BROADCOM®

Data Sheet

HDSP-511x, HDSP-513x, and HDSP-515A

14.22-mm (0.56-in.) General-Purpose Seven-Segment Display

Description

This 14.22-mm (0.56-in.) LED 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 displays are suitable for indoor use.

Applications

- Suitable for indoor use
- Not recommended for industrial application, that is, operating temperature requirements exceeding +85°C or below –25°C (for additional details, contact your local Broadcom® sales office or an authorized distributor)
- Extreme temperature cycling not recommended

Features

- Industry standard size
- Industry standard pinout
  14.22-mm (0.56-in.) DIP lead on 2.54 mm
- Choice of colors
  High Efficiency Red (HER), Green, AlGaAs Red, and Yellow
- Excellent appearance
  Evenly lighted segments package gives optimum contrast
  ± 50° viewing angle
- Design flexibility
  Common anode or common cathode
  Single digit
  Right-hand decimal point
- Categorized for luminous intensity
  Green and yellow categorized for color

Devices

HER	Green	AlGaAs Red	Yellow	Description
HDSP-511E	HDSP-511G	HDSP-511A	HDSP-511Y	Common Anode, Gray Surface, Right-Hand Decimal
HDSP-513E	HDSP-513G	HDSP-513A	HDSP-513Y	Common Cathode, Gray Surface, Right-Hand Decimal
—	—	HDSP-515A	—	Common Cathode, Black Surface, Right-Hand Decimal

Part Numbering System

5 0 8 2 - x_1 x_2 x_3 x_4 - x_5 x_6 x_7 x_8 x_9

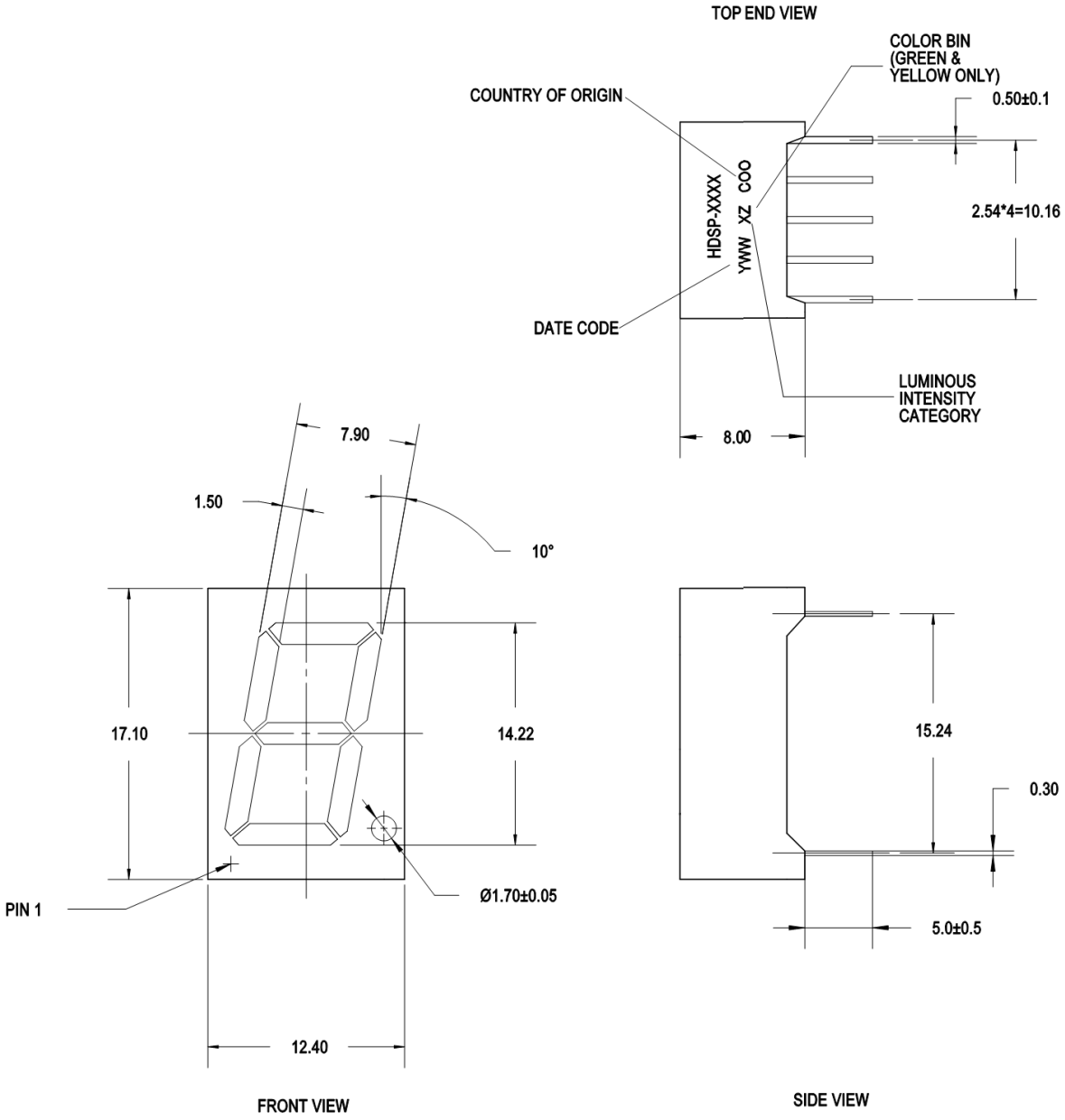
H D S P - x_1 x_2 x_3 x_4 - x_5 x_6 x_7 x_8 x_9

