

SK 151 GB 07F3 T



SEMITOP® 3

IGBT module

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Features*

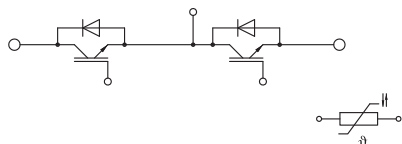
- Compact design
- One screw mounting module
- Heat transfer and isolation through direct copper bonded aluminium oxide ceramic (DBC)
- 650V Fast Trench3 IGBT technology
- CAL diode technology
- Integrated NTC temperature sensor
- UL recognized, file no. E 63 532

Typical Applications

- Switching (not for linear use)
- Inverter
- Switched mode power supplies
- UPS

Remarks

Dynamic measurements set-up:
 - IGBT switching on external 150A 600V Ultrafast diode
 - Diode switching on external 20A 600V Trench3 IGBT



GB-T

Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Inverter - IGBT				
V _{CES}	T _j = 25 °C		650	V
I _C	T _j = 175 °C	T _s = 25 °C	145	A
		T _s = 70 °C	115	A
I _{Cnom}			150	A
I _{CRM}			450	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 400 V V _{GE} ≤ 15 V V _{CES} ≤ 650 V	T _j = 150 °C	5	µs
T _j			-40 ... 175	°C
Inverse - Diode				
V _{RRM}	T _j = 25 °C		600	V
I _F	T _j = 175 °C	T _s = 25 °C	27	A
		T _s = 70 °C	21	A
I _{FRM}			40	A
I _{FSM}	10 ms, sin 180°, T _j = 150 °C		95	A
T _j			-40 ... 175	°C
Module				
I _{t(RMS)}	ΔT _{terminal} at PCB joint = 30 K, per pin		60	A
T _{stg}	module without TIM		-40 ... 125	°C
V _{isol}	AC, sinusoidal, t = 1 min		2500	V

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Inverter - IGBT					
$V_{CE(sat)}$	$I_C = 150\text{ A}$ $V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25\text{ °C}$	1.85	2.22	V
		$T_j = 150\text{ °C}$	2.18	2.55	V
V_{CE0}	chipelevel	$T_j = 25\text{ °C}$	1.10	1.20	V
		$T_j = 150\text{ °C}$	1.00	1.10	V
r_{CE}	$V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25\text{ °C}$	5.0	6.8	mΩ
		$T_j = 150\text{ °C}$	7.9	9.7	mΩ
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 2.4\text{ mA}$	4.2	5.1	5.6	V
I_{CES}	$V_{GE} = 0\text{ V}, V_{CE} = 600\text{ V}, T_j = 25\text{ °C}$			0.2	mA
C_{ies}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	9.30		nF
C_{oes}		$f = 1\text{ MHz}$	0.35		nF
C_{res}		$f = 1\text{ MHz}$	0.27		nF
Q_G	$V_{GE} = -15 \dots +15\text{ V}$		1380		nC
R_{Gint}	$T_j = 25\text{ °C}$		1.6		Ω
$t_{d(on)}$	$V_{CC} = 300\text{ V}$	$T_j = 150\text{ °C}$	153		ns
t_r	$I_C = 150\text{ A}$	$T_j = 150\text{ °C}$	130		ns
E_{on}	$R_{G on} = 15\text{ Ω}$	$T_j = 150\text{ °C}$	8.8		mJ
$t_{d(off)}$	$R_{G off} = 15\text{ Ω}$	$T_j = 150\text{ °C}$	719		ns
t_f	$di/dt_{on} = 974\text{ A}/\mu\text{s}$	$T_j = 150\text{ °C}$	43		ns
E_{off}	$di/dt_{off} = 3024\text{ A}/\mu\text{s}$	$T_j = 150\text{ °C}$	4		mJ
$R_{th(j-s)}$	per IGBT, $\lambda_{paste} = 0.8\text{ W}/(\text{mK})$		0.41		K/W



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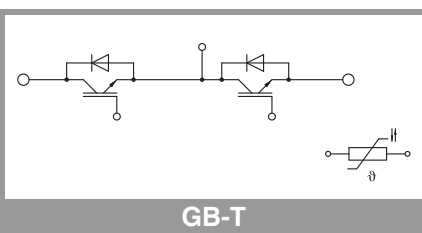
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Remarks

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 - Diode switching on external 20A 600V Trench3 IGBT

