

SEMITRANS® 5

## Trench IGBT Modules

### SKM300MLI066TAT

#### Features

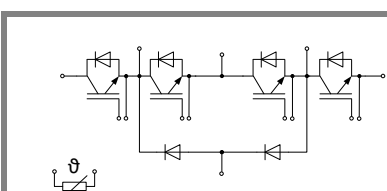
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$  with positive temperature coefficient
- Integrated NTC temperature sensor

#### Typical Applications\*

- UPS
- 3 Level Inverter

#### Remarks

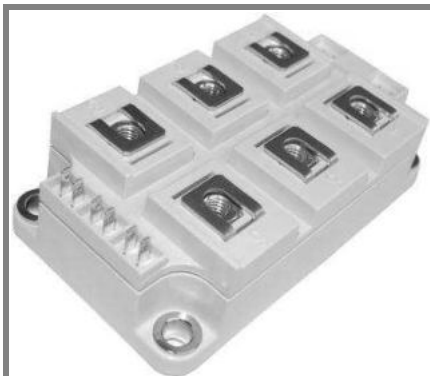
- Case temperature limited to  $T_c = 125^\circ\text{C}$  max
- Recommended  $T_{op} = -40..+150^\circ\text{C}$  for IGBT;  
 $T_{op} = -40..+125^\circ\text{C}$  for diode
- $T_{vj}$  is intended as absolute maximum rating, limited by diode
- Fig.2 is referred to IGBT current capability



MLI-TAT

Absolute Maximum Ratings			T <sub>case</sub> = 25°C, unless otherwise specified	
Symbol	Conditions		Values	Units
IGBT				
V <sub>CES</sub>	T <sub>j</sub> = 25 °C		600	V
I <sub>C</sub>	T <sub>j</sub> = 175 °C	T <sub>C</sub> = 25 °C	400	A
		T <sub>C</sub> = 80 °C	300	A
I <sub>CRM</sub>	I <sub>CRM</sub> =2xI <sub>Cnom</sub>		600	A
V <sub>GES</sub>			± 20	V
t <sub>psc</sub>	V <sub>CC</sub> = 360 V; V <sub>GE</sub> ≤ 15 V; T <sub>j</sub> = 150 °C V <sub>CES</sub> < 600 V		6	μs
Inverse Diode				
I <sub>F</sub>	T <sub>j</sub> = 150 °C	T <sub>C</sub> = 25 °C	324	A
		T <sub>C</sub> = 80 °C	211	A
I <sub>FRM</sub>	I <sub>FRM</sub> =2xI <sub>Fnom</sub>		420	A
I <sub>FSM</sub>	t <sub>p</sub> = 10 ms; half sine wave T <sub>j</sub> = 150 °C		2100	A
Freewheeling Diode				
I <sub>F</sub>	T <sub>j</sub> = 150 °C	T <sub>C</sub> = 25 °C	324	A
		T <sub>C</sub> = 80 °C	211	A
I <sub>FRM</sub>	I <sub>FRM</sub> =2xI <sub>Fnom</sub>		420	A
I <sub>FSM</sub>	t <sub>p</sub> = 10 ms; half sine wave T <sub>j</sub> = 150 °C		2100	A
Module				
I <sub>t(RMS)</sub>			500	A
T <sub>vj</sub>			- 40 ... + 150	°C
T <sub>stg</sub>			- 40 ... + 125	°C
V <sub>isol</sub>	AC, 1 min.		2500	V

