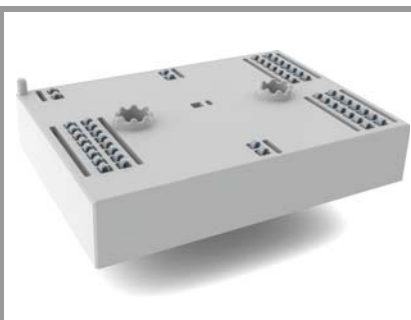




MiniSKiiP® 3 Dual

Half-Bridge

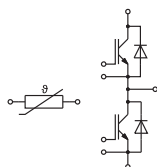
SKiiP 39GB12T7V1

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
- NTC T-Sensor

Remarks

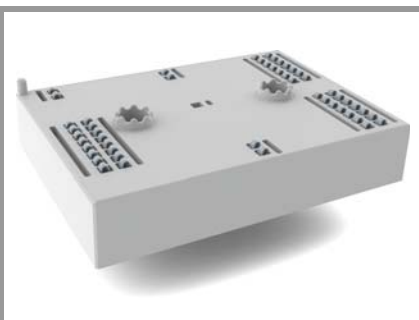
- Max. case temperature limited to $T_C = T_S = 125^\circ\text{C}$
- Product reliability results valid for $T_j \leq 150^\circ\text{C}$; $T_{j,op} > 150^\circ\text{C}$ during overload (Details see AN19-002)
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GB

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	335	A
	T _j = 175 °C	T _s = 100 °C	269	A
I _C	λ _{paste} =2.5 W/(mK)	T _s = 70 °C	394	A
	T _j = 175 °C	T _s = 100 °C	317	A
I _{Cnom}			400	A
I _{CRM}			800	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	232	A
	T _j = 175 °C	T _s = 100 °C	182	A
I _F	λ _{paste} =2.5 W/(mK)	T _s = 70 °C	268	A
	T _j = 175 °C	T _s = 100 °C	212	A
I _{FRM}			800	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 150 °C		1980	A
T _j			-40 ... 175	°C
Module				
I _{t(RMS)}	T _{terminal} = 80 °C, 20 A per spring		280	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 = 400 A	T _j = 25 °C		1.55	1.70	V
	V _{GE} = 15 V	T _j = 150 °C		1.73	1.88	V
	chiplevel	T _j = 175 °C		1.77	1.92	V
V _{CE0}		T _j = 25 °C		1.00	1.05	V
	chiplevel	T _j = 150 °C		0.80	0.85	V
		T _j = 175 °C		0.75	0.80	V
r _{CE}		T _j = 25 °C		1.38	1.6	mΩ
	V _{GE} = 15 V	T _j = 150 °C		2.3	2.6	mΩ
	chiplevel	T _j = 175 °C		2.6	2.8	mΩ
V _{GE(th)}	V _{GE} = V _{CE} , I _C = 8.2 mA		5.15	5.8	6.45	V
I _{CES}	V _{GE} = 0 V, V _{CE} = 1200 V, T _j = 25 °C				4.0	mA
C _{ies}	V _{CE} = 25 V V _{GE} = 0 V	f = 1 MHz		80.00		nF
C _{oes}		f = 1 MHz		1.01		nF
C _{res}		f = 1 MHz		0.28		nF
Q _G	V _{GE} = - 8V ... + 15 V			5600		nC
R _{Gint}	T _j = 25 °C			0.4		Ω



MiniSKiiP® 3 Dual

Half-Bridge

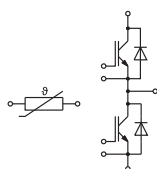
SKiiP 39GB12T7V1

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
- NTC T-Sensor

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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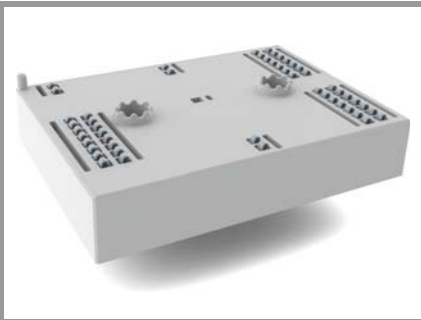


