

MiniSKiiP® 3

Twelvepack

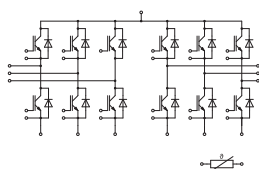
SKiiP 37ACC12T7V1

Features*

- 1200V Generation 7 IGBTs (T7)
- 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 $T_C = T_S = 125^\circ\text{C}$
- Product reliability results valid for $T_j \leq 150^\circ\text{C}$; $T_{j,op} > 150^\circ\text{C}$ during overload (Details see AN19-002)
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- For storage and case temperature with TIM see document "Technical Explanations Thermal Interface Materials"



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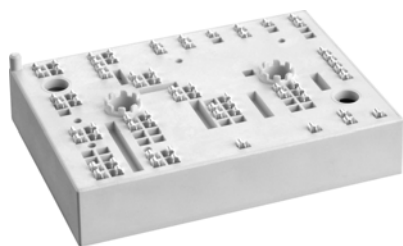
Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Inverter - IGBT				
V _{CES}	T _j = 25 °C		1200	V
I _C	λ _{paste} =0.8 W/(mK)	T _s = 70 °C	78	A
	T _j = 175 °C	T _s = 100 °C	63	A
I _C	λ _{paste} =2.5 W/(mK)	T _s = 70 °C	91	A
	T _j = 175 °C	T _s = 100 °C	74	A
I _{Cnom}			75	A
I _{CRM}			150	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 800 V V _{GE} ≤ 15 V V _{CES} ≤ 1200 V	T _j = 175 °C	7	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 = 70 °C	65	A
	T _j = 175 °C	T _s = 100 °C	52	A
I _F	λ _{paste} =2.5 W/(mK)	T _s = 70 °C	75	A
	T _j = 175 °C	T _s = 100 °C	60	A
I _{FRM}			150	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 150 °C		430	A
T _j			-40 ... 175	°C
Module				
I _{t(RMS)}	T _{terminal} = 80 °C, 20 A per spring		40	A
T _{stg}	module without TIM		-40 ... 125	°C
V _{isol}	AC sinus 50 Hz, t = 1 min		2500	V

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Inverter - IGBT					
$V_{CE(sat)}$	$I_C = 75\text{ A}$	$T_j = 25^\circ\text{C}$	1.55	1.70	V
	$V_{GE} = 15\text{ V}$	$T_j = 150^\circ\text{C}$	1.73	1.88	V
	chiplevel	$T_j = 175^\circ\text{C}$	1.77	1.92	V
V_{CE0}		$T_j = 25^\circ\text{C}$	1.00	1.05	V
	chiplevel	$T_j = 150^\circ\text{C}$	0.80	0.85	V
		$T_j = 175^\circ\text{C}$	0.75	0.80	V
r_{CE}	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$	7.3	8.7	$\text{m}\Omega$
	chiplevel	$T_j = 150^\circ\text{C}$	12	14	$\text{m}\Omega$
		$T_j = 175^\circ\text{C}$	14	15	$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 1.7\text{ mA}$	5.15	5.8	6.45	V
I_{CES}	$V_{GE} = 0\text{ V}, V_{CE} = 1200\text{ V}, T_j = 25^\circ\text{C}$			1	mA
C_{ies}	$V_{CE} = 25\text{ V}$	$f = 1\text{ MHz}$	15.10		nF
C_{oes}	$V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	0.19		nF
C_{res}		$f = 1\text{ MHz}$	0.54		nF
Q_G	$V_{GE} = -8\text{ V} \dots +15\text{ V}$		1050		nC
R_{Gint}	$T_j = 25^\circ\text{C}$		2.0		Ω

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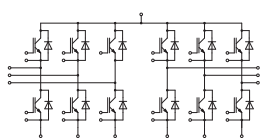
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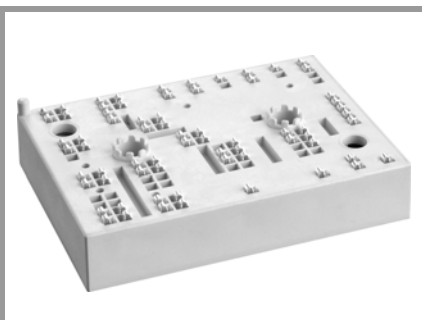


