



MiniSKiiP®0

3-phase bridge rectifier +
3-phase bridge inverter

SKiiP 02NAC066V1

Preliminary Data

Features

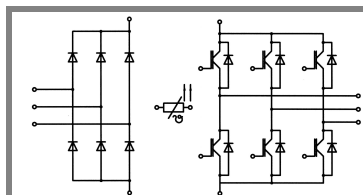
- Trench IGBTs
- Robust and soft freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognised file no. E63532

Typical Applications

- Inverter up to 5 kVA
- Typical motor power 2,2 kW

Remarks

- Case temperature limited to $T_C = 125^\circ\text{C}$ max.
- Product reliability results are valid for $T_J = 150^\circ\text{C}$
- SC data: $t_p \leq 6 \mu\text{s}$; $V_{GE} \leq 15 \text{ V}$; $T_J = 150^\circ\text{C}$; $V_{CC} = 360 \text{ V}$
- V_{CEsat} , V_F = chip level values



NAC

Absolute Maximum Ratings		$T_S = 25^\circ\text{C}$, unless otherwise specified	
Symbol	Conditions	Values	Units
IGBT - Inverter			
V_{CES}		600	V
I_C	$T_S = 25 (70)^\circ\text{C}$, $T_J = 150^\circ\text{C}$	17 (14)	A
I_C	$T_S = 25 (70)^\circ\text{C}$, $T_J = 175^\circ\text{C}$	20 (16)	A
I_{CRM}	$t_p = 1 \text{ ms}$	20	A
V_{GES}		± 20	V
Diode - Inverter			
I_F	$T_S = 25 (70)^\circ\text{C}$, $T_J = 150^\circ\text{C}$	20 (15)	A
I_F	$T_S = 25 (70)^\circ\text{C}$, $T_J = 175^\circ\text{C}$	20 (18)	A
I_{FRM}	$t_p = 1 \text{ ms}$	20	A
Diode - Rectifier			
V_{RRM}		800	V
I_F	$T_S = 70^\circ\text{C}$	35	A
I_{FSM}	$t_p = 10 \text{ ms}$, $\sin 180^\circ$, $T_J = 25^\circ\text{C}$	220	A
i^2t	$t_p = 10 \text{ ms}$, $\sin 180^\circ$, $T_J = 25^\circ\text{C}$	240	A^2s
I_{tRMS}	per power terminal (20 A / spring)	20	A
T_J	IGBT, Diode	$-40 \dots +175$	$^\circ\text{C}$
T_{stg}		$-40 \dots +125$	$^\circ\text{C}$
V_{isol}	AC, 1 min.	2500	V

