

HSMF-C175

Bi-color Top-Mount ChipLED

Overview

HSMF-C175 is a top-view amber and yellow-green bi-color surface-mount chipLED that comes in an industrial standard 1.6 x 1.25 mm² footprint. This LED uses high-efficiency AlInGaP chip technology and has high light output performance. Coupled with a wide viewing angle, this device is suitable for applications that require uniform light output and high brightness.

Its small form factor allows flexible board design and multiple LEDs can be closely mounted in application where space is a constraint.

This chipLED is shipped in tape and reel and is compatible with Industry-standard automatic machine placement and reflow soldering.

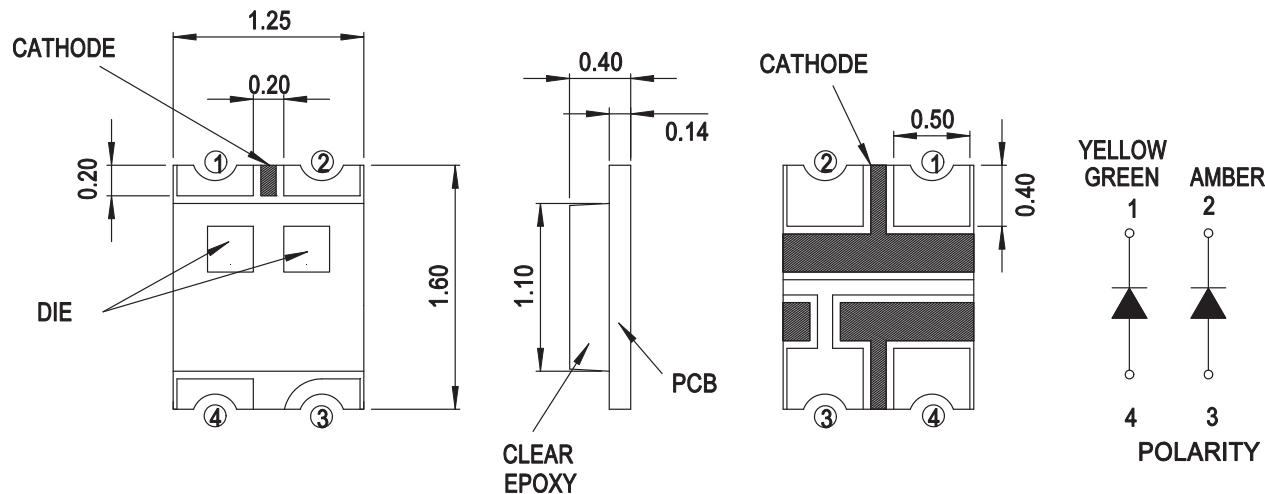
Features

- LED with AlInGaP Amber and AlInGaP Yellow Green
- Small package size
- Compatible with reflow soldering
- Available in 8-mm tape on 7-inch diameter reel

Applications

- Status indicator
- Keypad backlighting
- Pushbutton backlighting

Package Dimensions



NOTE:

- All dimensions in millimeters (mm).
- Tolerance is ± 0.10 mm unless otherwise specified.
- Encapsulation = clear epoxy.

CAUTION! This LED is Class 1A ESD sensitive per ANSI/ESDA/JEDEC JS-001. Observe appropriate precautions during handling and processing. Refer to Application Note AN-1142 for additional details.

Absolute Maximum Ratings

Parameter	AllInGaP	Unit
DC Forward Current (1 chip on) ^a	20	mA
DC Forward Current (2 chips on) ^a	15	mA
Power Dissipation	48	mW
LED Junction Temperature	95	°C
Operating Temperature Range	–40 to +85	°C
Storage Temperature Range	–40 to +85	°C

a. Derate linearly as shown in [Figure 9](#).

Optical Characteristics ($T_J = 25^\circ\text{C}$, $I_F = 20 \text{ mA}$)

Color	Luminous Intensity, I_V (mcd) ^a	Dominant Wavelength, λ_d (nm) ^b	Peak Wavelength, λ_p (nm)	Viewing Angle, $2\theta_{1/2}$ (°) ^c
	Min.	Typ.	Typ.	Typ.
Amber	28.5	589	593	140
Yellow Green	28.5	570	571	140

- 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. Viewing angle is the off axis angle where the luminous intensity is half of the peak intensity.

