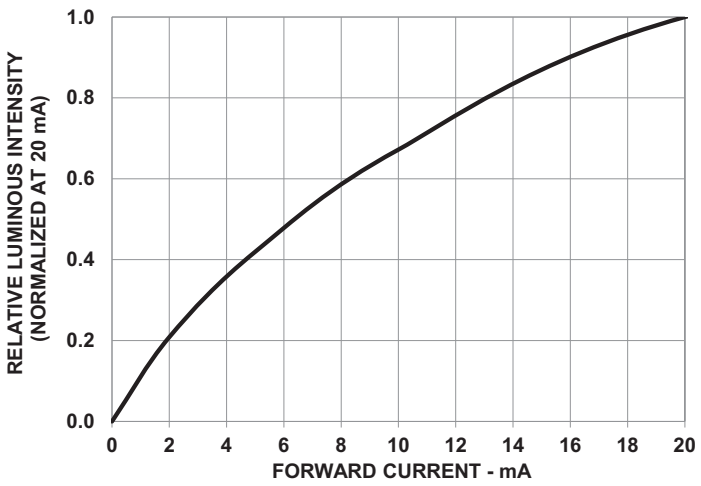


Figure 4: Forward Current vs. Forward Voltage

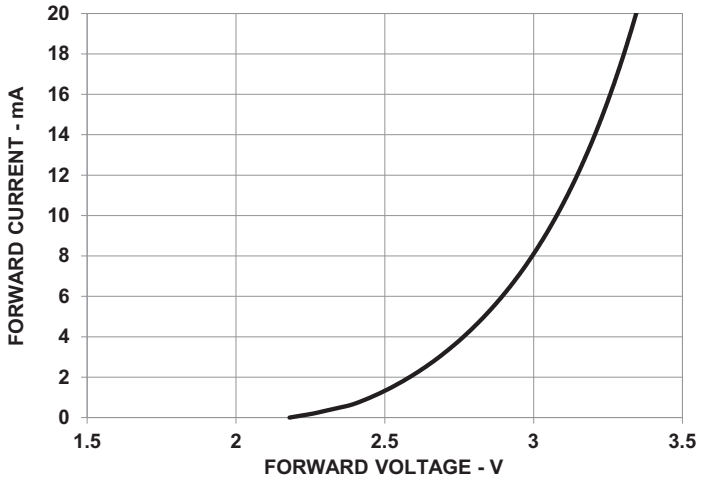


Figure 5: Radiation Pattern

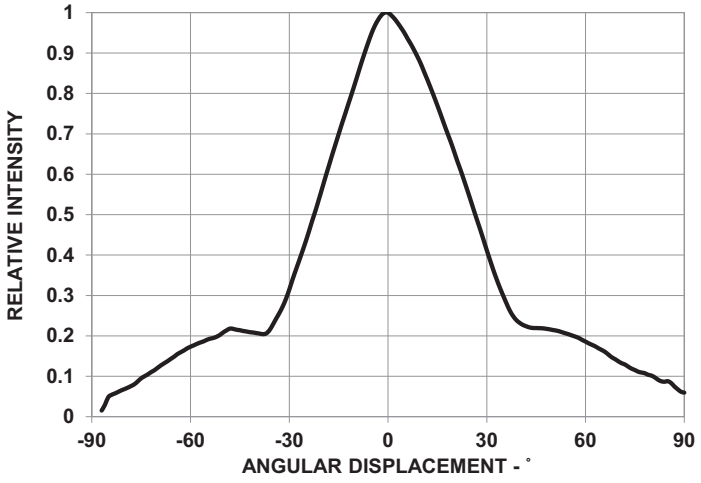


Figure 6: Wavelength Shift vs. Forward Current

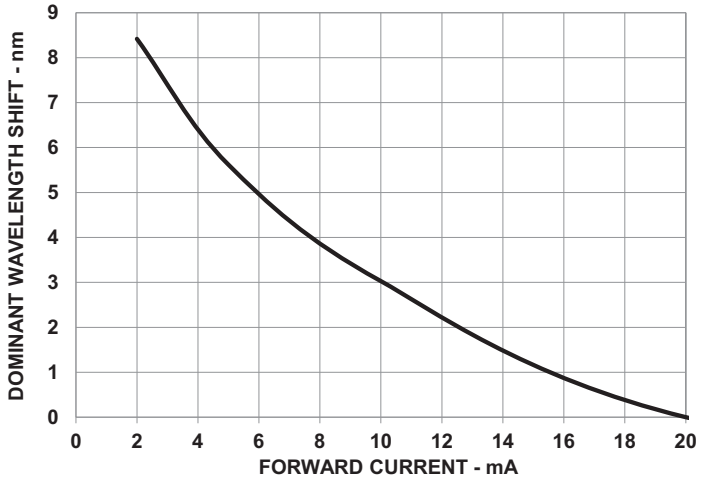


Figure 7: Relative Intensity vs. Temperature

