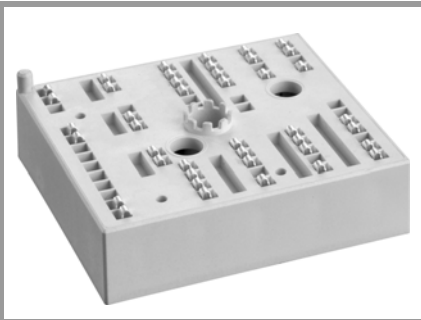


# SKiiP 23AC12T4V1



MiniSKiiP® 2

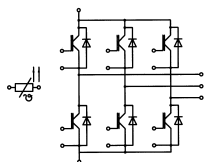
## SKiiP 23AC12T4V1

### 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

### 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. Top =  $-40 \dots +150^\circ\text{C}$ )

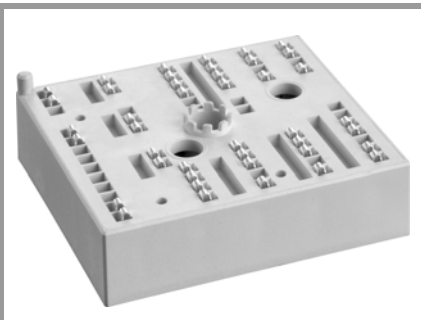


AC

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
<b>Inverter - IGBT</b>				
$V_{CES}$	$T_j = 25^\circ\text{C}$		1200	V
$I_C$	$T_j = 175^\circ\text{C}$	$T_s = 25^\circ\text{C}$	41	A
		$T_s = 70^\circ\text{C}$	34	A
$I_{Cnom}$			25	A
$I_{CRM}$	$I_{CRM} = 3 \times I_{Cnom}$		75	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>				
$I_F$	$T_j = 175^\circ\text{C}$	$T_s = 25^\circ\text{C}$	32	A
		$T_s = 70^\circ\text{C}$	26	A
$I_{Fnom}$			25	A
$I_{FRM}$	$I_{FRM} = 3 \times I_{Fnom}$		75	A
$I_{FSM}$	10 ms, sin $180^\circ$ , $T_j = 150^\circ\text{C}$		100	A
$T_j$			-40 ... 175	$^\circ\text{C}$
<b>Module</b>				
$I_{t(RMS)}$	$T_{terminal} = 80^\circ\text{C}$ , 20A per spring		100	A
$T_{stg}$			-40 ... 125	$^\circ\text{C}$
$V_{isol}$	AC sinus 50Hz, t = 1 min		2500	V

Characteristics							
Symbol	Conditions		min.	typ.	max.	Unit	
<b>Inverter - IGBT</b>							
$V_{CE(sat)}$	$I_C = 25\text{ A}$	$T_j = 25^\circ\text{C}$	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	
$r_{CE}$	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$	42	48		$\text{m}\Omega$	
		$T_j = 150^\circ\text{C}$	62	66		$\text{m}\Omega$	
$V_{GE(th)}$	$V_{GE} = V_{CE}$ , $I_C = 1\text{ mA}$		5	5.8	6.5	V	
$I_{CES}$	$V_{GE} = 0\text{ V}$	$T_j = 25^\circ\text{C}$			0.1	0.3	mA
					$V_{CE} = 1200\text{ V}$		
$C_{ies}$	$V_{CE} = 25\text{ V}$	$V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$		1.43	nF	
$C_{oes}$			$f = 1\text{ MHz}$		0.12	nF	
$C_{res}$			$f = 1\text{ MHz}$		0.09	nF	
$Q_G$	$-8\text{ V} \dots +15\text{ V}$				142	nC	
$R_{Gint}$	$T_j = 25^\circ\text{C}$				0.00	$\Omega$	
$t_{d(on)}$	$V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$			44	ns	
$t_r$	$I_C = 25\text{ A}$	$T_j = 150^\circ\text{C}$			46	ns	
		$T_j = 150^\circ\text{C}$			3.7	mJ	
$E_{on}$	$R_{Gon} = 39\ \Omega$	$T_j = 150^\circ\text{C}$			3.7	mJ	
	$R_{Goff} = 39\ \Omega$	$T_j = 150^\circ\text{C}$			330	ns	
$t_{d(off)}$	$di/dt_{on} = 465\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$			330	ns	
$t_f$	$di/dt_{off} = 350\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$			62	ns	
$E_{off}$	$V_{GE} = +15/-15\text{ V}$	$T_j = 150^\circ\text{C}$			2.4	mJ	
$R_{th(j-s)}$	per IGBT				1	K/W	

