

# Agilent HDSP-S5xE, HDSP-S5xG, HDSP-B5xZ Series 91.44 mm (3.6 inch) General Purpose 5 x 7 Dot Matrix Alphanumeric Displays

## Data Sheet



### Description

These displays have a 91.44 mm (3.6 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 or GaP Green colors.

The Bi-color display consists of GaP Red 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.

### Features

- **5 x 7 Dot matrix font**
- **Stackable horizontally**
- **Pin-out**
  - 76.2 mm (3.0 in.) Dual-In-Line (DIP) leads on 5.08 mm (0.2 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:**
  - Single color: luminous intensity
  - Bi-Color: luminance
- **Green categorized for color**

### Devices

GaP Red HDSP-	GaP Green HDSP-	Description
S53E	S53G	91.44 mm Black Surface Common Row Anode
S58E	S58G	91.44 mm Black Surface Common Row Cathode
B53Z		91.44 mm Black Surface Bi-Color Common Row Anode
B58Z		91.44 mm Black Surface Bi-Color Common Row Cathode

### Note:

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

### Applications

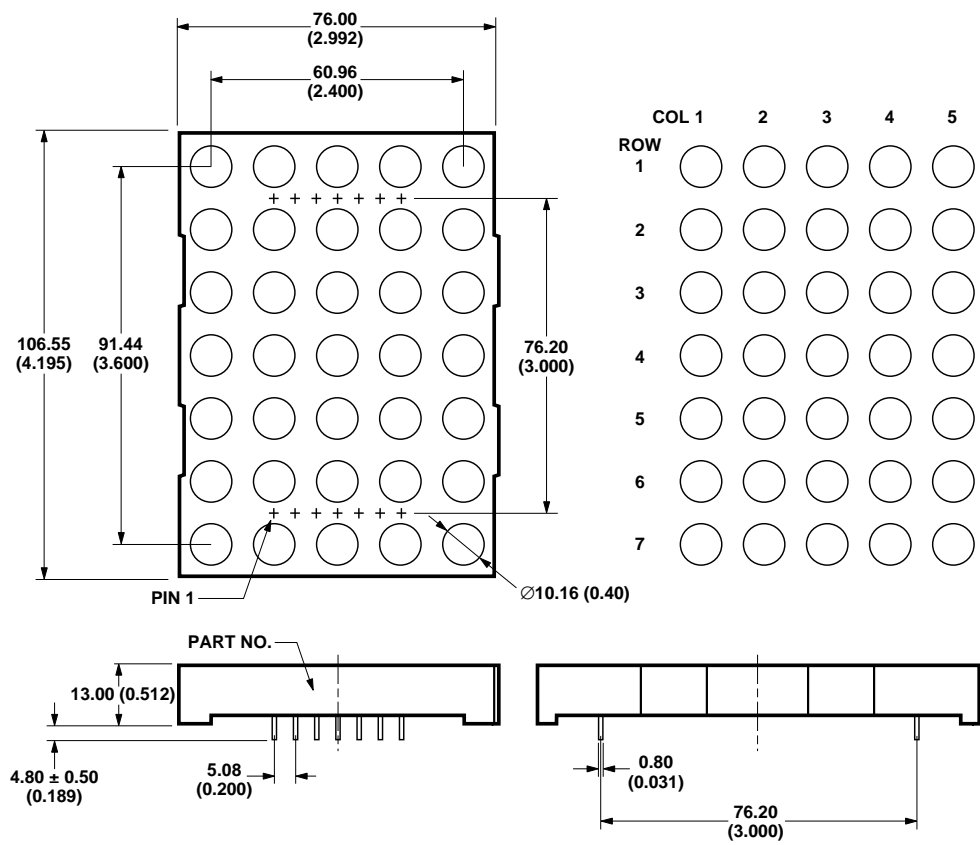
- **Suitable for indoor use**
- **Not recommended for industrial applications, i.e. operating temperature requirements exceeding 85°C or below -35°C**
- **Extreme temperature cycling not recommended<sup>[1]</sup>**



