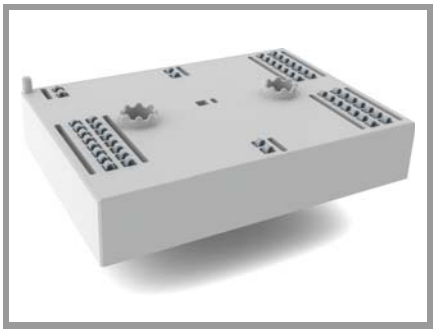
SKiiP39MLIT12F4V1



MiniSKiiP® 3

IGBT module

SKiiP39MLIT12F4V1

Target Data

Features

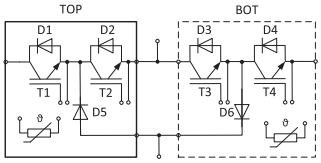
- Robust and soft freewheeling diodes in CAL technology for outer IGBTs
- Highly efficient rectifier diodes for inner IGBTs
- CAL diodes in neutral clamping path
- Highly reliable spring contacts for electrical connections
- 1200V Trench4 Fast technology in outer position
- 1200V Trench4 technology in inner position
- Integrated NTC temperature sensor
- UL recognized, file no. E63532

Typical Applications

- UPS
- Solar
- Suitable for NPC 3-level configuration featuring $1500V_{DC}$ bus

Remarks*

- IGBT1: outer IGBT of NPC configuration assembly T1/T4
- IGBT2: inner IGBT of NPC configuration assembly T2/T3
- Diode1: antiparallel diode of IGBT1 D1/D4
- Diode2: antiparallel diode of IGBT2 D2/D3
- Diode5: CAL clamping diode of NPC configuration assembly D5/D6



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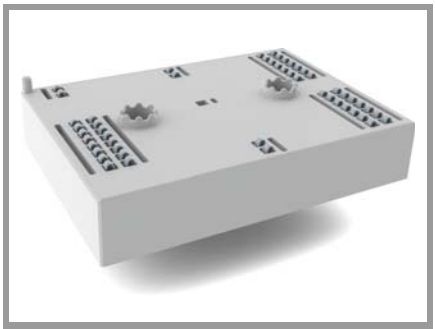
Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
IGBT1				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 175 °C	T_s = 25 °C	409	A
		T_s = 70 °C	328	A
I_{Cnom}			400	A
I_{CRM}	I_{CRM} = 3 x I_{Cnom}		1200	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	348	A
		T_s = 70 °C	282	A
I_{Cnom}			300	A
I_{CRM}	I_{CRM} = 3 x I_{Cnom}		900	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	193	A
		T_s = 70 °C	153	A
I_{Fnom}			200	A
I_{FRM}	I_{FRM} = 2 x I_{Fnom}		400	A
I_{FSM}	10 ms, sin 180°, T_j = 25 °C		990	A
T_j			-40 ... 175	°C
Diode2				
V_{RRM}	T_j = 25 °C		1200	V
I_F	T_j = 150 °C	T_s = 25 °C	241	A
		T_s = 70 °C	177	A
I_{Fnom}			150	A
I_{FRM}			-	A
I_{FSM}	10 ms, sin 180°, T_j = 25 °C		1800	A
T_j			-40 ... 150	°C
Diode5				
V_{RRM}	T_j = 25 °C		1200	V
I_F	T_j = 175 °C	T_s = 25 °C	320	A
		T_s = 70 °C	252	A
I_{Fnom}			375	A
I_{FRM}	I_{FRM} = 2 x I_{Fnom}		750	A
I_{FSM}	10 ms, sin 180°, T_j = 25 °C		1720	A
T_j			-40 ... 175	°C
Module				
$I_{t(RMS)}$	20 A per spring		t.b.d.	A
T_{stg}			-40 ... 125	°C
V_{isol}	AC sinus 50 Hz, t = 1 min		2500	V



MiniSKiiP® 3

IGBT module

SKiiP39MLIT12F4V1

Target Data

Features

- Robust and soft freewheeling diodes in CAL technology for outer IGBTs
- Highly efficient rectifier diodes for inner IGBTs
- CAL diodes in neutral clamping path
- Highly reliable spring contacts for electrical connections
- 1200V Trench4 Fast technology in outer position
- 1200V Trench4 technology in inner position
- Integrated NTC temperature sensor
- UL recognized, file no. E63532

