SK 120 GB 12F4 T

SEMITOP® 3

IGBT module

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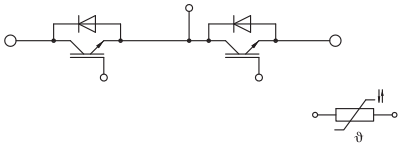
Features*

- Compact design
- One screw mounting module
- Optimum heat transfer and isolation through AlN direct copper bonding (DBC)
- Trench4 Fast IGBT technology
- CAL4F 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



GB-T

Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Inverter - IGBT				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 175 °C	T_s = 25 °C	174	A
		T_s = 70 °C	143	A
I_{Cnom}			120	A
I_{CRM}			240	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 800 V $V_{GE} \leq$ 15 V $V_{CES} \leq$ 1200 V	T_j = 150 °C	10	µs
T_j			-40 ... 175	°C
Inverse - Diode				
V_{RRM}	T_j = 25 °C		1200	V
I_F	T_j = 175 °C	T_s = 25 °C	29	A
		T_s = 70 °C	24	A
I_{FRM}			30	A
I_{FSM}	10 ms, sin 180°, T_j = 150 °C		65	A
T_j			-40 ... 175	°C
Module				
$I_{t(RMS)}$	$\Delta T_{terminal}$ 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 = 120 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		10	13	mΩ
		T_j = 150 °C		16	17	mΩ
$V_{GE(th)}$	$V_{GE} = V_{CE}$, I_C = 4.5 mA		5.2	5.8	6.4	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 1200 V, T_j = 25 °C				1.6	mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		6.90		nF
C_{oes}		f = 1 MHz		0.56		nF
C_{res}		f = 1 MHz		0.41		nF
Q_G	V_{GE} = - 15 V...+ 15 V			412		nC
R_{Gint}	T_j = 25 °C			2.7		Ω
$t_{d(on)}$	V_{CC} = 600 V	T_j = 150 °C		156		ns
t_r	I_C = 120 A	T_j = 150 °C		51		ns
E_{on}	$R_{G\ on}$ = 2.2 Ω	T_j = 150 °C		8.8		mJ
$t_{d(off)}$	$R_{G\ off}$ = 2.2 Ω di/dt_{on} = 2354 A/µs	T_j = 150 °C		346		ns
t_f	di/dt_{off} = 2264 A/µs	T_j = 150 °C		42		ns
E_{off}	V_{GE} = +15/-15 V	T_j = 150 °C		7.47		mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/(mK)			0.22		K/W

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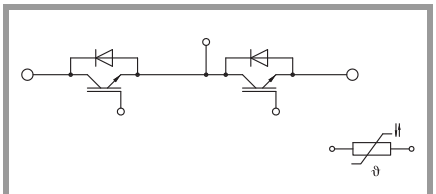

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Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Inverse - Diode						
$V_F = V_{EC}$	I_F = 15 A	T_j = 25 °C		2.38	2.71	V
	chiplevel	T_j = 150 °C		2.44	2.77	V
V_{F0}	chiplevel	T_j = 25 °C		1.30	1.50	V
		T_j = 150 °C		0.90	1.10	V
r_F	chiplevel	T_j = 25 °C		72	81	mΩ
		T_j = 150 °C		103	111	mΩ
I_{RRM}	I_F = 120 A di/dt_{off} = 2350 A/µs V_{GE} = -15 V V_{CC} = 600 V	T_j = 150 °C		43.4		A
Q_{rr}		T_j = 150 °C		5.7		µC
E_{rr}		T_j = 150 °C		2.04		mJ
$R_{th(j-s)}$	per diode, λ_{paste}=0.8 W/(mK)			1.25		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

