

SEMiX® 33c

SPT IGBT Modules

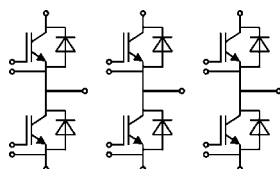
SEMiX553GD128Dc

Features

- Homogeneous Si
- SPT = Soft-Punch-Through technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- UL recognised file no. E63532

Typical Applications*

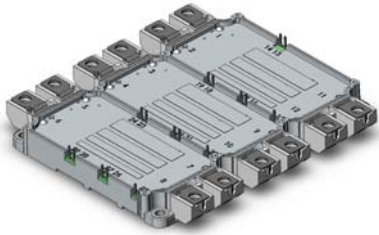
- AC inverter drives
- UPS
- Electronic welders up to 20 kHz



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Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
IGBT				
V _{CES}			1200	V
I _C	T _j = 150 °C	T _c = 25 °C	533	A
		T _c = 80 °C	379	A
I _{Cnom}			300	A
I _{CRM}	I _{CRM} = 2xI _{Cnom}		600	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 600 V V _{GE} ≤ 20 V V _{CES} ≤ 1200 V	T _j = 125 °C	10	µs
T _j			-40 ... 150	°C
Inverse diode				
I _F	T _j = 150 °C	T _c = 25 °C	421	A
		T _c = 80 °C	289	A
I _{Fnom}			300	A
I _{FRM}	I _{FRM} = 2xI _{Fnom}		600	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 25 °C		2300	A
T _j			-40 ... 150	°C
Module				
I _{t(RMS)}			600	A
T _{stg}			-40 ... 125	°C
V _{isol}	AC sinus 50Hz, t = 1 min		4000	V

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
IGBT						
V _{CE(sat)}	I _C = 300 A	T _J = 25 °C		1.9	2.35	V
	V _{GE} = 15 V chipllevel	T _J = 125 °C		2.1	2.55	V
V _{CE0}		T _J = 25 °C		1	1.15	V
		T _J = 125 °C		0.9	1.05	V
r _{CE}	V _{GE} = 15 V	T _J = 25 °C		3.0	4.0	mΩ
		T _J = 125 °C		4.0	5.0	mΩ
V _{GE(th)}	V _{GE} =V _{CE} , I _C = 12 mA		4.5	5	6.5	V
I _{CES}	V _{GE} = 0 V	T _J = 25 °C		0.1	0.3	mA
	V _{CE} = 1200 V	T _J = 125 °C				mA
C _{ies}	V _{CE} = 25 V V _{GE} = 0 V	f = 1 MHz		28.3		nF
C _{oes}		f = 1 MHz		1.86		nF
C _{res}		f = 1 MHz		1.17		nF
Q _G	V _{GE} = - 8 V...+ 15 V			2880		nC
R _{Gint}	T _J = 25 °C			1.33		Ω
t _{d(on)}	V _{CC} = 600 V	T _J = 125 °C		185		ns
t _r	I _C = 300 A	T _J = 125 °C		65		ns
E _{on}	R _{G on} = 3 Ω R _{G off} = 3 Ω	T _J = 125 °C		27		mJ
t _{d(off)}		T _J = 125 °C		635		ns
t _f		T _J = 125 °C		80		ns
E _{off}		T _J = 125 °C		33		mJ
R _{th(j-c)}	per IGBT				0.061	K/W



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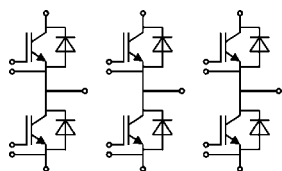
Features

