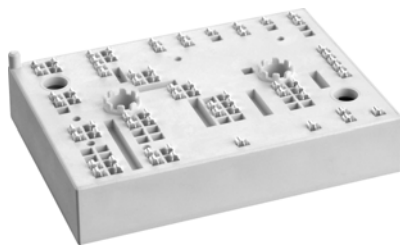


SKiiP 38NAB12T4V1



MiniSKiiP® 3

SKiiP 38NAB12T4V1

Features

- Trench 4 IGBT's
- Robust and soft freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognised file no. E63532

Typical Applications*

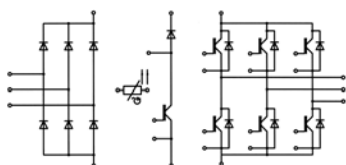
- Inverter up to 41 kVA
- Typical motor power 22 kW

Remarks

- V_{CEsat} , V_F = chip level value
- Case temp. limited to $T_C = 125^\circ\text{C}$ max. (for baseplateless modules $T_C = T_S$)
- product rel. results valid for $T_j \leq 150$ (recomm. $T_{op} = -40 \dots +150^\circ\text{C}$)
- for short circuit: Soft R_{Goff} recommended

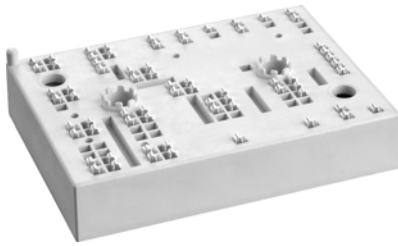
Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Inverter - IGBT				
V _{CES}	T _j = 25 °C		1200	V
I _C	T _j = 150 °C	T _s = 25 °C	103	A
		T _s = 70 °C	79	A
I _C	T _j = 175 °C	T _s = 25 °C	115	A
		T _s = 70 °C	93	A
I _{Cnom}			100	A
I _{CRM}	I _{CRM} = 3 x I _{Cnom}		300	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 800 V V _{GE} ≤ 15 V V _{CES} ≤ 1200 V	T _j = 150 °C	10	µs
T _j			-40 ... 175	°C
Chopper - IGBT				
V _{CES}	T _j = 25 °C		1200	V
I _C	T _j = 150 °C	T _s = 25 °C	103	A
		T _s = 70 °C	79	A
I _C	T _j = 175 °C	T _s = 25 °C	115	A
		T _s = 70 °C	93	A
I _{Cnom}			100	A
I _{CRM}	I _{CRM} = 3 x I _{Cnom}		300	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 800 V V _{GE} ≤ 15 V V _{CES} ≤ 1200 V	T _j = 150 °C	10	µs
T _j			-40 ... 175	°C
Inverse - Diode				
V _{RRM}	T _j = 25 °C		1200	V
I _F	T _j = 150 °C	T _s = 25 °C	89	A
		T _s = 70 °C	66	A
I _F	T _j = 175 °C	T _s = 25 °C	99	A
		T _s = 70 °C	79	A
I _{Fnom}			100	A
I _{FRM}	I _{FRM} = 3 x I _{Fnom}		300	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 150 °C		550	A
T _j			-40 ... 175	°C
Freewheeling - Diode				
V _{RRM}	T _j = 25 °C		1200	V
I _F	T _j = 150 °C	T _s = 25 °C	89	A
		T _s = 70 °C	66	A
I _F	T _j = 175 °C	T _s = 25 °C	100	A
		T _s = 70 °C	79	A
I _{Fnom}			100	A
I _{FRM}	I _{FRM} = 3 x I _{Fnom}		300	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 150 °C		550	A
T _i			-40 ... 175	°C



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SKiiP 38NAB12T4V1



MiniSKiiP® 3

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Features

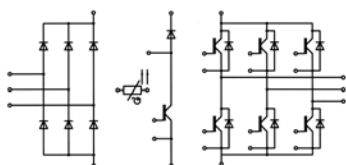
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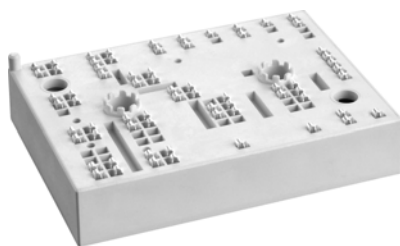
Absolute Maximum Ratings