Typical Applications

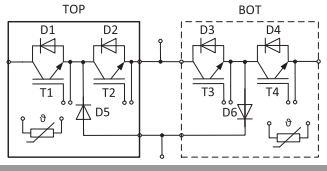
- UPS
- Solar
- Suitable for NPC 3-level configuration featuring 1500V_{DC} bus

Remarks*

- IGBT1: outer IGBT of NPC configuration assembly T1/T4
- IGBT2: inner IGBT of NPC configuration assembly T2/T3
- Diode1: antiparallel diode of IGBT1 D1/D4
- Diode2: antiparallel diode of IGBT2 D2/D3
- Diode5: CAL clamping diode of NPC configuration assembly D5/D6

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
IGBT1						
$V_{CE(sat)}$	I_C = 400 A V_{GE} = 15 V chiplevel	T_j = 25 °C		2.05	2.42	V
		T_j = 150 °C		2.59	2.96	V
V_{CE0}	chiplevel	T_j = 25 °C		1.10	1.28	V
		T_j = 150 °C		0.95	1.13	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		2.4	2.9	mΩ
		T_j = 150 °C		4.1	4.6	mΩ
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 15.2 mA		5.2	5.8	6.4	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 1200 V, T_j = 25 °C				0.3	mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		24.60		nF
C_{oes}		f = 1 MHz		1.62		nF
C_{res}		f = 1 MHz		1.38		nF
Q_G	V_{GE} = -8 V ... +15 V			2268		nC
R_{Gint}	T_j = 25 °C			0		Ω
$t_{d(on)}$	V_{CE} = 600 V I_C = 400 A V_{GE} = +15/-15 V	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}		T_j = 150 °C		-		mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/(K*m)			0.118		K/W
IGBT2						
$V_{CE(sat)}$	I_C = 300 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.80	2.05	V
		T_j = 150 °C		2.20	2.40	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		3.3	3.8	mΩ
		T_j = 150 °C		5.0	5.3	mΩ
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 11.4 mA		5	5.8	6.5	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 1200 V, T_j = 25 °C				0.6	mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		18.45		nF
C_{oes}		f = 1 MHz		1.22		nF
C_{res}		f = 1 MHz		1.04		nF
Q_G	V_{GE} = - 8 V...+ 15 V			1695		nC
R_{Gint}	T_j = 25 °C			2.5		Ω
$t_{d(on)}$	V_{CE} = 600 V I_C = 300 A V_{GE} = +15/-15 V	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}		T_j = 150 °C		-		mJ
$R_{th(j-s)}$	per IGBT, λ_{paste}=0.8 W/(K*m)			0.157		K/W



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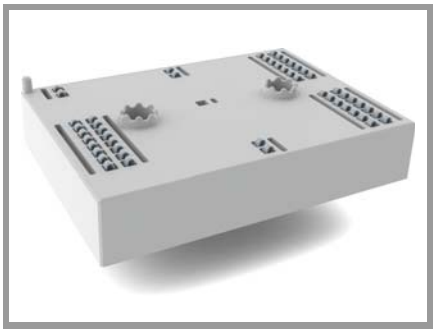

MiniSKiiP® 3

IGBT module

SKiiP39MLIT12F4V1

Target Data

Features

- Robust and soft freewheeling diodes in CAL technology for outer IGBTs
- Highly efficient rectifier diodes for inner IGBTs
- CAL diodes in neutral clamping path
- Highly reliable spring contacts for electrical connections
- 1200V Trench4 Fast technology in outer position
- 1200V Trench4 technology in inner position
- Integrated NTC temperature sensor
- UL recognized, file no. E63532

Typical Applications

- UPS
- Solar
- Suitable for NPC 3-level configuration featuring 1500V_{DC} bus

Remarks*

- IGBT1: outer IGBT of NPC configuration assembly T1/T4
- IGBT2: inner IGBT of NPC configuration assembly T2/T3
- Diode1: antiparallel diode of IGBT1 D1/D4
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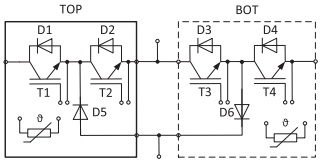
- Diode5: CAL clamping diode of NPC configuration assembly D5/D6