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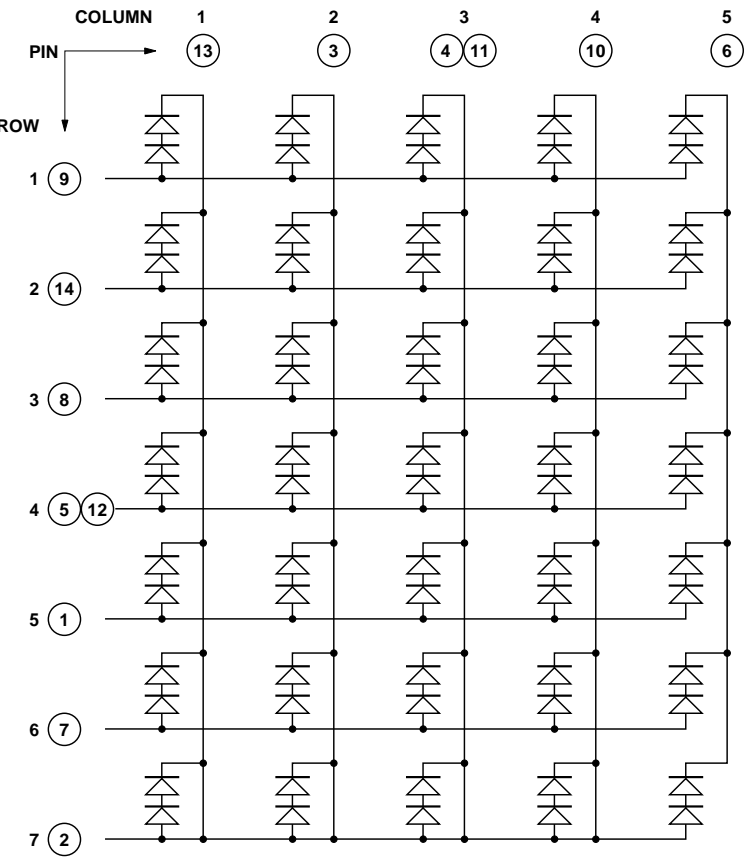
Package Dimensions

Single Color



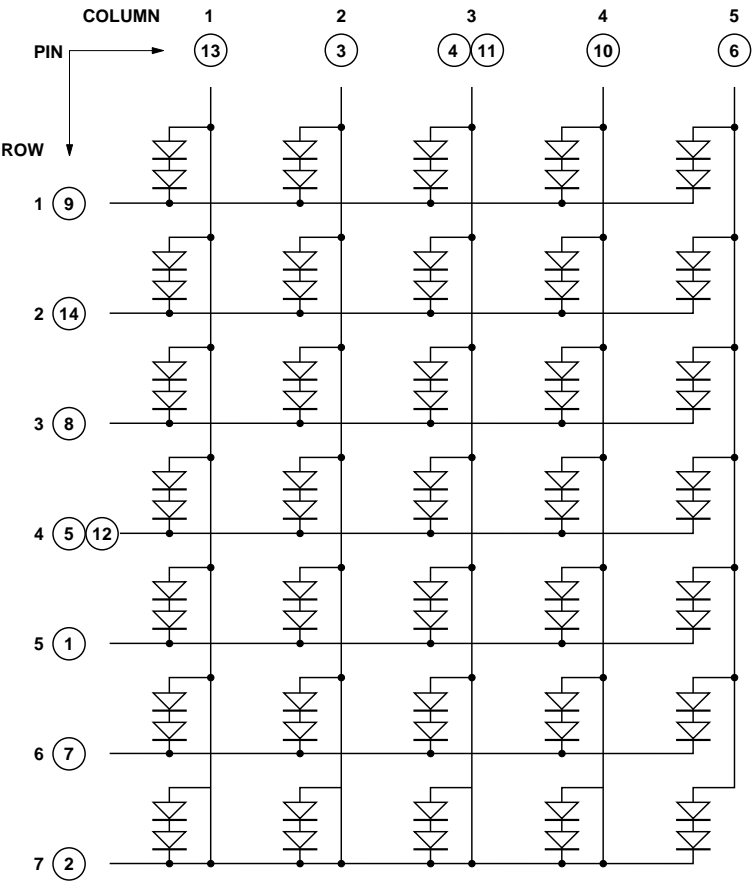
- NOTES:
- 1. ALL DIMENSIONS ARE IN MILLIMETERS (INCHES).
  - 2. UNLESS OTHERWISE STATED, TOLERANCES ARE  $\pm 0.25$  mm.

