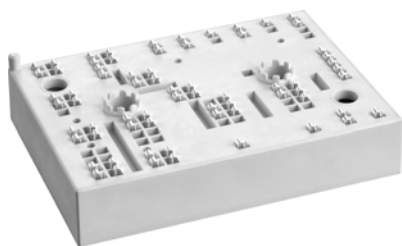


SKiiP 37NAC12T4V1



MiniSKiiP® 3

3-phase Converter – Inverter (CI)

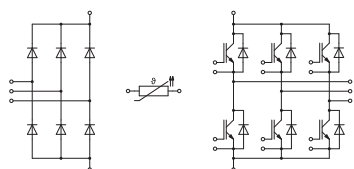
SKiiP 37NAC12T4V1

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

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 $T_{J,op} = -40 \dots +150^{\circ}\text{C}$)
- Please refer to MiniSKiiP “Technical Explanations” and “Mounting Instructions” for further information

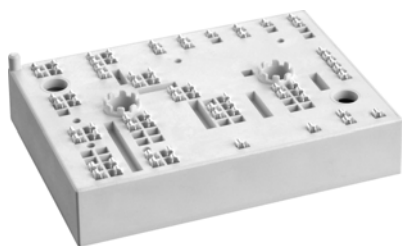


NAC

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 _j = 175 °C	T _s = 25 °C		90	A
		T _s = 70 °C		73	A
I _C	λ _{paste} =2.5 W/(mK) T _j = 175 °C	T _s = 25 °C		106	A
		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 _j = 175 °C	T _s = 25 °C		83	A
		T _s = 70 °C		66	A
I _F	λ _{paste} =2.5 W/(mK) T _j = 175 °C	T _s = 25 °C		95	A
		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
Rectifier - Diode					
V _{RRM}	T _j = 25 °C			1600	V
I _F	λ _{paste} =0.8 W/(mK) T _j = 150 °C	T _s = 25 °C		81	A
		T _s = 70 °C		60	A
I _F	λ _{paste} =2.5 W/(mK) T _j = 150 °C	T _s = 25 °C		92	A
		T _s = 70 °C		68	A
I _{FSM}	t _p = 10 ms sin 180°	T _j = 25 °C		700	A
		T _j = 150 °C		490	A
i ² t	t _p = 10 ms sin 180°	T _j = 25 °C		2450	A ² s
		T _j = 150 °C		1200	A ² s
T _j				-40 ... 150	°C
Module					
I _{t(RMS)}	T _{terminal} = 80 °C, 20 A per spring			80	A
T _{stg}	module without TIM			-40 ... 125	°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 A	T _j = 25 °C		1.85	2.10	V
	V _{GE} = 15 V chipelevel	T _j = 150 °C		2.25	2.45	V
V _{CE0}	chipelevel	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
	chipelevel	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

SKiiP 37NAC12T4V1



MiniSKiiP® 3

3-phase Converter – Inverter (CI)

SKiiP 37NAC12T4V1

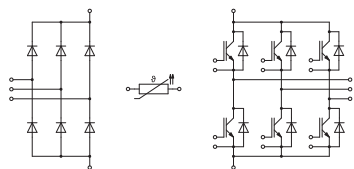
Features*

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- Robust and soft switching freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognized: 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 $T_{j,op} = -40 \dots +150^{\circ}\text{C}$)
- Please refer to MiniSKiiP “Technical Explanations” and “Mounting Instructions” for further information