Placeholder	Description	Option	Setting	Notes
x_1	Package			a
x_2 x_3	Device Specific Configuration			a
x_4	Device Configuration/Color	A	AlGaAs Red	a
		E	High Efficiency Red	
		G	Green	
		Y	Yellow	
x_5	Minimum Intensity Bin	0	No minimum intensity bin limitation	a, b
x_6	Maximum Intensity Bin	0	No maximum intensity bin limitation	a, b
x_7	Color Bin Options	0	No color bin limitation	a, b
x_8 x_9	Mechanical Options	00	No mechanical option	a

a. For codes not listed in the figure, refer to the respective data sheet or contact your nearest Broadcom representative for details.

b. Bin options, refer to shippable bins for a part number. Color and intensity bins are typically restricted to one bin per tube (exceptions may apply). Refer to the respective data sheet for specific bin limit information.

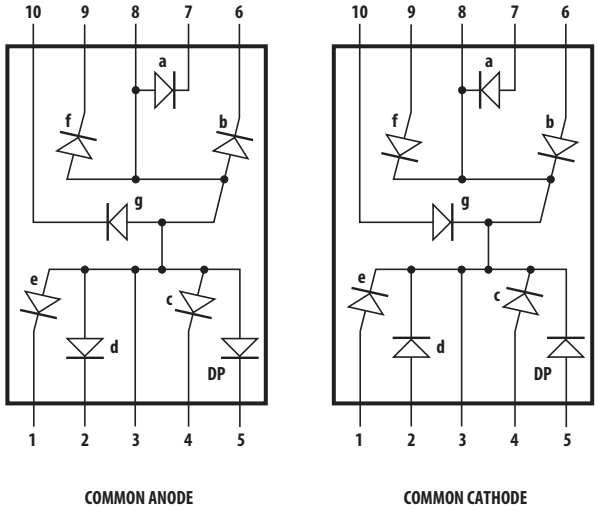
Package Dimensions



NOTE:

1. All dimensions are in millimeters (mm).
2. Tolerance is ± 0.25 mm unless otherwise specified.

Internal Circuit Diagram



HDSP-511E/511G/511Y/511A		HDSP-513E/513G/513Y/513A/515A	
COMMON ANODE		COMMON CATHODE	
PIN	FUNCTION	PIN	FUNCTION
1	CATHODE e	1	ANODE e
2	CATHODE d	2	ANODE d
3	COMMON ANODE	3	COMMON CATHODE
4	CATHODE c	4	ANODE c
5	CATHODE DP	5	ANODE DP
6	CATHODE b	6	ANODE b
7	CATHODE a	7	ANODE a
8	COMMON ANODE	8	COMMON CATHODE
9	CATHODE f	9	ANODE f
10	CATHODE g	10	ANODE g

Absolute Maximum Ratings at T_A = 25°C

Description	HER HDSP-51xE	Green HDSP-51xG	AlGaAs Red HDSP-51xA	Yellow HDSP-51xY	Units
Power Dissipation Segment	60	65	30	52	mW
Forward Current Segment	25[a]	25[b]	15[c]	20[d]	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
Wavesoldering Temperature for 3 seconds (at 2-mm distance from the body)	250	250	250	250	°C

a. Derate above 25°C at 0.33 mA/°C.

b. Derate above 25°C at 0.33 mA/°C.

c. Derate above 25°C at 0.2 mA/°C.

d. Derate above 25°C at 0.27 mA/°C.