**Internal Circuit Diagram**  
Common Row Anode – Single Color



PIN NO.	CONNECTION
1	ANODE ROW 5
2	ANODE ROW 7
3	CATHODE COLUMN 2
4	CATHODE COLUMN 3
5	ANODE ROW 4
6	CATHODE COLUMN 5
7	ANODE ROW 6
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

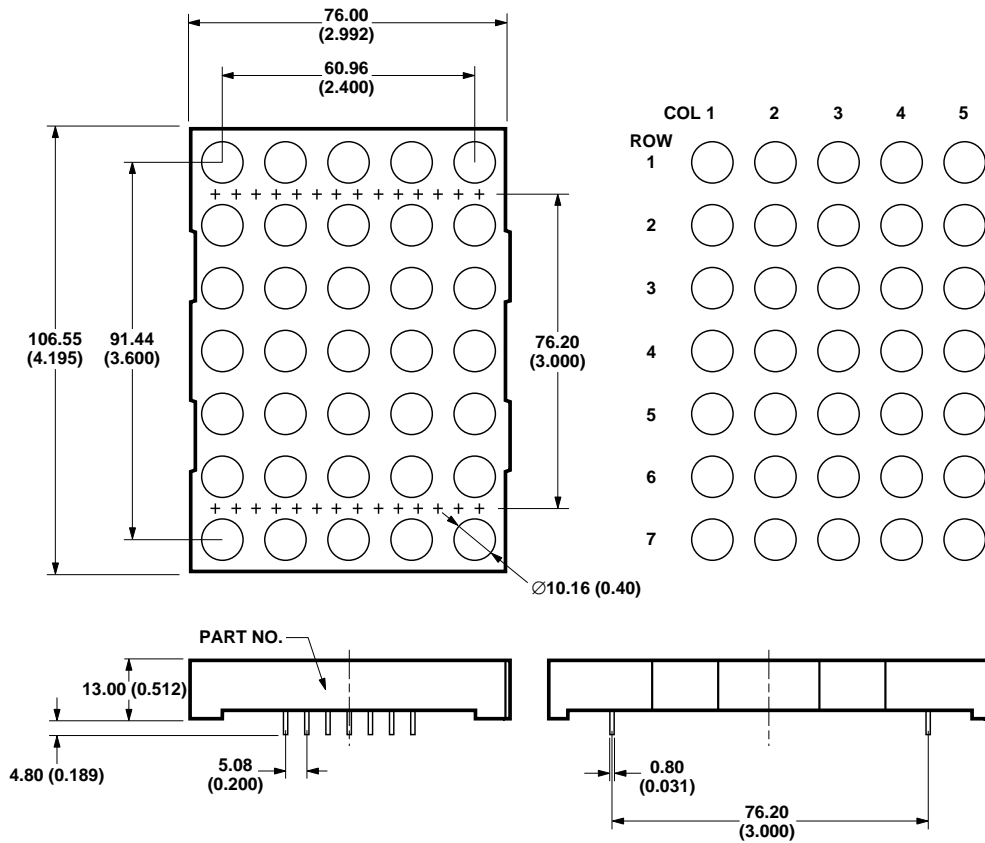
**Internal Circuit Diagram**  
Common Row Cathode – Single Color



PIN NO.	CONNECTION
1	CATHODE ROW 5
2	CATHODE ROW 7
3	ANODE COLUMN 2
4	ANODE COLUMN 3
5	CATHODE ROW 4
6	ANODE COLUMN 5
7	CATHODE ROW 6
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

