V_{RRM} = 4500 V
I_F = 2x 650 A

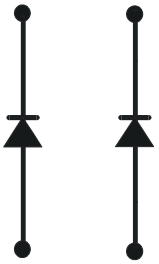


ABB HiPak

DIODE Module

5SLD 0650J450300

Doc. No. 5SYA 1599-05 09-2016

- **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**
- **Improved high reliability package**
- **Recognized under UL1557, File E196689**

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 = 1ms		1300	A
Total power dissipation	P_{tot}	T_c = 25 °C, per diode		3350	W
Surge current	I_{FSM}	V_R = 0 V, T_{vj} = 125 °C, t_p = 10 ms, half-sinewave		5300	A
Isolation voltage	V_{isol}	1 min, f = 50 Hz		10.2	kV
Junction temperature	T_{vj}			125	°C
Junction operating temperature	$T_{vj(op)}$		-50	125	°C
Case temperature	T_c		-50	125	°C
Storage temperature	T_{stg}		-50	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 A	T_{vj} = 25 °C		3.1		V
			T_{vj} = 125 °C		3.4		
Continuous reverse current	I_R	V_R = 4500 V	T_{vj} = 25 °C			10	mA
			T_{vj} = 125 °C		16	32	
Reverse recovery current	I_{rr}	V_R = 2800 V, I_F = 650 A, V_{GE} = ±15 V, di/dt = 4200 A/µs L_σ = 150 nH inductive load, switch: 5SNA 0650J450300	T_{vj} = 25 °C		830		A
			T_{vj} = 125 °C		930		
Recovered charge	Q_{rr}		T_{vj} = 25 °C		560		µC
			T_{vj} = 125 °C		930		
Reverse recovery time	t_{rr}		T_{vj} = 25 °C		1180		ns
			T_{vj} = 125 °C		1700		
Reverse recovery energy	E_{rec}		T_{vj} = 25 °C		910		mJ
			T_{vj} = 125 °C		1610		
Module stray inductance	$L_{\sigma AC}$	per diode			36		nH
Resistance, terminal-chip	$R_{AA'+CC'}$	per diode	T_C = 25 °C		0.2		mΩ
			T_C = 125 °C		0.3		

[2] Characteristic values according to IEC 60747 – 2
[3] Forward voltage is given at chip level

Package properties [4]

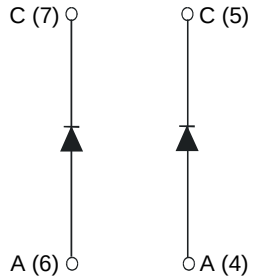
Parameter	Symbol	Conditions	min	typ	max	Unit
Diode thermal resistance junction to case	$R_{th(j-c)DIODE}$				0.030	K/W
Diode thermal resistance case to heatsink [5]	$R_{th(c-s)DIODE}$	diode per switch, λ grease = 1W/m x K		0.027		K/W
Partial discharge extinction voltage	V_e	f = 50 Hz, $Q_{PD} \leq$ 10pC (acc. to IEC 61287)	5100			V
Comparative tracking index	CTI		≥ 600			

Mechanical properties [4]

