# Agilent HDSP-S6xE, HDSP-S6xG, HDSP-B6xZ Series 32.9 mm (1.3 inch) General Purpose 5 x 8 Dot Matrix Alphanumeric Displays

Data Sheet

### Description

These displays have a 32.9 mm (1.3 inch) character height. The devices are available in either common row anode or common row cathode configurations. The displays come in only black face paint and are available in a choice of GaP Red (HER) or GaP Green colors. The Bi-color display consists of HER and green colors.

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

### Features

- **5 x 8 Dot matrix font**
- **X-Y stackable**
- **Pin-out**
  - 28.3 mm (1.114 in.) Dual-In-Line (DIP) leads on 2.54 mm (0.1 in.) centers
- **Choice of colors**
  - Single color: red or green
  - Bi-color: red and green
- **Face paint color: 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 –35°C**
- **Extreme temperature cycling not recommended[1]**

### Devices

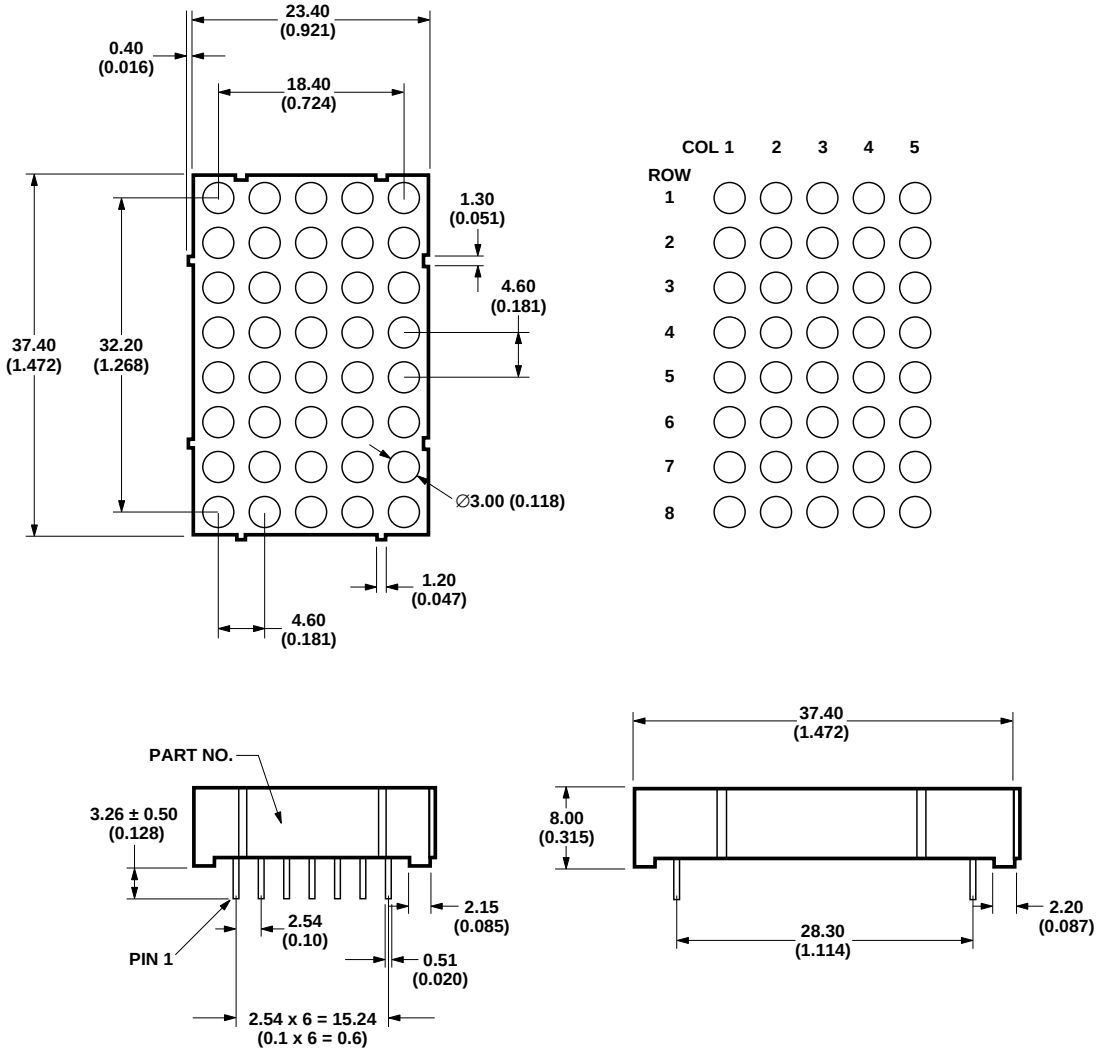
| GaP Red HDSP- | GaP Green HDSP- | Description |
|---|---|---|
| S61E | S61G | 32.9 mm Black Surface Common Row Anode |
| S66E | S66G | 32.9 mm Black Surface Common Row Cathode |
| B61Z | | 32.9 mm Black Surface Bi-Color Common Row Anode |
| B66Z | | 32.9 mm Black Surface Bi-Color Common Row Cathode |

