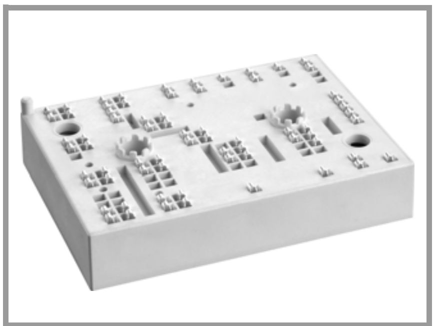
SKiiP 38AC176V2



MiniSKiiP® 3

3-phase bridge inverter

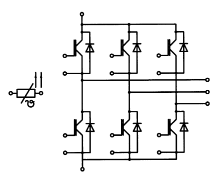
SKiiP 38AC176V2

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°C
- Product reliability results valid for T_j≤150°C (recommended $T_{j,op}$=-40...+150°C)
- Please refer to MiniSKiiP “Technical Explanations” and “Mounting Instructions” for further information



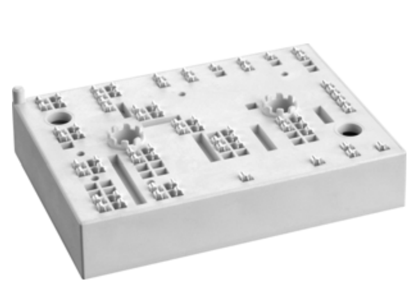
AC

Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Inverter - IGBT				
V_{CES}	T_j = 25 °C		1700	V
I_C	λ_{paste}=0.8 W/(mK) T_j = 175 °C	T_s = 25 °C	118	A
		T_s = 70 °C	95	A
I_C	λ_{paste}=2.5 W/(mK) T_j = 175 °C	T_s = 25 °C	151	A
		T_s = 70 °C	122	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
Inverse - Diode				
I_F	λ_{paste}=0.8 W/(mK) T_j = 175 °C	T_s = 25 °C	115	A
		T_s = 70 °C	89	A
I_F	λ_{paste}=2.5 W/(mK) T_j = 175 °C	T_s = 25 °C	142	A
		T_s = 70 °C	111	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
Module				
$I_{t(RMS)}$	$T_{terminal}$ = 80 °C, 20 A per spring		120	A
T_{stg}			-40 ... 125	°C
V_{isol}	AC sinus 50 Hz, t = 1 min		2500	V

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Inverter - IGBT						
$V_{CE(sat)}$	I_C = 100 A V_{GE} = 15 V chiplevel	T_j = 25 °C		2.00	2.40	V
		T_j = 150 °C		2.45	2.90	V
V_{CE0}	chiplevel	T_j = 25 °C		1.00	1.20	V
		T_j = 150 °C		0.90	1.10	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}, I_C = 4 mA		5.2	5.8	6.4	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 1700 V, T_j = 25 °C			0.1	0.3	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 I_C = 100 A $R_{G\,on}$ = 1 Ω $R_{G\,off}$ = 1 Ω di/dt_{on} = 3000 A/µs di/dt_{off} = 600 A/µs du/dt = 4500 V/µs V_{GE} = +15/-15 V L_s = 40 nH	T_j = 150 °C		160		ns
t_r		T_j = 150 °C		35		ns
E_{on}		T_j = 150 °C		23.8		mJ
$t_{d(off)}$		T_j = 150 °C		580		ns
t_f		T_j = 150 °C		150		ns
E_{off}		T_j = 150 °C		32.2		mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/(mK)			0.38		K/W
$R_{th(j-s)}$	per IGBT, λ_{paste}=2.5 W/(mK)			0.25		K/W



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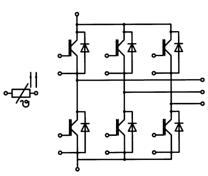
Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Inverse - Diode						
$V_F = V_{EC}$	I_F = 100 A V_{GE} = 0 V chiplevel	T_j = 25 °C		1.76	2.10	V
		T_j = 150 °C		1.77	2.09	V
V_{F0}	chiplevel	T_j = 25 °C		1.32	1.56	V
		T_j = 150 °C		1.08	1.22	V
r_F	chiplevel	T_j = 25 °C		4.4	5.4	mΩ
		T_j = 150 °C		6.9	8.7	mΩ
I_{RRM}	I_F = 100 A di/dt_{off} = 4000 A/µs +15/-15 V_{CC} = 900 V	T_j = 150 °C		226		A
Q_{rr}		T_j = 150 °C		38.5		µC
E_{rr}		T_j = 150 °C		26.2		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			0.61		K/W
$R_{th(j-s)}$	per Diode, λ_{paste}=2.5 W/(mK)			0.45		K/W
Module						
L_{CE}				20		nH
M_s	to heat sink		2		2.5	Nm
w				82		g
Temperature Sensor						
R_{100}	T_r=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

