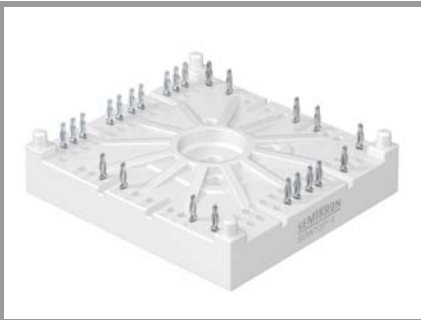


# SK 50 GD 12T4 Tp



SEMITOP® 4 Press-Fit

## IGBT module

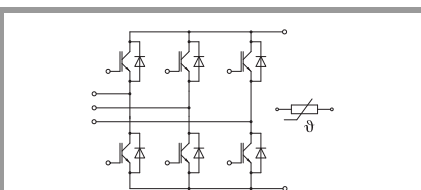
### SK 50 GD 12T4 Tp

#### Features

- One screw mounting module
- Solder free mounting with Press-Fit terminals
- Fully compatible with other SEMITOP® Press-Fit types
- Improved thermal performances by aluminium oxide substrate
- Trench4 IGBT technology
- CAL4F technology FWD
- Integrated NTC temperature sensor
- UL recognized, file no. E 63 532

#### Typical Applications\*

- Inverter up to 26kVA
- Typical motor power 15kW



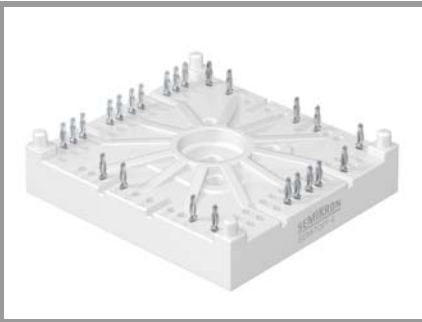
GD-T

Absolute Maximum Ratings			
Symbol	Conditions	Values	Unit
<b>IGBT 1</b>			
$V_{CES}$	$T_j = 25\text{ °C}$	1200	V
$I_C$	$T_j = 150\text{ °C}$	$T_s = 25\text{ °C}$	65
		$T_s = 70\text{ °C}$	50
$I_C$	$T_j = 175\text{ °C}$	$T_s = 25\text{ °C}$	72
		$T_s = 70\text{ °C}$	59
$I_{Cnom}$		50	A
$I_{CRM}$	$I_{CRM} = 3 \times I_{Cnom}$	150	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

Absolute Maximum Ratings			
Symbol	Conditions	Values	Unit
<b>Diode 1</b>			
$V_{RRM}$	$T_j = 25\text{ °C}$	1200	V
$I_F$	$T_j = 150\text{ °C}$	$T_s = 25\text{ °C}$	53
		$T_s = 70\text{ °C}$	40
$I_F$	$T_j = 175\text{ °C}$	$T_s = 25\text{ °C}$	60
		$T_s = 70\text{ °C}$	48
$I_{Fnom}$		50	A
$I_{FRM}$	$I_{FRM} = 2 \times I_{Fnom}$	100	A
$I_{FSM}$	10 ms, sin 180°, $T_j = 150\text{ °C}$	270	A
$T_j$		-40 ... 175	°C

Absolute Maximum Ratings			
Symbol	Conditions	Values	Unit
<b>Module</b>			
$I_{t(RMS)}$	$T_{terminal} = 100\text{ °C}$ , $T_s = 60\text{ °C}$ , per pin	40	A
$T_{stg}$		-40 ... 125	°C
$V_{isol}$	AC, sinusoidal, t = 1 min	2500	V

# SK 50 GD 12T4 Tp



SEMITOP® 4 Press-Fit

## IGBT module

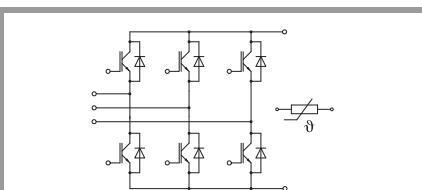
### SK 50 GD 12T4 Tp

#### Features

- One screw mounting module
- Solder free mounting with Press-Fit terminals
- Fully compatible with other SEMITOP® Press-Fit types
- Improved thermal performances by aluminium oxide substrate
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- CAL4F technology FWD
- Integrated NTC temperature sensor
- UL recognized, file no. E 63 532

