

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

$I_F = 2 \times 650 \text{ A}$

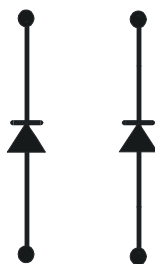


ABB HiPak™

DIODE Module

5SLD 0650J450300

Doc. No. 5SYA 1599-01 May 08

- Ultra low-loss, rugged SPT⁺ diode
- Smooth switching SPT⁺ diode for good EMC
- Industry standard package
- High power density
- AlSiC base-plate for high power cycling capability
- AlN substrate for low thermal resistance



Maximum rated values ¹⁾

Parameter	Symbol	Conditions	min	max	Unit
Repetitive peak reverse voltage	V_{RRM}			4500	V
DC forward current	I_F			650	A
Peak forward current	I_{FRM}	$t_p = 1 \text{ ms}$		1300	A
Total power dissipation	P_{tot}	$T_c = 25 \text{ °C}$, per diode		3350	W
Surge current	I_{FSM}	$V_R = 0 \text{ V}$, $T_{vj} = 125 \text{ °C}$, $t_p = 10 \text{ ms}$, half-sinewave		5300	A
Isolation voltage	V_{isol}	1 min, $f = 50 \text{ Hz}$		7400	V
Junction temperature	T_{vj}			125	°C
Junction operating temperature	$T_{vj(op)}$		-40	125	°C
Case temperature	T_c		-40	125	°C
Storage temperature	T_{stg}		-40	125	°C

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

Diode characteristic values ²⁾

Parameter	Symbol	Conditions	min	typ	max	Unit
Forward voltage ³⁾	V_F	$I_F = 650 \text{ A}$	$T_{vj} = 25 \text{ °C}$	3.1		V
			$T_{vj} = 125 \text{ °C}$	3.4		
Continuous reverse current	I_R	$V_R = 4500 \text{ V}$	$T_{vj} = 25 \text{ °C}$		10	mA
			$T_{vj} = 125 \text{ °C}$	16	32	
Reverse recovery current	I_{rr}	$V_R = 2800 \text{ V},$ $I_F = 650 \text{ A},$ $V_{GE} = \pm 15 \text{ V},$ $di/dt = 4200 \text{ A}/\mu\text{s}$	$T_{vj} = 25 \text{ °C}$	830		A
			$T_{vj} = 125 \text{ °C}$	930		
Recovered charge	Q_{rr}	$L_\sigma = 150 \text{ nH}$ inductive load, switch: 5SNA 0650J450300	$T_{vj} = 25 \text{ °C}$	560		μC
			$T_{vj} = 125 \text{ °C}$	930		
Reverse recovery time	t_{rr}		$T_{vj} = 25 \text{ °C}$	1180		ns
			$T_{vj} = 125 \text{ °C}$	1700		
Reverse recovery energy	E_{rec}		$T_{vj} = 25 \text{ °C}$	910		mJ
			$T_{vj} = 125 \text{ °C}$	1610		
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 Ω
			$T_C = 125 \text{ °C}$	0.3		

²⁾ Characteristic values according to IEC 60747 – 2³⁾ Forward voltage is given at chip level**Thermal properties** ⁴⁾

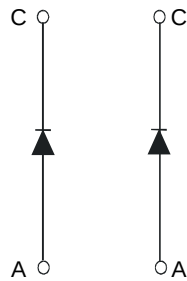
Parameter	Symbol	Conditions	min	typ	max	Unit
Diode thermal resistance junction to case	$R_{th(j-c)DIODE}$				0.030	K/W
Diode thermal resistance ⁵⁾ case to heatsink	$R_{th(c-s)DIODE}$	diode per switch, λ grease = 1W/m ² × K		0.027		K/W

