SK 35 GAR 12T4

SEMITOP® 2

IGBT module

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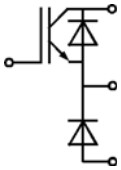
Features

- Compact design
- One screw mounting
- Heat transfer and isolation through direct copper bonded aluminium oxide ceramic (DCB)
- High short circuit capability
- Trench4 IGBT technology
- CAL4F diode technology
- $V_{CE,sat}$ with positive coefficient
- UL recognized, file no. E 63 532

Typical Applications*

- Inverter
- Motor drive



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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	43	A
		T_s = 70 °C	35	A
I_{Cnom}			35	A
I_{CRM}	I_{CRM} = 3 x I_{Cnom}		105	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
Chopper Diode				
I_F	T_j = 175 °C	T_s = 25 °C	38	A
		T_s = 70 °C	30	A
I_{Fnom}			35	A
I_{FRM}	I_{FRM} = 3 x I_{Fnom}		105	A
I_{FSM}	10 ms, sin 180°, T_j = 150 °C		170	A
T_j			-40 ... 175	°C
Freewheeling Diode				
I_F	T_j = 175 °C	T_s = 25 °C	38	A
		T_s = 70 °C	30	A
I_{Fnom}			35	A
I_{FRM}	I_{FRM} = 3xI_{Fnom}		105	A
I_{FSM}	10 ms, sin 180°, T_j = 150 °C		170	A
T_j			-40 ... 175	°C
Module				
$I_{t(RMS)}$				A
T_{stg}			-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 = 35 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.85	2.1	V
		T_j = 150 °C		2.25	2.45	V
V_{CE0}	chiplevel	T_j = 25 °C		0.8	0.9	V
		T_j = 150 °C		0.7	0.8	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		30.0	34.3	mΩ
		T_j = 150 °C		44.3	47.1	mΩ
$V_{GE(th)}$	V_{GE} = V_{CE} V, I_C = 1.2 mA		5	5.8	6.5	V
I_{CES}	V_{GE} = 0 V V_{CE} = 1200 V	T_j = 25 °C		0.062	0.186	mA
		T_j = 150 °C				mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		1.95		nF
C_{oes}		f = 1 MHz		0.155		nF
C_{res}		f = 1 MHz		0.115		nF
Q_G	- 8 V...+ 15 V			189		nC
R_{Gint}	T_j = 25 °C			-		Ω

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Typical Applications*

- Inverter
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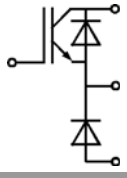
Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Chopper IGBT						
$t_{d(on)}$	V_{CC} = 600 V	T_j = 150 °C		28		ns
t_r	I_C = 35 A	T_j = 150 °C		25		ns
E_{on}	$R_{G\ on}$ = 22 Ω	T_j = 150 °C		3.27		mJ
$t_{d(off)}$	$R_{G\ off}$ = 22 Ω	T_j = 150 °C		303		ns
t_f	di/dt_{on} = 2900 A/µs	T_j = 150 °C		70		ns
E_{off}	di/dt_{off} = 2900 A/µs V_{GE} = +15/-7 V	T_j = 150 °C		3.3		mJ
$R_{th(j-s)}$	per IGBT			1.21		K/W
Chopper Diode						
$V_F = V_{EC}$	I_F = 35 A V_{GE} = 15 V chiplevel	T_j = 25 °C		2.3	2.62	V
		T_j = 150 °C		2.29	2.62	V
V_{F0}	chiplevel	T_j = 25 °C		1.3	1.5	V
		T_j = 150 °C		0.9	1.1	V
r_F	chiplevel	T_j = 25 °C		28.6	32.0	mΩ
		T_j = 150 °C		39.7	43.4	mΩ
I_{RRM}	I_F = 35 A di/dt_{off} = 2900 A/µs V_{GE} = -7 V V_R = 600 V	T_j = 150 °C		30		A
Q_{rr}		T_j = 150 °C		2		µC
E_{rr}		T_j = 150 °C		1.46		mJ
$R_{th(j-s)}$	per Diode			1.55		K/W
Freewheeling Diode						
$V_F = V_{EC}$	I_F = 35 A V_{GE} = 15 V chiplevel	T_j = 25 °C		2.3	2.60	V
		T_j = 150 °C		2.29	2.62	V
V_{F0}	chiplevel	T_j = 25 °C		1.3	1.5	V
		T_j = 150 °C		0.9	1.1	V
r_F	chiplevel	T_j = 25 °C		28.6	32.0	mΩ
		T_j = 150 °C		39.7	43.4	mΩ
I_{RRM}	I_F = 35 A di/dt_{off} = 2900 A/µs V_{GE} = -7 V V_R = 600 V	T_j = 150 °C		30		A
Q_{rr}		T_j = 150 °C		2		µC
E_{rr}		T_j = 150 °C		1.46		mJ
$R_{th(j-s)}$	per Diode			1.55		K/W
Module						
L_{CE}						nH
$R_{CC'+EE'}$		T_s = 25 °C				mΩ
						mΩ
M_s	Mounting torque to heatsink		1.8		2	Nm
M_t						Nm
						Nm
w				19		g
Temperature Sensor						
R_{100}						Ω
$B_{100/125}$						K