# SKiiP 23AC12T4V1



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## SKiiP 23AC12T4V1

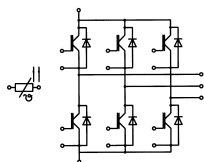
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- product rel. results valid for  $T_j \leq 150$  (recomm. Top =  $-40 \dots +150^\circ\text{C}$ )

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
<b>Inverse - Diode</b>						
$V_F = V_{EC}$	$I_F = 25 \text{ A}$ $V_{GE} = 0 \text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$		2.4	2.7	V
		$T_j = 150^\circ\text{C}$		2.5	2.8	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
$r_F$		$T_j = 25^\circ\text{C}$		44	50	m $\Omega$
		$T_j = 150^\circ\text{C}$		62	68	m $\Omega$
$I_{RRM}$	$I_F = 25 \text{ A}$	$T_j = 150^\circ\text{C}$		19		A
$Q_{rr}$	$di/dt_{off} = 640 \text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		4		$\mu\text{C}$
$E_{rr}$	$V_{GE} = -15 \text{ V}$ $V_{CC} = 600 \text{ V}$	$T_j = 150^\circ\text{C}$		1.64		mJ
$R_{th(j-s)}$	per Diode			1.52		K/W
<b>Module</b>						
$M_s$	to heat sink		2		2.5	Nm
w				65		g
<b>Temperatur Sensor</b>						
$R_{100}$	$T_C = 100^\circ\text{C}$ ( $R_{25} = 1000\Omega$ )			$1670 \pm 3\%$		$\Omega$
$R(T)$	$R(T) = 1000\Omega [1 + A(T - 25^\circ\text{C}) + B(T - 25^\circ\text{C})^2]$ ], $A = 7.635 \cdot 10^{-3} \text{ }^\circ\text{C}^{-1}$ , $B = 1.731 \cdot 10^{-5} \text{ }^\circ\text{C}^{-2}$					



