SKiM 304GD12T4D

SKiM® 4

Trench IGBT Modules

SKiM 304GD12T4D

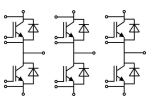
Preliminary Data

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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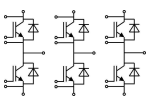

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Characteristics

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

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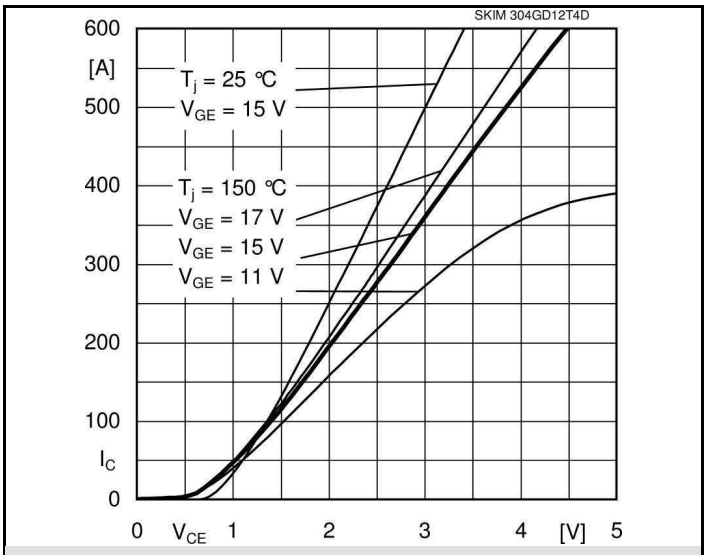

Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

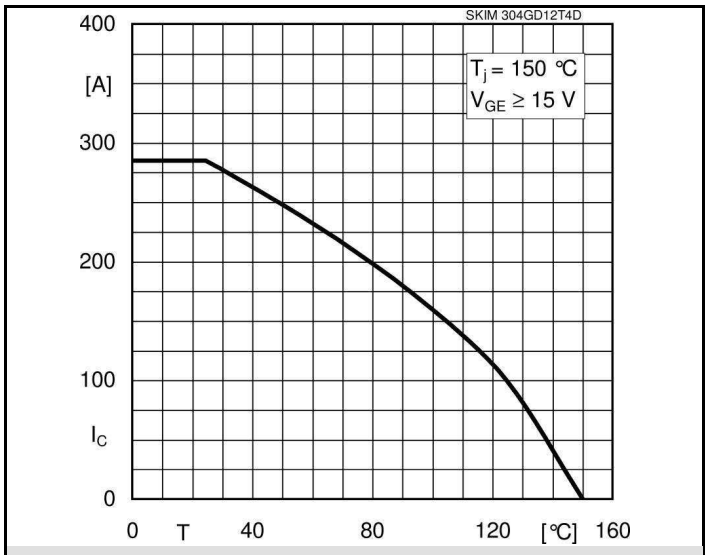

Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

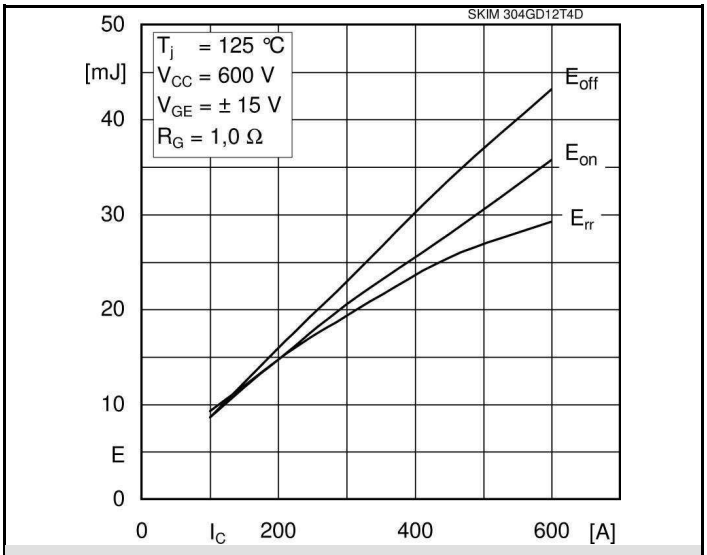

Fig. 3 Typ. turn-on /-off energy = f (I_C)

