# Agilent HDSP-511x/513x 14.22 mm (0.56 inch) General Purpose Seven-Segment Display

Data Sheet



## Description

This 14.22 mm (0.56 inch) 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 gray face displays are suitable for indoor use.

## Features

- **Industry standard size**
- **Industry standard pinout**
  14.22 mm (0.56 inch)
  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° viewing angle
- **Design flexibility**
  Common anode or common cathode
  Single digit
  Left and right hand decimal point
- **Categorized for luminous intensity**
  Green and yellow categorized for color

## Applications

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

**Notes:**

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

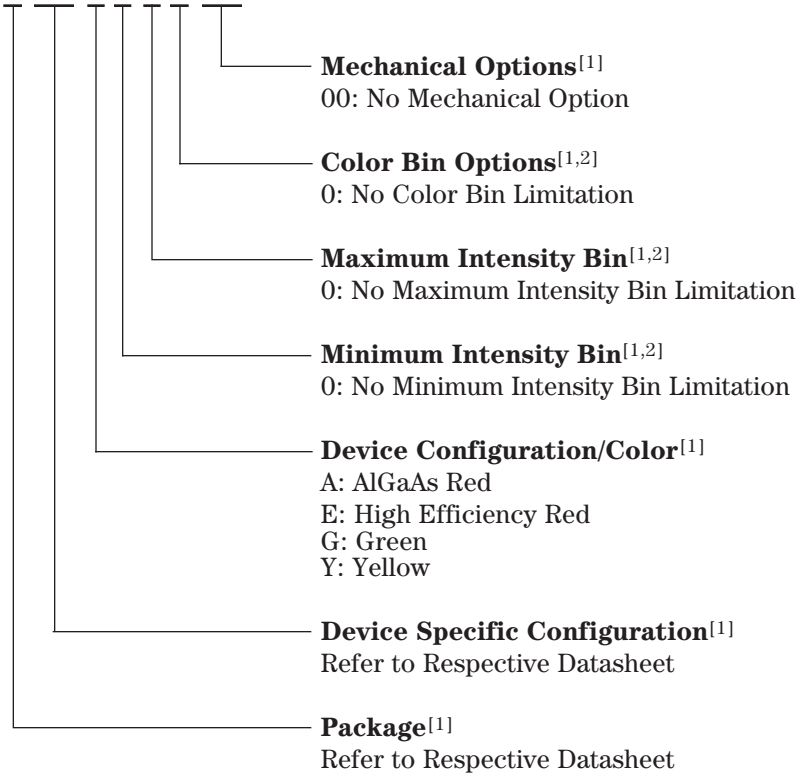
## Devices

| HER | Green | AlGaAs Red | Yellow | Description |
|---|---|---|---|---|
| HDSP-511E | HDSP-511G | HDSP-511A | HDSP-511Y | Common Anode, Right Hand Decimal |
| HDSP-513E | HDSP-513G | HDSP-513A | HDSP-513Y | Common Cathode, Right Hand Decimal |

