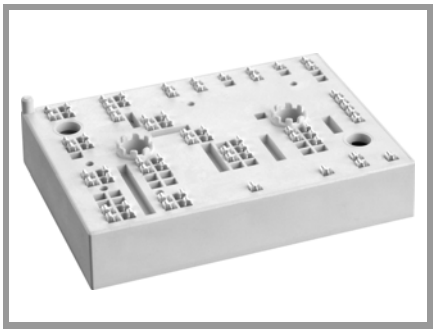
SKiiP 37NAS12F4V2



MiniSKiiP® 3

3-phase Converter with 3-phase Asymmetrical Half-Bridge (CI)

SKiiP 37NAS12F4V2

Features*

- Fast Trench 4 IGBTs
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- Highly reliable spring contacts for electrical connections
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Remarks

- Max. case temperature limited to T_C= 125°C
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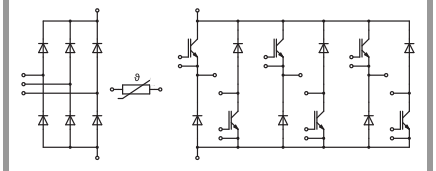


NAS

Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
IGBT 1				
V_{CES}	T_j = 25 °C		1200	V
I_C	λ_{paste}=0.8 W/(mK)	T_s = 25 °C	55	A
	T_j = 175 °C	T_s = 70 °C	45	A
I_C	λ_{paste}=2.5 W/(mK)	T_s = 25 °C	61	A
	T_j = 175 °C	T_s = 70 °C	50	A
I_{Cnom}			40	A
I_{CRM}			120	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

Absolute Maximum Ratings

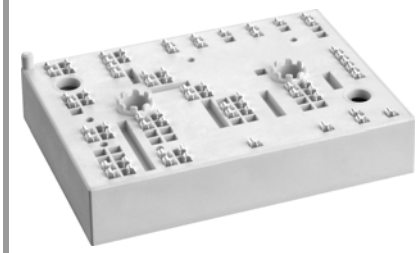
Symbol	Conditions		Values	Unit
Diode 1				
V_{RRM}	T_j = 25 °C		1200	V
I_F	λ_{paste}=0.8 W/(mK)	T_s = 25 °C	42	A
	T_j = 175 °C	T_s = 70 °C	34	A
I_F	λ_{paste}=2.5 W/(mK)	T_s = 25 °C	46	A
	T_j = 175 °C	T_s = 70 °C	37	A
I_{FRM}			70	A
I_{FSM}	10 ms	T_j = 25 °C	170	A
	sin 180°	T_j = 150 °C	170	A
T_j			-40 ... 175	°C

Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Diode 4				
V_{RRM}			1800	V
I_F	λ_{paste}=0.8 W/(mK)	T_s = 25 °C	57	A
	T_j = 150 °C	T_s = 70 °C	43	A
I_F	λ_{paste}=2.5 W/(mK)	T_s = 25 °C	62	A
	T_j = 150 °C	T_s = 70 °C	47	A
I_{FSM}	10 ms, sin 180°, T_j = 150 °C		270	A
i^2t	10 ms, sin. 180°, T_j = 150 °C		365	A^2s
T_j			-40 ... 150	°C

Absolute Maximum Ratings

Symbol	Conditions	Values	Unit
Module			
$I_{t(RMS)}$	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



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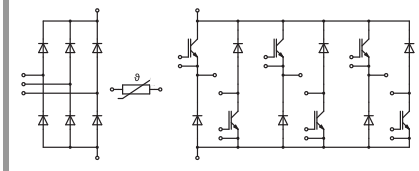

