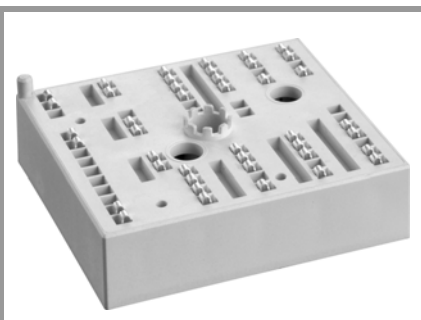


# SKiIP 28ANB18V3



MiniSKiIP® 2

3-phase bridge rectifier +  
brake chopper

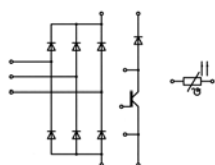
## SKiIP 28ANB18V3

### 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  $T_C=125^\circ\text{C}$
- Product reliability results valid for  $T_j \leq 150^\circ\text{C}$  (recommended  $T_{j,op} = -40 \dots +150^\circ\text{C}$ )
- IGBT 1: brake chopper IGBT
- Diode 1: brake chopper diode
- Diode 4: rectifier diode
- The distance between terminals of temperature sensor and -rect is not sufficient for basic insulation



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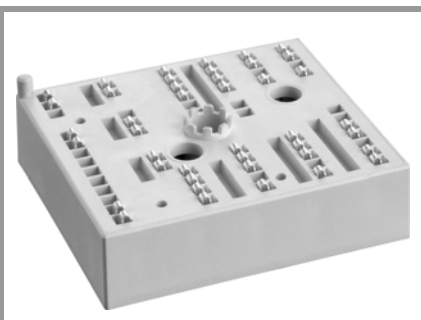
Absolute Maximum Ratings			
Symbol	Conditions	Values	Unit
<b>IGBT 1</b>			
$V_{CES}$	$T_j = 25^\circ\text{C}$	1700	V
$I_C$	$T_j = 150^\circ\text{C}$	$T_s = 25^\circ\text{C}$	115
		$T_s = 70^\circ\text{C}$	88
$I_C$	$T_j = 175^\circ\text{C}$	$T_s = 25^\circ\text{C}$	128
		$T_s = 70^\circ\text{C}$	104
$I_{Cnom}$		100	A
$I_{CRM}$	$I_{CRM} = 2 \times I_{Cnom}$	200	A
$V_{GES}$		-20 ... 20	V
$t_{psc}$	$V_{CC} = 1200\text{ V}$ $V_{GE} \leq 20\text{ V}$ $V_{CES} \leq 1700\text{ V}$	$T_j = 150^\circ\text{C}$	10
$T_j$		-40 ... 175	$^\circ\text{C}$

Absolute Maximum Ratings			
Symbol	Conditions	Values	Unit
<b>Diode 1</b>			
$V_{RRM}$	$T_j = 25^\circ\text{C}$	1700	V
$I_F$	$T_j = 150^\circ\text{C}$	$T_s = 25^\circ\text{C}$	105
		$T_s = 70^\circ\text{C}$	76
$I_F$	$T_j = 175^\circ\text{C}$	$T_s = 25^\circ\text{C}$	119
		$T_s = 70^\circ\text{C}$	93
$I_{Fnom}$		150	A
$I_{FRM}$	$I_{FRM} = 2 \times I_{Fnom}$	300	A
$I_{FSM}$	10 ms, sin $180^\circ$ , $T_j = 150^\circ\text{C}$	860	A
$T_j$		-40 ... 175	$^\circ\text{C}$

Absolute Maximum Ratings			
Symbol	Conditions	Values	Unit
<b>Diode 4</b>			
$V_{RRM}$		1800	V
$I_F$	$T_j = 150^\circ\text{C}$	$T_s = 25^\circ\text{C}$	139
		$T_s = 70^\circ\text{C}$	98
$I_{Fnom}$	DC current	88	A
$I_{FSM}$	10 ms, sin $180^\circ$ , $T_j = 150^\circ\text{C}$	890	A
$I^2t$	10 ms, sin. $180^\circ$ , $T_j = 150^\circ\text{C}$	3900	$\text{A}^2\text{s}$
$T_j$		-40 ... 150	$^\circ\text{C}$

