

SEMiX402GB066HDs



Trench IGBT Modules

SEMiX402GB066HDs

Features

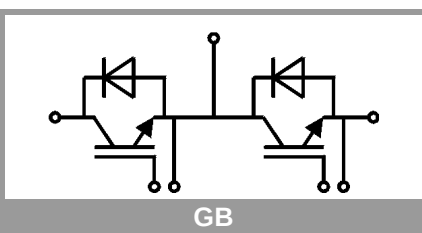
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- UL recognised file no. E63532

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	502	A
		T _c = 80 °C	379	A
I _{Cnom}			400	A
I _{CRM}	I _{CRM} = 2xI _{Cnom}		800	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	543	A
		T _c = 80 °C	397	A
I _{Fnom}			400	A
I _{FRM}	I _{FRM} = 2xI _{Fnom}		800	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 = 400 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}	V _{GE} = 15 V	T _j = 25 °C		1.4	2.1	mΩ
		T _j = 150 °C		2.1	3.0	mΩ
V _{GE(th)}	V _{GE} =V _{CE} , I _C = 6.4 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}	V _{CE} = 25 V	f = 1 MHz		24.7		nF
C _{oes}	V _{GE} = 0 V	f = 1 MHz		1.54		nF
C _{res}		f = 1 MHz		0.73		nF
Q _G	V _{GE} = - 8 V...+ 15 V			3200		nC
R _{Gint}	T _j = 25 °C			1.00		Ω
t _{d(on)}	V _{CC} = 300 V	T _j = 150 °C		150		ns
t _r	I _C = 400 A	T _j = 150 °C		125		ns
E _{on}	R _{G on} = 4.5 Ω	T _j = 150 °C		22		mJ
t _{d(off)}	R _{G off} = 4.5 Ω	T _j = 150 °C		900		ns
t _f		T _j = 150 °C		65		ns
E _{off}		T _j = 150 °C		24		mJ
R _{th(i-c)}	per IGBT				0.12	K/W



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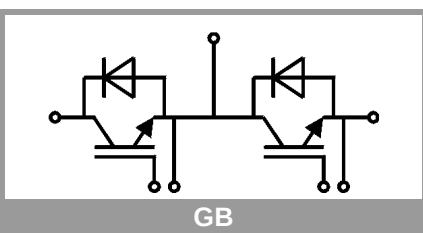
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- Matrix Converter
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- Take care of over-voltage caused by stray inductance

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
V _F = V _{EC}	I _F = 400 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	0.8	1.0	1.3	mΩ
		T _j = 150 °C	1.1	1.4	1.6	mΩ
I _{RRM}	I _F = 400 A	T _j = 150 °C	250			A
Q _{rr}	di/dt _{off} = 3700 A/μs	T _j = 150 °C	47			μC
E _{rr}	V _{GE} = -8 V	T _j = 150 °C	10			mJ
	V _{CC} = 300 V					
R _{th(j-c)}	per diode		0.15			K/W
Module						
L _{CE}			18			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		0.045			K/W
M _s	to heat sink (M5)		3	5		Nm
M _t		to terminals (M6)	2.5	5		Nm
						Nm
w			250			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



