

# HDSM-291x/293x

0.28" (7.0mm)

Dual digit surface mount LED display



## Data Sheet

### Description

The HDSM-291x/293x is a dual digit display of 0.28" (7.0mm) height. This device utilizes AlInGaP / GaAs chips and has a grey surface with white segments.

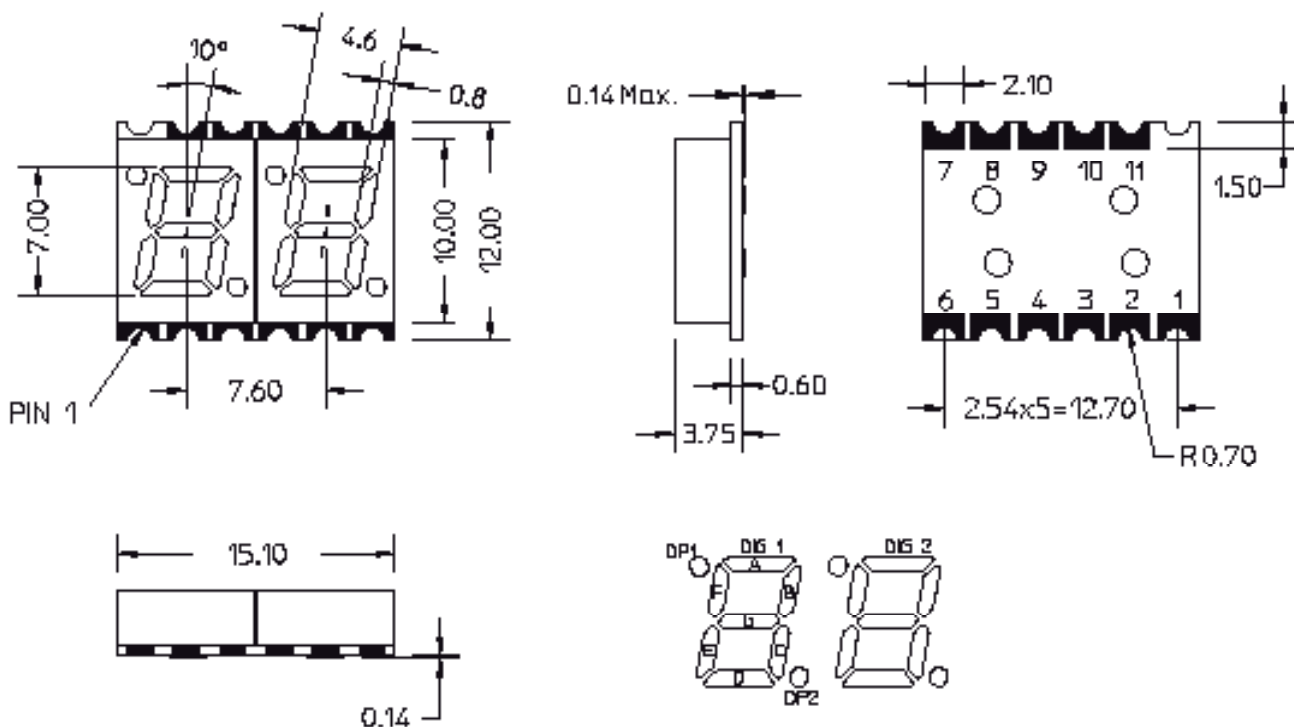
### Features

- 0.28" digit height
- Low current operation
- Excellent characters appearance
- Available in CA and CC
- 1000 pieces per reel
- Moisture sensitivity level: Level 3
- RoHS compliant

### Ordering Information

| Red       | Green     | Yellow    | Orange    | Description                             |
|-----------|-----------|-----------|-----------|---|
| HDSM-291C | HDSM-291H | HDSM-291F | HDSM-291L | Common Anode, Upper and Lower Decimal   |
| HDSM-293C | HDSM-293H | HDSM-293F | HDSM-293L | Common Cathode, Upper and Lower Decimal |

### Package Dimensions



Notes:

All dimensions are in millimeters (inches).

Tolerance:  $\pm 0.25\text{mm}$  (0.01") unless otherwise noted.

