

MiniSKiiP® 3

Twelvepack

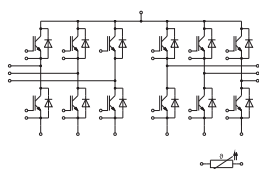
SKiiP 35ACC12F4V1

Features*

- Fast Trench 4 IGBTs
- Robust and soft freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognized: File no. E63532

Remarks

- Case temperature limited to $T_C=125^\circ\text{C}$ max.; $T_C = T_S$ (for baseplateless modules)
- Product reliability results valid for $T_J \leq 150^\circ\text{C}$ (recommended $T_{Jop} = -40 \dots +150^\circ\text{C}$)
- Inverter IGBT: IGBT 1 - IGBT 12
- Inverse Diode: Diode 1 – Diode 12
- The creepage distance between T-Sensor and DC- is 0,8mm (functional isolation of T-sensor only up to 200V)
- MiniSKiiP “Technical Explanations” and “Mounting Instructions” are part of the data sheet. Please refer to both documents for further information.



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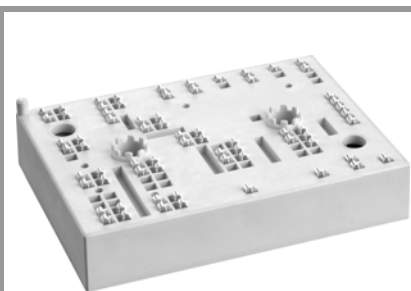
Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Inverter - IGBT				
V _{CES}	T _j = 25 °C		1200	V
I _C	λ _{paste} =0.8 W/(mK)	T _s = 25 °C	54	A
	T _j = 175 °C	T _s = 70 °C	43	A
I _C	λ _{paste} =2.5 W/(mK)	T _s = 25 °C	62	A
	T _j = 175 °C	T _s = 70 °C	50	A
I _{Cnom}			50	A
I _{CRM}			150	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 800 V V _{GE} ≤ 15 V V _{CES} ≤ 1200 V	T _j = 150 °C	10	μs
T _j			-40 ... 175	°C
Inverse - Diode				
V _{RRM}	T _j = 25 °C		1200	V
I _F	λ _{paste} =0.8 W/(mK)	T _s = 25 °C	58	A
	T _j = 175 °C	T _s = 70 °C	46	A
I _F	λ _{paste} =2.5 W/(mK)	T _s = 25 °C	65	A
	T _j = 175 °C	T _s = 70 °C	52	A
I _{FRM}			100	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 150 °C		270	A
T _j			-40 ... 175	°C
Module				
I _{t(RMS)}	T _{terminal} = 80 °C, 20 A per spring		40	A
T _{stg}	module without TIM		-40 ... 125	°C
V _{isol}	AC sinus 50 Hz, t = 1 min		2500	V

