

SEMiX854GB176HDs



SEMiX® 4s

Trench IGBT Modules

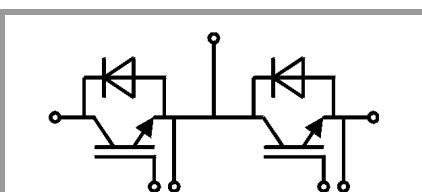
SEMiX854GB176HDs

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



GB

Absolute Maximum Ratings				
Symbol	Conditions	Values	Unit	
IGBT				
V_{CES}		1700	V	
I_C	$T_j = 150\text{ °C}$	$T_c = 25\text{ °C}$	779	A
		$T_c = 80\text{ °C}$	549	A
I_{Cnom}		600	A	
I_{CRM}	$I_{CRM} = 2 \times I_{Cnom}$	1200	A	
V_{GES}		-20 ... 20	V	
t_{psc}	$V_{CC} = 1000\text{ V}$	$T_j = 125\text{ °C}$	10	μs
	$V_{GE} \leq 20\text{ V}$			
	$V_{CES} \leq 1700\text{ V}$			
T_j		-55 ... 150	$^{\circ}\text{C}$	
Inverse diode				
I_F	$T_j = 150\text{ °C}$	$T_c = 25\text{ °C}$	740	A
		$T_c = 80\text{ °C}$	496	A
I_{Fnom}		600	A	
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$	1200	A	
I_{FSM}	$t_p = 10\text{ ms, sin } 180^{\circ}, T_j = 25\text{ °C}$	3800	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					
$V_{CE(sat)}$	$I_C = 600\text{ A}$ $V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25\text{ °C}$	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}	$V_{GE} = 15\text{ V}$	$T_j = 25\text{ °C}$	1.7	2.1	$\text{m}\Omega$
		$T_j = 125\text{ °C}$	2.6	3.0	$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 24\text{ mA}$	5.2	5.8	6.4	V
I_{CES}	$V_{GE} = 0\text{ V}$ $V_{CE} = 1700\text{ V}$	$T_j = 25\text{ °C}$		4	mA
		$T_j = 125\text{ °C}$			mA
C_{ies}	$V_{CE} = 25\text{ V}$		52.8		nF
C_{oes}	$V_{GE} = 0\text{ V}$		2.20		nF
C_{res}			1.75		nF
Q_G	$V_{GE} = -8\text{ V...} + 15\text{ V}$		5600		nC
R_{Gint}	$T_j = 25\text{ °C}$		1.25		Ω
$t_{d(on)}$	$V_{CC} = 1200\text{ V}$	$T_j = 125\text{ °C}$	340		ns
t_r	$I_C = 600\text{ A}$	$T_j = 125\text{ °C}$	80		ns
		$T_j = 125\text{ °C}$	395		mJ
E_{on}	$R_{Gon} = 2\text{ }\Omega$	$T_j = 125\text{ °C}$	890		ns
$t_{d(off)}$	$R_{Goff} = 2\text{ }\Omega$	$T_j = 125\text{ °C}$	155		ns
t_f		$T_j = 125\text{ °C}$	235		mJ
E_{off}		$T_j = 125\text{ °C}$			
$R_{th(j-c)}$	per IGBT			0.045	K/W

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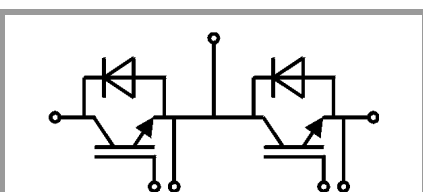
Features

- Homogeneous Si
- Trench = Trenchgate technology
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Typical Applications*