## Part Numbering System

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

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



**Mechanical Options**[1]
00: No Mechanical Option

**Color Bin Options**[1,2]
0: No Color Bin Limitation

**Maximum Intensity Bin**[1,2]
0: No Maximum Intensity Bin Limitation

**Minimum Intensity Bin**[1,2]
0: No Minimum Intensity Bin Limitation

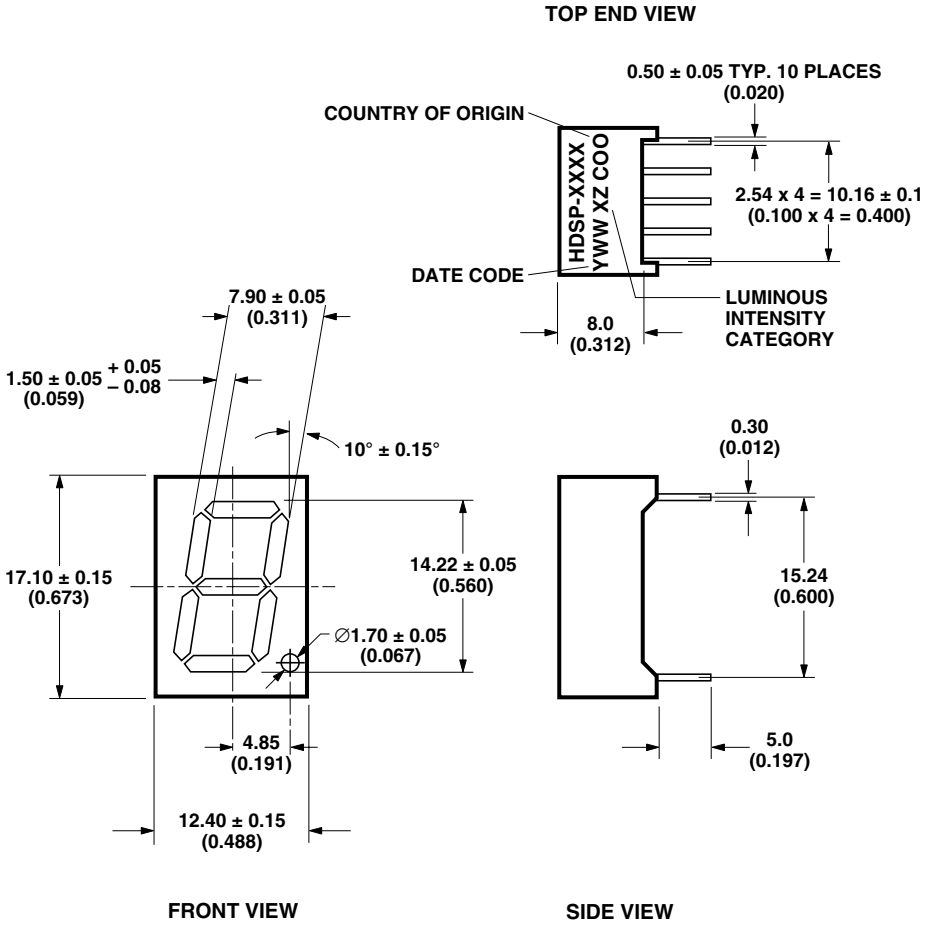
**Device Configuration/Color**[1]
A: AlGaAs Red
E: High Efficiency Red
G: Green
Y: Yellow

**Device Specific Configuration**[1]
Refer to Respective Datasheet

**Package**[1]
Refer to Respective Datasheet

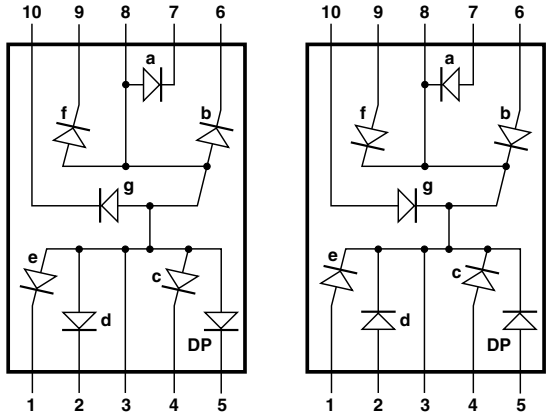
**Notes:**
1. For codes not listed in the figure above, please refer to the respective datasheet or contact your nearest Agilent representative for details.
2. Bin options refer to shippable bins for a part number. Color and Intensity Bins are typically restricted to 1 bin per tube (exceptions may apply).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

## Package Dimensions




ALL DIMENSIONS ARE IN MILLIMETERS (INCHES).