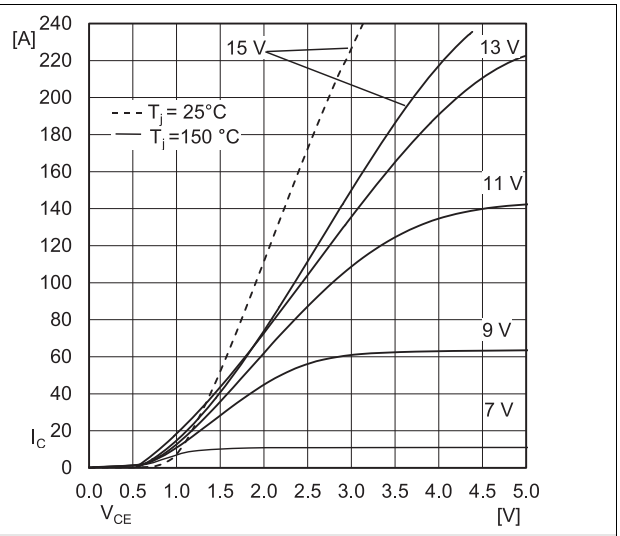


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

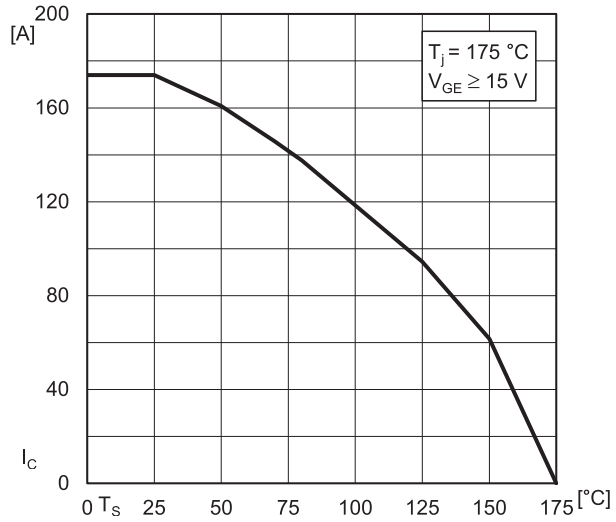


Fig. 2: Typ. rated current vs. temperature $I_C = f(T_S)$

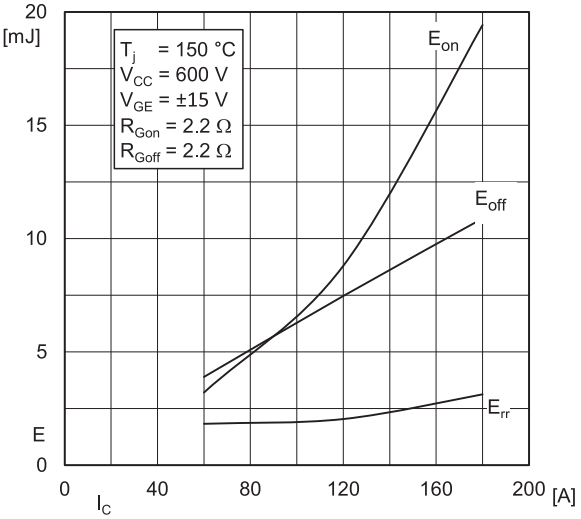


Fig. 3: Typ. turn-on /-off energy = f (I_C)

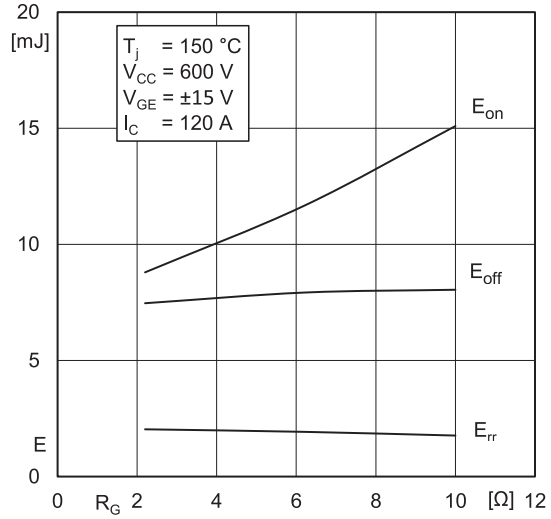


Fig. 4: Typ. turn-on /-off energy = f (R_G)

