

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

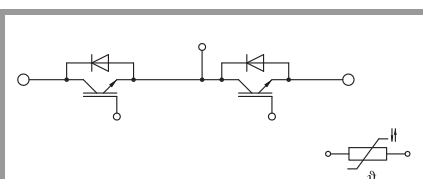
Typical Applications

- 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 A	T _j = 25 °C		1.85	2.22	V
	V _{GE} = 15 V chipelevel	T _j = 150 °C		2.18	2.55	V
V _{CE0}	chipelevel	T _j = 25 °C		1.10	1.20	V
		T _j = 150 °C		1.00	1.10	V
r _{CE}	V _{GE} = 15 V chipelevel	T _j = 25 °C		5.0	6.8	mΩ
		T _j = 150 °C		7.9	9.7	mΩ
V _{GE(th)}	V _{GE} = V _{CE} , I _C = 2.4 mA		4.2	5.1	5.6	V
I _{CES}	V _{GE} = 0 V, V _{CE} = 600 V, T _j = 25 °C				0.2	mA
C _{ies}	V _{CE} = 25 V V _{GE} = 0 V	f = 1 MHz		9.30		nF
C _{oes}		f = 1 MHz		0.35		nF
C _{res}		f = 1 MHz		0.27		nF
Q _G	V _{GE} = -15 ... +15 V			1380		nC
R _{Gint}	T _j = 25 °C			1.6		Ω
t _{d(on)}	V _{CC} = 300 V	T _j = 150 °C		153		ns
t _r	I _C = 150 A	T _j = 150 °C		130		ns
E _{on}	R _{G on} = 15 Ω	T _j = 150 °C		8.8		mJ
t _{d(off)}	R _{G off} = 15 Ω	T _j = 150 °C		719		ns
	di/dt _{on} = 974 A/μs	T _j = 150 °C				
t _f	di/dt _{off} = 3024 A/μs	T _j = 150 °C		43		ns
E _{off}	V _{GE} = +15/-15 V	T _j = 150 °C		4		mJ
R _{th(j-s)}	per IGBT, λ _{paste} =0.8 W/(mK)			0.41		K/W



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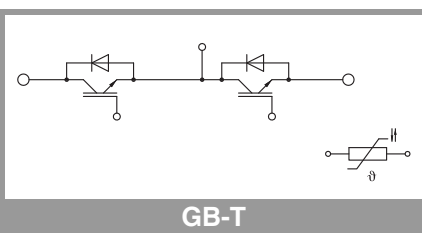
Typical Applications

- Switching (not for linear use)
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Remarks

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 - IGBT switching on external 150A 600V Ultrafast diode
 - 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



