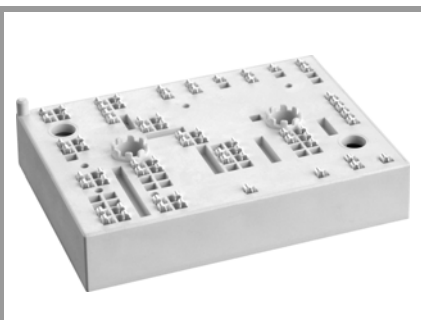


SKiiP 38NAB12T4V1



MiniSKiiP® 3

SKiiP 38NAB12T4V1

Features

- Trench 4 IGBTs
- Robust and soft freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognised: File no. E63532

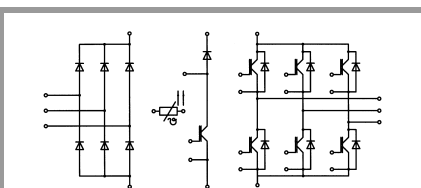
Typical Applications*

- Inverter up to 41 kVA
- Typical motor power 22 kW

Remarks

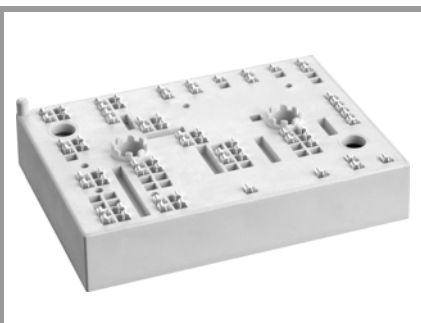
- Max. case temperature limited to $T_C=125^\circ\text{C}$
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- For short circuit: Soft R_{Goff} recommended
- MiniSKiiP "Technical Explanations" and "Mounting Instructions" are part of the data sheet. Please refer to both documents for further information.

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
Inverter - IGBT				
V_{CES}	$T_j = 25^\circ\text{C}$		1200	V
I_C	$\lambda_{paste}=0.8 \text{ W/(mK)}$	$T_s = 25^\circ\text{C}$	115	A
		$T_j = 175^\circ\text{C}$	93	A
I_C	$\lambda_{paste}=2.5 \text{ W/(mK)}$	$T_s = 25^\circ\text{C}$	140	A
		$T_j = 175^\circ\text{C}$	114	A
I_{Cnom}			100	A
I_{CRM}	$I_{CRM} = 3 \times I_{Cnom}$		300	A
V_{GES}			-20 ... 20	V
t_{psc}	$V_{CC} = 800 \text{ V}$	$T_j = 150^\circ\text{C}$	10	μs
	$V_{GE} \leq 15 \text{ V}$			
	$V_{CES} \leq 1200 \text{ V}$			
T_j			-40 ... 175	$^\circ\text{C}$
Chopper - IGBT				
V_{CES}	$T_j = 25^\circ\text{C}$		1200	V
I_C	$\lambda_{paste}=0.8 \text{ W/(mK)}$	$T_s = 25^\circ\text{C}$	115	A
		$T_j = 175^\circ\text{C}$	93	A
I_C	$\lambda_{paste}=2.5 \text{ W/(mK)}$	$T_s = 25^\circ\text{C}$	140	A
		$T_j = 175^\circ\text{C}$	114	A
I_{Cnom}			100	A
I_{CRM}	$I_{CRM} = 3 \times I_{Cnom}$		300	A
V_{GES}			-20 ... 20	V
t_{psc}	$V_{CC} = 800 \text{ V}$	$T_j = 150^\circ\text{C}$	10	μs
	$V_{GE} \leq 15 \text{ V}$			
	$V_{CES} \leq 1200 \text{ V}$			
T_j			-40 ... 175	$^\circ\text{C}$
Inverse - Diode				
V_{RRM}	$T_j = 25^\circ\text{C}$		1200	V
I_F	$\lambda_{paste}=0.8 \text{ W/(mK)}$	$T_s = 25^\circ\text{C}$	99	A
		$T_j = 175^\circ\text{C}$	79	A
I_F	$\lambda_{paste}=2.5 \text{ W/(mK)}$	$T_s = 25^\circ\text{C}$	116	A
		$T_j = 175^\circ\text{C}$	93	A
I_{Fnom}			100	A
I_{FRM}	$I_{FRM} = 3 \times I_{Fnom}$		300	A
I_{FSM}	$t_p = 10 \text{ ms, sin } 180^\circ, T_j = 150^\circ\text{C}$		550	A
T_j			-40 ... 175	$^\circ\text{C}$
Freewheeling - Diode				
V_{RRM}	$T_j = 25^\circ\text{C}$		1200	V
I_F	$\lambda_{paste}=0.8 \text{ W/(mK)}$	$T_s = 25^\circ\text{C}$	100	A
		$T_j = 175^\circ\text{C}$	79	A
I_F	$\lambda_{paste}=2.5 \text{ W/(mK)}$	$T_s = 25^\circ\text{C}$	116	A
		$T_j = 175^\circ\text{C}$	93	A
I_{Fnom}			100	A
I_{FRM}	$I_{FRM} = 3 \times I_{Fnom}$		300	A
I_{FSM}	$t_p = 10 \text{ ms, sin } 180^\circ, T_j = 150^\circ\text{C}$		550	A
T_j			-40 ... 175	$^\circ\text{C}$