**Note:**

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

**Package Dimensions**

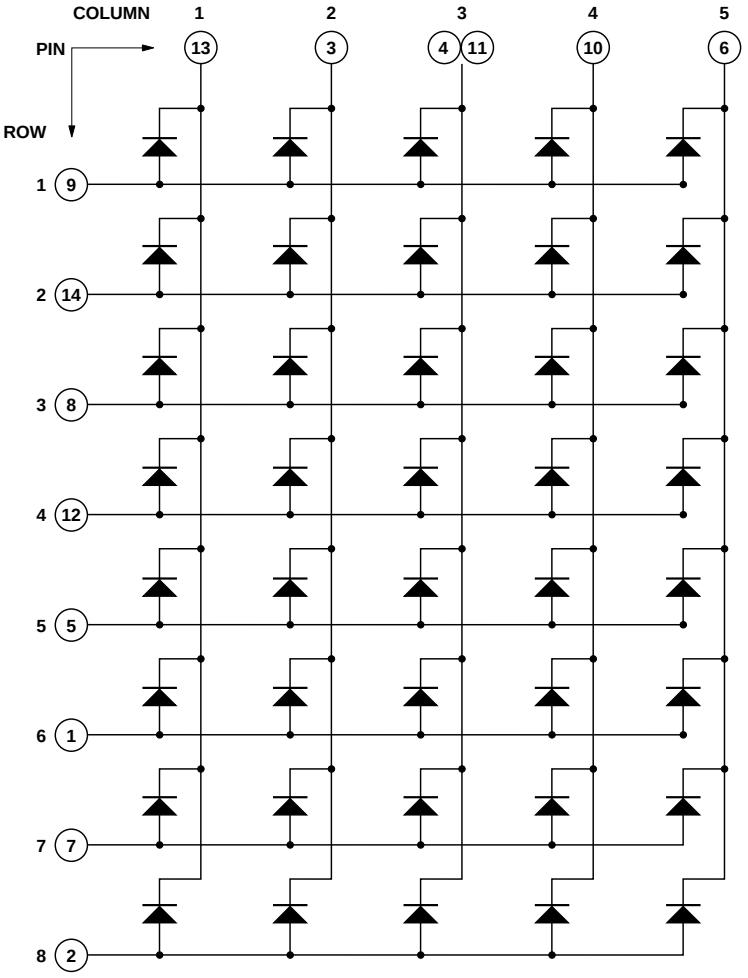
(Single Color)




TOLERANCE: ± 0.25 mm UNLESS OTHERWISE STATED.

