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Data sheet 5SYA 1508-01 Nov 22

5SLD 1500J450350

HiPak Diode module

- V_{CE} = 4500 V
- I_C = 2x 1500 A
- Ultra-low-loss, rugged SPT++ diode
- Exceptional ruggedness and highest current rating
- High insulation package, 2 Diodes in 1 package
- AlSiC base-plate and AlN substrate for low thermal resistance and high power cycling capability

Maximum rated values [1)]

Parameter	Symbol	Conditions	Min.	Max.	Unit
Repetitive peak reverse voltage	V_{RRM}	T_{vj} ≥ 25 °C		4500	V
Rated forward current [2)]	I_F			1500	A
Peak forward current	I_{frm}	t_p = 1 ms		3000	A
Maximum RMS current	I_{FRMS}	per Diode, T_C = 110 °C, $T_{Terminal}$ ≤ 60 °C		1030	A
Surge current	I_{fsm}	$T_{vj\ start}$ = 150 °C, t_p = 10 ms, half-sinewave		13200	A
Isolation voltage	V_{isol}	1 min, f = 50 Hz		10200	V
Max Junction temperature	T_{vj}		-40	150	°C
Junction operating temperature	$T_{vj(op)}$		-40	150	°C
Case temperature	T_c		-40	125	°C
Storage temperature	T_{stg}		-40	125	°C
Mounting torques [3)]	M_s	Base-heatsink, M6 screws	4	6	Nm
	M_{t1}	Main terminals, M8 screws	8	10	
	M_{t1}	Main terminals, M6 screws	8	10	

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

[2)] Based on the current rating per diode die

[3)] For detailed mounting instructions refer to application note 5SYA 2039

Diode characteristic values [4]

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Forward voltage [5]	V_F	I_F = 1500 A	T_{vj} = 25 °C		2.55		V
			T_{vj} = 125 °C		2.8		V
			T_{vj} = 150 °C		2.75		V
Continuous reverse current	I_R	V_R = 4500 V	T_{vj} = 25 °C			1	mA
			T_{vj} = 125 °C		8.5		mA
			T_{vj} = 150 °C		48		mA
Peak reverse recovery current	I_{rm}	V_{CC} = 2800 V, I_F = 1500 A, V_{GE} = ±15 V, R_G = 1.5 Ω, C_{GE} = 220 nF, L_σ = 150 nH, dI/dt = 4.83 kA / µs, inductive load switch: 5SNA 1500G450300	T_{vj} = 25 °C		1900		A
			T_{vj} = 125 °C		2089		A
			T_{vj} = 150 °C		2130		A
Recovered charge	Q_{rr}		T_{vj} = 25 °C		1570		µC
			T_{vj} = 125 °C		2492		µC
			T_{vj} = 150 °C		2863		µC
Reverse recovery time	t_{rr}		T_{vj} = 25 °C		1780		ns
			T_{vj} = 125 °C		1930		ns
			T_{vj} = 150 °C		2730		ns
Reverse recovery energy	E_{rec}		T_{vj} = 25 °C		2730		mJ
			T_{vj} = 125 °C		4602		mJ
			T_{vj} = 150 °C		5389		mJ

[4] Characteristic values according to IEC 60747 – 2

[5] Forward voltage is given at chip level

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Package properties

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Diode thermal resistance junction to case	$R_{th(j-c)DIODE}$	per Diode				0.016	K/W
Diode thermal resistance case to heatsink	$R_{th(c-s)DIODE}$	per Diode, λ grease = 1W/m x K			0.011		K/W
Partial discharge voltage	V_e	f = 50 Hz, Q_{PD} ≤ 10pC (acc. to IEC 61287)		5100			V
Comparative tracking index	CTI			600			
Module stray inductance	$L_{\sigma AC}$	per Diode			54		nH
Resistance, terminal-chip	$R_{A1C1\ Diode}$		T_C = 25 °C		0.2		mΩ
			T_C = 125 °C		0.3		
			T_C = 150 °C		0.33		

