



SEMITRANS® 5

## Trench IGBT Modules

## SKM300MLI066TAT

## Features

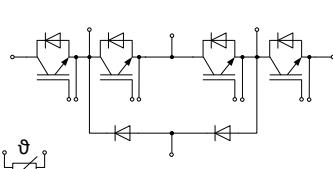
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$  with positive temperature coefficient
- Integrated NTC temperature sensor

## 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



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Absolute Maximum Ratings		$T_{case} = 25^\circ\text{C}$ , unless otherwise specified		
Symbol	Conditions	Values		Units
<b>IGBT</b>				
$V_{CES}$	$T_j = 25^\circ\text{C}$	600		V
$I_C$	$T_j = 175^\circ\text{C}$ $T_c = 25^\circ\text{C}$ $T_c = 80^\circ\text{C}$	400 300		A A
$I_{CRM}$	$I_{CRM} = 2 \times I_{Cnom}$	600		A
$V_{GES}$		$\pm 20$		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		$\mu\text{s}$
<b>Inverse Diode</b>				
$I_F$	$T_j = 150^\circ\text{C}$ $T_c = 25^\circ\text{C}$ $T_c = 80^\circ\text{C}$	324 211		A A
$I_{FRM}$	$I_{FRM} = 2 \times I_{Fnom}$	420		A
$I_{FSM}$	$t_p = 10\text{ ms}$ ; half sine wave $T_j = 150^\circ\text{C}$	2100		A
<b>Freewheeling Diode</b>				
$I_F$	$T_j = 150^\circ\text{C}$ $T_c = 25^\circ\text{C}$ $T_c = 80^\circ\text{C}$	324 211		A A
$I_{FRM}$	$I_{FRM} = 2 \times I_{Fnom}$	420		A
$I_{FSM}$	$t_p = 10\text{ ms}$ ; half sine wave $T_j = 150^\circ\text{C}$	2100		A
<b>Module</b>				
$I_{t(RMS)}$		500		A
$T_{vj}$		-40 ... +150		$^\circ\text{C}$
$T_{stg}$		-40 ... +125		$^\circ\text{C}$
$V_{isol}$	AC, 1 min.	2500		V

Characteristics		$T_{case} = 25^\circ\text{C}$ , unless otherwise specified		
Symbol	Conditions	min.	typ.	max.
<b>IGBT</b>				
$V_{GE(th)}$	$V_{GE} = V_{CE}$ , $I_C = 4,8\text{ mA}$	5	5,8	6,5
$I_{CES}$	$V_{GE} = 0\text{ V}$ , $V_{CE} = V_{CES}$ $T_j = 25^\circ\text{C}$		0,5	mA
$I_{GES}$	$V_{CE} = 0\text{ V}$ , $V_{GE} = 20\text{ V}$ $T_j = 25^\circ\text{C}$		1200	nA
$V_{CE0}$	$T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	0,9 0,85	1 0,9	V
$r_{CE}$	$V_{GE} = 15\text{ V}$ $T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	1,8 2,7	3 3,8	$\text{m}\Omega$
$V_{CE(sat)}$	$I_{Cnom} = 300\text{ A}$ , $V_{GE} = 15\text{ V}$ $T_j = 25^\circ\text{C}_{\text{chiplev.}}$ $T_j = 150^\circ\text{C}_{\text{chiplev.}}$	1,45 1,7	1,9 2,1	V
$C_{ies}$ $C_{oes}$ $C_{res}$	$V_{CE} = 25$ , $V_{GE} = 0\text{ V}$ $f = 1\text{ MHz}$	18,4 1,14 0,54		nF
$Q_G$	$V_{GE} = -15\text{ V}...+15\text{ V}$	3900		nC
$R_{Gint}$	$T_j = \text{---}$	1		$\Omega$
$t_{d(on)}$ $t_r$ $E_{on}$	$R_{Gon} = 2,2\text{ }\Omega$ $di/dt = 3400\text{ A}/\mu\text{s}$	140 89 3,5		ns ns mJ
$t_{d(off)}$ $t_f$ $E_{off}$	$R_{Goff} = 2,2\text{ }\Omega$ $di/dt = 3400\text{ A}/\mu\text{s}$ $T_j = 125^\circ\text{C}$ $V_{GE} = -15\text{ V}...+15\text{ V}$	433 116 10,1		ns ns mJ
$R_{th(j-c)}$	per IGBT	0,15		K/W