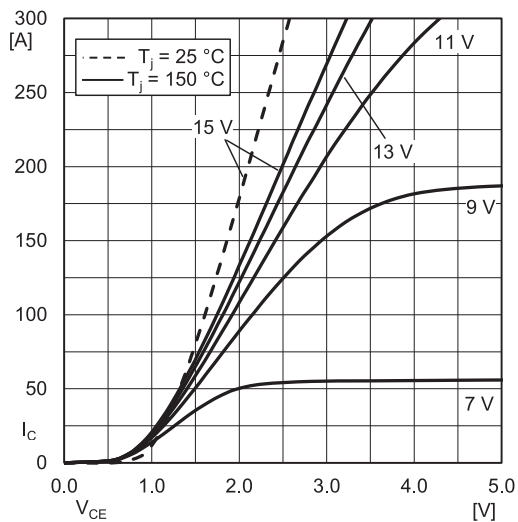


Fig. 1: Typ. output characteristic, inclusive $R_{CC} + E_{E'}$

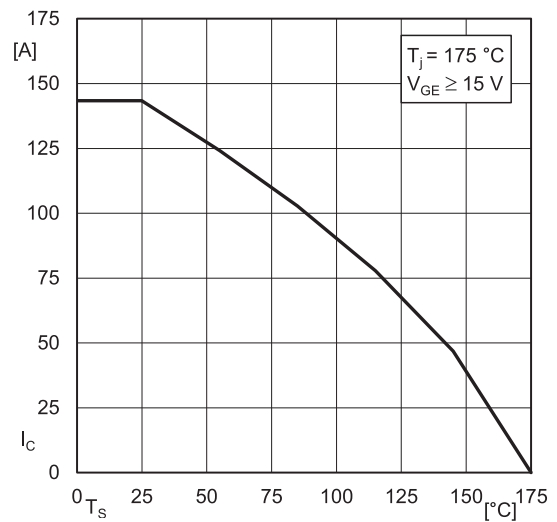


Fig. 2: Rated current vs. temperature $I_C = f(T_S)$

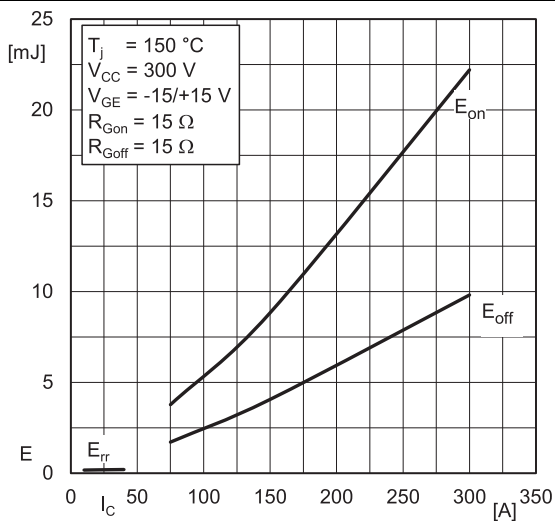


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

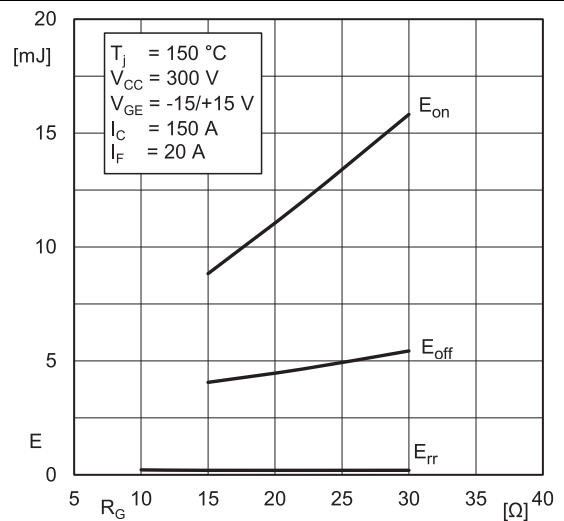


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

