



Trench IGBT Modules

SEMiX603GAL066HDs

Features

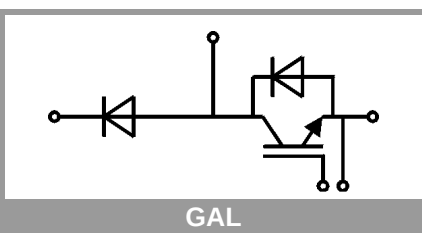
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- UL recognised file no. E63532

Typical Applications*

- Matrix Converter
- Resonant Inverter
- Current Source Inverter

Remarks

- Case temperature limited to $T_C=125^{\circ}\text{C}$ max.
- Product reliability results are valid for $T_J=150^{\circ}\text{C}$
- For short circuit: Soft R_{Goff} recommended
- Take care of over-voltage caused by stray inductance



Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
IGBT				
V _{CES}			600	V
I _C	T _j = 175 °C	T _c = 25 °C	720	A
		T _c = 80 °C	541	A
I _{Cnom}			600	A
I _{CRM}	I _{CRM} = 2xI _{Cnom}		1200	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 360 V V _{GE} ≤ 15 V V _{CES} ≤ 600 V	T _j = 150 °C	6	μs
T _j			-40 ... 175	°C
Inverse diode				
I _F	T _j = 175 °C	T _c = 25 °C	771	A
		T _c = 80 °C	562	A
I _{Fnom}			600	A
I _{FRM}	I _{FRM} = 2xI _{Fnom}		1200	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 25 °C		1800	A
T _j			-40 ... 175	°C
Freewheeling diode				
I _F	T _j = 175 °C	T _c = 25 °C	795	A
		T _c = 80 °C	577	A
I _{Fnom}			600	A
I _{FRM}	I _{FRM} = 2xI _{Fnom}		1200	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 25 °C		1800	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 = 600 A	T _j = 25 °C		1.45	1.85	V
	V _{GE} = 15 V chipelevel	T _j = 150 °C		1.7	2.1	V
V _{CE0}		T _j = 25 °C		0.9	1	V
		T _j = 150 °C		0.85	0.9	V
r _{CE}		T _j = 25 °C		0.9	1.4	mΩ
		T _j = 150 °C		1.4	2.0	mΩ
V _{GE(th)}	V _{GE} =V _{CE} , I _C = 9.6 mA		5	5.8	6.5	V
I _{CES}	V _{GE} = 0 V	T _j = 25 °C		0.15	0.45	mA
	V _{CE} = 600 V	T _j = 150 °C				mA
C _{ies}		f = 1 MHz		37.0		nF
C _{oes}	V _{CE} = 25 V	f = 1 MHz		2.31		nF
C _{res}	V _{GE} = 0 V	f = 1 MHz		1.10		nF
Q _G	V _{GE} = - 8 V...+ 15 V			4800		nC
R _{Gint}	T _j = 25 °C			0.67		Ω



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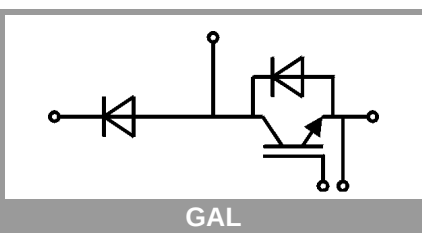
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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
t _{d(on)}	V _{CC} = 300 V	T _j = 150 °C		150		ns
t _r	I _C = 600 A	T _j = 150 °C		145		ns
E _{on}	R _{G on} = 3 Ω	T _j = 150 °C		12		mJ
t _{d(off)}	R _{G off} = 3 Ω	T _j = 150 °C		1050		ns
t _f		T _j = 150 °C		105		ns
E _{off}		T _j = 150 °C		43		mJ
R _{th(j-c)}	per IGBT				0.087	K/W
Inverse diode						
V _F = V _{EC}	I _F = 600 A	T _j = 25 °C		1.4	1.60	V
	V _{GE} = 0 V chip	T _j = 150 °C		1.4	1.6	V
V _{F0}		T _j = 25 °C	0.9	1	1.1	V
		T _j = 150 °C	0.75	0.85	0.95	V
r _F		T _j = 25 °C	0.5	0.7	0.8	mΩ
		T _j = 150 °C	0.8	0.9	1.1	mΩ
I _{RRM}	I _F = 600 A	T _j = 150 °C		350		A
Q _{rr}	di/dt _{off} = 3800 A/μs	T _j = 150 °C		63		μC
E _{rr}	V _{GE} = -8 V V _{CC} = 300 V	T _j = 150 °C		13		mJ
R _{th(j-c)}	per diode				0.11	K/W
Freewheeling diode						
V _F = V _{EC}	I _F = 600 A	T _j = 25 °C		1.3	1.5	V
	V _{GE} = 0 V chip	T _j = 150 °C		1.3	1.5	V
V _{F0}		T _j = 25 °C	0.9	1	1.1	V
		T _j = 150 °C	0.75	0.85	0.95	V
r _F		T _j = 25 °C	0.4	0.6	0.7	mΩ
		T _j = 150 °C	0.7	0.8	0.9	mΩ
I _{RRM}	I _F = 600 A	T _j = 150 °C		350		A
Q _{rr}	di/dt _{off} = 3800 A/μs	T _j = 150 °C		63		μC
E _{rr}	V _{GE} = -8 V V _{CC} = 300 V	T _j = 150 °C		13		mJ
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			0.04		K/W
M _s	to heat sink (M5)		3		5	Nm
M _t		to terminals (M6)	2.5		5	Nm
						Nm
w					300	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



