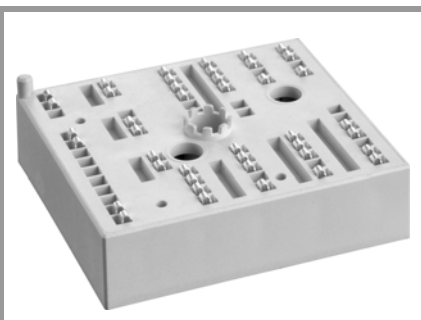


SKiIP 24NAB12T4V1



MiniSKiIP® 2

SKiIP 24NAB12T4V1

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

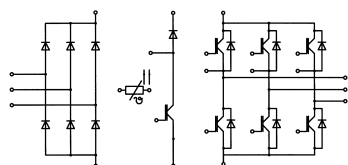
Typical Applications*

- Inverter up to 22 kVA
- Typical motor power 11 kW

Remarks

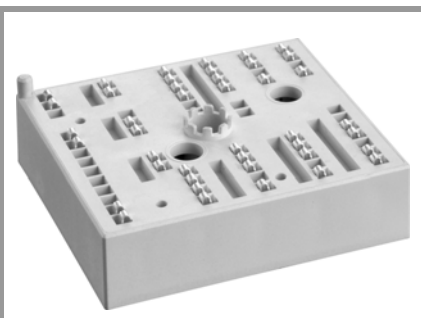
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- product rel. results valid for $T_j \leq 150$ (recomm. $T_{op} = -40 \dots +150^\circ\text{C}$)

Absolute Maximum Ratings				
Symbol	Conditions	Values	Unit	
Inverter - IGBT				
V_{CES}	$T_j = 25^\circ\text{C}$	1200	V	
I_C	$T_j = 150^\circ\text{C}$	$T_s = 25^\circ\text{C}$	43	A
		$T_s = 70^\circ\text{C}$	33	A
I_C	$T_j = 175^\circ\text{C}$	$T_s = 25^\circ\text{C}$	48	A
		$T_s = 70^\circ\text{C}$	39	A
I_{Cnom}		35	A	
I_{CRM}	$I_{CRM} = 3 \times I_{Cnom}$	105	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	$T_j = 150^\circ\text{C}$	$T_s = 25^\circ\text{C}$	43	A
		$T_s = 70^\circ\text{C}$	33	A
I_C	$T_j = 175^\circ\text{C}$	$T_s = 25^\circ\text{C}$	48	A
		$T_s = 70^\circ\text{C}$	39	A
I_{Cnom}		35	A	
I_{CRM}	$I_{CRM} = 3 \times I_{Cnom}$	105	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	$T_j = 150^\circ\text{C}$	$T_s = 25^\circ\text{C}$	39	A
		$T_s = 70^\circ\text{C}$	30	A
I_F	$T_j = 175^\circ\text{C}$	$T_s = 25^\circ\text{C}$	44	A
		$T_s = 70^\circ\text{C}$	35	A
I_{Fnom}		35	A	
I_{FRM}	$I_{FRM} = 3 \times I_{Fnom}$	105	A	
I_{FSM}	$t_p = 10\text{ ms, sin } 180^\circ, T_j = 150^\circ\text{C}$	170	A	
T_j		-40 ... 175	$^\circ\text{C}$	
Freewheeling - Diode				
V_{RRM}	$T_j = 25^\circ\text{C}$	1200	V	
I_F	$T_j = 150^\circ\text{C}$	$T_s = 25^\circ\text{C}$	39	A
		$T_s = 70^\circ\text{C}$	30	A
I_F	$T_j = 175^\circ\text{C}$	$T_s = 25^\circ\text{C}$	44	A
		$T_s = 70^\circ\text{C}$	35	A
I_{Fnom}		35	A	
I_{FRM}	$I_{FRM} = 3 \times I_{Fnom}$	105	A	
I_{FSM}	$t_p = 10\text{ ms, sin } 180^\circ, T_j = 150^\circ\text{C}$	170	A	
T_j		-40 ... 175	$^\circ\text{C}$	



