SKIIP 12NAB126V1 CONVERTER, INVERTER, BRAKE

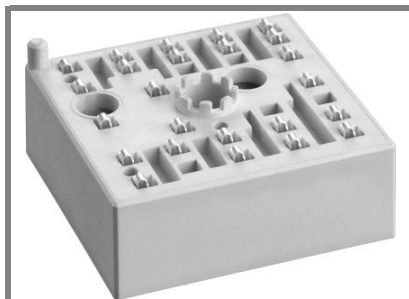## MiniSKiiP® 1

3-phase bridge rectifier +
brake chopper + 3-phase
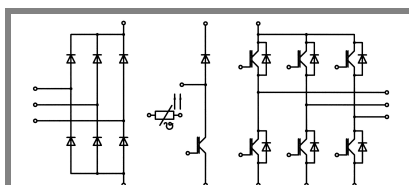bridge inverter
SKiiP 12NAB126V1

Features
- Fast Trench IGBTs
- 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 10 kVA
- Typical motor power 5,5 kW

Remarks
- V_{CEsat}, V_F = chip level value

NAB

Absolute Maximum Ratings		T_s = 25 °C, unless otherwise specified	
Symbol	**Conditions**	**Values**	**Units**
IGBT - Inverter, Chopper			
V_{CES}		1200	V
I_C	T_s = 25 (70) °C	28 (22)	A
I_{CRM}		30	A
V_{GES}		± 20	V
T_j		- 40 ... + 150	°C
Diode - Inverter, Chopper			
I_F	T_s = 25 (70) °C	26 (20)	A
I_{FRM}		30	A
T_j		- 40 ... + 150	°C
Diode - Rectifier			
V_{RRM}		1600	V
I_F	T_s = 70 °C	35	A
I_{FSM}	t_p = 10 ms, sin 180 °, T_j = 25 °C	220	A
i^2t	t_p = 10 ms, sin 180 °, T_j = 25 °C	240	A²s
T_j		- 40 ... + 150	°C
Module			
I_{tRMS}	per power terminal (20 A / spring)	20	A
T_{stg}		- 40 ... + 125	°C
V_{isol}	AC, 1 min.	2500	V

Characteristics			T_s = 25 °C, unless otherwise specified		
Symbol	**Conditions**	**min.**	**typ.**	**max.**	**Units**
IGBT - Inverter, Chopper					
V_{CEsat}	I_{Cnom} = 15 A, T_j = 25 (125) °C		1,7 (2)	2,1 (2,4)	V
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 0,6 mA	5	5,8	6,5	V
$V_{CE(TO)}$	T_j = 25 (125) °C		1 (0,9)	1,2 (1,1)	V
r_T	T_j = 25 (125) °C		47 (73)	60 (87)	mΩ
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		1		nF
C_{oes}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		0,1		nF
C_{res}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		0,1		nF
$R_{th(j-s)}$	per IGBT		1,15		K/W
$t_{d(on)}$	under following conditions		25		ns
t_r	V_{CC} = 600 V, V_{GE} = ± 15 V		25		ns
$t_{d(off)}$	I_{Cnom} = 15 A, T_j = 125°C		385		ns
t_f	R_{Gon} = R_{Goff} = 30 Ω		90		ns
E_{on}	inductive load		2		mJ
E_{off}			1,9		mJ
Diode - Inverter, Chopper					
V_F = V_{EC}	I_{Fnom} = 15 A, T_j = 25 (125) °C		1,6 (1,6)	1,8 (1,8)	V
$V_{(TO)}$	T_j = 25 (125) °C		1 (0,8)	1,1 (0,9)	V
r_T	T_j = 25 (125) °C		40 (53)	47 (60)	mΩ
$R_{th(j-s)}$	per diode		1,95		K/W
I_{RRM}	under following conditions		25		A
Q_{rr}	I_{Fnom} = 15 A, V_R = 600 V		3		µC
E_{rr}	V_{GE} = 0 V, T_j = 125 °C		1,3		mJ
	di_F/dt = 900 A/µs				
Diode - Rectifier					
V_F	I_{Fnom} = 15 A, T_j = 25 °C		1,1		V
$V_{(TO)}$	T_j = 150 °C		0,8		V
r_T	T_j = 150 °C		20		mΩ
$R_{th(j-s)}$	per diode		1,5		K/W
Temperature Sensor					
R_{ts}	3 %, T_r = 25 (100) °C		1000(1670)		Ω
Mechanical Data					
w			35		g
M_s	Mounting torque	2		2,5	Nm

