



SEMITRANS® 2

IGBT4 Modules

SKM 150GB12T4

Target Data

Features

- IGBT4 = 4. Generation IGBT
- V_{CEsat} with positive temperature coefficient
- High short circuit capability, self limiting to $6 \times I_{CNOM}$
- Soft switching 4 Generation CAL diode (CAL4)

Typical Applications

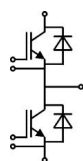
- AC inverter drives
- UPS
- Electronic welders at f_{sw} up to 20 kHz

Remarks

- Case temperature limited to $T_c = 125^\circ\text{C}$ max, recomm. $T_{op} = -40 \dots +150^\circ\text{C}$, product rel. results valid for $T_j \leq 150^\circ$

Absolute Maximum Ratings				$T_c = 25^\circ\text{C}$, unless otherwise specified	
Symbol	Conditions			Values	Units
IGBT					
V_{CES}	$T_j = 25^\circ\text{C}$			1200	V
I_C	$T_j = 175^\circ\text{C}$	$T_{case} = 25^\circ\text{C}$		230	A
		$T_{case} = 80^\circ\text{C}$		180	A
I_{CRM}	$I_{CRM} = 3 \times I_{CNOM}$			450	A
V_{GES}				± 20	V
t_{psc}	$V_{CC} = 600\text{ V}; V_{GE} \leq 15\text{ V}; T_j = 150^\circ\text{C}$ $V_{CES} < 1200\text{ V}$			10	μs
Inverse Diode					
I_F	$T_j = 175^\circ\text{C}$	$T_{case} = 25^\circ\text{C}$		190	A
		$T_{case} = 80^\circ\text{C}$		140	A
I_{FRM}	$I_{FRM} = 3 \times I_{FNOM}$			450	A
I_{FSM}	$t_p = 10\text{ ms; sin.}$	$T_j = 175^\circ\text{C}$		900	A
Module					
$I_{t(RMS)}$				200	A
T_{vj}				$-40 \dots +175$	$^\circ\text{C}$
T_{stg}				$-40 \dots +125$	$^\circ\text{C}$
V_{isol}	AC, 1 min.			4000	V

Characteristics			T _c = 25 °C, unless otherwise specified			
Symbol	Conditions		min.	typ.	max.	Units
IGBT						
V _{GE(th)}	V _{GE} = V _{CE} , I _C = 6 mA		5	5,8	6,5	V
I _{CES}	V _{GE} = 0 V, V _{CE} = V _{CES} T _j = 25 °C					mA
V _{CE0}	T _j = 25 °C			0,8	0,9	V
	T _j = 150 °C			0,7	0,8	V
r _{CE}	V _{GE} = 15 V	T _j = 25°C		6,7	7,3	mΩ
		T _j = 150°C		10	10,7	mΩ
V _{CE(sat)}	I _{Cnom} = 150 A, V _{GE} = 15 V	T _j = 25°C _{chiplev.}		1,8	2	V
		T _j = 150°C _{chiplev.}		2,2	2,4	V
C _{ies}	V _{CE} = 25, V _{GE} = 0 V	f = 1 MHz		9,3		nF
C _{oes}				0,58		nF
C _{res}				0,51		nF
Q _G	V _{GE} = -8V / +15V			850		nC
R _{Gint}	T _j = 25 °C			5		Ω
t _{d(on)}	R _{Gon} = Ω	V _{CC} = 600V I _{Cnom} = 150A T _j = 150 °C V _{GE} ≤ -8V		14,8		ns
t _r						ns
E _{on}					mJ	
t _{d(off)}	R _{Goff} = Ω					ns
t _f						ns
E _{off}						mJ
R _{th(j-c)}	per IGBT				0,19	K/W



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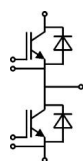
Remarks

- Case temperature limited to $T_c = 125^\circ\text{C}$ max, recomm. $T_{op} = -40 \dots +150^\circ\text{C}$, product rel. results valid for $T_j \leq 150^\circ$

