

SEMiX453GB12E4p



SEMiX® 3p

Trench IGBT Modules

SEMiX453GB12E4p

Target Data

Features

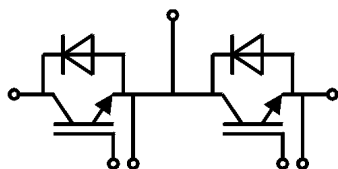
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- Press-fit pins as auxiliary contacts
- UL recognized, file no. E63532

Typical Applications*

- AC inverter drives
- UPS
- Renewable energy systems

Remarks

- Product reliability results are valid for $T_j=150^\circ\text{C}$



GB

Absolute Maximum Ratings

Symbol	Conditions	Values	Unit
IGBT			
V_{CES}	$T_j = 25^\circ\text{C}$	1200	V
I_C	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$	683
		$T_c = 80^\circ\text{C}$	526
I_{Cnom}		450	A
I_{CRM}	$I_{CRM} = 3 \times I_{Cnom}$	1350	A
V_{GES}		-20 ... 20	V
t_{psc}	$V_{CC} = 800\text{ V}$ $V_{GE} \leq 20\text{ V}$ $V_{CES} \leq 1200\text{ V}$	$T_j = 150^\circ\text{C}$	10
T_j		-40 ... 175	$^\circ\text{C}$

Inverse diode

I_F	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$	544	A
		$T_c = 80^\circ\text{C}$	407	A
I_{Fnom}			450	A
I_{FRM}	$I_{FRM} = 3 \times I_{Fnom}$		1350	A
I_{FSM}	$t_p = 10\text{ ms, sin } 180^\circ, T_j = 25^\circ\text{C}$		2430	A
T_j			-40 ... 175	$^\circ\text{C}$

Module

$I_{t(RMS)}$	$T_{terminal} = 80^\circ\text{C}$	600	A
T_{stg}		-40 ... 125	$^\circ\text{C}$
V_{isol}	AC sinus 50Hz, $t = 1\text{ min}$	4000	V

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
IGBT					
$V_{CE(sat)}$	$I_C = 450\text{ A}$ $V_{GE} = 15\text{ V}$ chipelevel		$T_j = 25^\circ\text{C}$	1.80	2.05
			$T_j = 150^\circ\text{C}$	2.19	2.40
V_{CE0}	chipelevel		$T_j = 25^\circ\text{C}$	0.8	0.9
			$T_j = 150^\circ\text{C}$	0.7	0.8
r_{CE}	$V_{GE} = 15\text{ V}$ chipelevel		$T_j = 25^\circ\text{C}$	2.2	2.6
			$T_j = 150^\circ\text{C}$	3.3	3.6
$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C = 18\text{ mA}$	5	5.8	6.5	V
I_{CES}	$V_{GE} = 0\text{ V}$ $V_{CE} = 1200\text{ V}$		$T_j = 25^\circ\text{C}$		5
			$T_j = 150^\circ\text{C}$		
C_{ies}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$		$f = 1\text{ MHz}$	27.9	nF
C_{oes}			$f = 1\text{ MHz}$	1.74	nF
C_{res}			$f = 1\text{ MHz}$	1.53	nF
Q_G	$V_{GE} = -8\text{ V} \dots +15\text{ V}$		2550		nC
R_{Gint}	$T_j = 25^\circ\text{C}$		1.67		Ω
$t_{d(on)}$	$V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$		220	ns
t_r	$I_C = 450\text{ A}$			70	ns
E_{on}	$V_{GE} = +15/-15\text{ V}$	$T_j = 150^\circ\text{C}$		28	mJ
$t_{d(off)}$	$R_{G on} = 1.3\ \Omega$	$T_j = 150^\circ\text{C}$		600	ns
t_f	$R_{G off} = 1.3\ \Omega$	$T_j = 150^\circ\text{C}$		120	ns
E_{off}	$di/dt_{on} = 7000\text{ A}/\mu\text{s}$ $di/dt_{off} = 7000\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$			
	$du/dt = 3100\text{ V}/\mu\text{s}$ $L_s = 35\text{ nH}$			60	mJ
$R_{th(j-c)}$	per IGBT			0.065	K/W

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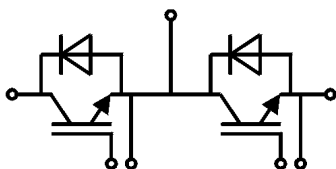
Typical Applications*

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- UPS
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Remarks