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Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
Inverter - IGBT					
$t_{d(on)}$	$V_{CC} = 600\text{ V}$ $I_C = 75\text{ A}$ $R_{G on} = 2.3\ \Omega$ $R_{G off} = 2.3\ \Omega$ $V_{GE} = +15/-15\text{ V}$	$T_j = 25^\circ\text{C}$	137		ns
		$T_j = 150^\circ\text{C}$	142		ns
		$T_j = 175^\circ\text{C}$	142		ns
t_r		$T_j = 25^\circ\text{C}$	35		ns
		$T_j = 150^\circ\text{C}$	41		ns
		$T_j = 175^\circ\text{C}$	44		ns
E_{on}	$R_{G on} = 2.3\ \Omega$ $R_{G off} = 2.3\ \Omega$ $V_{GE} = +15/-15\text{ V}$	$T_j = 25^\circ\text{C}$	6		mJ
		$T_j = 150^\circ\text{C}$	8.5		mJ
		$T_j = 175^\circ\text{C}$	9		mJ
$t_{d(off)}$		$T_j = 25^\circ\text{C}$	250		ns
		$T_j = 150^\circ\text{C}$	340		ns
		$T_j = 175^\circ\text{C}$	365		ns
t_f	$@ T_j = 150^\circ\text{C}$: $di/dt_{on} = 1940\text{ A}/\mu\text{s}$ $di/dt_{off} = 780\text{ A}/\mu\text{s}$ $dv/dt = 3650\text{ V}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	56		ns
		$T_j = 150^\circ\text{C}$	86		ns
		$T_j = 175^\circ\text{C}$	103		ns
E_{off}		$T_j = 25^\circ\text{C}$	4.7		mJ
		$T_j = 150^\circ\text{C}$	8.1		mJ
		$T_j = 175^\circ\text{C}$	8.8		mJ
$R_{th(j-s)}$	per IGBT, $\lambda_{paste} = 0.8\text{ W}/(\text{mK})$		0.68		K/W
$R_{th(j-s)}$	per IGBT, $\lambda_{paste} = 2.5\text{ W}/(\text{mK})$		0.53		K/W

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
		$T_j = 175^\circ\text{C}$	1.96	2.27	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
		$T_j = 175^\circ\text{C}$	0.82	0.98	V
r_F	chiplevel	$T_j = 25^\circ\text{C}$	12	13	m Ω
		$T_j = 150^\circ\text{C}$	16	18	m Ω
		$T_j = 175^\circ\text{C}$	15	17	m Ω
I_{RRM}	$I_F = 75\text{ A}$ $V_{GE} = +15/-15\text{ V}$ $V_{CC} = 600\text{ V}$	$T_j = 25^\circ\text{C}$	50		A
		$T_j = 150^\circ\text{C}$	67		A
		$T_j = 175^\circ\text{C}$	80		A
Q_{rr}		$T_j = 25^\circ\text{C}$	4		μC
		$T_j = 150^\circ\text{C}$	11.6		μC
		$T_j = 175^\circ\text{C}$	12.2		μC
E_{rr}	$@ T_j = 150^\circ\text{C}$: $di/dt_{off} = 1930\text{ A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	1.4		mJ
		$T_j = 150^\circ\text{C}$	4.5		mJ
		$T_j = 175^\circ\text{C}$	6		mJ
$R_{th(j-s)}$	per Diode, $\lambda_{paste} = 0.8\text{ W}/(\text{mK})$		0.77		K/W
$R_{th(j-s)}$	per Diode, $\lambda_{paste} = 2.5\text{ W}/(\text{mK})$		0.62		K/W
Module					
L_{CE}			-		nH
M_s	to heat sink	2		2.5	Nm
w			82		g

