

# 5SLD 1000N330300

## HiPak DIODE Module

$$V_{RRM} = 3300 \text{ V}$$

$$I_F = 2 \times 1000 \text{ A}$$

Ultra low-loss, rugged SPT+ diode  
 Smooth switching SPT+ diode for good EMC  
 AISiC 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 | $V_{RRM}$    | $T_{vj} \geq 25 \text{ }^{\circ}\text{C}$                                                                           |     | 3300 | V                  |
| DC forward current              | $I_F$        |                                                                                                                     |     | 1000 | A                  |
| Peak forward current            | $I_{FRM}$    | $t_p = 1 \text{ ms}$ , per Diode                                                                                    |     | 2000 | A                  |
| Total power dissipation         | $P_{tot}$    | $T_C = 25 \text{ }^{\circ}\text{C}$ , $T_{vj} = 150 \text{ }^{\circ}\text{C}$ , per Diode                           |     | 4900 | W                  |
| Surge current                   | $I_{FSM}$    | $V_R = 0 \text{ V}$ , $T_{vj} = 150 \text{ }^{\circ}\text{C}$ ,<br>$t_p = 10 \text{ ms}$ , half-sinewave, per Diode |     | 9000 | A                  |
| Isolation voltage               | $V_{isol}$   | 1 min, $f = 50 \text{ Hz}$                                                                                          |     | 6000 | V                  |
| Junction temperature            | $T_{vj}$     |                                                                                                                     |     | 175  | $^{\circ}\text{C}$ |
| Junction operating temperature  | $T_{vj(op)}$ |                                                                                                                     | -50 | 150  | $^{\circ}\text{C}$ |
| Case temperature                | $T_C$        |                                                                                                                     | -50 | 150  | $^{\circ}\text{C}$ |
| 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 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> = 1000 A                                                                                                                                      | T <sub>vj</sub> = 25 °C  | 2.05 | 2.5 | V    |
|                               |                  |                                                                                                                                                              | T <sub>vj</sub> = 125 °C | 2.25 | 2.6 | V    |
|                               |                  |                                                                                                                                                              | T <sub>vj</sub> = 150 °C | 2.20 |     | V    |
| Continuous reverse current    | I <sub>R</sub>   | V <sub>R</sub> = 3300 V                                                                                                                                      | T <sub>vj</sub> = 25 °C  |      | 0.5 | mA   |
|                               |                  |                                                                                                                                                              | T <sub>vj</sub> = 125 °C | 6    | 12  | mA   |
|                               |                  |                                                                                                                                                              | T <sub>vj</sub> = 150 °C | 30   |     | mA   |
| Reverse recovery current      | I <sub>rr</sub>  | V <sub>CC</sub> = 1800 V,<br>I <sub>F</sub> = 1000 A,<br>di/dt = 4 kA/μs<br>L <sub>σ</sub> = 100 nH, inductive load<br>switch: 5SNA 1000N330300<br>Per Diode | T <sub>vj</sub> = 25 °C  | 1010 |     | A    |
|                               |                  |                                                                                                                                                              | T <sub>vj</sub> = 125 °C | 1180 |     | A    |
|                               |                  |                                                                                                                                                              | T <sub>vj</sub> = 150 °C | 1230 |     | A    |
| Recovered charge              | Q <sub>rr</sub>  |                                                                                                                                                              | T <sub>vj</sub> = 25 °C  | 630  |     | μC   |
|                               |                  |                                                                                                                                                              | T <sub>vj</sub> = 125 °C | 1020 |     | μC   |
|                               |                  |                                                                                                                                                              | T <sub>vj</sub> = 150 °C | 1180 |     | μC   |
| Reverse recovery time         | t <sub>rr</sub>  |                                                                                                                                                              | T <sub>vj</sub> = 25 °C  | 1125 |     | ns   |
|                               |                  |                                                                                                                                                              | T <sub>vj</sub> = 125 °C | 1440 |     | ns   |
|                               |                  |                                                                                                                                                              | T <sub>vj</sub> = 150 °C | 1630 |     | ns   |
| Reverse recovery energy       | E <sub>rec</sub> |                                                                                                                                                              | T <sub>vj</sub> = 25 °C  | 700  |     | mJ   |
|                               |                  |                                                                                                                                                              | T <sub>vj</sub> = 125 °C | 1210 |     | mJ   |
|                               |                  |                                                                                                                                                              | T <sub>vj</sub> = 150 °C | 1420 |     | 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                              |                        |       | 0.025 | K/W  |
| Diode thermal resistance <sup>2)</sup> case to heatsink | $R_{th(c-s)DIODE}$ | Per Diode, $\lambda$ grease = 1W/m x K |                        | 0.024 |       | K/W  |
| Comparative tracking index                              | CTI                |                                        | 600                    |       |       |      |
| Module stray inductance                                 | $L_\sigma AC$      | Per Diode                              |                        | 24    |       | nH   |
| Resistance, terminal-chip                               | $R_{AA'+CC'}$      | Per Diode                              | $T_C = 25 \text{ °C}$  | 0.166 |       | mΩ   |
|                                                         |                    |                                        | $T_C = 125 \text{ °C}$ | 0.226 |       |      |
|                                                         |                    |                                        | $T_C = 150 \text{ °C}$ | 0.240 |       |      |

