

SKiiP 11AC12T4V1



MiniSKiiP® 1

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Features

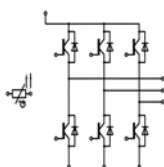
- Trench 4 IGBT's
- Robust and soft freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognised file no. E63532

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					
$V_{CE(sat)}$	$I_C = 8\text{ A}$				
	$V_{GE} = 15\text{ V}$ chipelevel				
V_{CE0}		$T_j = 25^\circ\text{C}$	1.85	2.10	V
		$T_j = 150^\circ\text{C}$	2.25	2.45	V
r_{CE}	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$	0.8	0.9	V
		$T_j = 150^\circ\text{C}$	0.7	0.8	V
$V_{GE(th)}$	$V_{GE} = V_{CE}$, $I_C = 1\text{ mA}$	$T_j = 25^\circ\text{C}$	131	150	m Ω
		$T_j = 150^\circ\text{C}$	194	206	m Ω
I_{CES}	$V_{GE} = 0\text{ V}$ $V_{CE} = 1200\text{ V}$	$T_j = 25^\circ\text{C}$	5	5.8	V
C_{ies}	$V_{CE} = 25\text{ V}$	$f = 1\text{ MHz}$	0.1	0.3	mA
C_{oes}	$V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$			
C_{res}		$f = 1\text{ MHz}$	0.49	0.05	nF
Q_G	- 8 V...+ 15 V		0.03		nF
R_{Gint}	$T_j = 25^\circ\text{C}$		45		nC
$t_{d(on)}$	$V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$	0.00		Ω
t_r	$I_C = 8\text{ A}$	$T_j = 150^\circ\text{C}$	32		ns
E_{on}	$R_{G on} = 56\text{ }\Omega$	$T_j = 150^\circ\text{C}$	28		ns
$t_{d(off)}$	$R_{G off} = 56\text{ }\Omega$	$T_j = 150^\circ\text{C}$	0.87		mJ
t_f	$di/dt_{on} = 280\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$	300		ns
E_{off}	$di/dt_{off} = 90\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$	65		ns
$R_{th(j-s)}$	$V_{GE} = +15/-15\text{ V}$	$T_j = 150^\circ\text{C}$	0.75		mJ
	per IGBT		1.84		K/W

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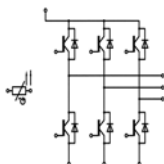
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Characteristics					
Symbol	Conditions		min.	typ.	max. Unit
Inverse - Diode					
$V_F = V_{EC}$	$I_F = 8 \text{ A}$ $V_{GE} = 0 \text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$		2.3	2.6 V
		$T_j = 150^\circ\text{C}$		2.4	2.7 V
V_{F0}		$T_j = 25^\circ\text{C}$		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}	$di/dt_{off} = 350 \text{ A}/\mu\text{s}$ $V_{GE} = -15 \text{ V}$	$T_j = 150^\circ\text{C}$		1.3	μC
E_{rr}	$V_{CC} = 600 \text{ V}$	$T_j = 150^\circ\text{C}$		0.53	mJ
$R_{th(j-s)}$	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