Characteristics					
Symbol	Conditions	min.	typ.	max.	Units
Inverse Diode					
$V_F = V_{EC}$	$I_{Fnom} = 150 \text{ A}; V_{GE} = 0 \text{ V}$				
	$T_j = 25^\circ\text{C}_{chiplev.}$		2,15	2,45	V
	$T_j = 150^\circ\text{C}_{chiplev.}$		2,05	2,4	V
V_{F0}	$T_j = 25^\circ\text{C}$		1,3	1,5	V
	$T_j = 150^\circ\text{C}$		0,9	1,1	V
r_F	$T_j = 25^\circ\text{C}$		5,67	6,33	mΩ
	$T_j = 150^\circ\text{C}$		7,67	8,67	mΩ
I_{RRM}	$I_{Fnom} = 150 \text{ A}$				A
Q_{rr}	$T_j = 150^\circ\text{C}$				μC
E_{rr}			11,3		mJ
$R_{th(j-c)}$	per diode			0,31	K/W
Freewheeling Diode					
$V_F = V_{EC}$	$I_{Fnom} = \text{A}; V_{GE} = \text{V}$				V
V_{F0}	$T_j = ^\circ\text{C}$				V
r_F	$T_j = ^\circ\text{C}$				V
I_{RRM}	$I_{Fnom} = \text{A}$				A
Q_{rr}	$T_j = ^\circ\text{C}$				μC
E_{rr}					mJ
	per diode				K/W
Module					
L_{CE}			20	30	nH
$R_{CC'+EE'}$	res., terminal-chip	$T_{case} = 25^\circ\text{C}$		0,75	mΩ
		$T_{case} = 125^\circ\text{C}$		1	mΩ
$R_{th(c-s)}$	per module			0,05	K/W
M_s	to heat sink M6		3	5	Nm
M_t	to terminals M5		2,5	5	Nm
w				160	g

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

This technical information specifies semiconductor devices but promises no characteristics. No warranty or guarantee expressed or implied is made regarding delivery, performance or suitability.



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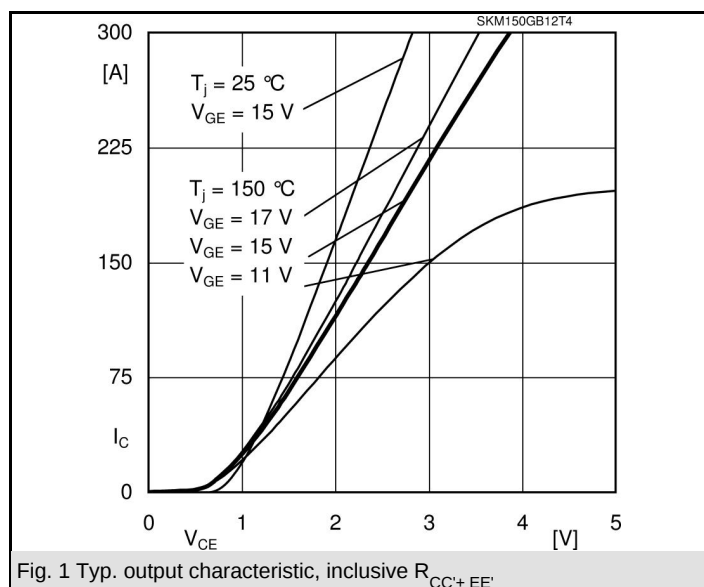


