



SEMiX® 4s

Trench IGBT Modules

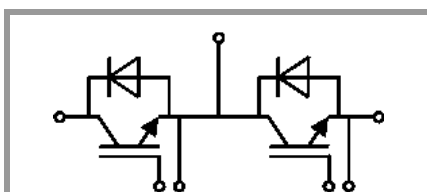
SEMiX604GB176HDs

Features

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

Typical Applications*

- AC inverter drives
- UPS
- Electronic welders



GB

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
IGBT				
V _{CES}			1700	V
I _C	T _j = 150 °C	T _c = 25 °C	567	A
		T _c = 80 °C	402	A
I _{Cnom}			400	A
I _{CRM}	I _{CRM} = 2xI _{Cnom}		800	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 1000 V V _{GE} ≤ 20 V V _{CES} ≤ 1700 V	T _j = 125 °C	10	μs
T _j			-55 ... 150	°C
Inverse diode				
I _F	T _j = 150 °C	T _c = 25 °C	740	A
		T _c = 80 °C	496	A
I _{Fnom}			400	A
I _{FRM}	I _{FRM} = 2xI _{Fnom}		800	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 25 °C		2700	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 = 400 A	T _j = 25 °C		2	2.45	V
	V _{GE} = 15 V chiplevel	T _j = 125 °C		2.5	2.9	V
V _{CE0}		T _j = 25 °C		1	1.2	V
		T _j = 125 °C		0.9	1.1	V
r _{CE}	V _{GE} = 15 V	T _j = 25 °C		2.5	3.1	mΩ
		T _j = 125 °C		3.9	4.5	mΩ
V _{GE(th)}	V _{GE} =V _{CE} , I _C = 16 mA		5.2	5.8	6.4	V
I _{CES}	V _{GE} = 0 V	T _j = 25 °C		0.12	4	mA
	V _{CE} = 1700 V	T _j = 125 °C				mA
C _{ies}	V _{CE} = 25 V V _{GE} = 0 V	f = 1 MHz		35.3		nF
C _{oes}		f = 1 MHz		1.46		nF
C _{res}		f = 1 MHz		1.17		nF
Q _G	V _{GE} = - 8 V...+ 15 V			3732		nC
R _{Gint}	T _j = 25 °C			1.88		Ω
t _{d(on)}	V _{CC} = 1200 V	T _j = 125 °C		360		ns
t _r	I _C = 400 A	T _j = 125 °C		65		ns
E _{on}	V _{GE} = ±15 V	T _j = 125 °C		215		mJ
t _{d(off)}	R _{G on} = 3 Ω	T _j = 125 °C		900		ns
t _f	R _{G off} = 3 Ω	T _j = 125 °C		165		ns
E _{off}		T _j = 125 °C		165		mJ
R _{th(j-c)}	per IGBT				0.058	K/W

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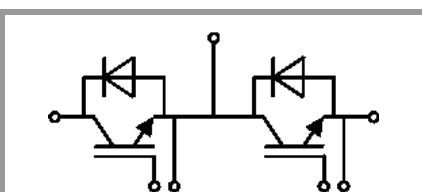
Features

