

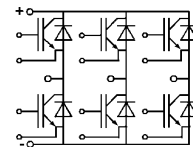
Absolute Maximum Ratings		Values	Units
Symbol	Conditions ¹⁾		
V _{CES}		1200	V
V _{CGR}	R _{GE} = 20 kΩ	1200	V
I _C	T _{HS} = 25/70 °C	235 / 180	A
I _{CM}	T _{HS} = 25/70 °C; t _p = 1 ms	470 / 360	A
V _{GES}		± 20	V
P _{tot}	per IGBT, T _{HS} = 25 °C	625	W
T _j ; (T _{stg})		- 40 ... +150 (125)	°C
T _{cop}	max. case operating temperature	125	°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 °C	230 / 180	A
I _{FM} = -I _{CM}	T _{HS} = 25/70 °C; t _p = 1 ms	460 / 360	A
I _{FSM}	t _p = 10 ms; sin.; T _j = 150 °C	2200	A
I ² t	t _p = 10 ms; T _j = 150 °C	24 200	A ² s

Characteristics		min.	typ.	max.	Units
Symbol	Conditions ¹⁾				
V _{(BR)CES}	V _{GE} = 0, I _C = 1 mA	≥ V _{CES}	-	-	V
V _{GE(th)}	V _{GE} = V _{CE} , I _C = 4 mA	4,5	5,5	6,5	V
I _{CES}	V _{GE} = 0 V _{CE} = V _{CES} } T _j = 125 °C	-	15	-	mA
I _{GES}	V _{GE} = 20 V, V _{CE} = 0	-	-	500	nA
V _{CESat} ⁴⁾	I _C = 200 A { V _{GE} = 15 V; T _j = 25 °C }	-	1,9	2,3	V
C _{ies}	V _{GE} = 0	-	18	-	nF
C _{oes}	V _{CE} = 25 V	-	4,3	-	nF
C _{res}	f = 1 MHz	-	3,6	-	nF
L _{CE}		-	-	20	nH
R _{CC'+EE'}	resistance, terminal-chip; T _{HS} = 25 °C	-	1,15	-	mΩ
t _{d(on)}	V _{CC} = 600 V	-	150	-	ns
t _r	V _{GE} = +15 V / -15 V ³⁾	-	45	-	ns
t _{d(off)}	I _C = 200 A, ind. load	-	700	-	ns
t _f	R _{Gon} = R _{Goff} = 5 Ω	-	50	-	ns
E _{on}	T _j = 125 °C	-	21	-	mJ
E _{off}		-	20	-	mJ
Inverse Diode ⁸⁾					
V _F = V _{EC}	I _F = 200 A { V _{GE} = 0 V; T _j = 25 (125) °C }	-	2,3 (2,1)	2,6	V
V _F = V _{EC}	I _F = 100 A { V _{GE} = 0 V; T _j = 25 (125) °C }	-	1,8 (1,6)	-	V
V _{TO}	T _j = 125 °C	-	1,1	-	V
r _T	T _j = 125 °C	-	5	-	mΩ
I _{RRM}	I _F = 200 A; T _j = 25 (125) °C ²⁾	-	TBD	-	A
Q _{rr}	I _F = 200 A; T _j = 25 (125) °C ²⁾	-	TBD	-	μC
Thermal Characteristics ⁵⁾					
R _{thjh}	per IGBT	-	-	0,20	°C/W
R _{thjD}	per diode	-	-	0,285	°C/W
R ¹ _{thjc} ⁶⁾	per IGBT	-	-	0,071	°C/W
R ¹ _{thjD} ⁶⁾	per diode	-	-	0,105	°C/W
Temperature Sensor					
R _{TS}	T = 25 °C / 100 °C	-	1,0 / 1,67	-	kΩ
tolerance	T = 25 °C / 100 °C	-	3,0 / 2,0	-	%

SKiM[®] 4
IGBT Modules

SKiM 250 GD 128 D

Preliminary Data



GD

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 °C, unless otherwise specified

²⁾ TBD

³⁾ Use V_{GEoff} = - 5 ... - 15 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