Absolute Maximum Ratings			
Symbol	Conditions	Values	Unit
<b>Module</b>			
$I_{t(RMS)}$	$T_{terminal} = 80^\circ\text{C}$ , 20 A per spring	80	A
$T_{stg}$		-40 ... 125	$^\circ\text{C}$
$V_{isol}$	AC sinus 50 Hz, $t = 1\text{ min}$	2500	V

# SKiIP 28ANB18V3



MiniSKiIP® 2

## 3-phase bridge rectifier + brake chopper

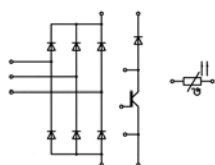
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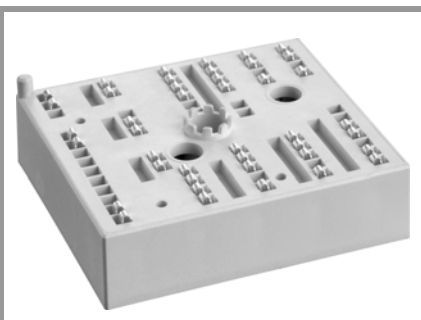
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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
<b>IGBT 1</b>						
$V_{CE(sat)}$	$I_C = 100\text{ A}$ $V_{GE} = 15\text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$		2.00	2.40	V
		$T_j = 150^\circ\text{C}$		2.45	2.90	V
$V_{CE0}$	chiplevel	$T_j = 25^\circ\text{C}$		1	1.2	V
		$T_j = 150^\circ\text{C}$		0.9	1.1	V
$r_{CE}$	$V_{GE} = 15\text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$		10	12	m $\Omega$
		$T_j = 150^\circ\text{C}$		16	18	m $\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}\text{ V}, I_C = 4\text{ mA}$		5.2	5.8	6.4	V
$I_{CES}$	$V_{GE} = 0\text{ V}$	$T_j = 25^\circ\text{C}$		0.1	0.3	mA
	$V_{CE} = 1700\text{ V}$					mA
$C_{ies}$	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$		8.82		nF
$C_{oes}$		$f = 1\text{ MHz}$		0.37		nF
$C_{res}$		$f = 1\text{ MHz}$		0.29		nF
$Q_G$	$-8\text{ V} \dots +15\text{ V}$			934		nC
$R_{Gint}$	$T_j = 25^\circ\text{C}$			4.8		$\Omega$
$t_{d(on)}$	$V_{CC} = 900\text{ V}$	$T_j = 150^\circ\text{C}$		160		ns
$t_r$	$I_C = 100\text{ A}$	$T_j = 150^\circ\text{C}$		35		ns
$E_{on}$	$R_{G on} = 1\ \Omega$	$T_j = 150^\circ\text{C}$		23		mJ
$t_{d(off)}$	$R_{G off} = 1\ \Omega$	$T_j = 150^\circ\text{C}$		580		ns
$t_f$	$di/dt_{on} = 3000\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		150		ns
$E_{off}$	$di/dt_{off} = 600\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		32.7		mJ
$E_{off}$	$V_{GE neg} = -15\text{ V}$ $V_{GE pos} = 15\text{ V}$	$T_j = 150^\circ\text{C}$		32.7		mJ
$R_{th(j-s)}$	per IGBT, $\lambda_{paste}=0.8\text{ W/K}^*\text{m}$			0.33		K/W

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
<b>Diode 1</b>						
$V_F = V_{EC}$	$I_F = 100\text{ A}$ $V_{GE} = 0\text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$		1.8	2.1	V
		$T_j = 150^\circ\text{C}$		1.8	2.1	V
$V_{F0}$	chiplevel	$T_j = 25^\circ\text{C}$		1.3	1.6	V
		$T_j = 150^\circ\text{C}$		1.1	1.2	V
$r_F$	chiplevel	$T_j = 25^\circ\text{C}$		4.4	5.4	m $\Omega$
		$T_j = 150^\circ\text{C}$		6.9	8.7	m $\Omega$
$I_{RRM}$	$I_F = 100\text{ A}$	$T_j = 150^\circ\text{C}$		226		A
$Q_{rr}$	$di/dt_{off} = 4000\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		38.5		$\mu\text{C}$
$E_{rr}$	$V_{GE} = -15\text{ V}$	$T_j = 150^\circ\text{C}$		26.4		mJ
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=0.8\text{ W/K}^*\text{m}$			0.58		K/W