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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
V _F = V _{EC}	I _F = 450 A	T _J = 25 °C		2.14	2.46	V
	V _{GE} = 0 V chiplevel	T _J = 150 °C		2.07	2.38	V
V _{F0}	chiplevel	T _J = 25 °C	1.1	1.3	1.5	V
		T _J = 150 °C	0.7	0.9	1.1	V
r _F	chiplevel	T _J = 25 °C	1.4	1.9	2.1	mΩ
		T _J = 150 °C	2.3	2.6	2.8	mΩ
I _{RRM}	I _F = 450 A	T _J = 150 °C		350		A
Q _{rr}	di/dt _{off} = 7000 A/μs	T _J = 150 °C		70		μC
E _{rr}	V _{GE} = -15 V	T _J = 150 °C		30		mJ
	V _{CC} = 600 V					
R _{th(j-c)}	per diode				0.11	K/W
Module						
L _{CE}				20		nH
R _{CC'+EE'}	res., terminal-chip	T _C = 25 °C		1.2		mΩ
		T _C = 125 °C		1.65		mΩ
R _{th(c-s)}	per module			0.04		K/W
M _s	to heat sink (M5)		3		6	Nm
M _t		to terminals (M6)	3		6	Nm
						Nm
w					340	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

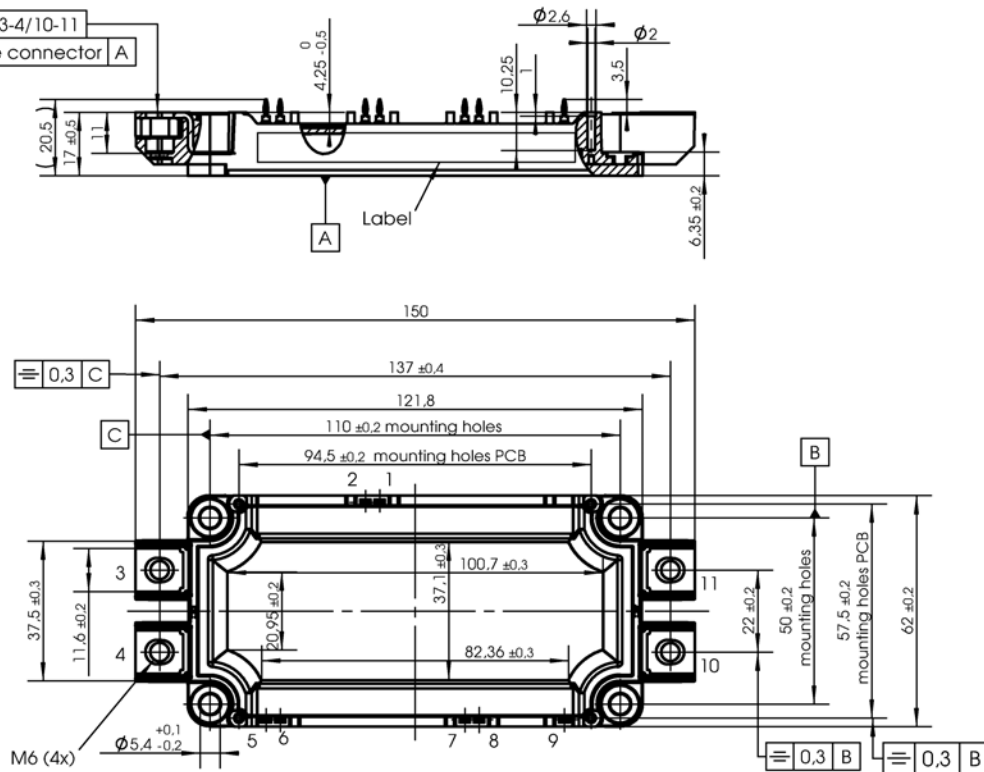


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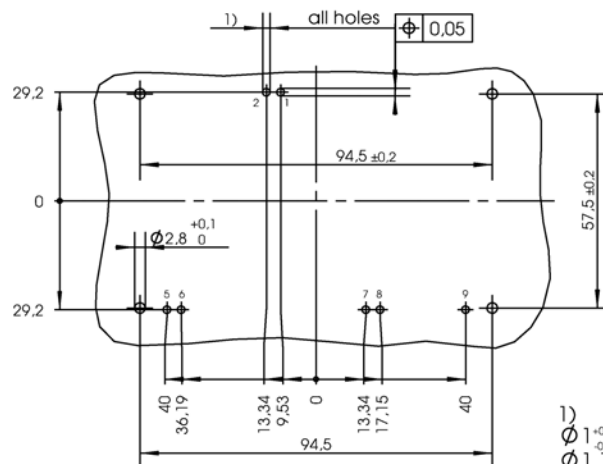
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Package outline

□	0,3 connector 3-4/10-11	
//	0,2 each single connector	A



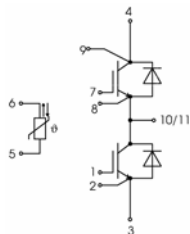
PCB drillhole pattern



1)
 $\varnothing 1^{+0,09}_{-0,06}$ diameter of finished plated trough-hole
 $\varnothing 1,15$ diameter of drilled hole

Dimensions valid in mounted status

SEMIX 3p



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.