#### Typical Applications\*

- Inverter up to 26kVA
- Typical motor power 15kW



GD-T

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
<b>IGBT 1</b>						
$V_{CE(sat)}$	$I_C = 50\text{ A}$ $V_{GE} = 15\text{ V}$ chiplevel	$T_j = 25\text{ °C}$		1.85	2.10	V
		$T_j = 150\text{ °C}$		2.20	2.40	V
$V_{CE0}$	chiplevel	$T_j = 25\text{ °C}$		0.80	0.90	V
		$T_j = 150\text{ °C}$		0.70	0.80	V
$r_{CE}$	$V_{GE} = 15\text{ V}$ chiplevel	$T_j = 25\text{ °C}$		21	24	mΩ
		$T_j = 150\text{ °C}$		30	32	mΩ
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 1.7\text{ mA}$		5	5.8	6.5	V
$I_{CES}$	$V_{GE} = 0\text{ V}$ $V_{CE} = 1200\text{ V}$	$T_j = 25\text{ °C}$			0.67	mA
				-		mA
$C_{ies}$	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$		2.77		nF
$C_{oes}$		$f = 1\text{ MHz}$		0.205		nF
$C_{res}$		$f = 1\text{ MHz}$		0.16		nF
$Q_G$	$V_{GE} = -7V...+15V$			375		nC
$R_{Gint}$	$T_j = 25\text{ °C}$			4.0		Ω
$t_{d(on)}$	$V_{CC} = 600\text{ V}$	$T_j = 150\text{ °C}$		63		ns
$t_r$	$I_C = 50\text{ A}$	$T_j = 150\text{ °C}$		65		ns
$E_{on}$	$R_{G\ on} = 32\text{ Ω}$ $R_{G\ off} = 32\text{ Ω}$	$T_j = 150\text{ °C}$		8.3		mJ
		$T_j = 150\text{ °C}$		521		ns
$t_{d(off)}$	$di/dt_{on} = 920\text{ A/μs}$		$T_j = 150\text{ °C}$			ns
$t_f$	$di/dt_{off} = 920\text{ A/μs}$		$T_j = 150\text{ °C}$		80	ns
$E_{off}$	$V_{GE\ neg} = -7\text{ V}$ $V_{GE\ pos} = 15\text{ V}$	$T_j = 150\text{ °C}$		5		mJ
				0.65		K/W
$R_{th(j-s)}$	per IGBT			0.65		K/W

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
<b>Diode 1</b>						
$V_F$	$I_F = 50\text{ A}$ chiplevel	$T_j = 25\text{ °C}$		2.22	2.54	V
		$T_j = 150\text{ °C}$		2.18	2.50	V
$V_{F0}$	chiplevel	$T_j = 25\text{ °C}$		1.30	1.50	V
		$T_j = 150\text{ °C}$		0.90	1.10	V
$r_F$	chiplevel	$T_j = 25\text{ °C}$		18	21	mΩ
		$T_j = 150\text{ °C}$		26	28	mΩ
$I_{RRM}$	$I_F = 50\text{ A}$		$T_j = 150\text{ °C}$		30	A
$Q_{rr}$	$di/dt_{off} = 920\text{ A/μs}$		$T_j = 150\text{ °C}$		7.2	μC
$E_{rr}$	$V_{GE} = -7\text{ V}$ $V_{CC} = 600\text{ V}$		$T_j = 150\text{ °C}$		2.15	mJ
$R_{th(j-s)}$	per diode			0.97		K/W

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
<b>Module</b>						
$M_s$	to heatsink		2.5		2.75	Nm
w	weight			60		g

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
<b>Temperature Sensor</b>						
$R_{100}$	$T_r = 100\text{ °C}$			$493 \pm 5\%$		Ω
$B_{100/125}$	$R_{(T)} = R_{100} \exp[B_{100/125}(1/T - 1/T_{100})]$ ; T[K];			$3550 \pm 2\%$		K