Electrical/Optical Characteristics at T_A = 25°C

High Efficiency Red (HER)

Device HDSP-	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
511E 513E	Luminous Intensity/Segment	I_V	—	1.73	—	mcd	I_F = 5 mA
			2.001	4.100	—	mcd	I_F = 10 mA
	Forward Voltage	V_F	—	2.05	2.40	V	I_F = 20 mA
	Peak Wavelength	λ_{PEAK}	—	635	—	nm	
	Dominant Wavelength	λ_d	—	620	—	nm	
	Reverse Voltage	V_R	5	—	—	V	I_R = 100 µA

Green

Device HDSP-	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
511G 513G	Luminous Intensity/Segment	I_V	2.001	4.100	—	mcd	I_F = 10 mA
	Forward Voltage	V_F	—	2.06	—	V	I_F = 10 mA
			1.80	2.25	2.60	V	I_F = 20 mA
	Peak Wavelength	λ_{PEAK}	—	568	—	nm	
	Dominant Wavelength	λ_d	—	573	—	nm	
	Reverse Voltage	V_R	5	—	—	V	I_R = 100 µA

AlGaAs Red

Device HDSP-	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
511A 513A 515A	Luminous Intensity/Segment	I_V	—	4.93	—	mcd	I_F = 5 mA
			3.201	6.500	—	mcd	I_F = 10 mA
	Forward Voltage	V_F	—	1.85	2.00	V	I_F = 20 mA
	Peak Wavelength	λ_{PEAK}	—	660	—	nm	
	Dominant Wavelength	λ_d	—	643	—	nm	
	Reverse Voltage	V_R	5	—	—	V	I_R = 100 µA

Yellow

Device HDSP-	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
511Y 513Y	Luminous Intensity/Segment	I_V	—	1.03	—	mcd	I_F = 5 mA
			1.251	2.600	—	mcd	I_F = 10 mA
	Forward Voltage	V_F	—	2.15	2.60	V	I_F = 20 mA
	Peak Wavelength	λ_{PEAK}	—	595	—	nm	
	Dominant Wavelength	λ_d	—	590	—	nm	
	Reverse Voltage	V_R	5	—	—	V	I_R = 100 µA

Intensity Bin Limits (mcd at 10 mA)

Bin Name	HER/Green		Yellow		AlGaAs Red	
	Min.[a]	Max.[a]	Min.[a]	Max.[a]	Min.[a]	Max.[a]
H	N/A	N/A	1.251	2.000	N/A	N/A
I	2.001	3.200	2.001	3.200	N/A	N/A
J	3.201	5.050	3.201	5.050	3.201	5.050
K	5.051	8.000	N/A	N/A	5.051	8.000
L	N/A	N/A	N/A	N/A	8.001	12.650

a. Tolerance for each bin limit is ± 10%.

Color Bin Limits (nm)

Color	Dominant Wavelength (nm)		
	Bin	Min.[a]	Max.[a]
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

a. Tolerance for each bin limit is 1 nm.

