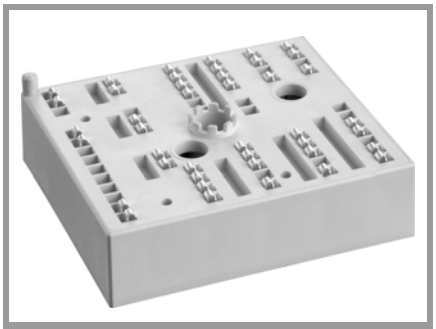
SKiiP 29TMLI12F4V1



MiniSKiiP® 2

3-Level TNPC Inverter (*)

SKiiP 29TMLI12F4V1

Target Data

Features

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

Remarks

- Case temperature limited to T_C=125°C max.; $T_C = T_S$ (for baseplateless modules)
- Product reliability results valid for T_j≤150°C (recommended T_{jop}=-40...+150°C)
- IGBT 1: outer IGBTs T1&T4
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- Diode 1: outer diodes D1&D4
- Diode 2: inner diodes D2&D3

Absolute Maximum Ratings

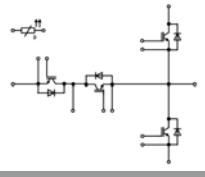
Symbol	Conditions		Values	Unit
IGBT 1				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 150 °C	T_s = 25 °C	137	A
		T_s = 70 °C	105	A
I_C	T_j = 175 °C	T_s = 25 °C	153	A
		T_s = 70 °C	124	A
I_{Cnom}			150	A
I_{CRM}	I_{CRM} = 3 x I_{Cnom}		450	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 800 V V_{GE} ≤ 15 V V_{CES} ≤ 1200 V	T_j = 150 °C	10	µs
T_j			-40 ... 175	°C

Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
IGBT 2				
V_{CES}	T_j = 25 °C		650	V
I_C	T_j = 150 °C	T_s = 25 °C	134	A
		T_s = 70 °C	100	A
I_C	T_j = 175 °C	T_s = 25 °C	150	A
		T_s = 70 °C	120	A
I_{Cnom}			150	A
I_{CRM}	I_{CRM} = 3 x I_{Cnom}		450	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 360 V V_{GE} ≤ 15 V V_{CES} ≤ 650 V	T_j = 150 °C	6	µs
T_j			-40 ... 175	°C

Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Diode 1				
V_{RRM}	T_j = 25 °C		1200	V
I_F	T_j = 150 °C	T_s = 25 °C	132	A
		T_s = 70 °C	98	A
I_F	T_j = 175 °C	T_s = 25 °C	148	A
		T_s = 70 °C	117	A
I_{Fnom}			150	A
I_{FRM}	I_{FRM} = 3 x I_{Fnom}		450	A
I_{FSM}	10 ms, sin 180°, T_j = 150 °C		774	A
T_j			-40 ... 175	°C



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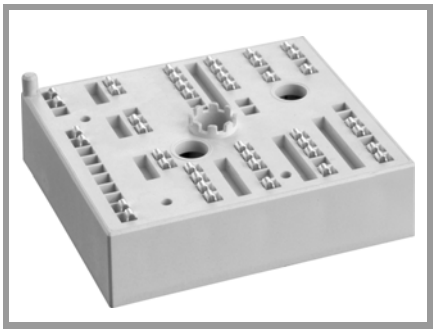

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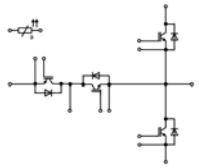

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Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Diode 2				
V_{RRM}	T_j = 25 °C		650	V
I_F	T_j = 175 °C	T_s = 25 °C	143	A
		T_s = 70 °C	111	A
I_{Fnom}			150	A
I_{FRM}	I_{FRM} = 2 x I_{Fnom}		300	A
I_{FSM}	10 ms sin 180°	T_j = 25 °C	1200	A
		T_j = 150 °C	1100	A
T_j			-40 ... 175	°C

Absolute Maximum Ratings

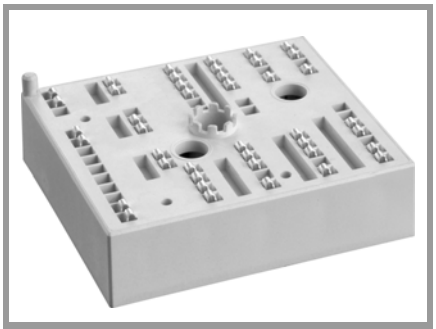
Symbol	Conditions	Values	Unit
Module			
$I_{t(RMS)}$	$T_{terminal}$ = 80 °C, 20 A per spring	100	A
T_{stg}		-40 ... 125	°C
V_{isol}	AC sinus 50 Hz, t = 1 min	2500	V