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Typical Applications*

- AC inverter drives
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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
V _F = V _{EC}	I _F = 400 A V _{GE} = 0 V chip	T _j = 25 °C		1.5	1.70	V
		T _j = 125 °C		1.4	1.6	V
V _{F0}		T _j = 25 °C	0.9	1.1	1.3	V
		T _j = 125 °C	0.7	0.9	1.1	V
r _F		T _j = 25 °C	1.0	1.0	1.0	mΩ
		T _j = 125 °C	1.3	1.3	1.3	mΩ
I _{RRM}	I _F = 400 A	T _j = 125 °C	560			A
Q _{rr}	di/dt _{off} = 6600 A/μs	T _j = 125 °C	131			μC
E _{rr}	V _{GE} = -15 V V _{CC} = 1200 V	T _j = 125 °C	95			mJ
R _{th(j-c)}	per diode				0.081	K/W
Module						
L _{CE}			22			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		0.03			K/W
M _s	to heat sink (M5)		3	5		Nm
M _t		to terminals (M6)	2.5	5		Nm
				Nm		
w			400			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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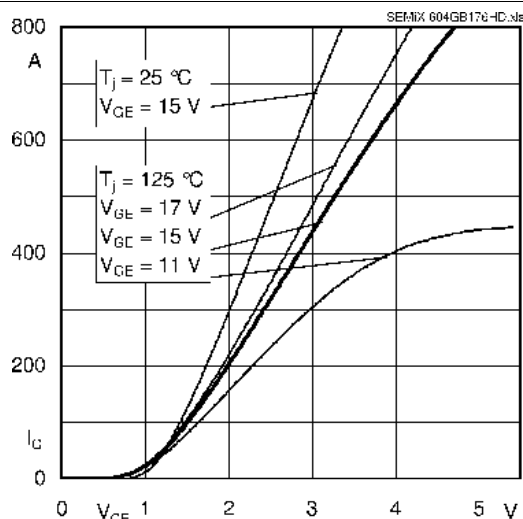
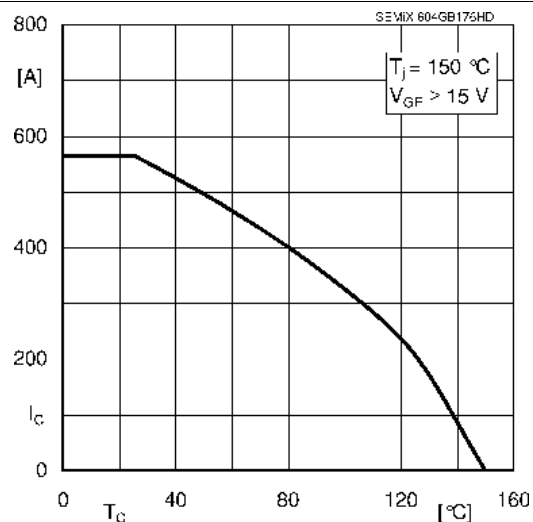
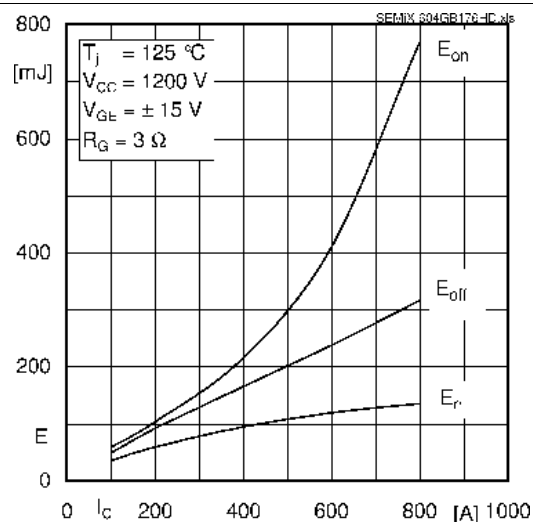
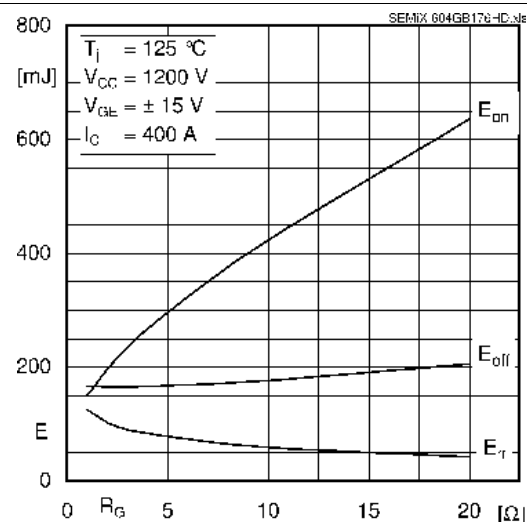
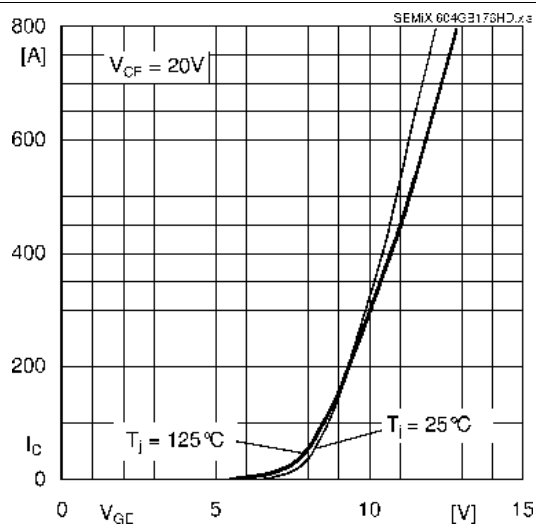
Fig. 1: Typ. output characteristic, inclusive $R_{CC} + EE'$ Fig. 2: Rated current vs. temperature $I_C = f(T_C)$ Fig. 3: Typ. turn-on /-off energy = $f(I_C)$ Fig. 4: Typ. turn-on /-off energy = $f(R_G)$ 