Characteristics			T <sub>case</sub> = 25°C, unless otherwise specified			
Symbol	Conditions		min.	typ.	max.	Units
IGBT						
V <sub>GE(th)</sub>	V <sub>GE</sub> = V <sub>CE</sub> , I <sub>C</sub> = 4,8 mA		5	5,8	6,5	V
I <sub>CES</sub>	V <sub>GE</sub> = 0 V, V <sub>CE</sub> = V <sub>CES</sub> T <sub>j</sub> = 25 °C				0,5	mA
I <sub>GES</sub>	V <sub>CE</sub> = 0 V, V <sub>GE</sub> = 20 V      T <sub>j</sub> = 25 °C				1200	nA
V <sub>CE0</sub>	T <sub>j</sub> = 25 °C			0,9	1	V
	T <sub>j</sub> = 150 °C			0,85	0,9	V
r <sub>CE</sub>	V <sub>GE</sub> = 15 V      T <sub>j</sub> = 25°C			1,8	3	mΩ
	T <sub>j</sub> = 150°C			2,7	3,8	mΩ
V <sub>CE(sat)</sub>	I <sub>Cnom</sub> = 300 A, V <sub>GE</sub> = 15 V      T <sub>j</sub> = 25°C <sub>chiplev.</sub>			1,45	1,9	V
	T <sub>j</sub> = 150°C <sub>chiplev.</sub>			1,7	2,1	V
C <sub>ies</sub>	V <sub>CE</sub> = 25, V <sub>GE</sub> = 0 V      f = 1 MHz			18,4		nF
C <sub>oes</sub>				1,14		nF
C <sub>res</sub>				0,54		nF
Q <sub>G</sub>	V <sub>GE</sub> = -15V...+15V			3900		nC
R <sub>Gint</sub>	T <sub>j</sub> = °C			1		Ω
t <sub>d(on)</sub>	R <sub>Gon</sub> = 2,2 Ω di/dt = 3400 A/μs		V <sub>CC</sub> = 300V I <sub>C</sub> = 300A	140		ns
t <sub>r</sub>				89		ns
E <sub>on</sub>	R <sub>Goff</sub> = 2,2 Ω di/dt = 3400 A/μs		T <sub>j</sub> = 125 °C V <sub>GE</sub> = --15V/+15V	3,5		mJ
t <sub>d(off)</sub>				433		ns
t <sub>f</sub>				116		ns
E <sub>off</sub>				10,1		mJ
R <sub>th(j-c)</sub>	per IGBT			0,15		K/W



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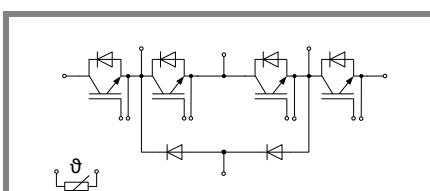
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Characteristics					
Symbol	Conditions	min.	typ.	max.	Units
<b>Inverse Diode</b>					
$V_F = V_{EC}$	$I_{Fnom} = 245\text{ A}; V_{GE} = 0\text{ V}$				
	$T_j = 25^\circ\text{C}_{chiplev.}$		1,35	1,6	V
	$T_j = 125^\circ\text{C}_{chiplev.}$		1,35	1,6	V
$V_{F0}$	$T_j = 25^\circ\text{C}$		1	1,1	V
	$T_j = 125^\circ\text{C}$		0,9	1	V
$r_F$	$T_j = 25^\circ\text{C}$		1,42	2	mΩ
	$T_j = 125^\circ\text{C}$		1,8	2,4	mΩ
$I_{RRM}$	$I_F = 245\text{ A}$				A
$Q_{rr}$					μC
$E_{rr}$	$V_{GE} = -8\text{ V}; V_{CC} = 300\text{ V}$				mJ
$R_{th(j-c)D}$	per diode		0,28		K/W
<b>Free-wheeling diode (Neutral Clamp Diode)</b>					
$V_F = V_{EC}$	$I_{Fnom} = 245\text{ A}; V_{GE} = 0\text{ V}$				
	$T_j = 25^\circ\text{C}_{chiplev.}$		1,35	1,6	V
	$T_j = 125^\circ\text{C}_{chiplev.}$		1,35	1,6	V
$V_{F0}$	$T_j = 25^\circ\text{C}$		1	1,1	V
	$T_j = 125^\circ\text{C}$		0,9	1	V
$r_F$	$T_j = 25^\circ\text{C}$		1,42	2	V
	$T_j = 125^\circ\text{C}$		1,8	2,4	V
$I_{RRM}$	$I_F = 300\text{ A}$		194		A
$Q_{rr}$	$di/dt = 3400\text{ A/μs}$		13		μC
$E_{rr}$	$V_{GE} = 0\text{ V}; V_{CC} = 300\text{ V}$		4		mJ
$R_{th(j-c)FD}$	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
<b>Temperature sensor</b>					
$R_{100}$	$T_s = 100^\circ\text{C} (R_{25} = 5\text{ kΩ})$		493±5%		Ω
					K

