

# SK 35 GAL 12T4



**SEMITOP® 2**

## IGBT module

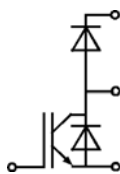
### SK 35 GAL 12T4

#### 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
<b>Chopper IGBT</b>				
$V_{CES}$	$T_j = 25\text{ °C}$		1200	V
$I_C$	$T_j = 175\text{ °C}$	$T_s = 25\text{ °C}$	43	A
		$T_s = 70\text{ °C}$	35	A
$I_{Cnom}$			35	A
$I_{CRM}$	$I_{CRM} = 3 \times I_{Cnom}$		105	A
$V_{GES}$			-20 ... 20	V
$t_{psc}$	$V_{CC} = 800\text{ V}$	$T_j = 150\text{ °C}$	10	$\mu\text{s}$
	$V_{GE} \leq 15\text{ V}$			
	$V_{CES} \leq 1200\text{ V}$			
$T_j$			-40 ... 175	$^{\circ}\text{C}$
<b>Chopper Diode</b>				
$I_F$	$T_j = 175\text{ °C}$	$T_s = 25\text{ °C}$	38	A
		$T_s = 70\text{ °C}$	30	A
$I_{Fnom}$			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	$^{\circ}\text{C}$
<b>Freewheeling Diode</b>				
$I_F$	$T_j = 175\text{ °C}$	$T_s = 25\text{ °C}$	38	A
		$T_s = 70\text{ °C}$	30	A
$I_{Fnom}$			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	$^{\circ}\text{C}$
<b>Module</b>				
$I_{t(RMS)}$				A
$T_{stg}$			-40 ... 125	$^{\circ}\text{C}$
$V_{isol}$	AC, sinusoidal, t = 1 min		2500	V

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
<b>Chopper IGBT</b>						
$V_{CE(sat)}$	$I_C = 35\text{ A}$ $V_{GE} = 15\text{ V}$ chiplevel	$T_j = 25\text{ °C}$	1.85	2.1		V
		$T_j = 150\text{ °C}$	2.25	2.45		V
$V_{CE0}$	chiplevel	$T_j = 25\text{ °C}$	0.8	0.9		V
		$T_j = 150\text{ °C}$	0.7	0.8		V
$r_{CE}$	$V_{GE} = 15\text{ V}$ chiplevel	$T_j = 25\text{ °C}$	30.0	34.3		m $\Omega$
		$T_j = 150\text{ °C}$	44.3	47.1		m $\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}\text{ V}, I_C = 1.2\text{ mA}$		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
$R_{Gint}$	$T_j = 25\text{ °C}$		-			$\Omega$

# SK 35 GAL 12T4



**SEMITOP® 2**

IGBT module

**SK 35 GAL 12T4**

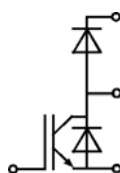
### Features

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- High short circuit capability
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### Typical Applications\*

