

SKiiP 11AC12T4V1



MiniSKiiP® 1

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Features

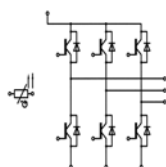
- Trench 4 IGBT's
- Robust and soft freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognised file no. E63532

Typical Applications*

- Inverter up to 8 kVA
- Typical motor power 4 kW

Remarks

- V_{CEsat} , V_F = chip level value
- Case temp. limited to $T_C = 125^\circ\text{C}$ max. (for baseplateless modules $T_C = T_S$)
- product rel. results valid for $T_j \leq 150$ (recomm. $T_{op} = -40 \dots +150^\circ\text{C}$)



AC

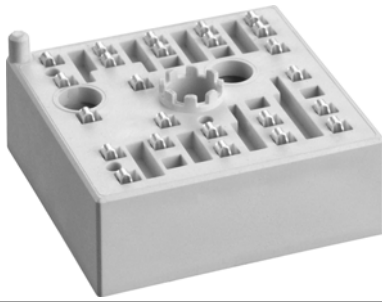
Absolute Maximum Ratings

Symbol	Conditions	Values	Unit
Inverter - IGBT			
V_{CES}	$T_j = 25^\circ\text{C}$	1200	V
I_C	$T_j = 175^\circ\text{C}$	$T_s = 25^\circ\text{C}$	12
		$T_s = 70^\circ\text{C}$	12
I_{Cnom}		8	A
I_{CRM}	$I_{CRM} = 3 \times I_{Cnom}$	24	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
T_j		-40 ... 175	$^\circ\text{C}$
Inverse - Diode			
I_F	$T_j = 175^\circ\text{C}$	$T_s = 25^\circ\text{C}$	15
		$T_s = 70^\circ\text{C}$	12
I_{Fnom}		8	A
I_{FRM}	$I_{FRM} = 3 \times I_{Fnom}$	24	A
I_{FSM}	10 ms, sin 180° , $T_j = 150^\circ\text{C}$	36	A
T_j		-40 ... 175	$^\circ\text{C}$
Module			
$I_{t(RMS)}$	$T_{terminal} = 80^\circ\text{C}$, 20A per spring	20	A
T_{stg}		-40 ... 125	$^\circ\text{C}$
V_{isol}	AC sinus 50Hz, $t = 1\text{ min}$	2500	V

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Inverter - IGBT					
$V_{CE(sat)}$	$I_C = 8\text{ A}$ $V_{GE} = 15\text{ V}$ 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}		$T_j = 25^\circ\text{C}$	0.8	0.9	V
		$T_j = 150^\circ\text{C}$	0.7	0.8	V
r_{CE}	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$	131	150	m Ω
		$T_j = 150^\circ\text{C}$	194	206	m Ω
$V_{GE(th)}$	$V_{GE} = V_{CE}$, $I_C = 1\text{ mA}$	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}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	0.49		nF
C_{oes}		$f = 1\text{ MHz}$	0.05		nF
C_{res}		$f = 1\text{ MHz}$	0.03		nF
Q_G	- 8 V...+ 15 V		45		nC
R_{Gint}	$T_j = 25^\circ\text{C}$		0.00		Ω
$t_{d(on)}$	$V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$	32		ns
t_r	$I_C = 8\text{ A}$	$T_j = 150^\circ\text{C}$	28		ns
E_{on}	$R_{G on} = 56\text{ }\Omega$	$T_j = 150^\circ\text{C}$	0.87		mJ
$t_{d(off)}$	$R_{G off} = 56\text{ }\Omega$ $di/dt_{on} = 280\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$	300		ns
t_f	$di/dt_{off} = 90\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$	65		ns
E_{off}	$V_{GE} = +15/-15\text{ V}$	$T_j = 150^\circ\text{C}$	0.75		mJ
$R_{th(j-s)}$	per IGBT		1.84		K/W

