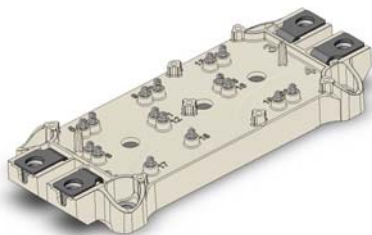


SEMiX603GAR066HDs



SEMiX® 3s

Trench IGBT Modules

SEMiX603GAR066HDs

Features

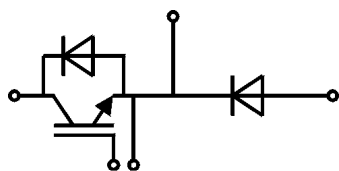
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- UL recognised file no. E63532

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

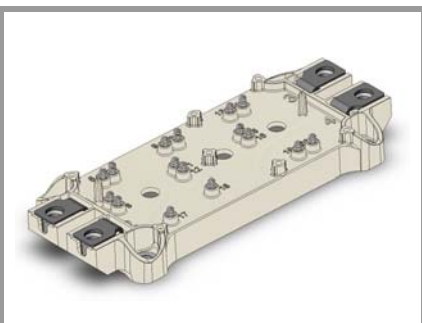


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Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
IGBT				
V_{CES}			600	V
I_C	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$	720	A
		$T_c = 80^\circ\text{C}$	541	A
I_{Cnom}			600	A
I_{CRM}	$I_{CRM} = 2 \times I_{Cnom}$		1200	A
V_{GES}			-20 ... 20	V
t_{psc}	$V_{CC} = 360\text{ V}$	$T_j = 150^\circ\text{C}$	6	μs
	$V_{GE} \leq 15\text{ V}$			
	$V_{CES} \leq 600\text{ V}$			
T_j			-40 ... 175	$^\circ\text{C}$
Inverse diode				
I_F	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$	771	A
		$T_c = 80^\circ\text{C}$	562	A
I_{Fnom}			600	A
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$		1200	A
I_{FSM}	$t_p = 10\text{ ms, sin } 180^\circ, T_j = 25^\circ\text{C}$		1800	A
T_j			-40 ... 175	$^\circ\text{C}$
Freewheeling diode				
I_F	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$	771	A
		$T_c = 80^\circ\text{C}$	562	A
I_{Fnom}			600	A
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$		1200	A
I_{FSM}	$t_p = 10\text{ ms, sin } 180^\circ, T_j = 25^\circ\text{C}$		1800	A
T_j			-40 ... 175	$^\circ\text{C}$
Module				
$I_{t(RMS)}$			600	A
T_{stg}			-40 ... 125	$^\circ\text{C}$
V_{isol}	AC sinus 50Hz, $t = 1\text{ min}$		4000	V

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
IGBT						
$V_{CE(sat)}$	$I_C = 600\text{ A}$ $V_{GE} = 15\text{ V}$ chipllevel	$T_j = 25^\circ\text{C}$	1.45	1.85		V
		$T_j = 150^\circ\text{C}$	1.7	2.1		V
V_{CE0}		$T_j = 25^\circ\text{C}$	0.9	1		V
		$T_j = 150^\circ\text{C}$	0.85	0.9		V
r_{CE}	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$	0.9	1.4		$\text{m}\Omega$
		$T_j = 150^\circ\text{C}$	1.4	2.0		$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 9.6\text{ mA}$		5	5.8	6.5	V
I_{CES}	$V_{GE} = 0\text{ V}$ $V_{CE} = 600\text{ V}$	$T_j = 25^\circ\text{C}$	0.15	0.45		mA
		$T_j = 150^\circ\text{C}$				mA
C_{ies}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	37.0			nF
C_{oes}		$f = 1\text{ MHz}$	2.31			nF
C_{res}		$f = 1\text{ MHz}$	1.10			nF
Q_G	$V_{GE} = -8\text{ V} \dots +15\text{ V}$		4800			nC
R_{Gint}	$T_j = 25^\circ\text{C}$		0.67			Ω

SEMiX603GAR066HDs



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Features

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- UL recognised file no. E63532