- Inverter
- Motor drive

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



**GAL**

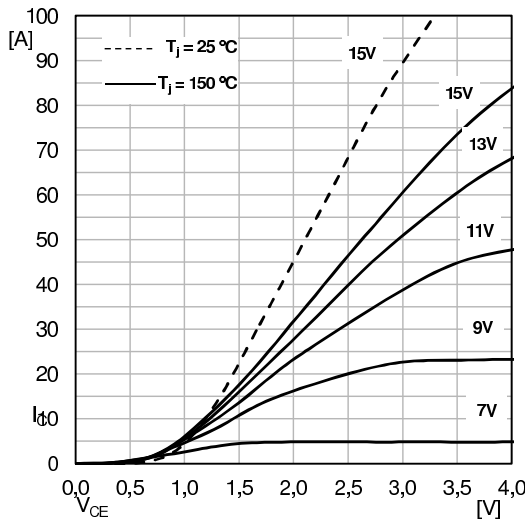


Fig. 1: Typical IGBT output characteristics

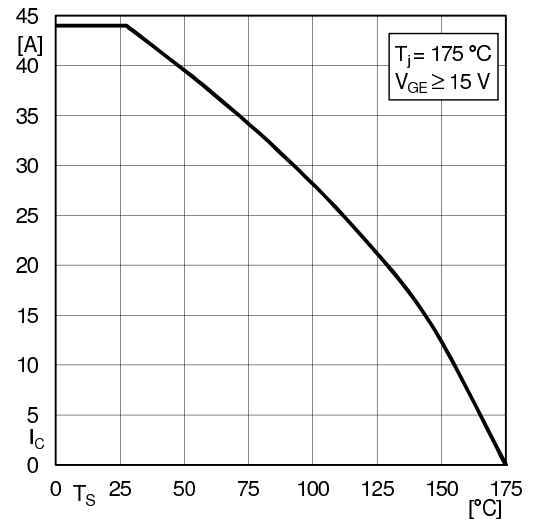


Fig. 2: Rated current vs. temperature  $I_C = f(T_S)$

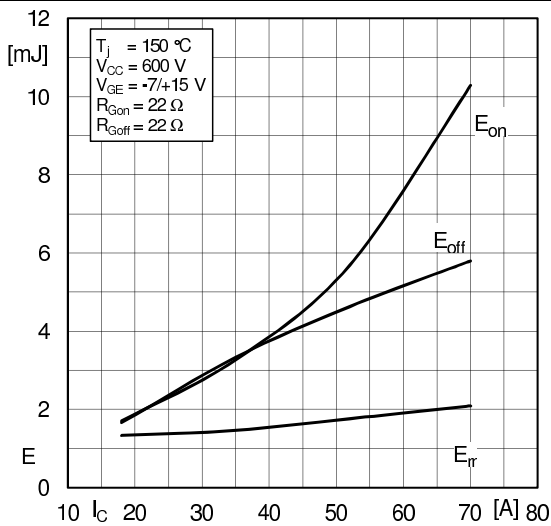


Fig. 3: Typ. turn-on /-off energy =  $f(I_C)$

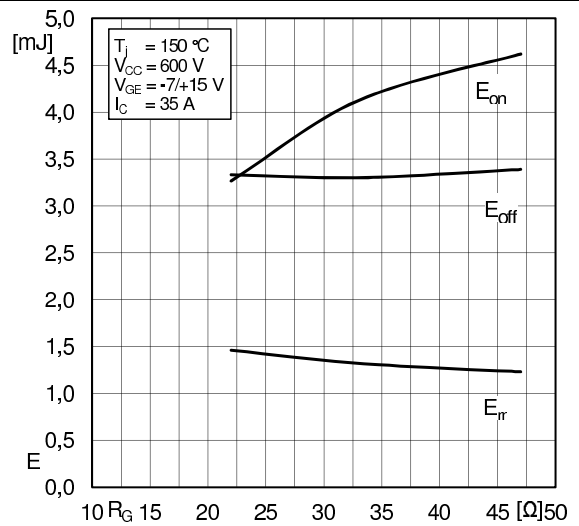


