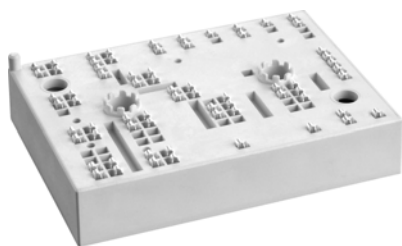


SKiiP 37NAB12T4V1



MiniSKiiP® 3

Converter-Inverter-Brake
(CIB)

SKiiP 37NAB12T4V1

Features*

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

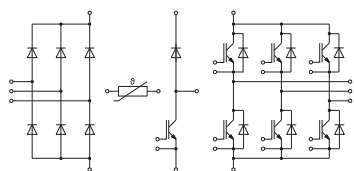
Typical Applications

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

Remarks

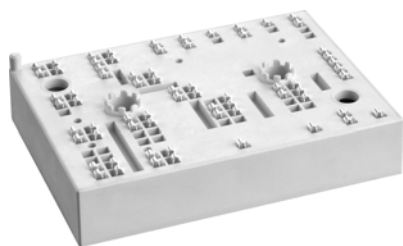
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- MiniSKiiP "Technical Explanations" and "Mounting Instructions" are part of the data sheet. Please refer to both documents for further information

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
Inverter - IGBT				
V _{CES}	T _J = 25 °C		1200	V
I _C	λ _{paste} =0.8 W/(mK)	T _s = 25 °C	90	A
	T _J = 175 °C	T _s = 70 °C	73	A
I _C	λ _{paste} =2.5 W/(mK)	T _s = 25 °C	106	A
	T _J = 175 °C	T _s = 70 °C	86	A
I _{Cnom}			75	A
I _{CRM}			225	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	λ _{paste} =0.8 W/(mK)	T _s = 25 °C	90	A
	T _J = 175 °C	T _s = 70 °C	73	A
I _C	λ _{paste} =2.5 W/(mK)	T _s = 25 °C	106	A
	T _J = 175 °C	T _s = 70 °C	86	A
I _{Cnom}			75	A
I _{CRM}			225	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	λ _{paste} =0.8 W/(mK)	T _s = 25 °C	83	A
	T _J = 175 °C	T _s = 70 °C	66	A
I _F	λ _{paste} =2.5 W/(mK)	T _s = 25 °C	95	A
	T _J = 175 °C	T _s = 70 °C	76	A
I _{FRM}			225	A
I _{FSM}	t _p = 10 ms, sin 180°, T _J = 150 °C		430	A
T _J			-40 ... 175	°C
Freewheeling - Diode				
V _{RRM}	T _J = 25 °C		1200	V
I _F	λ _{paste} =0.8 W/(mK)	T _s = 25 °C	83	A
	T _J = 175 °C	T _s = 70 °C	66	A
I _F	λ _{paste} =2.5 W/(mK)	T _s = 25 °C	95	A
	T _J = 175 °C	T _s = 70 °C	76	A
I _{FRM}			225	A
I _{FSM}	t _p = 10 ms, sin 180°, T _J = 150 °C		430	A
T _J			-40 ... 175	°C



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Typical Applications

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Remarks

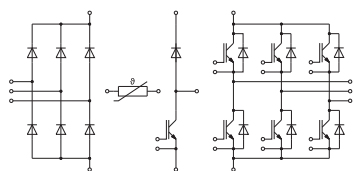
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Absolute Maximum Ratings

Symbol	Conditions	Values	Unit
Rectifier - Diode			
V_{RRM}	$T_j = 25^\circ\text{C}$	1600	V
I_F	$\lambda_{paste}=0.8 \text{ W/(mK)}$ $T_j = 150^\circ\text{C}$	81	A
	$T_s = 70^\circ\text{C}$	60	A
I_F	$\lambda_{paste}=2.5 \text{ W/(mK)}$ $T_j = 150^\circ\text{C}$	92	A
	$T_s = 70^\circ\text{C}$	68	A
I_{FSM}	$t_p = 10 \text{ ms}$ $\sin 180^\circ$	700	A
	$T_j = 150^\circ\text{C}$	490	A
i^2t	$t_p = 10 \text{ ms}$ $\sin 180^\circ$	2450	A^2s
	$T_j = 150^\circ\text{C}$	1200	A^2s
T_j		-40 ... 150	$^\circ\text{C}$
Module			
$I_{t(RMS)}$	$T_{terminal} = 80^\circ\text{C}$, 20 A per spring	80	A
T_{stg}	module without TIM	-40 ... 125	$^\circ\text{C}$
V_{isol}	AC sinus 50 Hz, 1 min	2500	V

