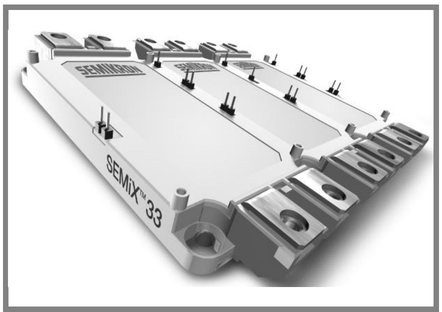
SEMiX 453GD176HDc



SEMiX® 33c

Trench IGBT Modules

SEMiX 453GD176HDc

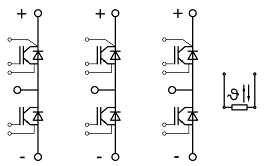
Preliminary Data

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



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

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

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

Symbol	Conditions	min.	typ.	max.	Units
IGBT					
$V_{GE(th)}$	$V_{GE} = V_{CE}$, I_C = 12 mA	5,2	5,8	6,4	V
I_{CES}	V_{GE} = 0, $V_{CE} = V_{CES}$, T_j = 25 () °C			0,45	mA
$V_{CE(TO)}$	T_j = 25 (125) °C		1 (0,9)	1,2 (1,1)	V
r_{CE}	V_{GE} = 0 V, T_j = 25 (125) °C		3,3 (5,2)	4,2 (6)	mΩ
$V_{CE(sat)}$	I_{Cnom} = 300 A, V_{GE} = 15 V, T_j = 25 (125) °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 V, f = 1 MHz		1,1		nF
C_{res}			0,9		nF
L_{CE}			20		nH
$R_{CC'+EE'}$	terminal-chip, T_c= 25 (125) °C		0,7 (1)		mΩ
$t_{d(on)}/t_r$	V_{CC} = 1200 V, I_{Cnom} = 300 A		335 / 70		ns
$t_{d(off)}/t_f$	V_{GE} = ± 15 V		990 / 150		ns
E_{on} (E_{off})	$R_{Gon} = R_{Goff}$ = 4,3 Ω, T_j = 125 °C		195 (115)		mJ
Inverse diode					
$V_F = V_{EC}$	I_{Fnom} = 300 A; V_{GE} = 0 V; T_j = 25 (125) °C, chip level		1,6 (1,6)	1,8 (1,8)	V
$V_{(TO)}$	T_j = 25 (125) °C		1,1 (0,9)	1,3 (1,1)	V
r_T	T_j = 25 (125) °C		1,7 (2,3)	1,7 (2,3)	mΩ
I_{RRM}	I_{Fnom} = 300 A; T_j = 25 (125) °C		(350)		A
Q_{rr}	di/dt = 4700 A/µs		(115)		µC
E_{rr}	V_{GE} = -15 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 °C		5 ±5%		kΩ
$B_{25/85}$	$R_2=R_1\exp[B(1/T_2-1/T_1)]$; 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