Characteristics		$T_S = 25^\circ\text{C}$, unless otherwise specified			
Symbol	Conditions	min.	typ.	max.	Units
IGBT - Inverter					
$V_{CE(sat)}$	$I_{Cnom} = 10 \text{ A}$, $T_J = 25 (150)^\circ\text{C}$	1,1	1,45 (1,65)	1,85 (2,05)	V
$V_{GE(th)}$	$V_{GE} = V_{CE}$, $I_C = 1 \text{ mA}$		5,8		V
$V_{CE(TO)}$	$T_J = 25 (150)^\circ\text{C}$		0,9 (0,7)	1,1 (1)	V
r_{CE}	$T_J = 25 (150)^\circ\text{C}$		60 (100)	80 (110)	$\text{m}\Omega$
C_{ies}	$V_{CE} = 25 \text{ V}$, $V_{GE} = 0 \text{ V}$, $f = 1 \text{ MHz}$		0,58		nF
C_{oes}	$V_{CE} = 25 \text{ V}$, $V_{GE} = 0 \text{ V}$, $f = 1 \text{ MHz}$		0,12		nF
C_{res}	$V_{CE} = 25 \text{ V}$, $V_{GE} = 0 \text{ V}$, $f = 1 \text{ MHz}$		0,04		nF
$R_{CC+EE'}$	spring contact-chip $T_S = 25 (150)^\circ\text{C}$				$\text{m}\Omega$
$R_{th(j-s)}$	per IGBT		2		K/W
$t_{d(on)}$	under following conditions		25		ns
t_r	$V_{CC} = 300 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$		25		ns
$t_{d(off)}$	$I_{Cnom} = 10 \text{ A}$, $T_J = 150^\circ\text{C}$		190		ns
t_f	$R_{Gon} = R_{Goff} = 39 \Omega$		40		ns
$E_{on} (E_{off})$	inductive load		0,5 (0,3)		mJ
Diode - Inverter					
$V_F = V_{EC}$	$I_F = 10 \text{ A}$, $T_J = 25 (150)^\circ\text{C}$		1,3 (1,3)	1,6 (1,6)	V
$V_{(TO)}$	$T_J = 25 (150)^\circ\text{C}$		0,9 (0,8)	1 (0,9)	V
r_T	$T_J = 25 (150)^\circ\text{C}$		40 (50)	60 (70)	$\text{m}\Omega$
$R_{th(j-s)}$	per diode		2,5		K/W
I_{RRM}	under following conditions		15,8		A
Q_{rr}	$I_{Fnom} = 10 \text{ A}$, $V_R = 300 \text{ V}$		1,5		μC
E_{rr}	$V_{GE} = 0 \text{ V}$, $T_J = 150^\circ\text{C}$		0,5		mJ
	$di_F/dt = 810 \text{ A}/\mu\text{s}$				
Diode - Rectifier					
V_F	$I_{Fnom} = 15 \text{ A}$, $T_J = 25^\circ\text{C}$		1,1		V
$V_{(TO)}$	$T_J = 150^\circ\text{C}$		0,8		V
r_T	$T_J = 150^\circ\text{C}$		20		$\text{m}\Omega$
$R_{th(j-s)}$	per diode		1,5		K/W
Temperature Sensor					
R_{ts}	3 %, $T_r = 25 (100)^\circ\text{C}$		1000 (1670)		Ω
Mechanical Data					
w			21,5		g
M_s	Mounting torque	2		2,5	Nm