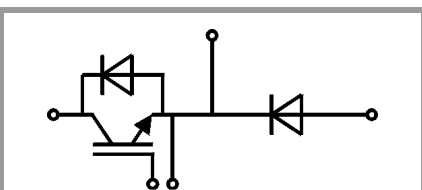
Typical Applications*

- 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

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
$t_{d(on)}$	$V_{CC} = 300\text{ V}$	$T_j = 150^\circ\text{C}$		150		ns
t_r	$I_C = 600\text{ A}$	$T_j = 150^\circ\text{C}$		145		ns
E_{on}	$R_{G\ on} = 3\ \Omega$	$T_j = 150^\circ\text{C}$		12		mJ
$t_{d(off)}$	$R_{G\ off} = 3\ \Omega$	$T_j = 150^\circ\text{C}$		1050		ns
t_f		$T_j = 150^\circ\text{C}$		105		ns
E_{off}		$T_j = 150^\circ\text{C}$		43		mJ
$R_{th(j-c)}$	per IGBT				0.087	K/W
Inverse diode						
$V_F = V_{EC}$	$I_F = 600\text{ A}$	$T_j = 25^\circ\text{C}$		1.4	1.60	V
	$V_{GE} = 0\text{ V}$ chip	$T_j = 150^\circ\text{C}$		1.4	1.6	V
V_{F0}		$T_j = 25^\circ\text{C}$	0.9	1	1.1	V
		$T_j = 150^\circ\text{C}$	0.75	0.85	0.95	V
r_F		$T_j = 25^\circ\text{C}$	0.5	0.7	0.8	m Ω
		$T_j = 150^\circ\text{C}$	0.8	0.9	1.1	m Ω
I_{RRM}	$I_F = 600\text{ A}$	$T_j = 150^\circ\text{C}$		350		A
Q_{rr}	$di/dt_{off} = 3800\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		63		μC
E_{rr}	$V_{GE} = -8\text{ V}$ $V_{CC} = 300\text{ V}$	$T_j = 150^\circ\text{C}$		13		mJ
$R_{th(j-c)}$	per diode				0.11	K/W
Freewheeling diode						
$V_F = V_{EC}$	$I_F = 600\text{ A}$	$T_j = 25^\circ\text{C}$		1.4	1.6	V
	$V_{GE} = 0\text{ V}$ chip	$T_j = 150^\circ\text{C}$		1.4	1.6	V
V_{F0}		$T_j = 25^\circ\text{C}$	0.9	1	1.1	V
		$T_j = 150^\circ\text{C}$	0.75	0.85	0.95	V
r_F		$T_j = 25^\circ\text{C}$	0.5	0.7	0.8	m Ω
		$T_j = 150^\circ\text{C}$	0.8	0.9	1.1	m Ω
I_{RRM}	$I_F = 600\text{ A}$	$T_j = 150^\circ\text{C}$		350		A
Q_{rr}	$di/dt_{off} = 3800\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		63		μC
E_{rr}	$V_{GE} = -8\text{ V}$ $V_{CC} = 300\text{ V}$	$T_j = 150^\circ\text{C}$		13		mJ
$R_{th(j-c)}$	per diode				0.11	K/W
Module						
L_{CE}				20		nH
$R_{CC+EE'}$	res., terminal-chip	$T_C = 25^\circ\text{C}$		0.7		m Ω
		$T_C = 125^\circ\text{C}$		1		m Ω
$R_{th(c-s)}$	per module			0.04		K/W
M_s	to heat sink (M5)		3		5	Nm
M_t		to terminals (M6)	2.5		5	Nm
w					300	g
Temperatur Sensor						
R_{100}	$T_C=100^\circ\text{C}$ ($R_{25}=5\text{ k}\Omega$)			$493 \pm 5\%$		Ω
$B_{100/125}$	$R_{(T)}=R_{100}\exp[B_{100/125}(1/T-1/T_{100})]$; $T[\text{K}]$;			3550 $\pm 2\%$		K



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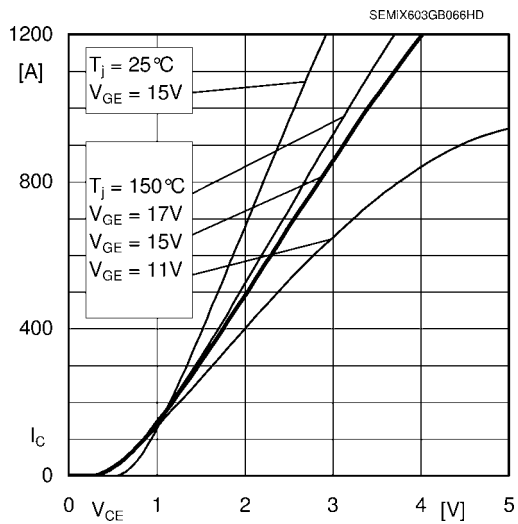