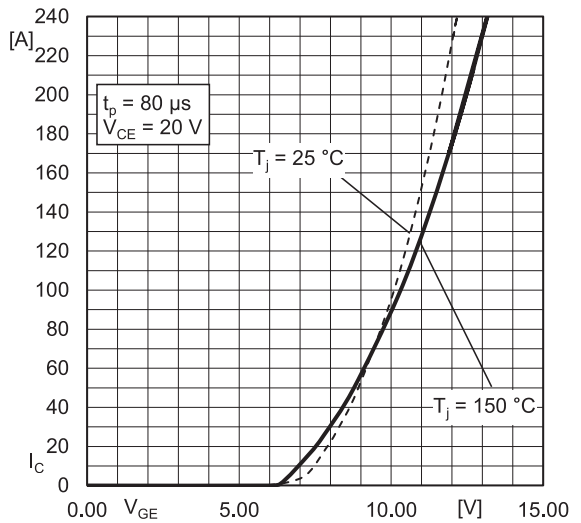


Fig. 5: Typ. transfer characteristic

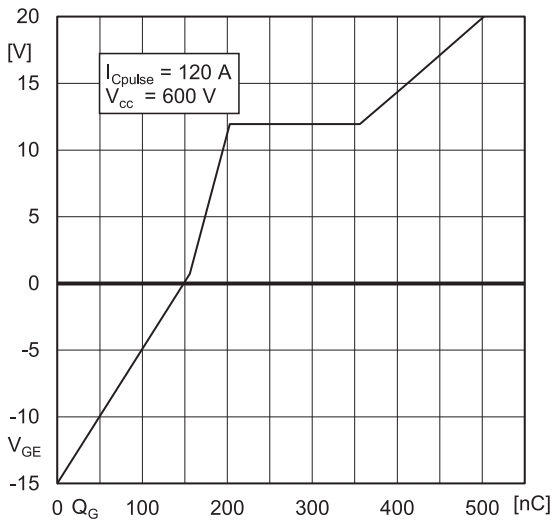


Fig. 6: Typ. gate charge characteristic

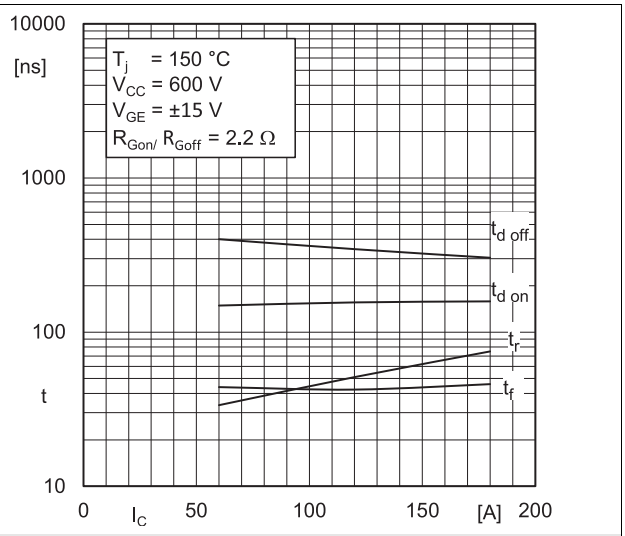


Fig. 7: Typ. switching times vs. I_C

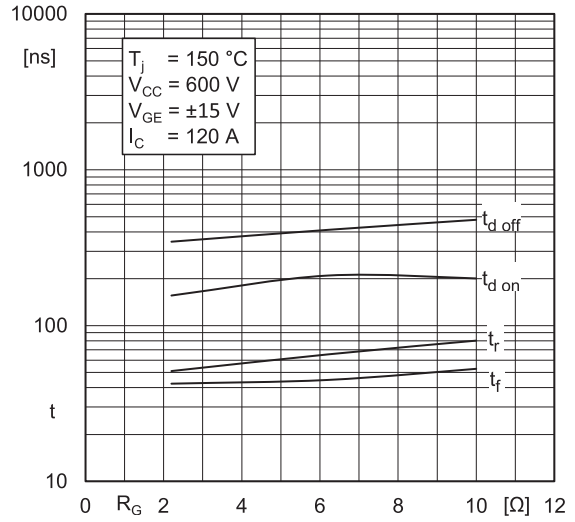


Fig. 8: Typ. switching times vs. gate resistor R_G

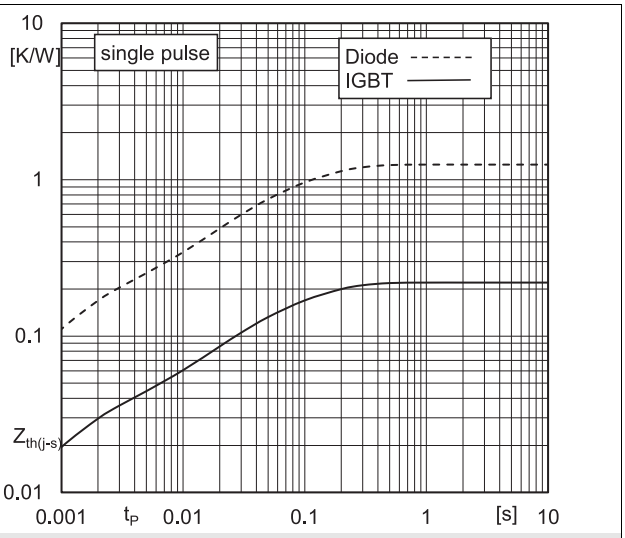


