

SEMiX® 33c

Trench IGBT Modules

SEMiX453GD12E4c

Features

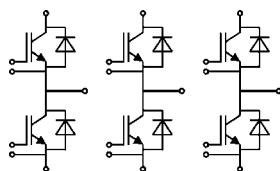
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- UL recognised file no. E63532

Typical Applications*

- AC inverter drives
- UPS
- Electronic Welding

Remarks

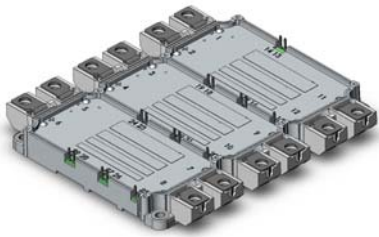
- Case temperature limited to $T_C=125^{\circ}\text{C}$ max.
- Product reliability results are valid for $T_J=150^{\circ}\text{C}$



GD

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
IGBT				
V _{CES}			1200	V
I _C	T _j = 175 °C	T _c = 25 °C	683	A
		T _c = 80 °C	526	A
I _{Cnom}			450	A
I _{CRM}	I _{CRM} = 3xI _{Cnom}		1350	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 800 V V _{GE} ≤ 20 V V _{CES} ≤ 1200 V	T _j = 150 °C	10	µs
T _j			-40 ... 175	°C
Inverse diode				
I _F	T _j = 175 °C	T _c = 25 °C	544	A
		T _c = 80 °C	407	A
I _{Fnom}			450	A
I _{FRM}	I _{FRM} = 3xI _{Fnom}		1350	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 25 °C		2430	A
T _j			-40 ... 175	°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 = 150 A	T _J = 25 °C		1.8	2.05	V
	V _{GE} = 15 V chipelevel	T _J = 150 °C		2.2	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		2.2	2.6	mΩ
		T _J = 150 °C		3.3	3.6	mΩ
V _{GE(th)}	V _{GE} =V _{CE} , I _C = 18 mA		5	5.8	6.5	V
I _{CES}	V _{GE} = 0 V	T _J = 25 °C		0.1	0.3	mA
	V _{CE} = 1200 V	T _J = 150 °C				mA
C _{ies}	V _{CE} = 25 V V _{GE} = 0 V	f = 1 MHz		27.9		nF
C _{oes}		f = 1 MHz		1.74		nF
C _{res}		f = 1 MHz		1.53		nF
Q _G	V _{GE} = - 8 V...+ 15 V			2550		nC
R _{Gint}	T _J = 25 °C			1.67		Ω
t _{d(on)}	V _{CC} = 600 V	T _J = 150 °C		253		ns
t _r	I _C = 450 A	T _J = 150 °C		85		ns
E _{on}	R _{G on} = 2 Ω	T _J = 150 °C		52		mJ
t _{d(off)}	R _{G off} = 2 Ω	T _J = 150 °C		629		ns
t _f	di/dt _{on} = 4400 A/μs	T _J = 150 °C		130		ns
E _{off}	di/dt _{off} = 3900 A/μs	T _J = 150 °C		67.8		mJ
R _{th(j-c)}	per IGBT				0.065	K/W



SEMiX® 33c

Trench IGBT Modules

SEMiX453GD12E4c

Features

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

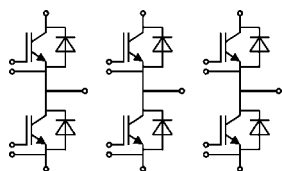
Typical Applications*

- AC inverter drives
- UPS
- Electronic Welding

Remarks

- Case temperature limited to $T_C=125^\circ\text{C}$ max.
- Product reliability results are valid for $T_J=150^\circ\text{C}$

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
V _F = V _{EC}	I _F = 450 A	T _J = 25 °C		2.1	2.46	V
	V _{GE} = 0 V chip	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	1.4	1.9	2.1	mΩ
		T _J = 150 °C	2.2	2.6	2.8	mΩ
I _{RRM}	I _F = 450 A	T _J = 150 °C		350		A
Q _{rr}	di/dt _{off} = 5200 A/μs	T _J = 150 °C		67		μC
E _{rr}	V _{GE} = -15 V	T _J = 150 °C		28		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