Fig. 1

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40 A

V_{GE}, T_j
15 V, 25 °C
11 V, 125 °C
15 V, 125 °C
17 V, 125 °C

30

20

10

I_C

0

0 1 2 3 4

V_{CE} V
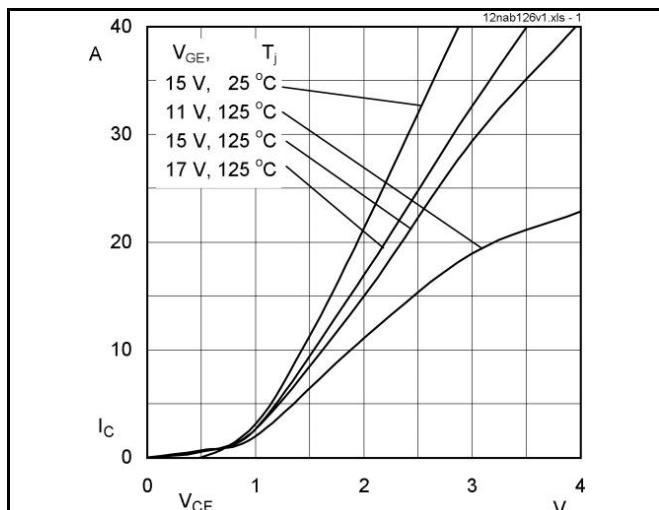
Fig. 1 Typ. output characteristic

Fig. 2

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30 A

T_j = 150 °C
V_{GE} = 15 V

20

Limited by terminals
to I_{tRMS} = 20 A

10

I_C

0

0 50 100 150

T_S °C
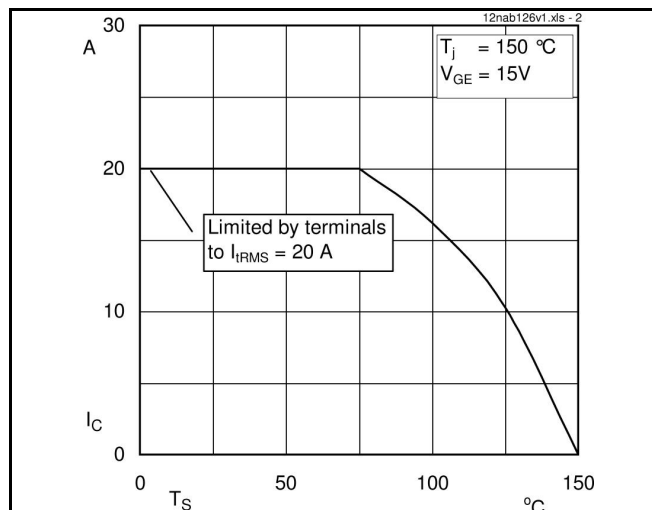
Fig. 2 Typ. rated current vs. temperature

Fig. 3

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50 A

V_{CE} = 20 V
t_p = 80 µs

40

30

20

10

T_j = 125 °C T_j = 25 °C

I_C

0

0 5 10 15

V_{GE} V
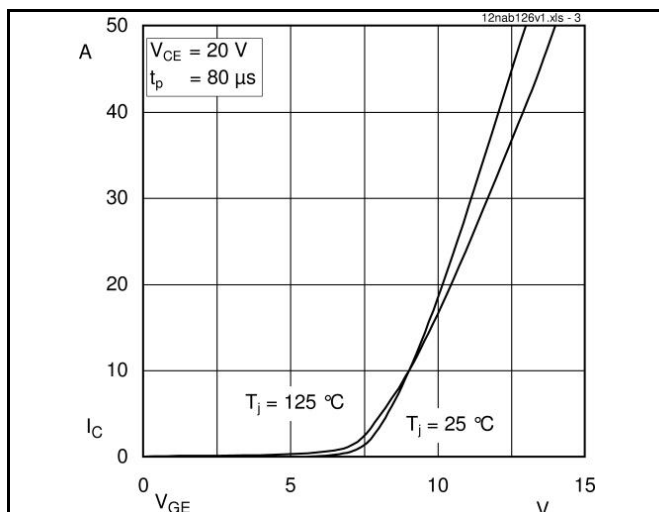
Fig. 3 Typ. transfer characteristic