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

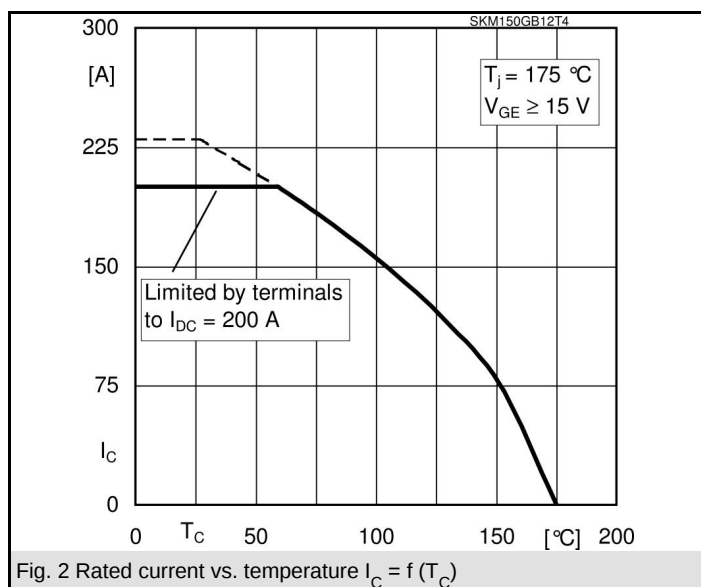


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

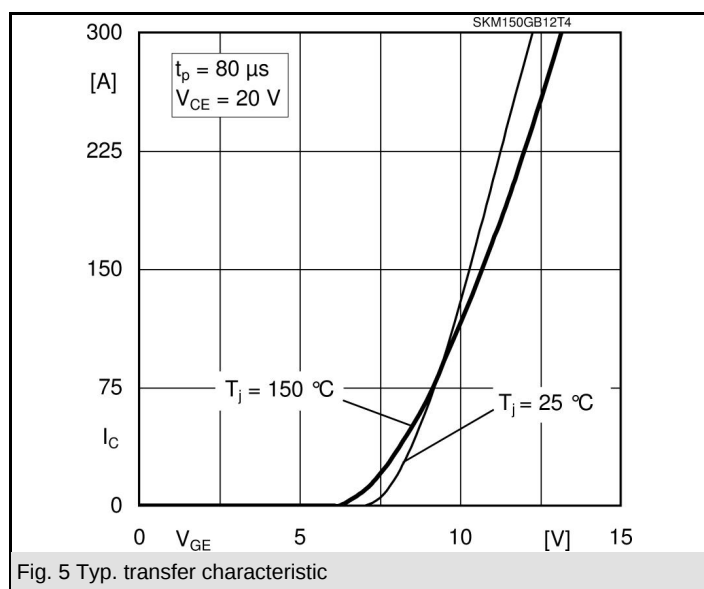


Fig. 5 Typ. transfer characteristic

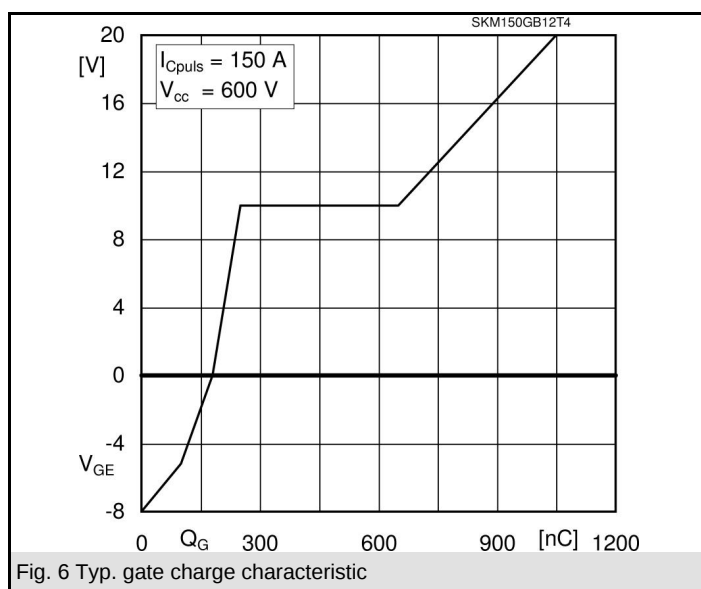


Fig. 6 Typ. gate charge characteristic

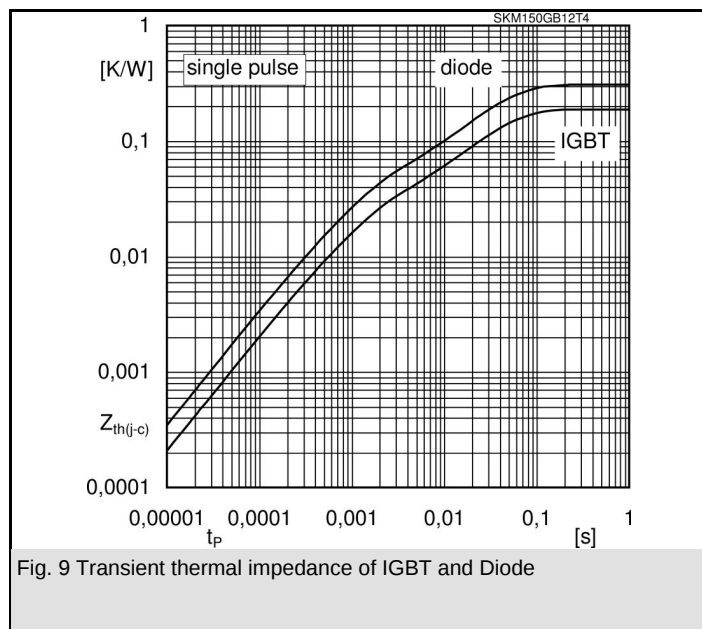