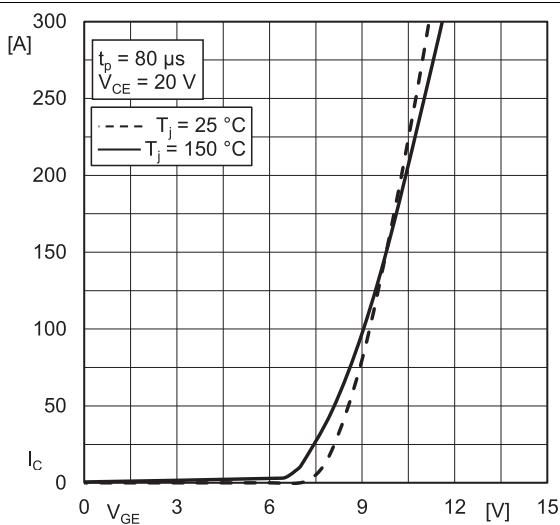


Fig. 5: Typ. transfer characteristic

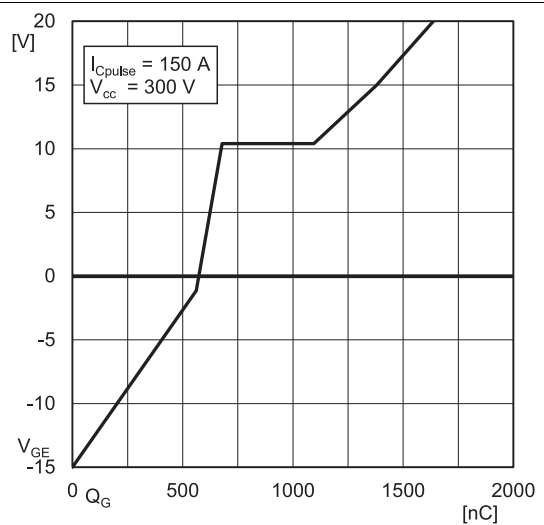


Fig. 6: Typ. gate charge characteristic

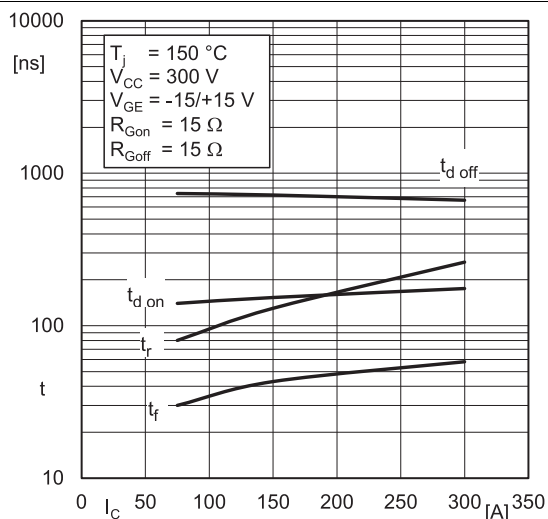


Fig. 7: Typ. switching times vs. I_C

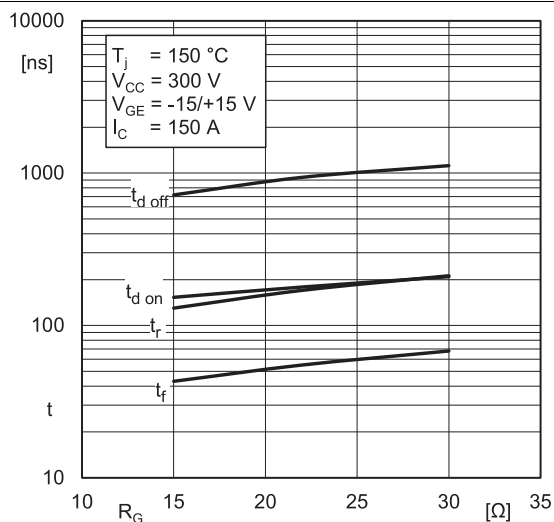


Fig. 8: Typ. switching times vs. gate resistor R_G

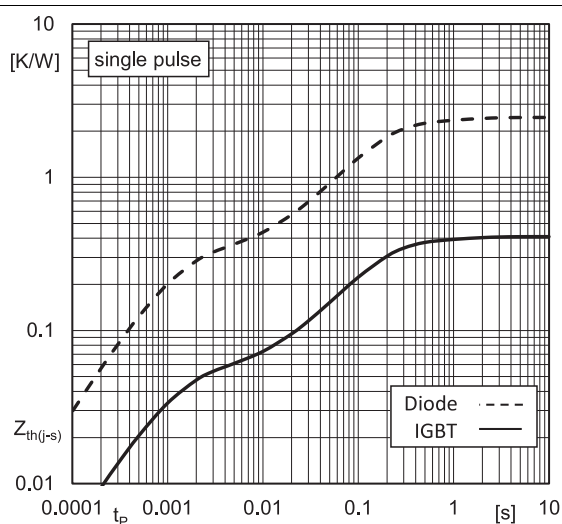


Fig. 9: Typ. transient thermal impedance of IGBT and Diode