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Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
IGBT 1						
$V_{CE(sat)}$	I_C = 40 A V_{GE} = 15 V chiplevel	T_j = 25 °C		2.05	2.40	V
		T_j = 150 °C		2.59	2.85	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 chiplevel	T_j = 25 °C		31	38	mΩ
		T_j = 150 °C		47	51	mΩ
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 1.5 mA		5.2	5.8	6.4	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		2.30		nF
C_{oes}		f = 1 MHz		0.19		nF
C_{res}		f = 1 MHz		0.14		nF
Q_G	V_{GE} = - 8 V...+ 15 V			227		nC
R_{Gint}	T_j = 25 °C			0		Ω
$t_{d(on)}$	V_{CC} = 600 V I_C = 40 A V_{GE} = +15/-15 V $R_{G\ on}$ = 8.2 Ω $R_{G\ off}$ = 8.2 Ω di/dt_{on} = 1990 A/µs di/dt_{off} = 590 A/µs	T_j = 150 °C		15.6		ns
t_r		T_j = 150 °C		21.6		ns
E_{on}		T_j = 150 °C		2.4		mJ
$t_{d(off)}$		T_j = 150 °C		264		ns
t_f		T_j = 150 °C		58		ns
E_{off}		T_j = 150 °C		3		mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/(mK)			0.73		K/W
$R_{th(j-s)}$	per IGBT, λ_{paste}=2.5 W/(mK)			0.6		K/W

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Diode 1						
V_F	I_F = 40 A V_{GE} = 0 V chiplevel	T_j = 25 °C		2.44	2.78	V
		T_j = 150 °C		2.49	2.84	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		29	32	mΩ
		T_j = 150 °C		40	43	mΩ
I_{RRM}	I_F = 40 A di/dt_{off} = 2200 A/µs V_{GE} = -15 V V_{CC} = 600 V	T_j = 150 °C		67		A
Q_{rr}		T_j = 150 °C		6.4		µC
E_{rr}		T_j = 150 °C		2.5		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			1.3		K/W
$R_{th(j-s)}$	per Diode, λ_{paste}=2.5 W/(mK)			1.1		K/W

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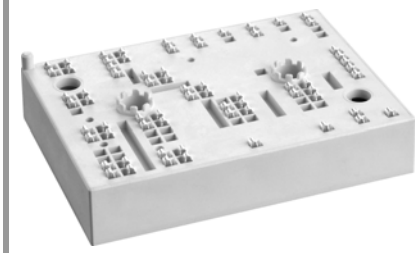

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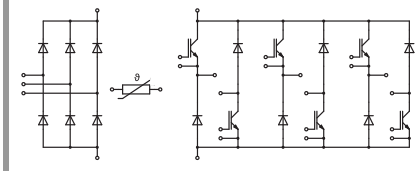

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Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Diode 4						
V_F	I_F = 13 A V_{GE} = 0 V chiplevel	T_j = 25 °C		1.00	1.21	V
		T_j = 125 °C		0.90	1.10	V
V_{F0}	chiplevel	T_j = 25 °C		0.88	0.98	V
		T_j = 125 °C		0.73	0.83	V
r_F	chiplevel	T_j = 25 °C		9.2	18	mΩ
		T_j = 125 °C		13	21	mΩ
I_R	T_j = 145 °C, V_{RRM}				1.1	mA
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			1.1		K/W
$R_{th(j-s)}$	per Diode, λ_{paste}=2.5 W/(mK)			0.94		K/W

Characteristics					
Symbol	**Conditions**	**min.**	**typ.**	**max.**	**Unit**
Module					
L_{CE}			-		nH
M_s	to heat sink	2		2.5	Nm
w	weight		82		g

Characteristics					
Symbol	**Conditions**	**min.**	**typ.**	**max.**	**Unit**
Temperature Sensor					
R_{100}	T_c=100°C (R_{25}=5 kΩ)		493 ± 5%		Ω
$B_{25/85}$	$R_{(T)}=R_{25}*\exp[B_{25/85}*(1/T-1/298)]$, T[K]		3420		K