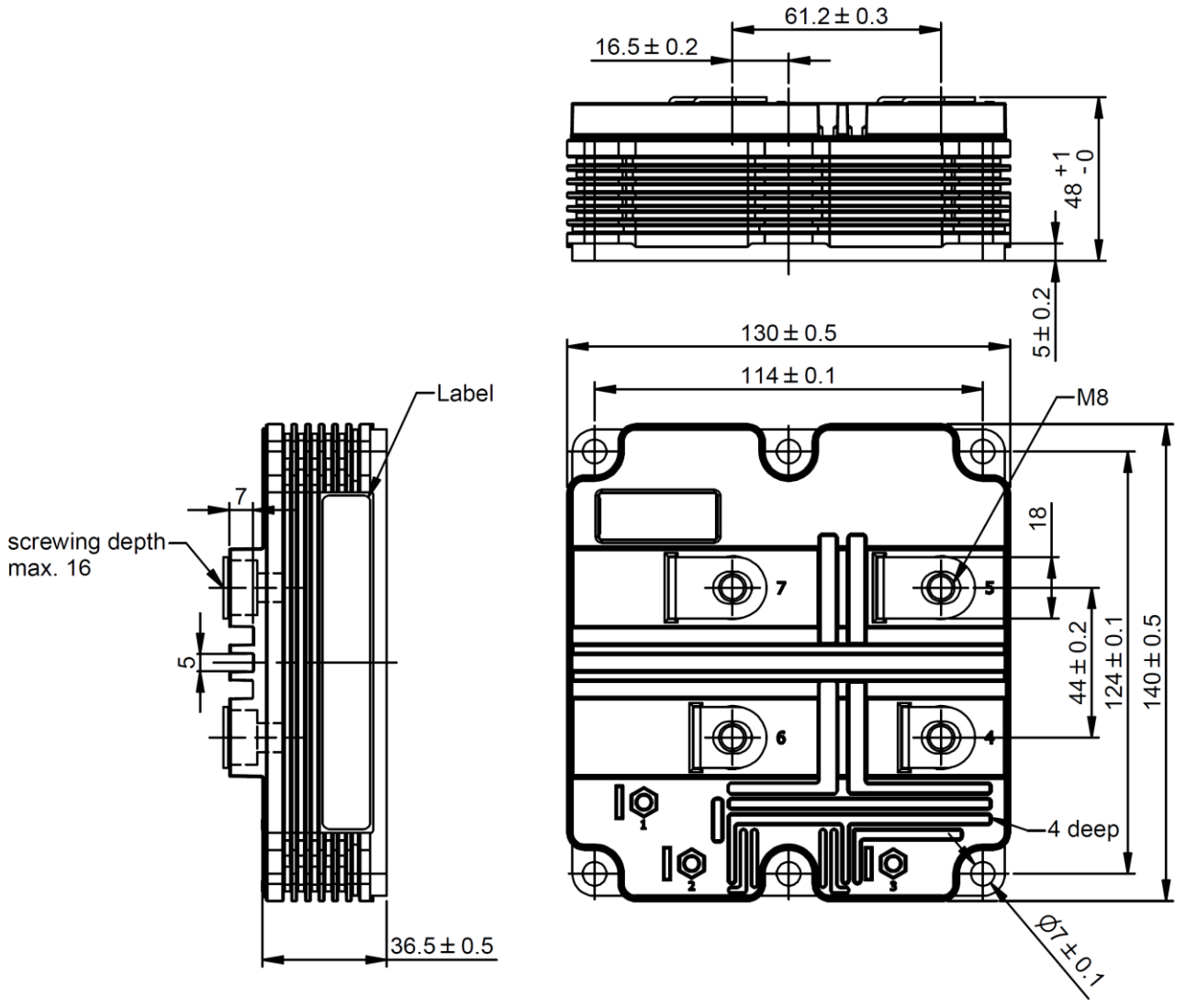
Parameter	Symbol	Conditions		min	typ	max	Unit
Dimensions	L x W x H	Typical , see outline drawing		130 x 140 x 48			mm
Clearance distance in air	d_a	according to IEC 60664-1 and EN 50124-1	Term. to base:	40			mm
			Term. to term:	26			
Surface creepage distance	d_s	according to IEC 60664-1 and EN 50124-1	Term. to base:	64			mm
			Term. to term:	56			
Mounting torques [5]	M_s	Base-heatsink, M6 screws		4		6	Nm
	M_{t1}	Main terminals, M8 screws		8		10	
Mass	m				980		g

[4] Package and mechanical properties according to IEC 60747 – 15
[5] 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. VIII.
This product has been designed and qualified for industrial level.