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse - Diode						
V _F = V _{EC}	I _F = 20 A	T _j = 25 °C		1.59	2.06	V
	chiplevel	T _j = 150 °C		1.68	2.01	V
V _{F0}	chiplevel	T _j = 25 °C		0.99	1.10	V
		T _j = 150 °C		0.80	0.89	V
r _F	chiplevel	T _j = 25 °C		30	48	mΩ
		T _j = 150 °C		44	56	mΩ
I _{RRM}	I _F = 20 A	T _j = 150 °C		32		A
Q _{rr}	di/dt _{off} = 3300 A/μs	T _j = 150 °C		2		μC
E _{rr}	V _{GE} = 15 V	T _j = 150 °C		0.2		mJ
	V _{CC} = 300 V	T _j = 150 °C				
R _{th(j-s)}	per diode, λ _{paste} =0.8 W/(mK)			2.46		K/W
Module						
L _{CE}				-		nH
M _s	to heatsink		2.25		2.5	Nm
w				29		g
Temperature Sensor						
R ₁₀₀	T _c =100°C (R ₂₅ =5 kΩ)			493 ± 5%		Ω
B _{100/125}	R _(T) =R ₁₀₀ exp[B _{100/125} (1/T-1/T ₁₀₀)]; T[K];			3550 ±2%		K