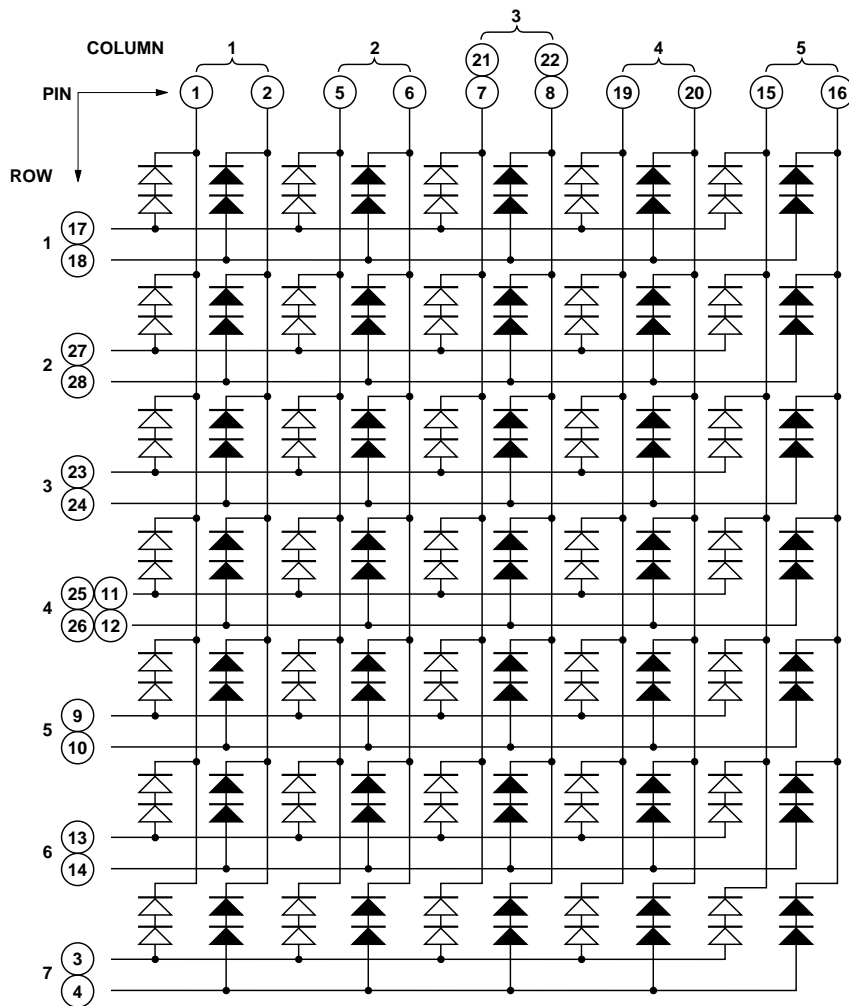


### NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS (INCHES).
2. UNLESS OTHERWISE STATED, TOLERANCES ARE  $\pm 0.25$  mm.

