

SK 35 GAR 12T4



SEMITOP® 2

IGBT module

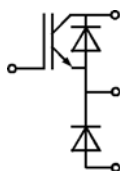
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Features

- 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}	$T_j = 25\text{ °C}$	1200	V
I_C	$T_j = 175\text{ °C}$	$T_s = 25\text{ °C}$	43
		$T_s = 70\text{ °C}$	35
I_{Cnom}		35	A
I_{CRM}	$I_{CRM} = 3 \times I_{Cnom}$	105	A
V_{GES}		-20 ... 20	V
t_{psc}	$V_{CC} = 800\text{ V}$ $V_{GE} \leq 15\text{ V}$ $V_{CES} \leq 1200\text{ V}$	$T_j = 150\text{ °C}$	10
T_j		-40 ... 175	°C
Chopper Diode			
I_F	$T_j = 175\text{ °C}$	$T_s = 25\text{ °C}$	38
		$T_s = 70\text{ °C}$	30
I_{Fnom}		35	A
I_{FRM}	$I_{FRM} = 3 \times I_{Fnom}$	105	A
I_{FSM}	10 ms, sin 180°, $T_j = 150\text{ °C}$	170	A
T_j		-40 ... 175	°C
Freewheeling Diode			
I_F	$T_j = 175\text{ °C}$	$T_s = 25\text{ °C}$	38
		$T_s = 70\text{ °C}$	30
I_{Fnom}		35	A
I_{FRM}	$I_{FRM} = 3 \times I_{Fnom}$	105	A
I_{FSM}	10 ms, sin 180°, $T_j = 150\text{ °C}$	170	A
T_j		-40 ... 175	°C
Module			
$I_{t(RMS)}$			A
T_{stg}		-40 ... 125	°C
V_{isol}	AC, sinusoidal, $t = 1\text{ min}$	2500	V

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Chopper IGBT					
$V_{CE(sat)}$	$I_C = 35\text{ A}$ $V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25\text{ °C}$	1.85	2.1	V
		$T_j = 150\text{ °C}$	2.25	2.45	V
V_{CE0}	chipelevel	$T_j = 25\text{ °C}$	0.8	0.9	V
		$T_j = 150\text{ °C}$	0.7	0.8	V
r_{CE}	$V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25\text{ °C}$	30.0	34.3	mΩ
		$T_j = 150\text{ °C}$	44.3	47.1	mΩ
$V_{GE(th)}$	$V_{GE} = V_{CE}\text{ V}, I_C = 1.2\text{ mA}$	5	5.8	6.5	V
I_{CES}	$V_{GE} = 0\text{ V}$ $V_{CE} = 1200\text{ V}$	$T_j = 25\text{ °C}$	0.062	0.186	mA
		$T_j = 150\text{ °C}$			mA
C_{ies}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	1.95		nF
C_{oes}		$f = 1\text{ MHz}$	0.155		nF
C_{res}		$f = 1\text{ MHz}$	0.115		nF
Q_G	- 8 V...+ 15 V		189		nC
R_{Gint}	$T_j = 25\text{ °C}$		-		Ω



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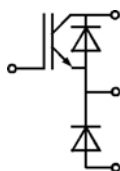
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Typical Applications*

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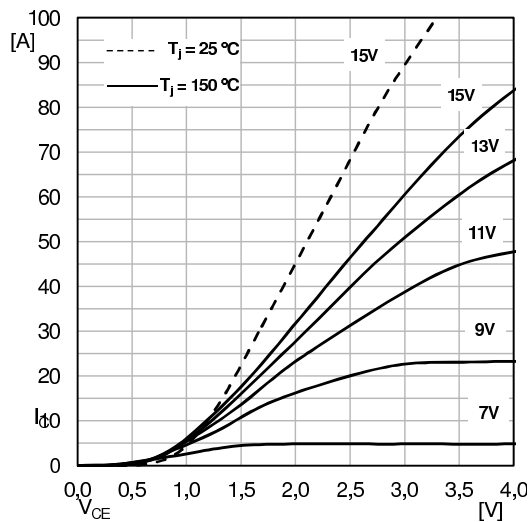