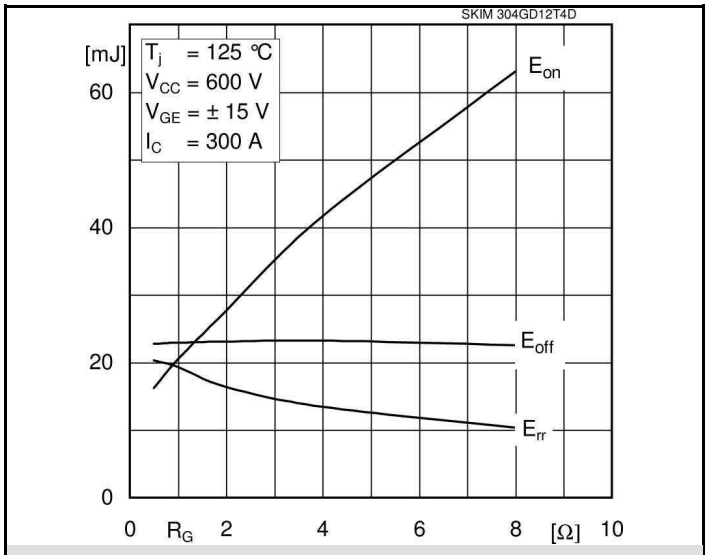

Fig. 4 Typ. turn-on /-off energy = f (R_G)

