SEMIKRON

Absolute Maximum Ratings

Symbol	Conditions [1]	Values	Units
Inverter			
V_{CES}		600	V
V_{GES}		± 20	V
I_C	$T_{heatsink}$ = 25 / 80 °C	24 / 17	A
I_{CM}	t_p < 1 ms; $T_{heatsink}$ = 25 / 80 °C	48 / 34	A
$I_F = -I_C$	$T_{heatsink}$ = 25 / 80 °C	36 / 24	A
$I_{FM} = -I_{CM}$	t_p < 1 ms; $T_{heatsink}$ = 25 / 80 °C	72 / 48	A
Bridge Rectifier			
V_{RRM}		800	V
I_D	$T_{heatsink}$ = 80 °C	25	A
I_{FSM}	t_p = 10 ms; sin. 180 °, T_j = 25 °C	370	A
I^2t	t_p = 10 ms; sin. 180 °, T_j = 25 °C	680	A^2s
T_j		− 40 ... + 150	°C
T_{stg}		− 40 ... + 125	°C
V_{isol}	AC, 1 min.	2500	V

Characteristics

Symbol	Conditions [1]	min.	typ.	max.	Units
IGBT - Inverter & Chopper					
V_{CEsat}	I_C = 20 A T_j = 25 (125) °C	–	2,1(2,4)	2,6(2,9)	V
$t_{d(on)}$	V_{CC} = 300 V; V_{GE} = ± 15 V	–	30	–	ns
t_r	I_C = 20 A; T_j = 125 °C	–	35	–	ns
$t_{d(off)}$	$R_{gon} = R_{goff}$ = 47 Ω	–	200	–	ns
t_f	inductive load	–	25	–	ns
$E_{on} + E_{off}$		–	1,7	–	mJ
C_{ies}	V_{CE} = 25 V; V_{GE} = 0 V, 1 MHz	–	1,1	–	nF
R_{thjh}	per IGBT	–	–	1,7	K/W
Diode [2] - Inverter & Chopper					
$V_F = V_{EC}$	I_F = 25 A T_j = 25 (125) °C	–	1,45(1,4)	1,7(1,75)	V
V_{TO}	T_j = 125 °C	–	0,85	0,9	V
r_T	T_j = 125 °C	–	22	32	mΩ
I_{RRM}	I_F = 25 A, V_R = − 300 V	–	16	–	A
Q_{rr}	di_F/dt = − 500 A/µs	–	2	–	µC
E_{off}	V_{GE} = 0 V, T_j = 125°C	–	0,25	–	mJ
R_{thjh}	per diode	–	–	1,7	K/W
Diode - Rectifier					
V_F	I_F = 25 A T_j = 25 °C	–	1,2	–	V
R_{thjh}	per diode	–	–	1,7	K/W
Temperature Sensor					
R_{TS}	T = 25 / 100 °C		1000 / 1670		Ω
Shunts (SKiiP 21 NAB 063 I T1)					
$R_{cs(dc)}$	5 % [4]		16,5		mΩ
$R_{cs(ac)}$	1 %		10		mΩ
Mechanical Data					
M_1	Mounting torque	2	–	2,5	Nm
Case			M2		

**MiniSKiiP 2
SEMIKRON integrated
intelligent Power
SKiiP 21 NAB 063 T1
SKiiP 21 NAB 063 I T1** [3]
**3-phase bridge rectifier +
braking chopper +
3-phase bridge inverter**

Case M2
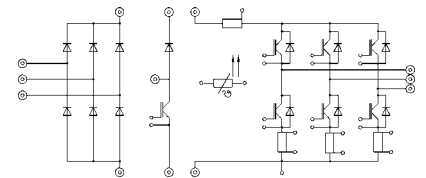
UL recognized file no. E63532

• fast NPT IGBTs

[1] $T_{heatsink}$ = 25 °C, unless otherwise specified
[2] CAL = Controlled Axial Lifetime Technology (soft and fast recovery)
[3] With integrated DC and AC shunts
[4] accuracy of pure shunt, please note that for DC shunt no separate sensing contact is used.