Mechanical properties ⁴⁾

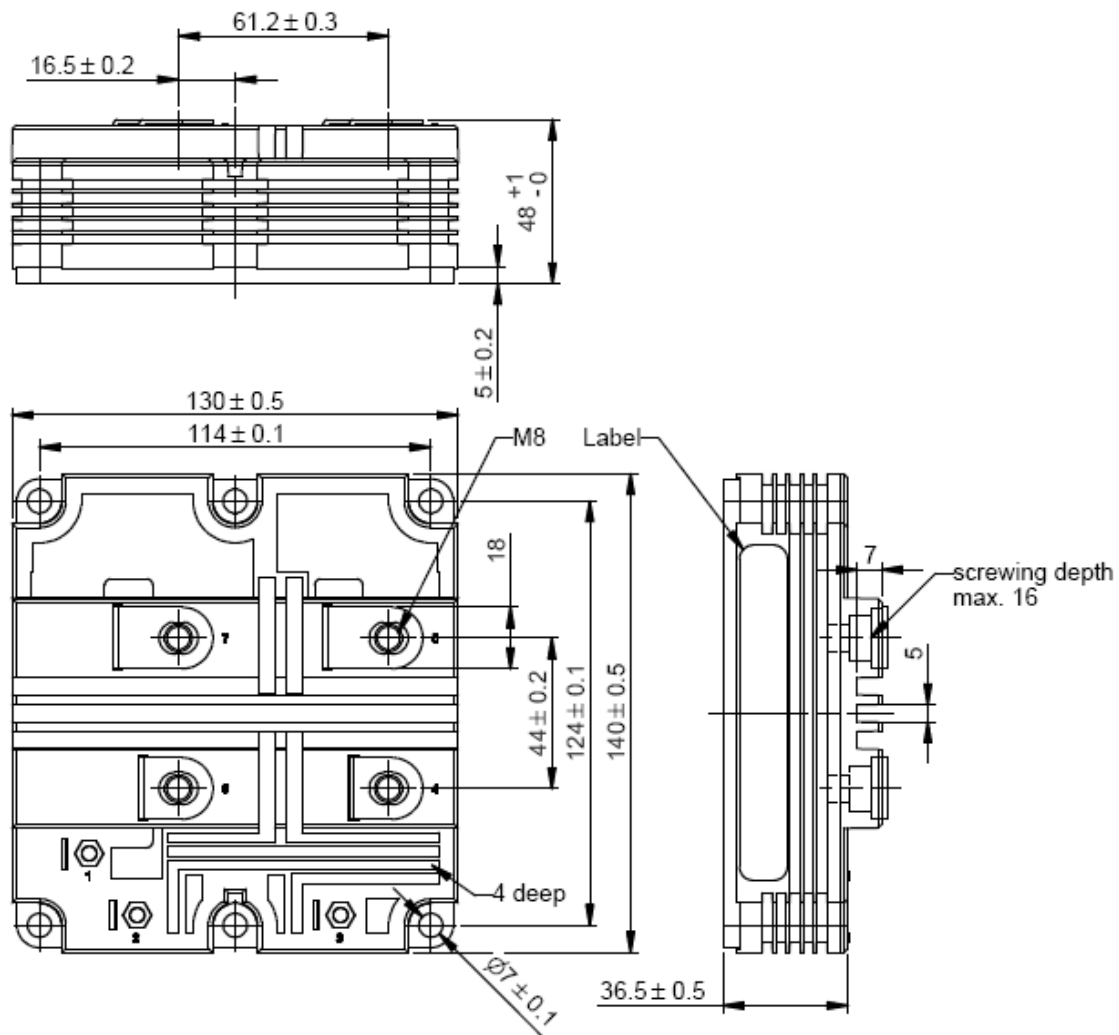
Parameter	Symbol	Conditions	min	typ	max	Unit
Dimensions	$L \times W \times H$	Typical , see outline drawing	130 × 140 × 48			mm
Clearance distance in air	d_a	according to IEC 60664-1 and EN 50124-1	Term. to base:	40		mm
			Term. to term:	26		
Surface creepage distance	d_s	according to IEC 60664-1 and EN 50124-1	Term. to base:	64		mm
			Term. to term:	56		
Comparative tracking index	CTI		≥ 600			
Mounting torques ⁵⁾	M_s	Base-heatsink, M6 screws	4		6	Nm
	M_{t1}	Main terminals, M8 screws	8		10	
Mass	m			1150		g

⁴⁾ Thermal and mechanical properties according to IEC 60747 – 15⁵⁾ For detailed mounting instructions refer to ABB document no. 5SYA 2039 - 01

Electrical configuration



Outline drawing ⁵⁾



Note: all dimensions are shown in mm

⁵⁾ For detailed mounting instructions refer to ABB document no. 5SYA 2039 - 01

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.

