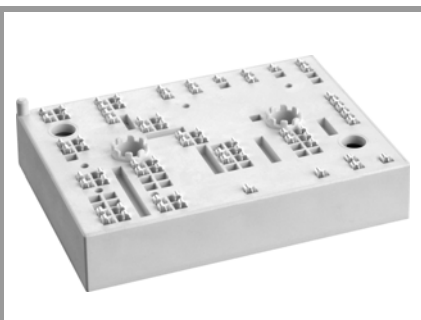


SKiiP 37NAB12T4V1



MiniSKiiP® 3

SKiiP 37NAB12T4V1

Features

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

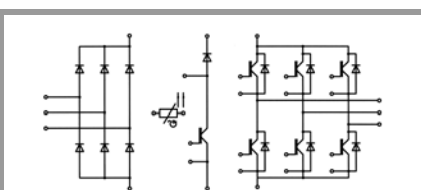
Typical Applications*

- Inverter up to 36 kVA
- Typical motor power 22 kW

Remarks

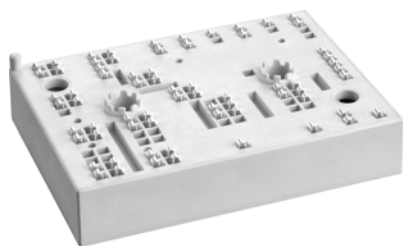
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- Case temp. limited to $T_C = 125^\circ\text{C}$ max. (for baseplateless modules $T_C = T_S$)
- product rel. results valid for $T_j \leq 150$ (recomm. $T_{op} = -40 \dots +150^\circ\text{C}$)

Absolute Maximum Ratings				
Symbol	Conditions	Values	Unit	
Inverter - IGBT				
V_{CES}	$T_j = 25^\circ\text{C}$	1200	V	
I_C	$T_j = 150^\circ\text{C}$	$T_s = 25^\circ\text{C}$	81	A
		$T_s = 70^\circ\text{C}$	62	A
I_C	$T_j = 175^\circ\text{C}$	$T_s = 25^\circ\text{C}$	90	A
		$T_s = 70^\circ\text{C}$	73	A
I_{Cnom}		75	A	
I_{CRM}	$I_{CRM} = 3 \times I_{Cnom}$	225	A	
V_{GES}		-20 ... 20	V	
t_{psc}	$V_{CC} = 800\text{ V}$ $V_{GE} \leq 15\text{ V}$ $V_{CES} \leq 1200\text{ V}$	$T_j = 150^\circ\text{C}$	10	μs
T_j		-40 ... 175	$^\circ\text{C}$	
Chopper - IGBT				
V_{CES}	$T_j = 25^\circ\text{C}$	1200	V	
I_C	$T_j = 150^\circ\text{C}$	$T_s = 25^\circ\text{C}$	81	A
		$T_s = 70^\circ\text{C}$	62	A
I_C	$T_j = 175^\circ\text{C}$	$T_s = 25^\circ\text{C}$	90	A
		$T_s = 70^\circ\text{C}$	73	A
I_{Cnom}		75	A	
I_{CRM}	$I_{CRM} = 3 \times I_{Cnom}$	225	A	
V_{GES}		-20 ... 20	V	
t_{psc}	$V_{CC} = 800\text{ V}$ $V_{GE} \leq 15\text{ V}$ $V_{CES} \leq 1200\text{ V}$	$T_j = 150^\circ\text{C}$	10	μs
T_j		-40 ... 175	$^\circ\text{C}$	
Inverse - Diode				
V_{RRM}	$T_j = 25^\circ\text{C}$	1200	V	
I_F	$T_j = 150^\circ\text{C}$	$T_s = 25^\circ\text{C}$	74	A
		$T_s = 70^\circ\text{C}$	55	A
I_F	$T_j = 175^\circ\text{C}$	$T_s = 25^\circ\text{C}$	83	A
		$T_s = 70^\circ\text{C}$	66	A
I_{Fnom}		75	A	
I_{FRM}	$I_{FRM} = 3 \times I_{Fnom}$	225	A	
I_{FSM}	$t_p = 10\text{ ms}$, $\sin 180^\circ$, $T_j = 150^\circ\text{C}$	430	A	
T_j		-40 ... 175	$^\circ\text{C}$	
Freewheeling - Diode				
V_{RRM}	$T_j = 25^\circ\text{C}$	1200	V	
I_F	$T_j = 150^\circ\text{C}$	$T_s = 25^\circ\text{C}$	74	A
		$T_s = 70^\circ\text{C}$	55	A
I_F	$T_j = 175^\circ\text{C}$	$T_s = 25^\circ\text{C}$	83	A
		$T_s = 70^\circ\text{C}$	66	A
I_{Fnom}		75	A	
I_{FRM}	$I_{FRM} = 3 \times I_{Fnom}$	225	A	
I_{FSM}	$t_p = 10\text{ ms}$, $\sin 180^\circ$, $T_j = 150^\circ\text{C}$	430	A	
T_j		-40 ... 175	$^\circ\text{C}$	



