

MiniSKiiP® 3

Sixpack

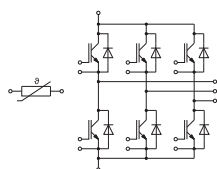
SKiiP 38AC176V2

Features*

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

Remarks

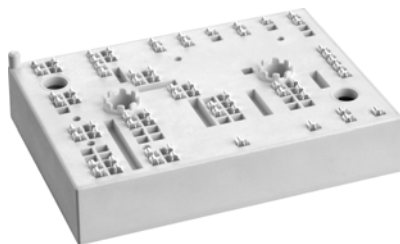
- Max. case temperature limited to $T_C=125^\circ\text{C}$
- Product reliability results valid for $T_J \leq 150^\circ\text{C}$ (recommended $T_{J,op} = -40 \dots +150^\circ\text{C}$)
- Please refer to MiniSKiiP "Technical Explanations" and "Mounting Instructions" for further information



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 _s = 25 °C	118	A
	T _J = 175 °C	T _s = 70 °C	95	A
I _C	λ _{paste} =2.5 W/(mK)	T _s = 25 °C	152	A
	T _J = 175 °C	T _s = 70 °C	123	A
I _{Cnom}			100	A
I _{CRM}			200	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 1000 V V _{GE} ≤ 20 V V _{CES} ≤ 1700 V	T _J = 150 °C	10	μs
T _J			-40 ... 175	°C
Inverse - Diode				
V _{RRM}	T _J = 25 °C		1700	V
I _F	λ _{paste} =0.8 W/(mK)	T _s = 25 °C	115	A
	T _J = 175 °C	T _s = 70 °C	89	A
I _F	λ _{paste} =2.5 W/(mK)	T _s = 25 °C	142	A
	T _J = 175 °C	T _s = 70 °C	111	A
I _{FRM}			300	A
I _{FSM}	t _p = 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}	module without TIM		-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	T _j = 25 °C		2.00	2.40	V
	V _{GE} = 15 V chipelevel	T _j = 150 °C		2.45	2.90	V
V _{CE0}	chipelevel	T _j = 25 °C		1.00	1.20	V
		T _j = 150 °C		0.90	1.10	V
r _{CE}	V _{GE} = 15 V chipelevel	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				1	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	V _{GE} = - 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		23.8		mJ
	R _{G off} = 1 Ω	T _j = 150 °C				
t _{d(off)}	di/dt _{on} = 3000 A/μs	T _j = 150 °C		580		ns
t _f	di/dt _{off} = 600 A/μs	T _j = 150 °C		150		ns
	dv/dt = 4500 V/μs					
E _{off}	V _{GE} = +15/-15 V L _s = 40 nH	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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Features*

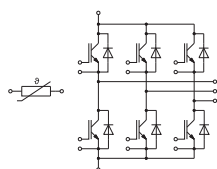
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Remarks

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Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Inverse - Diode					
$V_F = V_{EC}$	$I_F = 100 \text{ A}$ $V_{GE} = 0 \text{ V}$ chiplevel		$T_J = 25^{\circ}\text{C}$ $T_J = 150^{\circ}\text{C}$	1.76 2.10	V
V_{F0}	chiplevel		$T_J = 25^{\circ}\text{C}$ $T_J = 150^{\circ}\text{C}$	1.32 1.08	V
r_F	chiplevel		$T_J = 25^{\circ}\text{C}$ $T_J = 150^{\circ}\text{C}$	4.4 6.9	m Ω
I_{RRM}	$I_F = 100 \text{ A}$ $di/dt_{off} = 4000 \text{ A}/\mu\text{s}$ $V_{GE} = +15/-15 \text{ V}$ $V_{CC} = 900 \text{ V}$		$T_J = 150^{\circ}\text{C}$ $T_J = 150^{\circ}\text{C}$ $T_J = 150^{\circ}\text{C}$	226 38.5 26.2	A μC mJ
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=0.8 \text{ W}/(\text{mK})$			0.61	K/W
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=2.5 \text{ W}/(\text{mK})$			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}	$T_r=100^{\circ}\text{C}$ ($R_{25}=1000\Omega$)			$1670 \pm 3\%$	Ω
$R_{(T)}$	$R_{(T)}=1000\Omega[1+A(T-25^{\circ}\text{C})+B(T-25^{\circ}\text{C})^2]$, $A = 7.635 \cdot 10^{-3} \text{ }^{\circ}\text{C}^{-1}$, $B = 1.731 \cdot 10^{-5} \text{ }^{\circ}\text{C}^{-2}$				