High Efficiency Red (HER)

Figure 1: Maximum Allowable Average or DC Current vs. Ambient Temperature

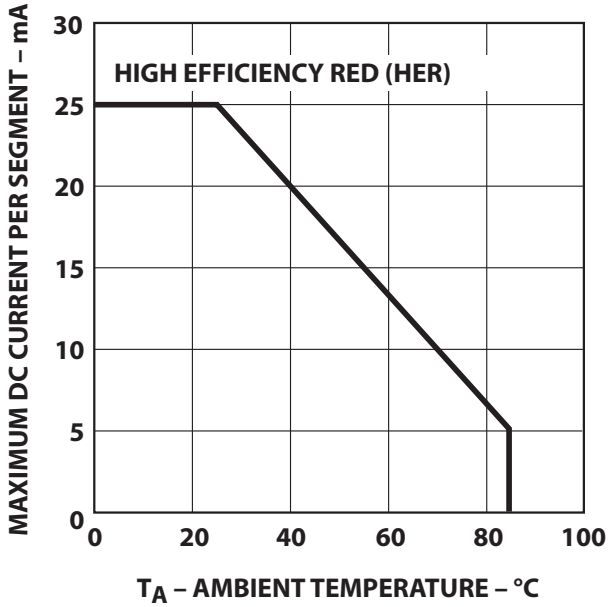


Figure 2: Forward Current vs. Forward Voltage

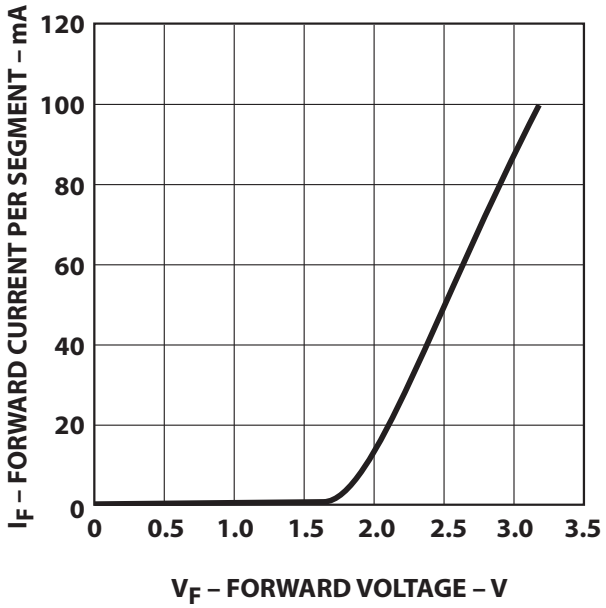


Figure 3: Relative Luminous Intensity vs. DC Forward Current

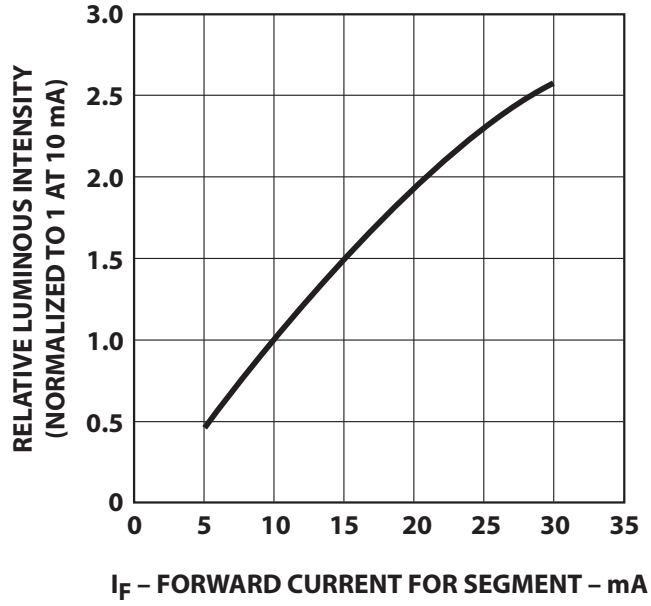
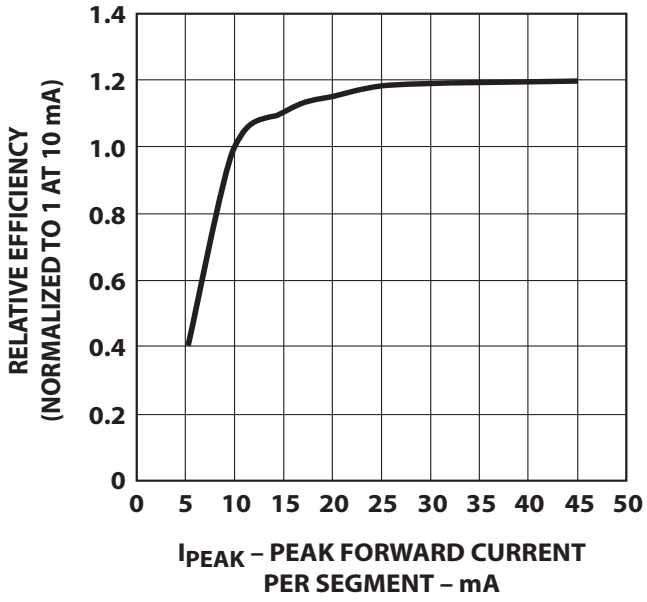


