SK 80 GD 12F4 T

SEMITOP® 4

IGBT module

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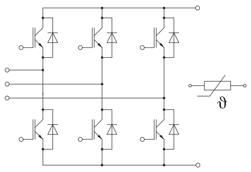
Features*

- One screw mounting module
- Fully compatible with SEMITOP® 1,2,3
- Improved thermal performances by aluminium oxide substrate
- Trench4 Fast IGBT technology
- CAL4F technology FWD
- Integrated NTC temperature sensor
- UL recognized, file no. E 63 532

Typical Applications

- Inverter



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Absolute Maximum Ratings

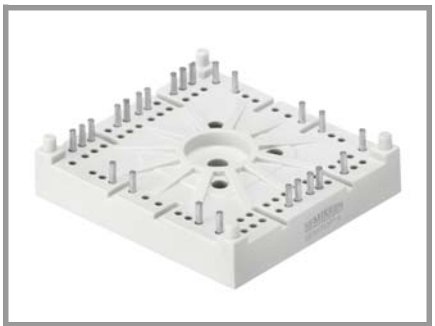
Symbol	Conditions		Values	Unit
IGBT 1				
V_{CES}			1200	V
I_C	T_j = 150 °C	T_s = 25 °C	82	A
		T_s = 70 °C	63	A
I_C	T_j = 175 °C	T_s = 25 °C	91	A
		T_s = 70 °C	74	A
I_{Cnom}			80	A
I_{CRM}			160	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 800 V V_{GE} ≤ 15 V V_{CES} ≤ 1200 V	T_j = 150 °C	10	µs
T_j			-40 ... 175	°C

Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Diode 1				
V_{RRM}	T_j = 25 °C		1200	V
I_F	T_j = 150 °C	T_s = 25 °C	90	A
		T_s = 70 °C	67	A
I_F	T_j = 175 °C	T_s = 25 °C	101	A
		T_s = 70 °C	80	A
I_{FRM}			200	A
I_{FSM}	10 ms, sin 180°, T_j = 150 °C		550	A
T_j			-40 ... 175	°C

Absolute Maximum Ratings

Symbol	Conditions	Values	Unit
Module			
$I_{t(RMS)}$	$\Delta T_{terminal}$ at PCB joint = 30 K, per pin	60	A
T_{stg}		-40 ... 125	°C
V_{isol}	AC, sinusoidal, t = 1 min	2500	V



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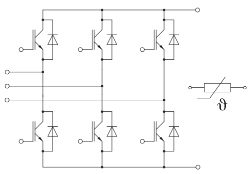
Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
IGBT 1						
$V_{CE(sat)}$	I_C = 80 A V_{GE} = 15 V chiplevel	T_j = 25 °C		2.05	2.40	V
		T_j = 150 °C		2.59	2.85	V
V_{CE0}	chiplevel	T_j = 25 °C		0.80	0.90	V
		T_j = 150 °C		0.70	0.80	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		16	19	mΩ
		T_j = 150 °C		24	26	mΩ
$V_{GE(th)}$	$V_{GE} = V_{CE}$, I_C = 3 mA		5.2	5.8	6.4	V
I_{CES}	V_{GE} = 0 V V_{CE} = 1200 V	T_j = 25 °C			1.36	mA
				-		mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		4.6		nF
C_{oes}		f = 1 MHz		0.37		nF
C_{res}		f = 1 MHz		0.27		nF
Q_G	V_{GE} = -15V...+15V			275		nC
R_{Gint}	T_j = 25 °C			2.4		Ω
$t_{d(on)}$	V_{CC} = 600 V I_C = 80 A $V_{GE\ neg}$ = -15 V $V_{GE\ pos}$ = 15 V $R_{G\ on}$ = 3.3 Ω $R_{G\ off}$ = 3.3 Ω di/dt$_{on}$ = 2300 A/µs di/dt$_{off}$ = 2200 A/µs	T_j = 150 °C		155		ns
t_r		T_j = 150 °C		51		ns
E_{on}		T_j = 150 °C		5.8		mJ
$t_{d(off)}$		T_j = 150 °C		345		ns
t_f		T_j = 150 °C		42		ns
E_{off}		T_j = 150 °C		5		mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/(mK)			0.51		K/W

