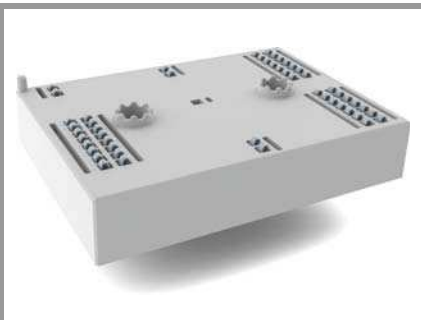


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MiniSKiiP® 3 Dual

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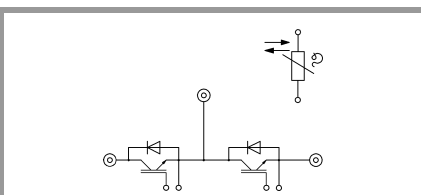
Features

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

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 $T_{j,op} = -40 \dots +150^\circ\text{C}$)



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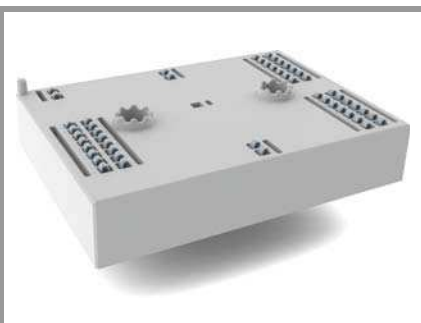
Absolute Maximum Ratings

Symbol	Conditions	Values	Unit	
Inverter - IGBT				
V_{CES}	$T_j = 25^\circ\text{C}$	1200	V	
I_C	$T_j = 175^\circ\text{C}$	$T_s = 25^\circ\text{C}$	329	A
		$T_s = 70^\circ\text{C}$	266	A
I_{Cnom}		300	A	
I_{CRM}	$I_{CRM} = 3 \times I_{Cnom}$	900	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			
Inverse - Diode				
I_F	$T_j = 175^\circ\text{C}$	$T_s = 25^\circ\text{C}$	267	A
		$T_s = 70^\circ\text{C}$	211	A
I_{Fnom}		300	A	
I_{FRM}	$I_{FRM} = 3 \times I_{Fnom}$	900	A	
I_{FSM}	10 ms, sin 180°, $T_j = 150^\circ\text{C}$	1485	A	
T_j		-40 ... 175	$^\circ\text{C}$	
Module				
$I_{t(RMS)}$	$T_{terminal} = 80^\circ\text{C}$, 20 A per spring	280	A	
T_{stg}		-40 ... 125	$^\circ\text{C}$	
V_{isol}	AC sinus 50 Hz, t = 1 min	2500	V	

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Inverter - IGBT					
$V_{CE(sat)}$	$I_C = 300\text{ A}$ $V_{GE} = 15\text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$	1.85	2.10	V
		$T_j = 150^\circ\text{C}$	2.25	2.45	V
V_{CE0}	chiplevel	$T_j = 25^\circ\text{C}$	0.8	0.9	V
		$T_j = 150^\circ\text{C}$	0.7	0.8	V
r_{CE}	$V_{GE} = 15\text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$	3.5	4	m Ω
		$T_j = 150^\circ\text{C}$	5.2	5.5	m Ω
$V_{GE(th)}$	$V_{GE} = V_{CE}$, $I_C = 12\text{ mA}$	5	5.8	6.5	V
I_{CES}	$V_{GE} = 0\text{ V}$ $V_{CE} = 1200\text{ V}$	$T_j = 25^\circ\text{C}$	0.1	0.3	mA
					mA
C_{ies}	$V_{CE} = 25\text{ V}$		17.60		nF
C_{oes}	$V_{GE} = 0\text{ V}$		1.16		nF
C_{res}			0.94		nF
Q_G	- 8 V...+ 15 V		1700		nC
R_{Gint}	$T_j = 25^\circ\text{C}$		2.5		Ω
$t_{d(on)}$	$V_{CC} = 600\text{ V}$ $I_C = 300\text{ A}$	$T_j = 150^\circ\text{C}$	180		ns
t_r	$R_{Gon} = 2\ \Omega$	$T_j = 150^\circ\text{C}$	51		ns
E_{on}	$R_{Goff} = 2\ \Omega$	$T_j = 150^\circ\text{C}$	19.1		mJ
$t_{d(off)}$	$di/dt_{on} = 6995\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$	455		ns
t_f	$di/dt_{off} = 3030\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$	96		ns
E_{off}	$du/dt = 5280\text{ V}/\mu\text{s}$ $V_{GE} = +15/-15\text{ V}$ $L_s = 25\text{ nH}$	$T_j = 150^\circ\text{C}$	34.6		mJ
$R_{th(j-s)}$	per IGBT, $\lambda_{paste} = 0.8\text{ W/K}^*\text{m}$		0.17		K/W