SKiiP 37ACC12T7V1



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Symbol	Conditions	min.	typ.	max.	Unit
Temperature Sensor					
R_{100}	$T_r=100^{\circ}\text{C}$ ($R_{25}=1000\Omega$)		$1670 \pm 3\%$		Ω
$R_{(T)}$	$R_{(T)}=1000\Omega[1+A(T-25^{\circ}\text{C})+B(T-25^{\circ}\text{C})^2]$, $A = 7.635 \cdot 10^{-3}^{\circ}\text{C}^{-1}$, $B = 1.731 \cdot 10^{-5}^{\circ}\text{C}^{-2}$				

Creepage distance (spring to spring) between temperature sensor and DC- is 0.8mm (CTI 600)

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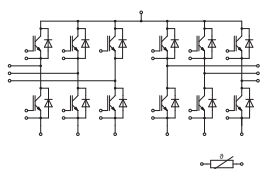
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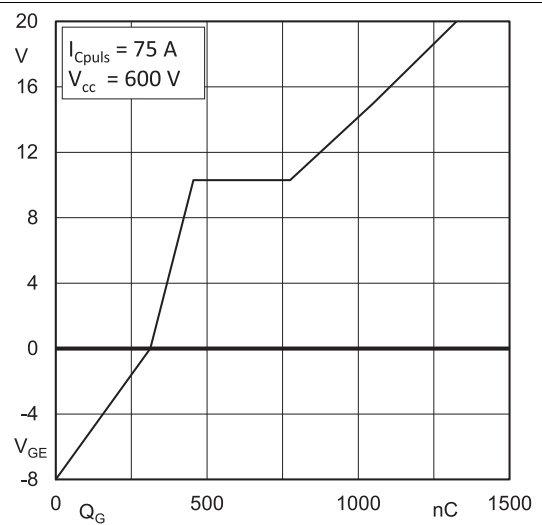
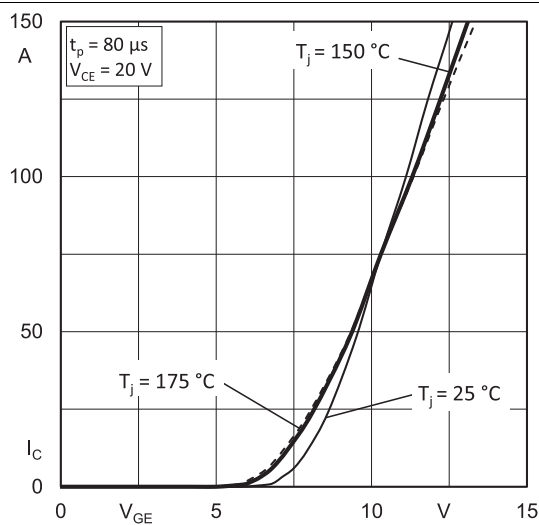
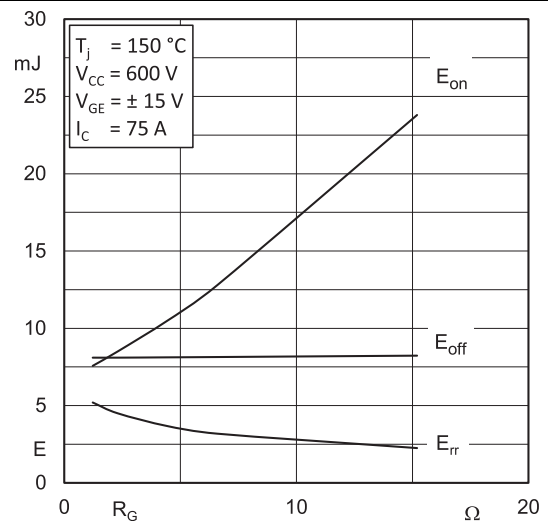
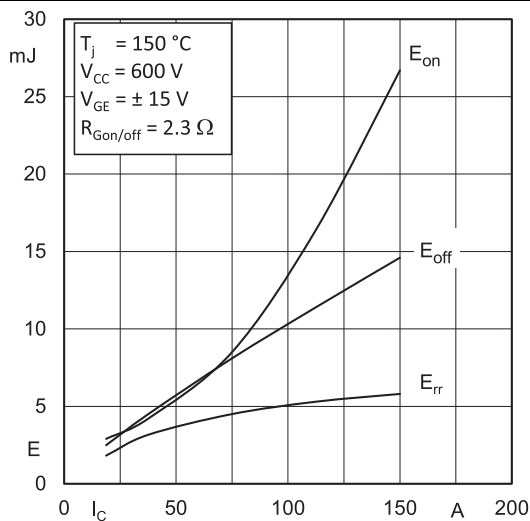
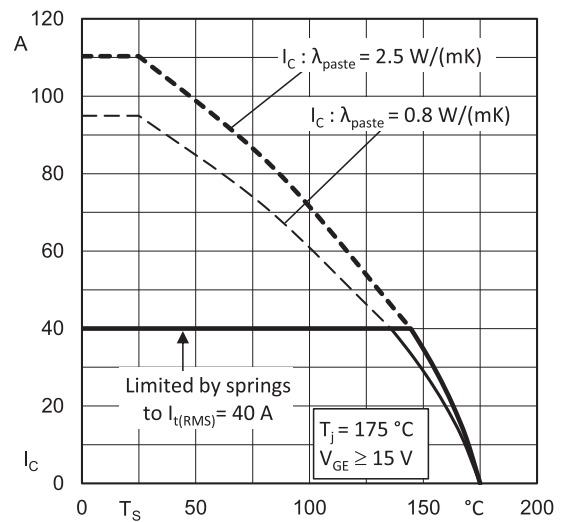
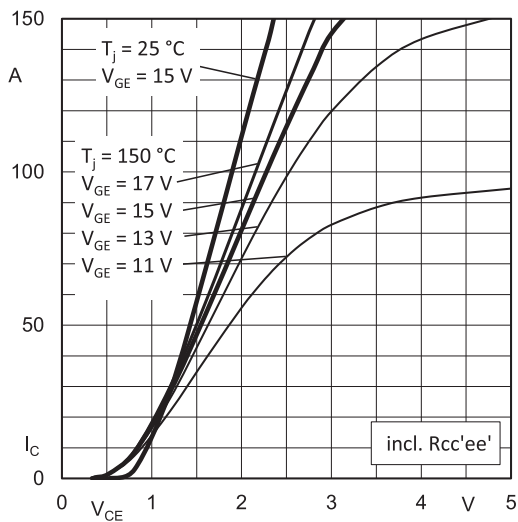
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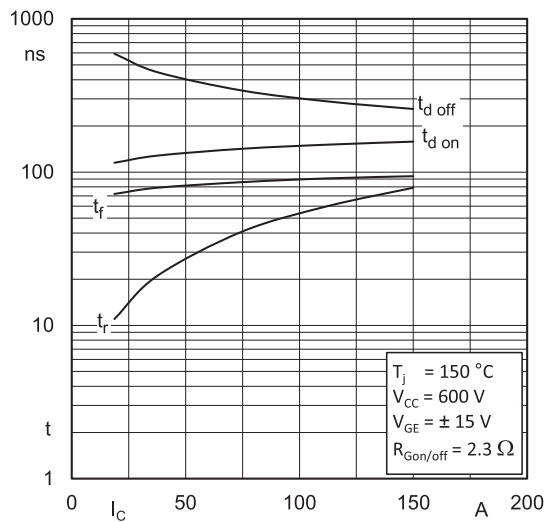


