

MiniSKiiP® 2

3-phase bridge rectifier +
brake chopper

SKiiP 28ANB18V3

Features

- Trench IGBTs
- Robust and soft freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognised: File no. E63532

Remarks

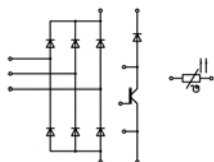
- Max. case temperature limited to $T_C=125^{\circ}\text{C}$
- Product reliability results valid for $T_j \leq 150^{\circ}\text{C}$ (recommended $T_{j,op} = -40 \dots +150^{\circ}\text{C}$)
- IGBT 1: brake chopper IGBT
- Diode 1: brake chopper diode
- Diode 4: rectifier diode
- The distance between terminals of temperature sensor and –rect is not sufficient for basic insulation

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
IGBT 1				
V _{CES}	T _j = 25 °C		1700	V
I _C	T _j = 150 °C	T _s = 25 °C	115	A
		T _s = 70 °C	88	A
I _C	T _j = 175 °C	T _s = 25 °C	128	A
		T _s = 70 °C	104	A
I _{Cnom}			100	A
I _{CRM}	I _{CRM} = 2 x I _{Cnom}		200	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 1200 V V _{GE} ≤ 20 V V _{CES} ≤ 1700 V	T _j = 150 °C	10	μs
T _j			-40 ... 175	°C

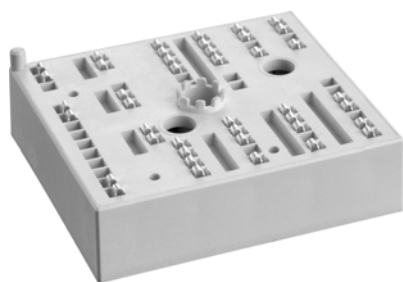
Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
Diode 1				
V _{RRM}	T _j = 25 °C		1700	V
I _F	T _j = 150 °C	T _s = 25 °C	105	A
		T _s = 70 °C	76	A
I _F	T _j = 175 °C	T _s = 25 °C	119	A
		T _s = 70 °C	93	A
I _{Fnom}			150	A
I _{FRM}	I _{FRM} = 2 x I _{Fnom}		300	A
I _{FSM}	10 ms, sin 180°, T _j = 150 °C		860	A
T _j			-40 ... 175	°C

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
Diode 4				
V _{RRM}			1800	V
I _F	T _j = 150 °C	T _s = 25 °C	139	A
		T _s = 70 °C	98	A
I _{Fnom}	DC current		88	A
I _{FSM}	10 ms, sin 180°, T _j = 150 °C		890	A
I ² t	10 ms, sin. 180°, T _j = 150 °C		3900	A ² s
T _j			-40 ... 150	°C

Absolute Maximum Ratings			
Symbol	Conditions	Values	Unit
Module			
I _{t(RMS)}	T _{terminal} = 80 °C, 20 A per spring	80	A
T _{stg}		-40 ... 125	°C
V _{isol}	AC sinus 50 Hz, t = 1 min	2500	V



