

## **HDSM-281x/283x**

### **0.28 in. (7.0 mm) Single-Digit Surface-Mount LED Display**

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#### **Description**

The Broadcom® HDSM-281x/283x is a single-digit display of 0.28 in. (7.0 mm) height. This device uses AlInGaP/GaAs chips and has a grey top surface with white segments.

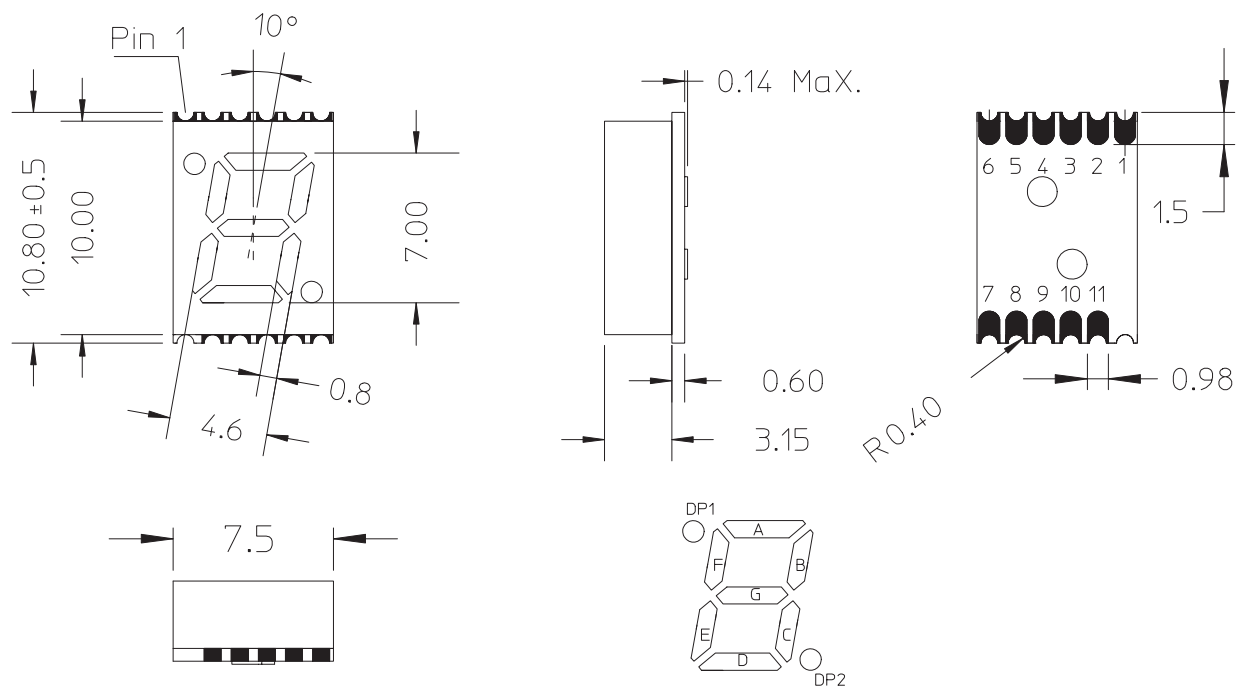
#### **Features**

- 0.28 in. digit height
- Low current operation
- Excellent characters appearance
- Available in CA and CC
- 1000 pieces per reel
- Moisture sensitivity level: Level 3
- RoHS compliant

#### **Ordering Information**

Red	Green	Yellow	Orange	Description
HDSM-281C	HDSM-281H	HDSM-281F	HDSM-281L	Common Anode, Upper and Lower Decimal
HDSM-283C	HDSM-283H	HDSM-283F	HDSM-283L	Common Cathode, Upper and Lower Decimal