001127

ms21nab063t1.xls - 1
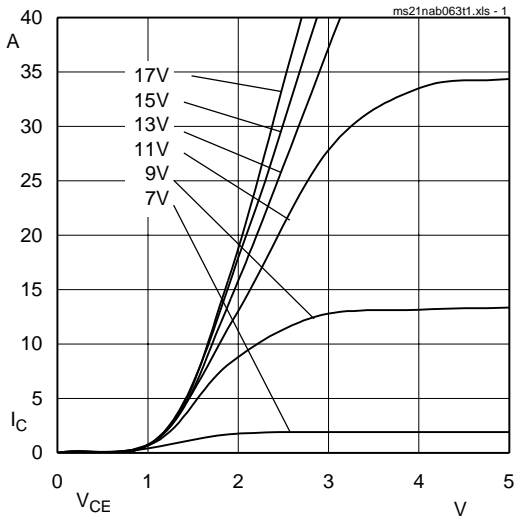
Fig. 1 Typ. output characteristic, t_p = 80 µs; 25 °C

ms21nab063t1.xls - 2

Fig. 2 Typ. output characteristic, t_p = 80 µs; 125 °C

ms21nab063t1.xls - 3

T_j = 125 °C
V_{CE} = 300 V
V_{GE} = ± 15 V
R_G = 47 Ω
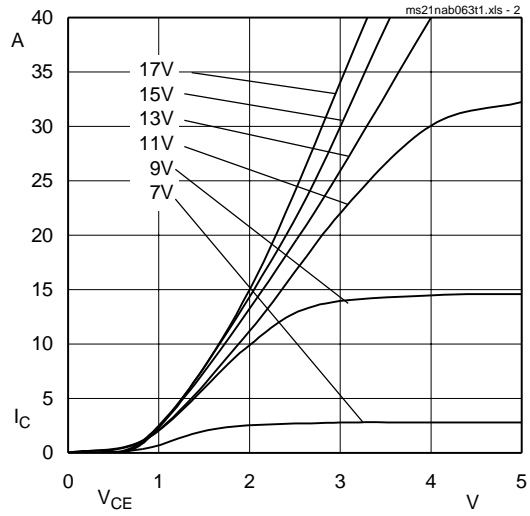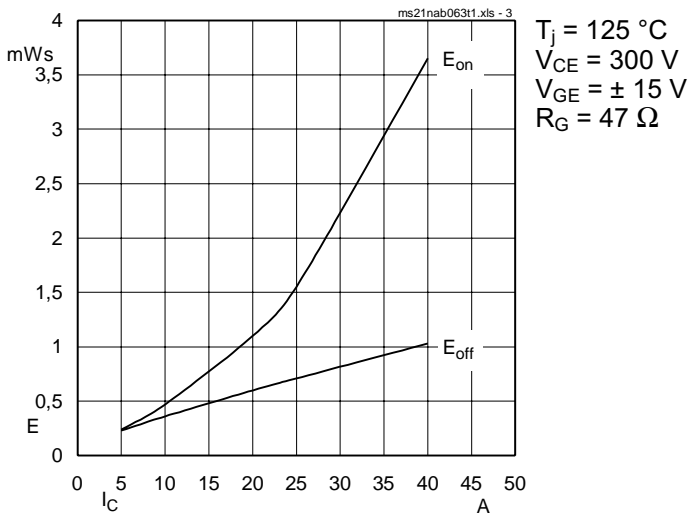
Fig. 3 Turn-on /-off energy = f (I_C)

