

## **5082-761x/-762x/-765x/-766x Series, HDSP-360x/-460x/-E15x Series**

### **7.6 mm (0.3 inch)/10.9 mm (0.43 inch) Seven-Segment Displays**



#### **Description**

The 7.6 mm (0.3 inch) and 10.9 mm (0.43 inch) LED seven-segment displays are designed for viewing distances up to 3 meeters (10 feet) and 5 meters (16 feet). These devices use an industry standard size package and pinouts. All devices are available as either common anode or common cathode.

#### **Features**

- Industry standard size
- Industry standard pinout
  - 7.62 mm (0.300 inch) DIP leads on 2.54 mm (0.100 inch) centers
- Choice of colors
  - AlGaAs Red, High Efficiency Red, Yellow, Green
- Excellent appearance
  - Evenly lighted segments
  - $\pm 50^\circ$  viewing angle
  - Optimum contrast given by gray top surface for AlGaAs Red and Green devices
  - Red top surface for HER devices
  - Yellow top surface for yellow devices
- Design flexibility
  - Common anode or common cathode
  - Single digits
  - Left or right hand decimal point  $\pm 1$ . overflow character
- Categorized for luminous intensity
  - Yellow and Green categorized for color
  - Use of like categories yields a uniform display
- High light output
- High peak current
- Excellent for long digit string multiplexing
- Intensity and color selection available
  - Refer to the *Intensity and Color Selected Displays Data Sheet*
- Sunlight viewable AlGaAs

## Devices

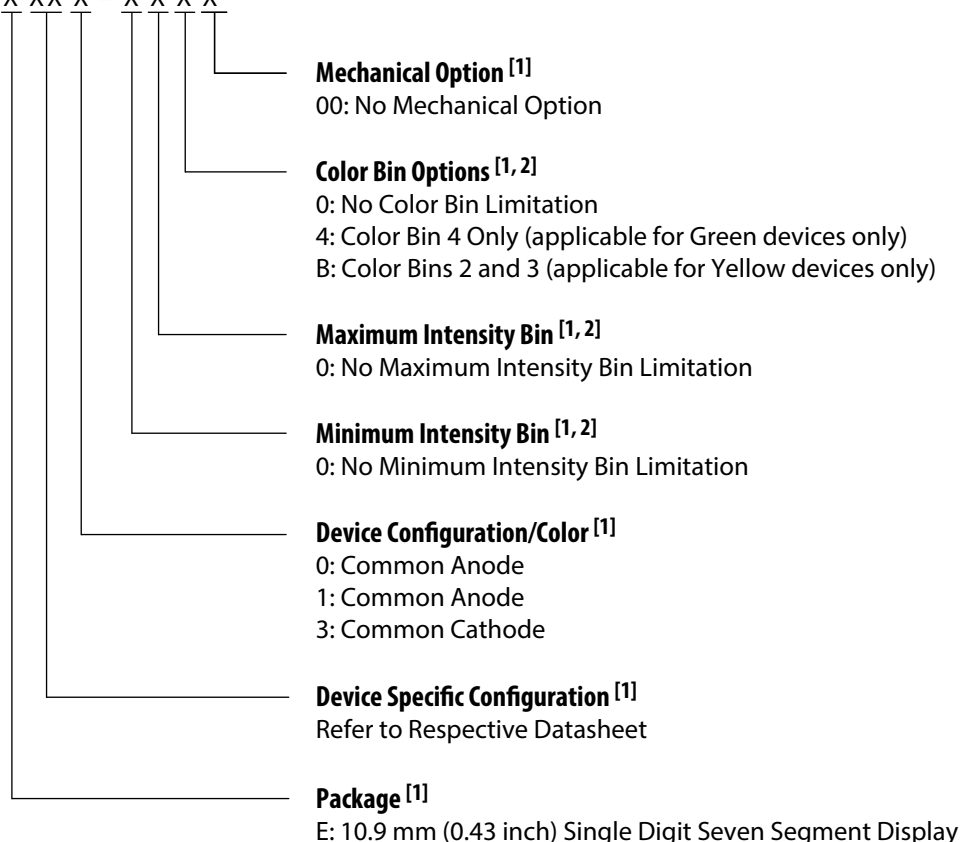
AlGaAs <sup>a</sup> Red HDSP-	HER <sup>a</sup> 5082-	Yellow 5082-	Green HDSP-	Description	Package Drawing
	7610	7620	3600	7.6 mm Common Anode Left Hand Decimal	A
	7611	7621	3601	7.6 mm Common Anode Right Hand Decimal	B
	7613	7623	3603	7.6 mm Common Cathode Right Hand Decimal	C
	7650		4600	10.9 mm Common Anode Left Hand Decimal	E
E151	7651	7661	4601	10.9 mm Common Anode Right Hand Decimal	F
E153	7653	7663	4603	10.9 mm Common Cathode Right Hand Decimal	G
	7656	7666	4606	10.9 mm Universal $\pm 1$ . Overflow Right Hand Decimal <sup>b</sup>	H