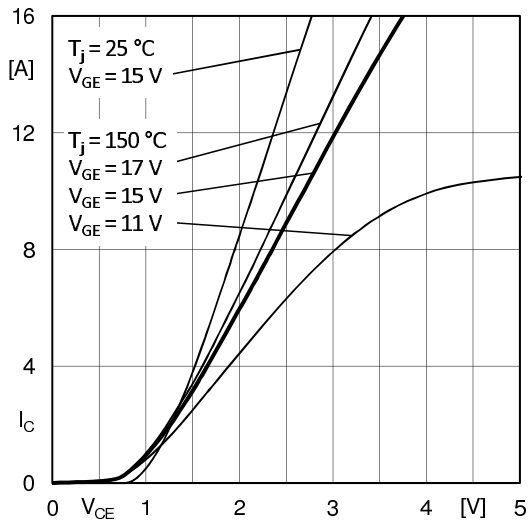


Fig. 1: Typ. output characteristic, inclusive $R_{CC'} + E_{E'}$

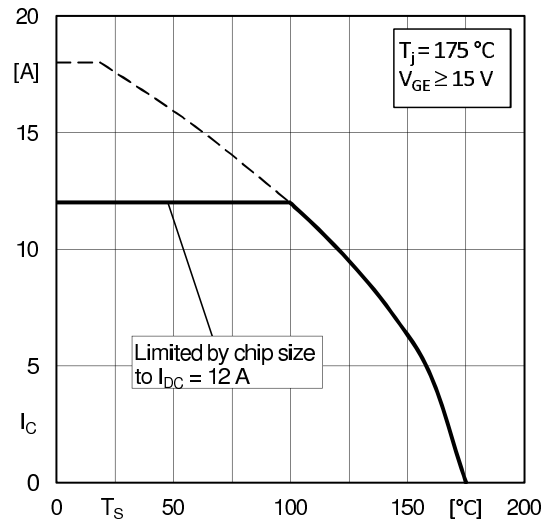


Fig. 2: Rated current vs. temperature $I_C = f(T_S)$

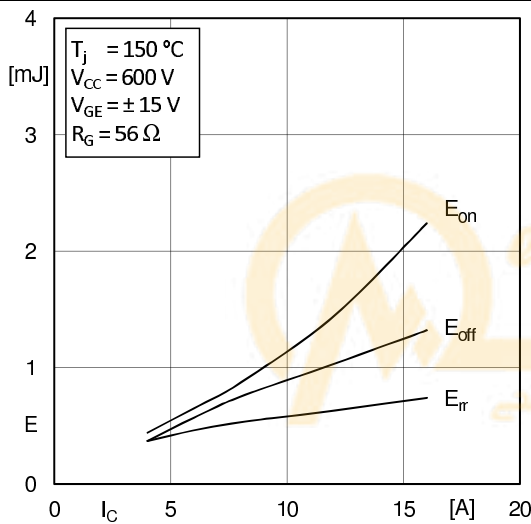


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

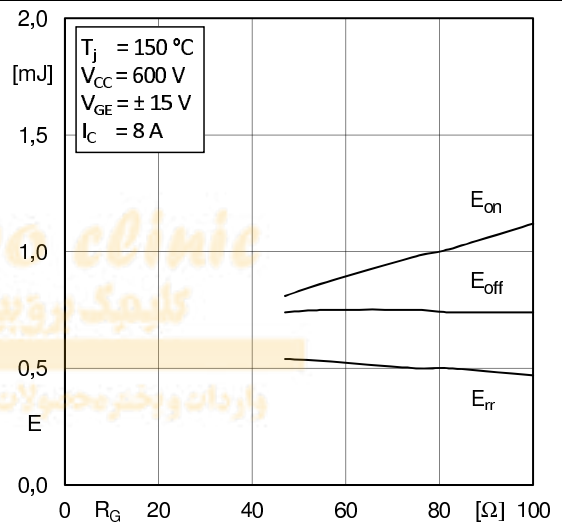


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

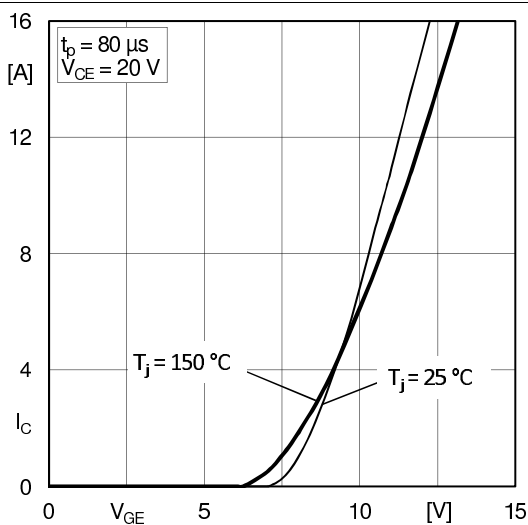


Fig. 5: Typ. transfer characteristic

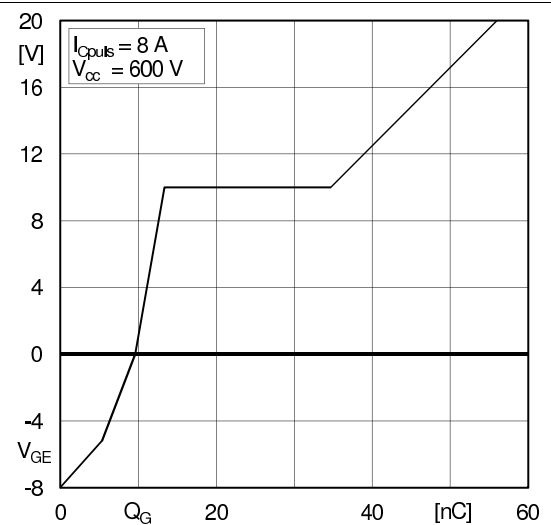


Fig. 6: Typ. gate charge characteristic

