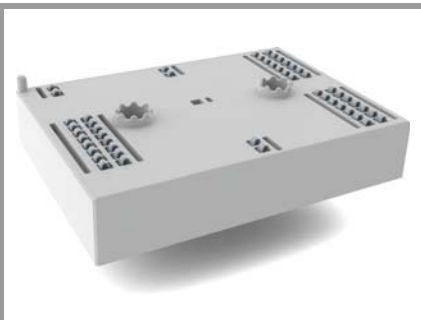


# SKiiP38GB12E4V1



MiniSKiiP® 3 Dual

## SKiiP38GB12E4V1

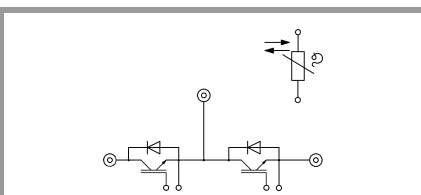
### Features

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

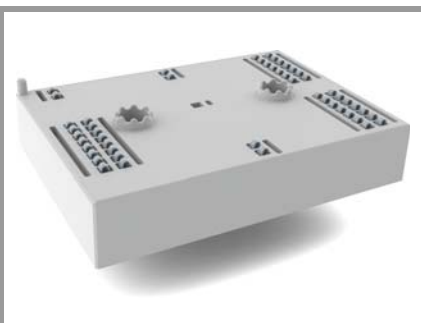


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Absolute Maximum Ratings				
Symbol	Conditions	Values	Unit	
<b>Inverter - IGBT</b>				
$V_{CES}$	$T_j = 25^\circ\text{C}$	1200	V	
$I_C$	$T_j = 175^\circ\text{C}$	$T_s = 25^\circ\text{C}$	329	A
		$T_s = 70^\circ\text{C}$	266	A
$I_{Cnom}$		300	A	
$I_{CRM}$	$I_{CRM} = 3 \times I_{Cnom}$	900	A	
$V_{GES}$		-20 ... 20	V	
$t_{psc}$	$V_{CC} = 800\text{ V}$	$T_j = 150^\circ\text{C}$	10	$\mu\text{s}$
	$V_{GE} \leq 15\text{ V}$			
	$V_{CES} \leq 1200\text{ V}$			
$T_j$		-40 ... 175	$^\circ\text{C}$	
<b>Inverse - Diode</b>				
$I_F$	$T_j = 175^\circ\text{C}$	$T_s = 25^\circ\text{C}$	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	$^\circ\text{C}$	
<b>Module</b>				
$I_{t(RMS)}$	$T_{terminal} = 80^\circ\text{C}$ , 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
<b>Inverter - IGBT</b>					
$V_{CE(sat)}$	$I_C = 300\text{ A}$ $V_{GE} = 15\text{ V}$ 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	$T_j = 25^\circ\text{C}$	0.8	0.9	V
		$T_j = 150^\circ\text{C}$	0.7	0.8	V
$r_{CE}$	$V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$	3.5	4	m $\Omega$
		$T_j = 150^\circ\text{C}$	5.2	5.5	m $\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}$ , $I_C = 12\text{ mA}$	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		$\Omega$
$t_{d(on)}$	$V_{CC} = 600\text{ V}$ $I_C = 300\text{ A}$	$T_j = 150^\circ\text{C}$	180		ns
$t_r$	$R_{Gon} = 2\ \Omega$ $R_{Goff} = 2\ \Omega$	$T_j = 150^\circ\text{C}$	51		ns
		$T_j = 150^\circ\text{C}$	19.1		mJ
$E_{on}$		$T_j = 150^\circ\text{C}$	19.1		mJ
$t_{d(off)}$	$di/dt_{on} = 6995\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$	455		ns
$t_f$	$di/dt_{off} = 3030\text{ A}/\mu\text{s}$ $du/dt = 5280\text{ V}/\mu\text{s}$	$T_j = 150^\circ\text{C}$	96		ns
		$T_j = 150^\circ\text{C}$	34.6		mJ
$E_{off}$	$V_{GE} = +15/-15\text{ V}$ $L_s = 25\text{ nH}$	$T_j = 150^\circ\text{C}$	34.6		mJ
$R_{th(j-s)}$	per IGBT, $\lambda_{paste} = 0.8\text{ W/K}\cdot\text{m}$		0.17		K/W

# SKiiP38GB12E4V1



MiniSKiiP® 3 Dual

## SKiiP38GB12E4V1

### Features

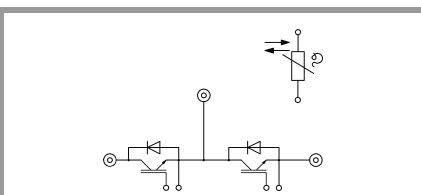
- Trench 4 IGBTs
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### Remarks