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

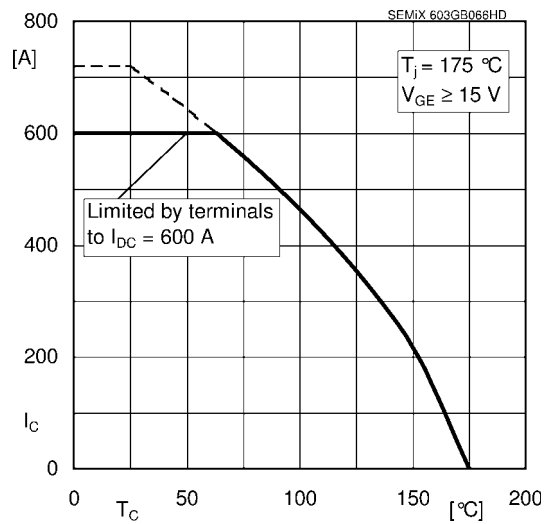


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

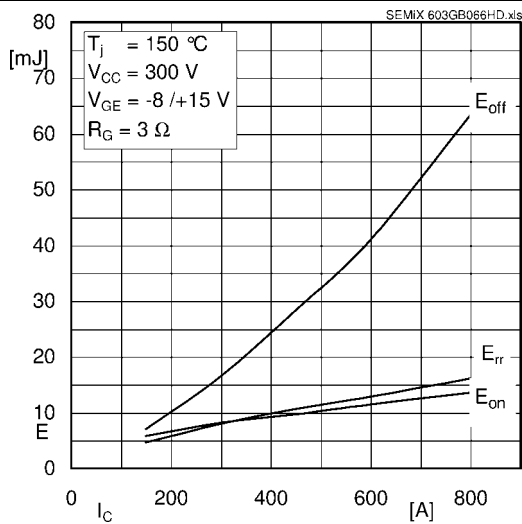


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

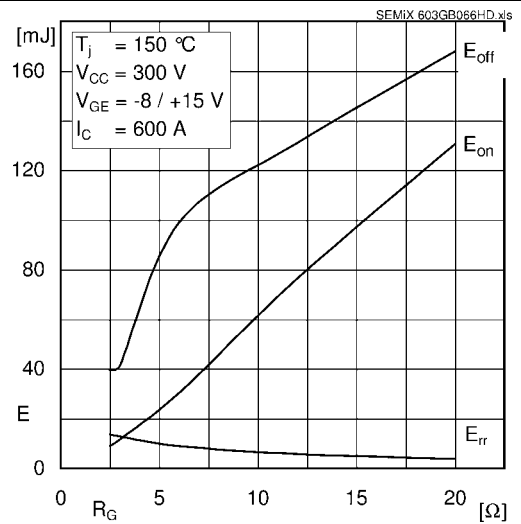


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

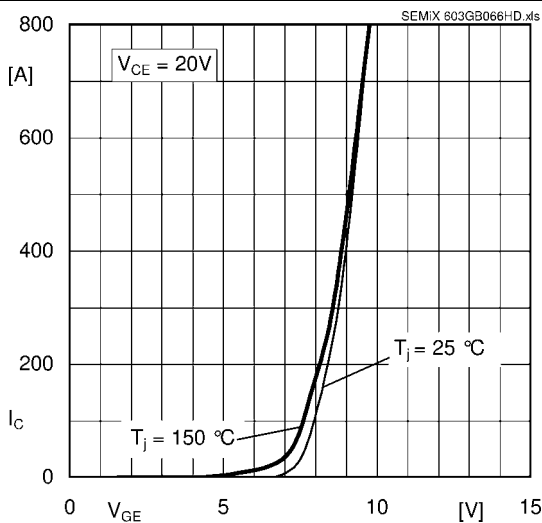


Fig. 5: Typ. transfer characteristic

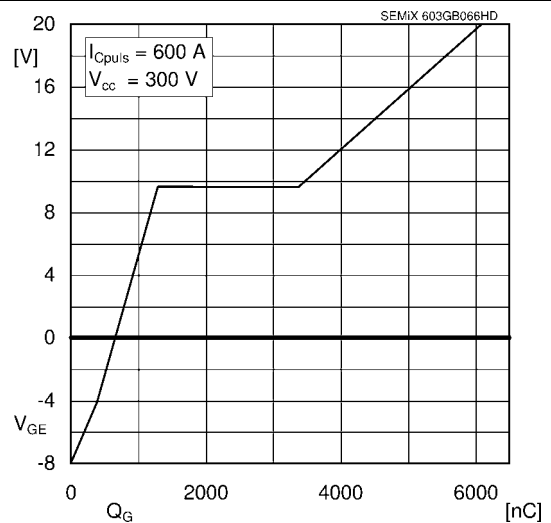