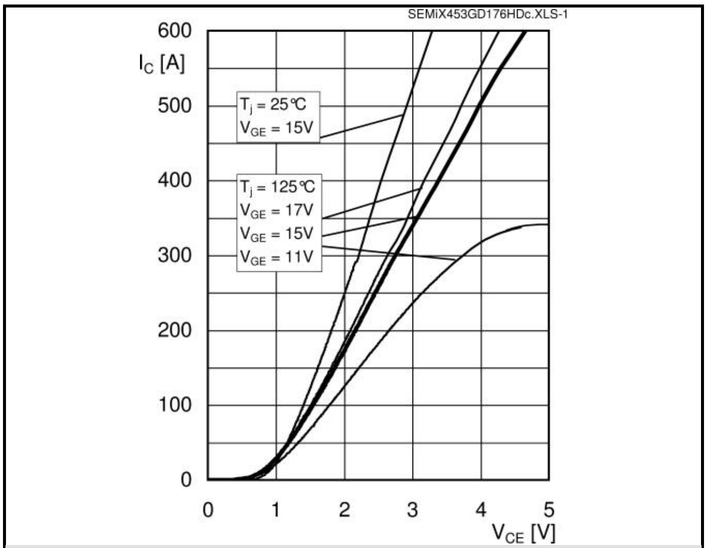


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+ EE'}$

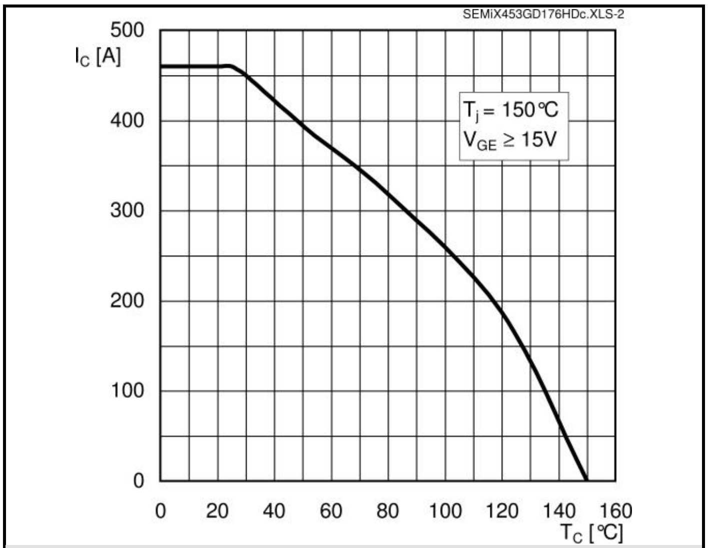


Fig. 2 Rated current vs. temperature $I_C = f (T_C)$

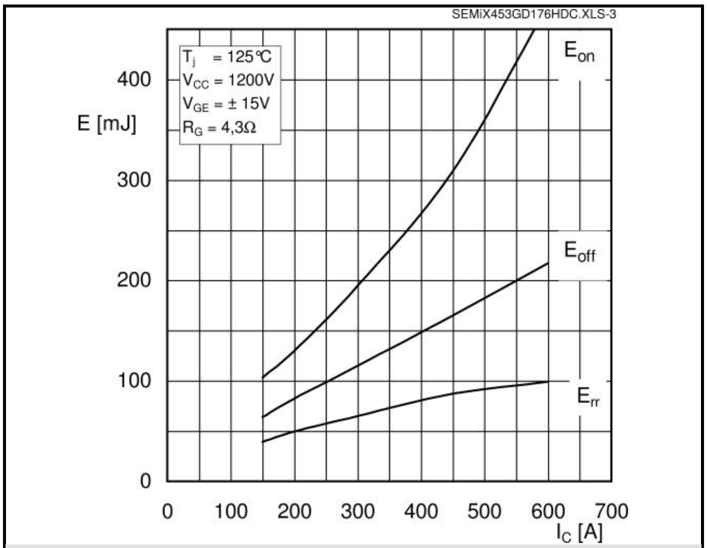


Fig. 3 Typ. turn-on /-off energy = f (I_C)

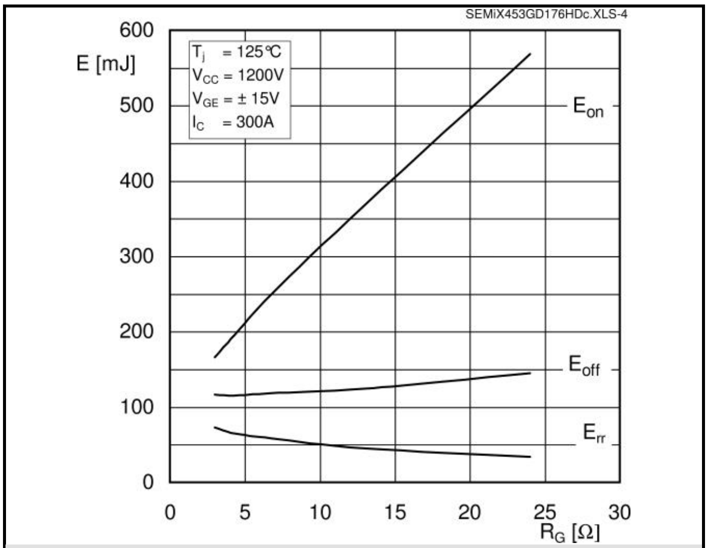


Fig. 4 Typ. turn-on /-off energy = f (R_G)