AC

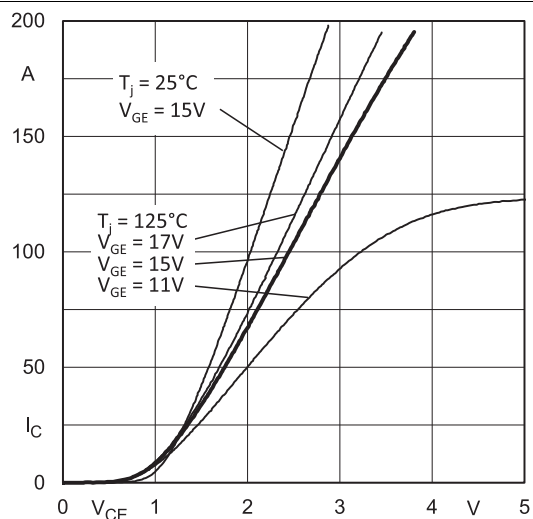


Fig. 1: Typ. output characteristic

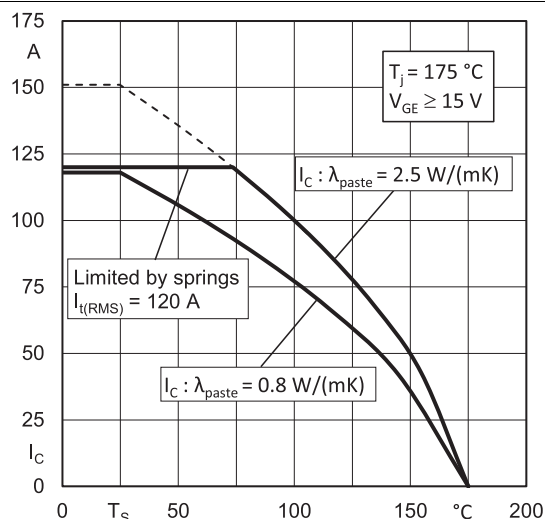


Fig. 2: Typ. rated current vs. temperature $I_C = f(T_s)$

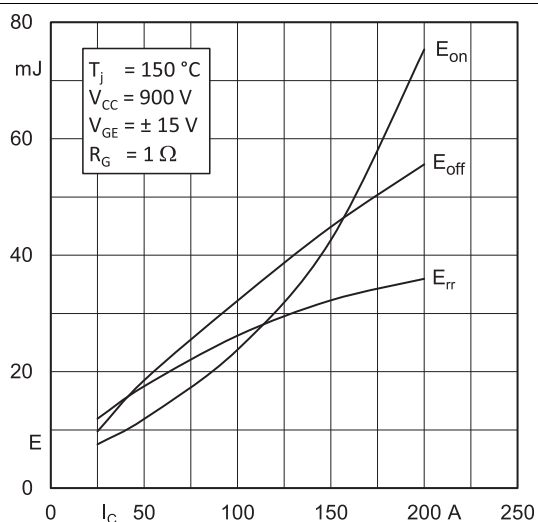


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

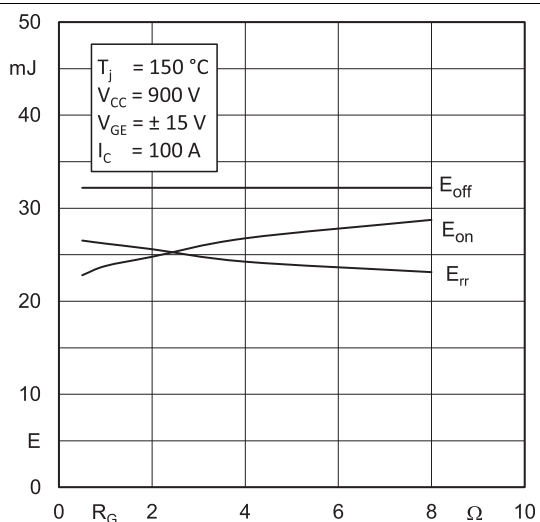


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