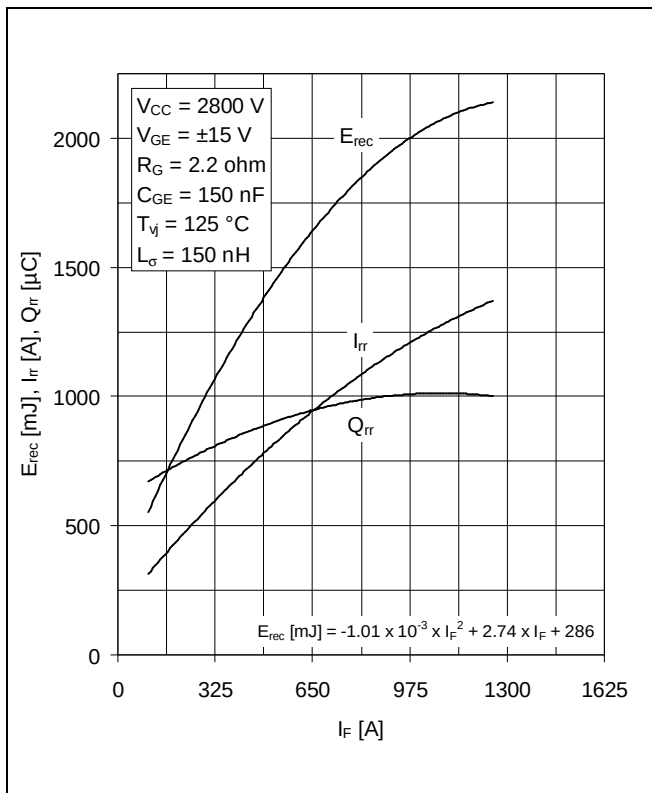


Fig. 1 Typical reverse recovery characteristics vs forward current

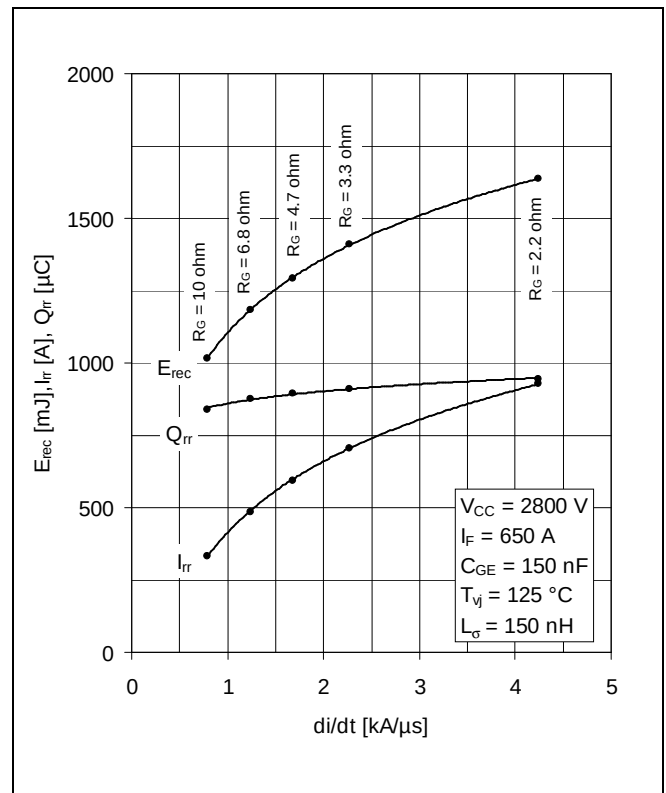


Fig. 2 Typical reverse recovery characteristics vs di/dt

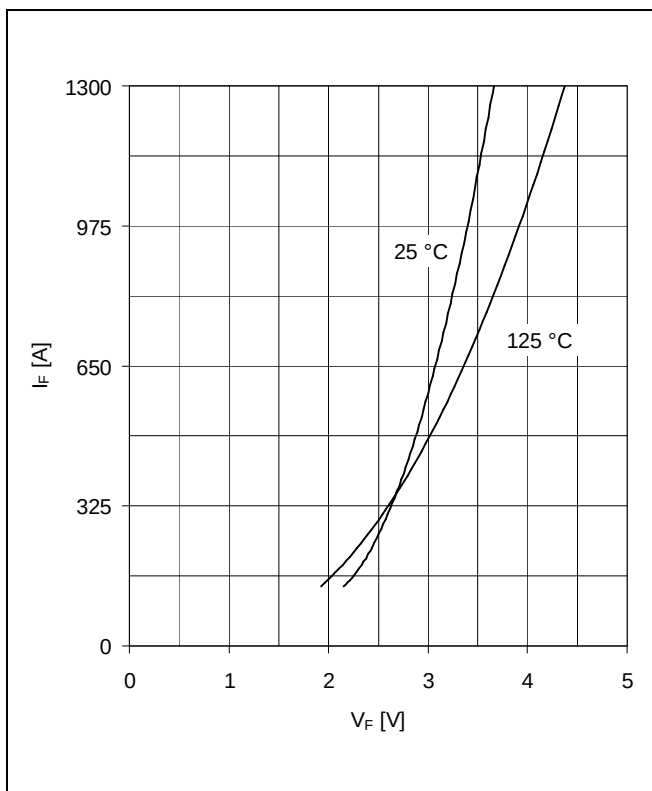


Fig. 3 Typical diode forward characteristics, chip level

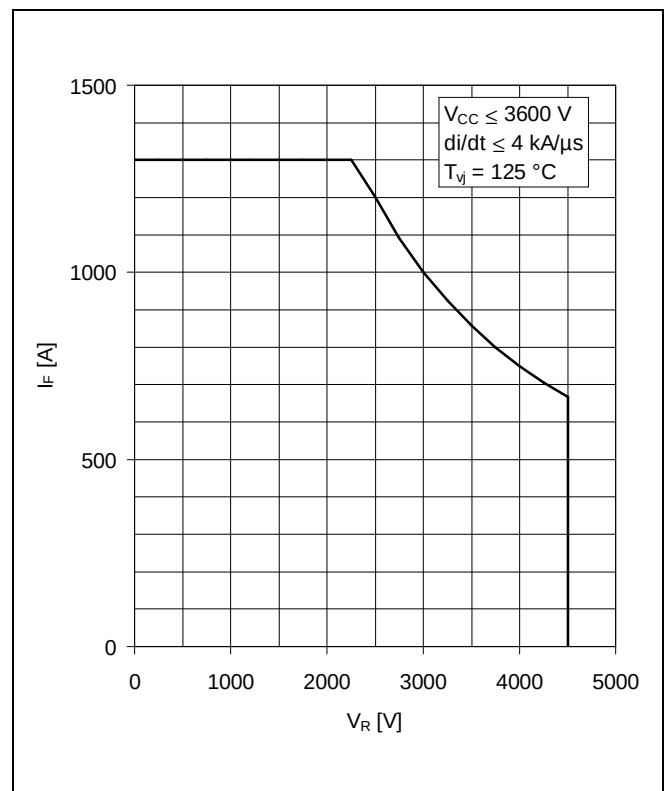


Fig. 4 Safe operating area diode (SOA)

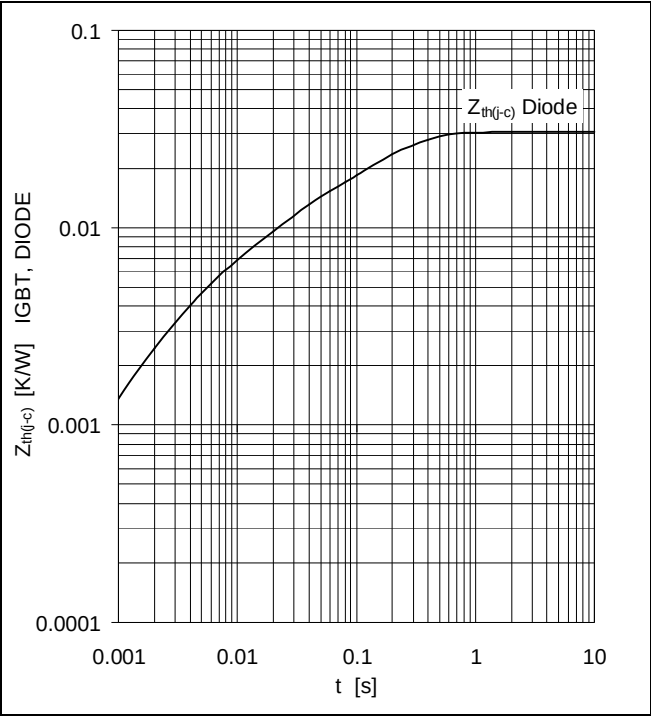


Fig. 5 Thermal impedance vs time

Analytical function for transient thermal impedance:

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

i	1	2	3	4	5
$R_i(K/kW)$	20	7.01	3.46		
$\tau_i(ms)$	191.5	22.6	3.1		

For detailed information refer to:

- 5SYA 2042-02 Failure rates of HiPak modules due to cosmic rays
- 5SYA 2043-01 Load – cycle capability of HiPaks
- 5SYA 2045-01 Thermal runaway during blocking
- 5SZK 9120-00 Specification of environmental class for HiPak

ABB Switzerland Ltd, Semiconductors reserves the right to change specifications without notice.



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