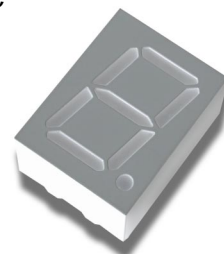


# HDSP-311x/313x

10.16 mm (0.4 inch) Single Digit General Purpose Seven Segment Display



## Data Sheet

### Description

This 10.16 mm (0.4 inch) LED single digit seven segment display uses industry standard size package and pinout. The device is available in either common anode or common cathode. The choice of colors includes High Efficiency Red (HER), Green, AlGaAs Red, and Yellow. The gray face displays are suitable for indoor use.

### Applications

- Suitable for indoor use
- Not recommended for industrial application, i.e., operating temperature requirements exceeding +85°C or below -25°C<sup>[1]</sup>
- Extreme temperature cycling not recommended

#### Note:

1. For additional details, please contact your local Avago sales office or an authorized distributor.

### Features

- **Industry standard size**
- **Industry standard pinout**  
10.16 mm (0.4 inch) character height  
DIP lead on 2.54 mm
- **Choice of colors**  
High Efficiency Red (HER), Green, AlGaAs Red, and Yellow
- **Excellent appearance**  
Evenly lighted segments gray package gives optimum contrast  
± 50 ft. viewing angle
- **Design flexibility**  
Common anode right hand decimal point or common cathode right hand decimal point
- **Categorized for luminous intensity**  
Green and yellow categorized for color

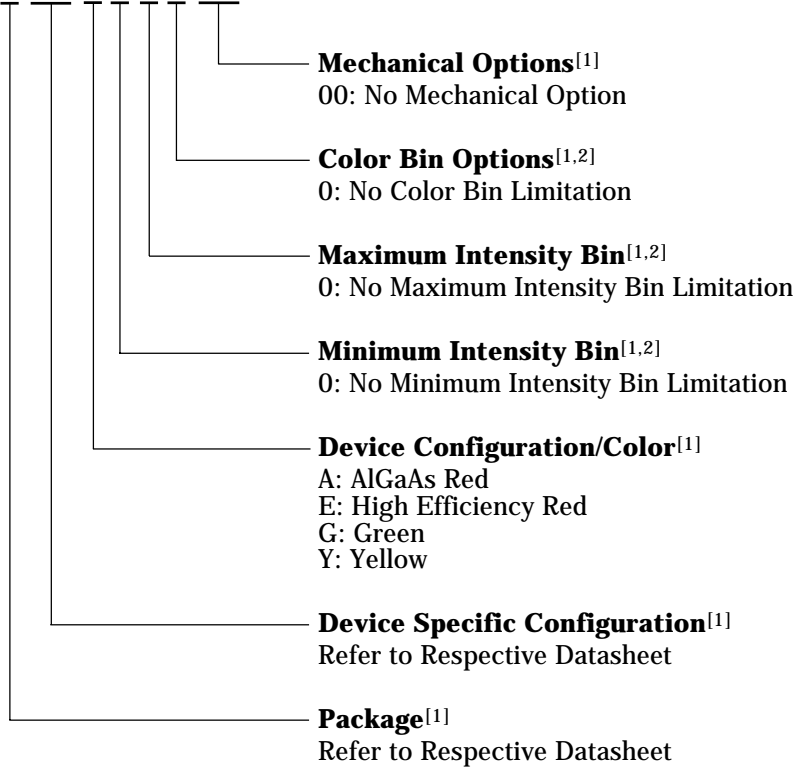
### Devices

HER	Green	AlGaAs Red	Yellow	Description	Package Drawing
HDSP-311E	HDSP-311G	HDSP-311A	HDSP-311Y	Common Anode Right Hand Decimal	A
HDSP-313E	HDSP-313G	HDSP-313A	HDSP-313Y	Common Cathode Right Hand Decimal	B