## Internal Circuit Diagram

Common Row Anode – Bi-Color

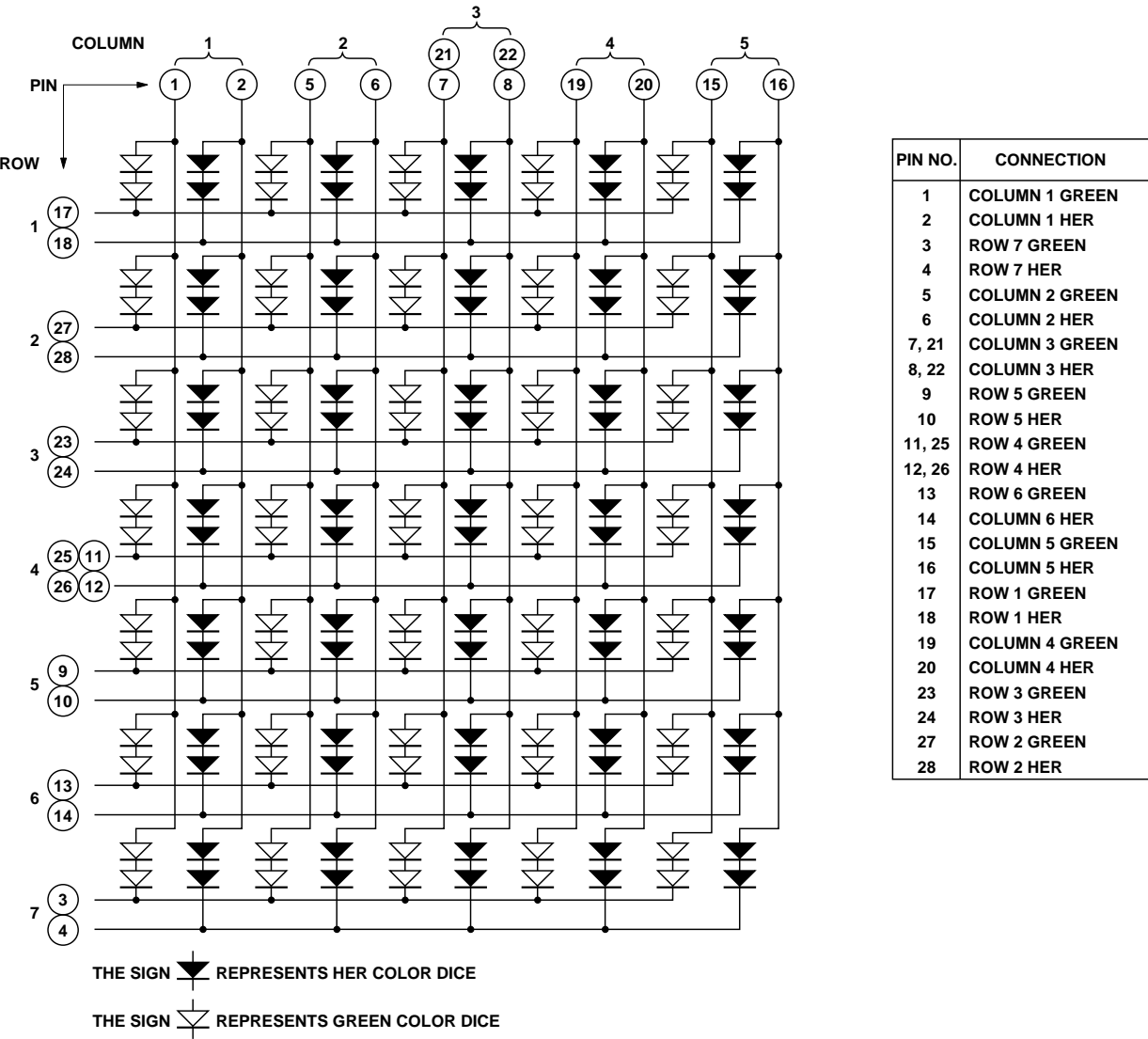


THE SIGN  REPRESENTS HER COLOR DICE

THE SIGN  REPRESENTS GREEN COLOR DICE

PIN NO.	CONNECTION
1	COLUMN 1 GREEN
2	COLUMN 1 HER
3	ROW 7 GREEN
4	ROW 7 HER
5	COLUMN 2 GREEN
6	COLUMN 2 HER
7, 21	COLUMN 3 GREEN
8, 22	COLUMN 3 HER
9	ROW 5 GREEN
10	ROW 5 HER
11, 25	ROW 4 GREEN
12, 26	ROW 4 HER
13	ROW 6 GREEN
14	COLUMN 6 HER
15	COLUMN 5 GREEN
16	COLUMN 5 HER
17	ROW 1 GREEN
18	ROW 1 HER
19	COLUMN 4 GREEN
20	COLUMN 4 HER
23	ROW 3 GREEN
24	ROW 3 HER
27	ROW 2 GREEN
28	ROW 2 HER

**Internal Circuit Diagram**  
Common Row Cathode – Bi-Color



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

Parameter	GaP Red HDSP-S53E/S58E/B53Z/B58Z	GaP Green HDSP-S53G/S58G/B53Z/B58Z	Units
Average Power per Dot <sup>[1]</sup>	130	130	mW
Peak Forward Current per Dot <sup>[1]</sup> (1/8 Duty Cycle at 10 KHz)	80	100	mA
Average Forward Current per Dot	25 <sup>[1,2]</sup>	25 <sup>[1,3]</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>[4]</sup> (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 0.20 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<sub>A</sub> = 25°C**  
**GaP Red**

Devices HDSP-	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
S53E S58E B53Z B58Z	Luminous Intensity/Unit (Digit Average) <sup>[1]</sup>	I <sub>V</sub>	2.2	4.0	7.47	mcd	I <sub>FP</sub> = 40 mA, 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>		4.1	5.2	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 Matching Ratio	I <sub>V-m</sub>			2:1		I <sub>FP</sub> = 40 mA, 1/8 Duty Factor

