

# 5SLD 1200J450350

## HiPak DIODE Module

$$V_{RRM} = 4500 \text{ V}$$

$$I_F = 2 \times 1200 \text{ A}$$

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  
 Improved high reliability package  
 Recognized under UL1557, File E196689



### Maximum rated values <sup>1)</sup>

| Parameter                       | Symbol       | Conditions                                                                                                     | min | max   | Unit               |
|---------------------------------|--------------|----------------------------------------------------------------------------------------------------------------|-----|-------|--------------------|
| Repetitive peak reverse voltage | $V_{RRM}$    | $T_{vj} \geq 25 \text{ }^{\circ}\text{C}$                                                                      |     | 4500  | V                  |
| DC forward current              | $I_F$        |                                                                                                                |     | 1200  | A                  |
| Peak forward current            | $I_{FRM}$    | $t_p = 1 \text{ ms, per Diode}$                                                                                |     | 2400  | A                  |
| Total power dissipation         | $P_{tot}$    | $T_C = 25 \text{ }^{\circ}\text{C}, T_{vj} = 125 \text{ }^{\circ}\text{C, per Diode}$                          |     | 5300  | W                  |
| Surge current                   | $I_{FSM}$    | $V_R = 0 \text{ V}, T_{vj} = 125 \text{ }^{\circ}\text{C},$<br>$t_p = 10 \text{ ms, half-sinewave, per Diode}$ |     | 9000  | A                  |
| Isolation voltage               | $V_{isol}$   | 1 min, $f = 50 \text{ Hz}$                                                                                     |     | 10200 | V                  |
| Junction temperature            | $T_{vj}$     |                                                                                                                |     | 150   | $^{\circ}\text{C}$ |
| Junction operating temperature  | $T_{vj(op)}$ |                                                                                                                | -50 | 125   | $^{\circ}\text{C}$ |
| Case temperature                | $T_C$        |                                                                                                                | -50 | 125   | $^{\circ}\text{C}$ |
| Storage temperature             | $T_{stg}$    |                                                                                                                | -50 | 125   | $^{\circ}\text{C}$ |
| Mounting torques <sup>2)</sup>  | $M_s$        | Base-heatsink, M6 screws                                                                                       | 4   | 6     | Nm                 |
|                                 | $M_{t1}$     | Main terminals, M8 screws                                                                                      | 8   | 10    |                    |

<sup>1)</sup> Maximum rated values indicate limits beyond which damage to the device may occur per IEC 60747

<sup>2)</sup> For detailed mounting instructions refer to ABB Document No. 5SYA 2039

### Diode characteristic values <sup>3)</sup>

| Parameter                     | Symbol           | Conditions                                                                                                                                                     | min                      | typ  | max | Unit |
|-------------------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------|-----|------|
| Forward voltage <sup>4)</sup> | V <sub>F</sub>   | I <sub>F</sub> = 1200 A                                                                                                                                        | T <sub>Vj</sub> = 25 °C  | 3.2  | 3.7 | V    |
|                               |                  |                                                                                                                                                                | T <sub>Vj</sub> = 125 °C | 3.5  | 4.0 | V    |
| Continuous reverse current    | I <sub>R</sub>   | V <sub>R</sub> = 4500 V                                                                                                                                        | T <sub>Vj</sub> = 25 °C  |      | 0.5 | mA   |
|                               |                  |                                                                                                                                                                | T <sub>Vj</sub> = 125 °C | 23   | 46  | mA   |
| Reverse recovery current      | I <sub>rr</sub>  | V <sub>CC</sub> = 2800 V,<br>I <sub>F</sub> = 1200 A,<br>di/dt = 4.8 kA/μs<br>L <sub>σ</sub> = 150 nH, inductive load<br>switch: 5SNA 1200G450350<br>Per Diode | T <sub>Vj</sub> = 25 °C  | 1460 |     | A    |
|                               |                  |                                                                                                                                                                | T <sub>Vj</sub> = 125 °C | 1600 |     | A    |
| Recovered charge              | Q <sub>rr</sub>  |                                                                                                                                                                | T <sub>Vj</sub> = 25 °C  | 1030 |     | μC   |
|                               |                  |                                                                                                                                                                | T <sub>Vj</sub> = 125 °C | 1660 |     | μC   |
| Reverse recovery time         | t <sub>rr</sub>  |                                                                                                                                                                | T <sub>Vj</sub> = 25 °C  | 1270 |     | ns   |
|                               |                  |                                                                                                                                                                | T <sub>Vj</sub> = 125 °C | 1860 |     | ns   |
| Reverse recovery energy       | E <sub>rec</sub> |                                                                                                                                                                | T <sub>Vj</sub> = 25 °C  | 1630 |     | mJ   |
|                               |                  |                                                                                                                                                                | T <sub>Vj</sub> = 125 °C | 2730 |     | mJ   |

