

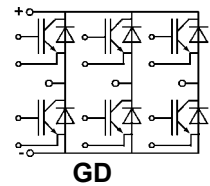
Absolute Maximum Ratings		Values	Units
Symbol	Conditions ¹⁾		
V_{CES}		1200	V
V_{CGR}	$R_{GE} = 20 \text{ k}\Omega$	1200	V
I_C	$T_{HS} = 25/70 \text{ }^\circ\text{C}$	235 / 180	A
I_{CM}	$T_{HS} = 25/70 \text{ }^\circ\text{C}; t_p = 1 \text{ ms}$	470 / 360	A
V_{GES}		± 20	V
P_{tot}	per IGBT, $T_{HS} = 25 \text{ }^\circ\text{C}$	625	W
$T_j, (T_{stg})$		$-40 \dots +150 (125)$	$^\circ\text{C}$
T_{cop}	max. case operating temperature	125	$^\circ\text{C}$
V_{isol}	AC, 1 min.	2500	V
humidity	IEC-EN 60721-3-3		
climate	IEC 68 T.1	40/125/56	
Inverse Diode			
$I_F = -I_C$	$T_{HS} = 25/70 \text{ }^\circ\text{C}$	230 / 180	A
$I_{FM} = -I_{CM}$	$T_{HS} = 25/70 \text{ }^\circ\text{C}; t_p = 1 \text{ ms}$	460 / 360	A
I_{FSM}	$t_p = 10 \text{ ms}; \sin.; T_j = 150 \text{ }^\circ\text{C}$	2200	A
I^2t	$t_p = 10 \text{ ms}; T_j = 150 \text{ }^\circ\text{C}$	24 200	A^2s

Characteristics		min.	typ.	max.	Units
Symbol	Conditions ¹⁾				
$V_{(BR)CES}$	$V_{GE} = 0, I_C = 1 \text{ mA}$	$\geq V_{CES}$	—	—	V
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 4 \text{ mA}$	4,5	5,5	6,5	V
I_{CES}	$V_{GE} = 0$ $V_{CE} = V_{CES}, T_j = 125 \text{ }^\circ\text{C}$	—	15	—	mA
I_{GES}	$V_{GE} = 20 \text{ V}, V_{CE} = 0$	—	—	500	nA
$V_{CESat}^{4)}$	$I_C = 200 \text{ A} \left\{ \begin{array}{l} V_{GE} = 15 \text{ V;} \\ T_j = 25 \text{ }^\circ\text{C} \end{array} \right\}$	—	2,0	2,3	V
C_{ies}	$V_{GE} = 0$	—	18	—	nF
C_{oes}	$V_{CE} = 25 \text{ V}$	—	4,3	—	nF
C_{res}	$f = 1 \text{ MHz}$	—	3,6	—	nF
L_{CE}		—	—	20	nH
$R_{CC'+EE'}$	resistance, terminal-chip; $T_{HS} = 25 \text{ }^\circ\text{C}$	—	1,15	—	m Ω
$t_{d(on)}$	$V_{CC} = 600 \text{ V}$	—	150	—	ns
t_r	$V_{GE} = +15 \text{ V} / -15 \text{ V}^{3)}$	—	45	—	ns
$t_{d(off)}$	$I_C = 200 \text{ A, ind. load}$	—	700	—	ns
t_f	$R_{Gon} = R_{Goff} = 5 \text{ } \Omega$	—	50	—	ns
E_{on}	$T_j = 125 \text{ }^\circ\text{C}$	—	21	—	mJ
E_{off}		—	20	—	mJ
Inverse Diode ⁸⁾					
$V_F = V_{EC}$	$I_F = 200 \text{ A} \left\{ \begin{array}{l} V_{GE} = 0 \text{ V;} \\ T_j = 25 (125) \text{ }^\circ\text{C} \end{array} \right\}$	—	2,3 (2,1)	2,6	V
$V_F = V_{EC}$	$I_F = 100 \text{ A} \left\{ \begin{array}{l} V_{GE} = 0 \text{ V;} \\ T_j = 25 (125) \text{ }^\circ\text{C} \end{array} \right\}$	—	1,8 (1,6)	—	V
V_{TO}	$T_j = 125 \text{ }^\circ\text{C}$	—	1,1	—	V
r_T	$T_j = 125 \text{ }^\circ\text{C}$	—	5	—	m Ω
I_{RRM}	$I_F = 200 \text{ A}; T_j = 25 (125) \text{ }^\circ\text{C}^{2)}$	—	TBD	—	A
Q_{rr}	$I_F = 200 \text{ A}; T_j = 25 (125) \text{ }^\circ\text{C}^{2)}$	—	TBD	—	μC
Thermal Characteristics ⁵⁾					
R_{thjh}	per IGBT	—	—	0,20	$^\circ\text{C/W}$
R_{thjD}	per diode	—	—	0,285	$^\circ\text{C/W}$
$R'_{thjc}^{6)}$	per IGBT	—	—	0,071	$^\circ\text{C/W}$
$R'_{thjD}^{6)}$	per diode	—	—	0,105	$^\circ\text{C/W}$
Temperature Sensor					
R_{TS}	$T = 25 \text{ }^\circ\text{C} / 100 \text{ }^\circ\text{C}$	—	1,0 / 1,67	—	k Ω
tolerance	$T = 25 \text{ }^\circ\text{C} / 100 \text{ }^\circ\text{C}$	—	3,0 / 2,0	—	%