AC

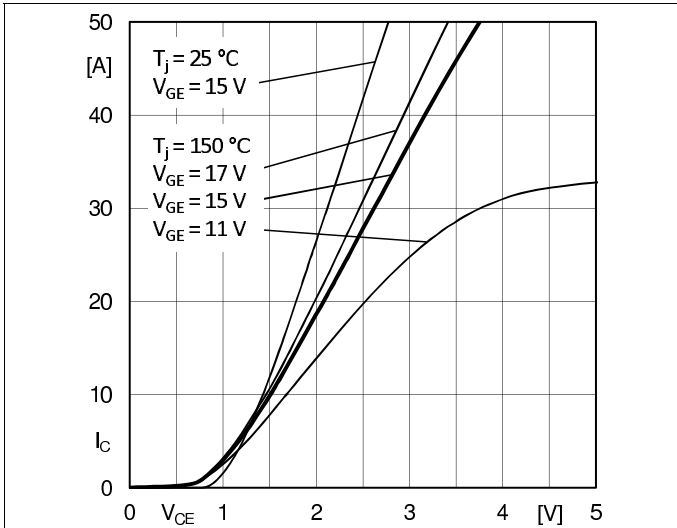


Fig. 1: Typ. output characteristic, inclusive  $R_{CC'+EE'}$

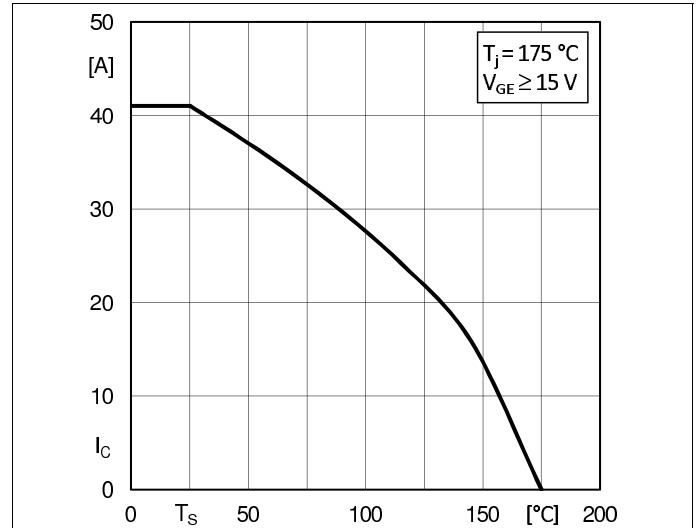


Fig. 2: Rated current vs. temperature  $I_C = f(T_S)$

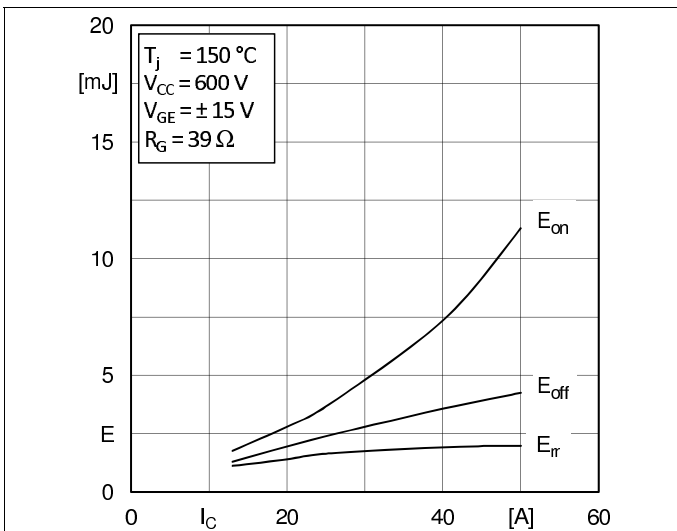


Fig. 3: Typ. turn-on /-off energy =  $f(I_C)$

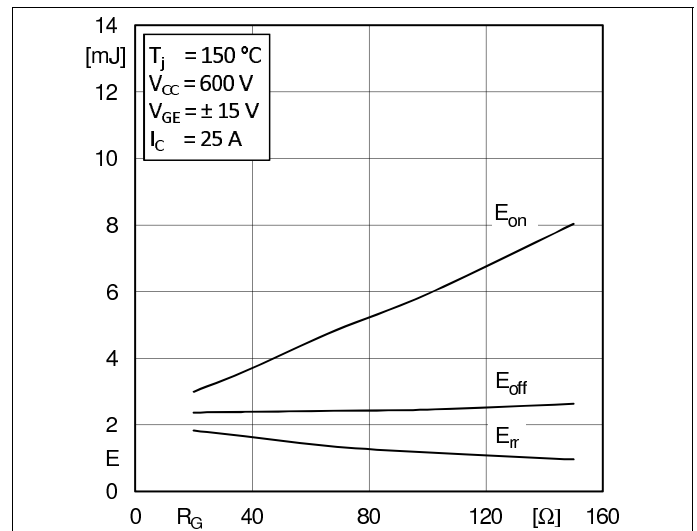


Fig. 4: Typ. turn-on /-off energy =  $f(R_G)$

