High Speed Infrared Emitting Diode, 870 nm, GaAlAs Double Hetero

DESCRIPTION

TSFF5210 is an infrared, 870 nm emitting diode in GaAlAs double hetero (DH) technology with high radiant power and high speed, molded in a clear, untinted plastic package.

FEATURES

- Package type: leaded
- Package form: T-1 3/4
- Dimensions (in mm): Ø 5
- Leads with stand-off
- Peak wavelength: \( \lambda_p = 870 \text{ nm} \)
- High reliability
- High radiant power
- High radiant intensity
- Angle of half intensity: \( \varphi = \pm 10^\circ \)
- Low forward voltage
- Suitable for high pulse current operation
- High modulation bandwidth: \( f_c = 24 \text{ MHz} \)
- Good spectral matching with Si photodetectors
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC

APPLICATIONS

- Infrared video data transmission between camcorder and TV set
- Free air data transmission systems with high modulation frequencies or high data transmission rate requirements
- Smoke-automatic fire detectors

PRODUCT SUMMARY

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>( I_e ) (mW/sr)</th>
<th>( \varphi ) (deg)</th>
<th>( \lambda_p ) (nm)</th>
<th>( t_r ) (ns)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSFF5210</td>
<td>180</td>
<td>( \pm 10 )</td>
<td>870</td>
<td>15</td>
</tr>
</tbody>
</table>

Note

- Test conditions see table “Basic Characteristics”

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>ORDERING CODE</th>
<th>PACKAGING</th>
<th>REMARKS</th>
<th>PACKAGE FORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSFF5210</td>
<td>Bulk</td>
<td>MOQ: 4000 pcs, 4000 pcs/bulk</td>
<td>T-1 ¾</td>
</tr>
</tbody>
</table>

Note

- MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS (\( T_{amb} = 25 ^\circ \text{C} \), 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</td>
<td></td>
<td>( V_R )</td>
<td>5</td>
<td>V</td>
</tr>
<tr>
<td>Forward current</td>
<td></td>
<td>( I_f )</td>
<td>100</td>
<td>mA</td>
</tr>
<tr>
<td>Peak forward current</td>
<td>( t_p/T = 0.5, t_p = 100 \mu s )</td>
<td>( I_{FM} )</td>
<td>200</td>
<td>mA</td>
</tr>
<tr>
<td>Surge forward current</td>
<td>( t_p = 100 \mu s )</td>
<td>( I_{FSM} )</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>Power dissipation</td>
<td></td>
<td>( P_V )</td>
<td>180</td>
<td>mW</td>
</tr>
</tbody>
</table>
**ABSOLUTE MAXIMUM RATINGS** (T_{\text{amb}} = 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>Junction temperature</td>
<td></td>
<td>T_j</td>
<td>100</td>
<td>°C</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td></td>
<td>T_{\text{amb}}</td>
<td>- 40 to + 85</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td></td>
<td>T_{\text{stg}}</td>
<td>- 40 to + 100</td>
<td>°C</td>
</tr>
<tr>
<td>Soldering temperature</td>
<td>t \leq 5 s, 2 mm from case</td>
<td>T_{\text{sd}}</td>
<td>260</td>
<td>°C</td>
</tr>
<tr>
<td>Thermal resistance junction/ambient</td>
<td>J-STD-051, leads 7 mm, soldered on PCB</td>
<td>R_{\text{thJA}}</td>
<td>230</td>
<td>K/W</td>
</tr>
</tbody>
</table>

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**BASIC CHARACTERISTICS** (T_{\text{amb}} = 25 °C, unless otherwise specified)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITION</th>
<th>SYMBOL</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward voltage</td>
<td>I_F = 100 mA, t_p = 20 ms</td>
<td>V_F</td>
<td>1.5</td>
<td>1.8</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I_F = 1 A, t_p = 100 μs</td>
<td>V_F</td>
<td>2.3</td>
<td>3.0</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Temperature coefficient of V_F</td>
<td>I_F = 1 mA</td>
<td>T_K{VF}</td>
<td>- 1.8</td>
<td>mV/K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reverse current</td>
<td>V_R = 5 V</td>
<td>I_R</td>
<td>10</td>
<td>μA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Junction capacitance</td>
<td>V_R = 0 V, f = 1 MHz, E = 0</td>
<td>C_J</td>
<td>125</td>
<td>pF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radiant intensity</td>
<td>I_F = 100 mA, t_p = 20 ms</td>
<td>I_e</td>
<td>120</td>
<td>360</td>
<td>mW/sr</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I_F = 1 A, t_p = 100 μs</td>
<td>I_e</td>
<td>1800</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radiant power</td>
<td>I_F = 100 mA, t_p = 20 ms</td>
<td>\phi_e</td>
<td>50</td>
<td>mW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature coefficient of \phi_e</td>
<td>I_F = 100 mA</td>
<td>T_K\phi_e</td>
<td>- 0.35</td>
<td>%/K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angle of half intensity</td>
<td>\psi</td>
<td>± 10</td>
<td>deg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak wavelength</td>
<td>I_F = 100 mA</td>
<td>\lambda_p</td>
<td>870</td>
<td>nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spectral bandwidth</td>
<td>I_F = 100 mA</td>
<td>\Delta \lambda</td>
<td>40</td>
<td>nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature coefficient of \lambda_p</td>
<td>I_F = 100 mA</td>
<td>T_K\lambda_p</td>
<td>0.25</td>
<td>nm/K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rise time</td>
<td>I_C = 100 mA</td>
<td>t_r</td>
<td>15</td>
<td>ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall time</td>
<td>I_C = 100 mA</td>
<td>t_f</td>
<td>15</td>
<td>ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cut-off frequency</td>
<td>I_{DC} = 70 mA, I_{AC} = 30 mA pp</td>
<td>t_c</td>
<td>24</td>
<td>MHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Virtual source diameter</td>
<td>\phi</td>
<td>3.7</td>
<td>mm</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**BASIC CHARACTERISTICS** (\(T_{\text{amb}} = 25 \, ^\circ\text{C}\), unless otherwise specified)

- **Fig. 3 - Pulse Forward Current vs. Pulse Duration**
- **Fig. 4 - Forward Current vs. Forward Voltage**
- **Fig. 5 - Radiant Intensity vs. Forward Current**
- **Fig. 6 - Relative Radiant Power vs. Wavelength**
- **Fig. 7 - Relative Radiant Intensity vs. Angular Displacement**
- **Fig. 8 - Attenuation vs. Frequency**
PACKAGE DIMENSIONS in millimeters

- Ø 5 ± 0.15
- 2.54 nom.
- 0.5 ± 0.15 + 0.15
- 0.5 ± 0.15 - 0.05
- 0.5 + 0.15 - 0.05
- 1.1 ± 0.25
- 12.7 ± 0.3
- 8.7 ± 0.15
- 7.7 ± 0.15
- 4.9
- 36.7 ± 0.56
- 6.544-5258.09-4

For technical questions, contact: emittertechsupport@vishay.com

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