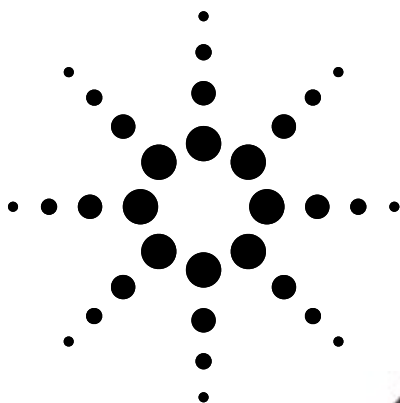


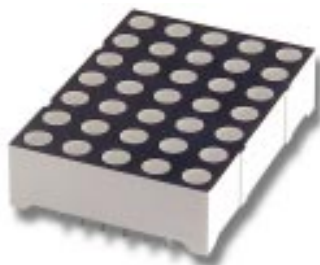


# Agilent HDSP-B5xZ Series

## 31.8 mm (1.25 inch) General Purpose

### 5 x 7 Dot Matrix Alphanumeric Displays

#### Data Sheet



#### Description

These displays have a 31.8 mm (1.25 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. The Bi-color display consists of GaP Red (HER) and GaP Green colors.

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

#### Devices

| HDSP- | Description                                       |
|-------|---------------------------------------------------|
| B5AZ  | 31.8 mm Black Surface Bi-Color Common Row Anode   |
| B5BZ  | 31.8 mm Black Surface Bi-Color Common Row Cathode |

#### Note:

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

#### Features

- **5 x 7 Dot matrix font**
- **X-Y stackable**
- **Pin-out**
  - 26.66 mm (1.05 in.) Dual-In-Line (DIP) leads on 2. mm (0.079 in.) centers
- **Choice of colors**
  - Bi-color: red and green
- **Face paint color: black**
- **Design flexibility**
  - Common row anode or common row cathode
- **Categorized for luminance**

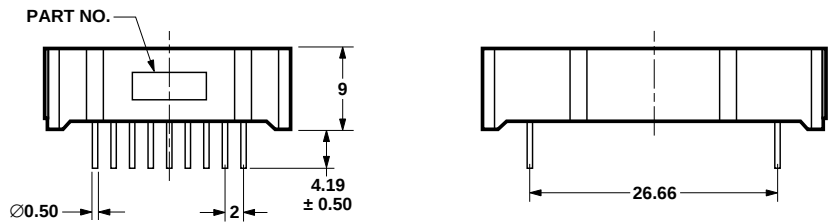
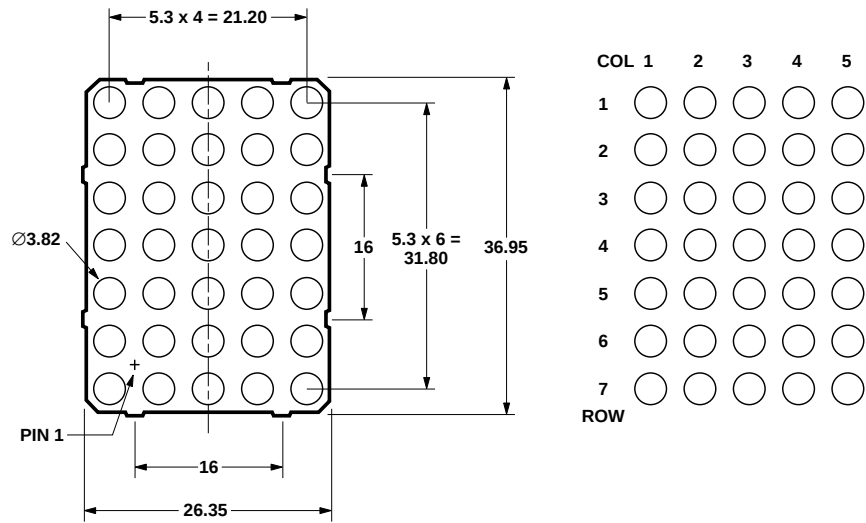
#### Applications

