

SEMiX353GD176HDc



SEMiX[®] 33c

Trench IGBT Modules

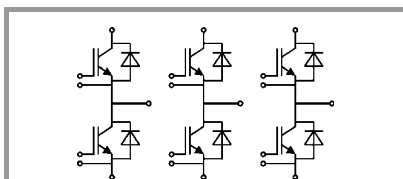
SEMiX353GD176HDc

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



GD

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
IGBT				
V_{CES}			1700	V
I_C	$T_j = 150\text{ °C}$	$T_c = 25\text{ °C}$	353	A
		$T_c = 80\text{ °C}$	251	A
I_{Cnom}			225	A
I_{CRM}	$I_{CRM} = 2 \times I_{Cnom}$		450	A
V_{GES}			-20 ... 20	V
t_{psc}	$V_{CC} = 1000\text{ V}$ $V_{GE} \leq 20\text{ V}$ $V_{CES} \leq 1700\text{ V}$	$T_j = 125\text{ °C}$	10	μs
T_j			-55 ... 150	$^{\circ}\text{C}$
Inverse diode				
I_F	$T_j = 150\text{ °C}$	$T_c = 25\text{ °C}$	428	A
		$T_c = 80\text{ °C}$	289	A
I_{Fnom}			225	A
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$		450	A
I_{FSM}	$t_p = 10\text{ ms}$, $\sin 180^{\circ}$, $T_j = 25\text{ °C}$		1800	A
T_j			-40 ... 150	$^{\circ}\text{C}$
Module				
$I_{t(RMS)}$			600	A
T_{stg}			-40 ... 125	$^{\circ}\text{C}$
V_{isol}	AC sinus 50Hz, $t = 1\text{ min}$		4000	V

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
IGBT						
$V_{CE(sat)}$	$I_C = 225\text{ A}$ $V_{GE} = 15\text{ V}$ chipllevel	$T_j = 25\text{ °C}$		2	2.45	V
		$T_j = 125\text{ °C}$		2.45	2.9	V
V_{CE0}			$T_j = 25\text{ °C}$	1	1.2	V
			$T_j = 125\text{ °C}$	0.9	1.1	V
r_{CE}	$V_{GE} = 15\text{ V}$	$T_j = 25\text{ °C}$	4.4	5.6		$\text{m}\Omega$
		$T_j = 125\text{ °C}$	6.9	8.0		$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}$, $I_C = 9\text{ mA}$		5.2	5.8	6.4	V
I_{CES}	$V_{GE} = 0\text{ V}$ $V_{CE} = 1700\text{ V}$	$T_j = 25\text{ °C}$			3	mA
		$T_j = 125\text{ °C}$				mA
C_{res}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$		$f = 1\text{ MHz}$		19.9	nF
C_{oes}			$f = 1\text{ MHz}$		0.83	nF
C_{res}			$f = 1\text{ MHz}$		0.66	nF
Q_G	$V_{GE} = -8\text{ V...} +15\text{ V}$			2100		nC
R_{Gint}	$T_j = 25\text{ °C}$			2.83		Ω
$t_{d(on)}$	$V_{CC} = 1200\text{ V}$ $I_C = 225\text{ A}$	$T_j = 125\text{ °C}$		250		ns
t_r		$T_j = 125\text{ °C}$		75		ns
E_{on}	$R_{G\ on} = 5.6\ \Omega$			155		mJ
$t_{d(off)}$	$R_{G\ off} = 5.6\ \Omega$			930		ns
t_f				180		ns
E_{off}				85		mJ
$R_{th(j-c)}$	per IGBT				0.086	K/W

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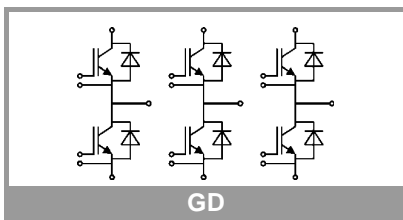
Features