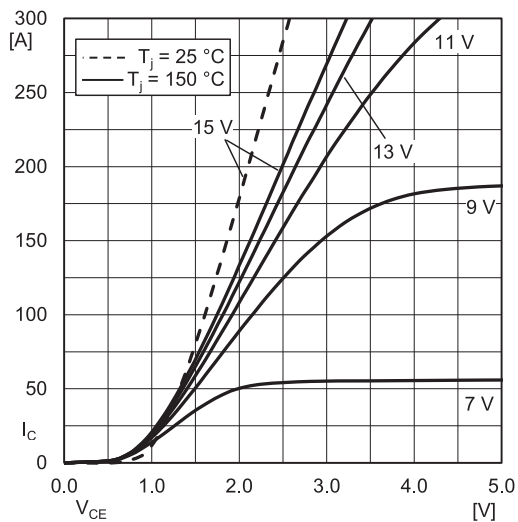


Fig. 1: Typ. output characteristic, inclusive $R_{CC} + EE'$

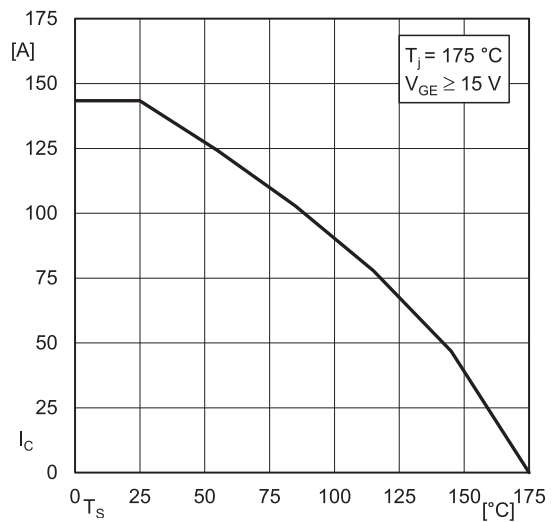


Fig. 2: Rated current vs. temperature $I_C = f(T_S)$

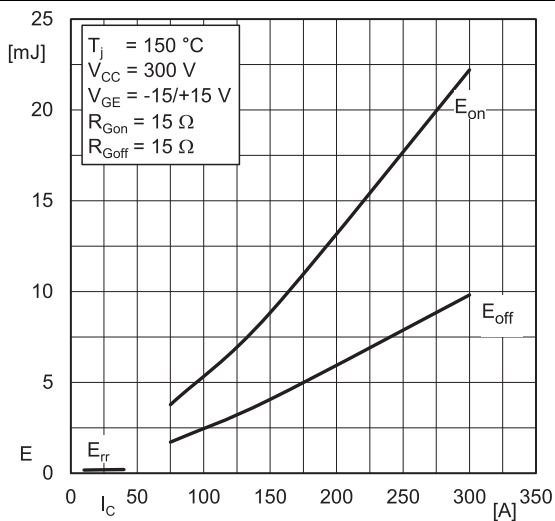


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

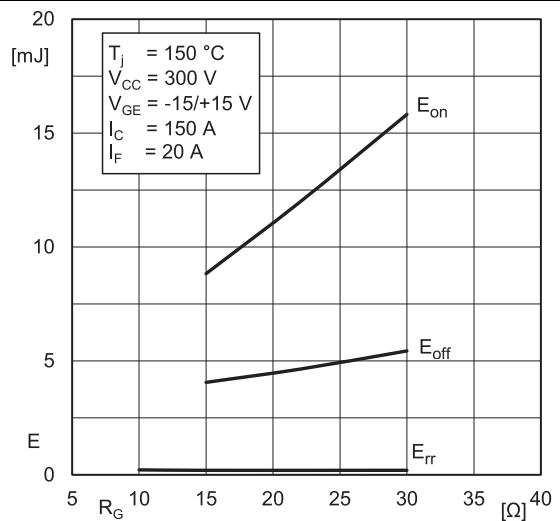


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

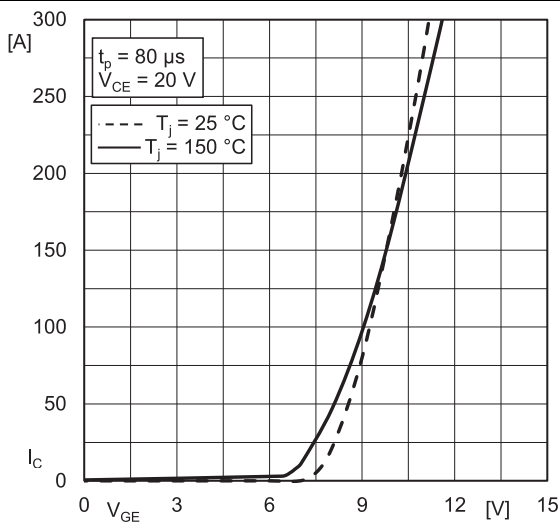


Fig. 5: Typ. transfer characteristic

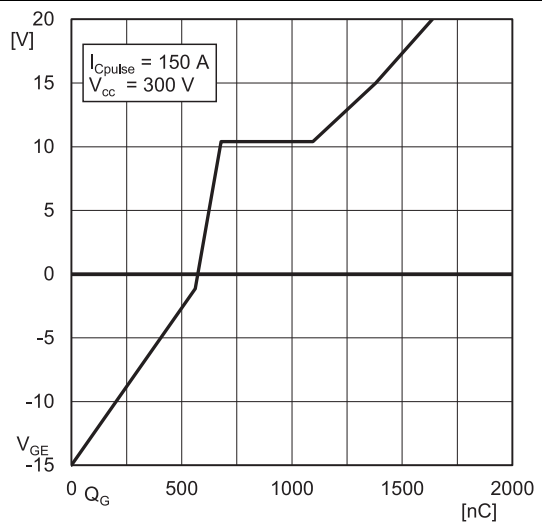


Fig. 6: Typ. gate charge characteristic

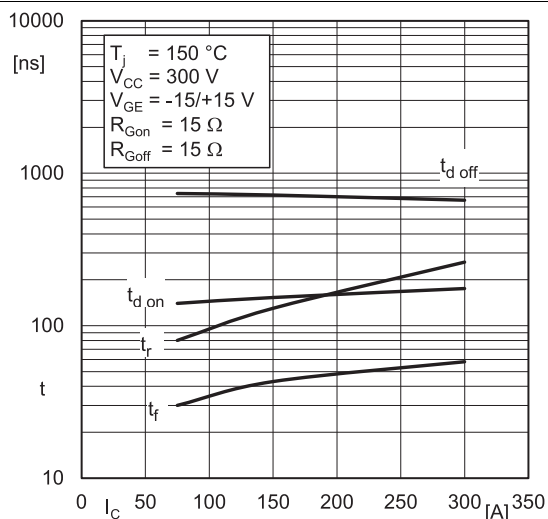


Fig. 7: Typ. switching times vs. I_C

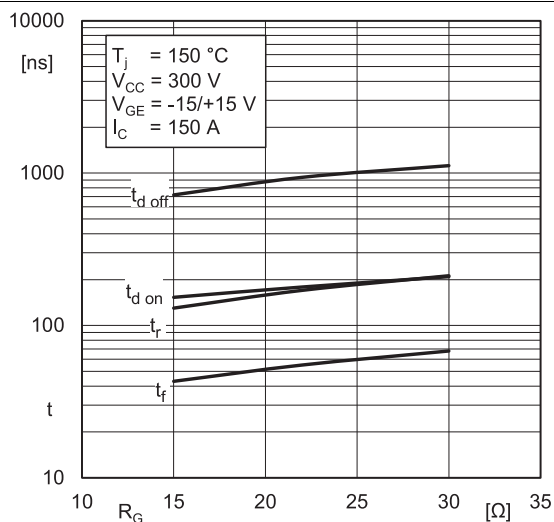


Fig. 8: Typ. switching times vs. gate resistor R_G