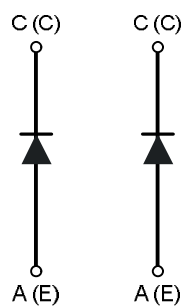
<sup>2)</sup> For detailed mounting instructions refer to Document No. 5SYA 2039

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

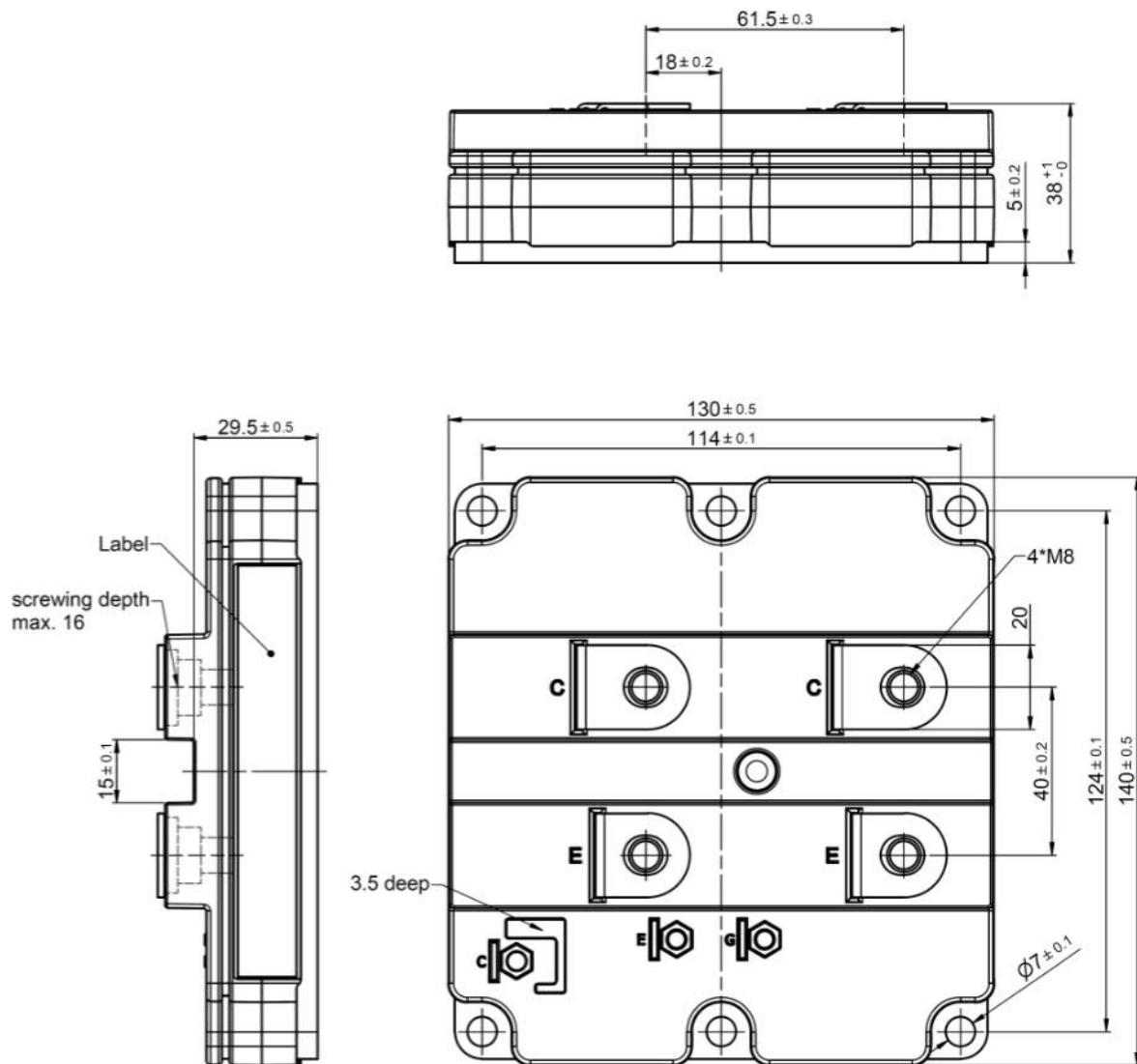
| Parameter                 | Symbol    | Conditions                              | min            | typ  | max | Unit |
|---------------------------|-----------|-----------------------------------------|----------------|------|-----|------|
| Dimensions                | L x W x H | Typical                                 | 130 x 140 x 38 |      |     | mm   |
| Clearance distance in air | $d_a$     | according to IEC 60664-1 and EN 50124-1 | Term. to base: | 19   |     | mm   |
|                           |           |                                         | Term. to term: | 19   |     |      |
| Surface creepage distance | $d_s$     | according to IEC 60664-1 and EN 50124-1 | Term. to base: | 28.2 |     | mm   |
|                           |           |                                         | Term. to term: | 28.2 |     |      |
| Mass                      | m         |                                         |                | 790  |     | 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 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.