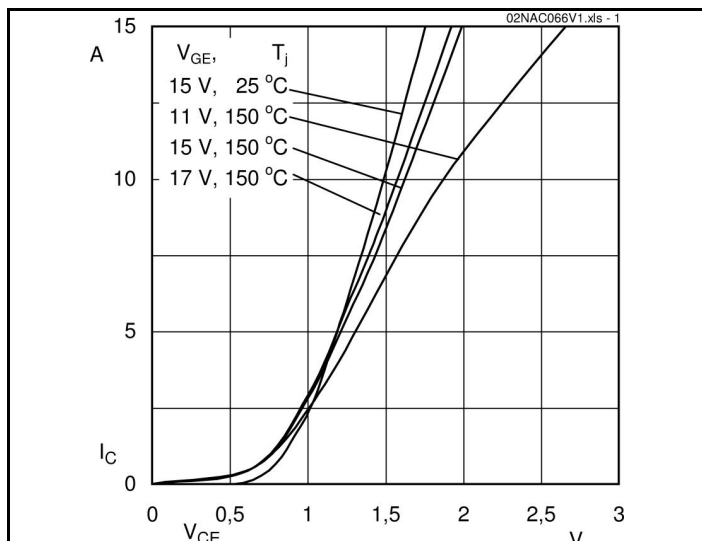


Fig. 1 Typ. output characteristic

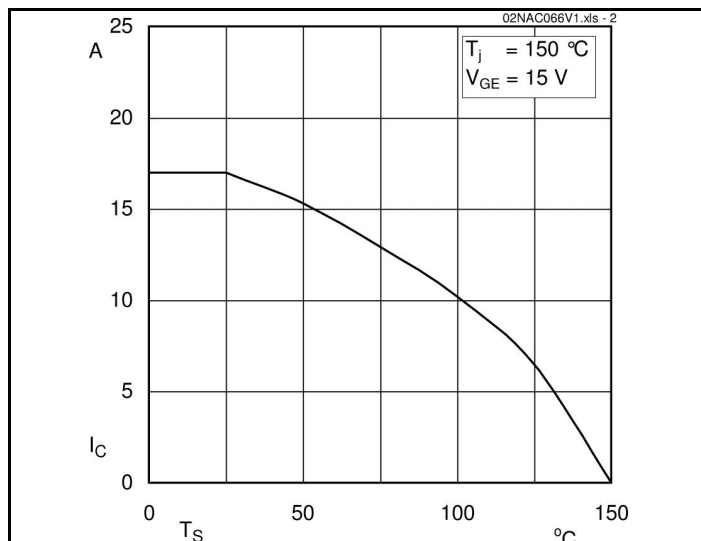


Fig. 2 Typ. rated current vs. temperature

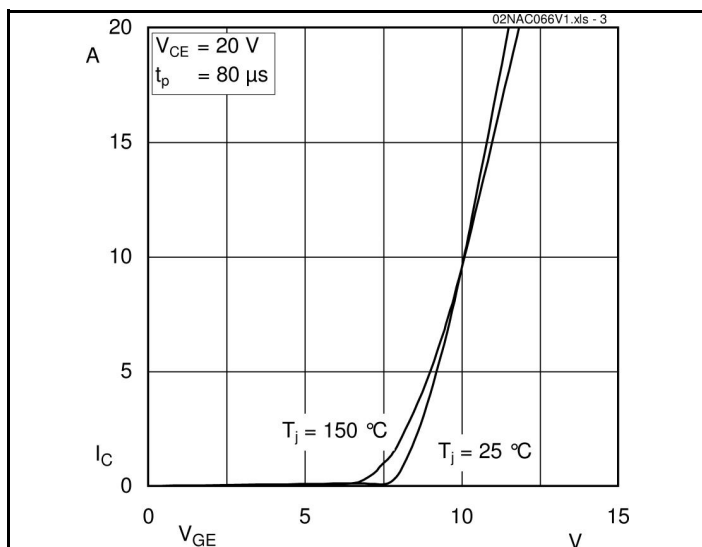


Fig. 3 Typ. transfer characteristic

