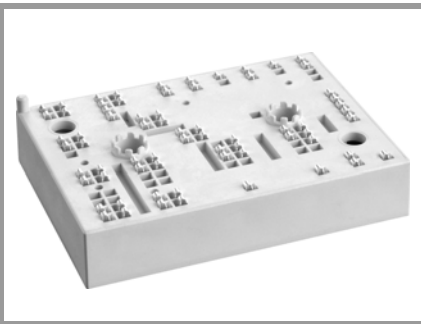


SKiiP 37AC12T4V1



MiniSKiiP® 3

Sixpack

SKiiP 37AC12T4V1

Features*

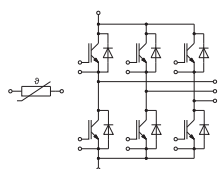
- Trench 4 IGBTs
- Robust and soft switching freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognized: File no. E63532

Typical Applications

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

Remarks

- Max. case temperature limited to $T_C=125^\circ\text{C}$
- Product reliability results valid for $T_j \leq 150^\circ\text{C}$ (recommended $T_{j,op} = -40 \dots +150^\circ\text{C}$)
- MiniSKiiP "Technical Explanations" and "Mounting Instructions" are part of the data sheet. Please refer to both documents for further information.

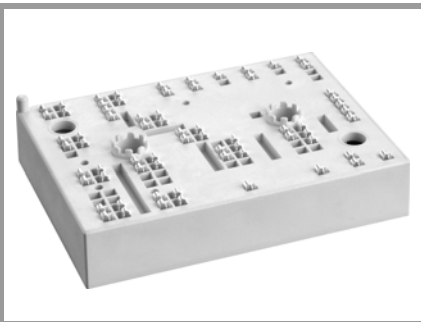


AC

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
Inverter - IGBT				
V_{CES}	$T_j = 25^\circ\text{C}$		1200	V
I_C	$\lambda_{paste}=0.8 \text{ W/(mK)}$	$T_s = 25^\circ\text{C}$	90	A
		$T_j = 175^\circ\text{C}$	73	A
I_C	$\lambda_{paste}=2.5 \text{ W/(mK)}$	$T_s = 25^\circ\text{C}$	106	A
		$T_j = 175^\circ\text{C}$	86	A
I_{Cnom}			75	A
I_{CRM}			225	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	$\lambda_{paste}=0.8 \text{ W/(mK)}$	$T_s = 25^\circ\text{C}$	83	A
		$T_j = 175^\circ\text{C}$	66	A
I_F	$\lambda_{paste}=2.5 \text{ W/(mK)}$	$T_s = 25^\circ\text{C}$	95	A
		$T_j = 175^\circ\text{C}$	76	A
I_{FRM}			150	A
I_{FSM}	$t_p = 10 \text{ ms, sin } 180^\circ, T_j = 150^\circ\text{C}$		430	A
T_j			-40 ... 175	$^\circ\text{C}$
Module				
$I_{t(RMS)}$	$T_{terminal} = 80^\circ\text{C}, 20 \text{ A per spring}$		160	A
T_{stg}	module without TIM		-40 ... 125	$^\circ\text{C}$
V_{isol}	AC sinus 50 Hz, $t = 1 \text{ min}$		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
$t_{d(on)}$	$V_{CC} = 600 \text{ V}$	$T_j = 150^\circ\text{C}$		145		ns
t_r	$I_C = 75 \text{ A}$ $R_{Gon} = 1 \Omega$	$T_j = 150^\circ\text{C}$		45		ns
		$T_j = 150^\circ\text{C}$		11.5		mJ
E_{on}	$R_{Goff} = 1 \Omega$	$T_j = 150^\circ\text{C}$		11.5		mJ
$t_{d(off)}$	$di/dt_{on} = 1560 \text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		350		ns
t_f	$di/dt_{off} = 1180 \text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		65		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

SKiiP 37AC12T4V1



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Features*

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- Highly reliable spring contacts for electrical connections
- UL recognized: File no. E63532

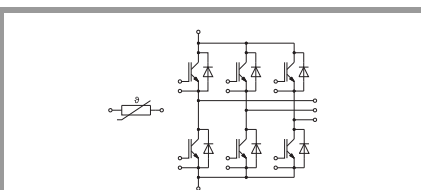
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Remarks