- AC inverter drives
- UPS
- Electronic welders

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
$V_F = V_{EC}$	$I_F = 600\text{ A}$	$T_j = 25\text{ °C}$		1.7	1.90	V
	$V_{GE} = 0\text{ V}$	$T_j = 125\text{ °C}$		1.7	1.9	V
	chip					
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		$T_j = 25\text{ °C}$	1.0	1.0	1.0	mΩ
		$T_j = 125\text{ °C}$	1.3	1.3	1.3	mΩ
I_{RRM}	$I_F = 600\text{ A}$	$T_j = 125\text{ °C}$		730		A
Q_{rr}	$di/dt_{off} = 8000\text{ A}/\mu\text{s}$	$T_j = 125\text{ °C}$		220		μC
E_{rr}	$V_{GE} = -15\text{ V}$	$T_j = 125\text{ °C}$		170		mJ
	$V_{CC} = 1200\text{ V}$					
$R_{th(j-c)}$	per diode				0.081	K/W
Module						
L_{CE}				22		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			0.03		K/W
M_s	to heat sink (M5)		3		5	Nm
M_t		to terminals (M6)	2.5		5	Nm
						Nm
w					400	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



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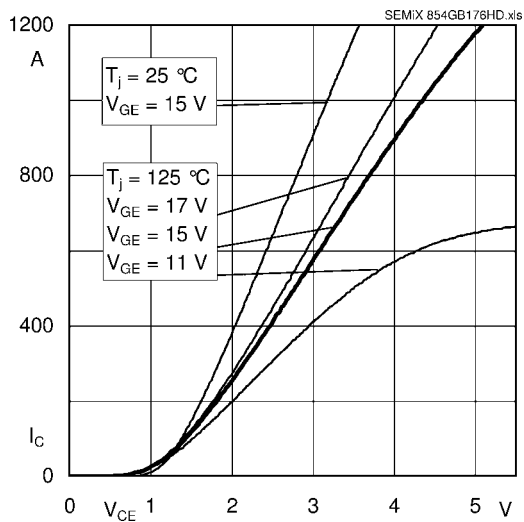