Symbol	Conditions	Values	Unit
Rectifier - Diode			
V_{RRM}	$T_j = 25^\circ\text{C}$	1600	V
I_F	$T_s = 25^\circ\text{C}$, $T_j = 150^\circ\text{C}$	117	A
I_{Fnom}		45	A
I_{FSM}	10 ms	$T_j = 25^\circ\text{C}$	A
	sin 180°	$T_j = 150^\circ\text{C}$	A
I^2t	10 ms	$T_j = 25^\circ\text{C}$	A^2s
	sin 180°	$T_j = 150^\circ\text{C}$	A^2s
T_j		-40 ... 150	$^\circ\text{C}$
Module			
$I_{t(RMS)}$	$T_{terminal} = 80^\circ\text{C}$, 20A per spring	80	A
T_{stg}		-40 ... 125	$^\circ\text{C}$
V_{isol}	AC sinus 50Hz, 1 min	2500	V

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Inverter - IGBT					
$V_{CE(sat)}$	$I_C = 100\text{ A}$ $V_{GE} = 15\text{ V}$ 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}		$T_j = 25^\circ\text{C}$	0.8	0.9	V
		$T_j = 150^\circ\text{C}$	0.7	0.8	V
r_{CE}	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$	10	12	$\text{m}\Omega$
		$T_j = 150^\circ\text{C}$	15	16	$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}\text{ V}$, $I_C = 4\text{ mA}$	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
					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}		$f = 1\text{ MHz}$	0.34		nF
Q_G	- 8 V...+ 15 V		565		nC
R_{Gint}	$T_j = 25^\circ\text{C}$		7.50		Ω
$t_{d(on)}$	$V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$	160		ns
t_r	$I_C = 100\text{ A}$	$T_j = 150^\circ\text{C}$	35		ns
E_{on}	$R_{G on} = 1\text{ }\Omega$	$T_j = 150^\circ\text{C}$	11.2		mJ
$t_{d(off)}$	$R_{G off} = 1\text{ }\Omega$	$T_j = 150^\circ\text{C}$	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		0.48		K/W
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}		$T_j = 25^\circ\text{C}$	0.8	0.9	V
		$T_j = 150^\circ\text{C}$	0.7	0.8	V
r_{CE}	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$	10	12	$\text{m}\Omega$
		$T_j = 150^\circ\text{C}$	15	16	$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}\text{ V}$, $I_C = 4\text{ mA}$	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
		$T_j = 150^\circ\text{C}$			mA
Q_G	- 8 V...+ 15 V		565		nC
R_{Gint}	$T_j = 25^\circ\text{C}$		7.50		Ω

SKiiP 38NAB12T4V1



MiniSKiiP® 3

SKiiP 38NAB12T4V1

Features

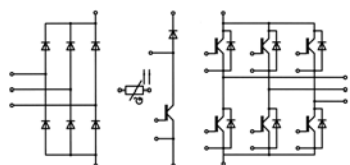
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- for short circuit: Soft R_{Goff} recommended



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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Chopper - IGBT						
t _{d(on)}	V _{CC} = 600 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		11.2		mJ
t _{d(off)}	R _{G off} = 1 Ω	T _j = 150 °C		390		ns
t _f		T _j = 150 °C		75		ns
E _{off}	V _{GE} = +15/-15 V	T _j = 150 °C		10		mJ
R _{th(j-s)}	per IGBT			0.48		K/W
Inverse - Diode						
V _F = V _{EC}	I _F = 100 A	T _j = 25 °C		2.2	2.5	V
	V _{GE} = 0 V chiplevel	T _j = 150 °C		2.1	2.5	V
V _{F0}		T _j = 25 °C		1.3	1.5	V
		T _j = 150 °C		0.9	1.1	V
r _F		T _j = 25 °C		9.0	10	mΩ
		T _j = 150 °C		13	14	mΩ
I _{RRM}	I _F = 100 A	T _j = 150 °C		82		A
Q _{rr}	di/dt _{off} = 2400 A/μs	T _j = 150 °C		16.4		μC
E _{rr}	V _{GE} = -15 V	T _j = 150 °C		6.5		mJ
	V _{CC} = 600 V					
R _{th(j-s)}	per Diode			0.66		K/W
Freewheeling - Diode						
V _F = V _{EC}	I _F = 100 A	T _j = 25 °C		2.2	2.5	V
	V _{GE} = 0 V chiplevel	T _j = 150 °C		2.1	2.5	V
V _{F0}		T _j = 25 °C		1.3	1.5	V
		T _j = 150 °C		0.9	1.1	V
r _F		T _j = 25 °C		9.0	10	mΩ
		T _j = 150 °C		13	14	mΩ
I _{RRM}	I _F = 100 A	T _j = 150 °C		82		A
Q _{rr}	di/dt _{off} = 2400 A/μs	T _j = 150 °C		16.4		μC
E _{rr}	V _{GE} = -15 V	T _j = 150 °C		6.5		mJ
	V _{CC} = 600 V					
R _{th(j-s)}	per Diode			0.66		K/W
Rectifier - Diode						
V _F = V _{EC}	I _F = 45 A	T _j = 25 °C		1	1.21	V
	V _{GE} = 0 V chiplevel	T _j = 125 °C			1.1	V
V _{F0}		T _j = 25 °C			1.0	V
		T _j = 125 °C			0.8	V
r _F		T _j = 25 °C		2.7	5.2	mΩ
		T _j = 125 °C			6.0	mΩ
R _{th(j-s)}	per Diode			0.7		K/W
Module						
M _s	to heat sink		2		2.5	Nm
w				95		g
Temperatur Sensor						
R ₁₀₀	T _r = 100 °C, tolerance = 3 %			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					

