

SKiiP 13AC12T4V1



MiniSKiiP® 1

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Features

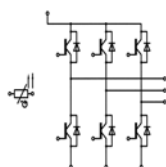
- Trench 4 IGBT's
- Robust and soft freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognised file no. E63532

Typical Applications*

- Inverter up to 14 kVA
- Typical motor power 7,5 kW

Remarks

- V_{CEsat} , V_F = chip level value
- Case temp. limited to $T_C = 125^\circ\text{C}$ max. (for baseplateless modules $T_C = T_S$)
- Product rel. results valid for $T_j \leq 150$ (recomm. $T_{op} = -40 \dots +150^\circ\text{C}$)



AC

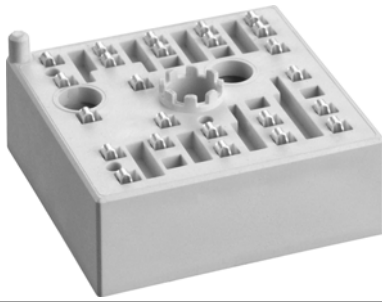
Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Inverter - IGBT				
V _{CES}	T _j = 25 °C		1200	V
I _C	T _j = 175 °C	T _s = 25 °C	41	A
		T _s = 70 °C	34	A
I _{Cnom}			25	A
I _{CRM}	I _{CRM} = 3 x I _{Cnom}		75	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 800 V V _{GE} ≤ 15 V V _{CES} ≤ 1200 V	T _j = 150 °C	10	μs
T _j			-40 ... 175	°C
Inverse - Diode				
I _F	T _j = 175 °C	T _s = 25 °C	32	A
		T _s = 70 °C	26	A
I _{Fnom}			25	A
I _{FRM}	I _{FRM} = 3xI _{Fnom}		75	A
I _{FSM}	10 ms, sin 180°, T _j = 150 °C		100	A
T _j			-40 ... 175	°C
Module				
I _{t(RMS)}	T _{terminal} = 80 °C, 20A per spring		40	A
T _{stg}			-40 ... 125	°C
V _{isol}	AC sinus 50Hz, t = 1 min		2500	V

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Inverter - IGBT					
$V_{CE(sat)}$	$I_C = 25\text{ A}$ $V_{GE} = 15\text{ V}$ chipsevel	$T_j = 25^\circ\text{C}$	1.85	2.10	V
		$T_j = 150^\circ\text{C}$	2.25	2.45	V
V_{CE0}		$T_j = 25^\circ\text{C}$	0.8	0.9	V
		$T_j = 150^\circ\text{C}$	0.7	0.8	V
r_{CE}	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$	42	48	m Ω
		$T_j = 150^\circ\text{C}$	62	66	m Ω
$V_{GE(th)}$	$V_{GE} = V_{CE}$, $I_C = 1\text{ mA}$	5	5.8	6.5	V
I_{CES}	$V_{GE} = 0\text{ V}$ $V_{CE} = 1200\text{ V}$	$T_j = 25^\circ\text{C}$	0.1	0.3	mA
					mA
C_{ies}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	1.43		nF
C_{oes}		$f = 1\text{ MHz}$	0.12		nF
C_{res}		$f = 1\text{ MHz}$	0.09		nF
Q_G	- 8 V...+ 15 V		142		nC
R_{Gint}	$T_j = 25^\circ\text{C}$		0.00		Ω
$t_{d(on)}$	$V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$	44		ns
t_r	$I_C = 25\text{ A}$	$T_j = 150^\circ\text{C}$	46		ns
		$T_j = 150^\circ\text{C}$	3.7		mJ
E_{on}	$R_{G on} = 39\text{ }\Omega$	$T_j = 150^\circ\text{C}$			
$t_{d(off)}$	$R_{G off} = 39\text{ }\Omega$ $di/dt_{on} = 465\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$	330		ns
		$T_j = 150^\circ\text{C}$	62		ns
t_f	$di/dt_{off} = 350\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$			
E_{off}	$V_{GE} = +15/-15\text{ V}$	$T_j = 150^\circ\text{C}$	2.4		mJ
$R_{th(j-s)}$	per IGBT		1		K/W