GD

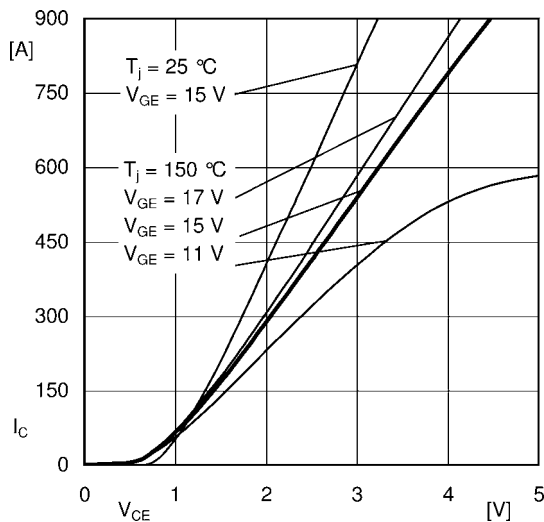


Fig. 1: Typ. output characteristic, inclusive $R_{CC'} + EE'$

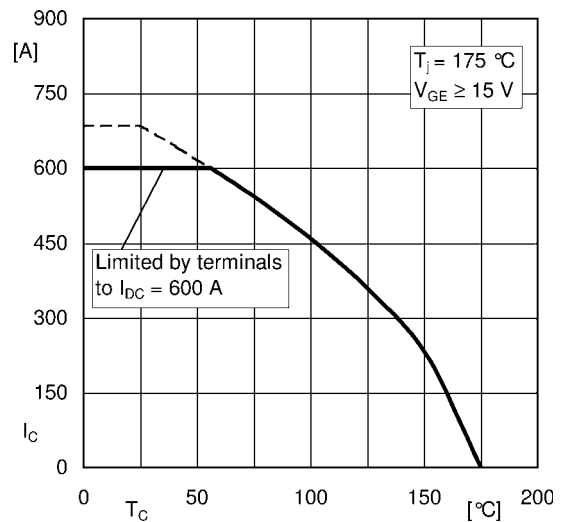


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

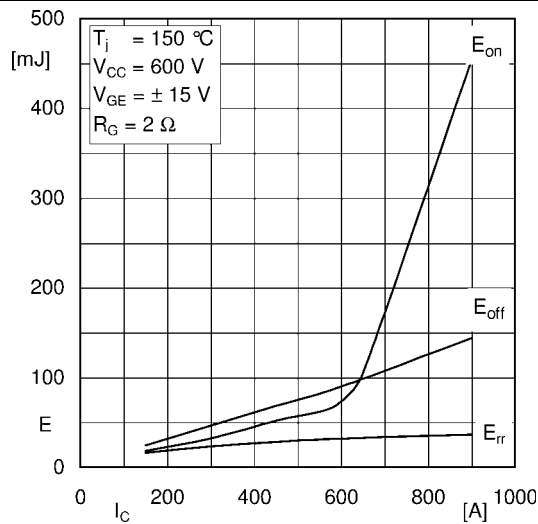