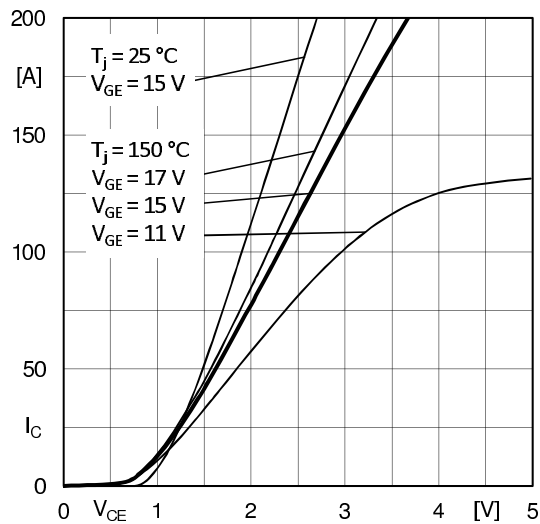


Fig. 1: Typ. output characteristic

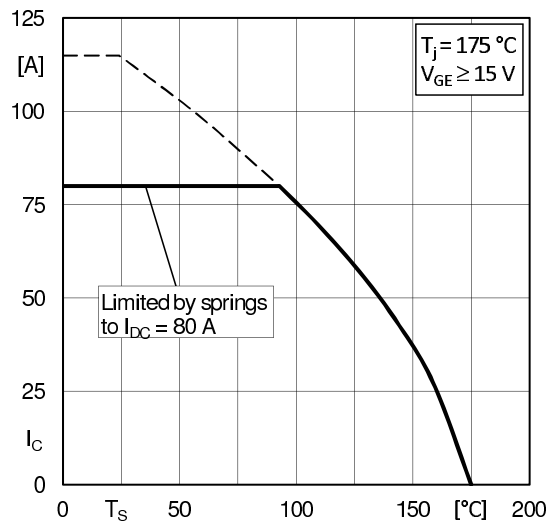


Fig. 2: Typ. rated current vs. temperature $I_C = f(T_S)$

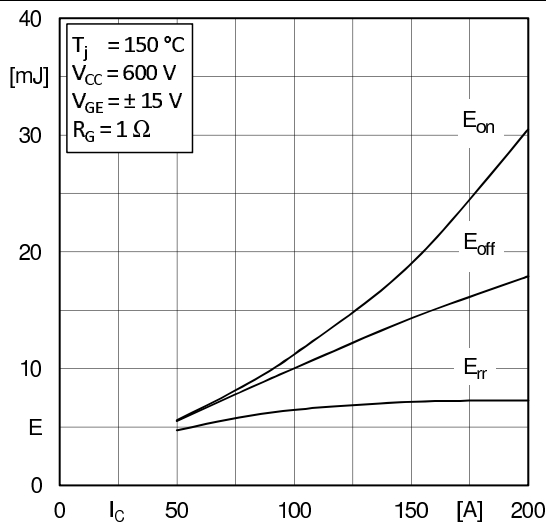


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

