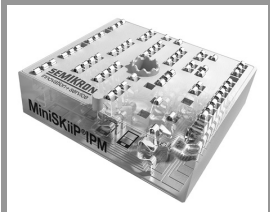


SKiiP 25AC12T4V2



MiniSKiiP® AC IPM

Three-phase inverter intelligent power module

SKiiP 25AC12T4V2

Data sheet status: preliminary

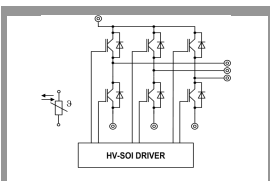
Features

- One screw assembly of driver, module and heat sink
- Solder-free assembly of power, control and auxiliary contacts
- Trench-Field-Stop IGBT
- Robust and soft freewheeling diodes in CAL technology
- Latch-up free SOI driver IC
- Advanced level shifter technology
- Bootstrap power supply technology
- Matched propagation delay for all channels
- Overcurrent shut-down via current sensing
- Interlock logic for shoot-through prevention
- Common shut-down signal
- Undervoltage lockout for all channels with hysteresis band
- Integrated temperature sensor (NTC)
- RoHS compliant

Typical Applications

- Industrial- & consumer drives
- Power supplies (SMPS & UPS)
- Industrial air conditioner

Remarks

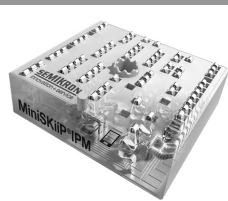


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Absolute Maximum Ratings (T _s =25°C, unless otherwise specified)				
Symbol	Parameter	Conditions	Values	Units
IGBT - Inverter				
V _{CES}			1200	V
I _C	T _J = 175 °C	T _S = 25 °C	61	A
		T _S = 70 °C	50	A
I _{Cnom}			50	A
I _{CRM}	I _{CRM} = 3xI _{Cnom}		150	A
t _{psc}	V _{CC} = 600V	T _J = 150°C	≤10	μs
T _{J(max)}	Junction temperature		-40 ... +175	°C
Diode				
I _F	T _J = 175°C	T _S = 25 °C	57	A
		T _S = 70 °C	45	A
I _{Fnom}			50	A
I _{FRM}	I _{FRM} = 3xI _{Cnom}	T _J < T _{J(max)}	150	A
I _{FSM}	t _p = 10 ms, sin 180°, T _J = 150 °C		265	A
T _{J(max)}	Junction temperature		-40 ... +175	°C
Driver				
V _{CC}	Applied between VCC-VSS, VCCL-VSSL		17	V
VBx	Applied between VB1-U, VB2-V, VB3-W		17	V
VSx	Voltage to VSS, t _p < 500ns		-3 ... 1200	V
V _{in}	Applied between HIN1, LIN1, HIN2, LIN2, HIN3, LIN3 - VSS		VSS-0.3 ... VCC+0.3	
V _{oErr}	Applied between /ERROUT-VSS		VSS-0.3 ... VCC+0.3	V
I _{max(EO)}	Between /ERROUT-VSS		10	mA
V _{ITRIP}	Applied between ITRIP-VSS		VSS-0.3 ... VCC+0.3	V
f _{max}			20	kHz
Temperature				
T _c			-40 ... +125	°C
T _{stg}			-40 ... +125	°C
System				
V _{isol}		AC, rms, f=60Hz, t=1min, all pins to heat sink	2500	V
I _{RMS}		Per power terminal (20A / Spring)	20	A

