SKiM 304GD12T4D

SKiM® 4

Trench IGBT Modules

SKiM 304GD12T4D

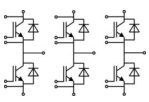
Preliminary Data

Features

- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability

Typical Applications*

- Automotive inverter
- AC inverter drives



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Absolute Maximum Ratings	T_{case} = 25°C, unless otherwise specified			
Symbol	**Conditions**		**Values**	**Units**
IGBT				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 150 °C	T_s = 25 °C	285	A
		T_s = 70 °C	215	A
I_{CRM}	I_{CRM}=3xI_{Cnom}		900	A
V_{GES}			±20	V
t_{psc}	V_{CC} = 800 V; $V_{GE} \leq$ 15 V; V_{CES} < 1200 V	T_j = 150 °C	10	µs
Inverse Diode				
I_F	T_j = 150 °C	T_s = 25 °C	220	A
		T_s = 70 °C	160	A
I_{FRM}			400	A
Module				
$I_{t(RMS)}$			400	A
T_{vj}			- 40 + 150	°C
T_{stg}			- 40 + 125	°C
V_{isol}	AC, 1 min.		2500	V

Characteristics	T_{case} = 25°C, unless otherwise specified					
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Units**
IGBT						
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 12 mA		5	5,8	6,5	V
I_{CES}	V_{GE} = 0 V, V_{CE} = V_{CES}	T_j = 25 °C			3,8	mA
V_{CE0}		T_j = 25 °C		0,8	0,9	V
		T_j = 125 °C		0,72	0,82	V
r_{CE}	V_{GE} = 15 V	T_j = 25°C		3,3	3,7	mΩ
		T_j = 125°C		4,7	5	mΩ
$V_{CE(sat)}$	I_{Cnom} = 300 A, V_{GE} = 15 V	T_j = 25°C$_{chiplev.}$		1,8	2	V
		T_j = 125°C$_{chiplev.}$		2,1	2,3	V
C_{ies}				19		nF
C_{oes}	V_{CE} = 25, V_{GE} = 0 V	f = 1 MHz		1,2		nF
C_{res}				1		nF
Q_G	V_{GE} = -15V...+15V			1700		nC
$t_{d(on)}$				225		ns
t_r	R_{Gon} = 1 Ω	V_{CC} = 600V		40		ns
E_{on}	di/dt = 9250 A/µs	I_C= 300A		21		mJ
$t_{d(off)}$	R_{Goff} = 1 Ω	T_j = 125 °C		435		ns
t_f	di/dt = 4060 A/µs	V_{GE} = -15V/+15V		60		ns
E_{off}				23		mJ
$R_{th(j-s)}$	per IGBT				0,19	K/W

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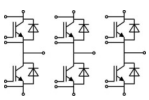

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Characteristics

Symbol	Conditions		min.	typ.	max.	Units
Inverse Diode						
$V_F = V_{EC}$	I_{Fnom} = 300 A; V_{GE} = 0 V	T_j = 25 °C$_{chiplev.}$		2,3	2,8	V
		T_j = 125 °C$_{chiplev.}$		2,2	2,7	V
V_{F0}		T_j = 25 °C		1,2	1,6	V
		T_j = 125 °C		0,9	1,3	V
r_F		T_j = 25 °C		3,5	4	mΩ
		T_j = 125 °C		4,2	4,7	mΩ
I_{RRM}	I_F = 300 A	T_j = 125 °C		430		A
Q_{rr}				45		µC
E_{rr}	V_{GE} = -15 V; V_{CC} = 600 V			19,3		mJ
$R_{th(j-s)D}$	per diode				0,25	K/W
Module						
L_{CE}					20	nH
$R_{CC'+EE'}$	res., terminal-chip	T_{case}= 25 °C		1,35		mΩ
		T_{case}= 125 °C		1,75		mΩ
M_s	to heat sink M4					Nm
M_t	to terminals M6		4		5	Nm
w					310	g
Temperature sensor						
R_{100}	T_c=100°C (R_{25}=1,0kΩ)			1,67		kΩ
$B_{100/125}$	$R(T)=R_{100}*\exp[B_{100/125}*(1/T-1/373)]$; T[K]					K