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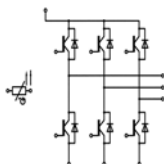
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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse - Diode						
V _F = V _{EC}	I _F = 25 A	T _j = 25 °C		2.4	2.7	V
	V _{GE} = 0 V chiplevel	T _j = 150 °C		2.5	2.8	V
V _{F0}		T _j = 25 °C		1.3	1.5	V
		T _j = 150 °C		0.9	1.1	V
r _F		T _j = 25 °C		44	50	mΩ
		T _j = 150 °C		62	68	mΩ
I _{RRM}	I _F = 25 A	T _j = 150 °C		19		A
Q _{rr}	di/dt _{off} = 640 A/μs	T _j = 150 °C		4		μC
E _{rr}	V _{GE} = -15 V	T _j = 150 °C		1.64		mJ
	V _{CC} = 600 V					
R _{th(j-s)}	per Diode			1.52		K/W
Module						
M _s	to heat sink		2		2.5	Nm
w				35		g
Temperatur Sensor						
R ₁₀₀	T _C =100°C (R ₂₅ =1000Ω)			1670 ± 3%		Ω
R(T)	R(T)=1000Ω[1+A(T-25°C)+B(T-25°C) ²], A = 7.635*10 ⁻³ °C ⁻¹ , B = 1.731*10 ⁻⁵ °C ⁻²					