<sup>3)</sup> Characteristic values according to IEC 60747 - 2

<sup>4)</sup> Forward voltage is given at chip level

### Package properties <sup>5)</sup>

| Parameter                                               | Symbol             | Conditions                                                          | min                   | typ   | max   | Unit       |
|---------------------------------------------------------|--------------------|---------------------------------------------------------------------|-----------------------|-------|-------|------------|
| Diode thermal resistance junction to case               | $R_{th(j-c)DIODE}$ | Per Diode                                                           |                       |       | 0.019 | K/W        |
| Diode thermal resistance <sup>2)</sup> case to heatsink | $R_{th(c-s)DIODE}$ | Per Diode, $\lambda$ grease = 1W/m x K                              |                       | 0.018 |       | K/W        |
| Partial discharge extinction voltage                    | $V_e$              | $f = 50\text{ Hz}$ , $Q_{PD} \leq 10\text{ pC}$ (acc. To IEC 61287) | 5100                  |       |       | V          |
| Comparative tracking index                              | CTI                |                                                                     | 600                   |       |       |            |
| Module stray inductance                                 | $L_{\sigma AC}$    | Per Diode                                                           |                       | 36    |       | nH         |
| Resistance, terminal-chip                               | $R_{AA'+CC'}$      | Per Diode                                                           | $T_C = 25\text{ °C}$  | 0.2   |       | m $\Omega$ |
|                                                         |                    |                                                                     | $T_C = 125\text{ °C}$ | 0.3   |       |            |

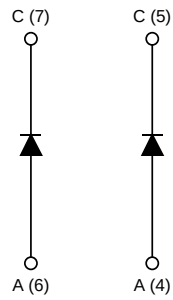
<sup>2)</sup> For detailed mounting instructions refer to ABB Document No. 5SYA 2039