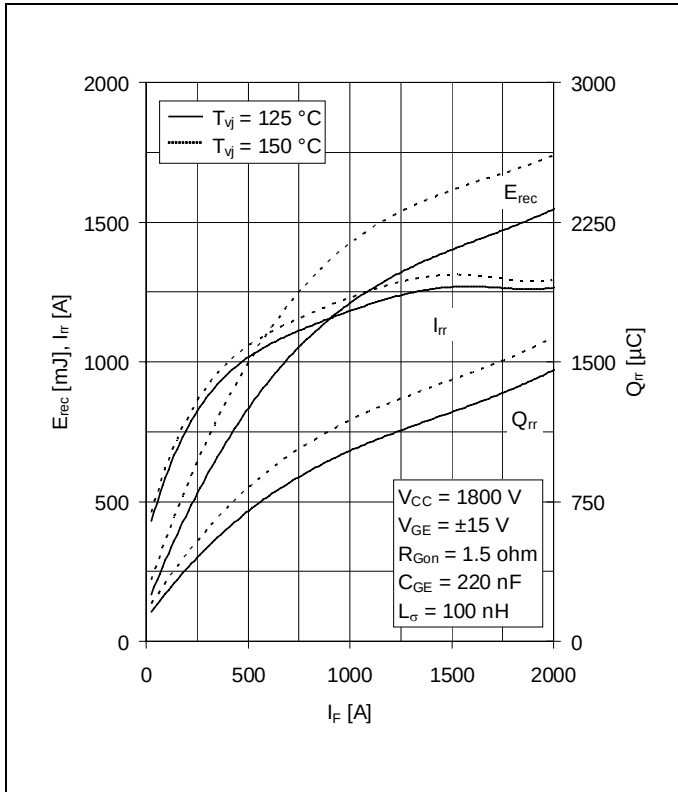


Fig. 1 Typical reverse recovery characteristics vs. forward current

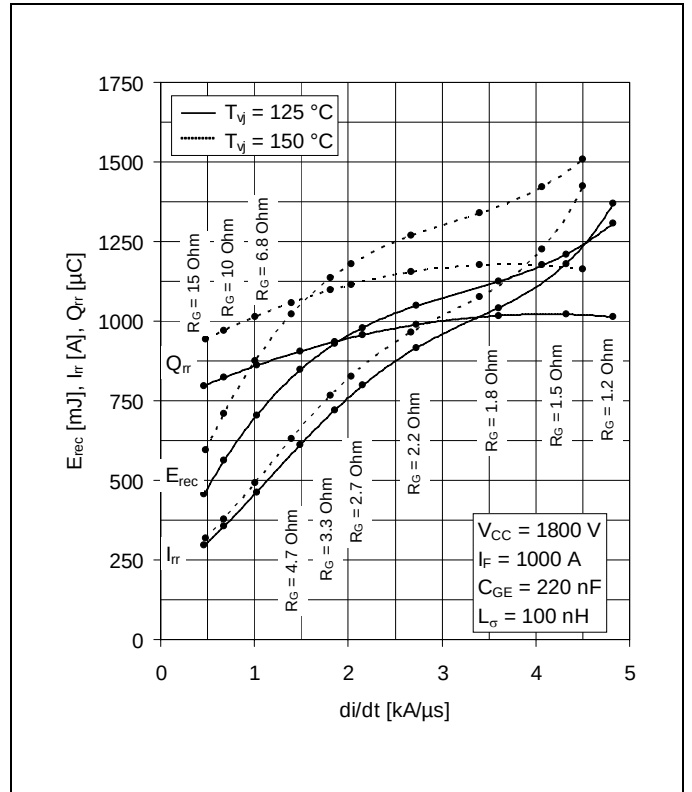


Fig. 2 Typical reverse recovery characteristics vs.  $di/dt$

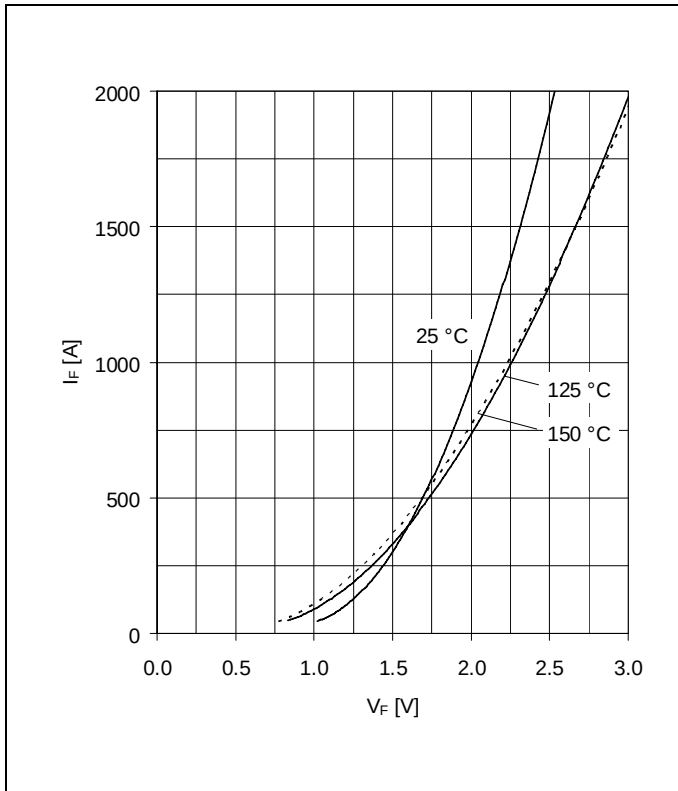


Fig. 3 Typical diode forward characteristics chip level