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

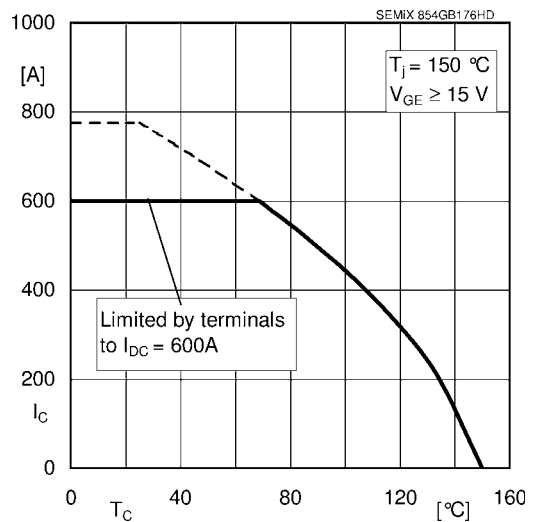


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

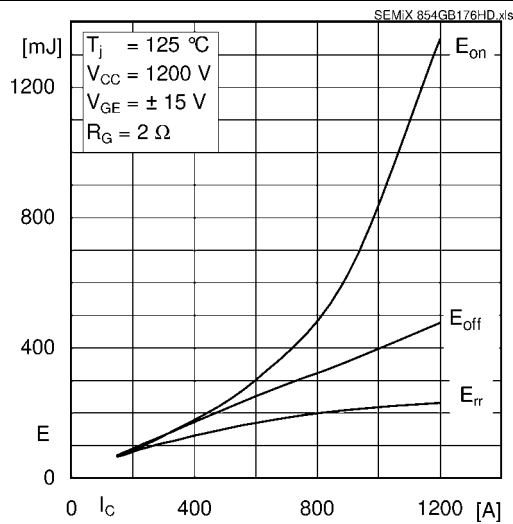


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

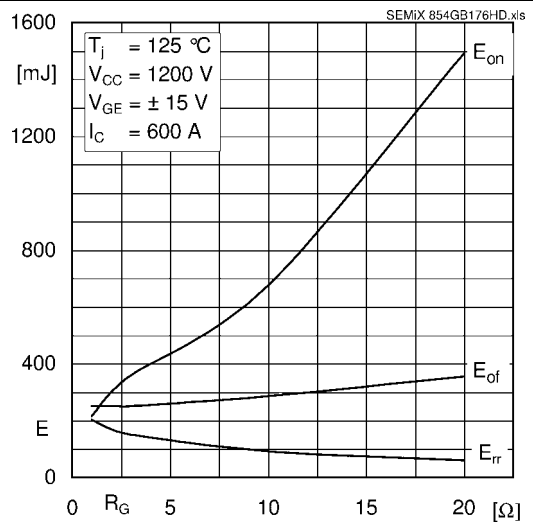


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

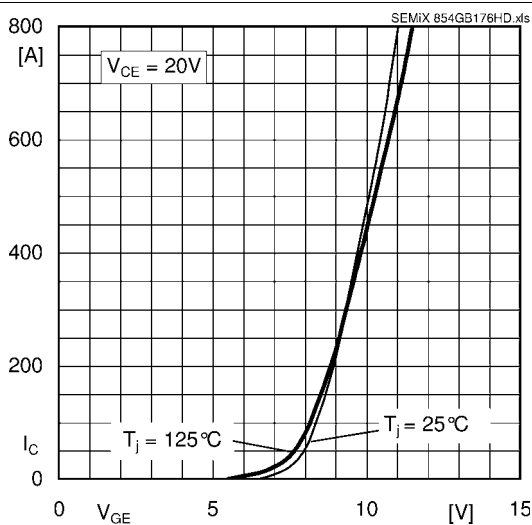


Fig. 5: Typ. transfer characteristic

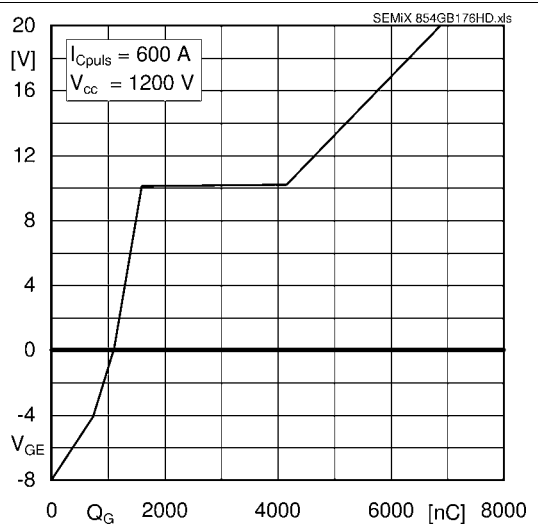


Fig. 6: Typ. gate charge characteristic