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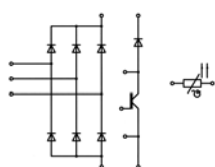
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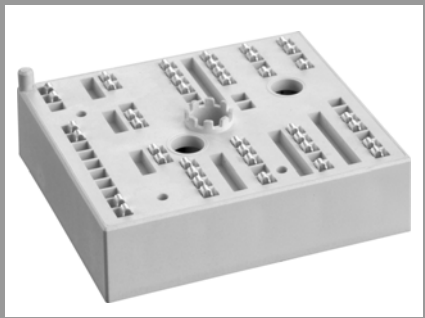
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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
IGBT 1						
V _{CE(sat)}	I _C = 100 A	T _j = 25 °C		2.00	2.40	V
	V _{GE} = 15 V chiplevel	T _j = 150 °C		2.45	2.90	V
V _{CE0}	chiplevel	T _j = 25 °C		1	1.2	V
		T _j = 150 °C		0.9	1.1	V
r _{CE}	V _{GE} = 15 V chiplevel	T _j = 25 °C		10	12	mΩ
		T _j = 150 °C		16	18	mΩ
V _{GE(th)}	V _{GE} = V _{CE} V, I _C = 4 mA		5.2	5.8	6.4	V
I _{CES}	V _{GE} = 0 V	T _j = 25 °C		0.1	0.3	mA
	V _{CE} = 1700 V					mA
C _{ies}	V _{CE} = 25 V V _{GE} = 0 V	f = 1 MHz		8.82		nF
C _{oes}		f = 1 MHz		0.37		nF
C _{res}		f = 1 MHz		0.29		nF
Q _G	- 8 V...+ 15 V			934		nC
R _{Gint}	T _j = 25 °C			4.8		Ω
t _{d(on)}	V _{CC} = 900 V	T _j = 150 °C		160		ns
t _r	I _C = 100 A	T _j = 150 °C		35		ns
E _{on}	R _{G on} = 1 Ω	T _j = 150 °C		23		mJ
t _{d(off)}	R _{G off} = 1 Ω	T _j = 150 °C		580		ns
t _f	di/dt _{on} = 3000 A/μs	T _j = 150 °C		150		ns
E _{off}	V _{GE neg} = -15 V	T _j = 150 °C		32.7		mJ
	V _{GE pos} = 15 V					
R _{th(j-s)}	per IGBT, λ _{paste} =0.8 W/K*m			0.33		K/W

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Diode 1						
V _F = V _{EC}	I _F = 100 A	T _j = 25 °C		1.8	2.1	V
	V _{GE} = 0 V chiplevel	T _j = 150 °C		1.8	2.1	V
V _{F0}	chiplevel	T _j = 25 °C		1.3	1.6	V
		T _j = 150 °C		1.1	1.2	V
r _F	chiplevel	T _j = 25 °C		4.4	5.4	mΩ
		T _j = 150 °C		6.9	8.7	mΩ
I _{RRM}	I _F = 100 A	T _j = 150 °C		226		A
Q _{rr}	di/dt _{off} = 4000 A/μs	T _j = 150 °C		38.5		μC
E _{rr}	V _{GE} = -15 V	T _j = 150 °C		26.4		mJ
R _{th(l-s)}	per Diode, λ _{paste} =0.8 W/K*m			0.58		K/W

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Diode 4						
V _F = V _{EC}	I _F = 88 A	T _j = 25 °C		1.1	1.3	V
	V _{GE} = 0 V chiplevel	T _j = 125 °C		1	1.3	V
V _{F0}	chiplevel	T _j = 25 °C	0.6	0.9	1.1	V
		T _j = 125 °C		0.7	1	V
r _F	chiplevel	T _j = 25 °C		2.3	2.6	mΩ
		T _j = 125 °C		3	3.3	mΩ
R _{th(j-s)}	per Diode, λ _{paste} =0.8 W/K*m			0.64		K/W

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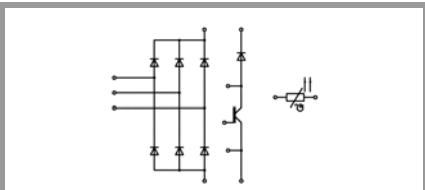
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Symbol	Conditions	min.	typ.	max.	Unit
Temperature Sensor					
R_{100}	$T_r=100^{\circ}\text{C}$ ($R_{25}=1000\Omega$)		$1670 \pm 3\%$		Ω
$R(T)$	$R(T)=1000\Omega[1+A(T-25^{\circ}\text{C})+B(T-25^{\circ}\text{C})^2]$, $A = 7.635 \cdot 10^{-3} \text{ }^{\circ}\text{C}^{-1}$, $B = 1.731 \cdot 10^{-5} \text{ }^{\circ}\text{C}^{-2}$				

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
Module					
M_s	to heat sink	2		2.5	Nm
w	weight		55		g