GB

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
Inverter - IGBT					
$t_{d(on)}$	$V_{CC} = 600\text{ V}$ $I_C = 400\text{ A}$ $R_{G\ on} = 1.5\ \Omega$ $R_{G\ off} = 1.5\ \Omega$ $V_{GE} = +15/-15\text{ V}$	$T_j = 25^\circ\text{C}$	127		ns
		$T_j = 150^\circ\text{C}$	136		ns
		$T_j = 175^\circ\text{C}$	133		ns
t_r		$T_j = 25^\circ\text{C}$	71		ns
		$T_j = 150^\circ\text{C}$	83		ns
		$T_j = 175^\circ\text{C}$	89		ns
E_{on}	$R_{G\ on} = 1.5\ \Omega$ $R_{G\ off} = 1.5\ \Omega$ $V_{GE} = +15/-15\text{ V}$	$T_j = 25^\circ\text{C}$	28		mJ
		$T_j = 150^\circ\text{C}$	39		mJ
		$T_j = 175^\circ\text{C}$	42		mJ
$t_{d(off)}$		$T_j = 25^\circ\text{C}$	393		ns
		$T_j = 150^\circ\text{C}$	483		ns
		$T_j = 175^\circ\text{C}$	508		ns
t_f	@ $T_j = 150^\circ\text{C}$: $di/dt_{on} = 5540\text{ A}/\mu\text{s}$ $di/dt_{off} = 3070\text{ A}/\mu\text{s}$ $dv/dt = 3650\text{ V}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	72		ns
		$T_j = 150^\circ\text{C}$	112		ns
		$T_j = 175^\circ\text{C}$	134		ns
E_{off}		$T_j = 25^\circ\text{C}$	30		mJ
		$T_j = 150^\circ\text{C}$	48		mJ
		$T_j = 175^\circ\text{C}$	51		mJ
$R_{th(j-s)}$	per IGBT, $\lambda_{paste} = 0.8\text{ W}/(\text{mK})$		0.18		K/W
$R_{th(j-s)}$	per IGBT, $\lambda_{paste} = 2.5\text{ W}/(\text{mK})$		0.14		K/W

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
Inverse - Diode					
$V_F = V_{EC}$	$I_F = 400\text{ A}$ $V_{GE} = 0\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$	2.20	2.52	V
		$T_j = 150^\circ\text{C}$	2.15	2.47	V
		$T_j = 175^\circ\text{C}$	2.00	2.31	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
		$T_j = 175^\circ\text{C}$	0.82	0.98	V
r_F	chipelevel	$T_j = 25^\circ\text{C}$	2.3	2.6	m Ω
		$T_j = 150^\circ\text{C}$	3.1	3.4	m Ω
		$T_j = 175^\circ\text{C}$	3.0	3.3	m Ω
I_{RRM}	$I_F = 400\text{ A}$ $V_{GE} = +15/-15\text{ V}$ $V_{CC} = 600\text{ V}$	$T_j = 25^\circ\text{C}$	194		A
		$T_j = 150^\circ\text{C}$	293		A
		$T_j = 175^\circ\text{C}$	368		A
Q_{rr}		$T_j = 25^\circ\text{C}$	15		μC
		$T_j = 150^\circ\text{C}$	56		μC
		$T_j = 175^\circ\text{C}$	60		μC
E_{rr}	@ $T_j = 150^\circ\text{C}$: $di/dt_{off} = 5450\text{ A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	6.7		mJ
		$T_j = 150^\circ\text{C}$	23		mJ
		$T_j = 175^\circ\text{C}$	29		mJ
$R_{th(j-s)}$	per Diode, $\lambda_{paste} = 0.8\text{ W}/(\text{mK})$		0.26		K/W
$R_{th(j-s)}$	per Diode, $\lambda_{paste} = 2.5\text{ W}/(\text{mK})$		0.21		K/W
Module					
L_{CE}			15		nH
M_s	to heat sink	2		2.5	Nm
w			76		g

SKiiP 39GB12T7V1



MiniSKiiP® 3 Dual

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
Temperature Sensor					
R_{100}	$T_c=100^{\circ}\text{C}$ ($R_{25}=5\text{ k}\Omega$)		$493 \pm 5\%$		Ω
$B_{100/125}$	$R(T)=R_{100}\exp[B_{100/125}(1/T-1/T_{100})]$; $T[\text{K}]$		$3550 \pm 2\%$		K

