

# 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	$I_{FSM}$	$V_R = 0 \text{ V}, T_{vj} = 125 \text{ }^\circ\text{C},$ $t_p = 10 \text{ ms, half-sinewave, per Diode}$		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>	$V_F$	$I_F = 1200 \text{ A}$	$T_{vj} = 25 \text{ °C}$	3.2	3.7	V
			$T_{vj} = 125 \text{ °C}$	3.5	4.0	V
Continuous reverse current	$I_R$	$V_R = 4500 \text{ V}$	$T_{vj} = 25 \text{ °C}$		0.5	mA
			$T_{vj} = 125 \text{ °C}$	23	46	mA
Reverse recovery current	$I_{rr}$		$T_{vj} = 25 \text{ °C}$	1460		A
			$T_{vj} = 125 \text{ °C}$	1600		A
Recovered charge	$Q_{rr}$	$V_{CC} = 2800 \text{ V}$ , $I_F = 1200 \text{ A}$ , $di/dt = 4.8 \text{ kA}/\mu\text{s}$ $L_\sigma = 150 \text{ nH}$ , inductive load switch: 5SNA 1200G450350 Per Diode	$T_{vj} = 25 \text{ °C}$	1030		$\mu\text{C}$
			$T_{vj} = 125 \text{ °C}$	1660		$\mu\text{C}$
Reverse recovery time	$t_{rr}$		$T_{vj} = 25 \text{ °C}$	1270		ns
			$T_{vj} = 125 \text{ °C}$	1860		ns
Reverse recovery energy	$E_{rec}$		$T_{vj} = 25 \text{ °C}$	1630		mJ
			$T_{vj} = 125 \text{ °C}$	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		

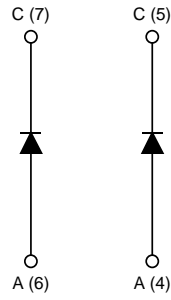
<sup>2)</sup> For detailed mounting instructions refer to ABB Document No. 5SYA 2039