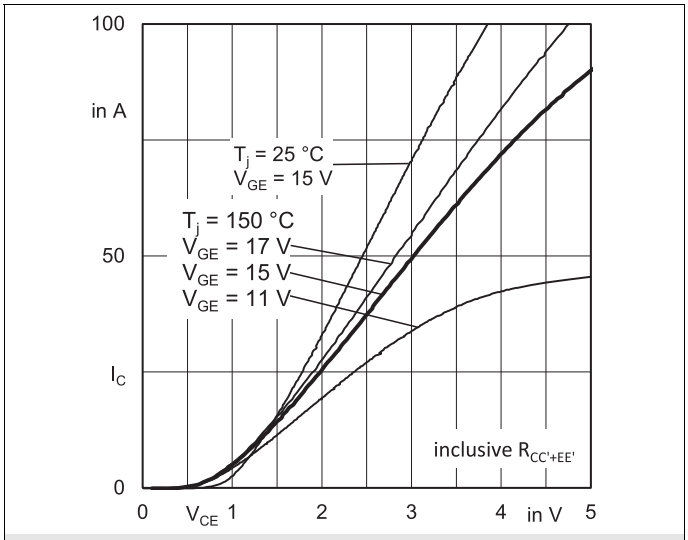

Fig. 1: Typ. output characteristic, inclusive $R_{CC'+ EE'}$

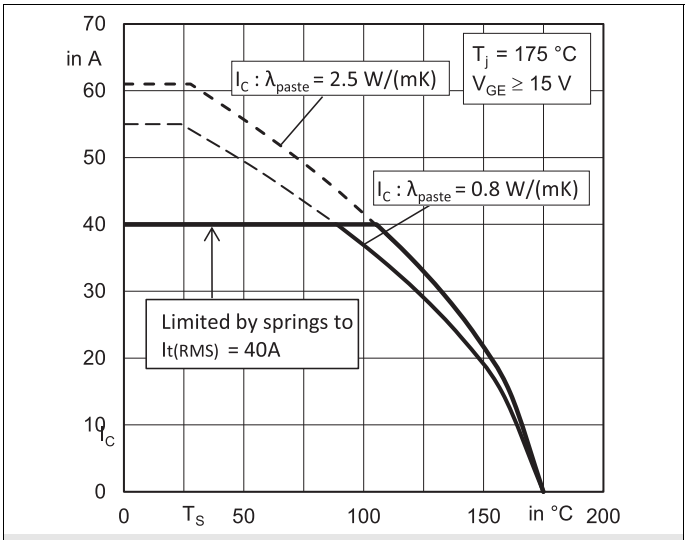

Fig. 2: Rated current vs. temperature Ic = f (Ts)

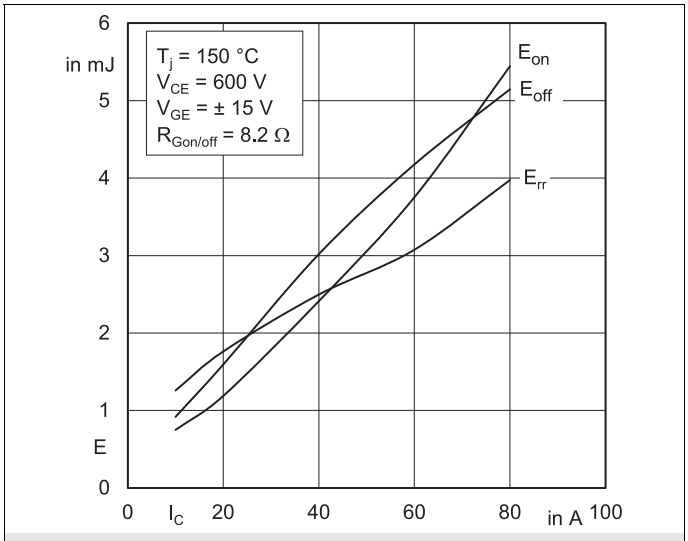

Fig. 3: Typ. turn-on /-off energy = f (I_C)

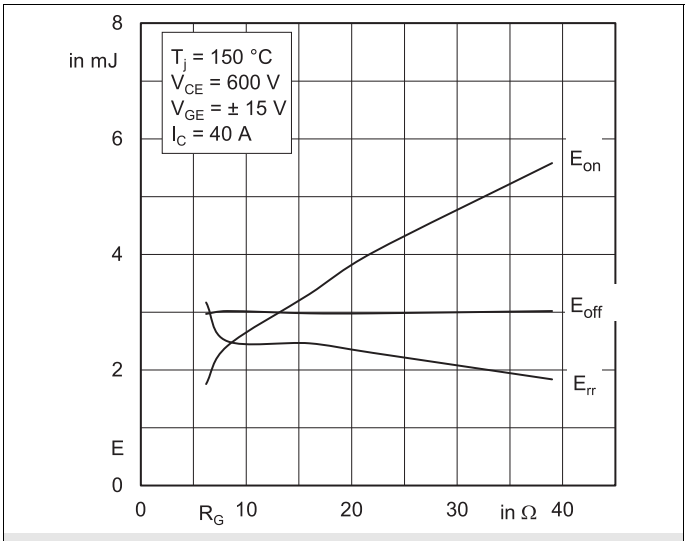

Fig. 4: Typ. turn-on /-off energy = f (R_G)