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SKiiP 38NAB12T4V1



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Typical Applications*

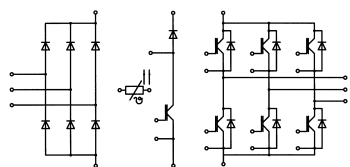
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Remarks

- Max. case temperature limited to $T_C=125^\circ\text{C}$
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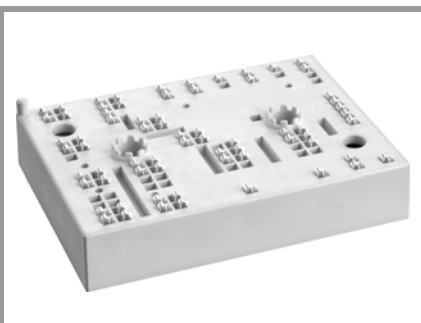
Absolute Maximum Ratings				
Symbol	Conditions	Values	Unit	
Rectifier - Diode				
V_{RRM}	$T_j = 25^\circ\text{C}$	1600	V	
I_F	$\lambda_{paste}=0.8 \text{ W/(mK)}$	$T_s = 25^\circ\text{C}$	117	A
	$T_j = 150^\circ\text{C}$	$T_s = 70^\circ\text{C}$	86	A
I_F	$\lambda_{paste}=2.5 \text{ W/(mK)}$	$T_s = 25^\circ\text{C}$	136	A
	$T_j = 150^\circ\text{C}$	$T_s = 70^\circ\text{C}$	101	A
I_{Fnom}		45	A	
I_{FSM}	10 ms	$T_j = 25^\circ\text{C}$	1000	A
	sin 180°	$T_j = 150^\circ\text{C}$	890	A
I^2t	10 ms	$T_j = 25^\circ\text{C}$	5000	A ² s
	sin 180°	$T_j = 150^\circ\text{C}$	3900	A ² s
T_j		-40 ... 150	°C	
Module				
$I_{t(RMS)}$	$T_{terminal} = 80^\circ\text{C}$, 20 A per spring	80	A	
T_{stg}		-40 ... 125	°C	
V_{isol}	AC sinus 50 Hz, 1 min	2500	V	

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
Inverter - IGBT					
$V_{CE(sat)}$	$I_C = 100 \text{ A}$ $V_{GE} = 15 \text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$	1.80	2.05	V
		$T_j = 150^\circ\text{C}$	2.20	2.40	V
V_{CE0}	chiplevel	$T_j = 25^\circ\text{C}$	0.80	0.90	V
		$T_j = 150^\circ\text{C}$	0.70	0.80	V
r_{CE}	$V_{GE} = 15 \text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$	10	12	mΩ
		$T_j = 150^\circ\text{C}$	15	16	mΩ
$V_{GE(th)}$	$V_{GE} = V_{CE} \text{ V}$, $I_C = 4 \text{ mA}$	5	5.8	6.5	V
I_{CES}	$V_{GE} = 0 \text{ V}$, $V_{CE} = 1200 \text{ V}$, $T_j = 25^\circ\text{C}$		0.1	0.3	mA
C_{ies}	$V_{CE} = 25 \text{ V}$ $V_{GE} = 0 \text{ V}$	$f = 1 \text{ MHz}$	6.15		nF
C_{oes}		$f = 1 \text{ MHz}$	0.41		nF
C_{res}		$f = 1 \text{ MHz}$	0.35		nF
Q_G	- 8 V...+ 15 V		565		nC
R_{Gint}	$T_j = 25^\circ\text{C}$		7.5		Ω
$t_{d(on)}$	$V_{CC} = 600 \text{ V}$ $I_C = 100 \text{ A}$	$T_j = 150^\circ\text{C}$	160		ns
t_r		$T_j = 150^\circ\text{C}$	35		ns
E_{on}	$R_{G on} = 1 \Omega$ $R_{G off} = 1 \Omega$	$T_j = 150^\circ\text{C}$	11.2		mJ
$t_{d(off)}$		$T_j = 150^\circ\text{C}$	390		ns
t_f		$T_j = 150^\circ\text{C}$	75		ns
E_{off}	$V_{GE} = +15/-15 \text{ V}$	$T_j = 150^\circ\text{C}$	10		mJ
$R_{th(j-s)}$	per IGBT, $\lambda_{paste}=0.8 \text{ W/(mK)}$		0.48		K/W
$R_{th(j-s)}$	per IGBT, $\lambda_{paste}=2.5 \text{ W/(mK)}$		0.34		K/W