- **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<sup>[1]</sup>**



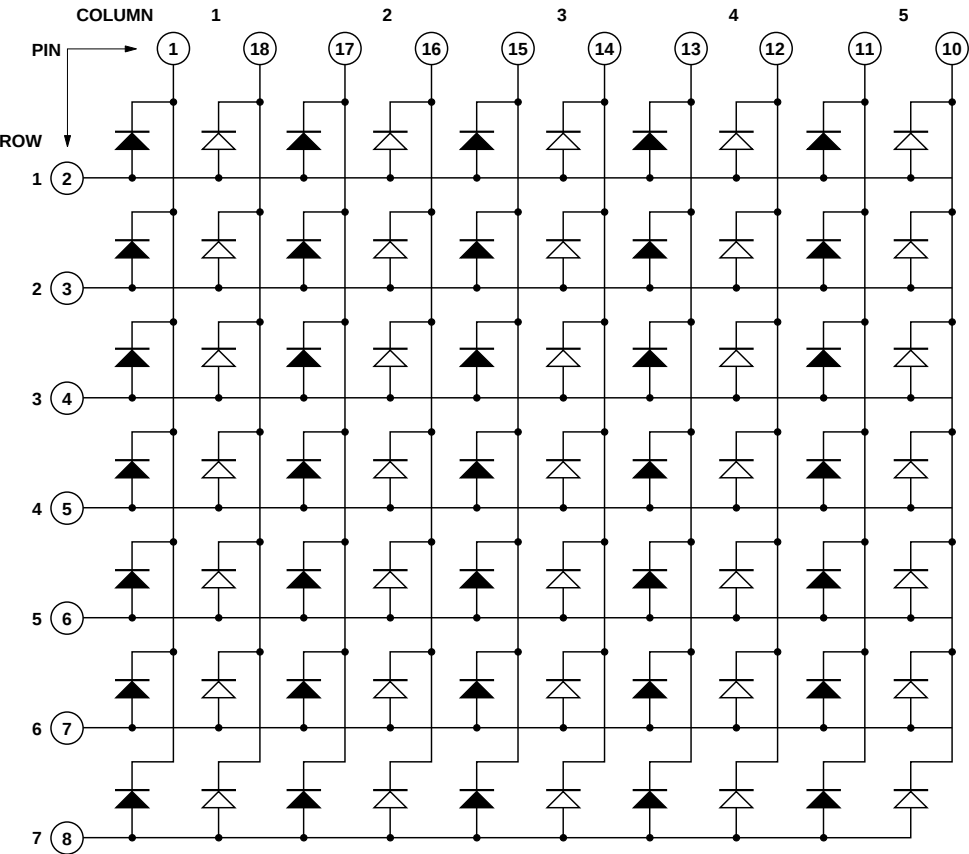
Agilent Technologies

Package Dimensions



- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS.
  2. UNLESS OTHERWISE STATED, TOLERANCES ARE  $\pm 0.25$  mm.