ms21nab063t1.xls - 4

T_j = 125 °C
V_{CE} = 300 V
V_{GE} = ± 15 V
I_C = 20 A
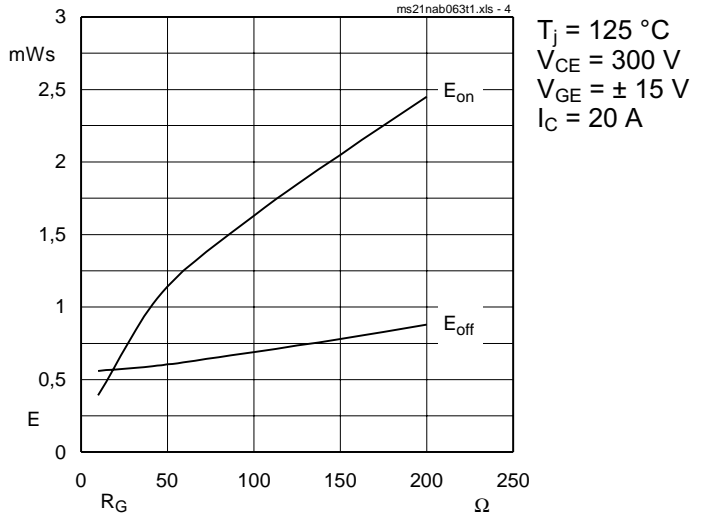
Fig. 4 Turn-on /-off energy = f (R_G)

ms21nab063t1.xls - 5

I_{Cpuls} = 20 A
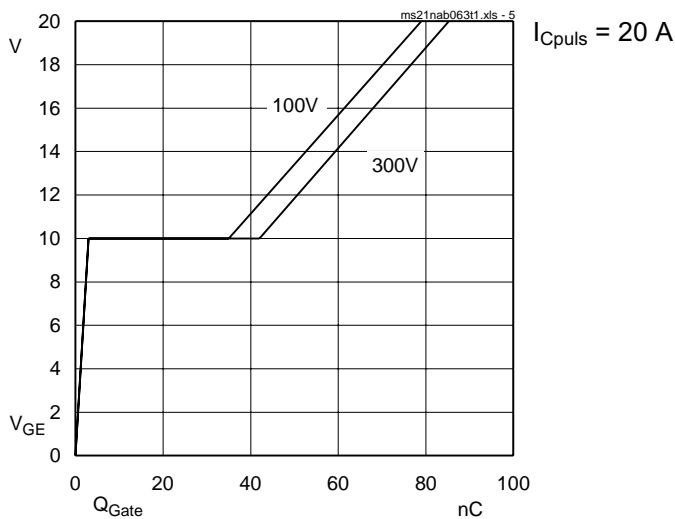
Fig. 5 Typ. gate charge characteristic

ms21nab063t1.xls - 6

V_{GE} = 0 V
f = 1 MHz
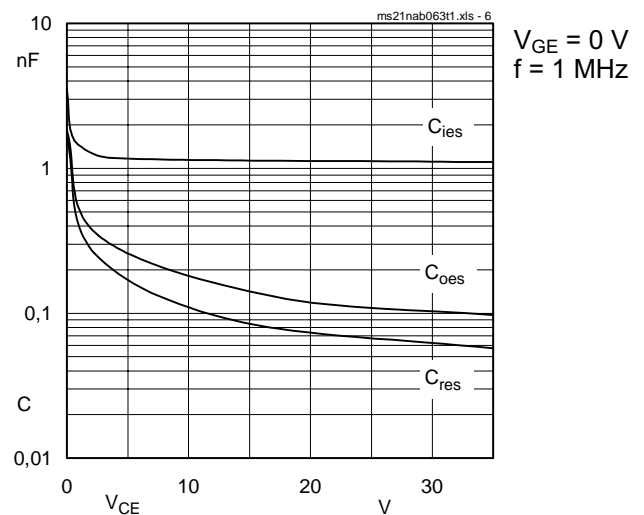
Fig. 6 Typ. capacitances vs. V_{CE}

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2. Common characteristics of MiniSKiiP

