

# Low Current Seven Segment Displays

## Technical Data

HDSP-335X Series  
HDSP-555X Series  
HDSP-751X Series  
HDSP-A10X Series  
HDSP-A80X Series  
HDSP-A90X Series  
HDSP-E10X Series  
HDSP-F10X Series  
HDSP-G10X Series  
HDSP-H10X Series  
HDSP-K12X, K70X Series  
HDSP-N10X Series

### Features

- **Low Power Consumption**
- **Industry Standard Size**
- **Industry Standard Pinout**
- **Choice of Character Size**  
7.6 mm (0.30 in), 10 mm (0.40 in), 10.9 mm (0.43 in), 14.2 mm (0.56 in), 20 mm (0.80 in)
- **Choice of Colors**  
AlGaAs Red, High Efficiency Red (HER), Yellow, Green
- **Excellent Appearance**  
Evenly Lighted Segments  
 $\pm 50^\circ$  Viewing Angle
- **Design Flexibility**  
Common Anode or Common Cathode  
Single and Dual Digit  
Left and Right Hand Decimal Points  
 $\pm 1$ . Overflow Character
- **Categorized for Luminous Intensity**  
Yellow and Green Categorized for Color  
Use of Like Categories Yields a Uniform Display
- **Excellent for Long Digit String Multiplexing**

### Description

These low current seven segment displays are designed for applications requiring low power consumption. They are tested and selected for their excellent low current characteristics to ensure that the segments are matched at low currents. Drive currents as low as 1 mA per segment are available.

Pin for pin equivalent displays are also available in a standard current or high light ambient design. The standard current displays are available in all colors and are ideal for most applications. The high light ambient displays are ideal for sunlight ambients or long string lengths. For additional information see the 7.6 mm Micro Bright Seven Segment Displays, 10 mm Seven Segment Displays, 7.6 mm/10.9 mm Seven Segment Displays, 14.2 mm Seven Segment Displays, 20 mm Seven Segment Displays, or High Light Ambient Seven Segment Displays data sheets.



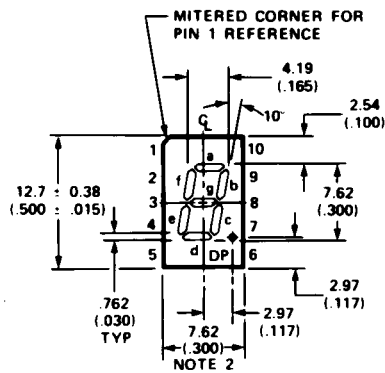
## Devices

| AlGaAs HDSP- | HER HDSP- | Yellow HDSP- | Green HDSP- | Description   | Package Drawing |
|--------------|-----------|--------------|-------------|---|-----------------|
| A101         | 7511      | A801         | A901        | 7.6 mm Common Anode Right Hand Decimal              | A               |
| A103         | 7513      | A803         | A903        | 7.6 mm Common Cathode Right Hand Decimal            | B               |
| A107         | 7517      | A807         | A907        | 7.6 mm Common Anode ± 1. Overflow                   | C               |
| A108         | 7518      | A808         | A908        | 7.6 mm Common Cathode ± 1. Overflow                 | D               |
| F101         |           |              |             | 10 mm Common Anode Right Hand Decimal               | E               |
| F103         |           |              |             | 10 mm Common Cathode Right Hand Decimal             | F               |
| F107         |           |              |             | 10 mm Common Anode ± 1. Overflow                    | G               |
| F108         |           |              |             | 10 mm Common Cathode ± 1. Overflow                  | H               |
| G101         |           |              |             | 10 mm Two Digit Common Anode Right Hand Decimal     | X               |
| G103         |           |              |             | 10 mm Two Digit Common Cathode Right Hand Decimal   | Y               |
| E100         | 3350      |              |             | 10.9 mm Common Anode Left Hand Decimal              | I               |
| E101         | 3351      |              |             | 10.9 mm Common Anode Right Hand Decimal             | J               |
| E103         | 3353      |              |             | 10.9 mm Common Cathode Right Hand Decimal           | K               |
| E106         | 3356      |              |             | 10.9 mm Universal ± 1. Overflow <sup>[1]</sup>      | L               |
| H101         | 5551      |              |             | 14.2 mm Common Anode Right Hand Decimal             | M               |
| H103         | 5553      |              |             | 14.2 mm Common Cathode Right Hand Decimal           | N               |
| H107         | 5557      |              |             | 14.2 mm Common Anode ± 1. Overflow                  | O               |
| H108         | 5558      |              |             | 14.2 mm Common Cathode ± 1. Overflow                | P               |
| K121         | K701      |              |             | 14.2 mm Two Digit Common Anode Right Hand Decimal   | R               |
| K123         | K703      |              |             | 14.2 mm Two Digit Common Cathode Right Hand Decimal | S               |
| N100         |           |              |             | 20 mm Common Anode Left Hand Decimal                | Q               |
| N101         |           |              |             | 20 mm Common Anode Right Hand Decimal               | T               |
| N103         |           |              |             | 20 mm Common Cathode Right Hand Decimal             | U               |
| N105         |           |              |             | 20 mm Common Cathode Left Hand Decimal              | V               |
| N106         |           |              |             | 20 mm Universal ± 1. Overflow <sup>[1]</sup>        | W               |

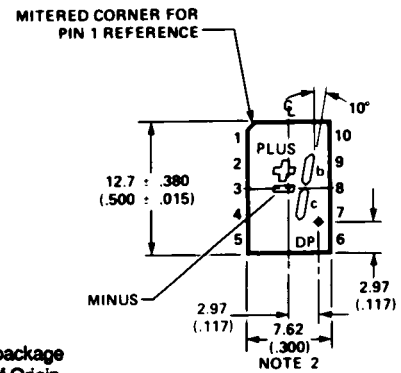
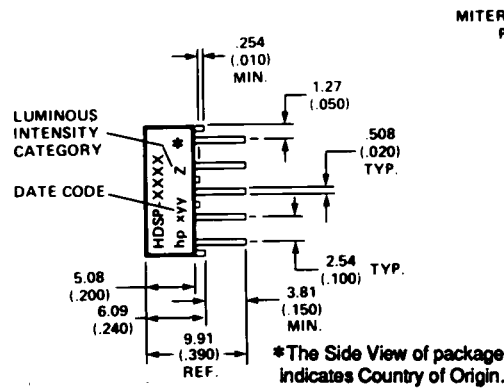
### Note:

1. Universal pinout brings the anode and cathode of each segment's LED out to separate pins. See internal diagrams L or W.

