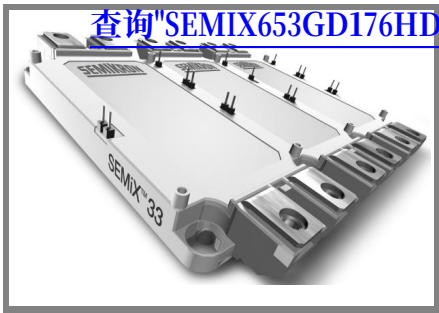
SEMiX 653GD176HDc



SEMiX® 33c

Trench IGBT Modules

SEMiX 653GD176HDc

Preliminary Data

Features

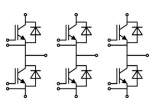
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability

Typical Applications

- Matrix Converter
- Resonant Inverter
- Current Source Inverter

Remarks

- short circuit capability is tested @ V_{CC}=1000V (all other static parameters are tested @ V_{CC}=1200V)



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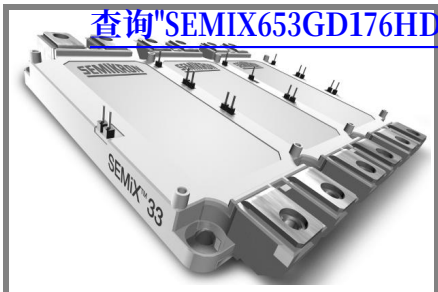
Absolute Maximum Ratings T_{case} = 25°C, unless otherwise specified

Symbol	Conditions		Values	Units
IGBT				
V_{CES}	T_j = 25 °C		1700	V
I_C	T_j = 150 °C	T_c = 25 °C	620	A
		T_c = 80 °C	435	A
I_{CRM}	I_{CRM}=2xI_{Cnom}		900	A
V_{GES}			± 20	V
t_{psc}	V_{CC} = 1200 V; $V_{GE} \leq$ 20 V; V_{CES} < 1700 V	T_j = 125 °C	10	µs
Inverse Diode				
I_F	T_j = 150 °C	T_c = 25 °C	545	A
		T_c = 80 °C	365	A
I_{FRM}	I_{FRM}=2xI_{Fnom}		900	A
I_{FSM}	t_p = 10 ms; sin.	T_j = 25 °C	2900	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 = 18 mA		5,2	5,8	6,4	V
I_{CES}	V_{GE} = 0 V, V_{CE} = V_{CES}	T_j = 25 °C			0,45	mA
V_{CE0}		T_j = 25 °C		1	1,2	V
		T_j = 125 °C		0,9	1,1	V
r_{CE}	V_{GE} = 0 V	T_j = 25°C		2,2	2,8	mΩ
		T_j = 125°C		3,4	4	mΩ
$V_{CE(sat)}$	I_{Cnom} = 450 A, V_{GE} = 15 V	T_j = 25°C$_{chiplev.}$		2	2,45	V
		T_j = 125°C$_{chiplev.}$		2,45	2,9	V
C_{ies}	V_{CE} = 25, V_{GE} = 0 V	f = 1 MHz		39,6		nF
C_{oes}				1,65		nF
C_{res}				1,3		nF
Q_G	V_{GE} = -8 V ... +15 V			4200		nC
$t_{d(on)}$	R_{Gon} = 3,6 Ω	V_{CC} = 1200V		290		ns
t_r		I_{Cnom}= 450A		90		ns
E_{on}		T_j = 125 °C		300		mJ
$t_{d(off)}$	R_{Goff} = 3,6 Ω			975		ns
t_f				190		ns
E_{off}				180		mJ
$R_{th(j-c)}$	per IGBT				0,054	K/W



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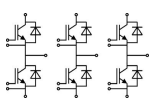