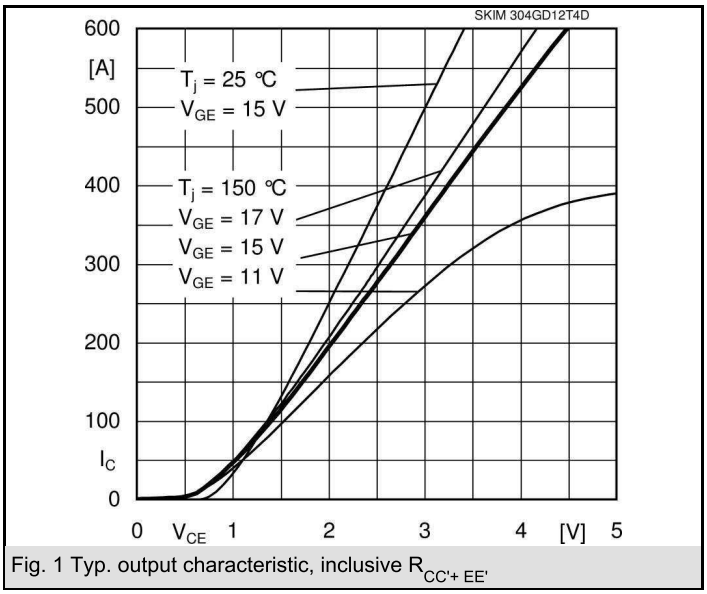


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

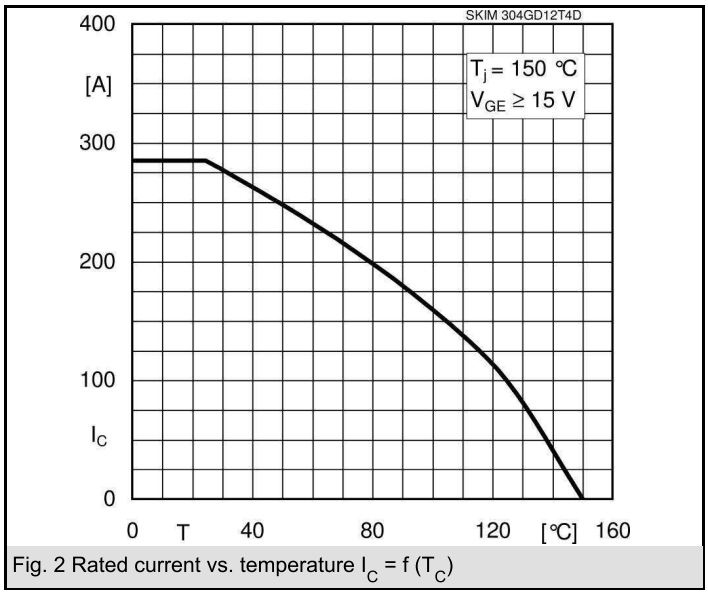


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

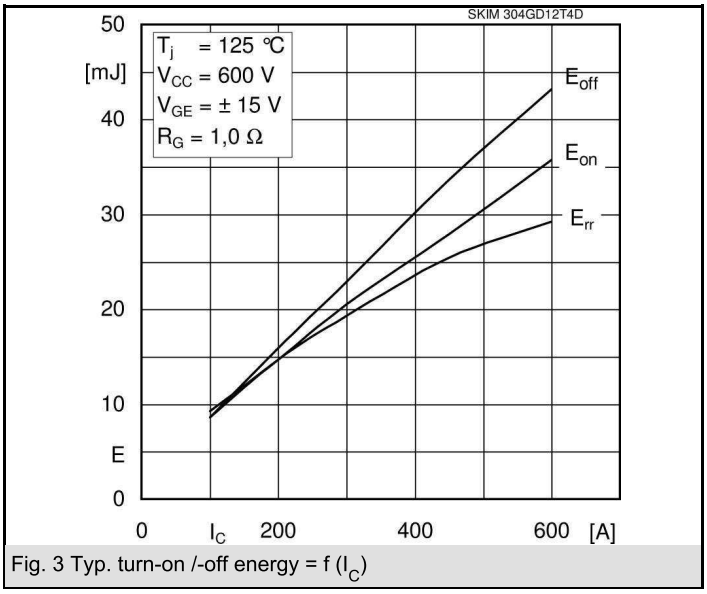


Fig. 3 Typ. turn-on /-off energy = f (I_C)

