

SEMiX703GB126HDs



SEMiX® 3s

Trench IGBT Modules

SEMiX703GB126HDs

Features

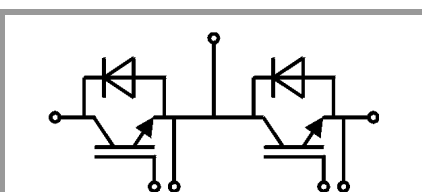
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- UL recognised file no. E63532

Typical Applications*

- AC inverter drives
- UPS
- Electronic Welding

Remarks

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



GB

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	642	A
		T _c = 80 °C	449	A
I _{Cnom}			450	A
I _{CRM}	I _{CRM} = 2xI _{Cnom}		900	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	561	A
		T _c = 80 °C	384	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		2900	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					
$V_{CE(sat)}$	$I_C = 450\text{ A}$ $V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$	1.7	2.10	V
		$T_j = 125^\circ\text{C}$	2.0	2.45	V
V_{CE0}	chipelevel	$T_j = 25^\circ\text{C}$	1	1.2	V
		$T_j = 125^\circ\text{C}$	0.9	1.1	V
r_{CE}	$V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$	1.6	2.0	$\text{m}\Omega$
		$T_j = 125^\circ\text{C}$	2.4	3.0	$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C = 18\text{ mA}$	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	mA
		$T_j = 125^\circ\text{C}$			mA
C_{ies}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	32.3		nF
C_{oes}		$f = 1\text{ MHz}$	1.69		nF
C_{res}		$f = 1\text{ MHz}$	1.46		nF
Q_G	$V_{GE} = -8\text{ V...} + 15\text{ V}$		3600		nC
R_{Gint}	$T_j = 25^\circ\text{C}$		1.67		Ω
$t_{d(on)}$	$V_{CC} = 600\text{ V}$	$T_j = 125^\circ\text{C}$	310		ns
t_r	$I_C = 450\text{ A}$ $V_{GE} = \pm 15\text{ V}$	$T_j = 125^\circ\text{C}$	60		ns
		$T_j = 125^\circ\text{C}$	32		mJ
E_{on}	$R_{G on} = 1.6\text{ }\Omega$	$T_j = 125^\circ\text{C}$	680		ns
$t_{d(off)}$	$R_{G off} = 1.6\text{ }\Omega$	$T_j = 125^\circ\text{C}$	135		ns
t_f		$T_j = 125^\circ\text{C}$	68		mJ
E_{off}		$T_j = 125^\circ\text{C}$			
$R_{th(j-c)}$	per IGBT			0.061	K/W

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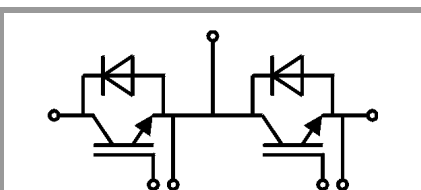
Typical Applications*

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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		1.6	1.80	V
	V _{GE} = 0 V chiplevel	T _j = 125 °C		1.6	1.8	V
V _{F0}	chiplevel	T _j = 25 °C	0.9	1	1.1	V
		T _j = 125 °C	0.7	0.8	0.9	V
r _F	chiplevel	T _j = 25 °C	1.1	1.3	1.6	mΩ
		T _j = 125 °C	1.6	1.8	2.0	mΩ
I _{RRM}	I _F = 450 A	T _j = 125 °C		580		A
Q _{rr}	di/dt _{off} = 8500 A/μs	T _j = 125 °C		130		μC
E _{rr}	V _{GE} = -15 V	T _j = 125 °C		60		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		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
						Nm
w					300	g
Temperature Sensor						
R ₁₀₀	T _c =100°C (R ₂₅ =5 kΩ)			493 ± 5%		Ω
B _{100/125}	R(Τ)=R ₁₀₀ exp[B _{100/125} (1/T-1/T ₁₀₀)]; T[K];			3550 ±2%		K