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

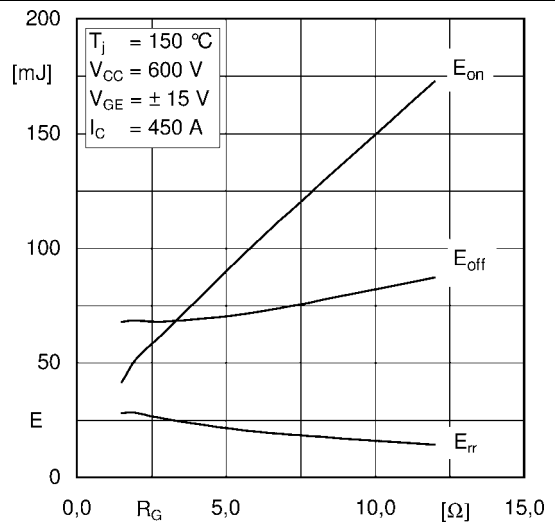


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

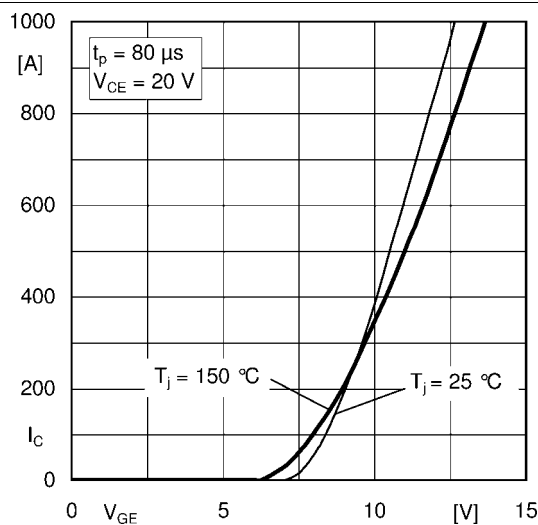


Fig. 5: Typ. transfer characteristic

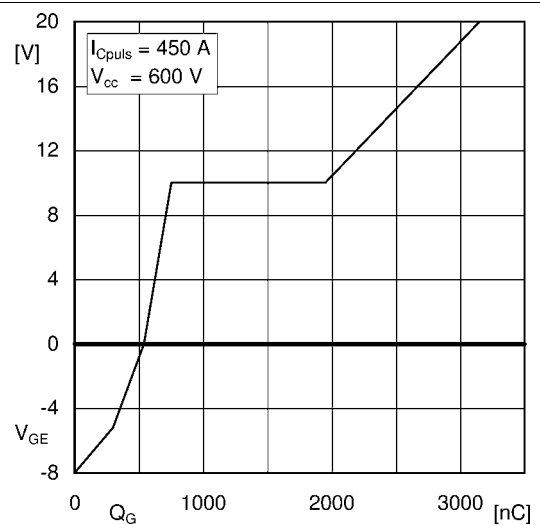