Electrical Characteristics ($T_J = 25^\circ\text{C}$, $I_F = 20 \text{ mA}$)

Color	Forward Voltage, V_F (V) ^a		Reverse Current, I_R (μA) at $V_R = 5\text{V}$ ^b	Thermal Resistance, $R\theta_{J-S}$ ($^\circ\text{C/W}$) ^c
	Min.	Max.	Max.	Typ.
Amber	1.6	2.4	100	300
Yellow Green	1.6	2.4	100	300

- a. Forward voltage tolerance = $\pm 0.1\text{V}$.
- b. Indicates product final test condition only. Long term reverse bias is not recommended.
- c. Thermal resistance from LED junction to solder point.

Bin Information

Intensity Bin Limit (CAT)

Bin	Luminous Intensity (mcd)	
	Min.	Max.
N	28.5	45.0
P	45.0	71.5
Q	71.5	112.5
R	112.5	180.0
S	180.0	285.0
T	285.0	450.0

Tolerance = $\pm 15\%$

Color Bin Limit (BIN)

Amber

Bin	Dominant Wavelength (nm)	
	Min.	Max.
A	582.0	584.5
B	584.5	587.0
C	587.0	589.5
D	589.5	592.0
E	592.0	594.5
F	594.5	597.0

Tolerance = ± 1.0 nm

Yellow Green

Bin	Dominant Wavelength (nm)	
	Min.	Max.
A	561.5	564.5
B	564.5	567.5
C	567.5	570.5
D	570.5	573.5
E	573.5	576.5

Tolerance = ± 1.0 nm

CAUTION! The above optical specifications are valid in the case where a single LED is lit up.

The above product specifications DO NOT provide any guarantee on color mixing, color consistency over time, or uniformity in luminous intensity when more than one LED is lit up.