NAB

SKiIP 24NAB12T4V1



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SKiIP 24NAB12T4V1

Features

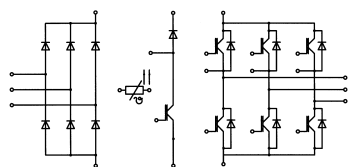
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- V_{CEsat} , V_F = chip level value
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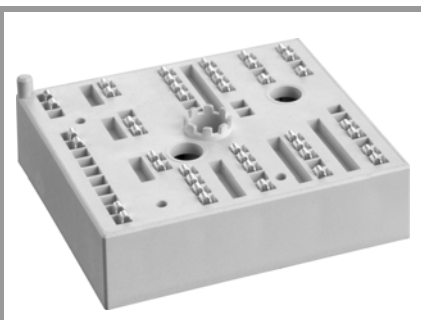


NAB

Absolute Maximum Ratings				
Symbol	Conditions	Values	Unit	
Rectifier - Diode				
V_{RRM}	$T_j = 25^\circ\text{C}$	1600	V	
I_F	$T_s = 25^\circ\text{C}, T_j = 150^\circ\text{C}$	52	A	
I_{Fnom}		13	A	
I_{FSM}	10 ms	$T_j = 25^\circ\text{C}$	370	A
	sin 180°	$T_j = 150^\circ\text{C}$	270	A
I^2t	10 ms	$T_j = 25^\circ\text{C}$	685	A ² s
	sin 180°	$T_j = 150^\circ\text{C}$	365	A ² s
T_j		-40 ... 150	°C	
Module				
$I_t(\text{RMS})$	$T_{\text{terminal}} = 80^\circ\text{C}, 20\text{A per spring}$	40	A	
T_{stg}		-40 ... 125	°C	
V_{isol}	AC sinus 50Hz, 1 min	2500	V	

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
Inverter - IGBT					
$V_{CE(sat)}$	$I_C = 35\text{ A}$ $V_{GE} = 15\text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$	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}	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$	30	34	mΩ
		$T_j = 150^\circ\text{C}$	44	47	mΩ
$V_{GE(th)}$	$V_{GE} = V_{CE}\text{ V}, I_C = 1\text{ mA}$	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}	$V_{CE} = 25\text{ V}$	$f = 1\text{ MHz}$	1.95		nF
C_{oes}	$V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	0.16		nF
C_{res}		$f = 1\text{ MHz}$	0.12		nF
Q_G	- 8 V...+ 15 V		200		nC
R_{Gint}	$T_j = 25^\circ\text{C}$		0.00		Ω
$t_{d(on)}$	$V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$	30		ns
t_r	$I_C = 35\text{ A}$	$T_j = 150^\circ\text{C}$	35		ns
E_{on}	$R_{Gon} = 18\ \Omega$	$T_j = 150^\circ\text{C}$	4.3		mJ
$t_{d(off)}$	$R_{Goff} = 18\ \Omega$	$T_j = 150^\circ\text{C}$	300		ns
t_f		$T_j = 150^\circ\text{C}$	55		ns
E_{off}	$V_{GE} = +15/-15\text{ V}$	$T_j = 150^\circ\text{C}$	3.25		mJ
$R_{th(j-s)}$	per IGBT		1		K/W
Chopper - IGBT					
$V_{CE(sat)}$	$I_C = 35\text{ A}$ $V_{GE} = 15\text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$	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}	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$	30	34	mΩ
		$T_j = 150^\circ\text{C}$	44	47	mΩ
$V_{GE(th)}$	$V_{GE} = V_{CE}\text{ V}, I_C = 1\text{ mA}$	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		200		nC
R_{Gint}	$T_j = 25^\circ\text{C}$		0.00		Ω

SKiIP 24NAB12T4V1



MiniSKiIP® 2

SKiIP 24NAB12T4V1

Features

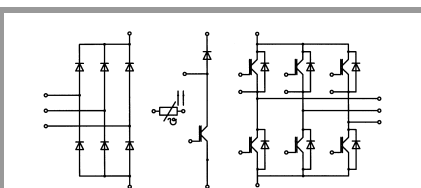
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- V_{CEsat} , V_F = chip level value
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- product rel. results valid for $T_j \leq 150$ (recomm. $T_{op} = -40 \dots +150^\circ\text{C}$)



