

SKM 300 GARL 066 T



SEMITRANS® 5

Trench IGBT Modules

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Features

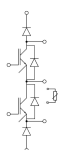
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- Integrated NTC temperature sensor

Typical Applications*

- UPS
- 3 Level Inverter

Remarks

- Case temperature limited to $T_c = 125^\circ\text{C}$ max
- Recommended $T_{op} = -40..+150^\circ\text{C}$
- T_{vj} is intended as absolute maximum rating
- Fig.2 is referred to IGBT current capability



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Absolute Maximum Ratings				$T_{case} = 25^\circ\text{C}$, unless otherwise specified	
Symbol	Conditions			Values	Units
IGBT					
V_{CES}	$T_j = 25^\circ\text{C}$			600	V
I_C	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$		400	A
		$T_c = 80^\circ\text{C}$		300	A
I_{CRM}	$I_{CRM} = 2 \times I_{Cnom}$			600	A
V_{GES}				± 20	V
t_{psc}	$V_{CC} = 360\text{ V}; V_{GE} \leq 15\text{ V}; T_j = 150^\circ\text{C}$ $V_{CES} < 600\text{ V}$			6	μs
Inverse Diode					
I_F	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$		40	A
		$T_c = 80^\circ\text{C}$		30	A
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$			60	A
I_{FSM}	$t_p = 10\text{ ms}; \text{half sine wave}$	$T_j = 150^\circ\text{C}$		160	A
Freewheeling Diode					
I_F	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$		400	A
		$T_c = 80^\circ\text{C}$		290	A
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$			600	A
I_{FSM}	$t_p = 10\text{ ms}; \text{half sine wave}$	$T_j = 150^\circ\text{C}$		2100	A
Module					
$I_{t(RMS)}$				500	A
T_{vj}				- 40 ... + 175	$^\circ\text{C}$
T_{stg}				- 40 ... + 125	$^\circ\text{C}$
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 = 4,8 mA		5	5,8	6,5	V
I _{CES}	V _{GE} = 0 V, V _{CE} = V _{CES}	T _j = 25 °C			0,5	mA
I _{GES}	V _{CE} = 0 V, V _{GE} = 20 V	T _j = 25 °C			1200	nA
V _{CE0}		T _j = 25 °C		0,9	1	V
		T _j = 150 °C		0,85	0,9	V
r _{CE}	V _{GE} = 15 V	T _j = 25°C		1,8	3	mΩ
		T _j = 150°C		2,7	3,8	mΩ
V _{CE(sat)}	I _{Cnom} = 300 A, V _{GE} = 15 V	T _j = 25°C _{chiplev.}		1,45	1,9	V
		T _j = 150°C _{chiplev.}		1,7	2,1	V
C _{ies}	V _{CE} = 25, V _{GE} = 0 V	f = 1 MHz		18,4		nF
C _{oes}				1,14		nF
C _{res}				0,54		nF
Q _G	V _{GE} = -15V...+15V			3900		nC
R _{Gint}	T _j = °C			1		Ω
t _{d(on)}	R _{Gon} = 2,2 Ω di/dt = 3400 A/μs	V _{CC} = 300V I _C = 300A		140		ns
t _r				89		ns
E _{on}	R _{Goff} = 2,2 Ω di/dt = 3400 A/μs	T _j = 150 °C V _{GE} = -15V/+15V		3,5		mJ
t _{d(off)}				433		ns
t _f				116		ns
E _{off}				10,1		mJ
R _{th(j-c)}	per IGBT			0,15		K/W

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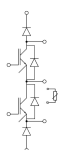
Remarks