**Internal Circuit Diagram**

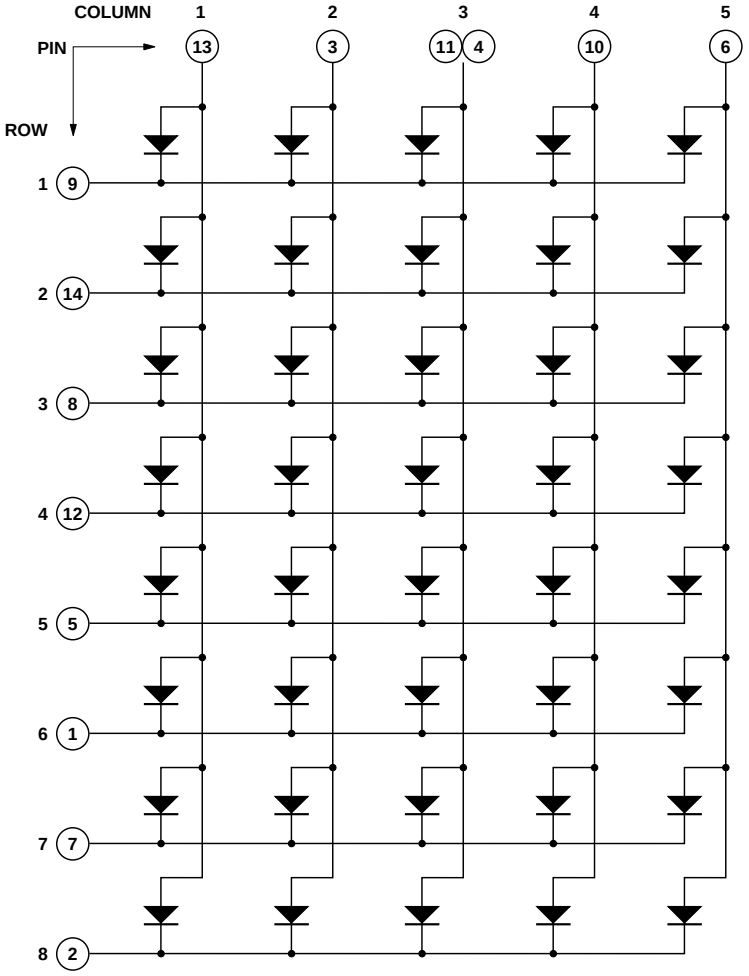
Common Row Anode (Single Color)




| PIN NO. | FUNCTION |
|---|---|
| 1 | ANODE ROW 6 |
| 2 | ANODE ROW 8 |
| 3 | CATHODE COLUMN 2 |
| 4 | CATHODE COLUMN 3 |
| 5 | ANODE ROW 5 |
| 6 | CATHODE COLUMN 5 |
| 7 | ANODE ROW 7 |
| 8 | ANODE ROW 3 |
| 9 | ANODE ROW 1 |
| 10 | CATHODE COLUMN 4 |
| 11 | CATHODE COLUMN 3 |
| 12 | ANODE ROW 4 |
| 13 | CATHODE COLUMN 1 |
| 14 | ANODE ROW 2 |

