SEMiX®4s

Trench IGBT Modules

SEMiX 604GB126HDs

Preliminary Data

Features

- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability

Typical Applications

- AC inverter drives
- UPS
- Electronic Welding

Remarks

- Case temperatur limited to T_C=125°C max.

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Absolute Maximum Ratings — T_{case} = 25°C, unless otherwise specified

Symbol	Conditions		Values	Units
IGBT				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 150 °C	T_c = 25 °C	595	A
		T_c = 80 °C	415	A
I_{CRM}	I_{CRM}=2xI_{Cnom}		800	A
V_{GES}			± 20	V
t_{psc}	V_{CC} = 600 V; V_{GE} ≤ 20 V; VCES < 1200 V	T_j = 125 °C	10	µs
Inverse Diode				
I_F	T_j = 150 °C	T_c = 25 °C	535	A
		T_c = 80 °C	370	A
I_{FRM}	I_{FRM}=2xI_{Fnom}		800	A
I_{FSM}	t_p = 10 ms; sin.	T_j = 25 °C	2500	A
Module				
$I_{t(RMS)}$			600	A
T_{vj}			- 40 ... + 150	°C
T_{stg}			- 40 ... + 125	°C
V_{isol}	AC, 1 min.		4000	V

Characteristics — T_{case} = 25°C, unless otherwise specified

Symbol	Conditions		min.	typ.	max.	Units
IGBT						
$V_{GE(th)}$	$V_{GE} = V_{CE}$, I_C = 16 mA		5	5,8	6,5	V
I_{CES}	V_{GE} = 0 V, $V_{CE} = V_{CES}$	T_j = 25 °C			0,3	mA
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		1,8	2,4	mΩ
		T_j = 125°C		2,8	3,4	mΩ
$V_{CE(sat)}$	I_{Cnom} = 400 A, V_{GE} = 15 V	T_j = 25°C$_{chiplev.}$		1,7	2,15	V
		T_j = 125°C$_{chiplev.}$		2	2,45	V
C_{ies}	V_{CE} = 25, V_{GE} = 0 V	f = 1 MHz		28,8		nF
C_{oes}				1,51		nF
C_{res}				1,31		nF
Q_G	V_{GE} = -8 ... +15V			3200		nC
$t_{d(on)}$	R_{Gon} = 2,2 Ω	V_{CC} = 600V		330		ns
t_r		I_{Cnom} = 400A		70		ns
E_{on}		T_j = 125 °C		36		mJ
$t_{d(off)}$	R_{Goff} = 2,2 Ω			630		ns
t_f				130		ns
E_{off}				60		mJ
$R_{th(j-c)}$	per IGBT				0,065	K/W

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Characteristics

Symbol	Conditions		min.	typ.	max.	Units
Inverse Diode						
$V_F = V_{EC}$	I_{Fnom} = 400 A; V_{GE} = 0 V	T_j = 25 °C$_{chiplev.}$		1,6	1,8	V
		T_j = 125 °C$_{chiplev.}$		1,6	1,8	V
V_{F0}		T_j = 25 °C		1	1,1	V
		T_j = 125 °C		0,8	0,9	V
r_F		T_j = 25 °C		1,5	1,8	mΩ
		T_j = 125 °C		2	2,3	mΩ
I_{RRM}	I_{Fnom} = 400 A	T_j = 125 °C		475		A
Q_{rr}	di/dt = 6200 A/µs			100		µC
E_{rr}	V_{GE} = -15 V; V_{CC} = 600 V			46		mJ
$R_{th(j-c)D}$	per diode				0,11	K/W
Module						
L_{CE}				22		nH
$R_{CC'+EE'}$	res., terminal-chip	T_{case} = 25 °C		0,7		mΩ
		T_{case} = 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
w					400	g
Temperature sensor						
R_{100}	T_c=100°C (R_{25}=5 kΩ)			0,493±5%		kΩ
$B_{100/125}$	R(T)=R_{100}exp[$B_{100/125}$(1/T-1/T_{100})]; T[K]			3550±2%		K

This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX.

This technical information specifies semiconductor devices but promises no characteristics. No warranty or guarantee expressed or implied is made regarding delivery, performance or suitability.