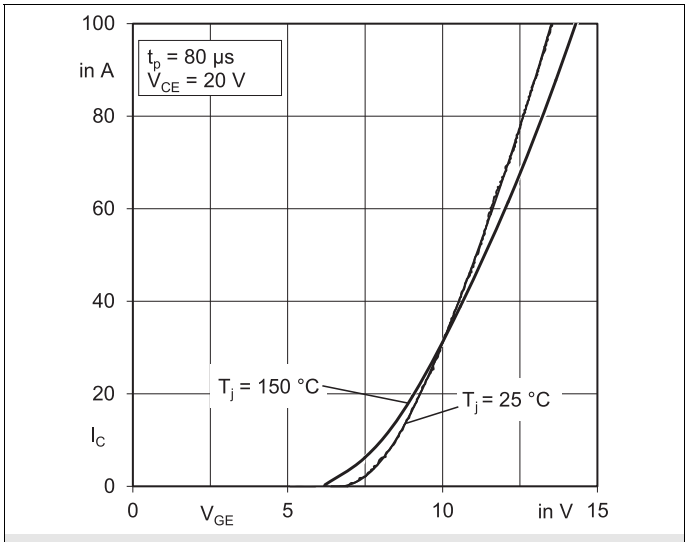

Fig. 5: Typ. transfer characteristic

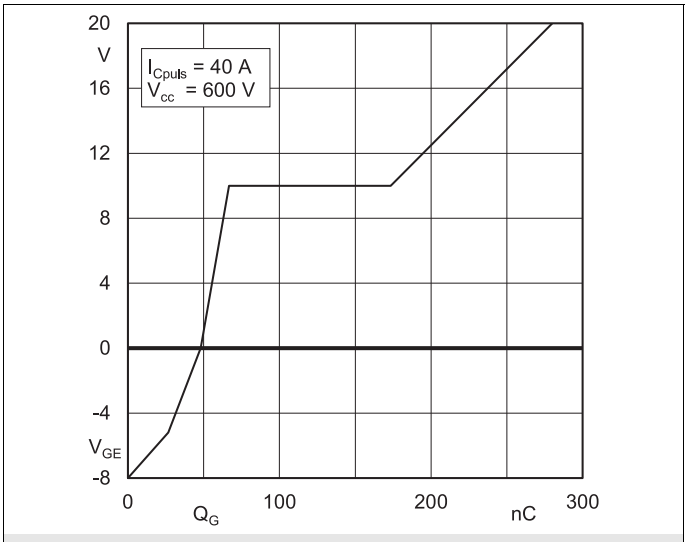

Fig. 6: Typ. gate charge characteristic

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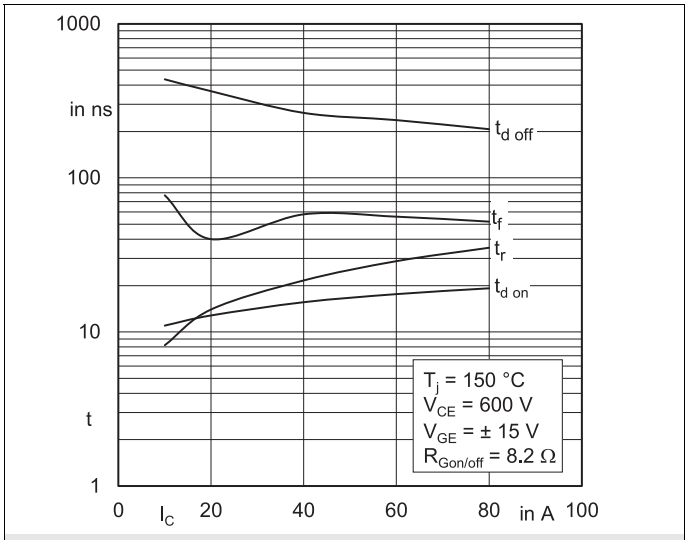