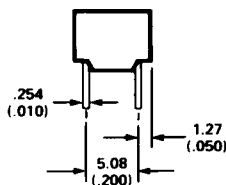
## Package Dimensions



A, B



C, D



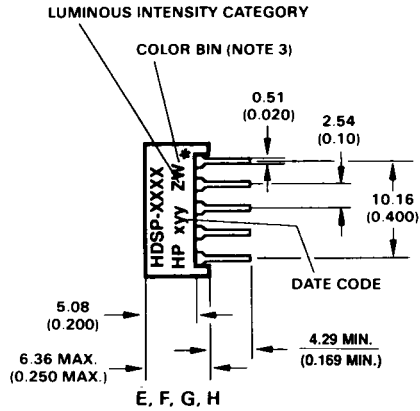
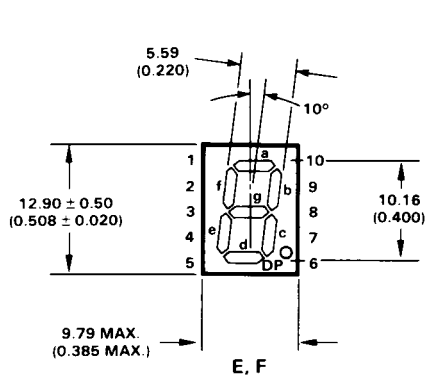
A, B, C, D

| PIN | FUNCTION             |                        |                      |                        |
|-----|----------------------|------------------------|----------------------|------------------------|
|     | A                    | B                      | C                    | D                      |
| 1   | ANODE <sup>[4]</sup> | CATHODE <sup>[5]</sup> | ANODE <sup>[4]</sup> | CATHODE <sup>[5]</sup> |
| 2   | CATHODE f            | ANODE f                | CATHODE PLUS         | ANODE PLUS             |
| 3   | CATHODE g            | ANODE g                | CATHODE MINUS        | ANODE MINUS            |
| 4   | CATHODE e            | ANODE e                | NC                   | NC                     |
| 5   | CATHODE d            | ANODE d                | NC                   | NC                     |
| 6   | ANODE <sup>[4]</sup> | CATHODE <sup>[5]</sup> | ANODE <sup>[4]</sup> | CATHODE <sup>[5]</sup> |
| 7   | CATHODE DP           | ANODE DP               | CATHODE DP           | ANODE DP               |
| 8   | CATHODE c            | ANODE c                | CATHODE c            | ANODE c                |
| 9   | CATHODE b            | ANODE b                | CATHODE b            | ANODE b                |
| 10  | CATHODE a            | ANODE a                | NC                   | NC                     |

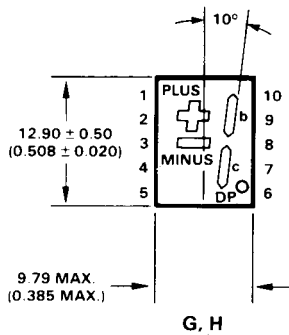
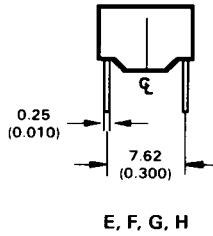
### NOTES:

1. ALL DIMENSIONS IN MILLIMETRES (INCHES).
2. MAXIMUM.
3. ALL UNTOLERANCED DIMENSIONS ARE FOR REFERENCE ONLY.
4. REDUNDANT ANODES.
5. REDUNDANT CATHODES.

## Package Dimensions (cont.)



\* The Side View of package indicates Country of Origin.

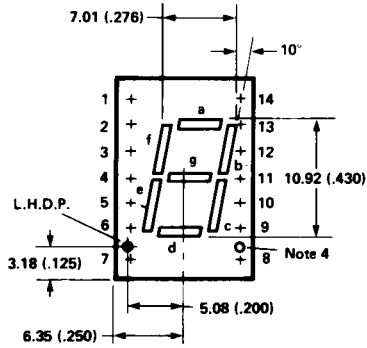


| PIN | FUNCTION             |                        |                      |                        |
|-----|----------------------|------------------------|----------------------|------------------------|
|     | E                    | F                      | G                    | H                      |
| 1   | ANODE <sup>(1)</sup> | CATHODE <sup>(2)</sup> | ANODE <sup>(1)</sup> | CATHODE <sup>(2)</sup> |
| 2   | CATHODE f            | ANODE f                | CATHODE PLUS         | ANODE PLUS             |
| 3   | CATHODE g            | ANODE g                | CATHODE MINUS        | ANODE MINUS            |
| 4   | CATHODE e            | ANODE e                | NC                   | NC                     |
| 5   | CATHODE d            | ANODE d                | NC                   | NC                     |
| 6   | ANODE <sup>(1)</sup> | CATHODE <sup>(2)</sup> | ANODE <sup>(1)</sup> | CATHODE <sup>(2)</sup> |
| 7   | CATHODE DP           | ANODE DP               | CATHODE DP           | ANODE DP               |
| 8   | CATHODE c            | ANODE c                | CATHODE c            | ANODE c                |
| 9   | CATHODE b            | ANODE b                | CATHODE b            | ANODE b                |
| 10  | CATHODE a            | ANODE a                | NC                   | NC                     |

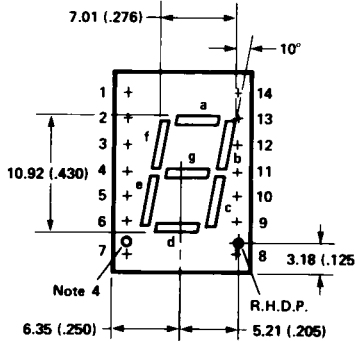
### NOTES:

1. ALL DIMENSIONS IN MILLIMETRES (INCHES).
2. ALL UNTOLERANCED DIMENSIONS ARE FOR REFERENCE ONLY.
3. FOR YELLOW AND GREEN SERIES PRODUCT ONLY.
4. REDUNDANT ANODES.
5. REDUNDANT CATHODES.