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SKiiP 38NAB12T4V1



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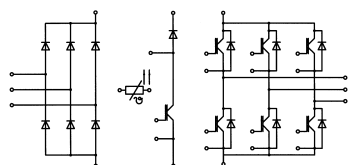
Typical Applications*

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- Typical motor power 22 kW

Remarks

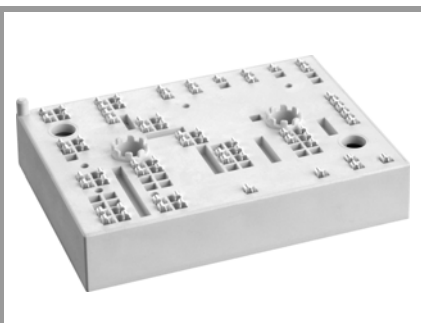
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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Chopper - IGBT						
$V_{CE(sat)}$	$I_C = 100 \text{ A}$ $V_{GE} = 15 \text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$		1.80	2.05	V
		$T_j = 150^\circ\text{C}$		2.20	2.40	V
V_{CE0}	chipelevel	$T_j = 25^\circ\text{C}$		0.80	0.90	V
		$T_j = 150^\circ\text{C}$		0.70	0.80	V
r_{CE}	$V_{GE} = 15 \text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$		10	12	m Ω
		$T_j = 150^\circ\text{C}$		15	16	m Ω
$V_{GE(th)}$	$V_{GE} = V_{CE} \text{ V}, I_C = 4 \text{ mA}$		5	5.8	6.5	V
I_{CES}	$V_{GE} = 0 \text{ V}, V_{CE} = 1200 \text{ V}, T_j = 25^\circ\text{C}$			0.1	0.3	mA
Q_G	$-8 \text{ V} \dots +15 \text{ V}$			565		nC
R_{Gint}	$T_j = 25^\circ\text{C}$			7.5		Ω
$t_{d(on)}$	$V_{CC} = 600 \text{ V}$	$T_j = 150^\circ\text{C}$		160		ns
t_r	$I_C = 100 \text{ A}$ $R_{G on} = 1 \Omega$	$T_j = 150^\circ\text{C}$		35		ns
		$T_j = 150^\circ\text{C}$		11.2		mJ
E_{on}	$R_{G off} = 1 \Omega$	$T_j = 150^\circ\text{C}$		390		ns
$t_{d(off)}$		$T_j = 150^\circ\text{C}$		75		ns
t_f		$T_j = 150^\circ\text{C}$				
E_{off}	$V_{GE} = +15/-15 \text{ V}$	$T_j = 150^\circ\text{C}$		10		mJ
$R_{th(j-s)}$	per IGBT, $\lambda_{paste}=0.8 \text{ W/(mK)}$			0.48		K/W
$R_{th(j-s)}$	per IGBT, $\lambda_{paste}=2.5 \text{ W/(mK)}$			0.34		K/W
Inverse - Diode						
$V_F = V_{EC}$	$I_F = 100 \text{ A}$ $V_{GE} = 0 \text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$		2.20	2.52	V
		$T_j = 150^\circ\text{C}$		2.15	2.47	V
V_{F0}	chipelevel	$T_j = 25^\circ\text{C}$		1.30	1.50	V
		$T_j = 150^\circ\text{C}$		0.90	1.10	V
r_F	chipelevel	$T_j = 25^\circ\text{C}$		9.0	10	m Ω
		$T_j = 150^\circ\text{C}$		13	14	m Ω
I_{RRM}	$I_F = 100 \text{ A}$	$T_j = 150^\circ\text{C}$		82		A
Q_{rr}	$di/dt_{off} = 2400 \text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		16.4		μC
E_{rr}	$V_{GE} = -15 \text{ V}$ $V_{CC} = 600 \text{ V}$	$T_j = 150^\circ\text{C}$		6.5		mJ
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=0.8 \text{ W/(mK)}$			0.66		K/W
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=2.5 \text{ W/(mK)}$			0.52		K/W
Freewheeling - Diode						
$V_F = V_{EC}$	$I_F = 100 \text{ A}$ $V_{GE} = 0 \text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$		2.20	2.52	V
		$T_j = 150^\circ\text{C}$		2.15	2.47	V
V_{F0}	chipelevel	$T_j = 25^\circ\text{C}$		1.30	1.50	V
		$T_j = 150^\circ\text{C}$		0.90	1.10	V
r_F	chipelevel	$T_j = 25^\circ\text{C}$		9.0	10	m Ω
		$T_j = 150^\circ\text{C}$		13	14	m Ω
I_{RRM}	$I_F = 100 \text{ A}$	$T_j = 150^\circ\text{C}$		82		A
Q_{rr}	$di/dt_{off} = 2400 \text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		16.4		μC
E_{rr}	$V_{GE} = -15 \text{ V}$ $V_{CC} = 600 \text{ V}$	$T_j = 150^\circ\text{C}$		6.5		mJ
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=0.8 \text{ W/(mK)}$			0.66		K/W
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=2.5 \text{ W/(mK)}$			0.52		K/W