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
Inverter - IGBT					
C_{ies}	$V_{CE} = 25\text{ V}$ $f = 1\text{ MHz}$		4.40		nF
C_{oes}	$V_{GE} = 0\text{ V}$ $f = 1\text{ MHz}$		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	$R_{G\text{ on}} = 2\text{ }\Omega$ $T_j = 150^{\circ}\text{C}$		32		ns
E_{on}	$R_{G\text{ off}} = 2\text{ }\Omega$ $T_j = 150^{\circ}\text{C}$		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, $\lambda_{paste}=0.8\text{ W}/(\text{mK})$		0.58		K/W
$R_{th(j-s)}$	per IGBT, $\lambda_{paste}=2.5\text{ W}/(\text{mK})$		0.44		K/W
Inverse - Diode					
$V_F = V_{EC}$	$I_F = 75\text{ A}$ $V_{GE} = 0\text{ V}$ chipelevel $T_j = 25^{\circ}\text{C}$		2.17	2.49	V
	$T_j = 150^{\circ}\text{C}$		2.11	2.42	V
V_{F0}	chipelevel $T_j = 25^{\circ}\text{C}$		1.30	1.50	V
	$T_j = 150^{\circ}\text{C}$		0.90	1.10	V
r_F	chipelevel $T_j = 25^{\circ}\text{C}$		12	13	m Ω
	$T_j = 150^{\circ}\text{C}$		16	18	m Ω
I_{RRM}	$I_F = 75\text{ A}$ $V_{GE} = -15\text{ V}$ $T_j = 150^{\circ}\text{C}$		62		A
Q_{rr}	$V_{CC} = 600\text{ V}$ $T_j = 150^{\circ}\text{C}$		12.6		μC
E_{rr}	$di/dt_{off} = 1940\text{ A}/\mu\text{s}$ $T_j = 150^{\circ}\text{C}$		4.9		mJ
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=0.8\text{ W}/(\text{mK})$		0.75		K/W
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=2.5\text{ W}/(\text{mK})$		0.61		K/W
Rectifier - Diode					
$V_F = V_{EC}$	$I_F = 25\text{ A}$ chipelevel $T_j = 25^{\circ}\text{C}$		1.00	1.21	V
	$T_j = 125^{\circ}\text{C}$		0.90	1.10	V
V_{F0}	chipelevel $T_j = 25^{\circ}\text{C}$		0.88	0.98	V
	$T_j = 125^{\circ}\text{C}$		0.73	0.83	V
r_F	chipelevel $T_j = 25^{\circ}\text{C}$		4.8	9.2	m Ω
	$T_j = 125^{\circ}\text{C}$		6.8	11	m Ω
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=0.8\text{ W}/(\text{mK})$		0.9		K/W
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=2.5\text{ W}/(\text{mK})$		0.75		K/W
Module					
M_s	to heat sink	2		2.5	Nm
w			82		g
Temperature Sensor					
R_{100}	$T_r=100^{\circ}\text{C}$ ($R_{25}=1000\Omega$)		1670 $\pm$ 3%		Ω
$R_{(T)}$	$R_{(T)}=1000\Omega[1+A(T-25^{\circ}\text{C})+B(T-25^{\circ}\text{C})^2]$, $A = 7.635 \cdot 10^{-3} \text{ }^{\circ}\text{C}^{-1}$, $B = 1.731 \cdot 10^{-5} \text{ }^{\circ}\text{C}^{-2}$				



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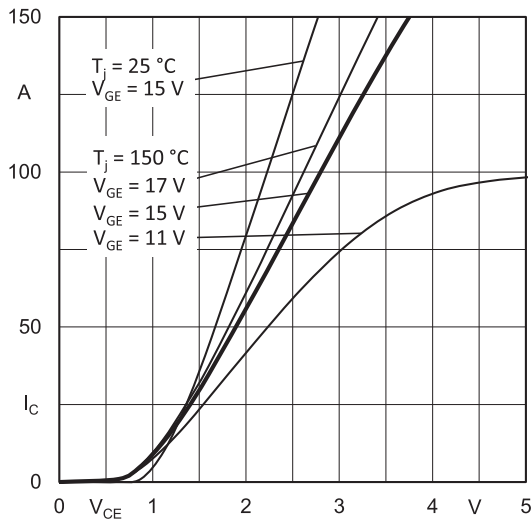