**Internal Circuit Diagram**

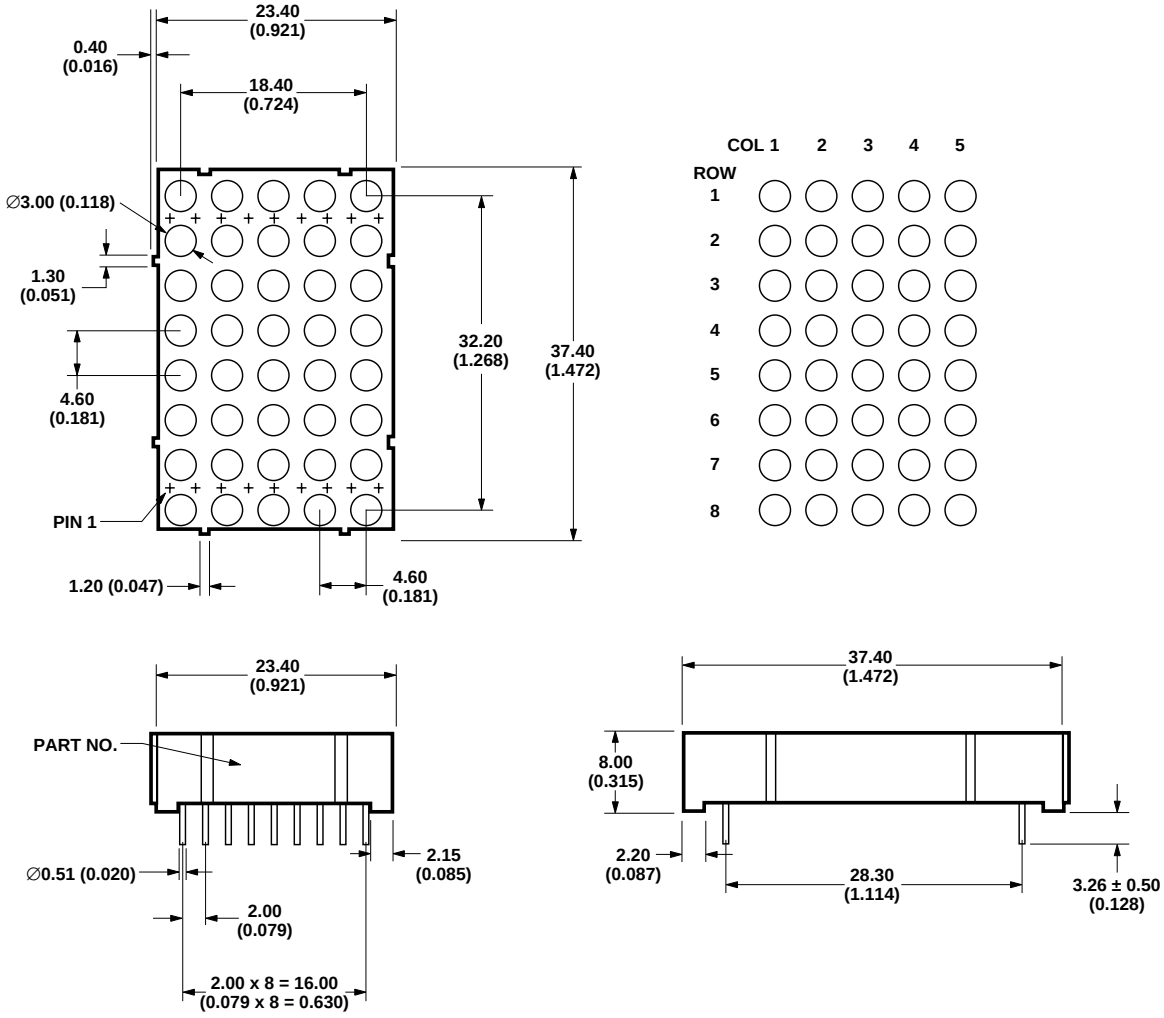
Common Row Cathode (Single Color)




| PIN NO. | FUNCTION |
|---|---|
| 1 | CATHODE ROW 6 |
| 2 | CATHODE ROW 8 |
| 3 | ANODE COLUMN 2 |
| 4 | ANODE COLUMN 3 |
| 5 | CATHODE ROW 5 |
| 6 | ANODE COLUMN 5 |
| 7 | CATHODE ROW 7 |
| 8 | CATHODE ROW 3 |
| 9 | CATHODE ROW 1 |
| 10 | ANODE COLUMN 4 |
| 11 | ANODE COLUMN 3 |
| 12 | CATHODE ROW 4 |
| 13 | ANODE COLUMN 1 |
| 14 | CATHODE ROW 2 |