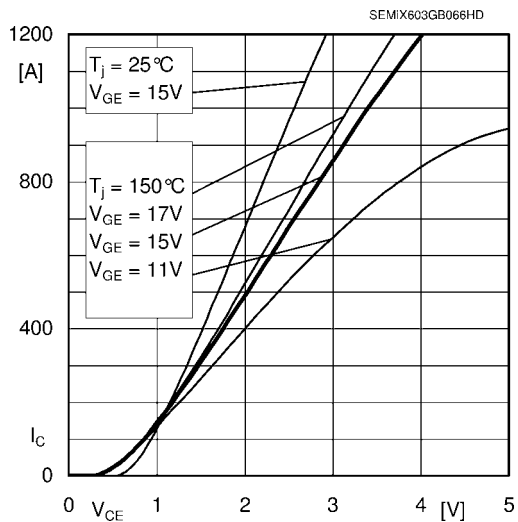


Fig. 1: Typ. output characteristic, inclusive $R_{CC'} + E_{E'}$

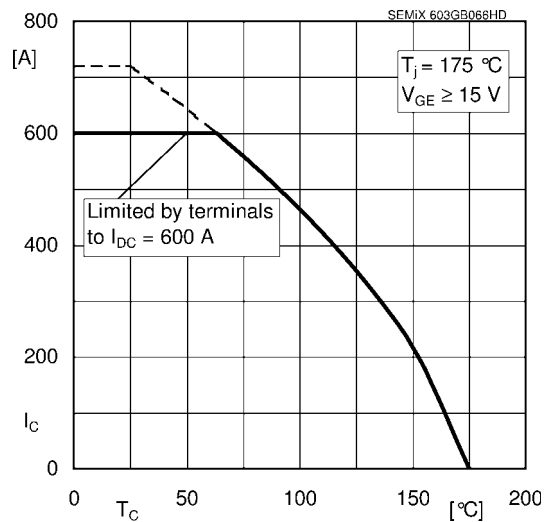


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

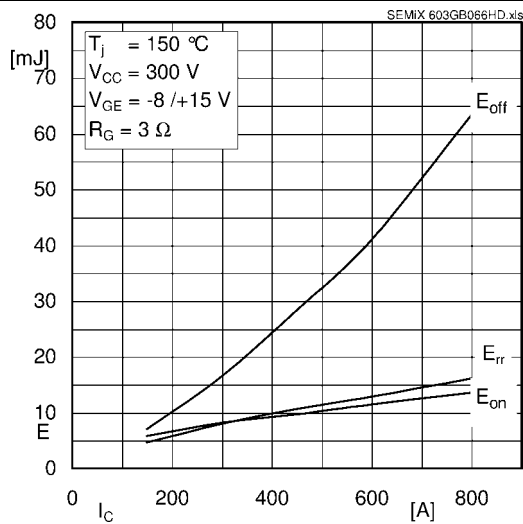