Fig. 1: Typ. output characteristic, inclusive $R_{CC} + EE'$

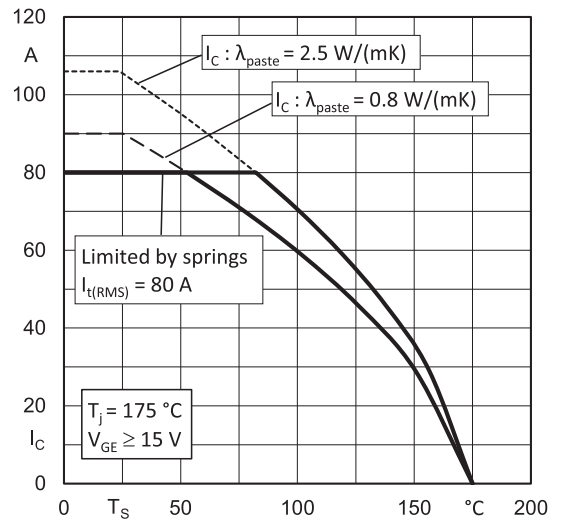


Fig. 2: Typ. rated current vs. temperature $I_C = f(T_S)$

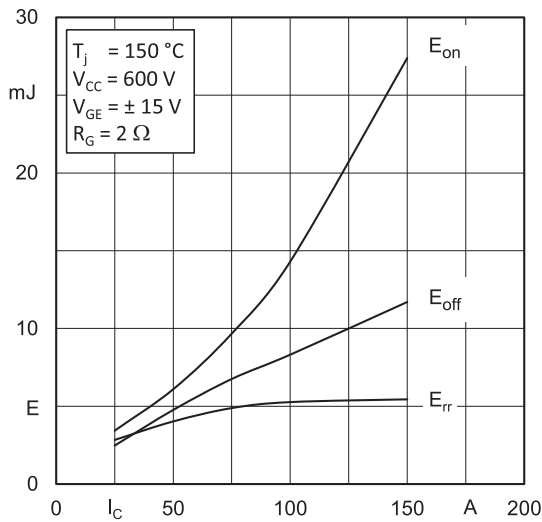


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

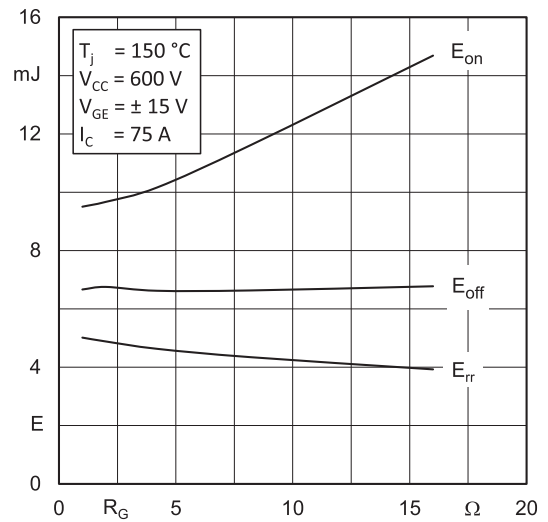


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

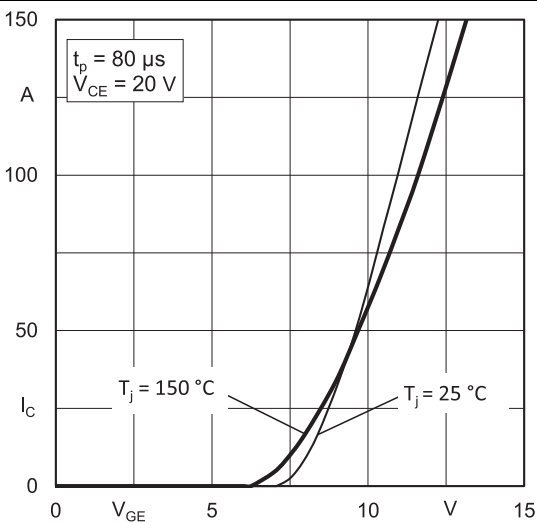


