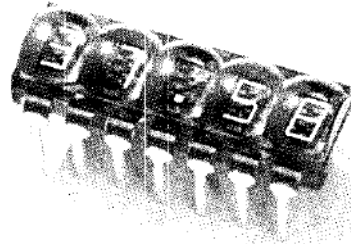


## Features

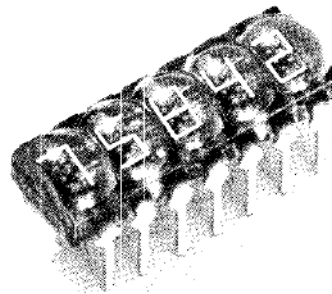
- **ULTRA LOW POWER**  
Excellent Readability at Only 500  $\mu$ A  
Average per Segment
- **CONSTRUCTED FOR STROBED OPERATION**  
Minimizes Lead Connections
- **STANDARD DIP PACKAGE**  
End Stackable  
Integral Red Contrast Filter  
Rugged Construction
- **CATEGORIZED FOR LUMINOUS INTENSITY**  
Assures Uniformity of Light Output from  
Unit to Unit within a Single Category
- **IC COMPATIBLE**



## Description

The HP 5082-7400 series are 2.79mm (.11"), seven segment GaAsP numeric indicators packaged in 3, 4, and 5 digit end-stackable clusters. An integral magnification technique increases the luminous intensity, thereby making ultra-low power consumption possible. Options include either the standard lower right hand decimal point or a centered decimal point for increased legibility in multi-cluster applications.

Applications include hand-held calculators, portable instruments, digital thermometers, or any other product requiring low power, low cost, minimum space, and long lifetime indicators.



## Device Selection Guide

| Digits per Cluster | Configuration                                                                       |  | Part Number          |                     |
|--------------------|-------------------------------------------------------------------------------------|--|----------------------|---------------------|
|                    | Device                                                                              |  | Center Decimal Point | Right Decimal Point |
| 3 (right)          |  |  | 5082-7402            | 5082-7412           |
| 3 (left)           |  |  | 5082-7403            | 5082-7413           |
| 4                  |  |  | 5082-7404            | 5082-7414           |
| 5                  |  |  | 5082-7405            | 5082-7415           |

## Absolute Maximum Ratings

| Parameter                                           | Symbol     | Min. | Max. | Units |
|-----------------------------------------------------|------------|------|------|-------|
| Peak Forward Current per Segment (Duration < 1msec) | $I_{PEAK}$ |      | 110  | mA    |
| Average Current per Segment                         | $I_{AVG}$  |      | 5    | mA    |
| Power Dissipation per Digit <sup>(1)</sup>          | $P_D$      |      | 80   | mW    |
| Operating Temperature, Ambient                      | $T_A$      | -40  | 75   | °C    |
| Storage Temperature                                 | $T_S$      | -40  | 100  | °C    |
| Reverse Voltage                                     | $V_R$      |      | 5    | V     |

NOTES: 1. At 25°C; derate 1mW/°C above 25°C ambient. 2. See Mechanical Section for recommended flux removal solvents.

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

| Parameter                                                          | Symbol           | Test Condition                                                          | Min. | Typ. | Max. | Units          |
|--------------------------------------------------------------------|------------------|-------------------------------------------------------------------------|------|------|------|----------------|
| Luminous Intensity/Segment or dp <sup>(3)</sup><br>(Time Averaged) | $I_V$            | $I_{AVG} = 1\text{mA}$<br>( $I_{PK} = 10\text{mA}$<br>duty cycle = 10%) | 5    | 20   |      | $\mu\text{cd}$ |
| Peak Wavelength                                                    | $\lambda_{PEAK}$ |                                                                         |      | 655  |      | nm             |
| Forward Voltage/Segment or dp                                      | $V_F$            | $I_F = 10\text{mA}$                                                     |      | 1.6  | 2.0  | V              |
| Reverse Current/Segment or dp                                      | $I_R$            | $V_R = 5\text{V}$                                                       |      |      | 100  | $\mu\text{A}$  |
| Rise and Fall Time <sup>(4)</sup>                                  | $t_r, t_f$       |                                                                         |      | 10   |      | ns             |

NOTES: 3. The digits are categorized for luminous intensity. Intensity categories are designated by a letter located on the back side of the package. 4. Time for a 10%-90% change of light intensity for step change in current.