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

Typical Applications*

- AC inverter drives
- UPS
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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
$V_F = V_{EC}$	$I_F = 225\text{ A}$ $V_{GE} = 0\text{ V}$ chip	$T_j = 25\text{ °C}$		1.6	1.75	V
		$T_j = 125\text{ °C}$		1.5	1.7	V
V_{F0}		$T_j = 25\text{ °C}$	0.9	1.1	1.3	V
		$T_j = 125\text{ °C}$	0.7	0.9	1.1	V
r_F		$T_j = 25\text{ °C}$	2.0	2.0	2.0	mΩ
		$T_j = 125\text{ °C}$	2.7	2.7	2.7	mΩ
I_{RRM}	$I_F = 225\text{ A}$	$T_j = 125\text{ °C}$		280		A
Q_{rr}	$di/dt_{off} = 4000\text{ A}/\mu\text{s}$	$T_j = 125\text{ °C}$		83		μC
E_{rr}	$V_{GE} = -15\text{ V}$ $V_{CC} = 1200\text{ V}$	$T_j = 125\text{ °C}$		45		mJ
$R_{th(j-c)}$	per diode				0.13	K/W
Module						
L_{CE}				20		nH
R_{CC+EE}	res., terminal-chip	$T_C = 25\text{ °C}$		0.7		mΩ
		$T_C = 125\text{ °C}$		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
						Nm
w					900	g
Temperatur Sensor						
R_{100}	$T_c = 100\text{ °C}$ ($R_{25} = 5\text{ k}\Omega$)			$493 \pm 5\%$		Ω
$B_{100/125}$	$R_{(T)} = R_{100} \exp[B_{100/125}(1/T - 1/T_{100})]$; $T[\text{K}]$;			3550 $\pm 2\%$		K