Half-Bridge

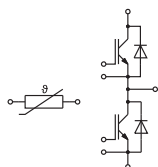
SKiiP 39GB12T7V1

Features*

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Remarks

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GB

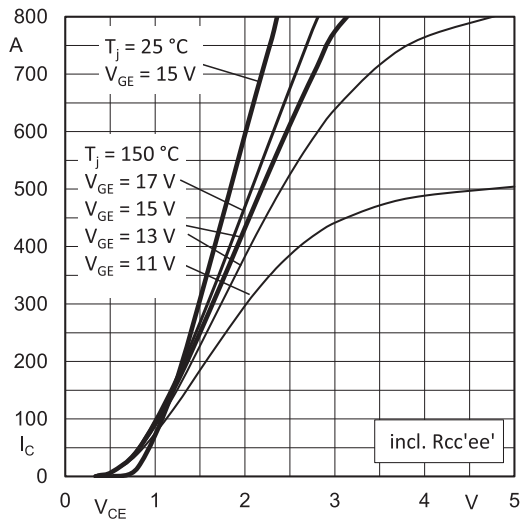


Fig. 1: Typ. output characteristic

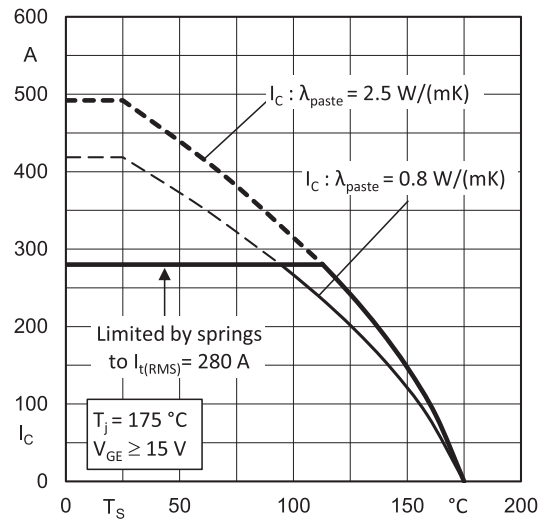


Fig. 2: Rated current vs. temperature $I_C = f(T_S)$

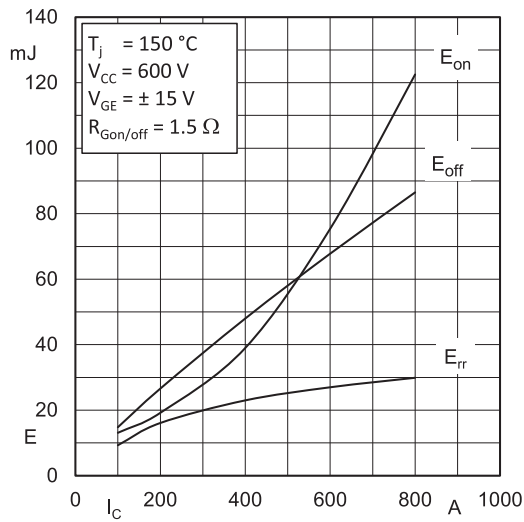