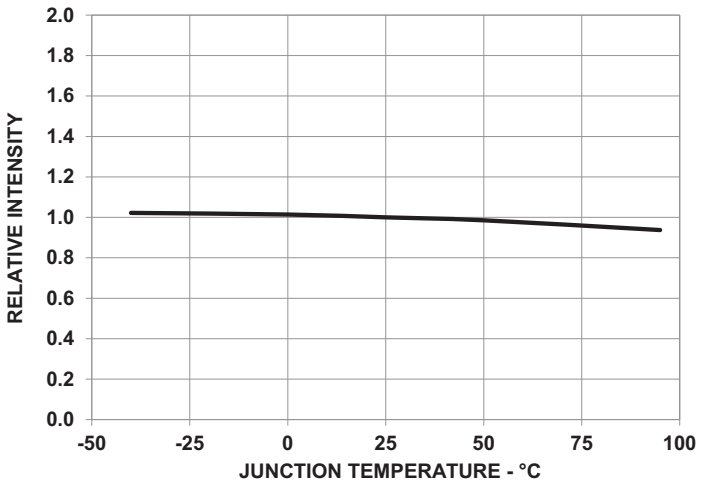


Figure 8: Forward Voltage Shift vs. Temperature

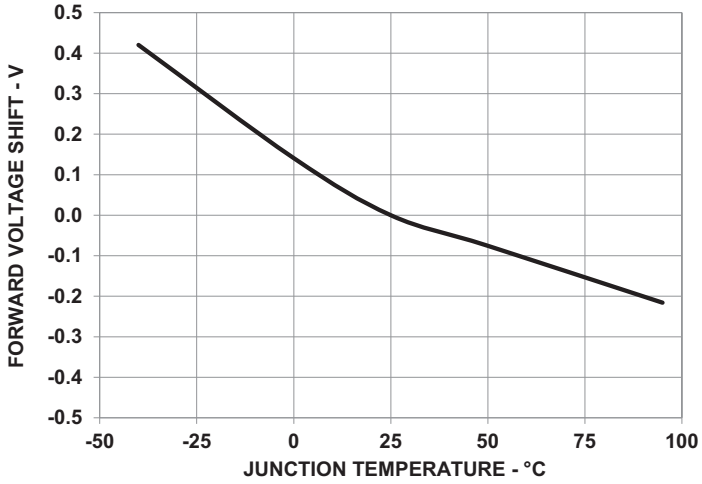


Figure 9: Wavelength Shift vs. Temperature

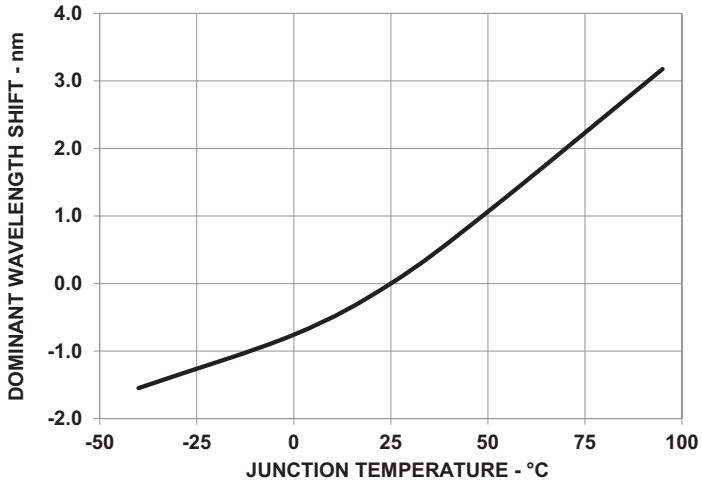


Figure 10: Derating Curve

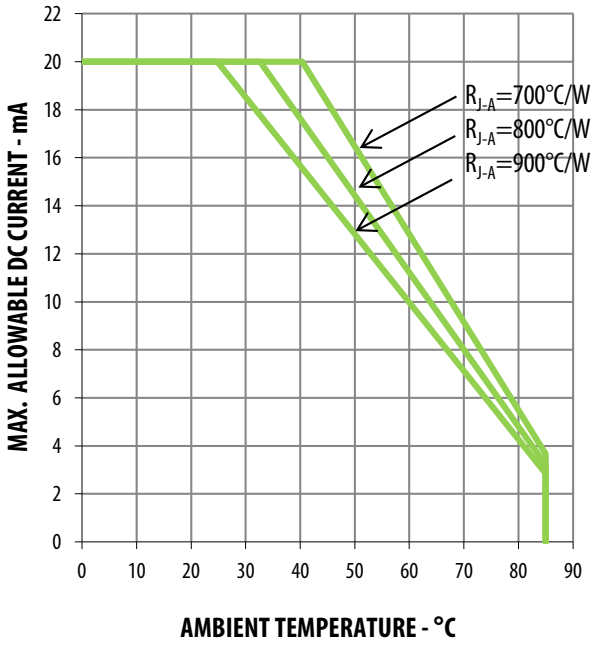


Figure 11: Recommended Solder Pad (Units: mm)