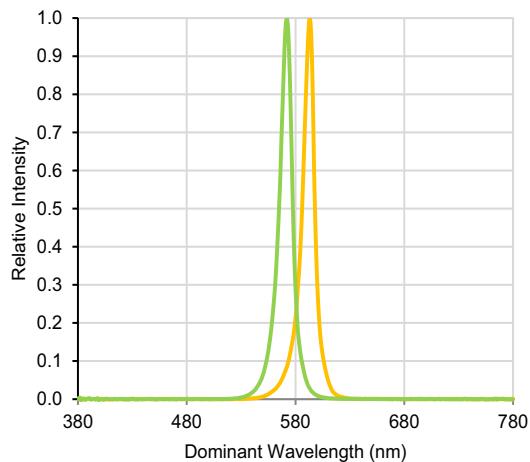
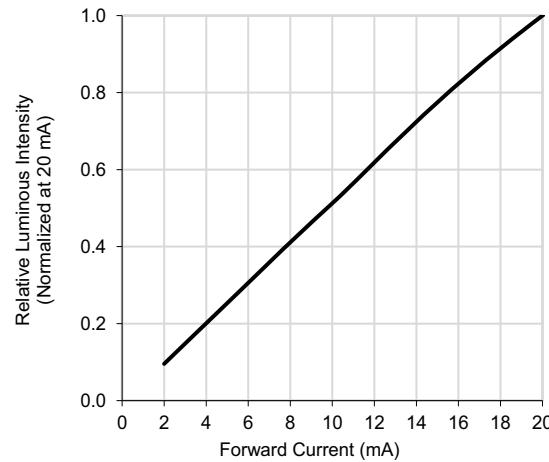
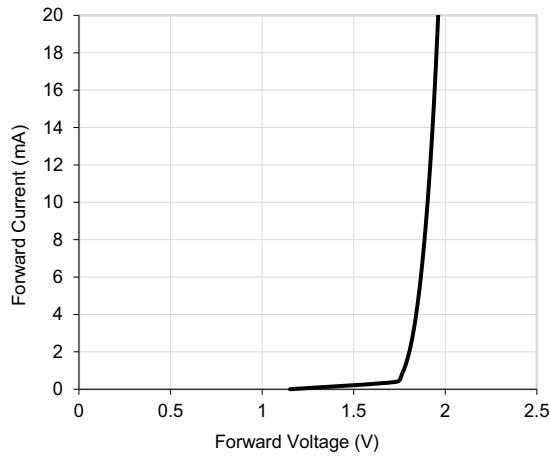
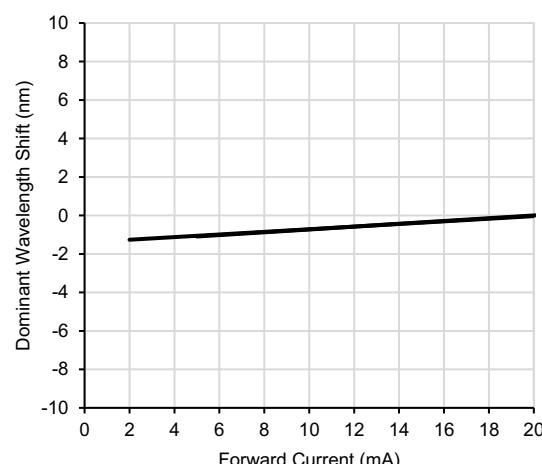
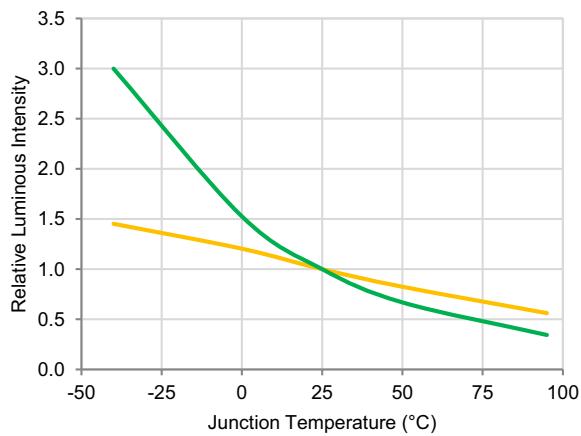
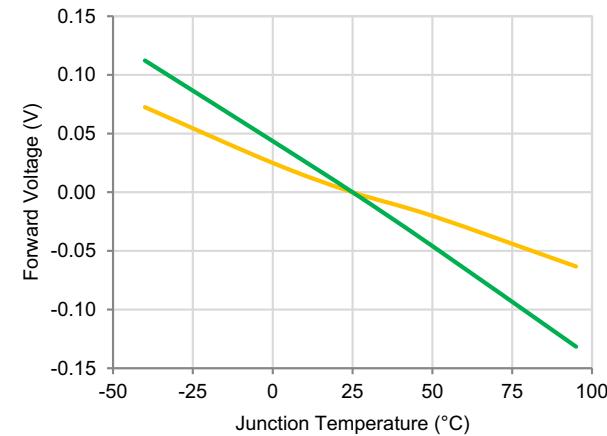
Figure 1: Spectral Power Distribution**Figure 2: Relative Luminous Intensity vs. Forward Current****Figure 3: Forward Current vs. Forward Voltage****Figure 4: Dominant Wavelength Shift vs. Forward Current****Figure 5: Relative Luminous Intensity vs. Junction Temperature****Figure 6: Forward Voltage Shift vs. Junction Temperature**