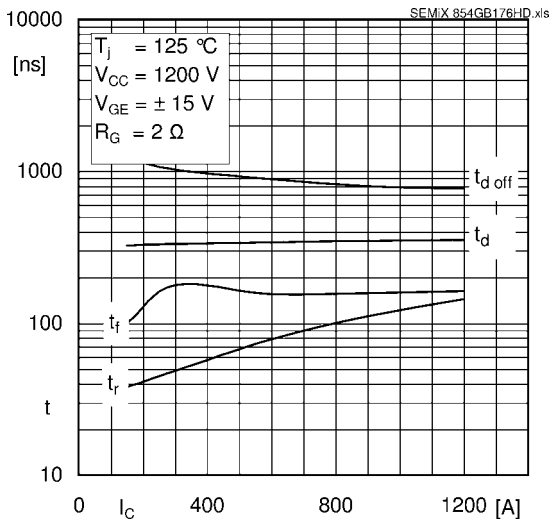


Fig. 7: Typ. switching times vs. I_C

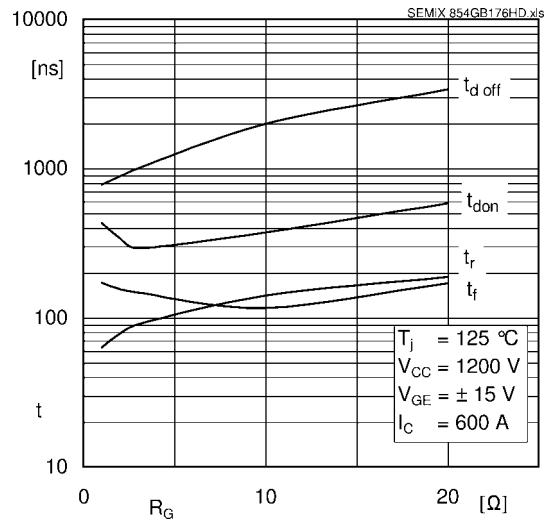


Fig. 8: Typ. switching times vs. gate resistor R_G

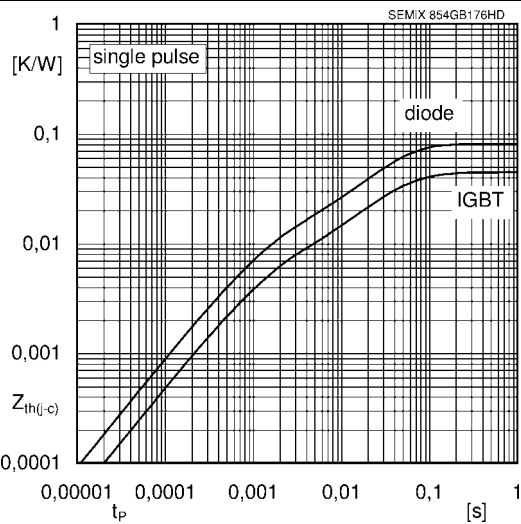


Fig. 9: Typ. transient thermal impedance

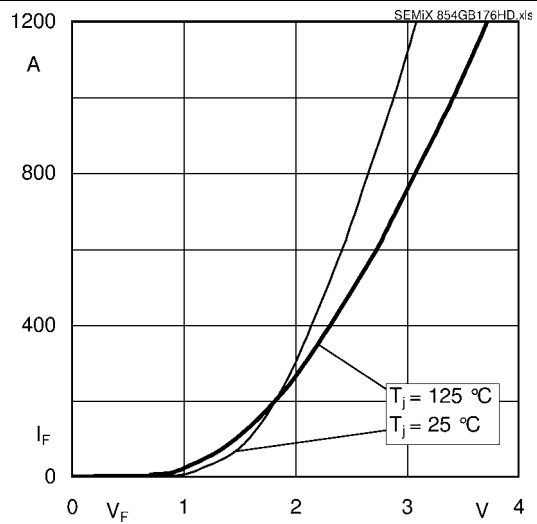


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC+EE'}$

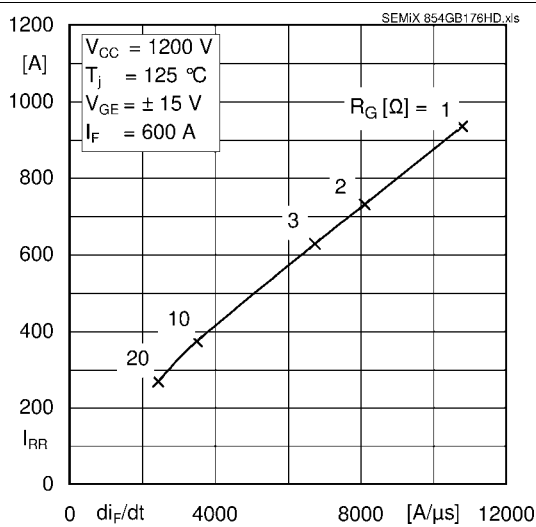


Fig. 11: Typ. CAL diode peak reverse recovery current

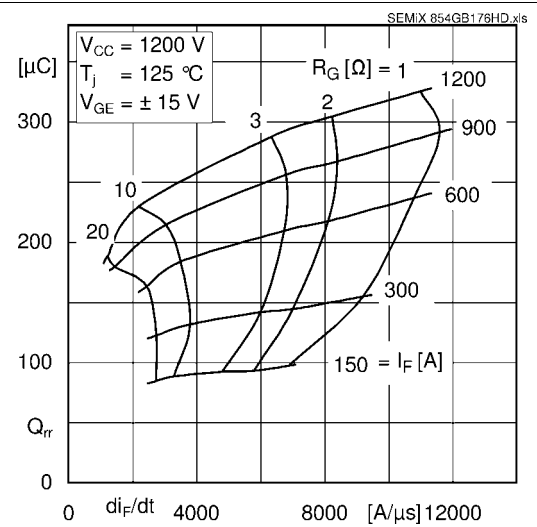


Fig. 12: Typ. CAL diode recovery charge