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
<b>Diode 4</b>						
$V_F = V_{EC}$	$I_F = 88\text{ A}$ $V_{GE} = 0\text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$		1.1	1.3	V
		$T_j = 125^\circ\text{C}$		1	1.3	V
$V_{F0}$	chiplevel	$T_j = 25^\circ\text{C}$	0.6	0.9	1.1	V
		$T_j = 125^\circ\text{C}$		0.7	1	V
$r_F$	chiplevel	$T_j = 25^\circ\text{C}$		2.3	2.6	m $\Omega$
		$T_j = 125^\circ\text{C}$		3	3.3	m $\Omega$
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=0.8\text{ W/K}^*\text{m}$			0.64		K/W

# SKiiP 28ANB18V3



MiniSKiiP® 2

3-phase bridge rectifier +  
brake chopper

## SKiiP 28ANB18V3

### Features

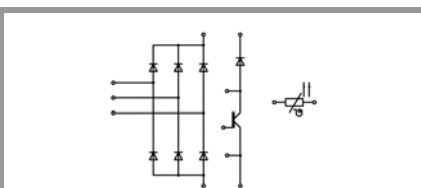
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- IGBT 1: brake chopper IGBT
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- The distance between terminals of temperature sensor and -rect is not sufficient for basic insulation

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
<b>Temperature Sensor</b>					
$R_{100}$	$T_r=100^{\circ}\text{C}$ ( $R_{25}=1000\Omega$ )		$1670 \pm 3\%$		$\Omega$
$R(T)$	$R(T)=1000\Omega[1+A(T-25^{\circ}\text{C})+B(T-25^{\circ}\text{C})^2]$ ], $A = 7.635 \cdot 10^{-3} \text{ }^{\circ}\text{C}^{-1}$ , $B = 1.731 \cdot 10^{-5} \text{ }^{\circ}\text{C}^{-2}$				

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
<b>Module</b>					
$M_s$	to heat sink	2		2.5	Nm
w	weight		55		g



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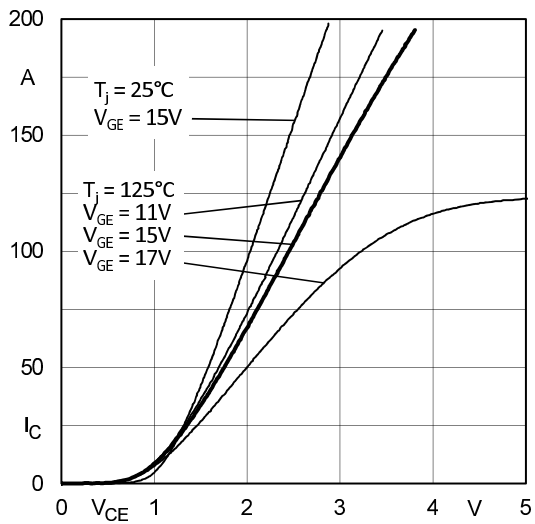