Fig. 9: Typ. transient thermal impedance

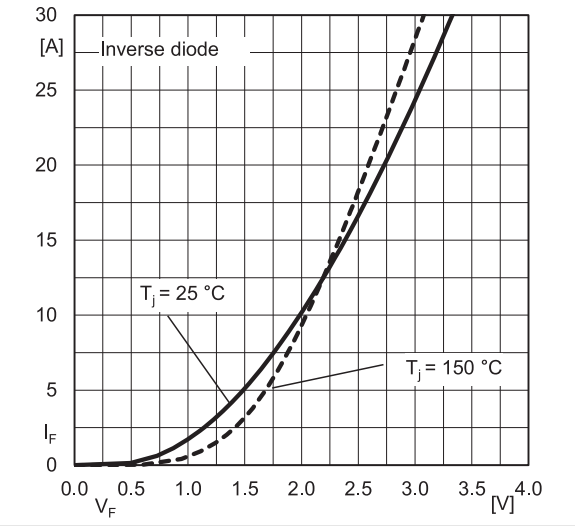


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

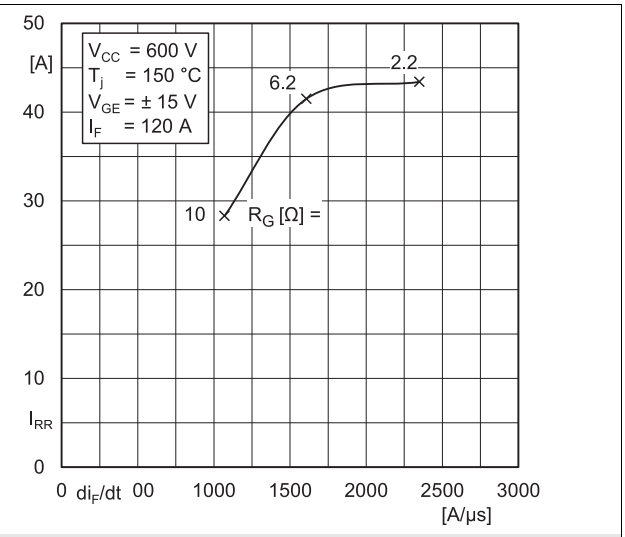
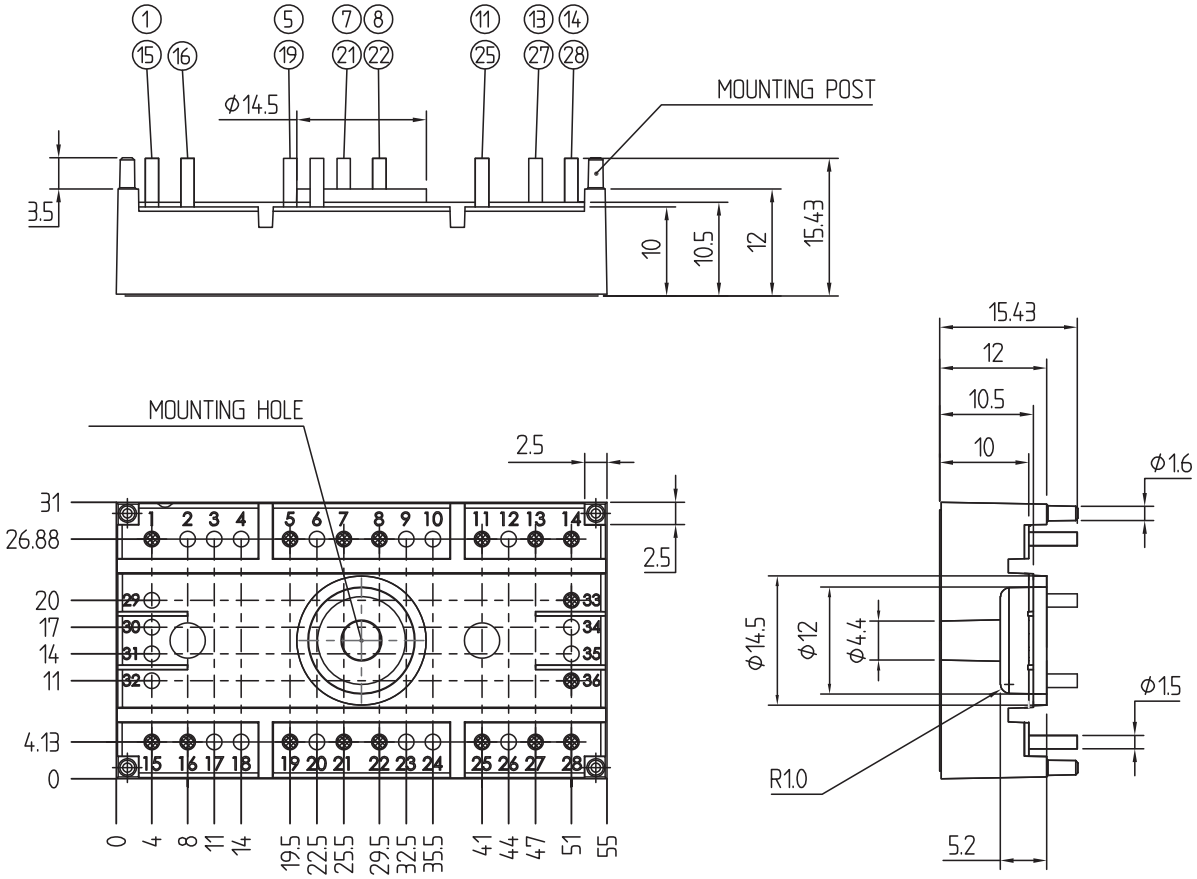


Fig. 11: Typ. CAL diode peak reverse recovery current

Dimensions: mm
Tolerance system: ISO 2768-m



-Hole specification for contacts:
refer Mounting Instruction SEMITOP® Classic

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

- refer Mounting Instruction SEMITOP® Classic

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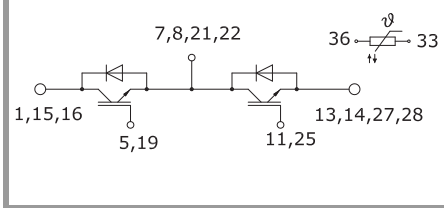

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This is an electrostatic discharge sensitive device (ESDS) due to international standard IEC 61340.

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