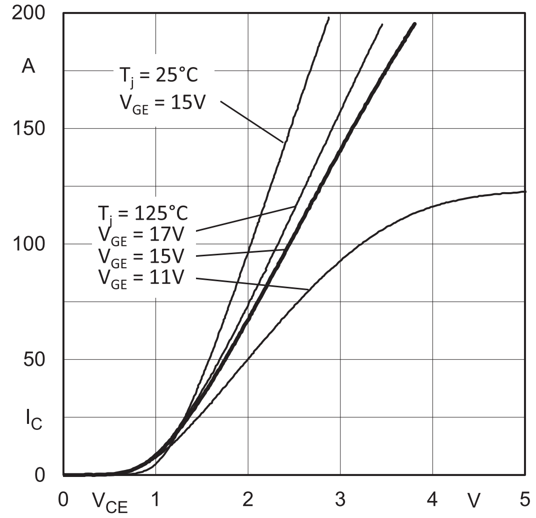


Fig. 1:Typ. output characteristic

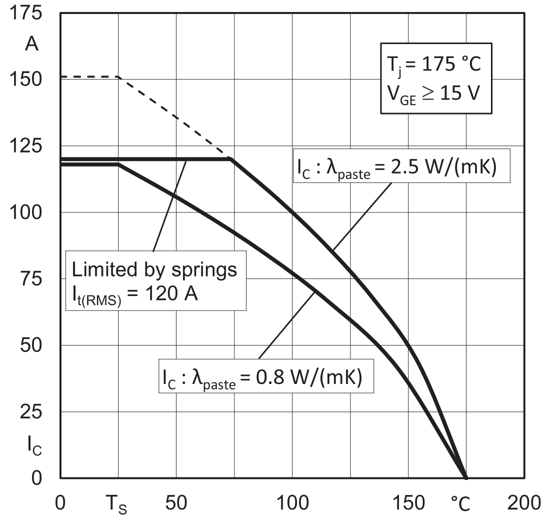


Fig. 2: Typ. rated current vs. temperature $I_C = f(T_S)$

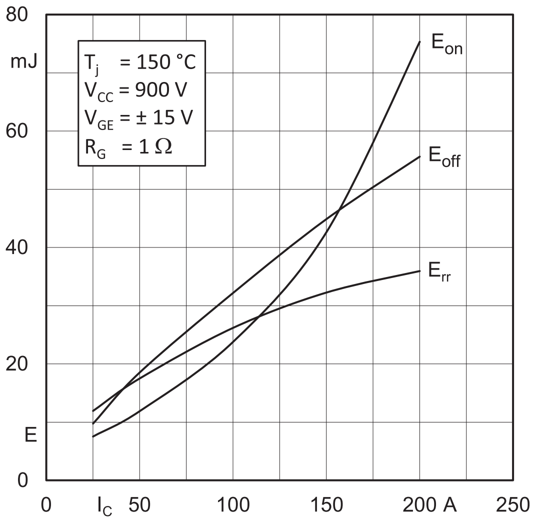


Fig. 3: Typ. turn-on /-off energy = f (I_C)

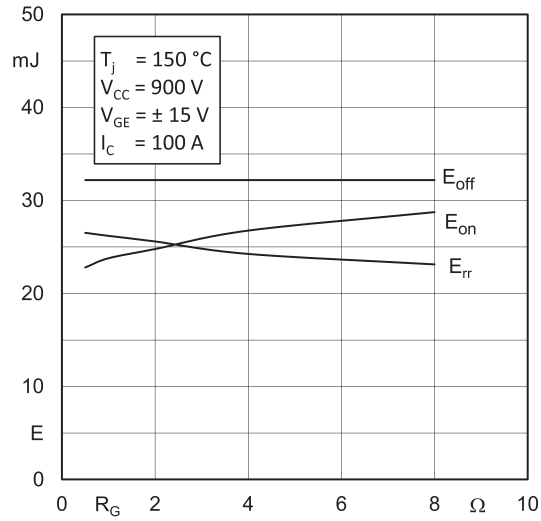


Fig. 4: Typ. turn-on /-off energy = f (R_G)