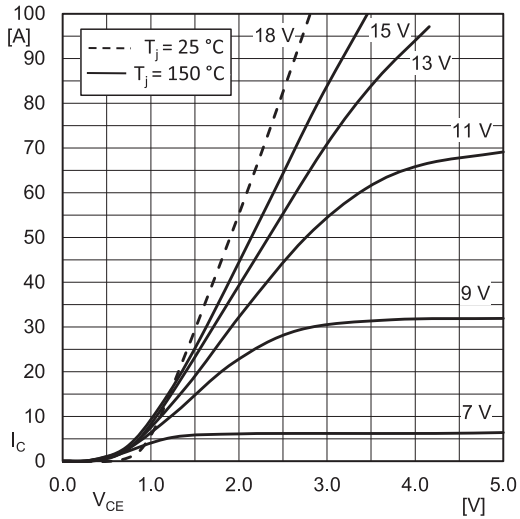


Fig. 1: Typ. IGBT1 output characteristic, incl.  $R_{CC'+EE'}$

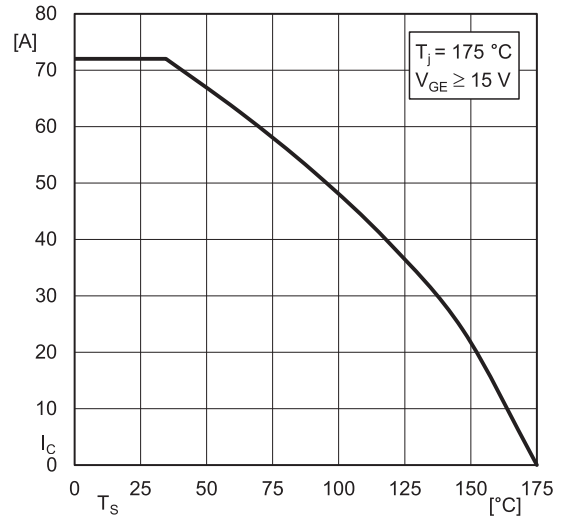


Fig. 2: Typ. rated current vs. temperature  $I_C = f(T_s)$

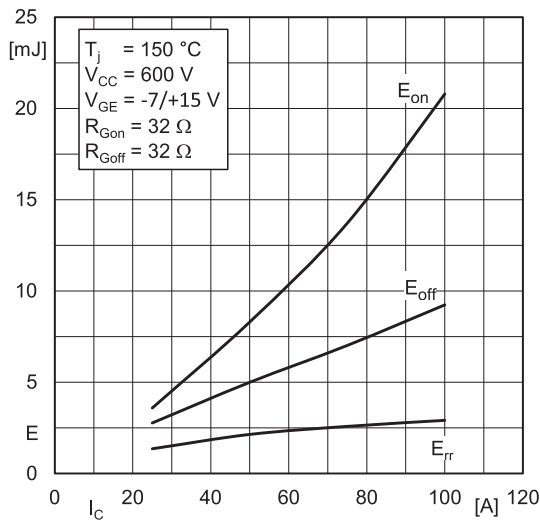


Fig. 3: Typ. turn-on /-off energy =  $f(I_C)$

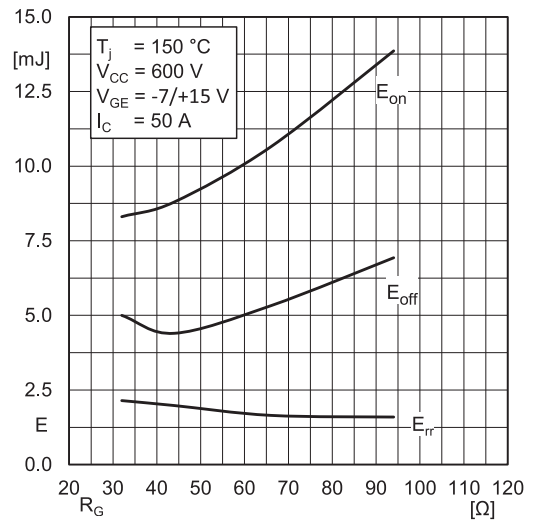


Fig. 4: Typ. turn-on /-off energy =  $f(R_G)$

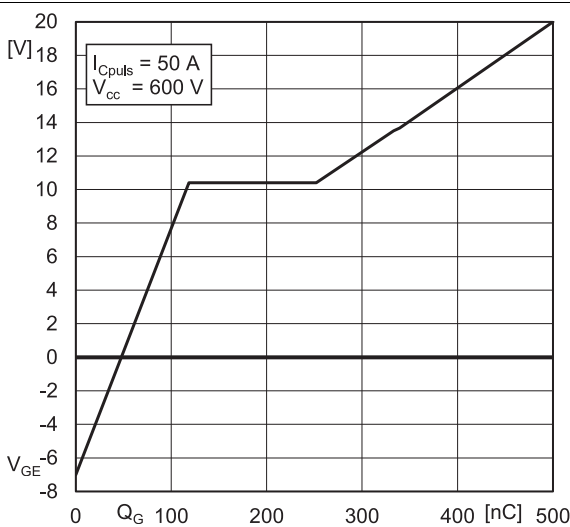