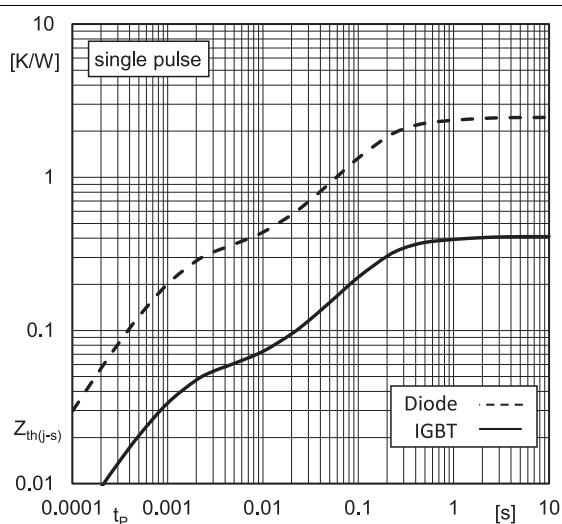


Fig. 9: Typ. transient thermal impedance of IGBT and Diode

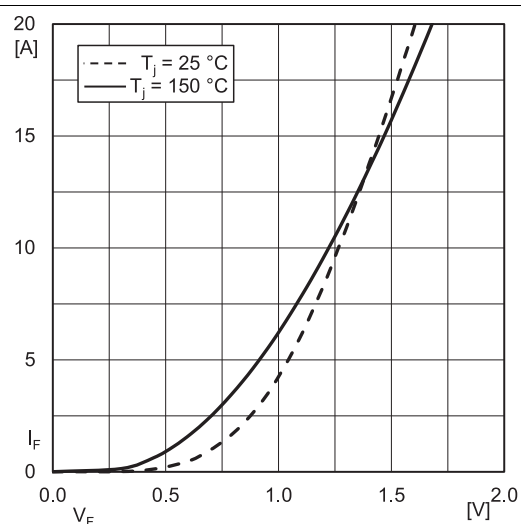
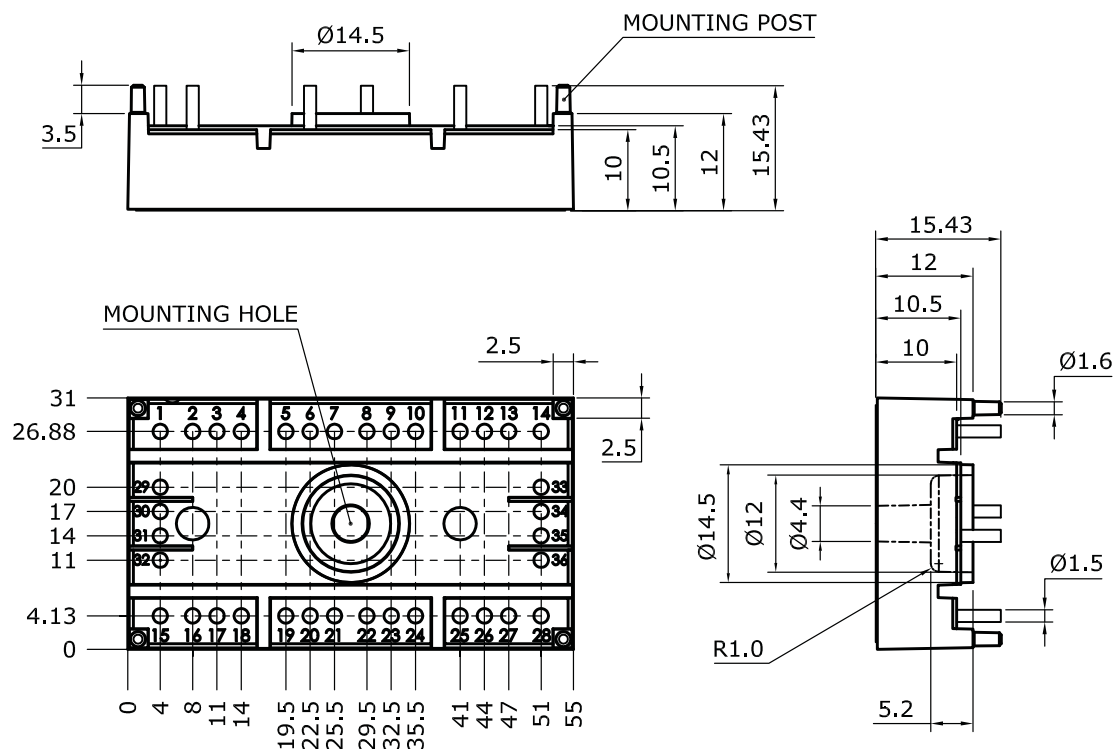


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'}+EE'$

Dimensions: mm

Tolerance system: ISO 2768-m



Suggested hole diameter for solder pins in the circuit board:

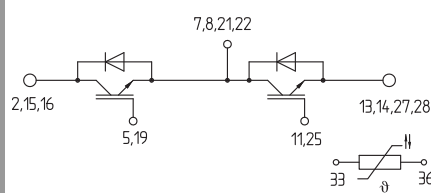
- 2.0 mm

Suggested hole diameter for the mounting post in the circuit board:

- 2.0 mm

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SEMITOP®3



GB-T

This is an electrostatic discharge sensitive device (ESDS) due to international standard IEC 61340.

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