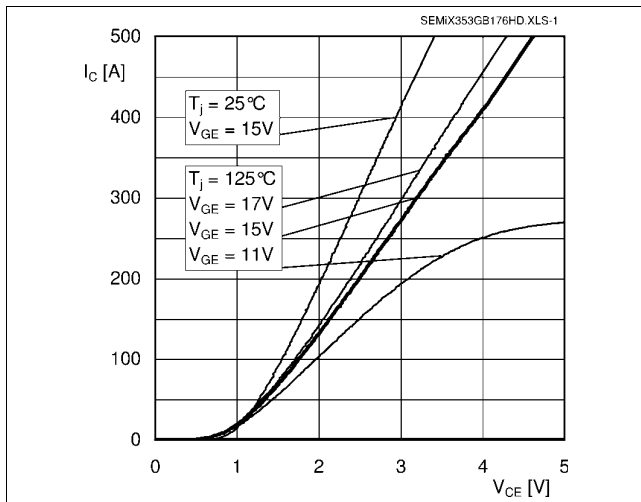


Fig. 1: Typ. output characteristic, inclusive $R_{CC+EE'}$

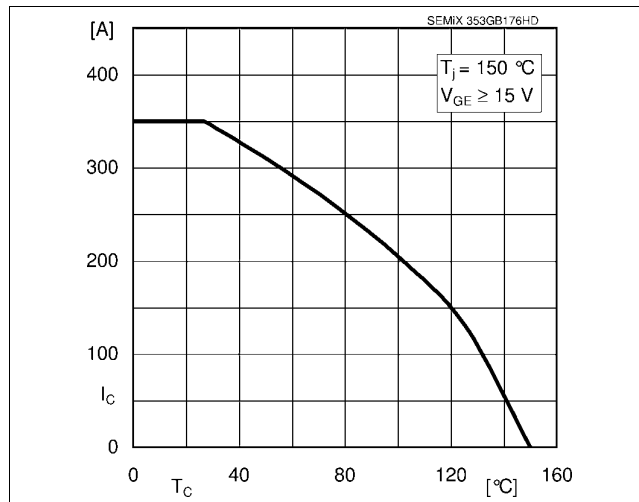


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

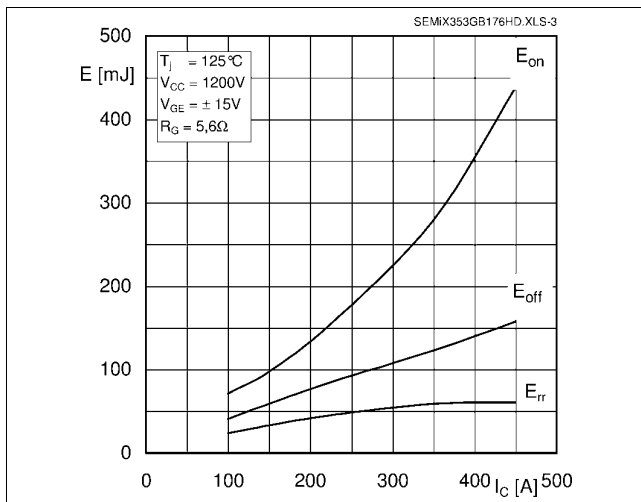


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

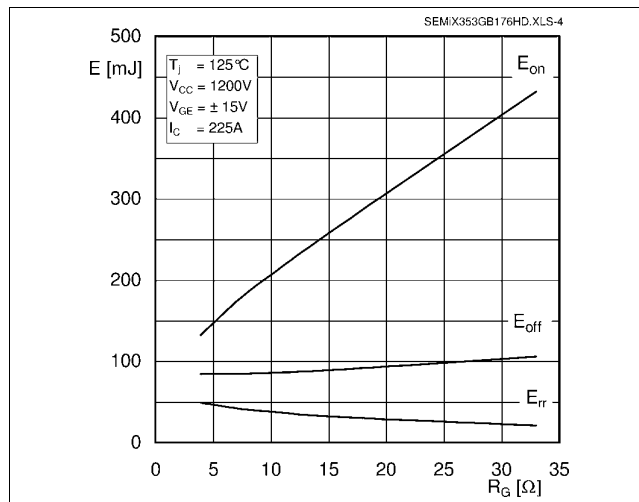