- Max. case temperature limited to $T_C=125^{\circ}\text{C}$
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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse - Diode						
$V_F = V_{EC}$	$I_F = 75\text{ A}$ $V_{GE} = 0\text{ V}$ chiplevel	$T_j = 25^{\circ}\text{C}$		2.17	2.49	V
		$T_j = 150^{\circ}\text{C}$		2.11	2.42	V
V_{F0}	chiplevel	$T_j = 25^{\circ}\text{C}$		1.30	1.50	V
		$T_j = 150^{\circ}\text{C}$		0.90	1.10	V
r_F	chiplevel	$T_j = 25^{\circ}\text{C}$		12	13	m Ω
		$T_j = 150^{\circ}\text{C}$		16	18	m Ω
I_{RRM}	$I_F = 75\text{ A}$	$T_j = 150^{\circ}\text{C}$		99		A
Q_{rr}	$di/dt_{off} = 2440\text{ A}/\mu\text{s}$ $V_{GE} = +15/-15\text{ V}$	$T_j = 150^{\circ}\text{C}$		13.3		μC
E_{rr}	$V_{CC} = 600\text{ V}$	$T_j = 150^{\circ}\text{C}$		5.5		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
Module						
L_{CE}				-		nH
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
$R_{(T)}$	$R_{(T)}=1000\Omega[1+A(T-25^{\circ}\text{C})+B(T-25^{\circ}\text{C})^2]$, $A = 7.635 \cdot 10^{-3}\text{ }^{\circ}\text{C}^{-1}$, $B = 1.731 \cdot 10^{-5}\text{ }^{\circ}\text{C}^{-2}$					