## Package Dimensions



### NOTE:

1. All dimensions are in millimeters (inches).
2. Tolerance  $\pm 0.25$  mm (0.01 in.) unless otherwise noted.

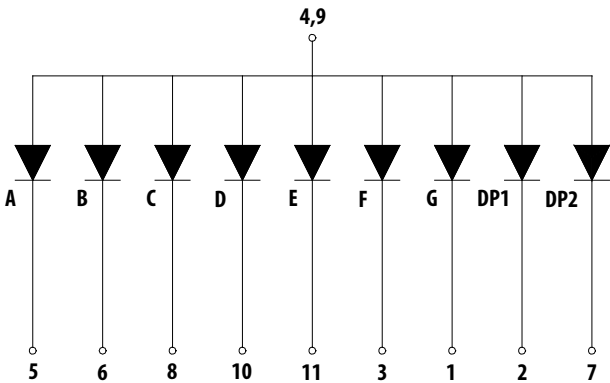
Pin Connection (Common Anode)

Pin Number	Connection
1	CATHODE G
2	CATHODE DP1
3	CATHODE F
4	COMMON ANODE
5	CATHODE A
6	CATHODE B
7	CATHODE DP2
8	CATHODE C
9	COMMON ANODE
10	CATHODE D
11	CATHODE E

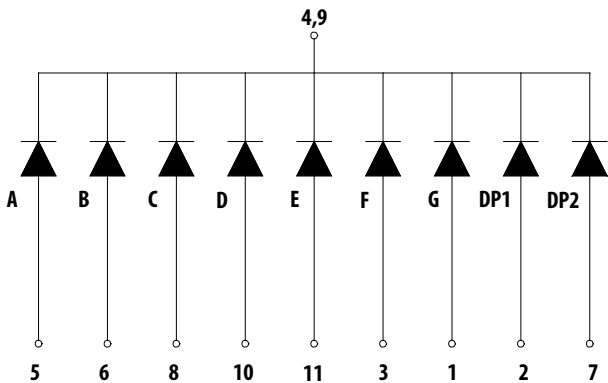
Pin Connection (Common Cathode)

Pin Number	Connection
1	ANODE G
2	ANODE DP1
3	ANODE F
4	COMMON CATHODE
5	ANODE A
6	ANODE B
7	ANODE DP2
8	ANODE C
9	COMMON CATHODE
10	ANODE D
11	ANODE E

Internal Circuit Diagram (Common Anode)



Internal Circuit Diagram (Common Cathode)



Absolute Maximum Ratings at T<sub>A</sub> = 25°C

Parameter	Green/Yellow/Red/Orange	Units
Power Dissipation Per Segment	65	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1-ms pulse width)	100	mA
Continuous Forward Current Per Segment	25	mA
Derating Linearly From 25°C Per Segment	0.25	mA/°C
Reverse Voltage Per Segment	5	V
Operating Temperature Range	−40°C to +105°C	
Storage Temperature Range	−40°C to +105°C	

## Electrical/Optical Characteristics at $T_A = 25^\circ\text{C}$

### Green

Parameters	Symbol	Min.	Typ.	Max.	Units	Test Condition
Average Luminous Intensity	$I_V$	3.4	6	—	mcd	$I_F = 10\text{ mA}$
Emissions Wavelength	$\lambda_p/\lambda_d$	—	572/571	—	nm	$I_F = 20\text{ mA}$
Spectral Line Half-Width	$\Delta\lambda$	—	20	—	nm	$I_F = 20\text{ mA}$
Forward Voltage, Per Segment	$V_F$	—	2.1	2.6	V	$I_F = 20\text{ mA}$
Reverse Current, Per Segment	$I_R$	—	—	100	$\mu\text{A}$	$V_R = 5\text{V}$
Luminous Intensity Matching Ratio	$I_{V-M}$	—	—	2:1		$I_F = 10\text{ mA}$

### Yellow

Parameters	Symbol	Min.	Typ.	Max.	Units	Test Condition
Average Luminous Intensity	$I_V$	3.4	8.0	—	mcd	$I_F = 10\text{ mA}$
Emissions Wavelength	$\lambda_p/\lambda_d$	—	591/589	—	nm	$I_F = 20\text{ mA}$
Spectral Line Half-Width	$\Delta\lambda$	—	15	—	nm	$I_F = 20\text{ mA}$
Forward Voltage, Per Segment	$V_F$	—	2.1	2.6	V	$I_F = 20\text{ mA}$
Reverse Current, Per Segment	$I_R$	—	—	100	$\mu\text{A}$	$V_R = 5\text{V}$
Luminous Intensity Matching Ratio	$I_{V-M}$	—	—	2:1		$I_F = 10\text{ mA}$