## Part Numbering System

5082 -X X X X-X X X X X

HDSP-X X X X-X X X X X

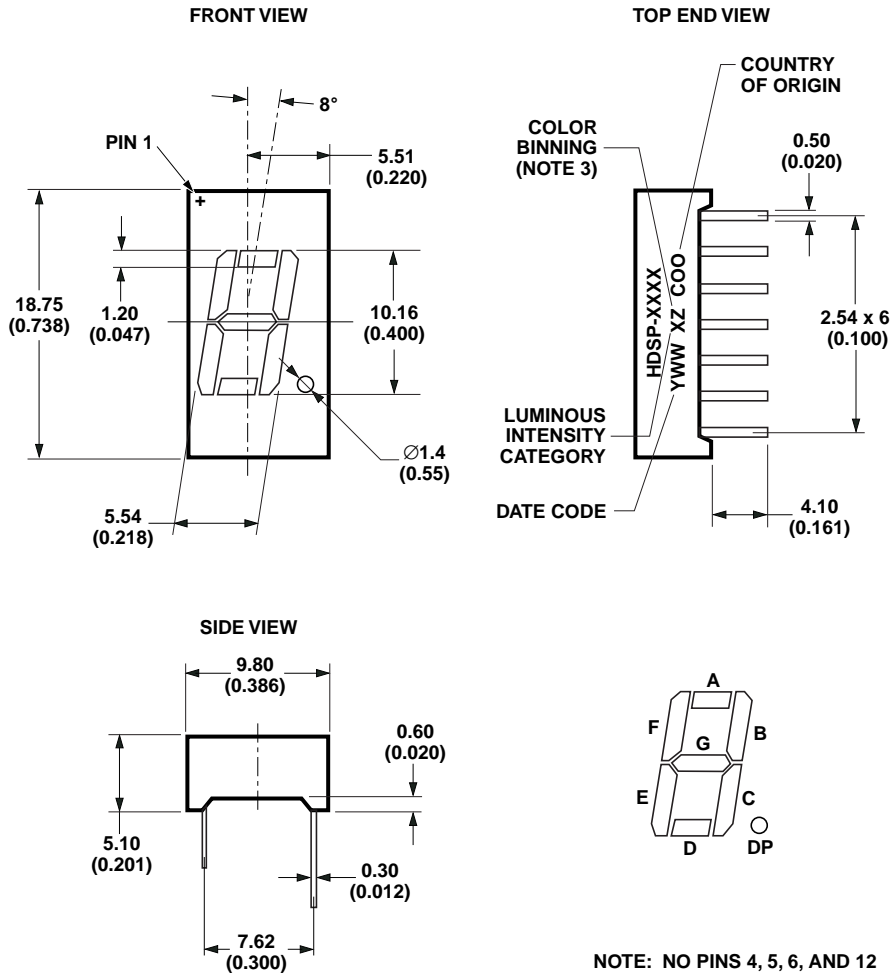


### Notes:

1. For codes not listed in the figure above, please refer to the respective datasheet or contact your nearest Avago representative for details.
2. Bin options refer to shippable bins for a part number. Color and Intensity Bins are typically restricted to 1 bin per tube (exceptions may apply). Please refer to respective datasheet for specific bin limit information.