Fig. 4: Typ. turn-on /-off energy =  $f(R_G)$

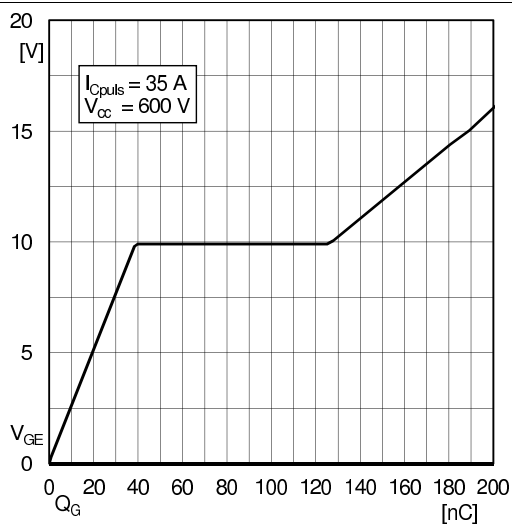


Fig. 6: Typ. gate charge characteristic

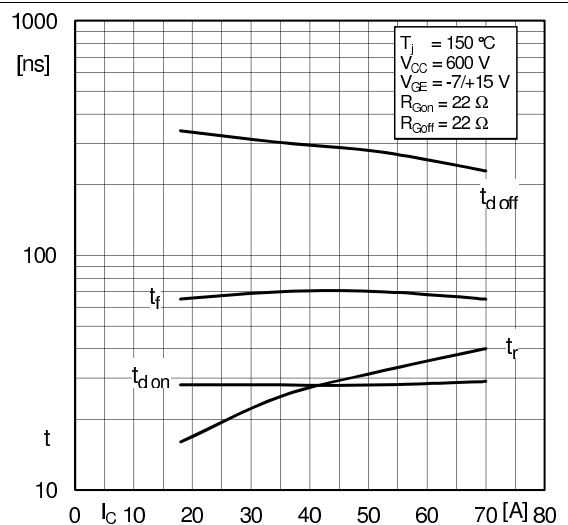


Fig. 7: Typ. switching times vs.  $I_C$

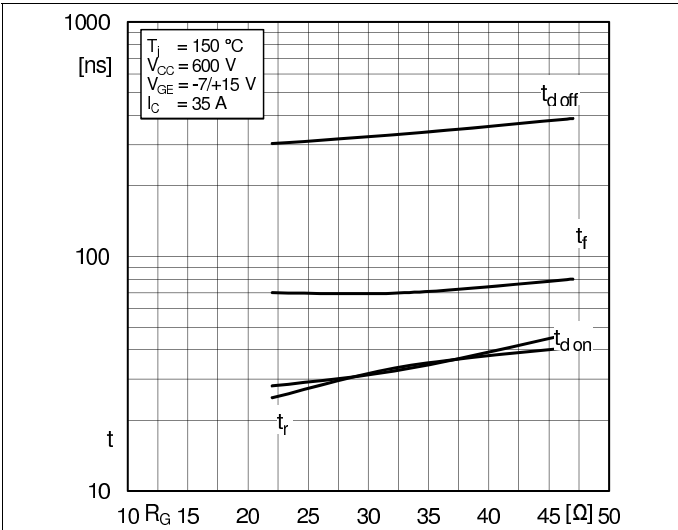


Fig. 8: Typ. switching times vs. gate resistor  $R_G$

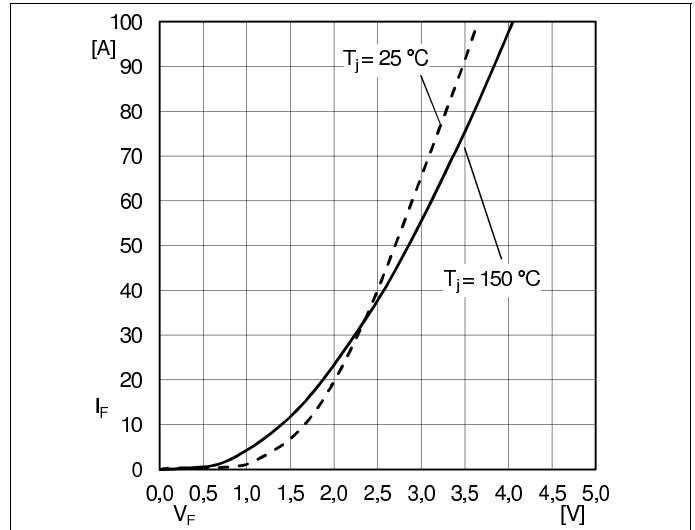


Fig. 10: Typ. FWD diode forward characteristic