Fig. 1: Typ. output characteristic, inclusive  $R_{CC'+EE'}$

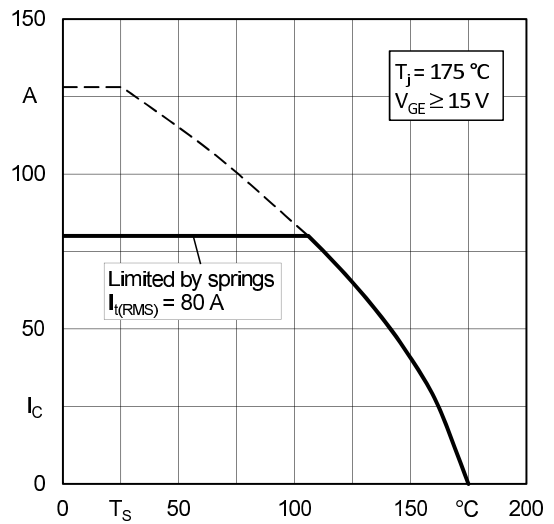


Fig. 2: Typ. rated current vs. temperature  $I_C = f(T_s)$

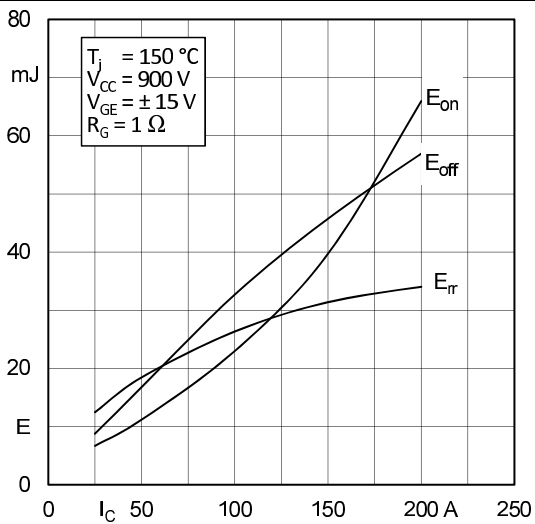


Fig. 3: Typ. turn-on /-off energy =  $f(I_C)$

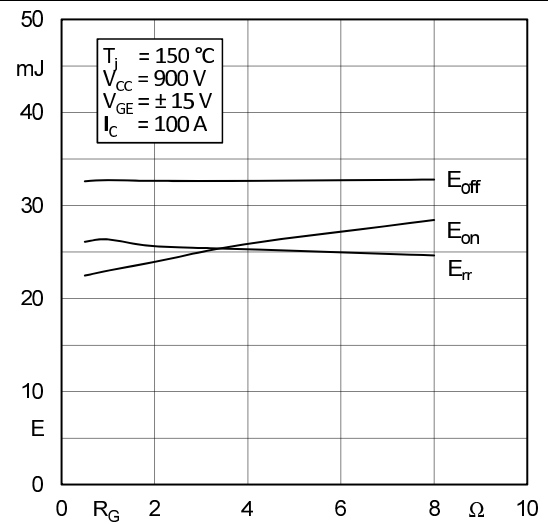


Fig. 4: Typ. turn-on /-off energy =  $f(R_G)$

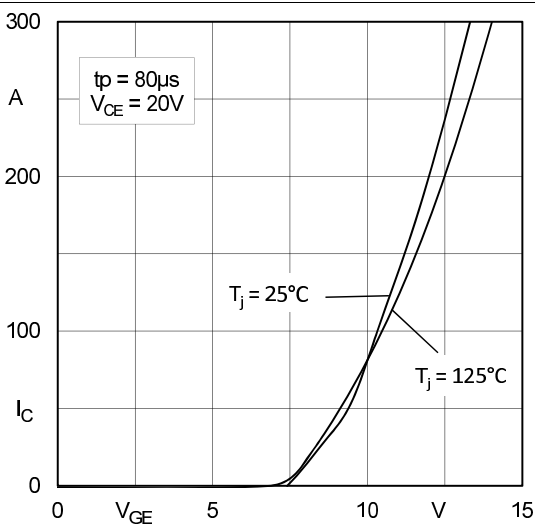