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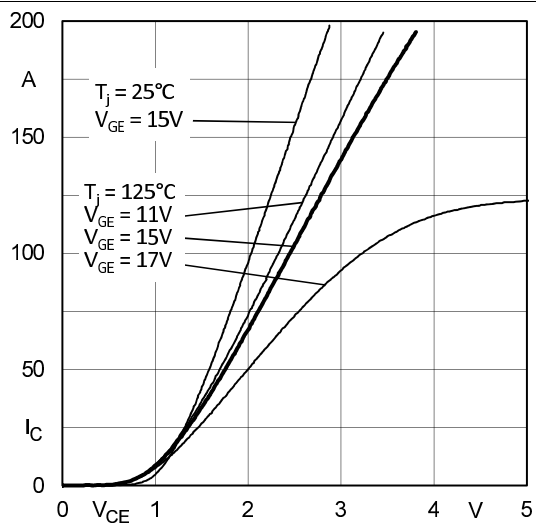


Fig. 1: Typ. output characteristic, inclusive $R_{CC} + EE'$

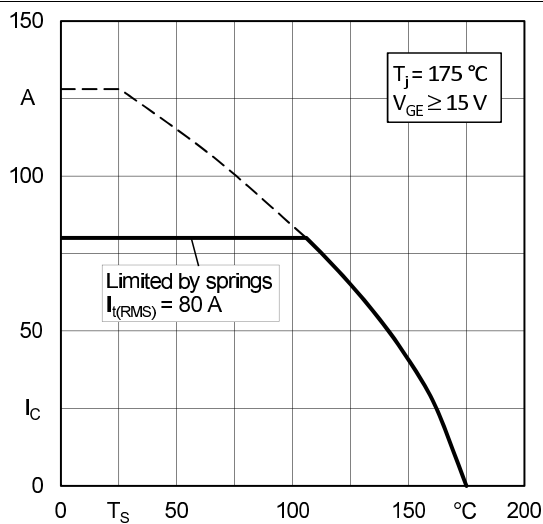


Fig. 2: Typ. rated current vs. temperature $I_C = f(T_S)$

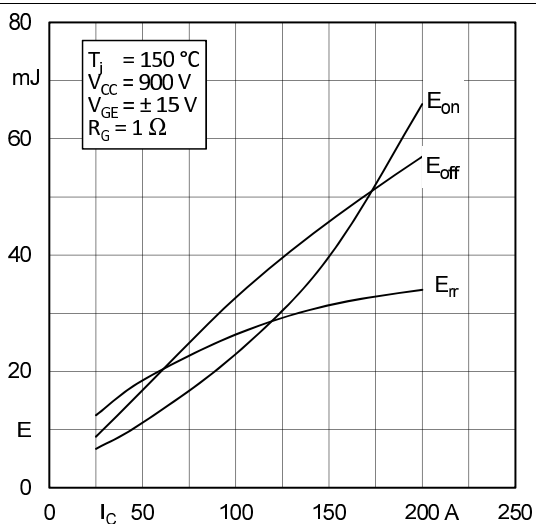


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

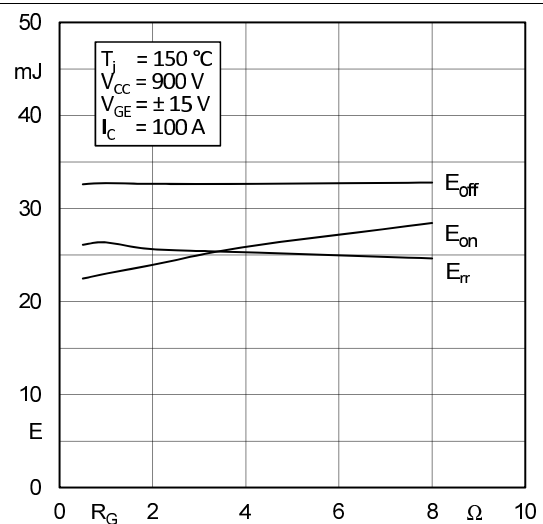


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