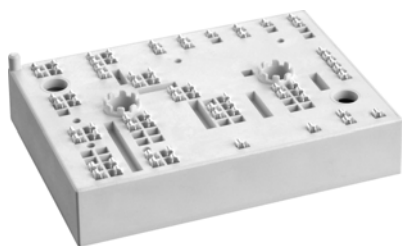
Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Inverter - IGBT					
$V_{CE(sat)}$	$I_C = 75 \text{ A}$ $V_{GE} = 15 \text{ V}$ 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}	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	$T_j = 25^\circ\text{C}$	14	16	$\text{m}\Omega$
		$T_j = 150^\circ\text{C}$	21	22	$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}$, $I_C = 3 \text{ mA}$	5	5.8	6.5	V
I_{CES}	$V_{GE} = 0 \text{ V}$, $V_{CE} = 1200 \text{ V}$, $T_j = 25^\circ\text{C}$			1	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}		$f = 1 \text{ MHz}$	0.24		nF
Q_G	$V_{GE} = -8 \text{ V} \dots +15 \text{ V}$		425		nC
R_{Gint}	$T_j = 25^\circ\text{C}$		10		Ω
$t_{d(on)}$	$V_{CC} = 600 \text{ V}$ $I_C = 75 \text{ A}$	$T_j = 150^\circ\text{C}$	150		ns
t_r	$R_{G on} = 2 \Omega$	$T_j = 150^\circ\text{C}$	35		ns
E_{on}	$R_{G off} = 2 \Omega$	$T_j = 150^\circ\text{C}$	9.7		mJ
$t_{d(off)}$	$di/dt_{on} = 2400 \text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$	355		ns
t_f	$di/dt_{off} = 355 \text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$	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, $\lambda_{paste}=0.8 \text{ W/(mK)}$		0.58		K/W
$R_{th(j-s)}$	per IGBT, $\lambda_{paste}=2.5 \text{ W/(mK)}$		0.44		K/W



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Features*

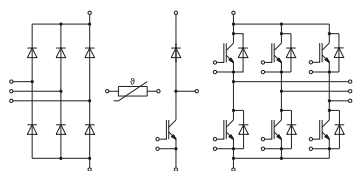
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- UL recognized: File no. E63532

