



SKiM<sup>®</sup> 4

## Trench IGBT Modules

SKiM 304GD12T4D

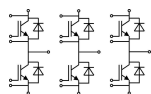
Preliminary Data

### 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		$T_{case} = 25^{\circ}C$ , unless otherwise specified		
Symbol	Conditions	Values	Units	
<b>IGBT</b>				
$V_{CES}$	$T_j = 25^{\circ}C$	1200	V	
$I_C$	$T_j = 150^{\circ}C$	$T_s = 25^{\circ}C$	285	A
		$T_s = 70^{\circ}C$	215	A
$I_{CRM}$	$I_{CRM} = 3 \times I_{Cnom}$	900	A	
$V_{GES}$		$\pm 20$	V	
$t_{psc}$	$V_{CC} = 800 V$ ; $V_{GE} \leq 15 V$ ; $T_j = 150^{\circ}C$ $V_{CES} < 1200 V$	10	$\mu s$	
<b>Inverse Diode</b>				
$I_F$	$T_j = 150^{\circ}C$	$T_s = 25^{\circ}C$	220	A
		$T_s = 70^{\circ}C$	160	A
$I_{FRM}$		400	A	
<b>Module</b>				
$I_{t(RMS)}$		400	A	
$T_{vj}$		- 40 + 150	$^{\circ}C$	
$T_{stg}$		- 40 + 125	$^{\circ}C$	
$V_{isol}$	AC, 1 min.	2500	V	