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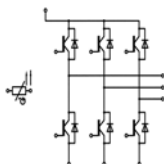
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- Case temp. limited to $T_C = 125^\circ\text{C}$ max. (for baseplateless modules $T_C = T_S$)
- product rel. results valid for $T_j \leq 150$ (recomm. $T_{op} = -40 \dots +150^\circ\text{C}$)

Characteristics					
Symbol	Conditions		min.	typ.	max. Unit
Inverse - Diode					
$V_F = V_{EC}$	$I_F = 8 \text{ A}$	$T_j = 25^\circ\text{C}$		2.3	2.6 V
	$V_{GE} = 0 \text{ V}$ chiplevel	$T_j = 150^\circ\text{C}$		2.4	2.7 V
V_{F0}		$T_j = 25^\circ\text{C}$		1.3	1.5 V
		$T_j = 150^\circ\text{C}$		0.9	1.1 V
r_F		$T_j = 25^\circ\text{C}$		129	144 mΩ
		$T_j = 150^\circ\text{C}$		181	198 mΩ
I_{RRM}	$I_F = 8 \text{ A}$	$T_j = 150^\circ\text{C}$		7.7	A
Q_{rr}	$di/dt_{off} = 350 \text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		1.3	μC
E_{rr}	$V_{GE} = -15 \text{ V}$	$T_j = 150^\circ\text{C}$		0.53	mJ
	$V_{CC} = 600 \text{ V}$				
$R_{th(j-s)}$	per Diode			2.53	K/W
Module					
M_s	to heat sink		2		2.5 Nm
w				35	g
Temperatur Sensor					
R_{100}	$T_C = 100^\circ\text{C}$ ($R_{25} = 1000\Omega$)			$1670 \pm 3\%$	Ω
$R(T)$	$R(T) = 1000\Omega [1 + A(T - 25^\circ\text{C}) + B(T - 25^\circ\text{C})^2]$], $A = 7.635 \cdot 10^{-3} \text{ }^\circ\text{C}^{-1}$, $B = 1.731 \cdot 10^{-5} \text{ }^\circ\text{C}^{-2}$				