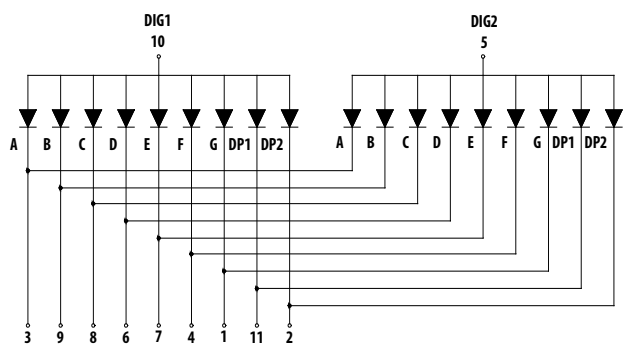
### Pin Connection (Common Anode)

| PIN No | Connection        |
|--------|-------------------|
| 1      | CATHODE G         |
| 2      | CATHODE DP2,DP4   |
| 3      | CATHODE A         |
| 4      | CATHODE F         |
| 5      | COMMON ANODE DIG2 |
| 6      | CATHODE D         |
| 7      | CATHODE E         |
| 8      | CATHODE C         |
| 9      | CATHODE B         |
| 10     | COMMON ANODE DIG1 |
| 11     | CATHODE DP1,DP3   |

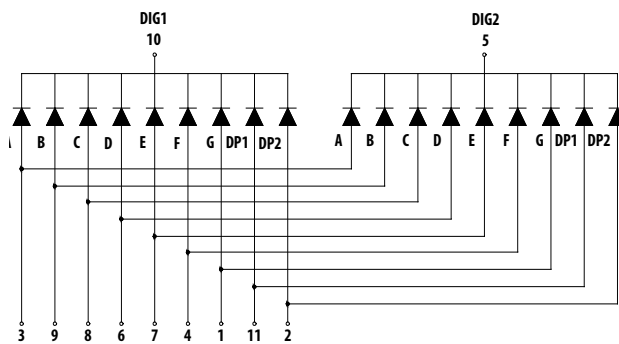
### Pin Connection (Common Cathode)

| PIN No | Connection           |
|--------|----------------------|
| 1      | ANODE G              |
| 2      | ANODE DP2,DP4        |
| 3      | ANODE A              |
| 4      | ANODE F              |
| 5      | COMMON CATHODE DIG2  |
| 6      | ANODE D              |
| 7      | ANODE E              |
| 8      | ANODE C              |
| 9      | ANODE B              |
| 10     | COMMON CATHODE DIG 1 |
| 11     | ANODE DP1,DP3        |

### Internal Circuit Diagram (Common Anode)



### Internal Circuit Diagram (Common Cathode)



### Absolute Maximum Ratings @ $T_A=25^\circ$

| Parameter   | Green/Yellow/Red/Orange | Unit   |
|---|-------------------------|--------|
| Power Dissipation Per Segment   | 65                      | mW     |
| Peak Forward Current Per Segment<br>( 1/10 Duty Cycle, .0.1ms pulse width)        | 100                     | mA     |
| Continuous Forward Current Per Segment<br>Derating Linearly From 25°C Per Segment | 25                      | mA     |
| Reverse Voltage Per Segment   | 0.25                    | mA/ °C |
| Operating Temperature Range   | 5                       | V      |
| Storage Temperature Range   | -40°C to +105°C         |        |
|   | -40°C to +105°C         |        |

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

### Green

| Parameters                        | Symbol                         | Min | Typ     | Max | Unit | Test Condition        |
|-----------------------------------|--------------------------------|-----|---------|-----|------|-----------------------|
| Average Luminous Intensity        | I <sub>V</sub>                 | 3.4 | 6       | -   | mcd  | I <sub>F</sub> = 10mA |
| Emissions Wavelength              | λ <sub>p</sub> /λ <sub>d</sub> | -   | 572/571 | -   | nm   | I <sub>F</sub> = 20mA |
| Spectral Line Half-Width          | Δλ                             | -   | 20      | -   | nm   | I <sub>F</sub> = 20mA |
| Forward Voltage, Per Segment      | V <sub>F</sub>                 | -   | 2.1     | 2.6 | V    | I <sub>F</sub> = 20mA |
| Reverse Current, Per Segment      | I <sub>R</sub>                 | -   | -       | 100 | μA   | V <sub>R</sub> = 5V   |
| Luminous Intensity Matching Ratio | I <sub>V-M</sub>               | -   | -       | 2:1 | -    | I <sub>F</sub> = 10mA |