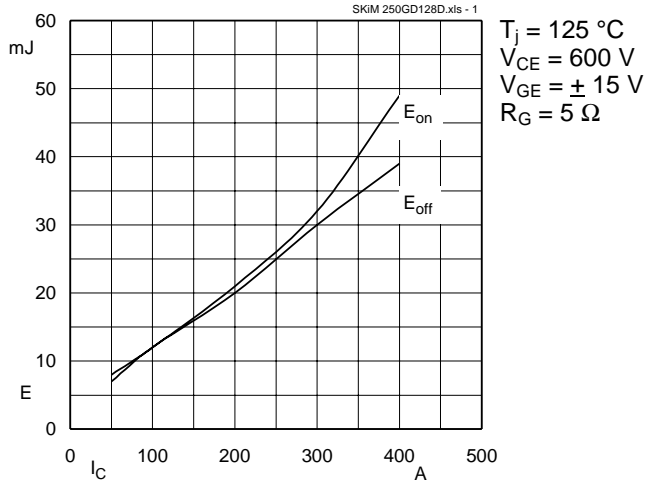


Fig. 1 Turn-on /-off energy = $f(I_C)$

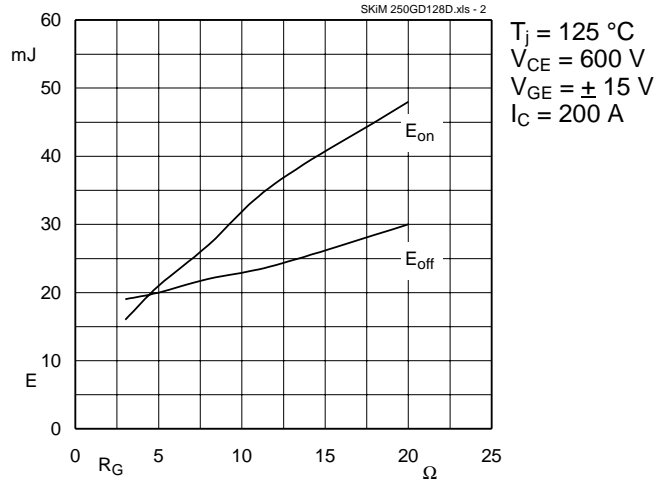


Fig. 2 Turn-on /-off energy = $f(R_G)$

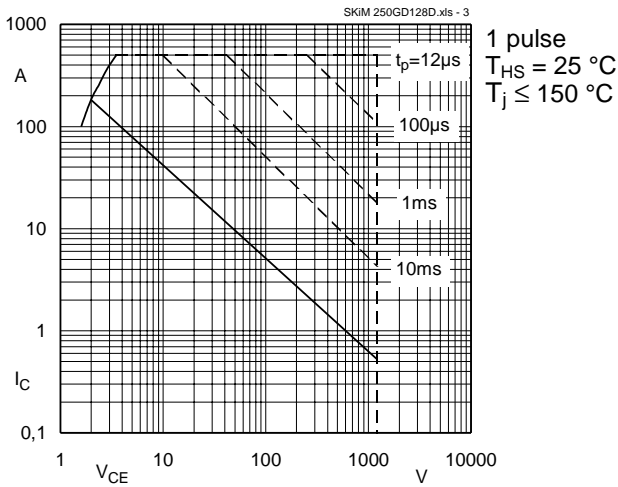


Fig. 3 Maximum safe operating area (SOA) $I_C = f(V_{CE})$

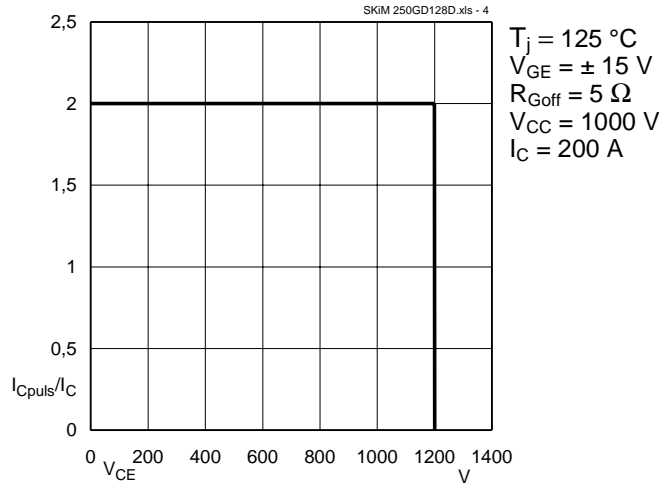


Fig. 4 Turn-off safe operating area (RBSOA)