AC

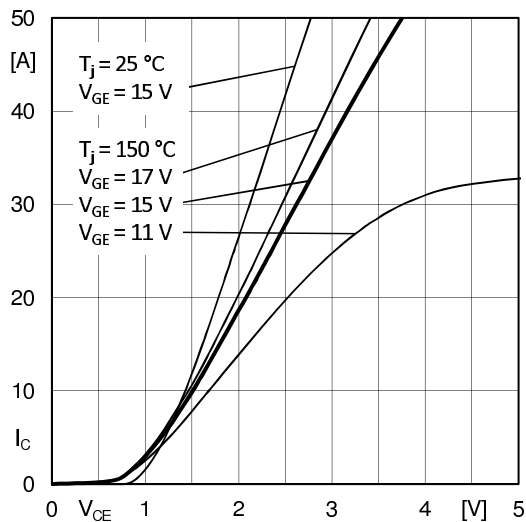


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

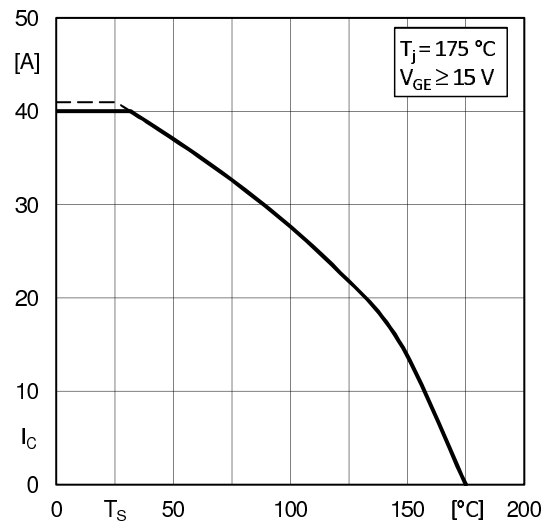


Fig. 2: Rated current vs. temperature $I_C = f(T_S)$

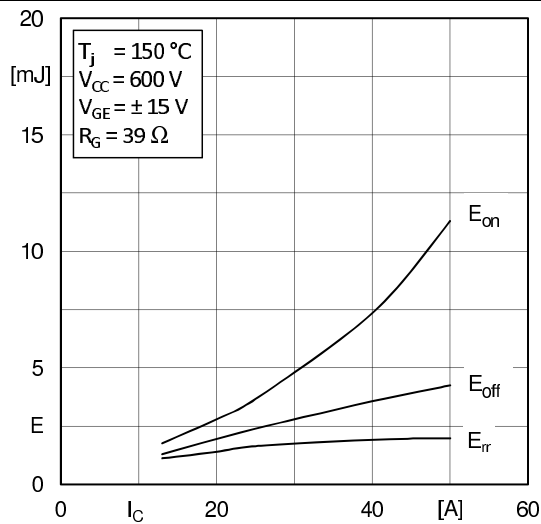


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

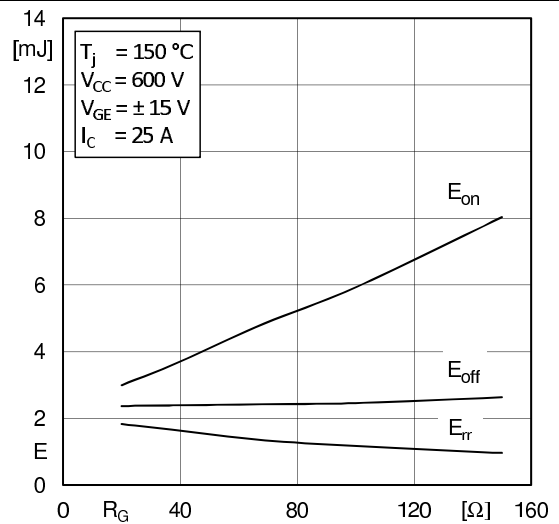


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

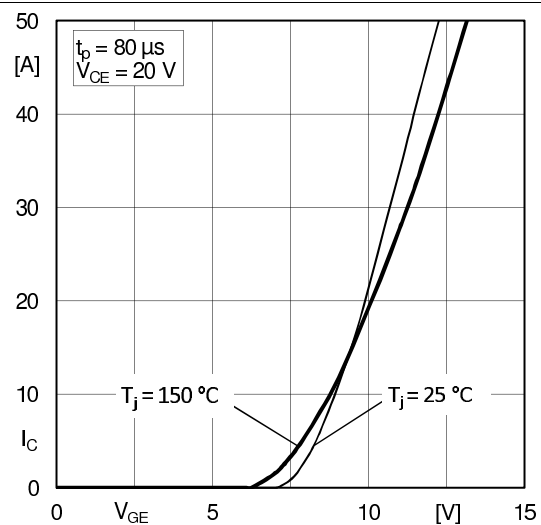


