

SK 35 GAR 12T4



SEMITOP® 2

IGBT module

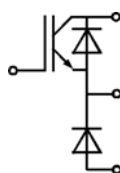
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Features

- 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



GAR

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}	$V_{CE} = 25\text{ V}$	$f = 1\text{ MHz}$	1.95		nF
C_{oes}	$V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	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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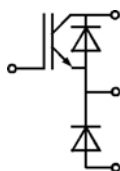
Features

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- High short circuit capability
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Typical Applications*

- Inverter
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Characteristics					
Symbol	Conditions		min.	typ.	max. Unit
Chopper IGBT					
$t_{d(on)}$	$V_{CC} = 600\text{ V}$	$T_j = 150\text{ °C}$		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}	chiplevel	$T_j = 25\text{ °C}$		1.3	1.5 V
		$T_j = 150\text{ °C}$		0.9	1.1 V
r_F	chiplevel	$T_j = 25\text{ °C}$		28.6	32.0 mΩ
		$T_j = 150\text{ °C}$		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}	chiplevel	$T_j = 25\text{ °C}$		1.3	1.5 V
		$T_j = 150\text{ °C}$		0.9	1.1 V
r_F	chiplevel	$T_j = 25\text{ °C}$		28.6	32.0 mΩ
		$T_j = 150\text{ °C}$		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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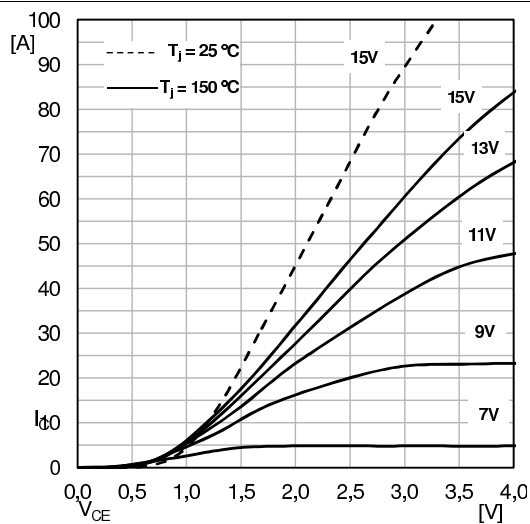