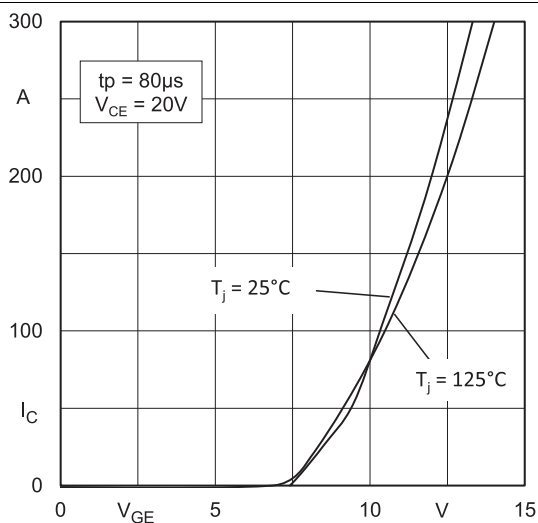


Fig. 5: Typ. transfer characteristic

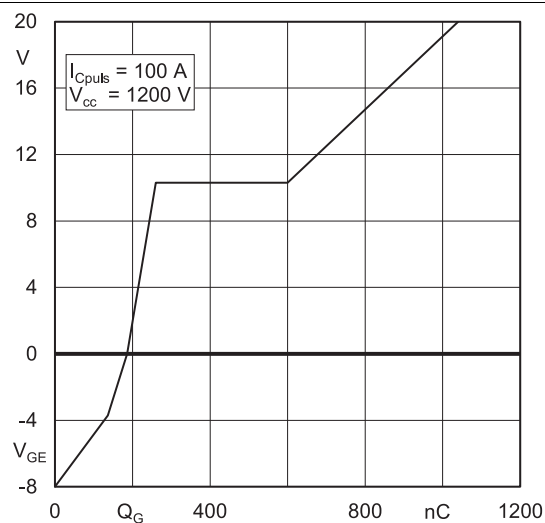


Fig. 6: Typ. gate charge characteristic

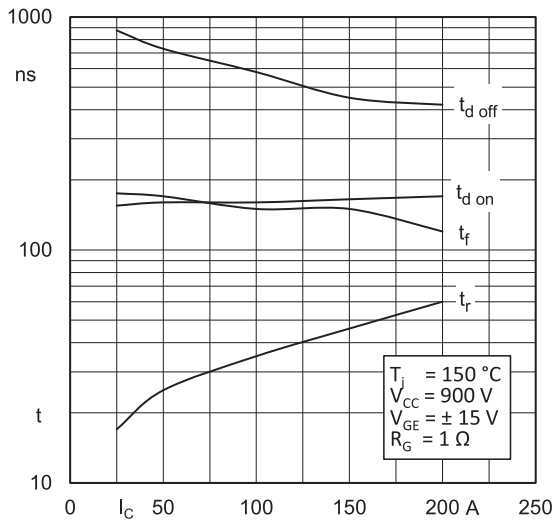


Fig. 7: Typ. switching times vs. I_C

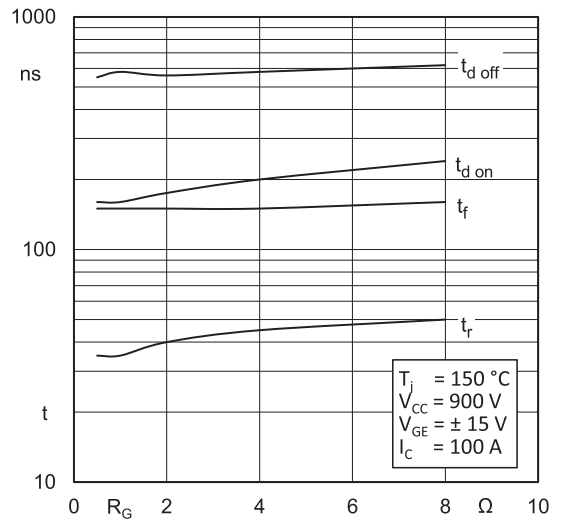


Fig. 8: Typ. switching times vs. gate resistor R_G