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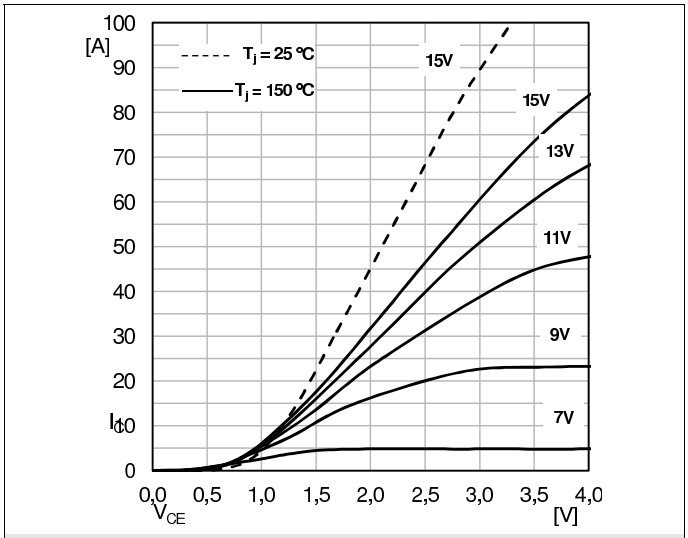


Fig. 1: Typical IGBT output characteristics

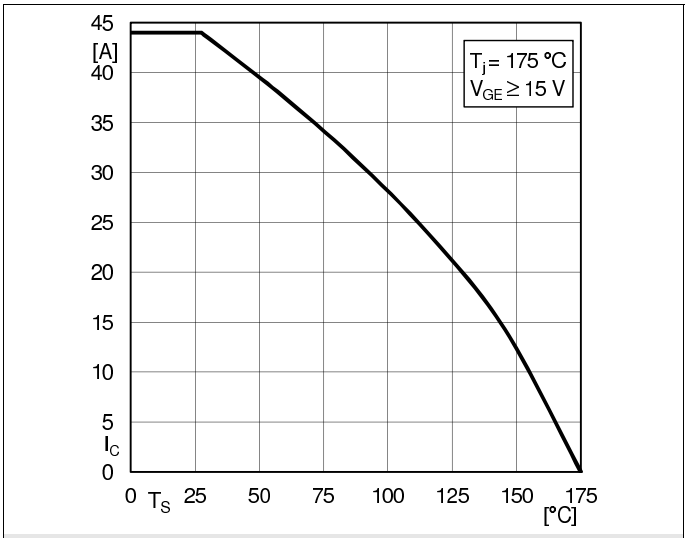


Fig. 2: Rated current vs. temperature $I_C = f(T_S)$

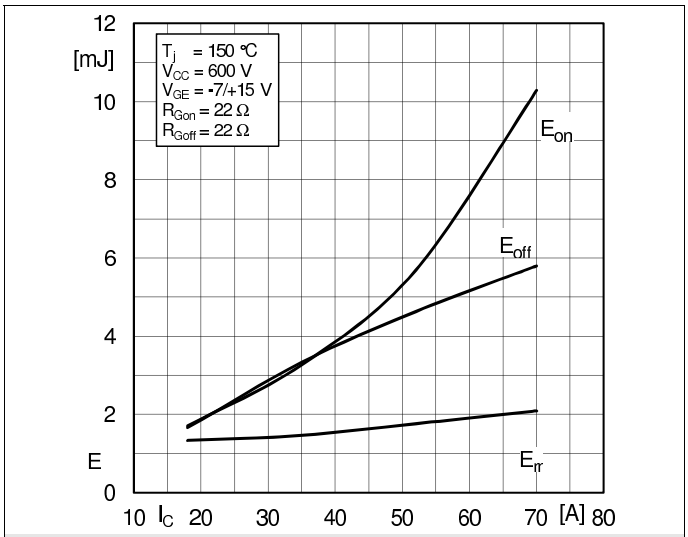


Fig. 3: Typ. turn-on /-off energy = f (I_C)