Figure 7: Dominant Wavelength Shift vs. Junction Temperature

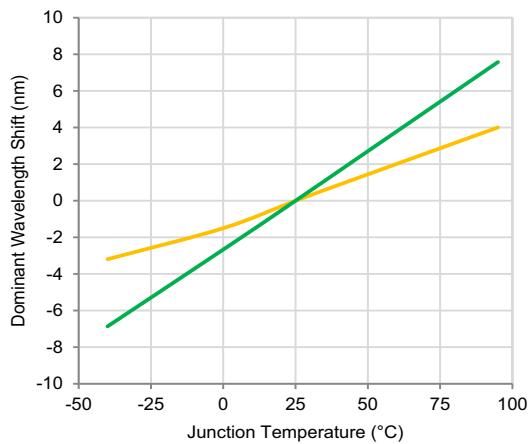


Figure 8: Radiation Pattern

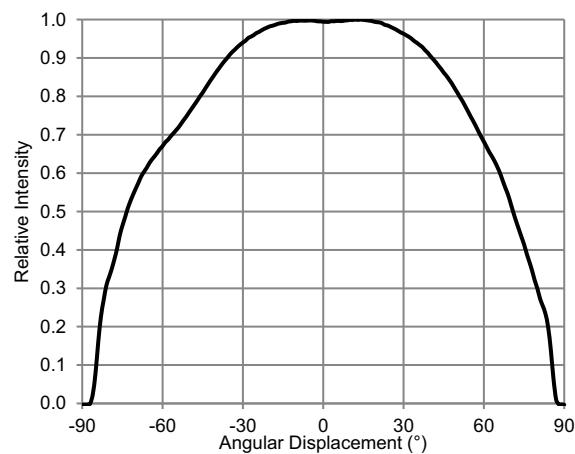


Figure 9: Derating Curve

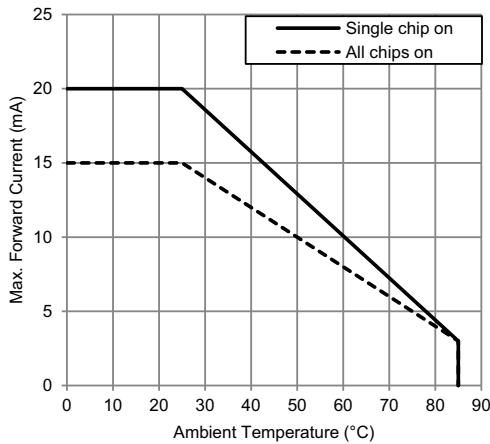
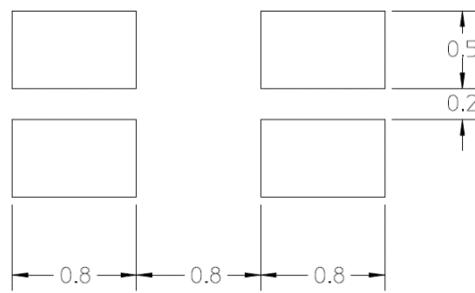
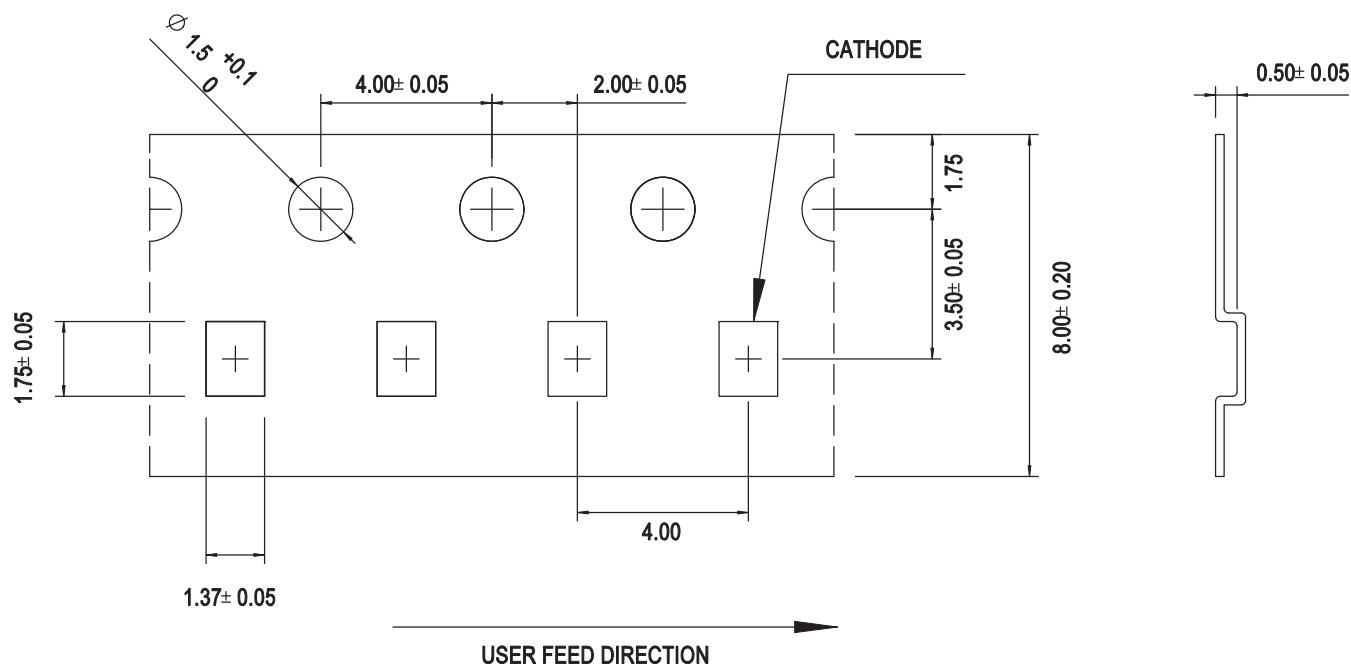