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- AC inverter drives
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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
V _F = V _{EC}	I _F = 300 A	T _J = 25 °C		2.0	2.50	V
	V _{GE} = 0 V chip	T _J = 125 °C		1.8	2.3	V
V _{F0}		T _J = 25 °C	0.75	1.1	1.45	V
		T _J = 125 °C	0.5	0.85	1.2	V
r _F		T _J = 25 °C	2.5	3.0	3.5	mΩ
		T _J = 125 °C	2.7	3.2	3.7	mΩ
I _{RRM}	I _F = 300 A	T _J = 125 °C		325		A
Q _{rr}	di/dt _{off} = 5400 A/μs	T _J = 125 °C		46		μC
E _{rr}	V _{GE} = -15 V	T _J = 125 °C		17		mJ
	V _{CC} = 600 V					
R _{th(j-c)}	per diode				0.11	K/W
Module						
L _{CE}				20		nH
R _{CC'+EE'}	res., terminal-chip	T _C = 25 °C		0.7		mΩ
		T _C = 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
						Nm
w					900	g
Temperatur Sensor						
R ₁₀₀	T _C =100°C (R ₂₅ =5 kΩ)			493 ± 5%		Ω
B _{100/125}	R _(T) =R ₁₀₀ exp[B _{100/125} (1/T-1/T ₁₀₀)]; T[K];			3550 ±2%		K



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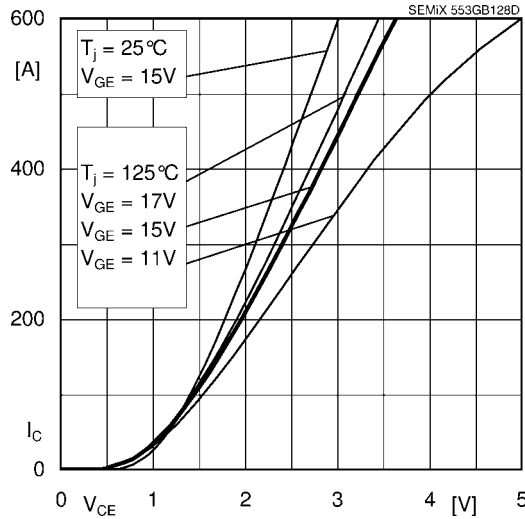