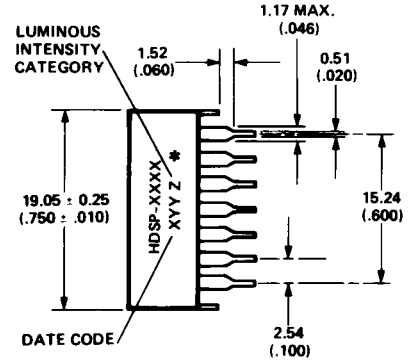
# Package Dimensions (cont.)



I  
FRONT VIEW

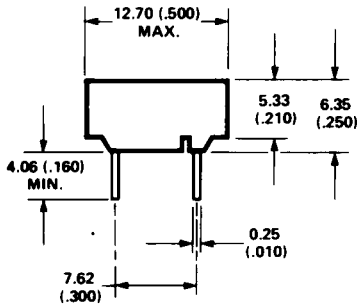


J, K  
FRONT VIEW



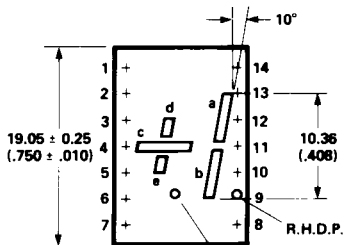
SIDE VIEW

\*The Side View of package indicates Country of Origin.



END VIEW

| PIN | FUNCTION                |                         |                         |            |
|-----|-------------------------|-------------------------|-------------------------|------------|
|     | I                       | J                       | K                       | L          |
| 1   | CATHODE-a               | CATHODE-a               | ANODE-a                 | CATHODE-d  |
| 2   | CATHODE-f               | CATHODE-f               | ANODE-f                 | ANODE-d    |
| 3   | ANODE <sup>[3]</sup>    | ANODE <sup>[3]</sup>    | CATHODE <sup>[6]</sup>  | NO PIN     |
| 4   | NO PIN                  | NO PIN                  | NO PIN                  | CATHODE-c  |
| 5   | NO PIN                  | NO PIN                  | NO PIN                  | CATHODE-e  |
| 6   | CATHODE-dp              | NO CONN. <sup>[5]</sup> | NO CONN. <sup>[5]</sup> | ANODE-e    |
| 7   | CATHODE-e               | CATHODE-e               | ANODE-e                 | ANODE-c    |
| 8   | CATHODE-d               | CATHODE-d               | ANODE-d                 | ANODE-dp   |
| 9   | NO CONN. <sup>[5]</sup> | CATHODE-dp              | ANODE-dp                | CATHODE-dp |
| 10  | CATHODE-c               | CATHODE-c               | ANODE-c                 | CATHODE-b  |
| 11  | CATHODE-g               | CATHODE-g               | ANODE-g                 | CATHODE-a  |
| 12  | NO PIN                  | NO PIN                  | NO PIN                  | NO PIN     |
| 13  | CATHODE-b               | CATHODE-b               | ANODE-b                 | ANODE-a    |
| 14  | ANODE <sup>[3]</sup>    | ANODE <sup>[3]</sup>    | CATHODE <sup>[6]</sup>  | ANODE-b    |

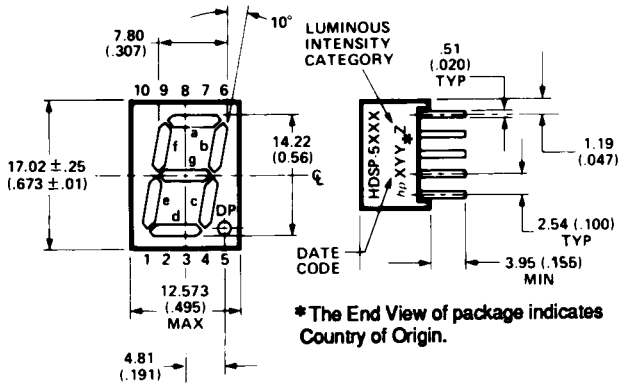


L  
NOTE [4]

### NOTES:

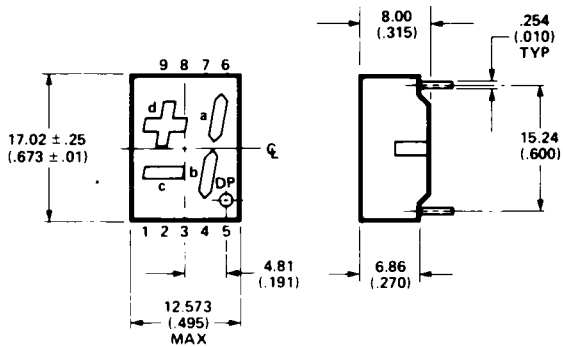
1. ALL DIMENSIONS IN MILLIMETRES (INCHES).
2. ALL UNTOLERANCED DIMENSIONS ARE FOR REFERENCE ONLY.
3. REDUNDANT ANODES.
4. UNUSED dp POSITION.
5. SEE INTERNAL CIRCUIT DIAGRAM.
6. REDUNDANT CATHODES.
7. SEE PART NUMBER TABLE FOR L.H.D.P. AND R.H.D.P. DESIGNATION.