MiniSKiiP 600 V
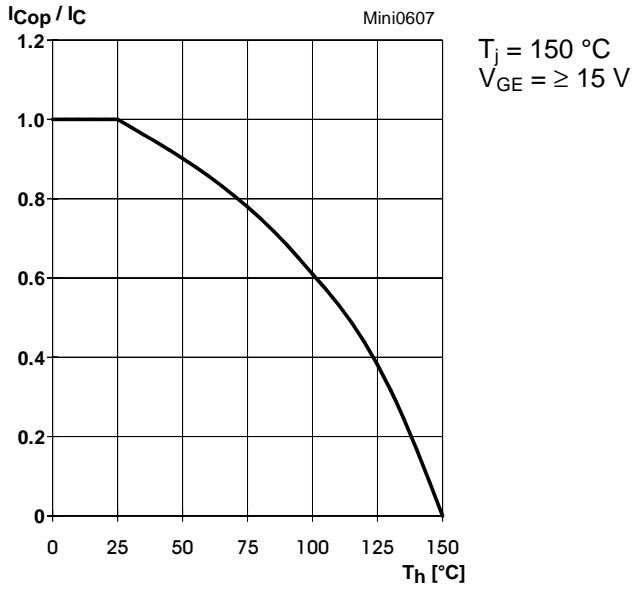
Fig. 7 Rated current of the IGBT $I_{Cop} / I_C = f (T_h)$

$T_j = 150 \,°C$
$V_{GE} = \geq 15 \, V$
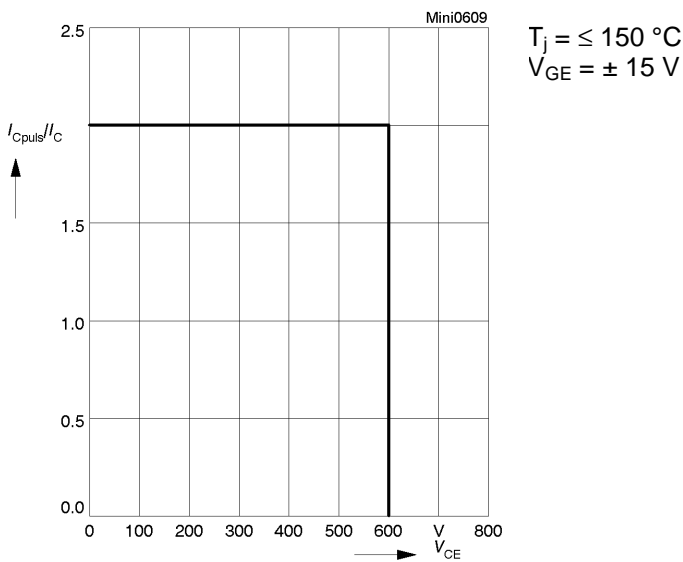
Fig. 9 Turn-off safe operating area (RBSOA) of the IGBT

$T_j = \leq 150 \,°C$
$V_{GE} = \pm 15 \, V$
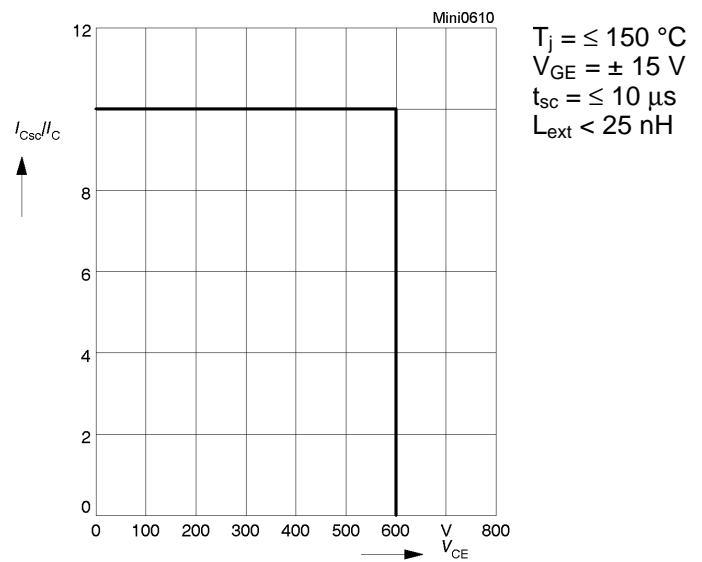
Fig. 10 Safe operating area at short circuit of the IGBT

