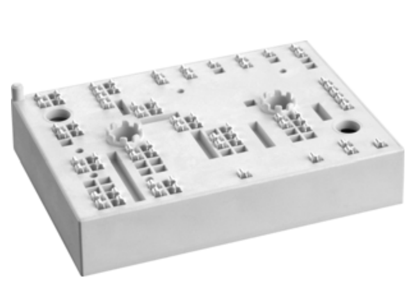
SKiiP39MLI12T4V1



MiniSKiiP® 3

3-Level NPC IGBT-Module

SKiiP39MLI12T4V1

Target Data

Features

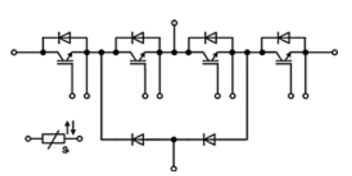
- Trench 4 IGBTs
- Robust and soft freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognised: File no. E63532
- NTC T-Sensor

Remarks*

- Max. case temperature limited to T_C= 125°C
- Product reliability results valid for T_j≤150°C (recommended $T_{j,op}$=-40...+150°C)
- IGBT1: outer IGBTs T1 & T4
- IGBT2: inner IGBTs T2 & T3
- Diode1: outer diodes D1 & D4
- Diode2: inner diodes D2 & D3
- Diode5: clamping diodes D5 & D6

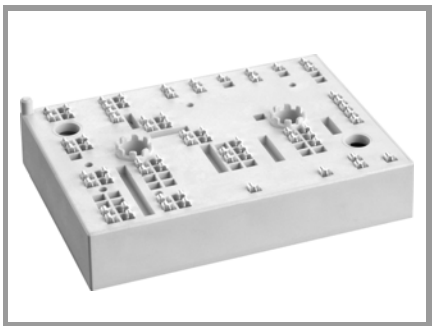
Footnotes

[1] Please find further technical information on the SEMIKRON website.



MLI

Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
IGBT1				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 175 °C	T_s = 25 °C	167	A
		T_s = 70 °C	135	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, T_j = 150 °C, V_{CES} ≤ 1200 V		10	µs
T_j			-40 ... 175	°C
IGBT2				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 175 °C	T_s = 25 °C	167	A
		T_s = 70 °C	135	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, T_j = 150 °C, V_{CES} ≤ 1200 V		10	µs
T_j			-40 ... 175	°C
Diode1				
V_{RRM}	T_j = 25 °C		1200	V
I_F	T_j = 175 °C	T_s = 25 °C	134	A
		T_s = 70 °C	106	A
I_{Fnom}			150	A
I_{FRM}	I_{FRM} = 3 x I_{Fnom}		450	A
I_{FSM}	10 ms, sin 180°, T_j = 25 °C		900	A
T_j			-40 ... 175	°C
Diode2				
V_{RRM}	T_j = 25 °C		1200	V
I_F	T_j = 175 °C	T_s = 25 °C	134	A
		T_s = 70 °C	106	A
I_{Fnom}			150	A
I_{FRM}	I_{FRM} = 3 x I_{Fnom}		450	A
I_{FSM}	10 ms, sin 180°, T_j = 25 °C		900	A
T_j			-40 ... 175	°C
Diode5				
V_{RRM}	T_j = 25 °C		1200	V
I_F	T_j = 175 °C	T_s = 25 °C	134	A
		T_s = 70 °C	106	A
I_{Fnom}			150	A
I_{FRM}	I_{FRM} = 3 x I_{Fnom}		450	A
I_{FSM}	10 ms, sin 180°, T_j = 25 °C		900	A
T_j			-40 ... 175	°C
Module				
$I_{t(RMS)}$	$T_{terminal}$ = 80 °C, 20 A per spring		160	A
T_{stg}			-40 ... 125	°C
V_{isol}	AC sinus 50 Hz, t = 1 min		2500	V