Package Dimensions

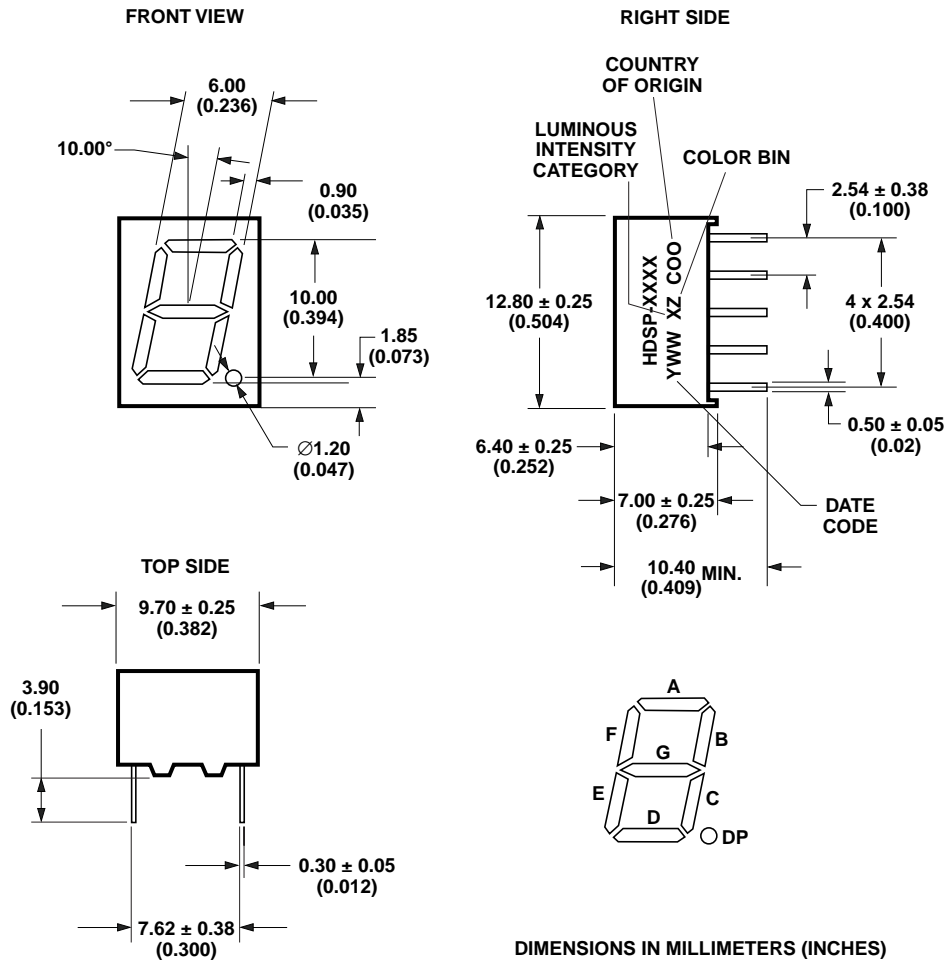
Package Drawing A



DIMENSIONS IN MILLIMETERS (INCHES)

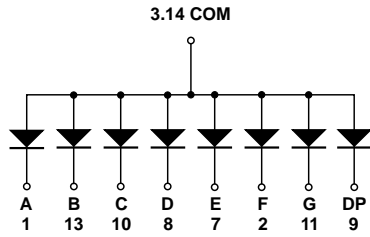
# Package Dimensions

## Package Drawing B



# Internal Circuit Diagram

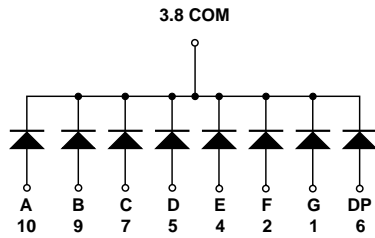
## COMMON ANODE RIGHT HAND DECIMAL



HDSP-311E/311G/311Y/311A

PIN No.	CONNECTION
1	CATHODE A
2	CATHODE F
3	COMMON ANODE
7	CATHODE E
8	CATHODE D
9	CATHODE DP
10	CATHODE C
11	CATHODE G
13	CATHODE B
14	COMMON ANODE
PINS 4, 5, 6, 12: NO PIN	

## COMMON CATHODE RIGHT HAND DECIMAL



HDSP-313E/313G/313Y/313A

PIN NO.	CONNECTION
1	ANODE G
2	ANODE F
3	COMMON CATHODE
4	ANODE E
5	ANODE D
6	ANODE DP
7	ANODE C
8	COMMON CATHODE
9	ANODE B
10	ANODE A

