SK 120 GAL 12F4 T

SEMITOP® 3

Boost Chopper

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Features*

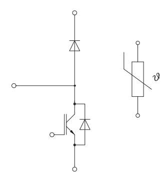
- One screw mounting module
- Low inductive design
- Heat transfer and insulation through
- direct copper bonded aluminum oxide ceramic (DBC)
- 1200V Trench4 IGBT (F4)
- Robust and soft switching freewheeling diode CAL4F
- Integrated NTC temperature sensor
- UL recognized, file no. E 63 532

Typical Applications

- Solar
- UPS
- Energy Storage Systems

Remarks

- Chopper Diode: antiparallel diode



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Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Chopper IGBT				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 175 °C	T_s = 25 °C	134	A
		T_s = 70 °C	109	A
I_{Cnom}			120	A
I_{CRM}			240	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
Chopper Diode				
V_{RRM}	T_j = 25 °C		1200	V
I_F	T_j = 175 °C	T_s = 25 °C	60	A
		T_s = 70 °C	47	A
I_{FRM}			-	A
I_{FSM}	10 ms, sin 180°, T_j = 150 °C		270	A
T_j			-40 ... 175	°C
Freewheeling Diode				
V_{RRM}	T_j = 25 °C		1200	V
I_F	T_j = 175 °C	T_s = 25 °C	148	A
		T_s = 70 °C	117	A
I_{FRM}			240	A
I_{FSM}	10 ms, sin 180°, T_j = 150 °C		774	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
Chopper 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			840		nC
R_{Gint}	T_j = 25 °C			1.6		Ω

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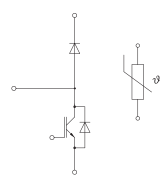

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Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Chopper IGBT						
$t_{d(on)}$	V_{CC} = 600 V	T_j = 150 °C		98		ns
t_r	I_C = 120 A	T_j = 150 °C		31		ns
E_{on}	$R_{G\ on}$ = 1.5 Ω $R_{G\ off}$ = 1.5 Ω	T_j = 150 °C		13.9		mJ
$t_{d(off)}$	di/dt_{on} = 3200 A/µs	T_j = 150 °C		306		ns
t_f	di/dt_{off} = 1900 A/µs	T_j = 150 °C		46		ns
E_{off}	V_{GE} = +15/-15 V dv/dt = 1990 V/µs	T_j = 150 °C		9		mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/(mK)			0.35		K/W
Chopper Diode						
$V_F = V_{EC}$	I_F = 13 A	T_j = 25 °C		0.97	1.20	V
	chiplevel	T_j = 150 °C		0.84	1.07	V
V_{F0}	chiplevel	T_j = 25 °C		0.89	1.09	V
		T_j = 150 °C		0.73	0.92	V
r_F	chiplevel	T_j = 25 °C		6.2	8.5	mΩ
		T_j = 150 °C		8.8	12	mΩ
I_{RRM}	I_F = 13 A			-		A
Q_{rr}				-		µC
E_{rr}				-		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			1.5		K/W
Freewheeling Diode						
$V_F = V_{EC}$	I_F = 150 A	T_j = 25 °C		2.17	2.49	V
	chiplevel	T_j = 150 °C		2.11	2.42	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		5.8	6.6	mΩ
		T_j = 150 °C		8.1	8.8	mΩ
I_{RRM}	I_F = 120 A	T_j = 150 °C		112		A
Q_{rr}	di/dt_{off} = 3200 A/µs V_{GE} = -15 V	T_j = 150 °C		21		µC
E_{rr}	V_R = 600 V	T_j = 150 °C		7.7		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			0.45		K/W
Module						
L_{CE}				-		nH
$R_{CC'+EE'}$		T_s = 25 °C		-		mΩ
		T_s = 150 °C		-		mΩ
M_s	to heatsink		2.25		2.5	Nm
M_t				-		Nm
				-		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