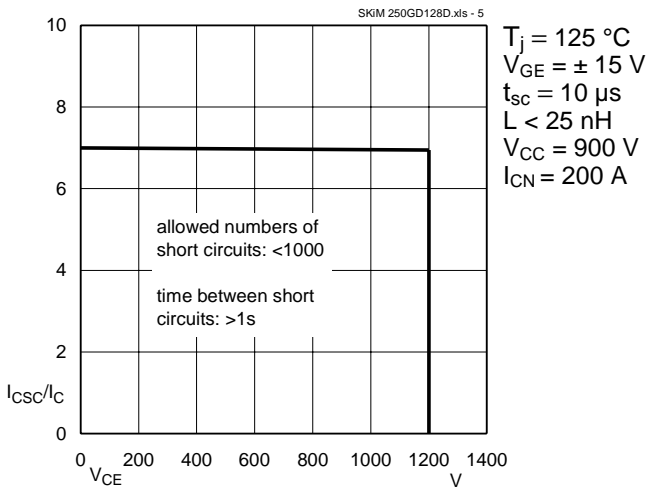


Fig. 5 Safe operating area at short circuit $I_C = f(V_{CE})$

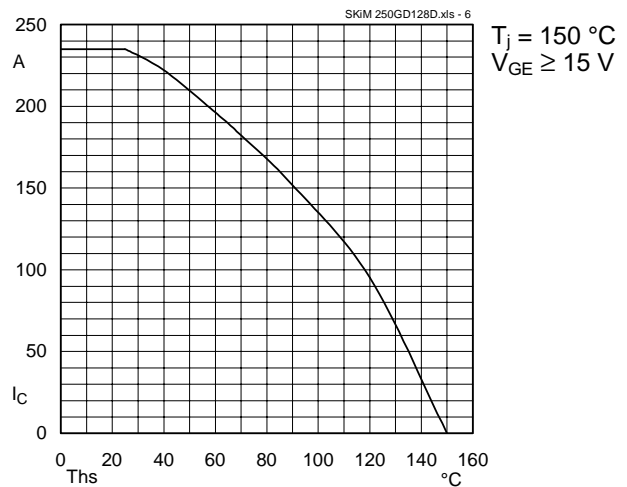


Fig. 6 Rated current vs. temperature $I_C = f(T_{HS})$

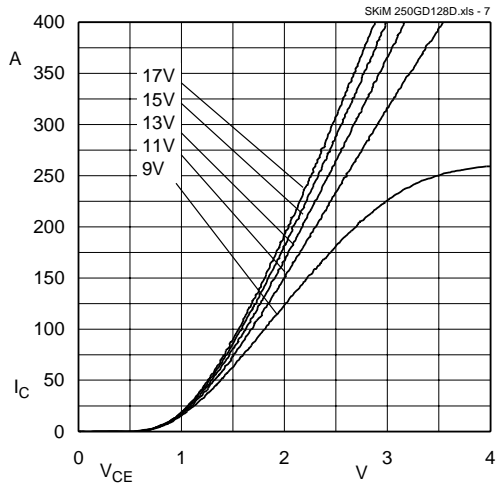


Fig. 7 Typ. output characteristic, $t_p = 80 \mu s$; $25 \text{ }^\circ\text{C}$

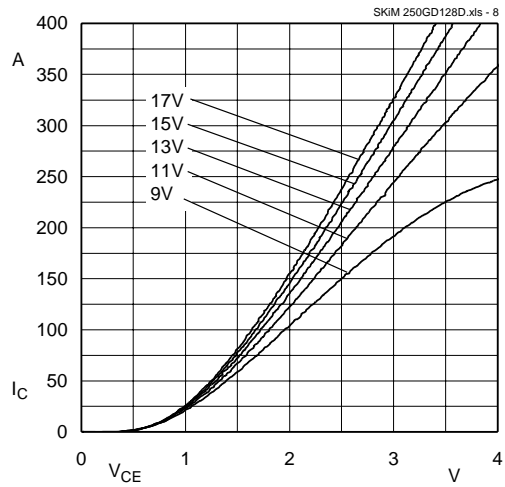


Fig. 8 Typ. output characteristic, $t_p = 80 \mu s$; $125 \text{ }^\circ\text{C}$

