

SEMiX453GB17E4Ip



SEMiX® 3p shunt

SEMiX453GB17E4Ip

Features

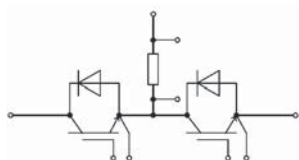
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- Press-fit pins as auxiliary contacts
- Current sensing shunt resistor
- UL recognized, file no. E63532

Typical Applications*

- AC inverter drives
- UPS
- Renewable energy systems

Remarks

- Product reliability results are valid for $T_j=150^\circ\text{C}$
- V_{isol} between temperature sensor and power section is only 2500V



GB + shunt

Absolute Maximum Ratings						
Symbol	Conditions		Values			Unit
IGBT						
V _{CES}	T _j = 25 °C		1700			V
I _C	T _j = 175 °C	T _c = 25 °C	731			A
		T _c = 80 °C	555			A
I _{Cnom}			450			A
I _{CRM}	I _{CRM} = 3xI _{Cnom}		1350			A
V _{GES}			-20 ... 20			V
t _{psc}	V _{CC} = 1000 V V _{GE} ≤ 15 V V _{CES} ≤ 1700 V	T _j = 150 °C	10			μs
T _j			-40 ... 175			°C
Inverse diode						
V _{RRM}	T _j = 25 °C		1700			V
I _F	T _j = 175 °C	T _c = 25 °C	557			A
		T _c = 80 °C	412			A
I _{Fnom}			450			A
I _{FRM}	I _{FRM} = 2xI _{Fnom}		900			A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 25 °C		2565			A
T _j			-40 ... 175			°C
Module						
I _{t(RMS)}			210			A
T _{stg}			-40 ... 125			°C
V _{isol}	AC sinus 50Hz, t = 1 min		4000			V
Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
IGBT						
V _{CE(sat)}	I _C = 450 A V _{GE} = 15 V chipelevel	T _j = 25 °C	1.90	2.20		V
		T _j = 150 °C	2.26	2.45		V
V _{CE0}	chipelevel	T _j = 25 °C	1.1	1.2		V
		T _j = 150 °C	1	1.1		V
r _{CE}	V _{GE} = 15 V chipelevel	T _j = 25 °C	1.78	2.2		mΩ
		T _j = 150 °C	2.8	3		mΩ
V _{GE(th)}	V _{GE} =V _{CE} , I _C = 18 mA		5.2	5.8	6.4	V
I _{CES}	V _{GE} = 0 V V _{CE} = 1700 V	T _j = 25 °C			5	mA
						mA
C _{ies}	V _{CE} = 25 V V _{GE} = 0 V	f = 1 MHz	36			nF
C _{oes}		f = 1 MHz	1.50			nF
C _{res}		f = 1 MHz	1.14			nF
Q _G	V _{GE} = - 8 V...+ 15 V		3600			nC
R _{Gint}	T _j = 25 °C		1.67			Ω
t _{d(on)}	V _{CC} = 900 V	T _j = 150 °C	270			ns
t _r	I _C = 450 A	T _j = 150 °C	90			ns
E _{on}	V _{GE} = +15/-15 V R _{G on} = 2.7 Ω	T _j = 150 °C	153			mJ
t _{d(off)}	R _{G off} = 2.7 Ω	T _j = 150 °C	815			ns
t _f	di/dt _{on} = 4300 A/μs di/dt _{off} = 2200 A/μs	T _j = 150 °C	200			ns
E _{off}	du/dt = 3200 V/μs L _s = 21 nH	T _j = 150 °C	150			mJ
R _{th(j-c)}	per IGBT				0.06	K/W
R _{th(c-s)}	per IGBT (λ _{grease} =0.81 W/(m²K))		0.029			K/W
R _{th(c-s)}	per IGBT, pre-applied phase change material		0.02			K/W



SEMiX® 3p shunt

SEMiX453GB17E4Ip

Features

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

Typical Applications*

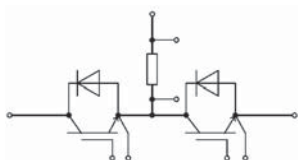
- AC inverter drives
- UPS
- Renewable energy systems

Remarks

- Product reliability results are valid for $T_j=150^\circ\text{C}$
- V_{isol} between temperature sensor and power section is only 2500V