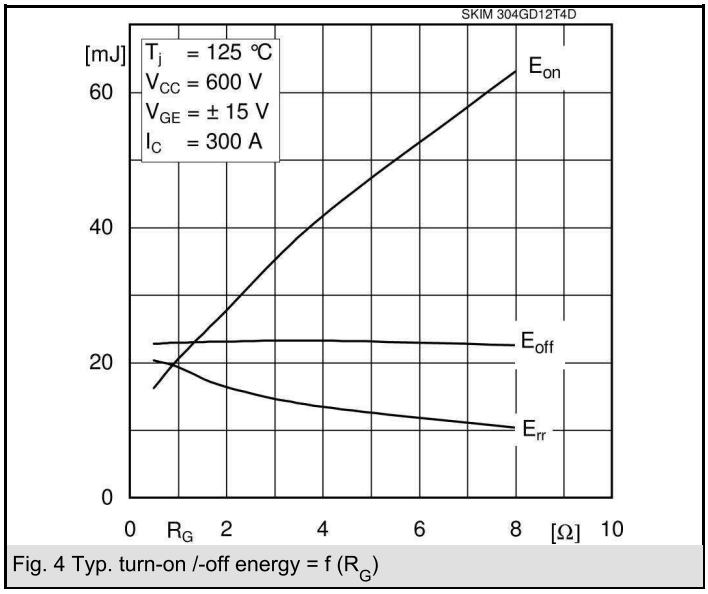


Fig. 4 Typ. turn-on /-off energy = f (R_G)