Fig. 5: Typ. transfer characteristic

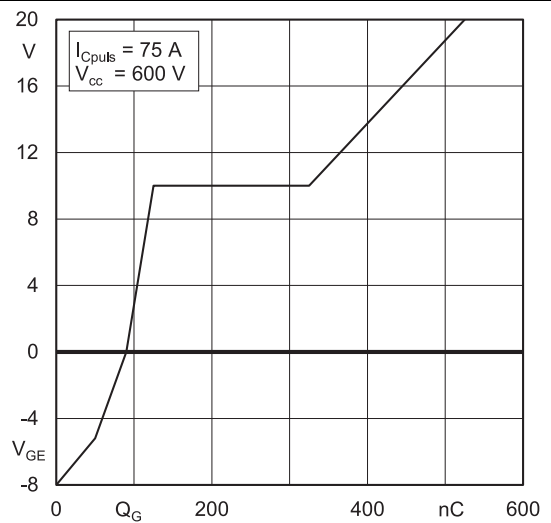


Fig. 6: Typ. gate charge characteristic

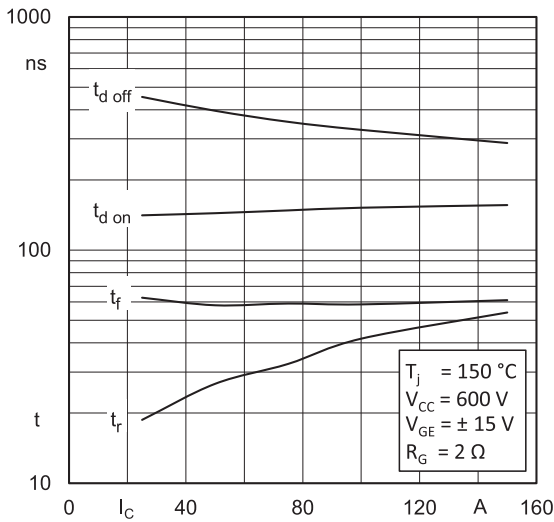


Fig. 7: Typ. switching times vs. I_C

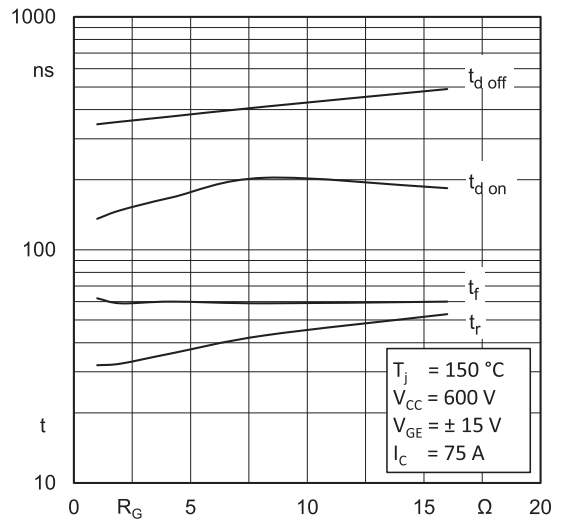


Fig. 8: Typ. switching times vs. gate resistor R_G

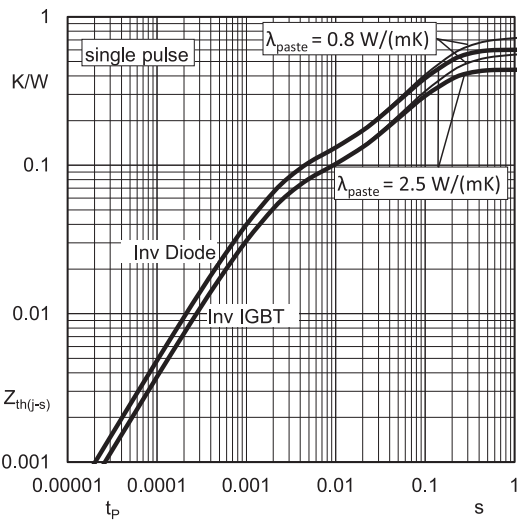


Fig. 9: Typ. transient thermal impedance