Mechanical properties [6)]

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 base:	26			
Surface creepage distance	d_s		Term. to base:	64			
			Term. to base:	56			
Mass	m				980		g

[6)] Package and mechanical properties according to IEC 60747 – 15

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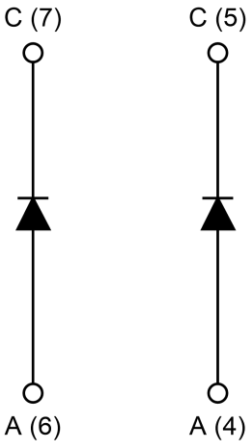
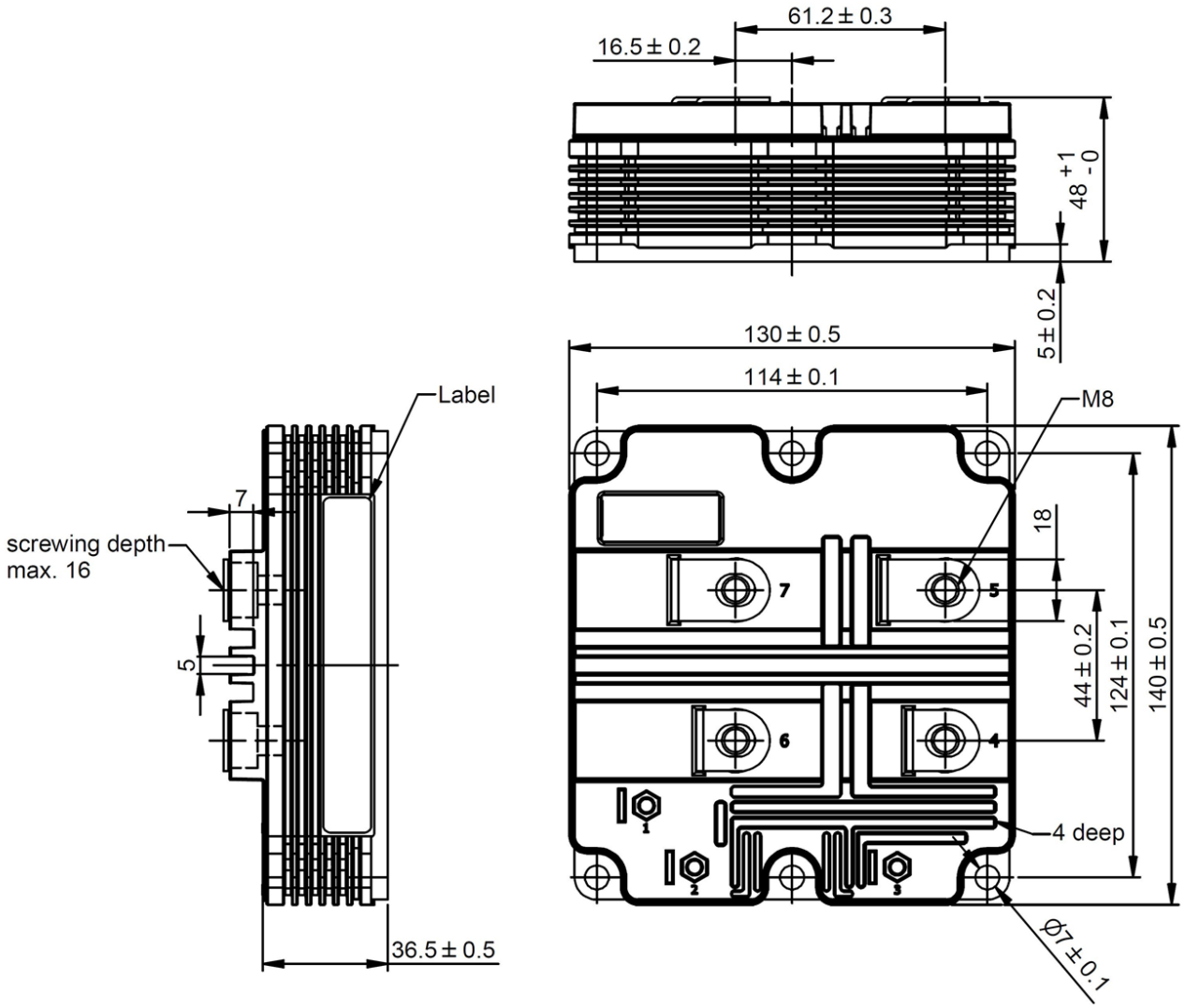
Electrical configuration



