



# 20 mm (0.8 inch) General Purpose Seven Segment Displays

## Technical Data

**HDSP-815E**  
**HDSP-816E**  
**HDSP-815G**  
**HDSP-816G**

### Features

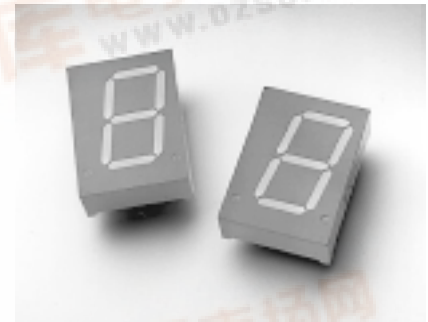
- **Industry Standard Size**
- **Industry Standard Pin-Out**  
15.24 mm (0.6 in.) DIP Leads  
on 2.54 mm (0.1 in.) Centers
- **Choice of Colors**  
Red, Green
- **Mitered Font**  
Mitered Corners on Segments
- **Gray Face Paint**  
Gray Package Gives Optimum  
Contrast
- **± 50° Viewing Angle**
- **Design Flexibility**  
Common Anode or Common  
Cathode
- **Categorized for Luminous  
Intensity**

### Applications

- **Suitable for Indoor Use**
- **Not Recommended for  
Industrial Applications, i.e.  
Operating Temperatures  
Requirements Exceeding  
85°C or Below -25°C<sup>[1]</sup>**
- **Extreme Temperature  
Cycling Not  
Recommended<sup>[2]</sup>**

### Description

These 20 mm (0.8 inch) displays use industry standard size and pin-out. The devices are available as either common anode or common cathode. Available in either red or green colors, these gray-faced displays are suitable for indoor use.



No color binning is offered for these parts.

These parts are subjected to Outgoing Quality Assurance (OQA) inspection with AQL of 0.065% for functional and visual/cosmetic rejects.

### Devices

| HER HDSP- | Green HDSP- | Description                       |
|-----------|-------------|-----------------------------------|
| 815E      | 815G        | Common Anode Right Hand Decimal   |
| 816E      | 816G        | Common Cathode Right Hand Decimal |

#### Notes:

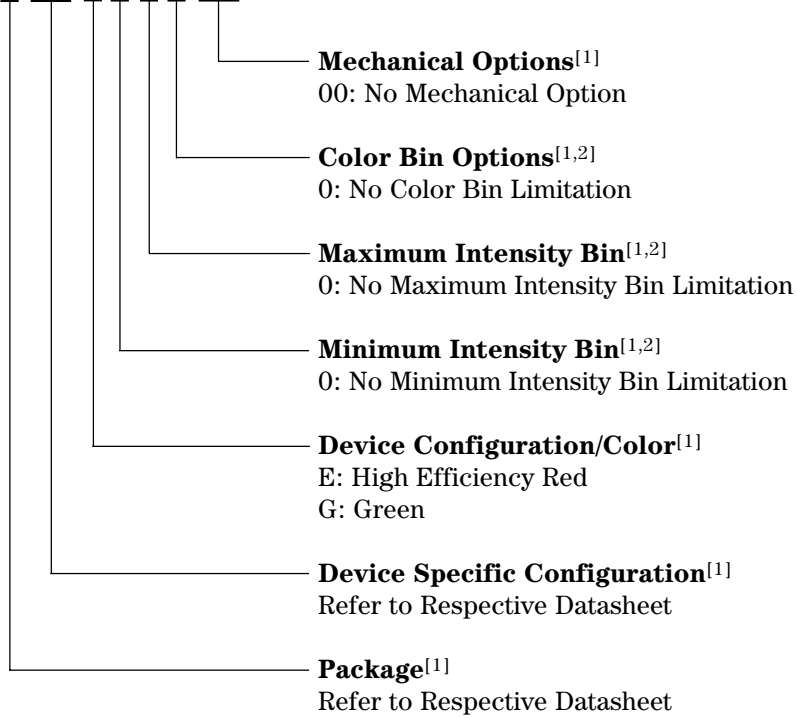
1. For industrial applications, it is recommended to use HDSP-3901/3903/8601/8603.
2. For details, please contact your local Agilent Technologies sales office or an authorized distributor.