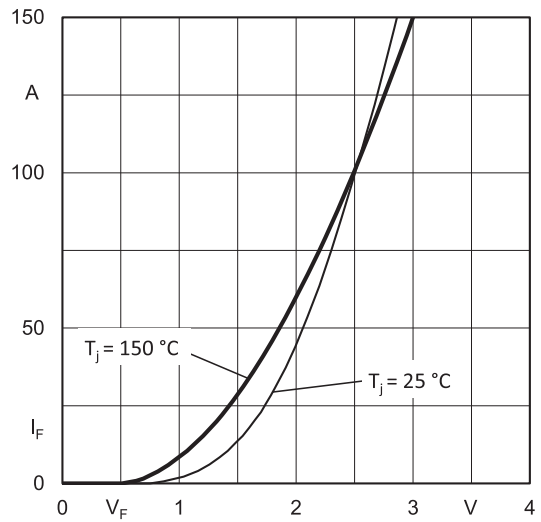


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

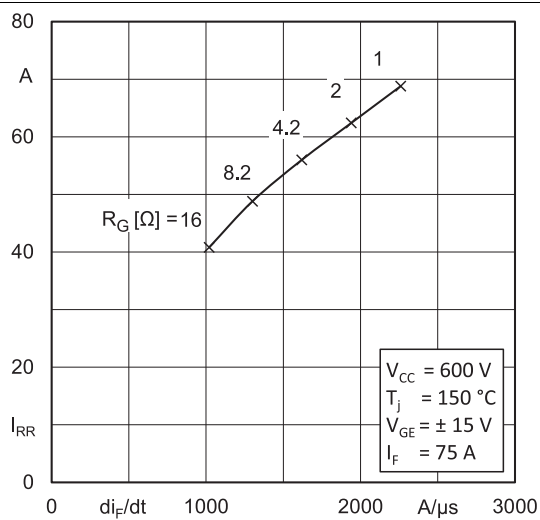


Fig. 11: Typ. CAL diode peak reverse recovery current

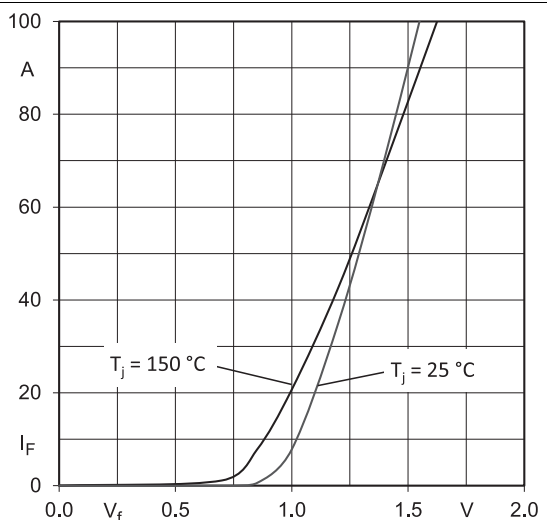
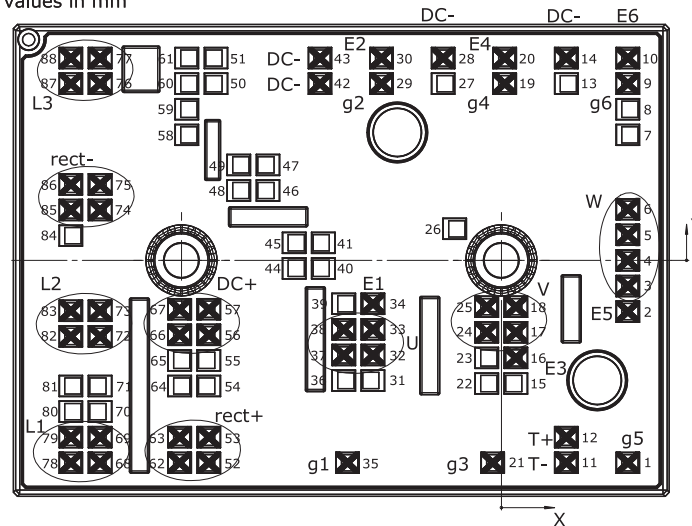


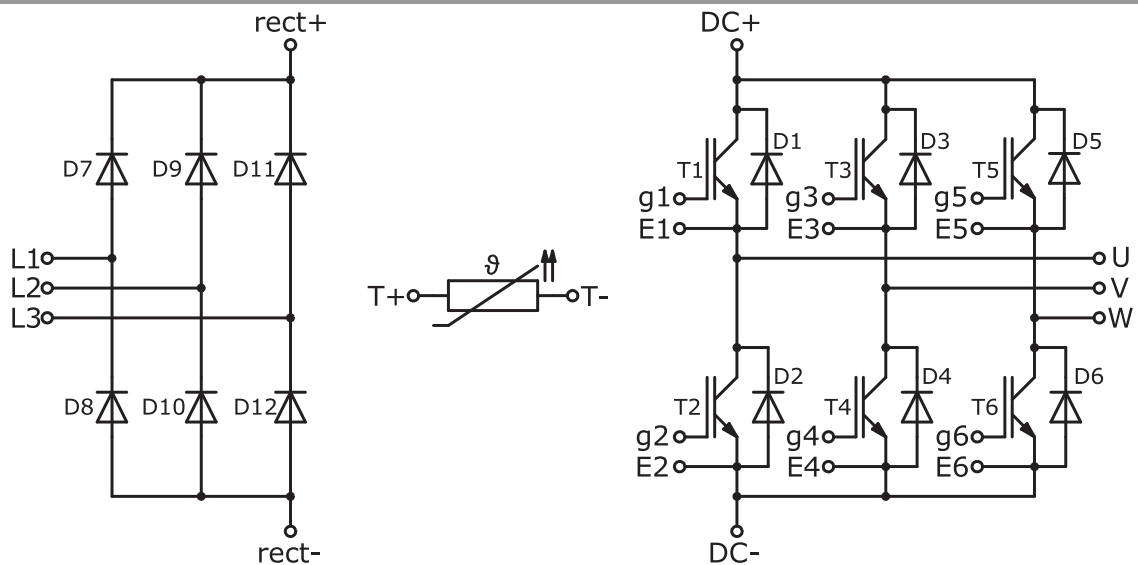
Fig. 12: Typ. input bridge forward characteristic incl. $R_{CC'+EE'}$