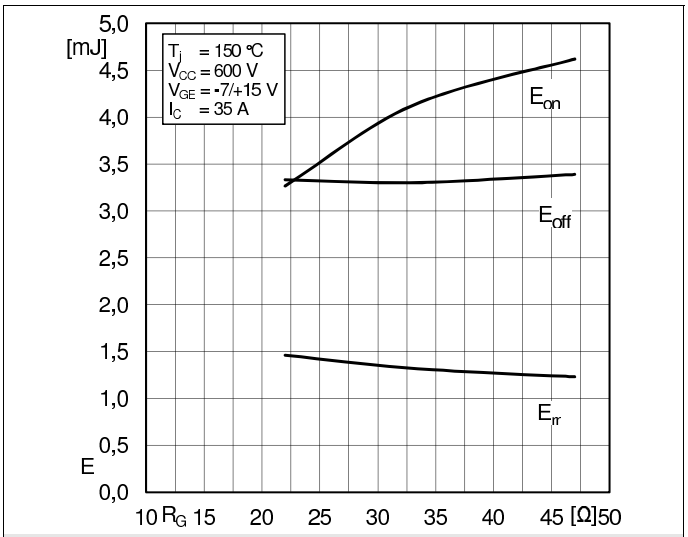


Fig. 4: Typ. turn-on /-off energy = f (R_G)