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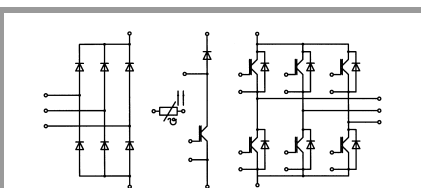
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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Rectifier - Diode						
$V_F = V_{EC}$	$I_F = 45 \text{ A}$ $V_{GE} = 0 \text{ V}$ chiplinevel	$T_j = 25^\circ\text{C}$		1.00	1.21	V
		$T_j = 125^\circ\text{C}$		0.90	1.10	V
V_{F0}	chiplinevel	$T_j = 25^\circ\text{C}$		0.88	0.98	V
		$T_j = 125^\circ\text{C}$		0.73	0.83	V
r_F	chiplinevel	$T_j = 25^\circ\text{C}$		2.7	5.1	m Ω
		$T_j = 125^\circ\text{C}$		3.8	6.0	m Ω
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=0.8 \text{ W/(mK)}$			0.7		K/W
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=2.5 \text{ W/(mK)}$			0.56		K/W
Module						
M_s	to heat sink		2		2.5	Nm
w				82		g
L_{CE}						nH
Temperature Sensor						
R_{100}	$T_r = 100^\circ\text{C}$, tolerance = 3 %			1670 \pm 3%		Ω
$R(T)$	$R(T)=1000\Omega[1+A(T-25^\circ\text{C})+B(T-25^\circ\text{C})^2]$], $A = 7.635 \cdot 10^{-3} \text{ }^\circ\text{C}^{-1}$, $B = 1.731 \cdot 10^{-5} \text{ }^\circ\text{C}^{-2}$					



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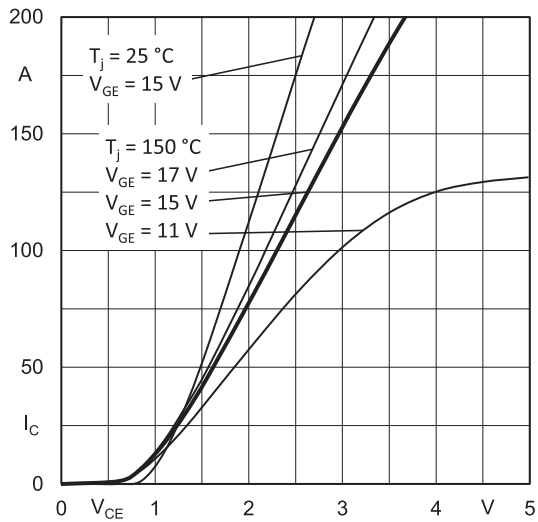