## Internal Circuit Diagram




| HDSP-511E/511G/511Y/511A | | HDSP-513E/513G/513Y/513A | |
|---|---|---|---|
| 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[1] | 25[2] | 15[3] | 20[4] | 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 |

**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 $T_A$ = 25°C**
**High Efficiency Red (HER)**

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

**Green**

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

**AlGaAs Red**

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

**Yellow**

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

**Intensity Bin Limits (mcd at 10 mA)**

| Bin | HER/Green | | Yellow | | AlGaAs Red | |
|---|---|---|---|---|---|---|
| Name | Min.[1] | Max.[1] | Min.[1] | Max.[1] | Min.[1] | Max.[1] |
| H | NA | NA | 1.251 | 2.000 | NA | NA |
| I | 2.001 | 3.200 | 2.001 | 3.200 | NA | NA |
| J | 3.201 | 5.050 | 3.201 | 5.050 | 3.201 | 5.050 |
| K | 5.051 | 8.000 | NA | NA | 5.051 | 8.000 |
| L | NA | NA | NA | NA | 8.001 | 12.650 |

**Note:**
1. Tolerance for each bin limit is ± 10%.

**Color Bin Limits (nm at 10 mA)**

| | | Dominant Wavelength (nm) | |
|---|---|---|---|
| Color | Bin | Min.[1] | Max.[1] |
| 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)

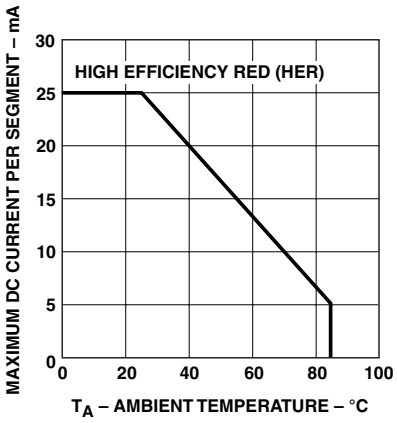



**Figure 1. Maximum allowable average or DC current vs. ambient temperature.**

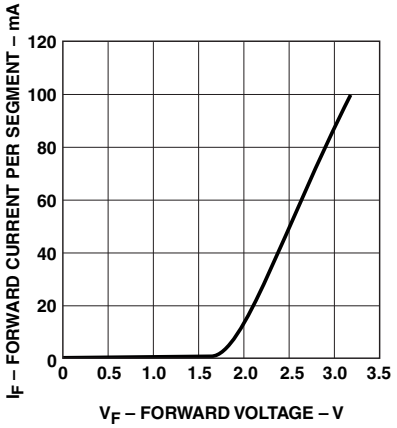



**Figure 2. Forward current vs. forward voltage.**

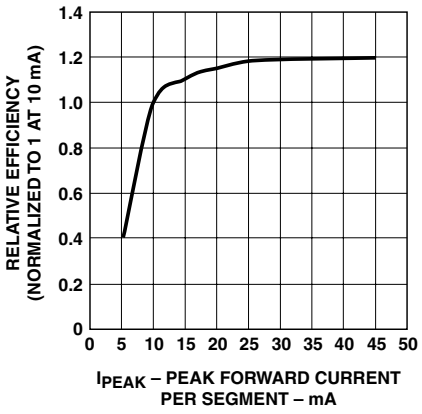



**Figure 3. Relative luminous intensity vs. DC forward current.**

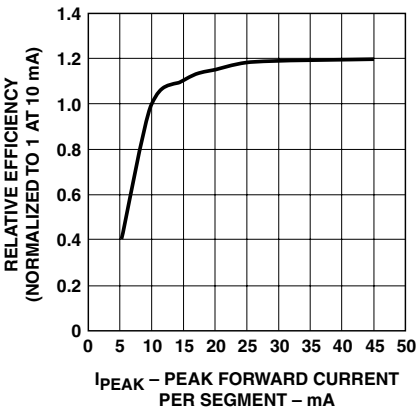



**Figure 4. Relative efficiency (luminous intensity per unit current) vs. peak current.**

## Green

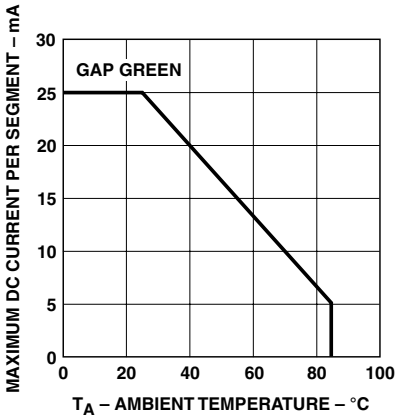



Figure 5. Maximum allowable average or DC current vs. ambient temperature.