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Characteristics

Symbol	Conditions		min.	typ.	max.	Units
Inverse Diode						
$V_F = V_{EC}$	I_{Fnom} = 450 A; V_{GE} = 0 V	T_j = 25 °C$_{chiplev.}$		1,7	1,9	V
		T_j = 125 °C$_{chiplev.}$		1,7	1,9	V
V_{F0}		T_j = 25 °C		1,1	1,3	V
		T_j = 125 °C		0,9	1,1	V
r_F		T_j = 25 °C		1,3		mΩ
		T_j = 125 °C		1,8		mΩ
I_{RRM}	I_{Fnom} = 450 A	T_j = 125 °C		380		A
Q_{rr}	di/dt = 4200 A/µs			130		µC
E_{rr}	V_{GE} = -15 V; V_{CC} = 1200 V			73		mJ
$R_{th(j-c)D}$	per diode				0,11	K/W
Module						
L_{CE}				20		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			0,014		K/W
M_s	to heat sink M5		3		5	Nm
M_t	to terminals M6		2,5		5	Nm
w					900	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]; B			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.

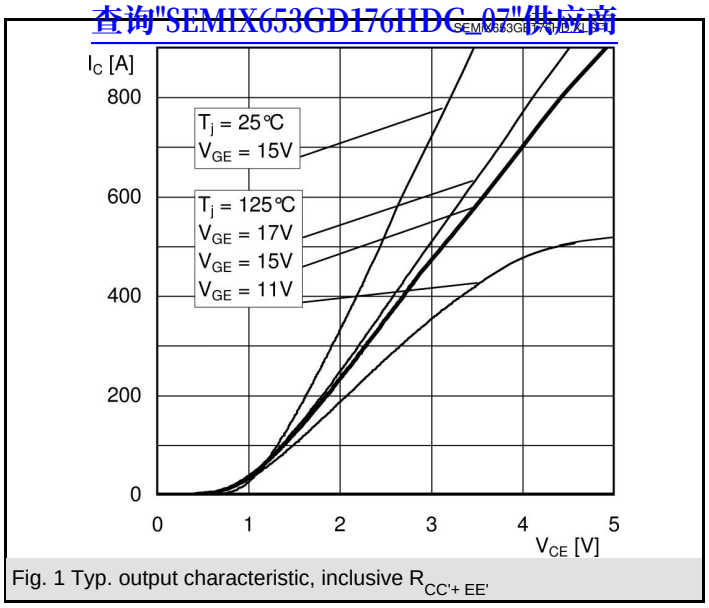

Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

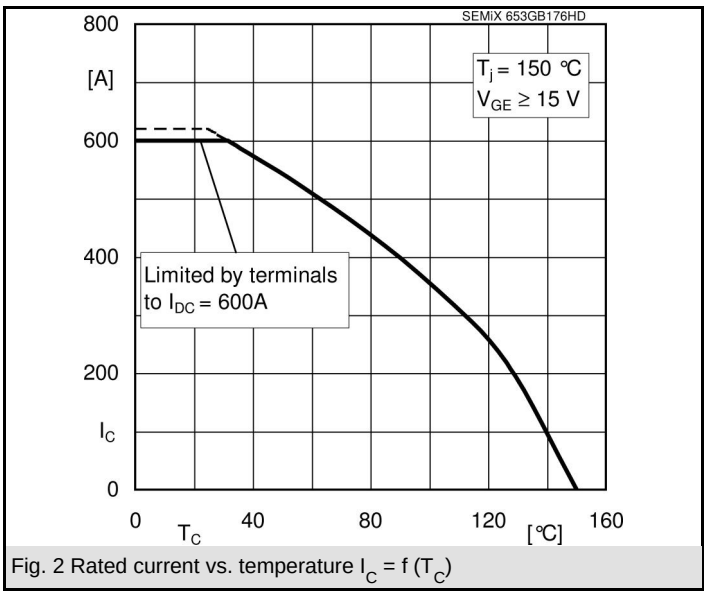

Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

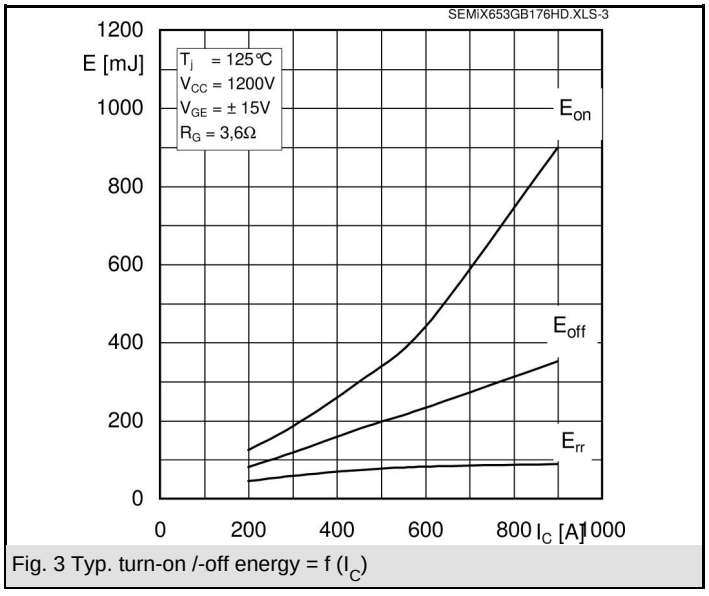

Fig. 3 Typ. turn-on /-off energy = f (I_C)

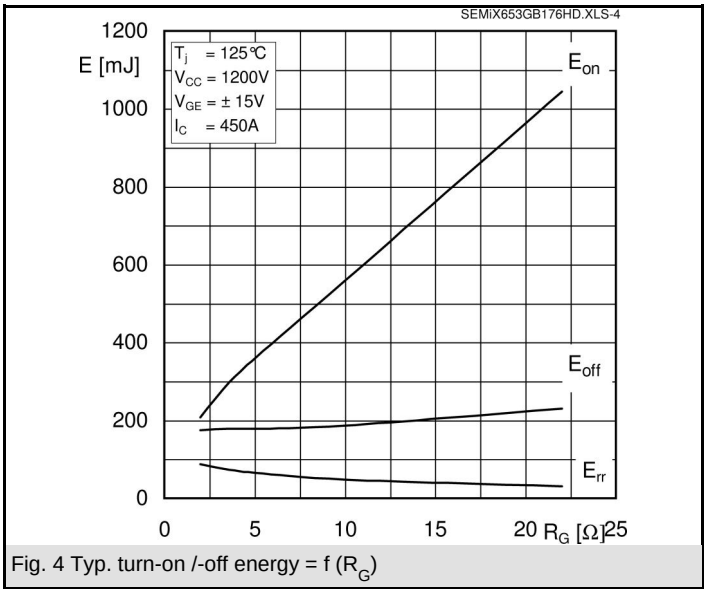

Fig. 4 Typ. turn-on /-off energy = f (R_G)