Fig. 1: Typ. output characteristic

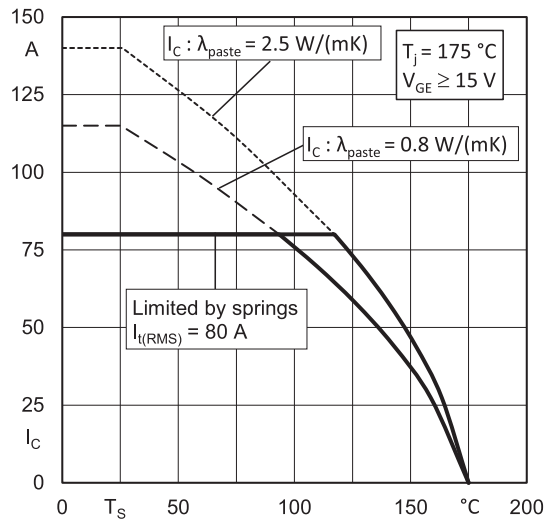


Fig. 2: Typ. rated current vs. temperature $I_C = f(T_s)$

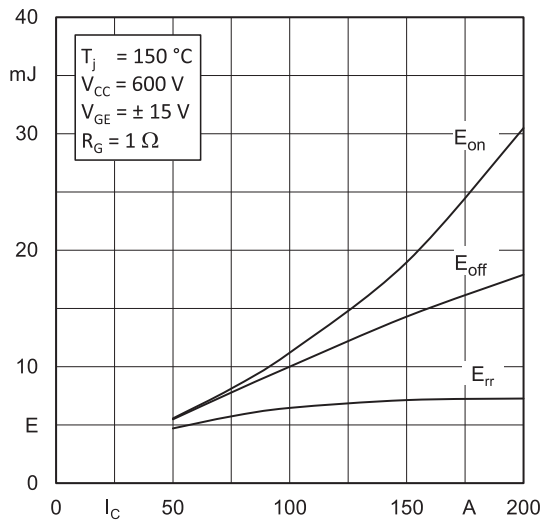


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