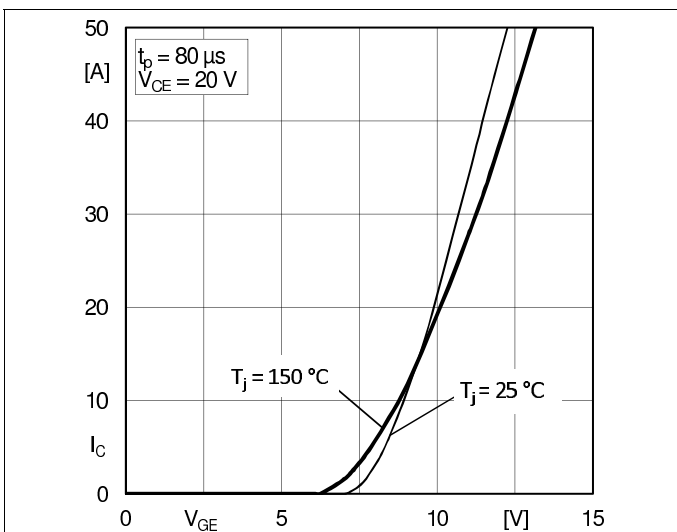


Fig. 5: Typ. transfer characteristic

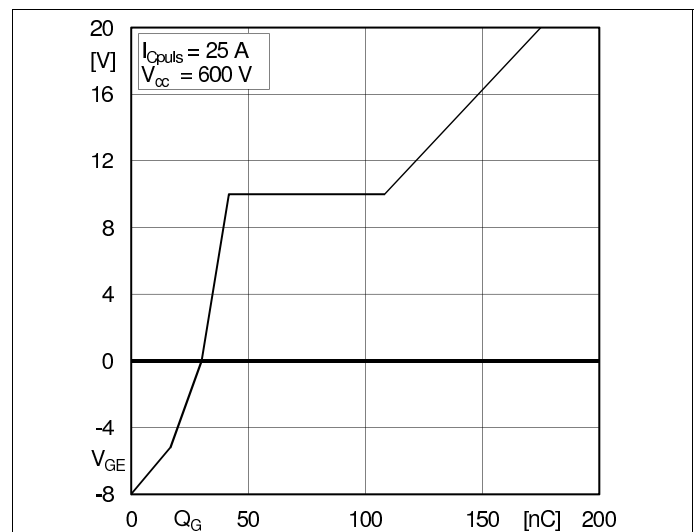


Fig. 6: Typ. gate charge characteristic

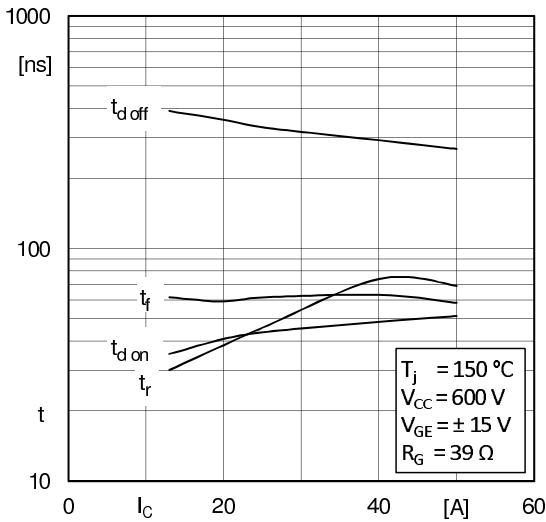


Fig. 7: Typ. switching times vs.  $I_C$

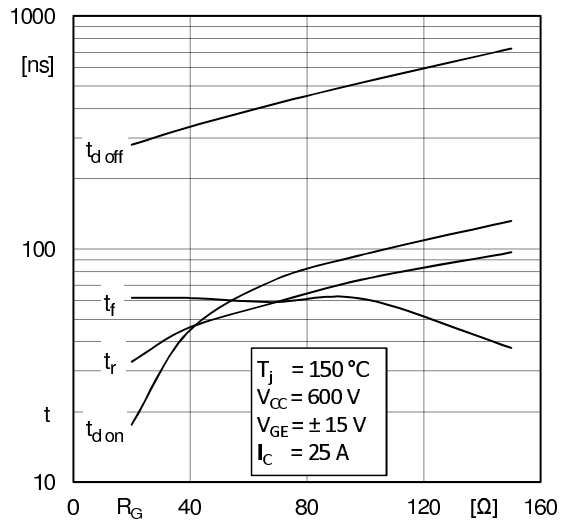


Fig. 8: Typ. switching times vs. gate resistor  $R_G$