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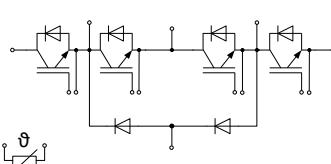
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- Recommended  $T_{op} = -40..+150^\circ\text{C}$  for IGBT;  $T_{op} = -40..+125^\circ\text{C}$  for diode
- $T_{vj}$  is intended as absolute maximum rating, limited by diode
- Fig.2 is referred to IGBT current capability

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

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

#### \*IMPORTANT INFORMATION AND WARNINGS

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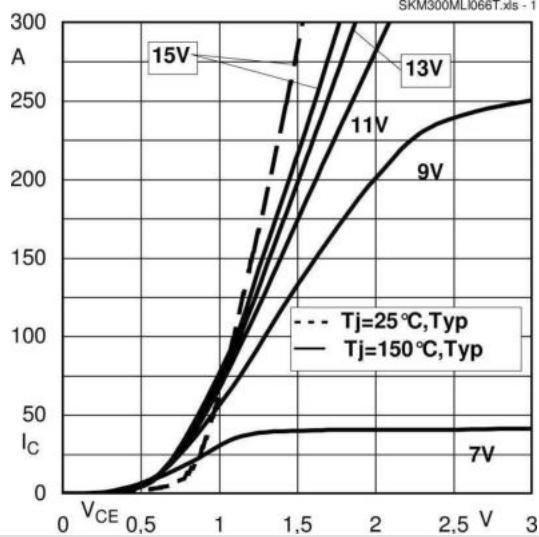


Fig. 1 Typ. output characteristic, inclusive  $R_{CC} + EE'$

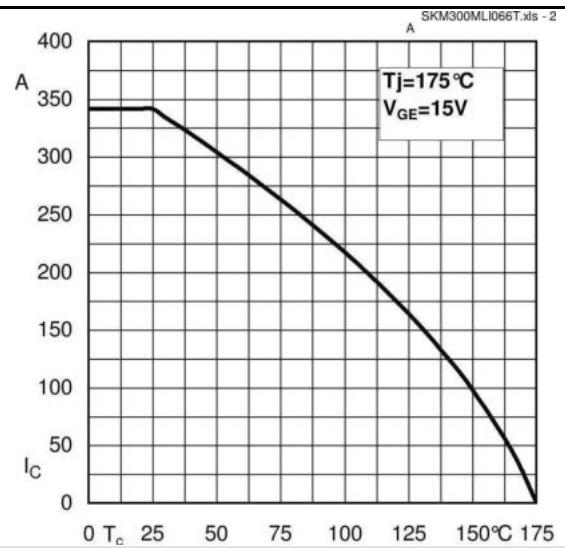


Fig. 2 Rated current vs. temperature  $I_C = f (T_C)$

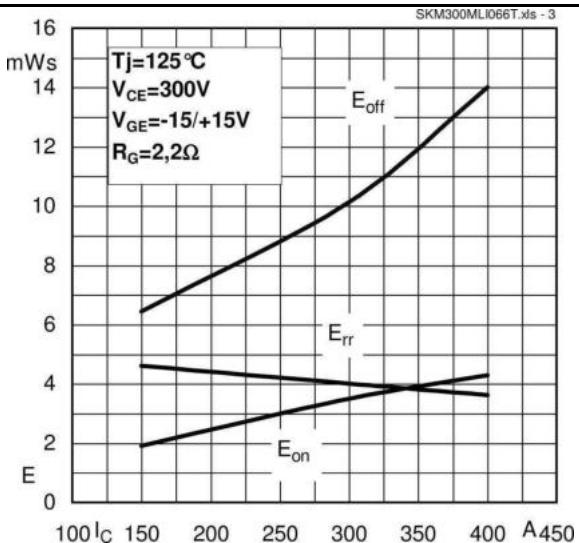


Fig. 3 Typ. turn-on /-off energy = f ( $I_C$ )