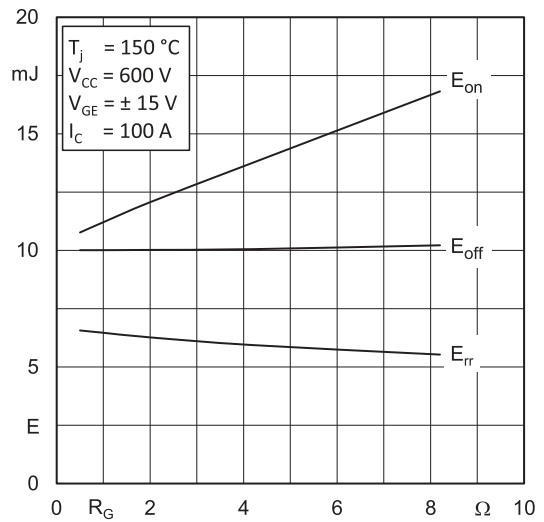


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

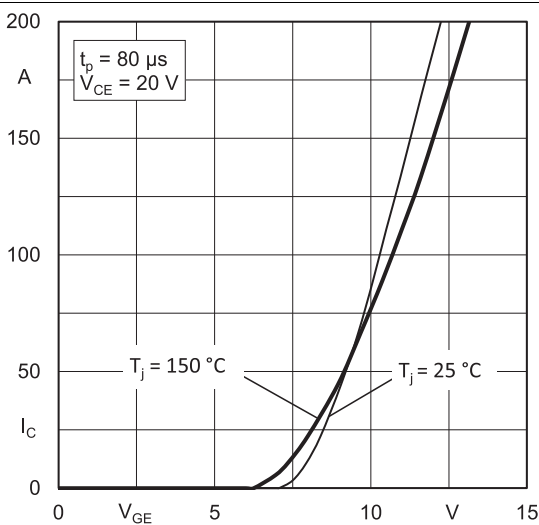


Fig. 5: Typ. transfer characteristic

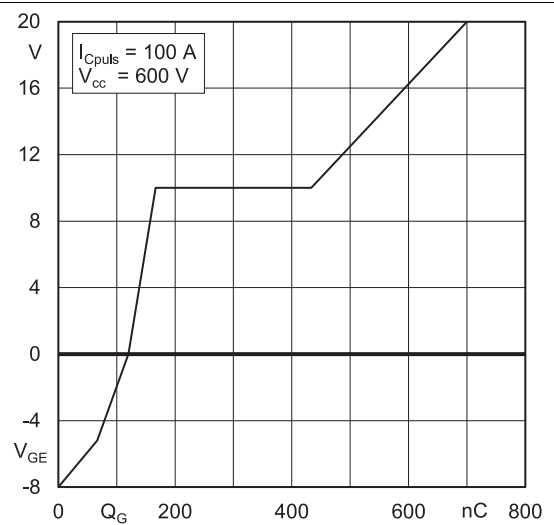
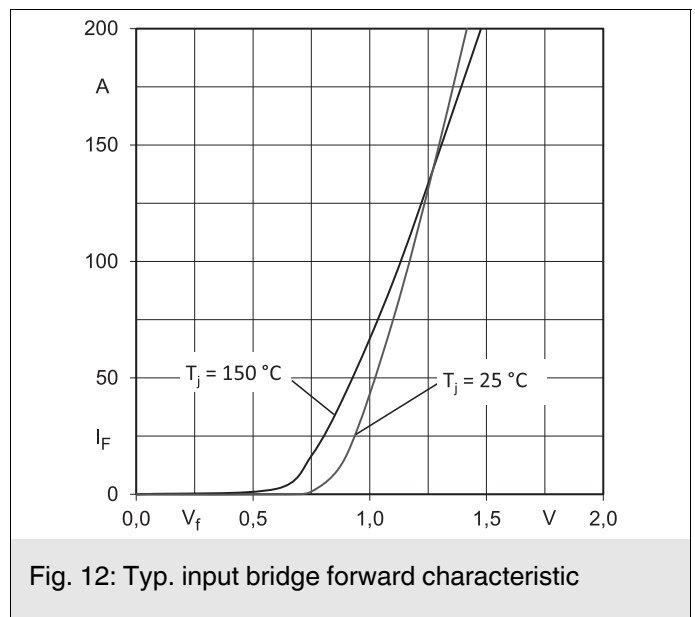