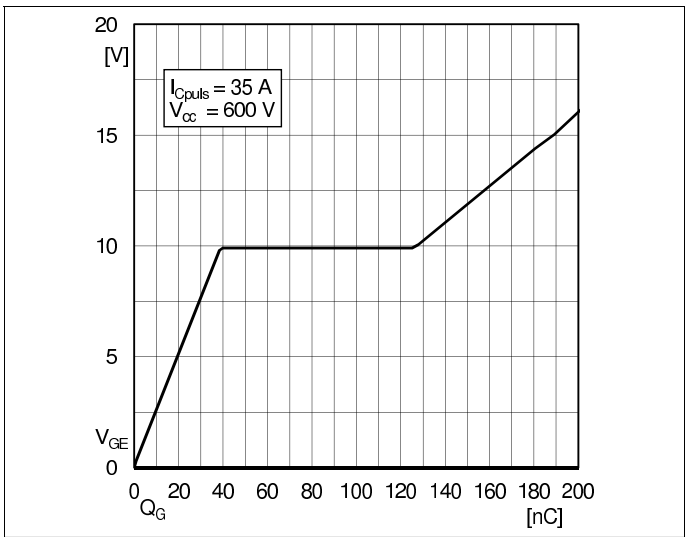


Fig. 6: Typ. gate charge characteristic

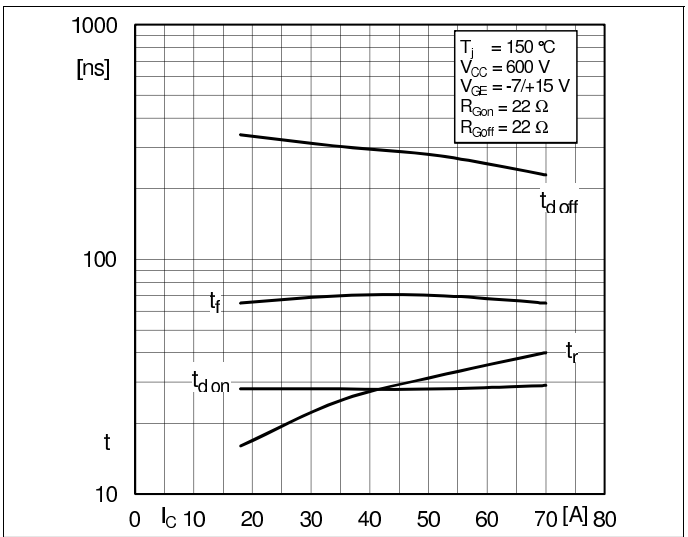


Fig. 7: Typ. switching times vs. I_C

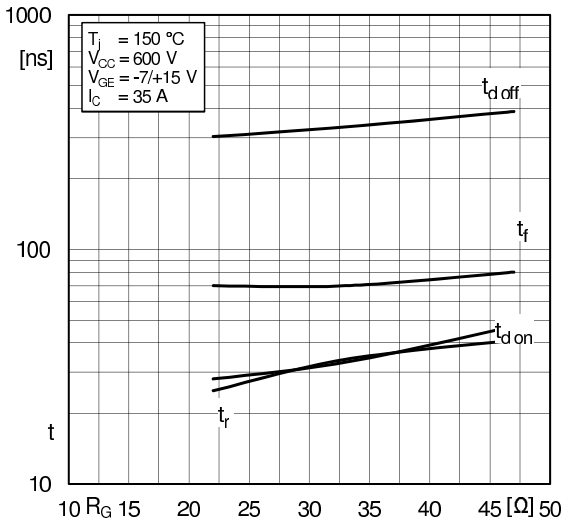


Fig. 8: Typ. switching times vs. gate resistor R_G

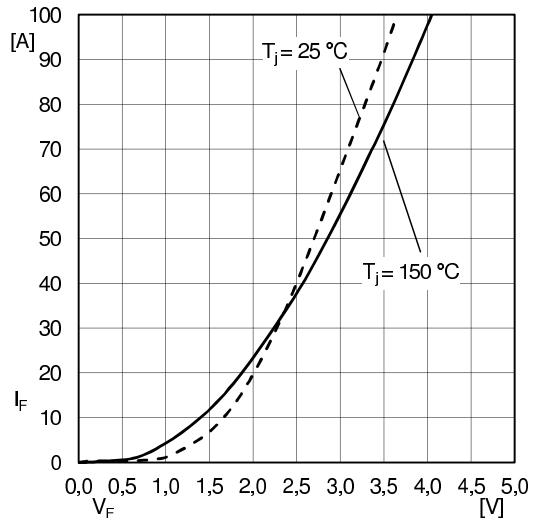
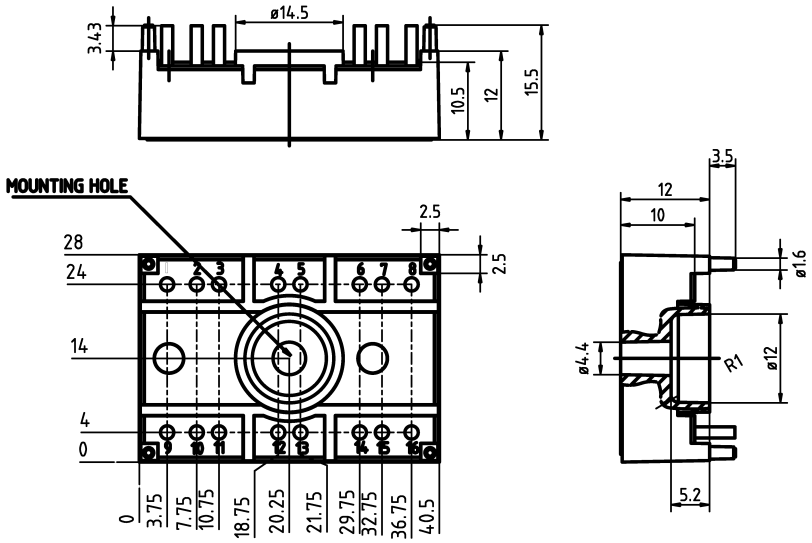
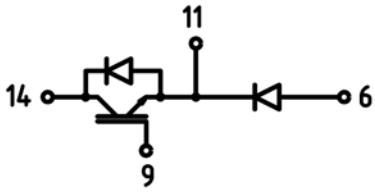


Fig. 10: Typ. FWD diode forward characteristic

dimensions in mm
tolerance system: ISO 2768-m



Suggested hole diameter, in the PCB, for solder pins and mounting plastic pins: 2mm



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This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX

* The specifications of our components may not be considered as an assurance of component characteristics. Components have to be tested for the respective application. Adjustments may be necessary. The use of SEMIKRON products in life support appliances and systems is subject to prior specification and written approval by SEMIKRON. We therefore strongly recommend prior consultation of our staff.