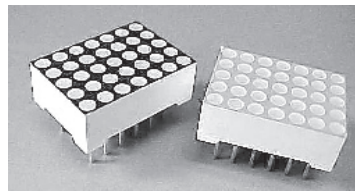


# HDSP-70xE

## 17.3 mm (0.68 inch) General Purpose 5x7 Dot Matrix Alphanumeric Displays



### Data Sheet



**HDSP-70xE Series, HDSP-71xE Series**  
**HDSP-70xG Series, HDSP-71xG Series**  
**HDSP-70xA Series, HDSP-71xA Series**

#### Description

These displays have a 17.3 mm (0.68 inch) character height and use industry standard size and pin-out. The devices are available in either common row anode or common row cathode configurations. The displays come in either gray or black face paint and are available in a choice of high efficiency red (HER) or green colors or AlGaAs.

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

For optimal intensity performance, please consider our industrial grade displays:

- HDSP-L20x
- HDSP-540x
- HDSP-L10x

#### Features

- **5 x 7 dot matrix font**
- Viewable up to 12 meters
- **X-Y stackable**
- **Industry standard pin-out**  
7.6 mm (0.3 in.) Dual-in-Line (DIP) leads on 2.54 mm (0.1 in.) centers
- **Choice of colors**  
Red or Green or AlGaAs
- **Choice of face paint colors**  
Gray or black
- Design flexibility  
Common row anode or common row cathode
- **Categorized for luminous intensity**
- **Green categorized for color**

#### Applications

- Suitable for indoor use
- Not recommended for industrial applications, i.e., operating temperature requirements exceeding 85°C or Below -40°C <sup>[1]</sup>
- Extreme temperature cycling not recommended <sup>[2]</sup>

