

SK 120 GB 12F4 T



SEMITOP® 3

IGBT module

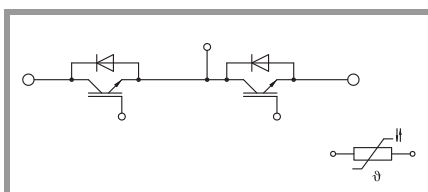
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Features*

- Compact design
- One screw mounting module
- Optimum heat transfer and isolation through AIN 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}	$T_j = 25\text{ °C}$	1200	V
I_C	$T_j = 175\text{ °C}$	$T_s = 25\text{ °C}$	174
		$T_s = 70\text{ °C}$	143
I_{Cnom}		120	A
I_{CRM}		240	A
V_{GES}		-20 ... 20	V
t_{psc}	$V_{CC} = 800\text{ V}$	$T_j = 150\text{ °C}$	10
	$V_{GE} \leq 15\text{ V}$		
	$V_{CES} \leq 1200\text{ V}$		μs
T_j		-40 ... 175	°C
Inverse - Diode			
V_{RRM}	$T_j = 25\text{ °C}$	1200	V
I_F	$T_j = 175\text{ °C}$	$T_s = 25\text{ °C}$	29
		$T_s = 70\text{ °C}$	24
I_{FRM}		30	A
I_{FSM}	10 ms, sin 180°, $T_j = 150\text{ °C}$	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					
$V_{CE(sat)}$	$I_C = 120\text{ A}$ $V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25\text{ °C}$	2.05	2.40	V
		$T_j = 150\text{ °C}$	2.59	2.85	V
V_{CE0}	chipelevel	$T_j = 25\text{ °C}$	0.80	0.90	V
		$T_j = 150\text{ °C}$	0.70	0.80	V
r_{CE}	$V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25\text{ °C}$	10	13	mΩ
		$T_j = 150\text{ °C}$	16	17	mΩ
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 4.5\text{ mA}$	5.2	5.8	6.4	V
I_{CES}	$V_{GE} = 0\text{ V}, V_{CE} = 1200\text{ V}, T_j = 25\text{ °C}$			1.6	mA
C_{ies}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	6.90		nF
C_{oes}		$f = 1\text{ MHz}$	0.56		nF
C_{res}		$f = 1\text{ MHz}$	0.41		nF
Q_G	$V_{GE} = -15\text{ V} \dots +15\text{ V}$		412		nC
R_{Gint}	$T_j = 25\text{ °C}$		2.7		Ω
$t_{d(on)}$	$V_{CC} = 600\text{ V}$	$T_j = 150\text{ °C}$	156		ns
t_r	$I_C = 120\text{ A}$	$T_j = 150\text{ °C}$	51		ns
E_{on}	$R_{G on} = 2.2\text{ }\Omega$ $R_{G off} = 2.2\text{ }\Omega$	$T_j = 150\text{ °C}$	8.8		mJ
$t_{d(off)}$	$di/dt_{on} = 2354\text{ A}/\mu\text{s}$	$T_j = 150\text{ °C}$	346		ns
t_f	$di/dt_{off} = 2264\text{ A}/\mu\text{s}$	$T_j = 150\text{ °C}$	42		ns
E_{off}	$V_{GE} = +15/-15\text{ V}$	$T_j = 150\text{ °C}$	7.47		mJ
$R_{th(j-s)}$	per IGBT, $\lambda_{paste} = 0.8\text{ W}/(\text{mK})$		0.22		K/W