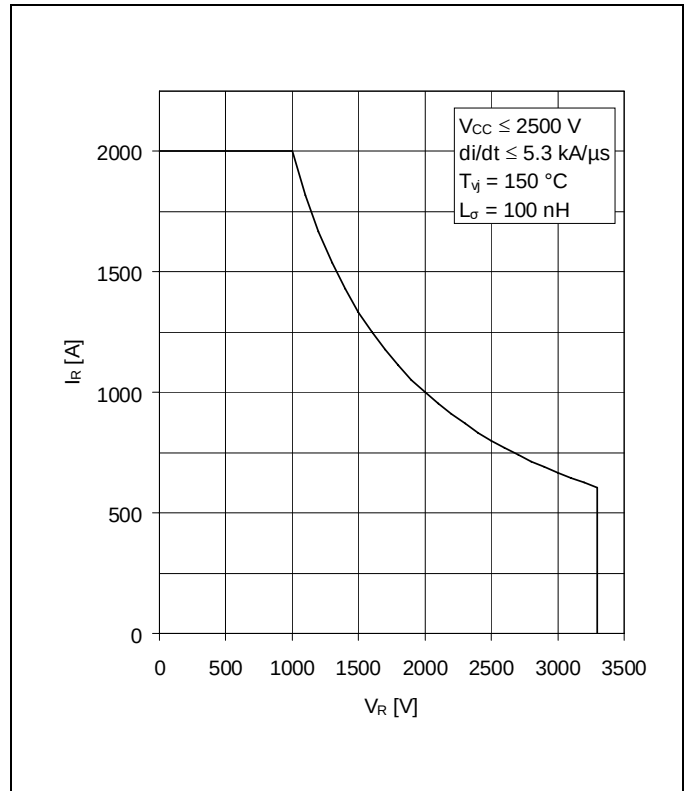


Fig. 4 Safe operating area diode (SOA)

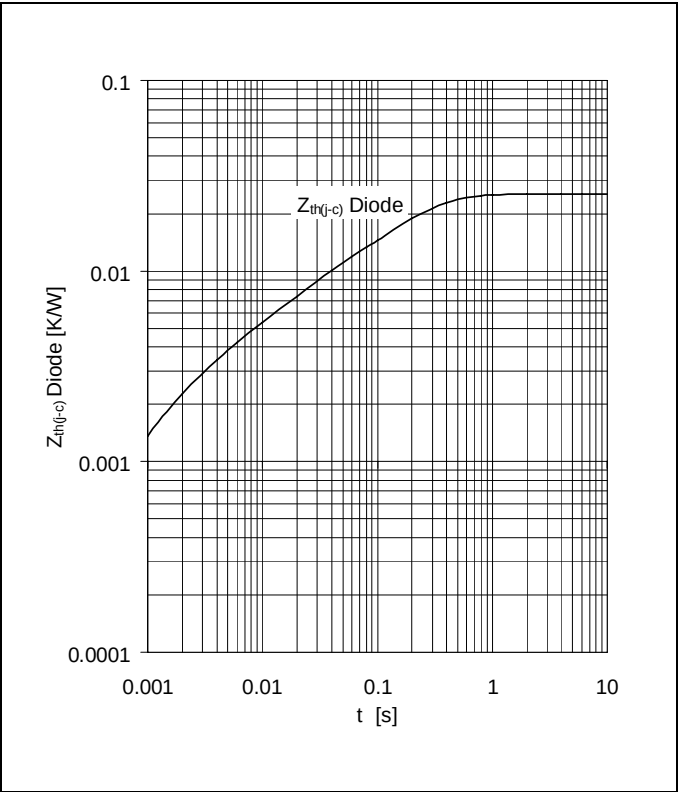


Fig. 5 Thermal impedance vs. time

Analytical function for transient thermal impedance:

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

|       |          |       |      |      |      |  |
|-------|----------|-------|------|------|------|--|
| DIODE | Ri(K/kW) | 17.1  | 4.28 | 1.92 | 1.92 |  |
|       | τi(ms)   | 203.6 | 30.1 | 7.53 | 1.57 |  |

**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 2058 Surge currents for IGBT diodes
- 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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