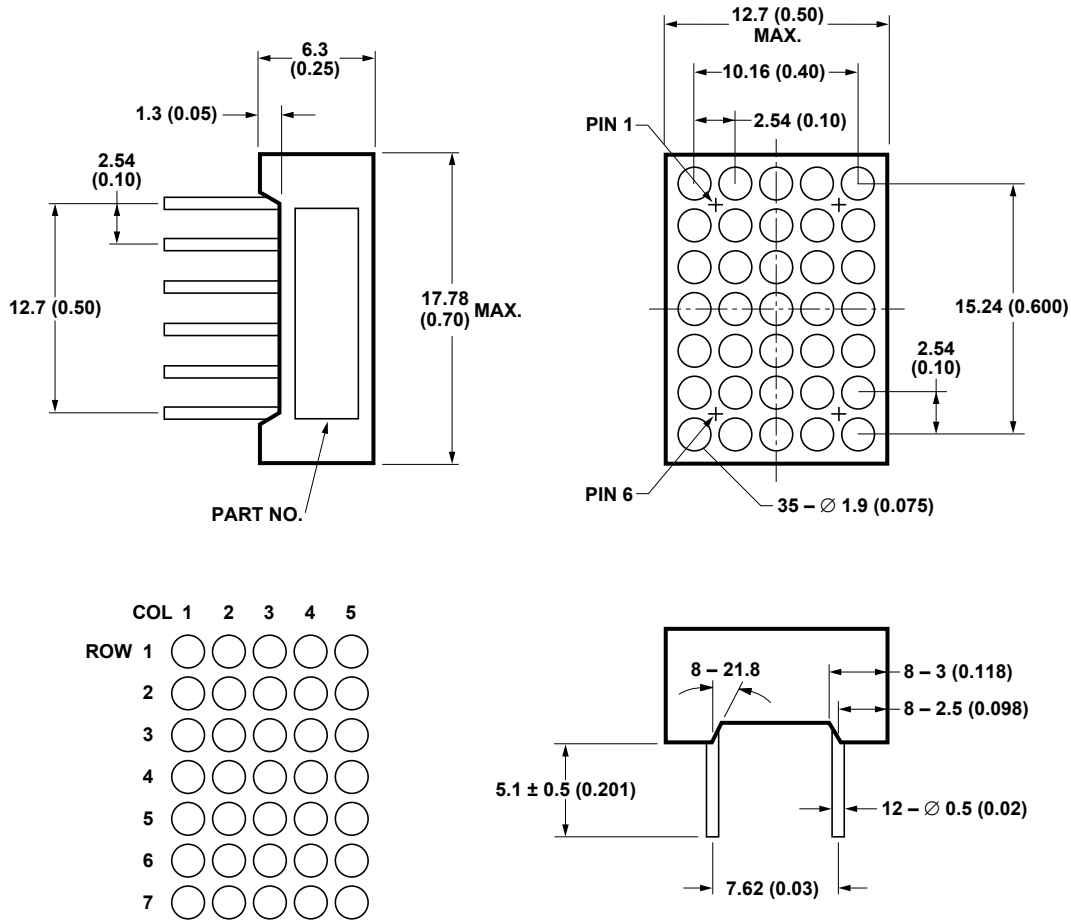
#### Devices

| HER HDSP- | Green HDSP- | AlGaAs HDSP- | Description                              |
|-----------|-------------|--------------|------------------------------------------|
| 701E      | 701G        | 701A         | 17.3 mm Gray Surface Common Row Anode    |
| 703E      | 703G        | 703A         | 17.3 mm Gray Surface Common Row Cathode  |
| 711E      | 711G        | 711A         | 17.3 mm Black Surface Common Row Anode   |
| 713E      | 713G        | 713A         | 17.3 mm Black Surface Common Row Cathode |

#### Notes:

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

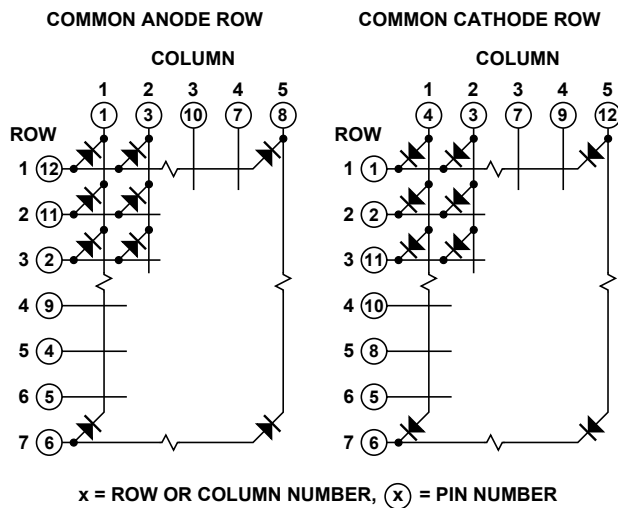
## Package Dimensions



### NOTES:

1. ALL DIMENSIONS IN MILLIMETERS (INCHES).
2. UNLESS OTHERWISE STATED, TOLERANCE IS  $\pm 0.25$  mm (0.010).
3. FOR GREEN ONLY.

## Internal Circuit Diagram



| COMMON ROW ANODE |                                        | COMMON ROW CATHODE |                                        |
|------------------|----------------------------------------|--------------------|----------------------------------------|
| PIN              | HDSP-701E/711E/<br>701G/711G/701A/711A | PIN                | HDSP-703E/713E/<br>703G/713G/703A/713A |
| 1                | COLUMN 1 CATHODE                       | 1                  | ROW 1 CATHODE                          |
| 2                | ROW 3 ANODE                            | 2                  | ROW 2 CATHODE                          |
| 3                | COLUMN 2 CATHODE                       | 3                  | COLUMN 2 ANODE                         |
| 4                | ROW 5 ANODE                            | 4                  | COLUMN 1 ANODE                         |
| 5                | ROW 6 ANODE                            | 5                  | ROW 6 CATHODE                          |
| 6                | ROW 7 ANODE                            | 6                  | ROW 7 CATHODE                          |
| 7                | COLUMN 4 CATHODE                       | 7                  | COLUMN 3 ANODE                         |
| 8                | COLUMN 5 CATHODE                       | 8                  | ROW 5 CATHODE                          |
| 9                | ROW 4 ANODE                            | 9                  | COLUMN 4 ANODE                         |
| 10               | COLUMN 3 CATHODE                       | 10                 | ROW 4 CATHODE                          |
| 11               | ROW 2 ANODE                            | 11                 | ROW 3 CATHODE                          |
| 12               | ROW 1 ANODE                            | 12                 | COLUMN 5 ANODE                         |