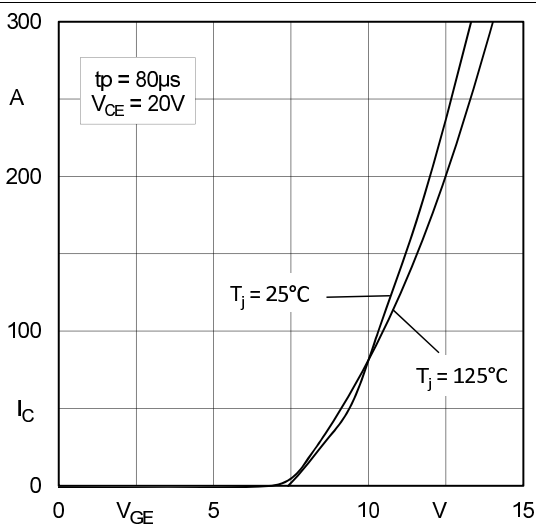


Fig. 5: Typ. transfer characteristic

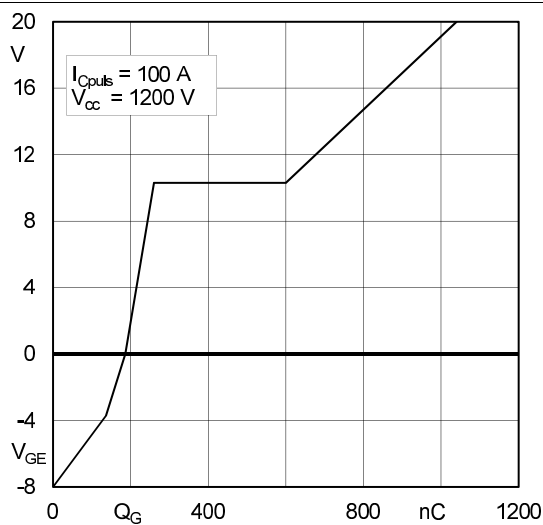


Fig. 6: Typ. gate charge characteristic

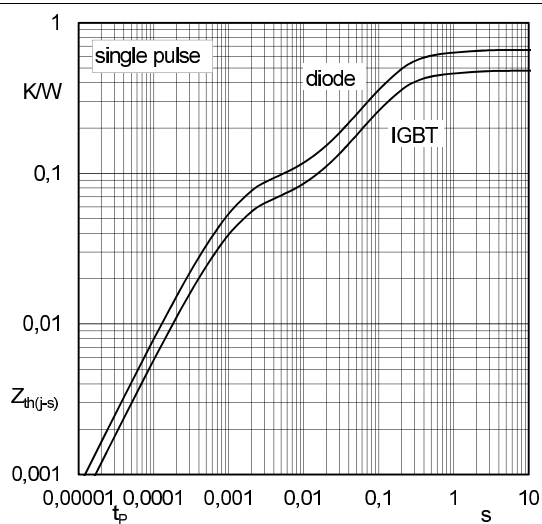


Fig. 7: Transient thermal impedance of IGBT and Diode

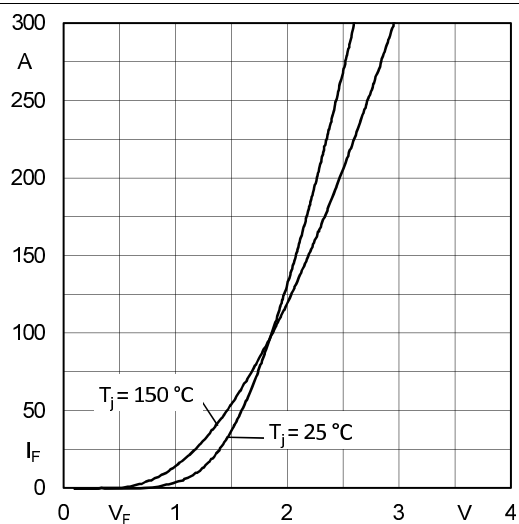


Fig. 8: CAL diode forward characteristic

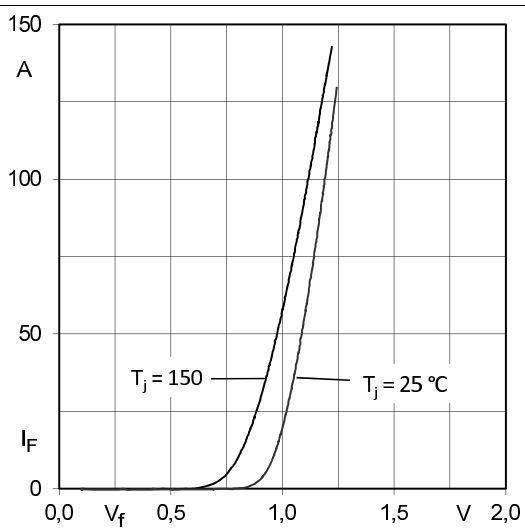
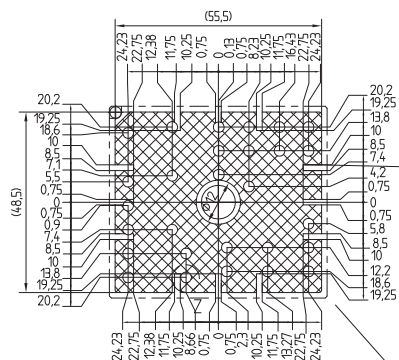