AC

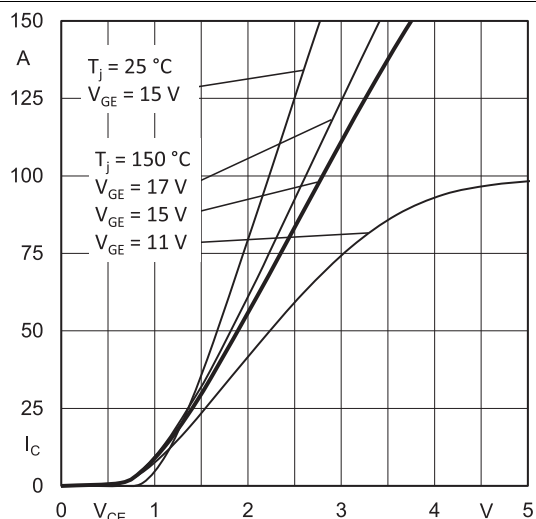


Fig. 1: Typ. output characteristic

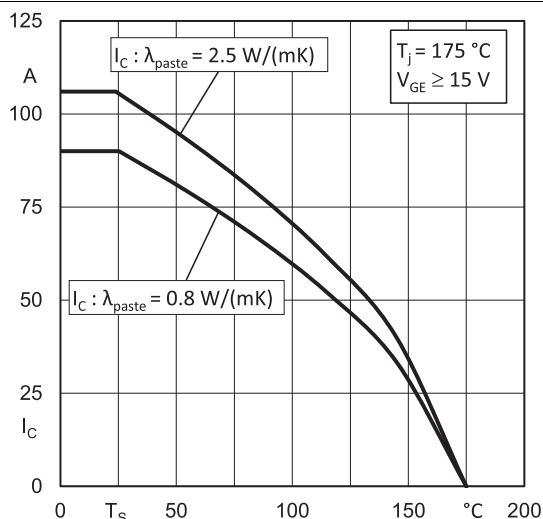


Fig. 2: Rated current vs. temperature $I_C = f(T_S)$

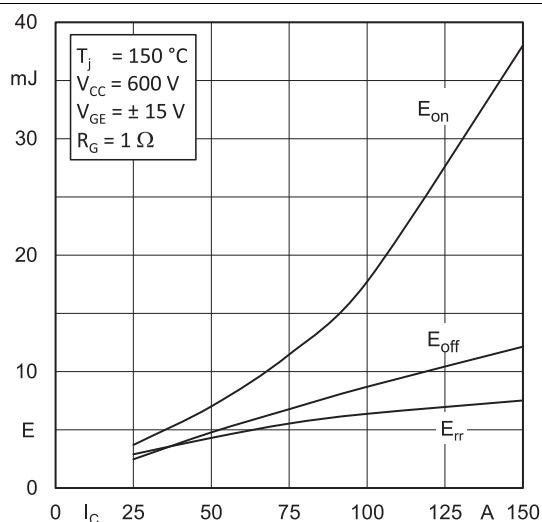


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

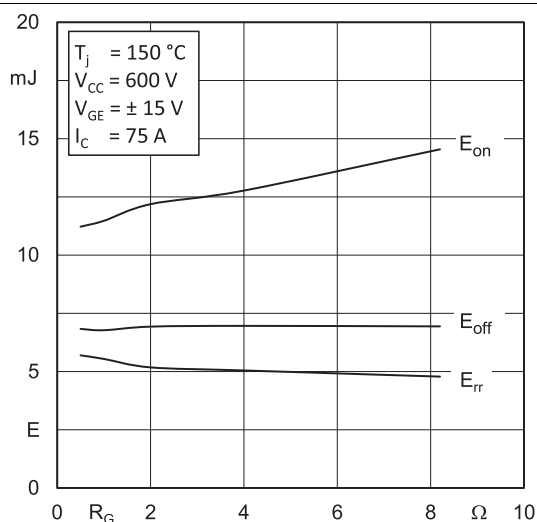


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

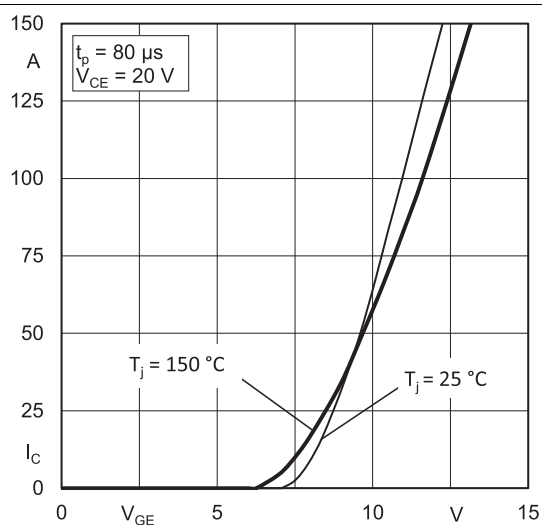


Fig. 5: Typ. transfer characteristic

