

SEMiX 453GD176HDc



Trench IGBT Modules

SEMiX 453GD176HDc

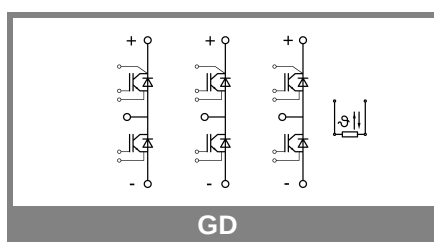
Preliminary Data

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



Absolute Maximum Ratings		$T_{case} = 25^{\circ}\text{C}$, unless otherwise specified	
Symbol	Conditions	Values	Units
IGBT			
V_{CES}		1700	V
I_C	$T_c = 25 (80)^{\circ}\text{C}$	450 (320)	A
I_{CRM}	$t_p = 1 \text{ ms}$	600	A
V_{GES}		± 20	V
T_{vj} (T_{stg})	$T_{OPERATION} \leq T_{stg}$	- 40 ... + 150 (125)	$^{\circ}\text{C}$
V_{isol}	AC, 1 min.	4000	V
Inverse diode			
I_F	$T_c = 25 (80)^{\circ}\text{C}$	500 (340)	A
I_{FRM}	$t_p = 1 \text{ ms}$	600	A
I_{FSM}	$t_p = 10 \text{ ms}$; sin.; $T_j = 25^{\circ}\text{C}$	2900	A

Characteristics		$T_{case} = 25^{\circ}\text{C}$, unless otherwise specified			
Symbol	Conditions	min.	typ.	max.	Units
IGBT					
$V_{GE(th)}$	$V_{GE} = V_{CE}$, $I_C = 12 \text{ mA}$	5,2	5,8	6,4	V
I_{CES}	$V_{GE} = 0$, $V_{CE} = V_{CES}$, $T_j = 25 (^{\circ})^{\circ}\text{C}$			0,45	mA
$V_{CE(TO)}$	$T_j = 25 (125)^{\circ}\text{C}$		1 (0,9)	1,2 (1,1)	V
r_{CE}	$V_{GE} = 0 \text{ V}$, $T_j = 25 (125)^{\circ}\text{C}$		3,3 (5,2)	4,2 (6)	m Ω
$V_{CE(sat)}$	$I_{Cnom} = 300 \text{ A}$, $V_{GE} = 15 \text{ V}$, $T_j = 25 (125)^{\circ}\text{C}$, chip level		2 (2,45)	2,45 (2,9)	V
C_{ies}	under following conditions		21,3		nF
C_{oes}	$V_{GE} = 0$, $V_{CE} = 25 \text{ V}$, $f = 1 \text{ MHz}$		1,1		nF
C_{res}			0,9		nF
L_{CE}			20		nH
$R_{CC'+EE'}$	terminal-chip, $T_c = 25 (125)^{\circ}\text{C}$		0,7 (1)		m Ω
$t_{d(on)}/t_r$	$V_{CC} = 1200 \text{ V}$, $I_{Cnom} = 300 \text{ A}$		335 / 70		ns
$t_{d(off)}/t_f$	$V_{GE} = \pm 15 \text{ V}$		990 / 150		ns
$E_{on} (E_{off})$	$R_{Gon} = R_{Goff} = 4,3 \Omega$, $T_j = 125^{\circ}\text{C}$		195 (115)		mJ
Inverse diode					
$V_F = V_{EC}$	$I_{Fnom} = 300 \text{ A}$; $V_{GE} = 0 \text{ V}$; $T_j = 25 (125)^{\circ}\text{C}$, chip level		1,6 (1,6)	1,8 (1,8)	V
$V_{(TO)}$	$T_j = 25 (125)^{\circ}\text{C}$		1,1 (0,9)	1,3 (1,1)	V
r_T	$T_j = 25 (125)^{\circ}\text{C}$		1,7 (2,3)	1,7 (2,3)	m Ω
I_{RRM}	$I_{Fnom} = 300 \text{ A}$; $T_j = 25 (125)^{\circ}\text{C}$		(350)		A
Q_{rr}	$di/dt = 4700 \text{ A}/\mu\text{s}$		(115)		μC
E_{rr}	$V_{GE} = -15 \text{ V}$		(65)		mJ
Thermal characteristics					
$R_{th(j-c)}$	per IGBT			0,06	K/W
$R_{th(j-c)D}$	per Inverse Diode			0,12	K/W
$R_{th(j-c)FD}$	per FWD				K/W
$R_{th(c-s)}$	per module		0,014		K/W
Temperature sensor					
R_{25}	$T_c = 25^{\circ}\text{C}$		5 $\pm$ 5%		k Ω
$B_{25/85}$	$R_2 = R_1 \exp[B(1/T_2 - 1/T_1)]$; $T[K]; B$		3420		K
Mechanical data					
M_s/M_t	to heatsink (M5) / for terminals (M6)	3/2,5		5 / 5	Nm
w			289		g