Fig. 1: Typical IGBT output characteristics

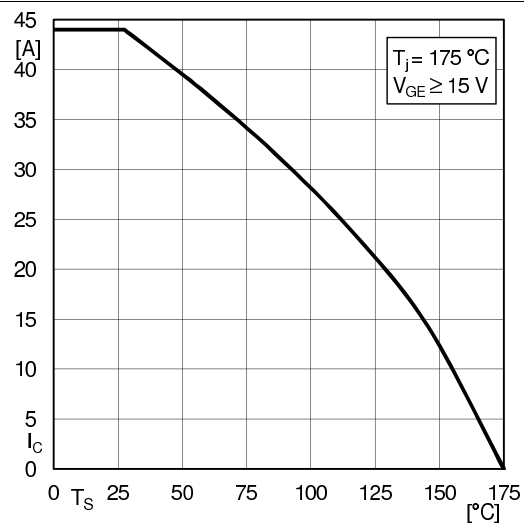


Fig. 2: Rated current vs. temperature $I_C = f(T_S)$

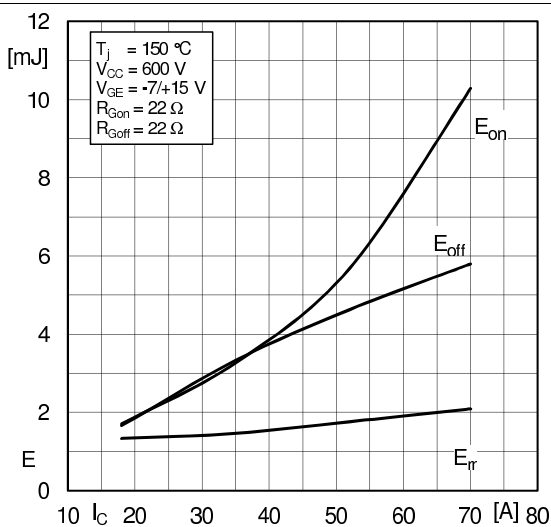


Fig. 3: Typ. turn-on /-off energy $= f(I_C)$

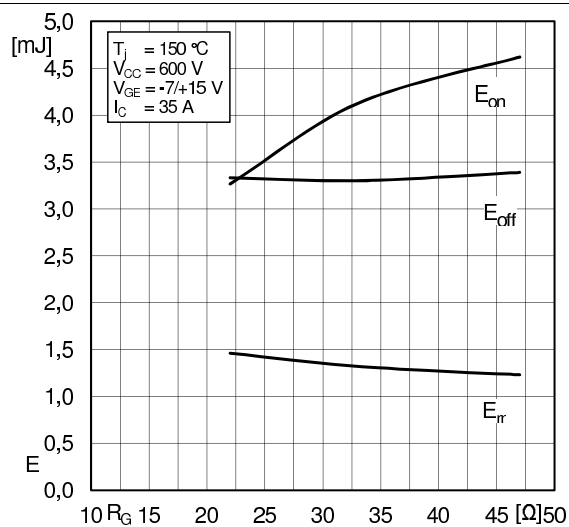


Fig. 4: Typ. turn-on /-off energy $= f(R_G)$

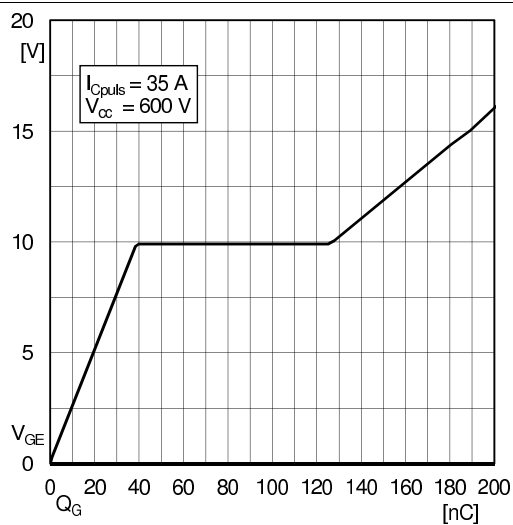


Fig. 6: Typ. gate charge characteristic

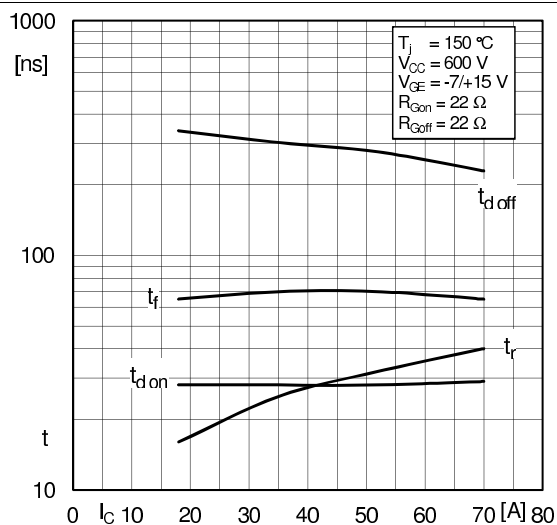


Fig. 7: Typ. switching times vs. I_C

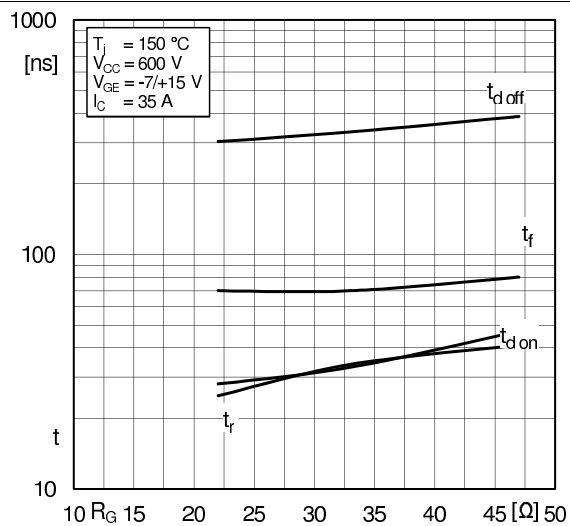


Fig. 8: Typ. switching times vs. gate resistor R_G

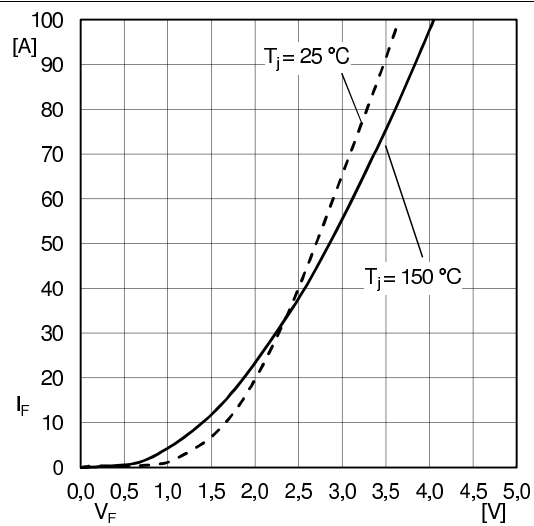
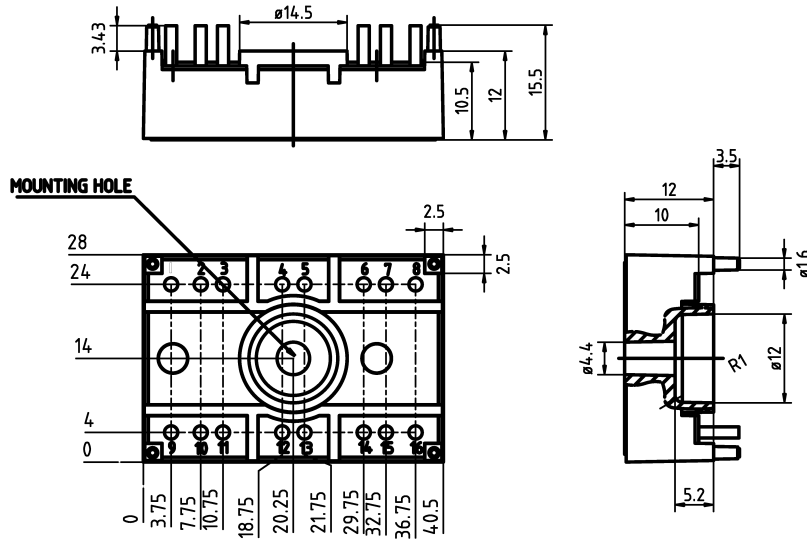


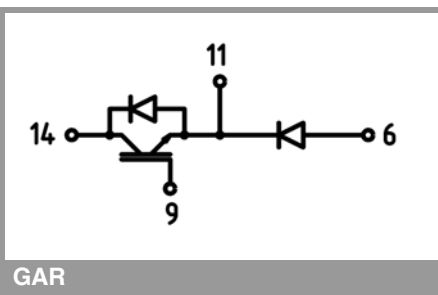
Fig. 10: Typ. FWD diode forward characteristic

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

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