Internal Circuit Diagram  
 HDSP-B5AZ

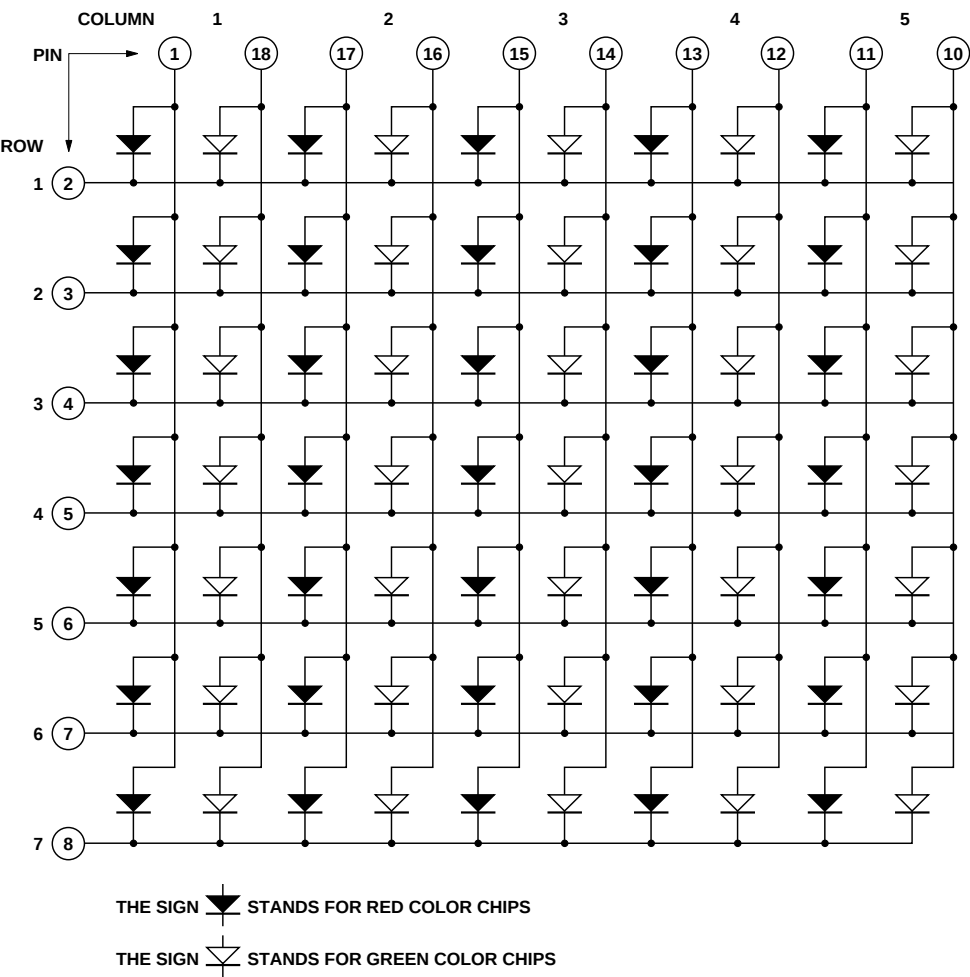


THE SIGN  STANDS FOR RED COLOR CHIPS

THE SIGN  STANDS FOR GREEN COLOR CHIPS

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

Internal Circuit Diagram  
HDSP-B5BZ



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

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

| <b>Parameter</b>                                                                               | <b>GaP Red<br/>HDSP-B5AZ/B5BZ</b> | <b>GaP Green<br/>HDSP-B5AZ/B5BZ</b> | <b>Units</b> |
|------------------------------------------------------------------------------------------------|-----------------------------------|-------------------------------------|--------------|
| Average Power per Dot <sup>[1]</sup>                                                           | 36                                | 36                                  | mW           |
| Peak Forward Current per Dot <sup>[1]</sup><br>(1/8 Duty Cycle at 10 KHz)                      | 100                               | 100                                 | mA           |
| Average Forward Current per Dot                                                                | 13 <sup>[1,2]</sup>               | 13 <sup>[1,2]</sup>                 | 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           |
| Lead Solder Temperature for 3 seconds <sup>[3]</sup><br>(2 mm [0.078 in.] below seating plane) | 260                               | 260                                 | °C           |

**Notes:**

1. Do not exceed maximum average current per dot.
2. Derate above 25°C at 0.17 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 3 seconds.

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

### GaP Red

| Devices<br>HDSP- | Parameter                                                | Symbol            | Min. | Typ. | Max. | Units | Test Conditions                             |
|------------------|----------------------------------------------------------|-------------------|------|------|------|-------|---------------------------------------------|
| B5AZ<br>B5BZ     | Luminous Intensity/Dot<br>(Digit Average) <sup>[1]</sup> | I <sub>V</sub>    |      | 2    |      | mcd   | I <sub>FP</sub> = 40 mA,<br>1/8 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>    |      | 2.1  | 2.6  | V     | I <sub>F</sub> = 20 mA                      |
|                  | Reverse Voltage <sup>[3]</sup>                           | V <sub>R</sub>    | 3.0  |      |      | V     | I <sub>R</sub> = 100 μA                     |
|                  | Luminous Intensity<br>Matching Ratio                     | I <sub>V-m</sub>  |      |      | 2:1  |       | I <sub>FP</sub> = 40 mA,<br>1/8 Duty Factor |

### GaP Green

| Devices<br>HDSP- | Parameter                                                | Symbol            | Min. | Typ. | Max. | Units | Test Conditions                             |
|------------------|----------------------------------------------------------|-------------------|------|------|------|-------|---------------------------------------------|
| B5AZ<br>B5BZ     | Luminous Intensity/Dot<br>(Digit Average) <sup>[1]</sup> | I <sub>V</sub>    |      | 3.4  |      | mcd   | I <sub>FP</sub> = 40 mA,<br>1/8 Duty Factor |
|                  | Peak Wavelength                                          | λ <sub>peak</sub> |      | 568  |      | nm    | I <sub>F</sub> = 20 mA                      |
|                  | Dominant Wavelength <sup>[2]</sup>                       | λ <sub>d</sub>    |      | 573  |      | nm    | I <sub>F</sub> = 20 mA                      |
|                  | Forward Voltage                                          | V <sub>F</sub>    |      | 2.3  | 2.6  | V     | I <sub>F</sub> = 20 mA                      |
|                  | Reverse Voltage <sup>[3]</sup>                           | V <sub>R</sub>    | 3.0  |      |      | V     | I <sub>R</sub> = 100 μA                     |
|                  | Luminous Intensity<br>Matching Ratio                     | I <sub>V-m</sub>  |      |      | 2:1  |       | I <sub>FP</sub> = 40 mA,<br>1/8 Duty Factor |