Fig. 4

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50 A

T_j ≤ 150 °C
V_{GE} = ± 15 V

40

30

20

10

I_C

0

0 200 400 600 800 1000 1200 1400

V_{CE} V
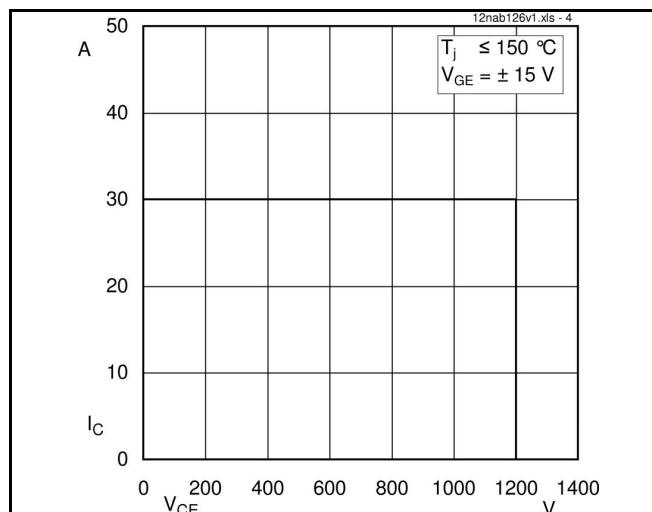
Fig. 4 Reverse bias safe operating area

Fig. 5

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10 mWs

T_j = 125 °C
V_{CE} = 600 V
V_{GE} = ± 15 V
R_G = 30 Ω

8

6

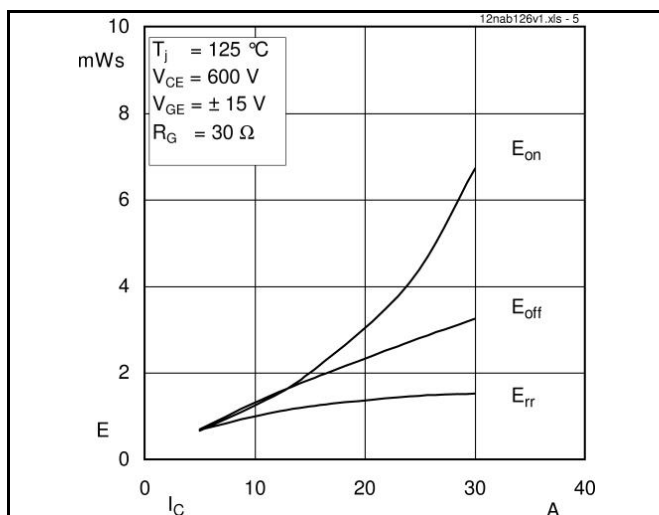E_{on}

4

E_{off}

2

E_{rr}

E

0

0 10 20 30 40

I_C A

Fig. 5 Typ. Turn-on /-off energy = f (I_C)

