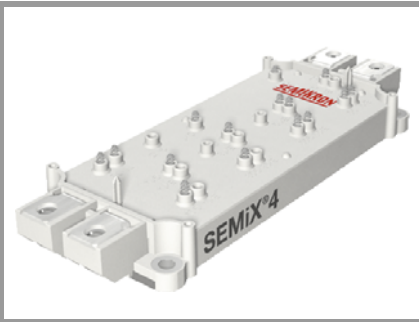


SEMiX604GB12T4s



SEMiX®4s

Trench IGBT Modules

SEMiX604GB12T4s

Features

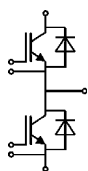
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- UL recognised file no. E63532

Typical Applications

- AC inverter drives
- UPS
- Electronic Welding

Remarks

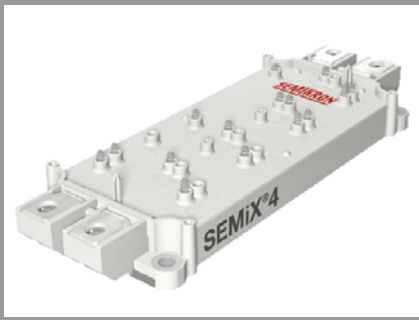
- Case temperature limited to $T_C=125^\circ\text{C}$ max.
- Product reliability results are valid for $T_J=150^\circ\text{C}$
- Dynamic values apply to the following combination of resistors:
 $R_{Gon,main} = 1,0 \Omega$
 $R_{Goff,main} = 6,2 \Omega$
 $R_{G,X} = 2,2 \Omega$
 $R_{E,X} = 0,5 \Omega$



GB

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
IGBT				
V _{CES}			1200	V
I _C	T _j = 175 °C	T _c = 25 °C	916	A
		T _c = 80 °C	704	A
I _{Cnom}			600	A
I _{CRM}	I _{CRM} = 3xI _{Cnom}		1800	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 800 V V _{GE} ≤ 20 V T _j = 150 °C V _{CES} ≤ 1200 V		10	µs
T _j			-40 ... 175	°C
Inverse diode				
I _F	T _j = 175 °C	T _c = 25 °C	707	A
		T _c = 80 °C	529	A
I _{Fnom}			600	A
I _{FRM}	I _{FRM} = 3xI _{Fnom}		1800	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 25 °C			A
T _j			-40 ... 175	°C
Module				
I _{t(RMS)}			600	A
T _{stg}			-40 ... 125	°C
V _{isol}	AC sinus 50Hz, t = 60 s		4000	V

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
IGBT						
V _{CE(sat)}	I _C = 600 A V _{GE} = 15 V chiplevel	T _J = 25 °C		1.8	2.05	V
		T _J = 150 °C		2.20	2.4	V
V _{CE0}		T _J = 25 °C		0.8	0.9	V
		T _J = 150 °C		0.7	0.8	V
r _{CE}	V _{GE} = 15 V	T _J = 25 °C		1.7	1.9	mΩ
		T _J = 150 °C		2.5	2.7	mΩ
V _{GE(th)}	V _{GE} =V _{CE} , I _C = 24 mA		5	5.8	6.5	V
I _{CES}	V _{GE} = 0 V	T _J = 25 °C		0.12	0.36	mA
	V _{CE} = 1200 V	T _J = 150 °C				mA
C _{ies}	V _{CE} = 25 V V _{GE} = 0 V	f = 1 MHz		37.2		nF
C _{oes}		f = 1 MHz		2.32		nF
C _{res}		f = 1 MHz		2.04		nF
Q _G	V _{GE} = - 8 V...+ 15 V			3400		nC
R _{Gint}	T _J = 25 °C			1.25		Ω
t _{d(on)}	V _{CC} = 600 V I _C = 600 A T _J = 150 °C R _{G on} = 1.7 Ω R _{G off} = 6.9 Ω di/dt _{on} = 7100 A/μs di/dt _{off} = 6350 A/μs			340		ns
t _r				85		ns
E _{on}				35		mJ
t _{d(off)}				1110		ns
t _f				90		ns
E _{off}				83		mJ
R _{th(l-c)}	per IGBT				0.049	K/W



