Low Current 13 mm 7-Segment Display

DESCRIPTION
The TDSL51.0 series are 13 mm character seven segment low current LED displays in a very compact package. The displays are designed for a viewing distance up to 7 m and available in high efficiency red. The grey package surface and the evenly lighted untinted segments provide an optimum on-off contrast.

All displays are categorized in luminous intensity groups. That allows users to assemble displays with uniform appearance.

Typical applications include instruments, panel meters, point-of-sale terminals and household equipment.

Due to the design of 13 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
• Low power consumption
• Suitable for DC and multiplex operation
• Evenly lighted segments
• Grey package surface
• Untinted segments
• Luminous intensity categorized
• Wide viewing angle
• Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS
• Panel meters
• Test- and measure-equipment
• Point-of-sale terminals
• Control units

PRODUCT GROUP AND PACKAGE DATA
• Product group: display
• Package: 13 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></td>
<td>MIN.</td>
<td>TYP.</td>
<td>MAX.</td>
<td>MIN.</td>
</tr>
<tr>
<td>TDSL5150</td>
<td>Red</td>
<td>280</td>
<td>400</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>TDSL5160</td>
<td>Red</td>
<td>280</td>
<td>400</td>
<td>-</td>
<td>2</td>
</tr>
</tbody>
</table>

ABSOLUTE MAXIMUM RATINGS (Tamb = 25 °C, unless otherwise specified)

<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></td>
<td>VR</td>
<td>6</td>
<td>V</td>
</tr>
<tr>
<td>DC forward current per segment</td>
<td></td>
<td>IF</td>
<td>15</td>
<td>mA</td>
</tr>
<tr>
<td>Peak forward current per segment</td>
<td></td>
<td>IFM</td>
<td>45</td>
<td>mA</td>
</tr>
<tr>
<td>Surge forward current per segment</td>
<td>t_p ≤ 10 μs (non repetitive)</td>
<td>IFSM</td>
<td>100</td>
<td>mA</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>Tamb ≤ 45 °C</td>
<td>PV</td>
<td>320</td>
<td>mW</td>
</tr>
<tr>
<td>Junction temperature</td>
<td></td>
<td>T_j</td>
<td>100</td>
<td>°C</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>Tamb</td>
<td>T_amb</td>
<td>-40 to +85</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>Stg</td>
<td>T_stg</td>
<td>-40 to +85</td>
<td>°C</td>
</tr>
<tr>
<td>Soldering temperature</td>
<td></td>
<td>Ts_d</td>
<td>260</td>
<td>°C</td>
</tr>
<tr>
<td>Thermal resistance LED junction to ambient</td>
<td></td>
<td>R_θJA</td>
<td>180</td>
<td>K/W</td>
</tr>
</tbody>
</table>

For technical questions, contact: LED@Vishay.com

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OPTICAL AND ELECTRICAL CHARACTERISTICS *(T_{amb} = 25 °C, unless otherwise specified)*