### Mechanical properties <sup>5)</sup>

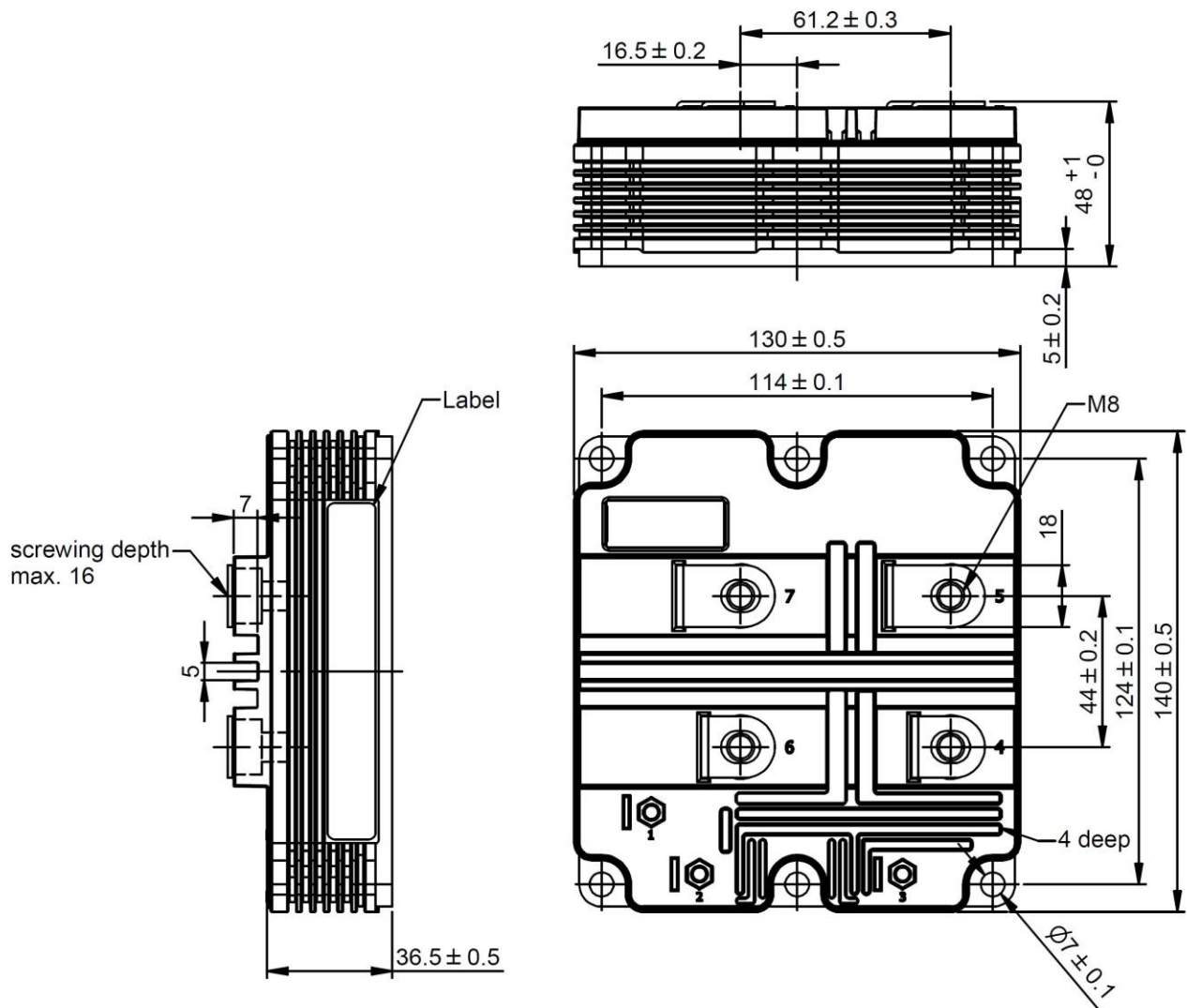
| Parameter                 | Symbol    | Conditions                              | min            | typ | max | Unit |
|---------------------------|-----------|-----------------------------------------|----------------|-----|-----|------|
| Dimensions                | L x W x H | Typical                                 | 130 x 140 x 48 |     |     | mm   |
| Clearance distance in air | $d_a$     | according to IEC 60664-1 and EN 50124-1 | Term. to base: | 40  |     | mm   |
|                           |           |                                         | Term. to term: | 26  |     |      |
| Surface creepage distance | $d_s$     | according to IEC 60664-1 and EN 50124-1 | Term. to base: | 64  |     | mm   |
|                           |           |                                         | Term. to term: | 56  |     |      |
| Mass                      | m         |                                         |                | 980 |     | g    |

<sup>5)</sup> Package and mechanical properties according to IEC 60747 - 15

## Electrical configuration



## Outline drawing <sup>2)</sup>



Note: all dimensions are shown in millimeters

<sup>2)</sup> 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. VIII.  
This product has been designed and qualified for Industrial Level.

