



SEMiX® 3s

Trench IGBT Modules

SEMiX353GB126HDs

Features

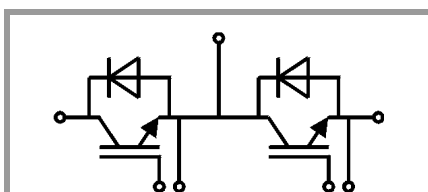
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- UL recognised file no. E63532

Typical Applications*

- AC inverter drives
- UPS
- Electronic Welding

Remarks

- Case temperatur limited to $T_C=125^\circ\text{C}$ max.
- Not for new design



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Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
IGBT				
V _{CES}	T _j = 25 °C		1200	V
I _C	T _j = 150 °C	T _c = 25 °C	364	A
		T _c = 80 °C	256	A
I _{Cnom}			225	A
I _{CRM}	I _{CRM} = 2xI _{Cnom}		450	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 600 V V _{GE} ≤ 20 V V _{CES} ≤ 1200 V	T _j = 125 °C	10	μs
T _j			-40 ... 150	°C
Inverse diode				
I _F	T _j = 150 °C	T _c = 25 °C	329	A
		T _c = 80 °C	228	A
I _{Fnom}			225	A
I _{FRM}	I _{FRM} = 2xI _{Fnom}		450	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 25 °C		1700	A
T _j			-40 ... 150	°C
Module				
I _{t(RMS)}	T _{terminal} = 80 °C		600	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 = 225 A	T _j = 25 °C		1.7	2.1	V
	V _{GE} = 15 V chipelevel	T _j = 125 °C		2.0	2.45	V
V _{CE0}	V _{GE} = 15 V	T _j = 25 °C		1	1.2	V
		T _j = 125 °C		0.9	1.1	V
r _{CE}		T _j = 25 °C		3.1	4.0	mΩ
		T _j = 125 °C		4.9	6.0	mΩ
V _{GE(th)}	V _{GE} =V _{CE} , I _C = 9 mA		5	5.8	6.5	V
I _{CES}	V _{GE} = 0 V	T _j = 25 °C		0.1	0.3	mA
	V _{CE} = 1200 V	T _j = 125 °C				mA
C _{ies}	V _{CE} = 25 V V _{GE} = 0 V	f = 1 MHz		16.0		nF
C _{oes}		f = 1 MHz		0.84		nF
C _{res}		f = 1 MHz		0.73		nF
Q _G		V _{GE} = - 8 V...+ 15 V			1800	
R _{Gint}	T _j = 25 °C			3.33		Ω
t _{d(on)}	V _{CC} = 600 V	T _j = 125 °C		265		ns
t _r	I _C = 225 A	T _j = 125 °C		55		ns
E _{on}	V _{GE} = ±15 V	T _j = 125 °C		26.5		mJ
t _{d(off)}	R _{G on} = 2 Ω	T _j = 125 °C		585		ns
t _f	R _{G off} = 2 Ω	T _j = 125 °C		120		ns
E _{off}		T _j = 125 °C		32.5		mJ
R _{th(j-c)}	per IGBT				0.1	K/W



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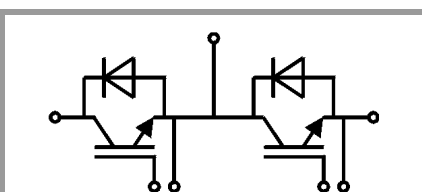
Typical Applications*