### Red

Parameters	Symbol	Min.	Typ.	Max.	Units	Test Condition
Average Luminous Intensity	$I_V$	3.4	7.5	—	mcd	$I_F = 10\text{ mA}$
Emissions Wavelength	$\lambda_p/\lambda_d$	—	644/630	—	nm	$I_F = 20\text{ mA}$
Spectral Line Half-Width	$\Delta\lambda$	—	20	—	nm	$I_F = 20\text{ mA}$
Forward Voltage, Per Segment	$V_F$	—	2.0	2.6	V	$I_F = 20\text{ mA}$
Reverse Current, Per Segment	$I_R$	—	—	100	$\mu\text{A}$	$V_R = 5\text{V}$
Luminous Intensity Matching Ratio	$I_{V-M}$	—	—	2:1		$I_F = 10\text{ mA}$

### Orange

Parameters	Symbol	Min.	Typ.	Max.	Units	Test Condition
Average Luminous Intensity	$I_V$	3.4	8.5	—	mcd	$I_F = 10\text{ mA}$
Emissions Wavelength	$\lambda_p/\lambda_d$	—	611/605	—	nm	$I_F = 20\text{ mA}$
Spectral Line Half-Width	$\Delta\lambda$	—	20	—	nm	$I_F = 20\text{ mA}$
Forward Voltage, Per Segment	$V_F$	—	2.1	2.6	V	$I_F = 20\text{ mA}$
Reverse Current, Per Segment	$I_R$	—	—	100	$\mu\text{A}$	$V_R = 5\text{V}$
Luminous Intensity Matching Ratio	$I_{V-M}$	—	—	2:1		$I_F = 10\text{ mA}$