SKiM[®] 4 IGBT Modules

SKiM 250 GD 128 D

Preliminary Data



Features

- N channel, homogeneous planar IGBT Silicon structure with n+ buffer layer in SPT (soft punch through) technology
- Low inductance case
- Fast & soft inverse CAL diodes ⁸⁾
- Isolated by DCB (Direct Copper Bonded) ceramic plate
- Pressure contact technology for thermal contacts
- Spring contact system to attach driver PCB to the control terminals
- Integrated temperature sensor

Typical Applications

- Switched mode power supplies
- Three phase inverters for AC motor speed control
- Switching (not for linear use)

¹⁾ $T_{HS} = 25 \text{ }^\circ\text{C}$, unless otherwise specified

²⁾ TBD

³⁾ Use $V_{GEoff} = -5 \dots -15 \text{ V}$

⁴⁾ Measured at chip level

⁵⁾ See mounting instructions

⁶⁾ Corresponding value. This value cannot be measured. It is only given for comparison.

⁸⁾ CAL = Controlled Axial Lifetime Technology

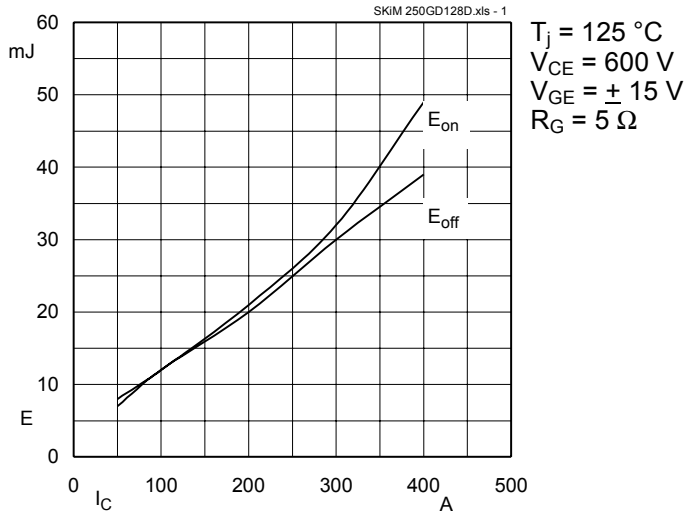


Fig. 1 Turn-on /-off energy = $f(I_C)$

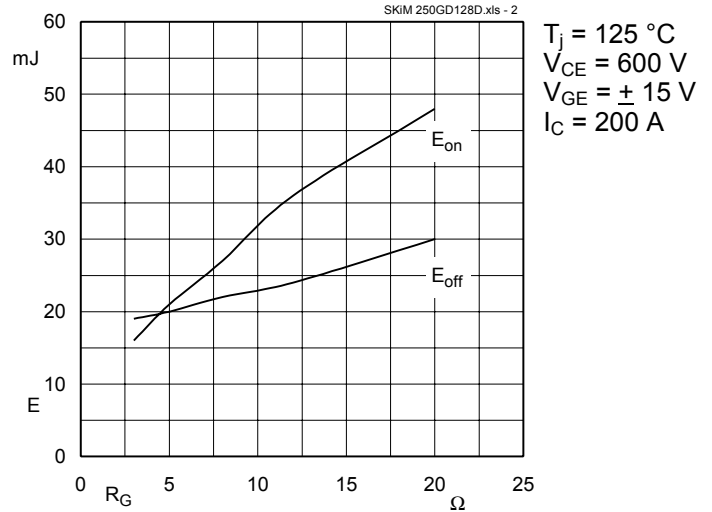


Fig. 2 Turn-on /-off energy = $f(R_G)$

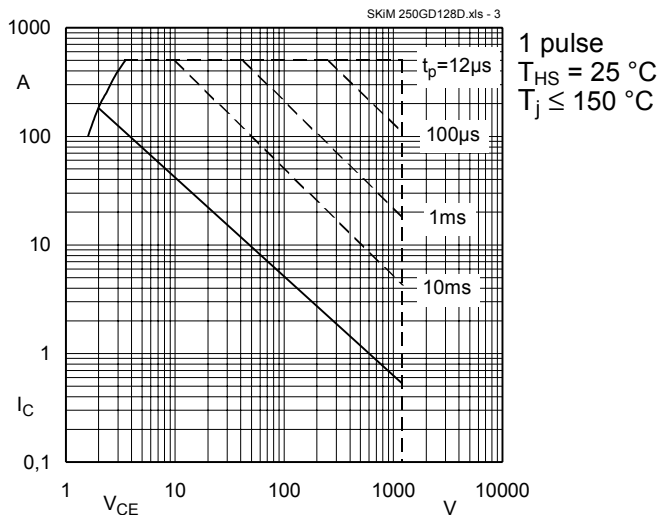


Fig. 3 Maximum safe operating area (SOA) $I_C = f(V_{CE})$

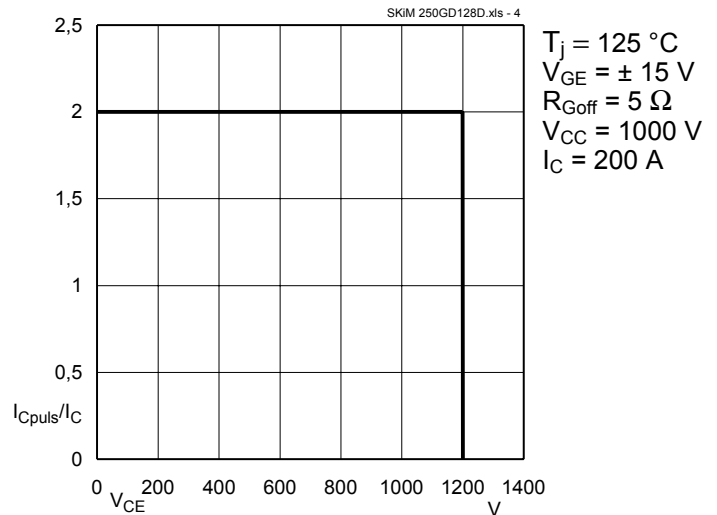


Fig. 4 Turn-off safe operating area (RBSOA)