Figure 4: Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak Current



Green

Figure 5: Maximum Allowable Average or DC Current vs. Ambient Temperature

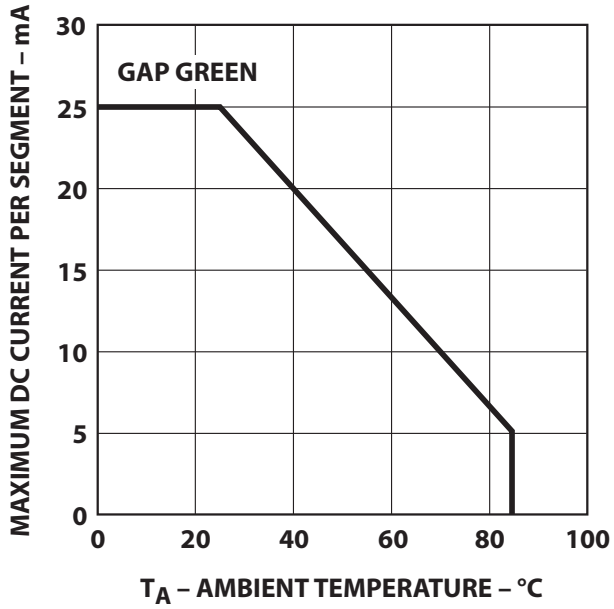


Figure 6: Forward Current vs. Forward Voltage

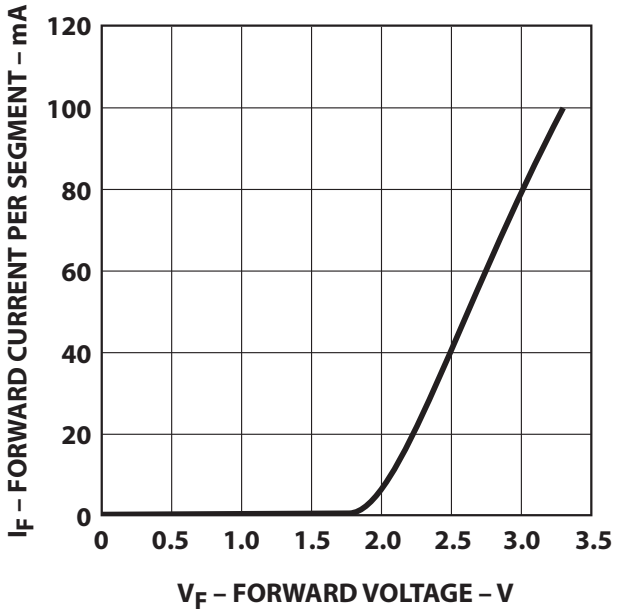


Figure 7: Relative Luminous Intensity vs. DC Forward Current

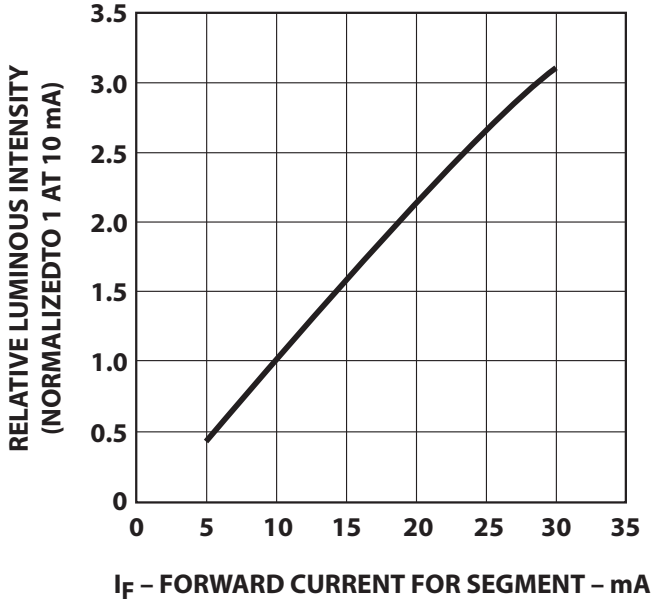
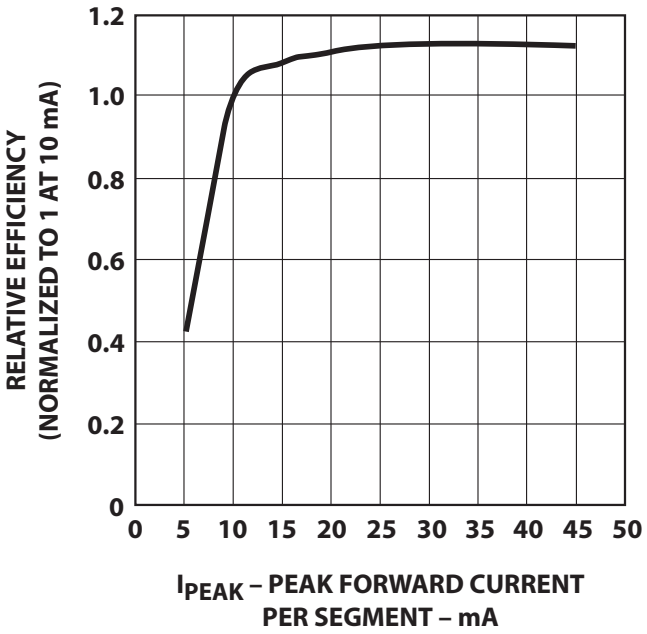