Fig. 5: Typ. transfer characteristic

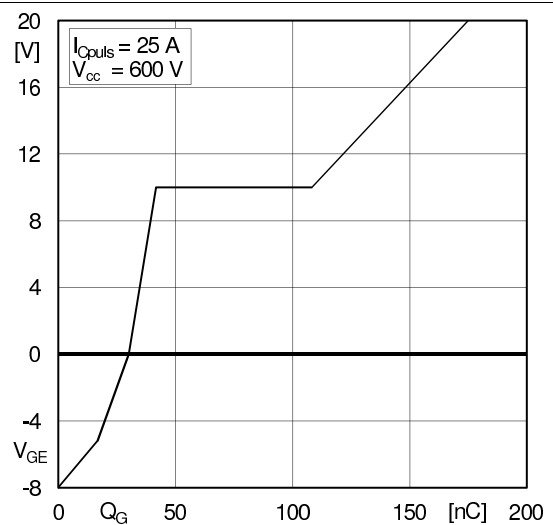


Fig. 6: Typ. gate charge characteristic

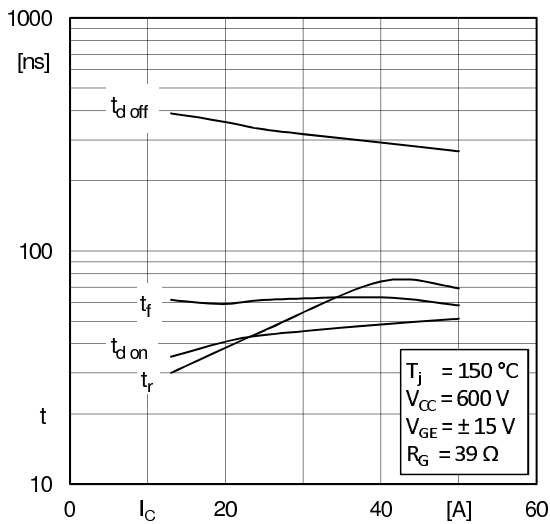


Fig. 7: Typ. switching times vs. I_C

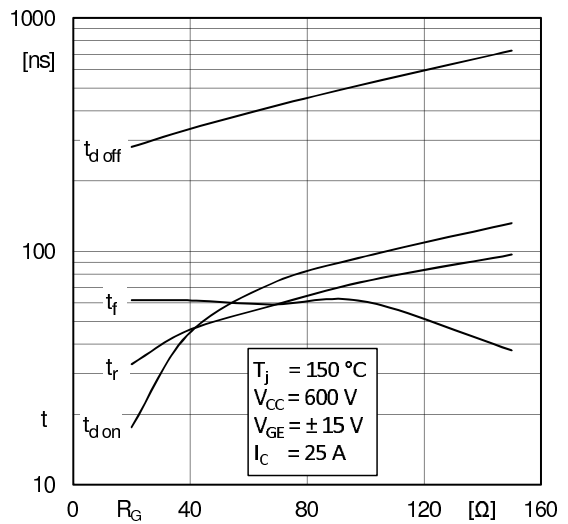


Fig. 8: Typ. switching times vs. gate resistor R_G

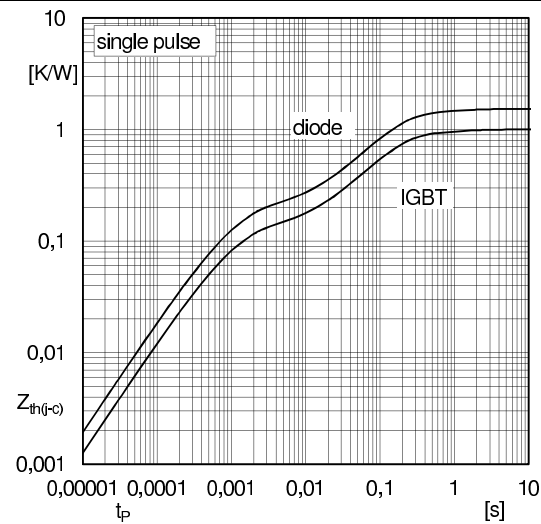


Fig. 9: Transient thermal impedance of IGBT and Diode

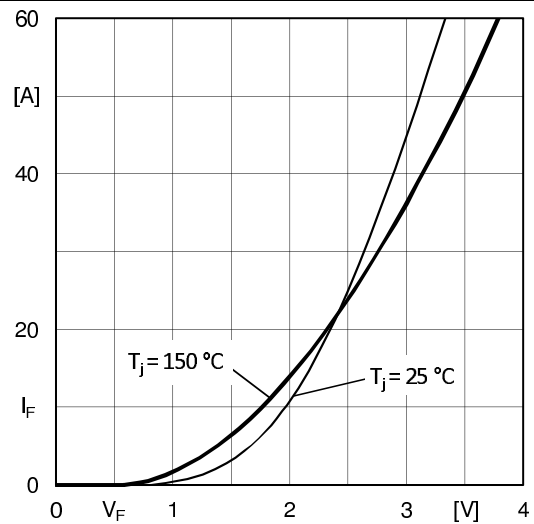