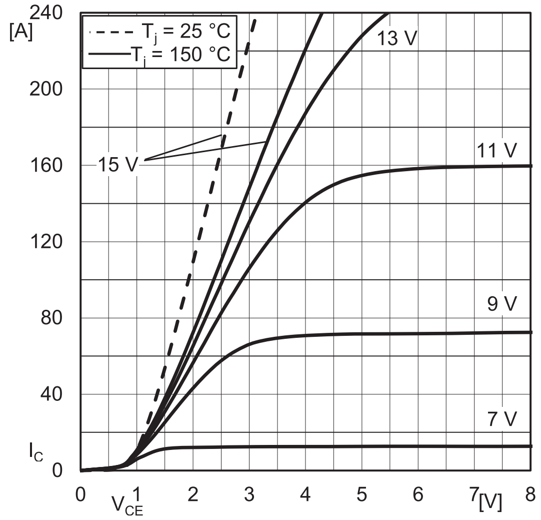


Fig. 1: Typ. IGBT output characteristic, inclusive $R_{CC'+ EE'}$

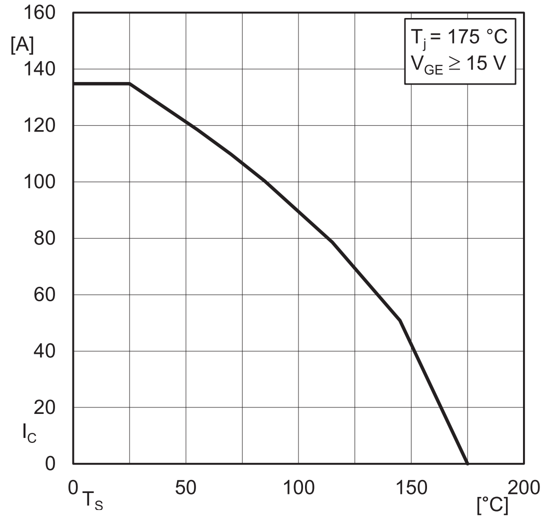


Fig. 2: IGBT rated current vs. temperature $I_c=f(T_s)$

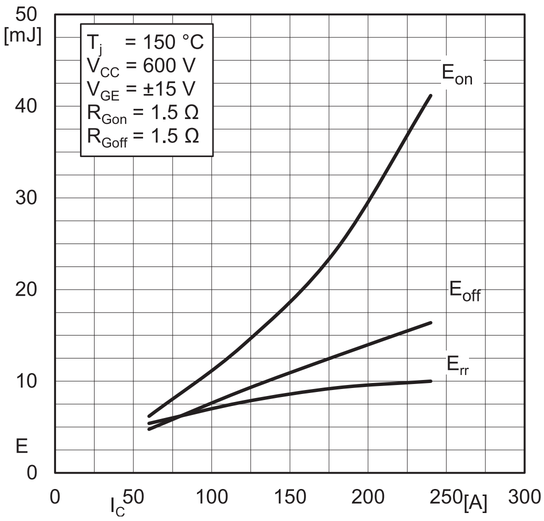


Fig. 3: Typ. turn-on /-off energy = f (I_C)

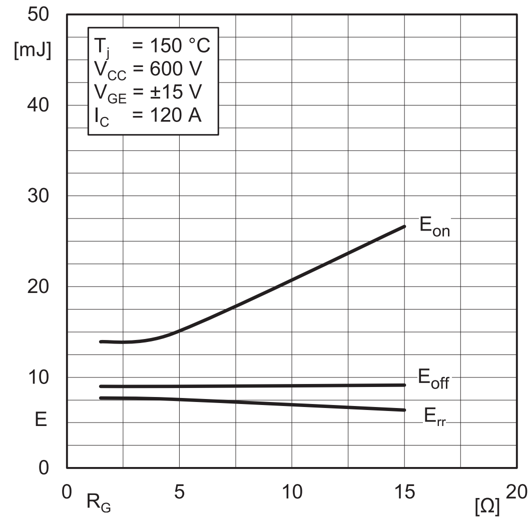


Fig. 4: Typ. turn-on /-off energy = f (R_G)