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Characteristics					
Symbol	Conditions	min.	typ.	max.	Units
Inverse Diode					
$V_F = V_{EC}$	$I_{Fnom} = 30\text{ A}; V_{GE} = 0\text{ V}$				
	$T_j = 25^\circ\text{C}_{chiplev.}$		1,45	1,7	V
	$T_j = 150^\circ\text{C}_{chiplev.}$		1,45	1,7	V
V_{F0}					
	$T_j = 25^\circ\text{C}$		1	1,1	V
	$T_j = 150^\circ\text{C}$		0,9	1	V
r_F					
	$T_j = 25^\circ\text{C}$		15	20	mΩ
	$T_j = 150^\circ\text{C}$		18	23,3	mΩ
I_{RRM}	$I_F = 30\text{ A}$				A
Q_{rr}					μC
E_{rr}	$V_{GE} = -8\text{ V}; V_{CC} = 300\text{ V}$				mJ
$R_{th(j-c)D}$	per diode		2		K/W
Free-wheeling diode					
$V_F = V_{EC}$	$I_{Fnom} = 300\text{ A}; V_{GE} = 0\text{ V}$				
	$T_j = 25^\circ\text{C}_{chiplev.}$		1,35	1,6	V
	$T_j = 150^\circ\text{C}_{chiplev.}$		1,3	1,5	V
V_{F0}					
	$T_j = 25^\circ\text{C}$		0,9	1	V
	$T_j = 150^\circ\text{C}$		0,85	0,9	V
r_F					
	$T_j = 25^\circ\text{C}$		1,5	2	V
	$T_j = 150^\circ\text{C}$		1,5	2	V
I_{RRM}	$I_F = 300\text{ A}$				A
Q_{rr}			194		μC
E_{rr}	$V_{GE} = 0\text{ V}; V_{CC} = 600\text{ V}$		13		mJ
			4		
$R_{th(j-c)FD}$	per diode		0,28		K/W
$R_{th(c-s)}$	per module			0,038	K/W
M_s	to heat sink M6	3		5	Nm
M_t	to terminals M6	2,5		5	Nm
w				310	g
Temperature sensor					
R_{100}	$T_s = 100^\circ\text{C} (R_{25} = 5\text{ k}\Omega)$		493±5%		Ω
					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 staff.



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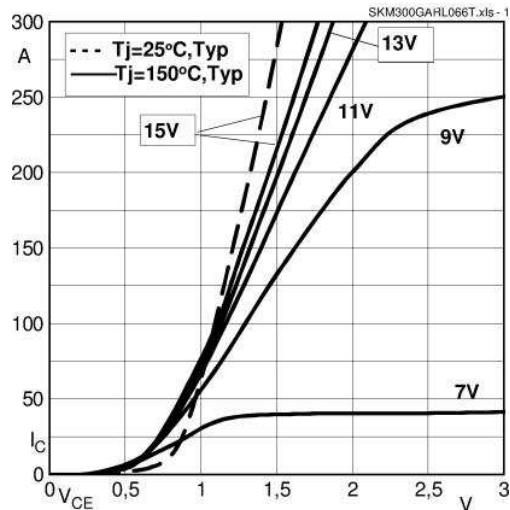