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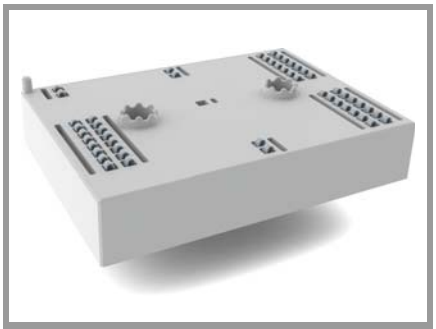
Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Diode1						
$V_F = V_{EC}$	I_F = 200 A V_{GE} = 0 V chiplevel	T_j = 25 °C		2.20	2.52	V
		T_j = 150 °C		2.15	2.47	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		4.5	5.1	mΩ
		T_j = 150 °C		6.3	6.9	mΩ
I_{RRM}	I_F = 200 A	T_j = 150 °C		-		A
Q_{rr}	V_R = 600 V V_{GE} = +15/-15 V	T_j = 150 °C		-		µC
E_{rr}		T_j = 150 °C		-		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(K*m)			0.342		K/W
Diode2						
$V_F = V_{EC}$	I_F = 150 A V_{GE} = 0 V chiplevel	T_j = 25 °C		1.08	1.36	V
		T_j = 125 °C		1.01	1.28	V
V_{F0}	chiplevel	T_j = 25 °C		0.88	0.98	V
		T_j = 125 °C		0.73	0.83	V
r_F	chiplevel	T_j = 25 °C		1.33	2.6	mΩ
		T_j = 125 °C		1.89	3.0	mΩ
I_{RRM}	I_F = 150 A	T_j = 150 °C		-		A
Q_{rr}	V_R = 600 V V_{GE} = +15/-15 V	T_j = 150 °C		-		µC
E_{rr} [1)]		T_j = 150 °C		-		mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(K*m)			0.336		K/W
Diode5						
$V_F = V_{EC}$	I_F = 375 A V_{GE} = 0 V chiplevel	T_j = 25 °C		2.17	2.49	V
		T_j = 150 °C		2.11	2.42	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		2.3	2.6	mΩ
		T_j = 150 °C		3.2	3.5	mΩ
I_{RRM}	I_F = 150 A					A
Q_{rr}	V_R = 600 V V_{GE} = +15/-15 V					µC
E_{rr}						mJ
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(K*m)			0.227		K/W



MiniSKiiP® 3

IGBT module

SKiiP39MLIT12F4V1

Target Data

Features

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Typical Applications

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- Solar
- Suitable for NPC 3-level configuration featuring 1500V_{DC} bus

Remarks*

- IGBT1: outer IGBT of NPC configuration assembly T1/T4
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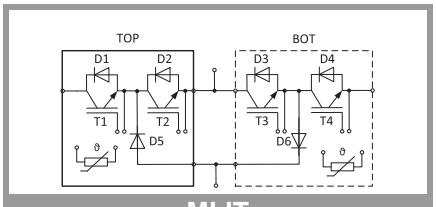
- Diode1: antiparallel diode of IGBT1 D1/D4
- Diode2: antiparallel diode of IGBT2 D2/D3
- Diode5: CAL clamping diode of NPC configuration assembly D5/D6

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Module						
L_{sCE1}				-		nH
L_{sCE2}				-		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)			493 ± 5%		Ω
$B_{100/125}$	$R_{(T)}=R_{100}\exp[B_{100/125}(1/T-1/T_{100})]$; T[K];			3550 ±2%		K