Fig. 9 Transient thermal impedance of IGBT and Diode

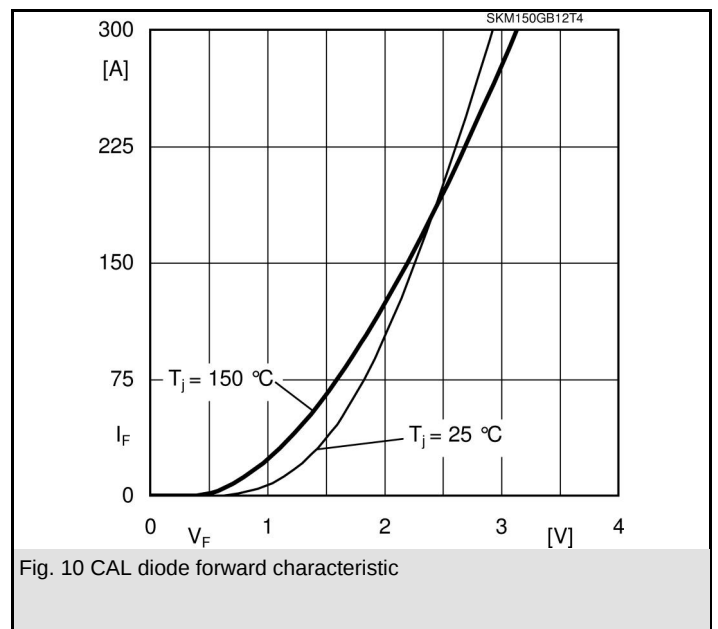


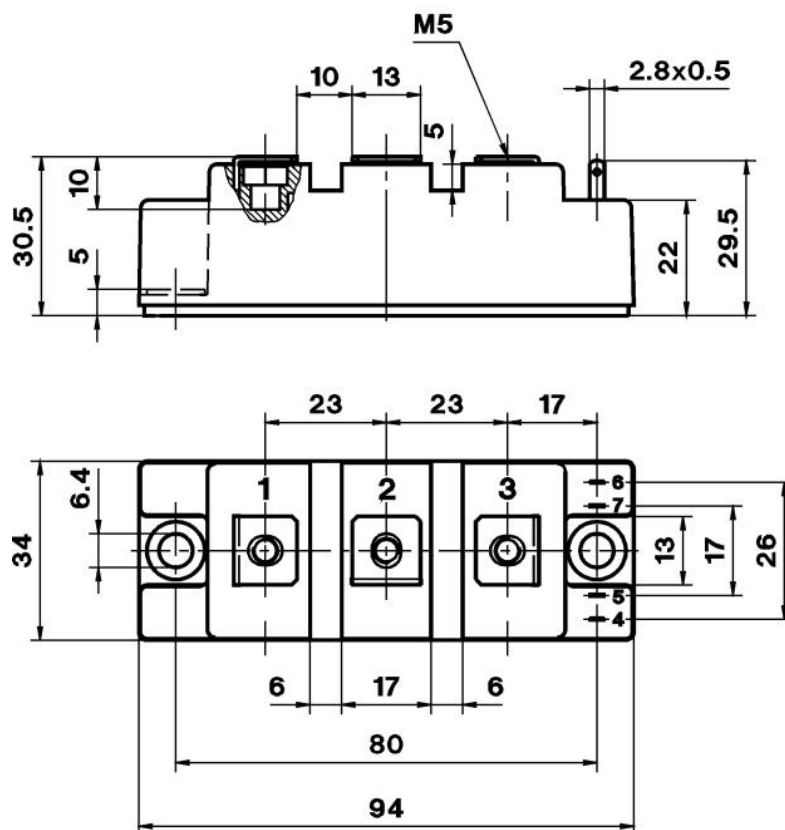
Fig. 10 CAL diode forward characteristic

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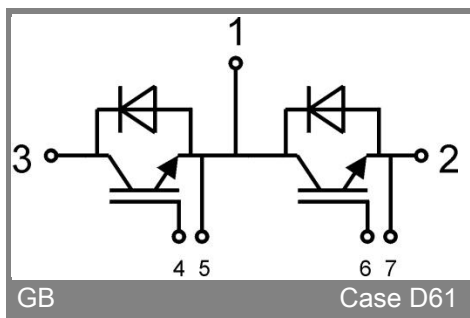
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