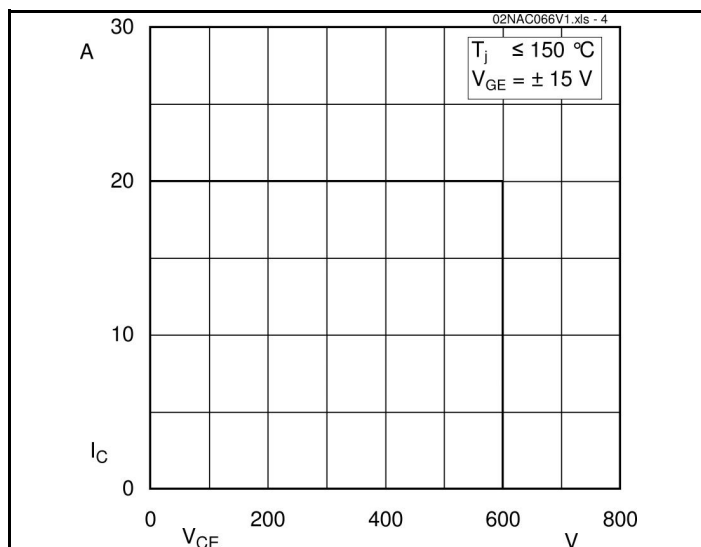


Fig. 4 Reverse bias safe operating area

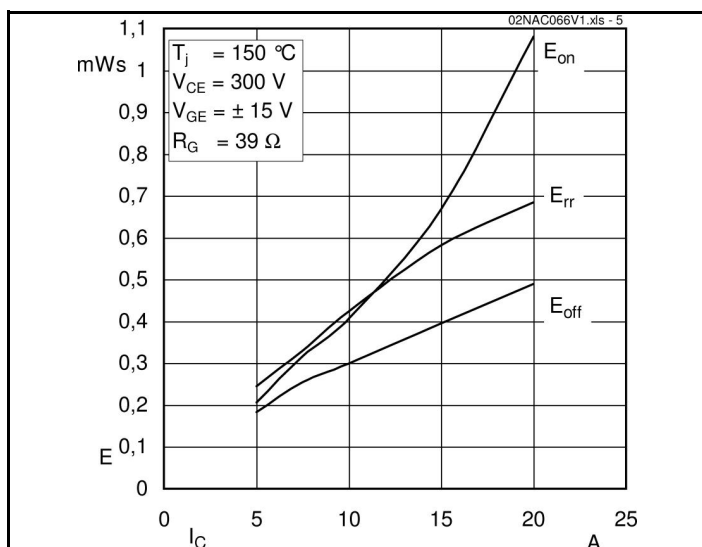


Fig. 5 Typ. Turn-on /-off energy = $f(I_C)$

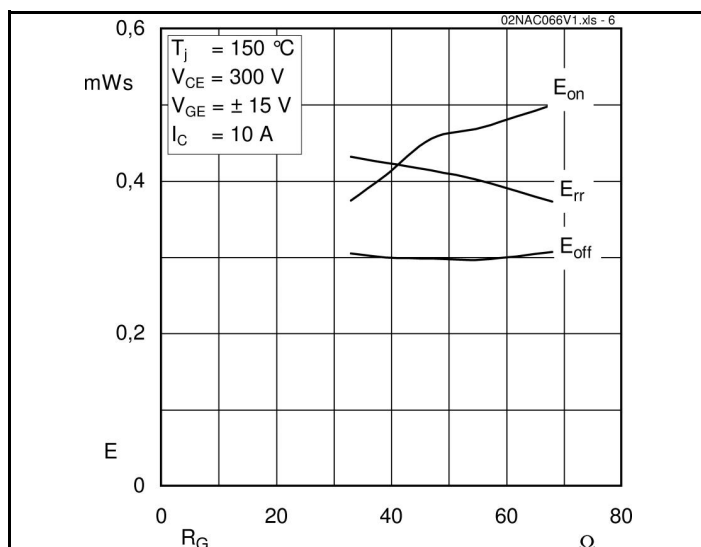


Fig. 6 Typ. Turn-on /-off energy = $f(R_G)$