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SKiiP 37NAB12T4V1



MiniSKiiP® 3

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Features

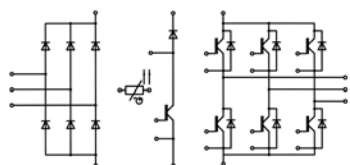
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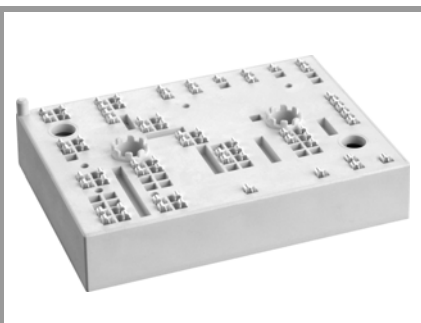


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Absolute Maximum Ratings				
Symbol	Conditions	Values	Unit	
Rectifier - Diode				
V_{RRM}	$T_j = 25^\circ\text{C}$	1600	V	
I_F	$T_s = 25^\circ\text{C}, T_j = 150^\circ\text{C}$	81	A	
I_{Fnom}		25	A	
I_{FSM}	10 ms	$T_j = 25^\circ\text{C}$	700	A
	sin 180°	$T_j = 150^\circ\text{C}$	490	A
I^2t	10 ms	$T_j = 25^\circ\text{C}$	2400	A ² s
	sin 180°	$T_j = 150^\circ\text{C}$	1200	A ² s
T_j		-40 ... 150	°C	
Module				
$I_t(\text{RMS})$	$T_{\text{terminal}} = 80^\circ\text{C}, 20\text{A per spring}$	80	A	
T_{stg}		-40 ... 125	°C	
V_{isol}	AC sinus 50Hz, 1 min	2500	V	

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
Inverter - IGBT					
$V_{CE(sat)}$	$I_C = 75\text{ A}$ $V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$	1.85	2.10	V
		$T_j = 150^\circ\text{C}$	2.25	2.45	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}	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$	14	16	mΩ
		$T_j = 150^\circ\text{C}$	21	22	mΩ
$V_{GE(th)}$	$V_{GE} = V_{CE}\text{ V}, I_C = 3\text{ mA}$	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}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	4.40		nF
C_{oes}		$f = 1\text{ MHz}$	0.29		nF
C_{res}		$f = 1\text{ MHz}$	0.23		nF
Q_G	- 8 V...+ 15 V		425		nC
R_{Gint}	$T_j = 25^\circ\text{C}$		10.00		Ω
$t_{d(on)}$	$V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$	150		ns
t_r	$I_C = 75\text{ A}$	$T_j = 150^\circ\text{C}$	35		ns
E_{on}	$R_{G\ on} = 2\ \Omega$	$T_j = 150^\circ\text{C}$	9.7		mJ
$t_{d(off)}$	$R_{G\ off} = 2\ \Omega$	$T_j = 150^\circ\text{C}$	355		ns
t_f		$T_j = 150^\circ\text{C}$	60		ns
E_{off}	$V_{GE} = +15/-15\text{ V}$	$T_j = 150^\circ\text{C}$	6.8		mJ
$R_{th(j-s)}$	per IGBT		0.58		K/W
Chopper - IGBT					
$V_{CE(sat)}$	$I_C = 75\text{ A}$ $V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$	1.85	2.10	V
		$T_j = 150^\circ\text{C}$	2.25	2.45	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}	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$	14	16	mΩ
		$T_j = 150^\circ\text{C}$	21	22	mΩ
$V_{GE(th)}$	$V_{GE} = V_{CE}\text{ V}, I_C = 3\text{ mA}$	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		425		nC
R_{Gint}	$T_j = 25^\circ\text{C}$		10.00		Ω