Pin out											
Pin	X	Y	Function	Pin	X	Y	Function	Pin	X	Y	Function
1	15,83	-25,30	g5	31	-16,05	-15,02		61	-39,33	25,30	
2	15,83	-6,40	E5	32	-16,05	-11,82	U	62	-40,23	-25,30	rect+
3	15,83	-3,20	W	33	-16,05	-8,62	U	63	-40,23	-22,10	rect+
4	15,83	0	W	34	-16,05	-5,42	E1	64	-40,23	-15,70	
5	15,83	3,20	W	35	-19,23	-25,30	g1	65	-40,23	-12,50	
6	15,83	6,40	W	36	-19,70	-15,02		66	-40,23	-9,30	DC+
7	15,83	15,70		37	-19,70	-11,82	U	67	-40,23	-6,10	DC+
8	15,83	18,90		38	-19,70	-8,62	U	68	-50,18	-25,30	L1
9	15,83	22,10	g6	39	-19,70	-5,42		69	-50,18	-22,10	L1
10	15,83	25,30	E6	40	-22,26	-1,00		70	-50,18	-18,90	
11	8,13	-25,30	T-	41	-22,26	2,20		71	-50,18	-15,70	
12	8,13	-22,10	T+	42	-22,68	22,10	DC-	72	-50,18	-9,50	L2
13	8,13	22,10		43	-22,68	25,30	DC-	73	-50,18	-6,30	L2
14	8,13	25,30	DC-	44	-25,91	-1,00		74	-50,18	6,30	rect-
15	1,83	-15,39		45	-25,91	2,20		75	-50,18	9,50	rect-
16	1,83	-12,19	E3	46	-29,18	8,74		76	-50,18	22,10	L3
17	1,83	-8,99	V	47	-29,18	11,94		77	-50,18	25,30	L3
18	1,83	-5,79	V	48	-32,83	8,74		78	-53,83	-25,30	L1
19	0,43	22,10	g4	49	-32,83	11,94		79	-53,83	-22,10	L1
20	0,43	25,30	E4	50	-35,68	22,10		80	-53,83	-18,90	
21	-1,08	-25,30	g3	51	-35,68	25,30		81	-53,83	-15,70	
22	-1,83	-15,39		52	-36,58	-25,30	rect+	82	-53,83	-9,50	L2
23	-1,83	-12,19		53	-36,58	-22,10	rect+	83	-53,83	-6,30	L2
24	-1,83	-8,99	V	54	-36,58	-15,70		84	-53,83	3,10	
25	-1,83	-5,79	V	55	-36,58	-12,50		85	-53,83	6,30	rect-
26	-5,83	3,95		56	-36,58	-9,30	DC+	86	-53,83	9,50	rect-
27	-7,28	22,10		57	-36,58	-6,10	DC+	87	-53,83	22,10	L3
28	-7,28	25,30	DC-	58	-39,33	15,70		88	-53,83	25,30	L3
29	-14,98	22,10	g2	59	-39,33	18,90					
30	-14,98	25,30	E2	60	-39,33	22,10					

all values in mm



Pinout and Dimensions



Pinout

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

***IMPORTANT INFORMATION AND WARNINGS**

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