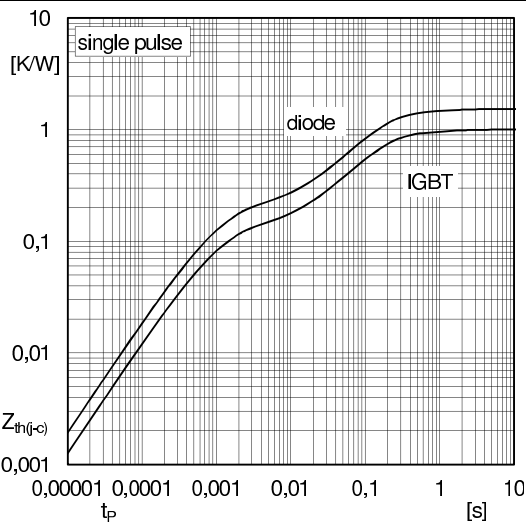


Fig. 9: Transient thermal impedance of IGBT and Diode

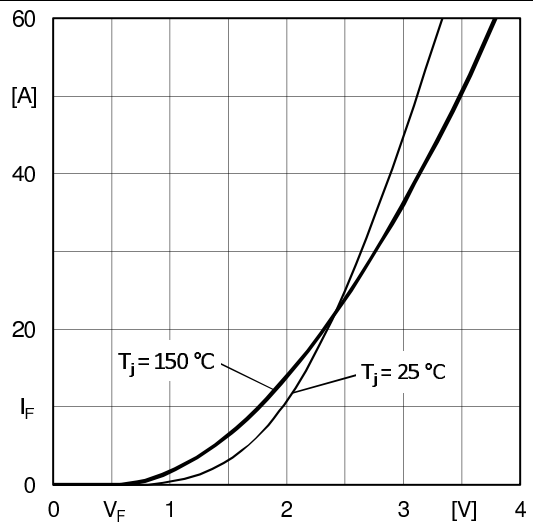


Fig. 10: CAL diode forward characteristic

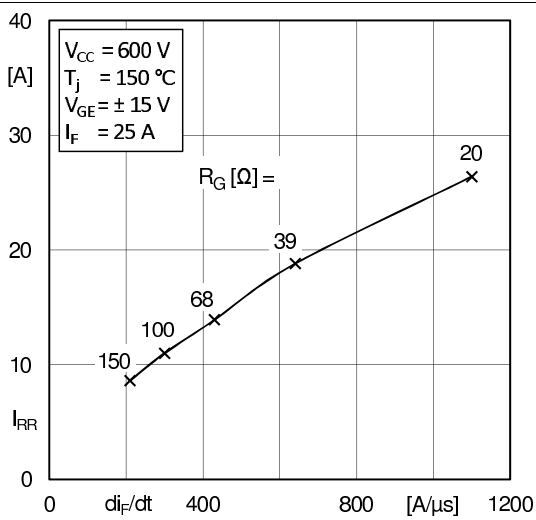


Fig. 11: Typ. CAL diode peak reverse recovery current

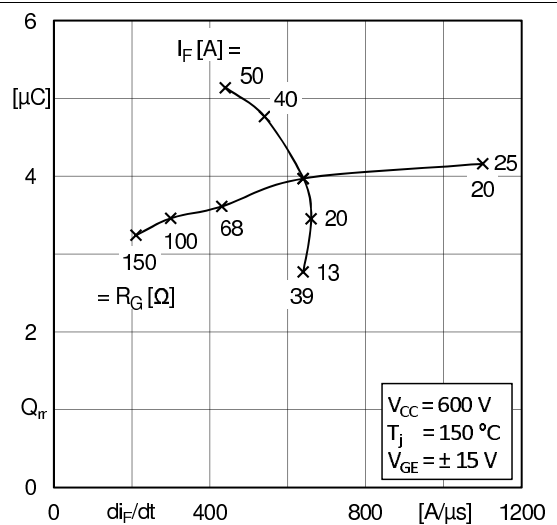
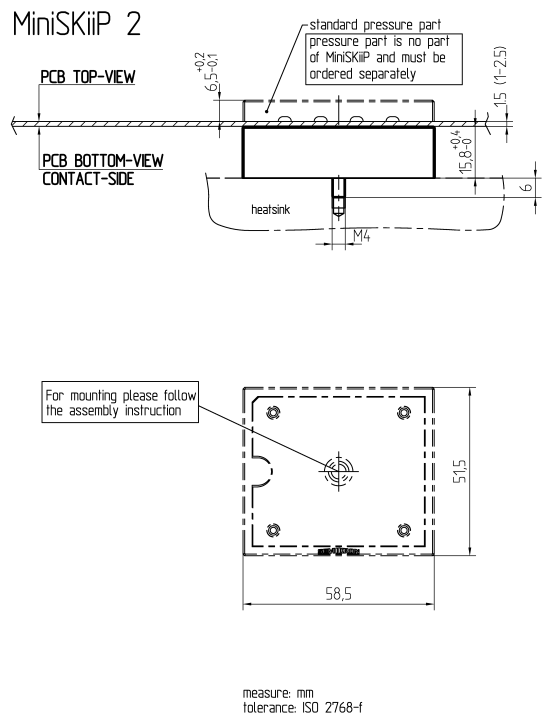