Fig. 7: Typ. switching times vs. I_C

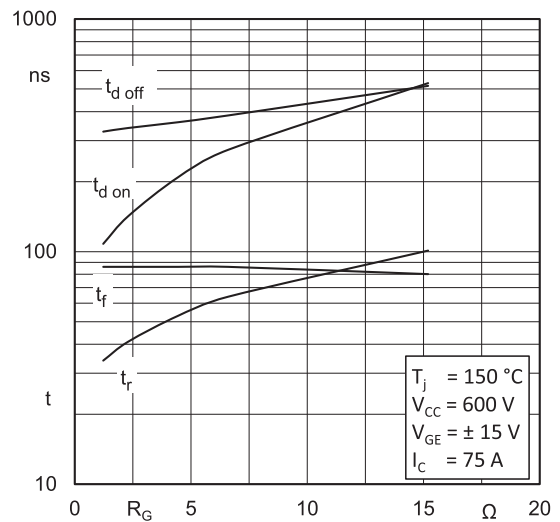


Fig. 8: Typ. switching times vs. gate resistor R_G

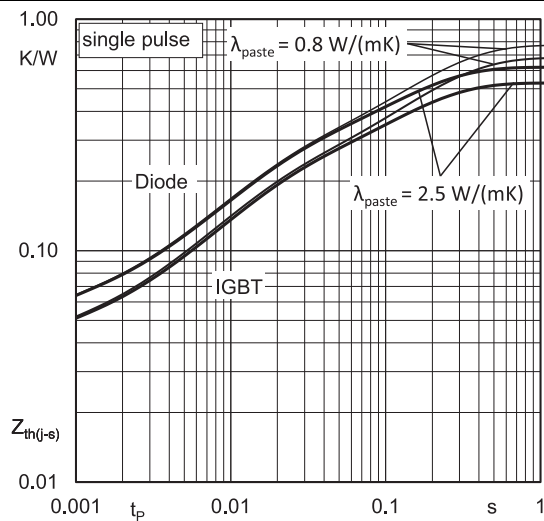


Fig. 9: Typ. transient thermal impedance

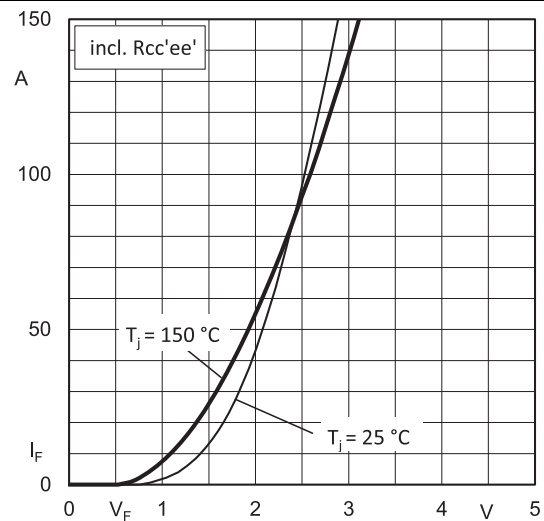