### TDSL5150, TDSL5160, RED

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITION</th>
<th>PART</th>
<th>SYMBOL</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luminous intensity per segment <em>(1)</em></td>
<td>IF = 2 mA</td>
<td>TDSL5150</td>
<td>( I_V )</td>
<td>280</td>
<td>400</td>
<td>-</td>
<td>( \mu \text{cd} )</td>
</tr>
<tr>
<td></td>
<td>IF = 5 mA</td>
<td>TDSL5160</td>
<td>( I_V )</td>
<td>280</td>
<td>400</td>
<td>-</td>
<td>( \mu \text{cd} )</td>
</tr>
<tr>
<td></td>
<td>IF = 20 mA, ( I_p/T = 0.25 )</td>
<td>TDSL5150, TDSL5160</td>
<td>( I_V )</td>
<td>-</td>
<td>1600</td>
<td>-</td>
<td>( \mu \text{cd} )</td>
</tr>
<tr>
<td>Dominant wavelength</td>
<td>IF = 2 mA</td>
<td>TDSL5150, TDSL5160</td>
<td>( \lambda_d )</td>
<td>612</td>
<td>-</td>
<td>625</td>
<td>( \text{nm} )</td>
</tr>
<tr>
<td>Peak wavelength</td>
<td>IF = 2 mA</td>
<td>TDSL5150, TDSL5160</td>
<td>( \lambda_p )</td>
<td>-</td>
<td>635</td>
<td>-</td>
<td>( \text{nm} )</td>
</tr>
<tr>
<td>Angle of half intensity</td>
<td>IF = 2 mA</td>
<td>TDSL5150, TDSL5160</td>
<td>( \phi )</td>
<td>-</td>
<td>± 50</td>
<td>-</td>
<td>( \degree )</td>
</tr>
<tr>
<td>Forward voltage per segment</td>
<td>IF = 2 mA</td>
<td>TDSL5150, TDSL5160</td>
<td>( V_F )</td>
<td>-</td>
<td>1.8</td>
<td>2.4</td>
<td>( \text{V} )</td>
</tr>
<tr>
<td>Reverse voltage per segment</td>
<td>IF = 20 mA</td>
<td>TDSL5150, TDSL5160</td>
<td>( V_R )</td>
<td>-</td>
<td>2.7</td>
<td>3</td>
<td>( \text{V} )</td>
</tr>
<tr>
<td>Junction capacitance</td>
<td>( V_R = 0 \text{ V}, f = 1 \text{ MHz} )</td>
<td>TDSL5150, TDSL5160</td>
<td>( C_j )</td>
<td>-</td>
<td>30</td>
<td>-</td>
<td>( \text{pF} )</td>
</tr>
</tbody>
</table>

**Note**

*(1) \( I_{\text{min}} \) and \( I_V \) groups are mean values of all segments (a to g), matching factor within segments is \( \geq 0.5 \), excluding decimal points and colon.*

### LUMINOUS INTENSITY CLASSIFICATION

<table>
<thead>
<tr>
<th>GROUP</th>
<th>MIN.</th>
<th>MAX.</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>180</td>
<td>360</td>
</tr>
<tr>
<td>F</td>
<td>280</td>
<td>560</td>
</tr>
<tr>
<td>G</td>
<td>450</td>
<td>900</td>
</tr>
<tr>
<td>H</td>
<td>700</td>
<td>1400</td>
</tr>
<tr>
<td>I</td>
<td>1100</td>
<td>2200</td>
</tr>
<tr>
<td>K</td>
<td>1800</td>
<td>3600</td>
</tr>
</tbody>
</table>

### TYPICAL CHARACTERISTICS *(T_{amb} = 25 °C, unless otherwise specified)*

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

![Fig. 2 - Relative Luminous Intensity vs. Angular Displacement](image2)
Fig. 3 - Relative Intensity vs. Wavelength

Fig. 4 - Forward Current vs. Forward Voltage

Fig. 5 - Relative Luminous Intensity vs. Forward Current

Fig. 6 - Relative Luminous Intensity vs. Forward Current/Duty Cycle

Fig. 7 - Relative Luminous Intensity vs. Ambient Temperature

Fig. 8 - TDSL51..
PACKAGE DIMENSIONS in millimeters

![Diagram of package dimensions](image)

LABEL OF FAN FOLD BOX (example)

A. 2D barcode
B. Part No: Vishay part number
C. QTY: quantity
D. SelCode: selection bin code
E. Country of origin
F. PTC: production plant code
G. Termination finish
H. Region code
I. Serial#: serial number
K. Batch number: year, week, country code, plant code
L. SL: storage location
M. Environmental symbols: RoHS, lead (Pb)-free, halogen-free
N. Lot numbers
Display-10 mm

Package Dimensions in mm
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Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany
Telephone: 49 (0)7131 67 2831, Fax number: 49 (0)7131 67 2423
Pin Connections 10 mm
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