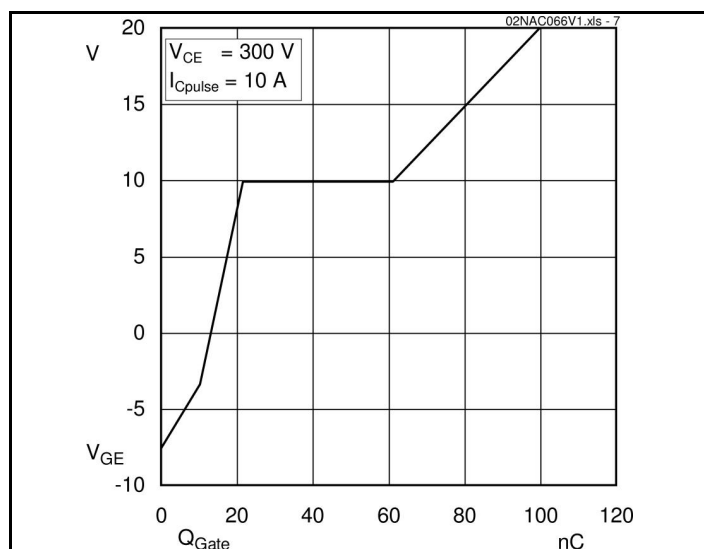


Fig. 7 Typ. gate charge characteristic

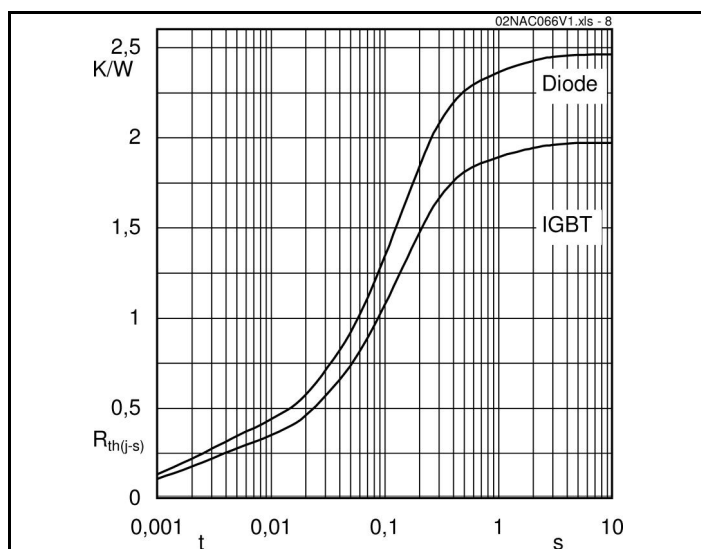


Fig. 8 Typ. thermal impedance

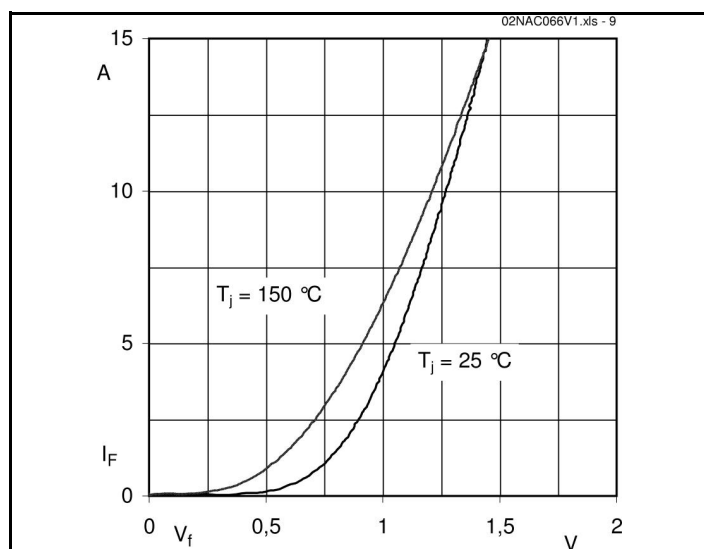


Fig. 9 Typ. freewheeling diode forward characteristic

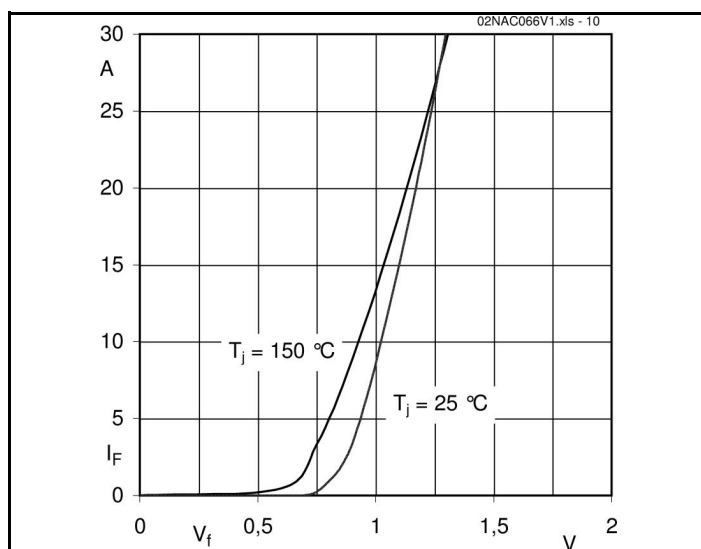