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

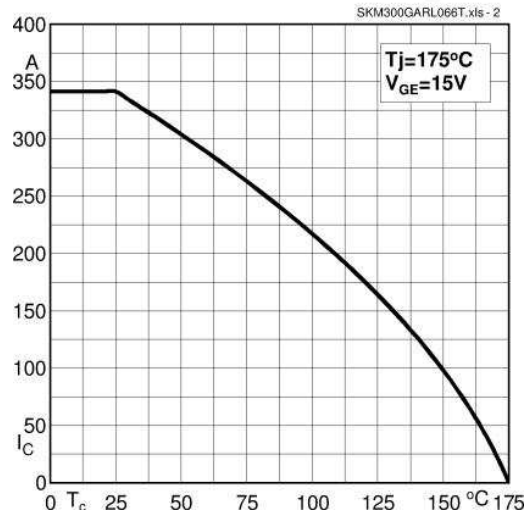


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

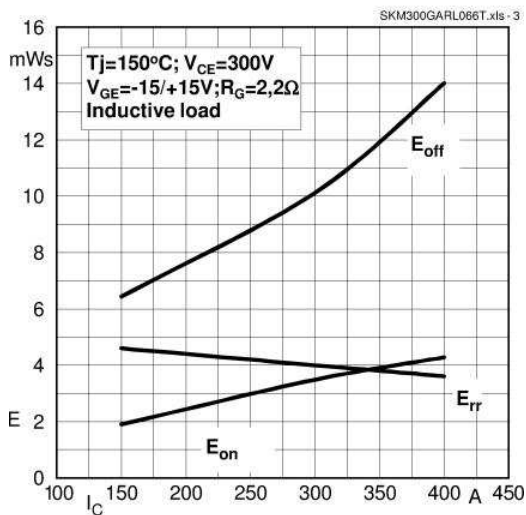


Fig. 3 Typ. turn-on /off energy = $f(I_C)$

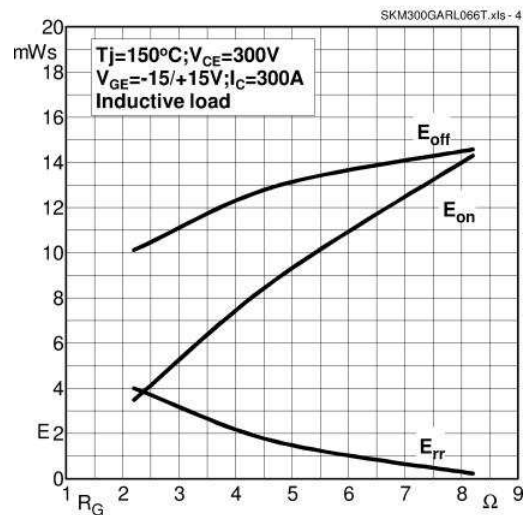


Fig. 4 Typ. turn-on /off energy = $f(R_G)$

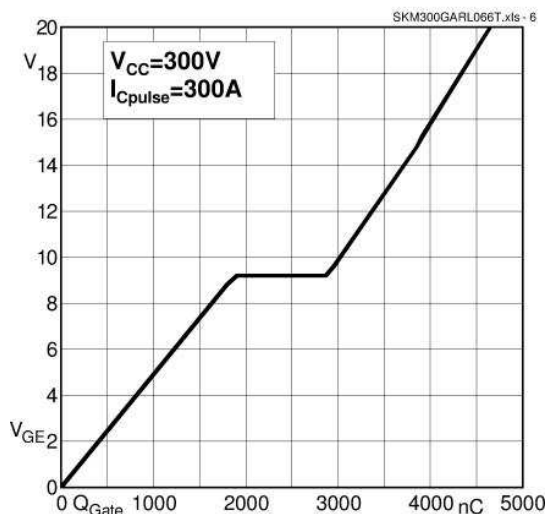


Fig. 6 Typ. gate charge characteristic

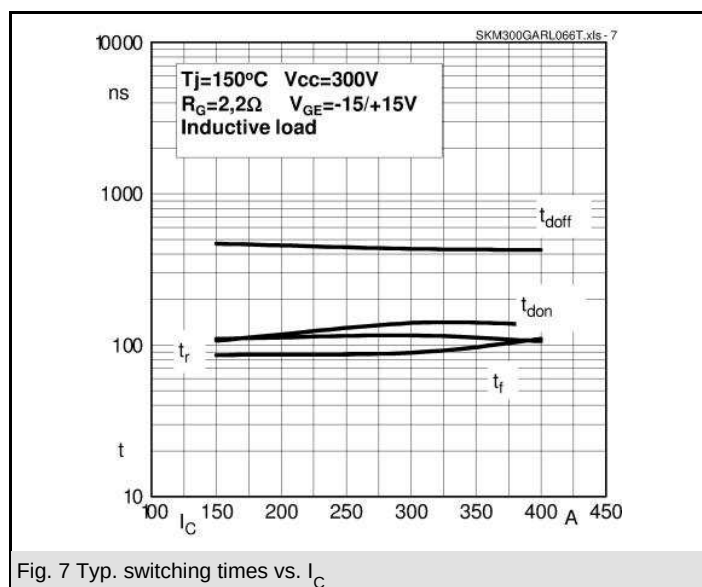