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

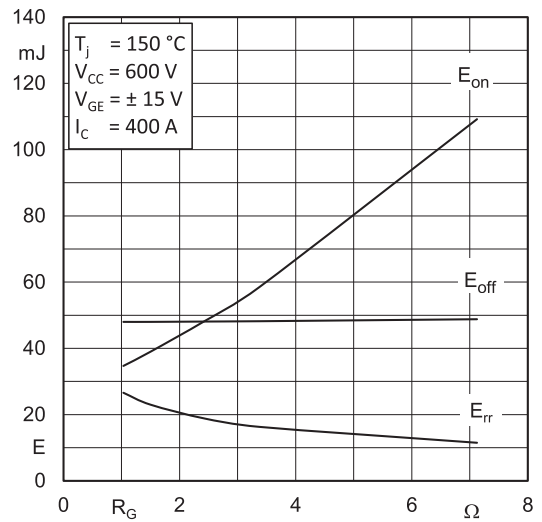


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

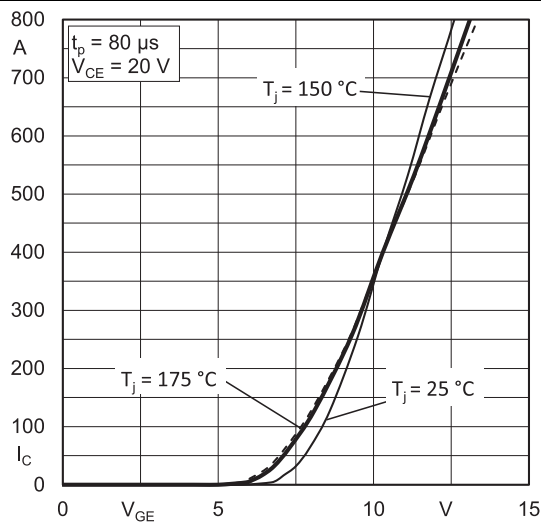


Fig. 5: Typ. transfer characteristic

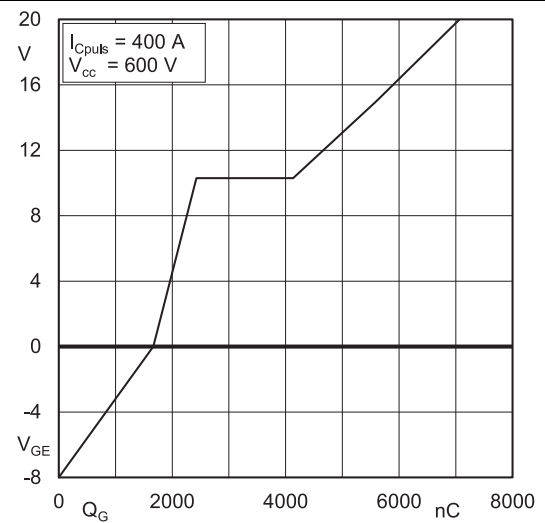


Fig. 6: Typ. gate charge characteristic

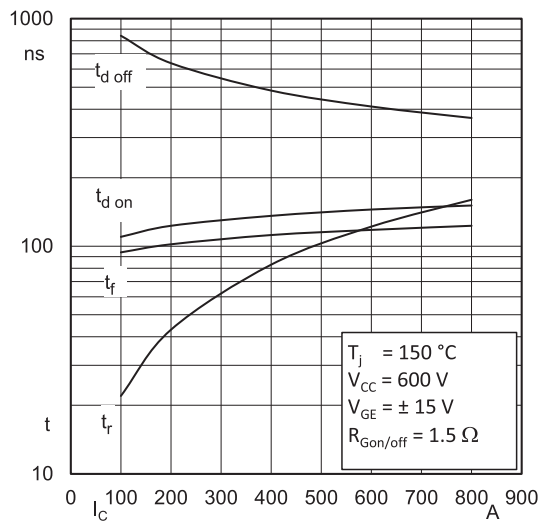


Fig. 7: Typ. switching times vs. I_C

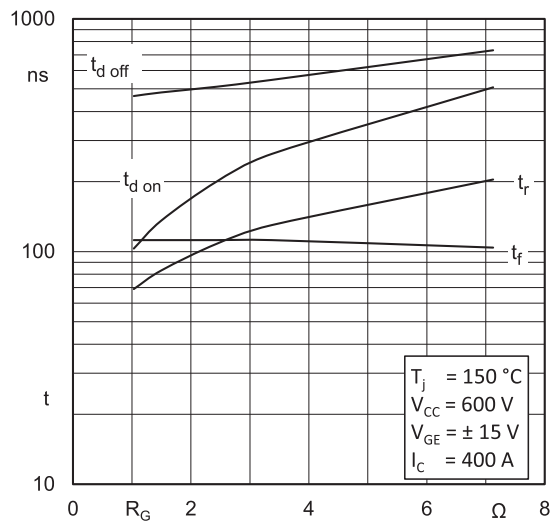