Typical Applications

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

Remarks

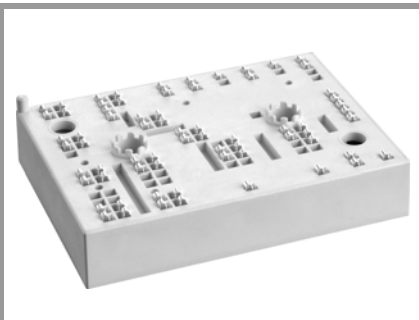
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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Chopper - IGBT						
V _{CE(sat)}	I _C = 75 A	T _J = 25 °C		1.85	2.10	V
	V _{GE} = 15 V chiplevel	T _J = 150 °C		2.25	2.45	V
V _{CE0}	chiplevel	T _J = 25 °C		0.80	0.90	V
		T _J = 150 °C		0.70	0.80	V
r _{CE}	V _{GE} = 15 V	T _J = 25 °C		14	16	mΩ
	chiplevel	T _J = 150 °C		21	22	mΩ
V _{GE(th)}	V _{GE} = V _{CE} , I _C = 3 mA		5	5.8	6.5	V
I _{CES}	V _{GE} = 0 V, V _{CE} = 1200 V, T _J = 25 °C				1	mA
C _{ies}	V _{CE} = 25 V V _{GE} = 0 V	f = 1 MHz		4.40		nF
C _{oes}		f = 1 MHz		0.29		nF
C _{res}		f = 1 MHz		0.24		nF
Q _G	V _{GE} = - 8 V...+ 15 V			425		nC
R _{Gint}	T _J = 25 °C			10.0		Ω
t _{d(on)}	V _{CC} = 600 V	T _J = 150 °C		150		ns
t _r	I _C = 75 A	T _J = 150 °C		35		ns
E _{on}	R _{G on} = 2 Ω	T _J = 150 °C		9.7		mJ
t _{d(off)}	R _{G off} = 2 Ω	T _J = 150 °C		355		ns
t _f		T _J = 150 °C		60		ns
E _{off}		V _{GE} = +15/-15 V	T _J = 150 °C		6.8	
R _{th(j-s)}	per IGBT, λ _{paste} =0.8 W/(mK)			0.58		K/W
R _{th(j-s)}	per IGBT, λ _{paste} =2.5 W/(mK)			0.44		K/W
Inverse - Diode						
V _F = V _{EC}	I _F = 75 A	T _J = 25 °C		2.17	2.49	V
	V _{GE} = 0 V chiplevel	T _J = 150 °C		2.11	2.42	V
V _{F0}	chiplevel	T _J = 25 °C		1.30	1.50	V
		T _J = 150 °C		0.90	1.10	V
r _F	chiplevel	T _J = 25 °C		12	13	mΩ
		T _J = 150 °C		16	18	mΩ
I _{RRM}	I _F = 75 A	T _J = 150 °C		62		A
Q _{rr}	di/dt _{off} = 1940 A/μs	T _J = 150 °C		12.6		μC
E _{rr}	V _{GE} = -15 V V _{CC} = 600 V	T _J = 150 °C		4.9		mJ
R _{th(j-s)}	per Diode, λ _{paste} =0.8 W/(mK)			0.75		K/W
R _{th(j-s)}	per Diode, λ _{paste} =2.5 W/(mK)			0.61		K/W
Freewheeling - Diode						
V _F = V _{EC}	I _F = 75 A	T _J = 25 °C		2.17	2.49	V
	V _{GE} = 0 V chiplevel	T _J = 150 °C		2.11	2.42	V
V _{F0}	chiplevel	T _J = 25 °C		1.30	1.50	V
		T _J = 150 °C		0.90	1.10	V
r _F	chiplevel	T _J = 25 °C		12	13	mΩ
		T _J = 150 °C		16	18	mΩ
I _{RRM}	I _F = 75 A	T _J = 150 °C		62		A
Q _{rr}	di/dt _{off} = 1940 A/μs	T _J = 150 °C		12.6		μC
E _{rr}	V _{GE} = -15 V V _{CC} = 600 V	T _J = 150 °C		4.9		mJ
R _{th(j-s)}	per Diode, λ _{paste} =0.8 W/(mK)			0.75		K/W
R _{th(j-s)}	per Diode, λ _{paste} =2.5 W/(mK)			0.61		K/W

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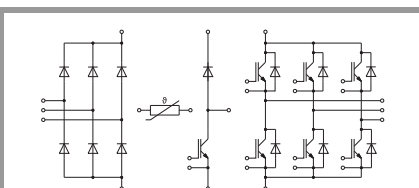
Typical Applications

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

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 $T_{j,op} = -40 \dots +150^\circ\text{C}$)
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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Rectifier - Diode						
V _F = V _{EC}	I _F = 25 A	T _j = 25 °C		1.00	1.21	V
	chiplevel	T _j = 125 °C		0.90	1.10	V
V _{F0}	chiplevel	T _j = 25 °C		0.88	0.98	V
		T _j = 125 °C		0.73	0.83	V
r _F	chiplevel	T _j = 25 °C		4.8	9.2	mΩ
		T _j = 125 °C		6.8	11	mΩ
I _R	T _j = 145 °C, V _{RRM}				1.1	mA
R _{th(j-s)}	per Diode, λ _{paste} =0.8 W/(mK)			0.9		K/W
R _{th(j-s)}	per Diode, λ _{paste} =2.5 W/(mK)			0.75		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°C (R ₂₅ =1000Ω)			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					



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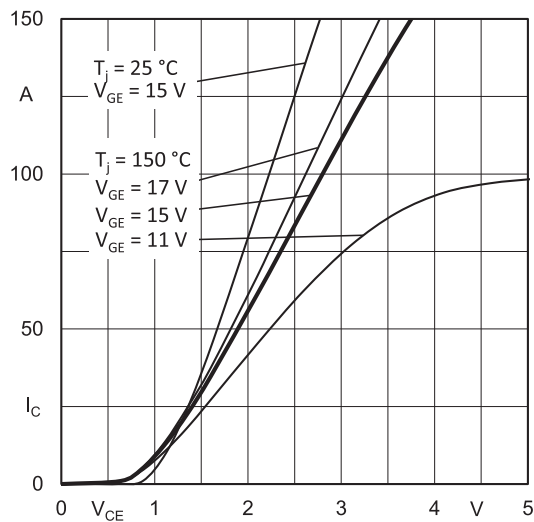