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Diode 1						
V_F	I_F = 100 A chiplevel	T_j = 25 °C		2.20	2.52	V
		T_j = 150 °C		2.15	2.47	V
V_{F0}	chiplevel	T_j = 25 °C		1.30	1.50	V
		T_j = 150 °C		0.90	1.10	V
r_F	chiplevel	T_j = 25 °C		9.0	10	mΩ
		T_j = 150 °C		13	14	mΩ
I_{RRM}	I_F = 80 A di/dt$_{off}$ = 2300 A/µs V_{GE} = -15 V V_{CC} = 600 V	T_j = 150 °C		41		A
Q_{rr}		T_j = 150 °C		11		µC
E_{rr}		T_j = 150 °C		6.5		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			0.65		K/W



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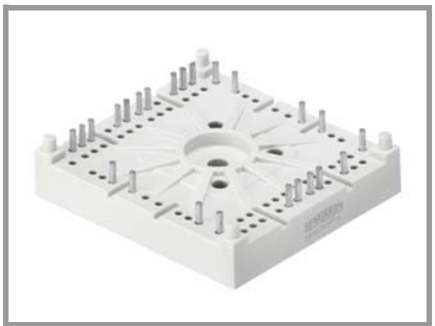

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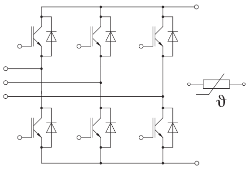

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Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Module					
M_s	to heatsink	2.5		2.75	Nm
w	weight		60		g

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Temperature Sensor					
R_{100}	T_r = 100 °C		493 ± 5%		Ω
$B_{100/125}$	$R_{(T)}=R_{100}\exp[B_{100/125}(1/T-1/T_{100})]$; T[K];		3550 ±2%		K