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

### \*IMPORTANT INFORMATION AND WARNINGS

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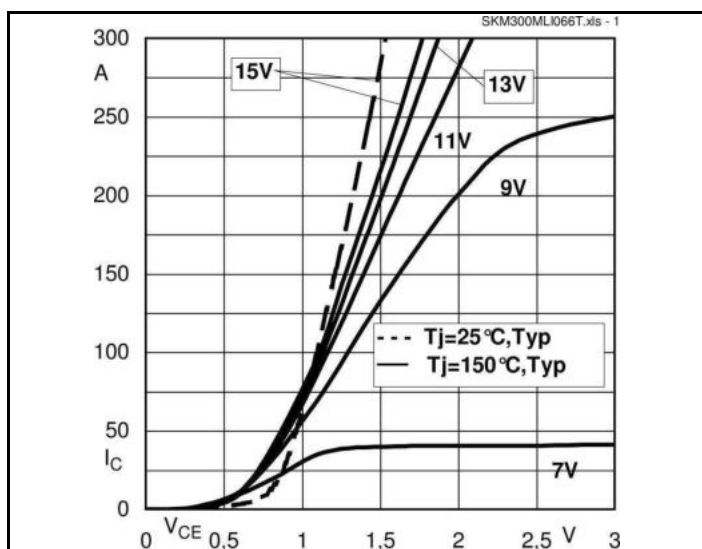