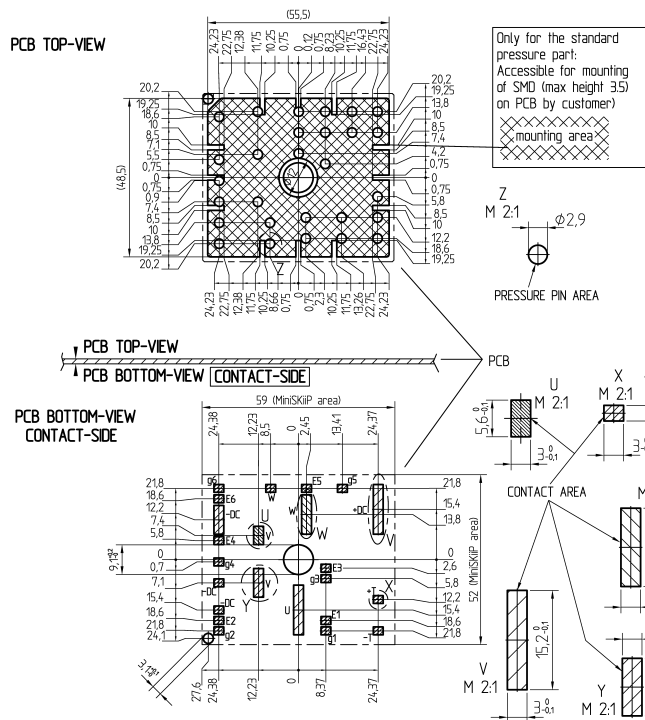


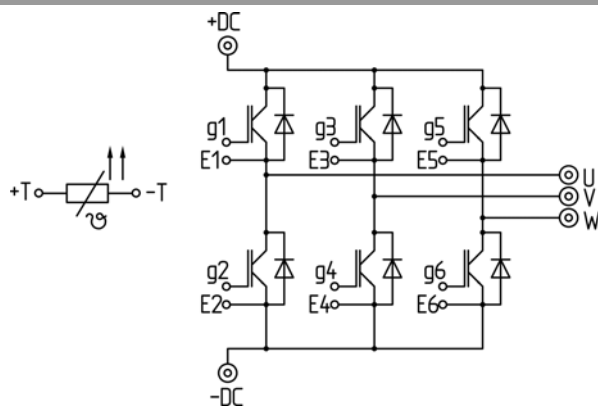
Fig. 12: Typ. CAL diode recovery charge

# SKiiP 23AC12T4V1



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## pinout, dimensions



⊙ power connector

◦ control connector

## pinout

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

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