Electrical Characteristics (T _s =25°C, unless otherwise specified)				Limits		Units
Symbol	Parameter	Conditions	min.	typ.	max.	
IGBT						
V _{CESat}	I _C = 50 A	T _J = 25 °C	1.85	2.05		V
	V _{GE} = 15 V	T _J = 150 °C	2.25	2.45		V
V _{CEO}		T _J = 25 °C	0.8	0.9		V
		T _J = 150 °C	0.7	0.8		V
r _{CE}	V _{GE} = 15 V	T _J = 25 °C	21	23		mΩ
		T _J = 150 °C	31	33		mΩ
I _{CES}	V _{GE} = 0 V	T _J = 25 °C			0.3	mA
	V _{CE} = 600 V					
E _{on}	V _{CC} = 600V	T _J = 150 °C	7.2			mJ
E _{off}	I _C = 50 A	T _J = 150 °C	5.6			mJ
t _{d(on)}	R _{goff} /R _{goff} = 4.7 Ω	T _J = 150 °C	1065			ns
t _r	di/dt _{on} = 1061 A/μs	T _J = 150 °C	50			ns
t _{d(off)}	di/dt _{off} = 693 A/μs	T _J = 150 °C	1670			ns
t _f		T _J = 150 °C	252			ns
R _{th(j-s)}	per IGBT		0.84			K/W
Diode						
V _F = V _{EC}	I _F = 50 A	T _J = 25 °C	2.25	2.55		V
	V _{GE} = 0 V (Chiplevel)	T _J = 150 °C	2.2	2.5		V
V _{F0}		T _J = 25 °C	1.3	1.5		V
		T _J = 150 °C	0.9	1.1		V
I _F		T _J = 25 °C	19	21		mΩ
		T _J = 150 °C	26	28		mΩ
E _{rr}	I _F = 50 A	T _J = 150 °C	3			mJ
Q _{rr}	di _F /dt = -1479 A/μs	T _J = 150 °C	8.3			μC
I _{RRM}	V _{CC} = 600 V, V _{GE} = 0 V	T _J = 150 °C	56			A
R _{th(j-s)}	per Diode		0.99			K/W

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Three-phase inverter intelligent power module

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Features

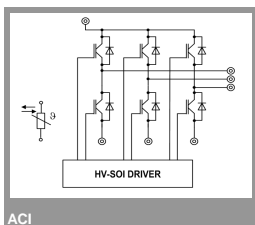
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- RoHS compliant