Fig. 6: Typ. gate charge characteristic

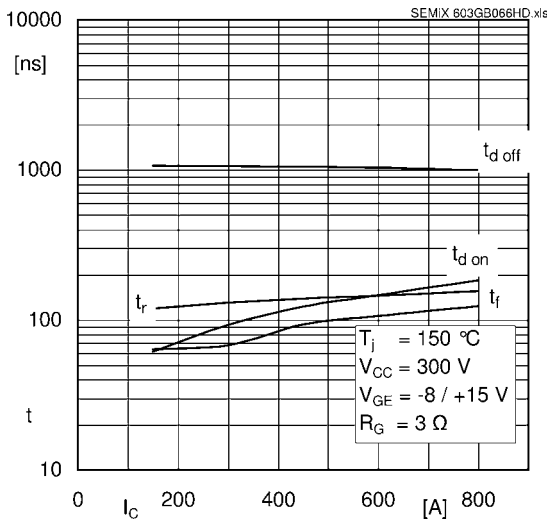


Fig. 7: Typ. switching times vs. I_C

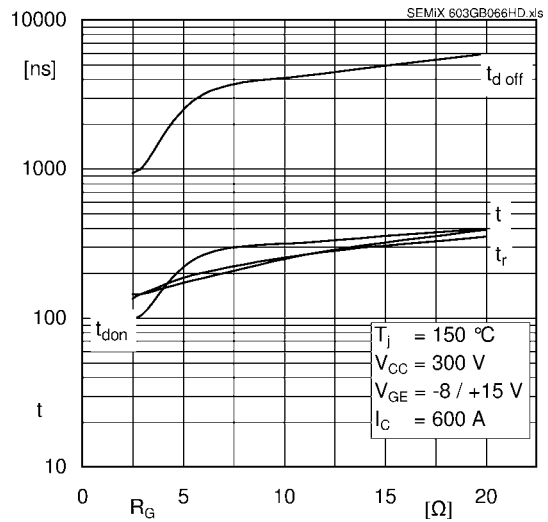


Fig. 8: Typ. switching times vs. gate resistor R_G

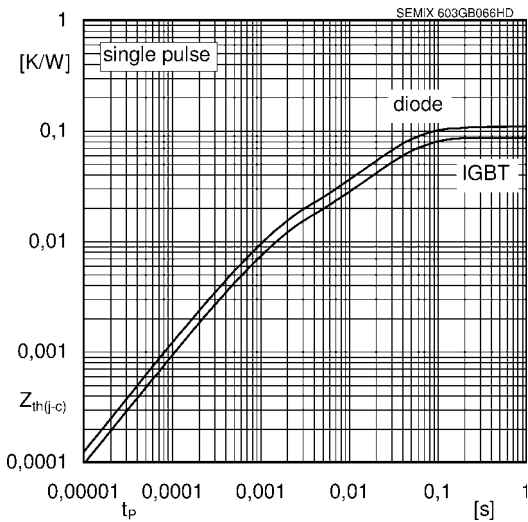


Fig. 9: Typ. transient thermal impedance

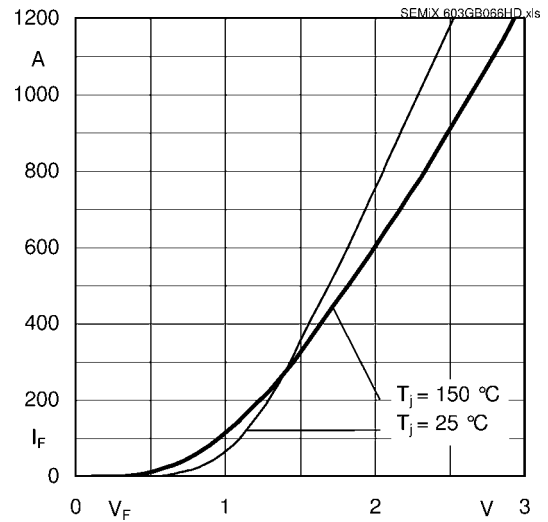


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC+EE'}$

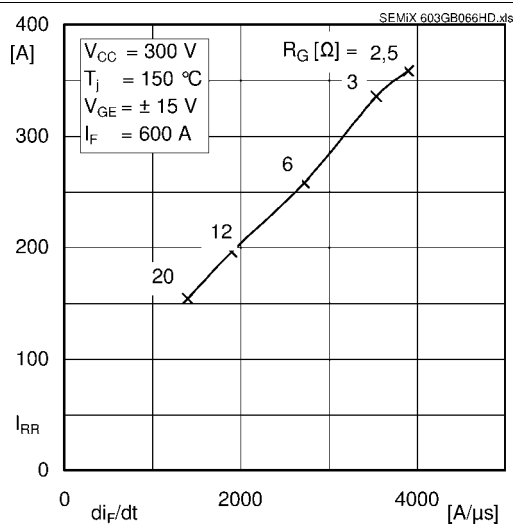