Fig. 6: Typ. gate charge characteristic

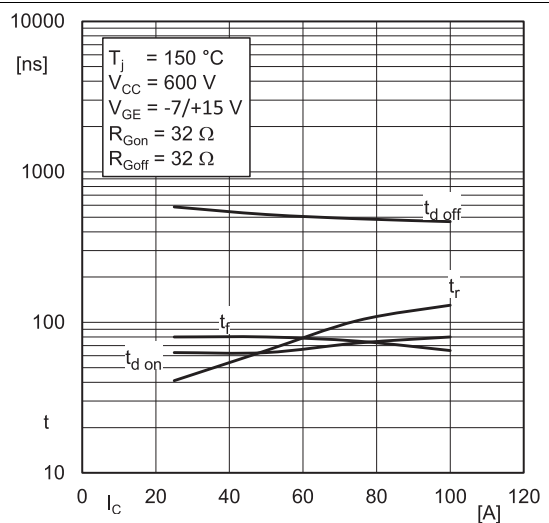


Fig. 7: Typ. switching times vs.  $I_C$

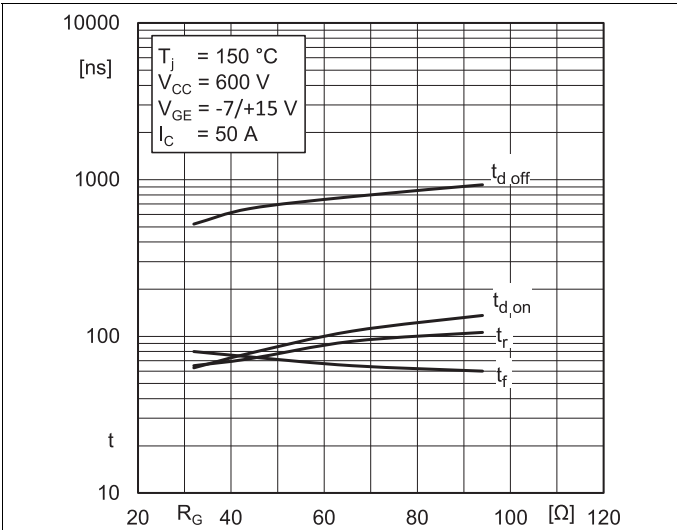


Fig. 8: Typ. switching times vs. gate resistor  $R_G$

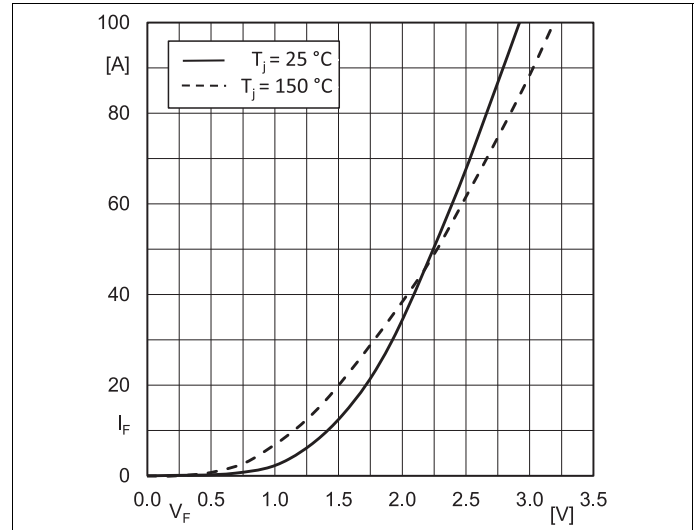
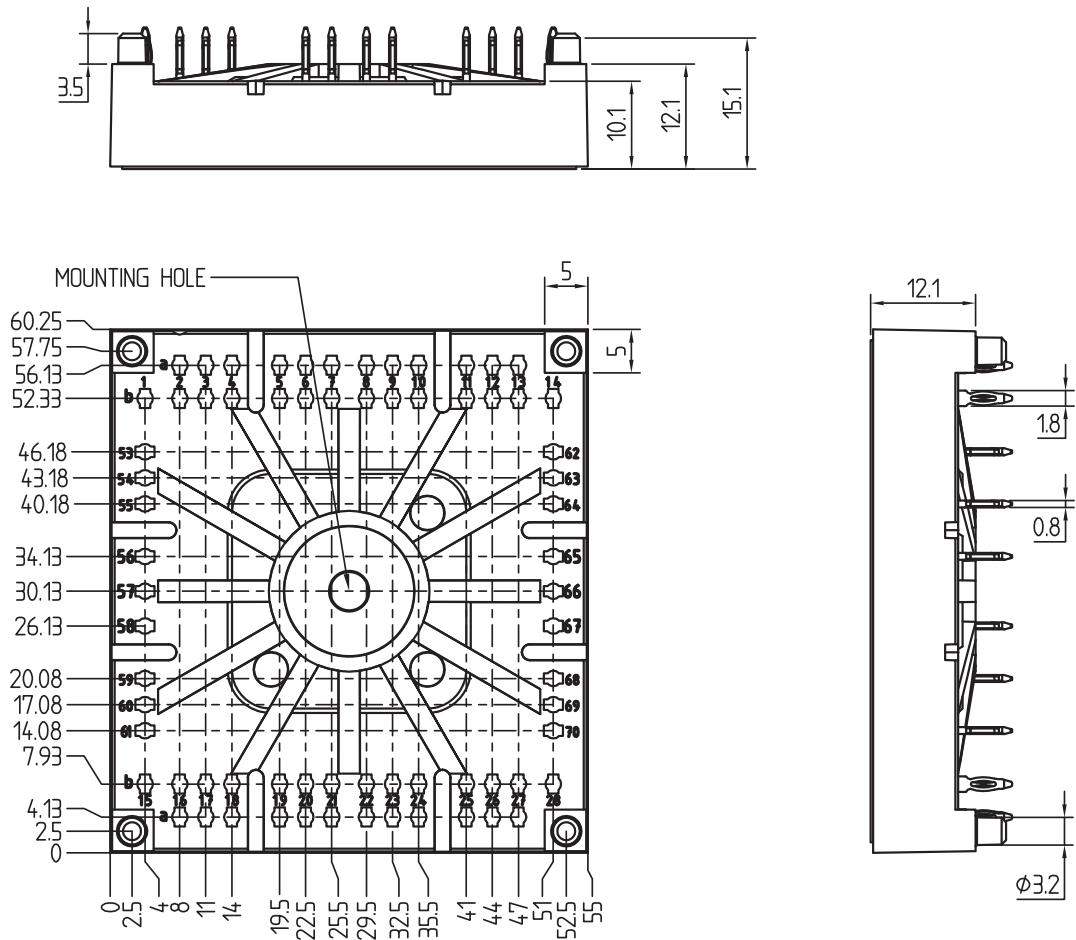


Fig. 10: Typ. CAL diode forward charact., incl.  $R_{CC'+EE'}$

# SK 50 GD 12T4 Tp

dimensions in mm  
tolerance system: ISO 2768-m



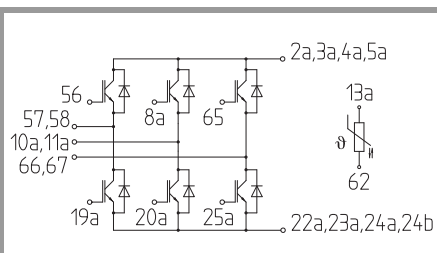
Suggested drilled hole diameter for terminal pins in the circuit board:

- minimum: 1.575mm
- typical: 1.6mm
- maximum: 1.625mm

Suggested hole diameter for the mounting pins in the circuit board: 3.6mm

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## SEMITOP 4 Press-Fit



GD-T

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

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