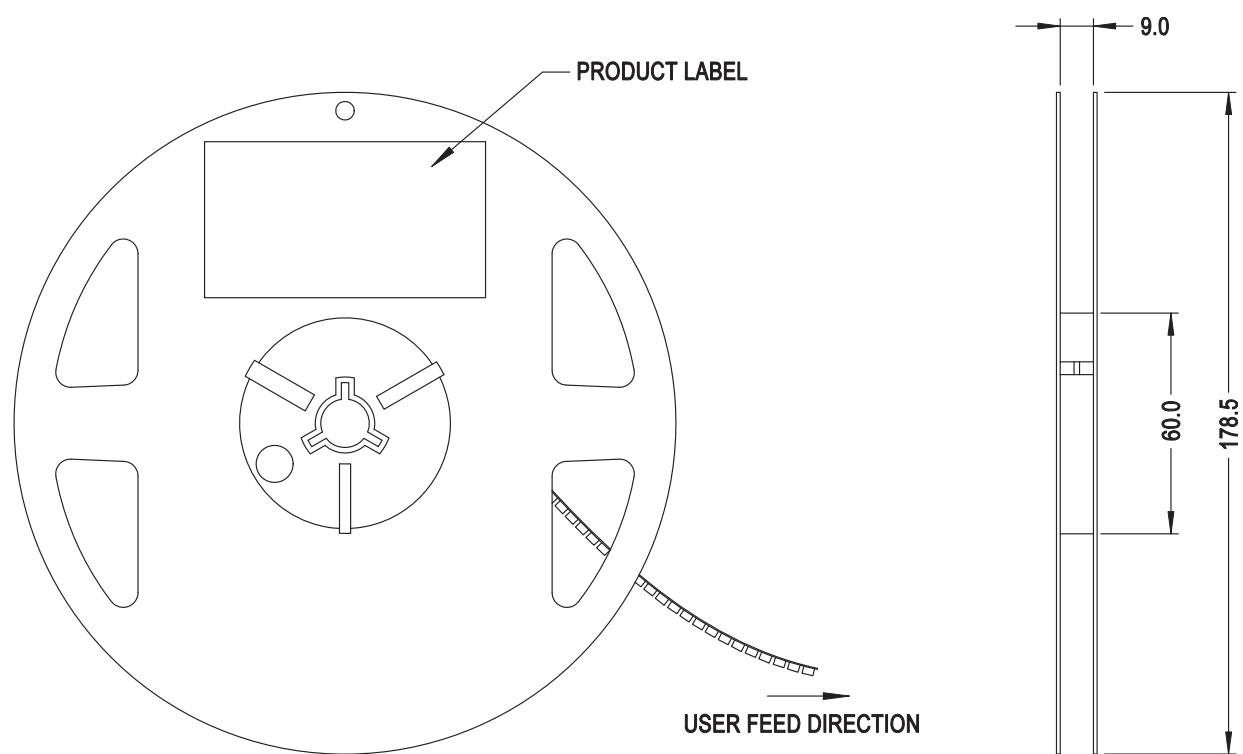
Figure 10: Recommended Soldering Land Pattern



Units: millimeters.