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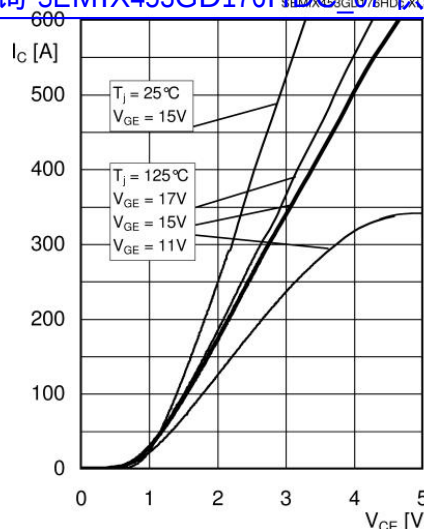


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

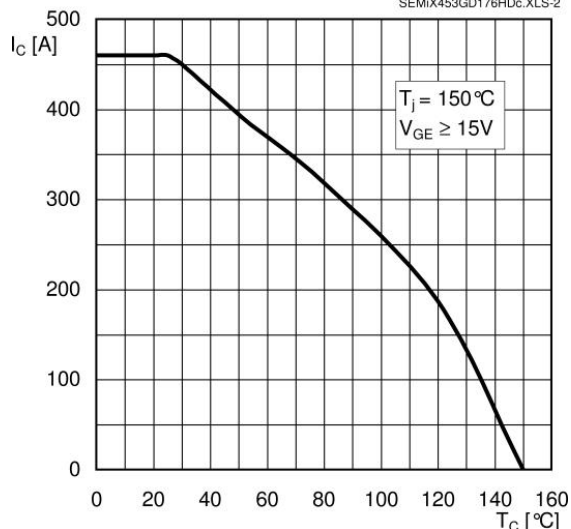