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Features

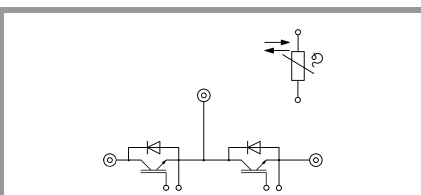
- Trench 4 IGBTs
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Remarks

Max. case temperature limited to $T_C = 125^\circ\text{C}$

Product reliability results valid for $T_j \leq 150^\circ\text{C}$ (recommended)
 $T_{j,op} = -40 \dots +150^\circ\text{C}$

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse - Diode						
$V_F = V_{EC}$	$I_F = 300\text{ A}$ $V_{GE} = 0\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$		2.2	2.5	V
		$T_j = 150^\circ\text{C}$		2.2	2.5	V
V_{F0}	chipelevel	$T_j = 25^\circ\text{C}$		1.3	1.5	V
		$T_j = 150^\circ\text{C}$		0.9	1.1	V
r_F	chipelevel	$T_j = 25^\circ\text{C}$		3	3.4	m Ω
		$T_j = 150^\circ\text{C}$		4.2	4.6	m Ω
I_{RRM}	$I_F = 300\text{ A}$	$T_j = 150^\circ\text{C}$		353		A
Q_{rr}	$di/dt_{off} = 7005\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		49		μC
E_{rr}	$V_{GE} = -15\text{ V}$ $V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$		21.5		mJ
$R_{th(j-s)}$	per Diode, $\lambda_{paste} = 0.8\text{ W/K}\cdot\text{m}$			0.26		K/W
Module						
L_{CE}				15		nH
M_s	to heat sink		2		2.5	Nm
w				76		g
Temperature Sensor						
R_{100}	$T_c = 100^\circ\text{C}$ ($R_{25} = 5\text{ k}\Omega$)			$493 \pm 5\%$		Ω
$B_{25/85}$	$R(T) = R_{25} \cdot \exp[B_{25/85} \cdot (1/T - 1/298)]$, [T]=K			3420		K



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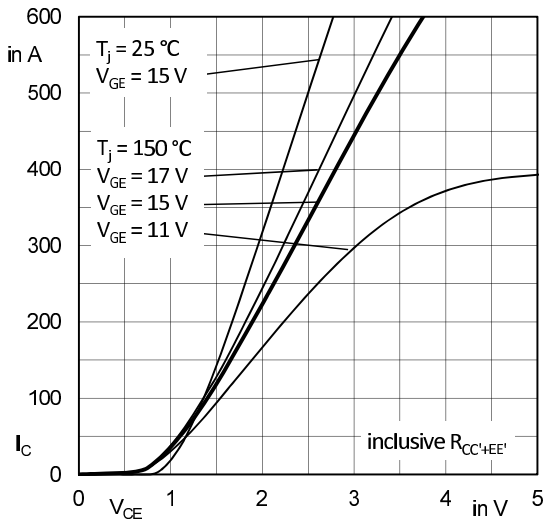