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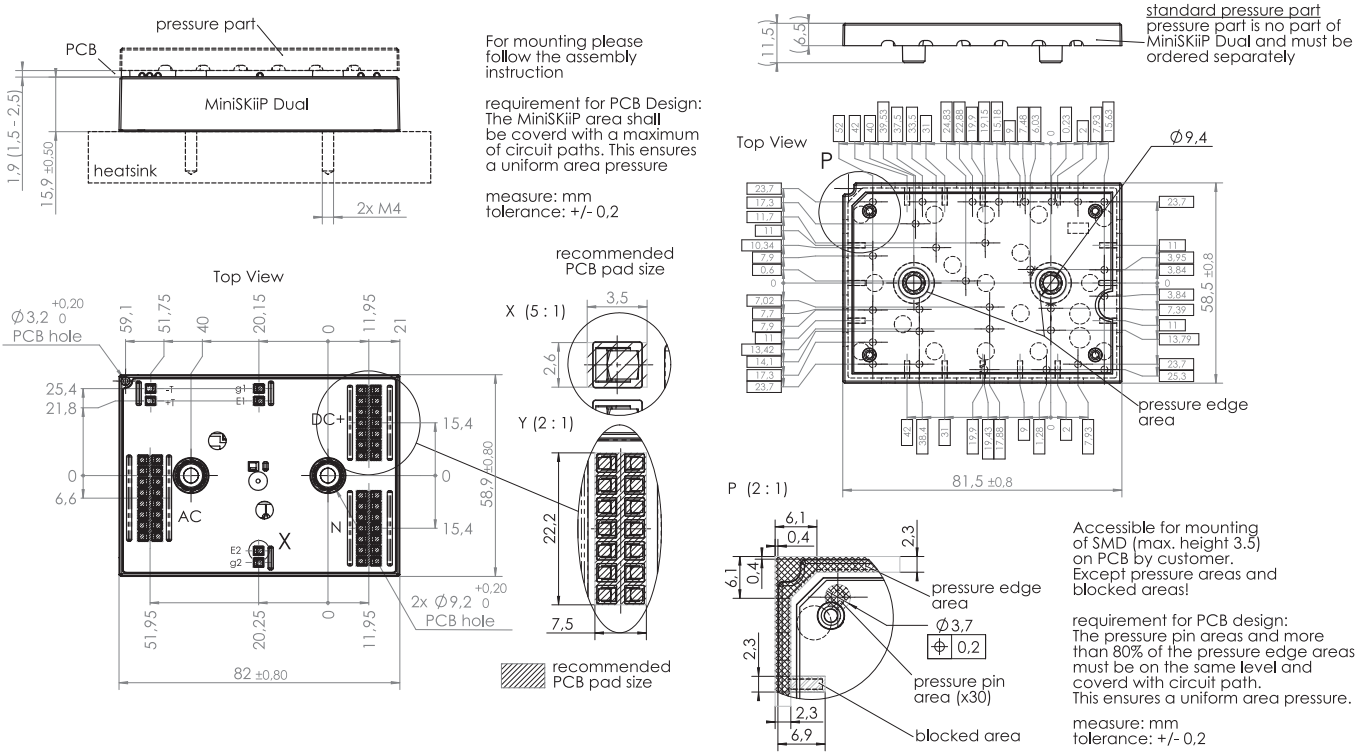
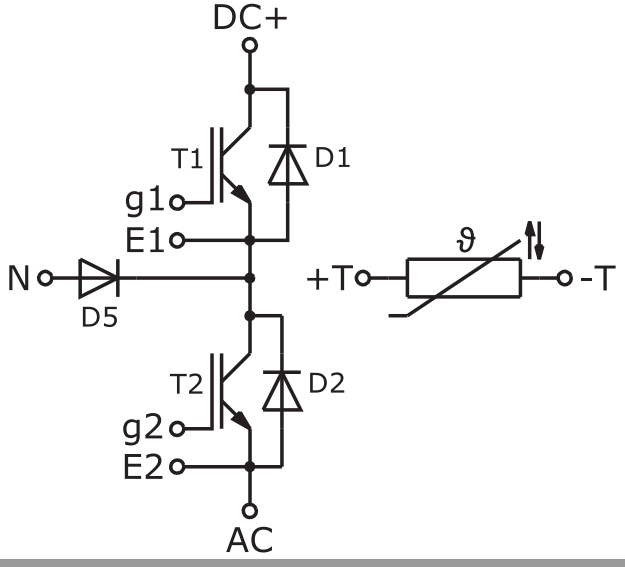


pinout, dimensions



pinout

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

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