Fig. 1: Typ. output characteristic, inclusive $R_{CC'} + E_E$

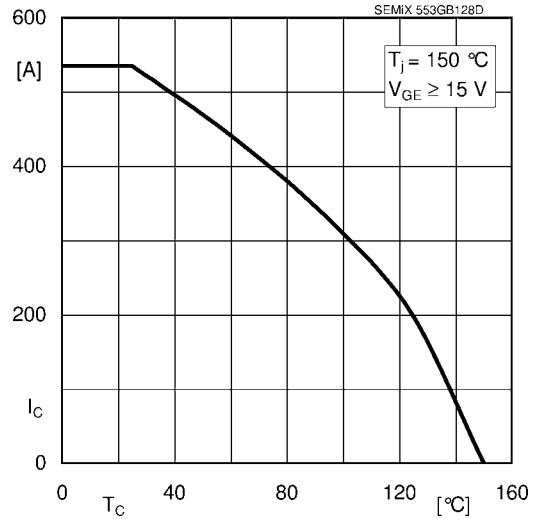


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

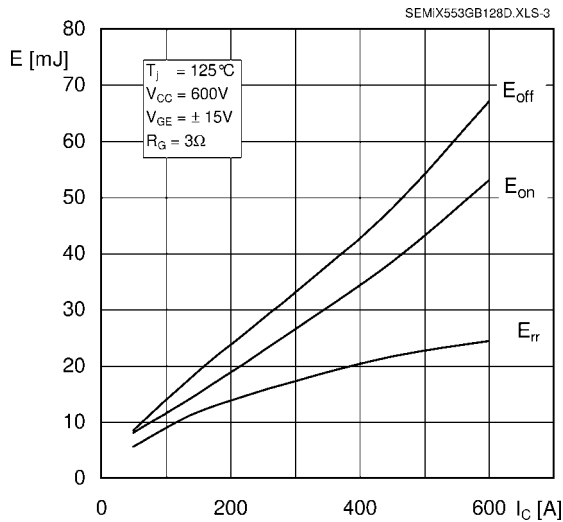


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

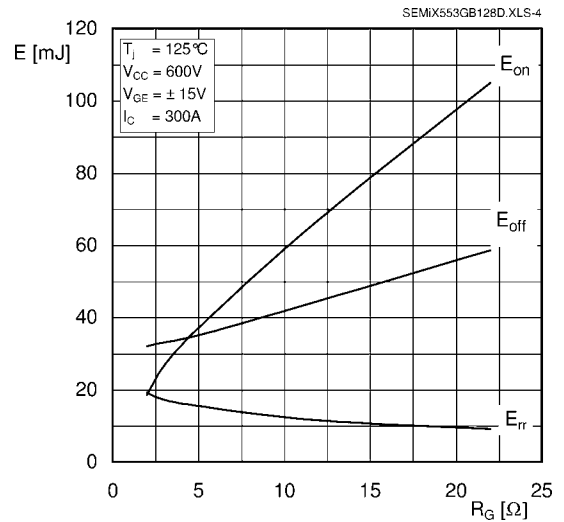


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

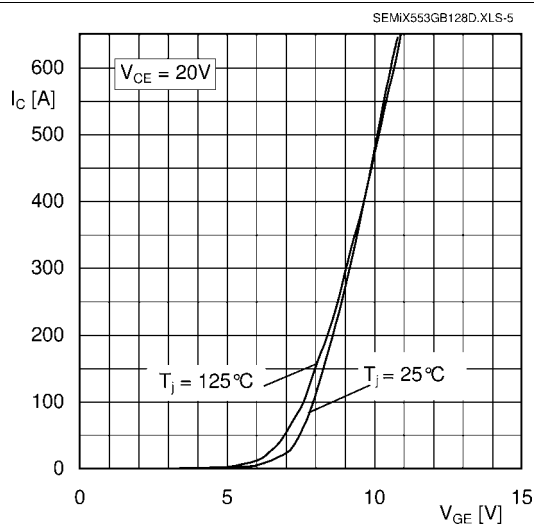


Fig. 5: Typ. transfer characteristic

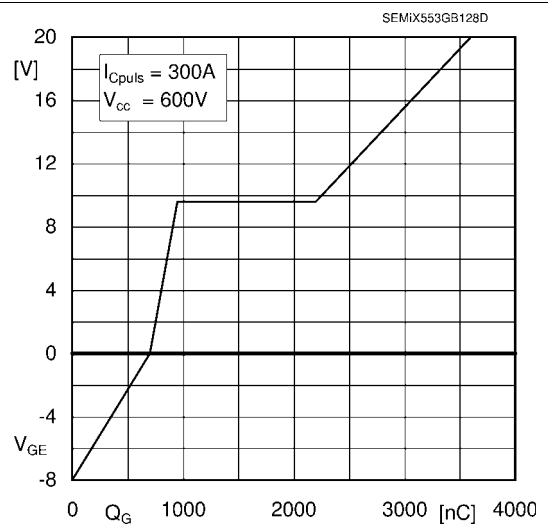


Fig. 6: Typ. gate charge characteristic