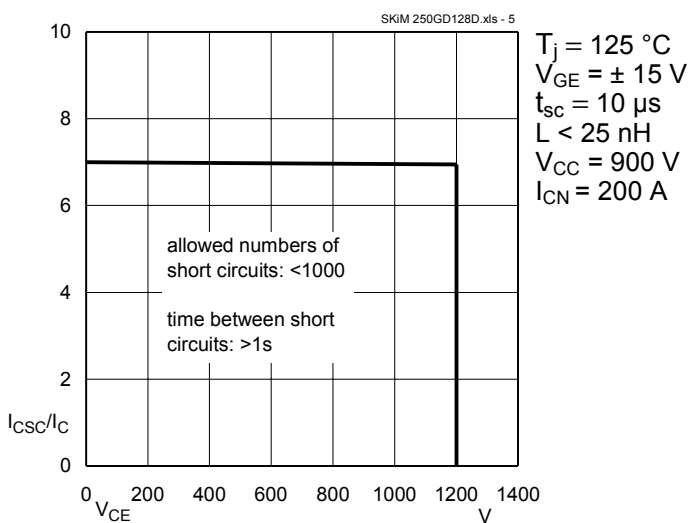


Fig. 5 Safe operating area at short circuit $I_C = f(V_{CE})$

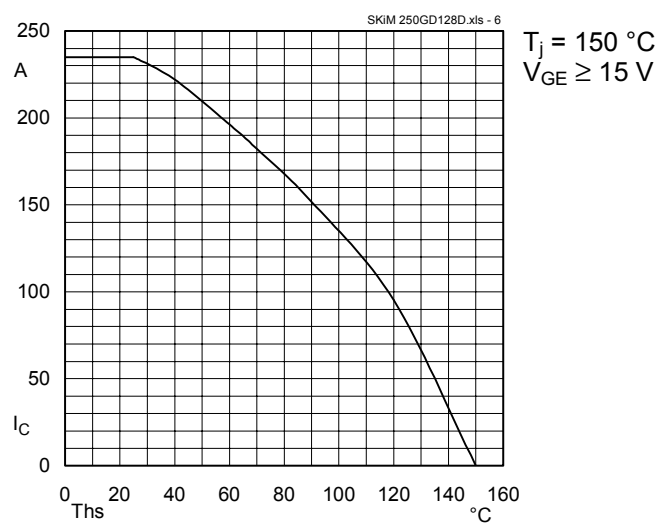


Fig. 6 Rated current vs. temperature $I_C = f(T_{HS})$

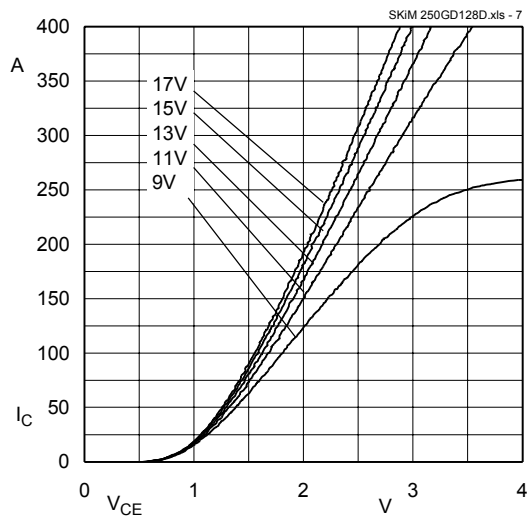


Fig. 7 Typ. output characteristic, t_p = 80 μs; 25 °C

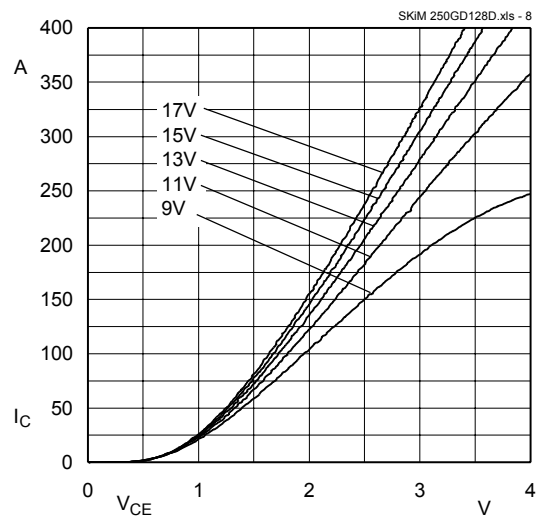


Fig. 8 Typ. output characteristic, t_p = 80 μs; 125 °C