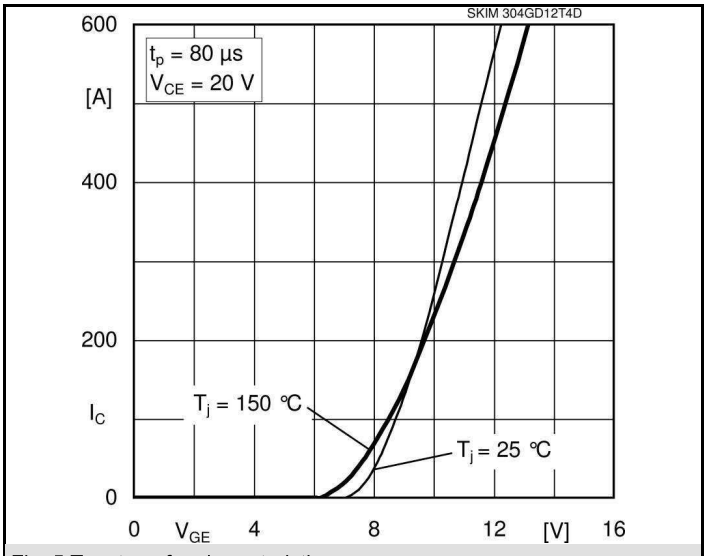

Fig. 5 Typ. transfer characteristic

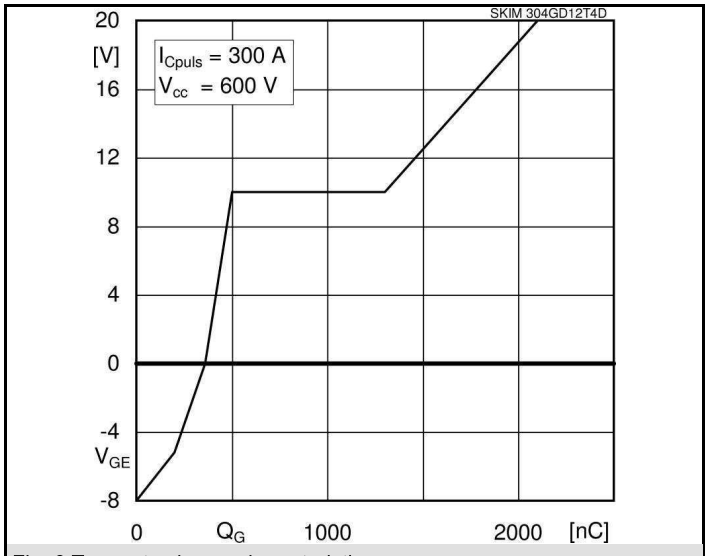

Fig. 6 Typ. gate charge characteristic

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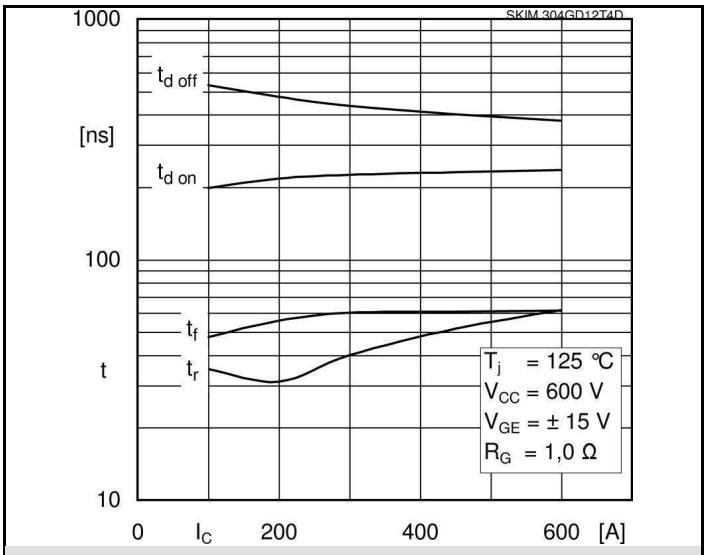