Fig. 1: Typical IGBT output characteristics

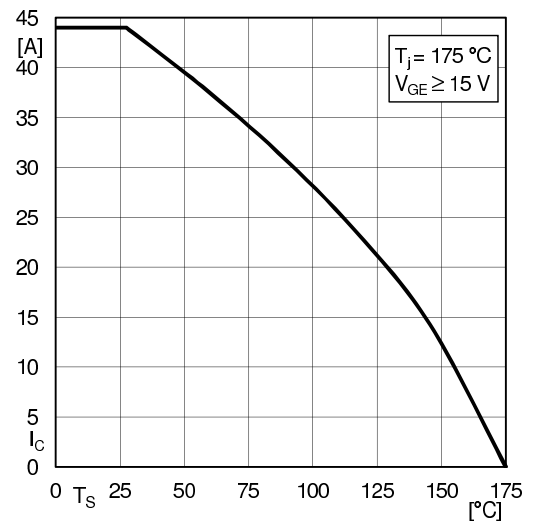


Fig. 2: Rated current vs. temperature $I_C = f(T_S)$

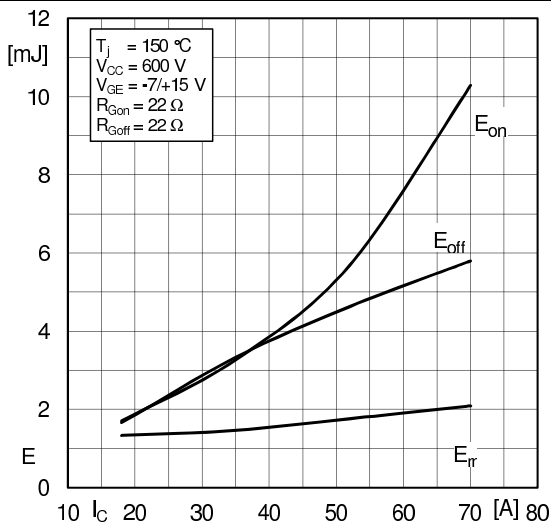


Fig. 3: Typ. turn-on /-off energy $= f(I_C)$

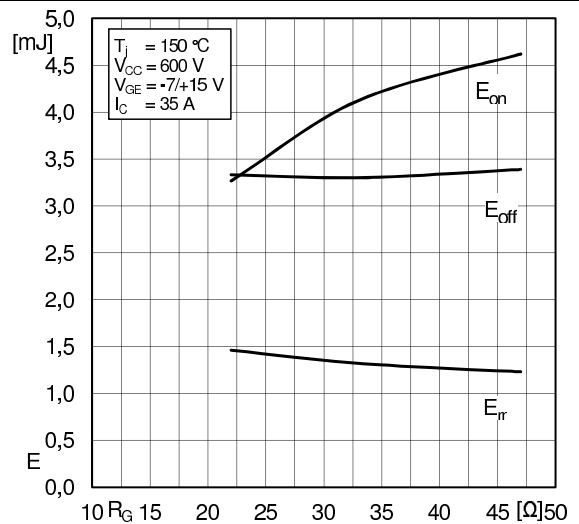


Fig. 4: Typ. turn-on /-off energy $= f(R_G)$

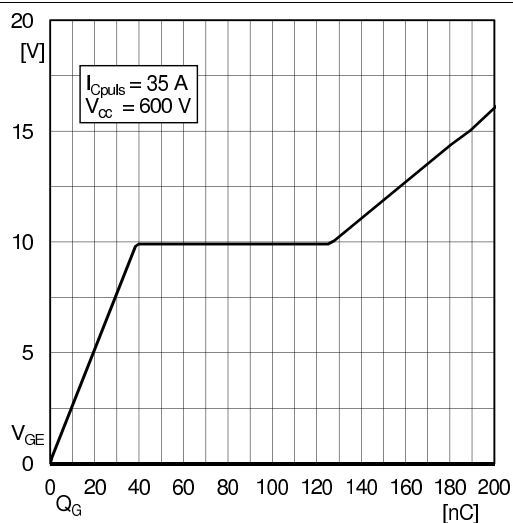


Fig. 6: Typ. gate charge characteristic