Fig. 11: Typ. CAL diode peak reverse recovery current

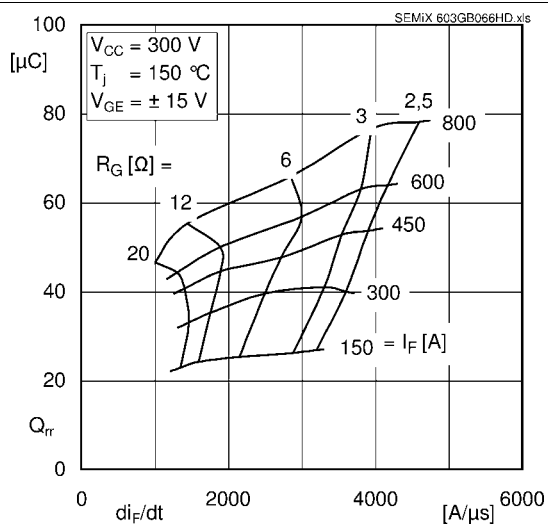


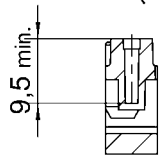
Fig. 12: Typ. CAL diode recovery charge

SEMiX603GAR066HDs

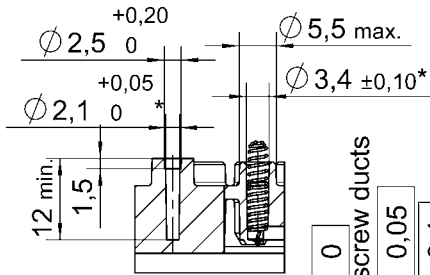
Case: SEMiX 3s

general tolerance ISO 2768-mK

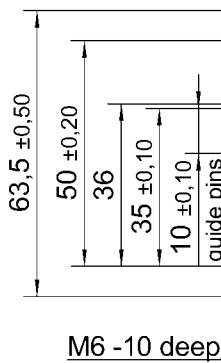
screw duct
(1x centre) :
H-H (1:1)



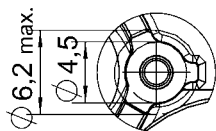
screw duct (6x)
spring duct (16x) :
A-A (1:1)