### Yellow

| Parameters                        | Symbol                         | Min | Typ     | Max | Unit | Test Condition        |
|-----------------------------------|--------------------------------|-----|---------|-----|------|-----------------------|
| Average Luminous Intensity        | I <sub>V</sub>                 | 3.4 | 8.0     | -   | mcd  | I <sub>F</sub> = 10mA |
| Emissions Wavelength              | λ <sub>p</sub> /λ <sub>d</sub> | -   | 591/589 | -   | nm   | I <sub>F</sub> = 20mA |
| Spectral Line Half-Width          | Δλ                             | -   | 15      | -   | nm   | I <sub>F</sub> = 20mA |
| Forward Voltage, Per Segment      | V <sub>F</sub>                 | -   | 2.1     | 2.6 | V    | I <sub>F</sub> = 20mA |
| Reverse Current, Per Segment      | I <sub>R</sub>                 | -   | -       | 100 | μA   | V <sub>R</sub> = 5V   |
| Luminous Intensity Matching Ratio | I <sub>V-M</sub>               | -   | -       | 2:1 | -    | I <sub>F</sub> = 10mA |

### Red

| Parameters                        | Symbol                         | Min | Typ     | Max | Unit | Test Condition        |
|-----------------------------------|--------------------------------|-----|---------|-----|------|-----------------------|
| Average Luminous Intensity        | I <sub>V</sub>                 | 3.4 | 7.5     | -   | mcd  | I <sub>F</sub> = 10mA |
| Emissions Wavelength              | λ <sub>p</sub> /λ <sub>d</sub> | -   | 632/624 | -   | nm   | I <sub>F</sub> = 20mA |
| Spectral Line Half-Width          | Δλ                             | -   | 20      | -   | nm   | I <sub>F</sub> = 20mA |
| Forward Voltage, Per Segment      | V <sub>F</sub>                 | -   | 2.0     | 2.6 | V    | I <sub>F</sub> = 20mA |
| Reverse Current, Per Segment      | I <sub>R</sub>                 | -   | -       | 100 | μA   | V <sub>R</sub> = 5V   |
| Luminous Intensity Matching Ratio | I <sub>V-M</sub>               | -   | -       | 2:1 | -    | I <sub>F</sub> = 10mA |

### Orange

| Parameters                        | Symbol                         | Min | Typ     | Max | Unit | Test Condition        |
|-----------------------------------|--------------------------------|-----|---------|-----|------|-----------------------|
| Average Luminous Intensity        | I <sub>V</sub>                 | 3.4 | 8.5     | -   | mcd  | I <sub>F</sub> = 10mA |
| Emissions Wavelength              | λ <sub>p</sub> /λ <sub>d</sub> | -   | 611/605 | -   | nm   | I <sub>F</sub> = 20mA |
| Spectral Line Half-Width          | Δλ                             | -   | 20      | -   | nm   | I <sub>F</sub> = 20mA |
| Forward Voltage, Per Segment      | V <sub>F</sub>                 | -   | 2.1     | 2.6 | V    | I <sub>F</sub> = 20mA |
| Reverse Current, Per Segment      | I <sub>R</sub>                 | -   | -       | 100 | μA   | V <sub>R</sub> = 5V   |
| Luminous Intensity Matching Ratio | I <sub>V-M</sub>               | -   | -       | 2:1 | -    | I <sub>F</sub> = 10mA |