SKiiP 37NAB12T4V1



MiniSKiiP® 3

SKiiP 37NAB12T4V1

Features

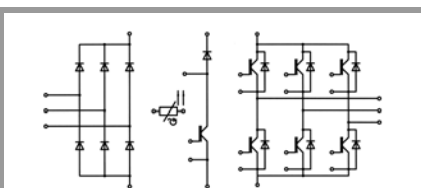
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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Chopper - IGBT						
$t_{d(on)}$	$V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$		150		ns
t_r	$I_C = 75\text{ A}$	$T_j = 150^\circ\text{C}$		35		ns
E_{on}	$R_{G\ on} = 2\ \Omega$	$T_j = 150^\circ\text{C}$		9.7		mJ
	$R_{G\ off} = 2\ \Omega$	$T_j = 150^\circ\text{C}$		355		ns
$t_{d(off)}$		$T_j = 150^\circ\text{C}$		60		ns
t_f		$T_j = 150^\circ\text{C}$		60		ns
E_{off}	$V_{GE} = +15/-15\text{ V}$	$T_j = 150^\circ\text{C}$		6.8		mJ
$R_{th(j-s)}$	per IGBT			0.58		K/W
Inverse - Diode						
$V_F = V_{EC}$	$I_F = 75\text{ A}$	$T_j = 25^\circ\text{C}$		2.2	2.5	V
	$V_{GE} = 0\text{ V}$ chiplevel	$T_j = 150^\circ\text{C}$		2.1	2.4	V
V_{F0}		$T_j = 25^\circ\text{C}$		1.3	1.5	V
		$T_j = 150^\circ\text{C}$		0.9	1.1	V
r_F		$T_j = 25^\circ\text{C}$		12	13	m Ω
		$T_j = 150^\circ\text{C}$		16	18	m Ω
I_{RRM}	$I_F = 75\text{ A}$	$T_j = 150^\circ\text{C}$		62		A
Q_{rr}	$di/dt_{off} = 1940\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		12.6		μC
E_{rr}	$V_{GE} = -15\text{ V}$ $V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$		4.9		mJ
$R_{th(j-s)}$	per Diode			0.75		K/W
Freewheeling - Diode						
$V_F = V_{EC}$	$I_F = 75\text{ A}$	$T_j = 25^\circ\text{C}$		2.2	2.5	V
	$V_{GE} = 0\text{ V}$ chiplevel	$T_j = 150^\circ\text{C}$		2.1	2.4	V
V_{F0}		$T_j = 25^\circ\text{C}$		1.3	1.5	V
		$T_j = 150^\circ\text{C}$		0.9	1.1	V
r_F		$T_j = 25^\circ\text{C}$		12	13	m Ω
		$T_j = 150^\circ\text{C}$		16	18	m Ω
I_{RRM}	$I_F = 75\text{ A}$	$T_j = 150^\circ\text{C}$		62		A
Q_{rr}	$di/dt_{off} = 1940\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		12.6		μC
E_{rr}	$V_{GE} = -15\text{ V}$ $V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$		4.9		mJ
$R_{th(j-s)}$	per Diode			0.75		K/W
Rectifier - Diode						
$V_F = V_{EC}$	$I_F = 25\text{ A}$	$T_j = 25^\circ\text{C}$		1	1.21	V
	$V_{GE} = 0\text{ V}$ chiplevel	$T_j = 125^\circ\text{C}$			1.1	V
V_{F0}		$T_j = 25^\circ\text{C}$			1.0	V
		$T_j = 125^\circ\text{C}$			0.8	V
r_F		$T_j = 25^\circ\text{C}$		4.8	9.3	m Ω
		$T_j = 125^\circ\text{C}$			11	m Ω
$R_{th(j-s)}$	per Diode			0.9		K/W
Module						
M_s	to heat sink			2	2.5	Nm
w				95		g
Temperatur Sensor						
R_{100}	$T_r = 100^\circ\text{C}$, tolerance = 3 %			1670 \pm 3%		Ω
$R(T)$	$R(T) = 1000\ \Omega [1 + A(T - 25^\circ\text{C}) + B(T - 25^\circ\text{C})^2]$ $A = 7.635 \cdot 10^{-3}\ \text{C}^{-1}$, $B = 1.731 \cdot 10^{-5}\ \text{C}^{-2}$					