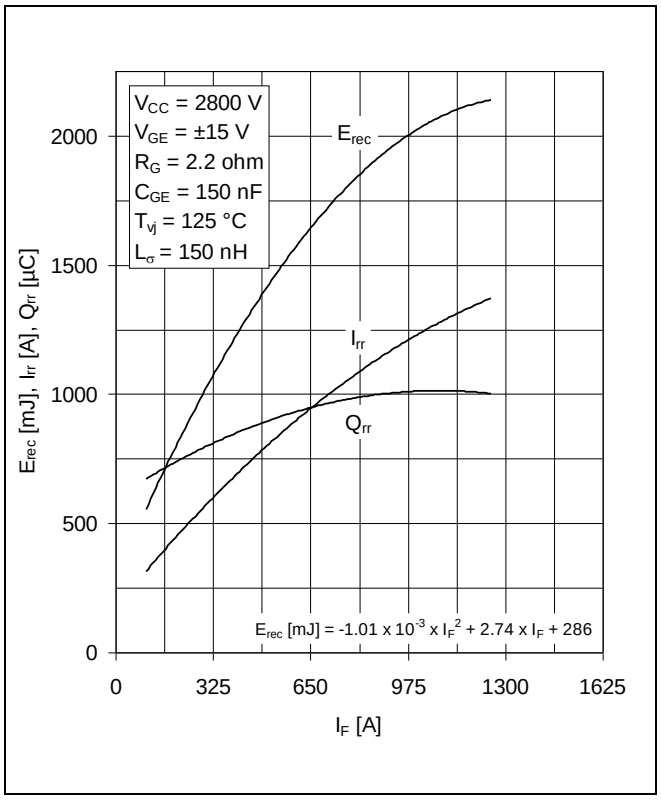


Fig. 1 Typical reverse recovery characteristics vs forward current

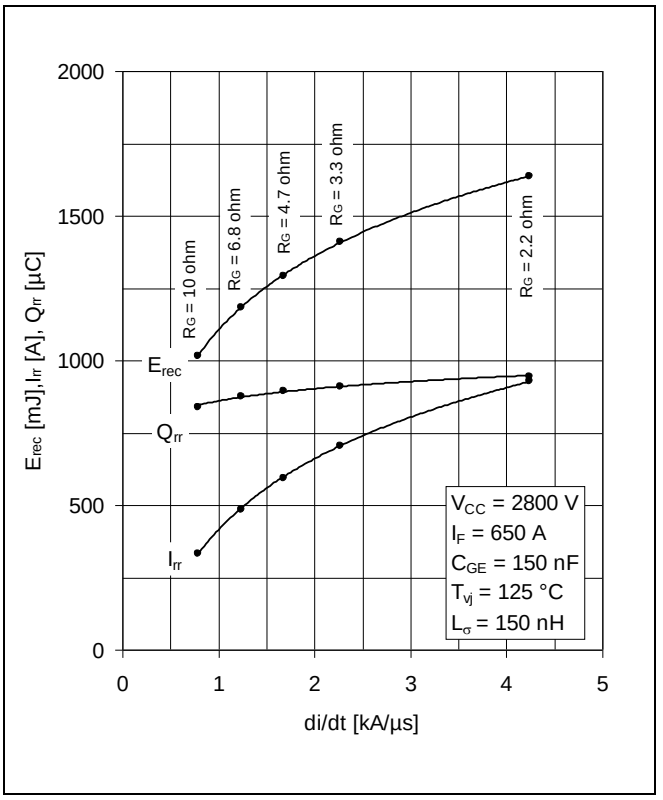


Fig. 2 Typical reverse recovery characteristics vs di/dt

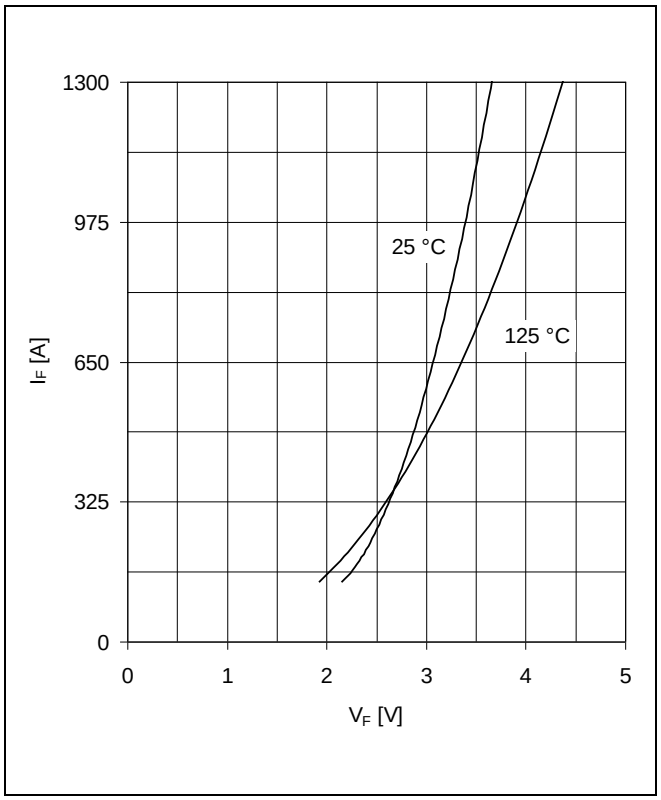


Fig. 3 Typical diode forward characteristics, chip level

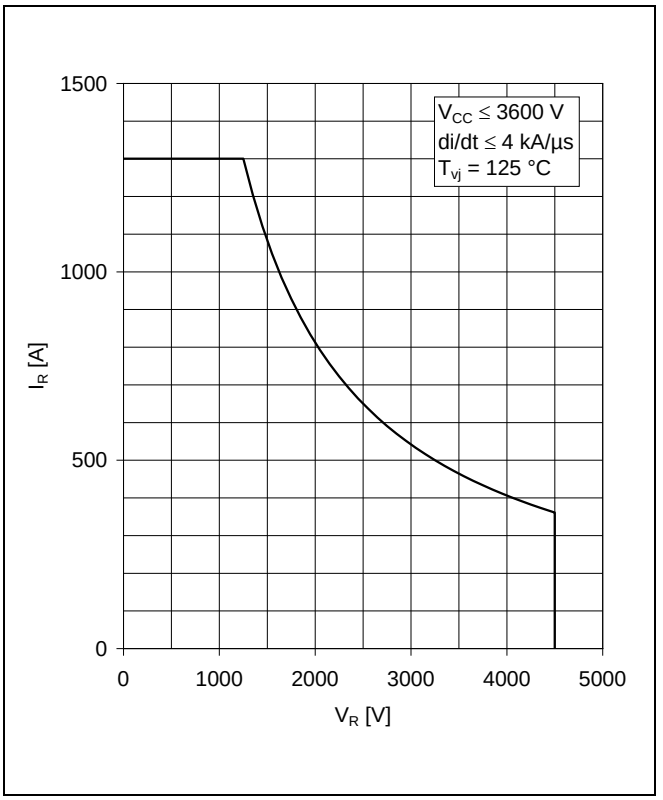


Fig. 4 Safe operating area diode (SOA)

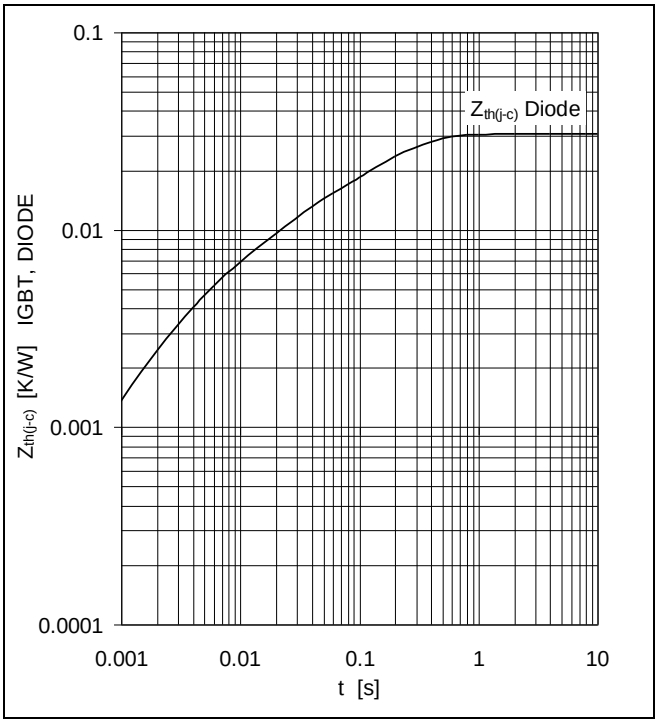


Fig. 5 Thermal impedance vs time

Analytical function for transient thermal impedance:

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

	i	1	2	3	4	5
DIODE	R_i(K/kW)	20	7.01	3.46		
	τ_i(ms)	191.5	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 2053 Applying IGBT
5SYA 2057 IGBT diode safe operating area (SOA)
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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