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

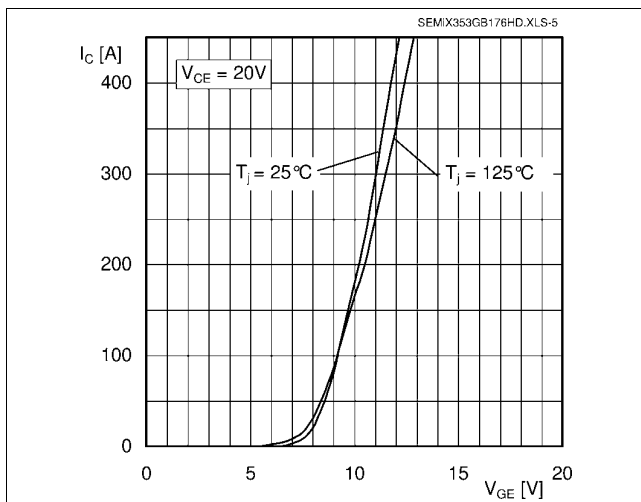


Fig. 5: Typ. transfer characteristic

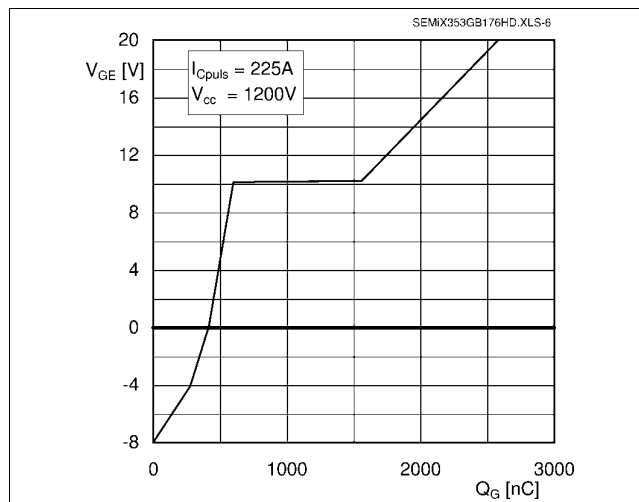


Fig. 6: Typ. gate charge characteristic

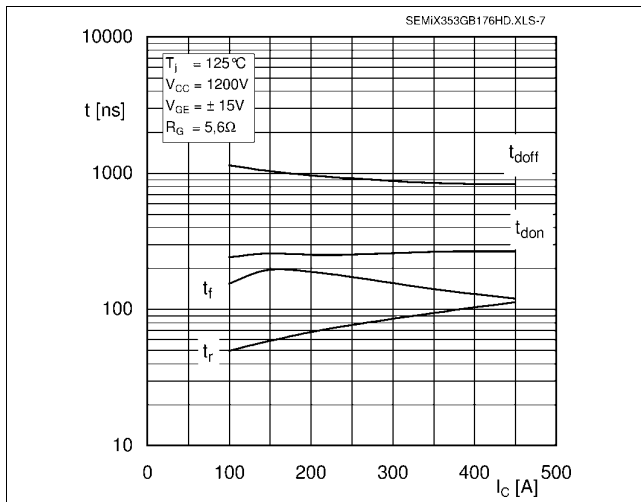


Fig. 7: Typ. switching times vs. I_C

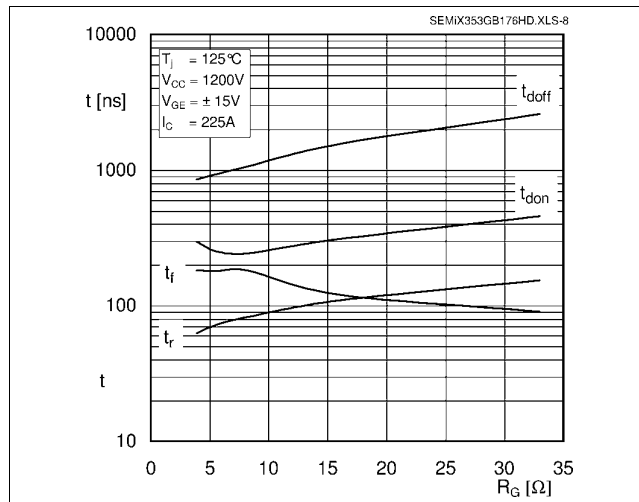


