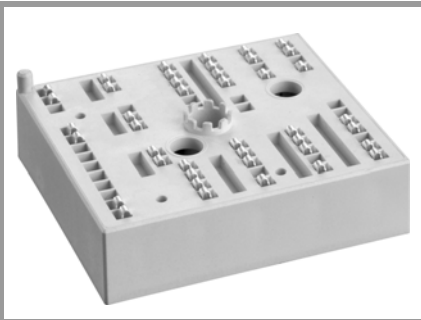


SKiiP 24AC12T4V1



MiniSKiiP® 2

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Features

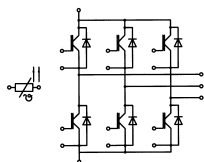
- Trench 4 IGBT's
- Robust and soft freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognised file no. E63532

Typical Applications*

- Inverter up to 22 kVA
- Typical motor power 11 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. $T_{op} = -40 \dots +150^\circ\text{C}$)

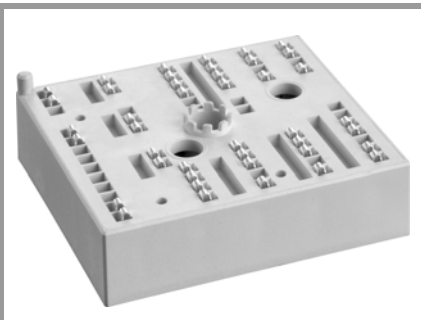


AC

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
Inverter - IGBT				
V_{CES}	$T_j = 25^\circ\text{C}$		1200	V
I_C	$T_j = 175^\circ\text{C}$	$T_s = 25^\circ\text{C}$	52	A
		$T_s = 70^\circ\text{C}$	43	A
I_{Cnom}			35	A
I_{CRM}	$I_{CRM} = 3 \times I_{Cnom}$		105	A
V_{GES}			-20 ... 20	V
t_{psc}	$V_{CC} = 800\text{ V}$	$T_j = 150^\circ\text{C}$	10	μs
	$V_{GE} \leq 15\text{ V}$			
	$V_{CES} \leq 1200\text{ V}$			
T_j			-40 ... 175	$^\circ\text{C}$
Inverse - Diode				
I_F	$T_j = 175^\circ\text{C}$	$T_s = 25^\circ\text{C}$	44	A
		$T_s = 70^\circ\text{C}$	35	A
I_{Fnom}			35	A
I_{FRM}	$I_{FRM} = 3 \times I_{Fnom}$		105	A
I_{FSM}	10 ms, sin 180°, $T_j = 150^\circ\text{C}$		170	A
T_j			-40 ... 175	$^\circ\text{C}$
Module				
$I_{t(RMS)}$	$T_{terminal} = 80^\circ\text{C}$, 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
Inverter - IGBT						
$V_{CE(sat)}$	$I_C = 35\text{ A}$ $V_{GE} = 15\text{ V}$ 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}						
	$T_j = 25^\circ\text{C}$		0.8	0.9		V
	$T_j = 150^\circ\text{C}$		0.7	0.8		V
r_{CE}	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$	30	34		m Ω
		$T_j = 150^\circ\text{C}$	44	47		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}				1.95		nF
C_{oes}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$		0.16		nF
C_{res}		$f = 1\text{ MHz}$		0.12		nF
Q_G	- 8 V...+ 15 V			200		nC
R_{Gint}	$T_j = 25^\circ\text{C}$			0.00		Ω
$t_{d(on)}$	$V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$		21		ns
t_r	$I_C = 35\text{ A}$	$T_j = 150^\circ\text{C}$		31		ns
E_{on}	$R_{Gon} = 15\ \Omega$	$T_j = 150^\circ\text{C}$		3.7		mJ
$t_{d(off)}$	$R_{Goff} = 15\ \Omega$ $di/dt_{on} = 1300\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		310		ns
t_f	$di/dt_{off} = 460\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		63		ns
E_{off}	$V_{GE} = +15/-15\text{ V}$	$T_j = 150^\circ\text{C}$		3		mJ
$R_{th(j-s)}$	per IGBT			0.85		K/W

SKiiP 24AC12T4V1



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- UL recognised file no. E63532

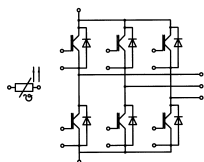
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- product rel. results valid for $T_j \leq 150$ (recomm. $T_{op} = -40 \dots +150^\circ\text{C}$)