NAB

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Chopper - IGBT						
$t_{d(on)}$	$V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$		30		ns
t_r	$I_C = 35\text{ A}$	$T_j = 150^\circ\text{C}$		35		ns
E_{on}	$R_{G\ on} = 18\ \Omega$	$T_j = 150^\circ\text{C}$		4.3		mJ
	$R_{G\ off} = 18\ \Omega$	$T_j = 150^\circ\text{C}$		300		ns
$t_{d(off)}$		$T_j = 150^\circ\text{C}$		55		ns
t_f		$T_j = 150^\circ\text{C}$		3.25		mJ
E_{off}	$V_{GE} = +15/-15\text{ V}$	$T_j = 150^\circ\text{C}$				
$R_{th(j-s)}$	per IGBT			1		K/W
Inverse - Diode						
$V_F = V_{EC}$	$I_F = 35\text{ A}$	$T_j = 25^\circ\text{C}$		2.3	2.6	V
	$V_{GE} = 0\text{ V}$ chiplevel	$T_j = 150^\circ\text{C}$		2.3	2.6	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		$T_j = 25^\circ\text{C}$		29	32	m Ω
		$T_j = 150^\circ\text{C}$		40	43	m Ω
I_{RRM}	$I_F = 35\text{ A}$	$T_j = 150^\circ\text{C}$		34		A
Q_{rr}	$di/dt_{off} = 1250\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		5.6		μC
E_{rr}	$V_{GE} = -15\text{ V}$ $V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$		2.4		mJ
$R_{th(j-s)}$	per Diode			1.2		K/W
Freewheeling - Diode						
$V_F = V_{EC}$	$I_F = 35\text{ A}$	$T_j = 25^\circ\text{C}$		2.3	2.6	V
	$V_{GE} = 0\text{ V}$ chiplevel	$T_j = 150^\circ\text{C}$		2.3	2.6	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		$T_j = 25^\circ\text{C}$		29	32	m Ω
		$T_j = 150^\circ\text{C}$		40	43	m Ω
I_{RRM}	$I_F = 35\text{ A}$	$T_j = 150^\circ\text{C}$		34		A
Q_{rr}	$di/dt_{off} = 1250\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		5.6		μC
E_{rr}	$V_{GE} = -15\text{ V}$ $V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$		2.4		mJ
$R_{th(j-s)}$	per Diode			1.2		K/W
Rectifier - Diode						
$V_F = V_{EC}$	$I_F = 13\text{ A}$	$T_j = 25^\circ\text{C}$		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		$T_j = 25^\circ\text{C}$		9.2	18	m Ω
		$T_j = 125^\circ\text{C}$			21	m Ω
$R_{th(j-s)}$	per Diode			1.25		K/W
Module						
M_s	to heat sink		2		2.5	Nm
w				65		g
Temperatur Sensor						
R_{100}	$T_r = 100^\circ\text{C}$, tolerance = 3 %			1670 \pm 3%		Ω
$R(T)$	$R(T) = 1000\ \Omega [1 + A(T - 25^\circ\text{C}) + B(T - 25^\circ\text{C})^2]$ $A = 7.635 \cdot 10^{-3}\ \text{C}^{-1}$, $B = 1.731 \cdot 10^{-5}\ \text{C}^{-2}$					