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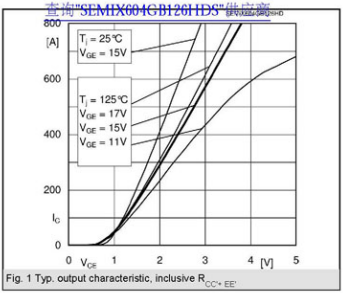


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

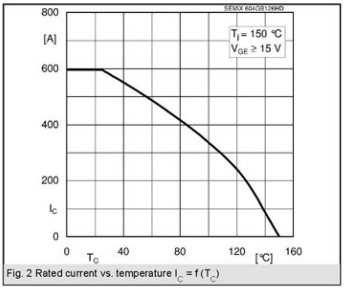


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

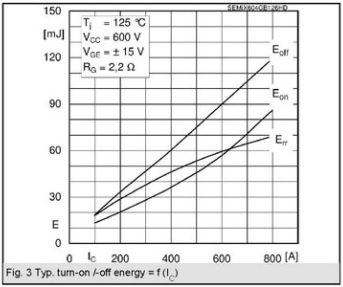


Fig. 3 Typ. turn-on /-off energy = f (I_C)

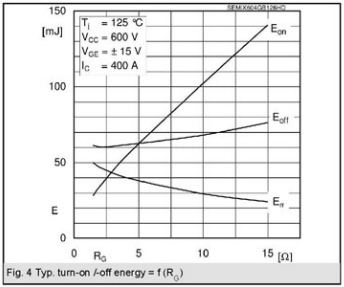


Fig. 4 Typ. turn-on /-off energy = f (R_G)

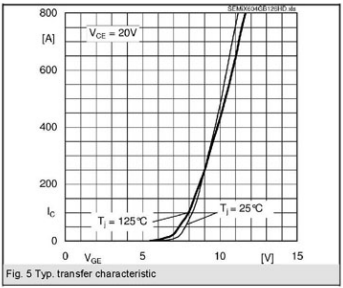


Fig. 5 Typ. transfer characteristic

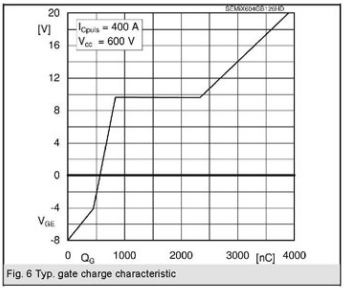


Fig. 6 Typ. gate charge characteristic

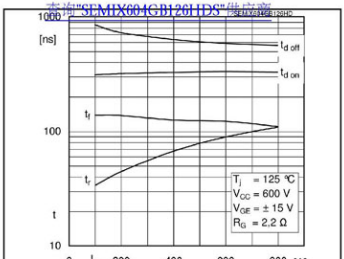


Fig. 7 Typ. switching times vs. I_C

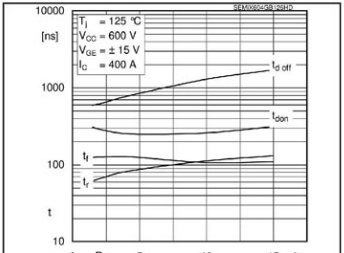


Fig. 8 Typ. switching times vs. gate resistor R_G

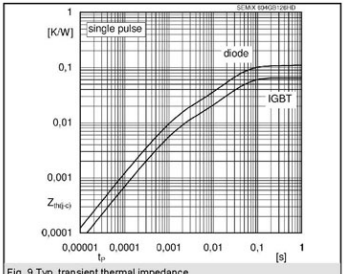


Fig. 9 Typ. transient thermal impedance

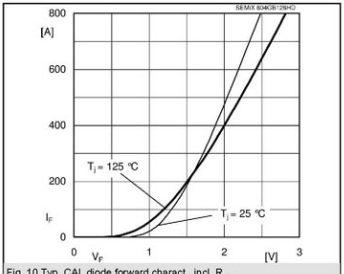


Fig. 10 Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

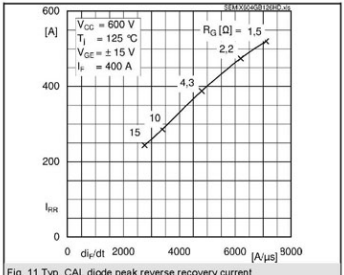


Fig. 11 Typ. CAL diode peak reverse recovery current

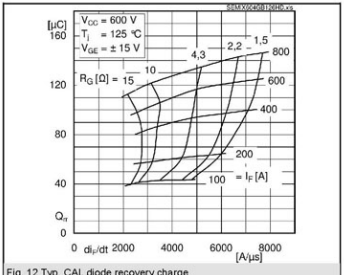
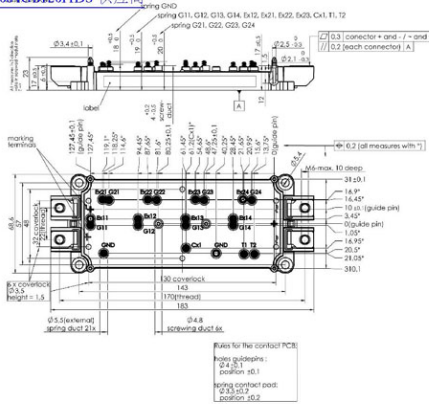
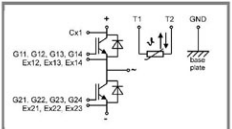


Fig. 12 Typ. CAL diode recovery charge



Case SEMiX 4s



Pinout GB