## Package Dimensions (cont.)



M, N  
FRONT VIEW

M, N, O, P  
TOP END VIEW



FRONT VIEW O, P

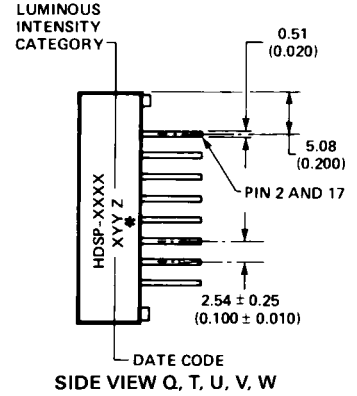
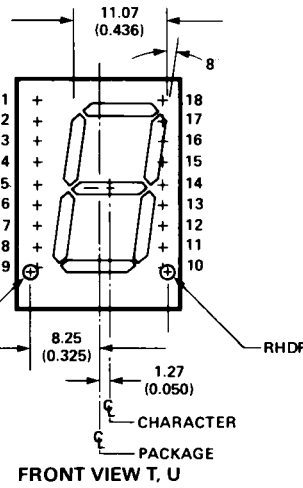
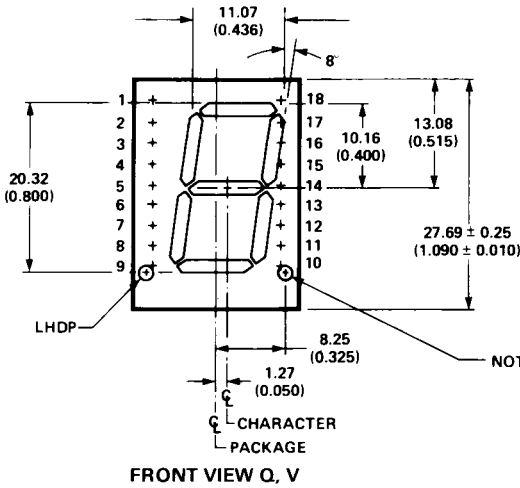
SIDE VIEW M, N, O, P

| PIN | FUNCTION   |            |                |                  |
|-----|------------|------------|----------------|------------------|
|     | M          | N          | O              | P                |
| 1   | CATHODE e  | ANODE e    | CATHODE c      | ANODE c          |
| 2   | CATHODE d  | ANODE d    | ANODE c, d     | CATHODE c, d     |
| 3   | ANODE[4]   | CATHODE[5] | CATHODE b      | ANODE b          |
| 4   | CATHODE c  | ANODE c    | ANODE a, b, DP | CATHODE a, b, DP |
| 5   | CATHODE DP | ANODE DP   | CATHODE DP     | ANODE DP         |
| 6   | CATHODE b  | ANODE b    | CATHODE a      | ANODE a          |
| 7   | CATHODE a  | ANODE a    | ANODE a, b, DP | CATHODE a, b, DP |
| 8   | ANODE[4]   | CATHODE[5] | ANODE c, d     | CATHODE c, d     |
| 9   | CATHODE f  | ANODE f    | CATHODE d      | ANODE d          |
| 10  | CATHODE g  | ANODE g    | NO PIN         | NO PIN           |

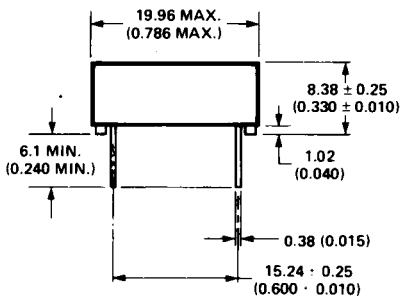
### NOTES:

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2. MAXIMUM.
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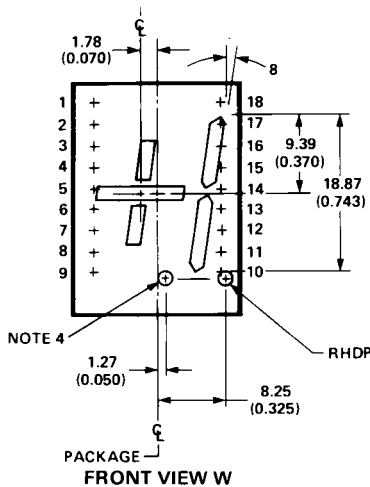
# Package Dimensions (cont.)



\*The Side View of package indicates Country of Origin.



END VIEW Q, T, U, V, W

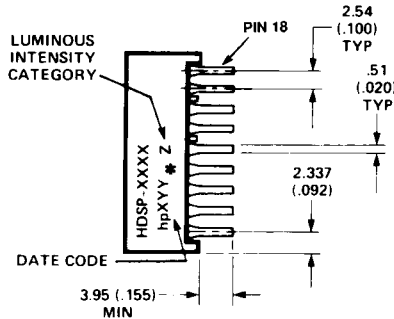


| Pin | Function             |                      |                        |                        |            |
|-----|----------------------|----------------------|------------------------|------------------------|------------|
|     | Q                    | T                    | U                      | V                      | W          |
| 1   | NO PIN               | NO PIN               | NO PIN                 | NO PIN                 | NO PIN     |
| 2   | CATHODE a            | CATHODE a            | ANODE a                | ANODE a                | CATHODE a  |
| 3   | CATHODE f            | CATHODE f            | ANODE f                | ANODE f                | ANODE d    |
| 4   | ANODE <sup>[3]</sup> | ANODE <sup>[3]</sup> | CATHODE <sup>[6]</sup> | CATHODE <sup>[6]</sup> | CATHODE d  |
| 5   | CATHODE e            | CATHODE e            | ANODE e                | ANODE e                | CATHODE c  |
| 6   | ANODE <sup>[3]</sup> | ANODE <sup>[3]</sup> | CATHODE <sup>[6]</sup> | CATHODE <sup>[6]</sup> | CATHODE e  |
| 7   | CATHODE dp           | NO CONNEC            | NO CONNEC              | ANODE dp               | ANODE e    |
| 8   | NO PIN               | NO PIN               | NO PIN                 | NO PIN                 | CATHODE dp |
| 9   | NO PIN               | NO PIN               | NO PIN                 | NO PIN                 | NO PIN     |
| 10  | NO PIN               | CATHODE dp           | ANODE dp               | NO PIN                 | ANODE dp   |
| 11  | CATHODE d            | CATHODE d            | ANODE d                | ANODE d                | CATHODE dp |
| 12  | ANODE <sup>[3]</sup> | ANODE <sup>[3]</sup> | CATHODE <sup>[6]</sup> | CATHODE <sup>[6]</sup> | CATHODE b  |
| 13  | CATHODE c            | CATHODE c            | ANODE c                | ANODE c                | ANODE b    |
| 14  | CATHODE g            | CATHODE g            | ANODE g                | ANODE g                | ANODE c    |
| 15  | CATHODE b            | CATHODE b            | ANODE b                | ANODE b                | ANODE a    |
| 16  | NO PIN               | NO PIN               | NO PIN                 | NO PIN                 | NO PIN     |
| 17  | ANODE <sup>[3]</sup> | ANODE <sup>[3]</sup> | CATHODE <sup>[6]</sup> | CATHODE <sup>[6]</sup> | CATHODE a  |
| 18  | NO PIN               | NO PIN               | NO PIN                 | NO PIN                 | NO PIN     |