MiniSKiiP® 3

3-Level NPC IGBT-Module

SKiiP39MLI12T4V1

Target Data

Features

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

Remarks*

- Max. case temperature limited to T_C= 125°C
- Product reliability results valid for T_j≤150°C (recommended $T_{j,op}$=-40...+150°C)
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Footnotes

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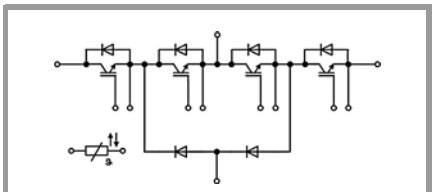
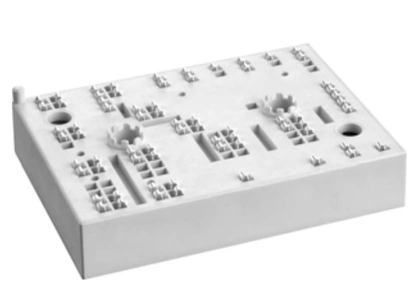


MLI

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
IGBT1						
$V_{CE(sat)}$	I_C = 150 A, V_{GE} = 15 V, chiplevel	T_j = 25 °C		1.85	2.10	V
		T_j = 150 °C		2.25	2.45	V
V_{CE0}	chiplevel	T_j = 25 °C		0.80	0.90	V
		T_j = 150 °C		0.70	0.80	V
r_{CE}	V_{GE} = 15 V, chiplevel	T_j = 25 °C		7.0	8.0	mΩ
		T_j = 150 °C		10	11	mΩ
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 6 mA		5	5.8	6.5	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 1200 V, T_j = 25 °C			0.1	0.3	mA
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V	f = 1 MHz		8.80		nF
C_{oes}		f = 1 MHz		0.58		nF
C_{res}		f = 1 MHz		0.47		nF
Q_G	- 8 V...+ 15 V			850		nC
R_{Gint}	T_j = 25 °C			5.0		Ω
$t_{d(on)}$	V_{CE} = 600 V, I_C = 150 A, V_{GE} = +15/-15 V	T_j = 150 °C				ns
t_r		T_j = 150 °C				ns
E_{on}		T_j = 150 °C		11.1		mJ
$t_{d(off)}$		T_j = 150 °C				ns
t_f		T_j = 150 °C				ns
E_{off}		T_j = 150 °C		16.9		mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/(K*m)			0.33		K/W
IGBT2						
$V_{CE(sat)}$	I_C = 150 A, V_{GE} = 15 V, chiplevel	T_j = 25 °C		1.85	2.10	V
		T_j = 150 °C		2.25	2.45	V
V_{CE0}	chiplevel	T_j = 25 °C		0.80	0.90	V
		T_j = 150 °C		0.70	0.80	V
r_{CE}	V_{GE} = 15 V, chiplevel	T_j = 25 °C		7.0	8.0	mΩ
		T_j = 150 °C		10	11	mΩ
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 6 mA		5	5.8	6.5	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 1200 V, T_j = 25 °C			0.1	0.3	mA
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V	f = 1 MHz		8.80		nF
C_{oes}		f = 1 MHz		0.58		nF
C_{res}		f = 1 MHz		0.47		nF
Q_G	- 8 V...+ 15 V			850		nC
R_{Gint}	T_j = 25 °C			5.0		Ω
$t_{d(on)}$	V_{CE} = 600 V, I_C = 150 A, V_{GE} = +15/-15 V	T_j = 150 °C				ns
t_r		T_j = 150 °C				ns
E_{on}		T_j = 150 °C		5.5		mJ
$t_{d(off)}$		T_j = 150 °C				ns
t_f		T_j = 150 °C				ns
E_{off}		T_j = 150 °C		17.9		mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/(K*m)			0.33		K/W



MiniSKiiP® 3

3-Level NPC IGBT-Module

SKiiP39MLI12T4V1

Target Data

Features

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

Remarks*

- Max. case temperature limited to T_C= 125°C
- Product reliability results valid for T_j≤150°C (recommended $T_{j,op}$=-40...+150°C)
- IGBT1: outer IGBTs T1 & T4
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- Diode1: outer diodes D1 & D4
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Footnotes