Fig. 6

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6 mWs

T_j = 125 °C
V_{CE} = 600 V
V_{GE} = ± 15V
I_C = 15 A

5

4

3

E_{on}

2

E_{off}

1

E_{rr}

E

0

0 20 40 60 80 100

R_G Ω
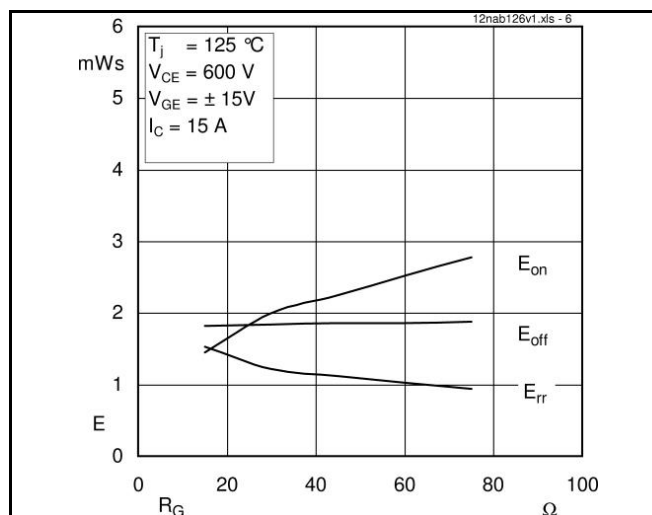
Fig. 6 Typ. Turn-on /-off energy = f (R_G)
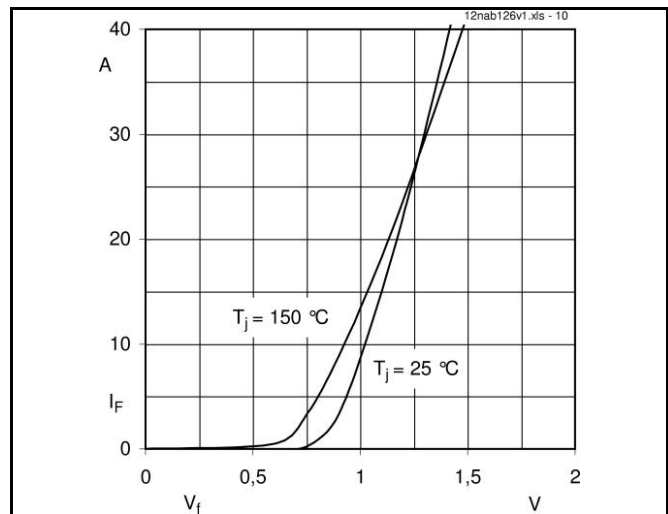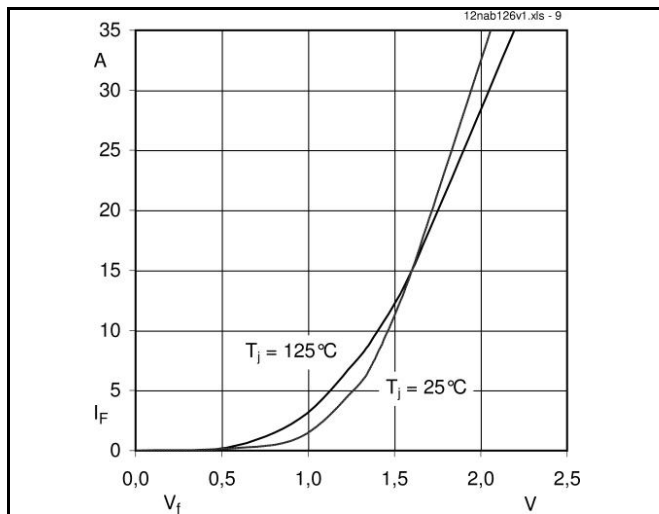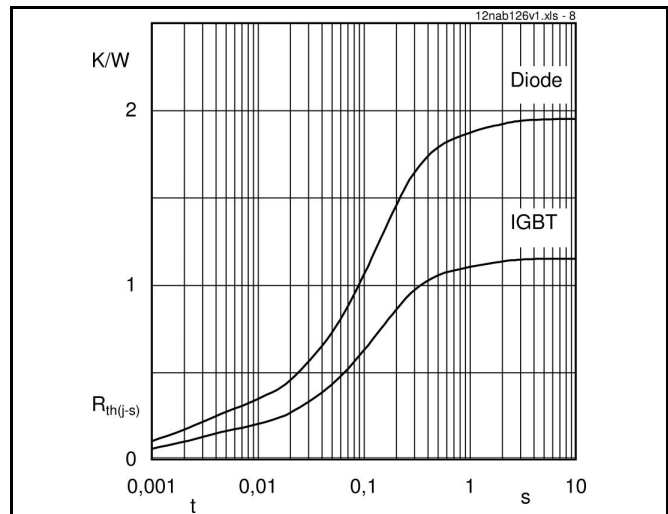