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse - Diode						
$V_F = V_{EC}$	$I_F = 35 \text{ A}$ $V_{GE} = 0 \text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$		2.3	2.6	V
		$T_j = 150^\circ\text{C}$		2.3	2.6	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		$T_j = 25^\circ\text{C}$		29	32	m Ω
		$T_j = 150^\circ\text{C}$		40	43	m Ω
I_{RRM}	$I_F = 35 \text{ A}$	$T_j = 150^\circ\text{C}$		38		A
Q_{rr}	$di/dt_{off} = 1400 \text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		6.2		μC
E_{rr}	$V_{GE} = -15 \text{ V}$ $V_{CC} = 600 \text{ V}$	$T_j = 150^\circ\text{C}$		2.3		mJ
$R_{th(j-s)}$	per Diode			1.2		K/W
Module						
M_s	to heat sink		2		2.5	Nm
w				65		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

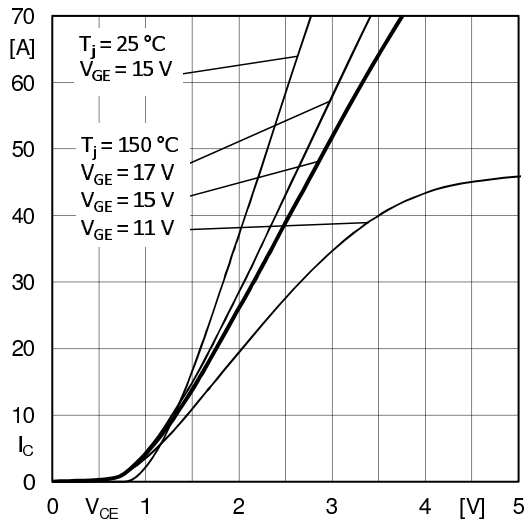


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

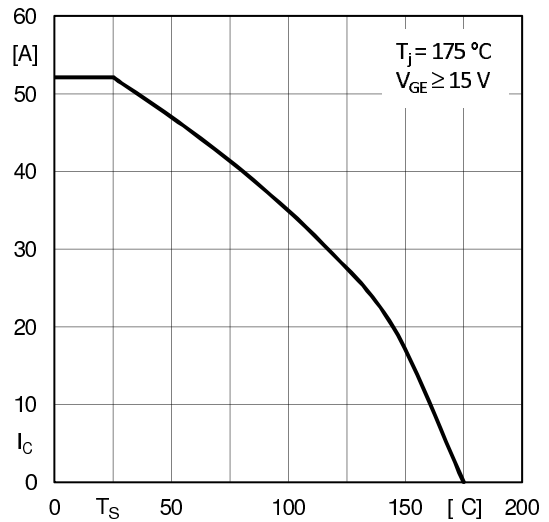


Fig. 2: Rated current vs. temperature $I_C = f(T_S)$

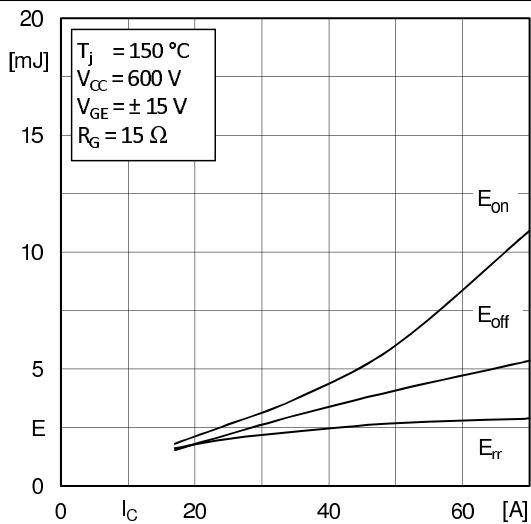


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

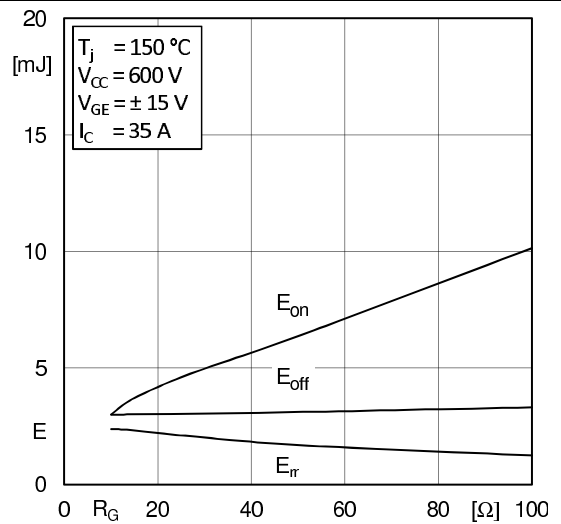


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

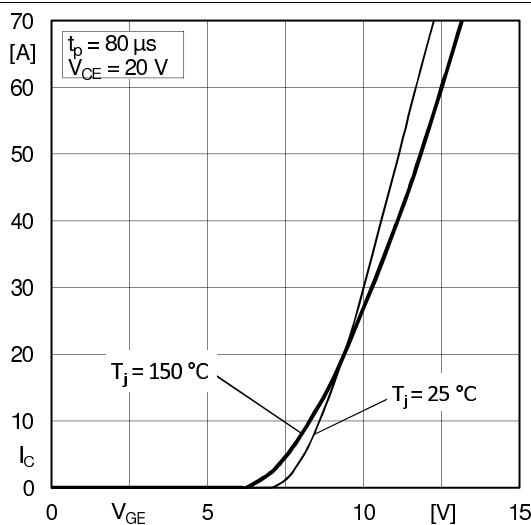


Fig. 5: Typ. transfer characteristic