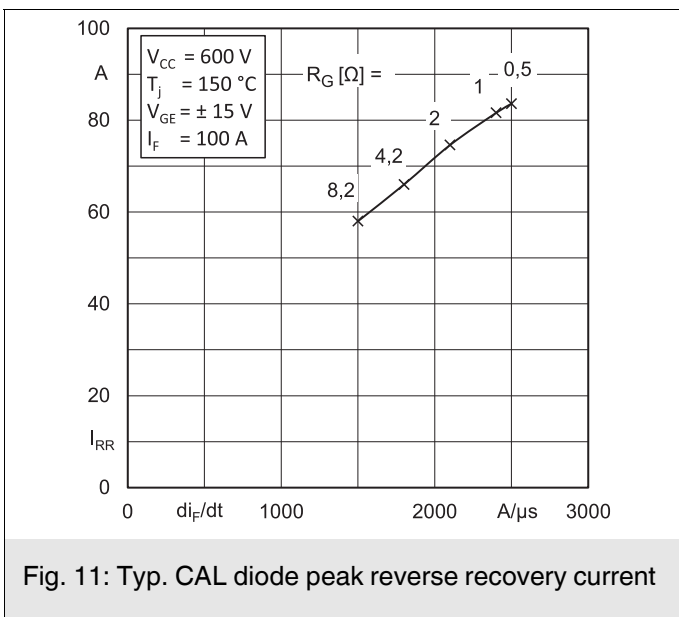
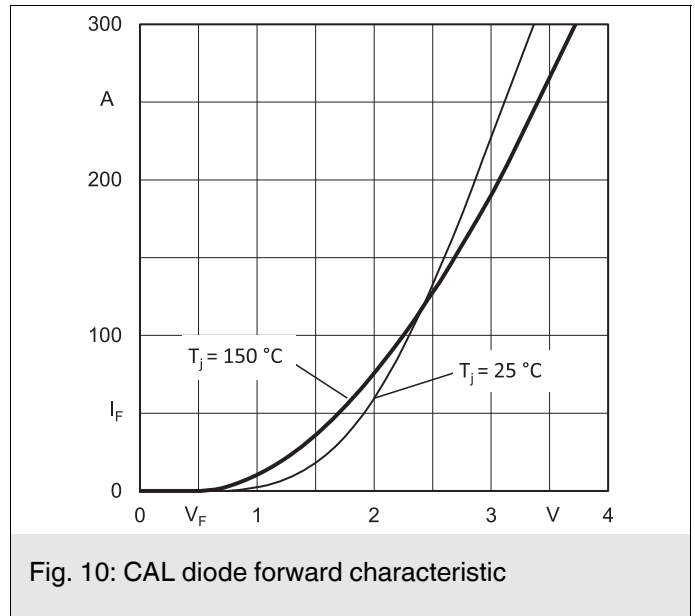
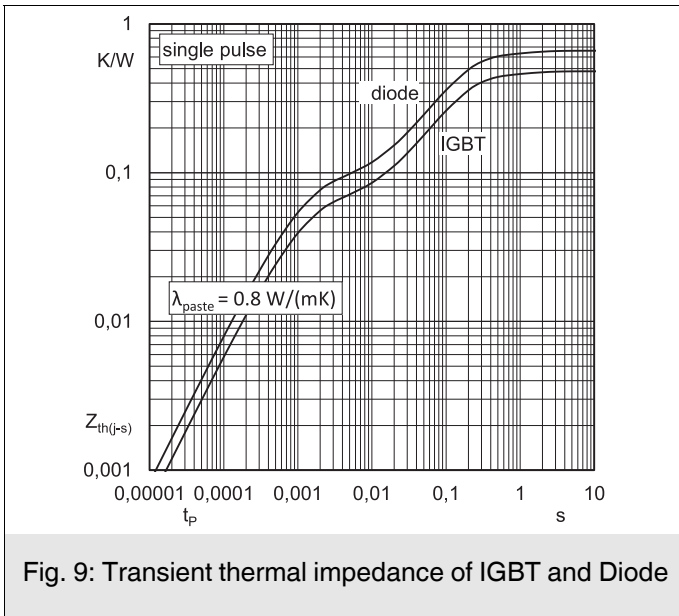
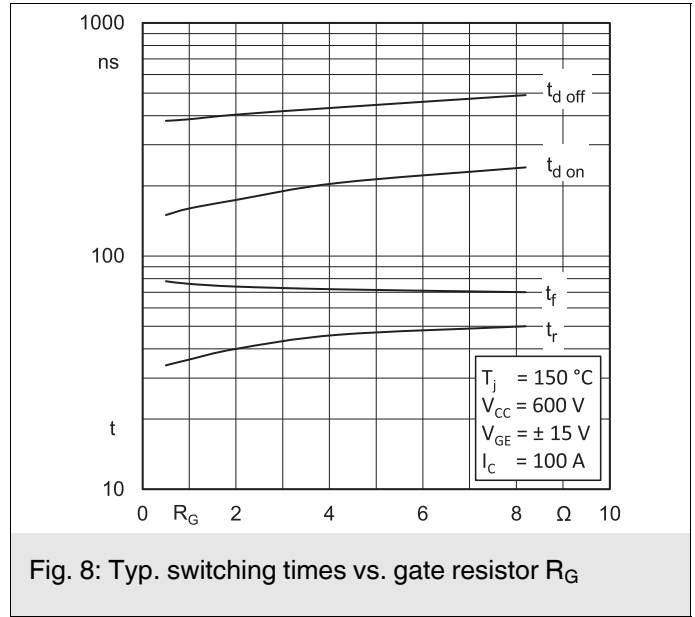
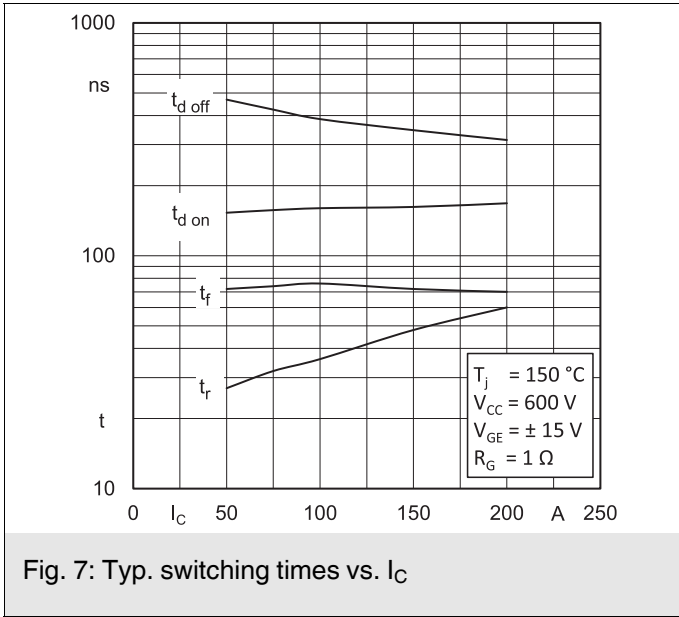
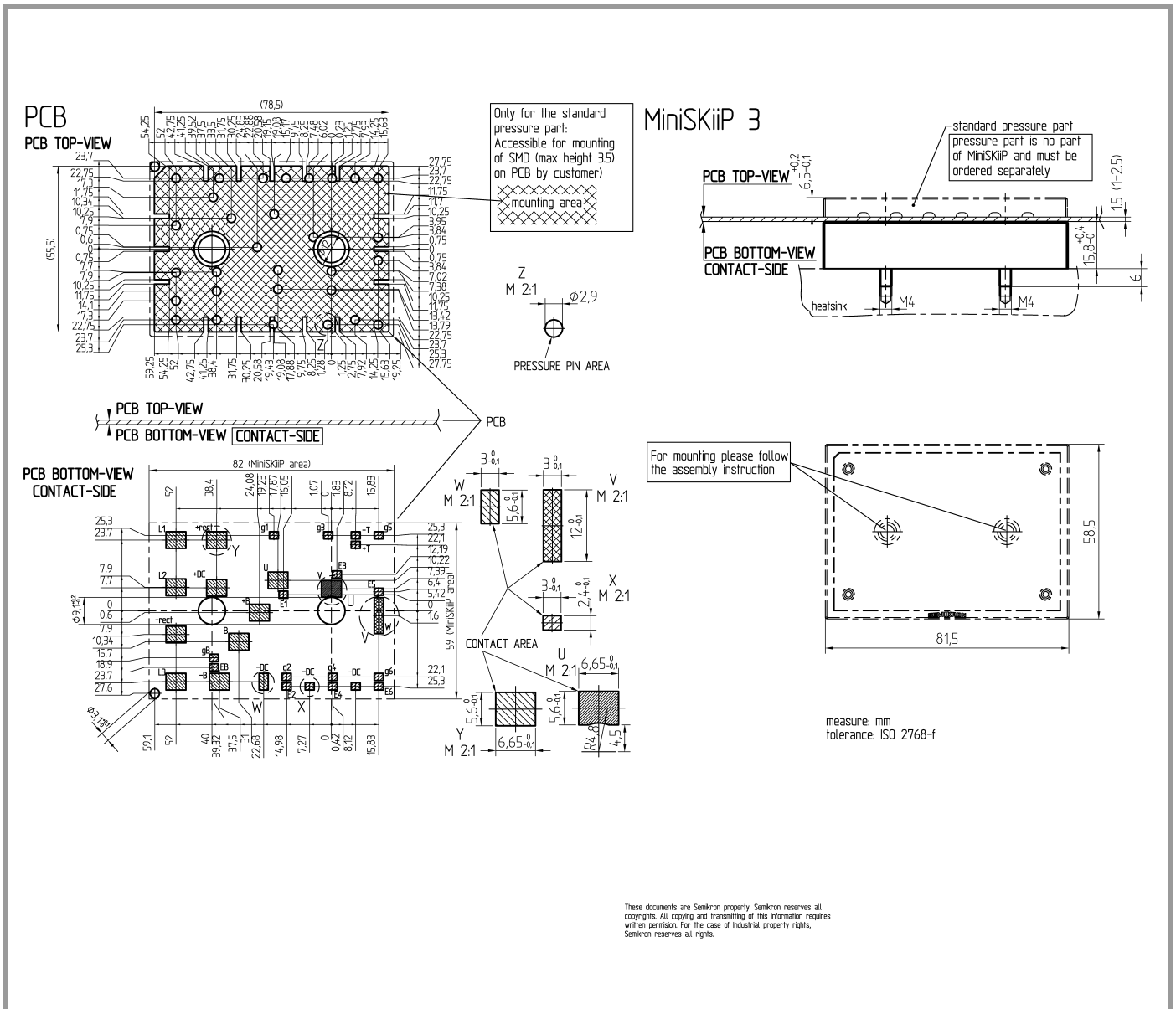