Fig. 7 Typ. switching times vs. I_C

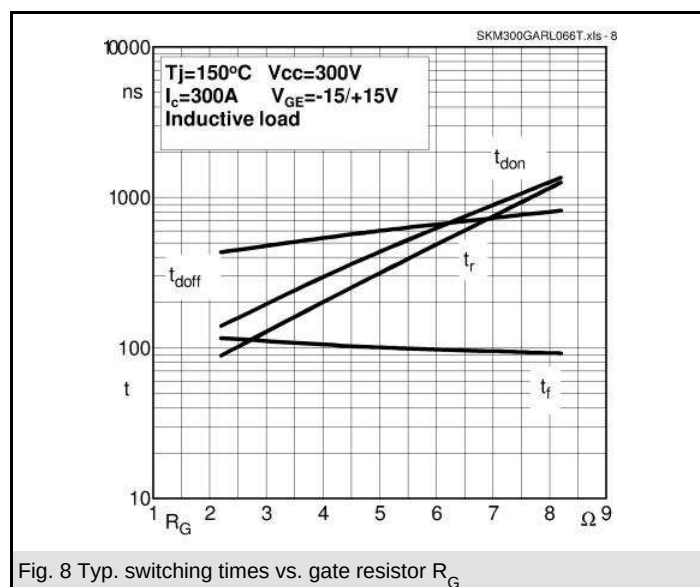


Fig. 8 Typ. switching times vs. gate resistor R_G

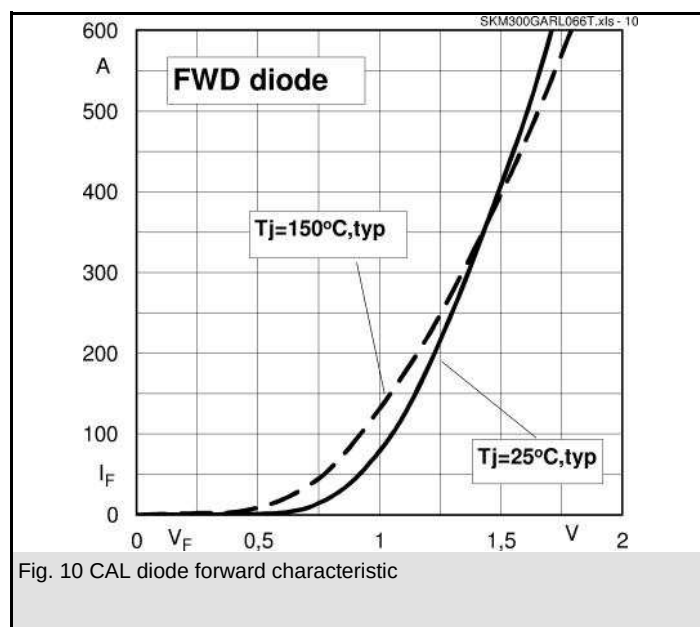
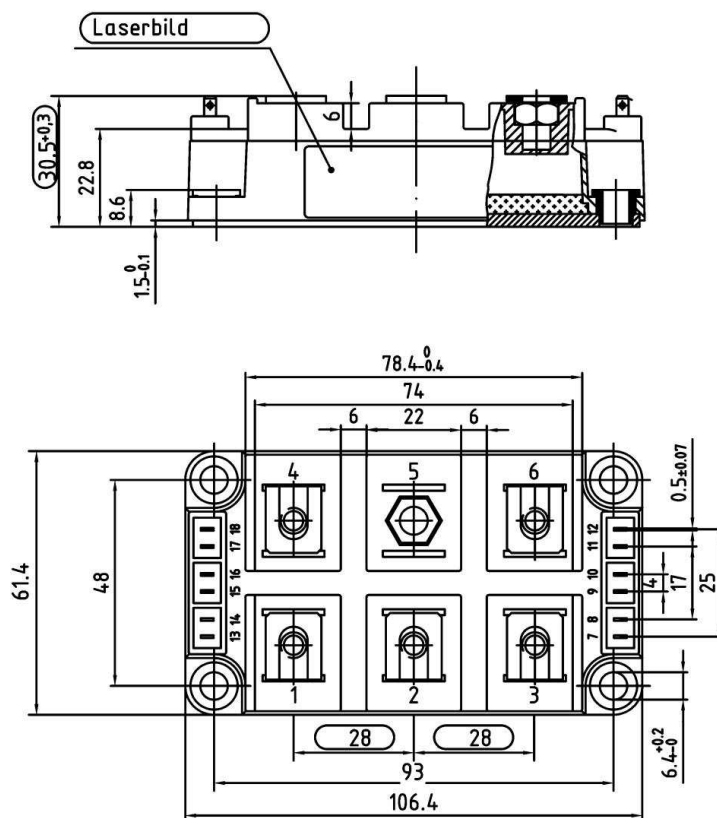


Fig. 10 CAL diode forward characteristic

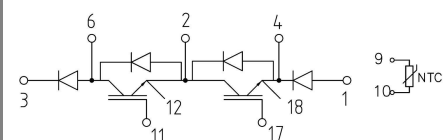
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Case D61



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