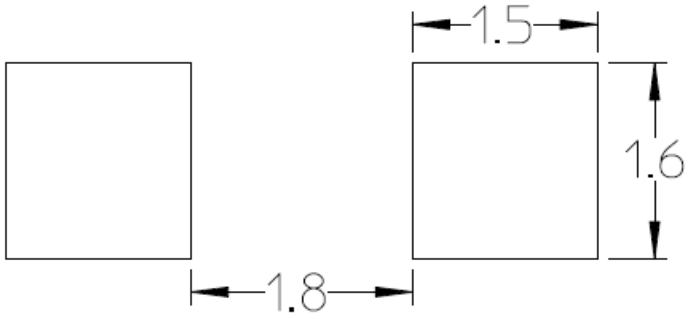
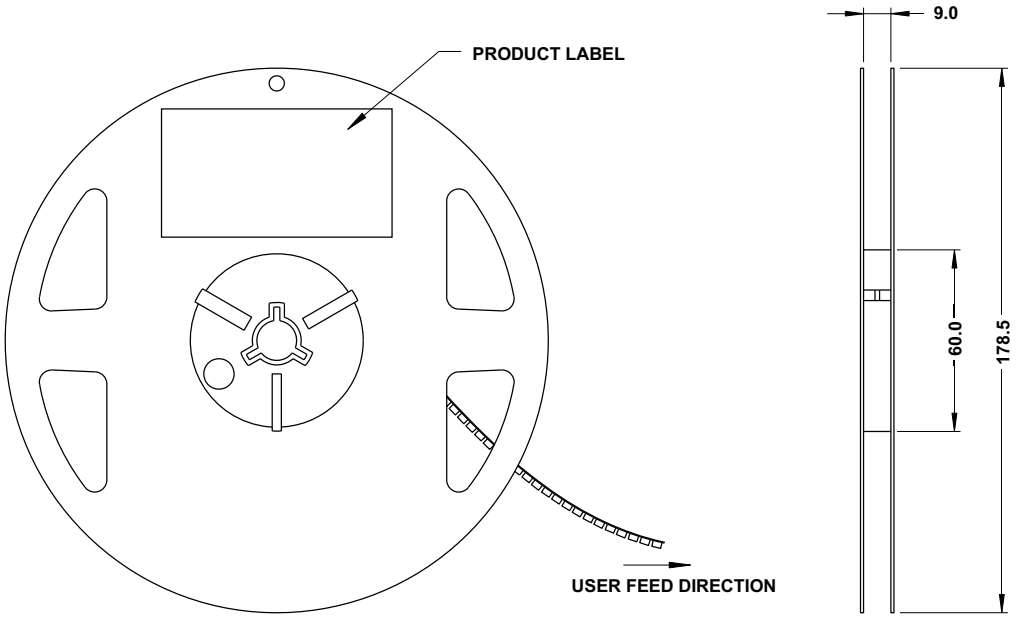
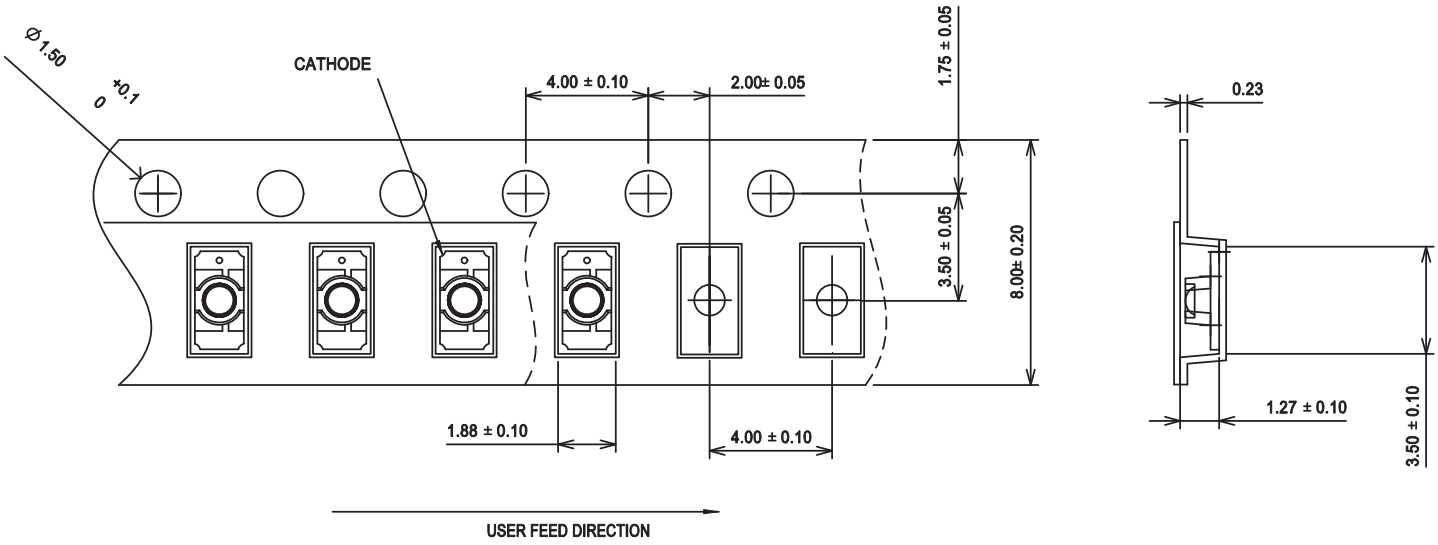