AC

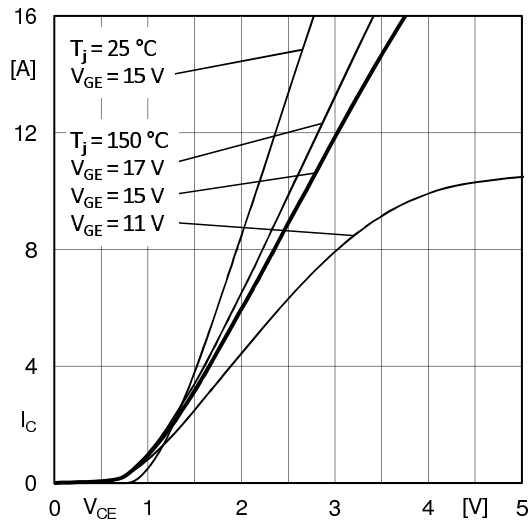


Fig. 1: Typ. output characteristic, inclusive $R_{CC} + EE'$

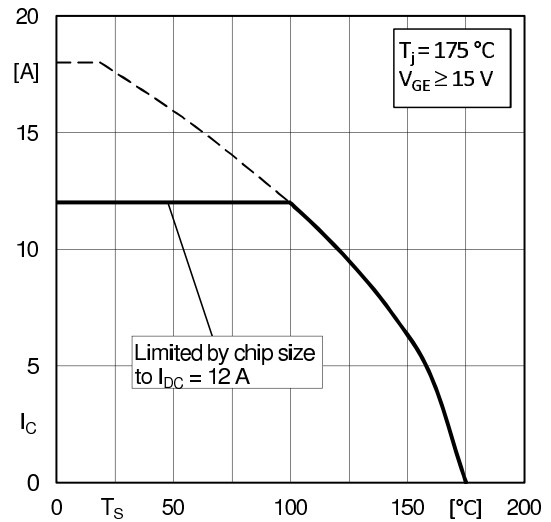


Fig. 2: Rated current vs. temperature $I_C = f(T_S)$

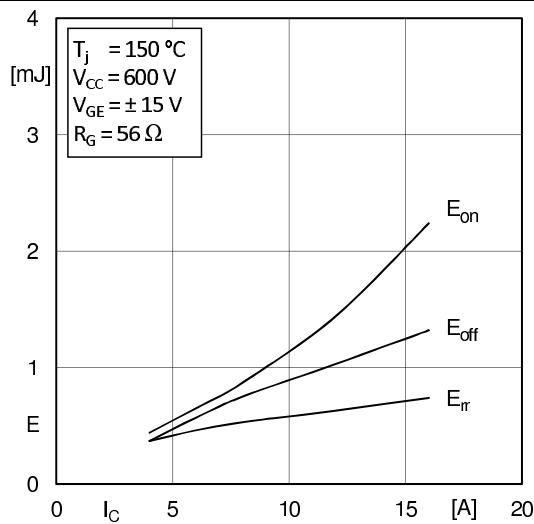


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