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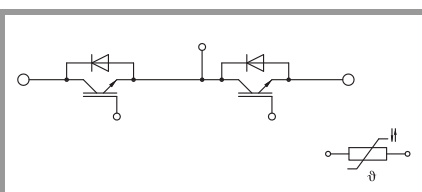
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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse - Diode						
$V_F = V_{EC}$	$I_F = 15 \text{ A}$	$T_j = 25 \text{ °C}$		2.38	2.71	V
	chipelevel	$T_j = 150 \text{ °C}$		2.44	2.77	V
V_{F0}	chipelevel	$T_j = 25 \text{ °C}$		1.30	1.50	V
		$T_j = 150 \text{ °C}$		0.90	1.10	V
r_F	chipelevel	$T_j = 25 \text{ °C}$		72	81	mΩ
		$T_j = 150 \text{ °C}$		103	111	mΩ
I_{RRM}	$I_F = 120 \text{ A}$	$T_j = 150 \text{ °C}$		43.4		A
Q_{rr}	$di/dt_{off} = 2350 \text{ A/}\mu\text{s}$	$T_j = 150 \text{ °C}$		5.7		μC
E_{rr}	$V_{GE} = -15 \text{ V}$ $V_{CC} = 600 \text{ V}$	$T_j = 150 \text{ °C}$		2.04		mJ
$R_{th(j-s)}$	per diode, $\lambda_{paste}=0.8 \text{ W/(mK)}$			1.25		K/W
Module						
L_{CE}				-		nH
M_s	to heatsink		2.25		2.5	Nm
w				29		g
Temperature Sensor						
R_{100}	$T_c=100\text{°C}$ ($R_{25}=5 \text{ k}\Omega$)			$493 \pm 5\%$		Ω
$B_{100/125}$	$R(T)=R_{100}\exp[B_{100/125}(1/T-1/T_{100})]$; $T[\text{K}]$;			3550 $\pm 2\%$		K