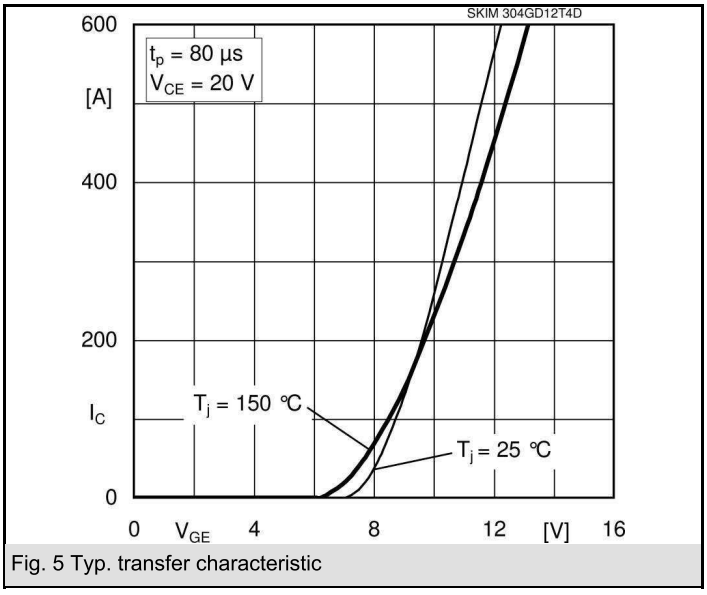


Fig. 5 Typ. transfer characteristic

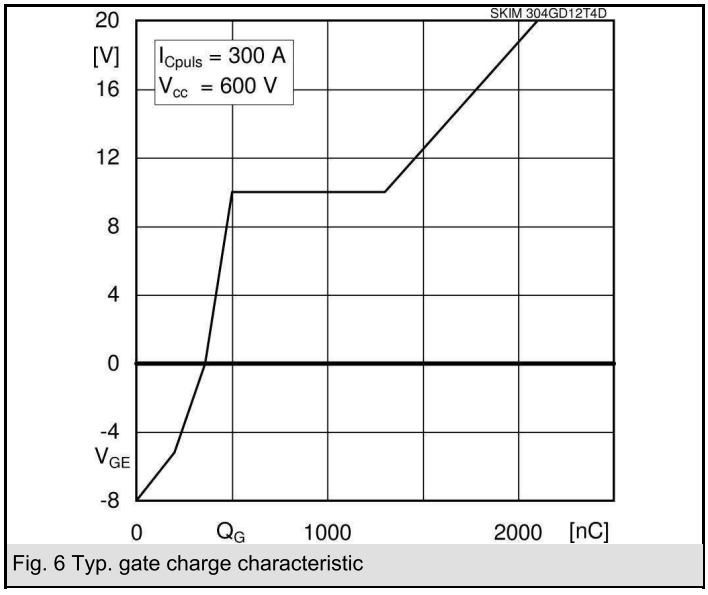


Fig. 6 Typ. gate charge characteristic

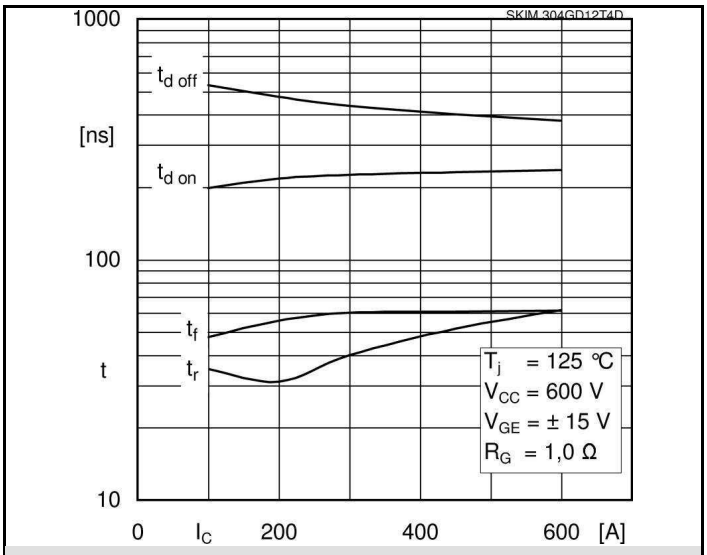


Fig. 7 Typ. switching times vs. I_C

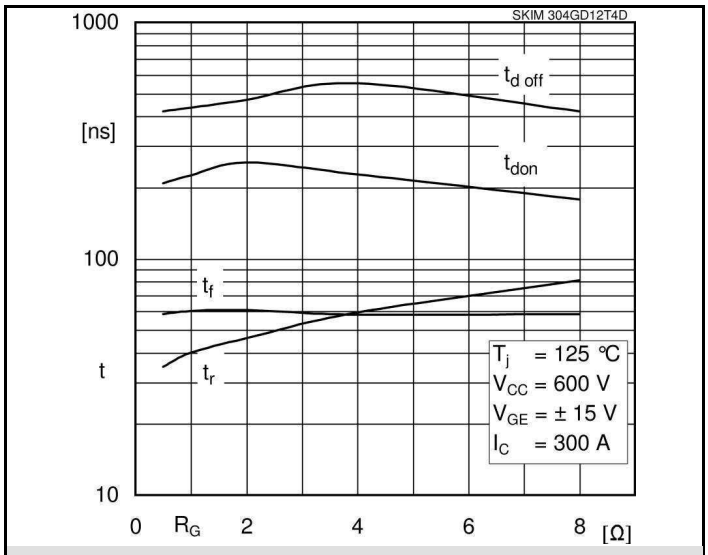


Fig. 8 Typ. switching times vs. gate resistor R_G