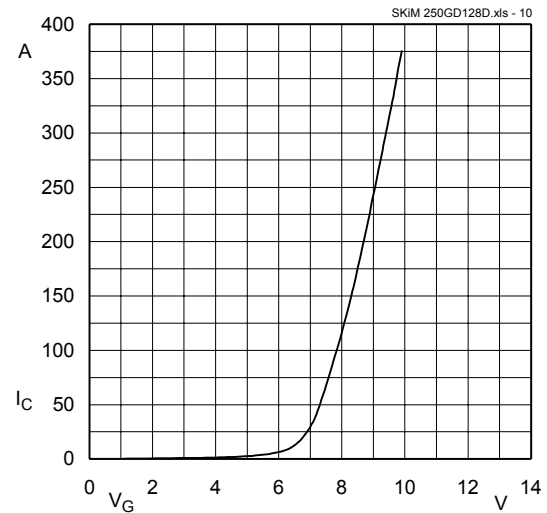


Fig. 9 Saturation characteristic (IGBT)
Calculation elements and equations

Fig. 10 Typ. transfer characteristic, t_p = 80 μs; VCE = 20 V

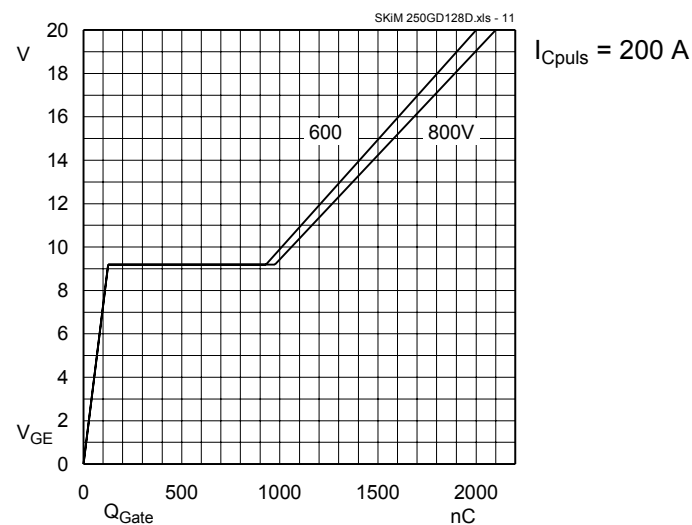


Fig. 11 Typ. gate charge characteristic

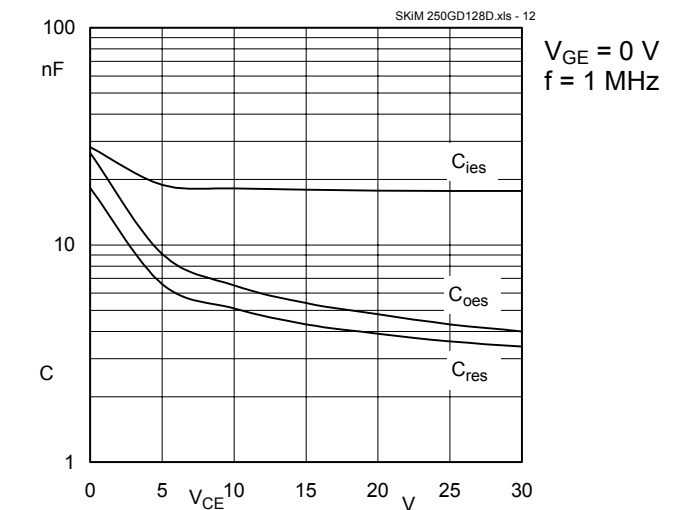


Fig. 12 Typ. capacitances vs. VCE

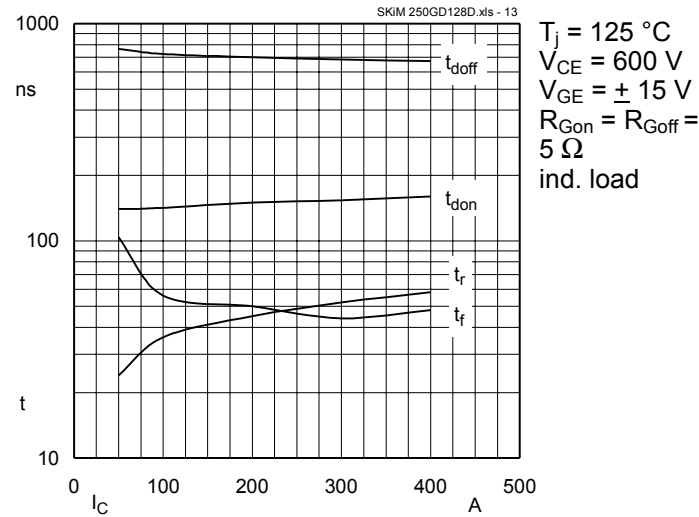