Fig. 1 Typ. output characteristic, inclusive  $R_{CC'+EE'}$

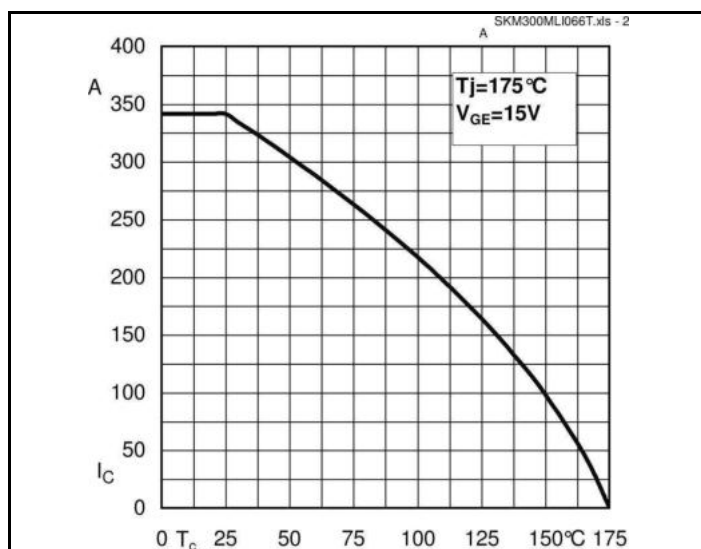


Fig. 2 Rated current vs. temperature  $I_C = f(T_C)$

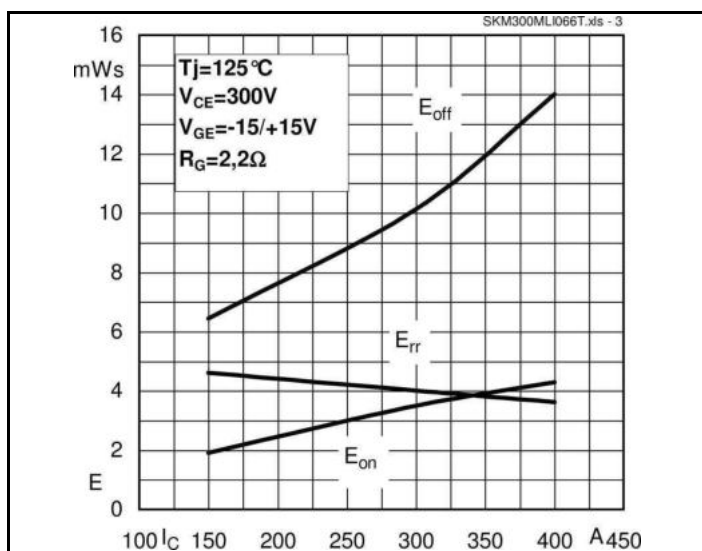


Fig. 3 Typ. turn-on /-off energy =  $f(I_C)$

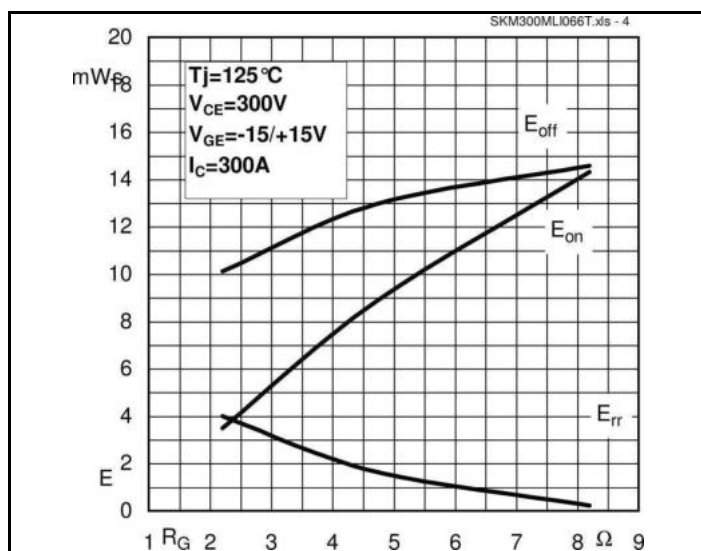