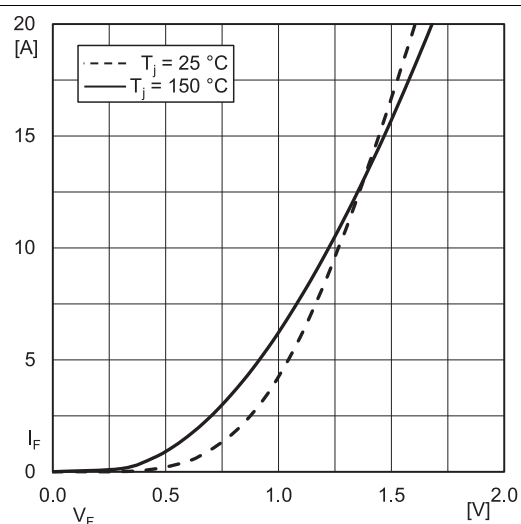
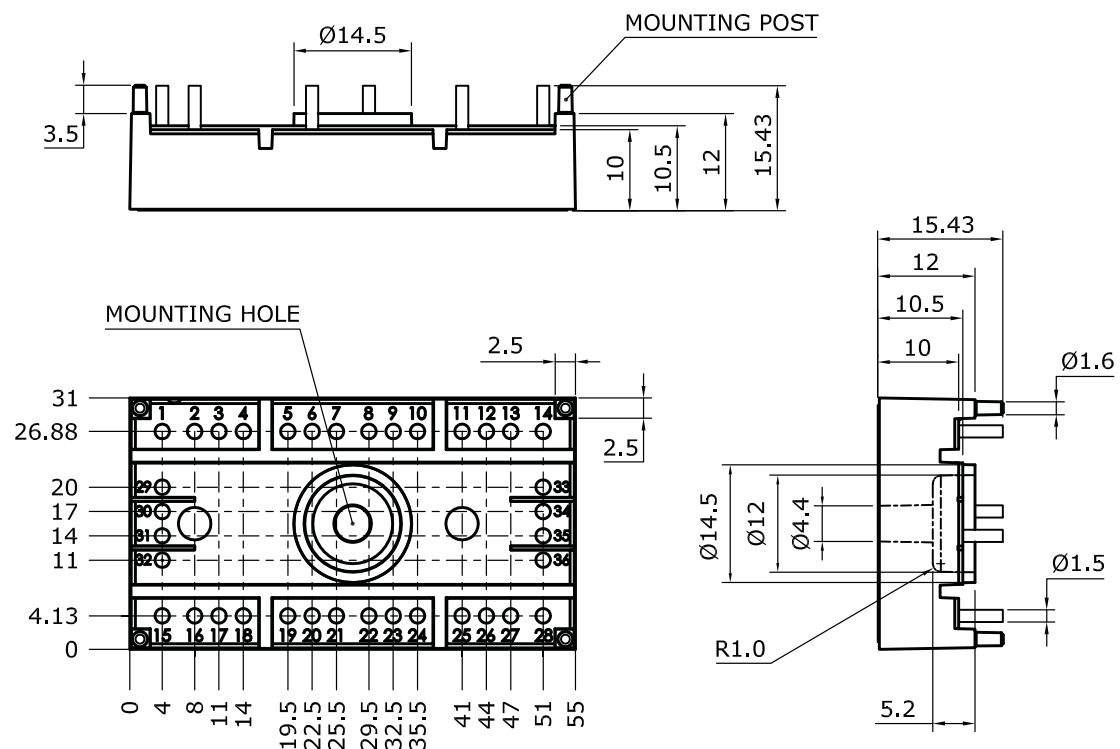


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'}+EE'$

Dimensions: mm

Tolerance system: ISO 2768-m



Suggested hole diameter for solder pins in the circuit board:

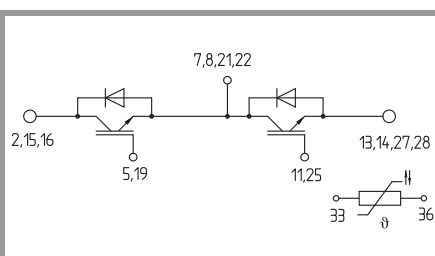
- 2.0 mm

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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