## Package Dimensions

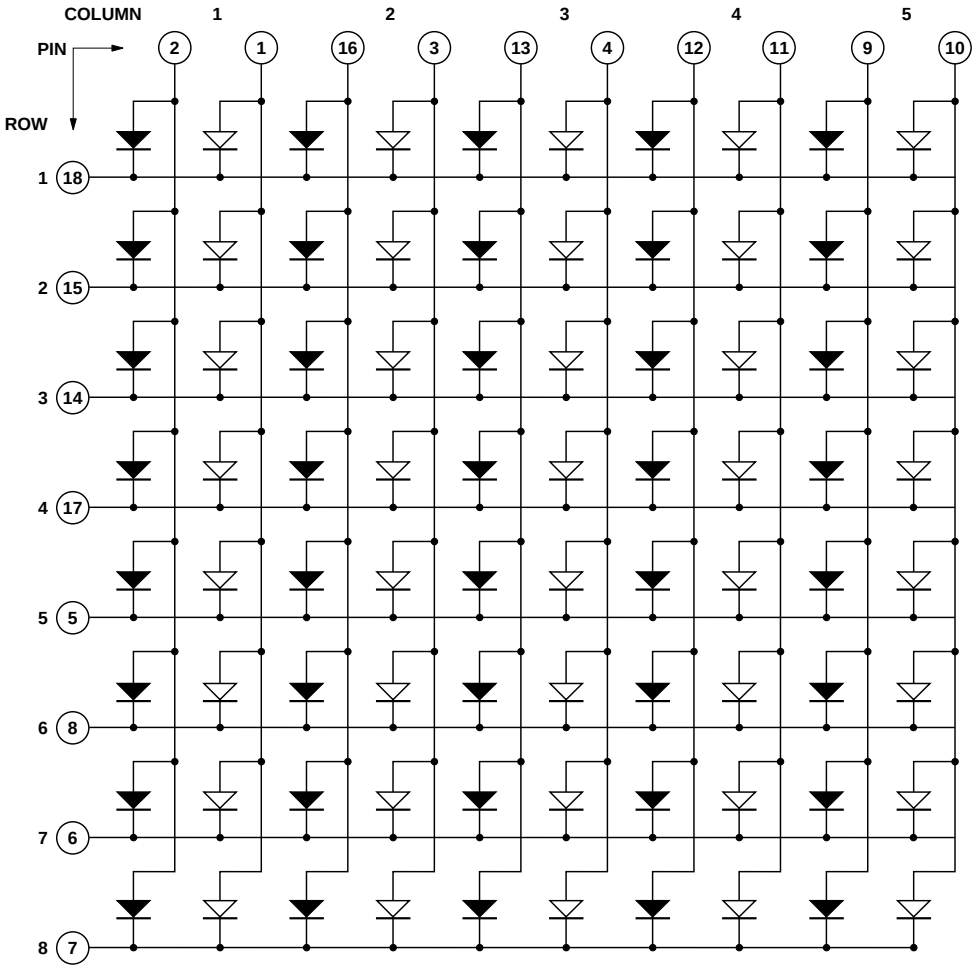
(Bi-Color)




**TOLERANCE: ± 0.25 mm UNLESS OTHERWISE STATED.**

**Internal Circuit Diagram**

Common Row Cathode (Bi-Color)