Fig. 7 Typ. switching times vs. I_C

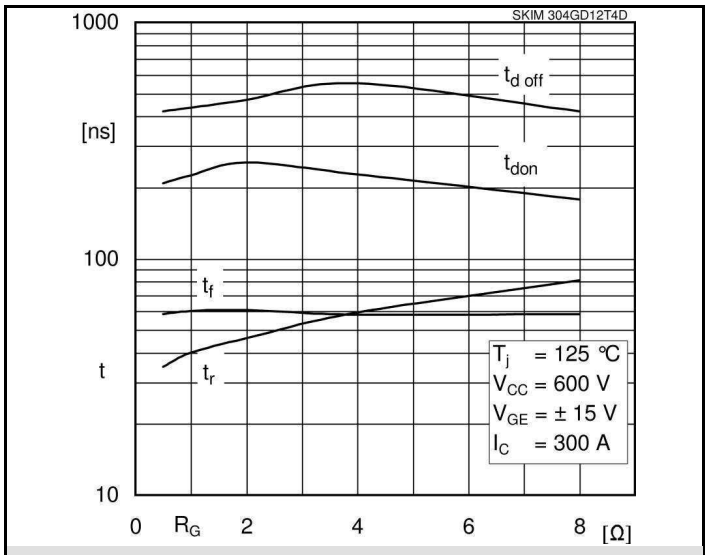

Fig. 8 Typ. switching times vs. gate resistor R_G

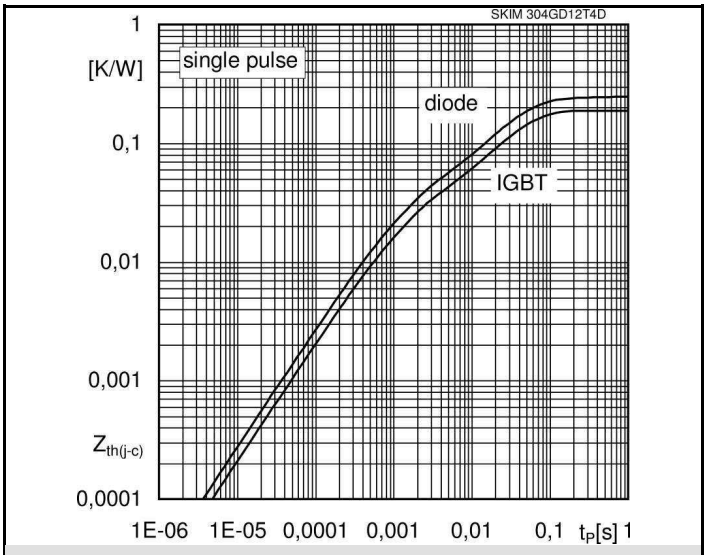

Fig. 9 Transient thermal impedance of IGBT and Diode

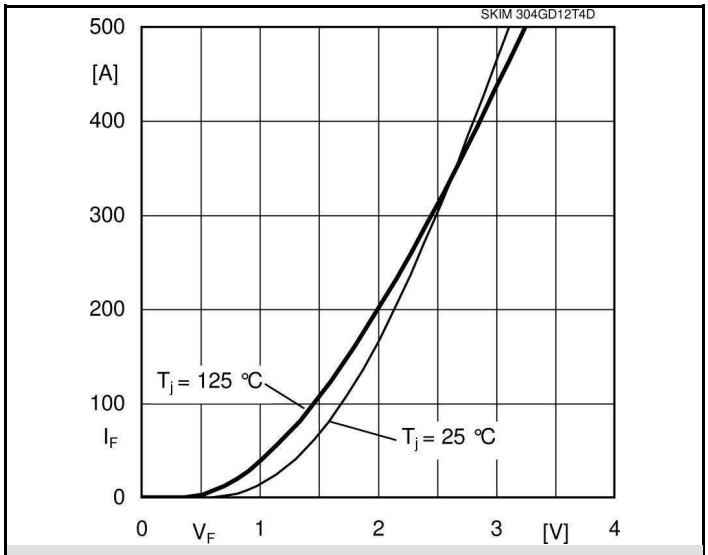

Fig. 10 CAL diode forward characteristic

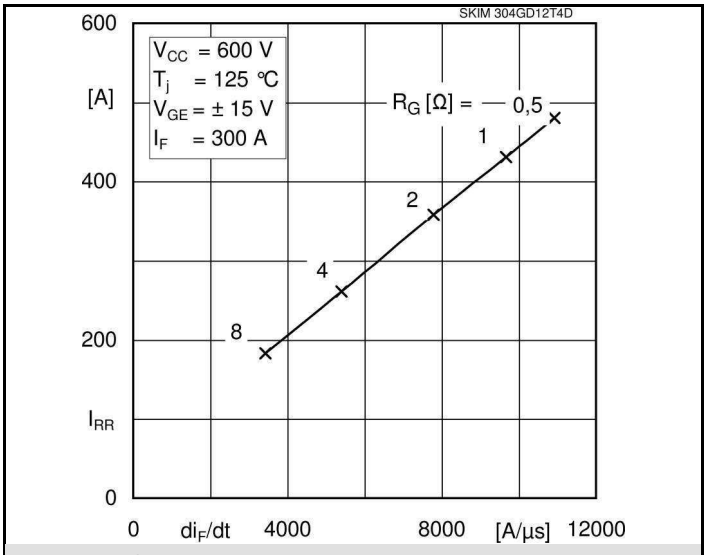

Fig. 11 Typ. CAL diode peak reverse recovery current