- AC inverter drives
- UPS
- Electronic Welding

Remarks

- Case temperatur limited to $T_C=125^\circ\text{C}$ max.
- Not for new design

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
V _F = V _{EC}	I _F = 225 A V _{GE} = 0 V chip	T _J = 25 °C		1.6	1.80	V
		T _J = 125 °C		1.6	1.8	V
V _{F0}		T _J = 25 °C	0.9	1	1.1	V
		T _J = 125 °C	0.7	0.8	0.9	V
r _F		T _J = 25 °C	2.2	2.7	3.1	mΩ
		T _J = 125 °C	3.1	3.6	4.0	mΩ
I _{RRM}	I _F = 225 A	T _J = 125 °C	330			A
Q _{rr}	di/dt _{off} = 5600 A/μs	T _J = 125 °C	69			μC
E _{rr}	V _{GE} = -15 V V _{CC} = 600 V	T _J = 125 °C	29			mJ
R _{th(j-c)}	per diode		0.17			K/W
Module						
L _{CE}			20			nH
R _{CC'+EE'}	res., terminal-chip	T _C = 25 °C	0.7			mΩ
		T _C = 125 °C	1			mΩ
R _{th(c-s)}	per module		0.04			K/W
M _s	to heat sink (M5)		3	5		Nm
M _t		to terminals (M6)	2.5	5		Nm
w			300			g
Temperatur 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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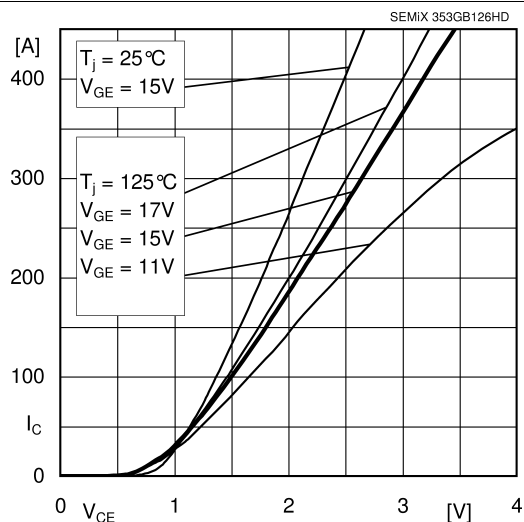