Typical Applications

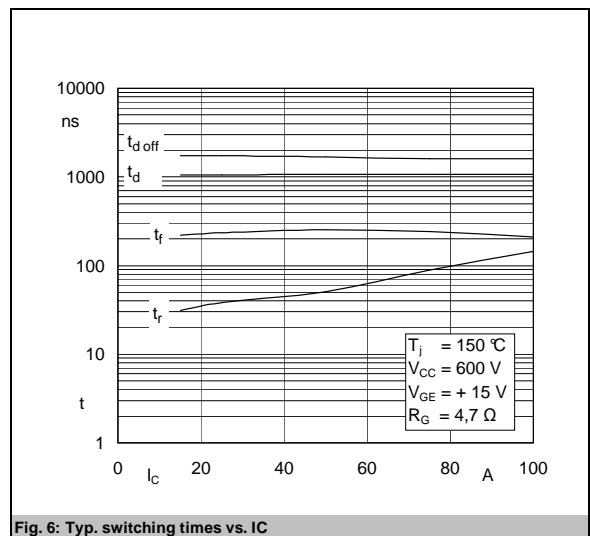
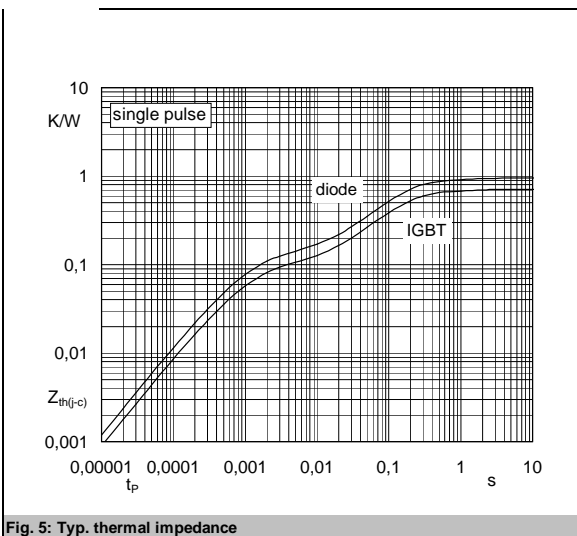
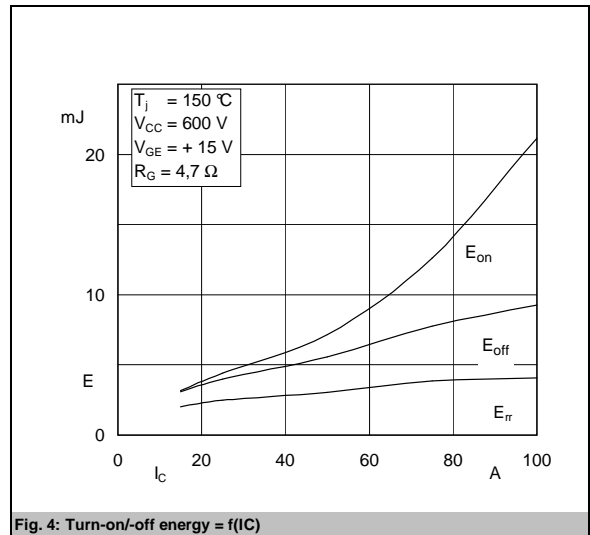
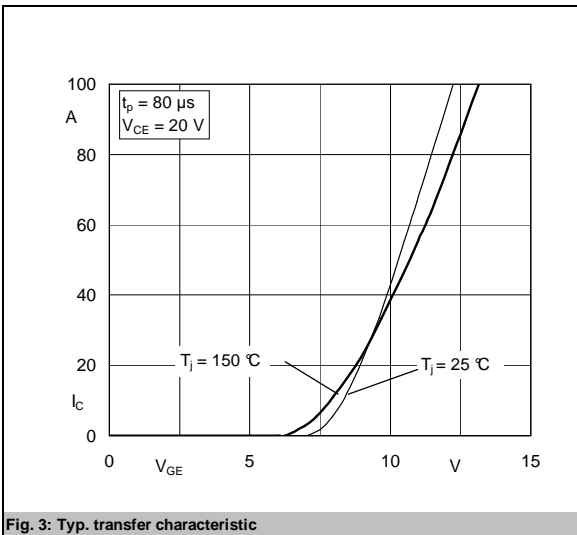
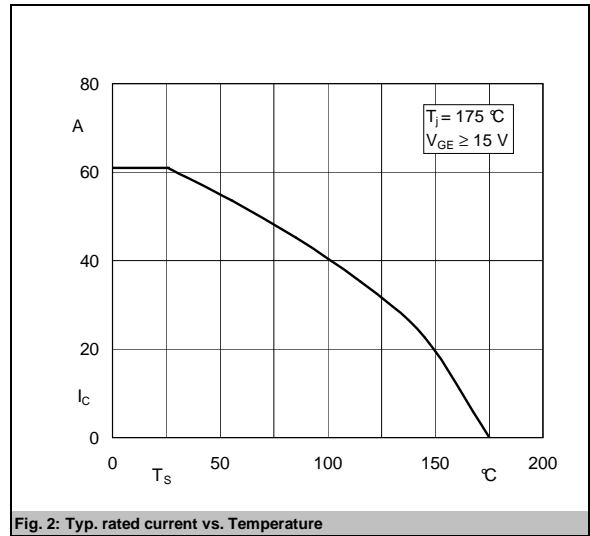
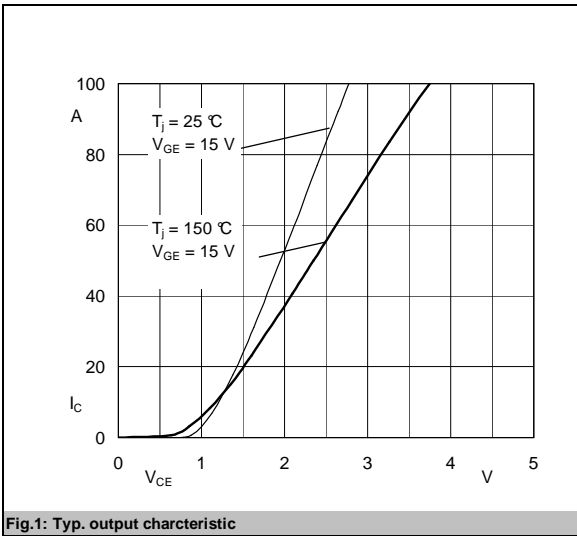
- Industrial- & consumer drives
- Power supplies (SMPS & UPS)
- Industrial air conditioner