Typical Electrical / Optical characteristic curves @  $T_A=25^\circ\text{C}$

Green



Figure 1. Relative Luminous Intensity vs. Wavelength



Figure 2. Relative Luminous Intensity vs. Forward Current



Figure 3. Allowable DC Current vs. Ambient Temperature



Figure 4. Forward Current vs. Forward Voltage

Yellow

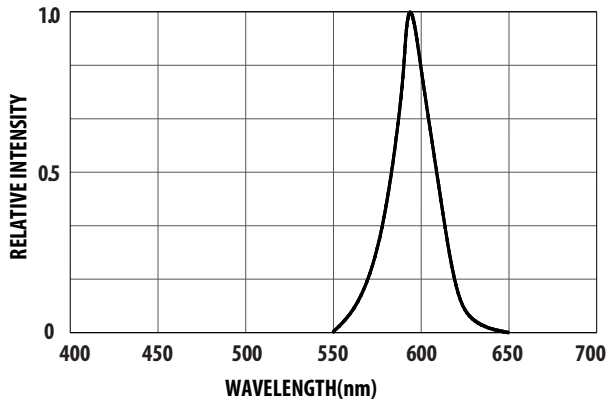


Figure 1. Relative Intensity vs. Wavelength

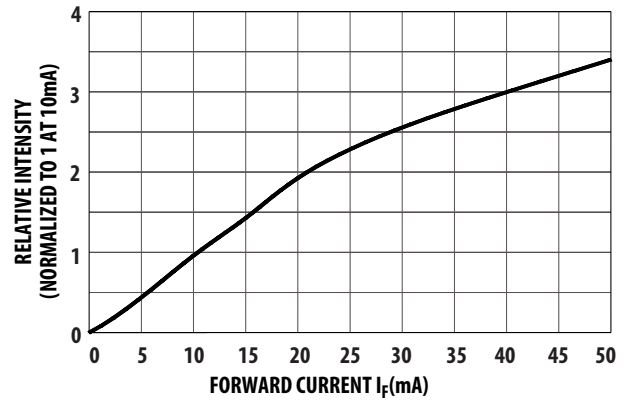


Figure 2. Relative Intensity vs. Forward Current

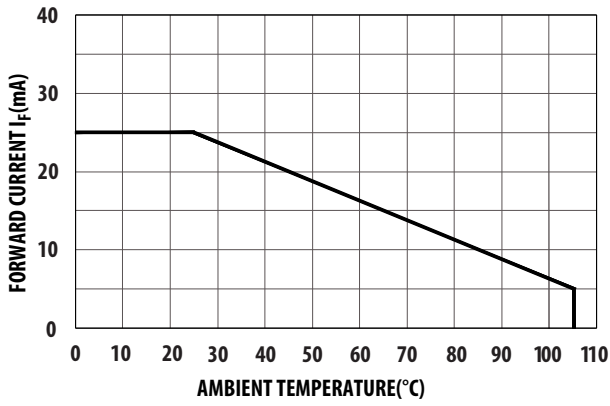


Figure 3. Allowable DC Current vs. Ambient Temperature

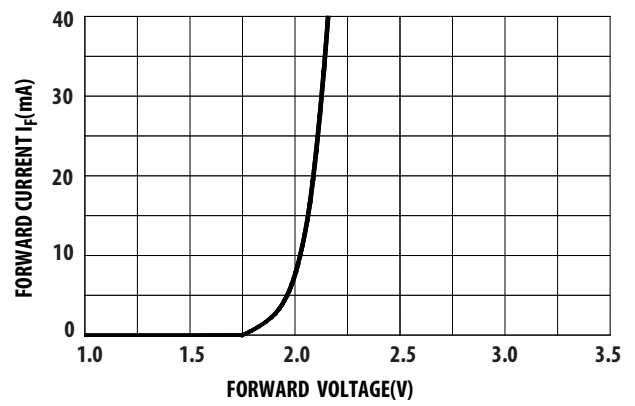


Figure 4. Forward Current vs. Forward Voltage

Red

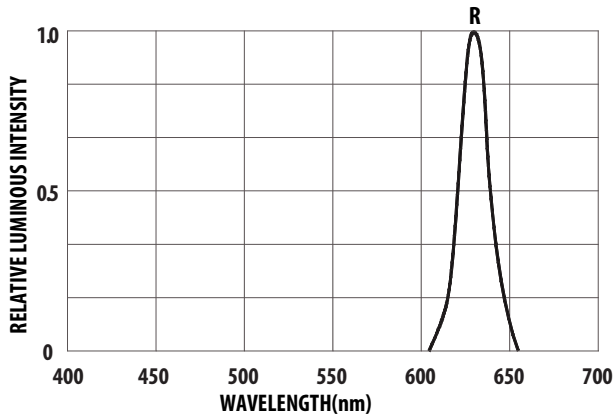


Figure 1. Relative Luminous Intensity vs. Wavelength

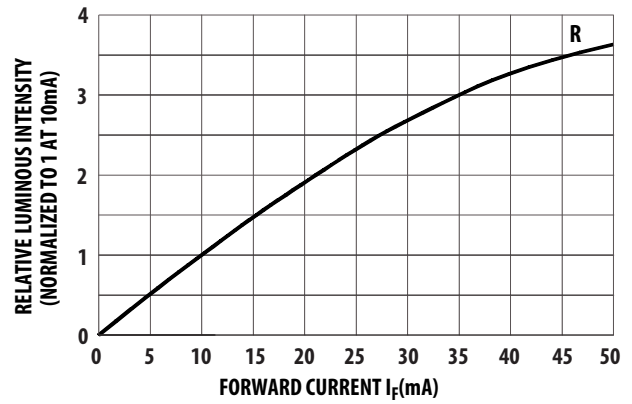