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Inverter - IGBT					
$V_{CE(sat)}$	$I_C = 50 \text{ A}$ $V_{GE} = 15 \text{ V}$ chiplevel	$T_J = 25^\circ\text{C}$	2.05	2.42	V
		$T_J = 150^\circ\text{C}$	2.59	2.96	V
V_{CE0}	chiplevel	$T_J = 25^\circ\text{C}$	1.10	1.28	V
		$T_J = 150^\circ\text{C}$	0.95	1.13	V
r_{CE}	$V_{GE} = 15 \text{ V}$ chiplevel	$T_J = 25^\circ\text{C}$	19	23	$\text{m}\Omega$
		$T_J = 150^\circ\text{C}$	33	37	$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 1.7 \text{ mA}$	5.2	5.8	6.4	V
I_{CES}	$V_{GE} = 0 \text{ V}, V_{CE} = 1200 \text{ V}, T_J = 25^\circ\text{C}$			1	mA
C_{ies}	$V_{CE} = 25 \text{ V}$	$f = 1 \text{ MHz}$	2.77		nF
C_{oes}	$V_{GE} = 0 \text{ V}$	$f = 1 \text{ MHz}$	0.21		nF
C_{res}		$f = 1 \text{ MHz}$	0.16		nF
Q_G	$V_{GE} = -8 \text{ V} \dots +15 \text{ V}$		283		nC
R_{Gint}	$T_J = 25^\circ\text{C}$		4.0		Ω
$t_{d(on)}$	$V_{CC} = 600 \text{ V}$	$T_J = 150^\circ\text{C}$	28		ns
t_r	$I_C = 50 \text{ A}$	$T_J = 150^\circ\text{C}$	21		ns
E_{on}	$R_{G on} = 6.2 \Omega$	$T_J = 150^\circ\text{C}$	4.8		mJ
$t_{d(off)}$	$R_{G off} = 0 \Omega$	$T_J = 150^\circ\text{C}$	234		ns
t_f	$di/dt_{on} = 2508 \text{ A}/\mu\text{s}$ $di/dt_{off} = 1082 \text{ A}/\mu\text{s}$	$T_J = 150^\circ\text{C}$	47		ns
E_{off}	$V_{GE} = +15/-15 \text{ V}$	$T_J = 150^\circ\text{C}$	3.4		mJ
$R_{th(j-s)}$	per IGBT, $\lambda_{paste}=0.8 \text{ W/(mK)}$		0.87		K/W
$R_{th(j-s)}$	per IGBT, $\lambda_{paste}=2.5 \text{ W/(mK)}$		0.69		K/W