Fig. 10: Typ. CAL diode forward characteristic

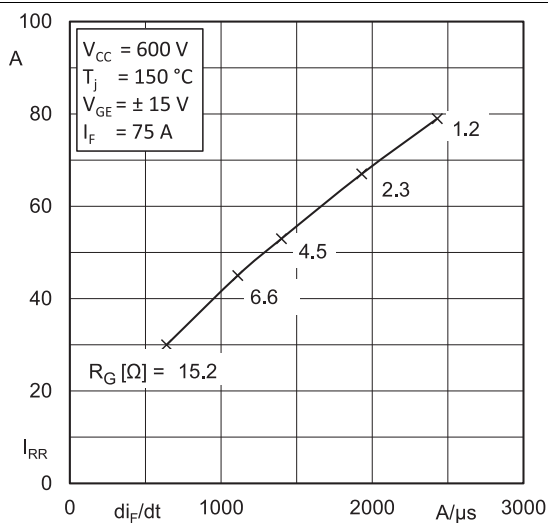


Fig. 11: Typ. CAL diode peak reverse recovery current

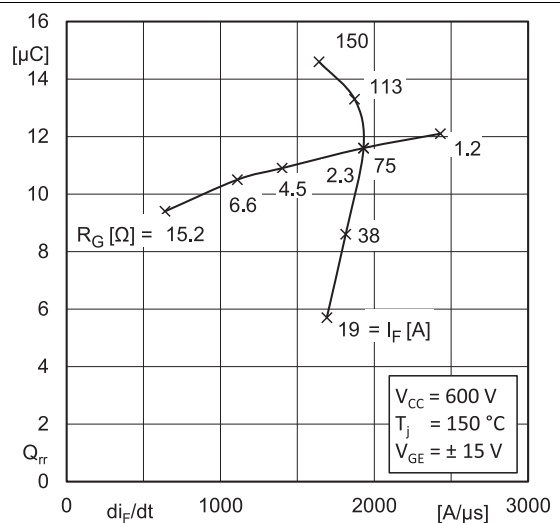
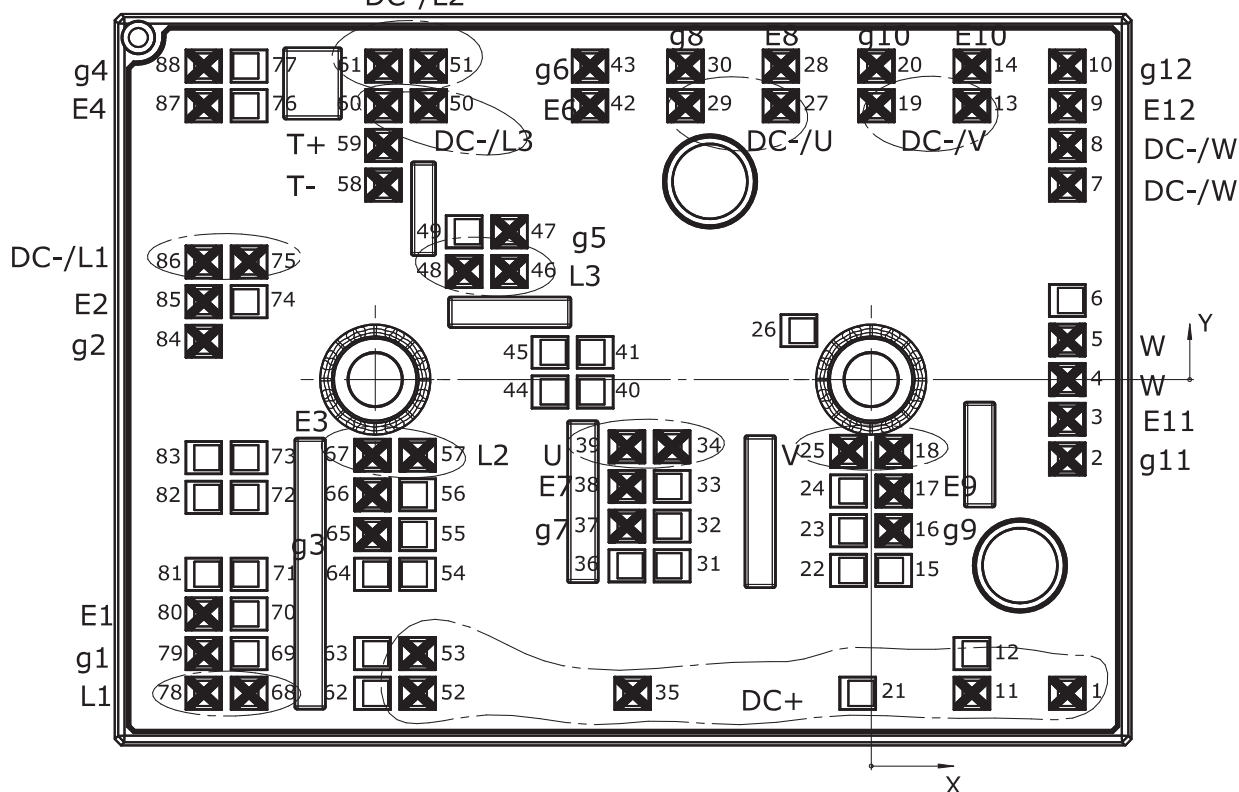