# Typical Electrical/Optical Characteristic Curves at T<sub>A</sub> = 25°C

## Green

Figure 1: Relative Luminous Intensity vs. Wavelength

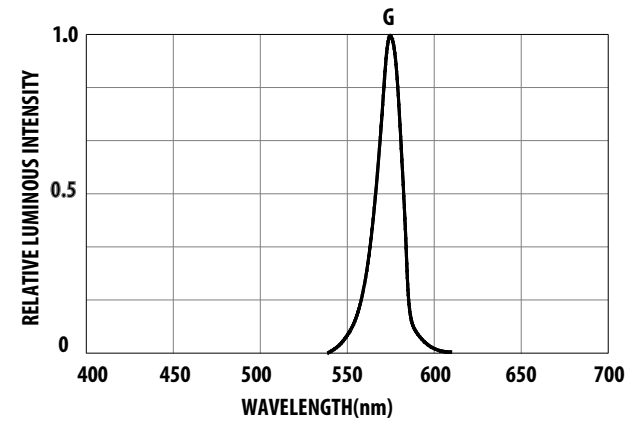


Figure 2: Relative Luminous Intensity vs. Forward Current

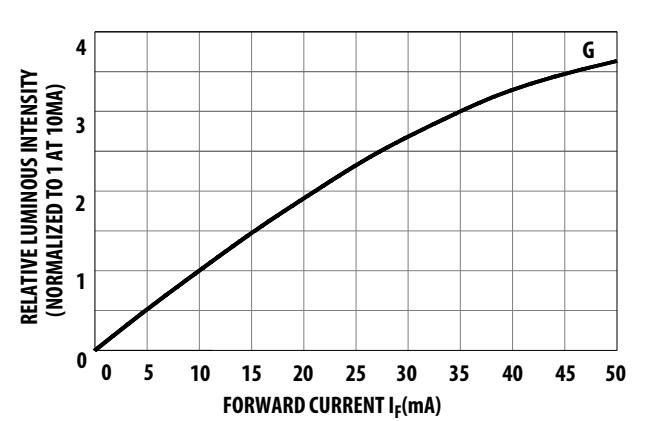


Figure 3: Allowable DC Current vs. Ambient Temperature

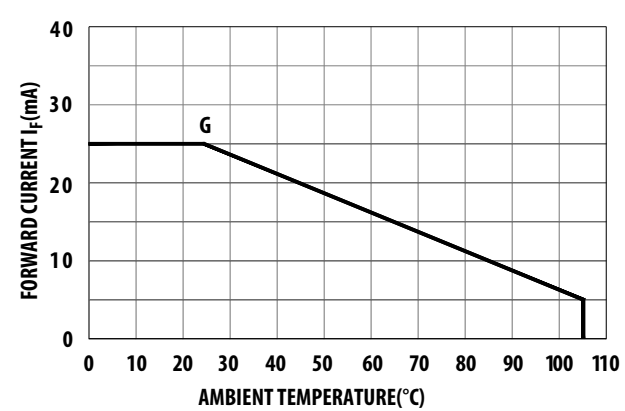
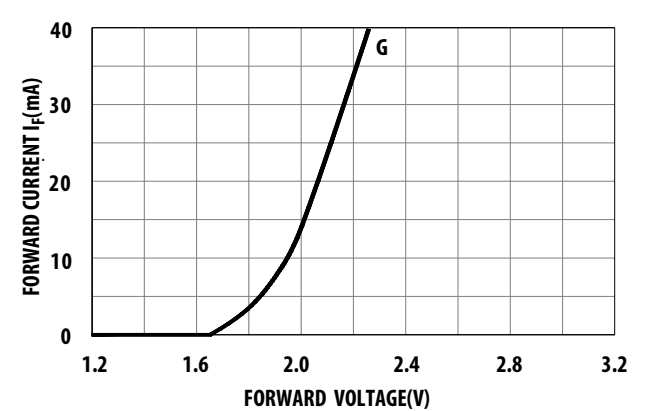