SKiiP 35ACC12F4V1



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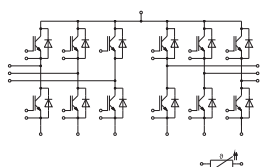
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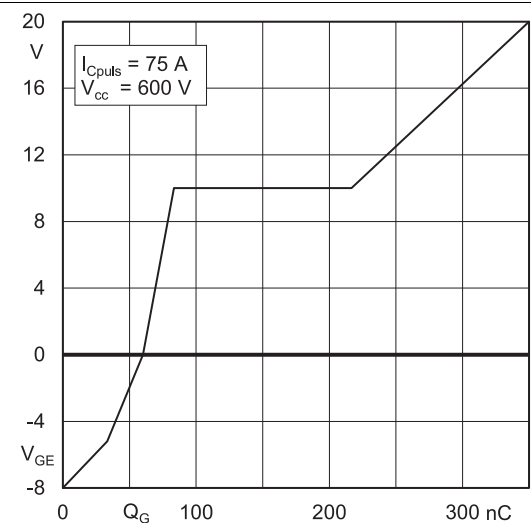
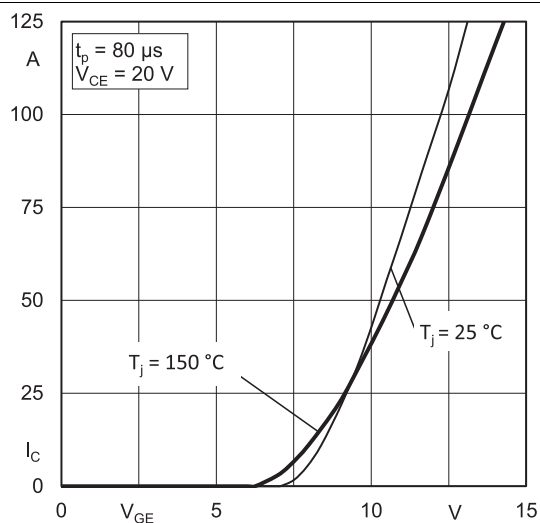
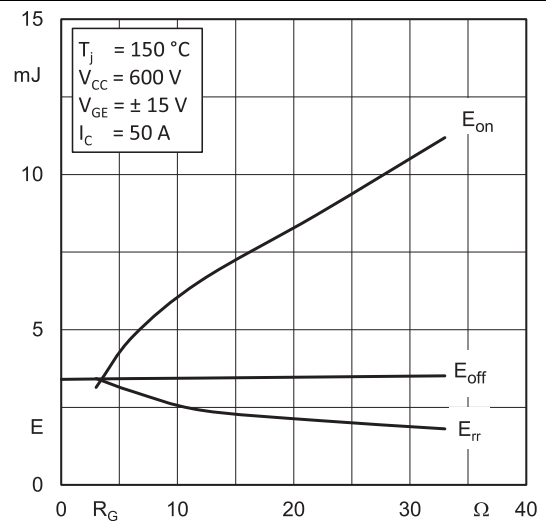
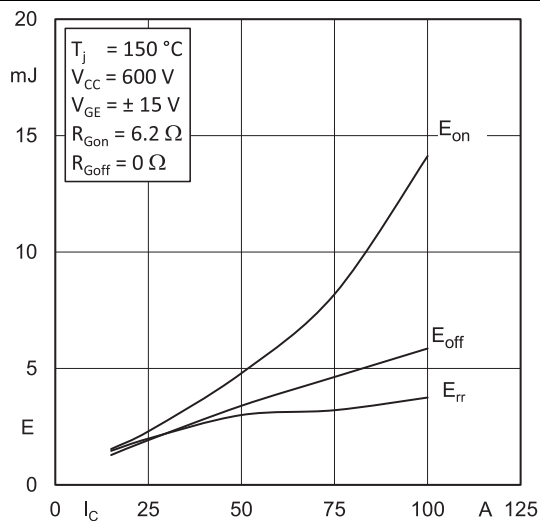
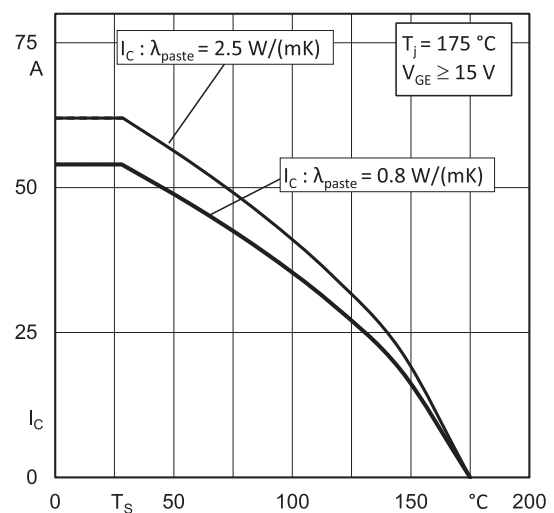
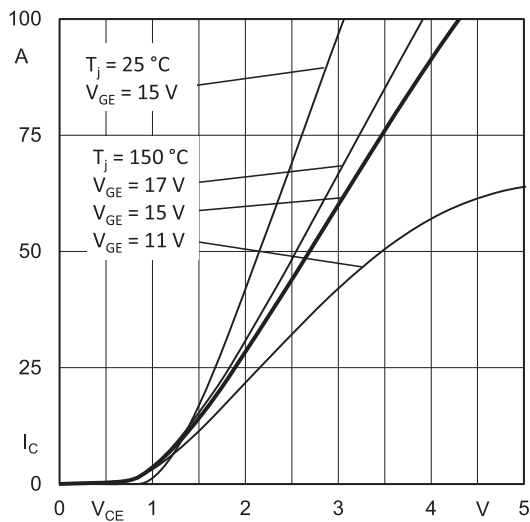
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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse - Diode						
V _F = V _{EC}	I _F = 50 A	T _j = 25 °C		2.22	2.54	V
	V _{GE} = 0 V chiplevel	T _j = 150 °C		2.18	2.50	V
V _{F0}	chiplevel	T _j = 25 °C		1.30	1.50	V
		T _j = 150 °C		0.90	1.10	V
r _F	chiplevel	T _j = 25 °C		18	21	mΩ
		T _j = 150 °C		26	28	mΩ
I _{RRM}	I _F = 50 A	T _j = 150 °C		90.1		A
Q _{rr}	di/dt _{off} = 2426 A/μs	T _j = 150 °C		8.25		μC
E _{rr}	V _{GE} = +15/-15 V V _{CC} = 600 V	T _j = 150 °C		3		mJ
R _{th(j-s)}	per Diode, λ _{paste} =0.8 W/(mK)			1.02		K/W
R _{th(j-s)}	per Diode, λ _{paste} =2.5 W/(mK)			0.84		K/W
Module						
L _{CE}				-		nH
M _s	to heat sink		2		2.5	Nm
w				82		g
Temperature Sensor						
R ₁₀₀	T _r =100°C (R ₂₅ =1000Ω)			1670 ± 3%		Ω
R _(T)	R _(T) =1000Ω[1+A(T-25°C)+B(T-25°C) ²] , A = 7.635*10 ⁻³ °C ⁻¹ , B = 1.731*10 ⁻⁵ °C ⁻²					