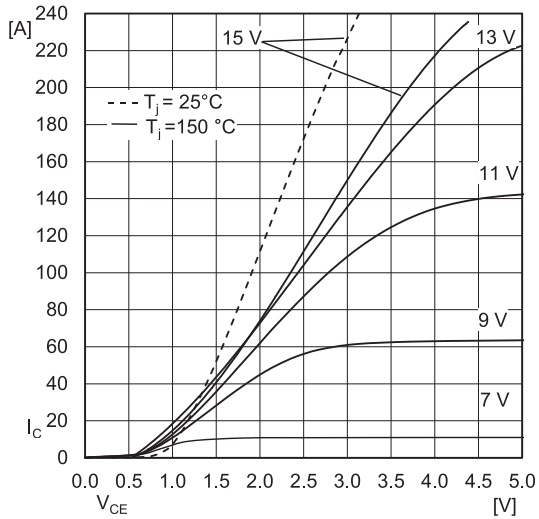


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

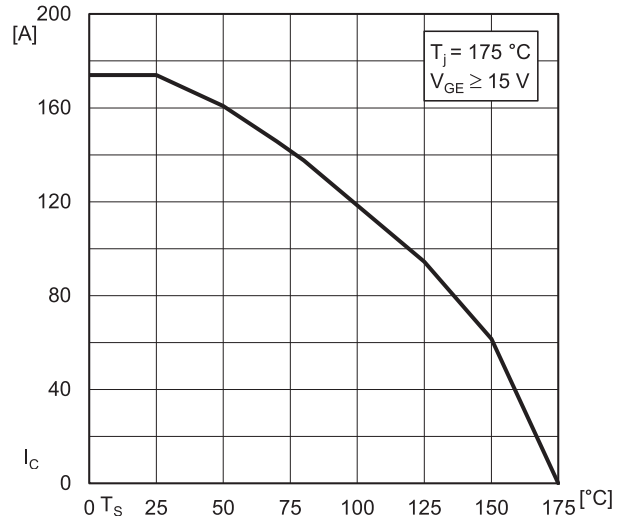


Fig. 2: Typ. rated current vs. temperature $I_C = f(T_s)$

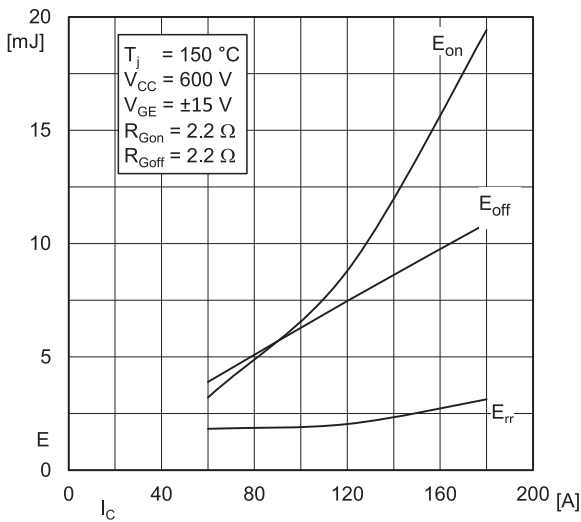


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

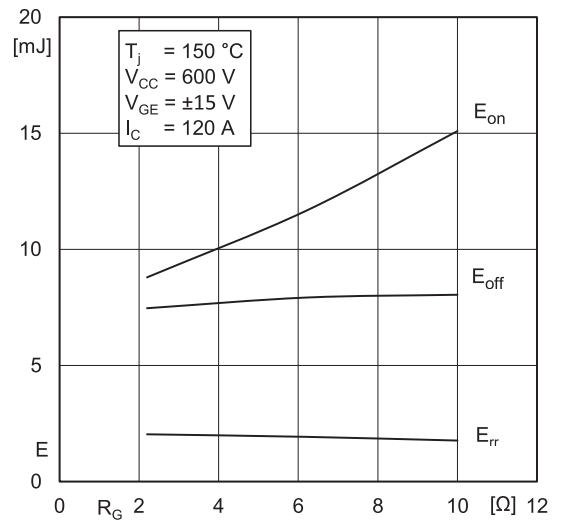


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

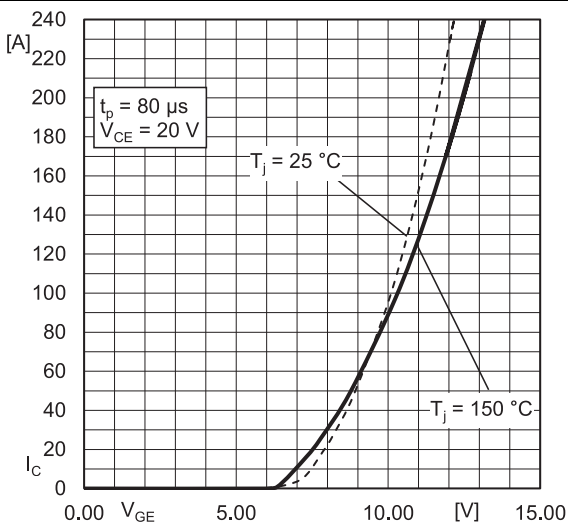


Fig. 5: Typ. transfer characteristic

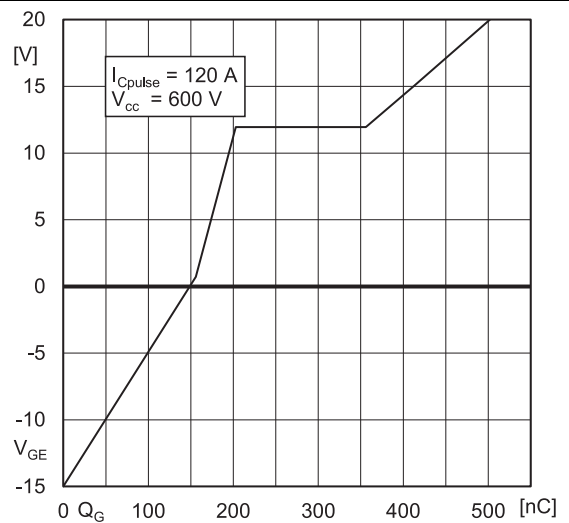