Remarks

Electrical Characteristics (T _s =25°C, unless otherwise specified)		Limits				
Symbol	Parameter	Conditions	min.	typ.	max.	Units
Driver						
VDC	Applied between VCC-VSS, VCCL-VSSL		15			V
ICC	VCC=15V, all logic inputs = open, VCC-VSS				5.0	mA
VBx	Applied between VB1-U, VB2-V, VB3-W		15			V
IBx	VBx = 15 V, V _{iH} = V _{iL} = 0 V		60			µA
V _{IT+}	Applied between HIN1, HIN2, HIN3, LIN1, LIN2, LIN3, LIN4, /ERRIN-VSS		1.9	2.4		V
V _{IT-}	Applied between HIN1, HIN2, HIN3, LIN1, LIN2, LIN3, LIN4, /ERRIN-VSS		0.8	1.1		V
V _{oErr}	Error Output Voltage Applied between /ERROUT-VSS				15	V
V _{LV}			10,5			V
V _{LVr}					12,3	V
t _{d,ITRIP}	Itrip to output propagation delay			500		ns
t _{SIS}	Short pulse suppression for signals inputs			460		ns
t _{TD}	Interlock Dead time			460		ns
f _{sw}				15	25	kHz
Temperature Sensor						
R ₁₀₀	T _{Sensor} = 100 °C (R ₂₅ = 5 kΩ)			339		Ω
B _{100/125}	R _(T) = R ₁₀₀ exp[B _{100/125} (1/T-1/373)]; [T] = K			4096		K
Module						
m					65	g
M _s			2		2.5	Nm



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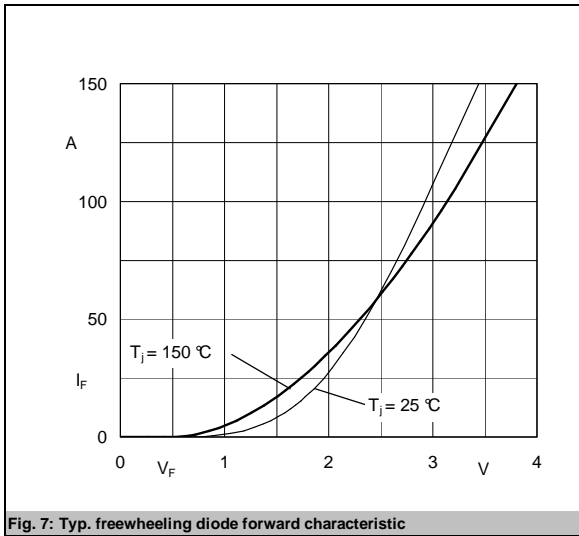


Fig. 7: Typ. freewheeling diode forward characteristic

Pin Number	Signal Name	Description
1	VB1	Floating supply for U phase high side IGBT
2	HIN1	PWM signal input for U phase high side switch
3	LIN1	PWM signal input for U phase low side switch
4	HIN2	PWM signal input for V phase high side switch
5	VCC	Driver IC main supply voltage
6	HIN3	PWM signal input for W phase high side switch
7	/ERRIN	External error / shut-down logic input (inverted)
8	VSS	Driver IC supply voltage ground
9	/ERROUT	Error logic output (inverted)
10	ITRIP	Comparator input / current sense input for overcurrent shut-down
11	VSSL	Low side supply voltage ground
12	VCCL	Low side supply voltage
13	VB2	Floating supply for V phase high side IGBT
14	VB3	Floating supply for W phase high side IGBT
15	LIN2	PWM signal input for V phase low side switch
16	LIN3	PWM signal input for W phase low side switch
	U	U phase power output
	E1	Auxiliary emitter terminal for U phase high side IGBT
	V	V phase power output
	E3	Auxiliary emitter terminal for V phase high side IGBT
	W	W phase power output
	E5	Auxiliary emitter terminal for W phase high side IGBT
	NU	Negative DC-Link power terminal for U phase
	E2	Auxiliary emitter terminal for U phase low side IGBT
	NV	Negative DC-Link power terminal for V phase
	E4	Auxiliary emitter terminal for V phase low side IGBT
	NW	Negative DC-Link power terminal for W phase
	E6	Auxiliary emitter terminal for W phase low side IGBT
	P	Positive DC-Link power terminal
	+T	Temperature sensor terminal (+)
	-T	Temperature sensor terminal (-)