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
IGBT 1						
$V_{CE(sat)}$	I_C = 150 A, V_{GE} = 15 V, chiplevel	T_j = 25 °C		2.05	2.40	V
		T_j = 150 °C		2.50	2.85	V
V_{CE0}	chiplevel	T_j = 25 °C		0.8	0.9	V
		T_j = 150 °C		0.7	0.8	V
r_{CE}	V_{GE} = 15 V, chiplevel	T_j = 25 °C		8.3	10	mΩ
		T_j = 150 °C		12	14	mΩ
$V_{GE(th)}$	V_{GE} = V_{CE} V, I_C = 5.2 mA		5.2	5.8	6.4	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 1200 V	T_j = 25 °C		0.1	0.3	mA
						mA
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V	f = 1 MHz		8.80		nF
C_{oes}		f = 1 MHz				nF
C_{res}		f = 1 MHz		0.47		nF
Q_G	- 8 V...+ 15 V					nC
R_{Gint}	T_j = 25 °C			5		Ω
$t_{d(on)}$	V_{CE} = 300 V, I_C = 150 A	T_j = 150 °C				ns
t_r		T_j = 150 °C				ns
E_{on}		T_j = 150 °C				mJ
$t_{d(off)}$		T_j = 150 °C				ns
t_f		T_j = 150 °C				ns
E_{off}	$V_{GE\ neg}$ = -15 V, $V_{GE\ pos}$ = 15 V	T_j = 150 °C				mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/K*m			0.33		K/W

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Module					
M_s	to heat sink	2		2.5	Nm
w	weight		55		g



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SKiiP 29TMLI12F4V1

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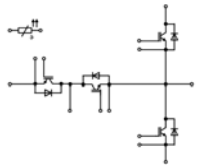

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Characteristics

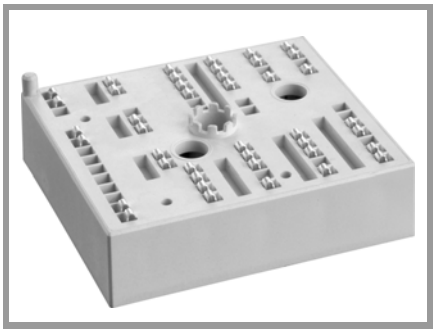
Symbol	Conditions		min.	typ.	max.	Unit
IGBT 2						
$V_{CE(sat)}$	I_C = 150 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.45	1.77	V
		T_j = 150 °C		1.70	2.10	V
V_{CE0}	chiplevel	T_j = 25 °C		0.9	1	V
		T_j = 150 °C		0.82	0.9	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		3.7	5.1	mΩ
		T_j = 150 °C		6	8	mΩ
$V_{GE(th)}$	$V_{GE} = V_{CE}$ V, I_C = 2.4 mA		5.1	5.8	6.4	V
I_{CES}	V_{GE} = 0 V V_{CE} = 650 V	T_j = 25 °C		0.1	0.3	mA
		T_j = 150 °C				mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		9.24		nF
C_{oes}		f = 1 MHz		0.60		nF
C_{res}		f = 1 MHz		0.27		nF
Q_G	- 8 V...+ 15 V			1360		nC
R_{Gint}	T_j = 25 °C			2		Ω
$t_{d(on)}$	V_{CE} = 300 V I_C = 150 A	T_j = 150 °C				ns
t_r		T_j = 150 °C				ns
E_{on}		T_j = 150 °C				mJ
$t_{d(off)}$		T_j = 150 °C				ns
t_f		T_j = 150 °C				ns
E_{off}	$V_{GE\ neg}$ = -15 V $V_{GE\ pos}$ = 15 V	T_j = 150 °C				mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/K*m			0.46		K/W

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Diode 1						
$V_F = V_{EC}$	I_F = 150 A V_{GE} = 0 V chiplevel	T_j = 25 °C		2.2	2.5	V
		T_j = 150 °C		2.1	2.4	V
V_{F0}	chiplevel	T_j = 25 °C		1.3	1.5	V
		T_j = 150 °C		0.9	1.1	V
r_F	chiplevel	T_j = 25 °C		5.8	6.6	mΩ
		T_j = 150 °C		8.1	8.8	mΩ
I_{RRM}	I_F = 150 A	T_j = 150 °C				A
Q_{rr}	V_{GE} = -15 V	T_j = 150 °C				µC
E_{rr}	V_R = 300 V	T_j = 150 °C				mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/K*m			0.45		K/W

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Diode 2						
$V_F = V_{EC}$	I_F = 150 A V_{GE} = 0 V chiplevel	T_j = 25 °C		1.4	1.8	V
		T_j = 150 °C		1.4	1.8	V
V_{F0}	chiplevel	T_j = 25 °C		1	1.2	V
		T_j = 150 °C		0.9	1	V
r_F	chiplevel	T_j = 25 °C		2.4	3.5	mΩ
		T_j = 150 °C		3.6	5.2	mΩ
I_{RRM}	I_F = 150 A	T_j = 150 °C				A
Q_{rr}	V_{GE} = -15 V	T_j = 150 °C				µC
E_{rr}	V_R = 300 V	T_j = 150 °C				mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/K*m			0.63		K/W



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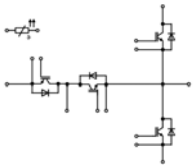