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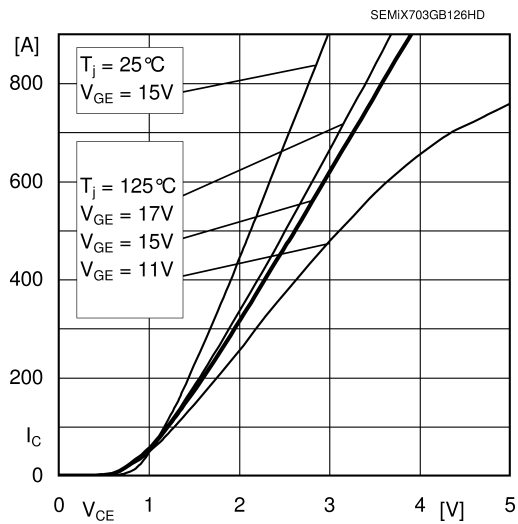


Fig. 1: Typ. output characteristic, inclusive $R_{CC} + EE'$

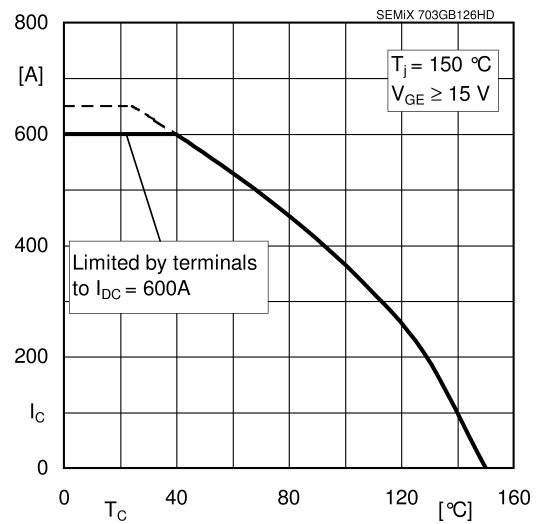


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

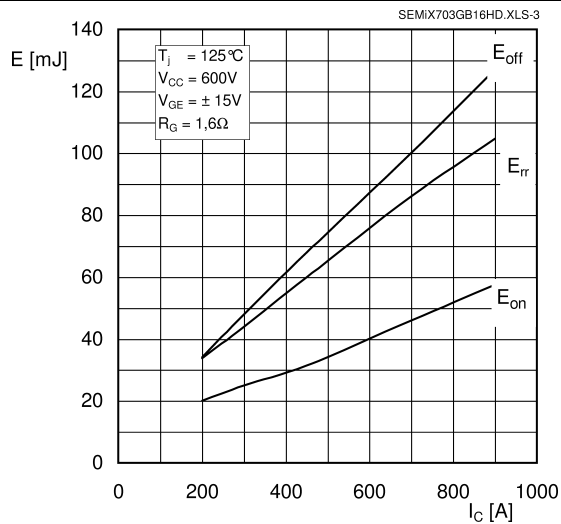


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

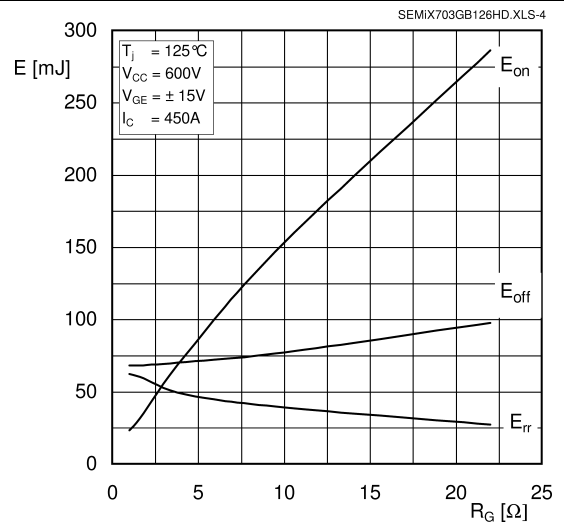


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