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

| Parameter                                                                                  | HER<br>HDSP-701E/<br>711E/703E/<br>713E | AlGaAs<br>HDSP-701A/<br>703A/711A/<br>713A | Green<br>HDSP-701G/<br>711G/703G/<br>713G | Units |
|--------------------------------------------------------------------------------------------|-----------------------------------------|--------------------------------------------|-------------------------------------------|-------|
| Average Power per Dot <sup>[1]</sup>                                                       | 75                                      | 75                                         | 75                                        | mW    |
| Peak Forward Current per Dot <sup>[1,2]</sup><br>(1/10 Duty Cycle, 0.1 ms Pulse Width)     | 90                                      | 125                                        | 90                                        | mA    |
| Average Forward Current per Dot <sup>[1]</sup>                                             | 23                                      | 23 <sup>[3]</sup>                          | 15 <sup>[2]</sup>                         | mA    |
| Reverse Voltage per Dot                                                                    | 5                                       | 5                                          | 5                                         | V     |
| Operating Temperature                                                                      | –40 to +85                              | –40 to +85                                 | –40 to +85                                | °C    |
| Storage Temperature                                                                        | –40 to +85                              | –40 to +85                                 | –40 to +85                                | °C    |
| Wave Soldering Temperature for 3 seconds <sup>[3]</sup><br>(1.6 mm [0.063 in.] below Body) | 250                                     | 250                                        | 250                                       | °C    |

Notes:

1. Do not exceed maximum average current per dot.
2. Derate above 35°C at 0.2 mA/°C.
3. 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                         |
|------------------------------|----------------------------------------------------------|-------------------|-------|-------|------|-------|--------------------------------------------|
| 701E<br>711E<br>703E<br>713E | Luminous Intensity/Dot<br>(Digit Average) <sup>[1]</sup> | I <sub>V</sub>    | 1.289 | 2.500 |      | mcd   | I <sub>F</sub> = 50 mA,<br>20% Duty Factor |
|                              | Peak Wavelength                                          | λ <sub>PEAK</sub> |       | 632   |      | nm    | I <sub>F</sub> = 20 mA                     |
|                              | Dominant Wavelength <sup>[2]</sup>                       | λ <sub>d</sub>    |       | 622   |      | nm    | I <sub>F</sub> = 20 mA                     |
|                              | Forward Voltage                                          | V <sub>F</sub>    |       |       | 3.40 | V     | I <sub>F</sub> = 50 mA                     |
|                              |                                                          |                   |       | 2.05  | 2.50 |       | I <sub>F</sub> = 20 mA                     |
|                              |                                                          |                   | 1.60  |       |      |       | I <sub>F</sub> = 5 mA                      |
|                              | Reverse Voltage <sup>[3]</sup> V <sub>R</sub>            | 5                 |       |       |      | V     | I <sub>R</sub> = 100 μA                    |
|                              | Luminous Intensity<br>Matching Ratio                     | I <sub>V-M</sub>  |       |       | 2:1  |       | I <sub>F</sub> = 50 mA<br>20% Duty Factor  |