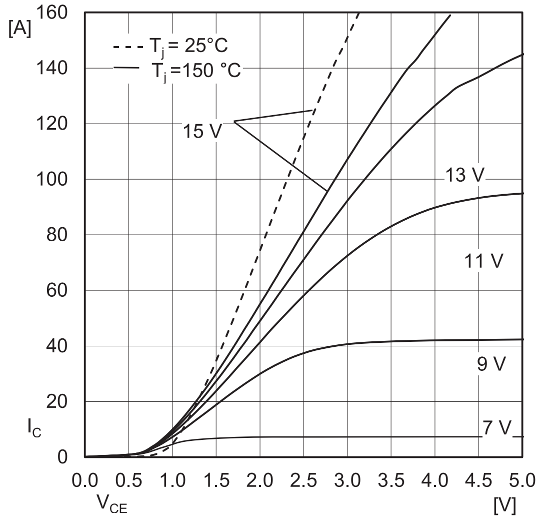


Fig. 1: Typ. IGBT1 output characteristic, incl. $R_{CC'+ EE'}$

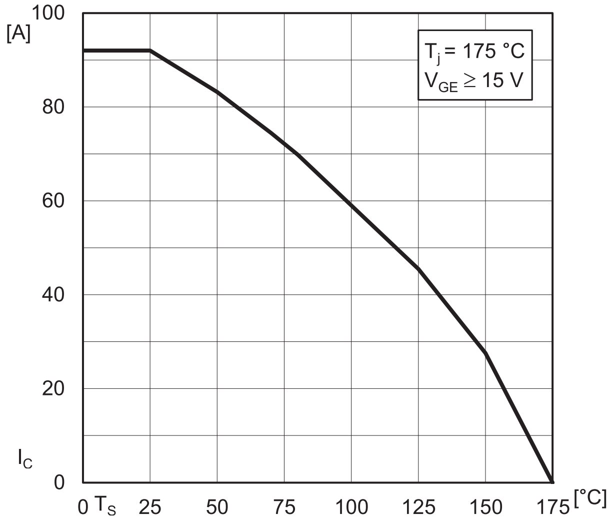


Fig. 2: Typ. rated current vs. temperature $I_C = f(T_S)$

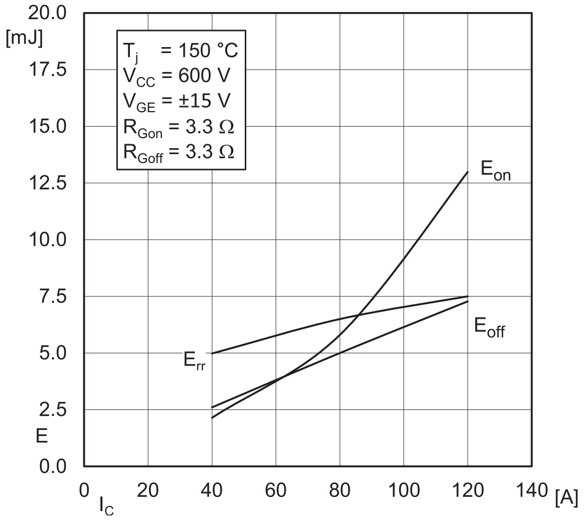


Fig. 3: Typ. turn-on /-off energy = f (I_C)

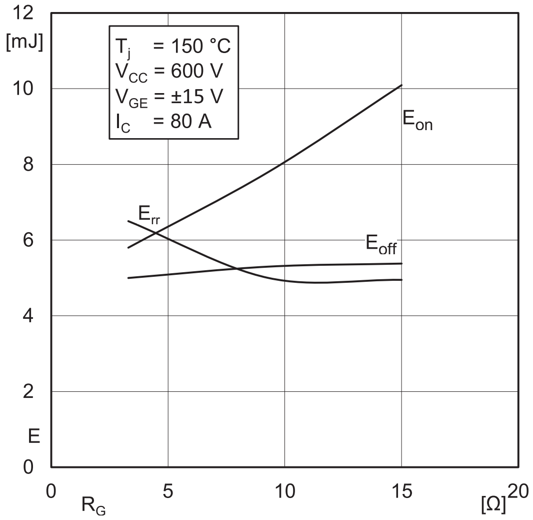


Fig. 4: Typ. turn-on /-off energy = f (R_G)