Mechanical drawing



Note: all dimensions are shown in millimeters

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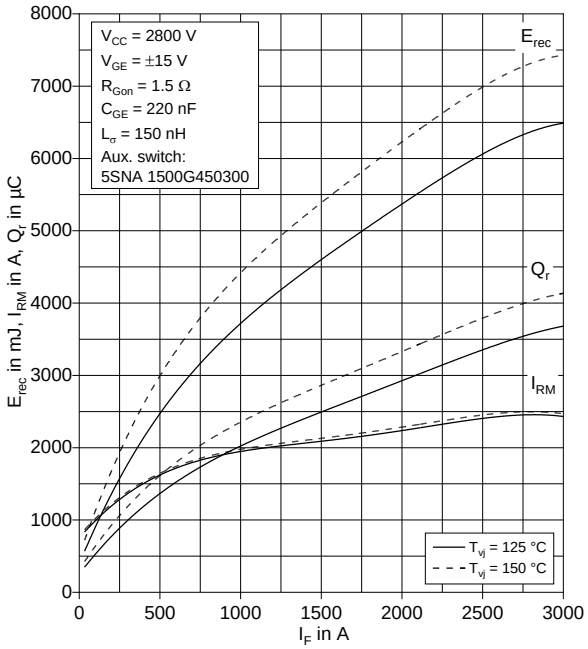