## Part Numbering System

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

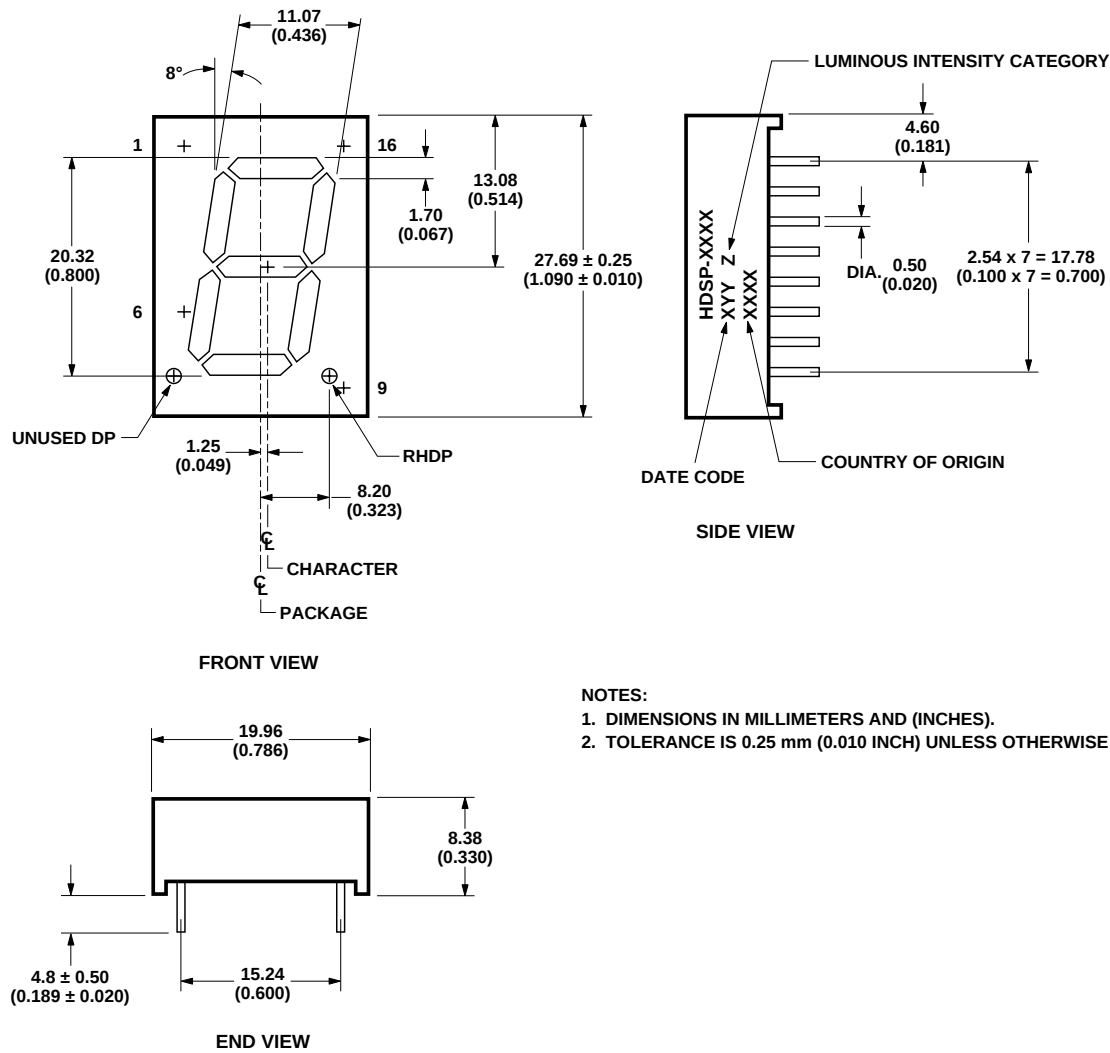
HDSP-X X X X-X X X X X



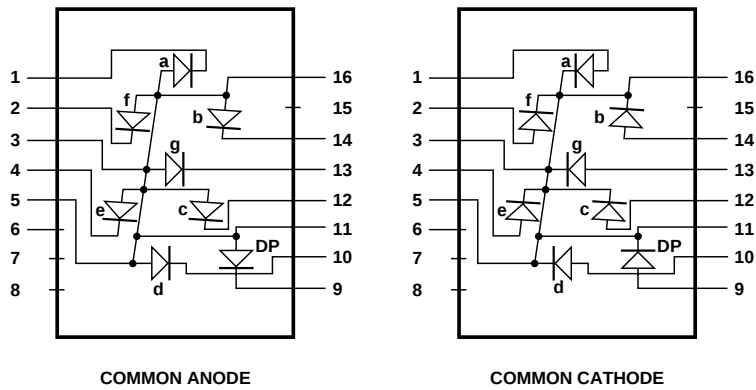
### Notes:

- For codes not listed in the figure above, please refer to the respective datasheet or contact your nearest Agilent representative for details.
- 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