SEMiX[®]4s

Trench IGBT Modules

SEMiX604GB12T4s

Features

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

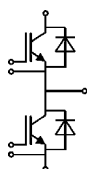
Typical Applications

- AC inverter drives
- UPS
- Electronic Welding

Remarks

- Case temperature limited to $T_C=125^\circ\text{C}$ max.
- Product reliability results are valid for $T_J=150^\circ\text{C}$
- Dynamic values apply to the following combination of resistors:
 $R_{Gon,main} = 1,0 \Omega$
 $R_{Goff,main} = 6,2 \Omega$
 $R_{G,X} = 2,2 \Omega$
 $R_{E,X} = 0,5 \Omega$

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
V _F = V _{EC}	I _F = 600 A	T _j = 25 °C		2.1	2.5	V
	V _{GE} = 0 V chipllevel	T _j = 150 °C		2.1	2.4	V
V _{F0}		T _j = 25 °C	1.1	1.3	1.5	V
		T _j = 150 °C	0.7	0.9	1.1	V
r _F		T _j = 25 °C	1.1	1.4	1.6	mΩ
		T _j = 150 °C	1.7	1.9	2.1	mΩ
I _{RRM}	I _F = 600 A	T _j = 150 °C		430		A
Q _{rr}	di/dt _{off} = 6000 A/μs	T _j = 150 °C		100		μC
E _{rr}	V _{GE} = -15 V V _{CC} = 600 V	T _j = 150 °C		44		mJ
R _{th(j-c)D}	per diode				0.086	K/W
Module						
L _{CE}				22		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			0.03		K/W
M _s	to heat sink (M5)		3		5	Nm
M _t	to terminals (M6)		2.5		5	Nm
w					400	g
Temperature sensor						
R ₁₀₀	T _c =100°C (R ₂₅ =5 kΩ)			0,493 ±5%		kΩ
B _{100/125}	R _(T) =R ₁₀₀ exp[B _{100/125} (1/T-1/T ₁₀₀)]; T[K];			3550 ±2%		K