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

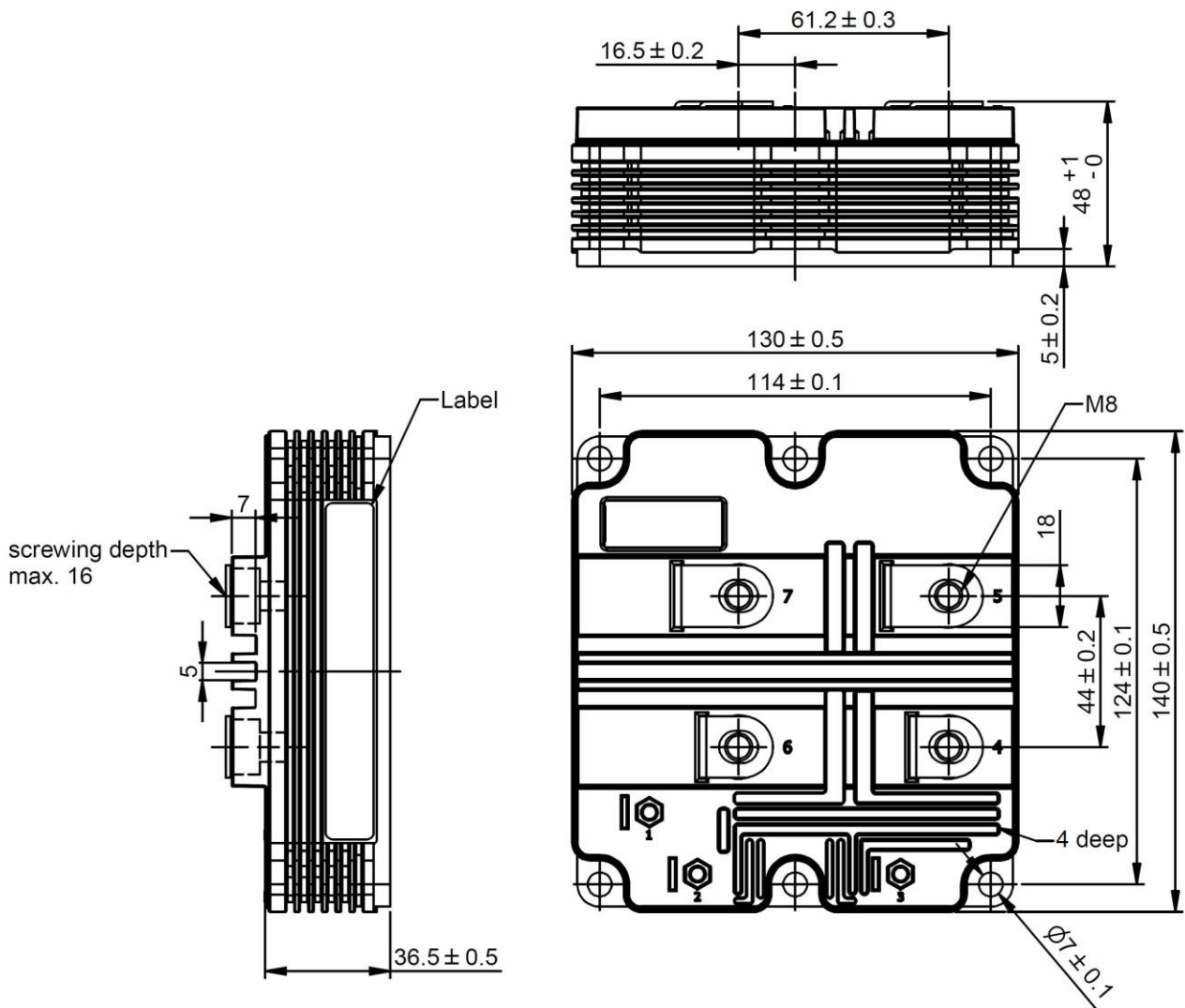
Parameter	Symbol	Conditions	min	typ	max	Unit
Dimensions	L x W x H	Typical		130 x 140 x 48		mm
Clearance distance in air	$d_a$	according to IEC 60664-1 and EN 50124-1	Term. to base:	40		mm
			Term. to term:	26		
Surface creepage distance	$d_s$	according to IEC 60664-1 and EN 50124-1	Term. to base:	64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