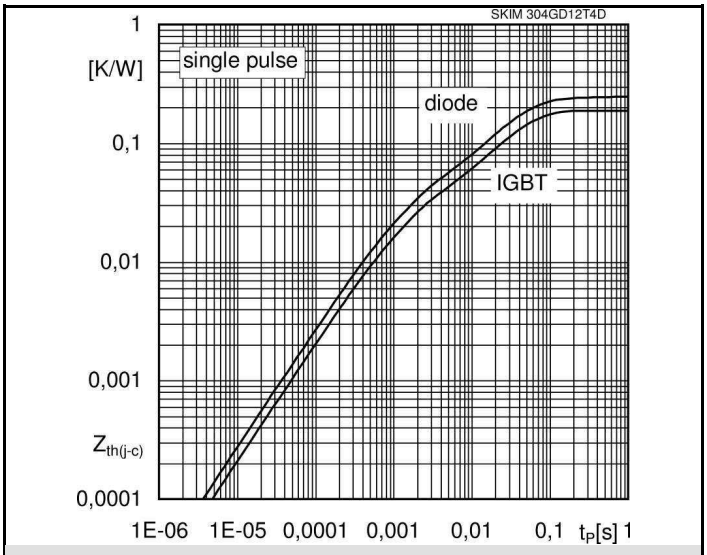


Fig. 9 Transient thermal impedance of IGBT and Diode

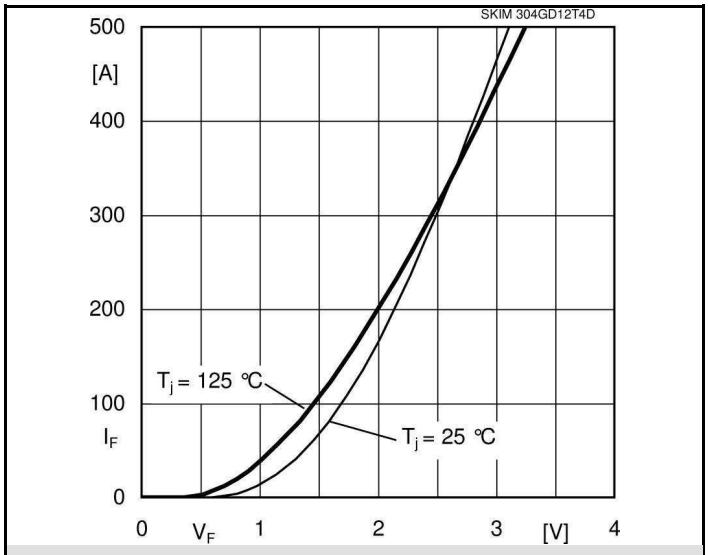


Fig. 10 CAL diode forward characteristic

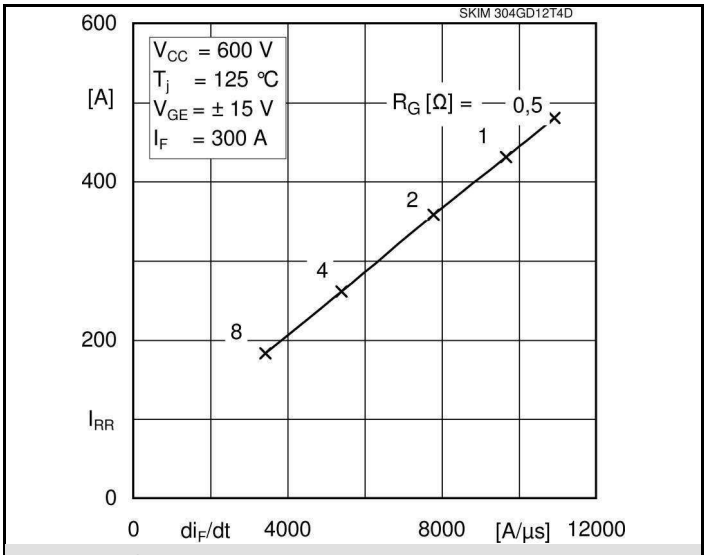


Fig. 11 Typ. CAL diode peak reverse recovery current