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

Description	HER HDSP-31xE	Green HDSP-31xG	AlGaAs Red HDSP-31xA	Yellow HDSP-31xY	Units
Power Dissipation Segment	65	65	30	52	mW
Forward Current Segment	25 <sup>[1]</sup>	25 <sup>[2]</sup>	15 <sup>[3]</sup>	20 <sup>[4]</sup>	mA
Peak Forward Current per Segment (1/10 Duty Factor at 10 KHz)	100	100	80	80	mA
Operating Temperature Range	-35 to +85	-35 to +85	-35 to +85	-35 to +85	°C
Storage Temperature Range	-35 to +85	-35 to +85	-35 to +85	-35 to +85	°C
Reverse Voltage per Segment or DP	5	5	5	5	V
Wave Soldering Temperature for 3 seconds (at 2 mm Distance from the Body)	250	250	250	250	°C

**Notes:**

1. Derate above 25 °C at 0.33 mA/°C.
2. Derate above 25 °C at 0.33 mA/°C.
3. Derate above 25 °C at 0.2 mA/°C.
4. Derate above 25 °C at 0.27 mA/°C.

### Electrical/Optical Characteristics at T<sub>A</sub> = 25 °C

#### High Efficiency Red (HER)

Devices							
HDSP-	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
	Luminous Intensity/Segment	I <sub>V</sub>		1.49		mcd	I <sub>F</sub> = 5 mA
			1.25	3.20		mcd	I <sub>F</sub> = 10 mA
311E	Forward Voltage	V <sub>F</sub>		2.05	2.40	V	I <sub>F</sub> = 20 mA
313E	Peak Wavelength	λ <sub>PEAK</sub>		635		nm	
	Dominant Wavelength	λ <sub>d</sub>		620		nm	
	Reverse Voltage	VR	5			V	I <sub>R</sub> = 100 μA

#### Green

Devices							
HDSP-	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
	Luminous Intensity/Segment	I <sub>V</sub>	1.25	3.20		mcd	I <sub>F</sub> = 10 mA
				2.06		V	I <sub>F</sub> = 10 mA
311G	Forward Voltage	V <sub>F</sub>	1.80	2.25	2.60	V	I <sub>F</sub> = 20 mA
313G	Peak Wavelength	λ <sub>PEAK</sub>		568		nm	
	Dominant Wavelength	λ <sub>d</sub>		573		nm	
	Reverse Voltage	VR	5			V	I <sub>R</sub> = 100 μA

## AlGaAs Red

Devices							
HDSP-	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
	Luminous Intensity/Segment	$I_V$		4.54		mcd	$I_F = 5 \text{ mA}$
			3.20	7.50		mcd	$I_F = 10 \text{ mA}$
311A	Forward Voltage	$V_F$		1.85	2.00	V	$I_F = 20 \text{ mA}$
313A	Peak Wavelength	$\lambda_{PEAK}$		660		nm	
	Dominant Wavelength	$\lambda_d$		643		nm	
	Reverse Voltage	$V_R$	5			V	$I_R = 100 \mu\text{A}$

## Yellow

Devices							
HDSP-	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
	Luminous Intensity/Segment	$I_V$		0.86		mcd	$I_F = 5 \text{ mA}$
			0.80	1.50		mcd	$I_F = 10 \text{ mA}$
311Y	Forward Voltage	$V_F$		2.15	2.60	V	$I_F = 20 \text{ mA}$
313Y	Peak Wavelength	$\lambda_{PEAK}$		595		nm	
	Dominant Wavelength	$\lambda_d$		590		nm	
	Reverse Voltage	$V_R$	5			V	$I_R = 100 \mu\text{A}$

## Intensity Bin Limits (mcd at 10 mA)

Bin Name	HER/Green		Yellow		AlGaAs Red	
	Min. <sup>[1]</sup>	Max. <sup>[1]</sup>	Min. <sup>[1]</sup>	Max. <sup>[1]</sup>	Min. <sup>[1]</sup>	Max. <sup>[1]</sup>
G	NA	NA	0.801	1.250	NA	NA
H	1.251	2.000	1.251	2.000	NA	NA
I	2.001	3.200	2.001	3.200	NA	NA
J	3.201	5.050	NA	NA	3.201	5.050
K	NA	NA	NA	NA	5.051	8.000
L	NA	NA	NA	NA	8.001	12.650