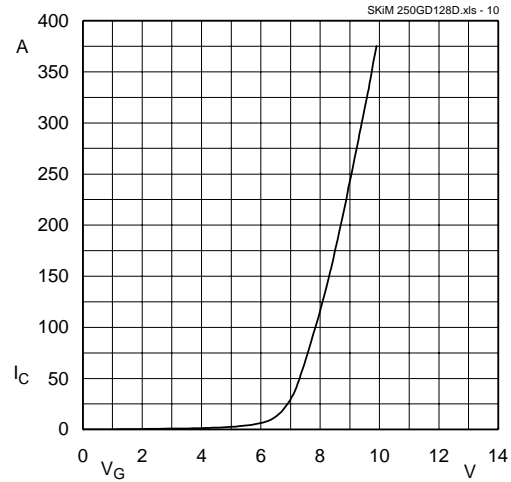


Fig. 9 Saturation characteristic (IGBT)
Calculation elements and equations

Fig. 10 Typ. transfer characteristic, $t_p = 80 \mu s$; $V_{CE} = 20 \text{ V}$

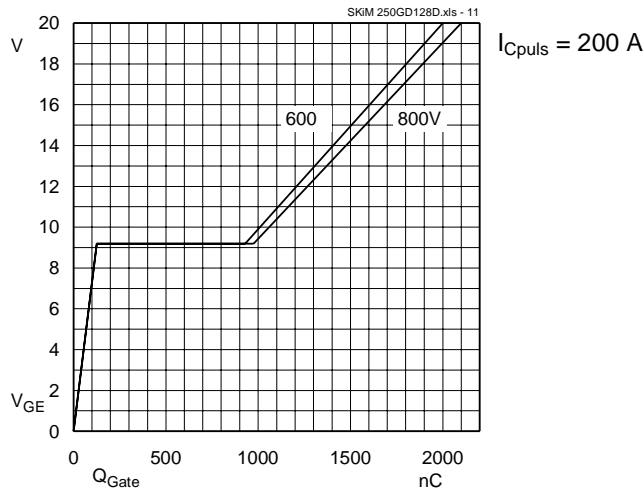


Fig. 11 Typ. gate charge characteristic

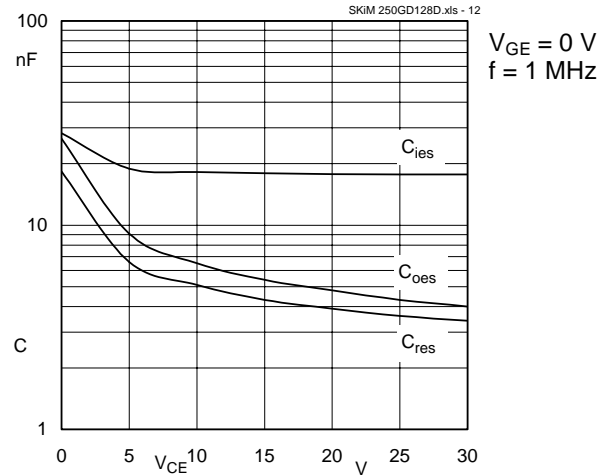


Fig. 12 Typ. capacitances vs. V_{CE}

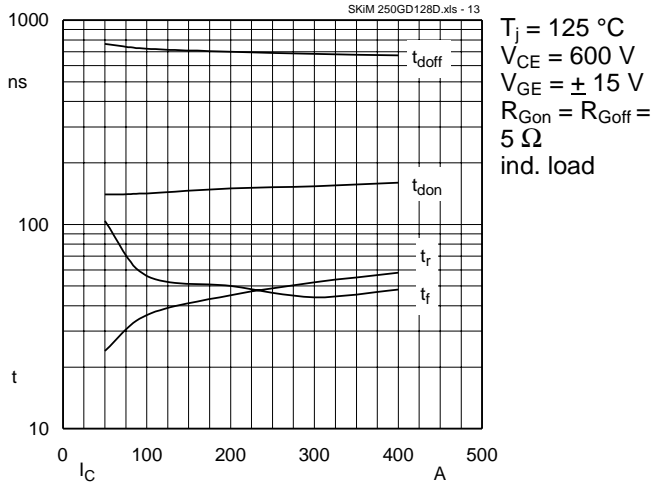