Fig. 13 Typ. switch times vs. I_C

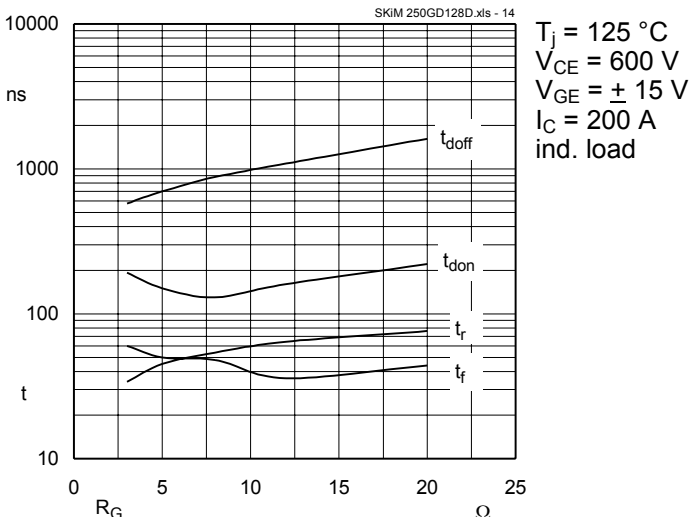


Fig. 14 Typ. switch times vs. gate resistor R_G

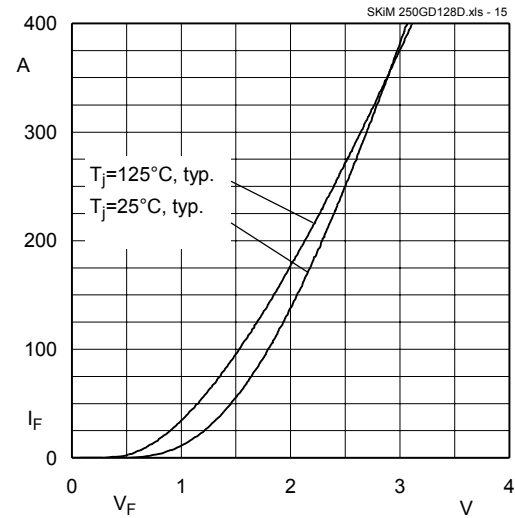


Fig. 15 Typ. CAL diode forward characteristic

Fig. 16 Diode turn-off energy dissipation per pulse

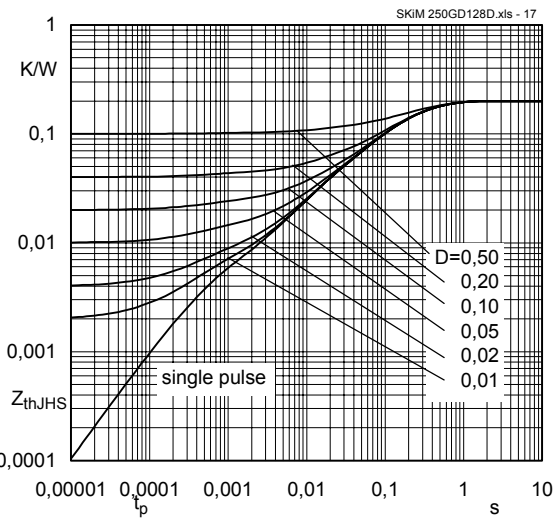


Fig. 17 Transient thermal impedance of IGBT
 $Z_{thJHS} = f(t_p)$; $D = t_p / t_c = t_p \cdot f$