Fig. 8: Typ. switching times vs. gate resistor R_G

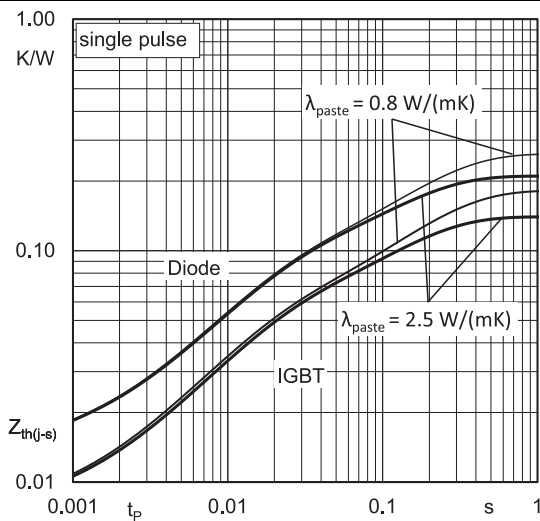


Fig. 9: Typ. transient thermal impedance

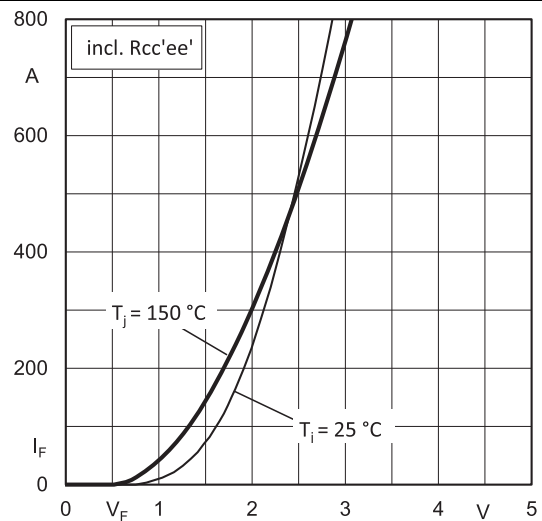


Fig. 10: Typ. CAL diode forward characteristic

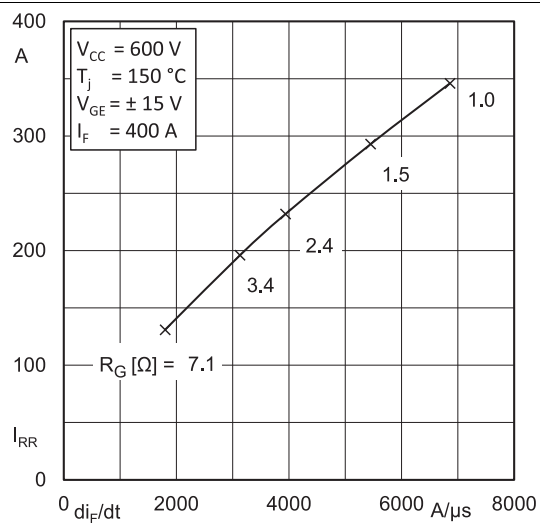


Fig. 11: Typ. CAL diode peak reverse recovery current

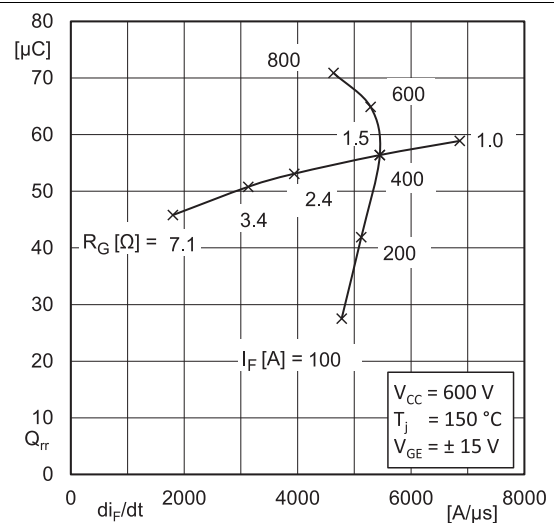
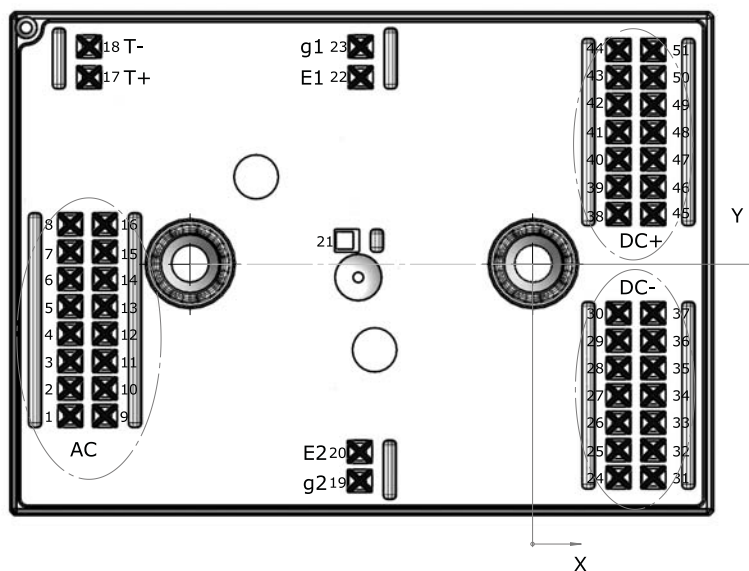