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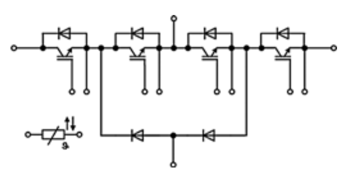
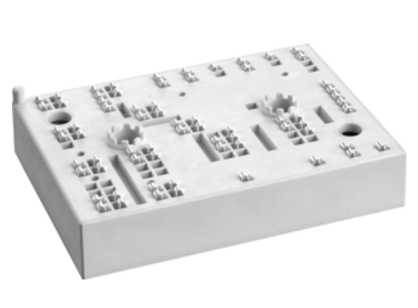


MLI

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Diode1						
$V_F = V_{EC}$	I_F = 150 A V_{GE} = 0 V chiplevel	T_j = 25 °C		2.14	2.46	V
		T_j = 150 °C		2.07	2.38	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		5.6	6.4	mΩ
		T_j = 150 °C		7.8	8.5	mΩ
I_{RRM}	I_F = 150 A	T_j = 150 °C				A
Q_{rr}		T_j = 150 °C				µC
E_{rr}	V_R = 600 V	T_j = 150 °C		10.9		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(K*m)			0.53		K/W
Diode2						
$V_F = V_{EC}$	I_F = 150 A V_{GE} = 0 V chiplevel	T_j = 25 °C		2.14	2.46	V
		T_j = 150 °C		2.07	2.38	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		5.6	6.4	mΩ
		T_j = 150 °C		7.8	8.5	mΩ
I_{RRM}	I_F = 150 A	T_j = 150 °C				A
Q_{rr}		T_j = 150 °C				µC
E_{rr} [1]	V_R = 600 V	T_j = 150 °C		-		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(K*m)			0.53		K/W
Diode5						
$V_F = V_{EC}$	I_F = 150 A V_{GE} = 0 V chiplevel	T_j = 25 °C		2.14	2.46	V
		T_j = 150 °C		2.07	2.38	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		5.6	6.4	mΩ
		T_j = 150 °C		7.8	8.5	mΩ
I_{RRM}	I_F = 150 A	T_j = 150 °C				A
Q_{rr}		T_j = 150 °C				µC
E_{rr}	V_R = 600 V	T_j = 150 °C		11.8		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(K*m)			0.53		K/W