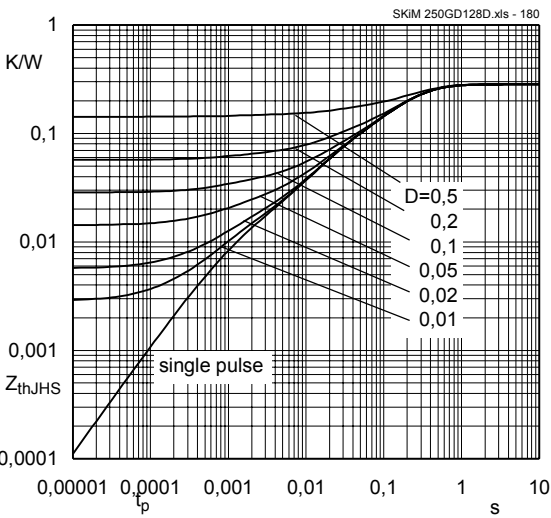
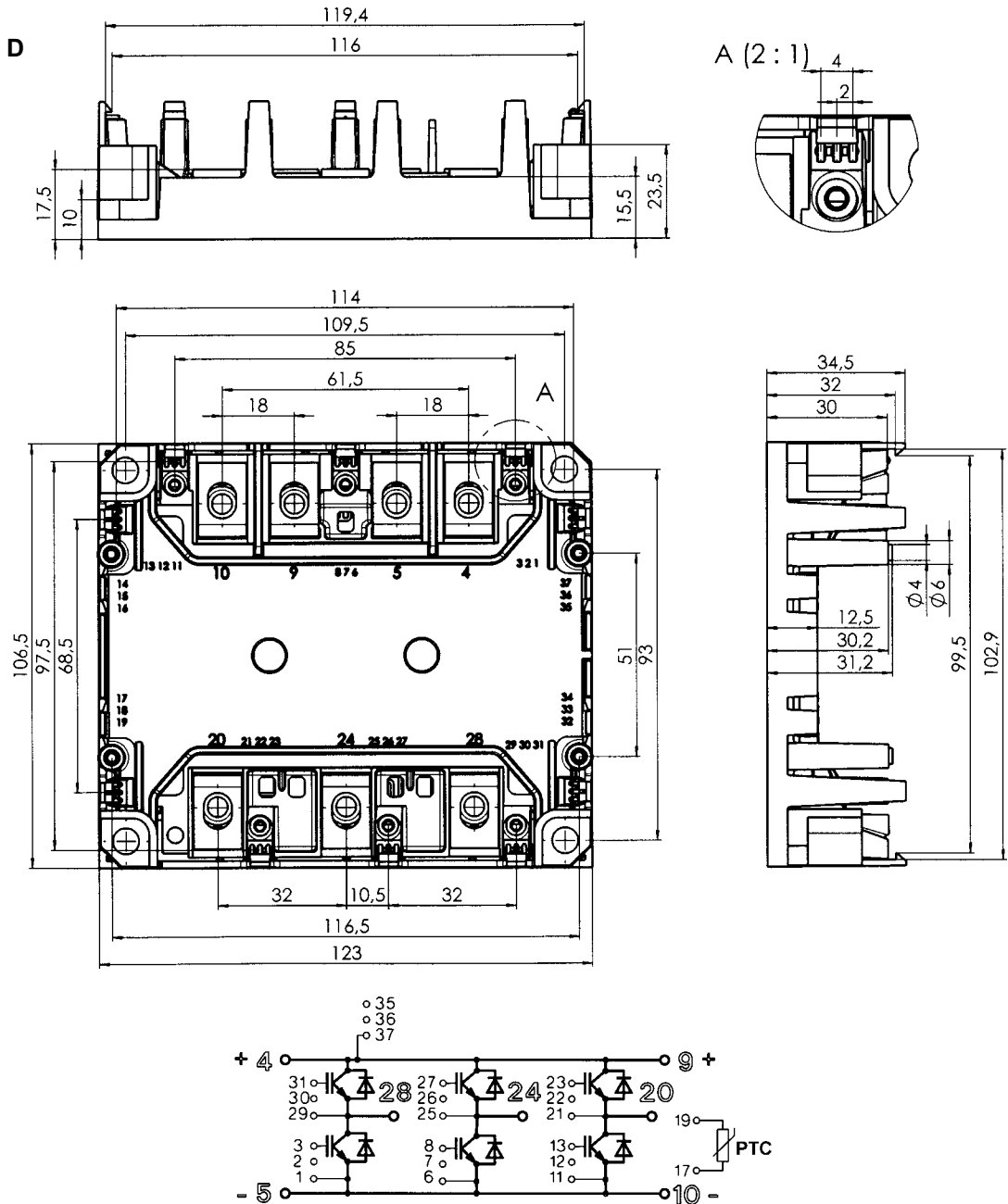


Fig. 18 Transient thermal impedance of inverse CAL diodes
 $Z_{thJHS} = f(t_p)$; $D = t_p / t_c = t_p \cdot f$

SKiM 4
SKiM 250 GD 128 D



Case outline and circuit diagram

Mechanical Data			Values			Units
Symbol	Conditions		min.	typ.	max.	
M ₁	to heatsink, SI Units (M5)		2	—	3	Nm
	to heatsink, US Units		18	—	26	lb.in.
M ₂	for terminals, SI Units (M6)		4	—	5	Nm
	for terminals, US Units		35	—	44	lb.in.
a			—	—	5x9,81	m/s ²
w			—	—	310	g

This is an electrostatic discharge sensitive device (ESDS).
Please observe the international standard IEC 747-1, Chapter IX.

This technical information specifies semiconductor devices but promises no characteristics. No warranty or guarantee expressed or implied is made regarding delivery, performance or suitability.