Fig. 1: Typ. output characteristic, inclusive $R_{CC} + EE'$

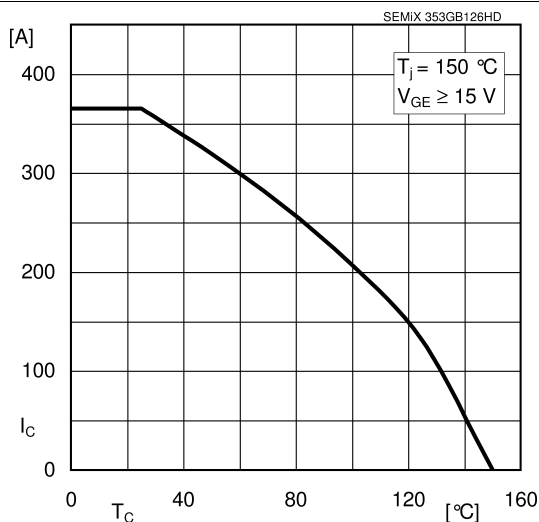


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

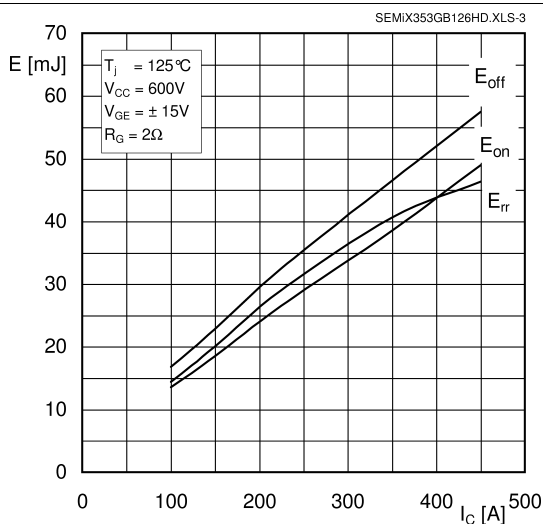


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

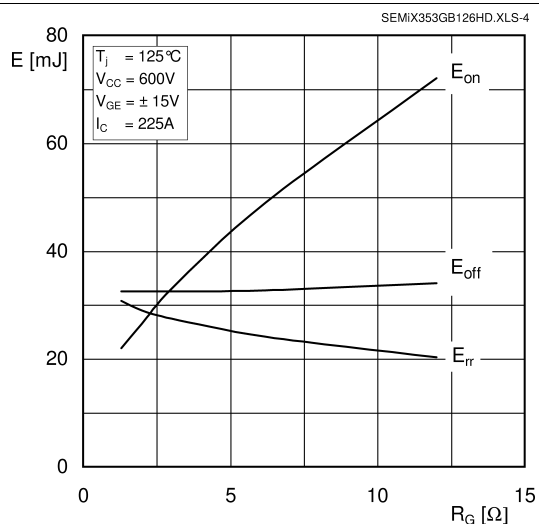


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

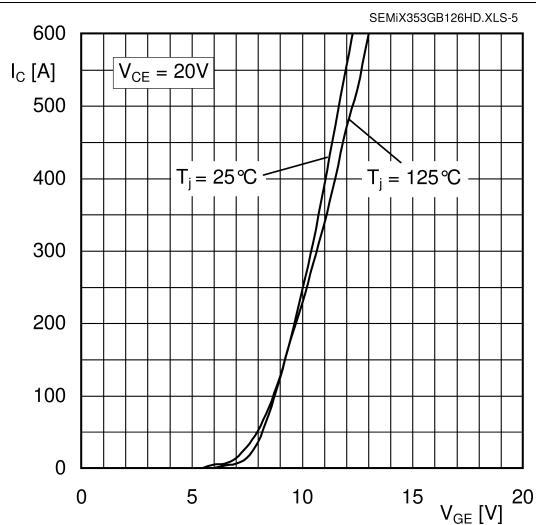


Fig. 5: Typ. transfer characteristic

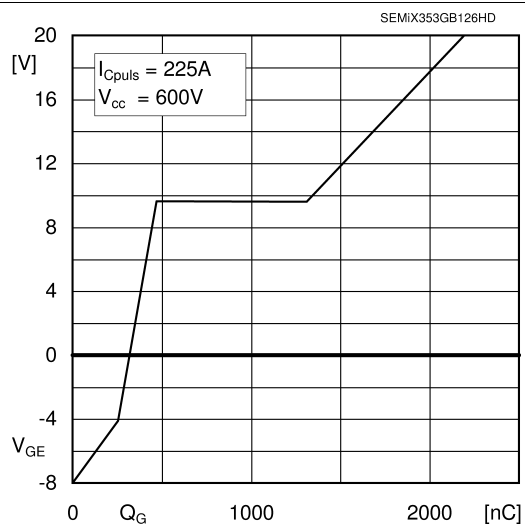


Fig. 6: Typ. gate charge characteristic

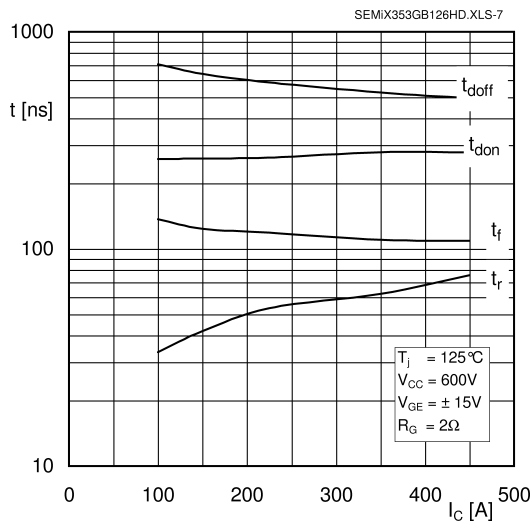
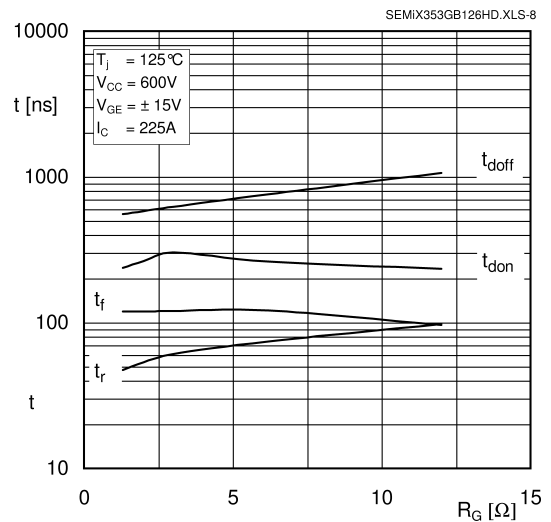
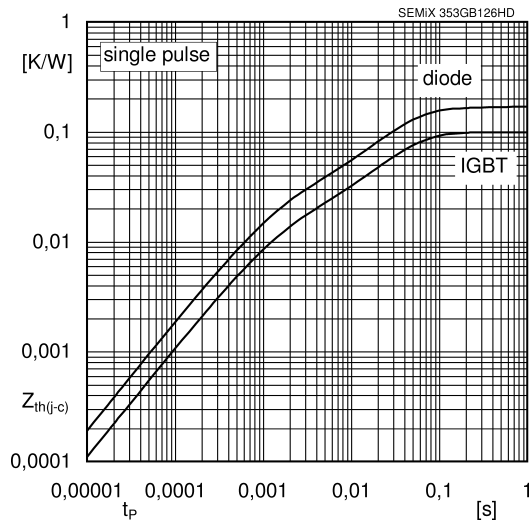