**Note:**

1. Tolerance for each bin limit is  $\pm 10\%$ .

## Color Bin Limits (nm at 10 mA)

Color	Bin	Dominant Wavelength (nm)	
		Min. <sup>[1]</sup>	Max. <sup>[1]</sup>
Green	3	569.1	571.0
	4	571.1	573.0
	5	573.1	575.0
Yellow	1	585.5	588.5
	2	588.5	591.5
	3	591.5	594.5

**Note:**

1. Tolerance for each bin limit is 1 nm.

### High Efficiency Red (HER)

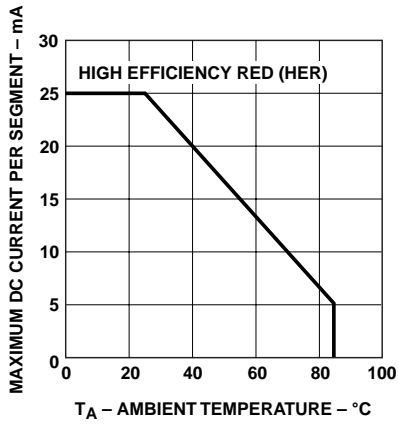


Figure 1. Maximum allowable average or DC current vs. ambient temperature.

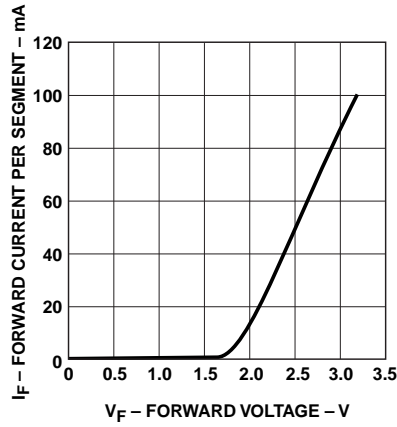


Figure 2. Forward current vs. forward voltage.

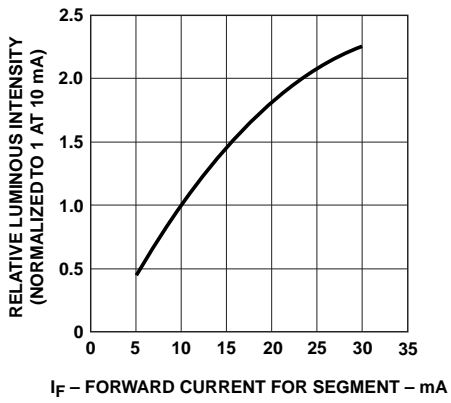


Figure 3. Relative luminous intensity vs. DC forward current.

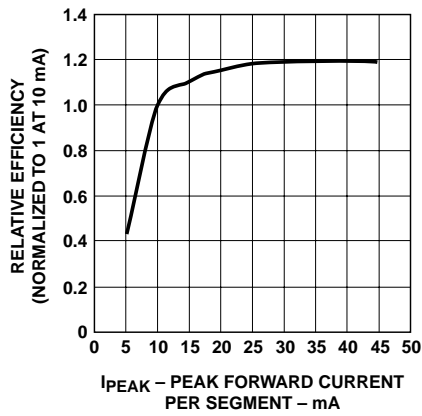


Figure 4. Relative efficiency (luminous intensity per unit current) vs. peak current.



Green

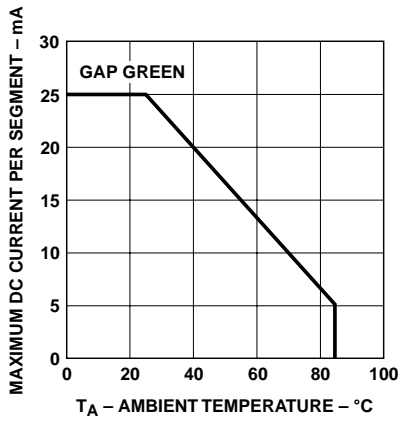


Figure 5. Maximum allowable average or DC current vs. ambient temperature.