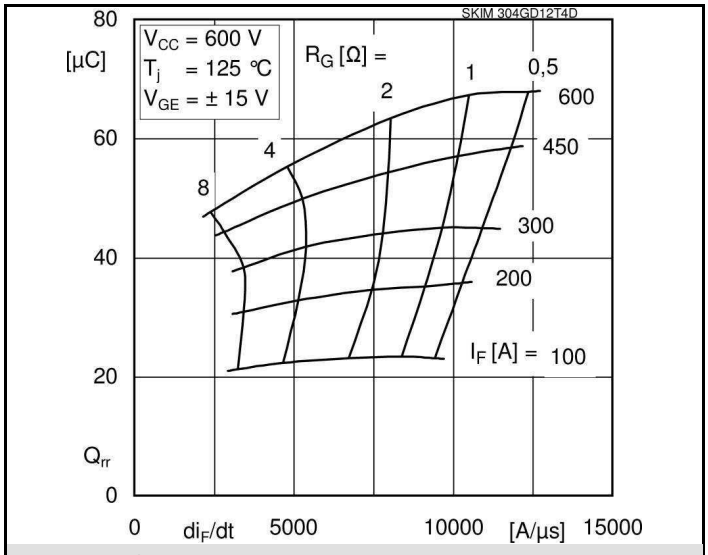

Fig. 12 Typ. CAL diode recovered charge

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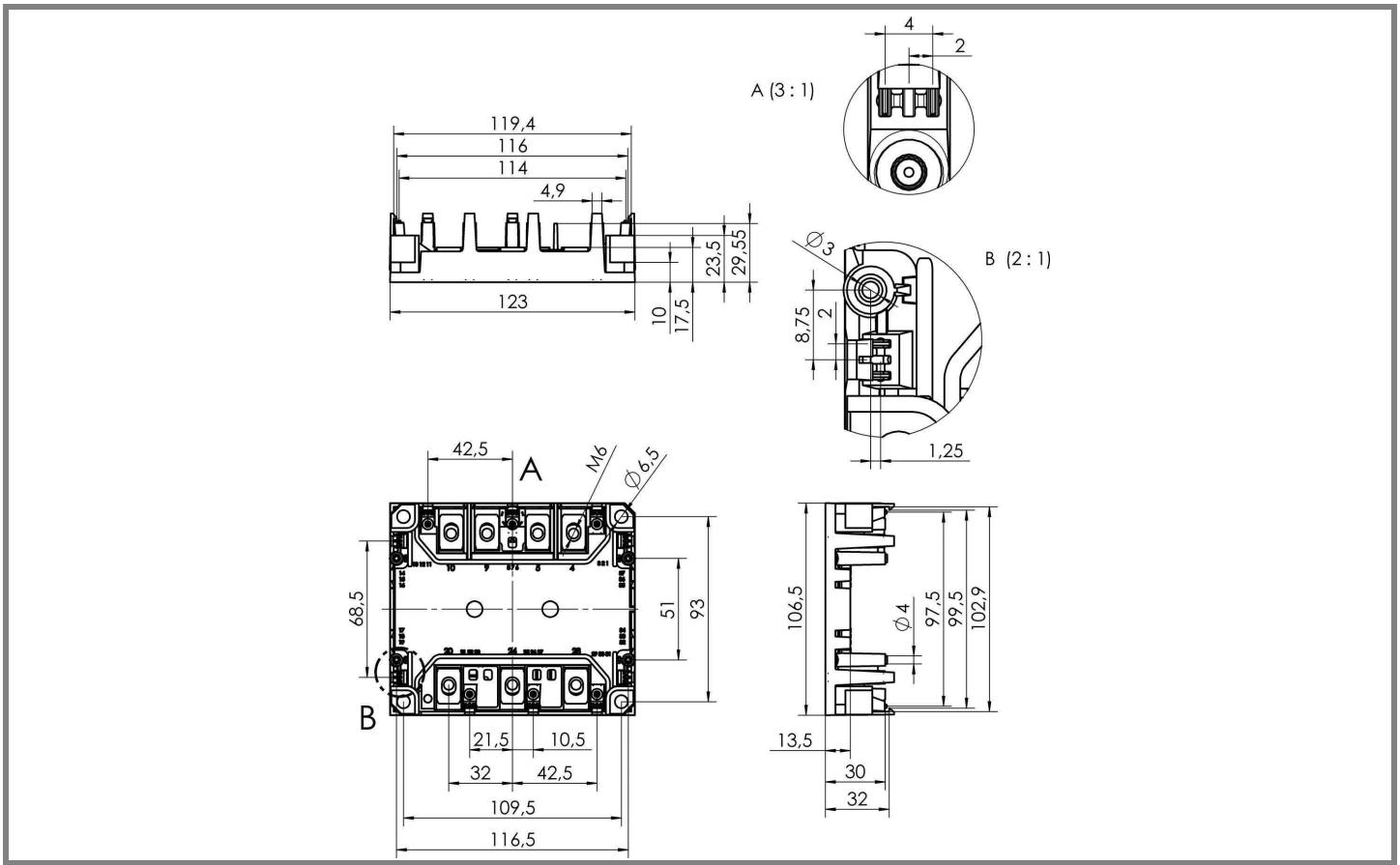
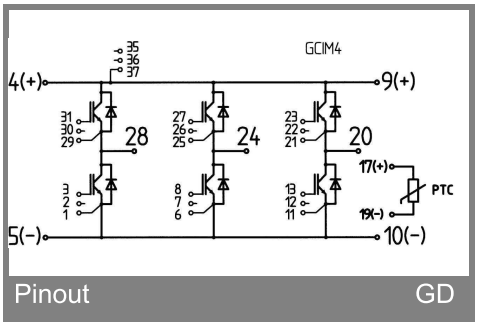


Case SKiM 4



Pinout GD

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

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