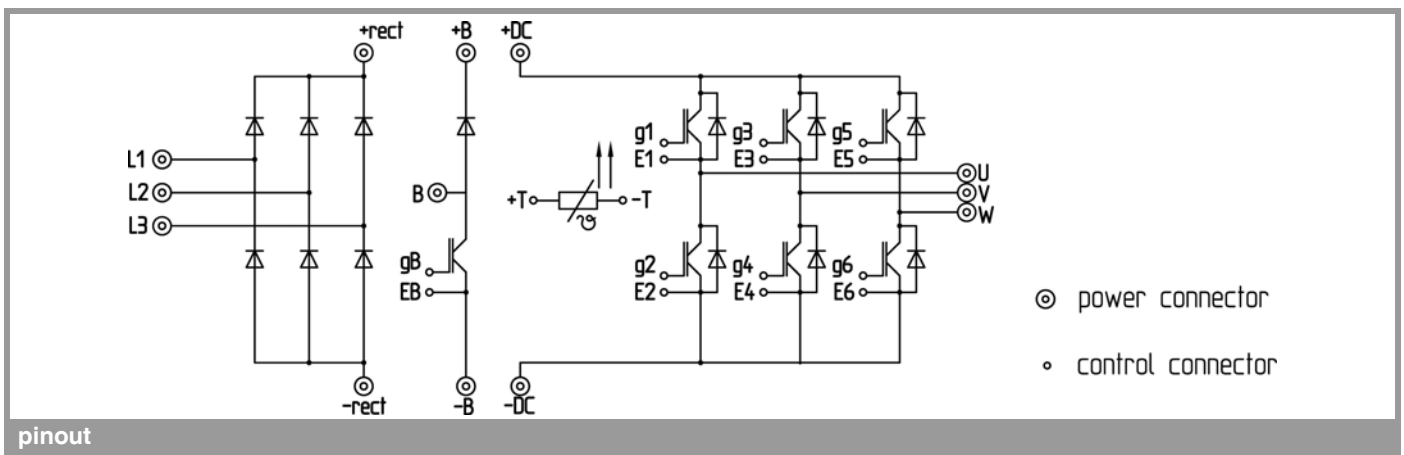
Fig. 6: Typ. gate charge characteristic



SKiiP 38NAB12T4V1



pinout, dimensions



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

*IMPORTANT INFORMATION AND WARNINGS

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