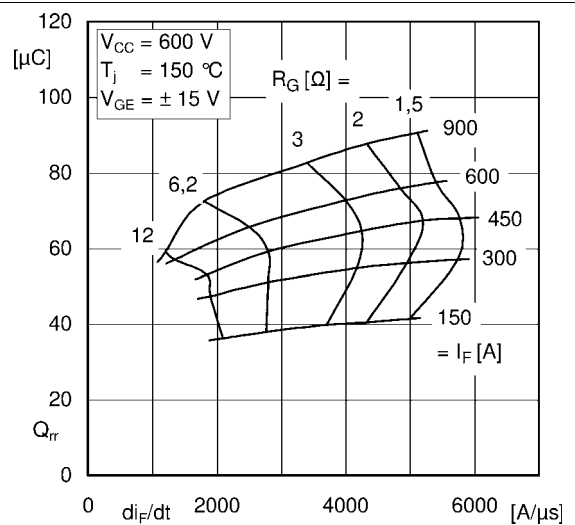
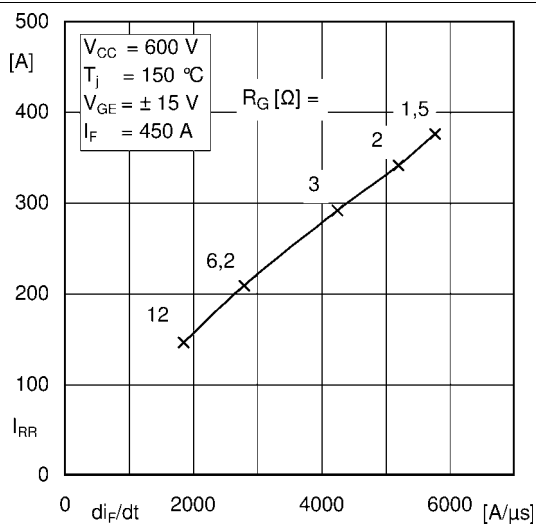
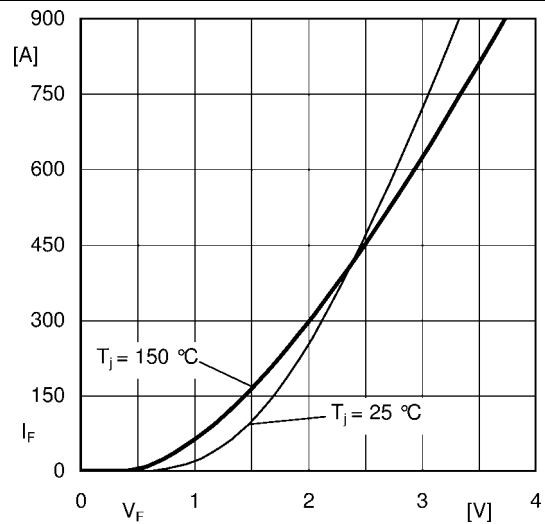
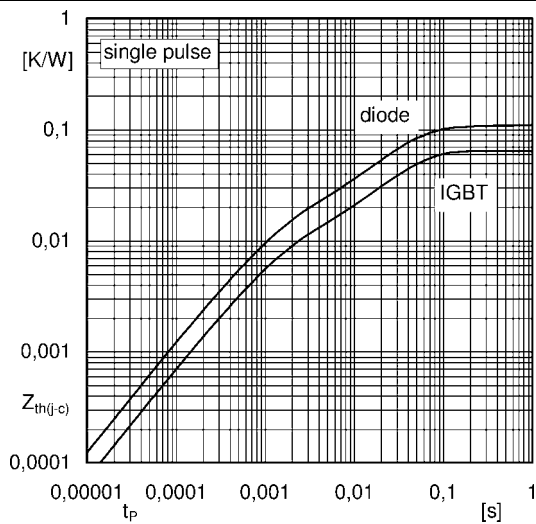
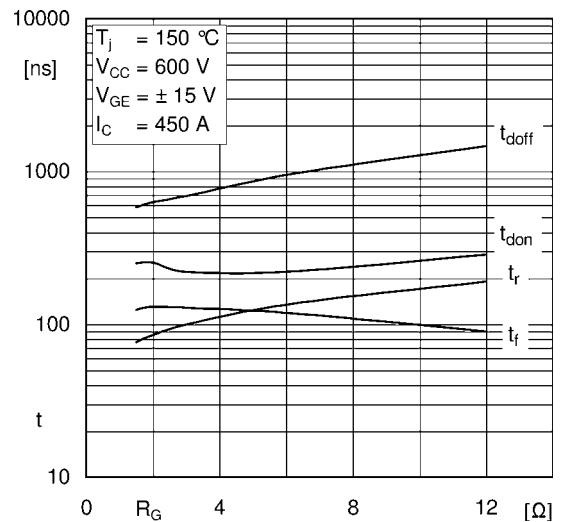
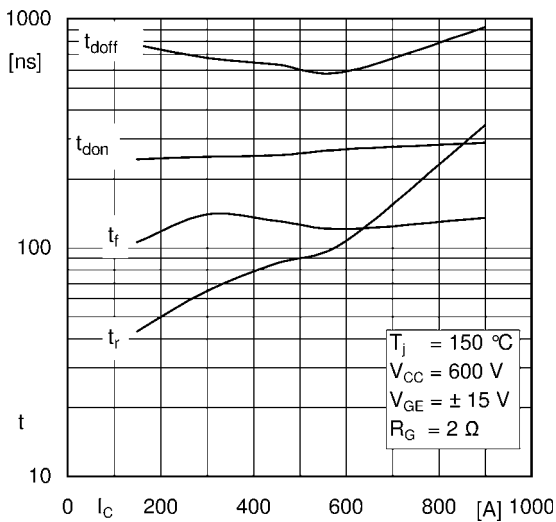
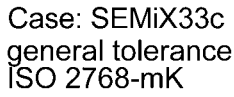