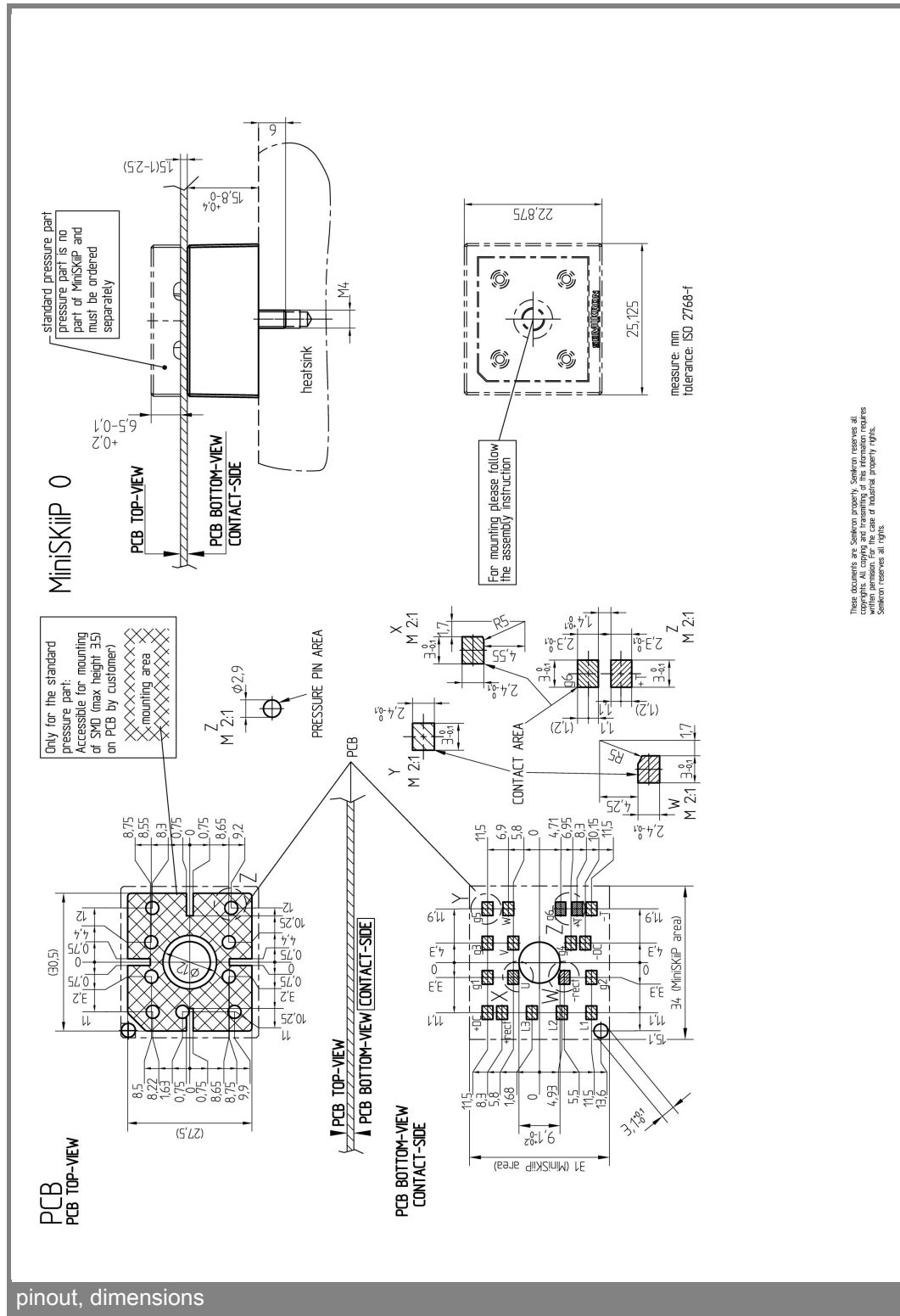
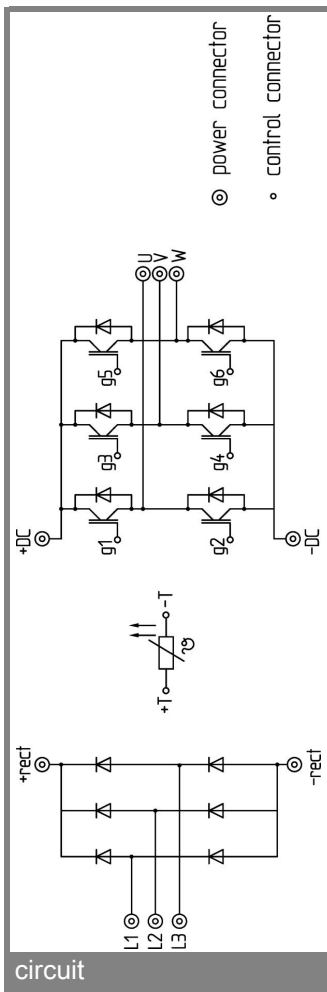


Fig. 10 Typ. input bridge forward characteristic



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

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