a. These displays are recommended for high ambient light operation. Refer to the HDSP-335X HER data sheet for low current operation.

b. Universal pinout brings the anode and cathode of each segment's LED out to separate pins. See internal diagram H.

## Part Number

5082 - X XX X - X X X X  
HDSP - X XX X - X X X X

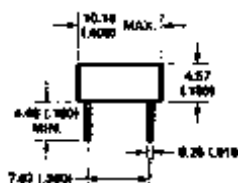
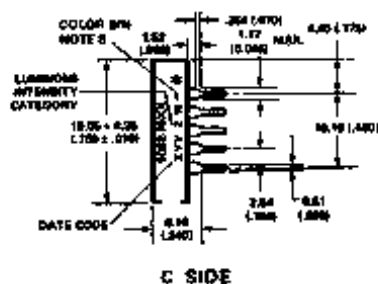


### NOTE:

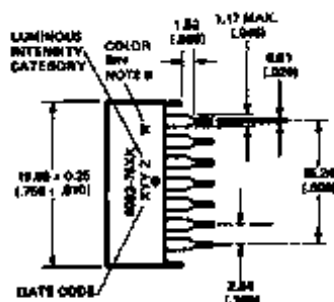
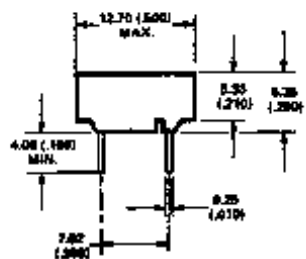
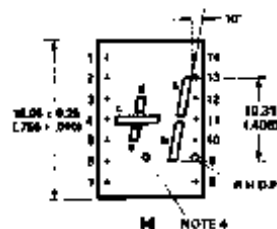
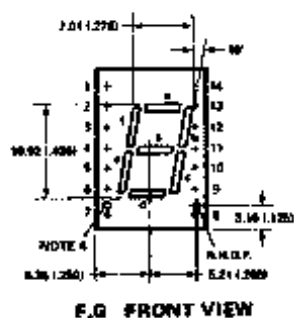
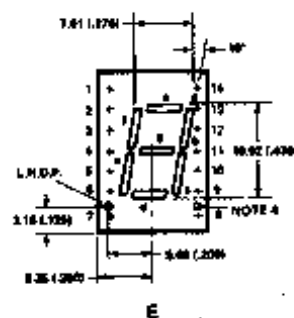
- For codes not listed in the figure above, please refer to the respective datasheet or contact your nearest Broadcom representative for details.
- Bin options refer to shippable bins for a part number. Color and Intensity Bins are typically restricted to one bin per tube (exceptions may apply). Refer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

## Package Dimensions

PIN	FUNCTION		
	A	B	C
1	CATHODE-a	CATHODE-a	NO PIN
2	CATHODE-f	CATHODE-f	CATHODE-b <sup>2</sup>
3	ANODE <sup>21</sup>	ANODE <sup>21</sup>	ANODE-f
4	NO PIN	NO PIN	ANODE-g
5	NO PIN	NO PIN	ANODE-e
6	CATHODE-d <sup>2</sup>	NO DOWN <sup>21</sup>	ANODE-d
7	CATHODE-e	CATHODE-e	NO PIN
8	CATHODE-f	CATHODE-g	NO PIN
9	NO DOWN <sup>21</sup>	CATHODE-d <sup>2</sup>	CATHODE <sup>21</sup>
10	CATHODE-o	CATHODE-c	ANODE-d <sup>2</sup>
11	CATHODE-n	CATHODE-g	ANODE-e
12	NO PIN	NO PIN	ANODE-b
13	CATHODE-b	CATHODE-b	ANODE-a
14	ANODE <sup>21</sup>	ANODE <sup>21</sup>	NO PIN