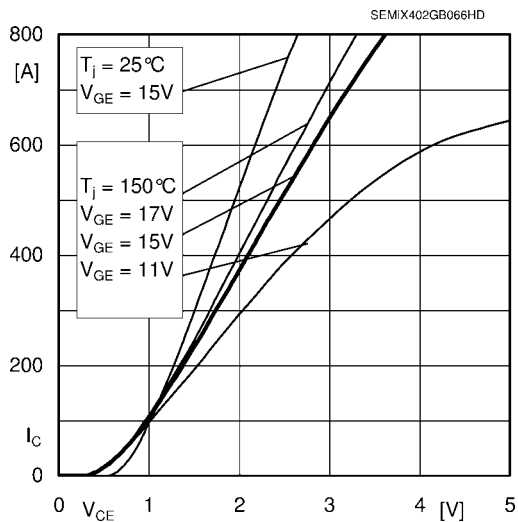


Fig. 1: Typ. output characteristic, inclusive $R_{CC'} + E_{E'}$

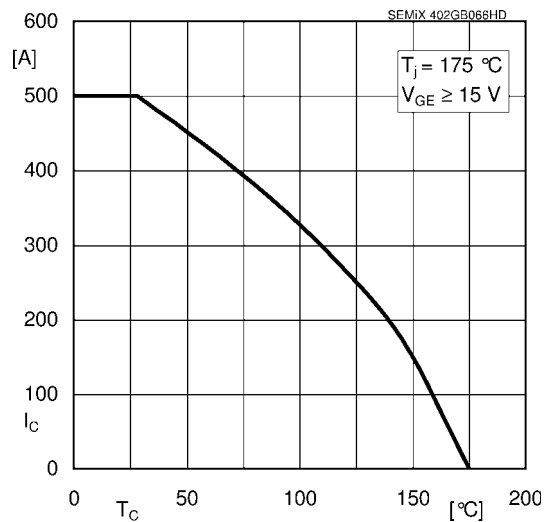


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

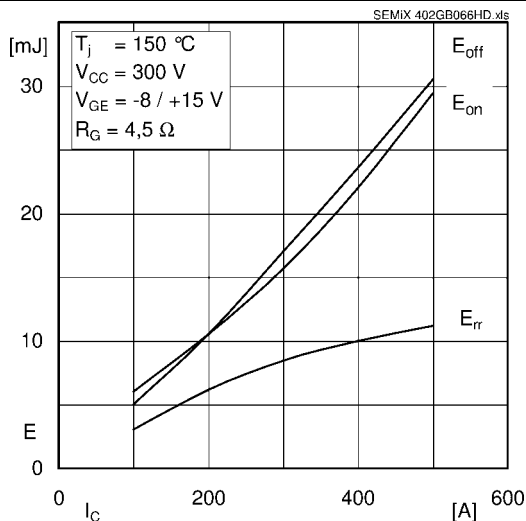


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

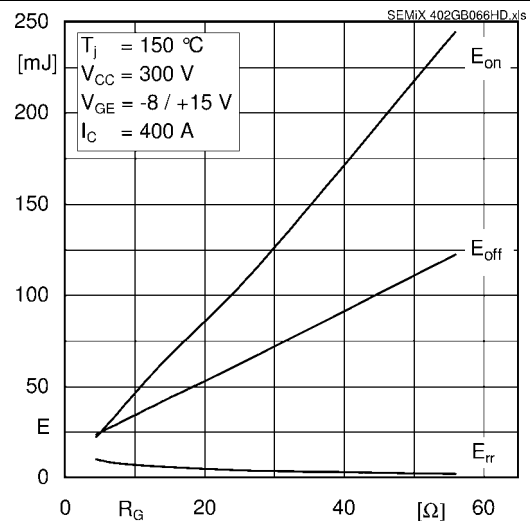


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