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

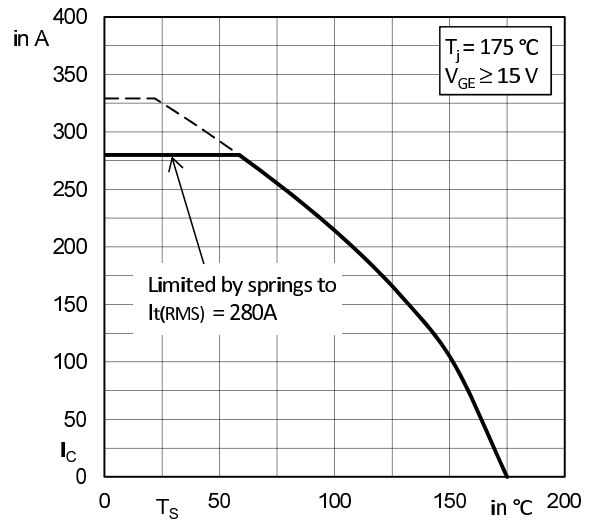


Fig. 2: Rated current vs. temperature $I_C = f(T_S)$

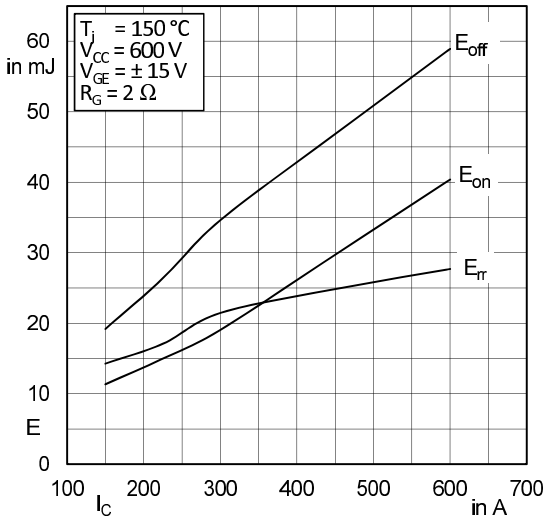


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

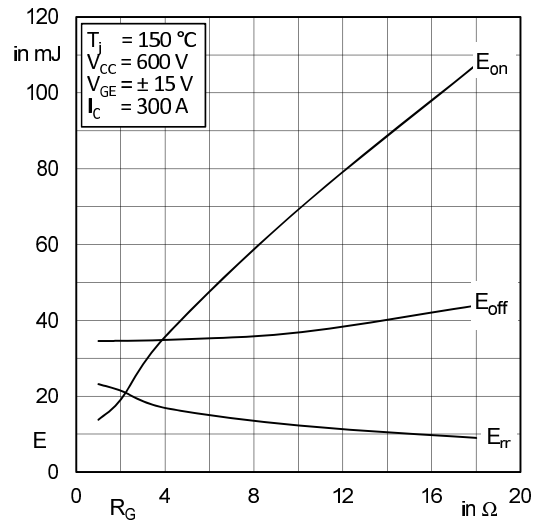


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

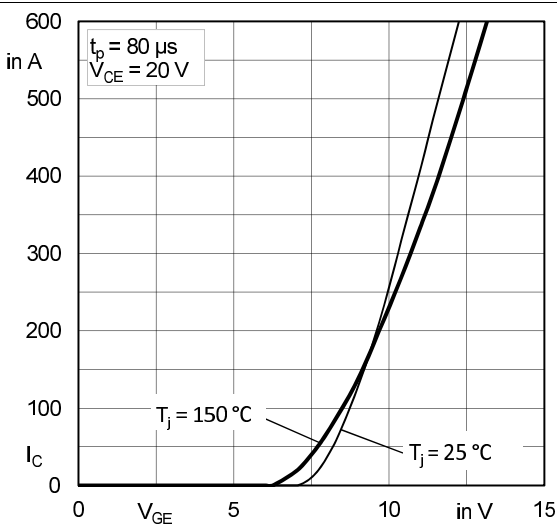


Fig. 5: Typ. transfer characteristic