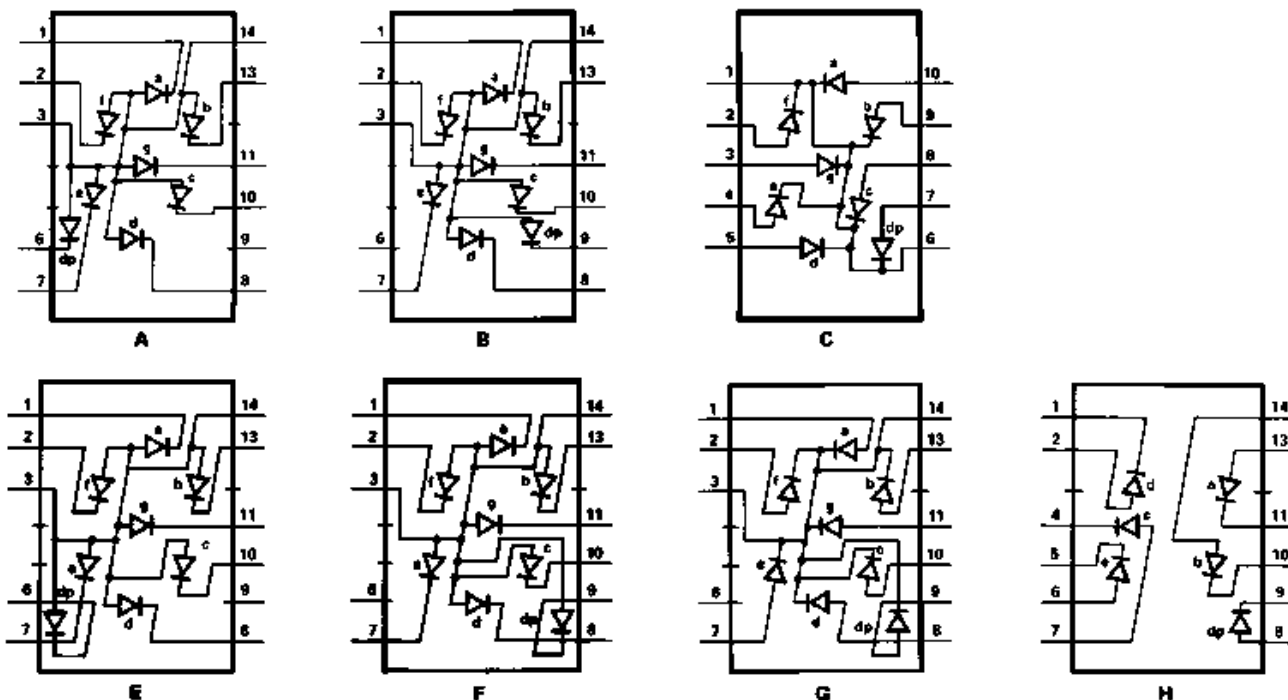


- NOTES:**
- 1. DIMENSIONS IN MILLIMETRES AND (INCHES).**
  - 2. ALL UNTOLERANCED DIMENSIONS ARE FOR REFERENCE ONLY.**
  - 3. REDUNDANT ANODES.**
  - 4. UNUSED DP POSITION.**
  - 5. SEE INTERNAL CIRCUIT DIAGRAM.**
  - 6. REDUNDANT CATHODE.**
  - 7. SEE PART NUMBER TABLE FOR L.H.D.P. AND R.H.D.P. DESIGNATION.**
  - 8. FOR YELLOW AND GREEN DEVICES ONLY.**