### NOTES:

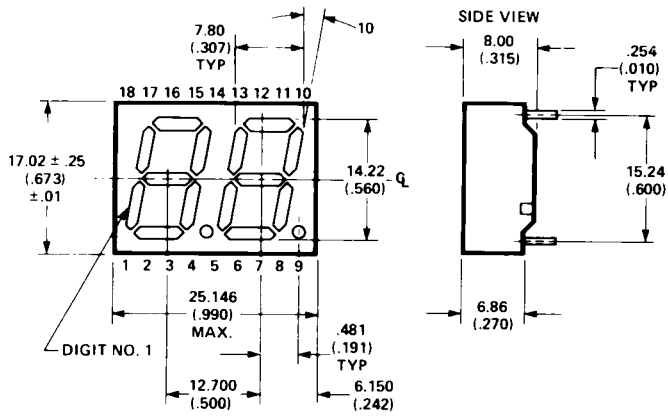
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3. REDUNDANT ANODES.
4. UNUSED dp POSITION.
5. SEE INTERNAL CIRCUIT DIAGRAM.
6. REDUNDANT CATHODES.
7. SEE PART NUMBER TABLE FOR L.H.D.P. AND R.H.D.P. DESIGNATION.

## Package Dimensions (cont.)

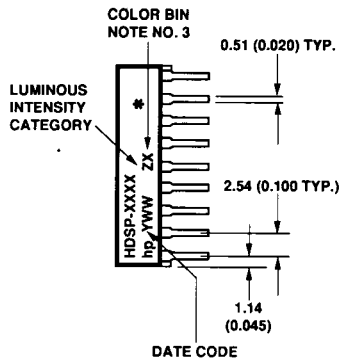


TOP END VIEW R, S

\*The Side View of package indicates Country of Origin.

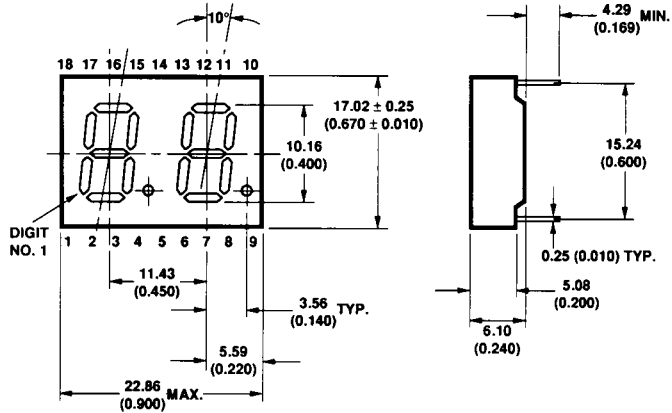


FRONT VIEW R, S



TOP END VIEW X, Y

\*The Side View of package indicates Country of Origin.



FRONT VIEW X, Y

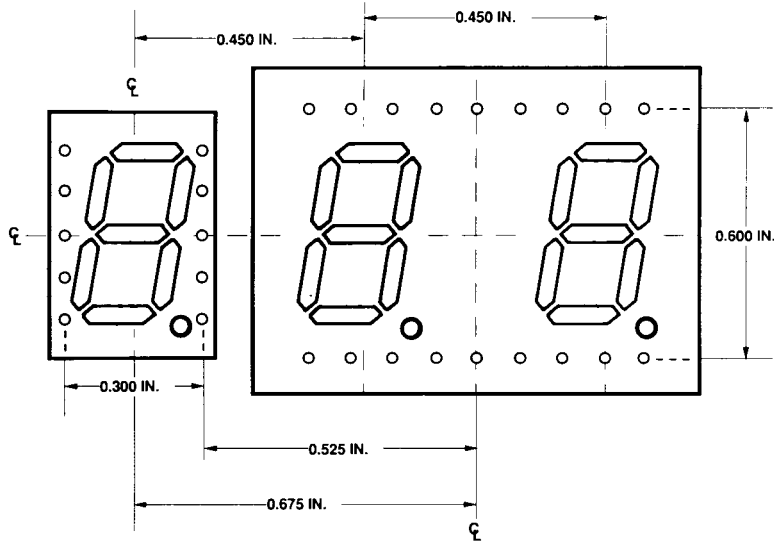
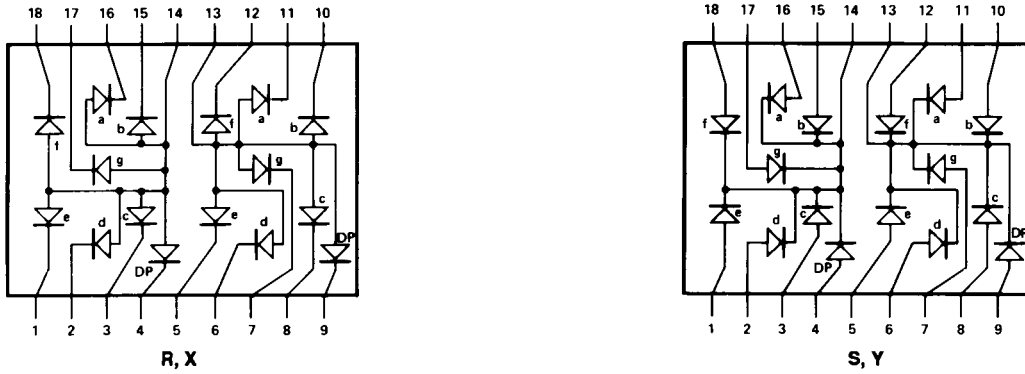
| Pin | Function          |                     |
|-----|-------------------|---------------------|
|     | R,X               | S,Y                 |
| 1   | E CATHODE NO. 1   | E ANODE NO. 1       |
| 2   | D CATHODE NO. 1   | D ANODE NO. 1       |
| 3   | C CATHODE NO. 1   | C ANODE NO. 1       |
| 4   | DP CATHODE NO. 1  | DP ANODE NO. 1      |
| 5   | E CATHODE NO. 2   | E ANODE NO. 2       |
| 6   | D CATHODE NO. 2   | D ANODE NO. 2       |
| 7   | G CATHODE NO. 2   | G ANODE NO. 2       |
| 8   | C CATHODE NO. 2   | C ANODE NO. 2       |
| 9   | DP CATHODE NO. 2  | DP ANODE NO. 2      |
| 10  | B CATHODE NO. 2   | B ANODE NO. 2       |
| 11  | A CATHODE NO. 2   | A ANODE NO. 2       |
| 12  | F CATHODE NO. 2   | F ANODE NO. 2       |
| 13  | DIGIT NO. 2 ANODE | DIGIT NO. 2 CATHODE |
| 14  | DIGIT NO. 1 ANODE | DIGIT NO. 1 CATHODE |
| 15  | B CATHODE NO. 1   | B ANODE NO. 1       |
| 16  | A CATHODE NO. 1   | A ANODE NO. 1       |
| 17  | G CATHODE NO. 1   | G ANODE NO. 1       |
| 18  | F CATHODE NO. 1   | F ANODE NO. 1       |