Fig. 1: Typ. output characteristic

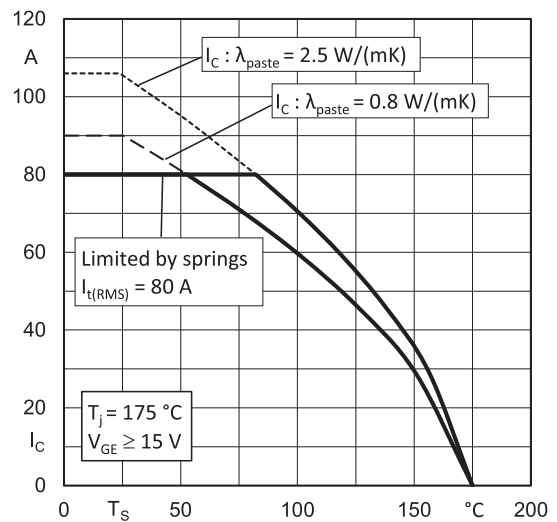


Fig. 2: Typ. rated current vs. temperature $I_C = f(T_S)$

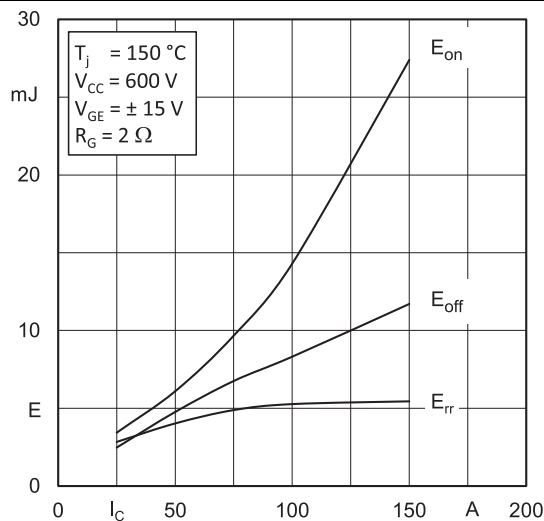


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

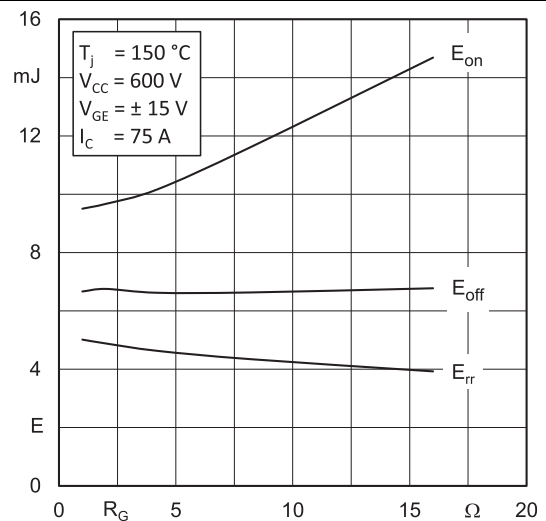


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

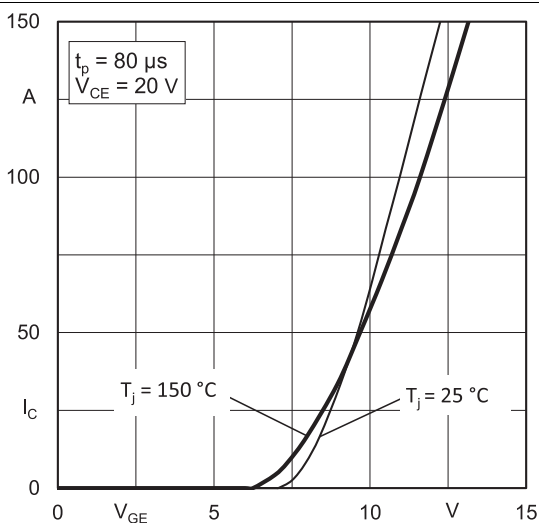


Fig. 5: Typ. transfer characteristic