Figure 2. Relative Luminous Intensity vs. Forward Current

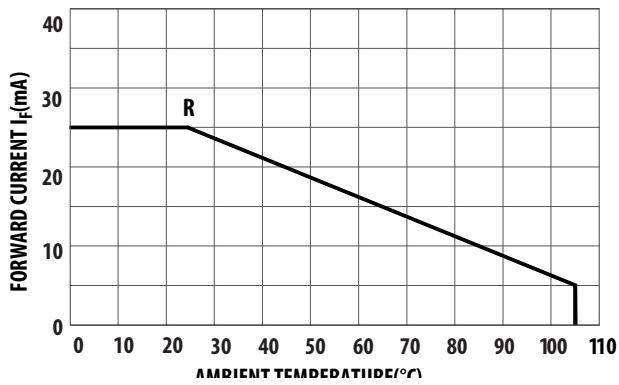


Figure 3. Allowable DC Current vs. Ambient Temperature

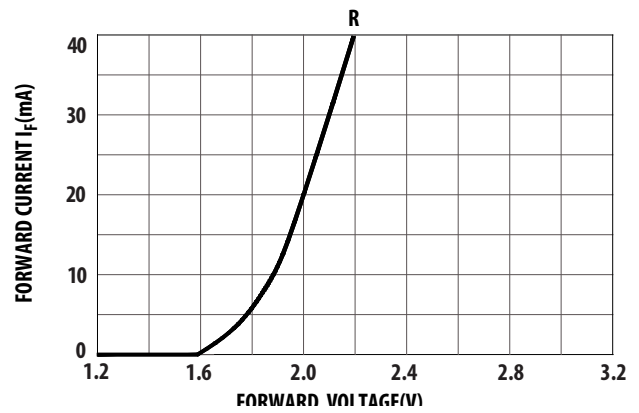


Figure 4. Forward Current vs. Forward Voltage

### Orange



Figure 1. Relative Intensity vs. Wavelength



Figure 2. Relative Intensity vs. Forward Current

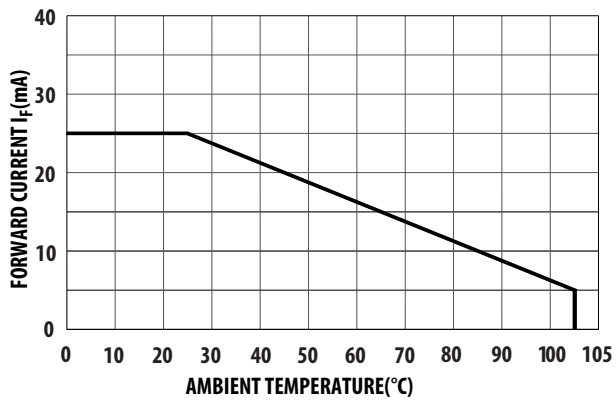


Figure 3. Allowable DC Current vs. Ambient Temperature



Figure 4. Forward Current vs. Forward Voltage

## Intensity Bin Limits (mcd)

### Yellow / Red / Orange / Green

| IV Bin Category | Min.   | Max    |
|-----------------|--------|--------|
| L               | 3.401  | 5.400  |
| M               | 5.401  | 8.600  |
| N               | 8.601  | 13.700 |
| P               | 13.701 | 21.800 |