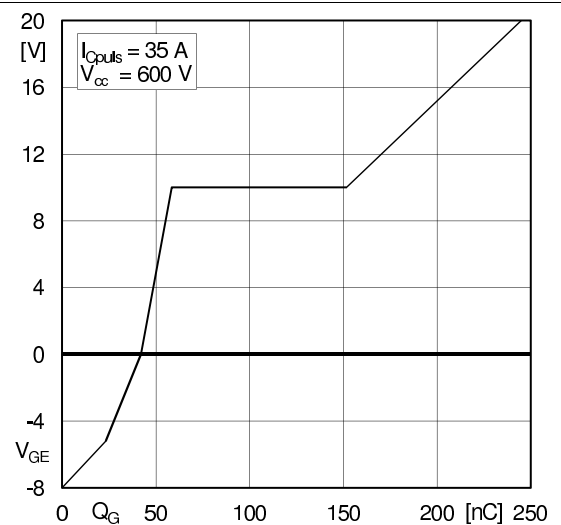


Fig. 6: Typ. gate charge characteristic

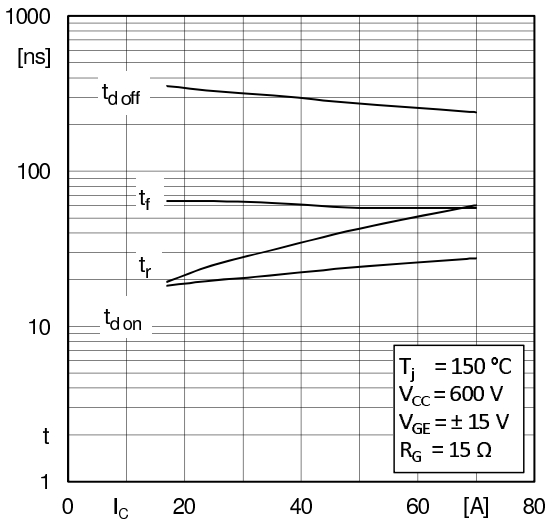


Fig. 7: Typ. switching times vs. I_C

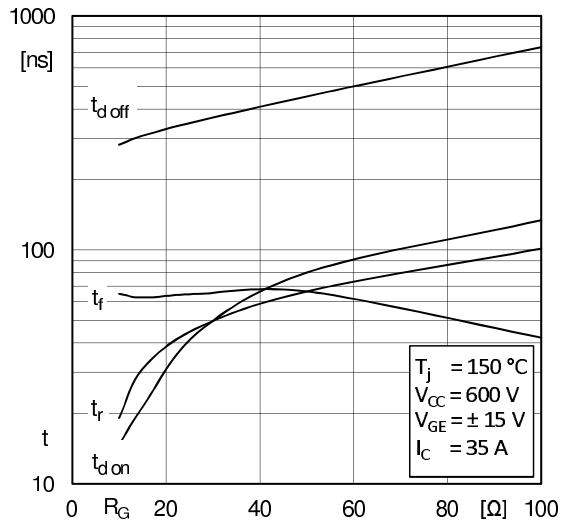


Fig. 8: Typ. switching times vs. gate resistor R_G

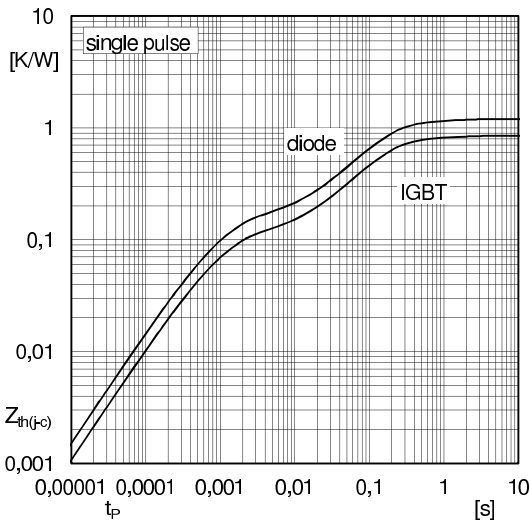


Fig. 9: Transient thermal impedance of IGBT and Diode

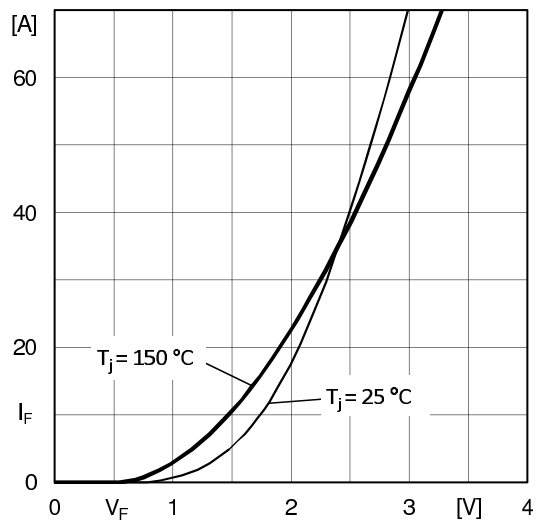


Fig. 10: CAL diode forward characteristic

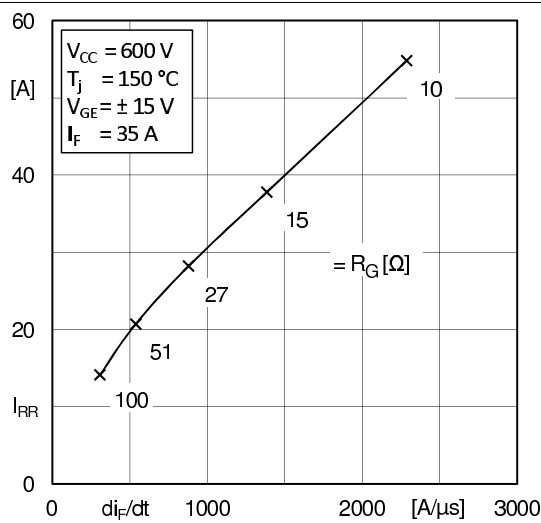


Fig. 11: Typ. CAL diode peak reverse recovery current

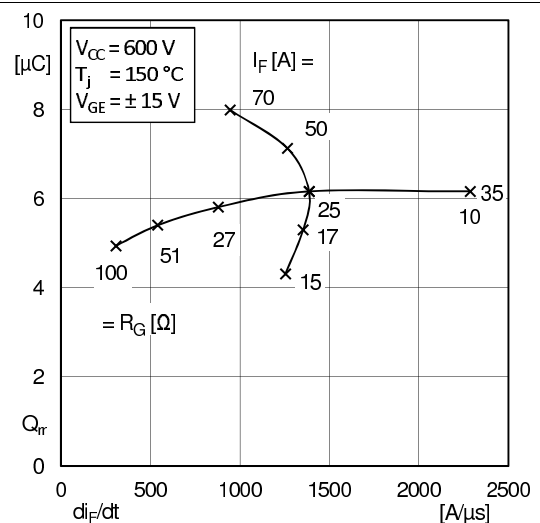


Fig. 12: Typ. CAL diode recovery charge