## Internal Circuit Diagram



| COMMON ANODE |               | COMMON CATHODE |                |
|--------------|---------------|----------------|----------------|
| PIN          | FUNCTION      | PIN            | FUNCTION       |
| 1            | CATHODE A     | 1              | ANODE A        |
| 2            | CATHODE F     | 2              | ANODE F        |
| 3            | COMMON ANODE  | 3              | COMMON CATHODE |
| 4            | CATHODE E     | 4              | ANODE E        |
| 5            | COMMON ANODE  | 5              | COMMON CATHODE |
| 6            | NO CONNECTION | 6              | NO CONNECTION  |
| 7            | NO PIN        | 7              | NO PIN         |
| 8            | NO PIN        | 8              | NO PIN         |
| 9            | CATHODE RHDP  | 9              | ANODE RHDP     |
| 10           | CATHODE D     | 10             | ANODE D        |
| 11           | COMMON ANODE  | 11             | COMMON CATHODE |
| 12           | CATHODE C     | 12             | ANODE C        |
| 13           | CATHODE G     | 13             | ANODE G        |
| 14           | CATHODE B     | 14             | ANODE B        |
| 15           | NO PIN        | 15             | NO PIN         |
| 16           | COMMON ANODE  | 16             | COMMON CATHODE |

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

| Parameter                                                                                  | High Efficiency Red<br>HDSP-815E<br>HDSP-816E | Green<br>HDSP-815G<br>HDSP-816G | Units |
|--------------------------------------------------------------------------------------------|-----------------------------------------------|---------------------------------|-------|
| Average Power per Segment or DP                                                            | 62.5                                          | 65                              | MW    |
| Peak Forward Current per Segment or DP<br>(1/10 Duty Cycle, 0.1 ms Pulse Width)            | 100                                           | 90                              | mA    |
| DC Forward Current per Segment or DP <sup>[1]</sup>                                        | 25                                            | 25                              | mA    |
| Reverse Voltage per Segment or DP                                                          | 3                                             | 3                               | V     |
| Operating Temperature                                                                      | -25 to +85                                    | -25 to +85                      | °C    |
| Storage Temperature                                                                        | -25 to +85                                    | -25 to +85                      | °C    |
| Wave Soldering Temperature for 3 Seconds <sup>[2]</sup><br>(1.6 mm [0.063 in.] below Body) | 250                                           | 250                             | °C    |

**Notes:**

- Derate above 25°C at 0.33 mA/°C.
- Not recommended to be soldered more than 2 times. Minimum interval between solderings is 15 minutes. Total soldering time not to exceed 5 seconds.

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

| Devices<br>HDSP- | Parameter                                                        | Symbol              | Min. | Typ. | Max. | Units | Test<br>Conditions      |
|------------------|------------------------------------------------------------------|---------------------|------|------|------|-------|-------------------------|
| 815E<br>816E     | Luminous Intensity/Segment<br>(Segment Average) <sup>[1,2]</sup> | I <sub>v</sub>      | 2.3  | 4.8  |      | mcd   | I <sub>F</sub> = 20 mA  |
|                  | Forward Voltage/Segment or DP                                    | V <sub>F</sub>      |      | 2.1  | 3.0  | V     | I <sub>F</sub> = 20 mA  |
|                  | Peak Wavelength                                                  | λ <sub>PEAK</sub>   |      | 635  |      | nm    |                         |
|                  | Dominant Wavelength <sup>[3]</sup>                               | λ <sub>d</sub>      |      | 626  |      | nm    |                         |
|                  | Reverse Voltage/Segment or DP <sup>[4]</sup>                     | V <sub>R</sub>      | 3.0  | 25   |      | V     | I <sub>R</sub> = 100 μA |
|                  | Temperature Coefficient of<br>V <sub>F</sub> /Segment or DP      | ΔV <sub>F</sub> /°C |      | -2   |      | mV/°C |                         |

### Green

| Devices<br>HDSP- | Parameter                                                        | Symbol              | Min. | Typ. | Max. | Units | Test<br>Conditions      |
|------------------|------------------------------------------------------------------|---------------------|------|------|------|-------|-------------------------|
| 815G<br>816G     | Luminous Intensity/Segment<br>(Segment Average) <sup>[1,2]</sup> | I <sub>v</sub>      | 1.5  | 3.3  |      | mcd   | I <sub>F</sub> = 20 mA  |
|                  | Forward Voltage/Segment or DP                                    | V <sub>F</sub>      |      | 2.1  | 2.6  | V     | I <sub>F</sub> = 20 mA  |
|                  | Peak Wavelength                                                  | λ <sub>PEAK</sub>   |      | 566  |      | nm    |                         |
|                  | Dominant Wavelength <sup>[3]</sup>                               | λ <sub>d</sub>      |      | 571  |      | nm    |                         |
|                  | Reverse Voltage/Segment or DP <sup>[4]</sup>                     | V <sub>R</sub>      | 3.0  | 50   |      | V     | I <sub>R</sub> = 100 μA |
|                  | Temperature Coefficient of<br>V <sub>F</sub> /Segment or DP      | ΔV <sub>F</sub> /°C |      | -2   |      | mV/°C |                         |