Fig. 4: PIN Description

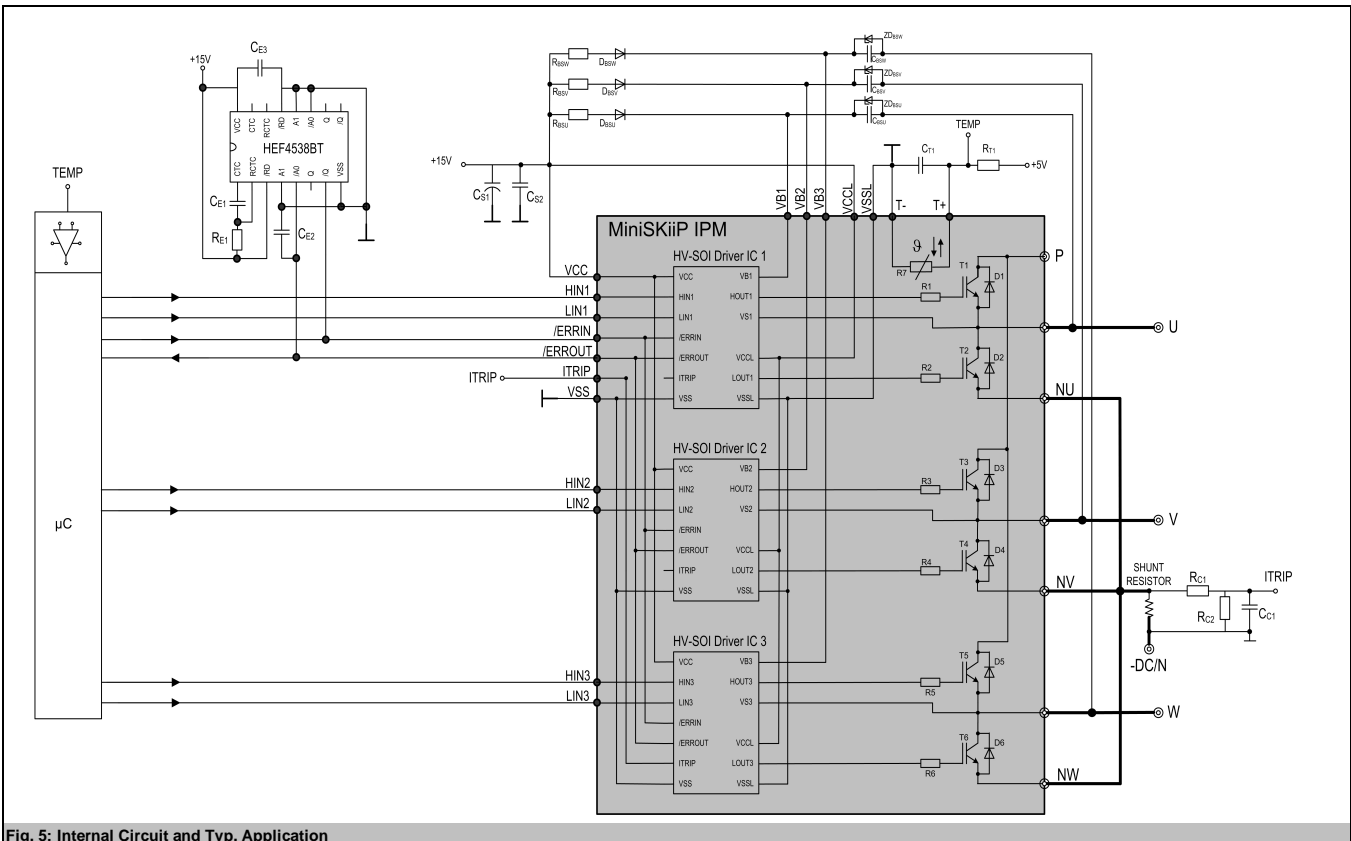


Fig. 5: Internal Circuit and Typ. Application