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



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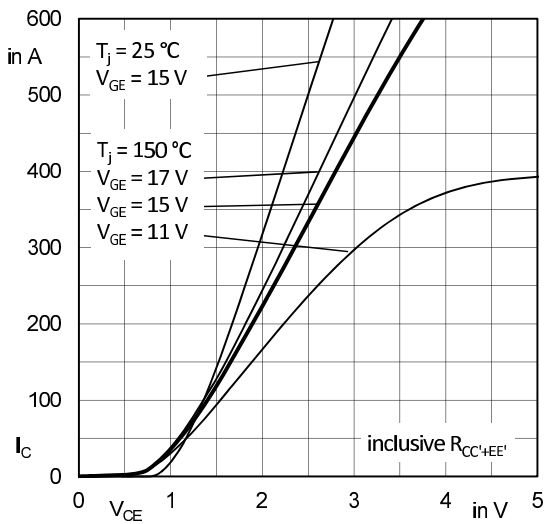


Fig. 1: Typ. output characteristic, inclusive  $R_{CC'+EE'}$

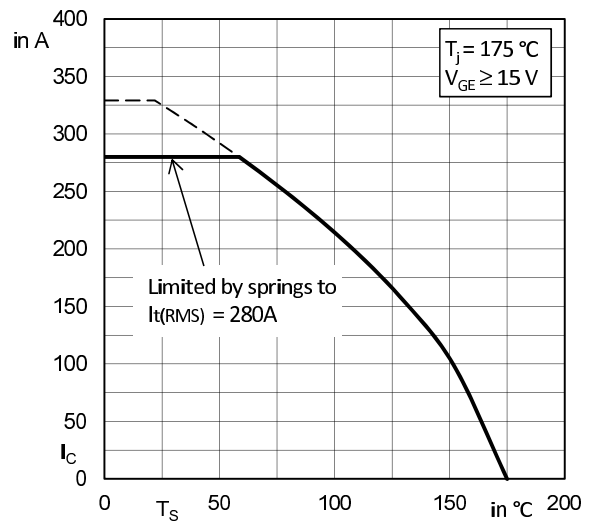


Fig. 2: Rated current vs. temperature  $I_C = f(T_S)$

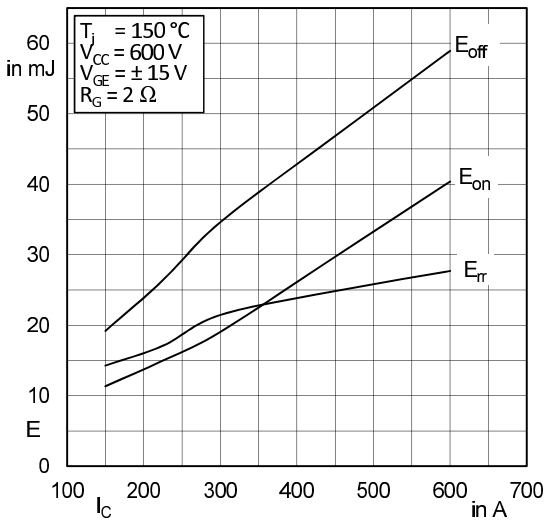