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

### Green

| Devices<br>HDSP-             | Parameter                                                | Symbol                  | Min. | Typ. | Max. | Units | Test<br>Conditions                        |
|------------------------------|----------------------------------------------------------|-------------------------|------|------|------|-------|-------------------------------------------|
| 701G<br>711G<br>703G<br>713G | Luminous Intensity/Dot<br>(Digit Average) <sup>[1]</sup> | $I_V$                   | 0.96 | 2.50 |      | mcd   | $I_F = 50\text{ mA}$ ,<br>20% Duty Factor |
|                              | Peak Wavelength                                          | $\lambda_{\text{PEAK}}$ |      | 568  |      | nm    | $I_F = 20\text{ mA}$                      |
|                              | Dominant Wavelength <sup>[2]</sup>                       | $\lambda_d$             |      | 573  |      | nm    | $I_F = 20\text{ mA}$                      |
|                              | Forward Voltage                                          | $V_F$                   |      |      | 3.40 | V     | $I_F = 50\text{ mA}$                      |
|                              |                                                          |                         | 1.80 | 2.25 | 2.60 |       | $I_F = 20\text{ mA}$                      |
|                              |                                                          |                         | 1.60 |      |      |       | $I_F = 5\text{ mA}$                       |
|                              | Reverse Voltage <sup>[3]</sup> $V_R$                     | 5                       |      |      |      | V     | $I_R = 100\text{ }\mu\text{A}$            |
|                              | Luminous Intensity<br>Matching Ratio                     | $I_{V-M}$               |      |      | 2:1  |       | $I_F = 50\text{ mA}$<br>20% Duty Factor   |

### AlGaAs

| Devices<br>HDSP-             | Parameter                                                | Symbol                  | Min. | Typ. | Max.  | Units | Test<br>Conditions                        |
|------------------------------|----------------------------------------------------------|-------------------------|------|------|-------|-------|-------------------------------------------|
| 701A<br>711A<br>703A<br>713A | Luminous Intensity/Dot<br>(Digit Average) <sup>[1]</sup> | $I_V$                   | 1.55 | 2.10 |       | mcd   | $I_F = 10\text{ mA}$ ,<br>20% Duty Factor |
|                              | Peak Wavelength                                          | $\lambda_{\text{PEAK}}$ |      | 660  |       | nm    | $I_F = 20\text{ mA}$                      |
|                              | Dominant Wavelength <sup>[2]</sup>                       | $\lambda_d$             |      | 643  |       | nm    | $I_F = 20\text{ mA}$                      |
|                              | Forward Voltage                                          | $V_F$                   |      | 1.8  | 2.0   | V     | $I_F = 20\text{ mA}$                      |
|                              |                                                          |                         |      |      | 2.0   |       | $I_F = 10\text{ mA}$                      |
|                              |                                                          |                         | 1.5  |      |       |       | $I_F = 5\text{ mA}$                       |
|                              | Reverse Voltage <sup>[3]</sup> $V_R$                     | 5                       |      |      |       | V     | $I_R = 100\text{ }\mu\text{A}$            |
|                              | Luminous Intensity<br>Matching Ratio                     | $I_{V-M}$               |      |      | 1.5:1 |       | $I_F = 10\text{ mA}$<br>20% Duty Factor   |

#### Notes:

1. The digits are categorized for luminous intensity. The intensity category is designated by a letter on the side of the package.
2. The dominant wavelength,  $\lambda_d$ , is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.
3. Typical specification for reference only. Do not exceed absolute maximum ratings.

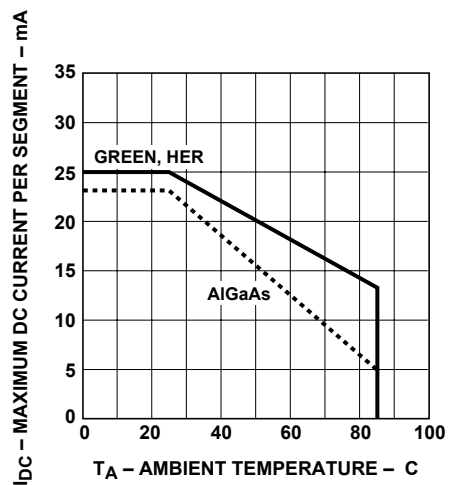


Figure 1. Maximum Allowable Average Current Per Dot vs. Ambient Temperature.

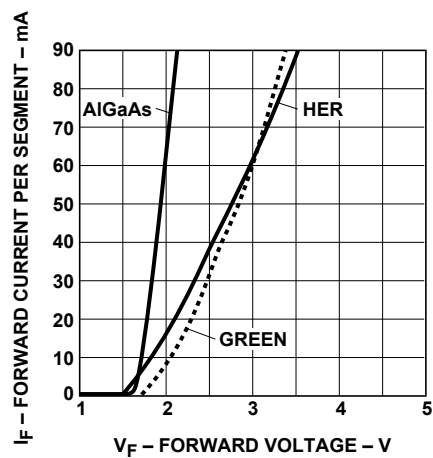


Figure 2. Forward Current vs. Forward Voltage.