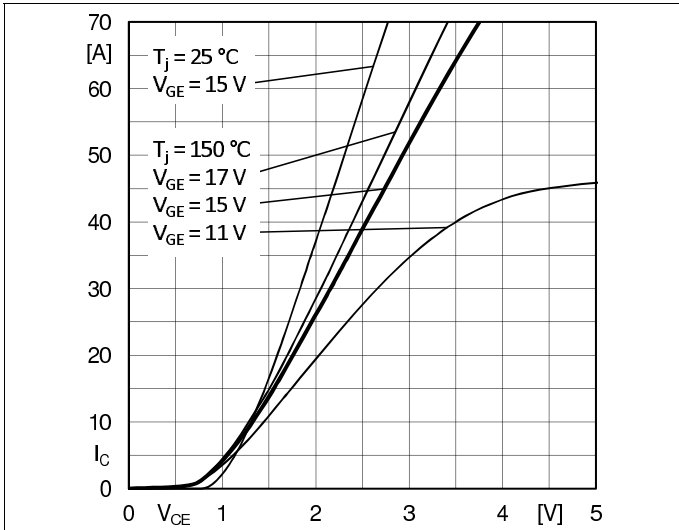


Fig. 1: Typ. output characteristic

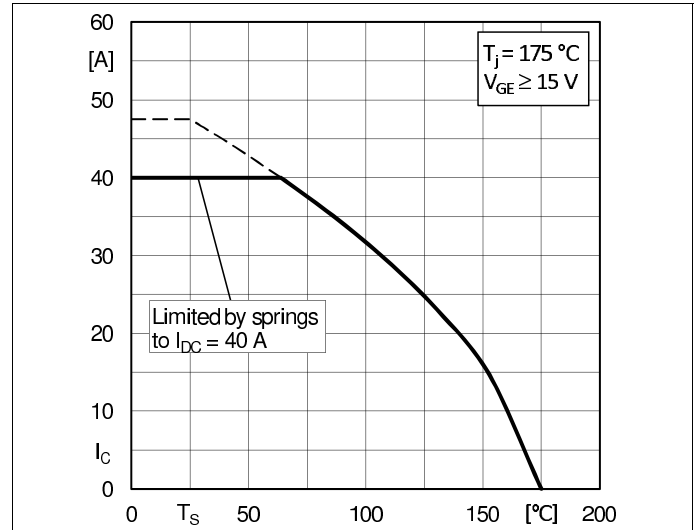


Fig. 2: Typ. rated current vs. temperature $I_C = f(T_s)$

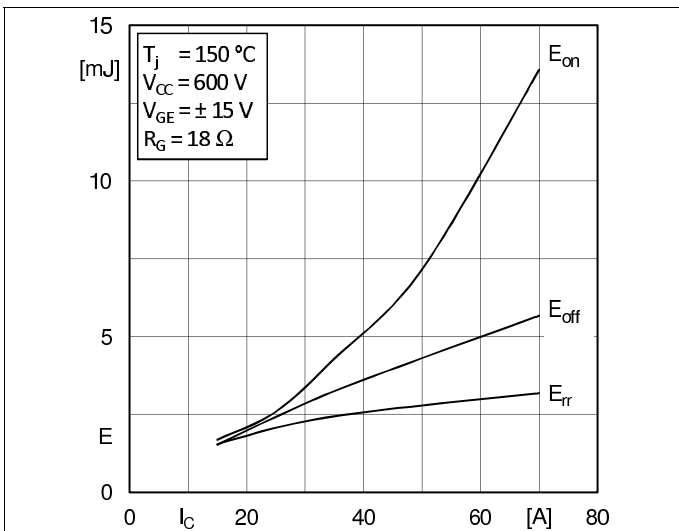


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

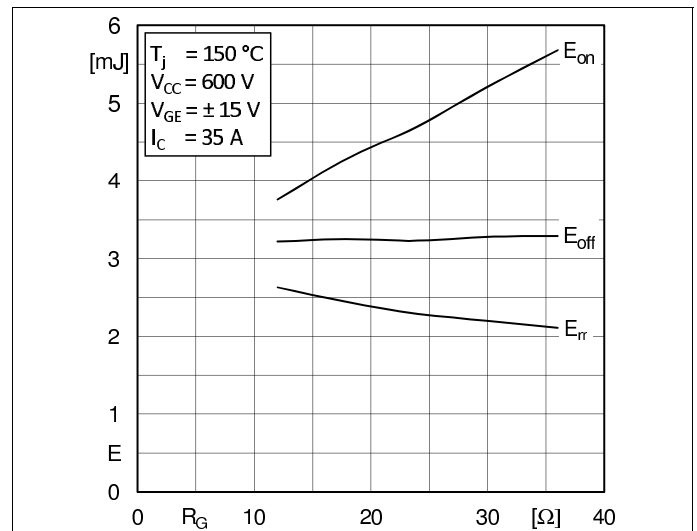


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

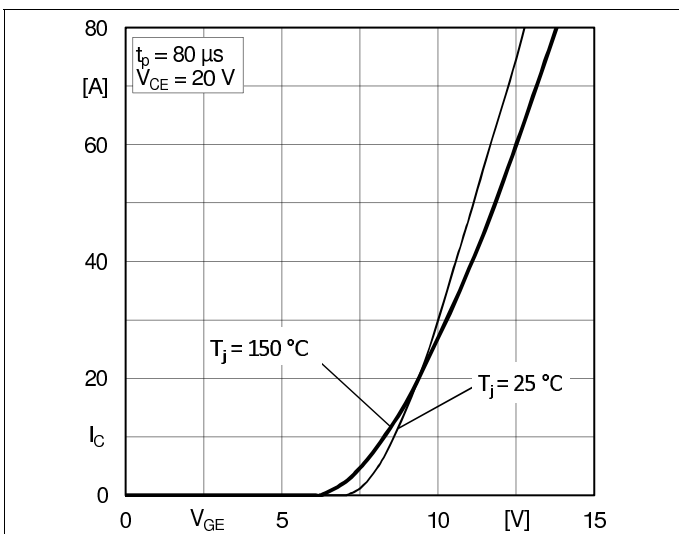


Fig. 5: Typ. transfer characteristic

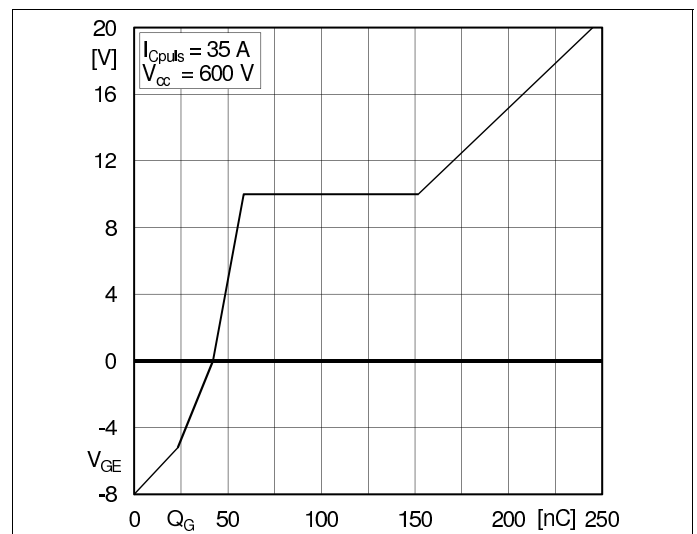


Fig. 6: Typ. gate charge characteristic