Fig. 5: Typ. transfer characteristic

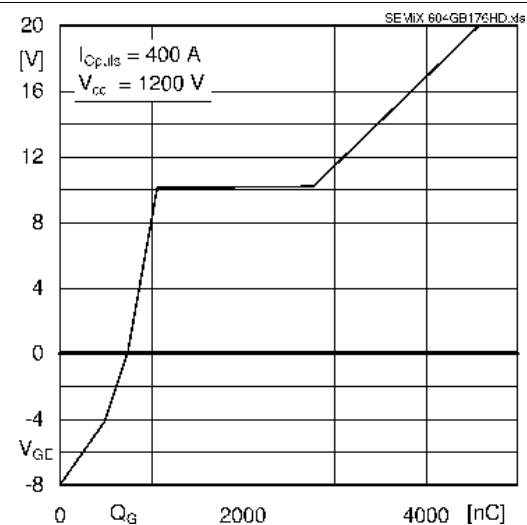
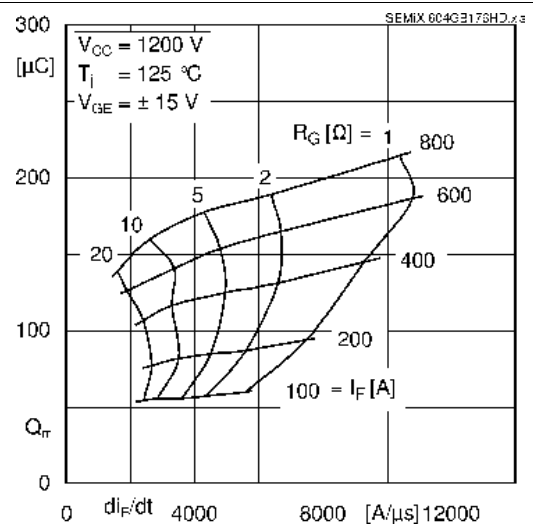
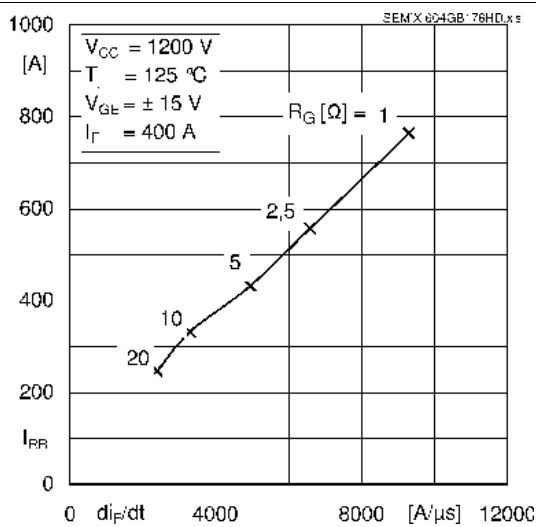
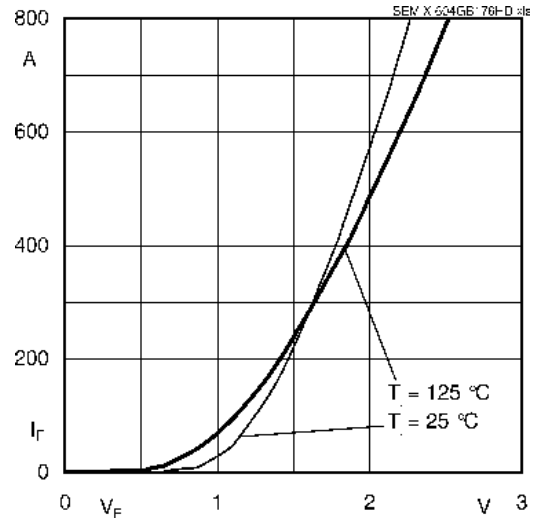