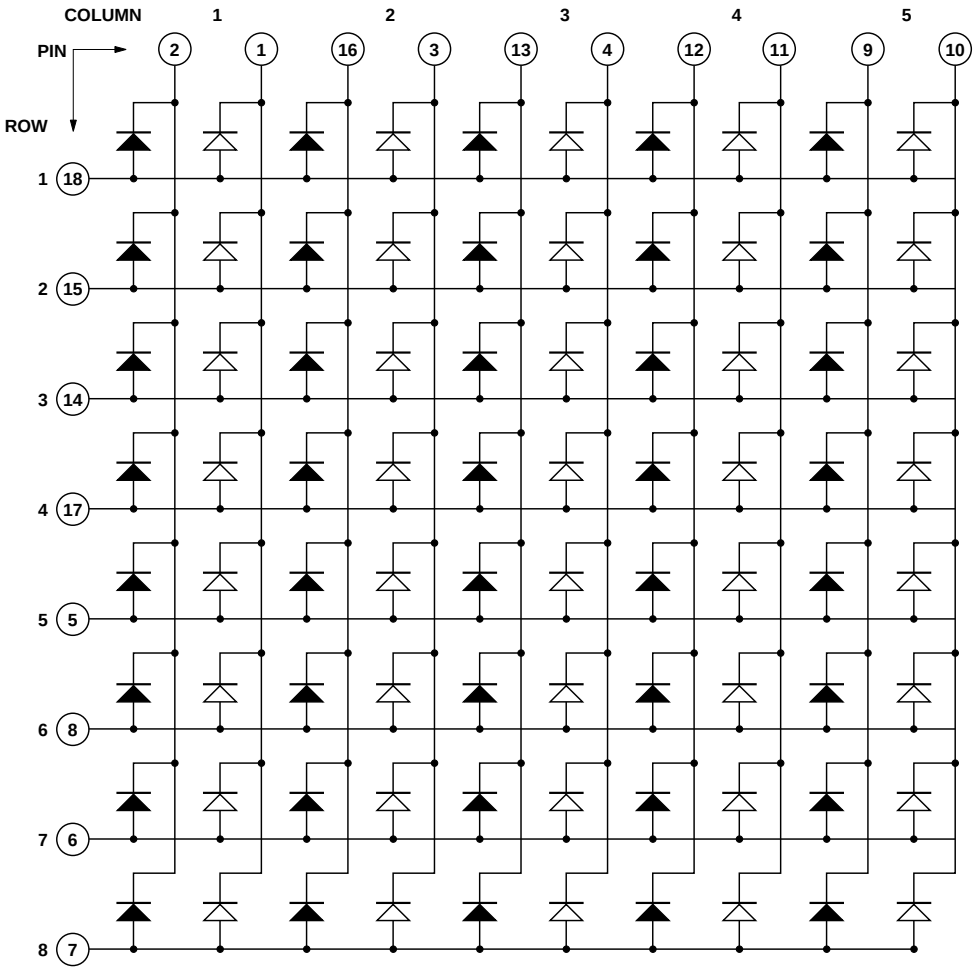

1. THE SIGN " ◀ " STANDS FOR HER COLOR DICE.

2. THE SIGN " ◁ " STANDS FOR GREEN COLOR DICE.

| PIN NO. | CONNECTION |
|---|---|
| 1 | ANODE COLUMN 1 GREEN |
| 2 | ANODE COLUMN 1 RED |
| 3 | ANODE COLUMN 2 GREEN |
| 4 | ANODE COLUMN 3 GREEN |
| 5 | CATHODE ROW 5 |
| 6 | CATHODE ROW 7 |
| 7 | CATHODE ROW 8 |
| 8 | CATHODE ROW 6 |
| 9 | ANODE COLUMN 5 RED |
| 10 | ANODE COLUMN 5 GREEN |
| 11 | ANODE COLUMN 4 GREEN |
| 12 | ANODE COLUMN 4 RED |
| 13 | ANODE COLUMN 3 RED |
| 14 | CATHODE ROW 3 |
| 15 | CATHODE ROW 2 |
| 16 | ANODE COLUMN 2 RED |
| 17 | CATHODE ROW 4 |
| 18 | CATHODE ROW 1 |

**Internal Circuit Diagram**

Common Row Anode (Bi-Color)




1. THE SIGN " ◀ " STANDS FOR HER COLOR DICE.

2. THE SIGN " ◁ " STANDS FOR GREEN COLOR DICE.

| PIN NO. | CONNECTION |
|---|---|
| 1 | CATHODE COLUMN 1 GREEN |
| 2 | CATHODE COLUMN 1 RED |
| 3 | CATHODE COLUMN 2 GREEN |
| 4 | CATHODE COLUMN 3 GREEN |
| 5 | ANODE ROW 5 |
| 6 | ANODE ROW 7 |
| 7 | ANODE ROW 8 |
| 8 | ANODE ROW 6 |
| 9 | CATHODE COLUMN 5 RED |
| 10 | CATHODE COLUMN 5 GREEN |
| 11 | CATHODE COLUMN 4 GREEN |
| 12 | CATHODE COLUMN 4 RED |
| 13 | CATHODE COLUMN 3 RED |
| 14 | ANODE ROW 3 |
| 15 | ANODE ROW 2 |
| 16 | CATHODE COLUMN 2 RED |
| 17 | ANODE ROW 4 |
| 18 | ANODE ROW 1 |