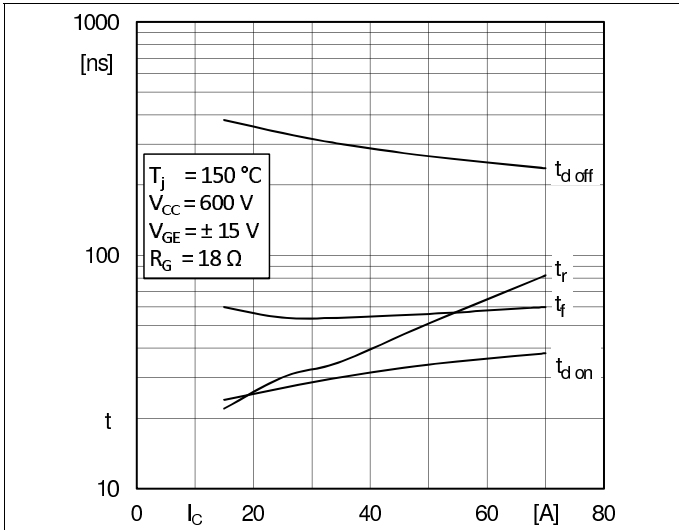


Fig. 7: Typ. switching times vs. I_C

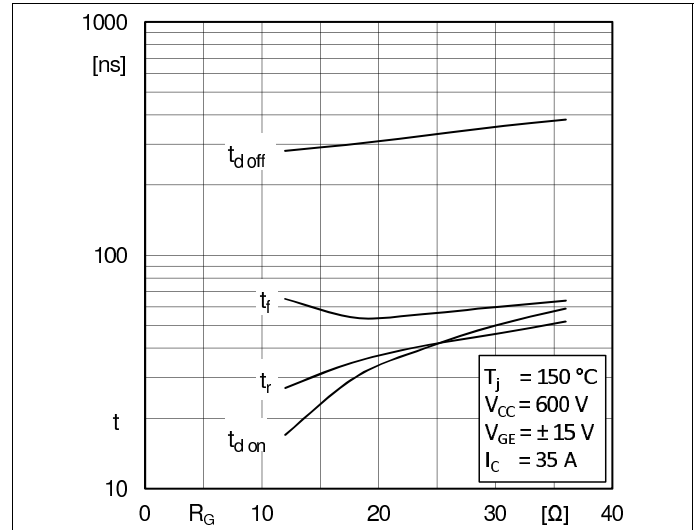


Fig. 8: Typ. switching times vs. gate resistor R_G

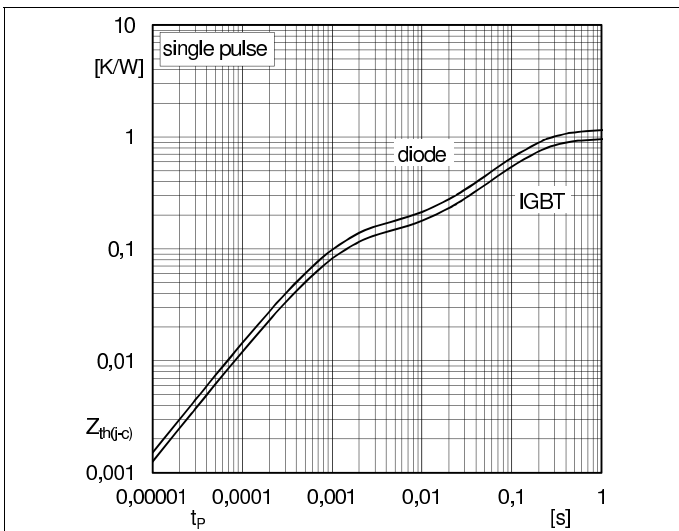


Fig. 9: Transient thermal impedance of IGBT and Diode

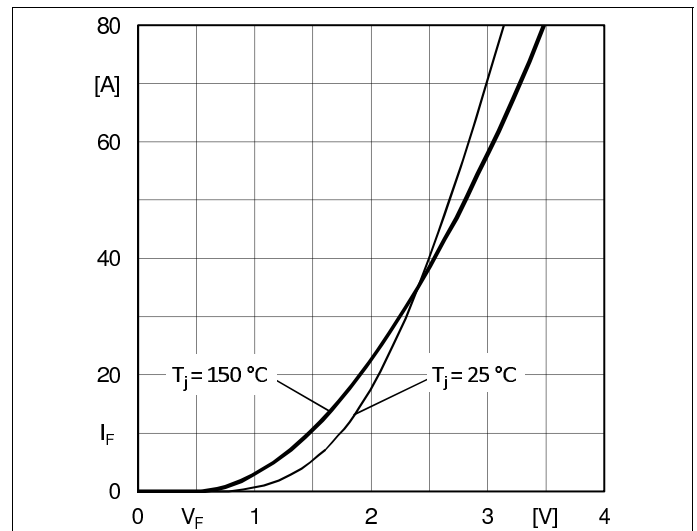


Fig. 10: CAL diode forward characteristic

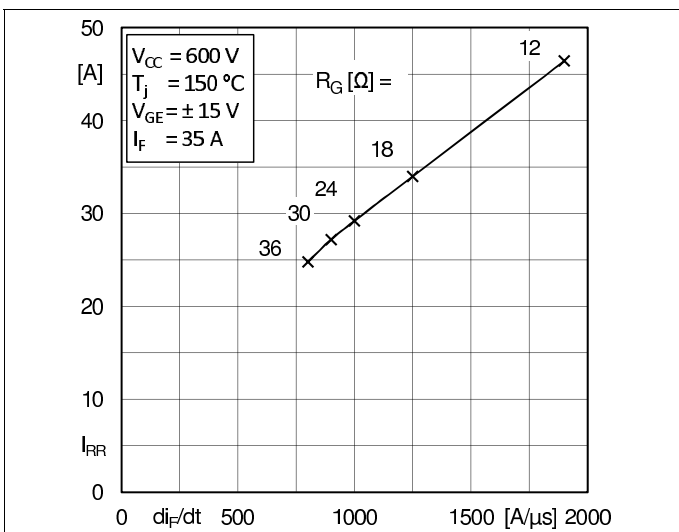


Fig. 11: Typ. CAL diode peak reverse recovery current

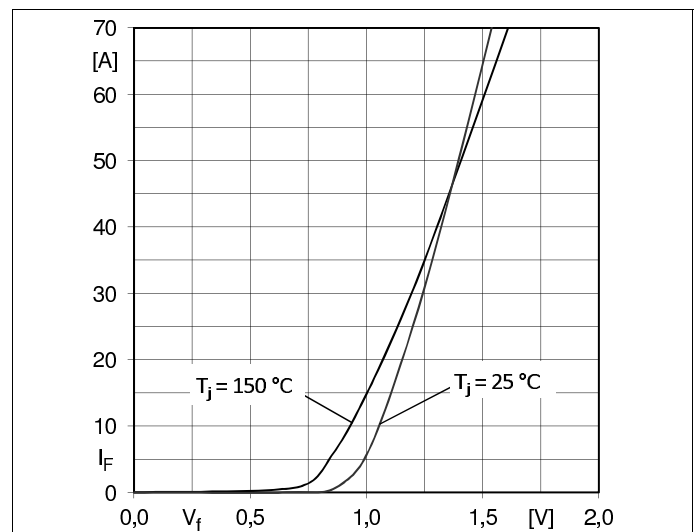