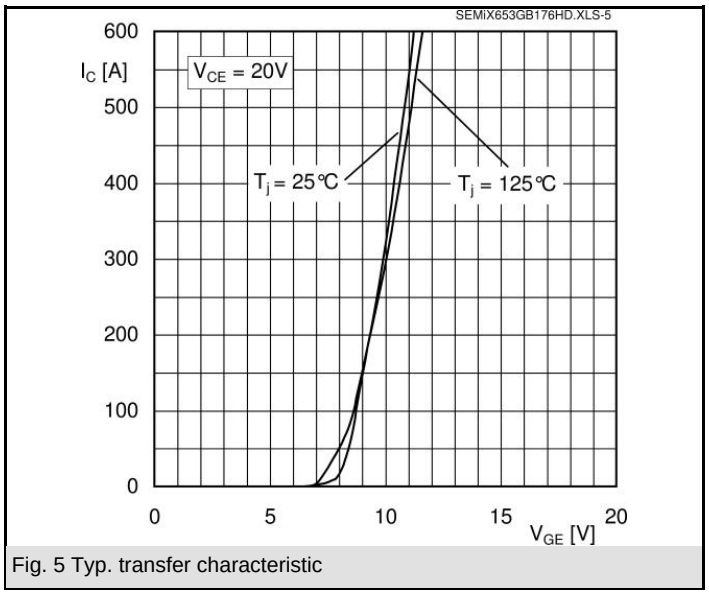

Fig. 5 Typ. transfer characteristic

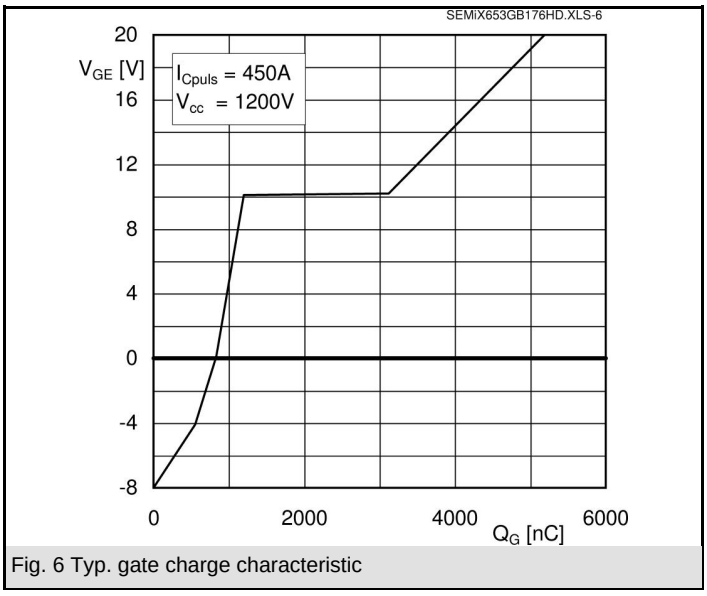

Fig. 6 Typ. gate charge characteristic

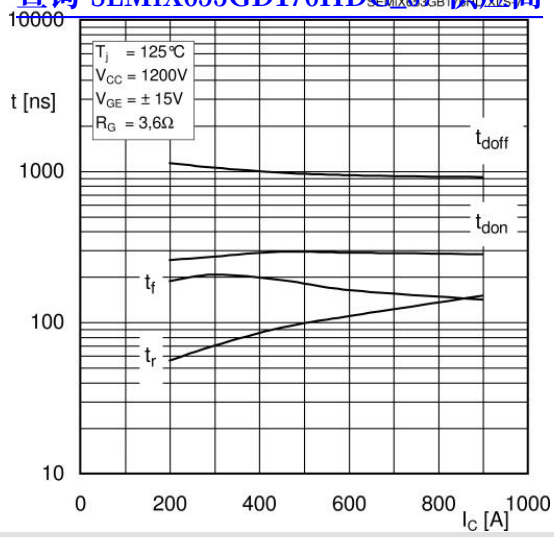

Fig. 7 Typ. switching times vs. I_C

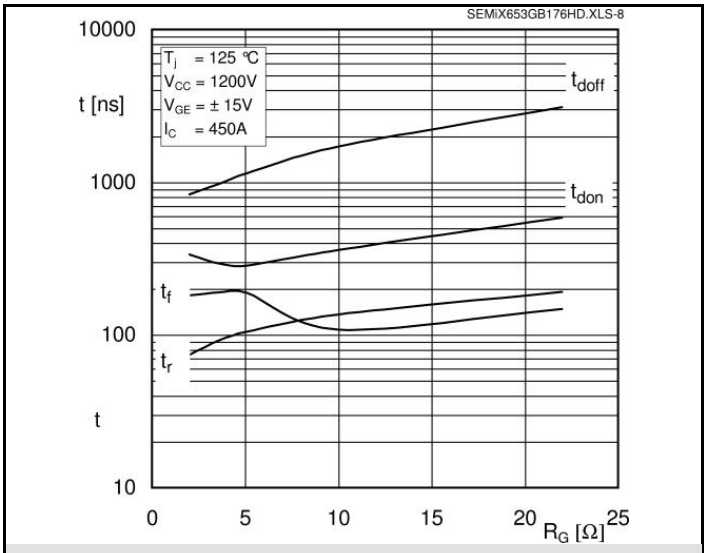