Fig. 5: Typ. transfer characteristic

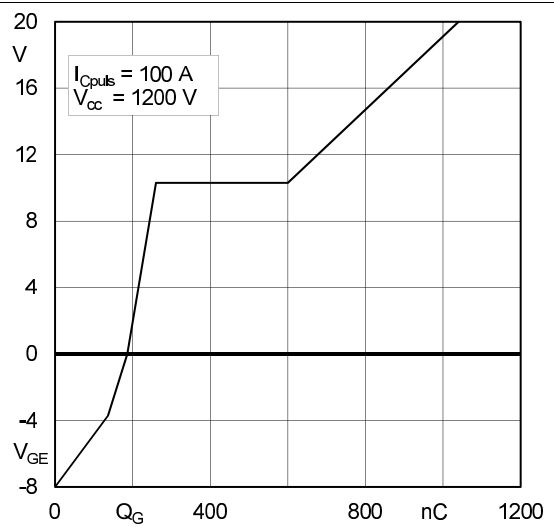


Fig. 6: Typ. gate charge characteristic

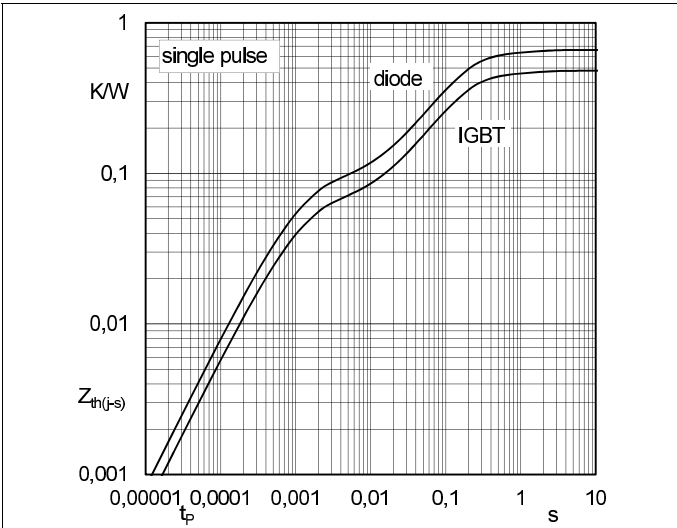


Fig. 7: Transient thermal impedance of IGBT and Diode

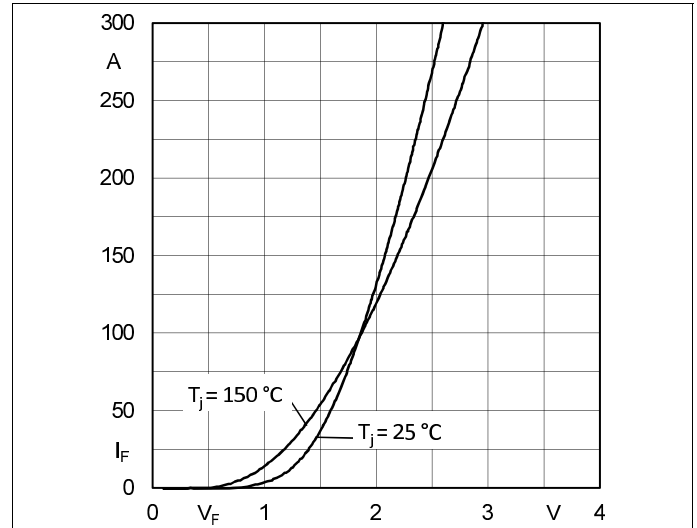


Fig. 8: CAL diode forward characteristic

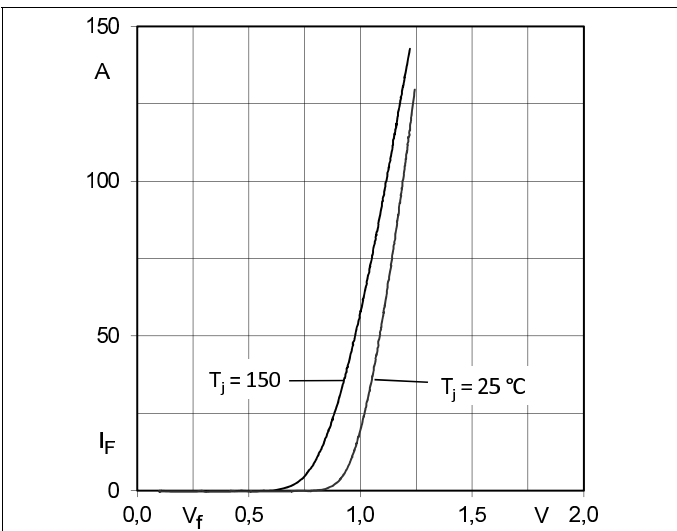


Fig. 9: Typ. input bridge forward characteristic