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

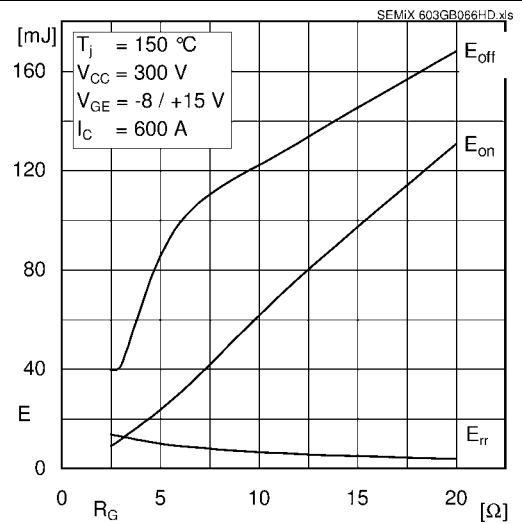


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

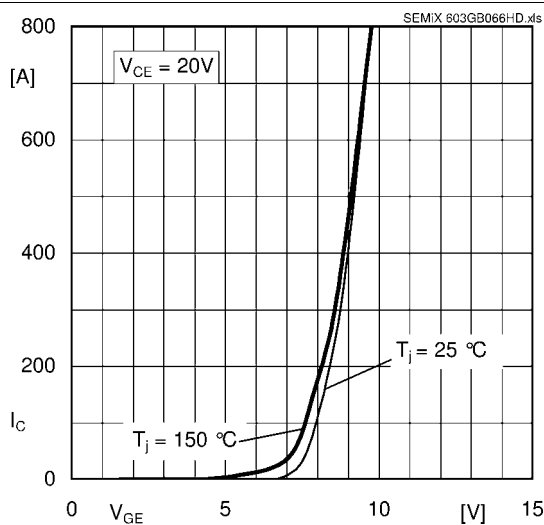


Fig. 5: Typ. transfer characteristic

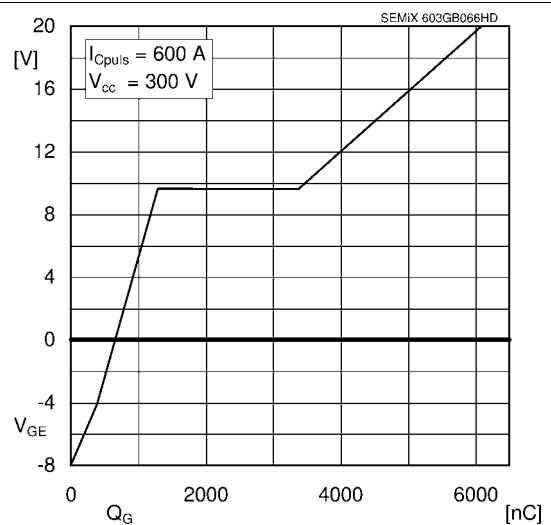