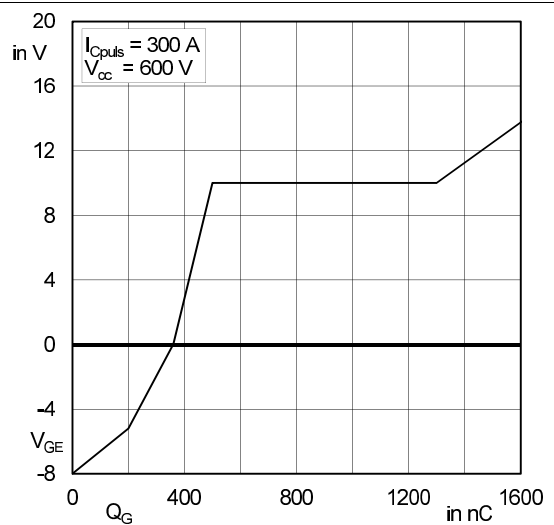


Fig. 6: Typ. gate charge characteristic

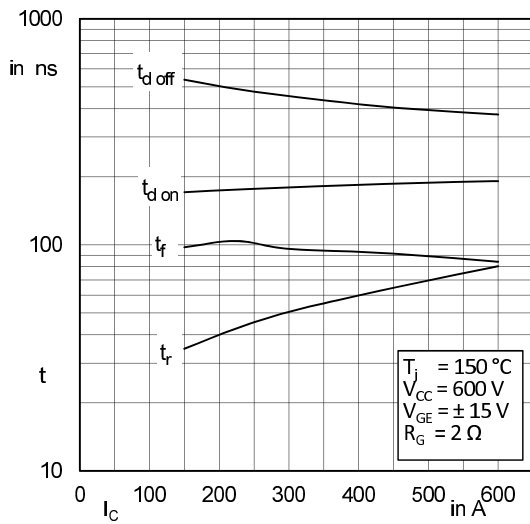


Fig. 7: Typ. switching times vs. I_c

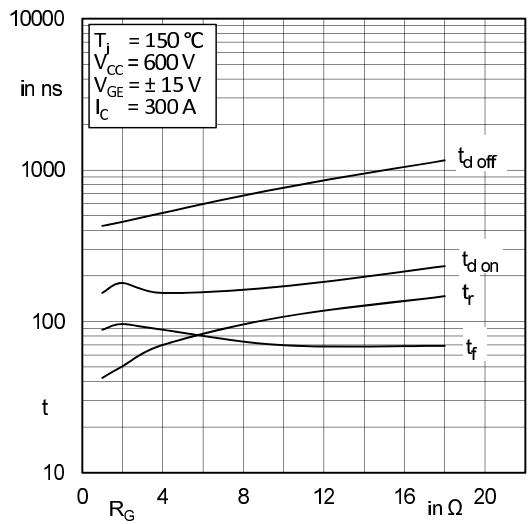


Fig. 8: Typ. switching times vs. gate resistor R_G

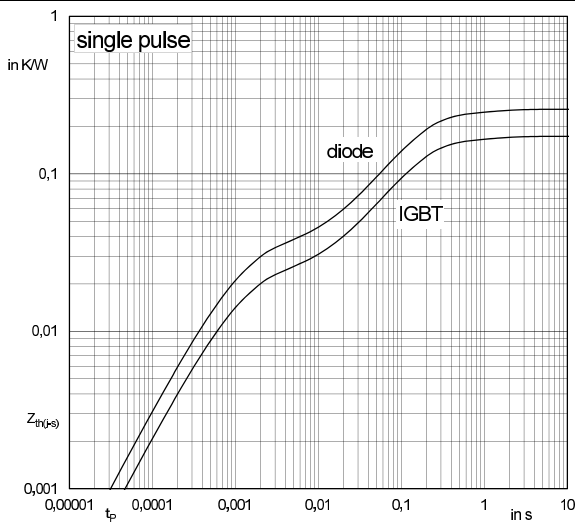


Fig. 9: Transient thermal impedance of IGBT and Diode

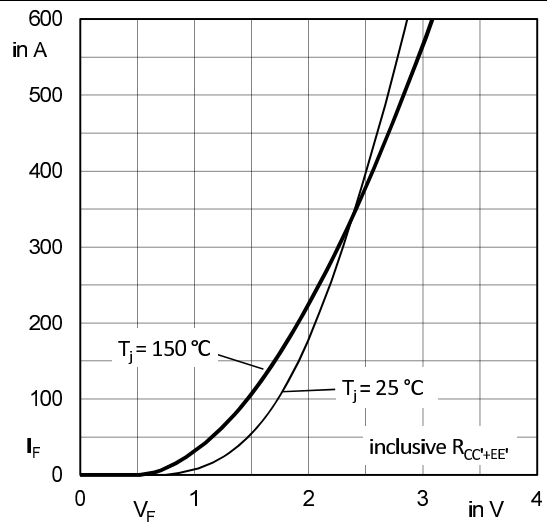