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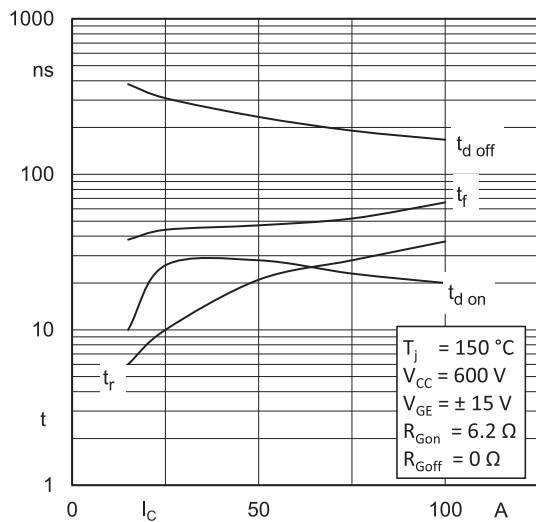


Fig. 7: Typ. switching times vs. I_C

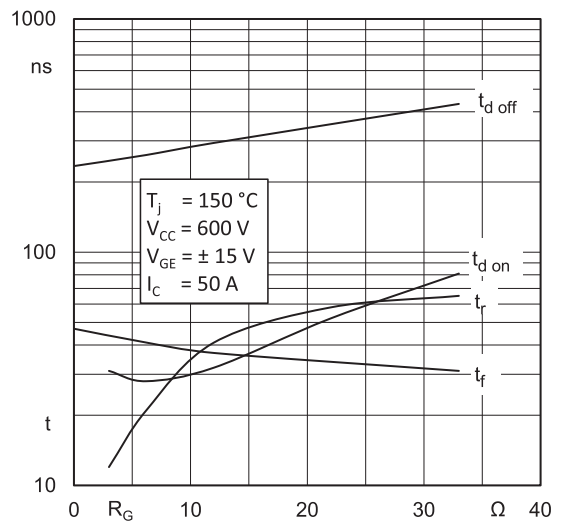


Fig. 8: Typ. switching times vs. gate resistor R_G

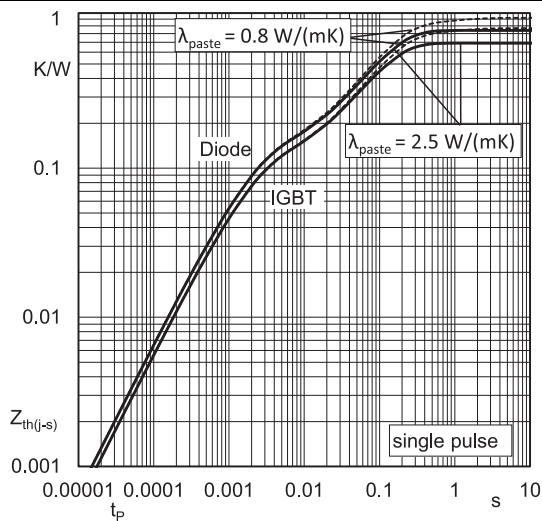


Fig. 9: Typ. transient thermal impedance

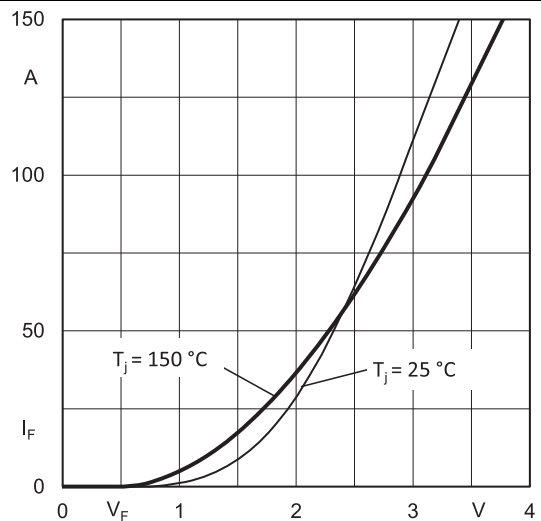


Fig. 10: Typ. CAL diode forward characteristic

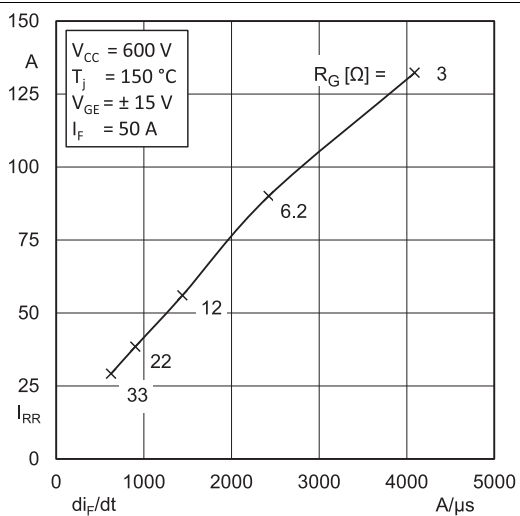


Fig. 11: Typ. CAL diode peak reverse recovery current

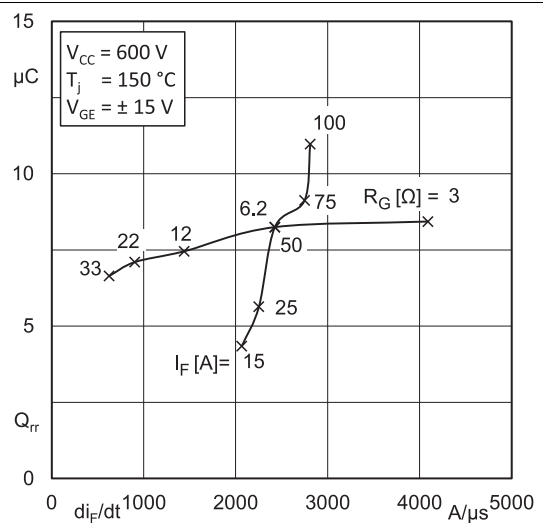
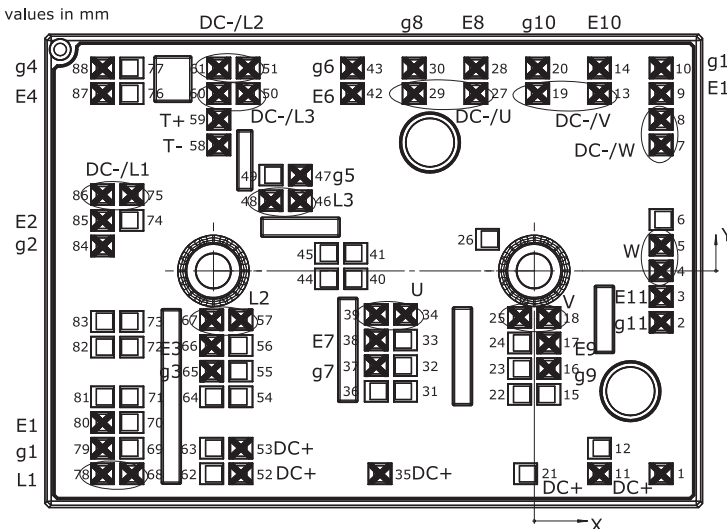