Figure 11: Carrier Tape Dimensions

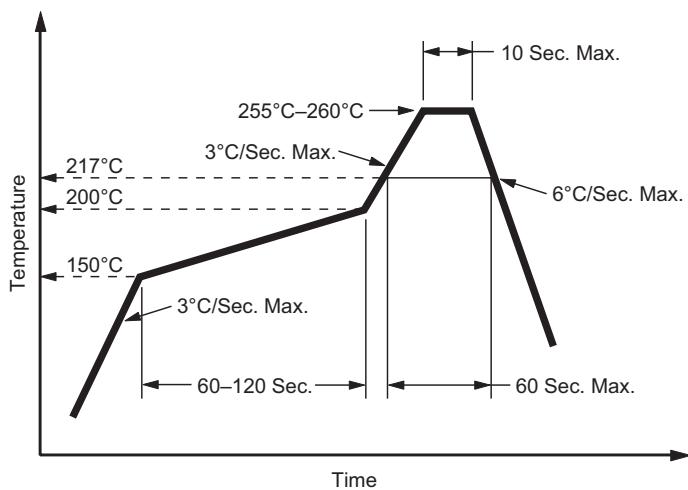
NOTE: Units in millimeters.

Figure 12: Reel Dimensions

NOTE: Units in millimeters.

Soldering

Recommended reflow soldering conditions:



- Reflow soldering must not be done more than 2 times. Observe the necessary precautions of handling moisture sensitive devices, as stated in the following section.
- Do not apply any pressure or force on the LED during reflow or after reflow when the LED is still hot.
- It is preferred to use reflow soldering to solder the LED. Hand soldering shall only be used for rework if unavoidable, but must be strictly controlled to the conditions below:
 - Soldering iron tip temperature = 310°C max.
 - Soldering duration = 2 sec. max.
 - Number of cycle = 1 only
 - Power of soldering iron = 50W max.
- Do not touch the LED package body with the soldering iron except for the soldering terminals as it may cause damage to the LED.
- User is advised to confirm beforehand whether the functionality and performance of the LED is affected by hand soldering.

Precautionary Notes

Handling of Moisture Sensitive Device

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

- 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 (for IQC, as an example).
- 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.
- Control for unfinished reel: Unused LEDs must be stored in a sealed MBB with desiccant or desiccator at <5% RH.
- Control of assembled boards: If the PCB soldered with the LEDs is to be subjected to other high-temperature processes, the PCB must 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.
- Baking is required if:
 - The HIC indicator is indicating a change in color for 10% and 5% as stated on the HIC.
 - The LEDs are exposed to a condition of >30°C/60% RH at any time.
 - The LED floor life exceeded 672 hrs.

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

Application Precautions

- 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.
- LEDs do exhibit slightly different characteristics at different drive current which might result in larger variation of their performance (meaning intensity, wavelength and forward voltage). User is recommended to set the application current as close as possible to the test current in order to minimize these variations.
- 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.
- Avoid rapid change in ambient temperature especially in high humidity environment as this will cause condensation on the LED.

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

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 equipment.

WARNING! Broadcom's products and software are not specifically designed, manufactured or authorized for sale as parts, components or assemblies for the planning, construction, maintenance or direct operation of a nuclear facility or for use in medical devices or applications. Customer is solely responsible, and waives all rights to make claims against Broadcom or its suppliers, for all loss, damage, expense, or liability in connection with such use.

Broadcom, the pulse logo, Connecting everything, Avago Technologies, Avago, and the A logo are among the trademarks of Broadcom and/or its affiliates in the United States, certain other countries, and/or the EU.

Copyright © 2019 Broadcom. All Rights Reserved.

The term "Broadcom" refers to Broadcom Inc. and/or its subsidiaries. For more information, please visit www.broadcom.com.

Broadcom reserves the right to make changes without further notice to any products or data herein to improve reliability, function, or design. Information furnished by Broadcom is believed to be accurate and reliable. However, Broadcom does not assume any liability arising out of the application or use of this information, nor the application or use of any product or circuit described herein, neither does it convey any license under its patent rights nor the rights of others.