Fig. 4 Typ. turn-on /-off energy =  $f(R_G)$

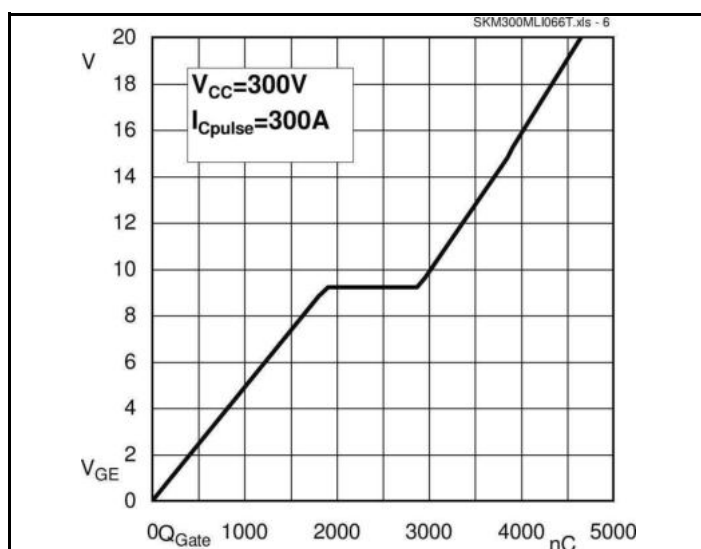
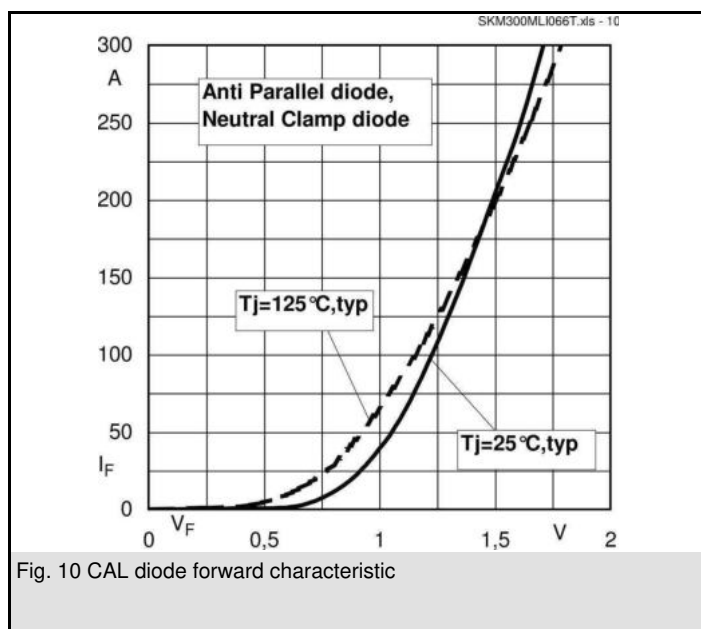
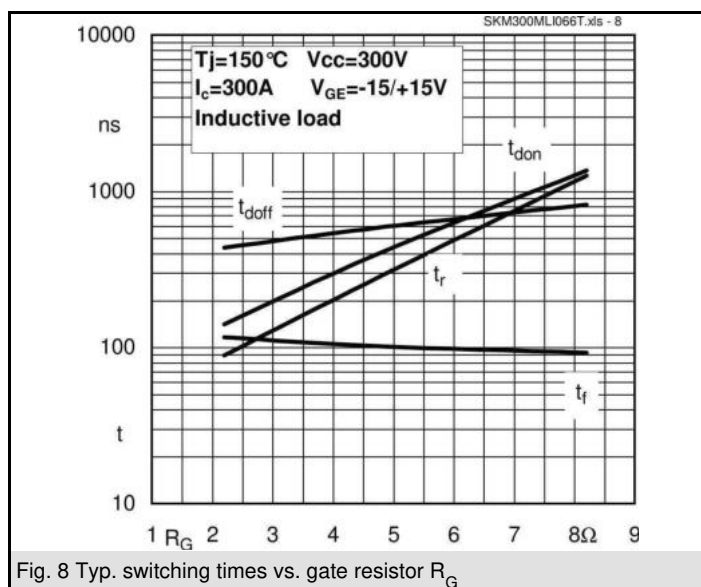
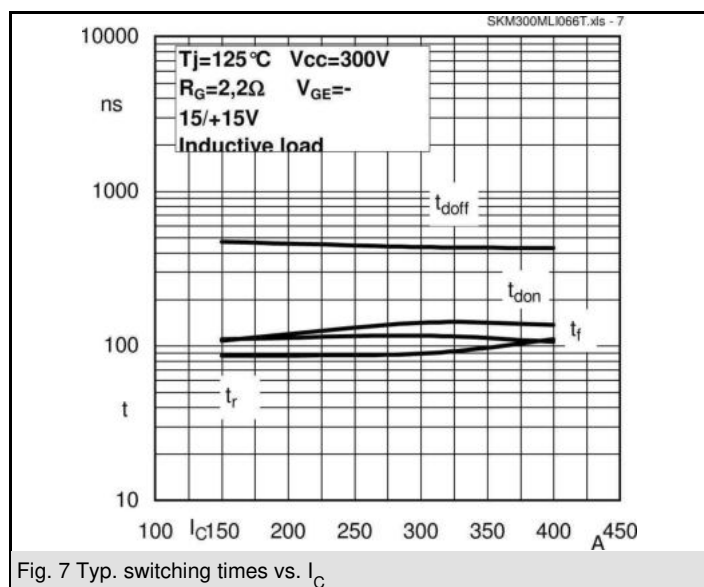


Fig. 6 Typ. gate charge characteristic



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