Fig. 12: Typ. CAL diode recovery charge

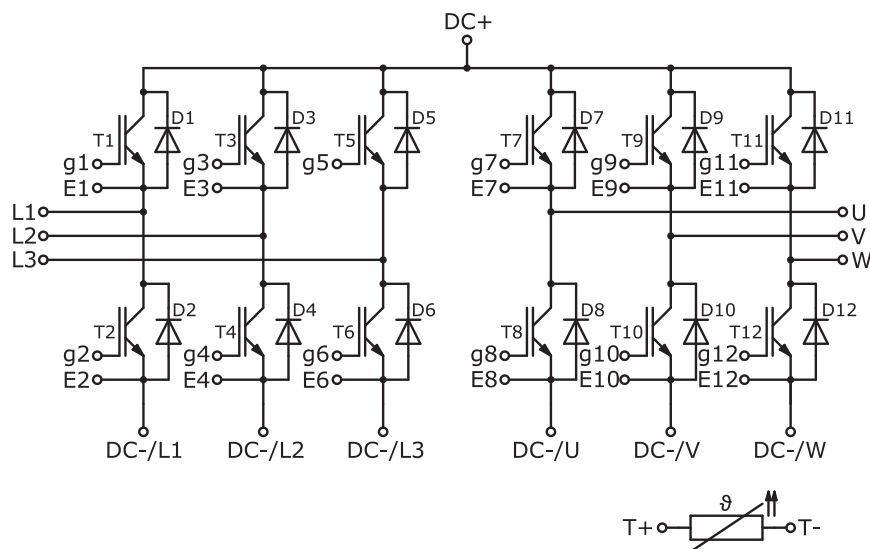
Pin out											
Pin	X	Y	Function	Pin	X	Y	Function	Pin	X	Y	Function
1	15,83	-25,30	DC+	31	-16,05	-15,02		61	-39,33	25,30	DC-/L2
2	15,83	-6,40	g11	32	-16,05	-11,82		62	-40,23	-25,30	
3	15,83	-3,20	E11	33	-16,05	-8,62		63	-40,23	-22,10	
4	15,83	0	W	34	-16,05	-5,42	U	64	-40,23	-15,70	
5	15,83	3,20	W	35	-19,23	-25,30	DC+	65	-40,23	-12,50	g3
6	15,83	6,40		36	-19,70	-15,02		66	-40,23	-9,30	E3
7	15,83	15,70	DC-/W	37	-19,70	-11,82	g7	67	-40,23	-6,10	L2
8	15,83	18,90	DC-/W	38	-19,70	-8,62	E7	68	-50,18	-25,30	L1
9	15,83	22,10	E12	39	-19,70	-5,42	U	69	-50,18	-22,10	
10	15,83	25,30	g12	40	-22,26	-1,00		70	-50,18	-18,90	
11	8,13	-25,30	DC+	41	-22,26	2,20		71	-50,18	-15,70	
12	8,13	-22,10		42	-22,68	22,10	E6	72	-50,18	-9,50	
13	8,13	22,10	DC-/V	43	-22,68	25,30	g6	73	-50,18	-6,30	
14	8,13	25,30	E10	44	-25,91	-1,00		74	-50,18	6,30	
15	1,83	-15,39		45	-25,91	2,20		75	-50,18	9,50	DC-/L1
16	1,83	-12,19	g9	46	-29,18	8,74	L3	76	-50,18	22,10	
17	1,83	-8,99	E9	47	-29,18	11,94	g5	77	-50,18	25,30	
18	1,83	-5,79	V	48	-32,83	8,74	L3	78	-53,83	-25,30	L1
19	0,43	22,10	DC-/V	49	-32,83	11,94		79	-53,83	-22,10	g1
20	0,43	25,30	g10	50	-35,68	22,10	DC-/L3	80	-53,83	-18,90	E1
21	-1,08	-25,30		51	-35,68	25,30	DC-/L2	81	-53,83	-15,70	
22	-1,83	-15,39		52	-36,58	-25,30	DC+	82	-53,83	-9,50	
23	-1,83	-12,19		53	-36,58	-22,10	DC+	83	-53,83	-6,30	
24	-1,83	-8,99		54	-36,58	-15,70		84	-53,83	3,10	g2
25	-1,83	-5,79	V	55	-36,58	-12,50		85	-53,83	6,30	E2
26	-5,83	3,95		56	-36,58	-9,30		86	-53,83	9,50	DC-/L1
27	-7,28	22,10	DC-/U	57	-36,58	-6,10	L2	87	-53,83	22,10	E4
28	-7,28	25,30	E8	58	-39,33	15,70	T-	88	-53,83	25,30	g4
29	-14,98	22,10	DC-/U	59	-39,33	18,90	T+				
30	-14,98	25,30	q8	60	-39,33	22,10	DC-/L3				

all values in mm

DC-/L2



Pinout



Pinout

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

*IMPORTANT INFORMATION AND WARNINGS

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