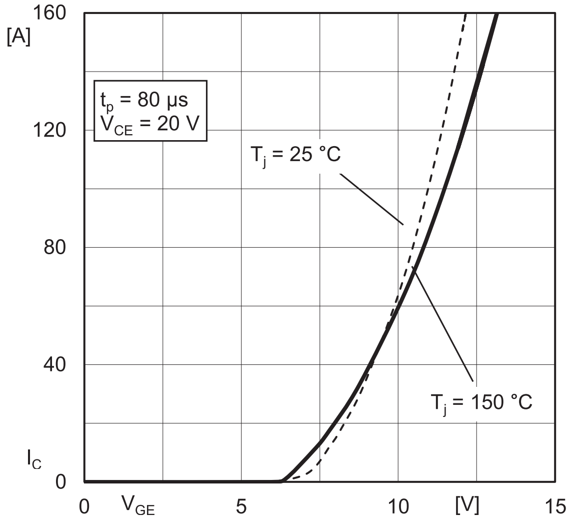


Fig. 5: Typ. transfer characteristic

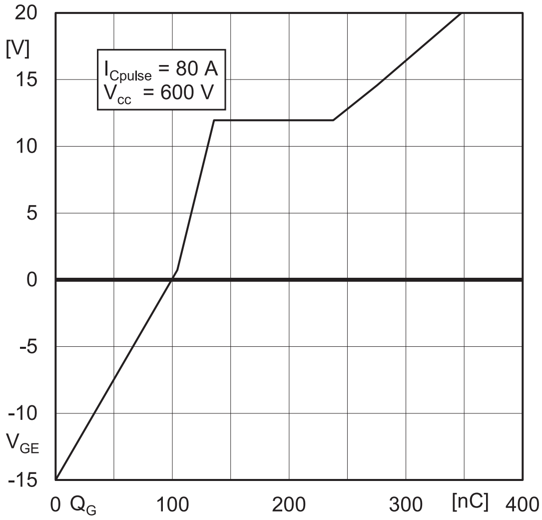


Fig. 6: Typ. gate charge characteristic

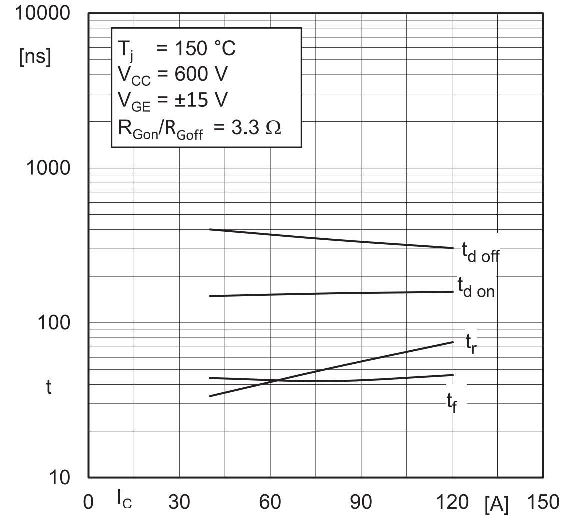


Fig. 7: Typ. switching times vs. I_C

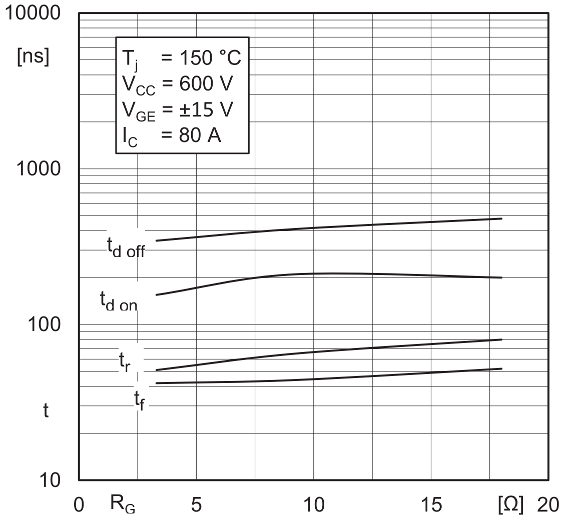


Fig. 8: Typ. switching times vs. gate resistor R_G

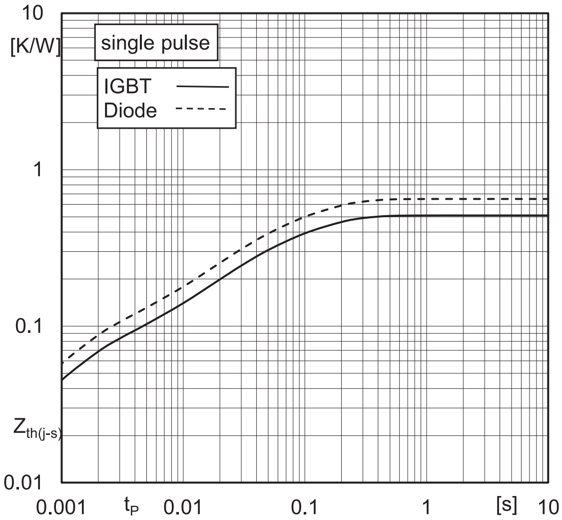


Fig. 9: Typ. transient thermal impedance

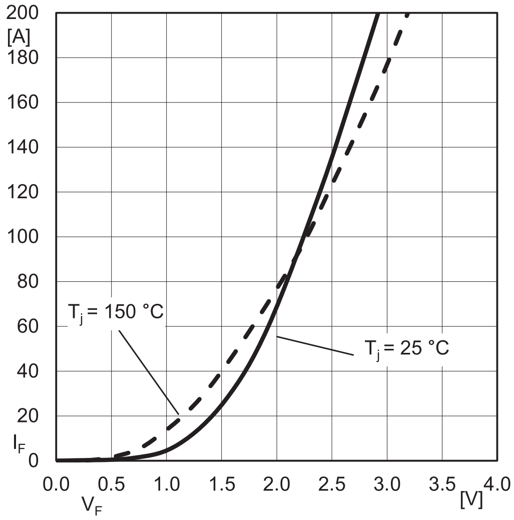