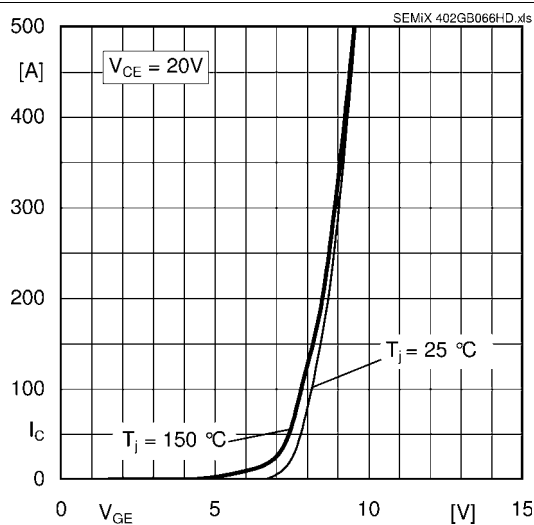


Fig. 5: Typ. transfer characteristic

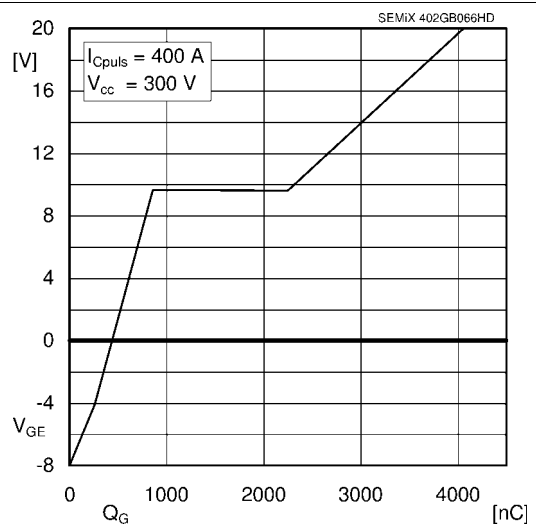
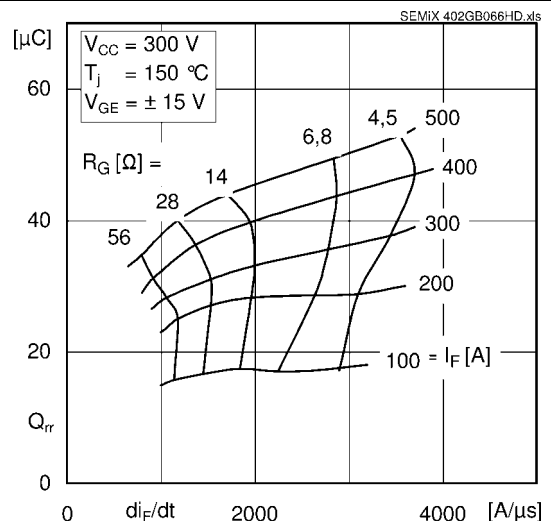
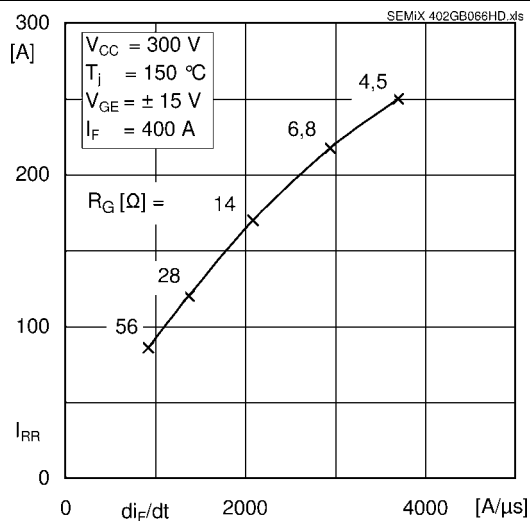
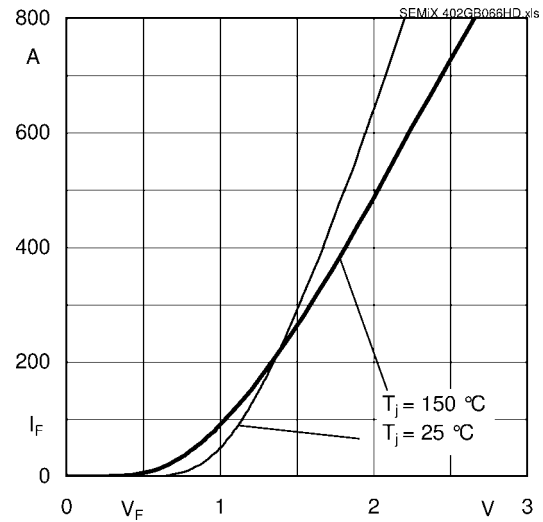
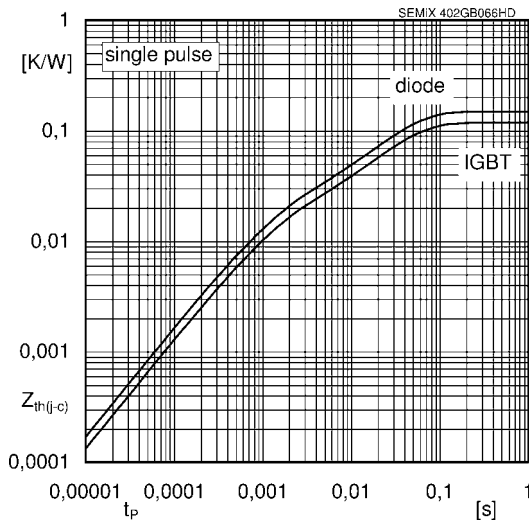
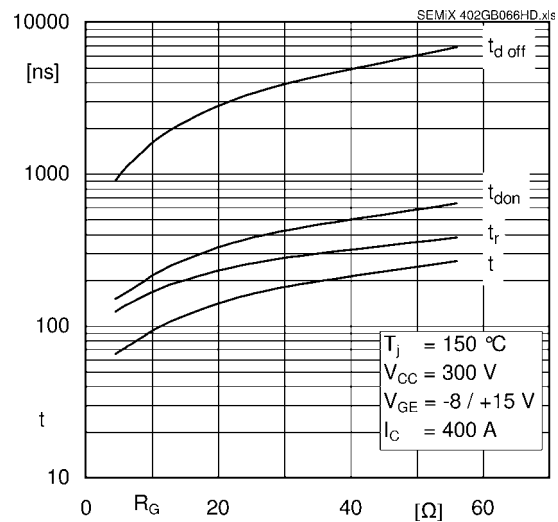
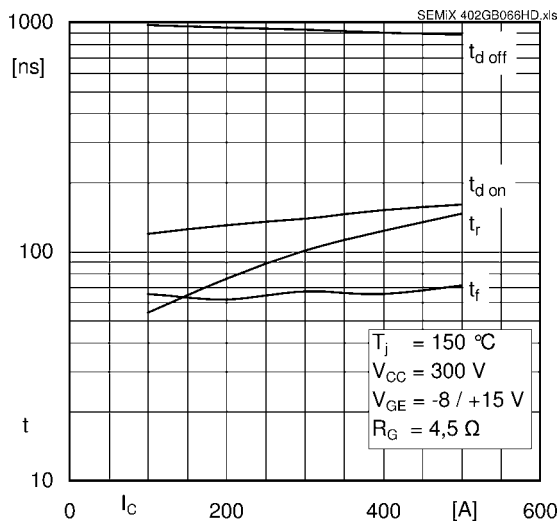
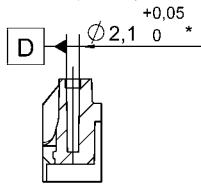