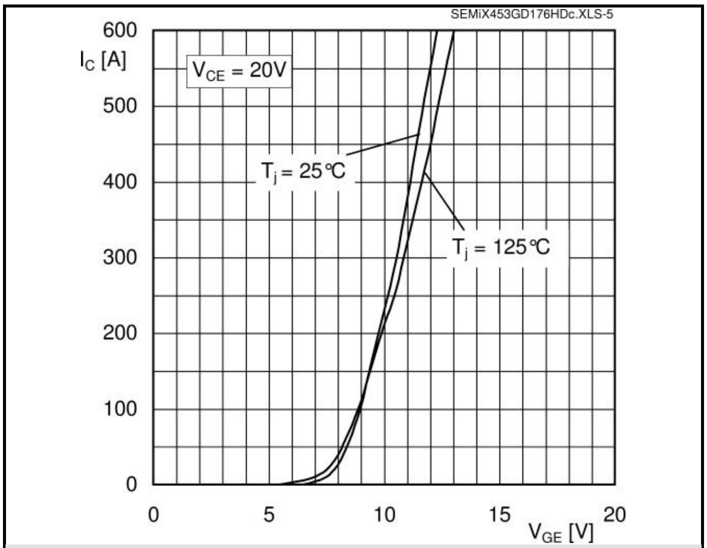


Fig. 5 Typ. transfer characteristic

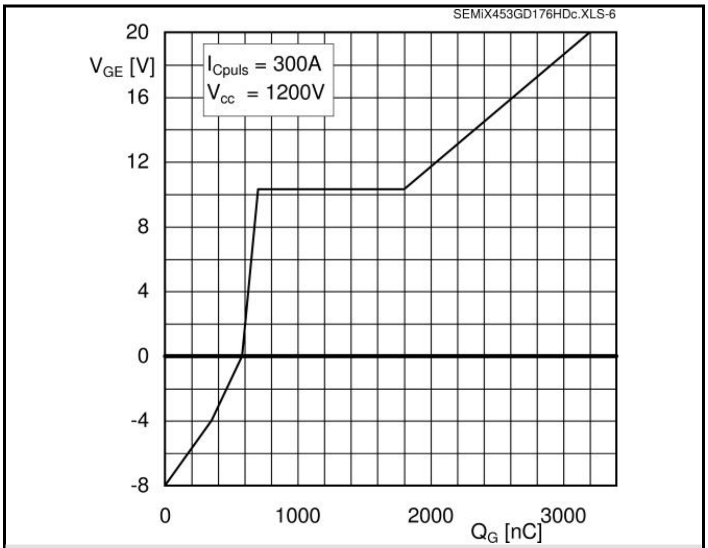


Fig. 6 Typ. gate charge characteristic

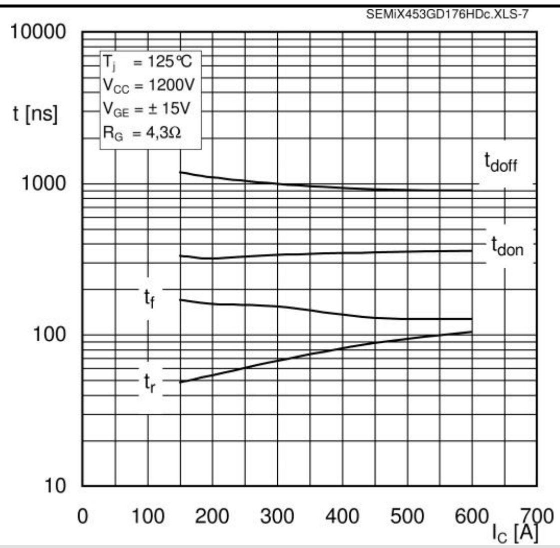


Fig. 7 Typ. switching times vs. I_C

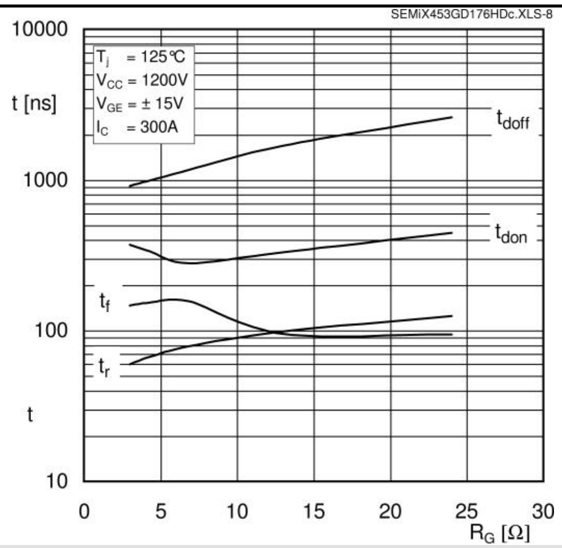


Fig. 8 Typ. switching times vs. gate resistor R_G