Fig. 7: Typ. switching times vs. I_C

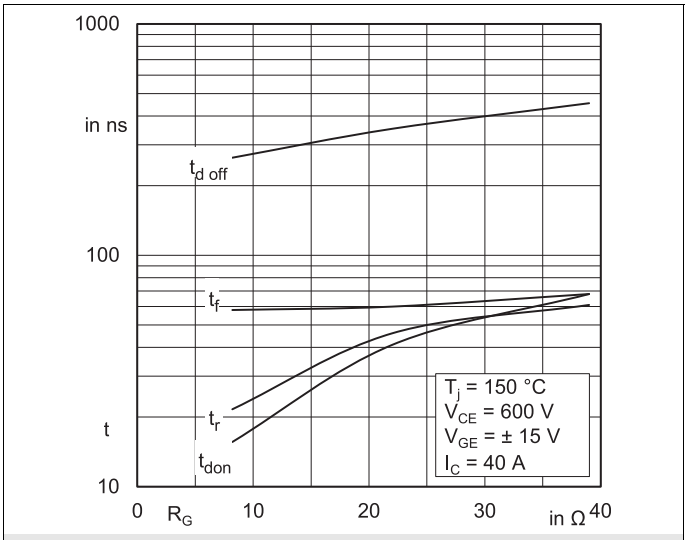


Fig. 8: Typ. switching times vs. gate resistor R_G

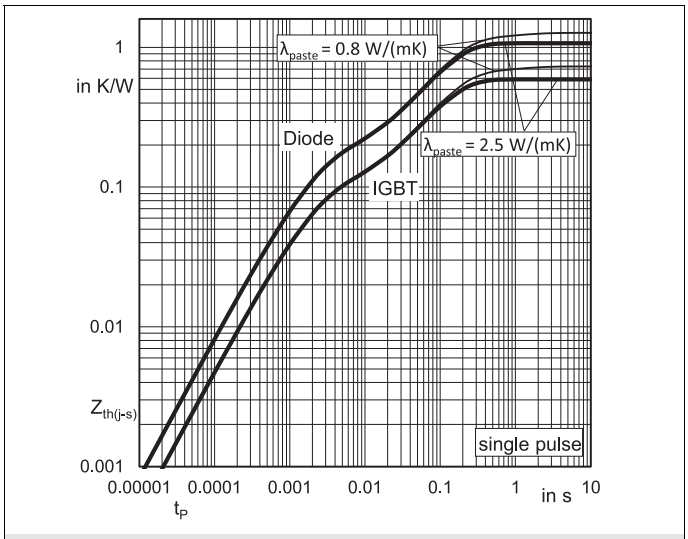


Fig. 9: Transient thermal impedance of IGBT and Diode

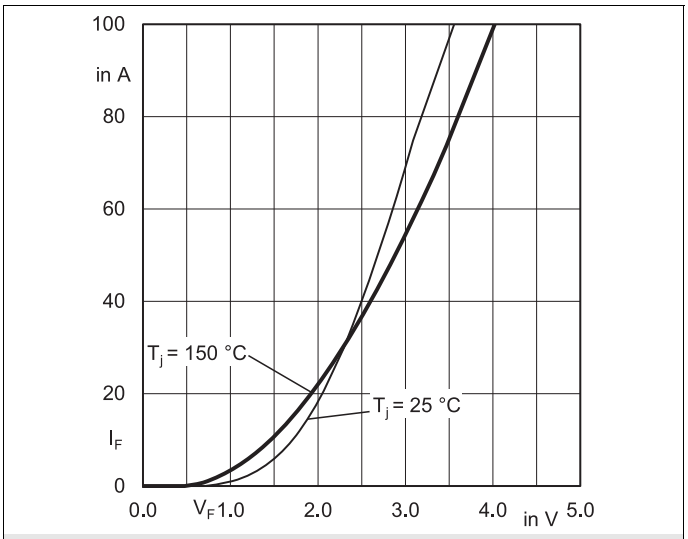