Fig. 3: Typ. turn-on /-off energy =  $f(I_C)$

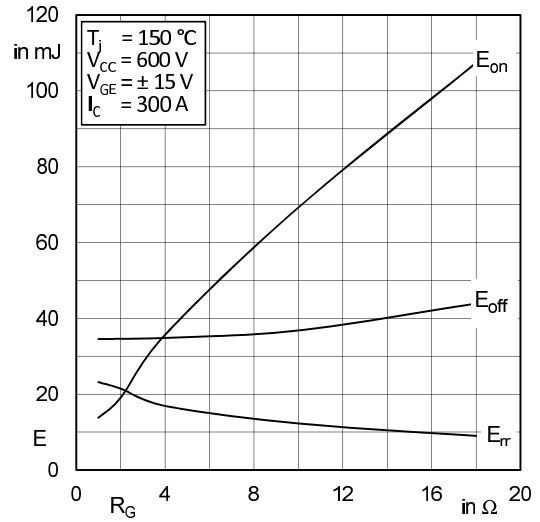


Fig. 4: Typ. turn-on /-off energy =  $f(R_G)$

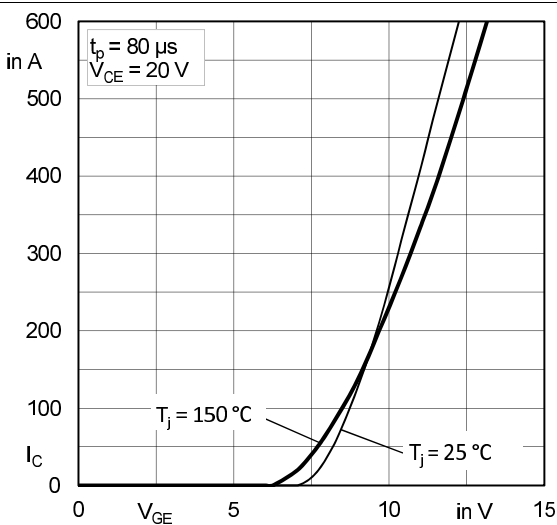


Fig. 5: Typ. transfer characteristic

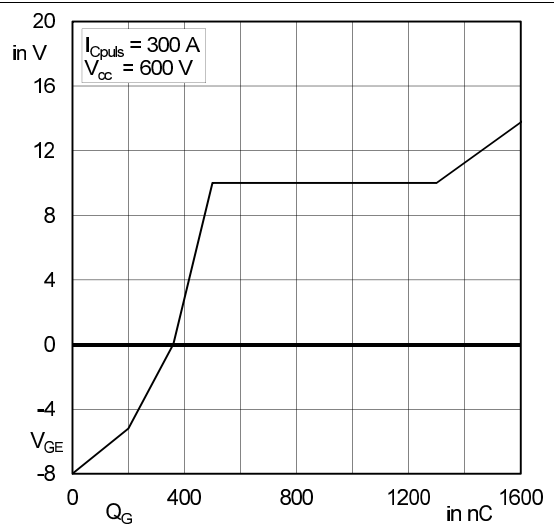


Fig. 6: Typ. gate charge characteristic

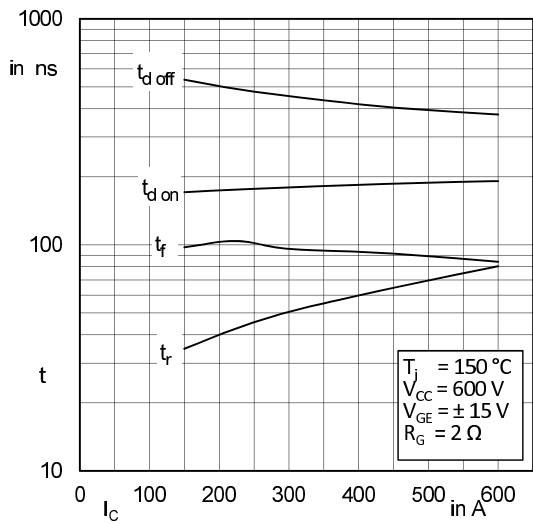