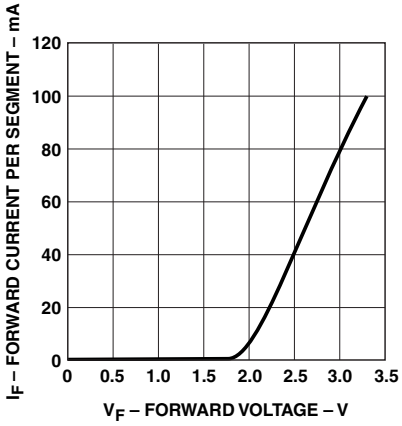



Figure 6. Forward current vs. forward voltage.

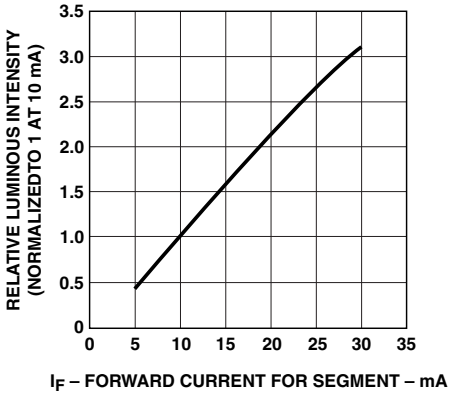



Figure 7. Relative luminous intensity vs. DC forward current.

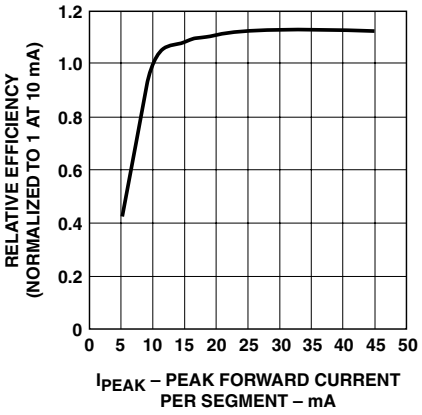



Figure 8. Relative efficiency (luminous intensity per unit current) vs. peak current.

## AlGaAs Red

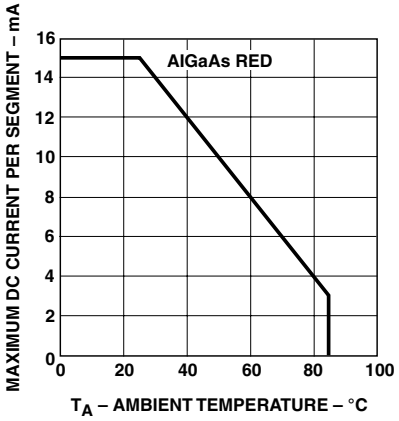



Figure 9. Maximum allowable average or DC current vs. ambient temperature.

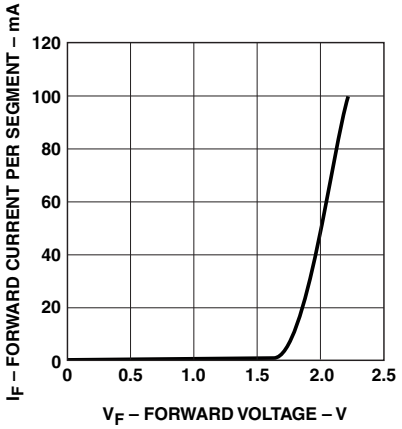



Figure 10. Forward current vs. forward voltage.

