**5SLG 0600P450300**

HiPak DIODE Module

\[ V_{RRM} = 4500 \text{ V} \]
\[ I_F = 2 \times 600 \text{ A} \]

**Ultra low-loss, rugged SPT+ diode**

Smooth switching SPT+ diode for good EMC

**AlSiC base-plate for high power cycling capability**

**AlN substrate for low thermal resistance**

2 diodes in 1 package

Recognized under UL1557, File E196689

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**Maximum rated values**  \(^1\)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>min</th>
<th>max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repetitive peak reverse voltage</td>
<td>( V_{RRM} )</td>
<td>( T_{VJ} \geq 25 \text{ °C} )</td>
<td></td>
<td>4500</td>
<td>V</td>
</tr>
<tr>
<td>DC forward current</td>
<td>( I_F )</td>
<td></td>
<td></td>
<td>600</td>
<td>A</td>
</tr>
<tr>
<td>Peak forward current</td>
<td>( I_{F_{PM}} )</td>
<td>( t_p = 1 \text{ ms}, \text{ per Diode} )</td>
<td></td>
<td>1200</td>
<td>A</td>
</tr>
<tr>
<td>Total power dissipation</td>
<td>( P_{tot} )</td>
<td>( T_C = 25 \text{ °C}, T_{VJ} = 125 \text{ °C}, \text{ per Diode} )</td>
<td></td>
<td>2650</td>
<td>W</td>
</tr>
<tr>
<td>Surge current</td>
<td>( I_{FSM} )</td>
<td>( V_R = 0 \text{ V}, T_{VJ} = 125 \text{ °C}, ) ( t_p = 10 \text{ ms}, \text{ half-sine wave, per Diode} )</td>
<td></td>
<td>4500</td>
<td>A</td>
</tr>
<tr>
<td>Isolation voltage</td>
<td>( V_{isol} )</td>
<td>1 min, ( f = 50 \text{ Hz} )</td>
<td></td>
<td>10200</td>
<td>V</td>
</tr>
<tr>
<td>Junction temperature</td>
<td>( T_{VJ} )</td>
<td></td>
<td></td>
<td>150</td>
<td>°C</td>
</tr>
<tr>
<td>Junction operating temperature</td>
<td>( T_{VJ\text{op}} )</td>
<td></td>
<td></td>
<td>-50</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>( T_{stg} )</td>
<td></td>
<td></td>
<td>-50</td>
<td>°C</td>
</tr>
<tr>
<td>Mounting torques (^2)</td>
<td>( M_s )</td>
<td>Base-heatsink, M6 screws</td>
<td>4</td>
<td>6</td>
<td>Nm</td>
</tr>
<tr>
<td></td>
<td>( M_{mt} )</td>
<td>Main terminals, M6 screws</td>
<td>4</td>
<td>6</td>
<td>Nm</td>
</tr>
</tbody>
</table>

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\(^1\) Maximum rated values indicate limits beyond which damage to the device may occur per IEC 60747

\(^2\) For detailed mounting instructions refer to Document No. 5SYA 2039
### Diode characteristic values ³)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>min</th>
<th>typ</th>
<th>max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward voltage ⁴)</td>
<td>$V_F$</td>
<td>$I_F = 600$ A, $T_J = 25 , ^\circ C$</td>
<td>3.2</td>
<td>3.7</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_J = 125 , ^\circ C$</td>
<td>3.5</td>
<td>4.0</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Continuous reverse current</td>
<td>$I_R$</td>
<td>$V_B = 4500$ V, $T_J = 25 , ^\circ C$</td>
<td>12</td>
<td></td>
<td>23</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_J = 125 , ^\circ C$</td>
<td></td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Peak reverse recovery current</td>
<td>$I_{RM}$</td>
<td>$V_{CC} = 2800$ V, $L = 300$ nH, inductive load, $di/dt = 2.4$ kA/µs Per Diode</td>
<td>515</td>
<td></td>
<td>830</td>
<td>µC</td>
</tr>
<tr>
<td>Recovered charge</td>
<td>$Q_r$</td>
<td>$I_F = 600$ A, $T_J = 25 , ^\circ C$</td>
<td></td>
<td></td>
<td>515</td>
<td>µC</td>
</tr>
<tr>
<td>Reverse recovery time</td>
<td>$t_{rr}$</td>
<td>$T_J = 25 , ^\circ C$</td>
<td></td>
<td>635</td>
<td>930</td>
<td>ns</td>
</tr>
<tr>
<td>Reverse recovery energy</td>
<td>$E_{rec}$</td>
<td>$T_J = 25 , ^\circ C$</td>
<td></td>
<td>815</td>
<td>1365</td>
<td>mJ</td>
</tr>
</tbody>
</table>