Figure 4: Forward Current vs. Forward Voltage



# Typical Electrical/Optical Characteristic Curves at T<sub>A</sub> = 25°C

## Yellow

Figure 5: Relative Intensity vs. Wavelength

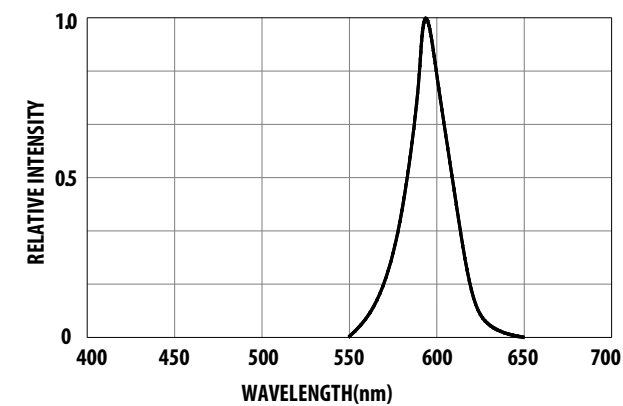


Figure 6: Relative Intensity vs. Forward Current

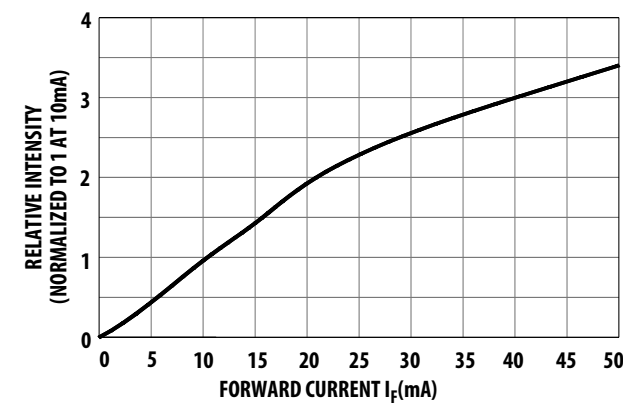


Figure 7: Allowable DC Current vs. Ambient Temperature

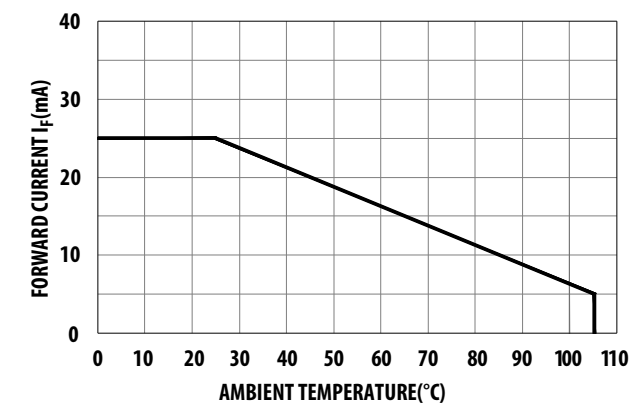
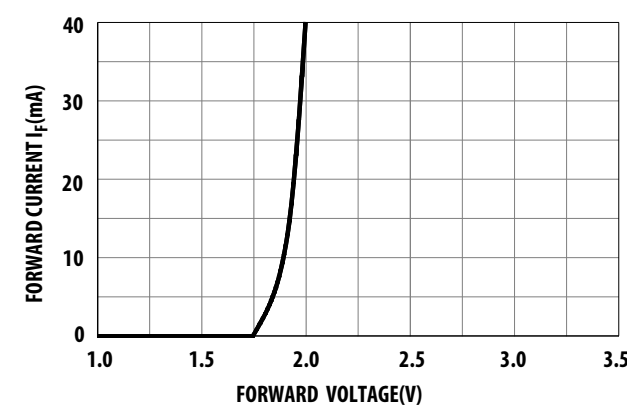


