High Intensity Red Low Current 7-Segment Display

DESCRIPTION
This series defines a new standard for low current displays. It is a single digit 7-segment LED display utilizing AlInGaP technology in color red.

The supreme light intensity allows applications under direct sunlight or “black front” designs by using tinted filter glass in front of the display.

Typical 1500 μcd at 1 mA is best in class performance for applications with very limited power supply. The maximum forward current of 10 mA is allowed for an ambient temperature range of -40 °C to +85 °C without current derating.

Due to the design of 10 mm displays, a certain amount of cross-talk between segments is unavoidable. This light leakage becomes more noticeable as the brightness of the operated segments increases. However, higher environmental illumination, or a partially transparent cover, may reduce this effect. Therefore, it’s important to consider this phenomenon during design-in and to validate suitability for the particular application and all its operation modes.

FEATURES
• 1500 μcd typical at 1 mA
• Very low power consumption
• Wide viewing angle
• Grey package surface
• Light intensity categorized at IF = 1 mA
• Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS
• Battery driven instruments
• Telecom devices
• Home appliances
• Instrumentation
• POS terminals

PRODUCT GROUP AND PACKAGE DATA
• Product group: display
• Package: 10 mm
• Product series: low current
• Angle of half intensity: ± 50°

PARTS TABLE

<table>
<thead>
<tr>
<th>PART</th>
<th>COLOR</th>
<th>LUMINOUS INTENSITY (μcd)</th>
<th>WAVELENGTH (nm)</th>
<th>FORWARD VOLTAGE (V)</th>
<th>CIRCUITRY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MIN.</td>
<td>TYP.</td>
<td>MAX.</td>
<td>at IF (mA)</td>
<td>MIN.</td>
</tr>
<tr>
<td>TDSR1050</td>
<td>Red</td>
<td>280</td>
<td>-</td>
<td>3600</td>
<td>1</td>
</tr>
<tr>
<td>TDSR1050-IK</td>
<td>Red</td>
<td>1100</td>
<td>-</td>
<td>3600</td>
<td>1</td>
</tr>
<tr>
<td>TDSR1060</td>
<td>Red</td>
<td>280</td>
<td>-</td>
<td>3600</td>
<td>1</td>
</tr>
</tbody>
</table>

ABSOLUTE MAXIMUM RATINGS (T_amb = 25 °C, unless otherwise specified)
TDSR1050, TDSR1050-IK, TDSR1060

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITION</th>
<th>SYMBOL</th>
<th>VALUE</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse voltage per segment</td>
<td>V_R</td>
<td></td>
<td>5</td>
<td>V</td>
</tr>
<tr>
<td>DC forward current per segment</td>
<td>I_F</td>
<td></td>
<td>10</td>
<td>mA</td>
</tr>
<tr>
<td>Peak forward current per segment</td>
<td>t_p ≤ 10 μs, duty cycle 1/10</td>
<td>I_F,M</td>
<td>50</td>
<td>mA</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>T_amb ≤ 85 °C</td>
<td>P_V</td>
<td>185</td>
<td>mW</td>
</tr>
<tr>
<td>Junction temperature</td>
<td>T_j</td>
<td></td>
<td>105</td>
<td>°C</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>T_amb</td>
<td></td>
<td>-40 to +85</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>T_stg</td>
<td></td>
<td>-40 to +85</td>
<td>°C</td>
</tr>
<tr>
<td>Soldering temperature</td>
<td>t ≤ 3 s, 2 mm below seating plane</td>
<td>T_sd</td>
<td>260</td>
<td>°C</td>
</tr>
<tr>
<td>Thermal resistance LED junction to ambient</td>
<td>R_ThJA</td>
<td></td>
<td>100</td>
<td>K/W</td>
</tr>
</tbody>
</table>
### OPTICAL AND ELECTRICAL CHARACTERISTICS \( (T_{amb} = 25 \, ^\circ C, \text{unless otherwise specified}) \)

<table>
<thead>
<tr>
<th>PART</th>
<th>SYMBOL</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDSR1050</td>
<td>( I_V )</td>
<td>( 280 )</td>
<td>( - )</td>
<td>( 3600 )</td>
<td>( \mu \text{cd} )</td>
</tr>
<tr>
<td>TDSR1050-IK</td>
<td>( I_V )</td>
<td>( 1100 )</td>
<td>( - )</td>
<td>( 3600 )</td>
<td>( \mu \text{cd} )</td>
</tr>
<tr>
<td>TDSR1050</td>
<td>( \lambda_d )</td>
<td>( - )</td>
<td>( 640 )</td>
<td>( - )</td>
<td>( \text{nm} )</td>
</tr>
<tr>
<td>TDSR1050-IK</td>
<td>( \lambda_d )</td>
<td>( - )</td>
<td>( 650 )</td>
<td>( - )</td>
<td>( \text{nm} )</td>
</tr>
<tr>
<td>TDSR1060</td>
<td>( \phi )</td>
<td>( - )</td>
<td>( \pm 50 )</td>
<td>( - )</td>
<td>( ^\circ )</td>
</tr>
<tr>
<td>TDSR1050,</td>
<td>( V_F )</td>
<td>( 1.8 )</td>
<td>( 2.4 )</td>
<td>( - )</td>
<td>( \text{V} )</td>
</tr>
<tr>
<td>TDSR1050-IK,</td>
<td>( V_R = 6 , \text{V} )</td>
<td>( 10 )</td>
<td>( - )</td>
<td>( - )</td>
<td>( \mu \text{A} )</td>
</tr>
<tr>
<td>TDSR1060</td>
<td>( I_R )</td>
<td>( - )</td>
<td>( 10 )</td>
<td>( - )</td>
<td>( \mu \text{A} )</td>
</tr>
</tbody>
</table>

### LUMINOUS INTENSITY CLASSIFICATION

<table>
<thead>
<tr>
<th>GROUP</th>
<th>LIGHT INTENSITY (( \mu \text{cd} ))</th>
</tr>
</thead>
<tbody>
<tr>
<td>STANDARD</td>
<td>MIN.</td>
</tr>
<tr>
<td>F</td>
<td>280</td>
</tr>
<tr>
<td>G</td>
<td>450</td>
</tr>
<tr>
<td>H</td>
<td>700</td>
</tr>
<tr>
<td>I</td>
<td>1100</td>
</tr>
<tr>
<td>K</td>
<td>1800</td>
</tr>
<tr>
<td>L</td>
<td>2800</td>
</tr>
</tbody>
</table>

**Note**
- The above type numbers represent the order groups which include only a few brightness groups. Only one group will be shipped in one tube (there will be no mixing of two groups in one tube).
- In order to ensure availability, single brightness groups will not be orderable.

### TYPICAL CHARACTERISTICS \( (T_{amb} = 25 \, ^\circ C, \text{unless otherwise specified}) \)

![Fig. 1 - Forward Current vs. Ambient Temperature](image1.png)

![Fig. 2 - Relative Luminous Intensity vs. Angular Displacement](image2.png)
Fig. 3 - Forward Current vs. Forward Voltage

Fig. 4 - Relative Luminous Intensity vs. Forward Current

Fig. 5 - Relative Luminous Intensity vs. Ambient Temperature

Fig. 6 - Relative Luminous Intensity vs. Ambient Temperature

Fig. 7 - TDSR10..
PACKAGE DIMENSIONS FOR TDSR10.. in millimeters

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