PIN	FUNCTION			
	E	F	G	H
1	CATHODE- $\phi$	CATHODE- $\phi$	ANODE- $\phi$	CATHODE- $\phi$
2	CATHODE-1	CATHODE-1	ANODE-1	ANODE-1
3	ANODE <sup>21</sup>	ANODE <sup>21</sup>	CATHODE <sup>11</sup>	NO PIN
4	NO PIN	NO PIN	NO PIN	CATHODE-c
5	NO PIN	NO PIN	NO PIN	CATHODE- $\phi$
6	CATHODE- $\phi$	NO COM <sup>14</sup>	NO COM <sup>14</sup>	ANODE- $\phi$
7	CATHODE- $\phi$	CATHODE- $\phi$	ANODE- $\phi$	ANODE-c
8	CATHODE- $\phi$	CATHODE- $\phi$	ANODE- $\phi$	ANODE- $\phi$
9	NO COM <sup>14</sup>	CATHODE- $\phi$	ANODE- $\phi$	CATHODE- $\phi$
10	CATHODE-c	CATHODE-c	ANODE-c	CATHODE- $\phi$
11	CATHODE-g	CATHODE-g	ANODE-g	CATHODE- $\phi$
12	NO PIN	NO PIN	NO PIN	NO PIN
13	CATHODE- $\phi$	CATHODE-b	ANODE- $\phi$	ANODE- $\phi$
14	ANODE <sup>21</sup>	ANODE <sup>21</sup>	CATHODE <sup>11</sup>	ANODE- $\phi$

## Internal Circuit Diagram



## Absolute Maximum Ratings

Description	AlGaAs Red HDSP-E150 Series	HER 5082- 7610/7650 Series	Yellow 5082- 7620/7660 Series	Green HDSP- 3600/4600 Series	Units
Average Power per Segment or DP	96	105	80	105	mW
Peak Forward Current per Segment or DP	160 <sup>a</sup>	90 <sup>b</sup>	60 <sup>c</sup>	90 <sup>d</sup>	mA
DC Forward Current per Segment or DP	40 <sup>e</sup>	30 <sup>f</sup>	20 <sup>g</sup>	30 <sup>h</sup>	mA
Operating Temperature Range	−20 to +100 <sup>i</sup>	−40 to +100			°C
Storage Temperature Range	−55 to +100				°C
Reverse Voltage <sup>j</sup> per Segment or DP	3.0V				V
Wave Soldering Temperature for 3s (1.59 mm [0.063 in.] below Body)	250				°C

- a. See Figure 1 to establish pulsed conditions.
- b. See Figure 6 to establish pulsed conditions.
- c. See Figure 7 to establish pulsed conditions.
- d. See Figure 8 to establish pulsed conditions.
- e. Derate above 46°C at 0.54 mA/°C.
- f. Derate above 53°C at 0.45 mA/°C.
- g. Derate above 81°C at 0.52 mA/°C.
- h. Derate above 39°C at 0.37 mA/°C.
- i. For operation below -20°C, contact your local Broadcom components sales office or an authorized distributor.
- j. Reverse voltage is for LED testing purposes and is not recommended to be used as application condition.

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

### AlGaAs Red

Device Series	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
HDSP-E15x	Luminous Intensity/Segment <sup>a, b, c</sup> (Digit Average)	$I_V$	8.5	15.0	—	mcd	$I_F = 20\text{ mA}$
	Forward Voltage/Segment or DP	$V_F$	—	1.8	—	V	$I_F = 20\text{ mA}$
			—	2.0	3.0	V	$I_F = 100\text{ mA}$
	Peak Wavelength	$\lambda_{\text{PEAK}}$	—	645	—	nm	
	Dominant Wavelength <sup>d</sup>	$\lambda_d$	—	637	—	nm	
	Reverse Voltage/Segment or DP <sup>e</sup>	$V_R$	3.0	15	—	V	$I_R = 100\text{ }\mu\text{A}$
	Temperature Coefficient of $V_F$ /Segment or DP	$\Delta V_F/^\circ\text{C}$	—	–2	—	mV/°C	
	Thermal Resistance LED Junction-to-Pin	$R\theta_{\text{J-PIN}}$	—	340	—	°C/W/Seg	

- a. Device case temperature is  $25^\circ\text{C}$  prior to the intensity measurement.
- b. The digits are categorized for luminous intensity. The intensity category is designated by a letter on the side of the package.
- c. For low current operation, the AlGaAs HDSP-E10X series displays are recommended. They are tested at 1 mA dc/segment and are pin for pin compatible with the HDSP-E15X series.
- d. The dominant wavelength,  $\lambda_d$ , is derived from the CIE chromaticity diagram and is that single wavelength which defines the color of the device.
- e. Typical specification for reference only. Do not exceed absolute maximum ratings.