Fig. 10: CAL diode forward characteristic

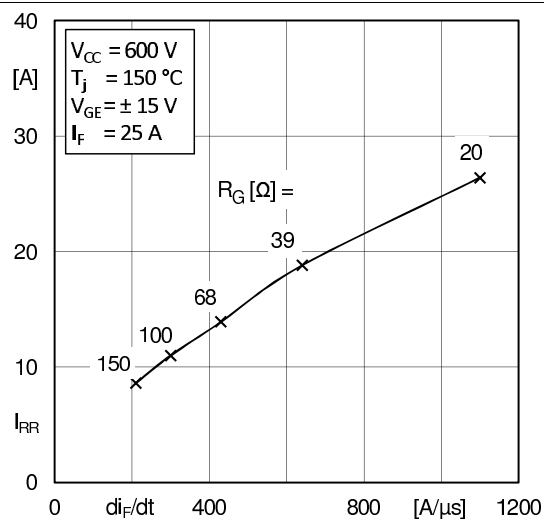


Fig. 11: Typ. CAL diode peak reverse recovery current

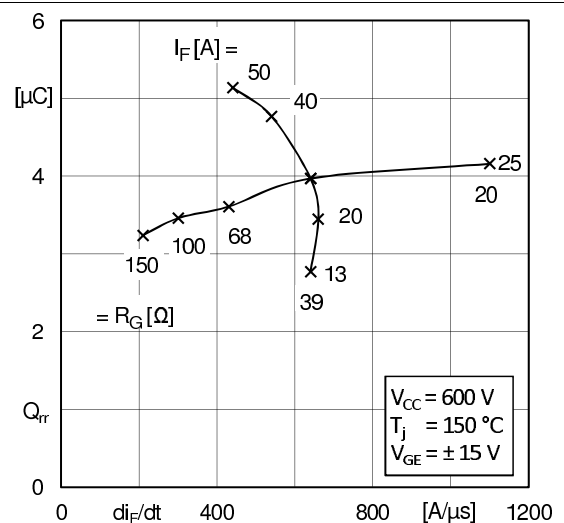
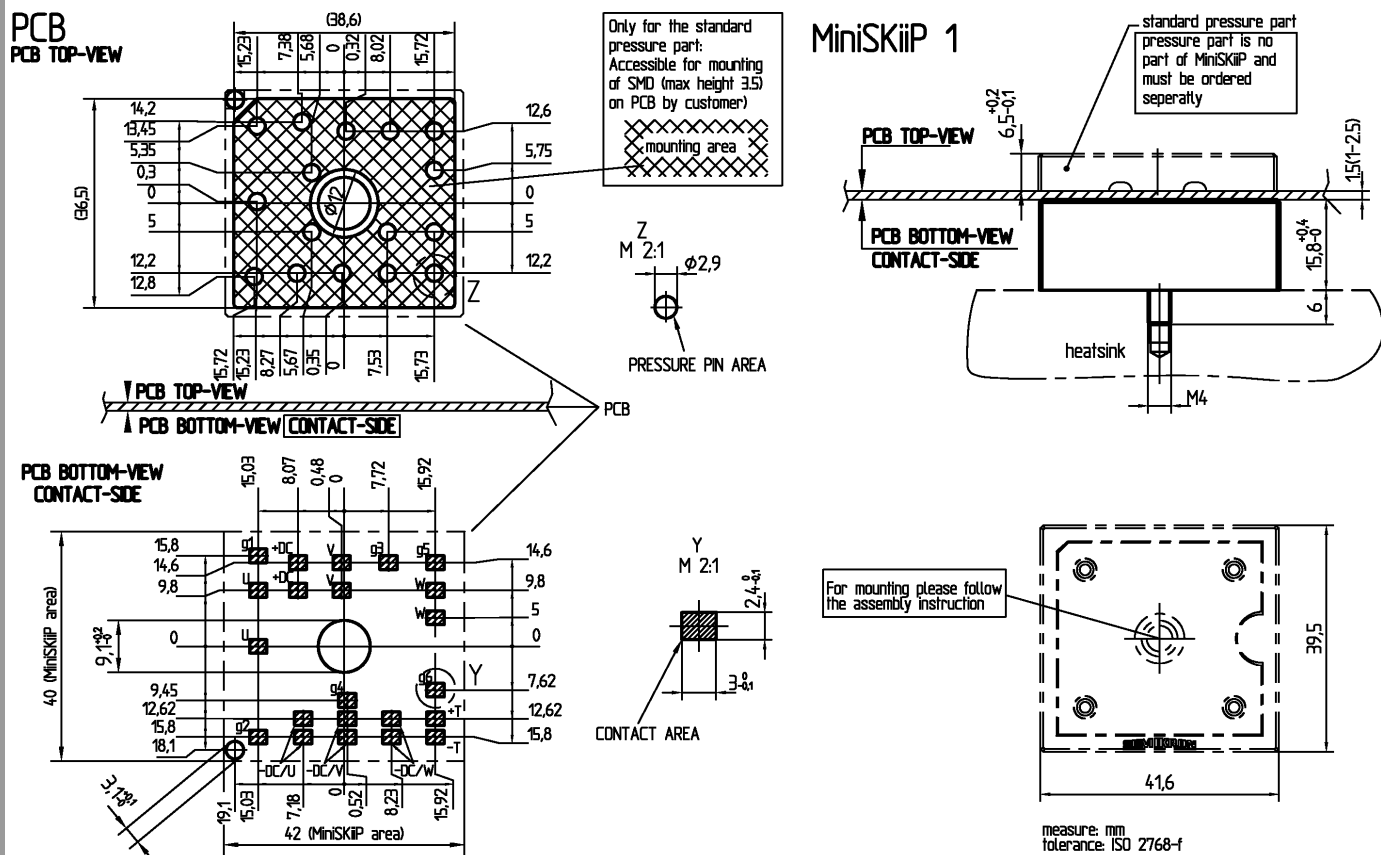
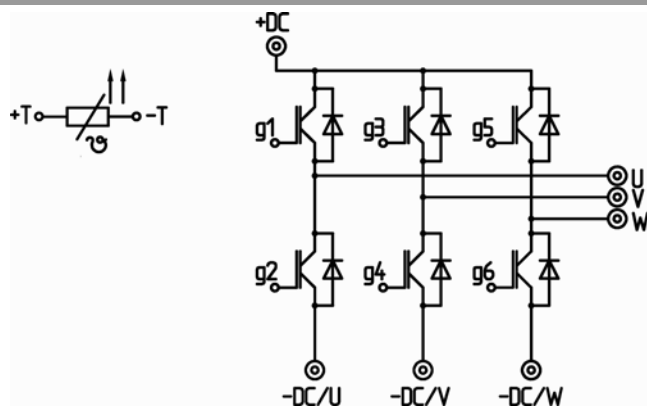


Fig. 12: Typ. CAL diode recovery charge



pinout, dimensions



- ⊙ power connector
- control connector

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.