Fig. 13 Typ. switch times vs. I_C

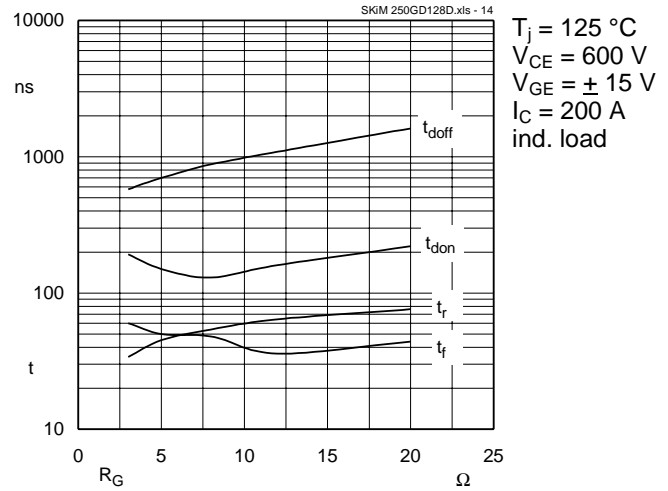


Fig. 14 Typ. switch times vs. gate resistor R_G

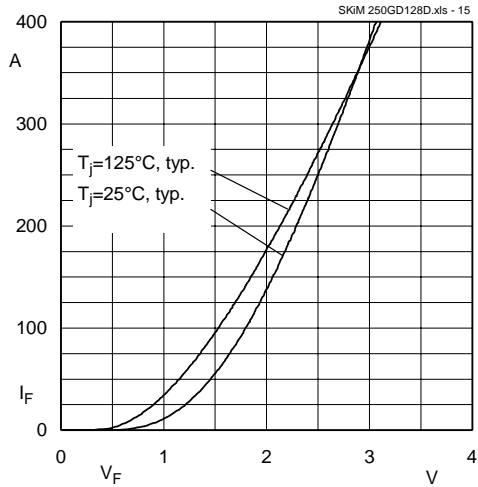


Fig. 15 Typ. CAL diode forward characteristic

Fig. 16 Diode turn-off energy dissipation per pulse

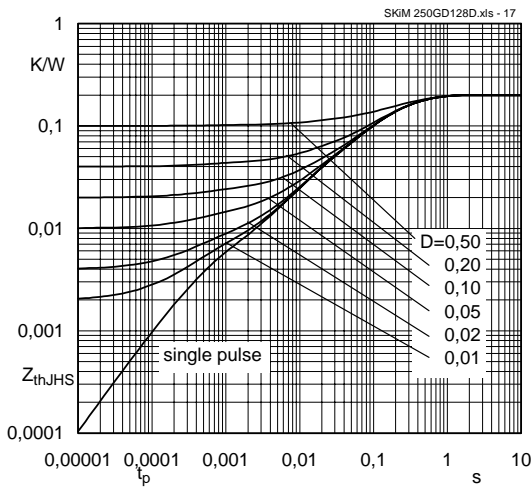


Fig. 17 Transient thermal impedance of IGBT
 $Z_{thJHS} = f(t_p)$; $D = t_p / t_c = t_p \cdot f$