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
V _F = V _{EC}	I _F = 450 A	T _j = 25 °C		1.98	2.37	V
	V _{GE} = 0 V chiplevel	T _j = 150 °C		2.11	2.52	V
V _{F0}	chiplevel	T _j = 25 °C	1.16	1.32	1.56	V
		T _j = 150 °C		1.08	1.22	V
r _F	chiplevel	T _j = 25 °C	1.2	1.5	1.8	mΩ
		T _j = 150 °C		2.3	2.9	mΩ
I _{RRM}	I _F = 450 A	T _j = 150 °C		350		A
Q _{rr}	di/dt _{off} = 4850 A/μs	T _j = 150 °C		130		μC
E _{rr}	V _{GE} = -15 V V _{CC} = 900 V	T _j = 150 °C		73		mJ
R _{th(j-c)}	per diode				0.1	K/W
R _{th(c-s)}	per diode (λ _{grease} =0.81 W/(m*K))			0.048		K/W
R _{th(c-s)}	per diode, pre-applied phase change material			0.038		K/W
Module						
L _{CE}				20		nH
R _{CC'+EE'}	res. terminal-chip, shunt excluded	T _C = 25 °C		0.85		mΩ
		T _C = 150 °C		1.2		mΩ
R _{th(c-s)1}	calculated without thermal coupling			0.009		K/W
R _{th(c-s)2}	including thermal coupling, Ts underneath module (λ _{grease} =0.81 W/(m*K))			0.014		K/W
R _{th(c-s)2}	including thermal coupling, Ts underneath module, pre-applied phase change material			0.011		K/W
M _s	to heat sink (M5)		3		6	Nm
M _t		to terminals (M6)	3		6	Nm
						Nm
w					350	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

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
Shunt					
I _{Shunt}	T _c = 100 °C, T _{Shunt,max} = 170 °C, R _{th} = 4 K/W			210	A
R _{Shunt}	Tolerance = ±1 %		0.40		mΩ
α				50	ppm/K