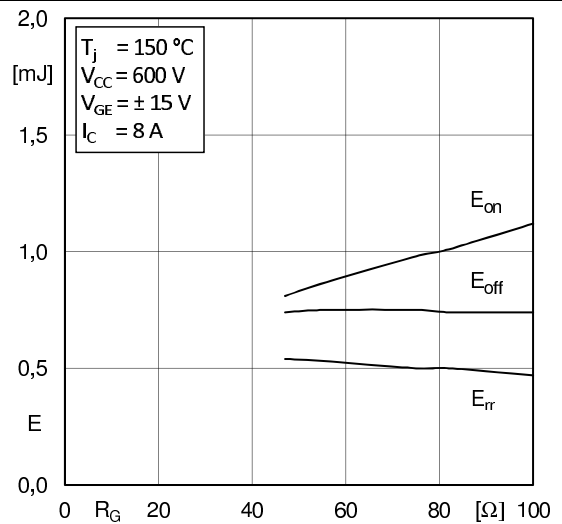


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

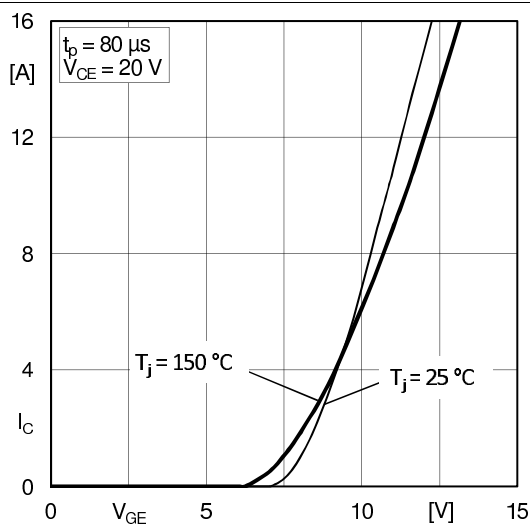


Fig. 5: Typ. transfer characteristic

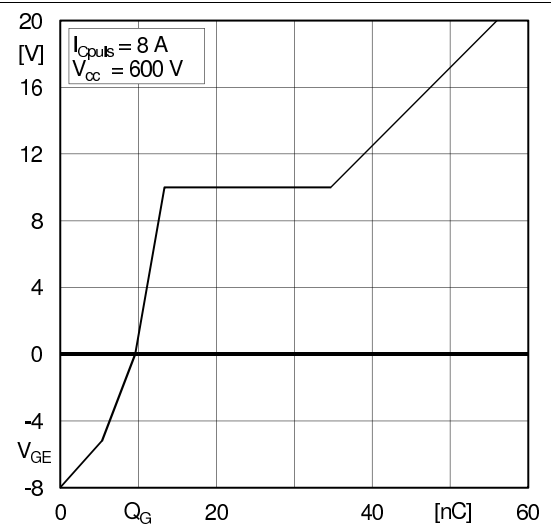


Fig. 6: Typ. gate charge characteristic

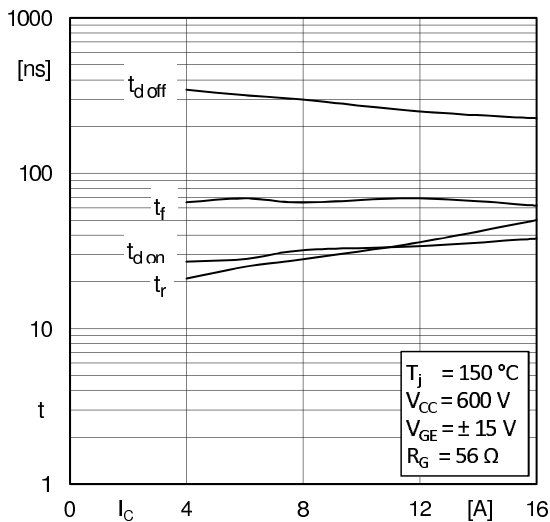


Fig. 7: Typ. switching times vs. I_C