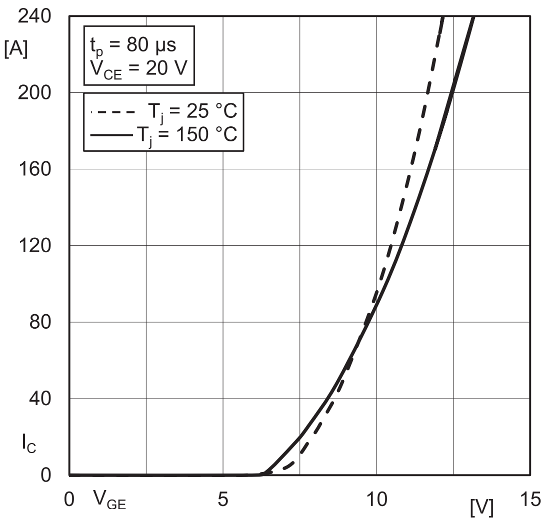


Fig. 5: Typ. IGBT transfer characteristic

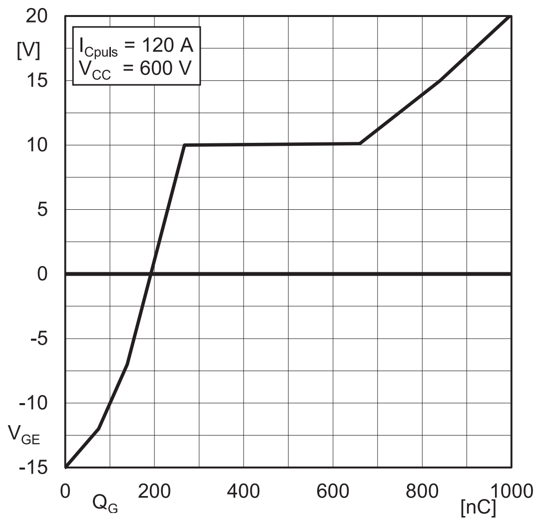


Fig. 6: Typ. gate charge characteristic

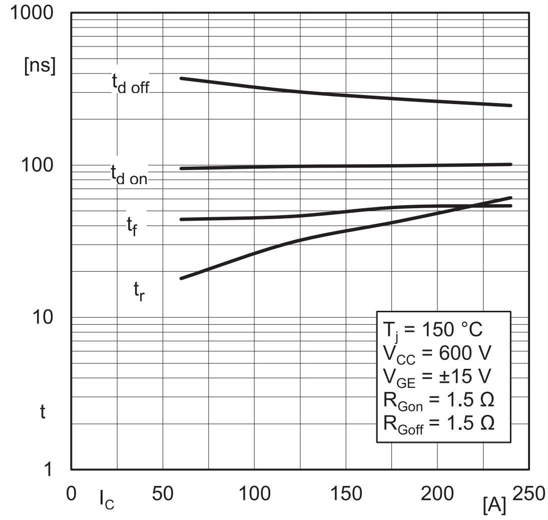


Fig. 7: Typ. switching times vs. I_C

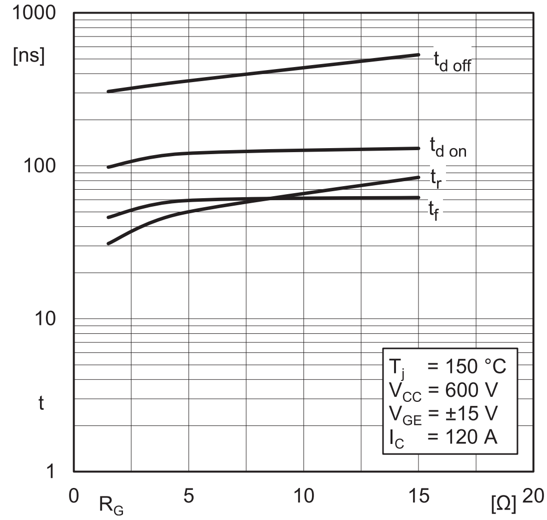


Fig. 8: Typ. switching times vs. gate resistor R_G

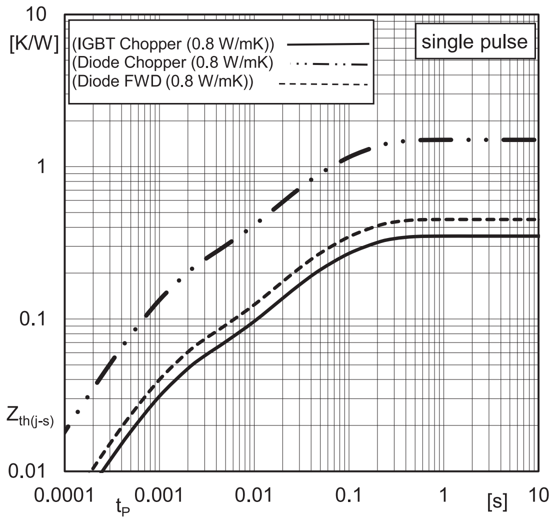