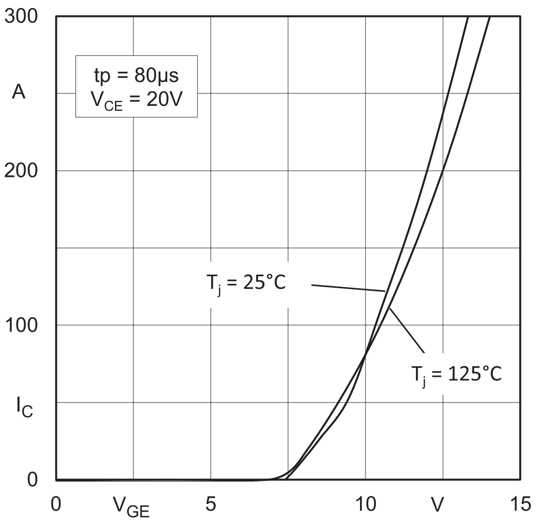


Fig. 5: Typ. transfer characteristic

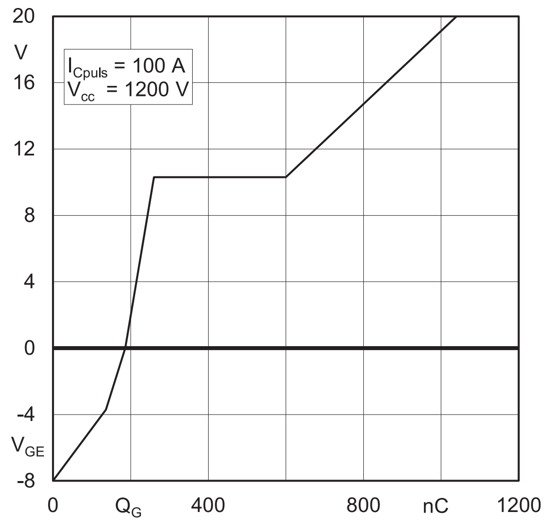


Fig. 6: Typ. gate charge characteristic

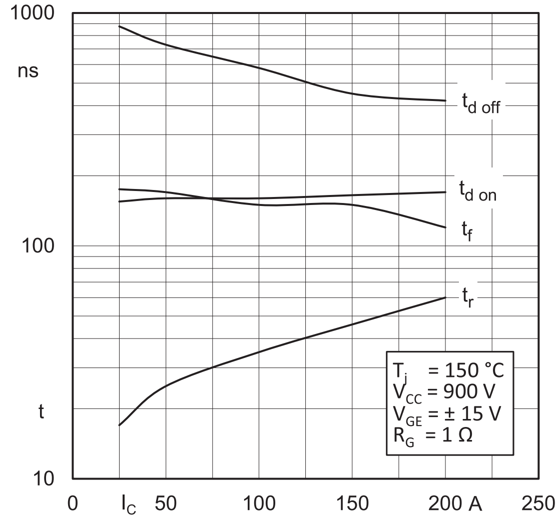


Fig. 7: Typ. switching times vs. I_C

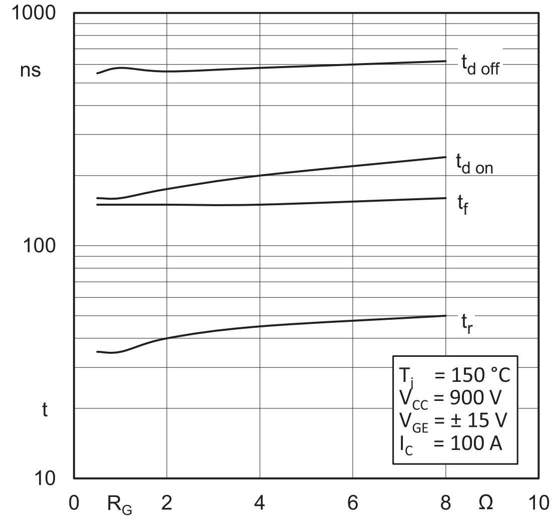