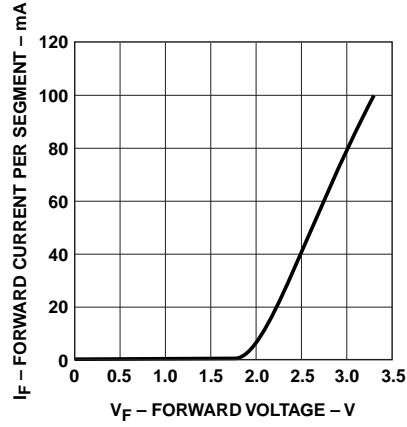


Figure 6. Forward current vs. forward voltage.

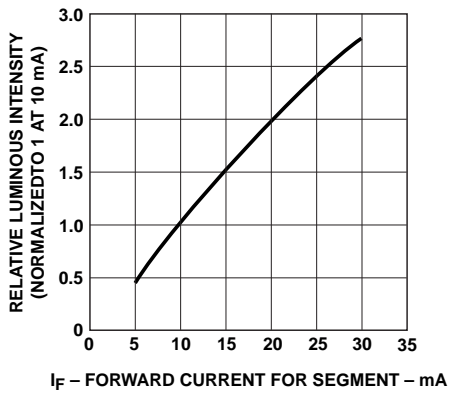


Figure 7. Relative luminous intensity vs. DC forward current.

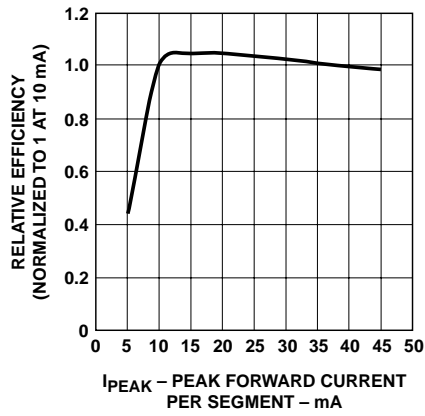


Figure 8. Relative efficiency (luminous intensity per unit current) vs. peak current.

## AlGaAs Red

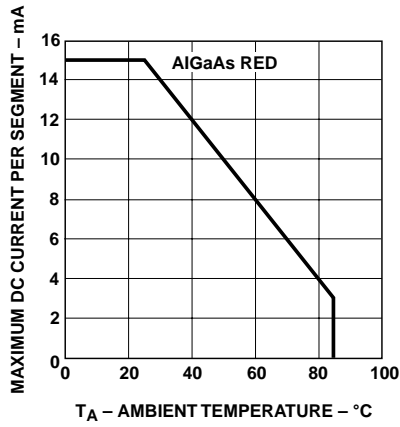


Figure 9. Maximum allowable average or DC current vs. ambient temperature.

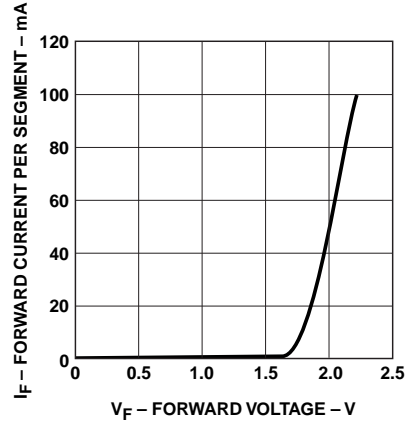


Figure 10. Forward current vs. forward voltage.