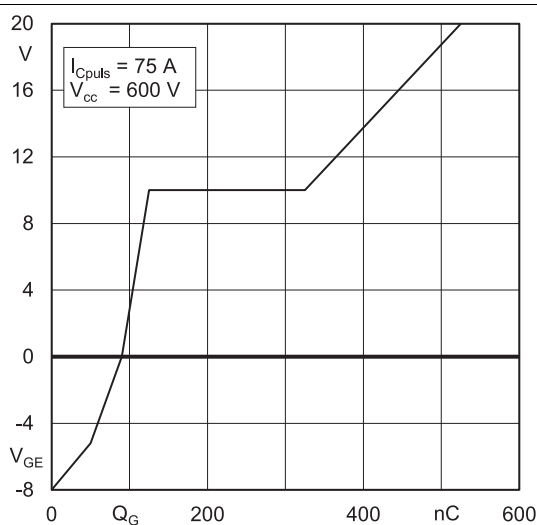


Fig. 6: Typ. gate charge characteristic

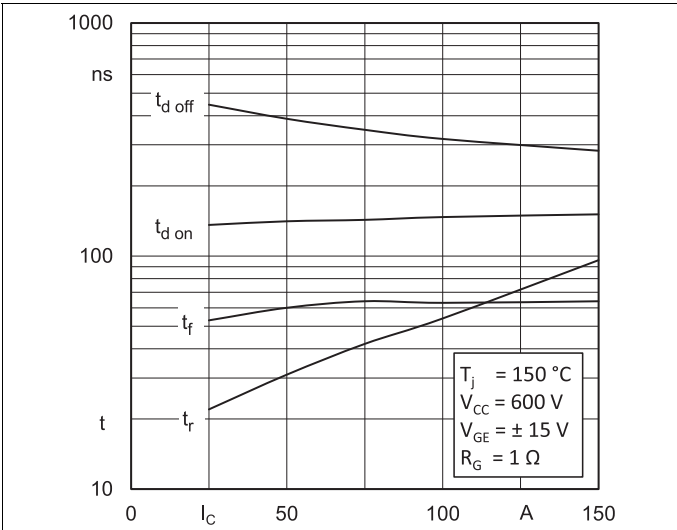


Fig. 7: Typ. switching times vs. I_C

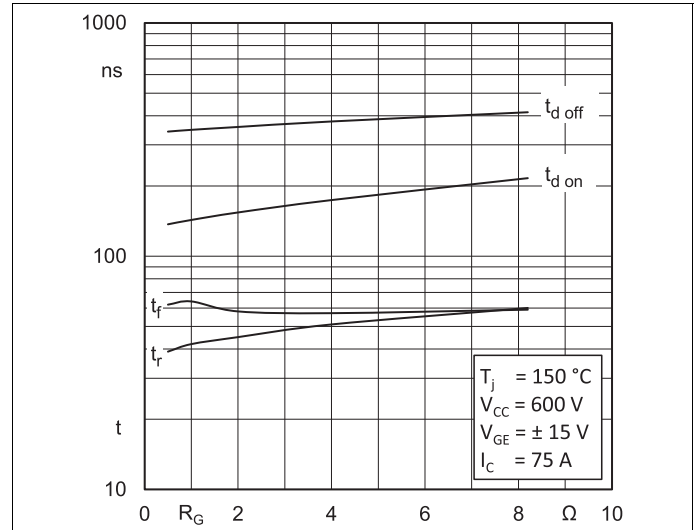


Fig. 8: Typ. switching times vs. gate resistor R_G

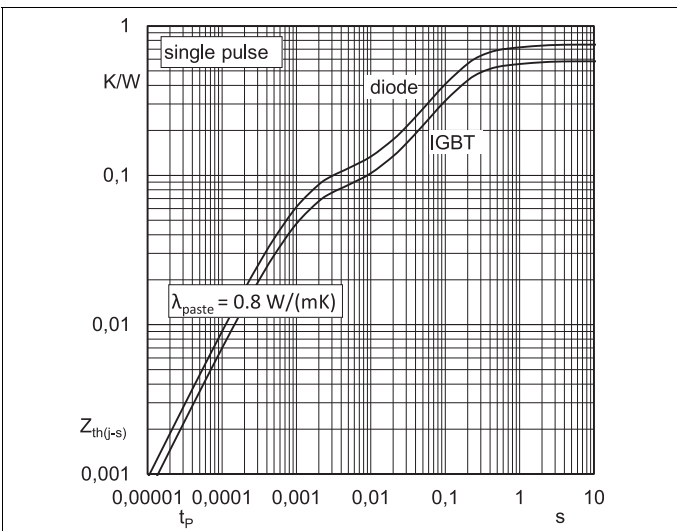


Fig. 9: Typ. transient thermal impedance

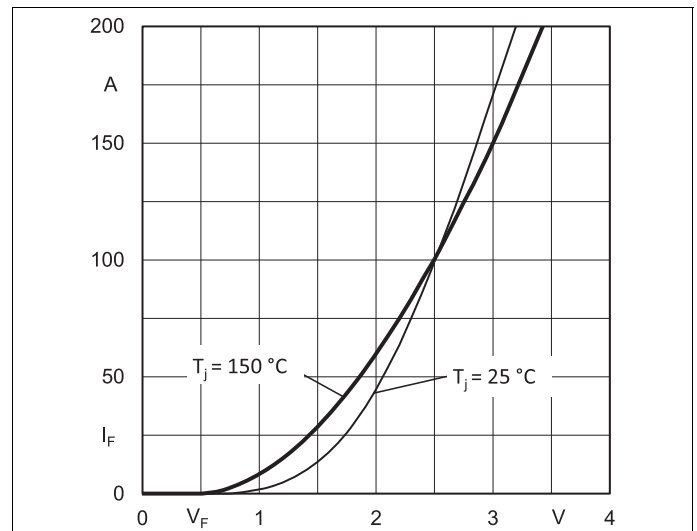


Fig. 10: Typ. CAL diode forward characteristic