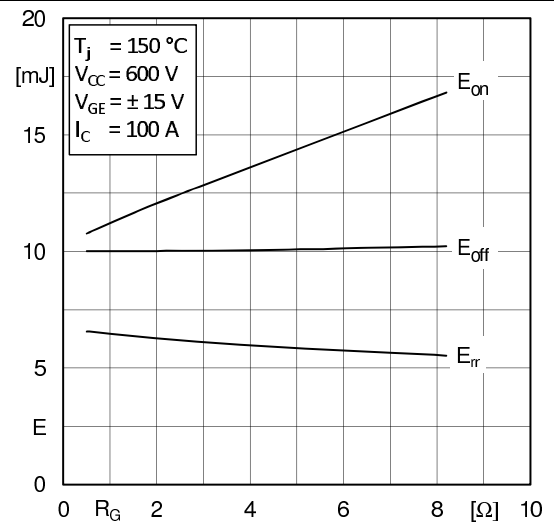


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

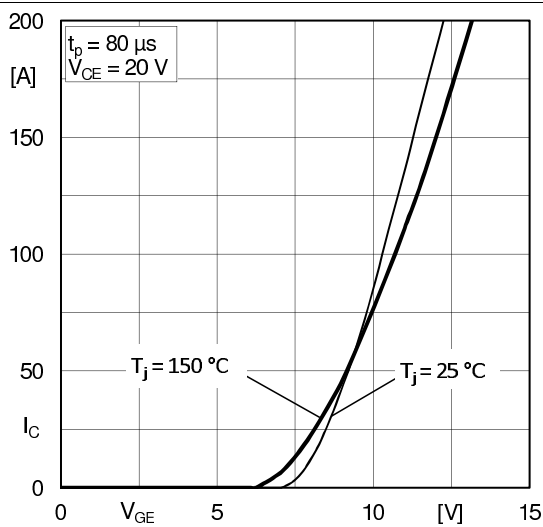


Fig. 5: Typ. transfer characteristic

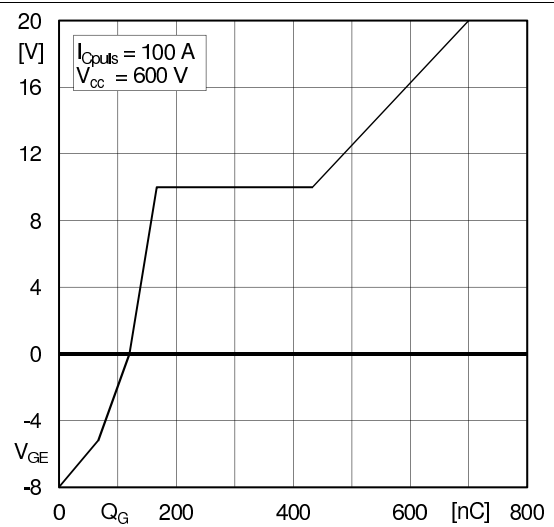
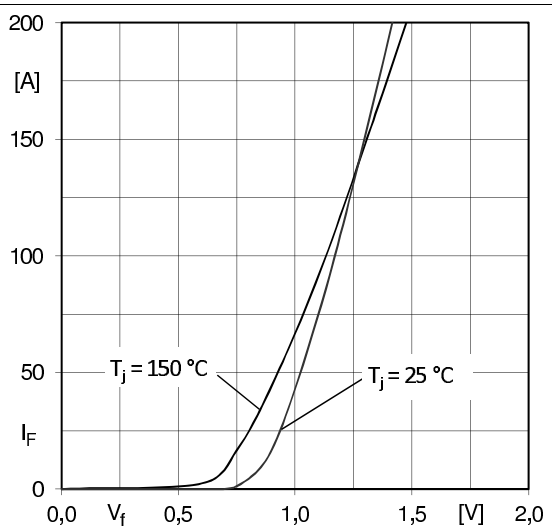
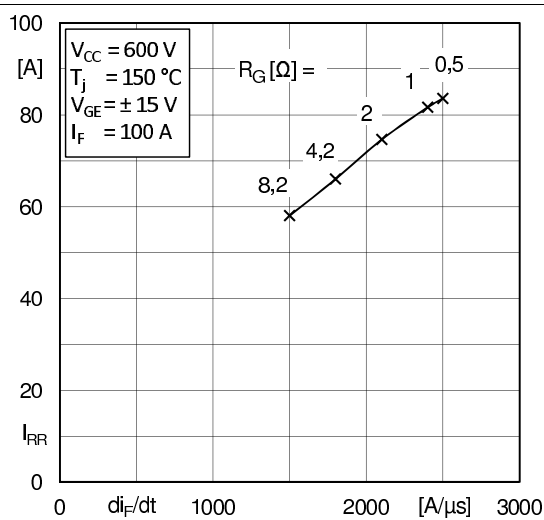