Fig. 6: Typ. gate charge characteristic

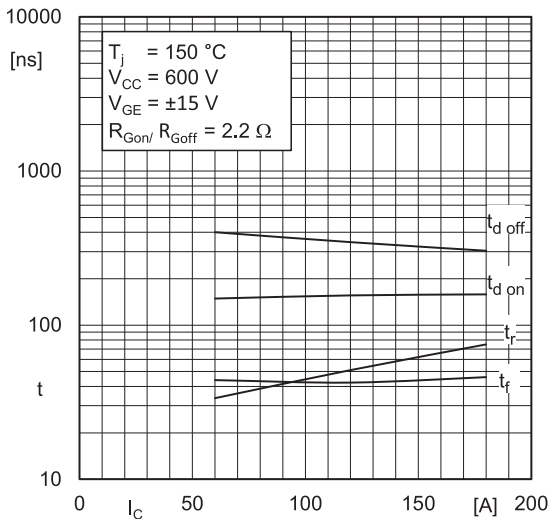


Fig. 7: Typ. switching times vs. I_C

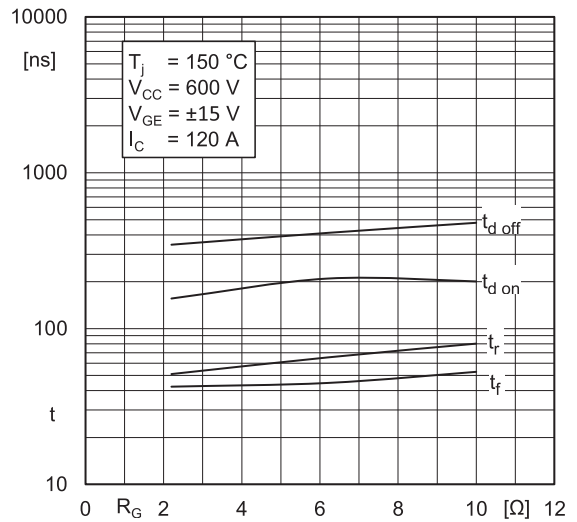


Fig. 8: Typ. switching times vs. gate resistor R_G

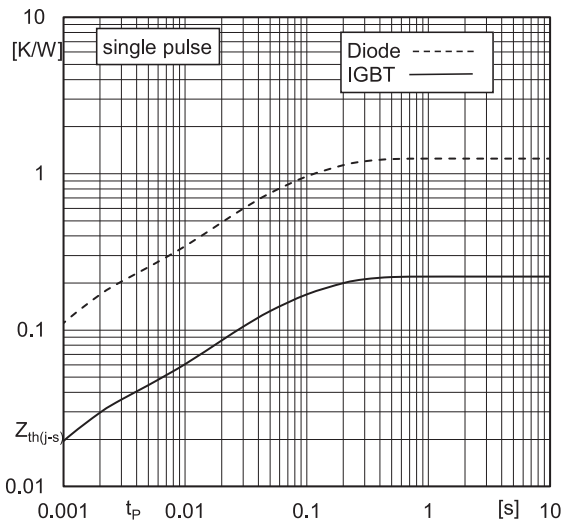


Fig. 9: Typ. transient thermal impedance

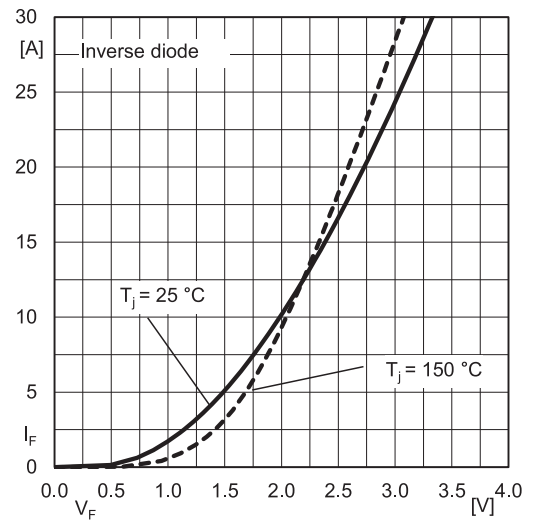


Fig. 10: Typ. CAL diode forward charact., incl. R_{CC+EE}

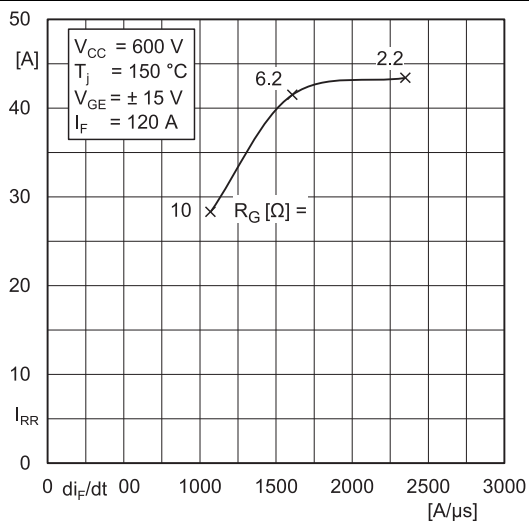
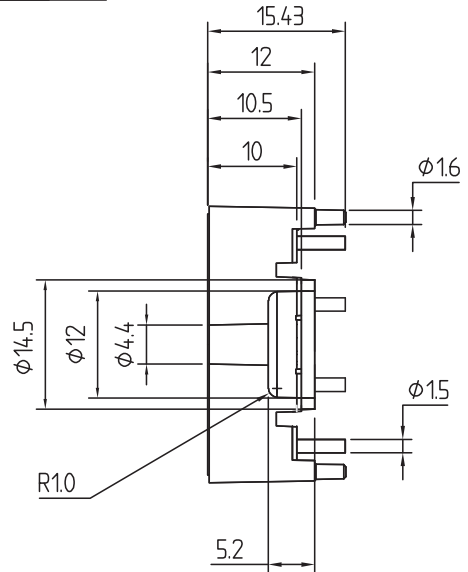
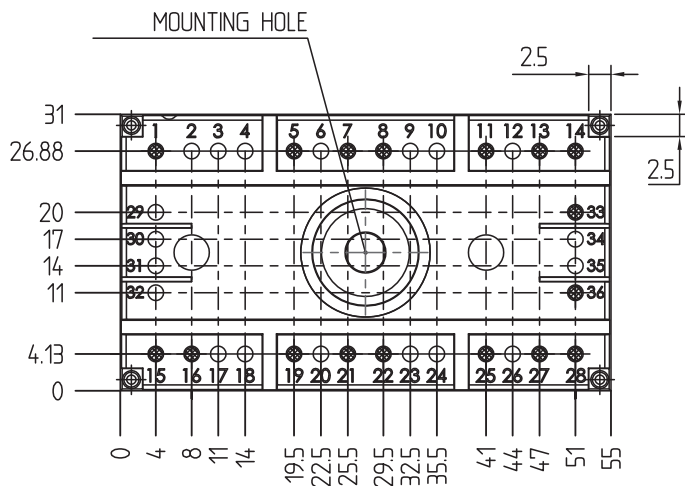