**Notes:**

- Case temperature of the device immediately prior to the intensity measurement is 25°C.
- The digits are categorized for luminous intensity. The intensity category is designated by a letter on the side of the package.
- The dominant wavelength, λ<sub>d</sub>, is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.
- Typical specification for reference only. Do not exceed absolute maximum ratings.

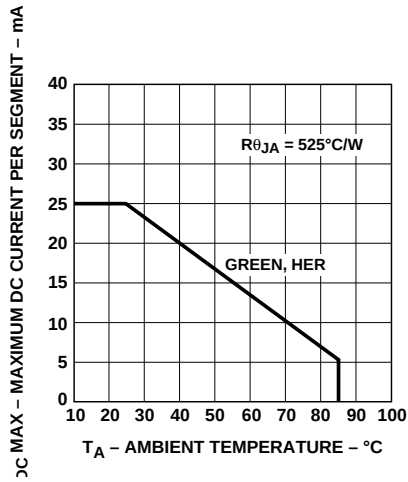


Figure 1. Maximum Allowable DC Current vs. Ambient Temperature.

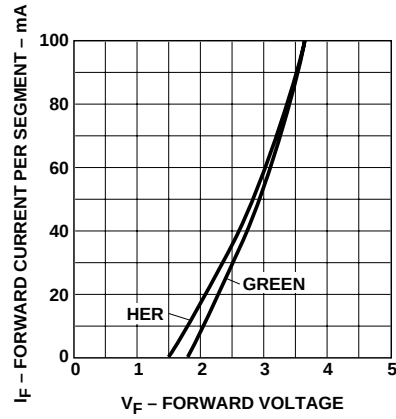


Figure 2. Forward Current vs. Forward Voltage.

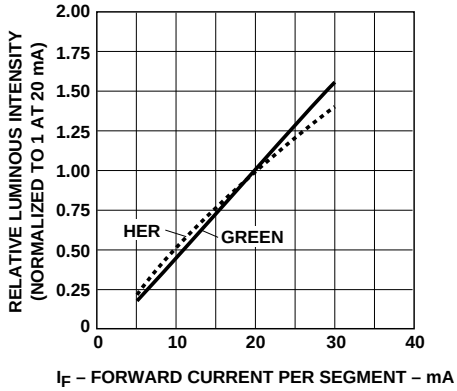


Figure 3. Relative Luminous Intensity vs. DC Forward Current.

## Intensity Bin Limits (mcd at 20 mA)

### HER/Green

| Bin Name | Green               |                     | HER                 |                     |
|----------|---------------------|---------------------|---------------------|---------------------|
|          | Min. <sup>[1]</sup> | Max. <sup>[1]</sup> | Min. <sup>[1]</sup> | Max. <sup>[1]</sup> |
| N        | NA                  | NA                  | 5.31                | 7.57                |
| P        | 7.57                | 10.78               | 7.57                | 10.78               |
| Q        | 10.78               | 15.10               | 10.78               | 15.10               |
| R        | 15.10               | 21.58               | NA                  | NA                  |

## Color Categories

| Color | Bin | Dominant Wavelength (nm) |        |
|-------|-----|--------------------------|--------|
|       |     | Min.                     | Max.   |
| Green | 1   | 569.00                   | 572.00 |
|       | 2   | 572.00                   | 575.00 |

### Note:

- All categories are established for classification of products. Products may not be available in all categories. Please contact your Agilent representative for further clarification/information.

**Contrast Enhancement**

For information on contrast enhancement, please see Application Note 1015.

**Soldering/Cleaning**

Cleaning agents from the ketone family (acetone, methyl ethyl ketone, etc.) and from the chlorinated hydrocarbon family (methylene chloride, trichloroethylene, carbon tetrachloride, etc.) are not recommended for cleaning LED parts. All of these various solvents attack or dissolve the encapsulating epoxies used to form the package of plastic LED parts.

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

**Device Reliability**

For reliability information, please see the reliability data sheet 20 mm (0.8 inch) General Purpose Seven Segment Display.



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For product information and a complete list of distributors, please go to our web site.

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