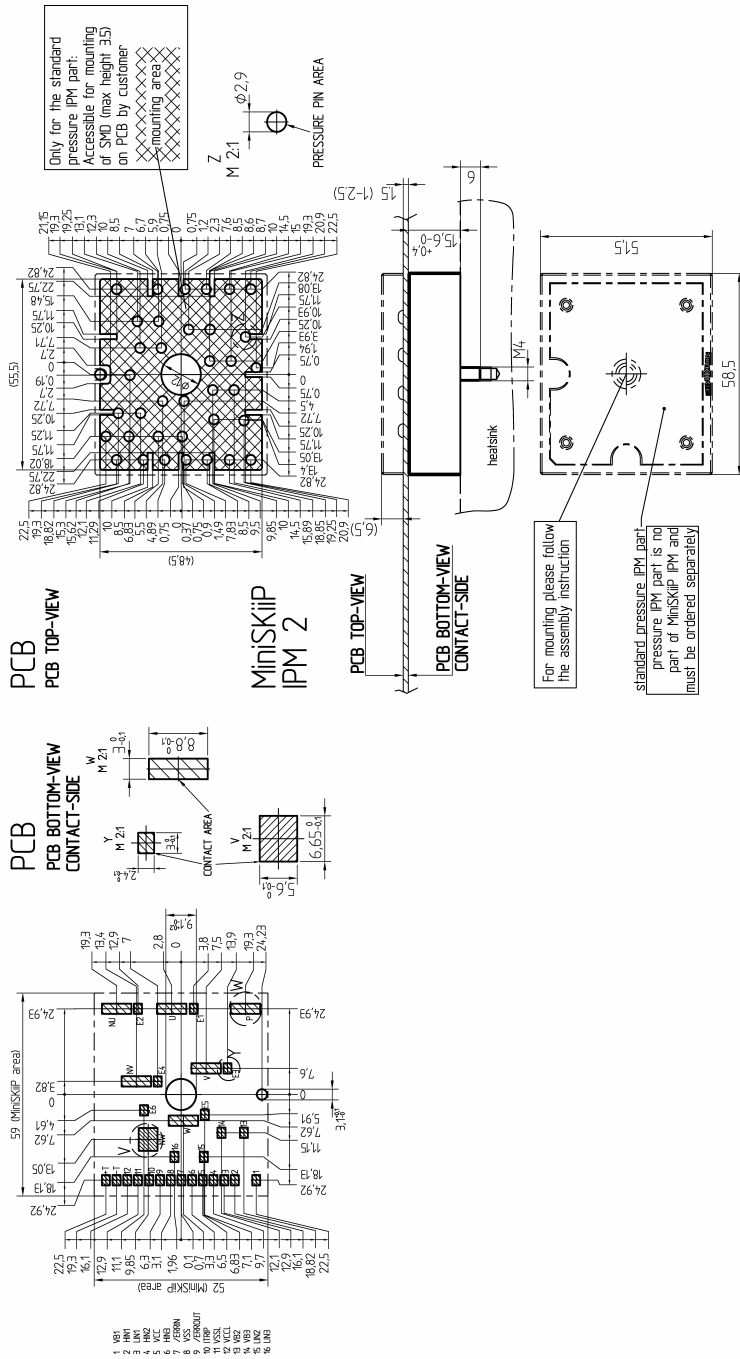


Fig. 6: Package Outline, Pinout

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 personal.