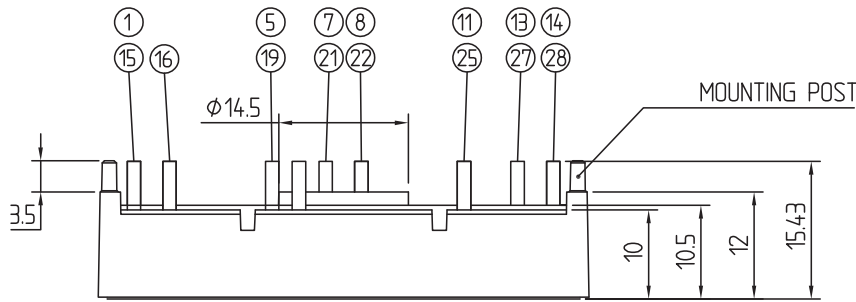


Fig. 11: Typ. CAL diode peak reverse recovery current

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Dimensions: mm

Tolerance system: ISO 2768-m



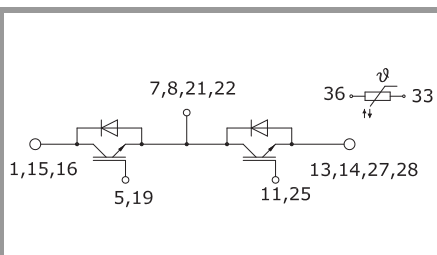
-Hole specification for contacts:
refer Mounting Instruction SEMITOP® Classic

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

- refer Mounting Instruction SEMITOP® Classic

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

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