### High Efficiency Red

Device Series	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
5082-761x	Luminous Intensity/Segment <sup>a, b, c</sup> (Digit Average)	$I_V$	340	800	—	$\mu\text{cd}$	$I_F = 5\text{ mA}$
5082-765x			340	1115	—	$\mu\text{cd}$	$I_F = 5\text{ mA}$
All	Forward Voltage/Segment or DP	$V_F$	—	2.1	2.5	V	$I_F = 20\text{ mA}$
	Peak Wavelength	$\lambda_{\text{PEAK}}$	—	635	—	nm	
	Dominant Wavelength <sup>d</sup>	$\lambda_d$	—	626	—	nm	
	Reverse Voltage/Segment or DP <sup>e</sup>	$V_R$	3.0	30	—	V	$I_R = 100\text{ }\mu\text{A}$
	Temperature Coefficient of $V_F$ /Segment or DP	$\Delta V_F/^\circ\text{C}$	—	–2	—	mV/°C	
	Thermal Resistance LED Junction-to-Pin	$R\theta_{\text{J-PIN}}$	—	280	—	°C/W/Seg	

- a. Device case temperature is  $25^\circ\text{C}$  prior to the intensity measurement.
- b. The digits are categorized for luminous intensity. The intensity category is designated by a letter on the side of the package.
- c. For low current operation, the HER HDSP-335X series displays are recommended. They are tested at 2 mA dc/segment and are pin for pin compatible with the 5082-7650 series.
- d. The dominant wavelength,  $\lambda_d$ , is derived from the CIE chromaticity diagram and is that single wavelength which defines the color of the device.
- e. Typical specification for reference only. Do not exceed absolute maximum ratings.

## Yellow

Device Series	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
5082-762x	Luminous Intensity/Segment <sup>a, b</sup> (Digit Average)	$I_V$	205	620	—	$\mu\text{cd}$	$I_F = 5 \text{ mA}$
5082-766x			290	835	—	$\mu\text{cd}$	$I_F = 5 \text{ mA}$
All	Forward Voltage/Segment or DP	$V_F$	—	2.2	2.5	V	$I_F = 20 \text{ mA}$
	Peak Wavelength	$\lambda_{\text{PEAK}}$	—	583	—	nm	
	Dominant Wavelength <sup>c, d</sup>	$\lambda_d$	581.5	586	592.5	nm	
	Reverse Voltage/Segment or DP <sup>e</sup>	$V_R$	3.0	40	—	V	$I_R = 100 \mu\text{A}$
	Temperature Coefficient of $V_F$ /Segment or DP	$\Delta V_F/^\circ\text{C}$	—	–2	—	mV/ $^\circ\text{C}$	
	Thermal Resistance LED Junction-to-Pin	$R\theta_{\text{J-PIN}}$	—	280	—	$^\circ\text{C/W/Seg}$	

- Device case temperature is 25°C prior to the intensity measurement.
- The digits are categorized for luminous intensity. The intensity category is designated by a letter on the side of the package.
- The dominant wavelength,  $\lambda_d$ , is derived from the CIE chromaticity diagram and is that single wavelength which defines the color of the device.
- The Yellow (5082-7620/7660) and Green (HDSP-3600/4600) displays are categorized for dominant wavelength. The category is designated by a number adjacent to the luminous intensity category letter.
- Typical specification for reference only. Do not exceed absolute maximum ratings.

## High Performance Green

Device Series	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
HDSP-360x	Luminous Intensity/Segment <sup>a, b</sup> (Digit Average)	$I_V$	860	2700	—	$\mu\text{cd}$	$I_F = 10 \text{ mA}$
HDSP-460x			1030	4000	—	$\mu\text{cd}$	$I_F = 10 \text{ mA}$
All	Forward Voltage/Segment or DP	$V_F$	—	2.1	2.5	V	$I_F = 10 \text{ mA}$
	Peak Wavelength	$\lambda_{\text{PEAK}}$	—	566	—	nm	
	Dominant Wavelength <sup>c, d</sup>	$\lambda_d$	—	571	577	nm	
	Reverse Voltage/Segment or DP <sup>e</sup>	$V_R$	3.0	50	—	V	$I_R = 100 \mu\text{A}$
	Temperature Coefficient of $V_F$ /Segment or DP	$\Delta V_F/^\circ\text{C}$	—	–2	—	mV/ $^\circ\text{C}$	
	Thermal Resistance LED Junction-to-Pin	$R\theta_{\text{J-PIN}}$	—	280	—	$^\circ\text{C/W/Seg}$	