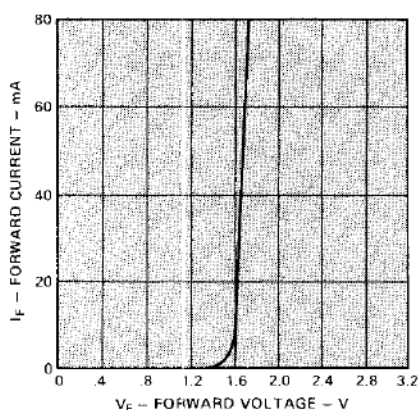


Figure 1. Forward Current vs. Forward Voltage.

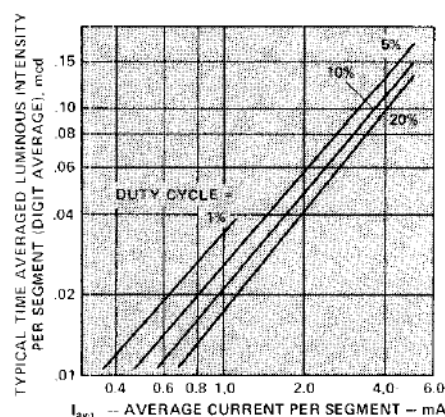


Figure 2. Typical Time Averaged Luminous Intensity per Segment (Digit Average) vs. Average Current per Segment.

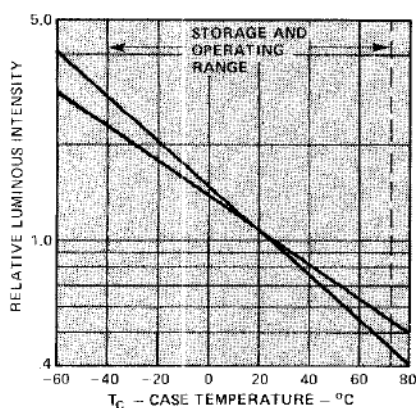


Figure 3. Relative Luminous Intensity vs. Case Temperature at Fixed Current Level.

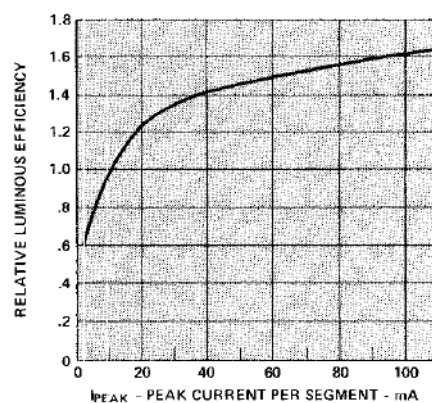


Figure 4. Relative Luminous Efficiency vs. Peak Current per Segment.

## Package Description

- NOTES: 1. Dimensions in millimeters and (inches).  
2. Tolerances on all dimensions are  $\pm 0.038\text{mm}$  ( $\pm 0.015$  in.) unless otherwise noted.