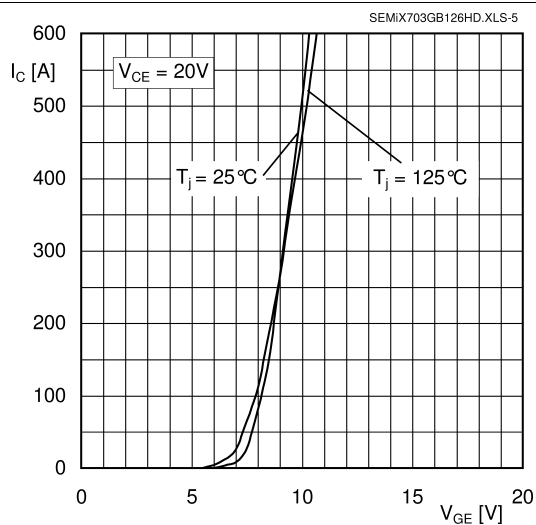


Fig. 5: Typ. transfer characteristic

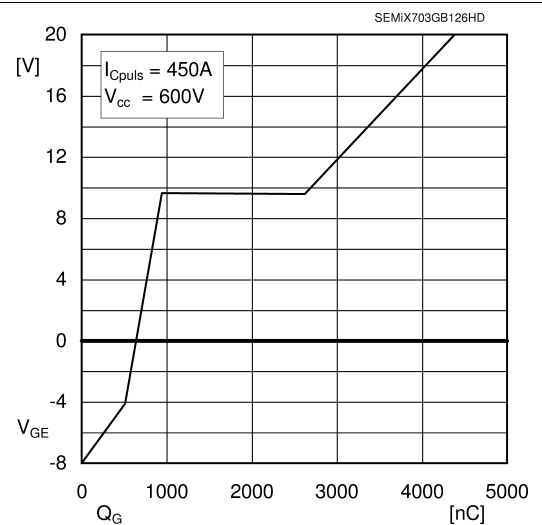


Fig. 6: Typ. gate charge characteristic

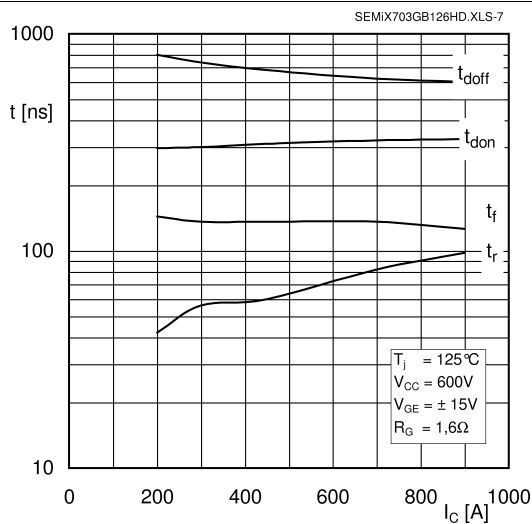


Fig. 7: Typ. switching times vs. I_C

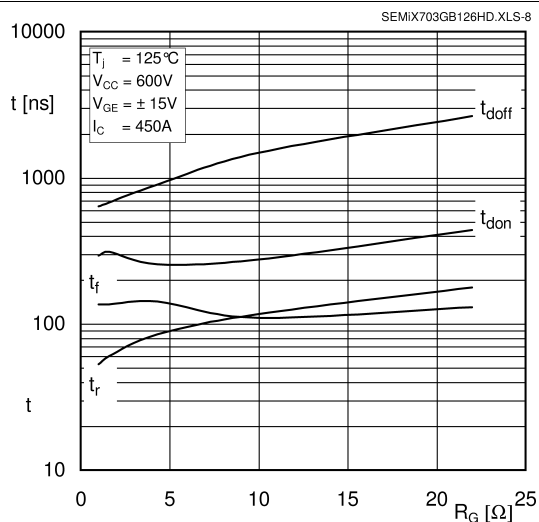


Fig. 8: Typ. switching times vs. gate resistor R_G

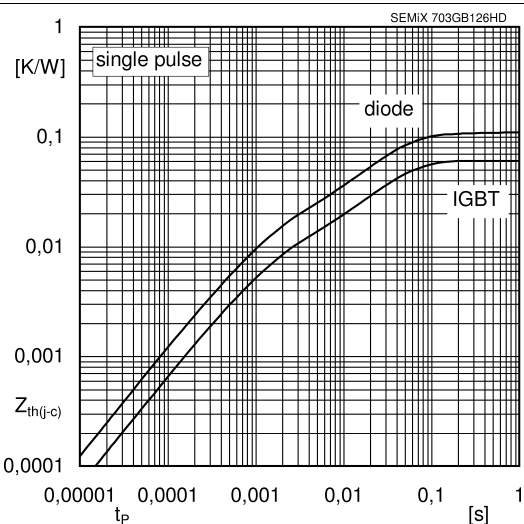


Fig. 9: Typ. transient thermal impedance