GB + shunt

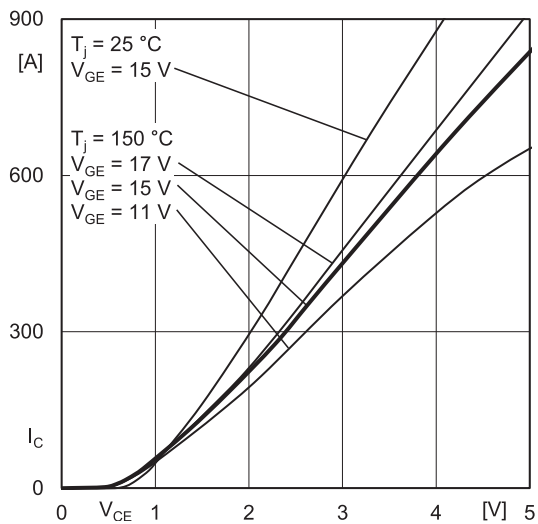


Fig. 1: Typ. output characteristic, inclusive $R_{CC'} + E_{E'}$

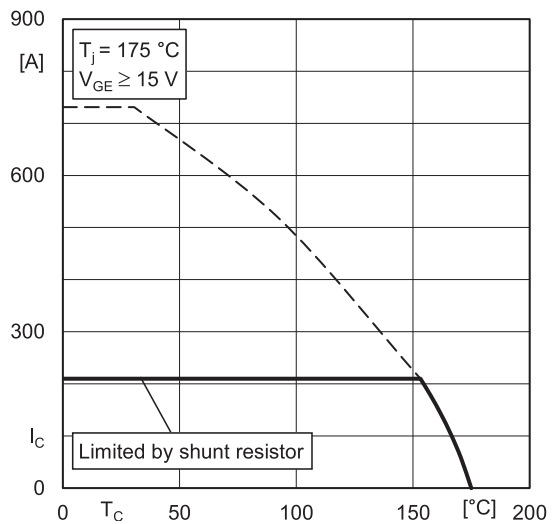


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

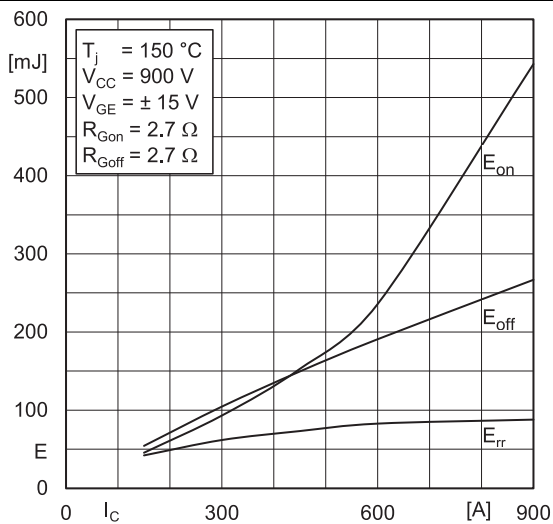


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

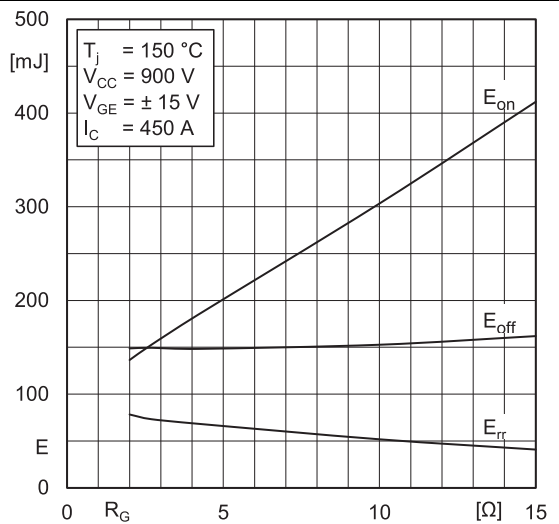


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