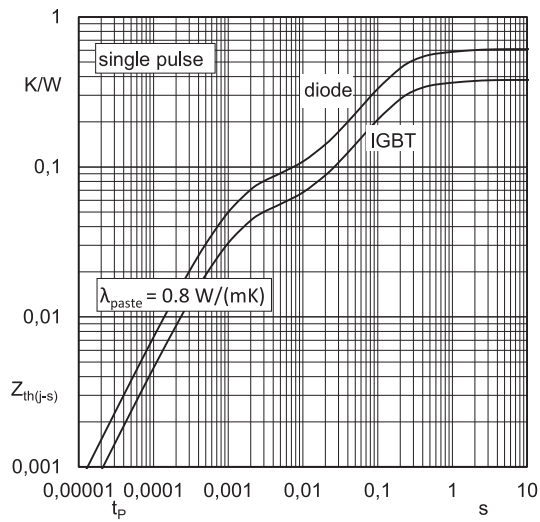


Fig. 9: Typ. transient thermal impedance

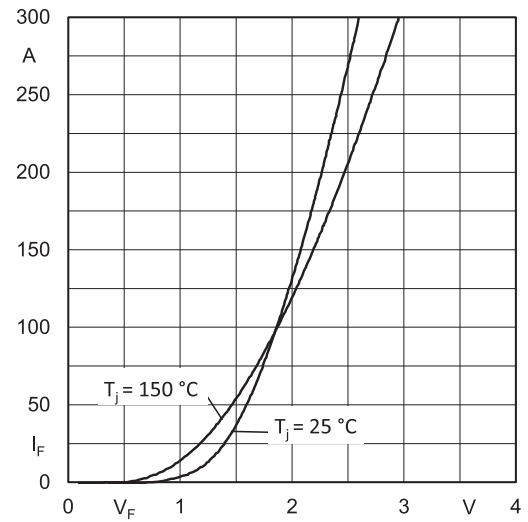


Fig. 10: Typ. CAL diode forward characteristic

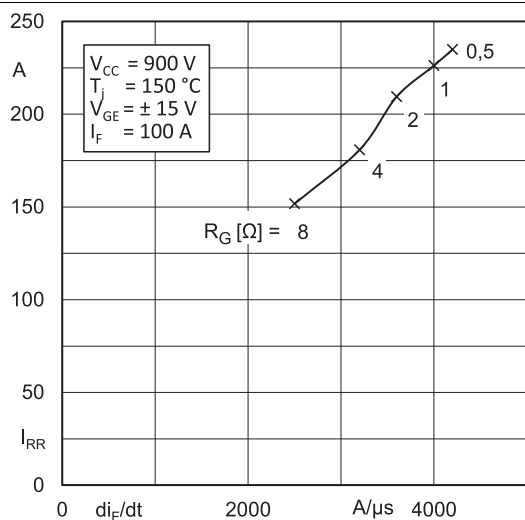


Fig. 11: Typ. CAL diode peak reverse recovery current

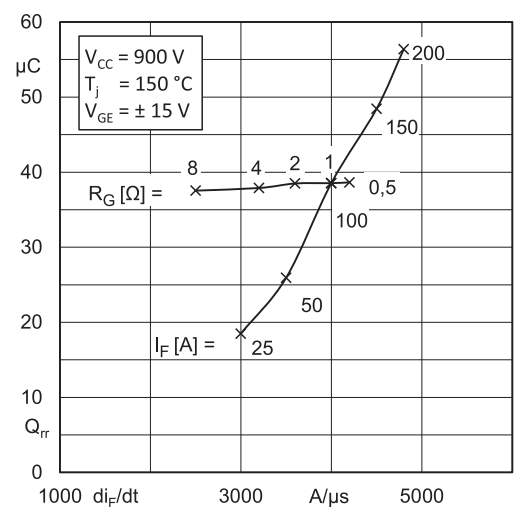
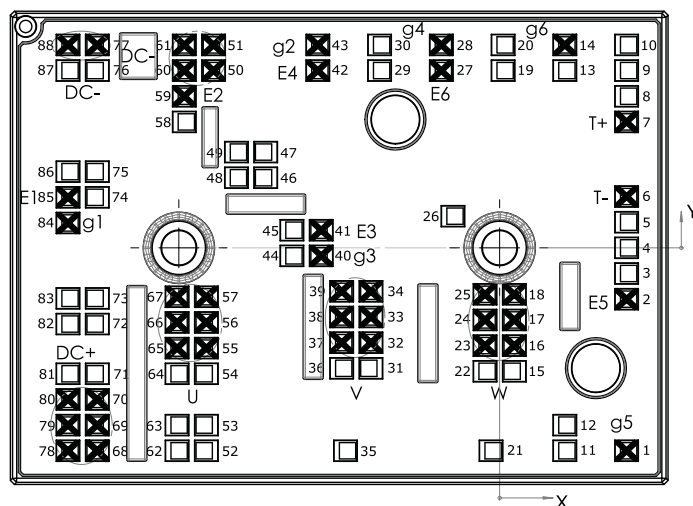