Fig. 10: CAL diode forward characteristic

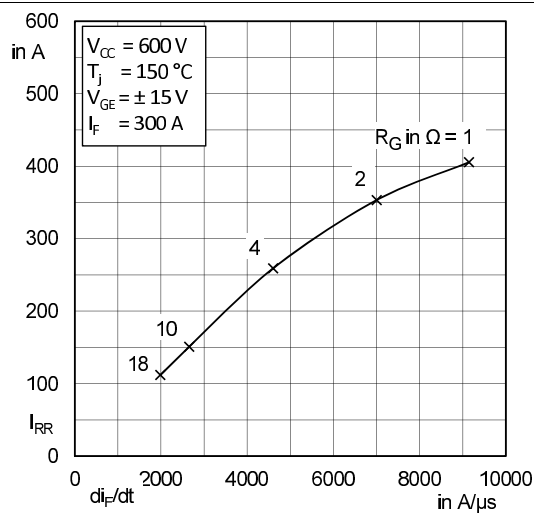


Fig. 11: Typ. CAL diode peak reverse recovery current

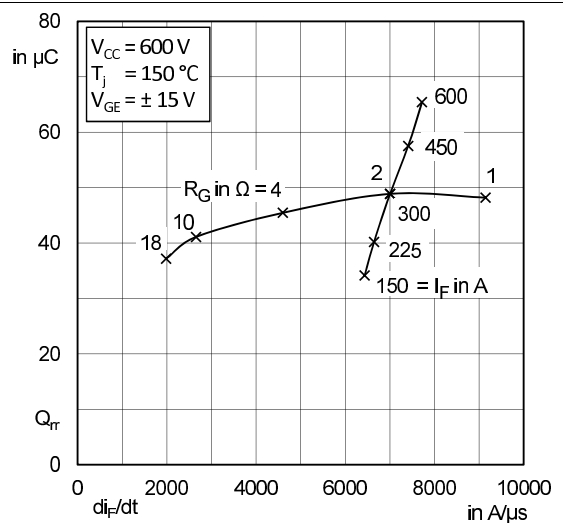
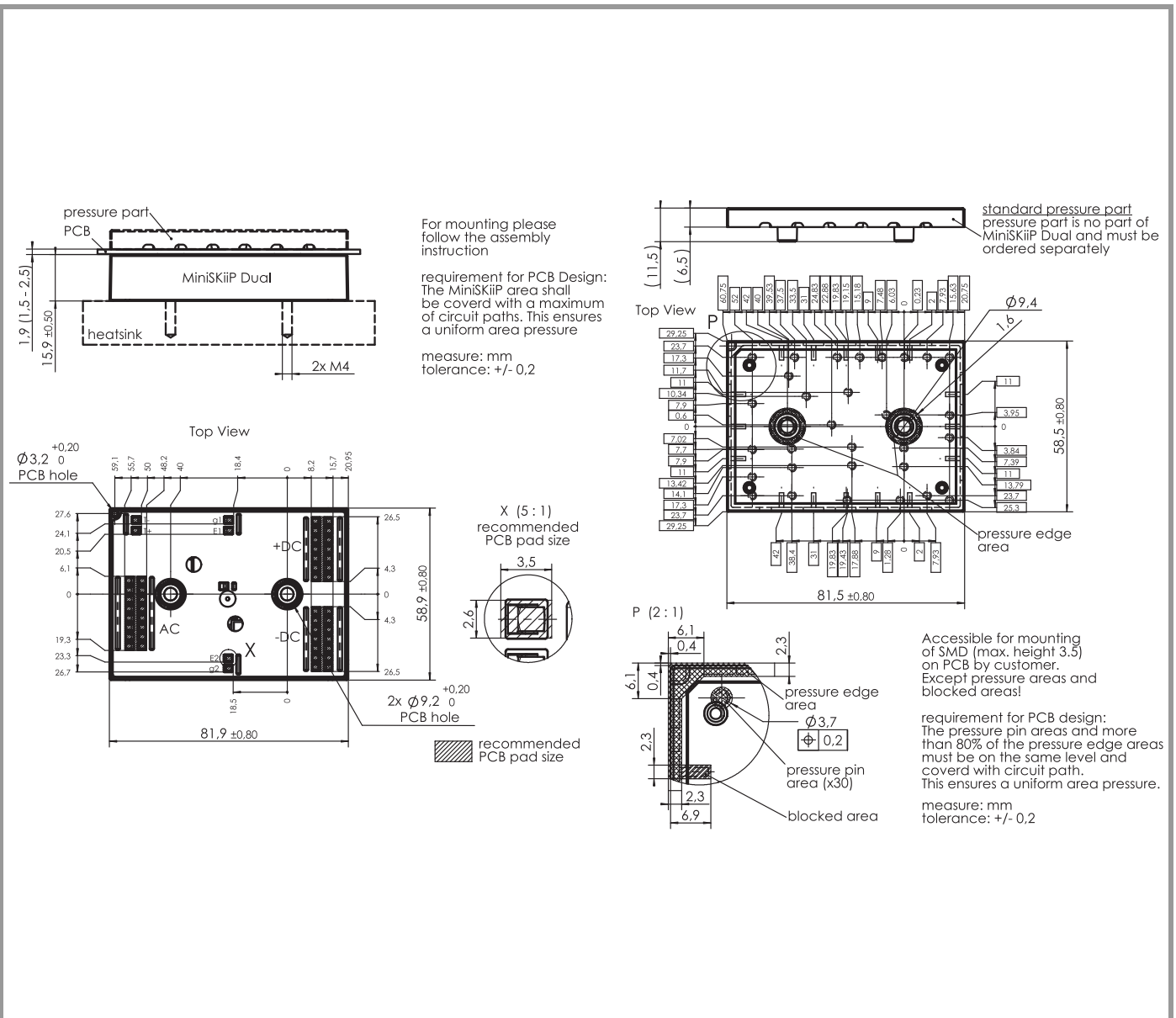
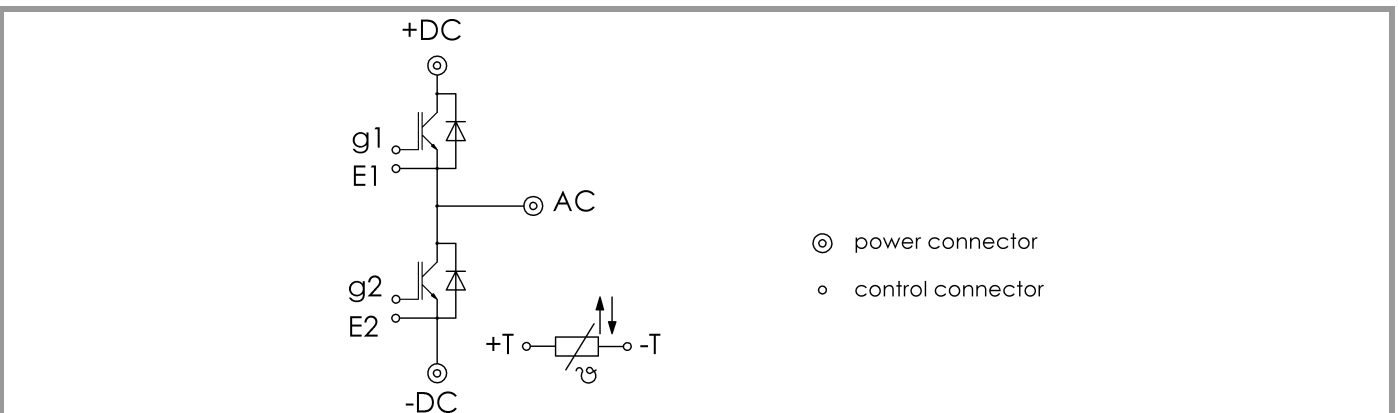


Fig. 12: Typ. CAL diode recovery charge

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pinout, dimensions



pinout

This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX

* The specifications of our components may not be considered as an assurance of component characteristics. Components have to be tested for the respective application. Adjustments may be necessary. The use of SEMIKRON products in life support appliances and systems is subject to prior specification and written approval by SEMIKRON. We therefore strongly recommend prior consultation of our staff.