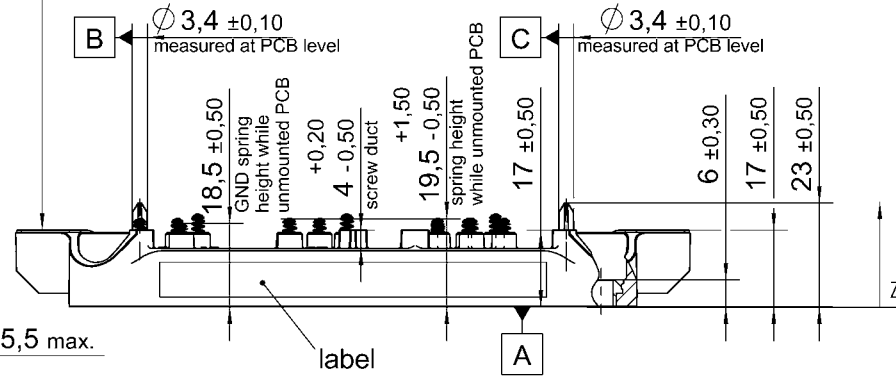
marking of terminals



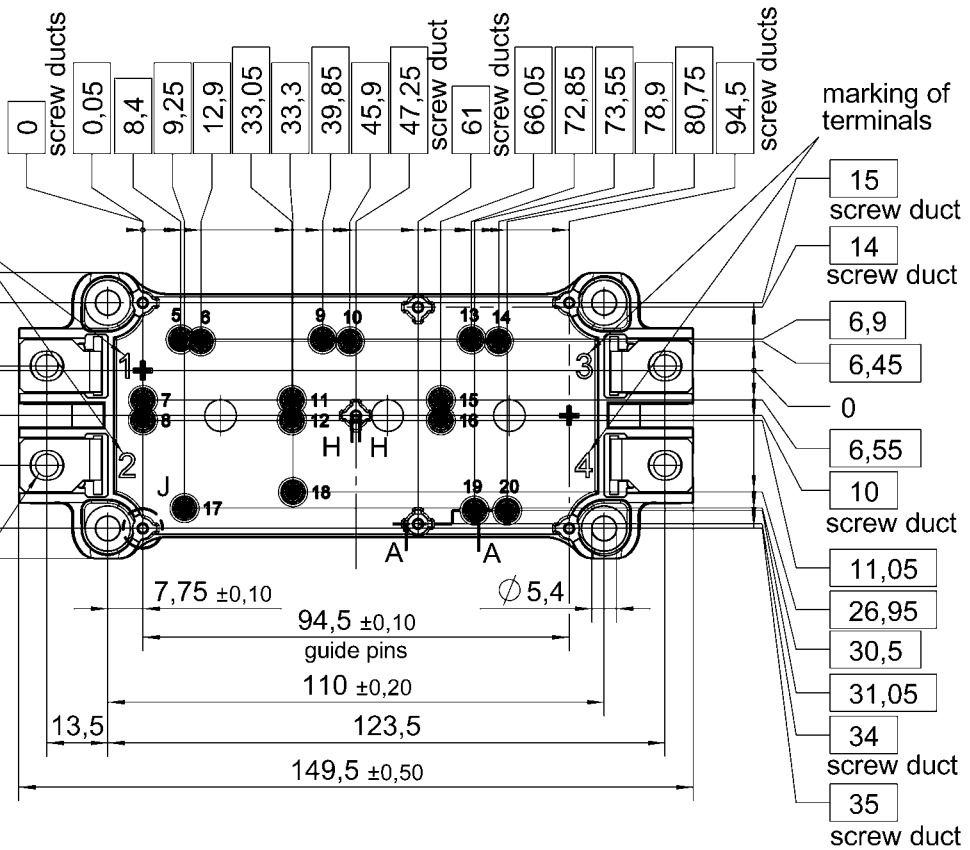
screw duct
top view (7x) :
J (2:1)



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



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

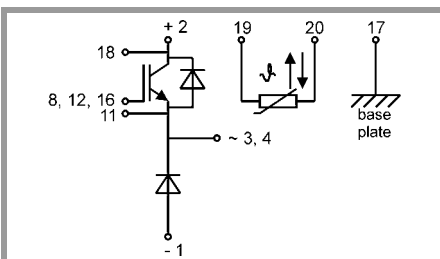


*screw ducts / spring ducts with $\phi \pm 0,2$ A B C

Rules for the contact PCB:

- holes guidepins = $\phi 4 \pm 0,1$ / position tolerance $\pm 0,1$
- spring landing pad = $\phi 3,5 \pm 0,2$ / position tolerance $\pm 0,2$

SEMiX 3s



spring configuration

SEMiX603GAR066HDs

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