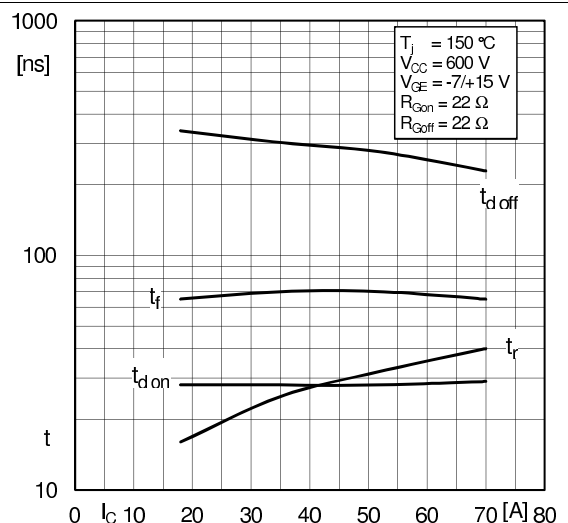


Fig. 7: Typ. switching times vs. I_C

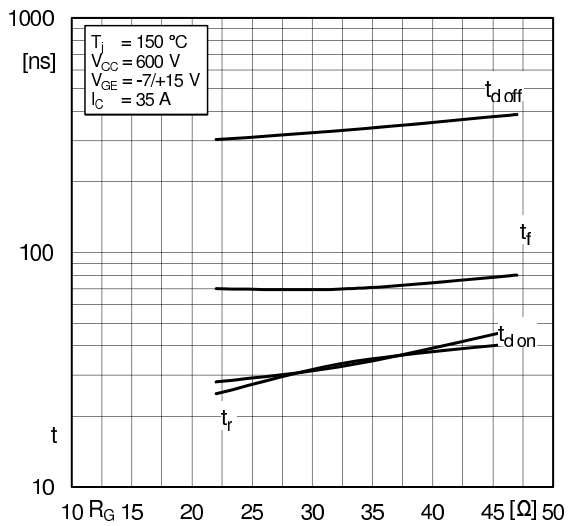


Fig. 8: Typ. switching times vs. gate resistor R_G

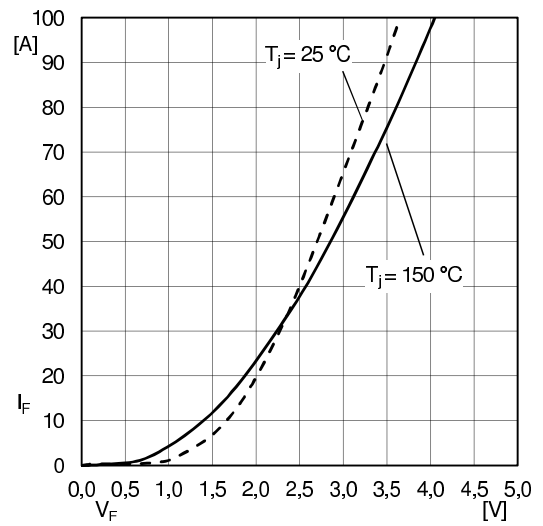
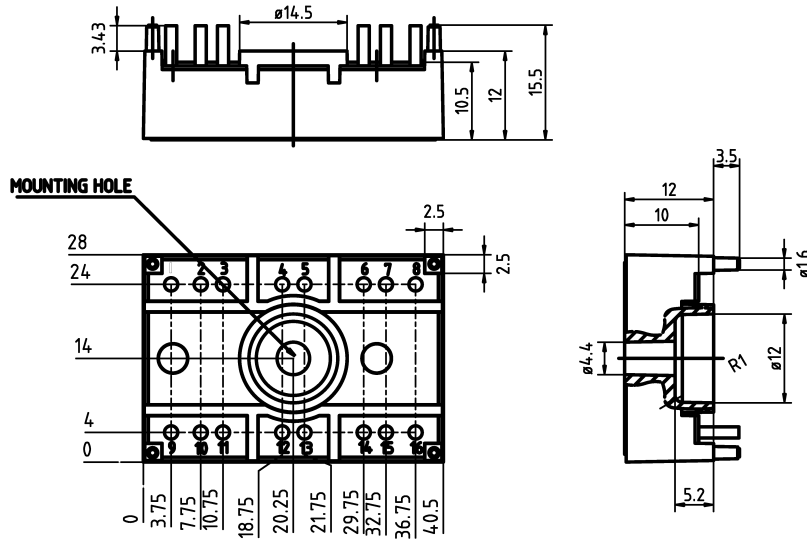


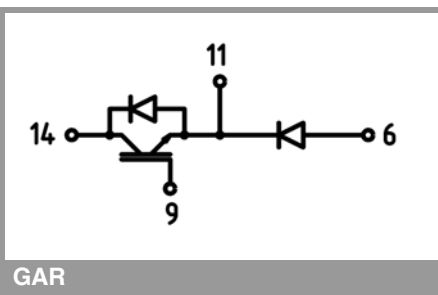
Fig. 10: Typ. FWD diode forward characteristic

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.