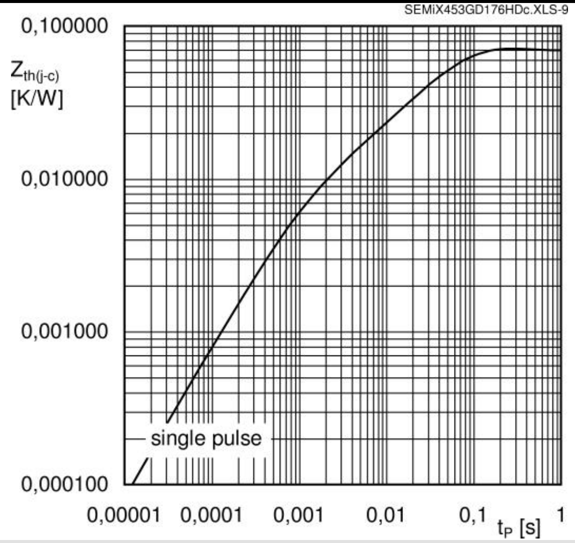


Fig. 9 Transient thermal impedance of IGBT

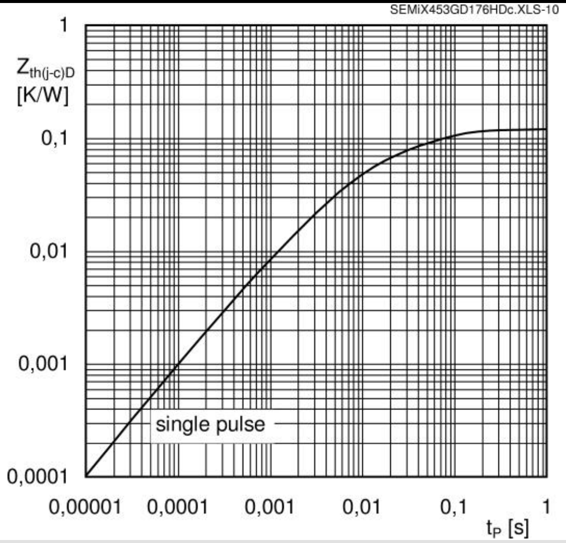


Fig. 10 Transient thermal impedance of FWD

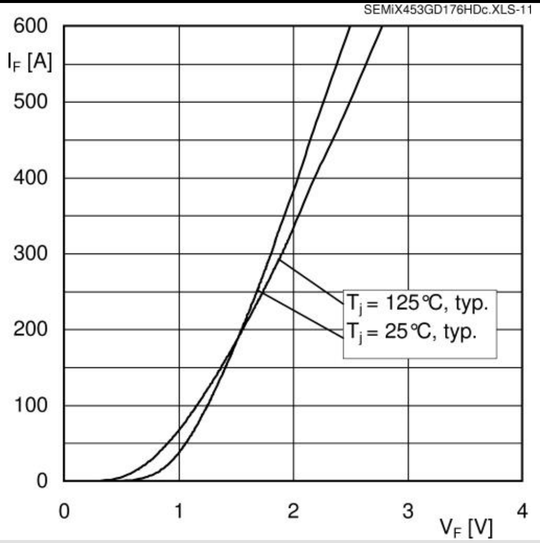


Fig. 11 Typ. CAL diode forward characteristic

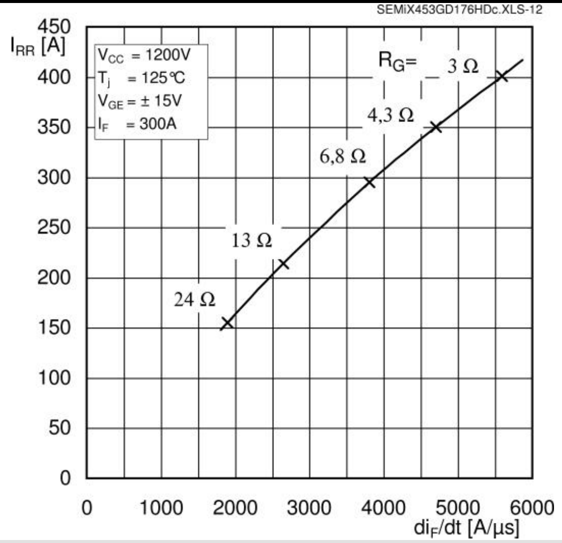


Fig. 12 Typ. CAL diode peak reverse recovery current