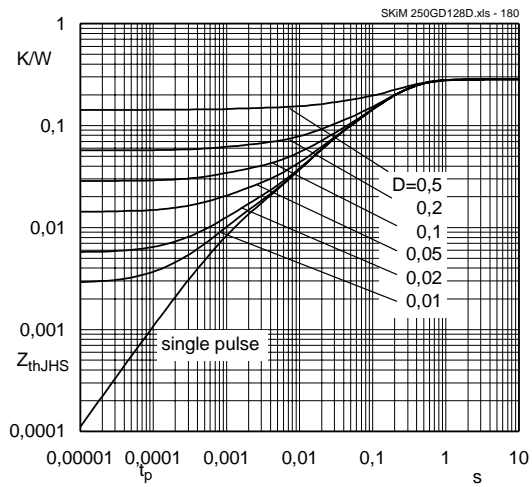
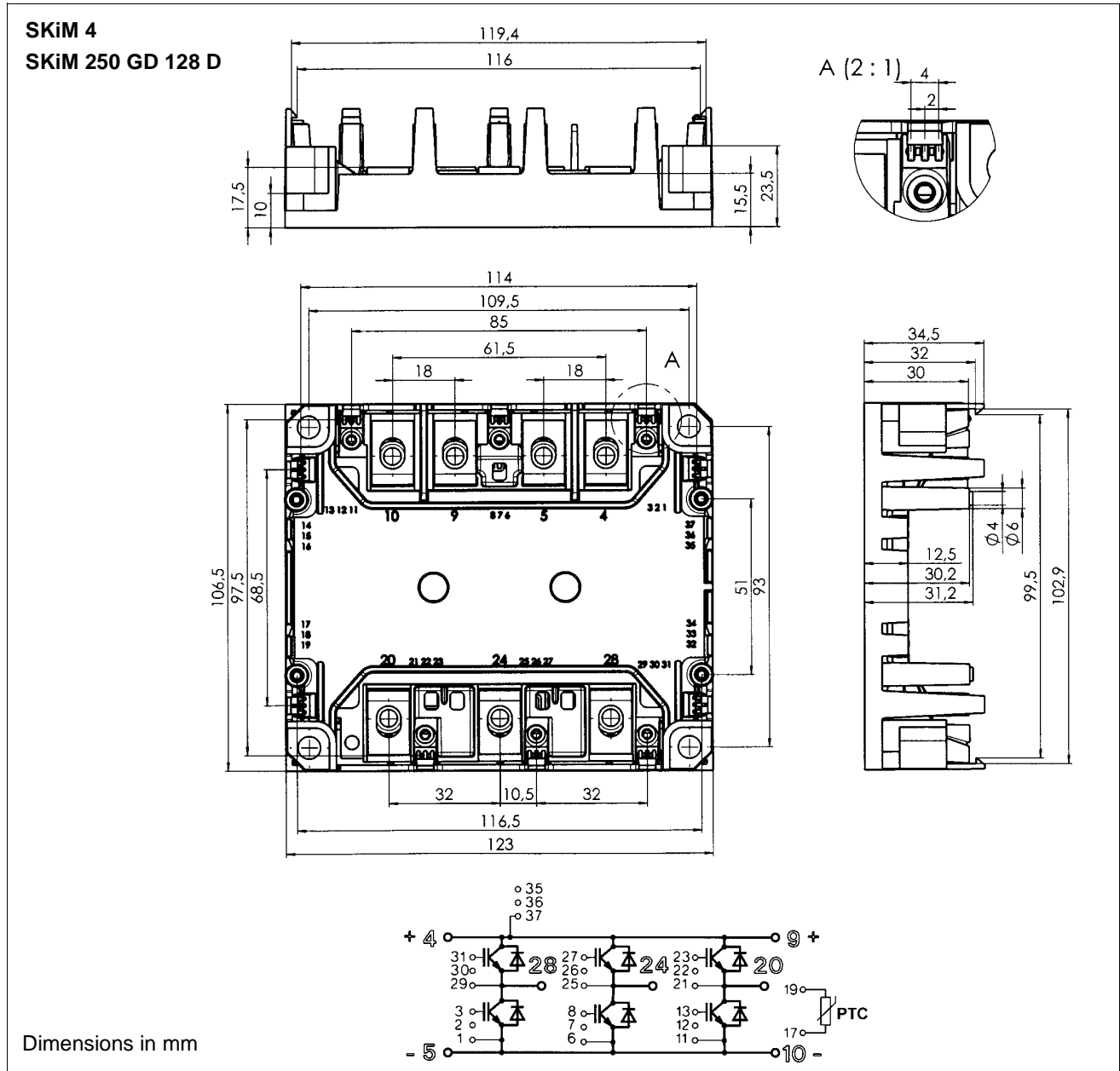


Fig. 18 Transient thermal impedance of inverse CAL diodes
 $Z_{thJHS} = f(t_p)$; $D = t_p / t_c = t_p \cdot f$



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.

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