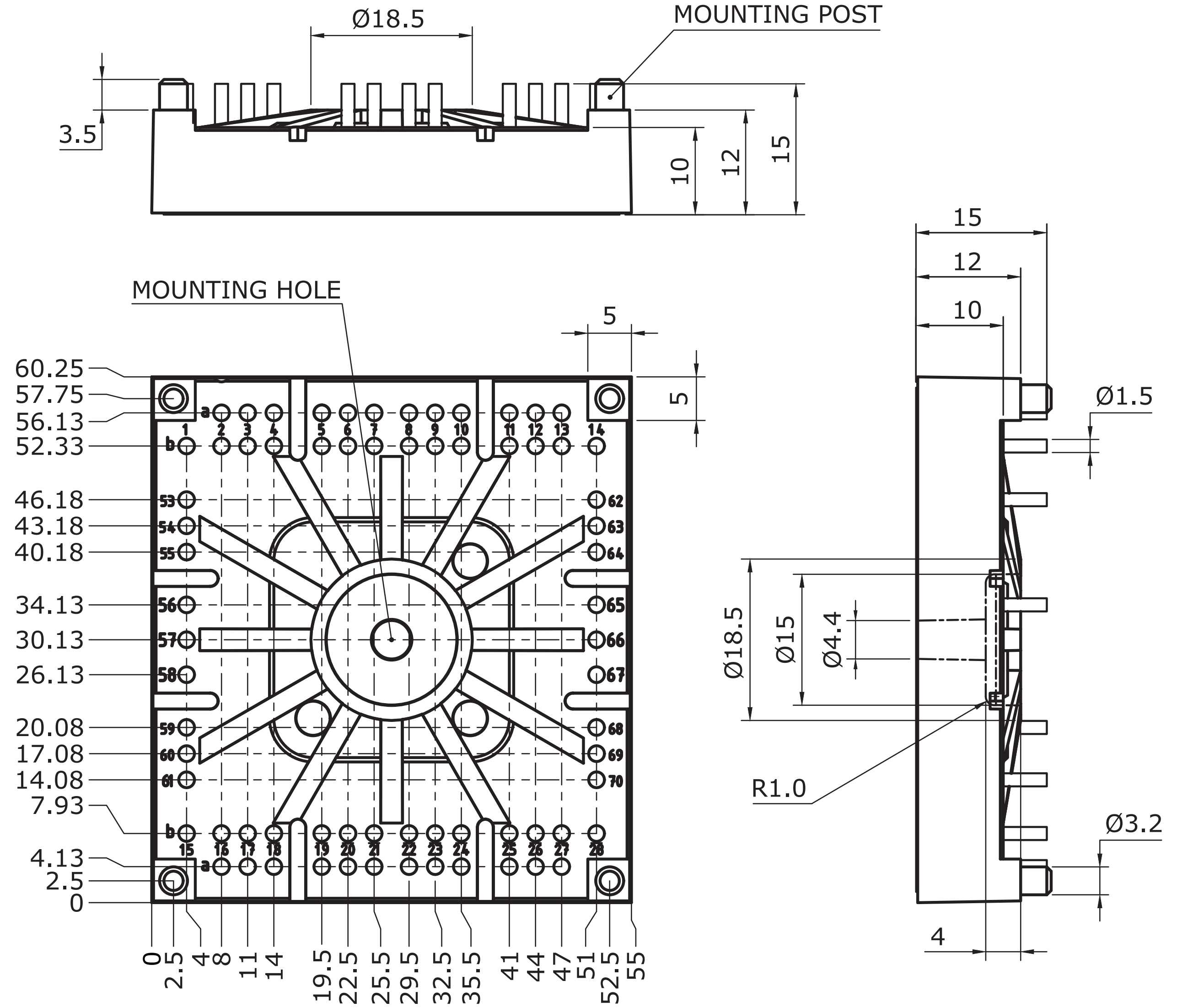


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

Dimensions: mm
Tolerance system: ISO 2768-m



Suggested drilled hole diameter for terminal pins in the circuit board:
- refer to Mounting Instruction SEMITOP® Classic

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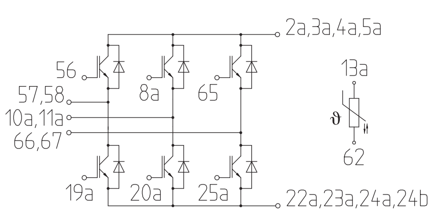

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IMPORTANT INFORMATION AND WARNINGS

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