$T_j = \leq 150 \,°C$
$V_{GE} = \pm 15 \, V$
$t_{sc} = \leq 10 \, \mu s$
$L_{ext} < 25 \, nH$
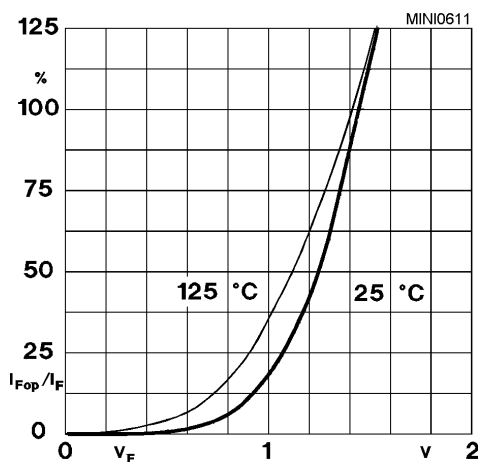
Fig. 11 Typ. freewheeling diode forward characteristic
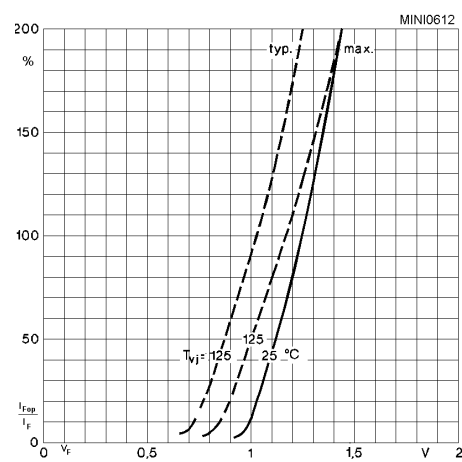
Fig. 12 Forward characteristic of the input bridge diode

MiniSKiiP 2

SKiiP 21 NAB 063 T1
SKiiP 22 NAB 063 T1

+rect +B +DC

L1
L2
L3

g1 g3 g5
E1 E3 E5

B

+T   -T

gB
EB

g2 g4 g6
E2 E4 E6

U
V
W

-rect -B -DC

Hauptanschluß
power connector

Steueranschluß
control pin

PCB

Mini-SKiiP 2

PCB TOP-VIEW

PCB BOTTOM-VIEW
CONTACT-SIDE

SEMIKRON

heatsink

M5

27.5 22.45 20.05 16.45 10.45 4.8 2.35 0.8 6.55 10.15 14.75 18.35 22.55 27.5

24
20.3
16.9
8.8
7
2.2
1.5
0
3
4.9
8.3
11.5
13.7
16.9
20.1
24

22.45 12.35 8.75 5.95 3.25 2.35 1.5 2.1 6.7

PCB TOP-VIEW

Accessible for mounting
of SMD (max height 2.5)
on PCB (by customer).

mounting area 2.5

PCB TOP-VIEW
PCB BOTTOM-VIEW CONTACT-SIDE

PCB

Einzelheit "X" Maßstab 2 : 1
CONTACT-AREA

12

16 +0.4

1.5 (1-2.5)