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



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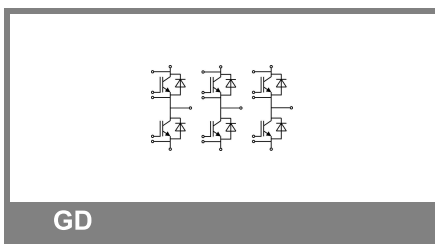
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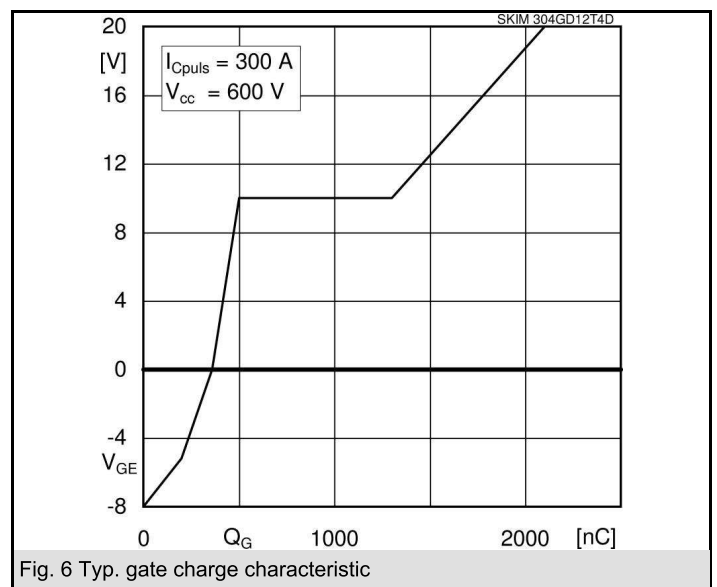