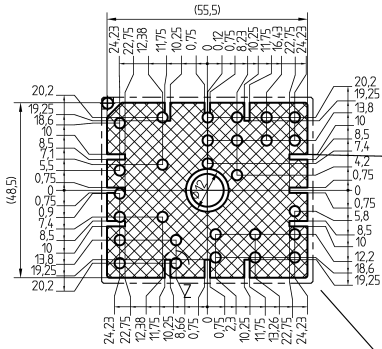


Fig. 12: Typ. input bridge forward characteristic

SKiiP 24NAB12T4V1

PCB
PCB TOP-VIEW



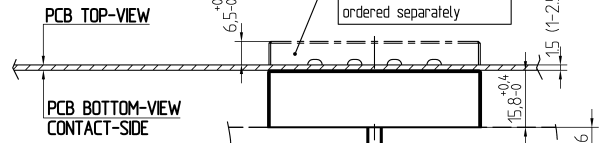
Only for the standard pressure part:
Accessible for mounting of SMD (max height 3.5) on PCB by customer

mounting area

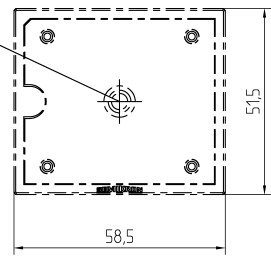
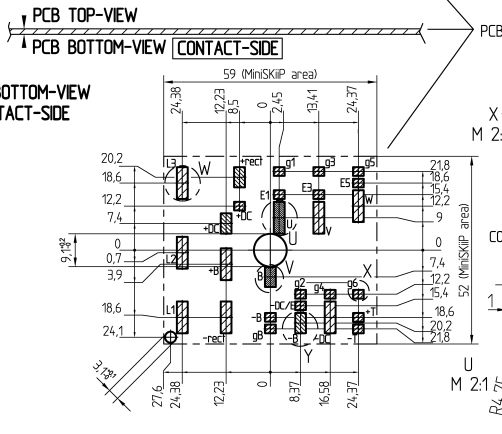
Z
M 2:1
∅ 2.9

PRESSURE PIN AREA

MiniSKiiP 2



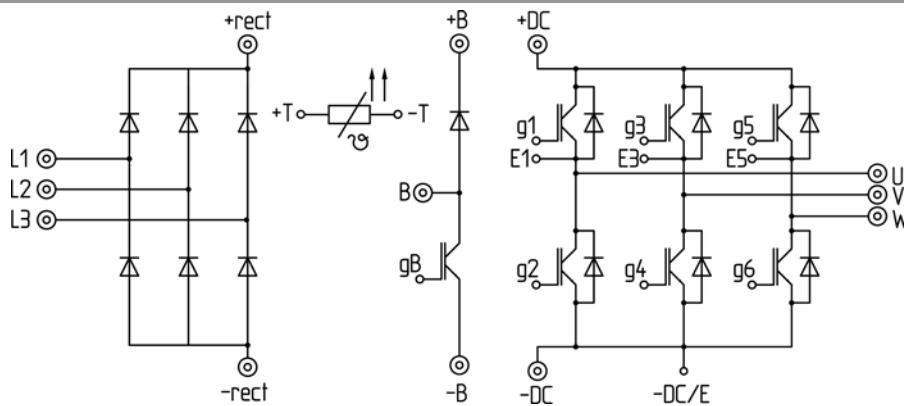
PCB BOTTOM-VIEW CONTACT-SIDE



measure: mm
tolerance: ISO 2768-f

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pinout, dimensions



pinout

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

* The specifications of our components may not be considered as an assurance of component characteristics. Components have to be tested for the respective application. Adjustments may be necessary. The use of SEMIKRON products in life support appliances and systems is subject to prior specification and written approval by SEMIKRON. We therefore strongly recommend prior consultation of our staff.