 Fig. 7: Typ. switching times vs. I_C

 Fig. 8: Typ. switching times vs. gate resistor R_G


Fig. 9: Typ. transient thermal impedance

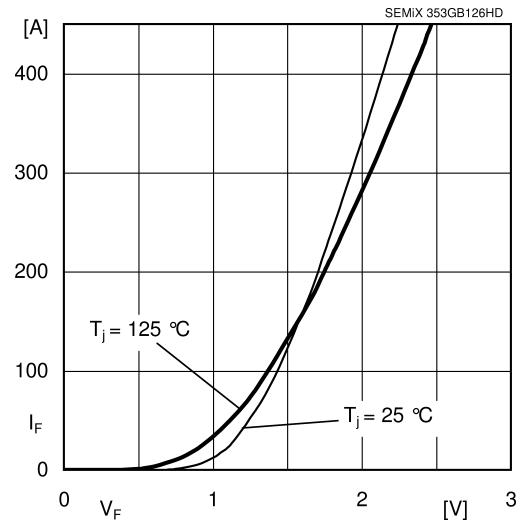
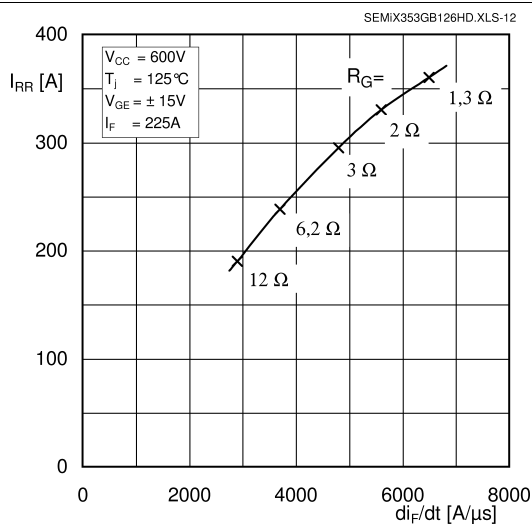

 Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'}+EE'$


Fig. 11: Typ. CAL diode peak reverse recovery current

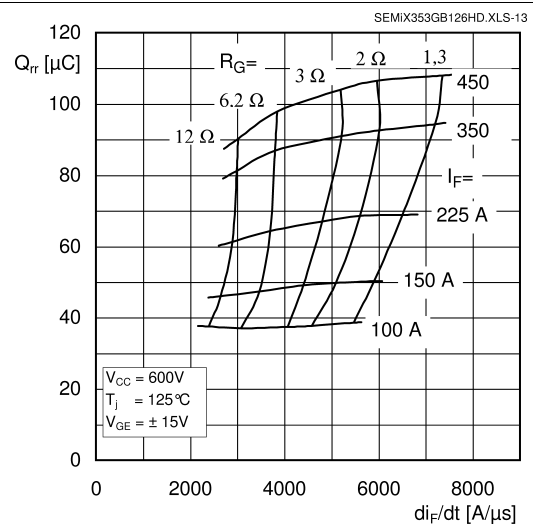
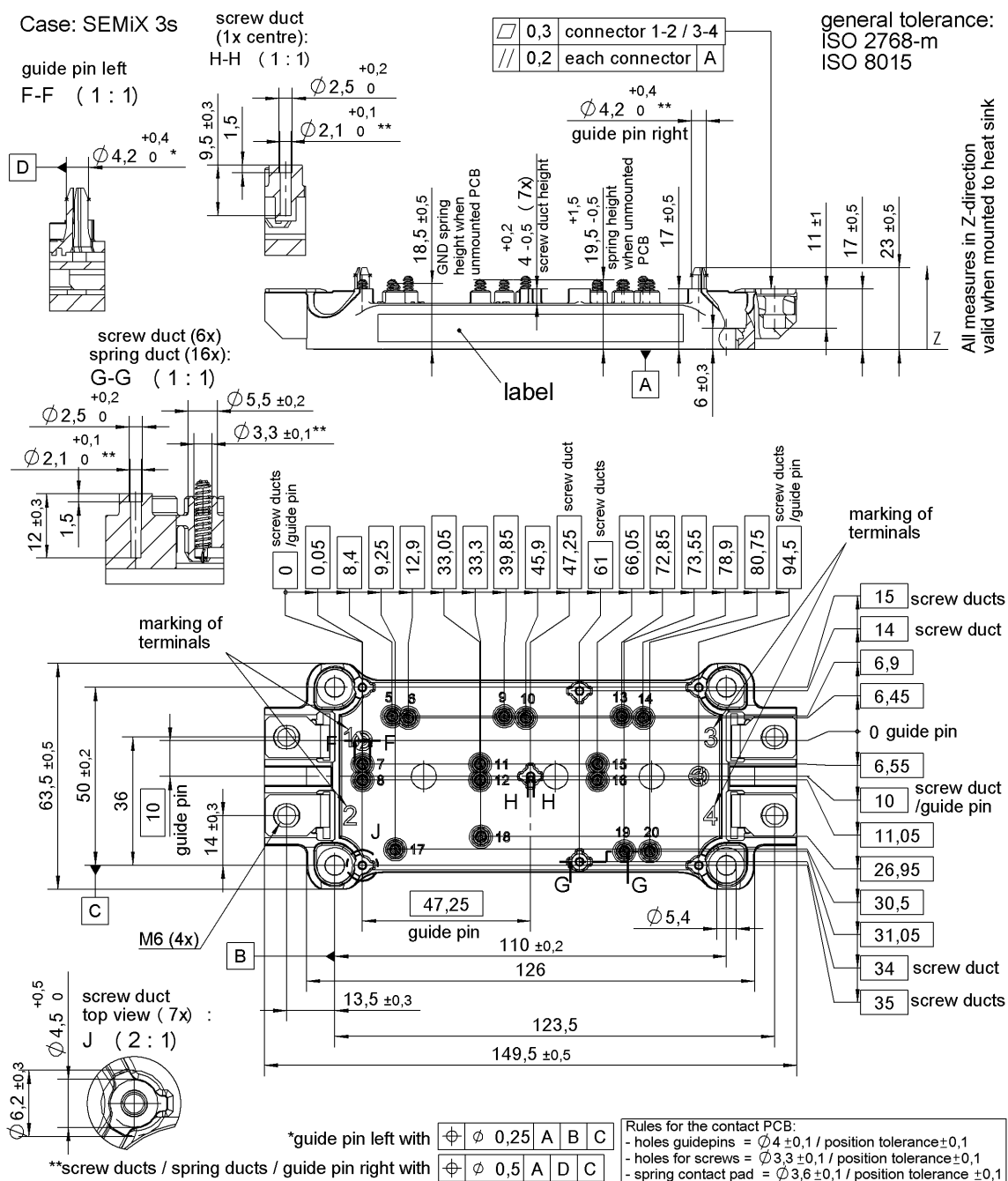
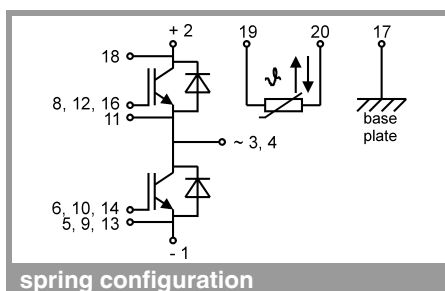


Fig. 12: Typ. CAL diode recovery charge



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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.