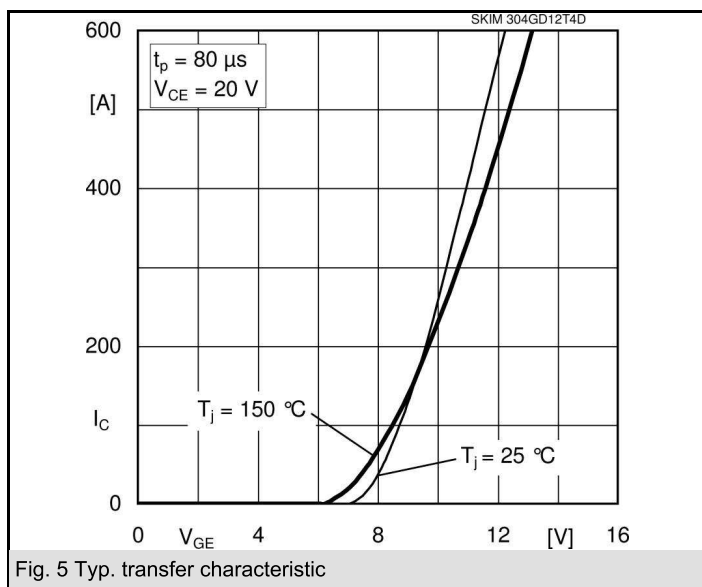
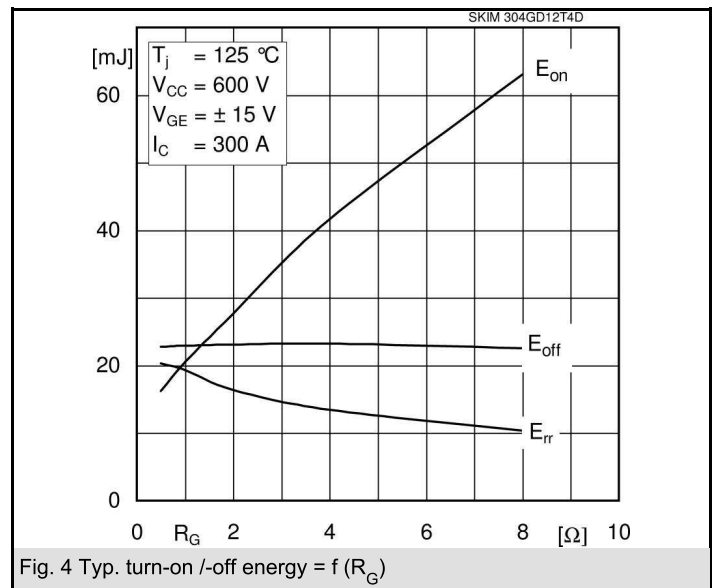
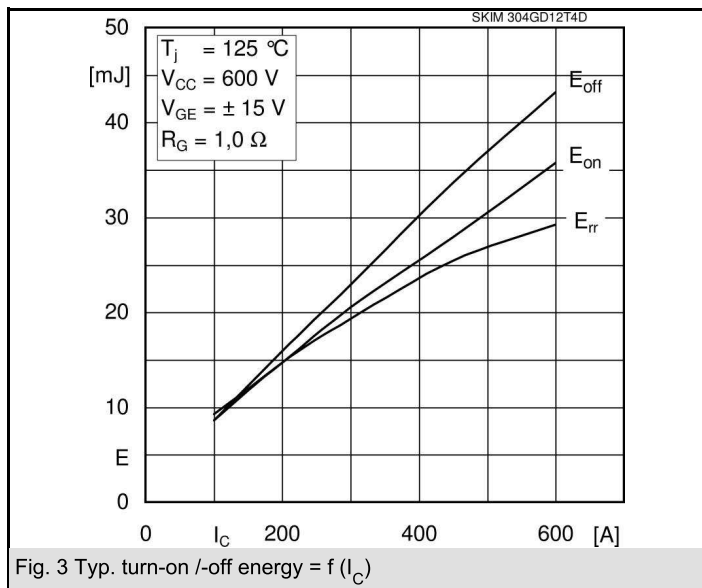
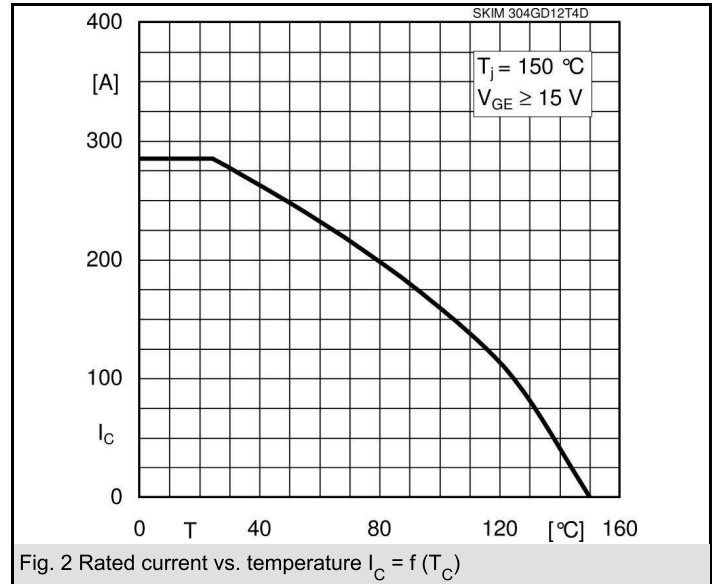
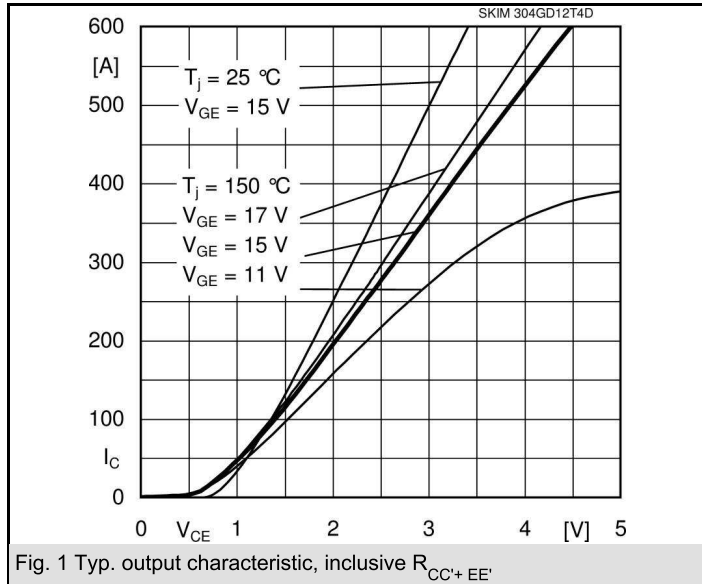