**Absolute Maximum Ratings at $T_A = 25^\circ C$**

| Parameter | GaP Red | GaP Green | Units |
|---|---|---|---|
| Average Power per Dot[1] | 65 | 65 | mW |
| Peak Forward Current per Dot[1] (1/8 Duty Cycle at 10 KHz) | 80 | 100 | mA |
| Average Forward Current per Dot | 25[1,2] | 25[1,3] | mA |
| Reverse Voltage per Dot | 3 | 3 | V |
| Operating Temperature | –35 to +85 | –35 to +85 | °C |
| Storage Temperature | –35 to +85 | –35 to +85 | °C |
| Wave Soldering Temperature for 3 seconds[4] (2 mm [0.078 in.] below Body) | 250 | 250 | °C |

**Notes:**

1. Do not exceed maximum average current per dot.
2. Derate above 25°C at 0.20 mA/°C.
3. Derate above 25°C at 0.33 mA/°C.
4. Not recommended to be soldered more than 2 times. Minimum interval between solderings is 15 minutes. Total soldering time not to exceed 3 seconds.

**Optical/Electrical Characteristics at $T_A = 25^\circ C$**

**GaP Red**

| Devices HDSP- | Parameter | Symbol | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|---|
| S61E S66E B61Z B66Z | Luminous Intensity/Dot (Digit Average)[1] | $I_v$ | 0.97 | 1.5 | | mcd | $I_{FP}$ = 40 mA, 1/8 Duty Factor |
| | Peak Wavelength | $\lambda_{peak}$ | | 632 | | nm | $I_F$ = 20 mA |
| | Dominant Wavelength[2] | $\lambda_d$ | | 622 | | nm | $I_F$ = 20 mA |
| | Forward Voltage | $V_F$ | | 2.1 | 2.4 | V | $I_F$ = 20 mA |
| | Reverse Voltage[3] | $V_R$ | 3.0 | | | V | $I_R$ = 100 μA |
| | Luminous Intensity Matching Ratio | $I_{v-m}$ | | | 2:1 | | $I_{FP}$ = 40 mA, 1/8 Duty Factor |

**GaP Green**

| Devices HDSP- | Parameter | Symbol | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|---|
| S61G S66G B61Z B66Z | Luminous Intensity/Dot (Digit Average)[1] | $I_v$ | 1.46 | 3.0 | | mcd | $I_{FP}$ = 40 mA, 1/8 Duty Factor |
| | Peak Wavelength | $\lambda_{peak}$ | | 568 | | nm | $I_F$ = 20 mA |
| | Dominant Wavelength[2] | $\lambda_d$ | | 573 | | nm | $I_F$ = 20 mA |
| | Forward Voltage | $V_F$ | | 2.3 | 2.6 | V | $I_F$ = 20 mA |
| | Reverse Voltage[3] | $V_R$ | 3.0 | | | V | $I_R$ = 100 μA |
| | Luminous Intensity Matching Ratio | $I_{v-m}$ | | | 2:1 | | $I_{FP}$ = 40 mA, 1/8 Duty Factor |

**Bi-Color**

| Devices HDSP- | Parameter | Symbol | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|---|
| B61Z B66Z | Luminance/Dot (Digit Average)[1] | $I_v$ | | | | $Cd/m^2$ | $I_{FP}$ = 40 mA, 1/8 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.

**Intensity Bin Limits[1] (mcd at $I_{FP}$ = 40 mA, 1/8 Duty Factor)**

**GaP Red**

| Bin Name | Min.[2] | Max.[2] |
|---|---|---|
| E | 0.97 | 1.45 |
| F | 1.46 | 2.19 |
| G | 2.2 | 3.3 |

**GaP Green**

| Bin Name | Min.[2] | Max.[2] |
|---|---|---|
| F | 1.46 | 2.19 |
| G | 2.2 | 3.3 |
| H | 3.31 | 4.97 |

**Bi-Color (Cd/m$^2$ at $I_{FP}$ = 40 mA, 1/8 Duty Factor)**

| Bin Name | Min.[2] | Max.[2] |
|---|---|---|
| F | 86 | 104 |
| G | 104 | 124 |
| H | 124 | 149 |
| I | 149 | 179 |
| J | 179 | 215 |
| K | 215 | 258 |
| L | 258 | 310 |