Figure 8: Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak Current



AlGaAs Red

Figure 9: Maximum Allowable Average or DC Current vs. Ambient Temperature

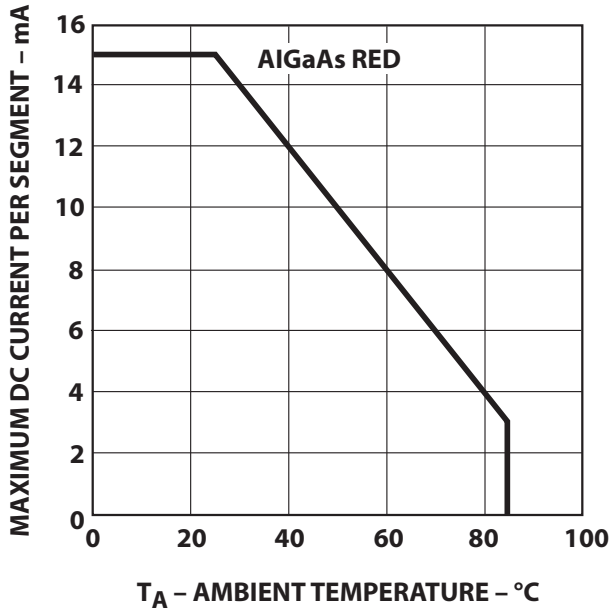


Figure 10: Forward Current vs. Forward Voltage

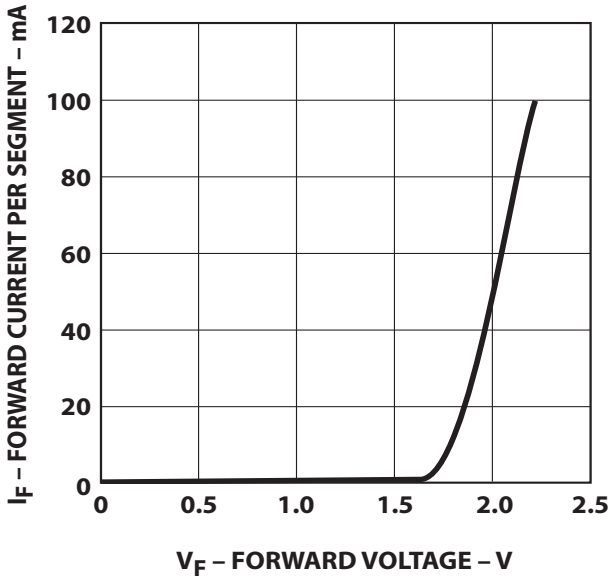


Figure 11: Relative Luminous Intensity vs. DC Forward Current

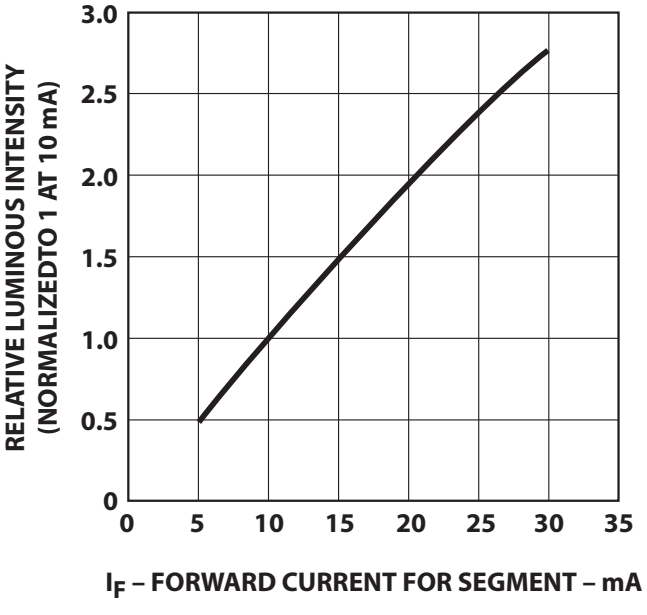
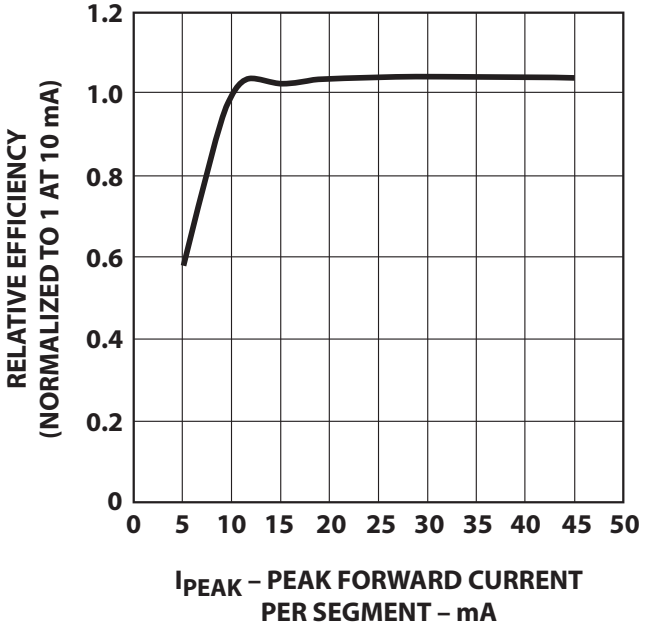