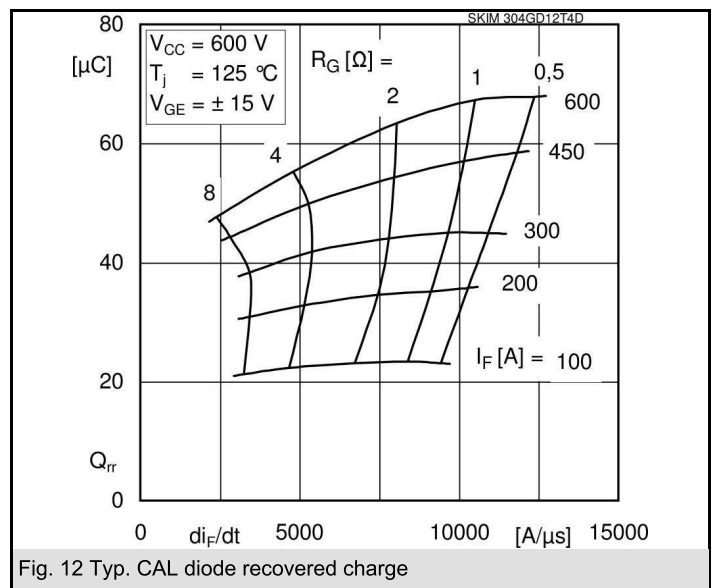
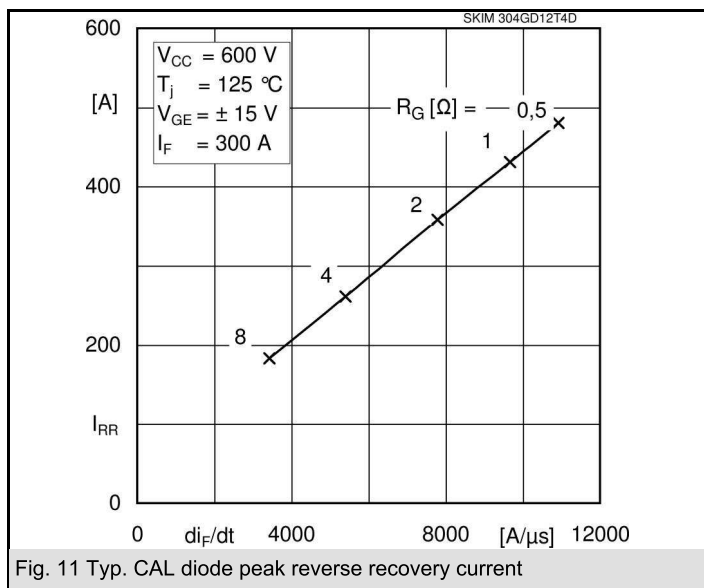
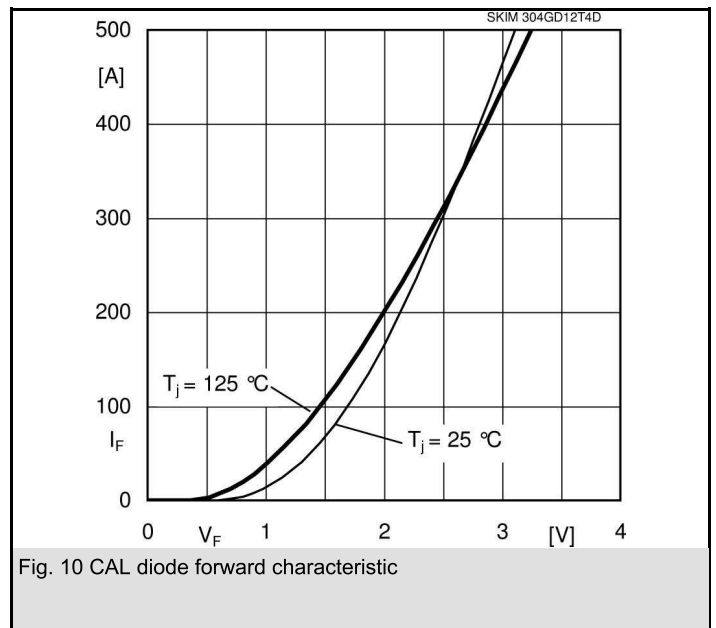
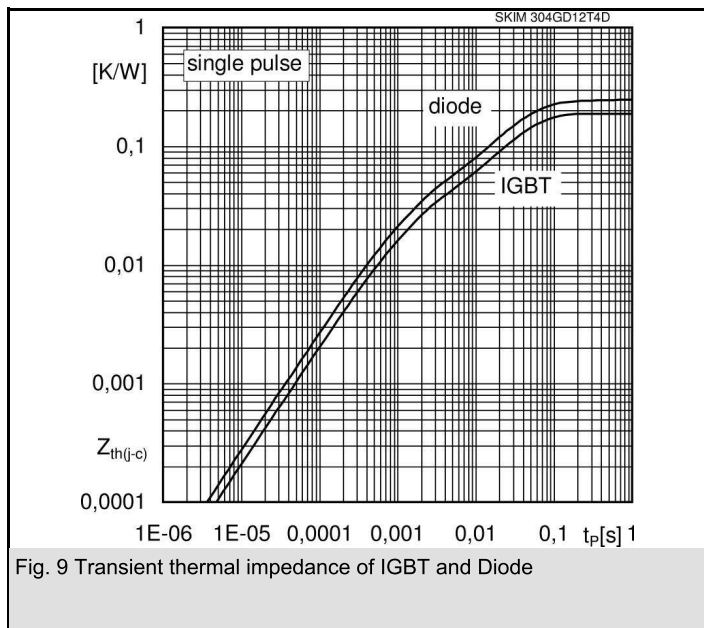
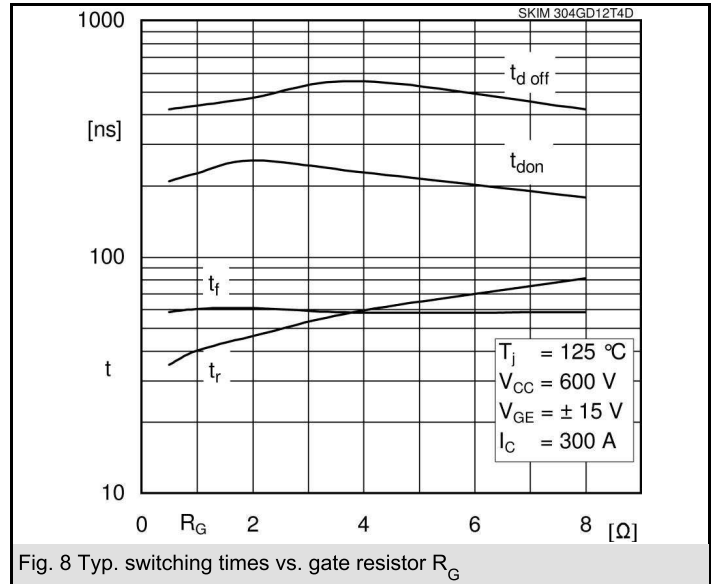
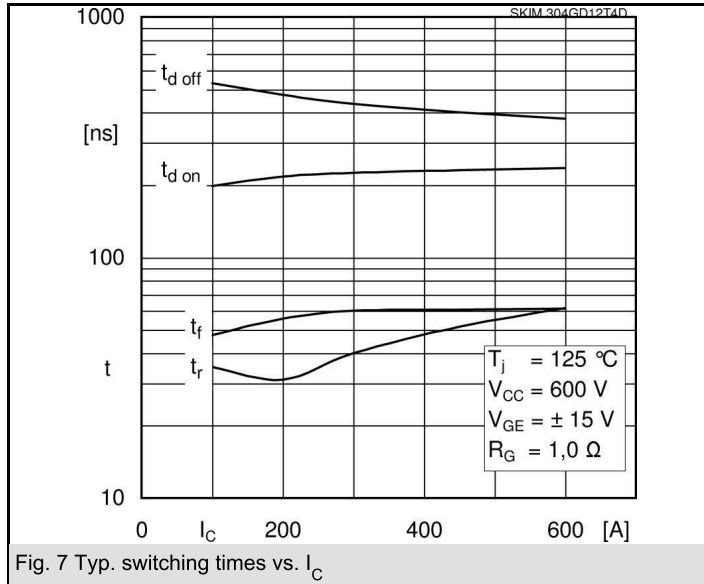
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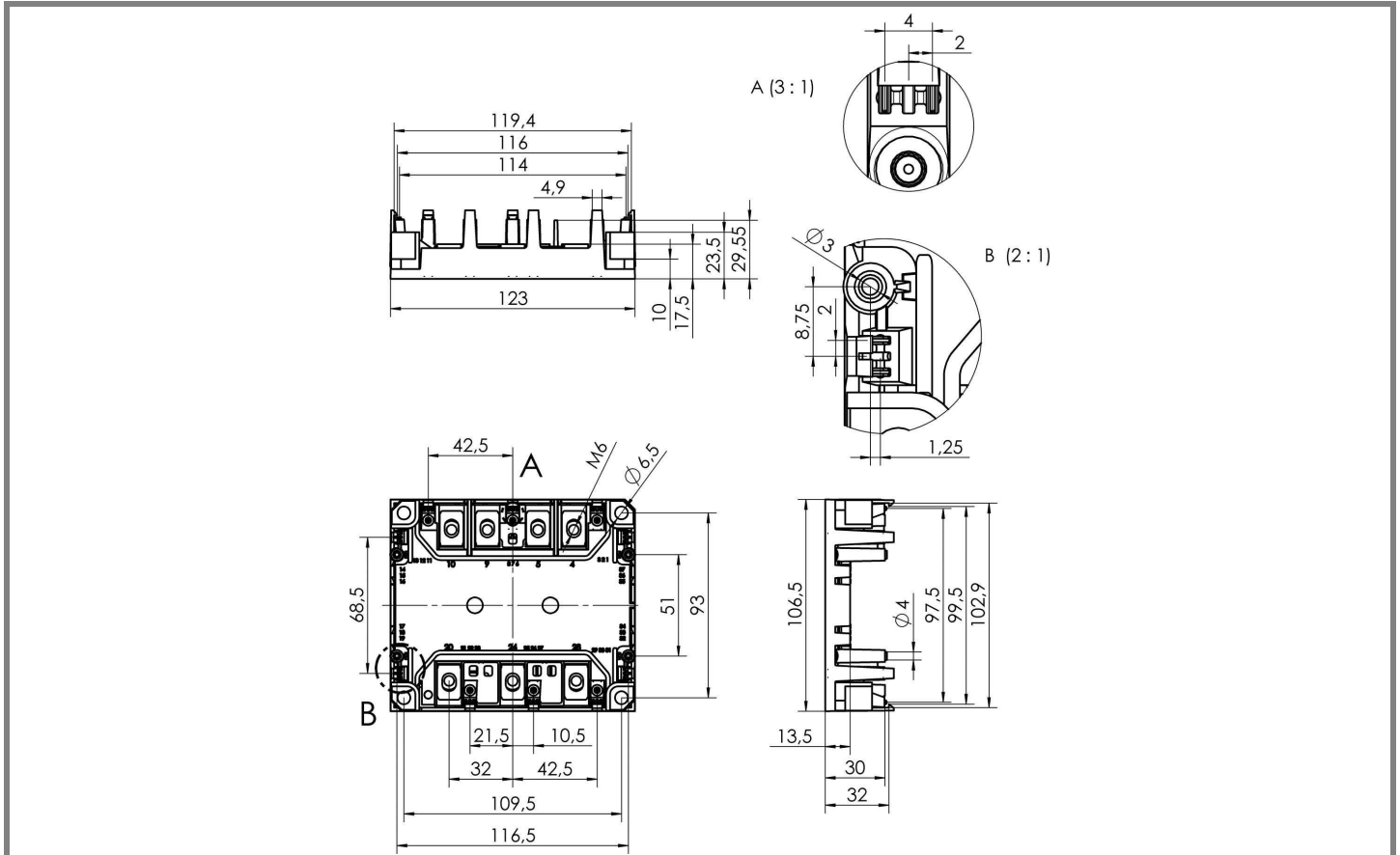
Characteristics					
Symbol	Conditions	min.	typ.	max.	Units
<b>Inverse Diode</b>					