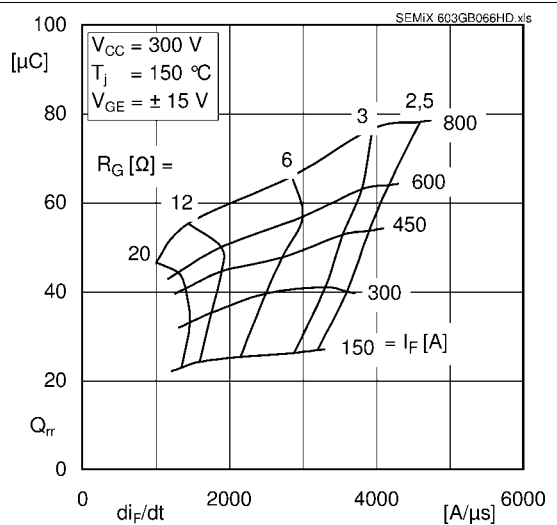
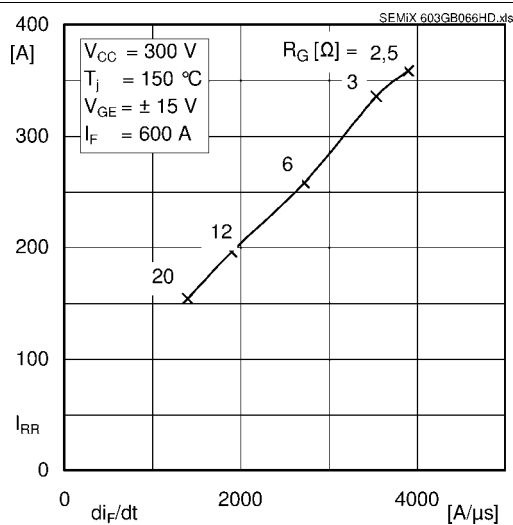
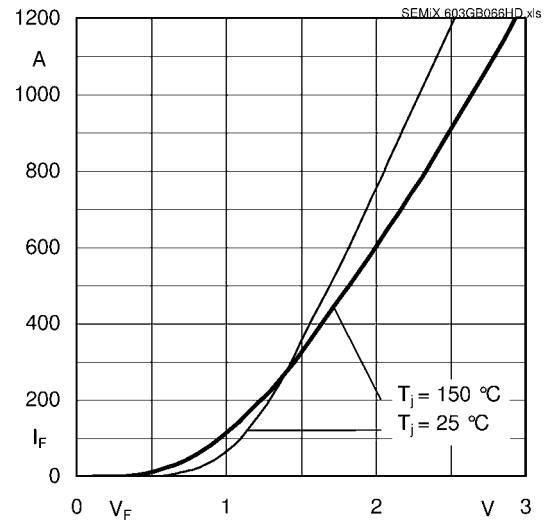
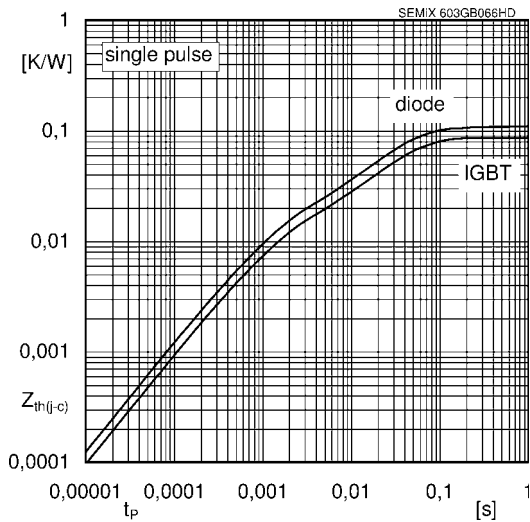
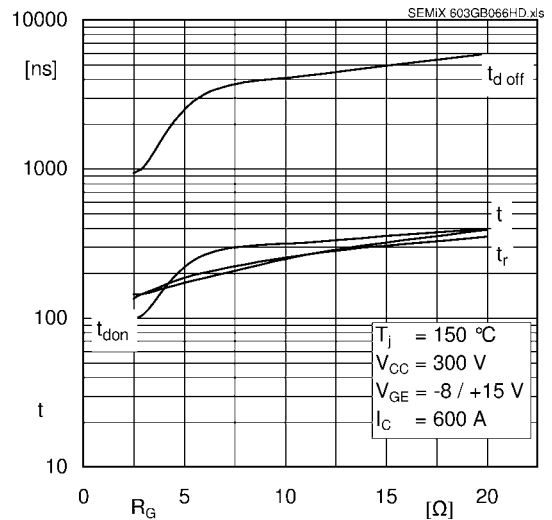
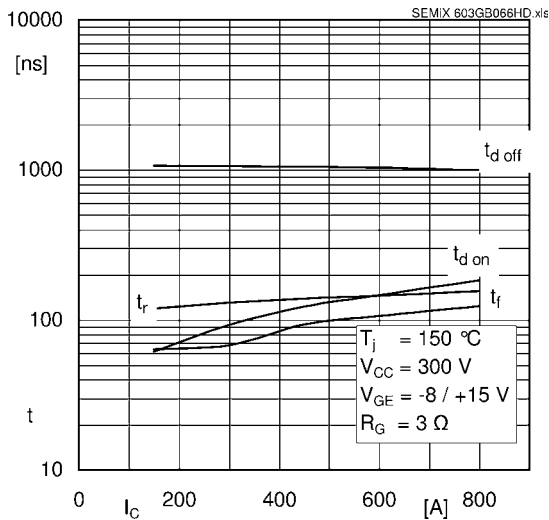
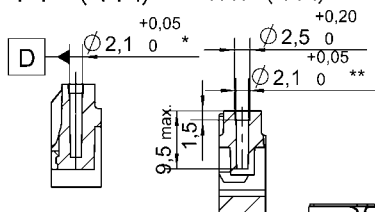