**Hue Grade**

| | Bin | | | | | | |
|---|---|---|---|---|---|---|---|
| Coordinate | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| X | 0.542-0.553 | 0.552-0.563 | 0.562-0.573 | 0.572-0.583 | 0.582-0.593 | 0.592-0.603 | 0.602-0.613 |
| Y | 0.445-0.456 | 0.435-0.446 | 0.425-0.436 | 0.415-0.426 | 0.405-0.416 | 0.395-0.406 | 0.385-0.396 |

**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 ± 10%.

**Color Bin Limits (nm)[1]**

**GaP Green**

| Bin Name | Min.[2] | Max.[2] |
|---|---|---|
| 3 | 569.1 | 571 |
| 4 | 571.1 | 573 |
| 5 | 573.1 | 575 |

**Notes:**

1. Bin categories are established for classification of products. Products may not be available in all bin categories.
2. Tolerance for each color bin limit is ± 1.0 nm.

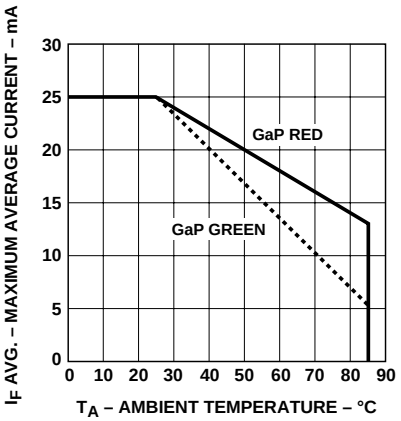



**Figure 1. Maximum allowable average current per dot vs. ambient temperature.**

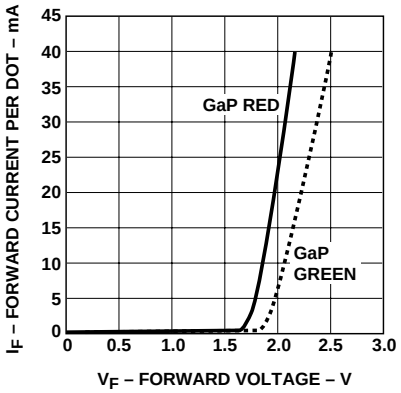



**Figure 2. Forward current vs. forward voltage.**

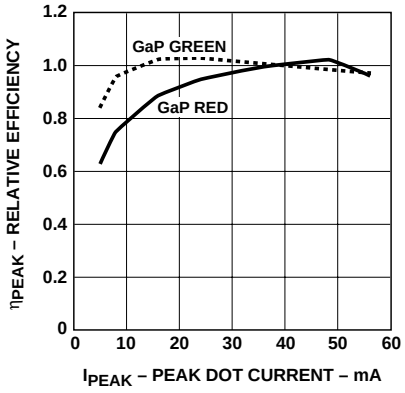



**Figure 3. Relative efficiency (luminous intensity per unit current per dot) vs. peak current per dot.**

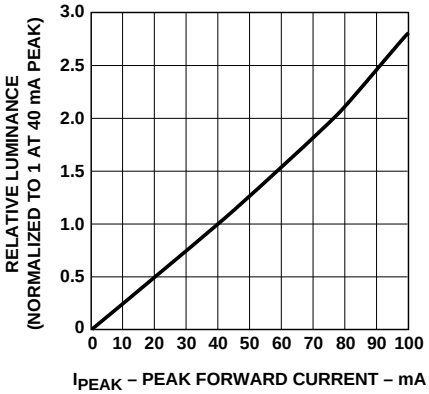



**Figure 4. Relative luminance vs. peak forward current.**

### 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 *32.9 mm General Purpose 5 x 8 Dot Matrix Alphanumeric Displays.*

**www.agilent.com/semiconductors**

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

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India, Australia, New Zealand: (+65) 6755 1939

Japan: (+81 3) 3335-8152 (Domestic/International), or 0120-61-1280 (Domestic Only)

Korea: (+65) 6755 1989

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5988-5214EN

Agilent Technologies