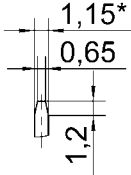
Fig. 6: Typ. gate charge characteristic



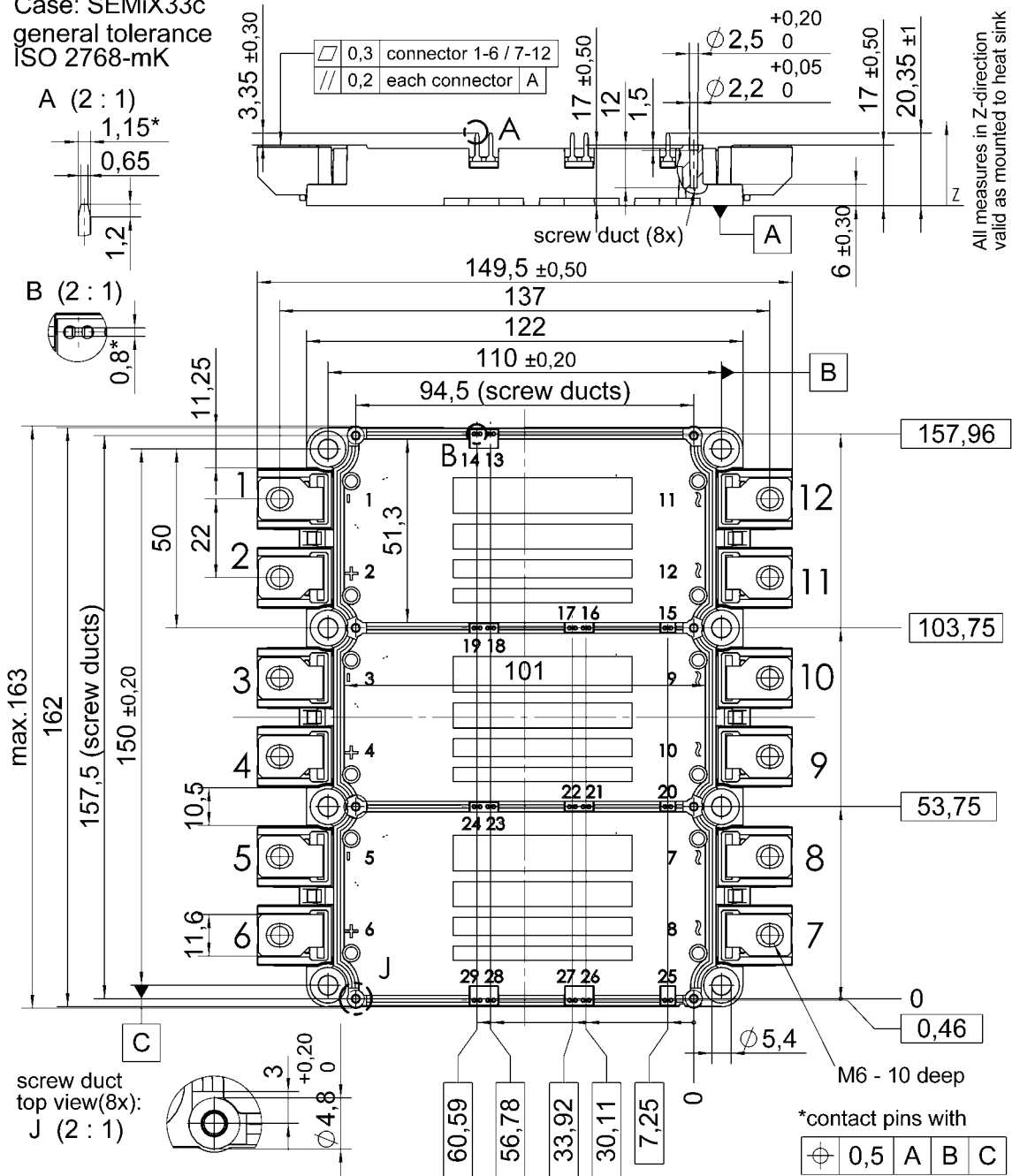
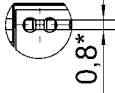
SEMiX453GD12E4c



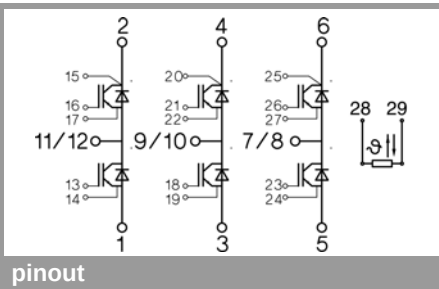
A (2 : 1)



B (2 : 1)



SEMiX 33c



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

This technical information specifies semiconductor devices but promises no characteristics. No warranty or guarantee expressed or implied is made regarding delivery, performance or suitability.