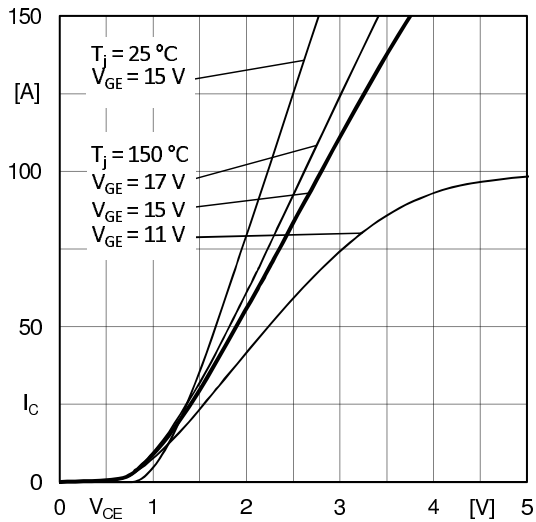


Fig. 1: Typ. output characteristic

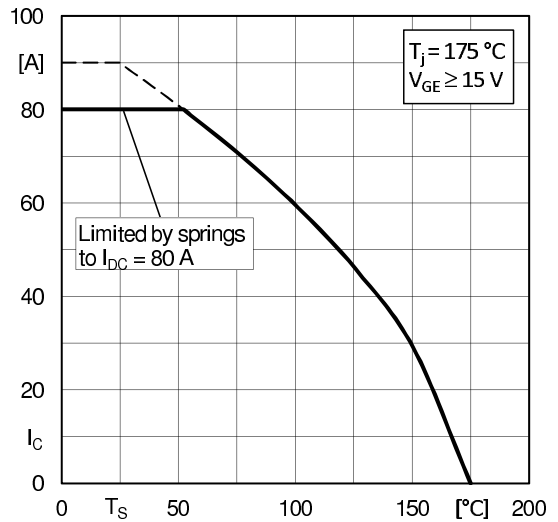


Fig. 2: Typ. rated current vs. temperature $I_C = f(T_S)$

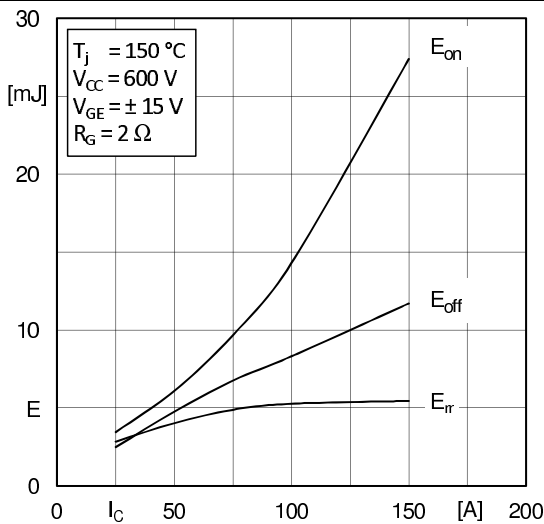


Fig. 3: Typ. turn-on /-off energy = f(Ic)

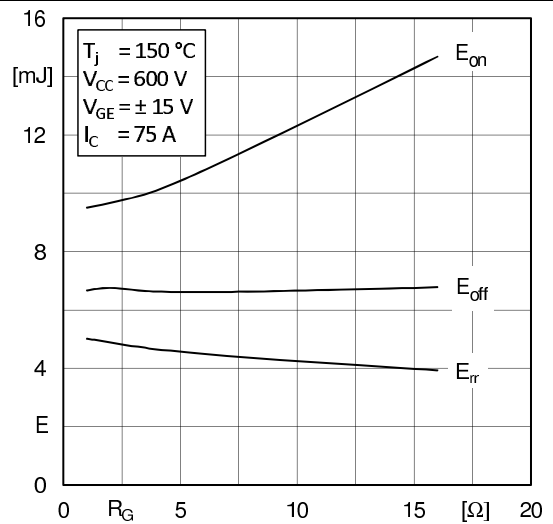


Fig. 4: Typ. turn-on /-off energy = f(RG)

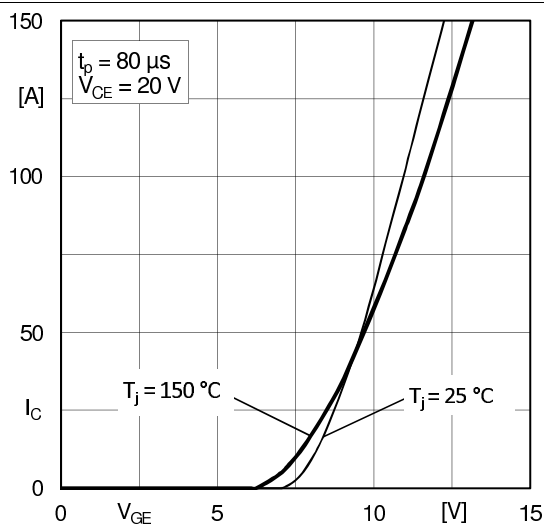


Fig. 5: Typ. transfer characteristic

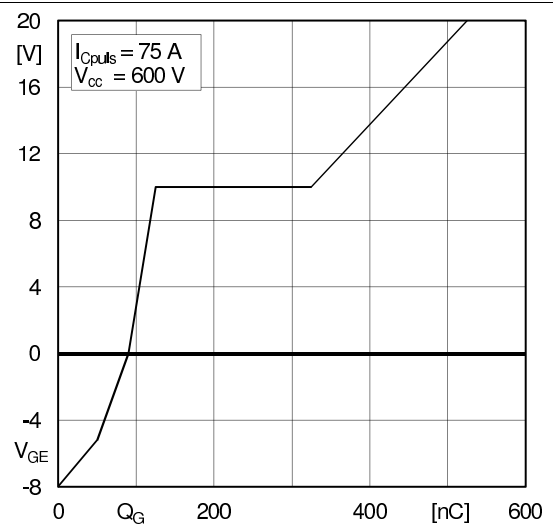


Fig. 6: Typ. gate charge characteristic