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

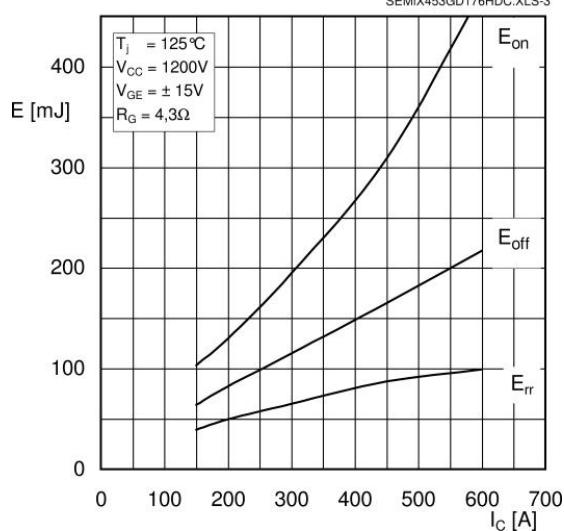


Fig. 3 Typ. turn-on /-off energy = $f(I_C)$

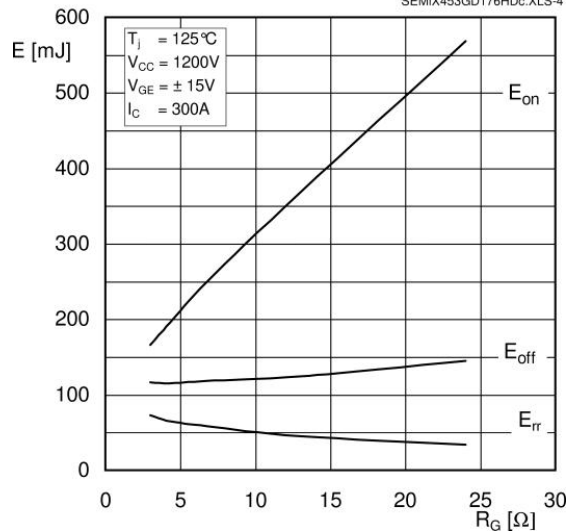


Fig. 4 Typ. turn-on /-off energy = $f(R_G)$