Fig. 9: Typ. transient thermal impedance

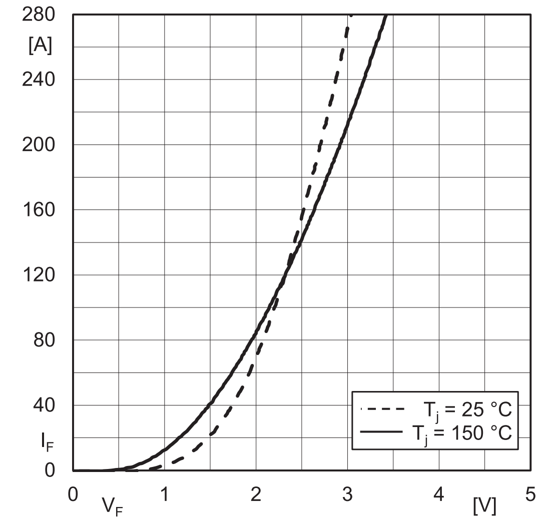


Fig. 10: Typ. FWD diode forward charact., incl. $R_{CC'+EE'}$

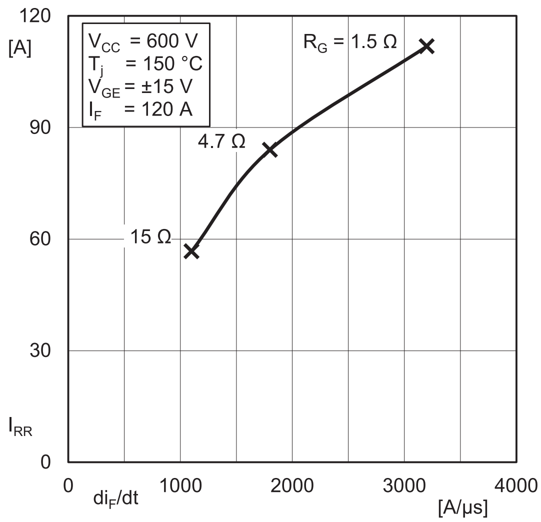


Fig. 11: Typ. diode peak reverse recovery current

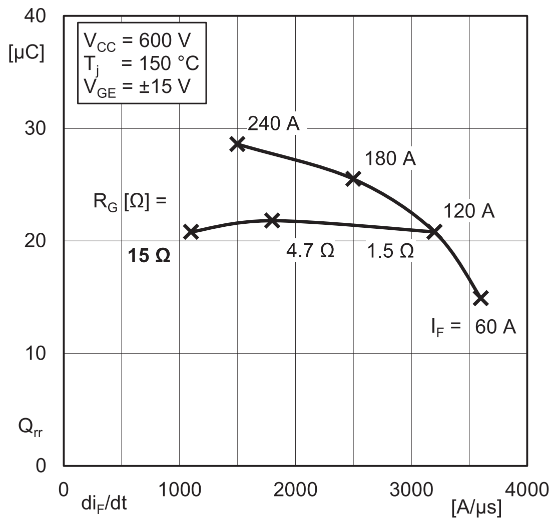
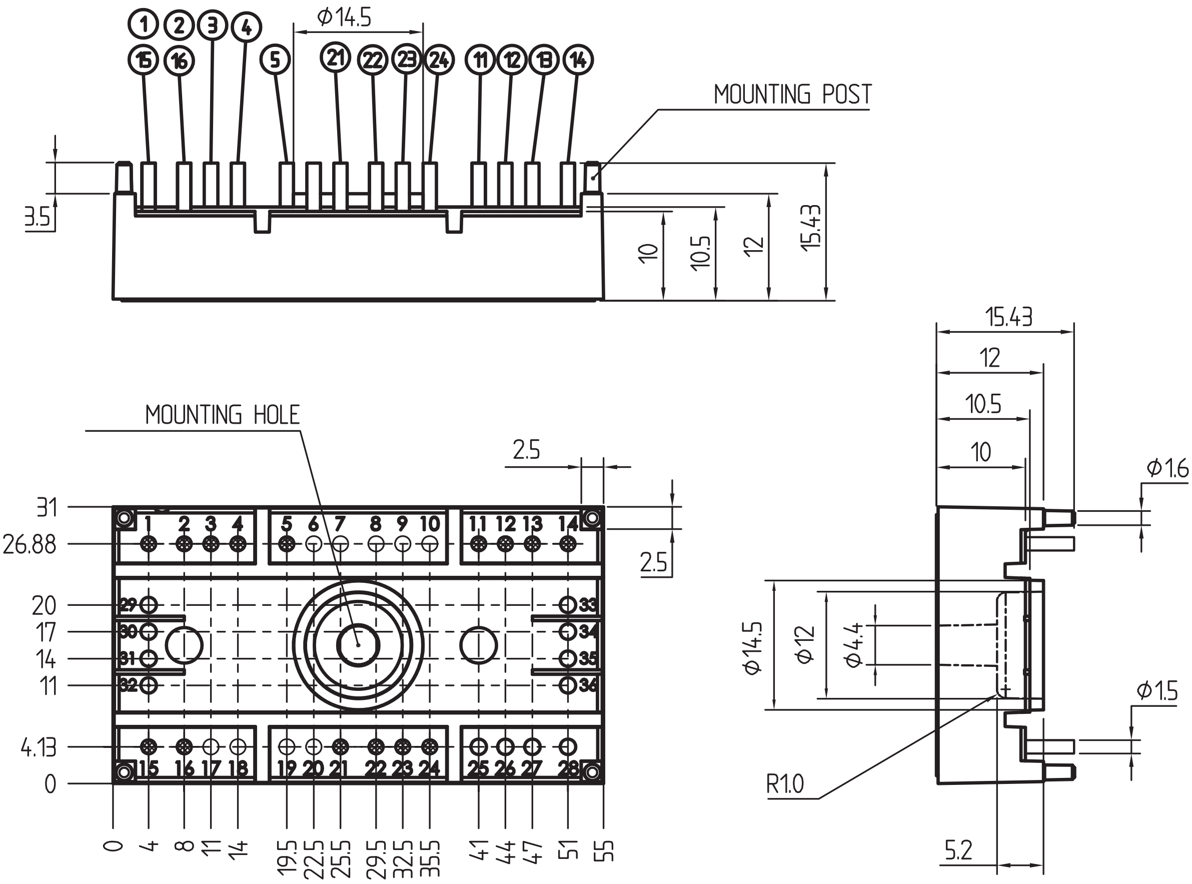


Fig. 12: Typ. Diode reverse recovery charge

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:

- 2.0 mm

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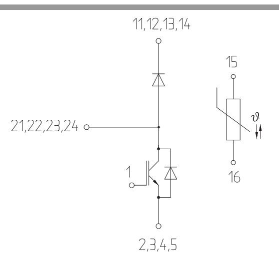

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This is an electrostatic discharge sensitive device (ESDS) due to international standard IEC 61340.

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