Fig. 8: Typ. switching times vs. gate resistor R_G

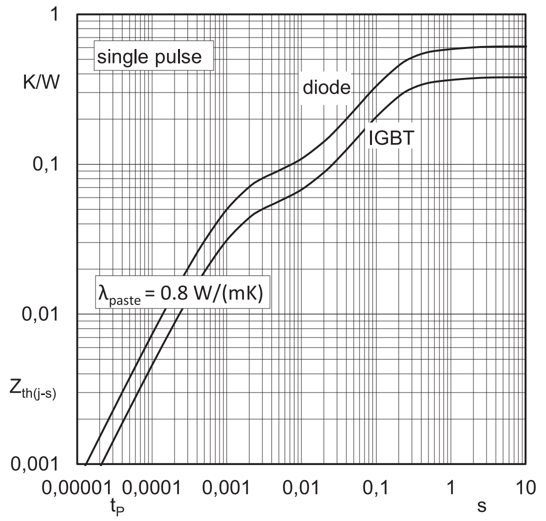


Fig. 9: Transient thermal impedance of IGBT and Diode

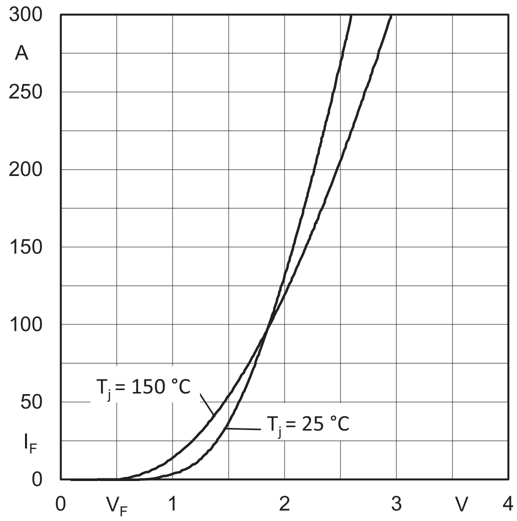


Fig. 10: CAL diode forward characteristic

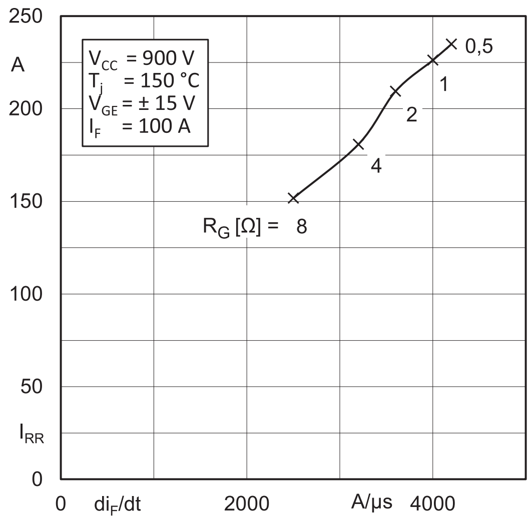


Fig. 11: Typ. CAL diode peak reverse recovery current