NOTES:  
 1. DIMENSIONS ARE IN MILLIMETRES (INCHES).  
 2. ALL UNTOLERANCED DIMENSIONS ARE FOR REFERENCE ONLY.  
 3. WHERE APPLICABLE.





**Internal Circuit Diagram (cont.)**



HOLE PATTERN FOR PCB LAYOUT TO ACHIEVE UNIFORM 0.450 in. DIGIT TO DIGIT PITCH. FOR HDSP-FXXX TO HDSP-GXXX.

**Absolute Maximum Ratings**

| Description   | AlGaAs Red<br>HDSP-A10X/E10X/<br>H10X/K12X/N10X/<br>F10X, G10X Series | HER<br>HDSP-751X/<br>335X/555X/<br>K70X Series | Yellow<br>HDSP-A80X<br>Series | Green<br>HDSP-A90X<br>Series | Units |
|---|---|--|-------------------------------|------------------------------|-------|
| Average Power per Segment or DP   | 37  | 52   |                               | 64                           | mW    |
| Peak Forward Current per Segment or DP  | 45  |  |                               |                              | mA    |
| DC Forward Current per Segment or DP  | 15 <sup>[1]</sup>   | 15 <sup>[2]</sup>                              |                               |                              | mA    |
| Operating Temperature Range   | -20 to +100   | -40 to +100                                    |                               |                              | °C    |
| Storage Temperature Range   | -55 to +100   |  |                               |                              | °C    |
| Reverse Voltage per Segment or DP   | 3.0   |  |                               |                              | V     |
| Lead Solder Temperature for 3 Seconds (1.60 mm [0.063 in.] below seating plane) | 260   |  |                               |                              | °C    |

**Notes:**

1. Derate above 91°C at 0.53 mA/°C.
2. Derate HER/Yellow above 80°C at 0.38 mA/°C and Green above 71°C at 0.31 mA/°C.

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

### AlGaAs Red

| Device Series HDSP- | Parameter  | Symbol                      | Min.                          | Typ.  | Max. | Units                  | Test Conditions        |                      |   |                          |
|---------------------|--|-----------------------------|-------------------------------|-------|------|------------------------|------------------------|----------------------|---|--------------------------|
| A10X                | Luminous Intensity/Segment <sup>[1,2]</sup><br>(Digit Average) | $I_V$                       | 315                           | 600   |      | $\mu\text{cd}$         | $I_F = 1 \text{ mA}$   |                      |   |                          |
| F10X, G10X          |  |                             |                               | 3600  |      |                        |                        | $I_F = 5 \text{ mA}$ |   |                          |
|                     |  |                             |                               | 330   | 650  |                        |                        | $I_F = 1 \text{ mA}$ |   |                          |
| E10X                |  |                             |                               | 390   | 650  |                        |                        | $I_F = 1 \text{ mA}$ |   |                          |
|                     |  |                             |                               |       | 3900 |                        |                        | $I_F = 5 \text{ mA}$ |   |                          |
| H10X, K12X          |  |                             |                               | 400   | 700  |                        |                        | $I_F = 1 \text{ mA}$ |   |                          |
|                     |  |                             |                               |       | 4200 |                        |                        | $I_F = 5 \text{ mA}$ |   |                          |
| N10X                |  |                             |                               | 270   | 590  |                        |                        | $I_F = 1 \text{ mA}$ |   |                          |
|                     |  |                             |                               |       | 3500 |                        |                        | $I_F = 5 \text{ mA}$ |   |                          |
| All Devices         |  |                             | Forward Voltage/Segment or DP | $V_F$ |      |                        | 1.6                    |                      | V | $I_F = 1 \text{ mA}$     |
|                     |  |                             |                               |       |      |                        | 1.7                    |                      |   | $I_F = 5 \text{ mA}$     |
|                     |  |                             |                               |       |      |                        | 1.8                    | 2.2                  |   | $I_F = 20 \text{ mA Pk}$ |
|                     | Peak Wavelength  | $\lambda_{\text{PEAK}}$     |                               | 645   |      | nm                     |                        |                      |   |                          |
|                     | Dominant Wavelength <sup>[3]</sup>                             | $\lambda_d$                 |                               | 637   |      | nm                     |                        |                      |   |                          |
|                     | Reverse Voltage/Segment or DP <sup>[4]</sup>                   | $V_R$                       | 3.0                           | 15    |      | V                      | $I_R = 100 \text{ mA}$ |                      |   |                          |
|                     | Temperature Coefficient of $V_F$ /Segment or DP                | $\Delta V_F/^\circ\text{C}$ |                               | -2 mV |      | mV/°C                  |                        |                      |   |                          |
| A10X                | Thermal Resistance LED<br>Junction-to-Pin                      | $R\theta_{\text{J-PIN}}$    |                               | 255   |      | $^\circ\text{C/W/Seg}$ |                        |                      |   |                          |
| F10X, G10X          |  |                             |                               | 320   |      |                        |                        |                      |   |                          |
| E10X                |  |                             |                               | 340   |      |                        |                        |                      |   |                          |
| H10X, K12X          |  |                             |                               | 400   |      |                        |                        |                      |   |                          |
| N10X                |  |                             |                               | 430   |      |                        |                        |                      |   |                          |