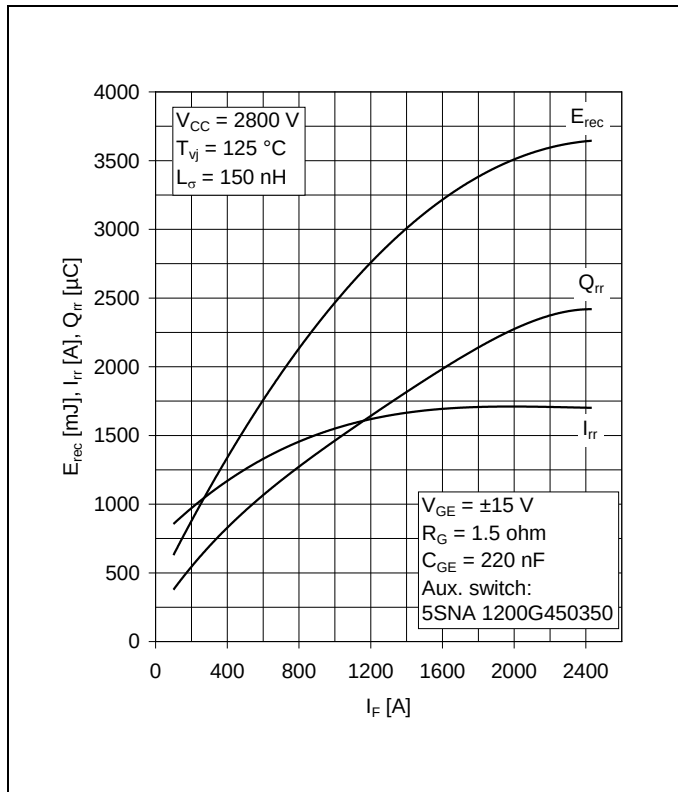


Fig. 1 Typical reverse recovery characteristics vs. forward current

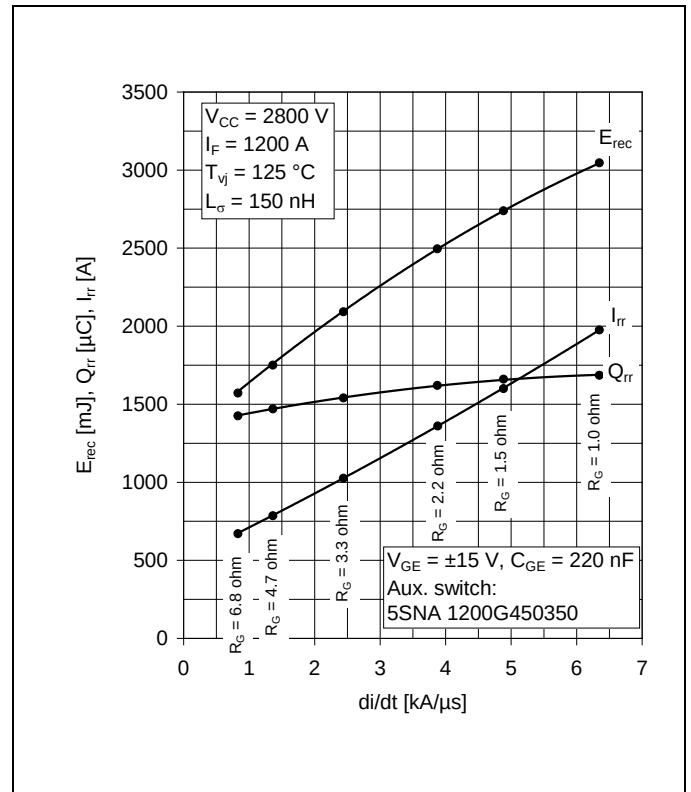


Fig. 2 Typical reverse recovery characteristics vs.  $di/dt$

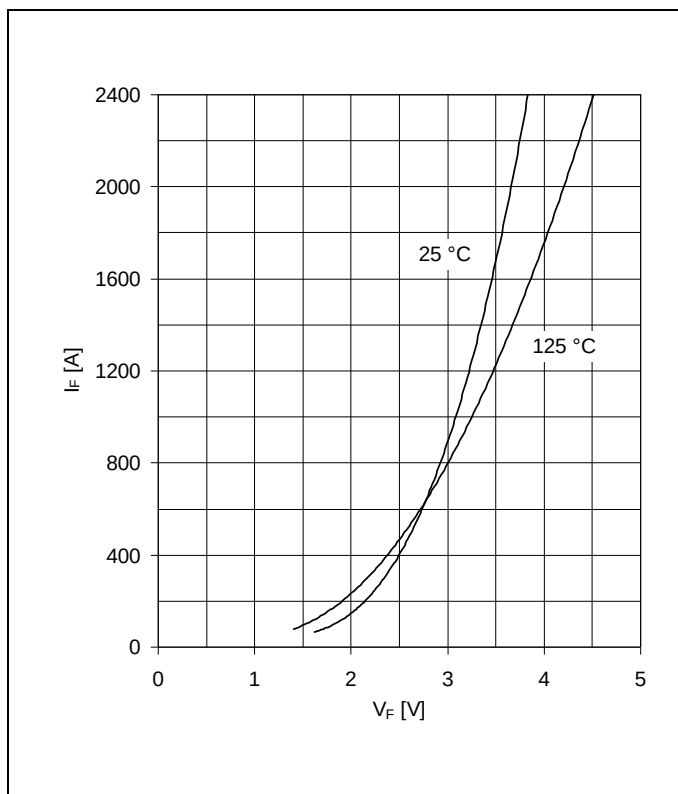


Fig. 3 Typical diode forward characteristics chip level

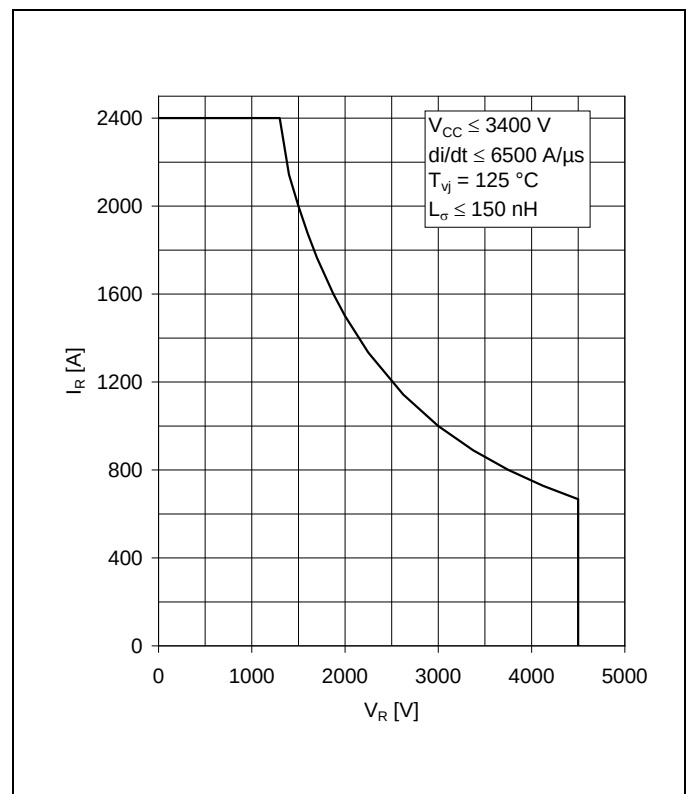


Fig. 4 Safe operating area diode (SOA)

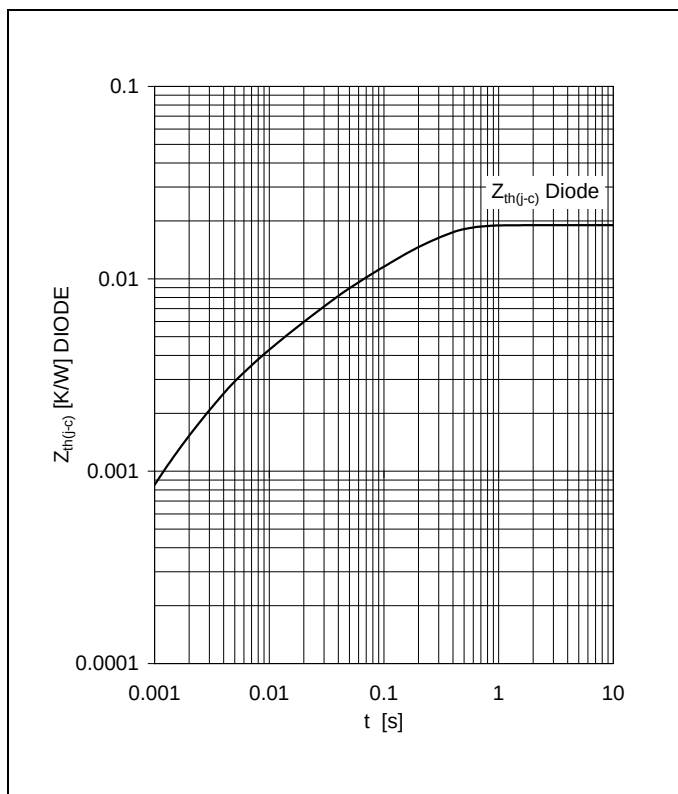


Fig. 5 Thermal impedance vs. time

Analytical function for transient thermal impedance:

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

|       |              |      |      |      |   |   |
|-------|--------------|------|------|------|---|---|
|       | i            | 1    | 2    | 3    | 4 | 5 |
| DIODE | $R_i(K/kW)$  | 12.5 | 4.37 | 2.16 |   |   |
|       | $\tau_i(ms)$ | 192  | 22.6 | 3.1  |   |   |

#### 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 2057 IGBT diode safe operating area (SOA)  
 5SYA 2058 Surge currents for IGBT diodes  
 5SYA 2093 Thermal design 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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