Fig. 8 Typ. switching times vs. gate resistor R_G

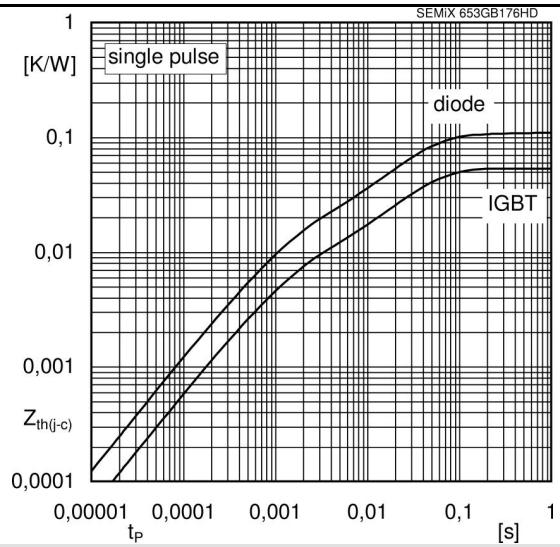

Fig. 9 Typ. transient thermal impedance

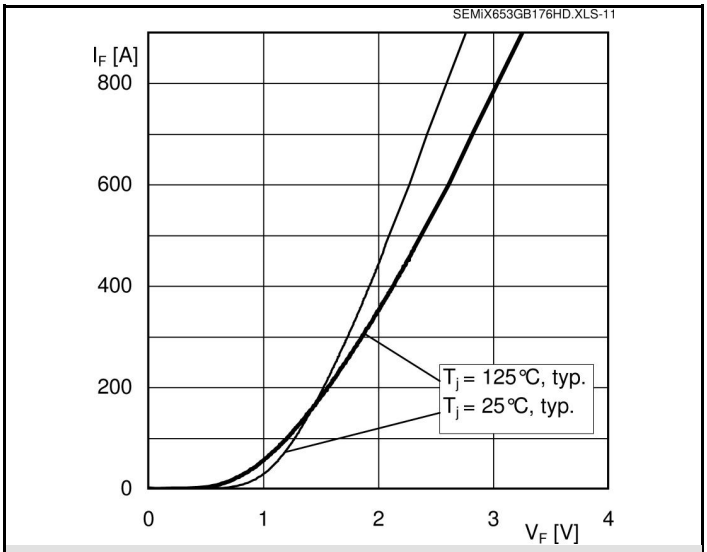

Fig. 10 Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

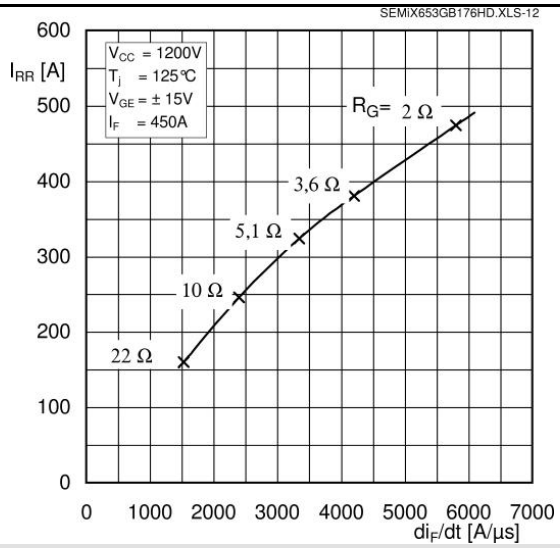