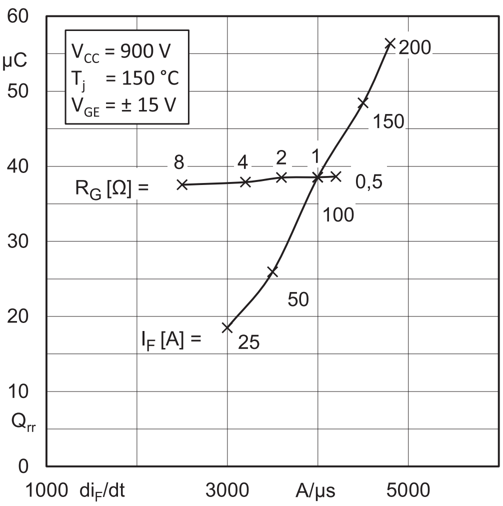
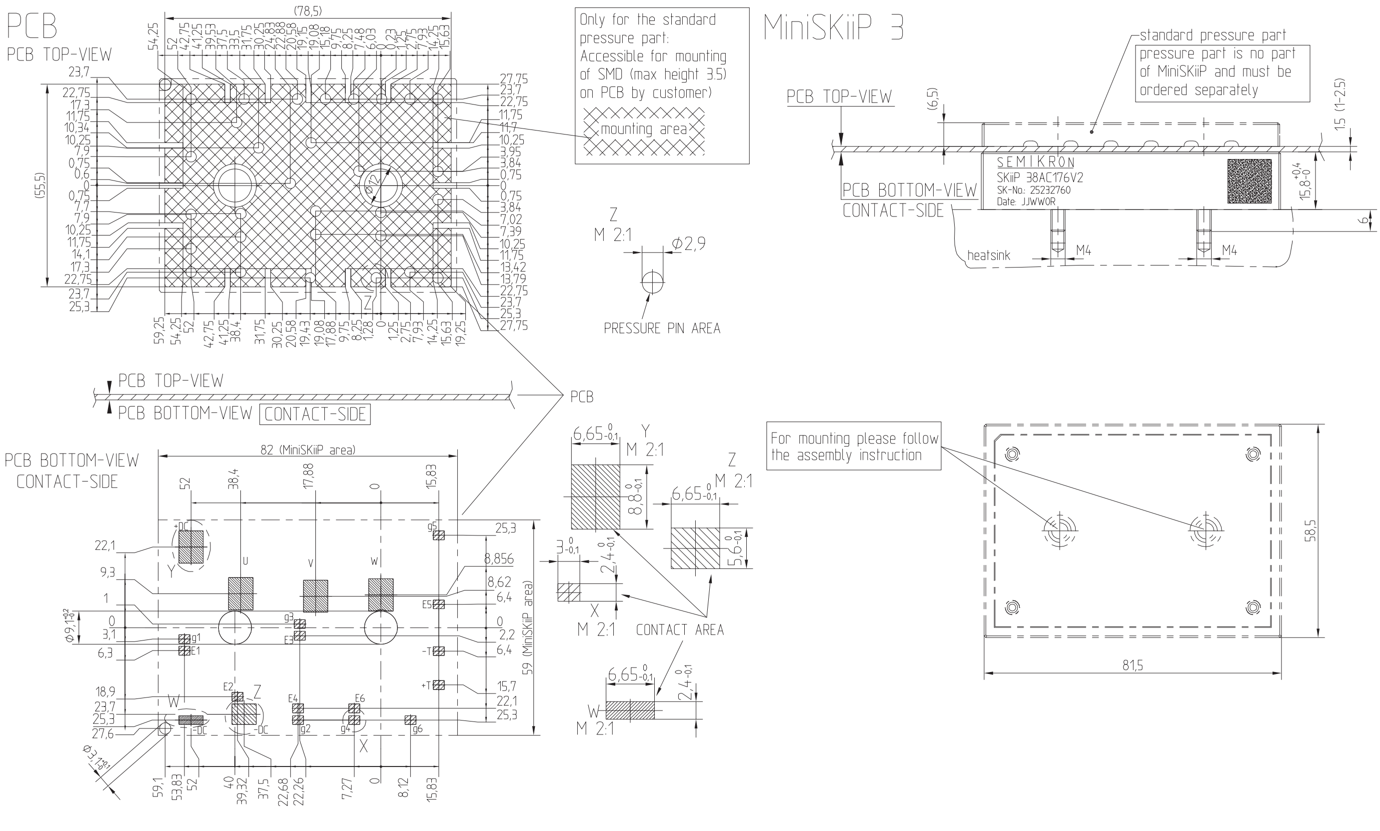
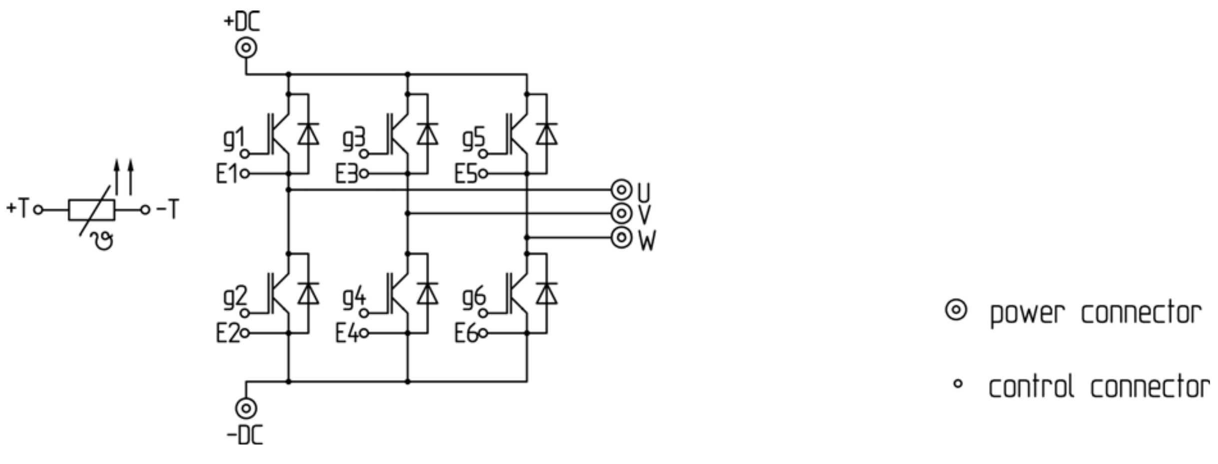


Fig. 12: Typ. CAL diode recovery charge



pinout, dimensions



pinout

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

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