Fig. 12: Typ. CAL diode recovery charge

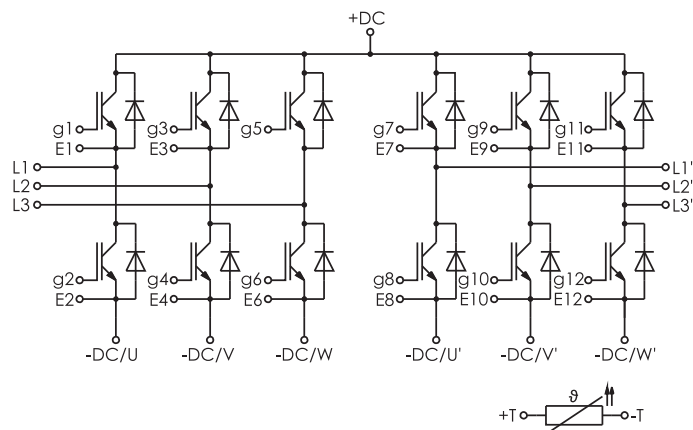
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Pin out											
Pin	X	Y	Function	Pin	X	Y	Function	Pin	X	Y	Function
1	15,83	-25,30	DC+	31	-16,05	-15,02		61	-39,33	25,30	DC-/L2
2	15,83	-6,40	g11	32	-16,05	-11,82		62	-40,23	-25,30	
3	15,83	-3,20	E11	33	-16,05	-8,62		63	-40,23	-22,10	
4	15,83	0	W	34	-16,05	-5,42	U	64	-40,23	-15,70	
5	15,83	3,20	W	35	-19,23	-25,30	DC+	65	-40,23	-12,50	g3
6	15,83	6,40		36	-19,70	-15,02		66	-40,23	-9,30	E3
7	15,83	15,70	DC-/W	37	-19,70	-11,82	g7	67	-40,23	-6,10	L2
8	15,83	18,90	DC-/W	38	-19,70	-8,62	E7	68	-50,18	-25,30	L1
9	15,83	22,10	E12	39	-19,70	-5,42	U	69	-50,18	-22,10	
10	15,83	25,30	g12	40	-22,26	-1,00		70	-50,18	-18,90	
11	8,13	-25,30	DC+	41	-22,26	2,20		71	-50,18	-15,70	
12	8,13	-22,10		42	-22,68	22,10	E6	72	-50,18	-9,50	
13	8,13	22,10	DC-/V	43	-22,68	25,30	g6	73	-50,18	-6,30	
14	8,13	25,30	E10	44	-25,91	-1,00		74	-50,18	6,30	
15	1,83	-15,39		45	-25,91	2,20		75	-50,18	9,50	DC-/L1
16	1,83	-12,19	g9	46	-29,18	8,74	L3	76	-50,18	22,10	
17	1,83	-8,99	E9	47	-29,18	11,94	g5	77	-50,18	25,30	
18	1,83	-5,79	V	48	-32,83	8,74	L3	78	-53,83	-25,30	L1
19	0,43	22,10	DC-/V	49	-32,83	11,94		79	-53,83	-22,10	g1
20	0,43	25,30	g10	50	-35,68	22,10	DC-/L3	80	-53,83	-18,90	E1
21	-1,08	-25,30		51	-35,68	25,30	DC-/L2	81	-53,83	-15,70	
22	-1,83	-15,39		52	-36,58	-25,30	DC+	82	-53,83	-9,50	
23	-1,83	-12,19		53	-36,58	-22,10	DC+	83	-53,83	-6,30	
24	-1,83	-8,99		54	-36,58	-15,70		84	-53,83	3,10	g2
25	-1,83	-5,79	V	55	-36,58	-12,50		85	-53,83	6,30	E2
26	-5,83	3,95		56	-36,58	-9,30		86	-53,83	9,50	DC-/L1
27	-7,28	22,10	DC-/U	57	-36,58	-6,10	L2	87	-53,83	22,10	E4
28	-7,28	25,30	E8	58	-39,33	15,70	T-	88	-53,83	25,30	g4
29	-14,98	22,10	DC-/U	59	-39,33	18,90	T+				
30	-14,98	25,30	g8	60	-39,33	22,10	DC-/L3				

all values in mm



Pinout and Dimensions



Pinout

This is an electrostatic discharge sensitive device (ESDS) due to international standard IEC 61340.

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