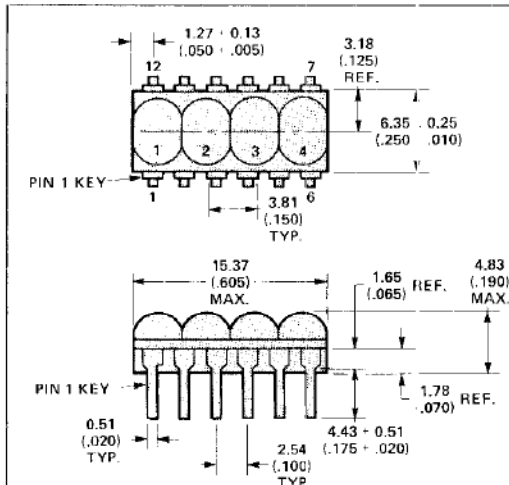


Figure 5. 5082-7402/-7403/-7404/  
-7412/-7413/-7414

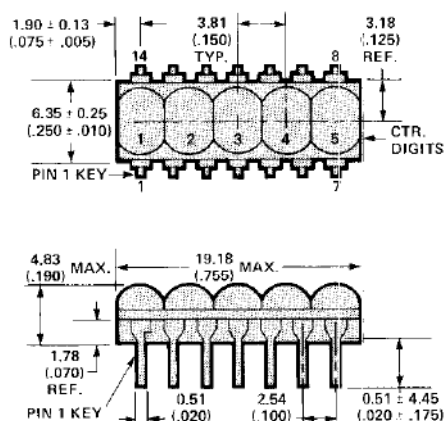
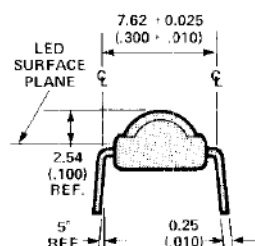


Figure 6. 5082-7405/7415



All Devices

## Magnified Character Font Description

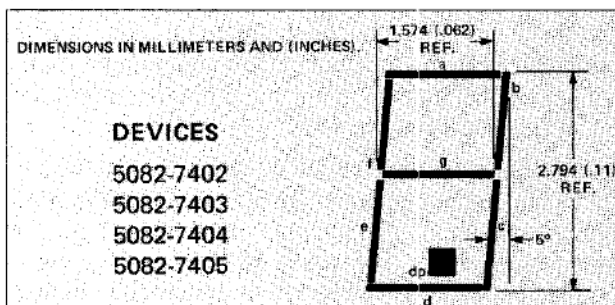


Figure 7. Center Decimal Point Configuration.

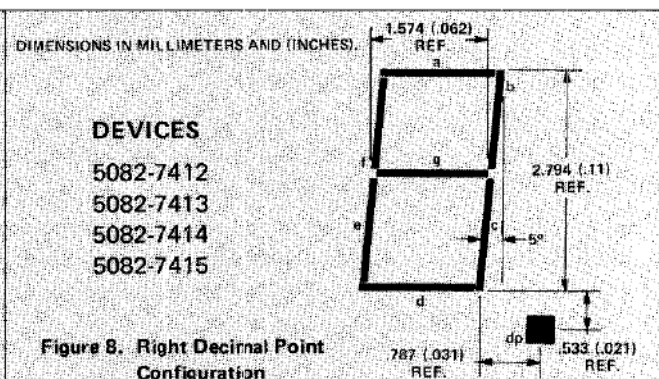


Figure 8. Right Decimal Point Configuration

## Device Pin Description

| PIN NO. | 5082-7402/7412<br>FUNCTION | 5082-7403/7413<br>FUNCTION | 5082-7404/7414<br>FUNCTION | 5082-7405/7415<br>FUNCTION |
|---------|----------------------------|----------------------------|----------------------------|----------------------------|
| 1       | N/C                        | CATHODE 1                  | CATHODE 1                  | CATHODE 1                  |
| 2       | ANODE e                    | ANODE e                    | ANODE e                    | ANODE e                    |
| 3       | ANODE c                    | ANODE c                    | ANODE c                    | ANODE c                    |
| 4       | CATHODE 3                  | CATHODE 3                  | CATHODE 3                  | CATHODE 3                  |
| 5       | ANODE dp                   | ANODE dp                   | ANODE dp                   | ANODE dp                   |
| 6       | CATHODE 4                  | N/C                        | CATHODE 4                  | ANODE d                    |
| 7       | ANODE g                    | ANODE g                    | ANODE g                    | CATHODE 5                  |
| 8       | ANODE d                    | ANODE d                    | ANODE d                    | ANODE g                    |
| 9       | ANODE f                    | ANODE f                    | ANODE f                    | CATHODE 4                  |
| 10      | CATHODE 2                  | CATHODE 2                  | CATHODE 2                  | ANODE f                    |
| 11      | ANODE b                    | ANODE b                    | ANODE b                    | (See Note 1)               |
| 12      | ANODE a                    | ANODE a                    | ANODE a                    | ANODE b                    |
| 13      | —                          | —                          | —                          | CATHODE 2                  |
| 14      | —                          | —                          | —                          | ANODE a                    |

Note 1. Leave Pin 11 unconnected.

## Electrical

Character encoding can be performed by commercially available BCD-7 segment decoder/driver circuits. Through the use of a strobing technique, only one decoder/driver is required for each display. In addition, the number of interconnection lines between the display and the drive circuitry is minimized to  $8 + N$ , where  $N$  is the number of characters in the display.