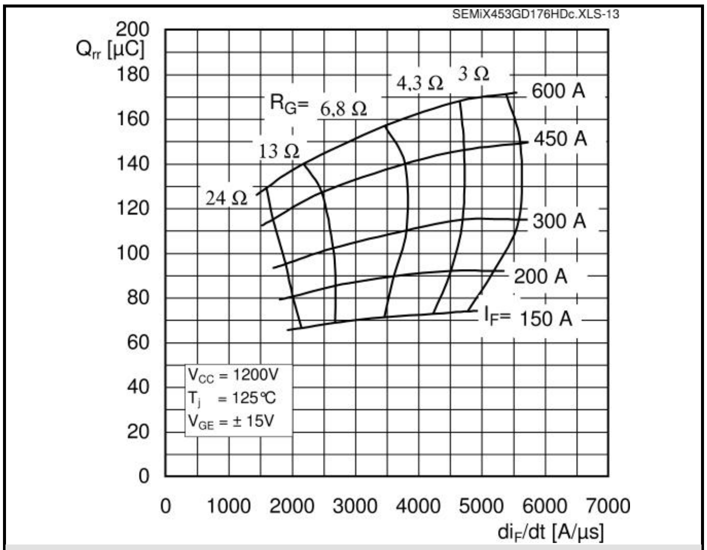
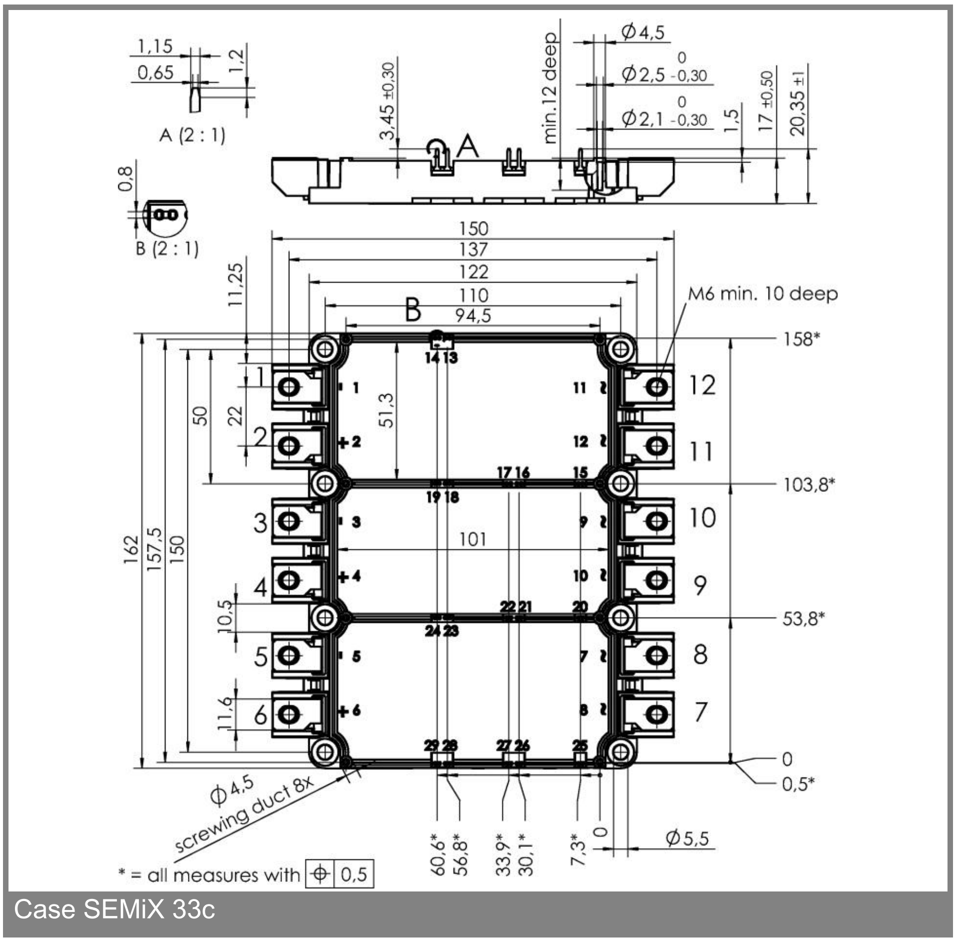
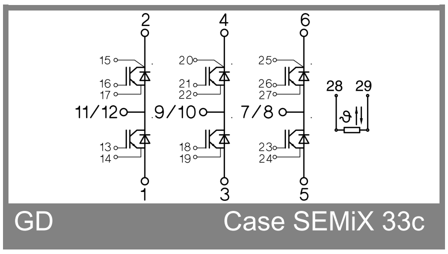


Fig. 13 Typ. CAL diode recovered charge



Case SEMiX 33c



GD Case SEMiX 33c

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

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