GB

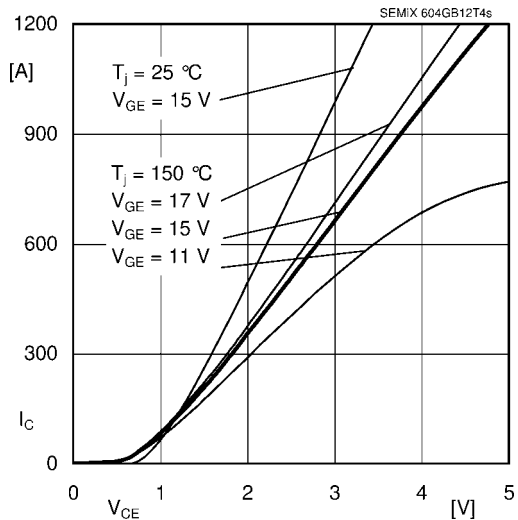


Fig. 1 Typ. output characteristic, inclusive $R_{CC'}+EE'$

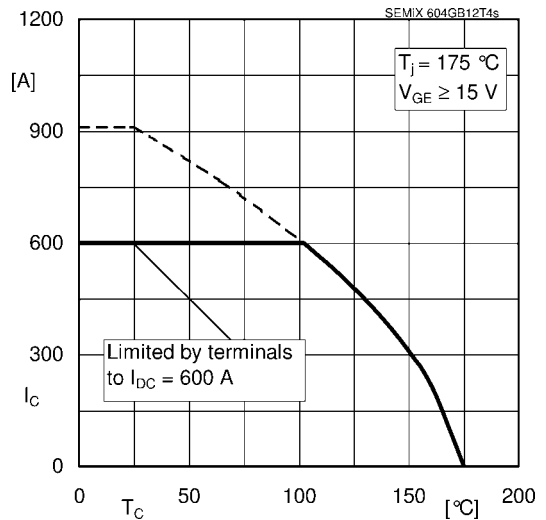


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

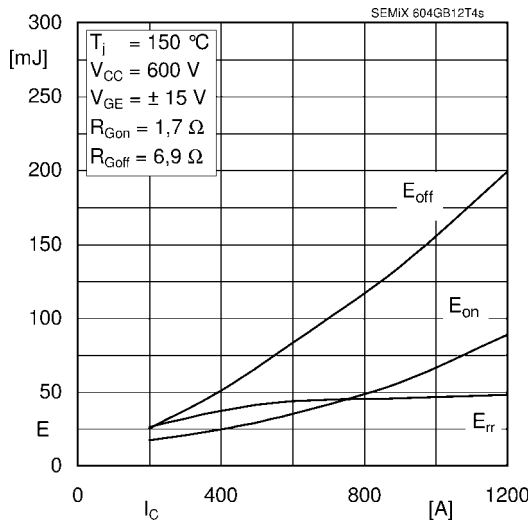


Fig. 3 Typ. turn-on /-off energy = $f(I_C)$

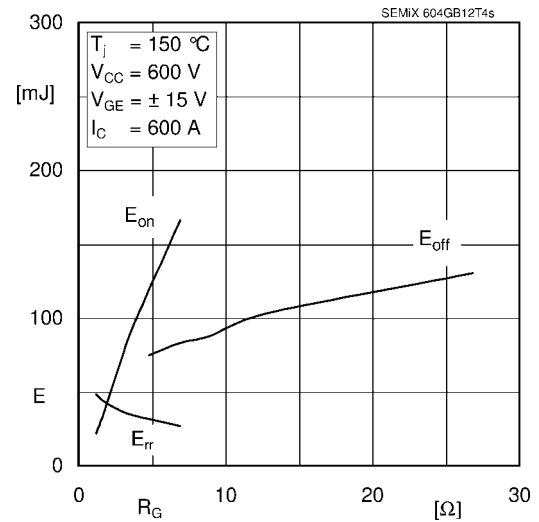


Fig. 4 Typ. turn-on /-off energy = $f(R_G)$

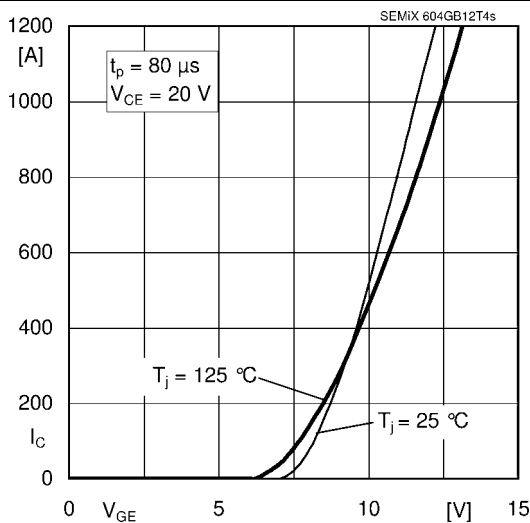


Fig. 5 Typ. transfer characteristic

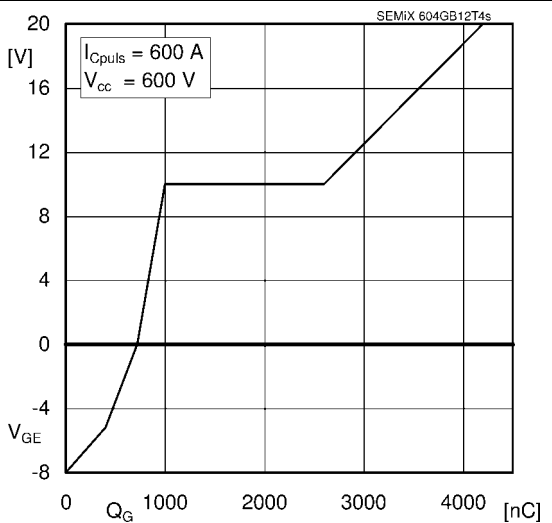


Fig. 6 Typ. gate charge characteristic