Fig. 6: Typ. gate charge characteristic

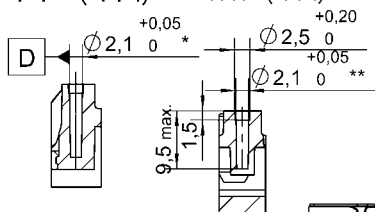


Case: SEMiX 3s

screw duct
(left top) :
F-F (1:1)

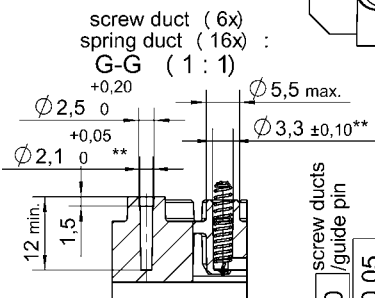


screw duct
(1x centre) :
H-H (1:1)

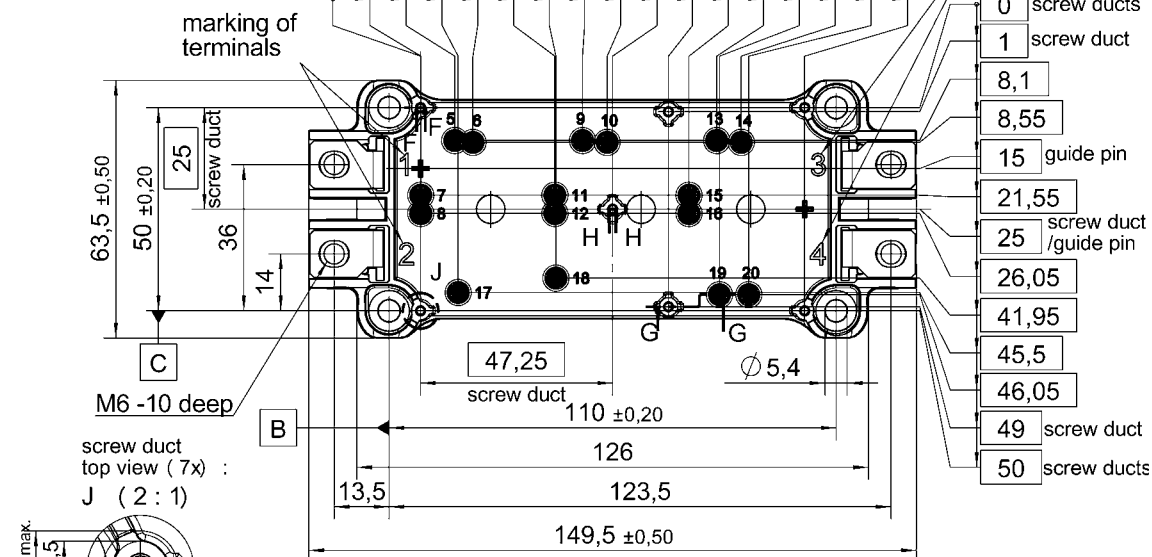


	0,3	connector 1-2 / 3-4
	0,2	each connector A

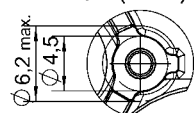
general tolerance:
ISO 2768-mK
ISO 8015



marking of
terminals



screw duct
top view (7x) :
J (2:1)



*screw duct left / top with

	0,2	A	B	C
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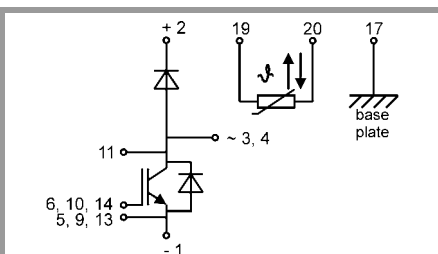
**screw ducts / guide pins / spring ducts with

	0,2	A	D	C
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Rules for the contact PCB:
- holes guidepins = $\varnothing 4 \pm 0,1$ / position tolerance $\pm 0,1$
- holes for screws = $\varnothing 2,9 \pm 0,1$ / position tolerance $\pm 0,1$
- spring contact pad = $\varnothing 3,6 \pm 0,1$ / position tolerance $\pm 0,1$

All measures in Z-direction
valid when mounted to heat sink

SEMiX 3s



spring configuration

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.