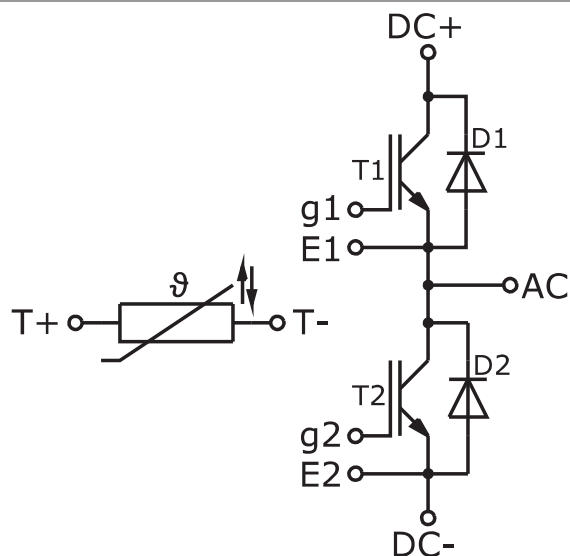
Fig. 12: Typ. CAL diode recovery charge

Pin out											
Pin	X	Y	Function	Pin	X	Y	Function	Pin	X	Y	Function
1	-53,98	-17,8	AC	18	-51,78	25,4	T-	35	13,98	-12,2	DC-
2	-53,98	-14,6	AC	19	-20,23	-25,4	g2	36	13,98	-9	DC-
3	-53,98	-11,4	AC	20	-20,23	-22	E2	37	13,98	-5,8	DC-
4	-53,98	-8,2	AC	21				38	9,93	5,8	DC+
5	-53,98	-5	AC	22	-20,13	21,8	E1	39	9,93	9	DC+
6	-53,98	-1,8	AC	23	-20,13	25,4	g1	40	9,93	12,2	DC+
7	-53,98	1,4	AC	24	9,93	-25	DC-	41	9,93	15,4	DC+
8	-53,98	4,6	AC	25	9,93	-21,8	DC-	42	9,93	18,6	DC+
9	-49,93	-17,8	AC	26	9,93	-18,6	DC-	43	9,93	21,8	DC+
10	-49,93	-14,6	AC	27	9,93	-15,4	DC-	44	9,93	25	DC+
11	-49,93	-11,4	AC	28	9,93	-12,2	DC-	45	13,98	5,8	DC+
12	-49,93	-8,2	AC	29	9,93	-9	DC-	46	13,98	9	DC+
13	-49,93	-5	AC	30	9,93	-5,8	DC-	47	13,98	12,2	DC+
14	-49,93	-1,8	AC	31	13,98	-25	DC-	48	13,98	15,4	DC+
15	-49,93	1,4	AC	32	13,98	-21,8	DC-	49	13,98	18,6	DC+
16	-49,93	4,6	AC	33	13,98	-18,6	DC-	50	13,98	21,8	DC+
17	-51,78	21,8	T+	34	13,98	-15,4	DC-	51	13,98	25	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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