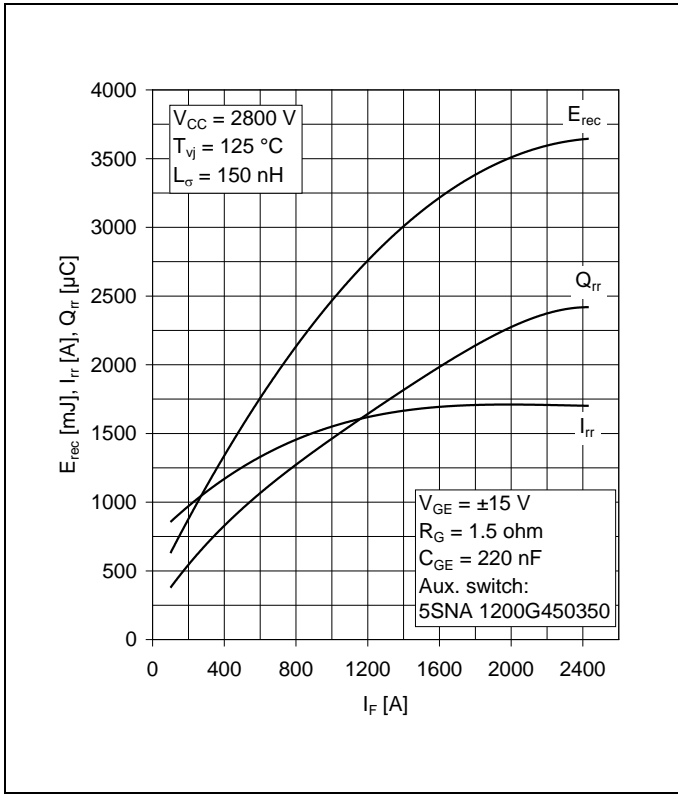


Fig. 1 Typical reverse recovery characteristics vs. forward current

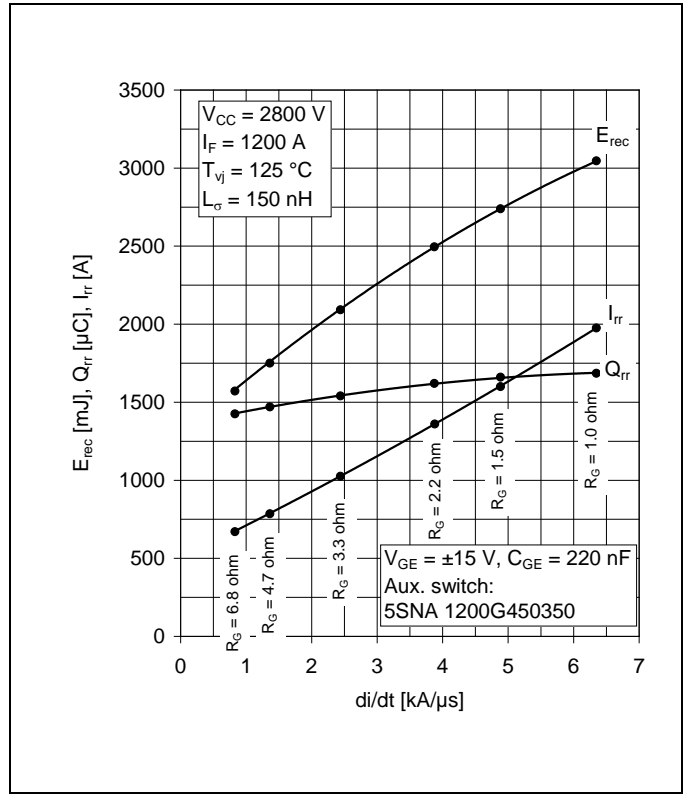


Fig. 2 Typical reverse recovery characteristics vs. di/dt

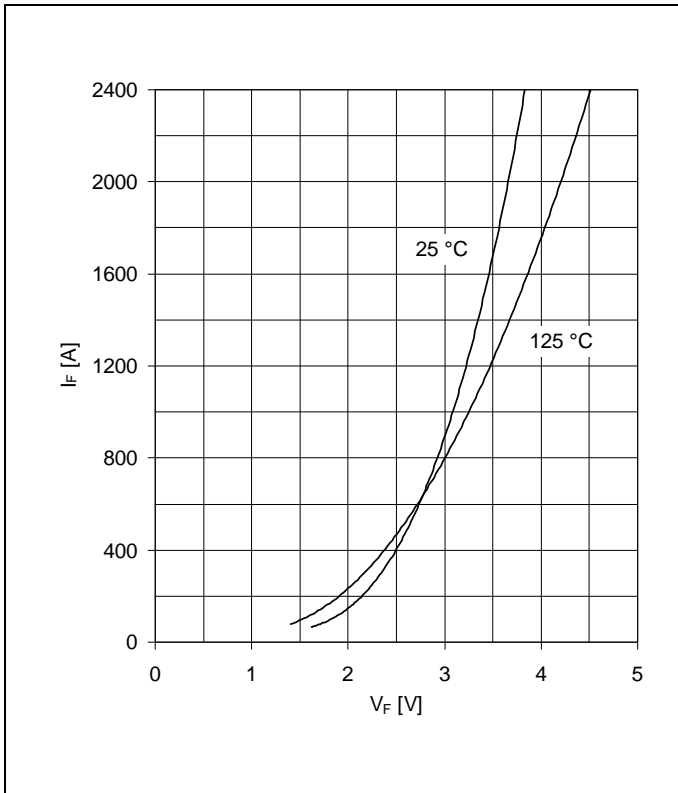


Fig. 3 Typical diode forward characteristics chip level

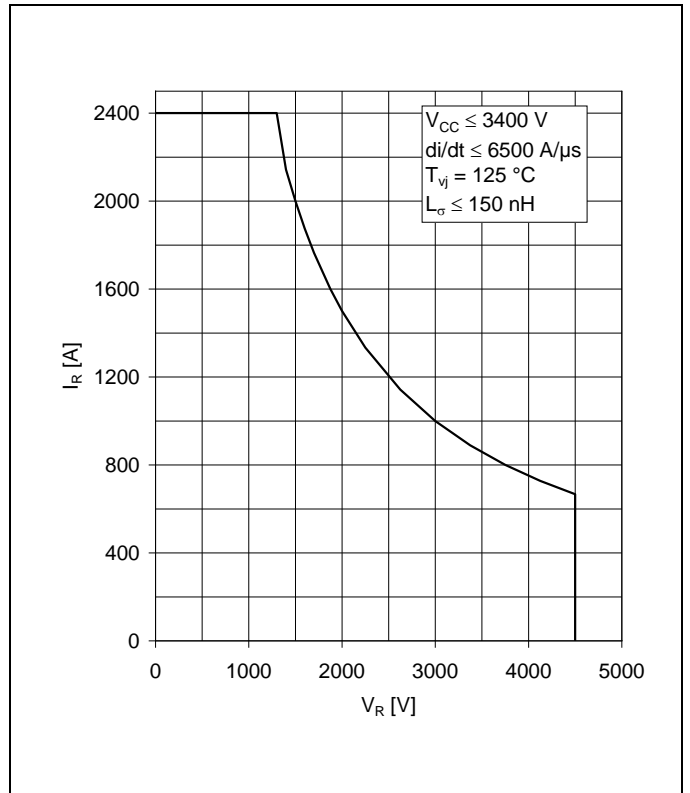