Fig. 8: Typ. switching times vs. gate resistor R_G

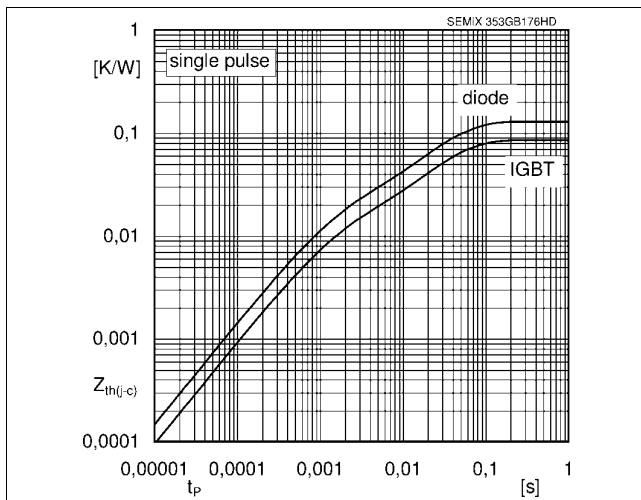


Fig. 9: Typ. transient thermal impedance

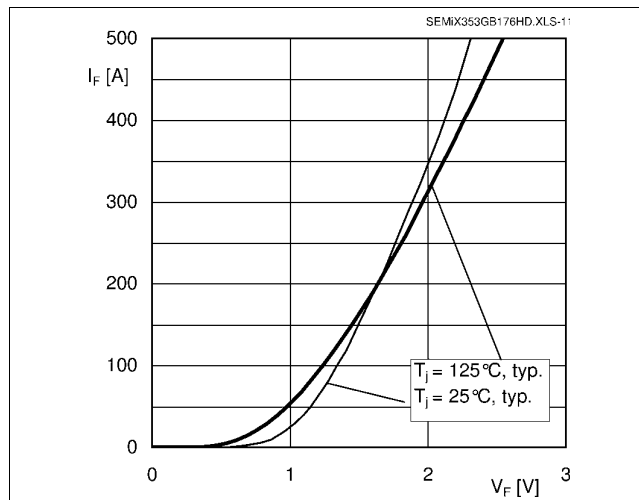


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

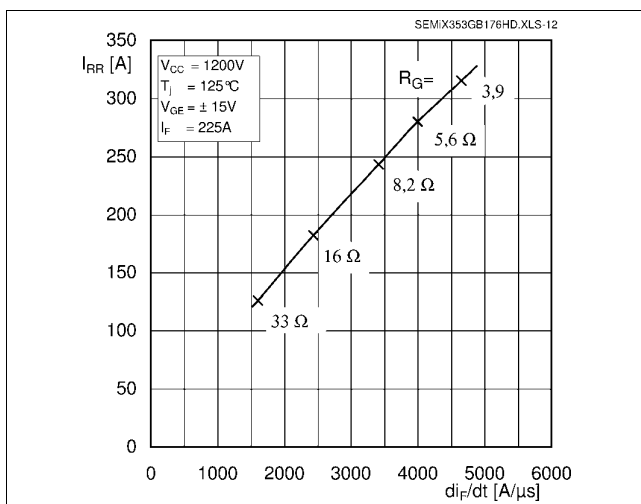


Fig. 11: Typ. CAL diode peak reverse recovery current