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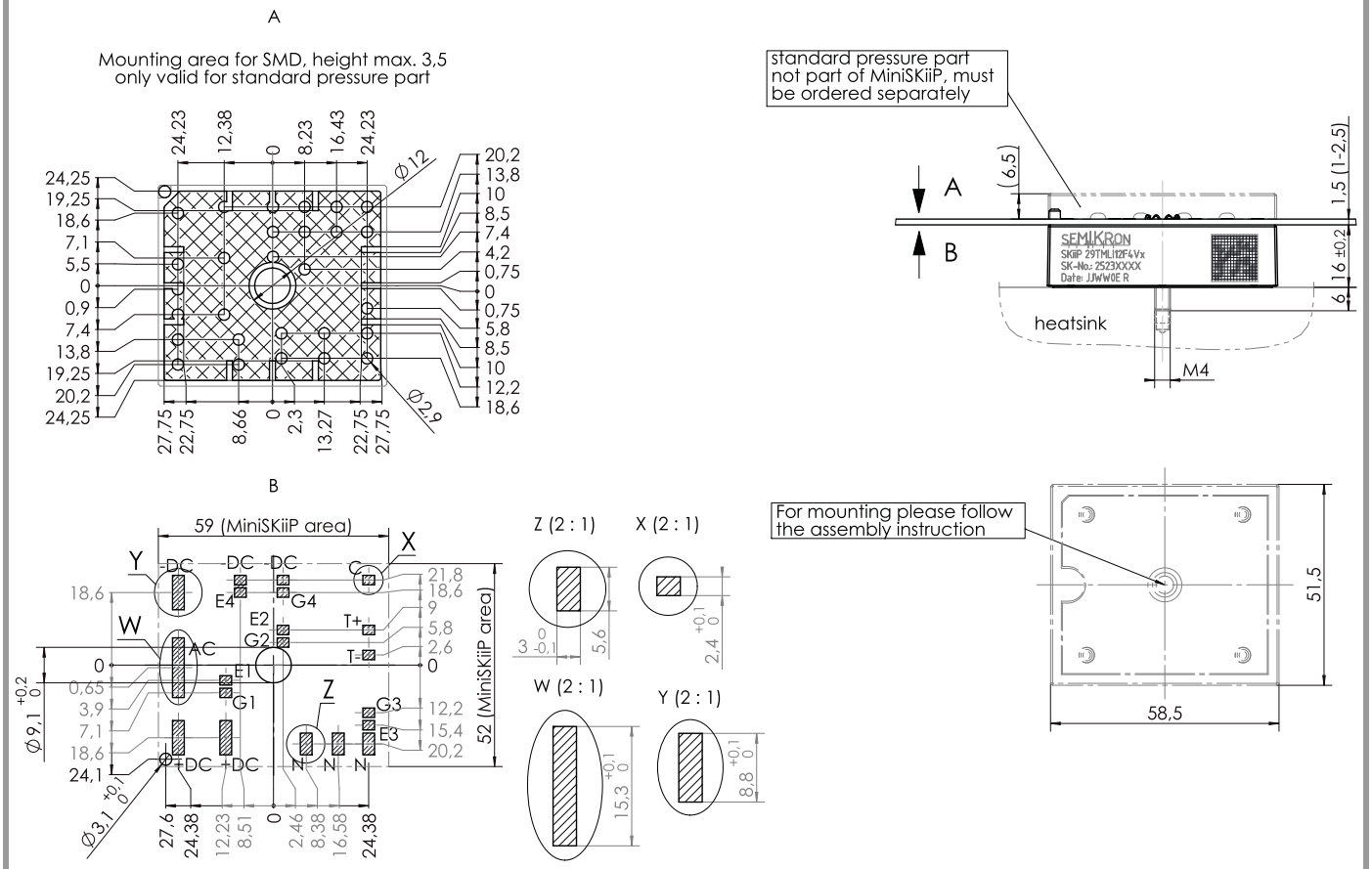
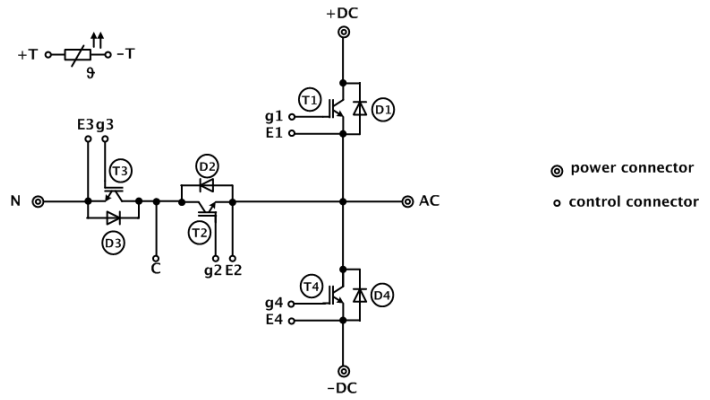
Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Temperature Sensor					
R_{100}	T_r = 100 °C, tolerance = 3 %		1670 ± 3%		Ω
$B_{100/125}$	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}		3550 ± 2%		K



pinout, dimensions



pinout

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

* 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 staff.