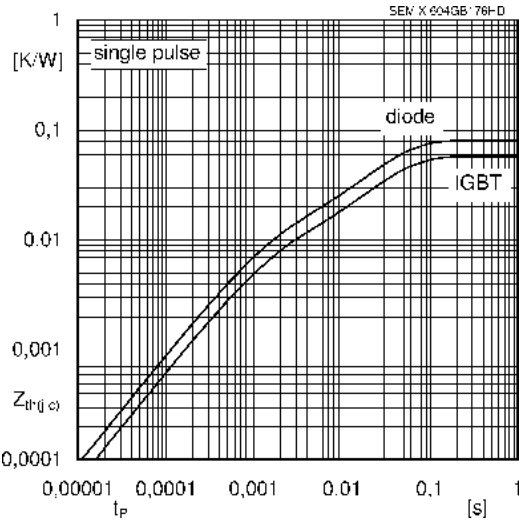
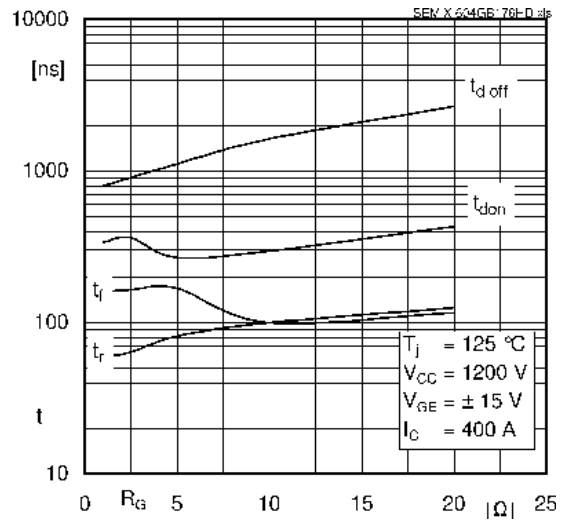
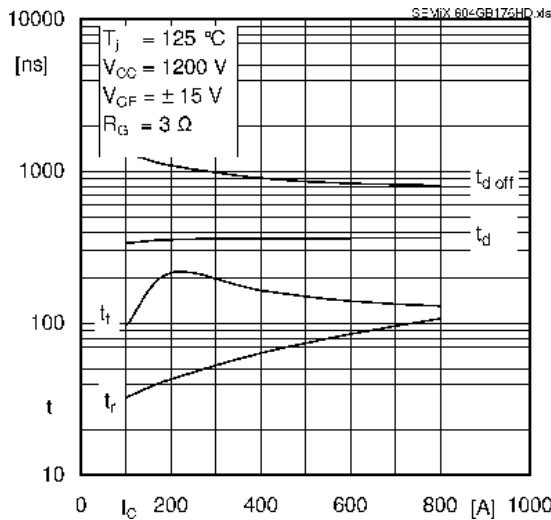
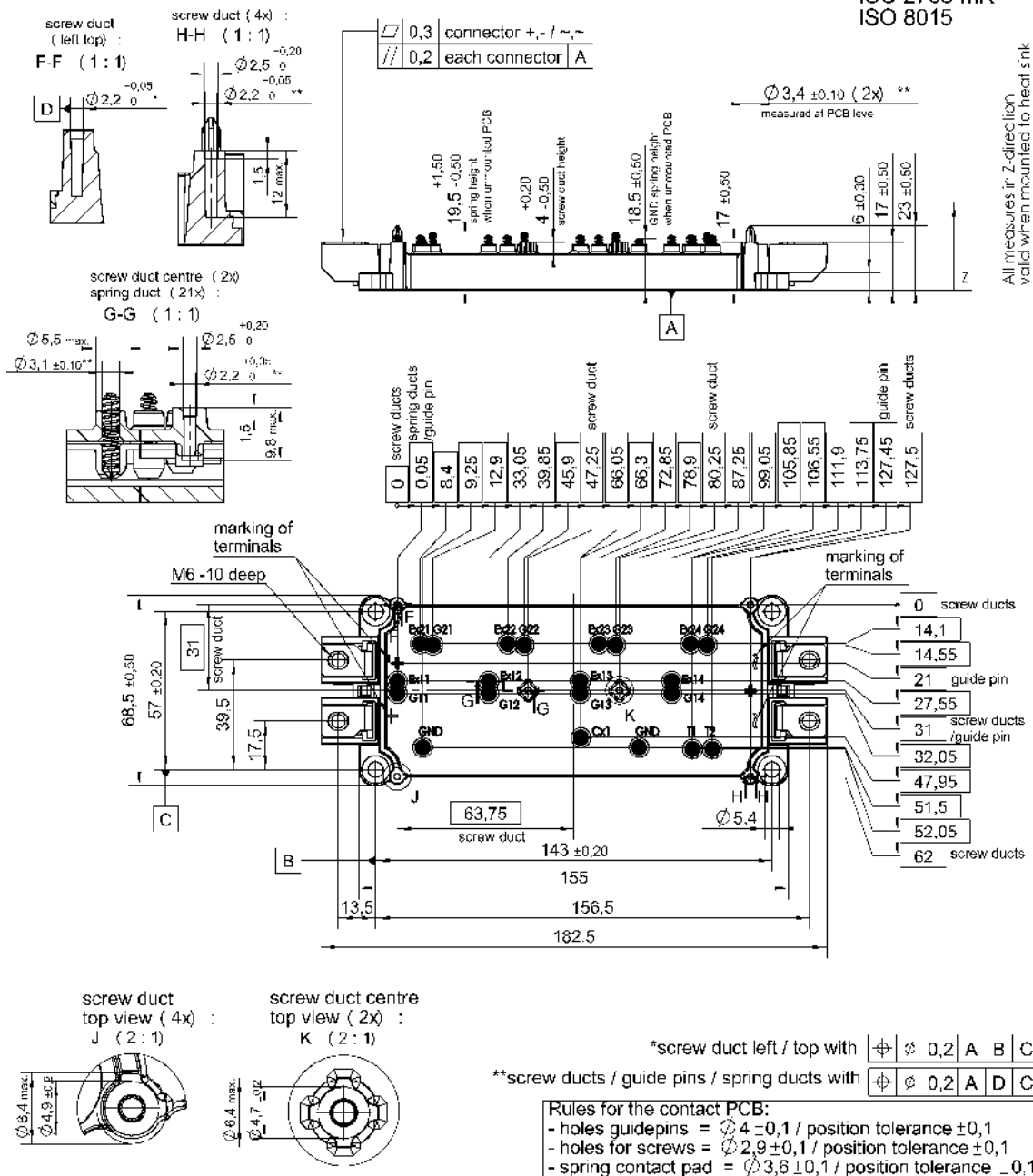


Fig. 6: Typ. gate charge characteristic



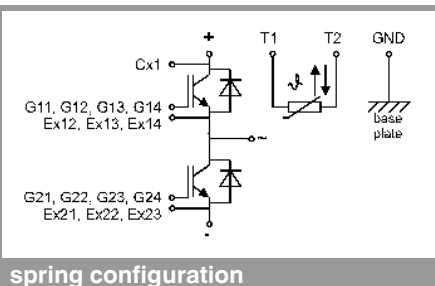
Case: SEMiX 4s

general tolerance:
ISO 2768-mK
ISO 8015



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

SEMiX 4s



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.