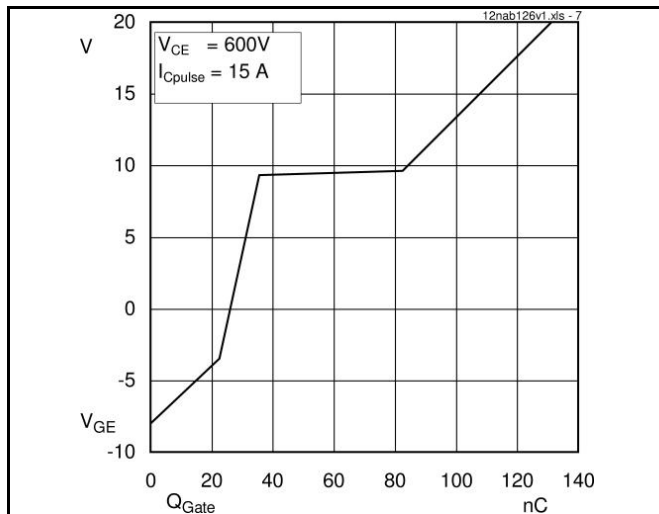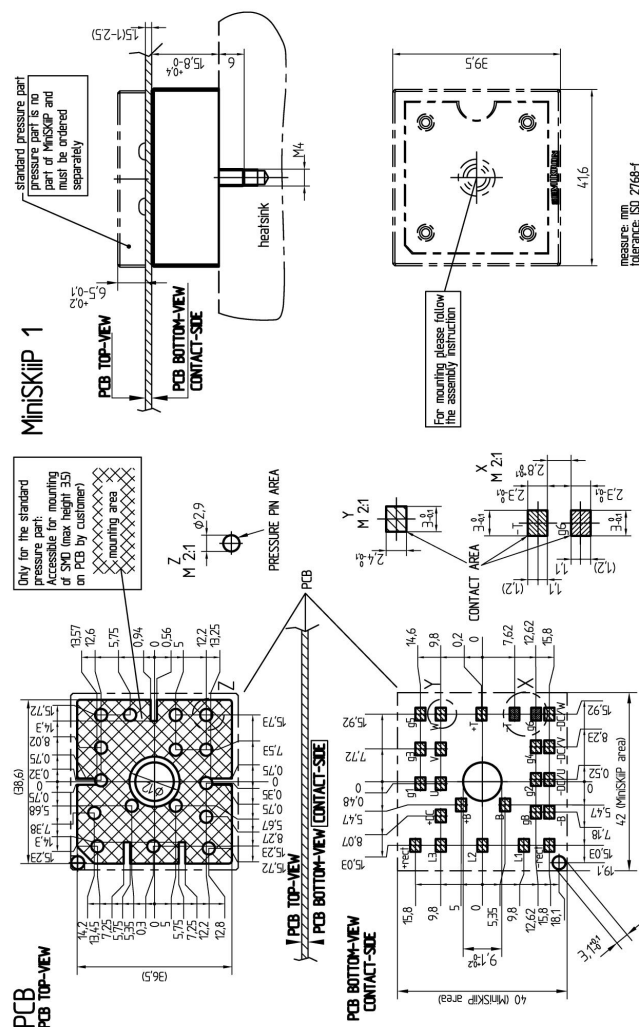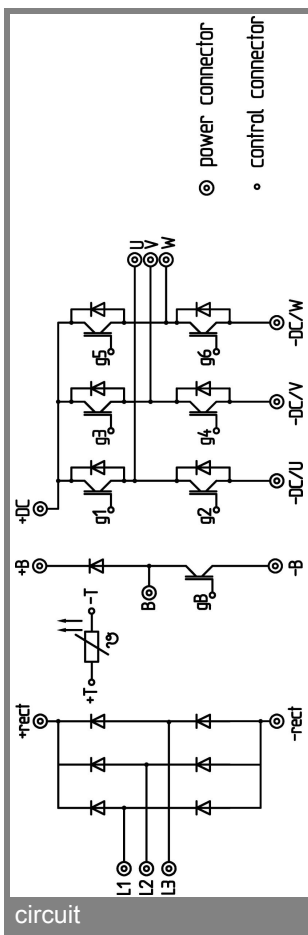
Fig. 7 Typ. gate charge characteristic

Fig. 8 Typ. thermal impedance

Fig. 9 Typ. freewheeling diode forward characteristic

Fig. 10 Typ. input bridge forward characteristic

circuit

pinout, dimensions

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 personal.