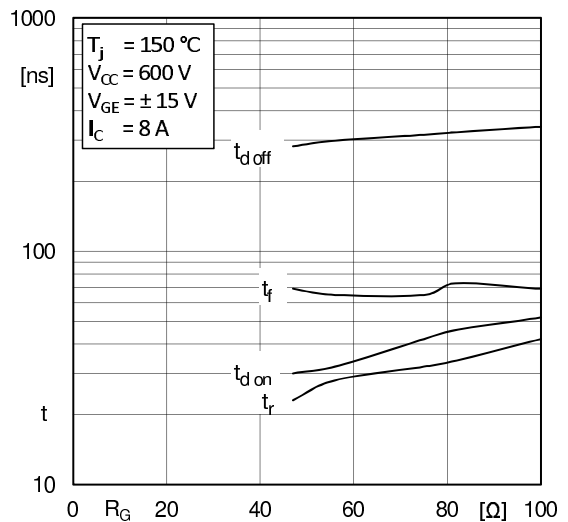


Fig. 8: Typ. switching times vs. gate resistor R_G

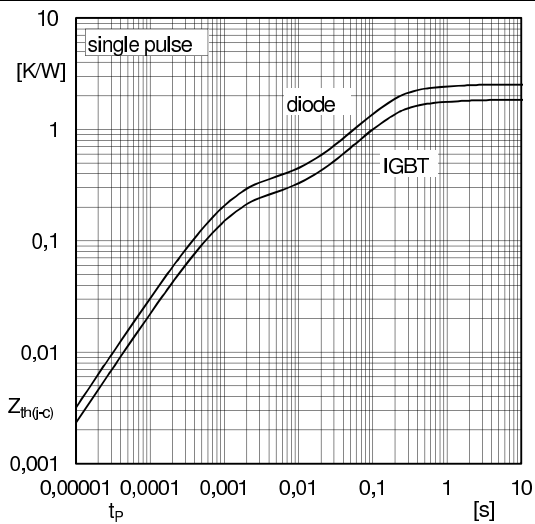


Fig. 9: Transient thermal impedance of IGBT and Diode

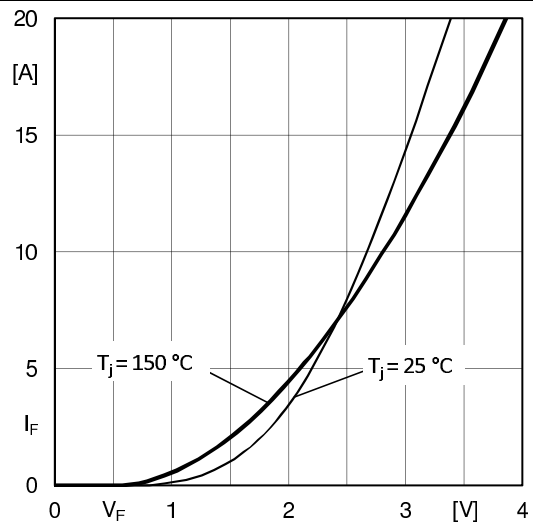


Fig. 10: CAL diode forward characteristic

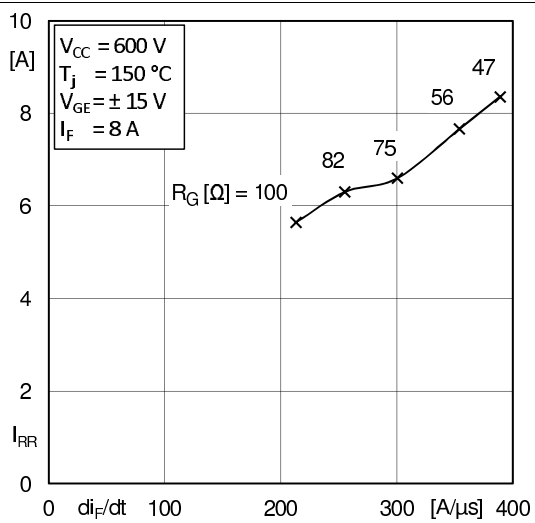