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

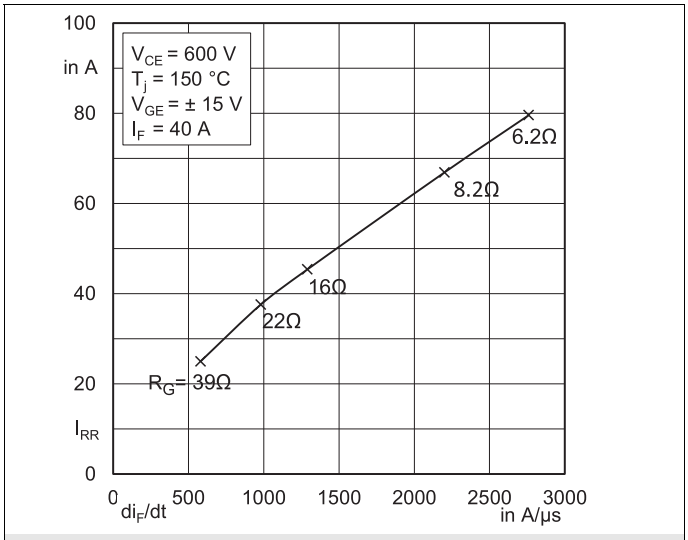


Fig. 11: Typ. CAL diode peak reverse recovery current

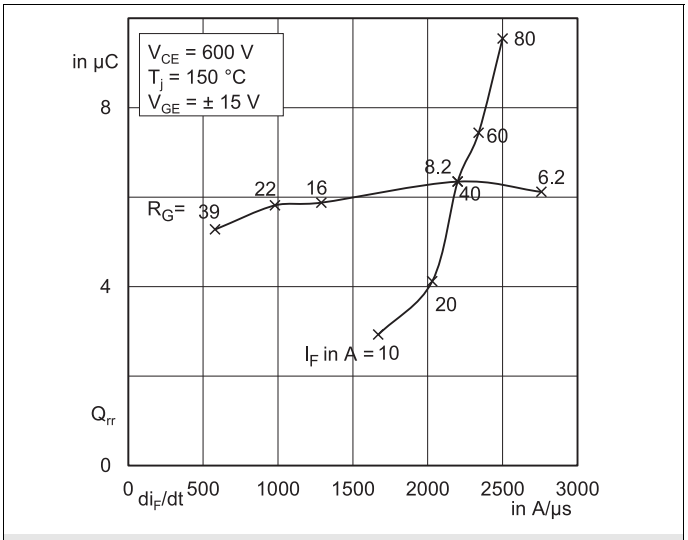
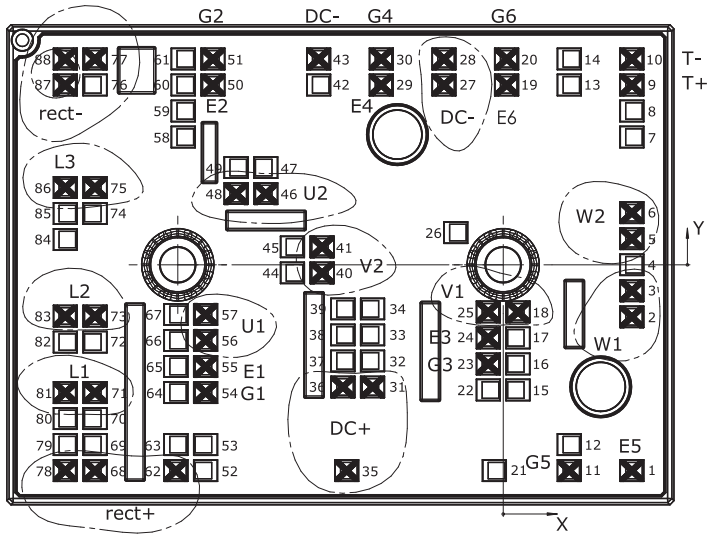