### Bi-Color

| Devices<br>HDSP- | Parameter                                        | Symbol         | Min.  | Typ. | Max. | Units             | Test Conditions                             |
|------------------|--------------------------------------------------|----------------|-------|------|------|-------------------|---------------------------------------------|
| B5AZ<br>B5BZ     | Luminance/Unit<br>(Digit Average) <sup>[1]</sup> | I <sub>V</sub> | 124.1 | 215  | 372  | Cd/m <sup>2</sup> | I <sub>FP</sub> = 40 mA,<br>1/8 Duty Factor |

#### Notes:

1. The digits are categorized for luminance. The category is designated by a letter on the side of the package.
2. 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.
3. Typical specification for reference only. Do not exceed absolute maximum ratings.

**Bi-Color (Cd/m<sup>2</sup> at I<sub>FP</sub> = 40 mA, 1/8 Duty Factor)**

| Bin Name | Min. <sup>[2]</sup> | Max. <sup>[2]</sup> |
|----------|---------------------|---------------------|
| H        | 124.1               | 149                 |
| I        | 149.1               | 179                 |
| J        | 179.1               | 215                 |
| K        | 215.1               | 258                 |
| L        | 258.1               | 310                 |
| M        | 310.1               | 372                 |

**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:**

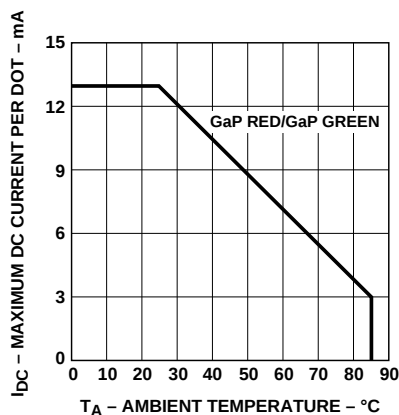
1. Hue categories are established for classification of products. Products may not be available in all bin categories.
2. Tolerance for each intensity bin limit is  $\pm 10\%$ .

**Color Bin Limits (nm)<sup>[1]</sup>****GaP Green**

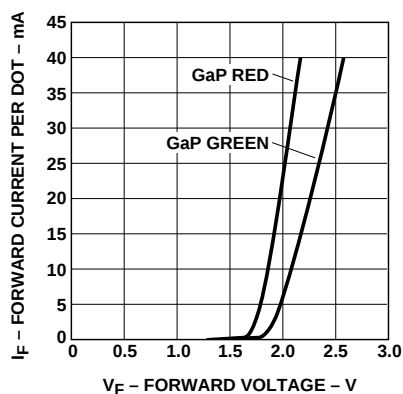
| Bin Name | Min. <sup>[2]</sup> | Max. <sup>[2]</sup> |
|----------|---------------------|---------------------|
| 3        | 569.1               | 571                 |
| 4        | 571.1               | 573                 |
| 5        | 573.1               | 575                 |

**Notes:**

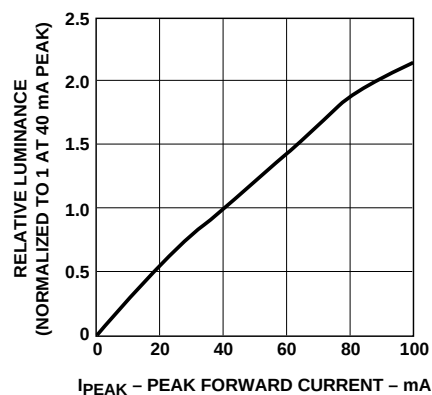
1. Bin categories are established for classification of products. Products may not be available in all bin categories.
2. Tolerance for each color bin limit is  $\pm 1.0$  nm.



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



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



**Figure 3. 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 datasheet *31.8 mm General Purpose 5 x 7 Dot Matrix Alphanumeric Displays*.