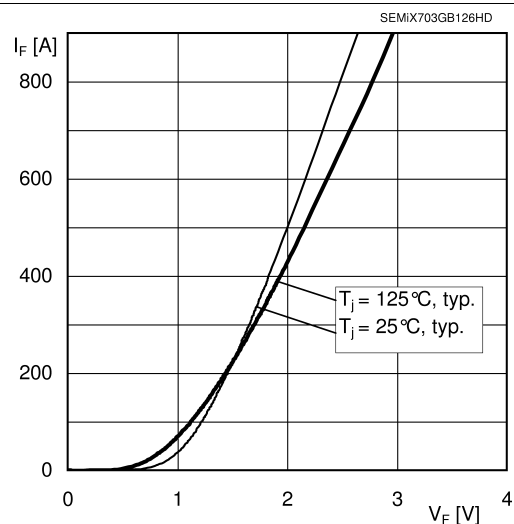


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'} + EE'$

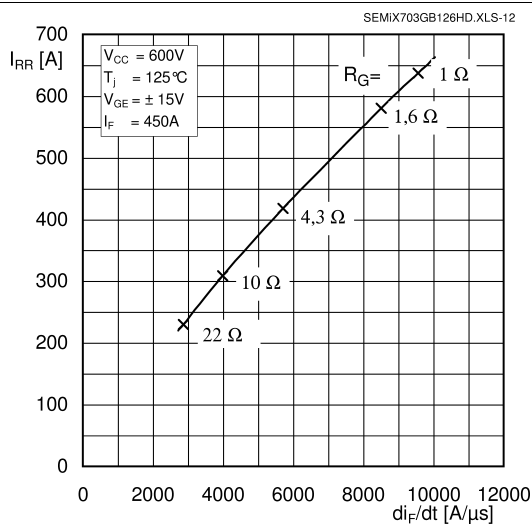


Fig. 11: Typ. CAL diode peak reverse recovery current

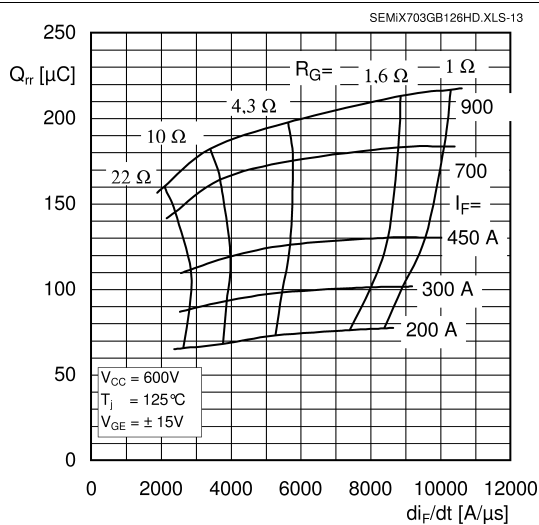
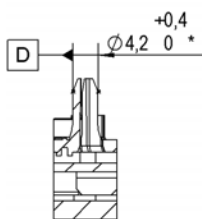


Fig. 12: Typ. CAL diode recovery charge

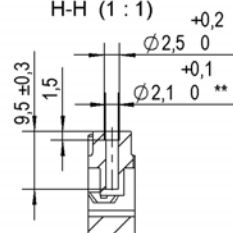
SEMiX703GB126HDs

Case: SEMiX 3s

guide pin left
F-F (1 : 1)