Figure 12: Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak Current



Yellow

Figure 13: Maximum Allowable Average or DC Current vs. Ambient Temperature

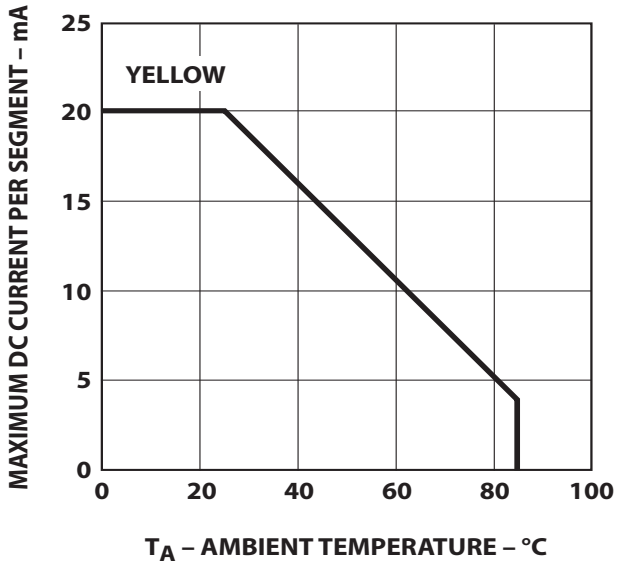


Figure 14: Forward Current vs. Forward Voltage

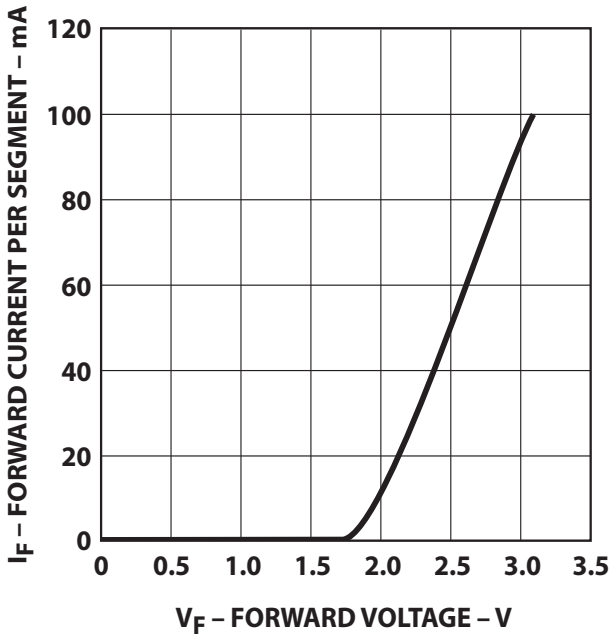


Figure 15: Relative Luminous Intensity vs. DC Forward Current

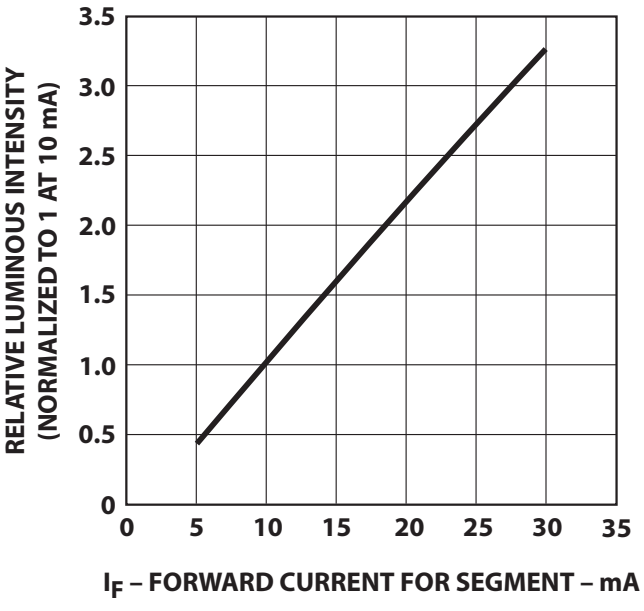
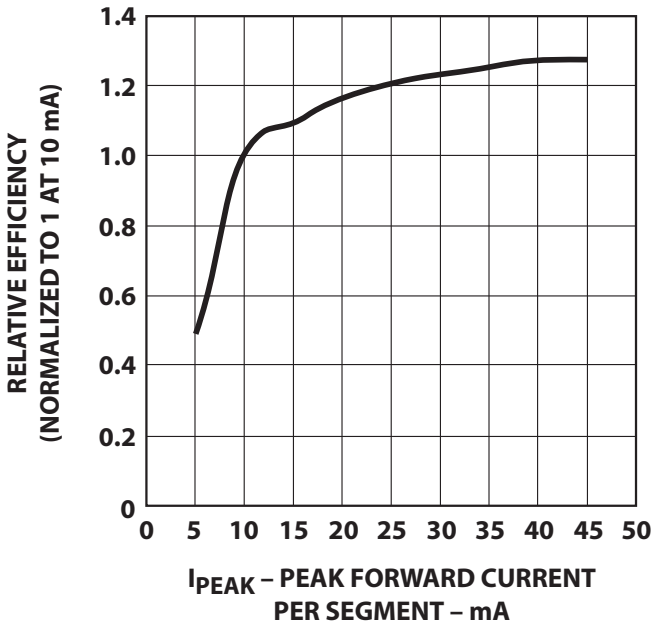


Figure 16: Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak Current



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