29.5 (29-30.5) +0.4

9

PCB BOTTOM-VIEW
CONTACT-SIDE

25 24.25 18.25 12.25 10.55 3 4.15 0.3 8.35 16.55 24.35

L3 +rect g1 g3 g5
+DC
-rect +B E1
E3 E5

3.1 +0.1
3.1

L2
W U

10.1 +0.2

B
gB g2 g4 g6
EB E2 E4 E6

L1 +T
-T -B
-DC -DC

21.8 20.2
17
9.8 8.2
6.6
1.8
0
5.5 7.1
12.2
17
18.6 20.2
21.8

gal Sn

3 -0.1
2.4 -0.1
5.6 -0.1
3 -0.1
6.8 -0.1
2.4 -0.1

Bitte beachten Sie die
Montagevorschrift

For mounting please follow
the assembly instruction

52

59

Tolerance: ISO 2768-f

001218

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MiniSKiiP 2

SKiiP 21 NAB 063 I T1

+rect +B +DC I+

L1
L2
L3

B

gB
EB

+T -T

g1 g3 g5
E1 E3 E5

g2 g4 g6
E2 E4 E6

Isu Isv Isw

0u 0v 0w

U
V
W

-rect -B -DC

⊙ Hauptanschluß
  power connector

○ Steueranschluß
  control pin

PCB

PCB TOP-VIEW

27.5 22.45 20.05 16.45 14.05 10.45 4.8 2.35 0 1.8 6.55 10.15 14.75 18.35 22.55 27.5