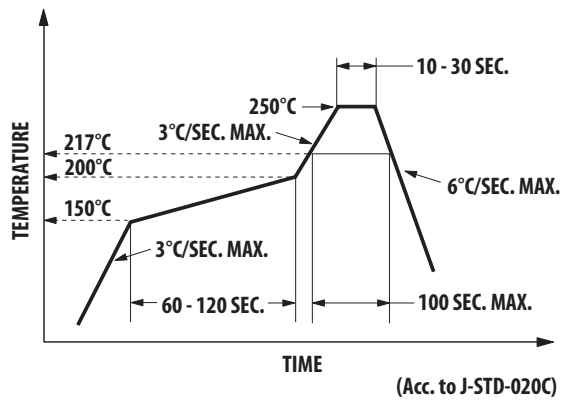
Tolerance:  $\pm 15\%$

#### Notes:

- Bin categories are established for classification of products. Products may not be available in all categories. Please contact your Avago representative for information on currently available bins.

## SMT Soldering Profile

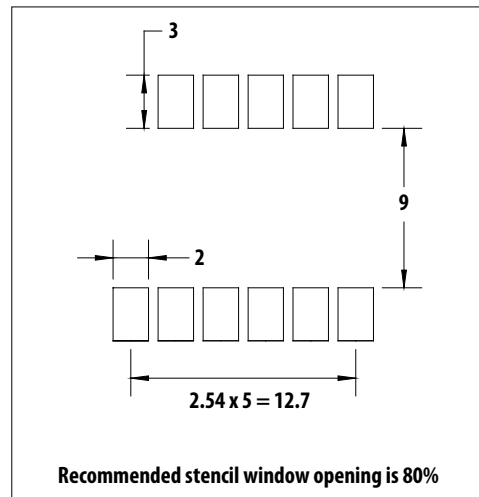
### Pb free reflow soldering Profile



#### Notes:

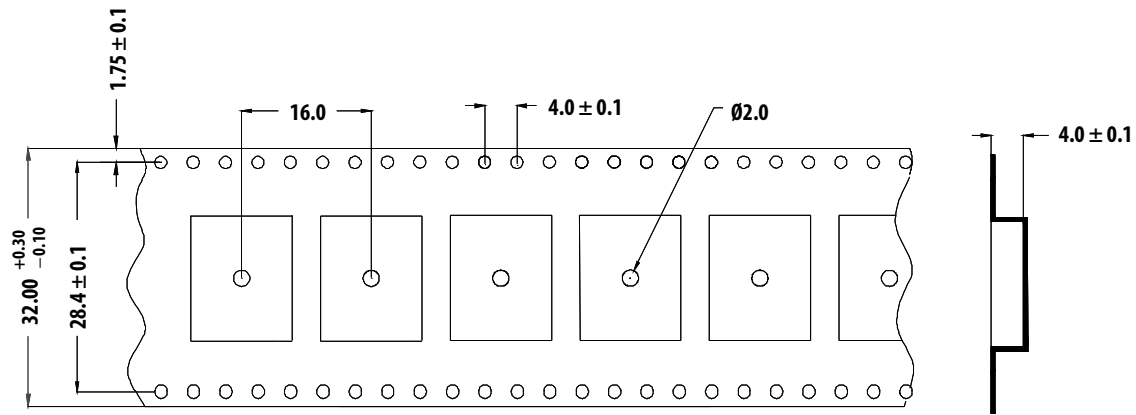
- The peak temperature refers to the peak package body temperature.
- Number of reflow process shall be limited to maximum 2 times only. Cooling process to normal temperature is required between first and second soldering process.

## Recommended soldering pattern (unit: mm)





**Tape specification (unit: mm)**



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