MiniSKiiP® 3

3-Level NPC IGBT-Module

SKiiP39MLI12T4V1

Target Data

Features

- Trench 4 IGBTs
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Footnotes

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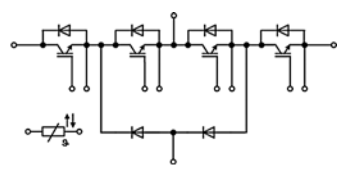
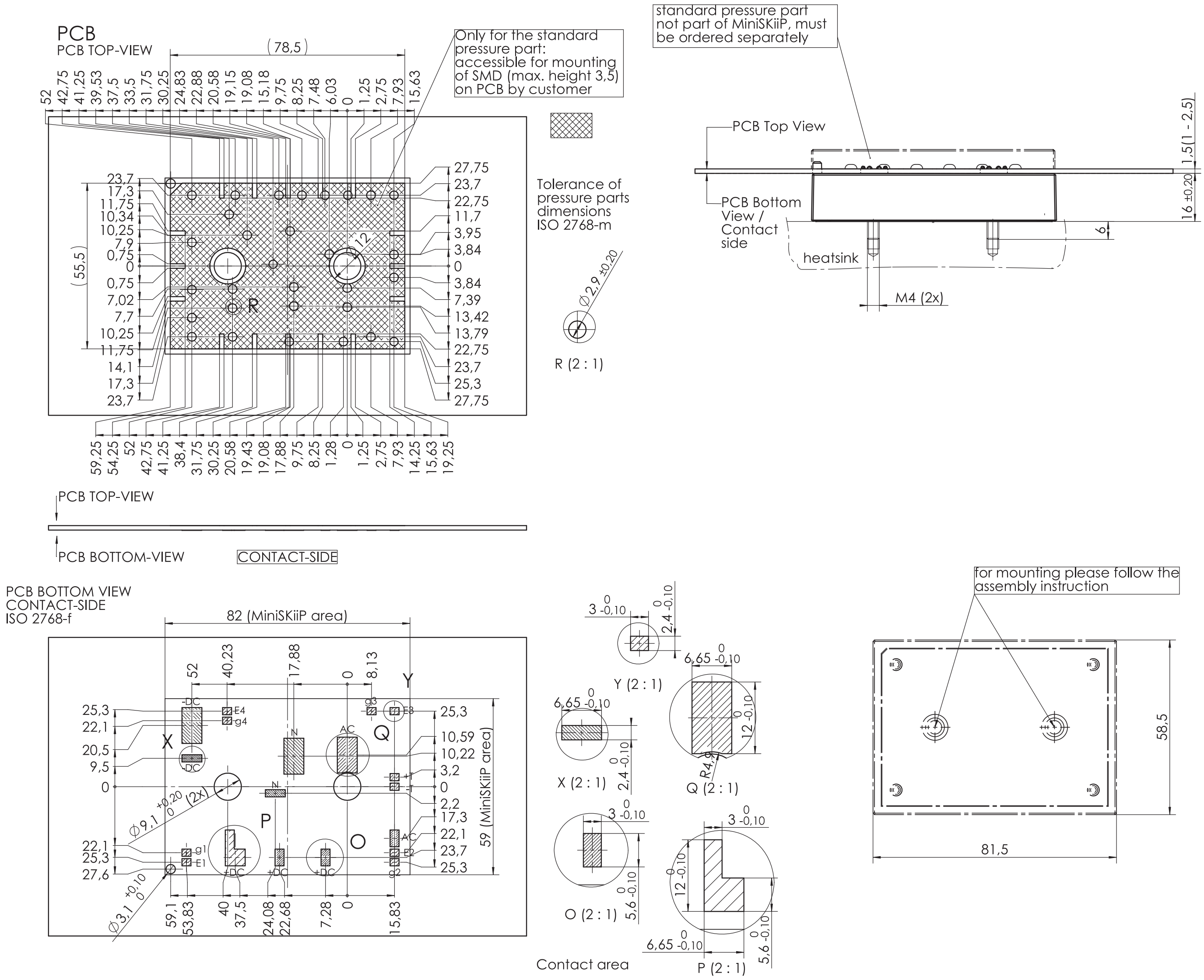
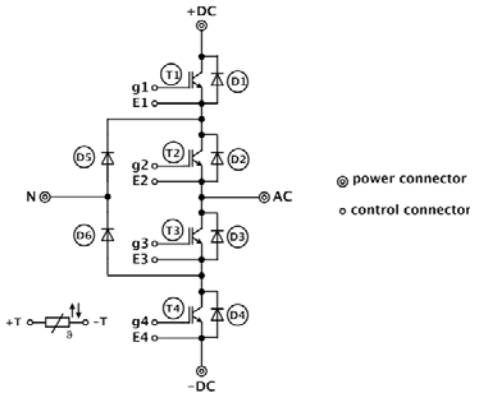


MLI

Symbol	Conditions		min.	typ.	max.	Unit
Module						
L_{sCE1}						nH
L_{sCE2}				t.b.d.		nH
$R_{CC'+EE'}$		T_s = 25 °C				mΩ
						mΩ
M_s	to heat sink		2		2.5	Nm
M_t		to heat sink				Nm
						Nm
w				82		g
Temperature Sensor						
R_{100}	T_c=100°C (R_{25}=5 kΩ) 1)			493		Ω
$B_{100/125}$	$R_{(T)}=R_{100}\exp[B_{100/125}(1/T-1/T_{100})]$; T[K];			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.