- Device case temperature is 25°C prior to the intensity measurement.
- The digits are categorized for luminous intensity. The intensity category is designated by a letter on the side of the package.
- The dominant wavelength,  $\lambda_d$ , is derived from the CIE chromaticity diagram and is that single wavelength which defines the color of the device.
- The Yellow (5082-7620/7660) and Green (HDSP-3600/4600) displays are categorized for dominant wavelength. The category is designated by a number adjacent to the luminous intensity category letter.
- Typical specification for reference only. Do not exceed absolute maximum ratings.

AlGaAs Red

Figure 1: Maximum Allowed Peak Current vs. Pulse Duration – AlGaAs Red

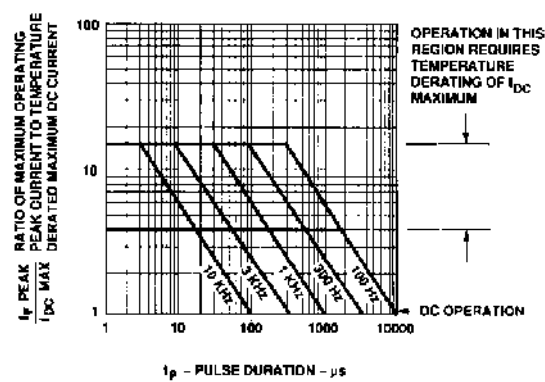


Figure 2: Maximum Allowable DC Current vs. Ambient Temperature

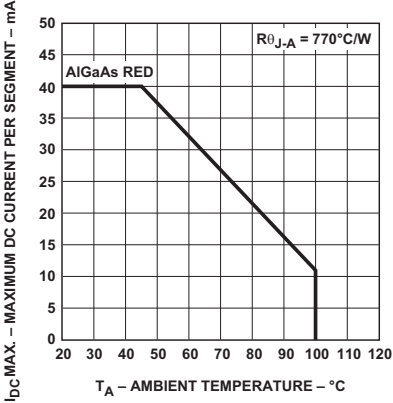


Figure 3: Forward Current vs. Forward Voltage

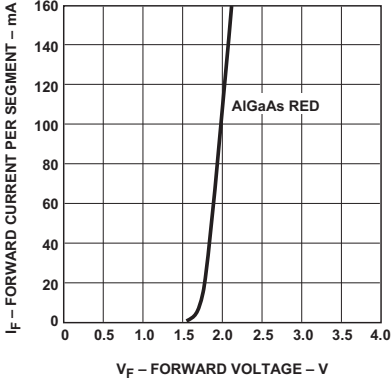


Figure 4: Relative Luminous Intensity vs. DC Forward Current

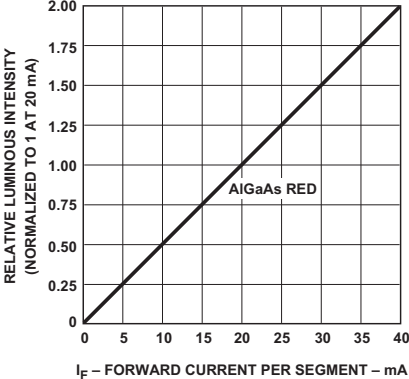
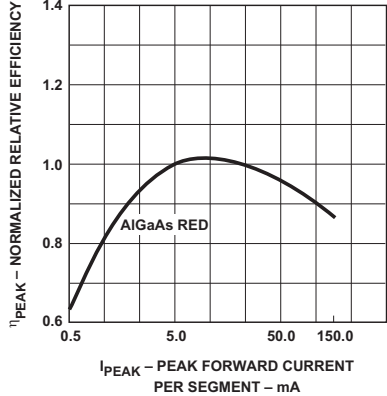