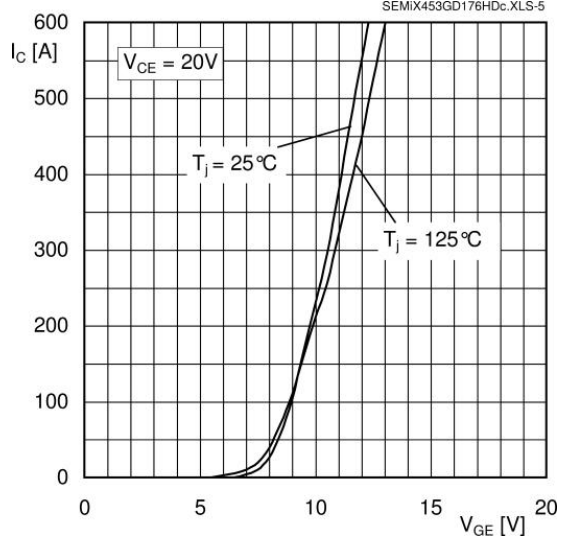


Fig. 5 Typ. transfer characteristic

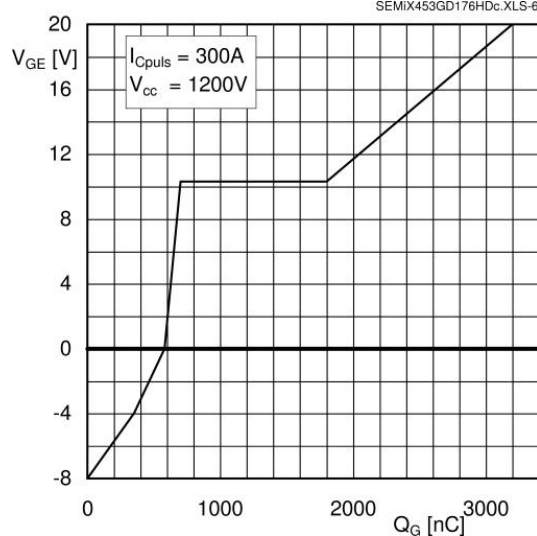
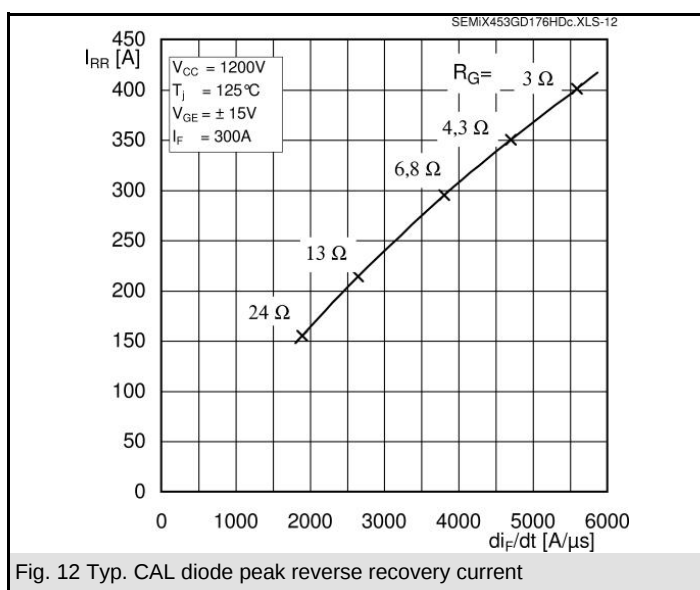
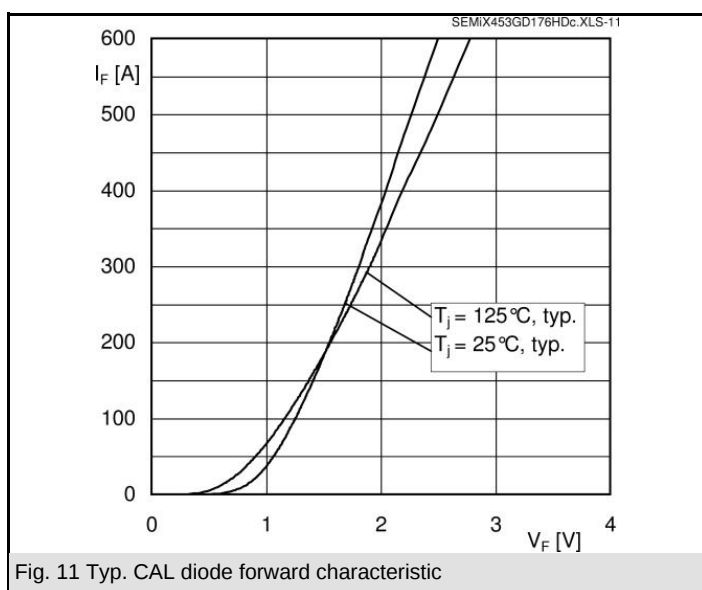