³) Characteristic values according to IEC 60747 - 2 ⁴) Forward voltage is given at chip level

### Package properties ⁵)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>min</th>
<th>typ</th>
<th>max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diode thermal resistance junction to case</td>
<td>$R_{th(j-c)DIODE}$</td>
<td>Per Diode</td>
<td>0.038</td>
<td></td>
<td></td>
<td>K/W</td>
</tr>
<tr>
<td>Diode thermal resistance case to heatsink</td>
<td>$R_{th(c-s)DIODE}$</td>
<td>Per Diode, $\lambda$ grease = 1 W/m x K</td>
<td>0.036</td>
<td></td>
<td></td>
<td>K/W</td>
</tr>
<tr>
<td>Partial discharge extinction voltage</td>
<td>$V_e$</td>
<td>$f = 50$ Hz, $Q_{PD} \leq 10$ pC (acc. To IEC 61287)</td>
<td>5100</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Comparative tracking index</td>
<td>CTI</td>
<td></td>
<td>&gt; 600</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Module stray inductance</td>
<td>$L_{AC}$</td>
<td>between C1 - A2</td>
<td>125</td>
<td></td>
<td></td>
<td>nH</td>
</tr>
<tr>
<td>Resistance, terminal-chip</td>
<td>$R_{AAC'CC'}$</td>
<td>Per Diode</td>
<td>0.25</td>
<td></td>
<td></td>
<td>mΩ</td>
</tr>
</tbody>
</table>

²) For detailed mounting instructions refer to ABB Document No. 5SYA 2039

### Mechanical properties ⁵)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>min</th>
<th>typ</th>
<th>max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>$L \times W \times H$</td>
<td>Typical</td>
<td>73 x 140 x 38</td>
<td></td>
<td></td>
<td>mm</td>
</tr>
<tr>
<td>Clearance distance in air</td>
<td>$d_a$</td>
<td>according to IEC 60664-1 and EN 50124-1</td>
<td>35</td>
<td></td>
<td></td>
<td>mm</td>
</tr>
<tr>
<td>Surface creepage distance</td>
<td>$d_s$</td>
<td>according to IEC 60664-1 and EN 50124-1</td>
<td>64</td>
<td></td>
<td></td>
<td>mm</td>
</tr>
</tbody>
</table>

⁵) Package and mechanical properties according to IEC 60747 - 15
Electrical configuration

Outline drawing

Note: all dimensions are shown in millimeters
**1) For detailed mounting instructions refer to ABB Document No. 5SYA 2039**

This is an electrostatic sensitive device, please observe the international standard IEC 60747-1, chap. IX. This product has been designed and qualified for Industrial Level.
Fig. 1  Typical reverse recovery characteristics vs. forward current

Fig. 2  Typical reverse recovery characteristics vs. di/dt

Fig. 3  Typical diode forward characteristics chip level

Fig. 4  Safe operating area diode (SOA)
Analytical function for transient thermal impedance:

\[ Z_{th} (j-c) (t) = \sum_{i=1}^{n} R_i (1 - e^{-t/\tau_i}) \]

<table>
<thead>
<tr>
<th>DIODE</th>
<th>Ri(K/kW)</th>
<th>(\tau_i)(ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zth(j-c) Diode</td>
<td>24.9</td>
<td>192</td>
</tr>
<tr>
<td></td>
<td>8.75</td>
<td>22.6</td>
</tr>
<tr>
<td></td>
<td>4.31</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Fig. 5 Thermal impedance vs. time

Related documents:
- 5SYA 2042 Failure rates of HiPak modules due to cosmic rays
- 5SYA 2043 Load-cycle capability of HiPaks
- 5SYA 2045 Thermal runaway during blocking
- 5SYA 2053 Applying IGBT
- 5SYA 2058 Surge currents for IGBT diodes
- 5SYA 2093 Thermal design of IGBT modules
- 5SYA 2098 Paralleling of IGBT modules
- 5SZK 9111 Specification of environmental class for HiPak Storage
- 5SZK 9112 Specification of environmental class for HiPak Transportation
- 5SZK 9113 Specification of environmental class for HiPak Operation (Industry)
- 5SZK 9120 Specification of environmental class for HiPak

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