Figure 8: Forward Current vs. Forward Voltage



# Typical Electrical/Optical Characteristic Curves at T<sub>A</sub> = 25°C

## Red

Figure 9: Relative Intensity vs. Wavelength

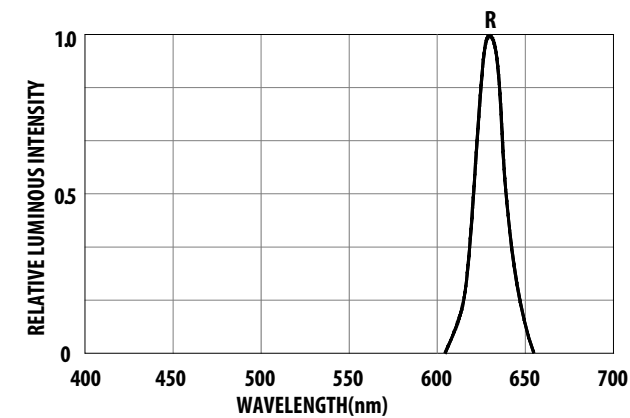


Figure 10: Relative Luminous Intensity vs. Forward Current

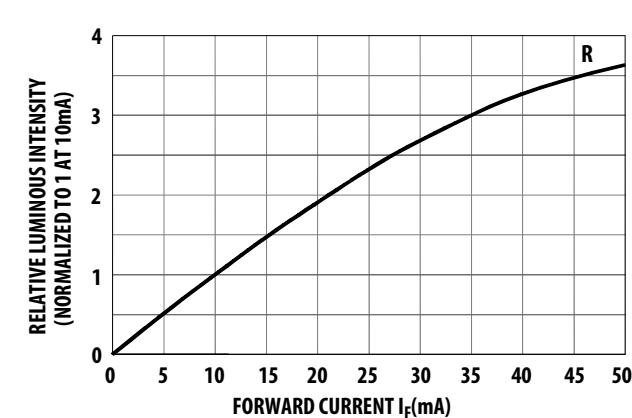


Figure 11: Allowable DC Current vs. Ambient Temperature

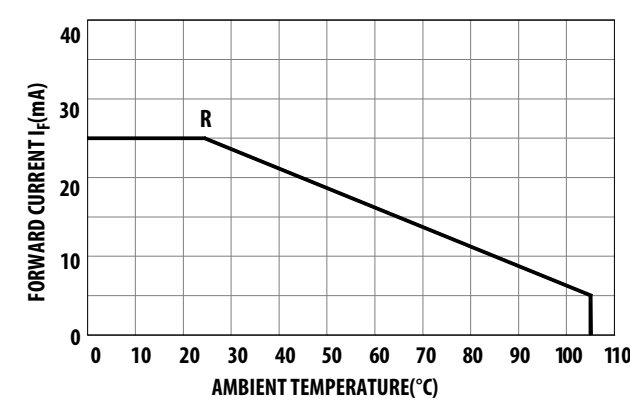
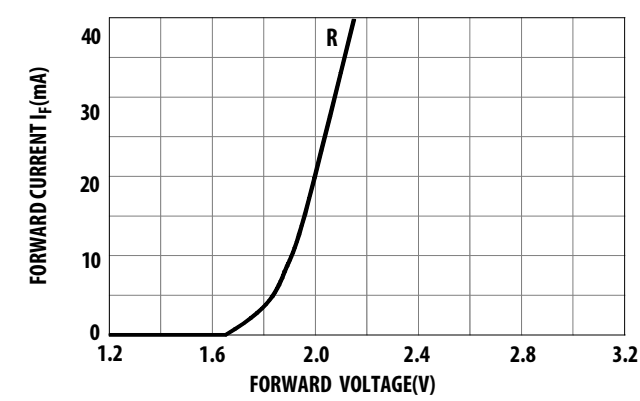


Figure 12: Forward Current vs. Forward Voltage



# Typical Electrical/Optical Characteristic Curves at T<sub>A</sub> = 25°C

## Orange

Figure 13: Relative Intensity vs. Wavelength

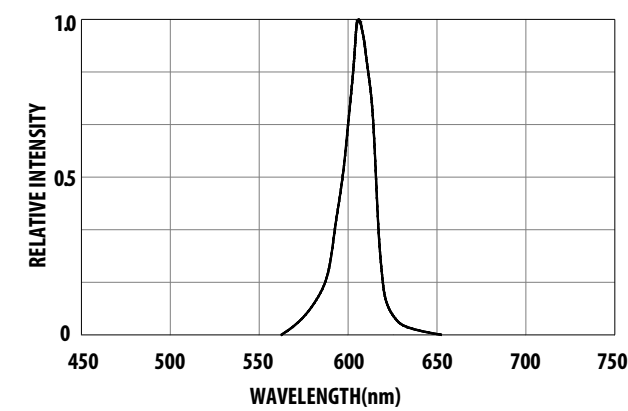


Figure 14: Relative Intensity vs. Forward Current

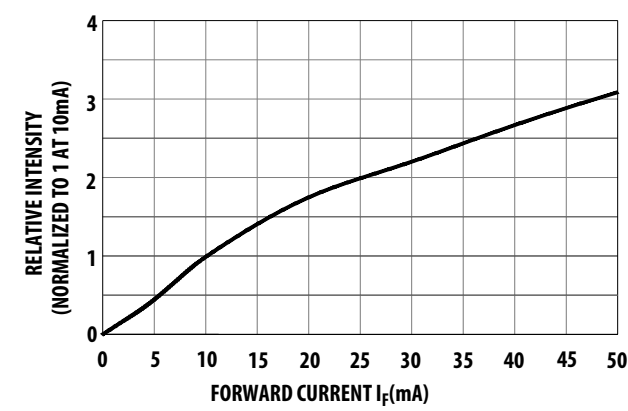


Figure 15: Allowable DC Current vs. Ambient Temperature

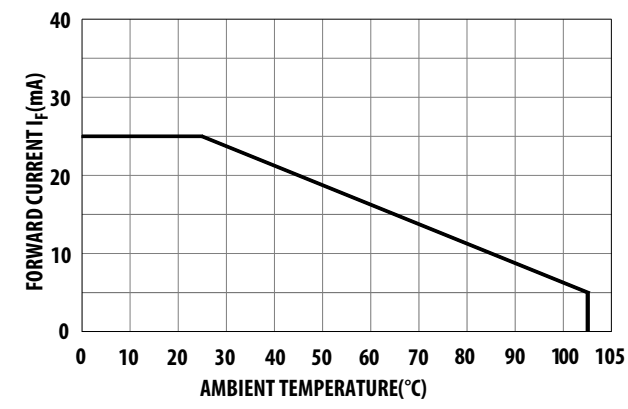
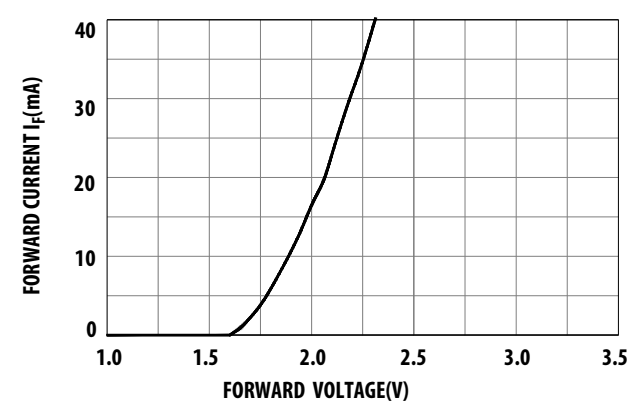