Fig. 11: Typ. CAL diode peak reverse recovery current

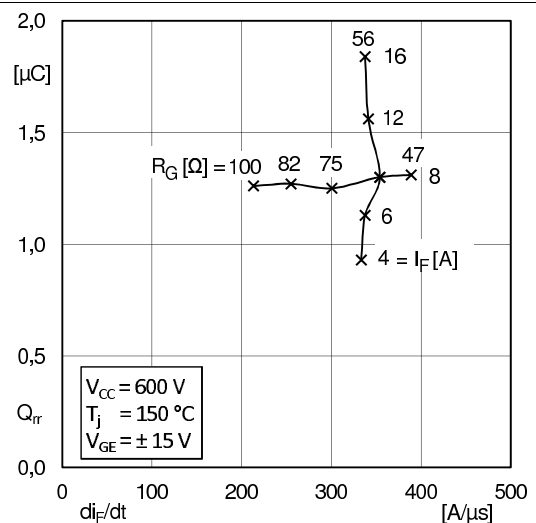
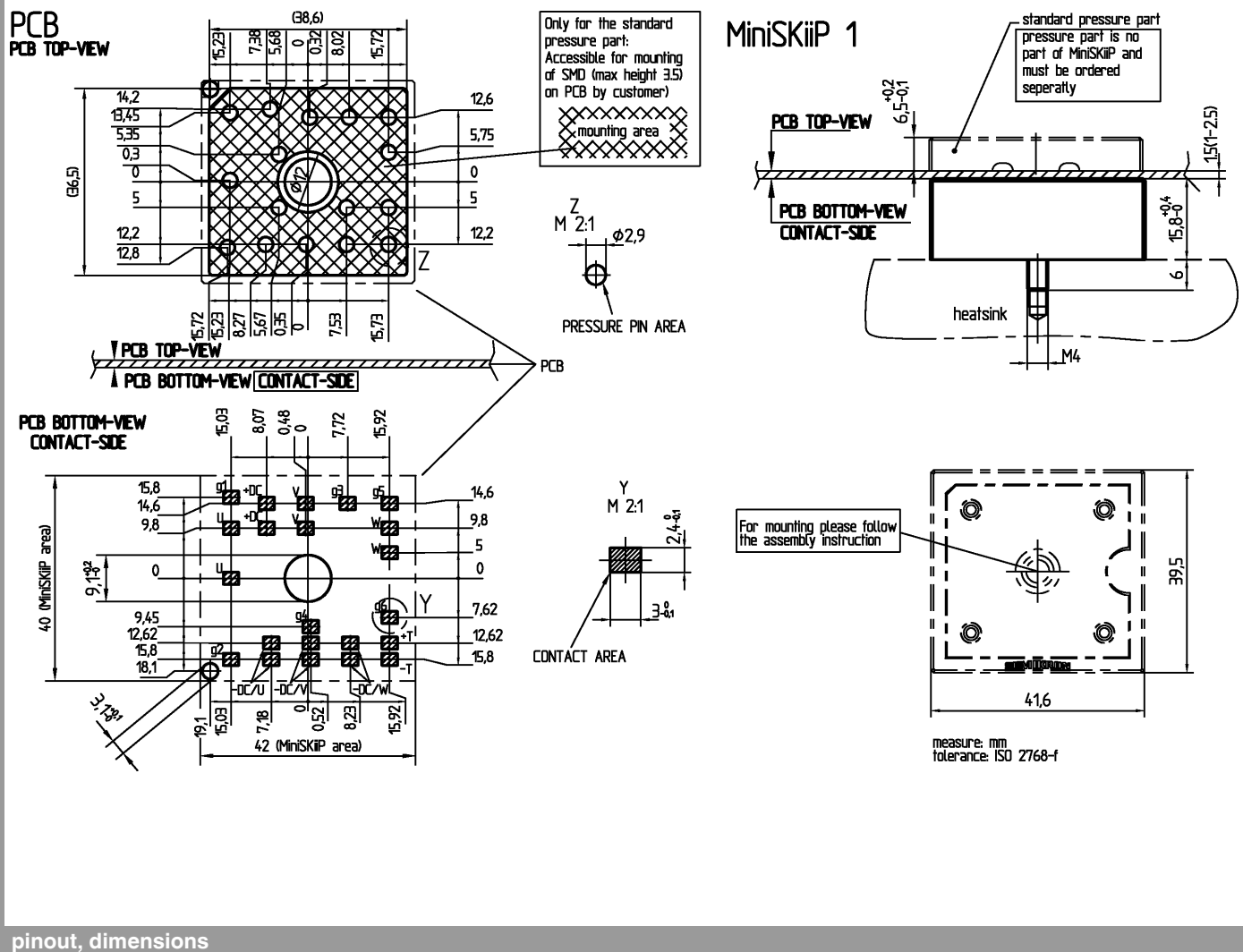
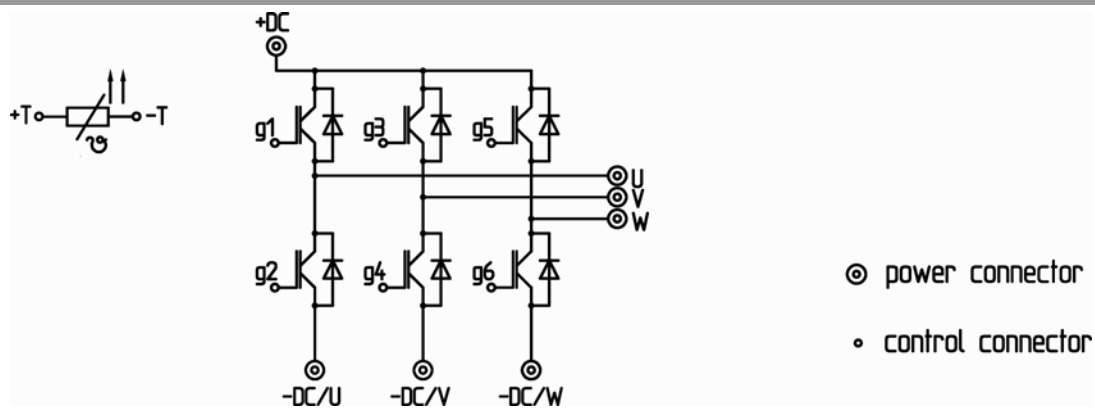


Fig. 12: Typ. CAL diode recovery charge



pinout, dimensions



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.