Figure 5: Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak Current



## HER, Yellow, Green

Figure 6: Maximum Tolerable Peak Current vs. Pulse Duration – HER Series

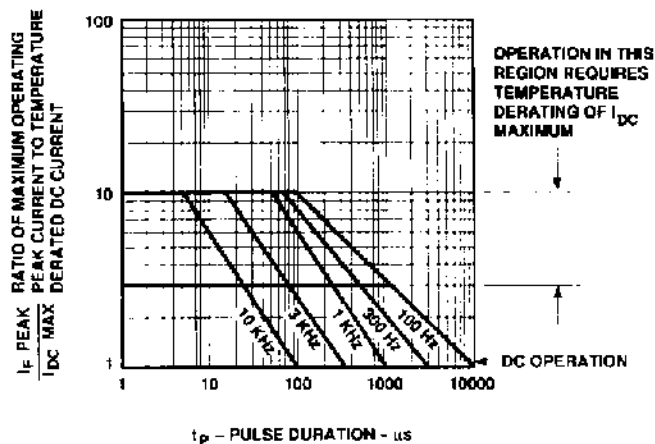


Figure 7: Maximum Tolerable Peak Current vs. Pulse Duration – Yellow Series

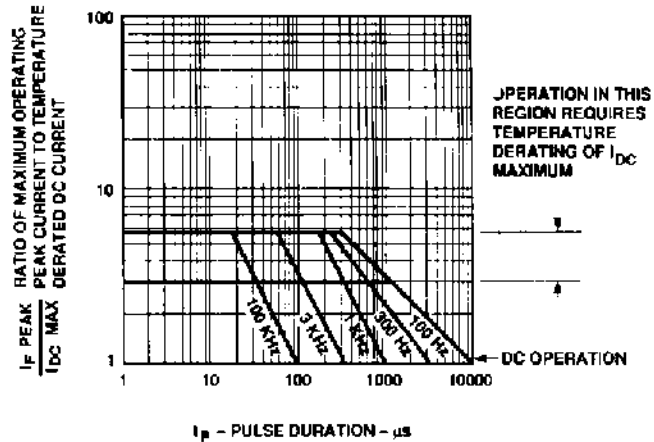


Figure 8: Allowable Peak Current vs. Pulse Duration – Green Series

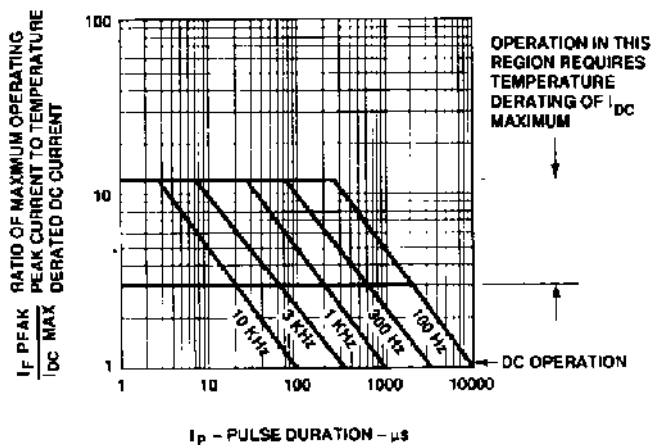


Figure 9: Maximum Allowable DC Current vs. Ambient Temperature

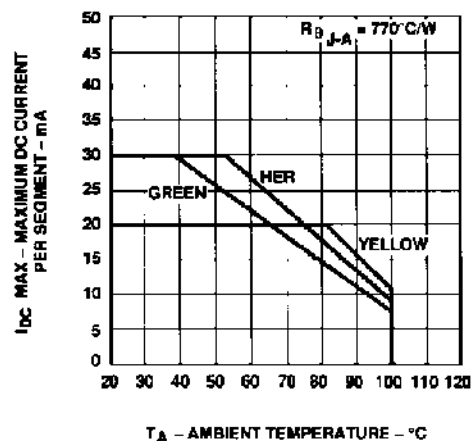




Figure 10: Forward Current vs. Forward Voltage

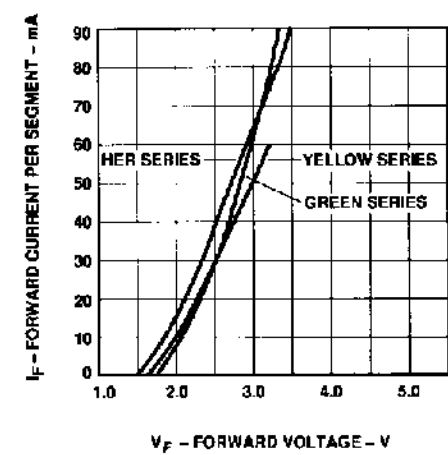


Figure 11: Relative Luminous Intensity vs. DC Forward Current

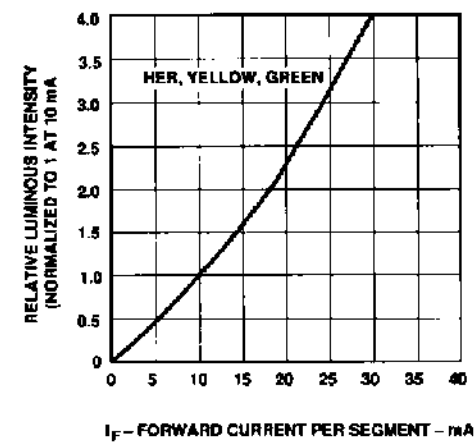
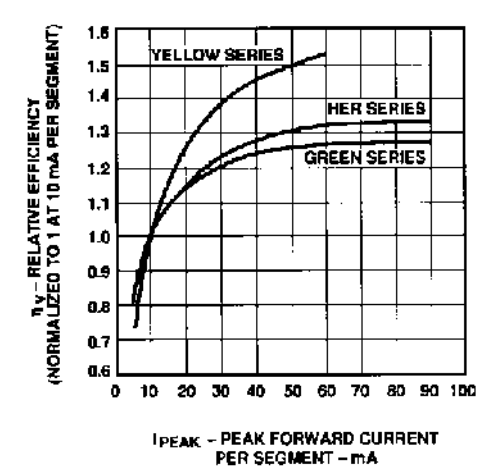


Figure 12: Relative Luminous Efficiency (Luminous Intensity per Unit Current) vs. Peak Current



## Intensity Bin Limits (mcd)

### AlGaAs Red

HDSP-E15x		
IV Bin Category	Min.	Max.
L	8.67	15.90
M	13.00	23.80
N	19.50	35.80
O	29.30	53.60
P	43.90	80.50

### HER

5082-761x		
IV Bin Category	Min.	Max.
B	0.369	0.630
C	0.516	0.946
D	0.774	1.418
E	1.160	2.127
F	1.740	3.190
G	2.610	4.785
H	3.915	7.177

5082-765x		
IV Bin Category	Min.	Max.
B	0.347	0.593