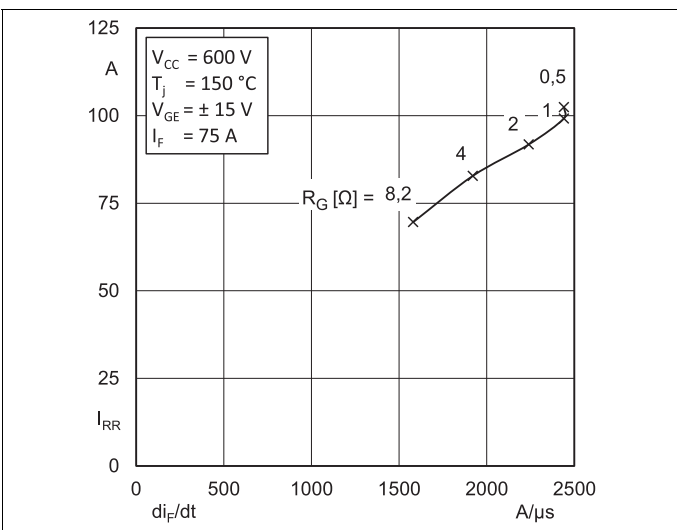


Fig. 11: Typ. CAL diode peak reverse recovery current

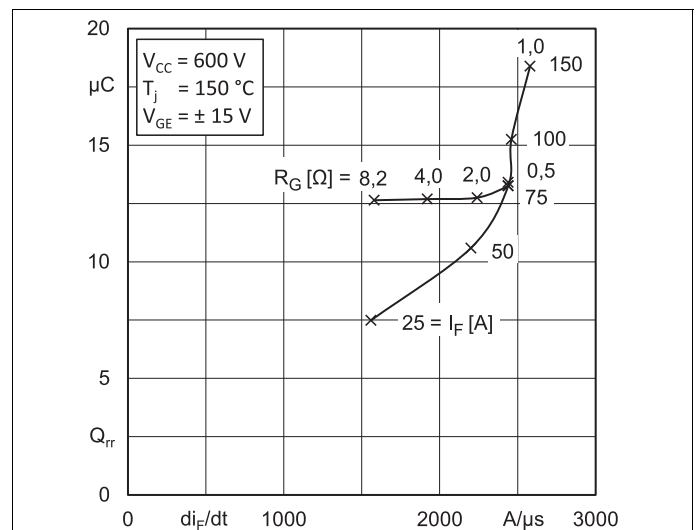
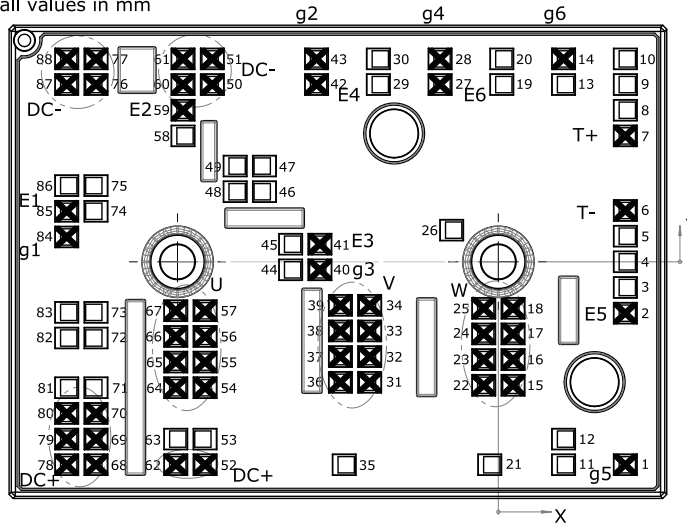


Fig. 12: Typ. CAL diode recovery charge

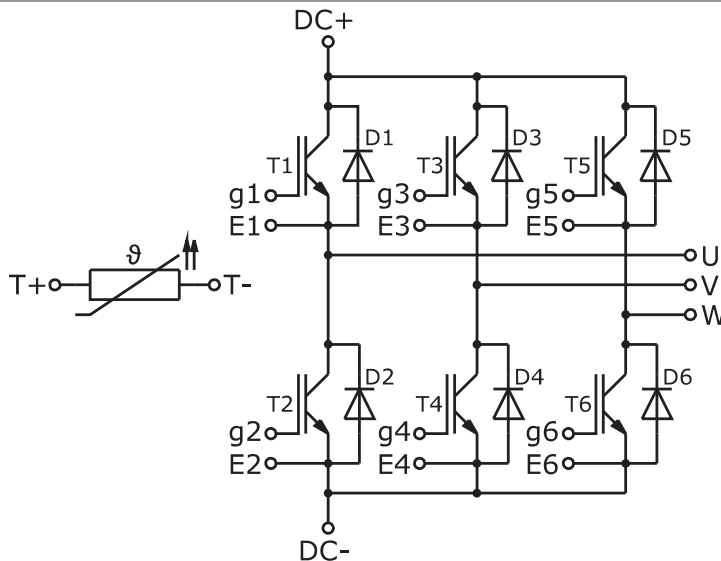
SKiiP 37AC12T4V1

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

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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