Figure 12: Reel Dimensions



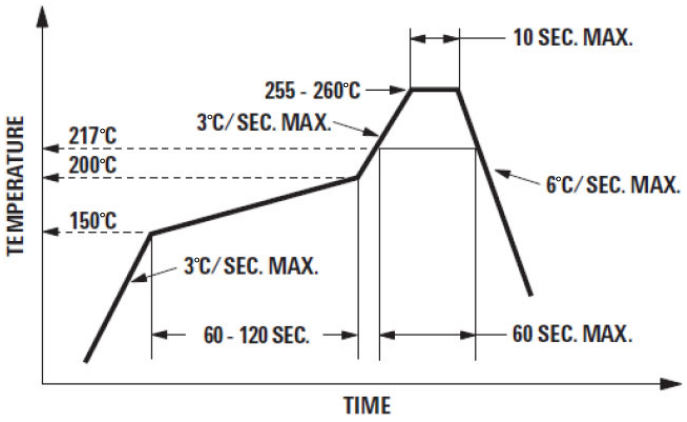
NOTE: All dimensions are in mm.

Figure 13: Carrier Tape Dimensions



Soldering

Figure 14: Recommended Reflow Soldering Conditions



- Reflow soldering must not be done more than twice. Observe necessary precautions of handling moisture-sensitive device as stated in the following section.
- Do not apply any pressure or force on the LED during reflow and after reflow when the LED is still hot.
- Use reflow soldering to solder the LED. If unavoidable (such as rework), use manual hand soldering strictly controlled to the following conditions:
  - Soldering iron tip temperature = 310°C maximum
  - Soldering duration = 2 seconds maximum
  - Number of cycles = 1 only
  - Power of soldering iron = 50W maximum
- Do not touch the LED package body with the soldering iron except for the soldering terminals because it might cause damage to the LED.
- Confirm beforehand whether the functionality and performance of the LED is affected by hand soldering.

Precautionary Notes

Handling Moisture-Sensitive Devices

This product has a Moisture Sensitive Level 2a rating per JEDEC J-STD-020. For additional details and a review of proper handling procedures, refer to Broadcom Application Note 5305, *Handling Moisture-Sensitive Surface-Mount LEDs*.

- **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, it is safe to reflow the LEDs per the original MSL rating.
  - Do not open the MBB prior to assembly (for example, for IQC).
- **Control after opening the MBB**
  - Read the HIC immediately upon opening the MBB.
  - Keep the LEDs at < 30°C/60% RH at all times. All high-temperature-related processes, including soldering, curing, or rework, must be completed within 672 hours.
- **Control for unfinished reels**

  Store unused LEDs in a sealed MBB with desiccant or a desiccator at < 5% RH.
- **Control of assembled boards**

  If the PCB soldered with the LEDs is to be subjected to other high-temperature processes, store the PCB in a sealed MBB with desiccant or a desiccator at < 5% RH to ensure that all LEDs have not exceeded their floor life of 672 hours.
- **Baking is required under the following conditions:**
  - The HIC indicator is not blue at 10% and is pink at 5%.
  - The LEDs are exposed to conditions of > 30°C/60% RH at any time.
  - The LEDs' floor life exceeded 672 hours.

  The recommended baking condition is 60°C ±5ºC for 20 hours.

  Baking should be done once only.

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