Fig. 1 Typical reverse recovery characteristics vs. forward current

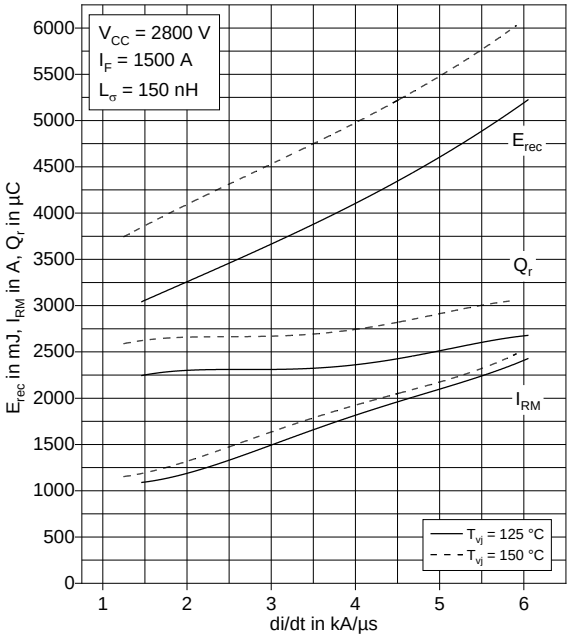

Fig. 2 Typical reverse recovery characteristics vs. di/dt

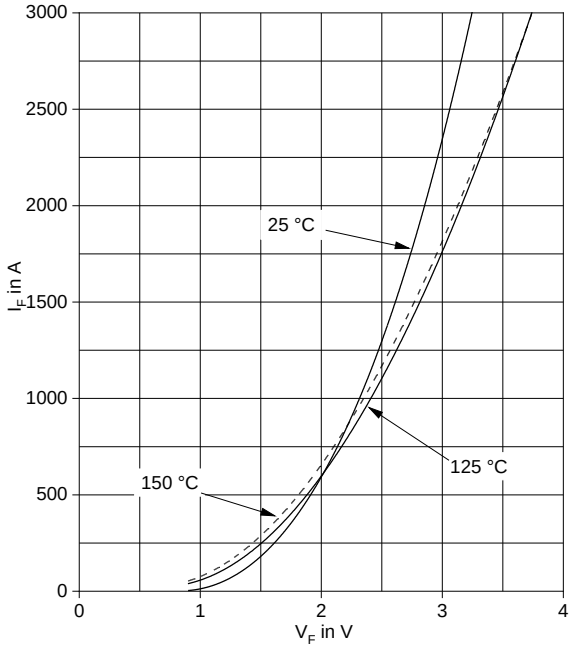

Fig. 3 Typical diode forward characteristics chip level

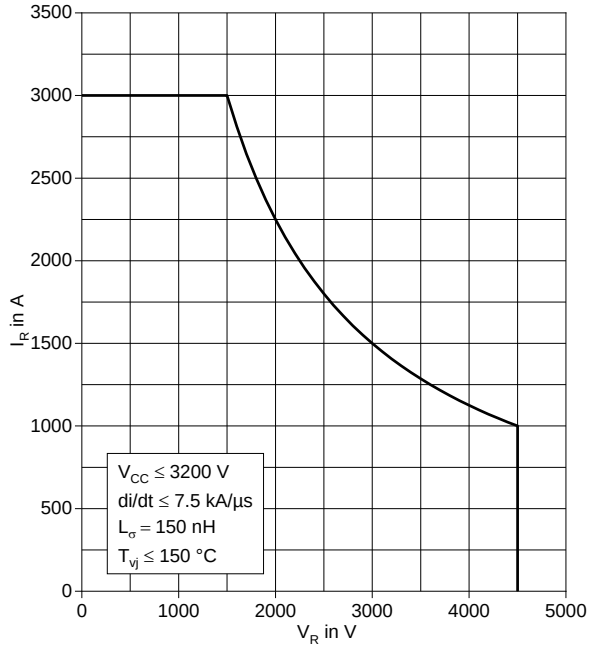

Fig. 4 Diode turn-off safe operating area (DSOA)

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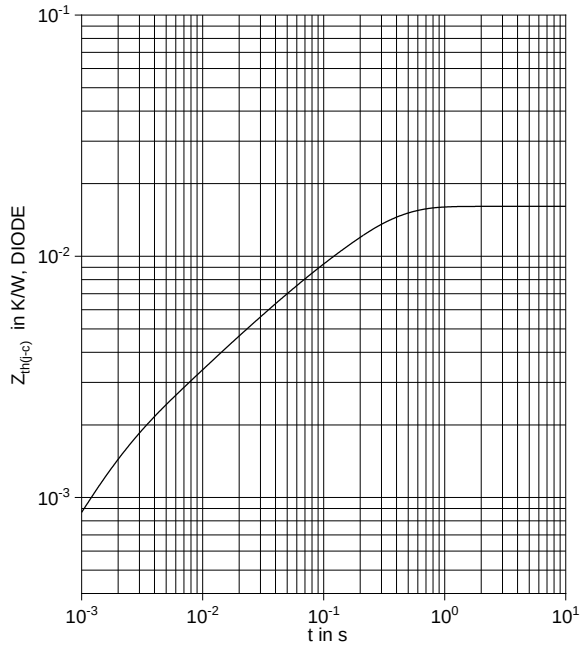

Analytical function for transient thermal impedance:

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

	i	1	2	3	4	5
DIODE	Ri(K/kW)	1.95	6.11	5.9	2.06	
	τi(ms)	2283	160	32	2.7	

Fig. 5 Thermal impedance vs time

Related documents:

5SYA 2042 Failure rates of IGBT 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
5SYA 2039 Mounting instructions for HiPak 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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