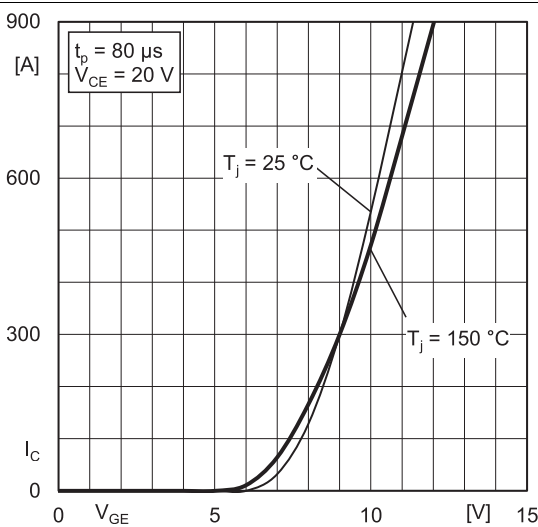


Fig. 5: Typ. transfer characteristic

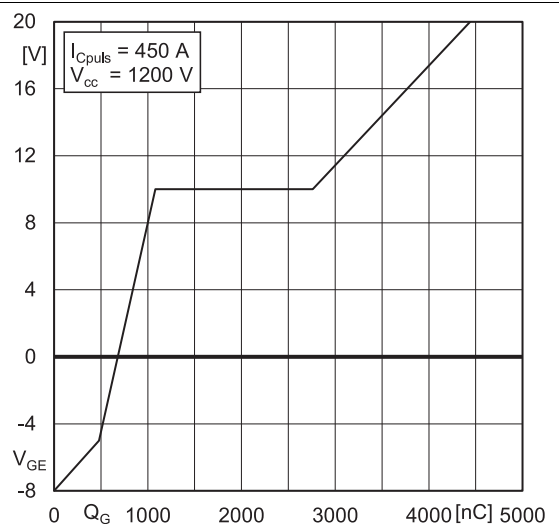
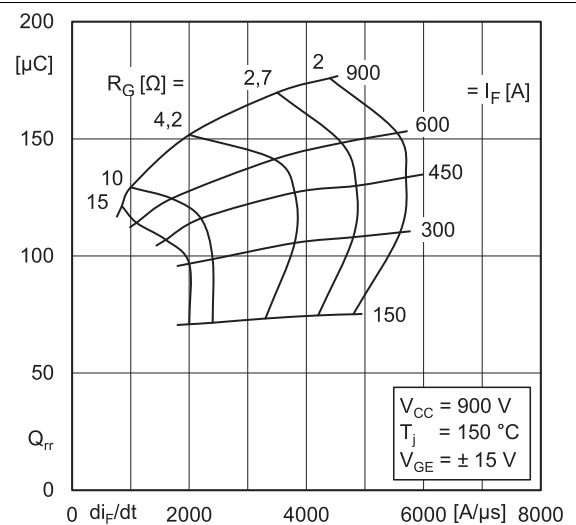
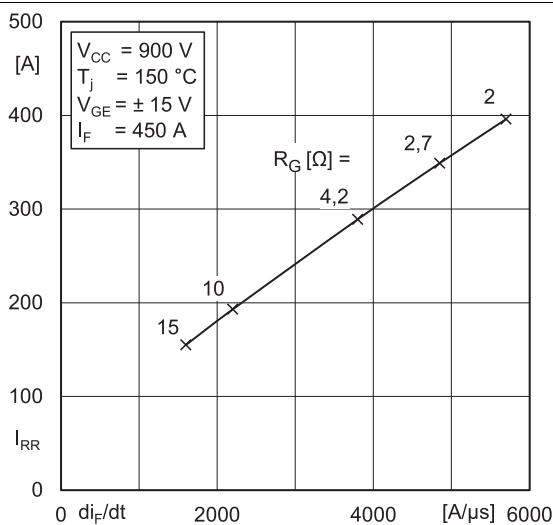
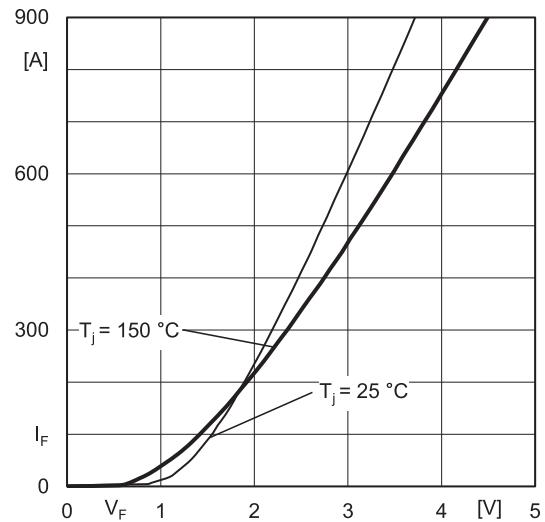
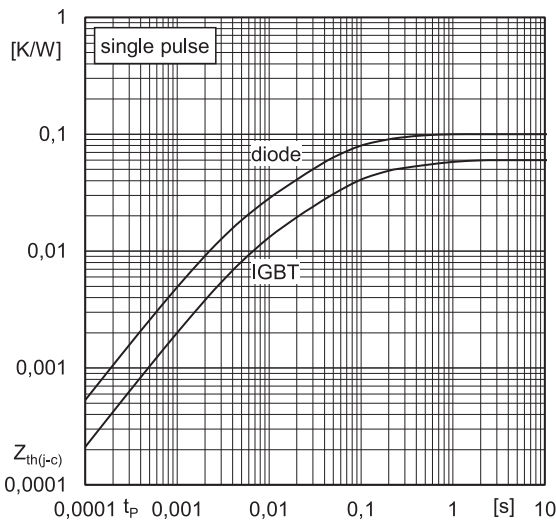
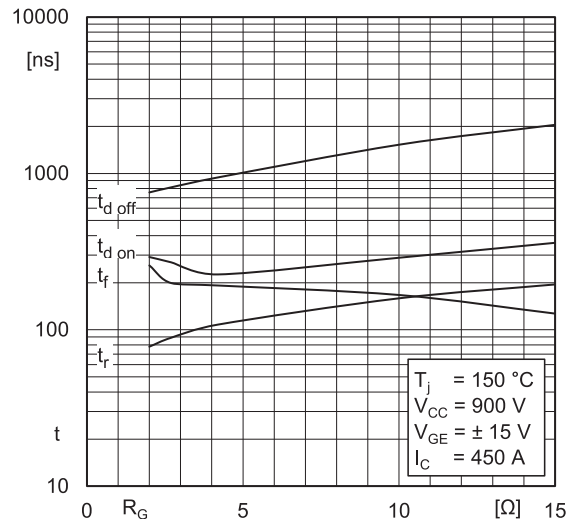
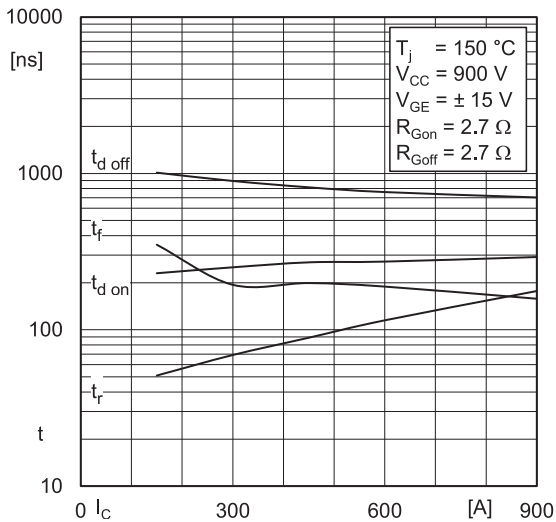
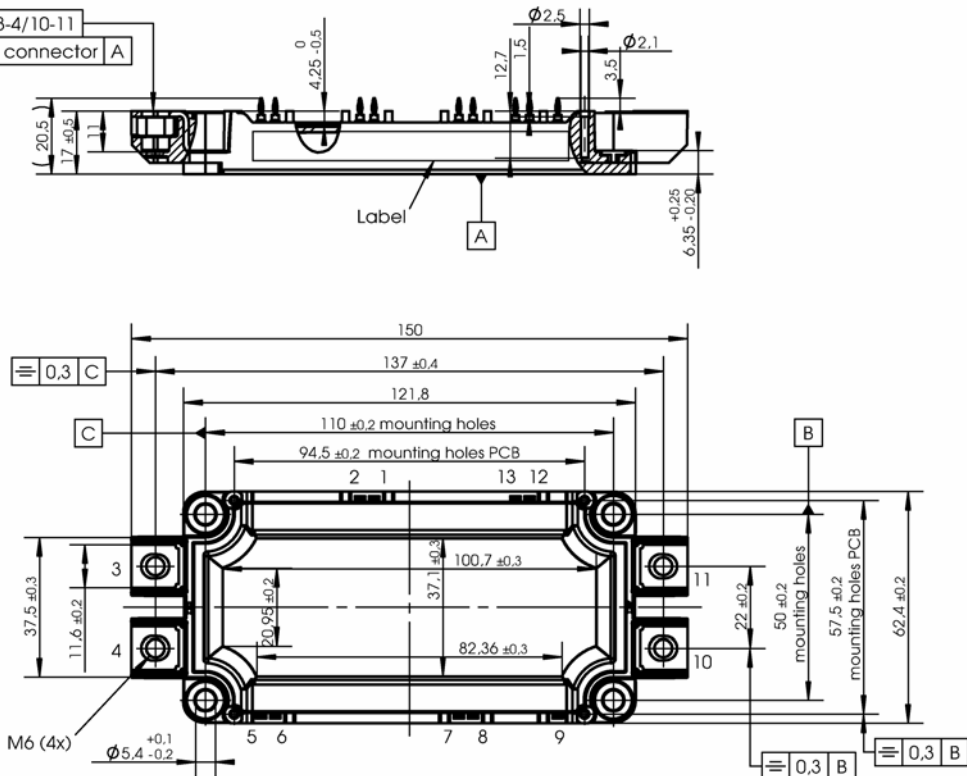