C	0.485	0.890
D	0.728	1.333
E	1.091	2.000
F	1.636	3.000
G	2.454	4.500
H	3.682	6.751

### Yellow

5082-762x		
IV Bin Category	Min.	Max.
B	0.229	0.387
C	0.317	0.582
D	0.476	0.872
E	0.714	1.311
F	1.073	1.967
G	1.609	2.950
H	2.413	4.425

5082-766x		
IV Bin Category	Min.	Max.
C	0.297	0.543
D	0.445	0.817
E	0.669	1.225
F	1.003	1.838
G	1.504	2.758
H	2.256	4.137

## Green

HDSP-360x		
IV Bin Category	Min.	Max.
H	0.86	1.58
I	1.29	2.37
J	1.94	3.55
K	2.90	5.33
L	4.37	8.01

HDSP-460x		
IV Bin Category	Min.	Max.
G	1.03	1.88
H	1.54	2.82
I	2.31	4.23
J	3.46	6.34
K	5.18	9.50
L	7.78	14.26

## Color Categories

Color	Bin	Dominant Wavelength (nm)	
		Min.	Max.
Yellow	1	581.50	585.00
	3	584.00	587.50
	2	586.50	590.00
	4	589.00	592.50
Green	2	573.00	577.00
	3	570.00	574.00
	4	567.00	571.00
	5	564.00	568.00

**NOTE:** All categories are established for classification of products. Products may not be available in all categories. Please contact your Broadcom representatives for further clarification/information.

## Contrast Enhancement

For information on contrast enhancement, refer to Application Note 1015.

## Soldering and Cleaning

For information on soldering LEDs, refer to Application Note 1027.

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