Fig. 11 Typ. CAL diode peak reverse recovery current

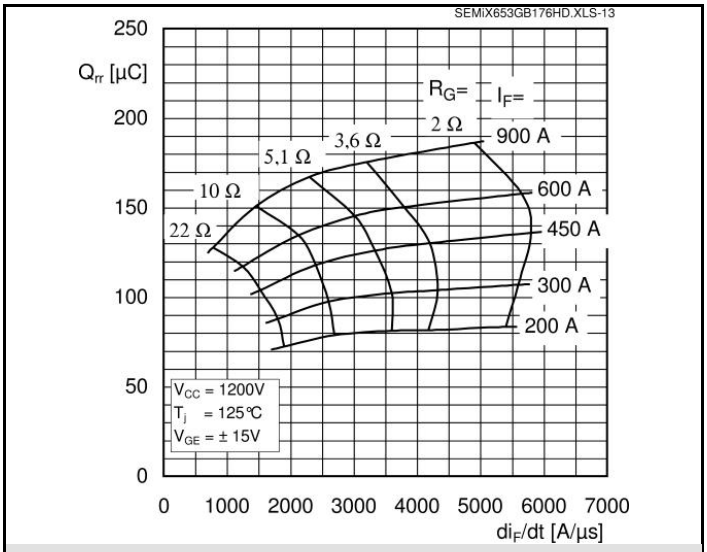

Fig. 12 Typ. CAL diode recovery charge

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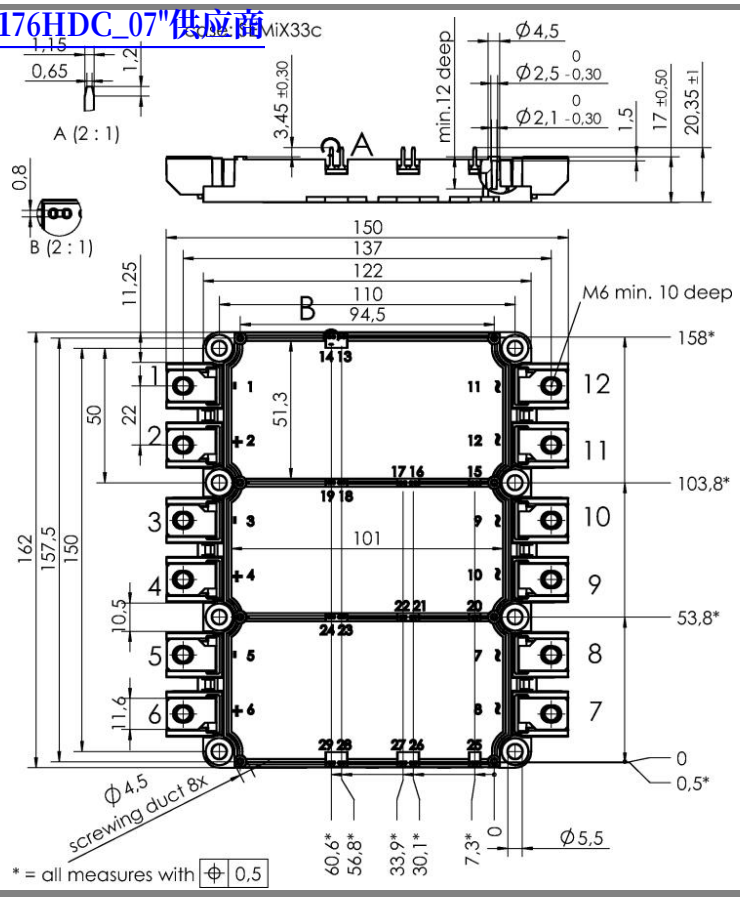
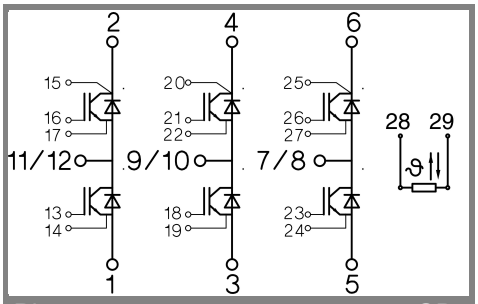


Case SEMiX 33c



Pinout GD