Fig. 6: Typ. gate charge characteristic

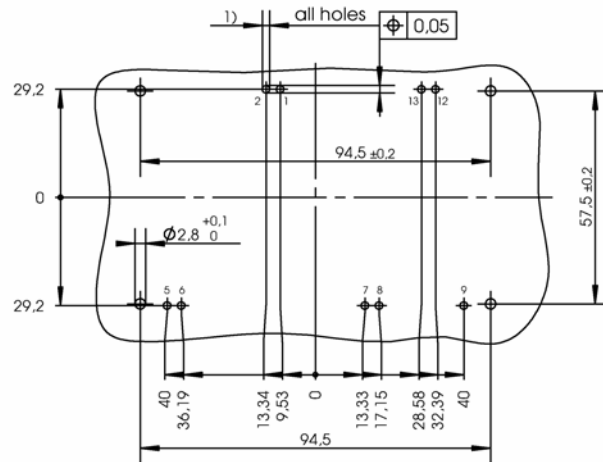


Package outline

- 0.3 connector 3-4/10-11
- /// 0.2 each single connector A



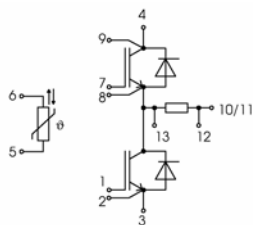
PCB drillhole pattern



Dimensions valid in mounted status

1) PCB hole specification see Mounting Instructions SEMiX press-fit

SEMiX 3p shunt



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.