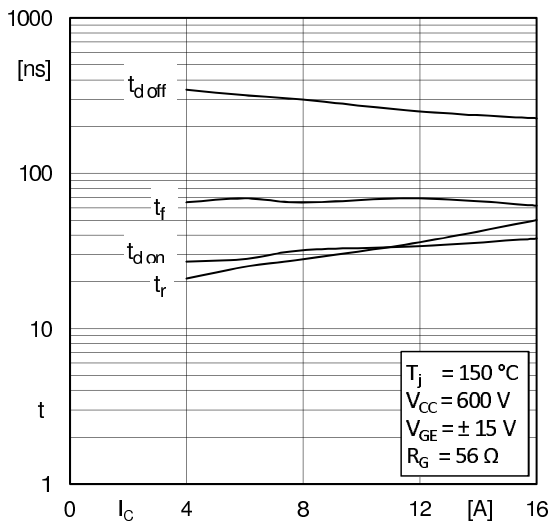


Fig. 7: Typ. switching times vs. I_C

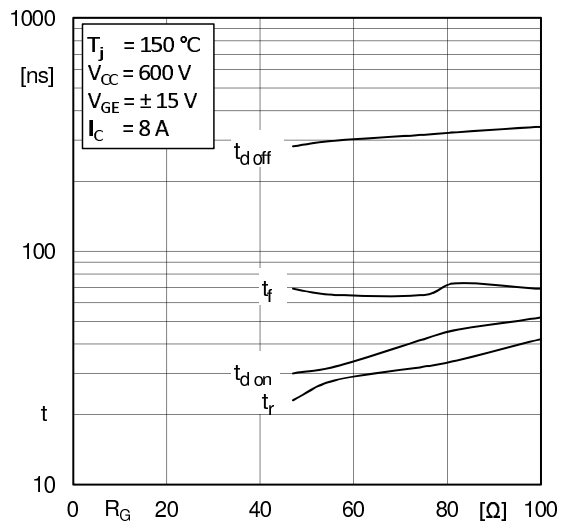


Fig. 8: Typ. switching times vs. gate resistor R_G

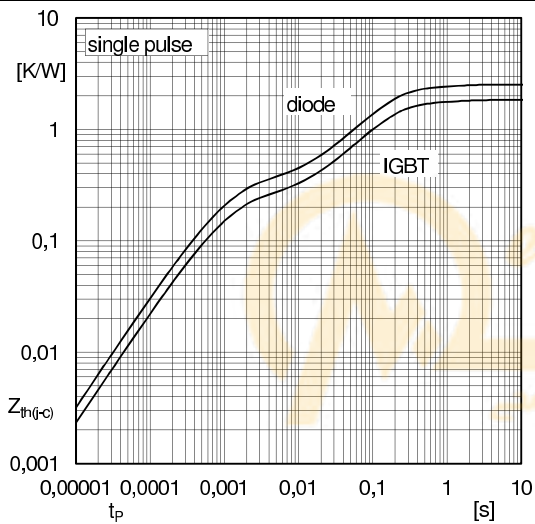


Fig. 9: Transient thermal impedance of IGBT and Diode

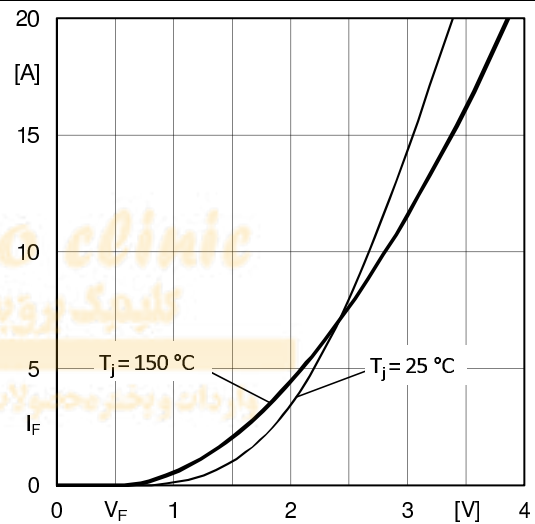


Fig. 10: CAL diode forward characteristic

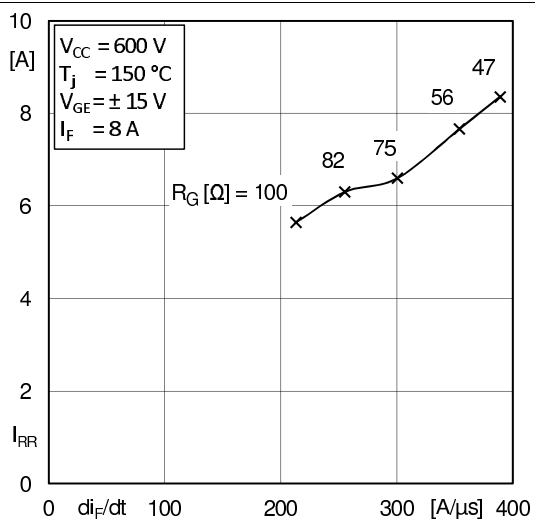


Fig. 11: Typ. CAL diode peak reverse recovery current

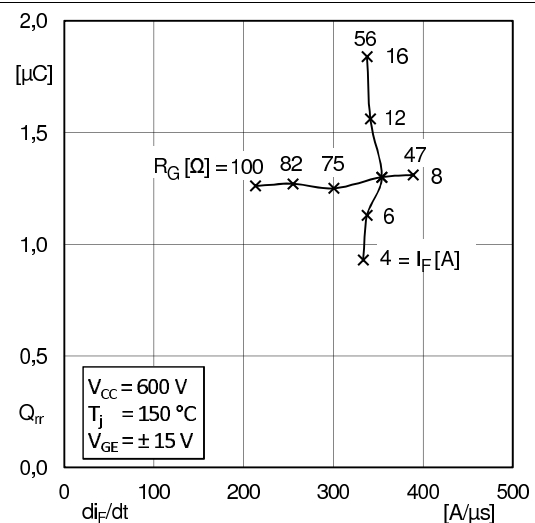


Fig. 12: Typ. CAL diode recovery charge



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