Figure 16: Forward Current vs. Forward Voltage





## Intensity Bin Limits (mcd)

### Yellow/Red/Orange/Green

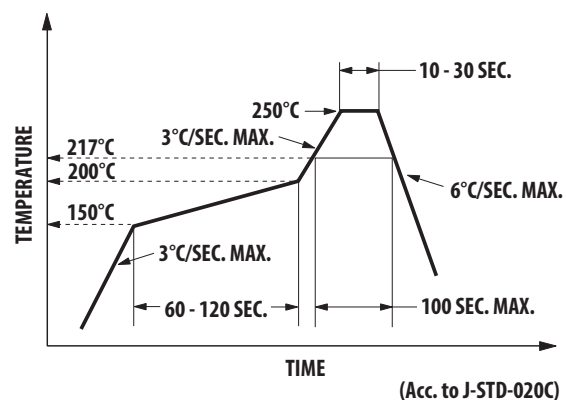
IV Bin Category	Min.	Max.
L	3.401	5.400
M	5.401	8.600
N	8.601	13.700
P	13.701	21.800

Tolerance:  $\pm 15\%$ .

**NOTE:** Bin categories are established for classification of products. Products may not be available in all categories. Contact your Broadcom representative for information on currently available bins.

## SMT Soldering Profile

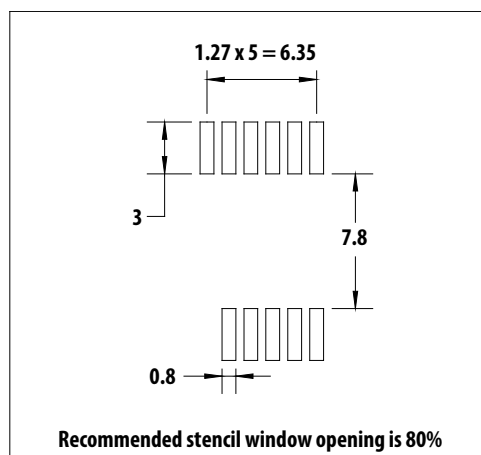
### Pb-Free Reflow Soldering Profile



**NOTE:**

1. The peak temperature refers to the peak package body temperature.
2. The number of reflow processes shall be limited to a maximum of twice only. A cooling process to normal temperature is required between the first and second soldering processes.

### Recommended Soldering Pattern (Unit: mm)



Technical drawing of a rectangular plate with dimensions and tolerances. The drawing includes a top view and a side view.

**Top View Dimensions:**

- Overall width:  $24.00^{+0.30}_{-0.10}$
- Overall height:  $22.25$
- Distance from top edge to first row of holes:  $11.50$
- Distance between centers of first two rows of holes:  $1.75 \pm 0.1$
- Distance between centers of first two columns of holes:  $2.00 \pm 0.1$
- Distance between centers of first two columns of holes (second row):  $4.00 \pm 0.1$
- Distance between centers of first two columns of holes (bottom row):  $12.00 \pm 0.1$
- Hole diameter (top row):  $\varnothing 1.5^{+0.10}_{-0.00}$
- Hole diameter (bottom row):  $\varnothing 1.5^{+0.10}_{-0.00}$

**Side View Dimensions:**

- Overall height:  $4.0$
- Thickness of top flange:  $0.35$

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