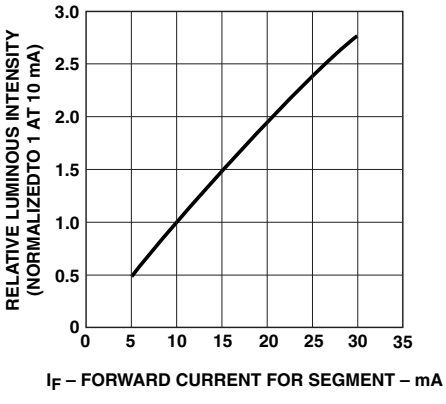



Figure 11. Relative luminous intensity vs. DC forward current.

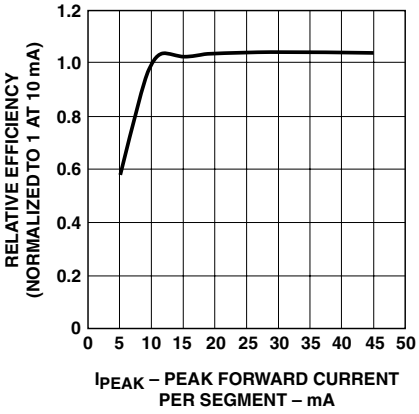



Figure 12. Relative efficiency (luminous intensity per unit current) vs. peak current.

## Yellow

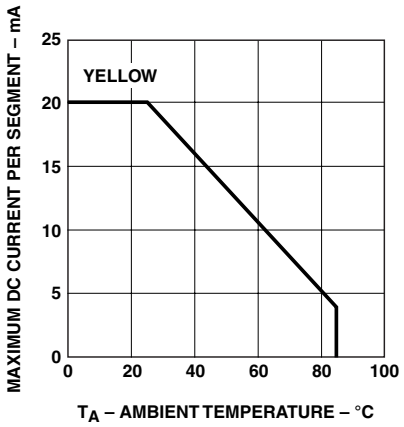



**Figure 13. Maximum allowable average or DC current vs. ambient temperature.**

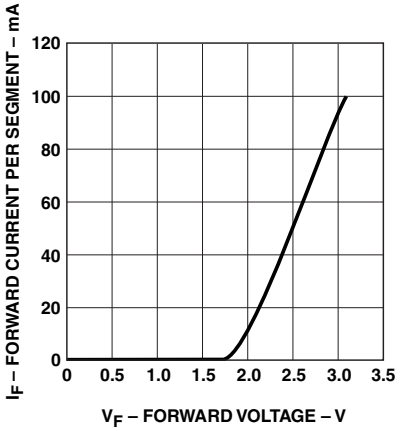



**Figure 14. Forward current vs. forward voltage.**

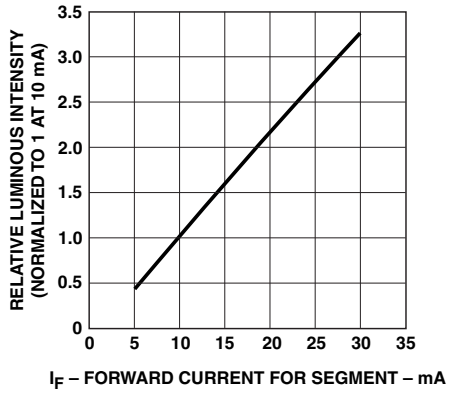



**Figure 15. Relative luminous intensity vs. DC forward current.**

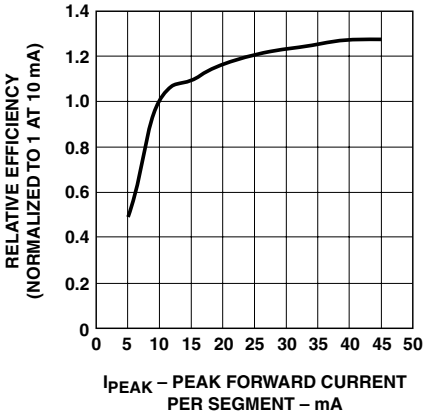



**Figure 16. Relative efficiency (luminous intensity per unit current) vs. peak current.**

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Data subject to change.

Obsoletes 5980-2919EN
June 30, 2004
5988-2968EN



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