Fig. 7: Typ. switching times vs.  $I_c$

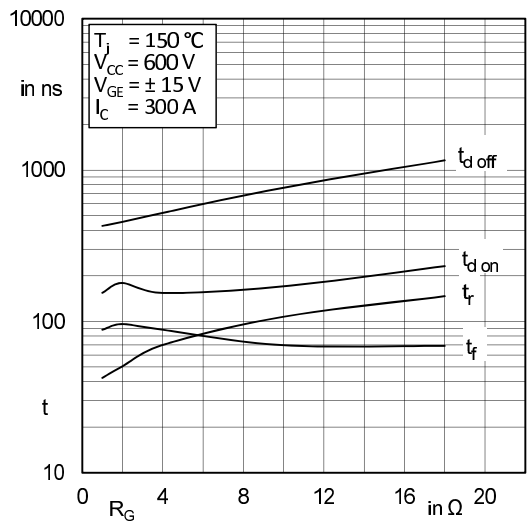


Fig. 8: Typ. switching times vs. gate resistor  $R_G$

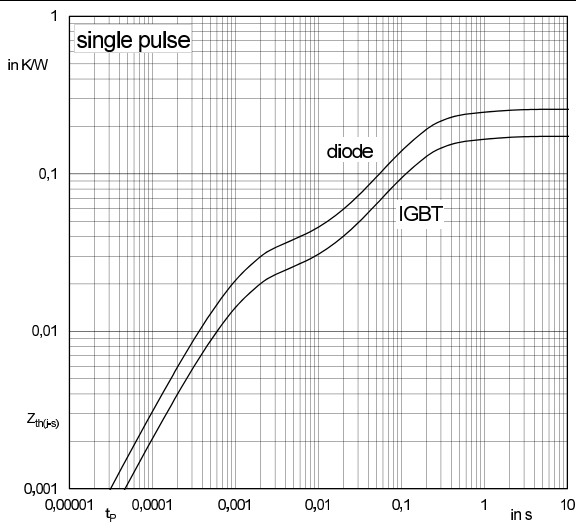


Fig. 9: Transient thermal impedance of IGBT and Diode

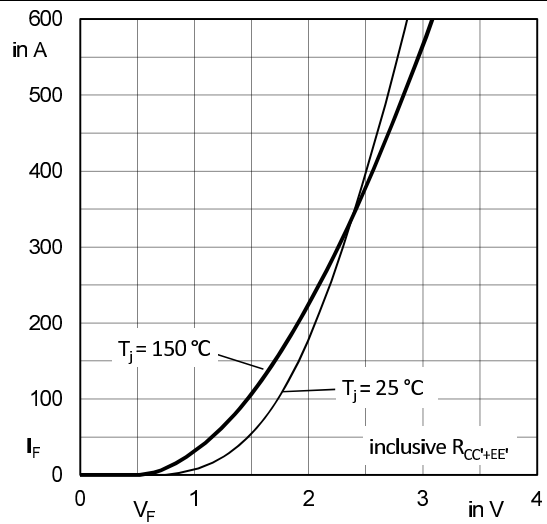


Fig. 10: CAL diode forward characteristic