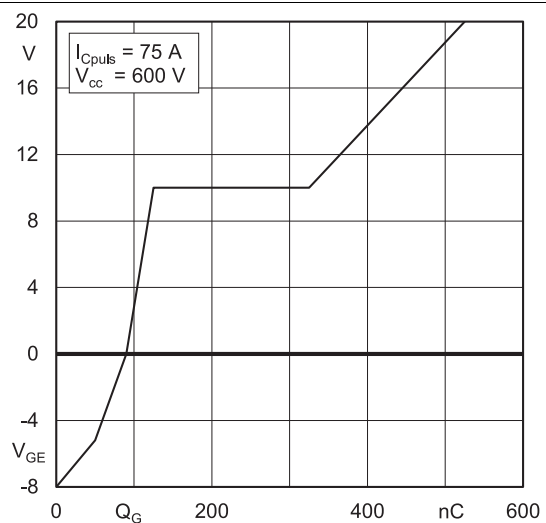


Fig. 6: Typ. gate charge characteristic

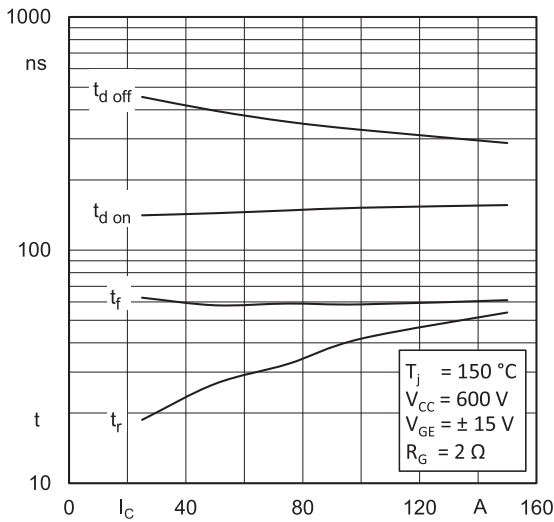


Fig. 7: Typ. switching times vs. I_C

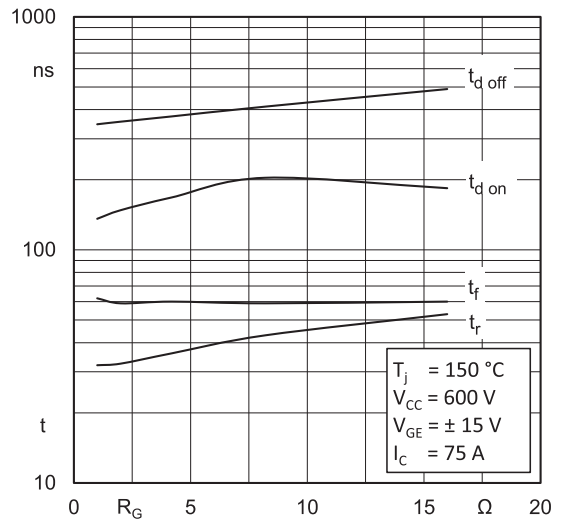


Fig. 8: Typ. switching times vs. gate resistor R_G

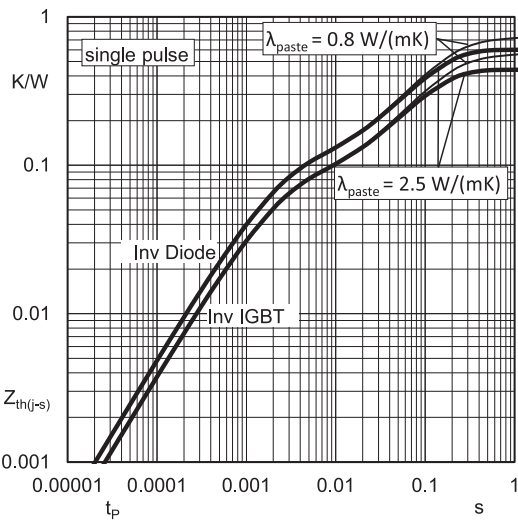


Fig. 9: Typ. transient thermal impedance

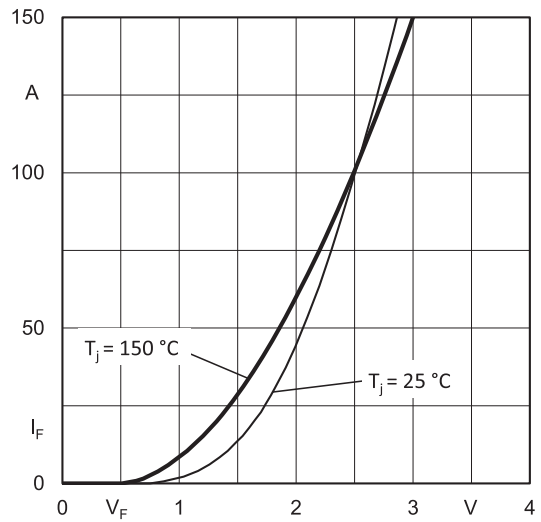


Fig. 10: Typ. CAL diode forward characteristic