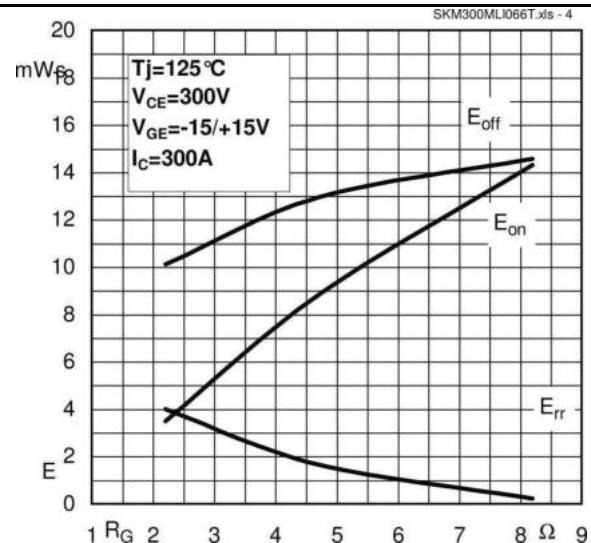


Fig. 4 Typ. turn-on /-off energy = f ( $R_G$ )

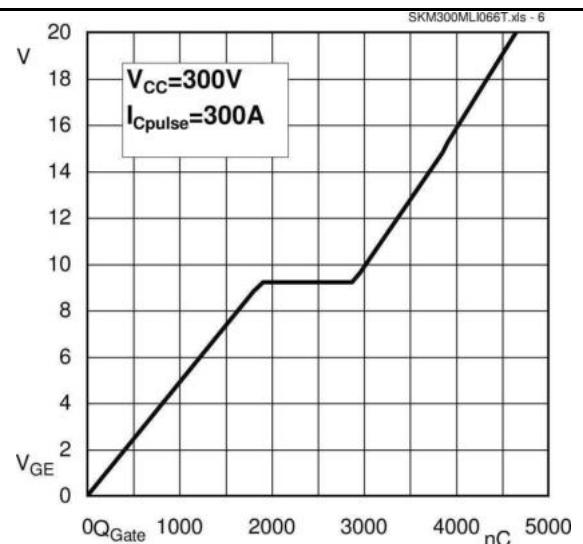


Fig. 6 Typ. gate charge characteristic

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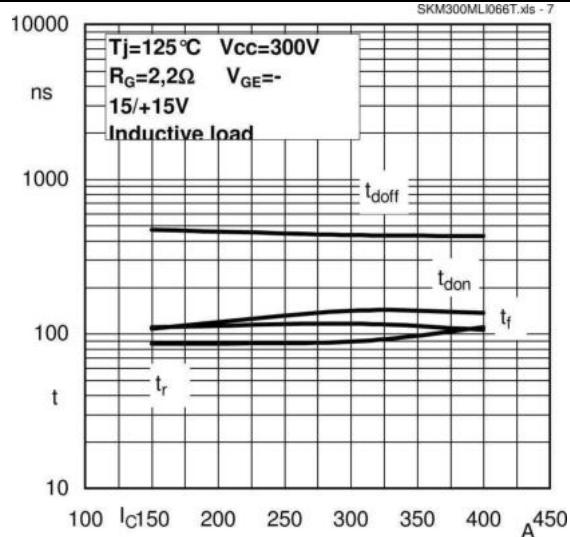