Each of the segments on the display is "addressable" on two sets of lines – the "character enable" lines and the "segment enable" lines. Displays are wired so that all of the cathodes of all segments comprising one character are wired together to a single character enable line. Similarly, the anodes of each of like segments (e.g., all of the decimal points, all of the center line anodes, etc.) are wired to a single line. Therefore, a single digit in the cluster can be illuminated by connecting the appropriate character enable line, with the appropriate segment enable lines for the character being displayed. When each character in the display is illuminated in sequence, at a minimum of 100 times a second, flicker free characters are formed.

The decimal point in the 7412, 7413, 7414, and 7415 displays is located at the lower right of the digit for conventional driving schemes.

The 7402, 7403, 7404 and 7405 displays contain a centrally located decimal point which is activated in place of a digit. In long registers, this technique of setting off the decimal point significantly improves the display's readability. With respect to timing, the decimal point is treated as a separate

character with its own unique time frame.

A detailed discussion of display circuits and drive techniques appears in Application Note 937.

## Mechanical

The 5082-7400 series package is a standard 12 or 14 Pin DIP consisting of a plastic encapsulated lead frame with integral molded lenses. It is designed for plugging into DIP sockets or soldering into PC boards. The lead frame construction allows use of standard DIP insertion tools and techniques. Alignment problems are simplified due to the clustering of digits in a single package. The shoulders of the lead frame pins are intentionally raised above the bottom of the package to allow tilt mounting of up to  $20^\circ$  from the PC board.

To improve display contrast, the plastic incorporates a red dye that absorbs strongly at all visible wavelengths except the 655 nm emitted by the LED. In addition, the lead frames are selectively darkened to reduce reflectance. An additional filter, such as Plexiglass 2423, Panelgraphic 60 or 63, and Homalite 100-1600, will further lower the ambient reflectance and improve display contrast.

The devices can be soldered for up to 5 seconds at a maximum solder temperature of  $230^\circ\text{C}$  ( $1/16''$  below the seating plane). The plastic encapsulant used in these displays may be damaged by some solvents commonly used for flux removal. It is recommended that only Freon TE, Freon TE-35, Freon TF, Isopropanol, or soap and water be used for cleaning operations.

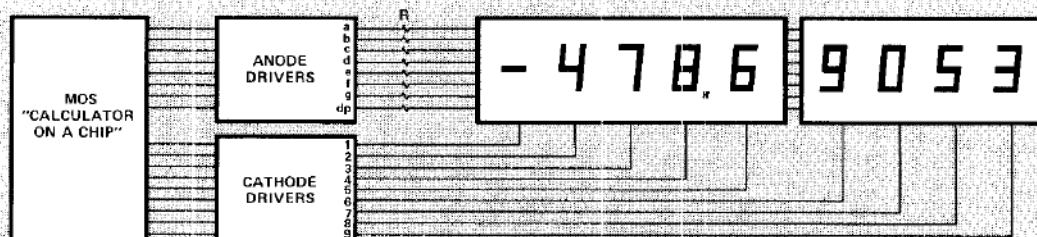


Figure 9. Block Diagram for Calculator Display Using Lower Right Hand Decimal Point.

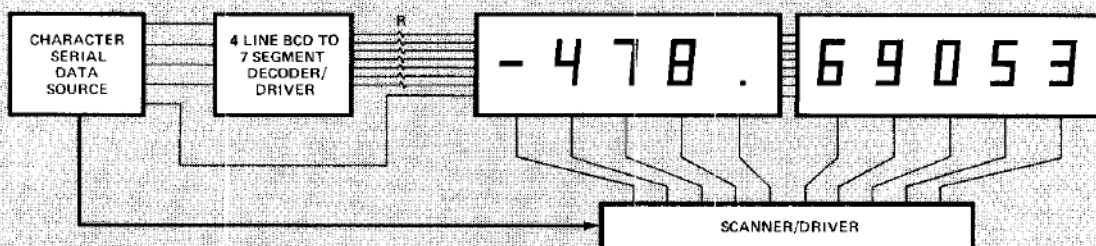


Figure 10. Block Diagram for Display Using Center Decimal Point.