Fig. 6: Typ. gate charge characteristic

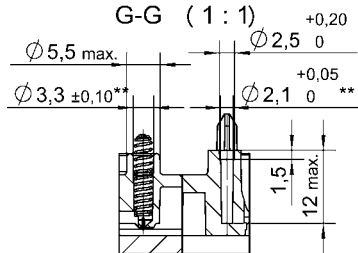


Case: SEMiX 2s

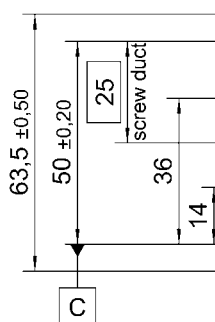
screw duct
(left top) :
F-F (1:1)



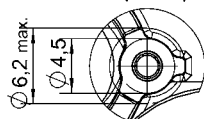
screw duct (4x)
spring duct (12x) :
G-G (1:1)



marking of terminals



screw duct
top view (4x) :
J (2:1)



*screw duct left / top with

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

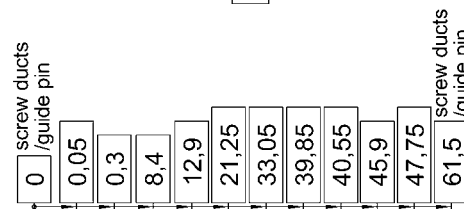
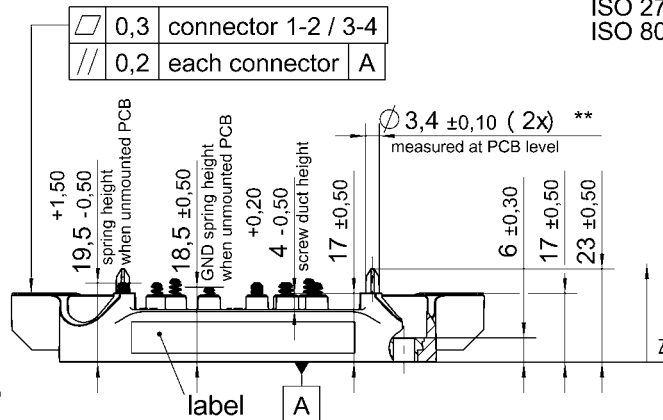
⌀	⌀ 0,2	A	D	C
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Rules for the contact PCB:

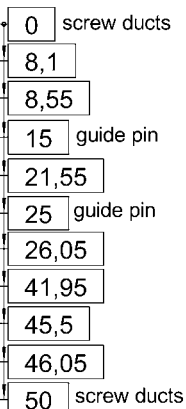
- holes guidepins = $\varnothing 4 \pm 0,1$ / position tolerance $\pm 0,1$
- holes for screws = $\varnothing 2,9 \pm 0,1$ / position tolerance $\pm 0,1$
- spring contact pad = $\varnothing 3,6 \pm 0,1$ / position tolerance $\pm 0,1$

general tolerance:
ISO 2768-mK
ISO 8015

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

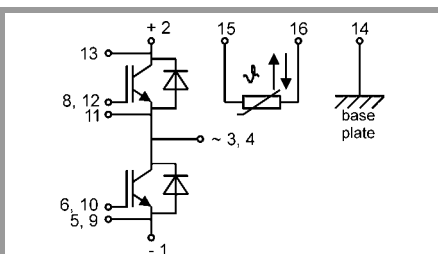


marking of terminals



M6 -10 deep

SEMiX 2s



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.