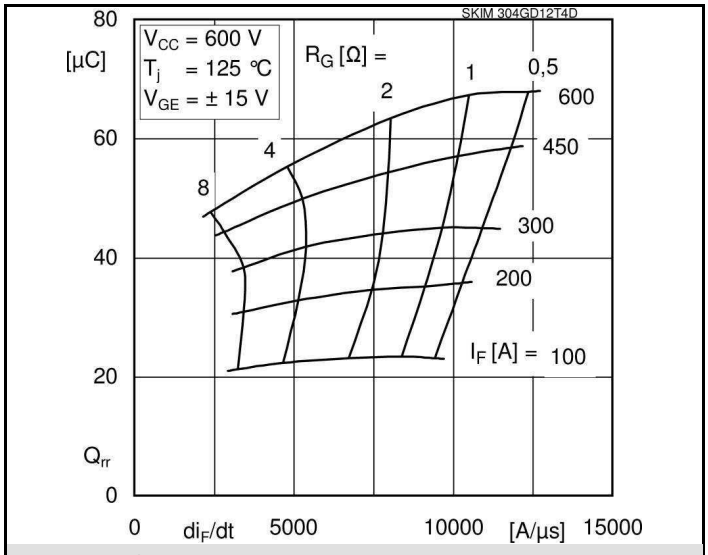
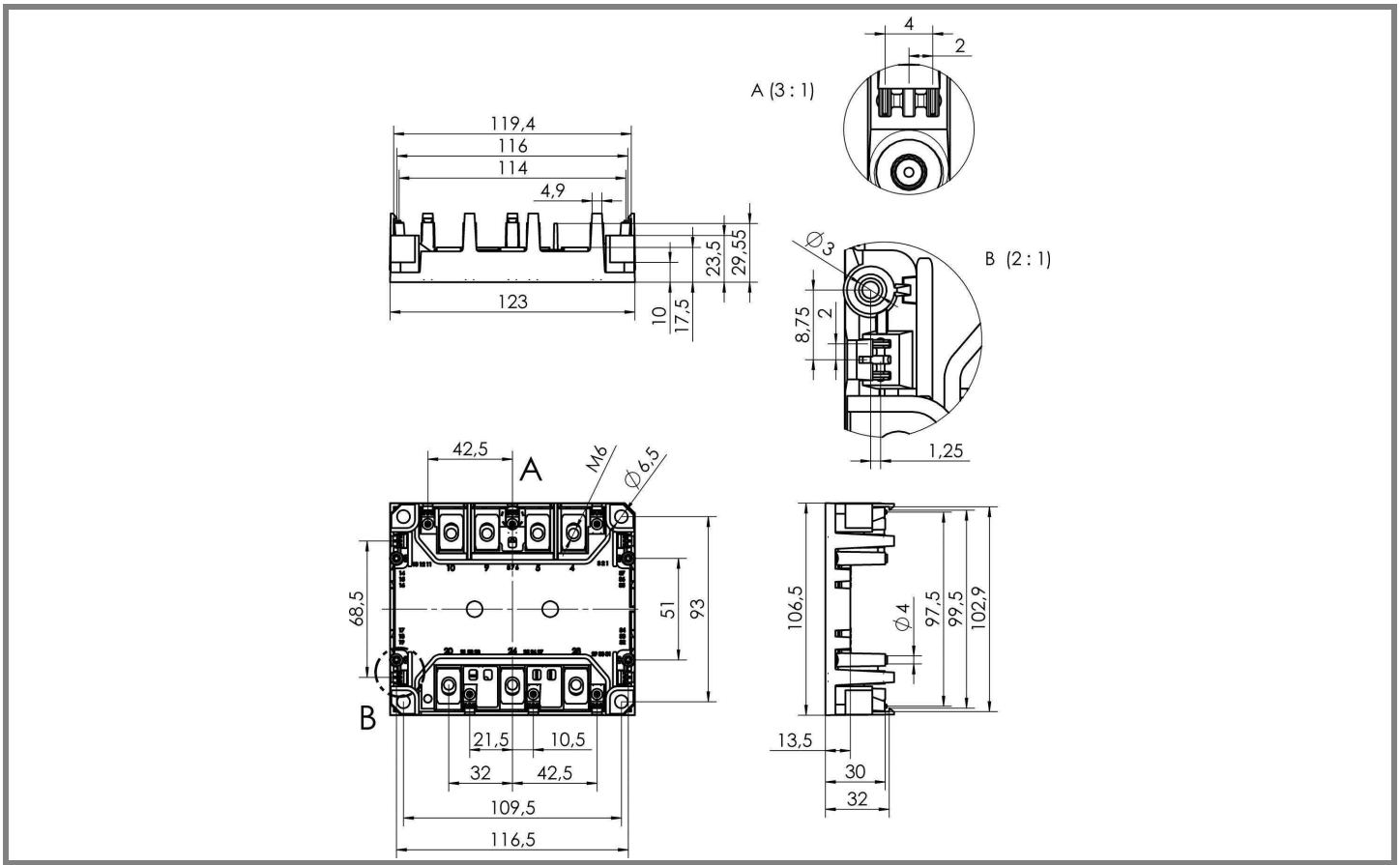
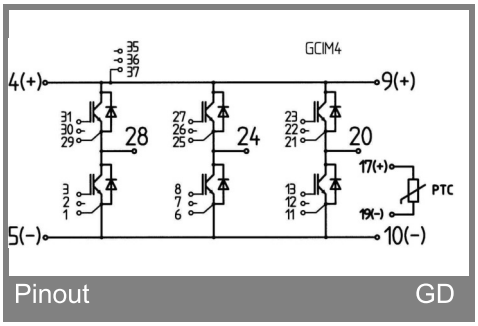


Fig. 12 Typ. CAL diode recovered charge



Case SKiM 4



Pinout GD

This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, chapter IX.

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