**GaP Green**

Devices HDSP-	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
S53G S58G B53Z B58Z	Luminous Intensity/Unit (Digit Average) <sup>[1]</sup>	I <sub>V</sub>	3.31	6.23	11.22	mcd	I <sub>FP</sub> = 40 mA, 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>		4.5	5.2	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 Matching Ratio	I <sub>V-m</sub>			2:1		I <sub>FP</sub> = 40 mA, 1/8 Duty Factor

**Bi-Color**

Devices HDSP-	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
B53Z B58Z	Luminance/Unit (Digit Average) <sup>[1]</sup>	I <sub>V</sub>	72.0	130	258.0	Cd/m <sup>2</sup>	I <sub>FP</sub> = 40 mA, 1/8 Duty Factor

**Notes:**

1. The digits are categorized for luminous intensity or luminance. The intensity or luminance 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.

**Intensity Bin Limits<sup>[1]</sup> (mcd at I<sub>FP</sub> = 40 mA, 1/8 Duty Factor)****GaP Red**

Bin Name	Min. <sup>[2]</sup>	Max. <sup>[2]</sup>
G	2.2	3.3
H	3.31	4.97
I	4.98	7.47

**GaP Green**

Bin Name	Min. <sup>[2]</sup>	Max. <sup>[2]</sup>
H	3.31	4.97
I	4.98	7.47
J	7.48	11.22

**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>
E	72	86
F	86	104
G	104.1	124
H	124.1	149
I	149.1	179
J	179.1	215
K	215.1	258

**Hue Grade**

Coordinate	4	5	6	Bin 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.

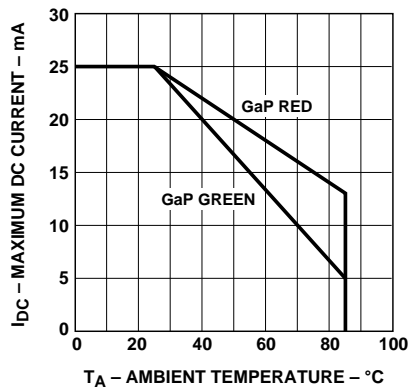


Figure 1. Maximum allowable average current per dot vs. ambient temperature.

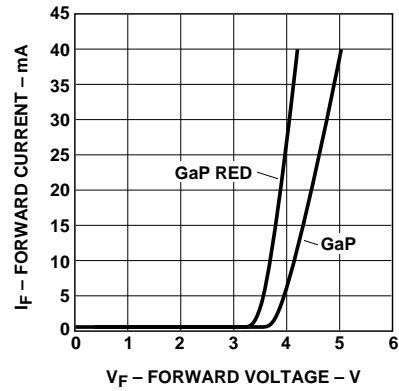


Figure 2. Forward current vs. forward voltage.

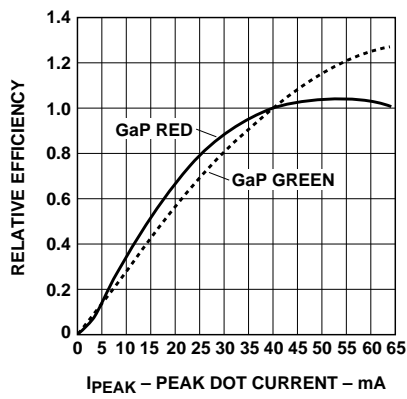


Figure 3. Relative efficiency (luminous intensity per dot) vs. peak current per dot.

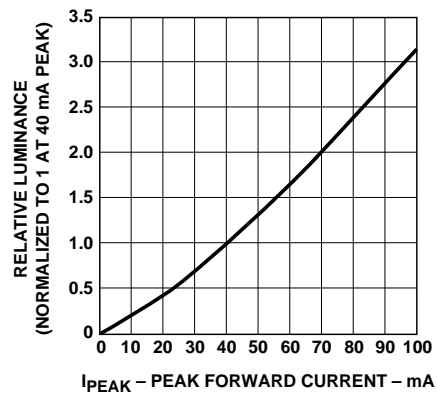


Figure 4. Relative luminance vs. peak forward current.

**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 *91.44 mm General Purpose 5 x 7 Dot Matrix Alphanumeric Displays*.