### High Efficiency Red

| Device Series HDSP- | Parameter  | Symbol              | Min. | Typ. | Max. | Units | Test Conditions           |
|---------------------|--|---------------------|------|------|------|-------|---------------------------|
| 751X                | Luminous Intensity/Segment <sup>[1,2]</sup><br>(Digit Average) | I <sub>V</sub>      | 160  | 270  |      | mcd   | I <sub>F</sub> = 2 mA     |
|                     |  |                     |      | 1050 |      |       | I <sub>F</sub> = 5 mA     |
| 335X, 555X,<br>K70X |  |                     | 200  | 300  |      |       | I <sub>F</sub> = 2 mA     |
|                     |  |                     |      | 1200 |      |       | I <sub>F</sub> = 5 mA     |
|                     |  |                     | 270  | 370  |      |       | I <sub>F</sub> = 2 mA     |
|                     |  |                     |      | 1480 |      |       | I <sub>F</sub> = 5 mA     |
| All Devices         | Forward Voltage/Segment or DP                                  | V <sub>F</sub>      |      | 1.6  |      | V     | I <sub>F</sub> = 2 mA     |
|                     |  |                     |      | 1.7  |      |       | I <sub>F</sub> = 5 mA     |
|                     |  |                     |      | 2.1  | 2.5  |       | I <sub>F</sub> = 20 mA Pk |
|                     | Peak Wavelength  | λ <sub>PEAK</sub>   |      | 635  |      | nm    |                           |
|                     | Dominant Wavelength <sup>[3]</sup>                             | λ <sub>d</sub>      |      | 626  |      | nm    |                           |
|                     | Reverse Voltage/Segment or DP <sup>[4]</sup>                   | V <sub>R</sub>      | 3.0  | 30   |      | V     | I <sub>R</sub> = 100 mA   |
|                     | Temperature Coefficient of V <sub>F</sub> /Segment or DP       | ΔV <sub>F</sub> /°C |      | -2   |      | mV/°C |                           |
| 751X                | Thermal Resistance LED<br>Junction-to-Pin                      | R <sub>θJ-PIN</sub> |      | 200  |      | °C/W  |                           |
| 335X                |  |                     |      | 280  |      |       |                           |
| 555X, K70X          |  |                     |      | 345  |      |       |                           |

## Yellow

| Device Series HDSP-                                      | Parameter  | Symbol            | Min.  | Typ. | Max.  | Units | Test Conditions           |
|--|--|-------------------|-------|------|-------|-------|---------------------------|
| A80X   | Luminous Intensity/Segment <sup>[1,2]</sup><br>(Digit Average) | I <sub>V</sub>    | 250   | 420  |       | mcd   | I <sub>F</sub> = 4 mA     |
|  |  |                   |       | 1300 |       |       | I <sub>F</sub> = 10 mA    |
|  | Forward Voltage/Segment or DP                                  | V <sub>F</sub>    |       | 1.7  |       | V     | I <sub>F</sub> = 4 mA     |
|  |  |                   |       | 1.8  |       |       | I <sub>F</sub> = 5 mA     |
|  |  |                   |       | 2.1  | 2.5   |       | I <sub>F</sub> = 20 mA Pk |
|  | Peak Wavelength  | λ <sub>PEAK</sub> |       | 583  |       | nm    |                           |
|  | Dominant Wavelength <sup>[3,5]</sup>                           | λ <sub>d</sub>    | 581.5 | 585  | 592.5 | nm    |                           |
|  | Reverse Voltage/Segment or DP <sup>[4]</sup>                   | V <sub>R</sub>    | 3.0   | 30   |       | V     | I <sub>R</sub> = 100 mA   |
| Temperature Coefficient of V <sub>F</sub> /Segment or DP | ΔV <sub>F</sub> /°C  |                   | -2    |      | mV/°C |       |                           |
| Thermal Resistance LED Junction-to-Pin                   | Rθ <sub>J-PIN</sub>  |                   | 200   |      | °C/W  |       |                           |

## Green

| Device Series HDSP-                                      | Parameter  | Symbol            | Min. | Typ. | Max.  | Units | Test Conditions           |
|--|--|-------------------|------|------|-------|-------|---------------------------|
| A90X   | Luminous Intensity/Segment <sup>[1,2]</sup><br>(Digit Average) | I <sub>V</sub>    | 250  | 475  |       | mcd   | I <sub>F</sub> = 4 mA     |
|  |  |                   |      | 1500 |       |       | I <sub>F</sub> = 10 mA    |
|  | Forward Voltage/Segment or DP                                  | V <sub>F</sub>    |      | 1.9  |       | V     | I <sub>F</sub> = 4 mA     |
|  |  |                   |      | 2.0  |       |       | I <sub>F</sub> = 10 mA    |
|  |  |                   |      | 2.1  | 2.5   |       | I <sub>F</sub> = 20 mA Pk |
|  | Peak Wavelength  | λ <sub>PEAK</sub> |      | 566  |       | nm    |                           |
|  | Dominant Wavelength <sup>[3,5]</sup>                           | λ <sub>d</sub>    |      | 571  | 577   | nm    |                           |
|  | Reverse Voltage/Segment or DP <sup>[4]</sup>                   | V <sub>R</sub>    | 3.0  | 30   |       | V     | I <sub>R</sub> = 100 mA   |
| Temperature Coefficient of V <sub>F</sub> /Segment or DP | ΔV <sub>F</sub> /°C  |                   | -2   |      | mV/°C |       |                           |
| Thermal Resistance LED Junction-to-Pin                   | Rθ <sub>J-PIN</sub>  |                   | 200  |      | °C/W  |       |                           |

### Notes:

1. Device case temperature is 25°C prior to the intensity measurement.
2. The digits are categorized for luminous intensity. The intensity category is designated by a letter on the side of the package.
3. The dominant wavelength, λ<sub>d</sub>, is derived from the CIE chromaticity diagram and is the single wavelength which defines the color of the device.
4. Typical specification for reference only. Do not exceed absolute maximum ratings.
5. The yellow (HDSP-A800) and Green (HDSP-A900) displays are categorized for dominant wavelength. The category is designated by a number adjacent to the luminous intensity category letter.