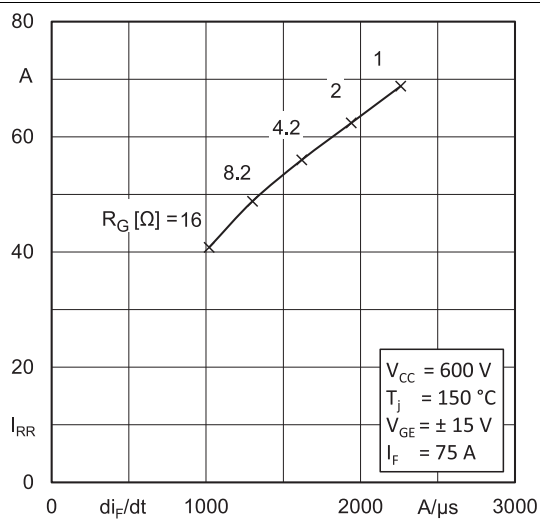


Fig. 11: Typ. CAL diode peak reverse recovery current

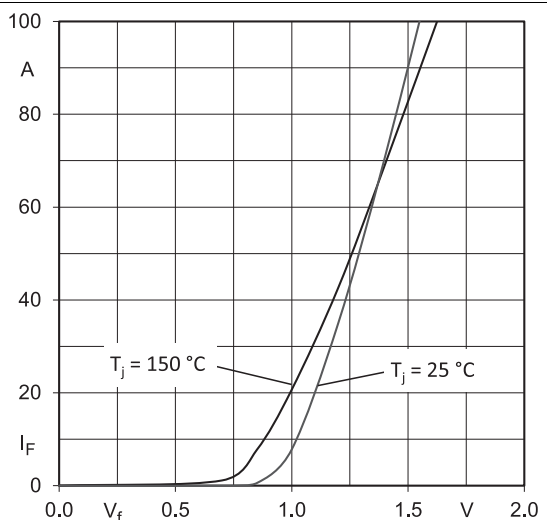
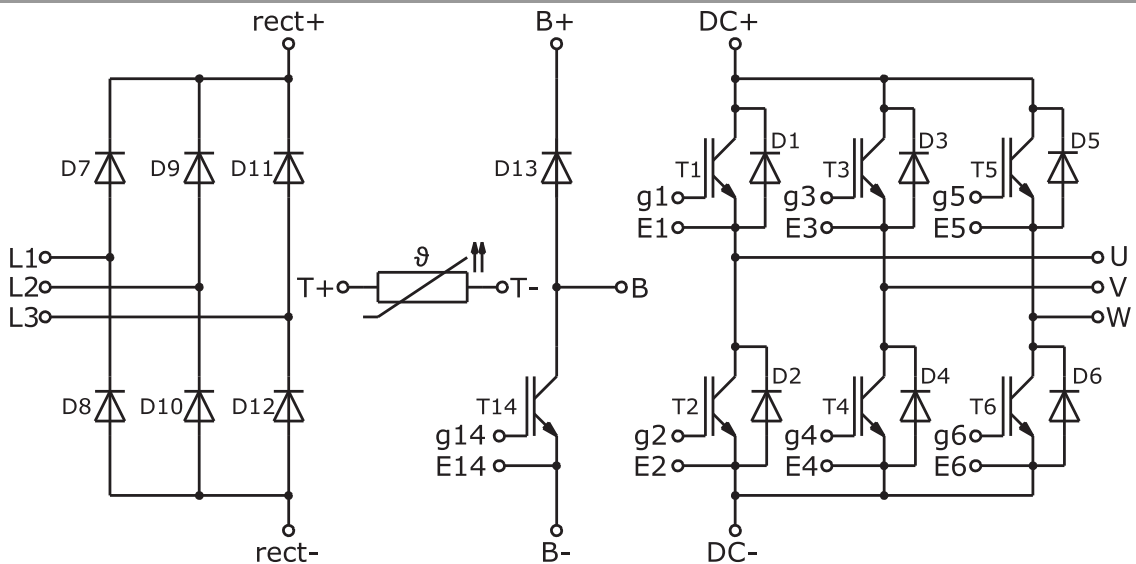


Fig. 12: Typ. input bridge forward characteristic

all values in mm





Pinout

This is an electrostatic discharge sensitive device (ESDS) due to international standard IEC 61340.

*IMPORTANT INFORMATION AND WARNINGS

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