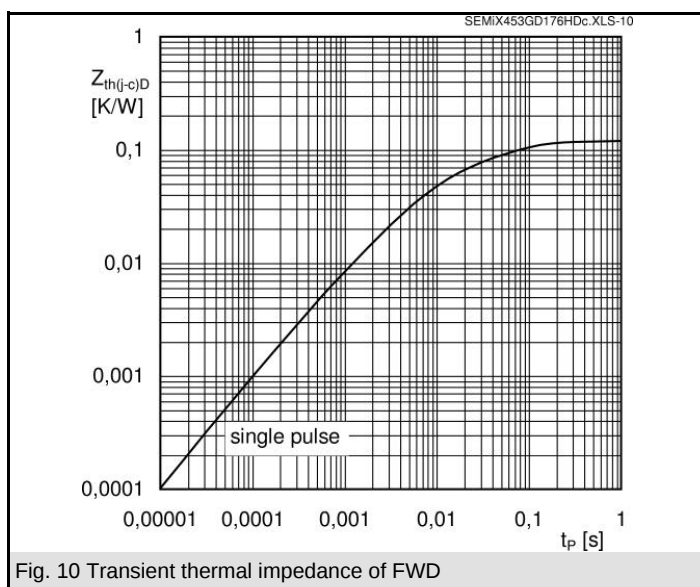
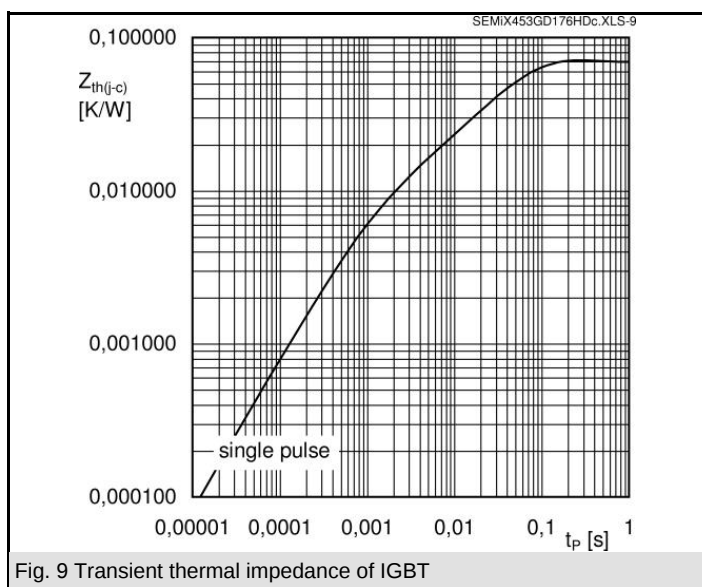
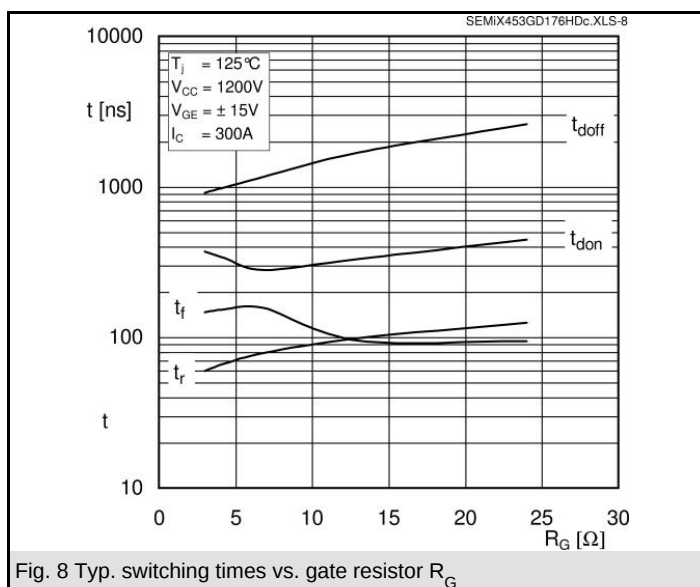
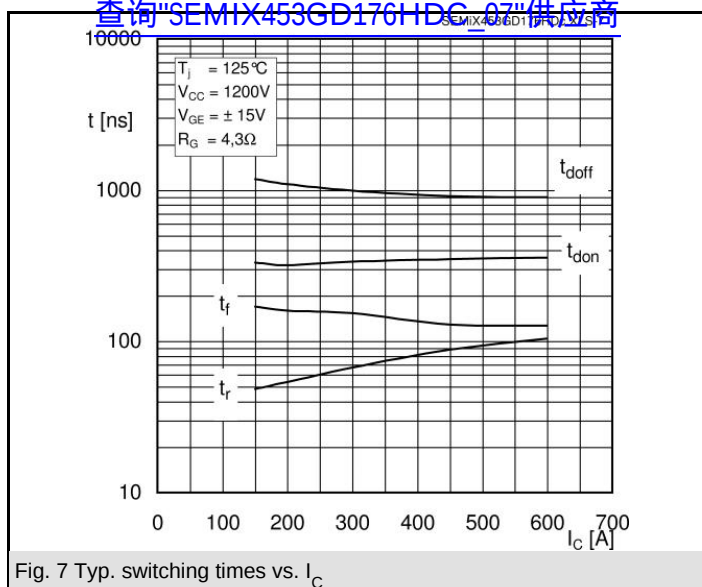
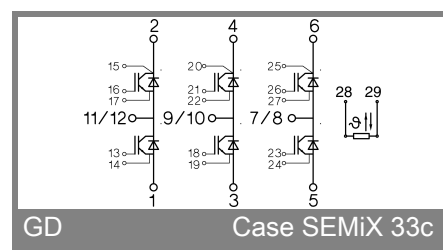