Fig. 7 Typ. switching times vs.  $I_C$

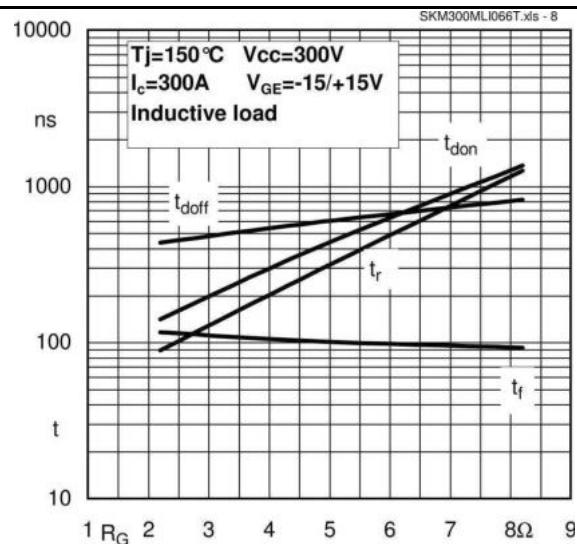


Fig. 8 Typ. switching times vs. gate resistor  $R_G$

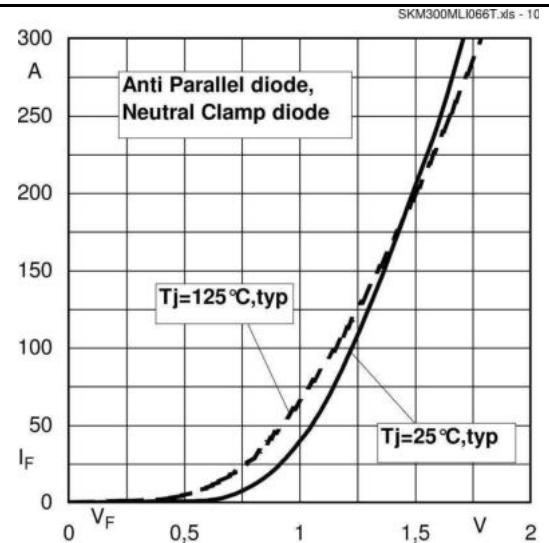
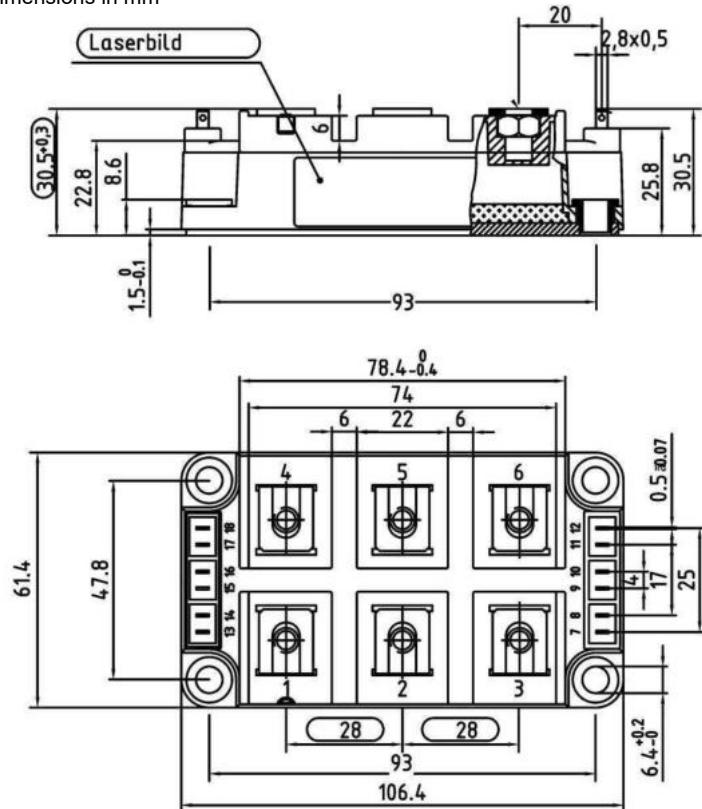


Fig. 10 CAL diode forward characteristic

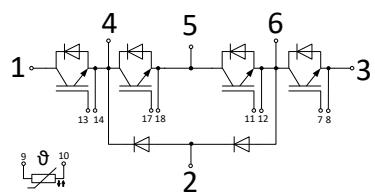
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Dimensions in mm



### Case D62



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Case D62