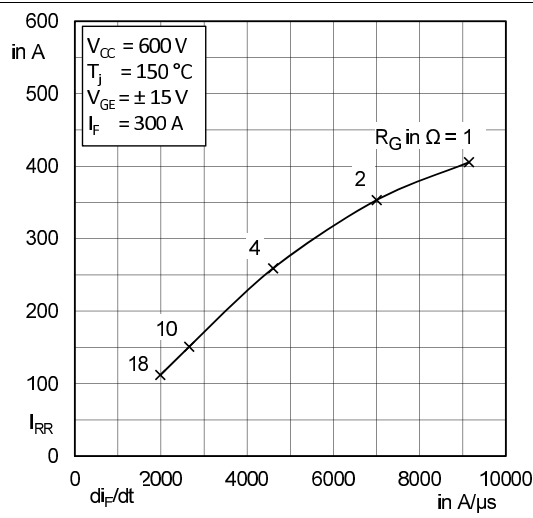


Fig. 11: Typ. CAL diode peak reverse recovery current

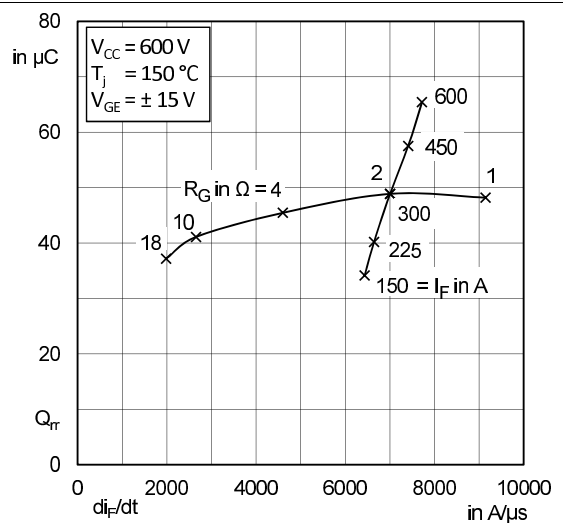
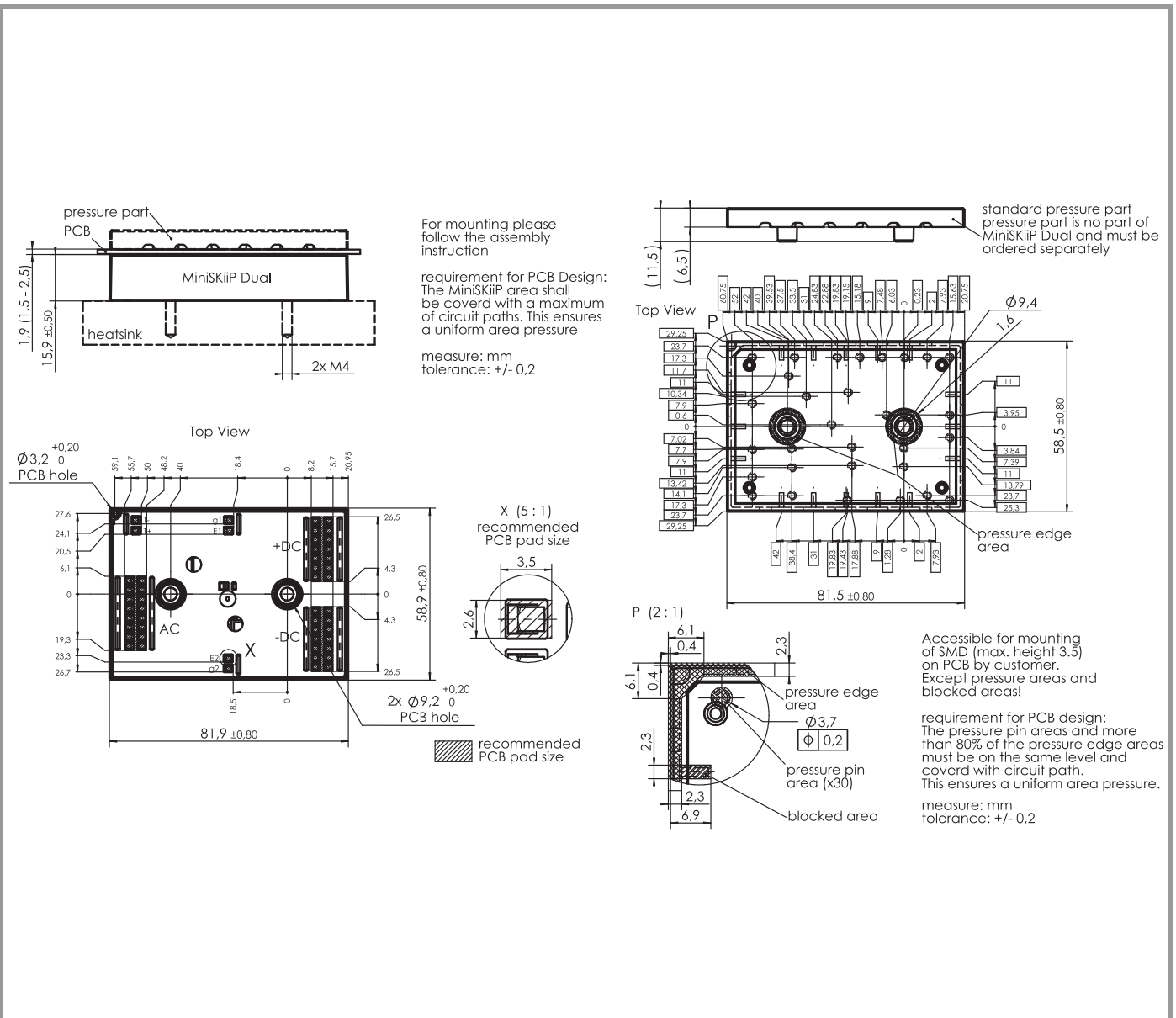
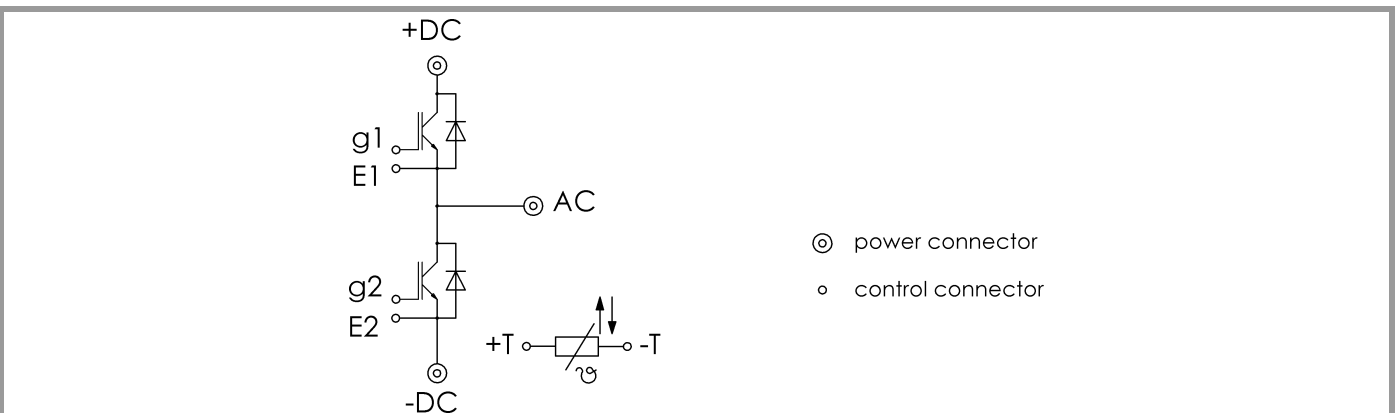


Fig. 12: Typ. CAL diode recovery charge

# SKiIP38GB12E4V1



## 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.