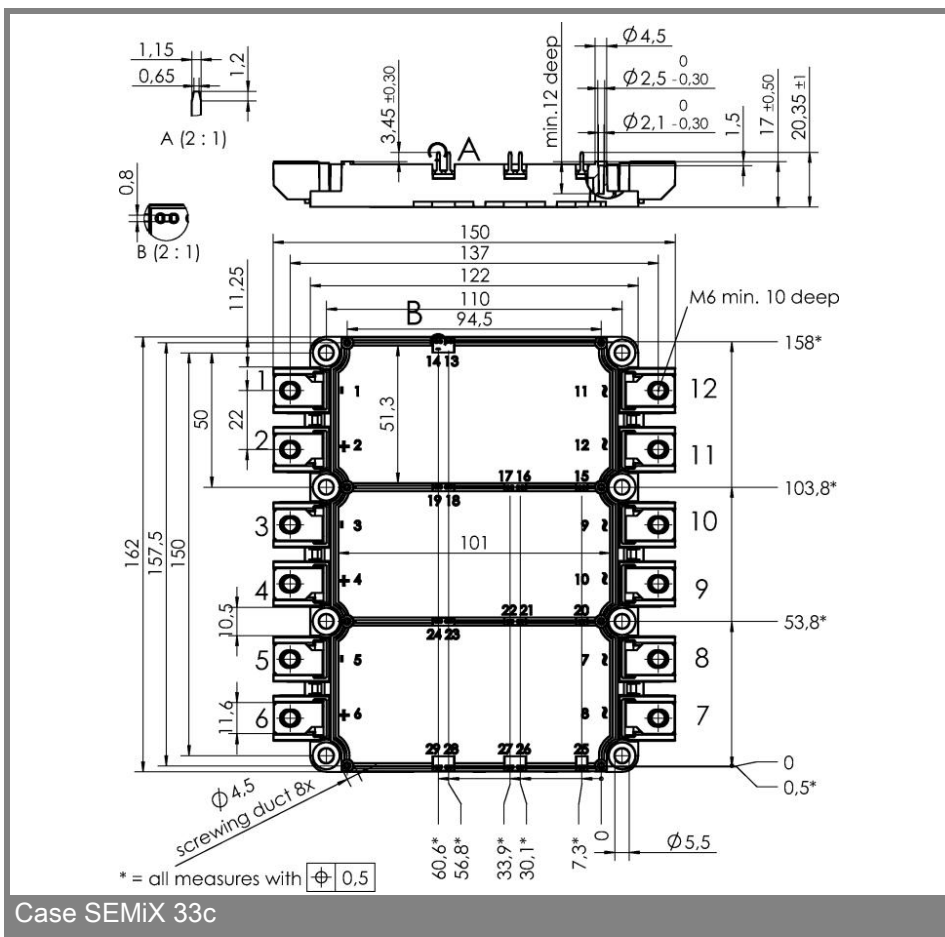
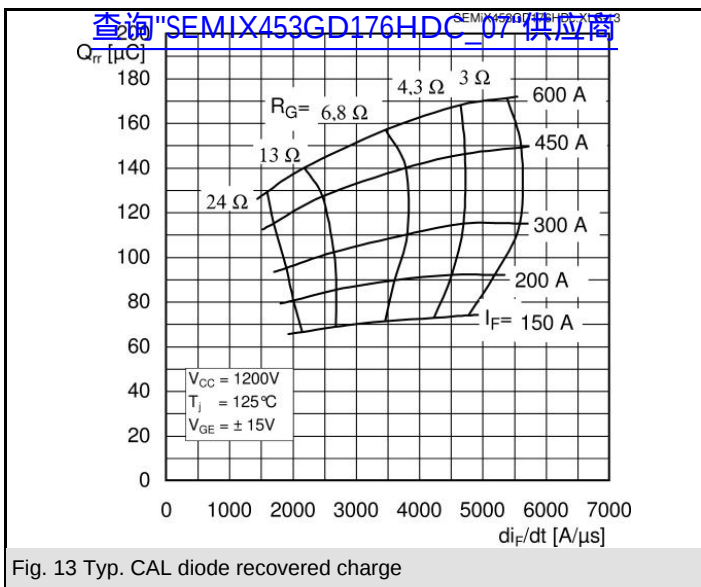


Fig. 6 Typ. gate charge characteristic

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

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