Fig. 4 Safe operating area diode (SOA)

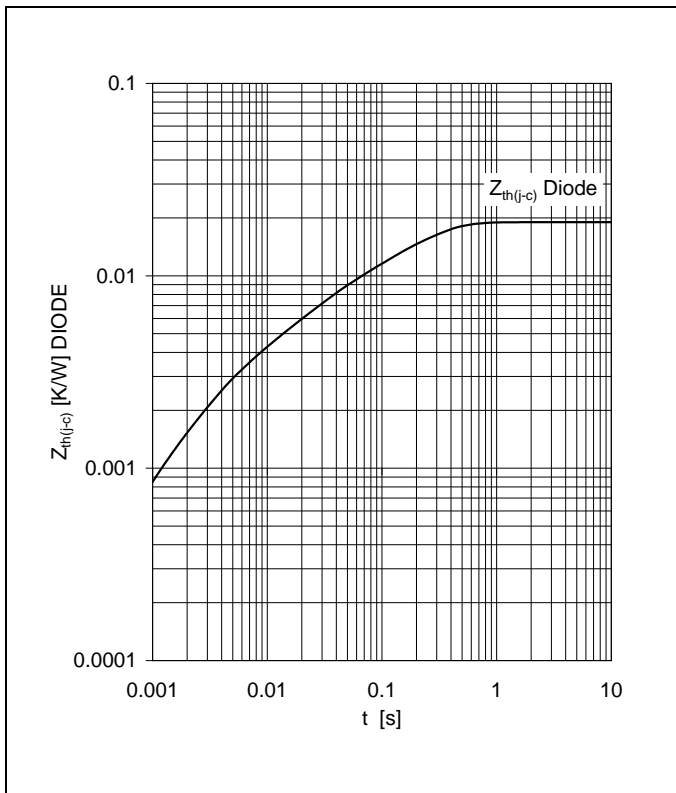


Fig. 5 Thermal impedance vs. time

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 <sub>i</sub> (K/kW)	12.5	4.37	2.16		
	τ <sub>i</sub> (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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