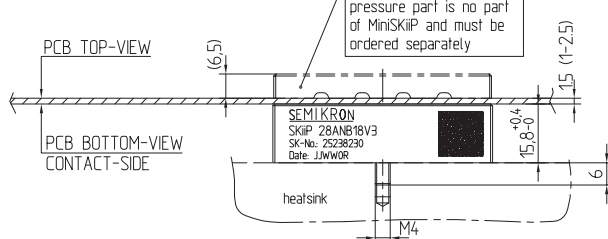
Fig. 9: Typ. input bridge forward characteristic

PCB

PCB TOP-VIEW

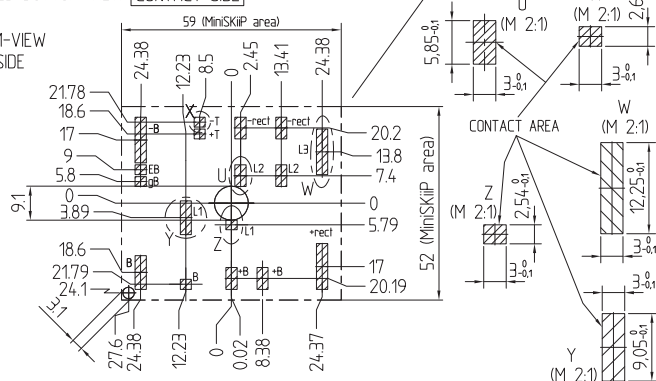


MiniSKiiP 2

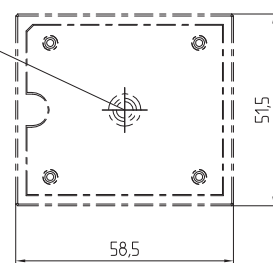


PCB TOP-VIEW
PCB BOTTOM-VIEW CONTACT-SIDE

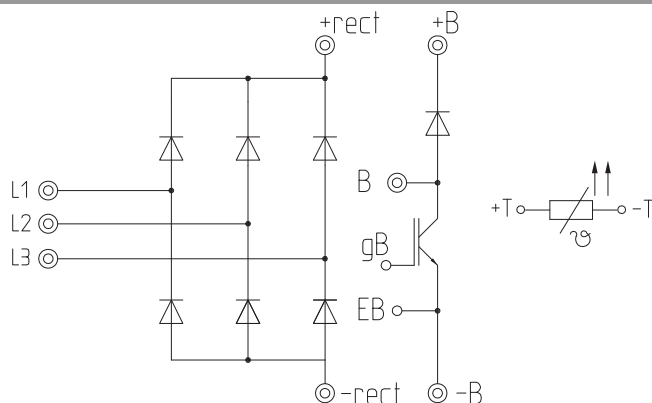
PCB BOTTOM-VIEW CONTACT-SIDE



For mounting please follow the assembly instruction



pinout, dimensions



pinout

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.