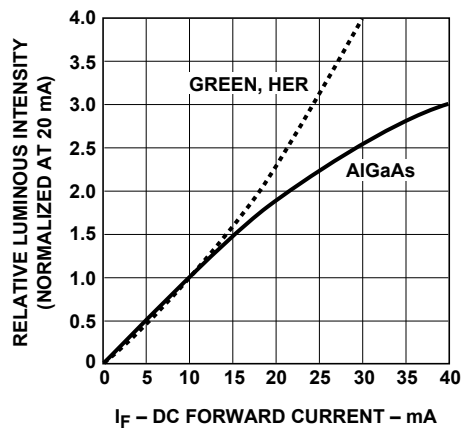


Figure 3. Relative Luminous Intensity vs. DC Forward Current.

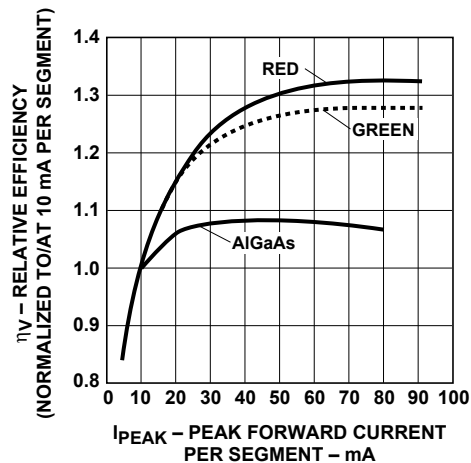


Figure 4. Relative Efficiency (Luminous Intensity Per Unit Current Per Dot) vs. Peak Current Per Dot.

**Intensity Bin Limits<sup>[1]</sup>**  
**(mcd at 50 mA, 20% Duty Factor)**

**High Efficiency Red**

| Bin name | Min. <sup>[2]</sup> | Max. <sup>[2]</sup> |
|----------|---------------------|---------------------|
| E        | 1.289               | 1.934               |
| F        | 1.934               | 2.900               |
| G        | 2.900               | 4.350               |
| H        | 4.350               | 6.525               |

**Green**

| Bin name | Min. <sup>[2]</sup> | Max. <sup>[2]</sup> |
|----------|---------------------|---------------------|
| H        | 0.96                | 1.44                |
| I        | 1.44                | 2.15                |
| J        | 2.15                | 3.23                |
| K        | 3.23                | 4.85                |
| L        | 4.85                | 7.28                |

Notes:

1. Bin categories are established for classification of products. Products may not be available in all bin categories.
2. Tolerance for each intensity bin limit is  $\pm 10\%$ .

**(mcd at 10 mA, 20% Duty Factor)**

**AlGaAs**

| Bin name | Min. <sup>[2]</sup> | Max. <sup>[2]</sup> |
|----------|---------------------|---------------------|
| I        | 1.55                | 2.33                |
| J        | 2.33                | 3.49                |

Notes:

1. Bin categories are established for classification of products. Products may not be available in all bin categories.
2. Tolerance for each intensity bin limit is  $\pm 10\%$ .

**Color Bin Limits (Dominant Wavelength)**

| Color | Bin | Dominant Wavelength (nm) |       |
|-------|-----|--------------------------|-------|
|       |     | Min.                     | Max.  |
| Green | 2   | 573.6                    | 576.5 |
|       | 3   | 570.6                    | 573.5 |
|       | 4   | 567.6                    | 570.5 |
|       | 5   | 564.5                    | 567.5 |

Note:

All categories are established for classification of products. Products may not be available in all categories. Please contact your local Avago representatives 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, trichloro-ethylene, 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 datasheet

*17.3 mm General Purpose*

*5 x 7 Dot Matrix Alphanumeric Displays.*

For product information and a complete list of distributors, please go to our website: [www.avagotech.com](http://www.avagotech.com)

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