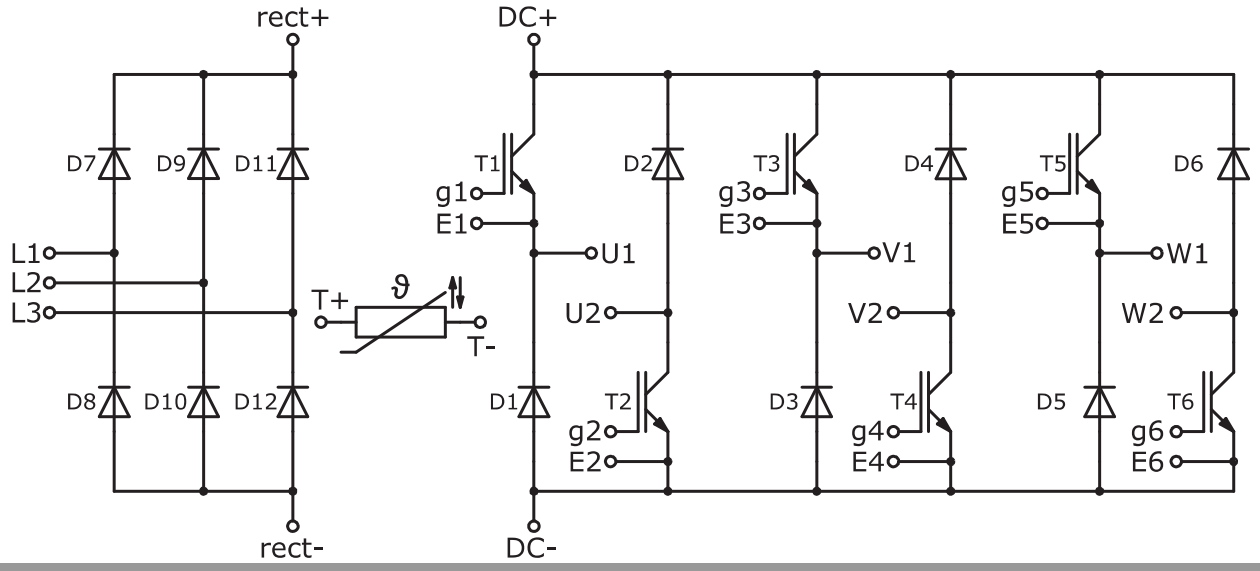
Fig. 12: Typ. CAL diode recovery charge

Pin out											
Pin	*X*	*Y*	*Function*	*Pin*	*X*	*Y*	*Function*	*Pin*	*X*	*Y*	*Function*
1	15,83	-25,30	E5	31	-16,05	-15,02	DC+	61	-39,33	25,30	
2	15,83	-6,40	W1	32	-16,05	-11,82		62	-40,23	-25,30	rect+
3	15,83	-3,20	W1	33	-16,05	-8,62		63	-40,23	-22,10	
4	15,83	0		34	-16,05	-5,42		64	-40,23	-15,70	
5	15,83	3,20	W2	35	-19,23	-25,30	DC+	65	-40,23	-12,50	
6	15,83	6,40	W2	36	-19,70	-15,02	DC+	66	-40,23	-9,30	
7	15,83	15,70		37	-19,70	-11,82		67	-40,23	-6,10	
8	15,83	18,90		38	-19,70	-8,62		68	-50,18	-25,30	rect+
9	15,83	22,10	T+	39	-19,70	-5,42		69	-50,18	-22,10	
10	15,83	25,30	T-	40	-22,26	-1,00	V2	70	-50,18	-18,90	
11	8,13	-25,30	G5	41	-22,26	2,20	V2	71	-50,18	-15,70	L1
12	8,13	-22,10		42	-22,68	22,10		72	-50,18	-9,50	
13	8,13	22,10		43	-22,68	25,30	DC-	73	-50,18	-6,30	L2
14	8,13	25,30		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	L3
16	1,83	-12,19		46	-29,18	8,74	U2	76	-50,18	22,10	
17	1,83	-8,99		47	-29,18	11,94		77	-50,18	25,30	rect-
18	1,83	-5,79	V1	48	-32,83	8,74	U2	78	-53,83	-25,30	rect+
19	0,43	22,10	E6	49	-32,83	11,94		79	-53,83	-22,10	
20	0,43	25,30	G6	50	-35,68	22,10	E2	80	-53,83	-18,90	
21	-1,08	-25,30		51	-35,68	25,30	G2	81	-53,83	-15,70	L1
22	-1,83	-15,39		52	-36,58	-25,30		82	-53,83	-9,50	
23	-1,83	-12,19	G3	53	-36,58	-22,10		83	-53,83	-6,30	L2
24	-1,83	-8,99	E3	54	-36,58	-15,70	G1	84	-53,83	3,10	
25	-1,83	-5,79	V1	55	-36,58	-12,50	E1	85	-53,83	6,30	
26	-5,83	3,95		56	-36,58	-9,30	U1	86	-53,83	9,50	L3
27	-7,28	22,10	DC-	57	-36,58	-6,10	U1	87	-53,83	22,10	rect-
28	-7,28	25,30	DC-	58	-39,33	15,70		88	-53,83	25,30	rect-
29	-14,98	22,10	E4	59	-39,33	18,90					
30	-14,98	25,30	G4	60	-39,33	22,10					

all values in mm



Pinout and Dimensions



Pinout

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

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