24
20.3
16.9

8.8
7.3
2.2
1.5
0
3.4.9
8.3
11.5
13.7
16.9
20.1
24

22.45 12.35 8.75 5.95 3.25 2.35 1.5 2.1 6.7

PCB TOP-VIEW
PCB BOTTOM-VIEW CONTACT-SIDE

PCB BOTTOM-VIEW
CONTACT-SIDE

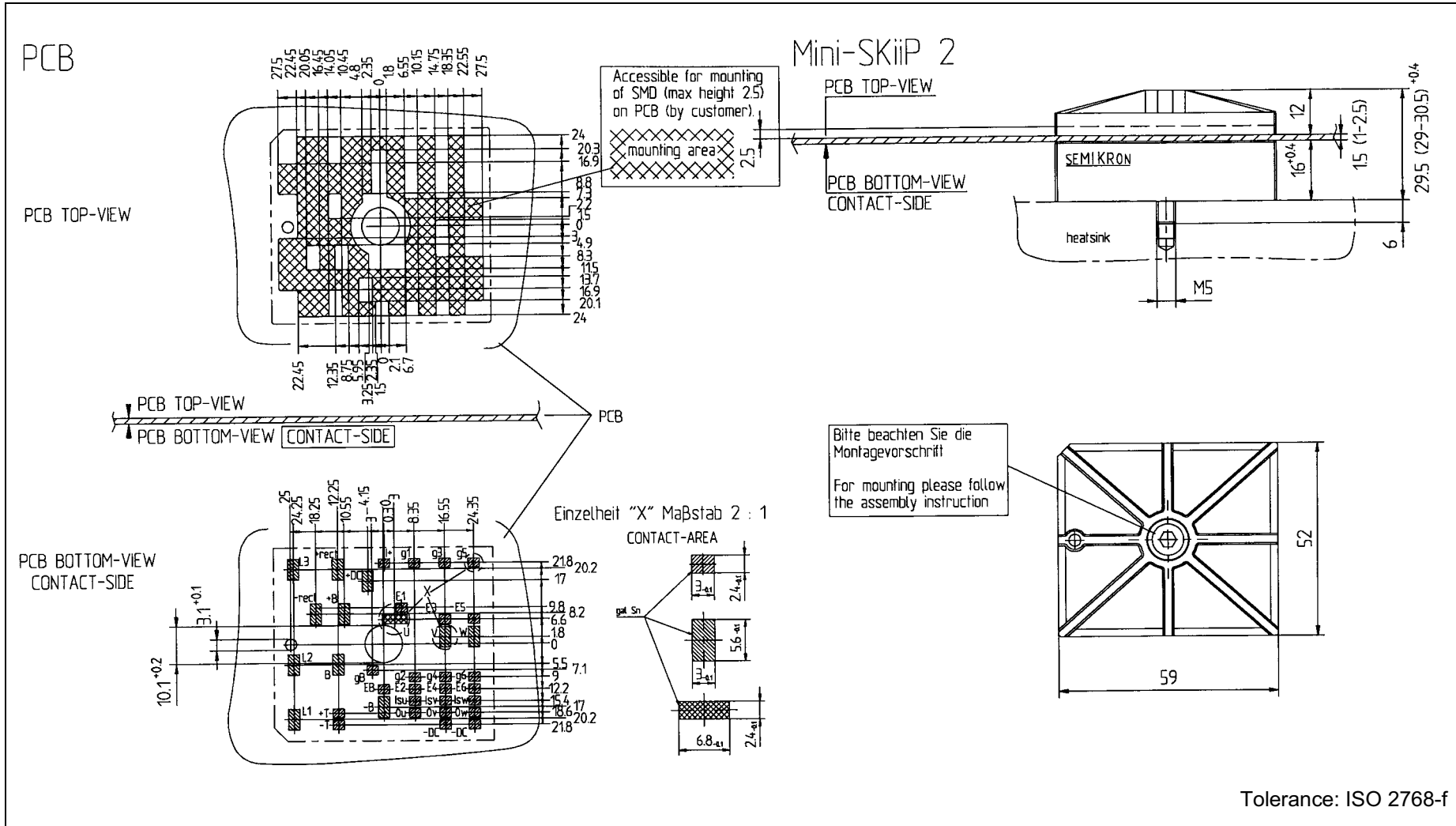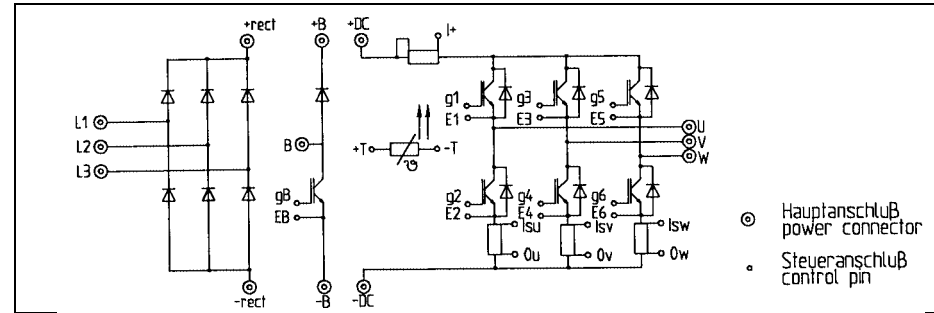25 24.25 18.25 12.25 10.55 4.15 3 0 3 8.35 16.55 24.35

L3 +rect I+ g1 g3 g5

+rect +B

E1 E5

U V W

B L2

gB g2 g4 g6
EB E2 E4 E6

L1 +T -T -B
Isu Isv Isw
0u 0v 0w
-DC +DC

3.1 +0.1

10.1 +0.2

21.8 20.2
17

9.8 8.2
6.6
18
0

5.5 7.1
12.2
14.2
15.4 17
18.6 17
21.8 20.2

Accessible for mounting
of SMD (max height 2.5)
on PCB (by customer).

mounting area

2.5

Mini-SKiiP 2

PCB TOP-VIEW

PCB BOTTOM-VIEW
CONTACT-SIDE

SEMIKRON

heatsink

M5

12
16 +0.4
29.5 (29.5-30.5) +0+
15 (1-2.5)
6

Einzelheit "X" Maßstab 2 : 1
CONTACT-AREA

3 ±1
2.4 ±1
gal Sn
5.6 ±1
3 ±1
6.8 ±1
2.4 ±1

Bitte beachten Sie die
Montagevorschrift

For mounting please follow
the assembly instruction

52

59

Tolerance: ISO 2768-f

SEMIKRON