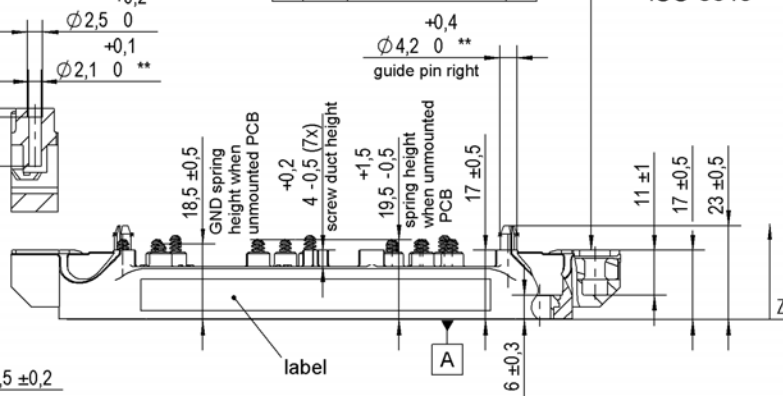
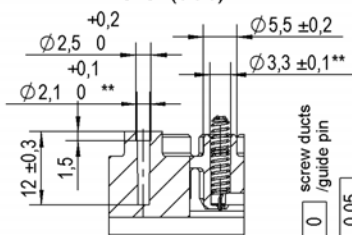
screw duct
(1x centre):
H-H (1 : 1)



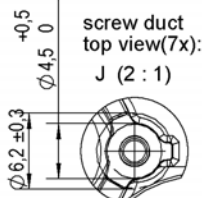
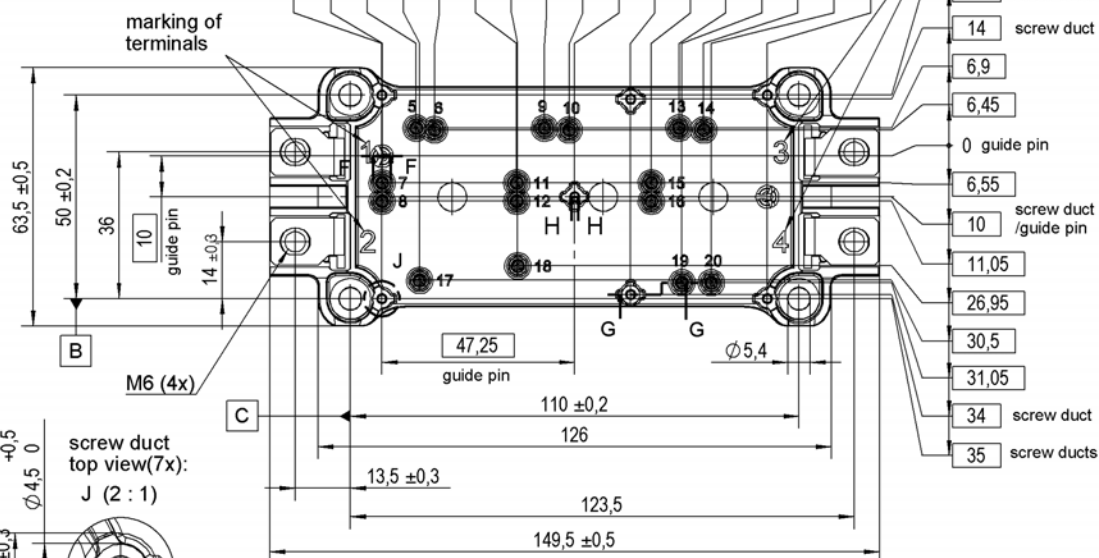
$\square$ 0,3	connector 1-2 / 3-4
$\parallel$ 0,2	each connector A

general tolerance:
ISO 2768-m
ISO 8015

screw duct (6x)
spring duct (16x):
G-G (1 : 1)



All measures in Z-direction
valid when mounted to heat sink



*guide pin left with

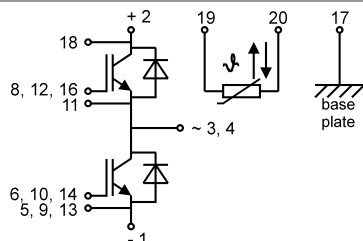
$\oplus$ Ø 0,25	A	B	C
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**screw ducts / spring ducts / guide pin right with

$\oplus$ Ø 0,5	A	B	D
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Rules for the contact PCB:
- holes guidepins = $\varnothing 4 \pm 0,1$ / position tolerance $\pm 0,1$
- holes for screws = $\varnothing 3,3 \pm 0,1$ / position tolerance $\pm 0,1$
- spring contact pad = $\varnothing 3,6 \pm 0,1$ / position tolerance $\pm 0,1$

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spring configuration

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.