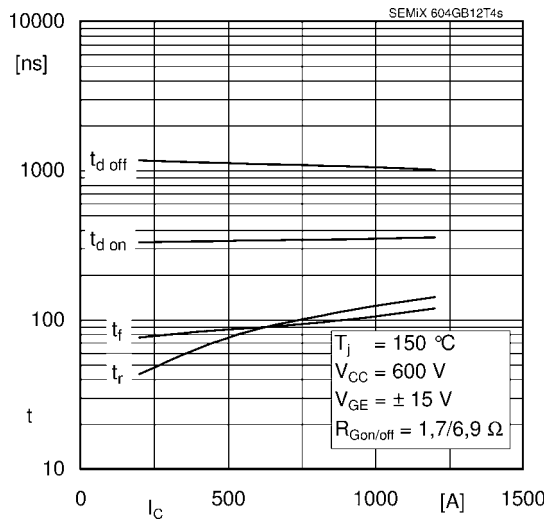


Fig. 7 Typ. switching times vs. I_C

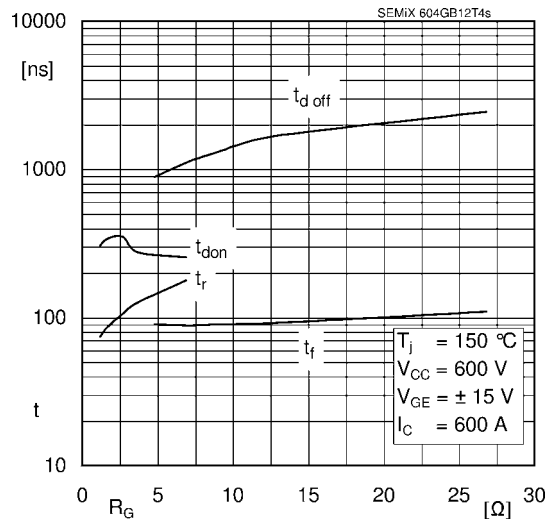


Fig. 8 Typ. switching times vs. gate resistor R_G

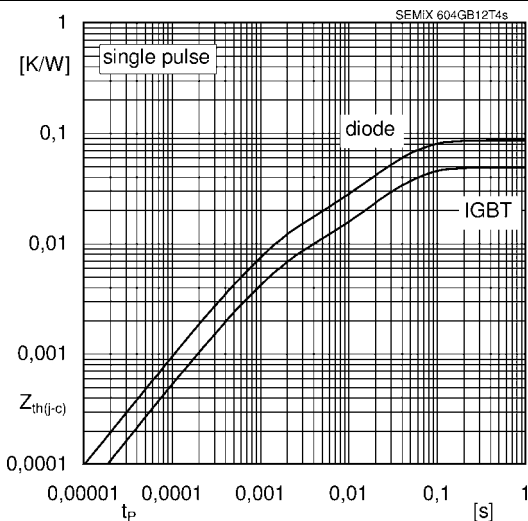


Fig. 9 Typ. transient thermal impedance

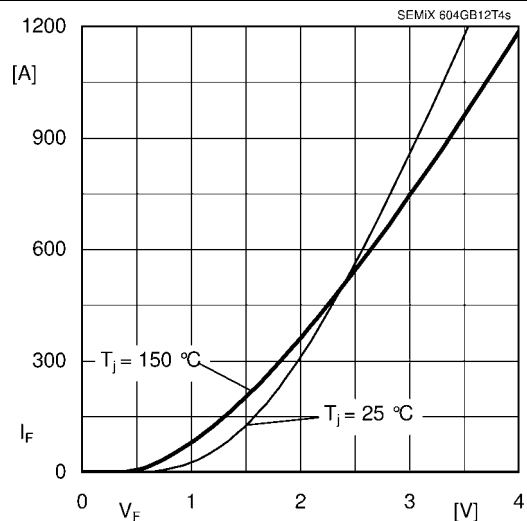


Fig. 10 Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

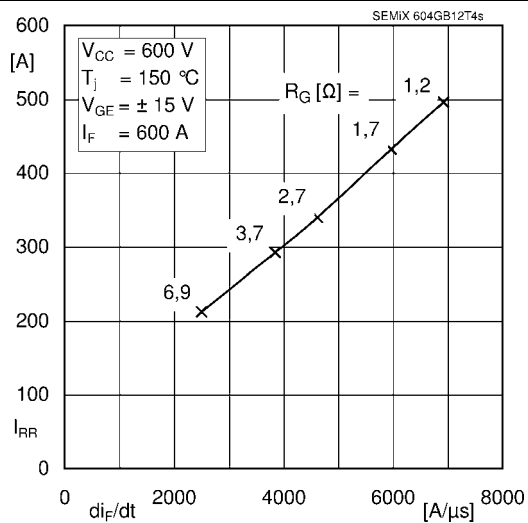


Fig. 11 Typ. CAL diode peak reverse recovery current

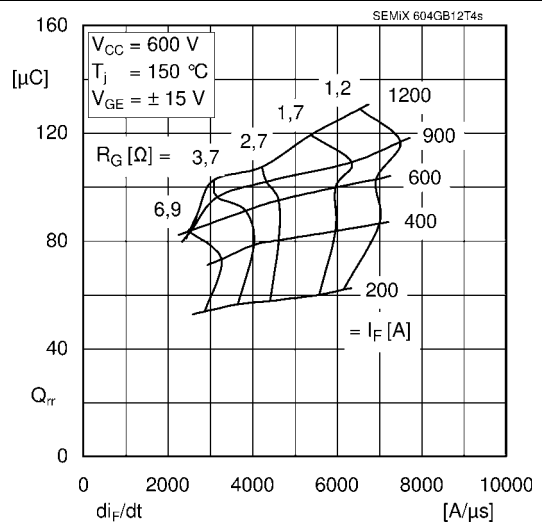


Fig. 12 Typ. CAL diode recovery charge