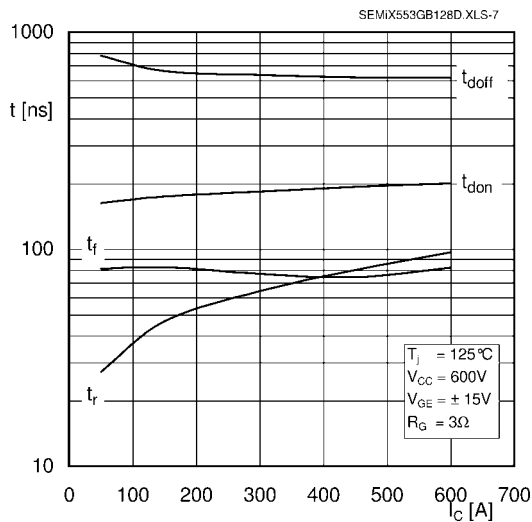


Fig. 7: Typ. switching times vs. I_C

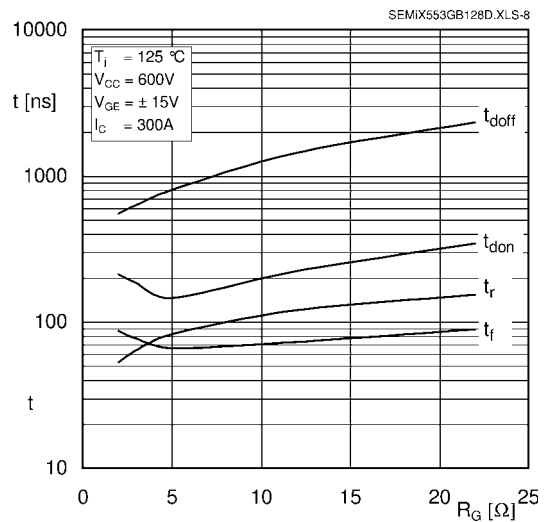


Fig. 8: Typ. switching times vs. gate resistor R_G

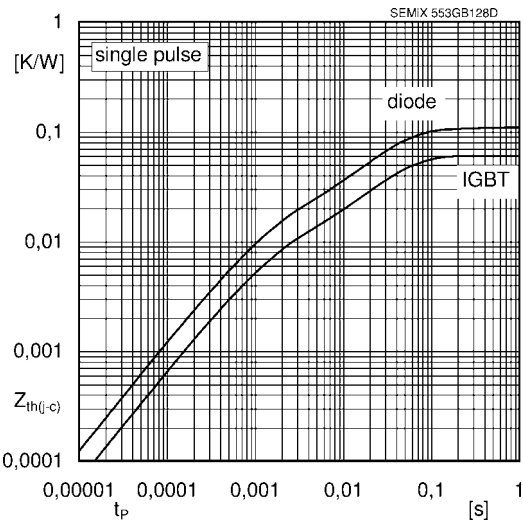


Fig. 9: Typ. transient thermal impedance

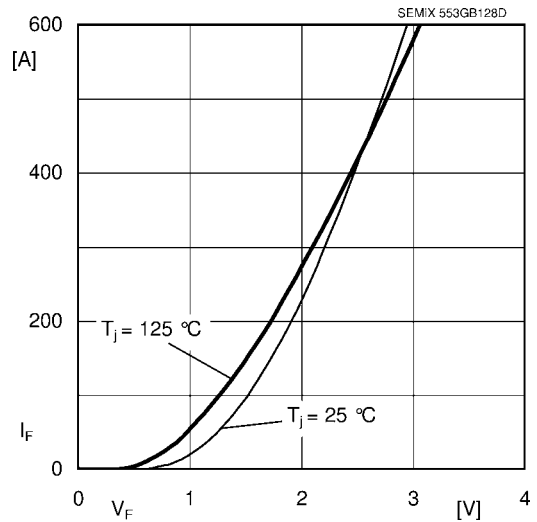


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

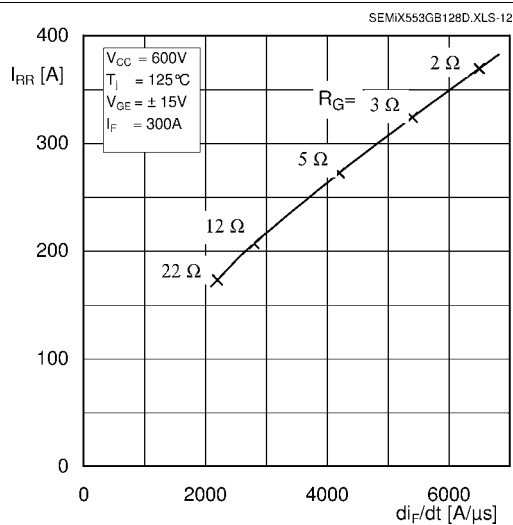


Fig. 11: Typ. CAL diode peak reverse recovery current

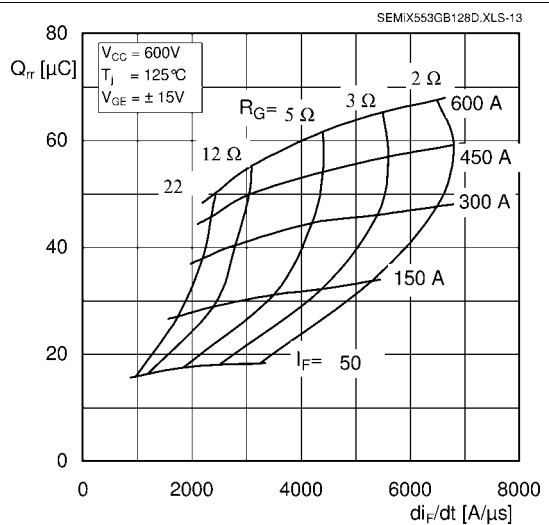


Fig. 12: Typ. CAL diode recovery charge