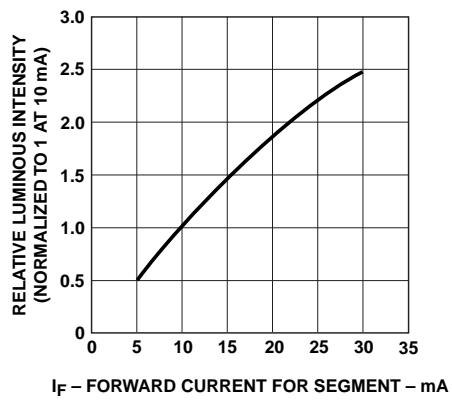


Figure 11. Relative luminous intensity vs. DC forward current.

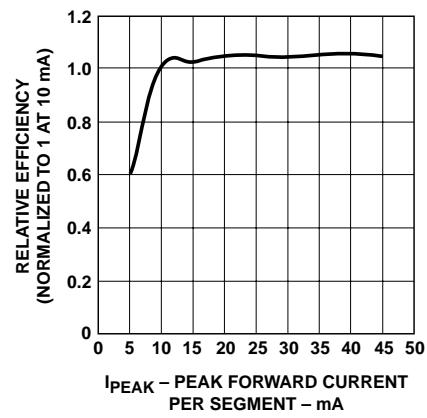


Figure 12. Relative efficiency (luminous intensity per unit current) vs. peak current.

Yellow

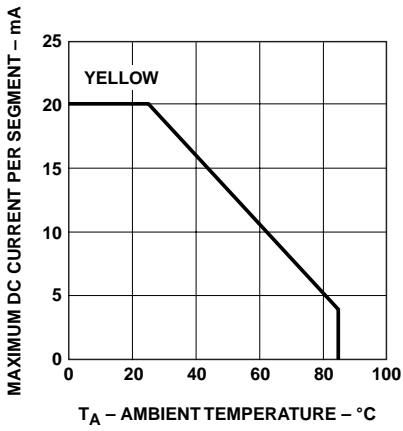


Figure 13. Maximum allowable average or DC current vs. ambient temperature.

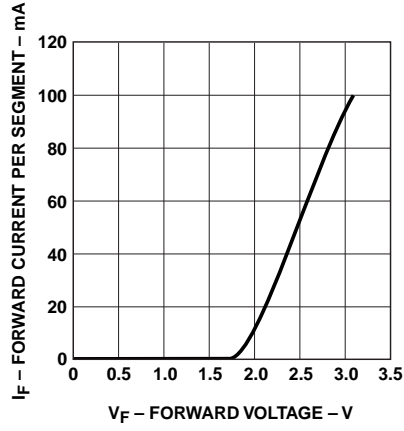


Figure 14. Forward current vs. forward voltage.

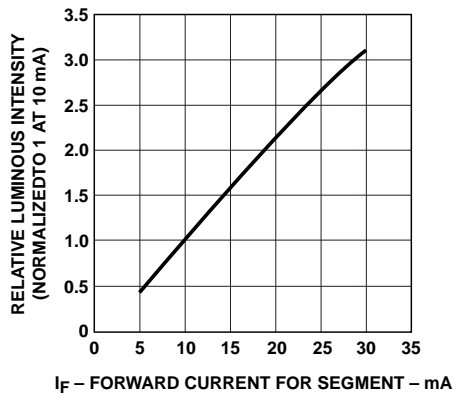


Figure 15. Relative luminous intensity vs. DC forward current.

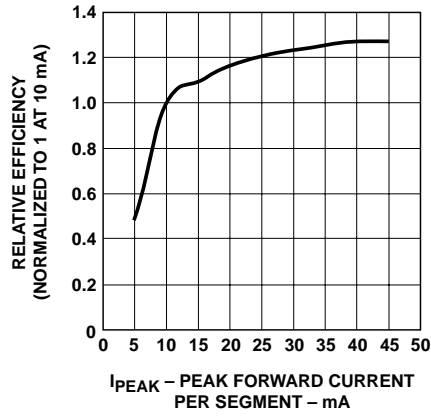


Figure 16. Relative efficiency (luminous intensity per unit current) vs. peak current.

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