# AlGaAs Red

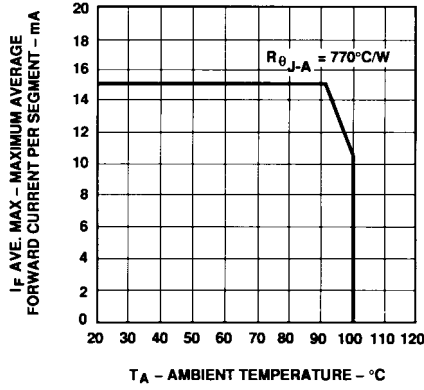


Figure 1. Maximum Allowable Average or DC Current vs. Ambient Temperature.

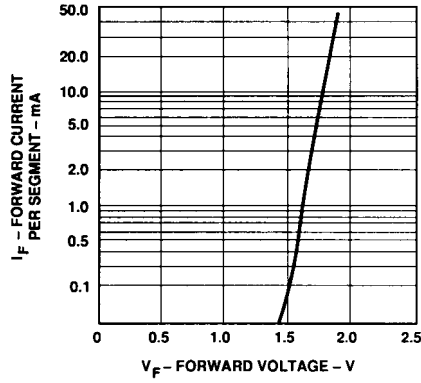


Figure 2. Forward Current vs. Forward Voltage.

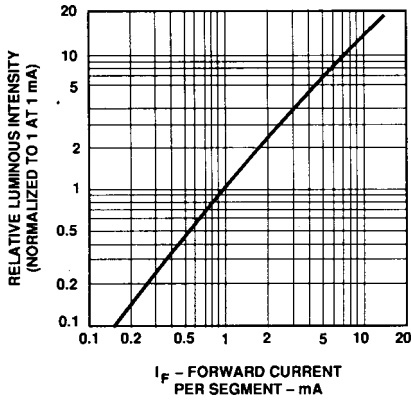


Figure 3. Relative Luminous Intensity vs. DC Forward Current.

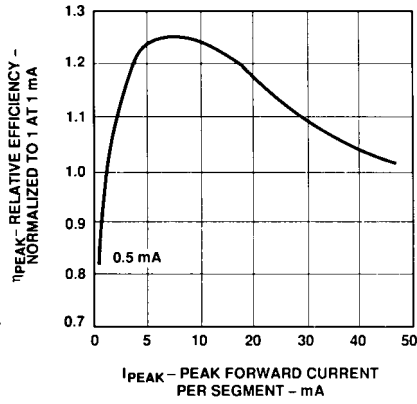


Figure 4. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak Current.

## HER, Yellow, Green

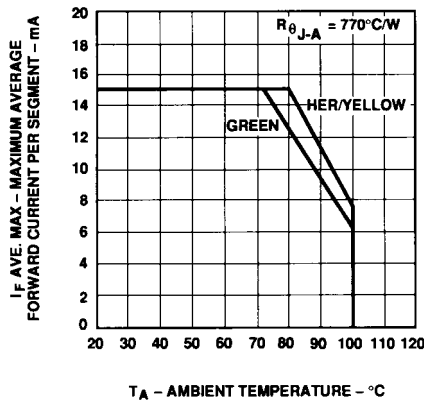


Figure 5. Maximum Allowable Average or DC Current vs. Ambient Temperature.

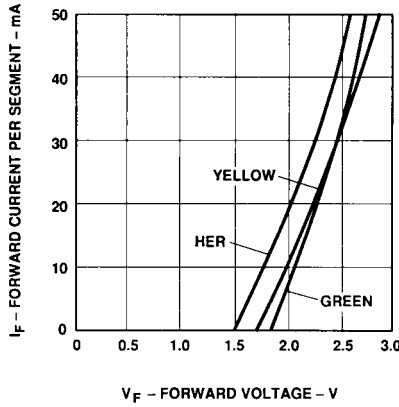


Figure 6. Forward Current vs. Forward Voltage.

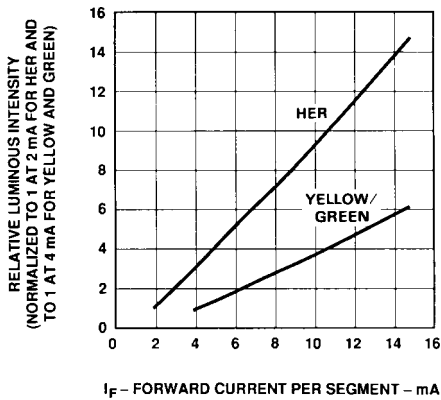


Figure 7. Relative Luminous Intensity vs. DC Forward Current.

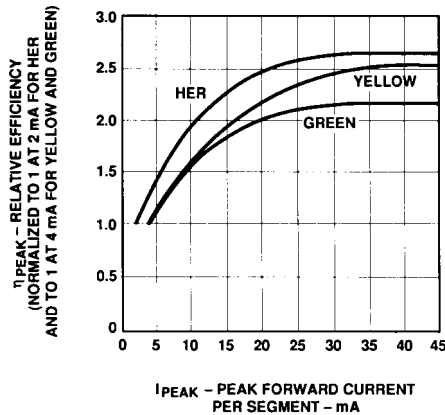


Figure 8. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak Current.

### Electrical/Optical

For more information on electrical/optical characteristics, please see Application Note 1005.

### 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.