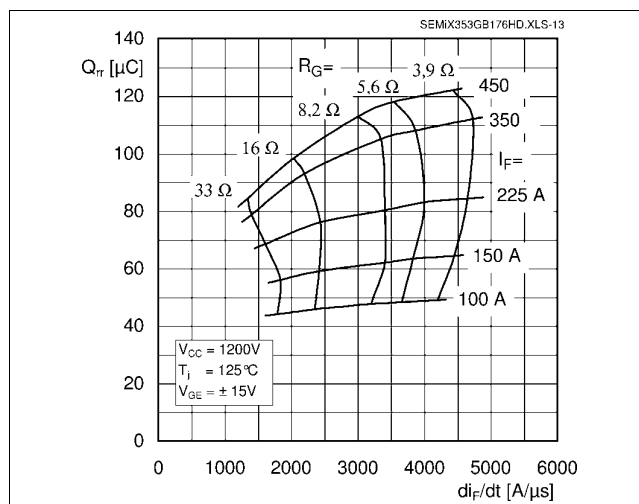
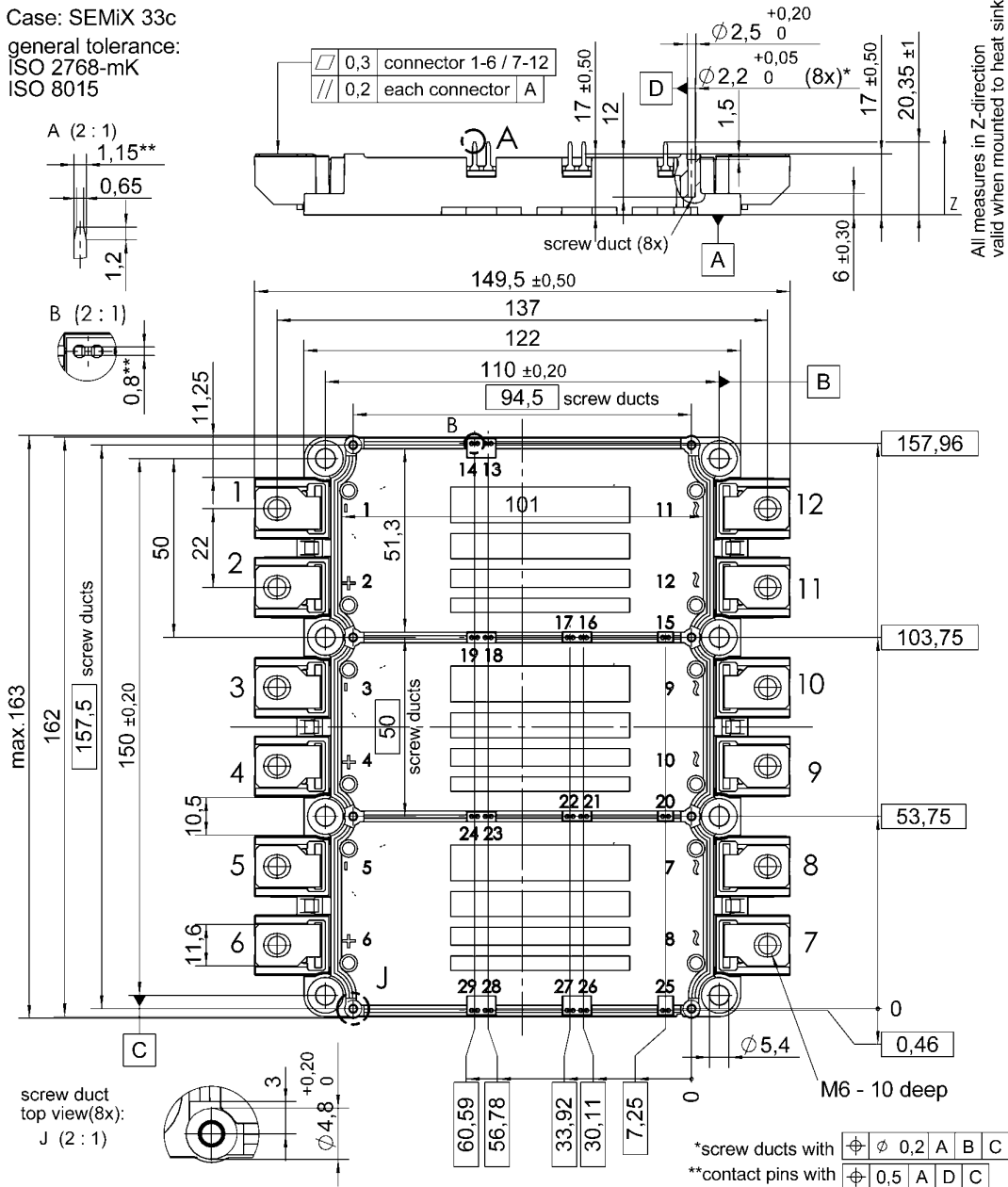


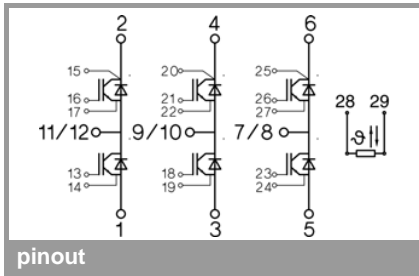
Fig. 12: Typ. CAL diode recovery charge

SEMiX353GD176HDc

Case: SEMiX 33c
 general tolerance:
 ISO 2768-mK
 ISO 8015



SEMiX 33c



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 personal.