$V_F = V_{EC}$	$I_{Fnom} = 300 \text{ A}; V_{GE} = 0 \text{ V}$		2,3	2,8	V
			2,2	2,7	V
					V
$V_{F0}$			1,2	1,6	V
			0,9	1,3	V
$r_F$			3,5	4	mΩ
			4,2	4,7	mΩ
$I_{RRM}$	$I_F = 300 \text{ A}$		430		A
$Q_{rr}$			45	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

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

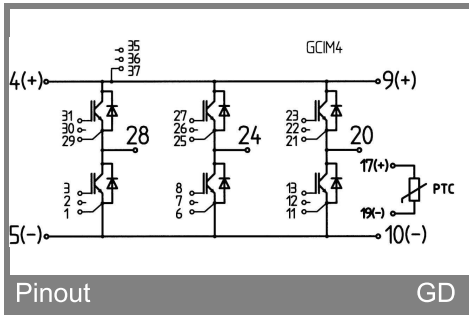
\* The specifications of our components may not be considered as an assurance of component characteristics. Components have to be tested for the respective application. Adjustments may be necessary. The use of SEMIKRON products in life support appliances and systems is subject to prior specification and written approval by SEMIKRON. We therefore strongly recommend prior consultation of our personal.







Case SKiM 4



Pinout

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