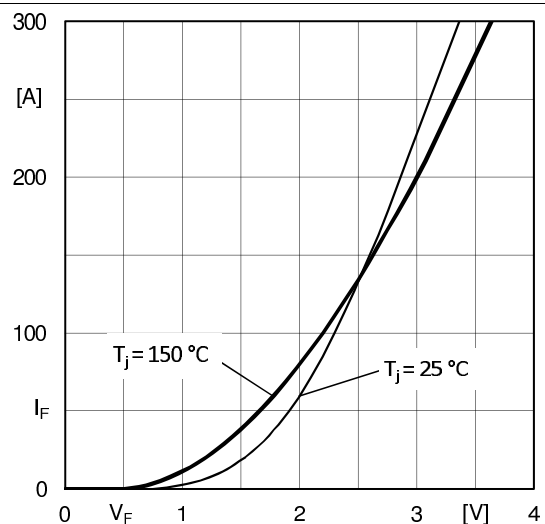
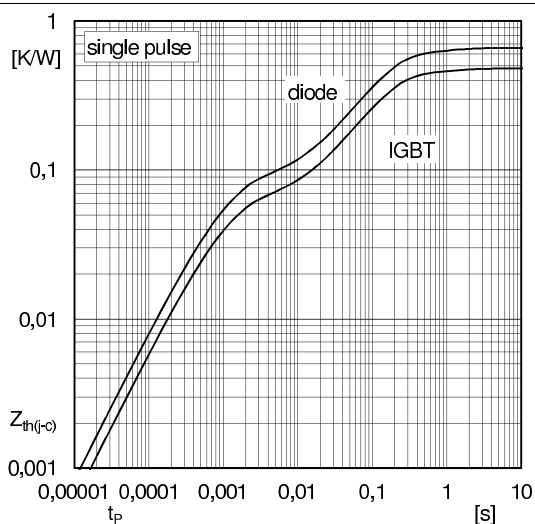
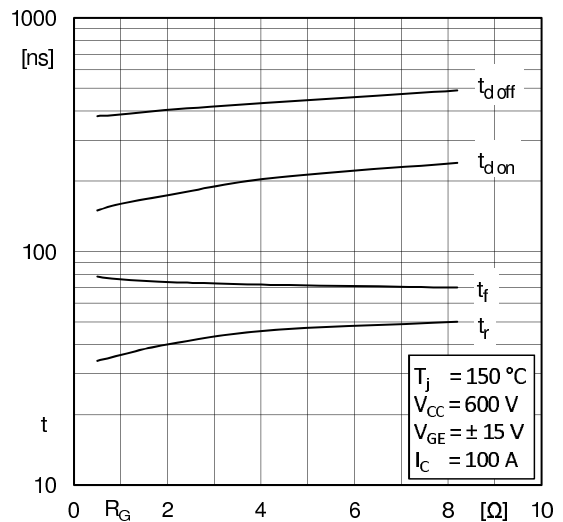
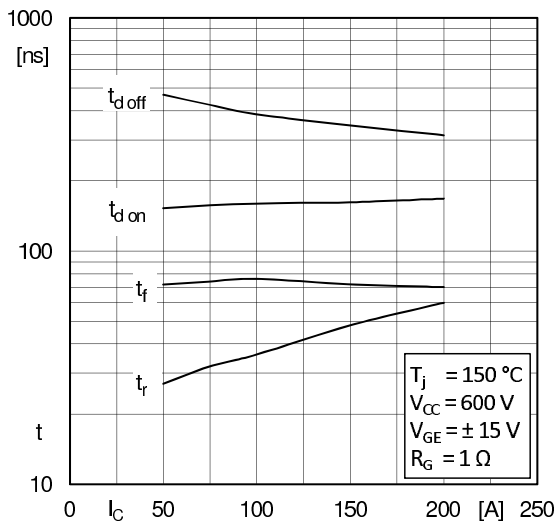
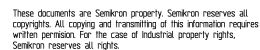


Fig. 6: Typ. gate charge characteristic





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