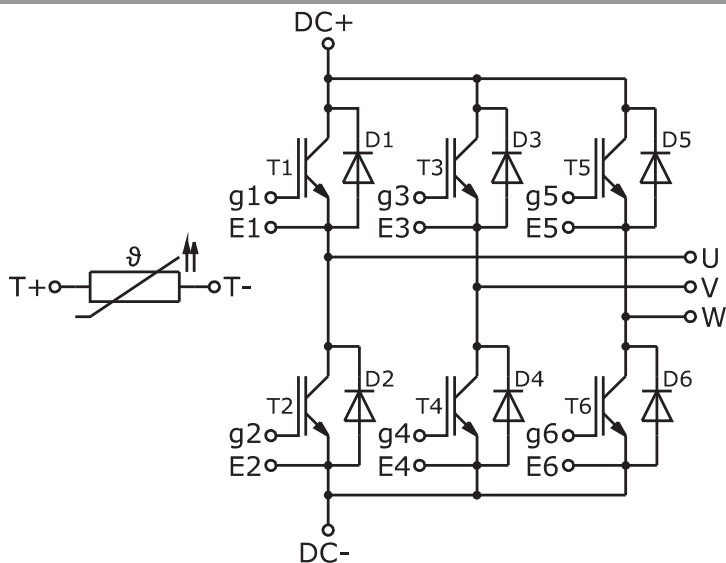
Fig. 12: Typ. CAL diode recovery charge

Pin out											
Pin	X	Y	Function	Pin	X	Y	Function	Pin	X	Y	Function
1	15,83	-25,30	g5	31	-16,05	-15,02		61	-39,33	25,30	DC-
2	15,83	-6,40	E5	32	-16,05	-11,82	V	62	-40,23	-25,30	
3	15,83	-3,20		33	-16,05	-8,62	V	63	-40,23	-22,10	
4	15,83	0		34	-16,05	-5,42	V	64	-40,23	-15,70	
5	15,83	3,20		35	-19,23	-25,30		65	-40,23	-12,50	U
6	15,83	6,40	T-	36	-19,70	-15,02		66	-40,23	-9,30	U
7	15,83	15,70	T+	37	-19,70	-11,82	V	67	-40,23	-6,10	U
8	15,83	18,90		38	-19,70	-8,62	V	68	-50,18	-25,30	DC+
9	15,83	22,10		39	-19,70	-5,42	V	69	-50,18	-22,10	DC+
10	15,83	25,30		40	-22,26	-1,00	g3	70	-50,18	-18,90	DC+
11	8,13	-25,30		41	-22,26	2,20	E3	71	-50,18	-15,70	
12	8,13	-22,10		42	-22,68	22,10	E4	72	-50,18	-9,50	
13	8,13	22,10		43	-22,68	25,30	g2	73	-50,18	-6,30	
14	8,13	25,30	g6	44	-25,91	-1,00		74	-50,18	6,30	
15	1,83	-15,39		45	-25,91	2,20		75	-50,18	9,50	
16	1,83	-12,19	W	46	-29,18	8,74		76	-50,18	22,10	
17	1,83	-8,99	W	47	-29,18	11,94		77	-50,18	25,30	DC-
18	1,83	-5,79	W	48	-32,83	8,74		78	-53,83	-25,30	DC+
19	0,43	22,10		49	-32,83	11,94		79	-53,83	-22,10	DC+
20	0,43	25,30		50	-35,68	22,10	DC-	80	-53,83	-18,90	DC+
21	-1,08	-25,30		51	-35,68	25,30	DC-	81	-53,83	-15,70	
22	-1,83	-15,39		52	-36,58	-25,30		82	-53,83	-9,50	
23	-1,83	-12,19	W	53	-36,58	-22,10		83	-53,83	-6,30	
24	-1,83	-8,99	W	54	-36,58	-15,70		84	-53,83	3,10	g1
25	-1,83	-5,79	W	55	-36,58	-12,50	U	85	-53,83	6,30	E1
26	-5,83	3,95		56	-36,58	-9,30	U	86	-53,83	9,50	
27	-7,28	22,10	E6	57	-36,58	-6,10	U	87	-53,83	22,10	
28	-7,28	25,30	g4	58	-39,33	15,70		88	-53,83	25,30	DC-
29	-14,98	22,10		59	-39,33	18,90	E2				
30	-14,98	25,30		60	-39,33	22,10	DC-				

all values in mm



Pinout and Dimensions



Pinout

This is an electrostatic discharge sensitive device (ESDS) due to international standard IEC 61340.

***IMPORTANT INFORMATION AND WARNINGS**

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